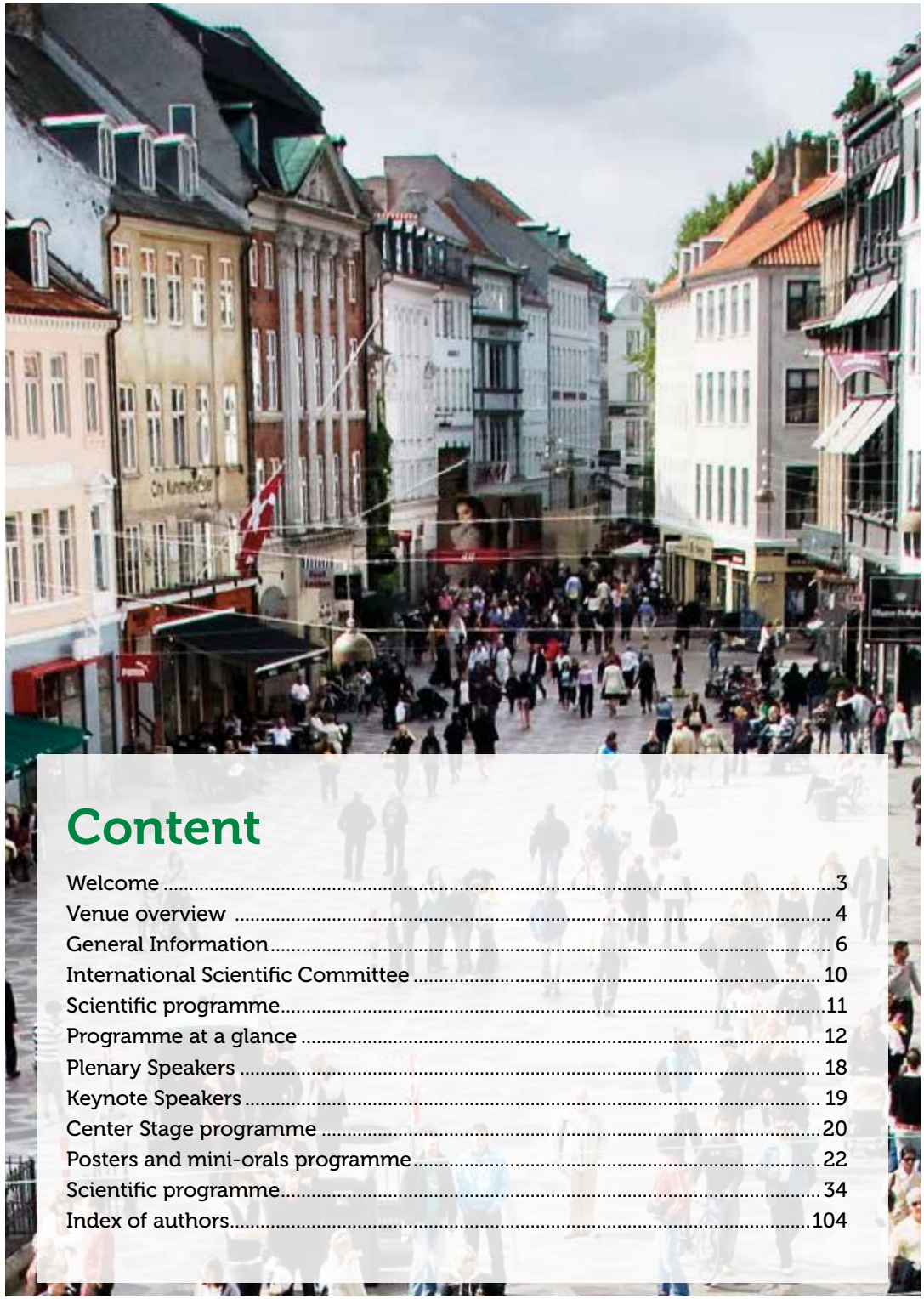
20th International Conference on Composite Materials

19-24 July 2015 - Copenhagen, Denmark

ICCM20

Programme and book of abstracts



Content

Welcome

Welcome to Copenhagen, Denmark and the 20th International Conference on Composite Materials (ICCM20).

The conference is the 20th in the series of conferences of the International Committee on Composite Materials (ICCM). The series of ICCM conferences have gone from success to success since the first two conferences, both termed ICCM1 were held in 1975 in Geneva, Switzerland and Boston, USA. We are very proud and delighted to be organising the conference in Copenhagen, Denmark in 2015. It is the first time that an ICCM conference has been organised in Scandinavia.

The scientific programme of the ICCM20 contains about 1450 presentations with full papers available in the conference proceedings, with the authors coming from 66 countries representing all three ICCM world regions, and with approximately 1800 registered participants. Thus, the ICCM20 is a truly international scientific event and the largest international conference in the field of composite materials to this date.

We are looking forward to a technically excellent conference, and we are very grateful to the many organisers of the conference "Themes" and "Tracks" for helping us put the programme together. Their names are listed in the International Organising Committee that is printed in this book. More importantly, we are grateful to the authors for their efforts in producing their outstanding contributions to the programme. The full programme is printed in this book including very brief abstracts, but you may also want to use the online version of the programme and the proceedings containing the full papers **www.ICCM20.org** or the version we have for smartphones and tablets that is accessible through the special ICCM20 App. Please download the ICCM20 app at ITunes or Google Play.

We hope that you will enjoy the conference and its many events, all of which are described in this book, and we also hope that you will enjoy your stay in Copenhagen. Conference updates on events and practical matters will be issued throughout the conference via TV screens placed throughout the conference venue (Bella Center) and through the conference App. If you require any assistance during the conference please do not hesitate to contact the ICCM20 secretariat or us for help.

A special thanks to MCI Copenhagen and the Scandinavian Organising and Scientific Committee, without whom the conference would not have been possible.

Conference chairmen

Ole Thybo Thomsen
Southampton University
& Aalborg University

Christian Berggreen
Technical University of
Denmark

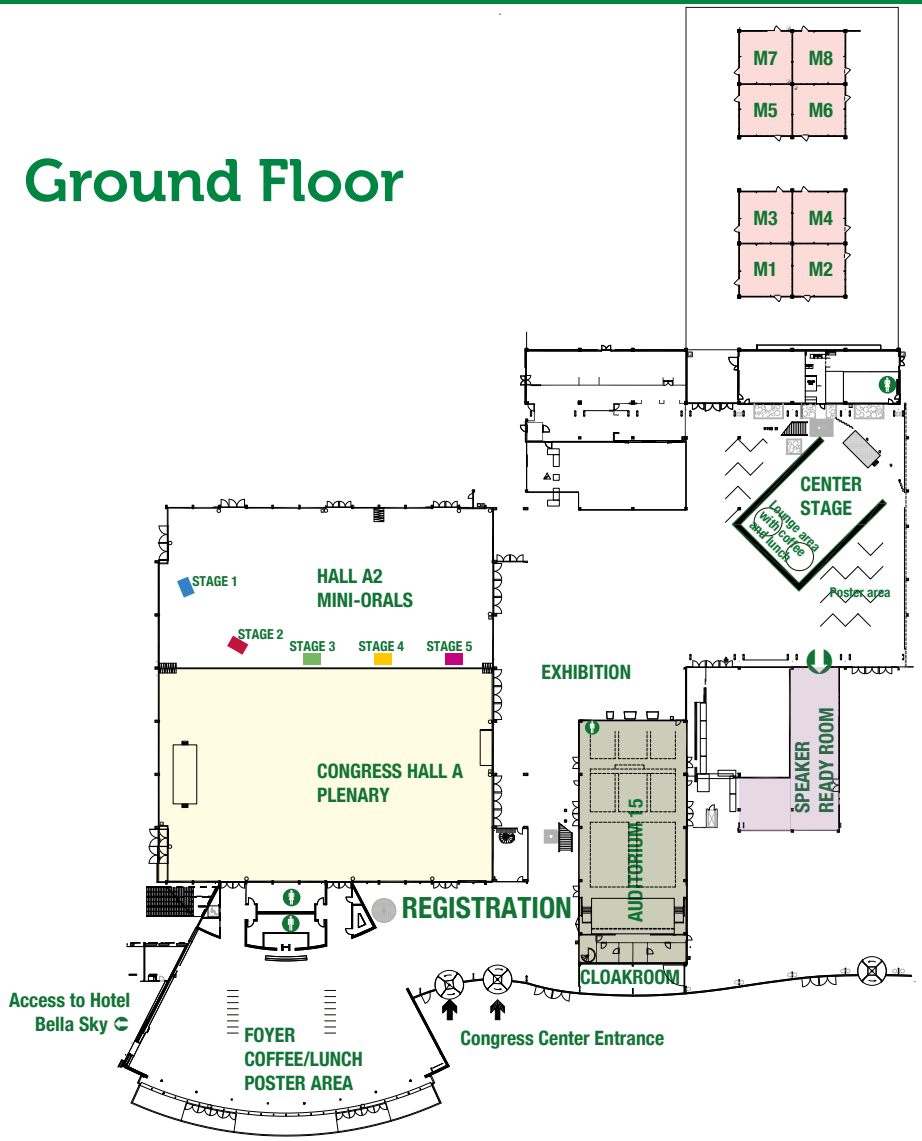
Bent F. Sørensen
Technical University of
Denmark

Use this QR code to download the ICCM20 App and create your own profile

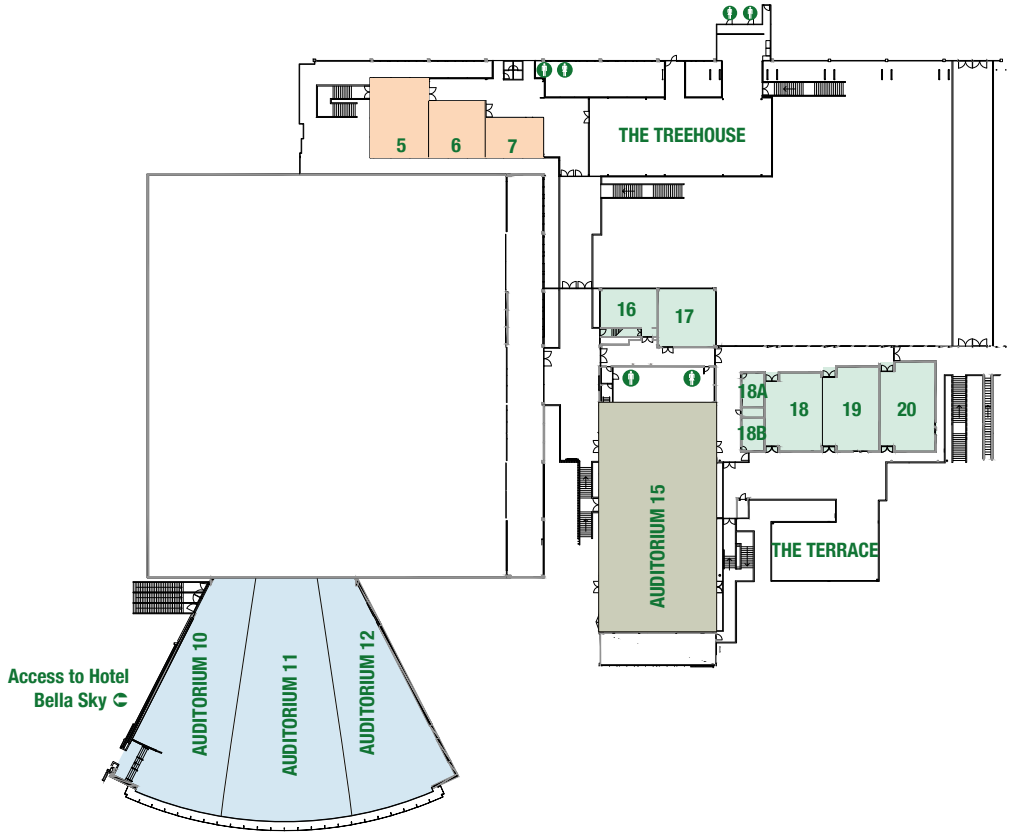
Venue overview

Bella Center is an all modern state-of-the art congress and fair centre integrated with the largest hotel in Scandinavia, AC Hotel Bella Sky Copenhagen. A unique location in the middle of Ørestaden – with its own Metro station and surrounded by Scandinavia's largest shopping mall, the Royal Golf Center and preserved nature - Bella Center ensures the best possible conditions for every type of event, only 10 minutes away from the centre of Copenhagen and Copenhagen International Airport.
Visit Fields (Scandinavia's largest shopping mall) here: www.fields.dk

Ground Floor



First Floor



SIEMENS

Did you know that our 75 meter long blade is the biggest serial produced blade for wind turbines? **Visit us at stand 001 at ICCM20 and learn more!**

Think inside the box

The new SWT-7.0-154

On the outside, our new 7 MW turbine isn't new at all. But we found a smart way to significantly increase the energy output of our proven SWT-6.0-154. Instead of "thinking outside the box," we actually thought "inside the box" and made some upgrades within the nacelle.

Siemens' unique experience with offshore wind power opens the door to fantastic opportunities. When we decided to improve the energy output of our largest offshore wind turbine, we used our expertise to approach product development in a new way. Instead of following the conventional wisdom, which tells us that "bigger is always better," we started with a proven product. We looked closely at every detail of the wind turbine and made as few upgrades as possible. Upgrades we knew would yield the greatest results – and so we created the new SWT-7.0-154.

Do you think both inside and outside of the box?
Then you might be our next colleague. At Siemens we highly value autonomous and independent employees. In addition you will become part of a team with talented peers giving you great professional development. We have many challenging open positions and we look forward to hearing how you can be part of the solution.

Visit us at stand 001 at ICCM20 and hear more about our new 7 MW turbine and Siemens as a workplace.

▲ The prototype in Østerild, Denmark was installed only a few months after the product launch at EWEA Offshore trade show in Copenhagen.

If you want to know more about what it is like to work and live in Denmark, please read more at www.siemens.dk/moving-to-denmark

www.siemens.dk/job

General Information

Registration and Information desk opening hours
Onsite registration is open:

Sunday 19. July:	16.00 - 20.00
Monday 20 July:	7.30 - 18.00
Tuesday 21 July:	8.00 - 18.00
Wednesday 22 July:	8.00 - 18.00
Thursday 23 July:	8.00 - 18.00
Friday 24 July:	8.00 - 12.00

Speaker Ready room opening hours

Sunday 19 July:	16.00 - 20.00
Monday 20 July:	7.30 - 17.00
Tuesday 21 July:	7.30 - 17.00
Wednesday 22 July:	7.30 - 15.00
Thursday 23 July:	7.30 - 15.00
Friday 24 July:	7.30 - 11.00

Exhibition opening hours

Monday 20 July:	9.30 - 18.00
Tuesday 21 July:	9.30 - 18.00
Wednesday 22 July:	9.30 - 17.00

Internet Access
Wireless internet is complimentary throughout the meeting. Network name: BC-guest. No password required.

Catering
Refreshments and lunch (lunch bags) will be provided in the exhibition area and in the Foyer during the official coffee and lunch breaks.
For your convenience, the Bella Center has a kiosk open daily from 10 am, where you may purchase food, drinks and necessaries.

Certificate of attendance
The registration desk will issue a certificate of attendance upon request.

Cloakroom
Please do not leave any bags or other personal belongings unattended at any time, whether inside or outside the sessions rooms. The cloakroom is located in the registration area. There is a fee of DKK 30,- pr day and both cash and credit card are accepted.

Conference admission – delegate badge
Admission to the ICCM20 is by badge only. Carrying the badge is mandatory for all participants. No one will be allowed admission to sessions, exhibition or social events without a badge.

Congress secretariat
MCI Copenhagen
Project Manager: Lisbeth Vestergaard Grove
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Emergency Services
In case of an emergency, please contact the staff at the Bella Center.
Police – Ambulance – Fire Brigade - dial 112 Interacting by smartphone

The ICCM20 app
Please download the ICCM20 app at ITunes or Google Play in order to receive important updates, vote during the sessions, receive reminders and to get evaluations directly on your smartphone

Official congress language
The official language is English. No simultaneous translation will be provided

Smoking policy
The Bella Center is a non-smoking facility

Public Transportation
Copenhagen is known for its well-developed transportation system.
Bella Center is located outside the city center but can be easily reached from both city center and airport by bus and Metro.
Bus: Bus 250S departs from Copenhagen Central Station and stops at Bella Center.
Metro: Metro line M1 (Vestamager) stops at Bella Center.
From Airport: From the airport the Bella Center can be reached by taking the M2 metro line to Christianshavn and then transfer with the M1 train to Vestamager, or by regional train (destination airport) to Ørestad and then change for the Metro line for 1 stop.
Tickets: Tickets for public transport can be purchased at any train station, credit card ok, but on board the bus it is cash only.

Shops
The shops in Copenhagen are open daily from 10.00 to 18.00, department stores and shopping malls until 20.00.

Copenhagen
The Danish capital is busily turning itself into a dynamic and trendy metropolis, attracting attention with everything from exciting architecture to design, art and shopping. New fashion houses, food temples, trendy boutiques and music venues are shooting up all over the city. Copenhagen has everything to offer - high standard hotels, excellent shopping, a friendly population, a safe atmosphere and wonderful sightseeing. The city is vibrating with youthful exuberance while reveling in its fascinating history. Old historical buildings, modern design and dynamic new buildings and boutiques attract trendsetters and design conscious people from all over the world as well as history and art lovers

Social programme

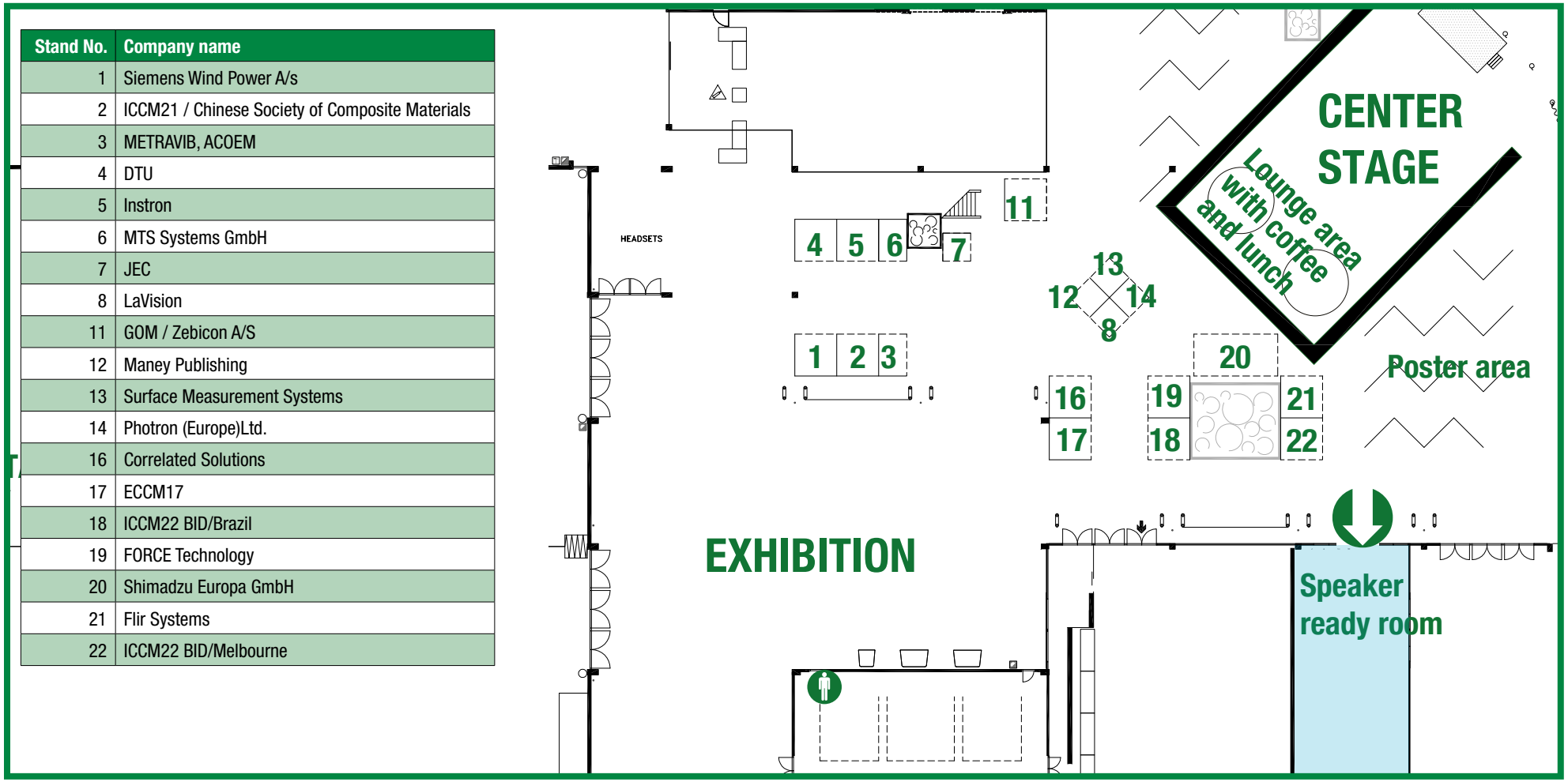
Welcome Reception in Tivoli Gardens
The Welcome Reception will take place Monday 20 July from 19.00 – 20.00 in Tivoli Gardens. Busses will depart from the Bella Center after the last sessions end around 18.00. Access to Tivoli, welcome drinks and snacks are included. Access is by badge only. Extra tickets purchased in advance will be handed out upon registration. Transportation back to your hotel is on your own.

Social programme

Conference Dinner "Midsummer Dinner"
The Conference Dinner will take place at the Bella Center Thursday 23 July in the exhibition area (Hall E). Welcome drinks will be served from 19.30 and the party ends at 23.30. Tickets for the Conference Dinner will be handed out upon registration. Please bring your ticket to participate in the dinner.

Exhibition

Stand No.	Company name
1	Siemens Wind Power A/s
2	ICCM21 / Chinese Society of Composite Materials
3	METRAVIB, ACOEM
4	DTU
5	Instron
6	MTS Systems GmbH
7	JEC
8	LaVision
11	GOM / Zebicon A/S
12	Maney Publishing
13	Surface Measurement Systems
14	Photron (Europe)Ltd.
16	Correlated Solutions
17	ECCM17
18	ICCM22 BID/Brazil
19	FORCE Technology
20	Shimadzu Europa GmbH
21	Flir Systems
22	ICCM22 BID/Melbourne



Special thanks for invaluable support in organizing the ICCM20 in Copenhagen:

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Professor Brian Hayman, Oslo University, Department of Mathematics

Scientific programme

The overall theme for the ICCM20 is “Sustainable Composite Solutions to Global Challenges”, which reflects the very important role that composite materials have in developing future sustainable low carbon foot print and low CO2 emission technologies that are so essential and a prerequisite for providing the basis for further development and improvement of the living conditions of the people of the world.

The themes chosen for ICCM20 will cover all relevant aspects of the science and technology of composite materials included in but not limited to the overall professional theme areas of Nanocomposites, Structures and Design, Damage and Failure, Fatigue, Dynamic Effects, Novel Material Systems, Experimental Characterization, Health/Condition Monitoring, Smart/Adaptive Material Systems, Manufacturing, Applications as well as covering special sessions within education/skills/training and technology transfer.

How to navigate in the scientific programme

Remember that you can also search for all presentations in your ICCM20 app.

The **session number** is made of 4 digits: XYZZ
X = day (Monday = 1, Tuesday = 2 …)
Y = session number this day
ZZ = room code

The programme number is made of the above 4 digits and adding the order of the presentations in the session: XYZZ-VV
X = day (Monday = 1, Tuesday = 2 …)
Y = session number this day
ZZ = room code
VV = presentation order in the session

In the printed program, the rooms located closely to each other are, see table below and venue map page 4.

Break out room	Room code
Congress Hall A	01
Auditorium 15	02
Auditorium 10	03
Auditorium 11	04
Auditorium 12	05
Meeting room 18	06
Meeting room 19	07
Meeting room 20	08
Meeting room 17	09
Meeting room 16	10
Meeting room 5	11

Break out room	Room code
Meeting room 6	12
Meeting room 7	13
M1	14
M2	15
M3	16
M4	17
M5	18
M6	19
M7	20
M8	21
Center Stage	22

How to navigate the poster and mini-oral programme

The poster presentations at the ICCM20 are fully integrated in the scientific programme. The poster sessions will include a short 3 minutes long oral overview presentation (termed “mini-oral”) of each poster (maximum of 3 slides) given in plenum to the entire conference. This will be followed by a poster session that will take place in the Exhibition area and Foyer of the Bella Center and where the presented posters will be on display and open for discussion.
The Posters are on display from Monday 20 July at 9.00 and until Wednesday 23 July at 16.30.
The numbers in the mini-oral programme is also the number of the posters : the numbers are as follows: PXXZ-VV
P=Poster
XX = session – (session 100 from 9:30 and session 200 from 13:00)
Z = Stage number for presentation (stages 1,2,3,4,5)
VV = presentation order in the session (20 presentations in each session)

Programme at a glance

Monday 20 July

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16	Meeting room 5
8:30	Opening Ceremony										
8:50	PETER SCALA LECTURE by: Ramesh Talreja, Texas A&M University, USA: Integration of manufacturing and failure analyses for sustainable design of composites										
9:45	COFFEE BREAK										
10:15	1101 Processing - Manufacturing Technology 1	1102 Nano Composites 1	1103 Multifunctional Composites - Sensing and Actuation 1	1104 Fatigue 1	1105 Structural Analysis and Optimization 1	1106 Processing - Preforming Technologies	1107 Process Modelling 1	1108 Biocomposites 1	1109 Interfaces and Interphases 1	1110 Ceramic Matrix Composites	1111 Textile-Based Composites and Fibre Architecture 1
12:15	LUNCH BREAK										
13:30	INDUSTRY SESSION - exhibitors will be presenting latest news in the industry										
15:00	1201 Processing - Manufacturing Technology 2	1202 Nano Composites 2	1203 Multifunctional Composites - Sensing and Actuation 2	1204 Fatigue 2	1205 Structural Analysis and Optimization 2	1206 Process Induced Effects 1	1207 Process Modelling 2	1208 Biocomposites 2	1209 Interfaces and Interphases 2	1210 Foams, Cellular and Lattice Materials 1	1211 Textile-Based Composites and Fibre Architecture 2
16:20	COFFEE BREAK										
16:40	1301 Processing - Manufacturing Technology 3	1302 Nano Composites 3	1303 Multifunctional Composites - Sensing and Actuation 3	1304 Fatigue 3	1305 Structural Analysis and Optimization 3	1306 Process Induced Effects 2	1307 Process Modelling 3	1308 Biocomposites 3	1309 Interfaces and Interphases 3	1310 Foams, Cellular and Lattice Materials 2	1311 Textile-Based Composites and Fibre Architecture 3
18:00	BUS DEPARTURE FOR the WELCOME RECEPTION AT TIVOLI GARDENS										

Tuesday 21 July

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16	Meeting room 5
8:30	PLENARY SPEECH by: S. Mark Spearing, University of Southampton, United Kingdom: High resolution computed tomography studies of composite materials: The data rich mechanics opportunity										
9:30	Mini Oral Session I in Congress Hall A2										
11:00	Poster Session in the Exhibition area and the Foyer										
12:00	LUNCH BREAK										
13:00	Mini Oral Session II in Congress Hall A2										
14:10	Poster Session in the Exhibition area and the Foyer										
15:00	2101 Processing - Manufacturing Technology 4	2102 Nano Composites 4	2103 Multifunctional Composites - Sensing and Actuation 4	2104 Fatigue 4	2105 Structural Analysis and Optimization 4	2106 Process Induced Effects 3	2107 Process Modelling 4	2108 Biocomposites 4	2109 Interfaces and Interphases 4	2110 Foams, Cellular and Lattice Materials 3	2111 Textile-Based Composites and Fibre Architecture 4
16:20	COFFEE BREAK										
16:40	2201 Processing - Manufacturing Technology 5	2202 Nano Composites 5	2203 Multifunctional Composites - Sensing and Actuation 5	2204 Fatigue 5	2205 Structural Analysis and Optimization 5	2206 Process Induced Effects 4	2207 Process Modelling 5	2208 Biocomposites 5	2209 Interfaces and Interphases 5	2210 Ductile and Pseudo-ductile Composites 1	2211 Textile-Based Composites and Fibre Architecture 5
18:00	END OF DAY										

Monday 20 July

Meeting room 6	Meeting room 7	M1	M2	M3	M4	M5	M6	M7	M8	Center Stage
Opening Ceremony										
PETER SCALA LECTURE by: Ramesh Talreja, Texas A&M University, USA: Integration of manufacturing and failure analyses for sustainable design of composites										
COFFEE BREAK										
1112 Graphene, Graphene-Based Composites 1	1113 Dynamic Material Behaviour	1114 Fracture and Damage - Micromechanics 1	1115 Fracture and Damage - Laminate Scale 1	1116 Fracture and Damage - Delamination 1	1117 Constitutive Models 1	1118 Joints - Design, Manufacturing and Testing 1	1119 In-situ Micro-Mechanical Testing	1120 Applications - Offshore and Subsea	1121 Multifunctional Composites - Energy Storage and Harvesting 1	
LUNCH BREAK										
INDUSTRY SESSION - exhibitors will be presenting latest news in the industry										
1212 Graphene, Graphene-Based Composites 2	1213 X-ray Computed Tomography 1	1214 Fracture and Damage - Micromechanics 2	1215 Fracture and Damage - Laminate Scale 2	1216 Fracture and Damage - Delamination 2	1217 Constitutive Models 2	1218 Joints - Design, Manufacturing and Testing 2	1219 Applications - Aerospace 1	1220 Applications - Automotive and Rail 1	1221 Multifunctional Composites - Energy Storage and Harvesting 2	1222 Workshop: Applications - Industry Needs 1
COFFEE BREAK										
1312 Graphene, Graphene-Based Composites 3	1313 X-ray Computed Tomography 2	1314 Fracture and Damage - Micromechanics 3	1315 Fracture and Damage - Laminate Scale 3	1316 Fracture and Damage - Delamination 3	1317 Constitutive Models 3	1318 Joints - Design, Manufacturing and Testing 3	1319 Applications - Aerospace 2	1320 Applications - Automotive and Rail 2	1321 Multifunctional Composites - Energy Storage and Harvesting 3	1322 Workshop: Applications - Industry Needs 2
BUS DEPARTURE FOR the WELCOME RECEPTION AT TIVOLI GARDENS										

Tuesday 21 July

Meeting room 6	Meeting room 7	M1	M2	M3	M4	M5	M6	M7	M8	Center Stage
PLENARY SPEECH by: S. Mark Spearing, University of Southampton, United Kingdom: High resolution computed tomography studies of composite materials: The data rich mechanics opportunity										
									2121 Special Symposium on active composites - 1	
LUNCH BREAK										
									2321 Special Symposium on active composites - 2	
									2521 Special Symposium on active composites - 3	
2112 Graphene, Graphene-Based Composites 4	2113 X-ray Computed Tomography 3	2114 Fracture and Damage - Micromechanics 4	2115 Fracture and Damage - Laminate Scale 4	2116 Fracture and Damage - Delamination 4	2117 Pressure Vessels and Piping 1	2118 Joints - Design, Manufacturing and Testing 4	2119 Applications - Aerospace 3	2120 Dynamic Fracture 1		2122 Workshop on quality in scientific publication 1
COFFEE BREAK										
2212 Graphene, Graphene-Based Composites 5	2213 X-ray Computed Tomography 4	2214 Fracture and Damage - Micromechanics 5	2215 Fracture and Damage - Laminate Scale 5	2216 Fracture and Damage - Delamination 5	2217 Pressure Vessels and Piping 2	2218 Joints - Design, Manufacturing and Testing 5	2219 Applications - Aerospace 4	2220 Applications - Bio & Medical 1	2621 Special Symposium on active composites - 4	2222 Workshop on quality in scientific publication 2
END OF DAY										

Wednesday 22 July

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16	Meeting room 5
8:30	PLENARY SPEECH by: Yapa D. S. Rajapakse, Office of Naval Research, Virginia, USA: Extreme loading of composite materials in naval applications										
9:30	3101 Processing - Manufacturing Technology 6	3102 Nano Composites 6	3103 ONR Special Symposium on Marine Composites 1	3104 Fatigue 6	3105 Structural Analysis and Optimization 6	3106 Process Induced Effects 5	3107 Process Modelling 6	3108 Fibre reinforcement	3109 Interfaces and Interphases 6	3110 Damage Tolerance of Composite Structures 1	3111 Textile-Based Composites and Fibre Architecture 6
10:50	COFFEE BREAK										
11:20	3201 Processing - Manufacturing Technology 7	3202 Nano Composites 7	3203 ONR Special Symposium on Marine Composites 2	3204 Fatigue 7	3205 Structural Analysis and Optimization 7	3206 Process Induced Effects 6	3207 Process Modelling 7	3208 Biocomposites 6	3209 Interfaces and Interphases 7	3210 Damage Tolerance of Composite Structures 2	3211 Textile-Based Composites and Fibre Architecture 7
13:00	LUNCH BREAK										
14:00	3301 Processing - Manufacturing Technology 8	3302 Nano Composites 8	3303 ONR Special Symposium on Marine Composites 3	3304 Fatigue 8	3305 Structural Analysis and Optimization 8	3306 Process Induced Effects 7	3307 Process Modelling 8	3308 Biocomposites 7	3309 Recycling of Composites and Sustainability 1	3310 Damage Tolerance of Composite Structures 3	3311 Textile-Based Composites and Fibre Architecture 8
15:20	COFFEE BREAK										
15:40	3401 Processing - Manufacturing Technology 9	3402 Nano Composites 9	3403 ONR Special Symposium on Marine Composites 4	3404 Fatigue 9	3405 Structural Analysis and Optimization 9	3406 Experimental Methods for Process Characterisation 1	3407 Short Fibre Composites 1	3408 Biocomposites 8	3409 Recycling of Composites and Sustainability 2	3410 Damage Tolerance of Composite Structures 4	3411 Textile-Based Composites and Fibre Architecture 9
16:50											
17:15	General Assembly										
19:15	END OF DAY										

Thursday 23 July

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16	Meeting room 5
8:30	PLENARY SPEECH by: Ignaas Verpoest, Katholieke Universiteit Leuven, Belgium: From fibres to tapes, from synthetic to natural fibres: a new generation of textile composites and their applications										
9:30	4101 Processing - Manufacturing Technology 10	4102 Nano Composites 10	4103 ONR Special Symposium on Marine Composites 5	4104 Multifunctional Composites - Self-Healing and Bio-inspired Designs 1	4105 Structural Analysis and Optimization 10	4106 Experimental Methods for Process Characterisation 2	4107 Fibres 1	4108 Biocomposites 9	4109 Liquid Composites Moulding 1	4110 Sandwich Structures and Materials 1	4111 Multifunctional Composites - Adaptive Response and Reconfiguration 3
10:50	COFFEE BREAK										
11:20	4201 Processing - Manufacturing Technology 11	4202 Nano Composites 11	4203 ONR Special Symposium on Marine Composites 6	4204 Multifunctional Composites - Self-Healing and Bio-inspired Designs 2	4205 Structural Analysis and Optimization 11	4206 Experimental Methods for Process Characterisation 3	4207 Short Fibre Composites 2	4208 Biocomposites 10	4209 Liquid Composites Moulding 2	4210 Sandwich Structures and Materials 2	4211 Multifunctional Composites - Coupled Properties and Multi-physics Models 1
13:00	LUNCH BREAK										
14:00	PLENARY SPEECH by: Jinsong Leng: Stimulus-responsive polymer composites: a path towards active shape changing structures										
15:00	4301 Processing - Manufacturing Technology 12	4302 Nano Composites 12	4303 ONR Special Symposium on Marine Composites 7	4304 Multifunctional Composites - Self-Healing and Bio-inspired Designs 3	4305 Applications - Bio & Medical 2	4306 Experimental Methods for Process Characterisation 4	4307 Short Fibre Composites 3	4308 Biocomposites 11	4309 Recycling of Composites and Sustainability 3	4310 Fibres 2	4311 Multifunctional Composites - Adaptive Response and Reconfiguration 4
16:20	COFFEEBREAK										
16:40	4401 Processing - Manufacturing Technology 13	4402 Nano Composites 13	4403 Sandwich Structures and Materials 3	4404 Multifunctional Composites - Self-Healing and Bio-inspired Designs 4	4405 Applications - Bio & Medical 3	4406 Experimental Methods for Process Characterisation 5	4407 Textile-Based Composites and Fibre Architecture 10	4408 Biocomposites 12	4409 Recycling of Composites and Sustainability 4	4410 Fibres 3	4411 Multifunctional Composites - Adaptive Response and Reconfiguration 5
19:30	Conference dinner at Bella Center, Exhibtion Area										
23:30	END OF DAY										

Wednesday 22 July

Meeting room 6	Meeting room 7	M1	M2	M3	M4	M5	M6	M7	M8	Center Stage
PLENARY SPEECH by: Yapa D. S. Rajapakse, Office of Naval Research, Virginia, USA: Extreme loading of composite materials in naval applications										
3112 Graphene, Graphene-Based Composites 6	3113 Matrix Materials 1	3114 Fracture and Damage - Materials Scale 1	3115 Models Homogenization – Micro to Macro 1	3116 Nanocomposites for Structural Lightweight - Modelling and Testing 1	3117 Ductile and Pseudo-ductile Composites 2	3118 Fire Resistance 1	3119 Applications - Aerospace 5	3120 New Structural Testing Methods 1	3121 Multifunctional Composites - Sensing and Actuation 6	3122 Tsai Award 1
COFFEE BREAK										'Young scientist award' - The Danish Plastics Federation – Composite Division
3212 Graphene, Graphene-Based Composites 7	3213 Matrix Materials 2	3214 Fracture and Damage - Micromechanics 6	3215 Models Homogenization – Micro to Macro 2	3216 Fracture and Damage - Delamination 6	3217 Ductile and Pseudo-ductile Composites 3	3218 Fire Resistance 2	3219 Applications - Aerospace 6	3220 New Structural Testing Methods 2	3221 Multifunctional Composites - Adaptive Response and Reconfiguration 1	3222 Tsai Award 2
LUNCH BREAK										
3312 Graphene, Graphene-Based Composites 8	3313 Matrix Materials 3	3314 Fracture and Damage - Materials Scale 2	3315 Models Homogenization – Micro to Macro 3	3316 Nanocomposites for Structural Lightweight - Modelling and Testing 2	3317 Ductile and Pseudo-ductile Composites 4	3318 Fire Resistance 3	3319 Applications - Civil Engineering 1	3320 New Structural Testing Methods 3	3321 Multifunctional Composites - Adaptive Response and Reconfiguration 2	3322 Workshop on Failure of composites: current status and future directions 1
COFFEE BREAK										
3412 Foams, Cellular and Lattice Materials 4	3413 Matrix Materials 4	3414 Fracture and Damage - Materials Scale 3	3415 Models Homogenization – Micro to Macro 4	3416 Nanocomposites for Structural Lightweight - Modelling and Testing 3	3417 Manufacturing Up-Scaling and Automation 1	3418 Sensors in Experimental Mechanics 1	3419 Applications - Civil Engineering 2	3420 New Structural Testing Methods 4	3421 Multifunctional Composites - Smart Structures 1	3422 Workshop on Failure of composites: current status and future directions 2
										Industry Session JEC Group
General Assembly										
END OF DAY										

Thursday 23 July

Meeting room 6	Meeting room 7	M1	M2	M3	M4	M5	M6	M7	M8	Center Stage
PLENARY SPEECH by: Ignaas Verpoest, Katholieke Universiteit Leuven, Belgium: From fibres to tapes, from synthetic to natural fibres: a new generation of textile composites and their applications										
4112 Composites with Metallic Components 1	4113 Ductile and Pseudo-ductile Composites 5	4114 Models Homogenization – Micro to Macro 5	4115 Identification using Full-Field Measurements	4116 Dynamic Fracture 2	4117 Manufacturing Up-Scaling and Automation 2	4118 Multiscale Modelling of Structures 1	4119 Applications - Wind, Wave and Tidal Energy 1	4120 Sensors in Experimental Mechanics 2	4121 Multifunctional Composites - Smart Structures 2	
COFFEE BREAK										
4212 Composites with Metallic Components 2	4213 Hybrid Composites 1	4214 Fracture and Damage - Materials Scale 4	4215 Digital Image Correlation 1	4216 Durability, Creep and Agressive Environment 1	4217 Manufacturing Up-Scaling and Automation 3	4218 Multiscale Modelling of Structures 2	4219 Applications - Wind, Wave and Tidal Energy 2	4220 Sensors in Experimental Mechanics 3	4221 Multifunctional Composites - Smart Structures 3	
LUNCH BREAK										
PLENARY SPEECH by: Jinsong Leng: 404 Stimulus-responsive polymer composites: a path towards active shape changing structures										
4312 Composites with Metallic Components 3	4313 Hybrid Composites 2	4314 Simulation of Progressive Failure 1	4315 Digital Image Correlation 2	4316 Durability, Creep and Agressive Environment 2	4317 Impact and Dynamic Structural Analysis 1	4318 Multiscale Modelling of Structures 3	4319 Applications - Ships and Boats	4320 Thermography 1	4321 Multifunctional Composites - Processing and Integration 1	
COFFEE BREAK										
4412 Composites with Metallic Components 4	4413 Hybrid Composites 3	4414 Simulation of Progressive Failure 2	4415 Digital Image Correlation 3	4416 Dynamic Fracture 3	4417 Impact and Dynamic Structural Analysis 2	4418 Multiscale Modelling of Structures 4	4419 Applications - Civil Engineering 3	4420 Thermography 2	4421 Multifunctional Composites - Processing and Integration 2	
Conference dinner at Bella Center, Exhibtion Area										
END OF DAY										

//Programme at a glance

Friday 24 July

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16	Meeting room 5
8:30	PLENARY SPEECH by: Richard A. Vaia, Air Force Research Laboratory, Ohio, USA - Materials for future aerospace technologies: Challenges and opportunities										
9:30	5101 Processing - Manufacturing Technology 14	5102 Nano Composites 14	5103 Sandwich Structures and Materials 4	5104 Fatigue 10		5106 Manufacturing Up-Scaling and Automation 4	5107 Processing - Manufacturing Technology 16	5108 Short Fibre Composites 4	5109 Process Induced Effects 8	5110 Fibres 4	5111 Multifunctional Composites - Coupled Properties and Multi-physics Models 2
10:50	COFFEE BREAK										
11:20	5201 Processing - Manufacturing Technology 15	5202 Nano Composites 15	5203 Sandwich Structures and Materials 5	5204 Multifunctional Composites - Self-Healing and Bio-inspired Designs 5	5205 Structural Design Criteria, Safety and Reliability	5206 Experimental Methods for Process Characterisation 6	5207 Liquid Composites Moulding 3	5208 Short Fibre Composites 5	5209 Recycling of Composites and Sustainability 5	5210 Fibres 5	5211 Multifunctional Composites - Coupled Properties and Multi-physics Models 3
13:00	LUNCH BREAK										
14:00	Closing Ceremony										
	GOODBYE AND HOPE TO SEE YOU IN 2017 FOR THE ICCM21!										

Friday 24 July

	Meeting room 6	Meeting room 7	M1	M2	M3	M4	M5	M6	M7	M8	Center Stage
8:30	PLENARY SPEECH by: Richard A. Vaia, Air Force Research Laboratory, Ohio, USA - Materials for future aerospace technologies: Challenges and opportunities										
9:30	5112 Tribology and Wear	5113 Damage Tolerance of Composite Structures 5	5114 Simulation of Progressive Failure 3	5115 Durability, Creep and Agressive Environment 3	5116 Dynamic Fracture 4	5117 Impact and Dynamic Structural Analysis 3	5118 Applications - Automotive and Rail 3	5119 Applications - Civil Engineering 4	5120 Ultrasound and Acoustic Emission		
10:50	COFFEE BREAK										
11:20	5212 Matrix materials 5	5213 Damage Tolerance of Composite Structures 6	5214 Simulation of Progressive Failure 4	5215 Durability, Creep and Agressive Environment 4		5217 Impact and Dynamic Structural Analysis 4	5218 Hybrid Composites 4	5219 Applications - Civil Engineering 5			
13:00	LUNCH BREAK										
14:00	Closing Ceremony										
	GOODBYE AND HOPE TO SEE YOU IN 2017 FOR THE ICCM21!										

Plenary Speakers

Ramesh Talreja (Peter Scala award)

Department of Aerospace Engineering at Texas A&M University, USA

Ramesh Talreja's research career began in 1978 with a project dealing with fatigue of wind turbine blades made of glass/polyester for the Danish Wind Energy programme. His work over the next seven years led to the monograph, "Fatigue of Composite Materials", and continued with contributions to the field of damage and failure of composite materials. After more than fifteen years on the faculty of the Technical University of Denmark, he moved to the United States to join Georgia Institute of Technology as a professor of Aerospace Engineering, and 10 years later, to head the Department of Aerospace Engineering at Texas A&M University. Professor Talreja has written numerous papers, book chapters, and most recently, the book, "Damage and Failure of Composite Materials" (with C.V. Singh), while serving on the editorial boards of 15 journals and editing several book volumes. His current interests are in cost-effective manufacturing of composites through engineering of defects.

Monday 20 July at 8.50 - PETER SCALA LECTURE: Integration of manufacturing and failure analyses for sustainable design of composites

Ignaas Verpoest

Department of Materials Engineering, Katholieke Universiteit Leuven (KU Leuven), Belgium

Prof. Ignaas VERPOEST was a full professor at the Katholieke Universiteit Leuven (Belgium and guiding a group of 8 postdoc researchers and 25 PhD-students. He is the author of more than 210 journal papers, about 500 conference papers and 3 books, and holds 15 patents. Since September 2013, Ignaas Verpoest is emeritus professor at KU Leuven. Prof. Verpoest is holder of the Toray Chair in Composite Materials at KU Leuven. He was President of the European Society for Composite Materials (ESCM), and of the International Committee on Composite Materials. Prof. Ignaas Verpoest won several awards, amongst others the Descartes Prize for Science Communication of the European Commission (2004), the International Fellowship of the Society for the Advancement of Materials Processing and Engineering (SAMPE, 2009) and of the International Committee on Composite Materials (ICCM, 2009). In 2014, he was awarded the 'Medal of Excellence in Composite Materials' of the University of Delaware. He is also co-founder and board member of the company Econcore, worldwide producer of innovative honeycomb cores.

Thursday 23 July at 8:30 - From fibres to tapes, from synthetic to natural fibres: a new generation of textile composites and their applications

Yapa D. S. Rajapakse

Programme Manager, Solid Mechanics, Office of Naval Research (ONR), USA

Dr. Rajapakse manages the ONR Solid Mechanics Programme, with the current focus on Mechanics of Marine Composites and Composite Sandwich Structures. He received his Ph. D. degree in Applied Mechanics (Advisor: J.N. Goodier), and a M. S. degree in Mathematics, from Stanford University. He is a Fellow of 4 technical societies: American Society of Mechanical Engineers (ASME), Society of Engineering Science (SES), American Society for Composites (ASC), and American Academy of Mechanics. He has served on several Editorial Boards of technical journals, including Composites Science and Technology, J. Sandwich Structures and Materials, J. Composite Materials, and Composites Part B. He has served SES as President, Vice-president, Member-Board of Directors. He has served ASME as Chairman of the Composite Materials Committee of the Applied Mechanics Division, and ASC as Chairman of the Polymer-Matrix Composites Division. He has organized ONR Symposia at the last four ICCM conferences. He has edited/coedited 32 books (e.g. Dynamic Failure of Materials and Structures, Blast Mitigation: Experimental and Numerical Studies).

Wednesday 22 July at 8:30 - Extreme loading of composite materials in naval applications

Jinsong Leng

Center for Smart Materials and Structures at Harbin Institute of Technology, China

Prof. Leng is Cheung Kong Chair Professor and Director of the Center for Smart Materials and Structures at Harbin Institute of Technology, China. His researches cover Sensors & Actuators, Stimulus Responsive Polymers (Shape Memory and Electro-Active Polymers) and their composites, Multifunctional Nanocomposites, Active Vibration Control, Structural Health Monitoring, and Active Morphing Structures. Prof. Leng has authored or co-authored over 260 scientific papers, 8 books/chapters, 29 issued patents and 15 pending patents. He is editor in Chief of International Journal of Smart and Nano Materials, Associate Editor of Smart Materials and Structures and Journal of Intelligent Materials Systems and Structures, and editorial board member of Composites A. Prof. Leng has been elected as an Executive Council Member of ICCM, Fellow of SPIE, Fellow of Institute of Physics (IOP), Fellow of Royal Aeronautical Society (RAeS), Fellow of Institute of Materials, Minerals, and Mining (IMMM) and Associate Fellow of AIAA.

Thursday 23 July at 14:00 - Stimulus-responsive polymer composites: a path towards active shape changing structures

S. Mark Spearing

School of Engineering Sciences, Southampton University. UK

Mark Spearing is Professor of Engineering Materials in the School of Engineering Sciences at Southampton University. He has served as Head of the School of Engineering Sciences and currently as Provost and Pro Vice-Chancellor (International) for the University. Prior to his appointment at Southampton he was a Professor of Aeronautics and Astronautics at the Massachusetts Institute of Technology, from 1994-2004. His technical interests include advanced composites materials, processes and structural analysis, design of Micro- and Nano-Systems, electronic packages and structural health monitoring. His work in composite materials has focused on understanding damage and failure processes with the aim of producing mechanism-based models to guide material development and design methods. He has been working in the field of composite materials since 1986, and attended his first ICCM in London in 1987. Spearing is an editor of the Journal of Composite Materials and also of Journal of Microelectromechanical Systems. He has published over 170 technical publications, including more than 100 in refereed journals. He holds five patents. In 2004 he received a Royal Society-Wolfson Research Merit Award.

Tuesday 21 July at 8:30 - High resolution computed tomography studies of composite materials: The data rich mechanics opportunity

Richard A. Vaia

Functional Materials Division of the Materials and Manufacturing Directorate, U.S. Air Force Research Laboratory (AFRL)

Richard A. Vaia is the Technology Director of the Functional Materials Division of the Materials and Manufacturing Directorate at the U.S. Air Force Research Laboratory (AFRL). The Division delivers functional materials and processing solutions that revolutionize AF aircraft, spacecraft, launch vehicles, and their structural, electronic and optical components. Rich serves on numerous editorial boards, Board of Directors and external review panels, and has authored over 200 peer-reviewed papers and patents on polymer nanocomposites, complex nanoparticle architectures and their impact on developing adaptive soft matter. He received his PhD in Materials Science and Engineering at Cornell University in 1995, and is a Fellow of the Materials Research Society, American Physical Society, American Chemical Society (PMSE Division), and the Air Force Research Laboratory.

Friday 24 July at 8:30 - Materials for future aerospace technologies: Challenges and opportunities

Keynote Speakers

Monday 20 July

Time	Programme number	Presenter	Title	Room
10:15-10:55	1108-1	Larry Lessard, Aart van Vuure	FATIGUE BEHAVIOUR OF WOVEN FLAX/EPOXY COMPOSITES	Meeting Room 20
10:15-10:55	1111-1	Valter Carvelli	FATIGUE PERFORMANCE OF MICRO-FIBRILLATED CELLULOSE AND RUBBER NANOPARTICLE HYBRID EPOXY RESIN REINFORCED CARBON PLAIN WEAVE	Meeting Room 5
10:15-10:55	1118-1	Evangelos Ioannis Avgoulas	NUMERICAL AND EXPERIMENTAL INVESTIGATION OF CFRP TO PERFORATED STEEL JOITNS	M5
15:00-15.40	1203-1	Fu-Kuo Chang	A COMPOSITE INTELLIGENT WING WITH STATE-SENSING AND AWARENESS CAPABILITIES	Auditorium 10
15:00-15.40	1221-1	Emilie Greenhalgh	RECENT ADVANCES IN STRUCTURAL SUPERCAPACITORS FOR TRANSPORT APPLICATIONS	M8
16.40-17.20	1306-1	Göran Fernlund	BULK AND SURFACE POROSITY IN OUT-OF-AUTOCLAVE PREPREGS	Meeting Room 18

Tuesday 21 July

15:00-15:40	2105-1	Erik Lund	RECENT DEVELOPMENTS OF DISCRETE MATERIAL OPTIMIZATION OF LAMINATED COMPOSITE STRUCTURES	Auditorium 12
15:00-15:40	2116-1	Masaki Hojo	CHARACTERIZATION OF FATIGUE R-CURVES BASED ON GMAX-CONSTANT DELAMINATION TESTS IN CF/PEEK LAMINATES	M3
16:40-17:20	2203-1	Ray Baughman	POWERFUL ARTIFICIAL MUSCLES FOR MORPHING COMPOSITES	Auditorium 10
16:40-17:20	2210-1	Michael Wisnom	HIGH PERFORMANCE PSEUDO-DUCTILE COMPOSITES	Meeting Room 16
16:40-17:20	2219-1	Thomas Kruse	BONDING OF CFRP PRIMARY AEROSPACE STRUCTURES – CRACK-STOPPING IN COMPOSITE BONDED JOINTS UNDER FATIGUE	M6

Wednesday 22 July

9:30-10:10	3103-1	Romesh Batra	DEFORMATIONS DUE TO EXPLOSIVE AND IMPLOSIVE LOADS OF SANDWICH CYLINDERS USING THIRD ORDER SHEAR AND NORMAL DEFORMABLE THEORY (TSNDT)	Auditorium 10
9:30-10:10	3112-1	Ian Kinloch	STRUCTURAL GRAPHENE COMPOSITES: TAKING THE LESSONS OF FUNDAMENTAL STUDIES THROUGH TO BULK COMPOSITES	Meeting Room 6
11:20-12:00	3204-1	Marino Quaresimin	MICROSCOPIC DAMAGE EVOLUTION IN OFF-AXIS PLIES UNDER FATIGUE LOADING	Auditorum 11
11:20-12:00	3210-1	Pedro Camanho	CONSTITUTIVE MODELING AND EXPERIMENTAL CHARACTERIZATION OF THE NON-LINEAR STRESS-STRAIN BEHAVIOR OF UNIDIRECTIONAL CARBON-EPOXY UNDER HIGH STRAIN RATES	Meeting Room 16
14:00-14:40	3322-1	Mike J. Hinton, Sam Kaddour	FAILURE OF COMPOSITE: STATUS AND FUTURE DIRECTION	Center Stage
15:40-16:00	3403-1	Dayakar Penumadu	CHARACTERIZATION OF SINGLE CARBON FIBER MECHANICAL BEHAVIOR BY NANO-TENSILE TESTING	Auditorium 10

Thursday 23 July

11:20-12:00	4201-1	Peter Mitschang	IMPREGNATION PERFORMANCE OF NON-ISOBARIC PROCESSES	Congress Hall A1
11:20-12:00	4206-1	Timotei Centea, Steven Nutt	MULTI-SCALE MATERIAL AND PROCESS CHARACTERIZATION FOR RESIN TRANSFER MOLDING: CASE STUDY FOR A BLENDED EPOXY/PHENOLIC RESIN	Meeting Room 18
11:20-12:00	4211-1	Somnath Ghosh	MULTI-SCALE COMPUTATIONAL MODELING FRAMEWORK FOR COUPLED ELECTROMAGNETICS AND MECHANICAL SIMULATIONS IN MULTIFUNCTIONAL MATERIALS	Meeting Room 5
11:20-12:00	4218-1	Brian Cox	STOCHASTIC VIRTUAL TESTS FOR FIBER COMPOSITES	M5
16:40-17:20	4419-1	Urs Meier	LONG TERM RELIABILITY OF CFRP IN BRIDGE ENGINEERING	M6
16:40-17:20	4421-1	Scott White	MULTIFUNCTIONAL MICROVASCULAR COMPOSITES	M8

Friday 24 July

11:20-12:00	5204-1	Nancy Sottos	SINGLE CHANNEL MICROVASCULAR DELIVERY FOR SELF-HEALING POLYMER COMPOSITES	Auditorum 11
11:20-12:00	5210-1	Yuris Dzenis	SIMULTANEOUSLY STRONG AND TOUGH CONTINUOUS NANOFIBERS: NEXT GENERATION REINFORCEMENT FOR NEW STRUCTURAL SUPERCOMPOSITES?	Meeting Room 16

Center Stage programme

Monday 20 July

	Center Stage
15:00	**1222 Introduction of Industry Needs Workshop and Scope**
15:05	**1222-1 ANALYSIS-ENABLED PRODUCTION AND PERFORMANCE OF COMPOSITE WING STRUCTURES** Richard Newley (GKN Aerospace), Richard Butler (University of Bath) The GKN - University of Bath partnership developments, such as FE formulations for laminate forming have already influenced manufacturing. New laminate rules will take longer to implement in design.
15:15	**Panel Discussion Part 1**
15:30	**1222-2 EFFICIENT TRANSFER OF PROMISING RESEARCH RESULTS TO INDUSTRIAL APPLICATIONS USING ADAPTIVE PROCESSES** Jan Bremer (BCT GmbH) Adaptive machining enables scalability and stability of fully automated processes. This is key to permit efficient transfer of research to industry, as for example in automated composite repair.
15:40	**1222-3 A MULTIFUNCTIONAL DEVICE APPLYING FOR THE SAFE MAINTENANCE AT HIGH-ALTITUDE ON WIND TURBINES** Peter Dahmann (Aachen University of applied Sciences), Stephan Kallweit (Aachen University of applied Sciences), Mohsen Bagheri (Aachen University of applied Sciences), Joseph Schleupen (Aachen University of applied Sciences) Developing this multifunctional climbing device, for scanning, repair and transportation, combines all the existing maintenance solutions for wind turbine blades into one weather-independent platform.
15:50	**Panel Discussion Part 2**
16:10	**1222-4 OPTIMIZATION OF COMPOSITE ICE HOCKEY STICK DESIGN THROUGH FINITE ELEMENT ANALYSIS** Adam Gans (Bauer Performance Sports) FEA is intrinsic to the design of composite sporting goods. We look to develop new measuring methods, a broader database of material properties, and better tools to predict performance and failure.
16:20	**1322-1 STANDARD QUALIFICATION PLAN DEVELOPED TO ENCOURAGE INNOVATION OF NEW MATERIALS AT LOWER COSTS** Michael Gower (NPL), Graham Sims (National Physical Laboratory) The development and experimental validation of a Standard Qualification Plan (SQP), satisfying minimum common requirements, to reduce the substantial cost of qualifying new composites is reviewed.
16:30	**Panel Discussion Part 3**
17:00	**1322-2 ENABLERS FOR THE INDUSTRIALIZATION OF INFUSION PROCESSES: MERGING RESEARCH AND APPLICATION DRIVEN EXPECTATIONS** Paulin Fideu (Airbus), Hauke Seegel (Composite Technology Center CTC GmbH), Claus Fastert (Composite Technology Center CTC GmbH), Cyrille Collart (Airbus) This paper presents the needs for the industrialization of infusion processes. Based on selected examples, remaining challenges are discussed and some solution approaches are proposed."
17:10	**1322-3 CHALLENGES OF INDUSTRIALISATION IN CFRP-ASSEMBLY IN AEROSPACE INDUSTRY** Joachim Piepenbrock (Composite Technology Center GmbH), Alexander Engels (Composite Technology Center GmbH)
17:20	**Panel Discussion Part 4**
17:45	Strategic direction and inuiting participants to continue participating through emails, app etc.
18:00	End of session

Tuesday 21 July

	Center Stage
15:00	**2122 Workshop on quality in scientific publication 1** Background and motivation for the workshop: Many scientists feel that the scientific culture of publication and peer review is close to collapse, in the sense that the amount of papers published is increasing dramatically while the overall quality of the published papers may not be at the same high level as was generally perceived in previous times. Many consider this to be a threat to the scientific culture at large. A pessimistic view is that this development threatens to undermine the entire scientific progress in general, and further poses a serious threat to the survivability of the peer review publication system in the long term. There are a number of issues: • Editors perspective: For example - The same manuscript is sometimes found to be submitted simultaneously to multiple journals. The review process does not work properly. • Reviewers perspective: Reviewers often receive manuscripts for review that are of poor quality - the impression that possibly a student wrote the manuscript without guidance and thorough review from the supervisor is not uncommon. Poorly prepared manuscripts that include elementary mistakes are sent for review. • Readers perspective: As an example a massive growth in the quantity of scientific publications in the field of composite materials has been experienced over the last years. Part of this may be due to increased activity in the research area at large, but the general quality of the papers by some is perceived to be declining (quantity over quality). Part of the explanation could be that not all reviews are being conducted with sufficient care and scrutiny to detail. Another issue is that the underlying mechanism that seem to be driving this development is the increasing pressure on scientists to publish many articles (quantity over quality); universities count publications and citations; scientific journals compete on impact factors, etc. The issues outlined above will be discussed in this Workshop.
16:40	**2222 Workshop on quality in scientific publication 2**

Wednesday 22 July

	Center Stage
9:30	**3122 Tsai Award 1**
	3122-1 MICROMECHANICAL CHARACTERISAZION OF FATIGUE DAMAGE INITIATION AND PROPAGATION IN CFRP USING SYNCHROTRON RADIATION COMPUTED TOMOGRAPHY Serafina Consuelo Garcea (University of Southampton), Ian Sinclair (University of Southampton), Simon Mark Spearing (University of Southampton) Micromechanisms of fatigue damage have been assessed using in situ and ex situ X-ray computed tomography. Fibre failures along the 0° ply splits and in the bulk composite were detected and quantified.
	3122-2 A MULTISCALE DAMAGE INITIATION MODEL FOR CNT-ENHANCED EPOXY POLYMERS Nithya Subramanian (Arizona State University), Ashwin Rai (Arizona State University), Aditi Chattopadhyay (Arizona State University) Multiscale framework simulates inelastic behavior of CNT-epoxy polymers at the molecular level due to bond dissociation and integrates atomistic data with continuum damage mechanics at microscale.
	3122-3 ENABLING FASTER STRUCTURAL DESIGN: EFFICIENT MULTISCALE SIMULATION OF LARGE COMPOSITE STRUCTURES Luigi Gigliotti (Imperial College London), Silvestre Pinho (Imperial College London) Novel Multiscale PBCs, exploiting symmetries in solid-to-shell homogenization of periodic structures, are presented. These reduce modelling (85%) and analysis (89%) CPU times very significantly.
10:50	'**Young scientist award' - The Danish Plastics Federation – Composite Division** The Danish Plastics Federation – Composite Division is every year awarding a talented young scientist that has impressed with a project related to composite. This year's winner is the 29 year old Ismet Baran, assistant professor at the University of Twente, NL. He finished his PhD study from DTU Mechanical Engineering in 2014 with the thesis 'Modelling the pultrusion process of off shore wind turbines blades'.

▸▸▸ Wednesday 22 July

	Center Stage
11:20	**3222 Tsai Award 2**
	3222-1 AN INVESTIGATION ON HYBRID INTERFACE USING ON-LINE MONITORING EXPERIMENT AND FINITE ELEMENT ANALYSES Hieu Truong (Texas A&M University), Marcias Martinez (Delft University of Technology), Ozden Ochoa (Texas A&M University), Dimitris Lagoudas (Texas A&M University) A study on room and elevated temperature mode-I fracture toughness of a hybrid interface using double cantilever beam tests, distributed strain sensing with fiber optics and finite element analysis
	3222-2 IS IT POSSIBLE TO ELIMINATE MICRO-SCALE STRESS CONCENTRATIONS IN COMPOSITES BY NANO ENGINEERING WITH CNTS? Valentin Romanov (KU Leuven), Stepan Lomov (KU Leuven), Ignaas Verpoest (KU Leuven), Larissa Gorbatikh (KU Leuven) A spatial distribution of CNTs in fiber-reinforced composites at the micro-scale is investigated to suppress stress concentrations without affecting stresses in the rest of the matrix.
	3222-3 EFFECT OF FUNCTIONALIZATION OF GRAPHENE ON THERMAL CONDUCTIVITIES OF GRAPHENE/EPOXY COMPOSITES Xi Shen (The Hong Kong University of Science and Technology), Zhenyu Wang (The Hong Kong University of Science and Technology), Ying Wu (The Hong Kong University of Science and Technology), Xiuyi Lin (The Hong Kong University of Science and Technology), Xu Liu (The Hong Kong University of Science and Technology), Xinying Sun (The Hong Kong University of Science and Technology), Jang-Kyo Kim (The Hong Kong University of Science and Technology) The effect of functionalization on thermal conductivities of graphene embedded in epoxy and its composites is studied using molecular dynamics simulations.
	3222-4 MECHANICAL PROPERTIES AND MODELING OF DISCONTINUOUS CARBON FIBER REINFORCED THERMOPLASTICS Yi Wan (the University of Tokyo), Toshiro Ohori (the University of Tokyo), Jun Takahashi (the University of Tokyo) Suitability of Mori-Tanaka model on two CFRTPs were certified. Results show dissimilarities in different materials, the reason was considered to be the residual deformation of fiber structures.
14:00	**3322 Workshop on Failure of composites: current status and future directions 1** Organised by: Dr A S Kaddour (QinetiQ*, UK) Prof M J Hinton (HVM Catapult**, UK) Prof P Smith (The University of Surrey, UK) Prof S Li (Nottingham University, UK) Failure of composites is perhaps the biggest single topic towards which the composites community worldwide has been engaged in extensive research initiatives and activities. Arguably, the most notable top level activity is that carried out under the World-Wide Failure Exercises (WWFE), spanning more than 20 years. But, have we reached the endgame, yet? A composite structure could be a single fibre embedded in a matrix, a unit cell, 3D composite, a coupon with hole, a panel with ribs, a vessel, a wing, a blade, a fuselage, an aircraft, a spacecraft etc… The workshop will debate how much more work is needed in order to close (or narrow) any gap between academics/theoreticians and industrial designers/end users for designing a composite structure. The workshop will address missing links in validated design capabilities employed for reliably predicting failure evolution and ultimate strength, all the way up to the structural scale. In order to address the above, this work shop will provide a keynote addressing where we are on failure of composites. This is followed by a series of short presentations, given by invited speakers giving their views on future directions in their own areas they are actively leading. Finally, an open discussion and concluding remarks will be made.
14:00	**3322-1 FAILURE OF COMPOSITE: STATUS AND FUTURE DIRECTION** Mike J. Hinton (High Value Manufacturing Catapult), Sam Kaddour (QinetiQ)

▸▸▸ Wednesday 22 July

	Center Stage
14:40	**Industry needs: Today and over the coming 10 years**
	Problems with interaction between manufacturing and failure Prof A Poursartip (UBC, Canada)
	Limitations of commercial software Ms S Miot (ssanalysis, UK)
	Industry needs for tools Dr M Jevons (Ferchau, Germany)
	Needs for design tools Dr M Stojkovic (NCC,UK)
15:20	COFFEE BREAK
15:40	**3422 Workshop on Failure of composites: current status and future directions 2**
	Which Science works and which does not
	Unresolved issues with prediction of damage/delamination Prof M Wisnom (University of Bristol, UK)
	Current status and future research in micro mechanics Prof S Li (University of Nottingham, UK)
	Future directions in 3D composites Prof S Lomov (K.U. Leuven, Belgium)
16:20	**Testing and Validation**
	Future research structural analysis of composites Prof A Mouritz (RMIT, Australia)
	Future research in structural testing Prof F Paris (Seville university, Spain)
16:35	**Final remarks - Key actions arising**
16:50	**INDUSTRY SESSION - JEC GROUP**
16:50	**Overview and dynamism of the worldwide composites market** Daniel Ageda (Secretary-General - JEC Group)

Posters and mini-orals programme

The poster presentations at the ICCM20 are fully integrated in the scientific programme and consists of both a poster and a mini-oral presentation.

Mini-oral presentation schedule

Tuesday 21 July

	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
9:30	**Mini Oral Session I**	**Mini Oral Session I**	**Mini Oral Session I**	**Mini Oral Session I**	**Mini Oral Session I**
	P101-1 STATISTICAL AND NUMERICAL ANLYSIS OF WEAR TOOL GEOMETRY IN DRILLING CFRP *Norberto Feito (Universidad Carlos III de Madrid), Ana Sánchez Muñoz (Universidad Carlos III de Madrid), Jorge Lopez Puente (Universidad Carlos III de Madrid), Maria Henar Miguelez Garrido (Universidad Carlos III de Madrid)* An experimental and statistical analysis has been carried out in woven CFRPs drilling to study the influence of wear in delamination. A numerical model was also developed to predict surface damage.	**P102-1 RECYCLING THE FIBER REINFORCED POLYMER COMPOSITES: OPTIMUM DECOMPOSITION CONDITIONS AND FIBER FAILURE MECHANISM** *Jian Shi (Akita prefectural university), Limin Bao (Shinshu University)* A recycling system was developed for the treatment of FRP. In this research, FRP was efficiently depolymerized and reinforced fiber was separated from resin by superheated stream.	**P103-1 INTERFACE FEATURES OF THE C/C COMPOSITE DURING ITS FORMING PROCESS WITH A COAL-TAR-PITCH AS THE PRECURSOR OF THE CARBON MATRIX** *Li Tong-Qi (Aerospace Reasearch Institute of Materials & Processing Technology), Feng Zhi-Hai (Aerospace Reasearch Institute of Materials & Processing Technology), Jiao Xing-Jan (Aerospace Reasearch Institute of Materials & Processing Technology), Zhang Zhong-Wei (Aerospace Reasearch Institute of Materials & Processing Technology), Feng Xiang (Aerospace Reasearch Institute of Materials & Processing Technology)* I have uploaded my full paper. We will attend the conference. For the strict time set by our institute, we have no enough time to joint other activities.	**P104-1 HEAT TREATMENT RESPONSES OF PARTICULATE TIC REINFORCED TOOL STEEL COMPOSITES** *S. H. Kim (GIFT-POSTECH), D. W. Suh (GIFT-POSTECH)* Heat treatment responses of a particulate TiC reinforced tool steel matrix composite, which is fabricated by pressure infiltration casting, have been investigated.	**P105-1 MODIFICATION OF EPOXY RESIN AND ITS INFLUENCE ON TENSILE PROPERTIES OF VISCOSE FABRIC COMPOSITES** *Rathish Rajan (Technology Centre Ketek Ltd), Mirva Rahkonen (Technology Centre Ketek Ltd), Mikael Skrifvars (University of Boras), Egidija Rainosalo (Technology Centre Ketek Ltd)* Modification of the epoxy resin with silane coupling agent and assessing the influence of resin modification on the properties of viscose fabric reinforced composite.
	P101-2 THE EFFECT OF POST-WELDING COOLING RATE ON THE STRENGTH OF TCW JOINTS *Zhi Bin Tan (University of Sydney), Liyong Tong (University of Sydney), Luke Djukic (Cooperative Research Centre for Advanced Composite Structures), Rowan Paton (Cooperative Research Centre for Advanced Composite Structures)* TCW technology allows two carbon-epoxy components, manufactured with thermoplastic surfaces to be welded together. This study focuses on the effect of the cooling rate on the strength of the joint.	**P102-2 KINETIC STUDY OF THE HYDROLYSIS OF AN EPOXY RESIN IN HIGH TEMPERATURE AND HIGH PRESSURE WATER** *Gidéon Simenou (Institut de recherche technologique Jules Verne), Eric Le Gal La Salle (l'Institut Catholique des Arts et Métiers de Nantes), Jean Luc Bailleul (Ecole Polytechnique de l'Université de Nantes), Jérôme Bellettre (Ecole Polytechnique de l'Université de Nantes)* This paper presents the findings of an investigation into the kinetic of the hydrolysis of carbon fiber epoxy composites, using high temperature and high pressure water.	**P103-2 EFFECT OF FIBER–POLYMER SOLUBILITY ON INTERFACIAL MECHANICAL PROPERTIES OF CARBON FIBER- REINFORCED BMI COMPOSITES** *Shi fenghui (AVIC composite Co.ltd), Li Jia (AVIC composite Co.ltd), Zhang baoyan (AVIC composite Co.ltd)* The interfacial shear strength (IFSS) of carbon fibers/BMI composites were investigated by micro-droplet test and the correlation of the fiber-matrix solubility parameter with interfacial mechanical p	**P104-2 EFFECTS OF SHORT ALUMINA FIBER REINFORCEMENT ON MACHINABILITY OF ALUMINUM ALLOY** *Kazunori Asano (Kinki University)* Short alumina fiber-reinforced aluminum alloy composites were fabricated by squeeze casting, and the effects of the fiber reinforcement on the turning machinability of the alloy were investigated.	**P105-2 OPTIMIZING THE MANUFACTURE OF BIO-BASED COMPOSITES AND LOW TEMPERATURE CURE POWDER COATING** *Karnika De Silva (University of Auckland), Mark Taylor (University of Auckland), Debes Bhattacharyya (University of Auckland), Sanjeev Rao (University of Auckland), Dawn Smith (Scion), Clemence Dranebois (Scion)* Variability in the surface conductivity, moisture level, porosity & heat distortion at high temp. employed to cure powders coatings on (MDF) boards have led to poor surface finishes.
	P101-3 EVALUATION OF SKIN-CORE EFFECTS IN THICK CFRTP LAMINATES BY EMBEDDED OPTICAL FIBER SENSORS AND MECHANICAL TESTS *Takuhei Tsukada (The University of Tokyo), Kentarou Iwanaga (The University of Tokyo), Shu Minakuchi (The University of Tokyo), Nobuo Takeda (The University of Tokyo)* This study demonstrated that the residual strain/stress distribution in thick CFRTP laminates due to skin-core effects can be evaluated by embedded optical fiber sensors and tensile tests.	**P102-3 INVESTIGATION OF TEXTILE DEFORMATION IN LIQUID COMPOSITE MOLDING PROCESS** *Dong Gi Seong (Korea Institute of Materials Science)* Several types of fiber preform deformation in liquid composite molding were observed and the related forces are measured in order to investigate the mechanism of the deformations	**P103-3 EFFECT OF REINFORCEMENT FIBER CROSS SECTION GEOMETRY ON INTERFACIAL DEBONDING BEHAVIOR OF COMPOSITES** *Tatsuya Yamasaki (Kyushu University), Nobuhide Uda (Kyushu University), Kousei Ono (Kyushu University), Hiroto Nagai (Kyushu University), Yuichi Hirakawa (Kyushu University), Tadashi Nagayasu (Kyushu University)* We found that interfacial debonding process of composite with irregularly-shaped reinforcement is unique. This unique debonding behavior may affect the increase of interfacial properties.	**P104-3 THE CARBON FOAM WITH SKELETON STRUCTURE IN COMPOSITE MATERIALS** *Jerzy Myalski (Silesian University of Technology), Andrzej Posmyk (Silesian University of Technology), Bartosz Hekner (Silesian University of Technology)* The manufacturing process and tribological investigations of composites reinforced by different types of foams (GC, Al203 and Al203+GC) are presented.	**P105-3 TENSILE CHARACTERISTICS OF JUTE ROPE PLAIN FABRIC REINFORCED POLYLACTIC ACID COMPOSITES** *Jieng-Chiang Chen (Vanung University), Chang-Mou Wu (National Taiwan University of Science and Technology), Jia-Sheng Li (Vanung University)* Manufacturing and tensile properties of jute plain fabric reinforced polylactic acid composites were investigated in current study. The composites have good tensile strength and energy absorption.
	P101-4 ASSESSMENT OF RESIDUAL STRESSES IN THICK-WALLED GFRP SLIDING BEARING AFTER WINDING AND CURING *Alexander Bezmelnitsyn (South Ural State University), Sergei Sapozhnikov (South Ural State University)* The structure of the woven GFRP ring was modelled by using impregnated unidirectional threads and repeated unit cell. Mechanical and thermal properties (micro-, macro- and meso-scale) were calculated	**P102-4 DIELECTRIC CURE MONITORING OF A FAST CURING RESIN SYSTEM** *Ffion A Martin (University of Nottingham), Anastasia F Koutsomitopoulou (University of Bristol), Ivana K Partridge (University of Bristol), Alex A Skordos (Cranfield University)* Study of a new three part epoxy system for use in short cycle time RTM processes. Following the establishment of a cure kinetics model, the potential of dielectric cure monitoring mould was explored.	**P103-4 STUDY OF THE INTERPHASE IN EPOXY/BASALT FIBRE COMPOSITES BY DYNAMIC MECHANICAL ANALYSIS** *Joana Ibarretxe (LEARTIKER), Ricardo Hernandez (LEARTIKER), Alex Arrillaga (LEARTIKER), Faustino Mujika (University of the Basque Country)* The viscoelastic properties of modified unidirectional epoxy basalt fibre composites were investigated. The sensitivity and applicability of cooperativity to the interphase analysis was proved.	**P104-4 THE EFFECTS OF MASTER SINTERING CURVE ON THE MICROSTRUCTURAL EVOLUTION AND MAGNETIC PROPERTIES OF NICUZN FERRITES** *Chenxin Ouyang (Harbin Institute of Technology), Shumin Xiao (Harbin Institute of Technology), Jianhua Zhu (Shenzhen Zhenhuafu Electronics Co.), Peng Zhou (Harbin Institute of Technology), Hai Wang (Shenzhen Zhenhuafu Electronics Co.)* This work reports our recent work on the fabrication of NiCuZn ferrites, with the particular interests on how the pre-sintering affect the microstructural evolution and magnetic properties.	**P105-4 AN ANALYTICAL MODEL FOR PREDICTING THE TENSION MODULUS AND POISSON'S RATIO OF SATIN WEAVE COMPOSITES** *Tianya Bian (Beijing University of Aeronautics and Astronautics), Zhidong Guan (Beijing University of Aeronautics and Astronautics), Junwu Mu (Beijing University of Aeronautics and Astronautics), Zhaojie Ji (Beijing University of Aeronautics and Astronautics), Geng Han (Beijing University of Aeronautics and Astronautics)* The article established an analytical model to make an accurate prediction for the tension modulus and Poisson's ratio based on energy method and improving rule of mixtures formulations.

Tuesday 21 July

	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
9:30	**Mini Oral Session I**	**Mini Oral Session I**	**Mini Oral Session I**	**Mini Oral Session I**	**Mini Oral Session I**
	P101-5 ACCEPTANCE TESTING OF TUNGSTEN-CFRP LAMINATE INTERFACES FOR SATELLITE ENCLOSURES *Mikko Kanerva (Aalto University), Jarno Jokinen (Aalto University), Paulo Antunes (University of Aveiro), Markus Wallin (Aalto University), Timo Brander (Aalto University), Olli Saarela (Aalto University)* This is a study about experimental 3-point bend testing of W-CFRP laminate specimens and FE simulations of the interfacial failure propagation during these tests.	**P102-5 A PRELIMINARY EVALUATION OF THE HIGH INJECTION PRESSURE RESIN TRANSFER MOULDING PROCESS** *Masoud Bodaghi (Engineering Design and Advanced Manufacturing-MIT Portugal Programme-Faculty of Engineering-University of Porto-Porto), Nuno Correia (Instituto de Engenharia Mecânica e Gestão Industrial-Campus da FEUP)* Void size distribution in composites produced by high injection resin transfer moulding was addressed.For no gap the HIPRTM delivers the composite part with the lowest frequency of void size of c.4 %.	**P103-5 FRIABILITY, THERMAL STABILITY, AND EFFECT OF HYGROTHERMAL AGING ON THE MECHANICAL PROPERTIES OF LIGNIN- AND WOOD-REINFORCED PHENOLIC FOAMS** *Juan Carlos Domínguez (Complutense University of Madrid), María Virginia Alonso (Complutense University of Madrid), Mercedes Oliet (Complutense University of Madrid), Belén del Saz-Orozco (Complutense University of Madrid), Francisco Rodriguez (Complutense University of Madrid)* Study of the influence of lignin nanoparticle and wood flour reinforcements on the final properties of a phenolic foam and the effect of hygrothermal aging on their compressive mechanical properties	**P104-5 IMPROVEMENT OF PARTICLE-REINFORCED COMPOSITES BY METAL FORMING AIDED BY CYCLIC SHEAR STRESS** *Jerzy Myalski (Silesian University of Technology), Franciszek Grosman (Silesian University of Technology), Bartosz Hekner (Silesian Univesity of Technology), Marek Tkocz (Silesian Universit of Technology)* The paper presents a method for altering the microstructure of cast composites reinforced with particles, which consists in compression aided by shear stress caused by transverse motion of a punch.	**P105-5 NON-CONVENTIONAL GLASS FIBER NCF COMPOSITES WITH THERMOSET AND THERMOPLASTIC MATRICES** *Thierry Lorriot (Institute of Mechanics and Engineering (I2M)), Jalal El Yagoubi (Institute of Mechanics and Engineering (I2M)), Julie Fourel (Chomarat Textiles Industries), Franck Tison (Plateforme CANOE)* We propose in this paper a preliminary experimental study on the mechanical behavior of glass NCF composites with shallow angled plies. We considered a thermoset matrix and a thermoplastic one.
	P101-6 ANALYSIS AND EVALUATION OF MECHANICAL PROPERTIES USING AUTOCLAVE MOLDING METHOD *Toshikazu Uchida (Kyoto Institute of Technology), Junpei Ochiai (UCHIDA Co.), Defang ZHAO (Donghua University), Yuqiu Yang (Donghua University), Tadashi Uozumi (Gifu University), Hiroyuki Hamada (Kyoto Institute of Technology), Koji Kuroda (Kyoto Institute of Technology), Atsushi Endo (Kyoto Institute of Technology), Akihiko Goto (Osaka Sangyo University)* This paper discusses how differences in the hand lay-up work process and workers' skill level influence the mechanical performance of molded products by process analysis and dynamic characteristics.	**P102-6 CARBON FIBER/PHTHALONITIRLE RESIN COMPOSITES WITH HIGH TEMPERATURE RESISTANT AND EXCELLENT RTM PROCESSABILITY** *Bao-Gang Sun (Aerospace Research Institute of Materials & Processing Technology), Han-Qiao Shi (Aerospace Research Institute of Materials & Processing Technology), Zhi-Yong Yang (Aerospace Research Institute of Materials & Processing Technology), Qian Liu (Aerospace Research Institute of Materials & Processing Technology), Yi Zhang (Aerospace Research Institute of Materials & Processing Technology)* Carbon fiber/phthalonitrile resin composites were prepared by RTM process. Their RTM processability, high-temperature resistant, mechanical properties and micromorphology were studied.	**P103-6 RIGID AROMATIC HETEROCYCLIC POLYMER FOAMS FOR HIGH TEMPERATURE APPLICATIONS** *Ming Liu (Nanyang Technological University), Liying Zhang (Nanyang Technological University), Xiao Hu (Nanyang Technological Univeristy)* The work present the development and characterization of rigid closed-cell foam based on an aromatic heterocyclic thermoset resins for high temperature applications.	**P104-6 TECHNOLOGICAL ASPECTS OF OBTAINING ALMMC - THE MODIFICATION OF ALSI MATRIX ALLOY** *Maciej Dyzia (Silesian University of Technology), Anna J. Dolata (Silesian University of Technology)* In the technological process based on the stir-casting appropriate preparation of matrix alloy is decisive importance for the permanent connection between the ceramic particles and the liquid matrix	**P105-6 APPLICATION OF HIGH IMPREGNATION CHARACTERIZATION OF A CYCLIC BUTYLENE TEREPHTHALATE OLIGOMER RESIN FOR ELECTRICALLY AND THERMALLY CONDUCTIVE COMPOSITES SIMULTANEOUSLY REINFORCED WITH CONTINUOUS FIBER AND NANOCARBON FILLERS** *Seong Yun Kim (Korea Institute of Sicence and Technology (KIST)), Ye Ji Noh (Korea Institute of Sicence and Technology (KIST))* Applications of high impregnation characterization of the polymerizable, low-viscosity CBT oligomer resin to continuous carbon fiber fabric and carbon nanotube mat composites are investigated
	P101-7 DETERMINATION OF ISOTROPY OF THE C/PPS SAMPLES MANUFACTURED FROM PELLETS *Zdenek Padovec (Czech Technical University in Prague-Faculty of Mechanical Engineering), Hynek Chlup (Czech Technical University in Prague-Faculty of Mechanical Engineering), Radek Sedlacek (Czech Technical University in Prague-Faculty of Mechanical Engineering), Michal Kral (Czech Technical University in Prague-Faculty of Mechanical Engineering), Milan Ruzicka (Czech Technical University in Prague-Faculty of Mechanical Engineering), Pavel Ruzicka (Czech Technical University in Prague-Faculty of Mechanical Engineering)* Presented work deals with isotropy determination of flat plate manufactured from randomly oriented C/PPS pellets with image processing methods, analytical and numerical calculation and experiment.	**P102-7 PROPERTIES OF ULTRA-CRYOGENIC EPOXY RESIN MATRIX COMPOSITES BY RTM PROCESS** *Han-Qiao Shi (Aerospace Research Institute of Materials & Processing Technology), Bao-Gang Sun (Aerospace Research Institute of Materials & Processing Technology), Qian Liu (Aerospace Research Institute of Materials & Processing Technology), Zhi-Yong Yang (Aerospace Research Institute of Materials & Processing Technology), Yi Zhang (Aerospace Research Institute of Materials & Processing Technology)* Epoxy composites with with excellent cryogenic mechanical properties and RTM processability were developed.The effects of temperature and cryogenic-cycles on mechanical properties were revealed.	**P103-7 MECHANICAL PROPERTIES OF POLYURETHANE CELLULAR FOAM FROM PALM CANOPY POWDER** *Anin Memon (Rajamangala University of technology thunyabury), Sirichai Torsakul (Rajamangala University of technology thunyabury), Varunee Premanond (King Mongkut's University of Technology Thonburi), Anucha Watanapa (King Mongkut's University of Technology Thonbuuri), Amnoiy Ruengwaree (Rajamangala University of Technology Thunyaburi)* Polyurethane cellular foam mixed palm canopy powder were fabricated with sized 350 mm x 350 mm x 100 mm (W x L x H), and were used as heat insulator. Palm canopy powder of three various sizes: 100 mes	**P104-7 THE INFLUENCE OF MODIFIER ELEMENTS ON THE MICROSTRUCTURE OF ALSI ALLOY DESTINED FOR MATRIX OF COMPOSITES WITH SIC AND C PARTICLES** *Anna Janina Dolata (Silesian University of Technology), Maciej Dyzia (Silesian University of Technology)* In presented work the influence of modifier elements such as Ti, B, Sr and Mg on microstructure of AlSi7Mg alloy designed as matrix of composites reinforced by SiC and Cg particles were presented.	**P105-7 PAPERMAKING PILOT TRIALS WITH A NEW SILICA COATED PCC FILLER** *Ana Lourenço (University of Coimbra), Rogério Simões (University of Beira Interior), Ana P. Costa (University of Beira Interior), José Gamelas (University of Coimbra), Paulo Ferreira (University of Coimbra)* The present work enabled to confirm, at pilot scale, the results obtained at laboratorial scale regarding the potential of silica-coated PCC filler to be used in papermaking.
	P101-8 »MULTI-MATERIAL-HEAD« ONE TOOL FOR 3 TECHNOLOGIES: LASER-ASSISTED THERMOPLAST-TAPE PLACEMENT, THERMOSET-PREPREG-PLACEMENT AND DRY-FIBER-PLACEMENT *Michael Emonts (Fraunhofer Institute for Production Technology IPT)* The all-in-one »Multi Material Head« is a flexible fiber-placement system and allows to process thermoplastic tape, thermoset prepreg and spread dry-fiber rovings covered with a binder within one tool	**P102-8 NUMERICAL SIMULATION OF TRI-BODY COMPOSITES BOAT BY VARTM INTEGRAL PROCESS** *Xiao Tang (Harbin Engineering University), Chai Jun (Harbin Engineering University), Lili Tong (Harbin Engineering University)* With the development of science and technology, variety of composite manufacturing processes emerged as the times required. The vacuum assisted resin transfer molding (VARTM) process is now used exten	**P103-8 A BIOBASED AND MOISTURE-STABLE HONEYCOMB STRUCTURE OF HIGH SHEAR STIFFNESS AND LOW DENSITY** *Lars Berglund (KTH Royal Inst of Technology), Qiliang Fu (KTH Royal Inst of Technology)* In the current study, we have used sodium chlorite and sodium hydroxide as extraction solutions, to remove lignin and hemicelluloses from the Balsa (Ochroma Lagopus) wood tissues.		**P105-8 INFLUENCE OF GLASS FILLERS ON PROPERTIES OF SHORT CARBON FIBER REINFORCED THERMOPLASTIC COMPOSITES** *Izabella Rashkovan (UVICOM Co.Ltd), Ol'ga Kulachinskaya (Polyplastic Co.), Mark Kazakov (UVICOM Co.Ltd)* Improving of physical-mechanical properties of 15% short carbon fiber reinforced polyamide-6 as a result of hybridization with glass fillers have been studied.

Tuesday 21 July

	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
9:30	**Mini Oral Session I**	**Mini Oral Session I**	**Mini Oral Session I**	**Mini Oral Session I**	**Mini Oral Session I**
	P101-9 ONLINE PROCESS MONITORING AND CONTROL BY DIELECTRIC AND PRESSURE SENSORS FOR A COMPOSITE MAIN SPAR FOR WIND TURBINE BLADES *Arne Breede (Faserinstitut Bremen e.V.), Maryam Kahali Moghaddam (Institut für Mikrosensoren--aktoren und -systeme), Christian Brauner (Faserinstitut Bremen e.V.), Walter Lang (Institut für Mikrosensoren--aktoren und -systeme), Axel S. Herrmann (Universität Bremen)* This study presents a monitoring method to determine viscosity and permeability for a composite main spar infusion process. Sensor data is fed into a 2D flow simulation to derive real process values.	**P102-9 ANALYSIS OF MECHANICAL PROPERTY IN VARTM-MANUFACTURED CARBON FIBRE REINFORCED COMPOSITE MATERIALS** *Yasunari Kuratani (Kyoto Institute of Technology), Kentaro Hase (KADO Corporation), Takahiro Hosomi (KADO Corporation), Tomoe Kawazu (KADO Corporation), Tadashi Uozumi (Gifu University), Akihiko Goto (Osaka Sangyo University)* VaRTM requires a preform to be manufactured before molding however, the majority works are manufactured by hand. So we focus on the accuracy of these preforms lies in the ability of the performers and	**P103-9 PROCESSING, MICROSTRUCTURE AND PROPERTIES OF CARBON NANOTUBES REINFORCED MG MATRIX COMPOSITES** *Xiaojun Wang (Harbin Institute of Technology), Xiaoshi Hu (Harbin Institute of Technology), Kun Wu (Harbin Institute of Technology), Yanqiu Wang (Harbin Engineering University), Xutang Zhang (Harbin Institute of Technology)*	**P104-9 EFFECTIVE THERMAL CONDUCTIVITY OF ALUMINUM MATRIX COMPOSITES WITH CONSIDERING INTERFACIAL THERMAL RESISTANCE** *Kenjiro Sugio (Institute of Engineering-Hiroshima Univ.), Rio Yamada (Institute of Engineering-Hiroshima Univ.), Gen Sasaki (Institute of Engineering-Hiroshima Univ.)* We developed new simulation code which can calculate the effective thermal conductivity of composites with considering the interfacial thermal resistance.	**P105-9 EVALUATION OF FIBER MATRIX INTERFACIAL STRENGTH FOR CNT GRAFTED CF/PA6 AT HIGH TEMPERATURE** *Kazuto Tanaka (Doshisha University), Genta Maeda (Doshisha University), Yusuke Morita (Doshisha University), Tsutao Katayama (Doshisha University)* Carbon nanotubes were grafted on the surface of carbon fibers. The influence of high temperature on the interfacial properties of CF/PA6 was revealed by single fiber pull-out tests.
	P101-10 INFLUENCE OF PREHEATING CONDITIONS ON THE DEGRADATION OF CARBON FIBER REINFORCED POLYPROPYLENE *Hao Piao (The University of Tokyo), Wataru Nagatsuka (The University of Tokyo), Hooseok Lee (The University of Tokyo), Isamu Ohsawa (The University of Tokyo), Jun Takahashi (The University of Tokyo)* This study investigate the Influence of heat aging on mechanical properties of MAPP. Regardless of both additional amount of maleic acid and heating time, the MAPP becomes brittler by heat exposure.	**P102-10 EFFECT OF SURFACE COATING ON THE CHARACTERIZATION OF THE PROCESS DYNAMICAL BEHAVIOUR DURING MOLD FILLING IN LIQUID RESIN INFUSION** *Victor García (University CEU Cardenal Herrera), Enrique Cortes (Aerox Advanced Polymers), Luis Domenech (University CEU Cardenal Herrera), Fernando Sanchez (University CEU Cardenal Herrera), Francisco Chinesta (Ecole Central de Nantes)* A mixed numerical/experimental technique based on artificial vision is used for estimating the induced effect of the surface coating curing in the laminate impregnation during filling.	**P103-10 STRONG AND DUCTILE NANOLAMINATED COMPOSITES FABRICATED BY FLAKE POWDER METALLURGY** *Zhiqiang Li (Shanghai Jiao Tong University), Genlian Fan (Shanghai Jiao Tong University), Zhanqiu Tan (Shanghai Jiao Tong University), Zhen Qin (Shanghai Jiao Tong University), Di Zhang (Shanghai Jiao Tong University)* A bio-inspired architecture design and flake powder metallurgy technique route was explored to coordinate the strength-ductility dilemma for CNT/Al composites	**P104-10 MECHANICAL HYSTERESIS BEHAVIOR OF FIBER-REINFORCED CERAMIC-MATRIX COMPOSITES AT ROOM AND ELEVATED TEMPERATURES** *Longbiao Li (Nanjing University of Aeronautics and Astronautics)*	**P105-10 MECHANICAL PROPERTIES OF CNT/CARBON FIBER/EPOXY HIERARCHICAL COMPOSITES PREPARED USING ELECTROPHORETICAL DEPOSITION** *Shinn-Shyong Tzeng (Tatung University), Ding-Hwa Cherng (Tatung University)* CNT/carbon fiber fabric/epoxy three-phase hierarchical composites were fabricated using electrophoretic deposition and the mechanical properties of the three-phase composites were investigated.
	P101-11 PREPARATION AND CHARACTERIZATION OF THE PVDF/LDPE THERMOPLASTIC COMPOSITE *Seung Goo Lee (Chungnam National University), Jong Sung Won (Chungnam National University)* In this study, polyvinylidene fluoride(PVDF) fiber reinforced low density polyethylene(LDPE) composites were manufactured by a hot pressing method using “conjugate spun fibers”.	**P102-11 THROUGH THICKNESS COMPACTION RESPONSE OF 3D WOVEN REINFORCEMENTS** *Rehan Umer (Khalifa University), Hussam Alhussein (Khalifa University), Sanjeev Rao (Khalifa University), Wesley Cantwell (Khalifa University)* This paper presents compaction characterization of 3D fabrics for LCM process. The data presented paves the ground for robust LCM processes in both simulation and real life.	**P103-11 ENHANCED LOAD TRANSFER IN CARBON NANOTUBES-REINFORCED ALUMINUM** *Jong Gil Park (Institute for Basic Science), Dong Hoon Keum (Sungkyunkwan Univ.), Young Hee Lee (Institute for Basic Science)* We report the fabrication method of CNTs-reinforced Al by castable process. The yield strength of Al-CNT composite is improved by 60%. The strengthening can be explained from load transfer mechanism.	**P104-11 SHEAR AND BENDING PROPERTIES OF CERAMIC FIBER REINFORCED SILICA AEROGEL MATRIX COMPOSITES** *Shuangqi Lv (Beihang University), Duoqi Shi (Beihang University), Xiaoguang Yang (Beihang University), Jian Feng (National University of Defense Technology), Yantao Sun (Beihang University)* Shear and bending properties of fiber reinforced aerogel composites were investigated experimentally to obtain the anisotropic mechanical behaviors and different failure modes.	**P105-11 EFFECT OF NANO ZNO ON THE PROPERTIES OF PP/ZNO COMPOSITE YARNS** *Samiha Gawish (National Reserach center), Amira Ramadan (National Reserach center)* SUMMARY:The objective of this study is the modification of PP with nano ZnO at a loading of 1,2 and 3% and determination of the influence of the additive on the thermal and mechanical properties
	P101-12 ATMOSPHERIC PRESSURE PLASMA SURFACE TREATMENT OF THERMOPLASTIC COMPOSITES FOR BONDED JOINTS *Clara Palleiro Palmou (AIMEN Technology Centre), Sergey Stepanov (Fraunhofer Institute for Manufacturing Technology and Advanced Materials IFAM), Elena Rodriguez-Senín (AIMEN Technology Centre), Ralph Wilken (Fraunhofer Institute for Manufacturing Technology and Advanced Materials IFAM), Jörg Ihde (Fraunhofer Institute for Manufacturing Technology and Advanced Materials IFAM)* Polypropylene matrix composites were treated by atmospheric pressure plasma, in order to improve their adhesive properties. The influence of the most significant operational parameters were studied	**P102-12 IN-PLANE AND THROUGH-THICKNESS PERMEABILITY CHARACTERIZATION OF 3D WOVEN REINFORCEMENTS** *Hussam Alhussein (Khalifa University), Rehan Umer (Khalifa University), Sanjeev Rao (Khalifa University), Wesley Cantwell (Khalifa University)* Permeability of three different 3D woven carbon fiber reinforcements were studied. For all reinforcements, unsaturated radial in-plane, and saturated through thickness were obtained at different Vfs	**P103-12 DEFINITION AND MANUFACTURING OF CARBON FIBER REINFORCED ALUMINUM FOR EMBEDDED ELECTRONIC PACKAGINGS** *Christophe Perron (Univ. Bordeaux), Corinne ARVIEU (Univ. Bordeaux), Eric LACOSTE (Univ. Bordeaux)* Pitch based carbon fibres reinforced aluminium is investigated for heat sink performance. Numerical simulations were led to evaluate its viability and processing routes were reviewed.	**P104-12 CATALYTIC PROPERTY OF ZIRCONIUM DIBORIDE-SILICON CARBIDE CERAMIC COMPOSITES** *Qingxuan Zeng (Harbin Institute of Technology), Hua Jin (Harbin Institute of Technology), Songhe Meng (Harbin Institute of Technology), Jiahong Niu (Harbin Institute of Technology), Fajun Yi (Harbin Institute of Technology)*	**P105-12 PREPARATION AND UV-AGEING RESISTANCE PROPERTIES OF POLY(P-PHENYLENE BENZOBISOXAZOLE)/NANO-TIO2 NANOCOMPOSITE FIBERS** *Byung Gil Min (Kumoh National Institute of Technology), Qingwei Wang (Kumoh National Institute of Technology), Kwan Han Yoon (Kumoh National Institute of Technology), Sang Cheol Lee (Kumoh National Institute of Technology)* Nanocomposite fibers of poly(p-phenylene benzobisoxazole) and nano-titania were prepared through dry-jet wet spinning for improving UV-ageing resistance.

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9:30	**Mini Oral Session I**	**Mini Oral Session I**	**Mini Oral Session I**	**Mini Oral Session I**	**Mini Oral Session I**
	P101-13 INTRINSIC JOINING OF INCOMPATIBLE FIBER-REINFORCED PLASTICS BY PHOTONICS *Michael Emonts (AZL of RWTH Aachen University), Kai Fischer (AZL of RWTH Aachen University), Stefan Schmitt (AZL of RWTH Aachen University), Richard Schares (AZL of RWTH Aachen University)* The process chain to combine thermoset and thermoplastic FRP has been proven by the use of a pulsed laser with continuous carbon fiber-reinforced epoxies and a short glass fiber-reinforced PA6.	**P102-13 RESIDUAL STRESS MEASUREMENT OF CFRP BY X-RAY DIFFRACTION** *Taisei Doi (Advanced Course Student of Kobe City College of Technology), Masayuki Nishida (Kobe City College of Technology), Junichi Ozaki (Kobe City College of Technology)* We try the next step to measure the residual stress in carbon fiber by x-ray stress measurement.The residual stress of CFRP have the possibility to measure by the x-ray stress measurement.	**P103-13 IN-SITU FABRICATION AND REFINEMENT OF AL-MATRIX COMPOSITES REINFORCED JOINTLY BY TIB2 AND MG2SI PARTICLES** *Shusen Wu (Huazhong University of Science and Technology), Qi Gao (Huazhong University of Science and Technology), Xuecheng Duan (Huazhong University of Science and Technology), Ping An (Huazhong University of Science and Technology), Shulin LÜ (Huazhong University of Science and Technology)* In-situ (TiB2+Mg2Si)/Al composites with higher particle volume fraction, about 15%, were fabricated successfully. Mechanical properties of the composites are improved.	**P104-13 OXIDATION BEHAVIOR OF CARBON/CARBON COMPOSITES WITH A NOVEL REUSABLE SIC–SIO2 OXIDATION PROTECTION SYSTEM** *Xingjian Jiao (Aerospace Research Institute of Materials & Processing Technology), Tongqi Li (Aerospace Research Institute of Materials & Processing Technology)* A low-cost SiC-borosilicate glass coating was prepared on C/C composites. The coating showed self-sealing performance and excellent anti-oxidation behavior in the temperature from 900 to 1500 .	**P105-13 GRAPHITE NANOSHEET 3-D NETWORKS FOR POLYMER COMPOSITES CAPABLE OF ENHANCED HEAT TRANSPORT** *Sang-Soo Lee (Korea Institute of Science and Technology), Sung Gook Jin (Korea Institute of Science and Technology)* Construction of carbon-based three-dimensional networks is an effective strategy for practical applications including thermal management materials, and we have developed a novel method for that matter
	P101-14 EVOLUTION BEHAVIOR OF TIB WHISKER DURING LASER WELDING IN-SITU SYNTHESIZED TIB/TI COMPOSITES *Mao Jianwei (State Key Laboratory of Metal Matrix Composites-Shanghai Jiaotong University), Chen Liangyu (State Key Laboratory of Metal Matrix Composites-Shanghai JiaoTong University), Wang Liqiang (State Key Laboratory of Metal Matrix Composites-Shanghai JiaoTong University), Lu Weijie (State Key Laboratory of Metal Matrix Composites-Shanghai Jiaotong University)* In-situ titanium matrix (TMCs) is a promsing and advanced structural materials, and how to solve the critical technology problem of their weldability are necessary for their engineering applications.	**P102-14 EXAMINATION OF THE CHEMICAL MECHANISMS DURING THERMAL TREATMENT OF CARBON FIBER PAN PRECURSORS** *Nino Haase (University of Augsburg), Robert Horny (University of Augsburg), Jonas Schmitz (University of Augsburg), Siegfried Horn (University of Augsburg), Klaus Ruhland (University of Augsburg)* PAN-homopolymers (partially deuterated) and corresponding oligomers were synthesized and their thermal behaviours were examined to further understand the stabilization mechanisms during CF-production.	**P103-14 MAGNESIUM ALLOY ELEKTRON21 REINFORCED WITH ALN: PROCESSING, MICROSTRUCTURE AND COMPRESSION CREEP RESPONSE** *Lydia Katsarou (Helmholtz-Zentrum Geesthacht), Maher Mounib (Université de Rouen), Williams Lefebvre (Université de Rouen), Hajo Dieringa (Helmholtz-Zentrum Geesthacht)* Magnesium alloy Elektron21 reinforced with nano-AlN was examined by metallography, electron microscopy, hardness, compression creep and mechanical compression strength methods within EC-project ExoMet	**P104-14 EVALUATION OF OXIDATION BEHAVIOR OF UHTC COMPOSITE MATERIALS** *Mamoru Yano (Tokyo Univercity of Science), Yuki Kubota (Tokyo Univercity of Science), Hiroki Tanaka (Tokyo Univercity of Science), Yasuo Kogo (Tokyo Univercity of Science), Ken Goto (Institute of Space and Astronautical Science)* Oxidation behavior of C/ZrB2-SiC-ZrC under dynamic heating condition at 1800°C was investigated. The composite showed better recession and oxidation resistance with the optimized composition.	**P105-14 INVESTIGATING INTERFACIAL THERMAL CONDUCTANCE OF GRAPHENE/EPOXY NANOCOMOPOSITES** *Jia-Lin Tsai (National Chiao Tung University), Tai-Yuan Wang (National Chiao Tung University), Hsiu-Yu Lee (National Chiao Tung University)* The functionalization of graphene on interfacial thermal conductance (ITC) of graphene/epoxy nanocomposites was investigated using non-equilibrium molecular dynamics (NEMD) simulation.
	P101-15 FORM-ADAPTIVE GRIPPING SYSTEM FOR LIGHT-WEIGHT PRODUCTIONS *Christian Brecher (Fraunhofer Institute for Production Technology IPT), Michael Emonts (Fraunhofer Institute for Production Technology IPT), Christian Kukla (Fraunhofer Institute for Production Technology IPT), Richard Schares (Fraunhofer Institute for Production Technology IPT)* Form-adaptive and area-selective electrostatic gripping technology. Automated handling and draping of non-rigid, air-permeable, sensitive technical textiles (e.g. carbon, glass or aramid fibres).	**P102-15 HIGH-TEMPERATURE CREEP BEHAVIOR OF ALUMINA/YAG/ZIRCONIA COMPOSITES** *Fredy A. HUAMAN-MAMANI (Universidad de Sevilla), Manuel JIMENEZ-MELENDO (Universidad de Sevilla)* Study of the fabrication, microstructure and creep properties of a three-phase alumina-yttrium aluminum garnet-zirconia composite with the ternary eutectic composition.	**P103-15 MICROSTRUCTURE AND PROPERTIES OF TIBCN–TC4 COMPOSITES PREPARED BY LASER MELTING** *Jiandong Hu (Jilin University)* TiBCN powder , possessing NaCl-type fcc structure , synthesized by boronizing of Ti , was firstly used as additives to make TiBCN–Ti–6Al–4V/TC4 base composites on TiC4by laser cladding. The TiBCN pow	**P104-15 EXPERIMENTAL STUDY ON ULTRASONIC ASSISTED GRINDING OF C/SIC COMPOSITES** *Yucan Fu (Nanjing university of Aeronautics and Astronautics)* Ultrasonic assisted grinding and conventional grinding tests of C/SiC composites were conducted. The machining quality, grinding force, grinding force ration and specific grinding energy were studied	**P105-15 BROADBAND DIELECTRIC SPECTRA AND MICROWAVE ABSORBING / SHIELDING EFFICIENCY OF DIELECTRIC-CONDUCTOR NANOCOMPOSITES** *Viktor Bovtun (Institute of Physics-Academy of Sciences of the Czech Republic), Alexandra Borisova (NTUU "Kiev Polytechnic Institute"), Martin Kempa (Institute of Physics-Academy of Sciences of the Czech Republic), Aleksander Machulyansky (NTUU "Kiev Polytechnic Institute"), Dmitry Nuzhnyy (Institute of Physics-Academy of Sciences of the Czech Republic), Maxim Savinov (Institute of Physics-Academy of Sciences of the Czech Republic), Jan Petzelt (Institute of Physics-Academy of Sciences of the Czech Republic), Yuriy Yakymenko (NTUU "Kiev Polytechnic Institute")* Microwave shielding and absorption efficiency of some polymer-based dielectric-conductor nanocomposites is simulated on the base of their experimentally studied broadband dielectric spectra.
	P101-16 ASSESSEMENT OF DIFFERENT TECHNIQUES FOR ADDING THERMOPLASTIC MATRIXMATERIAL IN THE REINFORCEMENT STRUCTURES *Joris Degrieck (Ghent University), Ruben Geerinck (Ghent university), Ives De Baere (Ghent university), Geert De Clercq (Ghent University), Jan Ivens (KU Leuven)*	**P102-16 FUNCTIONAL UV COATING COMPOSITION FOR STEEL COATING** *Hye-Jn Yoo (POSCO)* Modified urushiols were successfully synthesized and their properties of films were investigated. modified urushiol films showed better inhibitory results on the growth of bacteria than pristine film.	**P103-16 DISCUSSION OF THE EVOLUTION OF MICRO CRACKS BY CHARACTERIZATION AND MODELING OF METAL MATRIX COMPOSITES REINFORCED BY METALLIC GLASS PARTICLES** *Kay André Weidenmann (Karlsruhe Institute of Technology), Klaudia Lichtenberg (Karlsruhe Institute of Technology), Katrin Schulz (Karlsruhe Institute of Technology)* Innovative metallic glass particle reinforced MMCs produced by gas pressure infiltration were numerically and experimentally investigated regarding dislocationbased deformation and crack evolution.	**P104-16 GAMA RADIATION EFFECT ON THERMOGRAVIMETRIC PROPERTIES AND INFRARED SPECTROSCOPY OF SISAL FIBERS / POLYURETHANE DERIVED FROM CASTOR OIL COMPOSITES WITHOUT COUPLING AGENTS** *Marina Vasco (Technological Federal University of Paraná), Juliana Cortez (Technological Federal University of Paraná), Paulo Bittencourt (Technological Federal University of Paraná), Salvador Claro Neto (University of São Paulo), Elaine Azevedo (Technological Federal University of Paraná)* Thermogravimetric and infrared spectroscopy were used to analyze composites of dispersed and woven sisal fibers and polyurethane derived from castor oil before and after gamma irradiation.	**P105-16 ELECTRICAL AND MECHANICAL PROPERTIES OF CARBON AEROGELS / PHENOLIC RESIN FOR NANOCOMPOSITES** *Wei Jen Chen (National Tsing Hua University), Yi Luen Li (National Tsing Hua University), Chin-lung Chiang (Hung Kuang University), Ming Chuen Yip (National Tsing Hua University), CHEN-CHI M. Ma (National Tsing Hua University), Ming Yuan Shen (China University of Science and Technology)* In this study carbon aerogels and phenolic resin were used to prepare nano polymer resin. Polyethylene oxide (PEO) was used as the modifying agent for resin, to improve it mechanical properties.

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	P101-17 INVESTIGATION ON THE MECHANICAL ROBUSTNESS OF CFRP MOLDS *Philipp Kammerhofer (Institute for Carbon Composites), Swen Zaremba (Institute for Carbon Composites), Klaus Drechsler (Institute for Carbon Composites)* Wihtin this investigation the failure of composite edges due to a static load has been observed. Therefore a test has been developed that determines a quasi-static strength of edges.	**P102-17 SELF PROPAGATING HIGH TEMPERATURE SYNTHESIS OF TIB2-AL2O3 AND CRB2- AL2O3 PREPARATION OF TIB2-AL2O3 AND CRB2- AL2O3 COMPOSITES WITH A BROAD RANGE OF PHASE COMPOSITION WAS CONDUCTED BY SELF-PROPAGATING HIGH-TEMPERATURE SYNTHESIS (SHS).** *Danara Raimkhanova (Institute of Combustion Problems), Roza Abdulkarimova (Institute of Combustion Problems), Zulkhair Mansurov (Institute of Combustion Problems)* In this study, the SHS processes were conducted to prepare TiB2- Al2O3 and CrB2-Al2O3 composites. Composition and structure of synthesis products in the system B2O3-Cr2O3 and A1 were investigated.	**P103-17 A COMPOSITE BASED ON 7475 ALLOY REINFORCED WITH PARTICLES OF AL3TI** *Wojciech Szymański (Institute of Non-Ferrous Metals)* Beneficial effect of the semi-solid composite extrusion was most evidently manifested in the increased hardness and yield strength of this material when processed by extrusion.	**P104-17 THERMAL DEGRADATION PROPERTIES OF RHDPE/EVA/EGGSHELL POWDER COMPOSITES: EFFECTS OF FILLER LOADING AND PVC-MA COUPLING AGENT** *Nur Farahana Ramli (Universiti Malaysia Perlis (UniMAP)), Supri A. Ghani (Universiti Malaysia Perlis (UniMAP)), Teh Pei Leng (Universiti Malaysia Perlis (UniMAP))* This paper focuses on the effect of PVC-MA as a coupling agent on the thermal properties of the rHDPE/EVA/ESP composites using thermogravimetric (TGA) and differential scanning analysis (DSC).	**P105-17 METAL NANOWIRES SELF-ASSEMBLY BY DIELECTROPHORETIC** *Ching-Chang Lin (National Chiao Tung University), Wen-Hsien Sun (industrial technology Research Institute), Ya-Lin Lin (National Chiao Tung University), Fu-Hsiang Ko (National Chiao Tung University)* In this research,we use dielectrophoresis to make a spaced alignment of metal nanowires which will increase the reflection of substrate and result in negative effect on optical properties.
	P101-18 CONTINUOUS PROCESSING AND QUALITY INSPECTION OF WOVEN PREPREGS *Jens Schmidt (Fraunhofer ISC-HTL)*	**P102-18 A STUDY ON PROPERTIES OF BISMALEIMIDE RESIN MODIFIED BY BENZOXAZINE FOR RTM PROCESS** *Gang Liu (AVIC Composites Center), Jianwen Bao (AVIC Composites Center)* Bismaleimide resin for resin transfer molding process was modified by the benzoxazine (BOZ) with low curing shrinkage and its properties were investigated.	**P103-18 HIGH THERMAL CONDUCTIVITY OF DIAMOND PARTICLES DISPERSED ZR-ALLOYED CU MATRIX COMPOSITES PRODUCED BY GAS PRESSURE INFILTRATION** *Hailong Zhang (University of Science and Technology Beijing)* Diamond particles dispersed Zr-alloyed Cu matrix composites were produced by a gas pressure infiltration method. A maximum thermal conductivity of 930 W/mK was obtained at 0.5 wt.% Zr addition.	**P104-18 EFFECT OF CHEMICAL MODIFICATION FOR KENAF FIBER ON MECHANICAL PROPERTIES OF FURAN BASED NERP** *Jun Nakai (Tokyo Institute of Technology), Masatoshi Kubouchi (Tokyo Institute of Technology), Hiroha Tanaka (Tokyo Institute of Technology)* An approach to increase the mechanical properties of plant-derived resin and NFRP were achieved to reduce environmental load and petroleum consumption, through chemical analysis.	**P105-18 THERMAL AND MECHANICAL CHARACTERIZATION OF RESIN TRANSFER MOLDED TRI-COMPONENT POLYESTER / GLASS FIBER / MODIFIED CLAYS COMPOSITES.** *Daiane Romanzini (UFRGS), Vanessa Piroli (UCS), Ademir J. Zattera (UCS), Sandro C. Amico (UFRGS)* Evaluation of the effect of cation exchange and silane modified montmorillonite (MMT) nanoclays, on dispersion, mechanical, thermal properties and flammability of polyester/glass fiber composites.
	P101-19 SYSTEMATIC COMPARISON BETWEEN CARDING AND PAPER-MAKING METHOD FOR PRODUCING DISCONTINUOUS RECYCLED CARBON FIBER REINFORCED THERMOPLASTICS *Haowen Wei (The University of Tokyo), Hooseok Lee (The University of Tokyo), Wataru Nagatsuka (The University of Tokyo), Isamu Ohsawa (The University of Tokyo), Kazumasa Kawabe (Industrial Technology Center of Fukui Prefecture), Tetsuhiko Murakami (Industrial Technology Center of Fukui Prefecture), Ken Sumitomo (Tokyo), Jun Takahashi (The University of Tokyo)* Two kinds of manufacturing method for discontinuous recycled carbon fibers reinforced thermoplastics will be discussed and compared by the mechanical properties	**P102-19 MEASUREMENT AND ANALYTICAL OF TOW/MATRIX INTERFACIAL MECHANICAL PROPERTIES IN CARBON/CARBON COMPOSITE** *Chenghai Xu (Harbin Institute of Technology), Desheng Xu (Harbin Institute of Technology), Ying Fu (Harbin Institute of Technology), Songhe Meng (Harbin Institute of Technology)*	**P103-19 IN-SITU SYNTHESIZED MAGNESIUM MATRIX COMPOSITES** *Tongxiang Fan (Shanghai Jiaotong University-State Key Lab of Metal Matrix Composites), Di Zhang (Shanghai Jiaotong University-State Key Lab of Metal Matrix Composites)* In this work, TiC/AZ91D composites simultaneously in situ synthesized will be introduced, the compressive mechanical properties and the damping properties of this composite will be further discussed.	**P104-19 EXPERIMENTAL STUDIES OF THE EFFECT OF HYGROTHERMAL AGING ON FATIGUE OF NATURAL FIBER COMPOSITE** *Mahdi Mejri (Laboratory of Mechanics and Eco-Materials and Research Team in CAD/calculation integration-University of Quebec in Trois-Rivières), Lotfi TOUBAL (Laboratory of Mechanics and Eco-Materials-University of Quebec in Trois-Rivières), Jean-Christophe Cuillère (Research Team in CAD/calculation integration-University of Quebec in Trois-Rivières), Vincent François (Research Team in CAD/calculation integration-University of Quebec in Trois-Rivières)* The present work is focused on investigating the effects of hygrothermal aging on the quasi-static and fatigue behavior of a polyethylene composite reinforced with 40%wt of short birch fibers.	**P105-19 QUALITATIVE CHARACTERIZATION OF NANOCLAY PARTICLE EMISSIONS FROM PP NANOCOMPOSITES AFTER THERMAL DEGRADATION** *Nazanin Alipour (Royal Institute of Technology), Emma Strömberg (Royal Institute of Technology(KTH)), Jonas Enebro (SP)* The degradation and release of nanoclays from PP nanocomposite was simulated in a prototype exposure chamber under controlled conditions to evaluate and characterise the released particles.
	P101-20 TESTING OF THE MATERIAL CHARACTERISTICS OF RECYCLED GLASS FIBRE REINFORCED POLYMER FOR THE USE IN BEARING STRUCTURES *Tihomir Stefic (University of J.J.Strossmayer of Osijek-Faculty of Civil Engineering Osijek), Aleksandar Juric (University of J.J.Strossmayer of Osijek-Faculty of Civil Engineering Osijek), Pavao Marovic (University of Split-Faculty of Civil Engineering-Architecture and Geodesy)* Testing of some basic characteristics of recycled and original glass fibre reinforced polymer was conduted and appropriate diagrams are proposed in order to describe the tested materials.	**P102-20 EFFECT OF FIBER DOSAGE ON FIBER REINFORCED CONCRETE BOND-SLIP PERFORMANCE** *Yafang Zhang (Guangzhou University), Hao Liu (Guangzhou University), Yi Yang (Guangzhou University), Qinghua Wu (Guangzhou University)* The bond-slip performance of interface between steel fiber and concrete has been stuided in details by adopting both experimental and numerical methods.	**P103-20 A EXPERIMENTAL STUDY OF SURFACE MODIFICATION OF TA2 USING MICRO-BEAM PLASMA ARC** *Rongjuan Yang (School of Aerospace Engineering), Dongyun Ge (School of Aerospace Engineering), Zongde Liu (Key Laboratory of Condition Monitoring and Control for Power Plant Equipment of Ministry of Education)* The surface remelting was performed on commercial pure titanium TA2 using micro-beam plasma arc under 3 working conditions.the sample remelted 1 time with cooling water exhibits excellent performance	**P104-20 PREPARATION AND CHARACTERIZATION OF GREEN COMPOSITE USING BIOMIMETIC MODIFIED LIGNIN** *Sunghoon Kim (Graduate school student), Jongshin Park (Seoul National University)* In this study, two types of alkyl-chain modification agents.As a result, the physical properties of the resulting blends were limited by alkyl chain of modified lignin.	**P105-20 FABRICATION OF ES-NANOFIBER IMPRINTING PLASTIC MOLD AND MICRO-STRUCTURED PARTS BY NANOPOWDER PRINTING** *Kazuaki Nishiyabu (Kinki University)* Electrospinning nanofiber imprinting was developed to produce the plastic mold with microstructures and was applied for contact printing using paste consisting of nanopowder and followed by sintering.

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13:00	**Mini Oral Session II**	**Mini Oral Session II**	**Mini Oral Session II**	**Mini Oral Session II**	**Mini Oral Session II**
	P201-1 MECHANICAL PROPERTIES AND CURING BEHAVIOUR OF GRAPHITE/OXIDE EPOXY NANOCOMPOSITES *R. Mikael Larsen (Aalborg University)* Graphite oxide is added to epoxy using the functional groups to form stronger bonds to the epoxy network and thus improving the mechanical properties.	**P202-1 HIGH STRAIN RATE AND HYGROTHERMAL EFFECTS ON MECHANICAL PROPERTIES OF LAMINATED COMPOSITES** *Yiting Wu (Tsinghua University), Dongyun Ge (Tsinghua University), Chen Li (Tsinghua University)* The impact mechanical performances of T300 carbon fiber reinforced epoxy resin matrix composite laminates under hygrothermal circumstance and high strain rate are investigated using SHPB.	**P203-1 JOINT AND ASSEMBLING OF HUGE COMPOSITE TOP-HAT STIFFENED HULLS** *Jifeng Zhang (Harbin Engineering Universtiy), Limin Zhou (The HongKong Polytechnic University)* In the paper, a bolted joint scheme was studied to be used in foam inserted top-hat stiffened composite hull. and a 4m×2m×1.5m model was manufactured with the scheme proposed.	**P204-1 AN APPROACH FOR MULTI-OBJECTIVE OPTIMIZATION OF HYBRID MATERIAL STRUCTURES FOR MOBILITY APPLICATIONS** *Vahid Ghaffarimejlej (Technische Universität Braunschweig), Sebastian kleemann (Technische Universität Braunschweig), Thomas Vietor (Technische Universität Braunschweig)* Layup optimization for a composite part -in a structure made by metal and composite- subject to 3 axial loads using Genetic Algorithm. Two approaches for reducing the number of analyses are described.	**P205-1 EFFECTIVE VOLUME OF CURVED BEAM UD-CFRP SPECIMEN FOR OUT-OF-PLANE STRENGTH BY 4-POINT BENDING** *Eiichi Hara (JAXA), Tomohiro Yokozeki (The university of Tokyo), Yutaka Iwahori (JAXA)* In order to evaluate size effects of out-of-plane strength of CFRP curved beam, two equations for calculating effective volume were derived. Weibull statistics were applied to evaluate size effects.
	P201-2 DYNAMIC MECHANICAL ANALYSIS OF CELLULOSE NANOFIBER/POLYESTER RESIN COMPOSITES *Alessandra Lavoratti (UNIVERSIDADE DE CAXIAS DO SUL), Lisete Cristine Scienza (Universidade Federal do Rio Grande do Sul), Ademir José Zattera (UNIVERSIDADE DE CAXIAS DO SUL)* This study presents a recently developed method for processing cellulose residues by grinding them into cellulose nanofibers (CNFs) to be used in composite materials.	**P202-2 APPLICABILITY OF A TAPPING METHOD TO NON-DESTRUCTIVE INSPECTION OF CARBON FIBER REINFORCED THERMOPLASTICS** *Xiuqi Lyu (The University of Tokyo), Jun Takahashi (The University of Tokyo), Isamu Ohsawa (The University of Tokyo)* Tapping method including both global method and local method was introduced to detect defects such as voids caused by inadequate molding or inappropriate use or inappropriate use of CFRTP parts.	**P203-2 MODIFIED FICK'S LAW AND TSAI METHOD APPLIED TO THE ANALYSIS OF ADHESIVE BONDED COMPOSITE REPAIR** *Yin Yu (Shanghai Jiao Tong University), Xiu-Hua Chen (Shanghai Jiao Tong University), Kun-Hua Han (Shanghai Jiao Tong University), Hai Wang (Shanghai Jiao Tong University)* The coupled hygro-thermo-stress analysis method on adhesively bonded repaired composite under hygrothermal and mechanical loads environment was investigated and verified by the test.	**P204-2 ANALYSIS OF STRAIN UNIFORMITIES IN ASYMMETRIC BI-STABLE COMPOSITE LAMINATES** *Diankun Pan (Harbin Institute of Technology), Fuhong Dai (Harbin Institute of Technology)* It is found that the distributions of strains in asymmetric bistable composite laminates are uniform and the variations of strains during snap-though are also even.	**P205-2 INFRARED SIGNATURES OF BONDED INTERFACES FOR THE REPAIR OF PRIMARY STRUCTURES IN COMPOSITE MATERIAL** *Barus Matthias (Université Paul Sabatier), Francis Collombet (Université Paul Sabatier), Hélène Welemane (Ecole Nationale d'Ingénieurs de Tarbes), Laurent Crouzeix (Université Paul Sabatier), Arthur Cantarel (Université Paul Sabatier), Yves-Henri Grunevald (Composites Expertise & Solutions), Valérie Nassiet (Ecole Nationale d'Ingénieurs de Tarbes), Marie-Laetitia Pastor (université Paul Sabatier)* This work aims at evaluating bonded repaired composite structures by means of Infrared Thermography. It presents the characterisation of a heat flow by inverse identification.
	P201-3 FUNCTIONALIZED NANOCARBON BASED POLYMER COMPOSITES AND ITS FEASIBLE APPLICATION AT LEO SPACE ENVIRONMENT *Seung-Bo Jin (Korea Aerospace Research Institute), Jae-Young No (Korea Advanced Institute of Science and Technology), Chun-Gon Kim (Korea Advanced Institute of Science and Technology)* Recent advances in the development of nanocarbons (including carbon nanotube, graphene and their assembly) have gained much interest in the aerospace field.	**P202-3 ANALYSIS OF DEFORMATION AND FAILURE OF POLYMER-BONDED EXPLOSIVES USING COUPLED PLASTIC DAMAGE MODEL** *Xicheng Huang (China Academy of Engineering), Chengjun Chen (China Academy of Engineering), Gang Chen (China Academy of Engineering), Ming Liu (China Academy of Engineering)* A damaged plasticity model for the specific composite material PBX was used to describe the deformation and failure characteristics of PBX under complex stress states and at various strain rates.	**P203-3 ADHESION BONDING IMPROVEMENT OF PEEK/CARBON FIBER RECYCLABLE COMPOSITES BY SURFACE REDUCTION OR EPOXYDATION** *Emile Perez (Laboratoire des IMRCP), Nathalie Dendele (Laboratoire des IMRCP), Sophie Franceschi (Laboratoire des IMRCP), Aurélie Léonardi (Institut Carnot CIRIMAT), Eric Dantras (Institut Carnot CIRIMAT), Colette Lacabanne (Institut Carnot CIRIMAT)* The surface modification of PEI Ultem® 1000 was successfully achieved by the use of sodium borohydride as a mild reducing agent. The new chemical structure of reduced polyetherimide was determined by	**P204-3 ON THE MECHANICAL BEHAVIOUR OF A BUTT JOINTED THERMOPLASTIC COMPOSITE UNDER BENDING** *Ismet Baran (University of Twente-Faculty of Engineering Technology), Laurent Warnet (University of Twente-Faculty of Engineering Technology), Remko Akkerman (University of Twente-Faculty of Engineering Technology)* Crack initiation and propagation mechanisms for the filler and the delamination at the skin-filler interface were captured experimentally and numerically for an AS4/PEKK hybrid joint under bending.	**P205-3 NON-DESTRUCTIVE TESTING OF DEFECTS IN THICK COMPOSITES BY MEANS OF PULSE AND LOCK-IN THERMOGRAPHY TECHNIQUES** *Alper Aktas (National Physical Laboratory), Michael Gower (National Physical Laboratory), Richard Shaw (National Physical Laboratory), Rob Simpson (National Physical Laboratory), Louise Wright (National Physical Laboratory), Sam Gnaniah (National Physical Laboratory), Lindsay Chapman (National Physical Laboratory), Gordon Pilkington (National Physical Laboratory)* This study focuses on non-destructive inspection of defects within thick GFRP and CFRP composites by means of pulse and lock-in thermography techniques to evaluate the detection limits.
	P201-4 STUDY ON PREPARATION AND FLAME RETARDANT PROPERTIES OF EPOXY/GRAPHENE OXIDE NANOSHEETS COMPOSITES *Jia-Ming Yang (Hungkuang University), Chin-Lung Chiang (Hungkuang University)* The flame retardant containing silicon and phosphorus was grafted onto the surface of graphene oxide nanosheets via a condensation reaction and it can improve the flame retardancy of epoxy resin.	**P202-4 DETECTION OF SMALL-SIZED DAMAGE IN A UNIFORM BEAM USING VIBRATORY POWER ESTIMATED FROM THE MEASURED VELOCITIES BY A LASER SCANNING VIBROMETER** *Jae Kwan Kim (Seoul National University), Young Cheol Huh (Korea Institute of Machinery and Materials), Tae Young Chung (Korea Institute of Machinery & Materials)* A small size damage in a beam is identified with the damage index derived from the vibratory power. The vibratory power is estimated from the velocity data measured with laser scanning vibrometer.	**P203-4 EVALUATION OF SURFACE TREATMENT METHODS FOR PA6 FRP BONDING WITH ADHESIVES** *Toru Ohnishi (Tokyo Institute of Technology), Kazumasa Shimamoto (Tokyo Institute of Technology), Masato Katano (Tokyo Institute of Technology), Hiroshi Okamoto (Tokyo Institute of Technology), Yu Sekiguti (Tokyo Institute of Technology), Chiaki Sato (Tokyo Institute of Technology)* To find suitable surface treatment for PA6 FRP, strengths of adhesively bonded joints had experimentally been evaluated. Enough strength for structural bonding was obtained by some treatment methods.	**P204-4 AN APPROXIMATE ANALYTIC SOLUTION FOR DISTORTION OF THIN-WALLED ORTHOTROPIC BEAMS WITH SYMMETRIC CROSS-SECTIONS SECTIONS SUBJECTED TO TORSION** *Bože Plazibat (University of Split-The University Department of Professional Studies), Frane Vlak (University of Split-FESB)* The section distortion of thin-walled beams made of isotropic and orthotropic materials with approximately equal modulus of elasticity in both directions under torsion is considered.	**P205-4 A BENCHMARK FOR VIBRATION-BASED STRUCTURAL DAMAGE ASSESSMENT OF COMPOSITES USING WAVELET ANALYSIS** *Andrzej Katunin (Silesian University of Technology)* The benchmark consists of 143 simulation and experimental studies on damage assessment in composite structures using wavelet analysis of modal shapes of vibration.

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	P201-5 GRAPHENE/NICKEL COMPOSITE NANOWIRES UNDER UNIAXIAL COMPRESSION: A MOLECULAR DYNAMICS SIMULATION STUDY *Zhenyu Yang (Beihang University), Jian Sun (Beihang University), Zixing Lu (Beihang University), Guipin Lin (Beihang University)* The compressive behaviours of the nanolayered graphene/nickel composites nanowires (NWs) are studied with considering effects of layer spacing and temperature.	**P202-5 MICROSTRUCTURAL AND EXPERIMENTAL ANALYSIS OF STRAIN RATE EFFECT FOR SHORT GLASS FIBER REINFORCED POLYPROPYLENE** *Nadia Achour Renault (Ensam), Joseph Fitoussi (Ensam), Jean François Vittori (Renault), Fodil Meraghni (Ensam)* The scope of this work is to provide a microstructural description and an experimental analysis of the strain rate effect on short glass fiber reinforced polypropylene.	**P203-5 DESIGN AND OPTIMIZATION OF GRADIENT CELLULAR STRUCTURES** *Li Ma (Harbin Institute of Technology)* Combine with FE method and a genetic algorithm, a numerical methodology for design of gradient auxetic cellular structures was proposed and the geometrical and physical parameters were designed.	**P204-5 EFFECT OF THE REINFORCING SIC, CG AND GRP PARTICLES ON THE STRUCTURE AND PROPERTIES OF COMPOSITE PISTONS BASED ON ALSI7MG2SR0.03 ALLOY** *Sonia Boczkal (Institute of Non-Ferrous Metals in Gliwice), Marzena Lech-Grega (Institute of Non-Ferrous Metals in Gliwice), Wojciech Szymański (Institute of Non-Ferrous Metals in Gliwice), Marek Nowak (Institute of Non-Ferrous Metals in Gliwice), Anna Dolata (Silesian University of Technology)* The study gives characteristics of the structure and properties of the composite pistons based on AlSi7Mg2Sr0.03 alloy with different proportional content of SiC, Cg and GRp particles.	**P205-5 INTEGRATION OF SENSOR ELEMENTS IN FIBRE-REINFORCED THERMOPLASTICS USING REMOTE LASER PROCESSING** *Teresa Möbius (Technische Universität Dresden), Frank Adam (Technische Universität Dresden), Niels Modler (Technische Universität Dresden), Andreas Fürst (Fraunhofer IWS Dresden), Annett Klotzbach (Fraunhofer IWS Dresden), Jan Hauptmann (Fraunhofer IWS Dresden), Eckhard Beyer (Fraunhofer IWS Dresden)* The integration of sensor elements in fibre-reinforced thermoplastic textiles using remote laser processing was analysed with special focus on grade of modification of the textile layers.
	P201-6 GRAPHENE- BASED COMPOSITE MATERIALS FOR AUTOMOTIVE *Ahmed Elmarakbi (University of Sunderland), Brunetto Martorana (Centro Ricerche Fiat S.C.p.A)* This work advances innovative lightweight GRAPHENE based materials and their related modelling, designing, manufacturing, and joining capabilities suitable for large scale automotive productions.	**P202-6 DAMAGE BEHAVIOR IN PAPER-BASED FRICTION MATERIALS SUBJECTED TO COMPRESSIVE LOADING UNDER ELEVATED TEMPERATURE** *Tomoyuki Fujii (Shizuoka University), Keiichiro Tohgo (Shizuoka University), Naoya Urata (Shizuoka University), Shunya Kozaki (Shizuoka University), Yoshinobu Shimamura (Shizuoka University), Tomohiro Hasegawa (F.C.C. Co.-Ltd), Shintaro Yagi (F.C.C. Co.-Ltd), Yoichi Ito (F.C.C. Co.-Ltd)* This paper deals with investigation on microscopic damage behavior in paper-based friction materials subjected to compressive loading at elevated temperature.	**P203-6 EXPERIMENTAL AND NUMERICAL STUDY ON THE EFFECT OF STIFFENER STIFFNESS ON COMPRESSIVE STABILITY OF STIFFENED COMPOSITE PANEL** *Yuequan Wang (Nanjing University of Aeronautics and Astronautics), Shuhua Zhu (Nanjing University of Aeronautics and Astronautics), Mingbo Tong (Nanjing University of Aeronautics and Astronautics), Xing HU (Nanjing University of Aeronautics and Astronautics), Xiaowei Jiang (Nanjing University of Aeronautics and Astronautics)*	**P204-6 COMPOSITE POWER PYLONS FOR HIGH VOLTAGE TRANSMISSION LINES** *Mehrtash Manouchehr (Technical University of Denmark (DTU)), Christian Berggreen (Technical University of Denamrk (DTU))* Different stages of a project aimed at the development of a new composite power pylon for high voltage transmission lines is described. Finite element model and experimental test plans have been shown	**P205-6 COMPOSITE MICROPOWDERS FOR ADDITIVE TECHNOLOGIES.** *Pavel Lykov (Federal State State-Financed Educational Institution of High Professional Education "South Ural State University" (National Research University) FSSFEI HPE "SUSU" (NRU)), Sergei Vaulin (Federal State State-Financed Educational Institution of High Professional Education "South Ural State University" (National Research University) FSSFEI HPE "SUSU" (NRU)), Sergei Sapozhnikov (Federal State State-Financed Educational Institution of High Professional Education "South Ural State University" (National Research University) FSSFEI HPE "SUSU" (NRU)), Igor Shulev (Federal State State-Financed Educational Institution of High Professional Education "South Ural State University" (National Research University) FSSFEI HPE "SUSU" (NRU)), Dmitrii Zherebtsov (Federal State State-Financed Educational Institution of High Professional Education "South Ural State University" (National Research University) FSSFEI HPE "SUSU" (NRU)), Ruslan Abdrahimov (Federal State State-Financed Educational Institution of High Professional Education "South Ural State University" (National Research University) FSSFEI HPE "SUSU" (NRU))* The technology of obtaining composite micropowders, allowing the production of a wide range of composite powders suitable for use in additive technologies, is proposed.
	P201-7 THERMAL EVALUATION AND PREPARATION OF MORTAR CONTAINING N-HEXADECANE/XGNP SSPCM FOR ENERGY EFFICIENT BUILDINGS *Sumin Kim (Soongsil University), Su-Gwang Jeong (Soongsil University), Seong Jin Chang (Soongsil University), Sughwan Kim (Soongsil University)* We prpared the SSPCM which has high heat stotage property and it applied to a mortar. As a result, we confirmed that heat stroage mortar has time lag effect and energy saving.	**P202-7 INVESTIGATION OF THE DELAMINATION BEHAVIOR ON CARBON FIBER TAPE REINFORCED THERMOPLASTICS** *Mikio Akamatsu (The University of Tokyo), Toshiro Ohori (The University of Tokyo), Takahiro Hayashi (The University of Tokyo), Jun Takahashi (The University of Tokyo)* This study deals with L-shaped specimen made of CTT material. The fracture behavior and flexural rigidity of CTT in curved structure were verified, compared with UD material.	**P203-7 THE PREPARATION AND STUDY OF FLAME RETARDANT FOR EXPANDABLE POLYSTYRENE** *Yazhen Wang (Qiqihar University), Yongsheng Zhang (Qiqihar university), Guoli Chen (Qiqihar University), Haiyang Chang (Qiqihar University), Liwu Zu (Qiqihar University)* A composite flame retardant for expandable polystyrene was reported, in which phenol formaldehyde resin (PF) was used as coating agent, graphite oxide(GO)was used as flame retardant.	**P204-7 COMPARISON BETWEEN SIMULATED CENTRAL SUPPORT TESTS AND TWO-SPAN PANEL TESTS FOR SANDWICH PANELS** *Harald Nelke (TU Darmstadt), Jörg Lange (TU Darmstadt)* Simulated central support and two-span tests agree fairly well for the first failure mode. But EN 14509 does not predict the resistance (shear, core compression, wrinkling) at mid support correctly.	**P205-7 STRUCTURES AND PHYSICAL PROPERTIES OF POLYETHYLENE/BORON NITRIDE COMPOSITES BY REACTIVE EXTRUSION** *Soon Man Hong (Korea Institute of Science and Technology (KIST)), Bum Ki Baek (Korea Institute of Science and Technology (KIST)), Seunggun Yu (Korea Institute of Science and Technology (KIST)), Yun Ho La (Korea Institute of Science and Technology (KIST)), Jun Pyo Hong (Korea Institute of Science and Technology (KIST)), Chong Min Koo (Korea Institute of Science and Technology (KIST))* High-density polyethylene (HDPE) composites with chemically modified boron nitride (mBN) fillers, functionalized with an organosilane, were manufactured by twin screw reactive extrusion(REX) process.

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	P201-8 GRAPHENE OXIDE FUNCTIONALIZATION WITH POLYSILOXANES FOR ADVANCED COMPATIBILITY IN EPOXY NANOCOMPOSITES *Celina Maria Damian (University Politehnica of Bucharest), Maria Adina Vulcan (University Politehnica of Bucharest), Gheorghe Hubca (University Politehnica of Bucharest), Razvan Petre (Scientific Research Center for CBRN Defense and Ecology), Horia Iovu (University Politehnica of Bucharest)* The incorporation of GO functionalized with glycidyloxy type silane in epoxy matrix increased the properties of the final composites by creating a compatible interface between the matrix and the GO.	**P202-8 FRACTURE BEHAVIOR OF CROSS-PLY FIBRE REINFORCED COMPOSITE LAMINATES WITH CRACKS UNDER BIAXIAL LOADING CONDITIONS** *Nguyen Hai Dang (Nanyang Technological University), Sridhar Idapalapati (Nanyang Technological University), Narasimalu Srikanth (Nanyang Technological University)* This study is to investigate the effects of the biaxial stress states on failure behaviors of composite laminates with cracks under static conditions.	**P203-8 IMPACT DAMAGE AND PERFORATION OF THIN MONOLITHIC ALUMINIUM ALLOY PLATES: INSIGHTS FOR IMPACT RESISTANT POLYMER-METAL BILAYER LAMINATES** *Kedar Pandya (University of Cambridge), Graham McShane (University of Cambridge), William Stronge (University of Cambridge)* Numerical and experimental studies on the impact response of thin aluminium alloy plates in terms of ballistic limit velocity, energy absorption capability and sensitivity to projectile nose shape.	**P204-8 SHEAR-DOMINATED BENDING BEHAVIOR OF CARBON/EPOXY COMPOSITE LATTICE ISOBEAM STRUCTURES** *David W Jensen (Brigham Young University), Kirsten Hinds (Brigham Young University)* Three 0.6 m long rectangular carbon/epoxy composite lattice (IsoBeam™) structures manufactured (0.8 kg) and tested in 3-point shear-dominated bending demonstrated considerable ductility and potential.	**P205-8 PHOTOPOLYMERIZABLE HYBRID COMPOSITIONS BASED ON (THERMO) PHOTOSENSITIVE MONOMER UNITS USED AS ORGANIC MATRIX FOR SILVER AND ZNO NANOPARTICLES** *Emil Constantin Buruiana (Petru Poni Institute of Macromolecular Chemistry), Tinca Buruiana (Petru Poni Institute of Macromolecular Chemistry), Viorica Podasca (Petru Poni Institute of Macromolecular Chemistry)* Photopolymerized polymer composites incorporating Ag and ZnO nanoparticles into urethane acrylic monomers and hybrid monomers were synthesized and characterized as dye photocatalyst.
	P201-9 EMBEDDED TRILAYER GRAPHENE FLAKES UNDER INEFFICIENT TENSILE AND COMPRESSIVE LOADINGS *Georgia Tsoukleri (Foundation of Research and Technology Hellas-Institute of Chemical Engineering and High Temperature Processes), John Parthenios (Foundation of Research and Technology Hellas-Institute of Chemical Engineering and High Temperature Processes), Costas Galiotis (Foundation of Research and Technology Hellas-Institute of Chemical Engineering and High Temperature Processes), Konstantinos Papagelis (University of Patras)* The mechanical response of ABA 3LG flakes loaded in tension and compression embedded on polymer beams is monitored by simultaneous Raman measurements through the strain sensitivity of G or 2D peaks.	**P202-9 FATIGUE MECHANICAL BEHAVIOR OF MWCNT REINFORCED GFRP COMPOSITES UNDER THE PRESENCE OF ARTIFICIAL DEFECTS** *Ilona LAZARIDOU (UNIVERSITY OF THE AEGEAN), Nikolaos ALEXOPOULOS (UNIVERSITY OF THE AEGEAN), Evangelos FAVVAS (DEMOCRITUS Research Center), Markos PETOUSIS (Crete Institute of Technology), Achilles VAIRIS (TEI CRETE)* The present work investigates on the effect of artificial surface defects of glass fiber reinforced polymers (GFRP) under constant amplitude fatigue loadings and for various nano-reinforced matrices.	**P203-9 MODELING DRY FABRICS UNDER IMPACT WITH A 3D DISCRETE ELEMENT METHOD (DEM)** *Jeremie Girardot (Institute of Mechanics and Mechanical Engineering (I2M)), Frederic Dau (Institute of Mechanics and Mechanical Engineering (I2M))* n impact simulation scenario is performed to validate the implementation satisfying the criterion of energy conservation. Numerical results with DEM are compared to finite elements ones.	**P204-9 EFFECT OF THERMAL CYCLING ON THE MECHANICAL PROPERTIES OF CFRP FOR PRECISE SPACE STRUCTURE** *Satoshi Kobayashi (Tokyo Metropolitan University), Ken Goto (Japan Aerospace Exploration Agency), Minoru Iwata (Kyushu Institute of Technology)* Thermal cycle tests were conducted on carbon fiber reinforced poly-cyanate ester and epoxy resin. Transverse cracks in 90º layers and delamination occurred. Bending modulus, however did not decrease.	**P205-9 POLYMERIC IONIC LIQUIDS AS SEPARATORS FOR ALL-SOLID STATE THIN-FILM ELECTROCHROMIC DEVICES AND LI BATTERIES** *Alexander Shaplov (A.N. Nesmeyanov Institute of Organoelement Compounds Russian Academy of Sciences (INEOS RAS)), Denis Ponkratov (A.N. Nesmeyanov Institute of Organoelement Compounds Russian Academy of Sciences (INEOS RAS)), Pierre-Henri Aubert (Universite´ de Cergy-Pontoise), Elena Lozinskaya (A.N. Nesmeyanov Institute of Organoelement Compounds Russian Academy of Sciences (INEOS RAS)), Cédric Plesse (Universite´ de Cergy-Pontoise), Petr Vlasov (Saint-Petersburg State University), Michel Armand (University de Picardie Jules Verne), Mathieu Morcrette (University de Picardie Jules Verne), Frédéric Vidal (Universite´ de Cergy-Pontoise), Yakov Vygodskii (A.N. Nesmeyanov Institute of Organoelement Compounds Russian Academy of Sciences (INEOS RAS))* The all-polymer electrochromic devices were made from polymeric ionic liquids and PEDOT. The advantages are: simplicity, fast switching(3÷5 s), high coloration efficiency (430 cm2/C), work in vacuum.
	P201-10 INFLUENCE OF DISPERSION METHOD TO DISPERSIBILITY AND MECHANICAL PROPERTIES OF ULTRA-THIN CARBON FIBER TAPE REINFORCED THERMOPLASTICS *Hirofumi Suganuma (The University of Tokyo), Shinichiro Yamashita (The University of Tokyo), Xin Zhang (The University of Tokyo), Kouji Hashimoto (The University of Tokyo), Isamu Ohsawa (The University of Tokyo), Jun Takahashi (The University of Tokyo)* The applicable range of the methodology was experimentally verified to be practical and the cause of the difference between theory and experiment was elucidated.	**P202-10 MECHANICAL PROPERTIES OF CARBON NANOTUBE FIBER MATERIALS UNDER MONOTONIC AND CYCLIC TENSILE LOADING** *Qing-Sheng Yang (Beijing University of Technology), Zhong-Jun Yang (Beijing University of Technology)*	**P203-10 AN EXPERIMENTAL STUDY OF LOW VELOCITY IMPACT OF CARBON, GLASS AND MIXED FIBER COMPOSITE PLATES** *Ahmed Alomari (King Fahd University of Petroleum & Minerals), Abul Fazal M. Arif (King Fahd University of Petroleum & Minerals), M. Haris Malik (King Fahd University of Petroleum & Minerals), Faleh Alsulaiman (King Fahd University of Petroleum & Minerals), Shafique Khan (King Fahd University of Petroleum & Minerals)* In this work, impact response of composite laminates was experimentally studied to determine the energy absorption. Three types of composites were used: carbon, glass and mixed fiber composite plates.	**P204-10 PARAMETER STUDY OF THERMAL PROTECTION FUNCTION INTEGRATED SANDWICH STRUCTURES FOR AEROSPACE APPLICATION** *Songhe Meng (Harbin institute of technology), Qiang Yang (Harbin institute of technology), Weihua Xie (Harbin institute of technology), Shanyi Du (Harbin institute of technology), Yongxia Li (Harbin institute of technology)*	**P205-10 HIGH-STRENGTH, HIGH-DISSIPATION CARBON NANOTUBE NANO-COMPOSITES: THEORY AND EXPERIMENTS** *Walter Lacarbonara (Sapienza University of Rome), Giulia Lanzara (Universty of Rome Tre), Michela Talò (Sapienza University of Rome), Giovanni Formica (University of Rome Tre)* Carbon nanotube nanocomposites with tunable interfacial CNT-matrix properties are explored experimentally for optimal strength and dissipation performance.

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13:00	**Mini Oral Session II**	**Mini Oral Session II**	**Mini Oral Session II**	**Mini Oral Session II**	**Mini Oral Session II**
	P201-11 FLOWABILITY OF DISCONTINUOUS CARBON FIBER REINFORCED THERMOPLASTICS *Shuli Tang (The University of Tokyo), Takahiro Hayashi (The University of Tokyo), Hanchul Lee (The University of Tokyo), Wataru Nagatsuka (The University of Tokyo), Isamu Ohsawa (The University of Tokyo), Jun Takahashi (The University of Tokyo)* The investigation of effect of tape length and molding conditions on flowability of UT-CTT with rib structure and observation of fiber orientation to characterize the flow behavior.	**P202-11 VISCOELASTIC DAMPING PERFORMANCE AND RHEOLOGICAL BEHAVIOUR OF CUP-STACKED CARBON NANOTUBE MODIFIED EPOXY NANOCOMPOSITES WITH RE-AGGLOMERATION NETWORK** *Xiao-Chong Zhang (University of Bristol), Fabrizio Scarpa (University of Bristol), Hua-Xin Peng (Zhejiang University), Ronan McHale (Thomas Swan Co. Ltd.)* Re-agglomeration network of CSNT/RTM6 nanocomposite is tailored by controlling filler content, processing time and temperature thus influenced the physical and mechanical properties of cured composite	**P203-11 A NOVEL APPROACH FOR IMPACT MITIGATION USING MASS NEGATIVITY CONCEPT OF METACOMPOSITES** *K.T. Tan (The University of Akron)* Mass negativity concept of metacomposites is introduced by analytical models. Impact attenuation and blast-wave mitigation are demonstrated by computational simulation. Practical designs are proposed.	**P204-11 CHARACTERIZATION AND EVALUATION OF HIGH-STRENGTH LIGHTWEIGHT ABLATOR USING POROUS CARBON MATERIAL** *Eisuke Kojo (Tokyo University of Science), Yuki Kubota (Tokyo University of Science), Yasuo Kogo (Tokyo University of Science), Takuya Aoki (Japan Aerospace Exploration Agency-Chofu Aerospace Center), Toshio Ogasawara (Japan Aerospace Exploration Agency-Chofu Aerospace Center), Yuichi Ishida (Japan Aerospace Exploration Agency-Chofu Aerospace Center)* We manufactured new lightweight ablator using a porous carbon material. This indicated high compressive strength compared with traditional ablators and good thermal insulation performance.	**P205-11 EFFECT OF UV/VISIBLE LASER IRRADIATION ON SOME HYBRID FORMULATIONS CONTAINING PHOTOREACTIVE URETHANE (DI)METHACRYLATES AND GRAPHENE** *Anton Airinei (Petru Poni Institute of Macromolecular Chemistry), Tinca Buruiana (Petru Poni Institute of Macromolecular Chemistry), George Epurescu (2National Institute for Lasers-Plasma and Radiation Physics), Florentina Jitaru (Petru Poni Institute of Macromolecular Chemistry), Emil Constantin Buruiana (Petru Poni Institute of Macromolecular Chemistry), Ioana Ion (3National Institute for Research and Development in Electrical Engineering)* Hybrid nanocomposites based on novel urethane monomers and graphene were prepared through UV photopolymerization/direct laser writing by femtosecond laser pulses, and characterized.
	P201-12 MECHANICAL BEHAVIOR OF THE BRITTLE MATRIX LAYERED COMPOSITE REINFORSED BY SHORT FIBERS *Andrejs Krasnikovs (Institute of Mechanics-Riga Technical University), Olga Kononova (Institute of Mechanics-Riga Technical University), Arturs Machanovskis (Institute of Mechanics-Riga Technical University), Vitalijs Lusis (Institute of Mechanics-Riga Technical University), Arturs Lukashenoks (Institute of Mechanics-Riga Technical University)* Fracture of the brittle matrix composite material (CM) with short fibers is under investigation. Situation when fibers are uniformly distributed is compared with fibers arrange in layers.	**P202-12 NONLINEAR STRESS RELAXATION OF NANOSILICA-FILLED SILICONE RUBBER FOAM COMPOSITES** *Wenjun Hu (China Academy of Engineering Physics), Xicheng Huang (China Academy of Engineering Physics)*	**P203-12 CONTACT FORCE MEASUREMENT AND DELAMINATING RESPONSES OF COMPOSITE LAMINATE SUBJECTED TO SMALL-MASS-TUP IMPACT** *Yan chen (Shanghai Jiao Tong University), Baojun Ning (Shanghai Jiao Tong University), Zhefeng Yu (Shanghai Jiao Tong University), Bo Zhang (Shenyang institute of aircraft engine), Hongbo Liu (Shenyang institute of aircraft engine), Hai Wang (Shanghai Jiao Tong University)* The contact force measurement based on the impactor response is numerically studied for the laminate subjected to small mass impact, and the response of laminate on the delamination are analysed.	**P204-12 APPLICATION OF COMPOSITE MATERIAL IN THE AIRCRAFT STRUCTURE TO IMPROVE CRASHWORTHINESS** *Yiru Ren (Hunan University)* This paper summarizes the crashworthiness design method for composite transport aircraft, and design concept of the frame, bottom structure and strut are discussed.	**P205-12 BIOINSPIRED FUNCTIONAL MATERIALS TEMPLATED FROM NATURE MATERIALS** *Zhang Di (shanghai jiao tong university), Jiajun Gu (shanghai jiao tong university), Wang zhang (shanghai jiao tong universitiy), Huilan Su (shanghai jiao tong university), Qinglei liu (shanghai jiao tong university), Shenming zhu (shanghai jiao tong university)*
	P201-13 MICROMECHANICAL ANALYSIS OF NONLINEAR RESPONSE OF FIBROUS COMPOSITES *Yanchao Wang (Tongji University), Zhengming Huang (Tongji University)* An elasto-plastic bridging model is established to evaluate nonlinear behavior of composites. Using the equivalent fiber method, effects of an interphase on composites is studied numerically.	**P202-13 EFFECT OF WATER/CEMENT RATIO AND CURING TIME ON COMPRESSIVE STRENGTH OF MWCNT-CEMENT MORTAR** *Donghoon Kang (Korea Railroad Research Institute), Gang Seok Seo (Kyung Hee University), Wonseok Chung (Kyung Hee University)* This study conducted experiments for improving the compressive strength of cement mortar by adding MWCNTs w.r.t. MWCNT concentration, W/C ratio, curing age, and MWCNT concentration adjustment methods.	**P203-13 ANTI-BLAST DESIGN OF CELLULAR SACRIFICIAL CLADDING BASED ON A NONLINEAR PLASTIC SHOCK MODEL** *Yuanyuan Ding (University of Science and Technology of China), Shilong Wang (University of Science and Technology of China), Zhijun Zheng (University of Science and Technology of China), Liming Yang (Ningbo University), Jilin Yu (University of Science and Technology of China)* Dimensional analysis and a nonlinear plastic shock model based on the rigid–plastic hardening idealization was employed to guide the anti-blast design of cellular sacrificial cladding.	**P204-13 ADSORPTION OF CO2 ON AMINE-GRAFTED ACTIVATED CARBON FIBER FABRICS** *Yu-Chun Chiang (Yuan Ze University), Chien-Yuan Hung (Yuan Ze University)* The ACFs modified with MEA and TPEDA were characterized and their CO2 adsorption isotherms were measured. Results suggested that the aminated ACFs were the applicable adsorbents for CO2 adsorption.	**P205-13 STYLUS SUPPORT STRUCTURE AND FUNCTION OF RADULAR TEETH IN CRYPTOCHITON STELLERI** *Steven Herrera (University of California Riverside), Lessa Grunenfelder (University of Southern California), Enrique Escobar (Purdue University), Qianqian Wang (University of California Riverside), Christopher Salinas (University of California Riverside), Nicholas Yaraghi (University of California Riverside), Jeffrey Geiger (University of California Riverside), Richard Wuhrer (University of Western Sydney), Pablo Zavattieri (Purdue University), David Kisailus (University of California Riverside)* The chiton feeding apparatus demonstrates a high level of control at multiple length scales to produce extremely lightweight designs for structural materials.

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	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
13:00	**Mini Oral Session II**	**Mini Oral Session II**	**Mini Oral Session II**	**Mini Oral Session II**	**Mini Oral Session II**
	P201-14 UNDERSTANDING THE EFFECT OF IN-PLANE FIBER WAVINESS ON DAMAGE BEHAVIOR OF CURED WOVEN COPOSITES *Masoud Haghi Kashani (University of British Columbia), Abbas. S. Milani (University of British Columbia)* This article presents an experimental investigation into the mechanical behavior of a cured woven lamina under uniaxial tensile loading in warp and weft directions to assess in-plane waviness effect.	**P202-14 LIGHTWEIGHTING OPPORTUNITY USING FRP STEEL HYBRID** *Elspeth Keating (University of Warwick), Darren Hughes (University of Warwick), Janka Cafolla (Tata Steel Research and Development), Richard Dashwood (University of Warwick), Iain McGregor (Tata Steel Research and Development)* Using both simulation and mechanical testing, PA6 GF60 and DP600 hybrids are shown to offer a 30% increase in specific stiffness with respect to steel only.	**P203-14 PROBABILISTIC APPROACH FOR THE IMPACT ENERGY ABSORPTION OF CARBON/EPOXY COMPOSITE LAMINATES UPON BALLISTIC IMPACT** *Ju Won Park (Chungnam National University), Hyun Jun Cho (Chungnam National University), In-Gul Kim (Chungnam National University), Han Sol Lee (Chungnam National University), Jong Heon Kim (Agency for Defense Development)*	**P204-14 ACTUATION AND ENERGY HARVESTING OF DIELECTRIC ELASTOMERS AS FUNCTIONS OF THICKNESS, ELASTOMER TYPE AND CONSTITUENT CONTENT.** *Dong-Joo Lee (Yeungnam University), F.A. Y. Cui (Yeungnam University)* The energy harvesting performance of an EADE (Electro-active dielectric elastomer) is studied as functions of constituent content, specimen geometries and types of loading	**P205-14 EFFECTIVE ELECTRICAL CONDUCTIVITY OF CNT-EPOXY NANOCOMPOSITE** *Vladimir Kulakov (Institute of Polymer Mechanics-University of Latvia), Andrey Aniskevich (Institute of Polymer Mechanics-University of Latvia), Triinu Poltimae (Tallinn University of Technology)* The effective electrical conductivity of an epoxy resin filled with the well-dispersed and randomly oriented carbon nanotubes (CNTs) was calculated by applying the micromechanical approach.
	P201-15 INFLUENCE ON THE MECHANICAL BEHAVIOR OF CARBON FIBER FABRIC REINFORCED PPS LAMINATES UNDER DIFFERENT TEMPERATURE *Wang Shiyu (Harbin Institute of Technology), Zhang Jiazhen (Harbin Institute of Technology), Zhou Zhengong (Harbin Institute of Technology), Wang Yue (Harbin Institute of Technology)* With the temperature increasing up to Tg(120°C) of fiber fabrics reinforced PPS laminates degrades significantly the quality of the adhesion at the fiber/matrix interface.	**P202-15 EXPERIMENTAL ANALYSIS ON THE BEARING CAPACITY OF SANDWICH PANEL JOINTS** *Christina Kunkel (TU Darmstadt), Jörg Lange (TU Darmstadt)* According to industry standards sandwich panels are not permissible for the full stabilization or bracing of steel structures. Possible joint reinforcement solutions are assessed experimentally.	**P203-15 THERMAL AGING REDUCTION IN POLYMER MATRIX COMPOSITES** *Joe Hoffman (University of Denver), Maciej Kumosa (University Of Denver)* This paper presents an approach to reduce the impact of thermal aging of hybrid glass/carbon fiber epoxy matrix composite rods utilized in novel high voltage transmission lines.	**P204-15 EXPERIMENTAL SUB-COMPONENT INVESTIGATION OF WIND TURBINE BLADE RETROFIT REINFORCEMENTS** *Maurizio Sala (DTU - Technical University of Denmark), Christian Berggreen (DTU - Technical University of Denmark)* Experimental sub-component investigation of wind turbine blade reinforcement which aims to reduce the problems caused by longitudinal cracks detected at the blade trailing edge	**P205-15 MATERIAL CHARACTERIZATION AND VIBRO-ACOUSTIC ANALYSIS OF A PREIMPREGNATED CARBON FIBER REINFORCED EPOXY DRUM SHELL** *Manuel Ibañez (Rasch Drums), Alberto Gimenez (University CEU Cardenal Herrera), Fernando Sanchez (University CEU Cardenal Herrera)* The vibro-acoustic behavior of composite materials are analyzed depending on their material characterization in a set of test conducted in different drum shell prototypes.
	P201-16 LIGHTNING PROTECTION TESTING OF WET METALIZED POLYMER COMPOSITES *Rajesh P. S. M. (Ecole Polytechnique de Montreal), Martin Gagne (Ecole Polytechnique de Montreal), Xavier Cauchy (Ecole Polytechnique de Montreal), Jolanta E. Klemberg-Sapieha (Ecole Polytechnique de Montreal), Frederic Sirois (Ecole Polytechnique de Montreal), Daniel Therriault (Ecole Polytechnique de Montreal)* A qualitative analysis of the lightning protection ability of wet-metalized composites, studied via low energy strikes and resistive heating tests is presented.	**P202-16 FLEXIBLE SPACER FABRICS FOR REINFORCEMENT OF RIGID POLYURETHANE FOAMS IN SANDWICH STRUCTURES** *Kay Schäfer (Technische Universität Chemnitz), Jürgen Tröltzsch (Technische Universität Chemnitz), Frank Helbig (Technische Universität Chemnitz), Dariusz Niedziela (Fraunhofer Institute for Industrial Mathematics), Lothar Kroll (Technische Universität Chemnitz)* Spacer fabrics as reinforcement structure for rigid PUR foams achieve significant increases to the mechanical properties. Corresponding process simulation is developed for component designing.	**P203-16 EVALUATION BY AGING CYCLES OF TENSILE STRENGTHS AND DURABILITY CHARACTERISTICS OF MATERIALS REINFORCED BY CARBON, GLASS AND BASALT FIBERS** *Piero De Fazio (ENEA), Giuseppe Arleo (ENEA), Maria Bruna Alba (ENEA), Franco Bernardo (ENEA)*	**P204-16 INFLUENCE OF THE CUSP COMPLIANCE AND LAYERING METHOD ON THE CUSP DEFLECTION IN DENTAL BULK-FILL COMPOSITE RESTORATION.** *Yu-Jin Kim (Seoul national university), Ryan Jin-Young Kim (Seoul national university), In-Bog Lee (Seoul national university)* The aim of this study was to investigate the effects of the layering method and cusp compliance on cusp deflection in bulk-fill and conventional composite restorations, and to examine the relationship	**P205-16 ELECTROSPUN CORE-SHELL COMPOSITE FIBER FILMS WITH SELF-HEALING PROPERTY** *Fenghua Zhang (Harbin Institute of Technology), Zhichun Zhang (Harbin Institute of Technology), Yanju Liu (Harbin Insititute of Technology), Jinsong Leng (Harbin Institute of Technology)* Coaxial electrospinning that is a branch of nanotechnology has attracted great attention. Due to the easy operation process, it is able to form special structure and multifunctional fibers. The rapid

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	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
13:00	**Mini Oral Session II**	**Mini Oral Session II**	**Mini Oral Session II**	**Mini Oral Session II**	**Mini Oral Session II**
	P201-17 FAILURE BEHAVIOR OF LAMINATED COMPOSITE PLATES UNDER ANTICLASTIC BENDING *Yakup Okan Alpay (Bogazici University), Fazil O. Sonmez (Bogazici University), Nuri Ersoy (Bogazici University)* Failure behaviour of composite plates under anticlastic bending is studied using a unique test fixture. This is a special case of biaxial out-of-plane loading that applies mainly twisting moment.	**P202-17 CRUSHING ANALYSIS AND CRASHWORTHINESS OPTIMIZATION DESIGN OF REINFORCED REGULAR HEXAGON HONEYCOMB SANDWICH PANEL** *He Qiang (Nanjin University of science and technology)* This paper introduces single-rib reinforced regular hexagon HSP (R1-HSP) and double-rib reinforced regular hexagon HSP (R2-HSP). The mechanical characteristics of these three structures are first inve	**P203-17 A STUDY ON THE OPTIMAL DESIGN OF COMPOSITE ROTOR BLADE CROSS-SECTION USING MICRO GENETIC ALGORITHM** *You-Jin Won (Korea Aerospace Research Institute), Soo-Yong Lee (Korea Aerospace University)* In this study, optimal design of composite rotor blade cross-section was carried out to draw design variables for layout design of blade cross-section minimizing blade mass in early stage of design.	**P204-17 INNOVATIVE HYDROXYAPATITES, COLLAGEN AND CHITOSAN SCAFFOLDS FOR ENHANCED ADHESION, GROWTH AND BIOACTIVITY OF HUMAN OSTEOBLASTS IN VITRO** *Gheorghe Tomoaia (Iuliu Hatieganu University of Medicine and Pharmacy), Andrada Tomoaia-Cotisel (University of Utah. School of Medicine), Aurora Mocanu (Babes-Bolyai University of Cluj-Napoca), Maria Tomoaia-Cotisel (Babes-Bolyai University of Cluj-Napoca)*	**P205-17 DEVELOPMENT OF SHAPE MORPHING KIRIGAMI HONEYCOMBS AND ACTUATION METHODS** *Robin Neville (University of Bristol), Fabrizio Scarpa (University of Bristol)* This work presents techniques for the design and manufacture of morphing honeycombs using Kirigami (origami + cutting). A method is presented to predict the shape morphing behaviour of the honeycombs.
	P201-18 THE EFFECT OF PERPENDICULARITY ERROR ON STRESS CONCENTRATION FOR CARBON FIBER REINFORCED PLASTIC *Xueshu Liu (Dalian University of Technology), Hang Gao (Dalian University of Technology)* The perpendicularity error of bolt-hole affects stress distribution around the bolt-hole and when it increases up to 4 degree stresses in the region surrounding the bolt-hole may increase 20 times.	**P202-18 EMPIRICAL APPROACH OF ITERATIVE INSERT SHAPE OPTIMIZATION IN THIN SKINNED FRP-SANDWICH PANEL JOINTS** *Johannes Wolff (Insitute of Composite Structures and Adaptive Systems), Fritz Felix Trimpe (Insitute of Composite Structures and Adaptive Systems)* Analytical results, using an euqation provided by ECSS, predicting the first failure load level of sandwich insert connections using the core load path are compared to test data.	**P203-18 LATTICE TRUSS CORE SANDWICH STRUCTURES WITH AL LATTICE TRUSS CORE AND CFRP COMPOSITE FACESHEETS UNDER IMPACT LOADS** *Bing Wang (Harbin Institute of Technology), shaowei zhu (Harbin Institute of Technology), Guoqi zhang (Beijing Satellite Manufacturing Factory)* The mechanical response of pyramidal truss core sandwich structures consisting of carbon fiber reinforced polymer (CFRP) facesheets and aluminum alloy lattice truss cores	**P204-18 EFFECTS OF DIFFERENT TESTING CONDITIONS ON TENSILE PROPERTIES OF CARBON FIBER MULTIFILAMENT** *Junlin Chen (Beihang University), Yan Zhao (Beihang University), Ye Li (Beihang University), Zhe Yang (Beihang University), Jianwei Hao (Aviation Industry Corporation of China)* Effects of different sample preparation and testing conditions on tensile properties of carbon fiber yarn have been investigated based on some parameters.	**P205-18 SUBWAVELENGTH WAVE PROPAGATION CONTROL BY USING ACTIVE ELASTIC METAMATERIALS** *Guoliang Huang (University of Missouri), Yangyang Chen (University of Missouri)* Elastic metamaterials have been extensively investigated due to their unique abilities on controlling propagation of subwavelength elastic waves. One of the most interesting properties is the generati
	P201-19 EFFECTS OF PHASE SHIFT ON THE RESPONSE OF LAMINATED WOVEN COMPOSITES *Sam Huang (Suny at Stony Brook)* This research focuses on responses of 64 woven laminated composites whose phase shift in microstructure is different under uniaxial compression and biaxial compression.	**P202-19 INDENTATION MODELS AND FAILURE MODE MAP FOR CIRCULAR COMPOSITE SANDWICH PLATES** *Sridhar Idapalapati (Nanyang Technological University), Rajaneesh Anantharaju (Nanyang Technological University)* The failure response of clamped circular sandwich plates under localised central loading is investigated. The competing failure modes, failure mode map was created as function of geometry, properties.	**P203-19 A STUDY OF THE THERMAL BUCKLING BEHAVIOR OF A COMPOSITE PLATE USING THE DIGITAL IMAGE CORRELATION TECHNIQUE AND FINITE ELEMENT ANALYSIS** *Nam Seo Goo (Konkuk University)*	**P204-19 GRP BOGIE CHARACTERISTICS EVALUATED BY EXPERIMENTAL METHODS** *Jan Chvojan (VZU Plzen), Jaroslav Vaclavik (VZU Plzen), Miloslav Kepka (University of West Bohemia), Rayner Mayer (Sciotech Projects)* Testing methods have been developed and described in the paper for the bogie dynamics characteristics investigation in a laboratory conditional including drop test, sweep test and track profile test.	**P205-19 A STUDY ON THE DURABILITY OF GECKO-LIKE PDMS MICRO-STRUCTURES BY METAL COATINGS** *Gyu-He Kim (Andong National University), Tae-Chang Ahn (Andong National University), Hui Yun Hwang (Andong National University)* In this study, we suggested a metal coating method to improve durability of Gecko-like dry adhesives, and proved that metal coating can improve more than 30% by experimental works.
	P201-20 ANALYTICAL, EXPERIMENTAL AND NUMERICAL APPROACH OF STORAGE AND LOSS MODULI OF FIBRE REINFORCED EPOXY COMPOSITES *Efstathios Theotokoglou (National Technical university of Athens), Ioannis Giannopoulos (Cranfield University), Emilios Sideridis (National Technical university of Athens)* In the study presented in this article the Dynamic Mechanical Analysis of micro-mechanically modelled unidirectional fibre reinforced composites was investigated numerically by Finite Element Method.	**P202-20 EXPERIMENTAL-THEORETICAL ANALYSIS OF MECHANICAL PROPERTIES OF PERFORATED COMPOSITE SANDWICH PANELS FOR AIRCRAFT ENGINE NACELLE** *Aleksandr Anoshkin (Perm National Research Polytechnic University), Valerii Zuiko (Perm National Research Polytechnic University), Anna Tchugaynova (Perm National Research Polytechnic University), Evgeniya Shustova (Perm National Research Polytechnic University)* The work is dedicated to analysis of mechanical properties of composite sandwich panels. The influence of perforation on mechanical properties of fiberglass panels was studied.	**P203-20 COMPOSITE BEAM WITH CELL STRUCTURE FOR HIGH STIFFNESS SHORT BEAM APPLICATIONS** *Zdeněk Pošvář (Czech Technical University in Prague), Milan Růžička (Czech Technical University in Prague)*		

Scientific programme

Monday 20 July

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16
8:30	**Opening Ceremony**									
8:50	**Plenary: Integration of manufacturing and failure analyses for sustainable design of composites** Ramesh Talreja, Texas A&M University, USA									
9:45	**Coffee in the Exhibition**									
10:15	**1101 Processing - Manufacturing Technology 1**	**1102 Nano Composites 1**	**1103 Multifunctional Composites - Sensing and Actuation 1**	**1104 Fatigue 1**	**1105 Structural Analysis and Optimization 1**	**1106 Processing - Preforming Technologies**	**1107 Process Modelling 1**	**1108 Biocomposites 1**	**1109 Interfaces and Interphases 1**	**1110 Ceramic Matrix Composites**
10:15	**1101-1 ULTRASONIC WELDING OF THERMOPLASTIC COMPOSITES WITH FLAT ENERGY DIRECTORS: INFLUENCE OF THE THICKNESS OF THE ENERGY DIRECTOR ON THE WELDING PROCESS** *Genevieve Palardy (Delft University of Technology), Irene Fernandez Villegas (Delft University of Technology)* This paper presents a detailed experimental examination of the influence of the thickness of flat energy directors on the ultrasonic welding process for carbon fibre/polyetherimide composites.	**1102-1 ALL POLYPROPYLENE NANOCOMPOSITE WITH WELL-ALIGNED AND WELL ORIENTED ELECTROSPUN POLYPROPYLENE NANOFIBERS** *Takashi Nishino (Kobe University), Yuji Asahina (Kobe University), Chizuru Hongo (Kobe University)* All-it.PP nanocomposite, composed of it.PP matrix and it.PP drawn nanofibers by electrospinning, was found to show superior optical transparency and mechanical properties.	**1103-1 MICROMECHANICAL MODELING OF SMART MAGNETOELECTRIC COMPOSITE PLATES** *Alexander Kalamkarov (Dalhousie University), Demetra Hadjiloizi (Cyprus University of Technology), Chariklia Metti (Cyprus University of Technology), Pedro Pacheco (CEFET/RJ), Marcelo Savi (COPPE-Universidade Federal do Rio de Janeiro), Tasos Georgiades (Cyprus University of Technology)*	**1104-1 A MICROMECHANICAL APPROACH TO STUDY THE DAMAGE EVOLUTION OF EPOXY BASED COMPOSITE MATERIALS UNDER FATIGUE LOADING** *Daniel Krause (German Aerospace Center (DLR))* Using the hysteresis energy as a failure criterion, the transverse crack initiation and growth is modelled on a micro-scale. Test data for neat resin is obtained to calibrate the model.	**1105-1 BUCKLING ANALYSIS, DESIGN AND OPTIMISATION OF VARIABLE STIFFNESS SANDWICH PANELS** *Broderick Coburn (University of Bristol), Paul Weaver (University of Bristol)* A Ritz approach semi-analytical model is developed for the buckling analysis of fibre-steered sandwich panels. Results from parametric and optimisation studies are presented and discussed.	**1106-1 THERMAL AND CURE KINETICS MODELING OF THERMOSET LAMINATES DURING AND AFTER THE COMBINED AUTOMATED TAPE LAYING AND AUTOCLAVE PROCESS** *Maria Skandali (Delft University of Technology), Kaspar Jansen (Delft University of Technology), Sotiris Koussios (Delft University of Technology), Jos Sinke (Delft University of Technology)* A two-dimensional heat transfer model in a Lagrangian framework for Automated Tape Laying was developed. Stepwise laying down of the tapes, and more than the usual heat are applied on thermoset tapes.	**1107-1 SIMULATION OF THE THERMO-STAMPING PROCESS** *Kévin Le Meur (INSA Lyon)* The forming step of the thermo-stamping process is simulated. The material's behaviour is characterised experimentally for input data. Simulation results are compared to manufactured parts.	**KEYNOTE** **1108-1 FATIGUE BEHAVIOUR OF WOVEN FLAX/EPOXY COMPOSITES** *Larry Lessard (McGill University), Soroush Asgarinia (McGill University), Chanvit Viriyasuthe (McGill University), Steven Phillips (McGill University), Martine Dubé (Ecole de Technologie Supéieure), Joris Baets (KU Leuven), Aart van Vuure (KU Leuven), Ignaas Verpoest (KU Leuven)* Natural fibre flax composites and hybrid composites made from flax and glass fibres are studied. Understanding their fatigue performance is critical in order increase their current use.	**1109-1 QUANTIFICATION OF THE CRACK AREAS OF STABLE AND UNSTABLE CRACK PROPAGATION DURING SINGLE-FIBER PUSH-OUT TESTS PERFORMED ON CERAMIC MATRIX COMPOSITE SAMPLES** *Wolfgang M. Mueller (University of Augsburg), Judith Moosburger-Will (University of Augsburg), Michael Greisel (University of Augsburg), Siegfried Horn (University of Augsburg)* An approach for quantification of the relevant crack area at single-fiber pushout tests is presented resulting in a more reliable determination of interfacial properties of fiber-reinforced composites	**1110-1 MECHANICAL RESPONSE OF TYPICAL 2D C/SIC BEAMS UNDER DIFFERENT LOADING CASES** *Chengpeng Yang (northwestern polytechnical university), Bo wang (northwetern polytechnical university), Tao huang (northwestern polytechnical university)* The mechanical responses of two kinds of 2D C/SiC composite beams, I-sections and U-sections under different loading cases are investigated experimentally and numerically.
10:35	**1101-2 INTERDEPENDENCY OF WELDING SPEED AND DISTANCE BETWEEN COIL AND ROLLER DURING INDUCTION WELDING OF METAL AND GLASS FIBER REINFORCED POLYAMIDE 6** *Martina Hümbert (Institut für Verbundwerkstoffe), Peter Mitschang (Institut für Verbundwerkstoffe)* This study investigates the interdependency of welding speed and distance between coil and roller during continuous induction welding of glass fiber reinforced polyamide 6 and steel /aluminum.	**1102-2 INTERLAMINAR TOUGHENING OF RESIN TRANSFER MOULDED GLASS FIBRE EPOXY LAMINATES BY POLYCAPROLACTONE ELECTROSPUN NANOFIBRES** *Sam van der Heijden (Ghent University), Lode Daelemans (Ghent University), Bert De Schoenmaker (Ghent University), Ives De Baere (Ghent University), Hubert Rahier (vrije universiteit brussel), Wim Van Paepegem (Ghent University), Karen De Clerck (Ghent University)* Almost 100% improvement in mode I interlaminar fracture toughness could be achieved by electrospinning the PCL nanofibres on both sides of the glass fibre mats prior to impregnation.	**1103-2 INTERFACIAL EVALUATION OF CARBON REINFORCED NANO-COMPOSITES USING ELECTRICAL RESISTANCE MEASUREMENT WITH WETTING TESTS** *Dong-Jun Kwon (Gyeongsang National University), Zuo-Jia Wang (Gyeongsang National University), Pyeong-Su Shin (Gyeongsang National University), Jin-Yeong Choi (Gyeongsang National University), Lawrence DeVries (The University of Utah), Joung-Man Park (Gyeongsang National University)* Ultimately, it was demonstrated that mechanical property related to interfacial properties might potentially be predicted by electrical resistance measurement using empirical formulas and correlations	**1104-2 FATIGUE OF OUT-OF-PLANE FIBRE WAVINESS DEFECTS: EXPERIMENTAL AND NUMERICAL STUDY** *Supratik Mukhopadhyay (University of Bristol), Stephen Hallett (University of Bristol)* In this work, failure of laminates containing embedded fibre waviness or 'wrinkle' defect is investigated in tension-tension fatigue loading using both an experimental and numerical approach.	**1105-2 ULTIMATE STRENGTH PREDICTIONS OF IMPERFECT COMPOSITE PLATES** *Qiao Jie Yang (University of Oslo), Brian Hayman (University of Oslo)* A simplified, semi-analytical method to predict the buckling response and ultimate strength of FRP laminates is used in a parametric study of square and rectangular plates under in-plane compression.	**1106-2 FIRST STUDY ON USING HEAVY TOW FIBERS FOR TEXTILE PREFORM PROCESSES IN THE AEROSPACE INDUSTRY** *Daniel Gizik (Airbus Group Innovations), Christian Metzner (Airbus Group Innovations), Christian Weimer (Airbus Group Innovations), Peter Middendorf (University of Stuttgart)* A first investigation on the use of heavy tow carbon fibers for the aerospace industry is presented. Three commercial fibers were selected, spread to two areal weights and mechanical tests were done.	**1107-2 MODELING OF HEAT TRANSFER AND UNSATURATED FLOW IN WOVEN FABRICS DURING DIRECT INJECTION-PULTRUSION PROCESS OF THERMOPLASTIC COMPOSITES** *Arthur Babeau (Ecole Centrale de Nantes), Sébastien Comas-Cardona (Ecole Centrale de Nantes), Christophe Binetruy (Ecole Centrale de Nantes), Gilles Orange (Solvay)* In this work, a modeling of the thermoplastic pultrusion process is presented. A heat transfer model and a flow model are coupled. Data were measured on a pultrusion line to validate the models.		**1109-2 NEW CONTINUOUS FIBER REINFORCED THERMOPLASTIC COMPOSITES: AN ANALYSIS OF INTERFACIAL ADHESION FROM THE MICRO SCALE TO THE MACRO SCALE** *Johanna Beguinel (INSA Lyon), Frédéric Lortie (INSA Lyon), Jean-François Gérard (INSA Lyon), Jérôme Maupetit (CHOMARAT Textiles Industries), Pierre Gerard (ARKEMA)* Acrylic matrix/fiber interfaces were investigated by considering microcomposites. The study questions the relationships between wettability, work of adhesion, and practical adhesion at various scales.	**1110-2 INFLUENCE OF CARBON-FIBER SURFACE TREATMENT ON THE PROPERTIES OF C/C MATERIALS** *Simon J. A. Haug (University of Augsburg), Wolfgang M. Mueller (University of Augsburg), Siegfried R. Horn (University of Augsburg)* The influence of carbon fiber surface treatment on fiber matrix microstructure and adhesion in carbon fiber reinforced carbon materials (CFRC) was investigated.

Meeting room 5	Meeting room 6	Meeting room 7	M1	M2	M3	M4	M5	M6	M7	M8
Opening Ceremony										
Plenary: Integration of manufacturing and failure analyses for sustainable design of composites Ramesh Talreja, Texas A&M University, USA										
Coffee in the Exhibition										
1111 Textile-Based Composites and Fibre Architecture 1	**1112 Graphene, Graphene-Based Composites 1**	**1113 Dynamic Material Behaviour**	**1114 Fracture and Damage - Micromechanics 1**	**1115 Fracture and Damage - Laminate Scale 1**	**1116 Fracture and Damage - Delamination 1**	**1117 Constitutive Models 1**	**1118 Joints - Design, Manufacturing and Testing 1**	**1119 In-situ Micro-Mechanical Testing**	**1120 Applications - Offshore and Subsea**	**1121 Multifunctional Composites - Energy Storage and Harvesting 1**
KEYNOTE **1111-1 FATIGUE PERFORMANCE OF MICRO-FIBRILLATED CELLULOSE AND RUBBER NANOPARTICLE HYBRID EPOXY RESIN REINFORCED CARBON PLAIN WEAVE COMPOSITES** *Valter Carvelli (Politecnico di Milano), Andrea Betti (Politecnico di Milano), Toru Fujii (Doshisha University)* This work deals with the effects of hybrid epoxy resins, enhanced with micro-fibrillated cellulose and carboxylated nitrile-butadiene rubber nanoparticles, on the fatigue of carbon textile composites.	**1112-1 EFFECT OF REINFORCEMENT WEIGHT FRACTION AND DISPERSANTS ON MECHANICAL PROPERTIES OF GRAPHENE NANOCOMPOSITES** *Hsien-Kuang Liu (Feng Chia University), Yu-Chen Lin (Feng Chia University)* In this paper, GO and RGO graphenes are incorporated into polyvinyl alcohol and epoxy matrices as reinforcements to fabricate four kinds of nanocomposites with and without dispersant addition.	**1113-1 AN INVERSE ESTIMATION OF HIGH STRAIN RATE PROPERTIES OF COMPOSITE MATERIAL CONSTITUENTS** *Stanley Chacko Salem (The University of Nottingham), Arthur Jones (The University of Nottingham), Richard Brooks (The University of Nottingham), Mark Jonathan Lidgett (EPL Composite Solutions Ltd)* This paper is on inverse estimation of high strain rate properties of composite materials constituents using micro scale finite element model and numerical optimisation.	**1114-1 MICROSCOPIC PROGRESSIVE DAMAGE AND FAILURE ANALYSIS OF CARBON-FIBER REINFORCED COMPOSITE UNDER SHEAR LOADING** *Geng Han (Beihang University), Zhidong Guan (Beihang University), Mi Zhang (Beihang University), Zhaojie Ji (Beihang University), Shengzhe Li (Beijing), Shanyi Du (Beihang University)* The experimental method and a unit cell of fiber random distribution are used to analyze the damage initiation and evolution process of carbon fiber-reinforced composite under shear loading.	**1115-1 EFFECTS OF SPECIMEN WIDTH ON THE TENSILE STRENGTH OF ALIGNED SHORT-CARBON-FIBER REINFORCED EPOXY COMPOSITE LAMINATES** *Wen-Xue Wang (Kyushu University), Hang Li (Hunan University), Terutake Matsubara (Kyushu University), Dongmei Luo (Foshan University), Jia Xue (Beijing Aeronautical Science & Technology Research Institute)* This study investigates the size effects of specimen width on the tensile testing properties of various aligned short carbon fiber reinforced epoxy composite laminate. Significant effects are found.	**1116-1 INFLUENCE OF SPAN RATIO ON THE FOUR-POINT BEND END NOTCHED FLEXURE TEST** *Biao Li (Northwestern Polytechnical University), Yazhi Li (Northwestern Polytechnical University)* The inner to outer span ratio of four-point bend End Notched Flexure has little influence on the determination of mode II fracture toughness. The toughness value from natural crack should be used.	**1117-1 A GENERAL BEHAVIOR LAW IN ORDER TO MODEL THERMOSET AND THERMOPLASTIC COMPOSITE MATERIALS SUBJECTED TO DYNAMICS LOADS** *Patrick Rozycki (Ecole Centrale de Nantes), Laurent Gornet (Ecole Centrale de Nantes)* The paper deals with a unified behaviour law dedicated to the numerical simulations of thermoset and thermoplastic composite materials under rapid dynamic loadings.	**KEYNOTE** **1118-1 NUMERICAL AND EXPERIMENTAL INVESTIGATION OF CFRP TO PERFORATED STEEL JOITNS** *Evangelos Ioannis Avgoulas (University of Cambridge), Michael Sutcliffe (University of Cambridge)* Biomimetic inspired co-infused perforated steel to CFRP joint configurations that offer a transitional zone of stiffness in the joint site were numerically and experimentally investigated.	**1119-1 IN-SITU MONITORING OF COMPOSITE FAILURE BY COMPUTING TOMOGRAPHY AND ACOUSTIC EMISSION** *Sinan Kalafat (University of Augsburg), Andreea-Manuela Zelenyak (University of Augsburg), Markus Sause (University of Augsburg)* Carbon/Epoxy specimens are loaded in-situ in a commercial computing tomography device. Acoustic Emission is simultaneously recorded and the detected signals are compared to model predictions.	**1120-1 NUMERICAL SIMULATION OF STATIC MECHANICAL BEHAVIOR OF COMPOSITE WIND-BLADE - IMPLICATIONS ON FABRICATION TECHNOLOGIES** *Monssef DRISSI-HABTI (IFSTTAR), Venkadesh RAMAN (IRT Jules VERNE)* Wind turbine blade was simulated to optimise the layup and thickness. The adhesive material used to join the blade edges was included in the numerical study.	**1121-1 FIBER REINFORCED PIEZOELECTRIC COMPOSITES** *Christopher C. Bowland (University of Florida), Mohammad H. Malakooti (University of Florida), Hyun-Sik Hwang (University of Florida), Henry A. Sodano (University of Florida)* Multifunctional carbon fiber composites are fabricated utilizing the piezoelectric property of nanostructured zinc oxide and barium titanate deposited on Kevlar and carbon fiber fabrics.
	1112-2 ENHANCED DAMPING PROPERTIES OF GRAPHENE/NICKEL FOAM FILLED EPOXY COMPOSITES *You Zeng (Institute of Metal Research-Chinese Academy of Sciences), Han Wang (Institute of Metal Research-Chinese Academy of Sciences), Zhe Ying (Institute of Metal Research-Chinese Academy of Sciences), Minghe Fang (Institute of Metal Research-Chinese Academy of Sciences), Hui-Ming Cheng (Institute of Metal Research-Chinese Academy of Sciences)* Graphene/Ni-foam filled epoxy composites exhibit much higher flexural modulus and larger energy dissipation than neat epoxy due to remarkable Ni reinforcement and rich interfaces of the nanocomposites	**1113-2 INVESTIGATION OF THE DYNAMIC BEHAVIOUR OF EPOXY REINFORCED NANOSILICA AND MICROPARTICULATE RUBBER COMPOSITES THROUGH ANALYTICAL-EXPERIMENTAL TRANSFER FUNCTIONS** *Gabriel Mansour (Aristotle University of Thessaloniki), Konstantinos Tsongas (Aristotle University of Thessaloniki), Dimitrios Tzetzis (International Hellenic University)* An efficient identification method for modal testing of epoxy reinforced with nanosilica and CTBN rubber is demonstrated in this paper, through the analytical-experimental transfer function method.	**1114-2 FAILURE PROPERTIES OF BISMALEIMIDE THERMOSETTING RESINS FOR HIGH PERFORMANCE CARBON FIBRE REINFORCED COMPOSITES** *Guillaume Fischer (Airbus Group Innovations), Bruno Bresson (UMR CNRS 7615 - ESPCI ParisTech), Matteo Ciccotti (UMR CNRS 7615 - ESPCI ParisTech), Jacques Cinquin (Airbus Group Innovations), Frédéric Lortie (UMR CNRS 5223 - INSA de Lyon), Jean-François Gérard (UMR CNRS 5223 - INSA de Lyon)* The effect of several thermoplastics on the failure behaviour of a typical bismaleimide resin has been investigated with a time resolved method using AFM imaging.	**1115-2 PREDICTING THE FAILURE OF POLYMER MATRIX COMPOSITES INCORPORATING THE EFFECTS OF PROCESSING** *Brent Volk (Air Force Research Laboratory), Michael Braginsky (Air Force Research Laboratory), Ray Coomer (Air Force Research Laboratory), Endel Iarve (Air Force Research Laboratory), David Mollenhauer (Air Force Research Laboratory), Tara Storage (Air Force Research Laboratory)* A methodology used to incorporate the effects (i.e. residual stresses) due to processing on the resulting strength of organic matrix composites is demonstrated.	**1116-2 INFLUENCE OF REINFORCEMENT DESIGN ON DELAMINATION RESISTANCE & MECHANICAL PROPERTIES OF CFRP/CFRP JOINTS UNDER STATIC & FATIGUE LOADING** *Michael Jürgens (Airbus Group), Ana Carolina Nogueira (Fraunhofer), Holger Lang (Fraunhofer), Elke Hombergsmeier (Airbus Group), Klaus Drechsler (Technische Universität München)* Multidimensional metallic reinforcements significantly increase mode II fracture toughness of CFRP joints and laminates by milli- and nanoscaled mechanical interlocking and plastic shear deformation.	**1117-2 MODELLING THE HYSTERESIS COMPOSITE BEHAVIOR USING AN ELASTO-PLASTO-DAMAGE MODEL WITH FRACTIONAL DERIVATIVE** *Alina Krasnobrizha (Ecole Centrale de Nantes), Patrick Rozycki (Ecole Centrale de Nantes), Laurent Gornet (Ecole Centrale de Nantes), Pascal Cosson (Ecole Centrale de Nantes)* The proposed model is dedicated to composites material and composed of an elasto-plastic damage behavior law which is strain rate responsive and fractional derivatives to represent hysteretic loops.		**1119-2 DYNAMIC VISUALIZATION OF FIBER PULL-OUT BY X-RAY PCI** *Matthew Hudspeth (Purdue University), Wayne Chen (Purdue University)*	**1120-2 ANALYSIS OF BENDING AND TENSILE BEHAVIOR OF CFRP STRANDED AND SPIRAL CABLES USING A NUMERIC MODEL** *Felipe Luz (Federal University of Rio Grande do Sul), Laís Silva (Federal University of Rio Grande do Sul), Carlos Cimini (Federal University of Minas Gerais), Sandro Amico (Federal University of Rio Grande do Sul)* In this study, a CFRP Spiral composite cable was analyzed in order to evaluate their bending and tensile behavior as compared to a similar Stranded composite cable.	**1121-2 REALISATION OF STRUCTURAL BATTERY COMPOSITE MATERIALS** *Leif Asp (Swerea SICOMP), Simon Leijonmarck (Swerea SICOMP), Tony Carlson (Swerea SICOMP), Göran Lindbergh (KTH)* The paper presents details on the development of carbon fibre structural battery composite materials, and their devices, and the rationale for developing them.

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16
10:55	**1101-3 INFLUENCE OF TEMPERATURE ON STRENGTH AND FAILURE MECHANISMS OF RESISTANCE WELDED THERMOPLASTIC COMPOSITES JOINTS** *Nikos Koutras (TU Delft), Irene Fernandez Villegas (TU Delft), Rinze Benedictus (TU Delft)* Exposure of resistance welded thermoplastic composites joints at various temperatures up to 150°C result in strength reduction and changes in failure mechanisms.	**1102-3 A UNIFIED MODEL FOR THE PREDICTION OF YIELD STRENGTH IN PARTICULATE-REINFORCED METAL MATRIX NANOCOMPOSITES** *Foisal Mirza (Ryerson University), Daolun Chen (Ryerson University)* A unified model incorporating five factors (Orowan strengthening, load bearing, CTE mismatch, grain size, and porosity) is developed to predict the yield strength of metal matrix nanocomposites.	**1103-3 DESIGN AND CHARACTERIZATION OF PRESSURE, TEMPERATURE AND MOISTURE SENSORS BASED ON MWCNT-COMPOSITES** *Sergei Sapozhnikov (South Ural State University), Ruslan Abdrakhimov (South Ural State University), Alexander D'yakonov (South-Urals State University)* There were developed MWCNT-composite sensors with epoxy, PVA, rubber and glass matrices for direct measurement of external pressure, temperature and moisture changing with use of TAUNIT as nanofiller.	**1104-3 THE EFFECT OF FIBER WAVINESS AS MANUFACTURING DEFECT ON THE FATIGUE LIFE OF LAMINATED CFRP** *Susanne Hörrmann (Johannes Kepler University), Christoph Viechtbauer (Johannes Kepler University), Adi Adumitroaie (Johannes Kepler University), Martin Schagerl (Johannes Kepler University)* Damage initiation and progression of CFRP specimens with waviness out-of-plane are experimentally and numerically investigated, loaded in axial C-C and T-C and considering the geometry influence.	**1105-3 BUCKLING AND VIBRATION CHARACTERISTICS OF THIN-WALLED LAMINATED COMPOSITE BEAMS HAVING OPEN AND CLOSED SECTIONS** *Arash Asadi (University of Adelaide), Abdul Hamid Sheikh (University of Adelaide), Ole Thybo Thomsen (University of Southampton)* An efficient 1D beam finite element considering coupling between different deformation modes is proposed for buckling and vibration of thin-walled laminated composite beams having open/closed section.	**1106-3 REDUCING MANUFACTURING COSTS BY DIRECT ROVING PLACEMENT** *Yannis Grohmann (German Aerospace Center (DLR e.V.)), Niels Stoffers (German Aerospace Center (DLR e.V.)), Alexandra Kühn (German Aerospace Center (DLR e.V.)), Thorsten Mahrholz (German Aerospace Center (DLR e.V.)), Stefan Schmidt (German Aerospace Center (DLR e.V.)), Felix Kruse (German Aerospace Center (DLR e.V.))* The DRP technology lowers manufacturing costs for dry fiber preforms. This can be achieved by directly processing raw fiber material combined with an online binder application for the fiber fixation.	**1107-3 NON ISOTHERMAL REACTIVE FLOW MODELLING IN PULTRUSION PROCESS LOOKING TOWARD VOIDS PREDICTION** *Pierpaolo Carlone (University of Salerno), Gaetano Palazzo (University of Salerno)* An impregnation model for pultrusion, based on a non-homogeneous non-isothermal/reactive multiphase approach, is reported. Resin flow and pressure at die inlet are inferred, aiming to void prediction.	**1108-2 RELATIONSHIP BETWEEN FIBER ORIENTATION ANGLE AND STATIC BENDING CHARACTERISTIC OF LAMINATED BAMBOO PLATES** *Kazufumi UDA (Kanagawa Institute of Technology)* An evaluation of the bending characteristics of bamboo-fiber-laminated plates with fiber orientation angles at 15° intervals in the range from 0° to 90°. The applications to an EV were demonstrated.	**1109-3 IMPROVING INTERFACIAL STRESS TRANSFER IN GLASS FIBER POLYMER COMPOSITES THROUGH GRAPHITE NANOPLATELETS** *Alessandro Pegoretti (University of Trento), Diego Pedrazzoli (University of Trento), Kyriaki Kalaitzidou (Georgia Institute of Technology)* This study focuses on the effects of graphite nanoplatelets dispersed in polymer composites reinforced with short glass fibers. As matrices, both isotactic polypropylene and an epoxy resin, were used.	**1110-3 ELECTRO DISCHARGE MACHINABLE ALUMINA-BASED NANOCOMPOSITES** *Luis Antonio Diaz Rodriguez (Nanomaterials and Nanotechnology Research Center CINN-CSIC-UNIOVI-PA), Anna Okunkova (State University of Technology STANKIN), Washintong Solis (State University of Technology STANKIN), Pavel Peretyagin (State University of Technology STANKIN), Francisco José Gotor (Instituto de Ciencia de Materiales de Sevilla ICMS-US), Ramón Torrecillas (Nanomaterials and Nanotechnology Research Center CINN-CSIC-UNIOVI-PA), Ramón Torrecillas (State University of Technology STANKIN)* EDM ceramic composites consisting of a base non-conductive ceramic component such Al203, and electro-conductive ceramic nanoparticles such TiC, TiNC, NbNC, TaNC, and also SiC whiskers.
11:15	**1101-4 NUMERICAL SIMULATION BASED PROCESS DEVELOPMENT OF THE NOVEL THERMOCLINCHING TECHNOLOGY FOR TEXTILE REINFORCED THERMOPLASTICS** *Maik Gude (Technische Universität Dresden), Christian Vogel (Technische Universität Dresden), Andreas Freund (Technische Universität Dresden)* Based on a developed process simulation concept a numerical parameter study is carried out to support the experimental studies of the specific deformation phenomena in the thermoclinching joining zone	**1102-4 HIGH TEMPERATURE HYBRID COMPOSITES FOR THERMAL BARRIER APPLICATIONS** *Luis C. Herrera-Ramirez (IMDEA Materials Institute), Juan C. Fernandez (Universidad Politecnica Madrid), Roberto Guzman De Villoria (IMDEA Materials Institute)* In order to improve the thermal and electrical properties of a polymeric matrix, hollow glass microspheres and carbon nanotubes-hollow glass microspheres hybrids were added.	**1103-4 3D PRINTING OF CONDUCTIVE NANOCOMPOSITES FOR LIQUID SENSOR APPLICATION** *Kambiz Chizari (École Polytechnique de Montreal), Anil Raj Ravindran (École Polytechnique de Montreal), Daniel Therriault (École Polytechnique de Montreal)* 3D printing of conductive nanocomposite was used for investigation of the influence of structural parameters in scaffold configurations for their application as liquid sensors.	**1104-4 EFFECT OF STRESS RATIO ON FATIGUE CHARACTERISTICS IN THE OUT-OF-PLANE DIRECTION OF THICK CFRP LAMINATES WITH TOUGHENED INTERLAMINAR** *Atsushi Hosoi (Waseda University), Shigeyoshi Sakuma (Waseda University), Yuzo Fujita (Toray Industries-Inc.), Ichiro Taketa (Toray Industries-Inc.), Hiroyuki Kawada (Waseda University)* The effect of the stress ratio on fatigue characteristics in the out-of-plane direction of thick CFRP laminates with toughened interlaminar layers was evaluated quantitatively.	**1105-4 OPTIMIZATION OF NON-SYMMETRIC COMPOSITE PANELS USING FAST ANALYSIS TECHNIQUES** *Riccardo Vescovini (Politecnico di Milano), Chiara Bisagni (Politecnico di Milano)* A semi-analytical approach is presented for the optimization of laminated panels with nonsymmetric lay-ups with buckling, postbuckling and eigenfrequencies requirements.	**1106-4 IMPROVEMENT OF FIBRE PLACEMENT ACCURACY IN CONTINUOUS TOW SHEARING PROCESS** *Byung Chul Kim (University of Bristol), Evangelos Zympeloudis (University of Bristol)* Continuous Tow Shearing (CTS) is a new fibre placement technology that can steer the tow without causing the defects. In this work, the method to improve its layup accuracy was developed and tested.	**1107-4 NUMERICAL INVESTIGATION ON THE STRESS DISTRIBUTION FOR HOLLOW COMPOSITE STRUCTURES DUE TO OVERMOLD-ING** *Alexander Liebsch (Institute of Lightweight Design and Polymer Technologies), Andreas Freund (Institute of Lightweight Design and Polymer Technologies), Robert Kupfer (Institute of Lightweight Design and Polymer Technologies), Maik Gude (Institute of Lightweight Design and Polymer Technologies)* In the present work, a simulation method to analyze the deformation behavior of a hollow profile and the supporting core during the injection molding process was approved.	**1108-3 MECHANICAL PERFORMANCE AND FRACTURE CHARACTERISTIC OF BAMBOO FIBER REINFORCED POLYETHYLENE BIOCOMPOSITES PREPARED BY ROTATIONAL MOLDING** *Supaphorn Thumsorn (Rajamangala University of Technology Thanyaburi), Jitlada Boonlertsamut (Rajamangala University of Technology Thanyaburi), Thanadol Petchnoi (Rajamangala University of Technology Thanyaburi), Saowaluk Boonmawieng (Rajamangala University of Technology Thanyaburi), Narongchai O-Charoen (Rajamangala University of Technology Thanyaburi), Hiroyuki Hamada (Kyoto Institute of Technology)* LLDPE/bamboo fiber composites were made by rotational molding. LLDPE-g-MA was used to improve adhesion in the composites. BF enhanced tensile modulus, hardness and crystallinity of the composites.	**1109-4 LASER SHOCK TEST APPLICATION FOR MECHANICAL CHARACTERISATION OF FIBRE/MATRIX INTERFACE** *Amélie Perrier (Institut Pprime-CNRS-ISAE-ENSMA-Université de Poitiers UPR 3346), Romain Ecault (Institut Pprime-CNRS-ISAE-ENSMA-Université de Poitiers UPR 3346), Fabienne Touchard (Institut Pprime-CNRS-ISAE-ENSMA-Université de Poitiers UPR 3346), Maria Vidal Urriza (Institut Pprime-CNRS-ISAE-ENSMA-Université de Poitiers UPR 3346), Jacques Baillargeat (Institut Pprime-CNRS-ISAE-ENSMA-Université de Poitiers UPR 3346), Laurence Chocinski-Arnault (Institut Pprime-CNRS-ISAE-ENSMA-Université de Poitiers UPR 3346), Michel Boustie (Institut Pprime-CNRS-ISAE-ENSMA-Université de Poitiers UPR 3346)* The aim of this work is to study the ability of laser shock technique to characterise fibre/matrix adhesion in composites and also the influence of water ageing on this interface.	**1110-4 AN IMPROVED SHEAR-LAG MODEL FOR NEEDLE-PUNCHED CARBON/CARBON COMPOSITE LAMINATES** *Yongzhen Jia (Huazhong University of Science and Technology), Dunming Liao (Huazhong University of Science and Technology), Hong Cui (Xi'an Aerospace Composites Research Institute), Alin Ji (Xi'an Aerospace Composites Research Institute), Xia Bai (Xi'an Aerospace Composites Research Institute)* Based on the finite difference method and the shear-lag theory, this paper analyzed the stress concentrations in a needle-punched C/C composite laminate.

Meeting room 5	Meeting room 6	Meeting room 7	M1	M2	M3	M4	M5	M6	M7	M8
1111-2 A STUDY ON THE MECHANICAL PROPERTIES AND FORMABILITY PERFORMANCE OF STRETCH-BROKEN CARBON FIBER REINFORCED THERMOPLASTIC COMPOSITES *Patcharat Wongsriraksa (Kanazawa Institute of Technology), Mitsugu Kimizu (Industrial Research Institute of Ishikawa), Kiyoshi Uzawa (Kanazawa Institute of Technology), Isao Kimpara (Kanazawa Institute of Technology)* The purpose of this research is to study the effect of stretch-broken carbon fiber on mechanical properties and formability performance of the composites made with SBCF compared to CCF.	**1112-3 EFFECT OF GRAPHENE NANOPLATELETS FEATURES ON CURE KINETICS OF BENZOXAZINE COMPOSITES** *Vanessa Garcia (FIDAMC,Getafe (Madrid), Spain) María R. Gude (FIDAMC,Getafe (Madrid),Spain), Alejandro Ureña (Department of Applied Mathematics, Materials Science and Engineering and Electronics Technology, Universidad Rey), Juan Carlos (Móstoles (Madrid), Spain)*	**1113-3 CHARACTERISATION OF E-GLASS/VINYLESTER COMPOSITES SUBJECTED TO IN-PLANE AND OUT-OF-PLANE HIGH STRAIN RATE COMPRESSIVE LOADING: EXPERIMENTAL DATA AND NUMERICAL SIMULATION** *Jamal Arbaoui (ENSTA Bretagne), Mostapha Tarfaoui (ENSTA Bretagne), Aboulghit El Malki (ENSTA Bretagne)* This paper presents the in-plane and out-of-plane compression behavior of an E-glass fiber reinforced vinylester composite, which was tested in Split Hopkinson Pressure Bar, and modeled with Abaqus.	**1114-3 MICROMECHANICAL MODELLING OF NON-HOMOGENOUS MATERIALS BY MESHLESS METHODS** *Nelson Muthu (IIT Bombay), Brian Falzon (Queen's University Belfast), Surjya Maiti (IIT Bombay), Wenyi Yan (Monash University)* The element-free Galerkin (EFG) method is used to investigate the micromechanics of crack propagation in composite material. Two approaches for representing the bi-material interface are examined.	**1115-3 IMPACT DAMAGE EVALUATION AND REPAIR TECHNIQUE OF COMPOSITE LAMINATE FOR STRUCTURAL DESIGN OF SMALL SCALE AIRCRAFT** *Hyunbum Park (Howon University)*	**1116-3 THE INFLUENCE OF MECHANICAL TEST PARAMETERS ON THE OUTCOME OF THE END NOTCH FLEXURE TEST FOR MODE II FRACTURE TOUGHNESS.** *Ives De Baere (Ghent University), Stefan Jacques (Ghent University), Wim Van Paepegem (Ghent University), Joris Degrieck (Ghent University)* A mainly numerical evaluation of some experimental parameters, influencing the outcome of the end notch flexure test for the determination of the Mode II fracture toughness.	**1117-3 AN ELASTO-PLASTIC MODEL TO PREDICT PERMANENT INDENTATION DUE TO IMPACT AND QUASI-STATIC INDENTATION ON COMPOSITE LAMINATES** *Zhaojie Ji (Beihang University), Zhidong Guan (Beihang University), Zengshan Li (Beihang University), Wei He (Beihang University), Geng Han (Beihang University), Tianya Bian (Beihang University)* a finite element model based on an anisotropic elasto-plastic theory was established to capture permanent indentations on composite laminates under low velocity impact and quasi-static indentation.	**1118-2 PERFORMANCE OF VARIOUS DESIGNS OF HYBRID LOOP-LOADED CFRP-TITANIUM STRAPS** *Holger Büttemeyer (Faserinstitut Bremen e.V.), Patrick Schiebel (Faserinstitut Bremen e.V.), Axel S. Herrmann (Universität Bremen)* Investigation of hybrid straps with different flange designs, varying in radius and the quantity of the loops. The influence on the tensile strength depending on these designs has been tested.	**1119-3 IN-SITU EXPERIMENTAL CHARACTERIZATION OF INTERFACIAL TOUGHNESS OF ALUMINUM THIN FILMS ON POLYIMIDE SUBSTRATES** *Emanuele Cattarinuzzi (Politecnico di Milano), Riccardo Lucchini (Politecnico di Milano), Dario Gastaldi (Politecnico di Milano), Pasquale Vena (Politecnico di Milano), Leandro Lorenzelli (Fondazione Bruno Kessler), Johan P. M. Hoefnagels (Technical University of Eindhoven)* The adhesion of Aluminum thin films on Polyimide substrates was measured by means of peel tests. In-situ light microscopy of the peel front enabled comprehensive interpretation of the peel force trend	**1120-3 THERMOPLASTIC COMPOSITES FOR UNDERWATER APPLICATIONS** *Mael Arhant (Ifremer), Peter Davies (Ifremer), Christian Burtin (Ecole Centrale de Nantes), Christophe Briançon (CETIM)* Carbon fibre reinforced polyamide thermoplastic composites have been tested in compression before and after seawater aging. Implosion tests were performed and compared to carbon/epoxy tube results.	**1121-3 STRENGTH OF THIN SOLID POLYMER ELECTROLYTE COATINGS AND THE COATED CARBON FIBRES** *Simon Leijonmarck (Swerea SICOMP), Andrejs Pupurs (Luleå University of Technology), Leif Asp (Swerea SICOMP), Göran Lindbergh (KTH), Janis Varna (Luleå University of Technology)* Polymer coated carbon fibres for use in structural batteries were investigated with respect to the durability of the polymer after mechanical cycling. No failures in the coatings could be found.
1111-3 COMPARISON OF C-PLY SP (THIN PLY) WITH WOVEN FABRIC AND UD PERFORMANCES *Vicky Singery (CHOMARAT Textiles Industries), Thomas Roure (CHOMARAT Textiles Industries), Philippe Sanial (CHOMARAT Textiles Industries), Jean-François Osselin (Université de Haute Alsace), Jean-Yves Drean (Université de Haute Alsace)* Investigation of C-Ply™ performances and comparison with two different kinds of textile reinforcements : one woven fabric and one unidirectional tape already qualified for Aerospace applications.		**1113-4 NUMERICAL SIMULATION OF TRIAXIAL BRAIDED TEXTILE UNDER BALLISTIC IMPACT BASED ON MESO-SCALE MODELING METHODS** *Lulu Liu (Nanjing University of Aeronautics and Astronautics), Wei Chen (Nanjing University of Aeronautics and Astronautics), Minghua He (Tsinghua University), Gang Luo (Nanjing University of Aeronautics and Astronautics), Zhenhua Zhao (Nanjing University of Aeronautics and Astronautics)* meso-scale model methods based on yarn architecture of triaxial braided composites were employed to investigate its dynamic response, failure modes and energy absorption in LS-DYNA.	**1114-4 STRESS CONCENTRATION FACTOR OF MATRIX IN COMPOSITE UNDER TRANSVERSE LOAD** *Zheng-Ming Huang (Tongji University), Li-Min Xin (Tongji University)* Closed-form formulae for stress concentration factors of the matrix in a composite subjected to transverse loads are obtained, which are essential for micromechanical strength prediction of it	**1115-4 DISCRETE DAMAGE MODELING IN LAMINATED COMPOSITES UNDER FATIGUE LOADING** *Endel Iarve (University of Dayton Research Institute), Kevin Hoos (University of Dayton Research Institute), David Mollenhauer (Air Force Research Laboratory)* The Discrete Damage Modeling method was extended for fatigue loading simulation. Delamination and matrix cracking extent in open laminates was predicted and showed good comparison with experiment.	**1116-4 EXPERIMENTAL AND NUMERICAL INVESTIGATION ON THE FRACTURE PROPERTIES OF NANO-MODIFIED COMPOSITES** *Ali Naem S Alamry (UNSW), B. Gangadhara Prusty (UNSW), S Natarajan (Indian Institute of Technology), Sri Bandyopadhyay (UNSW)* This paper presents an experimental and a numerical investigation of fracture resistance of nano-modified composites.The MWCNTs were dispersed by a novel dispersion technique developed in-house.		**1118-3 EXPERIMENTAL INVESTIGATION OF MECHANICAL FASTENERS REGARDING THEIR INFLUENCE ON CRACK GROWTH IN ADHESIVELY BONDED CRFP-JOINTS SUBJECTED TO FATIGUE LOADING** *Ronny Sachse (Institut of Aircraft Design), Anthony Pickett (Institut of Aircraft Design), Wolfgang Adebahr (Institut für Kunststofftechnik), Moritz Käß (Institut of Aircraft Design), Peter Middendorf (Institut of Aircraft Design)* The capability of different fasteners to slow down and arrest crack growth in adhesively bonded CFRP-joints has been shown and associated crack arresting mechanisms have been identified.	**1119-4 STRAIN RATE DEPENDENT FAILURE OF GLASS/EPOXY INTERFACES AT NANO-MICROSCALE VIA NANOIMPACT EXPERIMENTS** *Vikas Tomar (Purdue University West Lafayette), Devendra Verma (Purdue University West Lafayette)* The mechanical strength of metallic interfaces is characterized at strain rates approaching 400 s-1. The JC model is fitted to show the effect of loading and interface structural inhomogeneity.	**1120-4 THERMOPLASTIC COMPOSITE PIPE; OPERATIONAL EXPERIENCE IN DEEPWATER AND TECHNOLOGY QUALIFICATION APPROACH** *Bart Steuten (Airborne Oil & Gas), Marcus Kremers (Airborne Oil & Gas), Henk de Boer (Airborne Oil & Gas), Jens de Kanter (Airborne Oil & Gas)* A verification of the TCP residual life during and after severe offshore usage for pipeline pre-commissioning, confirming the suitability of TCP for future use in other oilfield applications.	**1121-4 MOLECULAR DYNAMICS MODELLING OF STRUCTURAL BATTERY COMPONENTS** *Osvalds Verners (TU Delft), Adri van Duin (Penn State University), Marnix Wagemaker (TU Delft), Angelo Simone (TU Delft)* A crosslinked solid polymer electrolyte reactive molecular dynamics study of pressure equilibrium, plasticizer and anion effects on Li ion diffusivity and transport mechanisms is presented.

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16
11:35	**1101-5 THE INFLUENCE OF MOISTURE CONTENT ON THE WELD SEAM QUALITY FOR LASER WELDED THERMOPLASTIC COMPOSITES** *Verena Wippo (Laser Zentrum Hannover e.V.), Peter Jaeschke (Laser Zentrum Hannover e.V.), Oliver Suttmann (Laser Zentrum Hannover e.V.), Ludger Overmeyer (Laser Zentrum Hannover e.V.)* The influence of the moisture content on the weld seam quality of laser welded endless glass fiber reinforced polyetherimide (GF PEI) welded to GF PEI containing carbon black was investigated.	**1102-5 MORPHOLOGY, THERMAL DEGRADATION AND MECHANICAL PROPERTIES OF BIODEGRADABLE POLYESTER BLENDS AND NANOCOMPOSITES** *Riaan Luyt (University of the Free State), Julia Mofokeng (University of the Free State)* Morphology and properlends and nanocomposites of PLA and PCL blends and titania containing nanocomposites prepared through melt mixing and compression moulding.	**1103-5 ANALYSIS OF SMART MAGNETOELECTRIC REINFORCED PLATES** *Demetra Hadjiloizi (Cyprus University of Technology), Alexander Kalamkarov (Dalhousie University), Chariklia Metti (Cyprus University of Technology), Pedro Pacheco (CEFET/RJ), Marcelo Savi (COPPE-Universidade Federal do Rio de Janeiro), Tasos Georgiades (Cyprus University of Technology)* A comprehensive micro-mechanical model for the analysis of smart composite and reinforced piezo-magne-to-thermo-elastic thin plates is developed on the basis of asymptotic homogenization.		**1105-5 ANISOGRID COMPOSITE LATTICE FLOOR BEAM STRUCTURES FOR COMMERCIAL AIRPLANES** *Alexander Razin (Central Research Institute of Special Machinery), Valery Vasiliev (Central Research Institute of Special Machinery), Vyacheslav Barynin (Central Research Institute of Special Machinery), Andrey Azarov (Central Research Institute of Special Machinery)* The paper is concerned with design, analysis, fabrication and testing of Anisogrid (Anisotropic Grid) composite lattice floor beams for the fuselage of a commercial airplane.	**1106-5 NOVEL 3D PREFORM ARCHITECTURE FOR IMPROVED PERFORMANCE OF STRUCTURAL BEAMS** *Nandan Khokar (Biteam AB), Stefan Hallström (Div. of Lightweight Structures), Fredrik Winberg (Biteam AB)* The paper presents a new class of composite beams produced with an Add-on textile technology demonstrated by producing and testing I-beams with full interlacement of 0/90° flanges and a ±45 web.	**1107-5 MODELLING PRESSURE DISTRIBUTION DURING COOLING OF RANDOMLY-ORIENTED STRAND CARBON/PEEK COMPOSITES** *Benoit Landry (McGill University), Pascal Hubert (McGill University)* A model was developed to predict defect formation during compression moulding of ROS carbon/PEEK composites. It was validated by comparing the predicted defects with those found on moulded panels.	**1108-4 A COMPARATIVE STUDY OF IMPACT PERFORMANCE AND POST-IMPACT STRENGTH OF HIGH VOLUME FRACTION RESIN TRANSFER MOULDED FLAX AND GLASS FIBRE EPOXY LAMINATES** *Henry Ling (University of Auckland), Mark Battley (University of Auckland), Tom Allen (University of Auckland)* Experimental comparison of tensile, compressive and impact performance of flax and glass fibre laminates. Flax-fibre laminates were shown to have lower specific and absolute properties than glass.	**1109-5 INTERFACIAL IMPROVEMENT FOR CARBON FIBER/ EPOXY RESIN MONOFILAMENT COMPOSITE MODIFIED WITH GRAPHENE OXIDE** *Ye Li (Beihang University), Yan Zhao (Beihang University), Junlin Chen (Beihang University), Zhe Yang (Beihang University), Yue Hao (Beihang University), Jianming Sun (Beihang University)*	**1110-5 NANOSTRUCTURED HYBRID CARBON NANOTUBE-CERAMICS HETEROSTRUCTURES MICROSTRUCTURE EVOLUTION AND FORMING MECHANISM** *Changqing Hong (Harbin Institute of Technology)* The interest in carbon nanotubes (CNTs) as reinforcements for ceramic and ceramic matrix composites has been growing considerably. However, the dispersion effect and mechanical properties for CNTs-ceramics are not as satisfactory as anticipated.
11:55	**1101-6 INFLUENCE OF SURFACE PREPARATION ON FUSION BONDING OF THERMOPLASTIC COMPOSITES** *Francisco Sacchetti (ThermoPlastic composites Reserch Center), Wouter J. W. Grouve (ThermoPlastic composites Reserch Center), Laurent L. Warnet (University of Twente), Irene Fernandez Villegas (Delft University of Technology)* The contamination of the surface of laminate due to the release media and its effect on the mechanical performance of fusion bonded joints is the subject of this study.	**1102-6 SOUND ABSORPTION OF ELECTROSPUN POLYVINYLIDENE FLUORIDE/ CARBON NANOTUBE MEMBRANES** *Chang-Mou Wu (ational Taiwan University of Science and Technology), M. H. Chou (National Taiwan University of Science and Technology)* Effects of β-phase crystallinity and piezoelectricity of electrospun CNT/PVDF on the sound-absorbing were studied. Novel sound-absorbing material especially at low and middle frequency was developed.			**1105-6 COUPLING EFFECT OF COMPOSITE BLADE UNDER FLUID STRUCTURE INTERACTION** *Zhang Long (Northwestern polytechnical University), Huang Tao (Northwestern Polytechnical University), Jia Purong (Northwestern Polytechnical University), Jiao Guiqiong (Northwestern Polytechnical University)* The blade under fluid field was simulated by both CFD and FSI methods. the responses of blade structure and fluid field was compared through the finite element analysis.	**1106-6 ACTIVE CONTROL OF TEXTILE FORMING PROCESSES** *Thomas Gereke (Technische Universität Dresden-Institute of Textile Machinery and High Performance Material Technology), Farbod Nosrat Nezami (Daimler AG), Matthias Hübner (Technische Universität Dresden-Institute of Textile Machinery and High Performance Material Technology), Oliver Döbrich (Technische Universität Dresden-Institute of Textile Machinery and High Performance Material Technology), Chokri Cherif (Technische Universität Dresden-Institute of Textile Machinery and High Performance Material Technology)* Simulation approaches for modelling the drape process and a tailored forming process of carbon fibre fabrics are presented with a complex automotive structural part as example.	**1107-6 MULTI-SCALE, MULTI-PHYSICAL PROCESS SIMULATION OF THE PRODUCTION OF MULTICURVED CFRP REINFORCEMENTS** *Michael Scheerer (Aerospace & Advanced Composites GmbH), Zoltan Simon (Aerospace & Advanced Composites GmbH), Tim Roser (Airbus Helicopters), Bernhard Rittenschober (ALPEX Technologies GmbH), Raphael Reinhold (Broetje Automation), Sebastian Schmidhuber (Krauss Maffei Technologies)* Multi-scale and multi-physical finite element process simulation on an aircraft structural part is presented. Infiltration and spring-in simulation results are verified on an RTM manufactured part.	**1108-5 PROCESSING AND CHARACTERIZATION OF CARBON NANOTUBE / POLYLACTIC ACID NANOCOMPOSITE FILMS** *Erin Sullivan (Georgia Institute of Technology), Parvin Karimi (Texas A&M University), Francesca Gencarella (Georgia Institute of Technology), Renee Puvvada (Georgia Institute of Technology), Ben Wang (Georgia Institute of Technology), Rosario Gerhardt (Georgia Institute of Technology), Mohammad Naraghi (Texas A&M University), Kyriaki Kalaitzidou (Georgia Institute of Technology)* The effect of processing method on carbon nanotube/ polylactic acid films fabricated via: 1) melt fiber spinning/ compression molding or 2) electrospinning/compression molding was examined.	**1109-6 THERMAL CONDUCTIVITY IMPROVEMENT OF COPPER-CARBON FIBER COMPOSITE BY ADDITION OF AN INSULATOR: CALCIUM HYDROXIDE** *Jean-François Silvain (ICMCB-CNRS), Samuel Couillaud (ICMCB-CNRS), Yongfeng Lu (UNL)* The effects of adding calcium hydroxide (Ca(OH)2) to a copper-carbon fiber (30%) composite (Cu-CF(30%)) were studied. After sintering at 700 °C, precipitates of calcium oxide (CaO) were included in th	**1110-6 MONOTONIC TENSION, FATIGUE AND CREEP BEHAVIOR OF 3D BRAIDED KD-I-SIC-FIBER-REINFORCED POLYMER-DERIVED SIC-MATRIX COMPOSITES AT 11000C AND 13000C FOR COATED AND UNCOATED SPECIMENS** *Xin Jing (Beihang University), Duoqi Shi (Beihang University), Xiaoguang Yang (Beihang University)* Monotonic tension, fatigue and creep performance and failure mechanisms for a braided SiC/SiC composite at elevated temperatures were investigated in air.
12:15	**Lunch in the Exhibition**									
13:30	**INDUSTRY SESSION**									

Meeting room 5	Meeting room 6	Meeting room 7	M1	M2	M3	M4	M5	M6	M7	M8
1111-4 NOVEL WAVINESS DESIGN FOR THERMOPLASTIC TAPE BRAIDS TO IMPROVE MICROMECHANICAL PROPERTY PREDICTION *Daniel Barfuss (TU Dresden), Maik Gude (TU Dresden), Christian Garthaus (TU Dresden)* Tape braiding technology represents a novel, high rate preforming process for manufacturing composite structures. Here new ways of prediction for the resulting properties are shown.		**1113-5 NUMERICAL MODELLING OF POLYURETHANE USED AS CORE MATERIAL IN SACRIFICIAL CLADDING FOR BLAST MITIGATION** *Hamza Ousji (Royal Military Academy), Mohamed Abderaouf Louar (Royal Military Academy), Bachir Belkassem (Royal Military Academy), Lincy Pyl (Vrije Universiteit Brussel), John Vantomme (Royal Military Academy)* The present paper focuses on the comparison and reliability of the results of blast mitigation predictions with different material models for PU available in LS-DYNA.	**1114-5 INFLUENCE OF VOIDS ON TRANSVERSE CRACK ONSET LOCATION IN CFRP LAMINATES USING X-RAY COMPUTED TOMOGRAPHY** *Shigeki Aratama (Kawasaki Heavy Industries-Ltd.), Yusuke Tsumura (Kyoto University), Ryosuke Hashizume (Kyoto University), Masaaki Nishikawa (Kyoto University), Masaki Hojo (Kyoto University)* Effects of voids on strengths of CFRP laminates were experimentally investigated. X-ray CT was used to observe transverse cracks and voids in specimens after testing for understanding of mechanics.	**1115-5 APPLICATION OF A VIRTUAL SHEAR STRESS MODEL AND COMPARISON WITH WWFE-III PREDICTIONS TO DESCRIBE THE NON-LINEAR BEHAVIOR OF COMPOSITE MATERIALS** *Siegfried Galkin (KIT - Institute of Vehicle System Technology), Fabian Johannes Schirmaier (KIT - Institute of Vehicle System Technology), Luise Kärger (KIT - Institute of Vehicle System Technology)* Modeling nonlinear shear stress behavior with superimposed transverse tension without needing any iteration at the time integration points to reach convergence	**1116-5 EVALUATION OF THE CLIMBING DRUM PEEL (CDP) TEST FOR THE DETERMINATION OF THE MODE I FRACTURE TOUGHNESS OF MONOLITHIC LAMINATED COMPOSITE SPECIMENS** *Federica Daghia (ENS Cachan), Christophe Cluzel (ENS Cachan)* The CDP test and the classical DCB test are compared for monolithic composites. Global and local indicators enable us to validate the CDP for the determination of the mode I delamination toughness.	**1117-5 MATERIAL MODEL OF LAYERED FABRIC COMPOSITES WITH DELAMINATION PREDICTION FOR IMPACT SIMULATIONS USING STANDARD REISSNER-MINDLIN SHELL FORMULATION** *Sylvain Treutenaere (University of Valenciennes), Fanck Lauro (University of Valenciennes), Bruno Bennani (University of Valenciennes), Tsukatada Matsumoto (Toyota Motor Europe), Ernesto Mottola (Toyota Motor Europe)* The present work provides a way to predict the behaviour of textile composites under impact with a viscoelastic damageable model coupled to a recompuation of the realistic strain field.	**1118-4 BEARING STRENGTH AND INTERLAMINAR PROPERTIES OF NOVEL FIBRE REINFORCED POLYMER HYBRIDS WITH PERMEABLE METAL LAYERS** *Björn Bosbach (Technische Universität Hamburg-Harburg), Wilfried V. Liebig (Technische Universität Hamburg-Harburg), Bodo Fiedler (Technische Universität Hamburg-Harburg)* The hybrid composites with permeable metal fabrics are manufactured by using Resin-Transfer-Moulding. Resulting in high quality composites with enhanced load bearing capability.	**1119-5 MICROMECHANICAL TIME-LAPSE X-RAY CT STUDY OF FATIGUE DAMAGE IN UNI-DIRECTIONAL FIBRE COMPOSITES** *Kristine Munk Jespersen (Technical University of Denmark), Tristan Lowe (University of Manchester), Philip J. Withers (University of Manchester), Jens Zangenberg Hansen (LM Wind Power), Lars Pilgaard Mikkelsen (Technical University of Denmark)* The study considers fatigue damage evolution in a uni-directional glass fibre composite manufactured from a non-crimp fabric, by means of X-ray Computed Tomography on cut-outs of pre-fatigued samples.	**1120-5 CARBON-FIBER COMPOSITE CABLES FOR DEEP-WATER ANCHORAGE** *Eduardo Menezes (UFRGS), Lais Silva (UFRGS), Carlos Cimini (UFMG), Sandro Amico (UFRGS)* This paper describes the tensile and bending behaviour of carbon fibre composite cables intended to be used on the anchorage of oil platforms by confronting experimental tests with numerical results.	**1121-5 BUNDLE REINFORCED POLYMER COMPOSITES FOR NOVEL STRUCTURAL BATTERIES** *Yalin Yu (Beihang University), Boming Zhang (Beihang University), Guocheng Qi (Beihang University), Zhanwen Tang (Beihang University)* A novel structural battery was designed based on the carbon fiber bundle composites (CFBC), and the electrochemical and mechanical properties were measured experimentally and analyzed numerically.
1111-5 DUCTILITY FROM FIBRES AND MATRIX - LESSONS FROM NATURAL FIBRE COMPOSITES *Stephen Eichhorn (University of Exeter)* This review of the literature on ductility in composite fibres, networks and composite materials will draw out some principles on which one might form the basis for a ductile composite.		**1113-6 HIGH STRAIN RATE TENSILE TESTING OF ARAMID YARN - A FEASIBILITY STUDY OF OPTICAL MEASUREMENT** *Jørgen Kepler (Aalborg University), Lennart Hansen (Aalborg University), Peter Fritsen (Aalborg University)* High strain rate testing of dry aramid yarn through the use of ballistic test equipment and high-speed video recording, with supplementary accelerometer measurements for force calculation.	**1114-6 MICROMECHANICAL DAMAGE SIMULATION OF FIBRE REINFORCED COMPOSITE LAMINATES SUBJECTED TO LOW VELOCITY IMPACT BY MULTISCALE METHOD** *Lei Yang (Dalian University of Technology), Zhanjun Wu (Dalian University of Technology)* A multiscale model was presented to simulate and reveal the micromechanical damage mechanisms of fibre reinforced composite laminates subjected to low velocity impact.	**1115-6 SUPPRESSION OF INTERLAMINAR CRACK IN UD-CFRP CONTAINING FIBRE DISCONTINUITY USING POLYAMIDE MESH** *Hayato Nakatani (Osaka City University), Tatsuya Imamura (Osaka City University), Katsuhiko Osaka (Osaka City University)* Interlaminar crack onset stresses in CFRP laminates containing fibre discontinuity are improved by interlaminar toughening using mesh of polyamide, and they are predicted by an analytical model.			**1118-5 INVESTIGATION OF THE EFFECT OF MWCNT FILLED EPOXY ADHESIVES IN ENHANCING THE QUALITY OF DISSIMILAR MATERIAL BONDED JOINTS** *Maria Konstantakopoulou (NEWCASTLE UNIVERSITY), George Kotsikos (NEWCASTLE UNIVERSITY)* The objective of this study is to investigate the effects of the surface modification of the metal substrate accompanied by modification of the adhesive properties on the strength of single lap joints	**1119-6 TIME-LAPSE X-RAY MICROTOMOGRAPHIC IMAGING OF COMPRESSIVE FAILURE IN CARBON FIBRE-EPOXY COMPOSITES** *Ying Wang (The University of Manchester), Costas Soutis (The University of Manchester), Philip Withers (The University of Manchester)* The evolution of kink bands has been observed by time-lapse X-ray μCT in the compressive zone of carbon fibre/epoxy composite under in situ four-point bend test.	**1120-6 DESIGN AND FATIGUE ANALYSIS OF COMPOSITE TURBINE BLADES UNDER OCEAN WAVE AND CURRENT LOADING** *Hassan Mahfuz (Florida Atlantic University), Marco Canino (Florida Atlantic University), Takuya Suzuki (IHI Corporation), Fang Zhou (Florida Atlantic University)* Performing a static and fatigue analysis on an ocean current turbine blade through the implementation of modified National Renewable Energy Laboratory codes, based on blade element momentum theory.	**1121-6 DESIGNER LINEAR FUNCTIONALLY GRADED VISCOELASTIC COMPOSITE MATERIALS TAILORED TO OPTIMIZE ENERGY HARVESTING** *Harry Hilton (University of Illinois at Urbana-Champaign)* Motion damping by energy harvesting through piezoelectric devices recharging batteries and having it available to do useful work rather than simply dissipating energy by heat is a preferable process.
Lunch in the Exhibition										
INDUSTRY SESSION										

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16
15:00	**1201 Processing - Manufacturing Technology 2**	**1202 Nano Composites 2**	**1203 Multifunctional Composites - Sensing and Actuation 2**	**1204 Fatigue 2**	**1205 Structural Analysis and Optimization 2**	**1206 Process Induced Effects 1**	**1207 Process Modelling 2**	**1208 Biocomposites 2**	**1209 Interfaces and Interphases 2**	**1210 Foams, Cellular and Lattice Materials 1**
15:00	**1201-1 CONTINIOUS PRODUCTION OF FIBRE REINFORCED THERMOPLASTIC COMPOSITES BY BRAIDING PULTRUSION** *Jens Schäfer (Institut für Textiltechnik der RWTH Aachen University)* The Flechttrusion is an innovative process chain to produce fibre reinforced thermoplastic profiles. The main part is about the Integration of inserts, a cost calculation and a new heating technology.	**1202-1 MAGNETICALLY ANISOTROPIC NANO-PILLARS: MICRO-STRUCTURING OF NANOCOMPOSITES USING OSCILLATING MAGNETIC FIELDS** *Namiko Yamamoto (Penn State University), Harish Manohara (Jet Propulsion Laboratory-California Institute of Technology)* We investigated scalable patterning of iron-coated carbon nanotube pillars using oscillating magnetic fields, in order to achieve highly organized 1D micro-structures.	**KEYNOTE** **1203-1 A COMPOSITE INTELLIGENT WING WITH STATE-SENSING AND AWARENESS CAPABILITIES** *Fotis Kopsaftopoulos (Stanford University), Raphael Nardari (Stanford University), Yu-Hung Li (Stanford University), Fu-Kuo Chang (Stanford University)* The complete sensor network design, integration, and wind tunnel experimental assessment are presented for a bio-inspired intelligent composite UAV wing with self-sensing and awareness capabilities.	**1204-1 MICRO-MECHANICAL MULTIAXIAL FATIGUE MODEL FOR CRACK DENSITY EVOLUTION AND STIFFNESS DEGRADATION** *Jens Glud (Aalborg University), Janice Dulieu-Barton (University of Southampton), Ole Thybo Thomsen (Aalborg University), Lars Christian Terndrup Overgaard (Aalborg University)* The current research effort with regard to the development of a mechanistic micro-mechanical multiaxial fatigue model for use in wind turbine blade applications is presented.	**1205-1 BUCKLING OPTIMIZATION OF STEERING STIFFENERS FOR GRID-STIFFENED COMPOSITE STRUCTURES** *Dan Wang (Delft University of Technology), Mostafa Abdalla (Delft University of Technology)* Curved stiffeners are optimized for grid-stiffened composite structures to enhance the structural buckling resistance and performances are compared with variable-stiffness skins with curved fibers.	**1206-1 OPTICAL DEFORMATION ANALAYSIS OF THE FAILURE BEHAVIOR OF FIBER REINFORCED POLYMERS CAUSED BY LASER PROCESSING** *Michael Rose (Technische Universität Dresden), Andreas Fürst (Technische Universität Dresden), Jozsef-Sebastian Pap (Technische Universität Dresden), Annett Klotzbach (Fraunhofer IWS Dresden), Jan Hauptmann (Fraunhofer IWS Dresden), Irene Jansen (Technische Universität Dresden), Eckhard Beyer (Technische Universität Dresden)* Laser remote cutting of FRP provide fast processing. By an adapted tensile test procedure and a digital image correlation system the mechanical influence of the process on the material was examined.	**1207-1 DEVELOPMENT OF INFUSION STRATEGY FOR COMPOSITE RAILROAD HOPPER CAR WITH FLOW SIMULATION AND VALIDATION** *A. E. Ushakov (ApATeCh), A. A. Safonov (Skoltech), M. Labordus (Lightweight Structures B.V.), E. I. Kornienko (ApATeCh), N. V. Rozin (Tsagi)* Development of infusion strategy for composite railroad hopper car with flow simulation and validation. The hopper car roof and body were both impregnated in one shot.	**1208-1 RAPID AND EFFECTIVE METHODS FOR THE SCREENING OF FLAX FIBRES FOR COMPOSITE APPLICATIONS** *Kevin Hendrickx (KU Leuven), Ramona Delphine Romian Sitohang (KU Leuven), Toon Goedemé (KU Leuven), Aart Willem Van Vuure (KU Leuven), Jan Ivens (KU Leuven)* The effect of technical flax fibre fineness, purity and strength on the composite performance was investigated to provide screening methods to assess the composite suitability of the fibres.	**1209-1 LONG-TERM INTERFACIAL PERFORMANCE OF SURFACE TREATED CFRP COMPOSITES UNDER HYGROTHERMAL CONDITIONS** *Bin Yu (Nanyang Technological University), Jinglei Yang (Nanyang Technological University)* The aim of this work is to study the effect of moisture absorption and surface treatment of carbon fiber on the interfacial properties of carbon fiber reinforced polymer (CFRP).	**1210-1 NOVEL GEOPOLYMER BASED SYNTACTIC FOAMS** *Liying Zhang (Nanyang Technological University), Fan Zhang (Nanyang Technological University), Ming Liu (Nanyang Technological University), Xiao Hu (Nanyang Technological University)* Novel geopolymer based syntactic foams containing different types of hollow microspheres were fabricated The mechanical properties of the syntactic foams were systematically studied.
15:20	**1201-2 MANUFACTURING OF COMPLEX SHAPE COMPOSITE PARTS THROUGH THE COMBINATION OF PULL-BRAIDING AND BLOW MOLDING** *Renato Bezerra (Fraunhofer Institute for Chemical Technology ICT), Frederik Wilhelm (Fraunhofer Institute for Chemical Technology ICT), Sebastian Strauß (Fraunhofer Institute for Chemical Technology ICT), Holger Ahlborn (University of Stuttgart)* This work describes the development of a processing technology for the production of hollow thermoset CFRP parts of complex shape through the combination of pull-braiding and blow moulding.	**1202-2 FATIGUE DELAMINATION OF A CARBON FABRIC–REINFORCED EPOXY COMPOSITE WITH CARBON NANOTUBES** *Martin Kadlec (VZLU - Aerospace Research and Test Establishment), Jakub Šedek (VZLU - Aerospace Research and Test Establishment)* This work presents decreased fatigue crack growth rate by approximately 80 % on DCB specimens made from a CFRP with 0.5 % CNTs. The rate also related to the interface of the tows of the plain weave.		**1204-2 INFLUENCE OF IMPACT DAMAGE ON THE FATIGUE BEHAVIOUR OF LARGE SCALE COMPOSITES** *Bodo Fiedler (Technische Universität Hamburg-Harburg), Nils Kosmann (Technische Universität Hamburg-Harburg), Karl Schulte (Technische Universität Hamburg-Harburg)* The hexapod testing machine is a unique set up. It is possible to perform shear, normal loads and combinations. It enables to test composite structures under mulitaxial loading conditions up to 30Hz.	**1205-2 MINIMUM COST DESIGN OF A HYBRID LAMINATE WITH UNCERTAIN MATERIAL PROPERTIES SUBJECT TO FREQUENCY CONSTRAINTS** *Sarp Adali (University of KwaZulu-Natal), Isaac Radebe (Durban University of Technology)* Minimum cost design of hybrid cross-ply laminates for a given frequency is obtained by minimizing the thickness of expensive layers. Material properties are taken as uncertain using convex analysis.	**1206-2 A LOCAL SOLUTION FOR THE STRESS STATE IN A NEW NOTCHED RESIDUAL STRESS SPECIMEN SUBJECTED TO AN ANTI-SYMMETRIC BENDING LOADING CONDITIONS** *Johnny Jakobsen (Aalborg University), Anders Lyckegaard (-)* An Analytical solution for a newly proposed residual specimen is derived. The solution is a superposition of two elastic problems and may be used to explore fatigue characteristics of a composite.	**1207-2 NUMERICAL SIMULATION OF DYNAMIC WETTING FLOWS INTO FIBROUS MEDIA, FOR MACRO/MICRO-VOID CREATION ISSUES DURING LIQUID COMPOSITE MOLDING PROCESS** *Yujie Liu (Ecole des Mines de Saint-Etienne), Nicolas Moulin (Ecole des Mines de Saint-Etienne), Julien Bruchon (Ecole des Mines de Saint-Etienne), Pierre-Jacques Liotier (Ecole des Mines de Saint-Etienne), Sylvain Drapier (Ecole des Mines de Saint-Etienne)* NUMERICAL SIMULATION OF DYNAMIC WETTING FLOWS INTO FIBROUS MEDIA, FOR MACRO/MICRO-VOID CREATION ISSUES DURING LIQUID COMPOSITE MOLDING PROCESS - bifluid-solid contact model involving capillary effects	**1208-2 PROCESSING OF HIGH PERFORMANCE BIOCOMPOSITES FOR THE USE IN THE EUROPEAN BUILDING INDUSTRY** *Jovana Dzalto (Institute for Composite Materials), Luisa A. Medina (Institute for Composite Materials), Peter Mitschang (Institute for Composite Materials)* By optimizing the manufacturing process and using aligned fibers instead of conventional non-wovens, the mechanical as well as physical performance of bio-composites could be significantly increased.	**1209-2 PHYSICO-CHEMISTRY OF VINYLESTER/GLASS FIBER INTERFACES USED IN SMC COMPOSITES** *Thibaut Bénéthuilière (Ingénierie des Matériaux Polymères-INSA Lyon / Plastic Omnium Auto Exterior), Jannick Duchet-Rumeau (Ingénierie des Matériaux Polymères-INSA Lyon), Elise Dubost (Plastic Omnium Auto Exterior), Christophe Peyre (Plastic Omnium Auto Exterior - MCR), Cécile Margand (Plastic Omnium Auto Exterior), Jean-François Gérard (Ingénierie des Matériaux Polymères-INSA Lyon)* Evaluation of a styrene-free resin used in SMC composites for the automotive industry, in terms of wetting, impregnation, and adhesion. From micro to macroscale.	**1210-2 SOFT 3D ACOUSTIC METAMATERIAL WITH NEGATIVE INDEX** *Olivier Mondain-Monval (University of Bordeaux), Benoit Mascaro (University of Bordeaux), Olivier Poncelet (University of Bordeaux), Christophe Aristégui (University of Bordeaux), Thomas Brunet (University of Bordeaux), Aurore Merlin (University of Bordeaux), Kévin Zimny (University of Bordeaux), Jacques Leng (University of Bordeaux)*

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1211 Textile-Based Composites and Fibre Architecture 2	**1212 Graphene, Graphene-Based Composites 2**	**1213 X-ray Computed Tomography 1**	**1214 Fracture and Damage - Micromechanics 2**	**1215 Fracture and Damage - Laminate Scale 2**	**1216 Fracture and Damage - Delamination 2**	**1217 Constitutive Models 2**	**1218 Joints - Design, Manufacturing and Testing 2**	**1219 Applications - Aerospace 1**	**1220 Applications - Automotive and Rail 1**	**1221 Multifunctional Composites - Energy Storage and Harvesting 2**
1211-1 EVALUATION OF THE GEOMETRICAL INFLUENCE OF THE STITCHING YARN ON THE STIFFNESS AND STRESS DISTRI-BUTION IN CONTINUOUS CARBON FIBER REIN-FORCED PLAS-TICS MADE BY TAILORED FIBER PLACE-MENT USING FINITE ELEMENT ANALYSIS *Uhlig Kai (Leibniz-Institut für Polymerforschung Dresden e.V.), Matteo Tosch (Leibniz-Institut für Polymerforschung Dresden e.V.), Lars Bittrich (Leibniz-Institut für Poly-mer-forschung Dresden e.V.), Axel Spickenheuer (Leibniz-Institut für Polymerforschung Dresden e.V.), Uwe Gohs(Leibniz-Institut für Polymer-forschung Dresden e.V.), Gert Heinrich (Leibniz-Institut für Polymerforschung Dresden e.V.)* EVALUATION OF THE GEOMETRICAL INFLUENCE OF THE STITCHING YARN ON THE STIFFNESS AND STRESS DISTRIBUTION IN CONTINUOUS CARBON FIBER REINFORCED PLASTICS MADE BY TAILORED FIBER PLACEMENT	**1212-1 EFFECTIVE DISPERSION OF GRAPHENE IN THERMOPLASTIC POLYMERS: CHEMICAL AND PROCESSING STRATEGIES** *Horacio Salavagione (ICTP-CSIC), Marta Castelaín (ICTP-CSIC), Fabrizio Marra (Sapienza University of Rome), Marián Gómez-Fatou (ICTP-CSIC), Gerardo Martínez (ICTP-CSIC), Carlos Marco (ICTP-CSIC), Gary Ellis (ICTP-CSIC), Maria Sarto (Sapienza University of Rome)* A series of strategies to ob-tain thermoplastic/graphene nanocomposites with improved electrical, thermal and mechanical properties, based chemical function-alization of graphene are presented.	**1213-1 EFFECTIVE PROPERTIES OF UNIDIRECTIONAL FLAX/ EPOXY COMPOSITES WITH TWISTED YARNS** *Ilya Straumit (KU Leuven), Farida Bensadoun (KU Leuven), Stepan Lomov (KU Leuven), Martine Wevers (KU Leuven)* The paper present results of the modelling of unidirec-tional flax/epoxy composite samples to predict their effective properties taking into account twist and mis-alignment of the yarns.	**1214-1 EXPERIMENTAL CHARACTERIZATION AND COHESIVE LAWS FOR DELAMINATION OF OFF-AXIS GFRP LAMINATES** *Esben Lindgaard (Aalborg University), Brian Bak (Aalborg University)* This work experimentally characterizes delamination in GFRP laminates taking into account the influence of the off-axis angle between the lamina orientation and the crack growth direction.	**1215-1 COHESIVE LAWS FOR ANALYZING THROUGH-CRACK PROPAGATION IN CROSS PLY LAMINATES** *Andrew Bergan (NASA Langley Research Center), Carlos Dávila (NASA Langley Research Center)* Cohesive laws are char-acterized from tests of cross-ply compact tension specimens for two material systems. Results are com-pared for specimens with notches machined by water-jet and by wire slurry saw.	**1216-1 TESTING OF Z-PINNED LAMINATES WITH MULTIPLE DELAMINATIONS** *Mehdi Yasaee (University of Bristol), Galal Mohamed (University of Bristol), Stephen Hallet (University of Bristol)* Application of Z-pinning is a subject of great interest in the field of through-thick-ness reinforcement (TTR) of composite laminates. To date, the majority of Z-pin characterisation work has been cond	**1217-1 A MESO-MECHANICAL CONSTITUTIVE MODEL OF PARTICLE REINFORCED TITANIUM MATRIX COMPOSITES AT HIGH TEMPERATURES** *Weidong Song (Beijing Institute of Technology), Lijun Xiao (Beijing Institute of Technology)*	**1218-1 EXPERIMENTAL AND NUMERICAL ANALYSIS OF PRELOAD IN BOLTED COMPOSITE JOINTS WITH TEMPERATURE LOADS** *F. Hermsdorf (Universität der Bundeswehr München), T. Matzies (Universität der Bundeswehr München), H. Rapp (Universität der Bundeswehr München)* Preload loss is determined for quasi-isotropic, biaxial and UD CFRP-laminates at room temperature and 70°C. Results are compared to 3D-FE-simulations using viscoelastic and quasi-elas-tic method.	**1219-1 STRUCTURAL DESIGN OF AN INSTRUMENTED DOUBLE-SWEPT WIND TUNNEL MODEL** *Benjamin Lütke (DLR), Moritz Schmidt (DLR), Jens Neumann (DLR)* The experimental setup and the manufacturing are described. The FE model, the strength analysis and the validation by an exper-imentel modal analysis are presented. FSI simulations are shown.	**1220-1 EVALUATING MULTI-MATERIAL-CONCEPTS REGARDING TECHNICAL, ECOLOGICAL AND ECONOMICAL PROPERTIES** *Sebastian Kleemann (Technische Universität Braunschweig), Thomas Vietor (Technische Universität Braunschweig)* Due to the high complexity of desinging components in multi-material-design and conflicting development goals a software tool is de-veloped in order to support the designing engineer.	**KEYNOTE** **1221-1 RECENT ADVANCES IN STRUCTURAL SUPERCAPACITORS FOR TRANSPORT APPLICATIONS** *Emile Greenhalgh (Imperial College London), Natasha Shirshova (Durham University), Anthony Kucernak (Imperial College London), Milo Shaffer (Imperial College London), Rita Teixeira (Imperial College London), Alexander Bismarck (University of Vienna), Maxim Kireitseu (Cytec Industrial Materials), Richard Shelton (Cytec Industrial Materials)* The focus of this paper are structural power materials: structural composites which have the capacity to store and deliver electrical energy, and presents the current de-velopments in this field.
1211-2 A NUMERICAL APPROACH MODELING THE BRAIDING PROCESS FOR ARBITRARY MANDREL SHAPES TO CALCULATE PREFORM PROPERTIES *Thorsten Hans (Technical University of Munich), Roland Hinterhoelzl (Technical University of Munich)* The overbraiding process is virtually analyzed using the finite element method. An approach to analyzed arbitrary mandrel shapes, a post processing procedure and a validation method are presented.	**1212-2 THREE-DIMENSIONAL GRAPHENE/POLYMER COMPOSITES WITH EXCEPTIONAL MULTI-FUNCTIONAL PROPERTIES** *Zhenyu WANG (The Hong Kong University of Science and Technology), Xi Shen (The Hong Kong University of Science and Technology), Mohammad Akbari Garakani (The Hong Kong University of Science and Technology), Xiuyi Lin (The Hong Kong University of Science and Technology), Ying Wu (The Hong Kong University of Science and Technology), Xu Liu (The Hong Kong University of Science and Technology), Xinying Sun (The Hong Kong University of Science and Technology), Jang-Kyo Kim (The Hong Kong University of Science and Technology)* The exceptional multi-func-tional properties of the 3D graphene/polymer composites indicate that 3D GF and GA are more effective compared to 1D CNTs or 2D graphene sheets as composite reinforcement	**1213-2 MOISTURE-INDUCED SWELLING PROPERTIES OF NATURAL CELLULOSE FIBRES CHARACTERIZED BY SYNCHROTRON X-RAY COMPUTED TOMOGRAPHY** *Kristofer Gamstedt (Uppsala University), Thomas Joffre (Uppsala University), Per Isaksson (Uppsala University), Simon Sticko (Uppsala University), Pierre Dumont (Université Grenoble Alpes), Sabine Rolland du Roscoat (Université Grenoble Alpes), Laurent Orgéas (Université Grenoble Alpes)* The hygroexpansion coef-ficients of the cell wall of a single microscale wood fibre is determined by synchro-tron X-ray micro computed tomography and inverse 3D finite element modeling.	**1214-2 FATIGUE DAMAGE IN SHORT GLASS FIBER REINFORCED PA66: MICROMECHANICAL MODELING AND MULTISCALE IDENTIFICATION APPROACH** *Nicolas Despringre (ARTS), Yves Chemisky (Arts & Métiers ParisTech), Fodil Meraghni (Arts & Métiers ParisTech), Joseph Fitoussi (Arts & Métiers ParisTech), Gilles Robert (Solvay)* A micromechanical fatigue visco-damage model for short glass fiber reinforced polyamide-66 is developed for specific microstructure. It includes complex damage mechanisms and matrix viscosity.	**1215-2 DAMAGE AND FAILURE OF THERMOPLASTIC LAMINATES WITH STRATIFIED AND CLUSTERED FIBERS** *Arief Yudhanto (KAUST (King Abdullah University of Science and Technology)), Gilles Lubineau (KAUST (King Abdullah University of Science and Technology)), Ditho Pulungan (KAUST (King Abdullah University of Science and Technology)), Husam Wafai (KAUST (King Abdullah University of Science and Technology)), Warden Schijve (SABIC), Nikhil Verghese (SABIC Technology Center)* Effect of fiber clustering on damage of glass/polypro-pylene (GFPP) is studied through monotonic and cy-clic tests. Micromechanical framework is also proposed to predict damage growth in GFPP.	**1216-2 TESTING OF DELAMINATION BEHAVIOUR UNDER PURE MODE III LOADING** *Yangyang Ge (Institut Clément Ader-IUT Tarbes de l'Université Toulouse), Xiaojing Gong (Institut Clément Ader-IUT Tarbes de l'Université Toulouse), Anita Hurez (Département de Recherche en Ingénierie des Véhicules pour l'Environ-nement-IUT Le Creusot de l'Université de Bourgogne), Emmanuel De Luycker (Institut Clément Ader-IUT Tarbes de l'Université Toulouse)* Major testing methods for characterizing the pure mode III delamination be-haviors of composites are discussed and a new test Edge-Ring-Crack-Torsion method (ERCT) has been developed.	**1217-2 AN INVARIANT-BASED ANISOTROPIC THERMO-PLASTIC MATERIAL MODEL FOR SHORT FIBER REINFORCED THERMOPLASTICS** *Aamir Dean (Leibniz Universität Hannover), José Reinoso (Leibniz Universität Hannover), Shahab Sahraee (Leibniz Universität Hannover), Raimund Rolfes (Leibniz Universität Hannover)* This paper is concerned with the development of a new coupled thermome-chanical invariant-based transversely-isotropic elas-tic-plastic constitutive mod-el for short fibre reinforced composites.	**1218-2 NUMERICAL AND EXPERIMENTAL INVESTIGATION OF LOAD-SHARING IN COMPOSITE BONDED-BOLTED JOINTS** *Kobye Bodjona (McGill University), Gyu-Hyeong Lim (McGill University), Karthik Raju (McGill University), Larry Lessard (McGill University)* An efficient global finite element model of a hybrid bonded-bolted joint is proposed. An experimental validation of this model us-ing a bespoke instrumented bolt is also presented.	**1219-2 SHOCK PROPAGATION BEHAVIOR OF CFRP LATTICE STRUCTURES** *Tomohiro Yokozeki (University of Tokyo), Kento Shimode (University of Tokyo), Takahira Aoki (University of Tokyo), Keita Terashima (Japan Aerospace Exploration Agency), Toru Kamita (Japan Aerospace Exploration Agency)* Shock response behavior of composite lattice structure is experimentally evaluated. The shock attenuation char-acteristics of lattice struc-ture are discussed based on wave analysis.	**1220-2 FEA USING DESIGN OPTIMIZATION TECHNIQUE FOR AN APPLICATION OF CARBON FIBER REINFORCED THERMOPLASTICS TO AUTOMOBILE BODY STRUCTURE** *Toshiro Ohori (The Univercity of Tokyo), Takahiro Hayashi (The Univercity of Tokyo), Jun Takahashi (The Univercity of Tokyo)* We investigate weight-light-ening possibility of S-crank frame structure using CFRTP. Here, we introduce the study using optimization tools in FEM software.	

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16
15:40	**1201-3 HIGH-CYCLE MOLDING OF CONTINUOUS FIBER REINFORCED THERMOPLASTIC COMPOSITES PIPE** *Asami Nakai (Gifu University), Tadashi Uozumi (Gifu University), Akio Ohtani (Gifu University), Satoshi Nagoh (TOYOBO Co.-Ltd.)* The purpose of this study is to construct frame structure of continuous fiber reinforced thermoplastic composites with high impregnated intermediate materials and the high cycle molding.	**1202-3 EFFECTS OF CARBON NANOTUBE CONTENTS ON MECHANICAL AND ELECTRICAL PROPERTIES OF MULTI-SCALE CARBON NANOTUBE-FIBER REINFORCED EPOXY RESIN COMPOSITES** *Shaofeng Lin (National University of Defense Technology), Cai Jiang (National University of Defense Technology), Jianwei Zhang (National University of Defense Technology), Dazhi Jiang (National University of Defense Technology)* Amino-functionalized multi-walled carbon nanotubes and MWCNTs Buckypaper (BP) were used in CFRP to increase mechanical properties and electrical conductivities of the CNTs/CF/epoxy composites.	**1203-2 STUDY ON THE SENSING FUNCTION OF Z-PINS** *Bing Zhang (University of Bristol), Giuliano Allegri (Imperial College London), Mehdi Yasaee (University of Bristol), Stephen Hallett (University of Bristol)* This paper investigates the self-sensing behaviour of carbon/BMI Z-pin reinforced composite laminates and the multifunctional applications (delamination bridging and sensing) of carbon/BMI Z-pins.	**1204-3 FATIGUE BEHAVIOUR AND ITS DAMAGE MECHANICS MODELING FOR COMPOSITE LAMINATES UNDER MULTIAXIAL LOADINGS** *Feng Yubo (Harbin Institute of Technology), Zhang Li (Harbin Institute of Technology), Guo Licheng (Harbin Institute of Technology), Zhang Yidong (Harbin Institute of Technology), Liu Yingzhi (Harbin Institute of Technology)*	**1205-3 ROBUST DESIGN OF EFFICIENT DAMAGE TOLERANT LAMINATES BY ELASTIC ENERGY MINIMISATION** *Mark Nielsen (University of Bath), Andrew Rhead (University of Bath), Richard Butler (University of Bath)* Optimisation for minimum mass whilst accounting for uncertain loading reduces mass by up to 15% compared to current design practice. However, use of non-standard ply angles offers little benefit.	**1206-3 REAL AREA OF CONTACT IN CARBON FABRIC FORMING** *Olga Smerdova (Institut Pprime), Michael Sutcliffe (University of Cambridge), Daniel Mulvihill (University of Cambridge)* An experimental method has been developed to examine the microscopic contact conditions in composites forming. The technique is applied to a woven fabric and a single tow contacting a glass plate.	**1207-3 A LEVEL SET METHOD FOR VACUUM INFUSION OF COMPOSITE MATERIALS** *Carlos Gonzalez (Polytechnic University of Madrid & IMDEA Materials Institute), Joaquim Vila (IMDEA Materials Institute), Javier LLorca (Polytechnic University of Madrid & IMDEA Materials Institute)* A level set model for fluid flow through a fiber preform using vacuum infusion is presented. The model is correlated using digital image correlation of the bag displacement during infusion.	**1208-3 DEVELOPMENT OF A FLAX FIBER REINFORCED POLYMER FOR REINFORCED CONCRETE STRUCTURES STRENGTHENING** *Anne Hallonet (LGCIE Bohr - University Claude Bernard Lyon 1), Emmanuel Ferrier (LGCIE Bohr - University Claude Bernard Lyon 1), Laurent Michel (LGCIE Bohr - University Claude Bernard Lyon 1)* This study presents the development of a new externally bonded flax FRP for reinforced concrete strengthening with mechanical behavior characterization in tension and of the adherence with concrete.	**1209-3 ANALYSIS CHAIN TO DETERMINE THE CHEMICAL REACTION PATH BETWEEN CARBON FIBER SURFACE, SIZING AND RESIN** *Denise Wetjen (BMW AG), Jochen Töpker (BMW AG), Torsten Schunk (BMW AG), Felix Schmidt-Stein (BMW AG), Judith Moosburger-Will (University of Augsburg), Siegfried Horn (University of Augsburg)* Carbon fibers are coated with a sizing after the electrochemical activation; the according chemistry controls the interaction of the fiber and the resin.	**1210-3 IN-PLANE COMPRESSIVE RESPONSE OF HONEYCOMBS WITH NON-UNIFORM WALL THICKNESS AND CELL SIZE** *Youming Chen (The University of Auckland), Raj Das (The University of Auckland), Mark Battley (The University of Auckland)* The irregular honeycombs with cell size and wall thickness following lognormal distributions were manufactured using a 3D printer, and the in-plane compressive response of the honeycombs were tested.
16:00	**1201-4 ADVANCES IN THERMOPLASTIC PULTRUDED COMPOSITES** *Paulo Jorge Novo (Polytechnic Institute of Leiria), Joao Francisco Silva (ISEP), Joao Pedro Nunes (Minho University), Antonio Torres Marques (University of Porto)* Different thermoplastic pre-impregnated materials were produced and processed by pultrusion and the composite profiles were submitted to testing. The obtained results were discussed.	**1202-4 INFLUENCE OF CNT THIN SHEETS ON THE INTERLAMINAR SHEAR STRENGTH OF LAMINATES** *Ling Liu (Tongji University), Lulu Shen (Tongji University)* Influence of carbon nanotube buckypaper on the mode II interlaminar fracture toughness and interlaminar shear strength, and the corresponding fracture characteristics	**1203-3 MAN-MADE CELLULOSE FIBERS COATED WITH CARBON NANOTUBE NETWORKS AS UNIQUE SMART MATERIALS** *Haisong Qi (Leibniz Institute of Polymer Research Dresden), Jianwen Liu (Leibniz Institute of Polymer Research Dresden), Yinhu Deng (Leibniz Institute of Polymer Research Dresden), Shang-Lin Gao (Leibniz Institute of Polymer Research Dresden), Edith Mäder (Leibniz Institute of Polymer Research Dresden)* Excellent sensing ability, reproducibility and selectivity of cellulose fibers to liquid water and volatile molecules was achieved by CNT coating and has the potential to be used as smart materials.	**1204-4 STUDY OF THE BEHAVIOUR OF A WOVEN GLASS-FIBRE-REINFORCED COMPOSITE WITH A THERMOPLASTIC MATRIX FOR AUTOMOTIVE APPLICATION** *Amelie Malpot (PPrime Institute (DPMM)), Fabienne Touchard (PPrime Institute (DPMM)), Sébastien Bergamo (Renault)* Tensile-tensile fatigue behaviour of a woven glass-fibre-reinforced composite with polyamide 6,6 resin is investigated using acoustic emission and infrared camera techniques.	**1205-4 EXPERIMENTAL POSTBUCKLING STUDY OF PRE-CONFORMED COMPOSITE PLATES** *Antonio Blazquez (University of Seville), Jesus Justo (University of Seville), Rafael Roig (University of Seville), Federico París (University of Seville)* The possibility of avoiding the variability in the postbuckling regime is analyzed. Some panels were manufactured including intentionally specific imperfections.	**1206-4 CHARACTERISATION OF VISCOELASTIC MATERIAL PROPERTIES DURING CURING PROCESSES** *Sibin Saseendran (Swerea SICOMP), Maciej Wysocki (Swerea SICOMP), Janis Varna (Luleå University of Technology)* The present contribution is toward systematic characterisation the thermo-viscoelasticity of a curing epoxy resin. The results indicate that time, temperature and curing obey a linear relationship.	**1207-4 OPTIMISATION OF FORMING PROCESS FOR HIGHLY DRAPEABLE FABRICS** *Shuai Chen (The University of Nottingham), Lee Harper (The University of Nottingham), Andreas Endruweit (The University of Nottingham), Nicholas Warrior (The University of Nottingham)* A genetic algorithm is coupled with a finite element model to optimise the arrangement of in-plane constraints for a composite press-forming problem.	**1208-4 INVESTIGATION OF PATTERN STYLE OF WOVEN FABRICS PRODUCED FROM HYBRID WRAP SPUN YARNS ON FABRICATED COMPOSITE** *Behnaz Baghaei (University of Borås), Mikael Skrifvars (University of Borås)* This paper focuses on the effect of weave structure on the thermal and mechanical behavior as well as moisture absorption of the PLA/hemp woven fabric composites made by compression molding.	**1209-4 EVALUATION OF THE INTERFACIAL FRACTURE TOUGHNESS OF A CARBON FIBER REINFORCED THERMOPLASTIC COMPOSITE BY CYCLIC SINGLE-FIBER PUSH-OUT TESTS** *Michael Greisel (University of Augsburg), Michael Schulz (University of Augsburg), Judith Moosburger-Will (University of Augsburg), Wolfgang M. Mueller (University of Augsburg), Siegfried Horn (University of Augsburg)* An expanded approach to quantify the relevant energy dissipated in stable crack propagation during single-fiber push-out testing of a carbon fiber reinforced thermoplastic composite is presented.	**1210-4 SOLID STATE POLYLACTIDE-POLY(METHYL METHACRYLATE) PRECURSORS FOR THE IN-LINE PRODUCTION OF FOAM CORE SANDWICH STRUCTURES** *Yonghoon Yoon (Ecole Polytechnique Fédérale de Lausanne), Christopher Plummer (Ecole Polytechnique Fédérale de Lausanne), Jan-Anders Månson (Ecole Polytechnique Fédérale de Lausanne)* Bio friendly foam precursor was prepared and characterized by PLA/PMMA in order to modify thermal behavior of PLA. A sandwich structure was demonstrated by particleboard faces and CO2 blown foam core.
16:20	**Coffee in the Exhibition**									

Meeting room 5	Meeting room 6	Meeting room 7	M1	M2	M3	M4	M5	M6	M7	M8
1211-3 FIBRE ARCHITECTURE DESIGN OF 3D WOVEN COMPOSITE REINFORCEMENT WITH GENETIC ALGORITHMS--A UNIT CELL BASED OPTIMISATION FRAMEWORK AND PERFORMANCE ASSESSMENT *Xuesen Zeng (University of Nottingham), Andrew Long (University of Nottingham), Ian Ashcroft (University of Nottingham), Prasad Potluri (University of Manchester)* We present a novel approach to couple Genetic Algorithms and unit cell modelling to optimize 3D woven composites - in the case of constant stiffness design for aircraft landing gear braces.	**1212-3 A MICRO-MECHANICAL STUDY OF GRAPHENE REINFORCED EPOXY NANOCOMPOSITES** *Xin Zhao (University of Manchester), Robert Young (University of Manchester)* The efficiency of reinforcement for pristine graphene with two different lateral size but same thicknesses within the bulk epoxy nanocomposites has been studied by SEM and Raman spectroscopy.	**1213-3 IDENTIFICATION OF TRUE MICROSTRUCTURE OF COMPOSITES BASED ON VARIOUS FLAX FIBER ASSEMBLIES BY MEANS OF THREE-DIMENSIONAL TOMOGRAPHY** *Arttu Miettinen (University of Jyväskylä), Roberts Joffe (Luleå University of Technology), Liva Pupure (Luleå University of Technology), Bo Madsen (Technical University of Denmark)* Microstructure of flax fibre composites is studied with X-ray tomography and image analysis. The stiffness of the composites is estimated with micromechanical models.	**1214-3 A MICROMECHANICAL APPROACH TO INVESTIGATE THE INFLUENCE OF VOIDS ON THE STRUCTURAL BEHAVIOUR OF FRP UNDER COMPRESSION LOADING** *Wilfried Liebig (Technische Universität Hamburg-Harburg), Karl Schulte (Technische Universität Hamburg-Harburg), Bodo Fiedler (Technische Universität Hamburg-Harburg)* The subject of this presentation is the development of a micromechanical approach to investigate the influence of voids on the structural behaviour of FRP under compression load.	**1215-3 TEMPERATURE DRIVEN FRACTURE MECHANISMS IN UD/ WOVEN CARBON FIBRE EPOXY COMPOSITES** *James Meredith (University of Sheffield), Peter Wilson (University of Sheffield), Joel Foreman (University of Sheffield), Mahmoud Mostafavi (University of Sheffield)* Investigation into the effect of cure schedule on temperature driven inter and intra laminar fracture in cross ply carbon epoxy composites via digital image correlation	**1216-3 INFLUENCE OF SPECIMEN TWISTING ON FRACTURE SURFACE EVOLUTION IN THE SPLIT-SHEAR TORSION TEST** *Allison Johnston (Syracuse University), Barry Davidson (Syracuse University)* The influence of specimen twisting during anti-plane shear (mode III) loading in composite split beam specimens is studied using the split-shear torsion test.	**1217-3 APPLICATIONS AND LIMITATIONS OF NON-LINEAR VISCOELASTIC MODEL FOR SIMULATION OF BEHAVIOUR OF POLYMER COMPOSITES** *Liva Pupure (Luleå University of Technology), Janis Varna (Luleå University of Technology), Roberts Joffe (Luleå University of Technology)* Different non-linear material models have been studied. Methodology for simulating nonlinear stress-strain response in iso-strain situations of composites based on constituent properties is presented.	**1218-3 EXPERIMENTAL INVESTIGATION OF THE MECHANICAL BEHAVIOR OF BOLTED CERAMIC-MATRIX COMPOSITE JOINTS USING MULTI-INSTRUMENTATION** *Blanche Legin (Université de Technologie de Compiègne), Zoheir Aboura (Université de Technologie de Compiègne), Pierre Feissel (Université de Technologie de Compiègne), Florent Bouillon (SAFRAN Herakles)* The damage process of bolted ceramic matrix composite joints tested under tensile loading was investigated by coupling experimental methods (stereo-DIC and AE).	**1219-3 TESTING AND ANALYIS OF ANISOGRID PREPREG ELEMENT SPECIMEN UNDER UNIAXIAL TENSION AND COMPRESSION** *Steffen Niemann (German Aerospace Centre), Ronald Wagner (German Aerospace Centre), Matthias Beerhorst (German Aerospace Centre), Christian Hühne (German Aerospace Centre)* This paper reports on uniaxial tension and compression test results of Anisogrid Prepreg knot and rib specimen to give an answer which stiffness and strength properties can be expected.	**1220-3 LIGHTWEIGHTING ROAD FREIGHT SEMI-TRAILERS THROUGH THE APPLICATION OF COMPOSITES IN TRAILER DECKING** *Joel Galos (University of Cambridge), Michael Sutcliffe (University of Cambridge), David Cebon (University of Cambridge)* The potential application of different lightweight composite materials to semi-trailer decking is examined. Existing hardwood decking is heavy and a significant contributor to fuel consumption.	**1221-2 MULTIFUNCTIONAL COMPOSITE MATERIALS USING LITHIUM ION FUNCTIONALIZATION** *Dan Zenkert (KTH - Royal Institute of Technology), Eric Jacques (KTH - Royal Institute of Technology), Göran Lindbergh (KTH - Royal Institute of Technology), Simon Leijonmarck (Swerea SICOMP)* In this paper we show how one can functionalise carbon fibres electrochemically. This enables several multi-functional uses of carbon fibres, such as sensing, actuation and energy harvesting.
1211-4 INFLUENCE OF TEXTILE DESIGN PARAMETERS ON DRAPEABILITY OF WARP-KNIT NCF *Mirko Christ (Faserinstitut Bremen e.V.), Axel Herrmann (Faserinstitut Bremen e.V.)* The Textechno Drapetest automatic drapeability tester was used on a set of NCF that were chosen to show the influence of textile design parameters on drapeability effects.	**1212-4 EFFECT OF HEAT TREATMENT ON CONDUCTIVITY OF DOPED POLY(ANILINE)/GRAPHENE OXIDE COMPOSITE** *Shigeji Konagaya (Nagoya university), Mariko Terada (Nagoya university)* The conductivity of PANI/ GO thin film composites increases with PANI content and heat-treatment temperature, which is due to DBSA contained as a dopant in PANI.	**1213-4 ASSESSMENT OF ACCURACY OF FIBRE ORIENTATION MEASUREMENT USING X-RAY COMPUTED TOMOGRAPHY** *Dietmar Salaberger (University of Applied Sciences Upper Austria), Peter Hine (University of Leeds), Michael Jerabek (Borealis Polyolefine GmbH), Johann Kastner (University of Applied Sciences Upper Austria)* The accuracy of fibre orientation measurement using X-ray CT was determined for short glass fibre filled polymers. 3D CT analysis gives the same tensor values as the 2D sectioning standard method.	**1214-4 INVESTIGATING INTERLAMINAR FRACTURE IN TOUGHENED CFRP'S VIA QUANTITATIVE CT ANALYSIS** *Gregor Borstnar (University of Southampton), Mark Noel Mavrogordato (University of Southampton), Qingda Yang (University of Miami), Ian Sinclair (University of Southampton), Mark Spearing (University of Southampton)* CT studies that identify the chronology of damage events and crack paths within toughened CFRP interlayers are used to inform micromechanical A-FEM simulations to highlight the competing mechanisms	**1215-4 EXPERIMENTAL INVESTIGATION ON PERFORMANCE OF COMPOSITE JOINTS WITH EMBEDDED STEEL PLATE** *Shufeng Liu (Beihang University), Yunyan Xu (Beihang University), Xiaoquan Cheng (Beihang University), Jiayi Qi (Beihang University), Gaofeng Dong (Beihang University)* This article focuses on the tensile strength and stiffness of the metallic inserts composite structure. And two forms of inserts structure were compared: the blunt and tapered tip steel inserts.	**1216-4 MODELLING THE DOUBLE CANTILEVER BEAM TEST WITH BENDING MOMENTS BY USING BILINEAR DISCONTINUOUS COHESIVE LAWS** *Paolo S. Valvo (University of Pisa), Bent F. Sørensen (Technical University of Denmark), Helmuth L. Toftegaard (Technical University of Denmark)* A theoretical model of the DCB-UBM test is presented, based on bilinear discontinuous cohesive laws. The analytical solution is compared to experimental test results for fracture modes I and II.	**1217-4 MODELING THE STRAIN-RATE, TEMPERATURE AND PRESSURE DEPENDENT MECHANICAL RESPONSE OF A HIGHLY CROSSLINKED AEROSPACE GRADE EPOXY RESIN UP TO LARGE DEFORMATION** *Frédéric Lani (Institute of Mechanics-Materials and Civil Engineering (IMMC)-University of Louvain), Xavier Morelle (Institute of Mechanics-Materials and Civil Engineering (IMMC)-University of Louvain), Christian Bailly (Institute of Condensed Matter and Nanosciences (IMCN)-University of Louvain), Thomas Pardoen (Institute of Mechanics-Materials and Civil Engineering (IMMC)-University of Louvain)* The non-linear behavior of the RTM6 aerospace grade epoxy resin is characterized and modeled by addressing the effects of strain-rate, temperature and hydrostatic pressure.	**1218-4 SIZING OF BOLTED JUNCTIONS FOR 3D-WOVEN CERAMIC MATRIX COMPOSITES STRUCTURES USING ONERA DAMAGE MODEL AND COMPARISONS WITH MULTI-INSTRUMENTED TESTS** *Etienne Voland (SAFRAN Herakles), Florent Bouillon (SAFRAN Herakles), Thomas Vandellos (SAFRAN Herakles), Axel Candeau (SAFRAN Herakles), Zoheir Aboura (Université de Technologie de Compiègne), Frédéric Laurin (ONERA), Blanche Legin (Université de Technologie de Compiègne)* Analysis of 3D woven Ceramic Matrix Composite bolted junctions during single lap shear test using the dialog between simulations with the damage model ODM-CMC and multi-intrumented experimental tests	**1219-4 INVESTIGATION ON THE IMPACT PROPERTIES OF GLASS FIBER/ EPOXY COMPOSITES AT CRYOGENIC CONDITION** *Hei Lam Ma (The Hong Kong Polytechnic University), Kin Tak Lau (The Hong Kong Polytechnic University), Jinsong Leng (Harbin Institute of Technology)* Low velocity impact test was performed for Glass fiber/Epoxy composites. Results showed that composites at cryogenic condition exhibited smaller damage but had relatively poor energy absorbability.	**1220-4 EVALUATION OF BRAIDING AS A METHOD FOR THE MANUFACTURING OF COMPOSITE PRESSURE VESSELS** *Michael Lengersdorf (Institut für Textiltechnik (ITA) of RWTH Aachen University), Thomas Gries (Institut für Textiltechnik (ITA) of RWTH Aachen University), Jörg Multhoff (ISATEC GmbH)* Composite pressure vessels are nowadays mostly manufactured by wet-filament winding. This paper evaluates braiding as an alternative method for the manufacturing of composite pressure vessels.	**1221-3 FUNCTIONAL STRUCTURAL BATTERY** *Wilhelm Johannisson (KTH Royal Institute of Technology), Niklas Ihrner (KTH Royal Institute of Technology), Simon Leijonmarck (KTH Royal Institute of Technology), Johan Hagberg (KTH Royal Institute of Technology), Dan Zenkert (KTH Royal Institute of Technology), Göran Lindbergh (KTH Royal Institute of Technology)* A novel energy-storing carbon fiber composite electrode is produced, and investigated with regards to the mechanical properties of the composite and electrochemical properties of the electrode.

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16
16:40	**1301 Processing - Manufacturing Technology 3**	**1302 Nano Composites 3**	**1303 Multifunctional Composites - Sensing and Actuation 3**	**1304 Fatigue 3**	**1305 Structural Analysis and Optimization 3**	**1306 Process Induced Effects 2**	**1307 Process Modelling 3**	**1308 Biocomposites 3**	**1309 Interfaces and Interphases 3**	**1310 Foams, Cellular and Lattice Materials 2**
16:40	**1301-1 MANUFACTURE WITH SPREAD TOW FIBER MATERIALS, FOR REDUCED MICRO-CRACKING** *Kurt Olofsson (Swerea SICOMP), David Mattsson (Swerea SICOMP), Runar Langstrom (Swerea SICOMP), Fredrik Ohlsson (Oxeon AB)* TeXtreme® was introduced in a cryogenic fuel tank. Processability adjustments were introduced to the material, which lowered the resulting void content and needed mould filling times.	**1302-1 HIERARCHICAL HYBRID COMPOSITES WITH SECONDARY CNT NANOREINFORCEMENT: COMPUTATIONAL MODELLING** *Leon Mishnaevsky Jr. (Technical University of Denmark), Gaoming Dai (Technical University of Denmark)* Effect of secondary CNT (carbon nanotube) reinforcement on fatigue resistance of hybrid and carbon fiber reinforced composites is studied using computational modelling	**1303-1 MONITORING OF FATIGUE INDUCED PROPAGATING DELAMINATIONS USING EMBEDDED FIBRE BRAGG GRATING SENSORS AND OPERATIONAL MODAL PARAMETER ESTIMATION.** *Alfredo Lamberti (Vrije Universiteit Brussel (VUB)), Gabriele Chiesura (Ghent University), Ben De Pauw (Vrije Universiteit Brussel (VUB)), Steve Vanlanduit (Vrije Universiteit Brussel (VUB))* We investigate the use of embedded Fibre Bragg Grating sensors to monitor the modal frequencies shifts induced by a delamination which propagates in a composite beam subjected to fatigue load.	**1304-1 A NEW SCALING PARAMETER FOR DELAMINATION GROWTH IN COMPOSITE LAMINATES UNDER FATIGUE LOADING** *Matthew Donough (RMIT University), Andrew Gunnion (CRC-ACS), Adrian Orifici (RMIT University), Chun Wang (RMIT University)* A new scaling parameter that is consistent with the similitude principle and incorporates the effects of fibre bridging is proposed to unify the mode I and II fatigue delamination growth rates.	**1305-1 NUMERICAL CHARACTERIZATION OF THE KNOCK-DOWN FACTOR ON UNSTIFFENED CYLINDRICAL SHELLS WITH INITIAL GEOMETRIC IMPERFECTIONS** *Mariano Arbelo (PFH Private University of Applied Sciences), Kaspars Kalnins (Riga Technical Universityq), Olgerts Ozolins (Riga Technical University), Saulo Castro (PFH Private University of Applied Sciences), Richard Degenhard (German Aerospace Center)* The aim was to validate experimental test results, including imperfection measurements of composite cylinders, with FEM and point out their limitation, advantage and disadvantage against KDF approach.	**KEYNOTE** **1306-1 BULK AND SURFACE POROSITY IN OUT-OF-AUTOCLAVE PREPREGS** *James Kay (The University of British Columbia), Jeremy Wells (The University of British Columbia), Anoush Poursartip (The University of British Columbia), Göran Fernlund (The University of British Columbia)* In composites manufacturing both bulk and surface porosity are undesirable outcomes that should be minimized or eliminated. Bulk porosity negatively impacts mechanical properties whereas surface poros	**1307-1 ABOUT THE MODELING OF THE LASER ASSISTED TAPE PLACEMENT PROCESS** *Cyril Dedieu (GeM-UMR CNRS), Francisco Chinesta (GeM-UMR CNRS), Anaïs Barasinski (GeM-UMR CNRS), Adrien Leygue (GeM-UMR CNRS), Jean-Marc Dupillier (Airbus Defence and Space)* The study of the establishment of residual stresses in the Automated Tape Placement process of thermoplastic matrix composites. Two modeling approaches are detailed and compared.	**1308-1 MULTIPLE FIBER BREAKAGE BEHAVIOR ON SINGLE YARN FRAGMENTATION TEST OF NATURAL FIBER COMPOSITES** *Junji Noda (Yamaguchi University), Tomohiro Sugita (Yamaguchi University), Koichi Goda (Yamaguchi University)* To investigate the effect of TPI of natural fiber yarns on multiple fiber breakages and stress recovery behavior using single yarn composites, fragmentation tests and FEA were implemented.	**1309-1 INTERFACIAL EFFECTS IN CORE-SHELL POLYMER NANOCOMPOSITES** *Polycarpos Pissis (National Technical University of Athens), Panagiotis Klonos (National Technical University of Athens), Apostolos Kyritsis (National Technical University of Athens), Vladimir M Gun'ko (National Academy of Sciences of Ukraine)* DSC and dielectric techniques were employed to study glass transition and dynamics in the interfacial layer in core-shell type polymer nanocomposites based on poly(dimethyl siloxane) and metal oxides	**1310-1 MODELLING OPEN CELL FOAM STRUCTURES BASED ON 3D IMAGE DATA** *André Liebscher (TU Kaiserslautern), Dennis Merkert (TU Kaiserslautern), Claudia Redenbach (TU Kaiserslautern)* We present a 3D image data based modelling approach for open cell foams that realistically reproduces the foam's microstructure as well as its effective material properties.
17:00	**1301-2 CARBON FIBER TOW SPREADING PROCESS USING PNEUMATIC DEVICES AND APPLICATION TO THERMOPLASTIC PREPREG MANUFACTURING** *Gyu Hee Lee (Seoul National University), Woo Il Lee (Seoul National University)* Continuous 12k carbon fiber tow spreading process using air knife was investigated. The tow spread width and spread uniformity for 2 different process parameters were quantitatively evaluated.	**1302-2 EFFECTS OF CARBON NANOTUBE CONTENTS ON GLASS TRANSITION TEMPERATURE OF EPOXY MATRIX COMPOSITES** *Cai Jiang (National University and Defense Technology), Jianwei Zhang (National University of Defense Technology), Shaofeng Lin (National University and Defense Technology), Fubiao Yang (National University and Defense Technology), Dazhi Jiang (National University and Defense Technology)* Molecular dynamics simulation for carbon nanotubes (CNTs) reinforced epoxy matrix composites was conducted to study effects of CNT contents on glass transition temperature of the composites.	**1303-2 CONCEPT STUDY FOR THE MATERIAL COMPLIANT IMPLEMENTATION OF THE RFID TECHNOLOGY INTO CARBON FIBRE STRUCTURES** *Alexander Horoschenkoff (Munich University of Applied Sciences), Nadine Deichelsberger (Munich University of Applied Sciences), Andreas Bierbaumer (Munich University of Applied Sciences), Jürgen Rackles (Munich University of Applied Sciences)* Carbon fibres are used to built a radio-frequency identification (RFID) system, a transmitter-receiver system for wireless power transmission and health monitoring in multifunctional composites.	**1304-2 ULTRASONIC FATIGUE OF CARBON FIBER FABRIC REINFORCED POLYPHENYLENSULFIDE IN THE VERY HIGH CYCLE FATIGUE REGIME: TEST PROCEDURE AND MICROSTRUCTURAL ANALYSIS** *Frank Balle (University of Kaiserslautern), Daniel Backe (University of Kaiserslautern), Dietmar Eifler (University of Kaiserslautern)* The fatigue behavior of CF-PPS in the VHCF-regime was studied by a new developed ultrasonic testing facility for cyclic bending at 20 kHz accompanied by microscopy and online damage monitoring.	**1305-2 BUCKLING AND POST-BUCKLING IN CARBON/EPOXY FILAMENT WOUND COMPOSITE TUBES UNDER TRANSVERSE COMPRESSION** *José Humberto Almeida Jr. (Federal University of Rio Grande do Sul), Volnei Tita (University of São Paulo – São Carlos School of Engineering), Hugo Faria (INEGI - Institute of Mechanical Engineering and Industrial Management), António Marques (Faculty of Engineering of the University of Porto), Sandro Amico (Federal University of Rio Grande do Sul)* Non-linear models and progressive failure analysis pointed an increase in maximum compressive load for high angles. Matrix tensile and matrix compression induced by shear dominate the failure mode.		**1307-2 COMBINING DRAPING AND INFUSION MODELS INTO A COMPLETE PROCESS MODEL FOR COMPLEX COMPOSITE STRUCTURES** *Robert Pierce (Monash University), Brian Falzon (Queen's University), Mark Thompson (Monash University)* Experimental validation and demonstration of a Complete Process Model, for LCM processing of complex aircraft structures, which focuses on the relationship between fabric draping and resin infusion.	**1308-2 ANALYSIS OF PROCESSING PARAMETERS ON THE MECHANICAL BEHAVIOR OF MANICARIA FABRIC/PLA BIOCOMPOSITE LAMINA BY THE TAGUCHI METHOD.** *Alicia Porras (Universidad de los Andes), Alejandro Maranon (Universidad de los Andes), Ian A Ashcroft. (University of Nottingham)* The main focus of this study was to analyze the effect of processing parameters on the tensile properties of Manicaria fabric/PLA bio-composite lamina using the Taguchi Method.	**1309-2 ENHANCEMENT OF INTERFACIAL ADHESION IN EPOXY/GLASS/GRAPHENE MULTISCALE COMPOSITES** *Haroon Mahmood (University of Trento-Italy), Alessandro Pegoretti (University of Trento-Italy)* In this work, the aim is to use different forms of graphene nanosheets as an interphase in fiber reinforced polymer composite and evaluate its effect on interfacial properties.	**1310-2 INSIGHT ON THE DYNAMIC BEHAVIORS OF ALUMINUM FOAM BASED ON THE NEW PLASTIC CONSTITUTION** *Lingling Hu (Sun Yat-sen University), Liwen Xiong (Sun Yat-sen University), T. X. Yu (The Hong Kong University of Science and Technology)* Based on the empirical constitution of aluminium foams, the foam's dynamic plateau stress and densified strain can be predicted according to their deformation.

Meeting room 5	Meeting room 6	Meeting room 7	M1	M2	M3	M4	M5	M6	M7	M8
1311 Textile-Based Composites and Fibre Architecture 3	**1312 Graphene, Graphene-Based Composites 3**	**1313 X-ray Computed Tomography 2**	**1314 Fracture and Damage - Micromechanics 3**	**1315 Fracture and Damage - Laminate Scale 3**	**1316 Fracture and Damage - Delamination 3**	**1317 Constitutive Models 3**	**1318 Joints - Design, Manufacturing and Testing 3**	**1319 Applications - Aerospace 2**	**1320 Applications - Automotive and Rail 2**	**1321 Multifunctional Composites - Energy Storage and Harvesting 3**
1311-1 MODELING AND SIMULATION OF THE FORMING OF CONTINUOUS FIBER REINFORCED THERMOPLASTIC COMPOSITES *Anton Rusanov (INSA Lyon), Eduardo Guzman-Maldonado (INSA Lyon), Nahiene Hamila (INSA Lyon), Philippe Boisse (INSA Lyon)*	**1312-1 FAILURE MECHANISMS, ELECTRICAL AND THERMAL CONDUCTIVITY OF AEROGRAPHITE/EPOXY COMPOSITE** *Swetha Chandrasekaran (Technische Universität Hamburg-Harburg), Wilfred Liebig (Technische Universität Hamburg-Harburg), Matthias Mecklenburg (Technische Universität Hamburg-Harburg), Bodo Fiedler (Technische Universität Hamburg-Harburg), Rainer Adelung (Christian-Albrechts-Universität zu Kiel), Karl Schulte (Technische Universität Hamburg-Harburg)* Aerographite (AG) is a novel hierarchical 3D carbon nanomaterial which can be filled with epoxy resin, This results in novel electrical and fracture toughness properties of the composite.	**1313-1 X-RAY CT IMAGE-BASED MEASUREMENT AND MODELING OF MICROSCOPIC DEFECTS IN CFRP LAMINATES** *Akinori Yoshimura (Japan Aerospace Exploration Agency), Shingo Ii (the University of Tokyo), Ryohei Hosoya (Tokyo University of Science), Jun Koyanagi (Tokyo University of Science), Toshio Ogasawara (Japan Aerospace Exploration Agency), Keita Terashima (Japan Aerospace Exploration Agency), Toru Kamita (Japan Aerospace Exploration Agency), Nobuo Takeda (the University of Tokyo)* In this paper, the authors develop a method to measure the microscopic defects in CFRP laminates from X-ray CT images and a method to introduce the effect of the defects to the finite element method.	**1314-1 FAILURE LOCUS ANALYSIS OF FIBRE-REINFORCED COMPOSITES UNDER COMBINED TRANSVERSE STRESSES THROUGH COMPUTATIONAL MICROMECHANICS** *Taotao Zhang (Beihang University), Ying Yan (Beihang University)* a 3-D modified Hashion criterion for fibre-reinforced composites under transverse stress state is proposed through computational micromechanic analysis.	**1315-1 STUDY ON LOAD DISTRIBUTION OF MULTI-BOLT COUNTERSUNK COMPOSITE LAMINATE JOINTS** *Qian Zhang (Beihang University), Songwei Wang (Beihang University), Xiaoquan Cheng (Beihang University), Jiayi Qi (Beihang University), Gaofeng Dong (Beihang University)* The tensile performance of a multi-bolt joint of composite laminate with metal plate is analyzed. The effects of pin clearance, bolt torsion moment, height ratio on load distribution are researched.	**1316-1 EFFECT OF STACKING SEQUENCE ON THE FRACTURE TOUGHNESS AND FATIGUE DELAMINATION PROPAGATION BEHAVIOR OF COMPOSITE LAMINATES UNDER MODE I LOADING** *Yu Gong (Beihang University), Libin Zhao (Beihang University), Jianyu Zhang (Chongqing University), Stephen Richard Hallett (University of Bristol)*	**1317-1 NONLINEAR FINITE ELEMENT ANALYSIS OF FIBER COMPOSITES WITH DIFFERENT PROPERTIES IN TENSION AND COMPRESSION** *Jie Wang (Tongji University), Yi Xiao (Tongji University)* This study extended the constitutive model to that as a nonlinear finite element analysis tool by writing a UMAT to address two- or three-dimensional finite elements in ABAQUS.	**1318-1 REDUCED BOLT MODEL USING MULTI-CONNECTED RIGID SURFACES FOR COMPOSITE STRUCTURES JOINING** *Ramzi Askri (Univ. Bordeaux-I2M-UMR 5295), Christophe Bois (Univ. Bordeaux-I2M-UMR 5295), Hervé Wargnier (Univ. Bordeaux-I2M-UMR 5295), Julie Lecomte (Univ. Bordeaux-I2M-UMR 5295)* The development of a reduced model of bolted joint using Multi-Connected Rigid Surfaces and continuum shell elements for the prediction of both load distribution and stress field around hole.	**1319-1 CARBON NANOTUBES FOR PROPERTY ENHANCEMENT OF EPOXY AT CRYOGENIC ENVIRONMENTS** *Alan Kin Tak Lau (The Hong Kong Polytechnic University), Jinsong Leng (Harbin Institute of Technology)* In the outer space, composite structures are always subject to cyclic thermal stress in which one surface of the structures facing to the Sun experiences temperature over 393 K while an opposite side	**1320-1 ANALYSIS OF APPLICATION OF HYBRID MATERIAL ON A SILL** *Josef Oleksik (TU-Braunschweig)* This article discusses the possibilities and characters of using hybrid material on a sill aiming to increase the stiffness and to decrease the weight.	**1321-1 HIGH STRENGTH MULTIFUNCTIONAL STRUCTURAL BATTERY BASED ON SOLID-STATE G-CNT CARBON FIBER HYBRID COMPOSITES** *Mi-Young Park (KAIST), Jung-Yup Lim (Yonsei University), Jong-Hak Kim (Yonsei University), Chun-Gon Kim (KAIST)* High strength multifunctional structural battery based on solid-state G-CNT carbon fiber hybrid composites was successfully fabricated and experimented for electrical and structural study.
1311-2 NUMERICAL PERMEABILITY PREDICTIONS OF WOVEN TEXTILES: EXAMINING THE CHARACTERISTICS OF MULTI-LAYER PREFORMS *Elinor Swery (The University of Auckland), Piaras Kelly (The University of Auckland), Tom Allen (The University of Auckland), Simon Bickerton (The University of Auckland)* An automated tool has been developed for generation of permeability predictions. It has been used to study the effects of numerous parameters on permeability and has been verified experimentally.	**1312-2 DEFORMATION OF GRAPHENE OXIDE: FROM MONOLAYER TO BULK NANOCOMPOSITES** *Zheling Li (The University of Manchester), Robert Young (The University of Manchester), Ian Kinloch (The University of Manchester)* The deformation behaviour of monolayer and multilayer graphene oxide has been investigated using Raman spectroscopy. On this basis, their reinforcement to nanocomposites has been discussed.	**1313-2 COMPRESSIBILITY OF CHOPPED FIBRE-REINFORCED PREPREGS DURING COMPRESSION MOULDING** *Dimitri Ferré Sentis (Univ. Grenoble Alpes-Lab. 3SR-F-38000 Grenoble-France), Laurent Orgéas (Univ. Grenoble Alpes-Lab. 3SR-F-38000 Grenoble-France), Pierre Dumont (Univ. Grenoble Alpes-Lab. LGP2-F-38000 Grenoble-France), Sabine Rolland du Roscoat (Univ. Grenoble Alpes-Lab. 3SR-F-38000 Grenoble-France), Mustafa Sager (Plastic Omnium Auto Exterior)* Compressibility, pore kinetics and kinematics evolution of thermoset prepregs during compression moulding are investigated using a specially designed compression rheometer and X-ray microtomography.	**1314-2 EXPERIMENTAL AND ANALYTICAL EVALUATION OF FIBER-MATRIX INTERFACE ADHESION** *Jay Mahishi (Honda R & D Americas), Micheal Angelo Osero (Honda R & D Americas), Eric Walker (Honda R & D Americas), Duane Detwiler (Honda R & D Americas)* The paper discusses an effective and efficient test procedure to measure force needed to pull fiber from matrix. The experiment involves pulling 24K, 50K carbon fiber tows bonded with the matrix only	**1315-2 EFFECT OF CONSTRAINT RATIO AND COOLING RATE ON TRANSVERSE CRACKING IN THERMOPLASTIC CROSS-PLY LAMINATES** *Husam Wafai (King Abdullah University of Science and Technology (KAUST)), Gilles Lubineau (King Abdullah University of Science and Technology (KAUST)), Arief Yudhanto (King Abdullah University of Science and Technology (KAUST)), Matthieu Mulle (King Abdullah University of Science and Technology (KAUST)), Warden Schijve (SABIC), Nikhil Verghese (SABIC Technology Center)* In this work we study damage in cross-ply laminates made of impact-resistant Polypropylene Copolymer reinforced with continuous E-glass fibers (GF/PP).	**1316-2 ENHANCING THE INTERLAMINAR FRACTURE RESISTANCE OF LAMINATED COMPOSITES BY USING CONTINUOUS CARBON NANOTUBE FILMS** *Hong Xu (Suzhou Institute of Nano-Tech and Nano-Bionics-CAS-China), Xiao Tong (Suzhou Institute of Nano-Tech and Nano-Bionics-CAS-China), Yongyi Zhang (Suzhou Institute of Nano-Tech and Nano-Bionics-CAS-China), Qingwen Li (Suzhou Institute of Nano-Tech and Nano-Bionics-CAS-China), Tsu-Wei Chou (University of Delaware), Weibang Lu (Suzhou Institute of Nano-Tech and Nano-Bionics-CAS-China)* A novel method for fabricating continuous CNT film interleaved carbon fiber composites has been developed. This hybrid laminate composite shows better interlaminar properties.	**1317-2 AN ELASTOPLASTIC-DAMAGE CONSTITUTIVE MODEL BASED ON A LARGE-STRAIN HYPERELASTIC FORMULATION FOR AMORPHOUS GLASSY POLYMERS** *Van Dung Nguyen (University of Liège), Xavier Morelle (University of Louvain), Frédéric Lani (University of Louvain), Thomas Pardoen (University of Louvain), Christian Bailly (University of Louvain), Ludovic Noels (University of Liège)* An efficient viscoelastic-viscoplastic-damage constitutive model based on a large-strain hyperelastic formulation for amorphous polymers in the glassy state	**1318-2 HIGH-TEMPERATURE HYBRID WELDING OF THERMOPLASTIC (CF/PEEK) TO THERMOSET (CF/EPOXY) COMPOSITES** *Irene Fernandez Villegas (Delft University of Technology), Pablo Vizcaino Rubio (Delft University of Technology)* This paper presents an procedure to prevent thermal degradation during welding of CF/PEEK to CF/epoxy composites based on a drastical reduction of the welding time.	**1319-2 PREVENTION OF UVR DEGRADATION ON POLYMER-BASED COMPOSITES BY NANO-ZNO & HGFS** *Tsz-Ting Wong (The Hong Kong Polytechnic University), Kin-Tak Lau (The Hong Kong Polytechnic University), Wai-Yin Tam (The Hong Kong Polytechnic University), Jinsong Leng (Harbin Institute of Technology), Julie A. Etches (University of Bristol)* Effects of nano-ZnO/epoxy rheology and nano-ZnO particle dispersion on infiltration condition, UV absorbability and mechanical properties of a nano-ZnO/epoxy filled HGF composite.	**1320-2 USER-RELATED METHODICAL DEVELOPMENT OF COST OPTIMISED CFRP INTERIOR COMPONENTS FOR DERIVATIVES OF LUXURY CARS** *Jonathan Schmidt (RWTH Aachen University), Liliane Ngahane Nana (RWTH Aachen University), Zhuzhell Montano (RWTH Aachen University), Anna-Lena Beger (RWTH Aachen University), Jörg Feldhusen (RWTH Aachen University), Dave Cadwell (BENTLEY MOTORS LIMITED)* Developed design process that tries to give the engineer a tool to support and structure his work. It is a very simplified and authentic try to illustrate such a complex thing like a CFRP design.	**1321-2 SYNTHESIS OF CU-DOPED VANADIUM OXIDE/GRAPHENE HYBRID MATERIAL FOR HIGH PERFORMANCE ELECTROCHEMICAL CAPACITOR** *Xiaoran Zhao (Beihang University), Yan Zhao (Beihang University), Ye Li (Beihang University), Xiaoyan Zhang (Beijing Institute of Aeronautical Materials), Shanyi Du (Beihang University)* Cu-doped vanadium oxide/graphene electrode material has been successfully synthesized by one-step hydrothermal technology and excellent electrochemical properties have been obtained.

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16
17:20	**1301-3 MECHANICAL PROPERTIES OF CFRP PIPES MADE BY MULTI FILAMENT WINDING METHOD (MFW)** *Takehiko Hyodo (Sumitomo Rubber Industories), Yumi Kanemitsu (Sumitomo Rubber Industories), Tadashi Uozumi (Gifu University Composite Materials Center), Akio Ohtani (Gifu University Composite Materials Center), Asami Nakai (Gifu University)* We investigated the Multi-Filament-Winding method by applying a tensile load to carbon fibers and we confirmed that it is possible to produce CFRP pipes that are superior to those by SW method.	**1302-3 HYBRID CONDUCTIVE POLYMER COMPOSITES: THE EFFECT OF MIXED FILLERS AND POLYMER BLENDS ON PYRORESISTIVE PROPERTIES.** *Eric Asare (Queen Mary University of London), Jamie Evans (LMK Thermosafe Ltd), Emiliano Bilotti (Queen Mary University of London), Mark Newton (LMK Thermosafe Ltd)* Conductive polymer composites (CPC) with hybrid polymers and fillers are investigated for their pyro-resistive properties. Pyro-resistive properties increased upon addition of hybrid polymer/filler	**1303-3 LOCALIZED DAMAGE DETECTION AND STRAIN MEASUREMENT IN LAMINATED COMPOSITE MATERIALS USING INTEGRATED CARBON NANOTUBE YARN SENSORS** *Jandro Abot (The Catholic University of America), Kevin Wynter (The Catholic University of America), Samuel Mortin (The Catholic University of America), Huy Le (The Catholic University of America), Hugo Borges de Quadros (The Catholic University of America), Victor Casarotto (The Catholic University of America)* Piezoresistive characteristic of carbon nanotube yarns is tapped to detect damage and measure strain in laminated composite materials through resistance measurements without altering their integrity.	**1304-3 MASTER SN CURVE APPROACH- A HYBRID MULTISCALE APPROACH TO FATIGUE SIMULATION OF SHORT FIBER COMPOSITES** *Atul Jain (KULeuven), Yasmine Abdin (KULeuven), Stefan Straesser (Siemens Industry Software NV), Wim Van Paepegem (Ghent University), Ignaas Verpoest (KULeuven), Stepan V. Lomov (KULeuven)* A hybrid multi-scale method to predict the local SN curves of SFRC is proposed; this proposed method which involves both multiscale-mechanics and tests is validated by experiments.	**1305-3 EFFECT OF THE DESIGN GUIDELINES ON THE DESIGN SPACE** *Thiago Dutra (Instituto Tecnologico de Aeronautica), Clovis Ferreira (Embraer), Sergio Almeida (Instituto Tecnologico de Aeronautica)* The boundaries of the feasible region of lamination parameters when design guidelines is discussed. Laminate databases were generated and filtered according the desired design guideline.	**1306-2 CHARACTERIZATION AND NUMERICAL INVESTIGATION OF AN RTM CURE PROCESS WITH CFRP MOLDS AND INDEPENDENT HEAT PATCHES** *Jakob Weiland (Institute for Carbon Composites), Mathias Hartmann (Institute for Carbon Composites), Roland Hinterhölzl (Institute for Carbon Composites)* A numerical strategy for cure simulation of an RTM manufacturing process utilizing CFRP molds with temperature controlled heat patches has been developed and validated.	**1307-3 STOCHASTIC SIMULATION OF THE CURE OF ADVANCED COMPOSITES** *Alex Skordos (Cranfield University, Cranfield, United Kingdom), Tassos Mesogitis (Cranfield University, Cranfield, United Kingdom), Andrew Long (Nottingham University, Nottingham, United Kingdom)* A stochastic simulation methodology is developed to investigate the effects of cure kinetics, in plane fibre misalignment and boundary conditions uncertainty on the cure process of composites.	**1308-3 FATIGUE BEHAVIOR OF UNI-DIRECTIONAL FLAX FIBRE/EPOXY COMPOSITES** *Yosuke Ueki (Hitachi LTD), Hans Lilholt (Technical University of Denmark), Bo Madsen (Technical University of Denmark)* Fatigue behaviour of a uni-directional flax-epoxy composite was investigated. Results indicated that the failure criteria was determined by not only the fatigue damaging but also the creep strain.	**1309-3 WETTING BEHAVIOUR OF MOLTEN THERMOPLASTICS: EFFECT OF PHYSICAL AND CHEMICAL INTERACTIONS ON THE MECHANICAL PROPERTIES OF GLASS FIBRE-THERMOPLASTIC COMPOSITE INTERFACES** *Carlos Fuentes (KU Leuven), Els Van Santfoort (GroepT-Leuven Engineering College), Haoyu Guo (GroepT-Leuven Engineering College), Christine Dupont-Gillain (Université Catholique de Louvain-Louvain-la-Neuve), David Seveno (KU Leuven), Aart Van Vuure (KU Leuven)* Surface interactions and interface compatibility between PP, MAPP, and PVDF with glass substrates were evaluated, at room (20°C) and high temperature (200°C).	**1310-3 STATIC AND DYNAMIC RESPONSE OF NOVEL ANISOTROPIC COMPOSITE FOAM CONCEPT FOR PROTECTIVE HELMETS** *Yasmine Mosleh (KU Leuven), Bart Depreitere (KU Leuven), Jos Vander Sloten (KU Leuven), Jan Ivens (KU Leuven)* In this paper, a new anisotropic material concept namely composite foam is proposed as an alternative to next generation helmet liners which can potentially reduce head rotational accelerations.
17:40	**1301-4 FUSED DEPOSITION TECHNOLOGY APPLIED TO THERMOPLASTIC MATRIX PLACEMENT AND WETOUT IN FILAMENT WINDING** *Donald Radford (Colorado State University), Kevin Hedin (Colorado State University)* Glass fiber/PET composites are filament wound using an integrated fused deposition 3D printhead to wetout the fibers. The properties compare favorably to filament wound commingled tow composites.	**1302-4 ULTRADRAWING OF NANODIAMOND REINFORCED POLY (VINYL ALCOHOL) NANOCOMPOSITE FIBERS** *Seira Morimune-Moriya (Kobe University), Yuya Fujita (Kobe University), Masaru Kotera (Kobe University), Kimiya Goto (Bando Chem. Ind.-Ltd.), Katsuhiko Hata (Bando Chem. Ind.-Ltd.), Takashi Nishino (Kobe University)* ND reinforced PVA nanocomposite fibers were prepared through gel process followed by uniaxial drawing. The excellent mechanical properties of the drawn nanocomposite fibers were revealed.	**1303-4 THE MICROWAVE ACTUATED SHAPE MEMORY POLYMER FILLED WITH T-ZNOW** *Zhihong Xu (Nanjing University of Science and Technology)* The absorbed microwave energy could be transferred into heat efficiently in the T-ZnOw/SMP composite and the remote actuation of complex shape transitions by microwave is possible.	**1304-4 DELAMINATION FATIGUE PROPERTIES OF Z-PINNED CARBON-EPOXY LAMINATE USING METAL OR COMPOSITE RODS** *Fabio Pegorin (RMIT University), Khomkrit Pingkarawat (RMIT University), Stephen Daynes (RMIT University), Adrian Mouritz (RMIT University)* Fabio Pegorin is a Doctoral candidate in Aerospace Engineering at RMIT University. His Ph.D aims to create a multi-functional composite material for aerospace structure using z-pinning technique.	**1305-4 A PARAMETERIZED SURFACE METHOD TO DETERMINE OPTIMAL VARIABLE STIFFNESS LAYUP DESIGN BY GLOBAL SEARCH** *Simon Hesse (BMW AG. & Technische Universität München), Anna Arsenyeva (Technische Universität München), Dirk Lukaszewicz (BMW Group), Fabian Duddeck (Technische Universität München)* Variable Stiffness laminates are optimized by using bi-variate spline surfaces with a small number of control points. Our example showes a significant increase of the buckling load for a curved panel.	**1306-3 EFFECTS ON FORMING WHEN USING ALIGNED MULTI WALL CARBON NANOTUBES IN MULTI-STACKED PREPREG** *Per Hallander (Saab AB), Jens Sjölander (Royal Institute of Technology), Malin Åkermo (Royal Institute of Technology)* The aim of this study was to show how locally arranged MWCNTs in prepreg interlayers affect the global forming behavior. The study shows that MWCNT in the [0]/[45] interfaces affects wrinkling.	**1307-4 MONOLITHIC STOKES/DARCY FLUID FORMULATION IN DEFORMABLE MEDIA FOR THE SIMULATION OF RESIN-INFUSION BASED PROCESSES** *Maxime Blais (Ecole des mines de Saint-Etienne), Nicolas Moulin (Ecole des mines de Saint-Etienne), Pierre-Jacques Liotier (Ecole des mines de Saint-Etienne), Julien Bruchon (Ecole des mines de Saint-Etienne), Sylvain Drapier (Ecole des mines de Saint-Etienne)* Based on a monolithic Stokes-Darcy formulation coupled with a solid mechanics problem, this study describes a numerical approach for the simulation of composite parts made by infusion processes.	**1308-4 VISCOSE RAYON FIBRES: A POTENTIAL ADDITION TO THE TECHNICAL FIBRES FAMILY?** *Jonathon Chard (University of Surrey), Gavin Creech (Scott Bader), David Jesson (University of Surrey), Paul Smith (University of Surrey)* Viscose rayon fibres have the potential to bridge the gap between natural (in this context plant derived) and technical fibres. Data from mechanical tests are prestented.	**1309-4 EFFECTS OF TESTING TEMPERATURE ON INTERFACIAL SHEAR STRENGTH MEASUREMENTS OF EPOXY RESINS AT DIFFERENT MIXING RATIOS** *Helga Nørgaard Petersen (Technical University of Denmark), Ross Minty (University of Strathclyde), James L. Thomason (University of Strathclyde), Povl Brøndsted (Technical University of Denmark), Yukihiro Kusano (Technical University of Denmark), Kristoffer Almdal (Technical University of Denmark)* The interfacial shear stress of a glass fibre and epoxy matrix system was investigated. An inverse dependency of testing temperature and mixing ratio of hardener and epoxy resin was found.	

Meeting room 5	Meeting room 6	Meeting room 7	M1	M2	M3	M4	M5	M6	M7	M8
1311-3 DOES UNIT CELL SIZE PLAY A ROLE? AN OVERVIEW OF MECHANICAL PROPERTIES OF WOVEN LAMINATES *Mireia Olave (IK4-IKERLAN), Igor Vara (IK4-IKERLAN), Hodei Usabiaga (IK4-IKERLAN), Laurentzi Aretxabaleta (Mondragon Unibertsitatea), Stepan V. Lomov (KU Leuven), Dirk Vandepitte (KU Leuven)* The unit cell size effect of woven laminates for different mechanical properties is investigated: tensile strength, damage, static mode I/II and fatigue mode I fracture toughness values are analyzed.	**1312-3 THREE-DIMENSIONAL GRAPHENE FOAM/CNT/PDMS COMPOSITES WITH EXCEPTIONAL MICROWAVE AND NOISE SHIELDING** *Xinying Sun (The Hong Kong University of Science and Technology), Xu Liu (The Hong Kong University of Science and Technology), Xiuyi Lin (The Hong Kong University of Science and Technology), Xi Shen (The Hong Kong University of Science and Technology), Ying Wu (The Hong Kong University of Science and Technology), Zhenyu Wang (The Hong Kong University of Science and Technology), Gang Liu (Xi'an Jiaotong University), Jang-Kyo Kim (The Hong Kong University of Science and Technology)* This paper reports novel GF/CNT/PDMS hybrid composites with different porosities, densities and CNT contents for both high EMI shielding and sound absorption performances.	**1313-3 EFFECTIVE MECHANICAL PROPERTIES OF A WELD LINE IN A SHORT GLASS FIBRE REINFORCED POLYAMIDE 66 BASED ON X-RAY MICRO-TOMOGRAPHY AND FINITE ELEMENT COMPUTATION** *Abderrahmane Ayadi (Mines Douai), Hedi Nouri (Mines Douai), Sofiane Guessasma (INRA), Frederic Roger (Mines Douai)* X-Ray micro-tomography is combined with a two-scale finite element computational method to quantify the local anisotropic elastic properties within a hot weldline.	**1314-3 ACOUSTIC EMISSION ANALYSIS FOR VALIDATION OF MICRO MECHANICAL MODELS** *Fatih Oz (Bogazici University), Nuri Ersoy (Bogazici University)* A comparison between the predictions of finite element micromechanical analysis and results of tension tests with acoustic emission recording for a carbon fibre reinforced composite material.	**1315-3 A PROGRESSIVE FAILURE MODEL FOR COMPOSITE LAMINATES INCLUDING MATRIX CRACKS INTERNAL TRACTION** *Mahdi Salavatian (Washington State University), Lloyd Smith (Washington State University)* This paper concerns the shear modulus reduction due to transverse cracks. The effect of crack closure in the transverse and shear response of the laminates was incorporated in the damage model.	**1316-3 ENF TEST SIMULATION OF STITCHED COMPOSITES BASED ON SHEAR TESTING RESULTS OF SINGLE STITCHED LAMINATES** *Jonny Herwan (Tokyo Metropolitan University), Atsushi Kondo (Tokyo Metropolitan University), Satoshi Morooka (Tokyo Metropolitan University), Naoyuki Watanabe (Tokyo Metropolitan University)* End notch flexural (ENF) test simulation was developed based on single stitch testing, combined with cohesive zone model to facilitate crack propagation. FE results agreed well with the experiment.	**1317-3 NONLINEAR DYNAMIC CONSTITUTIVE MODEL FOR CARBON/EPOXY TEXTILE COMPOSITES** *Xing Liu (Vrije Universiteit Brussel), Lincy Pyl (Vrije Universiteit Brussel), Danny Van Hemelrijck (Vrije Universiteit Brussel), Wim Van Paepegem (Ghent University), Laszlo Farkas (Siemens Industry Software NV)* A constitutive model describing the behaviours (elastic fibers and viscoelastic matrix) of textile composites is presented in this paper and verified in a quasi-static loading case from literature.	**1318-3 INFLUENCE OF THE PIN SIZE ON THE TENSILE AND FATIGUE BEHAVIOR OF TI-CFRP HYBRID STRUCTURES PRODUCED BY LASER ADDITIVE MANUFACTURING** *Daniel Huelsbusch (TU Dortmund University), Matthias Haack (TU Dortmund University), Andreas Solbach (Hamburg University of Technology), Claus Emmelmann (Laser Zentrum Nord GmbH), Frank Walther (TU Dortmund University)* Quasi-static and cyclic investigations were carried out in order to assess the influence of additive-manufactured pin structures on the mechanical properties of a novel hybrid structure interface.	**1319-3 STRUCTURAL ROBUSTNESS ANALYSIS OF ANISOGRID COMPOSITE LATTICE STRUCTURES** *Ronald Wagner (German Aerospace Centre), Steffen Niemann (German Aerospace Centre), Christian Hühne (German Aerospace Centre)* The purpose of this paper is to compare the structural robustness of anisogrid composite lattice structures with orthogrid composite structures when subjected to axial compression.	**1320-3 THE EFFECTS OF COST AND WEIGHT EFFICIENT STRUCTURAL DESIGN FOR MANUFACTURING OF COMPOSITE AUTOMOTIVE BODY STRUCTURES** *Per Mårtensson (Royal institute of technology), Dan Zenkert (Royal institute of technology), Malin Åkermo (Royal institute of technology)* An analysis of the effects when dividing a composite structure to improve the cost effeciency of manufacturing. Cost and weight impact is investigated by finite element analysis and a cost model.	**1321-3 CERAMIC-METAL HYBRID PARTICLES AS FILLERS LEADING TO ENHANCED DIELECTRIC PERFORMANCE OF THE POLYMERIC COMPOSITES** *Shuhui Yu (Shenzhen Institutes of Advanced Technology-Chinese Academy of Sciences), Suibin Luo (Shenzhen Institutes of Advanced Technology-Chinese Academy of Sciences), Fang Fang (Shenzhen Institutes of Advanced Technology-Chinese Academy of Sciences), Rong Sun (Shenzhen Institutes of Advanced Technology-Chinese Academy of Sciences)* Hybrid particles of Nano Ag-depositing on BaTiO3 were prepared, which as fillers lead to high dielectric constant (235) and low dielectric loss (0.11) of the polymeric composites.
1311-4 EFFECT OF THE NUMBER OF LAMINATIONS ON BENDING AND TRANSVERSE SHEAR PROPERTIES OF PLAIN WEAVE FABRIC COMPOSITE LAMINATES *Keishiro Yoshida (Kanazawa Institute of Technology), Motohiro Nakagami (Kanazawa Institute of Technology), Yasuo Hirose (Kanazawa Institute of Technology)* Bending stiffness and transverse shear stiffness of plain weave fabric composite laminates are investigated considering the intra-lamina inhomogeneity through finite element analysis.	**1312-4 FACILE SYNTHESIS OF GRAPHENE SURFACE-MODIFIED FLAKE ALUMINUM POWDER WITH LOW INFRARED EMISSIVITY AND EXCELLENT ANTICORROSIVE PERFORMANCE** *Lihua He (Beijing Institute of Aeronautical Materials), Pinggui Liu (Beijing Institute of Aeronautical Materials), Yan Zhao (Beihang University), Youwei Zhang (Beijing Institute of Aeronautical Materials), Wen Luo (Beijing Institute of Aeronautical Materials), Tong Zhang (Beijing Institute of Aeronautical Materials)* GO was firstly functionalized with -PO(OH)2, and then reacted with Al to obtain graphene-modified Al powder, which was efficient in preparing lower infrared emissivity and anticorrosive coating.		**1314-4 MICROMECHANICAL INVESTIGATION OF THE INFLUENCE OF PLY THICKNESS ON FIBRE MATRIX DEBONDING** *Christian Leopold (Technical University Hamburg-Harburg), Wilfried Liebig (Technical University Hamburg-Harburg), Bodo Fiedler (Technical University Hamburg-Harburg)* The influence of ply thickness in the 90° layer in cross-ply laminates on fibre matrix debonding and inter-fibre-fracture is investigated experimentally with model composites and in FEM simulation.	**1315-4 ANALYSIS OF BENDING STIFFNESS REDUCTION IN LAMINATES DUE TO TRANSVERSE CRACKS AND DELAMINATIONS IN SURFACE LAYERS** *Andrejs Pupurs (Luleå University of Technology), Mohamed Loukil (Swerea SICOMP), Fredrik Ahlqvist (Swerea SICOMP), David Mattsson (Swerea SICOMP)* Bending stiffness of laminates with micro-damage was measured experimentally. DIC was used to measure the mid-plane curvature. Results yielded excellent agreement with FEM and analytical models.	**1316-4 MODE I FRACTURE OF THIN-PLY CARBON-EPOXY LAMINATES: EFFECTS OF PLY THICKNESS** *Guillaume Frossard (Ecole polythechnique fédérale de Lausanne (EPFL)), Joël Cugnoni (Ecole polythechnique fédérale de Lausanne (EPFL)), Thomas Gmür (Ecole polythechnique fédérale de Lausanne (EPFL)), John Botsis (Ecole polythechnique fédérale de Lausanne (EPFL))* The ply thickness influences the steady-state ERR in mode I fracture of carbon-epoxy laminates. The difference of microstructure affects the amount of bridging fibres, which leads to this size effect.	**1317-4 MICROMECHANICAL MODELING OF CERAMICS-BASED COMPOSITES VIA VORONOI-DELAUNAY NETWORKS** *Khalid Alzebdeh (Sultan Qaboos University), Uwe Kruger (Rensselaer Polytechnic Institute)* Using a discrete modeling, we utilize Voronoi tessellation to simulate random microstructure of 2D ceramics-based composites. Statistics on elastic moduli are calculated via numerical simulations.	**1318-4 EVALUATION OF AN ANALYTICAL ANALYSIS METHOD FOR INTERFERENCE FIT ASSEMBLIES FOCUSING ON THICK-WALLED PARTS BASED ON EXPERIMENTAL DATA** *Philipp Fahr (Technische Universität München-Faculty of Mechanical Engineering), Roland Hinterhoelzl (Technische Universität München-Faculty of Mechanical Engineering)* The assembly process of interference fit assemblies of CFRP shafts and steel hubs is investigated experimentally and analytically. The applicability of an analytical approach is evaluated.		**1320-4 DESIGN OPTIMIZATION OF A BOGIE STRUCTURE FOR A TRADE-OFF BETWEEN PROCESSING TIME AND STRUCTURAL PROPERTY** *Moo Sun Kim (Korea Railroad Research Institute), Jeongseok Kim (Korea Railroad Research Institute), Seung Mo Kim (Korea university of technology and education)* The optimal product design (thickness design) plan for train bogie frame was suggested to consider processing time of RTM process, weight and mechanical properties.	**1321-4 3D ORDERED GERMANIUM BASED COMPOSITE AND ITS ELECTROCHEMICAL PROPERTIES** *Jiupeng Zhao (Harbin Institute of Technology), Yao Li (Harbin Institute of Technology), Jian Hao (Harbin Institute of Technology)*

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	M8
8:30	**PLENARY: High resolution computed tomography studies of composite materials: The data rich mechanics opportunity** S. Mark Spearing, University of Southampton, United Kingdom									
9:30	**Mini Oral Session I in Congress Hall A2** - see detailed programme page 22. Programme number = poster id									**2121 Special Symposium on Active Composites**
9:30										**2121-1 Opening Remarks** *B.-L. ("Les") Lee*
9:50										**2121-2 Avian Inspired Multifunctional Morphing Vehicles: Critical Issues** *Daniel Inman*
10:10										**2121-3 Sensory Systems and Flight Stability of Birds** *Graham Taylor*
10:30										**2121-4 Power and Energy Issues for Morphing Wings** *Hugh Bruck*
11:00	**Poster Session in the Exhibition**									
12:00	**Lunch in the Exhibition**									
13:00	**Mini Oral Session II in Congress Hall A2** - see detailed programme page 22. Programme number = poster id									**2321 Special Symposium on Active Composites**
13:00										**2321-1 Multifunctional Skin Material for Morphing Leading Edge Applications** *Hans Peter Monner*
13:20										**2321-2 Bio-Inspired Materials That Self-Shape Through Programmed Microstructures** *Andre Studart*
14:10	**Poster Session in the Exhibition**									**2521 Special Symposium on Active Composites**
14:50										**2521-1 Co-Continuous Metal-Elastomer Foam Actuators for Morphing Wing MAVs** *Robert Shepherd*
15:10										**2521-2 Intelligent CNT Composite Network: The Neurons for MAV Musculoskeletal System** *Yong Chen*


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	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16
15:00	**2101 Processing - Manufacturing Technology 4**	**2102 Nano Composites 4**	**2103 Multifunctional Composites - Sensing and Actuation 4**	**2104 Fatigue 4**	**2105 Structural Analysis and Optimization 4**	**2106 Process Induced Effects 3**	**2107 Process Modelling 4**	**2108 Biocomposites 4**	**2109 Interfaces and Interphases 4**	**2110 Foams, Cellular and Lattice Materials 3**
15:00	**2101-1 AN INVESTIGATION OF EXPERIENCED PERSON IN HAND LAY-UP FABRICATION METHOD - CONVERTING TACIT KNOWLEDGE TO EXPLICIT IN THE FIBER REINFORCED PLASTICS MOLDING-** *Tetsuo KIKUCHI (Toyugiken Co.-Ltd.-Kanagawa), Erika SUZUKI (Toyugiken Co.-Ltd.), Yuka TAKAI (Osaka Sangyo University), Akihiko GOTO (Osaka Sangyo University), Hiroyuki HAMADA (Kyoto Institute of Technology)* This study investigated the relation between the pressure force applied by the operator when using a roller for fabrication work and the degree of proficiency in the hand lay up fabrication method.	**2102-1 REACTIVE SYNTHESIS: A PROMISING ROUTE FOR THE IN-SITU FORMATION OF NANOSIZED REINFORCEMENTS IN METAL MATRIX COMPOSITES** *Nassim Samer (University Lyon 1), Jérôme Andrieux (University Lyon 1), Bruno Gardiola (University Lyon 1), Sophie Gourdet (Airbus Group Innovations), Olivier Martin (Mecachrome), Hiroki Kurita (CEA-Saclay), Laurent Chaffron (CEA-Saclay), Olivier Dezellus (University Lyon 1)* The present paper describes a new in-situ synthesis route of MMCs leading to enhanced mechanical properties and to nanosized reinforcement without handling of nanosized particles.	**2103-1 COMPARATIVE STUDY ON MONITORING STRUCTURAL DEFECTS IN FRPS USING GLASS FIBRES WITH CARBON NANOTUBES AND GRAPHENE COATING** *Bin HAO (The Xinjiang Technical Institute of Physics and Chemistry-Chinese Academy of Sciences), Peng-Cheng MA (The Xinjiang Technical Institute of Physics and Chemistry-Chinese Academy of Sciences)* This paper studied the structural defects in composites by monitoring the deformation of glass fibers with CNTs or graphene coating and compared the different effects between them.	**2104-1 THE FATIGUE OF CARBON FIBRE COMPOSITES CONTAINING INTERLAMINAR INKJET PRINTED POLYMER DROPLETS** *Andrew Cartledge (The University of Sheffield), Christophe Pinna (The University of Sheffield), Alma Hodzic (The University of Sheffield), Patrick Smith (The University of Sheffield)* A study of the addition of interlaminar inkjet printed polymer droplets upon the fatigue life of unidirectional carbon fibre composites in 4 point bending	**KEYNOTE** **2105-1 RECENT DEVELOPMENTS OF DISCRETE MATERIAL OPTIMIZATION OF LAMINATED COMPOSITE STRUCTURES** *Erik Lund (Aalborg University), René Sørensen (Aalborg University)* This presentation will give a quick summary of recent developments of the DMO approach for structural optimization of laminated composites including examples of challenging optimization problems.	**2106-1 THICK-WALLED "CRACK-FREE" CFRP PIPES USING NOVEL STRESS REDUCTION METHOD** *Kazunori Takagaki (The University of Tokyo), Shu Minakuchi (The University of Tokyo)* Significant radial tensile stress is induced in thick-walled CFRP pipes. This study proposes a novel stress reduction method using an asymmetric layup, and demonstrates a crack-free thick CFRP pipe.	**2107-1 A RATE-TYPE CRYSTALLIZATION KINETICS MODEL FOR PROCESS MODELLING OF PEEK AND PEEK MATRIX COMPOSITES** *Kamyar Gordnian (The University of British Columbia), Anoush Poursartip (The University of British Columbia)* A rate type modelling approach is presented which is capable of predicting the degree of crystallinity during processing of carbon fibre reinforced PEEK composites.	**2108-1 RESIDUAL PROPERTIES AND DAMAGE EVOLUTION OF FLAX-EPOXY COMPOSITES SUBJECTED TO FATIGUE LOADING** *Farida Bensadoun (KU Leuven), Ignaas Verpoest (KU Leuven), Aart Willem Van Vuure (KU Leuven)* The present study focuses on the characterization of the residual properties of flax-epoxy composites subjected to fatigue loading as well as the damage development.	**2109-1 APPLICATION OF ATMOSPHERIC PLASMA TREATMENTS TO ENHANCE THE MECHANICAL PROPERTIES OF UNSIZED CARBON FIBRE /EPOXY COMPOSITES** *Kate O'Flynn (University College Dublin), Denis Dowling (Dublin)* A number of different atmospheric plasma sources are investigated for the treatment of glass and carbon fibres used in composites. The aim is to achieve enhanced composite mechanical properties.	**2110-1 EFFECT OF RELATIVE DENSITY ON SHOCK WAVE SPEED OF CELLULAR MATERIAL UNDER DYNAMIC IMPACT** *Shilong Wang (University of Science and Technology of China), Yuanyuan Ding (University of Science and Technology of China), Changfeng Wang (University of Science and Technology of China), Zhijun Zheng (University of Science and Technology of China), Jilin Yu (University of Science and Technology of China)* We investigated the dynamic mechanical behavior of closed-cell metallic foam under high constant-velocity impact and found that the shock wave speed increases linearly with the relative density.
15:20	**2101-2 COST AND WEIGHT EFFICIENT ASSEMBLY OF AERONAUTICAL COMPOSITE STRUCTURES** *Mathilda Karlsson Hagnell (Lightweight structures), Malin Åkermo (Lightweight structures)* This research discusses cost implications and trends of a generic wing box with regards to integration and mechanical assembly. Costs are defined using a previously developed cost estimation model.	**2102-2 APPLICATION OF THE EMBEDDED ELEMENT TECHNIQUE TO THE MODELLING OF NANO-ENGINEERED FIBER-REINFORCED COMPOSITES** *Anna Matveeva (KU Leuven), Valentin Romanov (KU Leuven), Stepan Lomov (KU Leuven), Larissa Gorbatikh (KU Leuven)* The Embedded Element technique is applied to model fiber-reinforced composites with carbon nanotubes. Its advantages and limitations for micro-stress analysis are discussed.	**2103-2 HYDROGEL CORE FLEXIBLE MATRIX COMPOSITE (H-FMC) ACTUATORS** *Michael Dicker (University of Bristol), Paul Weaver (University of Bristol), Ian Bond (University of Bristol), Jonathan Rossiter (University of Bristol), Charl Faul (University of Bristol)* H-FMC actuators are muscle-like devices powered by soft, pH-responsive hydrogels. This presentation explores how anisotropic composites and hydrogel micro-structure effect H-FMC performance.	**2104-2 A STUDY ON THE BIAXIAL FATIGUE OF E-GLASS/EPOXY LAMINATES UNDER NORMAL AND SHEAR LOADINGS** *Pankaj Mallick (University of Michigan-Dearborn), Raghuram Mandapati (University of Michigan-Dearborn)* Fatigue behavior of a fiber reinforced polymer laminate under a combination of normal and shear stresses is determined. The role of shear stress on biaxial fatigue life is demonstrated.		**2106-2 EFFECT OF BUCKLES MESOSCOPIC DEFECTS ON THE COMPOSITE PROPERTIES** *Samir Allaoui (Orleans University), Madjid Haddad (UTC), Romain Agogue (ONERA), Kamel Khellil (UTC), Gilles hivet (Orleans University), Pierre Beauchene (ONERA), Zoheir Aboura (UTC)* The aim of this study is to evaluate the effect of mesoscopic defects of shaping processes on composite. Specimens with calibrated defects were fabricated and then tested and compared to healthy ones.	**2107-2 ADVANCED 3D FINITE ELEMENT SIMULATION OF THERMOPLASTIC COMPOSITE INDUCTION WELDING** *Miro Duhovic (Institut für Verbundwerkstoffe GmbH-Erwin-Schrödinger-Str.-Gebäude 58), Pierre L'Eplattenier (Livermore Software Technology Corporation-7374 Las Positas Road), Inaki Caldichoury (Livermore Software Technology Corporation-7374 Las Positas Road), Joachim Hausmann (Institut für Verbundwerkstoffe GmbH-Erwin-Schrödinger-Str.-Gebäude 58)* The joining of carbon fiber reinforced thermoplastic (CFRTP) composites via electromagnetic (EM) induction welding is studied and simulated using the finite element simulation software LS-DYNA®.	**2108-2 CALCIUM PHOSPHATE CEMENT REINFORCED WITH NATURAL CELLULOSIC FIBERS FROM DIFFERENT SOURCES** *Pierre Leuret (Université de Nantes), Franck Tancret (Université de Nantes), Paul Pilet (Laboratoire d'ingénierie osteoarticulaire et dentaire), Jean-Michel Bouler (université de Nantes), Bruno Bujoli (université de Nantes)* Mechanical properties of a novel injectable biomaterial cement for bone defect filling reinforced with natural cellulosic fibers from different sources.	**2109-2 FUNCTIONALISATION OF CARBON FIBRE SURFACES FOR ENHANCED FIBRE/MATRIX ADHESION** *Linden Servinis (Deakin University), Luke Henderson (Deakin University), Bronwyn Fox (Deakin University), Mickey Huson (CSIRO), Thomas Gengenbach (CSIRO)*	**2110-2 THE INFLUENCE OF REDUCING THE CELL SIZE TO THE NANOSCALE ON THE PHYSICAL PROPERTIES OF POLYMERIC NANOCELLULAR FOAMS.** *Belen Notario (University of Valladolid), Javier Pinto (Istituto Italiano di Tecnologia (IIT)), Miguel Angel Rodriguez Perez (University of Valladolid)* The paper demonstrates that reducing the cell size to the nanoscale is a successful strategy to improve several physical properties of cellular polymers.

Meeting room 5	Meeting room 6	Meeting room 7	M1	M2	M3	M4	M5	M6	M7	M8
2111 Textile-Based Composites and Fibre Architecture 4	**2112 Graphene, Graphene-Based Composites 4**	**2113 X-ray Computed Tomography 3**	**2114 Fracture and Damage - Micromechanics 4**	**2115 Fracture and Damage - Laminate Scale 4**	**2116 Fracture and Damage - Delamination 4**	**2117 Pressure Vessels and Piping 1**	**2118 Joints - Design, Manufacturing and Testing 4**	**2119 Applications - Aerospace 3**	**2120 Dynamic Fracture 1**	
2111-1 SIMULATION METHODOLOGY FOR IMPACT DAMAGE AND FAILURE OF AERO-ENGINE COMPONENTS MADE OF TEXTILE COMPOSITES *Elena Sitnikova (University of Nottingham), Qing Pan (University of Nottingham), Tian-Hong Yu (University of Nottingham), Weiyi Kong (University of Nottingham), Xiantao Zhao (University of Nottingham), Shuguang Li (University of Nottingham), Richard Brooks (University of Nottingham), Andrew Long (University of Nottingham), Shoufeng Hu (AVIC Commercial Aircraft Engine), Victor Wang (AVIC Commercial Aircraft Engine), Jian Zhang (AVIC Commercial Aircraft Engine)* A multi-scale modelling strategy developed for predicting the constitutive behaviour of textile composites under impact loading in aerospace applications.	**2112-1 GRAPHENE WOVEN FABRICS/EPOXY COMPOSITES WITH EXCEPTIONAL FRACTURE TOUGHNESS AND MECHANICAL PROPERTIES** *Xu Liu (The Hong Kong University of Science and Technology), Xinying Sun (The Hong Kong University of Science and Technology), Xiuyi Lin (The Hong Kong University of Science and Technology), Xi Shen (The Hong Kong University of Science and Technology), Ying Wu (The Hong Kong University of Science and Technology), Zhenyu Wang (The Hong Kong University of Science and Technology), Jang-Kyo Kim (The Hong Kong University of Science and Technology)* Graphene woven fabric (GWF) is synthesized by a template-based CVD method. The GWF/epoxy composites exhibit excellent electrical conductivities, high mechanical properties and fracture toughness.	**2113-1 FAILURE MECHANISMS IN CENOSPHERE EPOXY SYNTACTIC FOAMS UNDER UNIAXIAL COMPRESSION** *Ruoxuan Huang (Nanyang Technological University), Peifeng Li (Nanyang Technological University), Tong Liu (Singapore Institute of Manufacturing Technology)* Syntactic foams have become attractive in transpotation applications. This work investigated the behaviour and the associated failure mechanisms in syntactic foams subjected to uniaxial compression.	**2114-1 EXPERIMENTAL AND NUMERICAL ANALYSIS OF THE PEEL FRACTURE ENERGY BETWEEN ALUMINA CERAMICS AND GLASS FIBRE-REINFORCED COMPOSITES** *Tom Thorvaldsen (Norwegian Defence Research Establishment (FFI)), Luiz Kawashita (University of Bristol), Bernt Brønmo Johnsen (Norwegian Defence Research Establishment (FFI)), Tyler Paul Jones (Norwegian Defence Research Establishment (FFI)), Dennis Bo Rahbek (Norwegian Defence Research Establishment (FFI))* The fixed arm peel test and FEM using CZM have been employed to investigate the failure between an alumina ceramic and a GFRP composite under quasi-static loading.	**2115-1 NUMERICAL ANALYSIS ON OPEN-HOLE CARBON-FIBRE/EPOXY STITCHED LAMINATES WITH DIFFERENT STITCH ORIENTATION** *Prabij Joshi (Tokyo Metropolitan University), Satoshi Morooka (Tokyo Metropolitan University), Atsushi Kondo (e-Xtream Engineering-MSC Software Company), Hikaru Hoshi (Japan Aerospace Exploration Agency (JAXA)), Naoyuki Watanabe (Tokyo Metropolitan University)* Open-hole woven stitched laminate showed a good agreement with experimental stress-strain distribution. Meanwhile, stress concentration factor has been improved by 14% with longitudinally than transve	**KEYNOTE** **2116-1 CHARACTERIZATION OF FATIGUE R-CURVES BASED ON GMAX-CONSTANT DELAMINATION TESTS IN CF/PEEK LAMINATES** *Masaki Hojo (Kyoto University), Takahira Aoki (The University of Tokyo)* The true growth law which is not affected by fiber bridging was obtained from a series of Gmax-constant fatigue tests. Then, the increase in the crack growth resistance was evaluated.	**2117-1 PROGRESSIVE FAILURE ANALYSIS OF CARBON/EPOXY FILAMENT WOUND COMPOSITE TUBES UNDER BIAXIAL LOADING** *José Humberto Almeida Jr. (UFRGS - Federal University of Rio Grande do Sul), Volnei Tita (Engineering School of São Carlos - University of São Paulo), Hugo Faria (INEGI - Institute of Mechanical Engineering and Industrial Management), António Marques (FEUP - Faculty of Engineering of the University of Porto), Sandro Amico (UFRGS - Federal University of Rio Grande do Sul)* A damage model is developed for predicts the mechanical behavior of composite tubes subjected to internal pressure. Failure in matrix by transverse tensile stress and in-plane shear were noticed.	**2118-1 DOMINANT EFFECT OF END DISTANCES ON GUARDED FAILURE OF COMPOSITE BOLTED JOINTS** *Fengrui Liu (Beihang University), Jianyu Zhang (China), Libin Zhao (Beihang University)* Influence of end distances on failure of composite double-lap single-bolt joints was studied by tests and PDM analyses. Lateral gaps between laminates and intrinsic critical length Lc were discovered.	**2119-1 EVALUATION OF LIGHTNING DAMAGE RESISTANCE OF PANI-BASED CONDUCTIVE THERMOSETTING COMPOSITE** *Yoshiyasu Hirano (Japan Aerospace Exploration Agency), Tomohiro Yokozeki (The University of Tokyo), Teruya Goto (Yamagata University), Tatsuhiro Takahashi (Yamagata University), Danna Qian (Mitsubishi Plastics-Inc.), Shouji Itou (Mitsubishi Plastics-Inc.), Yuichi Ishida (Japan Aerospace Exploration Agency), Toshio Ogasawara (Japan Aerospace Exploration Agency), Masaru Ishibashi (GSI Creos)* Newly developed PANI-based conductive thermosetting composite is proposed to improve a lightning damage resistance and their applicability was confirmed with a simulated lightening test.	**2120-1 MODELING HYPERVELOCITY-IMPACT RESPONSE OF CFRP-AL/HC LAMINATE** *Vaibhav A Phadnis (The University of Sheffield), Vadim Silberschmidt (Loughborough University), Anish Roy (Loughborough University)* A response of a composite structure with CFRP sheets and aluminium-foam core to hypervelocity impact (with velocity up to 1 km/s and projectile radius 3 mm) was studied with a developed 3D FE model.	
2111-2 THERMAL CYCLING OF A 3D WOVEN COMPOSITE: IN SITU X-RAY MICRO-TOMOGRAPHY STUDY AND STRAIN FIELD MEASUREMENTS *Yannick Pannier (Institut Pprime), Pascal Doumalin (Institut Pprime), Romain Boijoux (Institut Pprime), Camille Guigon (Institut Pprime), Carole Rakotoarisoa (SNECMA)* This work deals with in situ thermal loading of 3D woven polymer composite materials in a synchrotron x-ray micro-tomograph and strain field measurements by digital volume correlation.	**2112-2 CONTINUUM MODEL FOR GRAPHENE-BASED COMPOSITES** *Junjun Shang (College of Mechanical Engineering and Applied Electronics Technology -Beijing University Of Technology), Qingsheng Yang (College of Mechanical Engineering and Applied Electronics Technology -Beijing University Of Technology)* A coarse-grid beam model of graphene is proposed based on molecular structural mechanics approach to simulate graphene-based composite. The amount of calculation and time cost are reduced remarkably.	**2113-2 APPLICATION OF X-RAY COMPUTED MICRO-TOMOGRAPHY TO THE STUDY OF DAMAGE AND OXIDATION KINETICS OF THERMOSTRUCTURAL COMPOSITES** *Olivier Caty (LCTS), Mathieu Herbreteau (LCTS), Francis Rebillat (LCTS), Gérard Vignoles (LCTS)* In CMC, Weakening phenomena (mechanical and chemical) are 3D and inside the material. µCT is thus applied to the study of failure for mechanical loading and to the oxidation of self healing phases.	**2114-2 CHARACTERISATION OF VOIDS AND THEIR INFLUENCE ON DAMAGE PROPAGATION IN RESIN TRANSFER MOULDED CARBON FIBRE REINFORCED POLYMERS** *Sanjay Sisodia (Uppsala University), Mark Mavrogordato (University of Southampton), Andrew George (Brigham Young University), Daniel Bull (University of Southampton), Mark Spearing (University of Southampton), Kristofer Gamstedt (Uppsala University)* This study focuses on the formation of voids in resin infused carbon composites and their effect on the damage development to final failure during impact and fatigue using X-ray computed tomography.	**2115-2 COMPOSITE SANDWICH STRUCTURE WITH A NOTCH IN BENDING/TORSION: TEST AND SIMULATION UP TO RUPTURE** *Olivier Montagnier (French Air Force), Jean-Paul Charles (CNRS), Gabriel Eyer (CNRS), Christian Hochard (CNRS), Noël Lahellec (CNRS)* The aim of this work is to validate experimentally a CDM model for woven materials on a structural part consisting of a large sandwich notched specimen loaded in static bending/torsion.		**2117-2 A NEW FIBER-BUNDLE BASED MODELING APPROACH FOR THE ANALYSIS OF COMPOSITE PRESSURE VESSELS** *Jörg Multhoff (ISATEC GmbH)* A new approach motivated by the tenets of netting analysis and based on a finite element formulation with an embedded fiber-bundle model is being explored.	**2118-2 USE OF PIEZOELECTRIC THICK FILM SENSORS TO MEASURE STRESS DISTRIBUTION WITHIN A LAP JOINT** *Aikaterini Deligianni (Newcastle University), George Kotsikos (newcastle university), Jack Michael Hale (Newcastle University)* A novel approach of obtaining quantitative, interfacial strength information in adhesively bonded joints is proposed, using piezoelectric thick film sensors embedded into the overlap area of the bond	**2119-2 LASER REMOVAL OF RAC COATING FROM COMPOSITE MATERIAL SURFACES** *Tong Zhang (Beijing Institute of Aeronautical Materials), Yan Zhao (Beihang University), Zhiyong Wang (Beijing Institute of Aeronautical Materials), Pengrui Liu (Beijing Institute of Aeronautical Materials), Shengrong Xiao (Beijing Institute of Aeronautical Materials)* coating removal effects of three methods were compared, and mechanical properties and surface morphology of composite substrate after paint removal processes were tested.	**2120-2 STRAIN RATE DEPENDENT TENSILE PROPERTIES OF INJECTION MOLDED LONG GLASS FIBER REINFORCED THERMOPLASTICS** *Taesung Kim (Waseda University), Yoshihiko Arao (Doshisha University), Norihiko Taniguchi (ASICS Corporation), Tsuyoshi Nishiwaki (ASICS Corporation), Norio Hirayama (NITTO BOSEKI CO.), Atsushi Hosoi (Waseda University), Hiroyuki Kawada (Waseda University)* Mechanical properties and strain rate dependency of injection molded long glass fiber reinforced thermoplastics under impact loading were investigated.	

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16
15:40	**2101-3 THE MANUFACTURING ENERGY INTENSITY OF CARBON FIBER REINFORCED POLYMER COMPOSITES AND ITS EFFECT ON LIFE CYCLE ENERGY USE FOR VEHICLE DOOR LIGHTWEIGTING** *Deborah Sunter (U.S. Department of Energy), Joe Cresko (U.S. Department of Energy)* This paper performs a life cycle analysis of the substitution of a conventional steel light duty vehicle door with a carbon fiber reinforced polymer door for vehicle lightweighting.	**2102-3 HIGH PERFORMANCE NANO AND HIERARCHICAL COMPOSITES** *Tomi Herceg (Imperial College London), Emile Greenhalgh (Imperial College London), Alexander Bismarck (Imperial College London), Milo Shaffer (Imperial College London), David Anthony (London)* A powder based prepregging method was adapted to engineer composite with matrix heterogeneity. The nano-toughened materials have at least 50 vol% fibres and could be used in structural applications.	**2103-3 HOW HEAT TREATMENT AFFECTS THE CHROMATIC RESPONSE OF CARBON NANOTUBE – POLYDIACETYLENE COMPOSITES TO ELECTRICAL STIMULUS** *Reinack Hansen (Nanyang Technological University), Jinglei Yang (Nanyang Technological University), Lianxi Zheng (Khalifa University)* Pre-heat treatment appears to improve stacking interactions between PDA and MWCNTs due to intercalation of monomers between MWCNT bundles, improving the electrochromic response in these composites.	**2104-3 FATIGUE STRENGTH PREDICTION OF BOLTED JOINT STRUCTURES OF CARBON FIBRE REINFORCED POLYMER COMPOSITE BASED ON THE MICROMECHANICS** *Hongneng Cai (Xi'an Jiaotong University), Wangnan LI (Xi'an Jiaotong University)* The theory of micro-mechanics of failure (MMF) is extended to analyze the fatigue progressive failure and predict the strength for the bolted joint structures of carbon fibre reinforced polymer (CFRP) composite.	**2105-2 EFFECT OF STEERING LIMIT CONSTRAINTS ON THE PERFORMANCE OF VARIABLE STIFFNESS LAMINATES** *Daniël Peeters (Delft University of Technology), Mostafa Abdalla (Delft University of Technology)* A method to optimise manufacturable variable stiffness laminates is shown and used to study the influence of manufacturing constraints on performance. Examples include buckling and strength design.	**2106-3 A NEW DEVICE FOR THE MEASUREMENT OF DIMENSIONAL VARIATIONS OF ANISOTROPIC COMPOSITE MATERIALS DURING CURE** *Mael Péron (Laboratoire de Thermocinétique de Nantes - UMR CNRS 6607), Vincent Sobotka (Laboratoire de Thermocinétique de Nantes - UMR CNRS 6607), Nicolas Boyard (Laboratoire de Thermocinétique de Nantes - UMR CNRS 6607), Steven Le Corre (Laboratoire de Thermocinétique de Nantes - UMR CNRS 6607)* An original device measuring chemical shrinkage and thermal expansion coefficients of anisotropic composite materials along in-plane and through-thickness directions during cure is presented.	**2107-3 COMPRESSION MOLDING 3D-CAE OF DISCONTINUOUS LONG FIBER REINFORCED POLYAMIDE 6 - INFLUENCE ON CAVITY FILLING AND DIRECT FIBER SIMULATIONS OF VISCOSITY FITTING METHODS -** *Masatoshi Kobayashi (Honda R&D Co.-Ltd.), Koji Dan (Honda R&D Co.-Ltd.), Tsuyoshi Baba (Honda R&D Co.-Ltd.), Daisuke Urakami (Toray Engineering-Co.)* For compression molding CAE of L-FRTP, a suitable method of viscosity measurement and equation fitting has been proposed. Cavity filling and direct fiber simulations were examined by the method.	**2108-3 INVESTIGATION OF THE BEHAVIOUR OF FLAX FIBRE REINFORCED EPOXY COMPOSITES IN HUMID CONDITIONS** *Dieter Perremans (KU Leuven), Kevin Hendrickx (KU Leuven), Ignace Verpoest (KU Leuven), Aart Willem Van Vuure (KU Leuven)*	**2109-3 THE INFLUENCE OF A THERMAL AND CORROSIVE TREATMENT ON THE INTERFACE PROPERTIES OF POLYMER/METAL HYBRIDS: ADHESION BEHAVIOUR AND POLYMER DYNAMICS.** *Marieke Fuellbrandt (Technische Universitaet Berlin-Stranski-Laboratorium für Physikalische und Theoretische Chemie), Andreas Schoenhals (Bundesanstalt fuer Materialforschung und -pruefung), Regine von Klitzing (Technische Universitaet Berlin-Stranski-Laboratorium für Physikalische und Theoretische Chemie)* Polymer/metal hybrids are characterized with regard to their adhesion behaviour and polymer properties before and after corrosion testing down to a (sub)microscopic scale.	**2110-3 RVE MODELLING OF DEFORMATION AND FAILURE BEHAVIOUR OF CLOSED CELL RIGID POLYMER FOAMS** *Ralf Schlimper (Fraunhofer Institute for Mechanics of Materials IWM), Irene Vecchio (Fraunhofer Institute for Industrial Mathematics ITWM), Katja Schladitz (Fraunhofer Institute for Industrial Mathematics ITWM), Ralf Schaeuble (Fraunhofer Institute for Mechanics of Materials IWM)* RVE modelling of PMI foam by 3d random Laguerre tessellation which was adapted to the cell size distribution of the real foam. Experimental investigation by in situ X-ray computed tomography.
16:00	**2101-4 STUDY ON HYBRID INJECTION MOULDING OF CARBON FIBRE REINFORCED THERMOPLASTIC** *Masao Tomioka (MITSUBISHI RAYON CO.-LTD.), Takeshi Ishikawa (MITSUBISHI RAYON CO.-LTD.), Tatsuya Tanaka (Dohshisha Univ.)* This study relates to the hybrid injection moulding. This paper shows the influences of the temperature of inserted and injected materials on the adhesion of the insert-injection interface.	**2102-4 ATMOSPHERIC DC PLASMA PROCESSING OF TIO2/PEDOT:PSS NANOCOMPOSITE** *Dan Sun (Queen's University Belfast), Yazi Liu (Nanjing University), Sadegh Askari (University of Ulster), Jenish Patel (University of Ulster), Manuel Macias-Montero (University of ulster), Richao Zhang (Zhejiang University), Davide Mariotti (University of Ulster), Paul Maguire (University of Ulster)* In this paper, we report the synthesis of core-shell structured TiO2/PEODT:PSS nanocomposites directly processed in aqueous solution using a novel low temperature atmospheric DC microplasma technique.	**2103-4 FIBER REINFORCED COMPOSITES WITH ZINC OXIDE PIEZOELECTRIC NANOWIRES FOR STRUCTURAL HEALTH MONITORING AND ENHANCED INTERLAMINAR STRENGTH** *Sean Offenberger (Virginia Tech), Ayoub Boroujeni (Virginia Tech), Anahita Emami (Virginia Tech), Marwan Al-Haik (Virginia Tech), Michael Philen (Virginia Tech)* Fiber reinforced plastics with ZnO nanowires is investigated for improved mechanical properties and impedance-based SHM. Mechanical and impedance measurements are performed measure effect of ZnO.	**2104-4 CRACKING AND DELAMINATION OF CROSS- AND ANGLE-PLY GFRP BENDING SPECIMENS UNDER VERY HIGH CYCLE FATIGUE LOADING** *Till Julian Adam (Technische Universität Braunschweig), Peter Horst (Technische Universität Braunschweig)* A high frequency bending test rig is used to investigate fatigue of GFRP flat specimens in the very high cycle fatigue range. Cracking, delamination and stiffness degradation is investigated.	**2105-3 AN APPROXIMATE ANALYTIC SOLUTION FOR THE STRESSES AND DISPLACEMENTS OF THIN-WALLED COMPOSITE BEAMS WITH MONO-SYMMETRIC CROSS-SECTIONS SUBJECTED TO BENDING** *Marko Vukasovic (University of Split-Faculty of Electrical Engineering-Mechanical Engineering and Naval Architecture), Radoslav Pavazza (University of Split-Faculty of Electrical Engineering-Mechanical Engineering and Naval Architecture)* An approximate shear deformable theory of bending of thin-walled composite beams of open mono-symmetrical cross-sections is presented. The stresses and displacement are given in closed analytic form.	**2106-4 DETERMINATION OF RESIDUAL STRESSES IN A LAMINATED THERMOSET COMPOSITE USING THE INCREMENTAL SLITTING METHOD** *Michael Gower (National Physical Laboratory), Richard Shaw (National Physical Laboratory), Louise Wright (National Physical Laboratory), Jeannie Urquhart (National Physical Laboratory), Jon Hughes (National Physical Laboratory), Sam Gnaniah (National Physical Laboratory), Roger Morrell (National Physical Laboratory), Tomasz Gartstka (LMAT-UK Limited)* This paper details measurements of ply level residual stresses in [0°2/90°2]4s laminates fabricated from SE84 LV carbon fibre-reinforced epoxy using the incremental slitting approach.	**2107-4 MODELLING THE GEOMETRIC VIARIABILITY OF 3D WOVEN GLASS FIBRE FABRIC AND ITS EFFECTS ON PERMEABILITY** *Xiantao Zhao (University of Nottingham), Andrew Long (University of Nottingham)* A 3D woven ply to ply angle interlock glass fabric was characterized with X-ray micro-CT technology, and the influence of geometrical variability on permeability prediction is studied.	**2108-4 EFFECT OF THERMAL TREATMENT ON THE INTERFACIAL PROPERTIES OF FLAX FIBERS.** *Monica Francesca Pucci (Ecole des Mines de Saint-Etienne), Pierre-Jacques Liotier (Ecole des Mines de Saint-Etienne), David Seveno (Katholieke Univ Leuven), Carlos Fuentes (Katholieke Univ Leuven), Aart Van Vuure (Katholieke Univ Leuven), Sylvain Drapier (Ecole des Mines de Saint-Etienne)* Effect of thermal treatment on the interfacial properties of flax fibers. Elaboration of composites reinforced by treated and untreated fibers. Void and mechanical properties first characterizations.	**2109-4 FINITE ELEMENT ANALYSIS OF INTERPHASES PROPERTIES: A CRUCIAL PART IN THE DEGRADATION OF A UD COMPOSITES** *Lenaik BELEC (University of Toulon), Yoann JOLIFF (University of Toulon), Than Hoi NGUYEN (University of Danang), Jean François CHAILAN (University of Toulon)* The evolutions of interphases in a UD composite are characterized during natural tropical ageing. A correlation is made with bending tests which are simulated by FEA on a realistic microstructure.	
16:20	**Coffee in the Exhibition**									

Meeting room 5	Meeting room 6	Meeting room 7	M1	M2	M3	M4	M5	M6	M7	M8
2111-3 DEVELOPMENT OF AN ANALYTICAL MODEL FOR TUBULAR BRAIDED COMPOSITES *Garrett Melenka (University of Alberta), Jason Carey (University of Alberta)* Development of a new generalized analytical model for the characterization of tubular braided composites. The model allows for the prediction of diamond, regular and Hercules composite braids.	**2112-3 CHLORINE-DOPED GRAPHENE OXIDE/POLY (VINYLIDENE FLUORIDE) NANOCOMPOSITES: EXCEPTIONAL DIELECTRIC PROPERTIES** *Ying Wu (The Hong Kong University of Science and Technology), Xiuyi Lin (The Hong Kong University of Science and Technology), Xi Shen (The Hong Kong University of Science and Technology), Xinying Sun (The Hong Kong University of Science and Technology), Xu Liu (The Hong Kong University of Science and Technology), Zhenyu Wang (The Hong Kong University of Science and Technology), Jang-Kyo Kim (The Hong Kong University of Science and Technology)* We report a novel and facile method to fabricate the chlorinated GO by direct addition of SOCl2 into the GO dispersion and exceptional dielectric properties are obtained for Cl-rGO/PVDF composites.	**2113-3 X-RAY CT IMAGING OF DAMAGE UNDER IN-SITU LOADING** *Andrew Rhead (University of Bath), Liam Glen (University of Bath), Shi Hua (University of Bath), Richard Butler (University of Bath)* In-situ X-ray CT reveals a two stage evolution of damage in laminates subject to transverse, near and on-edge quasi-static impact. Initial intra-ply cracking is seen to give way to Mode I peeling.	**2114-3 MODELING OF DAMAGE EVOLUTION IN HIERARCHICALLY STRUCTURED COMPOSITE** *Songyun Ma (Institute of Materials Research-Helmholtz-Zentrum Geesthacht), Ingo Scheider (Institute of Materials Research-Helmholtz-Zentrum Geesthacht), Ezgi Deniz Yilmaz (Hamburg University of Technology), Swantje Bargmann (Hamburg University of Technology)* A continuum damage mechanic model coupled to hyperelasticity is developed for modeling the initiation and evolution of damage in mineral fibers as well as protein matrix of enamel	**2115-3 THE INFLUENCE OF FREE EDGES ON CURVED BEAM STRENGTH** *Timothy Fletcher (University of Bath), Richard Butler (University of Bath)* A new resin edge treatment for curved laminates is developed. This improves 4-point bending strength by protecting the free edges and aids FE analysis, undertaken alongside experimental work.	**2116-2 DELAMINATION RESISTANCE OF COMPOSITES USING INCLINED Z-PINS** *Beene M'membe (University of Bristol), Sam Gannon (University of Bristol), Mehdi Yasaee (University of Bristol), Stephen Hallett (University of Bristol), Ivana Partridge (University of Bristol)* This study explores the effect of inclined Z-pins on the fracture toughness of laminated composites in ELS specimens.	**2117-3 DESIGN AND ANALYSIS OF A MULTI-CELL SUBSCALE TANK FOR LIQUID HYDROGEN STORAGE** *Ilias Tapeinos (DELFT UNIVERSITY OF TECHNOLOGY), Sotiris Koussios (DELFT UNIVERSITY OF TECHNOLOGY), Roger Groves (DELFT UNIVERSITY OF TECHNOLOGY)* Analysis of the structural performance of a conformable pressurizable tank consisting of intersecting spherical shells (multi-cell tank) for application in cryogenic medium (LH2) storage	**2118-3 THROUGH THICKNESS REINFORCED CFRP/METAL JOINTS – THE IMPACT OF THE PINNING TECHNOLOGY ON THE JOINT'S TENSILE STRENGTH** *Ludwig Eberl (Technische Universität München), Swen Zaremba (Technische Universität München)* Quasistatic testing of pinned hybrid composite/steel double lap joints by the help of Digital Image Correlation techniques. Joints were created using laser pinning, inserted pinning and CMT pinning.	**2119-3 RESEARCH ON MULTI-PHYSICAL FIELD COUPLING MECHANISM IN TPS MATERIAL ABLATION** *Zhu Yanwei (Harbin Institute of Technology), Yi Fajun (Harbin Institute of Technology), Meng Songhe (Harbin Institute of Technology), Pan Weizhen (Harbin Institute of Technology), Peng Zujun (Harbin Institute of Technology)*	**2120-3 MICRO AND MACROSCOPIC CHARACTERIZATION OF A-SMC UNDER HIGH SPEED TENSILE TEST** *Mohammadali SHIRINBAYAN (ARTS-ENSAM), Joseph Fitoussi (ENSAM), Fodil MERAGHNI (ENSAM), Benjamin SUROWIEC (PLASTIC OMNIUM), Michel BOCQUET (ENSAM), Abbas TCHARKHTCHI (ENSAM)* Advanced Sheet Molding Compound (A-SMC) consists of high weight content of glass fibers. This work characterizes A-SMC behavior under high-speed tension.	
2111-4 THE MANUFACTURE AND MECHANICAL PROPERTIES OF A NOVEL NEGATIVE POISSON'S RATIO 3-COMPONENT COMPOSITE *Guanhua Zhang (University of Exeter), Oana Ghita (University of Exeter), Ken Evans (University of Exeter)* This paper introduces a further development to the current Helical Auxetic yarn by addition of a third component (a sheath), the presence of the sheath is expected to overcome previous problems.	**2112-4 PREPARATION OF REDUCED GRAPHENE OXIDE-BASED CARBON COMPOSITE FILMS AND THE CHARACTERIZATION** *Yao Li (Harbin Institute of Technology), Yongan Niu (Harbin Institute of Technology)*		**2114-4 MICRO-MECHANICAL MODELING OF THE PRESSURE DEPENDENT FAILURE OF A HIGHLY CROSSLINKED EPOXY RESIN** *Jérémy Chevalier (University of Louvain), Xavier Morelle (University of Louvain), Christian Bailly (University of Louvain), Thomas Pardoen (University of Louvain), Frédéric Lani (University of Louvain)* A new fracture criterion of the epoxy resin RTM 6 is presented. The criterion explains the brittle fracture of the resin both in compression and tension by the presence of microscale defects.	**2115-4 ANALYSIS OF INITIAL ACCUMULATION OF MATRIX CRACKS IN ANGLE-PLY LAMINATES** *Vladimir Vinogradov (Newcastle University)* A new variational stress analysis for angle-ply laminates with intralaminar cracks is proposed. The method allows analysis of antisymmetric, staggered and random arrays of parallel cracks.	**2116-3 EPOXY REDUCED GRAPHENE OXIDE/ EPOXY INTERLEAVED MULTI-SCALE FIBER REINFORCED COMPOSITES WITH SIMULTANEOUS ENHANCEMENT IN TOUGHNESS AND STRENGTH** *Jingjing Jia (The Hong Kong University of Science and Technology), Xusheng du (The University of Sydney), Jiefeng gao (The University of Sydney), Xiuyi Lin (The Hong Kong University of Science and Technology), Xi shen (The Hong Kong University of Science and Technology), Yiu-Wing Mai (The University of Sydney), Jang-Kyo Kim (The Hong Kong University of Science and Technology)* Developing a novel CVD-grown 3D network graphene interleaves in fiber reinforced composites with excellent interlaminar fracture toughness and interintererlaminar shear strenth	**2117-4 DAMAGE AND PERMEABILITY OF COMPOSITE LAMINATES** *Hortense Laeuffer (DLA / CNES), Christophe Bois (Univ. Bordeaux), Jean-Christophe Wahl (Univ. Bordeaux), Nicolas Perry (Arts et Metiers ParisTech)* This study investigates the link between damage development and permeability evolution in laminates. Permeability and damage experiments were led and a prediction of the leak path number is proposed.	**2118-4 FIBER-REINFORCEMENT-BASED CRACK ARRESTER FOR COMPOSITE BONDED JOINTS** *Shu Minakuchi (The University of Tokyo)* A new crack arrester employing interlocked continuous fibers is proposed. The apparent fracture toughness increased more than fivefold, and the maximum crack opening displacement doubled.	**2119-4 AN ENGINEERING VISION ABOUT ACOUSTIC FATIGUE IN COMPOSITE MATERIAL** *Francisco Kioshi Arakaki (EMBRAER S.A.)* According to the literature, of the early 60's until the mid 80's, there were few data on theoretical development about acoustic fatigue. By this time, abacus based on simple theoretical models has be	**2120-4 DEVELOPMENT OF A WORKFLOW FOR THE VIRTUAL OPTIMIZATION OF A NANOFIBER-INTERLEAVED COMPOSITE LAMINATE SUBJECTED TO IMPACT LOADING** *Alessandro Pirondi (Università di Parma), Francesco Musiari (Università di Parma), Gregorio Giuliese (Università di Parma), Andrea Zucchelli (Università di Bologna)* The aim of this work is to develop a virtual optimization procedure for the impact strength of a composite laminate with interleaved electrospun nylon fiber nanomats	

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16
16:40	**2201 Processing - Manufacturing Technology 5**	**2202 Nano Composites 5**	**2203 Multifunctional Composites - Sensing and Actuation 5**	**2204 Fatigue 5**	**2205 Structural Analysis and Optimization 5**	**2206 Process Induced Effects 4**	**2207 Process Modelling 5**	**2208 Biocomposites 5**	**2209 Interfaces and Interphases 5**	**2210 Ductile and Pseudo-ductile Composites 1**
16:40	**2201-1 PERFORMANCE OF LIGHTWEIGHT HYBRID COMPOSITES BASED ON PA6 FOR LOAD-BEARING AUTOMOTIVE PARTS: INFLUENCE OF PROCESS AND USE CONDITIONS** *Reda Ourahmoune (Ecole Centrale de Lyon), Michelle Salvia (Ecole Centrale de Lyon), Jerome Laborde (Ecole Centrale de Lyon)* The objective of this work is to characterize thermo-mechanical and mechanical properties of different composites: laminate, injected and over-molded in relation with the process conditions	**2202-1 INFLUENCE OF MWCNTS ON MECHANICAL AND INTERFACIAL PROPERTIES OF CARBON FIBER /EPOXY FILAMENT WOUND COMPOSITES** *Gang Sui (Beijing University of Chemical Technology), Xiaoping Yang (Beijing University of Chemical Technology), Gang Li (Beijing University of Chemical Technology)* The addition of liquid-like MWCNTs significantly improved the mechanical properties and interface bonding of T700 carbon fiber filament wound composites.	**KEYNOTE** **2203-1 POWERFUL ARTIFICIAL MUSCLES FOR MORPHING COMPOSITES** *Ray Baughman (University of Texas at Dallas)*	**2204-1 MICROCRACKING IN LAYERS OF COMPOSITE LAMINATES IN CYCLIC LOADING WITH TENSILE TRANSVERSE AND SHEAR STRESS COMPONENTS** *Hiba Ben Kahla (Lulea Univ of Technology), Janis Varna (Lulea Univ of Technology)* Intralaminar cracking in layers of a quasi-isotropic carbon fiber NCF laminate in tension-tension cyclic loading is studied experimentally. Methodology based on modified Weibull analysis is suggested	**2205-1 ON THE BENDING BEHAVIORS OF COMPOSITE CYLINDERS FILLED WITH AN ELASTIC CORE** *Chaiwat Khurukijwanich (King Mongkut's University of Technology Thonburi), Sontipee Aimmanee (King Mongkut's University of Technology Thonburi)* New models are developed for predicting bending response of composite cylindrical shells filled with an elastic core. They are good for designing and understanding the lightweight components.	**2206-1 INFLUENCE OF POST-CURE ON CARBON FIBRE POLYIMIDE COMPOSITES WITH GLASS TRANSITION TEMPERATURES ABOVE 400C** *Patrik Fernberg (Swerea SICOMP), Roberts Joffe (Luleå University of Technology), Spyros Tsampas (Swerea SICOMP), Peter Mannberg (Swerea SICOMP)* The communication presents results from an experimental study in which the influence of post-curing conditions on physical and microstructural properties of polyimide composites was investigated.	**2207-1 VISCOELASTIC INTER-PLY SLIP IN UNCURED LAMINATES: EXPERIMENTAL CHARACTERISATION AND MODELLING** *Samuel Erland (University of Bath), Timothy Dodwell (University of Bath), Richard Butler (University of Bath)* Experimental characterisation and modelling of inter-ply slip for varying ply angles to understand the shearing of an uncured laminate and its implications to manufacturing processes.	**2208-1 PROPERTIES OF NATURAL REINFORCED EARTH-BASED COMPOSITES: ADVANTAGES AND DRAWBACKS WITH SYNTHETIC REINFORCEMENTS** *Carmen Galan-Marin (Universidad de Sevilla), Carlos Rivera-Gomez (Universidad de Sevilla), Francisco De Paula García-Galindo (Universidad de Sevilla)* This paper aims for a comprehensive review of literature of natural or synthetic reinforced earth based composites. Characteristics such as type, composition and mechanical properties of the studied m	**2209-1 TRIAL TO OPTIMIZE FRACTURE PROPERTIES AND BIODEGRADABILITY IN HAP/PLA COMPOSITES AS BIO-ABSORBABLE BONE SUBSTITUTE USING HYBRID INTERFACE CONTROL** *Mototsugu Tanaka (Kanazawa Institute of Technology), Tomoyuki TAKAHASHI (Kanazawa Institute of Technology), Isao KIMPARA (Kanazawa Institute of Technology)* Previously, we had proposed the hybrid interface control in HAp/PLA composite materials as one of the most promising candidates of scaffold materials for the bone regeneration, using both pectin and c	**KEYNOTE** **2210-1 HIGH PERFORMANCE PSEUDO-DUCTILE COMPOSITES** *Michael Wisnom (University of Bristol), G Czel (Budapest University of Technology and Economics), J D Fuller (University of Bristol), M Jalavand (University of Bristol)* Pseudo-ductile response is created by means of hybridisation, rotation of angle plies and interfacial slip in discontinuous laminates, hence avoiding sudden catastrophic failure.
17:00	**2201-2 QUASI-STATIC AND FATIGUE EVALUATION OF LASER MACHINED CF-PPS AND CF-PEI COMPOSITES** *Peter Hansen (Element Materials Technology Hitchin), Richard Staehr (Laser Zentrum Hannover e.V), Peter Jaeschke (Laser Zentrum Hannover e.V)* This paper investigates the mechanical properties of laser cut CF-PPS & CF-PEI thermoplastic materials compared to conventionally machined samples. Several different laser cutting strategies were used	**2202-2 EFFECT OF "FUZZY" FIBER MORPHOLOGY ON THE INTERNAL GEOMETRY OF TEXTILE COMPOSITES CHARACTERIZED BY MICRO-COMPUTED TOMOGRAPHY** *Mohammadali Aravand (KU Leuven), Oksana Shishkina (KU Leuven), Ilya Straumit (KU Leuven), Andrew H. Liotta (Massachusetts Institute of Technology), Sunny S. Wicks (Massachusetts Institute of Technology), Brian L. Wardle (Massachusetts Institute of Technology), Stepan V. Lomov (KU Leuven), Larissa Gorbatikh (KU Leuven)* CNT growth can change the fiber processibility and affect the composite meso/microstructure, its properties. We study the effects of grown, radially aligned CNTs on the textile composite architecture.		**2204-2 EFFECT OF EXTREME TEMPERATURES ON MICRODAMAGE DEVELOPMENT IN CF/POLYIMIDE LAMINATES** *Hana Zrida (Lulea University of technology), Andrejs Pupurs (Lulea University of technology), Roberts Joffe (Lulea University of technology), Patrik Fernberg (Swerea Sicomp), Janis Varna (Lulea University of technology)* CF/polyimide composite was produced at arount 390°C. The composite was subjected to repeated temperature variations and to isothermal aging and the micro-damage development was investigated.	**2205-2 DEVELOPMENT OF A 15 METRE DIAMETER HIGH PERFORMANCE, LOW COST RADIO ANTENNA FOR THE SQUARE KILOMETRE ARRAY** *Gordon Lacy (National Research Council)* The specifications for the radio reflector telescopes required for the Square Kilometer Array (SKA) project are particularly challenging and unique. The SKA project is an international project with t	**2206-2 EFFECT OF PROCESSING PARAMETERS ON OUT-OF-AUTOCLAVE COMPLEX-SHAPE PREPREG LAMINATE QUALITY AND MECHANICAL PERFORMANCE** *Nicolas Krumenacker (McGill University), Pascal Hubert (McGill University)* High-quality flat composite parts can now be readily manufactured via out-of-autoclave prepregs and vacuum-bag-only processing. Still, the aim of these technologies remains the robust manufacturing of	**2207-2 THE NUMERICAL AND EXPERIMENTAL STUDIES ON THE COMPRESSION MOLDING OF THERMOSET COMPOSITE MATERIALS** *Sejin Han (Autodesk), Roy Bendickson (Premix), Eric Henry (Hampshire)* This is on the numerical analysis and the comparison with experiment for the compression molding of thermoset composite materials with an emphasis on the mechanical properties and shrinkage of the par	**2208-2 CARBONIZED ELECTROSPUN LIGNIN FIBERS: PROCESSING AND CHARACTERIZATION** *Manju Misra (University of Guelph), Vida Poursorkhabi (University of Guelph), Makoto Schreiber (University of Guelph), Singaravelu Vivekanandhan (VHNSN College), Amar Mohanty (University of Guelph)* Novel carbon fibres were produced by carbonization of lignin-based electrospun fibers. These fibers have potential applications in sustainable energy storage devices and air filters.	**2209-2 INVESTIGATION ON THE INTERFACE COATINGS WITHOUT STRENGTH DEGRADATION OF WOVEN OXIDE CERAMIC FABRICS** *Nijuan Sun (Aerospace Research Institute of Materials & Processing Technology), Juan Zhang (Science and Technology on Advanced Functional Composites Laboratory-Aerospace Research Institute of Materials & Processing Technology), Chi Wang (Aerospace Research Institute of Materials & Processing Technology), Dahai Zhang (Aerospace Research Institute of Materials & Processing Technology)* Effective interface coatings prepared for fabric preforms, which minimized the tensile strength degradation of oxide fibers and improved the strength of ceramic matrix composite at high temperature.	

Meeting room 5	Meeting room 6	Meeting room 7	M1	M2	M3	M4	M5	M6	M7	M8
2211 Textile-Based Composites and Fibre Architecture 5	**2212 Graphene, Graphene-Based Composites 5**	**2213 X-ray Computed Tomography 4**	**2214 Fracture and Damage - Micromechanics 5**	**2215 Fracture and Damage - Laminate Scale 5**	**2216 Fracture and Damage - Delamination 5**	**2217 Pressure Vessels and Piping 2**	**2218 Joints - Design, Manufacturing and Testing 5**	**2219 Applications - Aerospace 4**	**2220 Applications - Bio & Medical 1**	**2621 Special Symposium on Active Composites**
2211-1 DYNAMIC MECHANICAL PROPERTIES OF WOVEN CARBON FIBRE REINFORCED THERMOPLASTIC COMPOSITE MATERIALS *Diyar Kaka (University of Sheffield), Jem Rongong (University of Sheffield), Alma Hodzic (University of Sheffield), Charles Lord (University of Sheffield)* The dynamic mechanical properties of woven carbon fibre reinforced Poly ether Ether ketone (PEEK) was investigated over a range of temperatures by using both experimental and numerical methods.	**2212-1 IN-MOULD COATING OF THERMOSETTING COMPOSITES WITH POLYSULFONE** *Siti-Ros Shamsuddin (Imperial College London), Alexander Bismarck (University of Vienna)* We have shown that an amorphous thermoplastic PES film can be used as an in-mould coating material for the fabrication of carbon fibre reinforced epoxy composites.	**2213-1 CHARACTERISATION OF CRYOGENICALLY CYCLED AUTOCLAVE & ATL CF/PEEK LAMINATES USING 3-D X-RAY CT** *David Grogan (National University of Ireland-Galway), Sean Leen (National University of Ireland-Galway), Conchúr Ó Brádaigh (University College Cork)*	**2214-1 IS A HOMOGENEOUS REINFORCEMENT DISTRIBUTION OPTIMAL? - COMPOSITES WITH TAILORED INHOMOGENEOUS MICROSTRUCTURE** *Hua-Xin Peng (Zhejiang University), Lujun Huang (Harbin Institute of Technology)*	**2215-1 LOW-VELOCITY IMPACT RESPONSE OF PLANT FIBRE REINFORCED HYBRID COMPOSITES** *Yiou Shen (Tongji University), Yan Li (Tongji University), Junjie Zhong (Tongji University), Hao Ma (Tongji University)* This paper studied the effect of hybrid ratios on the low-velocity impact performance and energy absorption capacity of the jute/ramie fibre reinforced hybrid composites.	**2216-1 A STRESS GRADIENT APPROACH FOR PREDICTING SIZE EFFECTS ON MODE II DELAMINATION** *Giuliano Allegri (Imperial College London)* A nonlocal elastic fracture mechanics approach is presented and applied to predicting the size effect due to through-thickness compression on mode II delamination in “transverse crack tension” coupons	**2217-1 DEVELOPMENT OF DOME STRUCTURING MODEL OF FILAMENT WOUND COMPOSITE PRESSURE VESSEL** *El Moussaid Mohammed (University of Bordeaux), Wahl jean-christophe (University of Bordeaux), Perry Nicolas (Arts et Métiers ParisTech)* A structuring model of composite pressure vessel dome is proposed. The structuring model takes into account the variability and specificity of the geometry of the dome area.	**2218-1 NOVEL HYBRID CO-CURED CARBON/GLASS FIBRE COMPOSITE JOINTS FOR SAFETY CRITICAL STRUCTURES** *Jasim Ahamed (RMIT), Mathew Joosten (RMIT), Chun Wang (RMIT)* New structurally efficient joining technique for integrally co-cured hybrid composite structures has been proposed. Analysis methodology has been developed for accurate prediction of joint strength.	**KEYNOTE** **2219-1 BONDING OF CFRP PRIMARY AEROSPACE STRUCTURES – CRACKSTOPPING IN COMPOSITE BONDED JOINTS UNDER FATIGUE** *Thomas Kruse (Airbus Operations GmbH), Thomas Körwien (Airbus Defence and Space), Matthias Geistbeck (Airbus Group Innovations)* Fatigue testing of composite bonded joints validating the crackstopping capability of different crack stopping features to adress aerospace certification of bonded composite joints	**2220-1 MULTISCALE ENTHESIS MECHANICS** *Victor Birman (Missouri University of Science and Technology), Guy Genin (Washington University), Stavros Thomopoulos (Washington University)* Mechanical issues pertinent to multiscale mechanics of enthesis concentrating on state-of-the art knowledge are outlined. Coupling between nanoscale, microscale and macroscale effects is demonstrated.	**2621-1 High-Bandwidth Sensing and Feedback Control in Computational Meta-materials** *Nikolaus Correll*
2211-2 MICRO-DEBOND DEVELOPMENT IN THE FATIGUE OF A NON-CRIMP 3D ORTHOGONAL WEAVE COMPOSITE LOADED IN THE WARP AND WEFT DIRECTIONS *Matthew Poole (University of Surrey), Steven Ogin (University of Surrey), Paul Smith (University of Surrey), Garry Wells (DSTL), Prasad Potluri (University of Manchester), Philip Withers (University of Manchester), Tristan Lowe (University of Manchester)* Early stage fatigue damage development of a 3D non-crimp orthogonal weave glass fibre composite has been studied using optical microscopy and plan view photography of transparent specimens.	**2212-2 STUDY OF FUNCTIONALIZED-GRAPHENE BASED POLYMER NANOCOMPOSITES THROUGH DETAILED ATOMISTIC SIMULATIONS** *Vagelis Harmandaris (University of Crete), Petra Bacova (Foundation for Research and Technology Hellas (FORTH)), Anastassia Rissanou (University of Crete)* We present results through detailed atomistic molecular dynamics simulations of hybrid nanostructured polymer/graphene materials for different polymer matrices.	**2213-2 ALGORITHMS FOR THE DETERMINATION OF ORIENTATION-TENSORS FROM THREE DIMENSIONAL MICRO-CT IMAGES WITH VARIOUS MICROSTRUCTURES** *Pascal Pinter (KIT), Stefan Dietrich (KIT), Kay André Weidenmann (KIT)* Three algorithms for orientation analysis, based on the concepts of anisotropic Gaussian filtering, Hessian matrix and structure tensor were implemented and evaluated.	**2214-2 PARAMETRIC STUDY OF PROGRESSIVE DAMAGE GROWTH AT THE FIBER/MATRIX SCALE USING COHESIVE ZONE ELEMENTS** *M. Keith Ballard (Texas A&M University), John Whitcomb (Texas A&M University)* Cohesive zone elements were evaluated for use in modeling damage initiation and growth at the fiber/matrix scale. Various aspects of the parametric study will be discussed in the paper.	**2215-2 IN-SITU MEASUREMENTS OF STRUCTURAL DAMAGE IN NOTCHED COMPOSITE LAMINATES** *Yuri Nikishkov (University of Texas at Arlington), Guillaume Seon (University of Texas at Arlington), Andrew Makeev (University of Texas at Arlington)* This work investigates the in-situ development of structural damage around notches in composite laminates based on high fidelity three-dimensional X-Ray CT measurements under static loading.	**2216-2 A VARIATIONAL ASYMPTOTIC METHOD BASED FREE VIBRATION ANALYSIS OF A THIN PRETWISTED AND DELAMINATED ANISOTROPIC STRIP** *Santosh Salunkhe (Indian Institute of Technology Bombay), P. J. Guruprasad (Indian Institute of Technology Bombay)* In this work an attempt was made to analyze the modal behavior of pretwisted anisotropic strips in the presence of delamination based on the mathematical framework of VAM with sub-laminate approach.	**2217-2 ASSESSMENT OF THE TYPE OF STATISTICAL DISTRIBUTION CONCERNING STRENGTH PROPERTIES OF COMPOSITE CYLINDERS** *Georg Mair (BAM), Ben Becker (BAM), Florian Scherer (BAM)* Distribution function influences safety assessment, but individual determination isn’t possible. It is shown why Weibull distribution with T0=0 is recommanded for LC-assessment of composite cylinders.	**2218-2 MULTI AXIAL TESTING OF ADHESIVELY BONDED JOINTS OF FIBER REINFORCED THERMOPLASTIC POLYMERS** *Nans ARGOUD (University of Burgundy), Stéphane FONTAINE (University of Burgundy), Benoit PIEZEL (University of Burgundy), Jérôme ROUSSEAU (University of Burgundy), Antoine FIORE (VOLVO GTT)* This study present a multi axial device for testing adhesively bonded composite joints. Results show a large dependency on the load orientation, joint thickness, loading speed and test temperature.		**2220-2 DEVELOPING AN IN-SITU POLYMERISATION PROCESS FOR BIOCOMPOSITE MANUFACTURE** *Menghao Chen (the University of Nottingham), Derek Irvine (the University of Nottingham-UK), Andrew Parsons (the University of Nottingham), Christopher Rudd (the University of Nottingham), Ifty Ahmed (the University of Nottingham)* Investigations into manufacturing technique of fully bioresorbable polymer composites using In-situ polymerisation technique in order to improve and replace metal implants for hard tissue repair.	**2621-2 Closing Remarks** *Daniel Inman*

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16
17:20	**2201-3 INVESTIGATIONS ON THE PROCESS STRATEGY OF LASER REMOTE CUTTING OF CARBON FIBRE REINFORCED PLASTICS WITH A THICKNESS OF MORE THAN 3 MM** *Matthias Schmidt-Lehr (Hamburg University of Technology), Max Oberlander (Hamburg University of Technology), Dirk Herzog (Hamburg University of Technology), Marten Canisius (Hamburg University of Technology), Markus Radek (Hamburg University of Technology), Claus Emmelmann (Hamburg University of Technology)* Cutting CFRP with laser leads to a wear-free, fast process. State of the art is the cutting of thin laminates of max 3 mm. This paper introduces a laser process for parts with thicknesses up to 10 mm.	**2202-3 NANOTUBE-BUCKYPAPER/ POLYURETHANE COMPOSITES USING CARBON AND BORON NITRIDE NANOTUBES** *Yadienka Martinez Rubi (SDT-National Research Council Canada), Michael Jakubinek (SDT-National Research Council Canada), Behnam Ashrafi (Aerospace-National Research Council Canada), Keun Su Kim (SDT-National Research Council Canada), Kayla ONeill (Aerospace-National Research Council Canada), Christopher Kingston (SDT-National Research Council Canada), Stéphane Dénommée (SDT-National Research Council Canada), Benoit Simard (SDT-National Research Council Canada)* Carbon nanotube & boron nitride nanotube papers are produced and modified by integration of polyurethane, providing improved/tailorable mechanical properties and an intermediate for hybrid composites	**2203-2 DAMAGE DETECTION IN A COMPOSITE SKIN-STRINGER PANEL USING LAMB WAVE PROPAGATION TECHNIQUE: A NUMERICAL STUDY** *Mohammad Hossein Sherafat (McGill University), Pascal Hubert (McGill University), Larry Lessard (McGill University)* The finite element modelling of guided wave propagation for a composite skin-stringer assembly is developed, and the results justify the application of the methods for disbond detection.	**2204-3 VARIABLE LOADING FATIGUE LIFE OF WOVEN FABRIC CARBON/EPOXY LAMINATES UNDER ALTERNATING EQUAL-LIFE WAVEFORMS OF DIFFERENT R-RATIOS** *Masamichi Kawai (University of Tsukuba)* Effect of repeated alternations in R-ratios on fatigue life of a quasi-isotropic woven fabric CFRP laminate has been studied. A variable loading fatigue life prediction methodology is also developed.	**2205-3 LEVEL SET OPTIMISATION FOR COMPOSITE FIBRE PATHS** *H Alicia Kim (University of Bath), Christopher Brampton (University of Bath)* This work optimises variable orientation composite structures using a level set method. Solutions produced feature continuous fibre paths, suitable for advanced fibre placement (AFP) manufacture.	**2206-3 INFLUENCE OF CARBON FIBRES ON THE CRYSTALLNITY OF POLYAMIDE-6** *Thomas Guglhoer (University of Augsburg), Marco Korkisch (University of Augsburg), Markus G. R. Sause (University of Augsburg)* The influence of carbon fibres on the crystallinity of Polyamide 6 was investigated in dependence of the cooling rate during crystallization from melt.	**2207-3 NUMERICAL EVALUATION OF RESIDUAL MANUFACTURING DEFORMATIONS IN COMPLEX PULTRUDED COMPOSITE PROFILES** *Alexander Safonov (Skolkovo Institute of Science and Technology), Alexander Konstantinov (Mechanics Research Institute of the Lobachevsky State University of Nizhny Novgorod)* The purpose of this study is to develop a methodology for numeric evaluation of residual deformations after pultrusion in complex profiles of composite materials with thermoset resin.	**2208-3 MECHANICAL PROPERTY AND FRACTURE BEHAVIOR OF THERMOSETTING FRP REINFORCED CARBON FIBERS AND PAPERBOARD** *Takanori Kitamura (Kyoto Institute of Technology), Keisuke Kitai (Kitai Seisakusyo Co.-Ltd), Kanta Ito (Daiwa Itagami Co. Ltd.), Suguru Teramura (Daiwa Itagami Co. Ltd.), Zhiyuan Zhang (Daiwa Itagami Co. Ltd.), Hiroyuki Hamada (Kyoto Institute of Technology)* Deforestation is a big problem to the world. The usage of paperboard can release the needs to the timber. The paperboard FRP gives paperboard new properties.	**2209-3 INFLUENCE OF FIBER SIZING ON PROPERTIES OF BASALT FIBER REINFORCED COMPOSITE** *Lichao Yu (Donghua University), Zhenjin Cui (Kyoto Institute of Technology), Yuqiu Yang (Donghua University)* Comparison and analysis have been carried out to discuss the change of mechanical property by chang the PUD pick-up ratio on basalt fibre and improved mechanical properties compared with virgin one.	**2210-2 CELLULOSE NANOCOMPOSITES WITH DUCTILE MECHANICAL BEHAVIOR** *Lars Berglund (KTH Royal Inst of Technology), Mohd Farhan Ansari (KTH Royal Inst of Technology)* Ductility mechanisms in biocomposites based on cellulose nano fibers (CNF) are discussed.Preparation is as follows: porous CNF networks are formed, and impregnated by unsaturated polyester or epoxy.
17:40	**2201-4 RESEARCH ON CUTTING FORCE AND DELAMINATION DURING MILLING CFRP WITH VARIOUS WORKPIECE INCLINED ANGLES** *Yan Chen (Nanjing University of Aeronautics and Astronautics), Yucan Fu (Nanjing University of Aeronautics and Astronautics), Jingwen Zhou (Nanjing University of Aeronautics and Astronautics), Honghua Su (Nanjing University of Aeronautics and Astronautics)* CFRP laminates with varied bottom fiber direction angle were trimmed at various workpiece inclination angles. The cutting forces, delaminations, and model for delamination were studied.	**2202-4 TENSILE PROPERTIES OF CARBON NANOTUBE/EPOXY COMPOSITE FABRICATED BY PULTRUSION OF CARBON NANOTUBE SPUN YARN** *Yoshinobu Shimamura (Shizuoka University), Kahori Oshima (Shizuoka University), Keiichiro Tohgo (Shizuoka University), Tomoyuki Fujii (Shizuoka University), Yoku Inoue (Shizuoka University)* High mechanical performance carbon nanotube/epoxy composite fabricated by a pultrusion technique has developed by using carbon nanotube spun yarn produced from spinnable carbon nanotube forest.	**2203-3 INTERNAL TEMPERATURE AND THERMAL GRADIENT SENSING OF COMPOSITES VIA NANOROD PLASMON RESONANCE SPECTROSCOPY** *Jeffery Baur (Air Force Research Laboratory), Joshua Kennedy (Air Force Research Laboratory), Keith Slinker (Air Force Research Laboratory), Brent Volk (Air Force Research Laboratory), Hilmar Koerner (Air Force Research Laboratory), Gregory Ehlert (Air Force Research Laboratory)* Here we discuss a new method for the determination of internal temperatures and temperature gradients within a composite using a color change related to the aspect ratio of dispersed gold nanorods.	**2204-4 REDUCTION OF FATIGUE DAMAGE EQUIVALENT LOADS IN THE WIND TURBINE SYSTEM THROUGH THE USE OF OFF-AXIS PLIES IN THE SPAR CAPS OF COMPOSITE WIND TURBINE BLADES** *Altan Kayran (METUWind Center for Wind Energy), Mehmet Ozan Gözcü (METUWind Center for Wind Energy-Middle East Technical University), Touraj Farsadi (METUWind Center for Wind Energy-Middle East Technical University), Özgün Şener (METUWind Center for Wind Energy-Middle East Technical University)* REDUCTION OF FATIGUE DAMAGE EQUIVALENT LOADS IN THE WIND TURBINE SYSTEM THROUGH THE USE OF OFF-AXIS PLIES IN THE SPAR CAPS OF COMPOSITE WIND TURBINE BLADES.	**2205-4 AN IMPROVED VIRTUAL TESTING APPROACH FOR LAMINATED COMPOSITES BASED ON MICROMECHANICS** *Pierre Ladeveze (ENS Cachan), David Néron (ENS Cachan), Hadrien Bainier (ENS Cachan)* The work deals with two enhancements of our damage mesomodel for laminated composites: micromechanics-based modeling of coupling between ply microcracking and delamination, and prediction of splits.	**2206-4 STUDY OF NON-DESTRUCTIVE MEASUREMENT APPROACH OF RESIDUAL STRESS ON FRP LAMINATE BASED ON THERMAL EXPANSION** *Satoshi Hayashi (Kanazawa Institute of Technology), Hirokuni Adachi (Kanazawa Institute of Technology), Hiroshi Saito (Kanazawa Institute of Technology), Isao Kimpara (Kanazawa Institute of Technology)* We focused on the correlation between thermal expansion behavior and residual stress. Then it is clear there is strong linear relationship between residual stress and linear expansion coefficient.	**2207-4 TWO DIMENSIONAL FINITE ELEMENT MODELING OF COMMINGLED YARNS COMPOSITES CONSOLIDATION PROCESS** *Mylene Lagardere (Mines Douai), Baochao Li (Mines Douai), Chung-Hae Park (Mines Douai)* Modelling of consolidation processes for thermoplastic matrix composite structures is adressed, considering hybrid yarns textiles. Model is validated through analytical and experimental studies.		**2209-4 INTERFACIAL ADHESION BETWEEN GLASS FIBERS AND ACRYLIC-BASED MATRICES AS STUDIED BY MICROMECHANICAL TESTING** *Quentin Charlier (INSA-Lyon-Ingénierie des Matériaux Polymères-IMP-CNRS UMR5223-F-69621), Frédéric Lortie (INSA-Lyon-Ingénierie des Matériaux Polymères-IMP-CNRS UMR5223-F-69621), Jean-François Gérard (INSA-Lyon-Ingénierie des Matériaux Polymères-IMP-CNRS UMR5223-F-69621)* Acrylic/glass fiber model specimens were prepared by in-situ polymerizing a MMA-based reactive mixture onto a single filament and studied with single fiber fragmentation test and microbond test.	**2210-3 BIO-INSPIRED CONCEPTS FOR NATURAL & CELLULOSE FIBRE-REINFORCED COMPOSITES WITH DUCTILE BEHAVIOUR** *Jörg Müssig (Hochschule Bremen - University of Applied Sciences), Nina Graupner (Hochschule Bremen - University of Applied Sciences)* Biological materials show impressive combinations of mechanical properties like strength and toughness. The structure of a red rhubarb petiole and a coconut pericarp are transferred to composites.

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2211-3 EMBEDDED ELEMENT METHOD IN MESO- FINITE ELEMENT MODELLING OF TEXTILE COMPOSITE: A"GALLERY" *Seyed Ahmad Tabatabaei (Katholieke Universiteit Leuven), Stepan Lomov (Katholieke Universiteit Leuven-Leuven)* The application of the embedded element method in different aspect of textile composites ranging from calculation of the homogenized stiffness properties, stress/strain fields, etc is investigated.	**2212-3 STRUCTURAL HEALTH MONITORING OF CEMENT BASED MATERIALS REINFORCED WITH GRAPHENE NANOPLATELETS** *Zoi S. Metaxa (National Technical University of Athens)* The present work focuses on the use of graphene nanoplatelets for the development of smart cement based nanocomposites that, contrary to traditional approaches that require the use of high-cost attach	**2213-3 FOUR DIMENSIONAL SYNCHROTRON TOMOGRAPHY OF FATIGUE CRACK GROWTH AND DAMAGE IN METAL MATRIX COMPOSITES** *Peter Hruby (Arizona State University), Sudhanshu Singh (Arizona State University), Jason Williams (Arizona State University), Xianghui Xiao (Argonne National Laboratory), Francesco DeCarlo (Argonne National Laboratory), Nik Chawla (Arizona State University)* MMCs have high strength and toughness, In situ x-ray synchrotron tomography and extended finite element modeling of damage in 2080 aluminum alloy reinforced with SiC particles was conducted.	**2214-3 IMPLEMENTATION OF A MOLECULAR INTERPHASE MODEL WITHIN A MULTISCALE FRAMEWORK FOR POLYMER MATRIX COMPOSITES** *Joel Johnston (Arizona State University), Bonsung Koo (Arizona State University), Aditi Chattopadhyay (Arizona State University)* A novel multiscale model framework is presented which studies the effect of the interphase between carbon fiber and polymer matrix using atomistic scale simulations and subcell based micromechanics.	**2215-3 RESIDUAL FLEXURAL STRENGTH AFTER IMPACT AND HYDROSTATIC CYCLING IN GLASS/SYNTACTIC FOAM SANDWICH LAMINATES** *Prasad Potluri (University of Manchester), Sofia Pavlopoulou (University of Manchester)* Residual flexural strength of syntactic foam sandwich composites have been investigated. Influence of cyclic hydrostatic pressure and impact energy levels on flexural properties have been reported.	**2216-3 INTERLAMINAR DAMAGE ANALYSIS OF COMPOSITE STRUCTURES USING ROBUST INTERFACE ELEMENTS** *Tillmann Herwig (Institute for Structural Analysis), Werner Wagner (Institute for Structural Analysis)* For the development of robust interface elements a hybrid mixed formulation based on the potential by Hu-Washizu and a non-potential mixed mode cohesive law are applied.	**2217-3 INTEGRATED DESIGN AND PRODUCTION OF FILAMENT-WOUND COMPOSITE STRUCTURES: COMPROMISE BETWEEN STRENGTH AND MANUFACTURABILITY** *Lei Zu (Wuhan University of Technology), Jihui Wang (Wuhan University of Technology), Shuxin Li (Wuhan University of Technology)* An integrated design and production method of filament-wound structures was outlined to offer an effective tool able to fill the gap between "design for structures" and "design for manufacturability".	**2218-3 EXPERIMENTAL AND NUMERICAL INVESTIGATION INTO CO-BONDED PATCH REPAIRS FOR STRUCTURAL COMPOSITES ADDITIONALLY REINFORCED WITH HIGH PERFORMANCE MULTIFILAMENT YARN** *Markus Linke (Hamburg University of Applied Sciences), Marie Moebius (Hamburg University of Applied Sciences), Frank-David Georges (Hamburg University of Applied Sciences), Philipp Abel (RWTH Aachen University), Thomas Gries (RWTH Aachen University)* A co-bonding repair method is experimentally as well as numerically investigated using high performance multifilament yarns to reinforce the bonding area of single lapped joints.	**2219-2 SIMULATION OF COMPOSITE DAMAGE DUE TO LIGHTNING STRIKE** *Cédric Huchette (Onera the French Aerospace lab), Johann Rannou (ONERA the french Aerospace Lab), Laurent Chemartin (ONERA the french Aerospace Lab)* The aim of this study is to propose a first comprehension model of the matrix damage due to electro thermal loading imposed by lightning strike impact on carbon/epoxy laminates.	**2220-3 COMPOSITES OF MGB2 – RARE-EARTH-OXIDES: FABRICATION BY SPARK PLASMA SINTERING AND FUNCTIONAL PROPERTIES** *Dan Batalu (University POLITEHNICA of Bucharest), Robert Bololoi (University POLITEHNICA of Bucharest), Gheorghe Aldica (National Institute of Materials Physics), Petre Badica (National Institute of Materials Physics)* Dense MgB2 samples with La2O3 addition were obtained by spark plasma sintering. Formation of phosphate needles, gathered in bouquets, show a possible bioactive behavior of MgB2.	
2211-4 DAMAGE DEVELOPMENT IN STEEL FIBRE COMPOSITES WITH UNIDIRECTIONAL AND QUASI-UNIDIRECTIONAL WOVEN ARCHITECTURES *Michaël Guy Callens (KU Leuven), Larissa Gorbatikh (KU Leuven), Ignaas Verpoest (KU Leuven)* The effect of the microstructure on the damage development in steel fiber composites is investigated. Quasi-unidirectional and perfectly unidirectional fibre architectures are studied.	**2212-4 POLYETHYLENE/ GRAPHENE NANOCOMPOSITES OBTAINED BY SUPPORTED CATALYST OVER FEW GRAPHENE LAYERS** *Griselda Barrera Galland (Universidade Federal do Rio Grande do Sul/Instituto de Química), Giovani Pavoski (Universidade Federal do Rio Grande do Sul/Instituto de Química), Nara Regina de Sousa Basso (Pontifícia Universidade Católica do Rio Grande do Sul), Thuany Maraschin (Pontifícia Universidade Católica do Rio Grande do Sul), Marcéo Auler Milani (Universidade Federal do Rio Grande do Sul/Instituto de Química), Raúl Quijada (Universidad de Chile), Denise Azambuja (Universidade Federal do Rio Grande do Sul/ Instituto de Química)* In this work we synthetized nanocomposites of polyethylene with two types of graphites, graphite oxide (GO) and reduced graphene oxide (RGO), by in situ polymerization using a metallocene catalyst. Bo		**2214-4 EFFECT OF FIBER WAVINESS ON TENSILE STRENGTH OF FLAX FIBER-REINFORCED COMPOSITES** *Taweesak Piyatuchsananon (Yamaguchi University), Akira Furuya (Yamaguchi University), Koichi Goda (Yamaguchi University)* The purpose of this study is to analyze the effect of the fiber waviness on the tensile strength of flax fiber-reinforced composites by using Tsai-Hill theory and spatial autocorrelation.		**2216-4 INTERLAMINAR FRACTURE TOUGHNESS OF FIBER METAL LAMINATES** *Carlos Rubio-Gonzalez (CIDESI), Jorge Quintero (ITESM), Edgardo Perez-Hermosillo (ITESM)* The aim of this paper is to investigate the feasibility of applying different DCB models to predict interlaminar toughness of composite laminates and FMLs and compare with experimental results.		**2218-4 MODELING BLAST FAILURE OF FIBRE METAL LAMINATES** *Zhongwei Guan (University of Liverpool), Elena Sitnikova (University of Nottingham), Wesley Cantwell (Khalifa University of Science-Technology and Research)* The perforation failure of fibre metal laminates subjected to blast has been simulated. The model employs modified 3D Hashin's criteria with consideration of damage evolution and rate-dependence.	**2219-3 A PROOF-OF-CONCEPT OF SMART HANGAR FOR COMPOSITE AIRCRAFT** *See Yenn Chong (Korea Advanced Institute of Science and Technology), Syed Haider Abbas (Korea Advanced Institute of Science and Technology), Hye-Jin Shin (LANL-CBNU Engineering Institute-Korea-Chonbuk National University), Truong Thanh Chung (Korea Advanced Institute of Science and Technology), Jung-Ryul Lee (Korea Advanced Institute of Science and Technology)* To enhance the efficiency of the aircraft maintenance performance, a new cutting-edge paradigm of structural health management – Smart Hangar for aerospace industry is proposed in this paper.	**2220-4 A NOVEL DESIGN OF INJECTABLE POROUS HYDROGELS WITH IN SITU PORE FORMATION** *Ortal Yom-Tov (Technion), Havazelet Bianco-Peled (Technion), Dror Seliktar (Technion)* The use of injectable porous hydrogels is of great interest in biomedical applications due to their excellent permeability and ease of integration into sites of surgical intervention. By implementing	

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16
8:30	**Extreme loading of composite materials in naval applications** Yapa D. S. Rajapakse, Office of Naval Research, Virginia, USA									
9:30	**3101 Processing - Manufacturing Technology 6**	**3102 Nano Composites 6**	**3103 ONR Special Symposium on Marine Composites 1**	**3104 Fatigue 6**	**3105 Structural Analysis and Optimization 6**	**3106 Process Induced Effects 5**	**3107 Process Modelling 6**	**3108 Fibre reinforcement**	**3109 Interfaces and Interphases 6**	**3110 Damage Tolerance of Composite Structures 1**
9:30	**3101-1 THE GENESIS OF ART FRP - BASED ON THE JAPANESE TRADITIONAL SENSE OF BEAUTY-** *Yuki Ikenobo (Ikenobo), Tetsuo KIKUCHI (Toyugiken Co.-Ltd.), Hiroyuki HAMADA (Kyoto Institute of Technology)* This study has focused on the FRP. By combining superior FRP functionality, and the Japanese traditional sense of beauty originating in traditional Japanese Kyo-yuzen fabric and Ikebana.	**3102-1 A MODEL FOR THE ENHANCEMENT OF YOUNG'S MODULUS OF MACROSCOPIC CARBON NANOTUBE FIBERS VIA POLYMER INFILTRATION** *Bartolomé Mas (IMDEA Materials Institute), Juan José Vilatela (IMDEA Materials Institute)* We studied stress transfer mechanisms that take place in carbon nanotube fibres infiltrated with different polymers under axial load. A model to predict the final composite properties is proposed.	**KEYNOTE** **3103-1 DEFORMATIONS DUE TO EXPLOSIVE AND IMPLOSIVE LOADS OF SANDWICH CYLINDERS USING THIRD ORDER SHEAR AND NORMAL DEFORMABLE THEORY (TSNDT)** *Romesh Batra (Virginia Polytechnic Institute and State University), Priyal Shah (Virginia Polytrechnic Institute and State University)* We use an equivalent single layer third order shear and normal deformable shell theory (TSNDT) to study transient deformations of linear elastic sandwich cylinders under implosive and explosive loads.	**3104-1 EVALUATION OF BENDING FATIGUE CHARACTERISTICS OF CFRP FOR MARINE PROPELLERS** *Daichi Ogawa (School of Engineering-University of Tokyo), Hideaki Murayama (School of Engineering-University of Tokyo), Kazuro Kageyama (Graduate School of Engineering-University of Tokyo), Toshio Yamatogi (Nakashima Propeller Co. Ltd.), Makoto Kanai (School of Engineering-University of Tokyo), Takaya Sakurai (Nakashima Propeller Co. Ltd.)* This paper reports the bending fatigue characteristics of CFRP manufactured from VaRTM process about stiffness. Stiffness degradation among the number of cycles was evaluated.	**3105-1 FEASIBILITY STUDY OF A SANDWICH CHOPPER DISC FOR A TIME OF FLIGHT (TOF) SPECTROMETER** *Valeria Antonelli (Technische Universität München), Matthias Weinzierl (Technische Universität München), Horst Baier (Technische Universität München)* The aim of the feasibility study is the maximisation of the natural frequency of a chopper disc. A sandwich design reduces the weight penalty caused by a CFRP disc with the same natural frequency.	**3106-1 INTEGRATED ANALYSIS OF COMPACTION, EDGE DISTORTION AND RESIDUAL DEFORMATION OF WIND-TURBINE THICK COMPOSITES SPAR-CAP** *Ganapathi Ammasai Sengodan (Nanyang Technological University), Sunil C. Joshi (Nanyang Technological University), Zhong Chen (Nanyang Technological University)* A numerical method is established to integrate the compaction and cure deformation of a composite wind turbine spar cap. This predicts the non-uniform thickness and curvature of the cured spar cap.	**3107-1 COMPUTATIONAL SIMULATION OF COMPRESSION FORMING OF THE THERMOPLASTIC PREPREG** *Mark Kantor (skoltech), Andrei Ushakov (skoltech), Alexander Safonov (skoltech), Boris Fedulov (skoltech)* The research is the succesfull attempt to demonstrate that the thermoplastic composites forming problem can be solved in the framework of the single problem.	**3108-1 INVESTIGATION OF MECHANICAL PROPERTIES OF FILAMENT WOUND UNIDIRECTIONAL BASALT FIBER REINFORCED POLYMERS FOR AUTOMOTIVE AND PRESSURE VESSEL APPLICATION** *Eduard Kessler (NuCellSys GmbH), Rainer Gadow (University of Stuttgart), Patrick Weichand (University of Stuttgart)* Comparison of tensile properties of fibers and filament wound polymer composites for filament wound pressure vessels with focus on basalt fibers and basalt fiber composites.	**3109-1 THE ROLE OF THE EPOXY RESIN: CURING AGENT RATIO IN COMPOSITE INTERFACIAL STRENGTH BY SINGLE FIBRE MICROBOND TEST** *Ross Minty (University of Strathclyde), James Thomason (University of Strathclyde), Helga Petersen (Technical University of Denmark)* Found that the apparent IFSS of the glass fibre-epoxy matrix measured using the microbond test showed a significant dependence on the stoichiometric ratio of the epoxy resin and curing agent present.	**3110-1 EXPERIMENTAL ASSESSMENT AND NUMERICAL ANALYSIS OF 3D WOVEN COMPOSITE T-JOINTS UNDER TENSILE LOADING** *Shibo Yan (University of Nottingham), Andrew Long (University of Nottingham), Xuesen Zeng (University of Nottingham)* This paper presents the experimental assessment and numerical analysis of the mechanical properties of 3D woven composite T-joints subjected to a tensile pull-off loading scenario.
9:50	**3101-2 OPEN MICROWAVE HEATING OF POLYMER RESIN WITH DISPERSED CARBON NANOTUBES USING INTERDIGITAL ELECTRODE FILM** *Ryosuke Matsuzaki (Tokyo University of Sicence), Shinya Hatori (Tokyo University of Science), Akira Todoroki (Tokyo Institute of Technology)* The present study proposes an open-type microwave heating of a polymer resin using microwaves produced by an interdigital electrode array film positioned between the composites and the mold.	**3102-2 ESTIMATION OF STRENGTH AND FRACTURE TOUGHNESS FOR NANOMATERIALS** *Chyanbin Hwu (National Cheng Kung University), Yu-Kuei Yeh (National Cheng Kung University)* The molecular-continuum model proposed previously for the estimation of elastic constants was extended here for the prediction of ultimate strength and fracture toughness of nanomaterials.		**3104-2 FATIGUE-INDUCED DAMAGE MECHANISMS IN CARBON/EPOXY LAMINATES INFLUENCED BY MEAN STRESS AND FIBRE VOLUME CONTENT** *Julia Brunbauer (Montanuniversitaet Leoben), Gerald Pinter (Montanuniversitaet Leoben)* The combined effect of fibre volume content, anisotropy, load amplitude and mechanical mean stress on the mechanical behaviour and the fatigue damage of carbon/epoxy laminates was investigated.	**3105-2 AEROELASTIC TAILORING OF TOW-STEERED COMPOSITE WING BOXES** *Olivia Stodieck (University of Bristol), Jonathan Cooper (University of Bristol), Paul Weaver (University of Bristol), Paul Kealy (Airbus Operations UK Ltd)* Tow-steered laminates achieved improved aeroelastic behaviours compared to straight-fibre laminates by allowing the stiffness distributions and the wing spanwise bend-twist coupling to be optimised.	**3106-2 INFLUENCE OF MANUFACTURING-INDUCED DEFECTS ON THE INTRA- AND INTER-LAMINAR PROPERTIES OF CARBON/EPOXY NCF LAMINATES** *Paolo Andrea Carraro (University of Padova), Lucio Maragoni (University of Padova), Marino Quaresimin (University of Padova)* The influence of inter-tow voids on the inter-laminar and intra-laminar properties of carbon/epoxy NCF was analysed on specimens infused with different process parameters.	**3107-2 3-D DYNAMIC SIMULATION OF FLEXIBLE FIBER WITH A SYSTEM OF ARTICULATED BODIES** *Khalid El Azzouzi (IRT Jules Verne), Christophe BINETRUY (Institute of Civil Enginneering and Mechanics (GeM)-Ecole Centrale de Nantes), Sébastien COMAS CARDONA (Institute of Civil Enginneering and Mechanics (GeM)-Ecole Centrale de Nantes)* A new discrete element method is developed to study the dynamic motion of a flexible fibre using articulated body system and recursive algorithms based on the Newton-Euler equations.	**3108-2 MORI-TANAKA METHODS FOR MICROMECHANICS OF RANDOM FIBRE COMPOSITES** *Stepan Lomov (KU Leuven), Yasmine Abdin (KU Leuven), Atul Jain (KU Leuven)* Eshelby/Mori-Tanaka predict adequately the homogenised stiffness, non-linear stress-strain curves stresses in the fibres and on the fibre/matrix interface and progressive fibre debonding.	**3109-2 INFLUENCE OF DIFFERENT SIZING ON FRACTURE TOUGHNESS AND FLEXURAL PROPERTIES OF CARBON FIBER REINFORCED POLYPHTHALAMIDE** *Veronika Radlmaier (Technische Universität München-Faculty of Mechanical Engineering), Andreas Erber (Technology & Innovation), Patrik-Vincent Brudzinski (Technology & Innovation), Hannes Koerber (Technische Universität München-Faculty of Mechanical Engineering), Klaus Drechsler (Technische Universität München-Faculty of Mechanical Engineering)* In this study, the influence of two different carbon fiber sizing materials was investigated on mode I interlaminar fracture toughness and flexural properties of composites with PPA matrix.	**3110-2 INDUCED THERMO-MECHANICAL DAMAGE IN THE DRILLING OF THERMOPLASTIC-TOUGHENED CFRP COMPOSITES** *Julián Luis Merino-Pérez (The University of Sheffield), Alma Hodzic (The University of Sheffield), Eleanor Merson (Sandvik Coromant-Sandvik AB), Sabino Ayvar-Soberanis (The University of Sheffield)* This investigation focused on the assessment of the induced thermal and mechanical damage in the vicinity of the machined surface in the drilling of carbon fibre reinforced polymer (CFRP) composites.

Meeting room 5	Meeting room 6	Meeting room 7	M1	M2	M3	M4	M5	M6	M7	M8
3111 Textile-Based Composites and Fibre Architecture 6	**3112 Graphene, Graphene-Based Composites 6**	**3113 Matrix Materials 1**	**3114 Fracture and Damage - Materials Scale 1**	**3115 Models Homogenization – Micro to Macro 1**	**3116 Nanocomposites for Structural Lightweight - Modelling and Testing 1**	**3117 Ductile and Pseudo-ductile Composites 2**	**3118 Fire Resistance 1**	**3119 Applications - Aerospace 5**	**3120 New Structural Testing Methods 1**	**3121 Multifunctional Composites - Sensing and Actuation 6**
3111-1 THERMOFORMING SIMULATION OF THERMOPLASTIC PRE-IMPREGNATED TEXTILE REINFORCEMENT *Masato Nishi (JSOL Corporation), Tei Hirashima (JSOL Corporation), Tetsusei Kurashiki (Osaka University), Masashi Kurose (Gunma National College of Technology), Tetsushi Kaburagi (Gunma), Keisuke Uenishi (Osaka University)* We propose a shell and membrane hybrid FE model of CFRTP for non-isothermal forming simulation. The proposed model can describe temperature dependent non-linear in-plane and out-of-plane behaviors.	**KEYNOTE** **3112-1 STRUCTURAL GRAPHENE COMPOSITES: TAKING THE LESSONS OF FUNDAMENTAL STUDIES THROUGH TO BULK COMPOSITES** *Ian Kinloch (University of Manchester), Lei Gong (University of Manchester), Zhe Ling Li (University of Manchester), Cristina Valles (University of Manchester), Arun Raju (University of Manchester), Konstantin Novoselov (University of Manchester), Robert Young (University of Manchester)* The micromechanics of graphene composites has been explored using Raman spectroscopy on model experimental systems. The knowledge gained has been used to produce bulk composites with high loadings.	**3113-1 CURING OF EPOXY RESINS: A NANOSCALE VIEW** *David Seveno (KU Leuven), Adri Van Duin (Penn State)* This study presents a methodology to model the curing process of an epoxy system at the atomistic scale using reactive molecular dynamics simulations (ReaxFF force field).	**3114-1 A METHOD TO CHARACTERIZE BIAXIAL STRENGTHENING EFFECTS WITH A UNIAXIAL TEST** *Adam Biskner (LoadPath), Emmett Nelson (Autodesk), Jeffry Welsh (Operationally Responsive Space Office), Andrew Williams (Air Force Research Laboratory Space Vehicles Directorate)* This paper seeks to characterize the biaxial behavior of composites using a unique uniaxial experimental and verifying it with biaxial data and Autodesk Helius analytical predictions	**3115-1 A MULTI-SCALE MODEL FOR THE MECHANICAL PROPERTIES OF FIBER-REINFORCED SILICA AEROGEL COMPOSITE** *Zeshuai Yuan (Beihang University), Zixing Lu (Beihang University), Zhenyu Yang (Beihang University), Guiping Lin (Beihang University)* A new multi-scale model is proposed to investigate the relationship between the mechanical properties and microstructure of fiber-reinforced silica aerogel composites.	**3116-1 MODELING AND PREDCITION OF FRACTURE PROPERTIES IN NANO-GRAPHENE REINFORCED POLYMERS** *Samit Roy (University of Alabama), Avinash Akepati (University of Alabama), Vinu Unnikrishnan (University of Alabama)* In this paper, an atomistic (MD) methodology is employed to compute J-integral using atomistic data obtained from molecular dynamics simulations for epoxy/nanographene using the Reax force field.	**3117-1 EXPLORING ROUTES TO CREATE HIGH PERFORMANCE PSEUDO-DUCTILE FIBRE REINFORCED COMPOSITES** *Omar Bacarreza Nogales (Imperial College London), Alexander Bismarck (Imperial College London), Jonny Blaker (University of Manchester), Hele Diao (Imperial College London), Gael Grail (Imperial College London), Paul Robinson (Imperial College London), Soraia Pimenta (Imperial College London), Milo Shaffer (Imperial College London)* Approaches are presented for creating composites which exhibit pseudo-ductile behaviour. These include discontinuous composites, pre-weakened composites and composites exploiting waviness.	**3118-1 POST-FIRE TENSILE PROPERTIES OF SANDWICH COMPOSITES** *Aslina Anjang (RMIT University), Mark Spiteri (RMIT University), Venkata Chevali (RMIT University), Stefanie Feih (Singapore Institute of Manufacturing Technology), Adrian Mouritz (RMIT University)* A validated thermal-mechanical model for calculating the residual stiffness and strength of burnt sandwich composite structures following fire exposure is presented.	**3119-1 DEVELOPMENT AND INVESTIGATION OF A HYBRID CURVATURE-MORPHING SKIN STRUCTURE** *André Schmitz (TU Braunschweig), Peter Horst (TU Braunschweig)* A new curvature-morphing skin structure is presented. Large bending fatigue in morphing-direction and transverse strength (avoidance of buckling of rubber embedded composite bundles) is focused on.	**3120-1 MEASUREMENT OF IN-PLANE RESIDUAL STRESSES IN AN AS4/8552 COMPOSITE LAMINATE USING THE DEEP-HOLE DRILLING METHOD** *C. Garza (University of Bristol), D. J. Smith (University of Bristol), A. Shterenlikht (University of Bristol), M. Pavier (University of Bristol)* The in-plane residual stresses in an AS4/8552 composite laminate are experimentally measured using the Deep-Hole Drilling and compared to finite element predictions and classical lamination theory.	**3121-1 SELF SENSING GLASS/EPOXY CROSS-PLY LAMINATES FOR DAMAGE MONITORING UNDER FATIGUE LOADING: MODELLING AND EXPERIMENTS** *Paolo Andrea Carraro (University of Padova), Michele Zappalorto (University of Padova), Marino Quaresimin (University of Padova), Francesco Panozzo (University of Padova)* A solution is presented to predict the variation of the electrical resistance in crossply laminates, caused by matrix cracking. The accuracy of the model is verified by comparison to FE analyses.
3111-2 A STUDY OF WARP-KNITTED FABRIC STRUCTURE PARAMETERS AFFECTING THE MECHANICAL PROPERTIES OF TEXTILE-REINFORCED CONCRETE *Oleg Stolyarov (St. Petersburg State Polytechnical University), Till Quadflieg (RWTH Aachen University), Thomas Gries (RWTH Aachen University)* The results of investigations on the warp-knitted reinforced fabric and concrete samples from glass and carbon reinforced rovings with three common types of warp-knit stitches are presented.		**3113-2 NANO-RUBBER TOUGHENING IN EPOXY AND EPOXY/CARBON FIBRE COMPOSITES: TEMPERATURE EFFECT** *Feng Xu (The University of Sydney), Hong-Yuan Liu (The University of Sydney)* In this paper, we present the results of our recent work on the nano-rubber toughening effects on bulk epoxy and epoxy/carbon fibre composites tested in temperature range -80 to 50 .	**3114-2 EFFECT OF DAMAGE ON COMPRESSIVE STRENGTH IN FIBER DIRECTION FOR CFRP** *Gabriel Eyer (Laboratoire de Mecanique et d'Acoustique), Olivier Montagnier (Centre de Recherche de l'Armée de l'Air), Christian Hochard (Laboratoire de Mecanique et d'Acoustique), Jean-Paul Charles (Laboratoire de Mecanique et d'Acoustique), Frédéric Mazerolle (Laboratoire de Mecanique et d'Acoustique)* Compressive strength of CFRP in fiber direction is investigated. The effect of matrix damage is particularly studied. It is shown that matrix damage decreases significantly the compressive strength.	**3115-2 MICROMECHANICS MODELING OF MAGNETO-SENSITIVE POLYMERIC MATERIALS DURING CURING** *George Chatzigeorgiou (Arts et Métiers ParisTech), Mokarram Hossain (University of Erlangen-Nuremberg), Fodil Meraghni (Arts et Métiers ParisTech), Paul Steinmann (University of Erlangen-Nuremberg)* This work proposes a coupled magneto-mechanical multi-scale model, based on the Mori-Tanaka method, for simulating the curing process of magneto-sensitive polymers.	**3116-2 NANOCOMPOSITES BASED ON NONWOVEN BORON NITRIDE NANOTUBE SHEETS: PROCESSING AND PROPERTIES** *Behnam Ashrafi (National Research Council), Michael Jakubinek (National Research Council), Jingwen Guan (National Research Council), Yadienka Martinez-Rubi (National Research Council), Keun Su Kim (National Research Council), Kayla ONeill (National Research Council), Meysam Rahmat (National Research Council), Christopher Kingston (National Research Council), Ali Yousefpour (National Research Council), Andrew Johnston (National Research Council), Benoit Simard (National Research Council)* This study focuses on the development of nanocomposites based on impregnation of boron nitride nanotube (BNNT) buckypaper using a low viscosity aerospace grade epoxy.	**3117-2 EXPLORING THE POTENTIAL OF HIERARCHICAL COMPOSITE FIBRE BUNDLES TO IMPROVE THE TENSILE PERFORMANCE OF UNIDIRECTIONAL COMPOSITES** *Gael Grail (Imperial College London), Marie Coq (Imperial College London), Soraia Pimenta (Imperial College London), Silvestre T. Pinho (Imperial College London), Paul Robinson (Imperial College London)* A numerical study on the ability of hierarchical composites (i.e. small FRP bundles embbeded in a soft matrix) to reduce stress concentrations near clusters of broken fibres and delay final failure.	**3118-2 FIRE STRUCTURAL PERFORMANCE OF AEROSPACE CARBON FIBRE-EPOXY COMPOSITES** *Katherine Grigoriou (RMIT University), Adrian Mouritz (RMIT University)* This paper presents a comparative study into the fire performance of four quasi-isotropic laminates with different stacking sequences of the +45/-45/90/0 plies.	**3119-2 STRUCTURAL DESIGN OF THE DTU-ESA MM-WAVE VALIDATION STANDARD ANTENNA** *Kim Branner (Technical University of Denmark), Peter Berring (Technical University of Denmark), Christen Malte Markussen (Technical University of Denmark), Oleksiy S. Kim (Technical University of Denmark), Rolf Jørgensen (TICRA), Sergey Pivnenko (Technical University of Denmark), Olav Breinbjerg (Technical University of Denmark)* A new validation antenna is designed in cooperation between DTU and TICRA for European Space Agency. The antenna is designed using CFRP and Invar36 to be extremely thermally and mechanically stable.	**3120-2 AN INNOVATIVE MECHANICAL TESTING METHOD FOR MEASURING YOUNG'S MODULUS OF MULTI-LAYERED MATERIALS (OWN-WEIGHT CANTILEVER METHOD)** *Atsumi Ohtsuki (Meijo university)* Considering large deformation behaviors due to own-weight, an innovative method is developed to measure Young's modulus of each layer in a flexible multi-layered materials (thin plate, rod, wire).	**3121-2 BIOCOMPOSITE SUBSTRATES FOR WIRELESS SOIL SENSORS** *Chad Ulven (North Dakota State University), Mitchel Nordahl (North Dakota State University), Frederik Haring (North Dakota State University), Justin Hoey (North Dakota State University), Robert Sailer (North Dakota State University)* Biocomposites of flax fiber reinforced polylactic acid were demonstrated as potential substrates for biobased circuit boards used to fabricate wireless soil sensors.

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16
10:10	**3101-3 INNOVATIVE EQUIPMENT CONCEPTS FOR COATING OF COMPOSITE PRODUCTS WITH DUROPLASTIC AND THERMOPLASTIC ADHESIVES.** *Ludger Michels (Coatena Coating Machinery GmbH)* Growing market and new polymer and fabric developments demand new and highly innovative impregnation and coating machinery concepts for all kind of prepregs.	**3102-3 DEVELOPMENT OF POLYMER NANOCOMPOSITES REINFORCED BY CARBON NANOTUBES WITH 3-D NETWORKS** *Linfang Cui (The Xinjiang Technical Institute of Physics and Chemistry-Chinese Academy of Sciences), Peng-Cheng Ma (The Xinjiang Technical Institute of Physics and Chemistry-Chinese Academy of Sciences)* CNT foam as reinforcement for polymer nanocomposites was developed, ultimately eliminating the problems associated with the dispersion and agglomeration of CNTs in polymers.	**3103-2 BLAST PERFORMANCE OF COMPOSITE SANDWICH STRUCTURES** *Mark Kelly (Imperial College London), Hari Arora (Imperial College London), Alex Worley (Imperial College London), Paolo Del Linz (Imperial College London), Alexander Fergusson (Canterbury Court-1-3 Brixton Road), Paul Hooper (Imperial College London), Brian Hayman (University of Oslo), John Dear (Imperial College London)* Full scale air blast testing and finite element analysis on underwater blast testing performed on sandwich composite materials, to assess their suitability for naval applications.	**3104-3 AN APPROACH TO IDENTIFY MULTIAXIAL FATIGUE LIFE MODEL DEDICATED TO WIND TURBINE BLADES** *Damien Caous (I2M), Christophe Bois (I2M), Jean-Christophe Wahl (I2M), Thierry Palin-Luc (I2M), Julien Valette (TENSYL)* An approach is proposed to investigate multiaxial cyclic stress states in non crimp fabrics wind turbine blade plies and laminates, and identify critical stress states.	**3105-3 A TWO-PLY TERMINATION STRATEGY FOR MECHANICALLY COUPLED TAPERED LAMINATES** *Christopher York (University of Glasgow)* A two-ply termination algorithm is used to develop permissible tapered designs, with ply contiguity constraints, giving consistent mechanical coupling characteristics and immunity to thermal warping.	**3106-3 EXPERIMENTAL INVESTIGATION OF PROCESS INDUCED DEFORMATIONS OF CFRP COMPOSITES WITH FOCUS ON FAST CURING EPOXY RESINS** *Fabian Groh (German Aerospace Center), Erik Kappel (German Aerospace Center), Christian Hühne (German Aerospace Center)* Experimental study on process induced deformations of composites with focus on fast curing epoxy resins. Including experimental parametric study, comparison of resin systems and simplified modelling.	**3107-3 VARIABILITY OF PERMEABILITY IN FIBRE PREFORMS MANUFACTURED WITH AFP** *Mikhail Matveev (The University of Nottingham), Andrew Long (The University of Nottingham), Arthur Jones (The University of Nottingham)* Geometry of Automated Fibre Placement (AFP) preforms is analysed by means of image analysis. Results of the analysis are used for prediction of realistic variability of permeability in the preforms.	**3108-3 QUALIFICATIONS FOR STRENGTH: TENSILE PROPERTIES OF BACTERIAL CELLULOSE NANOPAPERS** *Katri Kontturi (Imperial College London), Koon-Yang Lee (University College London), Eero Kontturi (Aalto University), Alexander Bismarck (Imperial College London)* Above a minimum threshold grammage, the loose nanofibrous bacterial cellulose network transits into nanopaper possessing sufficient mechanical strength.	**3109-3 IMPROVING THE INTERFACE IN CARBON FIBRE REINFORCED COMPOSITES WITH VARIABLE STIFFNESS** *Henry Maples (University of Vienna), Damilola Smith (Imperial College London), Christoph Burgstaller (Transfercenter für Kunststofftechnik (TCKT)), Paul Robinson (Imperial College London), Alexander Bismarck (University of Vienna)* An investigation into how improving adhesion at the interleaf/CFRP interface affects the mechanical properties of interleaved composites with controllable stiffness.	**3110-3 EXPERIMENTAL CHARACTERIZATION AND NUMERICAL MODELING OF BEARING BEHAVIOUR OF 3D INTERLOCK WOVEN COMPOSITES** *Richard Mounien (SAFRAN), François-Xavier Irisarri (ONERA), Christian Fagiano (ONERA), Bastien Tranquart (SAFRAN), Nicolas Carrère (ENSTA-BRETAGNE/LBMS-Brest)* An experimental approach to characterize the bearing behaviour of 3D woven composites is presented. Experimental setups description and damage and failure mechanisms analysis are carried out.
10:30	**3101-4 A STOCHASTIC APPROACH TO MODEL VOID FORMATION DURING OUT-OF-AUTOCLAVE PREPREG CONSOLIDATION** *Rhena Helmus (Technische Universität München), Pascal Hubert (McGill University), Roland Hinterhoelzl (Technische Universität München)* A description of mathematical models available in stochastics that are suitable to account for variability in Out-of-Autoclave prepregs which may result in voids after material processing.	**3102-4 EFFECT OF THE CRYSTALLINITY ON THE BARRIER PROPERTIES OF PLA BASED NANOCOMPOSITES** *Jon Trifol (DTU), Caglar Mericer (University of Bologna), Anders Egede Daugaard (DTU), Cecile Sillard (Grenoble INP - Pagora), Ole Hassager (DTU), David Plackett (The University of British Columbia), Julien Bras (Grenoble INP - Pagora), Marco Giacinti (University of Bologna), Peter Szabo (DTU)* The nanocellulose is an effective filler to improve the barrier properties of PLA, specially when it is combined with clay decreases the water diffusition through the matrix.	**3103-3 A FLUID/SOLID MODEL FOR COMPOSITE SANDWICH SHELLS UNDER WATER BLAST** *Michelle Hoo Fatt (Univ of Akron), Dushyanth Sirivolu (Univ of Akron)* The water blast response of a composite sandwich panel is examined. Blast resistances under water blast/air back, water blast/water back and air blast/air back conditions are compared.	**3104-4 INTER FIBRE CRACKING BEHAVIOUR OF CFRP UNDER VERY HIGH CYCLE FATIGUE LOADING: EXPERIMENTAL AND NUMERICAL MULTI-SCALE APPROACH** *Gordon Just (TU Dresden), Ilja Koch (TU Dresden), Maik Gude (TU Dresden)* An energy based approach to model the fatigue behavior of CFRP under VHCF loading is proposed. Verification with experimental results for off-axis cracking in tension and bending shows good agreement.	**3105-4 ENERGY METHOD FOR BUCKLING OF CFRP INTERCONNECTED PLATES WITH ARBITRARY BOUNDARY CONDITIONS.** *Jose Antonio Martín Esteban (Airbus Operations S.L.)* An energy method based on the Rayleigh-Ritz approach is developed for the determination of the critical buckling loads of structures formed by a set of interconnected composite plates.	**3106-4 MEASUREMENT AND SIMULATION OF EDGE DEFECTS IN TURNING OF SICP/AL COMPOSITES** *Li Zhou (Shenyang)* SiC particle reinforced Al matrix (SiCp/Al) composites exhibit excellent physical and mechanical properties compared with conventional materials, such as high specific modulus, improved resistance to	**3107-4 MODELLING OF COMPRESSION MOULDING PROCESS CYCLE TIME AND APPLICATION OF DFMA CONCEPT TO EVALUATE THE TOOLING COSTS FOR CARBON FIBER REINFORCED THERMOPLASTIC COMPOSITES T-SHAPE PARTS** *Anh Dung Ngo (Ecole de technologie superieure), Mohamed EL Wazziki (Ecole de technologie superieure)* The simulated compression moulding process cycle time and the estimated mould costs for carbon fiber reinforced thermoplastic composites T-shape parts were validated		**3109-4 ASSESSMENT OF INTERFACIAL ADHESION BETWEEN CARBON FIBER AND EPOXY BY TRANSVERSE FIBER BUNDLE AND SINGLE FIBER FRAGMENTATION TESTS** *Guocheng Qi (Beihang University), Jiaxin Liu (Beihang University), Yalin Yu (Beihang University), Boming Zhang (Beihang University), Shanyi Du (Beihang University)* This work concentrates on contrasting interfacial normal strength and interfacial shear strength results separately from the transverse fiber bundle test and fragmentation test.	**3110-4 USING A POLYESTER POWDERCOATING FOR THE INTERLAMINAR TOUGHENING OF GLASS/EPOXY COMPOSITE LAMINATES** *Lode Daelemans (Ghent University), Sam van der Heijden (Ghent University), Ives De Baere (Ghent University), Hubert Rahier (Vrije Universiteit Brussel), Wim Van Paepegem (Ghent University), Karen De Clerck (Ghent University)* In this study we will show that a proper selection of bisphenol A based polyester binder (FILCO, ATLAC, …) concentration increase the mechanical properties of GFRP laminates.
10:50	**Coffee in the Exhibition**									

Meeting room 5	Meeting room 6	Meeting room 7	M1	M2	M3	M4	M5	M6	M7	M8
3111-3 A STUDY ON GEOMETRICAL PARAMETERS INFLUENCING THE MECHANICAL SPREADING OF FIBER BUNDLES *Maximilian Tonejc (Processing of Composits), Ewald Fauster (Processing of Composits), Ralf Schledjewski (Processing of Composits)* To fully understand the mechanisms which influence geometrical behaviour of direct rovings a study on spreading was carried out, via rollers causing mechanical deflection.	**3112-2 WIDEBAND, FLEXIBLE AND HIGH PERFORMANCE EMI SHIELDING THIN FILM BASED ON GRAPHENE-NANOTUBE-IRON 3D NANOSTRUCTURE** *Si-Hwa Lee (KAIST), Il-Kwon Oh (KAIST)*	**3113-3 THE STUDY OF HCL PENETRATION BEHAVIOR INSIDE OF AN UNSATURATED POLYESTER RESIN UNDER TEMPERATURE GRADIENT TO SIMULATE THE ACCIDENTAL ROOF FAILURE OF FRP OUTDOOR STORAGE TANK CONTAINING HIGH CONCENTRATION HCL SOLUTION** *Pradchar Pradyawong (Tokyo Institute of Technology), Masatoshi Kubouchi (Tokyo Institute of Technology), Saiko Aoki (Tokyo Institute of Technology), Tetsuya Sakai (Nihon University)* A study aims to investigate a roof failure of FRP chemical tank containing high HCl. Temperature gradient experiment show significantly affect to the strength of UP resin , which decrease about 50%.	**3114-3 STIFFNESS CRITICAL DAMAGE ENVELOPES FOR MULTIDIRECTIONAL COMPOSITE LAMINATES UNDER MULTIAXIAL LOADING CONDITIONS** *John Montesano (University of Toronto), Chandra Veer Singh (University of Toronto)*	**3115-3 MICROMECHANICAL MODELING OF THE NONLINEAR DEFORMATION OF LFTS UNDER CONSIDERATION OF THE EFFECTS OF INTERFACE DAMAGE** *Sascha Fliegener (Fraunhofer Institute for Mechanics of Materials IWM), Jörg Hohe (Fraunhofer Institute for Mechanics of Materials IWM), Benedikt Haspel (Karlsruhe Institute of Technology KIT), Kay André Weidenmann (Karlsruhe Institute of Technology KIT)* Fiber debonding is evaluated by fiber pushout experiments. The results are fed into a micromechanical model (RVE) of LFT. Interface damage inside the nonwoven structure is visualized by FE-simulation.	**3116-3 CHEMICAL, MORPHOLOGICAL AND MECHANICAL CHARACTERIZATION OF THE INTERPHASE OF POLYMER MATRIX COMPOSITES** *Dhriti Nepal (Universal Technology Corporation), Allison Echer (Universal Technology Corporation), James Moller (Miami University), Steve Barr (Universal Technology Corporation), Rajiv Berry (Air Force Research Lab), Timothy Breitzman (Air Force Research Lab)* The key focus includes understanding the chemical network structure of the bulk matrix and the interphase in PMC and property evaluation by experiment and simulation.	**3117-3 BIO-INSPIRED MICROSTRUCTURE DESIGN TO IMPROVE TRANSLAMINAR FRACTURE TOUGHNESS OF THIN-PLY COMPOSITES** *Gianmaria Bullegas (Imperial College London), Silvestre T. Pinho (Imperial College London), Soraia Pimenta (Imperial College London)* We developed an analytical model and a manufacturing technique which allowed us to promote and control the formation of large bundle pull-outs during translaminar fracture of composite laminates.	**3118-3 SIMULATION OF DELAMINATION AND COLLAPSE OF A FIRE EXPOSED FRP COMPOSITE BULKHEAD** *Kim Olsson (SP Technical Research Institute of Sweden), Johan Sandström (SP Technical Research Institute of Sweden), Joakim Albrektsson (SP Technical Research Institute of Sweden), Johan Anderson (SP Technical Research Institute of Sweden)* Finite element simulation of large scale fire tests on sandwich composite bulkheads. Temperature-degradation induced delamination and collapse, simulated in 2D and 3D and compared to tested behavior.	**3119-3 UNDERSTANDING VOLTAGE AND CURRENT DISTRIBUTION OF COST EFFECTIVE CARBON COMPOSITE TEST SAMPLES FOR AIRCRAFT LIGHTNING STRIKE TESTS** *Giuseppe Mastrolembo (Cardiff University), A. Manu Haddad (Cardiff University), Matthew Cole (Airbus Group Innovations), Simon Evans (Airbus Group Innovations)* Current distribution within a laminated CFRP sample with a fastener at its center and voltage drop between the current injection point and the grounding system using a parametric simulation	**3120-3 DAMAGE DETECTION OF COMPOSITE LAMINATES BASED ON VIBRATION TESTING** *Zheng Li (Peking University), Kan Feng (Peking University)* A superposed waveform method (SWM) is proposed as a fast, easy and universal vibration-based damage detection technique of composite structures, especially at high frequencies.	**3121-3 ARTIFICIAL HAIR SENSORS FROM STRUCTURAL MICROFIBERS AND CNT ARRAYS FOR EMBEDDED FLOW SENSING** *Keith Slinker (Air Force Research Laboratory), Corey Kondash (Air Force Research Laboratory), Matthew Maschmann (Air Force Research Laboratory), Benjamin Severin (Federal Republic of Germany Liaison Office for Defense Material USA/Canada), Gregory Reich (Air Force Research Laboratory), Benjamin Dickinson (Air Force Research Laboratory), Jeffrey Baur (Air Force Research Laboratory)* Artificial hair sensors for air flow detection or structural monitoring are fabricated from S2 microfibers and CNT arrays to transduce small force or displacement changes into changes in resistance.
3111-4 MECHANICAL CHARACTERISATION OF COMPOSITES WITH 3D-WOVEN REINFORCEMENT *Tomas Ekermann (Lightweight Structures), Stefan Hallström (Lightweight Structures)* Carbon/epoxy composite specimens, with fully interlaced 3D-woven reinforcement, were tested and the results are presented. Focus is on the weave architecture's influence on the mechanical properties.	**3112-3 SYNTHESIS OF GRAPHENENANOPLATES FROM ORGANOCLAY TEMPLATES AND THEIR REINFORCEMENT IN THERMOSET POLYMER** *Vijaya Rangari (Tuskegee University), Emmanuel Akugre (Tuskegee University), Shaik Jeelani (Tuskegee University)* In this research we have successfully synthesized graphene platelets by simple autogenic pressure reaction. The as synthesized materials is characterized using Rama spectrometer and X-ray diffraction.	**3113-4 MECHANICAL PROPERTIES OF A HIGH STRENGTH ALUMINIUM ALLOY DEVELOPED THROUGH POWDER METALLURGY** *Hippolyte Queudet (French-German Research Institute of Saint-Louis), Sébastien Lemonnier (French-German Research Institute of Saint-Louis), Elodie Barraud (French-German Research Institute of Saint-Louis), Nathalie Allain (Université de Lorraine), Thierry Grosdidier (Université de Lorraine), Eric Gaffet (Université de Lorraine)*	**3114-4 MODE I FRACTURE TOUGHNESS OF TRANSVERSELY LOADED LAYERS OF GFRP'S FABRICATED WITH DUCTILE MATRICES** *Davi Montenegro (Inspire AG), Francesco Bernasconi (ETH Zurich), Rafael Libanori (ETH Zurich), Markus Zogg (Inspire AG), Paolo Ermanni (ETH Zurich), André Studart (ETH Zurich)* In this work we analyze the flexural behavior (0º and 90º) and mode I intralaminar fracture toughness (90º) of unidirectional GFRPs fabricated either with an epoxy or a thermoset polyurethane resin.	**3115-4 DAMAGE BEHAVIOR IN ANGLE-PLY CFRP LAMINATES WITH DIFFERENT PLY THICKNESS** *Nurul Nabihah A Hamid (Tokyo University of Science), Shinji Ogihara (Tokyo University of Science)* Nowadays, CFRP is being widely used especially in aircraft industry in regards to its strength and light-weighted properties. A unidirectional CFRP laminates has high stiffness and strength in its fib	**3116-4 TUNING INTERFACE VIA MULTI-SCALE MODELING FOR SUPERIOR CARBON NANOTUBE-POLYMER NANOCOMPOSITES/ YARNS** *Elif Ozden-Yenigun (Istanbul Technical University), Canan Atilgan (Sabanci University), James Elliott (University of Cambridge)* This study is concerned with finding an improved route to achieve superior properties of carbon nanotube (CNT)-reinforced nanocomposites by designing their interface using multi-scale modeling.	**3117-4 USE OF INTERMITTENT INTERFACES AND WEAKENED PLIES TO ACHIEVE PSEUDO-DUCTILITY IN CARBON-EPOXY COMPOSITES** *Omar Bacarreza (Imperial College London), Paul Robinson (Imperial College London)* The deliberate introduction of defects in unidirectional carbon fibre composites was studied as a means of producing a pseudo-ductile tensile stress-strain behaviour.	**3118-4 EFFECT OF DOPO-BASED COMPOUND ON THE FLAMMABILITY AND MECHANICAL PROPERTIES OF RAMIE/POLY(LACTIC ACID) COMPOSITES** *Tao Yu (Tongji University), Yan Li (Tongji University)* Flame retardant ramie reinforced PLA composites were prepared loaded with DOPO-COOH by twin-screw extruder. DOPO-COOH in the composites are proved to be very effective to improve flame retardancy.		**3120-4 DOUBLE BEAM SHEAR (DBS) – A NEW TEST METHOD FOR DETERMINING INTERLAMINAR SHEAR PROPERTIES OF COMPOSITE LAMINATES** *Gang Zhou (Loughborough University), Pete Nash (Loughborough University), Joanne Whitaker (Loughborough University), Nicholas Jones (Nicholas Jones and Associates Ltd)* Loughborough University has developed a new interlaminar shear test method, called the Double Beam Shear, It not only guarantees ILS failure but also provides greater ILS strength.	

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11:20	**3201 Processing - Manufacturing Technology 7**	**3202 Nano Composites 7**	**3203 ONR Special Symposium on Marine Composites 2**	**3204 Fatigue 7**	**3205 Structural Analysis and Optimization 7**	**3206 Process Induced Effects 6**	**3207 Process Modelling 7**	**3208 Biocomposites 6**	**3209 Interfaces and Interphases 7**	**3210 Damage Tolerance of Composite Structures 2**
11:20	**3201-1 EFFECTS OF PROCESSING CONDITIONS IN UNIDIRECTIONAL CARBON FIBER THERMOPLASTIC TAPE LAYING** *Daiki Tanabe (Osaka university), Kazuaki Nishiyabu (Kinki university), Tetsusei Kurashiki (Osaka university)* In this study, the effects of processing parameters for carbon fiber thermoplastic tape laying using near infrared heater was investigated to predict the optimum processing conditions.	**3202-1 INTERFACIAL AND INTERNAL STRESS TRANSFER IN CARBON NANOTUBE BASED NANOCOMPOSITES** *Robert Young (University of Manchester), Ian Kinloch (University of Manchester), Libo Deng (Chinese Academy of Sciences), Tamer Wafy (Military Technical College)* This study is concerned with structure-property relationships in different types of CNTs, in particular investigating both interfacial and internal stress transfer for CNTs in nanocomposites.	**3203-1 LOW TEMPERATURE IMPACT OF COMPOSITE HULL WALL WITH FLOATING RIGID BODY** *Giancarlo Caprino (University of Naples "Federico II"), Antonio Langella (University of Naples "Federico II"), Valentina Lopresto (University of Naples "Federico II")* Experimental activity to assess the impact behavior at room and low temperature of laminates used in the shipbuilding industry. Impacts of a hull with a solid body in the water were reproduced.	**KEYNOTE** **3204-1 MICROSCOPIC DAMAGE EVOLUTION IN OFF-AXIS PLIES UNDER FATIGUE LOADING** *Marino Quaresimin (University of Padova), Lucio Maragoni (University of Padova), Paolo A. Carraro (University of Padova)* Glass/epoxy laminates were tested under fatigue loading to observe the damage evolution in the off-axis plies. The first event was the initiation of sub-micro cracks in the matrix between the fibres.	**3205-1 FORCED VIBRATION ANALYSIS AND OPTIMIZATION OF MODERATELY-THICK FIBER STEERED LAMINATES WITH EMBEDDED GAPS AND OVERLAPS** *Abdolhamid Akbarzadeh Shafaroudi (McGill University), Mahdi Arian Nik (McGill University), Damiano Pasini (McGill University)* Numerical results have shown that plates with gaps have a higher amplitude of dynamic deflection and a lower response frequency compared to a defect-free plate, as opposed to a plate with overlaps.	**3206-1 INFLUENCE OF THE THERMO-MECHANICAL PROPERTIES ON THE PREDICTIONS OF THE CURE-INDUCED DEFORMATIONS IN THERMOSET-BASED COMPOSITE PARTS** *Antoine Parmentier (Cenaero), Benoît Wucher (Cenaero), David Dumas (Cenaero)* The present study aims at determining the numerical model complexity in terms of material properties and boundary conditions allowing to predict the cure-induced spring-in with sufficient accuracy.	**3207-1 PREDICTION OF AUTOCLAVE CURING OF AERONAUTICAL COMPOSITES PARTS AND OF RESULTING SPRING-IN THROUGH ESI COMPOSITES SIMULATION SOLUTION** *Laurent Dufort (ESI Group), Jia Lijie (Shanghai Aircraft manufacturing), Liu Weiping (Shanghai Aircraft manufacturing), Yan Dongxiu (Shanghai Aircraft manufacturing)* Prediction of autoclave curing of SAMC aeronautical composites parts and resulting spring-in through ESI Composites Simulation Solution (funding from BPI Fr N°A1207028 Q & ISTCP N°2013DFG52420)	**3208-1 OPPORTUNITIES FOR BIO-BASED COMPOSITES IN ADVANCED INDUSTRIAL SECTORS** *Maya John (CSIR), Steve Chapple (CSIR)* The presentation highlights recent research at the Council for Scientific and Industrial Research (CSIR), South Africa on bio-composites for advanced industrial applications.	**3209-1 EFFECTS OF THERMAL HISTORIES ON CARBON FIBER/POLYAMIDE 6 MICROCOMPOSITE LOAD TRANSFER EFFICIENCY: MEASUREMENT, INTERFACE, CRYSTALLIZATION AND MODULUS** *Hongfu Li (Beihang University), Boming Zhang (Beihang University), Yang Wang (Beihang University)* Load transfer efficiencies of single carbon fiber reinforced PA 6 microcomposites with different cooling rates and annealing treatments were measured by electrical resistance method.	**KEYNOTE** **3210-1 CONSTITUTIVE MODELING AND EXPERIMENTAL CHARACTERIZATION OF THE NON-LINEAR STRESS-STRAIN BEHAVIOR OF UNIDIRECTIONAL CARBON-EPOXY UNDER HIGH STRAIN RATES** *Matthias Vogler (Leibniz University Hannover), Hannes Koerber (Technical University of Munich), Peter Kuhn (Technical University of Munich), Raimund Rolfes (Leibniz University Hannover), Pedro Camanho (University of Porto)* The mechanical response of IM7-8552 carbon epoxy was investigated and simulated for transverse tension and transverse tension / in-plane shear loadings at static and dynamic strain rates.
11:40	**3201-2 FLEXURAL PERFORMANCE AND PROCESS CONDITIONS OF THERMOPLASTIC COMPOSITE LAMINATES PROCESSED BY AUTOMATED TAPE PLACEMENT** *Norimichi Nanami (Nagoya University), Takashi Sato (Nagoya University), Tadashige Ikeda (Nagoya University), Takashi Ishikawa (Nagoya University)* The feasibility and advantages of in-situ consolidated thermoplastic laminates are investigated through experimental and computational work to assess their flexural performance.	**3202-2 DEVELOPING COMPONENT-SCALE HEIRARCHICAL COMPOSITES USING PLASMA FUNCTIONALISED NANO-CARBONS** *Mark Eaton (Cardiff University), Wayne Ayre (Cardiff University), Martin Williams (Haydale Limited), Rhys Pullin (Cardiff University), Samuel Evans (Cardiff University)*	**3203-2 EFFECT OF FRIGID TEMPERATURES ON THE DYNAMIC PROPERTIES OF FIBER REINFORCED MARINE COMPOSITES** *Maen Alkhader (Stony Brook University), Fu-Pen Chiang (stony brook university)* Fibre reinforced composites, such as carbon reinforced vinyl-ester, are increasingly being considered as practical structural materials for current and new classes of civilian and military naval craft		**3205-2 ROBUST AEROELASTIC OPTIMISATION OF COMPOSITE WINGS SUBJECT TO MATERIAL PROPERTY AND MANUFACTURING UNCERTAINTY** *Carl Scarth (University of Bristol), Pia Sartor (University of Bristol), Jonathan Cooper (University of Bristol), Paul Weaver (University of Bristol), Gustavo Silva (Embraer S.A.)* An efficient approach using adaptive surrogate modelling techniques is presented for the robust aeroelastic optimisation of composite plate wings with manufacturing uncertainty in the plies.	**3206-2 SHAPE DISTORTION ANALYSIS OF A COMPLEX SHAPED WING SKIN SECTION** *Erik Hörberg (Saab AB), Tonny Nyman (Saab AB), Thomas Hellström (Saab AB), Mats Rudlund (Saab AB), Jonas Bohlin (Saab AB), Rolf Berg (Saab AB)* In the Clean Sky programme Saab has developed a co-cured fully integrated carbon fibre upper wing-cover. This paper covers the shape distortion analysis and tooling technology used.	**3207-2 3D THERMO-MECHANICAL MODEL BASED SIMULATION OF THE WELDING OF THERMOPLASTIC COMPOSITE TAPE USING AUTOMATED TAPE LAYING (ATL) PROCESS** *Yann Duplessis Kergomard (ESI GROUP), Britto Satheesh (Montanuniversität Leoben), Laurent Dufort (ESI GROUP), Ralf Schledjewski (Montanuniversität Leoben)* This paper presents the works done in the STELLAR project about the 3D thermo-mechanical model based simulation of the welding of thermoplastic composite tape using Automated Tape Laying process.	**3208-2 MECHANICAL PERFORMACE OF NCC-FOAM** *Peter Mannberg (Swerea SICOMP AB), Birgitha Nyström (Swerea SICOMP AB), Fredrik Ahlqvist (Swerea SICOMP AB)* A newly developed self-assembling technique for crystalline nano cellulose into foam gives opportunities to tailor properties to a competitive material against fossil-based oil based foam.	**3209-2 PATTERNED GLASS FIBER SURFACES - ROUTE TO INTERFACE MODIFICATION?** *Seethalakshmi Chandramouli (Katholieke University Leuven), Mengshi Liu (Katholieke University Leuven), Grim Keulemans (Katholieke University Leuven), Frederik Ceyssens (Katholieke University Leuven), Larissa Gorbatikh (Katholieke University Leuven), David Seveno (Katholieke University Leuven)* The work reports results related to the surface modification of glass fibers, by formation of line-space patterns composed of hydrophilic and hydrophobic functional sequences along the fiber length.	

Meeting room 5	Meeting room 6	Meeting room 7	M1	M2	M3	M4	M5	M6	M7	M8
3211 Textile-Based Composites and Fibre Architecture 7	**3212 Graphene, Graphene-Based Composites 7**	**3213 Matrix Materials 2**	**3214 Fracture and Damage - Micromechanics 6**	**3215 Models Homogenization – Micro to Macro 2**	**3216 Fracture and Damage - Delamination 6**	**3217 Ductile and Pseudo-ductile Composites 3**	**3218 Fire Resistance 2**	**3219 Applications - Aerospace 6**	**3220 New Structural Testing Methods 2**	**3221 Multifunctional Composites - Adaptive Response and Reconfiguration 1**
3211-1 RATE-DEPENDENT BEHAVIOR OF ARAMID FIBERS COATED WITH SHEAR THICKENING FLUIDS *Sungjin Han (Seoul national university), Wonjin Na (Seoul national university), Hyunchul Ahn (Seoul national university), Woong-Ryeol Yu (Seoul national university)* In this study, the shear stress of STF-coated single aramid fiber was evaluated by single fiber pull-out test. The rate-dependent behavior can be ascribed to the STF effects at micros-cale level.	**3212-1 MELT PROCESSING AND PROPERTIES OF POLYAMIDE 6/GRAPHENE NANOPLATELET COMPOSITES** *Beatriz Mayoral (Queen's University), Eileen Harkin-Jones (University of Ulster), Noorunnisa Khanam (Qatar University), Mariam Alali Al Maadeed (Doha), Mabrouk Ouederni (Qatar Petrochemical Company), Andrew Hamilton (Queen's University), Dan Sun (Queen's University)* Processing and charac-terization (morphological, thermal, mechanical and electrical properties) of Polyamide 6 (PA6)/graph-ite nanoplatelets (GNPs) composites prepared by melt-mixing extrusion.	**3213-1 MECHANICAL PERFORMANCE OF NOVEL HIGH TG POLYIMIDE MATRIX CARBON FIBRE-REINFORCED LAMINATES** *Spyros Anastasios Tsampas (Swerea SICOMP AB), Patrik Sven Fernberg (Swerea SICOMP AB), Roberts Joffe (Luleå University of Technology)* Mechanical properties of a newly developed carbon fiber/polyimide composite T650/NEXIMID® MHT-R with exceptionally high Tg (~370-420°C) are evaluated and compared with other commercial materials.	**3214-1 COMPUTATIONAL MICROMECHANICS APPLIED TO POLYMER MATRIX COMPOSITES: FIBER-DEPENDENT PROPERTIES** *Fernando Naya (IMDEA Materials), Miguel Monclús (IMDEA Materials), Carlos González (Polytechnic University of Madrid-ETSCCP), Jon M. Molina-Aldareguia (IMDEA Materials), Claudio Lopes (IMDEA Materials)* A coupled experimen-tal-computational micro-mechanical framework has been developed to determine longitudinal mechanical properties of a fiber-reinforced composite lamina.	**3215-1 STRENGTH PREDICTION FOR TEXTILE COMPOSITES USING ARTIFICIAL NEURAL NETWORK, PRINCIPLE COMPONENT ANALYSIS AND UNIT CELLS** *Qing Pan (University of Nottingham), Elena Sitnikova (University of Nottingham), Shuguang Li (University of Nottingham)* Unit cell and Artificial Neural Network has been employed to represent the damage initiation and evolution of 3D textile composites under varies loading conditions from micro to macro scale level.	**3216-1 MULTI-SCALE MECHANICAL ANALYSIS OF INTERFACE DELAMINATION IN HIGH-TOUGHNESS METAL-ELASTOMER INTERFACES** *Johan Hoefnagels (Eindhoven University of Technology), Jan Neggers (Eindhoven University of Technology), Olaf Sluis van der (Eindhoven University of Technology), Marc Geers (Eindhoven University of Technology)*	**3217-1 ANALYTICAL MODELLING OF PSEUDO-DUCTILITY IN ANGLE-PLY CFRP LAMINATES WITH CENTRAL UNIDIRECTIONAL PLIES** *Jonathan Fuller (University of Bristol), Meisam Jalalvand (University of Bristol), Michael R. Wisnom (University of Bristol)* A new analytical method is developed and subse-quently used to predict the pseudo-ductile, metal-like stress-strain responses of thin ply CFRP angle-ply laminates with a central zero ply.	**3218-1 FIRE STRUCTURAL PERFORMANCE OF FLAX FIBRE REINFORCED LAMINATES** *Tanmay Bhat (RMIT University), Venkata Chevali (RMIT University), Adrian Mouritz (RMIT University)* The fire structural perfor-mance of a flax reinforced polymer matrix composite is experimentally assessed in this paper. Strength loss mechanisms in flax fibres at high temperatures are investigated.	**3219-1 MODELLING ACOUSTIC EMISSION EVENTS IN CARBON FIBRE LAMINATES FOR DAMAGE DETECTION AND IDENTIFICATION UNDER STATIC AND CYCLIC LOADS** *Luiz Kawashita (University of Bristol), Mark Eaton (Cardiff University), Carol Featherston (Cardiff University)* Techniques for scale-up of hierarchical composite manufacture are presented. Including plasma function-alization of MWCNT and graphene and liquid infusion of stiffened panels up to 0.9 x 0.55m in size.	**3220-1 TEMPERATURE CONTROLLED HEATED 3-POINT BENDING SET-UP FOR ELEVATED TEMPERATURES** *Rudi Velthuis (ABB Switzerland - Corporate Research), Jan Van Loon (ABB Switzerland - Corporate Research), Udo Lang (HSLU-Lucerne University of Applied Sciences and Arts)* The paper shows the design and construction of a heat-able 3-point bending set-up in order to enable faster and more accurate determina-tion of flexural properties at elevates temperatures (to 210 °C).	**3221-1 ACTIVE COMPOSITES AND 4D PRINTING** *Kai Yu (Georgia Institute of Technology), Yiqi Mao (Georgia Institute of Technology), Martin Dunn (Singapore University of Design and Technology), H. Jerry Qi (Georgia Institute of Technology)* We present the paradigm of printed active composites and 4D printing where the shape of a printed 3D object can change upon external stimuli, thus offering one additional dimension, time.
3211-2 THE EFFECT OF PREFORMING QUALITY ON THE PERMEABILITY OF NON-CRIMP FABRICS AND THE MECHANICAL PROPERTIES OF THEIR COMPOSITES *Long Li (Beihang University), Yan Zhao (Beihang University), Xiaoran Zhao (Beihang University), Shitai Liu (Beihang University), Gang Liu (AVIC Composites Center), Jianwen Bao (AVIC Composites Center)* Shear deformation, permea-bility of the non-crimp fabric and mechanical behavior of the composites are in-vestigated, after draping the reinforcements on a hemisphere.	**3212-2 COMPRESSION BEHAVIOUR OF GRAPHENE FLAKES OF VARIOUS THICKNESSES EMBEDDED IN POLYMER MATRICES** *Charalampos Androulidakis (ICEHT/FORTH), Georgia Tsoukleri (ICEHT/FORTH), Emmanuel Koukaras (ICEHT/FORTH), Dimitris Sfyris (ICEHT/FORTH), John Parthenios (ICEHT/FORTH), Konstantinos Papagelis (ICEHT/FORTH), Costas Galiotis (ICEHT/FORTH)* COMPRESSION BEHAVIOUR OF GRAPHENE FLAKES OF VARIOUS THICKNESSES EMBEDDED IN POLYMER MATRICES by J. Parthenios, C. Androulidakis, E. N. Koukaras, G. Tsoukleri, D Sfyris, K. Papagelis and C Galiotis	**3213-2 SYNTHESIS AND CHARACTERIZATION OF CONDUCTIVE CFRP & GFRP USING PANI-BASED ELECTRICALLY CONDUCTIVE THERMOSET POLYMER MATRIX** *Vipin Kumar (The University of Tokyo), Tomohiro Yokozeki (The University of Tokyo), T. Goto (Yamagata University), Tatsuhiro Takahashi (Yamagata University)* In the present work, PANI-based electrically conductive matrix used to prepare conductive ther-mosetting FRP composites. The conducting component of the matrix is polyaniline, protonated with DBSA.	**3214-2 INFLUENCE OF MOLDING OPERATION TIMES ON MECHANICAL PROPERTIES OF THE COMPOSITES PREPARED BY HAND LAY-UP METHOD** *Masakazu Migaki (Kyoto), Tetsuo Kikuchi (Kyoto Institute of Technology), Hiroyuki Hamada (Kyoto Institute of Technology)* Fiber reinforced plastic (FRP) has been referred to a composite material which has been impregnated fib-er-reinforcement with curing resin as the base material. FRP is used as an alterna-tive replacemen	**3215-2 EFFECT OF INTERFACIAL SHEAR STRENGTH ON MECHANICAL PROPERTY OF 4D CARBON/CARBON COMPOSITES** *Yingqiang Liao (Xi'an aero-space composites research institute)* average stiffness increases when interfacial shear strength increases , and axial elastic modulus is essentially in accord with experiment test result when the interfacial shear strength is 10.0MPa.	**3216-2 BRIDGE EFFECTS OF Z-PIN ON DAMAGE EVOLUTION OF Z-PIN REINFORCED COMPOSITE T-JOINT: EXPERIMENT AND SIMULATION** *Yu E Ma (Northwestern Poltechnical University), Rong Hua Du (School of Aeronautics), Pan Fu Xu (Northwestern Polytechnical University)* Both unpinned and z-pinned composite T-joints were tested under tension load-ing. The ultimate strength and displacements were measured, and failure modes were analyzed.	**3217-2 NECKING BEHAVIOUR OF FLATTENED TUBULAR BRAIDED COMPOSITES** *Mayank Gautam (University of Manchester), Prasad Potluri (University of Manchester), Stephen Ogin (University of Surrey)* The paper presents a cohe-sive study of effect of braid angle, effect of tow bound-ary conditions and effect of axial tow insertion upon mechanical performance of flattened tubular braided composites.	**3218-2 CHARACTERISATION OF COMPOSITE MATERIAL BEHAVIOUR UNDER MECHANICAL LOADING AND FIRE EXPOSURE** *Abdelkibir BENELFELLAH (Institut Pprime UPR 3346 – CNRS – ENSMA – Université de Poitiers), Thi Hai Yen QUACH (Institut Pprime UPR 3346 – CNRS – ENSMA – Université de Poitiers), Damien HALM (Institut Pprime UPR 3346 – CNRS – ENSMA – Université de Poitiers), Thomas ROGAUME (Institut Pprime UPR 3346 – CNRS – ENSMA – Université de Poitiers), Denis BERTHEAU (Institut Pprime UPR 3346 – CNRS – ENSMA – Université de Poitiers)* Hydrogen is expected to be valuable energy carrier for the future. To exploit its benefits, a study of thermal degradation property and influence of a fire on resid-ual mechanical behavior is proposed.	**3219-2 FULL-FIELD THROUGH-TRANSMISSION ULTRASONIC WAVE PROPAGATION IMAGING FOR NONDESTRUCTIVE COMPOSITE INSPECTION** *Seung-Chan Hong (LANL-CBNU Engineering Institute Korea), Jung-Ryul Lee (Korea Advanced Institute of Science and Technology)* In this study, full-field pulse-echo ultrasonic wave prop-agation imaging (UWPI) for nondestructive composite inspection visualizes the de-fects induced in composite structures.	**3220-2 CRITICAL STRAIN DETERMINATION BASED ON THE EULER-FRESNEL JIG** *Sotiris Koussios (Delft University of Technology), Katrin Tazelaar (Composites), Bert Rozen (Catholic University of Leuven), Adriaan Beukers (Delft University of Technology), Rene Alderliesten (Delft University of Technology)* In this paper we present a novel method for the deter-mination of critical strain on composite strip-formed specimens. The definition "critical strain" reflects here on the strain level at which the fi	**3221-2 MATERIALS WITH VARIABLE STIFFNESS** *Angelika Bachinger (Swerea SICOMP AB), Peter Hellström (Swerea SICOMP AB), Erik Marklund (Swerea SICOMP AB), Gaurav Vyas (Swerea SICOMP AB), Leif E. Asp (Swerea SICOMP AB)* Different stiffness-modifi-able composite materials were evaluated regarding their mechanical and thermal properties as well as their feasibility for traffic safety applications.

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16
12:00	**3201-3 EFFECTS OF LAYUP ON THE LASER ASSISTED FIBER PLACEMENT PROCESS** *Thijs Kok (University of Twente), Remko Akkerman (University of Twente), Laurent Warnet (University of Twente), Wouter Grouve (TPRC)* The interlaminar bond strength of laser assisted fiber placement produced laminates is tested. The effects of laser power and ply orientation on fracture toughness are assessed.	**3202-3 INFLUENCE OF CARBON NANOTUBES ON HEATING EFFICIENCY OF THE AU NANOPARTICLES SMALL HEAT SOURCE** *Rongguo Wang (Harbin Institute of Technology), Chengqin Dai (Harbin Institute of Technology), Lifeng Hao (Harbin Institute of Technology), Qi Wang (Harbin Institute of Technology), Zhenxing Cao (Harbin Institute of Technology), Ping Peng (Harbin Institute of Technology), Dongyao Wang (Harbin Institute of Technology), Wenbo Liu (Harbin Institute of Technology), Weicheng Jiao (Harbin Institute of Technology), Fan Yang (Harbin Institute of Technology)* We studied the thephotothermal effect of the AuNP in a polymer composites by finite element simulation. Primary research the influence of CNT added to Near the AuNP on temperature distribution.	**3203-3 MIXED-MODE DEBOND FRACTURE CHARACTERIZATION OF FOAM CORE SANDWICH COMPOSITES UNDER ARCTIC LOW TEMPERATURE CONDITIONS** *Arash Farshidi (Technical University of Denmark), Christian Berggreen (Technical University of Denmark)* Mixed-mode I/II fracture characterization of low temperature fracture properties for typical naval foam core sandwich composites has been carried out using the mixed mode bending (MMB) test fixtrure.	**3204-2 FATIGUE LIFE EVALUATION OF SPAR CAP MATERIALS BY FOUR POINT BENDING TEST ON WIDTH-TAPERED SPECIMENS** *Volker Trappe (BAM Federal Institute for Materials research and Testing), Ricardo Basan (Siemens)* The paper focuses on a new method to evaluate the fatigue strength of thick unidirectional laminates to be applied in spar caps. Therefore, a width-tapered bending specimen was developed and tested.	**3205-3 MULTI-MATERIALS SELECTION USING GENETIC ALGORITHM** *Baracchini Paul (CNRS-I2M-UMR 5295), Guillebaud Claire (Univ. Bordeaux-I2M-UMR 5295), Kromm Francois-Xavier (Univ. Bordeaux-I2M-UMR 5295), Wargnier Hervé (Univ. Bordeaux-I2M-UMR 5295)* The aim of this study is to propose a multi-material design method allowing a simultaneous selection of architectures and materials using genetic algorithm.	**3206-3 MODELING OF MESO-SCALE VOID FORMATION IN AN ARBITRARY RESIN IMPREGNATION ANGLE OF VARTM** *Masaki Naito (Tokyo University of Science), Ryosuke Matsuzaki (Tokyo University of Science), Daigo Seto (Tokyo Institute of Technology), Akira Todoroki (Tokyo Institute of Technology)* For the inhibition of the formation of void, we evaluated the void formation during VaRTM experiments. Based on the experiments, analytical model developed for predicting the void fraction.	**3207-3 NUMERICAL STUDY OF THE INFLUENCE ON THE MAX TEMPERATURE INSIDE THE RESIN MATRIX COMPOSITES WITH DIFFERENT THICKNESS DURING THE EXOTHERMIC CURING PROCESS** *Fei Sun (Huazhong University of Science and Technology), Dunming Liao (Huazhong University of Science and Technology), Yongzhen Jia (Huazhong University of Science and Technology), Liu Cao (Huazhong University of Science and Technology), Tao Chen (Huazhong University of Science and Technology)* Some numerical simulations for resin matrix composites are conducted. The temperature and degree of cure fields are obtained. The max temperature during the exothermic curing is discussed.	**3208-3 WHAT DOES NANOCELLULOSE DO TO THE PROPERTIES OF THERMOPLASTIC NATURAL FIBRE COMPOSITES?** *Marta Fortea Verdejo (Institute of Materials Chemistry and Research-Faculty of Chemistry), Elias Bumbaris (Institute of Materials Chemistry and Research-Faculty of Chemistry), Koon-Yang Lee (Imperial College London), Alexander Bismarck (Imperial College London)* Bacterial cellulose was shown to improve the tensile properties of PLA/flax composites by acting as a melt support for PLA. The effect of nanocellulose on PP/flax composites was also investigated.	**3209-3 SURFACE PROPERTIES OF CARBON FIBERS: IMPACT ON THE MECHANICAL PERFORMANCE OF SHORT FIBER REINFORCED POLYPROPYLENE COMPOSITES** *Christoph Unterweger (Kompetenzzentrum Holz GmbH (Wood K plus)), Jiri Duchoslav (Johannes Kepler University (JKU) Linz), David Stifter (Johannes Kepler University (JKU) Linz), Christian Fürst (Kompetenzzentrum Holz GmbH (Wood K plus))* Impact of carbon fiber surface properties and coupling agent content on the mechanical performance of short carbon fiber reinforced polypropylene composites	**3210-2 STATIC AND IMPACT TESTING OF COMPOSITE FAN BLADE LEADING EDGE SUBCOMPONENT DEMONSTRATING IMPROVED DAMAGE TOLERANCE THROUGH THERMOPLASTIC POLYURETHANE INTERLEAVE** *Sandi Miller (NASA Glenn Research Center), Gary Roberts (NASA Glenn Research Center), Lee Kohlman (NASA Glenn Research Center), Paula Heimann (Ohio Aerospace Institute), Michael Pereira (NASA Glenn Research Center), Charles Ruggeri (NASA Glenn Research Center), Richard Martin (Cleveland State University)* The intent of this paper is to evaluate the influence of a thermoplastic polyurethane veil interleave on the static and dynamic performance of composite test articles.
12:20	**3201-4 EFFICIENT POST-MACHINING AND AUTOMATED REPAIR PREPARATION USING ADAPTIVE MACHINING TECHNOLOGY** *Claus Bremer (BCT GmbH)* During FRP manufacturing and repair, deviations of composite components from nominal shape play a decisive role. Adaptive machining demonstrates great potential for improved efficiency and quality.	**3202-4 IMPROVING TOUGHNESS AND ELECTRICAL CONDUCTIVITY OF EPOXY ADHESIVE COMPOSITE JOINTS USING ALIGNED CARBON NANOFIBRES** *Chun Wang (Sir Lawrence Wackett Aerospace Research Centre-RMIT University), Raj Ladani (Sir Lawrence Wackett Aerospace Research Centre-RMIT University), Shuying Wu (Sir Lawrence Wackett Aerospace Research Centre-RMIT University), Kamran Ghorbani (RMIT University), Adrian Mouritz (Sir Lawrence Wackett Aerospace Research Centre-RMIT University), Anthony Kinloch (Imperial College)* Aligning carbon nanofillers by external electric or magnetic field can dramatically improve the mechanical and electric properties of epoxy nanocomposites.	**3203-4 MIXED-MODE G-CONTROL DEBOND FATIGUE CHARACTERIZATION OF SANDWICH COMPOSITES WITH PVC FOAM CORES** *Marcello Manca (DTU - Technical University of Denmark), Christian Berggreen (DTU - Technical University of Denmark), Leif A. Carlsson (FAU - Florida Atlantic University)* This paper presents experimental results from cyclic crack propagation tests performed on sandwich specimens with glass/epoxy face sheets and PVC foam cores using the G-control method.	**3204-3 EFFECT OF HIGH TEMPERATURE ON THE FATIGUE LIFE OF A PLAIN WEAVE CFRP LAMINATE UNDER TENSION-TENSION LOADING** *Martin Cardonne (École de Technologie Supérieure (ÉTS)), Mohamed Khay (École de Technologie Supérieure (ÉTS)), Pierre-Luc Vachon (École de Technologie Supérieure (ÉTS)), Martine Dubé (École de Technologie Supérieure (ÉTS)), Anh Dung Ngô (École de Technologie Supérieure (ÉTS))* In this study, the experimental characterization of the effect of a high temperature on the delamination onset of a plain weave CFRP laminate is presented.	**3205-4 STRUCTURAL DESIGN AND STRENGTH ANALYSIS OF THE NEW TANK-CONTAINER WITH COMPOSITE TANK FOR MULTIMODAL TRANSPORTATIONS OF CHEMICALLY AGGRESSIVE FLUIDS AND PETROCHEMICAL PRODUCTS** *I. Sergeichev (Skoltech), A. Ushakov (Skoltech), A. Safonov (Skoltech), B. Fedulov (Skoltech), W. Brouwer (Lightweight Structures B.V.), M. Timofeev (ApATeCh Co), Yu. Klenin (ApATeCh Co), A. Fedorenko (Skoltech)* A complete cycle of design, manufacturing and finite element strength analysis of the tank-container with fiberglass composite tank for multimodal transportation of chemically aggressive fluids and pe	**3206-4 POROSITY CONTROL BY PROCESS PARAMETERS** *Cédric PUPIN (École Polytechnique), Annie ROSS (École Polytechnique), Edu RUIZ (Formerly ERFT Composites), Martine DAUCHIER (HERAKLES), Nicolas VERNET (SAFRAN Composites), Bruno DAMBRINE (SNECMA SAFRAN Group)* A resol phenolic resin was investigated by TGA. Injection process parameters were chosen based on the results. The appearance of defects were observed directly through the RTM mold window.	**3207-4 BENDING OF FIBRE-REINFORCED THERMOPLASTIC TUBES** *Jan Böcking (University of Siegen), Bernd Engel (University of Siegen)* A bending process for endless fibre reinforced thermoplastic tubes is presented. Heating tests are performed and used for validation of a thermal FE analysis. Bending tests are performed and analysed.	**3208-4 NANOFIBRE COMPOSITES FROM CAPRINE BIOMASS** *Nurul Ain Mohd Kamal (Imperial College London), Koon-Yang Lee (Imperial College London), Alexander Bismarck (University of Vienna)* The demand of milk, meat and other livestock products increases every year due to population growth, urbanization and increasing income in developing countries. This results in a significant increase	**3209-4 A 3D MULTISCALE COHESIVE ZONE MODEL ACCOUNTING FOR FRICTION, DAMAGE AND INTERLOCKING** *Marco Albarella (Universita' degli studi del Sannio), Roberto Serpieri (Universita' degli studi del Sannio), Giulio Alfano (Brunel University), Elio Sacco (Università di Cassino e del Lazio Meridionale)* This paper presents the latest advances in the development of CZMs that are able to account for damage, friction and interlocking, including in particular their extension to a general 3D case.	**3210-3 MODELLING THE MECHANICAL PROPERTIES OF WRINKLED COMPOSITES FROM NDT DATA** *Ningbo Xie (University of Bristol), Robert Smith (University of Bristol), Supratik Mukhopadhyay (University of Bristol), Stephen Hallett (University of Bristol)* This paper introduced the process that FE models were created to investigate the mechanical performance of wrinkled composites, based on the NDT data obtained from 3D-characterisation techniques.

Meeting room 5	Meeting room 6	Meeting room 7	M1	M2	M3	M4	M5	M6	M7	M8
3211-3 OLU-PREG® TEXTILE-BASED THERMOPLASTIC NCF-COMPOSITES *Stefanie Schindler (Technische Universität Chemnitz), Frank Helbig (Technische Universität Chemnitz), Mike Scheika (SKM – Schwergewebe Konfektion Moers GmbH)* The OLU-Preg® technology offers lightweight materials for large series production that meet demands for structural variability, freedom of design, process compatibility - reproducible and recyclable.	**3212-3 OPTIMISATION OF THE IN-SITU EXFOLIATION/ DISPERSION PROCESSING PARAMETERS OF GRAPHENE NANOPLATELETS IN EPOXY FOR ENHANCED MECHANICAL AND ELECTRICAL PROPERTIES** *Yan Li (Queen Mary University of London), Han Zhang (Queen Mary University of London), Emiliano Bilotti (Queen Mary University of London), Oliver Picot (Queen Mary University of London), Ton Peijs (Queen Mary University of London)*	**3213-3 IMPROVED MANUFACTURING METHOD OF P-DCPD USING W, MO OR RU TYPE CATALYSTS IN AIR CONDITION** *Joung-Man Park (Gyeongsang National University), Zuo-Jia Wang (Gyeongsang National University), Dong-Jun Kwon (Gyeongsang National University), Pyeong-Su Shin (Gyeongsang National University), Jin-Yeong Choi (Gyeongsang National University), Jung-Chan Ha (Doha industry Co.-LTD.), Gyu-Sang Jeong (Doha industry Co.-LTD.), Lawrence DeVries (Doha industry Co.-LTD.)* The DCPD fabricated in air condition possibly, the best parameters were with 15 psi at 80 °C until 12 hours exposure time. However, it is good to fabricate as soon as possible.	**3214-3 ON THE STRENGTH OF COMPOSITES WITH HETEROGENEOUS REINFORCEMENT** *Rostislav Rypl (Brno University of Technology), Rostislav Chudoba (RWTH Aachen University), Miroslav Vořechovský (Brno University of Technology)* The contribution describes a semi-analytical probabilistic multiscale model of the tensile response of unidirectional brittle-matrix composites with heterogeneous reinforcement and its validation.	**3215-3 GENERATION OF VIRTUAL FIBER ARCHITECTURES IN STONE WOOL USING A MODIFIED FORCE-BIASED ALGORITHM** *Lucie Chapelle (Rockwool International A/S), Povl Brøndsted (Technical University of Denmark), Yukihiro Kusano (Technical University of Denmark), Mathilde R. Foldschack (Rockwool International A/S)* A numerical model for the generation of the fibers architectures is presented here. Non-overlapping fibers with complex shapes and controlled orientation and bending are achieved in this work.	**3216-3 EFFICIENT FINITE ELEMENT MODELLING OF Z-PIN REINFORCED COMPOSITES USING THE BINARY MODEL** *Matthew Blacklock (RMIT University), Mathew Joosten (RMIT University), Adrian Mouritz (RMIT University)* This study investigates the feasibility of the computationally efficient binary model for textile composites in predicting the mode I fracture toughness of z-pin reinforced composite laminates.	**3217-3 MODELLING THE NON-LINEAR MECHANCIAL BEHAVIOUR OF TRIAXIAL BRAIDED COMPOSITES** *Tobias Wehrkamp-Richter (Technische Universität München), Silvestre T. Pinho (Imperial College London), Roland Hinterhölzl (Technische Universität München)* A framework for predicting the non-linear response of highly compacted triaxial braids with meso FE continuum unit cells is proposed. Nesting effects,delamination,damage and plasticity are investigated	**3218-3 FIRE PROTECTED CARBON FIBER REINFORCED PLASTICS FOR STRUCTURAL AIRCRAFT COMPONENTS** *Imke Roese-Koerner (DLR German Aerospace Center), Benjamin Schuh (DLR German Aerospace Center), Jens Bachmann (DLR German Aerospace Center), Peter Wierach (DLR German Aerospace Center)* Investigation on hybrid carbon fibre reinforced plastics materials for structural aircraft components by incorporated flame protection layers and powdered additives.	**3219-3 MECHANICAL TESTING AND FINITE ELEMENT ANALYSIS OF LATTICE STRUCTURE FUSELAGE PROTOTYPE** *Amirhossein Hajdaei (Element Materials Technology), Vladimir Matěják (Element Materials Technology), Stefanos Giannis (Element Materials Technology)* A scaled down prototype of a CFRP lattice fuselage section was tested under pure bending (30 kN.m) to evaluate its mechanical response and validate the developed FE models via the recorded strains.	**3220-3 DEVELOPMENT OF A TESTING METHOD FOR VIBRATION FATIGUE AT RESONANCE** *Fabrizio Magi (University of Bristol), Dario Di Maio (University of Bristol), Ibrahim Sever (Rolls Royce)* A testing methodology for characterizing the fatigue behaviour of composite components under resonant conditions is described. A temperature based critical event is defined as the failure criterion.	**3221-3 ACTIVE AERODYNAMIC COMPONENTS FOR AUTOMOTIVE APPLICATIONS – FRP REAR SPOILER WITH INTEGRATED SMA ACTUATION** *Moritz Hübler (Institute for Composite Materials), Sebastian Nissle (Institute for Composite Materials), Martin Gurka (Institute for Composite Materials), Ulf Breuer (Institute for Composite Materials)* This contribution focuses on the application potential of active fiber reinforced polymer (FRP) structures with integrated shape memory alloy (SMA) elements for new aerodynamic functions.
3211-4 IMPROVING AND MODELLING THE ELECTRICAL CONDUCTIVITY OF NCF-REINFORCED CFRP *Johannes Rehbein (German Aerospace Center (DLR))* Silver coated knitting yarn is used in NCF textiles. The z-conductivity of CFRP laminates produced from these textiles is up to 100-times higher than in laminates with non-conductive yarn.	**3212-4 GRAPHENE-BASED POLYMER NANOCOMPOSITES: THE EFFECT OF FILLER ORIENTATION AND DISTRIBUTION ON THE ELECTRICAL AND MECHANICAL PROPERTIES** *Giovanni Santagiuliana (Queen Mary University of London), Luca Rubini (University of Trento), Olivier T. Picot (Queen Mary University of London), Ettore Barbieri (Queen Mary University of London), Nicola M. Pugno (Queen Mary University of London), Emiliano Bilotti (Queen Mary University of London), Ton Peijs (Queen Mary University of London)*	**3213-4 DEVELOPMENT OF COST EFFECTIVE THERMOPLASTIC COMPOSITES FOR ADVANCED AIRFRAME STRURCTURES** *Tim Krooß (Institut für Verbundwerkstoffe GmbH), Martin Gurka (Institut für Verbundwerkstoffe GmbH), Viktor Dück (Institut für Verbundwerkstoffe GmbH), Ulf Breuer (Institut für Verbundwerkstoffe GmbH)* The investigation aims at the development of thermoplastic PPS-PESU blends with properties comparable to PEEK. The focus is set on the improvement of thermo mechanical properties and chem. resistance.	**3214-4 A NON LOCAL DAMAGE MODEL FOR ADHESIVE INTERFACES** *Marcelo Krajnc Alves (Universidade Federal de Santa Catarina), David Roza José (Universidade Federal de Santa Catarina)* The work proposes a non local damage model and a numerical scheme for the analysis of the debonding process of quasi-brittle adhesives subjected to unilateral contact and friction effects.	**3215-4 SEMI-ANALYTIC SOLUTION OF NON-REGULARIZED UNFOLDING STRESSES IN COMPOSITE BEAMS EMPLOYING A SERIES APPROXIMATION BASED ON LEGENDRE POLYNOMIALS** *Juan Manuel González-Cantero (FIDAMC), Enrique Graciani (Universidad de Sevilla), Federico París (Universidad de Sevilla), Bernardo López-Romano (FIDAMC), Daniel Meizoso-Latova (Airbus)* Semi-analytic solution of non-regularized unfolding stresses in composite beams employing a series approximation in the displacements based on Legendre polynomials and higher-order moments	**3216-4 MODE I, MODE II AND FIXED RATIO MIXED I/II FATIGUE DELAMINATION OF DIFFERENT CARBON FIBER REINFORCED COMPOSITE LAMINATES** *Steffen Stelzer (Montanuniversitaet Leoben), Andreas Brunner (EMPA-Swiss Federal Laboratories for Materials Science and Technology), Gerald Pinter (Montanuniversitaet Leoben)* Monotonic and cyclic mixed mode I/II delamination tests of IM7/977-2 and AS4/8552 were carried out. Fatigue results are analyzed with a modified Hartman-Schijve approach for threshold estimation.	**3217-4 ENERGY DISSIPATION IN WEB-FLANGE JUNCTIONS OF PULTRUDED GFRP DECKS** *Sonia Yanes (Ecole Polytechnique Fédérale de Lausanne (EPFL)), Julia de Castro (Ecole Polytechnique Fédérale de Lausanne (EPFL)), Thomas Keller (Ecole Polytechnique Fédérale de Lausanne (EPFL))* The energy dissipation capacity resulting from progressive cracking of the web-flange junctions of a pultruded GFRP deck system was experimentally investigated through web-cantilever experiments.	**3218-4 HIGH TEMPERATURE BEHAVIOR OF PPS-BASED COMPOSITES FOR AERONAUTICAL APPLICATIONS: INFLUENCE OF FIRE EXPOSURE ON TENSILE AND COMPRESSIVE BEHAVIORS** *Aurélien PETIT (Institut National des Sciences Appliquées de Rouen), Benoit VIEILLE (Institut National des Sciences Appliquées de Rouen), Alexis COPPALLE (Institut National des Sciences Appliquées de Rouen), Fabrice BARBE (Institut National des Sciences Appliquées de Rouen)* Fire exposure influence on the high-temperature residual tensile and compressive behaviors of CFRP has been investigated. It is more detrimental to compressive properties than to tensile ones	**3219-4 ANISOGRID LATTICE STRUCTURE FOR AN INNOVATIVE COMPOSITE USV FUSELAGE** *Giovanni Totaro (CIRA-Italian Aerospace Research Center), Felice De Nicola (CIRA-Italian Aerospace Research Center)* An approach to the optimal design of complex double curvature anisogrid lattice structures for the cold fuselage of an unmanned space reentry vehicle (USV) being developed at CIRA.	**3220-4 INVESTIGATION OF FRACTURE BEHAVIOR OF CARBON FIBER REINFORCED THERMOPLASTICS BY 3-POINT BENDING IMPACT TEST** *Fumiaki Yano (Shimadzu Corporation), Wataru Nagatsuka (The University of Tokyo), Tsuyoshi Matsuo (The University of Tokyo)* In this study, we performed 3-point bending impact test of two kinds of carbon fiber reinforced thermoplastic composites (CFRTP) and evaluated strain-rate and temperature-dependent characteristics.	**3221-4 SHAPE MEMORY BEHAVIOURS OF CARBON FIBRE REINFORCED POLYURETHANE COMPOSITES** *Xinying Cheng (The University of Sydney), Lin Ye (The University of Sydney)* The mechanical properties and shape memory recovery behaviours of carbon fibre reinforced shape memory polyurethanes were studied and compared with pure polyurethanes.

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16
12:40	**3201-5 BONDED REPAIR OF COMPOSITE STRUCTURES** *Aris Khechen (Laval university), Marie-Laure Dano (Laval university), Augustin Gakwaya (Laval university), Chun Li (National Research Council Canada)* This study focuses on testing and modeling of bonded scarf-stepped composite joint under tensile loading. Effects of temperature and scarf angle on the bonded repair performance were investigated.	**3202-5 DISBOND MONITORING OF COMPOSITE ADHESIVE JOINTS WITH DC RESISTANCE TECHNIQUE UTILIZING ALIGNED CARBON NANOFIBRE NETWORK** *Raj Ladani (Sir Lawrence Wackett Aerospace Research Centre-RMIT University), Shuying Wu (Sir Lawrence Wackett Aerospace Research Centre-RMIT University), Adrian Mouritz (Sir Lawrence Wackett Aerospace Research Centre-RMIT University), Anthony Kinloch (Imperial College), Kamran Ghorbani (RMIT University), Chun Wang (Sir Lawrence Wackett Aerospace Research Centre-RMIT University)* This paper focuses on the ability of carbon nanofibre (CNF) networks for in-situ monitoring of fatigue induced disbond damage in carbon fibre adhesive bonded joints.	**3203-5 SHAPE MEMORY COMPOSITE SANDWICH WITH SELF-HEALING PROPERTIES FOR MARINE APPLICATIONS** *Loredana Santo (University of Rome "Tor Vergata"), Fabrizio Quadrini (University of Rome "Tor Vergata")* In this study, the feasibility of the production of a shape memory composite (SMC) sandwich with self-healing properties for marine applications is discussed.	**3204-4 FATIGUE TEST ON SKIN DOUBLER SPECIMENS WITH STEPPED AND PLY-DROP TAPERED DOUBLERS** *Chao Wu (Monash University), Andrew Gunnion (2Cooperative Research Centre for Advanced Composite Structures Ltd.), Bernard Chen (Monash University), Wenyi Yan (Monash University)* This paper presents an experimental study on the damage tolerance of stepped and ply-drop tapered skin doubler repairs when subjected to fatigue loading.	**3205-5 LOCAL FULL-FIELD STRESS TAILORING IN VARIABLE STIFFNESS BEAMS** *Rainer M J Groh (University of Bristol), Paul M Weaver (University of Bristol)* A higher-order theory is used to tailor the full 3D stress field within laminated beams by using variable stiffness plies. An optimisation scheme is then used to minimise the chance of delaminations.	**3206-5 NOVEL METHODS OF ASSESSING INTER-PLY PROPERTIES OF TOUGHENED PREPREGS IN APPLICATION TO THE ANALYSIS OF FIBRE PATH DEFECTS** *Dmitry Ivanov (University of Bristol), Julien Volatier (ECOLE NATIONALE SUPERIEURE DE MECANIQUE ET D'AEROTECHNIQUE), Jonathan Belnoue (University of Bristol), Stephen Hallett (University of Bristol), Kevin Potter (University of Bristol)* The paper discusses a new experimental technique for measuring interply adhesion properties of uncured prepregs. The advantages include high resolution and a natural assessment of defect modes.		**3208-5 EFFECT OF THROUGH-THE-THICKNESS STITCHING AND FIBER ARCHITECTURE ON THE INTERLAMINAR AND IMPACT FRACTURE PROPERTIES OF FLAX/EPOXY LAMINATES** *M. Ravandi (National University of Singapore), W. S. Teo (Singapore Institute of Manufacturing Technology), M. S. Yong (Singapore Institute of Manufacturing Technology), T. E. Tay (National University of Singapore)* The influences of through-the-thickness stitching on the in-plane tensile properties, delamination growth as well as impact energy absorption behavior were experimentally studied.		**3210-4 A FINITE ELEMENT STUDY ON THE EFFECTS OF TOUGHNESS AND PERMANENT OUT-OF-PLANE DEFORMATION ON POST-IMPACT COMPRESSIVE STRENGTH** *Daniel Bull (University of Southampton), Mark Spearing (University of Southampton), Ian Sinclair (University of Southampton)* Finite element models were used to study the role of the undamaged cone, extent of permanent indentation and toughness on residual compressive strength. Models included delamination growth using VCCT.
13:00	**Lunch in the Exhibition**									
14:00	**3301 Processing - Manufacturing Technology 8**	**3302 Nano Composites 8**	**3303 ONR Special Symposium on Marine Composites 3**	**3304 Fatigue 8**	**3305 Structural Analysis and Optimization 8**	**3306 Process Induced Effects 7**	**3307 Process Modelling 8**	**3308 Biocomposites 7**	**3309 Recycling of Composites and Sustainability 1**	**3310 Damage Tolerance of Composite Structures 3**
14:00	**3301-1 MICROHOLE MACHINING ON PRECISION CFRP COMPONENTS USING ELECTRICAL DISCHARGING MACHINING** *Soo-Hyun Park (Yonsei University), Gyuho Kim (Yonsei university), Byung-Kwon Min (Yonsei University), Seok-Woo Lee (KITECH), Tae-Gon Kim (KITECH)* Micro-EDM drilling of microhole with CFRP has been studied. Effects of the electrical discharging machining parameters on tool wear ratio and machining quality were investigated.	**3302-1 STRENGTHENING BEHAVIOR OF FEW-LAYERED GRAPHENE/ALUMINUM COMPOSITES** *Seeun Shin (Yonsei University), Donghyun Bae (Yonsei University)* Strengthening behaviour of composite containing discontinuous reinforcement is strongly related with load transfer at the reinforcement–matrix interface. Few-layer graphene (FLG) as a reinforcing agen	**3303-1 MOISTURE DIFFUSION UNDER PRESSURE IN COMPOSITES** *Corentin Humeau (Ifremer), Peter Davies (Ifremer), Frédéric Jacquemin (GeM)* The study focuses on the influence of hydrostatic pressure on water uptake in composites, and reaveals an influence of the microstructure on water diffusion under pressure.	**3304-1 FATIGUE CRACK PROPAGATION MECHANISMS OF CORE-SHELL RUBBER MODIFIED EPOXY RESINS** *Satoshi Matsuda (University of Hyogo), Yoshio Furukawa (Kaneka Corporation), Hajime Kishi (University of Hyogo)* Effect of core-shell rubber particles on the fatigue threshold of the epoxy composite depended on the molecular weight between crosslinks of the epoxy matrix.	**3305-1 DAMAGE PREDICTION DUE TO SIMULTANEOUS MULTIPLE IMPACTS IN COMPOSITES USING PERIDYNAMICS** *Erdogan Madenci (University of Arizona), Atila Barut (University of Arizona), Nam Phan (Naval Air Systems Command (NAVAIR)-Patuxent River-MD 20670)* This study demonstrates the application of peridynamics to predict damage initiation and progression in composite laminates subjected to simultaneous multiple impacts.	**3306-1 A STUDY OF PROCESS INDUCED VOIDS IN RESISTANCE WELDING OF THERMOPLASTIC COMPOSITES** *Huajie Shi (Delft University of Technology), Irene Fernandez Villegas (Delft University of Technology), Harald Bersee (Delft University of Technology)* The mechanisms of void formation in welding of woven fabric reinforced thermoplastic composites were investigated. The void fraction, void distribution and strategies for void reduction were studied.	**3307-1 EFFECTS OF DISORDERED TOUGHENING PARTICLES ON UNIDIRECTIONAL FIBER REINFORCEMENT PERMEABILITY** *Timothy Luchini (Michigan State University), Alfred Loos (Michigan State University), Stephen Sommerlot (Michigan State University)* Investigations into the effects of particles and fibers on micro-scale permeability. Particle and fiber volume fractions are varied to see their effects on steady state, single phase, permeability.	**3308-1 LIFE CYCLE ASSESSMENT OF HIGH PERFORMANCE NANOCELLULOSE-REINFORCED ADVANCED FIBRE COMPOSITES** *Martin Hervy (University College London), Sara Evangelisti (University College London), Paola Lettieri (University College London), Koon-Yang Lee (University College London)* In the work, the environmental impacts of bacterial cellulose (BC)- and nanofibrillated cellulose (NFC)-reinforced epoxy composites were evaluated using life cycle assessment (LCA).	**3309-1 COMPRESSION FAILURE MODES OF CARBON FIBRE FABRIC SCRAPS - EPOXY LAMINATES** *Carlos V. Opelt (ITA - Technological Institute of Aeronautics), Christiane S. R. Souza (ITA - Technological Institute of Aeronautics), José M. F. Marlet (EMBRAER S.A.), Geraldo M. Cândido (UNIFESP - Federal University of São Paulo), Mirabel C. Rezende (UNIFESP - Federal University of São Paulo)* Uncured prepreg scraps from the production waste were used to fabricate laminates. The compression test specimens showed shear and interlaminar failure modes, in addition to a mixed mode of failure.	**3310-1 EVALUATING THE STRUCTURAL PERFORMANCE OF MAGNESIUM OXIDE (MGO) BOARD FOR IMPLEMENTATION IN THE CONSTRUCTION INDUSTRY** *Haider Al Abadi (La Trobe University)* This paper investigates the bending capacity of Magnesium Oxide boards in composite with Fibre Reinforced Polymers component as an attempt for the development of portable bushfire shelters.

Meeting room 5	Meeting room 6	Meeting room 7	M1	M2	M3	M4	M5	M6	M7	M8
		3213-5 INTERFACIAL ADHESION AND MECHANICAL PROPERTIES OF THERMOPLASTIC ACRYLIC POLYMER MATRIX CARBON FIBER REINFORCED COMPOSITES *Hajime Kishi (University of Hyogo), Nozomu Nakao (University of Hyogo), Shiho Kuwashiro (University of Hyogo), Satoshi Matsuda (University of Hyogo)* Several functional acrylic monomers were co-polymerized with the MMA. HEAA copolymer improved the interfacial adhesion to CFs, which gave the two-fold flexural strength on the acrylic CFRTP.	**3214-5 HIERARCHICAL SIMULATION OF STRENGTH AND DAMAGE ACCUMULATION IN FIBRE-REINFORCED COMPOSITES UNDER LONGITUDINAL TENSION** *Marco Nicolo Coccon (Imperial College London), Soraia Pimenta (Imperial College London), Ugo Galvanetto (University of Padova)* We model the composite as a "bundle of sub-bundles" (grouping fibres 2-by-2 up to 7-by-7) and run Monte-Carlo analyses based on fibre-strength distribution and matrix shear-lag near fibre breaks		**3216-5 THE APPLICATION OF J INTEGRAL TO MEASURE COHESIVE LAWS IN MATERIALS UNDERGOING LARGE SCALE YIELDING** *Bent F. Sørensen (DTU Wind Energy), Stergios Goutianos (DTU Wind Energy)* We simulate the determination of cohesive laws by a J-integral approach for materials having non-linear stress-strain behavior by the use of a DCB sandwich specimen loaded with pure bending moments.			**3219-5 AN INTEGRATIVE ANALYSIS OF SPACE TELESCOPE COMPOSITE STRUCTURES** *Jae-Hung Han (KAIST), Jae-San Yoon (KAIST)* Measurement method for the thermal and out-gassing deformation of the composite and data-based integrated analysis are proposed for the preliminary design phase of space telescope composite structures		**3221-5 DOUBLE NEGATIVE CHARACTERISTICS OF METACOMPOSITES COMPRISED OF FERROMAGNETIC MICROWIRES AND POLYMER-BASED COMPOSITES** *Yang Luo (University of Bristol), Faxiang Qin (National Institute for Materials Science), Fabrizio Scarpa (University of Bristol), Mihail Ipatov (Universidad del Pais Vasco), Arkady Zhukov (Universidad del Pais Vasco), Jorge Carbonell (Universitat Politècnica de Valencia), Hua-Xin Peng (Zhejiang University)* Conventional metamaterials are structures and their manufacturing costs are rather high. We design and fabricate a composite metamaterial with multifunctional properties via an engineering strategy.
3311 Textile-Based Composites and Fibre Architecture 8	**3312 Graphene, Graphene-Based Composites 8**	**3313 Matrix Materials 3**	**3314 Fracture and Damage - Materials Scale 2**	**3315 Models Homogenization – Micro to Macro 3**	**3316 Nanocomposites for Structural Lightweight - Modelling and Testing 2**	**3317 Ductile and Pseudo-ductile Composites 4**	**3318 Fire Resistance 3**	**3319 Applications - Civil Engineering 1**	**3320 New Structural Testing Methods 3**	**3321 Multifunctional Composites - Adaptive Response and Reconfiguration 2**
3311-1 SYMMETRIES AND MATERIAL CHARACTERISATION *Shuguang Li (University of Nottingham)* Rotations are found to have the same effect as reflections for material characterization. A 3D 4-axial braid is orthotropic, and so is a twill weave but the principal axes are not aligned with fibres.	**3312-1 DIRECT OBSERVATION OF GRAPHENE OXIDE CONFORMATION AND POLYMER RADIUS OF GYRATION WITHIN NANOCOMPOSITES: A SCATTERING AND RHEOLOGICAL STUDY.** *Stephen Boothroyd (Durham University), David Johnson (Durham University), Mike Weir (Sheffield University), Nigel Clarke (Sheffield University), Richard Thompson (Durham University), Karl Coleman (Durham University)* Our paper studies composites of graphene oxide (GO) and polystyrene (PS), looking at the dispersion and stability of the GO within the polymer during processing.	**3313-1 POLY(ETHYLENE 2,6-NAPHTHALATE) (PEN) AS THERMOPLASTIC MATRIX FOR HIGH PERFORMANCE WOVEN COMPOSITES.** *Davi de Vasconcellos (Institute for Polymers-Composites and Biomaterials - CNR), Luigi Sorrentino (Institute for Polymers-Composites and Biomaterials - CNR), Marco d'Auria (Institute for Polymers-Composites and Biomaterials - CNR), Salvatore Iannace (Institute for Polymers-Composites and Biomaterials - CNR), Fabrizio Sarasini (Università di Roma "La Sapienza")* The impact behaviour of composites based on a thermoplastic matrix (PEN) and different reinforcing fibres (carbon, basalt and polymeric fibres) has been investigated and results have been compared.	**3314-1 DETERMINATION OF THE THROUGH-THICKNESS STRENGTH PROPERTIES TO PREDICT THE FAILURE OF THICK-WALLED COMPOSITE LUGS** *Marco Hoffmann (Airbus Group Innovations), Kristian Zimmermann (Airbus Group Innovations), Peter Middendorf (Universität Stuttgart)* A new specimen geometry to determine the through-thickness tensile strength of composites is presented. The determined strength is validated by DCB and unfolding tests in combination with FEA.	**3315-1 DISTORTIONAL DEFORMATION OF MATRIX IN OPEN-HOLE TENSION COMPOSITES: EXPERIMENTAL INVESTIGATION** *Don Lee (Toray Composites (America)), Kenichi Yoshioka (Toray Composites (America))* The present work was performed to demonstrate the process of homogenization/dehomogenization between micro- and macro-scale models and to employ the Onset Theory in the assessment of OHT tests.	**3316-1 A MOLECULAR DYNAMICS STUDY ON THE STRAIN RATE DEPENDENCE FOR ELASTO-PLASTIC RESPONSE OF CROSSLINKED EPOXY** *Hyungbum Park (Seoul National University), Byungjo Kim (Seoul National University), Hyunseong Shin (Seoul National University), Joonmyung Choi (Seoul National University), Seunghwa Yang (Dong-A University), Manyoung Lee (Agency for Defense Development), Euigyung Jeong (Agency for Defense Development), Maenghyo Cho (Seoul National University)* Deformation mechanisms of epoxy polymer was investigated using well-defined molecular dynamics simulations, considering crosslink density and strain rates dependency.	**3317-1 PSEUDO-DUCTILE CARBON/EPOXY HYBRID COMPOSITES** *Gergely Czel (Budapest University of Technology and Economics), Meisam Jalalvand (University of Bristol), Michael Wisnom (University of Bristol)* UD interlayer hybrids made of different grades of carbon fibres were studied. The best configuration showed pseudo-ductile failure and 1% strain margin between the first fracture and final failure.	**3318-1 POLYFURFURYL ALCOHOL THERMOSETS RESINS IN FIRE RESISTANT COMPOSITE APPLICATIONS** *Pietro Di Modica (Newcastle University), Geoff Gibson (Newcastle University), Geroge Kotsikos (Newcastle University), Hans Hoydonckx (TransFurans Chemicals bvba), Marco Monti (Proplast), Ivan Sanchez (Gaiker), Jens Bachmann (DLR)* The presentation will feature results coming from FIRERESIST project where Polyfuryl alcohol resins were investigated for there use in fire proof composite applications.	**3319-1 MODELLING OF STEEL-FRP SINGLE-LAP JOINTS UNDER FREEZE-THAW CYCLING** *Ankit Agarwal (University of New South Wales), Ehab Hamed (University of New South Wales), Stephen J Foster (University of New South Wales)* Impact of freeze-thaw cycles on steel-FRP lap-joints is examined numerically, and it has been found that the interfacial stresses in the adhesive layer increase with increase in the number of cycles.	**3320-1 MECHANICAL TESTING OF ADHESIVELY JOINED SANDWICH STRUCTURES** *Malte Mund (Technische Universität Braunschweig), Michael Griese (Technische Universität Braunschweig), Fabian Fischer (Technische Universität Braunschweig), Klaus Dilger (Technische Universität Braunschweig)* Test methods for adhesively joined sandwich structures are presented and evaluated concerning their ability to determine the strength of the joint and the influences of joining parameters.	**3321-1 MODELING OF LOW-FREQUENCY BROAD-BAND VIBRATION MITIGATION USING ZIG-ZAG INSERTS AND AN E-DAMPING CONCEPT.** *Katherine Reichl (University of Michigan), Daniel Inman (University of Michigan)* This research examines a multifunctional composite metastructure designed to provide broadband vibration suppression without increasing the overall weight of the structure.

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16
14:20	**3301-2 ALUMINUM/ CUBIC BORON NITRIDE FUNCTIONALLY GRADED GRINDING WHEEL FOR DRILLING CFRP FABRICATED BY THE CENTRIFUGAL MIXED-POWDER METHOD** *Yoshimi Watanabe (Nagoya Institute of Technology), Yuta Suzuki (Nagoya Institute of Technology), Hisashi Sato (Nagoya Institute of Technology)* Al matrix cubic boron nitride (cBN) particles dispersed functionally graded grinding wheels for the gyro-driving grinding wheel system have been fabricated by the centrifugal mixed-powder method.	**3302-2 MECHANICAL PROPERTIES OF CARBON NANOMATERIALS BASED MACROSCOPIC ARCHITECTURES** *Luqi Liu (National Center for Nanoscience and Technology-CHINA), Zhaohe Dai (National Center for Nanoscience and Technology-CHINA), Jun Kuang (National Center for Nanoscience and Technology-CHINA), Zhong Zhang (National Center for Nanoscience and Technology-CHINA)* To utilize individual carbon nanomaterials excellent properties at macroscopic level, graphene based paper and CNT based sponge are fabricated, and their mechanical properties are investigated.	**3303-2 EFFECTS OF HUMIDITY ON THE FRACTURE BEHAVIOR OF POLYMERIC MATRIX MATERIAL UNDER DYNAMIC LOADING** *Orlando Delpino Gonzales (University of Southern California), Veronica Eliasson (University of Southern California)* The effects of water sorption on the dynamic fracture of notched polymeric matrix materials were examined. The materials used were vinyl ester resin and poly-methyl methacrylate (PMMA).	**3304-2 SIMULATION METHODS FOR HIGH-CYCLE FATIGUE-DRIVEN DELAMINATION USING COHESIVE ZONE MODELS – FUNDAMENTAL BEHAVIOR AND BENCHMARK STUDIES** *Brian Bak (Aalborg University), Esben Lindgaard (Aalborg University), Erik Lund (Aalborg University)* A novel CZM based method for simulating fatigue-driven delamination under cyclic loading and new benchmark studies with four other comparable methods are presented.	**3305-2 DESIGN OF A CARBON FIBER REINFORCED PLASTIC SHAFT FOR A HIGH SPEED FLYWHEEL ROTOR** *Stefan Hartl (Vienna University of Technology), Alexander Schulz (Vienna University of Technology), Manfred Kaltenbacher (Vienna University of Technology)* A new flywheel rotor design containing a CFRP hollow shaft with a hoop wound inertia mass is optimized using FE method, manufactured and validated using a laser scanning vibrometer.	**3306-2 SIMULATION AND VERIFICATION OF CURE-INDUCED DEFORMATION FOR INTEGRATED COMPOSITE STRUCTURES** *Kai Liu (Beihang University), Jinrui Ye (Beihang University), Boming Zhang (Beihang University), Lijie Jia (Shanghai Aircraft Manufacuring Co)* A multi-level simulation method for cure process of composite integrated structure was developed to simplify calculation and improve accuracy of prediction.	**3307-2 MEASUREMENT AND NUMERICAL ANALYSIS OF THROUGH-THICKNESS RESIN FLOW AND HEAT TRANSFER DURING OOA PROCESSING OF THICK-SECTION WIND OR TIDAL TURBINE BLADES** *James Maguire (University College Cork), Conchúr Ó Brádaigh (University College Cork)* Resin characterisation of powder-epoxy for the numerical modelling of through-thickness resin flow during OOA processing of thick-section wind or tidal turbine blades.	**3308-2 IMPROVING THE MECHANICAL PROPERTIES OF WOOD-PLASTICS COMPOSITES BY PARTICLE SURFACE TREATMENT IN SOLUTION** *Ambre Verdaguer (Université Laval), Denis Rodrigue (Université Laval)* Wood-plastic composites were prepared by dry-blending of linear medium density polyethylene and maple wood flour with and without a surface treatment. The samples were produced by compression molding.	**3309-2 FUTURE DIRECTIONS IN THE RECYCLING OF COMPOSITE MATERIALS** *Geraldine Oliveux (University of Birmingham), Luke Dandy (University of Birmingham), Gary Leeke (University of Birmingham), Jean-Luc Bailleul (Laboratoire de Thermocinetique de Nantes)* Different technologies based on solvolysis were applied to degrade epoxy resins. The carbon fibres recovered after the most efficient solvolysis treatment were then reused in a new material.	**3310-2 INFLUENCE OF STRUCTURAL STITCHING ON COMPOSITE T-JOINT STRENGTH** *Michael Magin (Institute for Composite Materials), Nicole Motsch (Institute for Composite Materials)* Structural stitching of CFRP-T-joints containing glass fiber gusset fillers showed improvements of the failure resistance of this design commonly used in aerospace design.
14:40	**3301-3 BEHAVIOUR OF THERMOPLASTIC COMPOSITES WITH HOLES MACHINED USING A THERMALLY-ASSISTED PIERCING PROCESS** *Nicholas Brown (TWI Ltd.), Chris Worrall (TWI Ltd.), Steve Ogin (University of Surrey), Paul Smith (University of Surrey)* Results are discussed that show the possible strength improvement of CF/PEEK specimens with holes machined using a Thermally-Assisted Piercing process as opposed to a drilling process.	**3302-3 IMPROVEMENT OF INTERLAMINAR FRACTURE TOUGHNESS IN CARBON FIBRE/EPOXY COMPOSITES WITH CARBON NANOTUBES/ POLYSULFONE (CNTS/PSF) INTERLEAVES** *Nan Zheng (The University of Sydney), Jiefeng Gao (The University of Sydney), Hong-Yuan Liu (The University of Sydney), Yudong Huang (Harbin Institute of Technology), Yiu-Wing Mai (The University of Sydney)* A vacuum filtration method was used to fabricate carbon nanotube/polysulfone (CNT/PSF) paper as an interleaf to improve the interlaminar fracture toughness of CF/EP composite laminates.	**3303-3 INFLUENCE OF WATER ABSORPTION ON LONG-TERM STRENGTHS IN VARIOUS DIRECTIONS OF UNIDIRECTIONAL CFRP FOR MARINE USE** *Yasushi Miyano (Kanazawa Institute of Technology), Masayuki Nakada (Kanazawa Institute of Technology)* The influence of water absorption on the long-term strengths in various directions of unidirectional CFRP for marine use which consists of vinylester resin as a matrix was cleared.	**3304-3 MODELLING FATIGUE CRACK INITIATION IN COMPOSITE LAMINATES IN THE PRESENCE OF MICRO-SIZED VOIDS** *Lucio Maragoni (University of Padova), Paolo Andrea Carraro (University of Padova), Marino Quaresimin (University of Padova)* The influence of micro-sized voids on crack initiation and evolution under fatigue is studied, and a model based on a RVE is proposed to predict crack initiation in absence and presence of voids.	**3305-3 POSTBUCKLING OF PRE-PRESSURE–LOADED COMPOSITE LAMINATED CYLINDRICAL PANELS RESTING ON ELASTIC FOUNDATIONS SUBJECTED TO AXIAL COMPRESSION IN THERMAL ENVIRONMENTS** *Hai Wang (Shanghai Jiao Tong University), Hui-Shen Shen (Shanghai Jiao Tong University)* A postbuckling analysis is presented for shear-deformable laminated cylindrical panels resting on elastic foundations subjected to combined uniform lateral pressure and compressive edge loads.	**3306-3 CHARACTERIZING, MODELING, AND VALIDATING THE PROCESSING OF OUT-OF-AUTOCLAVE ORGANIC MATRIX COMPOSITES AS A FUNCTION OF CURE CYCLE** *Tara Storage (Materials and Manufacturing Directorate), Brent L. Volk (Materials and Manufacturing Directorate), C.w. Lee (University of Dayton Research Institute), Ray Coomer (University of Dayton Research Institute), Robert Brockman (University of Dayton Research Institute)* Experimental (angle bracket spring-in) and computational (mechanical, unit cell composite, and constituent property model) efforts toward predicting the processing of OMCs are presented.	**3307-3 A COSSERAT CONTINUUM MODEL FOR PREDICTING THE ONSET OF WRINKLES DURING THE PROCESSING OF COMPOSITE LAMINATES** *Richard Butler (University of Bath), Tim Dodwell (University of Bath), Samuel Erland (University of Bath)* A Cosserat continuum for uncured composite laminates is presented, demonstrating application to layer-wise mechanics on the macroscale. Effective modelling of wrinkle defects is highlighted.	**3308-3 ENVIRONMENTAL RESISTANCE OF FLAX/ BIO-BASED EPOXY AND FLAX/POLYURETHANE COMPOSITES MANUFACTURED BY RESIN TRANSFER MOULDING** *Nils Cuinat-Guerraz (McGill Univeristy), Pascal Hubert (McGill Univeristy), Marie-Josée Dumont (McGill Univeristy)* This study compares the evolution of the physical properties two biocomposites aged at 90%RH and 30°C: (1) a flax/bio-based epoxy and (2) a flax/polyurethane.	**3309-3 STUDY ON RECYCLING OF CARBON FIBRE THERMOPLASTIC PREPREG WASTE** *Kawashima Masaya (Doshisha University), Tanaka Tatsuya (Doshisha University), Arao Yoshihiko (Doshisha University), Okuyama kento (Doshisha University), Ishikawa Takeshi (MITSUBISHI RAYON), Tomioka Masao (MITSUBISHI RAYON)* We propose the recycling method of prepreg wastes and characterize the recycled material. Furthermore, the recycled material were investigated the potency.	**3310-3 3D FLOATING NODE METHOD FOR MODELLING PROGRESSIVE DAMAGE** *Bo-Yang Chen (National University of Singapore), Tong-Earn Tay (National University of Singapore), Silvestre Pinho (Imperial College London), Nelson Carvalho (National Institute of Aerospace), Pedro Baiz (Imperial College London), Vincent Tan (National University of Singapore)* This paper develops a 3D Floating Node Method to model explicitly the matrix crack, delamination and their intersection, such that the matrix crack/delamination interaction can be captured accurately.

Meeting room 5	Meeting room 6	Meeting room 7	M1	M2	M3	M4	M5	M6	M7	M8
3311-2 CUTTING STRATEGIES OF LONG FIBER PATCH PREFORMS FOR STRUCTURES WITH COMPLEX FIBER ARCHITECTURE *Bernhard Horn (Technische Universität München), Christoph Ebel (Technische Universität München), Klaus Drechsler (Technische Universität München)* Load path optimized layup design using fiber patches requires special patch shapes to avoid gaps and overlaps. A study on the influence of different patch geometries on mechanical properties is shown.	**3312-2 FRACTURE MECHANICS SIMULATIONS OF GRAPHENE COMPOSITES USING A 3D MESHFREE HIERARCHICAL MODEL** *Lucas Brely (università di torino), Federico Bosia (università di torino), Nicola pugno (University of Trento)* Here, we develop a multi-scale numerical model to simulate the mechanisms involved in damage progression and energy dissipation at different size scales in hierarchical graphene nanocomposites.	**3313-2 THE ROLE OF MATRIX RESIN MICRO-SCALE PROPERTIES ON THE AXIAL TENSILE STRENGTH OF CFRP** *Jun Misumi (Toray Industries Inc.), Raja Ganesh (University of Delaware), Subramani Sockalingam (University of Delaware), John W. Gillespie, Jr. (University of Delaware)* Preparation method of micro scale epoxy fiber specimen for tensile test was developed to evaluate matrix resin mechanical properties at length scales representative of matrix resin in CFRP.	**3314-2 AN INVESTIGATION OF IN-PLANE PERFORMANCE OF ULTRA-HIGH MOLECULAR WEIGHT POLYETHYLENE FIBRE COMPOSITES** *Mark Hazzard (University of Bristol), Paul Curtis (University of Bristol), Lorenzo Iannucci (Imperial College London), Stephen Hallett (University of Bristol), Richard Trask (University of Bristol)* In-plane mechanical properties of Ultra-High Molecular Weight Polyethylene fibre Dyneema® composites, typically used for impact applications, were investigated at low strain rates.	**3315-2 CHARACTERISATION OF MICRO-SCALE MECHANICAL BEHAVIOUR OF COMPOSITES USING STOCHASTIC BOUNDARY VALUE PROBLEM SOLUTIONS** *Mikhail Tashkinov (Perm National Research Polytechnic University), Natalia Mikhailova (Perm National Research Polytechnic University)* This work offers a mathematical model that combine several approaches of the stochastic mechanics to create an analytical tool for assessment of micro-scale stress and strain in multiphase composites	**3316-2 NANO-SCALE REINFORCEMENT FOR HIERARCHICAL AEROSPACE COMPOSITE LAMINATES** *Richard Li (Massachusetts Institute of Technology), Mark Payne (Massachusetts Institute of Technology), Brian Wardle (Massachusetts Institute of Technology)* Carbon nanotubes were radially grown on carbon fibers without degrading in-plane strengths, thus enabling hierarchical composites with the potential for improved inter- and intralaminar properties.	**3317-2 PSEUDO-DUCTILITY IN MULTI-DIRECTIONAL HYBRID LAMINATES** *Meisam Jalalvand (University of Bristol), Gergely Czel (University of Bristol), Michael R. Wisnom (University of Bristol)* The tensile behaviour of multi-directional hybrid laminates made with UD hybrid sub-laminates is studied. The final goal is to introduce pseudo-ductility to layups with wider industrial applications.	**3318-2 BIO-RESIN FOR NEW BIO-COMPOSITE PASSIVE FIRE PROTECTION FOR OFF-SHORE APPLICATION** *Pietro Di Modica (Newcastle University), Geoff Gibson (Newcastle University), George Kotsikos (Newcastle University), Hans Hoydonckx (TransFurans Chemicals bvba (TFC))* A small propane burner was used to compare fire protection performance of a new furan resin against a phenolic composite and simple Kaowool. The bio composite performed as good as the phenolic one.	**3319-2 PLASTIC HINGE RELOCATION OF DAMAGED PRECAST RC COLUMNS USING CFRP SHELLS** *Dylan Brown (University of Utah), Joel Parks (Univresity of Utah), Mohammad Ameli (University of Utah), Chris Pantelides (University of Utah)* A repair technique has been developed to relocate the column plastic hinge of severely damaged precast reinforced concrete bridge columns, using a combination of a CFRP shell, epoxy anchored headed st	**3320-2 COMPRESSION AFTER IMPACT TEST METHOD FOR THIN LAMINATES** *Marina Remacha (FIDAMC), Sonia Sánchez-Sáez (Carlos III University of Madrid), Enrique Barbero (Carlos III University of Madrid), Bernardo López (FIDAMC)* Application thickness range of a developed CAI (Compression After Impact) device to test thin composite laminates was analysed. Intact and undamaged specimens were tested and simulated.	**3321-2 3D PRINTING OF METASTRUCTURES FOR PASSIVE BROADBAND VIBRATION SUPPRESSION** *Jared D. Hobeck (University of Michigan), Charles M. V. Laurent (Catholic Institute of Arts and Crafts), Daniel J. Inman (University of Michigan)* This research presents experimentally validated analytical and finite element models focused on suppressing axial vibration of a 3D-printed metastructure rod with 10 internal resonators.
3311-3 INFLUENCE OF TEST RIG CONFIGURATION AND EVALUATION ALGORITHMS ON OPTICAL 2D PERMEABILITY MEASUREMENT: A BENCHMARK EXERCISE *David Christian Berg (Clausthal University of Technology), Ewald Fauster (Montanuniversität Leoben), Harald Grössing (Montanuniversität Leoben), Dieter Meiners (Clausthal University of Technology), Ralf Schledjewski (Montanuniversität Leoben), Gerhard Ziegmann (Clausthal University of Technology)* This study investigates the influence of experimental setup as well as evaluation algorithms on radial-flow permeability experiments by benchmarking the tests rigs of the involved institutions.	**3312-3 INVESTIGATION OF THE EFFECT OF MULTI-WALLED CARBON NANOTUBES AND GRAPHENE NANO-PLATELETS ON INTERLAMINAR FRACTURE TOUGHNESS OF CFRP** *Christina Kostagiannakopoulou (University of Patras), Xenia Tsilimigkra (University of Patras), George Sotiriadis (University of Patras), Vassilis Kostopoulos (University of Patras)* The aim of this article is to investigate the toughening mechanisms of MWCNTs and GNPs in CFRP laminates. Mode I & mode II tests were performed in order to study the fracture behavior of composites.	**3313-3 FRACTURE BEHAVIOR OF ACRYLIC THERMOPLASTIC POLYMER / CARBON FIBER COMPOSITES IN RELATION TO MATRIX TOUGHNESS** *Tommaso Pini (Politecnico di Milano), Francesco Briatico-Vangosa (Politecnico di Milano), Roberto Frassine (Politecnico di Milano), Marta Rink (Politecnico di Milano)* Interlaminar fracture toughness of an acrylic thermoplastic resin / carbon fibre composite produced by infusion molding in relation to matrix toughness and viscoelastic behaviour	**3314-3 INVESTIGATION ABOUT TEMPERATURE DEPENDENCE OF UNIDIRECTIONAL COMPRESSIVE STRENGTH OF CARBON FIBER REINFORCED THERMOPLASTIC COMPOSITES** *Tsuyoshi Matsuo (The University of Tokyo), Kazuro Kageyama (The University of Tokyo)* A novel test method and kink band failure model for compressive strength of unidirectional thermoplastic CFRP were proposed and verified its temperature dependence influenced by shear property.	**3315-3 DETERMINATION OF STRAIN AMPLIFICATION FACTORS FOR SIFT THEORY BASED ON RVE MODELS CONSIDERING PERIODICAL BOUNDARY CONDITIONS** *Jian Zhao (Shanghai Jiaotong University), Hai Wang (Shanghai Jiaotong University), Xinying Lv (Shanghai Jiaotong University), Xiuhua Chen (Shanghai Jiaotong University)* Efforts are taken to improve the precision of strain amplification factors and thermal strain vectors for SIFT by introducing periodical boundary conditions to RVE models	**3316-3 MECHANICAL PROPERTIES OF GRAPHENE NANOPLATELET/CARBON FIBER/EPOXY HYBRID COMPOSITES: MULTI-SCALE MODELING AND EXPERIMENTS** *Cameron Hadden (Michigan Technological University), Danielle Klimek-McDonald (Michigan Technological University), Julia King (Michigan Technological University), Alex Reichanadter (Michigan Technological University), Ibrahim Miskioglu (Michigan Technological University), Gregory Odegard (Michigan Technological University)* An experimentally validated multiscale modeling strategy (molecular dynamics and micromechanics) is used to predict the bulk behavior of graphene nanoplatelet/carbon fiber/epoxy composites.	**3317-3 THE EFFECT OF FIBER CUTS ON THE TENSILE BEHAVIOR OF HYBRID CARBON FIBER/ SELF-REINFORCED POLYPROPYLENE COMPOSITES** *Yannick Meerten (KU Leuven), Yentl Swolfs (KU Leuven), Mengdie Yang (KU Leuven), Jan Ivens (KU Leuven), Larissa Gorbatikh (KU Leuven)* Partial fibre cuts were introduced into the carbon fibre layers of carbon fibre/ self-reinforced polypropylene hybrids. Their effect on the tensile behaviour was analysed.	**3318-3 MODELLING THE THERMO-MECHANICAL BEHAVIOR OF AERONAUTICAL COMPOSITE MATERIALS EXPOSED TO FIRE.** *Denis BERTHEAU (Pprime Institute), Eric LAINE (Pprime Institute), Damien MARCHAND (Pprime Institute), Rocio DE VICENTE SUGUE (University of Sevilla)* Composite structures are subjected simultaneously to flame (75 to 200kW/ m²) and mechanical stress (bending). The correlation results testing / numerical simulations with Abaqus® will be presented.	**3319-3 SHEAR AND BUCKLING STRENGTHENING OF STEEL BRIDGE GIRDERS USING SMALL DIAMETER CFRP STRANDS** *Hamid Kazem (Construction and Environmental Engineering), Lucas Guaderrama (Construction and Environmental Engineering), Sami Rizkalla (Construction and Environmental Engineering), Akira Kobayashi (Nippon Steel & Sumikin Material Co.)* This paper presents the results of a comprehensive research programme undertaken to investigate the use of small-diameter CFRP strands for strengthening steel structures and bridges. The proposed CFRP s	**3320-3 BUCKLING TEST OF A THIN-WALLED SLENDER COMPOSITE SLIT TUBE** *Gregory Sanford (LoadPath), Jeremy Banik (AFRL)* Testing and evaluation of Storable Tubular Extendible Members (STEMs) made from thin composite laminates. The research focuses on STEMs to be used in numerous spacecraft applications.	**3321-3 PORO-VASCULAR COMPOSITES WITH SURFACE ROUGHNESS CONTROL** *James Thomas (US Naval Research Laboratory), Marriner Merrill (US Naval Research Laboratory), Raymond Auyeung (US Naval Research Laboratory), Alberto Pique (US Naval Research Laboratory)* Report on current Naval Research Laboratory R&D of multifunctional "poro-vascular composites" (PVCs) with the capability for both structure and active-addressable surface roughness control.

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15:00	**3301-4 DELAMINATION ANALYSIS OF LAMINATED COMPOSITES IN DRILLING AND QUASI-STATIC PENETRATION** *Navid Zarif Karimi (University of Bologna), Parnian Kianfar (University of Bologna), Giangiacomo Minak (University of Bologna)* In this paper, the effect of machining parameters, feed rate and cutting speed, on delamination in drilling process and quasi-static penetration were investigated.	**3302-4 ULTRASONICATION AND MECHANICAL PROPERTIES OF NANOCLAY/ POLY(ETHYLENE TEREPHTHALATE) COMPOSITES** *Kazuaki Sanada (Toyama Prefectural University), Makoto Kawagoe (Toyama Prefectural University), Wataru Mizuno (Toyama Industrial Technology Center)* Mechanical properties of nanoclay/poly(ethylene terephthalate) (PET) composites produced via ultrasonication and melt processing have been investigated experimentally and analytically.	**3303-4 DAMAGE EVOLUTION IN CARBON FIBER VINYL ESTER MARINE COMPOSITES AND SEA WATER EFFECTS** *Akawut Siriruk (University of Tennessee), Dayakar Penumadu (University of Tennessee), Kenneth Thomas (University of Tennessee)* This paper presents a fundamental study on the damage evolution of composite materials being considered by US Navy made of T700 based carbon fiber fabric and vinyl ester resin using VARTM process.	**3304-4 MULTI-SCALE MODELING OF THE FATIGUE BEHAVIOR OF SHORT GLASS FIBER REINFORCED POLYAMIDE NOTCHED SPECIMENS** *Enrico Belmonte (University of Padova), Matthias De Monte (Robert Bosch GmbH), Marino Quaresimin (University of Padova)* This paper presents a multi-scale strategy for the lifetime prediction, in terms of crack initiation, of short fiber reinforced polyamide notched specimens.	**3305-4 OPTIMAL DESIGN OF POLYMERIC LAMINATES FOR MAXIMUM ENERGY DISSIPATION UNDER LOW-VELOCITY IMPACT** *Romesh Batra (Virginia Polytechnic Institute and State University), G. O. Antoine (Virginia Polytechnic Institute and State University)*	**3306-4 STRUCTURAL ANALYSIS OF COMPOSITE BULKHEAD CONSIDERING VARIABILITY DUE TO VARTM PROCESS** *Atsushi Kondo (Tokyo Metropolitan University), Yutaka Iwahori (JAXA), Hirotaka Igawa (JAXA), Naoyuki Watanabe (Tokyo Metropolitan University)* A bulkhead for aircraft structure was fabricated with VaRTM process and effect of the manufacturing process on structural characteristics were experimentally and numerically investigated.	**3307-4 DEVELOPMENT OF SIMULATION MODEL FOR REPRODUCIBLE 3D MULTI-LAYERED WOVEN FABRICS SUITABLE IN LIGHTWEIGHT ENGINEERING** *Knut Großmann (TU Dresden-IWM), Michael Löser (TU Dresden-IWM), Chokri Cherif (TU Dresden-ITM), Gerald Hoffmann (TU Dresden-ITM), Adil Mountasir (TU Dresden-ITM)* A simulation model of weaving spacer preforms for composites is used to optimize machine parameters with the aim to limit maximum forces acting on reinforcing fibres during the weaving process.	**3308-4 ULTRASTRUCTURAL AND MECHANICAL ANALYSIS OF THE STOMATOPOD DACTYL CLUB EXOCUTICLE** *Nicholas Yaraghi (University of California-Riverside), Lessa Grunenfelder (University of Southern California), Nobphadon Suksangpanya (Purdue University), Steven Herrera (University of California-Riverside), Christopher Salinas (University of California-Riverside), Garrett Milliron (Max Planck Institute for Colloids and Interfaces), Isaias Gallana (Purdue University), Kenneth Evans-Lutterodt (Brookhaven National Lab), Elaine DiMasi (Brookhaven National Lab), Steven Nutt (University of Southern California), Pablo Zavattieri (Purdue University), David Kisailus (University of California-Riverside)* We investigate the multi-scale structural and compositional features as well as the mechanical properties of an impact-resistant biological composite material	**3309-4 RECYCLING OF WOVEN CARBON FIBER PATCHES FROM LAMINATED CFRP BY MEANS OF INDUCTION HEATING** *Anna Schneller (University of Augsburg), Wolfgang M. Mueller (University of Augsburg), Simone Richler (University of Augsburg), Siegfried Horn (University of Augsburg)* Selective heating of CFs in a laminated CFRP by induction heating to affect the fiber matrix interface and recycle well-defined patches of CF fabric while preserving the mechanical properties.	**3310-4 DAMAGE ESTIMATION IN NONLINEAR LAMINATES SUBJECTED TO A TRANSVERSE CONCENTRATED LOAD** *Hiroshi Suemasu (Sophia University), Michael Wisnom (University of Bristol), Stephen Hallett (University of Bristol), Xiao Sun (University of Bristol)* An analytical study on damage growth of nonlinear laminated plates subjected to a transverse concentrated load is conducted to give an expression for a rough estimate of the damage.
15:20	**Coffee in the Exhibition**									

Meeting room 5	Meeting room 6	Meeting room 7	M1	M2	M3	M4	M5	M6	M7	M8
3311-4 MECHANICAL PROPERTIES OF FRP WITH BRAIDED COMPOSITES LATERAL COMPRESSIONAL BEHAVIORS OF GROUND TUBE *Takeshi Saito (Kyoto Institute of Technology), AKIO OHTANI (Gifu University), Asami Nakai (Gifu University)* This study deals with the braided composite tube and its properties . The influence of lateral compression on load and stress caused by grinding was clarified .	**3312-4 AROMATIC POLYAMIDE/GRAPHENE NANOCOMPOSITES : EFFECT OF THE EXPANDED GRAPHITE SURFACE TREATMENT ON THE MATERIALS PROPERTIES** *Jean-Marie Raquez (University of Mons), Alexis Bobenrieth (University of Mons), Philippe Dubois (University of Mons)*	**3313-4 MODELLING CHARACTERISATION OF A FAST CURING SILICA NANOPARTICLE MODIFIED EPOXY** *Andre Keller (FHNW University of Applied Sciences and Arts Northwestern Switzerland), Kunal Masania (FHNW University of Applied Sciences and Arts Northwestern Switzerland), Ambrose Taylor (Imperial College London), Clemens Dransfeld (FHNW University of Applied Sciences and Arts Northwestern Switzerland)* The rheology and kinetics of a fast-curing epoxy were modelled. The temperature overshoot due to exotherm and variation in the Tg over the thickness were predicted and validated with experiments	**3314-4 CHARACTERISATION OF FAILURE PROCESSES OF COMPOSITE PLIES UNDER TRANSVERSE LOADING** *Christian Marotzke (BAM), Titus Feldmann (BAM)* The dependence of the failure mode on the specimen length and the off axis angle taking place in standard off axis tests is studied experimentally as well as by finite element analyses.	**3315-4 MEAN FIELD HOMOGENIZATION OF DISCONTINUOUS LONG FIBER REINFORCED POLYMERS AND PARAMETER IDENTIFICATION OF BIAXIAL TENSILE TESTS THROUGH INVERSE MODELING** *Malte Schemmann (KIT), Barthel Brylka (KIT), Loredana Kehrer (KIT), Viktor Müller (KIT), Thomas Böhlke (KIT)* Biaxial tensile test of discontinous fiber reinforced polymers, inverse parameter identification with a Gauss-Newton procedure, comparison with homogenized material parameters based on CT analysis	**3316-4 3D TRANSMISSION ELECTRON MICROSCOPY TO QUANTIFY MORPHOLOGY OF ALIGNED NANOFIBER NANOCOMPOSITES** *Brian L. Wardle (Massachusetts Institute of Technology), Bharath Natarajan (National Institute of Standards and Technology), Noa Lachman (Massachusetts Institute of Technology), Thomas Lam (National Institute of Standards and Technology), Douglas Jacobs (Massachusetts Institute of Technology), Christian Long (National Institute of Standards and Technology), Minhua Zhao (National Institute of Standards and Technology), Renu Sharma (National Institute of Standards and Technology), J. Alexander Liddle (National Institute of Standards and Technology)* We present three-dimensional transmission electron microscopy quantification of the nanoscale morphology of polymer nanocomposites containing up to 20% volume fraction of aligned carbon nanotubes.	**3317-4 ALIGNED UNIDIRECTIONAL PLA/ BACTERIAL CELLULOSE NANOCOMPOSITE FIBRE REINFORCED PDLLA COMPOSITES VIA MELT AND SOLUTION BLOW SPINNING** *Jonny Blaker (University of Manchseter), Koon-Yang Lee (University College London), Alexander Bismarck (University of Vienna)*	**3318-4 USE OF EXPANDABLE MULTI-LAYER METAL LAMINATES AS FIRE PROTECTION FOR ALUMINIUM AND CFRP AEROSPACE STRUCTURES** *Geoff Gibson (Newcastle University), Sandra Christke (Newcastle University), Sheila Wan-Jusoh (Newcastle University), George Kotsikos (Newcastle University), Adrian Mouritz (RMIT University)* Experimental study about a novel method of expandable polymer-metal laminates for effective fire protection of temperature-sensitive and mechanically loaded aerospace structures	**3319-4 FIRE EXPERIMENTS OF THIN-WALLED CFRP PRETENSIONED HIGH STRENGTH CONCRETE SLABS UNDER SERVICE LOAD** *Giovanni Pietro Terrasi (Empa), Jing Gao (Xiamen University), Cristiàn Maluk (University of Edinburgh), Luke Bisby (University of Edinburgh)* Sustainable precast concrete elements are emerging utilizing high-performance, self-consolidating, fibre-reinforced concrete (HPSCC) reinforced with high-strength, lightweight, and non-corroding prest	**3320-4 QUASI-STATIC ROLLER AND BALL TEST FOR COMPOSITE PLATES** *Ivonne Bartsch (German Aerspace Center (DLR))* An indention test for two different test bodies (roller and ball) based on the IATA ULD Regulations has been derived. These tests are necessary to find new materials fir Unit Load Devices.	**3321-4 BIO-INSPIRED REVERSIBLE CROSSLINKING, USING CHELATING POLYMERS AND METAL ION BINDING, FOR USE AS SOFT ACTUATION AND SELECTIVE GROWTH** *Anna Baker (University of Bristol), Duncan Wass (University of Bristol), Richard Trask (University of Bristol)* Ionoprinting has been used to create 3D polygons and origami shapes from flat homogeneous hydrogels; morphing trianglar based pyramid, a cube, an octahedron and an “umbrella” have all been created.

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16
15:40	**3401 Processing - Manufacturing Technology 9**	**3402 Nano Composites 9**	**3403 ONR Special Symposium on Marine Composites 4**	**3404 Fatigue 9**	**3405 Structural Analysis and Optimization 9**	**3406 Experimental Methods for Process Characterisation 1**	**3407 Short Fibre Composites 1**	**3408 Biocomposites 8**	**3409 Recycling of Composites and Sustainability 2**	**3410 Damage Tolerance of Composite Structures 4**
15:40	**3401-1 ANALYSIS OF PROCESSING CONDITIONS FOR A NOVEL 3D-COMPOSITE PRODUCTION TECHNIQUE** *Martin Eichenhofer (ETH Zürich), Jesus Maldonado (ETH Zürich), Florian Klunker (ETH Zürich), Paolo Ermanni (ETH Zürich)* A novel manufacturing process for a continuous fiber lattice fabrication (CFLF), inspired by 3D-printing, provides continuously extruded free form structures of reinforced thermoplastic material.	**3402-1 PREPARATION AND PROPERTIES OF MOS2 NANOSHEETS AND MOS2 NANOSHEETS/EPOXY COMPOSITES** *Rongguo Wang (Harbin Institute of Technology), Yafei He (Harbin Institute of Technology), Chengqin Dai (Harbin Institute of Technology), Ning Ding (Harbin Institute of Technology), Lifeng Hao (Harbin Institute of Technology), Qi Wang (Harbin Institute of Technology), Ping Peng (Harbin Institute of Technology), Xiaolong Lu (Harbin Institute of Technology), Wenbo Liu (Harbin Institute of Technology), Weicheng Jiao (Harbin Institute of Technology), Fan Yang (Harbin Institute of Technology)* Prepare MoS2 nanosheets suspension and MoS2 nanosheets reinforced epoxy composites and study the absorbance, photoluminescence, morphology, annealing property and tensile property of them.	**KEYNOTE** **3403-1 CHARACTERIZATION OF SINGLE CARBON FIBER MECHANICAL BEHAVIOR BY NANO-TENSILE TESTING** *Matthew Kant (University of Tennessee), Dayakar Penumadu (University of Tennessee)* This work demonstrates a novel approach to single fiber tensile testing for measuring axial, elastic properties with high fidelity using small amplitude harmonic loading.	**3404-1 FATIGUE BEHAVIOR OF WOOD FILLED POLYPROPYLENE COMPOSITE MATERIALS** *Mohd Nur Azmi Nordin (Yamaguchi University), Yuki Matsuda (Yamaguchi University), Koichi Goda (Yamaguchi University), Hirokazu Ito (Toclas Corporation)* This work includes the development of woods as reinforcing fillers for polymeric matrix to form an environmentally friendly composite material, i.e. wood-plastic composites (WPCs).	**3405-1 BUCKLING AND FIRST-PLY FAILURE OPTIMIZATION OF STIFFENED VARIABLE ANGLE TOW PANELS** *Momchil Jeliazkov (IMDEA Materials Institute), Claudio Lopes (IMDEA Materials Institute), Mostafa Abdalla (Delft University of Technology), Daniel Peeters (Delft University of Technology)* The current work presents a computationally efficient two-level design methodology for the optimization of stiffened compression loaded panels having variable stiffness panels as their skin.	**3406-1 THE COMPACTION BEHAVIOUR OF PREPREGS UNDER PROCESSING CONDITIONS** *Oliver Nixon-Pearson (University of Bristol), Jonathan Belnoue (University of Bristol), Dmitry Ivanov (University of Bristol), Stephen Hallett (University of Bristol)* Characterisation of compaction behaviour of toughened prepregs was undertaken to aid the understanding of manufacturing processes covering AFP deposition, hot debulking, and autoclave conditions.	**3407-1 A VALIDATION METHODOLOGY FOR QUANTITATIVE PREDICTION OF ANISOTROPIC MECHANICAL BEHAVIOR IN FIBER REINFORCED THERMOPLASTICS** *Amin Sedighiamiri (SABIC Innovative Plastics), Tim van Erp (SABIC Innovative Plastics), Julien Cathelin (SABIC Innovative Plastics), Dave Brands (SABIC Innovative Plastics)* Fiber reinforced thermoplastics offer potential for weight reduction and cost out but show anisotropic mechanical behavior. This has to be accounted for during the development of such part.	**3408-1 THE EFFECT OF PHYSICAL ADHESION PROMOTION TREATMENTS ON INTERFACIAL ADHESION IN CELLULOSE-EPOXY COMPOSITE** *Sanna Siljander (Tampere University of Technology), Jani Lehmonen (VTT), Essi Sarlin (Tampere University of Technology), Jyrki Vuorinen (Tampere University of Technology)* In this study we treated foam formed cellulose fibre sheets with plasma and atomic layer deposition (ALD) treatments to achieve better adhesion between cellulose fibres and epoxy matrix.	**3409-1 RECYCLABILITY OF RANDOMLY-ORIENTED STRAND THERMOPLASTIC COMPOSITES** *Dominic Leblanc (McGill University), Benoit Landry (McGill University), Marek Jancik (McGill University), Pascal Hubert (McGill University)* This paper compares two recycling approaches for carbon/PEEK randomly-oriented strand composites manufactured by compression moulding and their impact on flexural properties.	**3410-1 TRACTION SEPARATION RESPONSE OF A UNIDIRECTIONAL CARBON/EPOXY COMPOSITE IN INTRALAMINAR MODE I FRACTURE; EXPERIMENTAL AND NUMERICAL RESULTS.** *Georgios Pappas (ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE-EPFL), John Botsis (ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE-EPFL)* Studies in intralaminar Mode I fracture & bridging mechanisms of a unidirectional CFRP composite. A semi-experimental method uses FBG strains to optimize FE models with an objective bridging profile.
16:00	**3401-2 ADDITIVE MANUFACTURING OF HIGH TEMPERATURE GLASS AND CARBON REINFORCED PEEK COMPOSITES** *Yuan Wang (University of Exeter), Oana Ghita (University of Exeter), Richard Davies (University of Exeter)* This study presents recent developments in high temperature laser sintering of composites with focus on glass filled PEK (PEK/GB) and graphite platelet filled PEEK (PEEK/GP) materials.	**3402-2 EPOXY NANOCOMPOSITES WITH TWO-DIMENSIONAL TUNGSTEN DISULFIDE ADDITIVES** *Yukun Wang (Beihang University), Yan Zhao (Beihang University), Xiao Han (Beihang University), Muchun Liu (Beihang University)* In this study, we chose the tungsten disulfide with nanosheet structure as a reinforcement for the resin matrix. The results showed that tungsten disulfide was a significant reinforcement for epoxy.		**3404-2 MEAN-FIELD BASED FATIGUE DAMAGE MODELING OF COMPOSITES REINFORCED WITH SHORT STRAIGHT AND WAVY FIBERS** *Yasmine Abdin (KU Leuven), Atul Jain (KU Leuven), Ignace Verpoest (KU Leuven), Stepan V. Lomov (KU Leuven)* In this paper modelling approach is proposed for predicting the quasi-static and fatigue behavior of short random fiber reinforced composites in the framework of mean-field homogenization techniques.	**3405-2 DESIGN OF PASSIVE MORPHING WING STRUCTURES USING ELASTIC INSTABILITIES** *Falk Runkel (ETH Zurich), Andres Felipe Arrieta Diaz (ETH Zurich), Paolo Ermanni (ETH Zurich)* This investigation presents a concept of utilising local elastic instabilities for passive bending-twisting shape adaptation of compliant wing structures.	**3406-2 OPTICAL PERMEABILITY MEASUREMENT ON TUBULAR BRAIDED REINFORCING TEXTILES** *Christian Schillfahrt (Montanuniversität Leoben), Ewald Fauster (Montanuniversität Leoben), Ralf Schledjewski (Montanuniversität Leoben)* A novel approach for measuring the unsaturated 1D permeability of braided textiles is introduced. Furthermore, the influence of the compaction pressure on the impregnation behavior is investigated.	**3407-2 DAMAGE TOLERANT TOW-BASED DISCONTINUOUS COMPOSITES** *Soraia Pimenta (Imperial College London), Akshaya Ahuja (Imperial College London), Aik Yong Lau (Imperial College London)* The properties and failure mechanisms of several high-performance discontinuous composites are analysed, revealing higher fracture toughnesses than in continuous CFRP and a notch insensitive response.	**3408-2 BENDING FATIGUE AND CREEP PROPERTIES OF KENAF-FIBER MAT REINFORCED THERMOSETTING PLASTIC COMPOSITE** *Yuqiu Yang (Donghua University), Bing Xiao (Donghua University), Toshihiko Hojo (Kyoto Institute of Technology)*	**3409-2 REGENERATION OF THERMALLY RECYCLED GLASS FIBRE FOR COST-EFFECTIVE COMPOSITE RECYCLING : THE EFFECT OF FIBRE REGENERATION AND MATRIX MODIFICATION** *Ulf Nagel (University of Strathclyde), Eduardo Saez Rodriguez (University of Strathclyde), Chih-Chuan Kao (University of Strathclyde), Liu Yang (University of Strathclyde), James Thomason (University of Strathclyde)* Different approaches to maximise the reinforcement potential of thermally recycled glass fibres were compared. The fibre regeneration was found to be more effective than matrix modification.	**3410-2 NUMERICAL MODELING OF FRACTURE IN TEXTILE COMPOSITES BY VTMS/BSAM X-FEM** *David Mollenhauer (AFRL), Eric Zhou (University Of Dayton Reserach Institute), Endel Iarve (University Of Dayton Reserach Institute)* Textile PMC models were generated by VTMS.Stress analysis was accomplished through the BSAM. Delamination and cracks were modeled via an Rx-FEM method

Meeting room 5	Meeting room 6	Meeting room 7	M1	M2	M3	M4	M5	M6	M7	M8
3411 Textile-Based Composites and Fibre Architecture 9	**3412 Foams, Cellular and Lattice Materials 4**	**3413 Matrix Materials 4**	**3414 Fracture and Damage - Materials Scale 3**	**3415 Models Homogenization – Micro to Macro 4**	**3416 Nanocomposites for Structural Lightweight - Modelling and Testing 3**	**3417 Manufacturing Up-Scaling and Automation 1**	**3418 Sensors in Experimental Mechanics 1**	**3419 Applications - Civil Engineering 2**	**3420 New Structural Testing Methods 4**	**3421 Multifunctional Composites - Smart Structures 1**
3411-1 DENSITY DEPENDENT MATERIAL PROPERTIES OF GLASSFIBRE REINFORCED COMPOSITES MADE OF NON-WOVEN FABRICS *Matthias Klaerner (Technische Universität Chemnitz), Sebastian Iwan (Technische Universität Chemnitz), Lothar Kroll (Technische Universität Chemnitz)* Fibre-reinforced composites based on non-woven fabrics offer a wide range for the modification of elastic/ dynamic properties like stiffness, strength and damping by varying level of consolidation.	**3412-1 DIRECTLY MASS-PRODUCTION GROWING METHOD OF CNT AEROGEL WITH SUPERB LIQUID-ABSORPTION CAPABILITY** *Han Wang (Beihang University), Min Li (Beihang University), Weibang Lv (Suzhou Institute of Nano-Tech and Nano-Bionics), Yizhou Gu (Beihang University), Shaokai Wang (Beihang University), Qingwen Li (Suzhou Institute of Nano-Tech and Nano-Bionics), Zuoguang Zhang (Beihang University)* A kind of CNT aerogel, grown by floating catalyst chemical vapor deposition method, has great capability of oil-absorption, which can absorb more than 90 times of its own weight of oil.	**3413-1 EXPLORATORY STUDY ON THE BEHAVIOUR OF GLASS/PDCPD COMPOSITES** *Katleen Vallons (KULeuven), Renata Drozdzak (Telene SAS), Mathieu Charret (Telene SAS), Stepan V. Lomov (KULeuven)* Properties of glass fibre composites based on a tough thermoset PDCPD and a standard epoxy were compared. Glc, tensile and compressive properties and impact and CAI were investigated,	**3414-1 PREDICTION OF TENSILE STRENGTH OF UNIDIRECTIONAL CARBON FIBER COMPOSITES CONSIDERING THE INTERFACIAL SHEAR STRENGTH** *Wonjin Na (Seoul National University), Geunsung Lee (Seoul National University), Minchang Sung (Seoul National University), Mi-Young Kim (Seoul National University), Heung Nam Han (Seoul National University), Woong-Ryeol Yu (Seoul National University)* In this research the tensile strength of unidirectional fiber composites was predicted considering its interfacial shear strength. The composite strength was calculated considering the IFSS.	**3415-1 A MICROMECHANICS BASED CONSTITUTIVE MODEL FOR PROGRESSIVE DAMAGE ANALYSIS OF COMPOSITE MATERIALS** *Van Vu (The University of Adelaide), Abdul Hamid Sheikh (The University of Adelaide), Giang Nguyen (The University of Adelaide)* A new micromechanics-based constitutive model is developed for fibre reinforced polymer matrix composites having unidirectional fibre orientations which can incorporate elastic and inelastic responses	**3416-1 MODELLING AND TESTING OF THE SNAP-THROUGH PROCESS OF CROSS-PLY COMPOSITES** *Faustino Mujika (UNIVERSITY OF THE BASQUE COUNTRY), M.asuncion CANTERA (UNIVERSITY OF THE BASQUE COUNTRY), Itziar ADARRAGA (UNIVERSITY OF THE BASQUE COUNTRY), Jesús M. ROMERA (UNIVERSITY OF THE BASQUE COUNTRY)* The load-displacement curve of bi-stable unsymmetric cross-ply square composite plates supported at four points and loaded by a central concentrated force are analyzed experimentally and numerically.	**3417-1 TACK CHARACTERIZATION OF OUT-OF-AUTOCLAVE PREPREGS FOR AFP APPLICATIONS** *Sanjeev Rao (Khalifa University), Rehan Umer (Khalifa University), Wesley Cantwell (Khalifa University)* In this study, the peel resistance of unidirectional out-of-autoclave (OOA) prepregs tapes has been evaluated using floating roller peel tests and Design of Experiments.	**3418-1 ULTRASONIC STRUCTURAL HEALTH MONITORING OF CFRP BY USING NOVEL OPTICAL FIBER SENSING SYSTEMS** *Qi Wu (the University of Tokyo), Yoji Okabe (the University of Tokyo)* We proposed three novel ultrasonic optical fiber sensors based on fiber Bragg grating and erbium fiber laser, and demonstrated their performances in structural health monitoring of composites.	**3419-1 COMPRESSION BEHAVIOR OF CONCRETE CYLINDERS EXTERNALLY CONFINED BY FLAX FIBER REINFORCED POLYMER COMPOSITES** *Guijun Xian (Harbin Institute of Technology), Yuanyuan Xia (Harbin Institute of Technology), Hui Li (Harbin Institute of Technology)* Concrete cylinders were confined by FRP tubes wound with flax or hybrid of flax and basalt fibers. A remarkable enhancement of the compressive stress and strain was realized.	**3420-1 APPLICABILITY OF THE SINGLE CANTILEVER BEAM TEST FOR CHARACTERIZATION OF SANDWICH MATERIALS WITH VERY THIN FACESHEETS - FRACTURE MECHANICAL ANALYSIS AND TEST IMPROVEMENT** *Ralf Schaeuble (Fraunhofer Institute for Mechanics of Materials IWM), Anne Geyer (Fraunhofer Institute for Mechanics of Materials IWM), Marianne John (Fraunhofer Institute for Mechanics of Materials IWM), Ralf Schlimper (Fraunhofer Institute for Mechanics of Materials IWM)* A simple and robust SCB test procedure for fracture-mechanical characterization of facesheet/core disbonding of honeycomb core sandwich material is numerically and experimentally analysed.	**3421-1 DESIGN, FABRICATION, AND CHARACTERIZATION OF MULTIFUNCTIONAL WINGS TO HARVEST SOLAR ENERGY IN ROBOTIC BIRDS** *Hugh Bruck (university of maryland), Satyandra K. Gupta (university of maryland), Ariel Perez-Rosado (university of maryland)* We developed multifunctional compliant wings with solar cells for flapping wing air vehicles (FWAVs) to harvest energy, to increase flight time, and to enable recharging without external sources.
3411-2 MECHANICAL CHARACTERIZATION OF A THERMOPLASTIC CROSS-PLY PREPREG FOR HELMET PREFORM MANUFACTURE *Lisa Dangora (University of Massachusetts), James Sherwood (University of Massachusetts)* Characterization of temperature-dependent mechanical behaviors of a thermoplastic cross-ply to investigate the material for use in fabricating helmet preforms.	**3412-2 THE INFLUENCE OF THE META-ARAMID/EPOXY NANOFIBER MATS ON THE ADHESION STRENGTH AT CRYOGENIC ENVIRONMENTS** *Seung A Song (Chonbuk national university), Seong Su Kim (Chonbuk national university), Seung Yoon On (Chonbuk National University)* the influence of the meta-aramid/epoxy nanofiber mats on the adhesion strength at cryogenic environment. Residual strain was measured by FBG sensor with OFDR and FEA was performed	**3413-2 STRUCTURE AND PROPERTIES OF SINTERED MATRIX MATERIALS USED FOR FABRICATION OF DIAMOND AND CBN IMPREGNATED TOOLS** *Elżbieta Bińczek (The Institute of Advanced Manufacturing Technology), Barbara Staniewicz-Brudnik (The Institute of Advanced Manufacturing Technology)* The work presents the possibility of application of hybrid of CuSn–base with glass-crystalline materials from the ZnO-B2O3-SiO2-PbO system in the production of sintered diamond tools.	**3414-2 APPLICATION OF ONSET THEORY TO ONSET OF TRANSVERSE CRACKING IN FABRIC COMPOSITES** *Shen Hin Lim (UNSW Australia), Garth Pearce (UNSW Australia), Don Kelly (UNSW Australia), Gangadhara Prusty (UNSW Australia), Alan Crosky (UNSW Australia)* A failure theory based on critical strain invariants (Onset Theory) is applied to predict damage locations and failure strain for plain weave fabric specimens manufactured from two material systems.	**3415-2 DETERMINATION OF EFFECTIVE THERMAL AND THERMO-ELASTIC PROPERTIES OF WOVEN TEXTILE COMPOSITES USING VOXEL BASED VARIATIONAL ASYMPTOTIC UNIT CELL HOMOGENIZATION METHOD** *Rajeev G Nair (Indian Institute of Technology Bombay), B. Sivasubramonian (Vikram Sarabhai Space Centre), P. J. Guruprasad (Indian Institute of Technology Bombay)* Development of voxel based variational asymptotic method (VAM) homogenization technique as applied to woven composites to determine their thermal/ thermo-elastic properties.	**3416-2 MECHANICAL EFFECTS OF THE INJECTION-CVD NANOSTRUCTURATION OF CARBON-FIBRE COMPOSITES INVESTIGATED BY BUNDLE TENSILE TEST AND DMA** *Ludovic Chevallier (Institut Clément Ader), Quentin Govignon (Institut Clément Ader), Philippe Olivier (Institut Clément Ader), Gérard Bernhart (Institut Clément Ader), Martine Mayne-L'Hermite (Laboratoire Francis Perrin (CNRS URA 2453))* The purpose of this paper is to investigate the effects of the injection-CVD synthesis on the mechanical strength and more specifically the interlaminar shear strength of nanostructured composites.	**3417-2 CURE DEGREE MONITORING OF AN INFUSION PROCESS BY DEFORMABLE ELECTRONIC CIRCUIT WITH INTEGRATED CAPACITIVE SENSORS** *Yang Yang (Center for Microsystems Technology), Gabriele Chiesura (Ghent University), Thomas Vervust (Center for Microsystems Technology), Frederick Bossuyt (Center for Microsystems Technology), Geert Luyckx (Ghent University), Markus Kaufmann (Sirris Leuven Gent Composites Application Lab), Joris Degrieck (Ghent University), Jan Vanfleteren (Center for Microsystems Technology)* in this paper, we present our latest progress in applying deformable electronic circuit for the in situ cure degree monitoring of a resin infusion process.	**3418-2 CARBON FIBER EPOXY ATHERMAL STRUCTURES FOR OPTICAL FIBER GRATING WAVELENGTH STABILIZATION** *C S Shin (National Taiwan University), Yen-Chang Huang (National Taiwan University), Shien-Kuei Liaw (National Taiwan Univ of Science and Technology)* Stable wavelength is required of fiber Bragg gratings. Carbon fiber reinforced laminate structure is proposed as a low cost, easy to mass produce devices to offset their thermally induced drift.	**3419-2 SMART COMPOSITE DEMONSTRATOR DECID2 - CONCEPT & RESULTS** *Monssef Drissi-Habti (IFSTTAR)* A large smart composite platform prototype was modeled numerically and simulations run for three-point bending loads in static conditions to determine a stress damage threshold for future experiments.	**3420-2 FROM MEASUREMENTS ERRORS TO A NEW STRAIN GAUGE DESIGN FOR COMPOSITE MATERIALS** *Lars Pilgaard Mikkelsen (Technical University of Denmark), Sanita Zike (Technical University of Denmark), Jacopo Gili (Technical University of Denmark)* Strain gauges is found to over-estimate the material stiffness with 1-10% for fiber rienforced polymers. An over-estimation depending significantly on the present of a soft gelcoat or biax.	**3421-2 ON MECHANICALLY COUPLED TAPERED LAMINATES WITH BALANCED PLAIN WEAVE AND NON-CRIMP FABRICS** *Christopher York (University of Glasgow), Mohd Shamsudin (University of Kuala Lumpur)* Tapered designs for Balanced Plain Weave and Non-Crimp Fabric laminates is presented which has consistent mechanical coupling characteristics and immunity to thermal warping distortion are preserved.

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16
16:20	**3401-3 HIGH TEMPERATURE ADDITIVE MANUFACTURING FOR FOR RAPID MANUFACTURE, MODIFICATION AND ADAPTATION OF BESPOKE MILITARY EQUIPMENT** *Richard Davies (University of Exeter)* This paper presents an investigation into the use of net-shaped reinforced PEEK/CNT composites in additive manufacturing technologies, also known as Fused Deposition modelling (FDM).	**3402-3 SYNERGY EFFECT IN CARBON NANOTUBES/ONION LIKE MIXED COMPOSITES.** *Jan Macutkevic (Vilnius university), Ieva Kranauskate (Vilnius university), Juras Banys (Vilnius university), Olga Shenderova (International Technology Center), Nicholas Nunn (International Technology Center)* The dielectric/electric properties of polyurethane composites filled with carbon nanotubes (CNT), onion-like carbon (OLC) and mixed OLC/CNT are compared across a wide frequency range.	**3403-2 FABRICATION AND PERFORMANCE OF CARBON/EPOXY COMPOSITES WITH HYBRID OF NANOCLAY AND MWCNTS** *Mahesh Hosur (Tuskegee University), Tanjheel Mahdi (Tuskegee University), Md. Ekramul Islam (Tuskegee University), Alfred Tcerbi-Narteh (Tuskegee University), Shaik Jeelani (Tuskegee University)* This paper presents results of experimental investigations on the inclusion of nanoclay/MWCNTs hybrids in enhancing the performance of carbon/epoxy composites.	**3404-3 DAMAGE AND FRACTURE OF LAMINATES UNDER VARIOUS LOADS** *Christian Hochard (CNRS), Juliette Payan (CNRS), Noel Lahellec (CNRS), Aurore Girardot (CEA), Sandrine Le Roch (CEA)* The paper presents a fracture model for UD and woven ply laminates under static and fatigue loads, based on the reduction of strength in the fibre direction depending on the transverse damage.	**3405-3 COMPOSITE TUBES WITH NOVEL BEND-TWIST COUPLING** *Sean Rohde (University of Florida), Avinash Jonnalagadda (University of Florida), Aniruddha Savant (University of Florida), Peter Ifju (University of Florida), Bhavani Sankar (University of Florida)* A novel composite tube with bend-twist coupling is discussed. A formula for the distance of the shear center from the tube axis in terms of material properties and tube length is derived.	**3406-3 EXPERIMENTALLY VALIDATED MANUFACTURING RELIABILITY FOR COMPOSITE STRUCTURES** *Douglas Cairns (Montana State University), Michael Bauer (Montana State University)*	**3407-3 A NOVEL HIGH TEMPERATURE SINGLE POLYMER COMPOSITE** *Mingming Yu (Shanghai university), Bin Feng (Shanghai university), Wang Xie (Shanghai university), Lin Fang (Shanghai university), Liqi liu (Shanghai university), Musu ren (Shanghai university), Jinliang sun (Shanghai university), Xiaofeng wang (Shanghai Tanlon Fiber Co.-Ltd.)* The SPC based on polysulfonamide was prepared, and the experiments results indicated that the SPC had good thermal properties since its Tg was over 300oC and decomposition temperature was over 400oc	**3408-3 STRONG AND TOUGH FUNGAL BASED CHITIN-GLUCAN THIN FILM** *Wan Mohd Fazli Wan Nawawi (Imperial College London), Koon Yang Lee (Imperial College London), Eero Kontturi (Imperial College London), Alexander Bismarck (University of Vienna)* This study investigate the chemical, morphological, and mechanical properties of thin film made from fungi chitinous extract. The extract were from common mushroom and tree bracket fungi.	**3409-3 RECOVER: REGENERATING THE STRENGTH OF GLASS FIBRES THERMALLY RECYCLED FROM END-OF-LIFE COMPOSITES** *James Thomason (University of Strathclyde), Eduardo Saez-Rodriguez (University of Strathclyde), Chih Chuan Kao (University of Strathclyde), Liu Yang (University of Strathclyde)* Cost-effective treatments to restore the massive loss in strength of glass fibres thermally recycled from end-of-life composites have been developed and investigated.	**3410-3 IMPROVING THE DAMAGE TOLERANCE OF COMPOSITE JOINTS WITH TUFTING** *James Kratz (University of Bristol), Harry Clegg (The National Composites Centre), Giuseppe Dell'Anno (The National Composites Centre), Ivana Partridge (University of Bristol)* Tufting was used to increase the delamination resistance of T-stiffened panels by inserting carbon threads at the stringer tip. The failure mode changed from skin-stringer separation to web splitting.
16:40		**3402-4 MODELLING NANOSCALE GRAPHENE STRUCTURES USING A MULTI-PHYSICS MOLECULAR-DYNAMICS FINITE-ELEMENT METHOD** *Silvestre Pinho (Imperial College London), Andre Wilmes (Imperial College London)* A new MDFEM with reactive/charge force fields is proposed, including rotational BCs, bending properties of pillared graphene, graphene fracture toughness, virtually-designed porous graphene sensor.	**3403-3 IMPLOSION OF CYLINDRICAL COMPOSITE STRUCTURES SUBJECTED TO UNDERWATER IMPULSIVE LOADS** *Sid Avachat (Georgia Institute of Technology), Min Zhou (Georgia Institute of Technology)* The response of filament cylindrical carbon-fiber/epoxy composite structures subjected to underwater impulsive loads is analyzed experimentally and computationally.	**3404-4 ASSESSMENT OF FATIGUE DAMAGE ONSET AND GROWTH IN PLAIN WEAVE COMPOSITES WITH EMBEDDED FLAWS** *Ahmed Maslouhi (Université de sherbrooke), Braisaz Paul (Université de sherbrooke), Nassim Kanouni (Université de sherbrooke)* The paper proposes an experimental approach using acoustic emission to generate lifetimes curves and to predict the onset of fatigue damage and the propagation of an embedded artificial flaw in CFRP.	**3405-4 DESIGN AND TESTING OF BI-STABLE DEPLOYABLE BOOMS FOR SPACE APPLICATIONS** *Mark Pankow (North Carolina State University)* Design and development of deployable structures for small satellite applications. This paper examines how these structures can be designed and fabricated along with the deployment mechanism for deploy	**3406-4 NON-CONTACT HOLISTIC MEASUREMENT OF AEROSPACE FASTENER HOLES WITH RING LASER ADAPTIVE OPTICS** *George Bullen (Northrop Grumman-Ret.)* This paper will describe, illustrate, and define new non-contact laser inspection methods for assessing the acceptability of countersinks and holes in aerospace parts made from composite materials.	**3407-4 FORMULATION ABOUT TIME- AND TEMPERATURE- DEPENDENT FLEXURAL MODULUS OF DISCONTINUOUS CARBON FIBER MAT REINFORCED THERMOPLASTICS** *Wataru NAGATSUKA (The University of Tokyo), Tsuyoshi MATSUO (The University of Tokyo), Fumiaki YANO (Shimadzu Corporation), Kenichi FURUKAWA (Suzuki Motor Corporation), Jun TAKAHASHI (The University of Tokyo)* It was clarified that the time- and temperature-dependence of flexural modulus of CFRTP is caused by Young's modulus and out-of-plane modulus influenced from viscoelastic property of matrix resin.	**3408-4 AN INVESTIGATION ON COMPOSITE CONSTITUTED OF PAPER AND RESIN BY VENT-TYPE INJECTION MOLDING MACHINE** *Keisuke Kitai (Kitai Seisakusyo Co.-Ltd.), Satoshi Harada (Kitai Seisakusyo Co.-Ltd.), Takanori Kitamura (Daiwa Itagami Co.-Ltd.), Mitsunori Suda (Daisankogyo Co.-Ltd.), Zhiyuan Zhang (Daiwa Itagami Co.-Ltd.), Hiroyuki Hamada (Kyoto Institute of Technology)* The objective of this research is using composite combining with plastic and paper materials to relieve the depending on timber from ecological thinning.	**3409-4 THERMOSET COMPOSITE RECYCLING: TENSILE STRENGTH PROPERTIES OF RECOVERED GLASS FIBER** *Justine Beauson (DTU), Jakob Ilsted Bech (DTU), Povl Brøndsted (DTU), Helga Nørgaard Petersen (DTU)* Four different recycling processes, mechanical, burn off, pyrolysis and glycolysis are selected and compared based on the properties of the glass fiber recovered.	**3410-4 3D WOVEN COMPOSITES FOR ENERGY ABSORBING APPLICATIONS** *Harun Bayraktar (Albany Engineered Composites), David Ehrlich (Albany Engineered Composites), Jon Goering (Albany Engineered Composites), Michael McClain (Albany Engineered Composites)* This study shows that under three-point bending, a 3D woven composite side intrusion beam has 37% higher specific energy absorption than a similar high-strength steel beam.
17:15	**General Assembly**									

Meeting room 5	Meeting room 6	Meeting room 7	M1	M2	M3	M4	M5	M6	M7	M8
3411-3 A DISCRETE MESOSCOPIC FINITE ELEMENT MODEL USED TO LINK THE MANUFACTURING PROCESS TO THE FINAL PART STIFFNESS *Cynthia Mitchell (University of Massachusetts Lowell), James Sherwood (University of Massachusetts Lowell)* This paper presents a methodology to link the structural properties of a textile-reinforced composite components and structures to deformations seen in the textile during forming.	**3412-3 ARCHITECTURE AND PROPERTIES OF STOCHASTIC FOAM MODELS** *Stefan Hallström (Royal Institute of Technology (KTH)), Joonas Köll (Royal Institute of Technology (KTH))* Recent results from a numerical study of the microstructure and constitutive properties of equilibrium foams are presented and discussed focussing on relations between topology and properties.	**3413-3 CRACK ONSET IN A POLYMER MATRIX WITH OPEN-HOLE CONFIGURATION AND VISCOELASTIC BEHAVIOR. APPLICATION OF THE FINITE FRACTURE MECHANICS COUPLED CRITERION.** *Afonso Leite (Escuela Técnica Superior de Ingeniería-University of Seville), Vladislav Mantiń (Escuela Técnica Superior de Ingeniería-University of Seville), Federico París (Escuela Técnica Superior de Ingeniería-University of Seville)* Fracture of stretched open-hole PMMA plates is made by Finite Fracture Mechanics using Finite Elements with a linear viscoelastic material model. Predictions of the size effect are made and compared.	**3414-4 FAILURE PREDICTION MODEL FOR NCF LAMINATES LOADED IN COMPRESSION AND THE EFFECT OF OFF-AXIS LOADING** *Anton Shipsha (KTH Royal Institute of Technology), Magnus Burman (KTH Royal Institute of Technology), Johan Ekh (KTH Royal Institute of Technology)* Compressive strength of NCF laminates at various off-axis angles was studied experimentally for different lay-ups. Effect of stacking sequence was studied as well. Strength criterion was proposed.	**3415-3 IMPACT OF THE NUMERICAL MODEL ASSUMPTIONS ON THE WATER DIFFUSION KINETICS OF A UD COMPOSITES** *Yoann JOLIFF (MAPIEM - SeaTech - Université de Toulon), Lénaïk BELEC (MAPIEM - SeaTech - Université de Toulon), Jean-François CHAILAN (MAPIEM - SeaTech - Université de Toulon)* This work deals with the impact of the numerical models assumptions on the diffusion kinetics of a unidirectional composite. Numerical results are compared with experimental values (from µ-TA).	**3416-3 OUT-OF-OVEN CURING OF COMPOSITE LAMINATES VIA RESISTIVE MICROHEATERS COMPRISED OF ALIGNED CARBON NANOTUBE NETWORKS.** *Jeonyoon Lee (Massachusetts Institute of Technology), Itai Stein (Massachusetts Institute of Technology), Seth Kessler (Metis Design Corporation), Brian Wardle (Massachusetts Institute of Technology)* An in siu curing technique for polymer matrix composite using a resistive heating film comprised of an aligned carbon nanotube network enables highly efficient curing while adding multi-functionality.	**3417-3 ASSESSING THE STRUCTURAL RESPONSE OF AFP COMPOSITE STRUCTURES WITH GAPS AND OVERLAPS BY MEANS OF NUMERICAL APPROACHES** *Falk Heinecke (German Aerospace Center (DLR)), Wouter van den Brink (National Aerospace Laboratory (NLR)), Tobias Wille (German Aerospace Center (DLR))* Focusing on the automated dry fibre placement technique (AFP) the effect on stiffness and strength of manufacturing induced gaps and overlaps are assessed to enable a so called "as-built" analysis.	**3418-3 HEALTH MONITORING OF WOVEN COMPOSITE STRUCTURES BY STRAIN FIELD METHODS: COMPARISON BETWEEN FIBRE BRAGG GRATING SENSORS ARRAYS AND DIGITAL IMAGE CORRELATION.** *Md Kharshiduzzaman (Politecnico di Milano), Andrea Bernasconi (Politecnico di Milano), Lorenzo Comolli (Politecnico di Milano)* In this work the response of fiber Bragg grating (FBG) sensors is studied for non-uniform strain field present in woven composites for strain based SHM applications and compared with DIC results.	**3419-3 IN-PLANE STRUCTURAL BEHAVIOR OF MASONRY WALLS STRENGTHENED WITH AN INNOVATIVE HEMP-BASED COMPOSITE SYSTEM** *Costantino Menna (University of Naples Federico II), Domenico Asprone (University of Naples Federico II), Massimo Durante (University of Naples Federico II), Alberto Zinno (Stress S.c.a r.l.), Anna Bozza (University of Naples Federico II), Andrea Prota (University of Naples Federico II)* The in-plane structural behavior of masonry panels strengthened with an innovative hemp-based composite system was assessed by means of diagonal compression tests. A good performance was achieved.		**3421-3 NUMERICAL AND EXPERIMENTAL INVESTIGATIONS OF THIN-WALLED NEUTRALLY STABLE DEPLOYABLE COMPOSITE BOOMS** *Yang Liuyi (Harbin Institute of Technology), Tan Huifeng (Harbin Institute of Technology), Cao Zongsheng (Harbin Institute of Technology)* A neutrally stbale boom was investigated trhough an analytical model and numerical method. The coiling process was simulated, the strain enerygy of two methods agree well with each other.
			3414-4 EVALUATION OF CORRELATION BETWEEN IMPACT-INDUCED CRACK GROWTH BEHAVER AND INTERLAMINAR FRACTURE TOUGHNESS IN CFRP LAMINATES *Yasuhiro KOICHI (Kanazawa Institute of Technology), Hiroshi SAITO (Kanazawa Institute of Technology), Isao KIMPARA (Kanazawa Institute of Technology)* In this study, we compared mapping of fracture mode in CFRP laminates after impact and the result of numerical simulation, and identified consistency between these.	**3415-4 PREDICTION OF CRACK TORTUOSITY IN FIBER REINFORCED COMPOSITE MICROSTRUCTURES** *Timothy Breitzman (US Air Force Research Laboratory), Eric Zhou (University of Dayton Research Institute)* This paper considers the tortuosity of a minimal energy fracture surface through a fiber reinforced microstructure with variable fiber volume fractions and material fracture properties.	**3416-4 INTERFACIAL DECOHESION IN FIBER RICE HUSK POWDER FAILURE EPOXY COMPOSITE** *Anil Saigal (Tufts University), Alvaro Del Solar (Tufts University)* The paper deals with 2D analysis of a biocomposite consisting of 30 vol. percent of rice husk powder in an epoxy resin matrix in which the interfacial decohesion failure initiates between 1-2% strain.	**3417-4 STRUCTURAL HEALTH MONITORING AND PROCESSING OF COMPOSITE STRUCTURES USING PHOTONIC SENSING TECHNOLOGY** *Gangadhara Prusty (UNSW Australia), Ginu Rajan (UNSW Australia), Ebrahim Oromiehie (UNSW Australia), Paul Compston (Australian National University)* Utilizing FBG sensors for structural health monitoring of composite laminates and demonstrate their capabilities for for on-line monitoring of lay-up process in the advanced robotic composites.		**3419-4 MECHANICAL BEHAVIOR OF BFRP-STEEL COMPOSITE PLATE UNDER AXIAL TENSION** *Yanlei Wang (Dalian University of Technology), Yunyu Li (Dalian University of Technology)* A novel BFRP-steel composite plate (BSP) is proposed, where a steel plate is sandwiched between two outer BFRP laminates. The performance of the proposed BSP under uniaxial tension was investigated.		

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16
8:30	**From fibres to tapes, from synthetic to natural fibres: a new generation of textile composites and their applications** Ignaas Verpoest, Katholieke Universiteit Leuven, Belgium									
9:30	**4101 Processing - Manufacturing Technology 10**	**4102 Nano Composites 10**	**4103 ONR Special Symposium on Marine Composites 5**	**4104 Multifunctional Composites - Self-Healing and Bio-inspired Designs 1**	**4105 Structural Analysis and Optimization 10**	**4106 Experimental Methods for Process Characterisation 2**	**4107 Fibres 1**	**4108 Biocomposites 9**	**4109 Liquid Composites Moulding 1**	**4110 Sandwich Structures and Materials 1**
9:30	**4101-1 OPTIMUM PROCESSING PARAMETERS FOR HOT DRAPE FORMING OF OUT-OF-AUTOCLAVE PREPREG OVER COMPLEX SHAPE USING DOUBLE DIAPHRAGM TECHNIQUE** *Hassan Alshahrani (Concordia Center for Composites-Concordia University-), Mehdi Hojjati (Concordia Center for Composites-Concordia University-)* A double-diaphragm set-up for forming flat prepreg into complex shapes was developed. Formability of out-of-autoclave (OOA) prepregs and the effects of processing parameters were studied.	**4102-1 MECHANICAL AND TRIBOLOGICAL PERFORMANCE OF CARBON NANOTUBE BUCKYPAPER REINFORCED EPOXY COMPOSITE** *Jinhua Han (National Center for Nanoscience and Technology-China), Hui Zhang (National Center for Nanoscience and Technology-China), Zhong Zhang (National Center for Nanoscience and Technology-China)* Carbon nanotube buckypaper/ composites (285 mm in diameter) with remarkable mechanical and tribological properties, as well as lightning strike protection performance have been conducted.	**4103-1 WATER ENTRY OF ASYMMETRIC WEDGES THROUGH PARTICLE IMAGE VELOCIMETRY** *Adel Shams (New York University Polytechnic School of Engineering), Mohammad Jalalisendi (New York University Polytechnic School of Engineering), Maurizio Porfiri (New York University Polytechnic School of Engineering)* PIV is used to experimentally investigate the asymmetric water impact of a rigid wedge. The effect of a geometric asymmetry on the flow physics and pressure field is studied.	**4104-1 SELF-HEALING OF SKIN-STIFFENER DEBOND SPECIMENS UNDER FATIGUE CONDITIONS** *Rafael Luterbacher (University of Bristol), Richard S. Trask (University of Bristol), Ian P. Bond (University of Bristol)* Intralaminar damage within cross-ply laminates and skin-stiffener debond specimens is addressed via a vascular self-healing approach.	**4105-1 OPTIMAL DESIGN OF VARIABLE THICKNESS COMPOSITE STRUCTURES MADE BY PATCHES USING STACKING SEQUENCE TABLES** *François-Xavier Irisarri (ONERA), Cédric Julien (ONERA), Dimitri Bettebghor (ONERA)* A bi-level optimization strategy is presented in which stacking sequence tables are used to link thickness variations to stiffness variations within a continuous optimization.	**4106-1 INFLUENCE OF PROCESS PARAMETERS ON THE EFFICIENCY OF TRANSVERSE IMPREGNATION OF TEXTILES** *David Becker (Institut fuer Verbundwerkstoffe GmbH), Joachim Broser (Institut fuer Verbundwerkstoffe GmbH), Peter Mitschang (Institut fuer Verbundwerkstoffe GmbH)* By combining transverse permeability measurement with online-compaction monitoring, the influence of pressure drop, flow rate & flow acceleration on the textile impregnation behavior was investigated.	**4107-1 VISCOELASTIC BEHAVIOUR OF SINGLE HEMP FIBRE UNDER CONSTANT AND CYCLIC HUMIDITY ENVIRONMENT - EXPERIMENT AND MODELLING.** *Vincent Placet (FEMTO-ST), Ousseynou CISSE (FEMTO-ST), Violaine GUICHERET-RETEL (FEMTO-ST), Frédérique TRIVAUDEY (FEMTO-ST), Lamine BOUBAKAR (FEMTO-ST)* The aim of this study is to investigate and model the time-dependent tensile behaviour of single hemp fibres in view of their integration in composite materials.	**4108-1 DEGRADATION OF NFC SANDWICH PANELS DUE TO ACCELERATED WEATHERING** *Benjamin Hornblow (FORCE Technology)* Epoxy/flax-fibre sandwich panels were shown to be a suitable alternative to birch plywood for the carrying box of a cargo bicycle. UV resistant coating proved effective at preventing colour change.	**4109-1 VACUUM INFUSION PROCESSING OF CELLULOSE NANOFIBRE NETWORKS** *Yvonne Aitomäki (Luleå University of Technology), Sergio Moreno Rodríguez (Luleå University of Technology), Staffan Lundström (Luleå University of Technology), Kristiina Oksman (Luleå University of Technology)* Cellulose nanofibre networks of different porosity are made from fibrillated pulp with the aim of allowing vacuum infusion to be used to manufacture nanocomposites from these networks.	**4110-1 COMPARING UNREINFORCED AND PIN-REINFORCED CFRP/PMI FOAM CORE SANDWICH STRUCTURES REGARDING THEIR DAMAGE TOLERANCE BEHAVIOUR** *Marianne John (Fraunhofer IWM), Anne Geyer (Fraunhofer IWM), Ralf Schlimper (Fraunhofer IWM), Ralf Schäuble (Fraunhofer IWM)* The SCB-test is used to determine the Energy Release Rate (ERR) as a characteristic value of the Damage Tolerance behavior of unreinforced and pin-reinforced CFRP/PMI foam core sandwich structures.
9:50	**4101-2 ADVANCED SMC-PROCESSING WITH CONTINUOUS FIBER REINFORCEMENT** *Florian Gortner (Institut für Verbundwerkstoffe), Luisa Medina (Institut für Verbundwerkstoffe), Peter Mitschang (Institut für Verbundwerkstoffe)* The combination of textile reinforcement with a conventional short fiber Sheet Molding Compound (SMC) enables the production of complex component geometries with increased mechanical properties.	**4102-2 ENCAPSULATION OF MULTIWALL CARBON NANOTUBE VIA SELF-POLYMERIZED POLYDOPAMINE: THE IMPROVEMENT ON PROPERTIES OF ELASTOMERIC POLYURETHANE NANOCOMPOSITES WITH ULTRALOW NANOTUBE LOADINGS** *Chenzhong Mu (Nanyang Technological University), Liying Zhang (Nanyang Technological University), Yujie Song (Nanyang Technological University), Ming Liu (Nanyang Technological University), Xiao Hu (Nanyang Technological University)* A facile and eco-friendly method employing polydopamine (PDA) as a surface treatment agent was used to modify the CNTs surfaces and the influences of PDA-CNTs on nanocomposites were studied as well.	**4103-2 FAILURE MECHANICS OF SANDWICH PANELS SUBJECTED TO WATER SLAMMING** *Mark Battley (University of Auckland), Tom Allen (University of Auckland)* Failure mechanics of foam core sandwich panels subjected to water slamming are characterised demonstrating significant differences in damage evolution and strength depending on the type of material.	**4104-2 ADDITIVE LAYER MANUFACTURING OF VASCULAR NETWORKS FOR REPEATED SELF-HEALING FUNCTIONALITY** *Isabel Qamar (University of Bristol), Richard Trask (University of Bristol)* Additive Manufacturing techniques are used to develop porous vascular networks for self-healing applications, permitting multiple healing cycles by keeping the network intact.	**4105-2 STRUCTURAL OPTIMIZATION TO PREVENT CRACK PROPAGATION FOR CFRP CRYOGENIC TANK** *Hayato Fukui (Tokyo University of Science), Akinori Yoshimura (Japan Aerospace Exploration Agency), Ryosuke Matsuzaki (Tokyo University of Science)* We conducted structural optimizations for CFRP cryogenic propellant tank by using genetic algorithm, and proposed the structure, which can prevent crack propagation.	**4106-2 INFLUENCE OF COMPACTION BEHAVIOR OF CARBON NCF ON PREFORM MECHANICS FOR CONTINUOUS PROFILE PREFORMING** *Timo Grieser (Institute fuer Verbundwerkstoffe GmbH), Peter Mitschang (Institute fuer Verbundwerkstoffe GmbH)* The influence of process and material parameters on compaction behavior of singly-ply and multi-ply carbon fiber NCF preforms was investigated to improve stationary and continuous preforming.	**4107-2 DEVELOPING MULTIFILAMENT DRAWING FACILITIES FOR PHOSPHATE GLASSES** *Andrew Parsons (University of Nottingham), Nusrat Sharmin (University of Nottingham), Sharifah Shaharuddin (International Islamic University Malaysia), Ifty Ahmed (University of Nottingham), Martyn Marshall (Glass Technology Services), Tim Kermeen (Valmiera Glass UK Ltd.), Chris Rudd (University of Nottingham)* A prototype multi-filament fibre drawing system was developed to produce bound threads of resorbable phosphate glass fibre. These threads were then used to produce a phosphate glass woven textile.	**4108-2 WASTE SILK/WOOL HYBRID BIOCOMPOSITES WITH PBS MATRIX: PROCESSING, PROPERTIES AND ELECTRON BEAM TREATMENT EFFECT** *Donghwan Cho (Kumoh National Institute of Technology), Hwi Yong Lee (Kumoh National Institute of Technology)* The study is focusing on processing hybrid biocomposites with waste silk/wool fibers and PBS and on characterising the electron beame treatment effect on the thermal and mechanical properties.	**4109-2 PERMEABILITY ENHANCEMENT WITH DIFFERENT GLASS FIBER QUASI-UD STRUCTURE ARRANGEMENTS FOR RTM-TP PROCESS** *Guillaume Cazaux (Laboratoire Ondes et Milieux Complexes - Université du Havre), Laurent Bizet (Laboratoire Ondes et Milieux Complexes - Université du Havre), Joël Bréard (Laboratoire Ondes et Milieux Complexes - Université du Havre), Moussa Gomina (Centre National de Recherche Technologique Materiaux - ENSICAEN), Elena Syerko (Ecole Centrale de Nantes), Sebastien Comas-Cardona (Ecole Centrale de Nantes), Christophe Binetruy (Ecole Centrale de Nantes), Gilles Orange (Solvay)* The common work of TAPAS project members propose an in-plane permeability comparison of three different glass fiber fabrics structures, characterized by experiments and analytical/numerical models.	**4110-2 STRAIN VISUALISATION OF COMPOSITE SANDWICH STRUCTURES WITH DIFFERENT CORE MATERIALS FOR WIND TURBINE BLADES** *Cihan Kaboglu (Imperial College London), Soraia Pimenta (Imperial College London), Andy Morris (EDF Energy), John P. Dear (Imperial College London)* This work studies the effect of grading the density of the core material of sandwich structures. It is shown that a uniform core maximises flexural strength, but a graded core may delay final failure.

Meeting room 5	Meeting room 6	Meeting room 7	M1	M2	M3	M4	M5	M6	M7	M8
4111 Multifunctional Composites - Adaptive Response and Reconfiguration 3	**4112 Composites with Metallic Components 1**	**4113 Ductile and Pseudo-ductile Composites 5**	**4114 Models Homogenization – Micro to Macro 5**	**4115 Identification using Full-Field Measurements**	**4116 Dynamic Fracture 2**	**4117 Manufacturing Up-Scaling and Automation 2**	**4118 Multiscale Modelling of Structures 1**	**4119 Applications - Wind, Wave and Tidal Energy 1**	**4120 Sensors in Experimental Mechanics 2**	**4121 Multifunctional Composites - Smart Structures 2**
4111-1 COMPARING DIFFERENT NANOPARTICLE EMBEDDING IN A POLYMERIC MATRIX TOWARD MULTI-FUNCTIONALITY *Biswajit Basu (Trinity College), Fabio Casciati (University of Pavia), Sara Casciati (University of Catania), Biqiong Chen (University of Sheffield), Andrea Spagnoli (University of Parma)* Graphene Nanoparticles Embedded in a Polymeric Matrix for Added/value Multifunctionality. This paper reports some aspects of a work-in-progress. Scenarios of extreme environmental conditions.	**4112-1 SYNERGISTIC STRENGTHENING EFFECT IN THE GRAPHENE-CARBON NANOTUBE HYBRID-REINFORCED ALUMINUM MATRIX COMPOSITES** *Genlian Fan (Shanghai Jiao Tong University), Zan Li (Shanghai Jiao Tong University), Zhanqiu Tan (Shanghai Jiao Tong University), Zhiqiang Li (Shanghai Jiao Tong University), Qiang Guo (Shanghai Jiao Tong University), Di Zhang (Shanghai Jiao Tong University)*	**4113-1 ALIGNED SHORT FIBRE COMPOSITES WITH DUCTILE BEHAVIOUR** *Hana Yu (University of Bristol), Marco Longana (University of Bristol), Gael Grail (Imperial College London), Soraia Pimenta (Imperial College London), Paul Robinson (Imperial College London), Michael Wisnom (University of Bristol), Kevin Potter (University of Bristol)* Highly aligned short fibre composites with fibre length close to the critical value, which can bring a nonlinear behaviour, are manufactured and the results are compared with the analytical solution.	**4114-1 NON-CONFORMAL FINITE ELEMENT HOMOGENIZATION APPLIED TO WOVEN COMPOSITES WITH COMPLEX TEXTILE ARCHITECTURES** *Benoit Wucher (Cenaero), Stefan Hallström (Royal Institute of Technology (KTH)), David Dumas (Cenaero), Thomas Pardoen (Université catholique de Louvain), Christian Bailly (Université catholique de Louvain), Philippe Martiny (e-Xstream engineering), Frédéric Lani (Université catholique de Louvain)* A simple finite element procedure is developed for the homogenization of highly-compacted woven textiles, using non-conformal meshing and penetration compensation.	**4115-1 ULTRA-HIGH SPEED FULL-FIELD DEFORMATION MEASUREMENTS TO IDENTIFY THE HIGH STRAIN RATE BEHAVIOUR OF COMPOSITES** *Haibin Zhu (University of Technology of Troyes), Fabrice Pierron (University of Southampton), Clive Siviour (University of Oxford)* This communication presents a new methodology to obtain composite stiffness components at high strain rate, based on ultra-high speed imaging, full-field measurements and inverse identification.	**4116-1 EXPERIMENTAL ASSESSMENT AND MODEL DEVELOPMENT OF FIBRE REINFORCED COMPOSITE SANDWICH PANELS SUBJECTED TO OUT-OF-PLANE IMPACT LOADING** *Ingrid Schipperen (TNO)* The behaviour of FRP sandwich panels under impact was studied both experimentally and numerically. It was shown that design for impact and analysis of impact loaded panels is possible.	**4117-1 AUTOMATION OF COMPOSITE MANUFACTURING USING OFF-THE-SHELF SOLUTIONS; THREE INDUSTRIAL CASES FROM THE AEROSPACE INDUSTRY** *Andreas Björnsson (Linköping University), Marie Jonsson (Swerea Sicomp), Kerstin Johansen (Linköping University)* The paper explores how off-the-shelf solutions, developed for other purposes than composite manufacturing, can be used to build systems for automated composite manufacturing.	**4118-1 INTEGRATED MULTI-SCALE MODELLING OF 3D WOVEN STRUCTURES** *Bassam El Said (University of Bristol), Dmitry Ivanov (University of Bristol), Andrew Long (University of Nottingham), Stephen Hallett (University of Bristol)* A novel integrated multi-scale modelling framework that allows the designer to virtually weave, compact and simulate the mechanical performance of 3D woven composites structures.	**4119-1 STATIC AND DYNAMIC THROUGH THICKNESS LAMINA PROPERTIES OF THICK LAMINATES** *Francisco Lahuerta (Knowledge Centre WMC), Rogier Nijssen (Knowledge Centre WMC), Frans van der Meer (TU Delft (CITG)), Bert Sluys (TU Delft (CITG))* In order to study the through thickness variation of lamina properties in thick laminates, 60-70mm thick unidirectional GFRP infused panels were divided in sub-laminates and tested (static & fatigue).	**4120-1 MANUFACTURING OF HIGH PRESSURE COMPOSITE VESSEL WITH INTEGRATED OPTICAL FIBER SENSORS. LIMITATIONS AND BENEFITS** *Pawel Gasior (Wroclaw University of Technology), Jerzy Kaleta (Wroclaw University of Technology), Radosław Rybczyński (Wroclaw University of Technology)*	**4121-1 DAMAGE MONITORING OF SANDWICH PANELS BASED ON IMPACT FORCE IDENTIFICATION USING RADIATED SOUNDS** *Satoshi Atobe (Tohoku University), Masato Muramoto (Tohoku University), Hisao Fukunaga (Tohoku University)* This paper presents a method for identifying impact forces acting on sandwich panels, and also detecting the impact-induced damage using the information obtained by the impact force identification.
4111-2 SHAPE MEMORY POLYMER NANOCOMPOSITES: NANO-REINFORCEMENT AND MULTIFUNCTIONALIZATION *Haibao Lu (Harbin Institute of Technology), Jinsong Leng (Harbin Institute of Technology), Shanyi Du (Harbin Institute of Technology)* Research and development of shape memory polymer nanocomposites from nano-reinforcement and multi-functional will be reviewed and discussed in this work.	**4112-2 ON THE BEHAVIOUR OF FIBRE REINFORCED METAL MATRIX COMPOSITES UNDER LOADING AND THERMAL CYCLING CONDITIONS** *Haofeng Chen (University of Strathclyde)* The paper investigates the shakedown and ratchetting behaviour of an idealised fiber-reinforced MMC that consists of a square array of fibers in an aluminium matrix.	**4113-2 EFFECT OF FIBER LENGTH ON THE TENSILE STRENGTH OF UNIDIRECTIONALLY ARRAYED CHOPPED STRANDS** *Ichiro Taketa (Toray Industries-Inc.)* A newly-proposed equation closely reflects the relation between tensile strength and fiber length on unidirectional composites with a stagger-structure of chopped strands (UACS).	**4114-2 MULTISCALE ANALYSIS FOR NEGATIVE THROUGH-THE-THICKNESS POISSON'S RATIO OF ELASTIC-VISCOPLASTIC ANGLE-PLY CFRP LAMINATES** *Tetsuya Matsuda (University of Tsukuba), Keita Goto (University of Tsukuba), Nobutada Ohno (Nagoya University), Yusuke Kawasaki (Marubeni Information Systems Co.-Ltd.), Shintaro Miyashita (Marubeni Information Systems Co.-Ltd.)* A multiscale analysis for the negative through-the-thickness Poisson's ratio of angle-ply CFRP laminates in the viscoplastic region is performed based on a homogenization theory.	**4115-2 IDENTIFICATION OF FAILURE MECHANISMS IN CFRP LAMINATES USING 3D DIGITAL IMAGE CORRELATION** *Nora Schorer (University of Augsburg), Markus G. R. Sause (University of Augsburg)* The local strain concentration of artificially introduced defects in unidirectional composites is investigated experimentally and compared to a validated finite element modelling.	**4116-2 SOFT IMPACT RESPONSE OF LAMINATED GLASS PLATES** *Iman Mohagheghian (Imperial College London), Yi Wang (Imperial College London), Jie Zhou (Imperial College London), Xintao Guo (Beijing Institute of Aeronautical Materials), Maria Charalambides (Imperial College London), John Dear (Imperial College London)* Damage development in laminated glass plates with different types of polymer inter-layer is investigated under low and high velocity soft impact.	**4117-2 IN-LINE QUALITY CONTROL SYSTEM FOR THE INDUSTRIAL PRODUCTION OF MULTIAXIAL NON-CRIMP FABRICS** *Marcel Haeske (Institut fuer Textiltechnik (ITA) of RWTH Aachen University), Bahoz Abbas (Institut fuer Unternehmenskybernetik e.V. (IfU)), Tobias Fuertjes (Werkzeugmaschinenlabor (WZL) of RWTH Aachen University), Thomas Gries (Institut fuer Textiltechnik (ITA) of RWTH Aachen University)* A new approach is presented, in which a real-time system for error detection is developed in order to enable the inline quality control during the production process of NCF.	**4118-2 MULTISCALE ANALYSES OF WOVEN POLYMER MATRIX COMPOSITES: DAMAGE MODELING.** *Christian Fagiano (ONERA), Aurelien Doitrand (ONERA), Martin Hirsekorn (ONERA), Vincent Chiaruttini (ONERA)* A finite element strategy is proposed to evaluate the effects of mesoscale damage on the macroscopic mechanical properties of woven polymer matrix composites.	**4119-2 DESIGN AND TESTING OF THREE-DIMENSIONAL COMPOSITES FOR FLYWHEEL ROTOR** *Noboru Hiroshima (The Graduate University for Advanced Studies School of Physical Sciences), Masashi Koyama (MEISEI University), Hiroshi Hatta (Japan Aerospace Exploration Agency), Yuichi Nagura (Tokyo University of Science), Ken Goto (Japan Aerospace Exploration Agency), Yasuo Kogo (Tokyo University of Science)* Carbon fiber reinforced three-dimensional composites were applied to a high speed rotation disk. Based on its optimum design, three types of prototype rotor were made and evaluated by spin test.	**4120-2 REAL-TIME PROCESS MONITORING OF 3D PRINTED MULTILAYERED STRUCTURES USING OPTICAL FIBER BRAGG GRATING SENSORS** *Charoula Kousiatza (University of Piraeus), Dimitrios Karalekas (University of Piraeus)* The present work investigates the incorporation of optical fiber Bragg grating sensors for real-time monitoring of strain build up during the fabrication process of 3D printed multilayered structures.	**4121-2 EXPERIMENTAL AND NUMERICAL STUDY ON INFLUENCE OF EMBEDDED INTERROGATOR GEOMETRY ON STRUCTURAL PERFORMANCE OF FIBER REINFORCED COMPOSITES** *Nicolas Lammens (UGent), Geert Luyckx (UGent), Wim Van Paepegem (UGent), Joris Degrieck (UGent)* This work presents a F.E. technique to model the resin pocket surrounding any inclusion in composites, and the effect on structural performance of the composite host, and is validated by experiments.

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16
10:10	**4101-3 APPLICATIONS AND CHALLENGES OF PREPREG FORMING TECHNOLOGIES IN AIRCRAFT INDUSTRY** *Jan Christoph Kako (Airbus Operations GmbH)* Prepreg Forming is widely applied in manufacturing of reinforced panels in aircraft production. Recently progress was made on understanding and description of the process, still challenges remain.	**4102-3 CARBON NANOTUBE-BASED CONDUCTIVE FILMS FOR INDUCTION WELDING OF THERMOPLASTIC POLYMERS AND COMPOSITES** *Rouhollah Dermanaki Farahani (École de technologie supérieure), Martine Dube (École de technologie supérieure)* In this work, two conductive nanotube-based films are fabricated and tested as new types of heating elements for welding of thermoplastic polymers using microwave and induction welding processes.	**4103-3 BLAST MITIGATION USING ELASTIC METAMATERIALS WITH DESIGNABLE MULTI-DAMPERS** *Guoliang Huang (University of Missouri)* Elastic metamaterials have been intensively studied in recent years due to their unusual properties in manipulating elastic waves which are not readily available in nature. In the paper, an elastic me	**4104-3 THERMAL REGULATION OF VASCULARIZED POLYMER MATRIX COMPOSITES FOR ENHANCED THERMOMECHANICAL PERFORMANCE** *Anthony M Coppola (University of Illinois at Urbana-Champaign), Nancy R Sottos (University of Illinois at Urbana-Champaign), Scott R White (University of Illinois at Urbana-Champaign)* Results from thermomechanical testing of actively cooled vascularized polymer matrix composites are presented and compared to non-cooled composites. Performance is greatly enhanced by active cooling.	**4105-3 IN-PLANE MATERIAL CONTINUITY FOR THE DISCRETE MATERIAL OPTIMIZATION METHOD** *René Sørensen (Aalborg University), Erik Lund (Aalborg University)* In this work, we present in-plane material filters for multi-material topology optimization. The filters can impose a minimum length scale onto the optimized design without the use of a patch approach	**4106-3 A COMPARISON OF TWO MEASUREMENT TECHNIQUES FOR DETERMINING THE 2D PERMEABILITY CHARACTERISTICS OF REINFORCING TEXTILES** *Ewald Fauster (Montanuniversität Leoben), Harald Grössing (Montanuniversität Leoben), Ralf Schledjewski (Montanuniversität Leoben)* Two well-known techniques for 2D permeability characterization based on radial flow experiments are investigated in terms of sources for systematic deviations inherent to the results obtained.	**4107-3 DEVELOPMENTS IN HOLLOW POLYACRYLONITRILE (PAN) AND PAN/CARBON-NANOTUBE- (CNT-) BASED CARBON FIBERS** *Thomas Tsotsis (The Boeing Company), Satish Kumar (Georgia Institute of Technology), Han Gi Chae (Georgia Insititute of Technology), Prabhakar Gulgunje (Georgia Institute of Technology), Bradley Newcomb (Georgia Institute of Technology), Kishor Gupta (Georgia Insititute of Technology)* Hollow polyacrylonitrile (PAN) and PAN/carbon nanotube- (CNT-) based carbon fibers were processed using bi-component fiber spinning yielding fibers with moduli exceeding standard-modulus fibers.	**4108-3 NOVEL BIOPOLYMER COMPOSITES BASED ON WS2 INORGANIC NANOTUBES** *Mohammed Naffakh (Escuela Técnica Superior de Ingenieros Industriales-Universidad Politécnica de Madrid (ETSII-UPM)), Tyler Silverman (Escuela Técnica Superior de Ingenieros Industriales-Universidad Politécnica de Madrid (ETSII-UPM)), Ana M. García (Escuela Técnica Superior de Ingenieros Industriales-Universidad Politécnica de Madrid (ETSII-UPM)), Diego A. Moreno (Escuela Técnica Superior de Ingenieros Industriales-Universidad Politécnica de Madrid (ETSII-UPM)), Carlos Marco (Instituto de Ciencia y Tecnología de Polímeros (ICTP-CSIC)), Gary Elllis (Instituto de Ciencia y Tecnología de Polímeros (ICTP-CSIC)), Alla Zak (Holon Institute of Technology)* The aim of this investigation is to highlight the latest findings on the use of tungsten disulphide (WS2) inorganic nanotubes in the development of novel biopolymer composite materials.	**4109-3 CAPILLARY WICKING IN FLAX FIBERS REINFORCEMENTS; ORTHOTROPIC ISSUES AND COMPARISON WITH CARBON REINFORCEMENTS** *Monica Francesca Pucci (Ecole des Mines de Saint-Etienne), Pierre-Jacques Liotier (Ecole des Mines de Saint-Etienne), Sylvain Drapier (Ecole des Mines de Saint-Etienne)* Capillary wicking in treated and untreated flax fibers reinforcements. Orthotropic issues in capillary pressure characterization and comparison with carbon reinforcements.	**4110-3 VIRTUAL TESTING OF NOMEX HONEYCOMB SANDWICH PANEL INSERTS** *Ralf Seemann (Institute of Product Development and Mechanical Engineering Design-Technische Universität Hamburg-Harburg (TUHH)), Dieter Krause (Institute of Product Development and Mechanical Engineering Design-Technische Universität Hamburg-Harburg (TUHH))* The study develops a detailed progressive failure model based on the Finite Element Method (FEM) for the widely used fully potted threaded sandwich insert under pull-out loading.
10:30	**4101-4 INTRODUCTION OF A PRODUCTION TECHNOLOGY FOR THE PRE-ASSEMBLY OF MULTI-MATERIAL-PREFORMS AIMING AT A LARGE SCALE PRODUCTION** *Raphael Schnurr (Technische Universität Braunschweig), Christian Löchte (Technische Universität Braunschweig), Franz Dietrich (Technische Universität Braunschweig), Klaus Dröder (Technische Universität Braunschweig), Kristian Lippky (Technische Universität Braunschweig), Fabian Fischer (Technische Universität Braunschweig), Klaus Dilger (Technische Universität Braunschweig)* Automated pre-assembly approach for hybrid preforms in the scenario of a large scale production. Development of a first demonstration process for feasibility tests is presented.	**4102-4 SELF-ASSEMBLED "BRICK-AND-MORTAR" NANOSTRUCTURE INSPIRED BY NATURE: A ROUTE TOWARDS HIGH MECHANICAL PERFORMANCE NANOCOMPOSITES** *Francois De Luca (Imperial College London), Robert Menzel (Imperial College London), Jonny Blaker (Imperial College London), Milo Shaffer (Imperial College London), Alexander Bismarck (Imperial College London)* A hybrid nanostructure was assembled via Layer-by-Layer assembly to produce a "brick-and-mortar" (LDH/PSS)n coating similar to nacre, but with all dimensions scaled down to the nanometre lengthscale.	**4103-4 FUNCTIONALLY GRADED COMPOSITES WITH VERTICALLY ALIGNED CARBON NANO-TUBE (VACNT) EMBEDDED LAYERS FOR ENERGY ABSORPTION** *Prabhakar Mantena (UNIVERSITY OF MISSISSIPPI), Veera Boddu (ERDC)* Dynamic Mechanical Analysis and high strain-rate SHPB compression response of woven fiber-glass polyester/polyurethane matrix composites with embedded VACNT forest layers, is presented.	**4104-4 INTERLAMINAR FRACTURE OF CF/EP COMPOSITE CONTAINING A DUAL-COMPONENT MICROENCAPSULATED SELF-HEALING SYSTEM** *Habibah Ghazali (University of Sydney), Lin Ye (University of Sydney), Ming Qiu Zhang (Zhongshan University)* An experimental study on self-healing ability of carbon fibre/epoxy composite (Vf=65%) with microencapsulated epoxy and mercaptan as healant. Recovery of 80% original fracture toughness was achieved.	**4105-4 CONCURRENT MULTI-SCALE OPTIMIZATION DESIGN OF COMPOSITE FRAME STRUCTURES USING HEAVISIDE PENALIZATION DISCRETE MATERIAL OPTIMIZATION** *Zunyi Duan (Dalian University of Technology), Jun Yan (Dalian University of Technology), Guozhong Zhao (Dalian University of Technology)* With considering specific manufacturing constraints representative actual industrial requirement, the paper realizes the concurrent multi-scale design optimization of composite frame structure.	**4106-4 IMPROVED ANISOTROPIC PERMEABILITY CHARACTERIZATION IN UNIDIRECTIONAL INJECTIONS BASED ON FLOW FRONT ANGLE MEASUREMENTS** *Claudio Di Fratta (ETH Zürich), François Trochu (École Polytechnique de Montréal), Paolo Ermanni (ETH Zürich)* The work illustrates simple and cost-effective strategies to accurately characterize in-plane permeability by 1D injections along only one or two textile directions, instead of the conventional three.	**4107-4 EFFECTS OF COMBINED TREATMENT ON THE PROPERTIES OF PBO FIBER AND ITS COMPOSITES** *Shi Gang (National University of Defense Technology), Zhang Jianwei (National University of Defense Technology), Jiang Dazhi (Changsha)* Combined treatment of -ray radiation, PPA etching and coupling agent coating to PBO fibers was proposed and effects on mechanical properties of the PBO and PBO/epoxy composites were investigated.	**4108-4 DEVELOPMENT OF HIGH PERFORMANCES AND MULTI-FUNCTIONAL PLANT FIBER REINFORCED COMPOSITES** *Yan Li (Tongji University)*	**4109-4 MANUFACTURING AND TESTING OF CURVED FIBER COMPOSITES USING VACUUM ASSISTED RESIN TRANSFER MOULDING (VARTM) AND FDM-TECHNOLOGY** *Jens Schuster (University of Applied Sciences), Monis Kazmi (University of Auckland), Johannes Lutz (University of Applied Sciences Kaiserslautern)* 3D-printing is used to produce single and double curved molds for vacuum assisted resin transfer molding (VARTM). The produced parts were evaluated in terms of thickness variations and shear strength.	**4110-4 STATIC RESPONSE OF SANDWICH BEAMS USING A VARIABLE STIFFNESS HONEYCOMB CORE** *Qing Ai (Univeristy of Bristol), Paul Weaver (Univeristy of Bristol), Mahdi Azarpeyvand (Univeristy of Bristol)* A novel sandwich beam model is proposed and the effect of stiffness variation in the core on static response of the sandwich beam has been investigated parametrically using the present formulation.
10:50	**Coffee in the Exhibition**									

Meeting room 5	Meeting room 6	Meeting room 7	M1	M2	M3	M4	M5	M6	M7	M8
4111-3 MAGNETO-MECHANICAL ACTUATION OF FERROMAGNETIC SHAPE MEMORY ALLOY COMPOSITES *Susanne Glock (EPFL), Luis Canal (EPFL), Veronique Michaud (EPFL)* We investigated the magneto-mechanical actuation behaviour of composites made with Ni-Mn-Ga single crystalline rods embedded into epoxy, and compared with a FE analysis.	**4112-3 HIGH STRENGTH AND SUPERIOR OXIDATION RESISTANCE OF HYBRID (TIC+TIB)/TI6AL4V COMPOSITES WITH NOVEL NETWORK ARCHITECTURE** *Lujun Huang (Harbin Institute of Technology), Shaolou Wei (Harbin Institute of Technology), Wei Ren (Harbin Institute of Technology), Lin Geng (Harbin Institute of Technology)*	**4113-3 EXPERIMENTAL STUDY OF THE STRESS TRANSFER IN DISCONTINUOUS COMPOSITES ON THE BASIS OF A UNIT CELL MODEL** *Benjamin Bachmann (University of Applied Sciences and Arts Northwestern Switzerland), Jeremias Blum (University of Applied Sciences and Arts Northwestern Switzerland), Lian Giger (University of Applied Sciences and Arts Northwestern Switzerland), Kunal Masania (University of Applied Sciences and Arts Northwestern Switzerland), Clemens Dransfeld (University of Applied Sciences and Arts Northwestern Switzerland), Jesus Maldonado (ETH Zürich)* The stress-strain response of thermoplastic composites with a discontinuous 'brick-and-mortar' archi-tecture was determined experimentally and compared to shear-lag stress transfer model predictions.	**4114-3 ACCOUNTING FOR FIBER BENDING EFFECTS IN HOMOGENIZATION OF LONG FIBER REINFORCED COMPOSITES** *Konstantinos Poulios (Technical University of Denmark), Christian Niordson (Technical University of Denmark)* A homogenized finite-element model is presented, which captures the micro-mechanical behavior of long fiber reinforced composites accurately, including the contribution of the fiber bending stiffness.	**4115-3 MULTI-SCALE IDENTIFICATION USING M-CRE BASED ON FULL-FIELD MEASUREMENTS** *Shaojuan Huang (Laboratoire Roberval-Université de Technologie de Compiègne), Pierre Feissel (Laboratoire Roberval-Université de Technologie de Compiègne), Pierre VILLON (Laboratoire Roberval-Université de Technologie de Compiègne)* A two-scale identification strategy based on the modified constitutive relation error is proposed to find heterogeneous properties at the measurement level and homogeneous ones at the specimen level.	**4116-3 IMPACT DAMAGE RESPONSE OF CARBON FIBRE-REINFORCED AEROSPACE COMPOSITE PANELS** *Hamed Yazdani Nezhad (Irish Centre for Composites Research-Materials and Surface Science Institute-University of Limerick), Anthony Auffray (Limerick), Conor McCarthy (Irish Centre for Composites Research-Materials and Surface Science Institute-University of Limerick), Ronan O'Higgins (Irish Centre for Composites Research-Materials and Surface Science Institute-University of Limerick)* This research looks into the damage response and energy absorption behaviour of carbon fibre-reinforced thermoplastic and thermoset polymer composite panels subjected to low-velocity impact events.	**4117-3 ADDITIVE MANUFACTURE OF MULTIFUNCTIONAL COMPOSITE STRUCTURES** *Konstantine Fetfatsidis (Aurora Flight Sciences), Christopher Hansen (University of Massachusetts Lowell), Andrew Burke (University of Massachusetts Lowell), Bradford Olson (University of Massachusetts Lowell), Harshal Tarar (University of Massachusetts Lowell)* Automated Fiber Placement and 3D Printing are used to fabricate multifunctional composites using aerospace-grade carbon fiber prepreg with autoclave and out-of-autoclave thermoset epoxy resin systems.	**4118-3 A NEW METHOD OF SHEAR STIFFNESS PREDICTION OF PERIODIC TIMOSHENKO BEAMS** *Liang Xu (Dalian University of Technology), Gengdong Cheng (Dalian University of Technology), Sinan Yi (Dalian University of Technology)* This paper presents a presents a new method of shear stiffness prediction of periodic heterogeneous beams based on the new numerical implementation of AH method which the authors developed earlier.	**4119-3 EVALUATION OF SIMPLIFIED LOADING MODELS FOR FINITE ELEMENT ANALYSIS OF COMPOSITE WIND TURBINE BLADES** *Rosemary Barnes (UNSW), Evgeny Morozov (UNSW), Krishna Shankar (UNSW)* 3 loading approximations used in wind turbine blade analysis were compared: CFD load, uniform pressure and tip force. An FEA model was analysed and topological optimisation was performed for each.	**4120-3 DYNAMIC DEFORMATION MONITORING OF GFRP BEAM USING OPTICAL FIBER DISTRIBUTED SENSING SYSTEM BASED ON OPTICAL FREQUENCY DOMAIN REFLECTOMETRY** *Daichi Wada (The University of Tokyo), Hideaki Murayama (The University of Tokyo), Tetsuo Tamaoki (The University of Tokyo), Daichi Ogawa (The University of Tokyo)* This paper demonstrates the dynamic identification of the deformation of GFRP in the state of vibration using an optical fiber distributed sensing system. A measurement rate was more than 800S/s.	**4121-3 RIGIDITY TUNABLE MULTIFUNCTIONAL COMPOSITES FOR SOFT ROBOTICS** *Wanliang Shan (University of Nevada-Reno), Carmel Majidi (Carnegie Mellon University)* Methods for rigidity tuning in soft robotics through multilayered composite that is directly powered with electrical current; Potential applications are demonstrated with a soft pneumatic finger
4111-4 EMERGENT MECHANICAL ADAPTIVITY: CONTROLLING ACTUATION AND LOCOMOTION THROUGH GEOMETRY-COMPOSITION-GRADIENT CORRELATIONS IN COMPOSITE MATERIAL SYSTEMS *Richard A. Vaia (Air Force Research Laboratory), Phil Buskohl (Air Force Research Laboratory), David Wang (Air Force Research Laboratory), Loon-Seng Tan (Air Force Research Laboratory)* The design of semi-autonomous materials comprised of active-nodes in an inactive-matrix is demonstrated using polyimides that exhibit motion via energy harvesting from a vapour gradient.	**4112-4 MICROSTRUCTURE AND PROPERTIES OF IN-SITU TIB2 PARTICLE REINFORCED AL-4.5CU COMPOSITES** *Qi Gao (Huazhong University of Science and Technology), Shusen Wu (Huazhong University of Science and Technology), Shulin LÜ (Huazhong University of Science and Technology), Xuecheng Duan (Huazhong University of Science and Technology)* 5vol% TiB2/Al-4.5Cu composites were prepared by the salt-metal reactions . The size of TiB2 particles is under 0.4μm. extremely refined equiaxial grains are formed. mechnical properties have improved.		**4114-4 MODELING CHAIN FOR HOMOGENISATION AT MESOSCOPIC SCALE: APPLICATION FOR COMPOSITE MATERIALS WITH 3D WOVEN FABRICS** *Julien SCHNEIDER (SNECMA), Yanneck WIELHORSKI (SNECMA), Gaëtan HELLO (LMEE), Damien DURVILLE (LSSMAT (ECP))*	**4115-4 ASSESSING 3D MECHANICAL PROPERTIES OF COMPOSITES BASED ON DIGITAL IMAGE CORRELATION** *Guillaume Seon (University of Texas Arlington), Andrew Makeev (University of Texas Arlington), Julia Cline (University of Texas Arlington), Erian Armanios (University of Texas Arlington)* Simultaneous assessment of stress-strain curves in all principal material planes using a unidirectional small-plate torsion specimen and a full-field strain optimization method based on DIC and FEM	**4116-4 DELAMINATIONS AND ULTRASOUND ASSISTED REPAIR OF BALLISTICALLY LOADED GFRP** *Mikhail Zhikharev (South Ural State University), Sergei Vaulin (South Ural State University), Sergei Sapozhnikov (South Ural State University)* There were studied the factors influenced on the rheological properties of the matrix in terms of capillary effects for repair of delamination at the length up to 20 mm for 1.5 min.	**4117-4 IN-SITU CONSOLIDATION OF PEEK COMPOSITES BY AUTOMATED PLACEMENT TECHNOLOGIES** *Fernando Rodriguez-Lence (FIDAMC AIRBUS GROUP INNOVATION)* FIDAMC has developed a thermoplastic fibre placement technology based on laser beam heating that will enable in-situ consolidation of the thermoplastic material out of the autoclave.	**4118-4 MULTISCALE MODELLING APPROACH FOR FLEXIBLE RISERS** *Sridhar Narayanaswamy (Institute of High Performance Computing), Tianfu Guo (Institute of High Performance Computing), Zhiqian Zhang (Institute of High Performance Computing), Pham Dinh Chi (Institute of High Performance Computing), Ben Edmans (Lloyd's Register GTC), Graham Stewart (Lloyd's Register Energy)* We present developments in the linking of small scale local nonlinear structural behavior with large scale global dynamic analysis and demonstrate its application for unbonded flexible riser pipes.	**4119-4 BRIDGING THE GAP BETWEEN COUPON TESTS AND FULL-SCALE BLADE TESTS** *Arno Van Wingerde (Fraunhofer IWES), Simon Pansart (DNV-GL), Florian Sayer (Fraunhofer IWES), Eric Putnam (Fraunhofer IWES)* The rotor blade industry lacks subcomponent tests in its development cycle, needed to lower development costs and improve overall reliability. DNV-GL and Fraunhofer IWES are establishing such tests.		**4121-4 ACTIVE WING SHAPE RECONFIGURATION USING A VARIABLE CAMBER COMPLIANT WING SYSTEM** *James Joo (US Air Force Research Laboratory), Christopher Marks (University of Dayton Research Institute), Lauren Zientarski (University of Dayton Research Institute)* US Air Force Research Lab designed and fabricated a Variable Camber Compliant Wing and demonstrated a new capability and technology for an active wing camber change without discrete control surfaces.

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16
11:20	**4201 Processing - Manufacturing Technology 11**	**4202 Nano Composites 11**	**4203 ONR Special Symposium on Marine Composites 6**	**4204 Multifunctional Composites - Self-Healing and Bio-inspired Designs 2**	**4205 Structural Analysis and Optimization 11**	**4206 Experimental Methods for Process Characterisation 3**	**4207 Short Fibre Composites 2**	**4208 Biocomposites 10**	**4209 Liquid Composites Moulding 2**	**4210 Sandwich Structures and Materials 2**
11:20	**KEYNOTE** **4201-1 IMPREGNATION PERFORMANCE OF NON-ISOBARIC PROCESSES** *Peter Mitschang (Institut für Verbundwerkstoffe GmbH), Marcel Christmann (Simona AG), Luisa Medina (Institut für Verbundwerkstoffe GmbH)* Scope of the paper is to introduce a process model, which is capable to predict the impregnation performance for non-isobaric process conditions.	**4202-1 DENSIFYING EFFECT ON THE PROPERTIES OF CARBON NANOTUBE FILM** *Yanjie Wang (Beihang University), Min Li (Beihang University), Yizhuo Gu (Beihang University), Xiaohua Zhang (Suzhou Institute of Nano-Tech and Nano-Bionics), Shaokai Wang (Beihang University), Qingwen Li (Suzhou Institute of Nano-Tech and Nano-Bionics), Zuoguang Zhang (Beihang University)* The effects of densifying process parameters and densifying methods on the mechanical properties of CNT film fabricated from spinnable array were studied.	**4203-1 EXTENDED HIGH ORDER THEORY FOR SANDWICH PANELS AND COMPARISON WITH ELASTICITY** *George Kardomateas (Georgia Institute of Technology), Yeoshua Frostig (Technion-Israel Institute of Technology), Nunthadech Rodcheuy (Georgia Institute pf Technology)* The paper presents the response of a curved sandwich panels, within the framework of the EHSAPT model, i.e. where with the circumferential rigidity of the core is considered.	**4204-1 LIGHT WEIGHT AND IMPACT RESISTANT BIOMIMETIC COMPOSITES** *David Kisailus (University of California)*	**4205-1 COMPOSITE AIRCRAFT FUSELAGE STRUCTURE BLUNT IMPACT DAMAGE PREDICTION METHODOLOGY** *Hyonny Kim (University of California San Diego), Zhi Ming Chen (University of California San Diego)* This paper presents modeling development for predicting progressive damage to composite aircraft fuselage-type panels subject to wide area blunt impact.	**KEYNOTE** **4206-1 MULTI-SCALE MATERIAL AND PROCESS CHARACTERIZATION FOR RESIN TRANSFER MOLDING: CASE STUDY FOR A BLENDED EPOXY/PHENOLIC RESIN** *Jonathan Lo (University of Southern California), Mark Anders (University of Southern California), Timotei Centea (University of Southern California), Steven Nutt (University of Southern California)* We describe and demonstrate a comprehensive methodology for characterizing the properties and complex in-mold behavior of a thermoset RTM resin in various temperature and pressure conditions.	**4207-1 MULTI-SCALE ANALYSIS OF THE AGEING OF A REINFORCED POLYAMIDE 66 IN ETHANOL-BASED FUELS** *Camilo Cruz (Robert Bosch GmbH), Enrico Belmonte (Robert Bosch GmbH), Alexander Lux (Robert Bosch GmbH), Matthias De Monte (Robert Bosch GmbH), Marino Quaresimin (University of Padova)* Softening by fuel diffusion and polymer hydrolysis have been found as the most relevant degradation mechanisms triggered by an ethanol-based fuel on injection-moulded fibre reinforced PA66 composites	**4208-1 RAYLEIGH-TAYLOR SPIKES IN HARD AND SOFT NATURAL FIBER COMPOSITES** *Katharina Resch (University of Delaware), Xintian Su (University of Delaware), Shijin Gong (University of Delaware), Richard P. Wool (University of Delaware)* Morphology and properties of eco-leather, a highly innovative soft composite based on natural fibers and bio-based liquid molding resins are discussed.	**4209-1 CHARACTERISATION OF FLOW KINETICS AND VOID MIGRATION IN RFI PROCESS** *Simon B. Gosselin (University of Ottawa), François Robitaille (University of Ottawa)* Direct observations of resin flow and void formation during fabrication of composites produced using the resin film infusion (RFI) process are presented.	**4210-1 RESIN FILLET FORMATION IN HONEYCOMB SANDWICH STRUCTURES** *Matt Jennings (Deakin University), Mandy de Souza (Deakin University), Claudia Creighton (Deakin University), Anthony Pierlot (CSIRO), Steven Agius (Deakin University), Bronwyn Fox (Deakin University)* This study discusses the effect of heating rate during cure on the size and shape of resin fillets in honeycomb sandwich structures using null hypothesis significance testing.
11:40		**4202-2 STRUCTURE AND PERFORMANCE OF SILICON-CONTAINING POLYARYLACETYLENE-ATTAPULGITE NANOCOMPOSITES** *Jiadong Zhan (East China University of Science and Technology), Qiaolong Yuan (East China University of Science and Technology), Farong Huang (East China University of Science and Technology), Lei Du (East China University of Science and Technology)* Rod-like attapulgite particles (ATT) were used to reinforce the silicon-containing polyarylacetylene resin (PSA). The particle networks constructed in ATT/PSA affect the property of the nanocomposite	**4203-2 ANALYSIS OF FINITE DEFORMATIONS OF THICK PLATES WITH THIRD ORDER SHEAR AND NORMAL DEFORMABLE THEORY (TSNDT)** *Romesh Batra (Virginia Polytechnic Institute and State University), Arka Chattopadhyay (Virginia Polytechnic Institute and State University)*	**4204-2 SELF-HEALING COMPOSITES: IN-SITU REPAIR SOLUTIONS?** *Tim Coope (University of Bristol), Rafael Luterbacher (University of Bristol), Daniel Turkenburg (TNO Materials), Amirhossein Hajdaei (Element Materials Technology), Stefanos Giannis (Element Materials Technology), Konstantinos Kitsianos (GMI Aero), Hartmut Fischer (TNO Materials), Ian Bond (University of Bristol)* A novel epoxy resin containing reversible bondable Diels-Alder structures is developed and implemented into FRP composites to provide a self-healing functionality.	**4205-2 CONSIDERATION OF ADHESIVE JOINTS FOR A MULTI-MATERIAL TOPOLOGY OPTIMIZATION APPROACH** *Paul Falkenberg (Technische Universität Braunschweig), Thilo Franke (Volkswagen AG), Sierk Fiebig (Volkswagen AG), Thomas Vietor (Technische Universität Braunschweig)* The challenge lies in integrating the design of adhesive joints in the multi-material topology optimization process. Two modelling and a mechanical stress-based optimization approach are shown.		**4207-2 DEFORMATION AND FRACTURE BEHAVIOR OF INJECTION-MOLDED GLASS FIBER/POLYAMIDE 66 COMPOSITES WITH HIGH VOLUME FRACTION OF GLASS FIBER** *Kazuya Mizumoto (YKK Corporation), Kazuaki Sanada (Toyama Prefectural University), Makoto Kawagoe (Toyama Prefectural University), Mai Mizubayashi (YKK Corporation)* The effects of the fiber orientation and fiber volume fraction on the tensile and fracture properties of glass fiber/polyamide 66 composites produced via injection molding were investigated.	**4208-2 PREDICTION OF LINEAR DISSIPATIVE PROPERTIES OF FLAX FIBRES REINFORCED LAMINATES WITH VIBRATION ANALYSIS** *Marouane Belaïd (ISAT - Université de Bourgogne), Ali El Hafidi (ISAT - Université de Bourgogne), Stéphane Fontaine (ISAT - Université de Bourgogne), Papa-Birame Gning (ISAT - Université de Bourgogne), Benoît Piezel (ISAT - Université de Bourgogne)* Experimental and numerical approaches to identify the viscoelastic properties of flax fibre reinforced epoxy composite laminates are proposed in this study.	**4209-2 A FAST MARCHING-LEVEL SETS APPROACH FOR THE DISTANCE FIELD COMPUTATION AND ITS APPLICATION IN LIQUID COMPOSITE MOLDING PROCESS PERFORMANCE INDICATORS** *Luis Domenech (University CEU Cardenal Herrera), Fernando Sanchez (University CEU Cardenal Herrera), Victor García (University CEU Cardenal Herrera), Enrique Cortes (Aerox Advanced Polymers), Elias Cueto (University of Zaragoza), Francisco Chinesta (Ecole Centrale Nantes)* A technique that computes numerically approximate distance fields by invoking computational geometry is presented to relate the distance of the flow path to the filling time in LCM processes.	**4210-2 CREEP BEHAVIOUR OF GEOMETRICALLY NONLINEAR SOFT CORE SADNWICH PANELS** *Ehab Hamed (University of New South Wales), Yeoshua Frostig (Technion – Israel Institute of Technology)* The paper investigates the effects of creep of the core material on the global geometrically nonlinear behavior of sandwich panels under axial and lateral loading conditions.

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4211 Multifunctional Composites - Coupled Properties and Multi-physics Models 1	**4212 Composites with Metallic Components 2**	**4213 Hybrid Composites 1**	**4214 Fracture and Damage - Materials Scale 4**	**4215 Digital Image Correlation 1**	**4216 Durability, Creep and Agressive Environment 1**	**4217 Manufacturing Up-Scaling and Automation 3**	**4218 Multiscale Modelling of Structures 2**	**4219 Applications - Wind, Wave and Tidal Energy 2**	**4220 Sensors in Experimental Mechanics 3**	**4221 Multifunctional Composites - Smart Structures 3**
KEYNOTE **4211-1 MULTI-SCALE COMPUTATIONAL MODELING FRAMEWORK FOR COUPLED ELECTROMAGNETICS AND MECHANICAL SIMULATIONS IN MULTIFUNCTIONAL MATERIALS** *Somnath Ghosh (Johns Hopkins University)*	**4212-1 NANO TITANIUM CARBIDE PARTICLE REINFORCED ALUMINUM COMPOSITE MATERIALS PREPARED BY BALL MILLING FOLLOWED BY REACTIVE SINTERING** *Hiroki Kurita (CEA Saclay), Nassim Samer (University of Claude Bernard Lyon 1), Jérôme Andrieux (University of Claude Bernard Lyon 1), Olivier Dezellus (University of Claude Bernard Lyon 1), Sophie Gourdet (Airbus Group Innovations), Takamichi Miyazaki (Tohoku University), Olivier Martin (Mecachrome), Laurent Chaffron (CEA Saclay)* The ultimate tensile strength of Al–34 vol% nano TiC composite fabricated without the use of nanometric powders as a starting material was 628 MPa with a failure elongation of 4.2 %.	**4213-1 TENSILE PROPERTIES OF CARBON NANOTUBES-SHEETS/ CARBON FIBERS/ EPOXY AND CARBON NANOTUBES-GRAFTED CARBON FIBERS/EPOXY HYBRID COMPOSITES** *Kimiyoshi Naito (National Institute for Materials Science), Vikum Premalal (Shizuoka University), Hiroyuki Oguma (National Institute for Materials Science), Yoshinobu Shimamura (Shizuoka University), Yoku Inoue (Shizuoka University)* The tensile properties of carbon fiber reinforced polymer matrix composites incorporating CNT-sheets (CNT-sheets/carbon fibers) and CNT-grafted carbon fibers were investigated.	**4214-1 DAMAGE EVOLUTION OF CARBON EPOXY LAMINATES FOR TIDAL BLADES APPLICATION** *Nicolas Carrere (LBMS/ Ensta-Bretagne), Nicolas Tual (LBMS/Ensta-Bretagne), Peter Davies (IFREMER)*	**4215-1 INVESTIGATION OF THICKNESS EFFECTS ON SHEAR CHARACTERISATION OF COMPOSITES MATERIALS FOR AIRCRAFT STRUCTURES** *Kuangyi Zhang (Imperial college London), Long Yu (Imperial College London), Yuming Jia (Aviation Industry Corporation of China), Bamber Blackman (Imperial College London), John Dear (Imperial College London), Gordon Williams (Imperial College London)* This paper reviews the state of the art in composite shear testing. The main focus of this research is the effect of thickness and out-of-plane properties on shear strength.	**4216-1 ON THE ADHESIVE PROPERTIES OF NANO-SILICA/EPOXY BONDED SINGLE-LAP JOINTS** *Helezi Zhou (University of Sydney)* This study investigated the effects of nano-silica on the adhesive properties of epoxy by lap-shear test under quasi-static and cyclic loading, including the influence of hygrothermal treatment.	**4217-1 MECHANICAL PROPERTIES OF THERMOPLASTIC COMPOSITES MADE BY AUTOMATED FIBER PLACEMENT** *Suong Hoa (Concordia University), Minh Duc Hoang (Concordia University), Jeffrey Fortin Simpson (Concordia University)* This paper presents the results of an investigation to determine the mechanical properties of flat coupons made of carbon/PEEK and using Automated Fiber Placement.	**KEYNOTE** **4218-1 STOCHASTIC VIRTUAL TESTS FOR FIBER COMPOSITES** *Brian Cox (Teledyne)* We review micron-scale 3D imaging of a microstructure, statistical analysis of images, a generator of stochastic virtual specimens, and a computational model that tracks discrete damage events	**4219-1 A CRITICAL EVALUATION OF STRUCTURAL ANALYSIS TOOLS USED FOR THE DESIGN OF LARGE COMPOSITE WIND TURBINE ROTOR BLADES UNDER ULTIMATE AND CYCLE LOADING** *D. J. Lekou (Centre for Renewable Energy Sources (CRES)), K. C. Bacharoudis (Centre for Renewable Energy Sources (CRES)), A. B. Farinas (National Renewable Energy Center (CENER)), K. Branner (DTU Wind Energy), P. Berring (DTU Wind Energy), A. Croce (Politecnico di Milano), T. P. Philippidis (University of Patras), G. de Winkel (Knowledge Centre Wind turbine Materials and Constructions (WMC))* Comparison of stiffness and strength predictions under ultimate and cycling load of structural analysis tools for 10-20MW rotor blades from 6 organizations and estimation of modelling uncertainty.	**4220-1 STRUCTURAL HEALTH MONITORING METHOD FOR WIND TURBINE TRAILING EDGE: CRACK GROWTH DETECTION USING FIBRE BRAGG GRATING SENSOR EMBEDDED IN COMPOSITE MATERIALS** *Gilmar Pereira (Technical University of Denmark), Lars Mikkelsen (Technical University of Denmark), Malcolm McGugan (Technical University of Denmark)* Novel method to assess a crack growing/damage event in composite material using embedded Fibre Bragg Grating (FBG) sensors and application into a composite material structure.	**4221-1 EFFECT OF NICKEL COATED CARBON FIBER AND NICKEL COATED GRAPHITE PARTICLES ON INDUCTION HEATING** *Muhammad Muddassir (Institut für Verbundswerkstoffe), Martin Gurka (Institut für Verbundswerkstoffe)* Induction heating is a contact less joining technique that can be used to join non-conductive thermoplastic composite sheets with the help of susceptor sheet. The susceptor sheet not only gives better
	4212-2 MECHANICAL PROPERTIES OF CAST ALUMINIUM MATRIX COMPOSITES REINFORCED WITH SIC AND AL203 PARTICLES *Kim-Niklas Antin (Aalto University)* Cast aluminium alloys can be particle reinforced, but the processing route is difficult. We report mechanical properties of different die cast MMCs and the effect of heat treatment on them.	**4213-2 RATIONAL DESIGN OF HYBRID COMPOSITES: A GLOBAL LOAD SHARING ANALYSIS** *Varun Rajan (Ecole Polytechnique Federale de Lausanne), William Curtin (Ecole Polytechnique Federale de Lausanne)*	**4214-2 MEASUREMENT OF TENSILE PROPERTIES OF FIBRES USING A DCB-SPECIMEN** *Anders Biel (Technical University of Denmark), Ulf Stigh (University of Skövde)* A novel method is proposed to perform tensile tests using a double cantilever beam specimen. Similar results are achieved with the present method as with more standardized methods.	**4215-2 NUMERICAL MODELLING AND FULL-FIELD MEASUREMENT OF COMPOSITE LAMINATES UNDER BLAST LOADS** *Mohamed Abderaouf Louar (Royal Military Academy), Hamza Ousji (Royal Military Academy), Bachir Belkassem (Royal Military Academy), Lincy Pyl (Vrije Universiteit Brussel), John Vantomme (Royal Military Academy)* The results of a series of blast tests on fully clamped square glass fibre reinforced epoxy panels using an explosive driven shock tube are presented and compared to FE simulations.	**4216-2 MOISTURE AGING CHARACTERIZATION OF GLASS FIBER REINFORCED POLYAMIDE COMPOSITE** *Hassan Obeid (GeM-Université de Nantes-Centrale Nantes-UMR CNRS 6183), Pascal Casari (GeM-Université de Nantes-Centrale Nantes-UMR CNRS 6183), Alexandre Clement (GeM-Université de Nantes-Centrale Nantes-UMR CNRS 6183), Sylvain Freour (GeM-Université de Nantes-Centrale Nantes-UMR CNRS 6183), Frederic Jacquemin (GeM-Université de Nantes-Centrale Nantes-UMR CNRS 6183)* Due to their excellent specific properties, composite materials are increasingly used in various domains. During their lifetime, these materials can be subjected to aggressive environments including m	**4217-2 LASER-VISION INSPECTION SYSTEM FOR AUTOMATED FIBER PLACEMENT (AFP) PROCESS** *Farjad Shadmehri (Bombardier), Octavian Ioachim (Bombardier), Olivier Pahud (Bombardier), Jean-Evrard Brunel (Bombardier), Alain Landry (Bombardier), Suong V. Hoa (Concordia University), Mehdi Hojjati (Concordia University)* A new inspection technique, Laser-Vision inspection system, is presented for inspection of a composite ply manufactured using automated fiber placement (AFP) process.		**4219-2 COMPARING FATIGUE LIFE ESTIMATIONS OF COMPOSITE WIND TURBINE BLADES UNDER VARIOUS LOAD CASES AND FATIGUE METHODS** *Oscar Castro (Technical University of Denmark), Matthew Lennie (TU Berlin), Kim Branner (Technical University of Denmark), George Pechlivanoglou (Smart-Blade), Povl Brøndsted (Technical University of Denmark), Christian Navid Nayeri (TU Berlin), Christian Oliver Paschereit (TU Berlin)* In this paper, fatigue lifetime prediction of NREL 5MW reference wind turbine is presented. The fatigue response of selected blade cross sections was obtained by applying macroscopic fatigue models.	**4220-2 COMPOSITE PATCH STRENGTHENED I-BEAM – LONG-TERM PERFORMANCE AND CONDITION MONITORING** *Jon Harald Lambert Grave (Norwegian University of Science and Technology (NTNU)), Andreas T. Echtermeyer (Norwegian University of Science and Technology (NTNU))* The paper describes damage development under cyclic fatigue in metal I-beams strengthened with composite patches. Damage is monitored with embedded optical fibers.	**4221-2 ELECTRO-INDUCED SHAPE MEMORY POLYMER COMPOSITES INCORPORATED WITH CARBON FIBER FELT** *Xiaobo Gong (Harbin Institute of Technology), Yanju Liu (Harbin Institute of Technology), Liwu Liu (Harbin Institute of Technology), Jinsong Leng (Harbin Institute of Technology)*

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12:00	**4201-2 OVERJACKETING EXTRUSION OF UHMWPE MULTI-FILAMENT FIBER FOR THE DEVELOPMENT OF ULTRA-LIGHT, FULLY-THERMOPLASTIC COMPOSITES** *A. Andres Leal (Empa-Swiss Federal Laboratories for Materials Science and Technolgy), Kathrin Häfliger (Empa-Swiss Federal Laboratories for Materials Science and Technology), Joshi Veeramachaneni (Empa-Swiss Federal Laboratories for Materials Science and Technology), Rudolf Hufenus (Empa-Swiss Federal Laboratories for Materials Science and Technology)* A novel approach for the development of ultra-light, fully-thermoplastic fiber reinforced composites is presented. The composite has a fiber volume fraction of 0.54 and a density of 0.93 g/c^cm3.	**4202-3 VOLUMETRIC COMPOSITION OF NANOCOMPOSITES** *Bo Madsen (Technical University of Denmark), Hans Lilholt (Technical University of Denmark), Juha Mannila (VTT Technical Research Centre of Finland), Rangika Thilan De Silva (Monash University), Pooria Pasbakhsh (Monash University)* A methodology for the determination and analysis of the volumetric composition of nanocomposites is presented, using cellulose/epoxy and aluminosilicate/polylactate nanocomposites as case materials.	**4203-3 WAVE PROPAGATION IN MULTILAYER STRUCTURES AND ADVANCED STRUCTURAL THEORIES** *Serge Abrate (Southern Illinois University), Roberta Massabo (Unversity of Genova)* The dynamics laminated structures with relative motion in the tangential and normal directions at the interfaces is studied using a wave propagation approach.	**4204-3 CARBON FIBRE REINFORCED POLYMER WITH A DISCRETE AND INTEGRATED SELF-HEALING FUNCTION** *Patryk Jarzynka (University of Bristol), Ian Bond (University of Bristol), Duncan Wass (University of Bristol), Richard Trask (University of Bristol)* A fully integrated microcapsule – catalyst self-healing systems is demonstrated and evaluated for mode I recovery in a high performance CFRP composite.	**4205-3 ANISOTROPIC COUPLING EFFECTS USED IN AN ALL-NEW SHAFT/HUB-JOINT FOR PRINTING APPLICATIONS MADE OF REINFORCED PLASTICS** *Joerg Kaufmann (Technische Universität Chemnitz), Lothar Kroll (Technische Universität Chemnitz), Lutz Engisch (HTWK Leipzig)* Based on analytical analysis, a complex FE-analysis and comprehensive experimental studies an all-new FRP gravure printing system was developed that is now available in the printing market.	**4206-2 IN-LINE MONITORING AND NUMERICAL VERIFICATION OF RESIN TRANSFER MOULDING PROCESS WITH CYCOM® 890 RTM RESIN SYSTEM** *Cristian Lira (The National Composites Centre), Miroslav Stojkovic (The National Composites Centre), Josh Simpson (The National Composites Centre), Kevin Potter (University of Bristol), George Maistros (ADVISE)* The paper describes and demonstrates the effectiveness of simulation technology applied to the Resin Transfer Moulding (RTM) manufacturing process using in-line dielectric sensors for validation.	**4207-3 FATIGUE OF GLASS FIBERS REINFORCED POLYAMIDES: MEAN STRESS EFFECTS AS A FUNCTION OF GLASS FIBERS ORIENTATION** *Gilles Robert (Solvay Engineering Plastics), Olivier Moulinjeune (Solvay Engineering Plastics), Michel Houba (Solvay R&I center Brussels)* This study is focused on mean stress effects observed on short glass fibers reinforced PA6.6. They have been studied on several glass fibers orientation with great attention paid to thermal effects.	**4208-3 A CHECKLIST FOR THE DESCRIPTION OF NATURAL (BAST) FIBRE REINFORCED COMPOSITES** *John Summerscales (University of Plymouth), Antoine Le Duigou (University of South Brittany), Christophe Baley (University of South Brittany)* This paper proposes a checklist for data which should be included in any future bio-composites publications, albeit with the recognition that it may not always be possible to provide every item.	**4209-3 AUTOCLAVE INFUSION OF AEROSPACE RIBS BASED ON PROCESS MONITORING AND CONTROL BY ULTRASOUND SENSORS** *Nico Liebers (DLR), Markus Kleineberg (DLR)* Ultrasonic process monitoring of an autoclave based infusion with a network of 24 low cost sensors. Resin flow, laminate thickness and cure evlolution were monitored and fed into the process control.	**4210-3 DISTINGUISHING BETWEEN STRAIN MEASUREMENT PROCEDURES DURING COMPRESSIVE TESTING OF FOAM MATERIALS** *Moeen S Rajput (Kungliga Tekniska Högskolan), Magnus Burman (Kungliga Tekniska Högskolan), Stefan Hallström (Kungliga Tekniska Högskolan)* The out-of-plane compressive properties of foam materials are investigated using different test methodologies. A recommendation on strain measurements for foam core compression testing is proposed.

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4211-2 HARNESSING BIOMIMETIC CATCH BONDS TO CREATE MECHANICALLY ROBUST NANOPARTICLE NETWORKS *Anna Balazs (University of Pittsburgh)* Using computer simulations, we investigate the mechanical properties of a network of polymer-grafted nanoparticles (PGNs) that are interlinked by labile "catch" bonds. Unlike "slip" bonds, the life ti	**4212-3 ON THE THERMO CYCLING OF FIBER METAL LAMINATES** *Bernhard Müller (Delft University of Technology), Sofia Teixeira De Freitas (Delft University of Technology), Jos Sinke (Delft University of Technology)* The design of a thermal cycling setup is presented and discussed which allows the thermal cycling of fiber metal laminates with and without embedded heater elements. First results are presented.	**4213-3 EFFECT OF BASALT FIBRE HYBRIDIZATION ON HIGH VELOCITY IMPACT BEHAVIOUR OF CARBON/ EPOXY COMPOSITES** *Jacopo Tirillò (La Sapienza University of Rome), Fabrizio Sarasini (La Sapienza University of Rome), Luca Ferrante (La Sapienza University of Rome), Teodoro Valente (La Sapienza University of Rome), Luca Lampani (La Sapienza University of Rome), Enrique Barbero (Universidad Carlos III de Madrid), Sonia Sanchez (Universidad Carlos III de Madrid), Paolo Gaudenzi (La Sapienza University of Rome)* The positive role of basalt fibre hybridization on carbon/ epoxy laminates subjected to high velocity impacts is confirmed by experimental data and analytical method.	**4214-3 MANUFACTURING AND TESTING OF A CRUCIFORM SPECIMEN FOR BIAXIAL TRANSVERSE TESTS** *Federico París (University of Seville), Elena Correa (University of Seville), Alberto Barroso (University of Seville), Serafín Sánchez (University of Seville)* This study deals with the manufacturing of cruciform coupons to be tested under tensile biaxial transverse loads. The manufacturing process and the results of checking transverse tests are presented.	**4215-3 INTER- AND INTRA-LAMINAR DYNAMIC FRACTURE OF CFRPS WITH AND WITHOUT CNT MODIFICATION OF EPOXY: AN EXPERIMENTAL STUDY** *Hareesh Tippur (Auburn University), Robert Bedsole (Auburn University)* Mode-I inter- and intra-laminar dynamic fracture behaviors of carbon fiber reinforced plastics (CFRPs) have been studied. Thick unidirectional composites were processed using neat and carbon nanotube	**4216-3 EXPRESS PROCEDURE FOR EVALUATION OF DURABILITY OF COMPLEX SHAPE PULTRUDED COMPOSITE PROFILES** *Andrey Aniskevich (Institute of Polymer Mechanics-University of Latvia), Vladimir Kulakov (Institute of Polymer Mechanics-University of Latvia)* Analytical express procedure for evaluation of durability of complex shape pultruded composite profiles and reinforcing rods subjected to aggressive environmental factors is development.	**4217-3 VISCOELASTIC ANALYSIS OF PROCESS-INDUCED STRESSES IN MANUFACTURING OF THERMOPLASTIC COMPOSITES BY AUTOMATED FIBER PLACEMENT TECHNOLOGY** *Hossein Ghayoor (Concordia University), Suong V. Hoa (Concordia University)* A model for the development of stresses (considering both stress generation and relaxation) arising during the processing of thermoplastic composites using automated fiber placement is presented.	**4218-2 MICROSTRUCTURE-SENSITIVE ENVIRO-MECHANICAL RESPONSE CHARACTERIZATION AND SIMULATION IN SIC/ SIC CERAMIC MATRIX COMPOSITES** *Craig Przybyla (Air Force Research Laboratory), Stephan Bricker (University of Dayton), Jeff Simmons (Air Force Research Laboratory), Russell Hardie (University of Dayton), Michael Uchic (Air Force Research Laboratory), Ramanathan Krishnamurthy (UES-Inc.), Pavel Mogilevsky (UES-Inc.), Michael Braginsky (University of Dayton Research Institute), Travis Whitlow (Universal Technology Corporation), Triplicane Parthasarathy (UES-Inc.), Nick Engel (Southwest Ohio Council for Higher Education (SOCHE)), Eric Jones (Air Force Research Laboratory), Randy Hay (Air Force Research Laboratory), Jennifer Pierce (University of Dayton Research Institute), Larry Zawada (Air Force Research Laboratory)* This study seeks to understand the influence of microstructure on the response in SiC/SiC ceramic matrix composites through various enviro-mechanical damage models with experimental validation.	**4219-3 EFFECT OF TRAILING EDGE DAMAGE ON FULL-SCALE WIND TURBINE BLADE FAILURE** *Philipp Ulrich Haselbach (Technical University of Denmark), Kim Branner (Technical University of Denmark)* Numerically applied fracture mechanics approaches were used to investigate the effect of trailing edge failure on full-scale wind turbine blade failure under combined loading condition.	**4220-3 MONITORING THE MANUFACTURING PROCESS AND THE MECHANICAL PERFORMANCE OF A FULL-SIZED AIRCRAFT TAILCONE ASSEMBLY MADE FROM ALL-COMPOSITE MATERIAL USING EMBEDDED FIBRE OPTIC SENSORS** *Edmon Chehura (Cranfield University), Stephen James (Cranfield University), Stephen Staines (Cranfield University), Chris Groenendijk (National Aerospace Laboratory (NLR)), Denis Cartie (Coriolis Composites Technologies SAS), Stephanie Portet (DAHER Aerospace), Michael Hugon (DAHER Aerospace), Ralph Tatam (Cranfield University)* Monitoring the manufacturing process and the mechanical performance of a full-sized all carbon fibre composite aircraft tailcone assembly using embedded fibre optic sensors	**4221-3 FABRICATION AND FINITE ELEMENT ANALYSIS OF SMART MANDREL BASED ON SHAPE MEMORY POLYMER** *Liwu Liu (Harbin Institute of Technology), Haiyang Du (Harbin Institute of Technology), Fanlong Chen (Harbin Institute of Technology), Yanju Liu (Harbin Institute of Technology), Jinsong Leng (Harbin Institute of Technology)*

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12:20	**4201-3 INVESTIGATION OF DEFORMATION BEHAVIOUR IN PRESS FORMING OF SADDLE SHAPE U BEAM USING CFRTP LAMINATE AND SHEAR CUTTING BEHAVIOUR** *Daichi Tatsuno (Kanazawa University), Takeshi Yoneyama (Kanazawa University), Shoji Hineno (Kanazawa University), Masaki Kimura (Kanazawa University), Keisuke Shiozaki (Kanazawa University), Kiichirou Kawamoto (Komatsu Industries Corp.), Masaya Nakagawa (Komatsu Industries Corp.), Masayuki Okamoto (Komatsu Industries Corp.)* The continuous CFRTP sheet was press-formed into a U beam shape and the fibre deformation was analysed. In addition, shear cutting of CFRTP was preformed, and shear cutting behaviour was analysed.		**4203-4 DETERMINE INTERIOR STRAIN FIELDS IN COMPOSITES USING A 3D DIGITAL SPECKLE PHOTOGRAPHY TECHNIQUE** *Fu-Pen Chiang (Stony Brook University), Lingtao Mao (China University of Mining & Technology(Beijing))* The 3D deformation field of a composite beam under three-point bending has been mapped using the newly developed technique called Digital Volumetric Speckle Photography combined with X-ray CT	**4204-4 BIOINSPIRED MICROVASCULAR NETWORKS FOR MULTIFUNCTIONAL COMPOSITES** *Jason Patrick (University of Illinois at Urbana-Champaign), Brett Krull (University of Illinois at Urbana-Champaign), Mayank Garg (University of Illinois at Urbana-Champaign), Jeffrey Moore (University of Illinois at Urbana-Champaign), Nancy Sottos (University of Illinois at Urbana-Champaign), Scott White (University of Illinois at Urbana-Champaign)* Advancements in a vascularization technique for fiber-composites are provided as a pathway to imbue these synthetic, structural materials with multifunctional attributes found in biological systems.	**4205-4 ANALYSIS OF CARBON FIBER COMPOSITE COIL/RINGS FOR OFFLOADING HOSES SUBJECTED TO CRUSHING LOAD** *Maikson Luiz Passaia Tonatto (Federal University of Rio Grande do Sul), Maria Madalena de Camargo Forte (Federal University of Rio Grande do Sul), Ricardo Araújo Teles (PETROBRAS), Sandro Campos Amico (Federal University of Rio Grande do Sul)* This study aims to investigate the substitution of the coil steel of offloading hoses for composite materials. The composite coil showed specific stiffness and strength higher than that of the steel.	**4206-3 CHARACTERISATION OF PREPREG TACK ON DIFFERENT SURFACES TO AID AUTOMATED MATERIAL PLACEMENT** *Andreas Endruweit (University of Nottingham), Davide De Focatiis (University of Nottingham), Sayata Ghose (The Boeing Company), Brice Johnson (The Boeing Company), Douglas Younkin (The Boeing Company), Nicholas Warrior (University of Nottingham)* Prepreg tack on steel, prepreg and FEP surfaces was characterised experimentally. Employing time-temperature superposition allowed the feed rates for maximum tack at any temperature to be predicted.	**4207-4 INFLUENCE OF THE SERVICE ENVIRONMENT ON THE MATERIAL PROPERTIES OF SHORT- AND ENDLESS-FIBER REINFORCED THERMOPLASTICS** *Constantin Bauer (Institute for Composite Materials), Magin Michael (Institute for Composite Materials), Thomas Schalk (ZF Friedrichshafen AG)* The influence of different thawing salt solutions on the static and fatigue properties of SFRP and the effect of different conditioning methods on the tensile strength of EFRP is investigated.	**4208-4 HIGH PERFORMANCE COMPOSITES BASED ON NANOPAPERS** *Andreas Mautner (University of Vienna), Jessica Lucenius (Aalto University), Monika Österberg (Aalto University), Alexander Bismarck (University of Vienna)* A new type of nanopapers was developed by introducing polysaccharides into the matrix of a CNF film. These nanopapers were processed into high-loading composites via lamination with an epoxy-resin.	**4209-4 SIMULATION OF MOLD FILLING IN RESIN TRANSFER MOLDING CONSIDERING THE LOCAL FIBER ARCHITECTURE AFTER THE PREFORMING PROCESS** *Dino Magagnato (Karlsruhe Institute of Technology), Frank Henning (Karlsruhe Institute of Technology)* A special interface between draping simulation and mold filling simulation is developed to improve the modelling of resin transfer molding. The interface is designated for unidirectional fabrics.	**4210-4 BONDED REPAIRS OF HONEYCOMB SANDWICH STRUCTURES: IN SITU PROCESS MONITORING AND QUALITY ASSESSMENT** *Mathieu Préau (McGill University), Pascal Hubert (McGill University)* A modified adhesive is used for bonded scarf repairs of sandwich panels. Air channels in the adhesive is found to significantly reduce repair patch and bondline porosity under vacuum bag only pressure
12:40	**4201-4 MANUFACTURING METHOD OF A THERMOPLASTIC SEMI-FINISHED PRODUCT AS REINFORCEMENT IN LAMINATE THICKNESS DIRECTION** *Andreas Mierzwa (Technische Universität München-Faculty of Mechanical Engineering), Christoph Ebel (Technische Universität München-Faculty of Mechanical Engineering), Michael Brand (Technische Universität München-Faculty of Mechanical Engineering), Klaus Drechsler (Technische Universität München-Faculty of Mechanical Engineering)* The paper presents a manufacturing method for a staple-like pin made of carbon fiber reinforced thermoplastic for reinforcing laminates in thickness direction		**4203-5 INFLUENCE OF MONTMORILLONITE NANOCLAY, GRAPHENE NANOPLATELETS AND COMBINED NANOCLAY/ GRAPHENE HYBRID ON PROPERTIES OF EPOXY COMPOSITE** *Alfred Tcherbi-Narteh (Tuskegee University), Md. Nuruddin (Tuskegee University), Mahesh Hosur (Tuskegee University), Raju Gupta (Tuskegee University), Allyson Lattimore (Tuskegee University), Shaik Jeelani (Tuskegee University)* Influence of montmorillonite nanoclay, graphene nanoplatelets and combined binary nanoparticles of the two on flexural, viscoelastic and thermal properties of epoxy SC780 composites was investigated.	**4204-5 THERMALLY ACTIVATED HEALING IN HIGH PERFORMANCE CARBON FIBRE/EPOXY COMPOSITES** *Khomkrit Pingkarawat (RMIT University), Mel Dell'olio (Commonwealth Scientific and Industrial Research Organisation (CSIRO)), Adrian Mouritz (RMIT University), Russell Varley (Commonwealth Scientific and Industrial Research Organisation (CSIRO))* Investigation of thermally activated healing in high performance carbon fibre/epoxy composites using poly(ethylene-co-methacylic acid) (EMAA) as a thermoplastic healing agent		**4206-4 DETECTION AND MODELLING OF THERMAL AND RHEOLOGICAL TRANSITIONS OF A 2-STAGE THERMOSET USING DIELECTRIC AND STANDARD MEASURING TECHNIQUES** *Alexander Chaloupka (Fraunhofer Institute for Chemical Technology ICT), Renato Bezerra (Fraunhofer Institute for Chemical Technology ICT), André Wedel (Fraunhofer Institute for Chemical Technology ICT), Vinay Madaksira (Fraunhofer Institute for Chemical Technology ICT)* Dielectric measurement results show a strong correlation to differential scanning calorimetric data. Because of physical principles there is a connection between dielectric and rheology, too.	**4207-5 EFFECT OF FIBRE ORIENTATION AND NOTCH RADIUS ON THE IMPACT BEHAVIOUR OF SHORT GLASS FIBRE REINFORCED POLYPROPYLENE** *Michael Jerabek (Borealis Polyolefine GmbH), Anna Hartl (Johannes Kepler University Linz), Reinhold Lang (Johannes Kepler University Linz)*			**4210-5 THE MECHANICAL PROPERTIES OF SANDWICH STRUCTURES BASED WITH COMPOSITE COLUMN CORES** *H. Z. Jishi (Khalifa University of Science-Technology and Research (KUSTAR)), R. Umer (Khalifa University of Science-Technology and Research (KUSTAR)), Z. Barsoum (Khalifa University of Science-Technology and Research (KUSTAR)), W. J. Cantwell (Khalifa University of Science-Technology and Research (KUSTAR))* Composite sandwich structures containing high-performance core materials based on vertical composite columns have been manufactured using a lost-mold technique.
13:00	**Lunch in the Exhibition**									
14:00	**Stimulus-responsive polymer composites: a path towards active shape changing structures** Jinsong Leng, Harbin Institute of Technology, People's Republic of China									

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4211-3 STRUCTURAL MAGNETIC COMPOSITES FOR USE IN ELECTRO-MECHANICAL APPLICATIONS *Laura E. Edwards (University of Bristol), Jason M. Yon (University of Bristol), Ian P. Bond (University of Bristol), Phil H. Mellor (University of Bristol)* A fibre reinforced polymer composite laminate with both magnetic and mechanical functionality was developed. Particle-resin films were incorporated as a means of increasing magnetic permeability.	**4212-4 FABRICATION OF TIAL MATRIX COMPOSITE SHEETS WITH CONTROLLED MICRO-LAMINATED ARCHITECTURE BY A SOLID-LIQUID REACTION** *Xiping Cui (Harbin Institute of Technology), Lin Geng (Harbin Institute of Technology), Guohua Fan (Harbin Institute of Technology), Yuanyuan Gao (Harbin Institute of Technology), Songhe Meng (Harbin Institute of Technology)* TiB-TiAl composites prepared by foil metallurgy sintering display unique multi-layered structure and enhanced tensile properties and thus have potential for high-temperature structural applications.	**4213-4 INTRALAYER HYBRIDISATION TO COMBINE THE DUCTILITY OF SELF-REINFORCED POLYPROPYLENE WITH THE STIFFNESS OF CARBON FIBRE** *Yentl Swolfs (KU Leuven), Larissa Gorbatikh (KU Leuven), Ignaas Verpoest (KU Leuven)* Carbon fibre/self-reinforced polypropylene hybrids achieved a unique combination of stiffness and failure strain. The tensile, flexural and impact behaviour revealed the importance of bonding.	**4214-4 INDUCING FAILURES IN COMPOSITE FLYWHEELS- A STUDY USING 3 & 4 POINT BENDING** *Jennifer Lenz (Imperial College London), Bamber Blackman (Imperial College London)* Composite beam specimens with no defects and with inserted defects of transverse or inter-laminar nature were tested to failure in 3-point bending and modeled using finite element analysis.	**4215-4 INNOVATIVE METHODOLOGY BY USING DIC TO IDENTIFY INTRALAMINAR DAMAGE ON CFRP WITHIN AN INDUSTRIAL CONTEXT** *Nicolas SWIERGIEL (AIRBUS GROUP INNOVATIONS), Benjamin LEBOIME (AIRBUS GROUP INNOVATIONS), Ana Cristina GALUCIO (AIRBUS GROUP INNOVATIONS), François HILD (LMT Cachan), Caroline PETIOT (AIRBUS GROUP INNOVATIONS), Stéphane ROUX (LMT Cachan), Prisca VINCENT (AIRBUS GROUP INNOVATIONS)* For quantifying transverse cracking in layered composites, global Digital Image Correlation (DIC) is applied during tensile tests. 2 trustworthy methodologies are proposed for use at industrial level.	**4216-4 DURABILITY OF CARBON EPOXY COMPOSITES MATERIAL FOR TIDAL TURBINE BLADE APPLICATIONS.** *Nicolas Tual (LBMS), Nicolas Carrere (LBMS), Peter Davies (Ifremer)* Results from mechanical tests after seawater ageing and a diffusion model to account for water ingress are presented. These are used to estimate long term behaviour of a tidal turbine blade.	**4217-4 MANUFACTURING CHARACTERISTICS OF THE CONTINUOUS MULTI-TOW SHEARING FOR HIGH-VOLUME MANUFACTURING OF TOW-STEERED COMPOSITES** *Evangelos Zympeloudis (University of Bristol), Byung Chul Kim (University of Bristol)* The concept of CMTS offers the potential to dramatically increase fibre steering capabilities by utilising the material shear deformation, while enhancing productivity by employing multiple tows.	**4218-3 PROGRESSIVE FAILURE ANALYSIS OF THE OPEN-HOLE COMPOSITES LAMINATES USING SFEM METHOD AND TEST VALIDATION** *Xiuhua Chen (Shanghai Jiao Tong University), Yin Yu (Shanghai Jiao Tong University), Hai Wang (Shanghai Jiao Tong University), Jian Zhao (Shanghai Jiao Tong University)* The example of the open-hole composite plates well proves that the proposed methodology based on SFEM significantly reduces modeling difficulty and computational memory usage.	**4219-4 MATERIAL DESIGN AND RELIABILITY OF ADVANCED COMPOSITE MATERIALS** *Jens Zangenberg (LM Wind Power), Torben Jacobsen (LM Wind Power), Rasmus Østergaard (LM Wind Power), Michael Koefoed (LM Wind Power)* The design and reliability aspects of glass fibres and non-crimp fabrics used for the main load-carrying beam of a wind turbine rotor blade are addressed.		**4221-4 NANOSTRUCTURED 'SKIN' FOR MECHANICAL SENSING** *Yinhu Deng (Leibniz - Institut für Polymerforschung Dresden e.V.), Jianwen Liu (Leibniz - Institut für Polymerforschung Dresden e.V.), Edith Mäder (Leibniz - Institut für Polymerforschung Dresden e.V.), Gert Heinrich (Leibniz - Institut für Polymerforschung Dresden e.V.), Christina Scheffler (Leibniz - Institut für Polymerforschung Dresden e.V.), Uwe Gohs (Leibniz - Institut für Polymerforschung Dresden e.V.), Shanglin Gao (Leibniz - Institut für Polymerforschung Dresden e.V.)* An integration of optic performance and piezoresistive behaviour on glass fibres to realise strain sensor for traditional fibre reinforcement composites.
4211-4 MECHANICAL AND THERMAL PROPERTIES OF HEAT GENERATED COMPOSITE BOARD MADE OF WASTE OF CARBON FIBER *Teruo Kimura (Kyoto Institute of Technology), Masaki Yoshida (Kyoto Institute of Technology), Naoya Kurahashi (Kyoto Prefectural Institute for Northen Industry), Katsunori Osako (L&R Corporation)* The high-strength/light-weight composite reinforced by waste carbon fiber was tried to mold by extruding molding method. The mechanical properties of composite heated by carbon fiber were discussed.	**4212-5 TENSILE PROPERTIES OF AN INFILTRATED INTERPENETRATING POROUS SIC MMC** *Matthias Merzkirch (KIT), Volker Walter (KIT), Kay André Weidenmann (KIT)* The current paper deals with the producibility of SiC preforms and their infiltration. In addition it could be shown that tensile sample can be manufactured in miniature dimensions.	**4213-5 EXPERIMENTAL CHARACTERIZATION OF HYBRID MATERIAL SYSTEMS CONSISTING OF SHEET METAL AND ADVANCED COMPOSITES** *Michael Dlugosch (Fraunhofer Ernst-Mach-Institute-EMI), Dirk Lukaszewicz (BMW Group), Jens Fritsch (Fraunhofer Ernst-Mach-Institute-EMI), Stefan Hiermaier (Fraunhofer Ernst-Mach-Institute-EMI)* Hybrid coupon specimens comprised of sheet metal and cfrp/gfrp have been tested under quasistatic tension and 3-point-bending to study the effects of major design parameters and hybrid mechanisms	**4214-5 GEOMETRY DEFINITION FOR THE NORMAL AND SHEAR STRENGTH OF BIMATERIALS USING THE IOSIPESCU SPECIMEN WITHOUT STRESS SINGULARITIES.** *Alberto Barroso (University of Seville), Alberto Martín (University of Seville), Vladislav Mantic (University of Seville), Federico París (University of Seville)* Modified tensile and losipescu test samples of bimaterial joints with composites are proposed to evaluate the tensile and shear strength removing the stress singularities at the interface free-edges.		**4216-5 FINITE ELEMENT MODEL OF GALVANIC CORROSION IN A POLYMER COMPOSITE CORE CONDUCTOR** *Eva Hakansson (University of Denver), Paul Predecki (University of Denver), Maciej Kumosa (University of Denver)* A numerical model of the atmospheric galvanic corrosion between carbon fiber reinforced composite and aluminium in new design of an overhead transmission line conductor.	**4217-5 THERMOPLASTIC MATRIX COMPOSITES: XTRA COMPLEX, XTRA QUICK, XTRA EFFICIENT MANUFACTURING ADVANCED COMPOSITES FOR THE A350 XWB AND BEYOND** *Angelos Miaris (Premium AEROTEC GmbH), Klaus Edelmann (Premium AEROTEC GmbH), Sven Sperling (Premium AEROTEC GmbH)* Premium AEROTEC manufactures in a highly automated facility in Bremen 5000 CFRP –Parts for every A350 XWB. Quality, costs and on time delivery are the major key issues for the sucess of the projekt.		**4219-5 MULTI-AXIAL SUB-STRUCTURE FATIGUE TESTING OF A 34M WIND TURBINE BLADE** *Jacob Waldbjørn (Technical University of Denmark), Christian Berggreen (Technical University of Denmark), Henrik Stang (Technical University of Denmark)*		

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15:00	**4301 Processing - Manufacturing Technology 12**	**4302 Nano Composites 12**	**4303 ONR Special Symposium on Marine Composites 7**	**4304 Multifunctional Composites - Self-Healing and Bio-inspired Designs 3**	**4305 Applications - Bio & Medical 2**	**4306 Experimental Methods for Process Characterisation 4**	**4307 Short Fibre Composites 3**	**4308 Biocomposites 11**	**4309 Recycling of Composites and Sustainability 3**	**4310 Fibres 2**
15:00	**4301-1 APPLICATION OF WATERJET WITHOUT ABRASIVES TO SURFACE TREATMENT OF CFRP** *Hirohito Hira (Daido University), Tomoyuki SUZUKI (Kyoto Institute of technology)* Application of fan shape waterjet to the pretreatment of painting and repair of CFRP was studied. Good results were obtained for painting of PA66 matrix CFRP and for repair of epoxy matrix CFRP.	**4302-1 MECHANICAL PROPERTIES OF CARBON NANOTUBE /EPOXY COMPOSITE LAMINATES PROCESSED USING PREPREG METHOD** *Toshio Ogasawara (JAXA), Sook-Young Moon (JAXA), Takeshi Ogawa (Aoyama-Gakuin University), Yoshinobu Shimamura (Shizuoka University), Yoku Inoue (Shizuoka University)* This study examined the processing and mechanical properties of aligned MW-CNT /epoxy lamina and laminates processed using a hot-melt prepreg method. On-axis and off-axis tensile tests (0°, 45°, 90°)	**4303-1 STATISTICAL PREDICTION OF TENSILE CREEP FAILURE TIME FOR UNIDIRECTIONAL CFRP** *Masayuki Nakada (Kanazawa Institute of Technology), Yasushi Miyano (Kanazawa Institute of Technology)* A prediction method for the statistical creep failure time of polymer composites using the statistical static strengths of polymer composites measured at various temperatures is proposed.	**4304-1 EFFECT OF LOW TEMPERATURE ON SELF HEALING PERFORMANCE OF CARBON/EPOXY COMPOSITES** *Mohammad Asgar Khan (Concordia University), Suong Van Hoa (Concordia University)* Effect of low temperature on self healing of carbon/epoxy composites were investigated in this work. Epoxy incorporated with microcapsules containing 5-ethylidene-2-Norbornene (5E2N) and Grubbs cataly	**4305-1 CHARACTERIZATION OF A COMPOSITE MATERIAL TO MIMIC HUMAN CRANIAL BONE** *Thomas Plaisted (United States Army Research Laboratory), Jared Gardner (United States Army Research Laboratory), Jeffrey Gair (United States Army Research Laboratory), Michael Leadore (United States Army Research Laboratory)* We report on the characterization of a composite material to mimic the mechanical response of human cranial bones and serve as a surrogate for human tissue during testing of protective measures.	**4306-1 INTEREST OF A RHEOKINETIC STUDY FOR THE DEVELOPMENT OF THERMOPLASTIC COMPOSITES BY THERMOPLASTIC - RESIN TRANSFER MOLDING** *Matthieu Thomassey (Cetim-Cermat), Dimitri LERAY (Cetim-Cermat), Frédéric RUCH (Cetim-Cermat), Julia SCHELL (Cetim), Michel BOUQUEY (Institut Charles Sadron)* To a better control of T-RTM injection process, a rheological, physical and chemical study of the different phenomenons is proposed. This study is completed with a numerical simulation of injections.	**4307-1 FAST PREDICTION OF THE FATIGUE BEHAVIOR OF SHORT FIBER REINFORCED THERMOPLASTICS FROM HEAT BUILD-UP MEASUREMENTS: FROM THE SAMPLE TO THE STRUCTURE** *Leonell Serrano Abello (LBMS), Yann Marco (LBMS), Vincent Le Saux (LBMS), Pierre Charrier (TrelleborgVibracoustic), Gilles Robert (Solvay engineering plastics)* This paper aims at describing a method based on thermal measurements that reduces substantially the characterization duration of the fatigue properties for two families of samples	**4308-1 STRUCTURAL, MORPHOLOGICAL AND MICROMECHANICAL CHARACTERIZATION OF GELATIN-BACTERIAL CELLULOSE COMPOSITES** *Franck Quero (Universidad de los Andes), Abigail Coveney (University of Bristol), Anna Lewandowska (University of Exeter), Robert Richardson (University of Bristol), Paulo Díaz Calderón (Universidad de los Andes), Ashraf Alam (University of Bristol), Koon-Yang Lee (University College London), Stephen Eichhorn (University of Exeter), Javier Enrione (Universidad de los Andes)* The effect of adding bacterial cellulose (BC) to gelatin was investigated. The results showed that by adding 10 wt.% UV opacity was increased by ~40 %, compared to gelatin.	**4309-1 STRENGTH OF THEMERALLY CONDITIONED GLASS FIBRE: DEGRADATION, RETENTION, AND REGENERATION** *Liu Yang (University of Strathclyde), Peter Jenkins (University of Strathclyde), John Liggat (University of Strathclyde), James Thomason (University of Strathclyde)* The aim of this study is to verify the concept of regenerating thermally degraded glass fibres for a potential closed-loop recycling of glass fibre thermosetting composites.	**4310-1 MICROSCOPIC INVESTIGATION OF THE MICRO-STRUCTURE OF FIBRILS OF TECHNICAL POLYACRYLNITRILE FIBERS SEPARATED BY ULTRASONIC ETCHING** *Christina Kunzmann (University of Augsburg), Judith Moosburger-Will (University of Augsburg), Siegfried Horn (University of Augsburg)* Different morphologies of separated fibrils coexist in the same fiber. Based on FESEM, AFM and TEM analysis we derive a model showing the relationship of the micro-structures and polymer chain folding.
15:20	**4301-2 ABRASIVE WATERJET MACHINING OF SMALL FEATURES IN COMPOSITE MATERIALS** *Jeff Schwartzentruber (Ryerson University), Marcello Papini (Ryerson University), Jan Spelt (University of Toronto)* The research examined the cut surface morphology of three composite materials (two CFRP and one GFRP) using a prototype micro-abrasive waterjet nozzle to machine small features.	**4302-2 NOVEL STIFF AEROGEL-AEROGEL COMPOSITES FOR THERMAL INSULATION APPLICATION** *Jessica Laskowski (German Aerospace Center (DLR)), Barbara Milow (German Aerospace Center (DLR)), Lorenz Ratke (German Aerospace Center (DLR))* Non-fragile and stiff aerogel-aerogel composites consisting of highly insulating granular aerogels (silica or RF) and a cellulosic aerogel matrix were synthesized and characterized.	**4303-2 EXPERIMENTAL VIBRATIONS-BASED CHARACTERIZATION OF A COMPOSITE STIFFENED CURVED PANEL MANUFACTURED AS ONE PIECE FOR THE HULL OF A FAST BOAT** *Ioannis Georgiou (National Technical University of Athens)* This work uses few sensors to collect dense space-time acceleration databases in composite ship structures for multi-scale damage detection and system identification by advanced data processing.	**4304-2 EFFECT OF EMBEDDED CATALYTIC SELF-HEALING ON CARBON FIBRE REINFORCED POLYMER COMPOSITES** *Daniel Everitt (University of Bristol), Ian Bond (University of Bristol), Duncan Wass (University of Bristol), Richard Trask (University of Bristol)* The successful inclusion of a catalytic epoxy curing agent within a fibre reinforced polymer is demonstrated. Subsequent repair of damaged FRP specimens is carried out using the embedded catalyst.	**4305-2 THE ATTACHMENT OF TENDON TO BONE: STRATEGIES FOR MECHANICALLY ROBUST CONNECTIONS BETWEEN DISSIMILAR MATERIALS** *Stavros Thomopoulos (Washington University)* The attachment of tendon to bone is a significant mechanical challenge. Developing strategies for effectively connecting the two tissues will have significant clinical impact.	**4306-2 DEVELOPMENT OF IMPROVED METHODS FOR CHARACTERISING THE CURE OF COMPOSITE MATERIALS** *Ana Yong (National Physical Laboratory), Graham Sims (National Physical Laboratory), Paul Smith (University of Surrey), Stephen Ogin (University of Surrey)* The Tg of CFRP materials at four states of cure was measured using DMA, DSC and TMA by a new method that aims to eliminate thermal lag, often cited as a cause of disagreement between these techniques.	**4307-2 SHORT FIBRE POLYAMIDE UNDER COMBINED SHEAR AND TENSILE LOADING: A NON-DESTRUCTIVE EVALUATION OF MICRO DAMAGE EVOLUTION** *Karoline Metzkes (BAM Federal Insitute for Materials Research and Testing), Volker Trappe (BAM Federal Insitute for Materials Research and Testing)* The evolution of micro damage in short fibre polyamide is focus on. Tube samples are subjected to biaxial fatigue loadings. The evolution of micro damage is analysed by X-ray refraction analysis.	**4308-2 SUSTAINABLE COMPOSITES FROM BIOCHAR AND ENGINEERING PLASTIC** *Amar Mohanty (University of Guelph), Singaravelu Vivekanandhan (VHNSN College), Andrew Anstey (University of Guelph), Manjusri Misra (University of Guelph)* Biochar filled nylon 6 composites were fabricated through melt extrusion process. The effect of biochar loading on their mechanical properties was investigated.	**4309-2 COMPRESSIVE STRENGTH AND MIX BEHAVIOUR OF RUBBERISED CONCRETE** *Istvan Pocklington (Kingston University London), Hsein Kew (Kingston University London), Ted Donchev (Kingston University London), Mukesh Limbachiya (Kingston University London)* Compressive strength reductions as a result of both uniform and variable factors are discussed. Research suggests hydrocarbon contamination of rubber particles as but one of these causes.	**4310-2 A STUDY ON THE LENGTH EFFECT INFLUENCING THE MECHANICAL STRENGTH OF GLASS FIBRE FILAMENTS** *Alexander Maier (Processing of composites), Ralf Schledjewski (Processing of composites)* In the present work a possible length dependency for dry glass fibre bundles was investigated. These analyses are based on the needs for continuous composites manufacturing processes.

Meeting room 5	Meeting room 6	Meeting room 7	M1	M2	M3	M4	M5	M6	M7	M8
4311 Multifunctional Composites - Adaptive Response and Reconfiguration 4	**4312 Composites with Metallic Components 3**	**4313 Hybrid Composites 2**	**4314 Simulation of Progressive Failure 1**	**4315 Digital Image Correlation 2**	**4316 Durability, Creep and Agressive Environment 2**	**4317 Impact and Dynamic Structural Analysis 1**	**4318 Multiscale Modelling of Structures 3**	**4319 Applications - Ships and Boats**	**4320 Thermography 1**	**4321 Multifunctional Composites - Processing and Integration 1**
4311-1 MODELLING OF TEXTILE COMPOSITES WITH VARIABLE STIFFNESS *Erik Marklund (Swerea SICOMP AB), Gaurav Vyas (Swerea SICOMP AB), Peter Hellström (Swerea SICOMP AB)* In this work the macroscopic stiffness response of a short thermoplastic composite beam during impact at various temperatures is evaluated experimentally and supported by simulations.	**4312-1 STRUCTURE AND PROPERTIES OF THE AK7-SIC COMPOSITES AFTER MACHINING** *Jolanta Cyboron (Institute of Advanced Manufacturing Technology), Małgorzata Karolus (Institute of Advanced Manufacturing Technology), Piotr Putyra (Institute of Advanced Manufacturing Technology), Maciej Dyzia (Silesian University of Technology), Lucyna Jaworska (Institute of Advanced Manufacturing Technology)* The effects of addition silicon carbide on the phase composition, crystallite size, microstructure, residual stress and physical and mechanical properties on aluminum matrix alloy were investigated.	**4313-1 NEW MULTIFUNCTIONAL HYBRID POLYMER COMPOSITES REINFORCED BY CARBON AND STEEL FIBERS** *Benedikt Hannemann (Institute for Composite Materials (IVW GmbH)), Sebastian Backe (University of Kaiserslautern), Sebastian Schmeer (Institute for Composite Materials (IVW GmbH)), Frank Balle (University of Kaiserslautern), Ulf Paul Breuer (Institute for Composite Materials (IVW GmbH))* A carbon and steel fiber reinforced epoxy is investigated. Tests are conducted on coupons with different metal fiber volume fractions to demonstrate the electrical and mechanical material potentials.	**4314-1 A CONTINUUM DAMAGE MECHANICS MODEL FOR UD COMPOSITES WITH THE EVOLUTION LAW BASED ON THE DAMAGE DRIVING FORCE CONCEPT** *Tianhong Yu (University of Nottingham), Shuguang Li (University of Nottingham), Elena Sitnikova (University of Nottingham)* The present paper is the implementation of previous CDM theory with necessary extension, which further develops the theoretical model for UD composites into a functional material subroutine for FEA.	**4315-1 CHARACTERIZING QUASI-STATIC IMPACT EVENTS ON COMPOSITE MATERIALS WITH DIC** *Bob Desnoo (Carleton University), Calvin Rans (Delft University of Technology), Xiao Huang (Carleton University)*	**4316-1 DIRECTIONAL DIFFUSION OF MOISTURE IN CARBON FIBRE / EPOXY COMPOSITES: EXPERIMENTS AND MODELLING** *Feras Korkees (Swansea University), Sue Alston (Swansea University), Cris Arnold (Swansea University)* Directional diffusion of moisture in composites was studied to measure the diffusivity in all directions, and a multi-scale modelling approach was developed to predict these diffusivities.	**4317-1 THE SIMULATION OF THE IMPACT TESTS OF COMPOSITE STRUCTURES WITH MIXED ELEMENT TYPE ANALYSIS** *Weiyi Kong (University of Nottingham), Richard Brooks (University of Nottingham), Shuguang Li (University of Nottingham), Elena Sitnikova (University of Nottingham)* A mixed finite element type analysis, involving solid, thin shell elements and their coupling has been develop to reduce the cost of modelling large composite structures under impact loading,	**4318-1 A MICROMECHANICAL APPROACH TO MODELING THE EFFECT OF IMPACT INDUCED DAMAGE ON THE VIBRATION RESPONSE OF CFRP LAMINATES** *Marco A. Pérez (Universitat Politècnica de Catalunya - BarcelonaTech), Lluís Gil (Universitat Politècnica de Catalunya - BarcelonaTech), Sergio Oller (Universitat Politècnica de Catalunya - BarcelonaTech), Carlos A. Felippa (Center for Aerospace Structures-University of Colorado at Boulder)* This work deals with modeling the effect of low-velocity impact damage upon the vibration response of CFRP laminates through a micro-mechanical description of the induced internal damage.	**4319-1 COMPOSITE HATCH COVER FOR BULK CARRIERS** *Philippe Noury (DNV GL), Ragnar Hansen (HEAC), Bjørn Høyning (FiReCo)* Strength and fire risk assessments carried out to assess technical, regulatory and economic feasibility of GRP composite hatch cover showed that a GRP design was feasible and had equivalent fire safet	**4320-1 IMPROVEMENT OF DETECTION OF DEFECTS OF CFRP IN THE INFRARED PULSE PHASE THERMOGRAPHY** *Masashi Koyama (Meisei university), Masashi Ishikawa (Tokyo University of Science), Haruki Kitamura (Tokyo University of Science), Hirhoshi Hatta (Japan Aerospace Exploration Agency), Yasuo Kogo (Tokyo University of Science)* Pulse phase thermography (PPT) is one of the infrared thermography techniques. we tried to improve of detection of defect in the concrete structures using PPT with the heating by the halogen lamp.	**4321-1 MULTIFUNCTIONAL COMPOSITES REINFORCED WITH FUNCTIONALIZED NANOMATERIALS: INTERPHASE CHARACTERIZATION AND APPLICATIONS** *Qi An (University of Delaware), Andrew Rider (Defence Science and Technology Organization), Narelle Brack (La Trobe University), Erik Thostenson (University of Delaware)* This research based on a novel processing technique to hybridize carbon nanotubes with advanced fibers to prepare multifunctional composites, with focusing on characterizing interphases.
4311-2 ELECTROSTATIC ADHESION FOR ADDED FUNCTIONALITY OF COMPOSITE STRUCTURES *Callum Heath (University of Bristol), Ian Bond (University of Bristol), Kevin Potter (University of Bristol)* An overview of the potential use of Electrostatic adhesion, as a reversible attachment mechanism, to introduce variable stiffness capability into FRP sandwich structures	**4312-2 MECHANICAL AND MICROSTRUCTURE EVALUATION OF IN-SITU TITANIUM MATRIX COMPOSITE PROCESSED BY SEVERE PLASTIC DEFORMATION** *Weijie Lu (Shanghai Jiao Tong University), Yuanfei Han (Shanghai Jiao Tong University), Jiuxiao Li (Shanghai Jiao Tong University), Guangfa Huang (Shanghai Jiao Tong University), Yuting Iv (Shanghai Jiao Tong University)* In situ synthesized titanium matrix composite with a strongly clustered TiB fibers and TiC particles distribution is successfully subjected to equal channel angular pressing.	**4313-2 DURABILITY OF FLAX-BASALT HYBRID COMPOSITES FOR MARINE APPLICATIONS** *Vincenzo Fiore (University of Palermo), Tommaso Scalici (University of Palermo), Luigi Calabrese (University of Messina), Antonino Valenza (University of Palermo), Giuseppe La Bella (University of Messina)* In the present paper a study on the influence of basalt fibre layers on aging durability under salt spray exposition of flax/epoxy laminates is presented	**4314-2 REPRESENTING MATRIX CRACKS THROUGH DECOMPOSITION OF THE DEFORMATION GRADIENT TENSOR IN CONTINUUM DAMAGE MECHANICS METHODS** *Frank Leone (NASA Langley Research Center)* Presentation and demonstration of a new means of tracking matrix crack orientations in continuum damage mechanics material models for use in progressive damage analysis finite element models.	**4315-2 IN-PLANE SHEAR PROPERTIES OF CARBON FIBER REINFORCED THERMOPLASTIC COMPOSITES BY USING V-NOTCHED SPECIMEN AND DIGITAL IMAGE CORRELATION** *Takashi MURAKAMI (Shimadzu Corporation), Tuyoshi MATSUO (Tokyo University)* In-plane shear properties of carbon fiber reinforced thermoplastic composites (CFRTP) were investigated by the digital image correlation (DIC) analysis under the V-Notched Rail Shear Method.	**4316-2 ESTIMATION OF THE EFFECT THAT SPACE ENVIRONMENT ROAD GIVES IN THERMAL AND MECHANICAL PROPERTY OF CFRP** *Satomi Asai (Japan Aerospace Exploration Agency), Ken Goto (Japan Aerospace Exploration Agency), Satoshi Yoneyama (Aoyama Gakuin University), Shuichi Arikawa (Aoyama Gakuin University), Satoshi Kobayashi (Tokyo Metropolitan University)* This study searches relation of damage of laminate by thermal cycle and the changes in Young's modulus and CTE of CFRP laminate by experimental observations.	**4317-2 IMPACT PERFORMANCE OF COMPOSITE SANDWICH STRUCTURE UNDER HIGH VELOCITY IMPACT** *Long Yu (Imperial College London), Iman Mohagheghian (Imperial College London), Bamber Blackman (Imperial College London), John Dear (Imperial College London)* The energy absorption for uniform and graded foam core composite sandwich structures was investigated under low and high velocity impact by using drop-weight tower and gas gun.	**4318-2 MULTISCALE MODELING OF LAMINATED STRUCTURES** *Roberta Massabo (University of Genova), Marco Pelassa (University of Genova)* The influence of interfacial imperfections on the dynamic characteristics of multilayered plates is studied using a multiscale approach which couples a single-layer theory and a cohesive-crack model.	**4319-2 EFFECT OF FLEXIBILITY ON THE PERFORMANCE OF POLYMERIC FOAMS IN SANDWICH CONSTRUCTION HULL PANELLING UNDER SLAMMING LOADS** *Tom Allen (Unviersity of Auckland), Mark Battley (University of Auckland)* This paper explores experimentally how the stress state in polymeric foam cores varies as a result of flexibility in hull paneling during water impacts.	**4320-2 MONITORING AND REPAIR TECHNIQUE FOR INTERFACIAL DE-BONDING IN CARBON FIBER REINFORCED THERMOPLASTICS BY MEANS OF INDUCTION HEATING** *Takushi Miyake (Gifu University), Kazuya TAKENAKA (Gifu University)* A novel method for monitoring and repair the interfacial debonding in injection molded CFRTP parts was proposed with MHz-frequency induction heating which enable to heat carbon fibers very rapidly.	**4321-2 THREE-DIMENSIONAL PRINTING OF POLYVINYLIDENE FLUORIDE-BARIUM TITANATE NANOCOMPOSITE SENSORS** *Sampada Bodkhe (Ecole Polytechnique de Montreal), Daniel Therriault (Ecole Polytechnique de Montreal), Frederick Gosselin (Ecole Polytechnique de Montreal)* A novel fabrication approach to create 3D piezoelectric polyvinylidene fluoride (PVDF) – barium titanate (BaTiO3) nanocomposite sensors by solvent-cast 3D printing is presented.

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16
15:40	**4301-3 EFFECT OF TEMPERATURE AND CLEARANCE ON SHEAR CUTTING BEHAVIORS IN CFRP LAMINATES** *Keiji Ogi (Ehime University), Shigeki Yashiro (Shizuoka University)* The purpose of the present study is to optimize the shear cutting conditions (temperature and clearance) of thermosetting and thermoplastic CFRP cross-ply laminates.	**4302-3 PREPARATION AND PROPERTIES OF CNTS WEB/EXOXY COMPOSITES** *Lulu Shen (Tongji University), Ling Liu (Tongji University)* In the present study, the carbon nanotube (CNT) buckypapers (BPs) were prepared by positive pressure filtering process and then were infiltrated with epoxy resin by using of improved preparation proce		**4304-3 EVALUATION OF SELF-HEALING PERFORMANCE IN EPOXY/GLASS FIBER COMPOSITES MANUFACTURED USING VARTM** *Siddharth Dev (University of Massachusetts Lowell), Christopher Hansen (University of Massachusetts Lowell)* Resin solvent healing using pre-synthesized solvent loaded double shell walled microcapsules is investigated for implementation into epoxy-based fiber-reinforced composite materials.	**4305-3 DEVELOPMENT OF NOVEL SILK FIBROIN-MAGNETITE BIOCOMPOSITES FOR TISSUE ENGINEERING** *Catalin Zaharia (University Politehnica of Bucharest), Paul Stanescu (University Politehnica of Bucharest), Bianca Galateanu (University of Bucharest), Mihaela-Cristina Bunea (University Politehnica of Bucharest), Eugenia Vasile (University Politehnica of Bucharest)* The goal of this paper is to develop a novel magnetic biocomposite scaffold made of Bombyx mori silk fibroin and magnetite nanoparticles for wound dressing applications.	**4306-3 DETERMINATION OF GEOMETRICAL PARAMETERS FOR ELECTRICAL CHARACTERIZATION OF A CFRP DURING CURING** *Sonia Sassi (Institut Clément Ader), Philippe Marguerès (Institut Clément Ader), Rébecca Le Begue (Institut Clément Ader), Philippe Olivier (Institut Clément Ader)* Title: DETERMINATION OF GEOMETRICAL PARAMETERS FOR ELECTRICAL CHARACTERIZATION OF A CFRP DURING CURING. Keywords: CFRP T70/M21, cure monitoring, geometrical parameters, electrical properties.	**4307-3 MODELLING ELASTICITY OF INJECTION MOULDED SHORT FIBRE REINFORCED POLYMERS: COMPARISON BETWEEN EXPERIMENTAL AND ANALYTICAL APPROACHES** *Andrea Bernasconi (Politecnico di Milano), Edoardo Conrado (Politecnico di Milano), Francesca Cosmi (Università desgli Studi di Trieste), Peter Hine (University of Leeds)* Elastic constants of a short fibre reinforced polyamide are evaluated by two methods: one based on process simulation and mean field homogenization and one based on the Cell Method and micro–CT.	**4308-3 COMPRESSIVE PROPERTIES OF NATURAL FIBRE COMPOSITES** *Aart Willem Van Vuure (KU Leuven), Joris Baets (KU Leuven), Kimberly Wouters (KU Leuven), Kevin Hendrickx (KU Leuven)* Compressive properties of 3 different uni-directional natural fibre composites have been evaluated, based on flax, bamboo and coir fibres. Compressive properties reach 60-80% of tensile properties.	**4309-3 ECO-EFFICIENCY EVALUATION ON THE WASTE TREATMENT OF CARBON FIBRE REINFORCED POLYMER** *Xiang Li (The University of Nottingham), Jon McKechnie (The University of Nottingham), Ruibin Bai (The University of Nottingham)* Life cycle costing and environmental assessment methods are applied in this study to quantify the financial and environmental impacts of alternative waste CFRP treatment routes.	**4310-3 TENSILE STRENGTH OF PAN-BASED CARBON FIBRES AND NANOSTRUCTURE DEVELOPMENT** *Haruki Okuda (TORAY Industries-Inc.), Jun Watanabe (TORAY Industries-Inc.), Fumihiko Tanaka (TORAY Industries-Inc.), Tomonaga Okabe (Tohoku University), Robert Young (University of Manchester)* Tensile failure phenomena of the PAN-based carbon fibres and their potential will be discussed on the basis of a newly developed test technique which combines the loop test and in-situ Raman analysis.
16:00	**4301-4 MICRO-MECHANICAL MODEL AND MATERIAL REMOVAL MECHANISM OF MACHINING CARBON FIBER REINFORCED POLYMER COMPOSITE** *Bin Niu (Dalian University of Technology), Rui Yang (Dalian University of Technology)* The present paper studies the material removal mechanism of machining composites by a micro-mechanical model, and analytically derives cutting forces based on a two-parameter elastic foundation beam.	**4302-4 EFFECT OF FUNCTIONALIZATION AND ADDING METHOD OF CARBON NANOTUBE ON INTERLAMINAR PROPERTY OF CARBON FIBER/EPOXY COMPOSITE** *Mengsi Zhang (Beihang University), Yizhuo Gu (Beihang University), Yujiao Fan (Beihang University), Min Li (Beihang University), Shaokai Wang (Beihang University), Zuoguang Zhang (Beihang University)* The effect of functionalization and adding methods of carbon nanotube on interlaminar property of carbon fiber/epoxy composite were studied, including the effect on resin and interface properties.		**4304-4 TOUGH, SELF-REPORTING, BIOCOMPOSITES USING SILK AND NANOCELLULOSE FIBERS: TOUGHENING, INTERFACE MODIFICATION AND NEW MULTIFUNCTIONAL INTERFACE IMAGING PROBES** *Jeffrey Gilman (NIST), Jeremiah Woodcock (Georgetown University), Fritz Vollrath (Oxford University), Chelsea Davis (NIST), Ning Chen (Georgetown University), Stephan Stranick (NIST), Ryan Beams (NIST), J. Alexander Liddle (NIST), Iulia Sacui (University of Maryland), Danielle Grolman (University of Akron), Alamgir Karim (University of Akron), Muzhou Wang (NIST), Darshil Shah (Oxford University)* We will describe the surface functionalization methods developed to demonstrate new mechanically-activatable fluorescent probes (mechanophores) and UV/water activatable fluorescent probes (aquafluor).		**4306-4 PROCESS MONITORING OF GLASS REINFORCED POLYPROPYLENE LAMINATES USING FIBER BRAGG GRATINGS** *Matthieu Mulle (King Abdullah University of Science and Technology (KAUST)), Husam Wafai (King Abdullah University of Science and Technology (KAUST)), Arief Yudhanto (King Abdullah University of Science and Technology (KAUST)), Gilles Lubineau (King Abdullah University of Science and Technology (KAUST)), Warden Schijve (SABIC), Nikhil Verghese (SABIC)* The hot press process of glass reinforced polypropylene is monitored with FBGs. UD0 and UD90 laminates are investigated for 2 cooling rates. Transition phases, residual strains and CTEs are estimated.	**4307-4 A NOVEL TECHNOLOGY FOR SHORT FIBER REINFORCED COMPOSITE –DFFIM-** *Ryosuke Nakao (Kyoto Institute of Technology)* It is found that the CFRP made of carbon prepregs which impregnated nylon 66 resin in advanced had better bonding properties based on the tensile test and detailed SEM observations.	**4308-4 CONDUCTIVE AND STRONG NANOCOMPOSITES BASED ON NANOFIBRILLATED CELLULOSE AND CARBON NANOTUBES** *Alireza Hajian (KTH Royal Institute of Technology), Lars Berglund (KTH Royal Institute of Technology)* Single-wall carbon nanotubes can be dispersed with the aid of cellulose nanofibrils in aqueous medium and the dispersions can be utilized into making highly conductive nanocomposites.	**4309-4 SUSTAINABLE AND RECYCLABLE THERMOPLASTIC SIZING BASED ON AQUEOUS DISPERSION** *Aurelie Malho Rodrigues (Laboratoire des IMRCP), Sophie Franceschi (Laboratoire des IMRCP), Emile Perez (Laboratoire des IMRCP), Isabelle Giraud (Institut Carnot CIRIMAT-Physiques des polymères), Eric Dantras (Institut Carnot CIRIMAT - Physiques des polymères), Colette Lacabanne (Institut Carnot CIRIMAT - Physiques des polymères)* This work will illustrate how we succeeded to optimize, by QSPE method and artificial neural network, an eco-friendly (REACH) aqueous dispersion for thermoplastic sizing at industrial scale.	**4310-4 INVESTIGATION OF THE STATISTICAL DISTRIBUTIONS OF FRACTURE STRENGTHS FOR FLAX FIBERS USING THE TOW TESTING TECHNIQUE** *Jacques Lamon (CNRS/ENS), Mohamed R'Mili (INSA LYON)*
16:20	**Coffee in the Exhibition**									

Meeting room 5	Meeting room 6	Meeting room 7	M1	M2	M3	M4	M5	M6	M7	M8
4311-3 ADAPTIVE MULTIFUNCTIONAL MATERIALS FOR ADDITIVE LAYER MANUFACTURING *Richard Trask (University of Bristol), Marc Scholz (University of Bristol), Tom Llewellyn-Jones (University of Bristol), Laura Beckett (University of Bristol), Robert Allen (University of Bristol), Bruce Drinkwater (University of Bristol)*	**4312-3 TENSILE STRESS-STRAIN BEHAVIOUR OF MULTIAXIAL METAL MATRIX COMPOSITES** *Gerald Watt (University of Surrey), Stephen Kyle-Henney (TISICS Ltd), Andy Crocombe (University of Surrey), Stephen Ogin (University of Surrey)* A review of the ambient temperature tensile stress-strain behaviour of uniaxial and multiaxial metal matrix composites and a simple model to predict non-linear tensile behaviour.	**4313-3 HYBRID LAYERED COMPOSITES FOR HIGH TOUGHNESS** *H Daniel Wagner (Weizmann Institute of Science)*	**4314-3 DAMAGE EVOLUTION DURING HIGH-TEMPERATURE OXIDATIVE AGING OF COMPOSITES** *Kishore Pochiraju (Stevens Institute of Technology), Jianyong Liang (Stevens Institute of Technology)* A high-resolution chemo-mechanics-damage model is used to predict the degradation of high-temperature polymer matrix composites under long-term thermo-oxidative aging conditions.	**4315-3 DIGITAL IMAGE CORRELATION AND FINITE ELEMENT ANALYSIS APPLIED TO FIBER-REINFORCED COMPOSITES AT THE MICRO-SCALE** *Mahoor Mehdikhani (KU Leuven), Mohammadali Aravand (KU Leuven), Baris Sabuncuoglu (KU Leuven), Michaël G. Callens (KU Leuven), Stepan V. Lomov (KU Leuven), Larissa Gorbatikh (KU Leuven)* The application of micro-scale DIC to fiber-reinforced composites is explored. Validating against FEA, it shows promises for further mechanical investigation at the micro-scale.	**4316-3 EFFECTS OF TEMPERATURE ON STATIC AND FATIGUE STRENGTH OF WIND TURBINE COMPOSITES** *Sibrand Raijmaekers (Knowledge Centre WMC), Iuri Rocha (Knowledge Centre WMC), Rogier Nijssen (Knowledge Centre WMC)* The effect of temperature on the mechanical behaviour of wind turbine composites is evaluated. Damage mechanisms, such as physical ageing and thermal stresses are described and analysed.	**4317-3 THE LOW VELOCITY IMPACT RESPONSE OF SANDWICH STRUCTURES WITH GRADED FOAM CORES** *Jin Zhou (University of Liverpool), Zhongwei Guan (University of Liverpool), Rehan Umer (Khalifa University of Science-Technology and Research (KUSTAR)), Wesley Cantwell (Khalifa University of Science-Technology and Research (KUSTAR))* The low velocity impact response of sandwich structures with graded foams cores have been investigated both experimentally and numerically. Sandwich structures, based on graded foams, were fabricated	**4318-3 NUMERICAL MODELS WITH LAYERED ELEMENTS FOR NOMEX HONEYCOMB CORE UNDER FLATWISE COMPRESSION** *Longguan Liu (Shanghai Jiao Tong University), Hai Wang (Shanghai Jiao Tong University), Zhongwei Guan (University of Liverpool)* Different modelling methods of the Nomex honeycomb sandwich structures under flatwise compression were proposed and developed based on the structural features of the Nomex honeycomb cell walls.	**4319-3 DESIGN AND ANALYSIS OF A COMPOSITE PATCH REINFORCEMENT SYSTEM FOR A MARINE APPLICATION CASE** *Pablo Yarza (AIMEN-Technology Center), Arijana Milat (as2con), Tomislav Tomac (as2con), Giovanni Risso (CETENA)* The aim of this study was to find the optimal configuration of a composite patch for a marine application case, whose objective is to increase fatigue life of a typical detail of balcony opening.	**4320-3 DELAMINATION DETECTION IN LAMINATED GLASSY POLYMERS AND POLYMERIC COMPOSITES BY MEANS OF STRAIN SOLITONS** *Irina Semenova (Ioffe Physical Technical Institute), Galina Dreiden (Ioffe Physical Technical Institute), Alexander Samsonov (Ioffe Physical Technical Institute)* The paper presents an approach aimed for delamination detection in layered structures made of glassy polymers and composites based on the propagation and optical detection of bulk strain solitons.	**4321-3 DEVELOPMENT OF EXTREME-ENVIRONMENT ELECTRONIC INTERFACES THROUGH A COMBINATORIAL MATERIAL OPTIMIZATION AND ADDITIVE MATERIAL DEPOSITION APPROACH** *Thomas Reitz (The United States Air Force Research Laboratory), Evan Thomas (University of Dayton Research Institute), Kevin Yost (The United States Air Force Research Laboratory), Jared McCoppin (National Research Council)* Homogeneous and heterogeneous tape casts of Nb-doped CaMnO3 were fabricated into multilayer piles as a strategy to suppress phonon transport and enhance the bulk thermoelectric properties at high T.
4311-4 STIMULI RESPONSE, STRUCTURAL RECONFIGURATION, AND PROPERTY CONTROL IN CROSS-LINKED POLYMER *Michael Aldridge (University of Michigan), Katherine Sebeck (University of Michigan), Weimin Wang (University of Michigan), Andrew Bielawski (University of Michigan), John Kieffer (University of Michigan)* Structural developments in spatially confined epoxy-based materials systems have been investigated using a combination concurrent Raman and Brillouin scattering experiments and atomistic simulations.	**4312-4 IN-SITU THERMAL STRESS MEASUREMENT OF TUNGSTEN FIBER REINFORCED TITANIUM COMPOSITE BY HIGH-LOW TEMPERATURE X-RAY DIFFRACTION** *Masayuki Nishida (Kobe City College of Technology), Taisei Doi (Student of Advanced Course-Kobe City College of Technology), Tatsuya Matsue (Niihama National College of Technology), Takao Hanabusa (The University of Tokushima)* The thermal residual stress alteration of W/Ti composite was estimated by the x-ray diffraction with the cryogenic cooling system, temperature from 25oC to -250 oC	**4313-4 STEEL FOIL REINFORCED COMPOSITES: STUDY OF STRENGTH, PLASTICITY AND PLY SIZE EFFECTS** *Kunal Masania (University of Applied Sciences and Arts Northwestern Switzerland), Roman Geissberger (University of Applied Sciences and Arts Northwestern Switzerland), Daniel Stefaniak (German Aerospace Centre), Clemens Dransfeld (University of Applied Sciences and Arts Northwestern Switzerland)* Steel foil and carbon fibre epoxy laminates were studied using ply level hybridisation and thin plies to delay onset of damage circa 30%; failure modes varied significantly with laminate composition.	**4314-4 MICROMECHANICAL STUDY OF UNIDIRECTIONAL HIGH FIBER CONTENT COMPOSITE UNDER TRANSVERSE COMPRESSIVE, TENSILE AND SHEAR LOADINGS** *Hai Qing (Nanjing University of Aeronautics & Astronautics)* A new theoretical model is developed to perform more detail theoretical analysis on the stress transfer between fibre and matrix, and distributions of stress, strain and displacement in composites.	**4315-4 DATA-RICH CHARACTERISATION OF DAMAGE PROPOGATION IN COMPOSITE MATERIALS AFTER INTERMEDIATE STRAIN RATE LOADING** *Janice Dulieu-Barton (University of Southampton), Gary Battams (University of Southampton)* A novel methodology for simultaneously capturing DIC and TSA IR image data from CFRP specimens during fatigue loading is described and validated iusing X-ray CT.	**4316-4 GAMMA IRRADIATION AGING OF BASALT FIBER REINFORCED COMPOSITES** *Ran Li (Beihang University)* Gamma irradiation aging of E-glass fiber reinforced epoxy matrix composite is investigated in this study. The composite were treated with a 60Co gamma irradiation dose up to 2.0MGy-Ran Li	**4317-4 INVESTIGATION ON THE ENERGY ABSORPTION CAPABILITY OF COMPOSITE CRASH-BOX WITH RECYCLABLE THERMOPLASTIC MATERIAL** *Simonetta Boria (University of Camerino), Alessandro Scattina (Politecnico di Torino)* Starting from information obtained in the first experimental tests, the energy absorption capacity of thermoplastic impact attenuators made as thin wall tubes of circular cross section is investigated		**4319-4 RETROFITTING THE SUPERSTRUCTURE OF A LARGE PASSENGER SHIP USING COMPOSITES - A DEMONSTRATION** *Vasileios Karatzas (Technical University of Denmark), Niels Hjørnet (Niels Hjørnet Yacht Design), Christian Berggreen (Technical University of Denmark)* The superstructure of a RoPax ferry has been redesigned using composite materials and the new design has been compared to the existing steel superstructure.	**4320-4 THE CHARACTERISATION OF NOTCHED 3D WOVEN COMPOSITES USING THERMO-ELASTIC STRESS ANALYSIS AND DIGITAL IMAGE CORRELATION** *Paul Cunningham (Loughborough University), Shuo Dai (Loughborough University)* The paper is concerned with the investigation of notched versus un-notched strength using DIC, and the fatigue damage progression using TSA, of two 3D woven composite specimen types.	**4321-4 NANOSPRING FILMS FOR MULTIFUNCTIONAL INTERFACES** *Ryan Mott (University of Illinois at Urbana-Champaign), Ioannis Chasiotis (University of Illinois at Urbana-Champaign)* 10-micron high Cu nanospring films were studied for their mechanical compliance and reversible compressibility as a function of seed spacing that varied in the range of 2000-3200 nm.

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16
16:40	**4401 Processing - Manufacturing Technology 13**	**4402 Nano Composites 13**	**4403 Sandwich Structures and Materials 3**	**4404 Multifunctional Composites - Self-Healing and Bio-inspired Designs 4**	**4405 Applications - Bio & Medical 3**	**4406 Experimental Methods for Process Characterisation 5**	**4407 Textile-Based Composites and Fibre Architecture 10**	**4408 Biocomposites 12**	**4409 Recycling of Composites and Sustainability 4**	**4410 Fibres 3**
16:40	**4401-1 ECO-EFFICIENTLY CURED AND HALOGEN FREE FIRE RETARDANT COMPOSITES** *Frederik Goethals (Centexbel), Myriam Vanneste (Centexbel), Ralf Lungwitz (STFI), Martina Janickova (Inotex), Jan Marek (Inotex)* Eco-efficiently cured and halogen-free fire retardant composites are obtained by using UV-curable fire retardant oligomers as matrix material and glass UD fabrics as fibre reinforcement.	**4402-1 FABRICATION AND APPLICATIONS OF MULTI-FUNCTIONAL NANOCOMPOSITES FILLED WITH CARBON BASED NANOMATERIALS** *Soon Hyung Hong (Korea Advanced Institute of Science and Technology (KAIST)), Ho Jin Ryu (Korea Advanced Institute of Science and Technology (KAIST))* The experimental results on the characterization of structural and functional properties of CNT- or graphene-reinforced nanocomposites with various inorganic and organic matrices are reviewed.	**4403-1 VIRTUAL TESTING OF FOLDCORES MADE OF POLYETHYLENE TEREPHTHALATE** *Yong Hao (Shenyang Engine Design & Research Institute), Shixi Zang (Shanghai Jiao Tong University), Xiuhua Chen (Shanghai Jiao Tong University), Hai Wang (Shanghai Jiao Tong University), Zhong You (University of Oxford), Xiang Zhou (Shanghai Jiao Tong University)* A virtual test method based on the dynamic finite element simulation was developed to simulate the mechanical properties of polyethylene terephthalate foldcores.	**4404-1 OPTIMISED VASCULAR SYSTEMS FOR THE IN-SITU REPAIR OF COMPOSITE T-JOINTS** *Jack Cullinan (University of Bristol), Michael Wisnom (University of Bristol), Ian Bond (University of Bristol)* Presentation on the use of vascules (micro-channels) to repair complex composite structures in-situ. Preliminary work on the potential of Cyanoacrylate for composite repairs has also been presented.	**4405-1 BIOMIMETIC ORGANIC-INORGANIC COMPOSITE COATINGS FOR BIOINERT METAL IMPLANTS USED IN ORTHOPEDICS AND DENTISTRY. PREPARATION AND CHARACTERIZATION** *Helga Furedi Milhofer (the Hebrew University of Jerusalem), Alon Elyada (the Hebrew University of Jerusalem), Maja Dutour Sikiric (Rudjer Boskovic Institute), Ronald Schade (Institute for Bioprocessing and Analytical Measurement Techniques (iba)), Steffi Grohmann (Institute for Bioprocessing and Analytical Measurement Techniques (iba)), Klaus Liefeith (Institute for Bioprocessing and Analytical Measurement Techniques (iba)), Nissim Garti (the Hebrew University of Jerusalem), Herbert P. Jennissen (University of Duisburg-Essen)* Organic-inorganic composite coatings - polyelectrolyte multilayers with CaP - were prepared on glass and Ti surfaces. Calcification increases the mechanical stability and stiffness of the coatings.	**4406-1 CHARACTERISATION OF RESIN DEGREE OF IMPREGNATION OF OUT-OF-AUTOCLAVE PREPREG** *Marc Palardy-Sim (McGill University), Pascal Hubert (McGill University)* Investigation of three methods used to characterize the initial degree of impregnation of out-of-autoclave prepreg: micro-CT, water pick-up, and active thermography.		**4408-1 ADVANCED BIOCOMPOSITES MADE FROM METHACRYLATED EPOXIDIZED SUCROSE SOYATE RESIN REINFORCED WITH FLAX FIBERS** *Ali Amiri (North Dakota State University), Nassibeh Hosseini (North Dakota State University), Chad Ulven (North Dakota State University), Dean Webster (North Dakota State University)* Flax fiber composites were processed with a Methacrylated Epoxidized Sucrose Soyate (MESS) resin and properties were compared agains those of Flax/ Vinyl Ester resin composite.	**4409-1 ALIGNED SHORT FIBRE HYBRID COMPOSITES WITH VIRGIN AND RECYCLED CARBON FIBRES** *Marco Luigi Longana (University of Bristol), Hana Yu (University of Bristol), Kevin Potter (University of Bristol)* Intermingled hybrid composites with aligned virgin and recycled short carbon fibres were manufactured with a novel fibre alignment method to increase the availability of recycled carbon fibres.	**4410-1 EVOLUTION OF CRYSTALLINE PARAMETERS DURING STABILIZATION OF POLYACRYLONITRILE FIBERS** *Ray Frenzel (University of Augsburg), Judith Moosburger-Will (University of Augsburg), Siegfried Horn (University of Augsburg)* Textile polyacrylonitrile fibers showing different effective diameters were stabilized under air. The evolution of crystalline parameters of these fibers during stabilization was investigated.
17:00	**4401-2 USING A NEW DEVELOPED DIE AND DIFFERENT TYPES OF THERMOSETTING RESINS TO PRODUCE U200 PROFILES BY PULTRUSION** *Joao Pedro Nunes (Polymer Engineering Dept / Minho University), David Melo (Minho University), Miguel Vasconcelos (VIDROPOL SA)* This work concerns the study and optimisation of the production of U200 GRP pultrusion profiles. A steel heated die was designed and processing variables studied for 4 different resins and catalysts.	**4402-2 POLY (VINYLIDENE FLUORIDE)/MULTI-WALLED CARBON NANOTUBE COMPOSITES: POLYMORPHS TRANSFORMATION INDUCED DUCTILITY** *Xuelong Chen (Nanyang Technological University), Ming Yin (Nanyang Technological University)* Unexpected largely enhanced ductility was achieved in PVDF/CNTs composites and mechanism was explored. It is believed the phase transformation and CNTs pinning are responsible for this phenomenon.	**4403-2 FAILURE ANALYSIS OF SANDWICH COMPOSITES WITH CHOPPED FIBER REINFORCEMENT UNDER IN-PLANE COMPRESSION** *Shiyong Sun (Dalian University of Technology), Lingbing Xing (Dalian University of Technology), Jin Wang (Shenyang Aircraft Design & Research Institute), Xiaoshan Xu (Dalian University of Technology)* The experimental test and finite element model are employed to study the failure process of sandwich composites with reinforcement under in-plane compression load.	**4404-2 HEALING OF EARLY STAGE DAMAGE OF IONOMER COMPOSITE INTERLAYERS BY LOCALIZED HEATING UPON MAGNETIC INDUCTION** *Wouter Post (Technical University of Delft), Santiago Garcia (Technical University of Delft), Olivier Bou Matar, Koen Van Den Abeele (Catholic University of Leuven), Sybrand Van Der Zwaag (Technical University of Delft)* Early stage matrix healing of particulate ionomer composites was achieved by local particle heating upon induction. The potential for the restoration of fatigue and impact damage is shown.	**4405-2 BIOMIMETIC IMPLANT COATINGS FOR LOCAL DELIVERY OF GROWTH FACTORS AND ANTIBIOTICS** *Steffi Grohmann (Institute for Bioprocessing and Analytical measurements (iba)), Manuela Menne (Institute for Bioprocessing and Analytical measurements (iba)), Holger Rothe (Institute for Bioprocessing and Analytical measurements (iba)), Klaus Liefeith (Institute for Bioprocessing and Analytical measurements (iba))* The most challenging issues with bone implants i) stable osseointegration and ii) prevention of a possible implant-associated infection are adressed with a bioactive, biomimetic nano-coating.	**4406-2 PRACTICAL DEMONSTRATION OF FIBRE EVANESCENT WAVE SPECTROSCOPY FOR CURE MONITORING POLYMER MATRIX COMPOSITES USING NOVEL H3-GLASS FIBRES.** *Peter Wilson (The University of Sheffield), Simon Hayes (The University of Sheffield), Russell Hand (The University of Sheffield)* The development and practical demonstration of a reinforcing style, evanescent wave, fibre sensor for cure monitoring of epoxy resins.		**4408-2 FORMING OF NATIVE STARCH/WOOD COMPOSITES** *Arnaud Regazzi (CNRS), Maxime Teil (CNRS), Pierre Dumont (CNRS), Barthélémy Harthong (CNRS), Didier Imbault (CNRS), Robert Peyroux (CNRS), Jean-Luc Putaux (CNRS)* This study deals with the manufacturing of starch/ softwood composites made by thermal and ultrasonic compression moulding while preserving the interesting native properties of their constituents	**4409-2 RECYCLED GLASS FIBRE/POLYESTER COMPOSITES – PROCESSING AND MECHANICAL CHARACTERIZATION** *Durai Prabhakaran Rt (University of strathclyde), James Thomason (University of strathclyde)* The present article demonstrate the recycling and reuse of waste glass fibre fabrics. The recycled regenerated long glass fibres are impregnated with polyester resin to study the mechanical properties	**4410-2 SYNERGISTIC STRENGTHENING OF SISAL FIBER WITH ALKALI TREATMENT AND CELLULOSE NANOCRYSTALS MODIFICATION** *Yan Li (Tongji University), Zhongsen Zhang (Tongji University)* This study investigated the synergistic strengthening effect of sisal fiber with alkali treatment and cellulose nanocrystals modification by experiments and theories.

Meeting room 5	Meeting room 6	Meeting room 7	M1	M2	M3	M4	M5	M6	M7	M8
4411 Multifunctional Composites - Adaptive Response and Reconfiguration 5	**4412 Composites with Metallic Components 4**	**4413 Hybrid Composites 3**	**4414 Simulation of Progressive Failure 2**	**4415 Digital Image Correlation 3**	**4416 Dynamic Fracture 3**	**4417 Impact and Dynamic Structural Analysis 2**	**4418 Multiscale Modelling of Structures 4**	**4419 Applications - Civil Engineering 3**	**4420 Thermography 2**	**4421 Multifunctional Composites - Processing and Integration 2**
4411-1 SYNTHESIS AND CHARACTERIZATION OF BISMALEIMIDE BASED THERMOSET TRIPLE-SHAPE POLYMERIC SYSTEM *Qiwei Zhang (Harbin Institute of Technology), Yanju Liu (Harbin Institute of Technology), Jinsong Leng (Harbin Institute of Technology)* This paper concerns the synthesis and characterization of bismaleimide based triple-shape memory polymers. The author finds it necessary to introduce diisocyanate into polymeric system.	**4412-1 EFFECT OF MICROSTRUCTURE CONTROL ON THERMAL AND ELECTRICAL CONDUCTIVITIES OF CNF/AL COMPOSITES** *Gen Sasaki (Hiroshima University), Yusuke Omuro (Hiroshima University), Yongbum Choi (Hiroshima University), Kenjiro Sugio (Hiroshima University), Kazuhiro Matsugi (Hiroshima University)* Fiber direction in CNF/Al composites by sintering was controlled by rolling in order to improve the electrical and thermal conductibity. These propertes was affected by the fiber orientasion, density.	**4413-1 CHEMICAL AND MECHANICAL PROPERTIES OF CO-CURED HYBRID COMPOSITE/ALUMINIUM STRUCTURES** *Sébastien MERCIER (ONERA), Romain AGUOGUE (ONERA), Anne MAVEL (ONERA), Pilippe NUNEZ (ONERA)* This paper is related to the mechanical and chemical properties of Aluminium/CFRP hybrid materials. It concerns the influence of the aluminium surface treatment on the interface properties	**4414-1 FAILURE ANALYSIS OF NOTCHED FIBER-REINFORCED COMPOSITE MATERIALS** *Guangyan Liu (Beijing Institute of Technology), Kaili Tang (Beijing Institute of Technology), Hongchen Bao (Beijing Institute of Technology)* Progressive failure analysis of notched composite laminates was performed by introducing surface-based cohesive contact to model the longitudinal splitting.	**4415-1 MEASUREMENT OF THE INTERNAL STRAIN DISTRIBUTION IN A REINFORCED RUBBER-MATRIX COMPOSITE USING DIGITAL VOLUME CORRELATION** *Hubert Schreier (Correlated Solutions-Inc.), David Mollenhauer (US Air Force Research Laboratory), Andrew Makeev (University of Texas Arlington), Eric Jones (US Air Force Research Laboratory), Sirina Safriet (University of Dayton Research Institute)* A rubber-matrix composite specimen was investigated using digital volume correlation to assess bias and noise from the technique and compare experimental results to strain from finite element model.	**4416-1 PERMISSIBLE LOW VELOCITY IMPACT DEFECTS IN ORGANIC INTERLOCK WOVEN COMPOSITE** *Myriam Kaminski (ONERA), Adrien Elias (ONERA), Frédéric Laurin (ONERA)* A two-step simulation approach has been proposed and has consisted in predicting the damage induced by an impact in order to estimate the residual strength of the specimen.	**4417-1 OPTIMIZATION OF AN AUTOMOTIVE COMPOSITE BUMPER BEAM WITH OPEN SECTION FOR PRODUCTION AND STRUCTURAL PERFORMANCE** *Alem Tekalign Beyene (Politecnico Di Torino), Giovanni BELINGARDI (Politecnico Di torino), Giada Falcinelli (Politecnico Di Torino)* GMT bumper beam has been considered for light weight and better crash worthiness . Open section beam were chosen for production viability . FE cross-sectional and ribs optimization has conducted.	**4418-1 INTERLAMINAR STRESSES IN CORRUGATED STRUCTURES MADE FROM ANISOTROPIC MATERIALS** *Claudia Thurnherr (ETH Zürich), Gerald Kress (ETH Zürich), Paolo Ermanni (ETH Zürich)* The present study investigates the influence of geometry and material anisotropy on the interlaminar shear and through-thickness stress in corrugated laminates.	**KEYNOTE** **4419-1 LONG TERM RELIABILITY OF CFRP IN BRIDGE ENGINEERING** *Urs Meier (EMPA-Swiss Federal Laboratories for Materials Science & Technology), Rolf Brönnimann (EMPA), Peter Anderegg (EMPA)* Starting from 1991 pilot projects with CFRP applications have been initiated in bridge construction. Most noticeable is the Verdasio Bridge with a sustained stress of 1610 MPa in the CFRP cables.	**4420-1 FULL FIELD INSPECTION OF COMPOSITE COMPONENTS USING NATURAL FREQUENCY EXCITATION** *Rachael Waugh (University of Southampton), Janice Dulieu-Barton (University of Southampton), Simon Quinn (University of Southampton)* Thermoelastic stress analysis and digital image correlation (DIC) give different but complimentary information. To enable both to monitor cyclically loaded panels a lock-in DIC approach is introduced.	**KEYNOTE** **4421-1 MULTIFUNCTIONAL MICROVASCULAR COMPOSITES** *Scott White (University of Illinois at Urbana-Champaign), Stephen Pety (University of Illinois at Urbana-Champaign), Anthony Coppola (University of Illinois at Urbana-Champaign), Kevin Hart (University of Illinois at Urbana-Champaign), Jason Patrick (University of Illinois at Urbana-Champaign), Ryan Gergely (University of Illinois at Urbana-Champaign), Nancy Sottos (University of Illinois at Urbana-Champaign), Jeff Moore (University of Illinois at Urbana-Champaign)* Complex multidimensional vascular polymers and composites are seamlessly fabricated by using sacrificial material templates based on poly(lactide) polymers treated with a tin catalyst.
4411-2 DEVELOPMENT OF NOVEL COMPOSITE SANDWICH STRUCTURES WITH INTEGRATED SHOCK ABSORBING FUNCTIONALITY *Simon Bates (University of Bristol), Richard Trask (University of Bristol), Ian Farrow (University of Bristol)* A parametric study to assess the compressive behaviour of 3D printed, thermoplastic polyurethane cellular architectures, designed to be integrated into energy absorbing sandwich panel composites.	**4412-2 EVALUATION OF ALUMINA AS PROTECTIVE COATING FOR CARBON FIBERS IN MAGNESIUM-BASED COMPOSITES** *Alfaferi Zainal Abidin (Fraunhofer IKTS), Mario Krug (Fraunhofer IKTS), Michel Wolf (Technical University Dresden), Rafał Kozera (Faculty of Materials Science and Engineering Warsaw University of Technology), Martin Knaut (Technical University Dresden), Ingolf Endler (Fraunhofer IKTS), Alexander Michaelis (Fraunhofer IKTS)* Alumina thin layer can be used as protective coating in the Cf/AZ91 system. No interfacial reaction is observed at the fiber-matrix interface and furthermore the layer promote wetting with AZ91.	**4413-2 FALLING-WEIGHT IMPACT AND POST-IMPACT FLEXURAL PERFORMANCE OF HYBRID FLAX/CARBON LAMINATES** *Fabrizio Sarasini (Sapienza University of Rome), Carlo Santulli (Università degli Studi di Camerino), Jacopo Tirillò (Sapienza University of Rome), Teodoro Valente (Sapienza University of Rome), Luca Lampani (Sapienza University of Rome), Paolo Gaudenzi (Sapienza University of Rome)* Hybrid carbon(C)/flax (F) fiber laminates have been investigated under impact up to 30 J measuring BVID and post-impact flexure and considering the respective merits of CFC and FCF configurations.	**4414-2 MODELING OF DAMAGE AND SCALING EFFECTS IN COMPOSITE PIPES SUBJECTED TO LOW-VELOCITY IMPACTS.** *Ana Nieto (Petroleum Institute), Fahad Almaskari (Petroleum Institute)* The results of the effect of geometrical properties in the initiation and propagation of damage in composite pipes under low-velocity impact are presented and analyzed.	**4415-2 DYNAMIC ANALYSIS OF ADHESIVELY BONDED COMPOSITE SINGLE LAP JOINTS USING FULL-FIELD MEASUREMENT TECHNIQUES** *George Crammond (University of Southampton), J M Dulieu-Barton (University of Southampton), S W Boyd (University of Southampton)* Full-field evaluation of the strains in an adhesively bonded composite single lap joint under quasi-static and high rate loading using high speed Digital Image Correlation (DIC).	**4416-2 AN ASSESSMENT OF THE ARAMID FELT HIGH VELOCITY IMPACT RESISTANCE** *Natalia Dolganina (National Research South Ural State University), Oleg Kudryavtsev (National Research South Ural State University), Sergey Sapozhnikov (National Research South Ural State University)* Non-woven needle-punched aramid felt "Twaron® Felt No.9" impacting by 6.35 mm steel ball was studied numerically and experimentally for better understanding of the main energy dissipation mechanisms.	**4417-2 CAI DAMAGE MECHANISM CHARACTERISATION** *Yu Yang (Nottingham University), Shuguang Li (Nottingham University)* Parametric study about damage mechanism of CAI reveals multiplicity of delaminations is the major factor. For CAI stress concentration is the main failure mechanism.	**4418-2 YARN-SCALE ANALYSIS OF NOVEL TEXTILE COMPOSITES LACKING AN ELEMENTARY REPRESENTATIVE ELEMENT** *Yann Le Cahain (University of Bristol-ACCIS (Advanced Composites Centre for Innovation and Science)), Dmitry Ivanov (University of Bristol-ACCIS (Advanced Composites Centre for Innovation and Science))* A novel manufacturing technique based on 3D printing of liquid resin into a dry textile reinforcement is presented. Tensile tests are carried out and a pragmatic modelling approach is developed.			

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16
17:20	**4401-3 A NEW SYNTACTIC FOAM MANUFACTURING METHOD AND STUDY ON ITS PROPERTIES** *Qiyong Yu (Beihang University), Yan Zhao (Beihang University), Zhian Mi (Beijing Institute of Aeronautical Materials), Yuan Chen (Beihang University)* The present study focuses on a new manufacturing method involving syntactic foams. Syntactic foams of 500kg/m3 600kg/m3 were produced and the compressive property is from 35MPa to 49MPa.	**4402-3 ENHANCED DIELECTRIC PROPERTIES IN A THREE-PHASE COMPOSITE INDUCED BY MICROSTRUCTURE TAILORING** *Zhang Zhenchong (BeiHang University), Yi Zhuo Gu (BeiHang University), Shao Kai Wang (BeiHang University), Min Li (BeiHang University), Zuo Guang Zhang (BeiHang University)* A novel three-phase composite with high dielectric permittivity and low loss is proposed by introducing barium titanate in polyvinylidene fluoride matrix filled with silicon carbide whisker.	**4403-3 PREDICTION OF THE RESIN FILLET SIZE IN CO-CURED HONEYCOMB SANDWICH STRUCTURES** *Chao Chen (Beihang University), Yanxia Li (Beihang University), Yizhuo Gu (Beihang University), Min Li (Beihang University), Zuoguang Zhang (Beihang University)* The research provides a promising way to predict forming quality of honeycomb sandwich structure composites and guidance for the optimization of process conditions and control of processing quality.	**4404-3 SELF COOLING FUNCTIONALITY VIA VASCULAR CHANNEL HEAT TRANSIT IN AN EPOXY MATRIX** *Brendan Dalton (Ulster University), Edward Archer (Ulster University), Alistair McIlhagger (Ulster University)* Vascular polymers have been developed via the removal of sacrificial fibres. Components have then been trialled to determine their ability for temperature control through dynamic physical testing.	**4405-3 SILKFIBROIN-CA-P COMPOSITE BONE REPLACEMENT MATERIAL FOR GUIDED BONE GROWTH** *Feride Sermin Utku (Yeditepe University), Nazan Ebru Aksu (Yeditepe University), Nermin Yuksel (Yeditepe University)* Pure silk fabric, boiled in NaCO3 was Ca-P coated in 7 sequential immersion steps in Ca and HPO4, pH 7.4. Brushite crystals, analyzed with XRD, FTIR and SEM were transformed into HA using ECD.	**4406-3 PERMEABILITY MEASUREMENTS AND PROCESS SIMULATION OF LARGE SANDWICH STRUCTURES FOR INDUSTRIAL WIND TURBINE BLADES** *Allan Roulund Gersborg (LM Wind Power A/S)* Experimental characterization sandwich parts for wind turbine blades produced with the VARTM process. A poor quantitative fit with Darcy's law is found which limits the value of commercial software.		**4408-3 FEEDSTOCK AND PROCESSING EFFECTS ON THE PERFORMANCE OF NATURAL FIBER THERMOSET COMPOSITES** *John Wolodko (Alberta Innovates - Technology Futures)* In this comprehensive study, the mechanical performance of various natural fibre thermoset composites is compared. The effect of fibre type, fibre processing and composite fabrication method were investigated. Mechanical testing results include tensile strength, tensile modulus, elongation and charpy impact.	**4409-3 A THERMO-CHEMICAL MODEL FOR THE MECHANICAL PROPERTIES OF RECYCLED CARBON FIBRES** *Joseph Heil (University of Nottingham), Thomas Turner (University of Nottingham), Stephen Pickering (University of Nottingham)* A computational model using heat flow and reaction kinetics is used to determine the mass loss and thermal profile of a composite as it undergoes recycling.	**4410-3 USE OF FOAMED POLYPROPYLENE FIBERS TO IMPROVE FIBER/MATRIX BOND FOR CEMENTITIOUS COMPOSITES** *Bartolomeo Coppola (University of Salerno), Luciano Di Maio (University of Salerno), Paola Scarfato (University of Salerno), Loredana Incarnato (University of Salerno), Luc Courard (University of Liège)* For cementitious composite materials fiber/matrix bond is extremely important. This work is aimed to produce fibers with improved surface roughness produced by foam extrusion process.
17:40		**4402-4 HYBRID TOUGHENING OF EPOXY WITH RUBBER AND NANOSILICA PARTICLES: EXPERIMENTS AND MODELLING** *Tasnuva Khaleque (Imperial College London-South Kensington Campus), Soraia Pimenta (Imperial College London-South Kensington Campus), Ambrose C. Taylor (Imperial College London-South Kensington Campus)* Epoxies modified by different contents of nanosilica and core-shell rubber particles are characterised. The effect of plasticity, particle debonding and tri-axial stresses are studied through FE.	**4403-4 EXPERIMENTAL ANALYSIS OF STRESSES IN SANDWICH STRUCTURES DUE TO THE BRAZIER EFFECT** *Carl-Johan Lindholm (Diab Sweden AB), Anders T. Johansson (Chalmers University of Technology), Johan Hedlund (DIAB Sweden AB)* Experimental study of curved sandwich beams using five different grades of core material captured several different failure modes. Non-linear FEA agreed fairly well with the test results	**4404-4 SIMULATION OF SIMULTANEOUS REPAIR AND DEGRADATION PROCESSES IN SELF-HEALING MATERIALS** *Federico Bosia (University of Torino), Nicola Pugno (University of Trento)* In this work we extend previous Hierarchical Fibre Bundle models for self-healing to more general cases where tissue growth/degradation is considered, and derive overall mechanical behaviour		**4406-4 COMPARATIVE STUDY ON INTERNAL AND EXTERNAL RELEASE AGENTS – EVALUATION OF PROCESS PARAMETER VARIATION ON DEMOLDING STRESSES** *Maximilian Schaefer (Technical Universtiy of Munich), Swen Zaremba (Technical Universtiy of Munich), Klaus Drechsler (Technical Universtiy of Munich)* The demolding stress is investigated dependent on process parameter: amount of release agent, temperature of mold-surface, number of demoldings, and the kind of a reinforcement structure.		**4408-4 EXPERIMENTAL EVALUATION OF THE MECHANICAL PROPERTIES OF THE PLA-PAPER COMPOSITE** *Fernando Ramirez (Universidad de los Andes), Mateo Jimenez (Universidad de los Andes)* In the present work, the mechanical properties of a laminated composite made of paper and PLA laminae (PLAPER) were determined experimentally, indicating its potential application in many areas.	**4409-4 PREPARATION AND CHARACTERIZATION OF LEATHER POLYMER COMPOSITES** *Meenakshisundaram Omkumar (Colleg of Engineering Guindy), Annamalai Suresh Babu (College of Engineering Guindy), Anbiah Jacob Moses (College of Engineering Guindy)* This work proposes utilization of industrial leather wastes such as PVB and milk pouches to prepare a composite material with Green cost based objectives suiting to various industrial applications	

Meeting room 5	Meeting room 6	Meeting room 7	M1	M2	M3	M4	M5	M6	M7	M8
4411-3 RESONANCE TUNING OF RF DEVICES THROUGH ORIGAMI FOLDING *Kazuko Fuchi (Wright State Research Institute), Philip Buskohl (UES-Inc.), Gregory Reich (Air Force Research Laboratory), Richard Vaia (Air Force Research Laboratory), James Joo (Air Force Research Laboratory)* Investigation of the impact of origami folding patterns on reconfigurable RF devices. Sensitivity of resonance characteristics of frequency selective surfaces to fold angles on tessellated structures.	**4412-3 TAILORABLE CERAMIC CONTENT ALUMINIUM-MATRIX COMPOSITES BY SPONTANEOUS INFILTRATION** *Matteo Pavese (Politecnico di Torino), Xiang Chen (Politecnico di Torino), Claudio Badini (Politecnico di Torino), Sara Biamino (Politecnico di Torino), Paolo Fino (Politecnico di Torino)* A spontaneous infiltration technique is presented, to obtain MMCs with any alloy or preform. The theoretical model is discussed, validated in the Al-TiB2-SiO2 system, and the composites characterized.	**4413-3 FRACTURE AND DAMAGE OF CARBON NANOTUBE MODIFIED HYBRID COMPOSITES** *Rico Zeiler (University of Bayreuth), Zhe Zeng (University of Bayreuth), Dirk-Jacques Dijkstra (Bayer Material Science AG), Volker Altstädt (University of Bayreuth)* Carbon nanotubes are added as matrix reinforcement in carbon fiber reinforced composites produced by resin transfer molding. Fracture toughness, impact resistance and damage tolerance are assessed.	**4414-3 EFFECT OF FIBRE ORIENTATIONS ON PROGRESSIVE DAMAGE OF NOTCHED [/0°/- /90°]S COMPOSITE LAMINATES** *Muhammad Ridha (National University of Singapore), Tong Earn Tay (National University of Singapore), Alan Nettles (NASA)* A progressive damage simulation method was developed to predict the behaviour of [/0/- /90] laminates with fiber orientation varied from 0 to 90 under open-hole tests.	**4415-3 AN EVALUATION OF TEST METHODS FOR DETERMINING ADHESIVE SHEAR STRESS-STRAIN PROPERTIES** *Kara Storage (Air Force Research Laboratory), Brett A. Bolan (Air Force Research Laboratory), Kevin A. Tienda (University of Dayton Research Institute), Jeffrey A. Smith (University of Dayton Research Institute), David H. Mollenhauer (Air Force Research Laboratory), Kevin H. Hoos (University of Dayton Research Institute)* This effort evaluated a variety of strain measurement techniques (digital image correlation, moiré interferometry, and contact extensometers) and generated comparative adhesive property data.	**4416-3 LOW-VELOCITY IMPACT AND COMPRESSION AFTER IMPACT RESPONSE OF THIN PLY BASED COMPOSITE LAMINATES** *Emilio V. Gonzalez (Universitat de Girona), Albert Soto (Universitat de Girona), José Ramón Sainz de Aja (Aernnova Engineering Solutions Ibérica S.A.), Federico Martin de la Escalera (Aernnova Engineering Solutions Ibérica S.A.)* The work presented is an experimental study of drop-weight impact tests and Compression After Impact (CAI) tests on thin ply laminates. These tests are performed on two type of laminates.	**4417-3 UNDERSTANDING THE SEQUENCE OF DAMAGE IN COMPLEX HYBRID COMPOSITE-METALLIC STRUCTURES SUBJECT TO OUT-OF-PLANE LOADING USING COMPUTED TOMOGRAPHY** *Trevor Allen (University of Southampton), Warren Hepples (University of Southampton), Philippa Reed (University of Southampton), Ian Sinclair (University of Southampton), Mark Spearing (University of Southampton)* The progression of damage in a hybrid composite-metallic structure subject to out-of-plane loading has been examined throughout an interrupted quasi-static-indentation test using micro-focus CT		**4419-2 FUNCTION INTEGRATED ARCH BRIDGE IN A RESOURCE-EFFICIENT LIGHTWEIGHT DESIGN** *Enrico Rudolph (Institution of Lightweight Structures), Andreas Ehrlich (Institution of Lightweight Structures), Sandra Gelbrich (Institution of Lightweight Structures), Meike Röhrkohl (Institution of Lightweight Structures), Lothar Kroll (Institution of Lightweight Structures)* Within the scope of a research project innovative, functional integrated, modular support structures in GFRP sandwich design have been developed for the application in new lightweight arch bridges.		**4421-2 „MULTIFUNCTIONAL FIBRE-REINFORCED METAL MATRIX COMPOSITES WITH INTEGRATED OPTICAL FIBRE SENSORS"** *Piotr Malczyk (Technische Universität Dresden), Maik Gude (Technische Universität Dresden), Jerzy Kaleta (Wroclaw University of Technology), Anna Szczurek (Wroclaw University of Technology)* This paper contributes to the understanding of hampering phenomena occurring during the integration of Fibre Optic Sensors in the structure of Metal Matrix Composites via casting processes.
4411-4 TRIPLE-SHAPE MEMORY EFFECT OF POLYSTYRENE BASED POLYMER *Wenbing Li (Harbin Institute of Technology), Jinsong Leng (Harbin Institute of Technology), Yanju Liu (Harbin Institute of Technology)* In summary, we obtained a new polystyrene-based triple shape memory system, which showed an excellent triple-shape memory effect and could be potentially used in sensors and actuators.	**4412-4 DRAWABILITY OF CFRP/HSS HYBRID COMPOSITE MATERIAL** *Min-Sik Lee (Pusan National University), Sung-Jin Kim (Pusan National University), Ok-Dong Lim (R&D Center-Autogen), Chung-Gil Kang (Pusan National University)* In this study, the formability of the CR340LA/CFRP hybrid composite material is evaluated during square cup deep drawing by considering the process parameters. The experimental results show a decrease		**4414-4 A LEVEL SET MODEL FOR THE NUMERICAL MODELING OF COMPOSITES DELAMINATION WITH NONCONFORMING MESH AND MINIMAL REMESHING** *Elia Picault (Ecole Centrale de Nantes-GeM Institut-UMR CNRS 6183), Patrick Rozycki (Ecole Centrale de Nantes-GeM Institut-UMR CNRS 6183), Bastien Tranquart (Safran Composites)* Progressive delamination of multilayered composite laminates is investigated using a level set model with nonconforming mesh. The case of several crack fronts evolving simultaneously is considered.		**4416-4 TESTING AND COMPARISON OF ENERGY ABSORPTION FOR CRASH TUBES WITH DIFFERENT FIBRE ARCHITECTURES AND MATRICES** *Sindy Engel-Watzek (BMW Group), Dirk Lukaszewicz (BMW Group), Christian Boegle (BMW Group)* Rectangular CFRP tubes were tested for their energy absorption. Parameters such as resin, geometry and lay-up were studied. The results show relevant trends for effective crash structures.	**4417-4 SIMULATION OF THE INTERMEDIATE VELOCITY IMPACT BEHAVIOUR OF WOVEN COMPOSITE LAMINATES APPLYING PROGRESSIVE DAMAGE MODELS FOR PLIES AND INTERFACES** *Martin Schwab (Vienna University of Technology), Melanie Todt (Vienna University of Technology), Heinz E. Pettermann (Vienna University of Technology)* A main feature of the presented modelling approach is that the contributions of individual failure mechanisms to the total energy absorption of the laminate can be quantitatively predicted.		**4419-3 RESPONSE OF FRP-STRENGTHENED SLENDER RC COLUMNS UNDER CYCLIC COMPRESSION** *Ghaithan Al-Amri (King Saud University), Yousef Al-Salloum (King Saud University), Nadeem Siddiqui (King Saud University), Husain Abbas (King Saud University)* The available studies on FRP-confined slender RC columns under cyclic loading are very limited. The present study investigates the effect of cyclic compression on FRP-confined slender RC columns.		**4421-3 ADDITIVE LAYER MANUFACTURING OF COMPOSITE COMPONENTS: COMBINING SHORT FIBRE COMPOSITE FEEDSTOCKS WITH CURVED LAYER FUSED FILAMENT FABRICATION** *Robert Allen (University of Bristol), Thomas Llewellyn-Jones (University of Bristol), Richard Trask (University of Bristol)* Investigations are conducted into the potential of constructing short fibre composite materials with tailored reinforcement through curved layer fused filament fabrication (CLFFF).

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16
8:30	**Materials for future aerospace technologies: Challenges and opportunities** Richard A. Vaia, Air Force Research Laboratory, Ohio, USA									
9:30	**5101 Processing - Manufacturing Technology 14**	**5102 Nano Composites 14**	**5103 Sandwich Structures and Materials 4**	**5104 Fatigue 10**		**5106 Manufacturing Up-Scaling and Automation 4**	**5107 Processing - Manufacturing Technology 16**	**5108 Short Fibre Composites 4**	**5109 Process Induced Effects 8**	**5110 Fibres 4**
9:30	**5101-1 ASSEMBLY METHOD USED IN MANUFACTURING 3D AUXETIC CELLULAR STRUCTURES** *Xintao Wang (Harbin Institute of Technology), Li Ma (Harbin Institute of Technology), Jinshui Yang (Harbin Institute of Technology), Qi Shi (Harbin Institute of Technology)* A novel manufacturing method of one type of 3D auxetic structure was briefly introduced. Negative Poisson's ratio character of the structure was numerically demonstrated .	**5102-1 LOW VISCOSITY PROCESSING TO FORM ELECTRICALLY CONDUCTIVE EPOXY RESIN COMPOSITES USING NOVEL HYBRID CNT-COATED SILICA PARTICLES** *Arthur Wilkinson (University of Manchester), Ian Kinloch (University of Manchester), Raja Othman (University of Manchester)* Presents a rheological study of hybrid silica-multiwall CNT particles used to produce conductive epoxy-carbon composites. These particles are shown to give low viscosity processing compared to CNT.	**5103-1 NUMERICAL MODELLING OF FATIGUE CRACK GROWTH AND ARREST IN SANDWICH BEAMS INCLUDING CRACK STOPPERS** *Georgios Martakos (Aalborg University), Jens H. Andreasen (Aalborg University), Christian Berggreen (Technical University of Denmark), Ole T. Thomsen (University of Southampton)* A novel crack arresting device is implemented in sandwich beams and tested under fatigue loads. An FE model of the set up is used to effectively simulate and predict the fatigue life of the specimens.	**5104-1 ELECTRICAL MONITORING OF FATIGUE IN CARBON FIBRE REINFORCED COMPOSITES** *Peter Bailey (Instron)* Investigating the variation in electrical resistivity of carbon fibre composites during cyclic loading, with a view to improved monitoring of fatigue damage accumulation.		**5106-1 ON AN INTEGRATED PROCESS AND MACHINERY CONCEPT FOR ECONOMIC INDUSTRIALIZED PRODUCTION OF HIGHER QUALITY WIND TURBINE ROTOR BLADES** *Christian Doersch, Oliver Bagemiel (Fraunhofer Institute for Wind Energy and Energy System Technology IWES Northwest)* FhG IWES identified by a cost model cost drivers in blade manufacturing. Development of innovative prefoming and blade finish in combination with CAD-CAE-Tools offer high potential for cost reduction.	**5107-1 EFFECT OF HEATING CONDITIONS ON MECHANICAL PROPERTIES OF MOLDED PRODUCT IN HYBRID MOLDING** *Masaki Ohishi (Advanced Fibro-Science-Kyoto Institute of Technology), Tadashi Uozumi (Gifu University Composite Materials Center-Gifu University), Akio Ohtani (Gifu University Composite Materials Center-Gifu University), Asami Nakai (Department of Mechanical Engineering Faculty of Engineering-Gifu University)* In the hybrid molding, the heating condition and the ejection resin temperature investigated the effect of mechanical properties of the molding articles in the molded parts having rib structure.	**5108-1 MICROMECHANICALLY BASED MODELLING OF THE FAILURE BEHAVIOR OF SHORT FIBER REINFORCED POLYPROPYLENE COMPONENTS UNDER IMPACT LOADING** *Martin Reiter (Johannes Kepler University / IPPE), Michael Jerabek (Borealis Polyolefine GmbH), Zoltan Major (Johannes Kepler University / IPPE)*	**5109-1 UNDERSTANDING THE FLOW PROPERTIES OF A THERMOPLASTIC-TOUGHENED EPOXY RESIN FILM THROUGH MODEL-BASED ANALYSIS** *Claudia Creighton (Deakin University), Christian Weimer (Airbus Group Innovations), Patricia P. Parlevliet (Airbus Group Innovations), Bronwyn L. Fox (Deakin University)* The through-thickness flow characteristics of a toughened epoxy resin film are modelled for cure cycle optimisation. This presentation also describes the new Carbon Nexus research facility.	**5110-1 PART 1: COMPARATIVE STUDY BETWEEN ELECTROLYTIC OXIDATION AND AIR PLASMA TREATMENT OF UNTREATED/UNSIZED FIBRES** *Racim Radjef (Swinburne University), Sally McArthur (Swinburne University), Bronwyn Fox (Deakin University)* A comparative study between electrolytic oxidation and air plasma treatment has been performed. Both fibre treatments were compared to untreated/unsized fibres and surface treated/sized fibres.
9:50	**5101-2 INTERFACIAL PROPERTIES OF CARBON FIBER REINFORCED POLYMER LAMINATES JOINED BY A NOVEL PARTIAL CROSS-LINKING PROCESS** *Judith Moosburger-Will (University of Augsburg), Markus G. R. Sause (University of Augsburg), Michael Greisel (University of Augsburg), Robert Horny (University of Augsburg), Siegfried Horn (University of Augsburg), Jochen Scholler (Premium AEROTEC GmbH), Llorenç Llopart Prieto (Premium AEROTEC GmbH)* The interface region of joined partially cross-linked and fresh epoxy resin is analyzed by nanoindentation. A mismatch of material properties is found which is favorable for enhanced bonding quality.	**5102-2 EFFECT OF STRUCTURAL FACTOR AND MWCNTS ON MECHANICAL RESPONSE OF FILAMENT WOUND CFRP CYLINDERS** *Xiaolong Jia (Beijing University of Chemical Technology), Wenbin Li (Beijing University of Chemical Technology), Xiaoping Yang (Beijing University of Chemical Technology)* Effect of structural factor and amide various multi-walled carbon nanotubes (MWCNTs) on mechanical response of filament wound CFRP cylinder was examined in this study.	**5103-2 FRACTURE TESTING OF HONEYCOMB CORE SANDWICH COMPOSITES USING THE DCB-UBM TEST** *Vishnu Saseendran (Technical University of Denmark), Christian Berggreen (Technical University of Denmark), Leif Carlsson (Florida Atlantic University)* A novel test-rig exploiting the double cantilever beam-uneven bending moments (DCB-UBM) concept is used to determine the fracture toughness of aircraft type honeycomb core sandwich composites.	**5104-2 THE CONCEPT OF FATIGUE FRACTURE TOUGHNESS IN FATIGUE DELAMINATION GROWTH BEHAVIOR** *Liaojun Yao (Delft University of Technology), René Alderliesten (Delft University of Technology), Rinze Benedictus (Delft University of Technology)* This paper provides a study on mode I fatigue delamination growth in composite laminates. The stress ratio effect on fatigue crack growth is physically interpreted using the energy principles.		**5106-2 EFFECT OF PROCESSING CONDITIONS ON THE QUALITY OF OUT-OF-AUTOCLAVE LAMINATES MADE BY AUTOMATED FIBER PLACEMENT** *Angi Dong (Concordia University), Suong Hoa (Concordia University), Yan Zhao (Beihang University)* The combination of Automated Fiber Placement and Out-of-Autoclave technology can not only increase manufacturing rate but also help deliver parts of superior quality.	**5107-2 A NOVEL TOOL FOR CONTINUOUS PROCESSING OF POLYMER-METAL-HYBRIDS** *Stefan Mörl (University of Bayreuth), Volker Altstädt (University of Bayreuth)* The presented design shows a novel tool for the processing of metal-polymer-hybrids. By inserting the metal foil directly into the extrusion die, a completly continuous process has been developed.	**5108-2 FINITE ELEMENT ANALYSIS OF LINEAR AND NONLINEAR BEHAVIOR OF SHORT FIBER REINFORCED COMPOSITES** *Mohamed Amine Tiar (UTC), Hocine Kebir (UTC), Rezak Ayad (URCA), Wajdi Zouari (URCA)* Nonlinear projected fiber approach for the analysis of geometric nonlinear behavior of random short fiber reinforced composites based on Total Lagrangian Formulation.	**5109-2 HIGH ACCURACY CURE PROCESS SIMULATION OF COMPOSITES BASED ON INTERNAL STRAIN MEASUREMENT** *Shoma Niwa (The University of Tokyo), Kazunori Takagaki (The University of Tokyo), Shu Minakuchi (The University of Tokyo), Nobuo Takeda (The University of Tokyo)* A cure process is determined based on a lot of trial manufacture, which is costly and time-consuming. We developed an advanced cure simulation method based on in-situ measurement by FBG sensors.	**5110-2 INVESTIGATION OF THE STRENGTH OF THERMALLY CONDITIONED BASALT AND E-GLASS FIBRES** *Peter Jenkins (University of Strathclyde), Eduardo Sáez-Rodríguez (University of Strathclyde), Liu Yang (University of Strathclyde), James Thomason (University of Strathclyde), Sara Riopedre Méndez (University of Strathclyde)* A study of the mechanical properties of epoxy composite compatible E-glass and basaslt fibres following heat treatment at 300 – 600 °C, and thermal analysis of the degradation of the fibre sizings.

Meeting room 5	Meeting room 6	Meeting room 7	M1	M2	M3	M4	M5	M6	M7	M8
5111 Multifunctional Composites - Coupled Properties and Multi-physics Models 2	**5112 Tribology and Wear**	**5113 Damage Tolerance of Composite Structures 5**	**5114 Simulation of Progressive Failure 3**	**5115 Durability, Creep and Agressive Environment 3**	**5116 Dynamic Fracture 4**	**5117 Impact and Dynamic Structural Analysis 3**	**5118 Applications - Automotive and Rail 3**	**5119 Applications - Civil Engineering 4**	**5120 Ultrasound and Acoustic Emission**	
5111-1 COMPUTATIONAL DESIGN AND PERFORMANCE ASSESSMENT OF MICROVASCULAR COMPOSITE PANELS FOR BATTERY COOLING *Philippe H. Geubelle (University of Illinois), Stephen Pety (University of Illinois), Marcus Tan (University of Illinois), Ahmad Najafi (University of Illinois), Scott R. White (University of Illinois)* This collaborative computational and experimental study focuses on the design, manufacture and assessment of microvascular composite panels used for the active cooling of Li-ion car batteries.	**5112-1 PENETRATION BEHAVIOR OF ELECTROLYTE SOLUTION THROUGH CARBON FIBER REINFORCED THERMOPLASTICS (CFRTP) MATERIAL USING IN AUTOMOTIVE STRUCTURAL APPLICATION** *Patarapon Palungvachira (Tokyo Institute of Technology), Masatoshi Kubouchi (Tokyo Institute of Technology), Shinsuke Katayama (JFE Techno-Research Corporation), Hiroyuki Ogata (JFE Techno-Research Corporation)* In this study, the penetration behavior of water and other electrolytic solution through Carbon Fiber Reinforced Thermoplastics (CFRTP) has been investigated.	**5113-1 DESIGN OF FRACTURE RESISTANT COMPOSITES BY UTILIZING SPATIAL MATERIAL PROPERTY VARIATIONS** *Masoud Sistaninia (Erich Schmid Institute of Materials Science-Austrian Academy of Sciences), Otmar Kolednik (Erich Schmid Institute of Materials Science-Austrian Academy of Sciences)* In the current study, it is demonstrated that how a structure consisting of bulk material and soft interlayers becomes fracture resistant, if the composite architecture fulfills certain design rules.	**5114-1 A PHANTOM-NODE-BASED COHESIVE ELEMENT FORMULATION WITH COUPLED PLASTICITY FOR THE SIMULATION OF ADHESIVE JOINTS** *Carlos Sarrado (University of Girona), Joris J. C. Remmers (Eindhoven University of Technology), Albert Turon (University of Girona)* A new cohesive element for the simulation of adhesive joints is presented. The element is based on the phantom node method and allows the simulation of coupled plasticity and damage of the interface.	**5115-1 EFFECT OF JUTE ON THE HYDROLYTIC DEGRADATION OF POLY(LACTIC ACID)(PLA)** *Ning Jiang (Tongji University-China), Tao Yu (Tongji University-China), Yan Li (Tongji University-China)* This paper focuses on the effect of jute fibre on the hydrolysis of poly(lactic acid) (PLA) in deionized water under 60 ºC. Water absorption, mechanical properties and so on were characterized.	**5116-1 MODELLING OF WOUND, THICK UD COMPOSITES FOR HIGH-SPEED IMPACTS AND SUBSEQUENT DAMAGE EVALUATION** *Ralf Matheis (Forschungsgesellschaft Kraftfahrwesen mbH), Helmi Murnisya (Forschungsgesellschaft Kraftfahrwesen mbH), Thomas Johansson (DYNAmore Nordic AB)* As a part of a virtual testing methodology for crash analysis, a modelling approach for wound Type IV CNG tanks is proposed that takes several failure mechanisms into account.	**5117-1 PERFORMANCE OF COMPOSITE FUSELAGE AFTER MULTI-SITE IMPACTS** *Spyridon Psarras (Imperial College London), Paul Robinson (Imperial College London), Mazdak Ghajari (Imperial College London), Raul Muñoz (Imperial College London), Lorenzo Iannucci (Imperial College London)* This research investigates the post-impact behaviour of composite fuselage stiffened panels subjected to multi-site low-velocity impacts by comparing FE models with tests.	**5118-1 EVALUATION OF THE STATIC AND DYNAMIC PERFORMANCE OF ALUMINIUM AND COMPOSITE JOINTS FOR RAIL APPLICATIONS** *Udayanga Galappaththi (University of Nottingham), Mike Johnson (University of Nottingham)* Limited knowledge in the area of composite joining technologies acts as a barrier for using modular construction principles for the rail applications. The study is focused to develop aluminium-carbon fibre composite frictional grip joint. This would enable effective use of modular construction principle for composite integration in rail vehicles.	**5119-1 FULL SCALE FORM FINDING: INTRODUCING FABRIC MATERIALITY IN FRP FABRICATION FOR ARCHITECTURAL ELEMENTS** *Arielle Blonder (technion), Yasha Grobman (technion)* FRP's (fiber reinforced polymers) unique material properties have led to its wide application across industries in the past decades. Although we witness a growing interest in the material in the archi	**5120-1 HYGROTHERMAL EFFECTS ON FATIGUE BEHAVIOR OF NATURAL FIBERS COMPOSITES** *Kossi Sodoke (Université du Québec à Trois-Rivières), Lotfi Toubal (Université du Québec à Trois-Rivières), Luc Laperrière (Université du Québec à Trois-Rivières)* The aim of this work is to determine the influence of hygrothermal ageing on the mechanical proprieties and fatigue proprieties of natural fiber composite specifically of quasi-isotropic flax/epoxy	
5111-2 COMPUTATIONAL AND EXPERIMENTAL STUDIES ON THE TRANSPORT PROPERTIES OF HYBRID NANOCOMPOSITES BASED ON CARBON NANOTUBES AND GRAPHITE NANOPLATELETS *Mnasoud Safdari (University of Illinois at Urbana-Champaign), Marwan Al-Haik (Virginia Tech), M Yousuff Hussaini (Florida State University)*	**5112-2 WEAR PROPERTIES OF NANO-SI-CARBON/ CARBON COMPOSITES WITH BACTERIAL CELLULOSE AND BAMBOO CHARCOAL ADDITIVE** *Yoshihito Ozawa (Fukushima University), Uugansuren Lkhagvasuren (Fukushima University), Hiroki Sato (Fukushima University), Tokio Kikuchi (Fukushima Technology Centre)* The fabrication method of SiC/C/C composites with Bacterial Cellulose and Bamboo Charcoal Powder additive and their wear properties were investigated and the effects of SiC additive were discussed.	**5113-2 DAMAGE TOLERANCE OF DISPERSED-PLY LAMINATES** *Peyman Mouri Sardar Abadi (IMDEA Materials Institute), Claudio Lopes (IMDEA Materials Institute), Mostafa Abdalla (Delft University of Technology), Daniel Peeters (Delft University of Technology)* Current work presents the design of a quasi-isotropic laminate employing dispersion of ply orientations. A two-pheromone ant colony optimization algorithm is used to find an optimum laminate for CAI.	**5114-2 ANALYSIS OF COMPOSITES USING THE VOXEL FINITE ELEMENT METHOD WITH STRESS AVERAGING** *Guodong Fang (Harbin Institute of Technology), Stephen Hallett (University of Bristol), Bassam El Said (University of Bristol), Dmitry Ivanov (University of Bristol)* The stress averaging technique is an effective method to correct the spurious stresses introduced by the stepped block-liked interface at material junctions in voxel finite element models.	**5115-2 HYDROTHERMAL AGEING OF GLASS/EPOXY COMPOSITES FOR WIND TURBINE BLADES** *Iuri Rocha (Knowledge Centre WMC), Sibrand Raijmaekers (Knowledge Centre WMC), Rogier Nijssen (Knowledge Centre WMC)* A glass/epoxy system used in wind turbine blades is hydrothermally conditioned for 4800h and the incurred material damage is investigated. Results from composites and neat resin specimens are compared	**5116-2 INTEGRATION OF SHAPE MEMORY ALLOY WIRES IN FIBER REINFORCED POLYMERS FOR ENDLESS CRASH ABSORBER STRUCTURES** *Sebastian Nissle (Institute for Composite Materials), Moritz Hübler (Institute for Composite Materials), Martin Gurka (Institute for Composite Materials), Sebastian Schmeer (Institute for Composite Materials)* We present a theoretical extrapolation of the behavior of new hybrid structures under tensile loading, give an estimation of their potential and demonstrate a first experimental validation.	**5117-2 EXPERIMENTAL AND NUMERICAL CHARACTERIZATION OF HIGH-VELOCITY IMPACT DAMAGE IN CFRP LAMINATES** *Shigeki Yashiro (Shizuoka University), Keiji Ogi (Ehime University), Akinori Yoshimura (Japan Aerospace Exploration Agency (JAXA)), Yoshihisa Sakaida (Shizuoka University)* Mechanisms of damage extension in CFRP laminates due to high-velocity impact will be discussed based on the experiments and predictions by smoothed particle hydrodynamics (SPH).	**5118-2 HEAT TRANSFER ANALYSIS OF A COMPOSITE EXHAUST SYSTEM FOR AUTOMOTIVE APPLICATIONS** *Niels Reurings (Delft University of Technology), Sotiris Koussios (Delft University of Technology), Karel Vergote (Bosal ECS), Otto Bergsma (Delft University of Technology)* A new test method is presented to assess the heat transfer to composite shells lined with a fibrous, permeable, insulation. This will aid in the design optimization for high-temperature applications.	**5119-2 MECHANICAL PROPERTIES AND WATER UPTAKE OFPULTRUDED CARBON FIBER REINFORCED POLYURETHANE PLATES** *Hong Bin (Ministry of Education), Xian Guijun (Ministry of Education), Li Hui (Ministry of Education)* Water absorption and thermal-mechanical properties of PU resin and pultruded carbon fiber reinforced PU plates were studied through immersion of specimens in distilled water at different temperatures.	**5120-2 A REVIEW OF REFERENCE METHODS FOR AUTOMATED ULTRASONIC EVALUATION OF COMPOSITE STRUCTURES** *Steen Arnfred Nielsen (FORCE Technology)* The paper discusses automated ultrasonic testing of large composite structures like a wind rotor blade and reviews six different reference methods for evaluating the ultrasonic images.	

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16
10:10	**5101-3 INTEGRATION OF TEXTILE REINFORCEMENTS IN THE INJECTION-MOULDING PROCESS FOR MANUFACTURING AND JOINING THERMOPLASTIC SUPPORT-FRAMES** *Michael Stegelmann (Technische Universität Dresden), Michael Krahl (Technische Universität Dresden), Christian Garthaus (Technische Universität Dresden), Werner Hufenbach (Technische Universität Dresden)* As part of the research project TherMobility the project partners developed an innovative design for thermoplastic support-frame-structures that can be manufactured highly automated.	**5102-3 MECHANICAL PROPERTIES AND BIOCOMPATIBILITY OF FUNCTIONALIZED CARBON NANOTUBES FILLED POLYPROPYLENE COMPOSITES FOR ORTHOPEDIC BONE IMPLANTS APPLICATION** *Jing Ma (Taiyuan University of Technology), Xi Nan (Taiyuan University of Technology)* This study investigates the efficiency of carbon nanotubes (CNTs) as reinforcement for polypropylene (PP) for orthopedic bone implants application as a function of different surface functionalization	**5103-3 IMPACT BEHAVIOUR OF BIO-INSPIRED KAGOME SANDWICH CORE STRUCTURES MANUFACTURED THROUGH SELECTIVE LASER MELTING** *Inam Ullah (RMIT University), Milan Brandt (RMIT University), Stefanie Feih (Singapore Institute of Manufacturing Technology (SIMTech))* SLM manufactured 3D Kagome truss structures outperform conventional sandwich core structures in static compression and shear. The superior static properties translate into superior impact performance.	**5104-3 MODE I FATIGUE CRACK PROPAGATION OF UNIDIRECTIONAL CFRP LAMINATE TOUGHENED WITH CNF INTERLAYER** *Masahiro Arai (Nagoya University), Jun-Ichi Hirokawa (Shinshu University), Masaki Hojo (Kyoto Universtty), Marino Quaresimin (University of Padova)* Wwe implemented an alternative way to increase the interlaminar fracture toughness and fatigue property of CFRP laminates by inserting carbon nanofibers between the unidirectional CFRP laminates.		**5106-3 NON-CRIMP TUBULAR PREFORMING WITH AUTOMATION SYSTEM AND HIGH PRODUTIVITY** *Tadashi Uozumi (Gifu Universtiy), Motohiro Tanigawa (MURATA MACHINERY-LTD.), Tatsuhiko Nishida (MURATA MACHINERY-LTD.), Takahiro Miura (MURATA MACHINERY), Akio Ohtani (Gifu Universtiy), Asami Nakai (Gifu Universtiy)* A multi-supply filament winding machine was developed based on the concept of high productivity of produce non-crimp tubular fiber preforms with full automation system.	**5107-3 INFLUENCES OF PROCESS PARAMETERS ON THE MECHANICAL PROPERTIES OF HYBRID SHEET METAL-FRP-COMPOSITES MANUFACTURED BY PREPREG PRESS TECHNOLOGY** *Christian Lauter (University of Paderborn), Zheng Wang (University of Paderborn), Isabel Koke (University of Paderborn), Thomas Troester (University of Paderborn)* The prepreg press technology is an approach to manufacture sheet-metal-FRP structures with expected cycle times of less than five minutes, for instance for automotive lightweight applications.	**5108-3 FLOW CHARACTERISTICS OF CARBON FIBRE SHEET MOULDING COMPOUNDS** *Anthony Evans (University of Nottingham), Connie Qian (University of Nottingham), Lee Harper (University of Nottingham), Nicholas Warrior (University of Nottingham), Paul Brookbank (University of Exeter), Luke Savage (University of Exeter)* In-mould flow characteristics of carbon/epoxy Directed Fibre Compounds (DFC) compared with Press Formed Compounds (PFC) and benchmark commercial Carbon Fibre Sheet Moulding Compounds (CF-SMC)	**5109-3 INTERNAL STRESS AND DAMAGE ASSESSMENT IN THICK EPOXY BY LASER INDUCED SHOCK WAVE: EFFECTS OF THE PLASTICITY** *Christian Jochum (ENSTA Bretagne), Michel Arrigoni (ENSTA Bretagne)* Thermo-mechanical coupling predicts mechanical characteristics, in thick epoxy, aand their dependance on the degree of cure. A contactless laser induced shock inspection evidences this dependence.	**5110-3 LARGE-SCALE B, N-CODOPED HIERARCHICALLY NANOPOROUS CARBON NANOFIBERS AS EFFICIENT METAL-FREE CATALYSTS FOR ORR** *Yongpeng Lei (National University of Defense Technology), Qi shi (National University of Defense Technology), Hongliang Yuan (National University of Defense Technology), Yingde wang (National University of Defense Technology)* B, N-codoped carbon nanofibers (5.25 at% B, 6.68 at% N, 306.3 m2 g-1) were massively prepared, showing good cycling stability, methanol tolerance and direct four-electron pathway for ORR.
10:30	**5101-4 CFRP BONDING PRE-TREATMENT USING M-IR LASER RADIATION** *Stefan Kreling (Institute of joining and welding-TU Braunschweig), David Blass (Institute of joining and welding-TU Braunschweig), Fabian Fischer (Institute of joining and welding-TU Braunschweig), Klaus Dilger (Institute of joining and welding-TU Braunschweig)* This publication focuses on the application of CO2 laser radiation in the M-IR for the bonding pre-treatment of CFRP utilizing the high absorption of the matrix resin for this wavelength.	**5102-4 DEVELOPMENT OF NANOCOMPOSITE MATERIAL FILMS AND INTEGRATION INTO CFRPS FOR THE DEVELOPMENT OF MULTIFUNCTIONAL STRUCTURES.** *Athanasios Masouras (University of Patras/Applied Mechanics Laboratory), Antonios Vavouliotis (University of Patras/Applied Mechanics Laboratory), Athanasios Baltopoulos (University of Patras/Applied Mechanics Laboratory), Vassilis Kostopoulos (University of Patras/Applied Mechanics Laboratory), Laurent Pambaguian (European Space Agency/ESA)* Development of nano - composite films with high content of nano-particles and integration of them to CFRP composites with enhanced electrical and thermal conductivity through the thickness direction.	**5103-4 VISCOELASTIC BEHAVIOR OF TWO-LAYER COMPOSITE BEAM IN BENDING** *Miroslav J. Cerny (Czech Technical University in Prague), Pavel Slapak (Czech Technical University in Prague)* A theory of viscoelastic bending for two-layer beams subjected to arbitrary loading has been given. The beam has generally unsymmetrical structure with both viscoelastic layers.	**5104-4 TROUGH PROCESS MODELLING FOR THE FATIGUE LIFE ASSESSMENT OF INJECTED NOTCHED SAMPLES: DIFFERENT APPROACHES FOR THE FATIGUE CRITERION APPLICATION** *Carole Nadot-Martin (Institut Pprime - CNRS - ENSMA - Université de Poitiers-UPR 3346), Sylvie Castagnet (Institut Pprime - CNRS - ENSMA - Université de Poitiers-UPR 3346), Andrea Bernasconi (Polytechnics), Edoardo Conrado (Polytechnics)* Simulated fatigue lives of injected notched samples (3 radii and 2 injection geometries) are compared to experiments. Results show the TPM ability to distinguish notch and microstructure effects.		**5106-4 IN-SITU MEASUREMENT OF RESIN STATE AND CURE FOR EFFICIENT NON-AUTOCLAVE MANUFACTURING** *Daniel Kim (University of Southern California), Timotei Centea (University of Southern California), Steven Nutt (University of Southern California)* The study clarifies the coupled effect of out-time and exposure to humid environments for a representative thermoset resin, and confirms the usefulness of in-situ dielectric property monitoring.	**5107-4 OPTIMIZATION OF THE INTRINSIC MANUFACTURING PROCESS OF METAL-FRP-STRUCTURAL AUTOMOTIVE COMPONENTS BY RESIN TRANSFER MOULDING CONCERNING BOND STRENGTH** *Zheng Wang (Chair for Automotive Lightweight Construction), Christian Lauter (Chair for Automotive Lightweight Construction), Thomas Troester (Chair for Automotive Lightweight Construction), Carolin Zinn (Materials Science), Mirko Schaper (Materials Science)*	**5108-4 INTEGRATED NONLINEAR MULTI-SCALE MATERIAL MODELLING OF FIBER REINFORCED PLASTICS WITH DIGIMAT – PRESSURE AND RATE-DEPENDENT MATERIAL BEHAVIOURS.** *Laurent Adam (MSC Software Belgium), Samuel Melchior (MSC Software Belgium), Marc Duflot (e-Xstream engineering Sarl)* Presentation of Digimat which bridges the gap between process and structural modeling via nonlinear multi-scale material models. Focus on pressure sensitive behavior of fiber reinforced plastics.	**5109-4 LAMINATE PROCESSING EFFECT ON MICROVOIDS AND HYDRAULIC FLUID ABSORPTION OF QUARTZ/BMI LAMINATES** *Keith R. Hurdelbrink II (University of Oklahoma), Gorkem E. Guloglu (University of Oklahoma), Zahed Siddique (University of Oklahoma), M. Cengiz Altan (University of Oklahoma)*	
10:50	**Coffee in the Exhibition**									

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5111-3 OPTIMIZING MICROSTRUCTURES FOR CONDUCTIVE NANO-COMPOSITES *Gilles Lubineau (King Abdullah University of Science and Engineering (KAUST)-Physical Science and Engineering Division-COHMAS Laboratory), Fei Han (King Abdullah University of Science and Engineering (KAUST)-Physical Science and Engineering Division-COHMAS Laboratory), Angel Mora (King Abdullah University of Science and Engineering (KAUST)-Physical Science and Engineering Division-COHMAS Laboratory)*	**5112-3 EROSION TESTING OF FILLED VINYLESTERS IN WATER AT ELEVATED TEMPERATURE** *Sanna Siljander (Tampere University of Technology), Meri Kiviniemi (Tampere University of Technology), Reija Suihkonen (Tampere University of Technology), Mari Lindgren (Outotec Research Center), Essi Sarlin (Tampere University of Technology), Jyrki Vuorinen (Tampere University of Technology)* Slurry erosion of vinyl ester matrix composites; the effect of resin, filler and glass fibre reinforcement was studied at elevated temperatures. Erosion testing was done in pilot-scale reactor.	**5113-3 PROGRESSIVE DAMAGE MODELLING OF COMPOSITE STRUCTURES** *Reza Vaziri (The University of British Columbia), Ofir Shor (The University of British Columbia), Mina Shahbazi (The University of British Columbia)* An adaptive discrete modelling approach is combined with a continuum damage modelling methodology to simulate the progression of inter- and intra-laminar damage modes in composite materials.	**5114-3 DAMAGE INDUCED PLASTICITY AND LOW VELOCITY IMPACT BEHAVIOR OF COMPOSITES** *Harpreet Singh (Indian institute of Technology Delhi), Puneet Mahajan (Indian Institute of Technology Delhi)* An elasto plastic damage model for FRP composites is proposed. A user defined subroutine is developed and finite element (FE) simulations are performed of a laminate subjected to low velocity impacts.	**5115-3 EFFECT OF ACCELERATED AGING ON CARBON FIBER / EPOXY COMPOSITES AND NEAT EPOXY RESIN** *Ana Paula Cysne Barbosa (Federal University of Rio Grande do Norte), Ana Paula Pereira Fulco (Federal University of Rio Grande do Norte), Maria Carolina Burgos Costa do Nascimento (Federal University of Rio Grande do Norte), José Daniel Diniz Melo (Federal University of Rio Grande do Norte)* Evaluation of effects of aging on carbon-epoxy composites and neat epoxy subjected to accelerated aging in an aging chamber with controlled conditions of temperature, humidity and UV-radiation.	**5116-3 THE IMPACT DAMAGE ANALYSIS OF 2.5D BRAIDED COMPOSITES** *Yonggi Yang (Harbin Institute of Technology), Licheng Guo (Harbin), Jiuzhou Zhao (Harbin Institute of Technology), Yidong Zhang (China)*	**5117-3 EQUIVALENT IMPACT SET-UP FOR LIGHTNING STRIKE DAMAGE ON COMPOSITE COUPONS** *Floriane Soulas (ISAE), Christine Espinosa (ISAE), Frederic Lachaud (ISAE), Stéphane Guinard (Airbus Group Innovations), Bruno Lepetit (Airbus Group Innovations), Ivan Revel (Airbus Group Innovations)* The paper presents the work done to design an equivalent mechanical impact to lightning strike. The methodology, equivalent tests and results are analyzed in order to validate the equivalent method.	**5118-3 IMPLEMENTING OF THE OPTIMIZED TRUCK SEAT PLATE MADE OF THERMOPLASTIC GF/PP COMPOSITE** *Edgars Labans (Riga Technical University), Kapsars Kalnins (Riga Technical University), Eduards Skukis (Riga Technical University), Philippe Lefort (Volvo Group Trucks Technology), Clement Dufour (GEMTEX), Wolfgang Trümper (TU Dresden), Tim Callin (TU Dresden)* In current research design, optimisation and prototyping of truck cabin seat plate made of thermoplastic GF/PP composite was performed. Prototyped part has been validated by NDE and bolt pull-out test	**5119-3 UPGRADING SHEAR-STRENGTHENED RC BEAMS IN FATIGUE USING EXTERNALLY-BONDED CFRP** *Georges El-Saikaly (University of Quebec-École de Technologie Supérieure (ÉTS)), Omar Chaallal (University of Quebec-École de Technologie Supérieure (ÉTS))* The effectiveness of two externally-bonded carbon fiber-reinforced polymer (EB-CFRP) systems in extending the service life of RC T-beams shear-strengthened for fatigue upgrade has been examined.		
	5112-4 MECHANICAL BEHAVIOUR OF HIGH PERFORMANCE FIBER ROPES IN TECHNICAL APPLICATIONS *Markus Michael (TU Chemnitz), Thorsten Heinze (TU Chemnitz), Annett Schmieder (TU Chemnitz)* During the last years, fiber ropes have proven to be an option to replace steel wire ropes in many technical applications. Especially for hoisting applications or winch-based applications, fiber ropes	**5113-4 DELAMINATION PROPAGATION UNDER FATIGUE LOADING IN BONDED-BOLTED COMPOSITE STRUCTURES** *Luke Richard (University of Washington), Kuen Y. Lin (University of Washington)* Composite delamination arrest by fasteners is analyzed under both static and fatigue loading in order to develop predictive capabilities for the design of primary aircraft structures.		**5115-4 COMBINED CHARACTERIZATION OF THE EFFECTS OF HOT /WET AGING ON PULTRUDED FRP PLATE** *Sotirios Grammatikos (University of Bath), Richard Ball (University of Bath), Mark Evernden (University of Bath)* This paper presents a 'complete' characterization study of the hot/wet aging effects on a commercially available pultruded Glass Fibre Reinforced Polymer (GFRP).		**5117-4 EXPERIMENTAL AND NUMERICAL ANALYSIS OF A LAMINATED BASALT COMPOSITE PLATE SUBJECTED TO BLAST LOAD** *Süleyman Barlık (Turkish Air Force Academy), Sedat Süsler (İstanbul Technical University), Halit S. Türkmen (İstanbul Technical University), Valentina Lopresto (University of Naples Federico II), Silvio Genna (University of Naples Federico II), Zafer Kazancı (Turkish Air Force Academy)* The use of the advanced laminated composites is become more important in the structures of many engineering applications such as space stations, aerospace vehicles, automotives and marine structures.	**5118-4 BALLAST IMPACT EFFECT ON FATIGUE RESISTANCE OF COMPOSITE BASED CARBODYSHELLS IN RAILWAYS** *Mohamed Rachik (UTC), Pengcheng Cheng (UTC), Abdelouahed Laksimi (UTC)* The aim of this study is to integrate ballast impact influence in fatigue assessment for carbodyshell design. Lifetime of damaged structures can be estimated according to S-N curve of undamaged one.		

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11:20	**5201 Processing - Manufacturing Technology 15**	**5202 Nano Composites 15**	**5203 Sandwich Structures and Materials 5**	**5204 Multifunctional Composites - Self-Healing and Bio-inspired Designs 5**	**5205 Structural Design Criteria, Safety and Reliability**	**5206 Experimental Methods for Process Characterisation 6**	**5207 Liquid Composites Moulding 3**	**5208 Short Fibre Composites 5**	**5209 Recycling of Composites and Sustainability 5**	**5210 Fibres 5**
11:20	**5201-1 MATERIAL CHARACTERIZATION FOR DETERMINING THE CONSOLIDATION PROPERTIES OF CARBON FIBER TAPES WITH PA 6 MATRIX** *Philipp Schaefer (Technische Universitaet Muenchen), Swen Zaremba (Technische Universitaet Muenchen), Klaus Drechsler (Technische Universitaet Muenchen)* Carbon fiber reinforced tapes with a PA 6 matrix a characterized with respect to their consolidation properties. The fiber-matrix viscosity and the tapes' surface characteristics are determined.	**5202-1 FRACTURE TOUGHNESS MODELLING OF POLYMER MATRIX MODIFIED WITH NANO-RUBBER AND MICRO-INORGANIC FILLERS** *Bernd Lauke (Leibniz-Institut für Polymerforschung Dresden e.V.)* A hybrid composite consisting of a brittle polymer matrix and two filler components are considered. An analytical equation for the composite fracture toughness was obtained.	**5203-1 FAILURE BEHAVIOR OF CORRUGATED STIFFENED PANEL UNDER OUT-OF-PLANE LOADING** *Kenan Çinar (Namik Kemal University), Fatih E. OZ (Bogazici University), Nuri Ersoy (Bogazici University)* Acoustic emission monitoring technique was used to investigate the failure modes of a stiffened panel with a novel corrugated core design under three-point bending tests.	**KEYNOTE** **5204-1 SINGLE CHANNEL MICROVASCULAR DELIVERY FOR SELF-HEALING POLYMER COMPOSITES** *Brett Krull (University of Illinois), Yelizaveta Fedonina (University of Illinois), Scott White (University of Illinois), Nancy Sottos (University of Illinois)* We present a microfluidic device that accomplishes in-situ mixing of two-part healing agents through a single microvascular channel in polymer matrix composites.	**5205-1 PROBABILISTIC JUSTIFICATION OF COMPOSITE AIRFRAME IN-SERVICE INSPECTIONS** *Martin Gaitonde (Aircraft Manufacturer)* A probabilistic approach is described. It has been used to verify in-service inspection tasks for composite aircraft structures, such as those on A380 and A350, per damage tolerance requirements.	**5206-1 SIGNAL EVALUATION OF FIBER OPTICAL SENSORS EMBEDDED BETWEEN UNIDIRECTIONAL THERMOPLASTIC PREPREG TAPES IN A HOT-PRESS CONSOLIDATION FOR ONLINE PROCESS MONITORING** *Robert Gaitzsch (Faserinstitut Bremen e.V.), Michael Koerdt (Technische Universität Chemnitz), Christian Brauner (Faserinstitut Bremen e.V.), Lothar Kroll (Technische Universität Chemnitz), Axel Siegfried Herrmann* Fibre optical sensors were embedded in a unidirectional PA-6/GF laminate for online monitoring of the consolidation and annealing process. The sensor signals are discussed and compared with DSC scans.	**5207-1 LIQUID COMPOSITE MOLDING: ROLE OF MODELING AND SIMULATION IN PROCESS ADVANCEMENT** *Suresh Advani (University of Delaware), Pavel Simacek (University of Delaware)* Paper examines the role "virtual processing" - the numerical simulation of manufacturing process - can play in improving part design and production methodology.	**5208-1 INFLUENCE OF MEAN STRESS AND WELD LINES ON THE FATIGUE BEHAVIOUR OF SHORT FIBRE REINFORCED POLYAMIDE** *Andreas Primetzhofer (Montanuniversität Leoben), Andreas Mösenbacher (Montanuniversität Leoben), Gerald Pinter (Montanuniversität Leoben), Julia Brunbauer (Montanuniversität Leoben)* Proposal for consideration of mean stress effect and weld lines on the fatigue behaviour for short fibre reinforced polyamide by the local stress approach.	**5209-1 MEASUREMENT OF SHORT FIBRE LENGTH USING A RHEOLOGICAL METHOD** *Thomas Turner (University of Nottingham), Jiang Guozhan (University of Nottingham), Kok Wong (University of Nottingham), Steve Pickering (University of Nottingham)* A method is demonstrated for the quality assessment of recovered carbon fibres. Specifically, the concept of determination of fibre length from the shearing of a viscous fibre-containing suspension	**KEYNOTE** **5210-1 SIMULTANEOUSLY STRONG AND TOUGH CONTINUOUS NANOFIBERS: NEXT GENERATION REINFORCEMENT FOR NEW STRUCTURAL SUPERCOMPOSITES?** *Yuris Dzenis (University of Nebraska-Lincoln)* This talk reviews recent progress on continuous nanofibers with unique simultaneously high strength, modulus and toughness and the prospects for nanofibers to replace carbon as reinforcement in the next generation supercomposites.
11:40	**5201-2 IMPREGNATION AND MECHANICAL PROPERTY OF TEXTILE COMPOSITE MADE FROM PRE-IMPREGNATED COMMINGLED YARN** *Toshihiro Motochika (Gifu university), Akio Ohtani (Gifu university), Asami Nakai (Gifu university), Mitsuro Takagi (Kajirene Inc.)* New intermediate material for c-CFRTP called pre-impregnated commingled yarn was developed. Impregnation and mechanical property were investigated by comparing to commingled yarn.	**5202-2 SUPERHYDROPHOBIC SELF-REGENERATIVE SILICONE RUBBER NANOCOMPOSITES FOR ELECTRICAL OUTDOOR INSULATION** *Ana Isabel Mendoza (KTH Royal Institute of Technology), Henrik Hillborg (ABB), Emma Strömberg (KTH Royal Institute of Technology)* Development of new structural composite materials for HV outdoor insulation applications using PDMS coated with ZnO nanoparticles, creating hierarchical superhydrophobic and self cleaning surfaces.	**5203-2 FABRICATION AND AXIAL COMPRESSIVE BEHAVIOR OF COMPOSITE SANDWICH CYLINDRICAL SHELLS WITH PYRAMIDAL LATTICE TRUSS** *Jian Xiong (Harbin Institute of Technology), Wei Zheng (Harbin Institute of Technology), Lina Feng (Harbin Institute of Technology), Fanyi Meng (Harbin Institute of Technology)* We developed interlocking method and a hot press method to manufacture lightweight carbon fiber composite cylindrical shell with pyramidal truss constructions.		**5205-2 PROBABILISTIC ANALYSIS OF COMPOSITE STRUCTURES USING THE CGSM** *Qi Yin (Université de Technologie de Compiègne), Frédéric Druesne (Université de Technologie de Compiègne), Pascal Lardeur (Université de Technologie de Compiègne)* The CGSM is developed for probabilistic analysis of laminated composite plates and shells modeled by finite elements, taking into account the variability of material and physical properties.	**5206-2 ROOM TEMPERATURE CURE MONITORING USING A DMA /THERMAL FLUX CELL AND MECHANICAL BEHAVIOR OF A PHENOLIC SYNTACTIC FOAM** *Mounia Bouslah (Ecole Centrale de Lyon), Michelle Salvia (Ecole Centrale de Lyon), Isabelle Deschères (Institut Textile et Chimique de Lyon), Raymond Barbin (ACOEM group)* The transformation process of a phenolic syntactic foam was studied by a coupled calorimetry-DMA and a study of the compression behavior was performed by a macroscopic test and by X-ray tomography.	**5207-2 INVESTIGATION OF A COST-EFFECTIVE SYSTEM FOR ON-LINE FLOW MONITORING AND QUALITY CONTROL IN RESIN TRANSFER MOLDING** *Claudio Di Fratta (ETH Zürich), Grigorios Koutsoukis (ETH Zürich), Paolo Ermanni (ETH Zürich)* The work investigates a fast and cost-effective method, based on few pressure sensors, for monitoring the resin flow and controlling the injection parameters during Resin Transfer Molding.	**5208-2 FATIGUE DAMAGE MECHANISMS DESCRIPTION IN SHORT GLASS FIBRE REINFORCED THERMOPLASTIC BY MICROTOMOGRAPHIC OBSERVATIONS** *Héloïse Rolland (I2M - Arts et Métiers ParisTech - Bordeaux), Nicolas Saintier (I2M - Arts et Métiers ParisTech - Bordeaux), Gilles Robert (Solvay Engineering Plastics)* Fatigue damage mechanisms of PA66GF have been observed in relation to its microstructure. Proportions of identified mechanisms are determined at different damage levels.	**5209-2 SMART SELF-REINFORCED POLY(LACTIC ACID) (PLA) COMPOSITES WITH ENHANCED IMPACT PERFORMANCE, TENSILE PROPERTIES AND HEAT RESISTANCE** *Fang Mai (Queen Mary University of London), Emiliano Bilotti (Queen Mary University of London), Ton Peijs (Queen Mary University of London)* Through development of fully bio-based and recyclable self-reinforced PLA, the high brittleness and low HDT of PLA have been overcome, while simultaneously improving the tensile strength and modulus.	

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5211 Multifunctional Composites - Coupled Properties and Multi-physics Models 3	**5212 Matrix materials 5**	**5213 Damage Tolerance of Composite Structures 6**	**5214 Simulation of Progressive Failure 4**	**5215 Durability, Creep and Agressive Environment 4**		**5217 Impact and Dynamic Structural Analysis 4**	**5218 Hybrid Composites 4**	**5219 Applications - Civil Engineering 5**		
5211-1 ELECTRON AND THERMAL TRANSPORT MECHANISM IN CNT-NETWORK COMPOSITES FOR STRAIN RESILIENT ELECTRONICS *Ajit Roy (Air Force Research Laboratory), Sergei Shenogin (Air Force Research Laboratory), Vikas Varshney (Air Force Research Laboratory), Jonghoon Lee (Air Force Research Laboratory)* We propose carbon nano-tube network in high-strain tolerant polymer phase to implement strain resiliency in electronic materials and provide materials modeling to design CNT contact morphology.	**5212-1 PREPARATION AND PROPERTIES OF A NEW SILICON-POLYTRIAZOLE RESIN AND ITS COMPOSITE** *Bing Guo (Key Laboratory for Specially Functional Polymeric Materials and Related Technology(East China University of Science & Technology)), Liqiang Wan (Key Laboratory for Specially Functional Polymeric Materials and Related Technology(East China University of Science & Technology)), Lei Du (Key Laboratory for Specially Functional Polymeric Materials and Related Technology(East China University of Science & Technology)), Farong Huang (Key Laboratory for Specially Functional Polymeric Materials and Related Technology(East China University of Science & Technology))* Si-PTA resin synthesized from 4,4'-diazidomethyl biphenyl(DAMBP) and LPSA via 1,3-dipolar cycloaddition was preparation and characterization. The resin possessed good heat resistant property.	**5213-1 INTERFACE STRENGTH GRADATION IN THERMOPLASTIC COMPOSITES: A NEW APPROACH TO INCREASE THE DAMAGE TOLERANCE** *Luigi Sorrentino (CNR - IPCB), Fabrizio Sarasini (University of Rome - Sapienza), Jacopo Tirillò (University of Rome - Sapienza), Giorgio Simeoli (University of Naples Federico II), Salvatore Iannace (CNR - IPCB), Pietro Russo (CNR - IPCB)* Film stacked thermoplastic composites based on the gradation of the interlaminar interface strength (IGIS) have been investigated by flexural and impact tests as well as by acoustic emission analyzes.	**5214-1 AN IMPROVED COHESIVE ZONE MODEL VIA SELECTIVE ACTIVATION** *William Peterson (Montana State University), Douglas Cairns (Montana State University)* We demonstrate a method that results in an initially rigid cohesive zone in which intrinsic cohesive elements remain dormant until needed during the course of the analysis.	**5215-1 MECHANICAL BEHAVIOR OF CARBON FIBER/EPOXY FILAMENT WOUND FLAT LAMINATES EXPOSED TO ENVIRONMENTAL CONDITIONING** *José Humberto Almeida Jr. (Federal University of Rio Grande do Sul), Samia Souza (São Paulo State University (UNESP)), Edson Botelho (São Paulo State University (UNESP)), Sandro Amico (Federal University of Rio Grande do Sul)* Filament wound composites are exposed to hygrothermal conditioning. Non-Fickian kinetics govern moisture absorption, elastic and strength tensile/shear properties reduced for aged specimens.		**5217-1 MODELLING DELAMINATION DAMAGE IN 'EX-SITU' TOUGHENED LAMINATES DUE TO IMPACT** *Dafei Li (University of Nottingham), Elena Sitnikova (University of Nottingham), Shuguang LI (University of Nottingham), Xiaosu Yi (Beijing Institute of Aeronautical Materials (BIAM))* Modelling damage in laminated composites of toughened interface through 'Ex Situ' technique, in low speed impact, standard fracture tests such as mode I, mode II and mix mode.	**5218-1 ELECTRICAL AND MECHANICAL PROPERTY INVESTIGATION OF FUZZY FIBRE-REINFORCED COMPOSITES** *Idris Gürkan (İstanbul Technical University), Hülya Cebeci (İstanbul Technical University)* The electrical conductivity is measured in plane and out of plane and mode 1 fracture toughness test is performed to the specimens to determined multi-functional properties of fuzzy fiber-NECs.	**5219-1 ACTIVITY REGARDING APPLICATION OF THERMOPLASTIC FRP TO JAPANESE INFRASTRUCTURE** *Atsushi Hokura (Kanazawa Institute of Technology), Shinichi Miyazato (Kanazawa Institute of Technology)* Research activity on infrastructure application of thermoplastic FRP in Japan is described with an introduction to the KIT-COI (Kanazawa Institute of Technology-Center of Innovation) project.		
5211-2 HARVESTING ENERGY BY DEPOLING FERROELECTRIC PZT BASED COMPOSITES *Christopher Roberts (University of California-Los Angeles), Peng Lv (University of California-Los Angeles), Christopher Lynch (University of California-Los Angeles)* The depolarization of PZT 52/48 and PZT 95/5 is investigated under uniaxial stress at stress rates of 0.1-100 MPa/ms for impact energy harvesting applications.	**5212-2 SYNTHESIS AND CHARACTERIZATION OF A NEW HIGH TEMPERATURE SHAPE MEMORY POLYIMIDE** *Xinli Xiao (Harbin Institute of Technology), Xueying Qiu (Harbin Institute of Technology), Deyan Kong (Harbin Institute of Technology), Yang Hu (Harbin Institute of Technology), Wenbo Zhang (Harbin Institute of Technology), Shen Zhang (Harbin Institute of Technology), Yanju Liu (Harbin Institute of Technology), Jinsong Leng (Harbin Institute of Technology)* Shape memory polyimide with high glass transition temperature and excellent shape memory performances is reported, and the mechanism of high temperature shape memory effects of polyimide is proposed.	**5213-2 EVALUATION OF THROUGH-THE-THICKNESS STRESS DISTRIBUTION UNDER PURE MODE II ON A MODIFIED TRANSVERSE CRACK TENSION TEST** *Tommaso Scalici (Università degli Studi di Palermo), Giuseppe Pitarresi (Università degli Studi di Palermo), Antonino Valenza (Università degli Studi di Palermo), Giuseppe Catalanotti (Universidade do Porto), Pedro P. Camanho (Universidade do Porto)* implementation of two full-field experimental stress analysis techniques to evaluate the strain and stress field on the through-thickness surface of TCT samples	**5214-2 A THERMAL-MECHANICAL A-FEM FOR FRACTURE IN TEXTILE COMPOSITES** *Qingda Yang (University of Miami), Bao-Chan Do (University of Miami)* This paper presents how the novel augmented finite element method (A-FEM) can be extended to account for path-arbitrary, single intra-elemental discontinuities under general thermo-mechanical loading.	**5215-2 LONG-TERM DURABILITY TESTING OF TOKYO ROPE CARBON CABLES** *Ahmed Ali (Université de Sherbrooke), Hamdy M. Mohamed (Sherbrooke University), Adel Elsafty (University of North Florida), Brahim Benmokrane (Université de Sherbrooke)* The main objective of this study is to investigate the effect of different environmental conditions on the long-term behavior of Tokyo Rope carbon-cables (CFCCs) subjected to tensile load		**5217-2 ANALYTICAL MODELLING AND FE SIMULATION OF IMPACT RESPONSE AND DAMAGE GROWTH IN A THIN PLY LAMINATE** *Robin Olsson (Swerea SICOMP), Alann André (Swerea SICOMP), Peter Hellström (Swerea SICOMP)* Impact damage in thin ply laminates differs from conventional laminates. Models for predicting damage initiation and growth in a thin ply ply laminate are presented and compared with experiments.	**5218-2 IMPACT OF NON-HOOKEAN BEHAVIOUR ON MECHANICAL PERFORMANCE OF HYBRID COMPOSITES** *Christen Malte Markussen (DTU Wind Energy), Bo Madsen (DTU Wind Energy), Hans Lilholt (DTU Wind Energy), Tom Løgstrup Andersen (DTU Wind Energy)* Hybrid composites, based on unidirectional fibres of carbon and glass, in an epoxy matrix have been used to investigate the possibility of a hybrid effect. The hybrid effect is observed experimentally	**5219-2 BUCKLING BEHAVIOUR OF POLYURETHANE FOAM FILLED COLD-FORMED STEEL C-SECTIONS** *Aaron von der Heyden (TU Darmstadt-Institute for Steel Structures and Materials Mechanics), Jörg Lange (TU Darmstadt-Institute for Steel Structures and Materials Mechanics)* Cold-formed steel members tend to fail before reaching their yield strength due to buckling. Regarding this aspect, the influence of filling the cross-section with polyurethane foam is analysed.		

	Congress Hall A	Auditorium 15	Auditorium 10	Auditorium 11	Auditorium 12	Meeting room 18	Meeting room 19	Meeting room 20	Meeting room 17	Meeting room 16
12:00	**5201-3 NOVEL PREHEATING METHOD WITH MATRIX RESIN IMPREGNATION FOR STAMP FORMING OF CFRTP** *Takahiro Hayashi (The University of Tokyo), Kenichi Hasegawa (The University of Tokyo), Jun Takahashi (The University of Tokyo)* We investigated the effect of the impregnation conditions by a vacuum press preheater for semi-impregnated CFRTP to develop novel preheating device with impregnation.	**5202-3 CELLULOSE NANOCOMPOSITES – CONTROLLING DISPERSION AND MATERIAL PROPERTIES THROUGH NANOCELLULOSE SURFACE MODIFICATION** *Farhan Ansari (KTH Royal Institute of Technology), Michaela Salajkova (KTH Royal Institute of Technology), Lars Berglund (KTH Royal Institute of Technology)* This work investigates composites of surface modified cellulose nanocrystals with PVAc and discusses the effect of resulting nanostructure on the end properties of the composites.	**5203-3 COST-OPTIMAL DESIGN AND AUTOMATED PRODUCTION OF SANDWICH STRUCTURES FOR WIND TURBINE ROTOR BLADES** *Peipei Wang (Fraunhofer IWES), Roman Braun (Fraunhofer IWES), Christian Dörsch (Fraunhofer IWES), Heiko Rosemann (Fraunhofer IWES), Florian Sayer (Fraunhofer IWES), Oliver Bagemiel (Fraunhofer IWES), Frank Prissok (BASF Polyurethanes), Ragnar Stoll (BASF Polyurethanes), Jens Brandes (Fibretech Composites), Erwin Fröse (2 Komponenten Maschinenbau)* Automated in-situ foaming of liquid polyurethane directly in the mold is proposed and analytically assessed as a means to reduce production costs of sandwich panels for wind turbine rotor blades.	**5204-2 TOUGHER COMPOSITES CONTAINING SELF-HEALING MONOMERS PREPARED BY INKJET PRINTING** *Patrick J. Smith (University of Sheffield), Yi Zhang (University of Sheffield), Elliot Fleet (University of Sheffield), Jonathan Stringer (University of Sheffield), Simon A. Hayes (University of Sheffield), Alma Hodzic (University of Sheffield)* Poly(methyl methacrylate) and/or polyethylene glycol have been deposited between laminate plies by inkjet printing; resulting in a 40% improvement in Gic (propagation).	**5205-3 PROBABILISTIC STRENGTH ESTIMATION IN CONSIDERATION OF SIZE EFFECTS AND LOAD MODES FOR GLASS-SHORT-FIBER-REINFORCED THERMOSETTING PLASTICS.** *Takahiko Sawada (Hitachi Ltd.), Hiroshi Aoyama (Hitachi Ltd.)* We propose a strength estimation method for short-fibre-reinforced plastics in consideration of load modes and size effects by using the Weibull statistical theory, FEA, and experimental approaches.	**5206-3 FLOW FRONT AND CURE MONITORING OF THICK CFRP LAMINATES WITH INTEGRATED FIBER OPTIC SENSORS** *Jonathan Oelhafen (Technische Universität München), Ruben Fernandez (Premium Aerotec GmbH), Dirk Niefnecker (Premium Aerotec GmbH), Swen Zaremba (Technische Universität München), Klaus Drechsler (Technische Universität München)* Flow front measurements with embedded FBGs and Fresnel reflectometer during vacuum infusion. Additionally, curing and Tg measurements with Fresnel reflectometer in isothermal neat resin experiments.	**5207-3 WETTING ALONG FIBER(S) PLACED ON SOLID SUBSTRATE** *Takuma Setoguchi (Tokyo University of Science), Ichiro Ueno (Tokyo University of Science)* A special attention is paid to the wetting process along glass fiber(s) settled on the substrate. The tip velocity and the profile of the liquid between the fiber(s) and the substrate are evaluated.	**5208-3 A LOCAL STRESS ANALYSIS OF THE EFFECT OF FIBRE ORIENTATION ON FATIGUE THE BEHAVIOUR OF A SHORT FIBRE REINFORCED POLYAMIDE.** *Andrea Bernasconi (Politecnico di Milano), Edoardo Conrado (Politecnico di Milano), Alessandro Cavallaro (Politecnico di Milano), Peter Hine (University of Leeds)* A review of the effect of fiber orientation on the fatigue strength of a short glass fiber reinforced polyamide based on through process modelling and local stress analysis is presented.	**5209-3 EFFECT OF FIBRE LENGTH AND SUSPENSION CONCENTRATION ON ALIGNMENT QUALITY OF DISCONTINUOUS RECYCLED CARBON FIBRE** *Zhe Liu (The University of Nottingham), Kok Hoong (The University of Nottingham), Thomas Turner (The University of Nottingham), Stephen Pickering (The University of Nottingham)* Hydrodynamic alignment process is devised to achieve highly aligned orientation distribution mats with discontinuous random recycled carbon fibre.Effects of fibre length and concentration is invested.	**5210-2 CARBON FIBRES WITH MODULATED PROPERTIES AND SHAPE ALONG THE FIBRE LENGTH** *Jonny Blaker (The University of Manchester), David B. Anthony (Imperial College London), Guang Tang (University of Dundee), Siti-Ros Shamsuddin (Imperial College London), Gerhard Kalinka (Federal Institute of Materials Testing and Research (BAM)), Milo Shaffer (Imperial College London), Amin Abdolvand (University of Dundee), Alexander Bismarck (Imperial College London)* The possibility to weaken carbon fibres and shape their diameter using a nanosecond pulsed laser will be demonstrated. Predetermined break points can therefore be introduced into carbon fibres.
12:20	**5201-4 THERMOPLASTI COMPOSITES: MATERIAL DEVELOPMENTS FOR AEROSPACE APLLICATIONS, INCORPORATION OF A FUNCTIONAL TIE LAYER** *Hans Luinge (Nijverdal)* A tie layer is introduced at the surface of chemically resistant semi-crystallinge thermoplastic composites to improve the adhesion strength between these substrates and coatings or adhesives.	**5202-4 COMPARISON OF THE PROPERTIES OF POLYESTER-BASED POWDER COATINGS CONTAINING DIFFERENT CLAYS MODIFIED WITH -AMINO-PROPYLTRIETHOXYSILANE** *Paula Bertuoli (Federal University of Rio Grande do Sul), Lisete Scienza (Federal University of Rio Grande do Sul), Ademir Zattera (University of Caxias do Sul)* In this work the effect of silane modified montmorillonite clays on the mechanical, morphological and corrosion protection properties of a polyester-based powder coatings was evaluated.	**5203-4 NUMERICAL MODELING OF RESIN SHRINKAGE AROUND INSERT IN COMPOSITE SANDWICH PANELS** *Hubert Courteau-Godmaire (Polytechnique Montreal), Philippe Causse (Polytechnique Montreal), Edith-Roland Fostsing (Polytechnique Montreal), Edu Ruiz (Polytechnique Montreal)* Finite element sensibility analysis of the formation of surface defects on the visible panel side of blind insert assembly. The defects affect visual appearance of business jet furniture.	**5204-3 SELF HEALING OF EPOXY RESINS USING SELF ASSEMBLING HEALING AGENTS** *Frank Jones (The University of Sheffield), Russell Varley (CSIRO), Stephen Kalista (Rensselaer Polytechnic Institute), Buu Dao (CSIRO), Christopher Pillsbury (Union College)* Healing agents of critical MW for thermal mending of epoxy resins self-assemble in situ via ionomer formation. Efficiencies compare to high MW systems with less impact on viscosity for RTM processing.	**5205-4 PROBABILISTIC ANALYSIS OF WIND TURBINE BLADES CONSIDERING STIFFNESS, STRENGTH AND STABILITY UNDER EXTREME AND FATIGUE LOADING** *K. C. Bacharoudis (Centre for Renewable Energy Sources and Saving), D. J. Lekou (Centre for Renewable Energy Sources and Saving), T. P. Philippidis (University of Patras)* Effect of measurement uncertainty related to the material properties and of model uncertainties connected to the loads and the structural models directly on the reliability level of a 90m rotor blade.	**5206-4 PROCESS MONITORING FOR RESINS, CARBON FIBER FABRICS, PREFORMS AND CONSOLIDATED CFRPS BY HF RADIO WAVE TECHNIQUES** *Henning Heuer (Technische Universität Dresden), Martin Schulze (Fraunhofer IKTS), Matthias Pooch (Fraunhofer IKTS), Simone Gaebler (Leibniz Institute of Polymer Research)* EddyCus® High Frequency Eddy current technology applied on CFRP gives valuable information for material diagnostic and process control e.g. fiber position or cure quality of resins.	**5207-4 MINIMIZING VOLATILE-INDUCED SURFACE POROSITY IN RTM VIA MATERIAL AND PROCESS OPTIMIZATION** *Mark Anders (University of Southern California), Jonathan Lo (University of Southern California), Timotei Centea (University of Southern California), Steven Nutt (University of Southern California)* A description of the underlying mechanism behind volatile-induced surface porosity in RTM, and strategies to minimize this type of defect by modifying the resin cure kinetics.	**5208-4 METHOD FOR ENABLING HIGHLY LOADABLE MATERIAL COMBINATIONS OF PP AND ALUMINUM WITHOUT THE USE OF ADHESIVES** *Kim Kose (inpro), Ivonne Clausner (Neue Materialien Fürth GmbH), Fred Eggers (Daimler), Birgit Faisst (TRUMPF Laser- und Systemtechnik GmbH)* A new method for the joining of polymer-metal-hybrid parts is presented. Examples of reinforced PP (PP-LGF30) on aluminum show very good results even after thermal and corrosive aging.	**5209-4 MICROWAVE INDUCED DEGRADATION OF GLASS FIBER REINFORCED POLYESTER FOR FIBER AND RESIN RECOVERY** *Hülya U. Sokoli (Department of Chemistry and Bioscience, Aalborg University, Esbjerg, Denmark), Rudi P. Nielsen (Department of Chemistry and Bioscience, Aalborg University, Esbjerg, Denmark), Erik G Søgaard (Department of Chemistry and Bioscience, Aalborg University, Esbjerg, Denmark), Morten E. Simonsen (Department of Chemistry and Bioscience, Aalborg University, Esbjerg, Denmark)* A solvolysis process to depolymerize the resin in glass fiber reinforced composites and recover the glass fibers has been investigated using microwave induced irradiation.	**5210-3 EXTRACTION AND CHARACTERISATION OF CELLULOSE MICROFIBRILS FROM PONGAMIA PINNATA SEED HULL** *Manjula P (National Institute of Technology Karnataka Surathkal)* Biodiesel is a renewable resource of energy and has gained its importance in India due to soaring oil price and largely enhanced environmental awareness. Biodiesel and other biofuels are produced from

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5211-3 THERMO MECHANICAL BEHAVIOR OF THERMOPLASTIC COMPOSITE HIGHLY FILLED *Antoine Jeancolas (Pole de Plasturgie de l'Est), Henri Perrin (Pole de Plasturgie de l'Est), Florence Dinzart (LaBPS), Hafid Sabar (LaBPS)* Study of the shaping process and evaluation of the thermomechanical behavior of a thermoplastic composite highly filled of micronized particles of ceramic	**5212-3 THE PROPERTIES OF A SILICON-CONTAINING ARYACETYLENE RESIN MODIFIED BY OCTA(AZIDOPROPYL) POLYHEDRAL OLIGOMERIC SILSESQUIOXANE AND ITS CARBON FIBER REINFORCED COMPOSITES** *Xiaojun Bu, Lei Du (Key Laboratory for Specially Functional Polymeric Materials and Related Technology (East China University of Science & Technology)* A novel resin OAPS-PSA was obtained from PSA resin and octa(azidopropyl) polyhedral oligomeric silsesquioxane (OAPS) by "click" polymerization and the T300/OAPS-PSA had good mechanical properties.	**5213-3 STATIC AND DYNAMIC PROPERTIES OF NEEDLE PUNCHED CHOPPED STRAND MATS COMPOSITE WITH OPEN HOLE** *Daiki Ichikawa (Kyoto Institute of Technology), Ryo Marui (Marui Textile Machinery Co), Tohru Morii (Shonan Institute of Technology), Akio Ohtani (Gifu University)* In this study, needle punch process was applied on chopped glass fiber mat in order to improve the properties of glass mat composite with circular holes.	**5214-3 MODELLING OF PROPAGATING DELAMINATIONS IN TEXTILE REINFORCED DUROPLAST BEAMS BY AN ENRICHED SHELL ELEMENT FORMULATION** *Jim Brouzoulis (Chalmers University of Technology), Martin Fagerström (Chalmers University of Technology), Johannes Främby (Chalmers University of Technology), Jan Krollman (Technische Universität München), Peter Hellström (Swerea SICOMP)* A recent XFEM enriched shell element formulation, which internally can represent multiple interlaminar cracks, has been validated against experiments conducted on textile reinforced Duroplast beams	**5215-3 ON THE MECHANICAL CHARACTERIZATION OF PULTRUDED FIBRE REINFORCED PLATES SUBJECTED TO HYGROTHERMAL AGING** *Behrouz Zafari (The University of Warwick), Toby Mottram (The University of Warwic)* This paper presents experimental findings from characterization work to understand mechanical property changes of a polymeric composite after exposure to hot/wet conditioning.		**5217-3 LOW-IMPACT TESTING ON EPOXY COMPOSITES REINFORCED WITH DNA-FUNCTIONALIZED CARBON NANOTUBES** *Susanna Laurenzi (Sapienza Università di Roma), Matteo Sirilli (Sapienza Università di Roma), Mariagabriella Santonicola (Sapienza Università di Roma)* Despite the high elastic modulus and tensile strength of carbon nanotubes (CNTs), the enhancing of the mechanical properties of epoxy resins reinforced by CNTs are largely unpredictable due to their s	**5218-3 AN IMPROVED FRAGMENTATION MODEL TO ASSIST THE SELECTION OF FIBRES IN HYBRID COMPOSITES** *Josep Costa (University of Girona), Juan David Vanegas-Jaramillo (Universidad Pontificia Bolivariana), Albert Turon (University of Girona), Luis Javier Cruz (Universidad Pontificia Bolivariana)* Tow hybridization, to escape from brittleness and to achieve a pseudo-ductile behaviour, is explored by means of an advanced analytical fragmentation model for unidirectional hybrid composites.	**5219-3 A NOVEL ANCHOR METHOD OF FRP CABLE FOR LONG-SPAN CABLE-SUPPORTED BRIDGES** *Xin Wang (Southeast University)* This paper proposes a novel anchor toward large capacity fiber-reinforced polymer (FRP) cable and demonstrates anchor efficiency by the finite element method (FEM) and experiments.		
5211-4 MULTI-FUNCTIONAL PROPERTIES IN NATURAL FIBER REINFORCED COMPOSITES *Hitoshi Takagi (Tokushima University), Antonio Nakagaito (Tokushima University), Ke Liu (Wuhan Textile University)* The transverse thermal conductivity of unidirectional green composites is found to be expressed as a function of lumen size, thermal conductivity ratio of fiber to matrix, and fiber volume fraction.	**5212-4 STIFF MONOLITHIC AEROGEL MATRICES FOR STRUCTURAL FIBRE COMPOSITES** *Hui Qian (Imperial College London), Sang Nguyen (Imperial College London), David Anthony (Imperial College London), Emile Greenhalgh (Imperial College London), Alexander Bismarck (Imperial College London), Milo Shaffer (Imperial College London)* Carbon aerogel precursors were introduced into structural carbon fibre weaves, to generate monolithic hierarchical carbon preforms, subsequently infused with polymer resins to produce dense composites					**5217-4 IMPACT BEHAVIOUR OF COMPOSITE PLATES SUBJECT TO HIGH-VELOCITY IMPACT BY RIGID PROJECTILES: ANALYTICAL MODELLING OF THE ELASTIC RESPONSE.** *Andreas Schiffer (Khalifa University), Vito L. Tagarielli (Imperial College London)* Analytical models are developed to predict the elastic dynamic response of circular clamped composite plates subject to high-velocity impact by a rigid projectile.		**5219-4 SIMULATION OF INTERMEDIATE DEBONDING IN FRP-STRENGTHENED RC BEAMS** *Ricardo Perera (Technical University), Rui Sun (Technical University), Enrique Sevillano (Technical University)* Formulation of a spectral model based on a discrete crack approach to simulate the structural response of flexural FRP-strengthened concrete beams. It is focused on intermediate debonding.		

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12:40	**5201-5 PRODUCTION STUDY OF CARBON FIBER WOVEN FABRIC/PA6 COMPOSIE SHEET USING PA6 SOLUTION** *Osuke Ishida (Kanazawa Institute of Technology), Wataru Okumura (Industrial Research Institute of Ishikawa), Mitsugu Kimizu (Industrial Research Institute of Ishikawa), Kiyoshi Uzawa (Kanazawa Institute of Technology), Isao Kimpara (Kanazawa Institute of Technology)* In this study, the solution impregnation process using the mixture of calcium chloride and methanol was investigated to produce carbon fiber woven fabrics and polyamide 6 composite.	**5202-5 ALIGNMENT OF CARBON NANOTUBES IN GLASS FIBER COMPOSITES USING AC ELECTRIC FIELD** *Charles Bakis (Penn State University), Ambuj Sharma (Penn State University), Kon-Well Wang (University of Michigan)* Experiments and finite element analysis are used to investigate the alignment of carbon nanotubes through the thickness of unidirectional glass/epoxy composites using an alternating electric field.		**5204-4 MICROENCAPSULATED SOLVENT-BASED HEALING OF SHAPE MEMORY POLYMERS** *Jesse Hamilton (University of Massachusetts Lowell), Bradford Olson (University of Massachusetts Lowell), Siddharth Dev (University of Massachusetts Lowell), Norman Rice (Triton Systems Inc.), Christopher Hansen (University of Massachusetts Lowell)* Self-healing is pursued by a close-then-heal approach, in which the shape memory effect is activated by damage-induced release of encapsulated solvent to compress and bond fracture surfaces.	**5205-5 MICROMECHANICS AND RELIABILITY BASED COMPOSITE MATERIAL CHARACTERIZATION FOR WIND TURBINE BLADE COMPOSITES** *Ghulam Mustafa (Uni of Victoria BC Canada), Curran Crawford (Uni of Victoria BC Canada), Afzal Suleman (Uni of Victoria BC Canada)* This work presents a coupled approach for stiffness property prediction of composite materials used in wind turbine blades using advanced micromechanics and reliability-based methodologies.				**5209-5 INVESTIGATION OF CATALYSED FLUIDISED BED FOR THERMOSET COMPOSITE RECYCLING** *Kyle Pender (University of Strathclyde), Liu Yang (University of Strathclyde)* An investigation into catalysed thermal decomposition of epoxy resin was carried out with the goal to improve the commercial viability of glass fibre reinforced plastic recycling.	
13:00	**Lunch in the Exhibition**									
14:00	**Closing Ceremony**									

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	5212-5 A TERNARY MWCNT/CERIA/ POLYANILINE COMPOSITE FOR CORROSION PROTECTION *Cynthia Oueiny (MAPIEM laboratory), Sophie berlioz (MAPIEM laboratory), François-Xavier perrin (MAPIEM laboratory)* Ternary MWCNT/Ce/polyaniline nanocomposites were easily prepared andcaracterized. MWCNT/Ce(III)/EB pigments inserted in polyvinylbutyral matrix showed a good corrosion protection efficiency.									

Scientific programme

How to navigate in the scientific programme

Remember that you can also search for all presentations in your ICCM20 app.

The **session number** is made of 4 digits: XYZZ
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Y = session number this day
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The programme number is made of the above 4 digits and adding the order of the presentations in the session:
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X = day (Monday = 1, Tuesday = 2 …)
Y = session number this day
ZZ = room code
VV = presentation order in the session

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How to navigate the poster and mini-oral programme

The poster presentations at the ICCM20 are fully integrated in the scientific programme. The poster sessions will include a short 3 minutes long oral overview presentation (termed “mini-oral”) of each poster (maximum of 3 slides) given in plenum to the entire conference. This will be followed by a poster session that will take place in the Exhibition area and Foyer of the Bella Center and where the presented posters will be on display and open for discussion.
The Posters are on display from Monday 20 July at 9.00 and until Wednesday 23 July at 16.30.

The numbers in the mini-oral programme is also the number of the posters : the numbers are as follows:
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P=Poster
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VV = presentation order in the session (20 presentations in each session)

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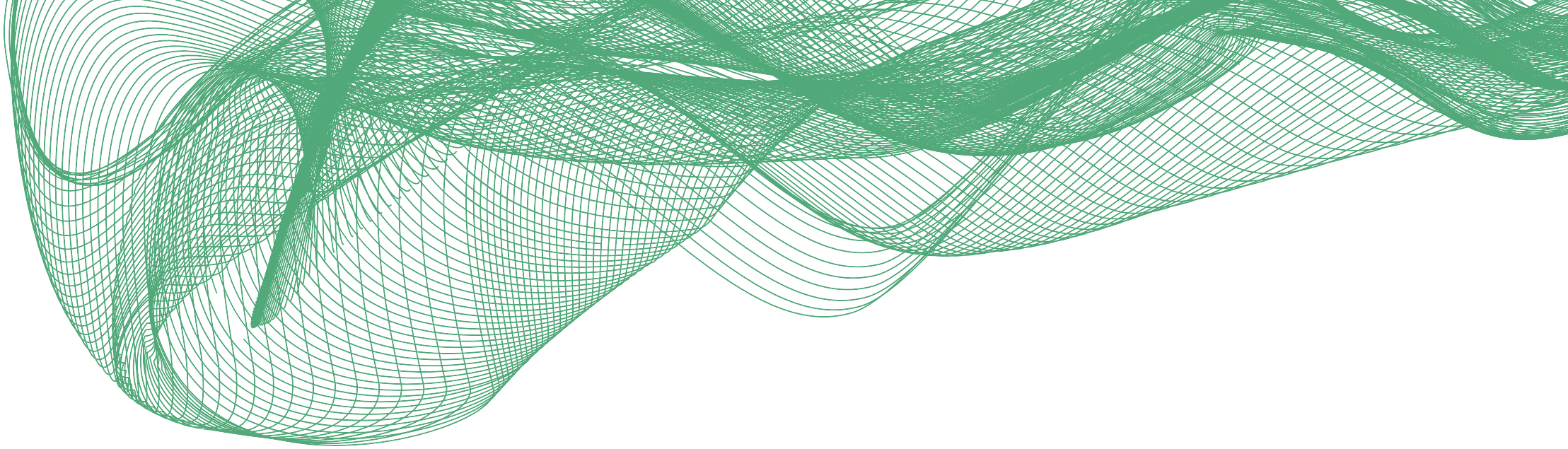

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