Material Designers

Boosting talent towards circular economies

MaDe (Material Designers) is a project, co-funded by Creative Europe Programme of The European Union, which aims at boosting talents towards circular economies across Europe. MaDe is a platform, a training program, an award and an event series showcasing and demonstrating the positive impact Material Designers can have across all industry and on the generation of an alternative creative industry aiming at circular economies.

Material Designers are agents of change. They can design, redesign, reform, reuse and redefine materials giving them an entirely new purpose. Increasing the potential of materials, they can go on to research, advise, educate and communicate what materials are and can be in the immediate, near and far future, implementing positive social, economic, political and environmental change across all sectors towards a responsibly designed future.

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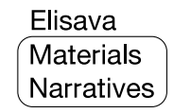

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Circular Material Fundamentals

Material Designers Toolkit

Circular Material Fundamentals

1.0

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Materials Designers: A New Design Discipline

Words by
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The history of the relationship between human beings, materials and technique is long and complicated but fascinating. It has always been addressed with a multi-disciplinary approach, thanks to various and relevant studies belonging to multiple fields of research. This relationship, since the mid-nineteenth century, has been inscribed in the field of industrial design, and it is transformed to an inseparable and consolidated connection between the designer, the materials and the techniques, capable of responding to the needs and requirements dictated by contexts and times.

Today, human beings are experiencing an era characterized by the need for a more responsible role for design in environmental, technological and social issues. It seems that new profiles of designers who are more aware and able to embody their work with the coming and future concerns, seem to be emerging. Scholars have always investigated the role of the designer, still questioning the foundations of a profession that only initially seemed to be exclusively dedicated to giving an aesthetic form to artefacts. Nowaday, in modern societies, the designer has become significant creator of meaning in everyday life (Grant & Fox,1992) with the growing responsibility of the product as a whole, starting from the material choices up to the considerations relating to the overall environmental impact (Thackara, 2006; Papanek, 1972). The urgent need to consider the specificities of respect for the environment in every artefact that is created is increasingly evident. It is no longer possible to wait or ignore the problems created by human beings to the environment in which they live.

Within the design culture, the idea is now ripe that it is always necessary to design inside the confines of design for sustainability practice. As Stengall stated in 2006, the role of the designer in developing a sustainable society is not merely to create "sustainable products," but rather to envision products, processes, and services that encourage widespread sustainable behaviour. This goal of designing for sustainability can be accomplished through the development of a new philosophy to help guide design decisions. Furthermore, it is necessary to take into consideration that every artefact is a form of persuasive communication in which it serves as an argument for how people should live because with every new artefact designers have directly influenced the actions of individuals and communities, changed attitudes and values, and shaped society in surprisingly fundamental ways (Buchanan, 1989).

Moving forward, you can also understand that to design for sustainability requires not only the redesign of human habits, lifestyles, and practices but also the way humans think about design (Wahl & Baxter, 2008). Vezzoli (2003) stated that designers have an essential role to play because they form a bridge between the consumer's cultural sphere and the world of production. Designers also need to become aware of their new responsibilities and their specific contribution in the transition towards a sustainable society.

Many scholars identify the materials used to shape the world as a fundamental element to manage a transition towards sustainability (Liedtke et al., 2015; Ceschin and Gaziulusoy, 2016; Crabbé et al., 2013; Gaziulusoy and Erdoğan Öztekin, 2019). The human being's ability to extract, transform and consume material resources has defined it as a species. The fact of transforming materials into useful, meaningful, ergonomic and performative artefacts described her/him as a designer. The scale they have done this, both as humans and as designers, over the past 50 years is placing an unsustainable burden on the planet.

In the history of design, it is possible to find examples of approaches and moments in which the importance of materials has emerged firmly. One of all is the example of Primary Design, thanks to which, towards the end of the 70s in Italy, a new approach to materials was defined. The merit of the Primary Design was to try to re-establish the primacy of human function, making the artefacts and the environment reactive to the touch and manipulable, to reconnect the human being to the existing centre. Sensations become a privileged theme of the project and the study of the chromatic, acoustic, tactile perception allows the possibility of elaborating new material languages that become just as important as the compositional and structural syntax.

With the Primary Design, the specificity of material design is born for the first time, which intervenes where the material is acquiring its set of chromatic, acoustic, visual and surface properties, to give it a specific, culturally recognizable identity (Petrillo, 1985; Petrillo, 1989; Trini Castelli, 1985). It can, therefore, be said that in this case, the design of the materials was focused on their sensorial-expressive dimension. As scholars stated (Branzi, 1984; Manzini, 1988; Doveil, 1998; Rognoli, 2005), the design of materials opened up new possibilities for planning and determining an intervention not on the form, but on the material definition of the products. New technical knowledge is indispensable for this kind of design focused on materials, and it allows control for the constructive process of materials, often employed misusing their authentic expressive skills. The design of materials, therefore, were defined as the design research, which makes the theme of materials the very ground of the project process. Materials have their cultural autonomy which helps to create an expressive structure that requires a dedicated design activity to be determined.

The real revolution produced by the recognition of the autonomy of the design of materials in the culture of the project was the development of design research addressed at giving meaning to technology, technical culture, accustomed instead to considering materials only as a tool aimed at the functional realization of objects.

The need to design materials, independently and beyond the shape of the objects, means entering industrial processes, paying greater attention to the expressive and sensorial components. The acceptance of the independence of the design of materials has undoubtedly brought out the need for a professional designer specialized in this field, and it has laid the foundations for today being able to talk about the design of materials aimed at the circular economy. In fact, the area of material design is mature enough to be able to face one of the most critical challenges that human beings have met, to defend their world from themselves, also thanks to design and the material designer.

This chapter is focused on communicating the reflections arisen during the Made Project regarding the designer's role concerning the impending environmental problems and the development of more sustainable solutions, including circular materials. It is a contribution to the overall reflection about the way humans think about design in the context of urgent needs for sustainable solutions to face uncertainties, turbulence and rapid change of the contemporary world. The contribution is aimed at outlining the characteristic features of the materials designer implicated in the transition to sustainability as a new design discipline and in discovering solutions for the circular economy approach.

01 MATERIAL DESIGNERS IN CONTEXT

What are they agents for? What are their contributions and specific skills?

What has been understood today is that not only the designer can transform and create using the material of the invention (Manzini, 1986), but she/he can invent the material itself. Over the past ten years or so, a phenomenon has been observed in the field of design. The scholars have called it as DIY-Materials (Rognoli et al., 2015; Ayala-Garcia, 2017). Under this designation, the idea was to collect all the examples, still growing today, of self-produced materials by designers. Whereas previously the only professionality involved in the creation and manipulation of materials were scientists and engineers, now designers have also shown that they are enthusiastic in developing the skills to design materials. The reasons for this desire are to be found in the awareness that the material is a fundamental and indissoluble part of the design process and on the other hand the desire to design sustainable and circular material solutions by discovering and experimenting with alternative resources.

Having said that, the Made project focused precisely on providing professional material lover designers with the right context to boost their skills by addressing them towards the design of circular materials. The results of the European Made project highlighted how a specific profile of materials designer is emerging, as a professional capable of simultaneously

managing circular design, material manipulation (Parisi et al., 2017) and creative processes based on practical experimentation.

This specialist materials designer evaluates, designs or develops materials and inspires means to manufacture materials for use in products that must meet specialized design and performance specifications. These Material designers, foreseen as work of the future by some experts (Brownlee, 2016), have a specific approach and contribution for a more responsible role in the current planetary and human challenges. They refer to the circular economy approach as their goal; they use creativity as a tool for innovation and addressing materials and processes as means to achieve this goal.

This material designer showcases a hybrid profile of creativity with science-driven design. They are great ideators, connectors of unexpected combinations, being able to go out of their comfort zone. Their creative spark, purposeful design attitude and material-driven design approach make them a great asset in today's economic, societal and environmental challenging context, including addressing the European Green Deal and the relevant UN's Sustainable Development Goals.

Their work should not be developed on their own, but being connected and collaborating with other disciplines, such as material science (to back up any creative-driven decision), industrial engineering (to scale up their materials design solutions into industry), social sciences (to systematically explore the materials impact on social structures and to explore how to communicate to a wider public in order to raise environmental awareness), and environmental sciences (to evaluate the environmental impact of their creations).

A good material designer demonstrates these specific skills:

- → Sectoral Transversality. Understanding the transversality of materials and connecting solutions from different industries.
- → Scientific and creative perspectives. Adopting a multidisciplinary view of materials, both from creative and scientific approach.
- → Sustainability and circular economies. Understanding circular economies in the context of design and materials.
- → Hybrid of traditional and computerised skills. Mastering hybrid skills that bridge traditional craft techniques with technological innovation in the field of materials processing (3D printing; Computer-aided fabrication,..)
- → Locality. Understanding the potentiality of local materials knowledge and culture
- → Business models. Gaining new business models knowledge that enables materials designers to envision alternative mainstream industry solutions and new sources of revenues.
- → Different production sectors. Understanding the different productive sectors they can impact with their creations.
- → Hands-on experimentation. Adopting experimental methodologies and DIY techniques from other disciplines and bring them into the creative ones.
- → Visual communication. Creating a visual attractive project to ensure high communication impact of any experimental creative project.

02 MATERIAL DESIGN PROJECTS

What are the typologies of materials design projects? An early analysis of existing material design projects has been performed, clustering them into five categories: Grown materials, Wasted materials, Zero-Waste materials, Domesticated materials, Technocraft materials. Table 1 displays the materials category along the definition, the reasoning behind, exemplifying design projects, and potential project/industry application. This analysis allows for the identification of the material design development starting point and the possible future applications, provided that the industrial scalability of these early material designs is addressed.

The materials categories and processing typologies can be classified as follows:

- → **Materials category: GROWN Materials**

  Definition: Materials that are grown through the use of bacteria or fungi.

  Reasoning behind: Biological processes to generate materials.

  Design projects: MOGU. Materials grown from funghi. Mauricio Montalti from Oficina Corpuscoli. | Biocouture. Materials grown from bacterial cellulose. Suzanne Lee.

  Project/industry application: Small home objects, construction bricks, insulation panels.

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Materials category: WASTED Materials

Definition: Composite materials that are created out of harvested waste.

Reasoning behind: Reuse of existing waste, undeeming the use of resources. Landfills as resource locations.

Design projects: Well proven chair, made out of wooden chips. Marjan van Aubel and James Shaw. | Waste clothing made out of recycled PET bottles. Jorge Penadés. | Paperbricks. Tables made out of waste paper pulp. Studiio Woojai. | Air Ink. Made out of recovered air pollution. Graviky Labs.

Project/industry application: Chairs, tables, stools, footwear, clothing, home accessories, fashion accessories (glasses, watches, jewellery), construction panels, architectural elements (kitchen fixtures,...).

→

Materials category: ZERO WASTE Materials

Definition: Materials normally discarded before production of goods and of local and abundant nature. From organic or non organic origin, issued from local abundance or culture, including food waste, that are used in a new way or as new resources.

Reasoning behind: Use the whole of a material resource, without discarding anything. Enhancing local and social economies.

Design projects: The new age of trichology. Human hair used as fibers. Sanne Wisser. | Piñatex. Vegetable leather out of pineaple leaves. | Porcaria. Pig skin-made bioplastic. Materials Experience Lab. | Remolten. Made out of local lava materials. Good things 2 people.

Project/industry application: Bioplastic packaging, automotive parts (upholstery, interior elements), cords, tableware, stools, fashion accesories (glasses, watches, jewelry), footwear, architectural elements (kitchen fixtures,...).

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Materials category: DOMESTICATED Materials

Definition: Materials imitating natural processes and conditioning natural matter to grow in a proposed direction.

Reasoning behind: design in a symbiotic manner with nature.

Design projects: Interwoven. Domesticating grass roots to generate woven material. Diana Scherer. Bamboo shelf. Luz Gallegos.

Project/industry application: Textiles, furniture.

→

Materials category: TECHNOCRAFT Materials

Definition: Materials that are developed to function specifically for its use together with the new technologies.

Reasoning behind: Lightness, minimum material or favouring the recuperation and reuse of original material with minimum impact on the ecosystem.

Design projects: Ceramic Constellation Pavilion by Plasma Studio and HKU Faculty of architecture.

Project/industry application: Architectural elements (façades,..), fashion trimmings, decorative objects.

The materials processing typologies can be fit into two categories: (a) DIY processes that include chemical and physical experimental processing, taken from other experimental disciplines (chemistry, gastronomy,...) and (b) Processes combined from traditional industry and from technological digital processing (CNC, 3D, etc).

03 MATERIAL DESIGNERS, A NEW DISCIPLINES

How is this new design discipline created? In order to set the seed for this new creative profession, actions are then needed such as training the skills, establishing a quality standard, generating a community and giving it visibility. MaDe (Material Designers) is the project, co-funded by Creative Europe Programme of The European Union, that has targeted these activities, aiming at boosting talents towards circular economies across Europe.

Training had to be adopted from a transdisciplinary perspective and immersive experience approach. The intensive 5-day MaDe training had two expert multi-disciplinary supervisors and tackled the scientific bases of the different typologies of materials, trends in materials, materials hands-on DIY processes and manipulations, and storytelling. The materials' project had to also oversee the possible sector application in view of generating an impact on industrial innovation. A community of 120 designers across Europe were trained.

The MaDe Awards were coined to set a quality standard for materials design projects, in the three different areas where material designers can have an impact as a profession: industry, entrepreneurship and forecasting. Three MaDe winners were appointed out of 18 selected finalists, based on criteria such as originality, industrial scalability, entrepreneurial potential and socioeconomic impact, and disruptive vision that can have future impact on society and industry in terms of circular economy.

The training of skills, quality standard and talent acquisition is achieved through the MaDe Challenges, industrial collaborations between each winner and an appointed company or organisation, as a way to give access to material designers to the corporate context and to specific, practical challenges that industry may have.

Generating a community of like-minded designers is achieved through the MaDe platform, a repository of talented material designers and their materials projects, but also through social media platforms. This community can be accessed by other designers, but also by companies willing to incorporate this talent into their organisation.

Exposure and visibility of all these new Material Designers's profiles is as important as the training in order to achieve a certain recognised status within the design community. In a context where physical and digital merge, and in order to successfully reach different audiences, it is necessary to find innovative ways to reach the audience, rely strongly on network multipliers and generate attractive communicative portfolios. The MaDe Edits is a short film, available for larger audiences, that promotes and positions with a focus on materials as taking up the responsibility for pursuing more circular design solutions. The MaDe Galleries and MaDe Films are audiovisual packages from the MaDe finalists that can help them showcase and share their projects and their professional profile. Conceived for sectoral audiences, the MaDe Talks help share the personal and professional experience of these material designers on a first-person perspective, and the MaDe Book can collect the different academic and industrial views on what are the role of material designers in the context of circular economy.

As a conclusion, Material Designers are agents of change. They can design, redesign, reform, reuse and redefine materials giving them an entirely new purpose. Increasing the potential of materials they can go on to research, advise, educate and communicate what materials are and can be in the immediate, near and far future, implementing positive social, economic, political and environmental change across all sectors towards a responsibly designed future.

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