

Atti del V Convegno Internazionale

RECYCLING

Proceedings of the 5th International Conference



a cura di / edited by
Adolfo F. L. Baratta
Laura Calcagnini
Antonio Magarò



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Laura Calcagnini
Antonio Magarò

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**Il valore della materia nella
transizione ecologica del
settore delle costruzioni**

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Conference
**The value of building materials
in the ecological transition of the
construction sector**

Acta de el V Congreso Internacional
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del settore delle costruzioni**

*The value of building materials in the ecological
transition of the construction sector*

*El valor de la materia en la transición ecológica en el
sector de las construcciones*

Rossano Albatici – Università degli Studi di Trento
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**Architectural jam sessions. Harmonized
improvisations from recycled components in
Casamatta, Mulini di Gurone, Malnate, Italy**

Gian Luca Brunetti *_gianluca.brunetti@polimi.it*

Associate Professor

Politecnico di Milano

Department of Architecture and Urban Studies

Summary

This paper presents the experiences cumulated in three stages of design-build experimentations through the work of graduate theses on a building that is being redesigned and retrofitted since more than a decade by volunteer work, utilizing recycled materials and re-used components with criteria of environmental sustainability and ultra-low economic cost. The lessons learned have been valuable under several viewpoints.

The paper described, in particular, the works that have been built in the first two editions of the workshops, seeking the traces of an evolution within the experience, and attempting some considerations about the challenges and opportunities stemming from component reuse in participated building rehabilitation.

Reuse, Timber, Retrofit,
Energy efficiency, Low cost

Introduction

The strategy of component re-use is at the centre of much of today's architectural debate, both in the research and the professional domains, but it is likely that the experiences that are being cumulated on the topic have just begun to scratch the surface of what is conceivable and advisable. The core issues emerging from the here presented experiences are the following:

1. the responsibility for the performance of the reused components is on the designer, and this can discourage many designers to reuse components altogether, and translates into extra costs, due to the responsibility over performance that designers accept to take on themselves;
2. the opportunities for solutions strictly depend on the components to be reused, and this, in turn, often requires re-inventing the solutions each time that new components are available;
3. the components, most of the time, require extra processing on part of the builders, most commonly for ensuring their biological safety, but also for re-finishing them, and this in a professional context would further add to the costs.

A "healthy" response may descend from the market, and not only from incentives devised from policies, although the latter can surely help. This entails that a wide range of experimentations is likely necessary to define a working route. This paper presents some experimentations on reuse conducted in the framework of environmental associationism as a contribution to that goal.

"Casamatta" as the ideal epicenter for coordinating improvisation

"Casamatta" is the name given to a building property that has been bought in the area called Mulini di Gurone, Malnate (Varese, Italy) by the branch of Varese of the Italian Association "Legambiente" ("League for the Environment"), about fifteen years ago, and slowly but steadily retrofitted and transformed with the support of the volunteers of Legambiente itself, plus some occasional humanitarian funding (Caripto programs). The major driving forces beyond the experience are Arch. Alberto Minazzi - from the beginning, the heart and soul of the initiative -, joined, after some years, by Arch. Marco Zanini, and a strong and motivated group of fellow volunteers. The property in question is part of a courtyard building located among a small group of houses in a highly naturalized site that has undergone gigantic mutations in the last years, after the use of the area for hosting wa-



ter mills has been superseded by the advancements in energy technologies. At the core of those changes there is the fact that the area has been modified into a flood plain for the Olona river nearby, in the context of regional-scale territorial land works, entailing the creation of a circular earth berm around the village core, to protect it from floods. This modification made the place even quieter than it was, up to the limit of slight surreality, in a manner that made it the perfect location for an information and hostel center aimed at sensitizing visitors towards the theme of environmental sustainability – which is indeed the aim of the building re-use in question. The rehabilitation works that have been executed in Casamatta since the beginning have utilized, in large measure, recycled materials donated by local producers and craftsmen, and in the last years have been supported by the startup "Re-sign", Varese, founded by Arch. Marco Zanini and Arch. Francesca Zanotto, operating in the intermediation of recycled materials and components. To these circumstances, it has to be added that around 2019 the local circle of Legambiente Varese, in the persons of Alberto Minazzi and Marco Zanini, took contact with the author suggesting the activa-



Figure 1. Plan of the area protected by the circular earth berm. The arrow at the centre signals the location of "Casamatta" [Source: Google Earth].



tion of design-build workshops focussing on rehabilitating the place. This endeavour produced three "waves" of design-build experimentations (one batch each year, one week long each) during the last three years, supervised by the author (expertise: Building and Environmental Technology), co-supervised by Prof. Gennaro Postiglione (Interior Design) and Prof. Giovanni Di Luzio (Structural Design), and supported by Arch. Marco Zanini as expert tutor. These experimentations shared the materials and components to be reused, as well as, obviously, the scenery constituted by the building to be retrofitted, but had also to guarantee coherence despite the fact that they could not share anything less than the authors – because, of course, the groups of students worked at separate theses, and changed each year.

Key elements for ensuring coherence in this context were the existence of (a) the commonality of reused construction materials and components and (b) the constancy of the dialoguing "client" (the Association). Both elements played a role that is comparable to that of the leading harmony in a Jazz session between musicians, which allows coherence between solos without coercion.

Two of the mentioned three years of activity have already bore design-build fruits, while the fruits of third one are still in the making. In the following sections, the activities of the first two "waves" of works will be presented.

Common technical criteria

The basis of the techniques used in these workshops has been constituted by wooden carpentry, interpreted to reduce the necessity of precision and increase the "forgiveness" of errors [Brunetti, 2022]. This strategy bore a series of consequences on the technical choices, like privileging lap joints over butt joints, and orthogonal joints over miter joints; light-frame timbers over timber-frame ones; trussed components over massive ones; and screwing over nailing and bolting; and bear, in turn, substantial consequences on the design process itself.

The "forgiveness" of the employed techniques allowed, indeed, the students to endeavour to taking decisions more and more by drawing directly on the components (rather than on paper or screen) the more they took confidence in the strategy, and this, in turn, encouraged them to decompose the design analysis in consequent steps, freeing them from the constraint



of approaching the whole design task upfront, as a monolithic whole.

Projects of the first year of design-build activities

The activities performed in the first edition of design-build workshops stemmed from the circumstance of the availability of used window frames, donated by the kindness of a local dealer (CSB Serramenti, Gerenzano, Varese): sturdy, high-quality, large-size frames, with clear double glass panels – a real blessing for the endeavour.

One of the projects for which those window frames were used was that of a tiny attached greenhouse set on a balcony, conceived to make it suited to host growing pots for flowers and plants, and give to the future inhabitants a place for thinking and reading. The draft project of it took a new turn once the author, Marta Robecchi [2021], could examine the available window frames, because their sturdiness enabled them to perform the structural role that originally had been attributed to separate, dedicated frame members, and allowed to conceive the greenhouse mainly as a cooperation of load-bearing panels.

The other project of the first workshop edition was designed and built by Federico Cortes, Tommaso Gatti, and Federica Melis, and featured a double



Figure 2. The greenhouse during construction [photo: Marta Robecchi, 2021].



façade, obtained with two layers of windows set between studs, to form a cavity that was afterward partially filled with various loose insulation materials collected locally from donors (wine corks), or by volunteers of the association (crumpled newspapers), or donated by producers in the vicinity (loose plastic pebbles of various kinds, by Rialti SpA, Taino, Varese; and wood wool insulation from Fammilume S.r.l., Sesto Calende, Varese, for the opaque parts). The cavities were only partially filled with those materials,



Figure 3. The double wall under construction [photo: Marco Zanini, 2021].



to allow a see-through experience. This project received the second prize in the edition 2022 of the "Premio Neolaureati" of the Order of Architects of the Province of Milan.

Projects of the second year of design-build activities

The activities in the second year started with a looser range of choices concerning the construction materials and components. The deposit of Casa-matta that year was filled with very much the same kinds of materials and



Figure 4. Views of the seats, partition cladding, and translucent door "shoulder" as built [photos: Jacopo Leccia, Benedetta Neri, Francesca Viscomi, 2022].





Figure 5. Above: the opaque part of the wall after completion. Below: views of the opaque wall cladding and of the sill on top of the wall "breach" [photos: Luca Panzeri and Noemi Riva, 2022].



components of the year before (wooden planks recycled from pavements, wooden laminated panels reused from a dismantled theatre, mixed timber components of various sizes, foam rubber recycled from mattresses, polycarbonate transparent and translucent double-wall panels...), but there were no new donations from producers. This allowed the choice of solutions to be even freer and undetermined, and highlighted the fact that the components that were being re-used had a value that was similar to that of scraps of paper for a collage-maker, or of sampled sounds for a digital musician. Another key difference with the first edition is that the students inevitably felt the responsibility of taking the baton from the ones that came before them, which therefore setting a tone for the following "tunes".

One of the three projects of the second edition of the workshop – the authors of which were Jacopo Leccia, Benedetta Neri, and Francesca Viscomi [2022] – stemmed from considerations about the nature of such a basic concept as the wall, very much thanks to these questions raised by Prof. Postiglione: what would happen if the interior cladding of the walls departed from the walls themselves, taking independence? This question gave shape to the general project of conversion to a hostel, as well as to the design-built part of it. The wall as built worked like cladding for an existing partition, and was completed by a fixed, elongated, level-changing seat at its foot, and sideways, transformed itself into a multi-layer translucent multi-layer wall that re-shaped the entrance to the main room.

All the studs, battens, and claddings used in this execution were obtained from wooden boards recycled from an old pavement and processed with precision and patience in various manners, including mechanical and manual sawing, hand-milling, and paper-sanding.

The authors of another work – Luca Panzeri and Noemi Riva [2022] – confronted the topic of wall retrofit technically, to update its performances to contemporary requirements concerning their energy and moisture behaviour, almost by the only means of the described reused pavement boards re-worked in various manners.

The insulation task was accomplished by utilizing loose crushed straw fibers obtained from straw bales, moderately re-compressed in the spaces between the studs (which were, in turn, obtained by screwing the boards in boxed configurations), and closed towards the room by boards laid out on horizontal ones. Utilizing the straw in that manner was aimed to increase



the thermal resistance of it as used in straw bales. In this context, the authors took the decision of leaving the large breaches on top of the wall open (to be completed by others, in subsequent interventions) to allow for a view uphill (very poetic) of the village of Bizzozzero, at the outskirts of Varese. The author of the third work – Enrico Farinella [2022] – addressed the technical issue of retrofitting some singly-glazed windows through experimental low-cost interventions suited to self-building. Enrico experimented and compared, at the performance level, two strategies, in particular: (a) increasing the number of layers of the transparent enclosures by adding wooden holders to them, clamping additional transparent films, at due distance from the existing glass panels; and (b) duplicating the windows, by exploiting the opportunity stemming from the substantial thickness of the existing masonry walls, so as to create an intermediate space in them, working as a sort of intercluded micro-greenhouse, suited to host pots for plants, or to just mediate the perception of the external environment.



Figure 6. Drawing of the multiple film solution, and view of a double window [Enrico Farinella, 2022].



Conclusions

The here presented design-build works have all been characterized by a willingness to embrace ingenuity as a re-inventive resource of components and materials. Re-invention has not here always been primarily pursued with the primary aim of making the re-invented solutions more performant than the already known ones, but with the aim of freshness - the freshness that comes from discovery, even when it is re-discovery - which may be seen, ultimately, as the positive side of ingenuity; something that happens when somebody seeks for the magic of things by re-finding their meaning - a sort of animistic stance that blends the sacral and the technical in the making of Architecture, reconducting Architecture itself into its most primordial meaning.

It is now foreseeable that the projects of the third edition will be influenced even more than those of the second one by the previous works, closing some challenges opened by the groups that came before, and opening up new ones for the fellows that may come after. Step after step, in this manner, a tradition is built, and maybe - who knows - even some heritage reaching into the future.

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Il V Convegno Internazionale Recycling, dedicato a "Il valore della materia nella transizione ecologica del settore delle costruzioni" si è tenuto a Roma il 26 maggio 2023, confermandosi come uno dei principali luoghi di confronto tra accademici e *stakeholders*. Il Comitato Scientifico, composto da docenti ed esperti provenienti da 24 Atenei internazionali, distribuiti su 4 Paesi e 3 continenti, ha selezionato i migliori contributi tra quelli pervenuti secondo la procedura *double blind peer review*. Come di consuetudine, i contributi sono stati suddivisi nelle tre sezioni del Convegno Internazionale: "Saggi", "Ricerche" e "Architettura". La raccolta degli atti ha come obiettivo la definizione dello stato dell'arte del riciclaggio nel settore delle costruzioni, oltre a fotografare la direzione verso la quale il mondo della ricerca scientifica si sta orientando. La moltitudine di punti di vista che caratterizza il presente volume è, probabilmente, il suo maggiore valore, restituendo un profilo innovativo e creativo sul tema.

The 5th International Conference Recycling, dedicated to "The value of building materials in the ecological transition of the construction sector" was held in Rome on May 26, 2023 confirming its status as one of the main venues for dialogue between academics and stakeholders. The Scientific Committee, consisting of professors and experts from 24 international universities, spread over 4 countries and 3 continents, selected the best papers among the ones received according to the double blind peer review. As usually, the papers were divided into the three sections of the International Conference: 'Essays', 'Research' and 'Architecture'. The aim of the proceedings is to define the state of the art of recycling in the construction sector, as well as to take a framework of the direction in which the world of scientific research is heading. The multitude of viewpoints that characterises this volume is probably its greatest value, providing an innovative and creative profile on the subject.

Adolfo F. L. Baratta, Architect and Ph.D. Since 2014, he is Associate Professor in Architectural Technology at the Roma Tre University.

Laura Calcagnini, Architect and Ph.D. Since 2019, she is Assistant Professor in Architectural Technology at Roma Tre University.

Antonio Magarò, Architect and Ph.D. Since 2021 he is Research Fellow in Architectural Technology at Roma Tre University.

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