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Architecture is a discipline in which either the technical or the artistic dimension may prevail, yet one element remains essential: the tangibility and physical presence of its outcomes. The material that gives substance and meaning to a design vision is an integral part of the project itself and, in some cases, may even become its generative principle. This is precisely the challenge addressed in this book created to highlight the richness of the reflections, contents, and projects that emerged from the convergence of production, research, and education. The theoretical essays are complemented by the presentation of nine design proposals resulting from discussions between researchers and students of the School of Architecture Urban Planning Construction Engineering at the Politecnico di Milano and the company AGGLOTECH.

ISBN 979-12-5644-183-9 € 25
www.letteraventidue.com

Edited by
P. Salvadeo, A. Tartaglia

Materials and Architectural Design

Edited by
Pierluigi Salvadeo
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Materials and Architectural Design

LetteraVentidue

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22
Alleli / Events Series

The volume has been subjected to peer review.

ISBN 979-12-5644-183-9

First Edition March 2026

The texts reproduced here were originally written in Italian. Their translations (including quotations) were edited by the authors and editors of the book, with the additional support of artificial intelligence tools for review and quality control.

Graphic design: Raffaello Buccheri, Roberta Raciti

LetteraVentidue Edizioni Srl
Via Luigi Spagna 50 P
96100 Siracusa, Italy

www.letteraventidue.com

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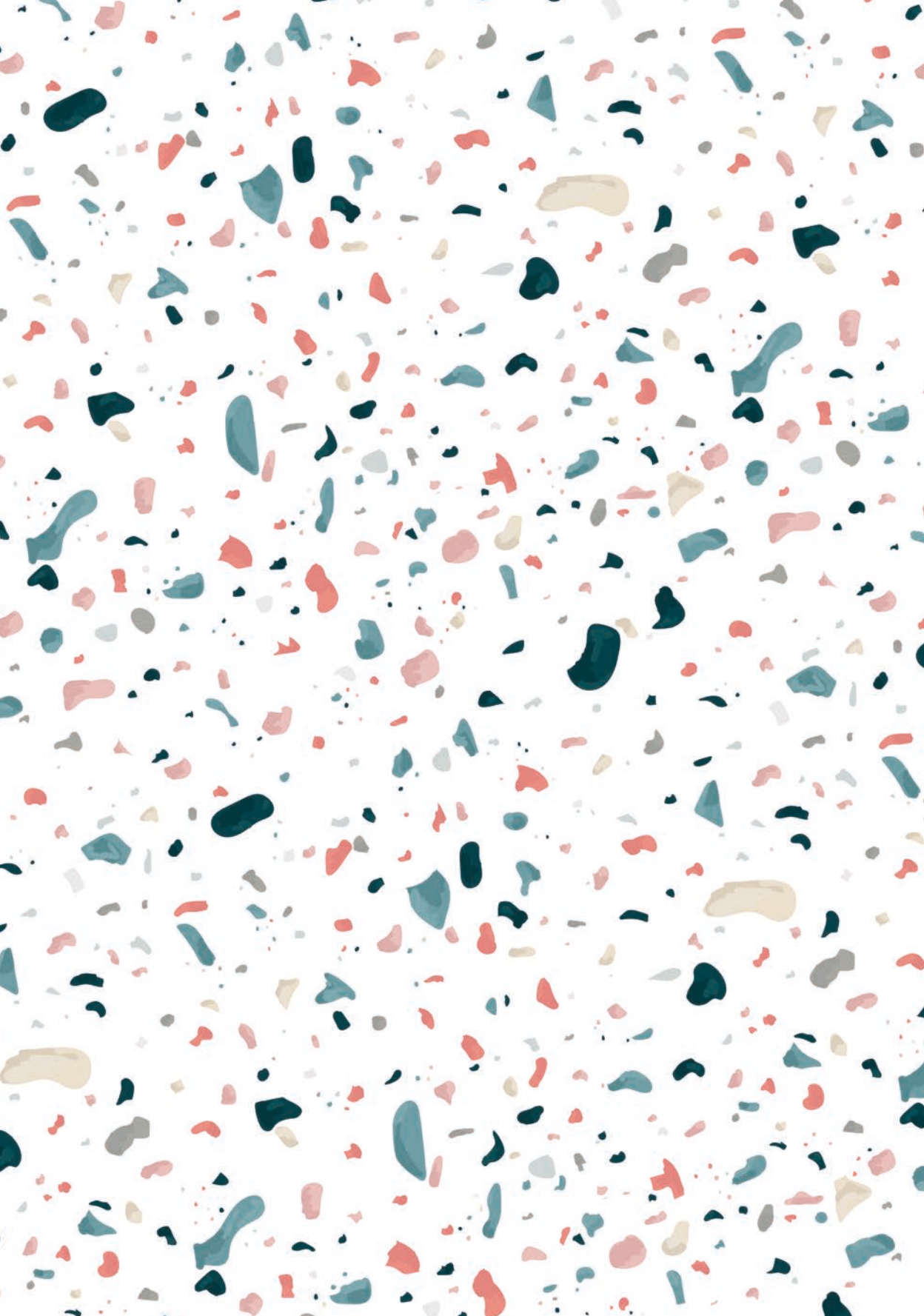
Foreword

Pierluigi Salvadeo,
Andrea Tartaglia

Architecture is a discipline in which either the technical or the artistic dimension may prevail, yet one element remains essential: the tangibility and physical presence of its outcomes. The material that gives substance and meaning to a design vision is an integral part of the project itself and, in some cases, may even become its generative principle. This is precisely the challenge addressed in this book.

The starting point is a modern and innovative material which, as clearly explained in Alessandro Ubertazzi's essay, originates from a millennia-old tradition dating back to Roman times, anticipating contemporary themes such as circular economy and reuse. Over the centuries, this material has undergone continuous aesthetic and technical evolution. Today, research continues to expand into new areas and to follow increasingly complex trajectories, as expertly described in Santi Centineo's contribution. These are the paths explored by the nine projects presented here, which also pursued the objective of offering the young participants an experience of cultural and professional growth. This goal is grounded in the well-founded conviction, reiterated in Fabrizio Schiaffonati's essay, that only direct engagement with the concreteness of reality and with issues of feasibility can generate true learning. Indeed, the relationship between production, research, and education today calls for new models and synergies capable of fostering what Andrea Campioli defines as a "collaborative ecosystem," one that brings together theoretical knowledge, technical expertise, production capacity, and social needs. Through its texts and images, this book documents a significant moment of dialogue and exchange between the worlds of production (AGGLOTECH) and research and education (the AUIC School at Politecnico di Milano). This encounter also gained broad visibility through participation in Milan Design Week 2024. The book was therefore conceived to preserve the legacy and richness of the reflections, contents, and projects that emerged from this convergence of production, research, and education. These projects were also realized as full-scale prototypes, demonstrating how the exploration of the "true nature of materials" remains an inexhaustible source of opportunity and innovation.

Milan, July 2025



Part 1

Essays

Production, research, and education: designing for circularity

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Urban Planning Construction
Engineering

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In recent years, the construction sector has been undergoing rapid and far-reaching transformation. The continuous evolution of technologies, the growing attention to environmental issues, the increasing digitalization of processes, and the emergence of new production paradigms are driving a gradual yet profound rethinking of the relationships between research, production, and design within the processes that shape the built environment. This shift has fostered the emergence of what may be described as a *collaborative ecosystem*, in which theoretical knowledge, technical expertise, production capacity, and social needs converge.

Collaboration between academia and industrial production has thus become a powerful driver of development and innovation. Universities generate knowledge and advance technological research, while companies possess the capacity to translate such innovations into concrete solutions with tangible impacts on both the market and society. This dialogue enables the tackling of complex challenges, such as waste reduction, the adoption of sustainable materials, and the implementation of low-impact construction techniques, by integrating multidisciplinary research expertise with the practical needs and resources of the manufacturing sector. Such synergies allow for the sharing of research and development costs and risks, make innovation more accessible, particularly for small and medium-sized enterprises, and encourage the adoption of circular and competitive business models capable of generating both economic and social value.

Within this renewed context, project-based education is likewise called upon to make a decisive effort to open up new fields of inquiry and to define training frameworks capable of offering students unprecedented opportunities to experiment with methods and tools that facilitate the transition from academic design experience to professional practice, in all its contemporary complexity.

▸ *Production and research: an evolutionary relationship*

For a long time, the relationship between research and production was interpreted through the so-called linear model of innovation: basic research generates knowledge, applied research translates it into technologies, and industry subsequently implements these technologies within production processes. This model presupposed a unidirectional and hierarchical flow of information, with limited interaction among the actors involved. In recent years, however, this paradigm has progressively lost relevance, largely due to the complexity inherent in the ongoing transitions, most notably the ecological transition.

Against this backdrop, the experimentation of interactive and network-based models, such as open innovation or systemic innovation, has become increasingly significant. Within these frameworks, universities, companies, public institutions, and civil society form an ecosystem in which knowledge circulates bidirectionally. Industry does not merely apply the outcomes of academic research, but actively contributes to shaping research agendas by providing concrete problems, empirical data, operational feedback, and opportunities for experimentation under real-world conditions.

In the construction sector, this evolution has taken on particular importance. Construction and infrastructure projects involve a wide range of competencies (engineering, architectural, economic, and environmental) and require the collaboration of multiple stakeholders, including designers, companies, material producers, regulatory bodies, and local communities. Innovation in this field thus extends beyond construction technologies alone, encompassing organizational processes, business models, and methods of project management and maintenance.

This context underscores the urgent need for design approaches grounded in continuous dialogue between academia and industry, between research and production—approaches capable of overcoming disciplinary and institutional barriers and remaining open to discussion and revision. Such openness is essential when design is called upon to support and experiment with strategies aimed at managing the multiple transitions that characterize contemporary society.

▸ *Production and education in the age of transitions*

Design education, too, is increasingly confronted with a scenario in which the imperatives shaping the transformation of the built environment are becoming decisive: reducing human impact on the planet, adapting to contexts profoundly affected by climate change, and responding to accelerating processes of digitalization.

While these imperatives have long featured on political agendas at all levels, the current need for effective action has revealed a widespread demand for skills that have historically been underestimated or overlooked. Ecological and digital transitions require updated cultural

frameworks, new technical competencies, and the ability to continuously revise and expand one's knowledge base. Yet, only sporadically do university teaching experiences attempt to provide concrete responses to these emerging requirements.

With regard to the ecological transition, there is a need to move beyond the ambiguity and vagueness that have often characterized discussions of environmental sustainability. Training must instead equip students to address sustainability from a holistic perspective, one that integrates environmental, social, and economic dimensions, through the use of innovative tools, techniques, and performance metrics capable of evaluating the real effectiveness of proposed solutions.

In terms of digitalization, it is essential to acknowledge the specific nature of the built environment. Architecture constitutes a particularly complex artifact: multifaceted, culturally stratified, and characterized by a strong physical presence, it is designed to create habitats that respond not only to functional requirements but also to social and experiential needs. The digital hybridization of the built environment and its transformation processes cannot therefore be reduced to mere virtualization or dematerialization. Rather, it must be oriented toward the redesign and enhancement of reality, endowing it with qualities better aligned with the needs of all stakeholders. Addressing the challenge of digitalization thus requires going beyond the simple acquisition of software and data-management skills, and instead fostering a broader cultural transformation.

The urgency of updating design education is further reinforced by changes in the professional landscape. Today, medium and large-scale design and management organizations capable of offering clients integrated expertise commensurate with the growing complexity and scale of projects are proving particularly competitive. These organizations demand skill sets that differ significantly from those fostered by traditional teaching models, calling for substantial innovation not only in the disciplinary structure of curricula but also, and above all, in course content and pedagogical approaches.

Within this framework, synergy between production and education becomes crucial. The integration of teaching and industrial practice is essential for preparing future architects capable of operating responsibly and innovatively. Given the experimental and interdisciplinary nature of architectural design, close engagement with social, technological, and economic realities is indispensable, and only sustained collaboration with industry can ensure the acquisition of up-to-date skills. Cooperative initiatives between universities and companies help bridge the gap between theory and practice, enabling students to gain direct experience of production and management processes and to develop the critical and practical competencies required to navigate ongoing transitions.

The educational experience presented in this book is part of this broader trajectory, focusing specifically on the design of products informed by the principles of the circular economy.

▸ ***Designing for resource circularity: educational perspectives***

Within the context of the ecological transition, the implementation of circular processes aimed at reducing the use of virgin raw materials in favor of reuse—and recycling—based resources represents a particularly significant challenge. This challenge directly concerns both manufacturing industries and academic research, and points toward a specific direction in terms of the skills required to address contemporary design tasks effectively.

Designing for circularity constitutes an approach in which design questions are intrinsically linked to technical and technological innovation. Adopting a circular perspective entails rethinking products in accordance with principles of reduction, reuse, and recycling; developing new business models that extend product lifecycles through innovative resource management; and governing technological change by fostering cooperative relationships among diverse stakeholders.

From an educational standpoint, this approach demands a multifaceted commitment. First, it requires the development of a full awareness of the interdependence among the three pillars of sustainability (economic, social, and environmental) within circular design processes. Second, it calls for the acquisition of knowledge across diverse disciplinary and cultural domains, supported by a strong capacity to explore new research trajectories. Finally, it necessitates openness to experimentation, understood as a space of active confrontation between theory and practice, academia and industry.

The literature on education for the circular economy highlights the intrinsic difficulty of teaching a field characterized by systemic complexity and the involvement of multiple stakeholders. For this reason, purely theoretical instruction is insufficient to develop the competencies required for effective circular design; a consideration that applies even more strongly when circularity principles are expected to inform concrete project activities.

University education thus plays a central role in facilitating the transition from a linear to a circular economic model, to the extent that education for the circular economy is increasingly emerging as an autonomous field of study. Recent contributions have sought to define its distinguishing features, with particular attention to two interconnected aspects: the competencies to be developed and the pedagogical methods through which they can be cultivated.

With regard to competencies, three key areas merit particular emphasis. First, the development of systemic thinking capable of addressing the interdependencies among sustainability dimensions and

grasping the complexity of circular systems and their environmental and social interactions. Second, the ability to understand and articulate the relationship between circular design strategies and the business models required to implement them, identifying both barriers and opportunities for real-world application. Third, the capacity to navigate the complex network of interdependencies among the various actors involved (companies, technical and scientific experts, financial stakeholders, and marketing professionals) in order to build effective collaborative frameworks.

In terms of pedagogical methods, the systemic nature of circular processes and the multiplicity of actors involved make active and experimental learning approaches particularly effective. These methods enable theoretical knowledge to be applied to real-world problems, with case studies and the direct involvement of stakeholders playing a crucial role.

In light of these considerations, the value of the experience presented in this book lies not only in the quality of the outcomes achieved, but also in the experimentation with an innovative teaching model based on cooperation among multiple stakeholders and aimed at developing complex design competencies fully aligned with the demands of the current era of transition.

The education of new professionals equipped with advanced knowledge and ecological awareness is essential to promoting design and construction practices consistent with sustainability objectives. Close collaboration between production and academic research, combined with direct engagement between students and the manufacturing sector, represents a fundamental tool for guiding architectural design and the construction industry toward integrated, innovative, and circular models, capable of responding effectively to the environmental and social challenges of our time.

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Teaching for Doing

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The teaching and learning of architecture cannot be reduced to the application of didactic models derived from a single, well-defined pedagogical tradition, as is often the case in disciplines that rely on long-established and codified methods. This difficulty is shared by all fields that combine technical knowledge with inventive and creative skills. Architecture, however, differs significantly from artistic production: while it necessarily incorporates a creative dimension, it cannot operate with the same degree of freedom. Its very nature is shaped by constraints of necessity, functionality, and economy, which distinguish it from the purely artistic act without negating its imaginative component.

More than a century ago, Paul Valéry, in *Eupalinos* (1921), clearly grasped this dual register inherent in architectural design. He identified a fundamental dialectic at the core of the discipline, from which emerges the architect's ability to seek a balance between structural and superstructural aspects, between functional requirements and iconic expression. This balance applies not only to architectural artifacts themselves, but also to the objects that enable their use. The furnishing and equipping of both interior and exterior spaces are therefore essential to the usability of the environments in which people live.

These are two different scales of design that, rather than remaining separate, must be integrated and recomposed. In this sense, the reform of architectural curricula in the 1960s, when Furniture courses were renamed Interior Architecture, notably through the influence of Carlo De Carli, marked a decisive shift. This change emphasized that interior design was no longer ancillary to Architectural Composition, but an integral dimension of the project. De Carli's concept of "Primary Space" (1982), understood as the generative and structuring origin of every construction, introduced an anthropological and archetypal perspective that architecture must take into account. It is therefore

unsurprising that his teaching emphasized interdisciplinarity, particularly through engagement with the humanities, sociology, psychology, and the philosophy of Dino Formaggio.

When we design, we imagine a spatial configuration inhabited by people and objects, without which space itself would not be fully measurable, much like a stage without its wings. This implies an approach that is simultaneously topological and proxemic, aimed at investigating the complex system of relationships established between human beings and artifacts.

Translating this sensory and psychological dimension into design is far from simple or linear. It requires the careful establishment of hierarchies and balances among components and objects. This challenge recalls the syntactic problem common to all forms of production, literary, musical, artistic, to which architectural design adds the material rigor imposed by construction techniques and feasibility. Yet, within Schools of Architecture, the discipline of Architectural Composition, long considered central, often appears today to refer back to an *ancien régime* notion of façade-based design characterized by abstract stylistic features. Such a scenographic approach is far removed from the three-dimensional and topological nature of architecture, particularly after the conceptual contribution of modern architecture, which marked a decisive break from historical styles and revivals. This rupture was rooted in the scientific revolution of the twentieth century, which placed architecture within an entirely new conceptual and representational framework.

Although this approach was later regarded as outdated, it resurfaced with Postmodernism at the end of the century, accompanied by a provocative critique of Functionalism and Rationalism, including their emphasis on ergonomic prescriptions and anthropometric dimensions. This brief phase arguably caused greater damage than anticipated, legitimizing a superficial and fragmentary architectural language that lacked integration among its components and assumed the possibility of separating form from function. It was an expression of an epistemic crisis that led some to seek refuge in historical stylistic features, a romantic escape from the risks of mannerism.

The well-known dictum "from the spoon to the city," associated with Gropius and later Rogers, affirms the unity of design methodology across scales and reflects an awareness of the production and social processes introduced by the industrial revolution. Today, however, specialization has produced multiple separations between the domains of design and production. Increasingly sophisticated technologies and components are far removed from the traditional construction processes that once relied on a wide range of artisanal contributions. As a result, the places and moments of "project production" have been rearticulated, accompanied by the emergence of new professional

roles with highly specialized competencies. This unprecedented acceleration has made it necessary to rationalize building processes and adopt organizational methodologies drawn from business management within increasingly interconnected socio-economic contexts.

Teaching architecture therefore requires an understanding of the complexity of the entire process, enabling future professionals to act consciously within architecture understood as a social fact, defined by use value, not merely exchange value. Without this teleological perspective, architectural practice risks being reduced to the passive execution of decisions imposed from elsewhere, depriving the architect of critical and propositional agency. Such a scenario raises profound ethical and political questions. Yet design has always entailed risk and challenge: it is fundamentally an act of foresight, capable of transforming reality through vocation and aptitude.

For this reason, it is essential to recognize the unity of the design process and to situate each action within a value chain that connects different project scales. The work of the great masters exemplifies this capacity. Their practice ranged seamlessly from objects of use to buildings, maintaining expressive coherence throughout. Giò Ponti stands as a particularly emblematic figure, demonstrating the continuity between interior space and the scale of the skyscraper. For many twentieth-century architects, such integration was natural, sustained by direct engagement with construction sites, manufacturing plants, and craft workshops. These experiences consolidated an understanding of production logic, material performance, and component behaviour. Constraints and possibilities alike were absorbed into the project, shaping spatial configurations in every detail.

Today's production and organizational context has undoubtedly changed. Nevertheless, conscious design cannot detach itself from experiential knowledge of the entire process. Theoretical instruction must therefore be combined with hands-on engagement in executive design, construction systems, and materials. Architecture must be understood as a technological system, not merely a formal one, overcoming idealistic approaches that neglect the technical and functional structures underpinning the discipline. This is the domain of Architectural Technology, which analyses the building process in its phases, actors, regulatory frameworks, and multiple scales.

Teaching should therefore rely on laboratories, regular visits to construction sites and industries, and the contribution of instructors with specialized expertise. Internships are likewise essential to place students in direct contact with professional environments. By contrast, contemporary academic structures often distance teaching from professional practice, unlike the situation in the recent past. The issue of incompatibility between teaching and professional activity, embedded in current regulations, has not been adequately addressed,

resulting in a growing disconnect between education and the realities of the labour market and construction processes.

Despite this, a minority of educators continue to work experimentally to reconnect theory and practice, fostering relationships with industry, professional bodies, and regulatory institutions through seminars, workshops, and collaborative initiatives. From this perspective, the experience documented in this text is exemplary. Professors Pierluigi Salvadeo and Andrea Tartaglia, representing two different Scientific Disciplinary Sectors, Interior Architecture and Architectural Technology, together with other scholars and researchers, involved a large group of students in developing projects for the furnishing and use of public space. This initiative took place in Milan during a major international event and addressed a highly topical issue: the poor quality of urban furniture, which contrasts sharply with the excellence of Milanese design culture and the neglect of public space despite increasing civic demand.

Teachers and students developed an articulated proposal, presented to the public through installations designed to test both functional and aesthetic performance. This uncommon design effort focused on the prototyping of elements made from an eco-compatible composite construction material, in direct collaboration with the sponsoring company, which provided technical and performance-related expertise.

Direct knowledge of production and manufacturing processes proved decisive in enabling a design approach that integrated conceptual intent with feasibility across ergonomic, functional, and aesthetic dimensions. Achieving this integration is not easy within today's university structures, often constrained by limited staff, resources, and facilities. Yet such experiential learning is fundamental to reconnecting theory and practice and to engaging students actively. It provides future architects with a methodological framework capable of addressing contemporary complexity and reclaiming a social role for architecture through widespread design quality, countering the aesthetic impoverishment of today's spaces.

This concern is particularly acute in Milan, given the city's strong professional tradition and its rich architectural and design heritage. Le Corbusier famously urged students to abandon lecture halls in favour of construction sites, provocatively, yet with deep insight. His call reminds us not to neglect experience, material culture, and direct observation, which must be integrated with theory in a Galilean spirit of experimentation. There is therefore a pressing need to return to these cultural foundations, which in many contexts appear to have been lost, replaced by an aestheticizing approach destined to leave only ephemeral traces, like the fleeting cycles of fashion.

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I set up, so I am

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«Lapidem quem reprobaverunt ædificantes,
hic factus est in caput anguli»

(Psalm 117, v. 22, quoted in Matthew 21:33-34)

December 1989. The world premiere of the ballet *Palermo Palermo*, a milestone in contemporary choreography, by Pina Bausch, is staged at the Teatro Biondo in Palermo. Famous for making barefoot dancers dance on the bare earth in Strawinsky's *Sacre du printemps* (this is 1975), Pina Bausch, inventor of the *Tanztheater*, sought a sense of gravity that, by continually shifting the dancers' centre of gravity downward, created a conflict between ether and tectonics of matter. This time, in Palermo, a city of a thousand barriers, the show opens with the grand sweep of a wall, which invades the entire stage designed by Peter Pabst. Almost immediately after the show begins, the wall collapses, an evocation of the then-recent imagery created by Pink Floyd's *The wall* (1979 album; 1982 movie), but especially of the concomitant historical events in Berlin just a month before. The bricks on stage are real and the deafening roar that their collapse produces literally shakes the theatre. Even today, traces of those vibrations and the props put up to reinforce them remain in the understage. But that is another story, a story already gone, which Wim Wenders does not fail to evoke in his 2011 docu-film *Pina*. Nonetheless, the episode gives us the cue to introduce a topic that seems to be gaining interest today, arousing, perhaps it is appropriate to say, a real phenomenology. It is necessary to systematize some data and let them be preceded by the necessary premises, since all phenomena of extremely material consistency subtend broad theoretical implications, although, animated at times by a certain poietic frenzy, they tend in truth to elude them.

▸ *From natural to cultural*

Let us start with two quotes. The first is from *Das Problem des Stiles*: the sense inherent in the form of a thing, says Georg Simmel «is given by style and not by that uniqueness thanks to which interiority is able

to find expression in an object from time to time specific according to what is unique in it[1]» (Georg Simmel 2020, 110). The second is taken from The Matter of Invention, where Ezio Manzini writes: «The identity of a material was thus constructed on the basis of knowledge understood as predictability of behaviour, enriched by the repetition of certain conditions of use. Memory thus sedimented on the material itself certain cultural values, which also ended up becoming elements of conventional communication: qualities such as 'precious,' 'warm,' and 'domestic'[2]» (Ezio Manzini 1986, 32). In the first case, by "style" Simmel means the set of formal characteristics of the object relatable to the nature of the material with which it is made, observing properly in note that the same concept (e.g., "dog"), will be made with different formal apparatuses, precisely depending on the different material used. There are many reasons for this, first of all technological, i.e., related to the physical characteristics of the material (strength, hardness, ductility, malleability, etc.), as they determine thicknesses, angles, possibilities of surface treatment, but also towards processing, as in the case of anisotropic materials. And so, next appear the technical motivations, that is, related to the workability of the material. The repercussion of these motivations is considerable, as they determine the conditions of use and thus, summarizing the discourse extremely, the natural imprint of the material, through its own characteristics, techniques of making and conditions of use, determines as an effect the constitution of a cultural value related to the material-object-use whole. Here, then, is the reason why in design disciplines the opposite of natural is not artificial. The *artificium* (or *artefactum*, i.e., artfully made) are only an intermediate stage of a path at the extreme edge of which lies instead the concept of cultural.

▸ ***From transcendent to immanent***

The dualism that animates (and bedevils) the history of mankind's thought also presents two edges of a discourse continually suspended between spirit and matter, between substance and form, between the metaphysical and the physical (and so on and so forth), which lends itself enormously to our discourse. In nature there is no material. There is matter. In philosophy there is something broader and more complex, but also absolute, which is substance. While not perfectly coincidental, matter, which is continually under our senses, lends itself to let us understand that in order to be experienceable, it must acquire a form. Dimensional discourse then (but also scalar discourse), while outside the scope of philosophical interests of a theoretical nature, in design genesis, on the other hand, takes on a centrality fundamental to our demonstration. Romanticism helps us in this task, as it is responsible for a great simplification, assimilating the scale of nature (which we are able to experience anyway) to the world of Platonic Ideas, to

the Infinite (ex multis, Leopardi, or Friedrich). From the mountain, to the rock, to the boulder, then to the stone, the qualities of the stone substance seem to incarnate, gradually submitting to the response of our senses. It is the same substance, but now the gradual shift in scale, more and more relatable to the human one, allows its characteristics to be identified, indeed, «at this scale the qualitative aspects connected with the material (technological, physical, but also aesthetic) and above all its behaviour allow a momentary overlapping of its ontological nature with its phenomenal one. [...] It is a vision, the one described so far, that has much to share with an existential dimension, which leads back, according to Heidegger's romantic vision ([1949], 2012), to a search for the meaning of things in a branch of content above man[3]» (Santi Centineo 2021: 38). This positioning of contents "above man" and their consequent attribution of meanings are also located at the head of a line that sees at the opposite flap the transmigration of the qualities of the material into the *artefactum*, as soon, that is, as soon as one moves from the large scale, the infinite scale of Substance, to the small scale, that of the object, that is, that of form. Thus at the two edges of the discourse stand the Romantic existentialist conception, on the one hand, and materialism, on the other, while the crucial junction is the intermediate one, according to Gillo Dorfles' definition of artifice and nature (1968): an existential sphere, in which the search for meaning and the branching out of meanings are found in a set of concrete conditions. From transcendent, then, substance becomes immanent by means of the project, we might dare to say by means of the creative act, thus retracing the events of how the Creator moulded from mud the Progenitor, in fact standing up as the first designer of all time and moreover inextricably linking that practice to man. Or, relying on Immanuel Kant's *Critique of the Power of Judgment*, we can think of resolving that dualism precisely through the aesthetic leap.

▸ ***Functional beauty and aesthetic function***

The Kantian "*pulchritudo adherens*" recalls a patchwork of issues, beginning with that Demiurge (Creator or Designer) who guides the process of coalescence between form and substance, defined by Plato in the *Timaeus* and repeated whenever matter infuses its own properties into a formal design. That there are assignees of a privileged role of transduction from the world of Ideas to the material world is all in all easier to accept than it seems. We all accord artists a divine or stellar role: Maria Callas was divine, Raphael was divine, great dancers are étoiles, Hollywood actors are stars, and again, Mozart embodied the ideal of the "divine child"... in short: to the work of art its aura, to the artist his halo. In the case of design (Kant specifically mentions architecture), the functional aspect seems to muddy the waters of understanding. That is, in design fields, the functional aspects are

inextricably linked to the aesthetic composite and, according to real pair dynamics, sometimes one prevails over the other (e.g., in certain technocratic or functionalist obsessions, sometimes the latter seems to predominate (e.g., in certain aestheticizing formalisms), and sometimes finally, a proper balance between the parts is found. In the case of some specific design fields, however, a further dilemma opens up. Particularly in the area of staging and stagecraft, functional aspects seem to be progressively disappearing. To be precise, they are lessened only in part, in the sense that, for example, by its vocation the staging does not necessarily have to fulfil all those functions provided by the domestic interior. But certainly, not for this reason, staging and scenography are to be considered less useful or important, as has been done and tends to be done even in recent times, those same times when, contradictorily, the disciplines of temporary architecture seem to be receiving unusual impetus, expanding to many areas of human life. Outfitting, no longer only in theatres, or museums, now expands, even to that sphere which we said above to be far removed, as far as its primary functions are concerned, namely the very domestic interior. In the face of this staging hypertrophy, one certainly cannot continue to regard ephemeral (or reversible, or temporary, or small-scale) architecture as a minor or irrelevant discipline. Indeed, in the face of its seemingly lesser functional burden, it must be made clear that the functional task of staging is, on the contrary and to say the least, a cumbersome overload of responsibility, dealing not with problems, albeit important ones (such as stormwater disposal), but with a dilemma that is difficult to manage in contemporary times: beauty. For this reason, too, theoretical reflection is indispensable, because «to study means not to be satisfied with our logical-rational image of the world[4]» (Chiara Valerio 2023, 26). Thus, aesthetic aspects constitute for the most part the functional program of staging, subject of course to the primary needs related to what and how to display, or, in the case of set design, those related to the needs of staging. However, beyond these more practical aspects, otherwise said disciplines move in a narrative sphere that privileges multidimensional codes. We live in a society strongly based on visuality and for this reason, except for linear codes, those written, which do not compete here (not making use of images), the staging disciplines in fact move for two-dimensional codes (such as images or decoration), for three-dimensional codes (plastic and architectural disciplines), four-dimensional (dramaturgical and choreographic codes) and even pentadimensional (interactive or augmented). So, it is clear that aesthetics plays a central role in the attribution of value to ephemeral architecture, helping to define it not only as a narrative discipline, but also a storytelling one. In short, as a discipline that underlies a memory and also a language. It is clear that language and memory are the two constituent and converging parts

in storytelling. But not only that: both said parts move by images, which therefore take on two respective values. First, that of an aesthetic function, that is, that of constituting the syntagma of a figurative code, aimed at the expression of thought; second, that of a functional beauty, that is, the seat of archetypes, cultural values, evocations, interpretations. If codes are found in the former, all the mechanisms of narrative find their home in the latter.

▸ ***Mimesis as reality***

Referring back to Kant, therefore, the modalities of aesthetic judgment are called into play, *adherens*, or otherwise, whether or not the *pulchritudo* they are found to adjudicate in a positioning of meaning. It is no coincidence that for Kant, architecture, thus a three-dimensional code, is the one that best lends itself to the exemplification of *pulchritudo adherens*. The disciplines of staging, therefore, by their aesthetic leap enable the bridging of that distance between the immeasurable and the commensurable, between the sublime and the material, between Substance and Form; in short, they authorize that shift in scale, toward the human dimension and its perceptibility. From a spiritual point of view, the underlying effort of understanding presages the aesthetic leap that projects the subject into the higher spheres, while, from an intellectual point of view, the exercise of awareness, is finalized in the direction of self-improvement (Bertram 2008). This introduces the problem of imitation, obviously not Platonically understood, that is, as idol and therefore falsification. In Philosophy of Images, Jean-Jacques Wunenburger defines the specific content of the image as an emanation of an original, of which, depending on various thoughts, it is supplication, continuity, reduction, semblance, simulacrum, reflection, imitation, even, according to Hans-Georg Gadamer (Gadamer 1983), augmentation of being. In truth, although mistreated by numerous philosophers, Plato in the lead, or by numerous iconoclasts, mimesis is not *diminutio* or misrecognition of the model, but, on the contrary, recognition, whereby imitation is also knowledge of the essence of things. Coupled with these eidetic considerations, that passage of scale also applies to the disciplines of staging, whereby the intangible features of substance are not lost, but concentrated; thus, in a sense they are thickened and amplified.

▸ ***The stone rejected by the builders***

This discourse now has to be related to our specific case, which involves stone materials, especially those innovative materials obtained through virtuous recycling practices, the buzzword of these last decades. To be frank, stone materials have always offered excellent ideas for their own reuse, just think of all the practices of expoliation of ancient monuments to build houses, a practice that today

is decisively rejected and blamed. For their part, contemporary times with their frenzy of recycling, and of the "re" pushed for everything (reuse, re-generation, etc.), although operations at the moment not always sustainable to the end, have the merit of having undertaken the writing of pages of a new ethics of consumption and a new ecology of production. From a cultural point of view, the lengthening life cycles of materials, their capacity for regeneration, and the predictions of recycling actually create an unwieldy oxymoron with regard to durability: that is, if, as early as the design stage, a second life is planned for objects, it is clear that we are not instilling in them any expectation of durability; on the contrary, they somehow embody the continuous impermanence, the continuous reversibility in which we live, verging on one of the most important realizations since the postwar period: the loss of immortality. And indeed, the halting of the expoliation of the stones of the Colosseum, establishes a most important principle, attributing to the artifact an archaeological value that is millennia old, if we go back in time, and eternal, if we look to its future. Thus one of the cardinal values of stone materials is recognized and reestablished in it: durability. Therefore, we can now explicitly refer to the phenomenology mentioned in the epigraph, namely, that arising from the use of stone materials for outfitting, a design procedure that has recently become increasingly popular and current. It is evident that all parts of the discourse conducted so far here converge in this phenomenology, and going back to enucleate them, this time in the light of their applicability to the case at hand, may be helpful in drawing conclusions. There are numerous avenues of research concerned with stone production waste. They range from PRIN projects (Research Projects of National Interest) to areas of the PNRR (National Recovery and Resilience Plan). For all of them, the challenge basically lies in trying to aggregate the different grain sizes (ranging from pieces of several centimetres up to sawing sludge), through the use of natural or otherwise easily recyclable materials, without having to resort to particularly energy-intensive processes. The wide harvest of materials that are appearing to hypothesize design and use is making it possible to extend the use of stone materials to areas that until now were thought unthinkable that they could take advantage of their technological properties and aesthetic values: objects of use and furnishings, street furniture, new decorative patterns, all played out in the terms of mass production, thus reducing waste to a minimum. New textures, which almost seem to soften the stone to the touch, giving it moreover a comfortable "temperature of use" and a harbinger of renewed visuality.

▸ ***Conclusion: the cornerstone***

This visuality is an element of great centrality, with respect to the theme offered. Indeed, from the values traditionally attributed to the stone substance descend two types of visuals: on the one hand, the technological value, based substantially on hardness, infuses the form with a value as a tool or as a constructive element; on the other hand, the cultural value, based substantially on durability, infuses the idea of immutability, eternity, or immovability, which has given rise to the infusion of self in megalithic architecture, Pharaonic tombs, Etruscan domomorphic tombs, Renaissance ashlars, and even Mannerist mock ashlars. It is clear that the two values, technological and cultural are intertwined in a relationship of bi-univocal correspondence; indeed, they originate precisely from one another. This property also holds true in the case we are now witnessing, namely the extension of the bases of these values: not rigidity, not hardness, not indeformability, but extreme ductility and malleability, almost plastic; not durability, not a sense of eternity, but rather total flexibility in the applicability of the various staging declinations of stone. In the opening we had mentioned Pina Bausch and her *Tanztheater*. The power of stage representation allowed the German artist to subvert the physical and symbolic order of choreography, establishing a new geography, but also geology, of the human body. Once again concrete and symbolic values converge in a redefinition of the cultural values underlying them. That *search for meaning* of things in a branch of content above man, mentioned above, now seems to have to be sought elsewhere, perhaps right below man. In finding, then, a process analogous to the case of our applicability of the reasons for setting up to the renewed stone substance, we cannot, once again, but extol the power of this discipline, capable of transforming everything it touches into reality.

Notes

1. «È dato dallo stile e non da quell'unicità grazie alla quale l'interiorità riesce a trovare espressione in un oggetto di volta in volta specifico secondo quello che in essa c'è di unico».
2. «L'identità di un materiale si costruiva quindi sulla base della conoscenza intesa come prevedibilità dei comportamenti, arricchita dal ripetersi di determinate condizioni di impiego. La memoria sedimentava così sul materiale stesso certi valori culturali, che finivano per diventare anch'essi elementi della comunicazione convenzionale: qualità come "prezioso", "caldo", e "domestico».
3. «A questa scala gli aspetti qualitativi connessi al materiale (tecnologici, fisici, ma anche estetici) e soprattutto il suo comportamento consentono una momentanea sovrapposizione della sua natura ontologica con quella fenomenica. […] È una visione, quella sin qui descritta, che ha molto da condividere con una dimensione esistenziale, che riconduce, secondo la visione romantica di Heidegger ([1949], 2012), a una ricerca di senso delle cose in una diramazione di contenuti al di sopra dell'uomo».
4. «Studiare significa non accontentarsi della nostra immagine logico-razionale del mondo».

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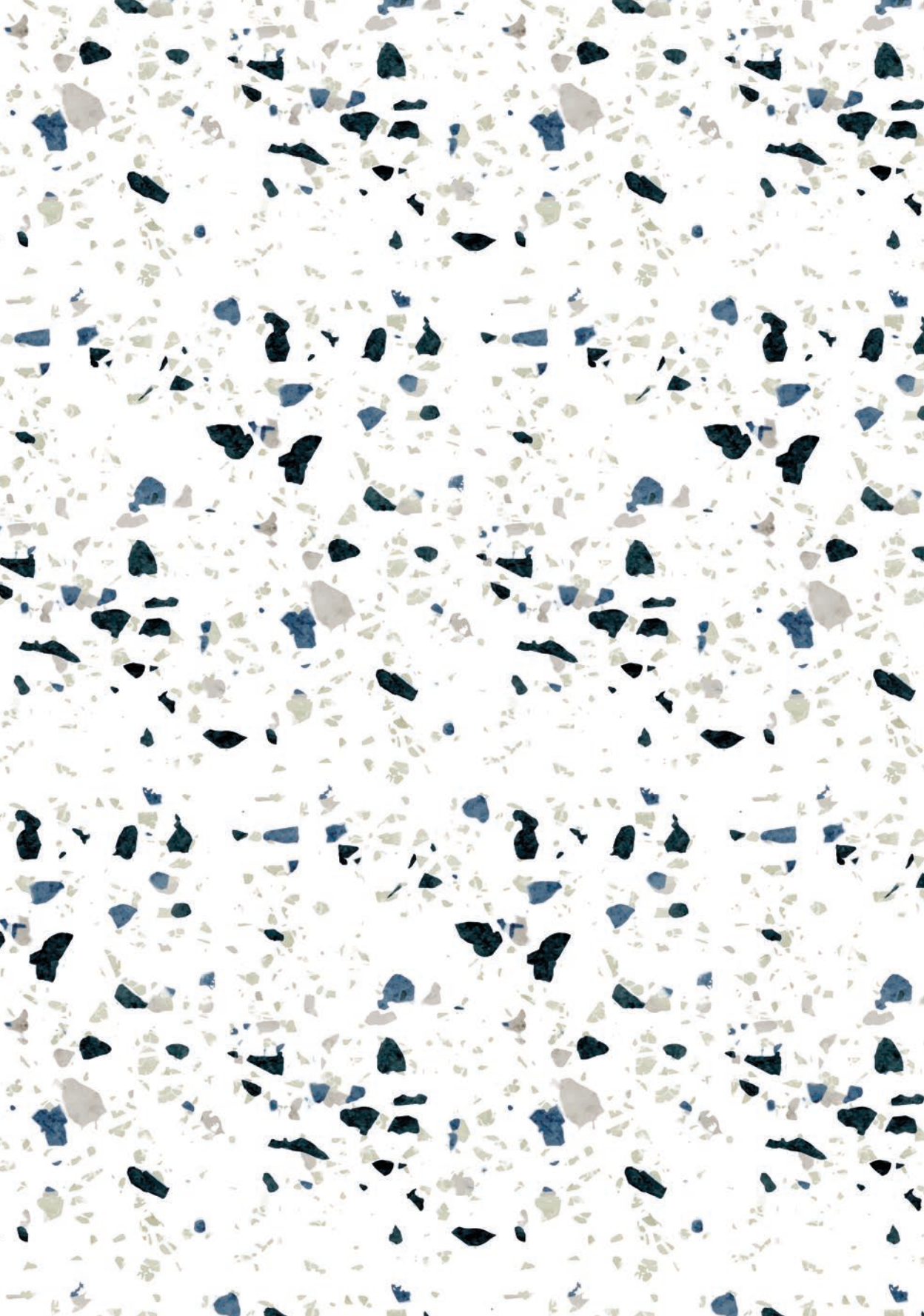

Part 2

Theory and design in nine experiences

Lapis Porfiris
Forms of Recycle

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«Reuse entails the coexistence of different temporalities, in which historical distance and narrative and emotional simultaneity are continually intertwined. The ancient Roman marbles belong to the same cultural horizon as those who reuse them, therefore appropriating them is felt to be natural[1]»

(Settis 2022, 64)

Red porphyry, formerly known as *lapis porphyrites*, is an ornamental stone characterized by an intense red matrix dotted with white or light pink crystals. This stone was quarried in the *Mons Porphyrites* quarries, located in the eastern desert of Egypt. The quarries, also known as *Mons Claudianus*, were a major source of this valuable material and were intensively exploited during Ptolemaic and Roman times. The difficulty of extraction and the hardness of porphyry made it extremely valuable, becoming a symbol of power and prestige (Allaby 2008). In Egypt, red porphyry was used mainly for sacred and decorative purposes: it was used in the making of statues, sarcophagi, and temple facings (Klemm 2001). Pharaohs and the Egyptian elite particularly valued this stone for its hardness and unique coloration, which evoked blood and, therefore, eternal life and rebirth. The ancient Romans discovered porphyry during their campaigns in Egypt and were immediately fascinated: they began importing it in large quantities to adorn buildings in the capital and the provinces. Red porphyry thus became a symbol of imperial power and Roman magnificence, used for columns, floors, wall coverings, imperial sarcophagi, and statues. One of the most famous examples of such use is *Pompey's Column* in Alexandria, made entirely of red porphyry. During the imperial period, porphyry was reserved almost exclusively for public buildings and the private spaces of emperors (De Nuccio 2002). Its hardness made it extremely difficult to work, and its presence in a building was a clear sign of wealth and power. With the fall of the Western Roman Empire, the import of porphyry and other precious materials from distant provinces stopped. However, the value of porphyry did not diminish; on the contrary, ancient buildings were systematically stripped of their decorative porphyry elements. Porphyry statues, columns, capitals and slabs were salvaged and reused in new buildings. This process of

stripping and reuse made it possible to preserve many works made of porphyry that would otherwise have been lost. Even in the Byzantine period, the use of porphyry continued with great intensity, especially in Constantinople, since 330 AD the new capital of the Eastern Roman Empire. Here, red porphyry was especially prized and used in many churches and imperial palaces. The *opus sectile* technique became very popular, combining porphyry with other precious stones to create geometrically elaborate floors and wall decorations. The use of porphyry in this period represented a symbol of continuity with the great Roman tradition and a sign of imperial legitimacy and power. The *Hagia Sophia* in Constantinople (537 AD) is one of the most illustrious examples of this use, with its porphyry floors and decorations. During the Middle Ages, especially in Italy, the reuse of porphyry from Roman and Byzantine buildings became a common practice. The Cosmati masters, active between the 12th and 13th centuries in central Italy, represent one of the most fascinating schools of floor and wall decoration of the Middle Ages (Matthiae 1952). Their work is distinguished by their masterful use of the *opus sectile* technique, which not only preserved the beauty and value of the material, but also gave historical and cultural continuity to new buildings (Cigola 1993). Byzantine-influenced Venetian pavements took up the techniques of *opus sectile* and adapted them to the local context (Guiglia Guidobaldi 1984): St. Mark's Basilica, with its mosaic and *opus sectile* floors, is an extraordinary example of how these techniques were integrated and developed in Venice. Indeed, the Venetians used porphyry and other precious stones to create rich, luminous floors that reflected light and added a dynamic dimension to the interiors of buildings (Dressen 2011). In the Renaissance, interest in classical antiquity and the recovery of ancient decorative techniques led to a renewed use of porphyry: artists and architects such as Michelangelo and Bramante used porphyry in their designs to create works that evoked the grandeur of ancient Rome. Today, porphyry continues to be used both in the restoration of historic buildings and in new construction because of its hardness, durability, and aesthetic beauty. Its presence in a contemporary building represents a direct link to history and tradition, while offering sustainable solutions through its reuse and long life. The decorative theme references compositional and figurative meaning, similarly to the abacus of ornament solutions in Owen Jones's *The Grammar of the Ornament* (1856), a seminal text in 19th-century decorative art that explores how ornamental motifs can be used to create an infinite variety of aesthetic combinations, offering respite to the wide range of compositional possibilities from simple geometric shapes and dimensional variations.

In Italy, cosmatesque floors decorate some of the most important churches in Rome, such as the *Basilica of San Clemente*, the *Basilica of Santa Maria in Trastevere*, and the *Basilica of San Giovanni in Laterano*

(Severino 2012). These pavements not only embellish the interiors of churches, but are also historical testimonies that tell the story of medieval art and architecture. Red porphyry, in this sense, represents a common thread through centuries of art and architectural history.

▸ *Paving techniques and styles*

Opus sectile is a paving and wall decoration technique used with particular prominence during the Roman Empire and later in the Byzantine period. This technique consisted of using stone fragments of various shapes and sizes to create geometric and figurative patterns. Porphyry, due to its hardness and vivid colors, was particularly popular for this type of work. The stone fragments were precisely cut and shaped to fit one another perfectly, creating a smooth, continuous surface. Common geometric patterns included squares, rectangles, triangles, hexagons and octagons, often combined in complex designs. The contrast between red porphyry and other stones, such as white or green marble, gave depth and visual richness to the floors. During the Byzantine period, the use of *opus sectile* spread widely: in Constantinople, in particular, this technique reached new levels of refinement. Geometric porphyry compositions were often edged with marble bands, creating a striking visual effect. Byzantine craftsmen also used *opus sectile* to decorate walls and liturgical furnishings, combining porphyry with other precious materials such as onyx and alabaster. Their pavements were distinguished by their complexity and the use of reclaimed materials, which contributed to a rich and varied aesthetic result. The Cosmati masters, on the other hand, developed a two-dimensional ornamental system, which consisted of the juxtaposition of stone fragments of different shapes and sizes to create complex geometric and figurative motifs, juxtaposing decorated square or rectangular panels with free-standing elements. Porphyry discs were frequently surrounded by intricate mosaics, which enhanced the beauty and rarity of the material (Venturi 2018). The space between the design and the lattice structure was filled with fields made of *opus sectile*. For square and rectangular panels, larger and simpler fragments were used, while more complex and minute pieces were used for other areas. The combinations of squares, triangles, hexagons, and octagons were derived from both Western and Eastern decorative repertoires, demonstrating Byzantine influence. This technique required not only great craftsmanship, but also a thorough knowledge of the properties and characteristics of the various materials used.

What is most interesting today is that advanced contemporary technologies allow porphyry to be cut and processed with unprecedented precision, enabling new applications and innovations in design and architecture. The result in the use of these materials is a harmonious balance between history and modernity, tradition and innovation,

making porphyry pavements a distinctive element in many contemporary architectures. The techniques and styles of paving that use porphyry, from ancient *opus sectile* to modern reinterpretations, represent a continuous link to the past. These methods have the potential to celebrate the beauty and durability of porphyry while reflecting a tradition of excellent craftsmanship and ongoing innovation: «The simultaneous presence of multiple temporalities opens up a narrative space that includes the *biography* of each object, the *context* of its reuse, the *intentions* of those who decided it, and its *reception*. The materiality of the objects, with the traces they bear of their history, weld together these aspects more and better than the eloquence of a text or the impact of a museum display[2]» (Settis 2022, 70-71). The combination of ancient traditions and modern technologies continues to make porphyry a valuable and versatile material that can enrich any architectural space with its history and material qualities.

▸ ***Reuse and sustainability***

The ability to reuse materials is an ancient practice that has preserved and enhanced valuable resources through the centuries. During the fall of the Roman Empire, when the supply of new valuable materials became difficult, reusing architectural elements of existing buildings became a common practice. This process, known as *spoliation*, involved the recovery of architectural and decorative elements from ancient structures for reuse in new construction. Statues, columns, capitals, and stone slabs, particularly those made of porphyry, were dismantled and incorporated into new buildings, taking with them the historical memory and symbolic value of their original use. In the Byzantine world, the reuse of materials became a fine art. Constantinople, with its wealth of buildings and monuments, was a center of this practice. Precious stones, such as porphyry, were frequently reused in churches and imperial palaces, giving these new structures a continuity with the Roman past. The *Hagia Sophia* is an emblematic example: built using salvaged materials, it integrates porphyry columns and slabs from older buildings, creating an ensemble of extraordinary beauty and historical significance. Also of great interest in relation to this practice are the events at *Canterbury Cathedral* and *Westminster Abbey* in England, where Richard de Ware, abbot of Westminster, commissioned a Cosmatesque floor using materials imported from Rome. This floor, known as the *Cosmati Pavement*, was completed in 1268 and is one of the most important examples of this technique outside Italy. The reuse of materials, in addition to preserving history, is in this sense a sustainable practice that minimizes the environmental impact of construction: reducing the need to extract new materials decreases the ecological footprint, saving significant natural resources and reducing carbon emissions associated with the production

and transportation of new materials. Cutting-edge manufacturing technologies have further increased the potential for reuse in a contemporary context. Modern cutting and processing techniques make it possible to recover and adapt ancient fragments with unparalleled precision, harmoniously integrating them into new architectural designs. These technologies make it possible not only to preserve the original aesthetics of materials, but also to adapt them to new uses and functions, promoting sustainability without sacrificing quality or compositional innovation. Several contemporary architects have embraced the reuse of historic materials as an integral part of their design approach. In their work, the reuse of porphyry and other stones creates a dialogue between past and present, adding depth and meaning to contemporary works. This approach not only celebrates the beauty and value of historic materials, but also promotes sustainable building practices. This cultural and figurative legacy, in the contemporary, can be conceptually juxtaposed in works such as that of the *Tate Britain* floor design by architecture firm Caruso St John with products from the Agglotech Company, and the artistic compositions of HB (Hughie O'Donoghue) paintings. O'Donoghue is known for his paintings that combine layers of color and texture to create works that evoke memory and history, an approach parallel to that of Swiss architects, who use layers of materials and geometric shapes to create a visual and tactile narrative. The idea of reuse is not only applied to materials, but also to design concepts and methods. In fact, the contemporary use of porphyry is inspired by the tradition of cosmatesque floors, reinterpreting it in an innovative way. This process creates a continuity between past and present, demonstrating how historical practices can be adapted and transformed to meet contemporary needs: «Aggregando segmenti di temporalità diverse e mettendoli in tensione tra loro, l'atto del riuso crea una rete intertestuale, che contiene le sue componenti ma non coincide con nessuna di esse. Non parla al passato, ma al futuro (By aggregating segments of different temporalities and putting them in tension with each other, the act of reuse creates an intertextual network, which contains its components but does not coincide with any of them. It speaks not to the past, but to the future)» (Settis 2022, 64). Reuse and sustainability are intertwined themes that reflect a growing awareness of the need to preserve historical heritage and minimize the environmental impact of construction. Porphyry, with its history and symbolism of power and nobility, represents an ideal material for this purpose. Through reuse, porphyry fragments not only continue to tell the story of the historical time they have passed through, but also contribute to a more sustainable future, where the beauty of the past enriches and inspires contemporary achievements. At a time when sustainability has become a priority, porphyry emerges as a material that combines tradition and innovation, offering durable

and environmentally friendly solutions. Red porphyry is, therefore, not only a material of extraordinary beauty and durability, but also represents a living link between past and present, an emblematic example of how art and architecture can contribute to a future that is more conscious and respectful of our planet's resources.

Notes

1. «Il riuso implica la coesistenza di diverse temporalità, in cui distanza storica e simultaneità narrativa ed emozionale si intrecciano continuamente. Gli antichi marmi romani appartengono allo stesso orizzonte culturale di chi li riutilizza, quindi appropriarsene è sentito come naturale».
2. «La presenza simultanea di più temporalità apre uno spazio narrativo che comprende la biografia di ogni oggetto, il contesto del suo riutilizzo, le intenzioni di chi lo ha progettato e la sua ricezione. La materialità degli oggetti, con le tracce della loro storia, salda questi aspetti più e meglio dell'eloquenza di un testo o dell'impatto di un'esposizione museale».

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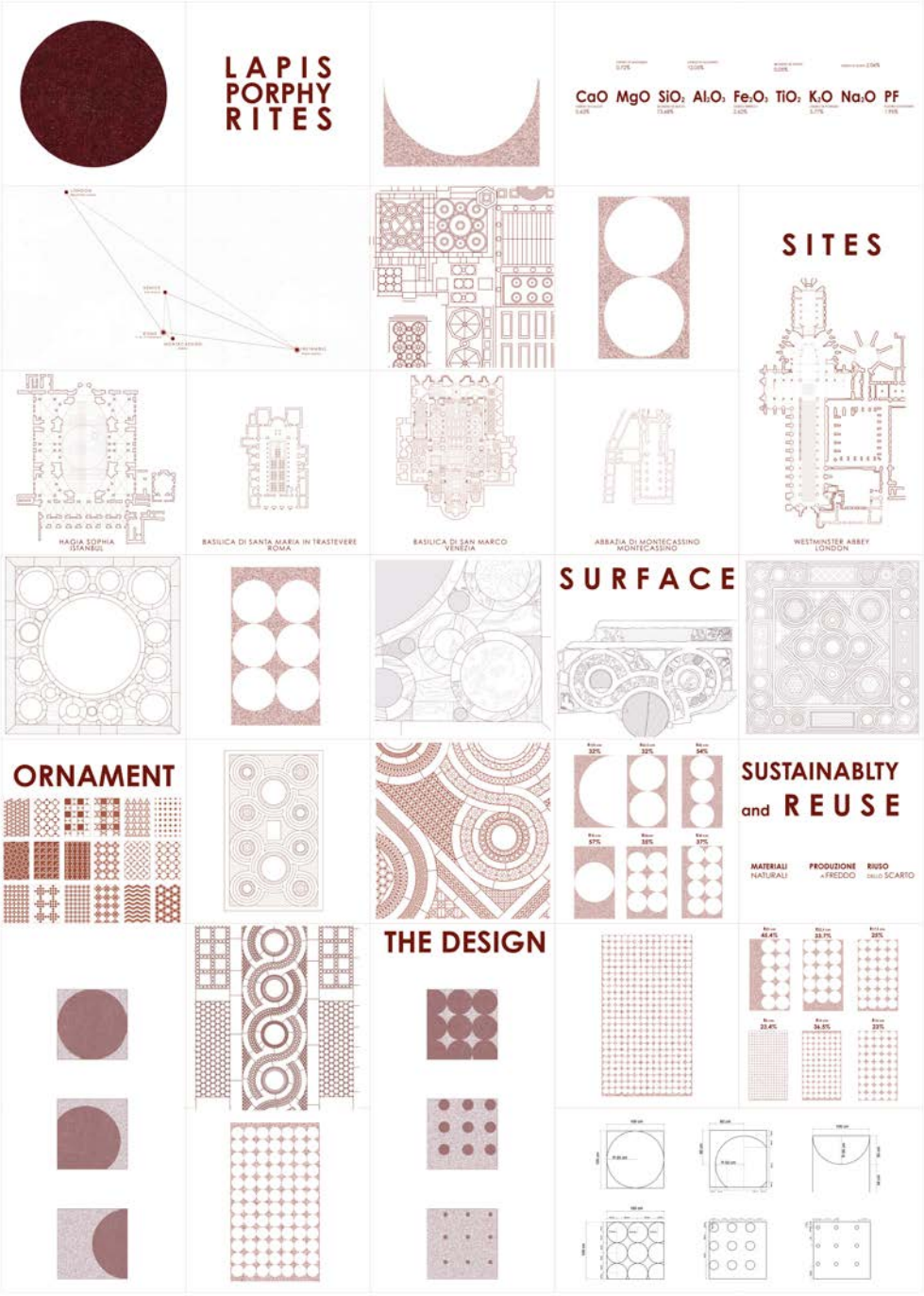
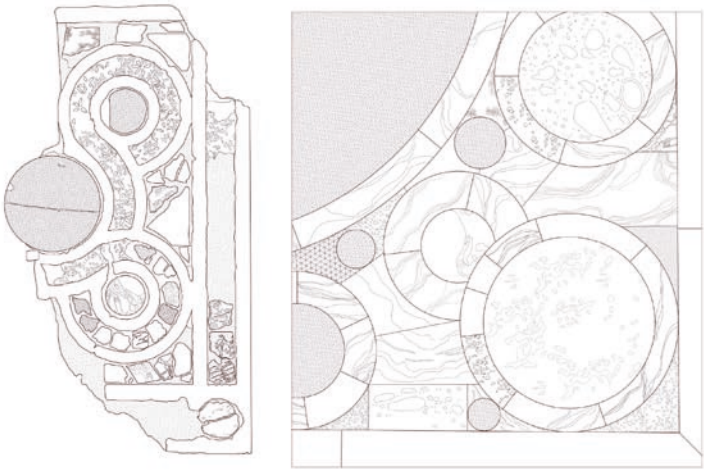
01 Forms of recycle

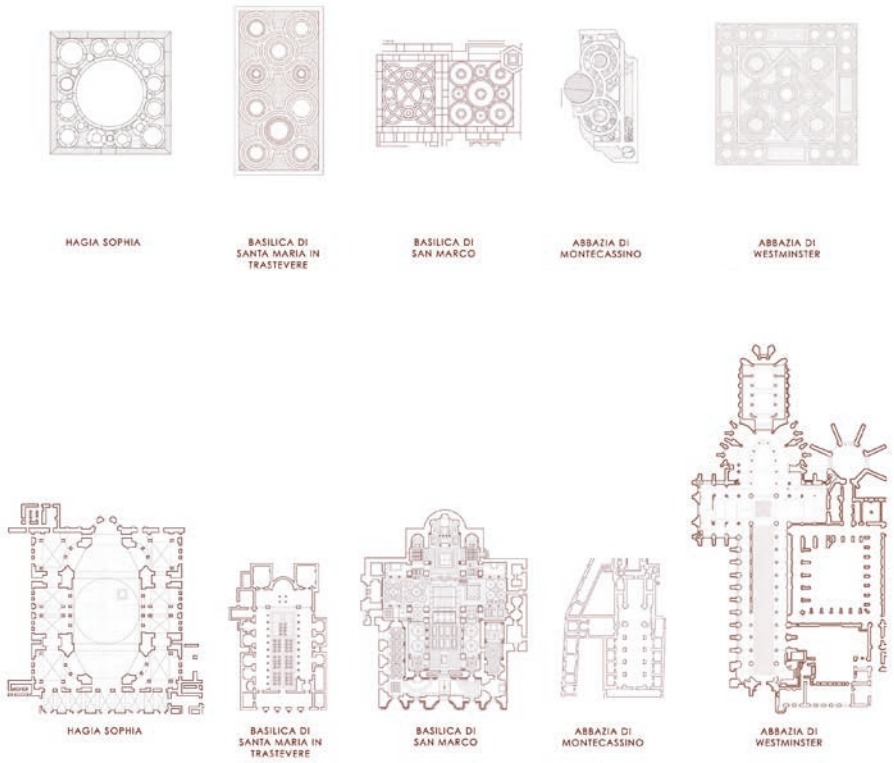
Angelo Raffaele Lunati
Elena Colletti, Giulia Colombo, Anna Menzani, Edoardo Zerbini

The project consists of a prototype of flooring characterized by a clear readability of the geometric shape in space, as a synthesis of ornament, with a strong material and reuse concept. The theme of reuse and surface are presented as one the consequence of the other: the juxtaposition of smooth red porphyry discs are inserted into the rough waste slab of the bottom of the formwork. The theme of ornamentation resorts to the compositional and figurative meaning of the infinite possibilities starting from a single geometric shape and its dimensional variation.
The chosen material is red porphyry, a resistant stone material that makes use of a particularly relevant cultural and artistic meaning in history. In fact, it was extracted for the first time in the Egyptian era, subsequently imported to the western continent up to Rome. This "sacred" use of red porphyry is rooted in the historical research that underpins the project: starting from the floor of the Basilica of Santa Sophia in Istanbul, it gave rise to a typological tradition of floors in sacred buildings in Italy, inspiring the floor compositions in many churches in Rome, in San Marco in Venice and in the Abbeys. The "Cosmatesque floor" that was later created by Richard Ware at Westminster Abbey, with materials recovered from abandoned Roman buildings, added to the symbolic compositional theme that of reuse and the inlay of geometric and residual forms.

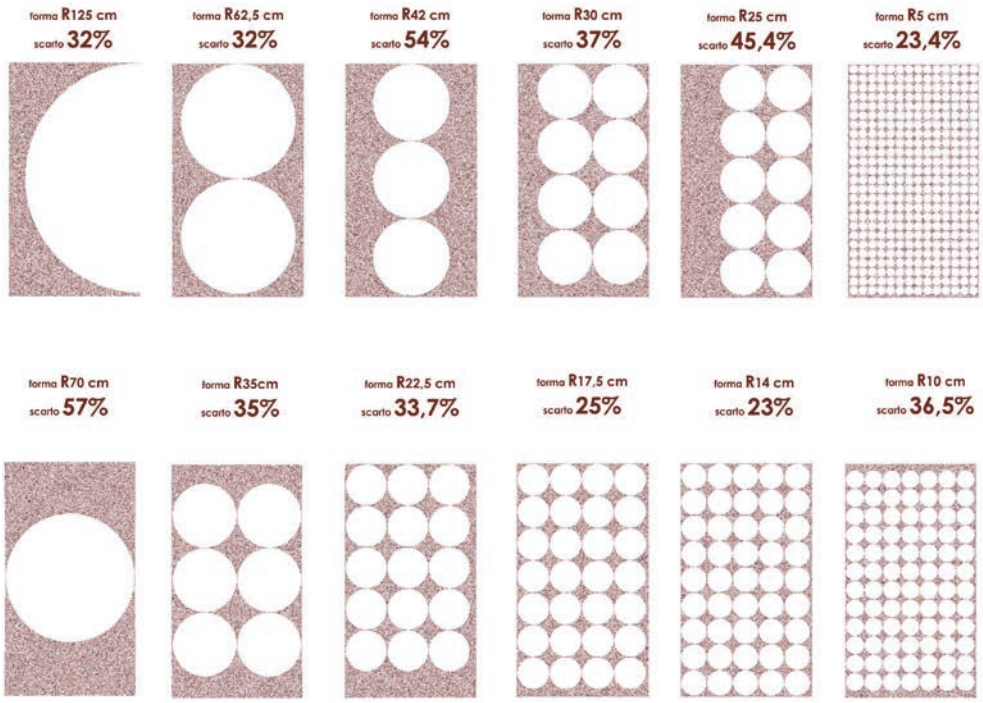

LAPIS PORPHYRITES
CaO MgO SiO2 Al2O3 Fe2O3 TiO2 K2O Na2O PF
SITES
HAGIA SOPHIA ISTANBUL
BASILICA DI SANTA MARIA IN TRASTEVERE ROMA
BASILICA DI SAN MARCO VENEZIA
ABBAZIA DI MONTECASSINO MONTECASSINO
WESTMINSTER ABBEY LONDON
SURFACE
ORNAMENT
SUSTAINABLTY and REUSE
MATERIALI NATURALI
PRODUZIONE a FREDDO
RIUSO DELLO SCARTO
THE DESIGN



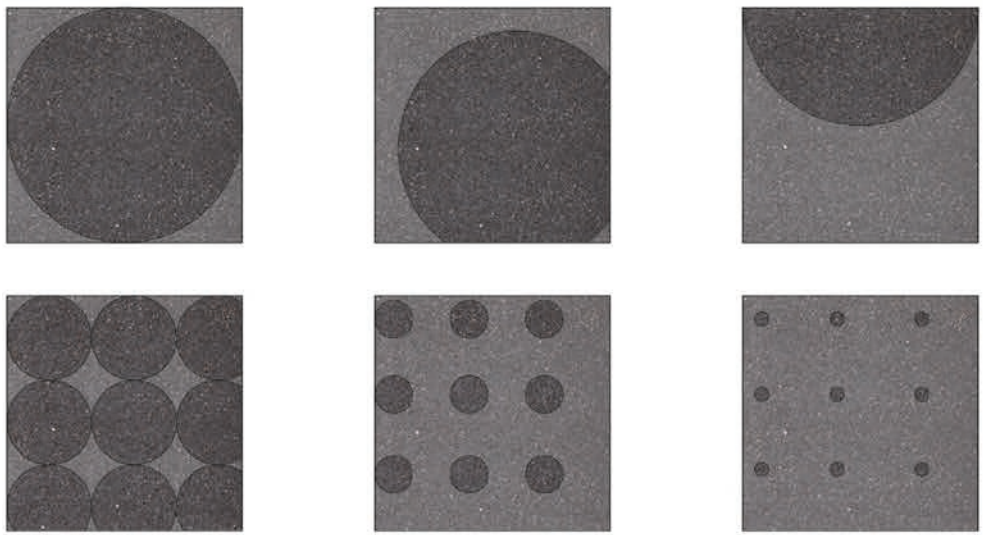
Details of the floors of the Abbey of Montecassino and of Hagia Sophia in Istanbul.



References: the space and the flooring design.



Sizing tests of circular elements in relation to the quantity of scraps.



Project samples.

On the joints

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The profession of the architect is a peculiar one. It leads us to seize even the smallest opportunities in order to try to say something that transcends the specific and addresses the general. Thus, a family of furniture objects designed by a group of students, generated through the free combination of several elements made of AGGLOTECH Terrazzo and assembled by means of a joint as ingenious as it is simple, can be taken as a pretext to briefly reflect on the variety of our profession and on some of the theoretical implications of this richness.

An architect, in fact, is faced with such a wide spectrum of professional opportunities, with such a variety of different activities to which time and labour may be devoted, that one may legitimately wonder whether they truly all belong to the same craft. All these activities appear to be so deeply intertwined that they seem to form a single practice, even though, in reality, they are not. What undoubtedly holds them together is the pleasure architects derive from moving from one to another. Yet this inclination is perhaps not a mere whim; rather, it is rooted in certain intrinsic characteristics of the discipline itself.

I am thinking in particular of objects of use, so-called "design" objects, which differ substantially from architecture, to the point that they seem, at least to me, to lie outside the architect's proper jurisdiction. Yet it is a fact that almost all architects have tried their hand at designing utilitarian objects. Le Corbusier did it, Mies did it, Schinkel did it, Siza did it, Rossi did it (and how!), and more recently Office KGDVS has done it, to say the least. But *baukuh*, the firm of which I am part, has never dealt with design in this sense. Perhaps this has something to do with what I am about to say and, in any case, I hope it may be worthwhile to compensate for the approximation with which I will approach a subject with which my professional activity has not led me to become familiar (at least for the time being).

▸ *Empty / Full*

In theory, architects deal only with the void, with the space between things. What we do seems to have no other purpose than to shape this emptiness. Walls, roofs, staircases, but also the very masses of buildings and their façades: apparently, everything we design serves to define the space in which human beings move, that is, to impose some form of order on human movement across the indistinct surface of the earth.

The things we design seem to have no value in themselves, but only in relation to other things. This relationship is, first and foremost, a physical and measurable one. Walls are seven meters apart, the ceiling is twenty meters high, the street is two meters wide. And also: the door stands opposite the window, the façade is aligned with the street, the first slab is one meter above the sidewalk. Distance between things, and the space generated by it, appears, at least at first glance, to be the exclusive object of our craft.

The space designed by architects shapes human affairs, represents them, and at the same time literally contains them. The relationship between architecture and human life is far more complex than it appears in the final, marvellous and unsettling minutes of *The Eclipse*, in which a bourgeois cottage under construction witnesses, passively yet participatively, a sentimental unravelling. Architecture is not set design. The "fixed scene" spoken of by Aldo Rossi is not a mere backdrop: it is everywhere. Human beings are immersed in it.

The things we design are never perceived from the outside, but always from the inside, even when that "inside" is the city or the sea. It is impossible for architecture not to establish a physical relationship with the world. Indeed, this is perhaps the most compelling aspect of our craft: there is no escape. In order to appear in the world, architecture must quite literally take a position. Every architecture engages in a hand-to-hand struggle with its surroundings.

This struggle, however, is exhausting. Thus, architects sometimes find it difficult to resist the temptation to step outside the world: to withdraw, to distance themselves, to isolate themselves, to stand hieratically apart, to dissociate themselves, to seek a quiet solitude, a phantom autonomy. Koolhaas is certainly not the only one who has succumbed to this temptation.

The design of a so-called "object," an autonomous form indifferent to context, or more precisely, indifferent to the world, may seem capable of satisfying this aspiration to estrangement. But this is only a mirage. In the end, any architectural object inevitably establishes, willingly or unwillingly, consciously or unconsciously, a relationship with its surroundings. The Seagram Building stands in relation to McKim, Mead & White's Racquet and Tennis Club (which explains why it is set back from the Park Avenue line: together, the two buildings shape a

small square, ornamented with two basins, much like Piazza Farnese); the small temple of San Pietro in Montorio stands at the centre of a courtyard; Villa Savoye has both a front and a back; Trajan's Column once stood between two libraries; the Basilica in Vicenza presses its edge against a medieval *palazzetto*; the symmetry of the façade of San Zulian is concealed by an adjacent palace, as is that of San Francesco della Vigna; the three Capitol buildings in Chandigarh charge the esplanade they overlook with tension (or at least attempt to do so, if the *Fossa delle Considerazioni* is to be read as the sign of an impossibility).

Buildings are not objects. Inexorably, all architecture, even that claiming the greatest autonomy of form, stands in the world, in a precise place and manner. Architectures that attempt to deny this relationship ultimately end up being simply poor architectures.

Things are quite different for objects of use, the so-called "of design" objects. Clearly, they are not outside the world either, but they inhabit it in a different way. The relationship binding architecture to the world is a formal relationship embodied in space: for architecture, meaningful form is the form of the void. For objects of use, by contrast, the form that matters is that of fullness.

From this decisive point of view, architecture and objects of use diverge radically. Yet, despite this fundamental difference, there must be something that binds them together, something that makes objects of use interesting to architects and, it might be said, makes architects interesting to objects of use.

▸ ***Space / Construction***

On closer inspection, architects can engage with the specific object of their craft, namely, the form of space, only indirectly. Space cannot be constructed directly. Space is what remains after construction; it is its by-product. Space is everything the architect has not touched; it is the result of work carried out on the container.

The architect operates on the envelope and must decide how it is made. The envelope, not space itself, presents construction problems. The architect must therefore confront the construction of the envelope with the aim of shaping space. It is no coincidence that Mies stated: «The art of building is the will of an age, translated into space[1]».

Objects of use, on the other hand, present construction problems in their own right, without subordinating them to the generation of space. Perhaps herein lies, at least in part, the interest architects have in objects of use: by designing them, architects can focus on the construction of the "full", independently of its negative counterpart, that is, empty space. If in architecture what matters is the space separating things, in objects of use what matters is how things touch, how they fit together, or how they move in relation to one another. When designing a utilitarian object, architects must concern themselves primarily

with how the parts are held together. Assembly becomes the central issue. The shape of the joint is the very essence of design.

▸ *The joint in design*

In certain utilitarian objects, the design of the joint has reached remarkable levels of sophistication, both where the joint is concealed within the object and where it is exposed to the point of becoming its dominant feature.

Consider, for example, three lamps by the Castiglioni brothers. In the *Arco* lamp, the crucial joint consists of a completely concealed screw connecting the steel arch to the marble base. A through-hole is drilled into the marble, allowing access to the screw head while keeping it hidden. This hole, which contributes decisively to the lamp's figure, can also accommodate the handle of a broom, providing a convenient grip for moving the lamp. One wonders whether the hole was initially conceived to solve the problem of the joint and later repurposed, or whether the joint was devised to take advantage of the hole's presence.

In the *Parentesi* lamp, the fundamental joint is the one that connects the tube holding the lamp holder to the cable running through it. Here, the friction generated by the curvature of the tube, which gives the lamp its name, allows it either to remain fixed or to slide along the cable.

In *Taccia*, the reflection on the joint is even subtler. The lamp consists of two elements: an aluminum base and a glass dome resting upon it. The seat receiving the dome is a negative spherical segment, while the dome itself is parabolic. This mismatch prevents the joint from ever being entirely perfect: when the dome is tilted to its maximum extent, the two shapes never coincide exactly. Perhaps the charm of this lamp lies precisely in this almost imperceptible imperfection, which undermines the illusion of mechanical perfection the lamp might otherwise convey.

In other utilitarian objects, the joint assumes the role of the primary element. The form of Enzo Mari's *Java* sugar bowl, for instance, essentially coincides with the hinge that allows the lid to open. Similarly, the *Plia* chair is defined by its joints: on the one hand, the hinge that allows the chair's three components to rotate and collapse; on the other, the joint between the plastic seat and the aluminum frame, whose design required meticulous theoretical and empirical studies to calibrate the deformation of the plastic so that the seat could be wedged securely while still supporting the weight of a seated person, at least until material fatigue intervenes.

In all these cases, and in countless others, the joint, a quintessentially constructive problem, is not resolved merely as a technical necessity, but is elevated to the primary site for the expression of formal values.

▸ *A brief epic of the joint in architecture*

Architects have always confronted construction problems. Yet the joint became an autonomous object of formal investigation only relatively recently, at least in Western architecture, what Loos referred to as the evolution of Roman architecture. It was only in the nineteenth century, with the introduction of new materials, that joints emerged as a central theme of architectural reflection.

Before then, architects had studied construction with great seriousness, one need only recall Piranesi's engravings of Roman building systems, but with an almost anatomical gaze, without attributing independent formal value to construction itself.

With iron and reinforced concrete, architects were forced to shift their attention from space to construction. Craft knowledge previously held by masons and carpenters now became an architectural concern. Architects approached construction from their own perspective: that of form.

This shift explains the sudden importance attributed to "truth," a concept previously irrelevant to architectural discourse. Yet defining what constructive truth means has never been simple.

Henry Labrouste exemplifies this ambiguity. At the Sainte-Geneviève Library, joints are both concealed and celebrated. Iron joints are masked by classical forms, while stone joints are displayed with obsessive precision. This contradiction reveals that the joint's formal treatment has little to do with truth and everything to do with form.

Otto Wagner pushed this logic further, exhibiting the nails of the Postsparkasse as compositional elements. From that point onward, the joint oscillated between revelation and concealment as a vehicle of architectural expression.

Le Corbusier stands apart. His *béton brut* eliminates joints altogether, asserting a radically spatial conception of architecture.

▸ *The joint in stone architecture*

In trilithic architecture, joints require little attention: gravity suffices. A column supports lintels, and the joint lies on the column's axis.

In the Doric order, however, this logic generates the infamous angular conflict, a problem so complex that it ultimately led to the abandonment of the order itself. This conflict demonstrates the independence of formal solutions from constructive constraints.

Architects are free either to reconcile or to accept this divergence, as demonstrated by Delorme and Vignola.

In stone architecture, the relationship between construction and decoration varies. In Alberti's Rucellai Sacellum, joints appear indifferent to ornament. Elsewhere, decoration masks irregular construction. Yet when construction and decoration coincide, architecture achieves serenity.

▸ ***Eros***

This harmony is exemplified by Angelo Mangiarotti's *Eros* tables, produced by Agape. The tables are made entirely of marble, yet allow endless variation in type, form, dimension, and function. What remains constant is the joint: gravity itself.

The truncated-conical legs interlock with the tabletop through matching holes, forming a perfect joint subtly emphasized by shadow. In *Eros*, design coincides entirely with the joint. Form and construction merge into a single, radical gesture, ambitious, reassuring, and serene.

Perhaps Mangiarotti chose the name *Eros* not to allude trivially to penetration, but to celebrate the encounter between Form and Construction. Or so I like to think.

Notes

1. «L'arte di costruire è la volontà di un'epoca, tradotta in spazio».

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02 Constellation of joints

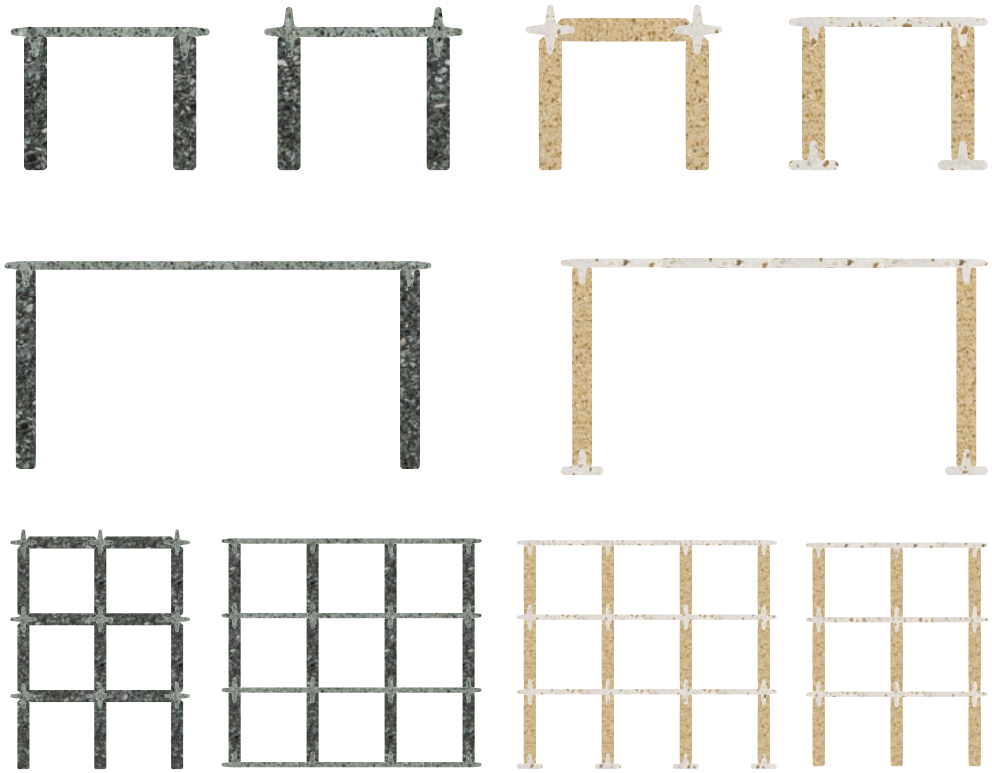
Paolo Carpi
Jekabs Barzdins, Philippe Chapuy, Costanza Franco, Sarp Tascioglu

Recognizing the sturdy nature of the material, the project Constellation of joints aims to contest the material's prevalent characteristics by offering a design resolution embedded in flexibility, fluidity and playfulness. Having drawn inspiration from the brilliant pieces of Angelo Mangiarotti, a set of ten differing terrazzo elements was developed. The main joints resembling a four-pointed star together with the elongated components of varying lengths, as well as all their eccentric derivatives present an opportunity to form a rich assortment of diverse, yet relating furniture.

Whether bookshelf or desk, table or stool, the particular design of each piece emerged from notions of comfort, structural stability, and, rather evidently, visual prominence. As a result of the technical constraints and possibilities the soft language that describes every tip and crevasse of each element fosters a more gentle user experience. Furthermore, AGGLOTECH's vibrant and contrasting palette of greens, reds, yellows and greys along with the simple principle of a dry-joint allows endless configurations/constellations according to any taste and necessity.

Detail of the star joint.

Example of furnishing a space with some of the furnishings that can be created with the designed system.



Variations with the use of the joint.

Joint examples.

Even the joint alone can become an element of use.

Examples of use.

Multimobile

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In the mid-1940s Charles and Ray Eames asked the question "What is a house?" and answered with a beautiful drawing in which they illustrated the multitude of activities that took place in the house, in a "futuristic" vision that surprises us even more today because it came true (Eames, 1944: 17-22). In the drawing the inhabitants of the house paint, play music, chat, play, rest, repair objects, dance, build, work, make cocktails... Today in the house we have become accustomed to various actions and activities, not only the traditional ones like eating, sleeping, etc., but many others. We have homes that are open to welcome friends and outsiders, and we have spaces that are gradually being transformed into multifunctional and modifiable spaces, abandoning the traditional layout organized by more or less separate rooms dedicated to a particular use. With the same attitude and spirit we asked ourselves today, "What is furniture?" And with the same attitude we reflected on the relationship between form-function and furniture-space: today, beyond the proven forms related to certain specific functions (bed, table, bookcase, ...), any form can be freely understood freely by man and can, from time to time, take on different interpretations (and therefore uses), conventional or not. And just as in the home a room no longer serves to accommodate a single function, so furniture can turn into a *Multimobile* and fulfill more than one function at the same time. Multimobile is thus a multifunctional piece of furniture that can fulfill several uses simultaneously or at different times and flexibly adapt flexibly to the needs of the space and the user, who decides how to use it. Unlike traditional furniture that is designed for a specific use (such as a chair for sitting or a table for eating), *Multimobile* is designed to be versatile and transformable and to integrate several functions into one object. It can be moved, modified, and used in unconventional ways, contributing to the creation of plurivalent, dynamic, and fluid spaces in both indoor

and outdoor environments. In this perspective, the only function of objects (even furniture) is tied to life, as Ettore Sottsass recalled when talking about his *Superboxes* for Poltronova or his Carlton for Memphis. To the criticism that the function of his furniture was not directly manifest, he replied, «The objects I designed are all 'functional,' they can serve. The important thing is that those who use them know how to use them. It is like an automobile: until one knows how to drive it, it is of no use. Everyone has different "functions" or needs. However. Maybe a boy needs to put all his scrolls in a container, a young lady on the other hand needs to put her books. I don't really know. There is no generic function. Function is life. I can't predict function. I have always designed furniture that I think is very functional. But you have to understand what they are for[1]» (Bozzer, 2007: 123). And again, furniture is no longer a collection of objects leaning against walls that defines a room and its uses, but furniture moves, defines new temporary environments, divides without closing. We had already been taught this by Achille and Pier Giacomo Castiglioni with the *Rampa*, or again by Bruno Munari with the *Abitacolo*, just to name a few.[2] However, it should be remembered that the first pieces of furniture in human history date back to prehistoric times and reflects the needs of a nomadic or semi-nomadic life. Primitive societies moved frequently in search of resources, and so objects had to be light, easily transportable and functional. Carpets, textiles, portable beds, chests and trunks, and folding chairs represented the mobility of societies on the move. Our furnishings, too, need to adapt to our movements, which are often geographical, but also related to the mutation of our daily habits, our way of conceiving life and living. And to enrich the discussion, one can take in the words in which Ugo la Pietra recalls Bruno Munari: «I remember what Munari once said to me, coming back from the East: but do you know that half of the world's population does not have a bed? Today we start with typologies, but first we should understand what people need and how people behave. The issue of living should be revisited, as the urban space is not equipped to entertain people, the private space should also respond to what is the common attitude of people, that is, not to stay at home[3]» (La Pietra, 2017: 71-73). In his work, Ugo La Pietra has often criticized the traditional model that sees the home as a set of rooms with specific and predetermined functions. He proposes a fluid vision, in which functions and spaces are not fixed, but adapt to the needs of the individual. The idea is that any space, even those commonly thought of as public or neutral, can be experienced as an extension of one's home. This concept emphasizes a personal and subjective perception of urban space, in which the individual appropriates spaces through his or her own experience. The concept of «*abitare è essere ovunque a casa propria* (to inhabit is to be everywhere at home)» (La Pietra 2019) reflects a vision of dwelling

that goes beyond mere physical belonging to a place and extends to an existential and psychological condition. This gives rise to a thought in which living is not only related to the defined and structured spaces of traditional architecture, but becomes a way of living and being in the world, in continuous relationship with the context and surroundings. Dwelling means being free to feel at home in any context. It is not just about adapting to the physical environment that welcomes us, but about creating a deep connection with the surrounding space, which can be a city, a street, but above all a piece of furniture. Its conception goes beyond the rigid boundaries of understood merely as the construction of houses or buildings, and embraces an idea of "diffuse living," which precisely includes furniture and physical space. And so furniture moves around, it is available for a variety of uses, it can be inside (in a house) just as it can be outside (in urban space) because the relationship with those who use it is the same. To the initial image of the Eames house, it now comes naturally to associate another. It is a beautiful photograph taken in 1981 in the lowered courtyard of the Politecnico di Milano, the one overlooked then by Giò Ponti's buildings, the *Nave* and the *Clover*, now joined by the newer ones, designed by Renzo Piano. The immortal photograph, the theatrical performance *Hot Zones* by Magazzini Criminali[4] made on the occasion of the open-air presentation of the *Infinito Furniture* designed by Alessandro Mendini with Alchimia. There are two aspects that deserve, in particular, to be noted: The first concerns the furniture, the second the occasion. The *Infinite Furniture* is «[...] a system of furniture (container, shelf, bookcase, table, chair, etc.) that is modular in a theoretically infinite line and designed with the decorative intervention of different designers who, on given gray furniture, each added different elements (legs, handles, profiles, decorations, etc.)[5]». Thus, the *Infinite Furniture* consists of a series of cabinets, nightstands and drawers, a total of 14 elements with dark, magnetized surfaces and magnet decorations, which can be combined in an infinite composition.

Alchimia's *Infinite Furniture* represents a radical design concept that challenges the traditional idea of furniture as a finished, static object. Born from the avant-garde thinking of Alessandro Mendini and the Alchimia design group, it is set in the context of postmodernity and reflection on the limits and potential of contemporary design. The true meaning of *Infinite Furniture* lies in its ability to transform itself continuously and to be "potentially unlimited," as its name suggests. Unlike traditional furniture, which is designed to perform a specific function, the *Infinite Furniture* is modular, composable and can be assembled, precisely, in infinite ways. Modularity allows it to adapt to different contexts and needs, breaking with the idea that a piece of furniture has a fixed form and function. The *Infinite Furniture* is not only a functional object, but also an expressive and decorative

medium, through which each participating designer can add his or her own distinctive mark. Each module is a kind of canvas open to creative intervention. This concept of modularity reflects the vision of a design that does not impose a single interpretation, but leaves room for customization and individuality. This is precisely why its conception and design involved several designers and artists, members of the Alchimia collective. This group, founded in 1976 by Alessandro Guerriero, established itself as one of the most important vanguards of Italian design in the 1970s and 1980s, thanks to its experimental research and critique of the aesthetic and functional conventions of industrial design. Among the main participants in the project were Alessandro Mendini, Michele De Lucchi, Ettore Sottsass and Franco Raggi and many others. Each designer added details such as handles, legs, decorations, and profiles so that each piece became a work in itself while being part of a modular system. The idea was that the furniture could be enriched by subsequent creative interventions, expanding its potential for transformation over time. The project opposed the idea of furniture as a standardized, mass-produced object, promoting instead diversity, customization and craftsmanship. A concept not so far from the dimension of contemporary furniture, which between globalized buying and selling processes, *standardization* and *customization*, represents an ever-changing theoretical dimension. IKEA, as a symbol of this globalization, has launched many memorable commercials over the years, featuring slogans that reflect the accessible, democratic and changing spirit of our lives and spaces. "We are made to change," "It only takes a little to change," and "Your home, your way," emphasize the concept of customization and freedom in the choice of furniture, encouraging people to make their homes unique and personal, thanks to the endless possibilities offered by the furniture itself and the ability to express their individuality. These slogans have helped furniture strengthen its image, but also solidified the idea that a furniture product can change one's relationships through space, use, and its ephemeral and reversible nature. Contemporary furniture invites the active participation of the user, who can configure and reconfigure the object according to his or her needs, abandoning the rigid conventions of functionality and traditional aesthetics. The second reflection, which opens the *Infinite Furniture* project, concerns its presentation to the public. *Fuorisalone* does not yet exist, but it is precisely since the 1980s that the design world understands that it needs to be, more and more, outside the official Salone, that is, the purely commercial-oriented pavilions of the *Milan Fair*. And so *Alchimia* chose the University, a place of research and experimentation, telling about a piece of furniture through an artistic performance. The performance was part of a breakthrough moment in the design and art scene, linking design creativity to a performative and theatrical dimension. Magazzini Criminali was

an avant-garde theater collective, and the choice to present a design project through a performance highlighted the intent to take design out of traditional spaces, such as the *Salone del Mobile*, and to integrate different forms of artistic expression.

Forty-three years after the *Endless Furniture*, the School of Architecture of the Milan Polytechnic University of Technology, offers us a new challenge and adds a new and interesting variable: to rethink the theme of furniture, considering the use of a material traditionally used for floors and walls. And to propose it to the public, as then, outside the official spaces of the Fair, but in a place open to the city, on the occasion of the now consolidated *Fuorisalone*. Thus, we set the conceptual and methodological premises of the project precisely from the elements and reflections developed about furniture and its role in contemporary living. We worked on a family of elements, as in *Furniture Infinity*, that can be freely associated. We designed them for both indoor and outdoor use We thought them mobile, movable. We thought them so that everyone can choose how to use them and also how to make them (in colors and elements). We thought them free in form, unconventional in size and capable of designing the spaces that contain them. We took to extremes the use of the main material to which we wanted to attach a strong aesthetic value and did so by playing on paradox. Terrazzo, which is a "heavy" material obtained from grits of marble, quartz, granite or other material, of different diameters, cast with a cementitious or polymeric binder, is used here presenting itself as a "light" material, pulled into thin slabs supported by an equally slender metal structure. Compositionally, the furnishings are conceived by the association of two parts: the slender metal tubular structure and the *terrazzo* slabs used as infill or planes of use. The use of a slender metal structure gives greater emphasis to the "solids" of the slabs. This choice makes *Multimobile* furniture visually light and thus able to highlight the slabs whose different granularities and chromaticities are enhanced. There is in *Multimobile* a sense of "disproportion" almost absurdity, given by the long, slender legs, the vertically developed elements and the "centipede-like" repetition of the legs corresponding to the horizontally developed elements. The use of *disproportion* shows that the furniture "does not take itself too seriously," but allows for a less rigid relationship with the user and the space. In this regard, we call to mind two other images: the design of Shiro Kuramata for *Memphis* who, with Imperial[6], rests a small *secretaire* on tall and slender supports, and the design of the designers Muller van Severen for multifunctional furniture made of tubular and colored tops[7], capable of designing, with their intelligence, the spaces of the home. To correspond the intention of enhancing the *terrace* at 360°, that is, so that the entire mass can be appreciated on all its faces and edges, the slabs are leaning against the structure and not included

within its frames. From a technical point of view, this means that the horizontal planes, to support the weight, consist of two slabs between which a reinforcing glass fiber is sandwiched. The inserted fiber is invisible and makes it possible to maintain material uniformity on all sides, thus making the material more valuable. And it is this three-dimensional characteristic of solid material with different textures and colorations, compositions and granularities that allows *terrazzo* slabs to be the true protagonists of the project. Touch and tension are important because the weight and texture of a piece of furniture can influence the sensory experience of users. Heavy materials can convey a feeling of solidity and authenticity, while light textures can give a sense of movement and mobility. But their "combination" produces an entirely new physical relationship between people and the furniture, one that is profoundly affected by movement and use, by an interaction that is different from that of a traditional piece of furniture. But so what actually is a mobile? And specifically, what is *Multimobile*? A chair for sitting, a bed for sleeping, a shelf for storing books and objects, a table for eating, a sofa for conversing... or a single piece of furniture for sitting, sleeping, eating and conversing? Multimobile is a multifunctional object that can be used in its three-dimensionality, redefining the space in which it is placed, disrupting the traditional idea of the room with furniture along the walls. With its extreme forms, it integrates in the same structure a bench, a desk and a bookcase that, while fulfilling its individual functions, leaves free interpretation to the flexible and unconventional ways of use. And it is from this methodology that, for us, innumerable pieces of furniture are born, which, playing on the non-canonicity of their forms, create a true family of multifunctional objects to be placed within a space, indoors or outdoors. The materials used are suitable for both environments. The "central" nature of the furniture, which is capable of generating an environment within a room, is not compromised by its placement in an open space, in which he himself is, once again, capable of creating a micro-environment around him.

Notes

1. «Gli oggetti che ho disegnato sono tutti "funzionali", possono servire. La cosa importante è che chi se ne serve sappia servirsene. E come un'automobile: finché uno non la sa guidare non serve a niente. Ognuno ha diverse "funzioni" o necessità. Comunque. Magari un ragazzo deve mettere in un contenitore tutti i suoi rotoli, una signorina invece deve mettere i suoi libri. Non so bene. Non c'è una funzione generica. La funzione è la vita. Io non posso prevedere la funzione. Ho sempre disegnato mobili che secondo me sono molto funzionali. Ma bisogna capire a cosa servono».
2. Achille and Piergiacomo Castiglioni, "Ambiente arredato per il Pranzo," designed for the exhibition "La casa abitata," Palazzo Strozzi, Florence, 1965. Bruno Munari, "Abitacolo," modular bed designed in 1971, initially produced by Robots. In 1979 he was awarded the XI Compasso d'Oro.
3. «Ricordo quello che mi disse una volta Munari, tornando dall'oriente: ma lo sai che metà della popolazione mondiale non ha il letto? Oggi si parte dalle tipologie, ma prima bisognerebbe capire cosa serve e come si comporta la gente. Il tema dell'abitare andrebbe rivisto, come lo spazio urbano non è attrezzato per divertire la gente, anche quello privato dovrebbe rispondere a quello che è l'atteggiamento comune delle persone, cioè quello di non stare a casa».
4. The performance is documented in *Magazzini Criminali*, No. 5, Spring 1982. Published by Magazzini Criminali Prod., directed by Federico Tiezzi, Marion d'Amburgo, Sandro Lombardi. Director in charge: Marion d'Amburgo. Editorial director: Franco Quadri. The publication can be viewed online at https://www.francoraggi.com/wp-content/uploads/Magazzini-Criminali-giornale-4-1981-copia.pdf (last viewed 10.10.2024).
5. «[…] un sistema di arredi (contenitore, scaffale, libreria, tavolo, sedia, ecc.) componibile in linea teoricamente infinita e disegnato con l'intervento decorativo di diversi progettisti che, su mobili grigi dati, aggiungevano ognuno elementi diversi (gambe, maniglie, profili, decori etc.)».
The description of *Furniture Infinity* is taken from Franco Raggi's website https://www.francoraggi.com/project/il-mobile-infinito/ (last consultation 10.10.2024).
6. *Imperial* is a lacquered solid wood secretaire designed by Shiro Kuramata for Memphis Milano in 1981.
7. "Muller Van Severen" is a collection of furniture designed by photographer Fien Muller and artist Hannes Van Severen, both from Belgium, nominated for the 2013 Design of the Year award sponsored by the Design Museum in London.

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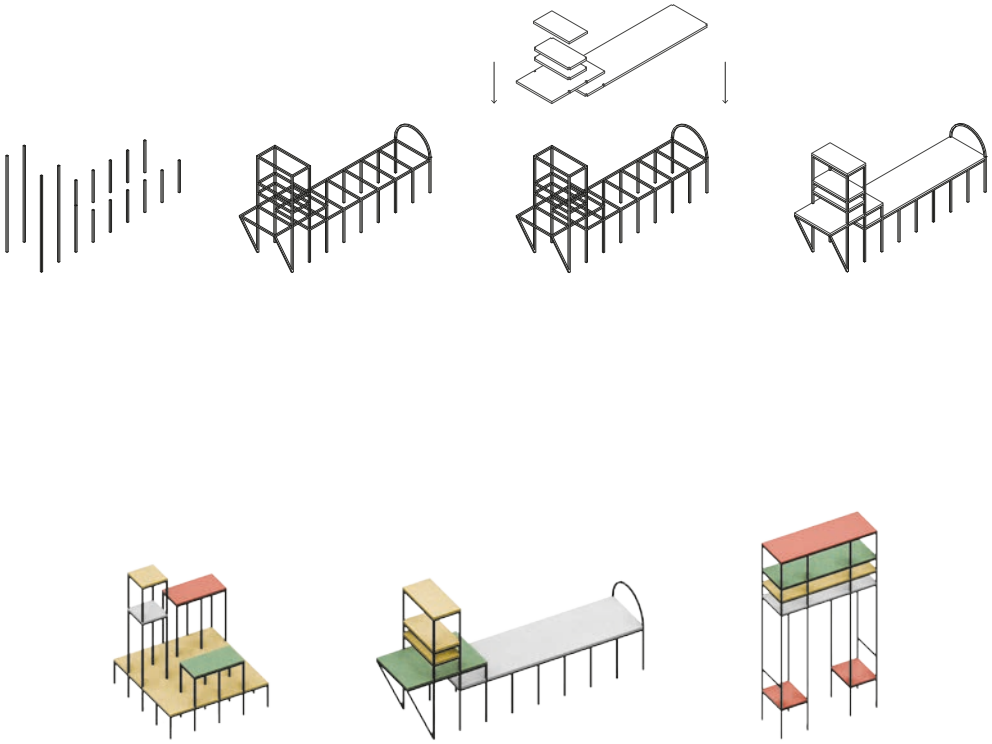
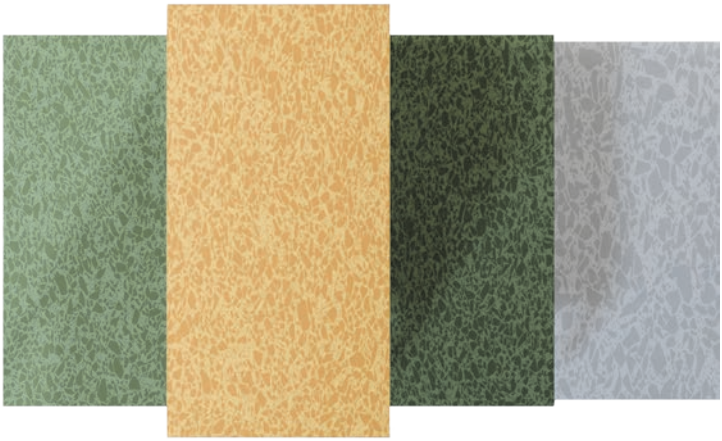
03 Multimobile

Davide Fabio Colaci, Elisabetta Lola Ottolini
Massimiliano Aloi, Amedeo Arrisio, Irene De Paoli, Matteo Del Bufalo

What is a piece of furniture? A chair to sit on, a bed to sleep on, a shelf to store books and objects, a table to eat on, a sofa to converse on... or a single piece of furniture to sit on, sleep on, eat on, converse on? This is how Multimobile was born: from the idea that a piece of furniture is many pieces of furniture and that a piece of furniture does not perform a single function, but rather performs several at the same time.
Multimobile is an object that can be used in its three-dimensionality, which redefines the space in which it is placed, breaking down the traditional idea of a room or environment with furniture along the walls.
With its extreme shapes, it integrates a bench, a desk and a bookcase into the same structure and, while fulfilling its individual functions, it leaves free interpretation to the flexible and unconventional ways of using it.
From this methodology countless furnishings are born, which always play on the paradox of their shapes, and create a real family of multifunctional objects to be placed inside a space, indoors or outdoors.
Composed of two parts, the painted metal support structure and the AGGLOTECH terrazzo slabs, used as infill or surfaces, the Multimobile furnishings are visually light elements, but capable of governing the design of the environments that accommodate them.
The AGGLOTECH slabs, whose different grains and chromaticity are enhanced, supported by the slender metal structure, are the true protagonists of the project and show their characteristic of full and therefore three-dimensional material, with a uniform appearance on all visible sides.





UNONESSUNOCENTOMILA/ ONENONEAHUNDREDTHOUSAND

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The dynamism of contemporary human societies, marked by the continuous evolution of shared sensibilities, material culture, and relational patterns, compels designers to question the motivations underlying design and the meaning of the tools it employs. Certainly, even within an increasingly ephemeral and immaterial society, the role of the physical and the tangible cannot be underestimated. Materials represent a fundamental medium through which our understanding of our surroundings is constructed. In this regard, Peter Rice stated that, in order to use a material, one must thoroughly understand its true nature (Rice 1984), a nature that can also be described through the perceptions conveyed by the cultural and historical filters that characterize a society.

From this perspective, the project itself may become both an opportunity and a journey, useful for discovering the "true nature" of a material in order to better understand and enhance it. To do so, however, it is necessary to eliminate, as much as possible, the superstructures that may influence this understanding, addressing them individually. Form is certainly a significant superstructure, which in some cases may arise from the mechanical characteristics of the material employed, or in other cases from a close relationship with the function for which the design is intended. At times, however, form becomes an independent variable, appropriating the physical element that defines it for reasons of mere expediency.

Another relevant case is undoubtedly that of scale, understood as dimension, which, while keeping form and material unchanged, can significantly alter the perception of an artifact. Purely by way of example, Peter Eisenman's (1999) studies on "scaling," or rather "scale shifting," clearly illustrate how a project establishes different relationships with its context, or even solely with its own internal compositional logic.

These considerations concern what may be defined as the "endogenous" aspects of the project, namely those that design can directly govern from within. Alongside these, there are other aspects, which we might instead define as "exogenous," to which the project must necessarily respond, even though they remain external to it. Among these is certainly the project's ability to coherently align with the requirements of use that, for various reasons, are imposed from outside. As already mentioned, these requirements are largely the result of cultural and contextual conditions that characterize different societies, the ways in which individuals live and relate to one another, in short, their ways of living.

It is from these initial considerations that our project set out to explore and outline the theme of domesticity as an indispensable condition of living. A form of domesticity that has undergone profound change in recent times, both in relation to everyday actions and in our perception of reality. We speak, therefore, of a domesticity that is simultaneously "invaded" and "invasive." It is "invaded" because activities that once took place outside the home, in the city or across the territory, have now entered the most intimate spaces of the domestic interior. It is "invasive" because modes of living that were once jealously guarded within the privacy of the home are now progressively migrating outward, permeating every space and every place.

Technology, and digital technology in particular, plays a crucial role in this process. It enables us to carry extensions of the home with us and to dwell wherever it becomes necessary or desirable to do so. Smartphones of various kinds and increasingly high-performance tablets allow for the continuous appropriation of the spaces through which we move, enabling us to inhabit them freely, whether on a permanent or temporary basis. Our actions today consist of a continuous overlap of situations of different natures, taking place indifferently in spaces that may be radically different from one another, inside or outside the domestic sphere. What emerges is an inhabited whole, expressed through a heterogeneous landscape that is always traversable and organized as a continuous system (La Rocca 2010).

This composite reality is one in which different abstractions relate to one another without dominant hierarchies, generating a multitude of styles and forms, uses and places, environments and technologies, services and information, languages and images, scenes, brands, advertisements, and economic systems. Contemporary inhabited space thus ceases to be defined solely as architectural space and becomes instead a complex structure of use, in which residential, productive, service-related, and other functions are freely distributed across a uniform and continuous plane.

This horizontal redistribution of uses does not represent a flattening of the experience of living. On the contrary, the ways in which we

imagine and carry out even the simplest everyday actions are becoming increasingly sophisticated and can be performed almost anywhere. This constitutes a subversion of traditional modes of living, increasingly expansive and open, increasingly heterogeneous and inclusive. It transforms our gestures, the sequence of our daily actions, the way we relate to objects and people, and the quality of the spaces in which we live or would like to live. It also transforms our idea of experience: what appeared new until recently has now become habitual.

It often seems that the reality of what can be done exceeds the imagination of what is conceived, with technology acting as an accomplice. Yet there is little doubt that the most profound revolution today is behavioural, rooted more in the cultural and personal spheres of individuals than in technology itself. The impression that this new mentality is merely the result of a technological or informational revolution is gradually dissolving, just as the sense of wonder once generated by technological innovation has faded. What now prevails is the feeling of having crossed a threshold, of beginning to explore areas of ourselves that had previously remained uncharted. In short, the impression is that we have acquired a different cultural and civic attitude (Baricco 2018).

All this suggests that inhabited space is now identified more with the actions that take place within it than with architecture understood as the primary reference framework. Space erodes in favour of new territories of occupation, often difficult to describe using the classical formal codes of architecture and not always immediately comprehensible or universally shared, yet endowed with a strong dynamic, performative, and inventive capacity. As a result, the boundaries within which architectural design traditionally operates become increasingly blurred, and multiple disciplines, in addition to architecture, contribute to the definition of new spatialities. By overlapping with one another, these disciplines extend their influence beyond their respective domains.

The figurative dimension of architecture also changes, as the linear correspondence between form and function, or, more precisely, between “figure” and “use”, is lost, with these elements now unfolding along different and non-parallel trajectories. Yet it is precisely this independence of use from form that often generates architectures and spaces whose figurative character appears even more pronounced, as if architecture were asserting its own representational autonomy, governed by internal laws and capable of generating its own contexts and geographies.

Space thus becomes more fluid and less defined by perimeters, a process that also involves the material dimension of artifacts, which increasingly tends toward dissolution. Materials reveal unexpected qualities in their chromatic characteristics, textures, and sensory

exchanges with the human body, in terms of heat and cold, hardness and softness. The overall impression is one of greater freedom, or perhaps more accurately of fewer constraints, in classifying space and its derivatives within established categories. Typological classifications lose relevance, and space is more readily identified through the "conditions of use" that develop within it, conditions that can change rapidly, altering even the logical sequence by which spaces are positioned in relation to one another.

Objects and actions fade into one another, and it often seems less interesting, and even unnecessary, to follow the traditional sequence that moves from the urban scale to the building, then to interiors and objects. This shift also produces a different perception of the environment as a whole, now regarded as one of the central concerns of contemporary society. What emerges is an ecological and systemic vision in which relationships between different components are continuously reconfigured. New connections of meaning profoundly transform humanity's relationship with space, consequently changing the way we perceive and classify each place. While physical distinctions between spaces, such as between the warmth of the dwelling and the cold exterior of the city, clearly persist, these divisions are increasingly instrumental, tied to utilitarian considerations for which alternative solutions are now available.

Starting from these premises, our project investigates the "true nature" of Terrazzo, a concrete conglomerate produced by AGGLOTECH, by experimenting with its expressive, tactile, and functional potential. We began with a simple and essential form, not immediately associated with specific uses, obtained by sectioning cylindrical blocks of different diameters along a curved surface. The result consists of concave and convex discs, conceived as neutral objects capable of responding to an almost infinite range of possible uses. These uses depend on size, thickness, texture, and colour, but above all on the context to which the object belongs and on the imaginative capacity of the user, a variable of fundamental importance in fully activating the meaning of the object.

Each disc, tray, or other designation one may attribute to it, whose only indisputable characteristic lies in the pure material from which it is made, liberates itself from labels and functional connotations suggested by its simple form. Its expressiveness unfolds according to dimensions, scenarios, and contexts. Countless figurative and expressive variations may be assumed by this simple artifact, derived from the combinations of dimensions, colours, and textures defined by the aggregates employed: stone fragments of different sizes, crumbled within the mixture, generate chromatic compositions; filigree patterns emerging on polished surfaces evoke woven brocades and textiles; tonal transitions between different textures suggest symphonies of stone.

Each figurative configuration may then be associated with a use. Diverse functional solutions emerge, capable of serving indoor and outdoor environments, private and public spaces, autonomously and independently of any predetermined scheme or pattern.

UNONESSUNOCENTOMILA/ONENONEAHUNDREDTHOUSAND may function as a small multipurpose tray for everyday use, or as a piece of furniture intended simply to be displayed within a domestic or other environment.

UNONESSUNOCENTOMILA/ONENONEAHUNDREDTHOUSAND, when reproduced at a larger scale and placed alongside cushions, upholstery, or fabrics, becomes a convex surface for resting, sitting, or reclining, suitable for stations, airports, hotel lobbies, or other public spaces.

UNONESSUNOCENTOMILA/ONENONEAHUNDREDTHOUSAND may serve as a newspaper holder for a waiting room or a domestic living area, yet when filled with soil it becomes a planter for flowers or plants, adaptable in scale from the home to the urban street or public square.

UNONESSUNOCENTOMILA/ONENONEAHUNDREDTHOUSAND, with the addition of hands and a suitable mechanism, becomes a clock, to be hung on a wall or placed on shelves or tables, indoors or outdoors.

UNONESSUNOCENTOMILA/ONENONEAHUNDREDTHOUSAND reduced to the scale of a tile and reproduced in series, it generates a vibrant wall covering, using uniform colours or contrasting combinations of textures and tones. It may also function as an ornament, a board game such as checkers, or as a traditional chopstick rest, known as *kuàizhěn* in China, *sujeobatchim* in Korea, and hashioki in Japan.

UNONESSUNOCENTOMILA/ONENONEAHUNDREDTHOUSAND may coexist with water, becoming a fountain for a public square or a sink for a domestic interior.

The list of possible uses can, as one might imagine, extend indefinitely, and indeed it must do so. Yet the designer must also know when to stop designing, in order to allow others, users, observers, inhabitants, to continue imagining. This is the reason behind the project's name: UNONESSUNOCENTOMILA/ONENONEAHUNDREDTHOUSAND, inspired by Luigi Pirandello's novel of the same name, whose protagonist, Vitangelo Moscarda, continually addresses the reader by posing questions and dilemmas, directly involving them in the narrative.

The same involvement and awareness are what we envision in the practices of "appropriation" and "re-appropriation" that may guide the future development of this project, which begins with a few and aspires to belong to everyone. It is an "unfinished" work, perpetually

open to new proposals, whose final form will emerge through spontaneous processes of evaluation and experimentation, aimed at shaping the spaces and places in which we live and act. This was also the path followed by Vitangelo Moscarda, initially awkward and imprisoned by the opinions of others, yet increasingly determined to seek the spiritual authenticity of his own existence.

Similarly, in UNONESSUNOCENTOMILA/ONENONEAHUNDREDTHOUSAND the only possible truth lies in a form of "essence": an expression of matter alone, shaped into a pure, essential, and balanced form, whose uses open onto countless contexts and "a hundred thousand" dimensions, colours, and textures, as well as the many individual trajectories of use that each person may invent. This is the ultimate aim of the project: the pursuit of a multi-textual expression, an outcome of contemporary complexity and its productive chaos, composed of layered, multilevel, and performative content. An endless beginning in which the user becomes an active participant, attributing new meanings, values, and uses to a material, AGGLOTECH, that is itself composed of a multitude of other materials, here resolved into pure form with infinite measures and infinite uses, while remaining, in essence, always and immutably the same.

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04 ONENONEONEHUNDREDTHOUSAND

Pierluigi Salvadeo, Andrea Tartaglia
Erika Ferrari, Marco Rampazzo, Gaia Uslenghi, Sofia Vrenozaj

The project investigates the use, expressive and tactile potentialities of the concrete conglomerate by AGGLOTECH, proposing a unique, simple and essential product obtained by sectioning cylindrical blocks of different diameters according to a curved plane. The result is concave and convex discs, like multi-coloured trays capable of responding to countless possible uses depending on the size, thickness, texture and colour, but above all depending on the context to which they belong. Each disc, or tray, freeing itself from the original use that its unmistakable primary form might suggest, freely expresses its own relationships with the world of architecture and more generally with art. Fragments of crumbled stones within the mixture describe mixtures of different colours; filigrees that emerge on the variously smoothed external surfaces are expressed as weavings of brocades and fabrics; atonal passages between the different textures are perceived as symphonies of stone. Here then are the different functional solutions proposed that can serve the internal space as well as the external one, the private space as well as the public one.
ONENONEONEHUNDREDTHOUSAND declining with freedom and creativity it can be a small tray to store objects, or if reproduced in large size, a basin that accommodates cushions to sit or lie down; it can be used to grow plants and flowers, or as a table ashtray; it can become a clock to hang in the house and outside, but if applied in series it can represent a vibrant wall covering, and much more.

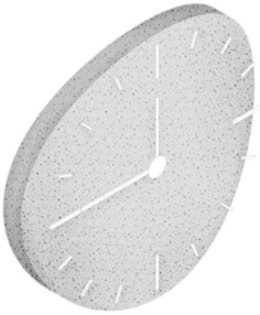
Concave or convex? A multipurpose primary shape.

So many scales, so many functions.

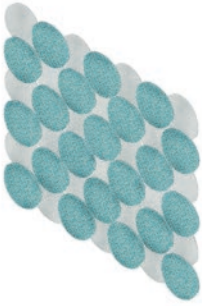
Fruit bowl.

Magazine rack.

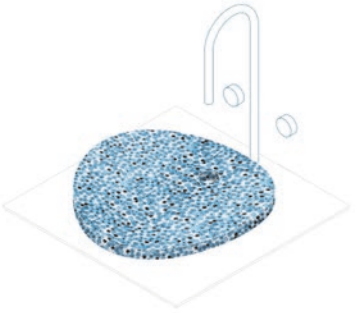
Lamp.



Clock.



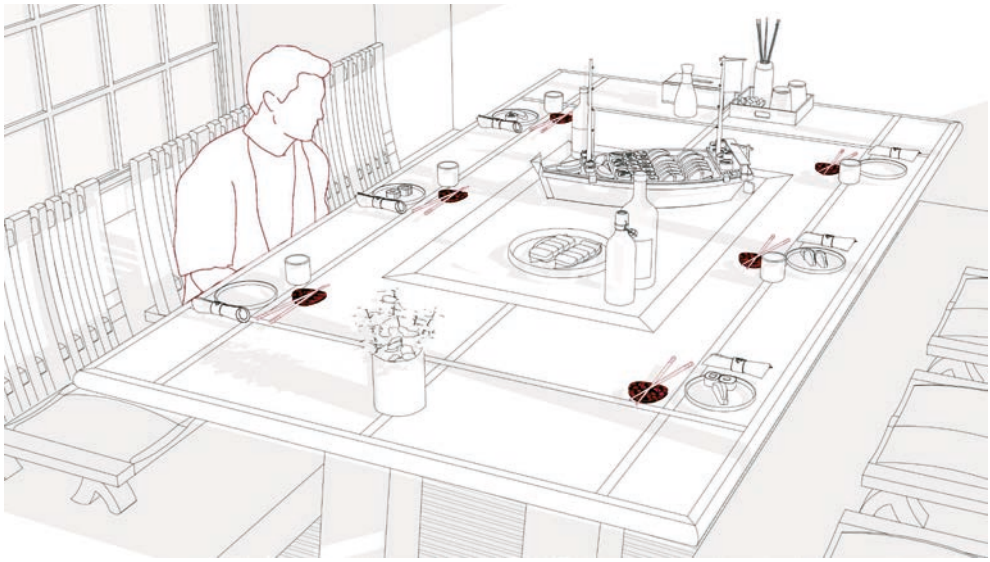
Tiles.



Washbasin.

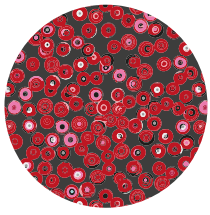
Chaise longue.

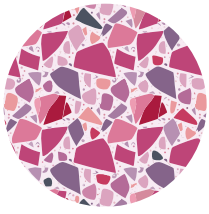
Chopstick rest.

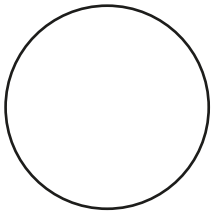


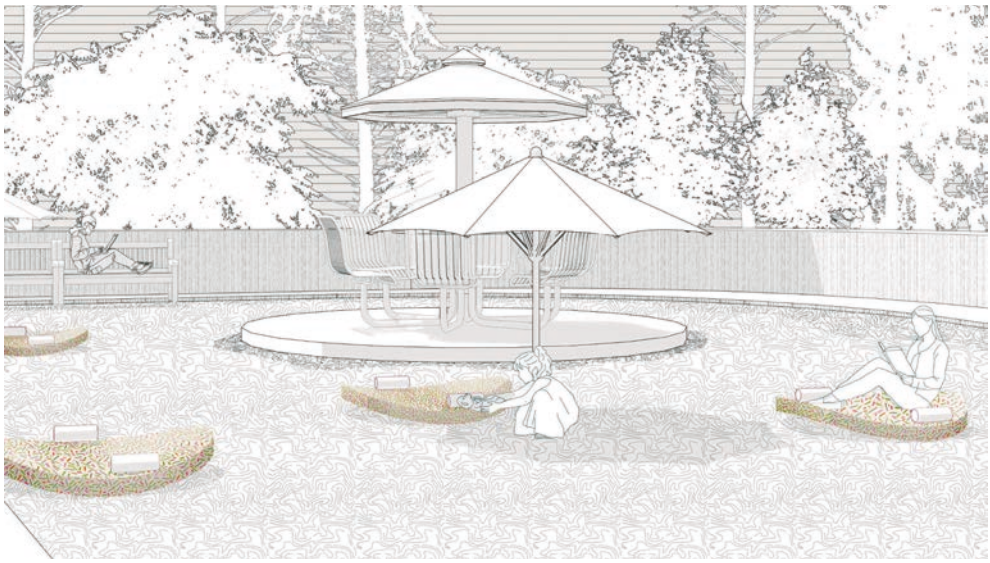
Banquet.

Everythingcarry









Hotsea.

Caressme.

STONET

Spatial relationships between plan and volumetric

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The theme proposed for the development of the design projects was characterized by a deliberate indeterminacy, leaving ample room for broad and open-ended reflections. We were confronted with a situation of non-definition of the design objective, understood as the absence of a clear question and of an expected outcome. A blank sheet of paper: an interesting and challenging opportunity. The only reference provided concerned the naturalness of the materials used and the sustainability of the production process: «We use all-natural materials to create our marble-cement terrazzo: Portland cement, marble aggregate, and water. The entire process requires non heat, so no fossil fuels, and no synthetic resins»[1].

We were aware that the response would necessarily take the form of a design proposal, but not in purely professional or market-oriented terms. As the company's catalogue clearly demonstrates, AGGLOTECH has already produced numerous prestigious works, including large-scale projects distributed across an extensive international context. The university was therefore asked to provide an ideational impulse, a deep reflection on the material itself and on other, different possible applications. Perhaps this also explains the uncertainty of the initial request. Now that the project has been completed, it is interesting to look back and reflect on how the path was approached and what outcomes it generated. This implies questioning the issues upon which the design research grounded its rationale. And sometimes it emerges that the reasons identified retrospectively are multiple and profound.

The possible outcomes of such an open-ended situation could have been many, as demonstrated by the heterogeneity of the proposals developed by the various student groups and their tutors who took part in the initiative.

The visit to the factory took on the significance of being able to see and physically experience the material in its different forms, as well as to follow its production process. Contact with a reality far removed from the academic environment, the understanding of a complex process and its necessary optimization, are just some of the premises that led to the configuration of different scenarios, free in purpose, that is, unconstrained by the need to serve a specific function. The themes of sustainability that must generally be pursued in every field of knowledge and practice, no waste, no squandering of resources, yes to recycling, yes to the valorisation of materials, shaped the proposals of the various groups, offering an interpretative key for both the compositional approach and the technical and formal aspects of the designs.

One might imagine that a company whose core business consists in producing cladding for interiors and exteriors, vertical and horizontal surfaces, with a vast and articulated range of slabs of different thicknesses, cuts, finishes, and colours, would organize its production lines to directly form the finished product, as happens in the case of ceramics and porcelain stoneware. In reality, however, the final product, the slabs, is obtained from a very different intermediate product, which results from the first phase of the production process: large blocks of so-called cement marble, semi-finished elements obtained by casting the cement mixture into large metal formworks. These blocks are then sectioned through multiple saw cuts to produce large slabs or, more rarely, milled and hollowed out to obtain specific volumetric forms according to design requirements: «This unique industrial process allows us to create customized materials»[2].

Once segmented, the block closely resembles, in shape and to some extent in size, the blocks extracted from marble or granite quarries. Looking back, a kind of paradox becomes evident: the lithic aggregates required for the cement mixture at the beginning of the production process, obtained by crushing quarry blocks, are recomposed into new blocks similar to those from which they originated. The production cycle thus seems to return the stone material to its point of departure, as if it had just been quarried from nature. The difference lies in the fact that while stone blocks are directly extracted from the mountain, those of "marble cement" are produced through an industrial process. The second phase of the production cycle, cutting and polishing, is essentially analogous.

From this perspective, one can glimpse the opening of a historically grounded compositional reflection on the use of exposed concrete that marked an era of modern architecture, shifting attention from purely structural value to the expressive potential of surface. Two main approaches emerged: one summarized by Le Corbusier in his so-called "brutalist" works, which combined the idea of "liquid stone" cast in place, and another related to industrial prefabrication, understood as

an intermediate stage for optimizing the construction process. To this day, Italcementi quotes on its website a phrase by Pier Luigi Nervi: «The fact of being able to create cast stones of any shape, superior to natural ones because they are capable of resisting tension, has something magical about it[3]». Cement as liquid stone represents one of the major innovations of twentieth-century construction, embraced by engineers and architects alike. Initially used exclusively for industrial and infrastructural works, it was later adopted in architectural terms as well, first by Perret and then by Le Corbusier, who exalted both its power and the expressive force of exposed concrete. A different condition arises when liquid stone is employed in the production of standardized off-site elements typical of prefabrication, which allows building components to be repeatedly shaped with extremely high levels of precision. As unique and unrepeatable as the trace of cast-in-place material is, so constant and precise is that of prefabrication.

The AGGLOTECH product at the centre of this reflection represents a third path, through which the fascination of artifice is grasped. Its innovative potential lies in the use of cement as a material to be left exposed without any structural necessity justifying its presence, and subsequently worked upon in expressive terms. Cement, freed from structural constraints, becomes a material employed purely as cladding, on floors and walls, indoors and outdoors, restoring a sense of continuous material corporeality between the surfaces of rooms and the overall built volume.

Concrete liberated from structural constraints thus becomes a cladding material used on floors and walls, inside and outside, enveloping the surfaces of spaces and wrapping the entire built volume in a kind of continuous material body.

In this context, the relevance of a text by Ezio Manzini becomes apparent, in which the author identifies in the term "artifacts" the density of a debate already underway in the 1980s and 1990s. Faced with «technical-scientific innovation and man's demiurgic capacity [...] in terms of manipulation of matter[4]», and with increasingly articulated and effective production processes that seemed capable of achieving any result, there was not always a corresponding coherence in terms of values and thought in the objects produced. «Artifact can also mean 'artfully made': a product that emerges from human intelligence and sensibility can express [...] Toward a New Ecology of the Artificial Environment[5]» removes the negative connotation of the term artificial, allowing us to grasp the beauty of what is "artfully made," even when produced by machines or through mechanized processes (Manzini 1990). In other words, an object does not automatically possess greater value simply because it is handcrafted, but because it exists as an artifact. AGGLOTECH's product allows concrete, processed into slabs, to assume this value. Even though the company's communication seems

to retain a certain modesty, emphasizing above all the qualities of machine-made production, along with the naturalness of the components and the sustainability of the process.

Exploring the potential of the countless blends of components used by AGGLOTECH, capable of generating a vast repertoire of finishes, colours, and effects, stimulated an initial research phase captivated by this only apparently limitless artificiality. This led to thinking about possible variations that could be introduced into the compound to achieve new grains and forms. It was not so much a matter of adding materials consistent with what had already been codified, but rather of disrupting the system, introducing what was incompatible. Despite the many possibilities offered by combining different inert materials, the production process imposed limitations related more to the size of the aggregates than to their type. Furthermore, the final product was essentially compact, considered one of the strengths of the slabs, and lacked empty interstitial spaces. This prompted the idea of inserting large aggregates capable of radically altering the fine grain of the material, or heterogeneous elements such as wood to test different effects, or even small hollow spheres that, once the block was cut into slabs, would generate cavities or holes of various dimensions. These are just a few of the hypotheses that emerged, moving beyond the scientific and technical aspects of production and introducing a tension toward the unexpected and the unforeseen. In this sense, the approach recalled Bruno Munari's *Xerographs*[6], in which, by moving rather than holding still the images to be photocopied, he produced unexpected effects, distorting the very logic for which the machine had been conceived. Munari's intent was not merely to pursue surprise for its own sake, but to experiment in order to uncover latent potentials to be recombined for aesthetic purposes. During the development of the project, however, these initial experimental hypotheses were set aside due to the immediate impossibility of realizing them and the need to reach, within a short time, the execution of objects to be exhibited at the "Fuorisalone."

As a first hypothesis, we rejected the idea of designing a piece of furniture in which AGGLOTECH slabs would simply replace the material traditionally used. Nor did it seem meaningful to focus on an "object" whose primary reference was utility.

Instead, the logic guiding the development of the "object" was experimental: while employing slabs, it also aimed to draw attention to the production process and to its intermediate product, the apparently "hollowed-out" block, a transitional state of form prior to its final reduction into slabs, recognizing the block itself as possessing expressive value.

«Everything had broken down [...] new things had to be made from fragments». Kurt Schwitters' phrase became a source of experimental

reflection, inviting us to consider not only the finished product but also the multiplicity of aspects involved in it, from form to production process, reassembling fragments and waste generated along the way.

Two projects emerged from the experience developed by our working group, both employing materials and tools drawn from the production cycle, such as screening meshes, and synthesized into true installations.

One proposal focused on the construction of an articulated, potentially welcoming spatiality; the other on the abstract visualization of the production process. In the first solution, entitled STONET[7], we started from production waste to create an "object" whose composition is based on the modularity of elements, integrating into the installation, made of blocks and slabs, the screening meshes used in stone-crushing machinery, components that are difficult to reuse or dispose of once worn out. The mesh thus becomes an integral part of the final "object."

Composed of two monolithic blocks into which meshes and slabs derived from production and cutting processes are grafted, STONET relies solely on the weight and morphology of the elements, connected through milling operations. Recycling, ease of assembly and disassembly, and flexibility define an object that initially assumes an expressive, almost sculptural value, and only secondarily opens up to possible interpretations of use: a display, an equipped wall, a diaphragm. The representation of materials from the company's production cycle turns it into a three-dimensional synthesis of AGGLOTECH's products. By highlighting the company's potential and its capacity for diverse forms of processing, the expressive possibilities of block and slab surfaces were explored through differentiated treatments, honed, bush-hammered, and brushed, focusing on the "decorative values" of materials and finishes in search of a «expressive underlining of form[8]» (Ottolini, 1996).

Within this design process, on the one hand "geometric-formal," on the other "technical-material", a physical body was defined that exists between object, furniture, and installation, yet fundamentally aspires to an architectural value of its own. This is not because it seeks to didactically summarize spatial elements and individual components, but because the articulation and arrangement of its parts are capable of incorporating spatiality and generating conditions of reception, for objects, people, and gestures.

Within this conscious ambiguity of definition, STONET reinterprets a hybrid of formal and structural systems between "plane" and "volume" (Ottolini 1997), between a spatiality defined by slabs of differing characteristics and materials and one shaped by block volumes. Constructing a space from a company product, beyond adhering to principles of sustainability and reuse, finds in the construction detail the pursuit of

dry assembly without the use of materials other than those produced or employed by AGGLOTECH. The dimensions, geometry, position, and shape of the millings become simultaneously sign and structure, almost a "tomographic" process controlled through design and pattern, combining static principles with compositional rules.

The references and contributions that spontaneously emerged in memory, while remaining embedded within a design process that unfolded gradually, are varied in time and form. All, however, converge in conveying the idea of a spatiality whose meaning is completed through interaction with people. Not an item of equipment per se, nor merely an object to be looked at, but a complexity to be explored.

From Munari's 1971 *Cockpit*, to BBPR's 1946 *Monument to the Fallen in the Concentration Camps*, to Gae Aulenti's room presented at MoMA in the exhibition *Italy: The New Domestic Landscape* (1972), to Alicja Kwade's works in *The Resting Thought* (2019), and Antony Gormley's *Extended Strapworks* (2022), a multiplicity of spatial experiences grounded in a deliberate non-definition of category intersected, acting as implicit companions in the reflection around our proposal.

The experiential dimension of human interaction with the installation introduces a playful character that opens up to the unexpected: interpreting vertical and horizontal planes as seating, reading them as an oversized catalogue of company products, conceiving the grids as permeable diaphragms or dividers, or even imagining the possibility of hanging objects, as in Dorothée Becker's *Uten.Silo* (1969).

The design research also involved experimenting with contrasting qualities in search of balance: the lightness and apparent fragility of vertical slabs versus the heaviness and solidity of the blocks into which they are inserted; the density of the material against the transparency of the screening frames; and again, contrasts in surface treatments, smoothness and sheen opposed to opacity and bush-hammering, reflection versus absorption of light. Inherent in STONET's design is the experimental ambition not to be an unchangeable unicum, but rather the realization of one of many possible configurations in which blocks, slabs, and grids can enter into synergy.

A large base slab placed on the ground, only a few centimetres thick, defines a threshold, a margin, an open and osmotic perimeter in relation to the surroundings, delineating a spatial field in which approaching one feels either inside or outside. It acts like a carpet, an area of pertinence that reinforces the idea of an intrinsic interiority of space in De Carli's thought. «Interior space and objects, through mutual influence, consolidate or transform until they configure, through forms that are illusively complete in every factor, the environment of a home, an office [...] reaching the most subtle values of the meaning of 'architectural cavity,' rich in relationships in every sense; from the apparent finite limits of a 'room' to the variability of the physical

contours of a volume that expands to accommodate the most complex functions of living, or contracts its contours and capacity while equally maintaining a sense of openness through the integration of each of its parts with the others[9]» (De Carli 1967). STONET thus presents itself as a ductile element, inducing possible spatial relationships open to interpretation by people through their gestures and behaviours, which constitute the richness of human life.

Notes

1. So it says on the website of the AGGLOTECH company that wanted and supported this project experience. https://www.agglotech.com/green.
2. Ibidem.
3. «Il fatto di poter creare pietre fuse di qualunque forma, superiori alle naturali, poiché capaci di resistere a tensioni, ha in sé qualcosa di magico».
4. «Un'innovazione tecnico scientifica e della capacità demiurgica dell'uomo [...] in termini di manipolazione della materia».
5. «Artefatto può significare [...] anche fatto "ad arte": un prodotto che emerge dall'intelligenza e della sensibilità umana può esprimere. [...] Verso una nuova ecologia dell'ambiente artificiale».
6. A detailed analysis of the creative process is published in an out-of-print volume published by Ranx Xerox with the title "*Bruno Munari Xerografia. Documentazione sull'uso creativo delle macchine Rank Xerox*" presented at the 1970 Venice Biennale.
7. The name STONET holds together stone and (screening) net.
8. «Sottolineatura espressiva della forma».
9. «Spazio interno e oggetti, per influenza reciproca, si consolidano o mutano sino a configurare, attraverso forme diverse che sono illusivamente complete d'ogni fattore, l'ambiente di una casa, di un ufficio [...]; sino a raccogliere i valori più sottili del significato di "cavità architettonica" ricco di relazioni in ogni senso; dagli apparenti limiti finiti di una "stanza" alla variabilità dei contorni fisici di un volume che si amplia per accogliere le più complesse funzioni dell'abitare; o riduce i suoi contorni e la capacità di contenere, mantenendo egualmente il senso di apertura attraverso l'integrazione di ogni sua parte con l'altra».

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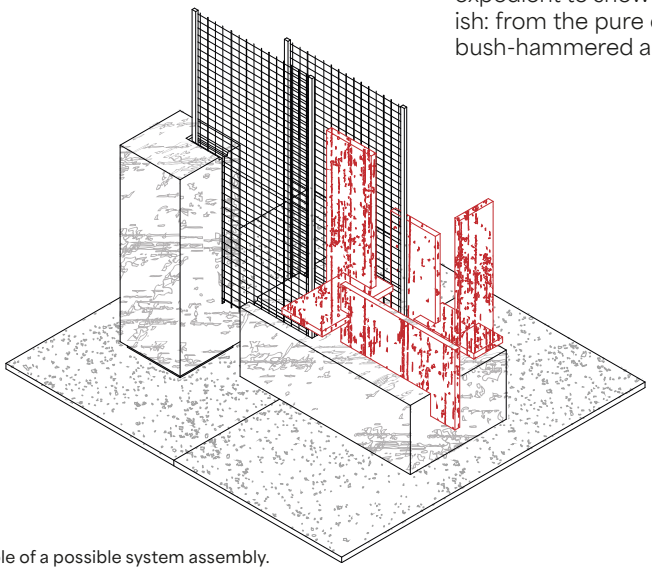
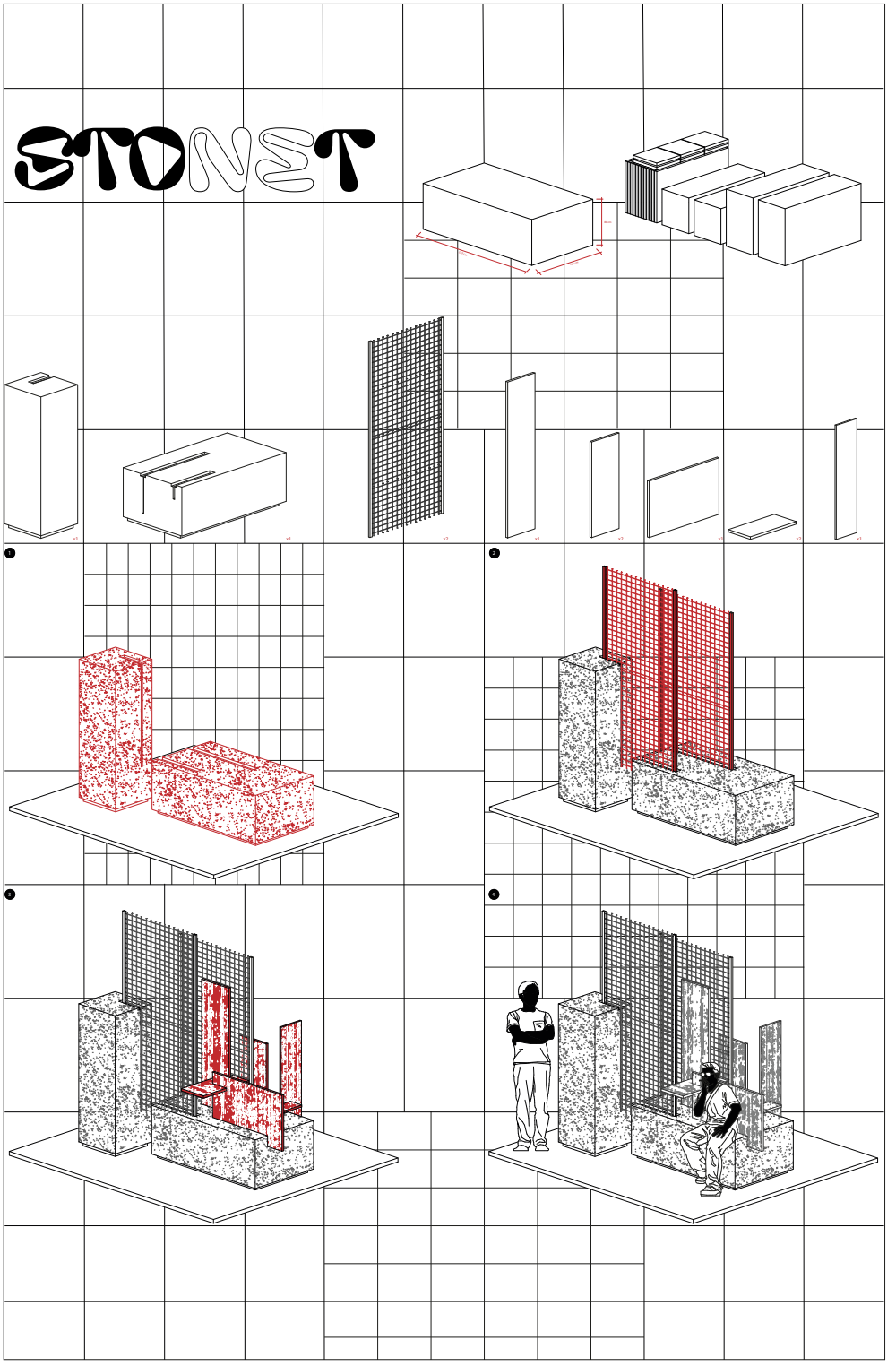
05 STONET

Michele Ugolini
Giulio Bongiorno, Cesar Parizze Lancas, Edoardo Primavesi, Francesco Zarotti

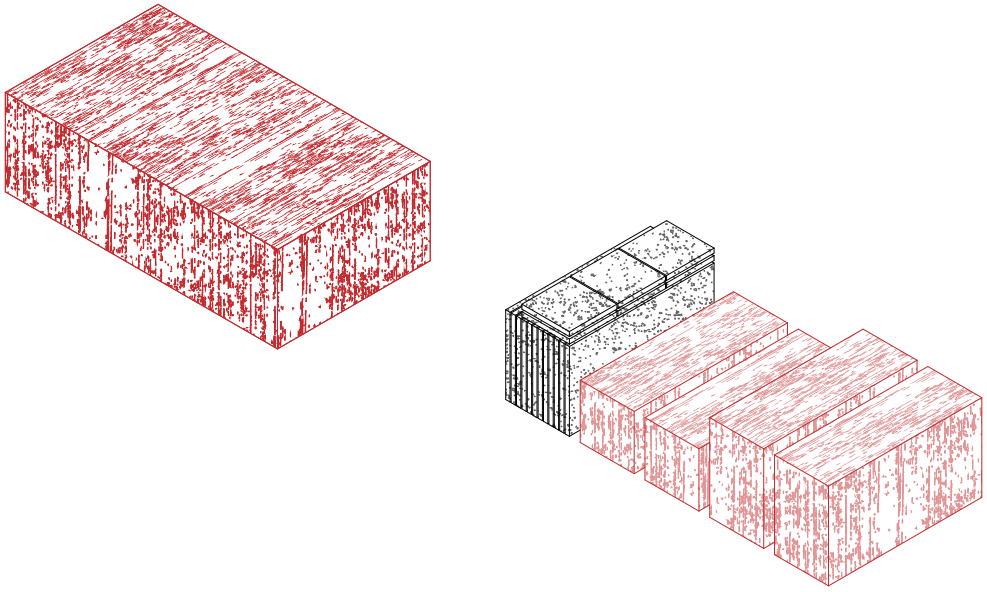
The theme of recycling is the theme on which the project is based. Starting from production waste with the aim of creating an object that not only tells the story of the company's production cycle but that at the same time is sustainable in its production, the goal is to transform a problem, production excesses, into a solution. The modularity of its elements was designed to create the minimum waste for a hypothetical mass production. The story of the production process is further emphasized by integrating the vibrating screen nets of the stone crushing machines into the prototype, elements that are difficult to reuse once worn out. The most complicated artifact to dispose of thus becomes the protagonist of our furniture. Weighing on two monolithic blocks, into which the screen nets are inserted and then the slabs obtained from the production and cutting processes, the object is created through the joints between the various elements. This type of interlocking between blocks-nets-slabs does not require the use of elements external to the company's production and uses only the weight and morphology of the elements to connect them together through various millings. To avoid contact between the various stone elements, which could cause cracks and breakages, an anti-rubbing sealing element has been designed which at the same time allows for greater anchoring.
Ease of assembly - disassembly and flexible function are also central to the project: the object becomes a display unit, a fitted wall, a diaphragm or simply a sculptural element. The representation of the company's production process and its materials also makes it a three-dimensional catalogue for AGGLOTECH and its products. Precisely for this reason, it was decided to treat all the surfaces of the blocks and slabs differently. A useful expedient to show every possible type of finish: from the pure element to the smoothed, bush-hammered and brushed surfaces.



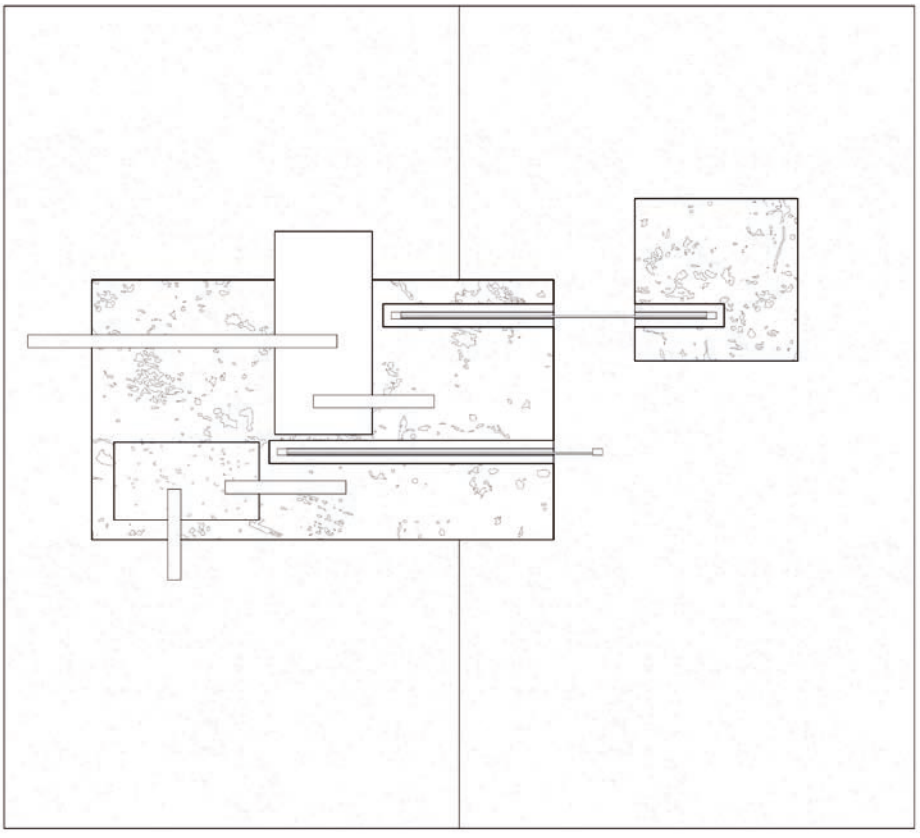
Example of a possible system assembly.

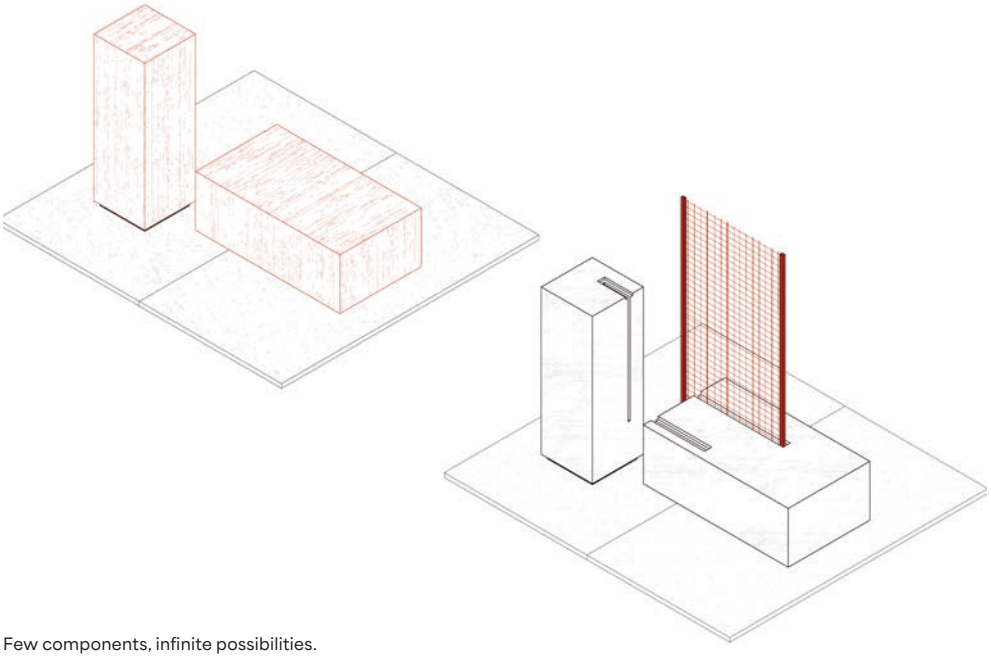


Composition and decomposition of the system into its generating elements.

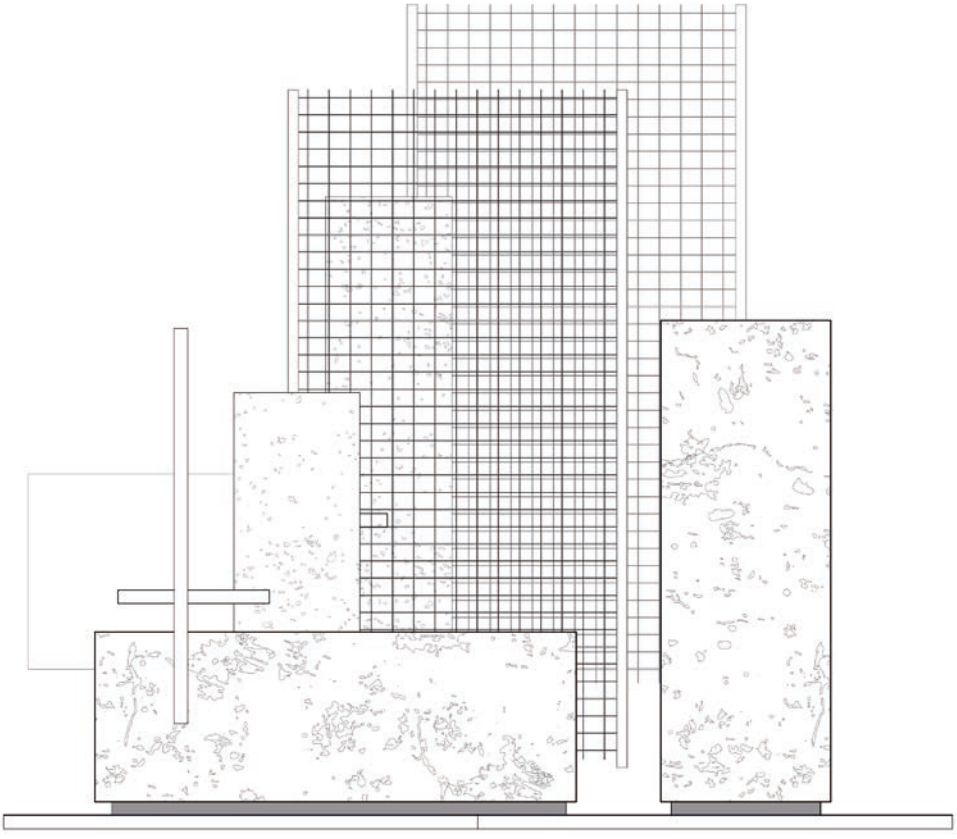


Example of a possible system assembly.





Few components, infinite possibilities.



Habitat

Verticality, modularity, and tectonics. From megastructure to the scale of domestic space[1]

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–
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▸ *Introduction*

The project presented here concerns an equipped, non-fixed piece of furniture, similar to a screen, made with *Architectural Terrazzo* by AGGLOTECH, exploring a novel use for an unusual material for furniture elements. The piece of furniture was titled *Habitat*, for reasons we will see later, and is characterized by modularity and flexibility as it consists of a base of eleven agglomerate blocks (eight 30×30 cm and two 60×60 cm), each of which is configured into different shapes through a process of excavation. The principle of modularity allows for a wide range of combinations: the prototype made provides twenty-two modules in a vertical configuration, but it is possible to obtain a horizontal and low cabinet, a small table or individual seats. Entirely variable is the chromatic range with which the different modules can be made and combined with each other; the granulometry typical of the material used gives them pastiness as much as figurative mutability.

▸ *Spatial verticality*

The Covid-19 pandemic and the emergency response of forced confinements at one's home for longer or shorter periods has often highlighted the substantial inadequacy of many contemporary residences to support the cohabitation of multiple people, engaged in different activities in the same environment. Studying, working, exercising or otherwise, mostly in spaces of limited size and at the same times, has involved daily compromises resolved with inadequate furnishings, unintentional interruptions, disturbing elements. From this experience arose the hypothesis of an equipped piece of furniture, not fixed, but capable of separating a pre-existing space into two areas and which, at the same time, can make adults and children visually interact and offer itself as a jagged and colourful container, albeit under the aegis

of a strict modularity. Several historical references subsume the evolution of a design that is based primarily on vertical development, then characterized dimensionally in the thickness of the material. From the ancient oriental civilization derives the type of the screen, as a mobile structure, formed by a wooden frame and one or more panels, made of paper or silk (Chiarelli 1983, 33). A decorative and functional element at once, the screen generates spaces through the architectural function of dividing, marking a more or less temporary threshold, but with the dignity of a wall partition (Kennedy 1997, 1147-1147). It also takes on symbolic values when it serves as a backdrop for the most important family ceremonies, for religious veneration or to emphasize the status of a person seated before it (Talbot 2013, 20-21). Finally, it also represents the census and importance of those who own it, qualifying as more or less valuable furniture. In the History of Furniture, various makers have reworked the Oriental tradition of the screen in all sorts of contaminations between art, furniture, and architecture, even to unusual expressions, as the recent exhibition *Folding Screens. Folding Screens from the 17th to 21st Centuries* at the Fondazione Prada[2], curated by Nicholas Cullinan (2023). Compared to the graphic and textural experiments of many artists, Jean Prouvé's *Soundproof Panel* (1955), created for the *Centre National D'Enseignement Technique* in Cachan, made of folded steel and perforated aluminium sheet, establishes a different record by interrupting the spread of sound as well as obstructing the view. On the other hand, Isa Genzken's ironic folding screen (1990) made of reinforced concrete, aluminium and hinges contradicts the original ephemeral character of the furniture, placing itself in the environment in the guise of a perforated monolith, which allows the view to sweep, but at the same time limits the passage from one place to another.

In 1964, sculptor and ceramist Pierre Culot materialized a further conceptual step with *Claustras*: the screen was transformed into a piece of furniture consisting of figuratively highly articulated terracotta modules for use in private rooms or public places. Thanks to its thickness, which also serves to make it more stable on the ground, the element offers itself as a display for small objects, as well as taking on an almost masonry-like consistency, but interspersed with a measured transparency. If the most obvious visual reference is Frank Lloyd Wright's *textile block* (Millard House, Pasadena-Cal. 1923), the logic behind Culot's design is that of a partition that plays with Victor Vasarely's abstract figurativeness. In contrast, the need to divide space and provide a protected but open workplace substantiates the *Action Office 2* (*AO2*) system that designer Robert Propst, together with a group of proxemics experts, mathematicians, psychologists and anthropologists, conceived in 1968 for the American company Herman Miller. The design is based on the vertical exploitation of a thin separating

element, of different heights, which can also be sound-absorbing, to which shelves, worktops, small containers can be attached. The idea behind *Action Office 2* is that everyone can choose the way they prefer to work: standing or sitting, on armchairs or stools, around a meeting table or on a single desk. In addition, the furniture encourages the movement of the human being in the space, as opposed to the static sitting position (Forino 2011, 199). In this way, this screen not only divides the environment but also configures a true piece of equipment that, thanks to modularity, can be repeated and varied in the space that accommodates it. These preceding can be considered the main formal and functional cues of the *Habitat* project for AGGLOTECH, which makes use in the granular and coloured component of the company's material to give rise to a visually striking dividing element. Set on a modular mesh, which allows for its easy technical reproduction, its perforations can be changed as needed, without forgetting the point of view of the adult or child who will interface with it. Between the utilitarian and the decorative, *Habitat* thus establishes a different conception of furnishing space, transfixing it, occupying it, equipping it.

▸ *Habitat*

The project for AGGLOTECH takes its name "on loan" from one of the best-known technological utopias of the late 1960s, namely Moshe Safdie's *Habitat '67*, built in Montreal for the 1967 Expo. It matured in a period of great interest in megastructures, considered a solution to the crisis of large cities, and was based on a simple and effective principle, namely, to repeat certain typological modules until a gigantic irregular composition of cells stacked in apparent disorder was obtained.

In general terms, megastructures can be analysed from the point of view of figurative and settlement concreteness understood as the ability to provide a place where one lives well.

The images that megastructures offer are a combination of utopia, naiveté and expressive power and are all the more effective the further they are from reality. Archigram's beautiful drawings have probably found their most authentic dimension on the web since the digitized archive[3] was made accessible. Manfredo Tafuri was not wrong to define them as "graphic *divertissments*" (Tafuri 1979, 347), identifying in all megastructural works a common desire to simplify urban complexity into a technological object. The living space was not only the expression of a figurative intentionality, but above all of a technical necessity, multiplied in its power by the very large size. A second side to consider is the ideological violence of megastructures: they find an archetype in Charles Fourier's *Falansterio* and the desire to control people's behaviour by concentrating a multitude in a large container, perhaps fragmented into many smaller habitations. The search for the large size for living has been very problematic as demonstrated by the

cases in Italy of the *Vele di Scampia* and *Corviale* are known (Lucchini 2003).

Internationally, the artifact conceptually closest to *Habitat '67* was Kisho Kurokawa's *Nakagin Capsule Tower*, an ill-fated icon of metabolism built in 1972 and demolished 30 years later, after a long abandonment caused by less than comfortable living conditions, despite a few courageous attempts to re-inhabit it animated by architectural passion (Magalaes, Soares 2013).

Habitat '67 had a greater concreteness. Shafdie had skilfully interwoven the megastructural principle with the «stepped dice[4]» image (Banham 1980, 119) that alluded to the seemingly random aggregate of small buildings in the spontaneous architecture of Mediterranean contexts. Moreover, his design sense horizon was to build a 1:1 scale prototype to be displayed together among other futuristic objects, such as Richard Buckminster Fuller's *geodesic dome*. At the scale of living, the reduction of the building from the planned twenty-two stories to the realized eleven helped determine, arguably, a more human scale. The prefabricated modules, in addition to offering a good variety of surfaces (apartments ranged from 57 sq.m to 160 sq.m in both simplexes and duplexes), did not stray too far from the image of the "house," understood as a recognizable figure in which to live comfortably. Shafdie himself owned an apartment, recently restored and opened to the public as a museum (Gibson 2018). Critics' minds continue to be drawn to the unusual morphology (Gopnick, Sorkin 1998, 23-24) and enviable location, as the complex, situated on a peninsula, allows views of both the St. Lawrence River and Montreal's Old Port. Canadian designer Byron Peart, who was struck by the architecture of Habitat '67 as a child when he visited the complex, has been realizing his dream of having a home there for a few years now: through a collaboration with EMarchitecture studio, he redesigned the interior of one of the housing modules with the intention of maintaining its original spirit. By dosing Scandinavian design, quotes from Mies, Bauhaus, and industrial design inspired by 1950s America (Bozikovic 2012), he achieved a *cozy* and, at the same time, suitable for receiving many guests, thus adapting the house to a professional need. The morphological regularity of the rectangular modules and the possibility of enjoying double-height spaces enhanced the design choices so that, for example, the Bulthaup kitchen arranged under Tom Dixon's *Beat Lights* lamps is in visual continuity with the *Cubit*® bookcase upstairs. *Habitat '67* belongs to a category of artifacts in which jumps in scale are facilitated both by the structure based on repeatability and by the extraneousness to the geographical context on which they rest without entering into relationship with it, except visually. We can speak of an ambiguity of scale between the object and the architecture: on the one hand, megastructures would like to be cities, but on the other

hand they are machines, such as Hans Hollein's 1964 underground aircraft carrier projects or Paolo Soleri's 1967 *Orbital arcology*, referable to Le Corbusier's steamships. The design for *Fort l'Empereur* of 1931, considered the matrix of all megastructures, can, according to Reynar Banham, be considered a «book shelf[5]» (Banham 1980, 3); in this statement by the English historian, the sense of *scaling* between *Habitat '67* and *Habitat* for AGGLOTECH is condensed. The latter transfers the properties of mega-structures into a domestic dimension, thus ridding itself of utopian and technocratic instances. *Habitat '67* is one of the few megastructures in which one can speak of tectonics, both because it was actually built and because the individual modules made of exposed reinforced concrete, in addition to being stereotomic and solid, are the components of a hierarchical and open structural order. *The Habitat* furniture for AGGLOTECH takes up this principle by interweaving stereotomy-the individual elements of *Architectural Terrazzo* are solid blocks, in which space is hollow and obtained by subtraction-with the discontinuous principle of analytic architecture, in which form is composed of simple elements assembled together in a hierarchical system. Tectonics, as is well known, is a theory of architecture that gives conceptual force to the "making" of craftsmanship and refers, in general terms, to the assemblage of different materials, in terms of form and texture, in such a way that they represent the logic of construction either directly or indirectly: in fact, a coating capable of "lying" about the actual construction technique is allowed. On the one hand, tectonics justifies the leap in scale of the screen-furniture from the urban to the domestic dimension; on the other, it places it in the realm of the "light" and textile walls that had fascinated Gottfried Semper when he had occasion to see the Caribbean hut. But the textile wall would not be architecture, only good craftsmanship, if there were not an "invisible," an abstract dimension working at the scale of the imaginary. The modules of the furniture-screen are small houses because they represent, through a metaphor, the sense of being in a space on a domestic scale. Moreover, they evoke a synthesis between form, cubic on the outside and convex on the inside, and material since the latter generates form itself through the tectonic principle of subtraction: «Form is formed matter[6]» (Frampton 1999, 42).

Notes

1. Although the result of a common reflection, the Introduction should be attributed to both authors, par. 1 to Imma Forio and par. 2 to Marco Lucchini.
2. Milan, 26.10.2023-26.02.2024.
3. http://archigram.westminster.ac.uk/ [Accessed 24/06/24].
4. «Dadi gradonati».
5. «Scaffalatura per libri».
6. «La forma è materia formata».

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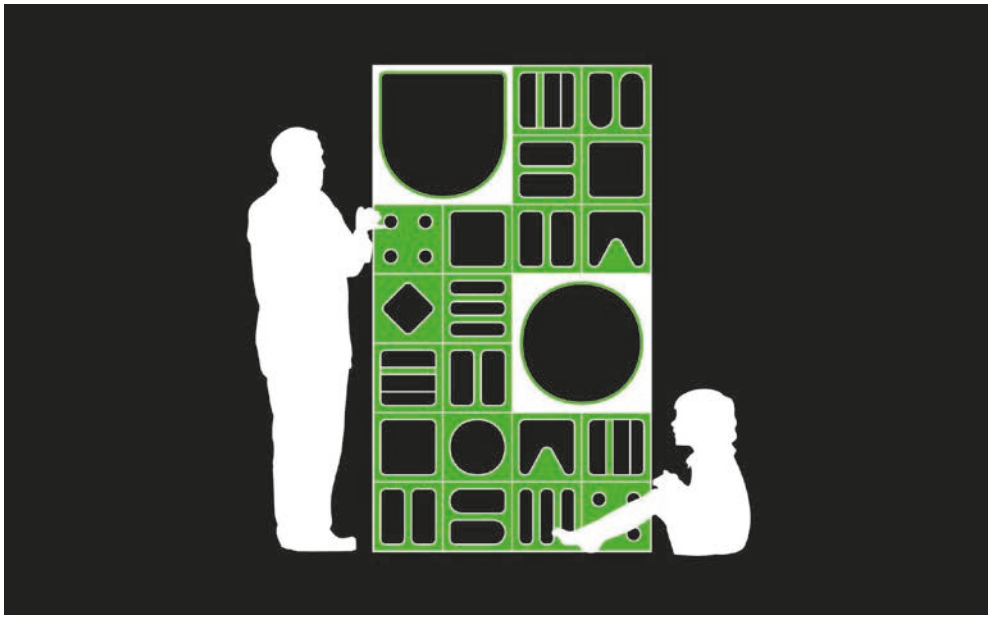
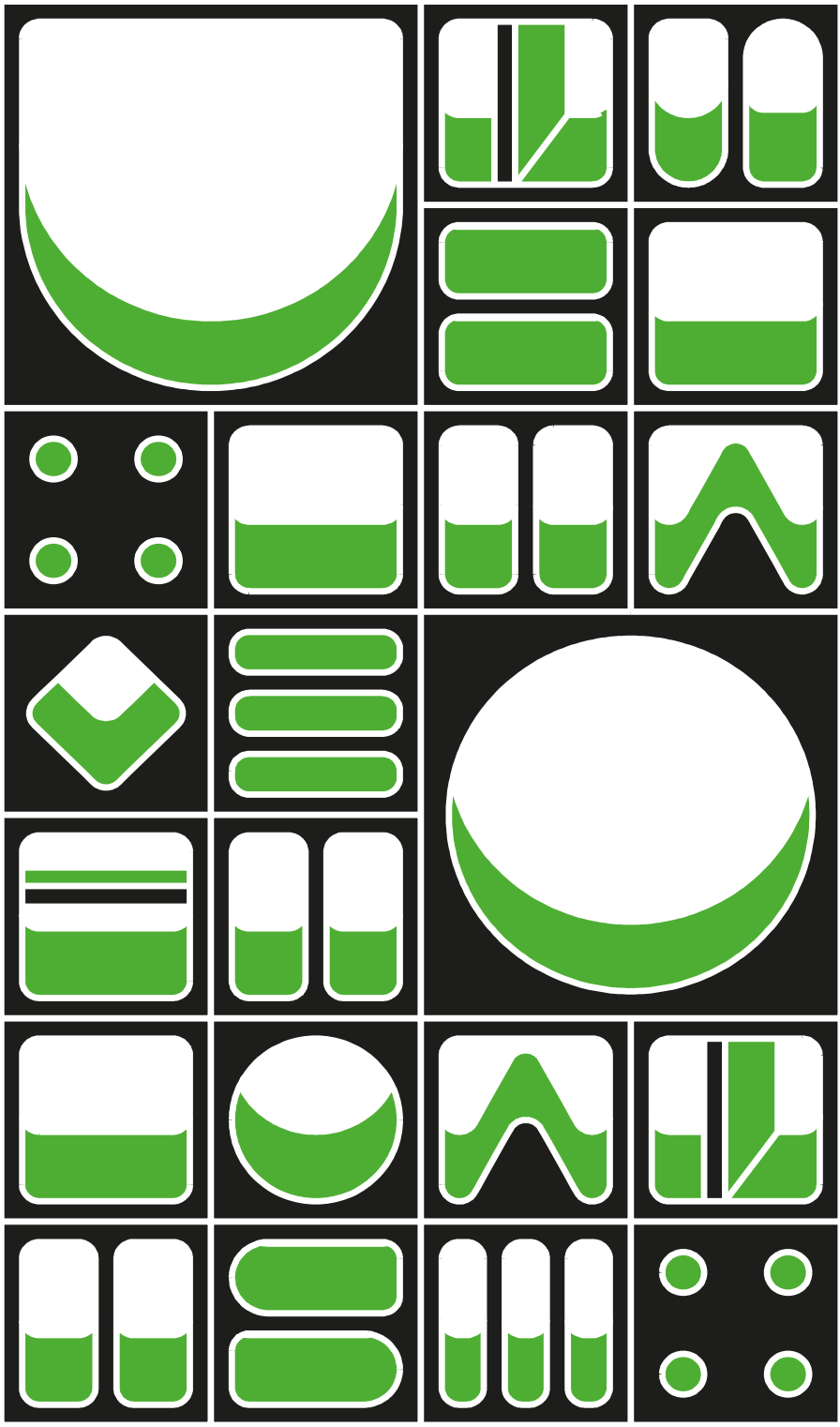
06 Habitat

Imma Forino, Marco Lucchini
Agnese Biondi, Lisa Bosco, Thomas Garofalo, Beatrice Varini

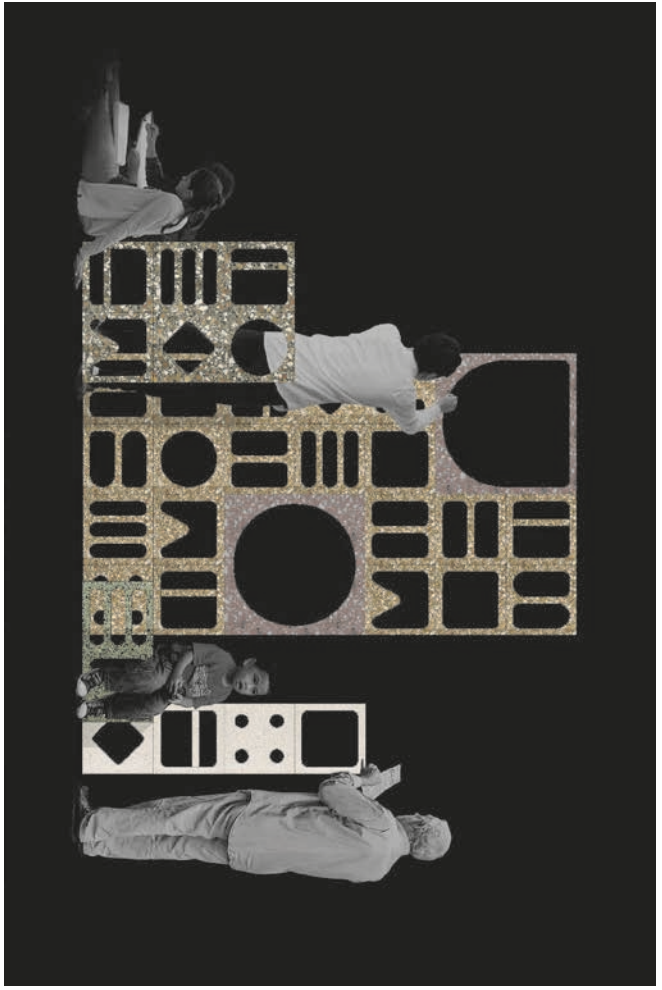
AGGLOTECH's Habitat was inspired by a demonstration project from the 1967 Montreal World's Expo, which pioneered the prefabrication and modularity of components. A partition or fitted wall, Habitat is a perfect example of design that transforms living space into a dynamic and customizable experience. It is composed of a series of blocks, each of which is a functional artifact in itself, which can be made in various colours of terrazzo, creating different atmospheres based on the desired effect. The distinctive feature of Habitat is its ability to be assembled in infinite typologies, thus offering various configuration possibilities. The blocks are designed with interiors hollowed out in different ways that allow them to accommodate a wide range of objects of different sizes and shapes. Each block can thus be used as a shelf, a divider or even as a seat, depending on the needs and preferences of the user. The name "Habitat" was chosen to reflect the concept of creating an environment that is inhabited by both objects and people. Each block becomes a small habitat in itself, welcoming and organizing objects in a creative and efficient way. Thanks to its flexibility and versatility, Habitat adapts perfectly to a wide variety of environments and is an ideal option for those who want to maximize the available space and at the same time express their creativity.



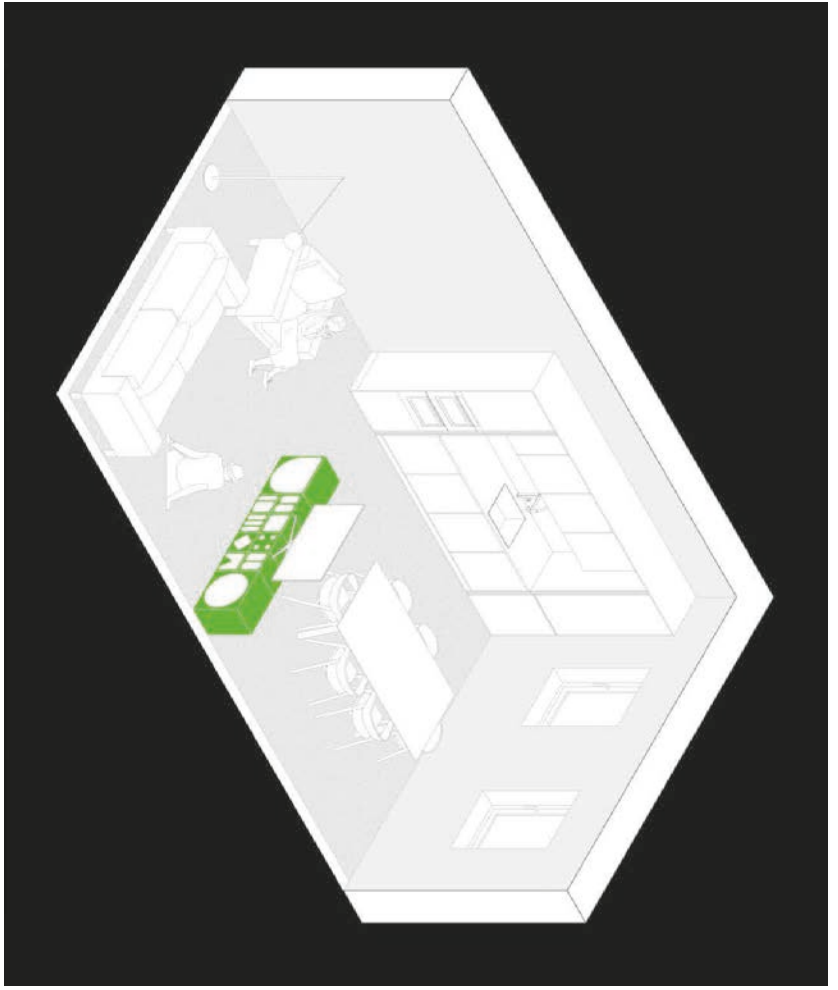
Habitat furniture element in relation to anthropometric measurements.



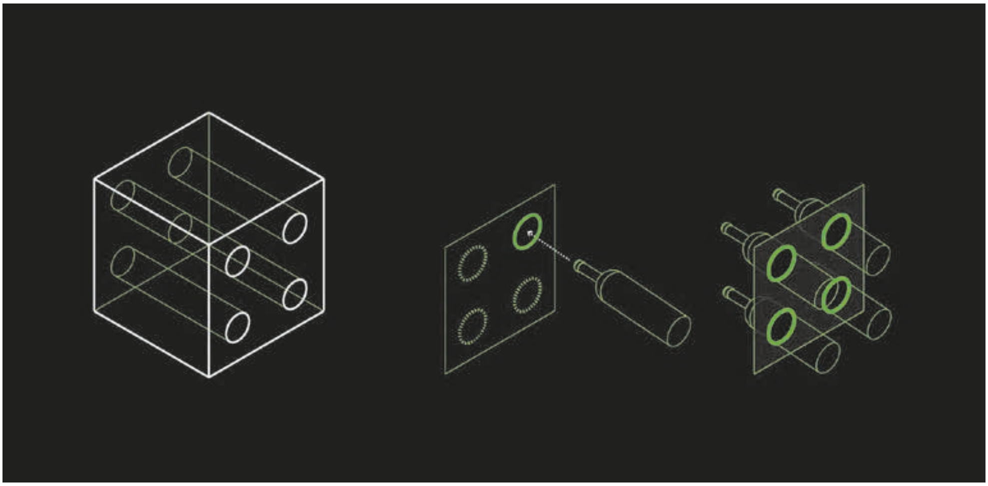
Elevation of the Habitat furniture element.



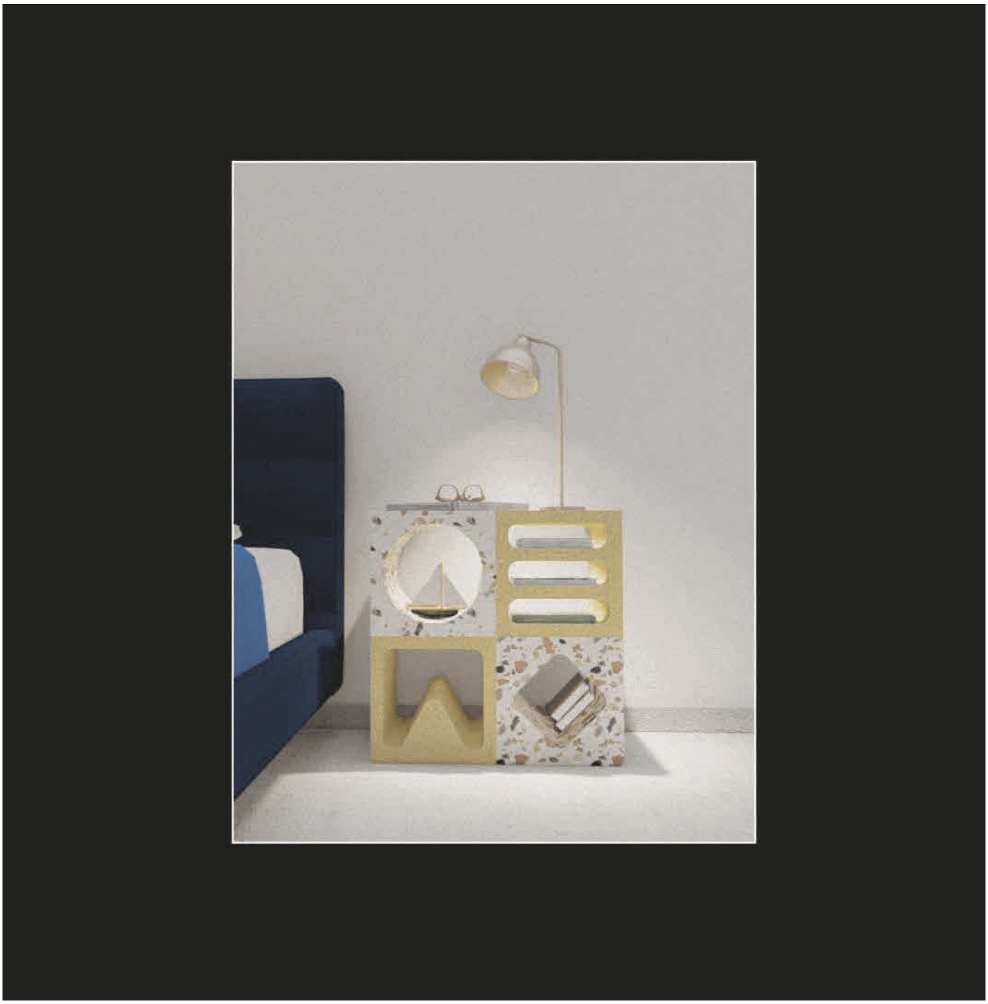
Hypothesis of a Habitat composition with different modules that expand its possible uses.



Configuration hypothesis of Habitat as a TV stand.



Hypothesis of using Habitat as a bottle holder.



Hypothesis of using Habitat as a bedside table.

Designing the envelope

Between technological experimentation and formal exploration

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The separation between enclosing architectural elements and the structural system along the vertical perimeter of buildings represents a pivotal moment in architectural history, opening up new formal, compositional, and technological trajectories (Beccu, Paris 2008; Nicolin 1999). From Paxton's Crystal Palace to the first U.S. skyscrapers of the late nineteenth century, from the architectural experiments of Behrens and Gropius to the emergence of the International Style, a profound revolution in the conception and construction of architecture unfolded in less than a century. The development of discontinuous reinforced concrete and steel structural systems with increasingly reduced footprints, together with the retreat of vertical structures from perimeter walls, led to a growing independence between enclosure and structure, eventually defining conditions of relative indifference between the building skeleton and the building envelope. Thus, on the one hand, the structural frame, realized through point and/or linear elements, and, on the other hand, the infill systems, initially conceived as simple closures and later assuming increasing functional complexity as filters between interior space and the external environment. Central to this transition was the cultural contribution of the Modern Movement, whose principles, including the *façade libre*, deeply influenced building production throughout the twentieth century, generating a wide range of formal outcomes[1], extending through postmodernism, high-tech architecture, and the articulated spectrum of contemporary architectural languages.

The shift from the unity of organism and envelope to the autonomy of the façade also implied the overcoming of the monolithic wall in favour of vertical enclosure systems composed through the juxtaposition of multiple functional layers. The decomposition of the envelope's technological unit into distinct components, from thermal insulation

to air- and water-tightness layers, testifies to the increasing attention, in recent decades, to achieving ever-higher performance levels aimed at containing energy demand and reducing environmental impacts across the entire building life cycle (Arbizzani 2021). The façade thus assumes the role of a sophisticated device for regulating energy flows, light, heat, air, through the design of material and component stratifications, both fixed and dynamic. In this sense, the technological dimension of the envelope is emphasized, together with the definition of environmental and performance requirements that must be ensured[2], in line with the Modern Movement's conception of architecture as a *machine à habiter*, capable of adapting to external climatic conditions.

According to Paris (Beccu, Paris 2008), two opposing trends can be identified in contemporary envelope stratigraphies: on the one hand, envelopes composed of monofunctional multilayer systems; on the other, systems based on multifunctional single-layer solutions. The first strategy consists of alternating layers, each assigned a specific function, culminating in an external cladding layer whose quality largely determines the architectural expression pursued by the designer. Issues related to the control of air and light flows often become decisive in architectural choices, influencing façade composition through devices such as double skins, air buffer zones, double window frames, ventilated walls, and various types of open-joint systems. Cladding materials provide differentiated performance levels, modulating the balance between transparency and opacity and enhancing control over heat loss. The relationship between envelope and structural system thus becomes increasingly complex, or, in some cases, deliberately indifferent, while questions of connection and anchoring assume a predominantly technical character, intertwining architectural design with specialized engineering expertise in structural resistance, fire safety, and building physics. Within this context, the growing need to reduce heat loss and contain energy consumption has driven the trend toward complete structural "cladding," ensuring continuity of the insulation layer between interior and exterior[3] and, consequently, fostering the expressive autonomy of the building envelope. The second trend in technological research focuses on enclosure systems capable of delivering multiple performances through single multifunctional components, such as honeycomb blocks filled with high-performance insulating materials (graphite-enhanced polystyrene, mineral wool, polyurethane foams), autoclaved aerated concrete blocks, and timber-based systems (lightweight wooden walls, engineered wood, flat elements made of multilayer panels), where the cladding material itself performs a finishing function. Innovation in glass façade systems must also be considered, with frames of progressively reduced thickness offering improved thermal transmittance performance, along with an increasingly diversified range of glazing solutions, including low-emissivity and selective glass.

In the context of the contemporary climate crisis and in light of international decarbonization objectives, the building envelope has increasingly become a focal point for designers and researchers seeking to optimize the relationship between buildings and their context while limiting construction-related impacts[4]. New requirements are emerging for envelope systems, including adaptability to varying environmental conditions, high thermal insulation performance, reduced maintenance, reparability, the use of low-impact materials, recyclability, reversibility, and integration with building systems. These demands call for coordinated efforts among manufacturing, research, and design sectors to rethink and innovate the envelope both technologically and formally. Smart façades, biodynamic façades, biomimetic façades inspired by natural processes, and adaptive envelopes now represent some of the most advanced frontiers in architectural technology (Sala, Romano 2011; COST 2018). This extensive field of experimentation encompasses building components, such as shading devices, insulation layers, and elements for thermal energy absorption and storage, materials including thermochromic, electrochromic, photochromic, and electroactive materials, shape-memory polymers, hydrogels, porous natural materials, and textiles, as well as entire building systems such as curtain walls, prefabricated modules, double-skin façades, and ventilated façades. Of particular interest are experiences involving the integration of nature-based solutions (NBS) into façades. The use of NBS in the built environment, at both building and urban scales, has long been recognized in scientific research as an effective strategy for climate change adaptation and mitigation, due to the ecosystem services provided by vegetation, such as microclimatic regulation, air pollutant absorption, and stormwater management, while also contributing to reduced building energy consumption (Mussinelli et al. 2018). Reference is made here to green façades, living walls, and vegetated wall systems.

Within this framework, defining design approaches capable of integrating technological demands, aimed at achieving high environmental, energy, and functional performance, with compositional and expressive intentions becomes increasingly crucial. The vast range of contemporary realization possibilities, supported not only by continuous innovations in manufacturing processes and construction-site organization[5], but also by the extraordinary potential of architectural representation and information control tools, from Building Information Modelling to computational design and emerging applications of artificial intelligence, must not allow envelope design to devolve either into an exclusively technical domain dominated by façade engineering specialists, or into a merely aesthetic exercise of surface embellishment and masking of the architectural organism.

The design proposal developed by the working group, coordinated by Massimo Facchinetti and Giovanni Castaldo and comprising

Francesca Giotto, Valeria Maddaloni, Jordan Lo Vecchio, and Michele Vignotti, is situated precisely within this conceptual framework. Collaboration with the company AGGLOTECH stimulated the group's interest in defining a methodology capable of maximizing compositional and expressive potential while optimizing the production process of façade cladding elements.

The foundation of the design research lies in the principle of combinatorial calculation, articulated through the definition of rules governing possible configurations of façade cladding modules, derived from a series of variables related to the company's production cycle. These initial variables include the chromatic characteristics of the composite material, with a catalogue exceeding 6,000 solutions; surface finishes (honed, polished, brushed, bush-hammered); dimensional and geometric properties of the slab elements; and the combinatorial relationships among these elements.

While the use of mathematical principles in architectural composition, such as the Fibonacci sequence or fractals, is well established, the construction of a matrix that simultaneously integrates production constraints, functional requirements (adaptability, customization, cleanliness, recyclability, maintainability), aesthetic-compositional criteria, and geometric parameters represents a line of inquiry that remains open and potentially innovative for companies operating in the façade cladding sector.

In the prior design experience of several group members, the pursuit of compositional order in façade components and the integration of functional layers within an organic architectural conception have been recurring objectives. A notable example is the coordination of the façade for the extension of the Casino Theatre in San Pellegrino Terme (2010). Here, corten steel panels perforated according to a geometric pattern derived from a numerical sequence are cut, assembled, and combined through bending, rotation, and inclination, imparting a distinctive expressive quality to the envelope while respecting the adjacent historic structures and ensuring high variability. At the same time, this façade system, combining corten sheets with a curtain wall, responds effectively to shading requirements and the provision of diffuse natural light for the theatre's new foyer. A similar approach can be observed in other projects by Facchinetti, such as the Wellness Centre *The Rose in the Desert* in Abu Dhabi, the façade of the Tunis Tower in Tunis, and the library hall in Alzano Lombardo (BG), all of which foreground customization of façade modules, cut, perforated, shaped, surface-treated, and the application of geometric-mathematical rules to organize façade composition.

Building on this research trajectory, the proposal developed by the working group seeks to conceive and communicate an order tending toward infinity in terms of combinatorial possibilities, or at least an

exponential number when considering alternatives derived from production processes and geometric choices. This set of sequences becomes even more extensive when multifunctionality is introduced into the envelope system. In contemporary architecture, façades can perform a wide range of functions: integrating lighting systems, hosting NBS or innovative materials (e.g., photocatalytic surfaces), supporting communication and advertising devices, or accommodating building systems such as photovoltaic panels, mini-wind turbines, energy storage systems, and heat pumps. These aspects further expand the range of formal outcomes and application scenarios for the proposed model.

The design of the contemporary building envelope thus emerges as both a highly challenging and particularly delicate issue within professional practice, situated at the intersection of multiple specializations and subject to constant innovation and experimentation. This condition risks fragmentation of expertise and a loss of design coherence. It is therefore an issue that must be substantively addressed within architectural education, avoiding approaches that are either purely technical or exclusively compositional, in order to preserve, or restore, the central role of the architect within the building process (Schiaffonati 2017). In this sense, collaboration with a company operating in the cladding sector, through internships organized in working groups coordinated by academics and professionals during Milan Design Week 2024, represented a significant and almost unique opportunity to pursue a synthesis between production, professional practice, and education, by engaging with an emerging theme in a real-world application context.

Notes

1. One need only think of the articulated Italian architectural production of the 1950s and 1960s, which highlights in its various local declinations the issues of continuity-discontinuity of the façade and the figurative autonomy of the envelope with respect to the building organism.
2. Reference is made to the so-called exigency-performance approach to design theorized by the scientific-disciplinary field of Technological and Environmental Design (Architectural Technology) and then to the meaning of quality consolidated since the 1980s with the first voluntary quality standards (ISO). Consider in particular the definition of building quality expressed in UNI 10838/1999, which states, «*Insieme delle proprietà e delle caratteristiche dell'organismo edilizio o di sue parti che conferiscono ad essi la capacità di soddisfare, attraverso prestazioni, esigenze espresse o implicite* (Set of properties and characteristics of the building organism or its parts that give them the capacity to satisfy, through performance, expressed or implied needs)».
3. Over the past three decades, attention to the thermal insulation of buildings has grown significantly, driven by the need to reduce energy consumption and CO_2 emissions. Thermal insulation has become a key element in buildings such as "Passive Houses" and "NZEBs" (Nearly Zero Energy Buildings), which combine the use of passive systems, such as high-performance insulation materials, and active systems, such as controlled mechanical ventilation systems with heat recovery, but also the combination of systems for the production of energy from renewable sources (thermal and photovoltaic solar panels, heat pumps, etc.).
4. The building envelope is undoubtedly fundamental in optimizing the relationship between the built and the environment, however, it is not sufficient. Therefore, other design principles theorized and developed by the discipline of Environmental Design related to orientation, exposure and sun lighting, form relationship, building aggregation and density, microclimatic characteristics of places, and internal distribution of buildings remain central.
5. Since the early 2000s, the manufacturing industry sector has made significant progress with the putting into production the new materials and components: from premixed cements to presorted plasters, from ceramic coating products to semi-finished products for the building site, to more complex systems such as, for example, ventilated facades, structural glazing and photovoltaic systems. An increasingly broad catalog in terms of solutions and performance levels offered. This has led today to a construction site increasingly oriented to the off-site dimension and characterized by lightweight construction techniques and dry assembly (Arbizzani 2021).

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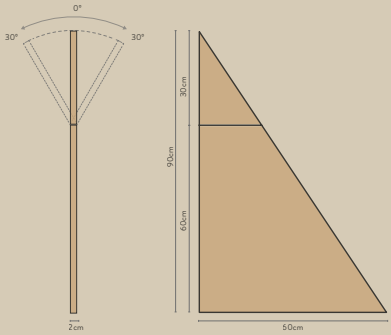
07 1 → ∞

Giovanni Castaldo, Massimo Facchinetti
Francesca Giotto, Jordan Lo Vecchio, Valeria Maddaloni, Michele Vignotti

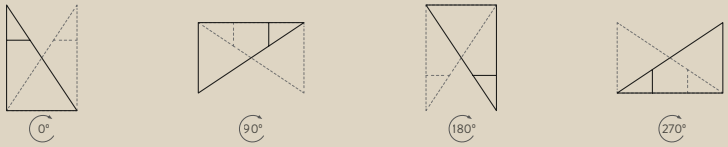
The project consists of a new type of facade cladding system, based on the triangular module as the basic unit. This module, characterized by legs of 90 and 60 cm, can be rotated or mirrored. A distinctive element of the project is the creation of a triangular sub-module, with legs of 30 and 20 cm, corresponding to a third of the size of the original module.
This small triangle can be tilted by +30° or -30°, allowing the generation of adaptable spaces for various applications, such as the integration of lighting systems or plant containers.
The project takes full advantage of the peculiarities of the Terrazzo material, including the wide range of colors available and the four different finishes: smooth, polished, bush-hammered and brushed.
The name of the project, 1 → ∞, emphasizes the possibility of creating an unlimited number of configurations thanks to the variation of rotation, mirroring, inclination, finishing and colors of the triangular modules, thus offering a wide range of aesthetic and functional solutions for architectural facades.

Triangular facade module.

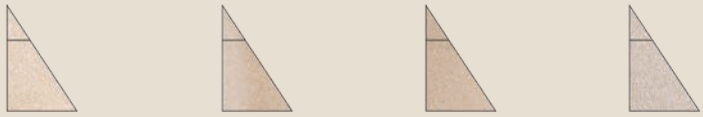
MODULO
POSSIBILITÀ[3]



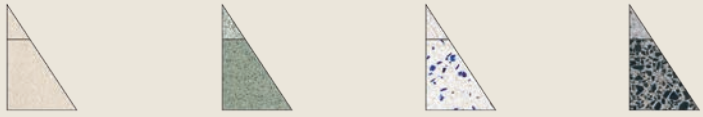
GEOMETRIA
POSSIBILITÀ[8]



FINITURA
POSSIBILITÀ[4]

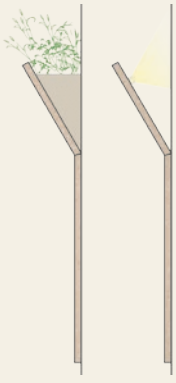


COLORE
POSSIBILITÀ[3663]

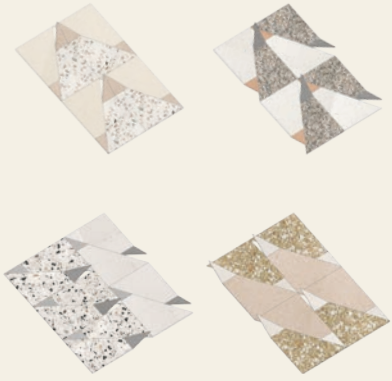


APPLICAZIONE
POSSIBILITÀ[∞]

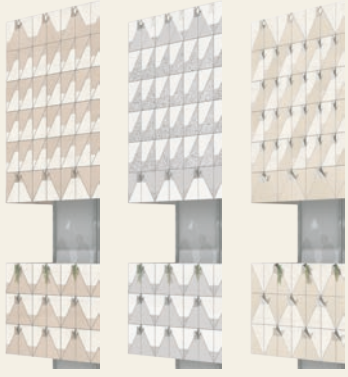
FUNZIONALITÀ



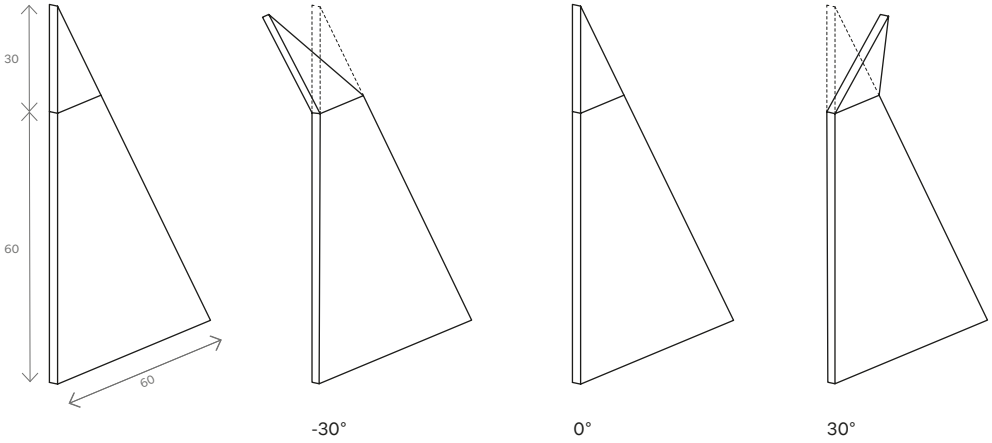
AGGREGAZIONE

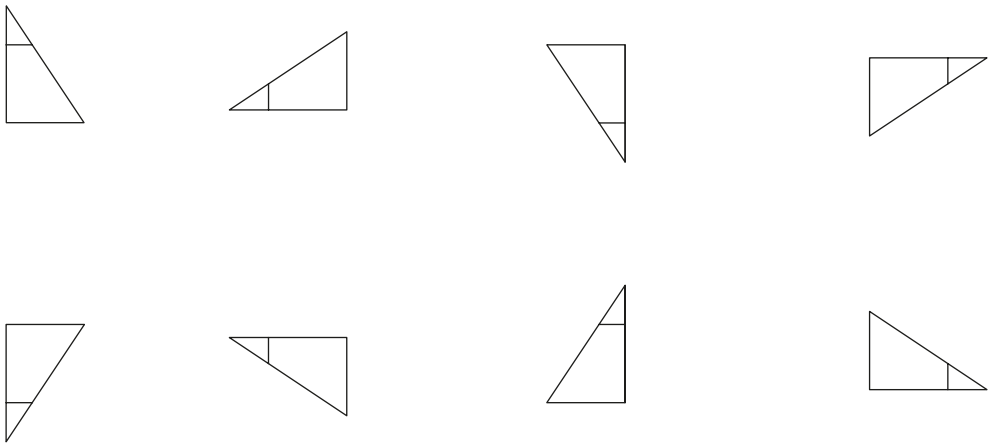


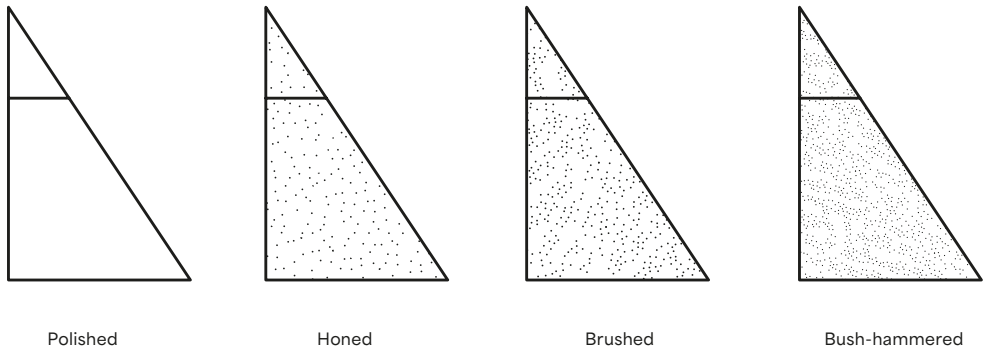
COMPOSIZIONE



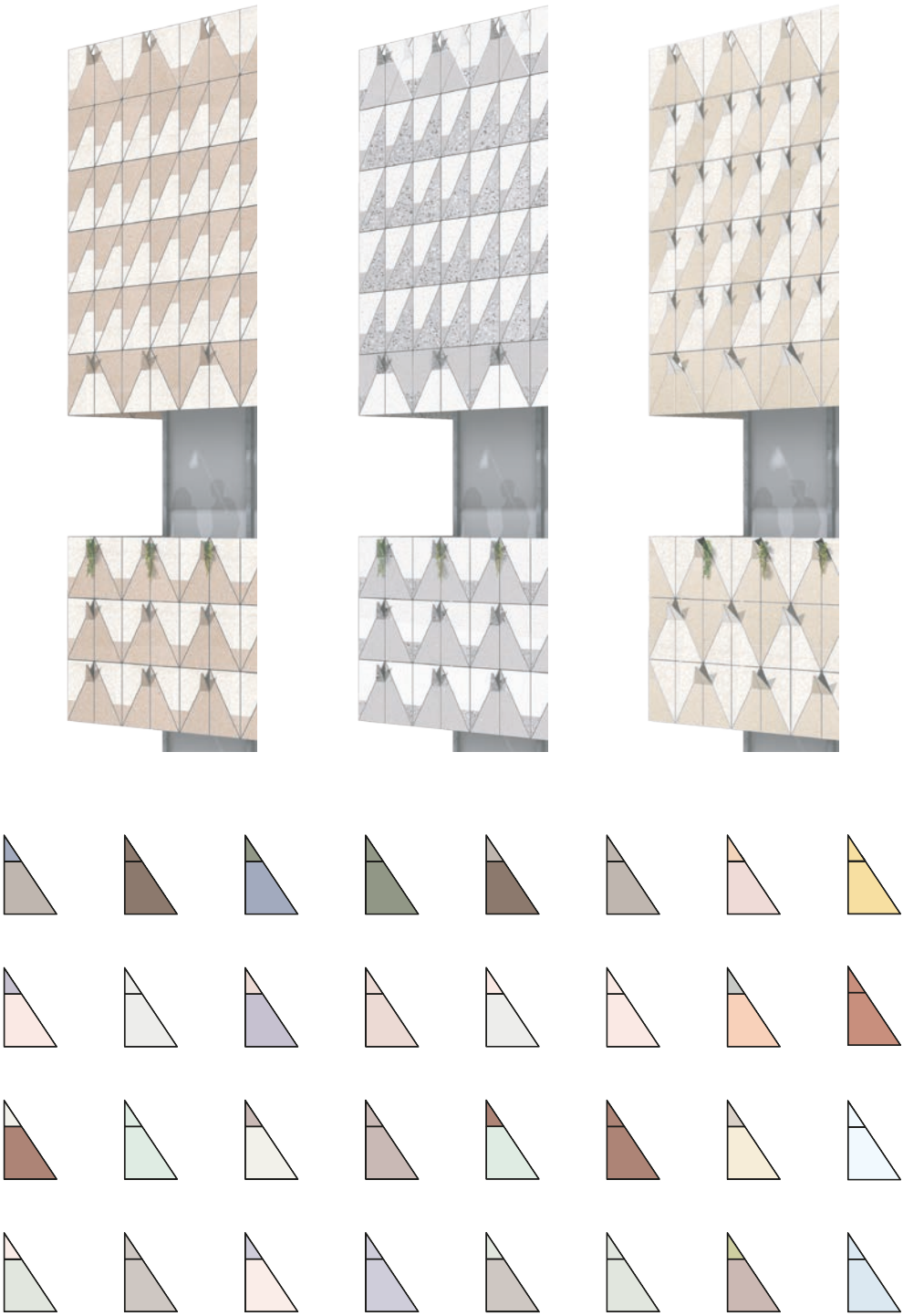
Possible configurations and combinations.







Variants and finishes.



Spatial, material and chromatic characteristics of the facade system.

Circular Design

Towards carbon neutrality: let’s start from nature

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The current climate emergency assigns renewed priority to design strategies aimed at climate change mitigation and adaptation. This text seeks to provide several useful insights into the systemic approach of designers, drawing in particular on the concept of design for a generative circular economy (Kelly 2012). That is, a form of design compatible with the regenerative cycles of natural ecosystems, of which the built environment is an integral part. In particular, two perspectives oriented toward strategies for climate change adaptation and mitigation are proposed.

▸ *From aesthetic experience to thermal comfort: rethinking public space through climate*

At the 13th International Architecture Exhibition of the Venice Biennale, ARCò (2012) presented a video exploring different ways of using public space. The video highlighted how public space, traditionally understood as a place for social gathering and interaction, should also be rethought from a sustainability-oriented perspective. Despite the diversity of uses presented, a clear lack of virtuous examples integrating sustainability into the design of public space emerged. Indeed, there remains a shortage of projects that use space as a source of energy production, that contribute to a virtuous water cycle, or that are designed to mitigate the urban heat island effect while improving user comfort. This gap raises significant questions about the role of contemporary architecture in promoting more sustainable and resilient cities.

Consider the microclimate of our cities. As global temperatures rise, the discomfort associated with the Urban Heat Island (UHI) effect intensifies. This phenomenon occurs when urban or metropolitan areas are significantly warmer than surrounding rural areas, primarily

as a result of human activities. Heat generated by building heating and cooling systems, industrial activities, and CO_2 emissions from vehicles are among the main contributing factors. In addition, the widespread presence of impermeable surfaces such as concrete and asphalt replaces vegetated, evapotranspiring surfaces capable of absorbing and dissipating heat more effectively (Zou, Zhang 2021). A key determinant influencing urban warming is albedo, namely the capacity of a surface to reflect or absorb solar radiation. Albedo depends on material choices and surface permeability. These factors directly affect the intensity of the heat island effect, making conscious and climate-aware public space design essential.

The heat island effect has evident consequences for human comfort. The American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) defines thermal comfort as the condition of mental and physical well-being in relation to the environment in which an individual lives (ASHRAE 1992). Outdoor thermal comfort is a complex concept influenced by multiple factors, including environmental, individual, and psychological variables (Dayi et al. 2020). Environmental factors include solar radiation, wind speed, air temperature, and humidity, which directly affect the human body's thermal balance and perception. Individual factors include age, gender, and physiological activity, which influence thermal regulation capacity and adaptability (Aljawabra, Nikolopoulou 2018). Psychological factors include experience, expectations, and activity purpose, which affect thermal satisfaction and preference (Liu et al. 2023). It is therefore necessary to study the complex interrelationships among these factors when designing public spaces.

What is intended to be challenged here is the supremacy of visual perception as the sole means of understanding the environment and conceiving architectural form. This tendency separates aesthetic experience from the multiple dimensions that characterize the lived experience of place. Architectural quality is thus reduced to an exclusively visual phenomenon, both as a mode of knowledge and as a form of enjoyment. Architectural composition becomes the sole objective and outcome of form, neglecting the role of the environment as a conditioning factor in architectural design. Yet architecture is fully immersed in, and deeply influenced by, the natural environment. Any variation in environmental conditions affects the perception and experience of architecture.

«Far from being narrowly based upon any single sense of perception such as vision, our response to a building derives from our body's total response to and perception of the environmental conditions the building affords» (Fitch 1999).

Consequently, any consideration of architectural aesthetics cannot disregard the perception of the environmental factors that define

a place. The capacity of architecture to respond to these factors and to generate an aesthetic experience becomes a measure of its quality. Only through aesthetic experience, understood in this expanded sense, can truly sustainable architecture be achieved.

«[...] a fundamental weakness in most discussions of architectural aesthetics is a failure to relate it to its matrix of experiential reality. Our whole literature suffers from this conceptual limitation in that it tends to divorce the aesthetic process from the rest of experience, as though it were an abstract problem in pure logic. Thus we persist in discussing buildings as though their aesthetic impact upon us were an exclusively visual phenomenon» (Fitch 1999).

Factors such as temperature regulation, humidity, solar radiation, and natural light, central to human well-being, are inescapable components of architectural aesthetic experience. These factors must underpin the formal design of buildings and public spaces. In doing so, architecture's vocation as a mediator between humans and the environment is placed at the centre, as is the ability to read and interpret the specific environmental context in which architecture is embedded. Only by offering formal responses to climatic conditions can we generate sustainable places and develop a meaningful language of sustainability.

Among the elements that define public space is the complex system known as street furniture. Yet this system rarely incorporates climatic considerations into the design of its individual components. Urban furniture is influenced by a wide range of factors, including user needs, social structures, urban morphology, geographic conditions, technology, materials, and cost. It plays a crucial role in fostering social interaction, providing spaces for gathering, and attracting diverse users. Elements of street furniture can become recognizable urban icons, fulfilling both functional and formal roles. They help establish visual order, define functional zones, and create landmarks that connect different parts of the city. Beyond their primary functions, such as seating, lighting, signage, fountains, and shading systems, these elements can also represent a form of public art (Grabiec et al. 2022).

The challenge, then, is to understand how climatic perception can be integrated into the functions and characteristics of public space. Climatic factors must become generators of forms capable of producing comfort.

Design experiences are currently emerging in this direction. Although still limited in number, often unresolved, and insufficiently disseminated, they are nonetheless important in charting a possible trajectory.

Consider, for instance, designers such as Philippe Rahm, whose work is distinguished by strategies cantered on the sensory and physiological well-being of users. Rahm exploits natural phenomena, light,

temperature, humidity, and ventilation, to create spaces responsive to human comfort and climate. His architecture moves beyond form to focus on the interaction between the human body and its environment. A paradigmatic example is the Jardin Métropolitain project in Taichung, Taiwan, where meteorological principles inform a landscape that changes in response to weather conditions, offering a rich and varied sensory experience. Rahm thus explores a new conception of public space, transforming it into an integrated ecosystem that actively contributes to the comfort and health of its users.

Similarly, the projects of practices such as *Ecosistema Urbano*, the engineering consultancy *Transsolar*, and the artistic works of Olafur Eliasson demonstrate how an integrated and innovative approach to public space design can address contemporary environmental challenges. These experiences transform public spaces into environments of climatic well-being, where aesthetic experience and environmental performance coexist, redefining the role of architecture and art in the construction of sustainable and resilient cities.

▸ *Circular design for climate change mitigation: notes on aquaponic technologies*

Designing for climate change mitigation entails reducing climate-altering emissions, chiefly carbon dioxide, to zero. Achieving climate neutrality, however, may require differentiated commitments of natural capital depending on the efficiency of energy and material use throughout the life cycle of a product or service. For the same service provided, the elimination of associated emissions may involve uneven resource use, sometimes resulting in opaque processes of renewable energy exploitation in remote regions and unequal access to global natural capital. For this reason, strategies for climate neutrality must be integrated with circularity strategies specifically oriented toward local resources.

Focusing on circularity and maximum efficiency in the use of energy and matter requires adopting a systemic perspective. Valuable insights can be drawn from natural ecosystems, which tend to evolve by maximizing the efficiency with which incident solar energy is used. In natural systems, the local closure of material cycles is a fundamental constraint inherent to their functioning. From a design perspective, however, it is often difficult to grasp the complexity of these systemic relationships, and nature is frequently reduced to a source of formal inspiration rather than systemic guidance. The current environmental emergency calls for moving beyond formal aspects and recognizing design as an opportunity to manage ecosystem dynamics in ways compatible with regenerative cycles.

Within the spectrum of existing solutions, aquaponic systems are identified here as a technological advancement that, at a small scale,

makes the systemic relationships of natural ecosystems legible and operational for meeting specific human needs. The effectiveness of this technology has led the FAO to publish manuals promoting best practices for small-scale implementation, freely available online and rich in information useful for understanding system functioning (FAO 2014). This dissemination effort provides an opportunity to understand what it means to design generative relationships, while also offering data useful for sizing systems capable of producing food, creating favourable microclimatic conditions, and minimizing environmental impacts.

From a systems perspective, aquaponics can be understood not only as a climate change mitigation strategy but also as an adaptation strategy, namely, an opportunity to transform elements of street furniture into generators of favourable microclimates through the use of vegetation and water.

Aquaponics refers to a production system that integrates plants, bacteria, and fish to maximize food production efficiency and close water and nutrient cycles. It can be interpreted as an application of Life Cycle Thinking within sustainable design: a way of intervening across the entire life cycle of a product to optimize both production and waste processes. While conventional food production relies on globalized flows of fertilizers and energy, aquaponic systems operate through synergies among biological actors, following principles analogous to those governing natural ecosystems. Plants, fish, and bacteria collaborate in closing cycles and maximizing the efficiency of energy and matter use, meeting fundamental needs such as nourishment.

Circularity and efficiency in energy and material use are core principles of natural ecosystem evolution under undisturbed conditions. Such systems consolidate existing relationships and generate new ones to maximize work performed with the same amount of incident solar energy. Lotka (1925) identified this tendency as common to all natural ecosystems, defining it as the maximum power principle. Howard Odum (1996) and Eugene Odum further clarified this principle, identifying solar energy as its foundational source and arguing that ecosystems evolve to maximize the work achievable from available solar input. In natural ecosystems, work and life coincide; maximizing work corresponds to increasing biological activity per unit area.

Aquaponic systems operate according to this same logic. Available solar energy is used to maximize the work performed by natural agents, plants, fish, and bacteria, in order to produce nutritionally valuable edible biomass. When assessed across the full life cycle of food production, the service provided is markedly more efficient. FAO-proposed micro-aquaponic systems for self-production in developing countries can occupy as little as 3 to 4 square meters, yielding annually approximately 54 kg of tomatoes, 360 heads of lettuce, and 30 kg of fish, with potential revenues of around $760.

Adopting a systemic perspective clarifies the mechanisms governing natural ecosystems, particularly when combined with the principle of local cycle closure. Circularity is not optional but a foundational constraint of ecosystem functioning; when coupled with efficiency in energy and material use, it becomes the raison d'être of biodiversity, which tends to increase under undisturbed conditions. In aquaponic systems, circularity is applied to major nutrient cycles, nitrogen, phosphorus, and potassium, as well as to the water cycle. The closure of these cycles is enabled by the interaction of organisms from different biological kingdoms, assigning biodiversity a central role in system performance.

Biodiversity, circularity, and eco-efficiency thus underpin the generative processes of natural ecosystems and define the principles for a constructive coexistence between natural and built environments, aimed at achieving a balanced condition in which climate neutrality represents one of several interrelated objectives.

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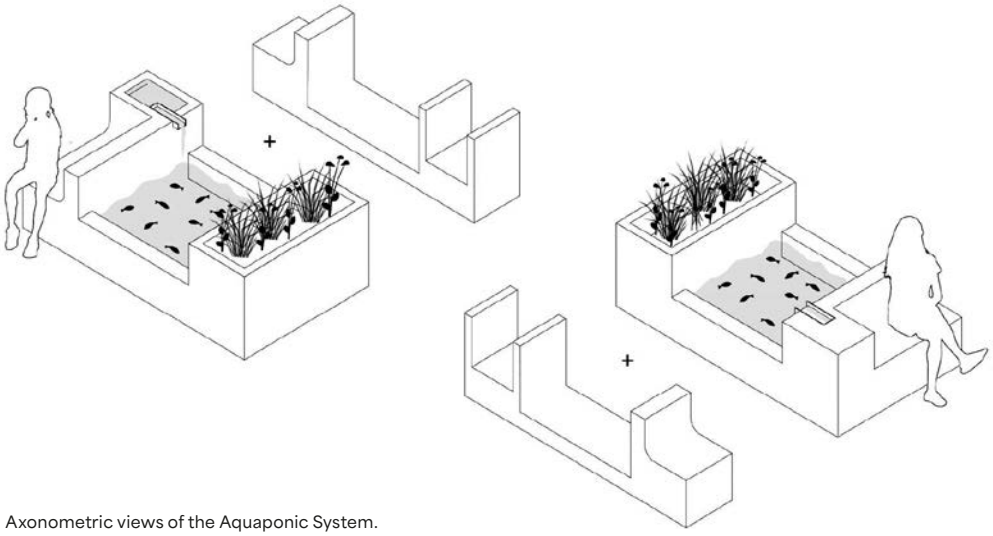
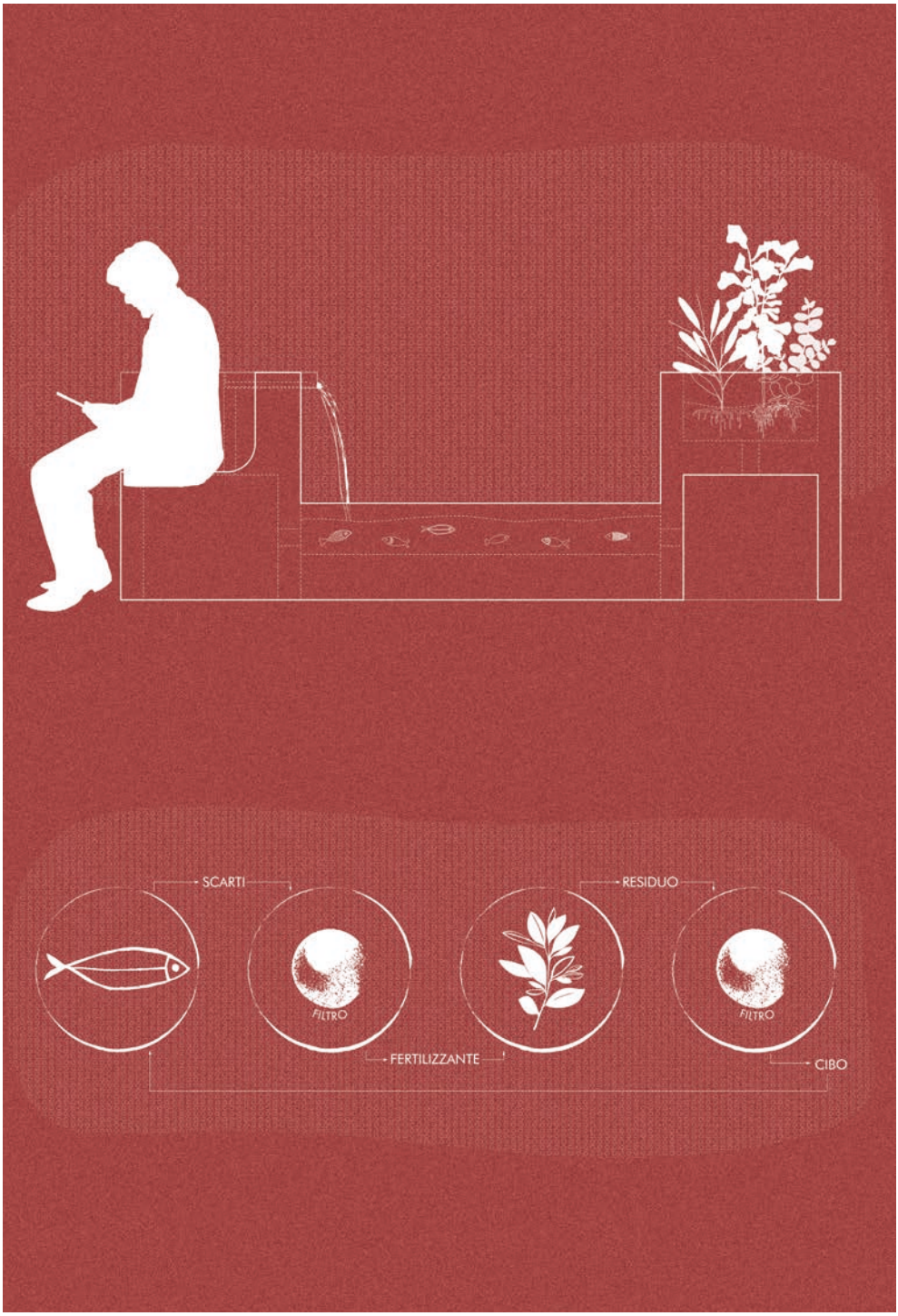
08 Aquaponic System

Alessio Battistella, Matteo Clementi
Silvia Albanese, Julian Alguera Kleine, Marta Laglia, Agnese Restivo

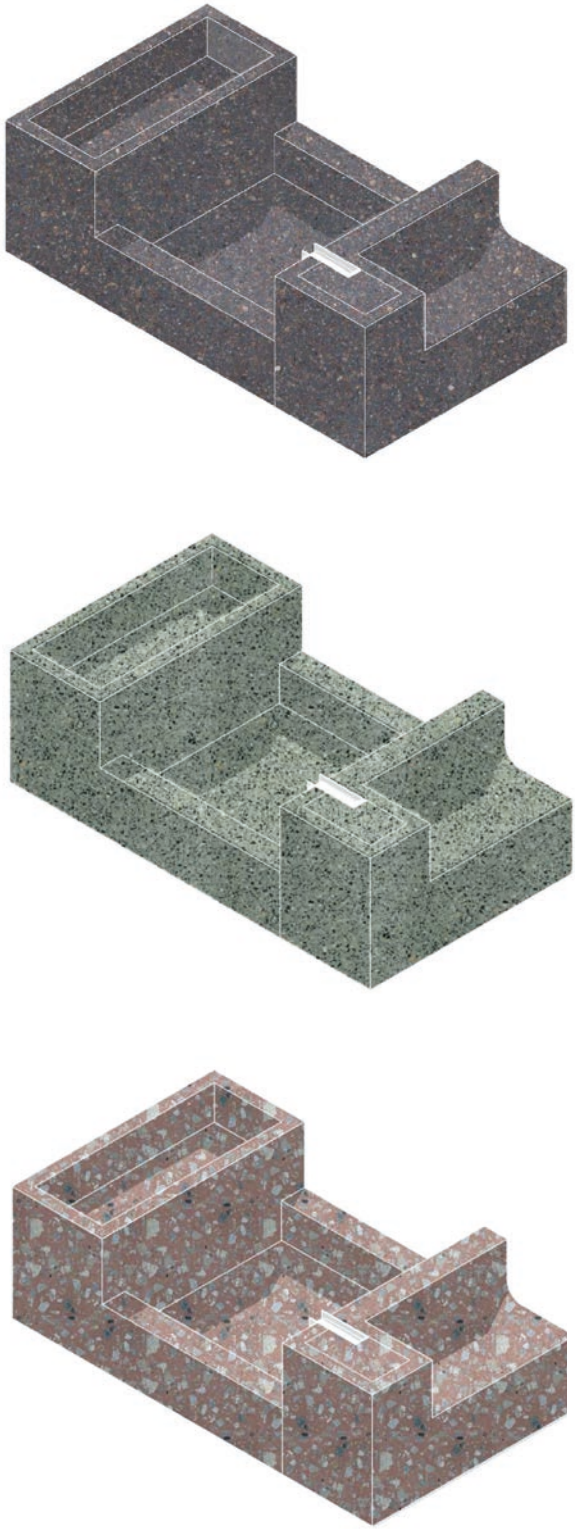
The Aquaponic System is a modular outdoor system that was created as a response to the need to provide adequate conditions of comfort in the summer period while contributing to the reduction of environmental impacts.
Aquaponic systems represent a model of circularity and efficiency, operating on closed cycles in which the waste from one component becomes input for another. Specifically, waste produced by fish acts as fertiliser for plants grown in the surrounding water. The plants, in turn, absorb the nutrients, helping to filter the water and maintain optimal conditions for fish health. These symbiotic relationships minimise resource waste and maximise efficiency, reflecting natural ecological balances.
Such systems are characterised by a significantly lower use of water than traditional soil-based agriculture. This is because water is continuously reused by the system instead of being lost through runoff or evaporation. Such water efficiency is crucial in urban areas where water resources are limited or expensive.
The elements of the system are made from a formwork measuring 253x142x80cm, resulting in a tripartite volume comprising a water tank for fish, a container for vegetation and a seating system with fountain. Additional elements of street furniture that are compatible with the main system are obtained from the off-cuts.
Furthermore, it is possible to implement the structure with a tensile shading system supported by light steel supports that integrate into the AGGLOTECH block.

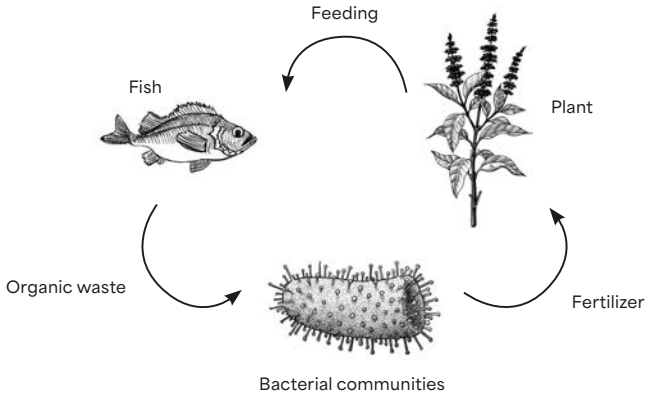


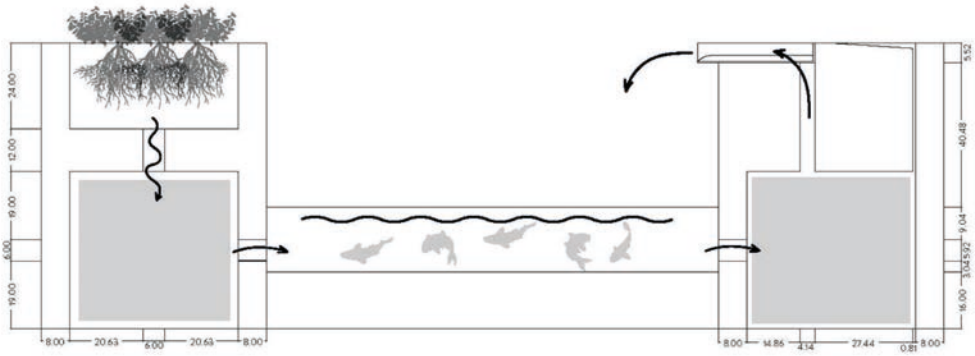
Axonometric views of the Aquaponic System.



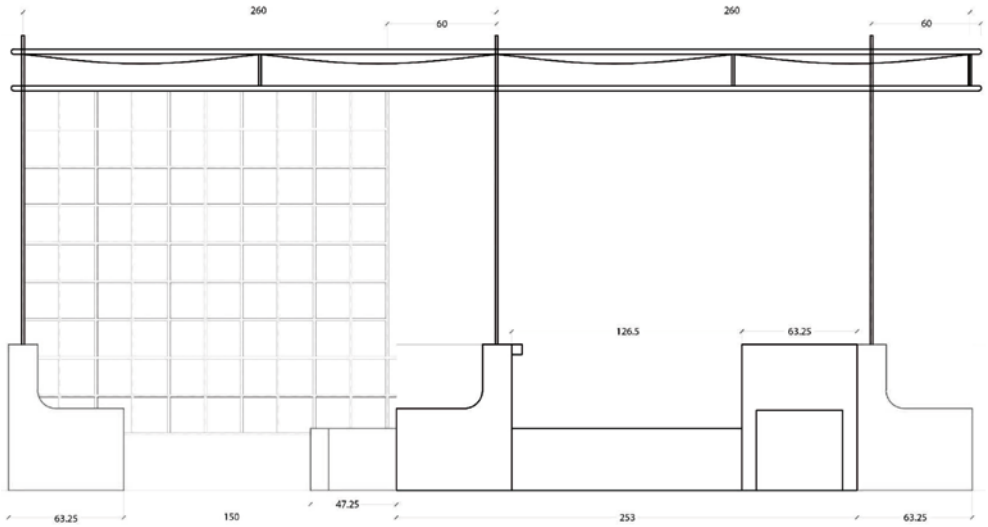
Vertical section of the device and diagram of the characteristic flows of aquaponic system. Metabolic waste from the fish is filtered into the plant tank, where it is transformed into nutrients by the bacteria present. The plants also contribute to increased comfort and/or local food production.







Dimensions, main flows, and water storage devices of the Aquaponic System. The top shows the main components of the system, representing the different living kingdoms: animals, plants, and bacteria. Below, the system includes additional components: elements obtained from processing waste (in red), a metal structure supporting shade cloths and climbing plants.



Of light and manner

Lighting fixtures, generators of spaces[1]

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▸ *Of light and manner*

There is no better way to enhance the technologically augmented versatility of a material that is by nature massive than to work it by contrast. Seeing a layering of surfaces where there is volume, for example, or variable dynamic balances instead of certain weights. So when you look at the end result, what emerges is not only the material, but also, and more importantly, the technique that allowed that result to be achieved. That of drawing lightness from mass, that is, permeability from a solid material, and movement from the static of a rigid body, among other things. All contrasts that, once taken stone as a second term of comparison, with all its physical specificities and symbolic connotations, can only admit a single other element as a counterpoint. That is, the atmospheric one related to light, which of mass is the exact negation, and which, by difference, can be used as a modeling tool, as well as a device of characterization. Provided that it is possible to find a dimension, such as the technical one defined by a lighting fixture, in which the two elements are not mutually exclusive, working, instead, in an integrated sense. Even in this case, however, the relationship is not simple, at least historically speaking. For it is true that stone has entered the design of light fixtures with some frequency, but it has always done so by virtue of its specificity. Almost exclusively as a basic counterweight, as in the very famous case of the Carrara marble parallelepiped of the *Arco* lamp by Achille and Pier Giacomo Castiglioni (1962). And much more rarely, only in more recent years, as a deflector, if one takes for example the concrete lampshade of Lucidi & Pevere's *Aplomb* (2010). Never, however, with the exception of artisanal experiments with alabaster, as a diffuser. On the one hand, because of the poor illuminating capacity of such a designed element, and on the other, because of the excessive redundancy in the use of a material that rarely succeeds in being properly designed. If one moves,

however, from the idea of designing a light fixture to that of making a light volume, the perspective changes quite a bit. Especially if, then, instead of a natural lithic material, one has an artificial stone of high mechanical performance, low cost, and high translucency. Indeed, in this case, there is no great difficulty in finding possible references for a design that, by contrast, enhances the stone as an element of light diffusion. Nor that it does so, because of the mechanical characteristics of the material, in an integrated way, absorbing in a single element all the essential components of a light fixture. Just take, for example, the design of Gino Sarfatti's *559* lamp (1954), a variant of a 1948 Arteluce foot model, the *1056*, and the first ever Compasso d'Oro in the year of its establishment. An oblong cylindrical bulb, about thirty centimeters in length, enclosed by a slightly taller tube of opaline glass and grafted vertically on a slender, circular-section tripod equipped with a ferrule. Which, in turn, rises from the stand to give space for the lamp holder, using the glass tube as a base, pierced by the three spokes of the pedestal to just over an inch. Supporting, through the ferrule, a sheet-steel reflector of the same height and curvature as the tube, which rotates around the latter by pivoting on the former. Nothing else to characterize it. Just a white luminous cylinder, with a soft, diffuse glow, and a black metal sheet that follows its profile as if in a caress, to direct and modulate the light. All, articulated by the essential profile of the pedestal, which pierces both elements, binding them in a relationship of simple support. And which, in fact, if artificial stone is used, can even be avoided, enforcing the diffuser's own weight, to transform it into a base and illuminating element together. Carrying on a research, Arteluce's one, that characterizes its entire production even after its divestiture, at least when considering the last products of that brand (Sarfatti 2012). As if to emphasize the natural ancestry of a product that, rather than a simple mass-produced lamp, seems to resemble a particular light sculpture or an art installation. According to an idea of art, however, which, in keeping with the tradition of Sarfatti's company, essentially coincides with the ability to put technique at the service of people. And which, therefore, takes shape within a well-defined set of lines of design experimentation and productive development. As in the case of the *Drop* lamp by Marc Sadler (1994), another Compasso d'Oro of the brand, worked even more explicitly by contrast (Ottagono 1994). With a semi-transparent box-shaped base that acts as a fixing structure and, at the same time, as a lamp holder for a compact fluorescent, and a convex, three-millimeter-thick silicone elastomer diffuser that creates a kind of soft, opaline shell to protect both the source and the base, conforming to its profile and anchoring itself by interlocking. So the light does not come from the diffuser, which turns barely milky from opaque, but neither does it come from an unshielded source or any reflector. Instead, the real diffuser is the transparent

base, which, in that gap left between the support surface and the anchorage of the shell, lets it filter through almost by accident, reflecting it on the wall, in a subversion of meaning that touches not only the functionality of the components but also the very quality of the flow. Making opaque what was previously transparent and vice versa. And not due to a simple formal game, but rather to resolve in a synthetic way, like its structure, all the typical themes of this type of product that, again, can be taken as a reference. Using stone, in other words, one can think about the design of a lighting fixture, reversing the modern logic of dissection and specialization of its basic components. That, to be clear, which characterizes the design of Achille Castiglioni and Pio Manzù's *Parentesi* (Crespi 1970). Instead, to devote themselves to solving them synthetically through a single element that makes material and its technical enhancement its true specificity. According, that is, to a more contemporary line of research, which sees in designers such as Michael Anastassiades the most advanced expression of a project capable of constructing space not only with light but with the very presence of the lighting fixture. Going so far as to incorporate diffuser, support, and power supply within a single luminous element, resolved, the latter, by subtraction from the lamp of everything that is not light. According, that is, to a formal research aimed not at bringing lighting design closer to the design of the luminous flux, as in many cases of dematerialization of the luminaire. But to enhance the source as an expressive element that, in this case, becomes the only characterizing subject, in a coincidence between lamp and lighting source. All this is to say that the motif of contrast alluded to earlier, resolved synthetically as in the cited references, not only lends itself to enhancing the performative qualities of a technologically enhanced artificial stone, as is the case here. But it is also perfectly in line with a research on the lighting fixture that is increasingly going in this direction. That of a monomateriality which, in addition to insisting on an idea of dry and minimal elegance, in the ambiguity it presupposes between technical element and sculpture, implies an implicit generative spatiality that exceeds the simple idea of a lamp. And which, from a formal point of view, lends itself, once again, to a further translation that makes contrast its fundamental pivot. Leading to interpret the theme of source and diffusion with lithic elements based on a symbolic imagery that speaks of solidity, stability and opacity. Columns, plinths, and walls, just to name a few figures in this vocabulary, vibrate and luminesce. Resolved not by ironic inversion, as in a postmodern game, but thanks to the intimate knowledge of a material that, because of its characteristics, can assume, by virtue of a delicate mannerism, all the forms that technique needs to express itself.

▸ *Tales of spatiality through light*

The design of lighting fixtures is one of the most thoroughly explored and developed themes within the affirmation of Italian design from the mid-1950s onward, not only as a single object, keeping well in mind all the observations exposed above, but also as a tool to generate domestic, commercial, and urban spatial arrangements. Ettore Sottsass, in a paper dedicated to *light*, emphasizes the ability, through it, to narrate architecture, to create infinite spaces, and to generate metaphors (Sottsass 2002, 368). The design of a lamp, its shape, and its placement in space determine the use of that environment, or rather, set it up. This second part of the text is aimed at emphasizing the significance of the light object as one of the characters that define interior scenes of different kinds: from the home, to displays at stores, to the extended context of the city. The lighting fixture is not just a functional component, but a real actor that helps tell stories, create atmospheres, and define spaces. Its design requires a deep understanding of spatial dynamics and attention to aesthetic and technical details that contribute to its versatility.

In the creation of domestic atmospheres, famous are two *manifesto rooms* (Ottolini 2016, 38) designed by Achille and Pier Giacomo Castiglioni where the design of lamps, together with other objects, contributes to define a precise idea of inhabited interior. The first takes the name of *Ambiente di Soggiorno* realized in the exhibition *Forme e colori nella casa d'oggi* (Villa Olmo, Como, 1957) where a small trapezoidal space is composed of a series of furnishings that combine elements of tradition alongside modern research on technologies and materials. Among the iconic objects are the *Luminator* floor lamp (Gilardi, Milan 1954, now produced by Flos) and the fluorescent bulb ceiling lamp (Zeta Lux, Milan) placed at a point in the room that creates a new centrality, not above the table but just outside it, defining a relationship between the different seats. In the design of the floor plan, it is interesting to observe the trace of the wire on the ground that composes a free geometry, as if to define a scope, a small, if invisible threshold. In the second arrangement of an *Ambiente arredato per il pranzo* in the exhibition *La casa abitata* (Florence, 1965), the light fixture defines and completes the space formed by a simple rectangular table, three chairs, and a stepped cabinet on casters that serves on one side as a table top and on the other as a shelf. The lamp (Flos, discontinued) consists of a milk-white glass outer dome and a mirrored aluminum inner reflector with three bulbs that uniformly diffuse the light. Again, the plan and sectional design of the individual elements contribute to the definition of a precise domestic scene. The creation of these inhabited atmospheres moves in a social, cultural, and economic context that, since the mid-1950s, has experienced rapid diffusion thanks to the boost given by Italian production in the lighting sector. Luminous bodies

became the protagonists of store fittings, store windows, and exhibition pavilions promoted by companies such as Artemide, Arteluce, and Oluce, to name a few, which entrusted the projects to the same architects with whom they collaborated in research and technological and material advancement (Bassi 2008). The Arteluce store, designed by Marco Zanuso (1951) for Gino Sarfatti in Corso Matteotti (Milan), is a precursor case of this trend and a historical example of highly poetic layout. The space in its totality becomes a metaphor for the idea of the shop window: «to abolish the usual shop windows, the window-altar isolated from the rest[2]» is what the architect wrote in *Domus* magazine (Zanuso 1953, 55). It is a total display where lights occupy all the surfaces of the room: a large circular panel hung from the ceiling with steel cables becomes a «scenic machine[3]» (Domus 2016) that hides the electrical cables used to power all the lamps; on the walls, white panels detach themselves from the walls and create an environmental unity. In 1963, Vittoriano Viganò designed the new Arteluce store (he was artistic director of the company from 1947 to 1960) inside an existing building on Via della Spiga (Milan), using some spatial solutions that amplify the interior views. The entrance threshold is set back to generate a small porch and an access compass that both face a "well" or void that reaches up to the level of the basement and allows views into the depths. Once again, lighting fixtures become a tool for amplifying spatial and volumetric features. Unlike the Zanuso-designed store, this interior, which is spread over five floors (basement and ground floor dedicated to the display, mezzanine and second floor house the offices, the second basement the warehouses) reflects Viganò's architectural research that defines masses and plays of plastic volumes also thanks to the use of color that characterizes some surfaces (Viganò 1963). Movable vertical and horizontal panels are grafted onto walls designed to accommodate the docking and hide the electrical part. The idea of overcoming the two-dimensionality of the store window is also addressed by Vico Magistretti in the design of the Artemide store in Corso Monforte (Milan, 1971). The space characterized by a significant depth is conceived as a meeting place with a domestic atmosphere, left as empty as possible in order to be transformed as needed through the presence of curtains on the ceiling, which, following an orthogonal pattern, can configure always different spaces (Ottagono 1972). The material choice of the claddings that distinguish the walls of the basin reflects the company's style and graphic choice: serizzo valmasino flooring with shiny, dark slabs and walls covered with a smooth, luminous synthetic material that intersperses red and white backgrounds. The creation of an introflexed, dark spatiality guides the last project in this short review, by architects Claudio Dini and Valerio Di Battista (1971, Brescia). The storefront is annulled or amplified by placing a triangular volume composed of inclined and transparent mirrors that

contain intermittently lit lamps that, in turn, generate a continuous change of reflections and scenes. Even the interior space, which is located at a higher elevation than the street, consists of parallelepipeds covered with mirrors and hung on a rail, which contain other lamps, producing an endless play of light, reflections, and movement (Dini, Di Battista 1971). These installations are not simply exhibition spaces, but environments that tell a story, inviting us to explore and interact with light in new and surprising ways. Light becomes a true expressive language that communicates emotions and sensations and allows new ideas of spaces and forms to be defined. In the same years, luminous installations also landed in the urban context to emphasize the cultural and not just technical value that was spreading through the research of artistic movements, first with Lucio Fontana and then with the *T group* in Milan and the *N group* in Padua. The city was transformed into a stage for action and experimentation through a renewed idea of light. Alongside some well-known architectural projects that permanently define a part of the city or an urban interior, such as the street lamps designed by the BBPR (Banfi, Belgioioso, Peressutti and Rogers) studio in 1958 in the square in front of the Torre Velasca and that also integrate a seat in the basement part, or the "cluster" street lamps designed by Ignazio Gardella for Piazza San Babila (1964) (Leveratto 2019), in 1962 Milan hosted the Parata Luci as a large temporary installation that highlighted the ephemeral character of light. Curated by Bruno Munari and promoted by the City Council and the Chamber of Commerce, the event gathers numerous interventions, including Vittoriano Viganò's *La verticale*, Piero Castiglioni and Gruppo T in Piazzetta Reale, Mario Brunati and Alessandro Mendini's intervention with white and blue rhombuses, and Giancarlo Illiprandi's intervention entitled Notturno Stellato (Musella, Naj Oleari 2018).

This albeit brief survey of historical cases shows the diversity of lighting fixture applications and their uniqueness in collaborating with spaces and architectural elements. Each example analyzed reveals how light can transform the experience of environments, emphasizing architectural details, creating atmospheres, and influencing the perception of spaces. From urban installations to domestic settings, lighting fixtures not only meet functional needs but also enrich the narrative of space.

Notes

1.The essay is the result of shared reflections between the two authors, with the first paragraph to be assigned to Jacopo Leveratto and the second to Michela Bassanelli.
2. «Abolire le abituali vetrine, le vetrine-altarino isolate dal resto».
3. «Macchina scenica».

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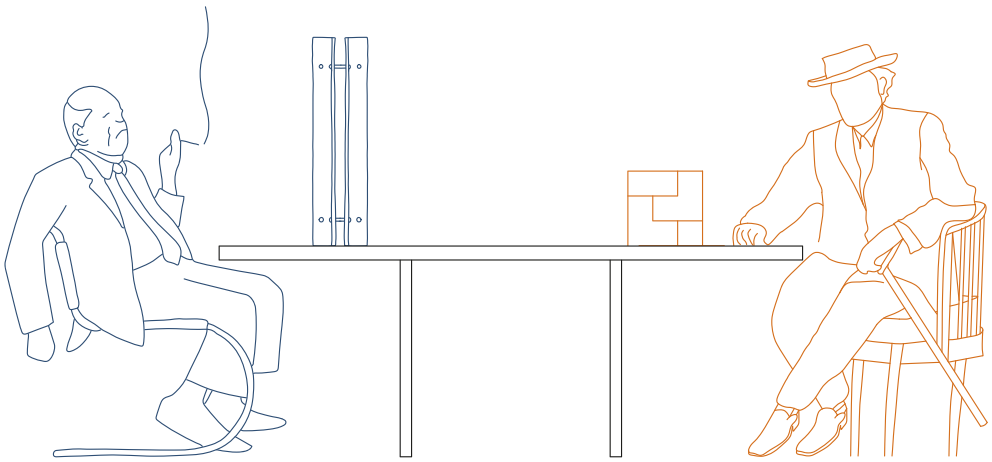
09 Ludwig | Alea

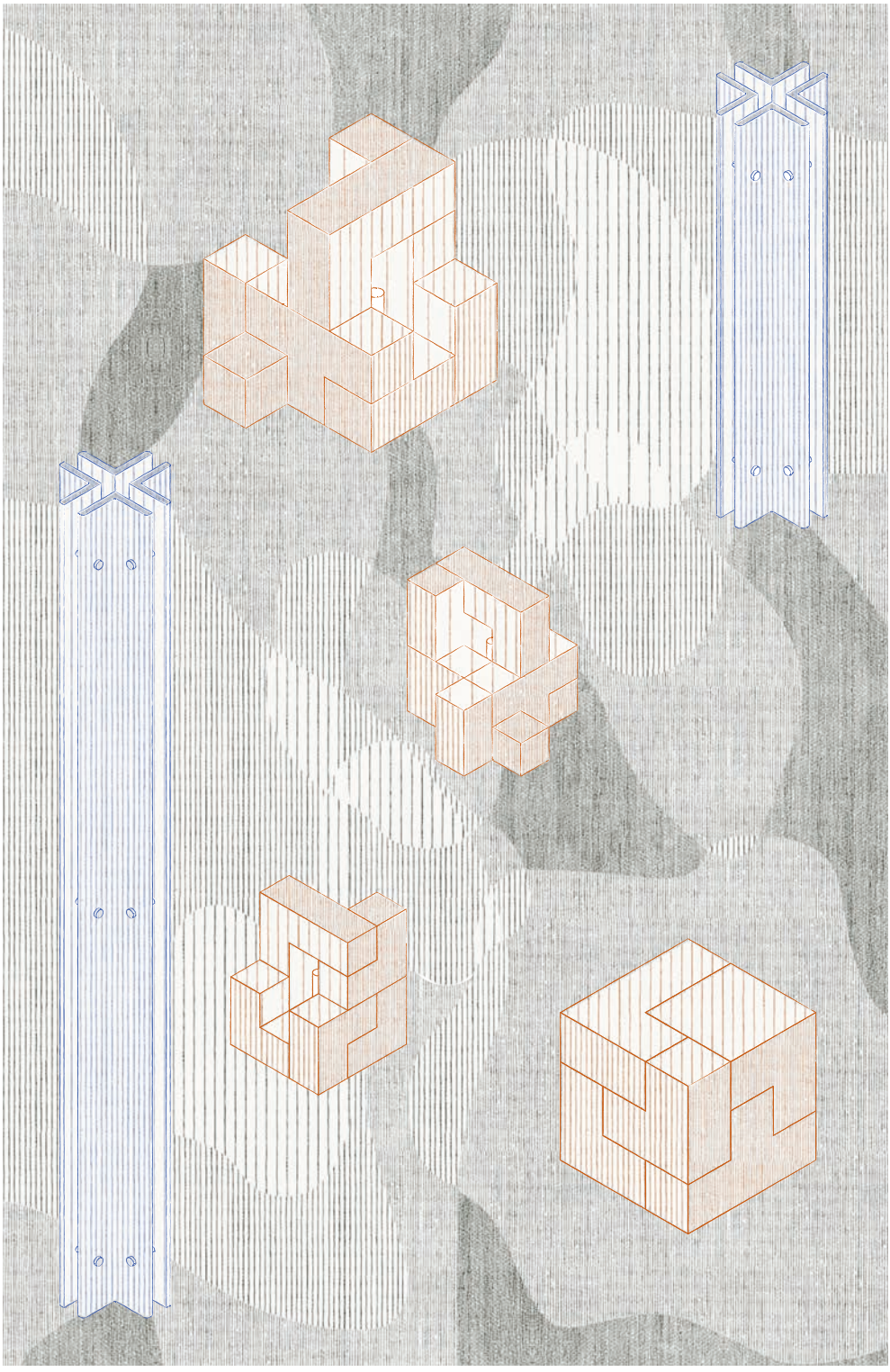
Michela Bassanelli, Jacopo Leveratto
Maria Vittoria Faravelli, Simone Fasoli, Sofia Locatelli, Camilla Passeri

Ludwig is a lighting fixture designed for both indoor and outdoor environments, inspired by the cruciform column of Mies van der Rohe's Barcelona Pavilion. The four iconic L-shaped profiles are joined by spacers and enclose a central light source. Modular and adjustable, the lamp can be reproduced in various heights.

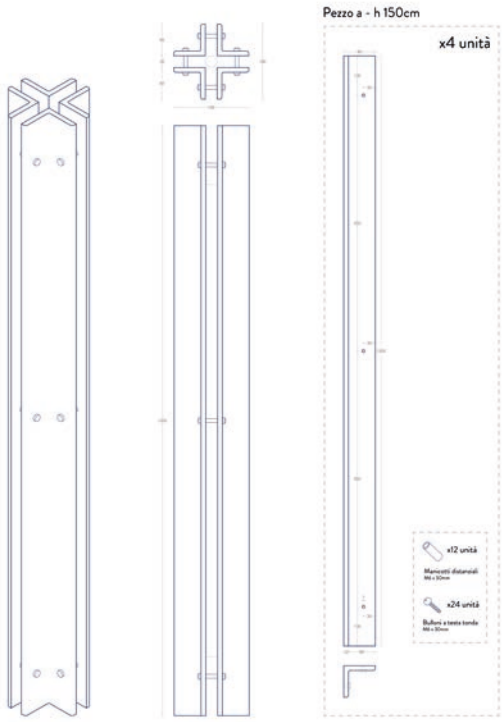
Instead, Alea lamp draws inspiration from Froebel's Cube, the same educational toy used by Frank Lloyd Wright to explore the essential volumes of his architectural compositions. Composed of freely combinable geometric modules, the lamp is fully customizable in both its aesthetic configuration and light diffusion.

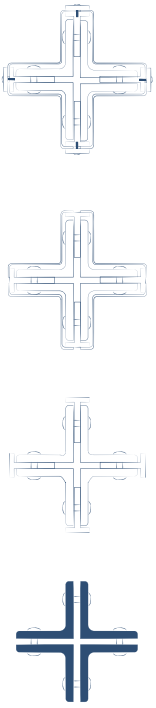


Concept.



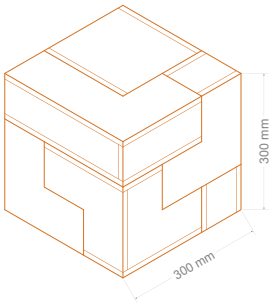
Project manifesto.

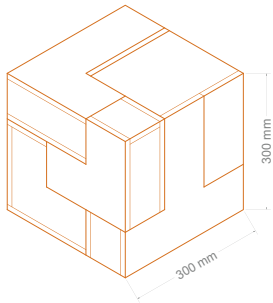




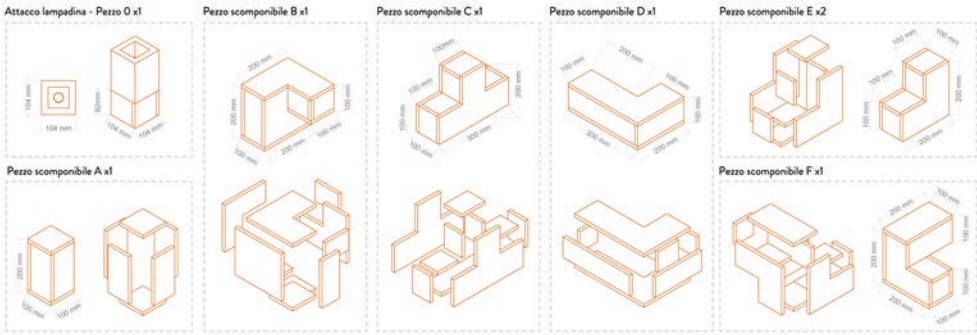
Ludwig

Plan, section and technical axonometry of the Ludwig lamp.

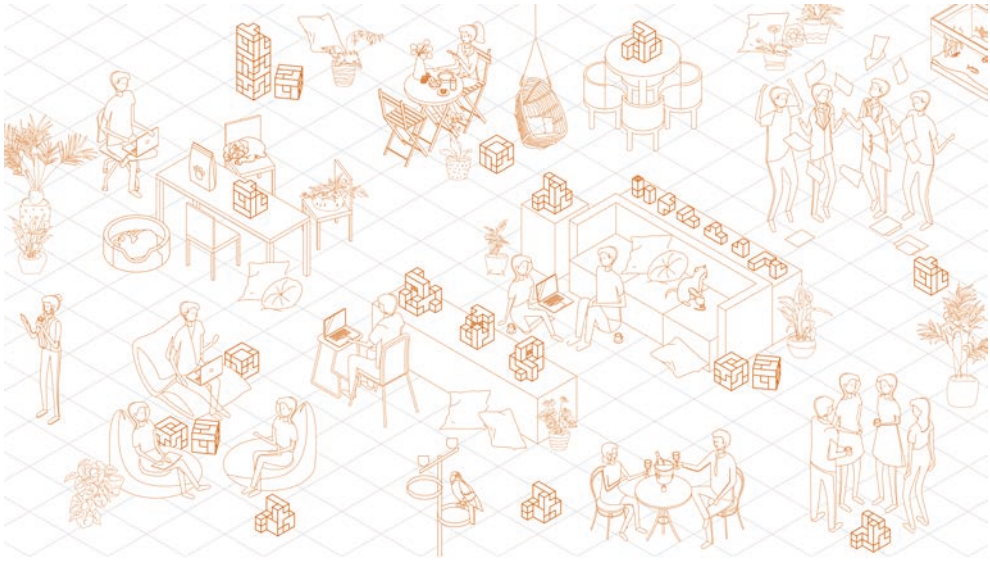


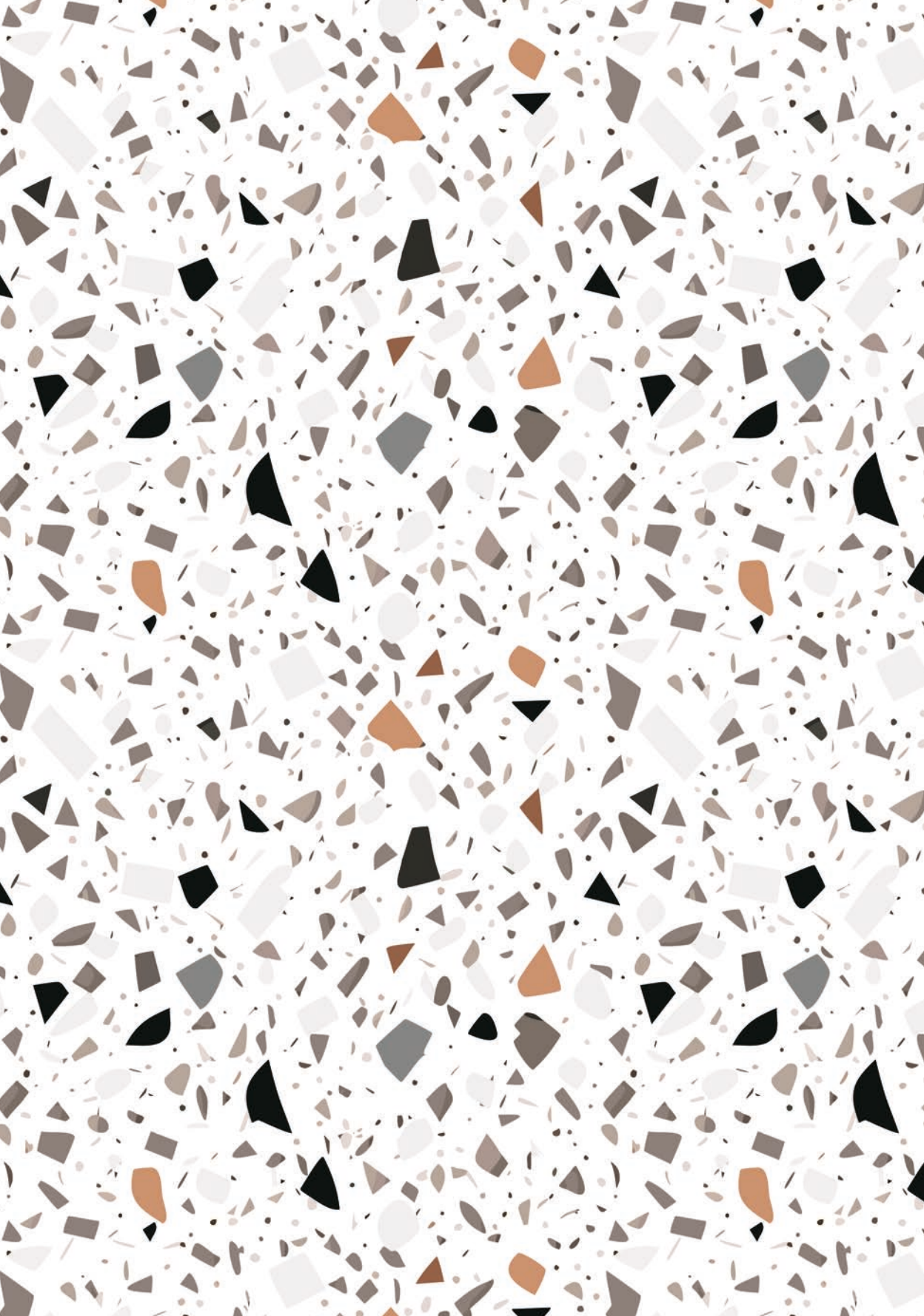


Alea



Technical assembly drawings of the Alea lamp.





Part 3

Innovation in history

From Roman mosaic culture to the production of "*marmette*" Background to the industrial production of artificial floor and wall coverings consisting of decorative aggregates embedded within high-performance cementitious mixtures

Alessandro Ubertazzi

–
Professor of Industrial Design

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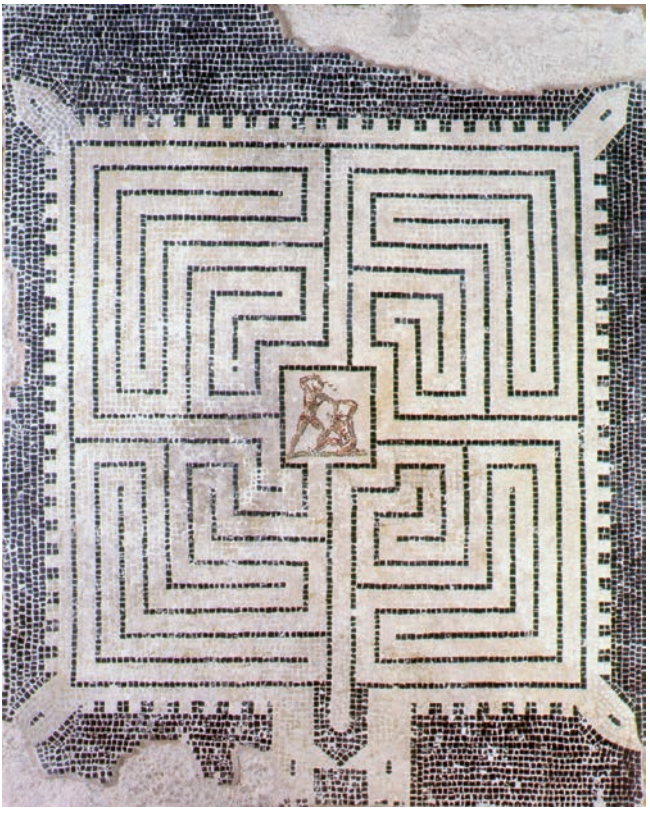
▸ Conceptual origins of cement and grit products

There are products so common and seemingly simple that we often feel no need to reflect on their history, nor on the technological developments that determined or enabled their existence. Among these are building components that we have all literally walked on and continue to walk on: the so-called *marmette* and, more generally, pavements composed of powders or fragments of noble materials, valued for their aesthetic and chromatic qualities, irreversibly aggregated[1] by an efficient binder.

I am personally convinced that the expressive quality of walkable surfaces in domestic spaces ensured by specific building components can be traced back to Roman building culture during its most radiant and "international" phase.



Figs. 1a-1d. Examples of mosaic floors in the Roman sphere.

Indeed, the spectacular mosaics composed of marble and/or glass tesserae of various colors and sizes, often executed by craftsmen from across the Mediterranean basin, were particularly prevalent in the wealthy public and private spaces of the vast Roman world [→ Figs. 1a-1d].

From the aforementioned decorative mosaics embedded in lime mortar to more recent building components consisting of ornamental aggregates enclosed in high-performance materials, the following outlines, in my view, the main steps that led to today's semi-industrial and fully industrial solutions.

The floors of high-status dwellings, which for centuries had been made *in situ* by specialized craftsmen (carpenters and stonemasons), began to be prefabricated and produced according to "industrial" principles with the rise of the bourgeoisie in the nineteenth century. In this respect, it is worth noting that the production of modular floor elements made of pseudo-monolithic and marble-like materials explicitly refers both to the well-established tradition of ceramic tiles [→ Fig. 2] e and to the more recent development of modular wooden parquet components [→ Figs. 3a-3l].

Fig. 2. Cover of the ceramic tile catalogue by Richard Ginori; Milan, early 20th century.

Figs. 3a-3c. Cover of the Bortolo Lazzaris prefabricated parquet flooring catalogue and some internal pages; 1911.

Figs. 3d-3e. Cover and title page of the catalogue of the wooden tile factory of Ing. G.A. Salvatico & C.; early 20th century.

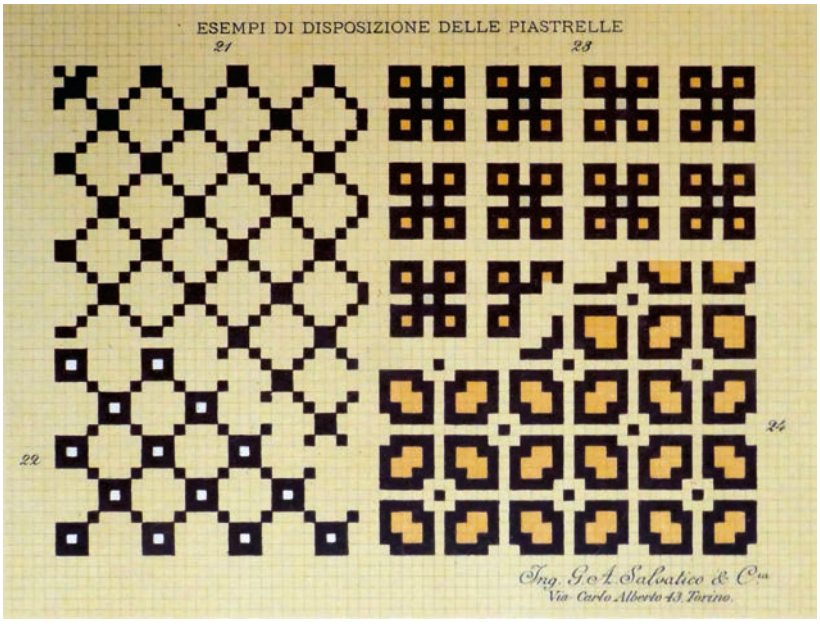
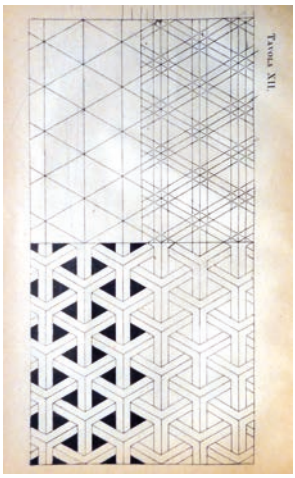


Fig. 3f. Examples of wood flooring compositions by Ing. G.A. Salvatico & C.

Figs. 3g-3l. Cover of the Flooring and Parquet catalogue from the G. Vitali company of Genoa, and some examples of wooden floors; around 1930.

From a compositional perspective, this production also draws on the culture of descriptive geometry and geometric drawing [→ Figs. 4a-4r].

Fig. 4a. Cover of a series of descriptive geometry cards; Germany, 1871.



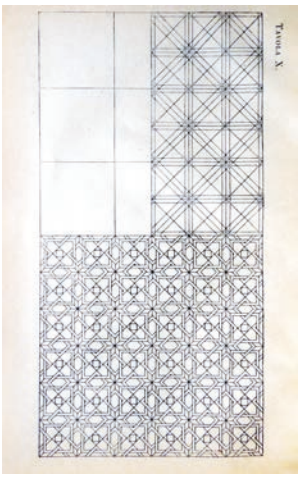
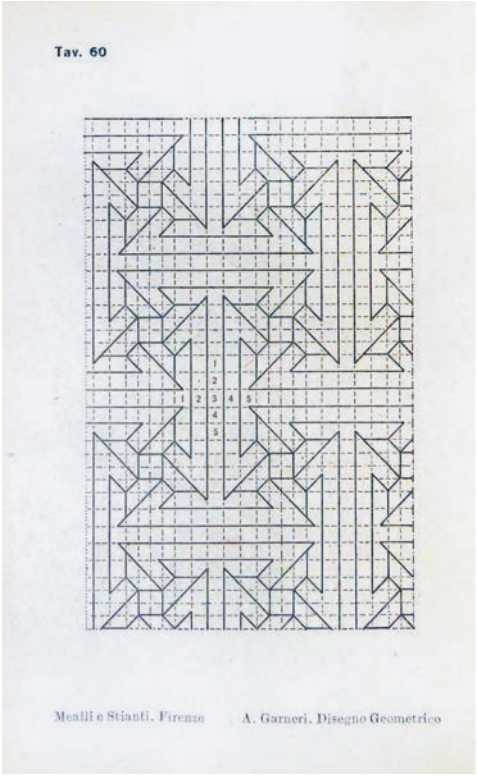
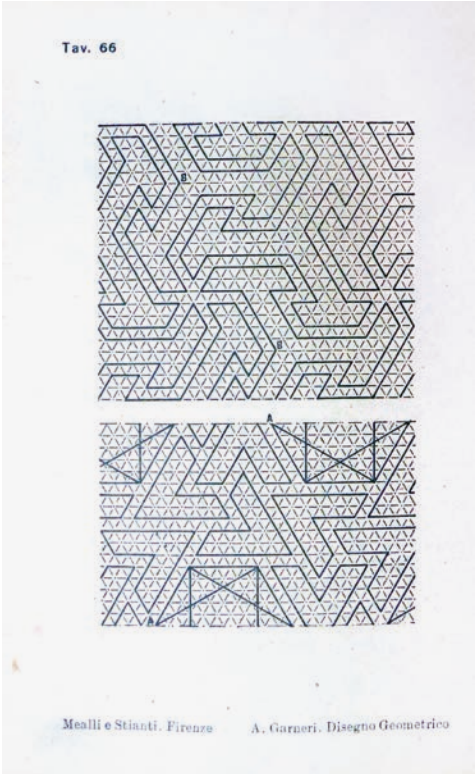


Fig. 4b-4d. Title page and plates from Giovanni Ricca's "*Trattato di disegno geometrico*"; Milan, 1911.

Figs. 4e-4g. Plates from an anonymous album with examples of geometric compositions; Italy, late 19th century.

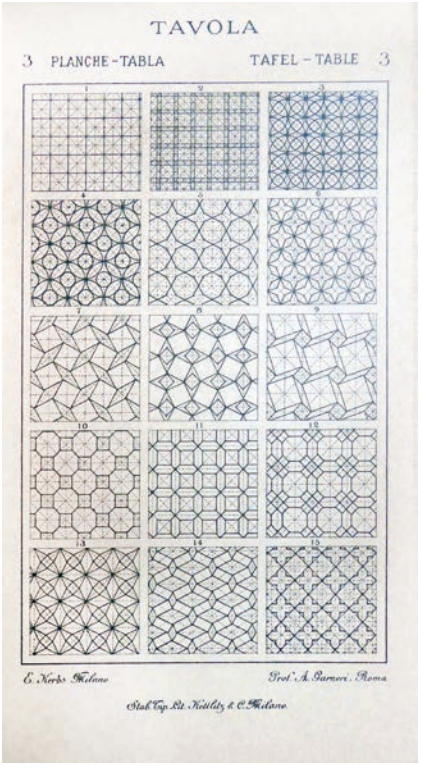
Fig. 4h-4n. Title page of the text "*Disegno geometrico*" by Augusto Garneri and some plates; Turin, 1871.

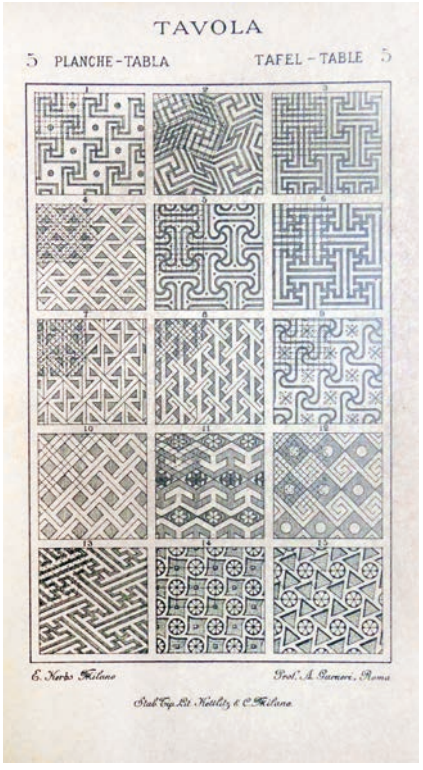



Tav. 66
Mealli e Stianti. Firenze
A. Garneri. Disegno Geometrico


Tav. 67
Mealli e Stianti. Firenze
A. Garneri. Disegno Geometrico

Figs. 4o-4r. Cover of Augusto Garneri's "*Vademecum dell'artista di ornamenti*" and several plates; Rome, early 20th century.





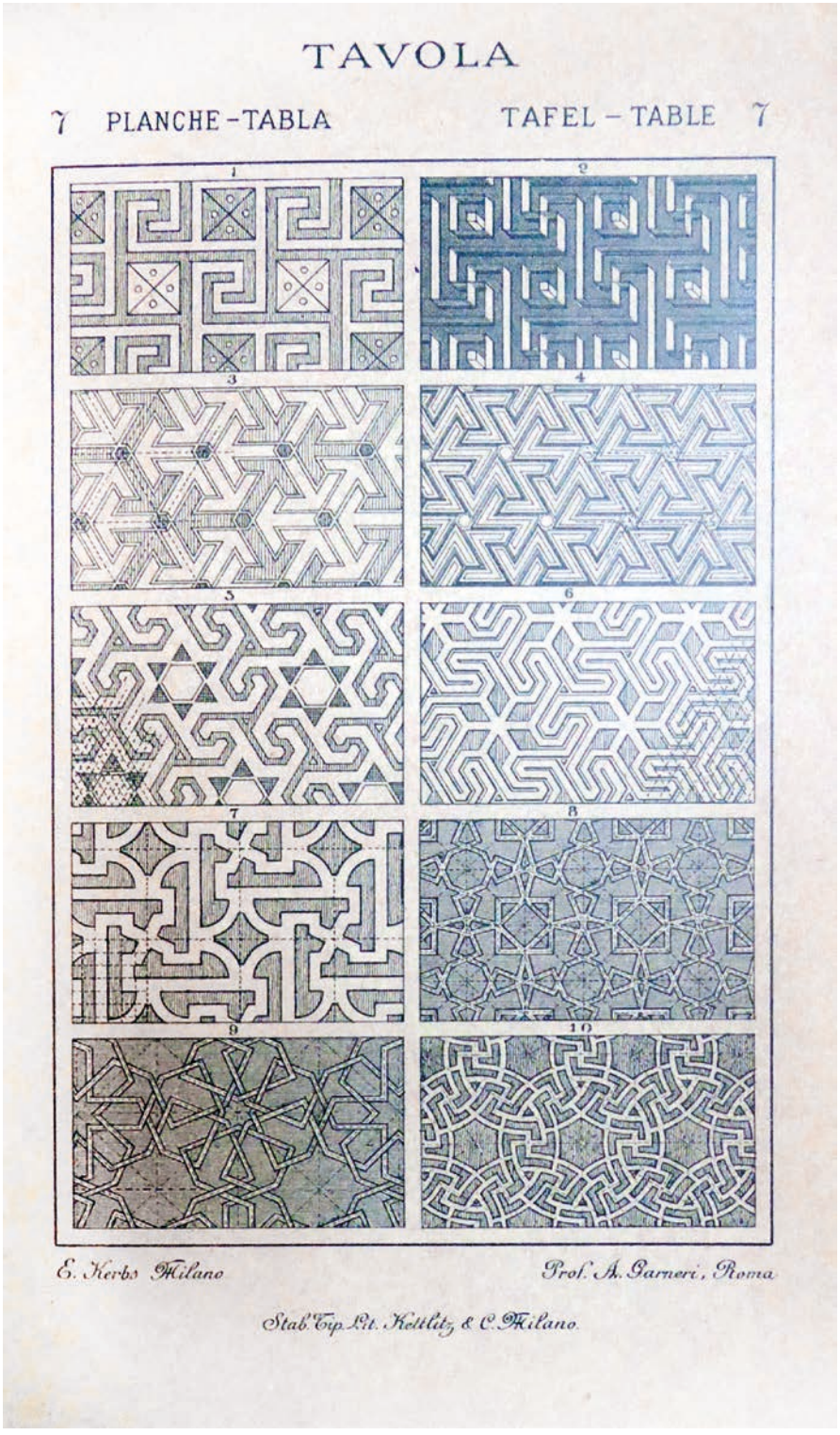


TAVOLA
7 PLANCHE - TABLA
TAFEL - TABLE 7
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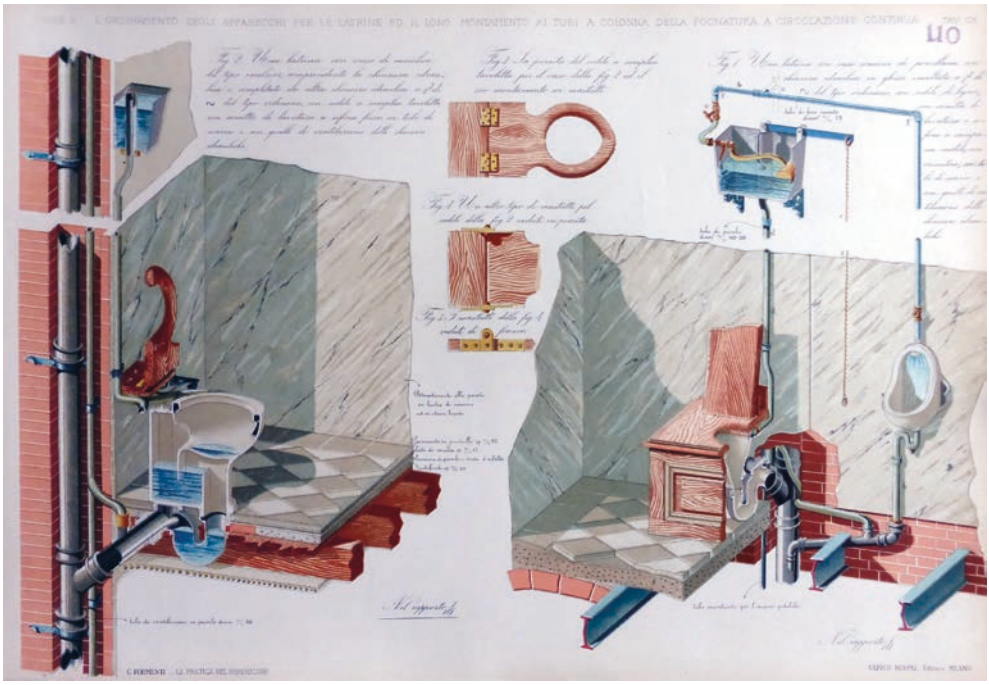
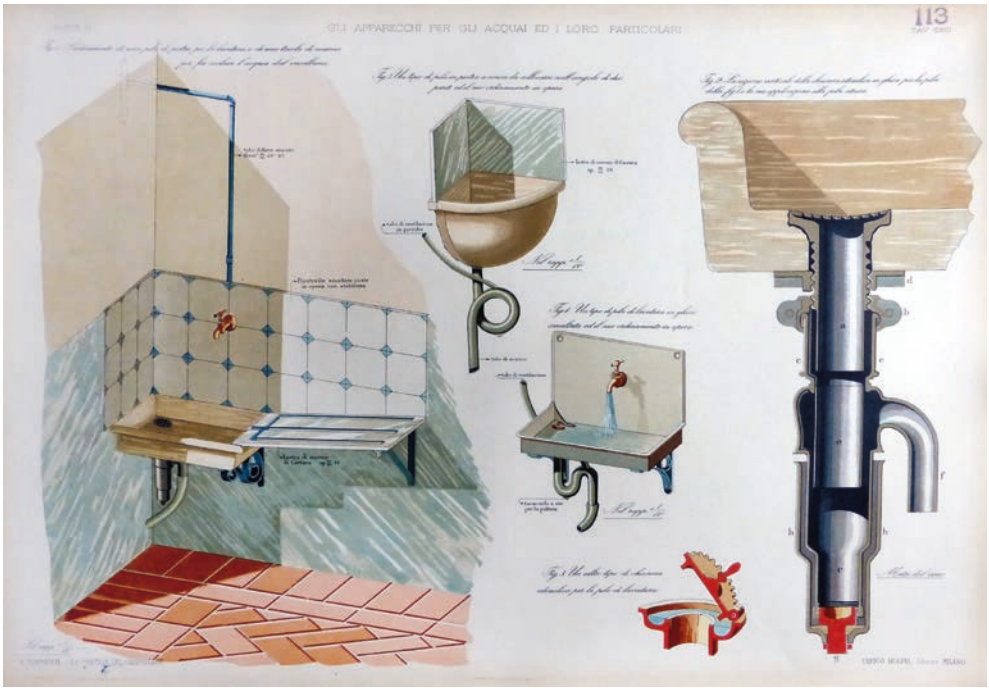
E. Kerbs Milano
Prof. A. Garneri, Roma
Stab. Tip. Lit. Kettlitz & C. Milano

Indeed, mid-nineteenth-century construction manuals [→ Figs. 5a-5c] already present examples of parquet floors made from modular prefabricated elements, as well as the cladding of bathrooms and kitchens using industrially produced tiles.

Fig. 5a. Cover of the manual "*La pavimentazione della casa*" by Engineer Piero Piazzini; Milan, 1928.





Figs. 5b-5c.Plates from "*La pratica del fabbricare*" by Carlo Formenti, featuring details of floors; Milan, 1893-1895.

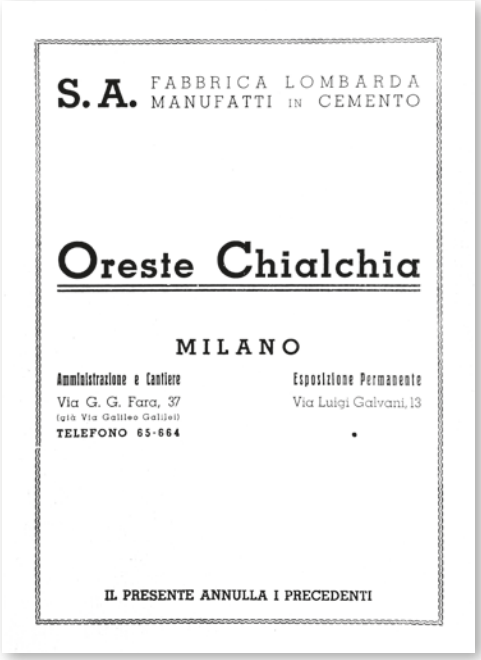
▸ The role of cementitious binders in the manufacture of building components

It was primarily due to the emergence of cementitious binders [→ Figs. 6a-6f] in the manufacture of building components that new products suitable for producing high-quality residential floors began to appear on the construction market.

In a recent text on vibrocompressed concrete slabs, I noted that: «On closer inspection, the particular history of building components used in public and collective applications, subject to significant mechanical stresses, is part of the broader and relatively recent history of Portland cement and its subsequent applications in concrete and decorative cements[2]».

This historical framework is clearly illustrated in the 1892 catalogue of the Ghilardi company[3], which documents the gradual diffusion of cement tiles in southern Italy and the establishment of local production facilities in response to high transportation costs and growing demand: «The use of concrete materials in southern Italy dates back about twenty years [Editor's note: since around 1870], but its diffusion was slow and difficult due to the high cost of the materials themselves. Concerned by this fact, our partner, Mr. Pasquale de Filippis of Bari, after a long series of years, encouraged by the favourable outcome of the trade in these products, and also with the aim of benefiting his customers in these regions from the higher costs of transporting materials that previously were sourced from factories in northern Italy and abroad, decided to establish a concrete construction site in Bari, the first to be established in southern Italy. To this end, in 1883, Mr. De Filippis joined the company with the firm of Ing. S. Ghilardi & Co. of Bergamo, which had been involved in the cement industry on a large scale since 1876 and was already well known throughout Italy for its excellent materials. Thus, the firm of Ing. S. Ghilardi, De Filippis & Co. was established in Bari. Since then, our factory has undergone significant expansion and improvements, resulting in the production of floor tiles, carried out with steam engines and the latest machinery, such that it now satisfies the countless requests we receive from southern Italy and overseas. The widespread and rapidly acquired reputation of our cement tiles has brought us, over the long period of our operation, a large number of successful projects, to the satisfaction of our esteemed customers. The use of our floor tiles is now widespread throughout the southern continent, including in Naples itself, where there are ancient factories producing various patinated bricks. The demand for our tiles is such that our company has chosen to maintain a special representative in that important city. Driven, as always, by the desire to best respond to the universal acclaim with which our cement products, and particularly our floor tiles, are received, we are pleased to present to the public today our new Album, significantly

Fig. 6a-6c. Title page of the Oreste Chialchia company catalogue and some examples of early concrete products; Milan, 1920.



S. A. FABBRICA LOMBARDA MANUFATTI IN CEMENTO

Oreste Chialchia

MILANO

Amministrazione e Cantiere
Via G. G. Fara, 37
(già Via Galileo Galilei)
TELEFONO 65-664

Esposizione Permanente
Via Luigi Galvani, 13

IL PRESENTE ANNULLA I PRECEDENTI

S. A.

ARTICOLI DI NOSTRA PRODUZIONE
IN GRANIGLIA O IN CEMENTO ARMATO

Lavatoi retinati, d'ogni tipo.
Lavatoi per Operai, per Stabilimenti.
Vasche retinate per candegina
„ » » candeggio
„ » » lavanderie
„ » » recipienti sali per Privative
„ » » Nichelatura
„ » » Litografia.
Piastrelle per rivestimenti
Mensole a saetta
Pilette per bagni, lavabi, lavandini
Tavoli in graniglia lucidata ed in mosaico di Vetro opalino per giardino, per copri tavolo da cucina, per copri banco da negozio macellai, salumieri, panettieri ed a uso industriale, in qualsiasi colore e disegno.
Vasche per Tripperie, ecc. ecc.

REFERENZE

CASE POPOLARI, TRAMVIERI, FERROVIERI e POSTELEGRAFONICI, CITTÀ DEGLI STUDI - ISTITUTI SUPERIORI - MERCATI RIONALI - MACELLO - PRINCIPALI IMPRESE DI COSTRUZIONI ecc. ecc.

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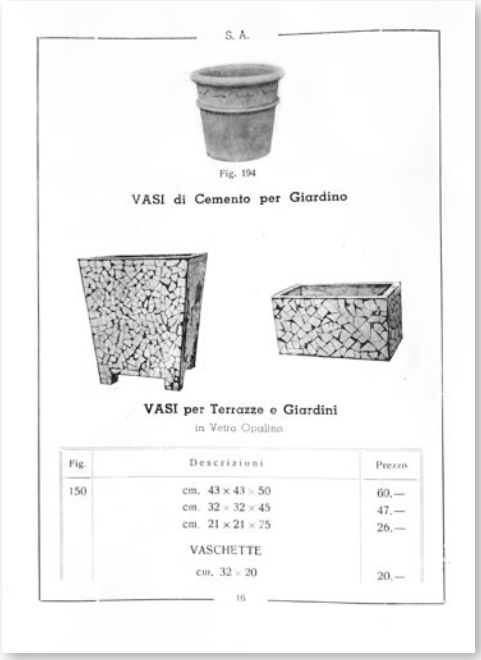

S. A.

Fig. 194

VASI di Cemento per Giardino

VASI per Terrazze e Giardini
in Vetro Opalino

Fig.	Descrizioni	Prezzo
150	cm. 43 × 43 × 50	60.—
	cm. 32 × 32 × 45	47.—
	cm. 21 × 21 × 25	26.—
	VASCHETTE	
	cm. 32 × 20	20.—

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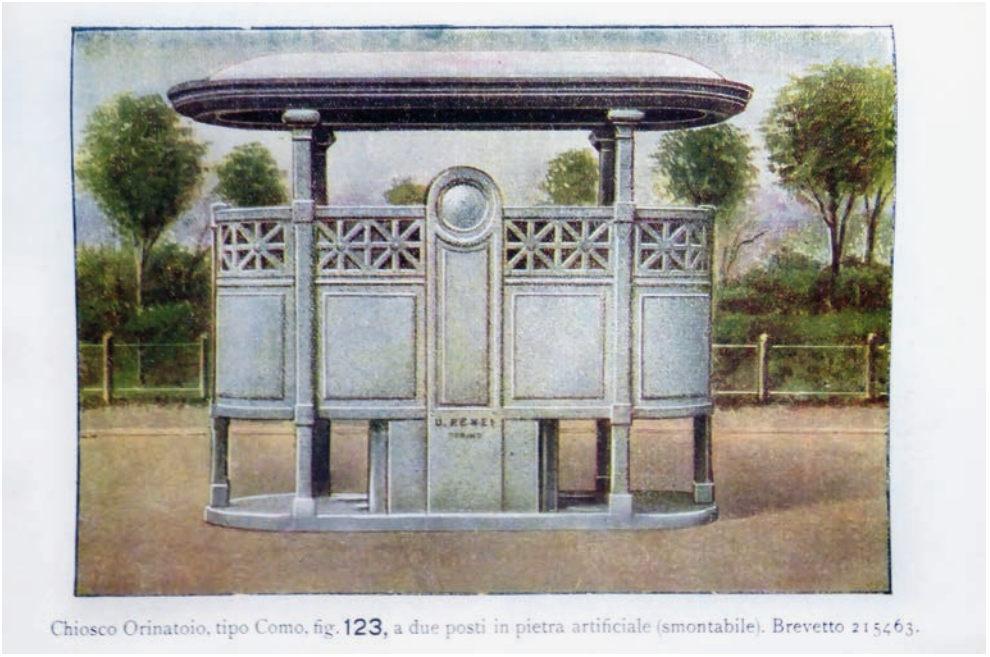
Fig. 6d. Cover of the "cement sanitary plumbing" product catalogue from the U. Renzi company of Turin, 1928.

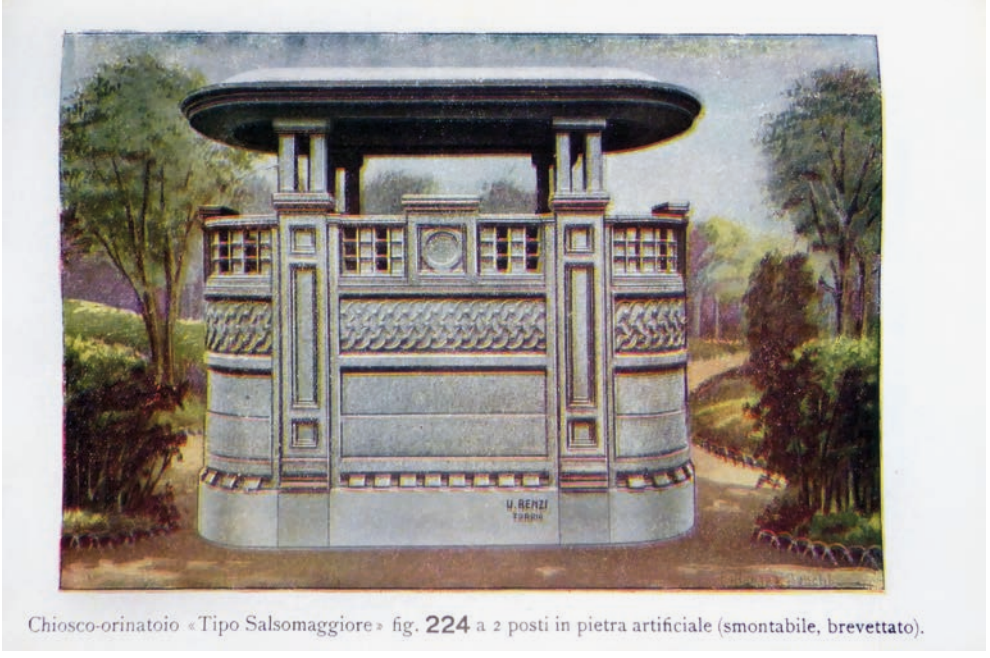
expanded and elegantly illustrated. We hope the wide variety of types and the accuracy of the designs will make this work a welcome addition. In compiling it, we have endeavoured to interpret and satisfy, as far as possible, the tastes and needs of our numerous and esteemed clientele. Bari, January 1, 1892[4]».

Similarly instructive are the remarks included in the catalogue of the *Società Lodigiana Lavori in Cemento*[5], which describe the firm's early industrial organization, access to raw materials, production processes, and extensive range of decorative and functional cement products: «Founded in 1874, the *Società Lodigiana* was among the first companies to engage in the concrete industry after Italy gained independence from foreign suppliers in the production of raw materials, especially Portland cement. The *Società Lodigiana*'s construction sites, certainly the largest in Italy, located along the Adda River, provide the known gravel; therefore, the industry is burdened only by its transportation from the riverbed to designated areas on the riverbank. They are traversed along their entire length, with appropriate branches, by a special track branching off the Interprovincial Tramways, and are therefore directly connected to the dense network of Tramways that crisscross Lombardy. The same track can also serve as a link to the train station. In our workshops, special machinery crushes natural stone and divides it into chips of various sizes, smooths and polishes mosaic materials, creates precise mixtures of cements and colour powders, and applies pressure to presses to obtain pressed materials of all qualities. A special laboratory is reserved for the careful testing of all incoming cements; numerous low-rise warehouses store a vast quantity of materials, allowing us to always supply well-seasoned goods, even in large quantities. Among the various products we manufacture and currently produce, special mention should be made of balustrades, altars, holy water fonts, bath tubs, vases, statues, mortuary monuments, steps, garden seats and benches, tables, fountains, tombstones, livestock troughs and watering troughs, mosaic slabs, etc., as per our price list and special album of smoothed and polished plain concrete and marble grit castings.)[6]» (AA.VV. 1900).

Despite the ideological opposition expressed during Italy's second autarkic period, as forcefully articulated by Giulio Pajotti in *Autarchia e marmo* (1943)[7], the production of decorative cement artifacts



Chiosco Orinatoio, tipo Como, fig. **123**, a due posti in pietra artificiale (smontabile). Brevetto 215463.



Chiosco-orinatoio «Tipo Salsomaggiore» fig. **224** a 2 posti in pietra artificiale (smontabile, brevettato).

Figs. 6e-6f. Two examples of products proposed by the U. Renzi company of Turin.

continued to expand and achieved significant success, demonstrating their resilience and adaptability within changing political and cultural contexts: «It was necessary to fight, above all against the concrete and artificial stones, which ostracized the beautiful marbles of our homeland: the battle attracted me for its superior, very Italian charm, and so I lined up, with enthusiasm, alongside Giulio Genovesi, and we fought with faith, with ardour, with extreme personal selflessness[8]» [→ Fig. 7].

As previously noted: «The industrial production of concrete ashlars for the modular finishing of walkable and drivable floors traces its origins, first, to the discovery and then the application of that particular product known in Italian as "cement." This building component appeared on the international scene in the third quarter of the nineteenth century with the "rediscovery" of hydraulic binders. In this sense, Portland cement was historically predated by a couple of millennia by the hydraulic limes the Romans obtained by calcining volcanic materials. Although these particular substances continued to be produced in minimal quantities (especially for the production of special mortars for port infrastructure), the use of pozzolana-derived binders in construction ceased almost everywhere and was essentially lost for more than fifteen centuries[9]» (Pajotti 1943).

Fig. 7. Cover of the text " Autarchia e marmo" by Giulio Pajotti; Monza, 1943.

▸ Notes on the production of modular concrete blocks (tiles) and grit; bricklayer's tools

During seminars conducted by Ettore Sottsass at the Industrial Design Degree Course at the Faculty of Architecture in Palermo (directed by Anna Mari Fundarò), studies were carried out on cement and grit tiles used in Italian bourgeois architecture from the late nineteenth century to the post-war period. Rereading the testimonies of that experience (see Catena La Guidara et al., *Mattoni in graniglia*, edited by Antonio Martorana) in "*Storie e progetti di un designer italiano; quattro lezioni di Ettore Sottsass Jr.*", we can summarize here some considerations on that material made on that occasion.

Grit can be defined as a composite material composed of cement, water, and marble chips no larger than three millimetres. Compact, durable, and versatile, it constitutes a true artificial stone capable of varied shaping and coloration. The affordability and artisanal production of grit, in addition to the material's own qualities, have-made it, from the end of the past century until the last post-war period, considered a fundamental material for finishing houses such as for making sinks, tubs. thresholds, window sills, floors, balustrades, stairs, etc.. When houses were "decorated," extraordinary colourful designs reproducing floral and/or geometric motifs were made with grit floors; the craftsmen themselves drew those decorations from a range of widespread European experience, yet to be explored and specified with appropriate studies. In general, room floors included a central area (with floral and/or geometric decorative motifs) extending up to about 80 centimetres from the walls; a row of tiles with geometric decorations that formed the edge of the central area; and, finally, a band about 60 centimetres thick made of single-color tiles, along the walls. This procedure is by no means original and in fact echoes the tradition of floors made with ceramic tiles. In recent years, artisanal grit has lost much of the "space" it enjoyed, both because of the spread of industrial products and, above all, because the production structure has been transformed by turning toward a banal production of cement tiles with marble chips or with stone fragments. Craftsmen who still produce such tiles with traditional "quality" are now few in number.

In the making of grit tiles, three layers are distinguished. The first is made by starting with a quasi-liquid mortar composed of white cement (20%), "seeded" limestone (15%), coloured "flake" (65%) and water, with a thickness of 5-6 mm. The mortar is coloured by adding natural oxides according to the chosen colour. Only the good quality of the oxides ensures that the tile retains its colour unchanged over time. The second layer consists of a mixture of cement (50%) and sand (50%): this has a thickness of about 2mm. The third layer consists of a wet mortar of cement (35%) and sand (65%), with a thickness of 18mm.

The working tools of the "brickmaker" (i.e., the craftsman who makes such tiles) are:

a) the mould, quadrangular in shape, made of steel or cast iron: it consists of a lower part into which the mortars are poured and an upper part that is used to compress the tiles;
b) the "divisional," made of brass or bronze blades reproducing the desired design: this tool is used to separate, in the formation of the first layer of the artifact, the mortars of different colours provided by the chosen design;
c) a special spoon with which the liquid mortar is poured into the first layer;
d) a small sieve (15x15 cm) through which the mixture of the second layer is passed;
e) a press [→ Figs. 7a-7g].

The making of the tile is done according to the following procedure.

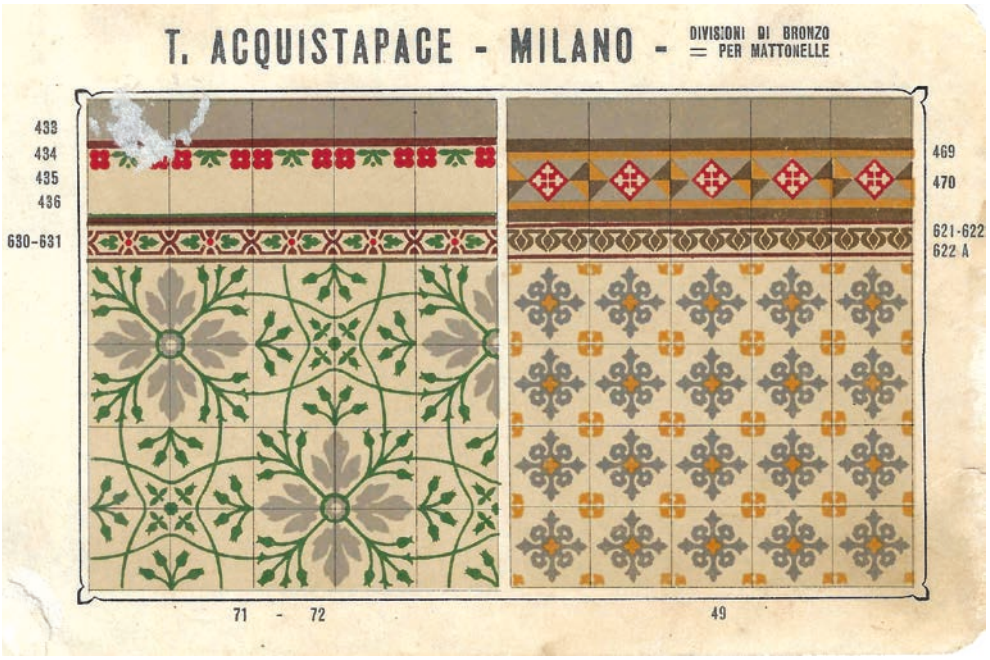
If a patterned tile is to be made, the divisional is placed in the lower part of the mould while, thanks to the special spoon, the coloured liquid mortars forming the first layer are poured into its interstices. This operation is very delicate and must be done with a firm and decisive hand because the distance between the slats of the divisional is often only a few millimetres; however, the uniform colour tone of the tile is obtained if worked mortar always has the same thickness. Next, the divisional is taken out of the mould in such a way that the mortars of different colours do not mix with each other; a mixture of cement and sand is superimposed on the coloured mortars with the help of the sieve, and this is done with the purpose of absorbing the excess water from the first layer; the mixture must be evenly distributed. Once the mortar of the third layer has been poured, after covering it with the top of the mould, the whole is subjected to pressure (110 Kg/sq.cm for the 20x20 tile; 150 Kg/sq.cm for the 25x25 tile; 200 Kg/sq.cm for the 30x30 or 40x40 tile). Twenty-four hours after preparation, the tile is treated with water spray; curing takes place in an average period of 40 days.

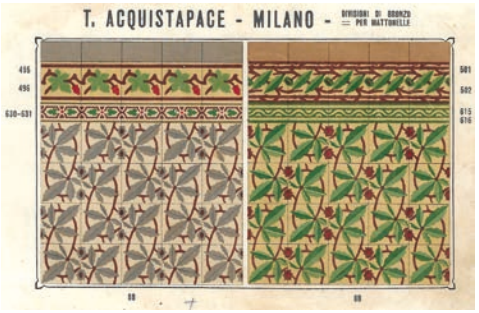
As an example of the above, some tile decorations obtainable with the divisional made and marketed by the Acquistapace company at the turn of the 19th and 20th centuries are presented below.

▸ Historical families of cement and grit tiles

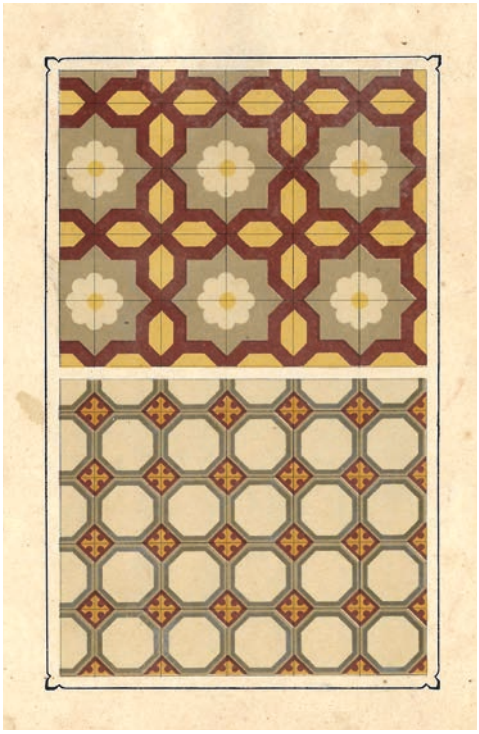
Italian manufacturers classified cement-based floor tiles into distinct families, including plain tiles, inlaid tiles and artificial marbles, technical paving stones, and Venetian-style mosaic tiles, an industrial reinterpretation of traditional terrazzo floors.

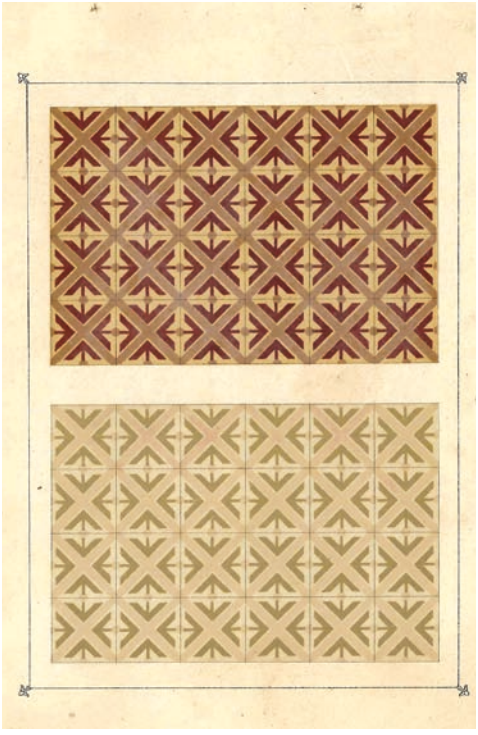
Extensive catalogues by firms such as *Ing. S. Ghilardi, De Filippis & C.*[10] [→ Figs. 8a-8b], *Società Lodigiana Lavori in Cemento*[11] [→ Figs. 9a-9b], and *G. Tonini e Figli*[12] illustrate these families through hundreds of





Figs. 7a-7g. As an example, some tile decorations obtainable with the divisional made and marketed by the Acquistapace company at the turn of the 19th and 20th centuries are presented.





chromolithographic plates, examples of which are reproduced below [→ Figs. 8-10].

Among the many factories producing modular components for the construction of concrete-based floors spread throughout Italy, the company *Ing. S. Ghilardi-De Filippis & C*. [→ Figs. 8a-8b] and the *Società Lodigiana Lavori in Cemento* [→ Figs. 9a-9b] have classified and described them according to specific families, while the company *G. Tonini e Figli* of Udine [→ Figs. 10a-10b] has simply illustrated them without further specifications. Some significant examples of all three of the aforementioned factories are reported below.

The first family of pavements created using the performance quality of concrete consisted of tiles that incorporated particularly hard and friction-resistant mineral pigments within grout. See the grey or reddish pavements (more or less squared, configured during installation using special rollers) that still characterize the face of many urban spaces, especially sidewalks, around the world. The transition from the domestic and decorative dimension of the ancient and consolidated tradition of tiles to that of technical floors suitable for providing adequate performance (though not detached from a decorative purpose) to urban streets and open spaces. This likely stems from the experience gained, especially in the creation of complex architectural artifacts in decorative concrete. Alongside this type of tile, companies specializing in their production supplied (and some still supply) components for pouring continuous floors decorated in relief with ornamental motifs very similar to prefabricated ones, also known as "pietrini" [→ Figs. 8.3.1-8.3.3; 9.3.1-9.3.2; 10.1.1-10.1.4].

The second family of modular components for the construction of residential floors based on the use of concrete consists of the so-called "plain, solid-colour tiles". These were made in various shapes and sizes; the colours were obtained by mixing the mixture with mineral pigments. Floors of this type, of reasonable cost, were mainly reserved for modest environments. However, the use of tiles of different colours still allowed for the creation of pleasant geometric compositions [→ Figs. 8.1.1-8.1.3; 9.1.1-9.1.3; 10.3.1-10.3.4].

The third family of floor tiles consists of "tiles with inlays and artificial marbles"; similar to the simple ones, they were polychrome and had complex geometric designs, allowing for particularly elaborate surfaces with borders, suitable for more sophisticated environments [→ Figs. 8.2.1-8.2.5; 9.2.1-9.2.3; 10.2.1-10.2.4].

The fourth family of tiles, decidedly more refined than the previous ones, consists of the so-called "Venetian mosaic tiles." These components, suitable for flooring particularly elegant environments, constitute, in fact, a form of industrialization of the so-called "Venetian *terrazzo*" [→ Figs. 8.4.1-8.4.3; 9.4.1-9.4.3; 10.4.1-10.4.4].

As is well known, "*terrazzi*" (real multi-material mosaics) were traditional floors created "on site" by incorporating stone granules (especially coloured marble) into a bed of lime mortar. The resulting relatively rough surface was smoothed and polished on site after the binder had cured, using pumice stone panels or other abrasives. The tiles of this family also hark back to the geometric culture of the previous typologies.

▸ **Examples of floors produced by the firm *S. Ghilardi-De Filippis & C.* of Bari**

Series I – Plain, solid-colour tiles

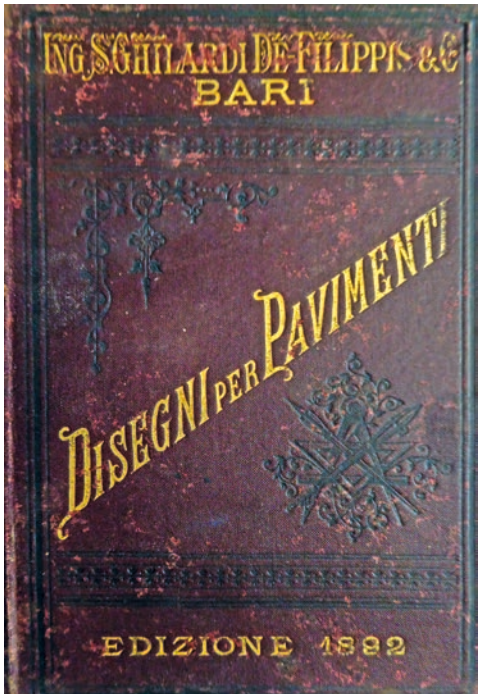
There are square and hexagonal tiles, in white, red, and black. They are made with the highest-quality domestic cements, coloured in the paste, and compressed by hand. They are used for floors of a certain elegance, sturdy yet economical [→ Figs. 8.1.1-8.1.3].

Series II – Inlaid and artificial marble tiles

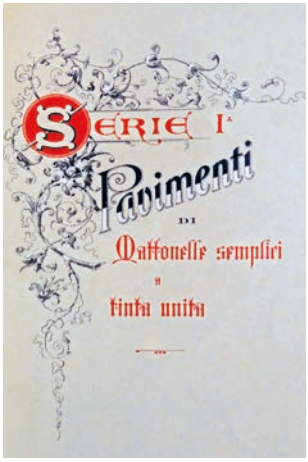
There are also square and hexagonal tiles, in various colours and designs. They are made with partly domestic and partly foreign cements, coloured in the paste, and mechanically compressed at 300 atmospheres. They are used for floors of greater elegance and durability [→ Figs. 8.2.1-8.2.5].

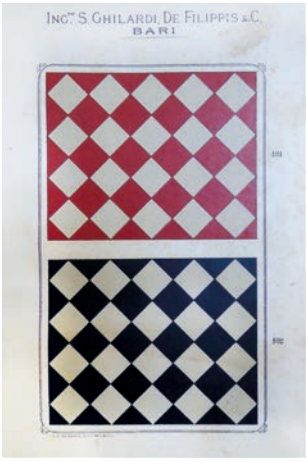
Series III – Smooth, grooved, and imprinted *pietrini*

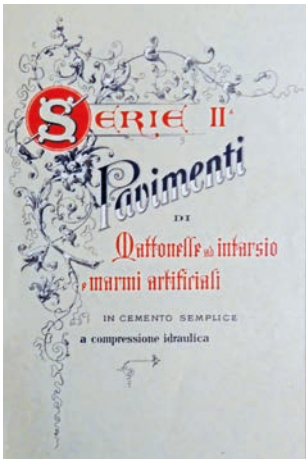
They come in square and rectangular shapes, with a noticeable thickness, a solid natural colour, and a smooth, grooved, or imprinted

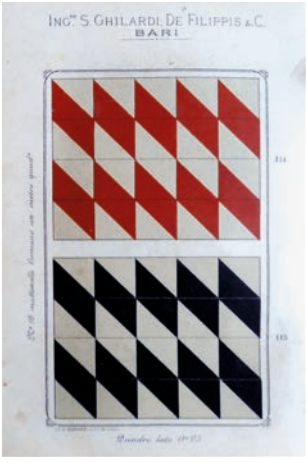


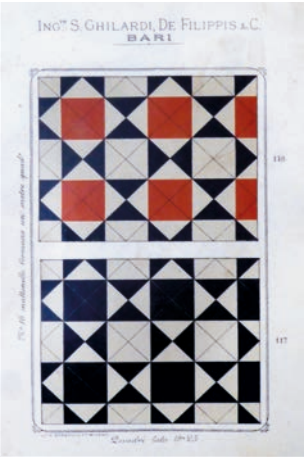
Figs. 8a-8b. Cover and title page of the album "*Disegni per pavimenti*" by S. Ghilardi-De Filipis & C.; Bari, 1892.











Figs. 8.1.1-8.1.3. Series I, plates concerning the catalogue of "Plain, solid-colour tiles".

Figs. 8.2.1-8.2.5. Series II, plates concerning the catalogue of "Inlaid and artificial marble tiles".

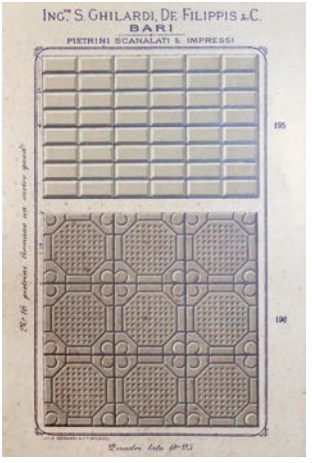
surface. They are made from a very special cement of exceptional strength and are also mechanically compressed to 300 atmospheres. They have a granite-like solidity, a beautiful grey colour, and are a great alternative to natural stone for pavements, train station squares, doorways, courtyards, porticos, warehouses, kitchens, and anywhere an elegant and exceptionally sturdy flooring is required [→ Figs. 8.3.1-8.3.3].

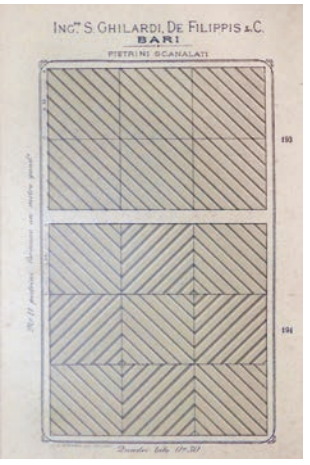
Figs. 8.3.1-8.3.3. Series III, plates concerning the catalogue of "Smooth, grooved, and imprinted pietrini".

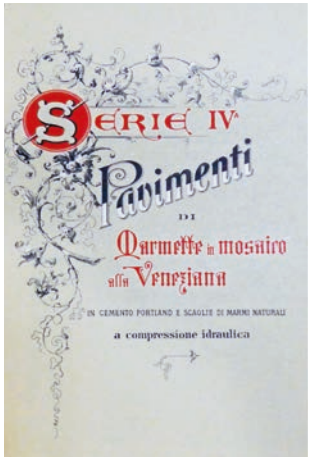
Figs. 8.4.1-8.4.3. Series IV, plates concerning the catalogue of "Venetian mosaic tiles".

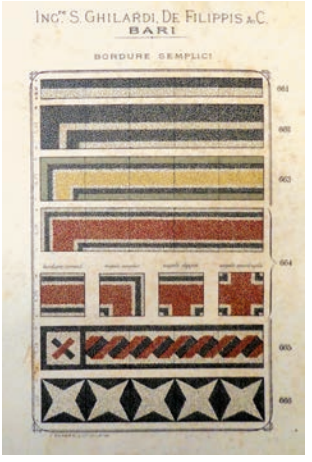
Series IV – Venetian mosaic tiles

They are made from real natural marble chips bonded together with Portland cement and hydraulically compressed. The floors, very robust and very luxurious, imitate and replace the Venetian floors and the mosaic floors which were already held in such high esteem by the ancients and which can still be admired in the rooms of some noble palaces [→ Figs. 8.4.1-8.4.3].









▸ **Examples of flooring produced by the *Società Lodigiana***

Series I – Plain tiles

They come in various shapes and sizes [...] to combine different designs [...] with appropriate combinations and colour swaps, an infinite number of other designs can be created [→ Figs. 9.1.1-9.1.3].

Series II – Hydraulic compression tiles in plain cement

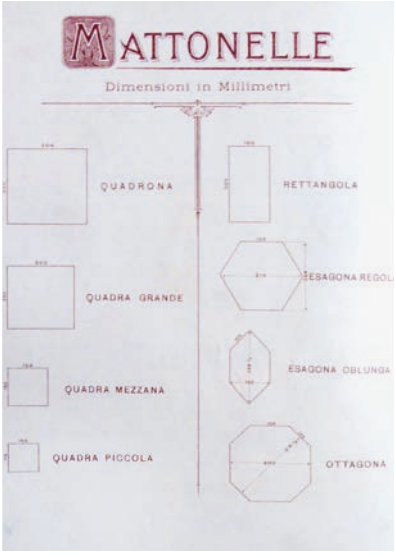
They are made with special coloured cements according to the designs and mechanically compressed at high pressures [→ Figs. 9.2.1-9.2.3].

Series III – Smooth, grooved, and striated hydraulic compression *pietrini* in plain cement

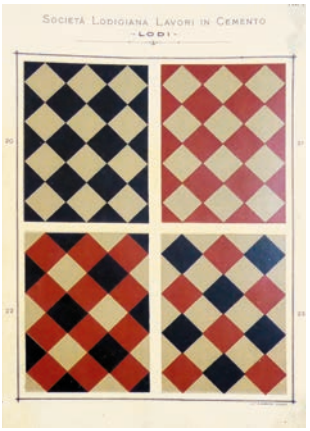
There are six different types [...] these *pietrini*, made entirely of top-quality Portland cement and compressed with powerful hydraulic presses at up to 300 atmospheres, are exceptionally solid. They are a very advantageous substitute for natural stone for pavements, doorways, courtyards, porticos, warehouses, stables, etc. [→ Figs. 9.3.1-9.3.2].

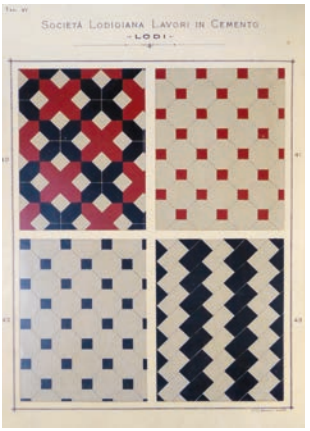
Series IV – Venetian mosaic tiles

[...] They are made with natural marble chips bonded together with premium Portland cement. They are extremely elegant and highly sought-after in Italy and abroad. They are used for floors in stately homes, churches, ballrooms, skating rinks, etc., where, in addition to solidity, a certain luxury is also required [→ Figs. 9.4.1-9.4.3].



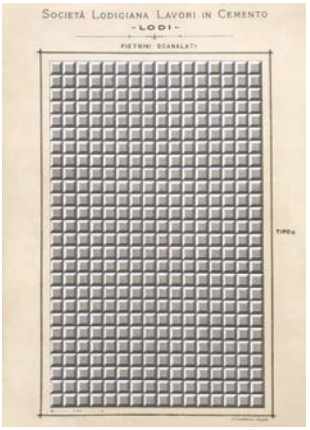
Figs. 9a-9b. Title page and table of sizes of the "Album dei pavimenti" produced by the Societá Lodigiana, 1900.





Figs. 9.1.1-9.1.3. Series I, plates concerning the catalogue of "Plain tiles".

Figs. 9.2.1-9.2.3. Series II, plates concerning the catalogue of "Hydraulic compression tiles in plain cement".



Figs. 9.3.1-9.3.2. Series III, plates concerning the catalogue of " Smooth, grooved, and striated hydraulic compression pietrini in plain cement".

Figs. 9.4.1-9.4.3. Series IV, plates concerning the catalogue of "Venetian mosaic tiles".

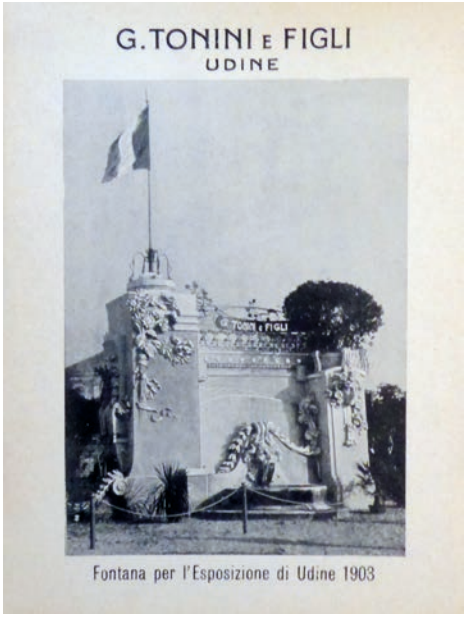
▸ Examples of tiles produced by the company *G. Tonini e Figli* of Udine

Type I – Grooved and impressed *pietrini*
[→ Figs. 10.1.1-10.1.4].

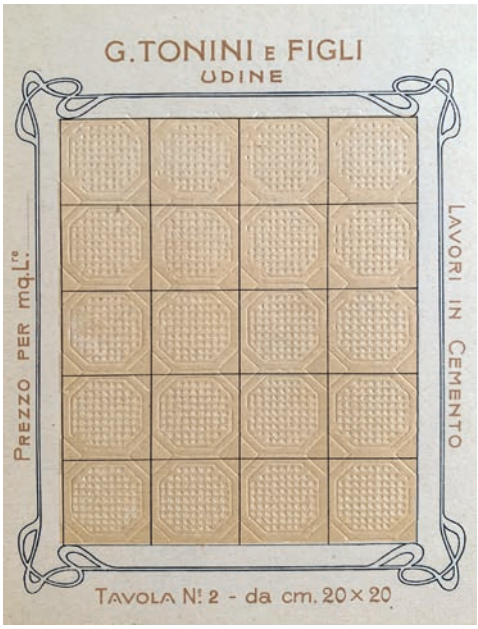
Type II – Plain cement tiles
[→ Figs. 10.2.1-10.2.4].

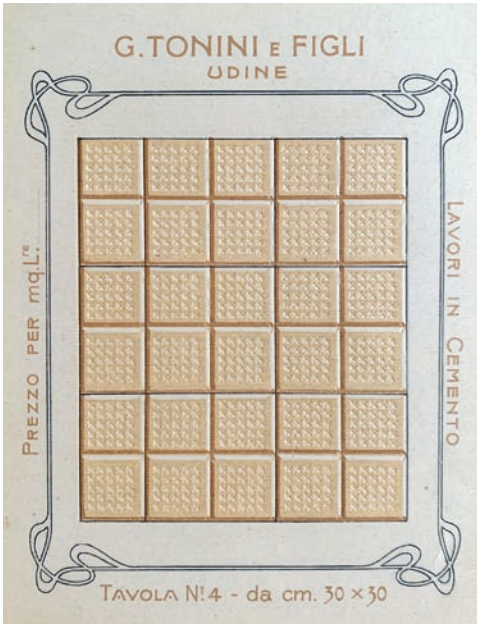
Type III – Hydraulically compressed tiles
[→ Figs. 10.3.1-10.3.4].

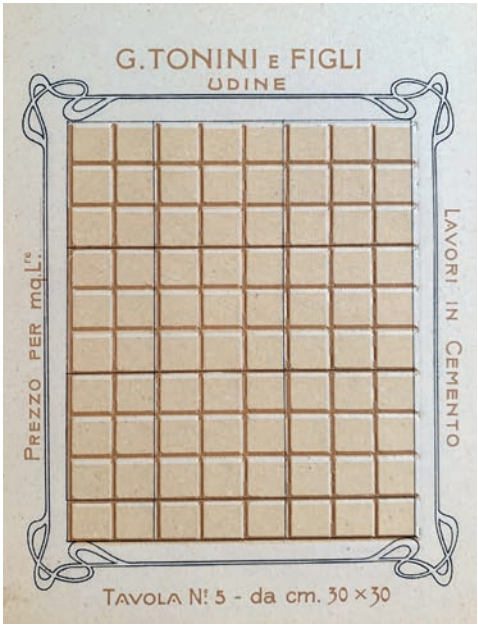
Type IV – Mosaic tiles
[→ Figs. 10.4.1-10.4.4].

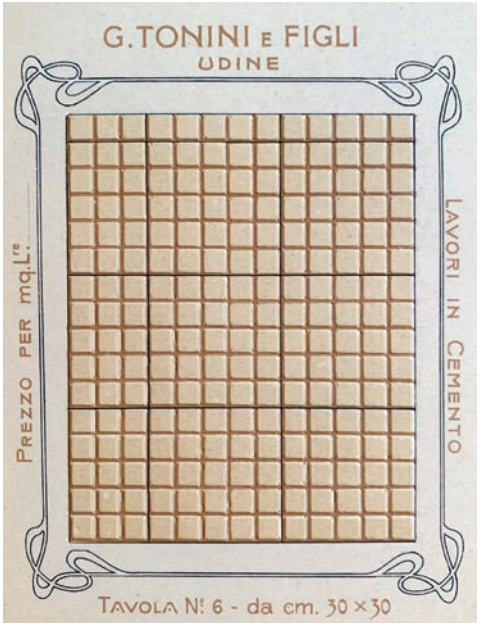


Figs. 10a-10b. Cover and first page of the flooring catalogue from the company G. Tonini e Figli of Udine, 1903.

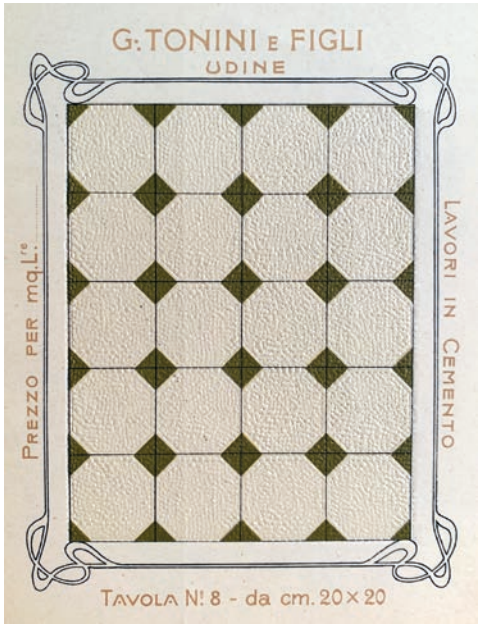


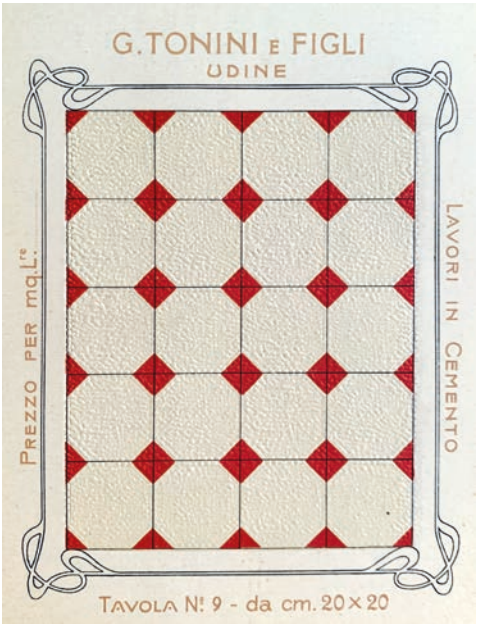


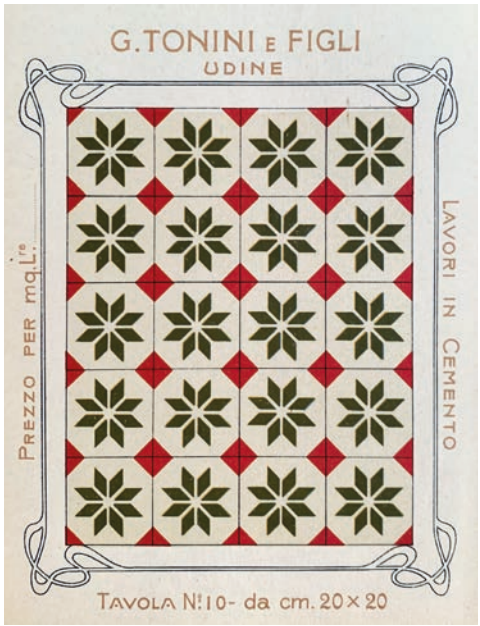




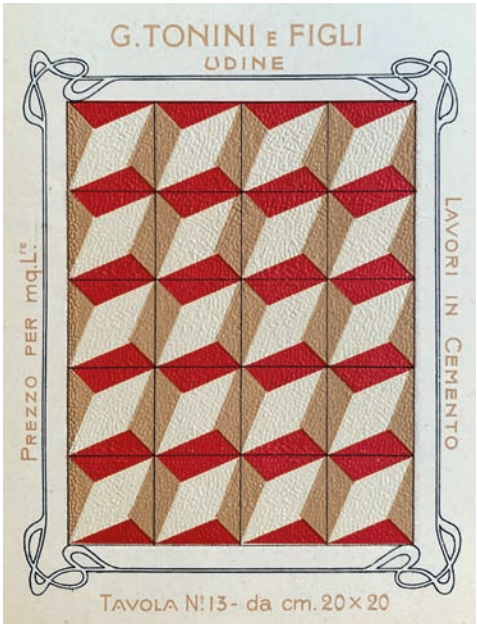
Figs. 10.1.1-10.1.4. Type I, plates concerning "Grooved and impressed pietrini".

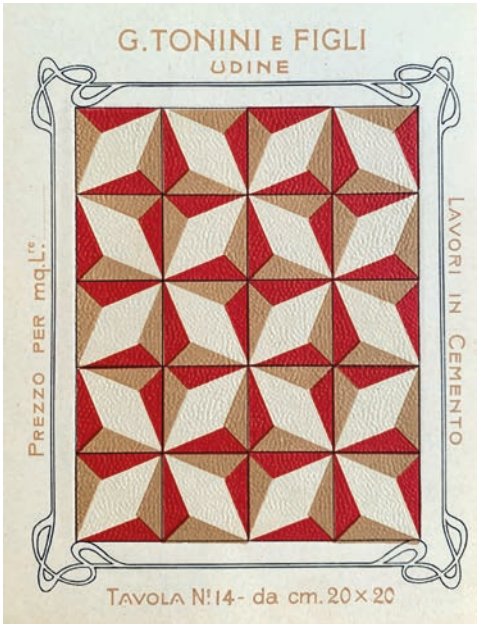


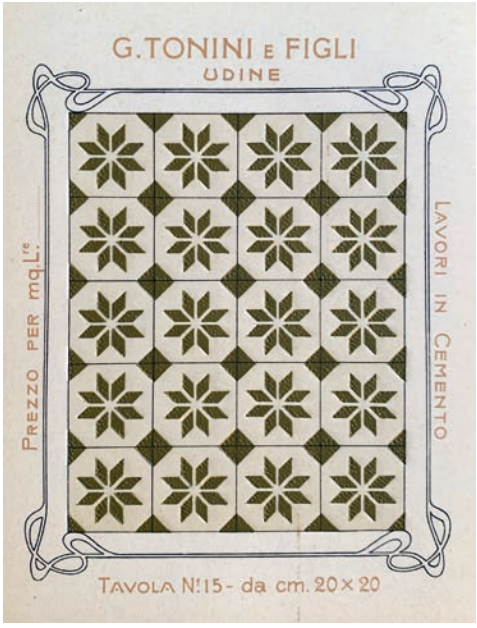


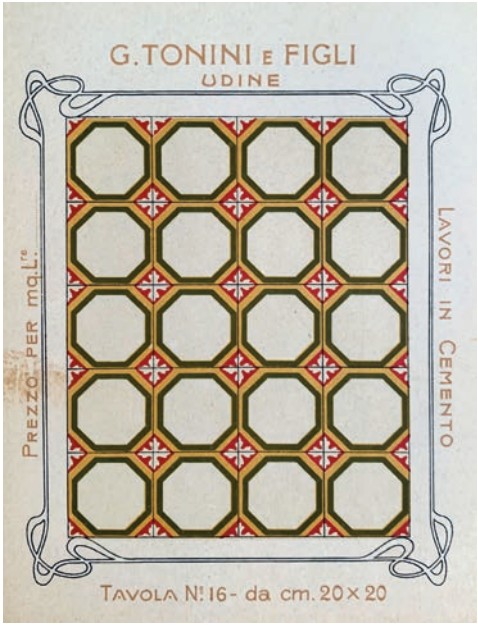


Figs. 10.2.1-10.2.4. Type II, plates concerning "Plain cement tiles".

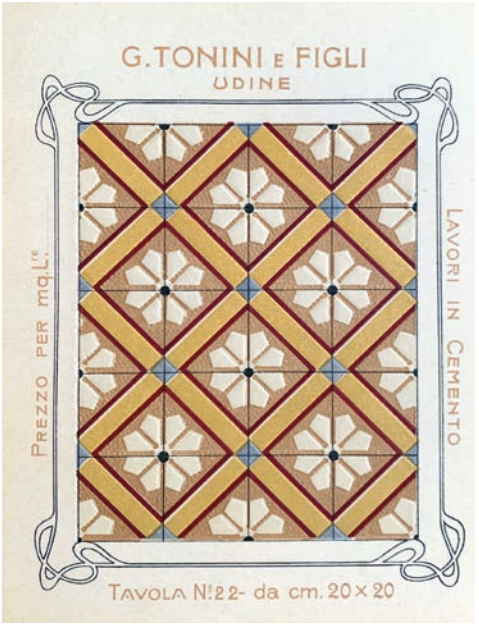








Figs. 10.3.1-10.3.4. Type III, plates concerning "Hydraulically compressed tiles".



Figs. 10.4.1.-10.4.4. Type IV, plates concerning "Mosaic tiles".

▸ Technical aspects of concrete and terrazzo tiles and their installation

Terracotta tiles reached the height of their popularity between the late nineteenth century and the 1940s. This product established itself as a material of great durability and relatively low cost (as it made use of low-quality marble chips that would otherwise have been almost unusable). Its versatility was particularly evident in its application in decorated floors, which even today evoke a lifestyle and domestic environment characteristic of the lower middle class, marked by solidity and decorum, in which ornamentation contributed to the display of relative affluence.

Initially, terrazzo referred both to the decorative structure (the so-called "carpet") and to the typical patterns of ceramic flooring. These patterns were generally naturalistic or geometric motifs (sometimes highly evocative) which, because of their complexity, depended on meticulous and patient craftsmanship. Unfortunately, this characteristic tends to disappear in more recent production, where design appears increasingly schematic, not only or not so much as a result of changing taste, but probably also due to the need to simplify manual operations or even to introduce this material into an industrialized production process. However, after the Second World War, the production of decorated terrazzo tiles almost completely ceased, with only very rare exceptions. Terrazzo continued to be used in plain, undecorated tiles, or gave way to *brecciato* and *segati di marmo* (marble tiles), which were considerably cheaper because they were more easily produced on an industrial scale.

Grit tiles were traditionally used to compose decorations that emphasized the regularity and composure of a space. Typically, a frame ran parallel to the walls, delimiting a quadrangular area within which the decorative motif was repeated in both directions; in other cases, the central portion consisted of a single field that echoed one of the colours used in the frame. It is common to observe terrazzo floors employed to provide a visual centre to an irregular room, to emphasize the layout of a corridor, or even to dictate the arrangement of furniture, which was usually placed against the walls so as to leave the frame unobstructed. In any case, terrazzo tile flooring imposed rather peremptory indications regarding how a dwelling was to be inhabited, and this rigidity is one of the reasons why such flooring is difficult to reproduce today. Often, the gradual deterioration of decorated terrazzo surfaces and the subsequent subdivision of the apartments in which they were used have rendered the original compositional intent almost illegible, surviving only as a trace of a way of living shaped by different needs.

It is interesting to note what the companies *Ing. S. Ghilardi, De Filippis & C.* and *Società Lodigiana Lavori in Cemento* respectively added.

[*Ing. S. Ghilardi, De Filippis & C.*] ***Tile installation.*** The surface on which the tiles are to be installed must be solid and resistant. It is advisable to immerse the tiles in clear water prior to installation, which is carried out in the same manner as for ordinary or marble floors. Hydraulic mortar is preferable, although pozzolana mortar is also excellent. In all cases, the mortar should be mixed so that it is not excessively liquid. Once the layer of mortar on which a tile is to be laid has been spread, the installer should apply a spoonful of a fairly liquid mixture made of pure Portland cement, or of Portland cement mixed with a small amount of lime. The tiles should be laid using hand pressure alone, avoiding hammer blows whenever possible. It is of the utmost importance that, during installation, the tiles are kept constantly and rigorously clean, so that no traces of mortar or cement remain on the surface of the floor. This precaution is essential because, if the mortar is allowed to dry on the surface, it will stain the floor, and subsequent cleaning, normally already quite difficult, will not always be entirely successful. When partial tiles are required to complete a floor, they are cut using a hand saw or a steel point. A groove 2–3 mm deep is made along the intended cutting line, after which the tile is split by tapping it against a hard edge. Once installation is complete, the joints are sealed with a liquid mixture of pure Portland cement, taking care to remove any excess with a rag before it has fully hardened. Fifteen or twenty days later, if stains or small protrusions remain on the floor, it is smoothed: if the floor consists of plain cement tiles, this is done lightly using fine-grained sandstone and water; if it consists of mosaic tiles, the operation is carried out with a fine-grained grindstone and water.

[*Ing. S. Ghilardi, De Filippis & C.*] ***Applications and benefits of concrete tiles.*** Concrete tiles are used for floors in churches, schools, warehouses, residential buildings, hospitals, barracks, and wherever solid and elegant flooring is required. These floors are hygienic because they do not absorb moisture from the subsoil and do not produce dust; they are extremely durable because they do not deteriorate with use; they are elegant owing to the great variety of designs and the sharpness and vividness of their colours; and they are economical, as they cost little more than terracotta tiles, with the higher initial cost largely offset by their superior durability.

[***Società Lodigiana Lavori in Cemento***] ***Tile installation.*** The subfloor on which the tiles are to be laid must be solid and well compacted. Installation is carried out in the same manner as for ordinary or marble floors, and hydraulic mortar is preferred, although pozzolana mortar is also suitable. During installation, the tiles must be kept clean. Once the work is finished, the joints are sealed with Portland

cement, removing any excess with a rag before it has fully hardened. Fifteen or twenty days later, if any stains or small protrusions remain, the surface is smoothed: in the case of cement tiles, this is done lightly with fine-grained sandstone and water; in the case of mosaic tiles, with a large fine-grained grindstone and water.

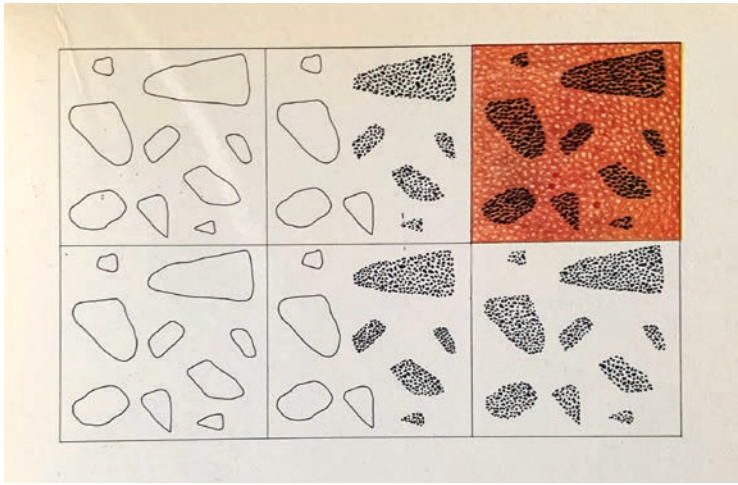
[Società Lodigiana Lavori in Cemento] Applications and benefits of tiles. Our hydraulically compressed concrete tiles, as solid as marble, are used for floors in churches, schools, hospitals, barracks, and wherever solid and elegant flooring is required. These floors are hygienic because they do not absorb moisture from the subsoil and do not produce dust; they are extremely durable and do not deteriorate with use; they are elegant owing to the great variety of designs and the sharpness and vividness of their colours; and they are economical, as they cost little more than terracotta floors.

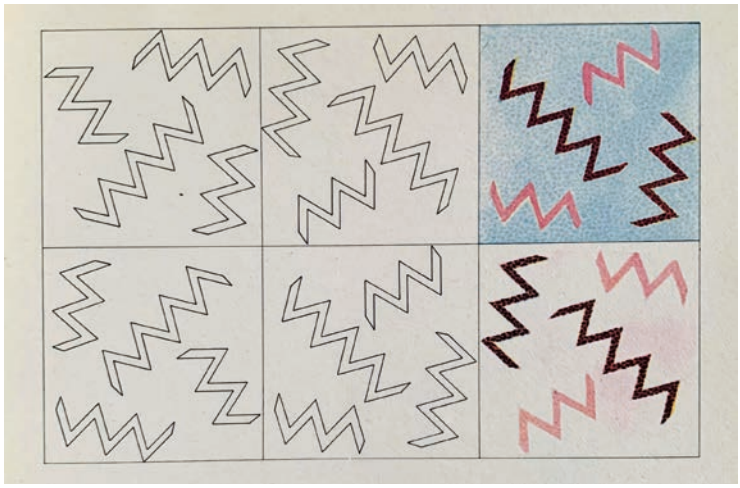
▸ **Reflections from the seminar led by Ettore Sottsass at the Faculty of Architecture in Palermo**

As mentioned above, the workshop held in Palermo by Ettore Sottsass was based on the hypothesis of reintroducing concrete and terrazzo tiles [→ Figs. 10.5.1–10.5.3]. The following paragraphs summarize the reflections on this theme contained in Antonio Martorana's text, accompanied by some images of the resulting projects. It is evident, however, that concrete and terrazzo tiles today represent a rather "dated" material, articulated according to the rules of a tradition that came to an end after completing its historical cycle; reviving it today therefore requires substantial technical and aesthetic innovation.

The drawings produced by the project curated by Sottsass stemmed from a series of reflections (reported verbatim):

1. on the nature of the material, and on its peculiarity of being inherently "decorative," insofar as it offers perception a grain, a discontinuity. The intention was therefore to emphasize the ambiguity between the irregularity of a drawn background and the random irregularity intrinsic to the material;
2. on "decoration," through the need to interpret it differently, to interrupt its continuity and the linear repetition of the motif, also responding to the desire to create floors without hierarchies or differentiations, capable of being used with greater flexibility [...]. The project, some aspects of which are presented here, was also the result of research into the effect of depth, that is, the introduction of a third dimension into the floor plane, an effect already observable in certain historical flooring examples;
3. finally, the project sought to revisit certain decorative structures of traditional floors by designing tiles that explicitly require adjacency,





Figs. 10.5.1-10.5.3. Innovative decorations proposed by the workshop held in Palermo by Ettore Sottsass on the hypothesis of the updated reintroduction of this type of flooring.

capable of expressing a compositional choice while simultaneously leaving the user a wide margin of freedom.

▸ **The marble tiles (brecciated, sawn marble)**

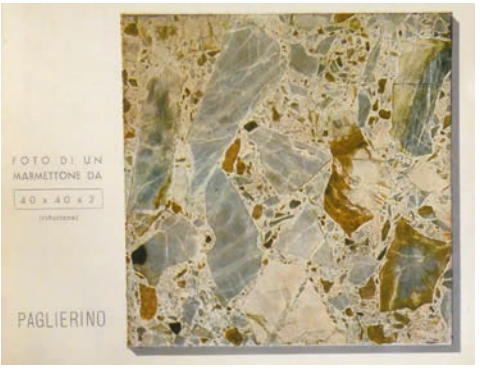
Immediately following concrete and terrazzo tiles, from which they evidently derive, one may place *marmette* in the strict sense, that is, the industrial (prefabricated) version of Palladian terrazzo, produced using marble aggregates such as chips, flakes, fragments, or even polychrome pebbles of quarry origin [→ Figs. 11a–11d].

These tiles, still in production today, are obtained by incorporating large flakes of coloured marble (often derived from quarry waste) into a cementitious mixture. Visually, they closely resemble natural marble slabs but, clearly, belong to a much more affordable price range. In the history of industrial products, the emergence of so-called *marmette*, which continue to play a significant role in paving spaces of all kinds and scales, represents one of the applications made possible by binders that, from the late nineteenth century onward, evolved continuously, giving rise on the one hand to reinforced concrete and, on the other, to ornamental cements. The latter, in particular, made it possible to reproduce construction elements and decorative architectural modules by means of moulds, elements that previously had to be individually shaped by hand.

If one may be allowed a bold simplification, the history of *marmette* tiles coincides in many respects with that of aluminium window frames. At their inception, both appeared well suited to satisfying certain practical requirements of modern architecture, yet proved entirely inadequate when inserted into historic buildings, lacking the richness of nuance and expressive versatility characteristic of window frames made of wood or other noble materials (including bronze and stainless steel) refined over previous centuries.

Engineer Aldo Scarsella's text *Il marmista*, published by Hoepli in 1923[13] [→ Fig. 12], explicitly refers to the new building components known as *marmette* in the following terms:

«They are generally used for flooring. A large quantity of marble tiles is obtained from offcuts and scraps of the slabs, and these are used in the most common jobs, being available in various colors. For similar, inexpensive marble tiles, the crusts are also used. They are trimmed by hand or machine. First- and second-quality marble tiles and colored marbles are used for luxury patterned floors. When polished to a mirror finish, these floors have a magnificent appearance. Large quantities of marble tiles are exported to the East, to create fresh, clean environments through large-scale marble floors and wall coverings. The thickness of the tiles is usually 2 cm. The sides vary from 20 to 80 cm[14]».



Figs. 11a-11d. Cover, title page, and plates of the catalogue of marble tiles from the MAB-Marmi agglomerati company; Bergamo (?), 1930s-1940s of the 20th century.

Fig. 12. Cover of the Hoepli manual Il Marmista (with 64 illustrations), by Aldo Scarzella; Milan, 1923.


MANUALI HOEPLI

ING. ALDO SCARZELLA

IL

MARMISTA

Lavorazione nei laboratori · Segatura · Lavorazione meccanica del marmo · Laboratori dei marmi · Segherie dei marmi · Segatura col filo elicoidale nelle cave e nei piazzali di deposito · Cenni storici su Carrara · Cenni geologici sulle Alpi Apuane · Legge sulla concessione degli agri marmiferi · Lavorazione alle cave · Quadro delle diverse serie di marmi cristallini · Minerali accessori del marmo · Ipotesi sull'origine dei marmi di Carrara · Potenzialità di produzione delle cave di marmo · Tabelle · Listino dei prezzi · Spedizioni per mare e ferrovia · Calcare di Botticino · Cave di granito · Elenco dei produttori e dei negozianti di marmi di Carrara e Massa

con 64 illustrazioni

ULRICO HOEPLI

EDITORE-LIBRAIO DELLA REAL CASA

MILANO

1923

Notes

1. Instead of the term "inert," it has become common practice today to call "aggregates" those natural or artificial stone elements that, due to their shape and size, are suitable for making concrete. Personally, I prefer to emphasize the binding function of the binders rather than their effect on the incorporated materials.
2. «A ben vedere, la storia particolare dei componenti edilizi che possono essere usati in applicazioni di interesse pubblico e collettivo e che possono, quindi, essere sottoposti a sollecitazioni anche molto importanti, rientra nella più ampia storia, relativamente recente, del cemento tipo Portland e delle sue successive applicazioni nei calcestruzzi o nei cementi decorativi». Alessandro Ubertazzi (with others), *Pavimentazioni di qualità; storie, caratteristiche, produzione e progettazione delle pavimentazioni in calcestruzzo vibropressato*, Modulimpianti for Magnetti Pavimentazioni, Bergamo, February 2003.
3. Album of *Disegni per pavimenti ing. Ghilardi, De Filippis e C., Bari*, 1892 edition, (catalogue of the company's concrete works with 84 chromolithograph plates featuring hundreds of types of concrete tiles), lithograph by E. Berardi and C. of Milan for Stabilimento Bolis, Bergamo 1902.
4. «L'impiego dei materiali in cemento nell'Italia meridionale data già da circa vent'anni [N.d.R.: dal 1870 circa] ma la sua diffusione era lenta e difficile a causa del costo elevato dei materiali medesimi. Preoccupato di tale fatto il nostro socio sig. cav. Pasquale de Filippis di Bari, dopo una lunga serie di anni, incoraggiato dall'esito favorevole del commercio di tali prodotti, e allo scopo altresì di avvantaggiare i suoi clienti in queste contrade delle maggiori spese di trasporto dei materiali che prima si ritiravano dalle fabbriche dell'alta Italia e dall'estero, stabilì di fondare in Bari un cantiere per lavori in cemento, il primo a sorgere nell'Italia meridionale. A tale scopo nel 1883 il cav. de Filippis si univa alla società con la Ditta Ing. S. Ghilardi e Co di Bergamo la quale fin dal 1876 si occupava su vasta scala dell'industria dei cementi ed era già favorevolmente conosciuta in tutta Italia per i suoi ottimi materiali, e così, fu costituita in Bari la ditta Ing. S. Ghilardi, De Filippis e C. Da quell'epoca ad oggi il nostro cantiere ha subito notevoli ampliamenti e perfezionamenti per effetto dei quali la fabbricazione delle mattonelle per pavimenti, eseguita con motrice a vapore e macchine dei più recenti sistemi, ha ora raggiunto tale ragguardevole produzione da soddisfare le innumerevoli richieste che ci pervengono dall'Italia meridionale e da oltremare. Il credito diffuso e rapidamente acquistato dalle nostre mattonelle in cemento ci ha procurato nel lungo periodo del nostro esercizio un abbondante quantità di lavori tutti riusciti contiene soddisfazione della spettabile nostra clientela. L'impiego delle nostre mattonelle per pavimenti è ormai diffuso in tutto il continente meridionale, e a Napoli stessa, dove esistono antiche fabbriche di svariati mattoni patinati; la richiesta delle nostre mattonelle è tale da indurre la nostra ditta a mantenere in quella importante città uno speciale rappresentante. Animati, come sempre, dal desiderio di corrispondere nel miglior modo possibile a questo favore speciale col quale vengono universalmente accolti i nostri prodotti in cemento, e particolarmente le nostre mattonelle da pavimento, siamo lieti di presentare oggi al pubblico il nostro nuovo Album notevolmente ampliato ed elegantemente illustrato. La molteplice varietà di tipi e l'accuratezza dei disegni, speriamo renderanno gradito questo lavoro, nella compilazione del quale ci siamo studiati di interpretare e soddisfare, per quanto possibile, il gusto e le esigenze della nostra spettabile numerosa clientela. Bari, 1 gennaio 1892».
5. *Album dei pavimenti – Edizione 1900* (*Società Lodigiana Lavori in Cemento)*, Legatoria Stanessi, Lodi, 1900.
6. «Sorta nell'anno 1874, la Società Lodigiana è fra le prime ditte che si dedicarono all'industria dei lavori in cemento, dopo che l'Italia seppe emanciparsi dall'estero

per la produzione della materia prima e specialmente dei cementi Portland. I cantieri della Società Lodigiana, certo i più estesi esistenti in Italia, situati lungo il fiume Adda, fornisce le ghiaie conosciute: queste non gravano perciò sull'industria che pel solo trasporto dal letto del fiume agli spazi predisposti sulla sponda. Essi sono percorsi per tutta la loro lunghezza, e con opportune diramazioni, da uno speciale binario di derivazione dei Trams Interprovinciali, e si trovano perciò in comunicazione diretta colla fitta rete di Tranvie che percorrono la Lombardia: lo stesso binario può servire anche di comunicazione colla stazione ferroviaria. Nei laboratori, apposito macchinario frange le pietre naturali e le divide in iscaglie di diverse grossezze, leviga e lucida i materiali a mosaico, fa miscele precise di cementi e polveri coloranti, dà pressione ai torchi coi quali si ottengono materiali pressati di ogni qualità. Apposito gabinetto è riservato per una attenta prova di tutti i cementi che arrivano; numerosi e bassi magazzini raccolgono una grandissima quantità di materiali permettendo così di fornire sempre merce ben stagionata, anche in rilevanti proporzioni. Tra i vari prodotti di nostra fabbricazione e corrente meritano speciale menzione balaustre, altari, pile per acqua santa, vasche da bagno, vasi, statue, monumenti mortuari, gradini, sedili e panchetto per giardino, tavolini, fontane, avelli per tomba, mangiatoie e abbeveratoi per bestiame, lastre a mosaico, ecc., come dal nostro listino dei prezzi e dall'album speciale dei lavori di getto in cemento semplice e a graniglia di marmo levigati e lucidati».

7. Giulio Pajotti, *Autarchia e marmo*, S.A. Tipografica Sociale, Monza 1943 (XXI).

8. «Bisognava combattere, soprattutto contro il cemento e le pietre artificiali, che davano l'ostracismo ai bei marmi della Patria nostra: la battaglia mi attrasse pel suo fascino superiore, italianissimo, e quindi mi schierai, con entusiasmo, a fianco di Giulio Genovesi, e si combatté con fede, con ardore, con estremo disinteresse personale».

9. «La produzione industriale dei conci in calcestruzzo per la finitura modulare di suoli calpestabili e carrabili vede la sua origine, dapprima, nella scoperta e, poi, nell'applicazione, di quel particolare prodotto che, nella lingua italiana, viene detto "cemento": detto componente edilizio appare sulla scena internazionale appunto a partire dal terzo quarto dell'Ottocento con la "riscoperta" dei leganti idraulici. In tal senso, il cemento Portland era stato storicamente anticipato di un paio di millenni da quelle calci idrauliche che i romani ottenevano calcinando materiali di origine vulcanica: anche se queste particolari sostanze continuarono ad essere prodotte in quantitativi minimi (soprattutto per la confezione di malte speciali atte a realizzare infrastrutture portuali), l'uso edilizio di leganti derivati dalle pozzolane si interruppe quasi ovunque e sostanzialmente si perse lungo più di quindici secoli». See note 2.

10. See note 3.

11. See note 4.

12. See note 5.

13. Aldo Scarzella, *The Marble Worker* (*with 64 illustrations*), manuali Hoepli, Ulrico Hoepli editore libraio della Real Casa, Milan 1923.

14. «Vengono impiegate generalmente per la pavimentazione. Una grande quantità di marmette si ottiene dai ritagli delle lastre e dai rottami delle medesime e queste sono impiegate nei lavori più comuni essendo di varie tinte. Per simili marmette di poco prezzo si adoperano anche le croste. Si rifilano a mano o a macchina. Marmette di marmi di I e II qualità e di marmi colorati si adoperano per pavimenti di lusso a disegni. Lucidati a specchio questi pavimenti riescono di aspetto grandioso. Di marmette si fa grande esportazione per l'Oriente, per ottenere ambienti freschi e maggior pulizia, mediante pavimenti in marmo e rivestimenti in grande scala. Lo spessore delle marmette è ordinariamente di 2 cm. I lati variano da 20 fino ad 80 cm».

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Printed in March 2025 by
The Factory Srl, Rome