100 Things Not to Forget

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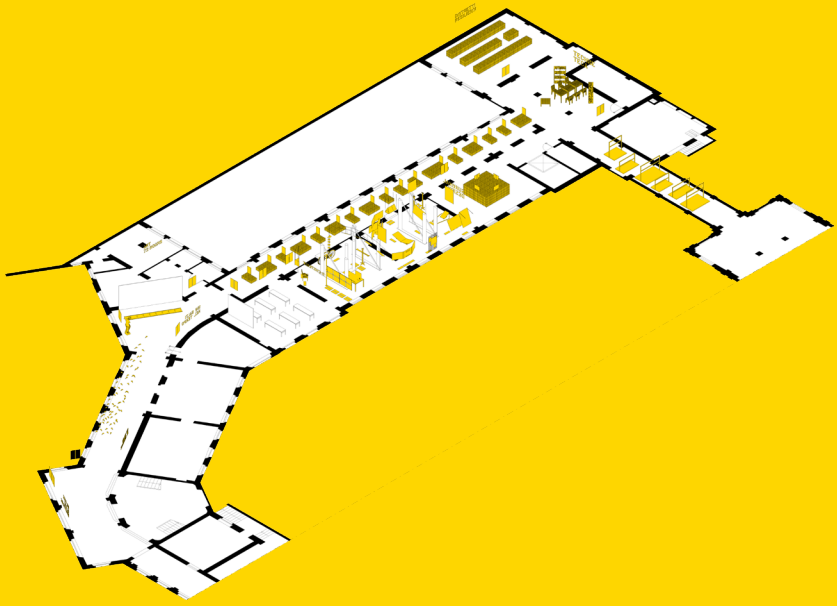

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IL PAPAVERO

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Materials as catalysts for relationships

An Eco-Social and Technological Perspective on Materials Design

Materials have always been the resources through which human beings have been able to give concrete form to their world. As Ashby and Johnson (2010) argue, we live in a world made of materials, in which humans are able to conceive, design, and manufacture functional and symbolic objects. However, in the face of contemporary environmental and social challenges, it seems increasingly necessary to consider materials not merely as resources to be extracted, transformed, and consumed, but rather as elements that contribute to the construction of complex systems - relationships involving people, communities, ecosystems, productive infrastructures, and, last but not least, other living species.

The capacity of matter to act echoes Latour's (2020) theoretical reflections on distributed agency and aligns with the vision of complexity proposed by Morin (2015).

From this perspective, materials become active elements within the networks that constitute the world.

The Anthropocene has made this state of interdependence particularly evident. The spread of plastiglomerates along coastlines (Corcoran et al., 2014), the discovery of microplastics in Antarctic ice (Aves et al., 2022), and even in the human placenta (Ragusa et al., 2021), and more generally the fact that the mass of anthropogenic materials has surpassed that of all living biomass (Elhacham

et al., 2020), demonstrate how material flows continuously cross the boundaries between natural and anthropogenic systems.

Recent reflections in the field of design suggest, in fact, interpreting materials as relational devices. Pasini (2025) highlights how every material holds memories of extraction, transformation, and use, embodying cultural values, territorial knowledge, and social practices that shape collective behaviors and imaginaries. Materials thus become authentic "triggers for relationships," capable of generating connections between people, territories, and production processes, transcending the traditional distinction between the technical-productive dimension and the social sphere.

This perspective is further developed in the concept of *Design Terroir* elaborated by Rigobello & Evans (2024). Drawing on the meaning originally associated with *culinary terroir*, the authors propose a vision of design based on the relationship between materials, territory, local knowledge, multispecies relationships, and situated ecologies. *Design Terroir* is conceived as an eco-social, relational, and bioregional approach (Fanelsa et al., 2025) that recognizes the value of territorial networks and ecological specificities in defining design processes, opposing the consumerist logic that has characterized much of industrial production.

The reflections of Langella et al. (2017) further expand this perspective, highlighting how contemporary material design operates at the intersection of material, form, information, and process. Thanks to digital technologies - advanced digital modeling and additive manufacturing - materials become performative systems in which the relationships between structure, behavior, and functionality play a central role in defining the design.

The case studies presented in this chapter, and exhibited as part of the Techneteca exhibition project, fall within this theoretical framework.

On the one hand, *Θuta* explores the role of seeds as biological and cultural infrastructures capable of fostering relationships between communities, biodiversity, and territories, promoting practices of care, conservation, and the transmission of ecological knowledge through the creation of a sculptural object designed using parametric design for the additive printing of ceramic materials. On the other hand, the *AERIAL* project addresses the issue of waste from the stone industry, reinterpreting "marmettola" - or marble slurry - not as mere industrial waste but as a resource for fostering new productive ecologies. Through biofabrication processes based on the use of photosynthetic microorganisms, the project transforms marble slurry into a new living material capable of connecting biological processes, scientific knowledge, production chains, and local resources.

Finally, the Morphological Protection project explores the potential of 3D-printed motorcycle protective gear. Using FDM technology, the component is reimagined: no longer a solid block of polyurethane, but a system of solid and hollow sections capable of delivering the same performance while using less material.
In the case of Θuta and *AERIAL*, materials thus become mediators of the local context - tools through which to imagine and build more sustainable ways of inhabiting the world. In Morphological Protection, on the other hand, materials act as mediators between the human and technological dimensions, demonstrating how the design of form and structure generates new relationships between performance, sustainability, and benefits for humanity.
All three projects demonstrate how material design can be interpreted as a practice for building eco-social and technological relationships. From this perspective, materials and technologies do not represent the end goal of the project, but rather the means through which to forge new connections between the human and the non-human, between culture and nature, and between production and regeneration.

AERIAL - Biofabrication Strategies for the Recovery of Stone Industry Byproducts

Marble quarrying and processing in the Apuan-Versilian district have significant environmental impacts. It is estimated that approximately 500,000 metric tons of marble dust are produced each year (Drysdale, in Piccini et al., 2019) - an impalpable powder that is as valuable as it is hazardous to the environment and human health, yet also a resource for the circular economy.
The *AERIAL*[1] project focuses on the process of recovering this waste to produce innovative bio-manufactured materials through the metabolic principle of biomineralization by photosynthetic microorganisms - Microorganism-Induced Calcite Precipitation (MICP) (Reali et al., 2022) (Fig. 1). The project implemented a design-driven, transdisciplinary methodology, involving collaboration among designers, biologists, and experts in agricultural and territorial microbiology (Marseglia et al., 2025), creating a disciplinary network of territorial knowledge and practices as an expression of the *distributed agency* described by Latour. The objective was to develop a material formulation for application in green building and design and to establish a pilot biotechnological plant for the processing of marble chips.
The technology developed during the project thus aims to regenerate the stone

extraction and processing sector by transforming a production district into a system capable of caring for the territory that hosts it, with direct benefits for the socio-ecological system that sustains this sector. The project aims to drastically reduce the environmental impact of local businesses and seeks to create a competitive advantage for the construction materials sector by providing new circular products and semi-finished goods with low environmental impact.
In this sense, *AERIAL*, with its pilot plant, aims to have a positive impact on the Apuan-Versilian socio-territorial system, as the pilot plant is distributed among the various companies that are part of the consortium, functioning as a shared production network.
The basic idea is to regenerate the supply chain by converting old quarries and problematic sites, in line with the principles of Regenerative and Restorative Design (Antonelli & Tannir, 2019), thereby creating social, environmental, and economic value (Armiero, 2021), and restoring resources, identity, and new relationships of coexistence to the terroir.

Θuta / thù-ta | A Project on Forms and Practices for the Collective Preservation and Living Memory of Seeds

Θuta / thù-ta[2] is dedicated to seed conservation and explores the relationship between matter, additive technologies, and eco-social practices for caring for living organisms. Building on the concept of "*Seed Rematriation*" - understood as the symbolic and material return of seeds to their places and communities of origin (DiCarlo, 2023) - the project interprets seeds as biological and cultural infrastructures capable of reactivating relationships between communities, biodiversity, and territories.
From this research emerges an installation designed to house and preserve seeds through differentiated microclimatic conditions. The system consists of a permanent structure (fig. 2) and two interchangeable capsules - one for conventional seeds and one for recalcitrant seeds - translating biological needs into a design solution based on clay, LDM (*Liquid Deposition Modeling)* 3D printing, and microclimatic control. Clay, linked to the earth and conservation practices, is reinterpreted through additive manufacturing as a meeting point between vernacular knowledge and technological innovation. The external structure experiments with TPMS (T*riple Periodic Minimal Surface*) lattices, featuring configurations

based on gyroid geometries: continuous, periodic three-dimensional surfaces that organize the ceramic material into an interconnected system of solids and voids (Gado, M. G. et al., 2024). Through porosity, thickness, and orientation, these minimal surfaces modulate light, air, water, and heat exchange. This approach limits direct sunlight, promotes natural ventilation and rainwater runoff, and - thanks to the thermo-hygrometric properties of clay - creates an internal microclimate suitable for seed conservation, without the need for active energy systems. Throughout the year, the collective opening of the capsules transforms preservation into a shared practice of care, memory, and giving back to the earth, strengthening the bond between community, biodiversity, and the local area.

Morphological Protection. Adaptive Protection System for Motorcyclists.

Il prototipo *Morphological Protection*[3] (fig.3) It illustrates how the integration of digitization and sustainability - through the interaction between the human factor and additive manufacturing - is reshaping contemporary industrial design according to the paradigms of the circular economy. Developed using digital design and parametric modeling processes, the device was prototyped in polylactic acid (PLA) using FDM (Fused Deposition Modeling) technology. Using the Grasshopper graphical algorithm editor, integrated into Rhinoceros software, a cross-shaped geometric configuration was defined to optimize ergonomics and adaptability to the user's specific anatomical variables. In the field of product design, parametric modeling has driven a transition toward mass customization, enabling the production of unique morphological solutions derived from a common generative matrix and shaping a new aesthetic of complexity. Digital design thus introduces computational and artificial intelligence approaches to support the designer, whose role is evolving from direct formal modeling to the coding of a system of rules, parameters, and constraints. This algorithmic framework is capable of generating infinite coherent variations (Touloupaki and Theodosiou, 2017), allowing for the management of highly complex geometries that cannot be described using traditional representation methods. The convergence between humans and digital design thus elevates material to the status of a technical and social catalyst, fostering the creation of relationships that lead to new digital design languages at the formal, geometric, and material levels, with sustainability rooted in the systemic balance between algorithmic innovation and material culture.

Conclusioni

he design projects presented highlight how material design is gradually emerging as a relational practice, in which matter is no longer viewed as an inert resource but as a catalyst for eco-social and technological connections. From this perspective, materials become mediators between human and non-human systems, between territories, technologies, and production processes, contributing to the construction of new forms of coexistence. The case studies presented demonstrate how different approaches - biomanufacturing, parametric design, and the eco-social approach - share a common drive toward regenerative and context-specific practices, where technologies and biotechnologies amplify and transform relationships.
In this sense, material design can therefore be understood as an approach to systemic transformation, capable of generating technical, functional, cultural, and ecological value, and able to redefine the role of design as an active agent in the construction of a new paradigm that connects nature, culture, and technology.

Note

[1] AERIAL – Biofabrication Strategies for the Recovery of Stone Industry By-products is funded by the Region of Tuscany (R&D POR FESR 2021–2027) and is a research project of the Laboratory of Design for Sustainability (DIDA-LABS, UNIFI) - scientific director: Prof. Marco Marseglia (Associate Professor of Design), research group: Prof. Giuseppe Lotti (Full Professor of Design), Prof. Natascia Biondi (Associate Professor of Agricultural Microbiology), Prof. Liliana Rodolfi (Associate Professor of Agricultural Microbiology), Dr. Francesco Cantini (designer, postdoctoral researcher), Edoardo Brunelli (designer, PhD candidate in Design), Tommaso Celli (biologist, PhD student in Design), Lorenzo Reali (PhD candidate in agricultural microbiology), Giacomo Sampietro (postdoctoral researcher). Companies involved: Ottomeccanica Srl, UTP Srl, and F&M Srl.

[2] Θuta / thù-ta is a bachelor's thesis from the degree program in Product, Interior, Communication, and Eco-Social Design at the University of Florence. Advisor: Prof. Marco Marseglia (Associate Professor of Design); Co-advisor: Prof. Francesco Ferrini (Full Professor of General Arboriculture and Tree Cultivation); Students: Anna Gemmi and Francesco Vigilucci.

[3] This is an experimental research project conducted by the Laboratory of Design for Sustainability (DIDA-LABS, UNIFI) and coordinated by Prof. Giuseppe Lotti (Full Professor of Design), with the following re-

search team: Gabriele Pontillo (Research Associate), Alessio Tanzini (Research Fellow in Design), and Claudio Catalano (Research Fellow in Design).

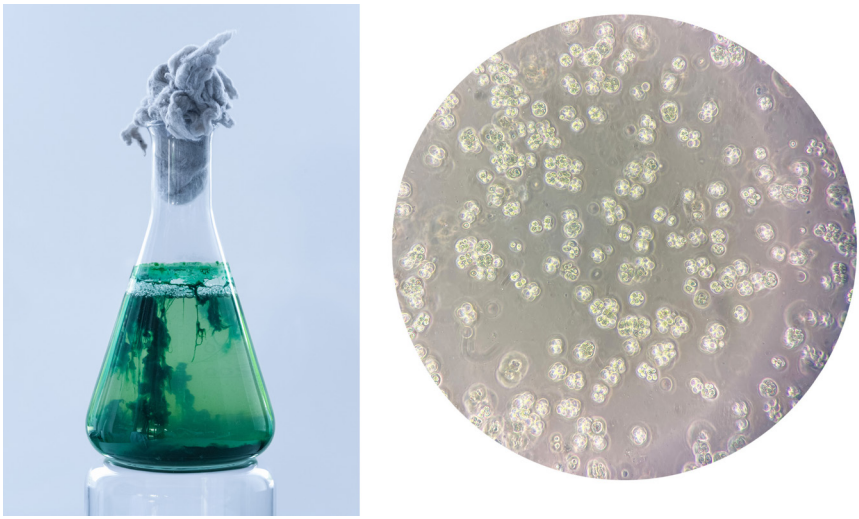

Fig. 1. AERIAL: On the left, a flask containing microalgae for material experiments. (Photo: Cristian Betti). On the right, a microscopic view of some of the microorganisms used in the project.

Fig. 2. Cuta / thù-ta. The external clay structure features TPMS (Triple Periodic Minimal Surface) lattices, with configurations based on gyroid geometries designed to optimize light, air, water, and heat exchange.

Fig. 3. Morphological Protection. Prototype of an adaptive protection system for motorcyclists. Compared to traditional systems, it uses less material while providing the same level of performance.

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Ragusa, A., Svelato, A., Santacroce, C., Catalano, P., Notarstefano, V., Carnevali, O., Papa, F.,

For over thirty years, Milan Design Week has served as one of the most acute barometers of transformations in contemporary design. However, it is a platform built around the presentation of the new, and in such a context, memory tends to occupy a marginal position. *100 Things Not to Forget* overturns this perspective: it chooses to start from memory and to treat it as a genuine subject of design.

The book emerged from an exceptional circumstance—the 2026 edition, in which Milan Design Week coincided with the celebrations marking the anniversary of Liberation Day—and from the insight to transform that coincidence into an opportunity. Promoted by Repubblica del Design in collaboration with the Ghigos studio, the project opens two World War II air-raid shelters—Rifugio 87 on Via Bodio and the Breda Bunker at Parco Nord Milano—to return them to the city not as relics to be preserved but as contemporary civic infrastructure. The transition "from air-raid shelter to cultural refuge" becomes the critical framework through which to examine the present: what a community chooses to protect, what values it considers essential, and what risks being lost. A shelter whose meaning shifts from the threat of war to that of environmental crisis, linking historical memory and the climate crisis.

At the heart of the project lies a precise design approach that gives voice to the entire research: staging through subtraction. This does not entail formal austerity, but rather a critical exercise that distinguishes the indispensable from the superfluous, countering the logic of accumulation—and the high consumption of resources associated with ephemeral events—with an installation based on reuse, circular materials, and care. The quality of the experience does not depend on the quantity of elements introduced into the space, but on the relationships one chooses to build.
Through its two sections—from "Learning from History" to "Survival Design," and from "Resilient Districts" to the "Technéteca," an archive of know-how for sustainable design—the book weaves together historical research, regional case studies, material experiments, and curatorial practices, interpreting design as a mediator between different forms of knowledge, actors, and temporalities. What emerges is the ambition to transcend the ephemeral nature of Design Week: to transform a few days' event into a lasting cultural presence capable of leaving a legacy in the local area.
Because innovation does not mean forgetting, but rather building new possibilities based on what a community decides not to let go of.

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