

Materia Fondente

Regione Toscana - Comune di Minucciano (Lucca)

Interreg
Euro-MED



Co-funded by
the European Union

BAUHAUS4MED



Af



Sveučilište u Zagrebu
Arhitektonski Fakultet
University of Zagreb
Faculty of Architecture



BIRSAJ MUNICIPALITY



Crad Sarajevo
City of Sarajevo



CROWD
POLICY

zavod



IFLA EUROPE
INTERNATIONAL FEDERATION
OF LANDSCAPE ARCHITECTS

Platoniq
Foundation



HELLENIC REPUBLIC
REGION OF CENTRAL MACEDONIA



Regione Toscana



SVILUPPO
EUROPA
MARCHE

MINISTERO DEL BENE UMBRO
Sviluppo Europa Marche
Sviluppo Europa Marche

Project Overview

Materia Fondente explores the potential of **marble dust** – a by-product of the stone industry – as a flux in ceramic glazes, proposing an innovative and sustainable approach to managing industrial waste. The extraction and processing of marble generate large quantities of waste, including fine powders that, if not properly handled, can pose an environmental concern. This by-product represents a challenge in industrial waste management but can be transformed into a valuable resource through circular economy practices.

Through an experimental method based on **Ian Currie's grid** – a system that allows the testing of 35 variations of a ceramic formula – the project investigates the behaviour of marble dust in terms of fusibility and its effects on glazed surfaces. This methodology enables the analysis of the material's physical and chemical properties and assesses its compatibility with the **ceramic glazing process**, providing a scientific basis for integrating marble waste into ceramic production.



Problem Statement

The stone industry in Minucciano generates large quantities of waste that are difficult to manage and environmentally problematic, yet this by-product when reduced to the dimension of dust, holds untapped potential as a resource for sustainable innovation in ceramics.

Turbulences

- Marble waste is produced in large volumes, and without alternative uses it remains an environmental burden for the territory.
- Traditional ceramic glazes rely on newly extracted calcium carbonate, increasing ecological impact and resource depletion.
- The marble and ceramic sectors operate separately, missing opportunities for material synergies and joint innovation.

Bold Vision

To transform marble dust from an overlooked industrial by-product into a catalyst for circular innovation by developing a new generation of ceramic glazes that embrace the material's natural impurities as aesthetic and functional assets, creating a replicable model where waste becomes value, craftsmanship meets scientific experimentation, and the marble territory of Minucciano evolves toward a more sustainable, expressive, and resource-aware future.

Where We are Now:

The Materia Fondente concept is authored by Victoria Sabba, a student of the Department of Architecture of the University of Florence

At the NEB Festival held in Gramolazzo on 14 June 2025 the idea was awarded the prize for the most sustainable concept and with the fourth award

Pilot status: *prototype available*

How did we get here?

II semester 2024:

- a B4M local node was created in Minucciano, with the involvement of 4-Helix stakeholders.
- thanks to an agreement between the Tuscany Region and DiDA, a group of international students was engaged in an idea contest, after a study visit onsite.

I semester 2025:

- all concept designs were presented to the local population in a public event and then voted by a jury of experts (weighted 60%) as well as by the citizens themselves (weighted 40%) through a combined online and offline polling system.

II semester 2025:

- private funds were mobilised to support the prototyping phase.

What if...

What if...

As a **Local Industry Actor**

I could **turn a costly by-product into a valuable material stream**

With a **scientifically tested method (Ian Currie's grid) that proves compatibility between marble dust and ceramic glazes**

So that **circular economy practices strengthen both sectors (marble and ceramics) and reduce environmental impact.**



Who will benefit?

Target Groups

- **Ceramic designers and artisans** could access a new palette of glazes derived from marble dust, unlocking unique textures and chromatic variations that embrace material impurities as expressive qualities.
- **Marble industry operators** could turn a costly waste stream into a valuable input for another sector, reducing disposal challenges and strengthening circular economy practices.
- **Ceramic manufacturers** could reduce their dependence on virgin calcium carbonate by adopting a scientifically tested, sustainable alternative that maintains fluxing properties.
- **The Municipality of Minucciano** could promote the area as a hub of sustainable material innovation, linking heritage, industry, and contemporary craft.
- **Local communities** could benefit from reduced waste accumulation and lower extraction pressure on natural resources.
- **Social investors** could support new creative products emerging from existing industries, strengthening identity and fostering sustainable innovation rooted in place.

Key Learnings

The project demonstrates that marble dust, traditionally treated as an industrial waste, can become a technically reliable and aesthetically rich ingredient in ceramic glazes when approached through systematic experimentation.

The Currie grid method proved essential for understanding how marble dust behaves as a flux, offering a replicable scientific framework that other territories and industries can adopt to test waste-based materials.

Embracing the natural impurities of marble dust revealed unexpected chromatic and textural qualities, showing that what is usually considered a flaw can become a distinctive expressive asset.

Moreover, the partial or total substitution of calcium carbonate with marble dust maintains fluxing properties, reducing reliance on virgin raw materials and lowering environmental impact.

NEB Values

Beautiful – Ambition: To Reveal

- The project uncovers the hidden aesthetic potential of marble dust, transforming its natural impurities into unique colours, textures, and surface qualities that enrich contemporary ceramic expression.

Sustainable – Ambition: To Reuse

- By replacing virgin calcium carbonate with marble waste, the project reduces extraction impacts, diverts industrial by-products from disposal, and demonstrates a circular, low-impact approach to material innovation.

Together – Ambition: To Connect

- Implementation links marble quarries, ceramic studios, researchers, students, and local institutions in a shared experiment, creating new synergies between industries and fostering a culture of collaborative, place-based innovation.



NEB Working Principles

Participatory Process **Ambition: To Engage**

- 4-Helix Stakeholder Involvement
- Consultation of the Local Population
- Heritage-driven Design

Multi-Level Engagement **Ambition: To Liaise**

- Local B4M Node as starting point & network hub
- Regional Government as prime motor (with B4M)
- Now building links with the European NEB hub

Transdisciplinarity **Ambition: To Merge**

- Professionals from multiple sectors/disciplines
- Young and seasoned designers
- Scientific knowledge with craftsmanship

Common Themes

- Living with landscape and natural materials
- Circularity and resource awareness
- Craft, symbolism, and contemporary reinterpretation
- Outdoor sociality and shared material cultures
- Climate adaptation and sustainable production



Lessons Learned



- Materia Fondente showed that waste based substitutions can maintain technical performance, proving that marble dust can partially or fully replace calcium carbonate without compromising fusibility.
- However the size of needed investments to hit the market are incompatible with a small sized start up enterprise, therefore broader alliances are being searched.

Sharing for the Future

What knowledge can contribute to the B4M Toolbox

Place-based material knowledge

- How to work with locally abundant industrial by products and transform them into new material resources.
- How to integrate geological identity into contemporary design, allowing the territory's mineral composition and impurities to shape aesthetic outcomes.
- How to build material literacy across sectors, helping communities understand the value, behaviour, and potential of what is usually treated as waste.

Circularity as a driver of innovation

- How a waste stream can become a functional substitute for virgin raw materials without compromising performance.
- How to use scientific methods to validate waste-based materials and create replicable protocols for other industries and regions.
- How to design processes that embrace variability, turning impurities, inconsistencies, and unpredictability into expressive and functional assets.