



MODUL'TERRE
MODUL'EARTH

MAXENCE ALVAREZ - LÉA BLANCHET - EWEN HERVÉ - HELOÏSE RENAULT - ESTEBAN SABLON

REFERENCES



Tilecloud, relief tiles



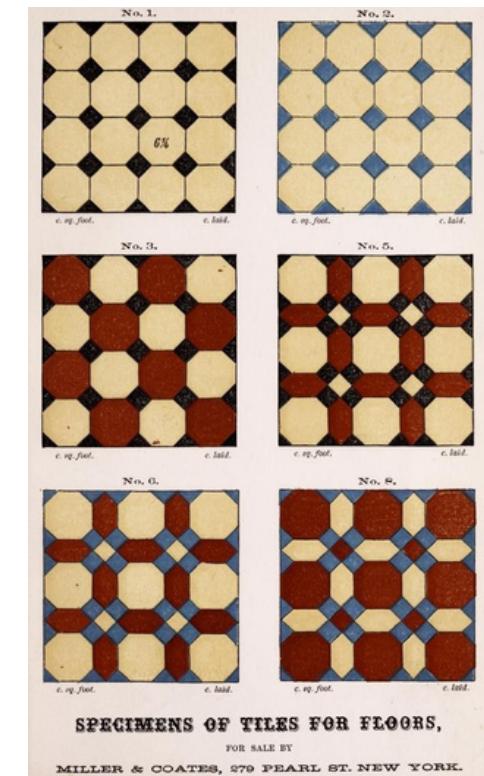
TERRE DE PARIS, excavation land experiments



Huguet Mallorca's tiles



The assembly system



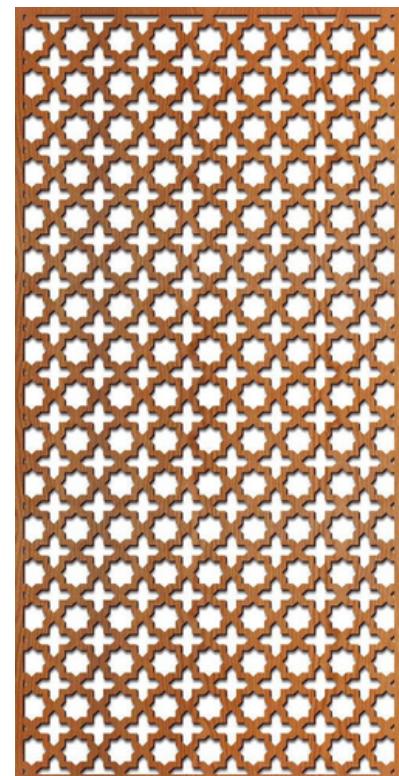
Concept of the "keystone"



No. 8



Mouscharabieh, traditional pattern



DEFINITION OF THE SPECIFICATIONS

To structure our work, we established specific constraints:

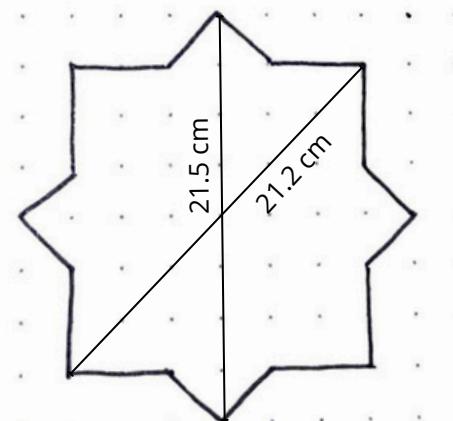
- Pavers designed for ground use
- The use of natural materials: earth, clay, and plant fibers
- Assembly without cement or mortar, based on dry joints and a "keystone" system
- Modularity allowing for various arrangements
- Integrated pigmentation to enhance the diversity of compositions

CREATION OF 3D-PRINTED MOLDS

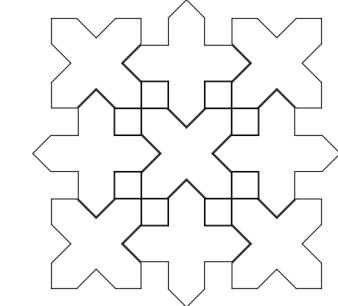
The first step of the project was to develop molds suited to our production. Three main shapes were chosen: the star, the cross, and the square. The shapes generated by these molds are compatible with each other, allowing for great flexibility in assembly.

We optimized the mold design by giving them thicker edges at the base (2 cm) than at the top (1 cm) to improve their resistance to the forces generated by the compacting of the mixture.

Element 1 : The star

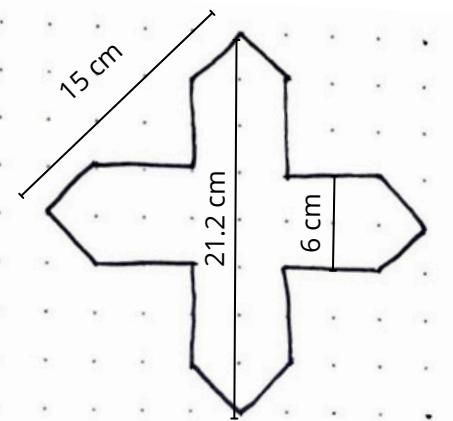


Assembly 1

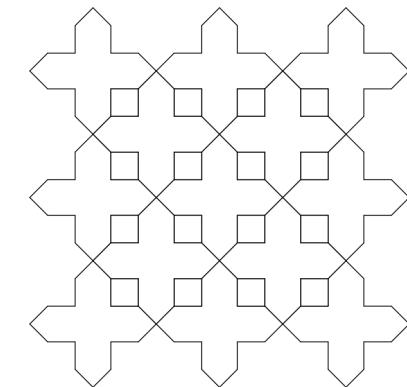


Element 1 and 3 :
cross & square

Element 2 : The cross

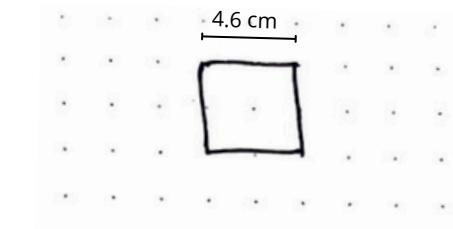


Assembly 2

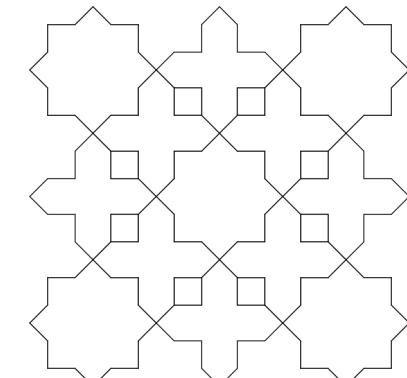


Element 1 and 3 :
cross & square

Element 3 : The square



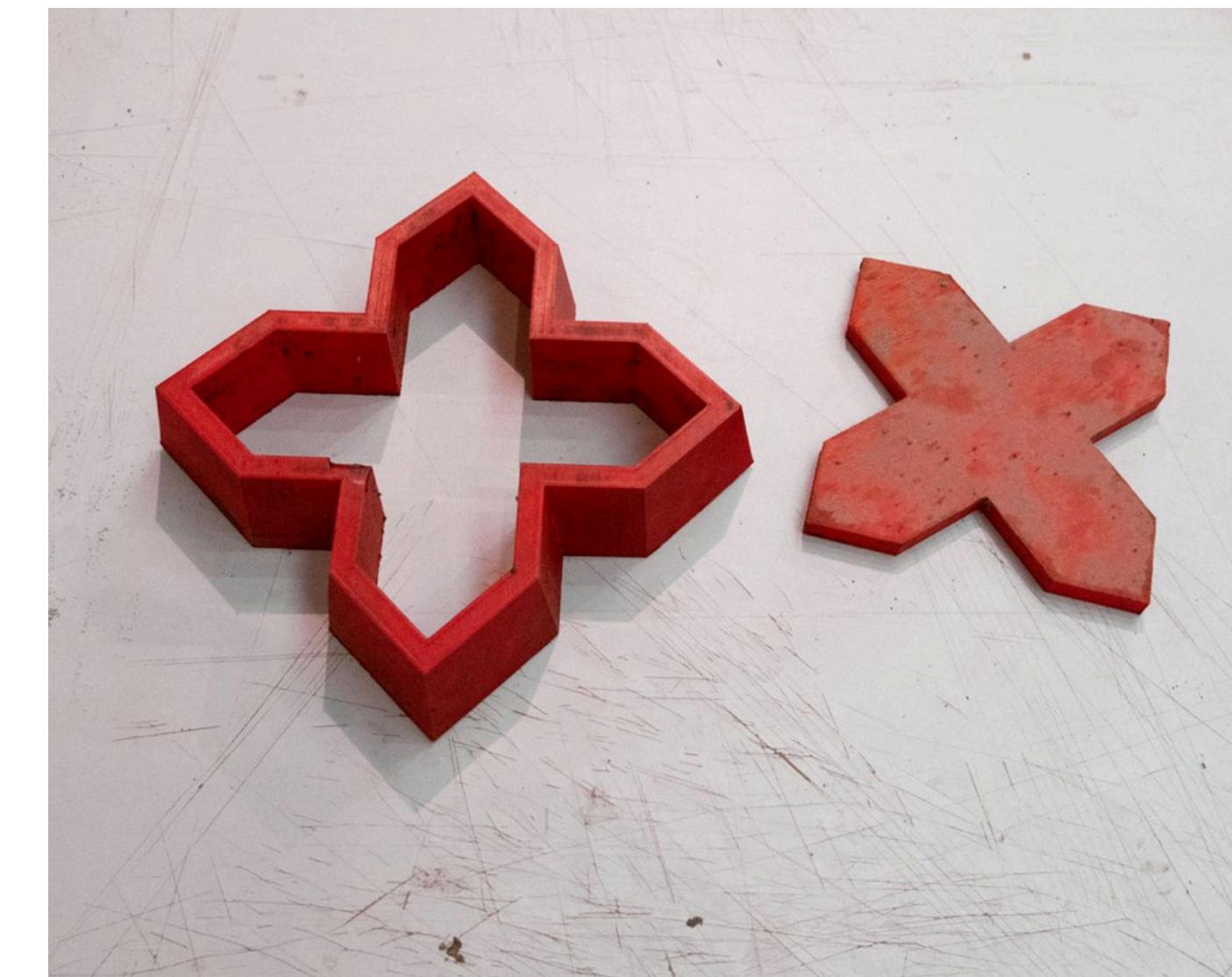
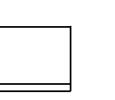
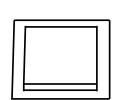
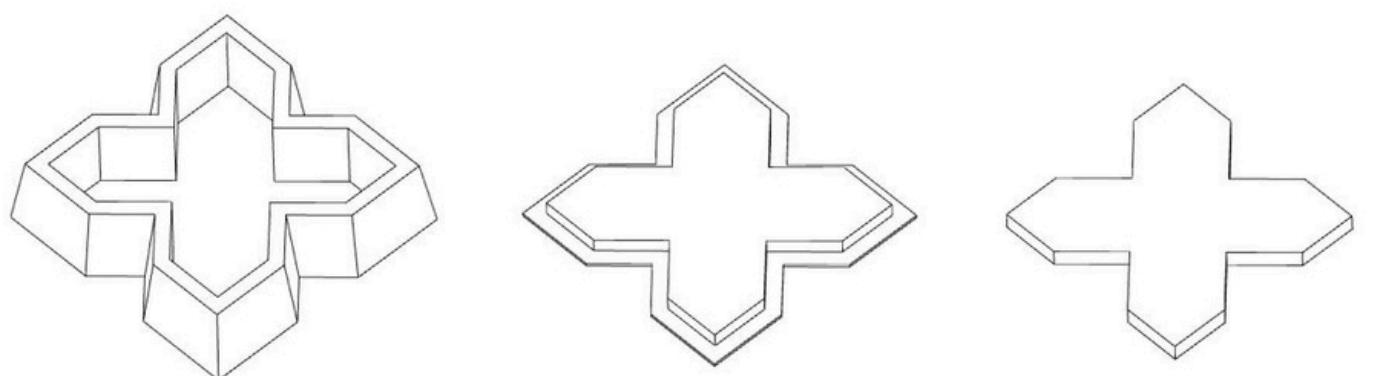
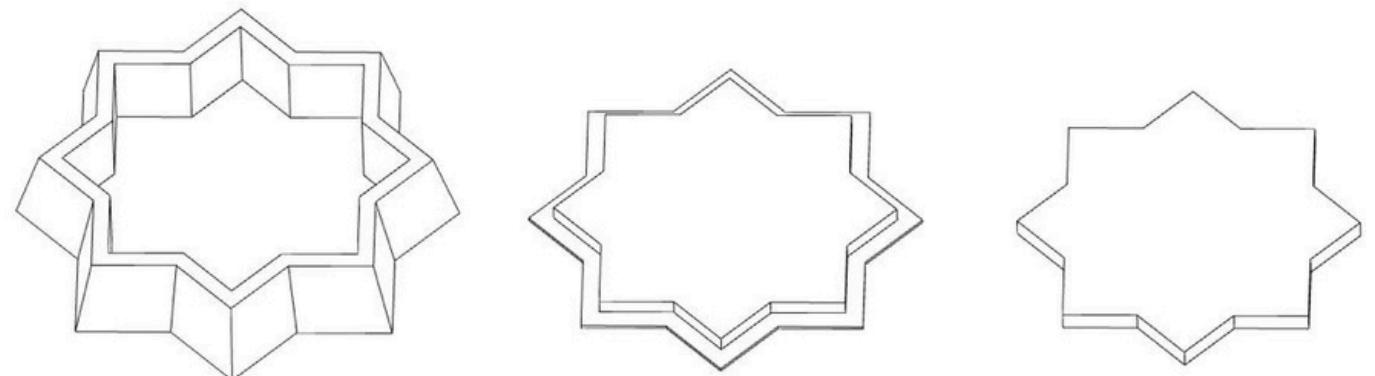
Assembly 4



Element 1 and 2 :
cross & star

Element 1, 2 and 3 :
star, cross & square

3D MOLDS



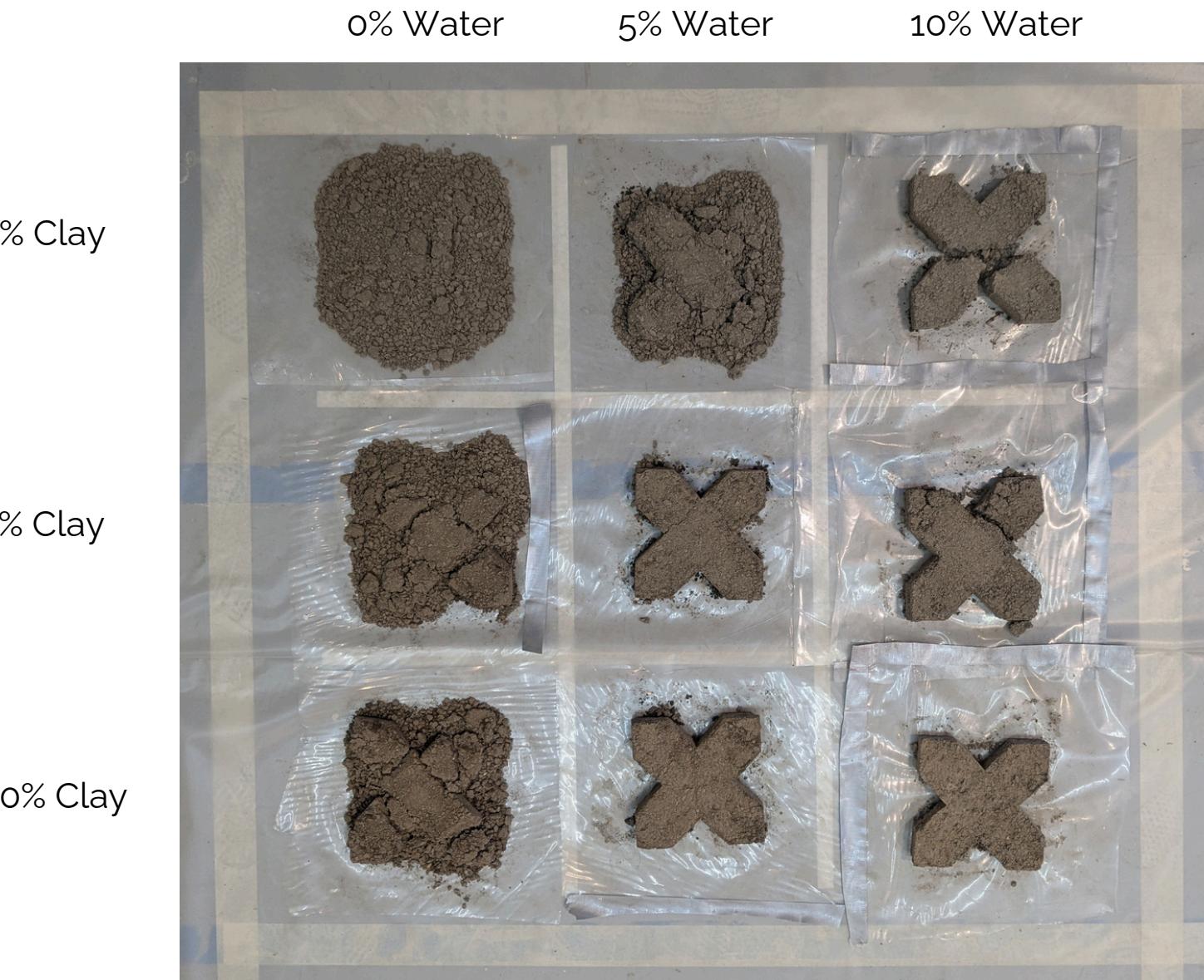
MATERIAL EXPERIMENTATION

A crucial phase of our approach was experimenting with materials, particularly the proportions of clay and water. We developed an experimentation matrix to test different combinations and determine the best formulation to ensure the mechanical resistance of the pavers.

The first tests revealed that the edges and numerous angles of our shapes were a weak point, causing fragility during handling and use. The next step in our experimentation process was to assess the impact of adding different fibers to our mixture. During this phase, the addition of long plant fibers proved to be effective. Although cracks still appeared, the fibers helped maintain the rigidity of the paver, allowing it to fulfill its function without compromising its solidity.

Based on these observations, we adjusted our final mixture and procedure:

- Gradual compaction in multiple steps to improve material strength.
- The addition of long fibers between each compacted layer to increase cohesion and resistance to bending.
- An increase in the thickness of the pavers to 3.5 cm, improving their robustness and durability.



TAMISED EARTH
1 kg



CLAY
250 g



BARLEY STRAW
10 g

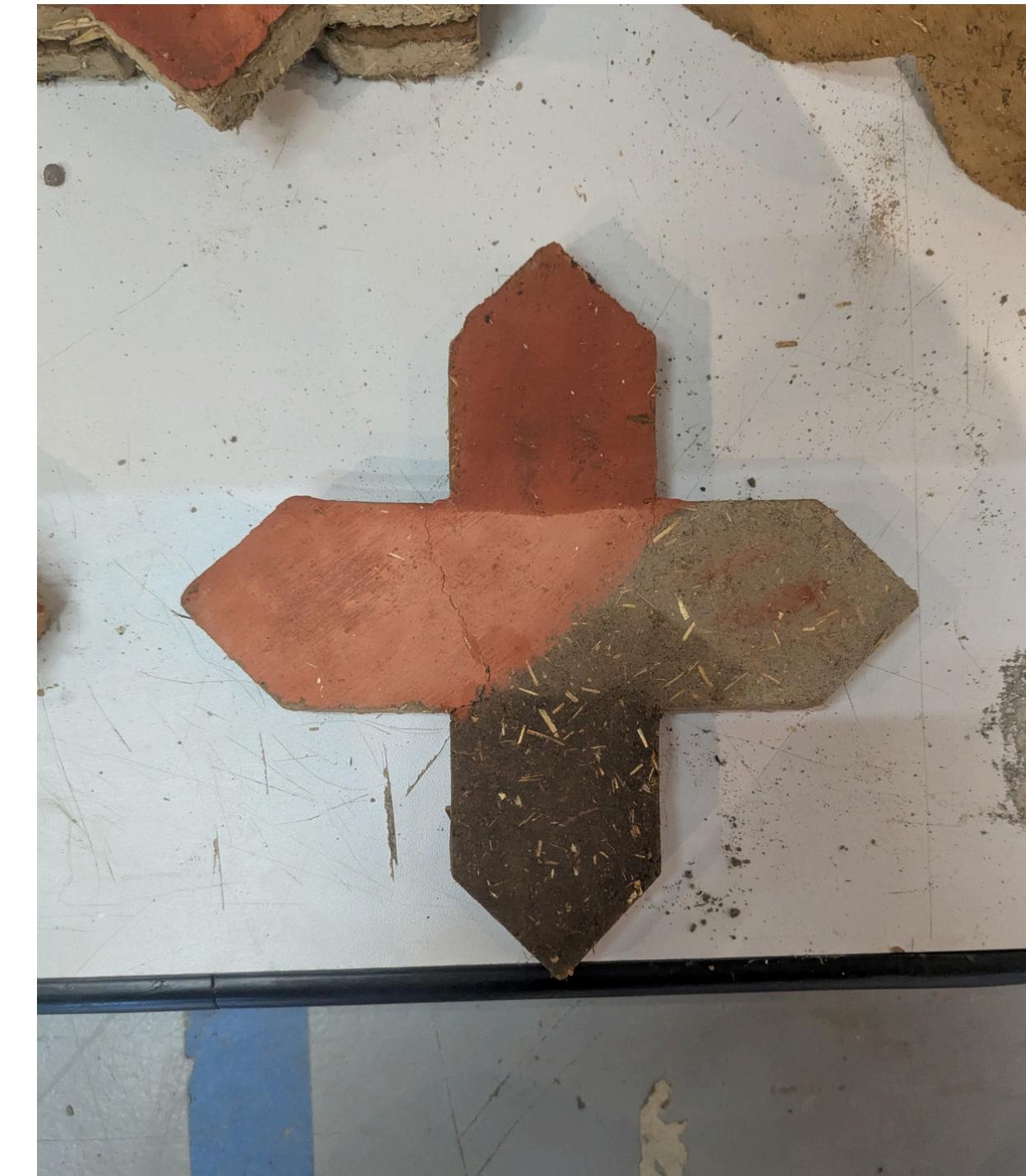


WATER
100 g

EXPERIMENTATION RESULTS



Test of the first blend (short fibre). The element broke during handling



Test of the second mix (presence of long fibres between the layers). When handled, the element cracked but did not break

EXPERIMENTATION WITH BICOLOR ELEMENTS

Finally, one of the last objectives of our workshop was to explore the bicolor aspect of our elements to enhance the modularity of the pavers and offer more diversity in the assemblies.

To achieve this, we designed a 3D-printed separator that allowed us to separate different shades of earth (colored with ground charcoal) before the first compaction.

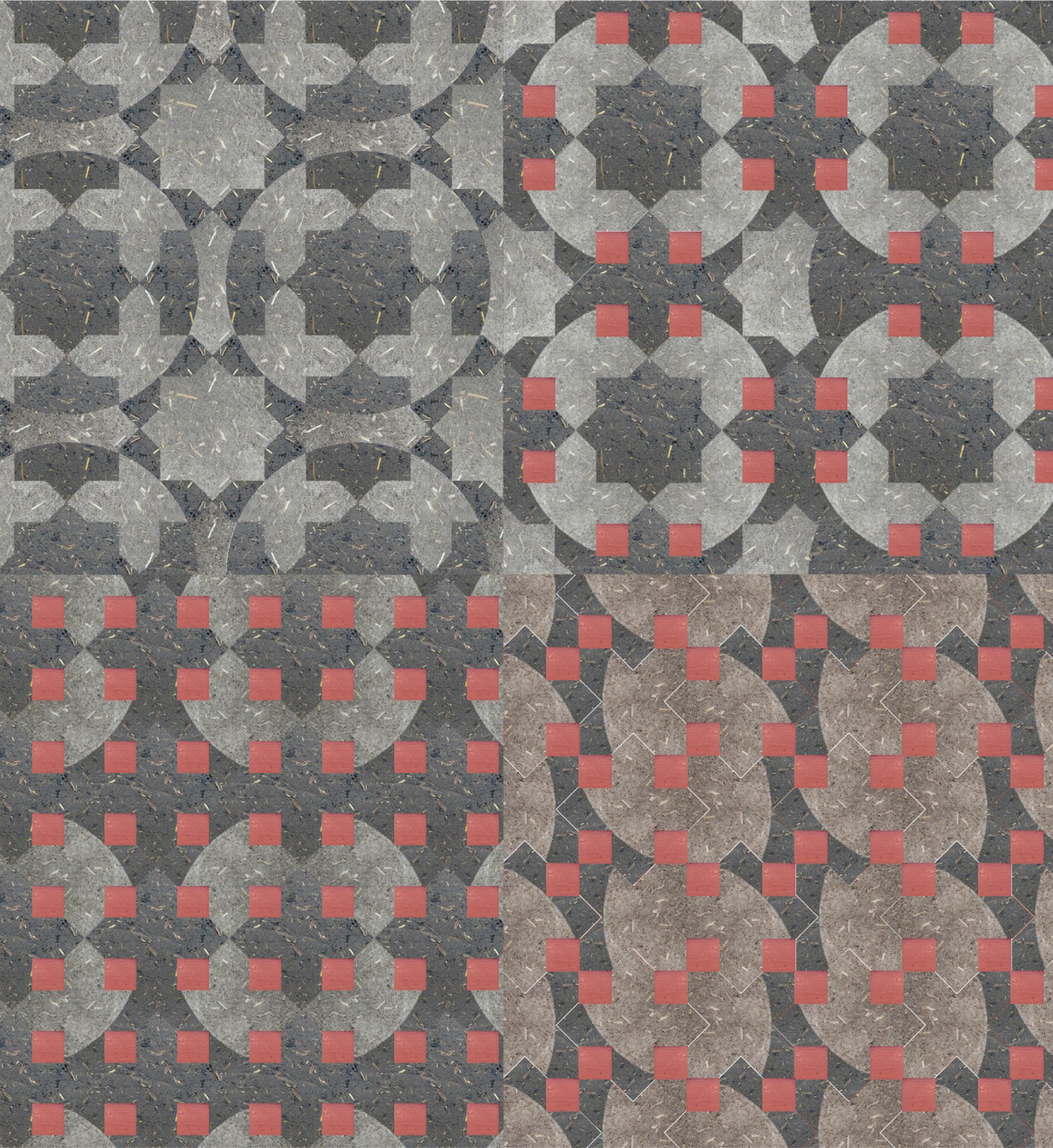
This technique enabled the creation of bicolor pavers, adding an additional aesthetic and functional dimension, with color contrasts that reinforce the modular aspect.

PRODUCTION AND FINISHING OF PAVERS

For the final production, around thirty pavers were made to demonstrate the variety of possible assemblies. To facilitate demolding, the molds were systematically coated with linseed oil.

Once the pavers were dry, two types of finishes were applied to protect them from wear and erosion:

- A coat of linseed oil to preserve the natural color
- A layer of slip to color and reinforce the edges



FINAL RESULT

