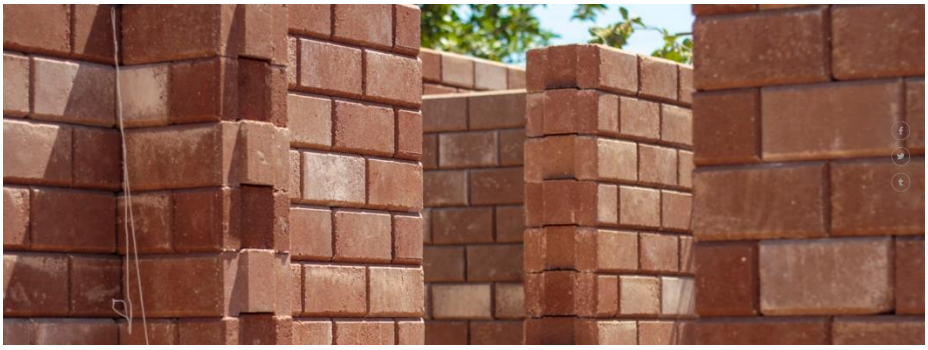
INNOVATIVE CONSTRUCTION TECHNOLOGY USING SUSTAINABLE HOUSING BLOCKS IN TUNISIA

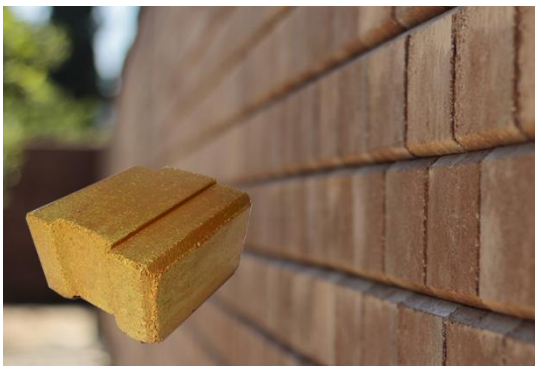
June 2025

The sustainable construction SOIB Company, established in 2009 in Ghazala, Tunisia has developed a new technology consisting of building blocks from mine site debris, which can be slotted together without using cement.



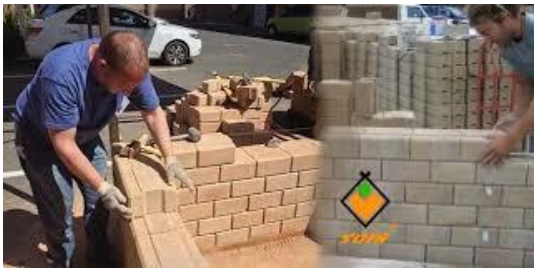
SOIB Company aims at reducing the various environmental and financial costs of construction, which include energy, water, and time. SOIB's construction blocks are sourced from remains of mine sites. The company then recycles these discarded materials into building blocks that fit together without needing cement, making them a practical substitute for conventional red clay bricks.

Abdelmalek Ghannem is the visionary founder of the Société Industrielle de Bloc (SOIB), a company that is making significant strides in the field of sustainable construction by producing Compressed Stabilized Earth Blocks (CSEB). The compressed and stabilized blocks are made by compressing a mixture of locally-sourced soil, cement, and water into a durable and resilient building block. The production process of CSEBs requires minimal energy and emits significantly lower carbon emissions compared to traditional construction materials such as bricks or concrete. Moreover, as the blocks are made from locally available soil, they are cost-effective and help reduce the dependency on resource-intensive building materials, making them an ideal choice for sustainable construction in regions with limited access to traditional building materials.

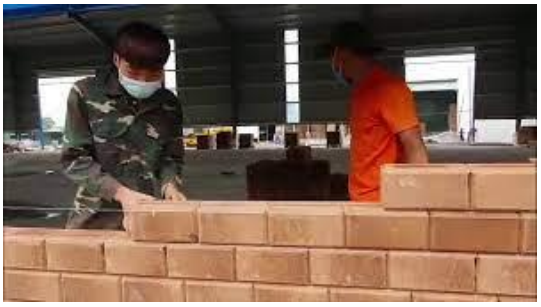


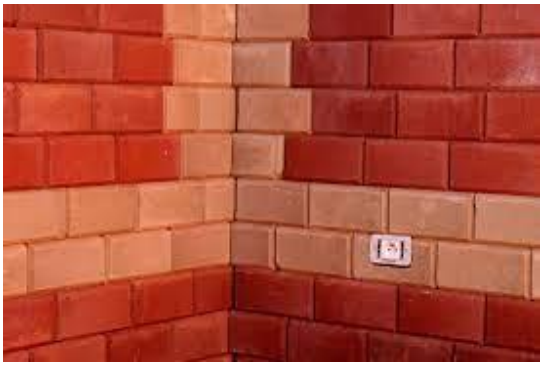
SOIB's innovative approach to using mining waste not only addresses the environmental concerns associated with mining waste disposal but also reduces the reliance on traditional construction materials such as clay and cement, which have a significant carbon footprint.

The company's building materials vary in size from 22 cm blocks (used for outer walls) to 6 cm blocks (used for inner walls). The blocks can be assembled above each other in an interlacing pattern where each block will attach to the other without the use of a binding substance thus making the construction process up to three times faster. The benefits of SOIB do not stop at the construction stage. These blocks have excellent thermal resistance. They can also withstand earthquakes, a quality that not all conventional masonry building blocks have.

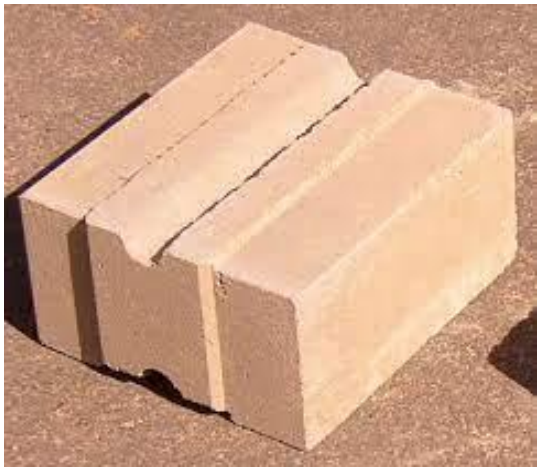


The SOIB building system is essentially a kind of Lego. The SOIB block is manufactured by a high-pressure machine and each block is laid one on top of the other without the need for mortar between the block joints; the blocks are almost all laid dry. It is a laterite block that interlocks and is manufactured with a high-pressure machine. Building with the SOIB block is easy and simple. Soib Blocks can be used to build load-bearing walls, partitions, decorative elements, interior wall partitions, vaults, and postless fences.





The company's website presents the main features of the Soib blocks:

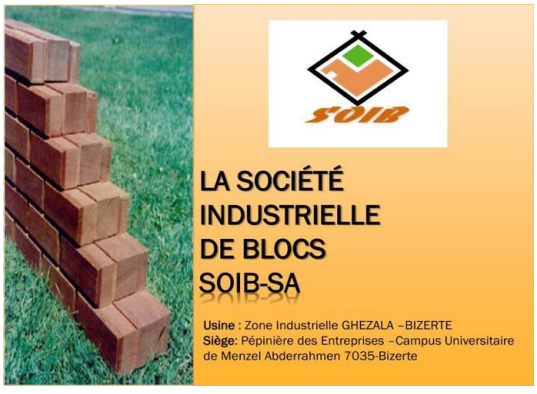


- *Strength.* Compressing the blocks reduces the volume of voids within the block, thus reducing its sensitivity to water and increasing its strength. The strength of the blocks is making them suitable for use underground in permanently humid conditions. Laboratory tests have shown that after five 12-hour cycles in a 99% humidity atmosphere followed by drying at 50°C to constant weight, the compressive strength remains unchanged. High compressive strength (which can reach up to 120 bars) guarantees a building on the ground floor + 1 floor without columns.

- *Seismic resistance*. Resist earthquakes: through research and development in collaboration with Wits University, the SOIB building system was modified for earthquake resistance and tested for use in seismic regions. During full-scale tests, the building system was able to withstand more than 7 on the Richter scale, a first for dry masonry.

- *Energy efficiency.* To save energy, of all building materials, SOIB blocks require the least energy during their manufacture. Compressed earth block production uses only about 1% of the energy required to produce a brick. Production is energy-efficient with low CO2 emissions. Energy is saved because a solid earth wall can store solar energy and re-emit it as radiant heat, thus lowering the temperature. With a SOIB block wall, the house will be warm in winter and cool in summer.

- *Humidity control*. The comfort of a room is closely linked to the humidity level in the air. SOIB blocks can absorb more moisture than most other building materials. By



absorbing excess moisture and releasing it when it's lacking, raw earth improves indoor comfort, preventing condensation and the growth of mold.

- *Thermal comfort.* Thanks to its extraordinary thermal inertia, the SOIB block significantly delays and dampens heat flow entering in summer and leaving in winter, ensuring astonishing indoor comfort in all seasons. The SOIB block has a good thermal conductivity coefficient, and due to its inertia (high density), the block is a very good thermal regulator, enabling significant energy savings. Acoustic comfort. The mass also helps reduce sound transmission. It is a very good sound insulator for the construction of interior partition walls or for separation between bedrooms and living rooms

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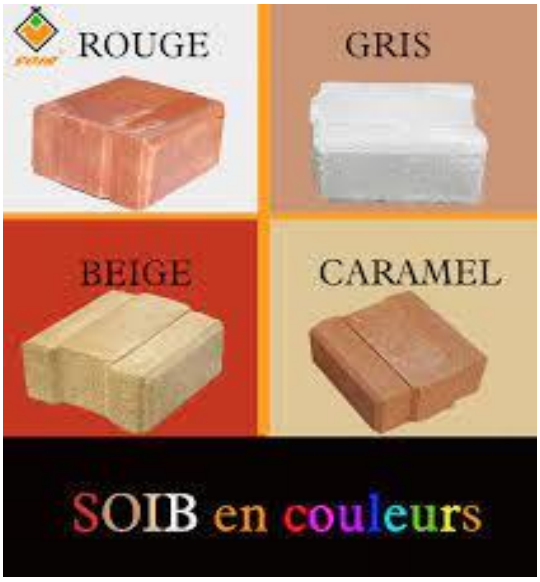
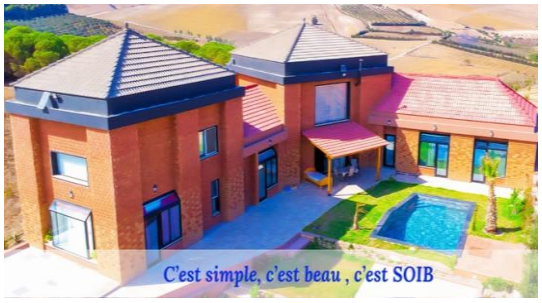
- *Fast and cost-effective construction***.** The process does not require the blocks to be baked. The blocks are all identical in size and quality. SOIB self-locking blocks fit perfectly together dry without mortar, with very simple, easy, quick and solid handling. Once cured, the earth and cement blocks can be dry-stacked into a superstructure, saving 30% in cost and time. The aesthetics of SOIB Blocks require no finishing. Buildings can blend into the landscape and meet the needs of clients in accordance with their surroundings. Building SOIB earth block walls allows for the development of a local economic niche and targeted professional training based on local needs and skill levels (architects, engineers, masons, manufacturers, applicators, etc.). Unskilled labor can be quickly trained for block manufacturing and construction. The SOIB process encourages self-construction.

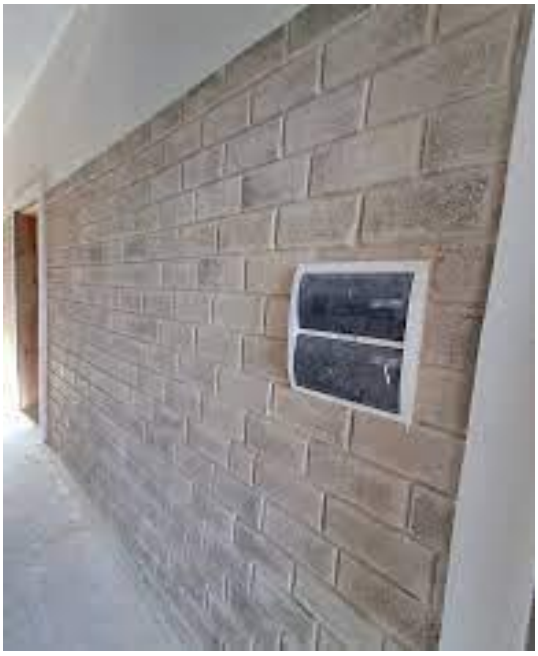
Ghannem and the SOIB Company has received several prestigious awards. In 2012 the company was named Best Innovative Project by the German Ownerforums programme; and the Tariik Ennajah TV program. In 2013, it received the national Prize for Energy Efficiency. Since 2022 SOIB has been recognized as one of the Innovative Solutions promoted by the Switchers Initiative in the Mediterranean region.

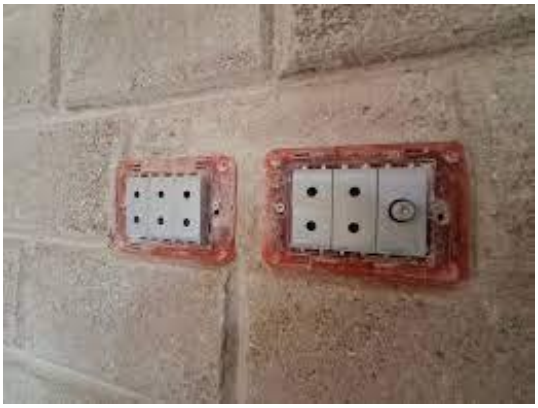
SOIB's circular economy model is driving progress towards several SDGs. By transforming mining waste into building materials, SOIB is promoting sustainable industrial practices and reducing the negative impact of mining activities on the environment. Additionally, by offering alternatives to traditional construction materials, SOIB is promoting responsible consumption and production by reducing resource extraction and waste generation.





The challenge for the SOIB Company lies in making this innovative technology accessible to more customers. Most Tunisian homeowners still rely on traditional building techniques, which are well-known and trusted, even though they have long become outdated. Ghannem's business aims to flip this reality, especially at a time when the world needs sustainable solutions. The company and the entrepreneur want to transform SOIB into a national and international franchise, which will promote sustainable change throughout the construction industry.





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