Master 2 internship offer 2026
Institut Pascal, Clermont-Ferrand

Hygrothermal behavior of masonry blocks from selectively compacted vegetal concrete

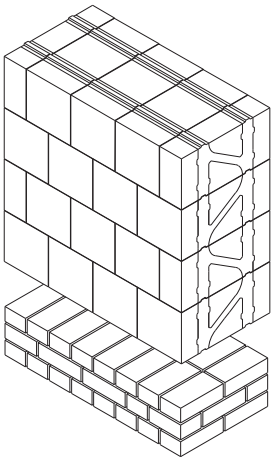
Background

Vegetal concretes such as hemp concrete have attracted considerable attention in the civil engineering research community due to their remarkable hygrothermal properties and their potential to sequester carbon. However, traditional hemp concrete blocks exhibit very low mechanical strength, restricting their use to non-load-bearing applications. To address this limitation, a German research team has recently introduced the concept of *selective compaction*. This innovative approach might enable the production of bio-based masonry blocks that combine good mechanical and hygrothermal performance with enhanced carbon storage capacity. Preliminary tests on selectively compacted specimens have already shown promising results in terms of compressive strength. The next step is the development of a specialized press for manufacturing blocks with an innovative geometry, for the construction of load-bearing exterior walls with high thermal performance.

Project

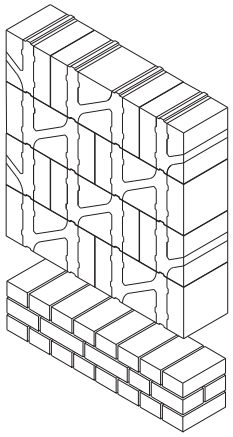
The objective of this internship is to investigate the **hygrothermal behavior** of these novel masonry blocks. The study will include:

- **Experimental testing** of hygrothermal properties, including moisture buffer value, thermal conductivity, water vapor diffusion, thermal diffusivity, and thermal effusivity.
- **Numerical modeling** to characterize coupled heat and moisture transfer within the different zones of the blocks.
- **Full-scale wall tests**, in which masonry walls will be constructed with two different block orientations and evaluated through measurements of thermal transmittance (U-value), phase shift and infrared thermography.



Planned Work

- Bibliographic study on hygrothermal behavior of vegetal concrete
- Fabrication of masonry blocks at the University for Applied Sciences in Cologne, Germany
- Construction of test walls
- Execution of the experimental campaign
- Critical analysis and interpretation of results



Profile

Master 2 student or engineering school student in civil engineering or mechanics of materials, with strong motivation for experimental work

Work conditions

Location: Institut Pascal, Campus Universitaire des Cézeaux, 4 Avenue Blaise Pascal, Aubière.
Scholarship: 15% of the hourly social security ceiling.
Duration: 5 months, starting in March 2026.

Supervision

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