Analysis of the supports influence on applied mortars performance

Summary

The objective of the present work was to analyze the influence of the substrates on the performance of the applied industrialized mortar, showing the differences between the characteristics of the industrialized mortar hardened in normalized laboratory specimens and hardened in real substrates, and to predict, through machine learning algorithms, which characteristics of the substrate could optimize the characteristics of this mortar. The central problem, the object of analysis in this work, consisted of evaluating how different substrates influence the physical and mechanical characteristics of the mortar when applied to these substrates. The research methodology carried out several experimental campaigns, which began with the characterization of industrialized mortar and substrates.

At the same time, the mortars were applied. After hardening, they were detached and characterized through the same tests, with necessary adaptations due to the dimensions of the mortar after detachment. The microstructure of the interface formed between the mortar and the substrate was also analyzed using advanced characterization techniques. The relevance of the study lies in providing the possibility of choosing the most suitable coating for the type of support, aiming at compatibility and performance, and contributing to the development of scientific and technical knowledge about the performance of the applied mortars. As a result, it can be said that the mortar applied on substrates has increased density, compressive strength, and water vapor permeability. At the same time, there is a reduction in open porosity when compared to mortar hardened in a standard mold. In conclusion, the influence of different substrates on the characteristics of the applied mortar is confirmed. Although mortar is general-purpose and suitable for different types of substrates, ceramic, concrete, and lightweight concrete substrates influence the properties of the applied mortar differently.

The most important characteristic of ceramic substrates that most influence the behavior of the mortar is the absorption of water by capillarity, and of concrete substrates is the open porosity. With the machine learning algorithms, it was possible to realize that the concrete slab is the most suitable substrate for the mortar under study.

Keywords
Performance, substrate, industrial mortar, machine learning algorithm.
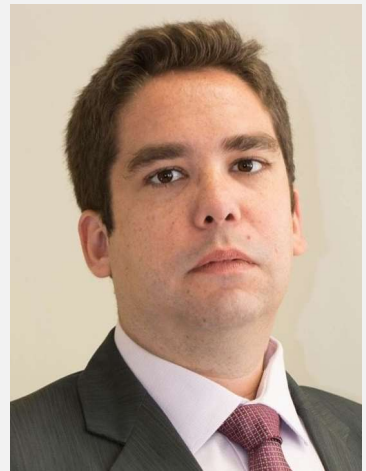
PhD student
Rafael Travincas Pinto

PhD program
Civil Engineering (FCT, University of Coimbra)

Supervisor
Isabel Torres (FCT, University of Coimbra; CERIS, IST, University of Lisbon)
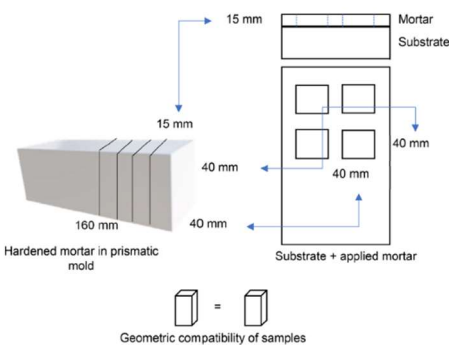
Co-supervisor
Inês Flores-Colen (CERIS, IST, University of Lisbon)
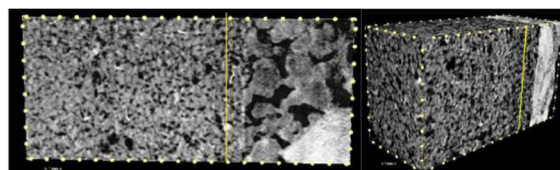
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Funding
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(a) Geometric compatibility of sampes scheme   *(b) Samples ready for detaching*
Experimental procedure.

(a) Samples for MicroCT   *(b) MicroCT results*
Microstructure analysis.