PREHORQUISA

PRECAST YOUR DESIGNS

Project Title:	**PRECAST SUSTAINABLE FREEFORM GRC PANEL WITH 3D-PRINTED MOLD, WITH A THICKNESS MAPPING SYSTEM VIA SCANNING-CALIBRATION.**
Acronim:	**PICARO**
Reference:	**IDI-20230157**
Lenght:	**01/07/2022-31/10/2024**
Financial Entity:	**Centre for the Development of Industrial Technology (CDTI)**
Call:	**Proyectos de Investigación Desarrollo 2022 (PID)**
Applicant:	**PREHORQUI, S.A.**
External Collaborations	**ETSAM-U.P.M., IO3-Soluciones**
Project Funding:	**262.006 €**

The present project aims to develop a new manufacturing process for glass fiber reinforced concrete (GRC) panels that maximizes their performance while reducing their environmental impact. This initiative responds to the transformation of the construction sector with the advent of so-called Construction 4.0, characterized by the integration of emerging technologies and the industrialization of processes.
In this context, the company seeks to innovate through research and development by implementing an additive manufacturing solution for molds, along with a novel thickness calibration control system based on scanning technology, which will facilitate the elimination of imperfections during the production process and significantly reduce manufacturing times.

To achieve these advancements, a new additive manufacturing process has been developed and validated, specifically adapted for the production of thermoplastic molds. This process optimizes mold geometries and printing times for their application in the construction of precast architectural façade panels.
In addition, new sustainable raw materials have been introduced both in the mold fabrication and in the production of the concrete components. As part of the project's technological development, a real-time 3D mapping system with augmented reality has been designed, enabling precise calibration of the panels during their manufacturing process and ensuring greater control and quality assurance.
Furthermore, the behavior of new, more sustainable concrete formulations has been analyzed through various tests, aiming to assess their suitability for unique architectural applications.
The results show that the PICARO formula achieves performance levels in GRC very similar to those obtained with PREHORQUISA's traditional mix (and even surpasses it in some aspects), while **reducing cement content by 20% and consequently lowering the carbon footprint by 15%**, as calculated using the digital tool developed by ANDECE for the creation of Environmental Self-Declarations (ADAP).

For the development of the project, collaboration was established with the School of Architecture of Madrid (ETSAM-UPM), which provided guidance on new additive manufacturing technologies in the construction field; IO3 SOLUCIONES, S.L., which developed the calibration control system; and EUROCONSULT S.L., which carried out the validation tests on the components produced using the new manufacturing system.

This project is **co-funded** by the Centre for the Development of Industrial Technology **(CDTI)** and **FEDER funds**.

Cofinanciado por la Unión Europea

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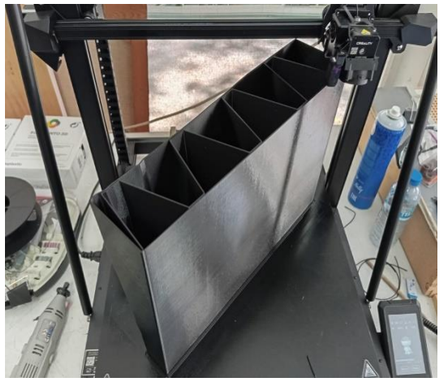
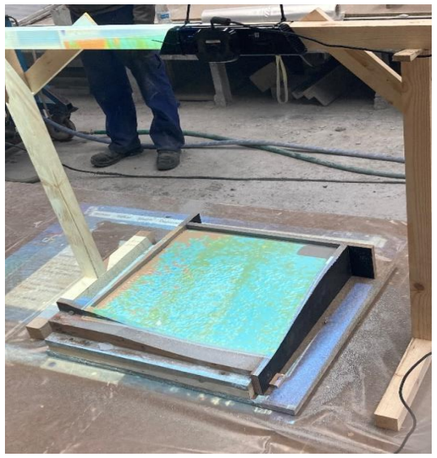


3D-printed mold with additive manufacturing



GRC panel sprayed onto a 3D-printed mold with thickness calibration control

Mock-up with GRC panels