

GENERAL AIM OF THE PROJECT

Development of Innovative externally bonded precast panels for integrated seismic and energy upgrading of existing buildings envelopes (i-SeePanel). The proposed precast panels combine the promising seismic strengthening solution TRM (composite material consisting of fibre-textiles reinforcement embedded into an inorganic matrix) or CRM (Composite Reinforced Mortar) with thermal insulation materials.

GENERAL OBJECTIVES and OUTPUTS OF THE PROJECT

- O1:** investigate the appropriateness of conventional or advanced matrix, fiber-textile and insulation materials for retrofitting purposes considering the cost, performance, compatibility, and eco-efficiency ([LINK TO WP4 AND SO2](#))
- O2:** design and develop precast panel made of reinforced mortar composites and insulation materials in such a way to ensure their compatibility to the substrate, continuity to the adjacent panels, and their anchoring to building envelopes, ([LINK TO WP5 and SO3 and SO4](#))
- O3:** investigate the mechanical and the thermal properties of the proposed panels, ([LINK TO WP5 AND SO4](#))
- O4:** evaluate the effectiveness and the sustainability of the precast panels in real-scale laboratory structure, ([LINK TO WP6 AND SO5](#))
- O5:** develop recommendations for production and application of the proposed panels ([LINK TO WP7 and SO6](#))

WP1 Project Management and coordination

Specific objectives (SO) And Tasks
SO1. Secondment and training,
T3.1 Training on seismic and energy upgrading solutions.

WP2 Mentoring and Training

WP3 – Secondment at the Joint Research Centre (JRC)

the Researcher will be trained on the design and construction detailing of integrated seismic and energy upgrading solutions experimental work that have been conducted in JRC. The secondment will also involve the design/planning of the pilot application experiments based on the internationally recognized experience of JRC on the proposed research topic.

WP8 Dissemination and Outreach

Deliverables and indicators
D1.1-Interim Report to EC/REA; (**Month 12, 3 April 2025**)

D1.2-Final Report to EC/REA;

D1.3-Data Management Plan (**Month 4, 03/August2024**)

D2.1 - Customized personal career development plan (**Month 2,03/ June 2024**)

D2.2 Evaluation questionnaire of researcher

D8.1 - Report on outreach activities conducted;

D8.2 - Submitted Publications

Specific objectives (SO) And Tasks
SO1. Secondment and training,
T3.1 Training on seismic and energy upgrading solutions.

Specific objectives and Tasks
SO2. mechanically characterize the matrix materials through tensile, bond, probetack and flow tests towards threshold mechanical properties along with adhesive and rheological characteristics for easiest application,
T4.1 Literature review on different matrix
T4.2 Laboratory production of trial mixtures
T4.3 Mixture characterization and synthesis finalization

WP4 –Matrix material design and characterization
Two matrix material high-strength fiber-reinforced cement-based matrix and Natural Hydraulic Lime- based matrix as (i) binding mortars for the textile reinforcement in the precast panels, and (ii) as adhesive mortars to mechanically connect the proposed precast panels to existing building envelopes. The mix-

Deliverables and Indicators
D4.1 - Report on the production and characterization of the binding and adhesive mortars. (**Month 4, 03/August2024**)

Specific objectives And Tasks
SO3: investigate the panel-to-substrate bond and anchorage behaviour, and the panel-to-panel continuity by pull-out, shear lap and bond tests. Direct tensile tests will be also conducted to obtain the stress-strain behaviour of the panel and to examine crack evolution mechanisms.
SO4: investigate the thermal resistance of the proposed panel through Hot box thermal tests.
T5.1 Literature review
T5.2 Laboratory production of panels
T5.3 Evaluation of panels' mechanical and thermal performance

WP5 – Design and characterization of precast panel
The proposed precast panels will be designed and tested. Direct tensile tests will be conducted to obtain the stress-strain behaviour of the panel and to examine crack evolution mechanisms, including the structural integrity of the solution. The panel-to-substrate bond and anchorage behaviour, and the panel-to-panel continuity will be investigated by pull-out, shear lap and bond tests. Thermal tests will be also conducted

Deliverables and Indicators
D5.1 - Report on the production and characterization of precast panels. **Month 13 (03/January 2025)**

Specific objectives And Tasks
SO5 : examine the effectiveness of the proposed panels in full-scale masonry-infilled RC frames under the most stringent seismic demand conditions, i.e. in-and out-of-plane loading (displacement control) using state-of-the-art technologies (shake table facility with 3D Digital Image Correlation (DIC) system), while the specimens will be instrumented accordingly (LVDTs, strain gages) to monitor and capture their behaviour under cyclic loading. resources, and updated information even after the training ends.
T6.1 Construction full-scale masonry-infilled RC frame
T6.2 Retrofitting of full-scale masonry-infilled RC frame specimens.
T6.3 Out-of-plane loading tests on specimens

WP6 – Design and characterization of precast panel
Pilot applications at the laboratory will be performed so as to address the effectiveness of the proposed solution (WP5) to full-scale tests on one-story, masonry-infilled RC frames against out-of-plane loadings. At least one unretrofitted and two retrofitted specimens

Deliverables and Indicators
D6.1 - Report on pilot applications of precast panels on full-scale specimens.. **Month 22**

Specific objectives And Tasks
SO6 : Develop Holistic methodology guidelines

WP7 – Design and characterization of precast panel
Design matters with a systematic approach of the proposed system application will be proposed to facilitate the development of design guidelines.

Deliverables and indicators
D7.1 - Report on design approach of the system application. **Month 24**