

## SeismicPRECAST – Seismic Performance Assessment of Existing Precast Industrial Buildings and Development of Innovative Retrofitting Sustainable Solutions

### Summary

The design of precast industrial buildings during the last years was based on a frame model, without considering the seismic demands, this fact was recently dramatically shown by several recent violent earthquakes, like L'Aquila (09), Emilia-Romagna (12) earthquakes, as well as during past events in Turkey (98 and 99). The seismic safety of the building stock is a requirement of modern societies and remains a concern in prone seismic areas. This aspect particularly affects a significant part of the built industrial building stock, designed essentially for gravitational loads or considering the seismic required prescribed by the first seismic codes, which do not reflect the current seismic engineering knowledge. The economic and social effects that could result from the interruption of industrial infrastructure activities in the case of an earthquake are immeasurable and would have short- and long-term repercussions on a country's economy. Recently it has been observed an increase of literature available regarding the seismic behavior of RC precast elements, but the majority refers to elements detailed according to the modern codes, however, there is a considerably less amount of similar data for elements representative of old building structures, and even lesser regarding the proper retrofitting solutions developed for old RC precast structures. The main objective of this proposal is to contribute to the knowledge about the

seismic vulnerability of existing prefabricated industrial buildings. In particular, it is intended to obtain relevant information that can be used to characterize this type of infrastructure and define the parameters that influence its response and promote a seismic risk study, to evaluate the economic and social effects of a seismic event. In the end, special attention will be given to the development of innovative reinforcement techniques to improve their behavior when subjected to seismic actions, considering the environmental impacts, thus seeking to satisfy the mechanical and environmental requirements of the solutions defined.

The project proceeds and takes advantage of the experience of the research team on previous development of numerical tools, as well as in the development of seismic risk studies. Also from an extensive experience in testing campaigns of full-scale specimens. National and international consultants with experience in practice and research in the current proposal field were also included to help and advise the research team on particular questions. All project represents a major innovation, for the Portuguese reality, and intend to represent a step forward in knowledge, which stimulates the interest of the technical community and realize decision makers for the advantages of retrofitting this constructive typology to minimize seismic vulnerability.

### Project Reference

POCI-01-0145-FEDER-028439

### Leading Institution

IPLeiria – Polytechnic of Leiria (Portugal)

### Partners

UA – University of Aveiro (Portugal), UP – Universidade do Porto (Portugal)

### CERIS Principal Investigator

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### CERIS Research Team

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### Funding

FCT – Fundação para a Ciência e a Tecnologia

### Period

2018-2021

### Total

239 980.55€

### CERIS

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### Project Website

<https://sites.ipleiria.pt/precast/>