Title - Prediction of degradation evolution for ordinary and prestressed reinforced concrete elements: alkali-silika reaction – post tensioning strands corrosion - strengthening systems degradation

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Department – Department of Architecture and Arts

ERC sector – PE8

Iuav role – lead partner

Other partners – "Tor Vergata" University of Rome, "Federico II" University of Naples, University of Pisa, Alma Mater Studiorum – University of Bologna

Duration – 24 months

Start – 28/09/2023

Closure – 27/09/2025

Project budget – € 244.900,00

Iuav budget – € 64.148,00

Funding to Iuav – € 45.188,00

Source of funding – MUR (Ministry of University and Research) - Call PRIN 2022

Description – The project aims to develop a methodology for predicting the effects of the evolution of different forms of degradation in existing ordinary and prestressed reinforced concrete elements. The topic has strong relevance at national and international level, from both social and economical points of view, because it has significant implications in terms of structural safety. Furthermore, the project is of high scientific relevance both in terms of topics and of the adopted methodological approach. One of the original aspects of the proposed methodology is due to the integration of experimental tests and numerical modelling at different levels, performed adopting numerical identification techniques based on inverse analysis and genetic algorithms for the calibration of the main parameters of the mechanical models.

Objectives – The main objective is obtaining estimates of the bearing capacity of structural elements over time, with reference to three of the most common degradation causes: corrosion of post-tensioning strands; deterioration of concrete due to Alkali-Silica Reactions (ASR); deterioration of reinforcing interventions based on the use of fiber composites (FRP). In detail, the calibration of the degradation models will be carried out using both material and structural data, so allowing to capture possible scale effects of the considered phenomena. Moreover, numerical identification and inverse analysis techniques will be adopted, creating numerical models for the structural elements subject to experimentation.