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Training și Workshop consolidări

COMPOSITE SYSTEMS FOR STRUCTURAL CONSOLIDATION: RESEARCH ACTIVITIES, DESIGN PRINCIPLES AND APPLICATION EXAMPLES

DESCRIPTION OF ENG ALLEN DUDINE

Allen Dudine, graduated first in Building Engineering and then in Civil and Structures Engineering at the University of Trieste, earned the Master in Anti-Seismic Design of Constructions - MUPAC and obtained a role at the University of Trieste as Research Fellow, from 2009 to 2011, deepening the issues of seismic behavior of existing buildings and consolidation / retrofit techniques with composite FRP materials. Since 2010 he has started the path of the freelance work, first taking on roles of assistance and then of designer and construction manager of relevant works on existing and new buildings and infrastructures. Since 2011 he has been collaborating with Fibre Net S.p.A. in the experimental research and development of new systems for the structural consolidation of residential and monumental buildings as well as infrastructures with FRP composite materials. He currently holds the role of Technical Director of Ardea Ingegneria S.r.l. and Head of the Research and Development Department of the Fibre Net S.p.A. Company, completing important research projects of national relevance ("SiCuRa" Project with the University of Roma3 and ENEA and "Push 'O Ver" Project with the University of Camerino, ENEA and Sapienza University among the others) and European (CONSTRAIN Project, Interreg 2020-2022, with the University of Trieste and the University of Ljubljana among the various project partners).

THE FOCUS OF THE INTERVENTION

Starting from the experimental results obtained during the CONSTRAIN project, Interreg 2014-2020, the presentation by Eng. Dudine will focus on an in-depth evaluation of the effectiveness of the consolidation technique for existing masonry buildings (CRM System - Composite Reinforced Mortar, which uses fiber-reinforced composite materials) applied to both faces of the masonry or only to the exterior of buildings, in order to maintain internal functionality during the consolidation phases. This evaluation is based on experimental tests conducted on buildings constructed using the same building techniques and materials, which are regular and very similar to each other in terms of the layout and elevation of structural elements. Additionally, it includes a significant satellite experimental campaign on masonry structural elements, substantial portions of buildings, and finally on another full-scale building, where structural interventions were designed based on the results of the detailed tests. Given the large volume of data and supplementary materials available, the activity was completed with the addition of a validation from an analytical and numerical perspective, which will allow professionals to design consolidation interventions using these systems.

The results (and consequently the behavioral models of existing buildings—both unconsolidated and after consolidation interventions—and the calculation/dimensioning models of the structural reinforcement

interventions) obtained over the last 25 years have been derived from experimental tests on partial samples, meaning they are not fully representative of the real behavior of the entire structure and its load-bearing elements (e.g., for masonry buildings: walls, shear walls, floor bands, slabs, and foundations). The behavioral models of individual buildings have always been treated as extrapolations of the results obtained from partial samples, mainly numerical (Finite Element Method - FEM) or analytical, without actual experimental confirmation.

The project and results achieved by Fibre Net S.p.A. in collaboration with Italian and international universities were obtained through operational and experimental phases, validating the results obtained in previous experimental campaigns (which should be considered an excellent starting point for this research project) and validating the models defined through experimental tests on real-scale buildings. This highlighted the effectiveness of the consolidation techniques applied broadly to the building, both externally and differentiating the level of consolidation these solutions can achieve.