1 Research Achievements Summary

Building Resilient (www.b-resilient.webs.upv.es) is a research group at the ICITECH-UPV. Our research is carried out in the structural engineering field and has always been oriented towards improving the resilience of buildings and infrastructures. The areas in which we work are: 1) structural retrofitting; 2) “Learning from Failures”; 3) structural assessment; and 4) progressive collapse and robustness.

We consider ourselves experimentalists; so our research has always been associated with ambitious experimental campaigns, including many on full-scale structures. We combine basic and applied research, with a high degree of transfer to industry.

At present we devote most of our time and resources to research areas #3 and #4:

Structural assessment. In this area we have worked on: a) masonry structures; b) Structural Health Monitoring (SHM); and c) the design, production, implementation and decision-making with fibre optic sensors. We have a patent for a new fibre optic sensor that can obtain much more precise measurements than its competitors. We have also directed a research project that involved testing full-scale timbrel cross vaults subjected to the settlement of their supports, which was a pioneer in the international field. We transfer the results obtained in this research area to society through the CALSENS spin-off company.

Progressive collapse and robustness. Here, we focus on: a) tests on full-scale buildings, which have provided an understanding of the alternative load paths that become active after the sudden failure of corner columns; b) robustness of temporary shoring structures and buildings under construction, which led to the development and putting on the market of novel “structural fuses” for shoring systems; and c) the first study in the world involving the testing of the robustness of a 21m span steel riveted railway bridge.

We can cite the following as some of the most important merits or contributions:

1) ERC Consolidator Grant 2020. We were recently awarded an ERC Consolidator Grant, which is one of the EU’s most prestigious research grant, for the amount of €2.5 million. This is the first grant of this type ever awarded in the structural engineering field. The overall aim of the project is to define a novel fuse-based segmentation design approach to arrest the propagation of failures in building structures. The project will range between basic research, defining a new building design philosophy, and applied research, leading to the design and production of novel structural fuses and two proofs of concept in actual buildings.

2) CALSENS (UPV spin-off company). We are partner-founders of CALSENS, which is involved in monitoring structures, structural assessment and decision making. By means of CALSENS we transfer to society the results obtained in my research area “structural assessment”.

2 Contact

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