

## EXPERIMENTAL TECHNIQUES FOR THE STUDY OF HISTORICAL MASONRY STRUCTURES

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The research focuses on the development of testing and consolidation techniques that combine the conservation of monuments with the seismic protection of users.

The activity includes:

- development of experimental techniques for non-destructive characterization of masonry walls. In particular, advanced diagnostic and monitoring techniques are implemented and used in laboratory and on-site, to allow the non-destructive evaluation of the quality, homogeneity, degradation and health state of structural elements in masonry, wood and concrete buildings. The development of new procedures for data acquisition, post-processing of the data and data fusion is pursued in order to maximize the potential of these techniques;
- analysis of seismic vulnerability of buildings and masonry bridges. In this context, a simplified methodology for the assessment of the vulnerability of existing RC structures and masonry has been developed;
- definition of consolidation techniques. Various solutions to repair masonry structures are studied. In particular, composite materials with metal or carbon fibers, in a cement-based or epoxy matrix are studied. Several applications to real cases have been carried out. The results of the analyses were included in the guidelines document developed by CNR for the repair of composite materials CD 200/2004;
- assessment of the structural damage induced by salts in masonry. The shear behaviour of artificially damaged masonry specimens is investigated by means of an ad hoc experimental test. As well known, the shear behaviour of masonry buildings plays a crucial role for structures located in areas prone to seismic hazard.

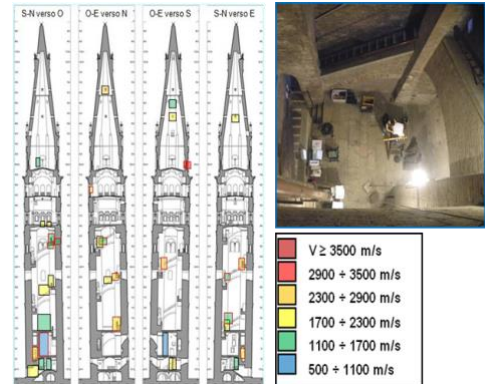


Fig. 1. Diagnosis on Ghirlandina tower, Modena, UNESCO site: sonic results and velocity classes (Colla).

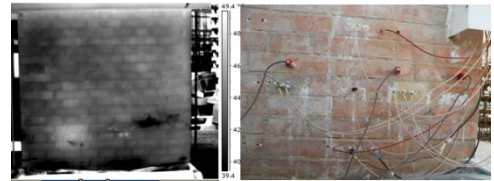


Fig. 2. Evaluation of homogeneity of masonry by thermography and wireless monitoring (Colla).



Fig. 3. Shear test on masonry triplet. Precompression apparatus (Gentilini).

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## RESEARCH PROJECTS

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3ENCULT – Efficient Energy for EU Cultural Heritage, FP7-2010, Collaborative EU project. Project Ref.: 260162.

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