

Timber reinforcements: local construction techniques and vulnerability assessment

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ABSTRACT

Defined as a creative process produced by the mutual influences among strictly connected entities, the idea of coevolution can be applied to the rich panorama of the historical building techniques for interpreting the realization of peculiar construction solutions. Wooden elements used for improving the common connection system among masonry elements, like vertical walls and masonry arches and vaults, are an example of an upgrade required by those structures showing forms of vulnerability interacting with the environment [1].

Referring to historical buildings, local construction solutions represent the response to technical demands appeared in different times for facing specific problems, from common state of stress distribution in masonry structures to seismic mitigation. The introduction of wooden elements into masonry walls, for instance, is a widely diffused measure for reinforcing stone or brickworks [2]. These techniques represent strategic solutions, initially far away from common building practices, providing positive contributes under seismic actions and more in general for contrasting static disruption. In Italy, after the recent earthquakes (L'Aquila 2009 and Amatrice 2016), the rediscovery of such building techniques, in some cases belonging to a sort of forgotten world of knowledge, drove to design alternatives and more sustainable retrofitting interventions for historical buildings [3].

The authors, with the aim to improve the attention on these construction solutions, focused on the rich contributions contain in the historical treaties of the Italian building tradition and on some archive documents describing original design for reinforcing elements [4]. Among the various materials, the study proposes the analysis of some specific contests, like Como Lake in Lombardy and the regions under the control of the Vatican state or the Kingdom of the Two Sicilies, promoting some comparison with other significant cases observed in other counties, where this technology, based on timber chains and hut-oriented diaphragms, improved the mechanical properties of the buildings.

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