

**ON THE USE OF COLD-FORMED STEEL VERTICAL
ADDITION SYSTEMS FOR ENERGETIC RETROFITTING
OF EXISTING MASONRY BUILDINGS**

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Volume: **Thematic Issue on Energy**

Pages: **1-14**

Date: **January 2012**

Abstract:

According to the current trend for sustainable constructions in urban areas, the present paper deals with the energetic retrofitting of existing masonry buildings. Starting from the new technical Italian code (M. D. 14/01/08) provisions for the behavioural assessment of such constructions, a finite element model (FEM) based on the use of shell elements has been implemented to investigate some structural units with variable storeys (1, 2 and 3) and masonry strength ($f_k = 1, 3$ and 6 MPa (145, 435 and 870 psi)). Later on, traditional (reinforced concrete, masonry and steel) and innovative (glued laminated timber and cold-formed steel) technologies have been proposed as a solution for vertical addition of the study buildings. Therefore, a numerical campaign of linear dynamic analyses has been undertaken on the examined structures aiming at selecting the best vertical extension solution. The achieved results have provided cold-formed steel systems as the top system for improving the energetic behaviour of the inspected existing masonry buildings. Finally, the achieved numerical results have been confirmed by an innovative multi criteria decision method, where the proposed structural types for vertical addition have been compared each other in terms of structural, environmental and economic parameters.

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