

2013/14 Undergraduate Research Grant Scheme – Executive Summary

Project title:

Reinforced prefabricated timber frame racking wall panels

University:

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Project summary:

All over Europe and in particular in the United Kingdom, timber Platform Frame is progressively being more used and appears to satisfy new needs, associating low cost construction and energy efficiency, centralizing the concept of comfort in the design stage. Timber frame construction permits a higher thermal performance of the structures compared to their volume and weight, allowing a relative architectural flexibility if well designed and if a special focus is brought to the critical in-plane loadings. In fact, reinforced prefabricated timber frame wall panels may be of special interest in United Kingdom for situations of high winds and also, regarding the pillars of bioclimatic conception, in situations whereas the effective length of walls resisting lateral loads is reduced (due to the increase of open spaces) and stiffness can compromise the structural design. In order to reach the requirements in term of racking resistance, alternative methods have to be employed and it is the point of this honours project sponsored by the Institution of Structural Engineers (IStructE). The work is based on the improvement of the basic features of a standard panel and then on the addition of elements increasing its racking performance.

The aim of this research is to carry out a theoretical analysis and a feasibility study of an innovative reinforced closed panel timber frame wall. It is first an investigation of the structural stiffness of a reinforced timber frame wall prototype in order to then carry out a practical study of the different designs obtained, with a focus on the thermal features of the different conceptions. The question answered is: "To what extent do the improvement of the structural stiffness affects the other features of a wall panel?". It shows that the stiffness modifies other parameters of the panel by following a three-stage methodology comprising theoretical testing, finite element analysis and analytical comparison of results.