

2013 MSc Research Grant Scheme – Executive Summary

Project title:

New hybrid timber concrete (HTC) system for timber floor

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University of Bath

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Project summary:

To date, the use of timber composite systems having a concrete layer on top of a timber layer was preferable for engineers because of the exploitation of concrete's high compression strength. However, this layout is not desirable by designers-architects because concrete layer cannot contribute significantly for diminishing energy consumption and improve thermal comfort of a building. Due to this, the study of a new prefabricated Hybrid Timber Concrete (HTC) system floor for office buildings was conducted by flipping the two layers. Therefore, the exposed concrete on ceiling can provide sufficient thermal mass.

In order for the study to be carried out, a laboratory test and a computer simulation were performed. This was because the laboratory test can evaluate the performance of the proposed floor system from an engineering point of view, while the simulation can assess HTC from an architectural point of view. According to the results HTC performed satisfactorily in terms of vibration after a short-term test for serviceability limit state. Computer modelling can be deemed as an ideal case assessment of a building. Thus, computer modelling offers a sense and a direction for the influence of HTC system floor. The simulations showed that the use of HTC independently of the construction type (lightweight or regular or heavyweight) enhances the internal thermal comfort and substantially reduces energy consumption and consequently CO2 emissions.

It should be stated that there were some limitations preventing the HTC system for the mass production, this leads to further research activities in the future: (1) the static ultimate state tests should be carried out so as to understand the failure pattern of this system; (2) experiments on thermal and acoustic performance of this system will make architects and engineers more confident to use this system; and (3) fire performance should be carried out.