

# 2013/14 Undergraduate Research Grant Scheme – Executive Summary

**Project title:**

Performance of anchored blind-bolts in lightweight self-compacting concrete-filled tubes

**University:**

University of Nottingham

**Supervisor:**

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**Project summary:**

Using anchored blind-bolt with concrete-filled square hollow sections was proved to improve the steel connection's moment resistance; however, concrete compaction cannot be readily achieved when dealing with long sections in practice. This problem was proposed to be solved by adopting lightweight self-compacting concrete, which can also cut down the dead weight and simplify construction procedure. The primary objective of this project is to investigate the face bending behaviour of blind-bolted connections to lightweight self-compacting concrete-filled hollow sections.

Ongoing research at the University of Nottingham has revealed the face bending behaviour of blind-bolted connections to hollow sections filled with normal concrete. In order to compare it with the behaviour when lightweight self-compacting concrete is applied, three groups of test were designed adopting lightweight concrete (LWC), lightweight self-compacting concrete (LWSCC) and normal weight self-compacting concrete (NWSKC) separately.

In this experiment, general face bending behaviour, similar yield lines on SHS face and volcano-shaped deformation around the bolts were observed in all tests. The force-displacement curves of lightweight self-compacting samples and normal weight samples shared similar trend, but it was concluded from the experiment that lightweight concrete infill resulted in lower ultimate strength with lower stiffness while self-compacting concrete infill resulted in lower ultimate strength more obviously than affecting stiffness. Although LWSCC group has comparatively lower stiffness and ultimate strength, it was still concluded as an alternative of NWC when dealing with longer profiles, depending on relative requirements.