The Institution of Structural Engineers

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2013/14 Undergraduate Research Grant Scheme

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

University: University of Nottingham

Supervisor: Walid Tizani

Student: tba

Aims of research:
The proposed research work is aimed at determining the behaviour of blind-bolts in concrete-filled tubes when a lightweight self-compacting mix is applied. Ongoing research at the University has established the response of blind-bolts in normal weight concrete, adopting standard compacting operations. But from a practical view, when dealing with long profiles, conventional compaction could be a challenge. Introducing self-compacting concrete with lightweight properties can overcome this challenge, simplifying the construction of the proposed connection technology, whilst reducing the dead weight of the tubular member.

The work will build on continuing research, aiming to model the behaviour of bolted moment-resisting connections to concrete-filled tubes.

Description of method:
- Design a testing programme to achieve project aim (setup, framing solution and procedure)
- Perform structural testing of a statistically sufficient number of pull-out specimens
- Conduct data analysis to develop and propose an appropriate bolt stiffness model
- Compare the results with available data related to normal weight concrete specimens
- Disseminate results

Benefits to structural engineering:
- The research will establish the feasibility of forming bolted moment-resisting connections to lightweight self-compacted concrete-filled tubular steel sections. The work will bring closer the reality of using such connections in practice therefore providing a beneficial technology in the area of structural engineering that is not currently available.

Proposed finish date: May 2014