

RESEARCH DIRECTIONS

Hybrid beam-column joints

Associate Professor Zhong Tao of the Institute for Infrastructure Engineering, together with Professor Lin-Hai Han from the Tsinghua University of Beijing will be investigating the behaviour of hybrid stainless-carbon steel composite beam-column joints for durability under extreme conditions such as wind, earthquakes and fire. This research is being supported by an ARC Discovery Project.

'In any structure, the point at which a horizontal (beam) and vertical (column) component come together (connections) is a critical element', says Associate Professor Zhong Tao. 'These beam-column connections have been found to be of great significance in enhancing structural behaviour at both ambient and elevated temperatures. They transfer the floor and beam loads to columns and provide the link between the principal structural elements of the overall stability of a structure. As a structure has many connections, there are economic as well as safety incentives to fully understand the behaviour of such important and necessary structural elements. We will investigate the behaviour of composite joints (stainless steel-carbon steel) under varying temperatures and extreme conditions.'

The researchers will conduct three series of tests. These will comprise joints subjected to static loading, cyclic loading and fire tests. The fire tests will be carried out at the Fire Testing Centre in Tianjin, China, as there are no existing comparative facilities available in Australia. A powerful simulation program will be used for the analysis of composite joints at ambient and elevated temperatures and models will be used to gain insight into the important issues of connection tying force capacity under different temperatures, plate bearing and bolt shearing behaviour.



The results of this project will be the development of reliable and economical joints to connect stainless steel columns and carbon steel beams. New insights will be gained into the behaviour of composite joints that will lead to the revision of design guidelines of composite joints at ambient and elevated temperatures. This research will further enhance Australia's reputation as a leading nation in the research and development of steel-concrete composite construction which is widely used in civil engineering.

Project Title: Hybrid stainless-carbon steel composite beam-column joints at ambient and elevated temperatures

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