

# RESEARCH DIRECTIONS

## Use of composite columns in large scale infrastructure

Professor Brian Uy, Foundation Director of the Institute for Infrastructure Engineering (IIE) and an international team of researchers will be investigating the design and behaviour of columns composed of high strength structural steel coupled with high strength concrete. This ARC Discovery Project will enable sustainable column systems to be developed for major civil engineering infrastructure. The research team consists of Associate Professor Zhong Tao (IIE) and Dr Fidelis Mashiri, School of Computing, Engineering & Mathematics, UWS; Professor Richard Liew of the National University of Singapore; and Professor Lin-Hai Han of Tsinghua University, Beijing.

'The construction industry makes a significant impact on the environment, consuming enormous energy and resources and accounting for a significant amount of waste to landfill', says Professor Uy. 'Methods that attempt to reduce the effects on the environment by reducing material used are of great value in the industry. The two most widely used construction materials, concrete and steel, can make a major contribution to sustainability in buildings by adopting two simple measures: the use of higher strength steels and a more sustainable concrete which has reduced amounts of ordinary Portland cement and uses high volume fly ash. This project will focus on concrete filled steel columns of varying strengths to provide the construction industry with a number of different column solutions.'

Experiments will be carried out on high strength box, tubular and very high strength steel polygonal sections using the newly commissioned universal testing facility at UWS. These tests will allow the effects of local buckling and concrete confinement to be defined. The project will also involve analytical and numerical modelling on a recently commissioned supercomputer.



Existing strength equations in current Australian and some overseas countries' Standards will be evaluated and compared with the experimental and analytical study and suggested recommendations will be made.

The benefits of this project will be an improved understanding of the complex behaviour of tubular steel and composite steel-concrete assemblages in bridges, buildings and offshore structures. These models will result in increased savings in the design of structural buildings and civil engineering infrastructure. Outcomes of this project will result in significant benefit to the construction industry and the Australian economy.

**Project Title:** The behaviour and design of composite columns coupling the benefits of high strength steel and high strength concrete for large scale infrastructure

**Funding has been set at:** \$400,000

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