

# RESEARCH DIRECTIONS

## Of Concrete and Steel

**Associate Professor Zhong Tao from the School of Engineering has been awarded a research fellowship to investigate the behaviour of concrete-filled stainless steel columns used in building construction. The project and fellowship have been funded by the Australian Research Council through its Future Fellowship grant scheme.**

'Stainless steel is an excellent material for construction with its corrosion-resistance, attractive appearance and ease of maintenance, as well as strength and stability', says Associate Professor Tao. 'But it is comparatively expensive, so using stainless steel tubular columns filled with concrete can make use of steel's properties, while reducing the construction costs. However, this combination of materials will behave differently to standard carbon steel, so the behaviour of these columns needs to be better understood in order to build safe and effective composite columns. There are already indications that an enhancement in fire resistance is obtained using stainless steel in construction and columns made of concrete and stainless steel have a superior load-bearing capacity to traditional construction methods. This study will determine the behaviour of these columns under a variety of conditions and loads and use these results to develop a new composite construction material.'

Theoretical and experimental testing will examine the behaviour of stainless steel and concrete composite beam-columns. Factors such as load-bearing capacity, stability and "slip" of concrete column against the steel outer shell will be assessed, as well as fire resistance and buckling of the steel at room and elevated temperatures. Stress and strain and thermal characteristics will be measured and a suitable theoretical model will be used to validate the results.

The outcomes of this research will likely be used to develop new design codes for structural engineers



enabling the use of an economical and more environmentally friendly building technique. By using this in building, bridge and offshore infrastructure, significant socio-economic benefits will be provided to Australia as well as increasing the country's infrastructure maintenance capability.

**Project Title:** Behaviour and design of concrete-filled stainless steel tubular columns at ambient and elevated temperatures.

**Funding has been set at:** \$686,400

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**May 2010**