



Research Directions

Office of Research Services

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Professor Brian Uy from the School of Engineering is exploring the behaviour and design of composite steel-concrete beams in large scale construction projects through a three year ARC Discovery Grant.



'Composite steel-concrete beams are the most widely used method of construction for steel framed structures such as bridges, stadia and buildings. They are considered to provide elegant form and design with minimum weight and are also re-usable and therefore environmentally sustainable', says Professor Uy. 'While much is known about the structural and load bearing properties of the beams when subjected to forces that may bend them, less is known of their behaviour and strength when subjected to different forces such as twisting, shearing or torsion. Knowing this would greatly expand the possibilities for design and construction of large structures. This project aims to develop a unified theory of the behaviour of steel-concrete building materials to integrate what we know about bending stresses with new knowledge of other types of stresses and strains that may also be encountered in building engineering and design.'

On beams made of a combination of steel and concrete, Professor Uy will conduct a series of experiments designed to test how the beams react when subjected to different forces - individually and in combinations of two or more different directional forces at the same time. Beams will be tested to the point of failure and analysed to determine the patterns of stress that led to their structural failure.

This project addresses a national research priority, *Frontier Technologies for Building and Transforming Australian Industries*, through the development of advanced materials and the structural systems which they will create. Improved understanding of the complex behaviour of steel-concrete building structures and the ability to analyse them more accurately will lead to increased economy of design and increased confidence in design and incorporation of these materials into structures and into Australian Standards. Economic benefits to Australia will also flow from this research, by placing the engineering and structural design professions at the forefront of developments in their field and thus improving Australia's international competitiveness.

Project Title: Unified theory for the behaviour and design of composite steel-concrete beams subjected to generalised loading and support conditions

Funding has been set at: \$300,413

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