2012 The Right Blend
Innovation and Transformation
TEMC
Adelaide Convention Centre
16-19 September 2012
www.temc.org.au

High Performance Buildings in a Non-linear World

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Nick Bamford *is a Senior Mechanical Engineer at AECOM. With over 8 years of experience Nick has been involved in a number of Tertiary Education projects for RMIT, Melbourne University and UTS. Nick has the mechanical lead role on the Swanston Academic Building and the Dr Chau Chak Wing Building.*

Universities within Australia are expanding and pushing boundaries. By association, new academic buildings are built to push boundaries, seeking the highest level of innovation for the learning environment. They are developed to be a point of difference and to have a distinct physical identity.

The modern day academic building is no longer just an indistinguishable building. They capture the imagination, transform the learning experience and encourage exploration. They respond to new learning pedagogies on the journey of transforming the student experience. There is a birth of new generation formal and informal learning spaces. Architecturally, spaces have been enhanced by moving away from rectilinear building design. Internal spaces mimic learning clusters. The building envelope itself responds to its environment in a more free flowing form.

The engineering elements of the building, by their nature, are linear. This new generation of non-linear buildings, coupled with aspirations for higher levels of sustainability and occupant comfort poses an interesting conundrum for building services design. Is there a locus of intersection between the linear and non-linear worlds, where non-linear buildings are beautifully engineered for high performance?

The aim of this presentation is to provide an insight into the journey of finding this intersection and aspiring to high performance building design. Discussion is focused on how engineering design has been applied to the design of non-linear buildings as well as some of the challenges faced. And how some of these challenges were overcome through advances in technology and changes to the design process itself.

Case studies from two exemplar tertiary education buildings, RMIT University's Swanston Academic Building and UTS's Dr Chau Chak Wing Building, are used for the discussion. Both buildings are non-linear in their rendition, architecturally distinct, and designed to be innovative and transformative in more ways than one. The engineering services design behind these buildings seek to attain high levels of performance and sustainability.