The huge auditorium embraces new methods of training young engineers through hands-on learning

WITHOUT AMPLIFICATION

A deeper sustainable outcome for new AEB

When the Advanced Engineering Building (AEB) at the University of Queensland's St Lucia campus in Brisbane opens this year it will immediately become part of the curriculum.

The design by Richard Kirk Architect (RKA), in association with Hassell, won a limited competition that called for a new benchmark in sustainability.

"From an early stage, we took the view that sustainability initiatives are often limited to ticking a series of boxes, and for us, merely addressing those criteria was inadequate," says Kirk. "Our proposition was to yield a deeper and more significant sustainable outcome for the project.

"Central to that was the use of local, inherently sustainable industries and building processes – often neglected by an overly risk-averse construction industry.

"Although the competition period was extremely brief – and at the time we had not fully resolved how this would play out – we felt that the goal of using materials from local, sustainable industries would be achievable."

The AEB design for the 22,000 m2 building favours a primarily passive response to sustainability and embraces new methods of training young engineers through hands-on learning. Its most dramatic feature is a huge roof structure of Australian hardwood glulam.

The structure is conceived as a 'living building' – allowing real-time monitoring of its performance in climatic and structural terms, and to a fine level. "In this way, the building becomes a lifelong learning tool, which is part of the curriculum," says Kirk.

The design also challenges the traditional concept of the university workplace, with fewer closed cellular spaces and a central atrium for better cross ventilation and daylight.

Timber is used extensively for the structural systems, facades and roofs, and reflects the architect's deep interest in developing related construction methods and material knowledge. "In this case, application of small project skills on larger projects has resulted in a grander scale use of local timber," says Kirk.

"There should also be greater utilisation of existing sustainable industries, previously denied access to these larger sectors because

of [entrenched] conservatism. It is critical that architects act in this way to develop sustainable approaches that can be adopted widely and immediately."

Timber structure

The AEB features almost certainly the largest timber-framed auditorium in Australia, and one of the longest wooden spans. "But that wasn't the driver," Kirk emphasises. "We wanted to express the structure and timber was selected for its sustainability credentials and for spaces that required an acoustic quality or 'colour'. The ambition for the space was to allow the spoken word without amplification – an idea that promotes a more intimate teaching and learning experience."

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Glulam was used for the main 500-seat auditorium – comprising a three-storey facade and roof structure. The trusses were produced by Hyne Timber at the company's Maryborough, Queensland plant.

"The purpose was to demonstrate the functional and aesthetic potential of timber. Our goal had always been to develop sustainability initiatives beyond the singular energy strategies typically targeted in large projects. The use of timber became central to this," says Kirk. "It also allowed us to identify a more sustainable industry that the project could support and contribute to. The fact that the supplier was local was incredibly important to us and the support of industry in regional Queensland was greatly valued by our client."

To express the auditorium externally and to gain greater structural capacity in the trusses, the roof was formed as a series of folded plates.

Given the scale, it is not surprising there were many challenges, notably the construction methodology used to connect the hundreds of glulam pieces. Exposed metal plates and fixings (including 32,000 bolts) meant there were fire resistance level issues to address.

The decision not to use conventional sprinklers within the auditorium meant an alternative (penetrative) fire retardant paint system was applied to the glulam as part of the fire engineering solution. Kirk says the contractors cleverly solved other challenges of assembly and construction using knowledge gained in the erection of large roofs for stadiums.

"The assembly process started with each truss being constructed off-site, then broken down into manageable sections [limited by transportation], reassembled on the floor of the auditorium and hoisted into place – some 15 metres up."

To protect the trusses during site assembly and erection they were covered at all times – presenting a major logistical headache. ■