



# Less is more with deft design approach

## The Flannery Centre, Bathurst NSW

The decision by structural engineers, Northrop Engineers to substitute steel portal frames with a braced frame structure in planning a new green skills centre in regional NSW provided a 35 percent saving in steel tonnage to help the building attain its targeted 6-Star Green Star rating.

The recently completed project won the ASI's 2011 Sustainable Steel Design Award for its holistic consideration of how all materials contribute over the structure's entire intended life.

The Flannery Centre in Bathurst is a GreenTrades educational facility aimed at offering state-of-the-art training facilities for green skills and trades to train up to 700 apprentices a year.

The project's structural engineer, **Jonathan Low** said whilst the initial structural engineers proposed steel portal frames in the north south direction using columns of 46kg per metre run in weight, when Northrop Engineers came on board they substituted a braced frame structure to the same layout and load path.

"This led to a steel tonnage saving in the building of 23.8 tonnes, further substantiating the ability of a structural steel approach to lighten the load onsite," he said.

"In addition to this, high grade steel was used in areas of the structure that were governed by strength rather than deflection in order to minimise tonnage."

The project employed 450 Grade square hollow sections (SHSs) in strength governed columns.

The structure of the building consists of a primary steel braced frame in both orthogonal directions with timber roof purlins supporting Kingspan insulated roofing panels. The wall construction is a combination of timber stud work, reinforced concrete blocks and rammed earth walls to provide thermal mass to the building.

The building is segmented into four distinct areas: the high bay workshop, the 'gallery', the 'hub' and the administration/computer laboratories.

Points were targeted under the Green Building Council of Australia's education rating tool in the design of this building in order to achieve the desired Green Star design rating in the categories of Mat-4 (Concrete), Mat-5 (Steel), Mat-7 (Sustainable Timber), Mat-8 (Design for Disassembly) and Mat-9 (De-materialisation) with optimal use of steel contributing to satisfying criteria for three of those.

Mr Low said the design of the structural frame considered life cycle analysis of the building and its ability to recycle building materials at the end of the design life.

"To this end, all connections were designed as bolted connections to allow for ease of disassembly in a logical and transparent manner," he said.

He said that there were no site welds done on the entire project as the entire steel frame was essentially a giant Meccano set when it arrived on site, helping alleviate work site disruption.

"The design is also innovative in that the thermal bridging to the steel structure was eliminated through the implementation of neoprene washers. We worked closely with the architect to develop the detailing through the different wall sections.

"This, along with the use of double glazing, thermal mass and the 'cool-room' roofing product have significantly minimised the energy consumption of the building.

*"The Flannery Centre in Bathurst is a Green Trades educational facility aimed at offering state-of-the-art training facilities for green skills and trades to train up to 700 apprentices a year."*

"The roof system is an offsite fabricated cool room panel product that is screw fixed to the structural steel frame acting as both a roof sheet and a ceiling in one and requiring less trades onsite and ultimately providing quicker erection time and cost savings.

Mr Low said the building has highlight north facing windows to allow natural lighting into the 'gallery'. They are supported on a steel frame which in turn is cantilevered into the 'gallery' from rafters supported by the walls from the adjoining classrooms.



"By cantilevering the rafters out into the space, it allowed for larger column free space within the communal areas," he said.

A solar farm is proposed to be installed in the adjacent grounds at the facility so provisions have been considered within the structural and building services designs.

The structural steel shop drawings and fabrication were contracted to local firms who specialise in servicing regional New South Wales.

"This local combination of expertise reduced the environmental impacts of transporting the steel and had the added advantage of increasing cash expenditure within the local economy, Mr Low said.



- Project Team**
- Client:** Skillset
- Architecture:** Crawford Architects
- Structural Engineer:** Northrop Consulting Engineers
- Building Services:** Wallis & Spratt
- Contractor:** National Buildplan Group
- Steel Fabricator:** Belmore Engineering
- Steel Detailing:** Central Design and Engineering
- ASI Steel Distributor:** OneSteel
- ASI Steel Manufacturer:** OneSteel