

New plant, process, home and tower top green nods



(L to R) ASI Sustainability Committee Chairman, **Andrew Marjoribanks** and Nepean Group CEO, **Miles Fuller** congratulate **Professor Veena Sahajwalla** (UNSW); **Paul O’Kane** (One Steel); **Saha Chaudhury** (UNSW) and **Susan Lundy** (UNSW) on their polymer injection technology win.

The winners of the Australian steel industry’s inaugural sustainability awards announced at the Australian Steel Convention in Sydney on 20 November testify to the diverse ways local industry is getting greener right across the value chain from the mill onward.

A collaborative effort between OneSteel and University of NSW (UNSW) that is already harvesting carbon for steelmaking from reclaimed polymers such as car tyres shared the top honour in the Sustainable Work Practices category.

The equal winner in that category was GB Galvanizing who built a range of provisions into their new Victorian plant to reduce waste and energy use and optimise water usage, showing clearly that you don’t have to be a huge organisation to find better solutions in steel processing.

Arup scored first place in the Sustainable Products and Solutions category by successfully utilising the steel framed way of extending the useful life of a well-worn Sydney CBD office building. Without the steel option, this building would have been demolished and rebuilt using valuable new resources and creating considerable waste.

In the same category, clever modeling of a prefabricated building by architect, **Andrew Bell** and Van Der Meer Consulting Engineers attracted special recognition from the Judging Panel for the Bell Residence in Victoria. The joint entrants demonstrated a good

understanding and application of the environmental hierarchy of Reduce, Reuse and Recycle.

Category One – Sustainable Work Practices in the Steel Industry

WINNER: *Polymer injection technology* (OneSteel and University of NSW)

WINNER: *Design and construction of a new galvanising plant* (GB Galvanizing)

Category Two – Developing Sustainable Products and Solutions

WINNER: *77 King Street Sydney* (Arup)

JUDGES’ AWARD: *Bell Residence* (Andrew Bell Architect and VDM Consulting Engineers)

Award Judges (members of the ASI Sustainability Committee)

- Andrew Marjoribanks** (ASI Sustainability Committee Chairman)
- Vince Chaplin** (OneSteel)
- Ross Davies** (BlueScope Steel)
- Nigel Howard** (Edge Environment)
- Anthony Ng** (OneSteel)
- David Ryan** (Australian Steel Institute)
- Carmelo San Gil** (BlueScope Steel)

Sustainable Work Practices Award:

CO-WINNER

Polymer injection technology – OneSteel and University of NSW
Submitted by **Kannan Thangaraj** (University of NSW)

This technology is a new patented process which partially substitutes the use of coke with polymers including rubber as alternative carbon ‘injectants’ to produce foaming slag in electric arc furnace (EAF) steelmaking. Usually the injection of coke produces a foaming slag used to form a blanket over the steel in the steelmaking process to prevent excessive heat transfer to the furnace roof and sidewalls, enhancing the thermal efficiency of the furnace. Adding polyethylene to coke has been proven to increase the foamy slag which in turn lowers the energy required to power the furnace in comparison to 100 percent coke. The innovation can save steel costs while lightening the load on the environment through energy savings and recycling materials. It lowers the total cost of production by reducing the quantity of ‘injectant’ material required and improves furnace productivity by reducing the ‘tap-to-tap’ time taken to produce one batch of molten steel. The technology has demonstrated in industrial trials at OneSteel’s Sydney steel mill to reduce specific electrical energy consumption by approximately three percent and require 12 percent less carbon ‘injectant’. Tyres are a valuable source of these polymers which are normally diverted to landfill at the end of their life. Globally, landfills are a major environmental hazard and a landfill shortage crisis is looming within the next decade unless tonnages of waste can be diverted or reduced significantly. Within Australia, approximately 64 percent of tyres have no afterlife use and the stockpile is estimated to be between 20-50 million units. Polymer Injection Technology not only reduces the requirement for virgin resource (coal), it also uses a product which is cheap to procure and environmentally detrimental to dispose of by traditional means.

“This entry satisfies nearly all of the criteria at the high level and is especially strong on innovation and use of otherwise waste material.” – ANDREW MARJORIBANKS

“Worldwide application (of this new technology represents) a significant impact in an area where it is difficult to make change. (It) utilises a resource (tyres) that would otherwise have limited uses.” – ROSS DAVIES



OneSteel-UNSW Polymer Injection

CO-WINNER

Design and construction of a new galvanising plant – GB Galvanizing
Submitted by **Vince Gucciardo** (Operations Manager, GB Galvanizing)



(L to R) Nepean Group CEO, **Miles Fuller** presents **Gian Gucciardo** and **Vince Gucciardo** from GB Galvanizing with their award.

The company examined all the aspects of a galvanising plant to improve the efficiency, sustainability and environmental friendliness of the various production steps. The incremental gains achieved at each part of the plant could then be combined to greatly improve overall plant performance gauged by efficiency and ‘green’ indicators. The project brings environmental benefits like lower resource use, lower environmental emissions and greater recycling. There was an emphasis placed on recycling of water and capture of rainwater. That means there is less use of precious potable water in the process. The aim of reducing water evaporation means that water can be used more efficiently and lasts longer. Also, rainwater capture uses the roof space of the facility rather than allowing water to pass into to the storm water system. The use of energy efficient equipment requires less natural gas and electricity. This results in lower energy use and consequently lower greenhouse gas emissions. The building was designed to capture all rainwater with suspended downpipes and has a current storage capacity of 150,000 litres which can be expanded if required. Any major process requiring water in the plant draws it from storage tanks. At this stage all caustic acid and flux tanks are made up using stored rainwater. The acid tanks were fabricated out of a polymer to eliminate the need for timber lining which becomes a hazardous waste and needs to be treated and disposed of to landfill. GB also introduced a new caustic degreaser that uses a solvent-based additive that is functional at 27 degrees Celsius and saves between 4000 to 5000 litres of water per day due to reduced evaporation and costs \$8000 less per month in natural gas whilst minimising greenhouse gas emissions and improving air quality and air emissions in the plant. It also employs a new scrubber unit of the company’s own design which allows water to be reused for four weeks rather than being disposed of and treated off-site as previously.

“I particularly liked this submission for the large number of small initiatives adding up to significant environmental benefit and saving of money.” – NIGEL HOWARD

“Best Practice demonstrated in an area with high energy and water use and which produces significant emissions.” – ROSS DAVIES



Filtration unit at GB Galvanizing's new plant.



(L to R) Miles Fuller and Andrew Marjoribanks congratulate Steven Lindsay from Arup on his building extension entry win.

Sustainable Products and Solutions Award:

WINNER

77 King Street, Sydney – Arup

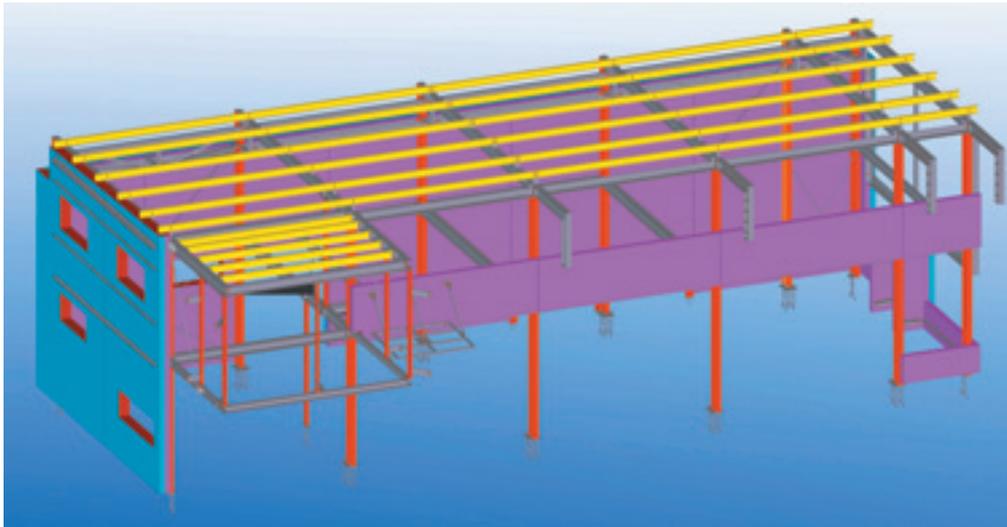
Submitted by **Steven Lindsay** (Senior Structural Engineer, Arup)

Lighter structures and the increased strength of steel have enabled the vertical extension of existing buildings. A fine example of this is 77 King Street in Sydney's CBD. The options for the principal to increase the number of floors of the structure were two fold – demolish the building and start from scratch or look at options to reuse and adapt the existing structure. By using a comparatively lightweight composite steel frame solution, the existing foundations, columns and other core elements could be used with minimal strengthening required. Originally a Westpac office, computer centre and retail bank branch, it was reinvented to accommodate new retail outlets including Rebel Sport and Australia's first flagship Apple Store. The existing 19 storey building was refurbished with an additional four level vertical extension of composite structural steel. The main tower floor plates were extended out approximately 800mm using custom-designed steel brackets. This created more leasable area and hid the previously external columns behind the façade line. The project showcases the reuse and adaption of an existing structure to extend the life of a building that otherwise would have been demolished. This building embodies the Reduce, Reuse, Recycle hierarchy by reducing waste sent to landfill, using a steel composite structure that significantly reduced materials required to retrofit the building and reusing core elements of the structure. Other sustainable features include reinventing the existing space, façade development and operational efficiency measures.

"This entry demonstrates the ability of steel to give a new lease of life to an old building which would have otherwise have been demolished at great environmental and financial cost."

– ANDREW MARJORIBANKS





“The accuracy and implementation of the prefabrication process reduced site wastage for the significant roof, wall and structural components to zero.”

JUDGES' AWARD

Bell Residence: Modeled and prefabricated building – Andrew Bell Architect and VDM Consulting Engineers

Submitted by **Richard Drew** (Principal, Van Der Meer Consulting Engineers) and architect **Andrew Bell**

The residence explores prefabrication methods to achieve affordable, efficient and environmentally sustainable construction of a family home. The result is demountable, adaptable or expandable. The project achieved a 6-star environmental rating through orientation by featuring a highly insulated shell that utilises steel portal frames for structural integrity and off-the-shelf technology for water and energy management. The achievements and lessons learnt were shared by the entire design, construction and supply team and can be enhanced and repeated in future projects. A fully integrated design and construction approach was employed with the architect acting as owner/builder working directly with the engineers and prefabricators throughout the design process. Structural engineering was pivotal to achieving efficient use of structure and materials. Dimensional accuracy was adhered to so prefabrication could occur before the site works. VDM Consulting used a three-dimensional model to help visualise the building for not only preempting design decisions, but to also lead onto the creation of connection details and generate shop drawings for fabrication. This helped save time, cost and simplified the interface between the steel, concrete and roof fabricators. The 'componentisation' and mechanical fixing methods allowed the building to be demounted and flat packed to another site or recycled piece by piece with ease. Within the design of the steel structure, there is allowance for adding more floor space above the living room. And if required in the future, the existing house can be modified to extend the building further and convert the interiors into dual units for leasing. The house has been future-proofed by fitting it with additional conduits from the street and under the slab to allow for future technologies. The design works to the structural tolerances of the steel frame and uses cantilevered elements to get the most out of it. The accuracy and implementation of the prefabrication process reduced site wastage for the significant roof, wall and structural components to zero. Rainwater harvesting from all roofs is stored in three underground tanks with a total capacity of 15,000 litres and is used to flush toilets and water gardens.

“An excellent example of bringing together design and material understanding to achieve a sustainable outcome.”

– ANDREW MARJORIBANKS



(L to R) **Andrew Bell** accepts the Judges Award from **Miles Fuller** and **Andrew Marjoribanks** with joint entrant **Richard Drew** from VDM Consulting.



The standard of entries in this inaugural sustainability awards was high and the ASI has commenced a promotional document featuring all the entries.