

## AUSTRALIAN PAVILION - SHANGHAI

### STEEL CLAD STRUCTURES AWARD 2010

#### NATIONAL AND STATE WINNER (NSW + ACT)

Bluescope Steel, Wood/Marsh Architects + Bovis Lend Lease



#### Architectural merit

The Australian pavilion has been designed to read in its surrounds as a bold sculptural form, both modern and organic. Set in a stark abstract landscape of the World Expo Site, the sensuous ribbon of the facade generates an undulating form which is designed to have no obvious front, rear or sides.

The singular materiality of the cladding reinforces the form, with the earthly tones of the weathering steel referencing the ubiquitous Australian landscape while the highly sculptural skin expresses the modernity and quality design of our cities.

The patina on the Azure weathering steel façade will change over the course of the expo so the building is not a static object; its colours will change over time, depending on the prevailing weather, and throughout the course of the day.

#### Innovation in the use of steel

The Azure paneling system has been designed for simple and precise installation. Our interlocking square or rectangular panels are screwed to the light weight supporting structure that is the basis of all Facade Solutions systems. Each panel is configured of sheet metal bent at all four sides to create cassette style panels. Edges may be bent inwards or outwards, depending on the panel type and fixing methodology.

All panels are manufactured with pre-punched fixing and drainage holes in the bottom flange for adequate secondary water drainage. The design of the AZURE™ panel system ensures it may be used as pressure equalized panels.

The innovation of the Azure weathering system stems from the technology used to fabricate the panels. The robotic

processing is at the leading edge of precision for this market, producing panels to an accuracy of 0.30mm. This accuracy allows the integration of key characteristics into the Azure system including:

- Concealed fixing without the need for external silicon to vertical and horizontal joints
- Ventilated out layer (pressure equalized system) whilst maintaining exceptionally clean module lines
- Free draining cavity ensuring water is managed and cavity is ventilated
- Variable lap allowing for both hairline and expressed joints

The Azure system is fabricated from 2.0mm HW350 material (weathering steel), comparably lighter than traditional heavy welded systems typical to the market. The result of the lighter material and accurate processing is a visually stunning appearance with clean sharp lines and no visual welds.

#### Efficient use of steel products

Rationalised design allowed the total envelope to be clad in six panel types only. This minimised fabrication costs via excellent part repetition, transport and packaging cost via the ability to consolidate packaging methods, and drafting time via reduced shop drawings.

The capability of robotic processing was also considered heavily during the design stage, to ensure parts could be processed using this technology, hence benefiting from reduced costs and increased production speed.

These benefits flowed through to simplified material handling and part identification on site, as well as outstanding installation speed.



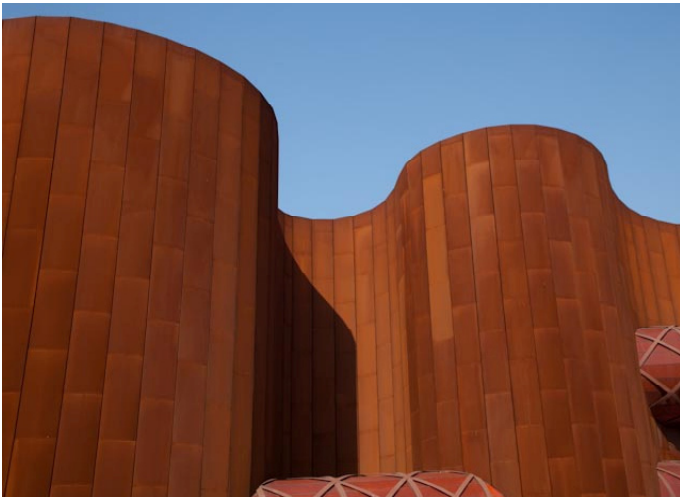
#### Environmental performance

Steel is a material with minimal embodied energy compared to equivalent panelling products, having four times less embodied energy than competing products on the market such as aluminium composite panels.

## Practicality of manufacturing, transportation and erection

The Azure system is flexible in the design of shape, but also efficiently fabricated using automated processes not typical with this industry. The modular engagement of panels assists with accurate installation and clean handling. Site welding is eliminated, increasing the speed and quality of installation. The panels are reportedly safer to install and require simplified safety provisions due to the lack of welding.

A total of six unique panel types for the bulk of the facade envelope was the result of a detailed and thorough design process. All parts were fabricated in Australia and exported to Shanghai, in a pre-planned sequence matching the installation program. The curved nature of the parapet was achieved by fabricating 276 pre-designed parapets panels each unique in geometry.



## Durability

The panels work using a pressure equalising system. This is using a double skin system, where the external skin acts as a rain screen which allows for the equilibrium of pressure between inside and outside and air gap protection to the inner face of the building.

The facade system is also maintenance free – as it is an oxidised natural material, there is no requirement to repaint and no use of exposed sealant.

## Sustainability

Panels can be removed and re-installed without damage. The open joint system of the panels means that no silicon is used with the cladding system and no maintenance required.

Azure panels have 17 – 20 % recycled content and are 100 % recyclable.

The panels are easy to unpack and utilise recyclable packaging, which was kept so that they can be shipped back to Australia to reuse.

## Summary

The curvilinear form of the Australian Pavilion utilises pre-fabrication technology throughout the design, fabrication and construction of the project, to create a building which is efficient both in construction and cost. The use of the Azure facade system is evocative of the Australian landscape whilst simultaneously providing a visually striking, low maintenance design solution.



## Project team

<b>Client:</b>	Department of Foreign Affairs and Trade (DFAT)
<b>Architect:</b>	Wood Marsh Architecture
<b>Structural Engineer:</b>	Aurecon Australia
<b>Head Building Contractor:</b>	Bovis Lend Lease
<b>ASI Manufacturer:</b>	BlueScope Steel
<b>ASI Distributor:</b>	SMS Processing
<b>Steel Fabricator:</b>	BlueScope Façade Solutions
<b>Steel Detailer:</b>	KDK Designs