



Airport expansion on course

Brisbane Airport International Terminal Expansion

A steel-intensive approach has been embraced for the \$73 million northern expansion of Brisbane Airport International Terminal to add an extra 13,500sqm of space, six more boarding zones, two new walk-out gates and four new aerobridges.

A total of 900 tonnes of structural steelwork has been deployed for the extension to the existing Concourse and 250 tonnes for the two new Fixed Links between the Concourse and Gates 73 and 74.

The expansion has been undertaken to meet increased airline demand and further position the high traffic airport as the future major gateway into Australia, delivering capacity for airlines to increase scheduled services, more airplane boarding capacity, facilitate faster boarding times and streamline aircraft arrivals and departures.

When complete, the expansion will provide many benefits including the redevelopment and upgrade of existing baggage handling systems, increased processing capability at Level 2 bag drop area and a new Transfer Check-in area on Level 2 Arrivals.

Steel Fabrications Australia was contracted by Laing O'Rourke to provide shop drawings, fabricate, surface protect and install the 1150 tonnes of structural steelwork for the northern expansion.

Structural Technical Director at Aurecon in Brisbane, **Aaron Toscan** said the busy and constrained airport environment meant that storage of materials onsite was not desirable.

"Steel construction is well suited to cater for these factors, given that materials were transported and erected without the need for storage," he said.

Expanded concourse

The new Concourse building is three floors high and constructed using a conventional column and beam configuration.

Toscan said that the base build design of the Concourse expansion was largely dictated by structural demands.

"From the column grid set-out and response to maintaining the parallel beam dual layered structural steel floor beam layout, a steel intensive approach was a logical solution for this development with pressures on program, flexibility, constructability in an airport environment as well as an emphasis on safety," he said.

He said that a lightweight building solution such as the adopted steel frame design lent itself to reducing self-weight, which helped minimise the foundation structure as the ground conditions at Brisbane Airport are typically weak at high level, the International Terminal building supported on piles.

"The lighter weight building solution also contributed to minimising the effect of differential settlement, which is prevalent at the airport."

The fact that the existing structure is predominantly steel framed also helped.

"As with any good design, planning is important for owners and operators. Provision for further expansion was built into the design of the end bays in Aurecon's design of the previous Northern Terminal expansion," Toscan said.

"This enabled the new similar framed structure, with similar column grid to seamlessly work with the existing one."

Steel Fabrications Australia General Manager, **Shane Farrell** said the design of the floor beam connections by the consultant engineers, Aurecon produced an efficient design whereby the secondary floor beams were installed over the top of the primary beams with a simple two-bolt connection used to connect the secondary beam to the primary beam top flange only.

"This minimised the labour-intensive shop welding of cleats if the more conventional connection between secondary and primary beams using bolts and cleats in the same plane was used and had a flow-on effect providing quicker site installation."

A Stramit Condek HP® flooring system was then laid over the secondary beams as formwork for the concrete floor slab.

"Joining the new structure to the existing Concourse structure proved to be a challenge to keep the connection water tight, maintain accuracy between the new and existing steelwork which had to bolt together and in working closely with airport security and Australian Federal Police to keep the area secure," Farrell said.

"The riggers, Wright Way Contracting embraced this challenge and ensured the connection was water tight during construction, floor beams fitted and there was no security breach."

Long-spanning fixed links

Toscan said that for the long-spanning fixed links, large steel trusses were utilised that enabled fabrication in the shop, fewer elements to be installed, limited working at heights and reduced welding onsite. They essentially each comprise a 60-metre long by eight-metres high by nine-metres wide fully-welded truss weighing 125 tonnes.

The connection of the articulated long-spanning fixed structures to the Terminal was tested in the shop prior to installation. The fit of the large steel pin was tested in the shop to make sure a confident fit could be attained onsite.

"These dimensions made it impossible to fabricate, transport and paint in one piece so we split the trusses into 16 transportable sub-assemblies with most 20 metres long and weighing about eight tonnes," Farrell said.

"The trusses were fully welded in the workshop, transported to the paint shop for surface protection and then transported to site.

"These deliveries to site had to be done after midnight as they had to access the site from Brisbane Airport's runway side and therefore had to be undertaken during the quieter hours of operation.

"The sub-assemblies were then bolted and site-welded together to form a 20-metre section of the final truss which was then lifted into position using a 450-tonne crane and landing on temporary support work at the free end.

"This was followed by the installation of the second and third 20-metre length of truss using the same crane. Final site welding of the joints and paint touch up were then undertaken."

Commencing in late 2016, the project is on course to be completed this February.



PROJECT TEAM

Client: Brisbane Airport Corporation

Managing Contractor: Laing O'Rourke

Structural Engineering: Aurecon Australia

ASI Steel Fabricator: Steel Fabrications Australia

Steel Detailers: BIMTek (Fixed Links), Online Drafting Services (Concourse)

Steel Product Suppliers: BlueScope Lysaght (purlins), Stramit Building Products (decking formwork)

Surface Protection: Industrial Painting Solutions, Tranzblast

Rigging: Wright Way Contracting

ASI Steel Distributors: Liberty OneSteel Metalcentre, Orrcon Steel, Vulcan Plate

ASI Steel Manufacturers: BlueScope, Liberty OneSteel, Orrcon Steel

