Award

GATWICK PIER 6 AIR BRIDGE

North Terminal, Gatwick Airport

Architect Wilkinson Eyre Architects **Structural Engineer** Arup **Steelwork Contractor** Watson Steel Structures Ltd **Construction Manager** Mace Ltd **Client** BAA Gatwick Ltd

This unique air bridge is a key component of Pier 6 at London's Gatwick Airport. The bridge is fully enclosed and provides a permanent link for pedestrians between the North Terminal and the new satellite building. It is the first bridge outside the United States to span an airport taxiway, and caters for much larger aircraft than its predecessor in Denver, Colorado; its scale and construction making it unique in engineering terms.

The bridge forms a major landmark for Gatwick, and provides passengers with a dramatic opportunity for viewing aircraft at close proximity as they pass beneath, thereby enhancing their experience of the airport. These key features, in conjunction with minimal impact on airport operations during its construction, realised the client's design brief.

Architecture and Structural Engineering

The architecture of the bridge has been part of the engineering and vice versa, the form and shape being dictated by the engineering needs of both assembly and completed state. The gentle vertical curve of the structure has been transposed to the cladding and to the interior.

The design of the bridge is elegant yet pragmatic, the main curve of its deck satisfying both airport operational requirements and relating to its structural behaviour. The elegant curved design is integral to the client's vision both for the unique experience of passengers using it and as a major landmark for the airport. The continuously varying and curved form makes a dynamic and interesting space, with visible lines as elegantly smooth curves, thus giving passengers the feeling that the bridge moves along with them. One of the most striking aspects of this interior is the view out. An expansive vista of the airfield is opened up to passengers, who are able to observe the activity of the airport from a completely new perspective.

Great efforts were made to integrate services within the bridge fabric in an unobtrusive yet accessible manner, with air supplied through a high-level spine plenum incorporating the support structure for the central glazed screen, which separates departing and arriving passengers.

The main superstructure and services are contained entirely within the building envelope to minimise long term maintenance. The controlled environment of the bridge interior limits the extent of corrosion protection required to the support piers only. The bridge elements and materials were carefully selected for quality and type, based upon airport requirements for standardisation and maintenance, aircraft safety and the desire to give passengers an exciting distinctive environment.

Aligned along the route of a major airfield road, the bridge has a main span of 128m, which allows for a future widening of the taxiway. The bridge has a minimum vertical clearance across the taxiway of 22m, accommodating the required clearance of the Boeing 747-400 tailfin.

In creating the passenger tube, the concept of the human spine and ribs was adopted. The central spine beam, with a varying depth from 6.0m to 9.3m on a subtle curve, supports the floor and roof rib beams, and the tube is completed by struts between the roof and floor ribs supporting the full-height glazed façade. The façade is inclined inwards by 11 degrees from the constant width roof towards the floor, creating a curved floor deck which narrows at mid-span.

The superstructure is supported on two Y-shaped piers, which are symmetrical to the centre of the taxiway and the bridge. The way the bridge works is simple and effective. The deck is simply supported during assembly, and the completed bridge is a continuous frame fixed on piled foundations.

Fabrication and Construction

Airports are extremely busy environments and it was essential that there was minimal disruption to airport operations during the bridge construction. The entire bridge was therefore prefabricated in a yard on the airport boundary, specially equipped with all necessary infrastructure and located 1.5km away from the bridge final location.

The 198m long structure was built in five component parts; the 164m long, 2000 tonne, central deck section; the two support piers; and the two 17m long end deck sections that would connect the bridge with the cores. The challenge was to ensure that these five components would fit perfectly together when brought into their final position, so that the taxiway would become a construction site for only 10 days.

Upon completion of assembly, the central deck section was fitted out with the secondary steel elements, glazing and services equipment before being made ready for the final move. Self-propelled modular transporters were used to manoeuvre each of the components and to place them exactly above the permanent foundations.

Conclusion

On 27 May 2004, exactly 10 days after it closed for the bridge erection, Gatwick's taxiway Lima successfully reopened, and airline staff and passengers alike witnessed the unique spectacle of aircraft taxiing beneath the new structure, a tribute to the accuracy, ingenuity and skill of the design and delivery team. Much of the bridge success lies in the integration of architecture and engineering and the innovative methods of procurement, assembly and erection employed by the design and construction teams.

Judges' Comment

A landmark structure in one of the world's busiest airports, providing a link for passengers between the North Terminal and the new satellite building.

The bridge, with a span of 198m and incorporating over 2,700 tonnes of steel, posed a major challenge, particularly in fabrication and erection. The main girders were originally started in the North of England, and later moved to the final assembly site 1.5kms away within the airport perimeter. The movement of the complete bridge structure, across taxiways to its final position, was a notable achievement.

The flowing, curved shape of the bridge provides a unique experience for passengers as they pass high above moving aircraft.

Image courtesy of ARUP

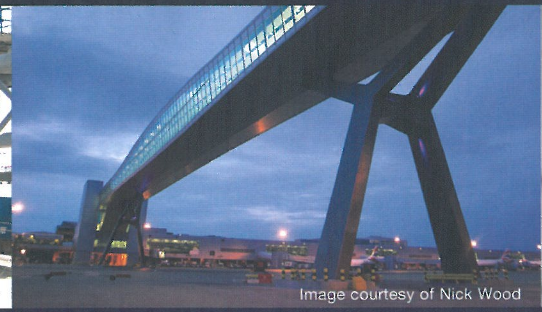
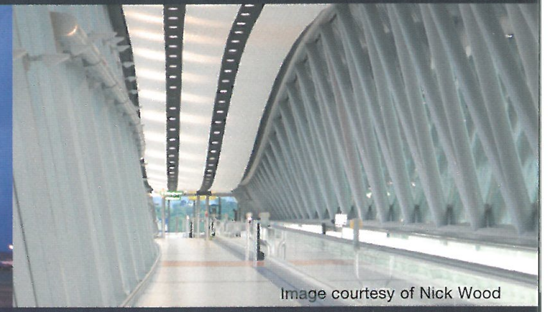


Image courtesy of Nick Wood



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