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## Aircraft Maintenance Hangar, Cardiff, Wales

Hangar pour l'entretien des avions, Cardiff, Wales  
Hangar für die Flugzeugunterhaltung, Cardiff, Wales

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### 1. INTRODUCTION

A new British Airways 3-bay hangar is sited at Cardiff Wales International Airport (Fig 1.) and provides an outstanding facility for the heavy maintenance of Boeing 747 aircraft. The £75M project encompasses a double and single bay 22,000m<sup>2</sup> hangar with a 6,000m<sup>2</sup> mezzanine floor, a 15,000m<sup>2</sup> support building, an aircraft ground run pen and a 35,000m<sup>2</sup> concrete apron. The hangar (Fig 2.) is equipped in each bay with full aircraft access docking, overhead craneage, aircraft undercarriage lifting platforms and specialist ground support services fundamental to the effectiveness of the maintenance operations.

The profile of the building steps down to suit the function within each part of the facility. The height of the hangar was reduced by utilising external tubular triangular shaped trusses (Fig 3). This structural form minimised the enclosed volume and heating costs. The approach also reduced the impact of the hangar on the surrounding area by softening the roof profile and providing an industrial facility of some distinction.

### 2. HANGAR FRAME CONCEPT

From the commencement of the project the supply and erection of the hangar steelwork was identified as a critical element of the works. Consequently, the frame concept was developed to allow elemental fabrication and erection of the main steelwork members. Full space structures would have provided a lighter structural solution but minimum weight in this instance did not achieve minimum cost or programme.

### 3. STRUCTURAL DETAILS

In the hangar the main members are two continuous tubular steel space truss girders. One located over the hangar doors is 9m deep x 5m wide, and the spine girder located at the step between the high and low level roof areas is 14.5m deep and 8m wide. These girders



Fig. 1 - Aerial View Feb 1993



weigh 600 tonnes and 1000 tonnes respectively and are 232.5m long with spans of 153.75m and 78.75m. The total weight of structural steelwork in the hangar is 4000 tonnes and on the project as a whole is approximately 6000 tonnes.

The infill low level roof structure is formed with steel hollow section trusses two way spanning and supported by externally exposed triangular girders. The high level roof is formed with single span trusses. A detailed review of the structural systems is given in a paper by S. Luke [1].

#### 4. CONSTRUCTION

The lifting procedure chosen by the steelwork fabricator for the main girders provided a notable event since both were lifted into position supported at two points approximately 200m apart using hydraulically operated lifting towers (Fig 4.). It is believed the structural roof members are the longest to be lifted by this method in Europe.

Construction commenced in May 1991 and was complete in April 1993. Following the Client fit out the first aircraft arrived for a maintenance check on the 1 June 1993, 38 months after commencement of the design, as planned at the beginning of the project.

#### 5. CONCLUSION

The Cardiff base is a 'state of the art facility' and is designed to make sure that the highly skilled workforce achieves maximum efficiency. When an aircraft enters the hangar, the power-operated docking platforms (Fig 5.) close around it, so that the engineers can reach every part. As a result, overhaul work can begin within 20 minutes and this has been made possible by careful integration of design with maintenance operations.

#### Reference

1. LUKE S.J. British Airways Maintenance Hangar, Cardiff Wales Airport Proc. Instn Civ Engrs Structs and Bldgs 1993, 99, Nov, 439 - 453

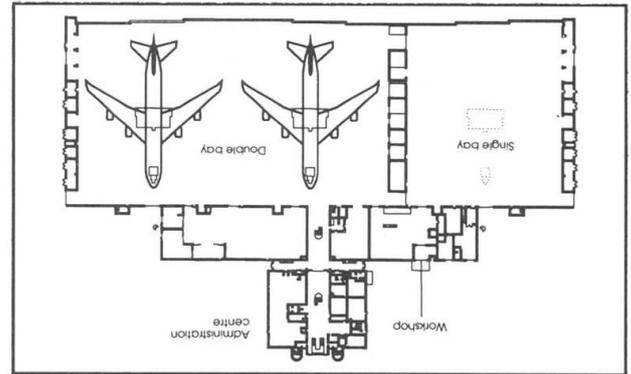


Fig. 2 - Plan

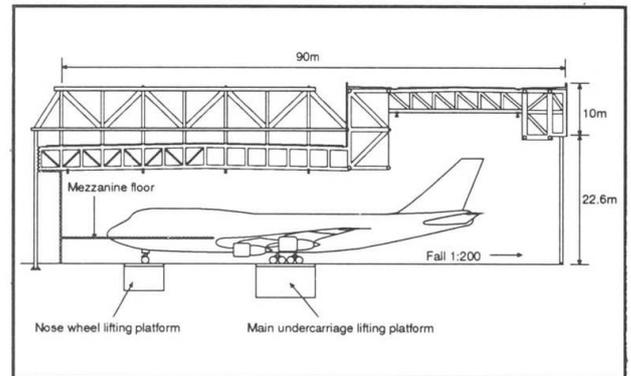


Fig. 3 - Hangar Section

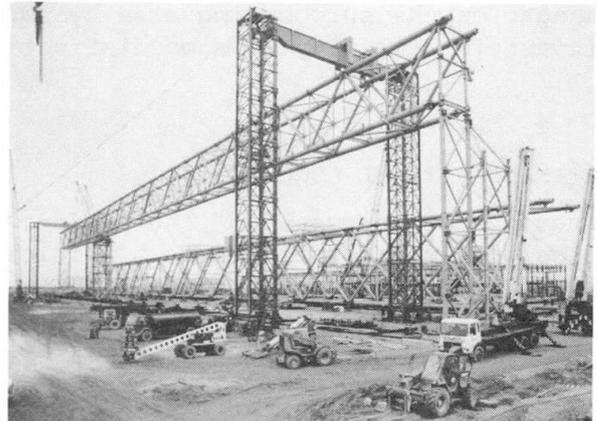


Fig. 4 - Door Girder Lift Jan 93

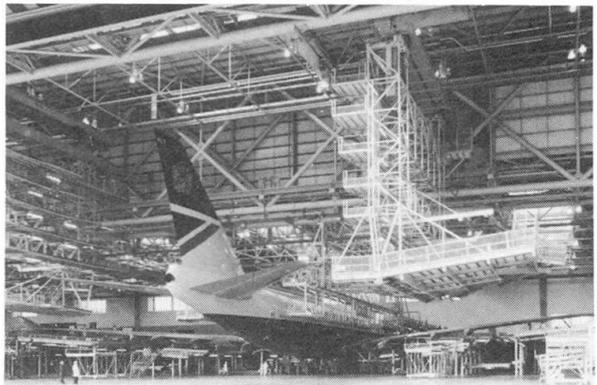


Fig. 5 - Access Docking