

Mock-ups used to Verify a Complex Structure

The Problem / Challenge

At Heathrow Terminal 5 (T5), the complexity of the roof abutments was seen as a source of risk to the project. The unusual design created a challenge to ensure that the roof design could be realised safely and on programme.

The Risks

There was concern that a complicated and unfamiliar construction sequence could lead to reactive problem solving on site. This in turn could lead to work at height being inadequately controlled. There was a commercial risk if there was delay to the project caused by the ineffectiveness of the proposed construction sequence.

The Solution

For T5, small scale models were constructed and considered in the design office. The scale of the abutment was part of the risk, so a full scale mock up was built off site. This provided the project team with the opportunity to explore the challenges of erecting the abutment and curtain wall in a controlled environment.



Full size mock-up of steelwork and curtain wall

The Benefits

- There was greater confidence in buildability and the proposed construction sequence. Over one hundred improvements to the erection methodology and safety were identified, including:
 - Improved means of gaining vertical access (a bespoke gantry system was commissioned for installing the cladding system externally which had the additional challenge of a negative incline)
 - Unsafe working platforms, which had not been identified during the pre-planning exercise, were corrected.
 - The method statements were amended to accurately reflect the on-site conditions.

In addition to the safety benefits, the client also profited

- Through the improved speed of erection – approximately 100 site days were saved.
- There was reduced risk to the programme in terms of any consequential over-run of associated critical path elements.
- There was a considerable overall cost benefit. Whilst the mock-up cost £1m it is estimated that it saved in the region of £4m, had the issues that needed to be resolved been repeated across all the abutments.

Key Points

- Even carefully considered designs and proposed construction sequences can benefit from models (or if the risks are big enough, a full scale mock-up).
- There can be a strong commercial as well as health and safety argument to support mock-ups.
- At T5 the mock-up enabled the steel fixers to gain valuable experience, providing feedback and suggesting improvements.