

# 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.