

Project:
Midfield Development Design Consultancy
Services

Location:
Hong Kong International Airport

Type:
Infrastructure

Scheduled Time of Completion:
Q3, 2015

“Using BIM was about the only way we could have done this job.”

David Mepham,
Divisional Director,
Hong Kong, Mott MacDonald

Flying Through an Airport Building



Image courtesy of Mott MacDonald and Arup

A joint venture between Mott MacDonald and Arup is providing full design consultancy and construction support services for a Midfield Concourse to be built at Hong Kong International Airport. With an area of 100,000 square metres, this will provide an additional 20 aircraft parking stands, together with passenger facilities including an extension of an automatic people move system, and a baggage handling area. This is the first Hong Kong Airport Authority project to deploy BIM.

BIM Partners Involved:

- Airport Authority Hong Kong
- Aedas Limited
- OTC Limited
- Atkins China Limited
- Bo Steiber Lighting Design

Deciding to use BIM “full-on”

“During our bid for the project, we thought long and hard about using BIM,” says the project manager Mr David Mepham, Divisional Director – Hong Kong, Mott MacDonald. “It was not specifically called for in the terms of reference, though the Airport Authority had asked for a computerised 3D model for clash resolution. We made a conscious decision to use BIM full-on.”

This was the first time BIM would be deployed on a Hong Kong Airport Authority project, and Mr Mepham explains that it would prove beneficial as in the project cycle, it saves money, through helping with more quickly understanding designs. “You can iron out issues before you get to site,” he adds. “During the construction phase is the wrong time for this. With BIM, you work on problems when you are most able to solve them.”



Image courtesy of Mott MacDonald and Arup

The project team used a variety of 3D design software, including Revit when it was the best tool for the job, such as for reinforced concrete, and mechanical, engineering and plumbing. Autodesk Navisworks was then used as a common platform for showing and assessing information in 3D, pulling together all the pieces from the designers.



Image courtesy of Mott MacDonald and Arup

Limiting detail ensures workable model

Once they had agreed to use BIM, Mr Mephram says, “We sat down as a team, and made a big decision: to limit the amount of detail in the model.” Team members from both Mott MacDonald and Arup could make this decision based on past experience with using BIM.

“There is still a focus on 2D contract documentation, but people are seeing how adding 3D data makes things easier,” says Ir Ian Taylor, Director of Infrastructure, Arup. “There are some things, such as baggage systems, we now design from the beginning in 3D as they involve three-dimensional problems concerning moving through buildings.”

In addition to a baggage system, the Midfield Concourse design includes a curvaceous roof

with complex 3D geometry. The architectural roof model was the basis for the roof steelwork model, and Navisworks helped with advancing the design, as well as identifying clashes. “We used the BIM model and analysis tool hand in hand,” says Ir Taylor.

Resolve densely packed services

“We solve the design in BIM, which proved quite powerful,” says Mr Mephram.

The designers faced many constraints, with the very tight site. For instance, floors could not be too high, as passengers must be able to access aircraft. Although floor to floor heights were very constrained, plans called for spaciousness. Plus, the overall site would be as tight and compact as possible.

“There are a lot of services, such as fail safe systems and communication systems, that are



Image courtesy of Mott MacDonald and Arup



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not in regular buildings,” says Mr Mephram. “So we were trying to cram in a massive amount of services. Using BIM was about the only way we could have done this job. In 2D, we could never have understood the issues.”

“In virtual reality, nothing is physically fixed,” adds Mr Mephram. “This is a much more pragmatic and sensible way of resolving the design.”

During weekly review sessions, team members viewed a combined 3D model on screen – quite

unlike the traditional practice in which big drawings are spread across a large table.

Flying through the virtual concourse

In addition, design team members could look for potential problems by examining the BIM model on screen. “It’s as if you can fly through the building, using a mouse,” says Mr Mephram. This helped find, for instance, some issues with sprinklers that were poorly positioned.

A BIM simulation likewise assisted end users with identifying potential operational constraints, and establishing access requirements.

The BIM model includes attributes of information on a range of passenger aircraft. These help with checking sight lines for an air traffic controller, such as to see whether planes taxiing by the new concourse can be seen: in some cases, the model showed that part only of the aircraft, such as its tail will be visible.

For each aircraft parking stand, there will be a moving bridge for passengers to access the



Image courtesy of Mott MacDonald and Arup

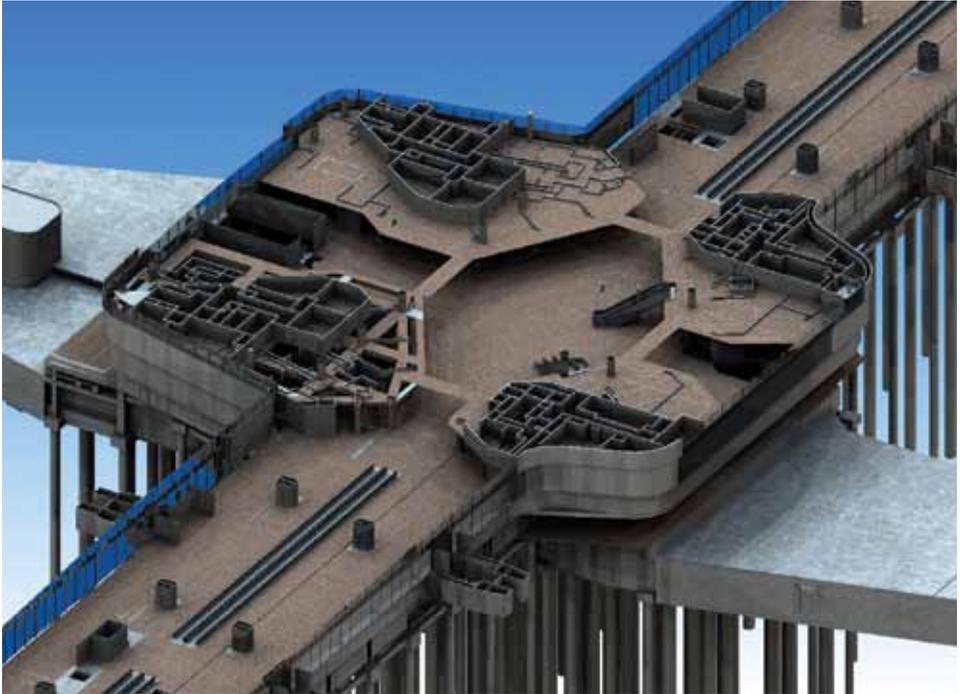


Image courtesy of Mott MacDonald and Arup

plane. “The bridge has a restricted reach, and getting it to meet with the fixed part of the building and taking account of the geometry of the various types of aircraft is quite complex – it needs to tilt and turn to meet the aircraft,” says Mr Mephram. “In the 3D BIM model, we can set up the bridge with the various parameters and test this dynamically.”

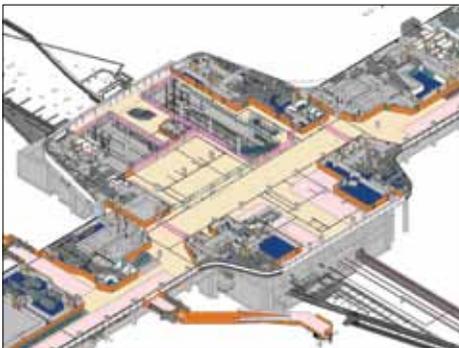


Image courtesy of Mott MacDonald and Arup

Saving time and resources

“Using BIM encourages contractors to engage with a project, so it is more likely to be successful,” says Ir Taylor. With it, the team can transfer their design intent and knowledge to the contractor. In turn, the contractor has invested in developing the model further.

“I think that at the time you are creating the design, using BIM is a bit of a hassle,” reflects Ir Taylor. “But given the benefit of getting the design right first time, you are glad to be using BIM. I look back at some projects, and think that if we had used BIM in the design, it would have saved us a lot of time and resources later on.”



About Mott MacDonald

The Mott MacDonald Group is a diverse management, engineering and development consultancy delivering solutions for public and private clients world-wide.

Mott MacDonald's uniquely diverse £1 billion global consultancy works across 12 core business areas. As of the world's largest employee-owned companies with over 14,000 staff, they have principal offices in nearly 50 countries and projects in 140.

Their breadth of skills, services and global reach across all markets makes them uniquely places to bring their customers:

- Holistic, innovative thinking
- Global experience with local insight
- World-expert practitioners
- Multi-sector perspective

About ARUP

Founded in 1946 with an initial focus on structural engineering, Arup first came to the world's attention with the structural design of the Sydney Opera House, followed by its work on the Centre Pompidou in Paris. Arup has since grown into a truly multidisciplinary organisation. Most recently, its work for the 2008 Olympics in Beijing has reaffirmed its reputation for delivering innovative and sustainable designs that reinvent the built environment.

Arup brings together broad-minded individuals from a wide range of disciplines and encourages them to look beyond the constraints of their own specialisms.

This unconventional approach to design springs in part from Arup's ownership structure. The firm is owned in trust on behalf of its staff. The result is an independence of spirit that is reflected in the firm's work, and in its dedicated pursuit of technical excellence.