Flying into the Future

A growing number of industries are turning to digital twins to help improve efficiency by pairing the virtual and physical elements of their operations. Now Hong Kong International Airport is embracing this technology. — By Dr Thomas Tang

A digital twin refers to a digital replica of physical assets and can be used throughout the lifecycle of a place or space – enabling people to build with data and then view data as a physical object. Global research and advisory organisation Gartner Consulting predicts that by 2021, half of large industrial companies will use digital twins and by doing so they can save up to 10% in operational running costs (Gartner, 2019). Additionally they can predict and avoid issues relating to safety risks, specify maintenance procedures such as for a component that is about to burn out, control quality during fit out phases, carry out tests by visualising performance under simulated conditions, identify design defects, remotely operate industrial robots and provide customer offerings like visual walkthroughs as part of the user experience.

Digital twins are being used in industries like oil and gas rigs, power stations, railway stations, nuclear plants and other facilities with complex operations. Airports in particular have embraced the idea of digital twinning as they face immense challenges in coordinating airplane movement, passenger flow, baggage, retail shops and restaurants, immigration, customs and security – plus they have incredibly high running costs. Other major airports which have commissioned digital twins include London Heathrow, Amsterdam's Schipol and Londrina airport in Brazil.

Hong Kong International Airport is in good company then, in embarking on its digital journey. Not only is it a busy airport, but it has unique geographical challenges as it was built on reclaimed land at Chek Lap Kok and is key to our regional economy.

The overall digital strategy for the airport is ambitious: to digitise the airport facility using Building Information Modelling or (BIM) to create a digital twin of the entire 1,255-hectare facility.

To create the BIM model for Hong Kong's airport, Atlas used laser scan technology, which is as accurate as it sounds. Typically, it can collect survey data points at a rate of 50,000 points per second over a range of up to 300m. Using this digital data, the Airport Authority can support its asset and facilities management programs and help it to visualise its future development and expansion.

- Modelling of the Terminal 1 Annex building, a 30,000m^2 extension to the existing terminal which includes the construction of a 7-storey reinforced structure with steel truss roof and associated new check-in counters and baggage reclaim carousels.

- Modelling of the Sky Bridge, a 28m-high and 200m-long footbridge to help reduce travelling time for passengers and the need for shuttle buses, while providing space for the accommodation of the largest A380 flights.

- Visualisation to demonstrate the impact of the East Hall Food Court renovation on passenger

experience and to check wayfinding to ensure smooth flow of passengers throughout the refurbishment area.

- Visualising commercial opportunities for advertising space for a three storey, 80m long hoarding part of the undertaking extension works to Terminal 1 as well as keeping the look and feel of the Terminal building.

Creating a digital twin is an essential investment for many large engineering operations, enabling designers, operators and users to save time and money in the future. By utilising this technology, Airport Authority Hong Kong is showing how seriously it takes its planning and that it understands the importance of the airport to our economy. B

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Atlas Industries is a leading digital design delivery solution provider to major architects, engineers, contractors and asset owners around the world. We provide high quality and cost-effective documentation and project delivery services with specialist expertise in Building Information Modelling (BIM). Our work adds measurable value.

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