

Charlotte Airport's space programme

Charlotte Douglas International Airport continues its ambitious growth plans, but its long-term strategy has had to adapt to restrictions in both space and cost. Using an innovative solution from **Transoft Solutions**, architecture and engineering consultant RS&H has devised a strategy to get more from less.

Leaving aside the impact of Covid-19, which has pushed down passenger numbers for airlines across the world, any forward-looking model has to anticipate continued growth in the burden on airports. Charlotte Douglas International Airport (CLT) in North Carolina is no exception.

In 2019 the airport saw a record 50.2 million people pass through its gates, and in late 2020, despite the impact of the pandemic on international travel, passenger numbers were on the rise again. There is, therefore, strong momentum behind its ten-year infrastructure development plan, which is part of a long-term vision of growth over the next 25 years.

As part of the airport's ongoing planning strategy, architecture and engineering consultancy RS&H has been providing planning services for

its terminal expansion programme, with the next block of new gates for Concourse A set to open in 2024.

The challenge facing RS&H was to maximise the number of gates within the constraints of the airfield, while making sure that aircraft could operate safely without disrupting the flow of traffic and causing delays. This was no small task.

"We were already involved in the interior design, and my role was gating analysis," says Peter Maiman, aviation consultant at RS&H. "As we did the design, we looked at how many aircraft we could fit around the Phase II concourse pier.

"There is limited land available for development north on Concourse A Phase I, so every extra foot that Phase II takes up impacts future aeronautical opportunities," says Amber Leathers,

planning and environmental manager at CLT.

The best laid plans

CLT is one of American Airlines' largest hubs, servicing the south-eastern US and acting as a secondary hub to the Caribbean. However, it's expected that the new gates on Concourse A will be used by other carriers – Southwest, United Airlines, JetBlue, Frontier and Air Canada – with American filling gates left behind as they migrate to the new concourse.

Planning the new gates, therefore, required a comprehensive analysis of traffic from different airlines and detailed mapping of anticipated movements in the newly developed part of the airport. "As the airport sponsor we are responsible for balancing the priorities of our airline stakeholders, therefore the refined planning effort needed to establish an operation that would be beneficial to those carriers," Leathers says. There was a careful balance to be struck between the needs of different airlines, the need to save space and the need to ensure operational efficiency.

"United currently operates from the Concourse A Phase I pier, and the Phase II pier will be used by Delta and other airlines," explains Maiman. "We needed to decide whether there should be a dual taxi lane between the two piers, or just a single lane."

"We used AviPLAN to build a short animation to compare Delta and United movements, and to simulate what a single taxi lane would look like," he continues. "What we found was that aircraft had to be at the right gate at exactly the right time – which is a best-case scenario – for



AviPLAN takes into account the different turning characteristics of large and small aircraft, as well as other regulations and parameters.

it to work. Any small change to that schedule would cause problems.”

Ultimately, CLT’s staff and the planning team deduced that a dual-lane taxiway between the two piers, though taking up more space and costing more, represented the optimal solution. The key to that decision was AviPLAN, a software suite from Transoft Solutions that is tailored to the needs of airside planning, design and operations professionals.

Transoft develops innovative software for engineers, architects and drafters for their civil and infrastructure design and planning needs. Its solutions are the de facto standard for airports, operators, consultants, and state and national agencies around the world.

At its core, AviPLAN has a comprehensive and highly accurate library of specifications for aircraft, ground support vehicles and passenger boarding bridges. The precision it offers enables planning to be done in minute detail or, as in the case of Concourse A, in a quick but extremely accurate thumbnail sketch that tests a particular set of design assumptions.

“AviPLAN dates back almost 30 years as a product, with its predecessor first launched in 1991,” says Michael Frost, senior product manager at Transoft Solutions. “It has a superset of functionality and the graphics it produces are not conceptual, they are based on real-world parameters, so designers can understand how complex machinery works in the real world.”

“You have to remember that large aircraft have different turning characteristics to small aircraft,” he adds. “We build in all of the regulations – clearances, slopes and everything else – and add a library of content that is based on the physics of movement.” Its precision and versatility are the main reasons that the solution is the first choice for RS&H when tackling complex planning problems in the aviation sector.

“AviPLAN is the only software we have ever used for this type of gate layout issue,” says Maiman. “We could use our own tools for visual animation and virtual reality simulations, but that takes a lot of time. AviPLAN has the simulation tool built in.

“We were already using it for all of our gate analysis, where there were certain parameters such as the slopes for boarding that were close to the margin



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for compliance,” he notes. “AviPLAN is the best solution on the market.”

Pinpoint precision

RS&H used AviPLAN extensively to build out aircraft gates using the least amount of apron as possible. The process began with an examination of the forecast schedule and, looking at the peak hour, it emerged that there was potential for overlapping operations by the same

to grow more, but our model showed that a dual-lane taxiway, though it does mean a hit to the airport’s revenue opportunity, would avoid conflict between airlines.”

“It is a very specific suite of software that gives our clients the confidence to perform design tasks,” he adds. “It is a CAD-based, super-precise simulation tool that understands the movement of aircraft. In this case, we know that our happy customer, RS&H, has a happy customer.”

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airline, and between different airlines. With AviPLAN, Maiman and his team simulated the schedule and initially developed a best-case scenario that could use a single taxi lane. There was, however, no margin for error or flexibility of gate use. Consequently, conflict between arrivals and departures would be likely, hence the decision to create a dual taxi lane between concourses.

“The animation AviPLAN created showed the conflict between pushback and flight schedules,” remarks Frost. “To do this, we didn’t need the full simulation, we just needed a quick, light-touch approach. We knew that space was very constrained so the airport cannot push the property out

The planning of an airport cannot be done using generalities, assumptions or guesswork. It requires precision and that is what AviPLAN brings to the table. With so many parties involved – not only multiple airlines and the airport itself, but also ground services, passengers and more – the optimal solution will inevitably involve a degree of compromise. That compromise is best achieved when detailed and specific scenarios can be compared. “In this case, a dual-lane taxiway came at an extra cost and with the use of more space,” Maiman explains. “With AviPLAN, we were able to prove that it would be worth it.” ●

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