Rising pax numbers point to rising sim demand

Asia's aviation sector is rapidly expanding post-pandemic, driving demand for advanced pilot and air traffic control (ATC) training, as **Tom King** reports.

TO MEET THE RISING PASSENGER NUMBERS, airlines and training centres are investing in cutting-edge simulators and technology like AI and VR to enhance training efficiency and meet growing needs, a trend that could position Asia-Pacific as a leader in global aviation innovation.

Flying throughout Asia can be a great experience, it can also be challenging, stressful, and don't forget those pockets of turbulence.

Living in Asia for well over 30 years I have had my share of all of

▲ *A student and instructor operating an Airways International air traffic control simulator.*

the above, and more. My own favourite flight memory was landing at Hong Kong's legendary Kai Tak as the sun was going down and the city's lights were beginning to glow. I was in the jump seat on the flight-deck behind the first officer on a Cathay Pacific 747-400.

Shortly after landing the Captain told me it was his younger col-

leagues' first landing at Kai Tak. It was precise, flawless, almost surgical, and after that experience witnessing flight professionals at work in one of the most stressful environments, I never worried about flying again.

I expect the rookie First Officer had spent many hours training for a landing at Kai Tak on a simulator, but that approach and landing was hard to replicate, and in the late 1980s the simulator technology was basically limited compared to contemporary offerings.

When we fly we are aware of the aircrew and cabin attendants, it's a tangible experience. In contrast no one really thinks that much about the back end, the unseen professionals who keep the aircrew sharp and up to speed with cutting edge operations, or those who keep the aircraft safe on time and in the right position in the sky.

Pilot training and Air Traffic Control (ATC) training is a significant global industry. According to data and research company Visiongain, the global ATC training market, particularly focused on simulation,

▲ *An AXIS Level-D CL350 full flight simulator cockpit.*

was valued at approximately US$966 million in 2023, and the sector is projected to grow at a compound annual growth rate of 6.5 percent from 2024 to 2034.

Increasing demand for skilled air traffic controllers, especially in regions experiencing a shortage, which includes Asia, will continue to drive the potential growth in air traffic operations.

Globally the commercial pilot simulator training market was valued at approximately US$2.2 billion in 2022, and this market is expected to grow at around 4-6 percent from 2023 to 2030. Asia is estimated to account for about 30-35 percent of the total market.

In Asia the key factors driving this sector include a growing challenge to source cost-effective pilot training solutions, an increasing

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PHILIP ADRIAN, MULTI PILOT SIMULATIONS

demand for trained commercial pilots, innovations in the training simulation technology and the expansion of airlines in China, India, and Southeast Asia.

A current example in Asia is in Hong Kong where the International Airport's new US$18 billion three-runway system is predicted to increase capacity by up to 50 percent by the end of 2024. However, local flag carrier Cathay Pacific is straining to match the predicted growth hampered by a pilot shortage.

SUPPLY CATCHING UP TO DEMAND

IATA's figures for July showed that again Asia-Pacific airlines continue to lead the return of passenger demand globally with a 27 percent year-on-year increase. Capacity also increased in Asia 26 percent year-on-year and the load factor rose to 81.6 percent. This performance maintained Asian carriers status as the largest contributor to industry-wide growth.

While the airline industry in Asia is more than happy to see the return of travellers, the increase in passenger traffic by association means more demand for air space and aircraft, and with that the requirement for more professional resources, flight crew, cabin crew and the specialists that support them in the air.

Post pandemic, Asia's returning aviation market has seen growth in the need for advanced pilot training solutions, particularly full flight simulators (FFS) that offer high-fidelity training environments.

These simulators, which replicate real aircraft cockpits, are equipped with advanced visual systems and motion platforms, augmenting and enriching the training experience, to be as close to the real experience as possible, without leaving the ground.

On the back of the steady growth in passenger numbers, training simulator manufacturers are expanding in Asia, and forming partnerships with local airlines, while Asian-based carriers like Singapore Airlines and Cathay Pacific are also investing in in-house training facilities with state-of-the-art simulators to maintain the highest training standards.

The availability and integration of technologies such as artificial intelligence (AI) and virtual reality (VR) is further revolutionising the simulator market by improving training efficiency and offering cost-effective solutions.

According to Philip Adrian, CEO at flight simulation manufacturer Multi Pilot Simulations (MPS) he believes there is no doubt that with steady passenger growth and increased delivery of airplanes to the region, a significant increased demand for simulation training will develop.

"With forced retirements during the Covid-19 period lowering the number of available pilots in addition to the already looming

global pilot shortage, there is a high need for additional pilots at all competency levels from Cadets to Captains to not only replenish but also future proof the regions fleets. This directly correlates to a need for additional training capacity," says Adrian. "Additionally, with the increase in Competency and Evidence Based Training and Assessment (CBTA/EBT), more time will be spent in simulators to ensure the pilots of the future have the required competencies to excel in their profession. This is especially true for less experienced cadets. This demand is now becoming evident in the Asia-Pacific region as well, with India leading the pack. However, we foresee growth to come back to the entire Asia-Pacific region in the next year or two."

▲ *The MPS FTD-2 is a full replica flight deck of the Boeing 737.*

Earlier this year, Brazil-headquartered Embraer and CAE inaugurated the Asia Pacific (APAC) region's first E-Jets E2 FFS in Singapore.

E-Jets E2 training is the latest programme offered by the recently expanded Embraer CAE Training Services (ECTS) joint venture. The FFS is located at the Singapore-CAE Flight Training Centre near Changi Airport and will support E2 operators in the region, like Scoot, which received its first E2 jet in 2024. Virgin Australia has also placed an order for 8 E190-E2s for delivery in the second half of 2025.

The establishment of the E2 simulator in Singapore is part of Embraer's commitment to expand its infrastructure in Asia Pacific and to contribute to the region's aviation growth story.

As the E-Jets fleet keeps growing in the APAC region, Embraer said it aims to study and implement new full-flight simulators and training facilities to support its customers.

Silvia Meloni, General Manager at Airbus Asia Training Centre (AATC) in Singapore said: "Passenger growth in the Asia-Pacific region has led to an increase in the fleets of airlines, which requires more skilled pilots. At AATC, we are helping airlines to meet this demand by providing the highest quality of flight training offering type rating, conversion or recurrent programmes."

AATC training programmes leverage an extremely experienced instructor pool and state-of-the-art simulators, which are certified by regulators to ensure that current pilots are well-prepared in this critical point.

Christian Theuermann, member of the executive board at AXIS Flight Simulation, concurred, pointing out that passenger demand is currently outweighing airline capacity, following staff cuts and fleet changes made to operations during the pandemic. This has been further intensified by the rising cost of obtaining certification and competitive salary incentives.

"Effective training solutions are key to mitigating the effect of staff limitations. Full flight simulators that utilise advanced technology to replicate the functions of real-life aircraft can be extremely beneficial for new pilots in their flight training programmes. Not only can FFS' train pilots faster, but they further eliminate the need for costly, inconvenient flight hours," Theuermann says.

With several carriers in Asia-Pacific choosing to modernise their fleets and looking to acquire new generation aircraft, existing and trainee pilots need to train on these latest aircraft types before they can fly passengers.

"FFS' technology easily replicates the engineering of these aircraft cockpits and are an effective training tool as well as mandatory for the authority, which is something we've recognised across Asia-Pacific as demand for FFS' continues to rise in the region," said Theuermann.

ATC SIMULATION DEVELOPMENT

By association, driven by the region's need to enhance air traffic management and the increase in air traffic across Asia, the ATC simulation market in Asia is also expanding. This latest alignment is leading to increased demand for a wide spectrum of ATC simulation and training products.

ATC simulators are vital in air traffic controller training, they offer a realistic environment where controllers can practice handling various scenarios, emergencies, and challenges, building their confidence without risk.

Today's simulations use accurate aircraft, airport models, and weather conditions to mirror real-situations, allowing controllers to fine tune and develop quick decision-making skills.

This training enhances a controllers ability to manage air traffic safely and effectively, ensuring they are well-prepared to apply standard procedures and tackle real-world situations if and when they arise.

Based in Christchurch New Zealand, Jonny Cooke is a product manager for Airways International, looking after the firms Total-

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JONNY COOKE, AIRWAYS INTERNATIONAL,

Control simulation platform. Cooke has over 10 years of experience working in ATC simulation as a sim pilot, technical specialist and product manager.

Cooke says there was an immediate and noticeable drop off in training demand during the COVID-19 pandemic and a subsequent lower demand for ATC simulators, as many air navigation service providers paused their recruitment activities and some laid off staff.

He highlights that two exceptions to this were demand for simulators for military customers, and some long-term strategic simulation projects where the budget was already allocated.

"With the increase in global travel post-Covid, there is now a clear requirement for surge capacity in the training of air traffic controllers, and greater revenue flow. As a result we are seeing an increased level of interest from customers globally for simulators, including in the Asia Pacific region," says Cooke. "Our customers in the Asia Pacific region are quite diverse in terms of size and training/ simulation requirements. We have seen the greatest interest in simulation from our larger customers — for example, we have recently delivered a simulation-as-a-service solution to Airservices Australia, including a mobile simulator and provision of a remote simulator pilot service from New Zealand."

James Adams is Director of ATC simulation at Florida headquartered Adacel Technologies, a global technology company that develops and implements air traffic management systems, air traffic control simulation and training.

Adacel has been experiencing increased demand from the Asia-Pacific region for its ATC simulation and training products. Adams said several factors have contributed to this trend including rapid aviation growth.

"The Asia-Pacific region has been experiencing significant growth in air travel, with an increasing number of passengers and flights. This growth drives the need for more air traffic controllers and advanced training solutions," Adams said. "Many countries in the Asia-Pacific region are investing in new airports and upgrading existing ones. This expansion necessitates the deployment of modern ATC systems and training facilities to ensure efficient and safe air traffic management. Governments in the region are also prioritising aviation safety and efficiency, leading to increased investment in state-of-the-art ATC training programs and simulation technologies.

▲ *Adacel's MaxSim — 3 Screen Tower Simulation System (TSS)*

Adacel's cutting-edge simulation and training products align with the region's focus on incorporating innovative solutions to improve ATC operations," he adds.

PERVASIVE AI AND BEYOND

With the ubiquitous AI moving so rapidly across all industries now, do these industry specialists see the increased adoption as a threat or a boon to the ATC and pilot training simulation business, and just what innovations and applications do they foresee in the sector?

AXIS Flight Simulation's Theuermann says FFS' can harness AI technology for maintenance tasks, such as performance analysis. Known as predictive maintenance, the function can run specific data analysis to forecast a system failure before it happens, improving simulator performance and decreasing equipment downtime.

"As it continues developing and being integrated in training systems, AI could help enhance a data-driven approach to pilot evaluation, harnessing the power of algorithms to assess pilot decision-making to ensure more targeted and efficient training. Of course, everything new seems to be a threat at first. While the use of AI in flight simulation is still in its infancy, it has potential to significantly improve procedures," he says.

Immersive technologies, augmented reality (AR), virtual reality (VR) and mixed reality (MR), all offer important advantages when it comes to flight simulation. Falling under the umbrella term extended

▲ *The AXIS Full Flight Simulator AX-D Flex enables pilots to train on multiple aircraft configurations.*

reality (XR), its introduction means training can also now be carried out remotely, reducing the need to travel to a specialist.

"As operators globally seek out ways to train a higher volume of pilots and reduce expenditure, utilising the power of XR can allow users to become more familiar with the cockpit layout and procedures before beginning FFS training. Ultimately, these training enhancement tools have potential to offer a greater degree of accessibility and flexibility for pilots," Theuermann stresses.

Adacel Technologies' Adams says that as well as AI, the ATC simulator sector is seeing a range of innovations and applications driven by advancements in technology and the increasing complexity of air traffic management.

This includes the early adoption of VR and AR, cloud computing, remote training performance assessment, and the adoption of unmanned traffic management to allow controllers to manage mixed traffic environments.

Adams expects that other future trends will include biometric and physiological monitoring to track student stress levels, fatigue, and cognitive load to provide even more personalized training experiences.

"There are many potential benefits to adopting artificial intelligence into the air traffic control simulation industry, AI can undoubtedly automate routine tasks for enhanced efficiency, and can quickly analyse vast amounts of data which can enhance decision making during simulations," Cooke says.

According to Cooke, ATC simulation provides a safe environment to explore AI technologies, and with careful consideration, planning and implementation, AI has the potential to significantly enhance the effectiveness and efficiency of ATC simulations and provide a glimpse of the future workspace.

On innovations in his sector he says audio and visual elements are key aspects of air traffic control simulation, and these lend themselves well to image diffusion and AI voice applications.

"Airways International's TotalControl ATC simulation team is actively testing and using AI engines in TotalControl product development, and as a result have some advanced new product offerings on the horizon, watch this space for what's to come in AI advancements in ATC simulation," said Cooke.✈