

## PORT OF ENTRY

The boom in air travel is driving the development of new aircraft and the facilities to service them. **Richard Lawn** visits Singapore's new Changi terminal, leading Asia's development



Singapore's Changi Airport has often been described as the Gateway to Asia – indeed, since opening its first terminal a quarter of a century ago, it has given many visitors their first glimpse of Asia before moving onto destinations such as Bangkok, Bali and Sydney. Located roughly 20km east of Singapore's CBD, the airport is operated by the Civil Aviation Authority of Singapore (CAAS), employing over 13,000 people and generating S\$4.5bn (US\$2.85bn) into the Singapore economy. The airport has been bestowed with numerous accolades and has been consistently voted the World's Best Airport by travellers, international publications and trade organisations and this may account for its rapid growth. In 2005, it processed a record 32.4m passengers, representing a seven per cent increase over 2004 and making it the 26th busiest airport in the world, and the sixth busiest in Asia by passenger traffic.

Growth has brought growing pains, however. Singapore Airlines became the first operator to place an order for 10 giant Airbus A380 aircraft and so a third terminal is currently under construction and is scheduled to open in 2008, when eight of terminal three's 28 gates will be able to handle 555 passengers boarding and alighting from the new Super Jumbo aircraft. In all, the CAAS is spending S\$60m (US\$38m) in upgrading its terminal buildings and airport infrastructure ahead of the arrival of the first A380. There are many logistical considerations in accommodating the A380 and, in addition to the enlarged gate hold rooms and new gates, the airport is also extending the baggage belt carousels at the A380 gates from 70m to 90m in length.

While passenger numbers and gate/aircraft dimensions increase, so does the demand for cheaper flights. Low-cost carriers presently account for approximately 10 per cent of Changi airport's total passenger flights, and this sector of civil aviation is set to continue to be a high-growth market in the Asia-Pacific region for the foreseeable future. With this demand in mind, Singapore and Kuala Lumpur took the bold decision to becoming the first Asian airports to open new terminals specifically for low-cost airlines last year. A competition to name the new terminal attracted 12,000 entrants to submit their suggestions, from which the CAAS bizarrely chose Budget Terminal as the winner - making the decision to hold the competition somewhat mystifying. However, there were no other shortcuts taken in the development of the 25,000m<sup>2</sup> terminal, which cost S\$45m (US\$27.5m) and can accommodate up to 5m passengers per annum. Hence the new terminal's voice evacuation and background music system were high on the CAAS' critical agenda.

Currently only Tiger Airways and Cebu (Philippines) operate from the terminal, being enticed by lower landing fees and airport tax compared to the main terminal. It does not, however, provide the levels of service and comfort that the main terminals provide - such as a people-mover system and aerobridges. In fact, the Spartan fixtures and fittings bear all the hallmarks of a budget terminal, and these have simply added to the sound reinforcement problems. A 6m- to 10m-high corrugated roof provides a sounding board for the rain, while air conditioning unit fans blow noisily at the entrance and the tiled floor and cavernous surroundings conspire to produce a reverberation time of 5.5s and present significant obstacles to the intelligibility of the announcement system.

Having earlier won the contract to provide the audio system for Terminal Three - installing 20 Duran Audio Intellivox column loudspeakers - the CAAS called upon Control Logic Systems to offer a design solution that would address the acoustic problems of the new building. Rather than trying to treat the hall acoustic, the solution involved a 100V line Bosch Plena PA system with two Intellivox DDC 1.80 speakers positioned for L-R imaging at a height of 2.5m behind the check-in counters, facing towards the entrance to relay passenger announcements. Director David Seow configured the two column speakers to have a throw of roughly 28m, falling short of the few passenger seats and entrance doors on the opposite wall at a downward angle of just 1.5°. The CAAS realised that the Intellivox speakers not only fulfilled their requirements, but also worked out more cost-effective than an acoustic remedy: 'The schematic diagrams and plans did not relate to the real world,' says Mr Seow. 'The check-in hall is a large open space hangar in which configuring and assimilating the DS software and input data into the speakers was extremely tricky. The DS software is ideal in an application where there is a room constant. However, at the Changi Budget Terminal there are many ambient noises that serve as differentials. For example, the acoustic co-efficiencies of the building materials, air-conditioning, overhead aircraft and numbers of people entering the terminal building keep changing.'

One Intellivox unit was erected on a speaker stand and demonstrated at the shoot-out, which greatly impressed the CAAS in its coverage and sound levels. The ultimate test came when six coaches of labourers from the Terminal Three project were transported to the hall and Mr Seow was asked to call the names of five Indian workers over the Intellivox speaker system from a wireless microphone. 'The five names were called and five workers came and collected their meal voucher prizes. This proved to the CAAS that the speaker offered clear intelligibility in a harsh environment.'

The two DS 180 models erected in the check-in hall have been joined by two DDC 2.0 speakers in the departure transit/duty-free area for final boarding announcements and a further two DDC 6.0 models in the immigration area, between the check-in and boarding areas. The switch from DS to DDC was a conscious one. 'I prefer to use the DDC 2.0 as it gives more control in the hall due to ever changing needs,' explains Mr Seow. 'DS models require software for simulation prior to the inputting of data into the speakers and are therefore best for rooms with constants.'

The DDC 2.0 speakers come with speaker stands and can be used for events in the terminal, negating the need to hire rental stock. It became transparent at the demonstration that the speakers would be demanded for retail and promotional activities that required clear speech or music. 'During the shoot-out, Tiger Airlines asked me if I could rent out the DC 180 speakers to them that evening for a private party. They had also heard another portable sound system played in the arrivals hall and knew that they couldn't play music without reverberation. The confectionary outlet also hired the system, as it offered them the added bonus of not having to clear security clearance, as the speakers were already on site. The speakers don't require any additional amplification, crossovers and equalisation - they're fairly plug-and-play offering ease of use to someone not familiar with pro audio products.'

Cutting costs may give budget-conscious travellers the perception that they are getting a good deal on the ticket, but like the rising transport costs that are commonly incurred between far-flung budget terminals and downtown destinations, they generally get what they pay for. Thus the cost saving enjoyed in specifying budget terminal aesthetics and no-frills architecture has led to an increased spend on the audio equipment. However, this in itself is a cost saving compared to the potential millions that would have been required for an acoustic remedy. The fact that only six speakers are required to deliver clear speech throughout the terminal is a powerful demonstration that there is more than one solution to reverberation problems - at least as far as the audio system is concerned. And the unobtrusive speakers are almost unnoticeable to those who prefer technology to be heard and not seen.

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