

**The -600 competes directly with the Boeing 747. Only the A380 will be larger; when it enters service in early 2006, it will take Airbus beyond the 747 into a totally new marketing domain**

Principal changes to the new A340s compared to their -300 predecessor include: a 10.9m fuselage stretch for the -600 and 3.2m for the -500; a 20% larger wing achieved by wing-box insert and extensions to the wingtips; increased fuel-tank volume (38% for the -600, 52% for the -500); a new, larger horizontal stabiliser; a 0.5m height reduction for the A330-200 fin and rudder, and a totally new four-wheel bogie centre landing gear, with braking.

The cabin internal space has been thoroughly restyled and includes extensive use of light-emitting diode (LED) lighting, which provides far greater flexibility in the way illumination is distributed and has a bulb lifetime "longer than that of the aircraft". A new touch-screen flight attendant panel has also been developed which permits the display and control of far more information than before, including, for example, cabin temperature data.

Passengers will also benefit from the introduction of larger overhead bins designed to take the new roll-on bags that have become popular as carry-on luggage.

Airlines will be able to configure the lower deck in a number of ways by using containerized roll-on/roll-off modules developed by Airbus. Crew rest compartments, extra toilets and lower-deck galleys or combinations of these will be accessible from a rear stair. "We've tried to modularise the design to provide a lot of solutions based around a common concept," says Pardoe. "We've already sold both full and partial bulk crew rest options."

He admits, however, that it has taken a "lot of clever design" to find the right balance between providing flexibility for passengers and cargo. "The market says freight is vital," he adds.

Performance estimates to date indicate that nominal design objectives should be met. For the -500, this is for a 15,725km (8,500nm) range with 313 passengers, and for the -600, 13,875km with 380 passengers, flying at a wind-tunnel proven Mach 0.83.

Initial structural and performance testing indicates that the -500 will be capable of a 3t higher maximum take-off weight and the -600 a 4t increase. This will allow either greater range or payload, giving the -600 the potential to reach New York from Dubai, prompting Emirates to consider converting three of its -500 options to the larger aircraft.

Airbus has been embroiled in a long-running discussion with certification authorities to try to have the A340-600 approved with six rather



Airbus has undertaken a 47h flight-test programme of the Trent 500 on its A340-300 prototype

than eight passenger doors. The consortium had hoped to eliminate the two overwing hatches, required under European Joint Aviation Authorities and US Federal Aviation Administration rules, which specify a maximum distance of "60ft" (18.3m) between adjacent passenger exits. Pardoe says that although the "long-term debate is continuing" over the exit requirements, "it is clear that all currently ordered and in-build -600s will have the [additional] exits". The prototype -600, which does not have the exits, will be retained by the manufacturer as a testbed.

The consortium argues that not including the smaller overwing hatches would lead to improved safety because they could become blocked during an evacuation. Eliminating them would also save 500kg (1,100lb) in weight, provide room for an extra row of seats and reduce production costs by enabling the centre-fuselage design of the -600 and the shorter, longer-range -500 model to be standardised.

Airbus sees the A340-500/600 programme as a stepping stone to the A380 in terms of cabin comfort, systems reliability and advanced design. Launched in December 1997, 10 years after the launch of the A330/A340, the pair cost \$2.9 billion to develop as against \$3.5 billion (today's prices) for the first versions of the A330/A340.

This reflects both the greater standardisation of the new aircraft as well as improvements in design efficiency resulting from the introduction throughout the Airbus partners of the

CADDS-5 three-dimensional design system.

But it also resulted in problems for one partner. BAE Systems suffered delays to wing production because some of its suppliers were not equipped with CADDS-5. The knock-on effect has meant a three-month delay to both programmes and consequent late delivery to the airlines. "We have kept them informed throughout," says Pardoe.

Virgin Atlantic will therefore receive its first -600 in June 2002 instead of March, while the first -500 will arrive at Air Canada in November 2002, instead of September.

Airbus will deliver 16 instead of 21 aircraft next year, with the last three delivered on time. The remaining five aircraft, all -500s, will be delivered in early 2003. "We will recover back to the contractual dates by early 2003," says Pardoe, adding that no sales have been lost because of the delay.

Flight testing of the A340-500/600 involves three aircraft in an 1,800h programme. The first, which will remain in Airbus' inventory of flight test aircraft, will undergo general aircraft development, flight envelope and other certification testing. The second will carry out powerplant-related certification trials and the third will perform cabin systems, long-haul and route-proving tests.

A single A340-500 is due to undergo a further 500h of certification and feature tests. □



Virgin will be the first airline to operate the A340-600 in June next year