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A350XWB – Shaping Efficiency

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Airbus employs 55,000 people worldwide and has its headquarters in Toulouse, France. The A350XWB programme has been supported by Airbus development and manufacturing sites spread throughout France, Germany, Spain and the UK.

Airbus today consistently captures about half of all commercial airliner orders. Of these the Airbus A320 is the world's best selling passenger aircraft with 5348 sold to date.

The A350XWB concept has resulted in a family of three long-range, twin aisle passenger aircraft; the 800 Series, the 900 Series and the 1000 Series. They are designed to carry 270-350 passengers over a distance typically up to 8,100 nm although more passengers can be carried in high density configurations.

A350XWB

There is a very high level of commonality between all three variants; essentially the 1000 Series is a 900 Series with extra fuselage sections added and the 800 Series is a 900 Series with some fuselage sections removed. This commonality offers advantages over the Boeing equivalent aircraft where two separate aircraft, the Boeing 777 and the Boeing 787, are needed to cover the same spread of capability. The A350XWB is an all new aircraft design with a new engine, the Rolls-Royce Trent XWB. Airbus are in fact highly satisfied with the progress that Rolls-Royce has achieved in developing this engine.

The aircraft cabin width is 220 inches which is 5 inches wider than that of the Boeing 787. It will have more passenger headroom than previous aircraft, larger overhead bins, wider windows and wider seats (18 inches). Its cabin pressure in flight will correspond to 6,000 ft altitude.

A350XWB Passenger Cabin

The aircraft structure is made from carbon fibre reinforced plastic (CFRP) (53%), high strength alloys (20%) and titanium (13%). The combined effect of these is to achieve a considerable weight reduction. This, coupled with an advanced wing design and high efficiency engines, has resulted in a fuel burn rate which is 25% lower than that of current in-service aircraft. Thus the A350XWB series offers a considerable competitive advantage to the airlines operating it.

Airbus have chosen to construct the aircraft fuselage from CFRP panels. This is unlike Boeing who have used a filament winding method to construct entire fuselage sections for their Boeing 787 aircraft. Airbus consider that their approach offers advantages if repairs are required.

The aircraft systems have been made more reliable, simpler and cheaper by the use of solid state technology. The cockpit incorporates six large screen LCD displays. These are fully interchangeable, thus reducing spares holding requirements. Together they are able to display all the necessary flight systems information. The overall cockpit display design also allows room for growth potential. In addition the cockpit configuration has significant commonality with that of other Airbus aircraft resulting in a reduced duration of conversion courses for pilots transferring from older Airbus aircraft to the A350XWB.

A350XWB Cockpit

The aircraft will be cleaner, quieter (10dB below current generation aircraft on landing) and “smarter” than current generation aircraft. The latter means advanced avionics and systems allow environmentally friendly operating procedures.

Airbus’ predictions are that, over the period 2011-30, there will be a worldwide requirement for 19,170 single aisle passenger aircraft, 6910 twin aisle and 1780 very large passenger aircraft. The growth rate in terms of total numbers of passenger aircraft is predicted to be 4.8% p.a. which corresponds to a doubling of the number of passenger aircraft every 15 years. Past experience has shown that this growth rate is resistant to events such as the knock-on effects of the attack on the World Trade Centre. It is Airbus’ aim that the A350XWB should take a large proportion of the twin aisle market.

As of the date of the lecture (11/12/2012) Airbus have 562 orders for the aircraft spread 65% (900 Series), 19% (1000 Series) and 16% (800 Series). Entry-into-service is planned for the second half of 2014 and the first flight is due to take place in May 2013. The final assembly of both the first flying aircraft (MSN001) and the static ground test bed (ES) is well under way at the Airbus plant in Toulouse, France using major sub-assemblies supplied from Airbus’ European factories and risk sharing partners .

The lecture was attended by 140 people.

Joint lecture with the IMechE

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