



Finalist

EADS Airbus

Achievement

The carbon keel beam for the A340-500/600

The Airbus A340-500 and A340-600 are the first commercial airliners to feature carbon composite keel beams – a major technological breakthrough in aircraft structures, providing strength, reliability and corrosion benefits over traditional aircraft structures.

The A340-500 and -600 are stretched versions of the basic A340-300, offering capacity and range increases over their predecessor. The A340-500 is being designed to carry 313 passengers over 15,700km (8,500nm), while the -600 will carry 380 passengers up to 13,900km. The stretched versions incorporate extensive modifications, particularly in the centre section, which is developed by the manufacturer in Toulouse.

The beam, which is made by a lay-up and curing process, was developed in just one year from go-ahead to design validation. The 16m (52ft)-long carbon keel beam is a major load-bearing component of the centre section which receives the wings, centre landing gear and the forward and rear bottom struc-

tures. Each carbon keel beam has a load carrying capability of 5,000kN.

Use of a carbon composite beam will allow five passengers plus their luggage to be gained compared with a traditional metal version. In addition to the weight gain, carbon composite is not prone to corrosion and has a low susceptibility to fatigue problems, and provides a perfect compromise between flexibility and rigidity.

The development of the carbon composite keel beam for the A340-500/-600 follows composite outer wing experience on the ATR 72 – the fleet of which has logged more than one million flying hours; the production of 1,200 composite ailerons for the A340; and 450 composite Dassault Mirage 2000 fins. The manufacturer employed innovative development, production and certification methods in the A340 carbon composite keel beam.

The judges commended Airbus for its "bold decision" to employ carbon composites in one of the most primary structural elements of the aircraft.



Finalist

Northrop Grumman

Achievement

Computer Replacement Programme for the Joint STARS

The Computer Replacement Programme (CRP) for the US Air Force's Boeing E-8 Joint Surveillance Target Attack Radar System (Joint STARS) aircraft is the first successful major incorporation of commercial off-the-shelf (COTS) equipment in an open architecture aboard a military aircraft, according to Northrop Grumman.

CRP was developed as part of the Block 20 upgrade to the Joint STARS for the US Air Force and as a result of a study to identify potential life cycle cost reductions for Joint STARS. The CRP replaced the aircraft's main computers, workstations and paired-wire networking with commercially available products, including developing technologies. The changes were extensive and required modifications to the entire Joint STARS system. A commercial hardware-friendly design baseline was created in which such equipment could safely operate in the military operational environment.

Over a 37-month engineering and manufacturing development (EMD) phase, the Joint STARS CRP

team, which included the Joint STARS Program Office, Northrop Grumman, the US Air Force and Army, Compaq, General Dynamics and Mercury Systems, successfully incorporated commercial computing hardware in an open system architecture onboard an E-8C. The EMD system exhibited 100% effective time on station on five of the seven formal system-level performance flight tests, says Northrop Grumman.

The CRP meets its initial objective by reducing projected life-cycle costs of the Joint STARS fleet by \$800 million. Instead of militarising commercial equipment, the team designed ways to isolate and protect commercial equipment from the vibration, shock, electromagnetic and thermal effects of the airborne military environment. This eliminated the need for modification or extensive environmental testing of the commercial products. The approach meant that equipment could be selected very late in the EMD schedule, allowing the team to skip a generation of hardware development and take advantage of the very latest technologies.