

say that many of these problems arose from older composite mixtures; considerable research and learning has taken place in the past 10 years on composite materials for aeroplanes.

Each contractor will use special tools, designed and fabricated by Boeing at its Wichita facility, to form their relevant section. Creating these huge pieces is the key to Boeing's plan to assemble the 7E7 in just three days. Only five or six separate major pieces will make up the fuselage and they will be completed using titanium fasteners.

The 7E7 wing-manufacturing processes are being handled by Mitsubishi and Boeing and are also located at the Boeing facility.

Boeing claim that the number of parts in the 7E7 compared to older aeroplanes is lowered significantly and the weight is reduced by almost 20 per cent. That should translate to lower direct operating costs for the airlines whilst offering bigger windows, lower cabin altitude pressurisation, and higher cabin humidity for the passengers.

The Boeing 7E7 represents a new path for Boeing in both manufacturing procedure and towards a new view of the airline future.

The use of composites is not an end in itself to Boeing but a step along that path to creating an aeroplane that combines several desirable airline friendly features including longer range, faster speeds, lower direct operating costs and superior cabin comfort. This requires the manufacturer to mate the composite design to suitable engines and other technology gains so as to present a complete package that advances the airlines cause on several fronts.

It is no secret that Boeing and Airbus share divergent views on the future of international airline operations. Boeing says that their experience with the B767 in transatlantic operations and the B777 in Asian operations points overwhelmingly to direct point to point flights as the way to go. This is opposed to hubbing into one major centre and using smaller aeroplanes from that major facility. Boeing says that a 250 seat, twin-engine long-range aircraft with relatively low initial price is the ideal solution.

Airbus says that the growth of air traffic is such that the major centres will be overwhelmed unless a larger aeroplane is introduced. To this end they have put huge development money into the 555 seat double decked A380.

Boeing and Airbus do not argue that one party is absolutely right or wrong but it is a dispute over emphasis and market size. In fact Boeing is considering upgrading its venerable 747 product to an "Advanced" model featuring more seats and the later technology. Airbus has gone further and is actually offering a model 350 to compete with the 7E7 albeit later in the decade.

Whether the apparent market turns out to be the real market is anyone's guess, but it must cause anxious private moments for those responsible for the future of each company. Nevertheless, Boeing with its innovative 7E7 marks a true turning point in aviation history and the first composite aeroplane will certainly lead on to more composite models.

The 7E7 is a family of three aeroplanes, all of which will use the same

engine type. The baseline version will carry 217 passengers in three-classes of seating with a range of up to 8,500 nautical miles (15,700 kilometres). The shorter-range 7E7 will carry 289 passengers in two-class seating on ranges up to 3,500 nautical miles (6,500 kilometres). The stretch version of the 7E7 will carry 257 passengers in three classes with a range of 8,300 nautical miles (15,400 kilometres).

Boeing has chosen two engine manufacturers to supply engines and they are General Electric and Rolls Royce.

General Electric's new engine, called the GENX (GE Next Generation), is derived from the ultra-high-thrust GE90 engine, which has a proven track record on twin-engine aircraft. The GENX technologies include composite fan blades, the highest pressure-ratio compressor in aviation, and a unique single-annular combustor (where compressed air and fuel are mixed) to achieve dramatically lower emissions. The GENX will have its first full-engine test in 2006. The engine is being designed and tested at GE Transportation's world headquarters in Evendale, Ohio. Final assembly will occur in Durham, N.C.

Rolls-Royce will produce a new variant of its successful, high-thrust Trent engine series to power the 7E7, the Trent 1000. Designed to deliver optimum performance with minimum development risk, it will be the fifth member of the Trent family to enter service, once again featuring the three-shaft design layout unique to Rolls-Royce. The engine will be the most efficient and environmentally advanced Trent ever built.

NOT TOO LATE TO BET ON 8

The number 8 was indeed lucky for Boeing when it made its long expected announcement that Chinese airlines would acquire the new 7E7 Dreamliner. What is interesting is that China has used its collective buying power to joint buy 60 Boeing 7E7 for its leading airlines. Boeing renamed the advanced composite airliner the Boeing 787 incorporating the Chinese lucky number 8 in its name.

Boeing Commercial Airplanes President and CEO Alan Mulally and China Aviation Supply Co. President Li Hai signed a preliminary aircraft acquisition agreement covering orders for 60 Boeing 787 aircraft.

Whilst the retail value of the 60 aircraft is around \$US 7 billion based on average retail prices, the group purchase of so many aeroplanes would ensure not only low unit prices but also participation in other Boeing ventures.

Six Chinese airlines will share the joint 60 unit buy and they are Air China, China Eastern, China Southern, Hainan Airlines, Shanghai Airlines and Xiamen Airlines. However the specific numbers of aircraft for each airline were not revealed nor was engine selection announced but it is expected that each airline will select its preferred engine between the Rolls Royce Trent and the Gex very advanced turbo fans.

Boeing said each airline is scheduled to receive its first 787 in time for the 2008 Beijing Olympics. Boeing has 186 orders and commitments for the 787, of which 56 are firm.

Composites Compressing

New GENx engine advancing unprecedented use of composites in jet engines

General Electric Company (GE) has initiated tests for its new GENx engine that advance the use of composites in jet engines in ways never before experienced.

The GENx is the only jet engine being developed with both the front fan case and fan blades made of composite materials - a breakthrough that will provide greater engine durability and dramatic weight reduction.

At GE Transportation's headquarters in Evendale, Ohio, the company ran a successful "blade-out" rig test using a composite fan

case and composite blades representative of the GENx configuration. In this test, a fan blade is released while the fan operates at full speed. The composite fan case maintained its structural integrity while containing the released blade.

"Simply put, the concept of a composite fan system worked, and worked well," said Tom Brisken, general manager of the GENx program.

The Boeing Company selected the GENx engine for its 7E7 Dreamliner aircraft. Based on the fuel-efficient GE90 engine, the GENx is being designed to meet or exceed performance targets for

the twin-engine 7E7. The GENx team is refining the engine design, and maturing key technologies, in order to commit a final design in early 2005. The first full engine will go to test in 2006, with engine certification scheduled for 2007.

Carbon fibre and epoxy resin composite materials are a key to GENx performance. The composite fan case will reduce engine weight by 350 pounds, or 700 pounds in a two-engine aircraft. Overall weight reduction is more than 800 pounds for the aircraft because composite materials also allow for weight avoidance in the engine installation. The weight reduction translates directly into fuel burn savings, increased payload, and greater aircraft range.

GE introduced the first composite fan blades in jet travel in 1995 with the GE90 engine on the Boeing 777. During nine years in airline service, the GE90 compos-

ite fan blade has proven to be extraordinarily reliable, with no special inspections or field actions ever required.

The most recent GE90 derivative, the GE90-115B for the 777-300ER and 777-200LR, introduced composite blades that were designed using three-dimensional aero technology. (The uniquely shaped blade is on display at the Museum of Modern Art in New York City.)

GENx composite fan blades will be produced using the same fibres, resin, and manufacturing processes as the GE90 fan blade.

The GENx fibre-braided composite fan case, to be the first in commercial service, results from more than 20 years of GE research and development, including testing on a NASA demonstrator engine. In addition to weight savings, the fan case's composite properties create a

tough, hard structure that eliminates the potential for corrosion.

Before GENx engine certification testing goes into full swing in 2006, GE will have run four rig tests on the composite fan system. In addition to the reduced scale "proof of concept" test recently conducted, GE will run a second reduced scale rig test in April 2005. These tests are designed to mature the technology.

In late 2005 and in 2006, GE will run two additional rig tests using a full-scale fan case and blades. These tests will evaluate the GENx fan configuration.

GENx is the next-generation of the engine technology to succeed GE's CF6 series, the best-selling engine family for widebody aircraft. The GENx engine will produce 55,000 to more than 70,000 pounds (245 to 311 kN) of thrust for the 7E7.

SINGAPORE CHANGI AIRPORT REACHES RECORD PASSENGER & CARGO VOLUMES IN 2004

The airport handled 30.35 million passengers and 1.78 million tonnes of cargo for the full year.

Singapore Changi Airport has broken its own record in terms of passenger and cargo traffic. A record of 30.35 million passengers passed through Changi Airport in 2004, a 23.1 per cent growth over year 2003's 24.67 million, and an increase of 4.7 per cent over the previous record of 29 million set in 2002.

In December 2004 alone, Changi Airport's passenger traffic jumped 9.4 per

cent from a year ago to 2.96 million. This is a 7.5 per cent rise from December 2002.

In terms of air cargo, Changi Airport moved a new record of 1.78 million tonnes of cargo in 2004, 10.2 per cent more than the 1.61 million tonnes in 2003. This is 8.4 per cent more than 2002's air cargo tonnage. In December 2004, Changi Airport moved 153, 512 tonnes of airfreight, an 8.5 per cent increase from December 2003, and a 12.9 per cent increase from December 2002.

Changi Airport is served by more than 70 airlines, which operate over 3,700 scheduled flights every week to 175 cities in 55 countries.

Caruso's' carousing not controlling

If you thought airways clearances were slow coming at Milan's Linate airport the reason was that the lads who were supposed to watching the screens were actually keeping their eye on the ball... a soccer ball that is. Others were observed doing the weekly shopping for Mama and the bambini when they were supposed to be on duty separating the Boeings from the Beechcraft.

Whilst this matter has nothing to do regarding the collision between the SAS MD80 and the Cessna Citation at Linate in 2001 it no doubt was on the mind of the whistle blower who contacted police.

Now Italian state prosecutor Fabio Roia who is conducting the investigation into the behaviour of 61 Linate air traffic controllers has recommended to a judge that 36 be convicted and penalised and 25 acquitted.

Police acting on the information supplied had followed and photographed the controllers engaged in their sporting and private pursuits when they were being paid by the Italian government to work. That said La Polizia is fraud.

Recommended fines and sentences range between 50 and 500 Euro, and six months to 1 year and 7 months in the Milan slammer for the most blatant miscreants.