National Institute for Aviation Research developing US composite aviation materials standards

The National Institute for Aviation Research, a US aerospace research and development laboratory, has been charged by NASA with developing national standards for composite materials used in aircraft manufacturing.

The aviation composite materials standards are similar to the "mil-spec" standards set for today's aluminum aircraft materials and which are the standards of construction and manufacture for aviation use of aluminum.

Working in conjunction with the National Aeronautics and Space Administration's Langley Research Centre, the National Institute for Aviation Research has established the National Centre for Advanced Materials Performance to accomplish this objective. The Institute, located in Wichita, Kansas, has global expertise in aircraft research, design, testing, and certification.

"The Institute's new National Centre for Advanced Materials Performance will develop the process by which aviation composite materials and advanced materials will be validated through a centralised database. These quality assurance standards will be used by all aircraft and parts manufacturers to reduce costs and cycle times for new products," said Dr. John Tomblin, Executive Director of the National Institute for Aviation Research.

"The National Institute for Aviation Research currently provides some 70% of the composite material research undertaken by the U.S. Federal Aviation Administration (FAA). The Institute will make the most of this extensive composite experience in developing the new national standards.

Increasing the efficiency of advanced material applications for new aircraft models and decreasing the cost of materials will be the primary focus of the Institute's new centre for advanced material performance.

"The Institute expects a trend towards more prevalent use of composite materials, said Executive Director Tomblin. The two major large transport aircraft manufacturers demonstrate this anticipated growth with the introduction of the Boeing 7E7 Dreamliner (Now designated the Boeing 787) and development of the Airbus A380 family, which both utilise considerable composite materials technology.

"Advances in vehicle development will likely accelerate during the next decade as new emerging technologies are applied to design and placed into production throughout the aircraft industry," said Tomblin, who also heads the Institute's Composites Laboratory and Structures Laboratory.

Aging Aircraft to Evaluate Beechcraft Starship and B737 Tail

In addition to the National Institute for Aviation Research in a bid to understand more about how composite, non-metallic structures age have begun research on a Beechcraft Starship and some Boeing 737 airliner composite tail structures at their Aging Aircraft and Composites laboratory.

The Starship, developed in the late 80s using an all-composite construction, was in production until December 1994, just two years after it entered commercial service. Said to be ahead of its time, the conservative certification requirements diminished the Starship's performance and economic viability. Only 53 Starships were produced.

Data generated from this program will provide industry with a better understanding of the aging phenomenon on the composite aircraft structure. Upon completion, the results will be used by the Federal Aviation Administration to assess the efficacy of the current emerging non-destructive investigation (NDI) methods to detect flaws.

Some of the issues the program will investigate include the:

- changes in mechanical properties using coupon and element level testing,
- degradation in physical properties and resin chemistry,
- effectiveness of repairs,
- material degradation due to heat, humidity and ultraviolet (UV) radiation
- bearing conditions and or failures around holes and fasteners.

The program is divided into two phases:

The first phase will address NDI and materials element level aging phenomenon of the structural components of the aircraft. The second phase of the program will address a full-scale test to assess the aircraft residual fatigue life the wing would be able to sustain after being in service for years.

"With the large number of aircraft flying with composite components, it is imperative that as an industry we understand the effects of aging phenomenon on the performance of the composite structure and to give recommendations pertaining to viability of composites versus metal aircraft structures.

New Gulfstream Jet

Gulfstream Aerospace has rolled out the first wide-cabin, high-speed G150 business jet aircraft. The G150 manufactured at the Israel Aircraft Industries (IAI) facility in Tel Aviv, Israel, was presented to the certifying authorities, supplier representatives and members of Gulfstream's G150 development team, many of whom work in Tel Aviv to oversee the building of the Gulfstream-designed aircraft in collaboration with the IAI development team.

First announced in September 2002, the G150 remains on schedule for first customer deliveries in the third quarter of 2006 the wide-cabin, high-speed G150 is on schedule for first customer delivery in the third quarter of the year.

Once built and certified by both the Federal Aviation Administration and the Israel Civil Aviation Authority, the first G150 will be delivered to Gulfstream's Dallas facility for the final phase of its manufacturing.

The G150 is an entirely new cabin design for Gulfstream. The G150's cabin height is just three inches shorter than in the large-cabin G450 and G550 series aircraft. The resulting effect is the G150's spacious cabin, designed and outfitted by the same team who design and install interiors for Gulfstream's larger aircraft.

Bryan Moss, president, Gulfstream said "We designed this aircraft to meet the needs of specific customers who use their aircraft primarily to transport eight or fewer passengers between cities within a continent," added Moss. "G150 owners will appreciate the operating efficiencies associated with this aircraft as well as the benefits of Gulfstream's world-renowned standard of excellence in product design, innovation and product support."

The G150 can accommodate six to eight passengers in a choice of several cabin configurations. Its wide-body fuselage provides stand-up headroom, ample aisle space and generous legroom and headroom when seated.

Powered by two Honeywell 731-40AR engines, the G150 can reach speeds of up to Mach .85 and altitudes of 45,000 feet, well above commercial traffic and weather. At a long-range cruise speed of Mach .75, the G150 can fly four passengers non-stop up to 2,700 nautical miles, longer than any other aircraft in its class. That's the equivalent of Los Angeles to New York, London to Moscow.

www.gulfstream.com