The National Aging Aircraft Research Program

As a result of accidents at the end of the last decade, Congress passed the Aviation Safety Research Act of 1988 (Public Law 100-591) and increased the scope of the Federal Aviation Administration (FAA) mission to include research on methods for improving maintenance technology and detecting the onset of cracking, delamination, and corrosion of aircraft structures.

In response, the FAA developed the National Aging Aircraft Research Program (NAARP). As a result of concerns relating to the increasing age of the air carrier fleet, the FAA is conducting research to ensure the continued airworthiness of high-time, high-cycle aircraft. The research in the NAARP includes the areas of structural integrity, corrosion, inspection systems, aircraft engines, airborne data monitoring systems, maintenance and repair, and rotocraft structural integrity.

Structural Integrity Research

The research activities in this program area include both the large and small transport. Of primary concern is the effect of simultaneous cracks at multiple structural details on structural integrity of aircraft structures. Predictive methodologies to analyze structural designs in terms of their damage tolerance capabilities and fatigue lives are under development. Tests are ongoing to validate the analytical methods under development. The photograph on the right shows the pressurized curved-panel test fixture that will be operated at the Technical Center. Damage tolerance principles, commonly used for large transport aircraft, are being extended to commuter aircraft. For further information, contact Paul Tan, (609) 485-6665, or John Bakuckas, (609) 485-4784.

Inspection Systems Research

The research in this program area is focused on developing new methods and techniques to detect cracks, corrosion, and disbonding. A large part of the basic research is done at the Center for Aviation Systems Research (CASR), which is composed of Iowa State University, Northwestern University, Wayne State University, and Tuskegee University. The FAA Aging Aircraft Nondestructive Validation Center (AANC) at Sandia National Laboratory then conducts validation and final development of inspection procedures. Aging aircraft and other specimens in the FAA Sample Defect Library housed at AANC are used to conduct the validation tests. For further information, contact Christopher Smith, (609) 485-5221.

Corrosion Research

This research is focused in two areas: investigation of corrosion-fatigue interaction and development of corrosion control procedures. The research will lead to the development of a more realistic structural integrity evaluation of fuselage lap joints, and other aircraft design details, which includes the effects of corrosion. For further information, contact Thomas Flournoy, (609) 485-5327.

Aircraft Engine Research

Research in this program area is focused in two areas. The first will develop a crack growth-based predictive methodology for engine static components and use that methodology to derive a maintenance and inspection

Safety

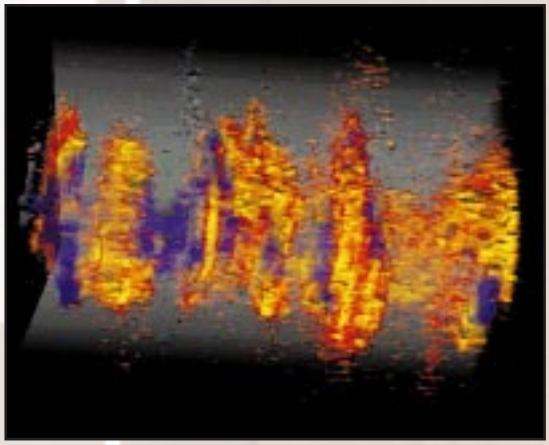
management program for commercial pressurized engine cases that may rupture due to fatigue cracks, initial flaws, or weld repairs. The second is developing improvements in titanium billet inspection practices and technology, analysis and enhancement of inspection reliability, and improvements to in-service inspections for engine components. A computer visualization of titanium defect is shown on the right. This research is being done by the Engine Titanium Consortium, which is made up of Iowa State University, General Electric, Pratt & Whitney, and AlliedSignal Engines. For further information, contact Richard Micklos, (609) 485-6531.

Airborne Data Monitoring Systems Research

A video landing data acquisition system has been developed to collect data on typical landing impact conditions for both large and small transport aircraft, and a series of surveys are underway at commercial airports. In addition, flight loads data are being collected for large and small transport aircraft. For further information, contact Thomas DeFiore, (609) 485-5009.

Maintenance and Repair Research

Improved maintenance and repair technologies are being identified and maintenance and repair practices from effective programs are being incorporated into appropriate user documentation. The results from this research will provide input for the Advisory Circular (AC) 43.13 series and other AC series. The input will include current and new information on airframe metal repairs, maintenance, and inspection. For further information, contact James Newcomb, (609) 485-5720.



Rotorcraft Structural Integrity

The research in this area is focused on two activities. The first will provide input for an Advisory Circular on health and usage monitoring system certification criteria for rotorcraft. The second will address the use of damage tolerance methods to establish inspection intervals for existing and new rotorcraft designs. For further information, contact Dy Le, (609) 485-4636.

To find out more about the National Aging Aircraft Research Program, contact:

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