

Aircraft Catastrophic Failure Prevention Program

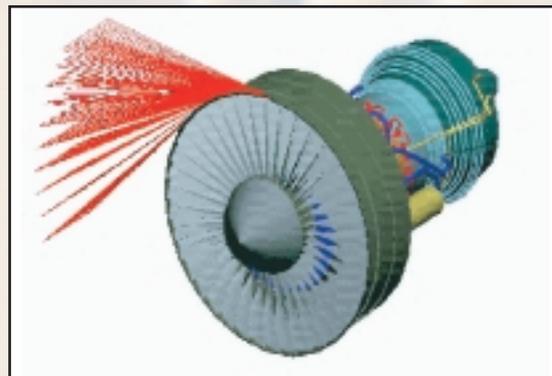
The FAA forecasts that U.S. carriers alone will carry 1.2 billion passengers by the year 2015. This will occur with a 40 percent increase in the number of flights.

If the current accident rate remains unchanged, some experts predict accidents resulting in numerous fatalities and an aircraft hull loss occurring as frequently as every 7 to 10 days. This potential is the primary driver behind the need to reduce the accident rate toward the zero accident goal. The Aircraft Catastrophic Failure Prevention Program is working to make sure this prediction does not become reality.

The Aircraft Catastrophic Failure Prevention Program was created by Congress in 1990 (Public Law 101-508) with the intended goal of improving aircraft system safety by developing technologies and methods that will assess the risk and prevent defects, failures, and malfunctions of aircraft, aircraft components, and aircraft systems which could result in catastrophic failure of aircraft.

The Aircraft Catastrophic Failure Prevention Program focuses principally on mitigating the hazards associated with propulsion, flight control, and structural failures that occur during operation. Priorities for research are set by using historical accident data and National Transportation Safety Board (NTSB) recommendations to identify areas for research:

- Turbine engine uncontainment events, including mitigation and modeling of uncontainment and the aircraft vulnerability to uncontainment. This research area was identified as the top priority by the Aerospace Industries Association Continued Airworthiness



Assessment Methodologies report and is responsive to NTSB recommendations A-72-006, A-82-38, A-84-060, A-90-170, and A-90-169.

- Working under the Airworthiness Assurance Center of Excellence (AAE), the FAA, in response to NTSB recommendation A98-37, is conducting research into copper/silver sulfide deposits found on components recovered from the TWA-800 accident. The research will characterize the deposits and potential hazards they may pose to safety.
- Examining the issues associated with accidents and incidents initiated by propulsion malfunctions and working with industry to develop solutions to this critical problem, this research area was identified as the second priority by the Aerospace Industries Association Continued Airworthiness Assessment Methodologies report and is responsive to NTSB recommendations A-79-105, A-87-009, and A-95-098.

FAA engineers are updating Advisory Circular 20-128 "Design Precautions for Minimizing Hazards to Aircraft From Uncontained Turbine Engine and Auxiliary Power Unit Rotor Failures" and are working with industry to develop a calibrated design system, which will be used to minimize



hazardous effects of turbine engine (including auxiliary power unit) rotor failures on transport aircraft. This effort, involving specialists from the FAA, military, industry, and national laboratories, is targeted for completion in the year 2000.

The AACE effort investigating copper/silver sulfide deposits is being led by SRI International. Subcontractors and partners include University of Dayton Research Institute, Arizona State University, Boeing, and BF Goodrich. This effort has been closely coordinated with the NTSB and the United States Air Force Wright Laboratories. The FAA effort has identified an electrochemical growth mechanism and will be conducting further studies on ignition and hazards associated with the deposits.

Again, working with industry and the Aerospace Industries Association Transport Committee, the FAA will develop improved engine failure data. Current simulator training is based on anecdotal assumptions rather than engine manufacturer and aircraft manufacturer data. This effort will form the foundation for simulator qualification and malfunction identification materials. A long-term goal is to develop an engine failure warning system that could be used to monitor engines in real time which should allow for timely maintenance, and in the event of an in-flight malfunction, assist the crew in identifying the problem and corrective actions. Additionally, a technical report will form the basis for new regulations as well as advisory circular material.

Future work also includes the development of appropriate modeling techniques and necessary guidance material to develop an Advisory Circular (AC20-XX) to predict the effects on aircraft structure, system, and flight crew from an imbalanced engine caused by loss of a fan blade or blades or a bearing failure.

The Aircraft Catastrophic Failure Prevention Program will introduce technologies and design procedures that will reduce the number of catastrophic accidents. By using enhanced computational capabilities and vulnerability analysis techniques, it will provide technologies and certification criteria to increase the survivability of transport aircraft with extensive failures, malfunctions, or damage.

To find out more about the Aircraft Catastrophic Failure Prevention Program, contact:

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