The FAA Aging Airplane Program Plan for Transport Aircraft

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INTRODUCTION

The FAA Aging Airplane Program is focused on five program areas: maintenance, transport airplanes, commuter airplanes, airplane engines, and research. These programs are complimentary and concurrent, and have been in effect since 1988. They are addressing the Aging Airplane challenge through different methods, including policies, research, procedures, and hardware development. Each program is carefully monitored and progress tracked to ensure the needs of the FAA, industry, and flying public are being met.

TRANSPORT AIRPLANE PROGRAM

Dramatic improvements in airliner performance, capacity, and safety have led to a significant increase of passenger travel. As early as 1968, the FAA recognized that large passenger transport airplanes were remaining in service longer than had been originally anticipated, and it organized the first conference on aging aircraft. In 1978, new procedures for maintaining the safety of airplane structures were adopted for new airplanes, and by 1981 the FAA had published Advisory Circular (AC) 91-56, relating these new procedures to maintaining the structural integrity of older airplanes. Airplane manufacturers responded to this AC by developing Supplemental Structural Inspection Documents (SSIDs) for their older model airplanes. By 1984, compliance with the first SSIDs was made mandatory by Airworthiness Directive.

The obvious failure of this system was the Aloha Airlines accident. This accident was an indictment of current industry and FAA practices devoted to preventing an accident of this type. Such an indictment dictated that the FAA and the industry it regulates reexamine these practices. The system in place in 1988 had provided millions of passenger miles of safe air transportation past original manufacturers' expected operational life criteria. This system is still providing safe air travel daily. Further examination focuses on improving this system.

OBJECTIVES

The objective of the Aging Airplane Transport Program is to assure the continued airworthiness of large transport airplanes as long as they remain in commercial service. To accomplish this, the Transport Airplane Directorate will take engineering actions in each of the following areas:

- The susceptibility of the Boeing cold bonded lap joints to corrosion and multiple site damage fatigue will be corrected.
- The adverse human factors resulting from heavy dependance on intensive inspections to maintain safety in aging airplanes will be corrected.
- The lack of standards for the control and prevention of corrosion in airplane structure will be corrected.
- The inability of the FAA's earlier aging airplane action (i.e., the current Supplemental Inspection Program ADs) to prevent the Aloha Airlines accident will be studied and appropriate changes will be made.
- The need for the use of damage tolerance principles in the design of repairs for the current generation of airplanes will be satisfied.

- The need for guidance material for operators and inspectors about how to maintain older airplanes will be satisfied.

- The need for first-hand familiarity by FAA certification engineers of the condition of in-service airplanes will be satisfied.

- The lack of a fatigue test basis for some existing transport designs to predict the onset of multiple site damage will be corrected. The lack of a fatigue test based on some existing transport design will be accounted for by a combination of techniques.

- Means will be provided for the FAA to evaluate the effectiveness of the aging airplane initiative so that the program can be altered if necessary.

- The need for better communication within the aviation community on issues related to the maintenance of airplanes will be studied and addressed.

- The need for better engineering support of FAA maintenance inspectors in the evaluation of airplane maintenance programs will be satisfied.

- The susceptibility of aging aircraft structures to multiple site damage or multiple element damage will be assessed for the eleven major aging transport models. Structures determined to be susceptible will be modified or monitored by inspection to preclude failure.

APPROACH

The FAA will work with airplane operators, manufacturers, other US federal agencies, and non-US airworthiness authorities to develop comprehensive programs to deal with the aging airplane issues raised by the Aloha accident. Coordination and identification of expectations and concerns is accomplished via the Aircraft Airworthiness Working Group, which has been established under the auspices of the Aviation Regulatory Advisory Committee. This group is composed of representatives from the Federal government, airplane operators, and airplane manufacturers. The manufacturers and operators provide the labor necessary to design corrective actions within this program. The FAA provides the overall management for the program by establishing its goals and objectives, assuring their accomplishment, generating necessary rules, and monitoring program effectiveness. It has also established a Technical Oversight Group for Aging Airplanes (TOGAA). This body is composed of independent technical experts that critique the FAA's program.

PROGRAM ELEMENTS

Lap Joints. This effort will implement corrective action for the cold bonded fuselage lap joints of specific Boeing model airplanes.

Schedule:

Issue ADs for Boeing 727/737/747 Airplanes	completed

Modification and Inspection Program. Aging airplanes will be modified to reduce reliance on intensive structural inspection for known fatigue cracking problems. Inspections will be mandated for aging airplane structures susceptible to multiple site damage or multiple element damage in cases where structural modification is determined not appropriate.

Schedule:

Issue Modification ADs for Eleven Major Transport Models	completed
Issue Inspection ADs for Eleven Transport Models as necessary	1/1/93

Corrosion Maintenance. A mandatory corrosion prevention and control program will be added to airplane operators' maintenance programs. This will ensure that corrosion is maintained at acceptable levels.

Schedule:

Support for Boeing Model Corrosion Program	complete
Issue ADs for the Boeing 707,727,737,&747 Models	complete
Issue ADs for the Seven Remaining Major Transport Models	10/1/92
Continued Engineering Support	on-going

Supplemental Inspection Program (SIP) This task will review and update SIPs for the eleven major transport models. Although already mandated by AD, this action will evaluate these models for deficiencies similar to those exposed by the Aloha Airlines accident.

Schedule:

Issue AD Revision for the Boeing Model 707	complete
Issue AD Revision for the Boeing Model 727	complete
Issue AD Revision for the Boeing Model 737	complete
Issue AD Revision for the Boeing Model 747	complete
Issue AD Revision for the Lockheed Model L1011	1/1/94
Issue AD Revisions for the Remaining Six Models	1/1/93

Repairs Assessment. Existing structural repairs will be assessed to assure adequate fatigue resistance and frequency of inspection. Results will be applied to future repairs.

Schedule:

Joint FAA/Industry Repair Survey	5/1/92
Industry Plan of Action Complete	10/1/92
Issue Regulation for Repairs Assessment Program	1/1/95

Research. An extensive research program will be conducted to improve the effectiveness of aircraft maintenance. Specific subject areas are inspections, repairs, structural fatigue prediction, material durability, and human factors. This Program is managed by the FAA Technical Center with support from the Transport Directorate and FAA offices.

Training. FAA engineers and others will be trained in the use and application of damage tolerance principles as they apply to airplane maintenance.

Schedule:

Conduct Periodic Workshops	on-going
FAA Certification Engineer Training	on-going

Airline Visits. Teams of FAA structural engineers will visit airlines to determine the needs of airplanes in service.

Schedule:

Conduct Airline Visits	on-going

Certification Standards. The present Transport Airline Certification Standards will be updated to establish minimum fatigue testing requirements for new models.

Schedule:

Issue Final Rule for Revision to FAR 25.571	6/1/93
Issue Advisory Circular to Accompany Rule Change	6/1/93

Structural Audit. The FAA will regulate a process that requires structural audits of older model airplanes. This audit will identify any supplemental inspections or modifications needed to extend manufacturers' expected operational life parameters.

Schedule:

Obtain Recommendations from the AATF(ARAC)	10/1/92
Publish NPRM	4/1/93
Issue Final Rulemaking Action	10/1/93
Annual Review Meetings for Foreign Models (3/year)	on-going
Annual Review Meetings for Domestic Models (8/year)	on-going
Publish AD Revisions	on-going

Transport Seminars. The FAA will conduct workshops and seminars to inform the worldwide aviation community of its concerns and actions regarding aging airplanes.

Schedule:

Aging Airplane Seminar for South America	complete
Aging Airplane Seminar for Caribbean/Central America	complete
Aging Airplane Seminar for Jakarta, Indonesia	complete
Aging Airplane Seminar for northern Africa	2/28/93
Aging Airplane Seminar for central/southern Africa	10/31/93

Maintenance Guide. A generic Aging Airplane Maintenance Guide has been developed by the AATF in conjunction with the Maintenance Program of this Plan.

International Conferences. Since 1988, the FAA has actively participated in conferences and meetings concerning aging airplanes. The FAA continues to participate in support conferences.

Schedule:

Attend ICAO Meeting on Continued Airworthiness	complete
International Pacific Air and Space Technology Conference/29th Aircraft Symposium	complete
Sponsor 3rd International Aging Aircraft Conference	complete
AATF Industry Committee Meeting on Wide Spread Fatigue Damage	complete
Support Conferences (5/year)	on-going

Oversight. The Transport Airplane Directorate will continue to provide advice to and liaisons with industry. Continued close coordination of effort is essential to continued success of this program.

Schedule:

Attend AATF Steering Committee Meetings	on-going
Attend Meetings with TOGAA	on-going
Attend Meetings with Manufacturers and Aircraft Certification Offices	on-going

Resources

The FAA has approved eight full time positions to accomplish the Aging Transport Airplane Program. These people will be located throughout the Large Airplane Directorate, and will attend meetings and conferences, approve SIDs, develop regulatory and policy actions, and write ADs that result from the Agency's Aging Transport Airplane Activity.

The airplane manufacturers and operators, under the auspices of the AATF, provide the engineering talent and experience necessary to conduct airplane structure evaluations and to design and implement corrective action programs.