

Addressing RAMs

In April of 2000, an FAA team was chartered to address standardization of the SSIP ADs with regard to RAMs. The team was formed due to concerns of operators regarding different approaches to addressing RAMs for the McDonnell Douglas series airplanes versus the Boeing Model 727 and 737 series airplanes. Also, since the issuances of AD 98-11-03 R1 and AD 98-11-04 R1, operators have had various problems addressing RAMs. As announced in a Notice of Public Meeting, published in the **Federal Register** on January 15, 2003 (68 FR 2103), a public meeting will be held to present our view and to receive comments from the public. Due to the many issues that have arisen in addressing RAMs, this proposed AD will not require damage tolerance-based inspections for RAMs on Boeing Model 747 series airplanes.

Aging Airplane Safety Rule (AASR)

The AASR was published in the **Federal Register** on December 6, 2002 (67 FR 72726). That rule requires the maintenance program applicable to affected airplanes to include damage tolerance-based inspections and procedures that include all major structural repairs, alterations, and modifications. The compliance time for these procedures is four years after December 8, 2003 (the effective date of the AASR). The FAA intends to eventually require damage tolerance-based inspections for RAMs during subsequent rulemaking. (See the information under the "Interim Action" paragraph of this proposed AD.)

Other SSIP Issues

Since the issuance of the current SSIP ADs for Model 747 series airplanes (ADs 94-15-12 and 94-15-18), the FAA has reconsidered the following two aspects of the existing SSIP:

1. *Candidate fleet vs. inspection threshold approach.* Paragraph 4.4 of AC No. 91-56, Change 2, dated April 15, 1983, states, "Inspection thresholds for supplemental inspections should be established. These inspections would be supplemental to the normal inspection including the detailed internal inspections." Moreover, paragraph 4.4.2 of AC No. 91-56 states, " * * * this threshold should be such as to include sufficient [high-cycle] airplanes in the inspection to develop added confidence in the integrity of the structure . . . "

A properly established inspection threshold ensures that: (1) The SSI inspections are accomplished; (2) fatigue cracks in SSIs are detected in a timely manner; (3) airplanes are

automatically added to the SSIP; and (4) the SSIP includes a statistically valid number of airplanes.

Among other things, SSID D6-35655 and Revision E of SSID D6-35022 (referenced as the appropriate service information in ADs 94-15-12 and 94-15-18) define a candidate fleet approach to ensure that fatigue cracks in SSIs are detected in a timely manner in the entire fleet of Model 747 series airplanes. The initial candidate fleet of Model 747-100 and -200 series airplanes, as defined in SSID D6-35022, consisted of a number of airplanes that had exceeded 10,000 total flight cycles by June 30, 1983. The initial candidate fleet of Model 747SR series airplanes, as defined in SSID D6-35655, consisted of a number of airplanes that had exceeded 12,000 total flight cycles by January 1, 1985. In other words, Boeing considered 10,000 total flight cycles for Model 747-100 and -200 series airplanes, and 12,000 total flight cycles for Model 747SR series airplanes, to be the threshold for the airplanes in the candidate fleets. Those airplanes were the most likely airplanes in the fleets to experience initial fatigue damage, because they had the highest number of flight cycles. Boeing produced those SSIDs with the assumption that the airplanes in the candidate fleets would continue to represent the entire fleet and would have the highest number of flight cycles in the fleet.

Under the existing SSIP, Boeing intended to periodically review the airplanes in the candidate fleet for significant changes in fleet distribution, composition, or utilization, and update of the candidate fleet, if any significant change was detected. It was intended that the FAA would then mandate any change to the SSID through the rulemaking process.

The FAA finds that the candidate fleet approach is deviating from Boeing's original philosophy in that the candidate fleet has not been updated to reflect changes in the fleet. This situation could result in a statistically invalid number of airplanes in the SSIP and undetected fatigue cracks in SSIs. The candidate fleet approach also does not automatically account for non-candidate airplanes that eventually accumulate more flight cycles than those of certain candidate airplanes. High-cycle airplanes are more likely to experience initial fatigue damage in the fleet. The confidence in the structural integrity of the fleet of airplanes could be reduced if high-cycle airplanes are excluded from the SSIP.

The FAA has reconsidered the candidate fleet approach described in SSID D6-35655 and Revision E of SSID

D6-35022 because it does not meet the guidelines of AC No. 91-56. We have also determined that the Model 747 SSIP must contain inspection thresholds for all Model 747 series airplanes to ensure the timely detection of fatigue cracks in the SSIs.

The FAA has reviewed the thresholds derived from Boeing's statistical analysis. The analysis is based on a certain probability that cracks will be detected in the inspected fleet before they initiate on other airplanes that have not been inspected. We find that the thresholds recommended in Revision G of SSID D6-35022 for the Model 747 airplane fleet are acceptable. Therefore, we have determined that a threshold of 20,000 total flight cycles or 100,000 total flight hours, whichever comes first, on wing structure, and 20,000 total flight cycles on all other structures are necessary in order to produce a statistically valid assessment of the service history for these airplanes. The original threshold for the Model 747SR series airplane was set higher by the manufacturer because it was believed that these airplanes were not subject to the same fatigue cycles due to use of a lower cabin differential pressure. We have since determined that an adjustment of flight cycles due to a lower cabin differential pressure is not substantiated and will not be allowed for use in determining the flight cycle threshold and inspection intervals of the SSID program. Therefore, the threshold for Model 747SR series airplanes is now the same as that of other Model 747 series airplanes.

It should be noted that, although the proposed AD specifies a threshold, the FAA may approve requests for adjustments to the compliance time (i.e., under the provisions of paragraph (g)(1) of this proposed AD) provided that no cracking is detected in the airplane structure. The request should include a new proposed inspection threshold and must include data to substantiate that such an adjustment would provide an acceptable level of safety.

Operators also should note that the alternative inspection threshold may be based solely on the analysis of the data of the existing fleet. However, the FAA has determined that the analysis that derives the new inspection threshold must include: (1) Data relevant to a sufficient number of high-cycle airplanes, and (2) data that show accomplishment of the inspections of the SSIs. An adequate statistical sampling size will provide confidence in the structural integrity of the fleet of airplanes. Therefore, additional airplanes may need to be added to the inspected fleet until a sufficient number