



News from the Hill

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FAA Damage Tolerance Proposal Could Be a Heavy Burden for AEA Members With STCs

Are you taking damage tolerance into account in the work you perform? The FAA has published new draft information on damage tolerance and is seeking public comments.

The guidance comes in the form of two proposed rules, which would require design approval holders to develop and make available damage tolerance information, and a proposed advisory circular, entitled “Damage Tolerance Inspections for Repairs” (tentatively known as AC 120-XX).

There is a strong likelihood most AEA members who perform installations on transport category (Part 25) aircraft would be affected by these regulations and could be subjected to a significant engineering burden in order to comply with these new damage tolerance regulations.

Damage tolerance often is thought of in the context of repairs, but it also should be considered in the context of some alterations performed by AEA members. It can be a factor, for example, anytime the skin of the aircraft is punctured. This includes circumstances such as the introduction of a new antenna on the exterior of the aircraft — a common endeavor for avionics installers. Have you given thought to the damage tolerance features of an antenna installation? If you are adding doublers, you have thought about the issue, whether you realize it or not.

The proposed regulations apply not only to future alterations, but they also impose a burden — potentially a significant burden — on some AEA members to substantiate past work as well.

What is Damage Tolerance?

Damage tolerance is concerned with the structural response and integrity associated with a given damage state of a structure. Essentially, it is a calculation of the likely possible results of damage to a structure and the related failure modes. One purpose of damage tolerance is to help drive engineering and design practices resulting in structures that will not fail (or are less likely to fail) when subjected to the most likely permutations damage. Variables in a damage tolerance analysis include the type, extent and location of the damage.

Under the proposed rule, anyone who holds an STC on a Part 25 aircraft will need to analyze that STC to identify and list fatigue critical alteration structures.

Formal use of damage tolerance engineering goes back at least to 1972, when the U.S. Air Force adopted damage tolerance as a method of fatigue substantiation. The FAA began to require damage tolerance engineering in transport category airplanes in 1978 and for transport category rotorcraft in 1989.

The FAA currently is focusing on damage tolerance for several reasons, but one driver is the concern over fatigue cracking. Fatigue cracking has been a major aviation safety concern for many years, and has been a documented contributing factor to a number of accidents. The current direction of damage tolerance, however, goes far beyond merely addressing fatigue cracking.

The FAA believes the industry has not carried out damage tolerance methods in a sufficiently comprehensive manner — this includes performing damage tolerance analysis using rigorous engineering analysis. A particular area of focus is the change in the damage tolerance analysis in a structure when the structure is subject to repair or alteration. For example, when an antenna is installed, are the doublers

that are installed sufficient to return the aircraft to a condition in which the damage tolerance analysis remains static, or does the new configuration change the damage tolerance features of the aircraft?

Because damage tolerance can be used to help build maintenance programs (such as by scheduling mainte-

nance of an article before its damage tolerance is degraded), changes in the damage tolerance analysis wrought by alterations to a structure can be very important to those who create continuous airworthiness maintenance schedules.

What is the FAA Proposing?

The FAA is offering a suite of two major rulemaking proposals and a proposed advisory circular that will address damage tolerance issues from the point of view of the design approval holder and the operator.

The FAA's rulemaking proposal would require those performing repairs and alterations to better take into account the adverse effects repairs, alterations and modifications may have on fatigue cracking and the inspection of this airplane structure. It also would require "holders of design approvals" to make available to operators damage tolerance data for repairs and alterations to fatigue critical airplane structure. This is meant to support the operator's requirements under the aging aircraft rules.

It is important to remember certain damage tolerance assessment already is required. For example, the changed products rule (14 C.F.R. 21.101, as amended) applied the most recent design regulations to major design changes incorporating significant changes. A structure that was not subject to damage tolerance analysis but is now the subject of an STC, might invoke the requirement for such analysis if the most recent regulations applying to that structure required damage tolerance analysis. Thus, the new regulations are meant to "fill in the gaps" and require damage tolerance analysis in other instances.

How Does This Affect AEA Members?

Remember, the TC holder is not

the only design approval holder in the loop. Supplemental type certificates (STCs) and field approvals are examples of design approvals. Under the rule as it is being proposed, anyone who holds one or more STCs on a Part 25 aircraft would be affected by the proposed rule.

The term "Part 25 aircraft" includes all aircraft with a maximum certificated takeoff weight of more than 12,500 lbs. This will include aircraft like the Super King Air, most business jets and turboprops, such as the Fokker F27 or Saab 340.

Under the proposed rule, anyone who holds an STC on a Part 25 aircraft will need to analyze that STC to identify and list fatigue critical alteration structures — the proposed rule only applies to Part 25 aircraft because the related damage tolerance rules only apply to Part 25 aircraft and Part 121/129 operators. In fact, certain aircraft known to be not flown by air carriers are specifically excluded in proposed section 25.1823(h). STC holders will have to examine existing and future STCs, existing and future non-STC alterations, and existing and future repair data associated with the alterations.

It is important to note the proposed language applies the mandate to "all alterations" developed by an STC holder. Thus, it would appear an STC holder is required to perform damage tolerance analysis on STCs and also on field approvals and other alterations developed by the STC holder. This imposes a burden on field-approval applicants who hold STCs; however, apparently it is not imposed on field-approval applicants who do not hold STCs.

Under the proposed rule, most of this damage tolerance information will need to be developed and submitted by June 30, 2009. The proposed rule also will require affected STC holders to

submit compliance plans no later than 180 days after the effective date of the rule (whenever it becomes final). All of this is designed to support aging aircraft regulations that will be imposed on operators in 2010.

The FAA says this proposal is needed to support operator compliance with the requirement to include damage tolerance inspections and procedures in their maintenance programs, and to enable operators to take into account the possible adverse effects of repairs and alterations on fatigue critical structure. The intended effect of this proposal is to ensure the continued airworthiness of fatigue critical airplane structure by requiring design approval holders to support Part 121 air carrier compliance with specified damage tolerance requirements.

The new regulatory requirements will relate to rules that apply to Part 121 air carrier damage tolerance initiatives — but that do not apply to Part 135 operators or to Part 91 operators.

For many AEA members who have acquired STCs, this could represent a major undertaking for Part 25 aircraft that are mostly not being flown by Part 121 air carriers because aircraft will be covered under the rule as long as there is at least one of that aircraft being flown by a Part 121 carrier (and there are some surprising things being flown by Part 121 carriers, particularly cargo carriers).

Many AEA members will have to perform this analysis for STCs that have been installed on particular aircraft that are not flown under Part 121 and are not covered under any operators' damage tolerance rules, based on the language of this regulation.

Make Your Voice Heard

The FAA is seeking comments on the proposed damage tolerance rule by July 20, 2006. If you believe this regulation

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will apply to your business, make your voice heard. Comments should be identified by Docket Number FAA-2005-21693, and can be submitted electronically at <http://dms.dot.gov>.

If you file comments on this rule-making proposal, submit a copy of your comments to AEA for its records as well.

Comments on the proposed advisory circular are due by June 20, 2006. They can be submitted by mail to the Federal Aviation Administration, Attention: Greg Schneider, Airframe/Cabin Safety Branch, ANM-115, FAA, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Ave. SW., Renton, WA 98055-4056.

Comment on the rule asking design approval holders to impose limits on operators' use of the aircraft are due by July 17, 2006, and should be submitted electronically at <http://dms.dot.gov>. Make reference to Docket Number FAA-2006-24281.

A copy of the proposed rule requiring design approval holders to compile damage tolerance information is available at http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=2006_register&docid=fr21ap06-14.

A copy of the availability announcement for the proposed advisory circular is available at http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=2006_register&docid=fr21ap06-114.

A copy of the proposed rule requiring design approval holders to establish operating limits on their designs is available at http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=2006_register&docid=fr18ap06-22. □