DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 33

[Docket No.: FAA–2006–23732; Amendment No. 33–22]

RIN 2120–AI72

Airworthiness Standards; Aircraft Engine Standards for Engine Life-Limited Parts

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: The FAA is amending the certification standards for original and amended type certificates for aircraft engines by modifying the standards for engine life-limited parts. This final rule establishes new and uniform standards for the design and testing of life-limited parts for aircraft engines certificated by the FAA and the European Aviation Safety Agency (EASA). This rule retains the current lifing requirements, introduces damage tolerance requirements into the design process, and strengthens cooperation between engineering, manufacturing, and service elements of turbine engine manufacturers. These new requirements provide an added margin of safety and will reduce the number of life-limited parts failures due to material, manufacturing, and service induced anomalies. Additionally, this action adds new standards for the design of reciprocating engine turbocharger rotors.

DATES: This amendment becomes effective November 5, 2007.

FOR FURTHER INFORMATION CONTACT: Tim Mouzakis, Engine and Propeller Directorate Standards Staff, ANE–110, Engine and Propeller Directorate, Aircraft Certification Service, FAA, New England Region, 12 New England Executive Park, Burlington, Massachusetts 01803–5299; telephone (781) 238–7114; fax (781) 238–7199, e-mail: *timoleon.mouzakis@faa.gov.*

SUPPLEMENTARY INFORMATION:

Authority for This Rulemaking

The FAA's authority to issue rules regarding aviation safety is found in Title 49 of the United States Code. Subtitle I, Section 106 describes the authority of the FAA Administrator. Subtitle VII, Aviation Programs, describes in more detail the scope of the agency's authority.

This rulemaking is promulgated under the authority described in Subtitle VII, Part A, Subpart III, Section 44701, ''General Requirements.'' Under that section, the FAA is charged with prescribing regulations for practices, methods, and procedures the Administrator finds necessary for safety in air commerce, including minimum safety standards for aircraft engines. This regulation is within the scope of that authority because it updates the existing regulations for aircraft engine life-limited parts.

Background

Manufacturing-induced anomalies in engine disks have caused several fatal airplane accidents, notably in Sioux City, Iowa, in 1989, and in Pensacola, Florida, in 1996. The DC–10 crash in Sioux City was caused by a titanium material anomaly created during the material melting process. The MD–88 accident in Pensacola was attributed to a fatigue crack which initiated from an abnormal microstructure created during manufacturing. Most of the uncontained engine failures have been traced to material, manufacturing or operations/maintenance induced anomalies. Recent examples include:

- Failure of a CF6 engine high pressure stage 1 turbine disk on a Boeing 767 airplane during a ground test at Los Angeles International Airport in June 2006, that was attributed to a manufacturing-induced anomaly in a rim slot; and
- In-flight failure of a CF34 engine fan disk on a Bombardier CRJ–200 airplane departing Denver International Airport on January 25, 2007. The root cause of this failure is currently under investigation.

Industry data has shown that manufacturing-induced anomalies have caused about 40 percent of recent rotor cracking and failure events. Data for the period 1984 to 1989 indicates that uncontained engine failures due to material, manufacturing and maintenance induced anomalies occur at the rate of 1.2 per 10 million flights or approximately 3 events per year. Due to these accidents and the supporting data, the FAA determined the need to revise engine certification standards related to the design of engine parts whose failure would result in a hazardous engine condition.

In addition, a group representing the FAA, the engine industry, and European aviation authorities has worked since 1989 to revise and harmonize the U.S. and European engine certification requirements. This rule, which is based on this group's recommendations, creates common U.S. and European engine requirements for turbine engine life-limited parts (called ''critical parts'' in European regulations).

Definitions of Terms Used in the Rule

The following definitions are provided, but are not part of the rule itself:

- Primary failure: Failure of a part that is not the result of a prior failure of another part or system.
- Failure: Separation of a part into two or more pieces such that the part is no longer whole or complete.
- Likely to result: Possible outcomes on an engine or aircraft when a part fails, regardless of probability of occurrence.

Safety Recommendation

The following safety recommendation, issued by National Transportation Safety Board (NTSB), is addressed by this rule:

- NTSB Safety Recommendation A–90–90 was issued as a result of the United Airlines accident on July 19, 1989, in Sioux City, Iowa, where 111 people died and 172 were injured. The NTSB recommended that the FAA amend 14 CFR part 33 ''to require that turbine engines certificated under this rule are evaluated to identify those engine components that, if they should fracture and separate, could pose a significant threat to the structure or systems of an airplane; and require that a damage tolerance evaluation of these components be performed.''

Regulations Affecting Static Parts

The FAA has regulated static parts for more than a decade under § 33.19(a), which requires the engine be designed and constructed to minimize the development of an unsafe condition between overhaul periods. Experience with several types of static parts has shown that fatigue failures can result in hazardous engine effects. For example, high-pressure casing fatigue failures have led to high pressure vessel bursts and fire. Issue papers initiated by the FAA, based on § 33.19, have resulted in engine manufacturers classifying a limited number of static parts as ''life-limited.'' Life-limited parts are included in the Airworthiness Limitations Section of the Instructions for Continued Airworthiness.

The new § 33.70 affects only those static parts whose failure could result in a hazardous engine effect. Therefore, only a limited number of static parts will be classified as ''life-limited parts'' and affected by the new rule. Those static parts formerly regulated under § 33.19 are more properly located under § 33.70, which is based on whether the failure of a part could cause a hazardous

engine effect rather than whether a part rotates or is static.

Summary of Final Rule

New § 33.70 replaces § 33.14. Section 33.70 introduces the term ''engine life-limited parts'' to cover rotating structural parts, as well as major static structural parts, whose primary failure is likely to result in a hazardous engine effect, as listed in § 33.75, and whose failure mode is either cycle (fatigue) or time (creep) dependent. This rule addresses all parts, rotating or static, that meet the definition of an engine life-limited part. The rule requires FAA approval of the procedures used to establish life limits and address anomalies.

This rule retains the current life methodology which limits the useful rotor life to the minimum number of flight cycles required to initiate a crack approximately 0.030 inches in length by 0.015 inches in depth. The rule requires sufficient analysis and testing to evaluate the effects of elevated temperatures and hold times as well as the interaction with other failure mechanisms (for example, high cycle fatigue, creep, and cold-dwell). The methodology used to establish life limits for static parts is similar to those used for rotating parts. For static parts, the life limit may be based on the crack initiation life plus a portion of the residual crack growth life, providing a safe margin is maintained between part retirement life and failure.

The rule also requires applicants to develop coordinated engineering, manufacturing, and service management plans for each life-limited part. This will ensure the attributes of a part that determine its life are identified and controlled so that the part will be consistently manufactured and properly maintained during service operation.

The rule introduces new requirements for applicants to conduct damage tolerance assessments to limit the potential for failure from material, manufacturing, and service induced anomalies. Applicants can use a variety of methods to conduct damage tolerance assessments. For example, applicants can use probabilistic risk assessments or design a part to have a specified crack growth life. The introduction of damage tolerance does not allow rotor components to remain in service with cracks. Rotor parts must be removed from service when the parts reach the end of their useful life as defined by the minimum number of flight cycles required to initiate a crack.

This rule removes turbocharger rotor life requirements from § 33.14 and places them in a new § 33.34.

Summary of Comments

The FAA published a Notice of Proposed Rulemaking (NPRM) entitled Airworthiness Standards: Aircraft Engine Standards for Engine Life-Limited Parts on February 2, 2006 (71 FR 5770). Nine commenters responded to the NPRM request for comments. The commenters included three turbine engine manufacturers; two domestic airplane operators, who submitted through their representative association; two foreign regulatory authorities; a domestic parts manufacturer; and an individual. The turbine engine manufacturers fully support the rule while proposing minor changes. Other commenters, including two airline operators and a parts manufacturer, believe that inclusion of structural static parts as life-limited parts in the rule would substantially increase their costs and affect the potential of small businesses to repair life-limited parts.

Static Parts

Those static parts that meet the definition of ''life-limited,'' as established by § 33.70, require FAA approval of the procedures used to establish life limits and address anomalies related to those parts.

Two airline operators and a parts manufacturer stated that the rule should not impose life limits on static parts. American Airlines stated that the FAA is introducing a new requirement that ''all structural parts, both rotating and static are to be addressed as Engine Life-Limited Parts.'' American noted that based on Continued Airworthiness Assessment Methodologies (CAAM) data from 1992 to 2000 ''the probability of occurrence of case ruptures is very small'' and ''there does not seem to be a good reason to consider static cases or other static parts as life-limited, and they should not be.'' Similarly, United Airlines ''does not see imposing life limits on this static hardware as enhancing safety.'' Chromalloy Gas Turbine Corporation found ''that the FAA has not identified sufficient, nor appropriate substantiating cause to make such a bold change as to include static structures (high pressure turbine casings) under the term life-limited parts.''

The FAA believes it is essential to include a limited number of structural static parts in the rules as service experience has demonstrated that failure of these parts may result in hazardous consequences to an aircraft. We also find that inclusion of certain static parts under § 33.70 does not impose a new requirement for turbine engine manufacturers who currently meet the requirements of § 33.19, Durability, and EASA certification requirements. We find that turbine engine manufacturers, based on § 33.19 and issue papers, have classified a limited number of static parts as ''life-limited'' for at least the last decade. Examples of engines with static parts classified as ''life-limited'' include: The CF34 (GE) family of engines, installed on Bombardier and Embraer regional jets; GE90 Growth family of engines, installed on the Boeing 777; Engine Alliance's (General Electric and Pratt & Whitney) GP7200 engine, installed on the Airbus A–380; and GEnx engine, to be installed on the Boeing 787.

All engine manufacturers who desire certification in Europe must also meet EASA engine certification requirements. Under EASA requirements, CS–E 515, Engine Critical Parts, turbine engine manufacturers already classify a limited number of static parts as ''life-limited'' and include these parts in the Airworthiness Limitations Section of the Instructions for Continued Airworthiness. Imposing two different standards for engine certification on U.S. engine manufacturers increases the costs of developing and certifying aircraft turbine engines with no associated safety benefits.

We note that CAAM data covers the period from 1982 to 1996. Based on this data, rupture of engine cases was the 10th leading cause of level 3 or 4 events (significant damage or total loss to aircraft, or minor injuries or loss of life).

Definition of ''Likely to Result''

Section 33.70 establishes that ''Engine life-limited parts are rotor and major static structural parts whose primary failure is likely to result in a hazardous engine effect.'' The term ''likely to result'' in this rule refers to possible consequences that may occur from an engine part failure.

American Airlines took issue with the definition and use of the term ''likely to result.'' American commented that ''likely to result'' is ''not clearly defined'' and ''does not agree with the SAE (Society of Automotive Engineers) interpretation for CAAM analysis.'' American also believes that the definition goes beyond the current § 33.14 and forces consideration of all failures no matter how remote the possibility of occurrence.

We have clarified that ''likely to result'' refers to possible consequences to an engine or aircraft that may occur from an engine part failure. The consequence of failure determines if a part is considered a life-limited part.

The commenter's reference to an SAE interpretation of ''likely to result,'' used

during CAAM analysis, deals with failures that have already occurred in service. The SAE interpretation is appropriate for analysis of failures that already occurred, but is not appropriate for a certification rule that applies to an engine manufacturer during the design and certification process. The definition of ''likely to result'' does not apply or alter the corresponding definition used by CAAM techniques.

The definition is consistent with current § 33.14 that states a life limit must be established for each rotor part, ''the failure of which could produce a hazard to the aircraft.'' It is absolutely essential to safety that the consequences of failure are anticipated to ensure appropriate engine parts are designated as life-limited parts. Once a part is designated as life-limited, a vast array of quality standards is applied to the part to prevent the unsafe consequences.

Costs of Rule

American Airlines expressed concern that the rule would result in ''unjustifiable additional costs.'' United Airlines stated that the rule will ''significantly drive up operator's costs.'' United claimed that ''the slightest defect, insignificant or otherwise, will result in a part being held-up in its repair cycle, while FAA Approved Data is sought. * * * To compensate, operators will be forced to increase inventory levels of this expensive hardware.''

The rule may result in a small increase in the number of static parts classified as ''life-limited'' beyond those few major structural static parts currently classified as life-limited under existing regulations. In addition, static parts are usually designed to have a life consistent with the life of the engine. Unlike rotor parts, static parts are repaired and their life is extended, provided their life limits are re-established using approved methods. The classification of static parts as life-limited requires engine manufacturers to design these parts to a higher standard including validation of life. The design of these parts to a higher standard, as well as the need to meet higher quality control manufacturing standards, has the potential to reduce the number of required repairs.

Effects on Small Businesses

Chromalloy Gas Turbine Corporation commented that ''With regard to static structural parts, there are many small entities that perform the maintenance tasks on these parts in direct competition with Original Engine Manufacturers.'' Chromalloy further claimed that ''The proposed rule change will severely affect the ability of these many entities to develop and perform repairs for the static structural parts independent of the Original Engine Manufacturers.''

We do not agree that the rule prevents any entities from performing maintenance on life-limited parts (''static'' or ''rotating''). Any entity, however, that repairs critical aircraft engine parts must possess the necessary inspection, design, analysis, and engineering skills to evaluate whether a repair is done properly. The safety of the part depends on the applicant possessing these skills.

Service Management Plan

Rolls-Royce Corporation noted that the rule requires a Service Management Plan that defines in-service processes for maintenance and repair, and that these processes become part of the Instructions for Continued Airworthiness (ICA). Rolls-Royce commented that the ''rule could be interpreted to require that all engine life-limited repair processes be defined by the Design Approval Holder (DAH) and subsequently 'made available' under the normal ICA requirements. * * *''

We revised the rule to require an applicant to specify the ''limitations'' associated with a part's repair instead of actually defining the repair process.

Parts Manufacturer Approval Standards

Transport Canada commented that life-limited parts are not acceptable candidates for Parts Manufacturer Approval (PMA) and FAA should reconsider PMA standards.

PMA standards are beyond the scope of this rule. Therefore, we did not make any changes in response to this comment.

Paperwork Reduction Act

As required by the Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)), the FAA submitted a copy of the amended information collection requirements(s) in this final rule to the Office of Management and Budget (OMB) for its review. OMB approved the collection of this information and assigned OMB Control Number 2120–0665.

An agency may not collect or sponsor the collection of information, nor may it impose an information collection requirement unless it displays a currently valid OMB control number.

This final rule consists of regulatory changes that will affect operators and individuals performing repairs. Some of those changes will require additional information collection. Comments received about these requirements and the FAA's responses are discussed earlier in this document, under the Comments section. The new information requirements and the persons who would be required to provide that information are described below.

SUMMARY

Affected entity	Annual hours	Annual cost
Operators	995	$ 49,750
Maintenance Providers	498	37,350

Required Information, Use, and Respondents

Additional recordkeeping will occur, because operators will be required to track the life of the part.

Additional engineering analysis will be performed anytime an affected part is repaired.

One-thousand nine-hundred and ninety (1,990) is the average number of affected aircraft and the corresponding estimated number of engine removals is 498 (1,990 × 25%).

Annual Burden Estimate

Recordkeeping

The recordkeeping cost estimate includes estimates of shop and records personnel time for tracking the part when an engine is removed. The total estimated recordkeeping time requirement is 2 hours per additional part per engine removal.

We calculate the annual recordkeeping hours by multiplying the additional number of parts (1), by the number of hours per part (2). That product is then multiplied by the annual number of engine removals (498), to arrive at the annual hour

estimate of 995. When combined with the burdened labor rate of $50 per hour, the estimated annual cost is $49,750.

Engineering

Additional engineering analysis will be required because operators and maintenance providers handle repairs differently on life-limited parts because of the critical nature of the part. More detailed analysis is performed, in addition to life methodology checks, when a life-limited part is repaired.

We calculated the annual engineering hours of 498 by multiplying the additional number of hours per part (10) by the annual number of engine removals (498) and then by the 10% repair factor. When combined with the burdened labor rate of $75 per hour, the estimated annual cost is $37,350.

International Compatibility

In keeping with U.S. obligations under the Convention on International Civil Aviation, it is FAA policy to comply with International Civil Aviation Organization (ICAO) Standards and Recommended Practices to the maximum extent practicable. The FAA has reviewed the corresponding ICAO Standards and Recommended Practices and has identified no differences with these regulations.

Economic Assessment, Regulatory Flexibility Determination, Trade Impact Assessment, and Unfunded Mandates Assessment

Changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 directs that each Federal agency shall propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs. Second, the Regulatory Flexibility Act of 1980 (Pub. L. 96–354) requires agencies to analyze the economic impact of regulatory changes on small entities. Third, the Trade Agreements Act (Pub. L. 96–39) prohibits agencies from setting standards that create unnecessary obstacles to the foreign commerce of the United States. In developing U.S. standards, this Trade Act requires agencies to consider international standards and, where appropriate, that they be the basis of U.S. standards. Fourth, the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4) requires agencies to prepare a written assessment of the costs, benefits, and other effects of proposed or final rules that include a Federal mandate likely to result in the expenditure by State, local, or tribal governments, in the aggregate, or by the private sector, of $100 million or more annually (adjusted for inflation with base year of 1995). This portion of the preamble summarizes the FAA's analysis of the economic impacts of this final rule. Readers seeking greater detail may read the full regulatory evaluation, a copy of which we have placed in the docket for this rulemaking.

In conducting these analyses, FAA has determined that this final rule: (1) Has benefits that justify its costs, (2) is not an economically ''significant regulatory action'' as defined in section 3(f) of Executive Order 12866, (3) is not ''significant'' as defined in DOT's Regulatory Policies and Procedures; (4) will not have a significant economic impact on a substantial number of small entities; (5) will not create unnecessary obstacles to the foreign commerce of the United States; and (6) will not impose an unfunded mandate on state, local, or tribal governments, or on the private sector by exceeding the threshold identified above. These analyses are summarized below.

Benefit-Cost Summary

There will be an overall benefit to manufacturers as a result of having common certification processes in the United States and in Europe. In addition to these benefits, the requirements contained in this final rule will provide an added margin of safety by reducing the number of failures in life-limited parts due to material, manufacturing and service induced anomalies. The FAA believes it is essential to include a limited number of structural static parts in the rules as service experience has demonstrated that failure of these parts can result in hazardous consequences to an aircraft. This final rule will prevent a portion of uncontained engine failures. If only one event is averted over the period of analysis, the benefits will be $11.6 million ($3.5 million present value).

The FAA estimates the total costs from implementing this final rule are roughly $3.6 million ($1.0 million present value). These costs are comprised of engineering and recordkeeping costs.

The estimated benefits of at least $11.6 million ($3.5 million present value) are greater than the estimated cost of $3.6 million ($1.0 million present value). Accordingly, the final rule is cost-beneficial.

Who Is Potentially Affected by This Rulemaking

Part 33 Engine Manufacturers
Operators of future part 33 engines
Entities performing maintenance and repairs

Assumptions and Sources of Information

Period of analysis—2008 through 2050
Discount rate—7%

Final Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (Pub. L. 96–354) (RFA) establishes ''as a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of the businesses, organizations, and governmental jurisdictions subject to regulation. To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the rationale for their actions to assure that such proposals are given serious consideration.'' The RFA covers a wide-range of small entities, including small businesses, not-for-profit organizations, and small governmental jurisdictions.

Agencies must perform a review to determine whether a rule will have a significant economic impact on a substantial number of small entities. If the agency determines that it will, the agency must prepare a regulatory flexibility analysis as described in the RFA.

The purpose of this analysis is to provide the reasoning underlying the FAA determination. The FAA has determined that:

- There will not be a significant impact on a substantial number of part 33 manufacturers.
- There will not be a significant impact on a substantial number of small entities that perform maintenance or repairs on affected parts.
- There will not be a significant impact on a substantial number of small operators.

Part 33 manufacturers will receive the certification harmonization savings that will arise as a result of this final rule. There will not be a significant impact on a substantial number of small entities performing maintenance or repairs on affected parts because their expected revenue will be greater than the expected cost. There will not be a significant impact on a substantial number of small airline operators because the ratio of compliance cost to revenue was below 0.03 (three hundredths) of one percent for 49 small entities where data was available.

A full discussion of the agency's regulatory flexibility analysis can be found in the final regulatory evaluation, which has been placed in the docket for this rulemaking.

Therefore, as the FAA Administrator, I certify that this final rule will not have a significant economic impact on a substantial number of small entities.

International Trade Impact Assessment

The Trade Agreements Act of 1979 (Pub. L. 96–39) prohibits Federal agencies from establishing any standards or engaging in related activities that create unnecessary obstacles to the foreign commerce of the United States. Legitimate domestic objectives, such as safety, are not considered unnecessary obstacles. The statute also requires consideration of international standards and, where appropriate, that they be the basis for U.S. standards.

This final rule considers and incorporates an international standard as the basis of a FAA regulation. Thus this final rule complies with The Trade Agreements Act of 1979 and does not create unnecessary obstacles to international trade.

Unfunded Mandates Assessment

Title II of the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4) requires each Federal agency to prepare a written statement assessing the effects of any Federal mandate in a proposed or final agency rule that may result in an expenditure of $100 million or more (adjusted annually for inflation with the base year 1995) in any one year by State, local, and tribal governments, in the aggregate, or by the private sector; such a mandate is deemed to be a ''significant regulatory action.'' The FAA currently uses an inflation-adjusted value of $128.1 million in lieu of $100 million.

The FAA has assessed the potential effect of this final rule and determined that it does not contain such a mandate. Therefore, the requirements of Title II of the Unfunded Mandates Reform Act of 1995 do not apply.

Executive Order 13132, Federalism

The FAA has analyzed this final rule under the principles and criteria of Executive Order 13132, Federalism. We determined that this action will not have a substantial direct effect on the States, or the relationship between the national Government and the States, or on the distribution of power and responsibilities among the various levels of government, and therefore does not have federalism implications.

Environmental Analysis

FAA Order 1050.1E identifies FAA actions that are categorically excluded from preparation of an environmental assessment or environmental impact statement under the National Environmental Policy Act in the absence of extraordinary circumstances. The FAA has determined this rulemaking action qualifies for the categorical exclusion identified in paragraph 312f and involves no extraordinary circumstances.

Regulations That Significantly Affect Energy Supply, Distribution, or Use

The FAA has analyzed this final rule under Executive Order 13211, Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use (May 18, 2001). We have determined that it is not a ''significant energy action'' under the executive order because it is not a ''significant regulatory action'' under Executive Order 12866, and it is not likely to have a significant adverse effect on the supply, distribution, or use of energy.

Availability of Rulemaking Documents

You can get an electronic copy using the Internet by:

(1) Searching the Department of Transportation's electronic Docket Management System (DMS) Web page (*http://dms.dot.gov/search*);

(2) Visiting the FAA's Regulations and Policies Web page at *http://www.faa.gov/regulations_policies/*; or

(3) Accessing the Government Printing Office's Web page at *http://www.gpoaccess.gov/fr/index.html.*

You can also get a copy by sending a request to the Federal Aviation Administration, Office of Rulemaking, ARM–1, 800 Independence Avenue, SW., Washington, DC 20591, or by calling (202) 267–9680. Make sure to identify the amendment number or docket number of this rulemaking.

You may search the electronic form of all comments received in any of our dockets by the name of the individual submitting the comment (or signing the comment, if submitted on behalf of an association, business, labor union, etc.). You may review DOT's complete Privacy Act statement in the **Federal Register** published on April 11, 2000 (Volume 65, Number 70; Pages 19477–78) or you may visit *http://dms.dot.gov.*

Small Business Regulatory Enforcement Fairness Act

The Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996 requires FAA to comply with small entity requests for information or advice about compliance with statutes and regulations within its jurisdiction. If you are a small entity and you have a question regarding this document, you may contact its local FAA official, or the person listed under **FOR FURTHER INFORMATION CONTACT**. You can find out more about SBREFA on the Internet at *http://www.faa.gov/regulations_policies/rulemaking/sbre_act/.*

List of Subjects in 14 CFR Part 33

Air Transportation, Aircraft, Aviation safety, Safety.

The Amendment

■ In consideration of the foregoing, the Federal Aviation Administration amends Chapter I of Title 14, Code of Federal Regulations as follows:

PART 33—AIRWORTHINESS STANDARDS: AIRCRAFT ENGINES

■ 1. The authority citation for part 33 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701–44702, 44704.

§ 33.14 [Removed]

■ 2. Remove § 33.14.

■ 3. Add new § 33.34 to read as follows:

§ 33.34 Turbocharger rotors.

Each turbocharger case must be designed and constructed to be able to contain fragments of a compressor or turbine that fails at the highest speed that is obtainable with normal speed control devices inoperative.

■ 4. Add new § 33.70 to read as follows:

§ 33.70 Engine life-limited parts.

By a procedure approved by the FAA, operating limitations must be established which specify the maximum allowable number of flight cycles for each engine life-limited part. Engine life-limited parts are rotor and major static structural parts whose primary failure is likely to result in a hazardous engine effect. Typically, engine life-limited parts include, but are not limited to disks, spacers, hubs, shafts, high-pressure casings, and non-redundant mount components. For the purposes of this section, a hazardous engine effect is any of the conditions listed in § 33.75 of this part. The applicant will establish the integrity of each engine life-limited part by:

(a) An engineering plan that contains the steps required to ensure each engine life-limited part is withdrawn from service at an approved life before hazardous engine effects can occur. These steps include validated analysis, test, or service experience which ensures that the combination of loads, material properties, environmental influences and operating conditions, including the effects of other engine parts influencing these parameters, are sufficiently well known and predictable

so that the operating limitations can be established and maintained for each engine life-limited part. Applicants must perform appropriate damage tolerance assessments to address the potential for failure from material, manufacturing, and service induced anomalies within the approved life of the part. Applicants must publish a list of the life-limited engine parts and the approved life for each part in the Airworthiness Limitations Section of the Instructions for Continued Airworthiness as required by § 33.4 of this part.

(b) A manufacturing plan that identifies the specific manufacturing constraints necessary to consistently produce each engine life-limited part with the attributes required by the engineering plan.

(c) A service management plan that defines in-service processes for maintenance and the limitations to repair for each engine life-limited part that will maintain attributes consistent with those required by the engineering plan. These processes and limitations will become part of the Instructions for Continued Airworthiness.

Issued in Washington, DC, on August 27, 2007.

Marion Blakey,

Administrator.

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