[Federal Register Volume 76, Number 162 (Monday, August 22, 2011)]
[Rules and Regulations]
[Pages 52213-52215]
From the Federal Register Online via the Government Printing Office [www.gpo.gov]
[FR Doc No: 2011-21312]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA-2010-0998; Directorate Identifier 2010-NE-29-AD; Amendment 39-16783; AD 2011-18-01]

RIN 2120-AA64

Airworthiness Directives; General Electric Company (GE) CF6-45 Series and CF6-50 Series Turbofan Engines

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: We are adopting a new airworthiness directive (AD) for the products listed above. This AD requires performing a fluorescent penetrant inspection (FPI) of the low-pressure turbine (LPT) rotor stage 3 disk at every shop visit at which the LPT module is separated from the engine. This AD was prompted by seven reports of uncontained failures of LPT rotor stage 3 disks and eight reports of cracked LPT rotor stage 3 disks found during shop visit inspections. We are issuing this AD to prevent LPT rotor separation, which could result in an uncontained engine failure and damage to the airplane.

DATES: This AD is effective September 26, 2011.

ADDRESSES: You may examine the AD docket on the Internet at http://www.regulations.gov; or in person at the Docket Management Facility between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this AD, the regulatory evaluation, any comments received, and other information. The address for the Docket Office (phone: 800-647-5527) is Document Management Facility, U.S. Department of Transportation, Docket Operations, M-30, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue, SE., Washington, DC 20590.

FOR FURTHER INFORMATION CONTACT: Tomasz Rakowski, Aerospace Engineer, Engine Certification Office, FAA, Engine & Propeller Directorate, 12 New England Executive Park, Burlington, MA 01803; phone: (781) 238-7735; fax: (781) 238-7199; e-mail: tomasz.rakowski@faa.gov.

SUPPLEMENTARY INFORMATION:

Discussion

We issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 to include an airworthiness directive (AD) that would apply to the specified products. That NPRM published in the Federal Register on October 20, 2010, (75 FR 64681). That NPRM proposed to require performing a fluorescent penetrant inspection at every shop visit when the LPT module assembly is separated from the engine.

Comments

We gave the public the opportunity to participate in developing this AD. The following presents the comments received on the proposal and the FAA's response to each comment.

Support for the NPRM as Written

Two commenters, the National Transportation Safety Board and The Boeing Company support the NPRM as written.

Request To Define LPT Module

Two commenters, GE and MTU Maintenance Canada, asked us to define "LPT module." The commenters feel the term LPT module could be confused with the LPT rotor assembly.

We agree. We changed paragraph (e) of the proposed AD to clarify that the intent of this AD is to inspect the LPT rotor stage 3 disk when the LPT module assembly separates from the engine for maintenance, and added new paragraphs (i) and (i)(1) that define the LPT module assembly.

Request To Require Only Conditional Inspection

One commenter, MTU Maintenance Canada, asked us to change the compliance time for the inspection. MTU stated the proposed AD requires stage 3 disk FPI at piece-part level regardless of the part utilization (cycles-since-last inspection) or operational history since the last inspection. MTU asked us to change the inspection to the next time the LPT module assembly is disassembled to piece-part level for certain engine conditions only.

We don't agree with the request for conditional inspections only. The intent of this AD is to require an FPI of the LPT rotor stage 3 disk forward spacer arm at each shop visit where the LPT module assembly is separated in a cyclic manner, regardless of the reason for the separation. The requirements for conditional piece-part FPI are already mandated by AD 2011-02-07. We didn't change the AD.

Request To Add Conditional Inspection

One commenter, Evergreen International Airlines, asked us to additionally require the inspection if the engine encountered excessive core vibration, or HPT blade separation or excessive material loss, or unserviceable LPT blade interlock wear, in addition to the repetitive inspections proposed in the NPRM.

We don't agree. The requirements for conditional piece-part FPI are already mandated by AD 2011-02-07. We didn't change the AD.

Request To Change the Compliance Time for the Inspection

One commenter, Evergreen International Airlines, asked us to require inspections if the LPT rotor stage 3 disk hasn't been FPI inspected within the last 2,000 cycles or at all. Evergreen stated the separation of the LPT module is required when the maintenance of certain HPC, combustor, and HPT assemblies and parts need to be performed. Engines removed for maintenance of those components would require LPT rotor stage 3 disk cleaning and FPI regardless of the time interval since the last FPI per the proposed AD, which would be an unnecessary burden on the operators.

We partially agree. We agree with the request for a certain number of cycles since the last FPI to exclude the part from mandatory inspection. However, we do not find the number of 2,000 cycles since last inspection (CSLI) appropriate to ensure a desired level of safety. We find that an acceptable level of safety will be retained when the disk FPI inspection is skipped during the shop visit if the disk was inspected within the last 1,000 cycles. We changed paragraphs (f) and (g) to "(f) At the next shop visit after the effective date of this AD, clean and fluorescent penetrant inspect the LPT rotor stage 3 disk forward spacer arm, including the use of a wet abrasive blast to eliminate residual or background fluorescence before inspecting. You can find guidance on cleaning the disk and performing the FPI in the CF6-50 Engine Manual, GEK 50481 72-57-02." and "(g) Thereafter, clean and inspect the LPT rotor stage 3 disk forward spacer arm, as specified in paragraph (f), at each engine shop visit that occurs after 1,000 cycles since the last FPI of the LPT rotor stage 3 disk forward spacer arm." We also added paragraphs (i) and (i)(2) that define an engine shop visit as follows: "An engine shop visit is the induction of an engine into the shop for maintenance involving the separation of the turbine mid-frame forward flange from the compressor rear frame aft flange, except that the separation of these engine flanges solely for the purposes of transportation without subsequent engine maintenance does not constitute an engine shop visit."

Request To Change the Type of Inspection

One commenter, GE, asked us to consider changing the type of inspection from FPI to ultrasonic inspection (USI). GE stated that they have developed a USI technique and tooling which allow inspecting the LPT rotor stage 3 disk forward spacer arm without piece part disassembly of the LPT. Implementing the USI will detect cracks in the forward spacer arm, which might propagate during operation and would be a suitable alternative to the piece-part disassembly, cleaning, and FPI of the forward spacer arm in many situations.

We don't agree. We don't believe USI technique specified in GE SB CF6-50 S/B 72-1309 is a sufficient means of detecting flaws or microcracks on the inner surface of the LPT rotor stage 3 disk forward spacer arm. Paragraph E.(5) of SB CF6-50 S/B 72-1309 states "The new USI probe was specifically designed to detect flaws 0.030 inch (0.76 mm) deep or greater in the forward spacer arm of the stage 3 LPTR disk." We find that a 0.030-inch deep surface crack size is unacceptable in that location, as it would have already propagated in a high-cycle fatigue mode. The intent of this AD is to detect cracks before they propagate. We made no change to the proposed AD.

Request To Change the Costs of Compliance

Two commenters, MTU Canada and FedEx, asked us to re-evaluate the Costs of Compliance for the actions required by the proposed AD. The commenters state that cleaning the stage 3 disk and performing an FPI are done at the piece-part level, and that the costs of disassembling and reassembling the LPT module assembly, and of the inspections required by the engine manual for reinstalling the stage 3 blades must be added to the cost of cleaning and inspecting the disk.

We don't agree. Our estimated cost is the direct cost to comply with the AD, and doesn't include preparatory disassembly or reinstallation. We didn't change the AD.

Request To Change Paragraph (f) of the Proposed AD

One commenter, GE, asked us to change paragraph (f) of the proposed AD to use the words "including the use of" in place of the word "using", where cleaning the LPT rotor stage 3 disk with wet-abrasive blast to eliminate residual or background fluorescence is required. GE doesn't consider a wet-abrasive blast alone sufficient to clean the LPT rotor stage 3 disk to allow performance of the FPI of the inner diameter of the forward cone body of the LPT rotor stage 3 disk.

We agree. We changed paragraph (f) of the proposed AD from "Clean the LPT rotor stage 3 disk, using a wet abrasive blast to eliminate residual or background fluorescence. You can find guidance on cleaning the disk in the cleaning procedure of CF6-50 Engine Manual, GEK 50481 72-57-02." to "At the next engine shop visit after the effective date of this AD, clean and fluorescent-penetrant inspect the LPT rotor stage 3 disk forward spacer arm, including the use of a wet-abrasive blast to eliminate residual or background fluorescence before inspecting. You can find guidance on cleaning the disk and performing the FPI in the CF6-50 Engine Manual, GEK 50481 72-57-02."

Request To Include Definitions for Cleaning and FPI of the LPT Rotor Stage 3 Disk

One commenter, Evergreen International Airlines, asked us to add definitions of "cleaning the LPT rotor stage 3 disk" and "FPI of the LPT rotor stage 3 disk," with specific engine manual subtask references, to the proposed AD. The commenter states that the definitions will clarify the actions required by the proposed AD.

We don't agree. The reference provided in the proposed AD is sufficient to define the required actions. We made no changes to the proposed AD.

Conclusion

We reviewed the relevant data, considered the comments received, and determined that air safety and the public interest require adopting the AD with the changes described previously.

We also determined that these changes will not increase the economic burden on any operator or increase the scope of the AD.

Costs of Compliance

We estimate that this AD will affect 387 engines installed on airplanes of U.S. registry. We also estimate that it will take about 7 work-hours per engine to clean and FPI the disk 387 engines. The average labor rate is $85 per work-hour. No parts will be required. Based on these figures, we estimate the total cost of the AD to U.S. operators to be $230,265.

Authority for This Rulemaking

Title 49 of the United States Code specifies the FAA's authority to issue rules on aviation safety. 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.

We are issuing this rulemaking under the authority described in Subtitle VII, Part A, Subpart III, Section 44701: "General requirements." Under that section, Congress charges the FAA with promoting safe flight of civil aircraft in air commerce by prescribing regulations for practices, methods, and procedures the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority because it addresses an unsafe condition that is likely to exist or develop on products identified in this rulemaking action.

Regulatory Findings

This AD will not have federalism implications under Executive Order 13132. This AD will not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.

For the reasons discussed above, I certify that this AD:

(1) Is not a "significant regulatory action" under Executive Order 12866,

(2) Is not a "significant rule" under DOT Regulatory Policies and Procedures (44 FR 11034, February 26, 1979),

(3) Will not affect intrastate aviation in Alaska, and

(4) Will not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

List of Subjects in 14 CFR Part 39

Air transportation, Aircraft, Aviation safety, Incorporation by reference, Safety.

Adoption of the Amendment

Accordingly, under the authority delegated to me by the Administrator, the FAA amends 14 CFR part 39 as follows:

PART 39–AIRWORTHINESS DIRECTIVES

1. The authority citation for part 39 continues to read as follows:

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

§ 39.13 [Amended]

2. The FAA amends § 39.13 by adding the following new airworthiness directive (AD):

2011-18-01 General Electric Company: Amendment 39-16783; Docket No. FAA-2010-0998; Directorate Identifier 2010-NE-29-AD.

Effective Date

(a) This AD is effective September 26, 2011.

Affected ADs

(b) None.

Applicability

(c) This AD applies to General Electric Company (GE) CF6-45A, CF6-45A2, CF6-50A, CF6-50C, CF6-50CA, CF6-50C1, CF6-50C2, CF6-50C2B, CF6-50C2D, CF6-50E, CF6-50E1, and CF6-50E2 series turbofan engines, including engines marked on the engine data plate as CF6-50C2-F and CF6-50C2-R, with a low-pressure turbine (LPT) rotor stage 3 disk that has a part number (P/N) listed in Table 1 of this AD installed.

Table 1–LPT Rotor Stage 3 Disk P/Ns

1473M90P01	1473M90P02	1473M90P03	1473M90P04
1479M75P01	1479M75P02	1479M75P03	1479M75P04
1479M75P05	1479M75P06	1479M75P07	1479M75P08
1479M75P09	1479M75P11	1479M75P13	1479M75P14
9061M23P06	9061M23P07	9061M23P08	9061M23P09
9061M23P10	9061M23P12	9061M23P14	9061M23P15
9061M23P16	9224M75P01		

Unsafe Condition

(d) This AD results from seven reports of uncontained failures of LPT rotor stage 3 disks and eight reports of cracked LPT rotor stage 3 disks found during shop visit inspections. We are issuing this AD to prevent LPT rotor separation, which could result in an uncontained engine failure and damage to the airplane.

Compliance

(e) You are responsible for having the actions required by this AD performed at each shop visit after the effective date of this AD, at which the LPT module assembly is separated from the engine.

Initial Inspection

(f) At the next shop visit after the effective date of this AD, clean and fluorescent-penetrant inspect the LPT rotor stage 3 disk forward spacer arm, including the use of a wet-abrasive blast to eliminate residual or background fluorescence before inspecting. You can find guidance on cleaning the disk and performing the FPI in the CF6-50 Engine Manual, GEK 50481 72-57-02.

Repetitive Inspection

(g) Thereafter, clean and inspect the LPT rotor stage 3 disk forward spacer arm, as specified in paragraph (f) of this AD, at each engine shop visit that occurs after 1,000 cycles since the last FPI of the LPT rotor stage 3 disk forward spacer arm.

(h) If a crack or a band of fluorescence is present, remove the disk from service.

Definitions

(i) For the purpose of this AD:

(1) The LPT module assembly is defined as consisting of turbine mid-frame, LPT stage 1 nozzle, LPT stator cases and vanes, LPT rotor, and turbine rear frame.

(2) An engine shop visit is the induction of an engine into the shop for maintenance involving the separation of the turbine mid-frame forward flange from the compressor rear frame aft flange, except that the separation of these engine flanges solely for the purposes of transportation without subsequent engine maintenance does not constitute an engine shop visit.

Alternative Methods of Compliance

(j) The Manager, Engine Certification Office, has the authority to approve alternative methods of compliance for this AD if requested using the procedures found in 14 CFR 39.19.

Related Information

(k) For more information about this AD, contact Tomasz Rakowski, Aerospace Engineer, Engine Certification Office, FAA, Engine & Propeller Directorate, 12 New England Executive Park, Burlington, MA 01803; phone: (781) 238-7735; fax: (781) 238-7199; e-mail: tomasz.rakowski@faa.gov.

Material Incorporated by Reference

(l) None.

Issued in Burlington, Massachusetts on August 15, 2011.
Peter A. White,
Manager, Engine & Propeller Directorate,
Aircraft Certification Service.