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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA-2008-1131; Directorate Identifier 2008-NE-37-AD; Amendment 39-15903; AD 2009-10-08]

RIN 2120-AA64

Airworthiness Directives; Pratt & Whitney Models PW2037, PW2037(M), and PW2040 Turbofan Engines

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: The FAA is adopting a new airworthiness directive (AD) for Pratt & Whitney models PW2037, PW2037(M), and PW2040 turbofan engines with high-pressure turbine (HPT) 2nd stage hubs that have previously been exposed to Pratt & Whitney cleaning procedure SPOP 10 or SPOP 9 or equivalent procedure. This AD requires a onetime optical comparator inspection (OCI) of the blade retention slots of the affected HPT 2nd stage hubs at the next HPT overhaul after the effective date of the AD. This AD results from an uncontained release of HPT 2nd stage blades and blade retention lugs. We are issuing this AD to remove nonconforming HPT 2nd stage hubs, which could result in an uncontained release of turbine blades and blade retention lugs, and damage to the airplane.

DATES: This AD becomes effective June 17, 2009.

ADDRESSES: You can get the service information identified in this AD from Pratt & Whitney, 400 Main Street, East Hartford, CT 06108.

The Docket Operations office is located at Docket Management Facility, U.S. Department of Transportation, 1200 New Jersey Avenue SE., West Building Ground Floor, Room W12-140, Washington, DC 20590-0001.

FOR FURTHER INFORMATION CONTACT: Mark Riley, Aerospace Engineer, Engine Certification Office, FAA, Engine and Propeller Directorate, 12 New England Executive Park, Burlington, MA 01803; e-mail: mark.riley@faa.gov; telephone (781) 238-7758, fax (781) 238-7199.

SUPPLEMENTARY INFORMATION: The FAA proposed to amend 14 CFR part 39 with a proposed AD. The proposed AD applies to PW models PW2037, PW2037(M), and PW2040 turbofan

engines. We published the proposed AD in the Federal Register on November 14, 2008 (73 FR 67427). That action proposed to require inspecting all HPT 2nd stage hubs at the next HPT overhaul after the effective date of the AD.

Examining the AD Docket

You may examine the AD docket on the Internet at http://www.regulations.gov; or in person at the Docket Operations office 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 street address for the Docket Operations office (telephone (800) 647-5527) is provided in the ADDRESSES section. Comments will be available in the AD docket shortly after receipt.

Comments

We provided the public the opportunity to participate in the development of this AD. We have considered the comments received.

Recommend Referring to the Inspection as ''Special Dimensional Inspection''

Pratt & Whitney recommends that the inspection in the proposed AD be referred to as a "Special Dimensional Inspection" per Pratt & Whitney Alert Service Bulletin (ASB) PW2000 72-734, which is approved by the FAA. The proposed AD currently specifies an Optical Comparator Inspection (OCI). Use of the term "Special Dimensional Inspection" instead of OCI will provide better alignment with the inspection procedures that Pratt & Whitney is presently developing and for which it will seek FAA approval, to use as an alternative to OCI.

We do not agree. The inspection is an OCI. Therefore, identifying the type of inspection the AD requires by its name is proper. We did not change the AD.

Request To Revise the Estimated Cost

Pratt & Whitney and two air carriers request that we revise the estimated cost to perform an OCI. Pratt & Whitney states that the cost is higher than previously anticipated and we should add about $4,000 to the cost of each disk overhaul. Delta Air Lines states that the total cost is actually closer to $8,000 and it should include shipping ($1,000), vendor charges ($5,900), and should take into account additional inventory required ($180,000 per hub) due to out-of-service time required to support the off-site inspection.

We partially agree. We agree that the cost estimate in the proposed AD is not accurate. We do not agree that it should consider shipping charges or additional inventory requirements unique to each operator. We changed the cost to perform the OCI to $4,000 for each HPT stage 2 hub as quoted by Pratt & Whitney and updated the total to $3,048,000.

Request for Clarification of the Inspection Being a Onetime Inspection

Pratt & Whitney and two air carriers request clarification in the AD to state that the inspection is a onetime inspection. Also, Delta Air Lines comments that repetitive inspections should be required unless the cause of the hub out-of-tolerance condition is addressed. They also stated that the cause of the hub out-of-tolerance condition is not known and repetitive inspections are therefore required.

We partially agree. We agree that we need to clarify that the OCI is a onetime inspection requirement. We changed the AD to clarify that the OCI is a onetime inspection requirement. We do not agree that the AD should require repetitive inspections. If we determine at a later date that repetitive inspections are required, we may issue an AD to require them.

Proposal To Eliminate the Fluorescent Penetrant Inspection

Pratt & Whitney and United Airlines propose that we eliminate the fluorescent penetrant inspection (FPI) requirement for the HPT 2nd stage hub. FPI of the HPT 2nd stage hub is redundant, since it is already mandated per FAA AD 2005-18-03.

We agree. We changed the AD to only require a onetime OCI of the HPT 2nd stage hub after the fluorescent penetrant inspection and all shop cleaning processes have been completed.

Proposal To Reduce the Affected Population of HPT 2nd Stage Hubs

Pratt & Whitney proposes that we reduce the affected population of HPT 2nd stage hubs to only those that have been exposed to Pratt & Whitney cleaning procedure SPOP 10 or SPOP 9 (cleaning processes that have similar abrasive characteristics) during their shop overhaul history. Based on recent findings from the NTSB-led investigation, the blade slot dimensional variations on the event hub and on other inspected hubs resulted from a specific process used during the cleaning of hubs during the normal overhaul process.

We agree. We changed the AD applicability to state that this AD applies to Pratt & Whitney models PW2037, PW2037(M), and PW2040 turbofan engines with HPT 2nd stage hubs that have previously been exposed to Pratt & Whitney cleaning procedure SPOP 10 or SPOP 9 or equivalent procedure.

Proposal To Delay Issuance of AD

United Airlines proposes that we delay issuance of the AD, because initial OCI results are showing a 25% reject rate. This suggests that the proposed inspections will not detect the problem that led to the one industry failure. Otherwise, the industry failure rate would be higher. Consequently, issuing the AD would be premature, as the failure mechanism is not understood, and it is not clear that the proposed inspections will prevent future failures.

We do not agree. The investigation identified that an out-of-tolerance condition of the HPT 2nd stage hub blade slots is the cause of the failure event. However, the root cause of the out-of-tolerance condition is still under investigation, but is believed to have been caused by aggressive cleaning with an abrasive media blast. Inspection of the HPT 2nd stage hub blade slots is required to identify hubs that are out-of-tolerance, to minimize the risk of future failures. Pratt & Whitney is reviewing the current acceptance criteria for the OCI of HPT 2nd stage hub blade slots, and if appropriate, may revise these limits to reduce the current reject rate. We did not change the AD.

Proposal To Remove the Reporting Requirement From the AD

Three air carriers propose that we remove the requirement for operators to be responsible for reporting HPT 2nd stage hub OCI results within 72 hours of the inspection. Delta Air Lines also asks if they are required to report OCI results after the 6-month period, since not all of their HPT 2nd stage hubs will go through overhaul within 6 months. The three air carriers state that it will be extremely difficult for operators to comply with the reporting requirements of the proposed rule, because it will not be the operators performing the inspections. The sole source that performs the inspections, (Pratt & Whitney), should be responsible for reporting to the FAA.

We agree. We removed the reporting requirement from the AD.

Request That an Alternate Inspection Be Developed That Is Not Source-Approved

Two air carriers request that an alternate inspection method be developed that is not source-approved and will permit all overhaul shops the capability to perform the inspection. They state that

Pratt & Whitney is currently the only source-approved vendor for the OCI. Operators are experiencing turn times in excess of 30 days, which is a hardship to them.

We agree that an alternate inspection procedure that can be performed by all overhaul facilities is preferred. However, we are unaware of any that may exist. We will evaluate any proposed alternative inspection an operator may submit as an alternative method of compliance. We did not change the AD.

Compliance Time Should Be Revised

The National Transportation Safety Board (NTSB), states that the compliance time should be revised to reflect the recommended compliance time in the NTSB Urgent Safety Recommendation A-08-85. That compliance time requires removal of all PW2037 2nd stage turbine hubs for inspection when they have accumulated significantly fewer hours and/or cycles than the incident engine (10,880 hours and/or 4,392 cycles). The 10,880 hours and 4,392 cycles referenced in A-08-85 were based on the time and cycles that the incident engine had accumulated from the last overhaul until engine failure. Metallurgical examination of the failed hub was not able to discern any fatigue striations, so it is unknown how long it took those fatigue cracks to progress to failure. Typically, when the cause of the failure, or length of time for a crack to progress to failure is unknown, the time and/or cycles, whichever is less, since the part was new or overhauled until failure, is divided by a factor of two or three to establish a compliance schedule.

We do not agree. The field management plan defined in the proposed AD is based on a risk analysis performed by Pratt &Whitney, which we reviewed and concluded is adequate. Further, additional field data received to-date has not indicated any increased risk, or that a more restrictive field plan is required. We did not change the AD.

Proposed OCI Procedure Should Be Revised

The NTSB states that the proposed OCI procedure should be revised to also require that the blade slots be measured using a coordinate measuring machine (CMM) or another dimensional inspection device capable of measuring deviations in the center of the blade slots. The OCI procedure is limited to only measure the blade slot profile on the forward and aft ends of the blade slot. The current procedure does not measure the center portion of the blade slot.

We partially agree. We agree that the current OCI procedure is limited such that it cannot measure the center portion of the blade slot. However, we disagree that the OCI procedure is not an acceptable inspection method to identify non-conforming hubs. We verified that the OCI procedure can identify HPT 2nd stage hubs with non-conforming blade retention slots. We established limits for OCI that ensured that no parts with non-conformances similar to the event hub would be released into service. We continue to work with Pratt & Whitney to identify other improved inspection methods that can be used as an alternate to OCI. We did not change the AD.

AD Compliance Should Also Include Inspection of the HPT 2nd Stage Blade Root Serrations for Uneven Contact Wear

The NTSB states that the AD compliance should also include inspection of the HPT 2nd stage blade root serrations for uneven contact wear, as defined in the PW2000 Engine Manual, Task 72-52-17-200-014, Inspection/Check 14. The AD should also specify an action to take with the HPT 2nd stage hubs if any HPT 2nd stage blades are detected with uneven wear. The HPT 2nd stage blades removed from the incident engine showed evidence of uneven contact wear on the blade root serrations. The AD should therefore also include inspection of the HPT 2nd stage blades and include an action to take with the hub if blades are detected to have root serrations with uneven wear.

We do not agree. Inspection of the HPT 2nd stage blade root serrations was incorporated in the PW2000 Engine Manual to address a non-conformance issue for the blades and is performed during

normal inspection. All blades that are identified with uneven wear on the root serrations are rejected and removed from service. The cause of failure of the incident engine was due to a nonconformance of the HPT 2nd stage hub blade retention slots. All HPT 2nd stage hubs that have previously been exposed to Pratt & Whitney cleaning procedure SPOP 10 or SPOP 9 or equivalent procedure will require OCI per the AD. All non-conforming hubs will be identified by OCI and removed from service. We did not change the AD.

AD Should Mandate That All of the HPT 2nd Stage Hub Blade Slots Be Inspected Using OCI

The NTSB states that the AD should mandate that all of the HPT 2nd stage hub blade slots be inspected using OCI. The current procedure only requires that every fourth blade retaining slot in the hub be inspected. The incident engine had cracks in several adjacent blade retaining lugs that resulted in the simultaneous release of multiple blades that exceeded the turbine case's containment capability. If only every fourth slot in the hub is inspected, then two adjacent nonconforming blade slots could slip through the inspection and result in an uncontained engine failure.

We do not agree. Inspecting every fourth blade retaining slot will identify all non-conforming hubs. HPT 2nd stage hubs that are aggressively cleaned using a grit blast procedure will typically have a high number of non-conforming slots. Field inspection data to-date indicates that this assumption currently remains valid. We did not change the AD.

Conclusion

We have carefully reviewed the available data, including the comments received, and determined that air safety and the public interest require adopting the AD with the changes described previously. We have determined that these changes will neither increase the economic burden on any operator nor increase the scope of the AD.

Costs of Compliance

We estimate that this AD will affect 762 engines installed on airplanes of U.S. registry. We also estimate that it will take about 50 work-hours per engine to perform the actions, and that the average labor rate is $80 per work-hour. No parts are required. Based on these figures, we estimate the total cost of the AD to U.S. operators to be $3,048,000.

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

We have determined that 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); and

(3) 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.

We prepared a summary of the costs to comply with this AD and placed it in the AD Docket. You may get a copy of this summary at the address listed under ADDRESSES.

List of Subjects in 14 CFR Part 39

Air transportation, Aircraft, Aviation safety, Safety.

Adoption of the Amendment

Accordingly, under the authority delegated to me by the Administrator, the Federal Aviation Administration 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:

2009-10-08 Pratt & Whitney: Amendment 39-15903. Docket No. FAA-2008-1131; Directorate Identifier 2008-NE-37-AD.

Effective Date

(a) This airworthiness directive (AD) becomes effective June 17, 2009.

Affected ADs

(b) None.

Applicability

(c) This AD applies to Pratt & Whitney models PW2037, PW2037(M), and PW2040 turbofan engines with high-pressure turbine (HPT) 2nd stage hubs that have previously been exposed to Pratt & Whitney cleaning procedure SPOP 10 or SPOP 9 or equivalent procedure. These engines are installed on, but not limited to, Boeing 757-200 and 757-300 airplanes.

Unsafe Condition

(d) This AD results from an uncontained release of HPT 2nd stage blades and blade retention lugs. We are issuing this AD to remove nonconforming HPT 2nd stage hubs, which could result in an uncontained release of turbine blades and blade retention lugs, and damage to the airplane.

Compliance

(e) You are responsible for having the actions required by this AD performed at the next HPT overhaul, unless the actions have already been done.

Onetime Optical Comparator Inspection (OCI) of HPT 2nd Stage Hubs

(f) Perform a onetime optical comparator inspection of the HPT 2nd stage hubs after a fluorescent penetrant inspection and all shop cleaning processes have been completed. Pratt & Whitney Alert Service Bulletin No. PW2000 A72-734, dated November 3, 2008, contains information about the optical comparator inspection.

(g) Remove from service any hubs that fail the optical comparator inspection.

Definition

(h) This AD defines an HPT overhaul as when the HPT is at its piece-part level.

Alternative Methods of Compliance

(i) 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

(j) Contact Mark Riley, Aerospace Engineer, Engine Certification Office, FAA, Engine and Propeller Directorate, 12 New England Executive Park, Burlington, MA 01803; e-mail: mark.riley@faa.gov; telephone (781) 238-7758, fax (781) 238-7199, for more information about this AD.

(k) Pratt & Whitney Alert Service Bulletin No. PW2000 A72-734, dated November 3, 2008, contains information about the optical comparator inspection.

Material Incorporated by Reference

(l) None.

Issued in Burlington, Massachusetts, on May 4, 2009.
Peter A. White,
Assistant Manager, Engine and Propeller Directorate,
Aircraft Certification Service.