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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. 2000-NE-27-AD; Amendment 39-12423; AD 2001-17-31]

RIN 2120-AA64

Airworthiness Directives; Rolls-Royce Corporation (Formerly Allison Engine Company) AE 2100 Turboprop and AE 3007 Turbofan Series Engines

AGENCY: Federal Aviation Administration, DOT.

ACTION: Final rule.

SUMMARY: This amendment adopts a new airworthiness directive (AD), that is applicable to Rolls-Royce Corporation (formerly Allison Engine Company) AE 2100 turboprop and AE 3007 turbofan series engines. This amendment requires a one-time acid etch inspection of the 2nd stage high pressure turbine (HPT) wheel for evidence of damaged material indicating that a higher probability of cracking in future service exists. If the etch inspection reveals damage, this AD requires replacement of the turbine wheel with a serviceable part. This amendment is prompted by a report of a 2nd stage HPT wheel that was returned from the field with cracks in the aft bore face. The actions specified by this AD are intended to detect and prevent early development of cracks due to low cycle fatigue of the 2nd stage HPT wheel in the aft bore face that can lead to wheel failure, power loss, and possible damage to the airplane.

DATES: Effective date October 5, 2001. The incorporation by reference of certain publications listed in the **regulations** is approved by the Director of the Federal Register as of October 5, 2001.

ADDRESSES: The service information referenced in this AD may be obtained from Rolls-Royce Corporation, P.O. Box 420, Indianapolis, IN 46206-0420; telephone: (888) 255-4766. This information may be examined at the Federal Aviation Administration (FAA), New England Region, Office of the Regional Counsel, 12 New England Executive Park, Burlington, MA; or at the Office of the Federal Register, 800 North Capitol Street, NW, suite 700, Washington, DC.

FOR FURTHER INFORMATION CONTACT: Michael Downs, Aerospace Engineer, Chicago Aircraft Certification Office, FAA, Small Airplane Directorate, 2300 E. Devon Ave., Des Plaines, IL 60018; telephone (847) 294-7870, fax (847) 294-7834.

SUPPLEMENTARY INFORMATION: A proposal to amend part 39 of the Federal Aviation Regulations (14 CFR part 39) to include an AD that is applicable to Rolls-Royce Corporation (formerly Allison Engine Company) AE 2100 and AE 3007 series engines was published in the Federal Register on December 12, 2000 (65 FR 77528). That action proposed to require a one-time acid etch inspection of the 2nd stage HPT wheel for cracks. If the wheel is cracked, this AD would require replacement of the turbine wheel with a serviceable part in accordance with Rolls-Royce Alert Service Bulletins (ASB's): AE 2100A-A-72-234, Revision 2, dated October 13, 2000; or AE 2100C-A-72-183, Revision 2, dated October 13, 2000; AE 2100D3-A-72-179, Revision, 2, dated October 13, 2000; AE 3007A-A-72-179, Revision 2, dated October 17, 2000; and AE 3007C-A-72-153, Revision 2, dated October 17, 2000, that describe the procedures for examining the turbine wheel for damage using the one-time acid etch procedure. Since the NPRM was published, Rolls-Royce has issued Revision 3, dated June 19, 2001, to all five ASB's because they were revised from level 2 to level 3 to align them with changes agreed to by the FAA as a result of comments made to the NPRM. also included in this amendment are the different types of engines that were omitted from the NPRM.

Comments

Interested persons have been afforded an opportunity to participate in the making of this amendment. Due consideration has been given to the comments received.

Remove Part Number

The manufacturer requests that turbine wheel part number (P/N) 23069438 be removed from the AD. As a result of testing, it was discovered that the 1/10,000 minimum crack initiation life is greater than the Chapter 5 life limit for the AE 3007A1, A1/1, A1/2, A1/3, and A3 and within 100 cycles of the Chapter 5 life for the AE 3007A1P.

The FAA agrees. The manufacturer completed a comprehensive program to quantify the impact on fatigue capability of Udimet 720 material damaged by improper tool contact in the same manner as discussed for turbine wheel P/N 23050912 in the proposed rule. Program results demonstrated that shot peening during manufacturing greatly increases the crack initiation life of a wheel containing the damage, thus decreasing the likelihood of failure from a crack resulting from that damage. The analysis of damaged wheels discussed in the proposed AD did not take into consideration wheels that were shot peened during manufacture. Thus, the applicability of the AD has been changed to reflect that the AD does not apply to engines with turbine wheel P/N 23069438 installed.

Change Inspection Compliance Times

The manufacturer also states that Table 2. should be changed to reflect increased inspection times for the engines having turbine wheel P/N 23069592 with serial number up to (SN) MM183060. as follows:

1. AE 3007A prior to 12,800 cycles.
2. AE 3007C prior to 12,800 cycles.
3. AE 2100A prior to 16,800 cycles.
4. AE 2100C prior to 16,800 cycles.
5. AE 2100D3 prior to 14,100 cycles.

The FAA agrees that the change is justified because wheel P/N's 23069438 and 23069592 are both shot peened during manufacturing. The effects of shot peening were not considered in the writing of the proposed rule. However, P/N 23069592, unlike P/N 23069438, did not have a minimum crack initiation life greater than it's chapter 5 life limit. Table 2 has been changed accordingly.

Change Definition of Serviceable Part

The manufacturer also requests that the definition of a serviceable part in paragraph (e) be changed to reflect that an acid etch inspection does not reveal cracks, but reveals damage that may indicate a higher probability that a crack will initiate.

The FAA agrees and the definition has been changed. The FAA has also made a similar change to the discussion in the preamble to this final rule.

Table 2 Correction

Finally, the manufacturer asks that Table 2 be corrected as there is a typographical error in column (2); part number 233064473 should be 23064473.

The FAA agrees and the change has been made.

The FAA has also corrected the applicability to reflect that the AD applies to AE2100A and AE2100C engines that have turbine wheels with P/N's other than 23050912 installed, as indicated in Table 2 of the proposed rule. Also, P/N's 23070672 and 23070675 were inadvertently left out of the original service bulletins and have been added to Table 2, row 4.

After careful review of the available data, including the comments noted above, the FAA has determined that air safety and the public interest require the adoption of the rule with the changes described previously. The FAA has determined that these changes will neither increase the economic burden on any operator nor increase the scope of the AD.

Economic Impact

Since the issuance of the NPRM, engine models AE 3007A1 series and AE 3007A3 have been removed from this proposed amendment and this AD no loner applies to the EMB-135 aircraft. As a result, there are now approximately 833 engines of the affected design in the worldwide fleet. The FAA estimates that approximately 280 engines installed on airplanes of US registry would be affected by this proposed AD. The FAA estimates that disassembly to perform the acid etch inspection and reassembly will take approximately 130 work hours, which includes teardown to the HPT, inspection and reassembly, and that the average labor rate is $60 per work hour. Labor costs to perform the disassembly and reassembly are $7,800, and a test stand run will cost about $5,000, for a total cost of $12,800 per engine to conduct the acid etch inspection. Based on these figures, the FAA estimates that the total cost impact of performing the acid etch inspection on US operators will be $3,584,000. If a wheel must be replaced, the cost of a replacement wheel is $18,000, and it will take an additional 30 work hours to replace the wheel, at $60 per work hour. Therefore, the total cost of parts and labor for replacing the wheel will total $19,800 per wheel. If all wheels needed to be replaced, the total cost impact of the proposed AD on U.S. operators would be $5,544,000. The FAA estimates, however, that not all wheels will need replacement and that some labor costs required to accomplish the requirements of this proposed AD may be reimbursed by the manufacturer, thus reducing the total cost impact of the proposed AD on US operators.

Regulatory Impact

This final rule does not have federalism implications, as defined in Executive Order 13132, because it would 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. Accordingly, the FAA has not consulted with state authorities prior to publication of this final rule.

For the reasons discussed above, I certify that this action (1) is not a ``significant regulatory action'' under Executive Order 12866; (2) is not a ``significant rule'' under the DOT Regulatory Policies and Procedures (44 FR 11034, February 26, 1979); and (3) if promulgated, 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. A final evaluation has been prepared for this action and it is contained in the Rules Docket. A copy of it may be obtained by contacting the Rules Docket at the location provided under the caption ADDRESSES.

List of Subjects in 14 CFR Part 39

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

Adoption of the Amendment

Accordingly, pursuant to the authority delegated to me by the Administrator, the Federal Aviation Administration amends part 39 of the Federal Aviation Regulations (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.

Sec. 39.13 [Amended]

2. Section 39.13 is amended by adding a new airworthiness directive to read as follows:

AIRWORTHINESS DIRECTIVE

Aircraft Certification Service
Washington, DC

U.S. Department
of Transportation
Federal Aviation Administration

We post ADs on the internet at "av-info.faa.gov"

The following Airworthiness Directive issued by the Federal Aviation Administration in accordance with the provisions of Title 14 of the Code of Federal Regulations (14 CFR) part 39, applies to an aircraft model of which our records indicate you may be the registered owner. Airworthiness Directives affect aviation safety and are regulations which require immediate attention. You are cautioned that no person may operate an aircraft to which an Airworthiness Directive applies, except in accordance with the requirements of the Airworthiness Directive (reference 14 CFR part 39, subpart 39.3).

2001-17-31 Rolls-Royce Corporation: Amendment 39-12423. Docket No. 2000-NE-27-AD.

Applicability

This airworthiness directive (AD) is applicable to Rolls-Royce Corporation (formerly Allison Engine Company) models AE 2100A and AE 2100C turboprop engines with high pressure turbine (HPT) wheel part number (P/N) 23050912 installed; AE 2100A turboprop engine with turbine wheel P/N 23063462 serial number (SN) MM14062 installed; AE 2100A, AE 2100C, AE 2100D3 turboprop and AE 3007A, and AE 3007C turbofan engines with 2nd stage HPT wheels with SN's before MM183060. These engines are installed on but not limited to Embraer EMB-145, Cessna 750, SAAB 2000, and Industi Pesawat Terbang Nusantara (IPTN) N-250 series airplanes.

Note 1: This AD applies to each engine identified in the preceding applicability provision, regardless of whether it has been modified, altered, or repaired in the area subject to the requirements of this AD. For engines that have been modified, altered, or repaired so that the performance of the requirements of this AD is affected, the owner/operator must request approval for an alternative method of compliance in accordance with paragraph (g) of this AD. The request should include an assessment of the effect of the modification, alteration, or repair on the unsafe condition addressed by this AD; and, if the unsafe condition has not been eliminated, the request should include specific proposed actions to address it.

Compliance

Compliance with this AD is required as indicated, unless already done.

To detect and prevent early development of cracks due to low cycle fatigue of the 2nd stage HPT wheel in the aft bore face that can lead to wheel failure, power loss, and possible damage to the airplane, do the following:

One-time Inspection

(a) Perform a one-time acid etch inspection to the 2nd stage high pressure turbine wheel in accordance with the Accomplishment Instructions contained in the following Rolls-Royce Alert Service Bulletins:

Table 1.--Applicable Alert Service Bulletins	
AE models	**Rolls-Royce service bulletin**
AE 2100A.....	AE 2100A-A-72-234, Revision 2, dated October 13, 2000 or Revision 3, dated June 19, 2001.
AE 2100C.....	AE 2100C-A-72-183, Revision 2, dated October 13, 2000 or Revision 3, dated June 19, 2001.
AE 2100D3.....	AE 2100D3-A-72-179, Revision 2, dated October 13, 2000 or Revision 3, dated June 19, 2001.
AE 3007A.....	AE 3007A-A-72-179, Revision 2, dated October 17, 2000 or Revision 3, dated June 19, 2001.
AE 3007C.....	AE 3007C-A-72-153, Revision 2, dated October 17, 2000 or Revision 3, dated June 19, 2001.

(b) Perform these inspections according to the following compliance times:

Table 2.--Inspection Compliance Times		
Models	**With turbine wheel**	**Mandatory**
(1) AE 2100A, AE2100C.....	23050912.....	Before 4,800 cycles since new (CSN).
(2) AE 2100A.....	23063462-S/N MM14062.	Before 4,800 CSN.
(3) AE2100D3.....	23050912.....	Before 3,200 CSN.
(4) All other AE 2100A, AE 2100C and AE2100D3.	23063462, 23064822, 23070673, 23065892, 23069116, 23064473, 23064474, 23068072, 23070672 and 23070675 with S/N's MM183060 and before.	At next shop visit.
(5) All AE 3007A, and AE 3007C..	23063462, 23065892, 23069116 with S/N MM183060 and before.	At next shop visit.
(6) All AE 3007A and AE 3007C...	23069592 with S/N MM183060 and before.	At next exposure but not to exceed 12,800 CSN.
(7) All AE 2100A and 23069592 AE 2100C.	23069592 with S/N MM183060 and before.	Next exposure but not to exceed 16,800 CSN.
(8) All 2100D3.....	23069592 with S/N MM183060 and before.	At next exposure but not to exceed14,100 CSN.

(c) If damage is discovered, replace the turbine wheel with a serviceable part.

Definitions

(d) The next shop visit is defined as whenever the engine is removed and sent to a maintenance center for inspection or repair.

(e) A serviceable part is defined as any applicable turbine wheel with a serial number greater than MM183060, or a wheel with a serial number MM183060 or lower that has undergone an acid etch inspection with no indication of damage.

(f) After the effective date of this AD, do not install any 2nd-stage gas-generator turbine wheel listed in Table 2 of this AD, unless it has been inspected as specified in paragraph (a).

Alternative Methods of Compliance

(g) An alternative method of compliance or adjustment of the compliance time that provides an acceptable level of safety may be used if approved by the Manager, Chicago Aircraft Certification Office. Operators must submit their request through an appropriate FAA Principal Maintenance Inspector, who may add comments and then send it to the Manager, Chicago Aircraft Certification Office.

Note 2: Information concerning the existence of approved alternative methods of compliance with this airworthiness directive, if any, may be obtained from the Chicago Aircraft Certification Office.

Special Flight Permits

(h) Special flight permits may be issued in accordance Secs. 21.197 and 21.199 of the Federal Aviation Regulations (14 CFR 21.197 and 21.199) to operate the aircraft to a location where the requirements of this AD can be accomplished.

Documents That Have Been Incorporated by Reference

(i) The inspection must be done in accordance with the following Rolls-Royce Corporation Alert Service Bulletins:

Document No.	Pages	Revision	Date
ASB AE 2100A-A-72-234.....	All.....	2	October 13, 2000.
ASBAE 2100C-A-72-183.....	All.....	2	October 13, 2000.
ASB AE 2100D3-A-72-179.....	All.....	2	October 13, 2000.
	Total Pages: 13		
ASB AE 2100A-A-72-234.....	All.....	3	June 19, 2001.
ASBAE 2100C-A-72-183.....	All.....	3	June 19, 2001.
ASB AE 2100D3-A-72-179.....	All.....	3	June 19, 2001.
	Total Pages: 13		
ASB AE 3007A-A-72-179.....	All.....	2	October 17, 2000.
ASB AE 3007C-A-72-153.....	All.....	2	October 17, 2000.
	Total Pages: 12		
ASB AE 3007A-A-72-179.....	All.....	3	June 19, 2001.
ASB AE 3007C-A-72-153.....	All.....	3	June 19, 2001.
	Total Pages: 12		

This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from Rolls-Royce Corporation, P.O. Box 420, Indianapolis, IN 46206-0420; telephone: (888) 255-4766 . Copies may be inspected at the FAA, New England Region, Office of the Regional Counsel, 12 New England Executive Park, Burlington, MA; or at the Office of the Federal Register, 800 North Capitol Street, NW, suite 700, Washington, DC.

Effective Date of This AD

(j) This amendment becomes effective on October 5, 2001.

Issued in Burlington, Massachusetts, on August 21, 2001.

Donald Plouffe,

Acting Manager, Engine and Propeller Directorate, Aircraft Certification Service.

[FR Doc. 01-21894 Filed 8-30-01; 8:45 am]

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