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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA-2011-0959; Directorate Identifier 2011-NE-25-AD; Amendment 39-16970; AD 2012-04-14]

RIN 2120-AA64

Airworthiness Directives; Rolls-Royce plc Turbofan Engines

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: We are adopting a new airworthiness directive (AD) for RB211-Trent 800 series turbofan engines. This AD requires inspecting the front combustion liner head section for cracking, and if found cracked, removing the front combustion liner head section from service at the next shop visit. This AD was prompted by mandatory continuing airworthiness information (MCAI) issued by an aviation authority of another country to identify and correct an unsafe condition on an aviation product. Specifically, routine inspections revealed cracking on the head sections of two RB211-Trent 800 front combustion liners. We are issuing this AD to prevent uncontained engine failure and damage to the airplane.

DATES: This AD becomes effective April 11, 2012. The Director of the Federal Register approved the incorporation by reference of certain publications listed in this AD as of April 11, 2012.

ADDRESSES: 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: Alan Strom, Aerospace Engineer, Engine Certification Office, FAA, Engine & Propeller Directorate, 12 New England Executive Park, Burlington, MA 01803; email: alan.strom@faa.gov; phone: 781-238-7143; fax: 781-238-7199.

SUPPLEMENTARY INFORMATION:

Discussion

We issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 to include an AD that would apply to the specified products. That NPRM was published in the Federal Register on November 25, 2011 (76 FR 72650). That NPRM proposed to correct an unsafe condition for the specified products. The MCAI states:

> Routine inspections have revealed cracking on the head sections of two Trent 800 front combustion liners.
>
> This condition, if not detected and corrected, could lead to hot gas breakout with subsequent downstream component release potentially leading to uncontained high energy debris, possibly resulting in damage to the aeroplane or injury to persons on the ground.

Comments

We gave the public the opportunity to participate in developing this AD. We considered the comments received.

Request To Reference the Latest Service Information

American Airlines, The Boeing Company, and Rolls-Royce plc, requested that we reference the latest service information, which is Alert Service Bulletin (ASB) No. RB.211-72-AG456, Revision 1, dated November 4, 2011.

We agree. We changed the AD to reference Revision 1 of the ASB.

Request To Add Previous Credit Paragraph

American Airlines, The Boeing Company, and Rolls-Royce plc, requested that we add a Previous Credit paragraph to list the original ASB to give credit to operators who have performed the initial and repetitive inspections before the effective date of the AD.

We agree. We added Credit for Previous Action paragraph (i) to the AD.

Request To Borescope-Inspect the 04 Module When Removed

Rolls-Royce plc requested that we add wording to the AD that states that the 04 module may be borescope-inspected when it is removed from the engine but is not being stripped. This would give the operator the opportunity to restart the 2,000-cycle on-wing life before the next inspection, or if cracked, would give the operator the opportunity to replace the front combustion liner head section.

We agree. We changed the AD to allow as an alternate procedure, an in-shop borescope inspection.

Request To Eliminate Unnecessary Borescope Inspection

Rolls-Royce plc pointed out that the proposed AD requires the front combustion liner head section to be borescope inspected even if it is being stripped. Visual and fluorescent penetrant inspections would be done as part of the maintenance manual activities after stripping, and the borescope inspection would be unnecessary.

We agree. We changed the AD to eliminate the unnecessary borescope inspection.

Request To Clarify AD Meaning

American Airlines and The Boeing Company requested that we change paragraphs (f)(2) and (g)(1)(i) to state that if you find cracking, repetitively inspect the front combustion liner as specified in Table 1 and remove it from service as specified in Table 1 or at the next shop visit, whichever occurs first. The commenters claim that this change would clarify the meaning of the AD.

We do not agree. Any engine found to have cracks during the initial inspection in paragraph (f)(1) or a repetitive inspection in paragraph (g)(1) must have its front combustor liner head section removed from service at the next shop visit. Table 1 allows for further flight with mitigating actions until the next shop visit. We did not change the AD.

Request To Identify the Repetitive Inspections Paragraph

The Boeing Company requested that we identify the repetitive inspections paragraph, as paragraph (g).

We do not agree. The paragraph is already identified as paragraph (g). We did not change the AD.

Request To Remove Erroneous Reference

American Airlines requested that in paragraph (g)(2), we not reference paragraph (f)(2) as being a step that would find cracks, because it does not.

We agree. We removed that reference in the AD.

Request To Revise Shop Visit Definition and To Inspect During All Shop Visits

American Airlines requested that we revise the definition of shop visit to include all engine shop visits, and revise paragraph (g)(2) of the proposed AD such that paragraph 3.B.(1) or 3.B.(2) of the ASB can be used to do the inspections. The commenter stated that the proposed AD shop visit definition limits the number of shop visits where an inspection is required. Further, paragraph (g)(2) of the proposed AD is inconsistent with the definition of shop visit in the ASB because the ASB has instructions for borescope inspection when the front combustor liner head section is not exposed.

We partially agree. We agree with revising paragraph (g)(2) (now paragraph (g)(3) in the AD) and paragraph (h), because Revision 1 of the ASB is worded differently from the original ASB, and Revision 1 of the ASB added an alternate borescope inspection that can be performed without disassembling the 04 module.

We do not agree with requiring the inspection during all shop visits because the mitigating actions in Table 1 of the AD are sufficient to ensure safe operation pending a shop visit in accordance with the definition of shop visit in the AD. We changed paragraph (g)(2) (now paragraph (g)(3)) from:

"For engines not found to have cracks in the front combustion liner head section in accordance with paragraphs (f)(1), (f)(2), or (g)(1) of this AD, at every shop visit after the effective date of this AD, inspect the front combustion liner head section for cracking. Use paragraph B.(2), except B.(2)(a)(i), of the In-shop Accomplishment Instructions of RR ASB No. RB.211-72-AG456, dated September 9, 2010, to do the inspections," to:

"For engines not found to have cracks in the front combustion liner head section in accordance with paragraphs (f)(1) or (g)(1) of this AD, at every shop visit after the effective date of this AD:

(i) Fluorescent-penetrant inspect the front combustion liner head section for cracking; or

(ii) Borescope-inspect the front combustion liner head section for cracking. Use paragraph 3.B.(1)(b) except paragraph 3.B.(1)(b)(i), or use paragraphs 3.B.(2)(b) through 3.B.(2)(d), of the In-

shop Accomplishment Instructions of RR ASB No. RB.211-72-AG456, Revision 1, dated November 4, 2011.

(iii) If any cracks are found, reject the front combustion liner."

We also changed paragraph (h) from:

"For the purpose of this AD, the term shop visit means the induction of an engine into the shop for maintenance where the front combustion liner is exposed or when the engine has been removed from service as a result of paragraph (f)(2) or (g)(1)(i) of this AD," to:

"For the purpose of this AD, the term shop visit means the induction of an engine into the shop for maintenance where the front combustion liner is exposed, or when the 04 module has been removed from the engine or when the engine has been removed from service as a result of paragraph (f)(2) or (g)(2) of this AD."

Request To Change Action Wording in Table 1

The Boeing Company requested that we change the action wording in Table 1 of the proposed AD from "Replace the engine before next flight" to "Remove the engine immediately." The commenter stated that this would make the AD consistent with the ASB and prevent failures on the ground.

We do not agree. Engine running on the ground is not a flight safety issue. We note, however, that the NPRM (76 FR 72650, November 25, 2011) used both "remove the engine" and "replace the engine" in Table 1. We changed Table 1 in the AD to use the phrase, "remove the engine" in each case.

Need To Show All Acceptable Means of Completing the On-Wing Inspection

Since we issued the NPRM (76 FR 72650, November 25, 2011), we determined that to be consistent with Revision 1 of the ASB, we need to show all acceptable means of completing the on-wing inspection. We changed paragraphs (f)(1) and (g)(1) of the proposed AD from:

"Within 1,000 flight cycles (FCs) after the effective date of this AD, inspect the front combustion liner head section for cracking. Use paragraph 3.A, except for 3.A.(1)(a)(i), of the On-Wing Accomplishment Instructions of RR ASB No. RB.211-72-AG456, dated September 9, 2010, to do your inspections" to:

"Within 1,000 flight cycles (FCs) after the effective date of this AD, inspect the front combustion liner head section for cracking. Use paragraph 3.A.(1), except for 3.A.(1)(a)(i), or paragraphs 3.A.(2)(b) through 3.A.(2)(d) of the On-Wing Accomplishment Instructions of RR ASB No. RB.211-72-AG456, Revision 1, dated November 4, 2011, to do your inspections."

Conclusion

We 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 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 about 125 products of U.S. registry. We also estimate that it will take about 10 work-hours per engine to inspect and 10 additional work-hours for those combustion liners that require replacement. The average labor rate is $85 per work-hour. Required parts will cost about $525,000 per engine. We expect that four front combustion liners will require replacement. Based on these figures, we estimate the cost of the AD on U.S. operators to be $2,209,650.

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 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 this AD:

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. 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 regulatory evaluation of the estimated costs to comply with this AD and placed it in the AD docket.

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 (phone: 800-647-5527) is provided in the ADDRESSES section. Comments will be available in the AD docket shortly after receipt.

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):

2012-04-14 Rolls-Royce plc: Amendment 39-16970; Docket No. FAA-2011-0959; Directorate Identifier 2011-NE-25-AD.

(a) Effective Date

This AD becomes effective April 11, 2012.

(b) Affected ADs

None.

(c) Applicability

This AD applies to Rolls-Royce plc (RR) RB211-Trent 800 turbofan engines, all models, all serial numbers.

(d) Reason

(1) This AD results from mandatory continuing airworthiness information (MCAI) issued by an aviation authority of another country to identify and correct an unsafe condition on an aviation product. The MCAI describes the unsafe condition as:

Routine inspections have revealed cracking on the head sections of two Trent 800 front combustion liners.

This condition, if not detected and corrected, could lead to hot gas breakout with subsequent downstream component release potentially leading to uncontained high energy debris, possibly resulting in damage to the aeroplane or injury to persons on the ground.

(2) We are issuing this AD to prevent uncontained engine failure and damage to the airplane.

(e) Actions and Compliance

Unless already done, do the following actions.

(f) Initial Inspection

(1) Within 1,000 flight cycles (FCs) after the effective date of this AD, inspect the front combustion liner head section for cracking. Use paragraph 3.A.(1), except for 3.A.(1)(a)(i), or paragraphs 3.A.(2)(b) through 3.A.(2)(d) of the On-Wing Accomplishment Instructions of RR Alert Service Bulletin (ASB) No. RB.211-72-AG456, Revision 1, dated November 4, 2011, to do your inspections.

(2) If you find cracking, remove the front combustion liner head section from service at the next shop visit. Until the next shop visit, take the corrective actions listed in Table 1 of this AD, as applicable.

Table 1–Inspection Findings and Follow-on Actions

Inspection findings	Action(s) and compliance time(s)
(i) Cumulative crack length up to 150 mm (up to 2 heatshields)	Reduce the inspection intervals to 250 FCs.
(ii) Cumulative crack length 150 mm to 300 mm (up to 4 heatshields)	Reduce the inspection intervals to 100 FCs.
(iii) Cumulative crack length 300 mm to 450 mm (up to 6 heatshields)	Remove the engine within 50 FCs.
(iv) Cumulative crack length 450 mm to 900 mm (up to 12 heatshields)	Remove the engine within 5 FCs.
(v) Cumulative crack length greater than 900 mm (more than 12 heatshields)	Remove the engine before next flight.

(g) Repetitive Inspections

(1) Within 1,000 FCs after the effective date of this AD, inspect the front combustion liner head section for cracking. Use paragraph 3.A.(1), except for 3.A.(1)(a)(i), or paragraphs 3.A.(2)(b) through 3.A.(2)(d) of the On-Wing Accomplishment Instructions of RR ASB No. RB.211-72-AG456, Revision 1, dated November 4, 2011, to do your inspections.

(2) If you find cracking, remove the front combustion liner head section at the next shop visit. Until the next shop visit, take the corrective actions as detailed in Table 1 of this AD, as applicable.

(3) For engines not found to have cracks in the front combustion liner head section in accordance with paragraphs (f)(1) or (g)(1) of this AD, at every shop visit after the effective date of this AD:

(i) Fluorescent-penetrant inspect the front combustion liner head section for cracking; or

(ii) Borescope-inspect the front combustion liner head section for cracking. Use paragraph 3.B.(1)(b) except paragraph 3.B.(1)(b)(i), or use paragraphs 3.B.(2)(b) through 3.B.(2)(d), of the In-shop Accomplishment Instructions of RR ASB No. RB.211-72-AG456, Revision 1, dated November 4, 2011.

(iii) If any cracks are found, reject the front combustion liner.

(4) Accomplishment of a shop visit inspection as required by paragraph (g)(3) of this AD may substitute for the accomplishment of an on-wing inspection as required by paragraph (f)(1) or (g)(1) of this AD.

(h) Definition of Shop Visit

For the purpose of this AD, the term shop visit means the induction of an engine into the shop for maintenance where the front combustion liner is exposed, or when the 04 module has been removed from the engine, or when the engine has been removed from service as a result of paragraph (f)(2) or (g)(2) of this AD.

(i) Credit for Previous Action

An initial or repetitive inspection performed before the effective date of this AD using RR ASB No. RB.211-72-AG456, dated September 9, 2010, satisfies the initial inspection requirement in paragraph (f) or repetitive inspection requirement in paragraph (g) of this AD.

(j) Alternative Methods of Compliance (AMOCs)

The Manager, Engine Certification Office, may approve AMOCs for this AD. Use the procedures found in 14 CFR 39.19 to make your request.

(k) Related Information

(1) For more information about this AD, contact Alan Strom, Aerospace Engineer, Engine Certification Office, FAA, Engine & Propeller Directorate, 12 New England Executive Park, Burlington, MA 01803; email: alan.strom@faa.gov; phone: 781-238-7143; fax: 781-238-7199.

(2) Refer to European Aviation Safety Agency AD 2011-0080, dated May 6, 2011, for related information.

(l) Material Incorporated by Reference

(1) You must use the following service information to do the actions required by this AD, unless the AD specifies otherwise. The Director of the Federal Register approved the incorporation by reference (IBR) under 5 U.S.C. 552(a) and 1 CFR part 51.

(i) Rolls-Royce plc Alert Service Bulletin No. RB.211-72-AG456, Revision 1, dated November 4, 2011.

(ii) Rolls-Royce plc Alert Service Bulletin No. RB.211-72-AG456, dated September 9, 2010.

(2) For service information identified in this AD, contact Rolls-Royce plc, P.O. Box 31, Derby, DE24 8BJ, United Kingdom; phone: 011 44 1332 242424; fax: 011 44 1332 249936; email: http://www.rolls-royce.com/contact/civil_team.jsp; or Web: https://www.aeromanager.com.

(3) You may review copies of the service information at the FAA, Engine & Propeller Directorate, 12 New England Executive Park, Burlington, MA. For information on the availability of this material at the FAA, call 781-238-7125.

(4) You may also review copies of the service information incorporated by reference at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: http://www.archives.gov/federal-register/cfr/ibr-locations.html.

Issued in Burlington, Massachusetts, on February 22, 2012.
Peter A. White,
Manager, Engine & Propeller Directorate,
Aircraft Certification Service.