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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA-2020-1138; Project Identifier MCAI-2020-01258-E; Amendment 39-21488; AD 2021-07-11]

RIN 2120-AA64

Airworthiness Directives; Rolls-Royce Deutschland Ltd & Co KG (Type Certificate Previously Held by Rolls-Royce plc) Turbofan Engines

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: The FAA is adopting a new airworthiness directive (AD) for certain Rolls-Royce Deutschland Ltd & Co KG (RRD) Trent 1000-A2, 1000-AE2, 1000-C2, 1000-CE2, 1000-D2, 1000-E2, 1000-G2, 1000-H2, 1000-J2, 1000-K2, and 1000-L2 model turbofan engines. This AD was prompted by the manufacturer's analysis which determined that cracks may initiate in the front seal fins and cause cracks in the low-pressure turbine (LPT) disk. This AD requires repetitive inspection of the seal fins and, depending on the results of the inspection, replacement of the LPT disk before further flight. The FAA is issuing this AD to address the unsafe condition on these products.

DATES: This AD is effective May 11, 2021.

The Director of the Federal Register approved the incorporation by reference of a certain publication listed in this AD as of May 11, 2021.

ADDRESSES: For service information identified in this final rule, contact Rolls-Royce plc, P.O. Box 31, Derby, DE24 8BJ, United Kingdom; phone: +44 (0)1332 242424; website: https://www.rolls-royce.com/contact-us.aspx. You may view this service information at the FAA, Airworthiness Products Section, Operational Safety Branch, 1200 District Avenue, Burlington, MA 01803. For information on the availability of this material at the FAA, call (781) 238-7759. It is also available at https://www.regulations.gov by searching for and locating Docket No. FAA-2020-1138.

Examining the AD Docket

You may examine the AD docket at https://www.regulations.gov by searching for and locating Docket No. FAA-2020-1138; or in person at Docket Operations between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this final rule, the mandatory

continuing airworthiness information (MCAI), any comments received, and other information. The address for Docket Operations is 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: Kevin M. Clark, Aviation Safety Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: (781) 238-7088; fax: (781) 238-7199; email: kevin.m.clark@faa.gov.

SUPPLEMENTARY INFORMATION:

Background

The FAA issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 by adding an AD that would apply to certain Rolls-Royce Deutschland Ltd & Co KG (RRD) Trent 1000-A2, 1000-AE2, 1000-C2, 1000-CE2, 1000-D2, 1000-E2, 1000-G2, 1000-H2, 1000-J2, 1000-K2, and 1000-L2 model turbofan engines. The NPRM published in the Federal Register on December 21, 2020 (85 FR 82970). The NPRM was prompted by the manufacturer's analysis which determined that cracks may initiate in the front seal fins and cause cracks in the LPT disk. In the NPRM, the FAA proposed to require repetitive inspection of the seal fins and, depending on the results of the inspection, replacement of the LPT disk before further flight. The FAA is issuing this AD to address the unsafe condition on these products.

The European Union Aviation Safety Agency (EASA), which is the Technical Agent for the Member States of the European Community, has issued EASA AD 2020-0195, dated September 8, 2020 (referred to after this as "the MCAI"), to address the unsafe condition on these products. The MCAI states:

> Analysis of certain LP turbine discs in service has determined that, due to rubbing contact with interstage static seals, cracks may initiate in the front seal fins which could lead to cracks in the disc of the affected parts, as defined in this [EASA] AD.
>
> This condition, if not detected and corrected, could lead to crack propagation, possibly resulting in LP turbine disc failure and high-energy debris release, with consequent damage to, and reduced control of, the aeroplane.
>
> To address this potential unsafe condition, Rolls-Royce published the NMSB to provide inspection instructions.
>
> For the reason described above, this [EASA] AD requires repetitive ultra-high sensitivity fluorescent penetrant inspections of the seal fins of the affected parts and, depending on findings, replacement of affected parts.

You may obtain further information by examining the MCAI in the AD docket at https://www.regulations.gov by searching for and locating Docket No. FAA-2020-1138.

Discussion of Final Airworthiness Directive

Comments

The FAA received comments from two commenters. The commenters were Boeing Commercial Airplanes (Boeing) and Rolls-Royce. Rolls-Royce requested a change that resulted in an update to this AD. Boeing supported the AD as written. The following presents the comments received on the NPRM and the FAA's response to each comment.

Request To Change Engine Shop Visit to Refurbishment Shop Visit

Rolls-Royce requested that the FAA revise the references in paragraphs (g)(1) and (h)(1) of this AD from "engine shop visit" to "refurbishment shop visit." Rolls-Royce reasoned that the FAA introduced a different inspection frequency to that defined in Rolls-Royce Non-Modification Service Bulletin (NMSB) Trent 1000 72-AK416, Initial Issue, dated June 29, 2020, and EASA AD 2020-0195, dated September 8, 2020. Rolls-Royce further reasoned that a pair of mating flanges may be separated at most engine shop visits even when undertaking specific hospital shop or check and repair workscopes. Rolls-Royce indicated that it was not their intent, nor is it required by the safety case presented to and agreed by EASA, to strip and inspect the LPT seals at hospital or check and repair shop visits.

The FAA agrees. The FAA changed references in paragraphs (g)(1) and (h)(1) of this AD from "engine shop visit" to "refurbishment shop visit." The FAA also updated paragraph (h)(1) of this AD to define a "refurbishment shop visit."

Support for the AD

Boeing expressed support for the AD as written.

Conclusion

The FAA reviewed the relevant data, considered the comments received, and determined that air safety and the public interest require adopting this AD as proposed. Accordingly, the FAA is issuing this AD to address the unsafe condition on these products. Except for minor editorial changes and any other changes described previously, this AD is adopted as proposed in the NPRM. None of the changes will increase the economic burden on any operator.

Related Service Information Under 1 CFR Part 51

The FAA reviewed Rolls-Royce NMSB Trent 1000 72-AK416, Initial Issue, dated June 29, 2020 (the NMSB). The NMSB provides instructions for inspecting the LPT stage 3 disk and the LPT stage 4 disk. This service information is reasonably available because the interested parties have access to it through their normal course of business or by the means identified in ADDRESSES.

Costs of Compliance

The FAA estimates that this AD affects 26 engines installed on airplanes of U.S. registry.

The FAA estimates the following costs to comply with this AD:

Estimated Costs

Action	Labor cost	Parts cost	Cost per product	Cost on U.S. operators
Inspect the LPT stage 3 disk and LPT stage 4 disk	80 work-hours × $85 per hour = $6,800	$0	$6,800	$176,800

The FAA estimates the following costs to do any necessary replacement that would be required based on the results of the required inspection. The agency has no way of determining the number of aircraft that might need this replacement:

On-Condition Costs

Action	Labor cost	Parts cost	Cost per product
Replace LPT stage 3 disk	0 work-hours × $85 per hour = $0	$336,158	$336,158
Replace LPT stage 4 disk	0 work-hours × $85 per hour = $0	$406,345	$406,345

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.

The FAA is 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 this AD:

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

(2) Will not affect intrastate aviation in Alaska, 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.

List of Subjects in 14 CFR Part 39

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

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:

2021-07-11 Rolls-Royce Deutschland Ltd & Co KG (Type Certificate previously held by Rolls-Royce plc): Amendment 39-21488; Docket No. FAA-2020-1138; Project Identifier MCAI-2020-01258-E.

(a) Effective Date

This airworthiness directive (AD) is effective May 11, 2021.

(b) Affected ADs

None.

(c) Applicability

This AD applies to Rolls-Royce Deutschland Ltd & Co KG (Type Certificate previously held by Rolls-Royce plc) (RRD) Trent 1000-A2, 1000-AE2, 1000-C2, 1000-CE2, 1000-D2, 1000-E2, 1000-G2, 1000-H2, 1000-J2, 1000-K2, and 1000-L2 model turbofan engines with a low-pressure turbine (LPT) stage 3 disk with part number (P/N) KH36323, or an LPT stage 4 disk with P/N KH33943, installed.

(d) Subject

Joint Aircraft System Component (JASC) Code 7250, Turbine Section.

(e) Unsafe Condition

This AD was prompted by the manufacturer's analysis of certain LPT disks in service. The analysis determined that, due to rubbing contact with interstage static seals, cracks may initiate in the front seal fins, which could lead to cracks in the LPT stage 3 and stage 4 disks. The FAA is issuing this AD to prevent failure of the LPT disk. The unsafe condition, if not addressed, could result in uncontained LPT disk release, damage to the engine, and damage to the airplane.

(f) Compliance

Comply with this AD within the compliance times specified, unless already done.

(g) Required Actions

(1) During each refurbishment shop visit after the effective date of this AD, inspect the seal fins of the LPT stage 3 disk and the LPT stage 4 disk in accordance with the Accomplishment Instructions, paragraphs 3.B and 3.C, of Rolls-Royce Alert Non-Modification Service Bulletin Trent 1000 72-AK416, Initial Issue, dated June 29, 2020.

(i) For an engine that is in a refurbishment shop visit on the effective date of this AD, if the LPT stage 3 disk and LPT stage 4 disk are exposed, perform the inspection before the engine is returned to service.

(ii) [Reserved]

(2) If, during any inspection required by paragraph (g)(1) of this AD, any crack is detected, before further flight, remove the affected LPT disk and replace it with a part eligible for installation.

(h) Definitions

(1) For the purpose of this AD, a "refurbishment shop visit" is the induction of an engine into the shop for maintenance that involves removing the blades from a disk in the intermediate-pressure turbine and replacing a disk in either the high-pressure compressor or high-pressure turbine.

(2) For the purpose of this AD, a "part eligible for installation" is an LPT stage 3 disk or LPT stage 4 disk with zero flight cycles since new, or an LPT stage 3 disk or LPT stage 4 disk that has passed the inspection required by paragraph (g)(1) of this AD.

(i) Alternative Methods of Compliance (AMOCs)

(1) The Manager, ECO Branch, FAA, has the authority to approve AMOCs for this AD, if requested using the procedures found in 14 CFR 39.19. In accordance with 14 CFR 39.19, send your request to your principal inspector or local Flight Standards District Office, as appropriate. If sending information directly to the manager of the certification office, send it to the attention of the person identified in Related Information. You may email your request to: ANE-AD-AMOC@faa.gov.

(2) Before using any approved AMOC, notify your appropriate principal inspector, or lacking a principal inspector, the manager of the local flight standards district office/certificate holding district office.

(j) Related Information

(1) For more information about this AD, contact Kevin M. Clark, Aviation Safety Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: (781) 238-7088; fax: (781) 238-7199; email: kevin.m.clark@faa.gov.

(2) Refer to European Union Aviation Safety Agency (EASA) AD 2020-0195, dated September 8, 2020, for more information. You may examine the EASA AD in the AD docket at https://www.regulations.gov by searching for and locating Docket No. FAA-2020-1138.

(k) Material Incorporated by Reference

(1) The Director of the Federal Register approved the incorporation by reference (IBR) of the service information listed in this paragraph under 5 U.S.C. 552(a) and 1 CFR part 51.

(2) You must use this service information as applicable to do the actions required by this AD, unless the AD specifies otherwise.

(i) Rolls-Royce Alert Non-Modification Service Bulletin Trent 1000 72-AK416, Initial Issue, dated June 29, 2020.

(ii) [Reserved]

(3) For Rolls-Royce service information identified in this AD, contact Rolls-Royce plc, P.O. Box 31, Derby, DE24 8BJ, United Kingdom; phone: +44 (0)1332 242424; website: https://www.rolls-royce.com/contact-us.aspx.

(4) You may view this service information at FAA, Airworthiness Products Section, Operational Safety Branch, 1200 District Avenue, Burlington, MA 01803. For information on the availability of this material at the FAA, call (781) 238-7759.

(5) You may view this service information that is incorporated by reference at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, email: fedreg.legal@nara.gov, or go to: https://www.archives.gov/federal-register/cfr/ibr-locations.html.

Issued on March 23, 2021.
Lance T. Gant,
Director, Compliance & Airworthiness Division, Aircraft Certification Service.
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