Airworthiness Directive

AD No.: 2018-0073

Issued: 30 Mars 2018

Note: This Airworthiness Directive (AD) is issued by EASA, acting in accordance with Regulation (EC) 216/2008 on behalf of the European Union, its Member States and of the European third countries that participate in the activities of EASA under Article 66 of that Regulation.

This AD is issued in accordance with Regulation (EU) 748/2012, Part 21.A.3B. In accordance with Regulation (EU) 1321/2014 Annex I, Part M.A.301, the continuing airworthiness of an aircraft shall be ensured by accomplishing any applicable ADs. Consequently, no person may operate an aircraft to which an AD applies, except in accordance with the requirements of that AD, unless otherwise specified by the Agency [Regulation (EU) 1321/2014 Annex I, Part M.A.303] or agreed with the Authority of the State of Registry [Regulation (EC) 216/2008, Article 14(4) exemption].

Design Approval Holder's Name:

ROLLS-ROYCE plc

Type/Model designation(s):

Trent 1000 engines

Effective Date: 03 April 2018

TCDS Number(s): EASA.E.036

Foreign AD: Not applicable

Supersedure: This AD supersedes EASA AD 2017-0248 dated 13 December 2017.

ATA 72 – Engine – Intermediate Pressure Compressor Rotor 1 and 2 Blades – Inspection

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Manufacturer(s):

Rolls-Royce plc (RR)

Applicability:

Trent 1000-A2, Trent 1000-AE2, Trent 1000-C2, Trent 1000-CE2, Trent 1000-D2, Trent 1000-E2, Trent 1000-G2, Trent 1000-H2, Trent 1000-J2, Trent 1000-K2 and Trent 1000-L2 engines, all serial numbers.

These engines are known to be installed on, but not limited to, Boeing 787 series aeroplanes.

Definitions:

The applicable NMSB: RR Alert NMSB (Non-Modification Service Bulletin) TRENT 1000 72-AJ814 Revision 1 dated 26 September 2017 and Alert NMSB TRENT 1000 72-AJ819 Revision 1 dated 09 October 2017.

The additional NMSB: RR Alert NMSB TRENT 1000 72-AK058.

Where, in this AD, reference is made to an RR NMSB with an 'A' (Alert) in the number, it should be recognised that an earlier or later revision may not have that 'A'. This kind of change does not effectively alter the publication references for the purpose of this AD.

Reason:

Occurrences have been reported on RR Trent 1000 'Pack C' engines, where some Intermediate Pressure Compressor (IPC) Stage (Rotor) 1 and Rotor 2 blades were found cracked.

This condition, if not detected and corrected, could lead to in-flight blade release, possibly resulting in reduced control of the aeroplane.

To address this potential unsafe condition, RR issued Alert NMSB TRENT 1000 72-AJ814 and 72-AJ819 to provide inspection instructions for IPC Rotor 1 blades, and IPC Rotor 2 blades and IPC shaft Stage 2 dovetail posts, respectively. RR also issued NMSB TRENT 1000 72-J871 to provide rework instructions for the affected parts, and Alert NMSB TRENT 1000 72-AJ869 to inspect those post-rework parts. Consequently, EASA issued AD 2017-0248 to require repetitive inspections of the affected IPC Rotor blades and IPC shaft Stage 2 dovetail posts and, depending on findings, removal from service of the engine for corrective action.

Since EASA AD 2017-0248 was issued, following further analysis, it was determined that, for certain engines, the inspection of front face of the IPC Stage 2 Rotor Blades and IPC Shaft Stage 2 Dovetails Posts must be accomplished earlier. RR issued the additional NMSB to provide on-wing instructions.

For the reasons described above, this AD retains the requirements of EASA AD 2017-0248, which is superseded, and additionally requires a one-time visual borescope inspection and, depending on findings, removal from service of the engine for corrective action.

This AD is considered an interim action, pending the development of a modification which is expected to be terminating action for the repetitive inspections as required by this AD.

Required Action(s) and Compliance Time(s):

Required as indicated, unless accomplished previously:

Pre-NMSB TRENT 1000 72-J871 Repetitive Inspections:

(1) From 27 December 2017 [the effective date of EASA AD 2017-0248], following receipt of an alert engine health monitoring (EHM) notification (see Note 1 of this AD and example shown in Figure 1 of this AD) from the RR Operational Service Desk (OSD), within the compliance time specified in Table 1 of this AD, as applicable, and, thereafter, at intervals not to exceed 200 flight cycles (FC), accomplish an inspection in accordance with the instructions of the applicable NMSB.

Note 1: RR OSD manages the EHM process and will send an Alert EHM notification containing the wording as shown in Figure 1 of this AD. The EHM Alert is only provided for the initial inspection (threshold), not for subsequent repeat inspections.

Figure 1 – Example Alert EHM Notification

Engine: **#2/10ad4** on aircraft **cV-fJC**
Symptoms: Possible cracking of Rotor 1 and/or Rotor 2 in accordance with NMSB 72-AJ814 or 72-AJ819
Diagnosis: Risk of IP Compressor Rotor 1 or Rotor 2 Cracking
Please be advised that we have observed IP Compressor Rotor 1 and 2: Crack inspection required. The recommended fault isolation process for Risk of IP Compressor Rotor Cracks states:
Possible Causes: The above engine is identified as being at increased risk of cracking on the IP Compressor Rotor 1 & Rotor 2 blades and/or shaft dovetail posts.
Reaction Time: 80 flight cycles.

Table 1 – Initial Inspection (see Note 2 of this AD)

Inspected	Compliance Time
No	Within 80 FC, or within the reaction time specified in the EHM Alert, whichever occurs first after receiving the EHM Alert
Yes	Within 200 FC after the last inspection

Note 2: For the purpose of Table 1 of this AD, 'inspected' means that the affected engine has passed an inspection (no cracks identified) in accordance with the instructions of RR Technical Variation (TV) TV176758 or TV177125, or the original issue of RR NMSB TRENT 1000 72-AJ814; or TV177005, TV177006, TV177187, TV177623 or TV177659, or the original issue of RR NMSB TRENT 1000 72-AJ819, or NMSB TRENT 1000 72-J744, as applicable.

Post-NMSB TRENT 1000 72-J871 Repetitive Inspections:

(2) For an engine, subject to inspections as required by paragraph (1) of this AD, after in-shop replacement of the affected IPC Rotor 1 blades, IPC Rotor 2 blades and the IPC shaft Stage 2 assembly, Part Number FW89043, on that engine in accordance with the instructions of RR NMSB TRENT 1000 72-J871, before exceeding the threshold, and, thereafter, at intervals not exceeding the values as specified in RR NMSB TRENT 1000 72-AJ869, accomplish an inspection in accordance with the instructions of the applicable NMSB.

Note 3: Where the applicable NMSB specifies the interval as "Inspect at 200 flight cycles since shop visit or last inspection", this AD requires those actions within 200 FC.

One-time inspection for engines as defined in Paragraph D. 1. of the additional NMSB:

(3) Within 55 days after the effective date of this AD or within the compliance times specified in the additional NMSB, as applicable, whichever occurs later, accomplish a borescope inspection in accordance with the instructions of the additional NMSB.

Corrective Action(s):

(4) If, during any inspection as required by this AD, any crack indication is found, before next flight, remove the engine from service, contact RR for approved corrective action instructions and, before release to service of the engine, accomplish those instructions accordingly.

Reporting:

(5) Within 30 days after the inspection as required by paragraph (3) of this AD, report the inspection result (including no findings) to RR, in accordance with the instructions of additional NMSB. Appendix 1 of the additional NMSB can be used for this reporting requirement.

Terminating Action:

(6) None.

Ref. Publications:

Rolls-Royce Alert NMSB TRENT 1000 72-AJ814 original issue dated 17 August 2017, and Revision 1 dated 26 September 2017.

Rolls-Royce Alert NMSB TRENT 1000 72-AJ819 original issue dated 17 August 2017, and Revision 1 dated 9 October 2017.

Rolls-Royce NMSB TRENT 1000 72-J744 original issue dated 20 June 2017.

Rolls-Royce NMSB TRENT 1000 72-J871 original issue dated 19 October 2017.

Rolls-Royce Alert NMSB TRENT 1000 72-AJ869 original issue dated 19 October 2017.

Rolls-Royce Alert NMSB TRENT 1000 72-AK058 original issue dated 30 March 2018.

The use of later approved revisions of these documents is acceptable for compliance with the requirements of this AD.

Remarks:

1. If requested and appropriately substantiated, EASA can approve Alternative Methods of Compliance for this AD.

2. Based on the required actions and the compliance time, EASA have decided to issue a Final AD with Request for Comments, postponing the public consultation process until after publication.

3. Enquiries regarding this AD should be referred to the EASA Safety Information Section, Certification Directorate. E-mail: ADs@easa.europa.eu.

4. For any question concerning the technical content of the requirements in this AD, please contact your designated Rolls-Royce representative, or download the publication from your Rolls Royce Care account at https://customers.rolls-royce.com.

   If you do not have a designated representative or Rolls Royce Care account, please contact **Corporate Communications** at **Rolls-Royce plc**, P.O. Box 31, Derby, DE24 8BJ, United Kingdom Telephone +44 (0)1332 242424,

or send an email through http://www.rolls-royce.com/contact/civil_team.jsp identifying the correspondence as being related to **Airworthiness Directives**.