European Union Aviation Safety Agency

Airworthiness Directive

AD No.: 2019-0249

Issued: 09 October 2019

Note: This Airworthiness Directive (AD) is issued by EASA, acting in accordance with Regulation (EU) 2018/1139 on behalf of the European Union, its Member States and of the European third countries that participate in the activities of EASA under Article 129 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 (EU) 2018/1139, Article 71 exemption].

Design Approval Holder's Name:
ROLLS-ROYCE DEUTSCHLAND Ltd & Co KG

Type/Model designation(s):
Trent 1000 engines

Effective Date: 23 October 2019

TCDS Number(s): EASA.E.036

Foreign AD: Not applicable

Supersedure: This AD supersedes EASA AD 2019-0075 dated 29 March 2019.

ATA 72 – Engine – Intermediate Pressure Compressor Blades / Shafts – Inspection

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Manufacturer(s):
Rolls-Royce plc

Applicability:
Trent 1000-A, Trent 1000-AE, Trent 1000-C, Trent 1000-CE, Trent 1000-D, Trent 1000-E, Trent 1000-G and Trent 1000-H engines, all serial numbers.

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

Definitions:
For the purpose of this AD, the following definitions apply:

Where, in this AD, reference is made to a Rolls-Royce Non-Modification Service Bulletin (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.

The NMSB: Rolls-Royce Alert NMSB TRENT 1000 72-AK130 Revision 5.

Affected part: Intermediate Pressure Compressor (IPC) Stage 1 rotor (Rotor 1) blades, Part Number (P/N) FW61601 and P/N KH16052, IPC Stage 2 rotor (Rotor 2) blades, P/N FW61602 and P/N KH16053, and IPC Shaft Stage 1-8 Rotor assemblies P/N FW58316 and P/N FW75680.

Groups:

Group	IPC module configuration
1	Not embodied Rolls-Royce NMSB TRENT 1000 72-K132
3	(sub-)Group 3A: Embodied work package Part B of Rolls-Royce NMSB TRENT 1000 72-K132 at original issue or Revision 1 (sub-)Group 3B: Embodied work package Part B of Rolls-Royce NMSB TRENT 1000 72-K132 at Revision 2 or later revision
4	Embodied work package Part C of Rolls-Royce NMSB TRENT 1000 72-K132 (any revision)
5	Embodied work package Part D of Rolls-Royce NMSB TRENT 1000 72-K132 (any revision)
6	Embodied work package Part E of Rolls-Royce NMSB TRENT 1000 72-K132 (any revision)

For further details, refer to Table 1 (for IPC Rotor 1 blades front face), Table 2 (for IPC Rotor 2 blades front and rear face and IPC Shaft Stage 2 dovetail posts), Table 3 (for IPC Rotor 2 blades of Group 3A) and Appendix 1 (engine serial numbers excluded from sub-Group 3A) of the NMSB.

The applicable NMSB: Rolls-Royce NMSB TRENT 1000 72-K099 (for IPC Rotor 1 blades), NMSB TRENT 1000 72-K100 (for IPC Rotor 2 blades front face and IPC Shaft Stage 2 dovetail posts) and NMSB TRENT 1000 72-K129 (for IPC Rotor 2 blades rear face), as applicable.

Asymmetric power conditions: Operation of the aeroplane at an altitude of less than 28 000 feet, either single engine take-off, engine fault (reduced power on one engine), or single engine in-flight shut-down (IFSD), which includes execution of any non-normal checklist procedure.

Reason:

Occurrences were reported on Rolls-Royce Trent 1000 ‘Pack B’ engines, where some IPC 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, Rolls-Royce issued NMSB TRENT 1000 72-AK130 and the applicable NMSB to provide instructions to inspect IPC Rotor 1 blades, IPC Rotor 2 blades (front and rear face) and IPC shaft Stage 2 dovetail posts. Consequently, EASA issued AD 2018-0128 (later revised) to require a one-time inspection of the affected parts and, depending on findings, accomplishment of applicable corrective action(s).

After EASA AD 2018-0128R1 was issued, it was determined that repetitive borescope inspections are necessary on all engines to ensure fleet-wide continued safe operation. Consequently, Rolls-Royce revised NMSB TRENT 1000 72-AK130 (Revision 2), introducing three different Group definitions (four more Groups were reserved) of IPC modules. Consequently, EASA issued AD 2018-0167 (later revised), retaining the requirements of EASA AD 2018-0128R1, which was superseded, to require repetitive on-wing borescope inspections of the affected Rotor 1 parts and affected Rotor 2 blades and shaft, and depending on findings, removal from service of the engine

for corrective action. That AD also introduced specific inspection requirements following operation in asymmetric power conditions, and provided an alternative in-shop inspection method.

After EASA AD 2018-0167R2 was issued, work packages D and E were added to NMSB TRENT 1000 72-K132 (Revision 1) and it was determined that inspections are required to ensure an acceptable level of safety for engines with such refurbishment embodied. Rolls-Royce revised NMSB TRENT 1000 72-AK130 (Revision 3) accordingly, adding Groups 5 and 6 IPC modules. Consequently, EASA issued AD 2019-0075, retaining the requirements of EASA AD 2018-0167R2, which was superseded, and to require repetitive inspections of certain engines in post-NMSB TRENT 1000 72-K132 (refurbishment work D or E) at Revision 1 or Revision 2 configuration and, depending on findings, accomplishment of applicable corrective action(s).

Since that AD was issued, Rolls-Royce issued the NMSB, as defined in this AD, amending the asymmetric power conditions for engine inspection and introducing cabin depressurisation as an event to trigger engine inspection(s).

For the reason described above, this AD retains the requirements of EASA AD 2019-0075, which is superseded, and adds the new requirements as outlined in the NMSB.

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

Required as indicated, unless accomplished previously:

On-Wing Inspection:

(1) For an engine having a Group 1, Group 3, Group 4, Group 5 or Group 6 module installed: Before exceeding the applicable threshold as specified in Table 1 of the NMSB, or within 30 days after 12 April 2019 [the effective date of EASA AD 2019-0075], whichever occurs later, and, thereafter, at intervals not to exceed the applicable value as specified in Table 1 of the NMSB, inspect the front face of the affected IPC Rotor 1 blades in accordance with the instructions of the applicable NMSB.

(2) For an engine having a Group 1, Group 3, Group 4, Group 5 or Group 6 module installed: Before exceeding the applicable threshold as specified in Table 2 or Table 3 of the NMSB, as applicable, or within 30 days after 12 April 2019 [the effective date of EASA AD 2019-0075], whichever occurs later, and, thereafter, at intervals not to exceed the applicable value as specified in Table 2 of the NMSB, inspect the front and rear face of the affected IPC Rotor 2 blades and the IPC shaft Stage 2 dovetail posts in accordance with the instructions of the applicable NMSB.

In-Shop Inspection:

(3) An engine or module in-shop inspection in accordance with the instructions of Sections 3.A.2, 3.B.2 and 3.C.2 of the NMSB may be substituted for an on-wing inspection as required by paragraph (1) or (2) of this AD, as applicable, provided the applicable threshold and intervals are not exceeded.

Inspection following Asymmetric Power Operation:

(4) From the effective date of this AD, within 5 flight cycles (FC) after each operation in asymmetric power conditions, as defined in this AD, accomplish an on-wing borescope

inspection of the affected Rotor 1 parts and affected Rotor 2 parts of the not-affected engine (no power reduction, no IFSD) installed on the aeroplane, in accordance with the instructions of Section 3.A, 3.B and 3.C of the NMSB.

Inspection following a Depressurisation Event:

(5) From the effective date of this AD, within 5 FC after each aeroplane depressurisation event, inspect the affected parts of both engines of the aeroplane in accordance with the instructions of Sections 3.A, 3.B and 3.C of the NMSB.

Corrective Action(s):

(6) If, during any on-wing inspection as required by paragraph (1), (2), (4) or (5) of this AD, as applicable, any discrepancies or crack indications are detected, as identified in the NMSB, before next flight, remove the engine from service, contact Rolls-Royce for approved repair instructions and, before release to service of the engine, accomplish those instructions accordingly.

A single ferry flight (up to 3 FC, non-ETOPS, no passengers) is permitted to move the aeroplane to a location where the engine can be removed from service.

(7) If, during any in-shop inspection as specified in paragraph (3) of this AD, any discrepancies or crack indications are detected, as identified in the NMSB, before release to service of the engine, or before installation of the module on an engine, as applicable, contact Rolls-Royce for approved repair instructions and accomplish those instructions accordingly.

(8) For an engine not previously subject to repetitive inspections as required by paragraph (1) or (2) of this AD, as applicable, which passes (no deficiencies detected) an inspection as required by paragraph (4) or (5) of this AD, as applicable, that inspection must be considered the initial (threshold) inspection as required by paragraph (1) and (2) of this AD. Thereafter, continue inspecting the engine as required by this AD.

(9) For an engine subject to repetitive inspections as required by paragraph (1) or (2) of this AD, as applicable, which passes (no deficiencies detected) an inspection as required by paragraph (4) or (5) of this AD, as applicable, thereafter, continue inspecting the engine as required by this AD.

Credit:

(10) Any action(s) on an engine, accomplished before the effective date of this AD in accordance with the instructions of Rolls-Royce NMSB TRENT 1000 72-AK130 original issue, or Revision 1, or Revision 2, or Revision 3, or Revision 4, as applicable, is acceptable to comply with the initial corresponding action(s) as required by this AD for that engine.

Terminating Action:

(11) None.

Parts Installation:

(12) From 11 August 2018 [the effective date of EASA AD 2018-0167], it is allowed to install a Group 1, Group 3, Group 4, Group 5 or Group 6 module on an engine, provided that the

affected parts installed on that module have passed an inspection (no defects found) in accordance with the instructions of the applicable NMSB, or the module has been corrected as required by paragraph (6) of this AD, or as specified in paragraph (7) of this AD, as applicable.

Ref. Publications:

Rolls-Royce Alert NMSB TRENT 1000 72-AK130 original issue dated 11 June 2018, or Revision 1 dated 29 June 2018, or Revision 2 dated 26 July 2018, or Revision 3 dated 10 January 2019, or Revision 4 dated 04 March 2019, and Revision 5 dated 22 August 2019.

Rolls-Royce NMSB TRENT 1000 72-K099 original issue dated 11 June 2018, or Revision 1 dated 03 July 2018, or Revision 2 dated 27 September 2018.

Rolls-Royce NMSB TRENT 1000 72-K100 original issue dated 11 June 2018, or Revision 1 dated 02 July 2019.

Rolls-Royce NMSB TRENT 1000 72-K129 original issue dated 11 June 2018, or Revision 1 dated 02 July 2018, or Revision 2 dated 27 September 2018, or Revision 3 dated 28 February 2019.

Rolls-Royce NMSB TRENT 1000 72-K132 original issue dated 29 June 2018, or Revision 1 dated 10 January 2019, or Revision 2 dated 26 March 2019.

The use of later approved revisions of the above-mentioned 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. This AD was posted as PAD 19-168 on 09 September 2019 for additional consultation until 23 September 2019. The Comment Response Document can be found in the EASA Safety Publications Tool, in the compressed (zipped) file attached to the record for this AD.

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

4. Information about any failures, malfunctions, defects or other occurrences, which may be similar to the unsafe condition addressed by this AD, and which may occur, or have occurred on a product, part or appliance not affected by this AD, can be reported to the EU aviation safety reporting system.

5. 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**.