



## Airworthiness Directive

**AD No.:** 2018-0167R1

**Issued:** 01 August 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:** 11 August 2018 (same as original issue)

**TCDS Number(s):** EASA.E.036

**Foreign AD:** Not applicable

**Revision:** This AD revises EASA AD 2018-0167 dated 27 July 2018, which superseded EASA AD 2018-0128R1 dated 06 July 2018.

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

### Manufacturer(s):

Rolls-Royce plc (RR)

### 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:

**The NMSB:** RR Alert Non-Modification Service Bulletin (NMSB) TRENT 1000 72-AK130 Revision 2.

**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 1 IPC modules are those that have not embodied RR NMSB TRENT 1000 72-K132. Group 3 and Group 4 IPC modules are those that have embodied RR NMSB TRENT 1000 72-K132, Part B or Part C, respectively. For details, refer to Table 1 (for IPC Rotor 1 blades front face) and



Table 2 (for IPC Rotor 2 blades front and rear face and IPC Shaft Stage 2 dovetail posts) of the NMSB.

**The applicable NMSB:** RR 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, either with reduced power on one engine, or with single engine in-flight shut-down (IFSD), if sustained for more than 30 minutes below 25 000 feet.

**Reason:**

Occurrences were reported on RR 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, RR 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).

Since 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, RR issued the NMSB, introducing three different Group definitions (four more Groups are reserved) of IPC modules.

For the reasons described above, this AD retains the requirements of EASA AD 2018-0128R1, which is superseded, and requires 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. This AD also introduces specific inspection requirements following operation in asymmetric power conditions.

This AD is still considered an interim action and further AD action may follow.

This AD is revised to clarify the methodology for engine flight cycles (EFC) counting defined in Note 1 and to add the correct NMSB paragraphs that have to be addressed for the in-shop inspection.

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

Required as indicated, unless accomplished previously:

**On-Wing Inspection:**

- (1) For Group 1, Group 3 and Group 4 modules: Except as required by paragraph (2) of this AD, before exceeding the applicable threshold as specified in Table 1 of the NMSB, or within 15 days after the effective date of this AD, 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 or Group 4 module installed where the front faces of IPC Rotor 1 blades were found uncracked during the latest inspection in accordance with RR NMSB TRENT 1000 72-AK130 original issue or Revision 1, as applicable, accomplish the initial inspection as required by paragraph (1) of this AD within the compliance time specified in Table 1 of this AD, as applicable.

Note 1: Unless specified otherwise, the EFC in Table 1 and Table 2 of this AD are those accumulated by the Group 1 module since the latest inspection or equivalent inspection in accordance with RR NMSB TRENT 1000 72-AK130 original issue or Revision 1.

Table 1 – Initial Inspection of uncracked front face of IPC Rotor 1 blades (see Note 1 of this AD)

<b>EFC Accumulated</b>	<b>Compliance Time</b>
More than 400 EFC	Within 15 days after the effective date of this AD
More than 200 EFC, but not more than 400 EFC	Within 45 days after the effective date of this AD
Not more than 200 EFC	Before exceeding 200 EFC, or within 45 days after the effective date of this AD, whichever occurs later

- (3) For Group 1, Group 3 and Group 4 modules: Except as required by paragraph (4) of this AD, before exceeding the applicable threshold as specified in Table 2 of the NMSB, or within 15 days after the effective date of this AD, 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.
- (4) For an engine having a Group 1, Group 3 or Group 4 module installed where the front and rear faces of the affected IPC Rotor 2 blades, and the IPC shaft Stage 2 dovetail posts, were found uncracked during the latest inspection in accordance with RR NMSB TRENT 1000 72-AK130 original issue or Revision 1, as applicable, accomplish the initial inspection as required by paragraph (3) of this AD within the compliance time specified in Table 2 of this AD, as applicable.

Table 2 – Initial Inspection of uncracked front and rear face of the affected IPC Rotor 2 blades, and uncracked IPC shaft Stage 2 dovetail posts (see Note 1 of this AD)

<b>EFC Accumulated</b>	<b>Compliance Time</b>
More than 200 EFC	Within 15 days after the effective date of this AD
More than 100 EFC, but not more than 200 EFC	Within 45 days after the effective date of this AD



Not more than 100 EFC	Before exceeding the applicable interval as specified in Table 2 of the NMSB, or within 45 days after the effective date of this AD, whichever occurs later
-----------------------	---

**In-Shop Inspection:**

- (5) 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), (2), (3) or (4) of this AD, as applicable, provided the applicable threshold and intervals are not exceeded.

**Inspection following Asymmetric Power Operation:**

- (6) From the effective date of this AD, before next flight after each operation in asymmetric power conditions, as defined in this AD, accomplish an on-wing borescope inspection, as defined in Section 1.D.(4) of the NMSB, of the Rotor 1 blades, Rotor 2 blades and the IPC shaft Stage 2 dovetail posts installed on the not-affected engine (no power reduction, no IFSD) installed on the aeroplane, in accordance with the instructions of Section 3.D of the NMSB.

**Corrective Action(s):**

- (7) If, during any on-wing inspection as required by paragraph (1), (2), (3), (4) or (6) of this AD, as applicable, any discrepancies or crack indications are detected, before next flight, remove the engine from service, contact RR for approved repair instructions and accomplish those instructions accordingly. A single ferry flight of up to three flight cycles is permitted to move the aeroplane to a location where the engine can be removed from service.
- (8) If, during any in-shop inspection as specified in paragraph (5) of this AD, any discrepancies or crack indications are detected, before release to service of the engine, or before installation of the module on an engine, as applicable, contact RR for approved repair instructions and accomplish those instructions accordingly.

**Parts Installation:**

- (9) From the effective date of this AD, it is allowed to install a Group 1, Group 3 or Group 4 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 (7) or (8) of this AD, as applicable.

**Ref. Publications:**

RR Alert NMSB TRENT 1000 72-AK130 original issue dated 11 June 2018, or Revision 1 dated 29 June 2018, and Revision 2 dated 26 July 2018.

RR NMSB TRENT 1000 72-K099 original issue dated 11 June 2018, or Revision 1 dated 03 July 2018.

RR NMSB TRENT 1000 72-K100 original issue dated 11 June 2018.

RR NMSB TRENT 1000 72-K129 original issue dated 11 June 2018, or Revision 1 dated 02 July 2018.

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. 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](mailto: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](http://www.rolls-royce.com/contact/civil_team.jsp) identifying the correspondence as being related to **Airworthiness Directives**.

