



# Notification of a Proposal to issue an Airworthiness Directive

**PAD No.: 19-081**

**Issued: 09 May 2019**

Note: This Proposed 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.

In accordance with the EASA Continuing Airworthiness Procedures, the Executive Director is proposing the issuance of an EASA Airworthiness Directive (AD), applicable to the aeronautical product(s) identified below.

All interested persons may send their comments, referencing the PAD Number above, to the e-mail address specified in the 'Remarks' section, prior to the consultation date indicated.

## Design Approval Holder's Name:

ROLLS-ROYCE DEUTSCHLAND Ltd & Co KG

## Type/Model designation(s):

Trent 1000 engines

**Effective Date:** [TBD standard: 14 days after AD issue date]

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

**Foreign AD:** Not applicable

**Supersedure:** This AD supersedes EASA AD 2018-0257 dated 28 November 2018.

## ATA 72 – Engine – Intermediate Pressure Turbine Blades – Replacement

### Manufacturer(s):

Rolls-Royce plc

### Applicability:

Trent 1000-A, Trent 1000-A2, Trent 1000-AE, Trent 1000-AE2, Trent 1000-AE3, Trent 1000-C, Trent 1000-C2, Trent 1000-CE, Trent 1000-CE2, Trent 1000-CE3, Trent 1000-D, Trent 1000-D2, Trent 1000-D3, Trent 1000-E, Trent 1000-E2, Trent 1000-G, Trent 1000-G2, Trent 1000-G3, Trent 1000-H, Trent 1000-H2, Trent 1000-H3, Trent 1000-J2, Trent 1000-J3, Trent 1000-K2, Trent 1000-K3, Trent 1000-L2, Trent 1000-L3, Trent 1000-M3, Trent 1000-N3, Trent 1000-P3, Trent 1000-Q3 and Trent 1000-R3 engines, serial numbers (ESN) as listed in Appendix 1, 2 and 3 of the NMSB, except those that have embodied Rolls-Royce modification (mod) 72-H818 or mod 72-J559 in production, or have embodied the applicable SB in service.

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 mod, Service Bulletin (SB) or Non-Modification SB (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-AK186 Revision 2. Appendix 1 of the NMSB contains the applicable time limit of each ESN for removal from service and replacement of intermediate pressure turbine blades (IPTB). Appendix 2 contains a list of ESN that, at the time of NMSB issuance, were known to be in shop. Appendix 3 provides the applicable IPTB cyclic limits, as applicable, after installation of SUM (service used material, having been refurbished) IPTB as replacement.

**Affected IPTB:** IPTB, having Part Number (P/N) KH30773 or P/N KH44898.

**The applicable SB:** Rolls-Royce SB TRENT 1000 72-H818, introducing IPTB P/N KH11808; or SB TRENT 1000 72-J559, introducing IPTB P/N KH71526, as applicable.

#### Reason:

Occurrences were reported of IPTB shank cracking. Analysis shows that this kind of failure is due to sulphidation corrosion.

This condition, if not corrected, could lead to IPTB shank release, possibly resulting in engine in-flight shut-down (IFSD) and consequent reduced control of the aeroplane.

Prompted by these events, Rolls-Royce identified engines with a high level of sulphidation exposure using a corrosion fatigue life (CFL) model. Consequently, EASA issued AD 2017-0056 to require removal from service of certain engines, to be corrected in shop. In addition, to reduce the risk of dual IFSD, it was decided to introduce a new cyclic life limit to certain engines, determining when an engine can no longer be installed on an aeroplane in combination with certain other engines. Consequently, EASA issued Emergency AD 2017-0253-E, AD 2018-0086, and finally AD 2018-0139, each next AD superseding the previous one, to require de-pairing of the affected engines.

After EASA AD 2018-0139 was issued, prompted by further analyses of data provided by operators, Rolls-Royce developed an updated service management approach to minimise the risk of IPTB release and issued the NMSB, identifying those ESN at highest risk, and providing the corresponding cyclic limits for in-shop IPTB replacement. Consequently, EASA issued AD 2018-0257, superseding EASA AD 2017-0056 and AD 2018-0139, to require removal from service of certain engines, to be corrected in shop. That AD also required, for engines having SUM IPTB installed, the introduction of IPTB cyclic limits. Finally, that AD retained the optional terminating action as previously provided by EASA AD 2018-0139.

Since that AD was issued, it was determined that, unless mod/SB 72-H818 or mod/SB 72-J559 is embodied, each engine must remain subject to service management to minimise the risk of IPTB release. Rolls-Royce mod/SB 72-J559 applies to the Trent 1000 TEN engine standard, introducing IPTB P/N KH71526 and additional IPTB coating.



For the reason described above, this AD retains the requirements of EASA AD 2018-0257, which is superseded, expands the Applicability by including Trent 1000 TEN engine models, and including reference to the NMSB, as defined in this AD.

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

Required as indicated, unless accomplished previously:

#### **Removal from Service:**

- (1) Before exceeding the affected IPTB life limit (cycles) as specified in Appendix 1 of the NMSB, as applicable to ESN, or within 30 days after the effective date of this AD, whichever occurs later, remove the affected engine from service.

#### **Corrective Action(s):**

- (2) After removing an engine from service as required by paragraph (1) of this AD, before release to service of that engine, replace the affected IPTB.
- (3) For an engine identified by ESN in Appendix 2 of the NMSB, that, on the effective date of this AD, is in shop, before release to service of that engine, replace the affected IPTB.

#### **Cyclic Life Limit:**

- (4) For an engine on which SUM parts are installed during IPTB replacement, either as required by paragraph (2) or (3) of this AD, as applicable, or at any time thereafter, before exceeding the applicable IPTB cyclic limit as specified in Appendix 3 of the NMSB after that installation, remove that engine from service and, before release to service of that engine, replace the affected IPTB.

#### **Replacement:**

- (5) Replacement of IPTB, as required by paragraph (2), (3) or (4) of this AD, as applicable, can be accomplished by using the instructions of Rolls-Royce TRENT 1000 NMSB 72-J442 Revision 3, or Rolls-Royce TRENT 1000 NMSB 72-J465 Revision 4, as applicable, installing SUM parts.

#### **Credit:**

- (6) Corrective action(s) accomplished on an engine, before the effective date of this AD in accordance with the Rolls-Royce Alert NMSB TRENT 1000 72-AK186 at original issue or Revision 1, as applicable, are acceptable to comply with the initial action(s) as required by this AD for that engine.

#### **Optional Terminating Action:**

- (7) Modification of an affected engine in accordance with the instructions of the applicable SB constitutes terminating action for the requirements of this AD for that engine.

#### **Ref. Publications:**

Rolls-Royce Alert NMSB TRENT 1000 72-AK186 original issue dated 08 October 2018, or Revision 1 dated 31 October 2018, and Revision 2 dated 16 April 2019.

Rolls-Royce NMSB TRENT 1000 72-J442 Revision 3 dated 08 October 2018.



Rolls-Royce NMSB TRENT 1000 72-J465 Revision 4 dated 08 October 2018.

Rolls-Royce SB TRENT 1000 72-H818 original issue dated 14 November 2016.

Rolls-Royce SB TRENT 1000 72-J559 original issue dated 27 November 2017.

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

**Remarks:**

1. This Proposed AD will be closed for consultation on 06 June 2019.
2. Enquiries regarding this AD should be referred to the EASA Programming and Continued Airworthiness Information Section, Certification Directorate. E-mail: [ADs@easa.europa.eu](mailto:ADs@easa.europa.eu).
3. 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](#).
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](http://www.rolls-royce.com/contact/civil_team.jsp) identifying the correspondence as being related to **Airworthiness Directives**.

