



Notification of a Proposal to issue an Airworthiness Directive

PAD No.: 18-010

Issued: 26 January 2018

Note: This Proposed Airworthiness Directive (PAD) 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.

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 plc

Type/Model designation(s):

RB211 Trent 700 engines

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

TCDS Number(s): EASA.E.047

Foreign AD: Not applicable

Supersedure: None

ATA 72 – Engine – Intermediate Pressure Compressor Rotor Shaft and Balance Weights – Inspection / Modification

Manufacturer(s):

Rolls-Royce plc (RR)

Applicability:

RB211 Trent 768-60, 772-60, 772B-60 and 772C-60 engines, all serial numbers.

These engines are known to be installed on, but not limited to, Airbus A330 series aeroplanes.

Definitions:

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

The NMSB: RR NMSB RB.211-72-AG270 Revision 5 dated 8 November 2017, which defines the applicable compliance time(s). Although the NMSB has an 'A' (Alert) in the number, an earlier or later revision may not have that 'A', which does not effectively alter the publication references in this AD.

NSO: Non-Standard Operations (NSO), as defined in the Time Limits Manual (TLM), section 05-00-01.



The TLM: RR Trent 700 TLM, which provides instructions on how to determine whether standard operations or NSO are conducted.

Qualified shop visit: A shop visit in which the IP compressor module is scheduled for a module check and repair, module overhaul, or engine refurbishment; or where the engine is disassembled sufficiently to expose the rear face of the IP compressor module.

Reason:

Cracks were found on the rear balance land feature of the intermediate pressure (IP) compressor rotor shaft of two in-service Trent 800 engines and on one in-service Trent 700 engine. The cracking had initiated from fretting marks caused by balance weights, but the key factors behind the crack propagation are not fully understood. Stress analysis of the damage condition has shown that it presents a possible threat to the rotor integrity.

This condition, if not detected and corrected, could lead to IP compressor rotor shaft failure and consequent non-contained high energy debris, possibly resulting in damage to the aeroplane.

EASA initially issued AD 2007-0052 to address this unsafe condition with visual inspections of the balance land. Subsequently, RR improved the inspection methods for the Trent 700 and 800 engines and developed a modification for those engines, accomplishment of which terminates the need for on-wing inspections. EASA issued AD 2010-0266 (later revised), which incorporated these changes, superseded EASA AD 2007-0052, and required, for Trent 700 and 800 engines, repetitive on-wing borescope and in-shop eddy current (EC) inspections of the IP compressor rotor shaft for discrepancies and, depending on findings, corrective actions. After EASA AD 2010-0266R1 was issued, efforts to develop an on-wing EC inspection, intended to increase the effectiveness of the programme for Trent 700 and 800 engines, failed. Consequently, EASA issued AD 2011-0221 (later revised), superseding EASA AD 2010-0266R1 and partially retaining its requirements, to require introduction of new balance weight design for Trent 700 and 800 engines.

Subsequently, EASA issued AD 2013-0002, retaining the requirements of EASA AD 2011-0221R1, which was superseded, expanding the Applicability to include all Trent 900 engines, and adding repetitive on-wing inspections for Trent 500 and Trent 900 engines to the requirements. After EASA AD 2013-0002 was issued, it was found that for post-modification (mod) 72-G401 Trent 800 engines and post-mod 72-G402 Trent 700 engines, which were excluded from the Applicability of that AD, the in-shop inspections must remain required. Those modifications constitute terminating action only for the repetitive on-wing inspections. Consequently, EASA issued AD 2014-0152 (later corrected), retaining the requirements of EASA AD 2013-0002, which was superseded, to clarify that modification does not constitute terminating action for the repetitive in-shop inspections.

Since EASA AD 2014-0152 was issued, RR published the NMSB to make distinction between standard operations and NSO, which affects the compliance times for the repetitive on-wing inspections. In addition, it was agreed that the modification requirements could be relaxed.

For the reason described above, this PAD proposes to take over the requirements for RB211 Trent 700 engines from EASA AD 2014-0152, extend the compliance time for modification by removing the 90 months limit, and change the compliance time definition for NSO.



Upon publication of this PAD as Final AD, EASA AD 2014-0152 will be revised accordingly, removing Trent 700 engines from its Applicability.

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

Required as indicated, unless accomplished previously:

On-Wing Inspection(s):

- (1) Within the applicable compliance time as specified in the NMSB (see Note 2 of this AD) in flight cycles (FC, for standard operations) or standard duty cycles (SDC, for NSO) after 20 January 2011 [the effective date of EASA AD 2010-0266R1] and, thereafter, at intervals not to exceed the applicable FC or SDC as specified in the NMSB, depending on operation of the engine, accomplish an on-wing visual borescope inspection of the IP compressor rotor shaft for discrepancies in accordance with the instructions of the NMSB. Section 1.D.(1) of the NMSB contains the details on how to determine the applicable SDC.

On-wing inspections are not required for engines that have SB (mod) 72-G402 incorporated.

In-Shop Inspections:

- (2) During each shop visit after the effective date of this AD in which the engine is sufficiently disassembled to expose the IP compressor module rear face, accomplish an EC inspection of the IP compressor rotor shaft for discrepancies in accordance with the instructions of RR NMSB RB.211-72-AG085 Revision 2.

Alternative Actions:

- (3) An EC inspection accomplished in shop, as specified in paragraph (2) of this AD, is acceptable in lieu of an on-wing visual borescope inspection as required by paragraph (1) of this AD.
- (4) If an engine is insufficiently disassembled to expose the rear face of the IP compressor module, an in-shop visual borescope inspection of that engine, using the instructions of the NMSB, is acceptable in lieu of an on-wing inspection as required by paragraph (1) of this AD for that engine.

Corrective Action(s):

- (5) If, during any inspection as required by paragraph (1) or (2) of this AD, or as specified in paragraph (4) of this AD, discrepancies (as detailed in the NMSB, or in NMSB RB.211-72-AG085, as applicable) are detected, within the time period specified in the NMSB, or before release to service of the engine, as applicable, accomplish the applicable corrective action(s), depending on findings, as detailed in the NMSB, or NMSB RB.211-72-AG085, as applicable, or replace the affected parts with serviceable parts.

Modification:

- (6) During the next qualified shop visit after 28 November 2011 [the effective date of EASA AD 2011-0221], modify the engine (introduction of new balance weight design) in accordance with the instructions of RR SB RB.211-72-AG402.



Terminating Action:

- (7) Modification of an engine as required by paragraph (6) of this AD constitutes terminating action for the repetitive on-wing inspections as required by paragraph (1) of this AD for that engine.

Credit:

- (8) Inspection(s) and corrective action(s) on an engine, accomplished before the effective date of this AD in accordance with the instructions of the NMSB at Revision 4 or earlier, are considered acceptable to comply with the initial requirements of paragraphs (1), (2), (4) and (5) of this AD for that engine.

Ref. Publications:

Rolls-Royce NMSB RB.211-72-AG085 Revision 2 dated 7 July 2011.

Rolls-Royce NMSB RB.211-72-AG270 Revision 4 dated 21 March 2011, or Revision 5 dated 8 November 2017.

Rolls-Royce SB RB.211-72-AG402 Revision 2 dated 7 July 2011, or Revision 3 dated 8 July 2014.

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

Remarks:

1. This Proposed AD will be closed for consultation on 23 February 2018.
2. Enquiries regarding this PAD should be referred to the EASA Safety Information Section, Certification Directorate. E-mail: ADs@easa.europa.eu.
3. For any question concerning the technical content of the requirements in this PAD, 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**.

