

COMMENT RESPONSE DOCUMENT

EASA PAD No.: 24-081

[Published on 09 July 2024 and officially closed for comments on 06 August 2024]

Commenter 1: JAL Engineering – Koichi Nakano – 10/07/2024

Comment # 1

Japan Airlines would like to ask two enquiries with regard to PAD 24-081.

Thank you for your kind response.

- A. Why will EASA issue the new AD even if the current AD 2020-0277 accepts to use the later approved revision of SB 72-K633?
- B. The inspection NMSB in the PAD is 72-K633 Revision 1, however, the actual NMSB issued by Rolls-Royce is 72-AK633 Revision 1. Is NMSB 72-AK633 Revision 1 considered the same document as NMSB 72-K633 Revision 1?

EASA response:

- A. **Comment noted. EASA issues this new AD superseding AD 2020-0277 in order to mandate accomplishment of inspections and corrective actions provided in NMSB TRENT XWB 72-AK633 Revision 1. This NMSB contains enhanced crack measuring criteria which allows to introduce also additional fly on criteria's not present in AD 2020-0277. AD 2020-0277 only allowed the use of NMSB TRENT XWB 72-AK633 Revision 1 but not mandated it. In order to ensure that the fleet will be inspected and corrected using the enhanced methods the new AD mandates those methods.**
No changes have been made to the Final AD in response to this comment.
- B. **We agree. Compliance of Rolls-Royce NMSB TRENT XWB 72-AK633 Revision 1 was changed to ALERT.**
The Final AD has been amended accordingly.



Commenter 2: Hong Kong Aero Engine Services Limited – Eric Lo – 11/07/2024

Comment # 2

I noted that PAD 24-081 is going to issue a new AD to supersede EASA AD 2020-0277 due to the new revision of SB72-K633 released. Since the new revision of the SB changed the SB number from 72-K633 to 72-AK633, I would suggest to use the new SB number 72-AK633 in the upcoming EASA AD to avoid misunderstanding.

EASA response:

We agree. See reply to Comment #1 B.

The Final AD has been amended accordingly.

Commenter 3: Ken Hardy – Senior NDT Engineer – 11/07/2024

Comment # 3

As a NDT Materials Engineer with over 50 years in the Aircraft power plant & fuselage materials fatigue crack business, I can't believe Rolls is asking operators of the XWB engine to "monitor " crack growth over 200 cycles before replacement, cracks never get smaller on bigger and Ti is known for catastrophic failure after reaching yield strength. Comments?

EASA response:

Comment noted; There is no requirement to monitor crack growth over 200 cycles. The NMSB TRENT XWB 72-AK633 Revision 1 and the Final AD clarify the number of flight cycles in which an engine is required to be removed (following findings detected during the borescope inspection). The timescale for removal is dependent on size of remaining material and not dependent on any subsequent inspections.

No changes have been made to the Final AD in response to this comment.



Commenter 4: Frank Kushner Consulting, LLC – Frank Kushner – 12/07/2024

Comment # 4

- A.** I do not understand sequence allowing 200 then 100 cycles more flight cycles after a blade crack is found.
- B.** It says "...depending on the remaining blade material from the end of the crack and the base of the root". Can direction of existing crack make a big difference?
- C.** Also, each flight cycle is not identical. Could there be some with much higher alternating forces and more speed excursions per flight?
- D.** Rolls Royce must verify they are not violating the "Paris Law" for crack growth rate with extreme conservatism. Allowing 100 flight cycles when remaining length can be close to 0.10 mm should be eliminated. My suggestion: Any crack found with less than 0.3 mm length remaining should stop all future flights.
- E.** Also are inspections accurate and difficult to have mistakes made by inspectors as has occurred for other engines? Will all inspections be by Rolls Royce inspectors?

EASA response:

Comments noted.

- A.** *The AD requires removal of the engine within 200 EFC or 100 EFC or before next flight, depending on the crack size, after identification of the cracking. The AD does not foresee any sequence allowing 200 EFC and then 100 EFC.*
- B.** *RR have confirmed that the measurement method (of remaining material) is a valid technique for ensuring the crack length (across the flank) and is effective.*
- C.** *No - the crack growth is understood and can be assessed against flight cycles, regardless of stage length and minor cycles etc.*
- D.** *The RR NMSB and associated AD instruct removal of an engine in the event that the inspection finds any blades with cracks. If the crack is large enough such that the remaining material is less than 1mm then the engine is rejected before further flight. Crack growth is fully understood and characterised for the applicable parts.*
- E.** *RR have assessed human factors within the assessment done to support the proposed limits. The inspection task can, and has been, carried out by Operator maintenance organisations.*

No changes have been made to the Final AD in response to this comment.

Commenter 5: Lufthansa Technik AG – Rene SCHINKEL – 12/07/2024



Comment # 5

I have to following comments for PAD 24-081:

- A. PAD definition of a “Serviceable part: An affected part that is new (not previously installed), or that has not exceeded 2 300 engine flight cycles (EFC) since first installation on an engine; or an affected part that, prior to installation, has passed an inspection in accordance with the instructions of the inspection NMSB.”: please specify if affected parts above 2300 EFC are allowed for re-installation and if affected parts below 2300 FC need to be inspected prior to re-installation.**
- B Proposed wording is: “Serviceable part: An affected part that is new (not previously installed), or that has not exceeded 2 300 engine flight cycles (EFC) since first installation on an engine and that prior to installation, has passed an inspection in accordance with the instructions of the inspection NMSB.”**
- C AD actions (1) and (2): The AD does not specify the exact definition of “on-wing” and “in-shop”. E.g. it is unclear if an engine (inspected iaw SB 72-AK633R1 prior to installation off-wing but not inducted in an MRO) is allowed for re-installation although it is sentenced for engine removal within 200 EFC/100 EFC iaw table 2 of the AD. Please specify in the AD accordingly.**
- D AD action (3): “If, during any in-shop inspection as required by paragraph (1) of this AD, any affected part is found cracked, before release to service of the engine, accomplish all the corrective actions in accordance with the instructions of the inspection NMSB.” The SB does not specify which parts are allowed for reinstallation after finding cracked affected part(s).**

Proposed wording is: “If, during any in-shop inspection as required by paragraph (1) of this AD, any affected part is found cracked, before release to service of the engine, replace the full set of affected parts with serviceable parts iaw instructions of the inspection NMSB.”

EASA response:

- A. Comment noted. Parts above 2300 cycles are allowed for re-installation as long as they meet the inspection limits defined in the NMSB and parts below 2300 cycles do not require to be inspected.**
No changes have been made to the Final AD in response to this comment.
- B. Comment noted. The existing wording is preferred as the requirement to have passed the inspection on a part 'prior to installation' is applicable regardless of life of the part. In case using the connector “AND” the part would be considered serviceable only if they meet both conditions (1. Life <2 300 EFC AND 2. passed an inspection) which is not the intention of the AD. See also reply to A. above.**



No changes have been made to the Final AD in response to this comment.

C. Comment noted. The NMSB and AD do not regulate re-installation of an engine (for example after an off-wing inspection or any other off-wing maintenance) but do define the maximum number of cycles during which an engine can be operated before removal following finding after an inspection.

No changes have been made to the Final AD in response to this comment.

D. Comment agreed. The Final AD has been amended accordingly.

Commenter 6: Delta Air Lines, Inc. – Michael Tharp – 01/08/2024

Comment # 6

Reference: (A) EASA Proposed Airworthiness Directive: PAD No. 24-081, dated 09 Jul 24

(B) Rolls-Royce NMSB Trent XWB 72-K633 Original Issue, dated 07 Aug 20

(C) Rolls-Royce NMSB Trent XWB 72-K633 Revision 1, dated 08 Jul 24

Commenter Request	Modify Ref (A) PAD Required Action(s) and Compliance Time(s), Credit paragraph (5), to allow the use of Ref (B) to comply with both the initial and repeat requirements of paragraph (1) of the AD regardless of the AD effective date.
Request justification	Revision 1 of the Rolls-Royce NMSB (Ref. C) only relaxes the fly-on limit of the finding compares to the original issue of the NMSB (Ref. B). Ref (B) is currently mandated by EASA AD 2020-0277. And after the AD effective date of Ref (A), if an inspection is done per Ref (B), the safety concern is still addressed. Note that the corresponding FAA AD 2021-17-11 only allows the use of Ref (B) to comply with the FAA AD. And there is no current AMOC for Ref (C) of the NMSB. Therefore, inspections could have been done in accordance with Ref (B) of the NMSB after the AD effective date of Ref (A).
List paragraphs that change; describe (nonobvious) changes	<ul style="list-style-type: none"> • Required Action(s) and Compliance Time(s), Paragraph (5): <ul style="list-style-type: none"> • Inspection(s) accomplished on an engine in accordance with the instructions of Rolls-Royce Trent XWB 72-K633 at original issue are an acceptable method to comply with the initial and repeat requirements of paragraph (1) of this AD for that engine.



EASA response:

Comment not agreed. EASA issues this new AD in order to mandate accomplishment of inspections and corrective actions provided in NMSB TRENT XWB 72-AK633 Revision 1 to enable operational support for the fly on criteria. It is expected that Rolls-Royce applies to the FAA for a global AMOC to permit use of the NMSB TRENT XWB 72-AK633 Revision 1 as an alternative method of compliance to the FAA AD 2021-17-11.

No changes have been made to the Final AD in response to this comment.

