

Repeater Technical Variance



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This is a repeat application technical variance. It is the responsibility of the operator / overhaul base to control the application of this document.

This document is supplemental to the Manual(s) specified below and should be suitably stored in accordance with local airworthiness requirements.

Technical Variance No.	132217	Issue	5	Date	23 MAY 2013	
Operator / Applicant	ALL OPERATORS / ALL APPLICANTS			Original Request No.	DK_08_03_2013	
Engine Type	RB211	Engine Mark(s)	TRENT 900 ALL ENGINE MARKS			
Part Description	LP TURBINE EXHAUST CASE (TAIL BEARING HOUSING)					
Part No.	FW35923, FW51434, FW27718					
Manual Title	AMM	Ref.	NA	ATA Ref.	72-52-51	
TV Title	MOUNT LUG FORGING LEADING EDGE INSPECTIONS					
Hours	NA		Cycles	NA		
Existing Requirement						
The Aircraft Maintenance Manual (AMM) does not contain a procedure to inspect the Tail Bearing Housing (TBH) Mount Lug Forging Leading Edge (LE) area for crack indications on wing						
Requested Variance						
Currently there is a requirement to inspect the TBH Mount Lug Forging LE area on Trent 900 engines on wing.						
NMSB72-AH154 will follow the issue of this repeater TV and will include details of the new inspection. This repeater TV includes the details of the inspection until NMSB72-AH154 is finalised and issued. This Technical Variance may be applied until 28th June 2013.						
The results of this inspection are to be reported to Rolls-Royce.						
Summary of Investigation and Conclusions						
Rolls-Royce Engineering has reviewed the above requirement and an inspection technique has been developed. This TV is issued to instruct the inspection of the TBH Mount Lug Forging LE area.						
Issue 2 of this Repeater Technical Variance is released to update the fly on and re inspection requirements for crack indications in the Mount Lug Forging LE area. Additionally, inspection and acceptance criteria for fail safe catcher damage are updated for clarity.						
Issue 3 is released to correct a formatting error.						
Issue 4 is released to correct an error in task reference for removal and installation of the aft exhaust plug.						
Issue 5 is released to make the removal and installation of the exhaust nozzle and forward and aft exhaust plugs, optional tasks.						
Approval on Behalf of Rolls-Royce						
Title	SERVICE ENG. TRENT 900 T/L					
Signature			Printed name	CHRIS NAESSENS	Date	23 May 2013
Document Created by	Daniel Keblell					

Declaration of Approval

This document is approved under the authority of Airbus EASA Design Organisation Approval no. EASA.21J.031.

Refer to Repair Design Approval Sheet reference no

Rolls-Royce plc. Proprietary Information – Not for Manufacture



A. Manpower Requirements

1) On-wing

- (a) Time to gain access
2.5 hours (2 persons)
- (b) Time to inspect Mount Lug Forging LE Areas
2 hours (2 persons)
- (c) Time to restore to serviceable condition
2.5 hours (2 persons)

The FPI defined in this Technical Instruction shall only be performed by personnel qualified to Fluorescent Penetrant Inspection FPI Level 2 or higher and in possession of an up to date eyesight record in accordance with EN4179/NAS410 or alternative standards/guidelines accepted by the applicable National Aviation Authority.

B. Material Price and Availability

- OMat 632 – Aerosol penetrant - Commercially Available
- OMat 617 – Aerosol developer - Commercially Available
- OMat 150 – Acetone - Commercially Available
- OMat 2/101 – Lint Free Cloths - Commercially Available
- OMat 677 – Penetrant Test Panel - Commercially Available

C. Tooling Price and Availability

- Dark Non-Reflective cover to darken the area for inspection – Commercially Available
- UV Light source – Commercially Available
- Mirror – Commercially Available

D. References

(1) Aircraft Maintenance Manual (AMM):

- (a) 71-13-00, Maintenance Practices, Opening of Fan Cowl Doors
- (b) 78-26-00, Maintenance Practices, Opening/Closing of the Fan Exhaust Cowl or Thrust Reverser
- (c) 78-30-00, Deactivation/Reactivation, Make the Thrust Reverser Unserviceable for Maintenance
- (d) 78-11-41-000-801-A Removal of the Exhaust Nozzle
- (e) 78-11-42-000-804-A Removal of the Aft Exhaust Plug



- (f) 78-11-42-000-803-A Removal of the Forward Exhaust Plug
- (g) 78-11-41-400-801-A Installation of the Exhaust Nozzle
- (h) 78-11-42-400-804-A Installation of the Aft Exhaust Plug
- (i) 78-11-42-400-803-A Installation of the Forward Exhaust Plug

E. On-Wing –Mount Lug Forging LE Area Inspection

WARNING: YOU MUST BE CAREFUL WHEN YOU WORK ON THE ENGINE AFTER THE ENGINE IS SHUTDOWN. THE ENGINE CAN STAY HOT FOR UPTO ONE HOUR.

WARNING: YOU MUST NOT TOUCH HOT PARTS WITHOUT APPLICABLE GLOVES. HOT PARTS CAN CAUSE INJURY. IF YOU GET AN INJURY, TREAT WITH COLD WATER FOR 10 MINUTES, THEN SEEK MEDICAL AID.

1) To get access to the mount lug forging LE Area

- (i) Open the Fan Cowl Doors in accordance with AMM Task 71-13-00, Maintenance Practices to get access
- (ii) Make the Thrust Reverser unserviceable for maintenance in accordance with AMM Task 78-30-00 Deactivation/Activation.

WARNING: YOU MUST MAKE THE THRUST REVERSER UNSERVICEABLE (INSTALL AND SAFETY THE INHIBITION DEVICE) BEFORE YOU DO WORK ON OR AROUND THE THRUST REVERSER. IF YOU DO NOT INSTALL AND SAFETY THE INHIBITION DEVICE, THERE IS A RISK THAT THE THRUST REVERSER CAN OPERATE ACCIDENTALLY. THIS CAN CAUSE INJURY TO PERSON AND/OR DAMAGE TO THE EQUIPMENT.

- (iii) Open the Fan Exhaust Cowls in accordance with the AMM, Task 78-26-00
- (iv) Remove the Exhaust Nozzle to allow access to the rear of the TBH in accordance with AMM, Task 78-11-41-000-801-A
- (v) Remove the Aft Exhaust Plug in accordance with AMM, Task 78-11-42-000-804-A
- (vi) Remove the Forward Exhaust Plug in accordance with AMM, Task 78-11-42-000-803-A

NOTE: STEPS (iv) TO (vi) ARE OPTIONAL TASKS INTENDED TO IMPROVE ACCESS TO THE TBH. IF SUITABLE ACCESS CAN BE GAINED WITHOUT PERFORMING SOME OR ALL OF TASKS (iv) TO (vi) THEN THEY ARE NOT REQUIRED.

- (vii) Use appropriate staging and platforms to gain access to the Tail Bearing Housing

2) Processing the penetrant test panel

- (i) The OMat 677 – penetrant test panel must be processed at the beginning of each shift and viewed in each engine that is to be inspected during the shift in order to ensure that the test environment and materials are acceptable.



- (ii) Ensure the OMat 677 – penetrant test panel is clean and there is no residual fluorescence.
- (iii) Cover the region of the engine to be inspected with a dark non-reflective cover in order to reduce the white light levels in the leading edge inspection area.
- (iv) Apply OMat 632 penetrant to the OMat 677 – penetrant test panel by sponge applicator or brush. The penetrant must be dispensed from a sealed aerosol can and any unused penetrant must go to waste following the inspection.
- (v) Leave the penetrant in contact with the panel for 20 minutes.
- (vi) After the 20 minutes contact time, take the OMat 677 penetrant test panel inside the darkened area to process. Allow 3 minutes for eye adaptation to the low light levels.
- (vii) Remove the excess penetrant from the panel surface by wiping thoroughly with a clean, dry OMat 2/101 – lint free cloth whilst illuminating the panel with UV light.
- (viii) Soak a clean OMat 2/10 - lint free cloth in water and then gently squeeze the excess water out to reduce the flow of water on the panel surface.
- (ix) Whilst illuminating the OMat 677 – penetrant test panel with UV light, wipe off the penetrant with the wet cloth before immediately wiping over with a clean, dry OMat2/10 lint free cloth. Repeat this process using the minimum application necessary to achieve acceptable background fluorescence.
- (x) Ensure that the panel is dry by wiping with a clean, dry OMat2/10 lint free cloth.
- (xi) Apply a light, even coating of OMat 617 – non-aqueous wet developer from a sealed aerosol can to the OMat 677 – penetrant test panel.
- (xii) Allow 10 minutes contact time for the developer prior to inspecting the panel.
- (xiii) Ensure there are no white light sources or fluorescent items (including clothing) within the darkened area.
- (xiv) Hold the OMat 677 – penetrant test panel alongside the leading edge of the Top Core Vanes and illuminate it with UV light.
- (xv) Inspect the OMat 677 – penetrant test panel and check that the visible indications match the control photograph for that panel.
- (xvi) If the panel matches the photograph then the inspection materials and environment are acceptable and the inspections can be performed.
- (xvii) Repeat steps (xiii) to (xvi) for each engine to be inspected during the shift. Ensure that the inspection area is darkened for each engine.
- (xviii) Restore the OMat 677 – penetrant test panel to a completely clean condition and ensure there is no residual fluorescence and store in acetone.

3) Carry out the inspection of the Mount Lug Forging LE Area

WARNING: PROTECTIVE GLOVES AND SAFETY GLASSES MUST BE WORN AT ALL TIMES DURING THE INSPECTION. IF YOU GET AN INJURY, SEEK MEDICAL AID IMMEDIATELY.



- (i) Clean the inspection areas (See Fig. 2) with a clean OMat 2/101 – lint free cloth moistened with OMat 150 – acetone.
- (ii) Discard the soiled cloth after use.
- (iii) Repeat the swabbing using fresh OMat 150 – acetone and a fresh OMat 2/101 – lint free cloth until all deposits have been removed.

NOTE: THE INSPECTION SURFACE, MUST BE CLEAN, DRY AND FREE FROM SOILS, OIL, GREASE, PAINT, COATINGS, CORROSION PRODUCTS, SCALE, SMEARED METAL, WELDING FLUX, CHEMICAL RESIDUES OR ANY OTHER MATERIAL THAT COULD PREVENT PENETRANT FROM ENTERING A DISCONTINUITY, AFFECT PROCESS PERFORMANCE OR PRODUCE AN UNACCEPTABLE BACKGROUND.

- (iv) Allow 5 minutes for the area to completely dry prior to penetrant application.
- (v) Apply OMat 632 penetrant to the inspection areas in Fig.2. The penetrants must be dispensed from a sealed aerosol can and any unused penetrant must go to waste.
- (vi) Ensure that the inspection areas are fully covered with penetrant with the aid of the UV lamp and mirror.
- (vii) Leave the penetrant in contact with the components for 20 minutes.

NOTE: THE PENETRANT CONTACT TIME MUST NOT EXCEED 1 HOUR. IF IT DOES THE PENETRANT MUST BE REAPPLIED AND 5 MINUTES CONTACT TIME ALLOWED.

- (viii) After the 20 minutes contact time, remove the excess penetrant from the inspection surface by wiping thoroughly with a clean OMat 2/101 – lint free cloth.
- (ix) Soak a clean OMat 2/10 - lint free cloth in water and then gently squeeze the excess water out to reduce the flow of water on the component surface.
- (x) Whilst illuminating the inspection area with UV light, wipe off the penetrant with the wet cloth before immediately wiping over with a clean, dry OMat2/10 lint free cloth. Repeat this process using the minimum application necessary to achieve acceptable background fluorescence.
- (xi) Ensure that the inspection area is dry by wiping with a dry OMat2/10 lint free cloth.
- (xii) Apply a light, even coating of OMat 617 – non-aqueous wet developer from a sealed aerosol can to the inspection area.
- (xiii) Allow a minimum of 10 minutes and a maximum of 15 minutes contact time for the developer prior to inspection.
- (xiv) Cover the region of the engine with a dark non-reflective cover in order to reduce the white light levels.
- (xv) Ensure there are no white light sources or fluorescent items (including clothing) within the inspection area.
- (xvi) Positioned inside the darkened area, allow 3 minutes for eye adaptation to the low light levels.



- (xvii) Illuminate the inspection surfaces with UV light in the darkened area and view by line of sight or by using the mirror as necessary.
- (xviii) Assess the Inspection areas for crack indications. White light may be used to aid assessment
- (xix) The "Wipe Off" technique shall be used to determine the nature of any indications.
1. Dampen a cotton swab with acetone.
 2. Wipe once across the indication.
 3. Allow the acetone to evaporate and inspect immediately.
 4. If the indication reappears then record it as a crack. If the indication does not reappear then apply a light, even coating of OMat 617 – non-aqueous wet developer from a sealed aerosol can to the area.
 5. Allow the solvent in the developer to evaporate and inspect immediately.
 6. If the indication reappears record it as a crack. If the indication does not reappear then allow 10 minutes contact time for the developer.
 7. If the indication reappears after the 10 minutes contact time then record it as a crack. If the indication does not reappear then that area is acceptable.

- (xx) Record any suspected crack indication in Appendix 1.

Determine whether the indication is continuous or discontinuous where possible.

Measure the length of the indication using a fluorescent comparator gauge.

Photograph any crack indications.

(xxi) No cracks detected	ACCEPT
Any discontinuous cracks that total less than 6mm in length (see Fig.3)	RE-INSPECT WITHIN 75 FC
Any discontinuous cracks that total greater than or equal to 6mm and less than 9mm in length (see Fig.3)	RE-INSPECT WITHIN 50 FC
Any discontinuous cracks that total greater than or equal to 9mm and less than 12mm in length (see Fig.3)	REMOVE ENGINE WITHIN 100 FC
Any discontinuous cracks that total 12 mm in length or greater (see Fig.3)	REMOVE ENGINE
Any single continuous crack less than 2mm in length (see Fig.4)	RE-INSPECT WITHIN 75 FC
Any single continuous crack greater than or equal to 2mm and less than 5mm in length (see Fig.4)	RE-INSPECT WITHIN 50 FC
Any single continuous crack greater than or equal	REMOVE ENGINE



to 5mm and less than 8mm in length (see Fig.4)

WITHIN 100 FC

Any single continuous crack equal to or greater than 8mm in length (see Fig.4)

REMOVE ENGINE

- (xxii) Once all indications have been evaluated and recorded, remove the penetrant processing materials from the inspection surface by wiping with a clean OMat 2/101 – Lint Free Cloth moistened with OMat 150 – Acetone.

4) Inspect the fail safe catcher for signs of contact

- (i) Visually inspect the LE face of the fail safe catcher (see Fig.5)

NOTE: ON WING VISIBILITY OF THE LE FACE OF THE FAIL SAFE CATCHER IS LIMITED. VIEW AS MUCH OF THE LE FACE AS ACCESS ALLOWS AND ASSESS FOR DAMAGE SIMILAR TO THAT IN FIG.6.

NOTE: IF DAMAGE IS FOUND ON FAIL SAFE CATCHER USE BSI EQUIPMENT TO MEASURE THE EXTENT OF THE DAMAGE IF REQUIRED.

- (ii) If Scored, galled, fretted or dented on the centre lug (fail safe lug) front surface:

(1) Not more than 8,00 mm in width and 1,00 mm in depth

ACCEPT

(2) More than 2,60 mm in depth

REJECT

(3) More than in (1) and less than in (2)

REPAIR,
FRS3253 AMM
TASK 70-42-
11-300-801-A
within 100
Flight Cycles

(4) If the minimum cross sectional area (Area A, see Fig. 7) of the catcher in the repaired areas is less than 1155 sqmm after repair.

REJECT

- (iii) Photograph any damage and note location of the damage on the fail safe catcher and or the engine mounts. See Fig.6 for example photographs of typical damage.

5) Measure the distances between the fail safe catcher and the engine mount

- (i) When the engine is fully cooled, measure the distances A and B as illustrated in Fig. 8.

- (ii) Record in Appendix 1.

6) Close access to the TBH

- (i) Make sure the work area is clean and clear of tools and other items.
- (ii) If applicable, install the Forward Exhaust Plug in accordance with AMM, Task 78-11-42-400-803-A.
- (iii) If applicable, install the Aft Exhaust Plug in accordance with AMM, Task 78-11-42-400-804-A.



- (iv) If applicable, install the Exhaust Nozzle in accordance with AMM, Task 78-11-41-400-801-A.
- (v) Close the Fan Exhaust Cows in accordance with AMM 78-26-00, Maintenance Practices.
- (vi) Make the Thrust Reverser serviceable after maintenance in accordance with AMM 78-30-00, Deactivation/Activation as necessary.
- (vii) Close the Fan Cowl Doors in accordance with AMM Task 71-13-00, Maintenance Practices.

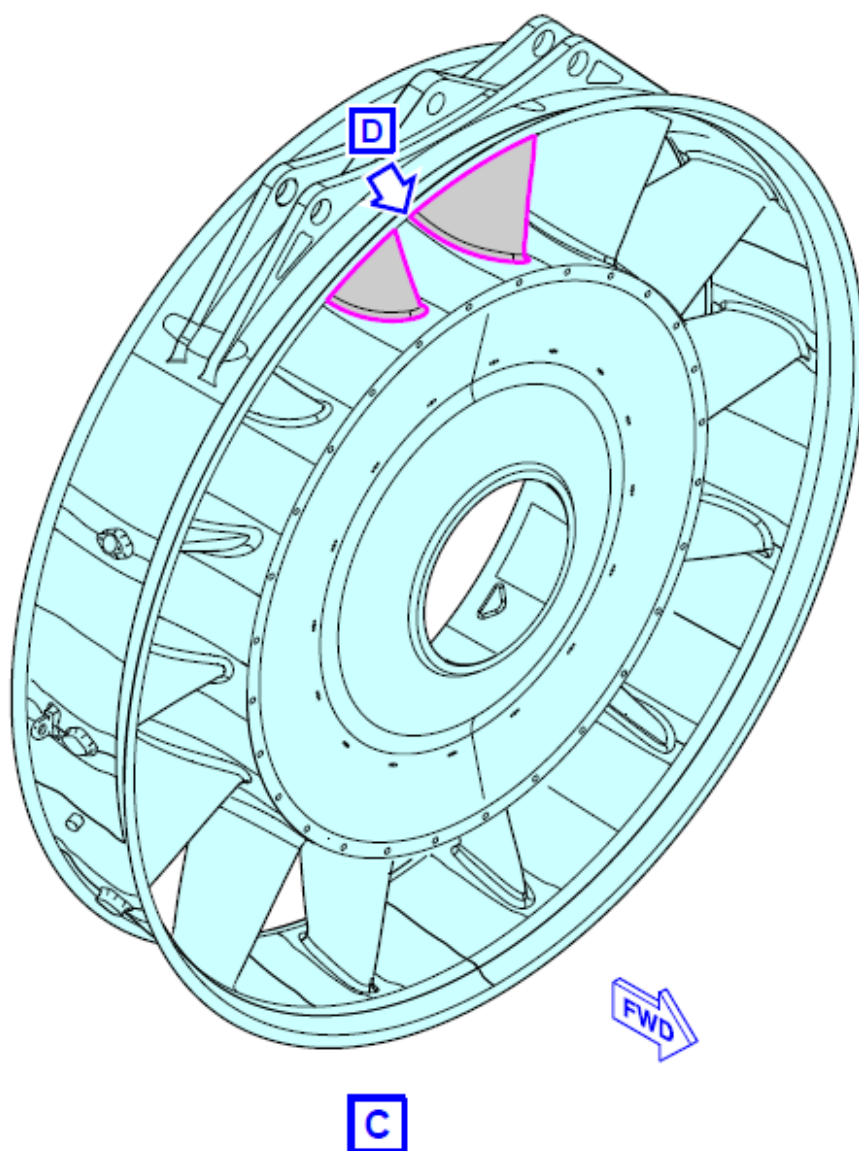


Figure 1 – Tail Bearing Housing

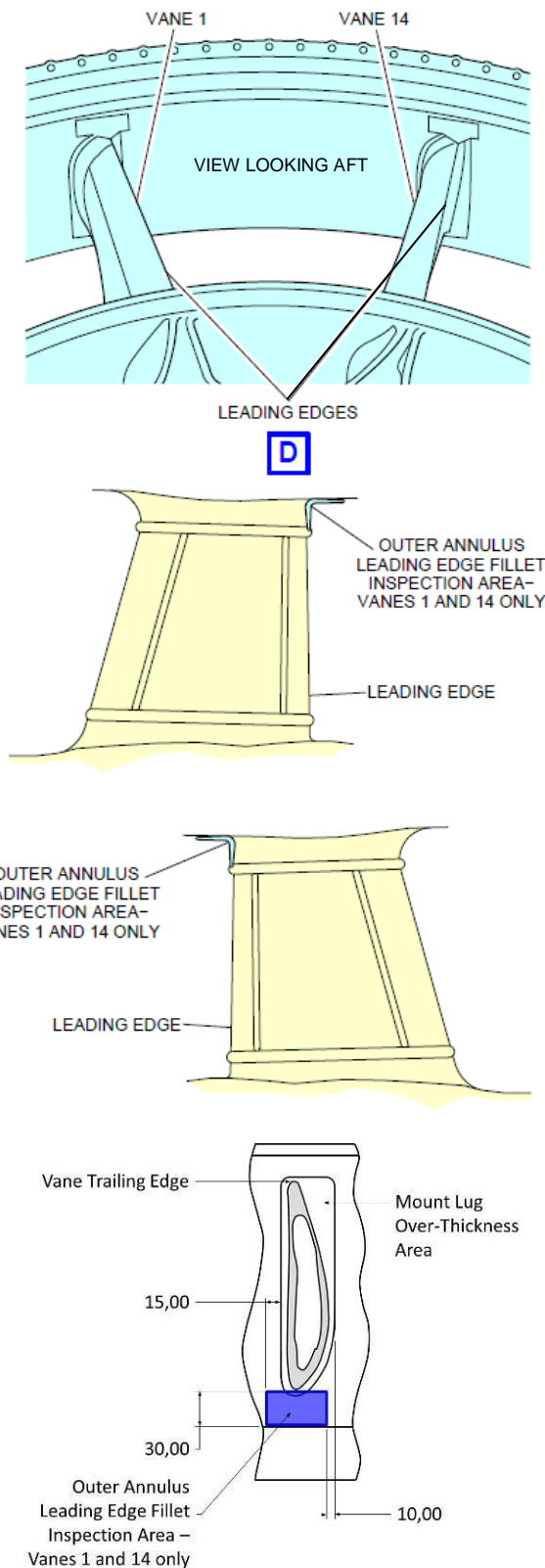


Figure 2 - Mount Lug Forging LE Area

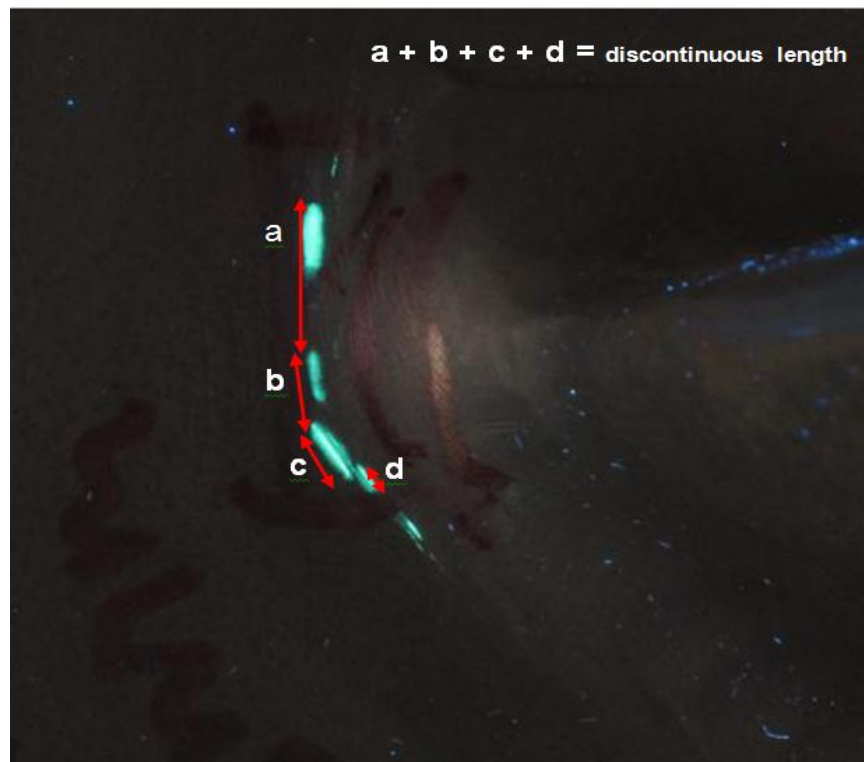


Figure 3 – Discontinuous crack indication

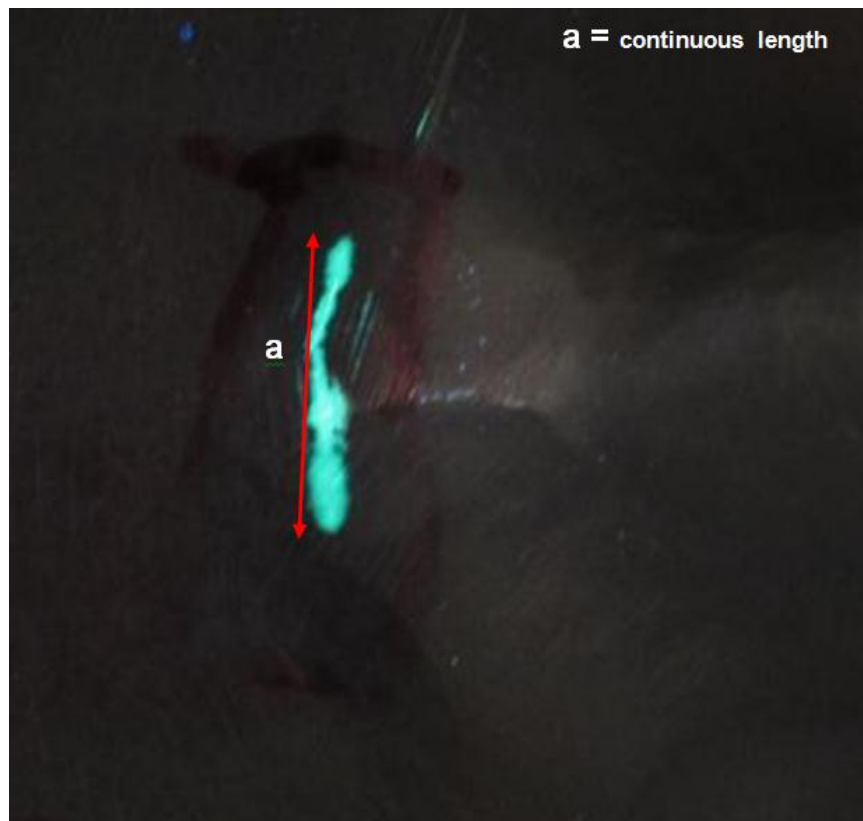


Figure 4 - Continuous crack indication

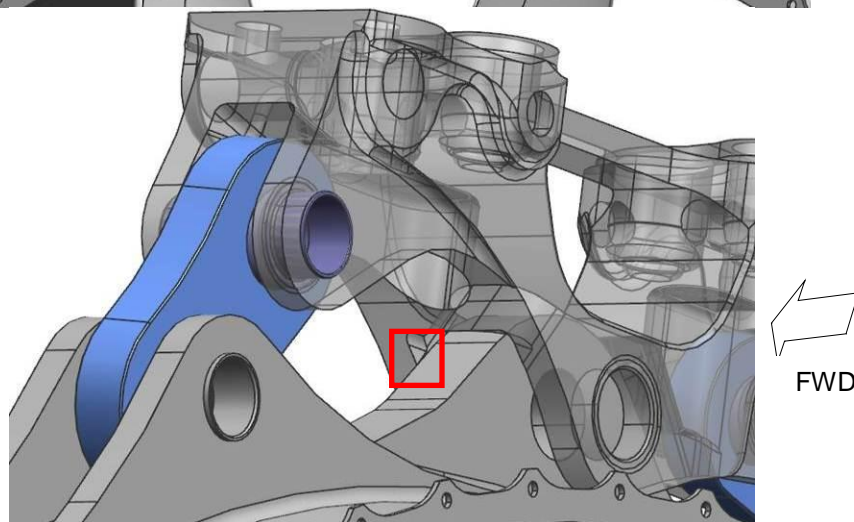
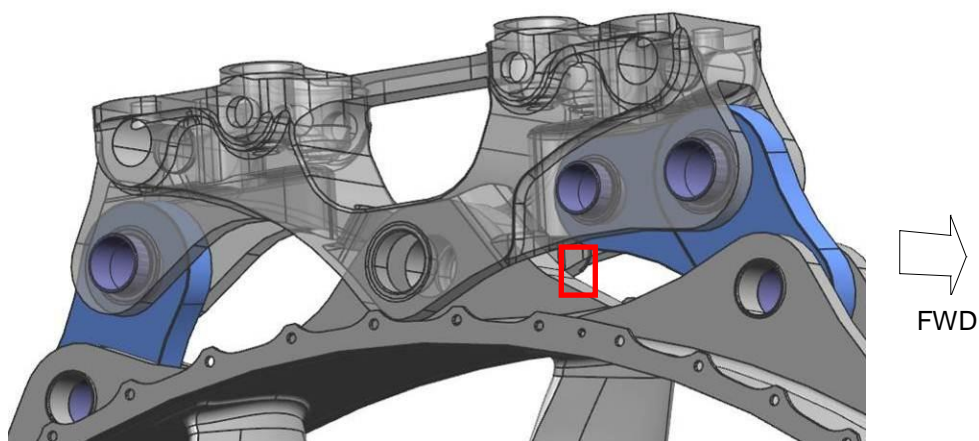
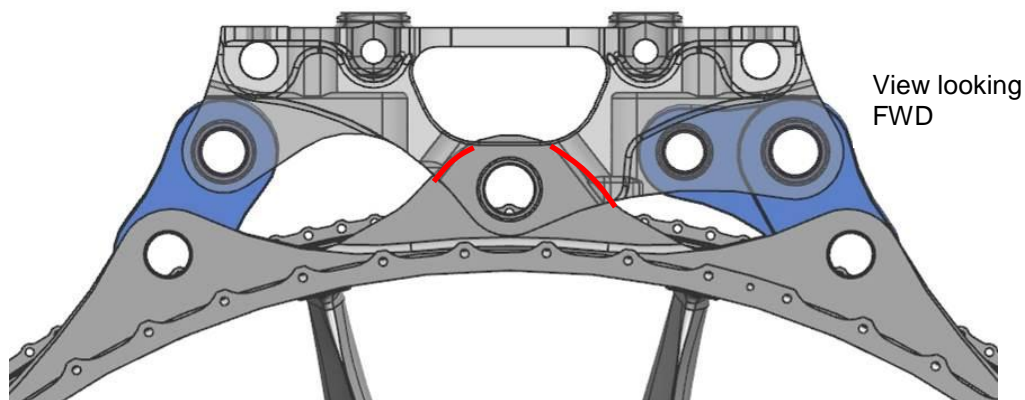


Figure 5 - Fail Safe Catcher Inspection locations

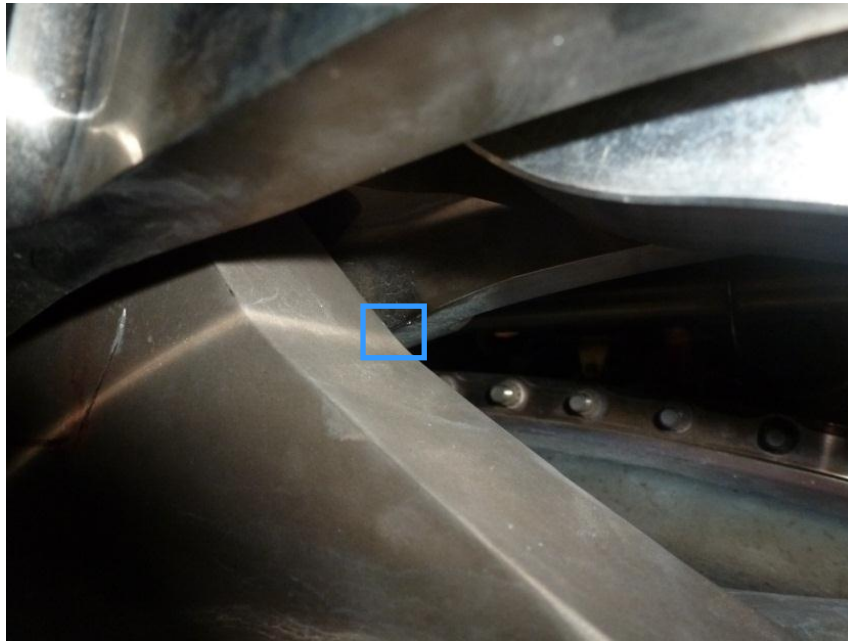
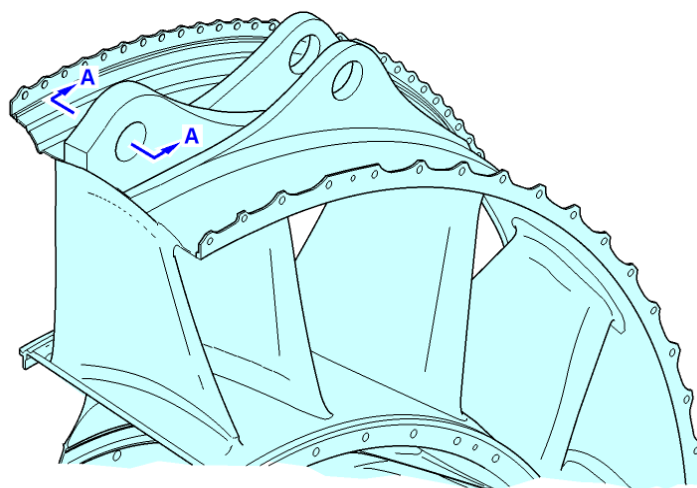


Figure 6 - On Wing - Fail Safe Catcher Damage



B

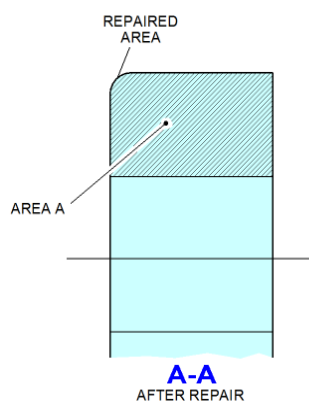


Figure 7 - Repair Acceptance Criteria

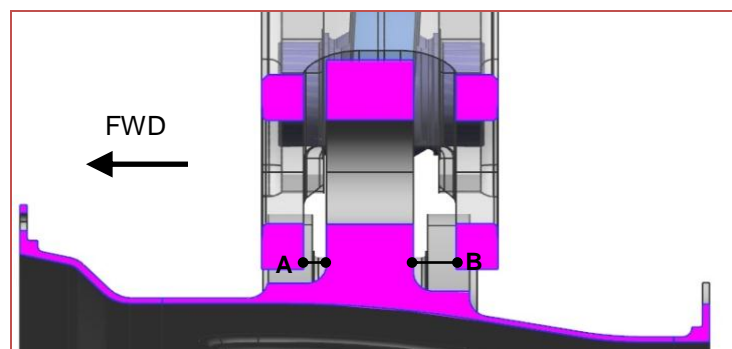
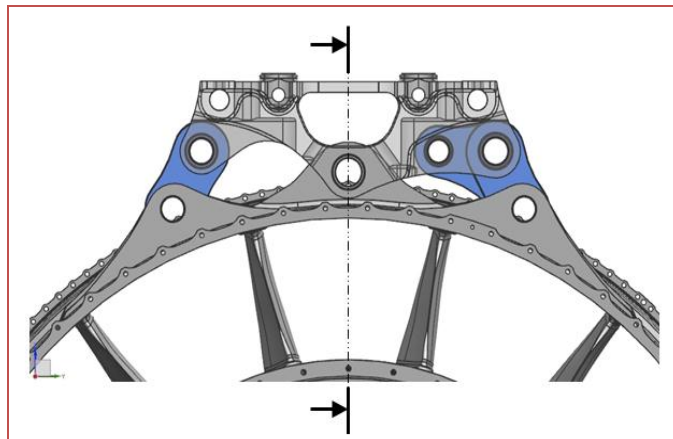


Figure 8 – Distances between fail safe catcher and engine mount



APPENDIX 1

This form (or similar) to be completed for every engine/component inspected
Results to be sent to Rolls-Royce via your Service Representative

Feedback Sheet TV 132217		
Aircraft and Engine Position		
Operator		
Date of Inspection		
Engine Serial Number		
Engine Hours Since New		
Engine Cycles Since New		
08 Module Serial Number		
08 Module Hours Since New		
08 Module Cycles Since New		
Component Part Number		
Component Serial Number		
Component Hours Since New		
Component Cycles Since New		
	Inspection result and comments	
On Wing Inspection of Mount Lug Forging Leading Edge Area	Any crack indications?	
	Max continuous length	
	Max discontinuous length	
	Photographs of crack indications	
On Wing inspection of Fail Safe Catcher LE face and any photographs of damage		
Distance A between Fail Safe Catcher LE and Engine mount (mm)		
Distance B between Fail Safe Catcher TE and Engine mount (mm)		