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V2500-A1 SERIES PROPULSION SYSTEMS NON-MODIFICATION SERVICE BULLETIN

This document transmits Revision 4 to Service Bulletin EV2500-72-0387

Document History

Service Bulletin Revision Status		Supplement Revision Status
Initial Issue	Oct.3/00	
Revision 1	Mar.27/01	
Revision 2	Aug.31/01	
Revision 3	Apr.30/02	

Bulletin Revision 4

Remove	Incorporate	Reason for change
Pages 1 to 10 of the Service Bulletin	Pages 1 to 11 of the Service Bulletin	To revise interval rates and to add Scotchbrite CAUTION.
All pages of Appendix 1	Page 1 and 2 of Appendix 1	To revise interval rates and to add Scotchbrite CAUTION.
All pages of Appendix 2	Pages 1 to 3 of Appendix 2	To revise interval rates and to add Scotchbrite CAUTION.

V2500-ENG-72-0387

CHECK THAT ALL PREVIOUS TRANSMITTALS HAVE BEEN INCORPORATED
If any have not been received please advise Customer Data Services, Rolls-Royce plc, Derby, England

LIST OF EFFECTIVE PAGES

The effective pages to this Service Bulletin following incorporation of Revision 4 are as follows:

	Page	Revision Number	Revision Date
	Bulletin		
R	1	4	Mar.9/06
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International Aero Engines

SERVICE BULLETIN

ENGINE - LP COMPRESSOR FAN BLADES - DOVETAIL ROOT FLANK ULTRASONIC INSPECTION AND APPLICATION OF DRY FILM LUBRICANT (ROOT FRETTING/WEAR - SCARRING) NON-MODIFICATION SERVICE BULLETIN

1. Planning Information

A. Effectivity

(1) Airbus A320

V2500-A1 Engines

B. Concurrent Requirements

None

C. Reason

Latest fan blade dovetail inspections have revealed the need for early action to make sure fan blade dovetail deterioration is minimised. The intent of this NMSB is:

(1) To make sure the blade root dovetail dry film lubricant is maintained in the best possible condition, thereby minimising root stresses.

(2) To make sure there is current population integrity, before the dry film lubricant is re-applied.

D. Compliance

Category Code 3

R NOTE: This Non-Modification Service Bulletin is split into 4 sections:

Section 1 - Visual inspection and re-application of dry film lubricant.

Section 2 - Shop visit inspections.

Section 3 - All inspected engines.

R Section 4 - Clarification of the re-application of Dry Film Lubricant
R (DFL) interval after use of Scotchbrite (or other abrasive).

NOTE: In order to reduce the potential for multiple engine in-flight shutdown, power loss, or other anomaly due to maintenance error, IAE recommends that operators avoid performing maintenance on multiple engines installed on the same aircraft at the same time. If it is not possible to avoid maintenance on more than one engine at the same time, IAE recommemds that additional controls be applied in order to make sure that maintenance tasks have been completed as defined. Maintenance guidelines should be revised where possible to promote this recommendation.

NOTE: During removal/installation of fan blades, ensure that blades are re-installed in the same position as they were removed from.

The actions detailed in 3. Accomplishment Instructions are to be carried out at the intervals that follow:

(1) Section 1 - Visual Inspection and Re-application of DFL

(a) All in service engines - except those at (b) below:

INTERVAL	If the fan blade life has exceeded 2000 cycles (from new or since last DFL application), remove the fan blades from the fan disc (Refer to Fig.1 and AMM, 72-31-11, Removal/Installation) within 500 cycles following receipt of this NMSB and action as below. Repeat at intervals no greater than 2500 cycles.
CLEAN	Remove any loose particles of dry film lubricant on the fan blade root using a lint free cloth.
R	CAUTION:
R	DO NOT USE ANY ABRASIVE (E.G. SCOTCHBRITE) TO
R	REMOVE ANY DFL. IF ABRASIVE HAS BEEN USED REFER TO
R	SECTION 4.
INSPECT	Perform a visual inspection (Refer to AMM, 72-31-11, Inspection/Check).
ACTION	Apply a coating of dry film lubricant to the fan blade root dovetail flanks prior to re-installation of the fan blades (Refer to AMM, 72-31-11, VRS1030).

(b) All in service engines with SB72-0375 and/or SB72-0384 (Metco 58 coated blade roots) fan blades installed:

R	INTERVAL	Within 2500 cycles, following receipt of this
R		NMSB, remove the fan blades from the fan disc (Refer to Fig.1 and AMM, 72-31-11, Removal/Installation) and action as below.
R		Repeat every 2500 cycles.
	CLEAN	Remove any loose particles of dry film lubricant on the fan blade root using a lint free cloth.
R		CAUTION:
R		DO NOT USE ANY ABRASIVE (E.G. SCOTCHBRITE) TO
R		REMOVE ANY DFL. IF ABRASIVE HAS BEEN USED REFER TO
R		SECTION 4.
	INSPECT	Do a visual inspection (Refer to AMM, 72-31-11, Inspection/Check).
	ACTION	Apply a coating of dry film lubricant to the fan blade root dovetail flanks prior to re-installation of the fan blades (Refer to AMM, 72-31-11, VRS1030).

(2) Section 2 - Shop visit inspections

R All engines with pre or post SB 72-0375 and pre or post SB 72-0384 (Metco 58 and non-Metco 58 coated blade roots)

(a) Remove the dry film lubricant on all fan blades and the fan disc, regardless of the condition of the coating on receipt (Refer to Fig.1 and Engine Manual (EM), 72-31-11, Cleaning - 72-31-12, Cleaning).

(b) Do an ultrasonic inspection on all fan blades (refer to 3. Accomplishment Instructions).

(c) If any blade is rejected following (b), do a detailed inspection of the fan disc including a x30 binocular inspection of the bedding surfaces of the fan disc dovetail slots (refer to EM, 72-31-12, Inspection/Check). Advise the IAE Representative of the finding of both the fan blade(s) and fan disc binocular inspections.

(d) On acceptable parts accomplish all remaining Engine Manual inspections (EM, 72-31-11, Inspection/Check) and rework including re-application of the dry film lubricant on all acceptable fan blades and fan discs. (refer to EM, 72-31-11, VRS1023 and 72-31-12, VRS1154).

(3) Section 3 - All inspected engines in Sections 1 and 2

(a) When the accomplishment instructions are completed on acceptable parts, record that V2500 NMSB 72-0387 has been completed. It is also recommended to notify the IAE Representative that this NMSB has been accomplished.

(b) In addition IAE recommend completion of the proforma (Appendix 1) for each engine and to provide a copy to your IAE Representative.

(c) For tracking purposes IAE recommend that all operators record all fan blade change details, along with the Part Number, Serial Number, life and location of all fan blades in their fleet, including any removed and held as serviceable spares.

R (4) Section 4 - Clarification of the re-application of Dry Film Lubricant
R (DFL) interval after use of Scotchbrite (or other abrasive)

R Post SB 72-0375 and SB 72-0384 fan blade roots feature a Metco 58 coating.
R Metco 58 is a metal spray and leaves a rough surface designed to improve
R the retention of root lubricant. At new production root lubricant is
R stoved onto the Metco 58 coating. Subsequent coats of DFL applied in
R service (as per this service bulletin) are air dried.

R When applying the DFL any existing root lubricant must not be removed. All
R that is required is to wipe the root with a lint-free cloth made moist
R with methylethylketone (material number V10-106) prior to lubricant
R application. This is to make sure that no grease remains on the blade root
R and any loose flakes of existing lubricant are removed.

R There have been cases where operators have completely removed existing
R coats of root lubricant before re-applying DFL.

R The DFL specified in this service bulletin are not as durable as the
R stoved on lubricant applied during new manufacture or overhaul. Therefore
R it is beneficial to leave as much of the existing coating on the blade
R root as possible.

R Also the removal of existing lubricant from the blade root can involve the
R abrasion of the Metco 58 coating. This abrasion can cause the Metco
R coating to become smoother and lose its ability to retain lubricant.

R Failure to correctly apply the DFL can increase friction between the fan
R disc and fan blade root. This can lead to increased levels of vibration
R and increased stresses in the fan blade root and fan disc. In addition,
R increased levels of wear in the fan disc and fan blade root can be
R observed.

R CAUTION:

R IF AN ABRASIVE HAS BEEN USED TO REMOVE DFL FROM THE METCO 58 COATING THEN
R THE SURFACE ROUGHNESS HAS TO BE ASSUMED TO HAVE BEEN REMOVED. IN SUCH
R CASES THE RETENTION PROPERTIES OF THE METCO 58 COATING MUST BE ASSUMED
R INNEFECTIVE. INSPECT AND RE-APPLY THE DFL AT INTERVALS IN ACCORDANCE WITH
R SECTION 1 (a) AND (b).

E. Approval

The compliance of statement 1.D. and the procedures outlined in Section 3 of this Non-Modification Service Bulletin, comply with the Federal Aviation Regulations and are FAA approved for the engine model listed.

F. Manpower

Estimate of manhours to embody this Service Bulletin in full:

(1) In service

7 hrs 24 mins

(2) At overhaul

6 hrs 30 mins

NOTE: The parts affected by this Service Bulletin are accessible at scheduled maintenance and/or overhaul

G. References

R (1) Internal reference number 00VJ634D.

(2) Other References

(a) In-Service

(i) A320 Aircraft Maintenance Manual (AMM), 72-31-11, Removal/Installation, Inspection/Check and Repair VRS1030.

(ii) Powerplant Illustrated Parts Catalogue, 72-31-11.

(b) In-Shop

(i) V2500 Engine Manual (EM) (E-V2500-1IA):

(1) 72-31-00, Disassembly/Assembly.

(2) 72-31-11, Cleaning, Inspection/Check and Repair VRS1023.

(3) 72-31-12, Cleaning, Inspection/Check and Repair VRS1154.

(ii) V2500 Engine Illustrated Parts Catalogue 72-31-11

(iii) V2500 Standard Practices/Processes Manual (SPM-V2500-1IA)

(c) V2500 Service Bulletins:

(i) ENG-72-0375 - Engine - LP compressor blades and fillers - Introduction of a revised LP compressor blade with Metco 58

(ii) ENG-72-0384 - Engine - LP compressor blades and fillers - Introduction of a revised LP compressor blade with Metco 58 - Rework

(3) ATA Locator - 72-31-00

2. Material Information

None

3. Accomplishment Instructions

A. Tools and Equipment

(1) Ultrasonic flaw detector - For operation in the 5-10 MHz range (IAE recommend use of Buehler Krautkramer - USN52 (Krautkramer Branson - USN52) or EPOCH 3B).

(2) Ultrasonic couplant CoMat 06-148

(3) Items (4) and (5) are included in kit IAE 2R19429

(4) Test block QC6827 - IAE 2R19315

(5) Ultrasonic probe - IAE 2R19316

B. Calibration of Ultrasonic Detector

(1) Set up the ultrasonic flaw detector for dual or through transmission operation, with zero delay.

(2) Set the amplifier switch to 5-10 MHz

(3) Apply couplant to the rear angled flank and position the probe on the test block

(4) Identify the signal produced by the large slot A. With the range control, position this signal at division line 5 on the time base and adjust the amplitude to approximately 50 percent screen height

(5) Increase the gain by 20dB. Move the probe over slot B and identify the signal produced. Adjust the amplifier to bring the signal to 60 percent screen height

(6) If a monitor gate is available, position it between the 4.5 and 5.5 division lines on the time base. Adjust any visual or audible alarms to trigger at 60 percent screen height

C. Ultrasonic inspection - Shop visit engines

(1) Remove the fan blades. (Refer to the Engine Manual (EM) 72-31-11, Disassembly)

(2) Do a general inspection of the fan blades. (Refer to EM 72-31-11, Inspection/Check)

(3) Do an ultrasonic inspection on each of the fan blades

(a) Apply the couplant to the concave face of the blade root flank at the area to be inspected. Position the probe at the front of the concave blade root flank and move the probe along the first 2.4in. (60mm) of the chordal width of the blade root. (Refer to Fig 2)

(b) Monitor the signal very carefully as you move the probe, over this area

(c) Reject the blade if a signal greater than 60 percent screen height is produced between the 4.5 and 5.5 division lines on the time base. It is recommended to identify the locations of all indication(s) over 60 percent screen height from the root front face and record on the proforma (Appendix 1) the ultrasonic signal percentage height and position from the root front face.

(d) Subsequent to the above, perform a x30 binocular inspection at each indication position (refer Appendix 2). Reject any blades where cracking is confirmed by this inspection.

(e) Apply the couplant to the convex face of the blade root flank at the area to be inspected. Position the probe 1.77in. (45mm) from the front face of the blade root (immediately behind the front chocking pad if still installed) and move the probe along the next 4.33in. (110mm) of the chordal width of the blade root, terminating the inspection at 6.10in. (155mm) from the front face of the blade root (approximately 3.3in. (85mm) from rear face of root)

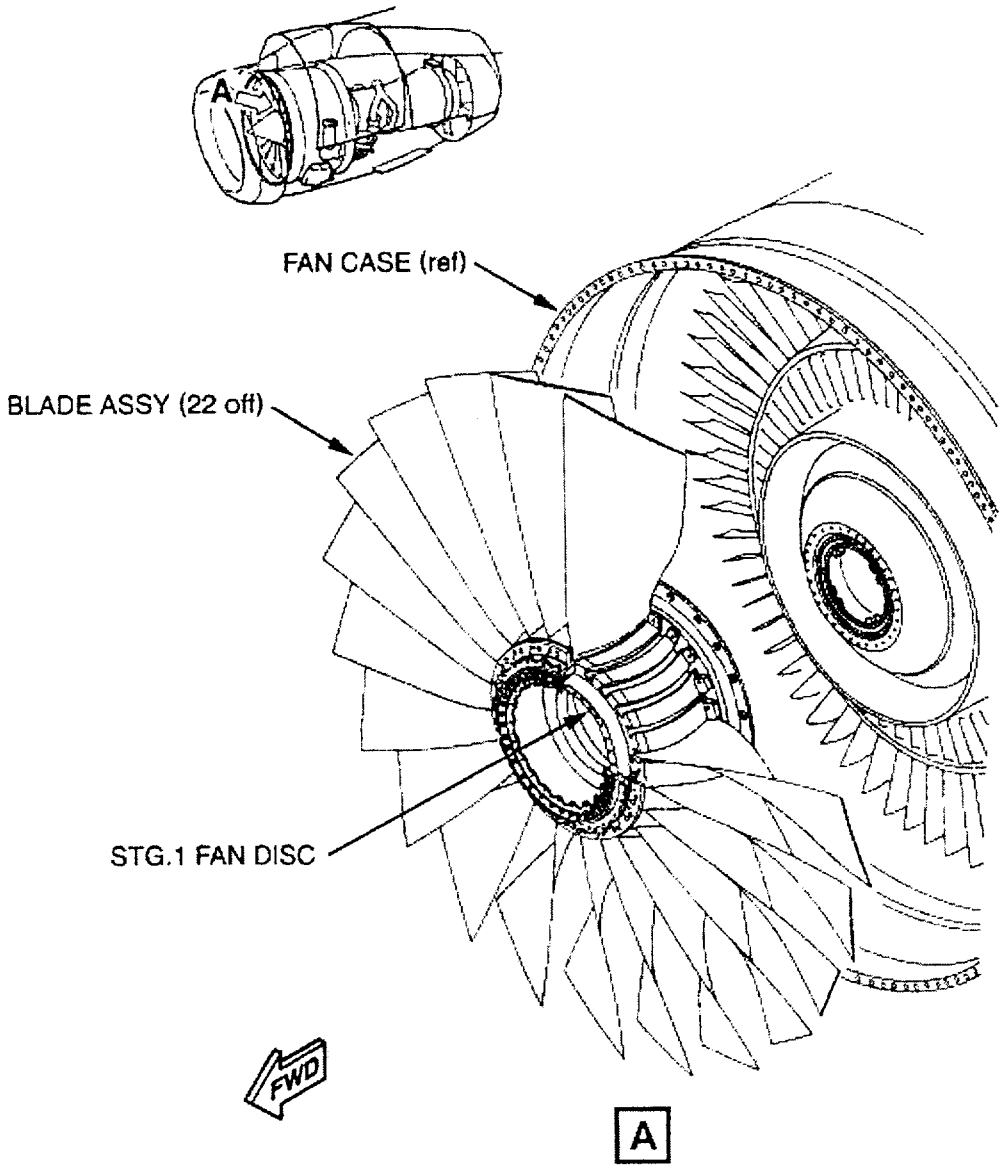
(f) Monitor the signal very carefully as you move the probe over this area

(g) Reject the blade if a signal greater than 60 percent screen height is produced between the 4.5 and 5.5 division lines on the time base. It is then recommended to identify the locations of all indications over 60 percent screen height from the root front face and record on the proforma (Appendix 1) the ultrasonic signal percentage height and position from the root front face.

(h) Subsequent to the above, perform a x30 binocular inspection at each indication position (refer Appendix 2). Reject any blades where cracking is confirmed by this inspection.

(i) On any rejected blade at (d) or (h) above, identify the location of any such indications) on the blade. It is also recommended to record the indication positions and length on the proforma (Appendix 1) and advise the IAE Representative.

(j) If no cracking is present following step (d) and (h), the blade is considered suitable for completion of any further Engine Manual inspection/rework operations required to return it to service operation. On any such blade, it is recommended to record on the proforma that a x30 binocular inspection has been successfully completed with no cracking being detected.



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Location of blade assembly and stage 1 fan disc
Fig 1

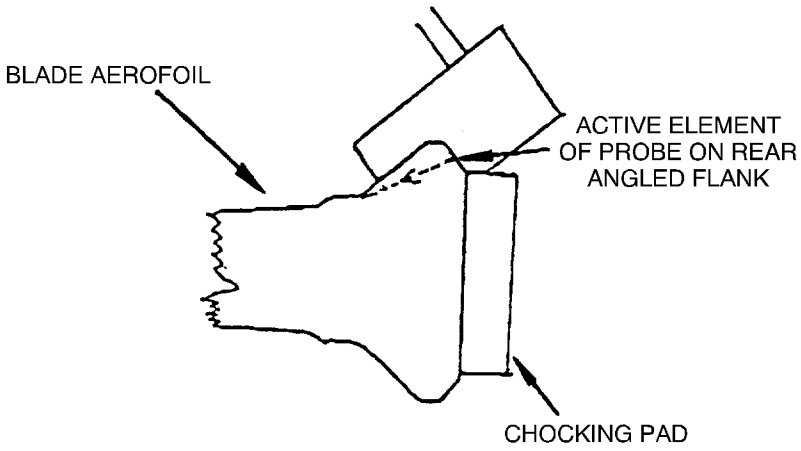

FIGURE 2

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Schematic diagram showing position of probe on concave root flank
Fig 2

APPENDIX 1

Inspection Proforma

Appendix 1
Proforma for reporting inspection results

After completion fax this information to to the IAE representative

Operator:	**Rating:**	**Date of Inspection:**
Engine S/N:	**Previous rating if applicable:**	**Engine TSN / CSN:**
Fan Set TSN/CSN (If different to engine cycles)		**TSN/CSN:**
U/Sonic Inspection of Fan Set		**Yes/No (delete as appropriate)**
Are the Fan Blades Metco 58 standard		**Yes/No (delete as appropriate)**
(Shop visit only) Metco 58 coating applied per SB 72-0384 at this shop visit		**Yes/No (delete as appropriate)**

Note: The information contained above is required as a minimum.

The table below is to be completed if any Fan Blade/s are rejected by Ultrasonic inspection.

NMSB 72-0387 Fan Blade			% DFL loss on contact surface	Frettage on contact surface	Time (TSN / CSN) since		U/sonic Inspection (USI) (Rejection Indication Data)			Binocular inspection (shop visit only)	
P/N	S/N	TSN / CSN *	Concave (CV) / Convex (CX)	Yes/No	Last DFL lubri-cation	Last USI	US signal (% screen height	CX or CV side of Fan Blade	position from Leading Edge (mm)	Confirmed indication yes/no	Length of indication
6A	RG										

* (If different to engine cycles)

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Inspection proforma
Appendix 1, Fig.1

APPENDIX 2

Binocular inspection on a blade rejected following the ultrasonic inspection on shop visit engines

Tooling and equipment

Desk lamp (local supply)	40 - 50W bulb with shade, less than 110 mm dia. and 110 mm. length.
Blade mounting fixture	Local manufacture
Binocular (local supply)	Minimum magnification range of x10 to x30 and overhang such that centre of binocular can be positioned 350 mm. away from edge of base mounting.

NOTE: Advice on suitable binoculars can be provided by IAE. An example of a suitable binocular would be a Nikon SMZ645 with x10 eyepieces and C-US2 stand.

A. Introduction

This technique covers the additional binocular inspection of V2500 fan blade roots for possible top edge of bedding cracking, detected by ultrasonic inspection as shown in Appendix 2, Figure 1.

The person carrying out this inspection should be proficient at binocular inspections. Additional specific training is recommended for this inspection, contact IAE.

B. Preparation

Ensure that dry film lubricant (DFL) has been removed from the fan blade root using:

TASK 72-31-11-100-002-A00 for Non Metco 58 coated root in accordance with EM practices.

TASK 72-31-11-100-002-B00 for Metco 58 coated root in accordance with EM practices.

C. Inspection

(1) Position fan blade in mounting fixture to view the side of the fan blade root presenting an ultrasonic indication.

(2) Adjust lamp to optimum position for highlighting top edge of bedding at ultrasonic indication position, as illustrated in Appendix 2, Figure 1.

(3) Set magnification of binocular to x10 and bring the top edge of bedding at the ultrasonic indication position into focus. Adjust magnification to x30 and re-focus if necessary.

(4) Slowly traverse along the blade, inspecting the top edge of bedding 10 mm. either side of the ultrasonic indication position, as shown in Appendix 2, Figure 1.

(5) Check any suspicious features by inspecting at the highest magnification available.

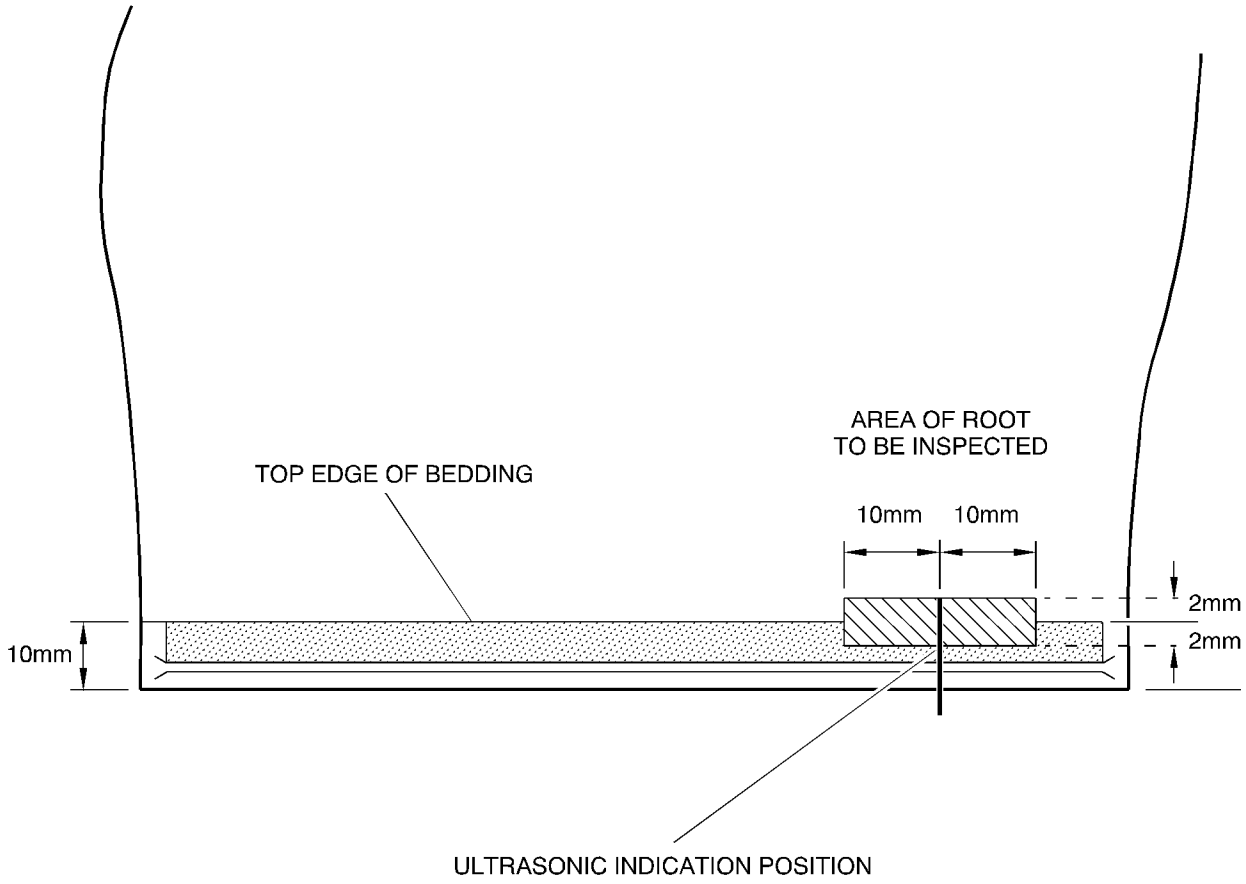
NOTE: The inspection should cover the area approximately 2 mm. above and below the top edge of bedding. Re-focus the binocular and adjust the lamp as required.

(6) Repeat steps (1) to (5) above for each ultrasonic indication position.

D. Rejection criteria:

(1) Reject any blade exhibiting a crack-like feature running axially along the root in the inspected region.

(2) Reject any blade exhibiting a 'scar' or crater-like feature.



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Inspection areas
Appendix 2, Fig.1