NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Aviation Engineering Division
Washington, DC 20594

January 16, 2004

ADDENDUM NUMBER 20 TO THE STRUCTURES GROUP CHAIRMAN'S FACTUAL REPORT

DCA02MA001

A. ACCIDENT

Location:	Belle Harbor, NY
Date:	November 12, 2001
Time:	09:16:14 EST
Aircraft:	American Airlines Flight 587, Airbus Model A300-605R, N14053 Manufactures Serial Number (MSN) 420

B. STRUCTURES GROUP

Chairman:	Brian K Murphy National Transportation Safety Board Washington, DC

C. AIRBUS INSPECTION REPORT

1. "Incoming inspection of the rear lug cut outs LH side shell of the fin box from the aircraft MSN 513 of the American airlines"

AIRBUS	**Technical Note**	

Report Nr.: TN – ESWNG – 1238/03

Author:
Department.:

Title

Incoming inspection of the rear lug cut outs **LH** side shell of the fin box from the aircraft MSN 513 of the American airlines

Date: 19.12.2003

Summary:

Rear lug cut outs from MSN 513, operated by American Airlines, were taken from the left hand (LH) shell of the fin box for test purpose.

Incoming inspection was performed both visual and non-destructive:

1. After arrival from American Airlines, Tulsa, OK, USA
2. After specimen preparation in Airbus Stade, Germany

In some areas additional or increased findings compared to Tulsa were detected.

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Table of contents

1 General 4
2. Test program 4
3. Test results 5
3.1First incoming inspection at the arrival from American Airlines Tulsa 5
3.1.1 Attachment fitting 5
3.1.2 CFRP skin 5
3.1.3 Rib 1 attachment angle 5
3.1.4 Connecting area rib1 to rib1 attachment angle (area riveted). 5
3.1.5 Connecting area rear spar web to rear spar attachment flange (area riveted). 5
3.2 Second incoming inspection after preparation activities 5
3.2.1 CFRP skin 5
4 Inspection of MSN 513 in Tulsa versus incoming inspection in Hamburg 6

Figure 1:Cut outs of the RH side shell and the LH side shell of the fin box of the aircraft MSN513 7
Figure 2: Structure elements of the cut out (view from the inboard side) 8
Figure 3: Area with cracks and delamination in a depth of 3 mm around the bushing 9
Figure 4: Delamination and cracks in the rear lug LH side 9
Figure5: Orientation of the bushing to the attached fitting in the direction of cut B15-B15 at the first incoming inspection 10
Figure 6: Orientation of the bushing to the attached fitting in the direction of cut A15-A15 at the first incoming inspection 11
Figure 7: Visible indications on the inboard side of the lug 12
Figure 8: Delamination at stringer P5 on LH side shell 13
Figure9: Additional findings at the second incoming test in the cut out LH of the fin box of the MSN 513 14
Figure 10: Details of the additional findings at the second incoming test 15
Figure 11: Delamination in the foot of stringer P2 16
Figure 12: Delamination in the foot of stringer P7 17

1 General

After removal of the cut outs from the fin-box of MSN 513 in Tulsa, OK in June 2003 these have been sent to Airbus, Hamburg facility for testing.

The cut out (figure 1.) consists of an area between stringer P1 to P8, Rib 1 to 4 and the rear attachment fitting. The structure elements of the cut outs are shown in figure 2.

A first incoming inspection was performed July 21st to July 30th 2003 in Hamburg.

A second one was done after return of the specimen from Airbus Stade plant to Hamburg test center. At Stade load introduction fittings and laminates were attached to enable structural testing.

Reference of the results will be made to the initial inspection at Tulsa, done by Airbus inspector, on march 2002.

2. Test program

The program covers:

- Visual inspection
- Hand held ultrasonic inspection
    - Check for delaminations between skin and elements (stringers, rear spar and rib attachments)
    - Complete inspection of the lug area from both sides
    - Inspection of the skin above rib 1 from outside and inside
    - Inspection of the connecting area rib 1 to rib 1 attachment angle
    - Rib attachment angle

Inspection procedure

- NTM 55 30 01
- QVA-Z10-52-06
- AITM 64005 Draft D

Equipment used: Ultrasonic device type Isonic 2001
Inspector: Airbus NDI Inspector

3. Test results

3.1First incoming inspection at the arrival from American Airlines Tulsa

3.1.1 Attachment fitting

Delamination and cracks around the bushing were found.
Referred to the outboard side of the structure the indication area is in a depth of round about 3 mm (see figure 3 and 4).
During the inspection of the fin box in Tulsa

- in this area no delamination was detected, only indications of cracks below reportable limits
- no gap between bushing and composite was detected

At the inspection in Hamburg on the lug a gap between bushing and CFRP structure of 0,3 mm to 0,5 mm is visible.
The result of a coordinate measuring device about the orientation of the bushing to the CFRP structure is described in the figures 5 and 6.
On the inboard side of the lug there are visible indications like cracks, as in figure 7 described.
This area was inspected with ultrasound, but no crack indications were found. (Wedge was handled as in non SSI NTM 55 30 01 described.)

3.1.2 CFRP skin

A delamination in the foot of stringer P5 near rib 4 was found (figure 8). When this area was inspected in Tulsa no defect indications were detected.

3.1.3 Rib 1 attachment angle

No defects were detected.

3.1.4 Connecting area rib1 to rib1 attachment angle (area riveted).

No defects were detected.

3.1.5 Connecting area rear spar web to rear spar attachment flange (area riveted).

No Defects were detected.

3.2 Second incoming inspection after preparation activities

The indications of the first incoming test were confirmed and additional indications were found.

3.2.1 CFRP skin

- Delamination in the foot of stringer P2 near rib 4 (figure 11)
- Delamination in the foot of stringer P7 near rib 4 (figure 12)

4 Inspection of MSN 513 in Tulsa versus incoming inspection in Hamburg

The objective for the inspection in Tulsa was to find delaminations as defined in the NTM / SRM whereas in Hamburg the maximum sensitivity level was applied.

Some indications that are not to be reported were detected in Tulsa, for example indications in the area of rivets, scattering echoes due to different layer thickness (resin rich areas, deviations of fiber volume). In some cases the size of the indication plane was too small.

The criterion for a delamination is that the back wall decreases and in the same moment a delamination echo increases. Details are described in non SSI NTM 55 30 01.

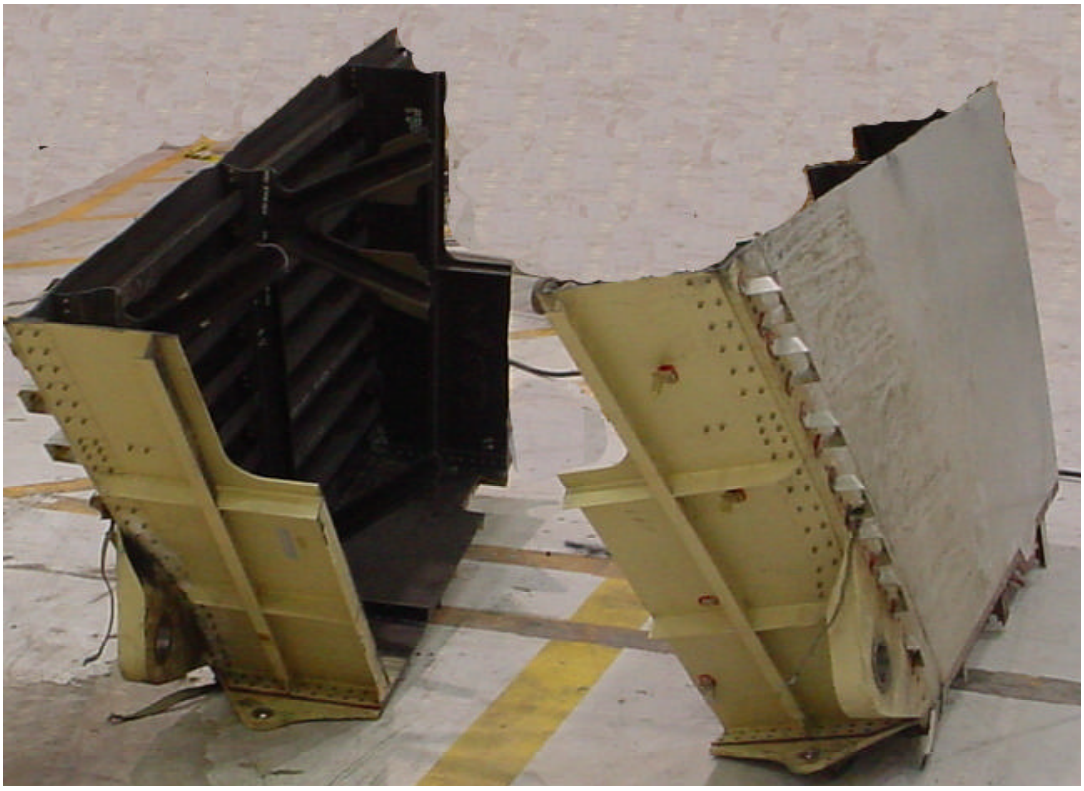


Figure 1:Cut outs of the RH side shell and the LH side shell of the fin box of the aircraft MSN513

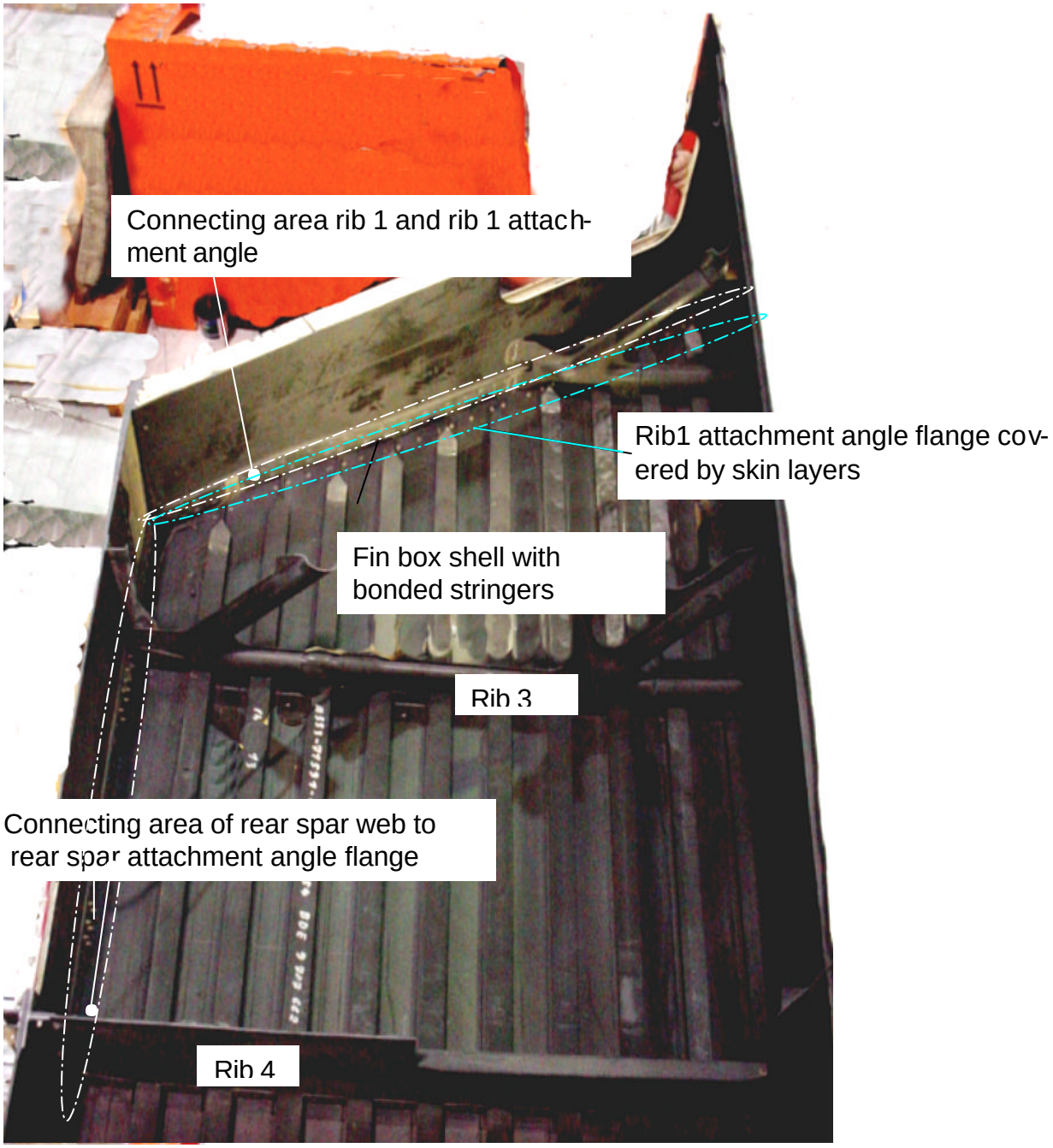


Figure 2: Structure elements of the cut out (view from the inboard side)

First incoming inspection cut out LH

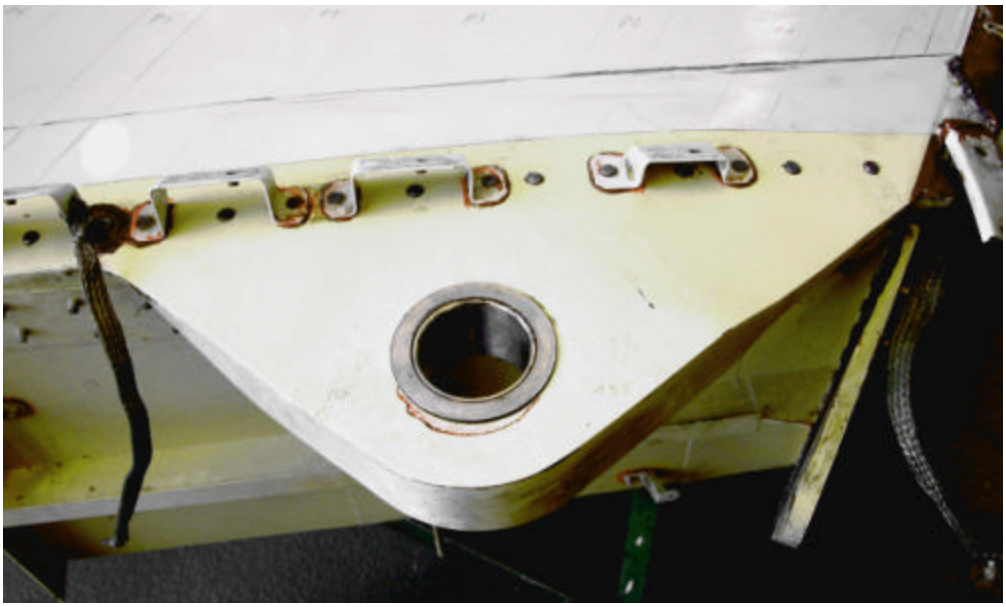


Figure 3: Area with cracks and delamination in a depth of 3 mm around the bushing
(Inspected from the outboard side of the lug)

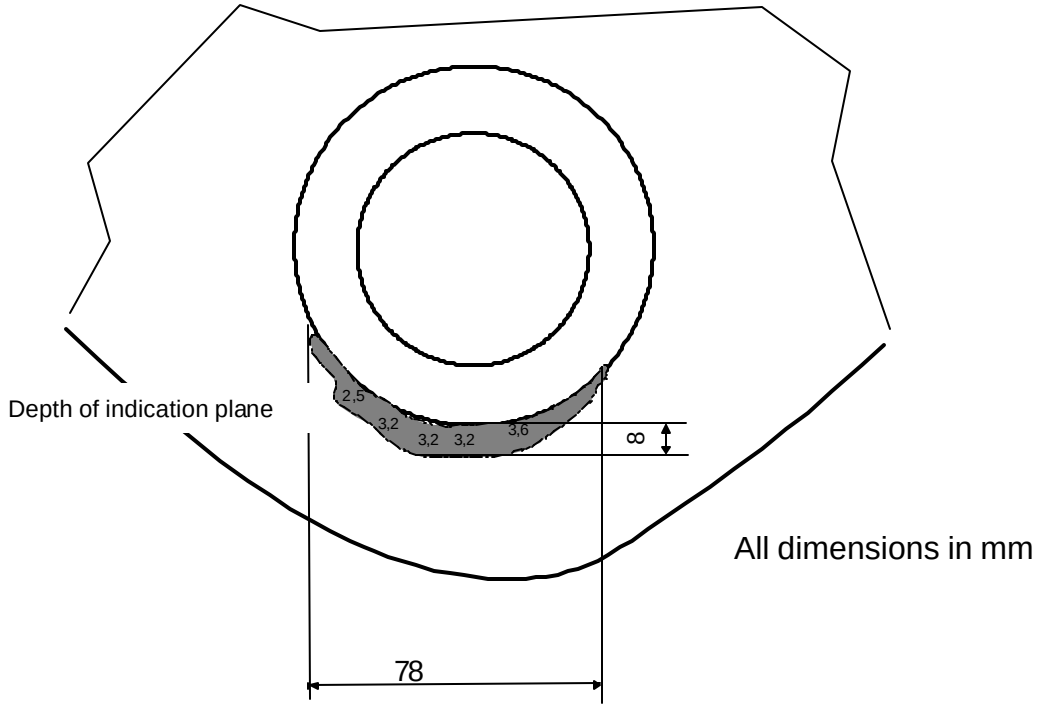
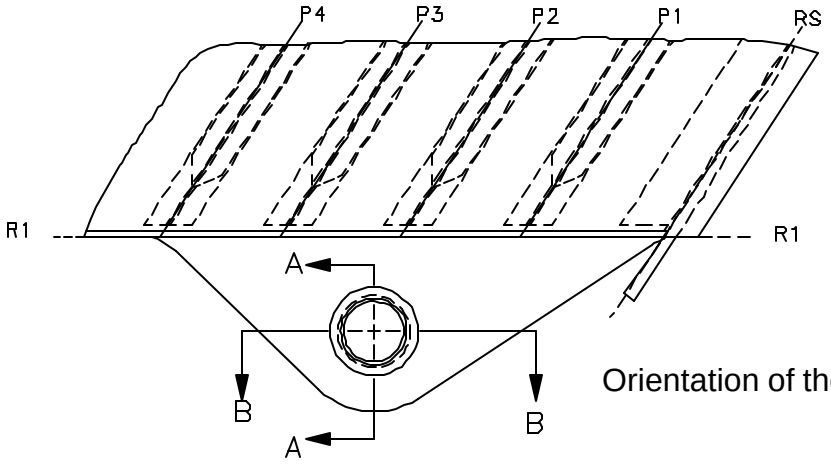


Figure 4: Delamination and cracks in the rear lug LH side
(Inspected from the outboard side of the lug)

Rear attached fitting LH side



Orientation of the cuts A15-A15 and B15-B15

Cut : B – B

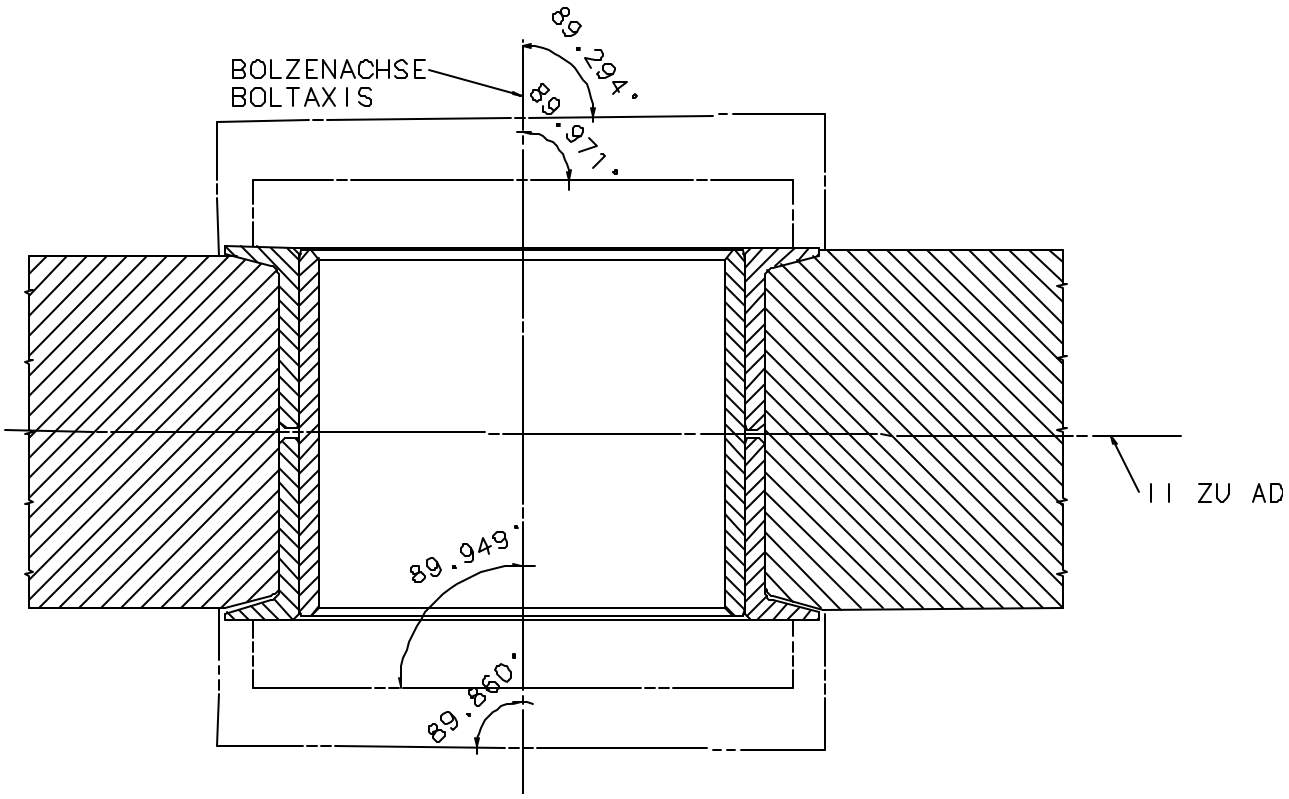
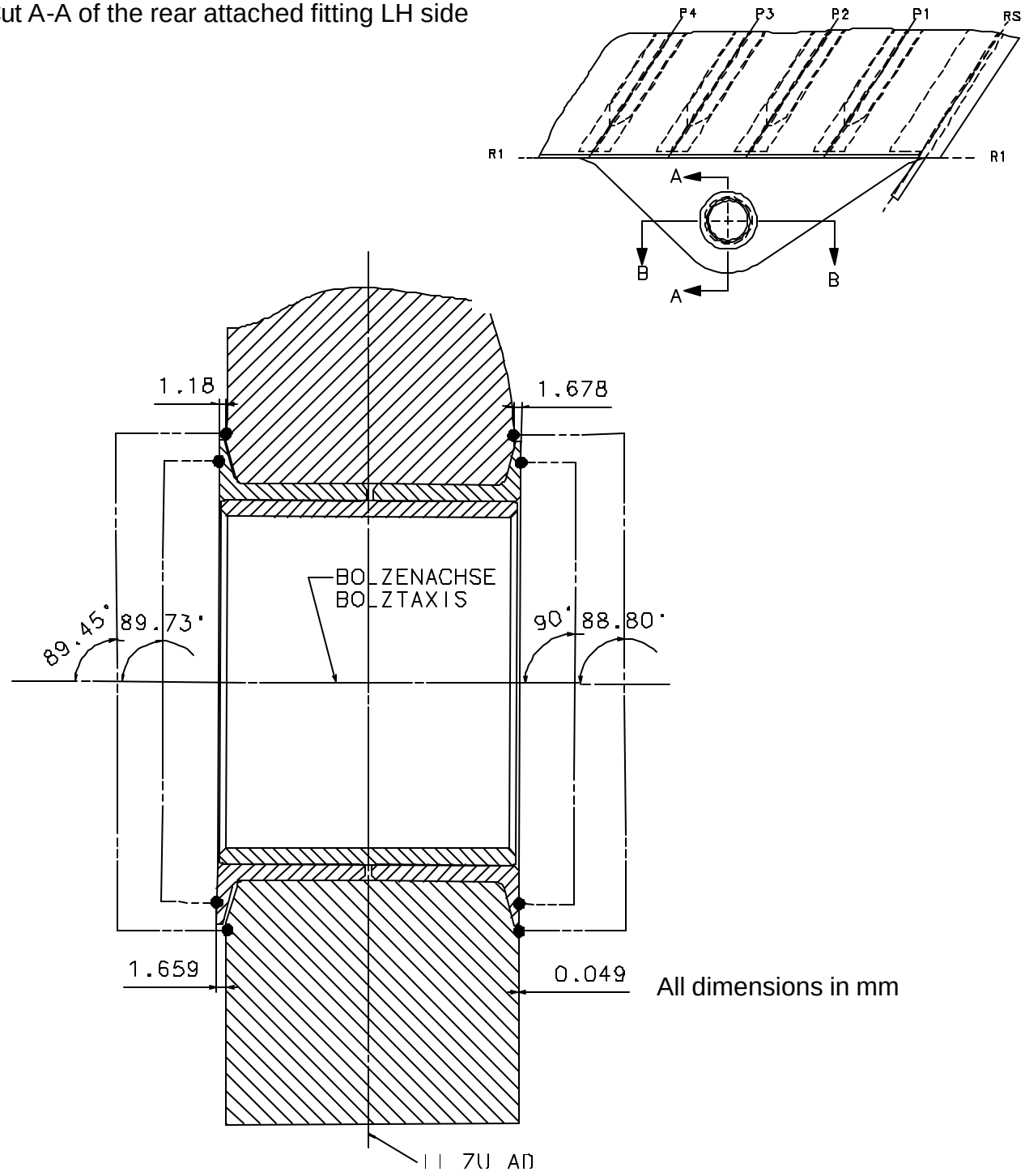


Figure5: Orientation of the bushing to the attached fitting in the direction of cut B15-B15 at the first incoming inspection
(results of a coordinate measuring device)

Cut A-A of the rear attached fitting LH side



All dimensions in mm

Figure 6: Orientation of the bushing to the attached fitting in the direction of cut A15-A15 at the first incoming inspection
(results of a coordinate measuring device)

First incoming inspection cut out LH

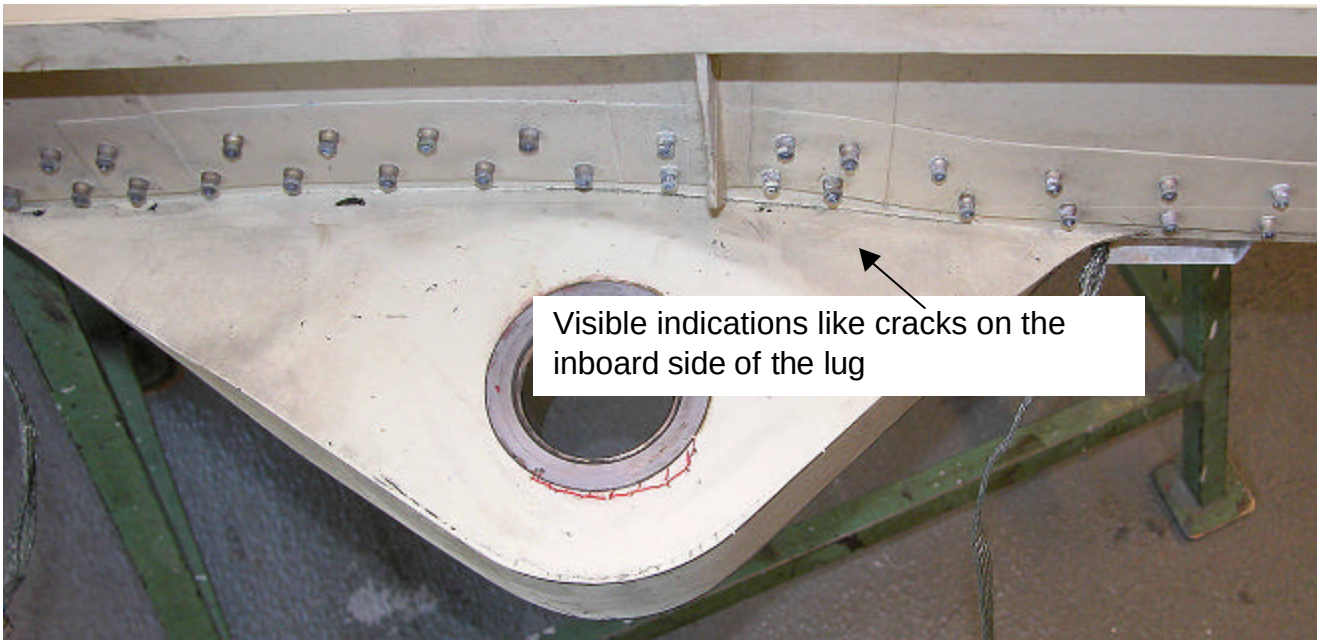


Figure 7: Visible indications on the inboard side of the lug

First incoming inspection cut out LH

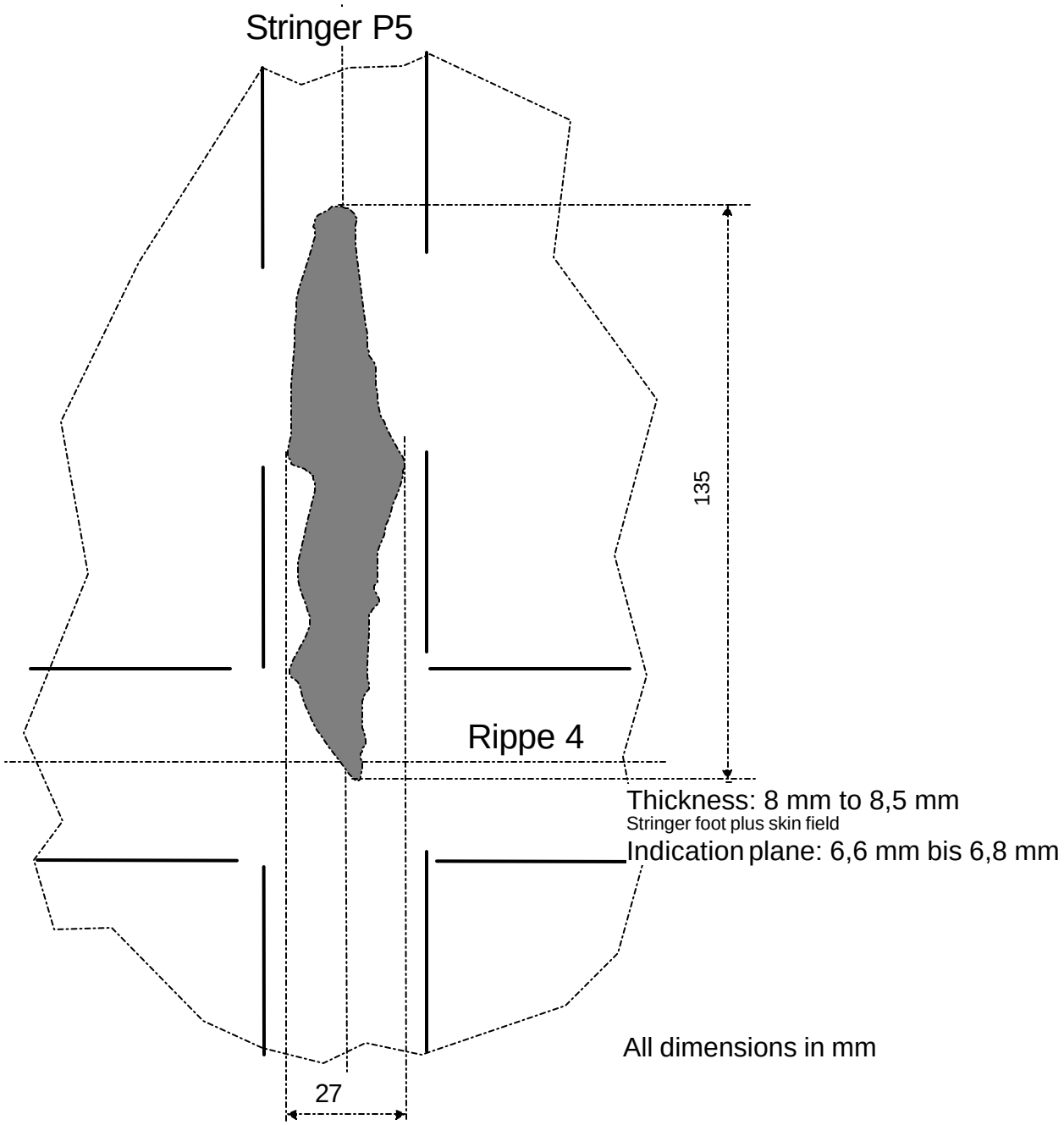


Figure 8: Delamination at stringer P5 on LH side shell

Second incoming inspection cut out LH

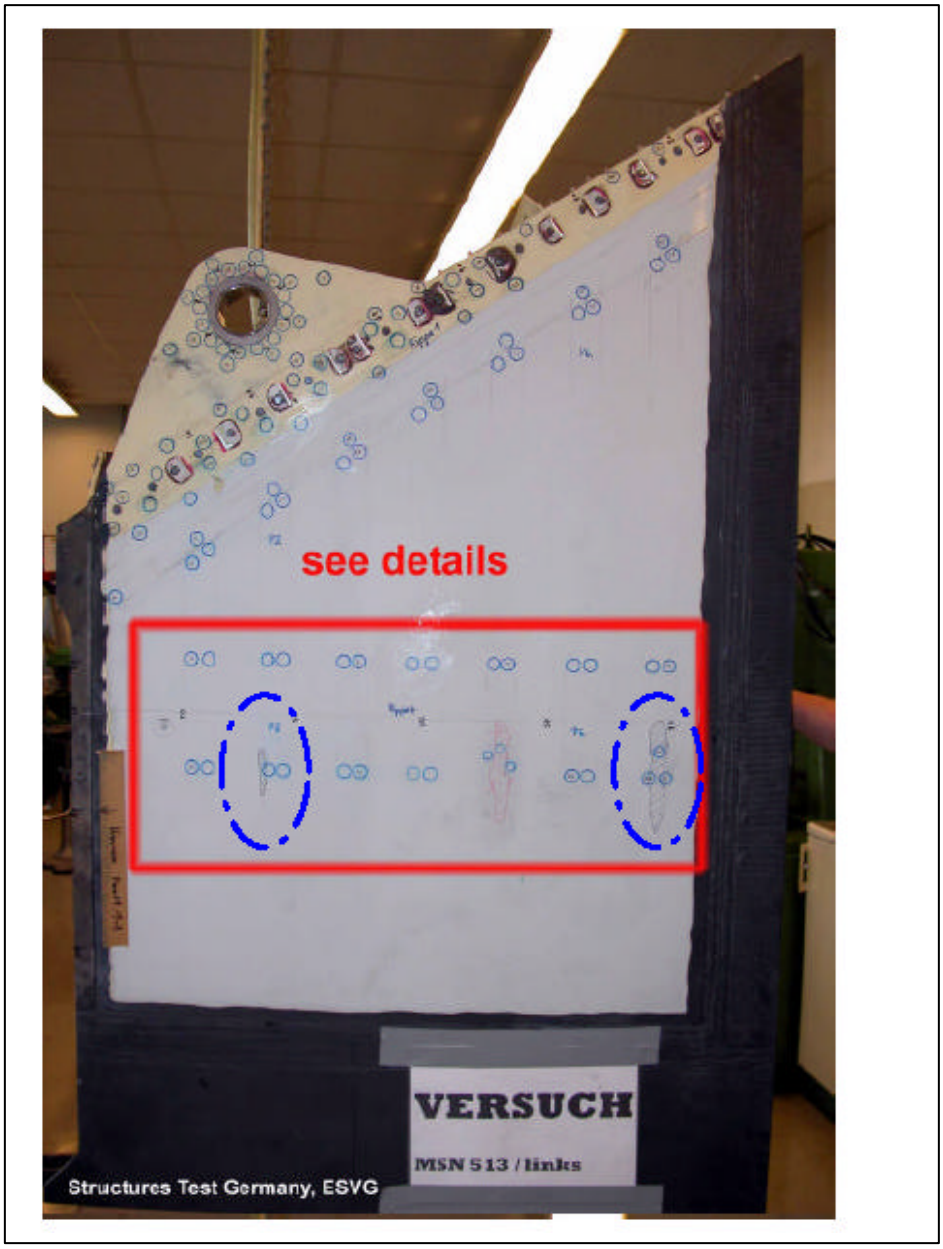


Figure9: Additional findings at the second incoming test in the cut out LH of the fin box of the MSN 513

Second incoming inspection cut out LH

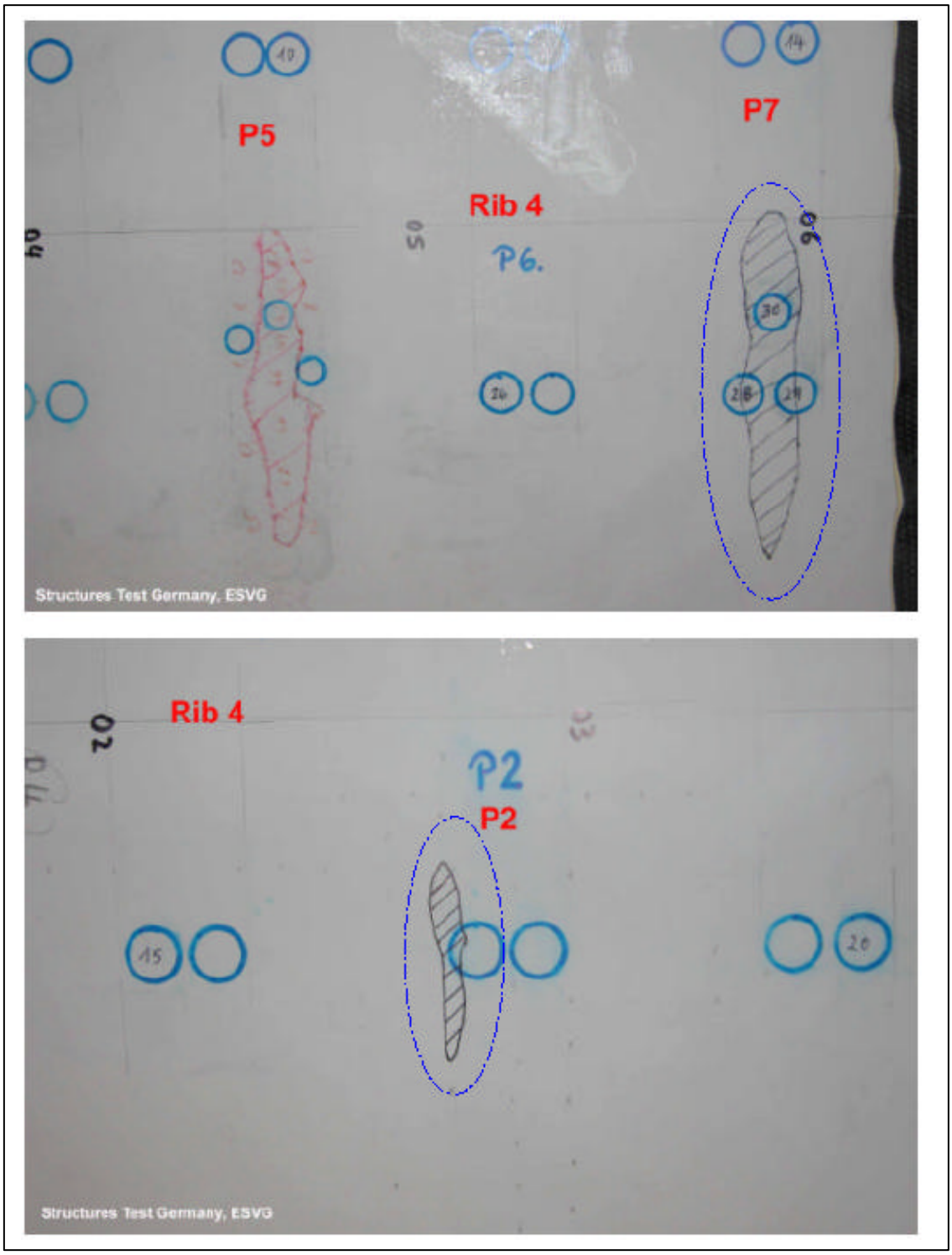
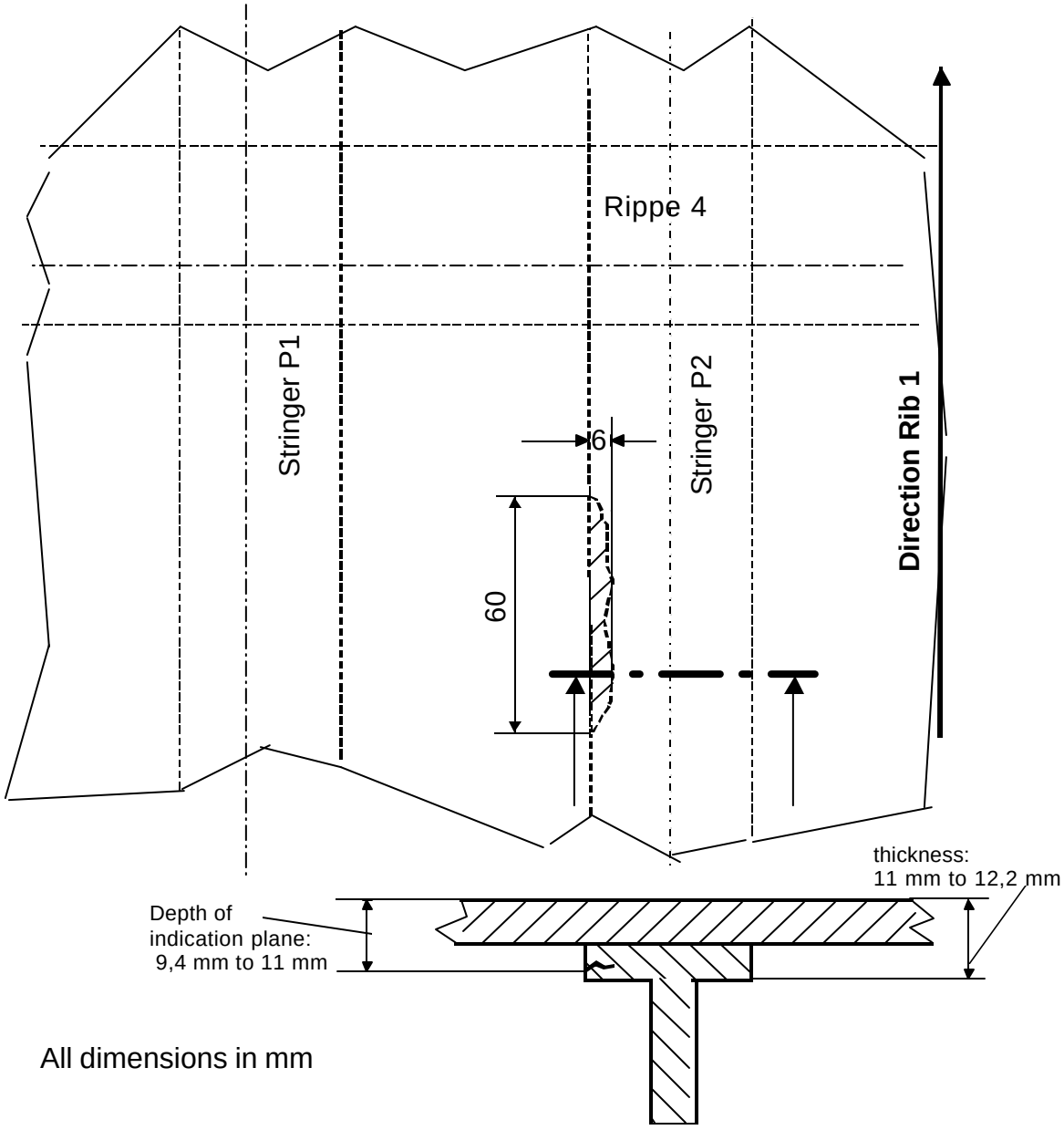


Figure 10: Details of the additional findings at the second incoming test

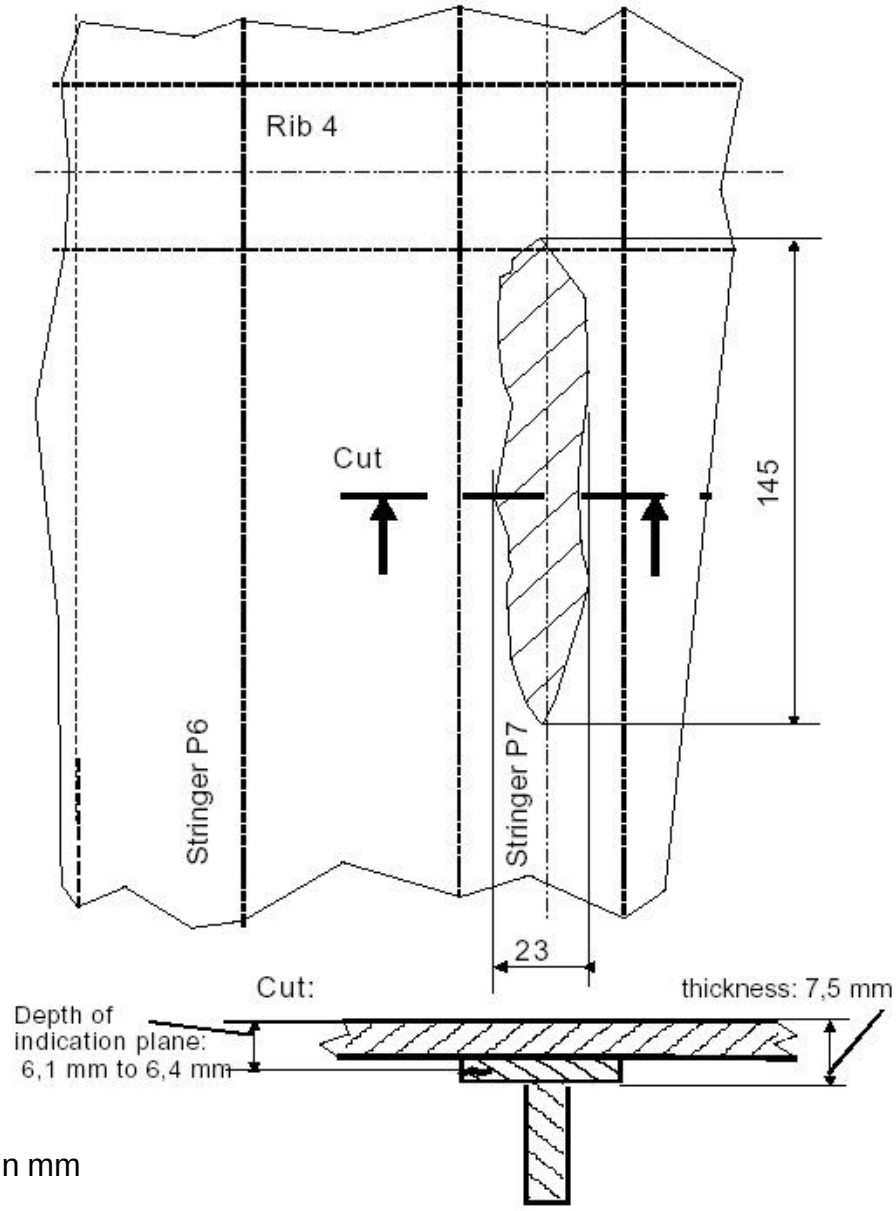
Second incoming inspection cut out LH



All dimensions in mm

Figure 11: Delamination in the foot of stringer P2

Second incoming inspection cut out LH



All dimensions in mm

Figure 12: Delamination in the foot of stringer P7