NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Aviation Engineering Division
Washington, DC 20594

January 16, 2004

ADDENDUM NUMBER 21 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 RH side shell of the fin box from the aircraft MSN 513 of the American airlines"

AIRBUS	**Technical Note**	

Report Nr.: TN – ESWNG – 1239/03

Author:
Department.:

Title

Incoming inspection of the rear lug cut out **RH** 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 right hand (RH) 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.

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

3.1 First 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 6).
Compared with the inspection of the fin box in Tulsa

- this area is increased (Figure 3 to 5)
- the gap between metal bushing and CFRP lug is increased. In Tulsa it was small, only a piece of paper could fit in. Now a gap between bushing and CFRP structure of 0,3 mm to 0,5 mm is visible.
- around the delaminated area a zone with cracks has developed. The depth of this plane is identical with that of the delamination.

The result of a coordinate measuring device about the orientation of the bushing to the CFRP structure is described in the figures 6 and 7.

On the inboard side of the lug there are visible indications like cracks, as in figure 8 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

An area with single-depth pores or concentration of small cracks in a certain depth was found on stringer P5 at the connecting area of the rib 1 attachment angle and the skin panel. The indication plane is in a depth of 1 mm measured from the surface (See Figure 9 and 10).
An area with single-depth pores or a concentration of cracks in the bonding of stringer P1 (Figure 11) was found.
The area of this indication is the same as in Tulsa. This indication was not published in the damage report, because this area was too small to be reported and the ultrasound echo from the indication plane was too small.

3.1.3 Rib 1 attachment angle

No Defects were detected.

3.1.4 Connecting area of rib1 to rib 1 attachment angle

No Defects were detected.

3.1.5 Connecting area of rear spar web to rear spar attachment flange

No Defects were detected.

3.2 Second incoming inspection after preparation activities

The indications of the first incoming test were confirmed and no additionally indications were found.

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.

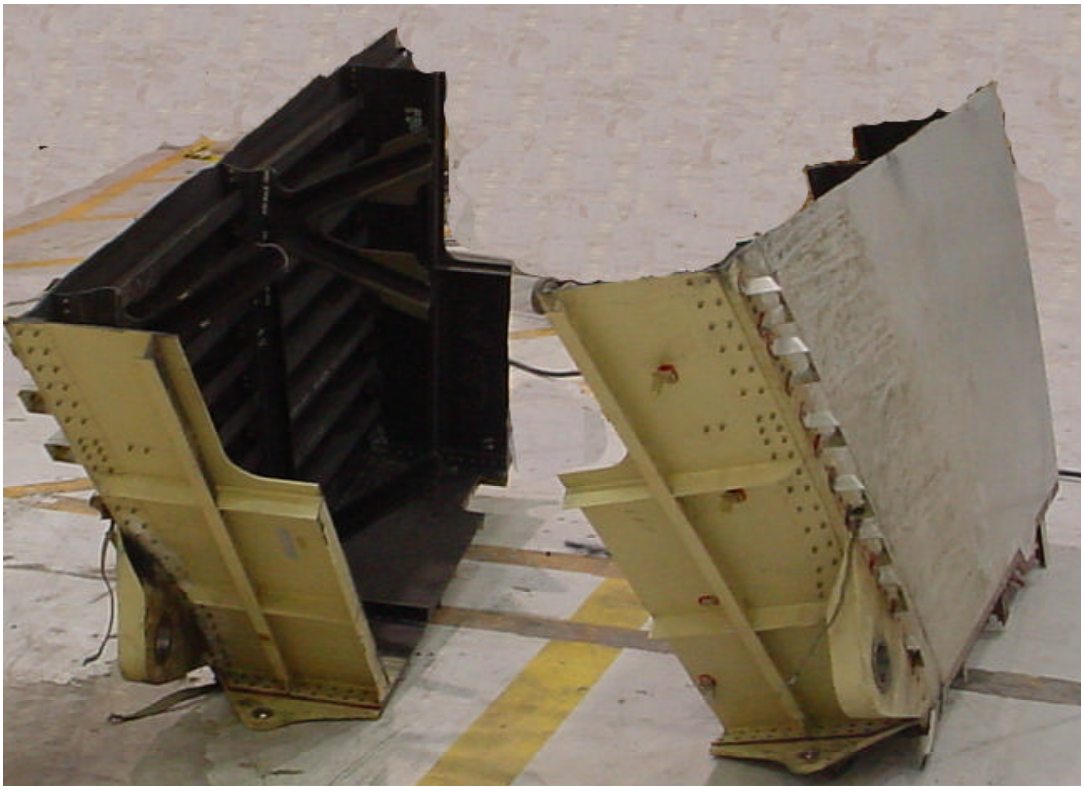


Figure 1: Cut outs of the RH side shell and the LH side shell of the fin box of the aircraft MSN513

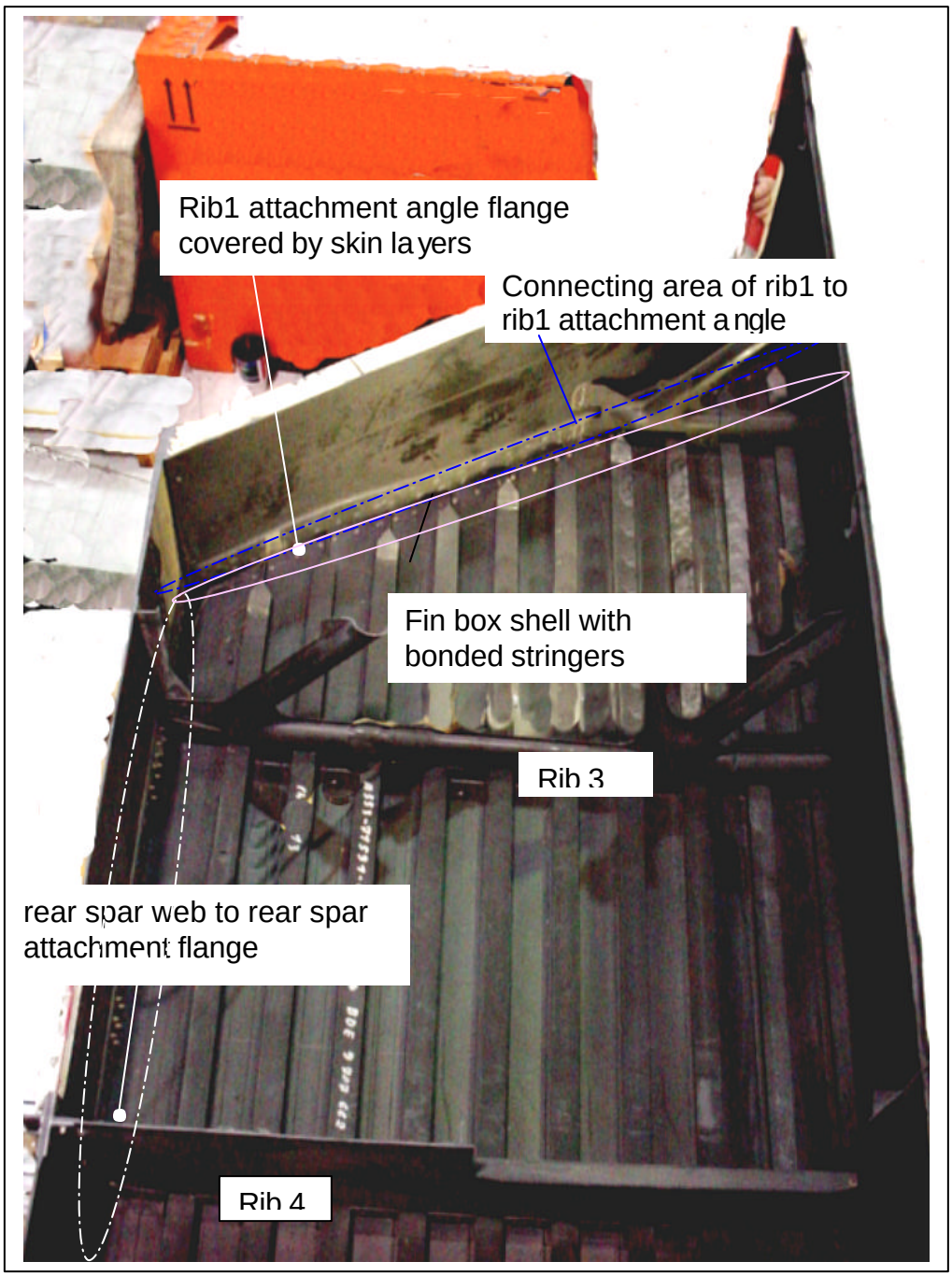


Figure 2: Structure elements of the cut outs
(view from the inboard side)

First incoming inspection of the cut out RH:

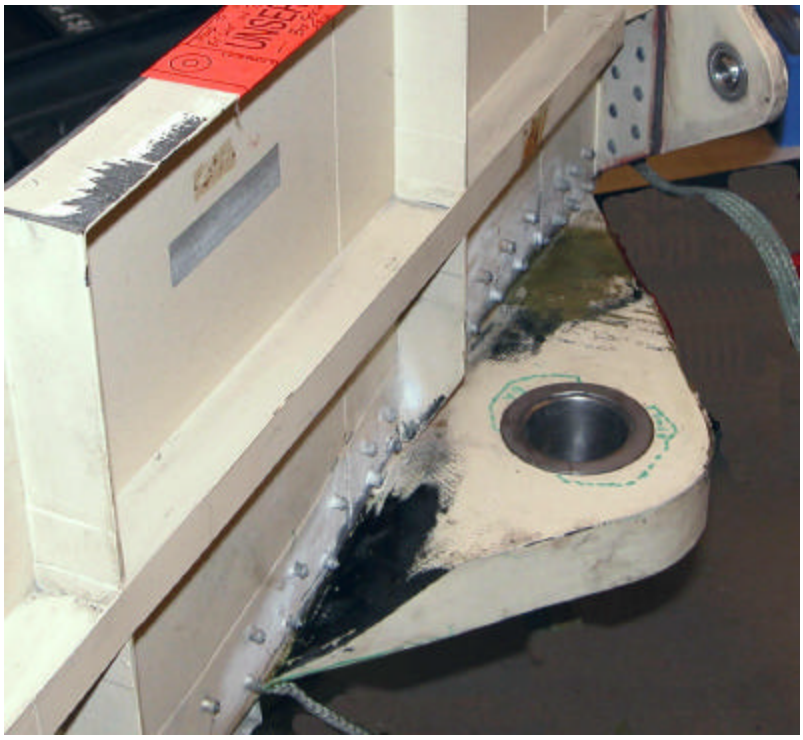


Figure 3: Area with cracks and delaminations in a depth of 3 mm around the bushing
(Inspected from the inboard side of the lug)

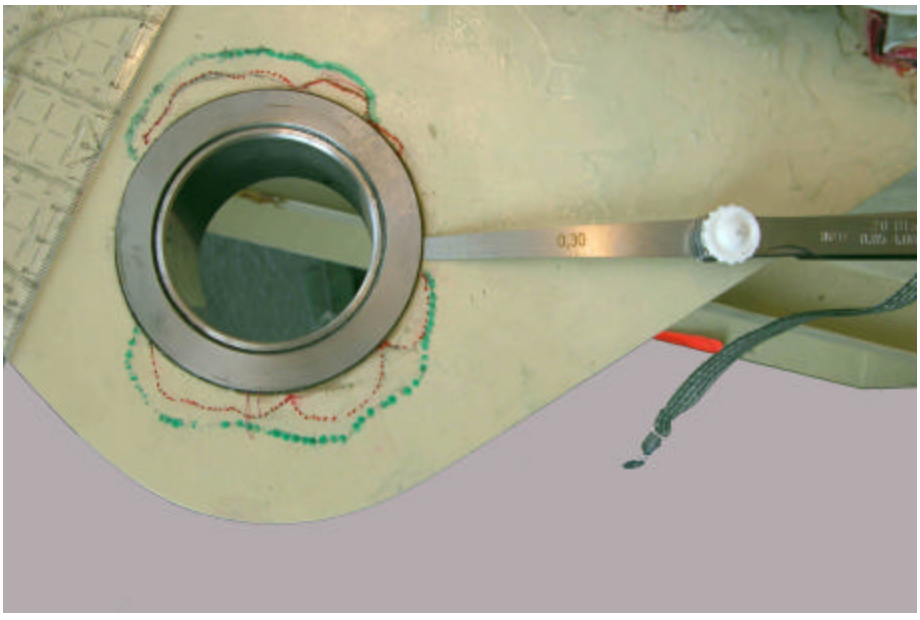
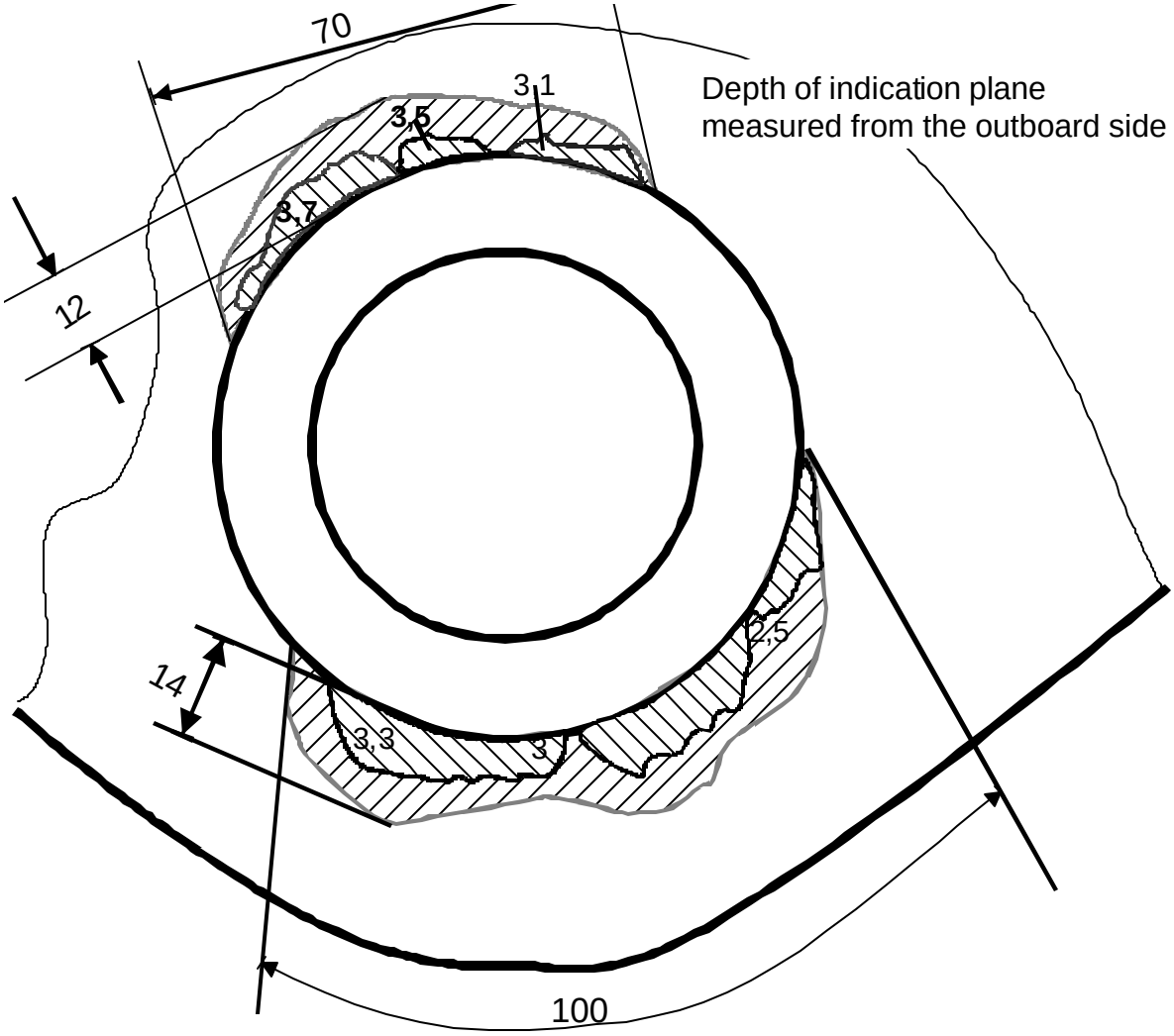


Figure 4: Delamination and cracks in the rear lug
(Inspected from the outboard side of the lug)
Indication area from the inspection in Tulsa is marked red
Indication area from the incoming inspection at Airbus Hamburg is marked green

First incoming inspection of the cut out RH:



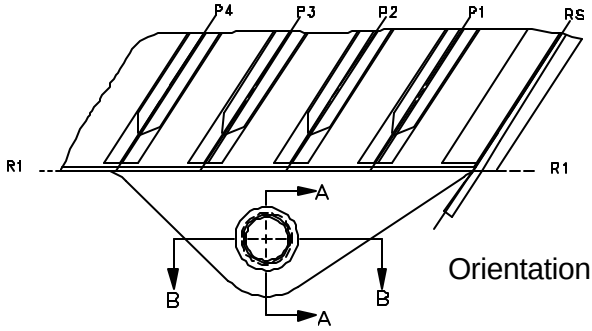
all dimensions in mm

Area of the delamination at the inspection of the MSN 513 at AA in Tulsa

Area of the delaminations and cracks at the incoming inspection of the cut out in the structure test department

Figure 5: Delamination around the bushing of the rear lug

Rear attached fitting RH side



Orientation of the cuts A15-A15 and B15-B15

Cut : B – B

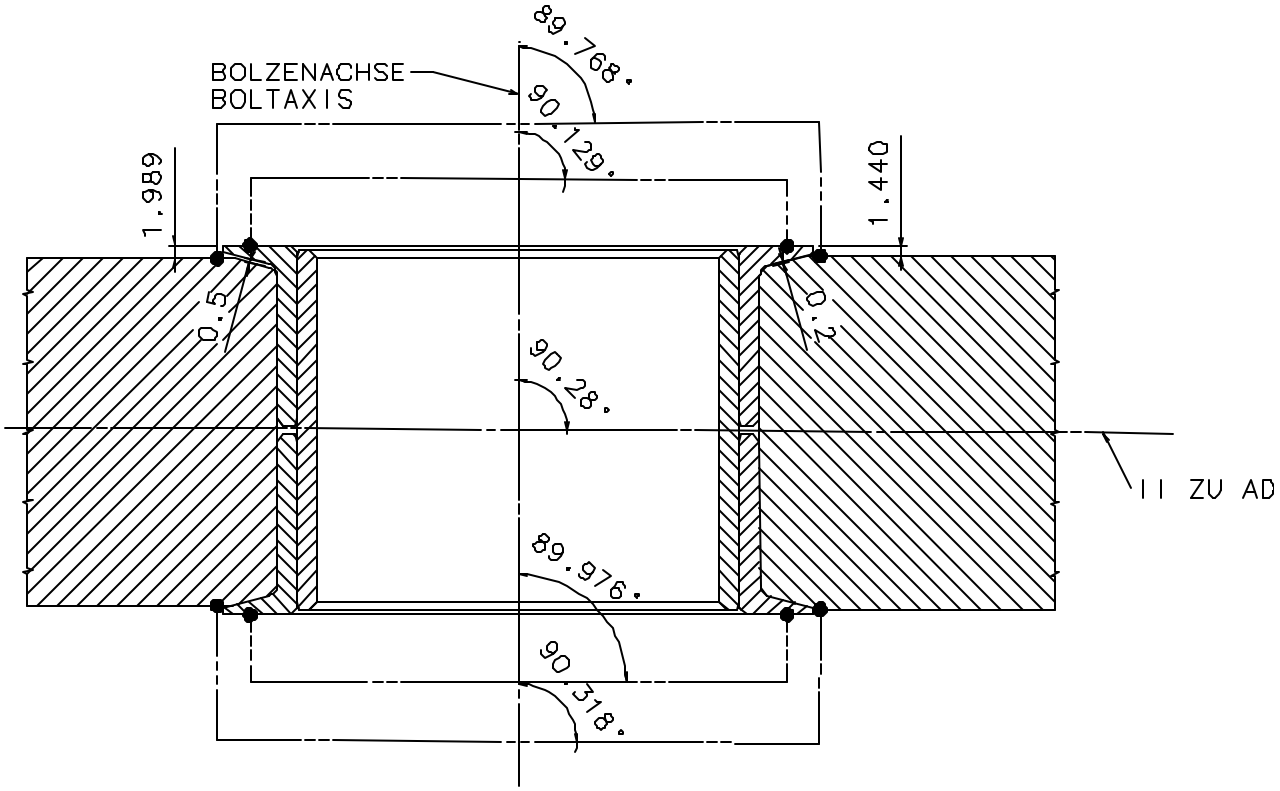
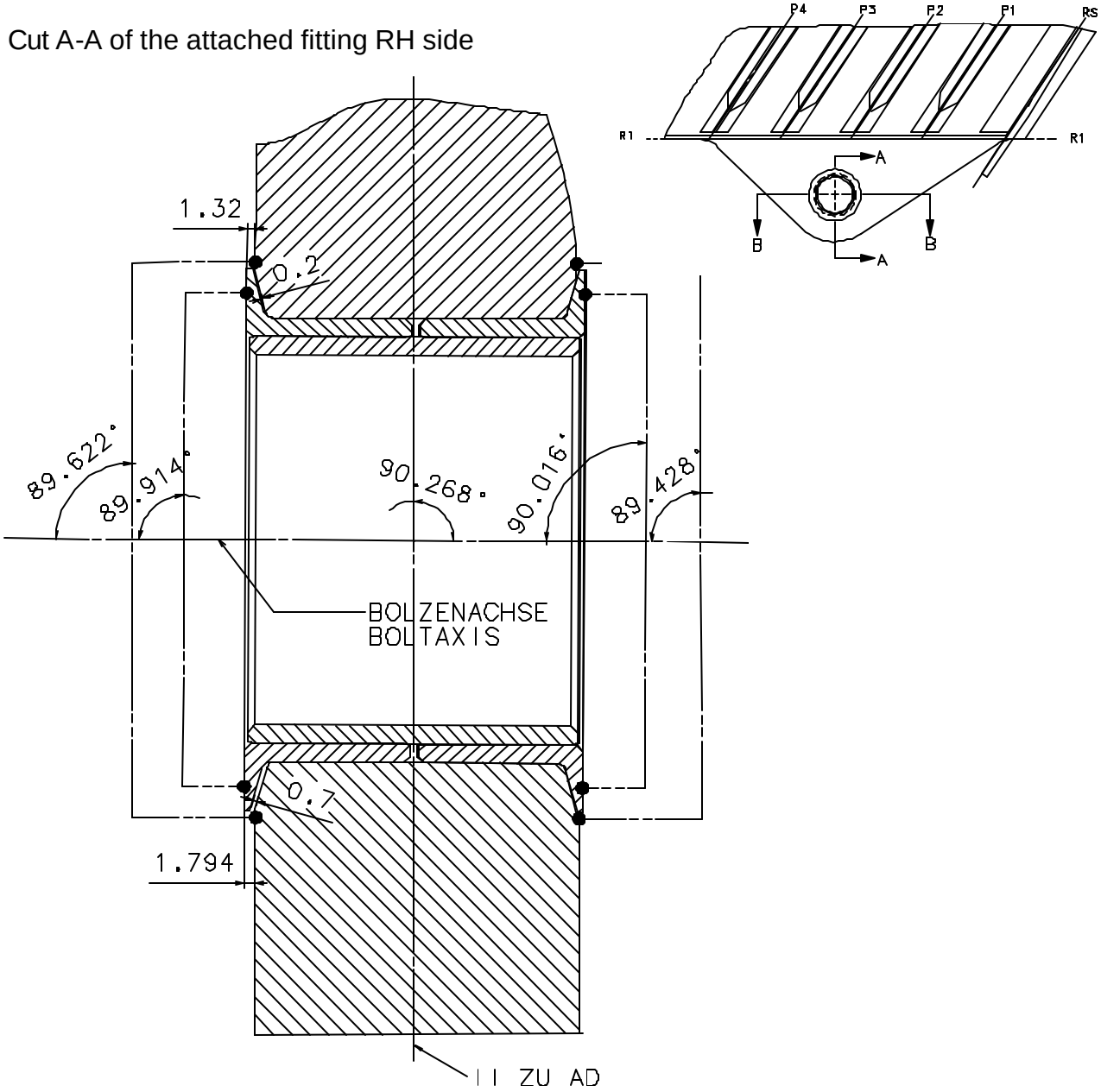


Figure6: Orientation of the bushing to the attached fitting in the direction of cut B15-B15 at the first incoming inspection
(results of a coordinate measuring device)

Cut A-A of the attached fitting RH side



All dimensions in mm

Figure 7: 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 RH

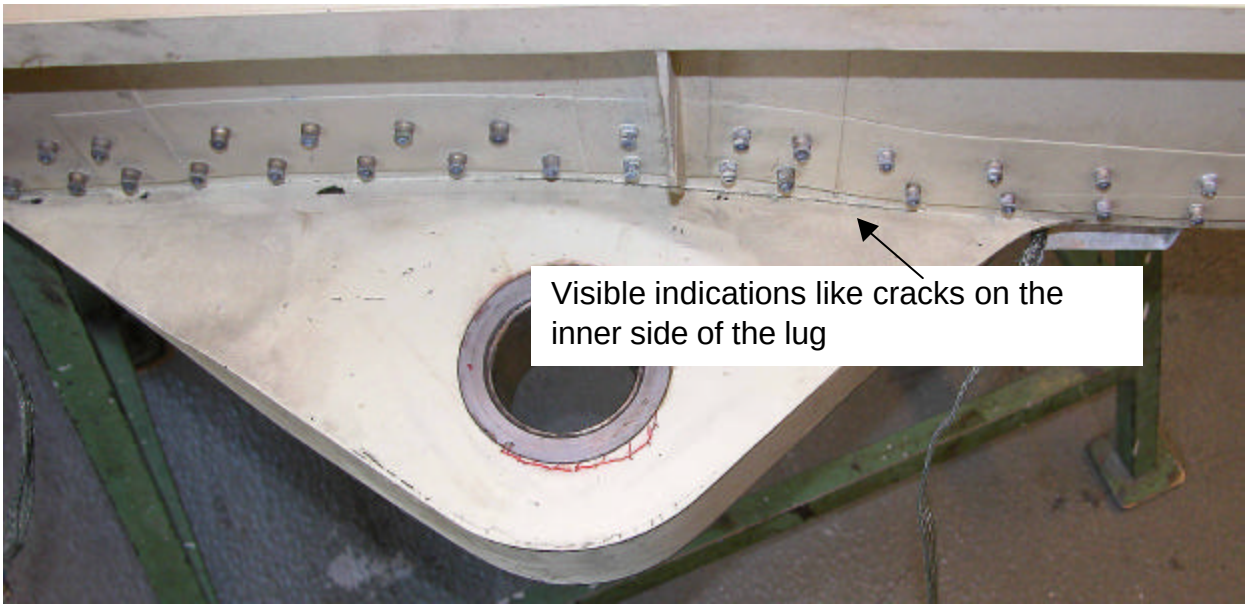


Figure 8: Visible indications on the inboard side of the lugs
(Picture shown is from left hand side)

First incoming inspection of the cut out RH:

Figure 9: Area stringer P5 / rib1 attachment angle
Single depth porosity or concentration of small cracks

First incoming inspection of the cut out RH:

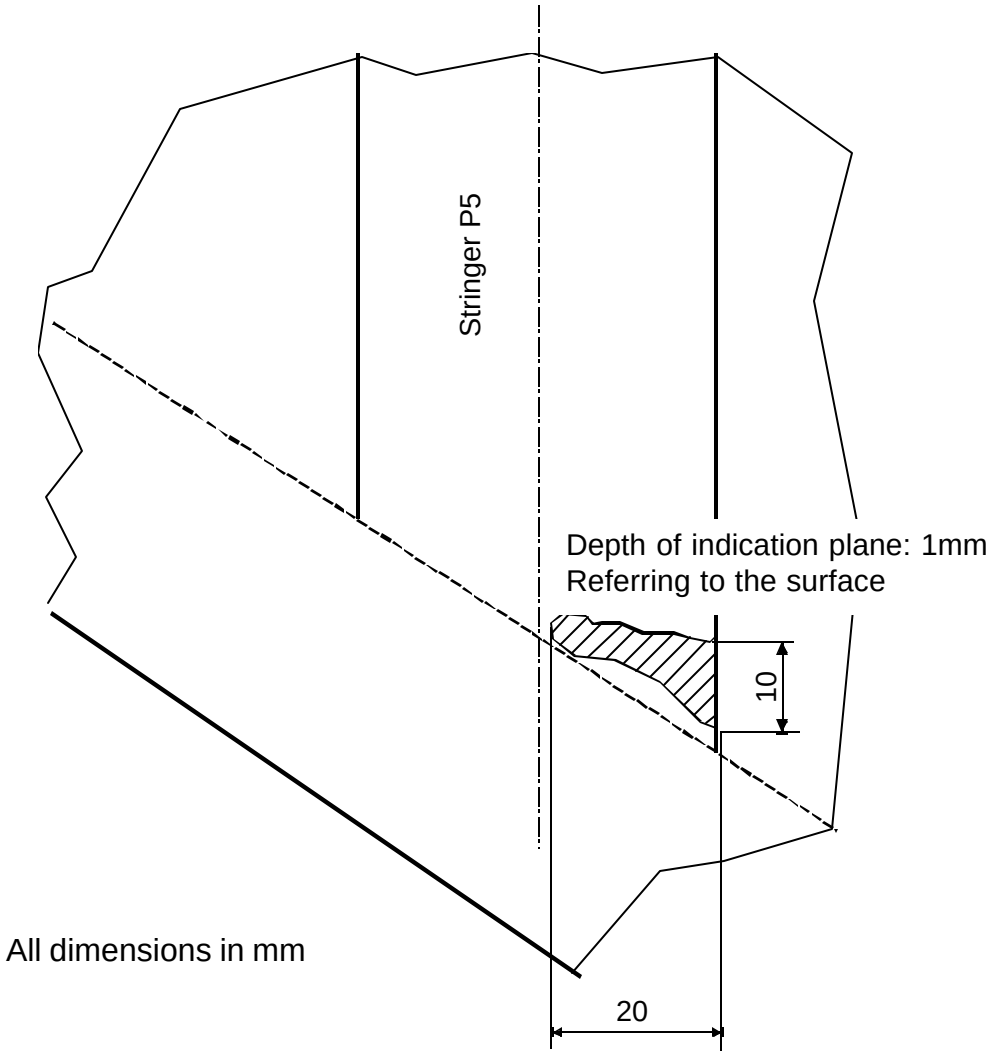
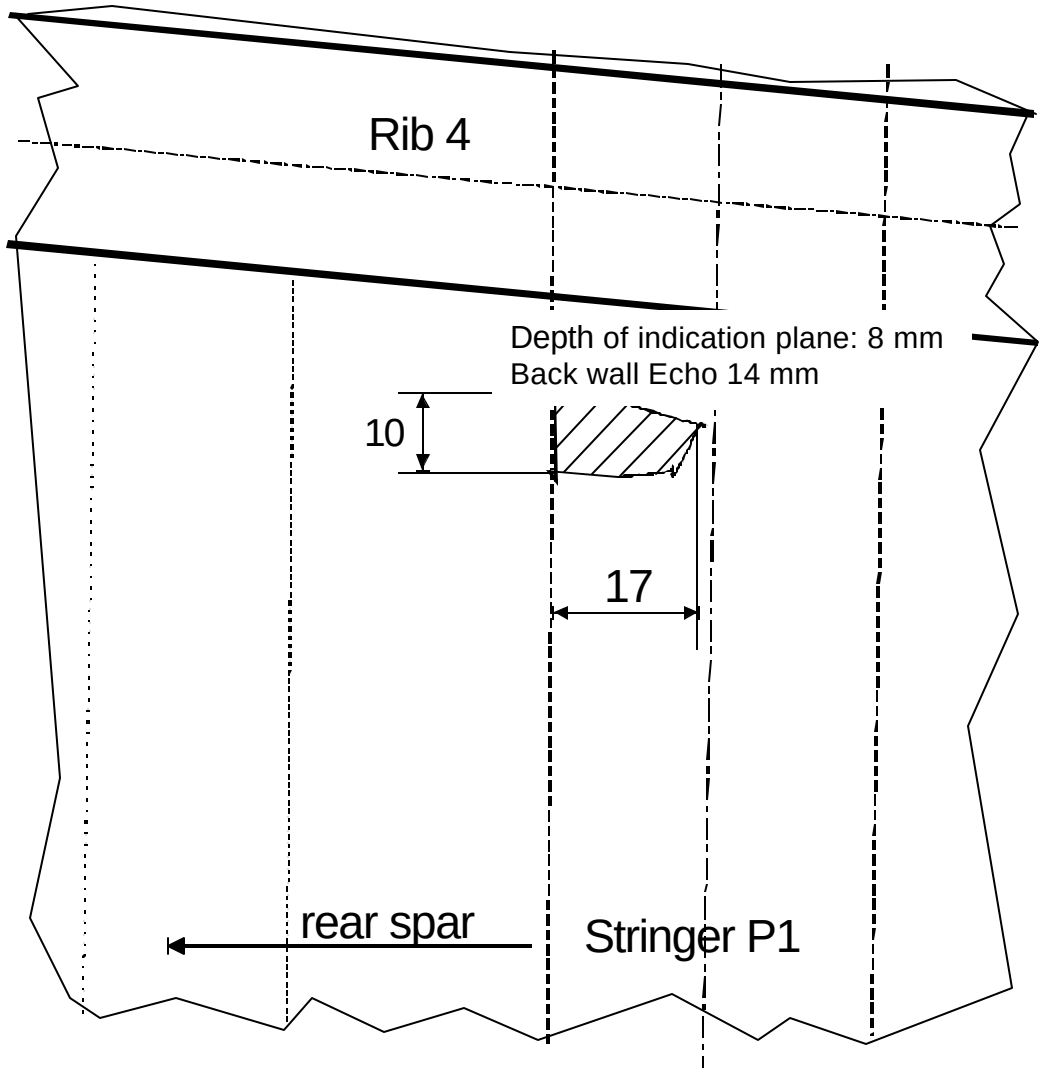


Figure10: Indications on stringer P1 / rib 1 attachment angle; dimensions
(Location of single depth porosity or concentration of small cracks)

First incoming inspection of the cut out RH:



All dimensions in mm

Figure 11: Dimension and location of the indication on stringer P1 / rib 4.
(single depth porosity or cracks in the same depth)