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EASA.21J.117

SERVICE BULLETIN No BO-115/2022 SWIFT S-1

CONCERNS:

Inspection of front node in tailplane mount, and
repair with modification – as necessary

The technical content of this document is approved
under the authority of DOA ref. EASA.21J.117

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Bielsko-Biała, 12.01.2022

1. GROUNDS FOR ISSUANCE OF THIS BULLETIN

On a single SWIFT S-1 glider, in pre-flight inspection, an increased play has been noticed at the tailplane front mount fitting.

After dismounting the tailplane from a glider, detected were the cracks on external surface of the concerned fitting composite parts.

Verification of the damage at Maintenance Organisation revealed:

- on assembled glider, a perceptible play on the stabilizer front mount (fitting),
- on tailplane disassembled from a glider, the cracks penetrating into composite structure of the „console” (item 5 in Dwg No A/2-3.01.000 Tailplane), visible on outboard surfaces on both sides close to the front fitting sleeve
- after removing lacquer coat from the front fitting area, visible cracks and delamination in the “console” glass fabric



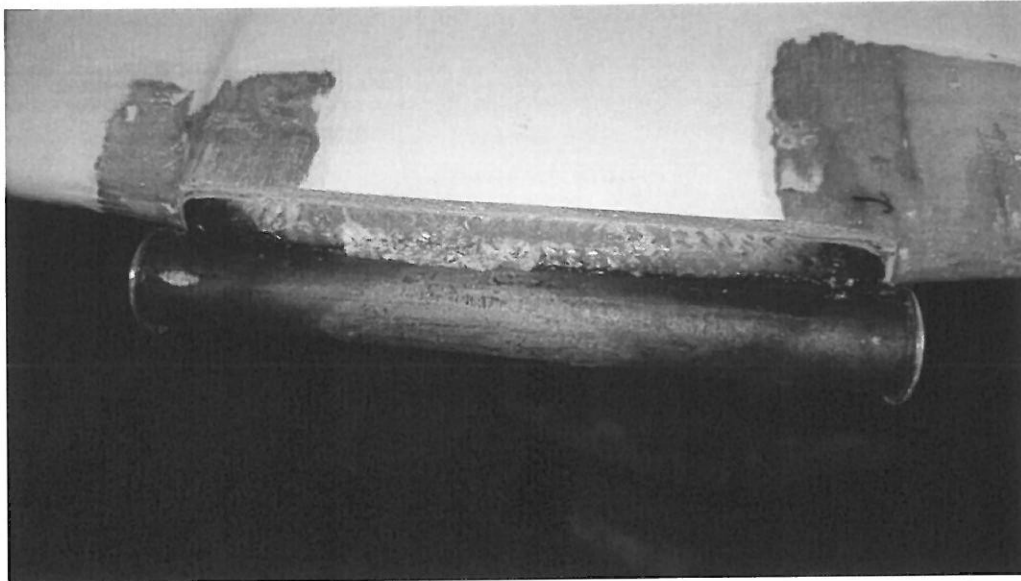
The glider verification continued at the production facilities of TC Holder, with structure gradual tear-down inspection to identify the mode and size of damage, revealed the following defects on the concerned glider, originated:

in production

- the adhesive has been applied only under the central part of the tube with the fitting sleeves (manufacturing defect - no support under the sleeves),

in operation

- the play between metal elements of the front fitting (mounting bolt / sleeves of the stabilizer front fitting) close to its allowed size specified in the glider Maintenance Manual - considered an evidence of wear, also signs of corrosion on the tube, moisture and rust on the surface of the composite console,
- after removing the outer composite layers, no signs of damage on the exposed console foam block,



The identified causes of the damage are: design features and defects in production process.

design:

- the dominant loads on the front fittings (operating in direction perpendicular to the chord plane) are transferred through the composite console built up on the leading edge of the stabilizer, no structural elements duplicating this function are provided.

production:

- the defect initiated by inaccuracy in fabrication of the tailplane front mounting node (applies to the "console" - as above) may occur on other SWIFT S-1 gliders, whereas these may differ in size / location from the described case.

The damage is easily accessible for inspection, and its occurrence was detected in the pre-flight inspection provided in the glider Manual, after 29 years from the production date, at 1470 hours total flight time. This indicates a low sensitivity of the structure to the defect described in the hitherto operation, but there is no data to assess its growth tendency under the loads in continued operation (also due to the possible variability of the significant parameters of defect). At the same time, due to aerobatic flights performed with this glider, high variable loads on the main airframe assemblies and connections between these may occur in service.

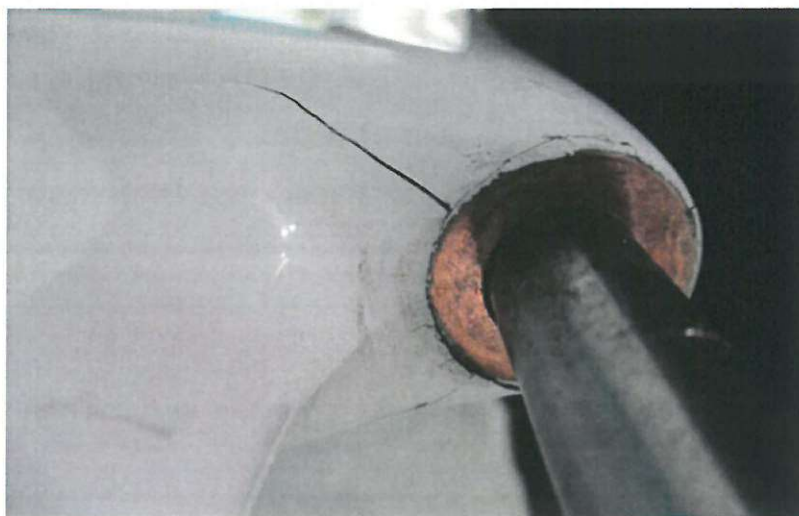
Hence it cannot be excluded that the damage, if not detected on time, may develop to a size critical for safety.

2. LIST OF FACTORY NOS COVERED WITH THIS BULLETIN

This Bulletin concerns SWIFT S-1 glider, all Serial Nos

3. PROCEDURE

1. As one-time action, immediately upon receiving this Bulletin or when either detecting an excessive play at the tail mount fitting in ground inspection or encountering abnormal vibrations in flight,
and on a glider not modified as described below, also repeatedly at each 100-hour inspection - inspect the tailplane front mounting node.
2. Inspect the concerned area for cracks on the outboard side of the composite console that supports the fitting sleeves and for the detachment / disbanding of the sleeves from the composite support. Check expansion of the crack gap, free movement of the fitting sleeves by moving (front/back up/down) the pin inserted into the sleeve.



Possible form of damage to the tailplane front mounting node.

3. Examine the extent of each crack detected on the surface of composite elements: check if it is confined to the layer of lacquer and putty, or penetrates into the composite. To do this, carefully remove the lacquer from the fracture area and check the exposed composite for cracked fibers and / or white spots evidencing damage to the composite.
4. Every detected damage must be repaired before the next flight. If the nature of damage matches the description in the document – repair by the method including the design change, described in [1] REPAIR / MODIFICATION INSTRUCTION ..., see item 6. ENCLOSURES. The proposed change, by introducing additional elements supporting the fitting sleeves, contributes to a more even distribution of forces in the fitting composite elements and increases its resistance to the encountered type of damage.
5. Measure the play between metal components of the fitting. Compare with the allowed value specified in the glider Maintenance Manual, item 2.5. Permissible assembly play - if necessary, reduce the play using the method described in the INSTRUCTION pos. [1] in point 6. ENCLOSURES.
6. Record the modification made in the airframe logbook.

NOTE:

Due to the location of damage in the tailplane mounting node, being the primary element of structure, the repair is to be completed at an aviation Repair Station authorised for repairs of composite structure aircrafts – in accordance with regulations in the country of glider registration.

4. LABOUR DEMAND

Time required to implement this repair 5 days/1 person.

5. MASS (WEIGHT) AND BALANCE

In case of repair, repeat the weighing and CG determination for empty glider – in accordance with item 2.6 WEIGHING THE GLIDER in Technical Service Manual. When necessary correct the glider loading plan.

6. ENCLOSURES

1. REPAIR/MODIFICATION INSTRUCTION, TAILPLANE FRONT MOUNT,
SWIFT S-1, Doc. No A2-OR-01/2021, iss. 29.11.2021

7. FINAL PROVISIONS

1. If no defects to the structure have been found, the decision on repair with implementation of the design change is left to the operator / owner of the glider. TC Holder recommends introducing the design change to the tailplane front mounting node in every case, either as a method of repairing the damage encountered now or as a preventive measure to avoid possible problems in further operation of the glider.

- THE END -



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REPAIR/ MODIFICATION INSTRUCTION TAILPLANE FRONT MOUNT SWIFT S-1

Doc. No: A2-OR-01/2021

Technical content of this document is approved under the authority of DOA EASA.21J.117.
Internal Reference No.: SWIFT S-1/01/2021 R

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Issue: 29.11.2021

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1 Defect description

The cracks, visible on surface of composite elements around the metal sleeve of tailplane front mount, have been detected in operation on a single SWIFT S-1 glider (S/N P-08, year of production: 1992, total flight time: 1470 h).

Verification of the concerned glider at the certified Maintenance Organisation revealed:

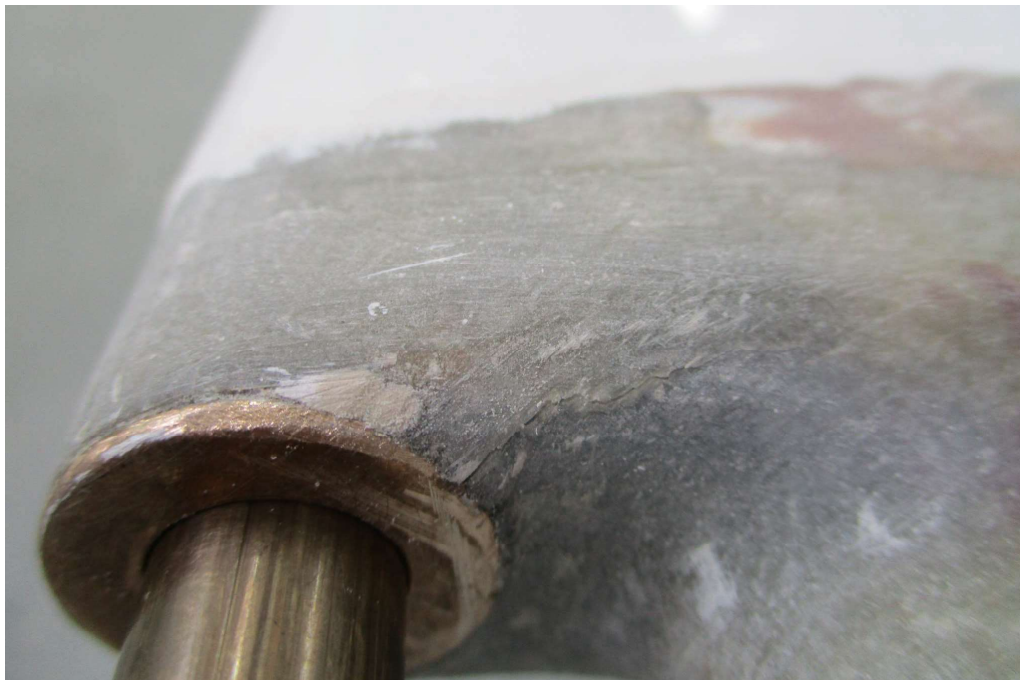
- on assembled glider, clear evidence of enlarged play on tailplane front fitting
- on tailplane disassembled from the glider, cracks penetrating into composite structure of the „console” (item 5 in Dwg No A/2-3.01.000 Tailplane) visible in the area of installation of the front fitting sleeve, on outboard surfaces on both sides



- when checking a bonded joint between the metal front fitting and composite, by moving (front-back, up-down) the bolt inserted into the fitting sleeve - size of the crack gap significantly widens, the stabilizer metal fitting moves freely



- after removing the lacquer coat in the area of „console” damage, discovered cracks and delamination in reinforcement fabric layers on the outboard surface of this element



The identified damage comprises:

- cracks of „console” side webs, propagating from the fitting sleeve in directions +/- 45 deg in relation to the plane of chord
- disbonding of the fitting metal sleeve /damage to adhesive in bonding joint and “console” tapping/

The sequence, in which the above mentioned forms of damage occurred, is unknown.

After removing the composite layers fastening the metal components (tube with sleeves), it was found:

- missing adhesive between the composite and the front fitting metal tube (production fault)
- no protective layer of BWF-21 glue on surface of the fitting metal tube (production fault) + corrosion - see figure below)



- • increased play between the front fitting sleeves and the bolt, close to the allowable value specified in the glider Manual

2 Material and equipment for modification

2.1 Equipment

No.	Item
1	Laminating brush
2	Scraper
3	Portable heater, allowing to cure the repair area at 65 degC.
4	Resin mixing pots

2.2 Material

No	Item
1	Glass fabric Interglass 92125
2	Glass fabric Interglass 92145
3	Peel-ply fabric
4	Resin MGS LR285
5	Hardener MGS LH286
6	Aerosil
7	Foam Herex C.70.55 x30mm
8	Chopped glass fibre
9	Sprayed filler/ putty
10	Lacquer material – adequate for lacquer coat used on this particular glider, see production certificate

3 Labour demand

1. Time required to implement this modification 5 days/1 person

4 Repair process

When encountering a damage with characteristics described above, perform the following repair to tailplane front mount with design modification which, by re-construction of elements already existing in the design and introducing additional elements supporting the sleeve, will contribute to a more uniform distribution of loads in the concerned fragment of the structure, increasing its resistance to this type of damage.

4.1 Scheme of repair process

1. Remove external lacquer coat.
2. Repair to the installation of metal fitting
 - STEP 1 Fix the position of front fitting to restore the original tailplane suspension geometry during the repair process
 - STEP 2 Remove taping of tailplane front fitting (layers No WIII and WII in orig. design Dwg), separate the metal fitting from composite, uncover the foam block of „console” – remove layer No WI.
 - STEP 3 Evaluate technical condition of dismounted metal front fitting / composite console

Where necessary, replace elements – see details of repair process

 - STEP 4 Even-up and flatten the console side surfaces
 - STEP 5 a, b Re-construct the composite layer WI (taping of console), add extra fabrics – the pad for a rib
 - STEP 6 Re-install the metal front fitting
 - STEP 7a, b, c Fabricate, and next – install the ribs
 - STEP 8 Re-construct the composite layer No WIII
 - STEP 9 Re-construct the composite layer No WII
 - STEP 10 Glue in the foam support for a rib, tape with a glass fabric
 - STEP 11 Cure
3. Repair of stabiliser lacquer coat
4. Ensure clearance between fuselage rear web and stabilizer (as necessary)
 - STEP 1 Cut-out the opening
 - STEP 2 Laminate the composite pad
 - STEP 3 Support the pad with plywood, prepare for bonding
 - STEP 4 Bond in the composite pad

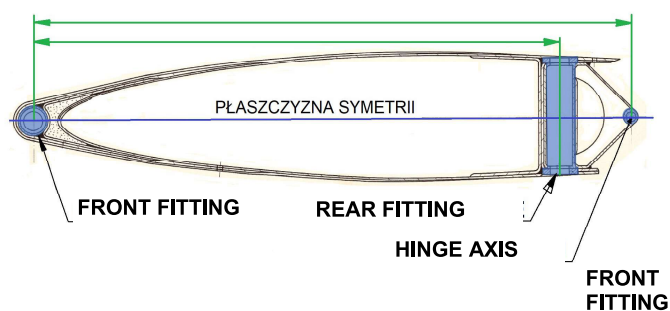
4.2 Details of repair process

4.2.1 Remove external lacquer coat

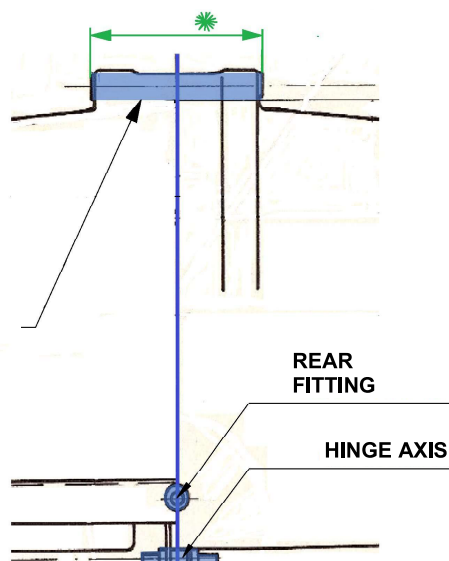
Remove the external coat of lacquer and putty from stabiliser repair area: 160 mm wide strap between leading edge and stabiliser internal, rear web on upper and lower surface – by grinding down to composite.

4.2.2 Repair to installation of metal fitting

STEP 1



NOTE!
 * TAKE INTO ACCOUNT THE REPAIR DIMENSIONS
 – TO REDUCE EXCESSIVE PLAY (SEE STEP 3 IN
 ITEM 4.2.2 BELOW

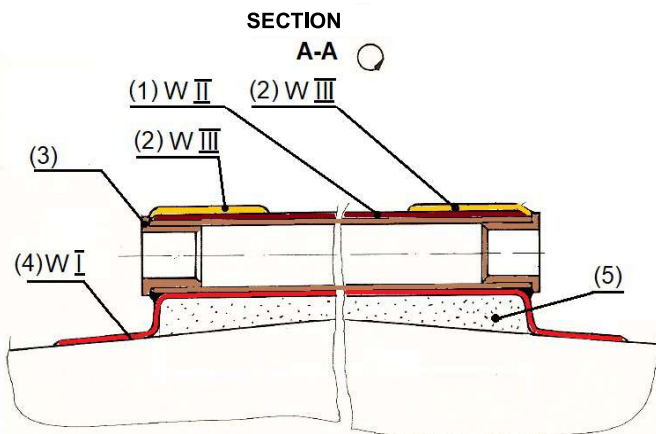
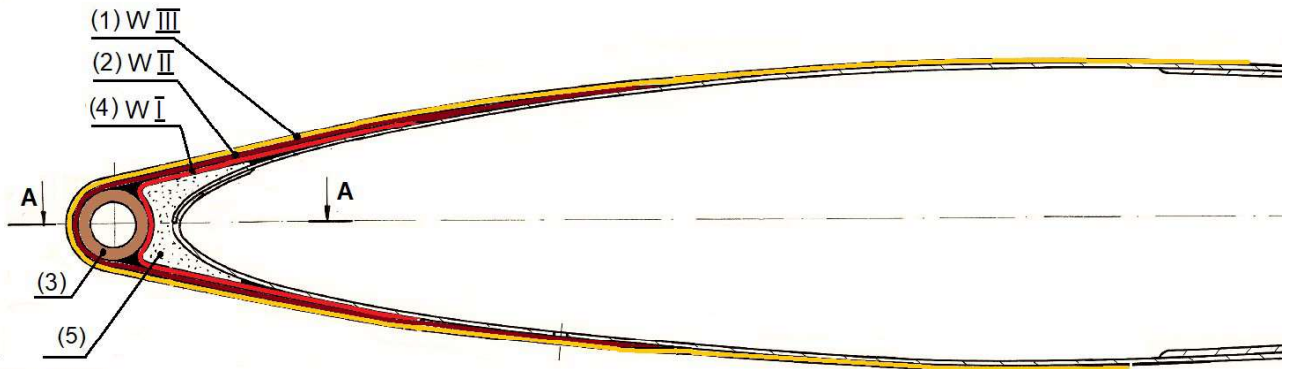


1. FABRICATE A RETAINER FIXING THE POSITION OF FRONT FITTING IN RESPECT TO ELEMENTS OF STABILISER /COMPONENTS OF SUSPENSION/ NOT AFFECTED BY REPAIR, TO MAINTAIN THE DIMENSIONS SHOWN IN THE ILLUSTRATION ABOVE

NOTE!
 THE RETAINER TO BE PREPARED PRIOR TO ANY FURTHER ACTION IN STEP 2



STEP 2



1. REMOVE EXTERNAL LAYERS OF COMPOSITE:

- (1) W III 2 x 92145 => 3 x 92145 =>
- (2) W II 3 x 92125 X

NOTE:

AVOID DAMAGE TO STABILISER SKIN

2. REMOVE FRONT FITTING (3)

NOTE:

AVIOD DAMAGE TO THE ELEMENT

3. REMOVE LAYERS OF COMPOSITE

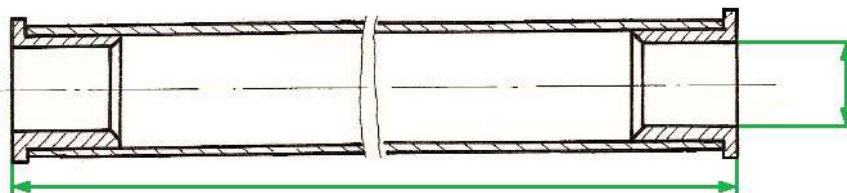
- (4) W I 3 x 92125 X, FASTENING THE CONSOLE FOAM BLOCK (5)

NOTE!

AVOID DAMAGE TO FOAM

STEP 3

1. EVALUATE TECHNICAL CONDITION OF DISMOUNTED METAL FITTING
2. VERIFY PLAY IN CONNECTION BETWEEN MATING ELEMENTS OF FRONT FITTING (SLEEVES IN FUSELAGE/ IN STABILISER – BOLT)
(SEE TECHNICAL SERVICE MANUAL OF THE GLIDER
- item 2.5 Allowed assembly play)



FOAM BLOCK

IN CASE OF:

- DAMAGE
- EXCEEDING ALLOWED PLAY ($\Delta=0,10\text{ mm}$)
- LACKING PROTECTIVE COAT BWF-21
 (CONCERNS METAL COMPONENTS OF FITTING)

ORDER THE NECESSARY COMPONENTS AT PRODUCER, SPECIFYING REPAIR DIMENSIONS NECESSARY FOR CORRECT MATING

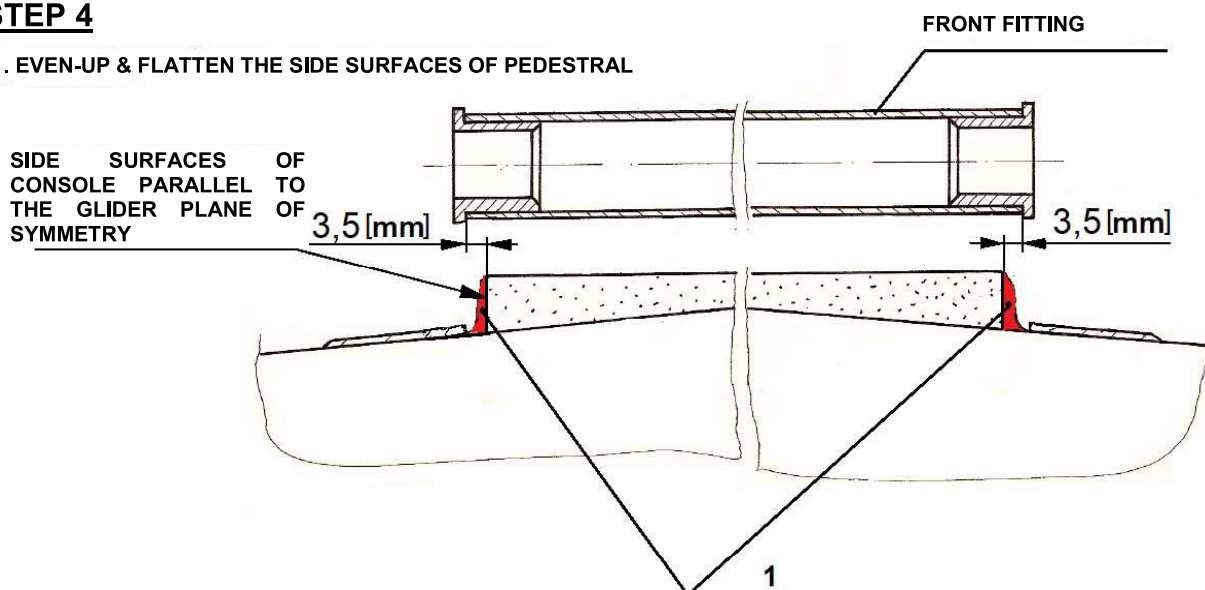
NOTE!

USING COMPONENTS WITH REPAIR DIMENSIONS REDUCE PLAY TO APPROX. 30% OF ALLOWED VALUE

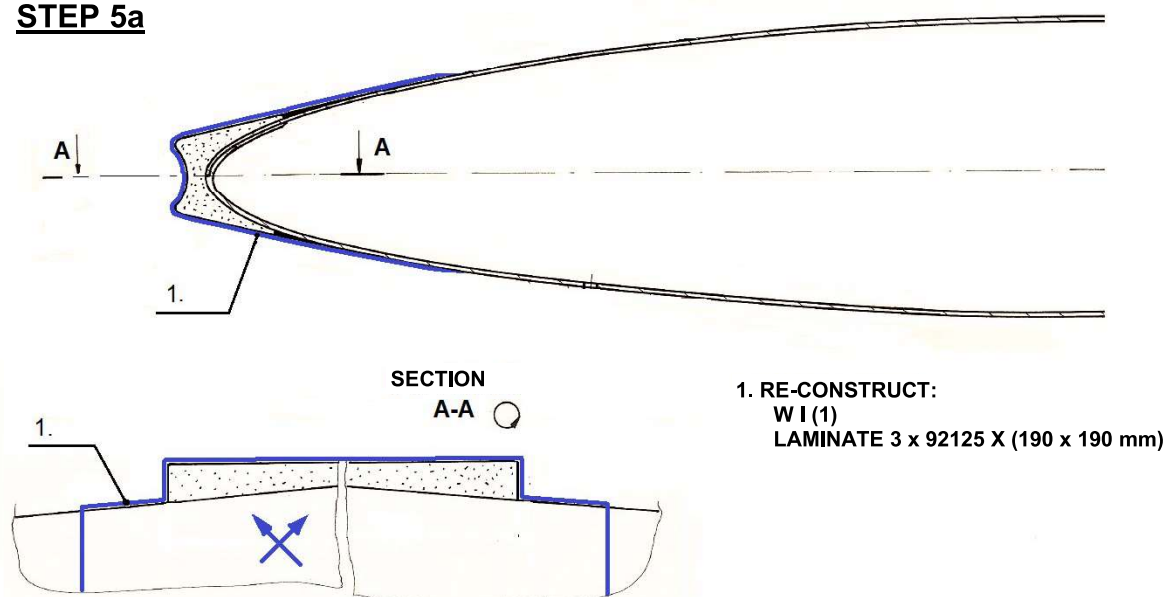
3. EVALUATE TECHNICAL CONDITION OF FOAM BLOCK – IN CASE OF VISIBLE DAMAGE (INDENT, LOSS) RECONSTRUCT THE BLOCK WITH HEREX C 70.55 FOAM

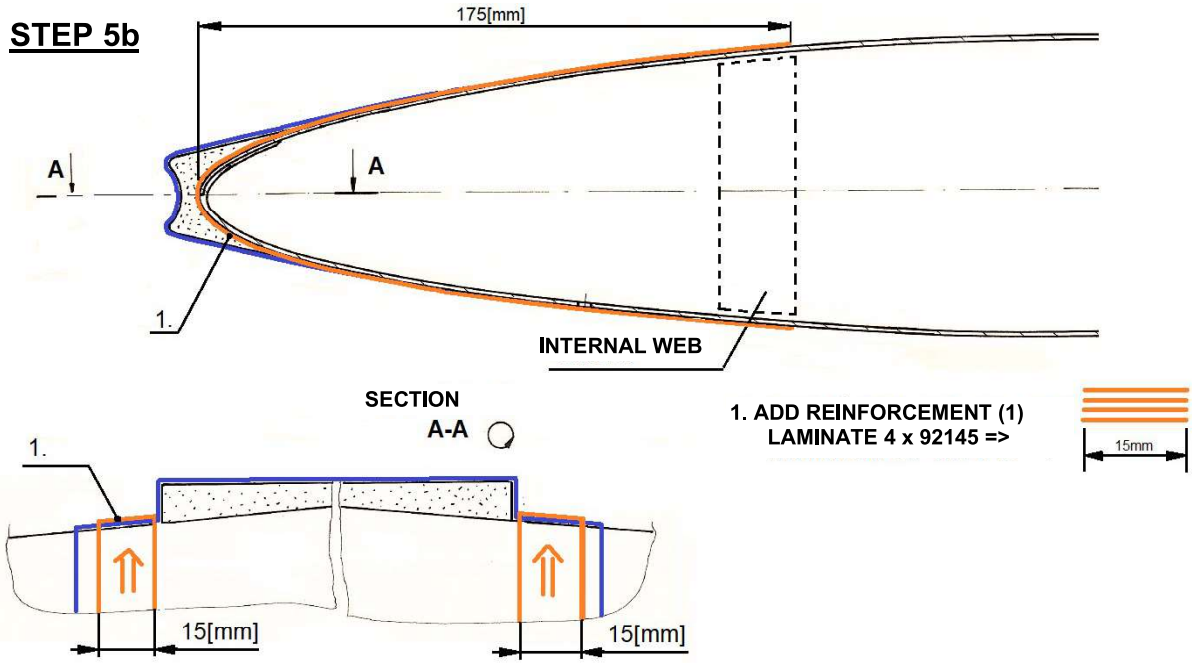
STEP 4

1. EVEN-UP & FLATTEN THE SIDE SURFACES OF PEDESTAL

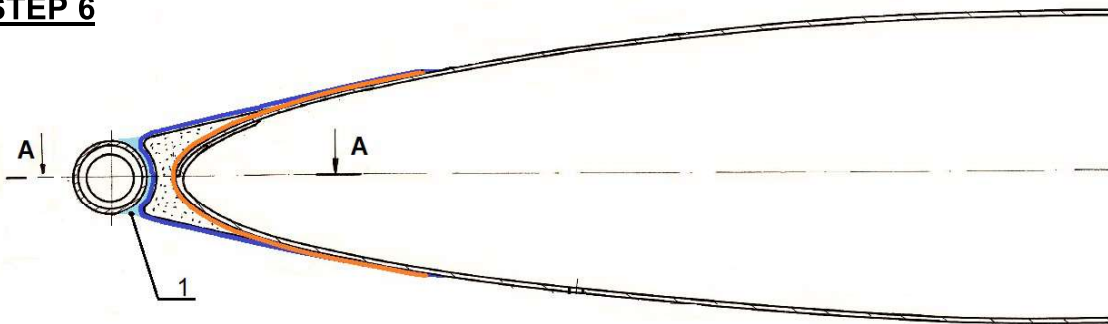


STEP 5a



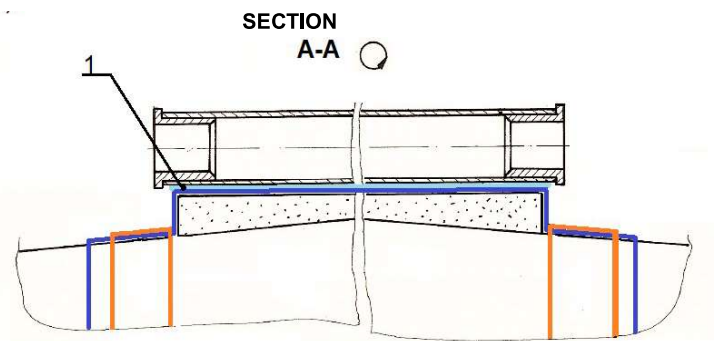


STEP 6



1. WITH AID OF THE RETAINER (SEE STEP 1), PREPARED INDIVIDUALLY FOR THE CONCERNED S/N PRIOR TO FURTHER STEPS, BOND-IN THE METAL FRONT FITTING WITH COMPOSITION:
 LR 285 / LH 286 + aerosil + chopped glass fibre (1)

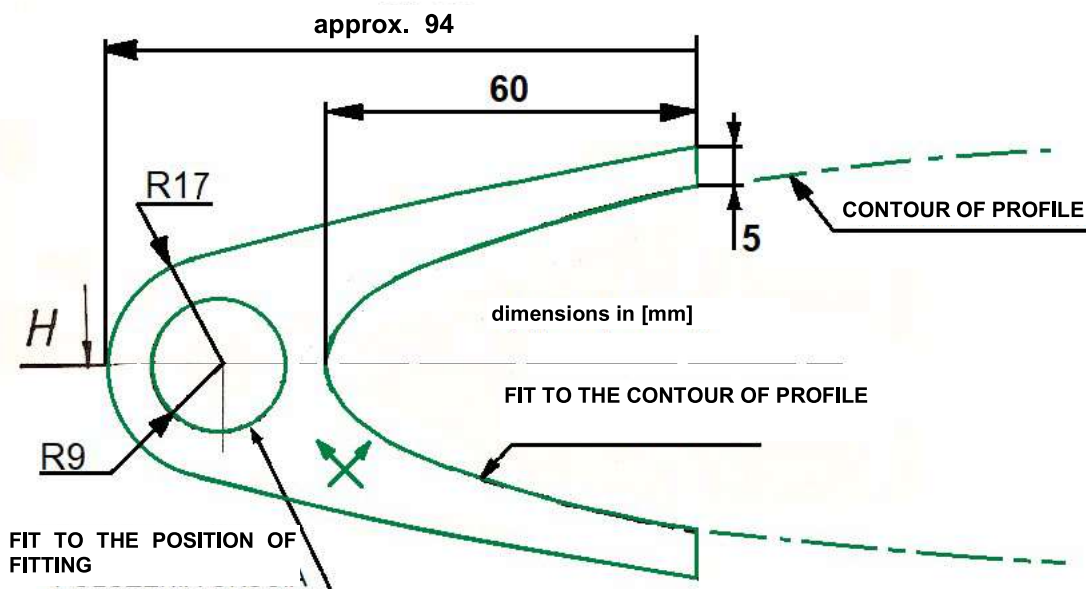
NOTE!
 PREPARE THE RETAINER PRIOR TO STEP 2



STEP 7a

1. LAMINATE 2 RIBS, ACCORDING TO THE SKETCH BELOW

FABRICS LAYOUT: 8 x 92125 X

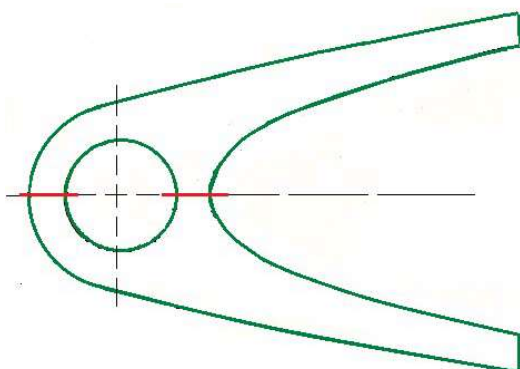


NOTE!
 ENSURE CORRECT ORIENTATION/ POSITION OF ELEMENTS

STEP 7b

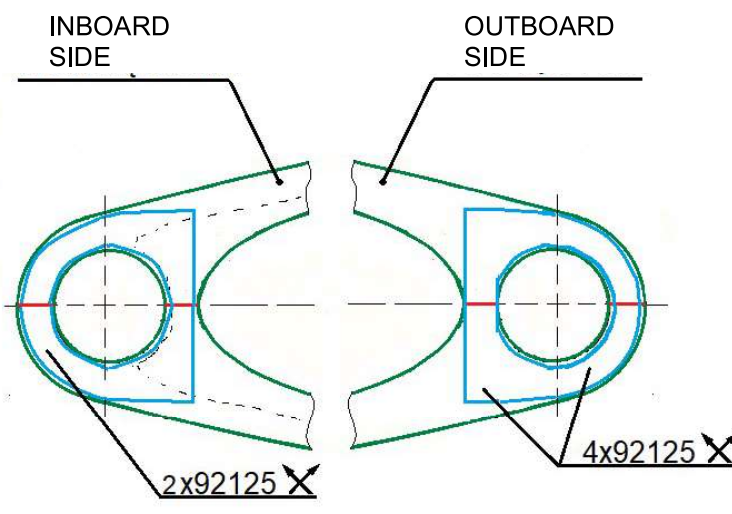
HOW TO INSTALL THE RIB

1. CUT IN HALVES, AS BELOW

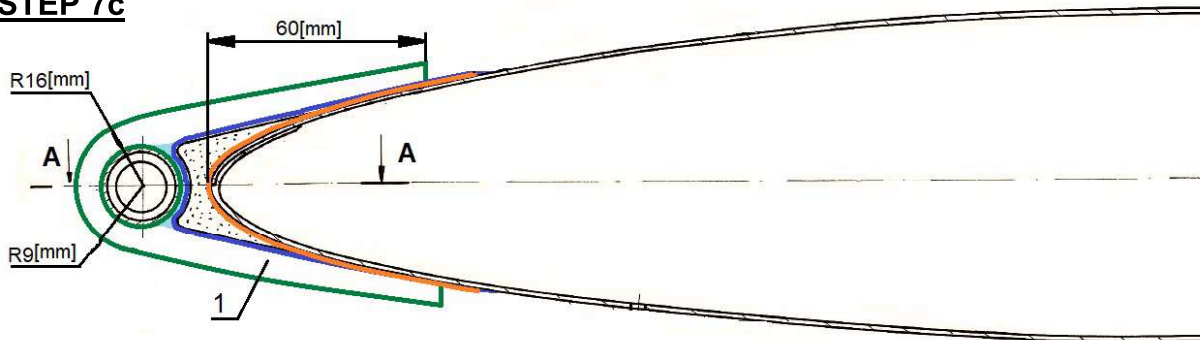


2. RE-CONNECT THE RIB

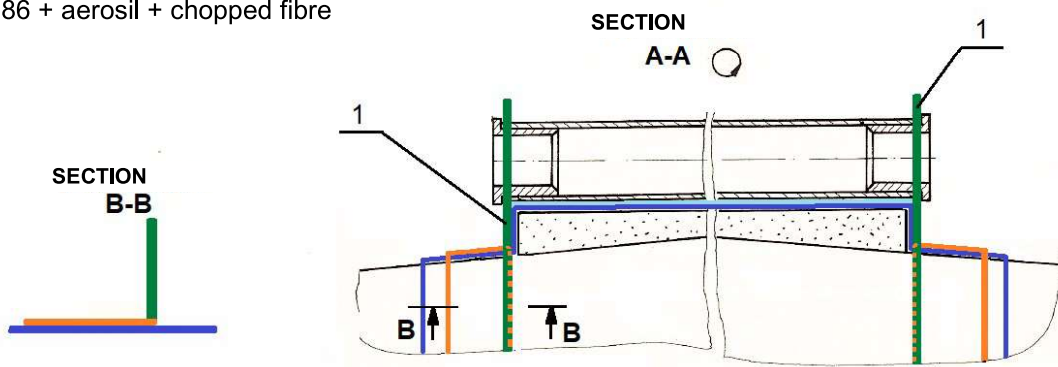
- a) BY BONDING
 WITH COMPOSITION LR 285 / LH 286
- b) BY TAPING, AS PER SKETCH BELOW



STEP 7c

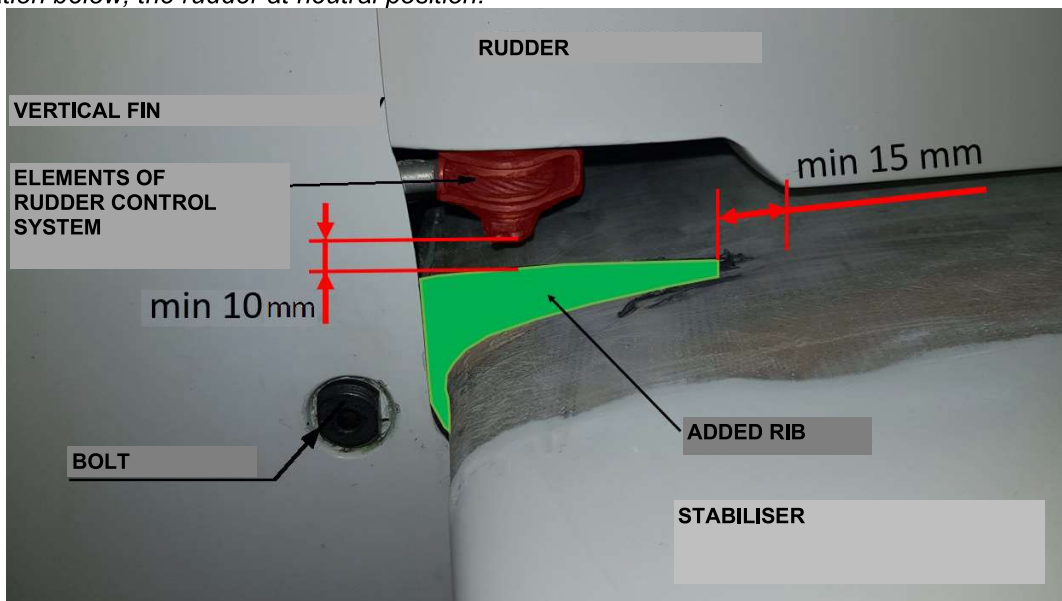


1. BOND-IN THE RIBS WITH:
 LR 285 / LH 286 + aerosil + chopped fibre

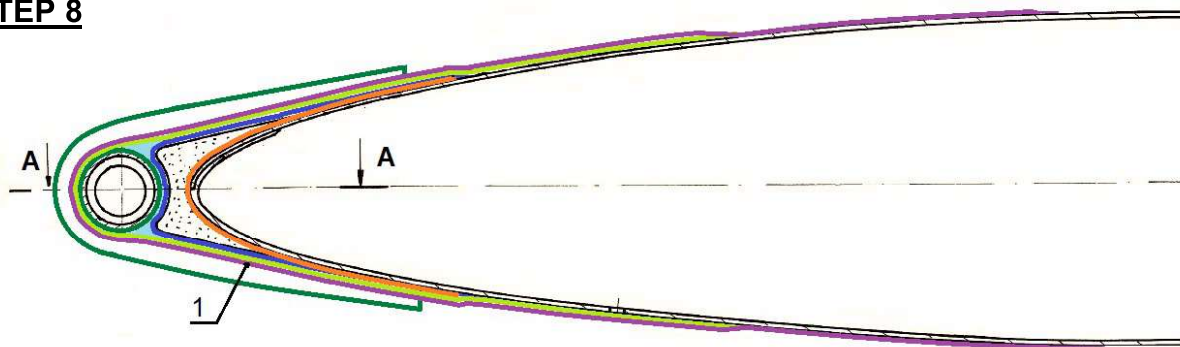


NOTE!
 ENSURE SAFE CLEARANCE BETWEEN ADDED RIB AND COMPONENTS OF RUDDER ACTUATION,
 TO AVOID COLLISION BETWEEN MOVABLE ELEMENTS. SEE ILLUSTRATION BELOW

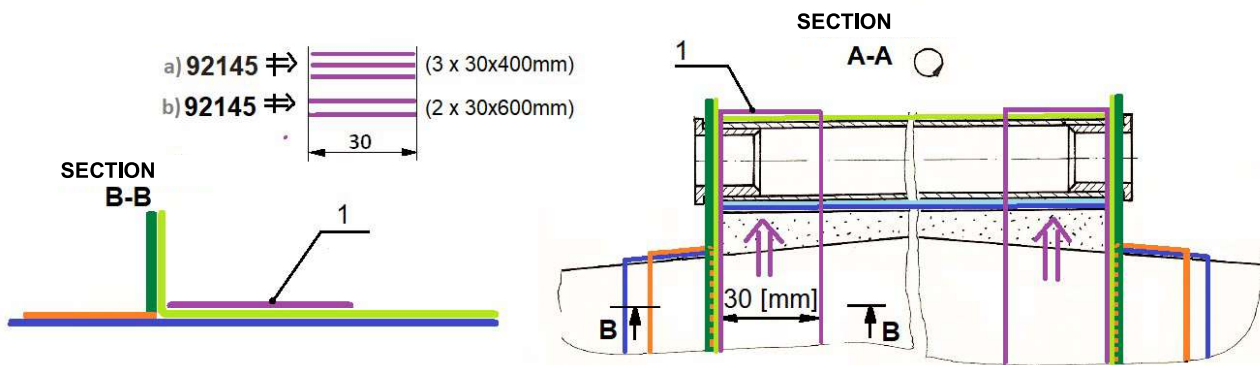
In illustration below, the rudder at neutral position.



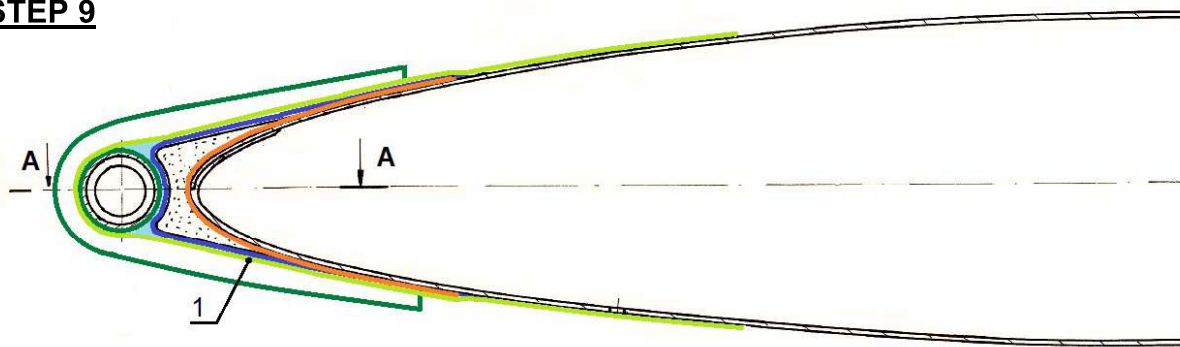
STEP 8



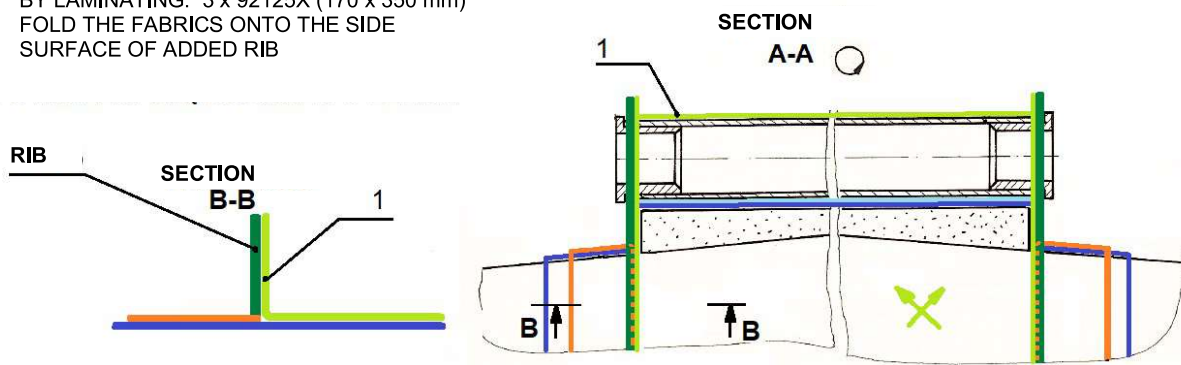
RE-CONSTRUCT:
 W III (1)
 BY LAMINATING:



STEP 9

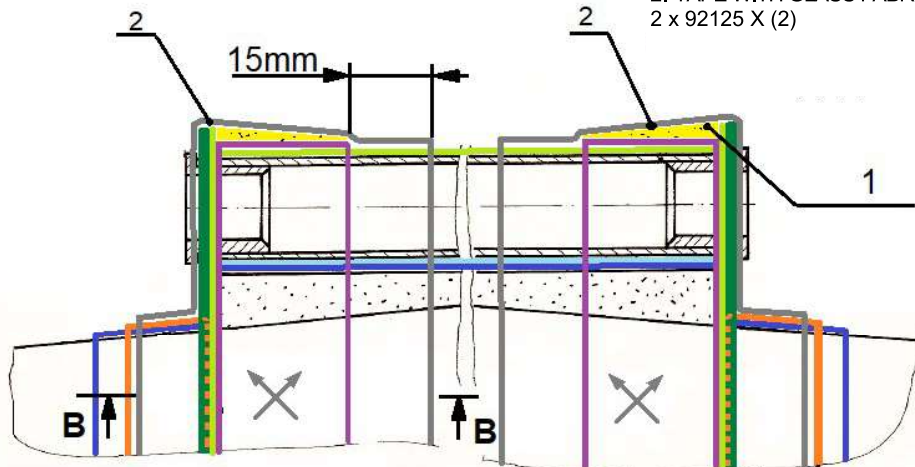


RE-CONSTRUCT:
 W II (1)
 BY LAMINATING: 3 x 92125X (170 x 350 mm)
 FOLD THE FABRICS ONTO THE SIDE
 SURFACE OF ADDED RIB

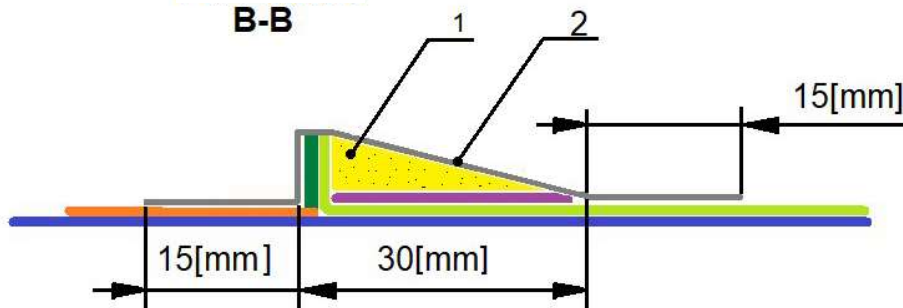


STEP 10

1. GLUE-IN THE FOAM SUPPORTING THE RIBS (C.70.55) (1)
2. TAPE WITH GLASS FABRIC (OVER THE RIB LENGTH) 2 x 92125 X (2)



SECTION
B-B



STEP 11

Cure the composite structure in the area of repair. Parameters of curing process for LR285/LH286 composition, see table

Composition	Curing time	Temperature
LR285/LH286	24h (hardening)	min. +19°C
		max. +28°C
	15h (post curing)	+60°C +/-5°C

NOTE: CURING OF THE REPAIRED FRONT FITTING NODE RECOMMENDED ON STABILISER ASSEMBLED WITH FUSELAGE.

<i>Laminating the console item 5, with added ribs design modification: STEP 5b; 7a;7b;7c;10</i>		<i>Remark:</i>
<i>operation</i>	<i>layer (description)</i>	
<i>STEP 5a</i>	<i>WI:3x92125 X (190x190)</i>	
<i>STEP 5b</i>	<i>extra pad: 4x92145 => 15mm width; length 175mm (from leading edge – linear dimension, parallel to X axis)</i>	<i>2 strips</i>
<i>STEP 6</i>	<i>Bond in (wet lamination) the metal fitting with composition: LR285/LH286+aerosil+chopped glass fibre</i>	
<i>STEP 7a</i>	<i>RIBS: 8x92125 X</i>	<i>2 pcs</i>
<i>STEP 7b</i>	<i>Connect rib halves with composition: LR285/LH286+aerosil tape on both sides 4x92125 X:</i>	
<i>STEP 7c</i>	<i>Bond in ribs with composition: LR285/LH286+aerosil+chopped glass fibre</i>	
<i>STEP 8</i>	<i><u>WIII:</u> 3 x 92145 =>UD-fabric (30X400) 2 x 92145 =>UD-fabric (30X600)</i>	<i>2 strips</i>
<i>STEP 9</i>	<i>WII 3x92125 X (170x350mm)</i>	
<i>STEP10</i>	<i>Foam block Herex C.70.55 supporting a rib on inboard side (width 30 mm) tape over the foam block 2x92125 X</i>	<i>2 pcs</i>

4.2.3 Repair of lacquer coat

- a) Remove peel-ply, manually even-up the laminated surface for application of putty
- b) Apply putty, prepare the surface of stabiliser for lacquering
- c) Restore lacquer coat according to the material specification used on this specific S/N. Lacquering – in accordance with general recommendations for painting the aeronautical composite parts

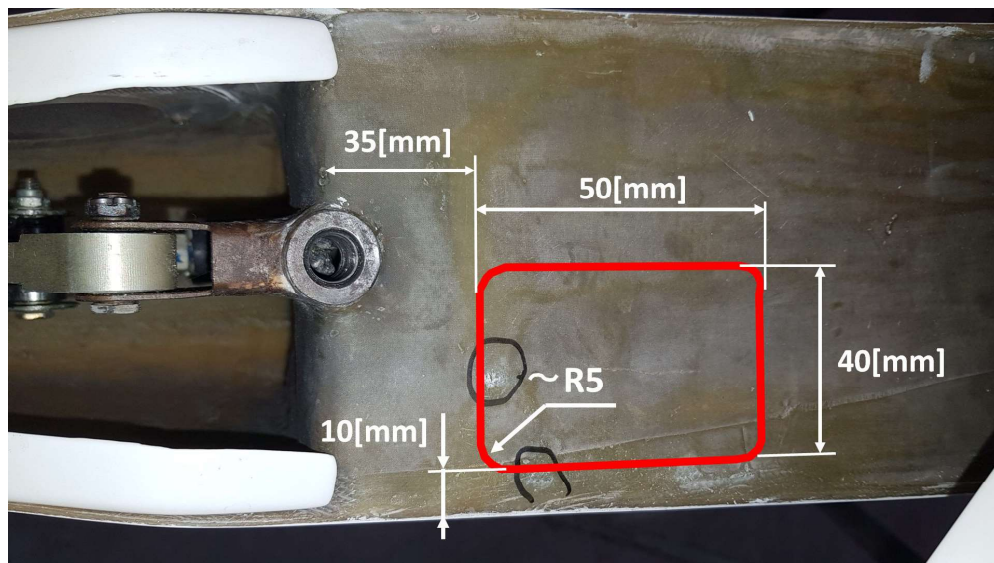
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4.2.4 Ensuring the clearance between fuselage web and stabiliser

In case of insufficient clearance between the modified stabiliser and rear web in fuselage (found on the first glider repaired in accordance with this Instruction ..., resulting of incorrect, oblique web positioning in production), correct as follows.

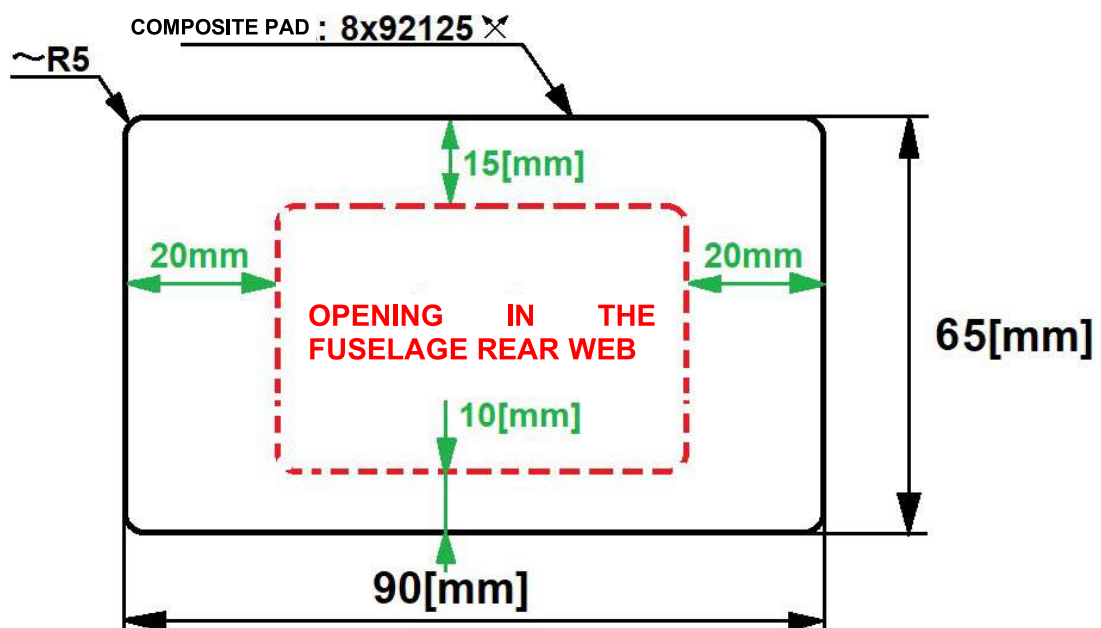
STEP 1

Cut the opening as in sketch below (approx dimensions corresp. to the condition on the 1- st repaired glider).



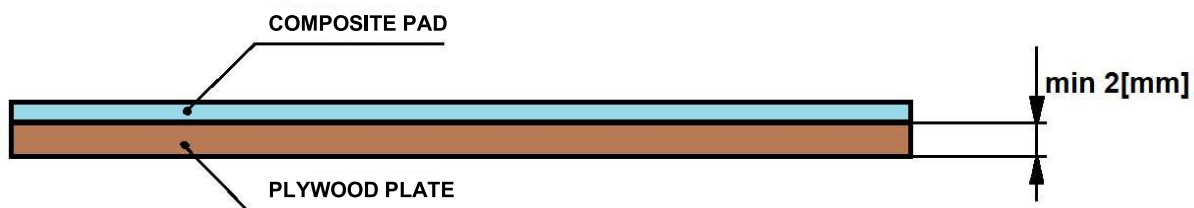
STEP 2

Laminate on flat surface the composite reinforcing pad, with a contour as shown in the sketch below, adjust dimensions to the size of opening.

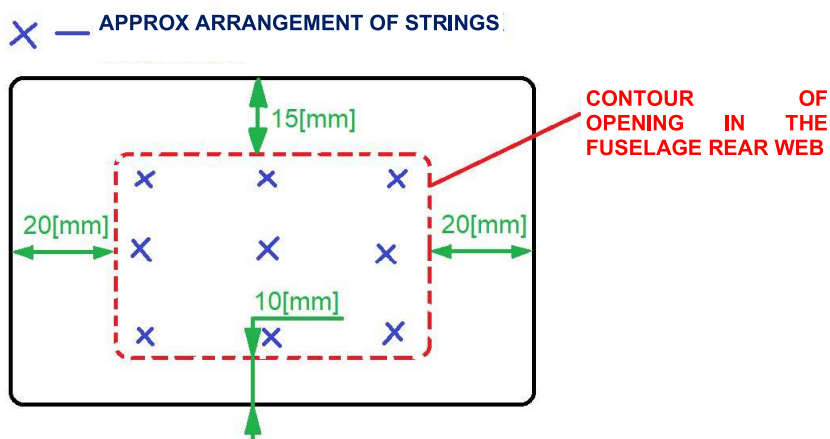


STEP 3

Glue up the composite reinforcement to plywood plate with appropriate dimensions (on composition : LR285 + LH286 + aerosil)

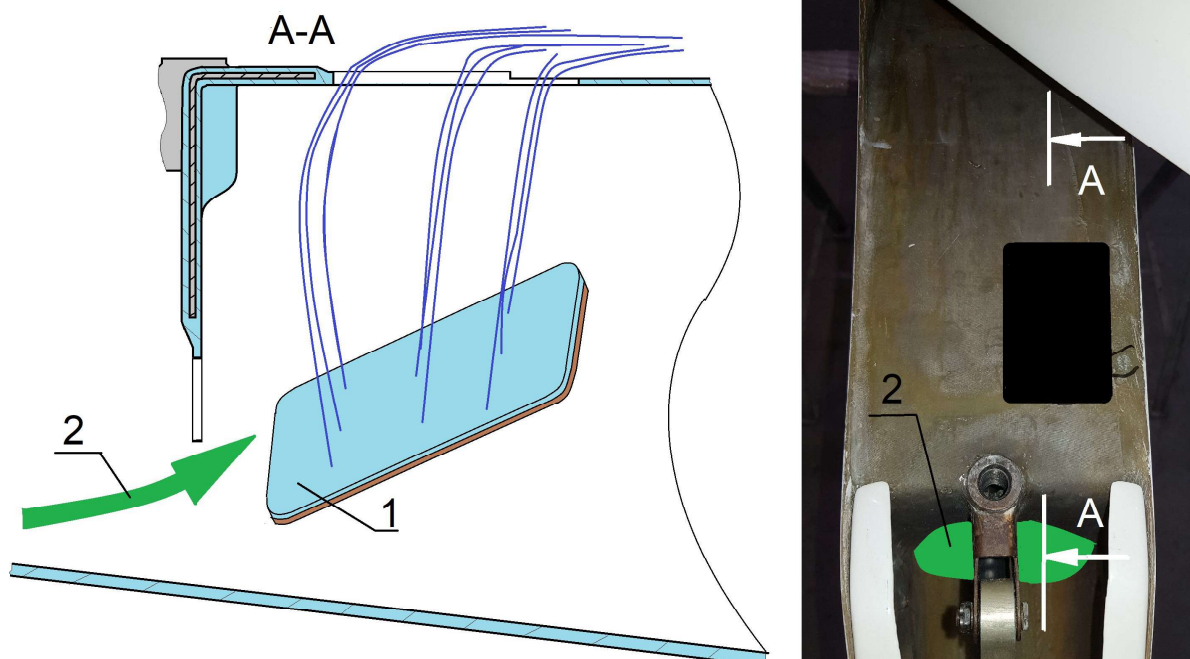


To press the reinforcement against the rear web, use strings of 500 mm length – arrangement of string see sketch below.

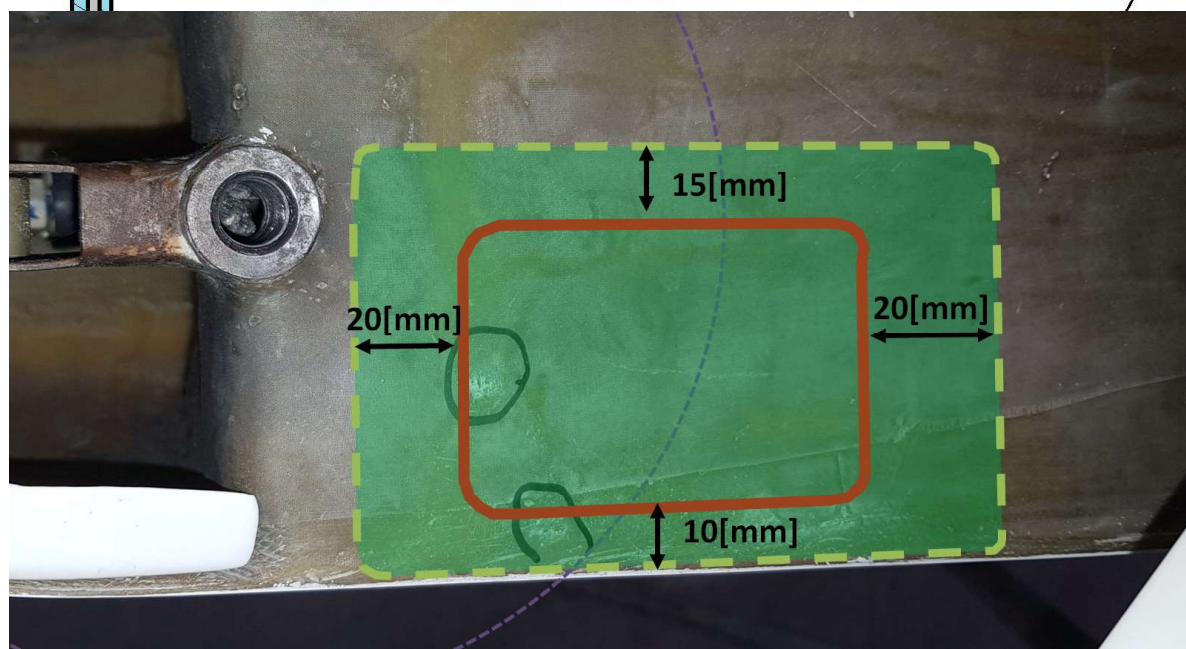
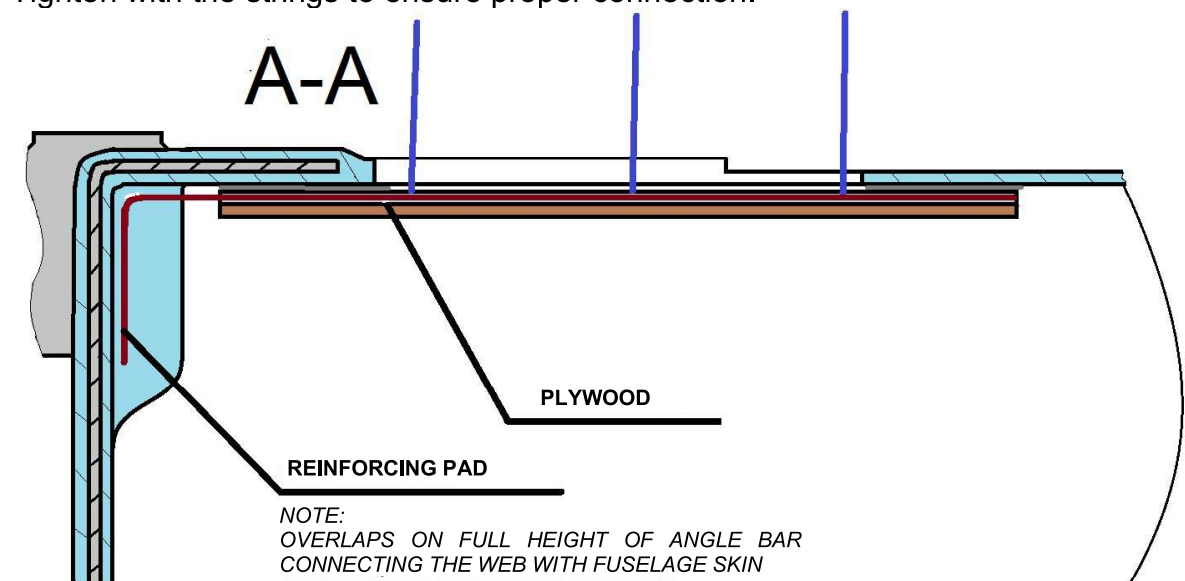


STEP 4

Insert the plywood with reinforcement through the opening. See sketch below.



In accordance with the sketch below, bond in the reinforcing pad with composition: LR285 + LH286 + aerosil + chopped glass fibre
Tighten with the strings to ensure proper connection.



Cure the composite structure locally in the area of repair/modification. Curing process parameters for LR285/ LH286 composition - see table

Composition	Curing time	Temperature
LR285/LH286	24h (hardening)	min. +19°C
		max. +28°C
	15h (post curing)	+60°C +/-5°C

5 Final provisions:

Due to the modification of structure in the area of main fittings, this repair with acceptance inspection must be carried out at the Aviation Maintenance Station, authorised for repair of aircraft composite structures.

In particular, the acceptance inspection required after modification involves:

- verification of correct rigging for tailplane assembly (including rudder and elevator, in accordance with glider Technical Service Manual TSM items 2.1.2 and 2.1.3, 2.1.4 - respectively
- verification of rudder and elevator deflections – see TSM of the glider
 - Fig 1. 3-view drawing with control surface deflection data
 - Item 2.2 Control systems and their adjustment
- empty glider weighing and CG calculation - in accordance with glider TSM item 2.6
- test flight not required.