

Service Letter SL 32 Rev.1

 DOA - No.
 EASA.21J.020

Affected Propellers

All MT-; MTE- and MTV- Propellers with Natural Composite Blades

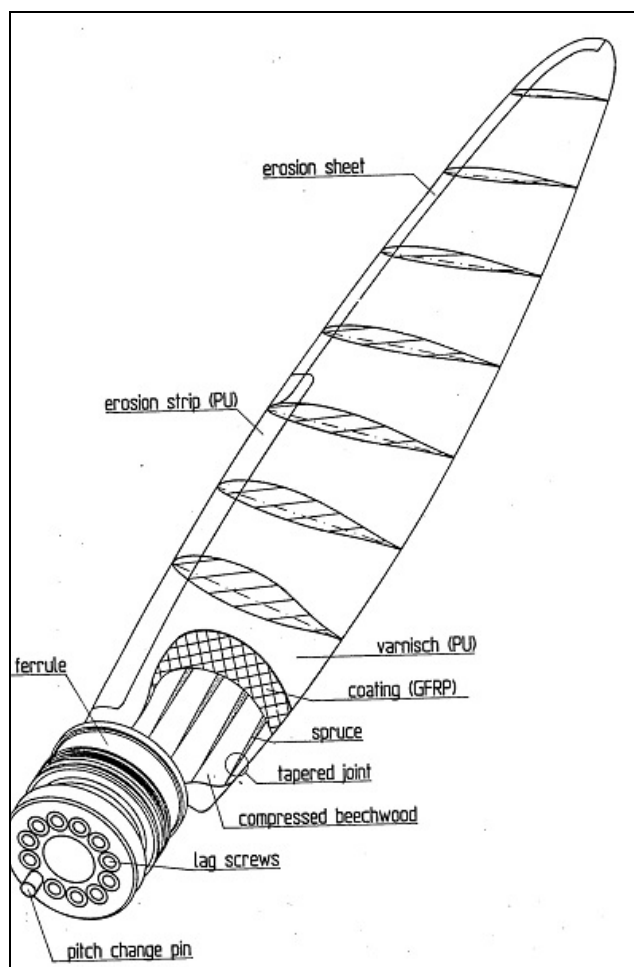
1. Background:

During the operation time between overhaul periods it is sometimes necessary to perform minor infield repairs of the natural composite MT-Propeller blades.

This Service Letter defines limitations of maximum dimensions of damage which are repairable in field and serves as a guideline how to perform such repairs.

Basically it must be noted that the load carrying structure of natural MT-Propeller blades is the blade body and the composite shell serves as a surface protection which must be kept intact to maintain protection of the load carrying blade structure.

Principle Design of MT-Propeller Natural Composite Blades



This Service Letter replaces SL32D

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Edition

J. Hoell
 Date: Feb.05 , 2014

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Checked / Approved

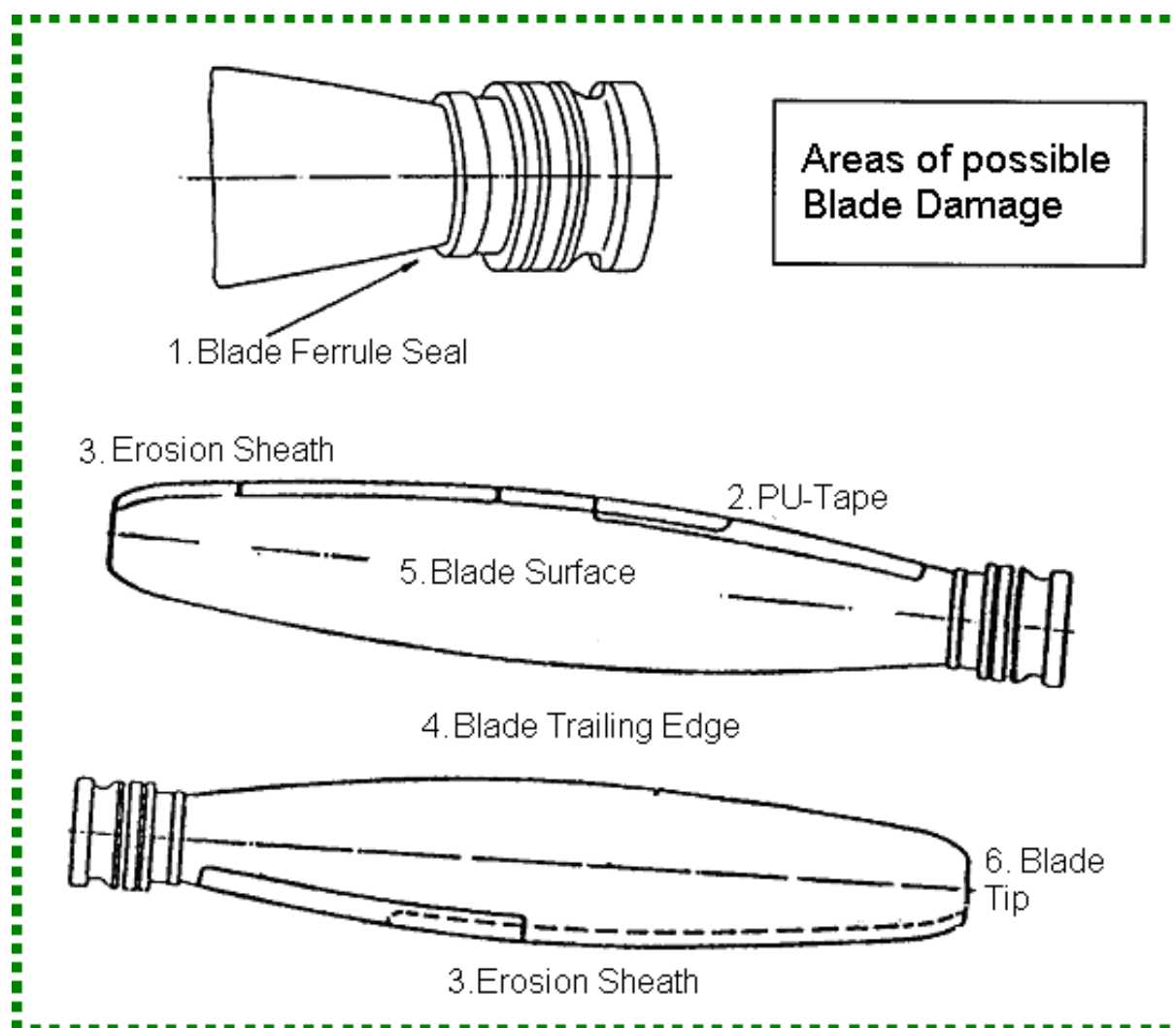
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 Date: Feb 05, 2014

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2. Work Procedure:

Classification of possible Damage:

Propeller blade surface damage occurs in the following blade areas.



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**Service Letter
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The blade ferrule seal serves as a moisture protection of the natural composite blade root in the aluminum blade ferrule.

It consists of grey RTV Silicone and covers the gap between the blade ferrule and the blade root.



Possible Damage: Cuts due to incorrect spinner installation.

Repair: Clean the affected area and fill up the affected area with Silicone
(Refer to List of Materials)

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2.2 PU Erosion Strip


Undamaged PU-Erosion Sheath.



Typical Damage: Punched through PU-Strip

The PU-Erosion Protection strip serves as erosion protection in the blade area which is not covered by the metal erosion protection leading edge.

Possible Damage: Punched through or missing.

Repair: Completely replace erosion strip according to SI.37A

Material:

PU-strip type 3M-Scotch 8562 (transparent) 50 mm wide.or
 PU-strip type 3M-Scotch 8663 (black) 50 mm wide.

The PU-strip must be installed at the leading edge of the propeller starting from the silicone on the blade ferrule, ending 5 cm / 2 inch beyond the metal leading edge.

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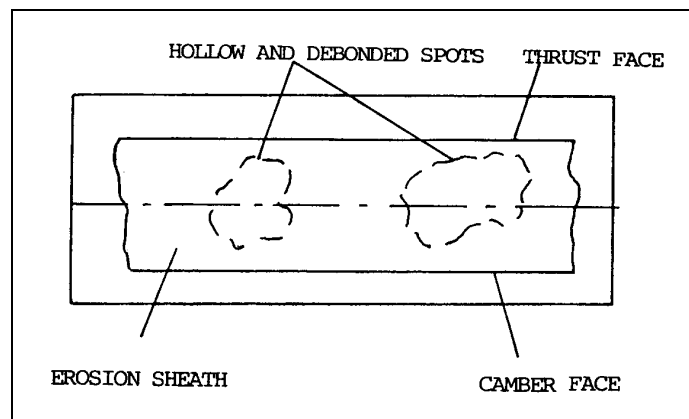
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2.3. Erosion Sheath

The metal erosion sheath is bonded onto the composite structure using a special Hysol Epoxy bonding system. Refer to the "List of Materials".

Possible Damage:

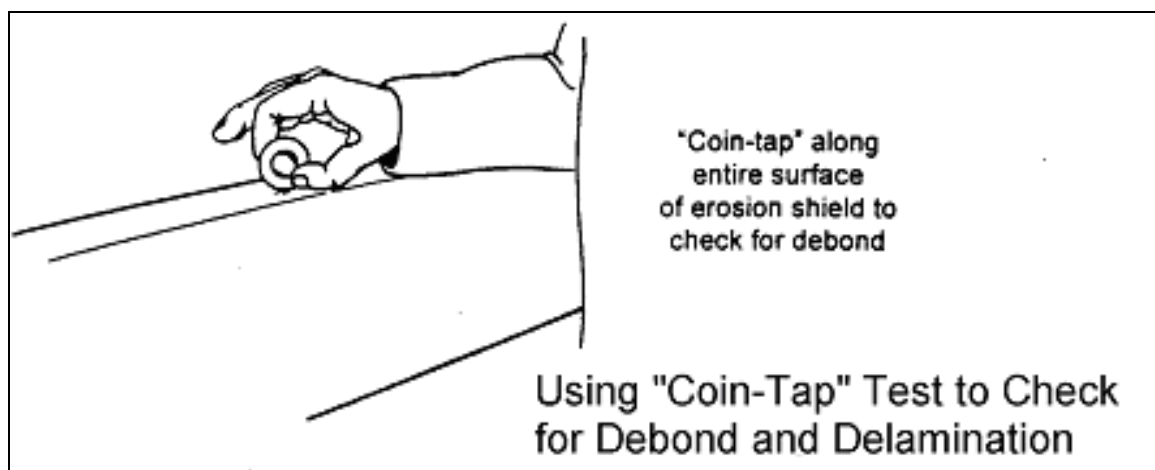
2.3.1 Debondig and Delamination:



In case of debonding only very limited repair is possible. However the extent of debonding where repair is required is defined and not every debonding requires repair.

Required Activities

If any hollow and debonded spots exist, mark them. Whenever performing pre-flight inspection, monitor whether there are further delamination and/or whether the already existing delamination has become worse. The inspection can be executed by using an appropriate coin (Tab-Test).



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2.3.1 Debondig and Delamination: continued

Damage Limits and possible Field Repairs:

- ✓ The hollow and debonded spots must not exceed 30% of the surface of the erosion sheath at all (lengthwise only 1 inch allowed).
- ✓ Hollow and debonded spots (max. 0,39 square inch* 2,5cm²), no two spots may occur within 5,5 inch =13cm of each other.
- ✓ Debonded areas which result in an open bonding crack must be sealed in order to prevent water from penetrating.
- ✓ The length of open bonding cracks must not exceed 1 inch (2.5cm)



- ✓ Bonding cracks which are not open to the blade tip may be resealed using 5minute epoxy. Refer to Table 1.



- ✓ Bonding cracks which are open to the blade tip must be sealed using the original erosion sheath bonding epoxy. Refer to Table 1.
- ✓ Whenever performing pre-flight inspection, monitor whether there are further delamination and/or whether the already existing delamination becomes worse. Check secure fixing of the erosion sheath in any case every time before flight.
- ✓ If any of the above listed limits is exceed the blade is to be sent to the manufacturer or to an authorized Service Station for repair as soon as possible.

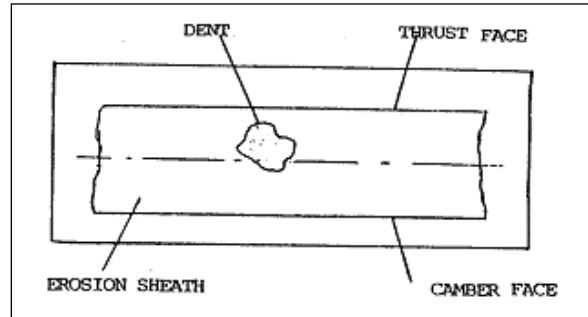
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2.3.2 Erosion Sheath Dents due to FOD



Damage Limits on Stainless Steel Erosion Sheaths and Possible Repairs:

- ✓ Circular dents not more than 0,24 inch x 0,24 inch (6 mm x 6mm)
- ✓ Pointed dents not more than 0,24 inch x 0,24 inch (6 mm x 6 mm)
- ✓ If within 51 mm (2 inches) no other dents of that size are visible, the dent size may exceed the original maximum size by 3 mm (0,12 inch) to a maximum of 9 mm x 9 mm (0,36 inch x 0,36 inch).
- ✓ If within 76 mm (3 inches) no other dents of that size are visible, the dent size may exceed the original maximum size by 5 mm (0,197 inch) to a maximum of 11 mm x 11 mm (0,433 inch x 0,433 inch).



FOD below 6 mm x 6 mm (0,24 inch x 0,24 inch):
If within 51 mm (2 inches) no other dents of that size are visible, the dent size may exceed the original maximum size by 3 mm (0,12 inch) to a maximum of 9 mm x 9 mm (0,36 inch x 0,36 inch).
If within 76 mm (3 inches) no other dents of that size are visible, the dent size may exceed original maximum size by 5 mm (0,197 inch) to a maximum of 11 mm x 11 mm (0,433 inch x 0,433 inch)
No action necessary if not delaminated or punched through.
Dents may be filled with Epoxy!



FOD exceeding limits shown on the left side.

Replace Erosion Sheath as soon as possible!

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**Service Letter
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Due to the wider boning area the allowable dents in nickel erosion sheaths are bigger than in steel erosion sheaths.

- ✓ Longitudinal dents not more than 0,78 inch x 0,24 inch (20 mm x 6mm)
- ✓ If within 51 mm (2 inches) no other dents of that size are visible, the dent size may exceed the original maximum size by 3 mm (0,12 inch) to a maximum of 23 mm x 9 mm (0.9 inch x 0,36 inch).

**2.3.2 Erosion Sheath Dents due to FOD continued****Field Repair:**

Check whether the dent penetrates through the erosion sheath.
If the dent does not penetrate through the erosion sheath, the dent may be filled with Epoxy.
The Epoxy can be sanded flush until there is a smooth surface.

No material removal from the metal erosion sheath is allowed! Do not grind the metal.!

Check this area carefully for possible cracks whenever a pre-flight inspection must be performed.
Erosion sheath can retain until next repair/overhaul will be conducted.

If the dent penetrates through the erosion sheath, check erosion sheath for possible cracks. If there are no cracks, the dent must be filled with Epoxy so that no moisture can enter into the blade body.
The Epoxy can be sanded flush until there is a smooth surface.

No material removal from the metal erosion sheath is allowed! Do not grind the metal.!

Check this area carefully for possible cracks whenever pre-flight inspection must be performed.
The erosion sheath must be replaced as soon as possible.

If any of the above listed limits is exceeded the blade is to be sent to the manufacturer or to an authorized service station for repair as soon as possible.

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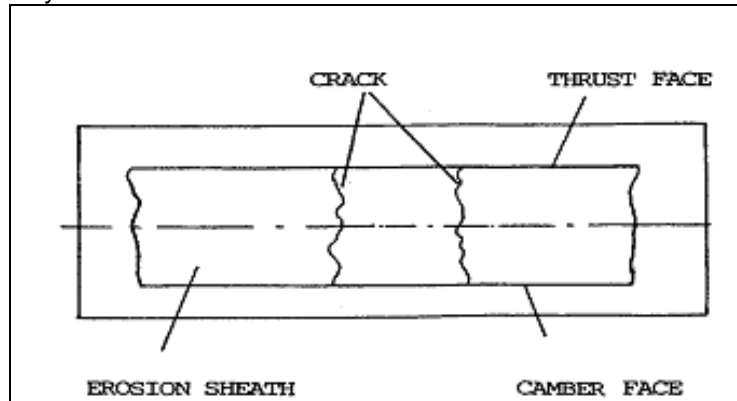
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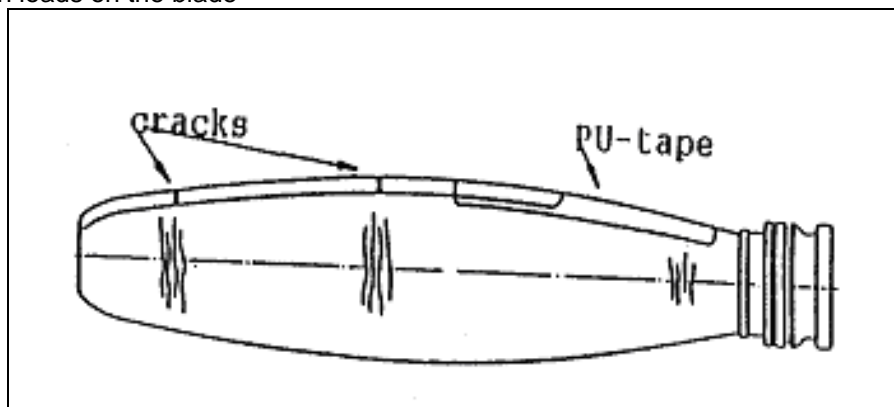
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2.3.3 Cracked Erosion Sheath

Cracked erosion sheaths require immediate repair. If chordwise cracks appear, return the propeller to the manufacturer or any authorized Service station.



Chordwise cracks in the erosion sheath may also occur together with fine surface cracks indicating high vibration loads on the blade



When Erosion Sheath is cracked chordwise no field repair is possible

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2.4. Damaged Trailing Edges

Typical Trailing Edge Damage

- Hangar Damage
- Tow Bar Damage
- Cowling Damage



Tow bar damage, seal with Epoxy or repair permanently with fiber glass



Delaminated composite shell on the trailing edge



Damage caused by Cowling, seal and fill up with epoxy

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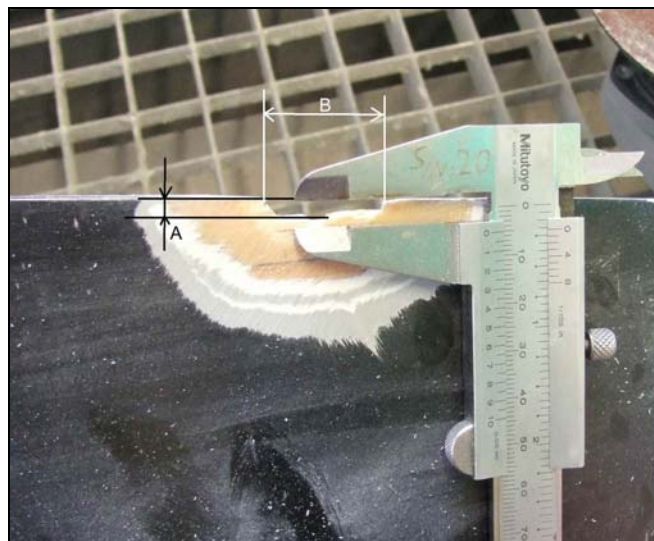
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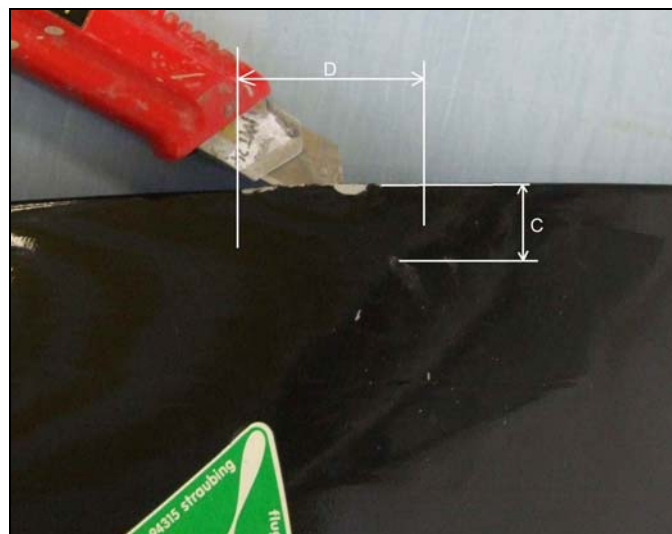
Damage Limits

Crunched trailing edges can be sealed by using 5 minute Epoxy if the damage is not deeper (Dimension A) than 5 mm (0,20 inches) and not wider (Dimension B) than 15 mm (0,60 inches).

Crunched trailing edges can be repaired by replacing the fiber glass cover if the damage is not deeper (Dimension A) than 7.5 mm (0,30 inches) and not wider (Dimension B) than 25 mm (1 inch).



Delaminated fiber glass shell on the trailing edge may be rebonded if the debonding is not deeper (Dimension C) than 12,5mm (0,5 inch) measured from the trailing edge and not wider (Dimension D) than 25mm (1 inch).



Caution: Assure that any moisture cannot enter the load carrying blade body.

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2.4. Damaged Trailing Edges continued

Field Repairs

Sealing of damage with 5 Minute Epoxy (e.g. Devon TM or equivalent)
(Damage not deeper than 5 mm (0,20 inches) and not wider than 15 mm (0,60 inches).
Minor damages on the trailing edge may be sealed with 5 minute epoxy,
If the fiber glass shell is locally delaminated place trailing edge vertical and let epoxy pour into the crack. Then clamp the loose shell using C-clamps or similar.



Minor damage on the trailing edges may be sealed with 5 minute Epoxy



Longitudinal cracks may be sealed with 5 minute Epoxy



If the fiberglass shell on the trailing edge is delaminated the shell may be rebonded.
Let pour 5 minute Epoxy into the trailing edge crack.



Then clamp the trailing edge with C-clamps and let the epoxy cure.
Then clean the trailing edge and repaint the repaired areal.

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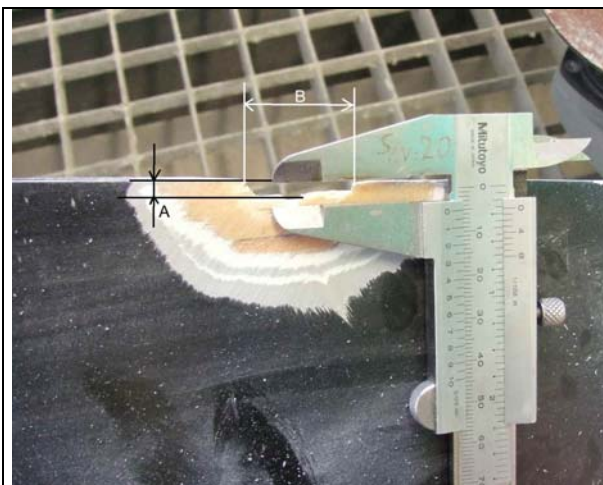
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2.4. Damaged Trailing Edges continued

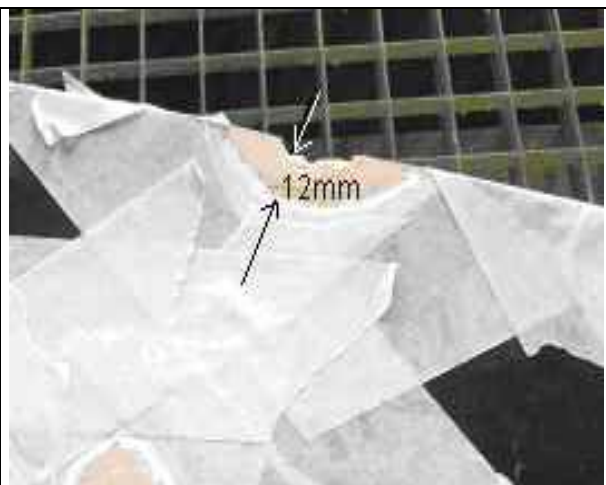
Field Repairs continued

Repair of the Fiber Glass Shell

(Damage not deeper than 7.5 mm (0,30 inches) and not wider than 25 mm (1 inch)).



Measure the extent of damage
Max. 7.5mm from Trailing Edge and 25mm wide
allowed for Field Repair



Scarf-grind area 0,5inch (1.25cm) wide after removal of
paint and filler
Before putting Epoxy on the surfaces carefully
degrease the surface using MEK or Acetone



Apply 3 layers of fiber glass Interlas 92110 or similar
on both sides using 5 minute Epoxy or Epoxy
according to list of recommended material.



Grind the fiberglass to smooth surface then add filler
and appropriate paint

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2.5. Blade Surface Damage

Blade Surface damage can occur with the following appearance

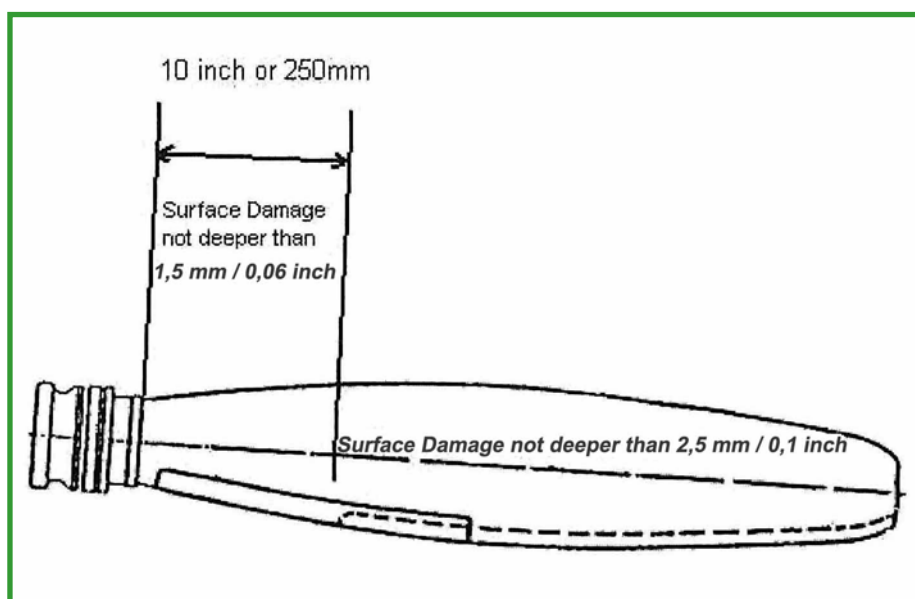
- Stone impacts FOD
- Blisters and Delaminations
- De-Ice Boot Damage causing Blade Damage

All surface damage shall be repaired in order to protect the load carrying blade structure against moisture and erosion.

Damage Limits

Blade surface damage can be field repaired under the following conditions:

- ✓ There may be no crack in the load carrying natural composite structure beyond the following repair limits.
- ✓ All dimensions are measured after local removal of paint and filler.
- ✓ Blade Root: inside 25 cm (10 inch) from Blade Ferrule:
Damage may not be deeper than 1,5 mm (0,06 inch.)
- ✓ Blade outside Blade Root: Damage may not be deeper than 2,5 mm (0,01 inch)



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2.5. Blade Surface Damage continued

Damage Limits continued

Surface damage whose size (E X E) is below 6 mm x 6 mm (0.2 inch x 0.2inch) may be sealed by filling the dent with 5 minute Epoxy.

Failed de-ice boots may cause damage to the blade surface structure behind the boot failure. Such damage may be repaired with 5 Minute Epoxy also.

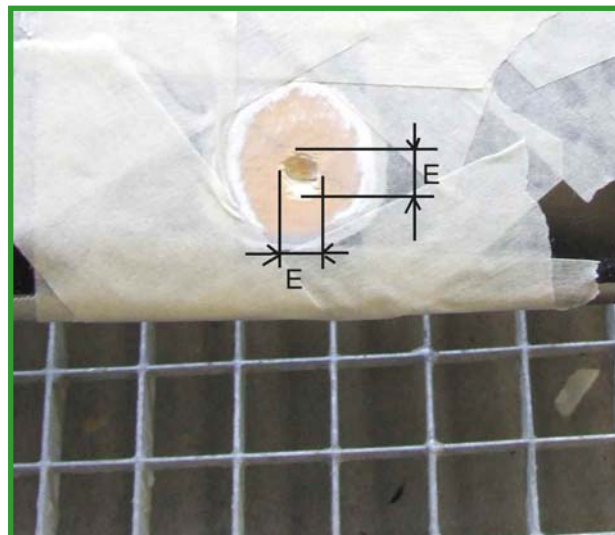
Maximum damage in the De-Ice Boot area:

14 mm x 8 mm x 1, 5 mm (0,55 inch x 0,31 inch x 0,06 inch)



Surface damage whose size (E X E) is above 6mm x 6mm (0.2 inch x 0.2 inch) but below 12mm x 12mm (0.5 inch x 0.5 inch) must be field repaired by locally replacing the fiber glass shell.

Blades with surface damage above 12mm x 12mm (0.5in x 0.5in) must be must be sent to the manufacturer or to an authorized service station for repair as soon as possible.



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Damage Limits continued:



Field Repair Limits:
Blade Root: inside 25cm (10 inch) from Blade Ferrule:
Damage may not be deeper than 1.5 mm (0,06 inch)
Blade outside Blade Root: Damage may not be deeper
than 2,5 mm (0,1 inch)



Blade Surface damage obviously exceeding the field
repair limits

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2.5. Blade Surface Damage continued

Field Repair



If the damage size allows to just fill up the dent with 5minute epoxy only local removal of the paint and filler is required



If the damage size requires repair of the fiber glass shell completely remove paint and filler approximately 1,2cm (1/2 inch) around the hole and scarf the composite layer towards the hole.

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2.5. Blade Surface Damage continued

Field Repair



Scarf the affected area approximately 12mm (0.5in) wide.
Before putting epoxy on the surfaces carefully degrease the surface using MEK or Acetone.
Fill the hole with epoxy and cotton flax or any thick epoxy resin.
Then apply 3 layers of fiber glass onto the area. The fiber orientation shall be $\pm 45^\circ$ to the blade axis.



Finally grind and locally repaint the repair location

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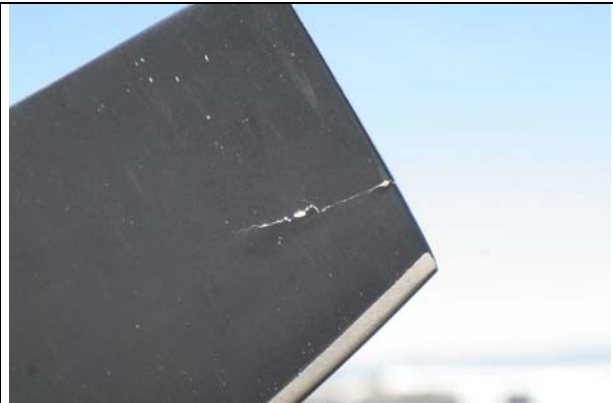
2.6. Blade Tip Damage

Minor tip damage caused by airplane handling may be field repaired

Typical minor damages.



Hangar Damage: Broken Tip Trailing Edge
Seal with 5 Minute Epoxy or permanent repair with
Fiber Glass



Split Blade tip. Repair with fiber glass



Paint and Filler Material scratched off from Blade Tip.
Seal with 5 Minute Epoxy



Split Blade Tip and delaminated trailing Edge.
Rebond Trailing Edge with 5 minute Epoxy.
Repair split Tip with Fiber Glass

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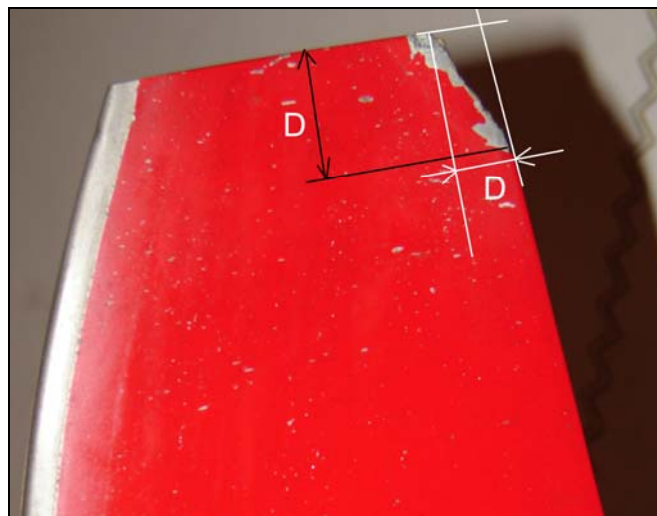
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2.5. Blade Tip Damage continued

Damage Limits

Broken blade tip Trailing edges

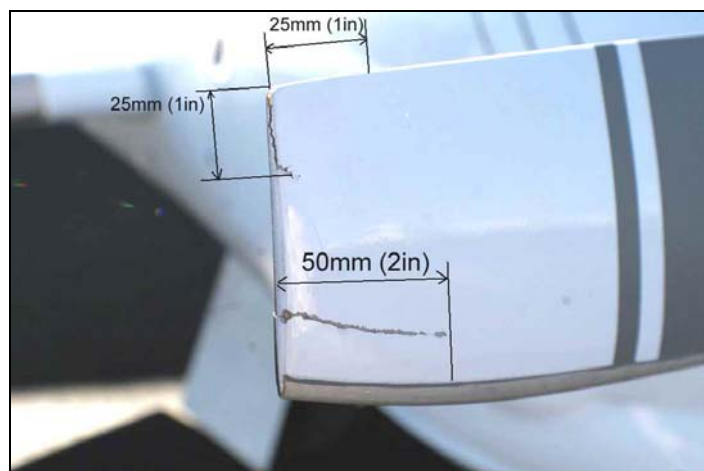
Maximum damage size measured from the blade tip trailing edge



Dimension "D" below 12mm (0.5 in) : Only sealing with 5 minute Epoxy required.

Dimension "D" above 12mm (0.5in) and below 25mm (1 in) local repair with fiber glass required

Split Blade tips and delaminated Blade tip Trailing edges



Split trailing edges may be field repaired if the crack length is below 50mm (2 in) . The fiber glass shell must be scarf repaired from both sides

Delaminated blade tip trailing edges can be field repaired if the length of delamination is Less than 25mm (1 in).

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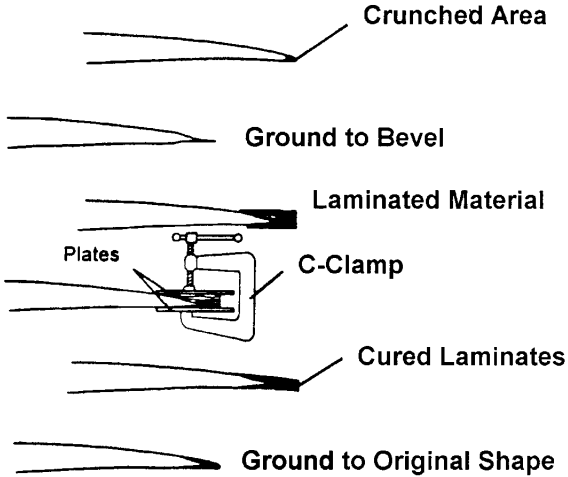
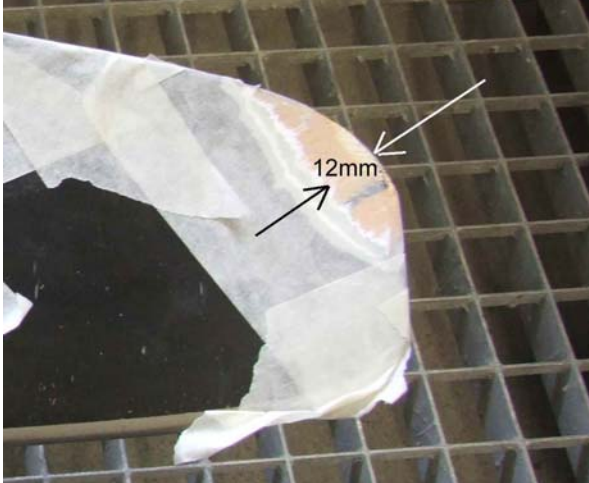


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2.5. Blade Tip Damage continued

Field Repair

Fiber glass Repairs

If repairs are carried out on the composite shell the following work sequence is applicable

 <p>Crunched Blade Trailing Edge Repair (Cross Section View)</p>	 <p>12mm</p> <p>Completely remove paint and filler from both sides and scarf both sides 12mm (0.5in)</p> <p>Before putting epoxy on the surfaces carefully degrease the surface using MEK or Acetone.</p>
 <p>Apply 3 layers of fiber glass (Interglas 92110 or similar) with epoxy from both sides and support layers with some stiff flat piece of plywood or cardboard.</p>	 <p>After the epoxy is cured sand blade tip to original shape. Apply some filler and locally repaint the area.</p>

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Silicone Sealant RTV 109 General Electric or similar

Epoxy Resin Materials:

Quick Epoxy: Devcon 14210 (5 Minute Epoxy) or similar
Loctite 0151 Epoxy Patch or similar
Scheufler: Resin 285 Hardener 500 or similar
Fuller: Resin A20 Hardener B20 (original MT-System)

Erosion Sheath (V2A and Nickel) Bonding Epoxy:

EA-9309NA QT System Part A Epoxy Adhesive; Hysol / Henkel
EA-9309NA QT System Part B, Epoxy Adhesive Hysol / Henkel

EA 9359.3 QT System Part A Epoxy Adhesive; Hysol / Henkel
EA 9359.3 QT System Part B Epoxy Adhesive Hysol / Henkel

Fiber Glass MaterialFiber Glass Cloth: Interglas Type 92110 Fiber Glass (twill 2/2 163g/m²) or similar**Filler Material:**

Reladur 481 PU spraying filler, gray 48PU-7750 or similar
Feycopur 610 PU Priming color
Relonit priming, color grey 61-AC-9000 or similar

Paint Material

Relonit 620 2K Acrylic Paint:

White: Opaque pigment, clear white, 63-AC-9010, RAL 9010

Grey: MT - Grey

Black: RAL 9005 black , dull

Red: RAL 5001 dark red

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