Service Information Letter

AG-SIL-2019-03-EN	Issue: 1	Dated: 13.09.2019	

The purpose of this document is to communicate information that may be of benefit to pilot owners of AutoGyro Gyros. If there is any clarification required of the content of the letter, contact the addressee stated at the bottom of the page

Aircraft type & model applicability:	Aircraft serial numbers affected:
All AutoGyro gyroplanes	All

Subject: Rotor blade inspection guidelines

Safety effect:

The purpose of this document is to provide inspectors with more information regarding inspection processes for rotor blades

Weight and CG effect:

None

Background:
The 25 and 100hr maintenance checklist for all AutoGyro gyroplanes requires careful inspection of the rotor blades for cracks or damage.

This document is designed to offer more information of what and where to inspect

Discussion:

The inspection of the rotor is a requirement within the 100hr service documents.

Recommendation:

Inspectors are recommended to have available suitable lighting and equipment to be able to view the rotor blades effectively, when either assembled or disassembled.

Means of inspection can be dye penetrant or visual high magnification or as determined appropriate by the inspector.

Construction and general information.
The rotor blade is a relatively simple aluminium extrusion, made out of EN AW-6005A T6. It is anodised for surface protection against corrosion both inside and out. Inside the blade are steel balance weights, securely bonded in place and fitted with end screws to prevent axial detachment.

End caps are fitted to prevent insect or other access, and minimise water entrance. Later blades are part foam filled to further limit this. Outer end caps are riveted in place to enable replacement in the event of damage.
The inner balance weights are not removable or serviceable.

The end caps are not sealed, to allow any water to exit.
The inner end caps are removable for inspection and addition of blade balance weights.

Several assembled versions of the rotors / rotor blades exist.

Standard rotors carry balance weights either 1.5m (RSI), 2m (RSII) or 4m (RSII TOPP) long.
Length and position of the weights is easily checked with a magnet.
End cap colour normally denotes the type of blade length and weight.

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airworthiness@auto-gyro.com
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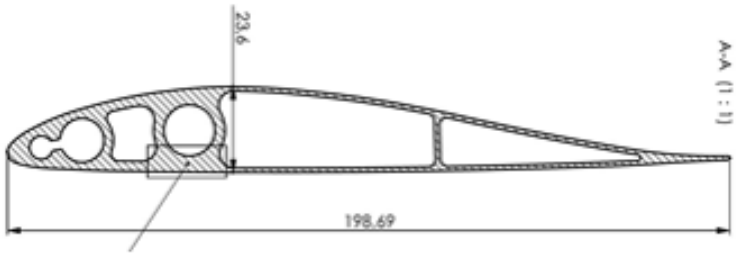
Cap colour	Type	Notes and construction
Black	RotorSystem I, only fitted to approx. 2010. 8.4m. No longer manufactured	Nine bolt hole attachment. 1.5m balance weights. UK life limit 700hrs.
Light grey	RotorSystem I, only fitted to approx. 2010. 8.0m. No longer manufactured	Nine bolt hole attachment. 1.5m balance weights
Orange	RotorSystem II 8.4m. No longer manufactured (since approx. 2011)	6 bolt hole blade attachment. 1.5m weights
Red	RotorSystem II 8.4m	6 bolt hole blade attachment, scalloped hub bars, new coning angle incorporated into hub bar. 2m balance weights. 2,500hr life limit
Red	RotorSystem II 8.8m	6 bolt hole blade attachment, scalloped hub bars, new coning angle incorporated into hub bar. 2m balance weights. 2,500hr life limit
Blue	RotorSystem II TOPP 8.4m.	Full length balance weights 2,500hr life limit
Grey	RotorSystem II TOPP 8.6m	Full length balance weights 2,500hr life limit

The blade extrusion inner profile differs between RSI and RSII. See below.



RotorSystem II extrusion.

Different hub blocks exist to connect the rotorsystem to the different teeter tower heights, and are interchangeable.

Areas of the blade and importance.
This applies to both RotorSystem I and II, regardless of the type of bolted connection to the hub.

By design analysis, the highest tensile load from centripetal forces, and induced bending loads in flight and ground handling, is at the outboard bolt hole. (smallest blade cross section).

Cracks in the outboard bolt hole area in a RotorSystem I is the reason for the establishment of a life limit of 1500 hrs (UK 700hrs).

To date no cracks have been found in this area in RotorSystem II, which is calculated to have a safe life of 2,500hrs.

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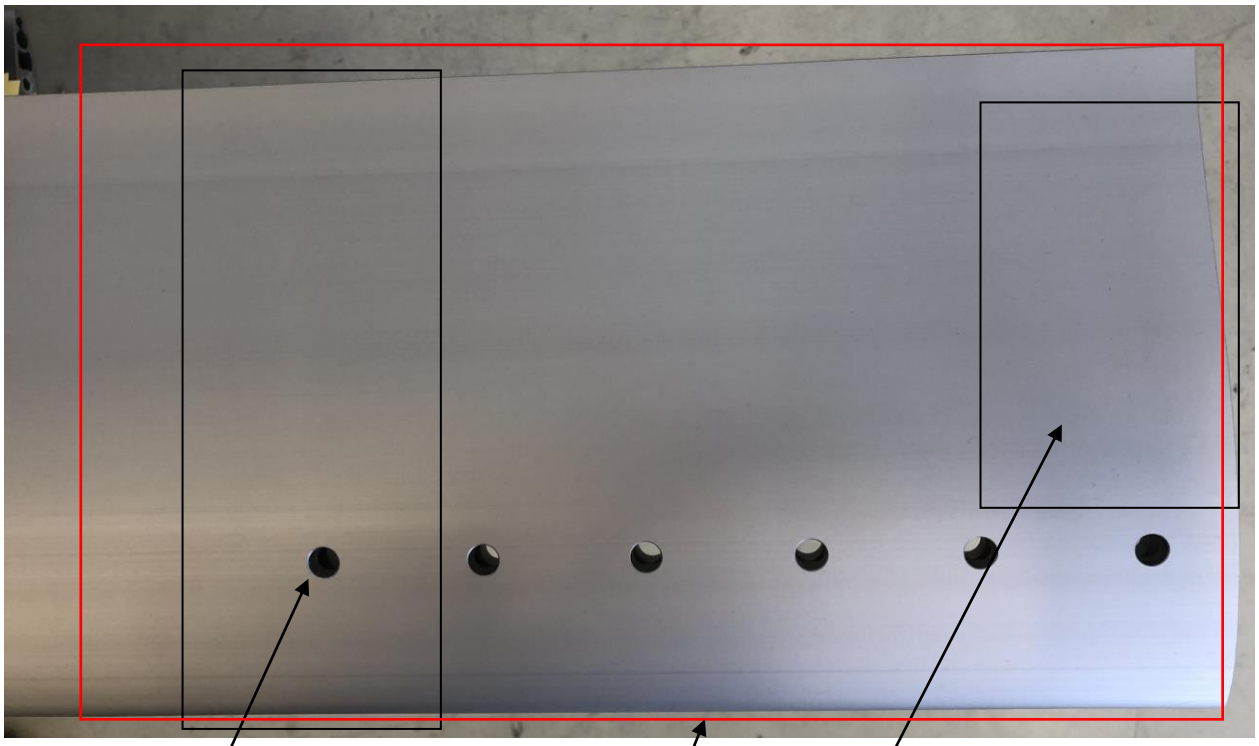
To permit detail inspection of the blade to hub bar joint;

The RotorSystem I blade to hub bar joint must be strip-inspected every 100hrs (due to the lower safe life)
The RotorSystem II blade to hub bar joint must be strip-inspected every 500hrs (1/5 of the safe life limit).



Outboard bolt hole area. Both upper and lower surfaces must be carefully inspected. No cracks, splits, dents or defects allowed +/-100mm either side of this hole.
No bending of the blade in any plane permissable in this area.
See SB-034 for RotorSystem I.

Area of possible crack in upper surface. Inspected either during strip down, or by removing the inner end cap and viewing in side the extrusion end with a bright lamp. See later note and photos.

The entire root area connection to the hub bar is of importance. Holes must be clean and free of burrs and corrosion. Fretting between the clamp profile (that sets the angle of blade incidence to the hub) should be minimal and not rubbing into the blade surface. Light damage to the trailing edge area, rear of the clamp profile, is permissable.

View of the top side of the rotor root (RSII, 6-hole attachment. The same applies to this area on the 9-hole attachment).

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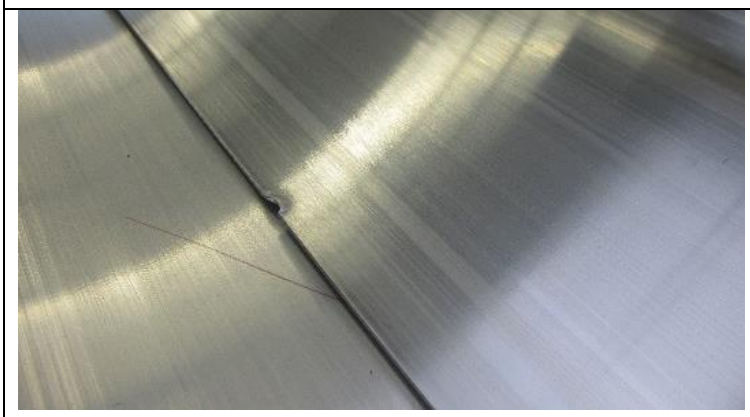
Attachment bolts.
The blade to hub bar bolts on early RotorSystem I's are unplated, and are oiled on assembly. These may be replaced by the later zinc plated bolts.
Attachment bolts with corroded shanks must be replaced.



Trailing edge damage.
The photo shows an example of trailing edge damage. A ding in the trailing edge may be flatted out and the rotors continued in service provided that the ding does not cause a fracture into the inner part of the extrusion, and is not within 1m of the hub bar connection.

Small damage resulting in a light bend (1-2mm, typically at the rotor tip) may be straightened carefully to the same profle as the rest of the blade section. More damage must be discused with AutoGyro technicians. Remember, damage that changes the aerodynamic profile will affect the flight characteristic of the blade in that area. The further outboard the damage is, the faster the blade is turning, and thus the aerodynaminc effect is greater.

Leading edge damage.
Occasionally a stone or other foreign object enters the rotor disc whilst spinning, resulting in a dent in the leading edge, or in the blade surface. The leading edge is solid aluminium of significant thickness. Small dings can be dressed out only to the basic blade profile. Filling is not permitted. Significant dings within 2m of the hub bar are potential stress raisers and damge left in service must be carefully considered by the inspector for the level of risk. If in doubt, contact airworthiness@auto-gyro.com.

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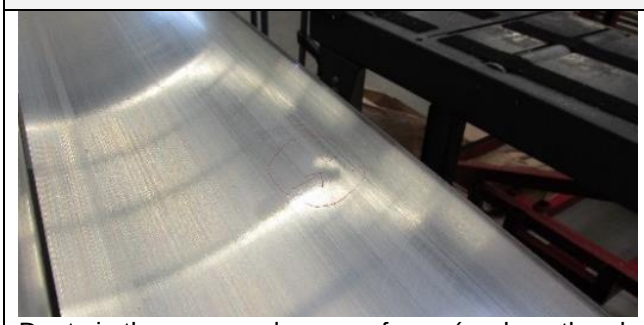

Dents in the upper or lower surfaces (such as the photo above) more than 1m from the hub bar up to 10mm in diameter are unlikley to cause a stress raiser and may be left in service and monitiored by the user

Longitudinal blade root crack, adjacent to bolted area.
The presence of such a crack is can be easily inspected by removing the blade inner end cap, and viewing with a bright torch.

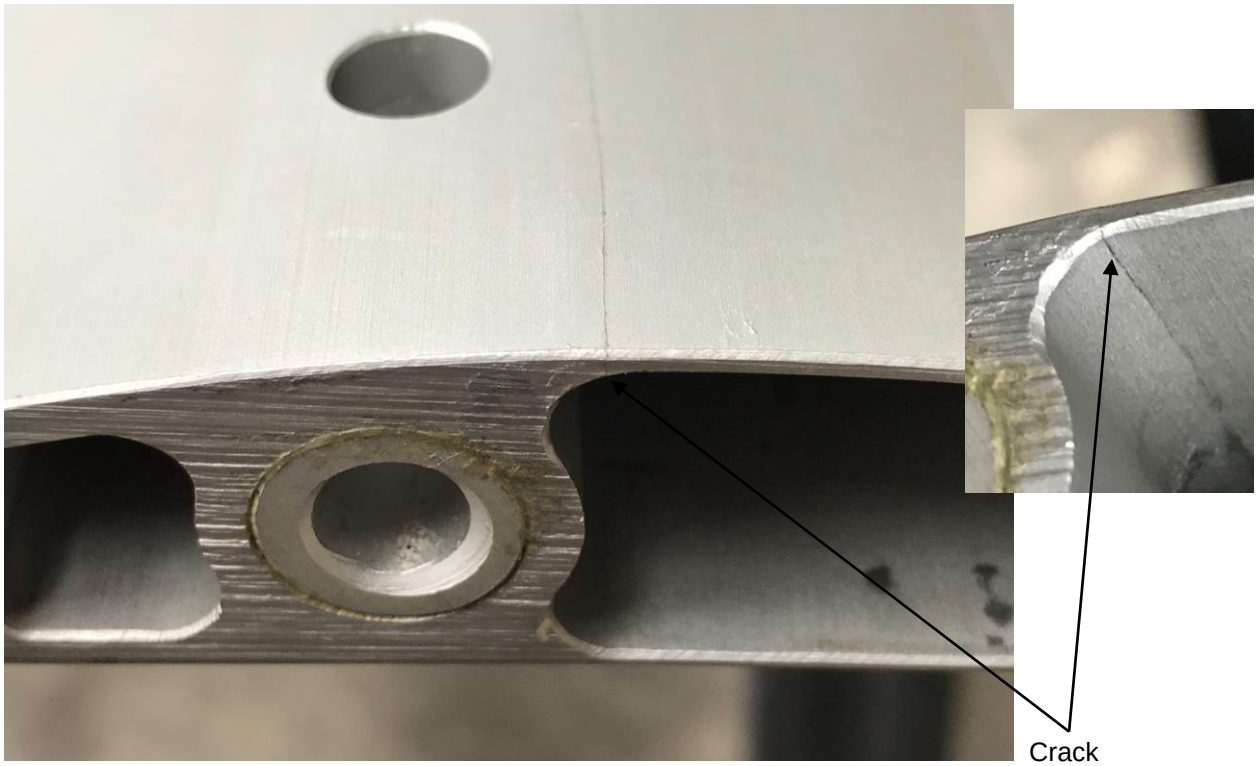

Photo of a longitudinal blade root crack, and inset a photo taken viewing from inside the blade with the inner end cap removed.

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More substantial damage.
In all instances where the suffered damage such that the blade is bent in any plane, then the rotorsystem as a whole must be replaced. Rotor blades are carefully weighed and measured, and paired through the process for optimum performance. Random pairing is not likely to result in a satisfactory rotorsystem.

Whenever a rotorsystem is replaced due to damage, then the rotor bearing MUST be replaced. Due to the long lever arm of the rotor, impact damage at the tip can lead to high forces in the bearing and possible internal bearing brinelling. This will reduce service life and possibly create premature failure.

If in doubt, always ask. airworthiness@auto-gyro.com

Summary;

Every inspection must be thorough.
Cracks in the root area, either at the bolt holes or longitudinal at the blade root, are not permissible.
Bending of the blade in any plane is not permissible.
Limited damage may be dressed out or corrected
If in doubt, contact airworthiness@auto-gyro.com.

References:
Relevant aircraft AMM

Approval Statement:

Effect on Pilots Handbook or Maintenance Manual:

None. Always refer to the aircraft POH or AMM for disassembly and re-assembly instructions.

SIL authorised by:

Chief Certification Officer	Chief Technical Officer
Name: G Speich	**Name: O. Birkner**
G. Speich Sep 13 2019 5:23 PM This document has been issued according to an approved computer generated signature procedure DocuSign	Otmar Birkner Sep 16 2019 8:27 AM DocuSign
Signature and date:	**Signature and date:**

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