ASSEMBLY AND MAINTENANCE INSTRUCTION MANUAL

of GYRO-TECH CARBON ROTOR NACA 8H12

gyro-tech

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VERSION 2020

KIT CONTENTS

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- Transport box
- Composite carbon blades airfoil NACA 8H12 (2 pieces)
- Aluminium hub bar + mounting bolts, nuts, washers
- Rotor head/rotor head tower*
- Assembly and maintenance instruction manual
- Warranty card
- Invoice

* included not in all sets

Product description

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Hub bar	Carbon blades	Rotor head
• Gyro-Tech hub bar is made of aluminium alloy type 7075-T651. • The hub bar block contains 4 ball bearings and a bushing. It also contains a system of centering the rotor between rotor head towers. • Blades tracking regulation is done by use of thin pads that have to be situated between the block and the hub bar. • All bolts, nuts and washers are protected against corrosion. • Used are bolts class 10.9. • Cone angle of the hub bar is 2.5°.	• Gyro-Tech composite carbon blades are made in 100% of composite carbon fibers. • The blades production process is done under strict control using checklists. • Inside the blade root installed are aluminum bushings with mounting holes. The bushings are installed at the stage of spar and blades skin production. • All production stages of Gyro-Tech blades are done at the same time which means that the spar and skin form a monolith.	• Gyro-Tech rotor head is manufactured on CNC machines. • The rotor head towers are milled from a monolith aluminium block and have a double row bearing no. 3206. • The set includes bendix, ring gear and a brake. • All parts of the rotor head are made of 7075 aluminium.

COMPOSITE BLADE
NACA 8H12 – technical data

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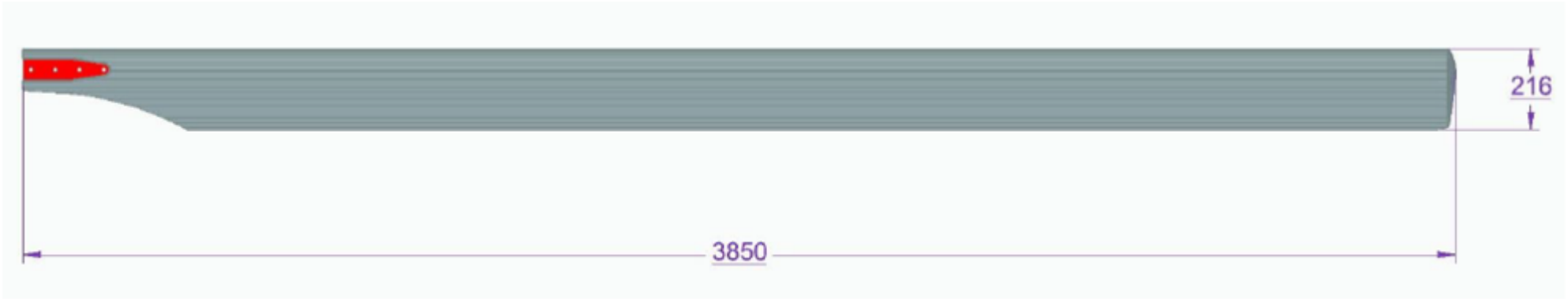

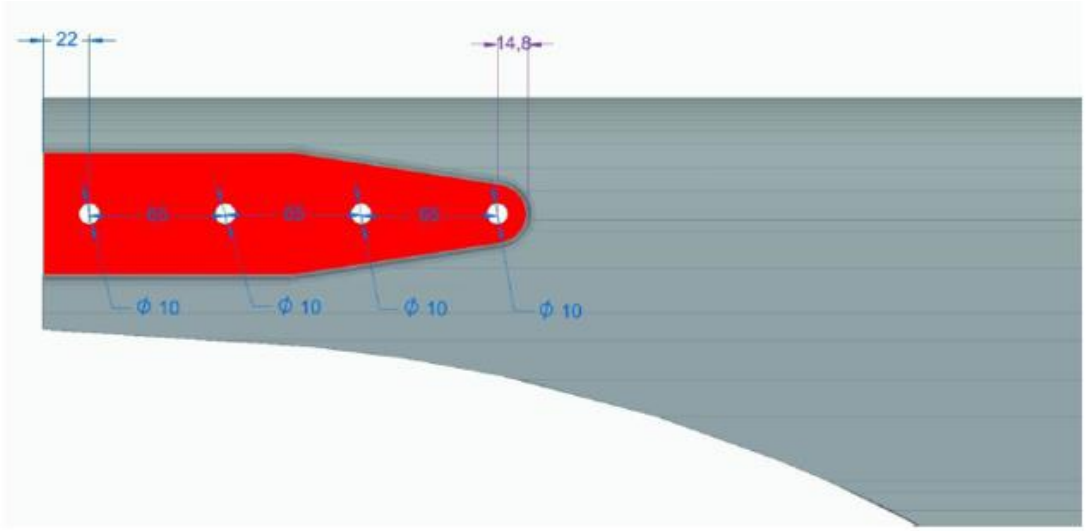

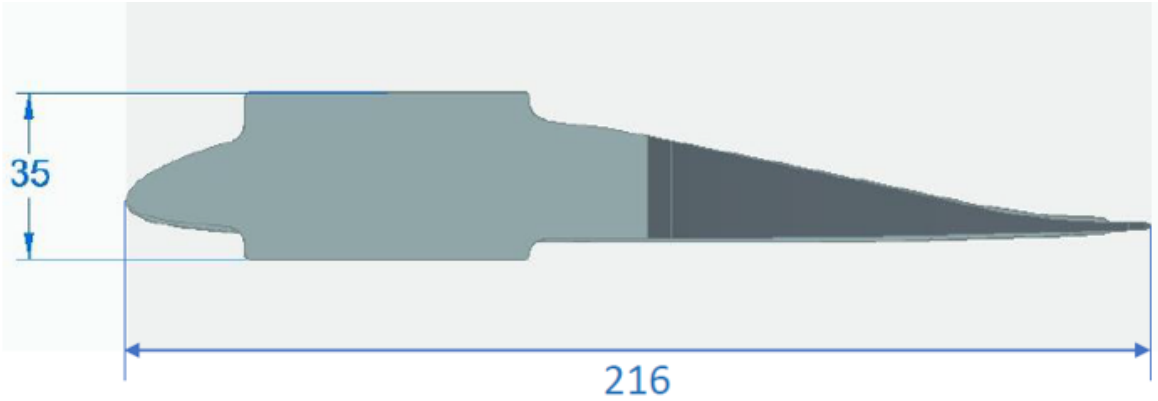

HUB BAR CONSTRUCTION

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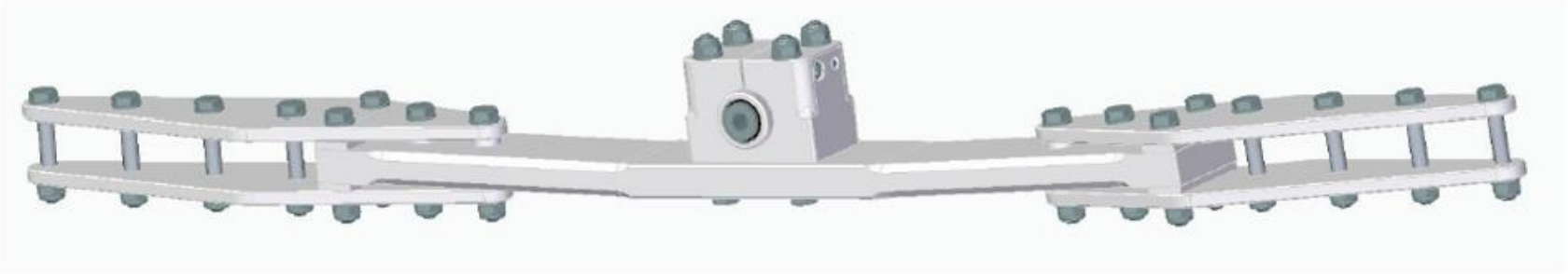
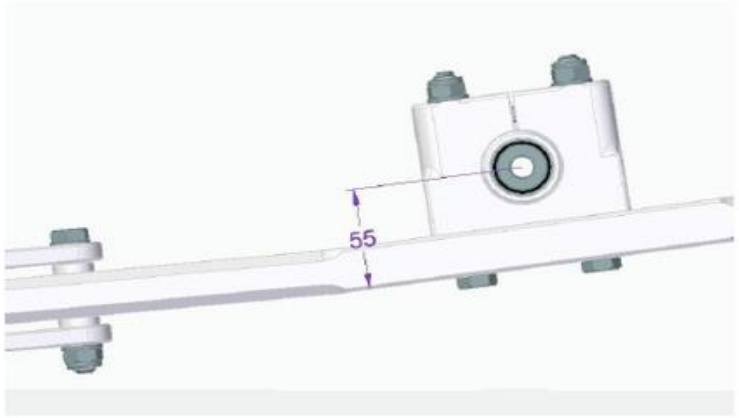


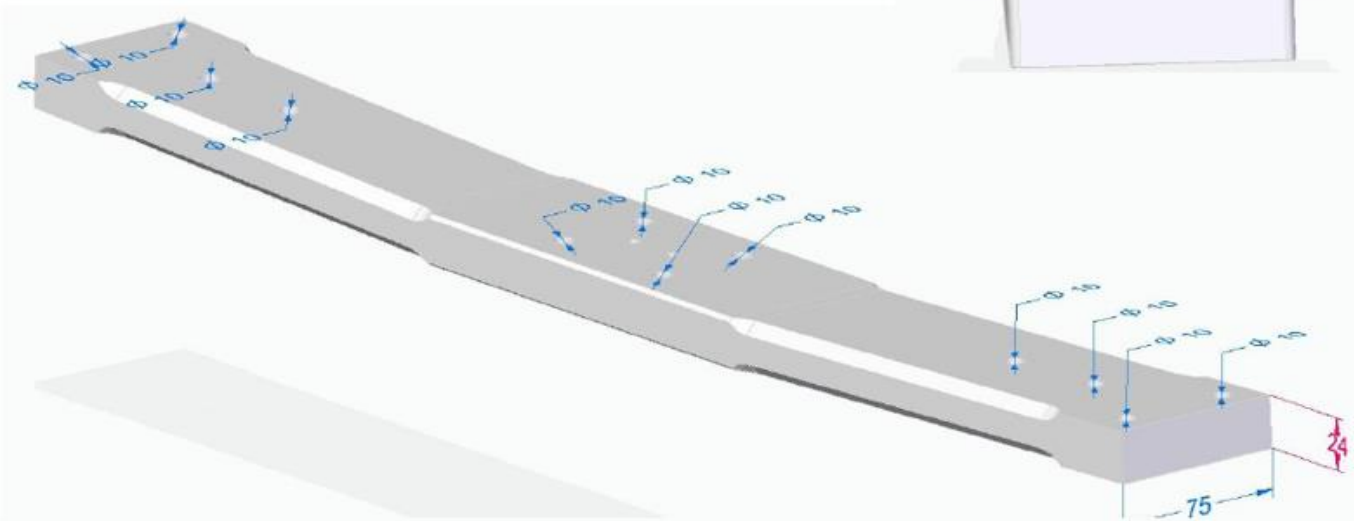
Material: 7075 aluminium

Possible adjustments:

- Blades tracking system
- Rotation axis centering system
- Blade pitch adjustment

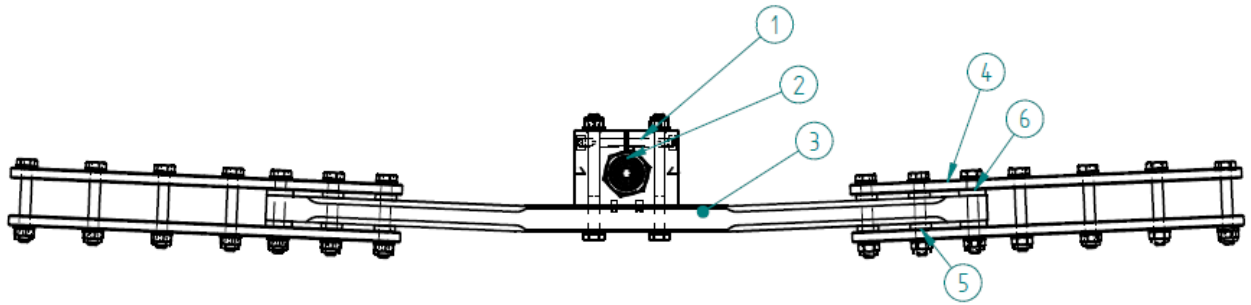
HUB BAR DIMENSIONS

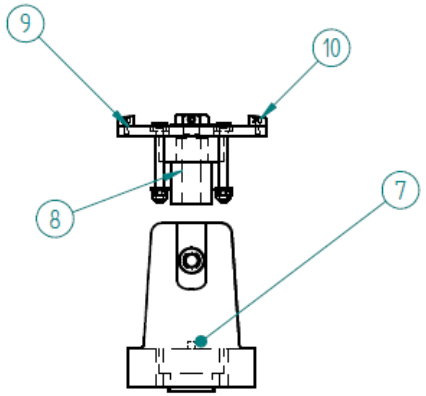


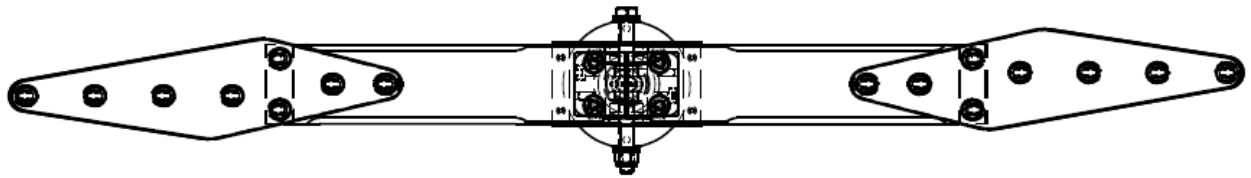


* Hub bar length is dependent on rotor diameter

HUB BAR AND HEAD CONSTRUCTION DETAILS







1. Block
2. Module
3. Hub
4. Connecting grip
5. Washer 5.5 mm
6. Grip 5.5 mm
7. Head tower
8. Main bearing bushinh
9. Grip 140x80 mm
10. Stop plate

HUB BAR AND HEAD CONSTRUCTION DETAILS

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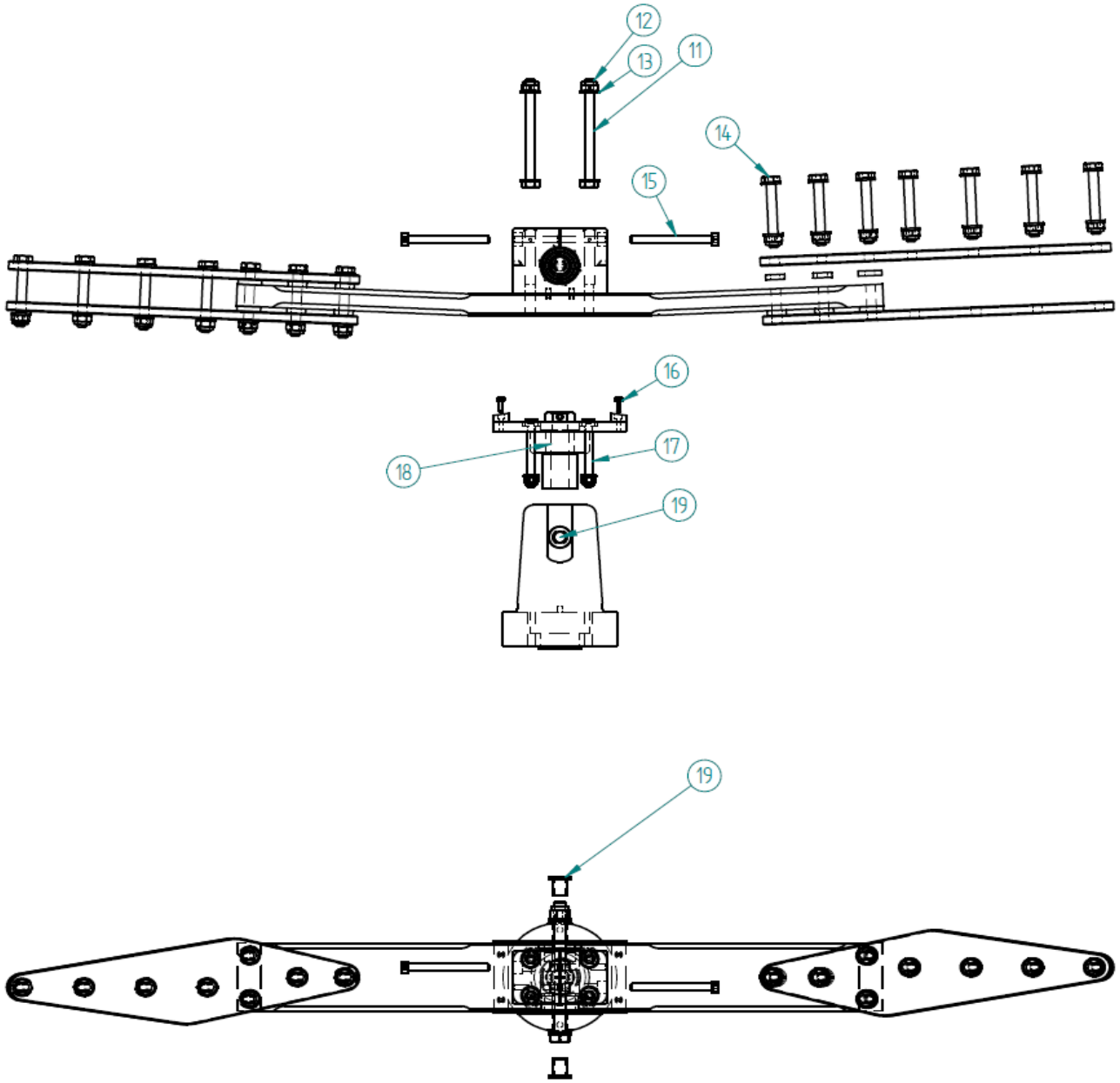
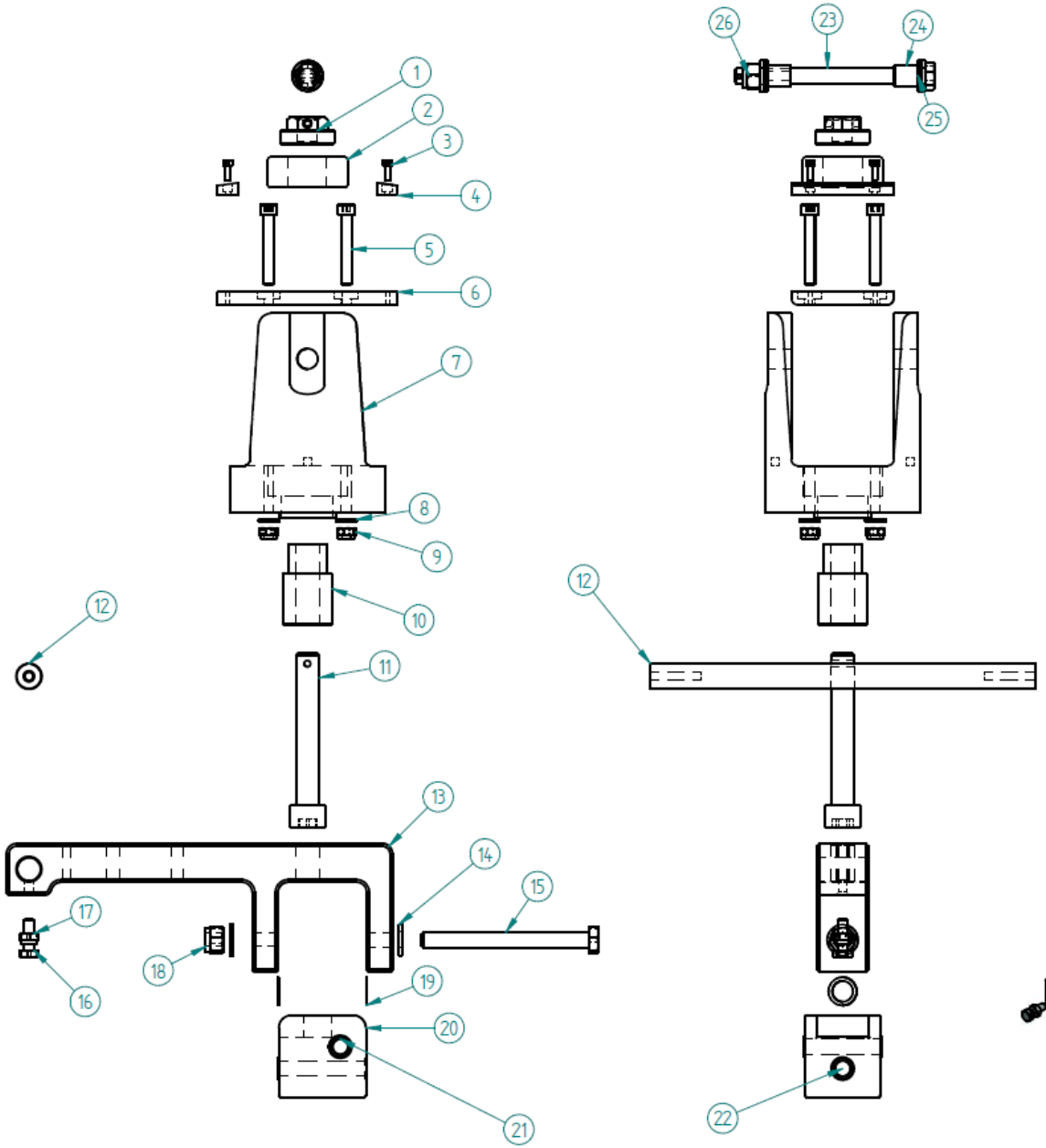
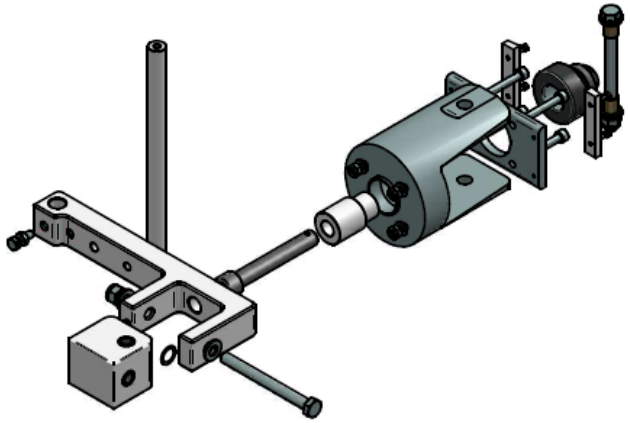


11. Screw M10 x 115 mm class 10.9 4 pcs
12. Lock nut M10 22 pcs
13. Washer M10 36 pcs
14. Bolt M10 x 75 class 10.9 16 pcs
15. Bolt M8 x 85 class 8.8 2 pcs
16. Bolt M4 x 12 class 8.8 4 pcs
17. Bolt M8 x 74 class 8.8 4 pcs
18. Bearing 3206 A-2RS1TN9 / MT33
19. Bushing

HUB BAR AND HEAD CONSTRUCTION DETAILS



1. Nut M18
2. Bearing 3206 A-2RS1TN9/MT333
3. Bolt M4x12mm class 8.8 4 pcs
4. Stopper 2 pcs
5. Bolt M8x55mm class 8.8 4 pcs
6. Grip 79x140mm
7. Head tower
8. Pad M8 4 pcs
9. Nut M8 4 pcs
10. Bushing 3206
11. Bolt M18x120mm class 10.9
12. Steering shaft
13. Control body
14. Pad M12 2 pcs
15. Bolt M12x130mm class 10.9
16. Bolt M8x25mm class 8.8
17. Nut M8
18. Nut M12
19. Pad ⌀17x0.5 2 pcs
20. Block
21. Bushing ⌀16x59mm
22. Bushing ⌀16x68mm
23. Bolt M12x150mm class 10.9
24. Nut M12
25. Bronze bushing
26. Pad M12 2 pcs



HEAD CONSTRUCTION DETAILS

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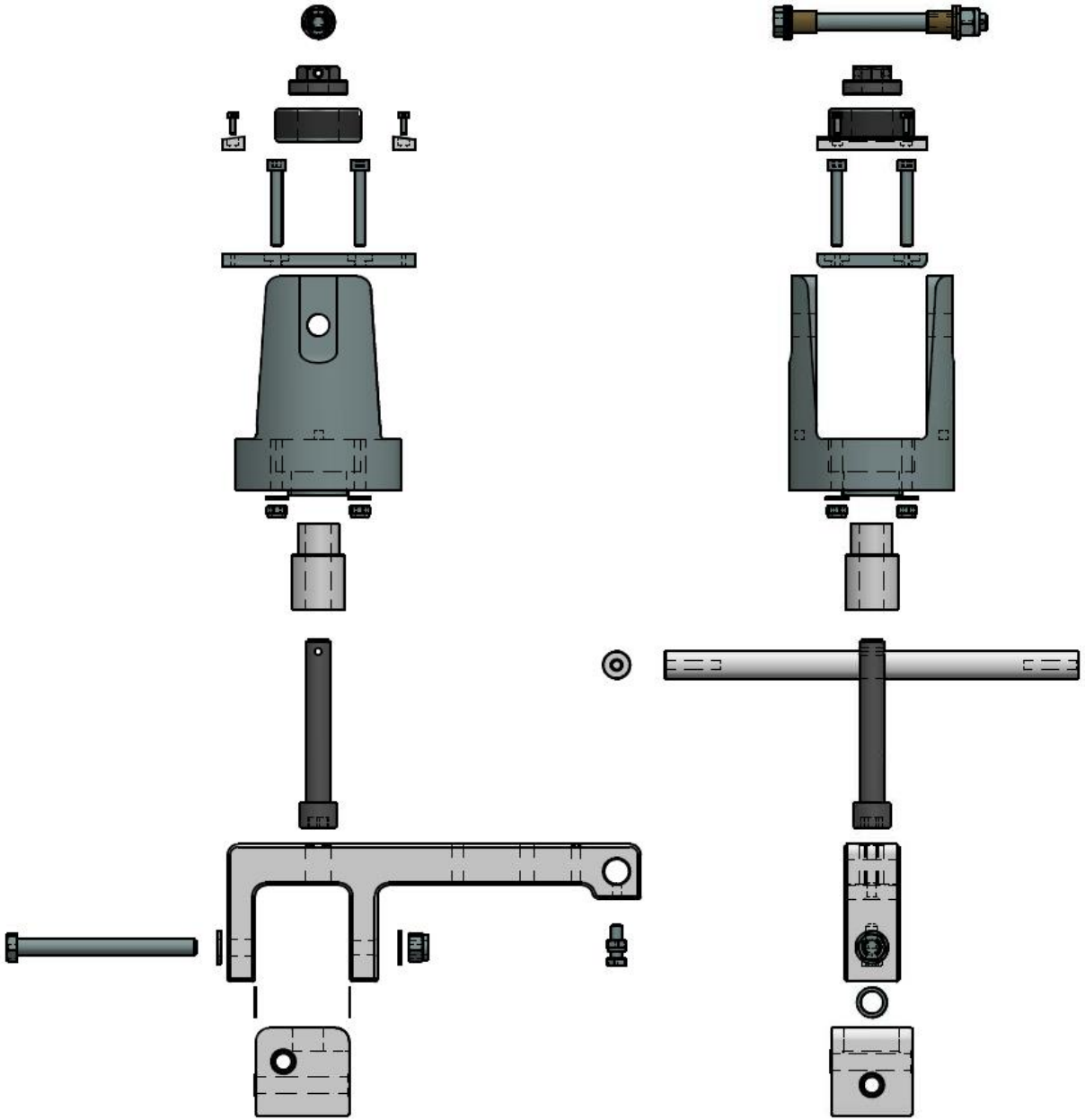

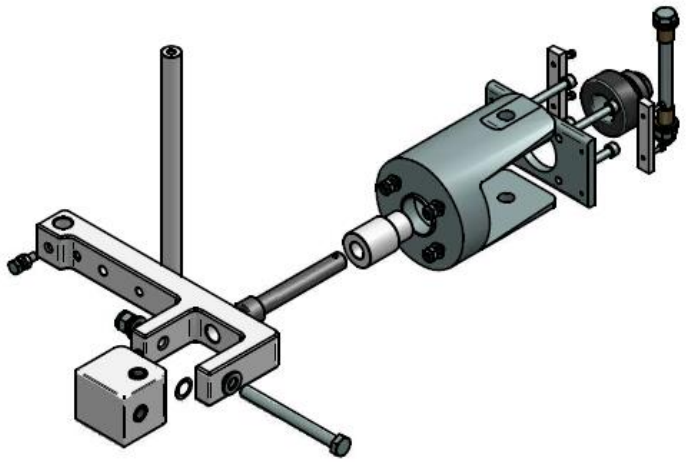

HEAD CONSTRUCTION DETAILS

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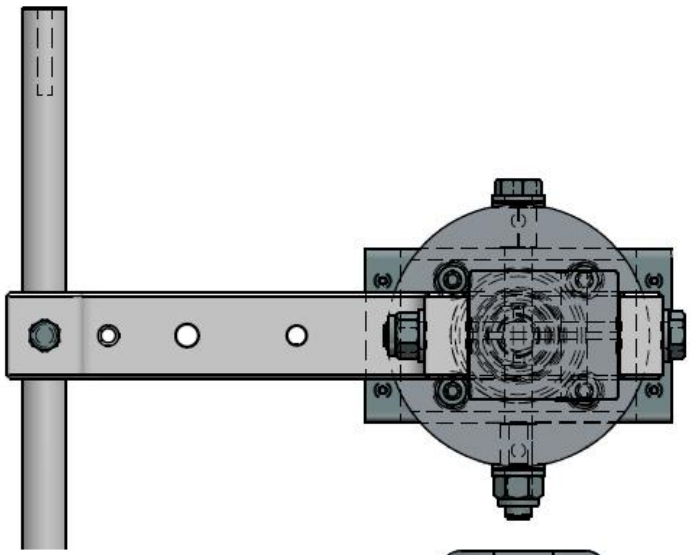

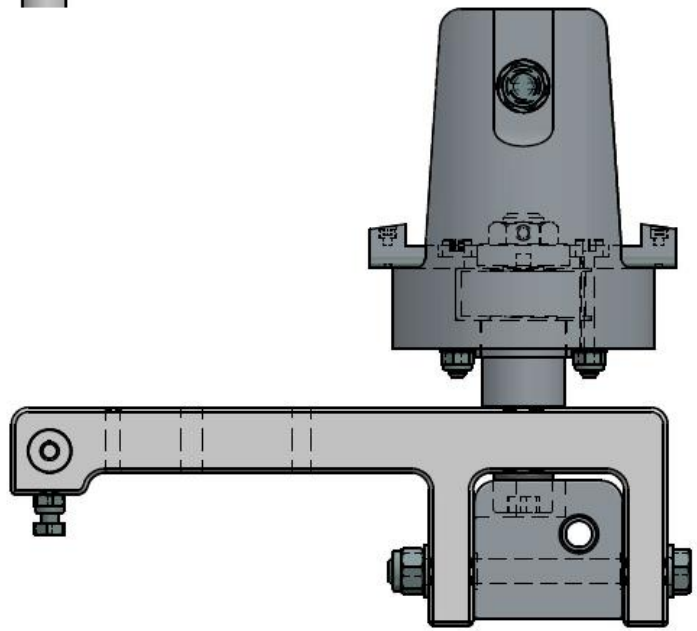

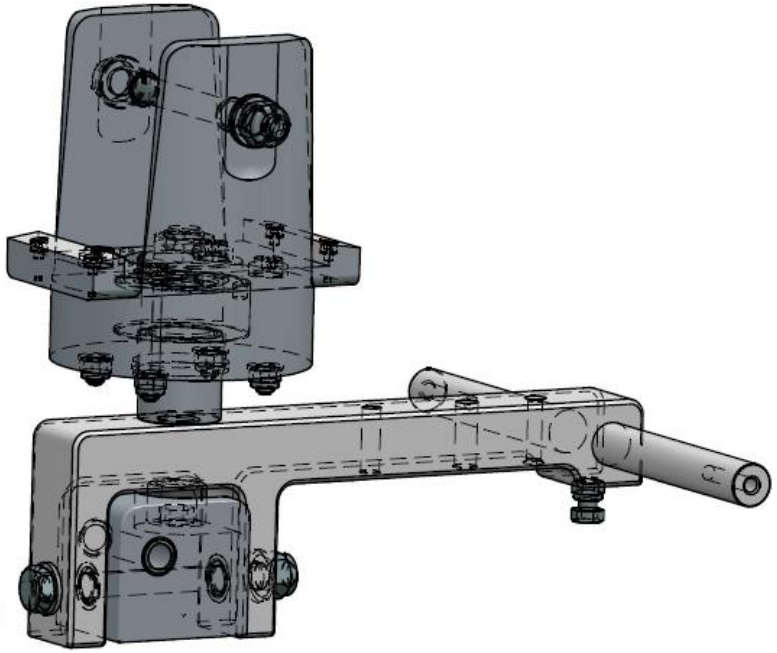

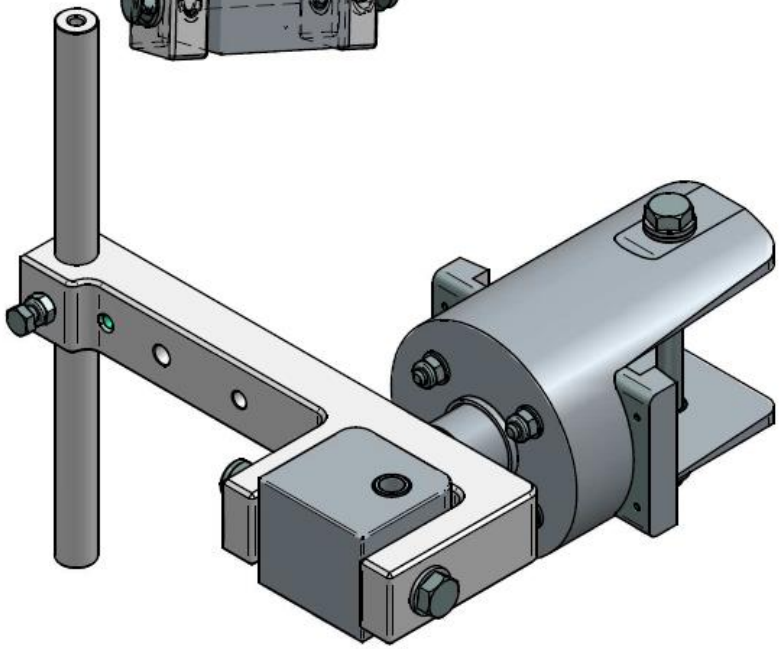

Balancing of Gyro-Tech blades and a complete rotor set

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- All Gyro-Tech composite carbon blades are statically balanced at the factory before delivery to a customer. Each blade has exactly the same weight and equal CG position.
- Then, the blades are assembled with the hub bar and installed on a ground testing station, where dynamic balancing is performed by use of PB 4 balancer and where blades tracking is adjusted.
- Please keep in mind that the rotor has to be disassembled for transport in a box. Reassembly of the rotor and its installation on a gyrocopter will cause necessity to make some minor adjstments and regulations.

Blades stringing procedure

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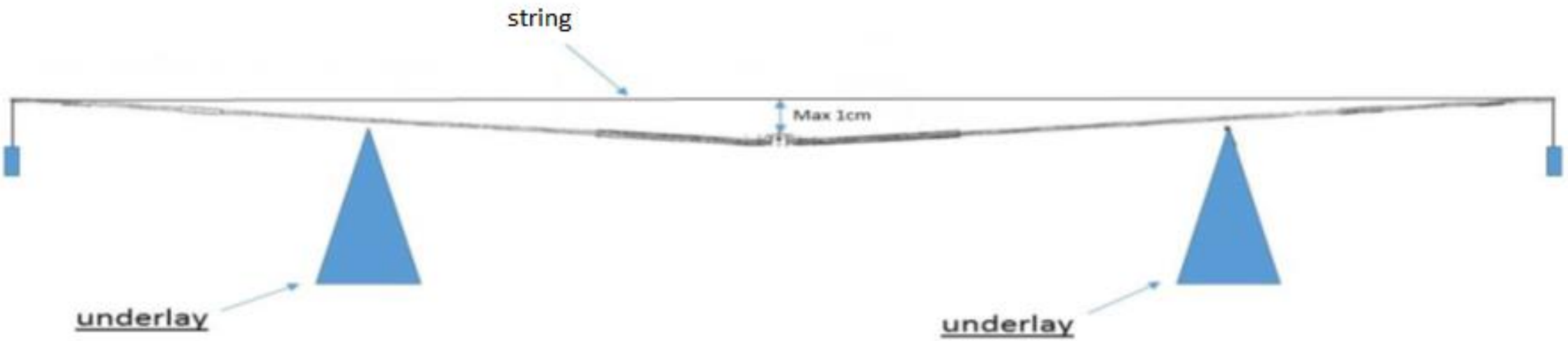
Blades stringing is required before installation of the rotor on a gyrocopter.

1. Assemble the blades to the hub bar and place the rotor on two underlays. The underlays should be situated in such a way that the height of the string over the control point on the block does not exceed 10 mm.



At this stage, all mounting bolts should be tightened with a light force enabling to make stringing adjustments.

2. Then, install a string with weights and carry it through control points located at blade ends

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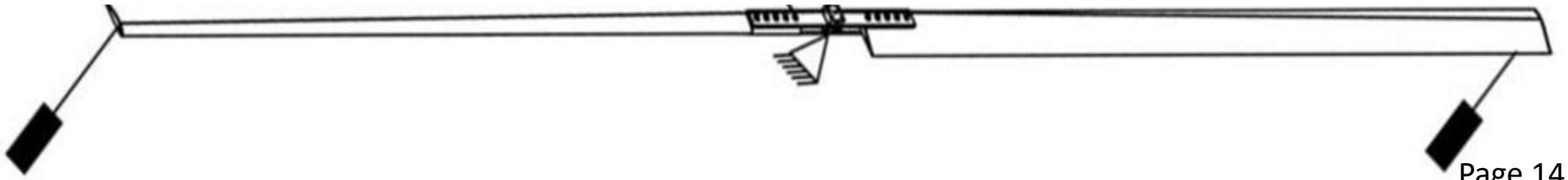
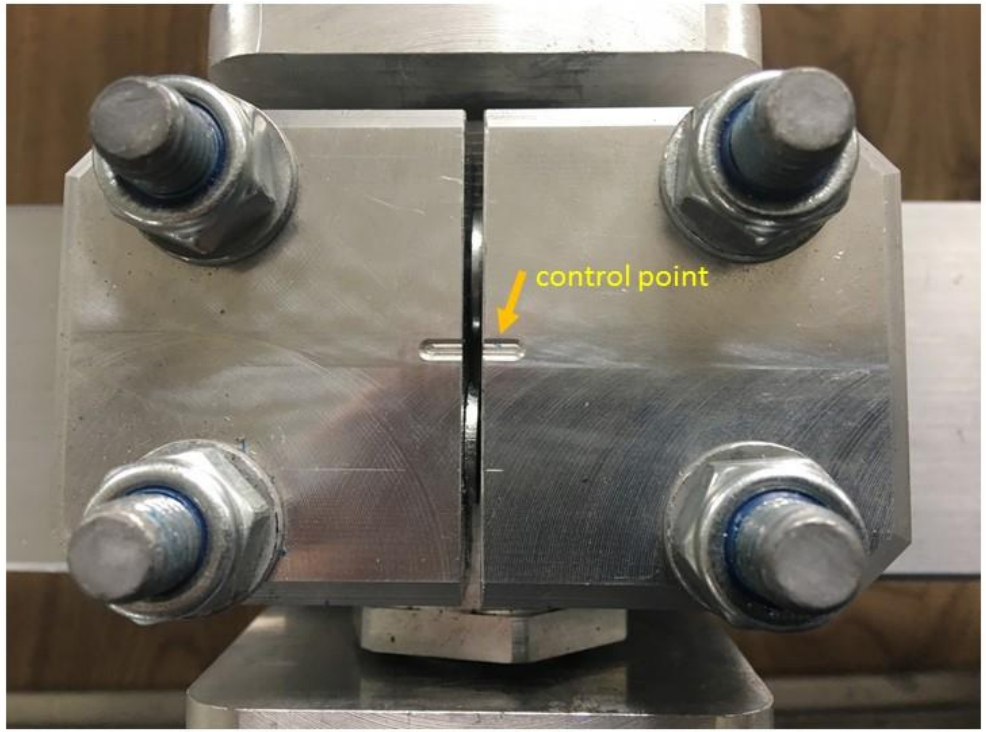
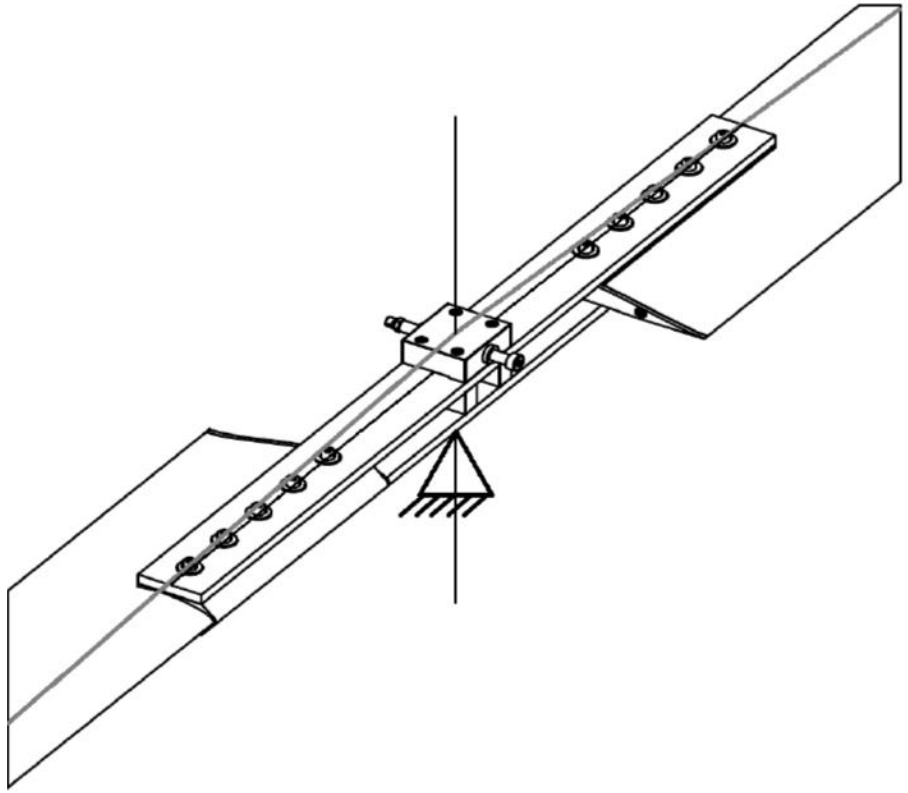
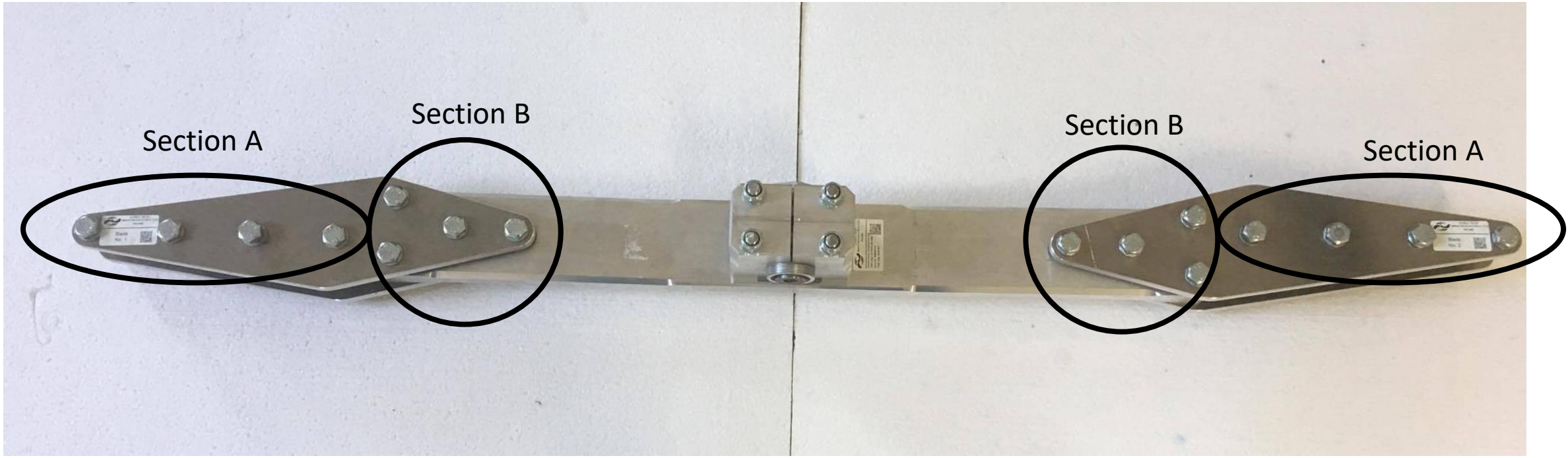


3. After initial stringing adjustments, the string should be located centrally over the control point in the middle of the hub bar block.





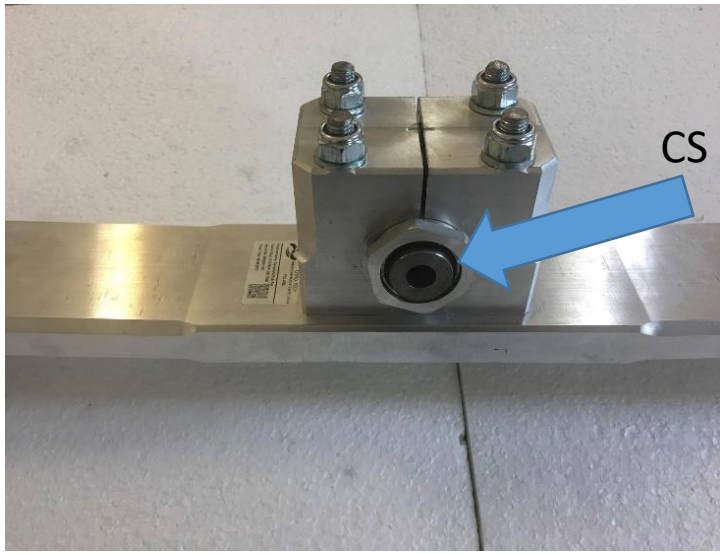
4. Then, tighten all the bolts in section A (at both sides) and at one side of section B.
   Use torque of 60 Nm for section A and 60 Nm for section B.



5. After tightening the bolts at both sections A and B, once again check the position of the string over the control point on the hub bar block. The string must be located exactly above the centre of the control point. If needed, make some adjustments and finally tighten the bolts at the second B section.

6. If the rotor stringing has been successfully finished, the rotor is ready to install on a gyrocopter.

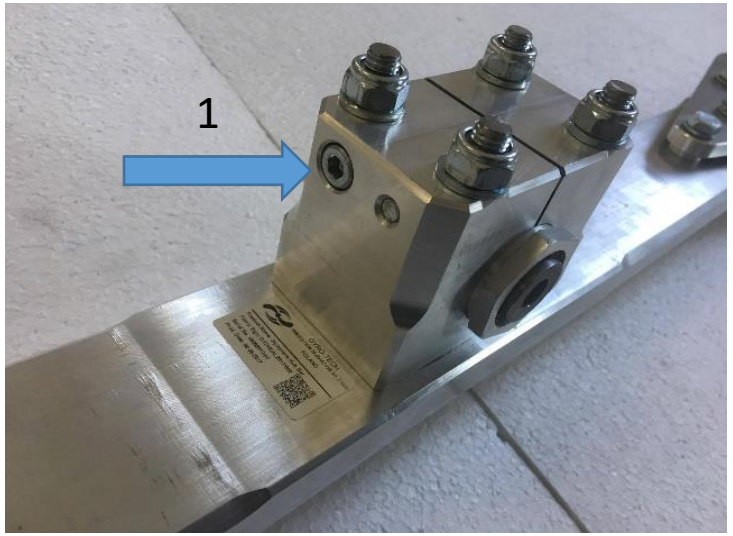
7. After installation of the rotor on the gyrocopter, the hub bar needs to be centered between rotor head towers.

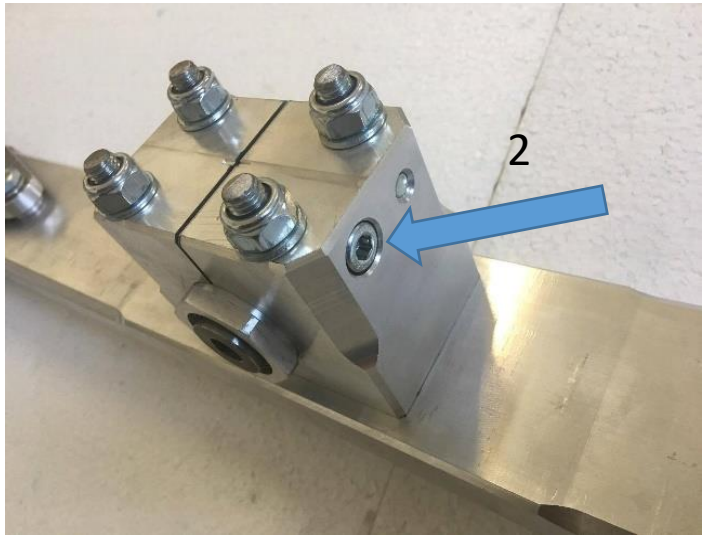


For this purpose, use the centering system installed inside the hub bar block (CS).

To start using the centering system, loosen the bolts 1 and 2 at both sides of the hub bar block.

The hub bar should be located right at the middle between two rotor head towers. If it is not, use the centering system and a filler gauge.

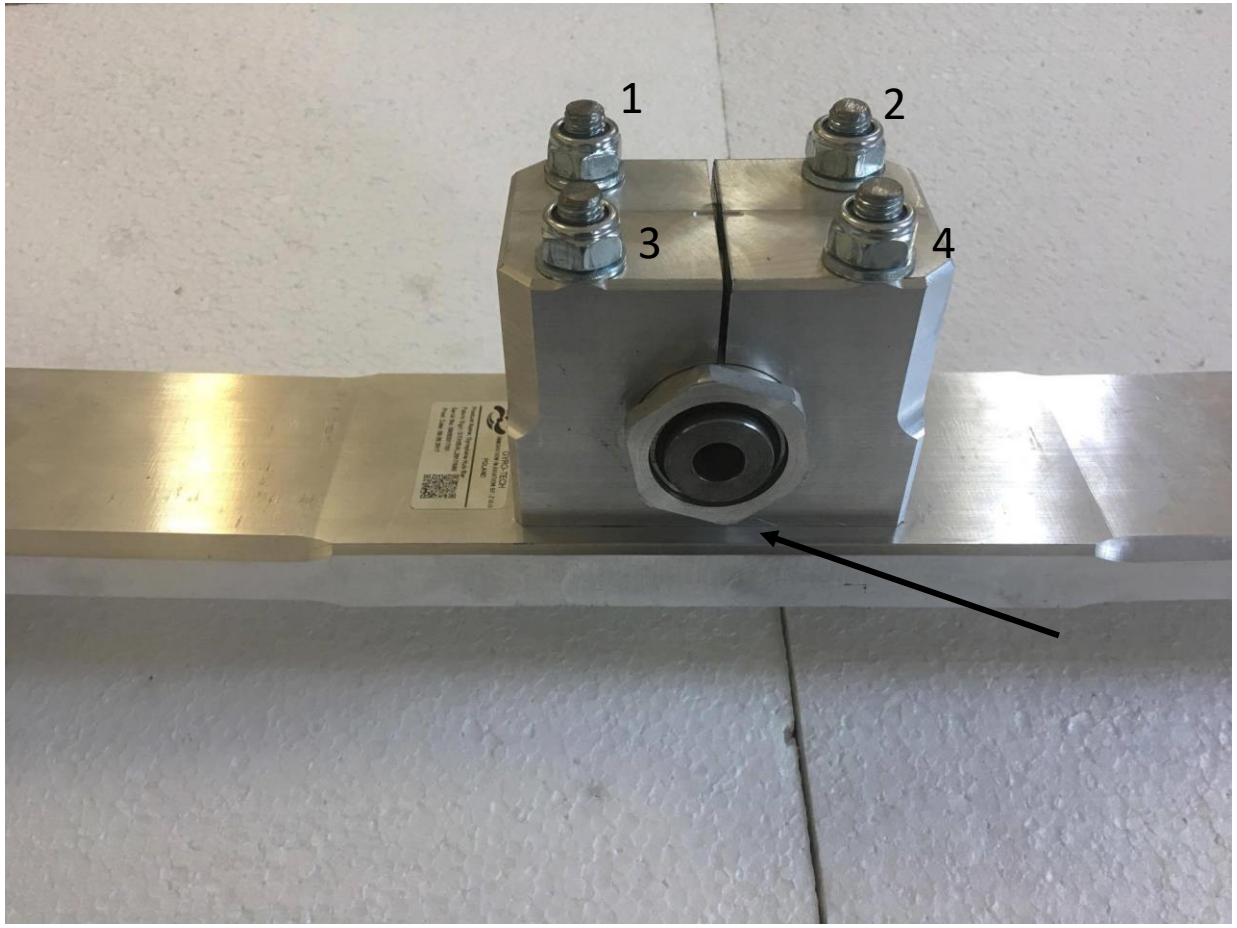




Make adjustments by use of the main CS bolt.

After finishing of the adjustments, bolts 1 and 2 need to be tightened.

8. After centering the hub bar between rotor head towers, the last step is blades tracking adjustment. Blades tracking adjustment is done by use of thin pads placed between the block and the hub bar



In order to adjust tracking of the blades, loosen the bolts 1-4 as presented in the picture.

On the proper side, install a thin pad between the block and the hub bar. The pad needs to be at full length of the hubbar block.

Then, tighten all 4 bolts with 60 Nm torque. Normally, used are pads of 0.05 mm to 0.10 mm thickness.

The washers can be made of a filler gauge elements.

Maintenance activities

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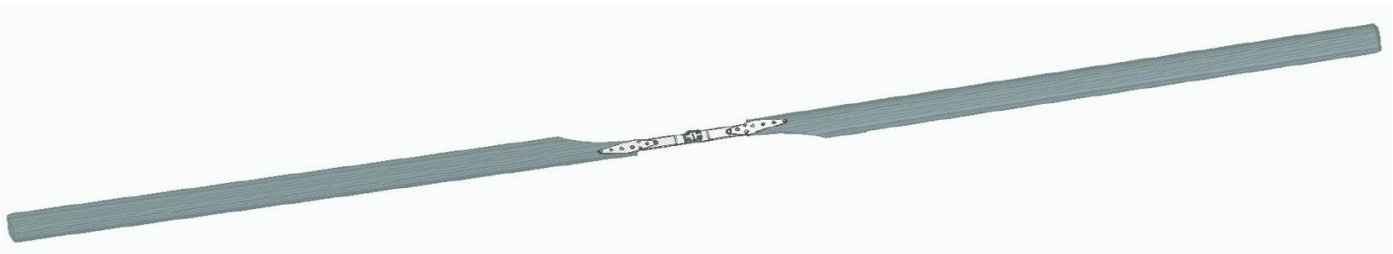
Carbon blades
1. Visual inspection before each flight
2. Please note that the recommended rpm range is 320-390 depending on the gyrocopter weight. The maximum rpm level is 430.
3. Before each flight, the blades need to be washed and cleaned of all impurities and insects. Use water with soap or detergent and a sponge.
4. Check the condition of hub and blade connection. Stringing of rotor blades according to blades stringing procedure – each 100 hours
5. The blades do not require any service activities. Their lifetime is unlimited. Permitted are minor repairs of the paiting coat on your own. In case of any doubts please contact the Manufacturer.
6. It is recommended that the blades are sent back to the Manufacturer for overhaul and eventual paint coating correction each 1,000 hours



Maintenance activities

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Hub bar
1. Visual inspection before each flight
2. Check the tightening torques for bolts and nuts fastening blades and rotor hub – each 25 hours
3. Condition assessment of the 4 bearings in the hub bar block - once a year or each 100 working hours
4. Replacement of the bearings in the hub bar block - each 500 working hours Agressive flying techniques cause faster wear of bearing (look at point 1.)
5. Replacement of the mounting bolts – each 1000 working hours

Maintenance activities

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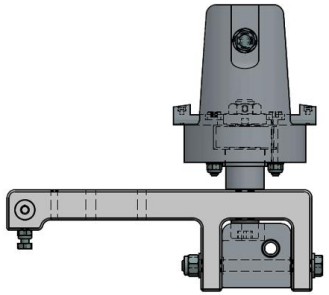
Rotor head (part 1)
1. Visual inspection before each flight
2. Check of the head for its general condition, cracks, deformations, corrosion, strength of fastening, other irregularities – each 25 hours. Check for direct corrosion around the main bearing, if present, the bearing must be replaced
3. Check the freedom of rotation of the rotor hub on the head (teeter bolt) and tightening the nut. - each 25 hours. The correct torque is 15 Nm. Secure with a cotter pin.
4. Checking the operation of the rotor brake – each 25 hours. If the friction contact with the brake lining is on the shield is not correct (full), adjust its setting to ensure the most effective braking at keeping the right angle.
5. Check the bolts in the head for general condition, signs of wear, deformation, corrosion and other irregularities – each 50 hours



Maintenance activities

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Rotor head (part 2)
6. Check the looseness in bearings – each 50 hours. If necessary, replace the bearing.
7. Check the attachment of the ring wheel to the head and fixing screws - each 100 hours. M8 bolts: 24 Nm ± 1 Nm
8. Check the condition of the brake lining and the friction surface of the disc. – each 100 hours. The maximum wear of cooperating friction elements is 0.5 mm. If necessary, please replace them with original parts.
9. Check the rotor oscillation limiters, if they provide freedom of fluctuation of ± 6° - each 100 hours
10. Replacement of the main bearing – each 500 hours. Bearing no. 3206 A-2RS1TN9/MT333

We wish you a nice and pleasant flying
with Gyro-Tech rotor!

Your Gyro-Tech Team