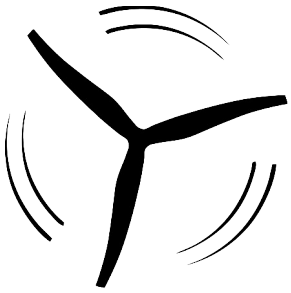
E-Props

INSTALLATION & MAINTENANCE MANUAL

ASCALON
range of Ground ajustable pitch propellers



Thank you for choosing an E-PROPS ASCALON propeller.

The ASCALON range has been designed and manufactured with the highest standards of quality, performance and reliability, drawing on E-PROPS' long experience in composite propeller technology.

A propeller is NOT an accessory but a **critical structural and rotating component of the aircraft**. Its correct installation, adjustment and maintenance are essential to flight safety.

This Installation and Maintenance Manual has been prepared to provide the information required for the safe installation, ground pitch adjustment, operation and continued airworthiness of the ASCALON ground-adjustable propeller, designed for direct-drive engines. It applies to both certified and non-certified (experimental) aircraft installations.

Before installation or operation, **read this Manual carefully and in its entirety**, and ensure that all procedures are fully understood and strictly followed. If any doubt exists regarding installation, adjustment, compatibility or operation, contact E-PROPS before proceeding.

When correctly installed, adjusted and maintained, your E-PROPS ASCALON propeller will provide you with efficient and reliable service.

We wish you safe and enjoyable flights.

Anne LAVRAND

E-PROPS CEO

Jérémie BUIATTI

E-PROPS CTO

1. WARNING

Failure to comply with the instructions and limitations contained in this Manual may result in propeller malfunction, loss of aircraft control, serious injury or death.

The ASCALON propeller is approved only for installation on direct-drive engines and only on engine models expressly listed as approved for the specific ASCALON propeller model. Installation on any engine type, variant or configuration not listed as approved by E-PROPS, is not permitted.

Installation, ground pitch adjustment, inspection and maintenance shall be performed by appropriately qualified and authorized personnel, in accordance with this Manual and the applicable airworthiness requirements. Only E-PROPS-approved parts, fasteners, tools and specified torque values shall be used.

Any modification, alteration, repair, substitution of parts, or assembly not accomplished in accordance with the instructions approved by E-PROPS invalidates the airworthiness approval of the propeller, voids the E-PROPS warranty, and releases E-PROPS from any responsibility or liability for resulting consequences.

For installations on aircraft operated under experimental or non-certified regulations, the owner and/or operator acknowledges that the propeller-engine-airframe combination may not be approved or demonstrated under certification standards and assumes full responsibility for its airworthiness and continued safe operation. Enhanced inspection and maintenance practices are required.

This Manual is part of the Instructions for Continued Airworthiness and shall be retained with the aircraft documentation for the entire service life of the propeller.

Only the latest revision issued by E-PROPS is valid.

The current approved revision of this Manual is available on the E-PROPS website: www.e-props.fr

For any questions regarding installation, approved configurations, operation or maintenance, E-PROPS Technical Support shall be contacted before proceeding.

2. AMENDMENT TABLE

Issue	*Amendment Description*	*Date*
01	Initial issue	07/10/2025

	Name	*Date*	*Signature*
Prepared	Yoann Cossec	07/10/2025	
Verified	Himaé Guigne		
Approved	Jérémie Buiatti		

3. TABLE OF CONTENTS

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4. GENERAL

4.1. Purpose

This publication provides operation, installation and maintenance instructions for E-PROPS on ground ajustable pitch propellers (range ASCALON). Installation, removal, operation and trouble shooting data are included in this publication. However, the airplane manufacturer's manuals should be used in addition to this information.

4.2. Contact Information

Helices E-Props – SAS Electravia

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04200 Vaumeilh - FRANCE

Phone: +33 492 340 000

E-mail: helices@e-props.fr

Website: www.e-props.fr

4.3. Certification

The ASCALON propeller range is designed and tested to EASA CS-P.

All propellers are produced in accordance with E-Props quality system which guarantees conformity with the design data.
E-PROPS is currently working on the following procedures:
- application for DOA (Design Organisation Approval) according to EASA Part 21J
- application for POA (Production Organization Approval) according to EASA Part 21G
- application for Type Certificates for some E-Props models suitable for use on certified aircraft (EASA CS-P, FAA 14 CFR PART 35)

4.4. Abbreviations

Abbreviation	Term
AD	Airworthiness Directives
AFM	Aircraft Flight Manual
AMM	Aircraft Maintenance Manual
Opt.	Optional
EASA	European Aviation Safety Agency
FAA	Federal Aviation Administration
FH	Flight Hour
ICA	Instructions for Continued Airworthiness
IPL	Illustrated Parts List
IPS	Inch Per Second
N/A	Not Applicable
POH	Pilot’s Operating Handbook
P/N	Part Number
RPM	Revolution per Minute
STC	Supplemental Type Certificate
S/N	Serial Number
TBO	Time Between Overhaul
TC	Type Certificate
TSN	Time Since New
TSOH	Time Since Overhaul
TT	Total Time

TSO	Technical standard order
ONRP	Outils numerique de reglage du pas (numeric tool for pitch ajustement)

4.5. Terms and Definitions

Term	Definition
Blade Angle	Measurement of blade airfoil location described as the angle between the blade airfoil and the surface described by propeller rotation
Blade Centerline	An imaginary reference line through the length of a blade around which the blade rotates
Blade Station	Refers to a location on an individual blade for blade inspection purposes. It is a measurement from the blade "zero" station to a location on a blade, used to apply blade specification data in blade overhaul manuals. Note: Do not confuse blade station with reference blade radius; they may not originate at the same location
Chord	A straight line distance between the leading and trailing edges of an airfoil
Composite Material	Carbon, or fiberglass fibers bound together with, or encapsulated within an epoxy resin
Corrosion	Corrosion is the gradual degradation of a material due to a chemical or electrochemical reaction with its environment.
Crack	Irregularly shaped separation within a material, sometimes visible as a narrow opening at the surface
Defect	An imperfection that affects safety or utility
Delamination	Internal separation of the layers of composite material

Dent	The permanent deflection of the cross section that is visible on both sides with no visible change in cross sectional thickness
Distortion	Alteration of the original shape or size of a component
Erosion	Gradual wearing away or deterioration due to action of the elements
Fretting	Damage that develops when relative motion of small displacement takes place between contacting parts, wearing away the surface
Impact Damage	Damage that occurs when the propeller blade or hub assembly strikes, or is struck by, an object while in flight or on the ground
Laminate	To unite composite material by using a bonding material, usually with pressure and heat
Minor Deformation	Deformed material not associated with a crack or missing material
Moment of Inertia	Rotational inertia is a quantity that determines the torque needed for a desired angular acceleration around the rotational axis. Moment of inertia, expressed in kg.m2 or lbf.ft.s2
Nick	Removal of paint and possibly a small amount of material
Outboard	Toward the tip of the blade
Overhaul	The periodic disassembly, inspection, repair, refinish, and reassembly of a propeller assembly to maintain airworthiness
Pitting	Formation of a number of small, irregularly shaped cavities in surface material caused by corrosion or wear
Porosity	Air or gas that has been trapped and cured into a

	laminate
Track	In an assembled propeller, a measurement of the location of the blade tip with respect to the plane of rotation, used to verify face alignment and to compare blade tip location with respect to the locations of the other blades in the assembly
Trailing Edge	The aft edge of an airfoil over which the air passes last
Leading edge	It is the leading edge of an aerodynamic profile. This edge is the first point of contact and allows the separation of air molecules.
Windmilling	The rotation of an aircraft propeller caused by air flowing through it while the engine is not producing power
Torsional vibration	Torsional vibrations are dynamic angular oscillations that occur in a rotating mechanical system when there is a variation in torque.
Restricted Operation	This is an area (operating range) that should be avoided for prolonged periods as there is a risk of resonance.

4.6. Definition of Component Life and Service

4.6.1 Component Life

Component life is expressed in terms of total hours of service (TT for Total Time or TSN for Time Since New) and in terms of hours of service since overhaul (TSOH, or Time Since Overhaul). Both references are necessary in defining the life of the component.

Certain components may be "life limited", which means that they must be replaced after a specified period of use (TT or TSN).

When a component or assembly undergoes an overhaul, the TSOH is returned to zero hours. TT or TSN can never be returned to zero.

Repair without overhaul does not affect TSOH.

Refer to §7 Airworthiness limitations.

4.6.2 Overhaul

Overhaul is the periodic disassembly, cleaning, inspecting, repairing as necessary, reassembling, and testing in accordance with approved standards and technical data.

The overhaul interval is based on hours of service (operating time) or on calendar time.

At such specified periods, the propeller assembly should be completely disassembled and inspected for cracks, wear, corrosion and other unusual or abnormal conditions. As specified, certain parts should be refinished, and certain other parts should be replaced.

Overhaul is to be accomplished in accordance with the latest revision of the corresponding Overhaul Manual. The overhaul interval for the propellers is indicated in §7.2.4

4.6.3 Repair

A Repair is a correction of a damage caused during normal operation. It is done on an irregular basis, as required.

A repair is not an overhaul.

Amount, degree and extent of damage determines whether or not a propeller must be repaired.

4.7. Warranty Service

4.7.1 General

E-PROPS warrants that the ASCALON propeller is free from defects in materials and workmanship at the time of delivery, when installed, operated and maintained in accordance with this Manual, the applicable Instructions for Continued Airworthiness, and E-PROPS approved documentation.

Warranty coverage applies only to propellers installed on approved engine configurations.

4.7.2 Warranty Claims

In the event of a suspected warranty claim, E-PROPS Technical Support shall be contacted before any repair, disassembly, modification or replacement is performed, unless immediate action is required for safety reasons.

The owner and/or operator shall provide the information required for claim evaluation, including propeller identification, operating times and a description of the reported issue.
E-PROPS will determine the appropriate corrective action and provide further instructions.

4.7.3 Exclusions and Limitations

Warranty coverage does not apply to damage resulting from:

- Improper installation, incorrect pitch adjustment or misuse
- Installation on unapproved engine types or configurations
- Unauthorized modification, repair or use of non-approved parts
- Operation outside approved limitations
- Normal wear, foreign object damage, ground strikes or environmental effects

Any unauthorized repair or alteration may void the warranty.

4.7.4 Responsibility

The determination of warranty eligibility rests solely with E-PROPS. Warranty service does not relieve the owner, operator or maintenance personnel of their responsibility to ensure continued airworthiness and safe operation of the propeller.

For warranty claims or technical assistance, contact E-PROPS Technical Support using the information available on the E-PROPS website: www.e-props.fr

5. DESCRIPTION OF PROPELLER

5.1. System overview

5.1.1 System description

- The series covered in this manual are 2 and 3 blades, on ground variable pitch propellers. They are designed for use with direct drive engines such as Lycoming, Continental, Jabiru or Vw.

(See chapter 5.1.4 for correspondence table between engine and propeller)

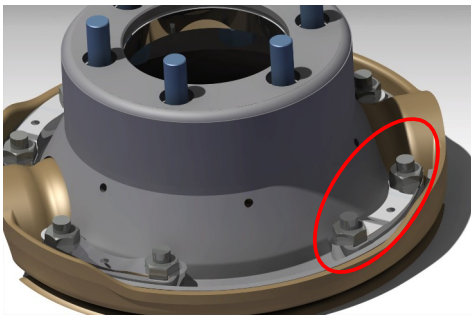
- Different blades are available depending on the propeller diameter required and engine. Different hub extensions are available depending on the distance required between the crankshaft flange and the propeller disc see §5.8.

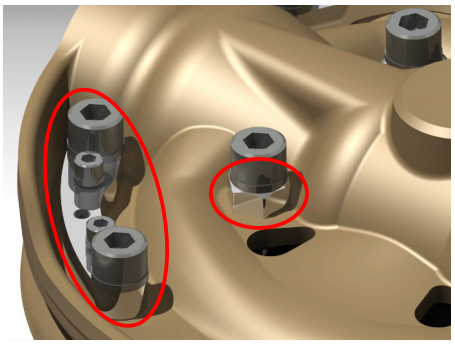
- The propeller hub and blades are made of epoxy/carbon fibre reinforced composite material, the blades include a foam core and a titanium leading edge for erosion protection.

- The hub allows a large range of pitch, stops are provided to limit the range for safety.

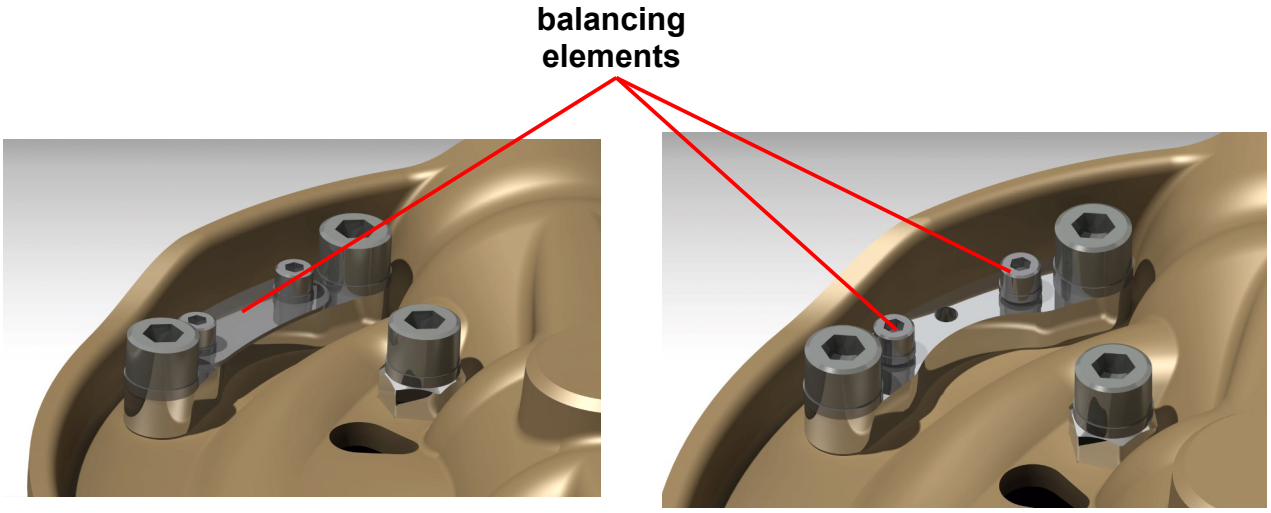
- The fasteners are custom-made in titanium specially designed for this range of propellers.

- “clamping plate” are also essential for the proper functioning of the propeller.





- Balancing screws and plates. Please note that the screws, if fitted alone, are there for balancing purposes.



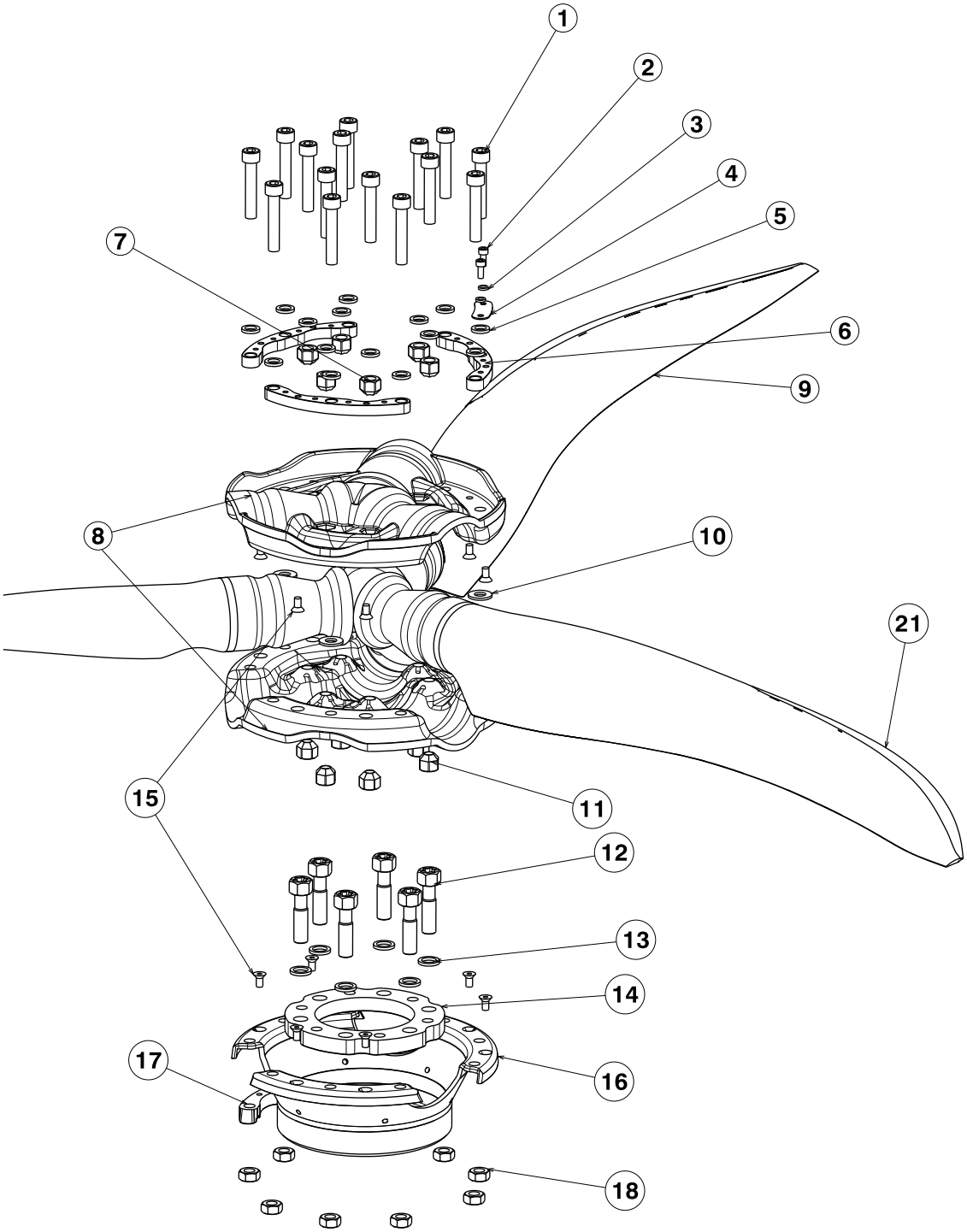
Optional equipment includes :

- A propeller spinner, is available in different shapes and diameters to fit the engine cowling. The propeller spinner is made of carbon fibre and is bolted into a conical mounting plate attached to the propeller hub extension.

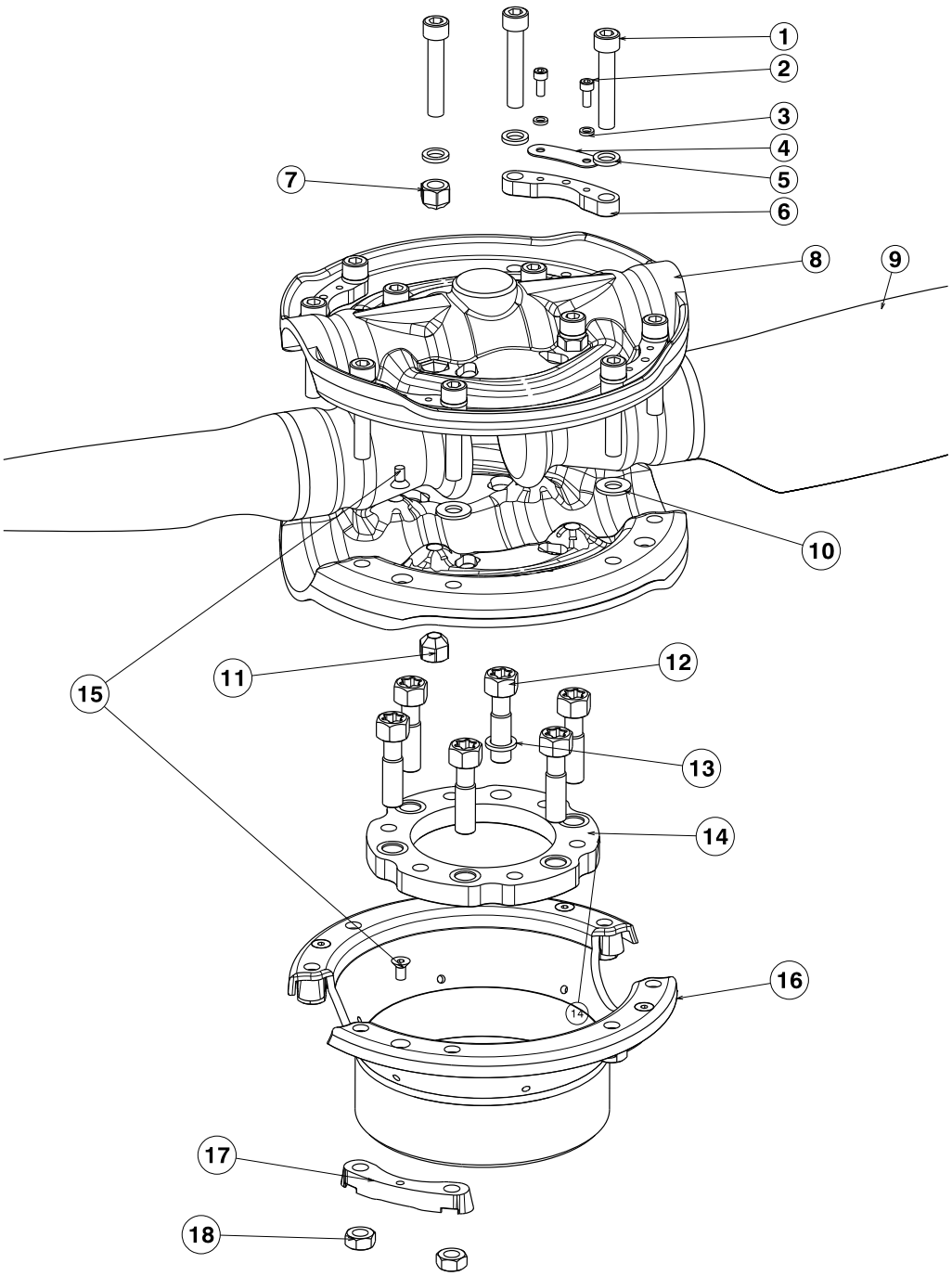
- The propeller spinner mounting plate, is available in different shapes and diameters to fit the propeller spinner. It is made of carbon fibre/epoxy.

5.1.2 Exploded view

Ascalon 3 blades



Ascalon 2 Blades



NOTE : This view shows the principle of the propeller assembly. The size of the components is variable and depends of the configuration. Spinner and spinner mounting plate are not shown.

5.1.3 Bill of materials

Item	Réf	Designation	Quantity 2 blades	Quantity 3 blades
1	o4613m4614v4614	M10x55 screw 22mm partial thread	12	15
2	o4618m4619v4619	M5x12 Socket head cap screw	depends on balancing	depends on balancing
3	o4619m4620v4620	Nordlock 5	depends on balancing	depends on balancing
4	o4614m4615v4615	Balance weight plate	depends on balancing	depends on balancing
5	o4620m4621v4621	Nordlock 10	12	15
6	o4608m4609v4609	Upper bean 2 blades	4	0
6 bis	o4609m4610v4610	Upper bean 3 blades	0	3
7	o4141m4146v4148	M10 Hexa-conical washer	4	6
8	o4612m4613v4632	half hub 2 blades	2	0
8 bis	o3833m3833v3833	half hub 3 blades	0	2
9	o4558m4558v4558	Blade	2	3
10		Carbon washer	4	3
11	o4139m4144v4146	M10 Hexa-conical nut	4	6
12	o4615m4616v4616	Hexa torx screw 1/2-UNF	6	6
12 bis	o4616m4617v4617	Hexa torx screw 3/8-UNF	6	6
13	o4621m4622v4622	Nordlock 1/2 inch	6	6
13 bis	o4622m4623v4623	Nordlock 3/8 inch	6	6
14	o3645m3645v3645	Clamping plate SAE1	1	1
14 bis	o3644m3644v3644	Clamping plate SAE2	1	1
15	o4623m4624v4624	M6x12 cuntersunk	8	12
16	o2310m3080v3080	Hub extension	1	1
17	o4610m4611v4611	Lower bean 2 blades	4	0
17 bis	o4611m4612v4612	Lower bean 3 blades	0	3
18	o4631m4632v4633	M10 titanium nut	12	15
19		Spinner [360-370-380] (PPCU)	1	1
19		Spinner [330-340-350] (PPCU)	1	1
19		Spinner [310-320] (PPCU)	1	1
19		Spinner [320-330-340-350-360-370-380] (composite)	1	1
19	o594m807v807	Spinner [310] (composite)	1	1
20	o4655m4655v4655	Spinner mounting plate [310]	1	1
20	o4656m4656v4656	Spinner mounting plate [320]	1	1
20	o4657m4657v4657	Spinner mounting plate [330]	1	1
20	o3834m3834v3834	Spinner mounting plate [340]	1	1
20	o4658m4658v4658	Spinner mounting plate [350]	1	1
20	o4659m4659v4659	Spinner mounting plate [360]	1	1
20	o4660m4660v4660	Spinner mounting plate [370]	1	1
20	o4661m4661v4661	Spinner mounting plate [380]	1	1
21		Titanium leading edge	2	3
22	o4618m4619v4619	M5x12 domed head titanium screw	6	6
23	o4683m4683v4683	M5 Nylstop nut	6	6
24		Countersunk rivet Ø3,2mm	16	18
25		M6x15 domed head titanium screw	8	9
26		Captive floating nut	8	9

5.1.4 Characteristicsand airworthiness limitations.

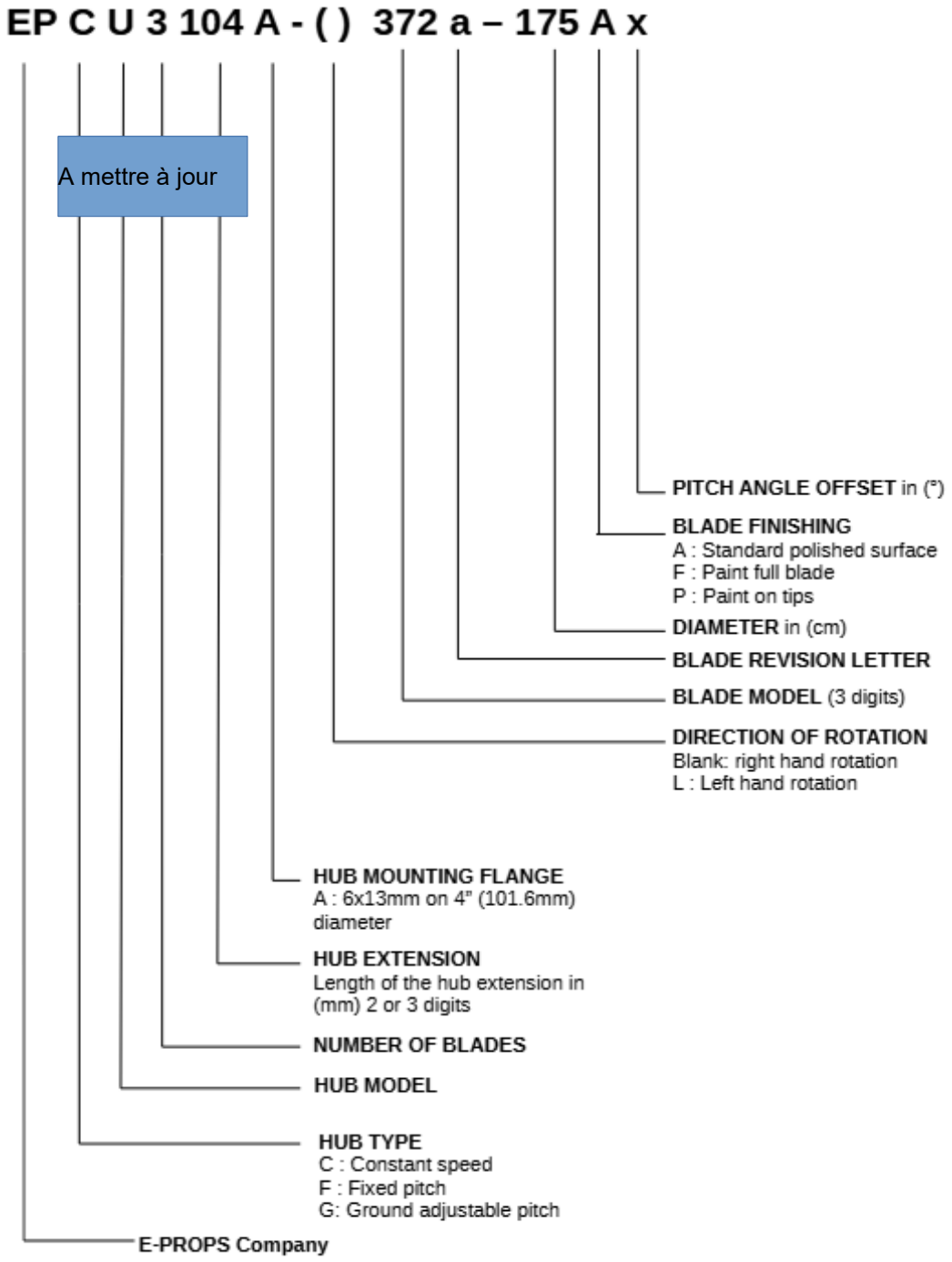
Type	Description
Number of blades	2 or 3 blades.
Diameters	From 140 to 208cm
Weight	6.5kg [diameters 190 cm in 2-blade]
Pitch variation	See table below
Propeller type	See table below
Propeller maximal power	157 kW for 2-blade / 201 kW for 3 blade
Propeller maximal RPM	See table below

For propeller-engine limitations and compatibility, a configuration table is available on the website www.e-props.fr .

Please refer to this table when choosing a configuration.

Each blade model is designed for a specific engine configuration in terms of vibration frequency.

5.2. Propeller model Designation (Meme que sur FORM52)



5.3. Performance data

For the general performance data refer to the applicable propeller data sheet.

5.4. Marking

Each part is marked with an S/N except for standard parts like screws, nuts, washers, etc.

5.5. Hub

The hub is composed of:

- Two half hubs for blade retention
- One hub extension doing the interface between the engine flange and the two half hubs: it is available in different lengths depending on the offset required between engine flange and engine cowlings, refer to the section "Propeller Model Designation" in §5.2.

All parts are made of Epoxy/Carbon fabrics.

5.6. Blade

Composite blades are made of Epoxy / Carbon braids over a foam core. Fibres are continuous between upper and lower surface to improve strength and fatigue resistance.

A protection in titanium is bonded to the leading edge of the blade, in order to protect from impact and erosion.

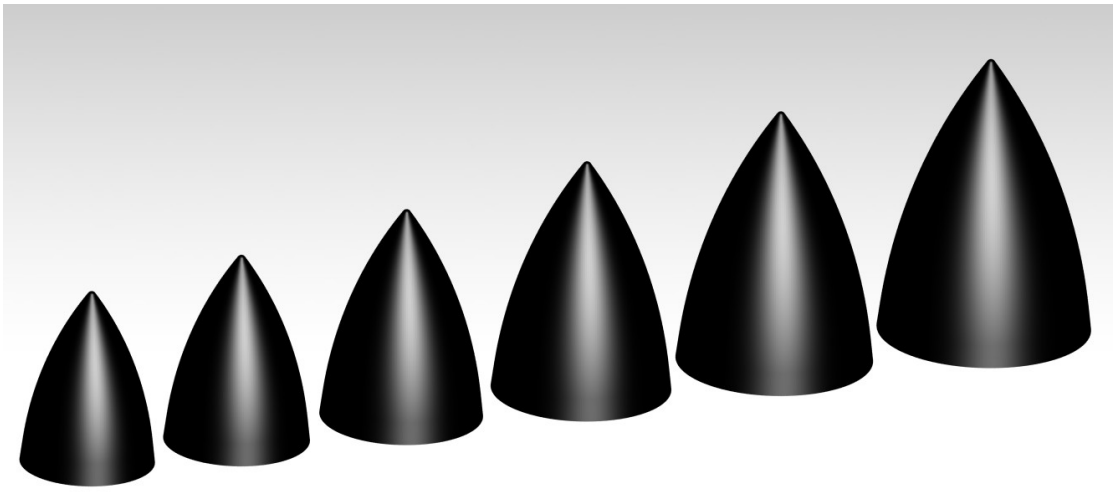
Composite blades are identified by direction of rotation, propeller diameter, and other blade characteristics. Refer to the section "Propeller Model Designation" in this chapter.

5.7. Spinner (Optional)

A complete set of spinner is composed of the spinner, its mounting plate and the necessary screws.

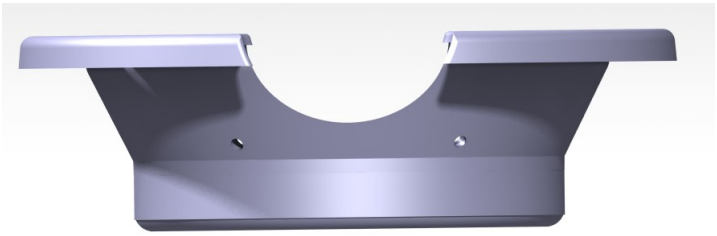
All composite parts are made in carbon fabric + epoxy resin.

The epoxy resin used by E-PROPS is including a high resistance to UV additive (UVA and UVB).



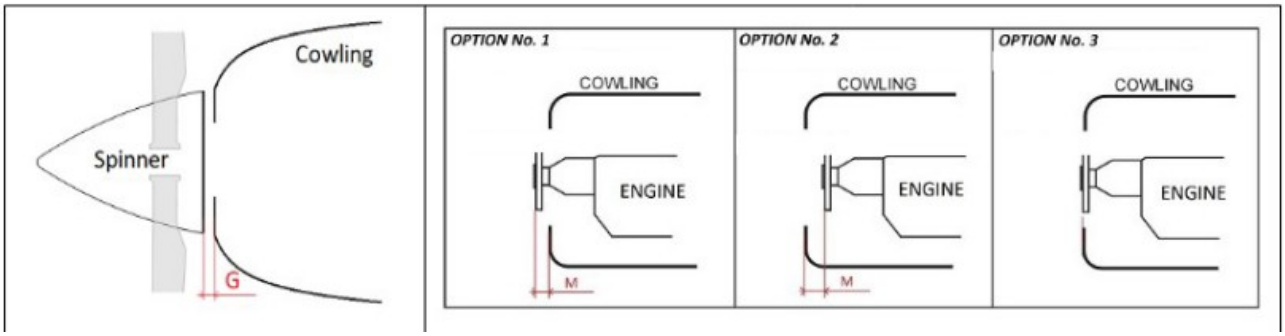
5.8. Hub extention

We offer a range of full carbon hub extention from -15 mm to +230 mm (He).Hub extention is mandatory for all propellers in the range.



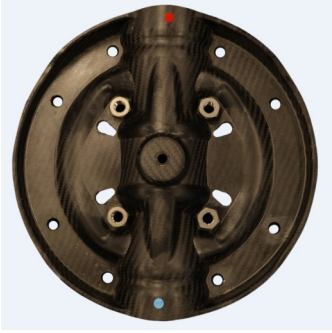
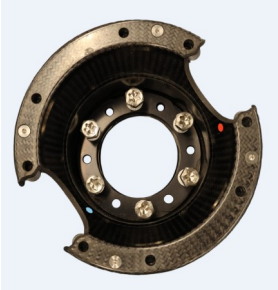
- Define the gap G you want between spinner and engine cowling, usually 10mm is perfect
- Take the measure M

Option 1 : Spacer length he = G - M
Option 2 : Spacer length he = M + G
Option 3 : Spacer length he = 0 + G



6. INSTALLATION AND CHECKS

6.1. Packaging content

Designation	Picture	Quantity
Blade		2 or 3
Superior half hub assembly		1
Inferior half hub assembly		1
Hub extension assembly **without** spinner option		1

Hub extension assembly **with** spiner option		1
Spiner (optional)		1
fasteners		1

6.2. Tools and consumables

To mount the propeller, the following tools are required:

- Torque wrench (Torque: **5**/ **11**/**80**/**100**/ N.m)
- T60 Torx bit
- T50 Torx bit
- 19 mm or 3/4 inch socket (½ screw SAE2)
- 9/16inch socket (3/8 screw SAE1)
- 17 mm flat wrench (optional)
- 8 mm flat wrench
- Allen keys
- Ratchet wrench / screwer

6.3. Torque values

Tolerance: ±2N.m et en ft,lb?

Bolt size/thread	Torque (metric)	Torque (imperial)
M10	80 N.m	59 ft·lbs
M6	11 N.m	8 ft·lbs
M5	8 N.m	6 ft·lbs
½ inch	100 N.m	74 ft·lbs
7/16	80 N.m	59 ft·lbs
3/8 inch	70 N.m	52 ft·lbs

NOTE: When an adapter is used with a torque wrench, use the following equation to determine the setting to obtain the correct torque value.

$$\text{Corrected torque reading} = \frac{\text{Torque required x wrench length}}{\text{Wrench length + extension length}}$$

$$R = \frac{T \times L}{L + A}$$

T = Actual torque reading as listed in the service manual.

L = Torque wrench lever length. This is the lever length of your torque wrench — center of grip to center of drive (see drawing). Refer to the instruction sheet that came with you torque wrench on how to determine this length.

A = Torque adapter extension length.

R = Corrected torque reading (indicated torque value to set on torque wrench).

CAUTION: Under torque of propeller bolts may cause loose blade or fretting of blade roots.

CAUTION: Over torque may cause bolt failure or hub damage.

6.4. Pre-Installation

6.4.1 Cleaning

Cleaning of the composite parts are to be done with soap and water.

The half hubs, blade roots and hub extension must be clean and dry prior to assembly.

CAUTION: Do not contaminate parts with oil, grease or silicon based lubricant, it may result in loose blade.

NOTE: In case of contamination, clean contact areas with a cloth impregnated with solvent.

CAUTION: Wear appropriate personal protective equipment when manipulating solvent.

6.4.2 Assembly of Propeller parts

When new from factory:

- Static balancing has been done, therefore it is not necessary to perform another static balancing.

6.4.2.1 Assembly of the propeller on the table

For each step, thick the box when the task is done.

❒ **Step 1** : Dismounting of the packaging assembly

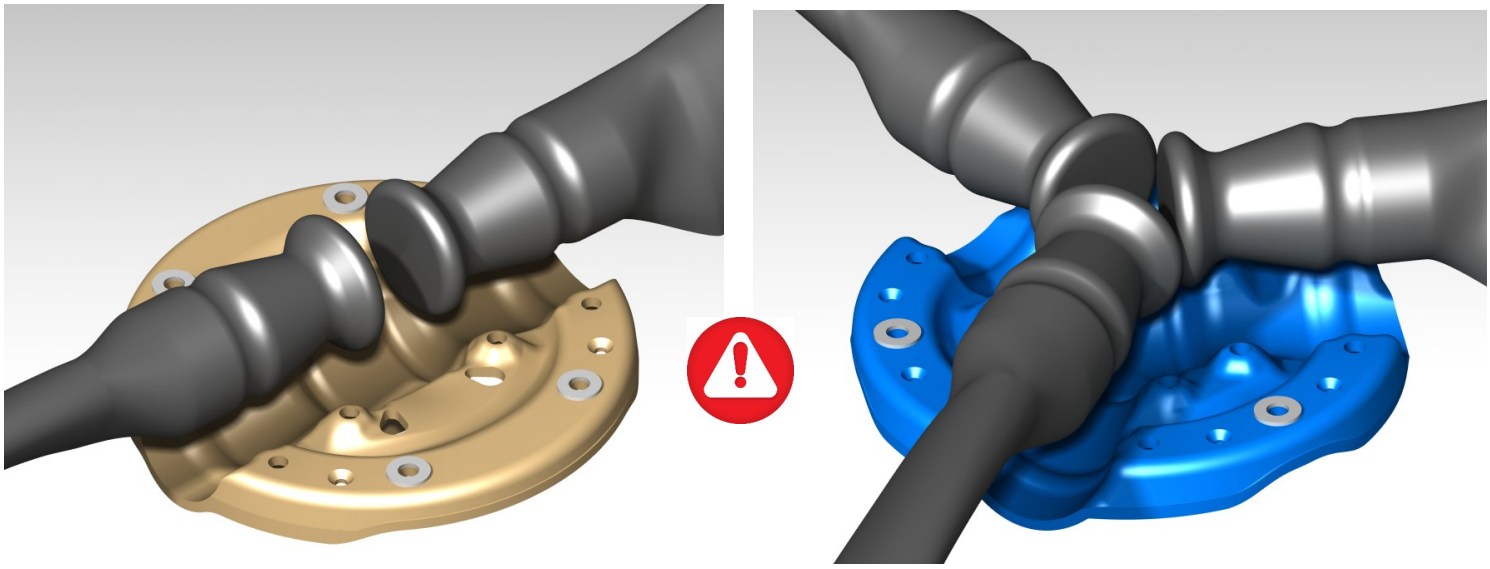
PHOTO PACKAGING

+ donner description de comment faire voir IMM glorieuse

❒ **Step 2 : Assembly of the equipped hub**

.Place the blades in their slots on the lower hub assembly. (Hub with hexaconical nuts). Match the colour of the stickers on the blades to those on the hub.

NOTE: Each blade got a sticker with 3 different colours (red, blue for 2-blade and red, blue and yellow for 3-blade), so as upper and lower half hub.



CAUTION: Check that the carbon washers are glued to the lower half hub during assembly. These washers act as spacers and ensure that the hubs are properly tightened at the blade feet. Incorrect positioning of these washers may cause the propeller to malfunction.

Place the second half hub on the blades, match the colour of the stickers on the blades to those on the hub.

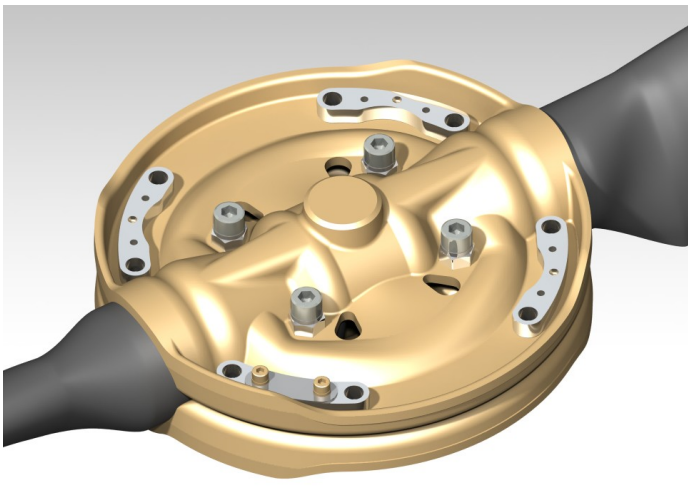
Fit the M10 screws with nickel grease on the thread (Ref. xxx) on the center hexaconical washer with Lock washers to hold the two hub halves together. Do not tighten the screws to torque in order to maintain free rotation of the blades in the equipped hub (pitch adjustment).

CAUTION: Nickel Grease must be applied to the thread to prevent the screws from seizing up. Be careful not to put grease under the lock washers so as not to change the coefficient of friction.

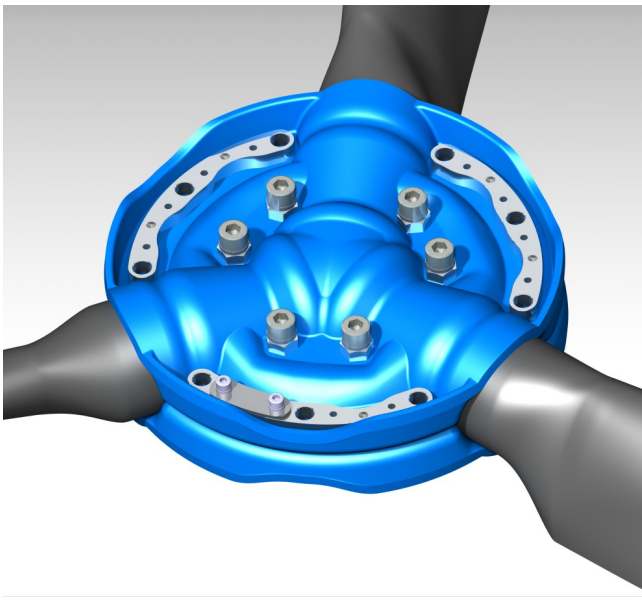
CAUTION: Check that there is no grease under Lock washers, if there is any, clean them.

CAUTION: The Lock washers work in pairs. Do not separate the two half washers.

The two sides with the most slats are the sides that come into contact with the screw and the support.

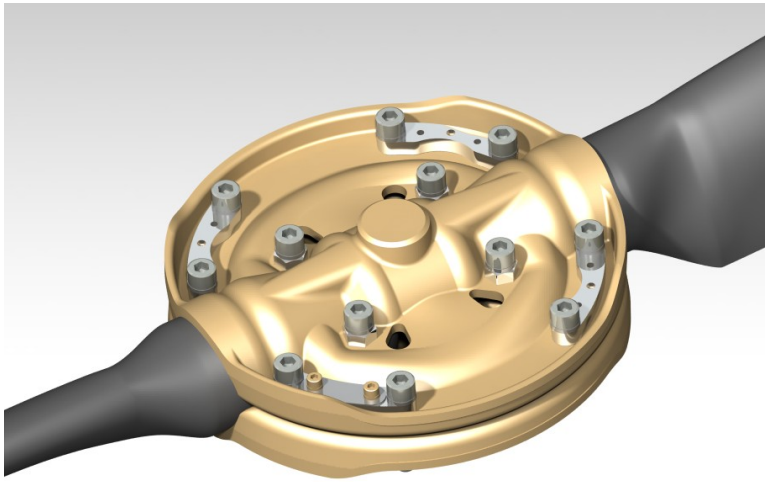


4 X screw and lock washer

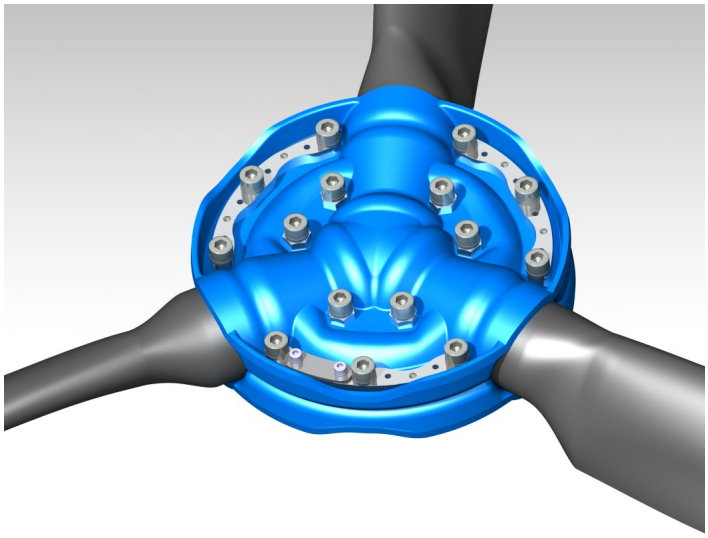


6 X screw and lock washer

Insert the M10 screws with nickel grease on the thread (Ref. Xxx) with Lock washers to secure the hub assembly.



8 X screw and lock washer



9 X screw and lock washer

6.4.2.2 Static balance

Each propeller is carefully balanced by the E-Props team: blades + hub + spacer, on high-precision digital balancing benches designed and built in-house.

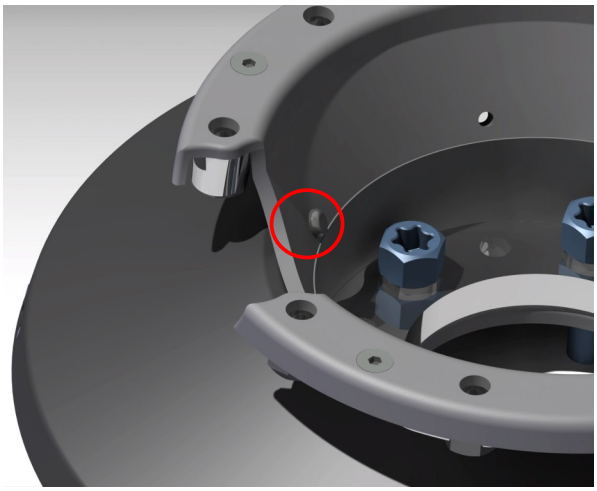
The computer system imposes a maximum tolerance of 0.3 g/m, and quality control must validate this value before authorizing shipment.

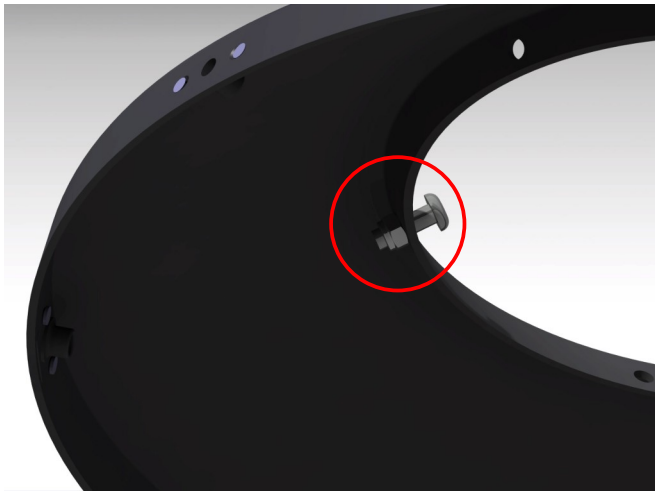
Ultra-light parts, ultra-low balancing tolerances and extremely precise assemblies result in perfectly balanced propellers that generate very little vibration.

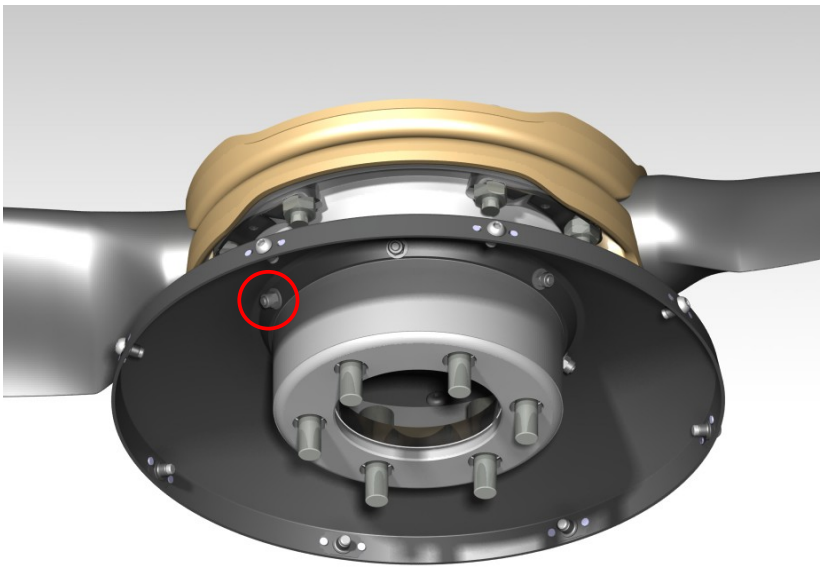
6.5. Propeller Installation

Clean engine and propeller flange. Both surfaces must be dry and clean. Remove all surface defects if any.

WARNING: If you have spinner option, please check the tightening torque of the screws holding the spinner mounting plate to the hub extension. (See § 6.3 for values.)







WARNING: MAKE SURE THAT THE ENGINE CONTACT IS OFF BEFORE ROTATING THE PROPELLER.

- Step 1 : Mounting of the hub extension to the engine flange

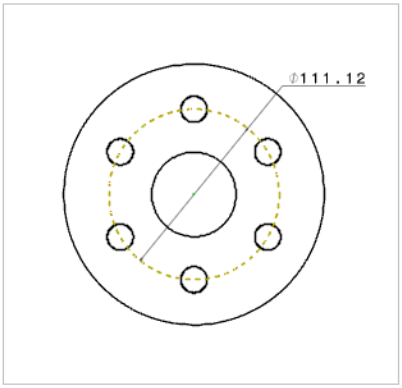
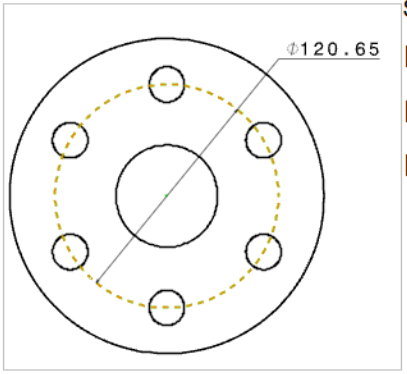
Install the clamping plate inside the equipped hub extension.

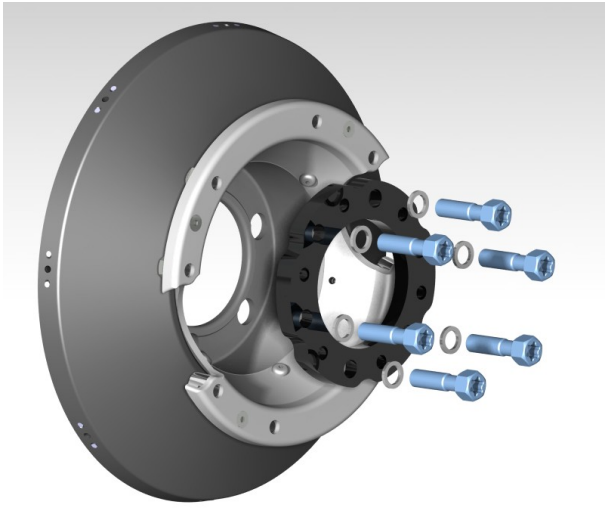
Mount the hub extension on the engine flange, insert the hexatorx screws with anti sizing grease (ref xx) and lock washers on the clamping plate.

CAUTION: SAE1/ SAE2 depending the engine flange configuration.

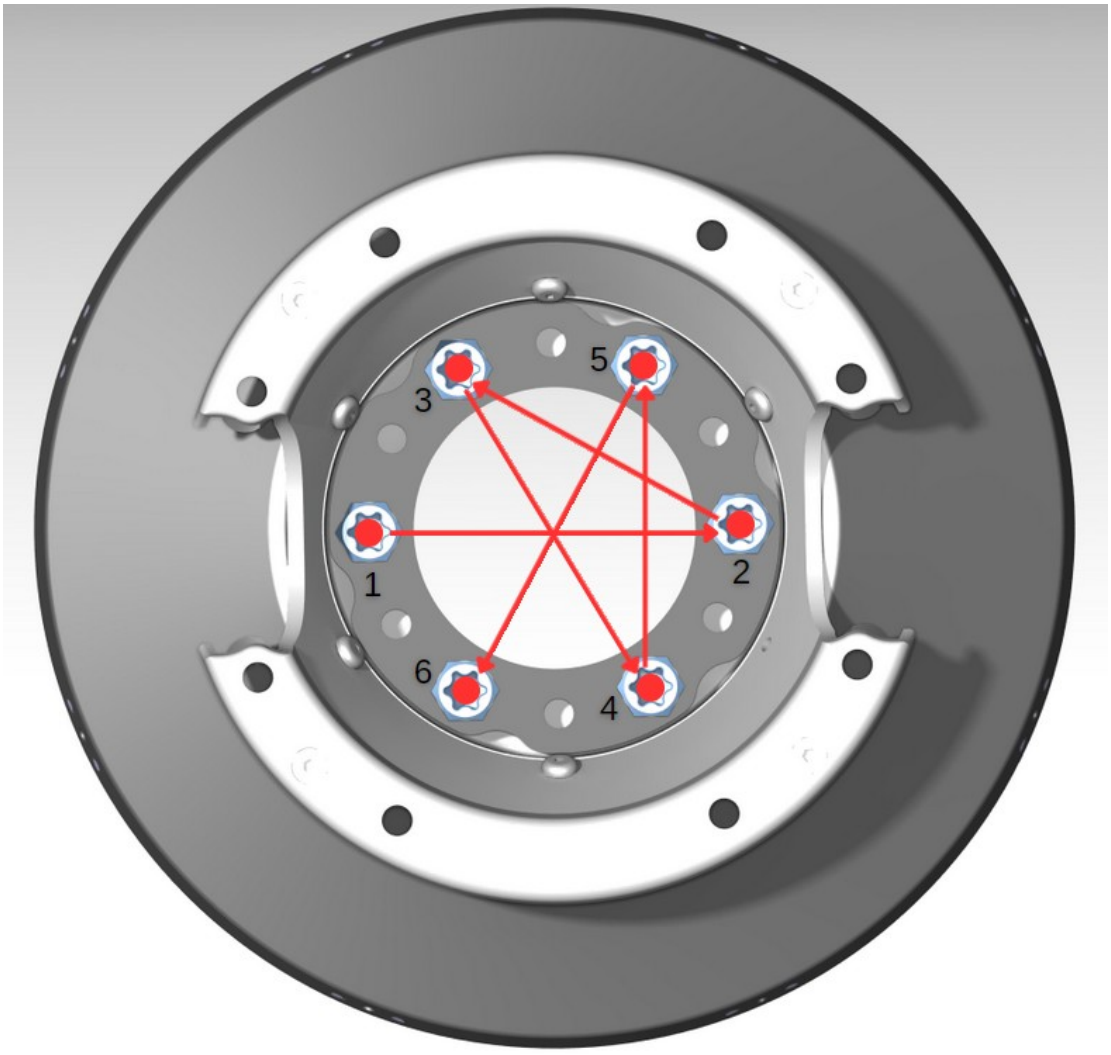
CAUTION: (½"), (7/16") or (3/8") hexatorx screw depending the engine flange configuration.

Engine Flange and Bushing

☐ SAE1 location diameter 111.12 **mm** 4-3/8 **inch**	☐ SAE2 location diameter 120.65 **mm** 4-3/4 **inch**
	 Screw : ☐ AN6 (3/8 inch) ☐ AN7 (7/16 inch) ☐ AN8 (1/2inch)



Tighten the hexatorx screws in the following order, using the torque values mentioned on §6.3.



Note: Use the tool xxx to maintain the hub extension during assembly.

(Photo avec positionnement outillage)

❒ Step 2 : Mounting of the equipped hub

Mount the equipped hub on the equipped hub extension.

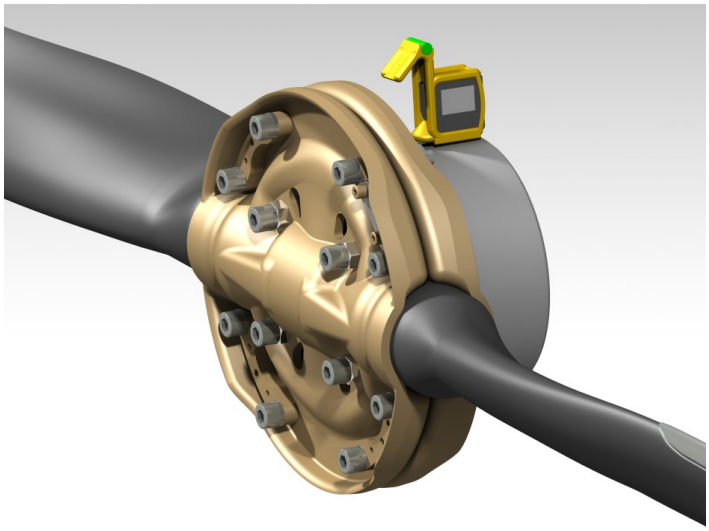
CAUTION: Check that nickel grease is applied to the exterior M10 screw threads.

Tighten the screws only until they make contact to maintain free rotation of the blades when adjusting the pitch.

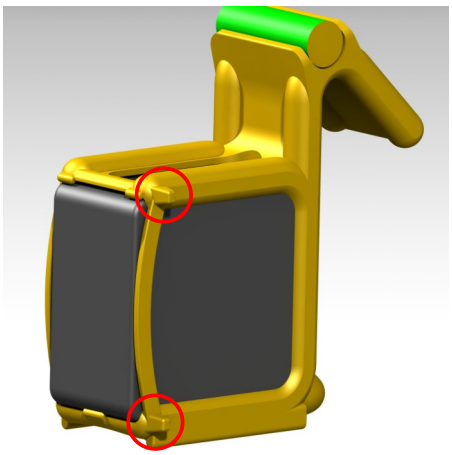
❒ Step 3: Pitch setting

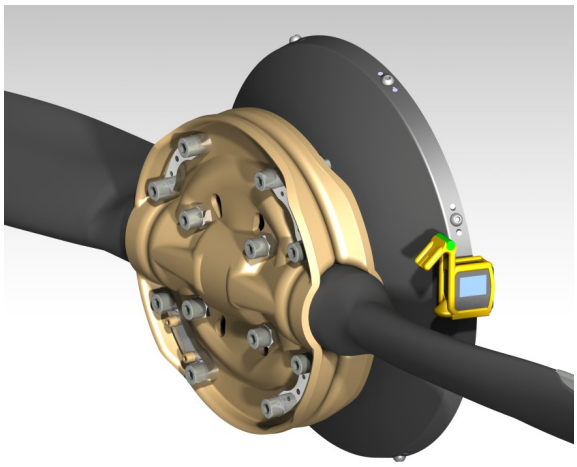
See table of engine-propeller couple for blade pitch angle

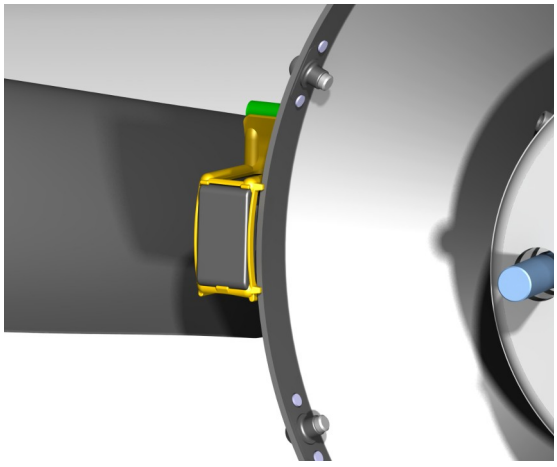
Without optional spinner: Place the inclinometer on the hub extention (centred on the cylindrical part), check that the ball is in the centre before setting it to zero.
Once the bubble is in the centre, set it to zéro.
Please note that the zero setting must only be performed once, as any misalignment of the crankshaft could distort the measurement.



With optional spinner: Tare the ONRP on the fallen edge of the spinner plate, make sure the bubble is level (the stop is provided by the two small tabs).



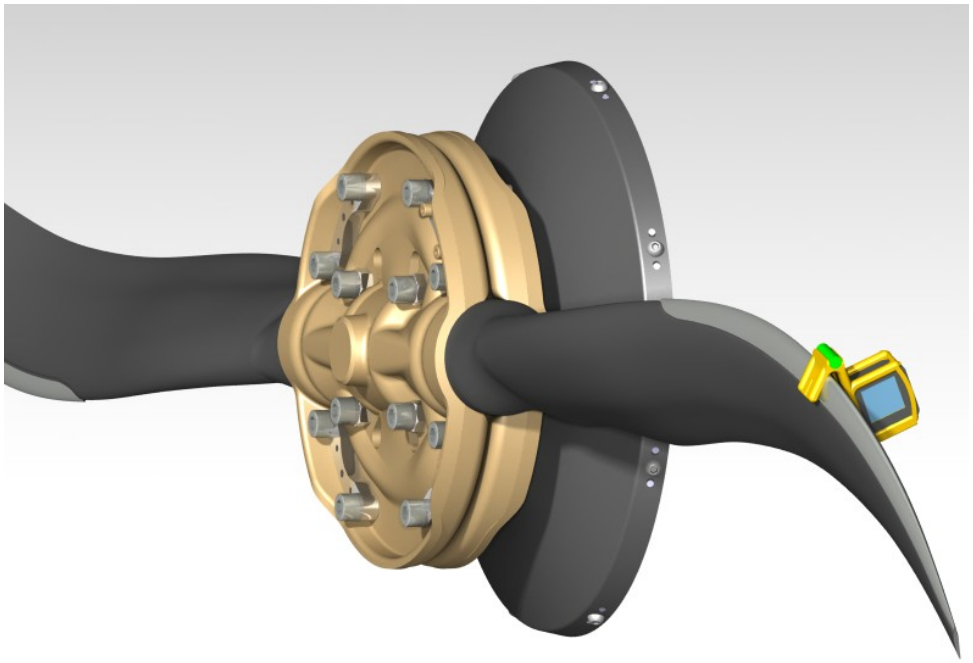




Tolerance for blade angle difference is ±0.5°

Place the inclinometer at xxx mm (see table of engine-propeller couple for distance from the edge of the hub) and then position the blade so that the ONRP bubble is in the centre.

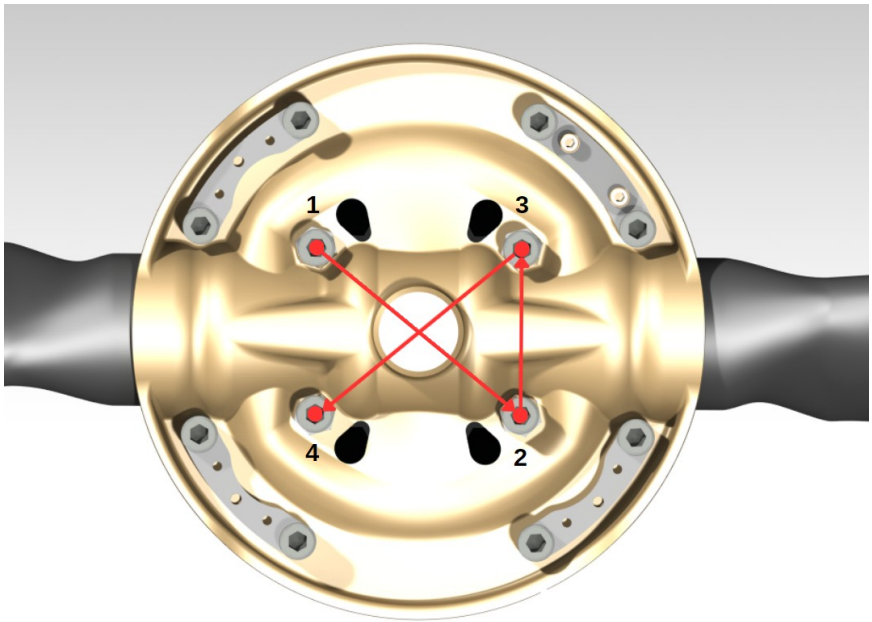
If the blade has difficulty rotating around its axis, try tapping lightly with a mallet on the trailing edge at the foot or slightly loosen the M10 screws to facilitate rotation.



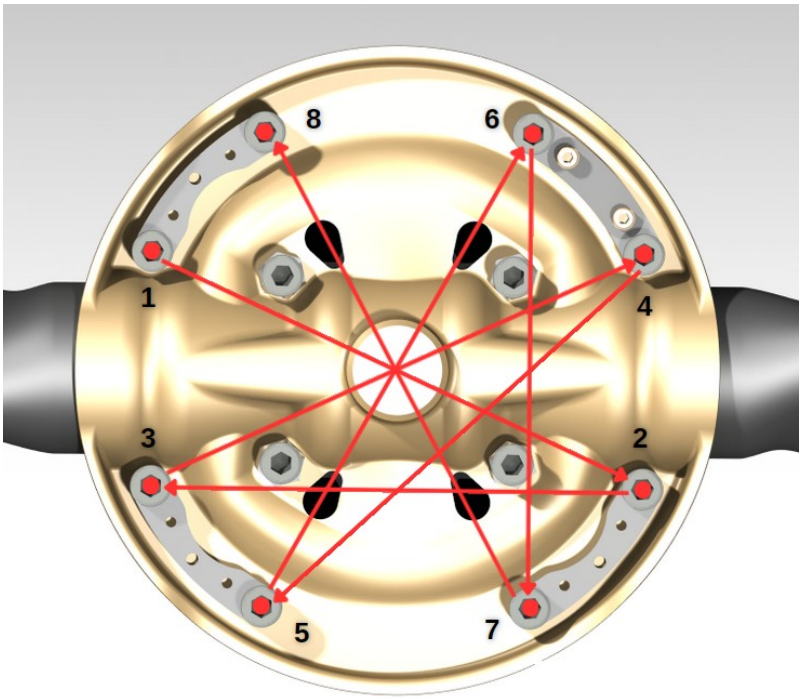
Once the step adjustment is completed, screw the bolts in the order shown on the pictures bellow.

First, tighten the central screws in following order, using the torque values specified in §6.3.

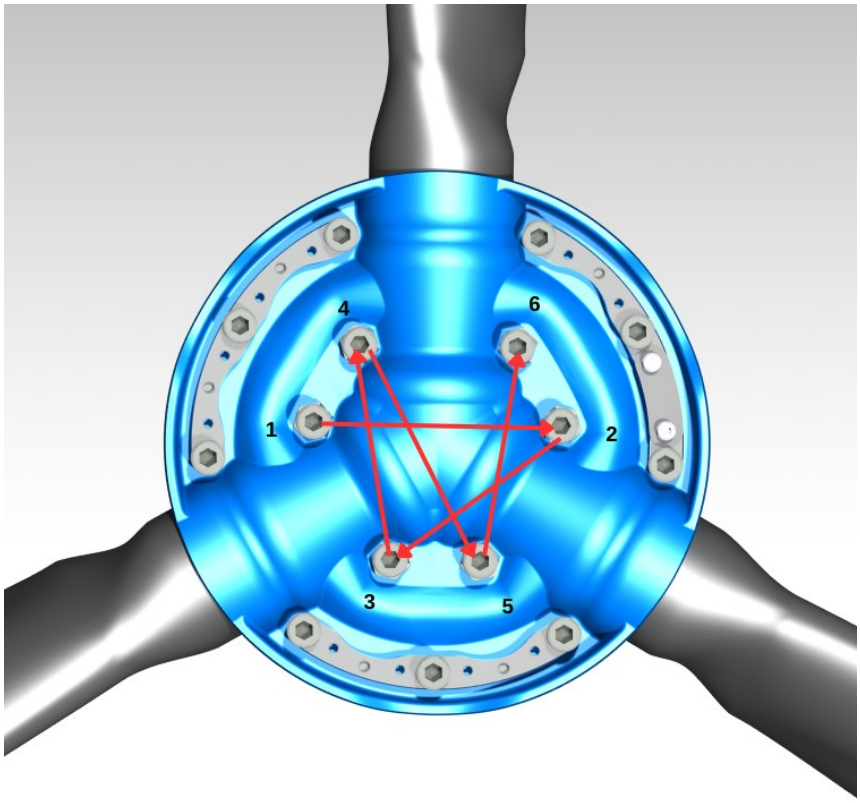
2 blades configuration

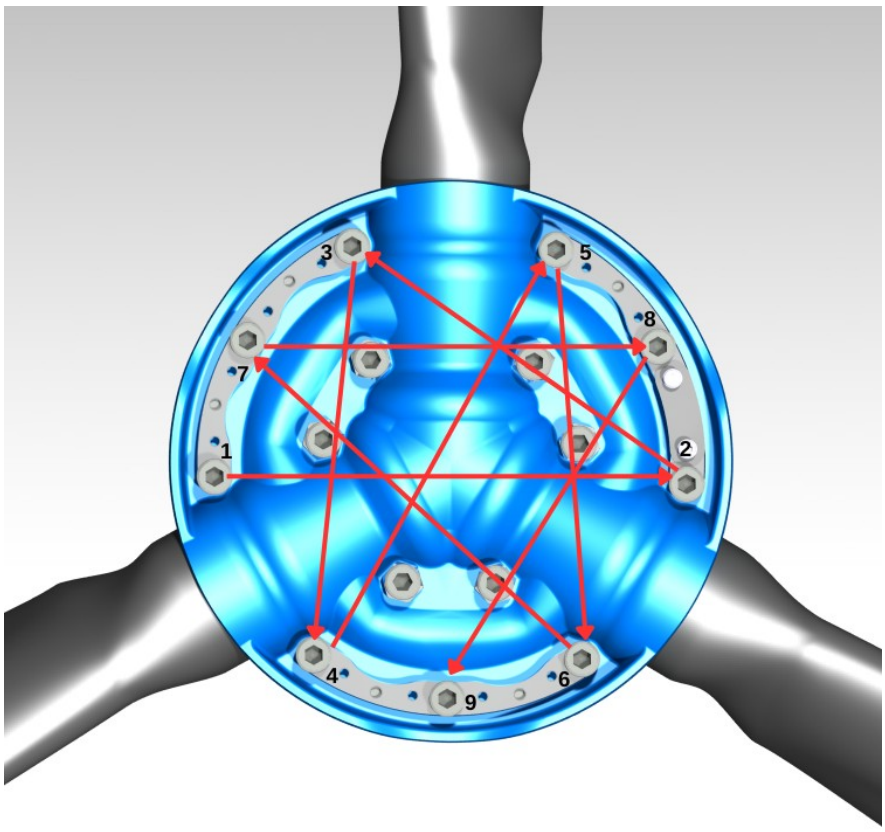


Second, tighten the external screws in the following order, using the torque values specified in §6.3.



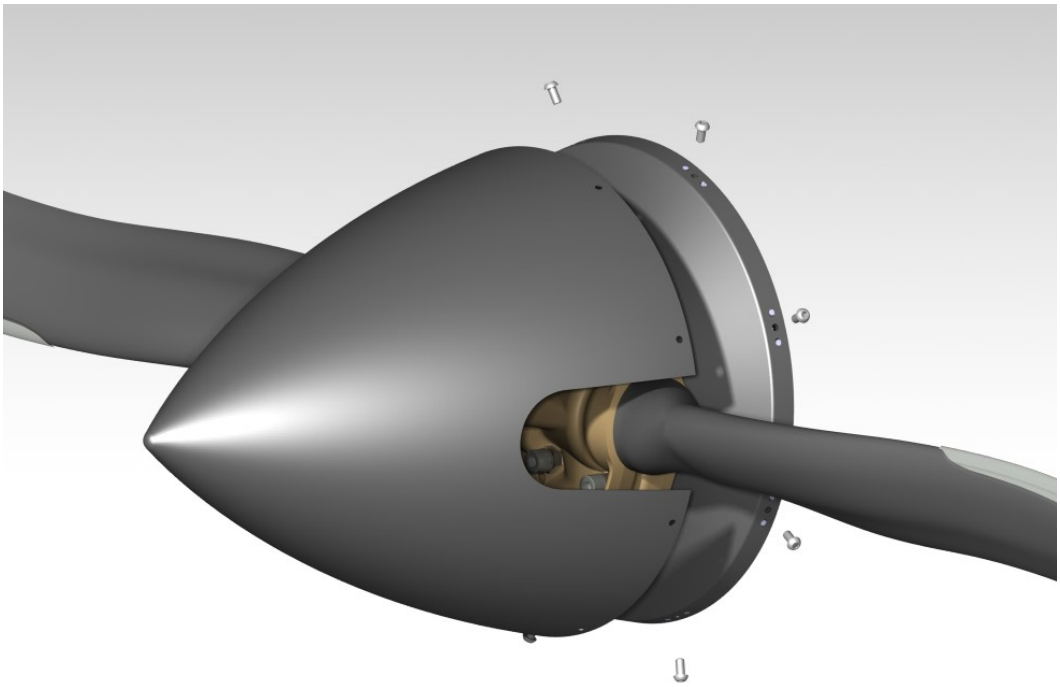
3 blades configuration





6.6. Spinner installation (optional)

Mount the spinner with titanium M6 screws, using the torque values specified in §6.3.



6.7. Engine run

CAUTION: After propeller installation and before first flight, a static run up has to be performed.

Run the engine until it reaches operating temperature according to the flight manual of the aircraft, follow those steps:

1. Increase RPM on the full range and check for unusual vibrations.
2. Decrease RPM on the full range and check for unusual vibrations.

WARNING: Depending on the aircraft and the engine, some procedures describe below may not be possible or restricted. Refer to the aircraft manual to find out the applicable procedures.

6.8. Final torque Check

After the engine run and before the engine has completely cooled down, perform a torque check of the 12 M10 Hub assembly bolts and 4 (if 2-blade propeller) / 3 (if 3-blade propeller) of 6 engine bolts through the inspection holes of hubs.

Refer to the torque values on §6.3.

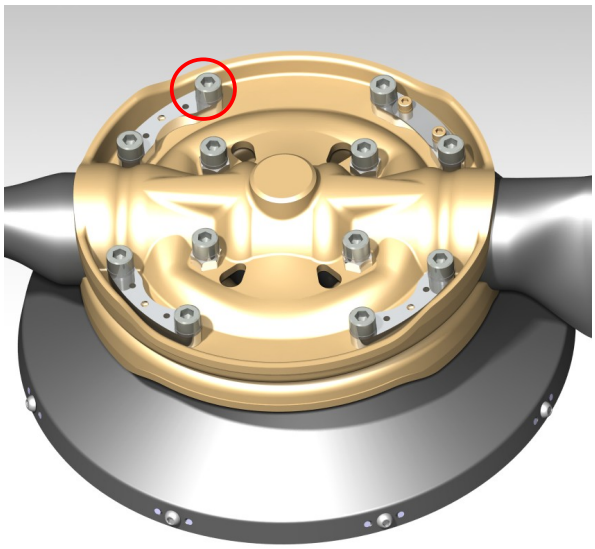
6.9. Removal

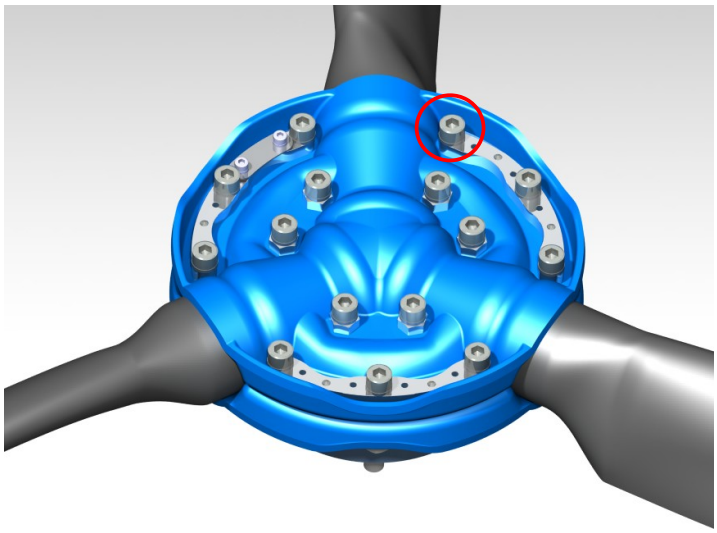
WARNING: MAKE SURE THAT THE ENGINE CONTACT IS OFF BEFORE ROTATING THE PROPELLER.

Removal of the propeller from the engine:

- Remove the screws holding the spinner to the spinner mounting plate. Remove the spinner.

- Unscrew the outer M10 screws to remove the hub assembly from the equipped hub extension.





- Unscrew the 6 hexatorx screws on the clamping plate. Remove the hub extension assembly.

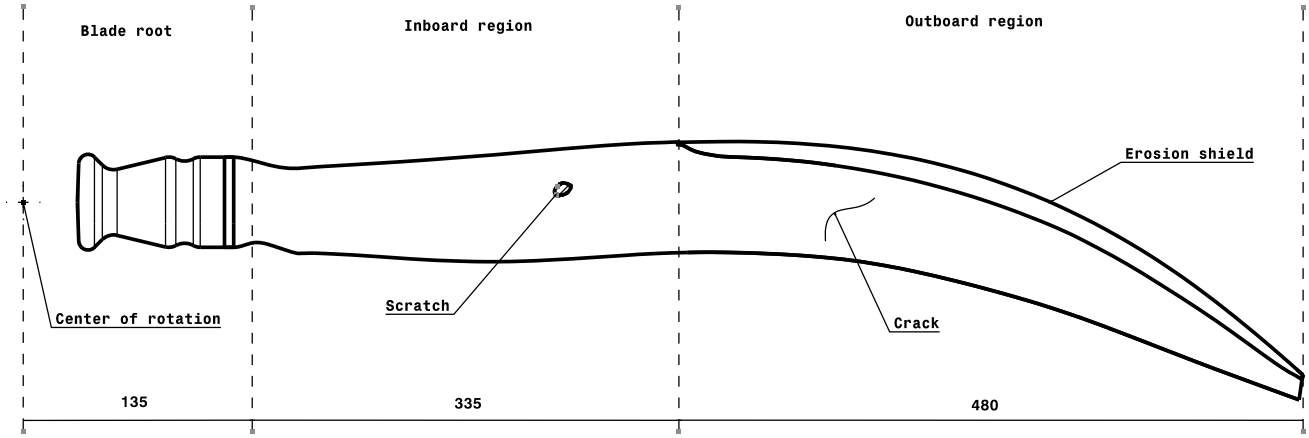
Note: Use the tool xxx to maintain the hub extension during disassembly.

(NOTE dans bas de page à remonter / supprimer)

7. INSPECTIONS AND MAINTENANCE

7.1. Damages

7.1.1 Blade damages



Blade root
Damage type
No Gouge/Dent, crack, delamination, scratch allowed.

INBOARD REGION				
Damage type	Maximal acceptable size (mm)	Maximal accpetable size (in)	Maximal number	Maximal repair limit
Gouge/Dent	3x3x0.5 deep	0.12x0.12x0.02 deep	3	6
Crack	6	1/4	0	1
Trailing edge delamination	5x5	0.2x0.2	1	2
Scratch	0.4 deep	0.015 deep	n/a	n/a
Exposed foam is not permitted				

OUTBOARD REGION				
Damage type	Maximal acceptable size (mm)	Maximal accpetable size (in)	Maximal number	Maximal repair limit
Gouge/Dent	5x5x0.5 deep	0.2x0.2x0.01 deep	5	20
Crack	12	0.5	0	1
Trailing edge delamination	3x25	0.12x1	1	2
Scratch	0.4 deep	0.015 deep	n/a	n/a
Exposed foam is not permitted				

EROSION SHIELD			
Damage type	Maximal acceptable size (mm)	Maximal accpetable size (in)	Maximal number
Gouge/Dent	5x5x2 deep	0.2x0.2x0.01 deep	3
Crack	6	0.25	1
Debond spot	25 length	1 length	2
	0.4 deep	0.015 deep	1

Blade can withstand some damages and still being airworthy. Use the Damage Type Table(s) to determine the Limits Designation and the Airworthy Damage Limits.

NOTE: 0.4mm (0.015”) corresponds to one layer of composite material.

7.1.1.1 Composite areas

If the damage is within the Airworthiness Damage Limits, the propeller blade can remain in service.
If the damage is greater than the permitted Airworthiness Damage Limits, the propeller blade must be removed from service until the required repair or replacement is completed.

7.1.1.2 Titanium leading edge protection

If the damage is within the Airworthiness Damage Limits, the leading edge protection can remain in service.
The leading edge protection in Titanium must be replaced if the damages exceed the limits indicated in the previous table.

7.1.1.2.1 Dents and nicks

In case of any impact within the limits of the table §7.1.1, the leading edge protection in Titanium may remain airworthy until next repair/overhaul.

If the leading edge protection is penetrated, it may be filled with Epoxy and grind off. The leading edge protection may remain until next repair/overhaul.

7.1.1.2.2 Debond spots and cracks

If any debond spot is suspected, it should be confirmed by a coin-tap inspection on the entire leading edge protection following procedure §10.1.

Mark the debond spot and check if it is in the limits of §7.2. Monitor whether there are further delamination and/or whether the already existing debond becomes worse. Otherwise the leading edge protection in Titanium is to be replaced as soon as possible.

7.1.2 Loose blades

Blades should be tight in the propeller hub, absolutely **NO** movement between blade and hub is acceptable.

If any inappropriate movement or loose blade is detected the propeller is not airworthy. If it is suspected that the propeller has run with a loose blade, the propeller requires an overhaul.

WARNING: FLYING WITH LOOSE BLADE MAY CAUSE HIGH VIBRATION LEVEL AND POSSIBLE FAILURE.

7.1.3 Vibration

NOTE: Vibration may originate in the engine, propeller, or airframe. Troubleshooting procedures typically begin with an investigation of the engine.

Airframe components (such as engine mounts or loose landing gear doors) can also be the source of vibration. When investigating an abnormal vibration, the blades and the blade retention components should be considered as potential sources of the vibration.

Instances of abnormal vibration should be investigated immediately.

Perform troubleshooting and evaluation of possible sources of vibration in accordance with engine or airframe manufacturer's instructions. Perform the checks to determine possible cause of the vibration.

If no cause is found or if the cause of the vibration is not readily apparent, the propeller could be the source of the vibration. Examine the propeller in accordance with all the Inspections & maintenance steps in this section, in particular the following ones:

- Blade damage
- Torque check
- Loose blades
- Blade angle (pitch setting)
- Balancing static and dynamic
- Fretting between hub and blade

7.1.4 Corrosion

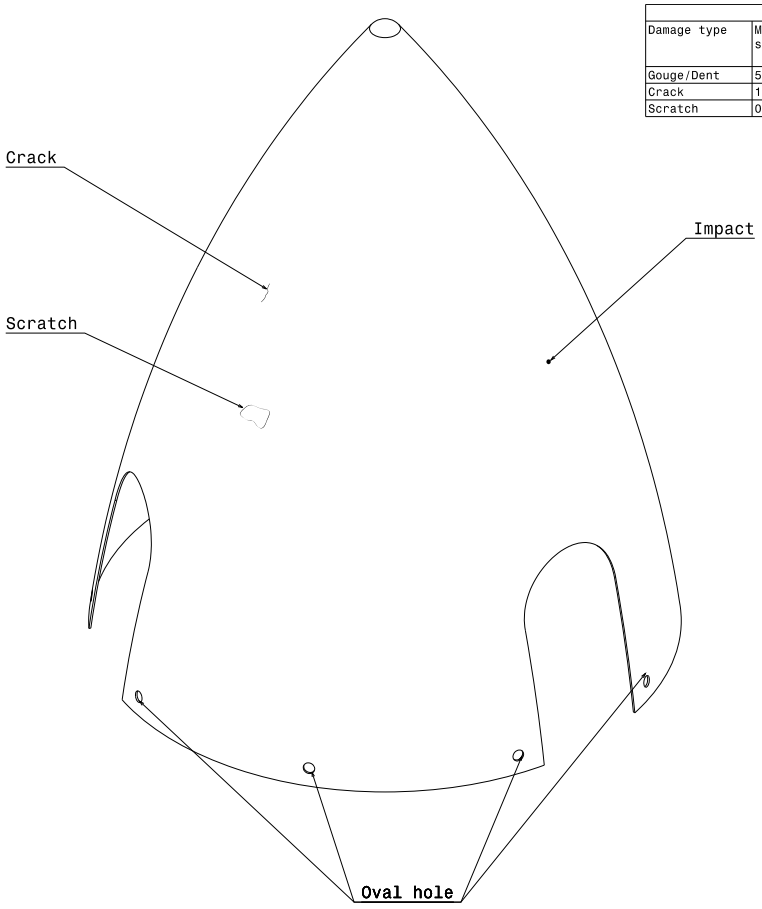
Inspect for corrosion and pitting on steel bolts and aluminium parts. If any corrosion or pitting found, replace identified parts.

7.1.5 Spinner Damages

If the damage is within the Airworthiness Damage Limits, the spinner can remain in service.

If the damage is greater than the permitted Airworthiness Damage Limits, the spinner must be removed from service until the required repair is completed.

SPINNER				
Damage type	Maximal acceptable size (mm)	Maximal accpetable size (in)	Maximal number	Maximal repair limit
Gouge/Dent	5x5x0.5 deep	0.2x0.2x0.01 deep	5	20
Crack	12	0.5	1	1
Scratch	0.4 deep	0.015 deep	n/a	n/a



NOTE: 0.4mm (0.015”) corresponds to one layer of composite material.

7.1.6 Hub Damages

Inspect the hub parts visually for any damage.

Any crack of any length, delamination, scratch on the half hub or hub extension is a cause for replacement.

No repair is allowed on the hub, defective parts must be replaced by factory new ones.

7.1.7 Overspeed

An overspeed has occurred when the propeller RPM has exceeded the maximum RPM stated in the propeller Data Sheet (§5.1.4).

Up to 15 % above the certified RPM limit, perform an inspection according to §7.2.4. If overspeed is more than 15 % above the certified RPM creates the propeller is not airworthy any more and must be removed from service immediately, an overhaul is required.

A voir selon la certif, potentiellement on le fait sauter pcq non démontré, si overspeed → poubelle ou inspection

7.2. Propeller Verification

This Airworthiness Limitations Section (ALS) is EASA approved in accordance with Part 21A.31(a)(3) and CS-P40(b). Any change to mandatory replacement times, inspection intervals and related procedures contained in this ALS must also be approved.

Type	Frequency	Actions	Details
After first flight	Once	Tightening of the propeller screws	*See § 6.3*
Pre-Flight check	Before each flight	Propeller fixation check Propeller pitch check Visual inspections	*See § 7.2.1*
Annual check	One time every 12 months or every xxxxh of flight (*)	*Play between the hub and the blade : **NO** play allowed* *Tightening of the propeller screws* *Visual inspections*	*See §7.2.2*
Inspection and minor change	Every xxx fh for xxx or every xx months (*)	*- Disassembly* *- Visual inspections* *- Change 6 x 1/2" or 3/8" lock washers* *- Change 12 x M10 lock washer* *- Change nylstop 6 x M5 if the retaining ring is worn* *- Reassembly*	*See § 7.2.3*
Overhaul (TBO)	- every xxx fh for xxx	*Disassembly* *Visual inspections* *- Change 6 x M1/2" lock*	*See § 7.2.3*

		washer *- Change 12 X M10 lock washer* *Reassembly*	

(*) whichever comes first

The TBO starts with the installation on the aircraft. However, if the installation is later than 24 months after new assembly or overhaul and proper storage provided, the TBO automatically starts after these 24 months.

When installed in airplane the calendar time can be extended to coincide with the next annual inspection of the aircraft if the propeller is in a proper condition and the limit of hours in service is not yet reached. Calendar Limit is not interrupted by subsequent removal and / or storage.

When checking the tightness, if you need to add more than a quarter turn to reach the torque, then: check for fretting in both hub halves and blade feet.

If you change the key, check the setting before tightening

7.2.1 Pre-flight check

Follow propeller preflight inspection procedures as specified in the Pilot Operating Handbook (POH) in addition to the inspections specified in this section.

Type	Control method	Part	Possible issue	Action
Propeller fixation check	Shake firmly the propeller	Hub extension	Play between spacer and flange. (*No play allowed*)	Stop using the propeller and apply the following steps: - inspection of the state of the screws - if necessary disassemble propellers to check elements - tighten the screws to the required torque
		Hub and hub extension	Play between hub and spacer (*No play allowed*)	
		Hub	Play between inferior and superior hub (*No play allowed*)	
Visual inspection	- Visually check the propeller without disassembly (look for composite damages see §7.1) - Check bolts	Propeller	- Loss of a bolt - Damage on composite part	Stop using the propeller and contact E-Props

Defects or damage found during the pre-flight inspection must be evaluated in accordance with the applicable section in the Testing and Troubleshooting §9 and/or the Maintenance Practices chapter of this manual.

7.2.2 Required Periodic Inspections – 200 FH / annual check

Perform the following inspection procedures according to Aircraft Maintenance Manual limited to 200 flight hour intervals, not to exceed twelve calendar months. Procedures involved in those inspections are detailed below.

Type	Control method	Part	Possible issue	Action
Visual inspection	- Check composite parts. - Look for composite damage - Check if all fasteners are present.	- Blade - Hub - Hub extension - Fasteners	- Composite damage - Loss of a bolt	- If composite damages: stop using propeller and contact E-props for instructions. - If loss of a bolt, stop using propeller and contact E-props for instructions.
Torque verification	- Check hub extension bolts torque (½" or 3/8") - Check hub torque (M10) - Check Spinner torque (M6) - Check Spinner mounting plate (M5) - Check balancing plate torque (M5)	- Hub extension bolts - Hub bolts - Spinner bolts - Balancing plates	- Incorrect tightening	- Tighten the following components to the specified torque see §6.3

7.2.2.1 Parts change

After disassembling of the propeller, proceed with the following changes:

Designation	Part	Quantity	Localisation
Lockwasher M10		12/15	Under the M10 screw heads on upper half hub
Lockwasher M1/2 or 3/8		6	Under the M1/2 or 3/8 screw heads into hub extension
Nylstop nut if the nylon insert is worn		6	Into the spinner plate

7.2.3 Overhaul

Perform the following inspection procedure according to Aircraft / engines Maintenance Manual limited for **Lycoming**, **Continental**, **Jabiru**, **Vw** or every 12 months.

Type	Control method	Part	Possible issue	Action
Disassemble and visual inspection	Visual inspection	- Composite parts - Fasteners	- Crick on composite parts - Corrosion on fasteners - Loss of a fastener	- If composite damages stop using propeller and contact E-props for instructions. - If loss of a fastener, stop using propeller and contact E-props for instructions.
Fretting inspection	Visual inspection	- Hub - Blades	- Presence of fretting at the contact points between the blade root and the hub	Contact E-Props before reassembling propeller.

After disassembling of the propeller, proceed with the following changes:

Follow § 7.2.3.1 for parts changes.

8. TROUBLESHOOTING

Trouble	Probable cause	Correction
Loose blade	*Inappropriate Bolt torque*	*Overhaul required*
Loose spinner	*Oval fixation hole*	*Change the spinner*
	Loose screws	*Tighten the screws*
Vibration	*Improper Static Balance*	*Perform a static or dynamic balance, check balance tolerance*
	Loose blade	*Overhaul required*
	Damages on blade surface	*Perform a blade inspection*
	Different pitch angle between blades	*Adjust blade pitch angle (contact E-props)*

4. 8.1 Tests

After each Mounting , See §6.6 to perform test.

9. STORAGE AND SHIPPING

9.1. Storage

Long-term storage does not require additional preservation if the propeller is stored in a dry and temperature controlled area (temperature 5°C to 30°C, rel. humidity 10% to 75%). The composite blades and parts need no special protection but mechanical damage has to be avoided.

Do not apply any oil, wax or anti-corrosion protection on the composites parts, especially on blade root and propeller hub. These fluids may penetrate inside the composite and alter the characteristics of the material.

9.2. Shipping

For any shipment of the propeller it is recommended to disassemble the blades and use the original rectangular box or a similar box that will ensure a proper protection during shipping. In case of returning the propeller it is furthermore recommended to return all accessories and parts together with the propeller. They will also be inspected and not considered to be missing.

9.3. Acceptance Checking

Examine the exterior of the shipping container for signs of shipping damage, especially at the box ends. A hole, tear or crushed appearance at the end of the box (at the propeller tips) may indicate the propeller was dropped during shipment, possibly damaging the blades. After removing the propeller parts from the shipping container, examine the propeller components for eventual shipping damage.

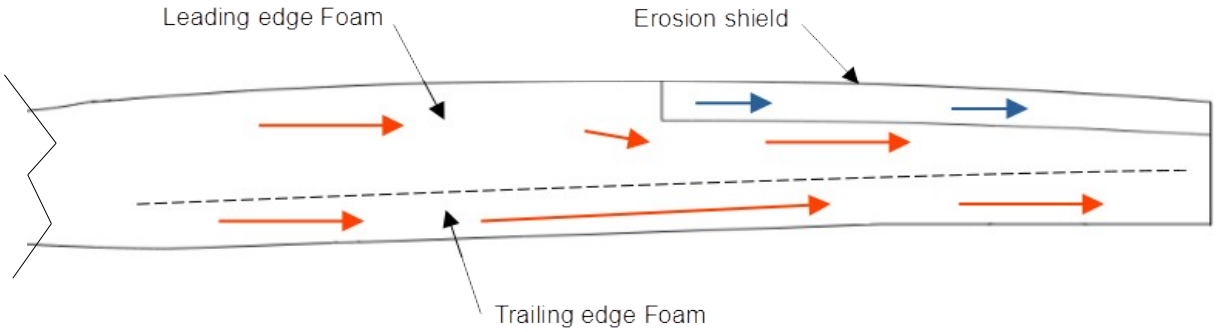
10. ANNEXES

10.1. Coin-Tap Inspection

There is no periodic coin-tap inspection required. A coin-tap inspection is only recommended to determine if a damage has caused a delamination or a debond of the leading edge protection.

Composite blades can be inspected for delaminations and debonds by tapping the entire surface of the blade, or cuff (if applicable) with a washer-shaped metal tapper or "coin".

Using a washer-shaped metal tapper, approximately 2.5 inches (64 mm) OD x 1.25 inches (32 mm) ID x 0.25 inch (6.4 mm) thick, and weighing around 3 oz. (85 g), tap the entire surface of the blade from root to tip along the leading edge then along the trailing edge and on the leading edge protection as shown by the following schema. Do the coin-tap operation on the upper and lower surface of the blade.



NOTE: Blades have a separate foam trailing edge that makes a different tone when coin-tapped in that area.

If an audible change is apparent, sounding hollow or dead, a debond or delamination or crack is likely.

Using a pencil, outline the suspected area to determine the approximate size of the damage.

If any debond is suspected on the blade composite, retire the blade.

10.2. Occurrence Reporting sheet

If you detect a fault, please check whether a service bulletin is available online. If not, download the 'occurrence report' document ref: EP-ORS on the website