

FRESH

Sail flight model for F3-RES



Span: 2000 mm

Wing area: 35,6 dm²

Weight RES: from 435 gr.

Weight E-RES: from 465 gr.

Airfoil: AG36_{mod}/AG37_{mod}

Construction manual

(2016 August 28th, Oliver Matzen)

Notes before construction work

Because of the simple construction, it is possible to produce the model very quickly. Only little grinding work is required.

To build the model you need usual model construction tools:

- Balsa knife,
- Sanding block with sandpaper 100 and 400 grid,
- Jigsaw with metal blade,
- File, rasp,
- Drill,
- Pliers,
- Scissors,
- Needles, clamps and weights,
- and a balsa plane is also useful.

An even stable board approx. 30cm x 100cm is required as construction pad.

For a finish with covering film is an iron, a pair of scissors and a sharp razor necessary. A long steel ruler is helpful.

For the assembly and finish you need:

- Superglue low viscosity appr. 20 gr and activator,
- 5 minutes epoxy,
- Wood glue,
- Covering film appr. 2 m*0,6 m,
- Scotch tape 15 mm wide

for flying you need:

- a remote control with a minimum of three channels
- 2 servos appr. 10 gr
- 1 Servo appr. 5 gr
- 1 small receiver
- 1 receiver battery
- 1 servo extension leads

Slightly trim weight may also be necessary and tape is required to secure the outer wing.

For the high Start a suitable high starting rubber with cord, ground anchors, ring and a little flag is used. The launch system will develop no more than 4kg force. (Vendors for bungees are e.g. www.setatech.de, www.emc-vega.de, www.hobbyking.com (the blue))

Construction is fun but keep in mind:

- You are responsible for your own healthiness.
- almost all adhesives contain solvents and other volatile substances, care for adequate ventilation!
- Be carefully in the use of superglue! Fingers and eyelids are glued together faster than you do not mind!
- The processing of CFRP caused finest coal dust which must not be inhaled or swallowed!
- Wash your hands when coal dust adheres to your fingers!
- Do not blow the coal dust from the building board, remove the dust with a vacuum cleaner!
- Note the operating instructions by the manufacturers and suppliers.
- Handling tools can cause injury.
- Operation of an Aircraft model can cause accidents.
- Construction and operation of a flight model must be learned.
- For beginners, it is necessary that an experienced person helps.
- For damages and accidents that will arise in connection with the construction and operating of the model, "Oliver Flugmodellbau" do not take any responsibility.

.... and here we go with building fun!

Construction of horizontal stabilizer (elevator)



Separate components with a sharp balsa knife from balsa and connection webs remove from the components (little grinding).

Stuck together and stick together. Use superglue in order to save weight.

Leading edge and tip grind around. Tail edge grind tapered.

Planing in the hinge region with the balsa plane at 45 degree.

The control horn is glued with superglue after ironing the covering film.

Construction of vertical stabilizer (rudder)



Separate components with a sharp balsa knife from balsa and connection webs remove from the components (little grinding).

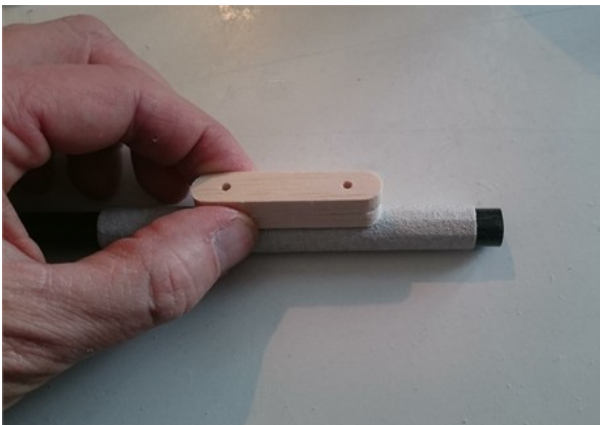
Stuck together and stick together. Use superglue in order to save weight.

Leading edge and tip grind around. Tail edge grind tapered.

Planing in the hinge region with the balsa plane at 45 degree.

The control horn is glued with superglue after ironing the covering film.

Construction of the tail boom



Elevator support stick together of two balsa parts. Then grinding a trough according to the 12mm tail boom diameter. If something goes wrong during grinding, don't worry, the kit contains additional support parts.



Place the support centered under the tail boom and measure at the tube ends the same distance to the building board. So it is checked that the trough was grind parallel to the top of the support.



Tail boom sanded before bonding in the area of the support with 400 grain sandpaper and remove the sanding dust.

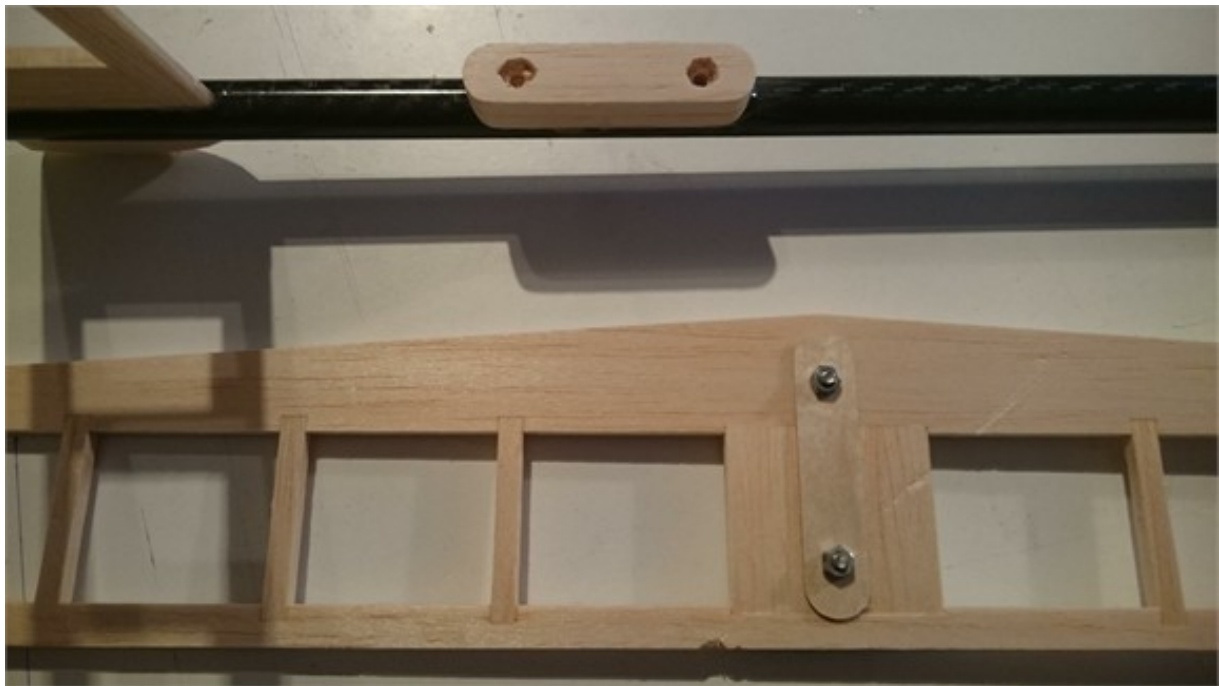
Stick the support with 5 minute epoxy to the tail boom. The two holes in the support are in alignment with the two holes in the tail boom. Push the fixed front part of the rudder into the slot of the tail boom.

Vertically align the tail edge of the rudder to the tail boom.

Stick the "Fresh" rudder with superglue into the tail boom.

Superglue activator ist helpful in this case.



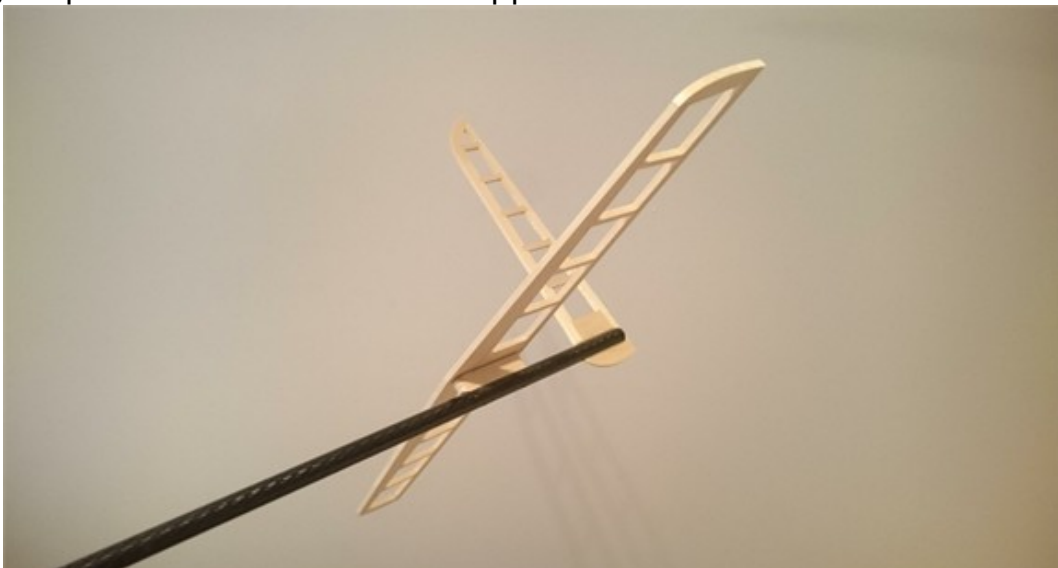


The layer of plywood which is glued to the elevator support is first screwed with two M3 metal screws (not included in the kit) and the plastic nuts to the elevator.

Use M(etric) 3mm*20mm metal screws, which can be easily unscrewed after gluing. Later during flying use the plastic screws to save weight.

Press the elevator to the support to transfer the contours of the nuts on the support.

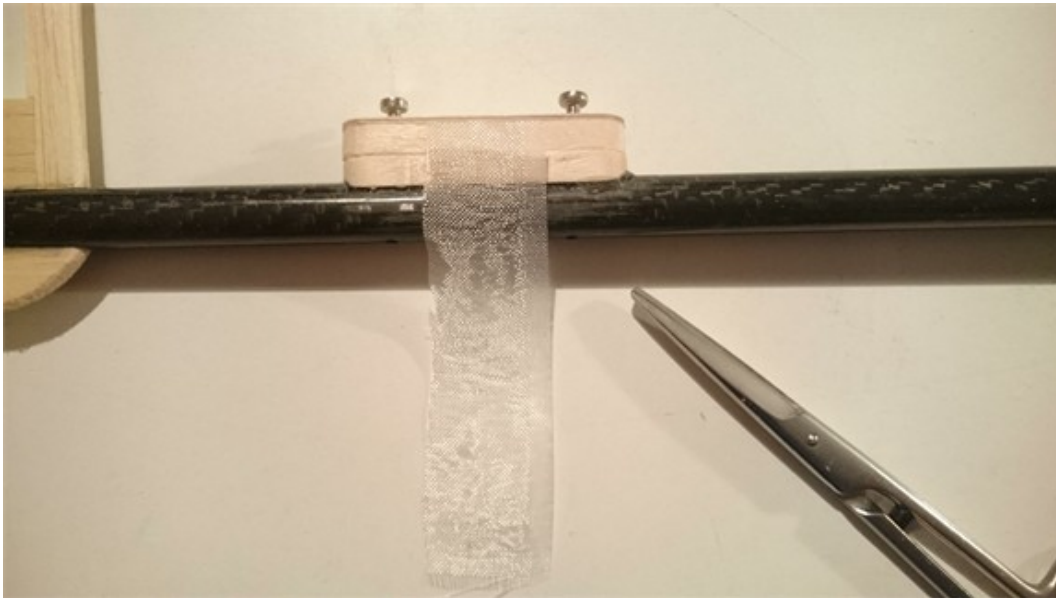
According to the footprint of the nuts on the support edit the support with a balsa knife to get space for the nuts in the support.



Before gluing the plywood layer and the nuts with the support, check the right angle of the horizontal and vertical stabilisator.

If it is not rectangular, you can grind the surface of the support and corrected it accordingly.

Glue the plywood with 5 minute epoxy to the support.



The elevator-support is fixed with 25gr/m² glass fabric strips in addition to the tail boom.

Grind the tail boom in the area of the glass fabric with 400 grain sandpaper and remove the sanding dust.

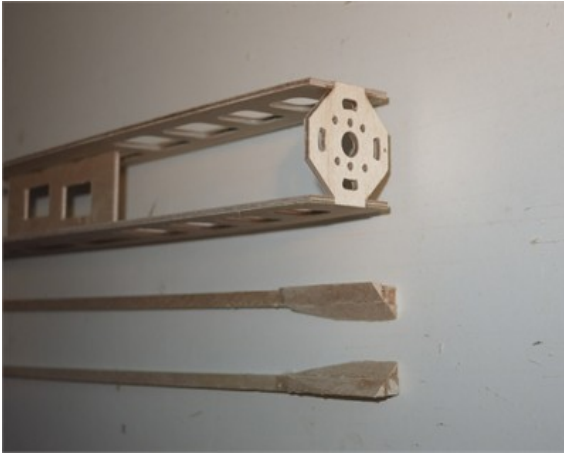
To glue the glass fabric use thin superglue.

First fix the glass fabric near the top of the balsa support with superglue. Then drag the tissue around the tail boom and soak it with superglue.

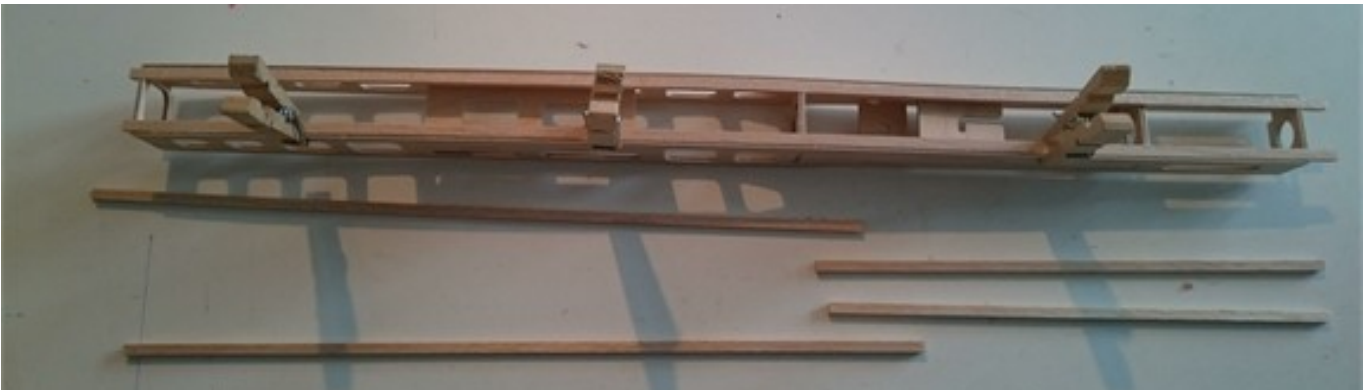
Construction of the fuselage



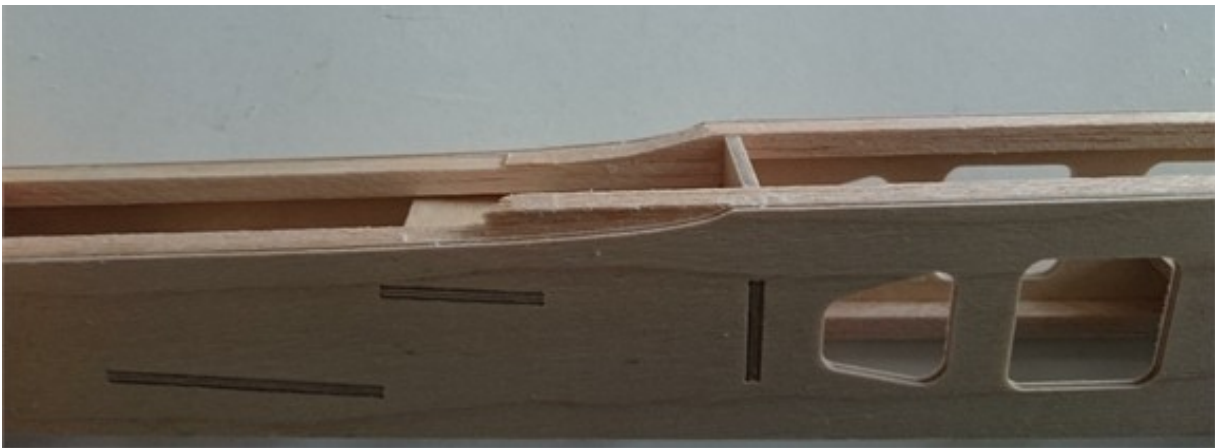
Glue the fuselage formers, servo plate, wing screw and ballast carrier with wood glue or super glue together.



For the electric glider version 4*4mm triangular strips (approx 4-5 cm long each) are glued to the stringers.



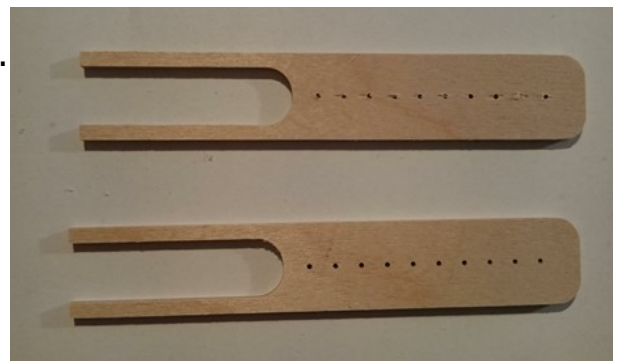
After the formers and other internals are dried, glue the 4*4mm Balsa stringers with wood glue into the fuselage.

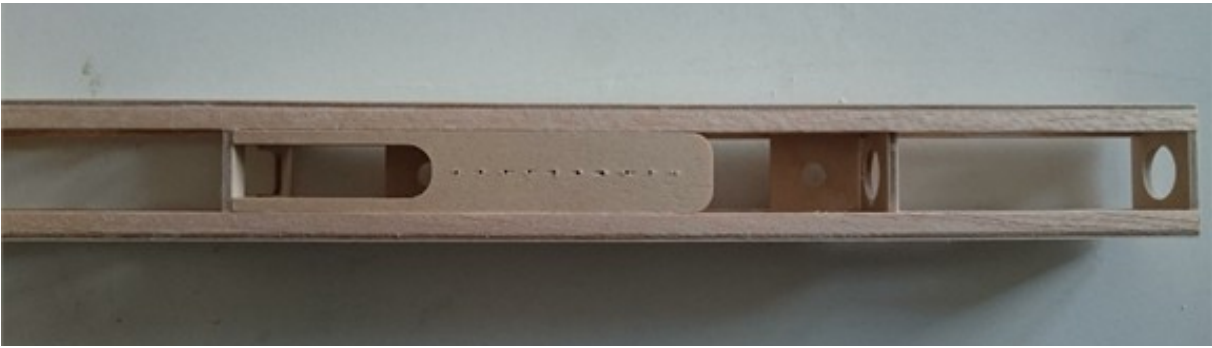


In the area of the wing leading edge the stringers are overlapping. Grind the top stringer to fit the airfoil shape.

The hook board is glued together of two parts.

The board is not necessary in the electric glider version.

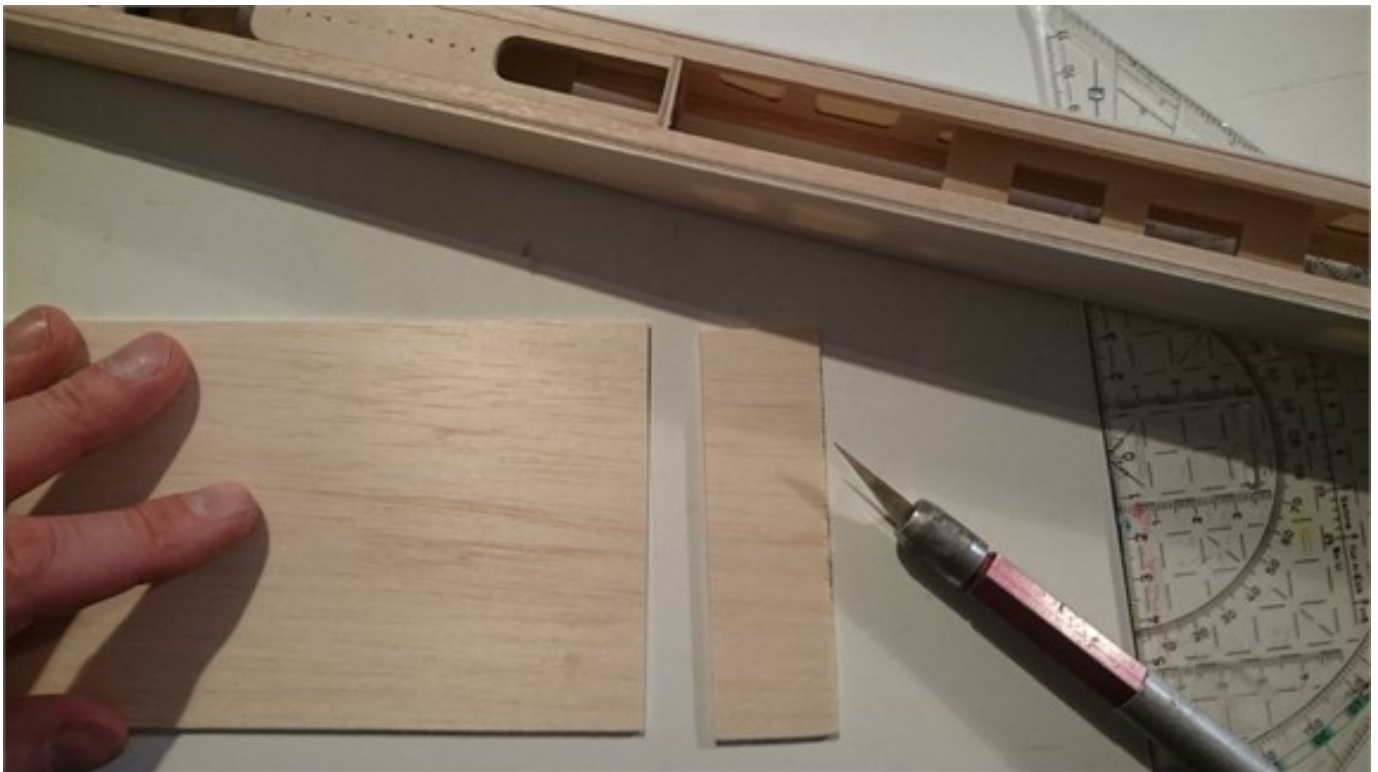




Glue the hook board with wood glue between the lower fuselage stringers.

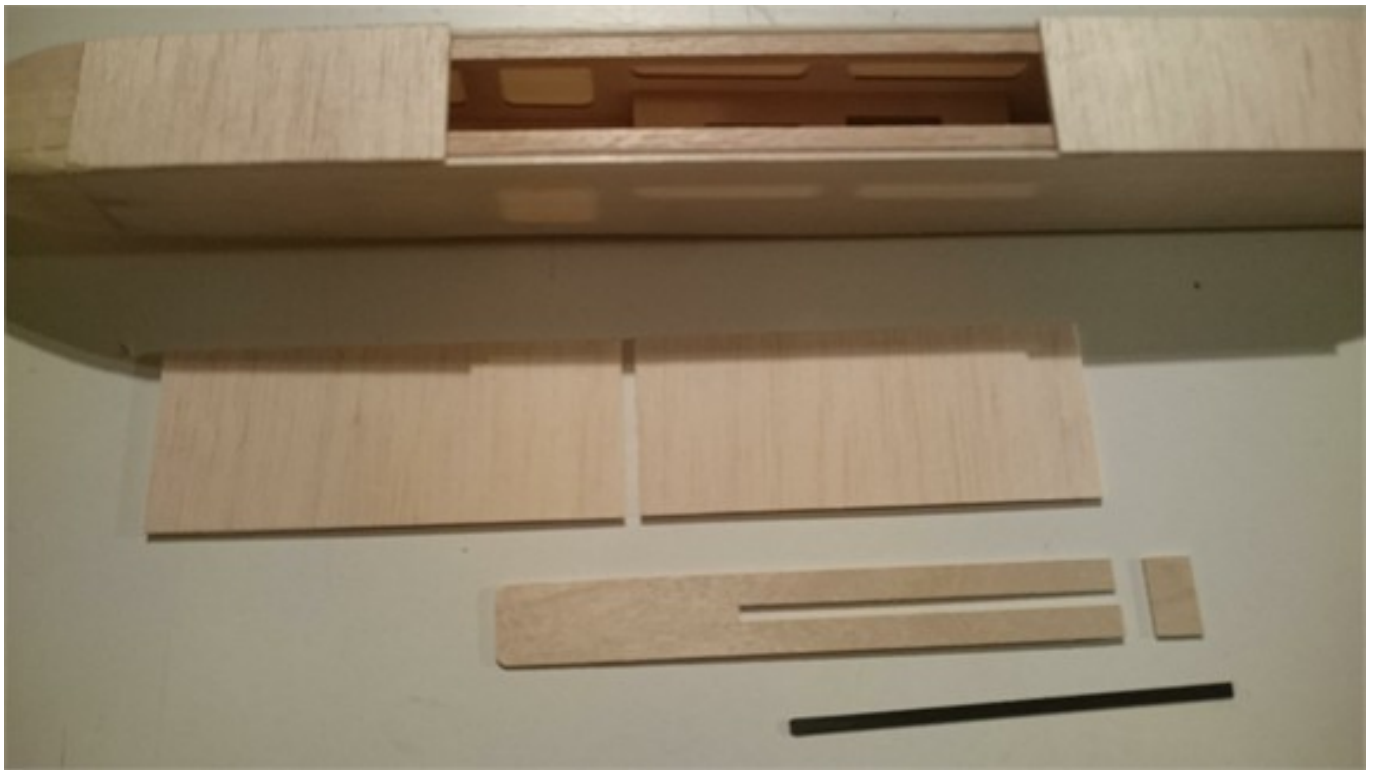


Glue balsa sides of the fuselage with wood glue on the plywood sides



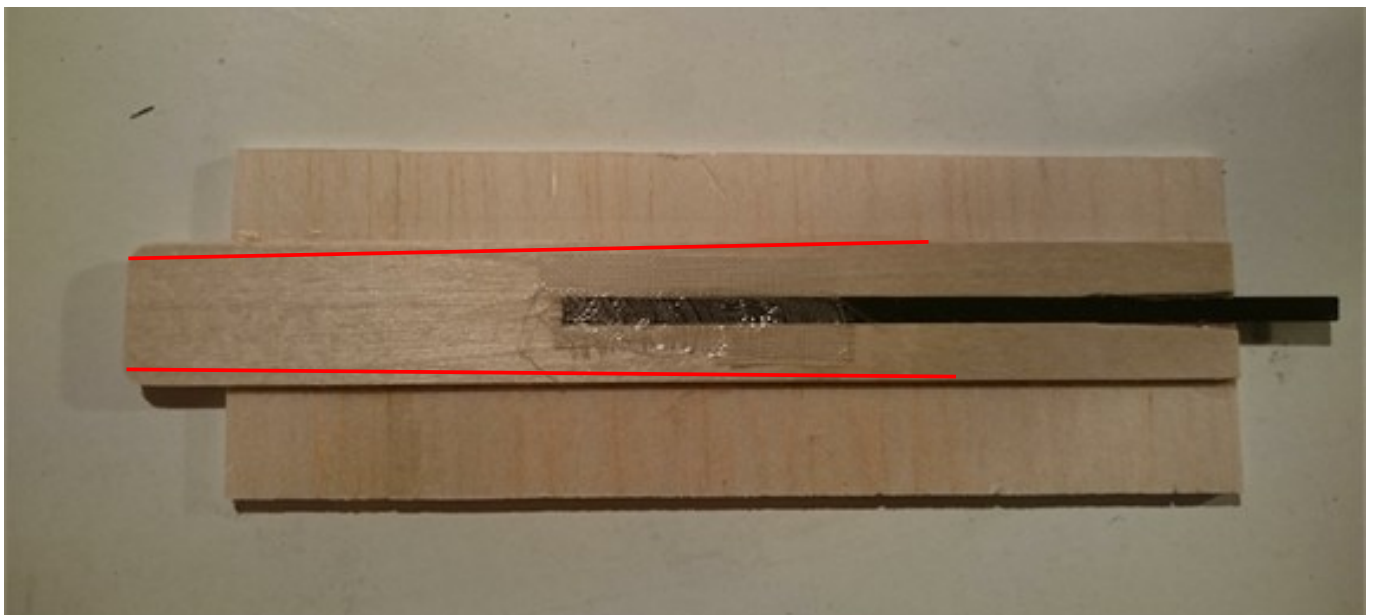
The upper and lower fuselage planking is made of 2mm balsa. Cut 3cm wide strips from the 2mm balsa sheet.

The wood grain of the fuselage planking is transverse to the direction of flight.



For the cockpit cover the 2mm Balsa planking is cut out wider as the fuselage (approx 4cm). Glue the plywood reinforcement in the center of the plating. Stick the carbon flat profile only on the first 3 cm into the slot and strengthen the glue area additionally with a little glass cloth. The glass cloth can be glued with thin super glue.

In the glider version, before gluing, the plywood reinforcement is slightly narrowed to the front (red lines), so that the plywood fits between the upper stringers.



The fixed plywood tongue over the lid to the left and the flexible carbon flat over the lid to the right.



To close the cover, the spring is first pushed under the fuselage planking and the lid by lifting simultaneously slid over the planking.

The cover is pushed back until the front tongue can be slid under the fuselage planking.

As long as the lid is not ironed, the edges of the cover are to be treated carefully. After ironing the edges are sufficiently strong to pull the lid to open up.

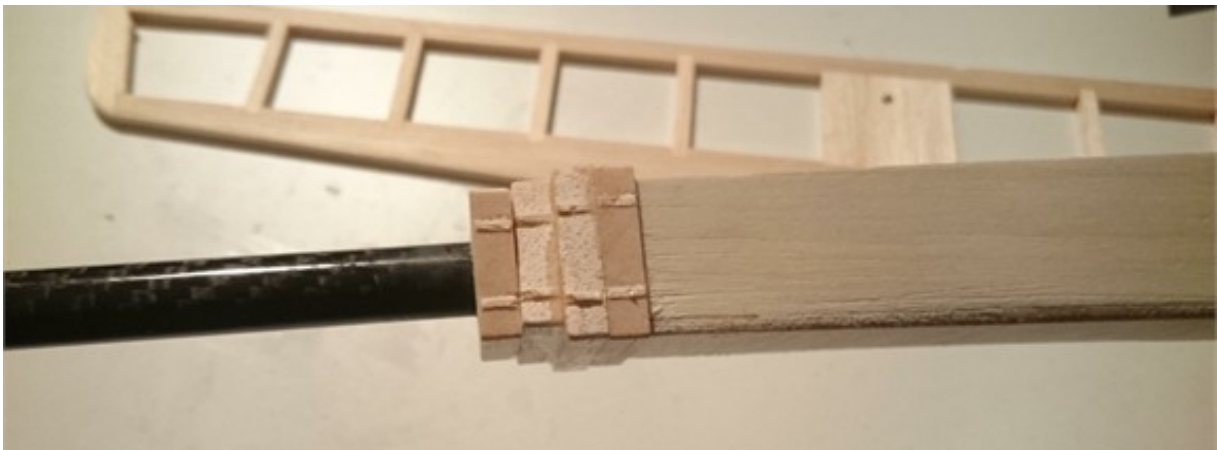


Sand and clean the tail boom slightly for bonding to the fuselage.

Before gluing the tail boom into the fuselage slide the eight balsa cone pieces on the tail boom without gluing them.



Insert the tail boom into the fuselage and align the elevator parallel with the center wing section which is screwed on the fuselage. Place the jigs Z2 under the Tail boom and check the right attitude for forward fuselage.



Tail boom and balsa cone pieces stick together with super glue each by each.



After gluing treat the balsa conical with rasp and sandpaper.

During rasping and grinding protect the tail boom with tape.

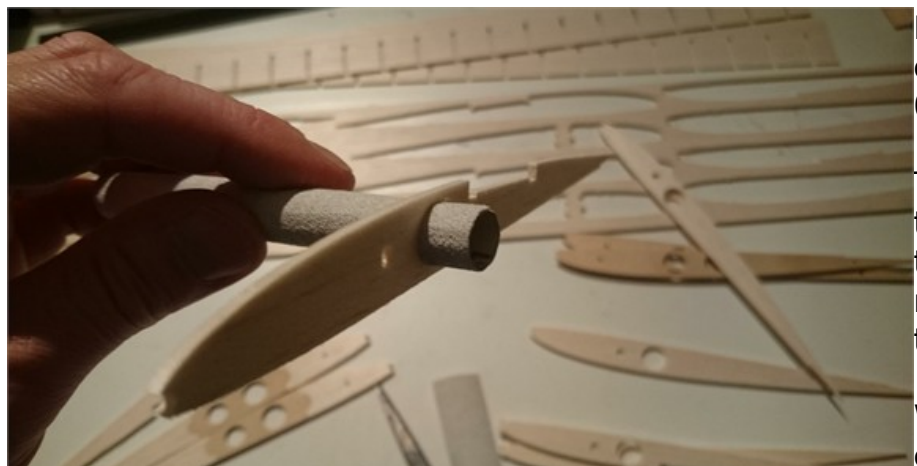
Construction of the wing center section



Center rib is made of two balsa and two plywood ribs.



The balsa/plywood hybrid ribs stick together with superglue.



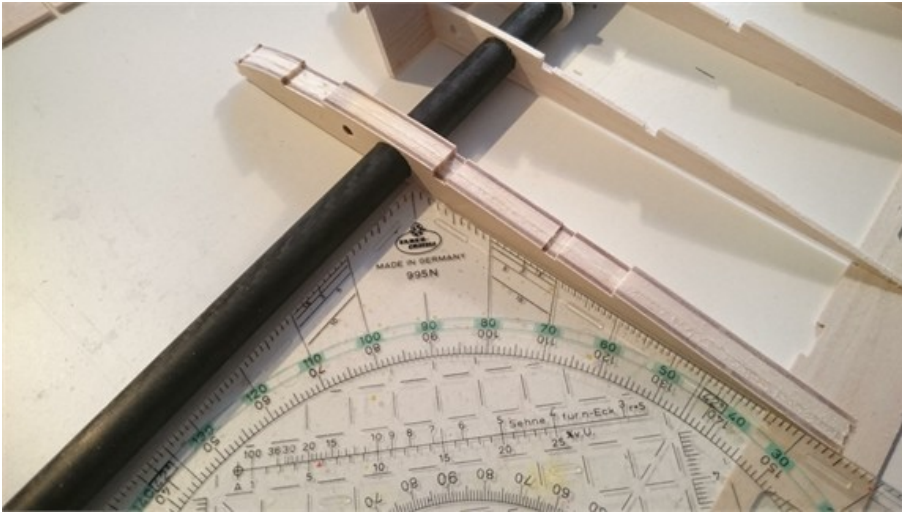
Production tolerance of the carbon tubes is $\pm 0,2\text{mm}$.

Therefore it is possible, that the holes in ribs has to be edit by grinding to make them fit to the tubes.

With a roll made of 100 grain sandpaper it is done quickly.



Ribs and half ribs sorted before pushing on the tube.



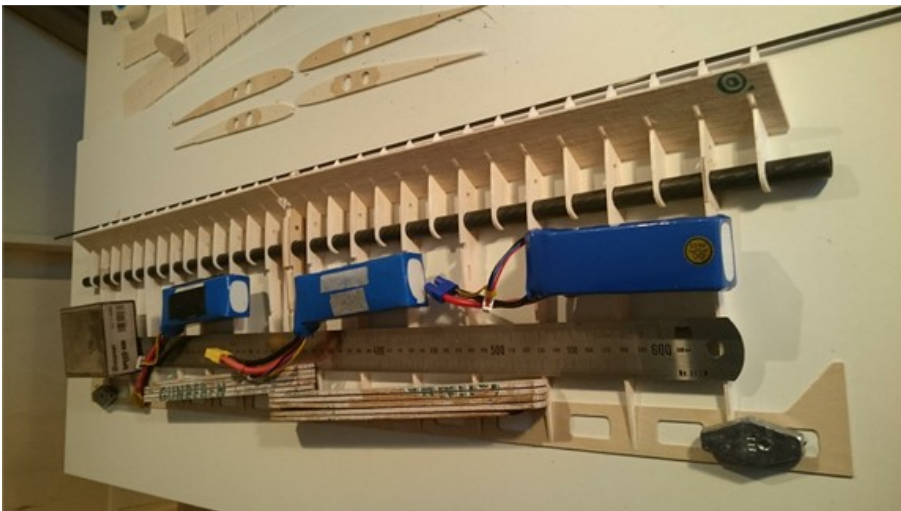
Grind the spar slightly with sandpaper 400 grain carefully and clean the spar before pushing the ribs on the tube.

The center rib has to be right angular to the spar.



Push all ribs on the tube spar and adjust with the slots in the tail edge and the jigs. Put the 3mm carbon nose tube into the ribs noses.

Do not push the end ribs on the tube spar now.



Adjust all ribs carefully and use some weights to press the ribs to the building board.

Glue ribs with tube spar and nose tube and trailing edge with superglue.



Grind the holes incline for the tube spar in the end ribs according to the dihedral.



Use the dihedral jig for gluing the end ribs.

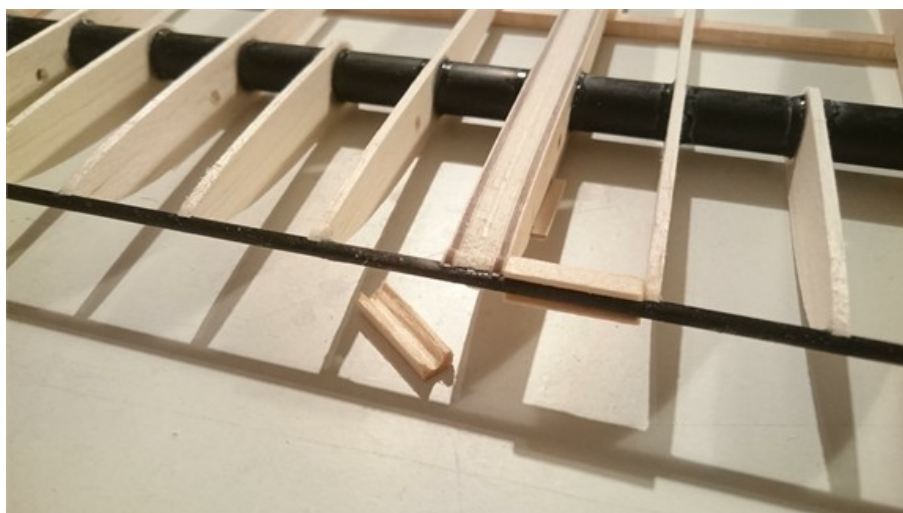


Hybrid rib and Plywood rib glue together. Glue the ribs carefully to the Spars.

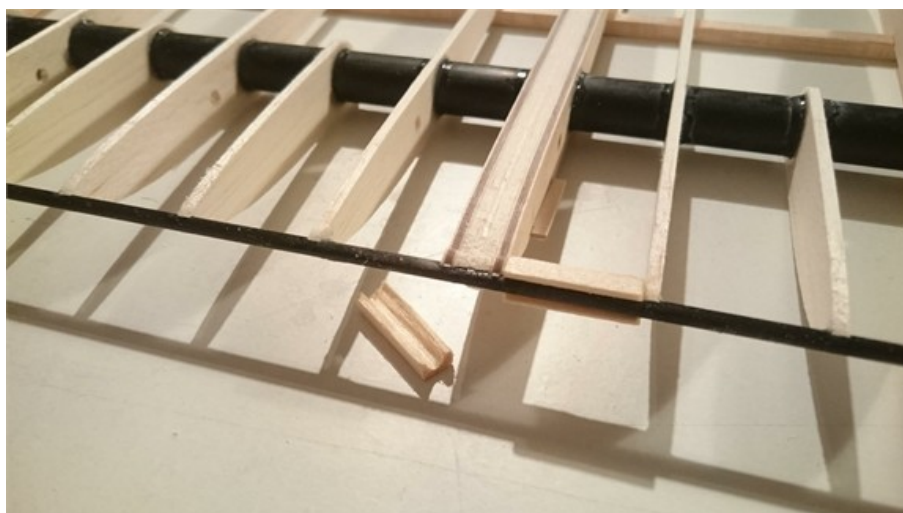
Do not try to save glue when gluing ribs to the spars.



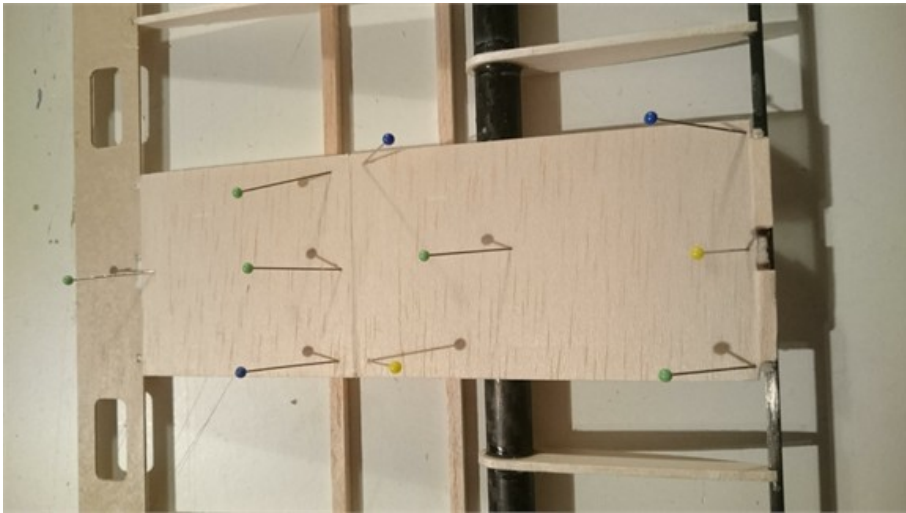
Install 4x4mm balsa strips for the spoiler frame.



Install the plywood reinforcements for the center wing screwing.



Produce filling pieces made of remaining balsa material for the nose bar.



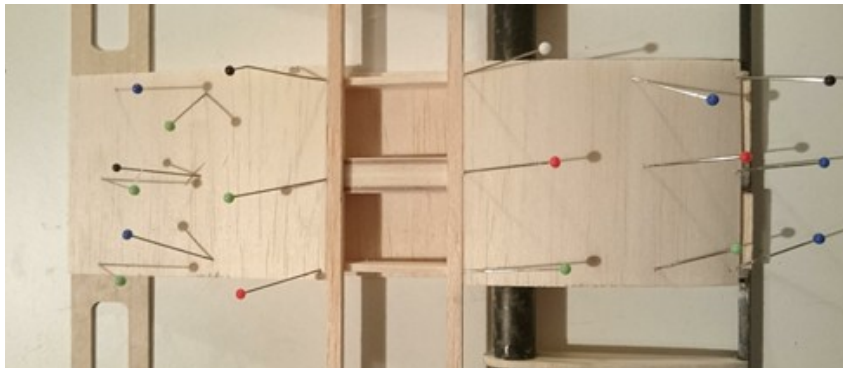
Install 1mm planking on the lower side with wood glue.

The wood grain of the planking is transverse to the direction of flight.



Install the balsa pieces on top of the wing screwing reinforcements.

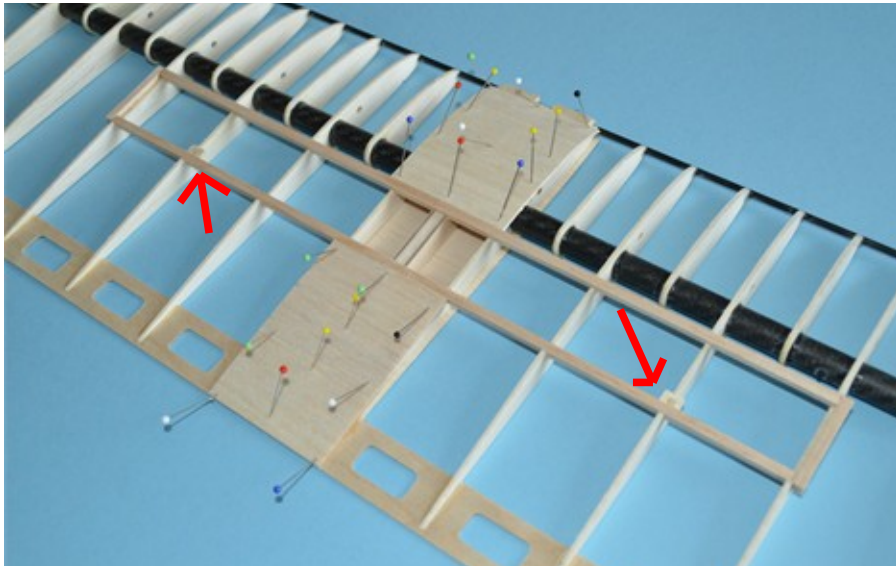
Grind the balsa pieces to the airfoil shape.



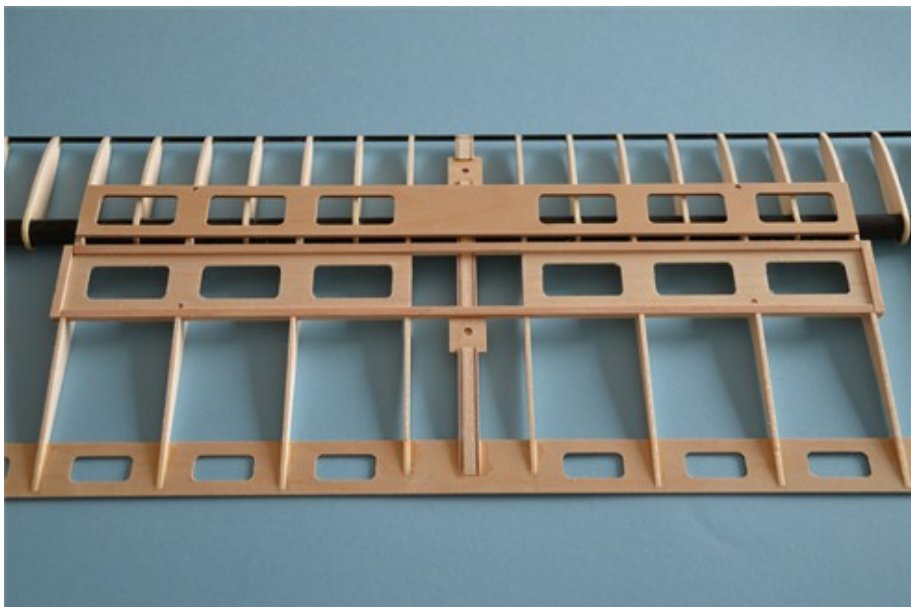
Install the 1mm upper planking with wood glue.



Drill the two 4mm holes through the center rib for the wing screws.



Install the two little balsa pieces for the spoiler magnets.



The spoiler support F19 adjust to the frame. Ironing the Cover film on the supports before gluing the supports into the wing.

3mm magnets glue with super glue.

3mm magnets glue into the spoiler.

Be sure that the magnets do pull and do not push each other.



Shorten the carbon tubes with a metal blade.

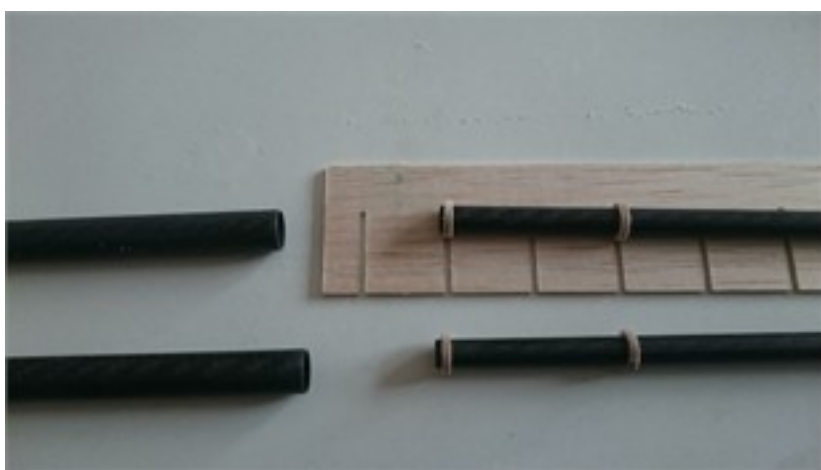
After all grind the ribs carefully to smoth the surface.

Construction of inner sektion and outer sektion of the outer wing

**The inner sektion of the outer wing has to be build in normal position.
The outer sektion of the outer wing has to be build upside down !**



Stick the hybrid ribs with plywood and balsa wood with superglue together.



Sand slightly and clean the tube spar the entire length with 400 grit sandpaper.

Slide spacers to the 8mm tube spar and glue with superglue.

The distance of the rings according to the distance of the full ribs.



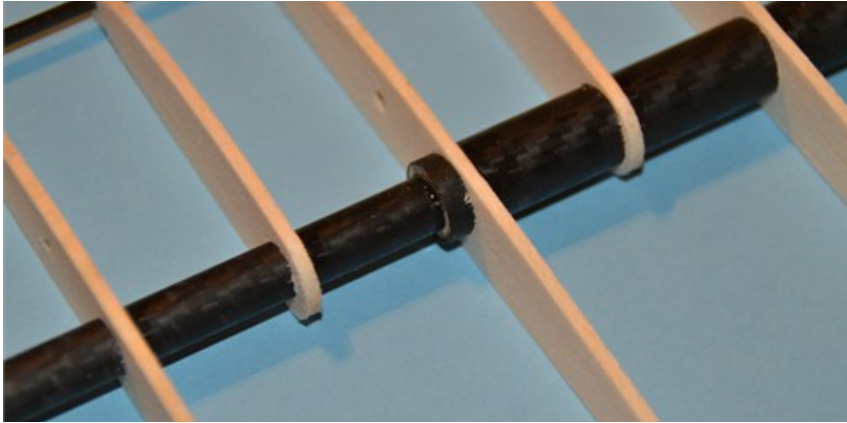
Possibly adjust the diameter of the rings.

Insert 5 minute epoxy in the 12mm tube and insert the 8mm tube spar into the 12mm tube spar and glue. Use also glue between the rings.



Ribs on the spar pushing and adjust to the tail strip and the rib jig for the inner sektion and glue with superglue.

Do not push the end ribs on the spar.



Detail photo of the transition of the 8mm spar into the 12mm tube spar.

After all ribs are aligned neatly, the wings with some weight rests on the building board, glued with superglue spar and leading edge with the ribs.

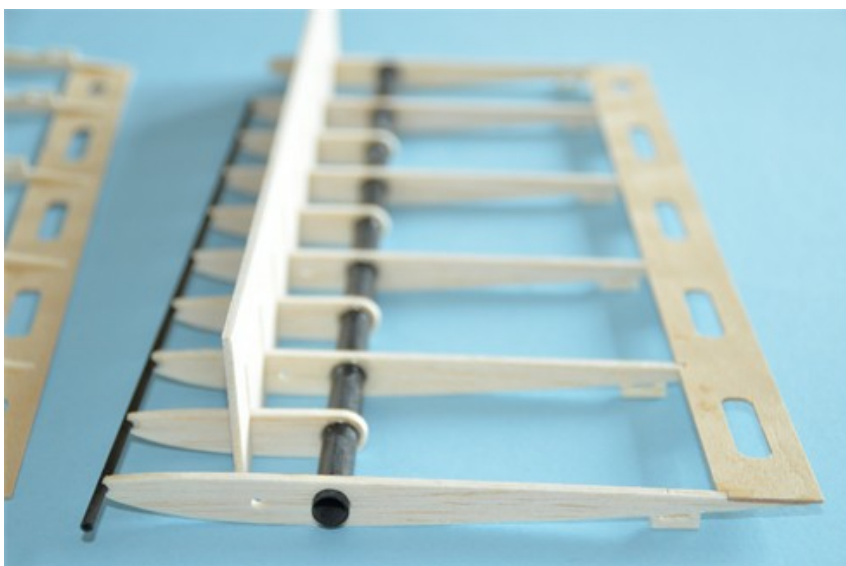


Glue the end ribs according to the dihedral jigs.

Glue the spar carefully with the ribs.

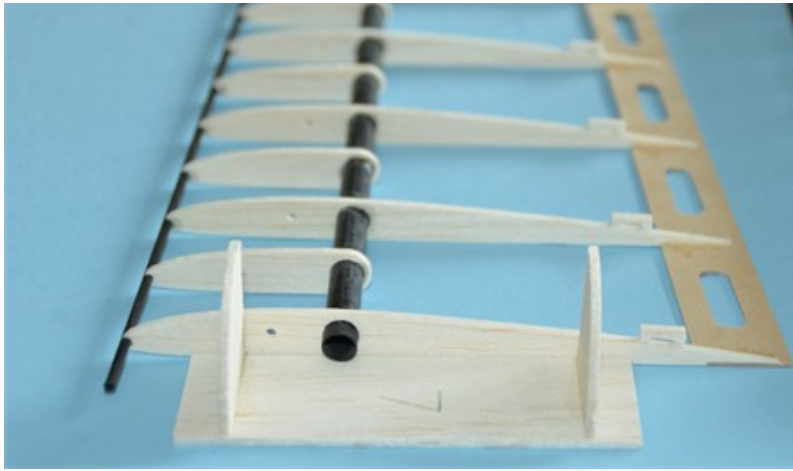
Saw off over standing tubes and grind the surface carefully.

The outer sektion of the outer wing has to be build upside down ! Make sure that is made a left and a right outer wing sektion.



Align ribs with the jig and the trailing edge.

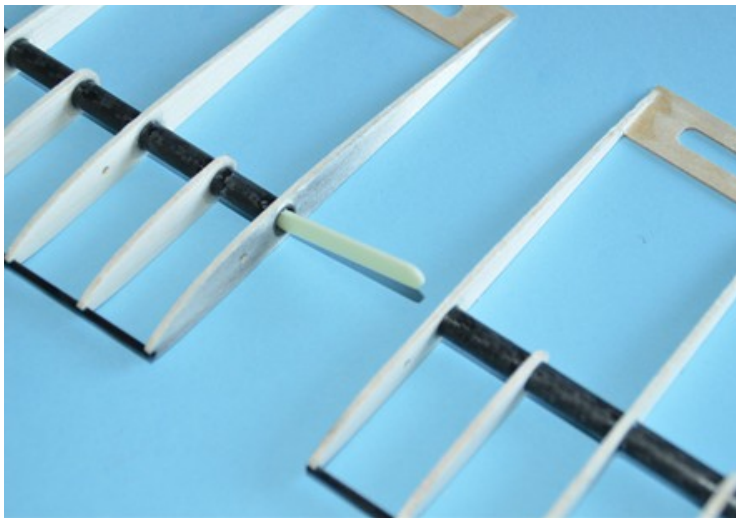
Push nose tube into the ribs noses. Align carefully and glue with superglue.



When dried turn the outer wing around in normal position and use the dihedral jig to glue the end ribs.



The wingtip is made of three formed balsa pieces. Grind the tip with sandpaper.



The dihedral giving FRP piece in the outer wing is glued with enough 5 minute epoxy into the tube spars. The end ribs glued together with wood glue.

Construction of wing conector



The fixture is made of rings and spacers.

The small holes in the spacers showing the side with the dihedral shape.

On the dihedral side is the 6mm bore above of the ring. In the other ring is the 6mm bore down.



Aluminium tube in holder fixture.

Glue the parts with some superglue together.



Side view of two fixtures. The 5mm diameter carbon rod is inserted.

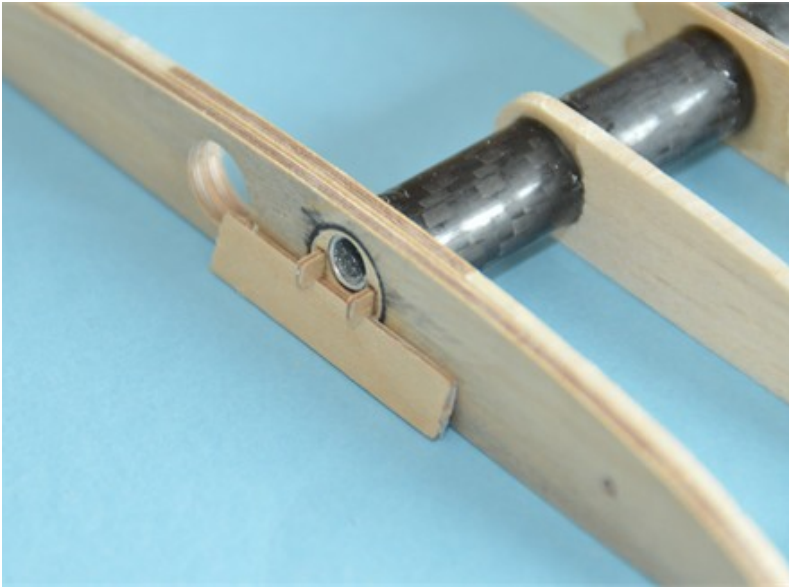


First insert the fixture without glue to test it.

Possibly the wooden rings grind slightly until it fits.



Before gluing the fixture into the tube spar seal the inside aluminium tube with tape, so that when inserting no glue is pressing in the aluminium tube.

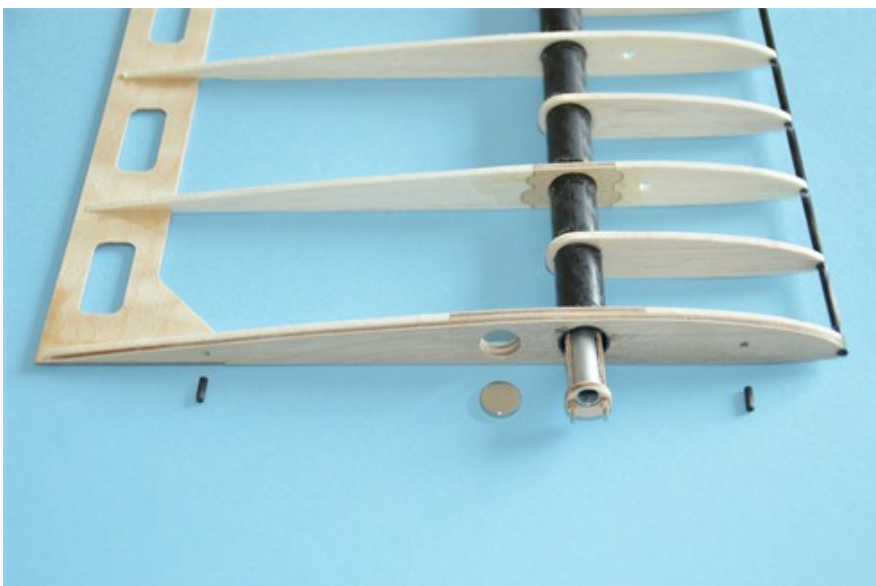


The spacers with "excess length" are installed in the wing center section and aligned with the template Z7. The supernatant is grind away after drying with the rib.

Then the framework is installed without the "excess length" in the outer wing and aligned using the 5mm Carbon rod.



The aluminium tube is at the end ribs always at the top of the timber ring.

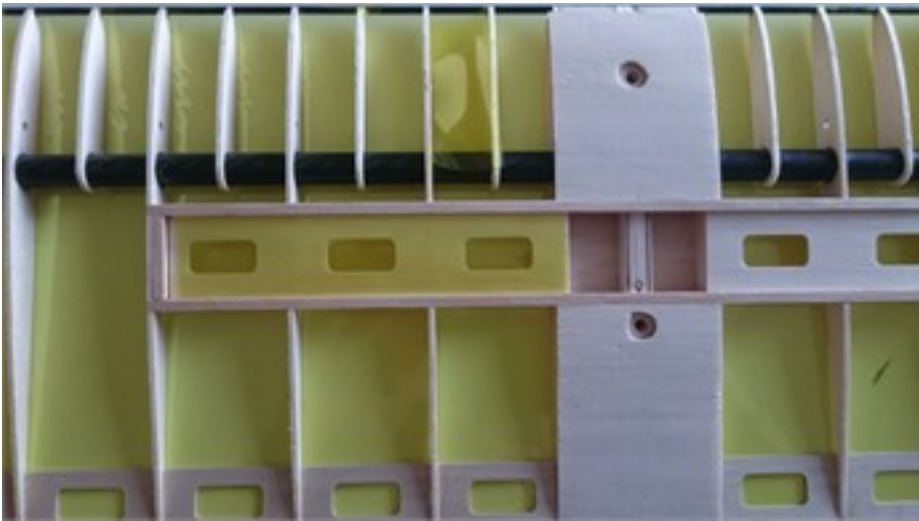


The 10mm magnet can inserted as option. If inserted use superglue.

The needed torsion bars are glued with superglue.

During flight the outer wing is always secure with tape to the center wing!

Notes for the finish and the RC installation



Ironing spoiler pad F19 before sticking the pad into the wing.

As cover film Oralight is proved to achieve a low take-off weight.

For stronger stress use Oracover.



Installation proposal for the spoiler servo.

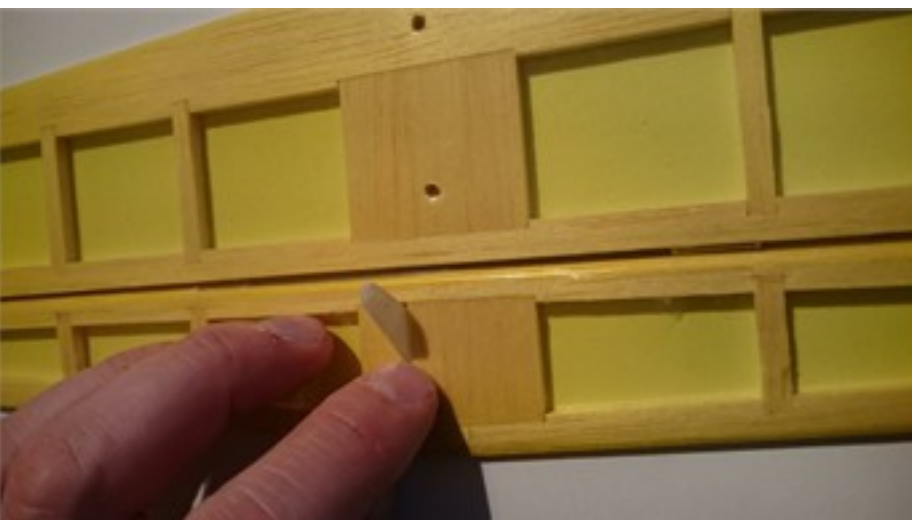
Making balsa crossbars from remains and glue the servo with superglue.

Depending on the servo used it may be necessary that the balsa rib must be cut out in accordance with the servo size.



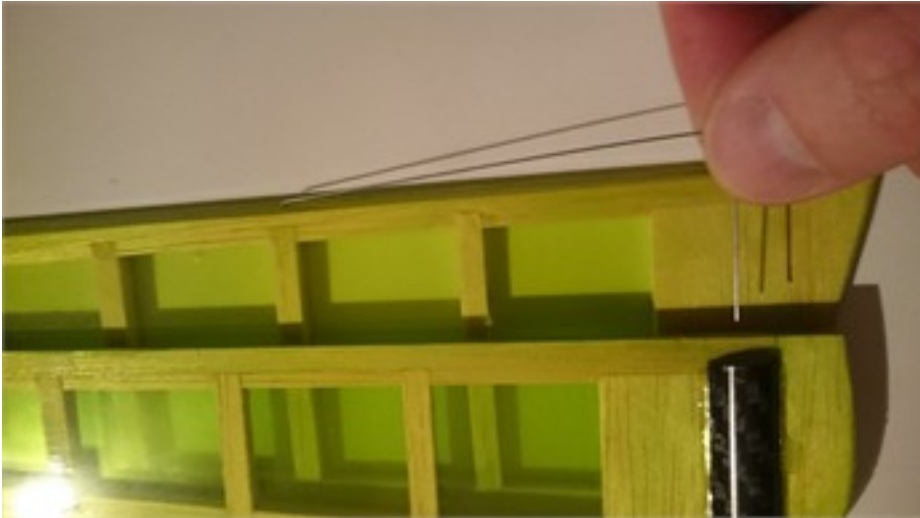
Torsion spring of elevator.

0,5mm steel is two times 90° bent and stab into the ribs twistend counter-clockwise to the rope tension.



Glue the control horns after ironing with superglue in the slots of elevator and rudder.

Grind the gluing surface of the horns slightly before gluing.



Torsion spring of rudder.
0,6mm steel is two times 90° bent and stab into the rib and forward part of the rudder twistend counterclockwise to the rope tension.



Rope with crimp connected to the Servo horn.



The rope plastic tubes be laid from the servo department to about 1cm into the tail boom.
Inside the tail boom the ropes lie free without the plastic cable housing.



At the stern tube end an approximately 2cm long piece of cable housing S-shaped bent and glued with superglue in the outlet.

Settings:

Elevator: +/- 9mm (if you like with expo)

Rudder: +/- 50mm (if you like with expo)

High start hook position 6th hole counted from rear side of the hook board.

Before drilling the hook into the hook board use a needle to make a marking from inside to outside and than drill with 1,5mm before screwing the hook into the hook board.



Picture shows prototype of Fresh

I wish you many good thermal flights

Oliver

If there are any questions please ask and write to:

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Email: hallo@oliver-flugmodellbau.de