



Assembly Instructions for the Elfe 5.0

With the Elfe 5 you receive a kit for a refined F5L/F3L competition model that has been continuously developed over many years.

The Elfe 5.0 has very good all-round characteristics, with particular strengths in stronger wind and when covering distance. Every material in the kit is optimized in weight and strength for its intended location.

2025 fly-off results 26.04.25 Hager Cup, places 1, 3, 4 03.-04.05.25 Podhorany, place 6 10.05.25 Pym-Priel Cup, places 1, 2 24.05.25 Koasa Cup, F3L, places 3, 5 31.05.25 Lockenhaus, places 2, 3, 6 01.06.25 Coburg, places 3, 4, 6 14.06.25 Fürstenfeld, places 4, 5 15.06.25 Kornberg, place 3 28.06.25 Gera, place 3 05.07.25 Feldkirchen, place 1 09.-10.08.25 Austrian Championship, Lienz, places 1, 4, 5, 7

2024 fly-off results 04.05.24 Pym-Priel Cup, places 1, 3, 4, 5 11.05.24 Lockenhaus, places 1, 3, 4 18.05.24 Eppenstein, place 4 07.07.24 Gera, place 1 03.-04.08.24 Lienz, places 2, 4, 6 31.08.24 Feldkirch, places 2, 5 28.-29.09.24 Fürstenfeld, places 2, 5, 6 06.10.24 Hallwang, places 1, 2, 3, 4 16.10.24 Steyr-Weistrach, places 1, 2, 3, 4, 5

The kit is complete except for RC equipment, power system, adhesive, and covering film.

The model is designed for: - installation of 4x DHV56MG servos, which have proven reliable over recent years - T-Motors F60 with 1750 or 1950 kv - 30 or 32 mm spinner from GM - 9x5 in or 9x6 in propellers from GM - BL_HELI-32 ESC, 30 A, for example the Francy2 from FLYCOLOR

The construction method differs slightly from what you may be used to and is explained briefly here:

The underside of the airfoils is almost straight over a defined section. For that reason, all plans for the wing parts show a dashed line. This line must be aligned with the

trailing edge of a straight building base at least 3 mm high.

The wing parts are arranged on the building plan so that you can build center section A first, then both B parts, then both C parts and both D parts, each in one session.

All parts are first dry-fitted. Only when everything is aligned and weighted down is it glued. In the photo below everything is assembled; nothing has been glued yet.

The dashed line extends sideways beyond the plans so the plan section can easily be fixed on the building board in the correct position.

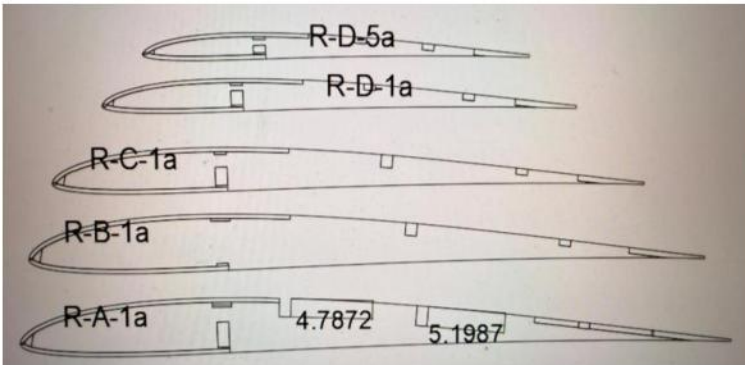
The plan should be covered with film to prevent accidental gluing.

In the kit, the wooden parts are sealed in a plastic sleeve to protect the wood from moisture. Since nothing sticks to this film, it is convenient to cut open this sleeve and use it to protect the plan while gluing.



Wing

Overview based on the airfoil



cross-sections

We begin with wing center section A.

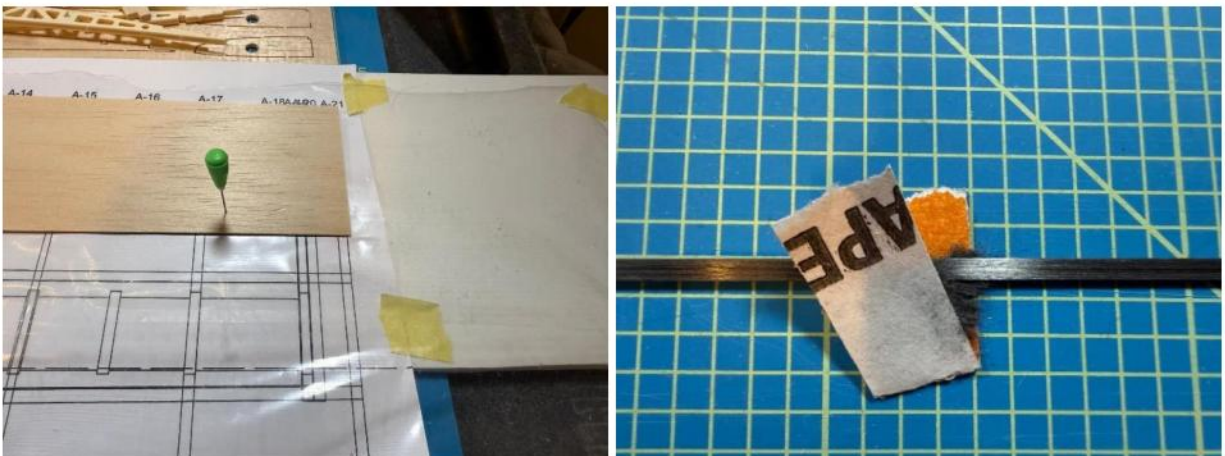
The kit includes PDF printouts of the labeled milled parts so you can identify where each part belongs.

The first step is always to prepare the building surface, plan, and protective film.

Once everything is fixed in place, begin with the lower sheeting and the lower carbon spar cap.

Fix the sheeting in position and sand the 3 x 0.5 mm carbon strip.

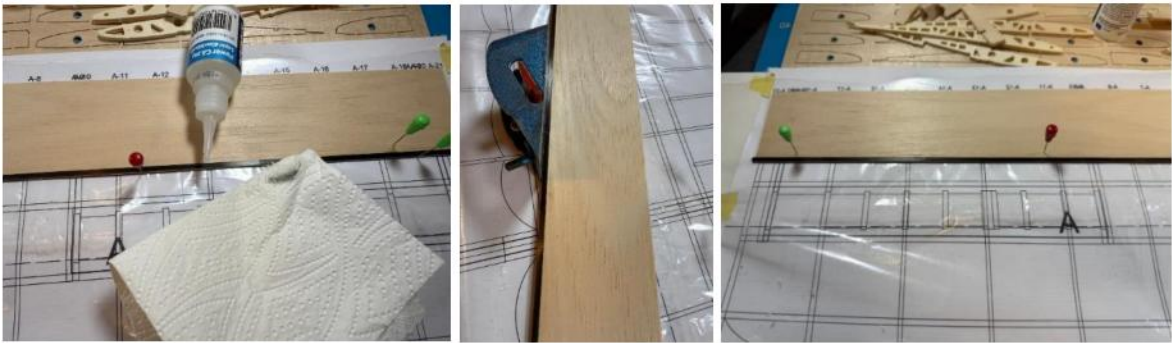
The lower spar cap is flush with the rear edge of the lower sheeting, so it is glued



directly onto the lower sheeting.

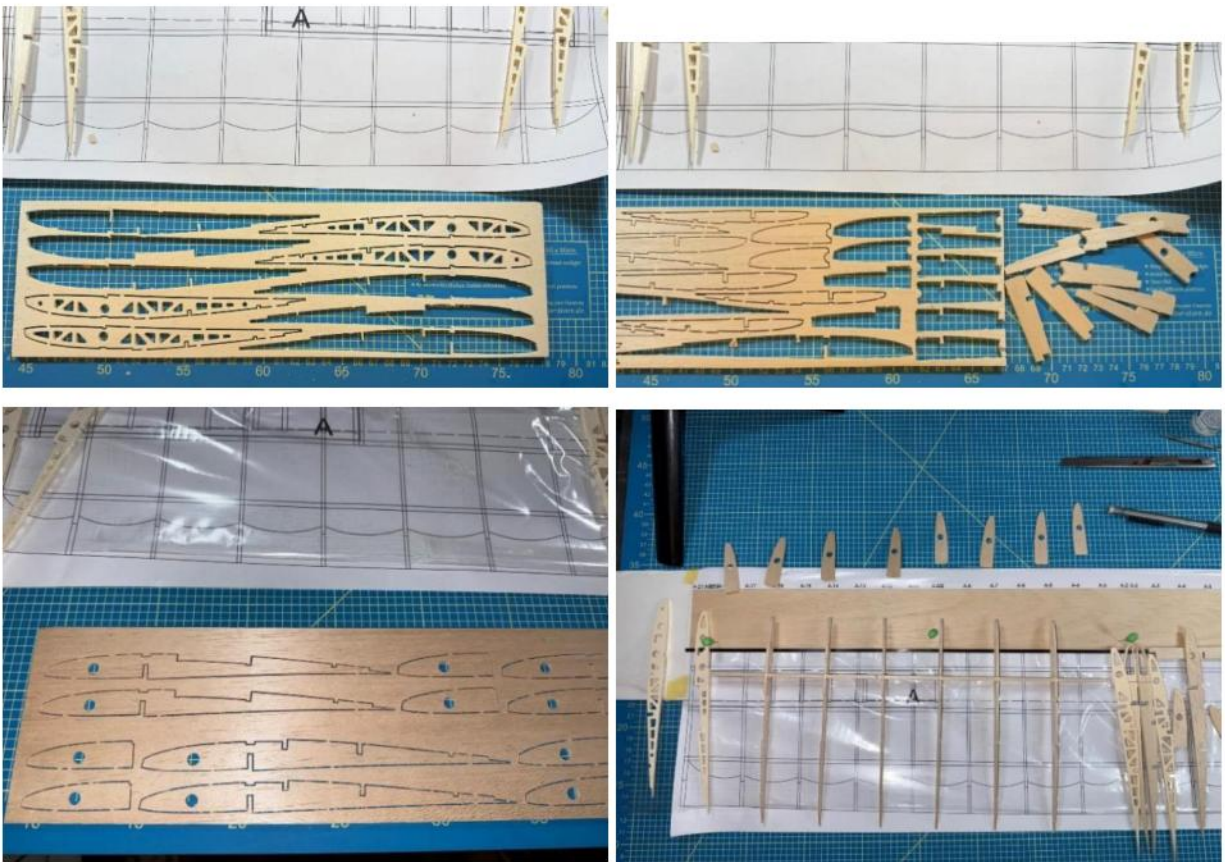
Use pins to hold the carbon strip in position and carefully wet the front edge of the carbon spar cap with thin CA. Immediately wipe over it with a piece of absorbent paper to press it down and to remove excess adhesive, which would otherwise affect the exact seating of the ribs.

After curing, clean up the trailing edge of the sheeting and carbon cap with a balsa plane and then pin the assembly in position on the plan.



This procedure is repeated for all wing parts.

Now place all components, one after another, directly from the milled sheet onto their positions on the plan. Remove the retaining tabs as you do so.



Glue the four center ribs together in pairs, and also glue the end ribs of the spoilers together in pairs.



Carefully enlarge the two markings for the later wing bolt holes to 4 mm.

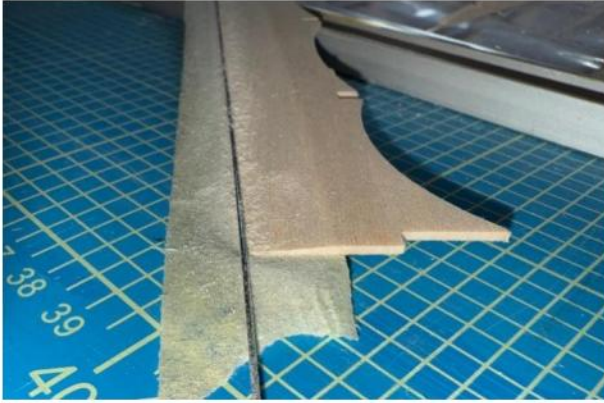
Do not sand away the step on the two shear webs. That is where the upper carbon reinforcement sits.



Then you can already plug the ribs onto the shear web in their positions. Do not glue anything yet.

Next, taper the underside of the trailing edge. Mask the trailing edge and press a 0.8 mm steel wire directly against it. Sand evenly for about 12 mm up to the wire.





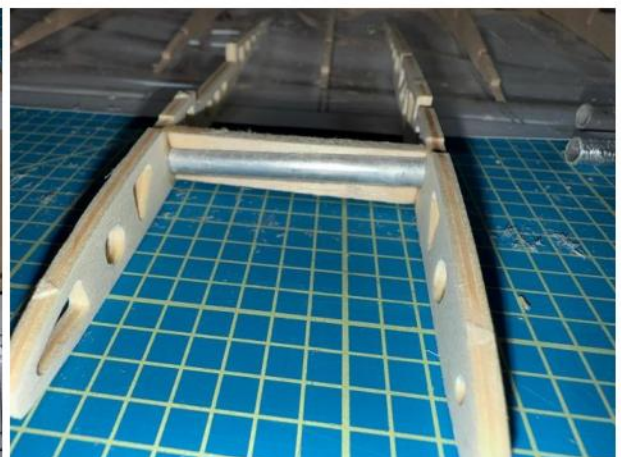
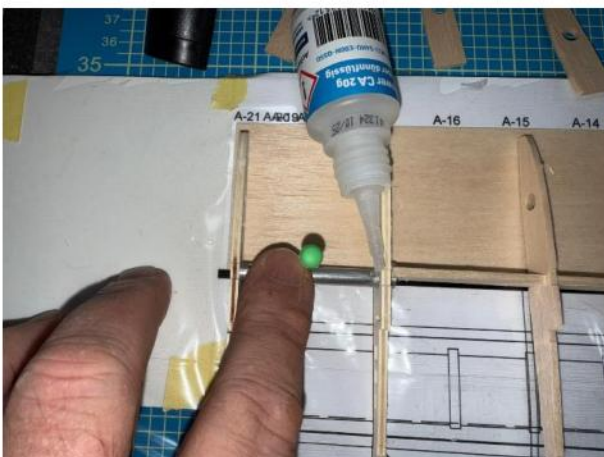
Next, bring the trailing edge and the ribs into position. Only fix the trailing edge for now. It is important that all parts sit in position without stress.

First, I tack the center ribs in place with thin CA. Use only a small amount.

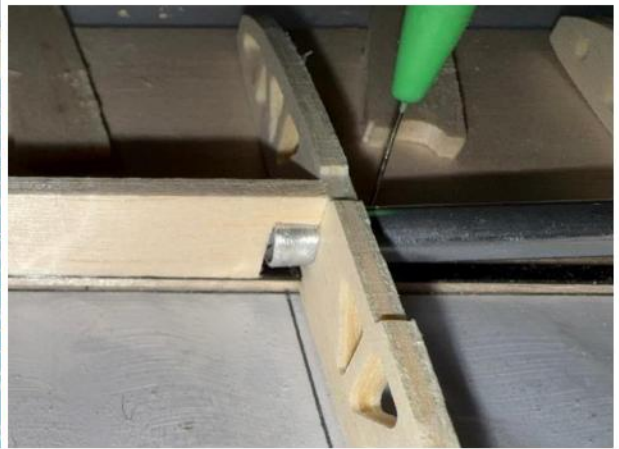
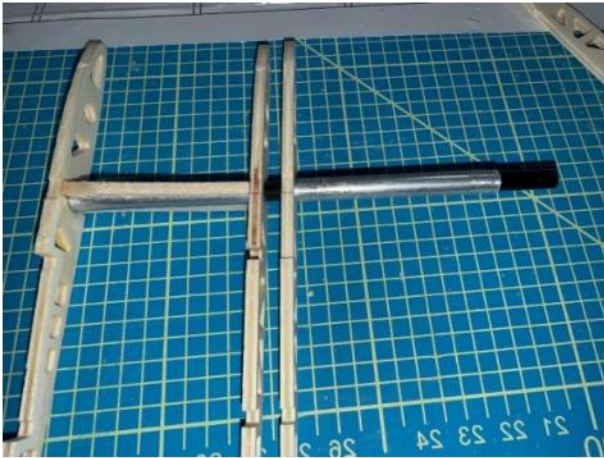


Roughen the tubes and test-fit them into the plywood ribs. The tubes may project slightly at rib A17. Rib A21 stands perpendicular to the tube. When both ribs and the tube are in position, carefully secure the ribs to the tube with a little CA. Do not glue them to the lower sheeting.

Then fill above and below with 3 mm balsa offcuts. Check that there is still room for the carbon strips.



I prepare the joiners for the B parts at the same time by assembling the B tube and the first B rib with the 5 mm carbon rod, then fixing B1 to the B aluminum tube.

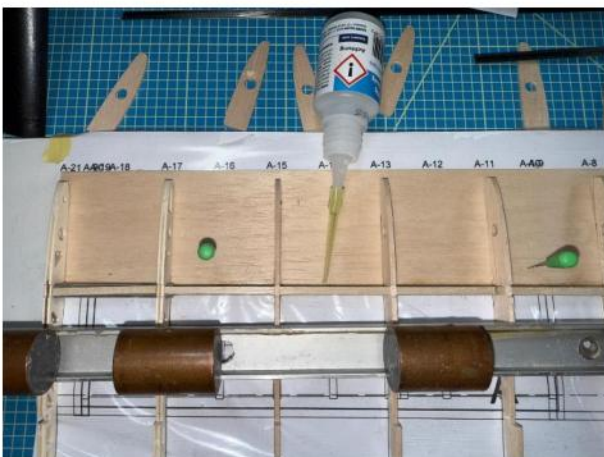
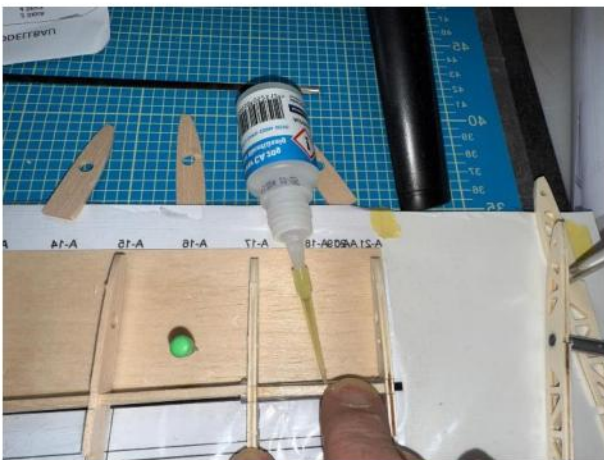


Relieve the shear web slightly so there is room for the small projection of the aluminum tube.

It is important that the 5 mm carbon rod extends a few millimeters past the second rib so that under stronger bending loads the load remains in the plywood rib.

Then the two joiner ribs can be fixed in position together with the sheeting and the carbon spar cap. Everything must lock in cleanly and sit without gaps.

Then align everything, add weights, and begin gluing the shear web.



Next, align the trailing edges carefully and fix them only very lightly with a minimal amount of CA where they meet the ribs.

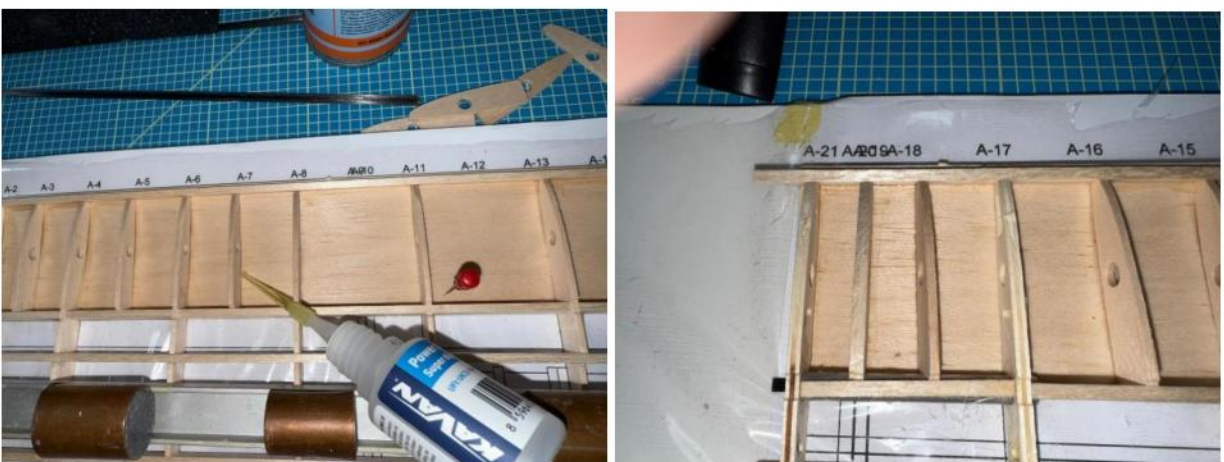
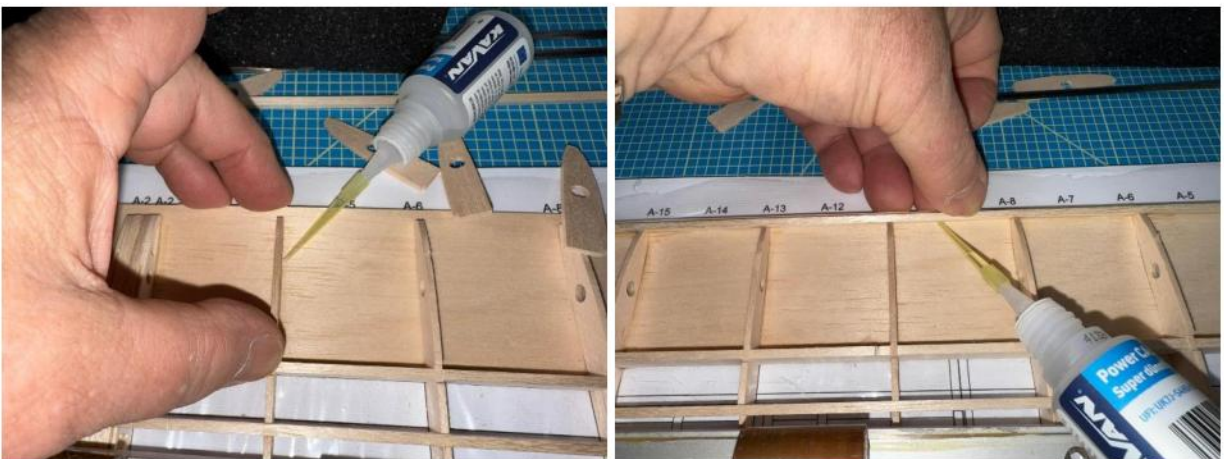
Fit the front and rear spoiler end strips, 3 x 5 mm, plus the rear 1.5 mm strip. When everything sits stress-free, fix all of it in sequence with thin CA.

Allow some time for curing.



Now you can lift the lower sheeting slightly and fix it with thin CA. The blue CA grabs very quickly, so the ribs can be fixed one after another. Use a little activator if necessary. Then glue on the leading edge immediately afterwards.

Fit and glue the intermediate ribs.





Now fit the upper short carbon strip, about 40 cm, 5 x 0.6 mm, and glue it with medium CA. Then glue the full-length carbon strip, add weights, and let it cure.



After curing, the panel can be removed from the building board so the leading edge can be planed to the airfoil contour.



You can now nicely fillet the shear web to the ribs from the front; I use medium CA for this.

Do not forget to enlarge the hole through the lower sheeting, otherwise it will be difficult to find later.

For applying the upper sheeting, put the center panel back in position on the building board and weight the wing down again.

Fix the sheeting with tape and fold it back.



For applying the upper sheeting I recommend my YouTube video:
<https://www.youtube.com/watch?v=dcUB1dR-lgo&t=58s>

Thick CA is my first choice for this. It stays liquid long enough and still cures quickly when you spray activator on the outside of the sheeting. It is important to keep the aluminum pressing bar moving, otherwise it will instantly glue itself through the balsa to the inside with the CA.

After enough curing time, ideally overnight, turn the wing over and finish gluing the

trailing edge.

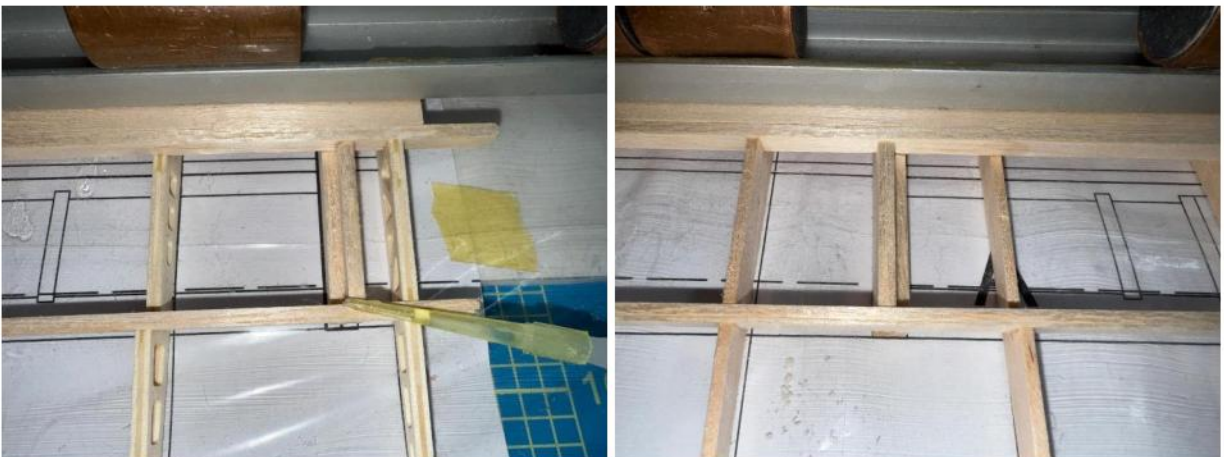
Since the top surface is straight over the last 5 to 6 cm, you can press the ribs and trailing edge onto a flat surface to glue them permanently.

I also press down the thin end of the rib with the CA bottle until the glue has grabbed.



Now fix the outer spoiler stop according to the plan.

The inner stop is fitted, but not yet glued. That is done once the spoiler flap is finished.



You may reinforce the front bolt hole, but it is not essential.

Fill the rear cutout with a piece of plywood and reinforce the hole that way.



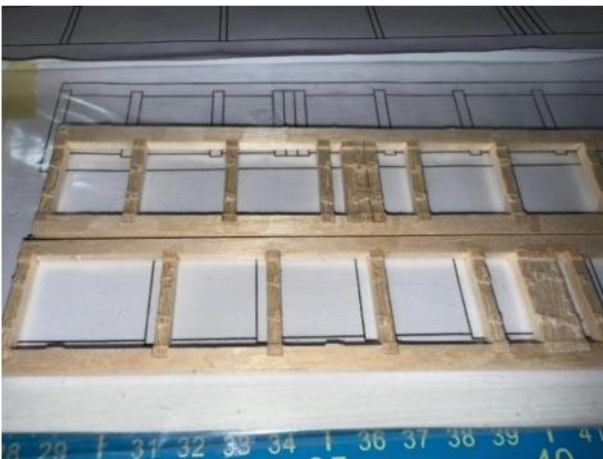
Assemble and glue the spoilers according to the plan.

I always use a stop strip so the front side is absolutely straight.

Do not remove the small feet or the retaining tabs from the ribs before gluing here. The feet point downward.

After curing, sand the underside slightly hollow until the surface is smooth. This leaves about 0.5 mm clearance so the flap can later sit cleanly without stress.

At the front and rear I always sand a slight bevel so the flaps move easily into the spoiler box.



At the rear, left and right, there should be a gap of about 0.5 mm.

Now the inner end rib for the spoiler can also be glued in.

The 1 mm spoiler base closes off the inside of the spoiler box.



Next come the mounts for the spoiler servos.

The position of the spoiler linkage is intentionally asymmetric.

The servo mounts are sanded in from the sides and the openings for the shear web and servo arm are made. On the front spoiler web, the 0.5 mm projection is filed off.



The servo mount is sanded so that, with the servo installed, it is flush with the underside of the airfoil. When everything fits, glue the servo mount all the way around with CA.

The servo itself is not glued in and can therefore be replaced quickly at any time.

Later, after final servo installation, the opening is simply closed with covering film.



Sand the leading edge to shape using the templates. When the overhangs of the sheeting and the carbon spar caps have been sanded flush with the root rib, the center section is complete in basic structure.

Both B panels and all the other wing parts are built in the same sequence.

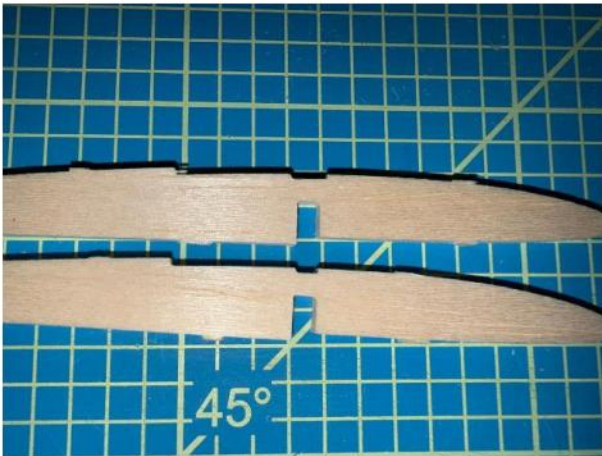
Starting with the building surface, plan, and protective film, fit the lower sheeting with the 3 x 0.5 mm carbon strip.

Lay out all parts on the plan with the help of the PDF overview.

There are two 3 mm balsa ribs that are easy to confuse.

In the photo, the upper rib has space for the 5 x 0.6 mm carbon strip, the lower one for the 3 x 0.5 mm strip.

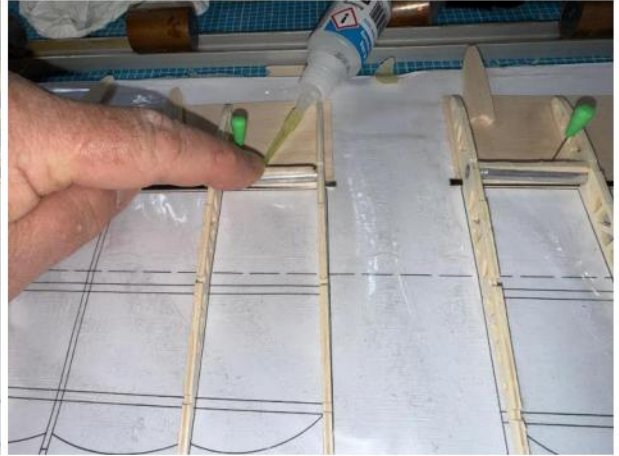
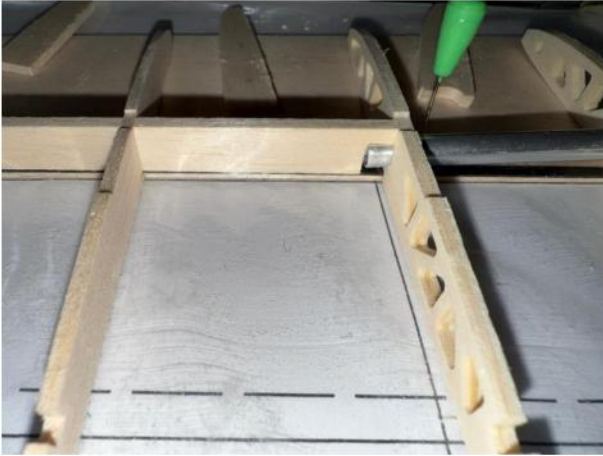
Part B has 5 x 0.6 mm carbon on top, so the upper rib is the end rib of B. The lower one is the root rib of part C.



When everything is prepared, begin dry-fitting and laying the parts on the plan.

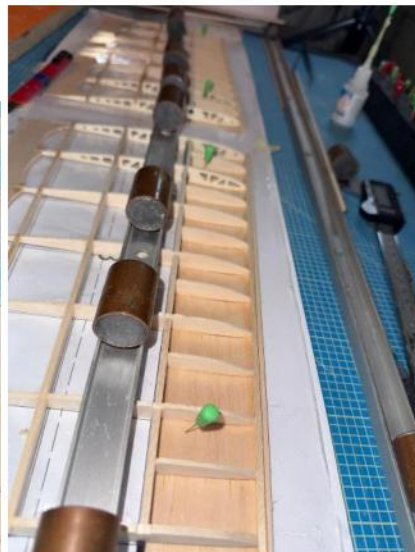
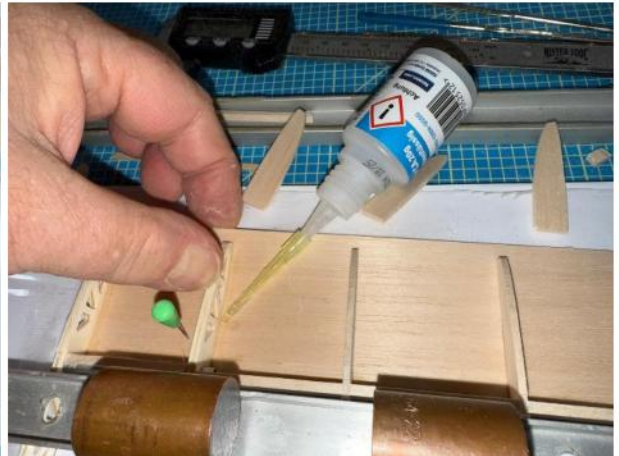
The joiners for the B parts have already been prepared. Only the reliefs for the tubes and the exact position of each second plywood rib were still missing.

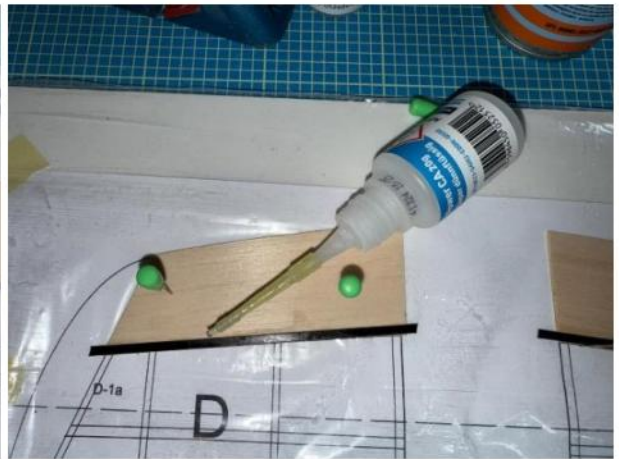
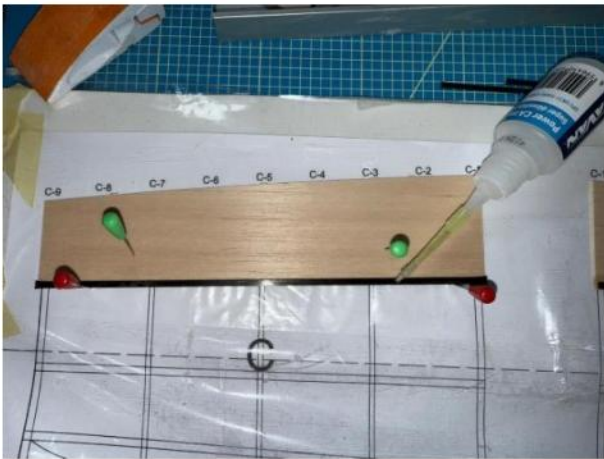
After filling with balsa, the joiners can already be glued in position.



Now assemble everything again, make sure once more that all parts are stress-free, add weights, and glue it piece by piece.

For the angle of the 3 mm end rib, please use the template, although the shear web already provides the correct angle.





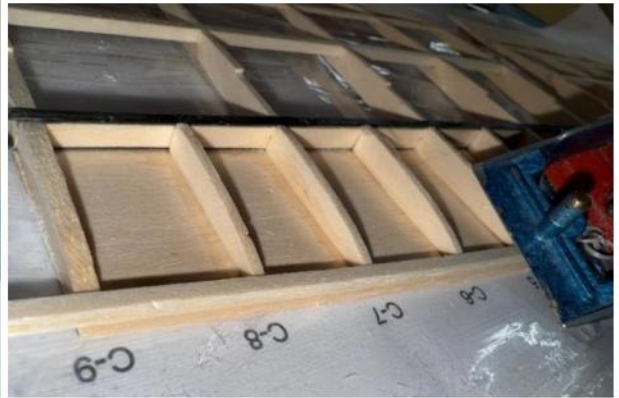
Parts C and D should now already feel almost routine.

With the 3 mm root ribs of C and D there is again a risk of mixing them up.

The two upper 3 mm ribs shown in the picture, for C, have room for the 3 x 3 mm strip; the two lower ones, for D, only for the 1.5 mm strips.



Use the templates to set the correct angle of the joining strips, although the webs already provide the correct angle for the joining ribs. This completes the basic wing structure.





Sand the leading edges to the templates, check the joining angles, and sand them if necessary.

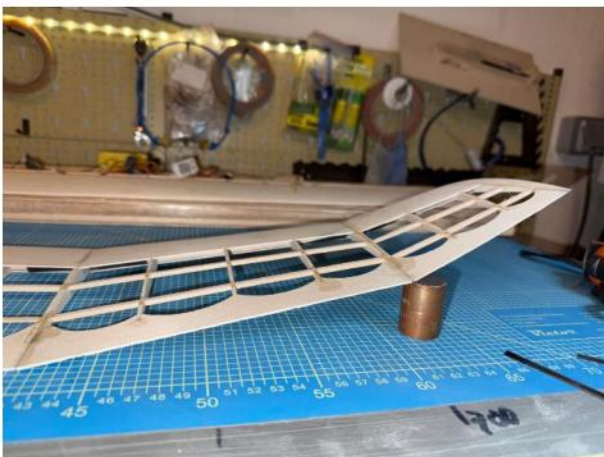
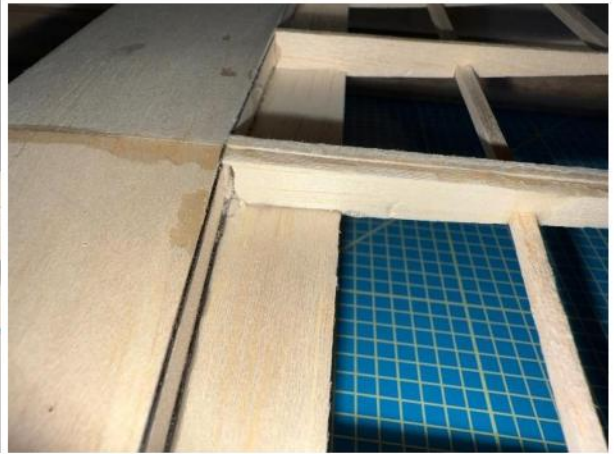
Now only the tip bows and the joining of parts B-C-D remain. While sanding, always compare the right and left wing parts so the Elfe flies straight later.

Shim C-D by 35 mm at the trailing edge. Shim B-C by 30 mm. A-B is determined by the carbon joiner.

Before gluing wing parts C-D and B-C, cut a slot in each joining rib behind the spar.



Use leftovers of the 5 x 0.6 mm carbon spar cap as joiners, sanding them so they are flush with the underside of the wing parts. Then soak the area with CA and, if needed, press the joiners slightly so they make good contact with the web.



At the front underside between the plywood ribs of the center section, remove the balsa until the holes for the wire channel become visible.

Solder the servo wires to the six-pin connector strip, and for safety plug the mating socket on while soldering.

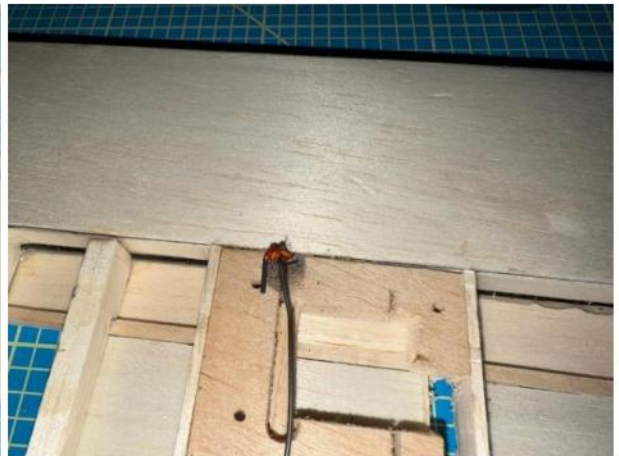
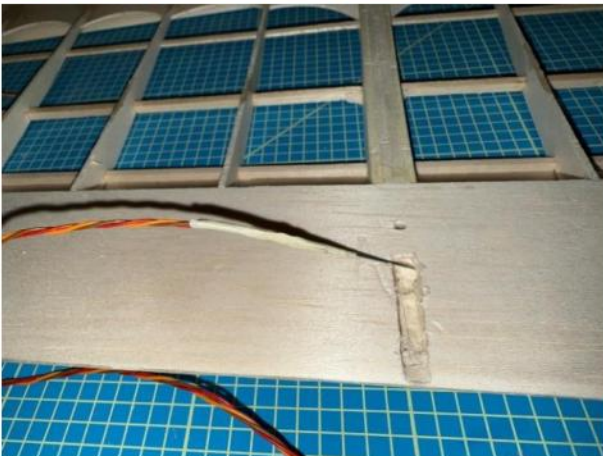
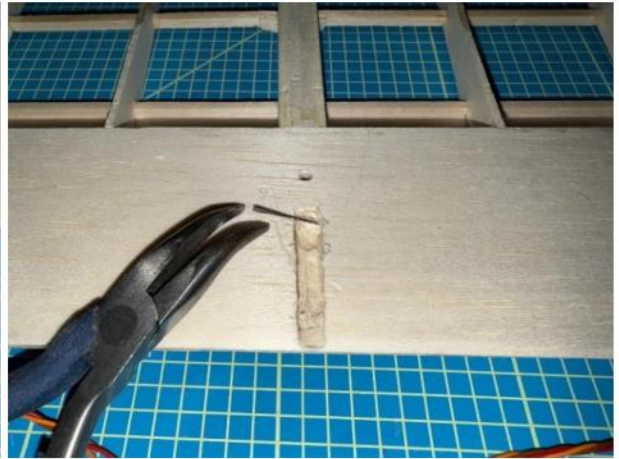
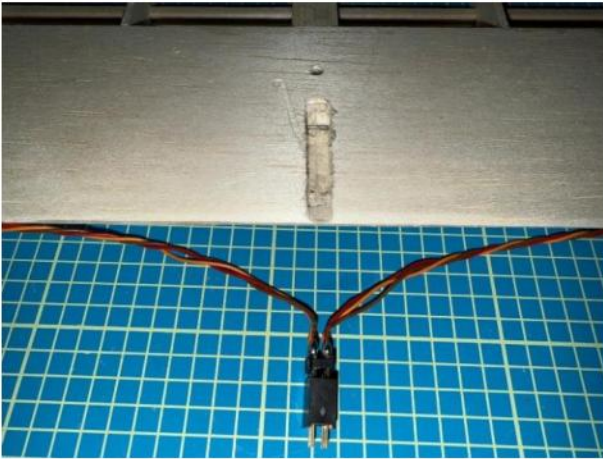
During final servo installation, I cut off the wires at the servo and then solder them to this socket. That gives me a finished lead for the connection to the receiver. The servo is soldered to the cable in the wing. So far I have never had to replace a servo.



Shown here while soldering with the connector strip plugged in.

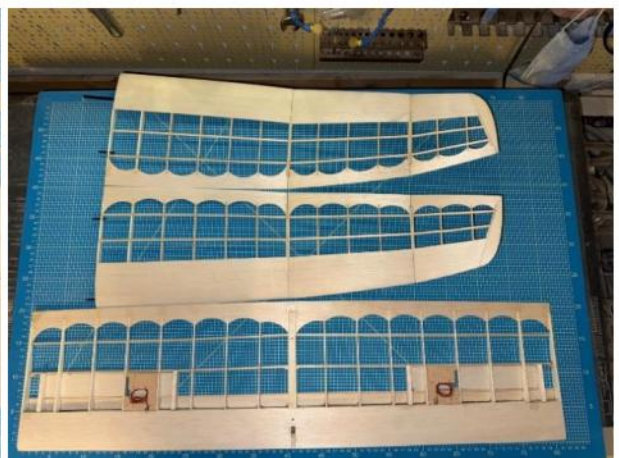
The cable can then be fed in from the center on each side. I use a hook to pull the cable to the servo bay.

After the final servo test, I glue the connector strip into the wing with hot glue, with the mating socket plugged in, in



the area of the inner solder joints.

Glue the 3 mm carbon anti-twist pins into the root ribs of part B.



Tail surfaces

Now the vertical tail.

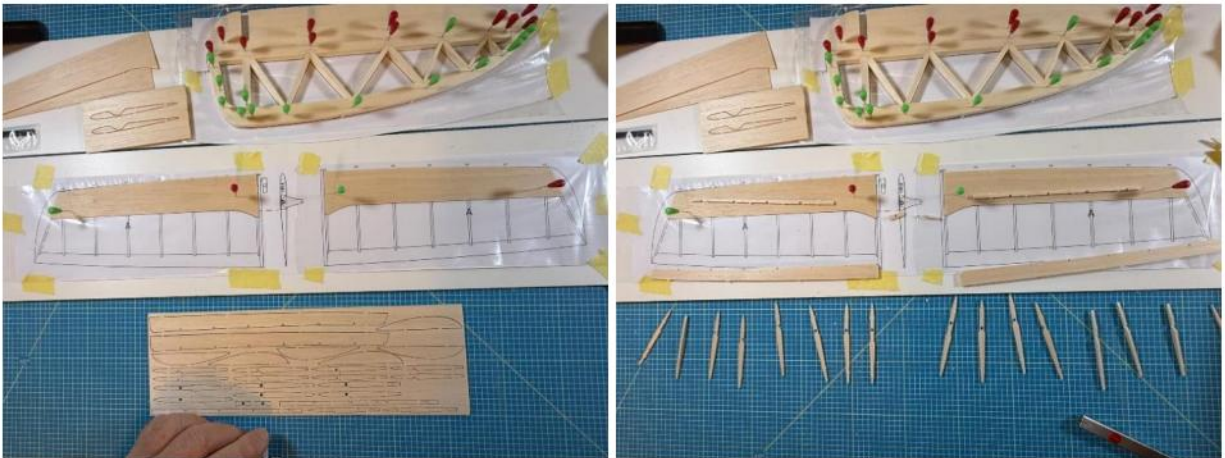
It can even be built without the plan, because the parts are almost self-explanatory. Lay out the parts in sequence and, after removing the retaining tabs, align them on the plan.

The slightly thicker ends of the ribs always face forward.

At their ends, the ribs always have one straight and one rounded contact face. The straight faces always meet each other; the rounded faces are on the outside. The ribs are always slightly wider at the front than at the rear.

After pinning everything in place, glue it with very thin CA.





While that cures, we begin with the horizontal tail.

Fix the lower sheeting on the plan.

Release all parts from the milled sheet and carefully remove the retaining tabs.

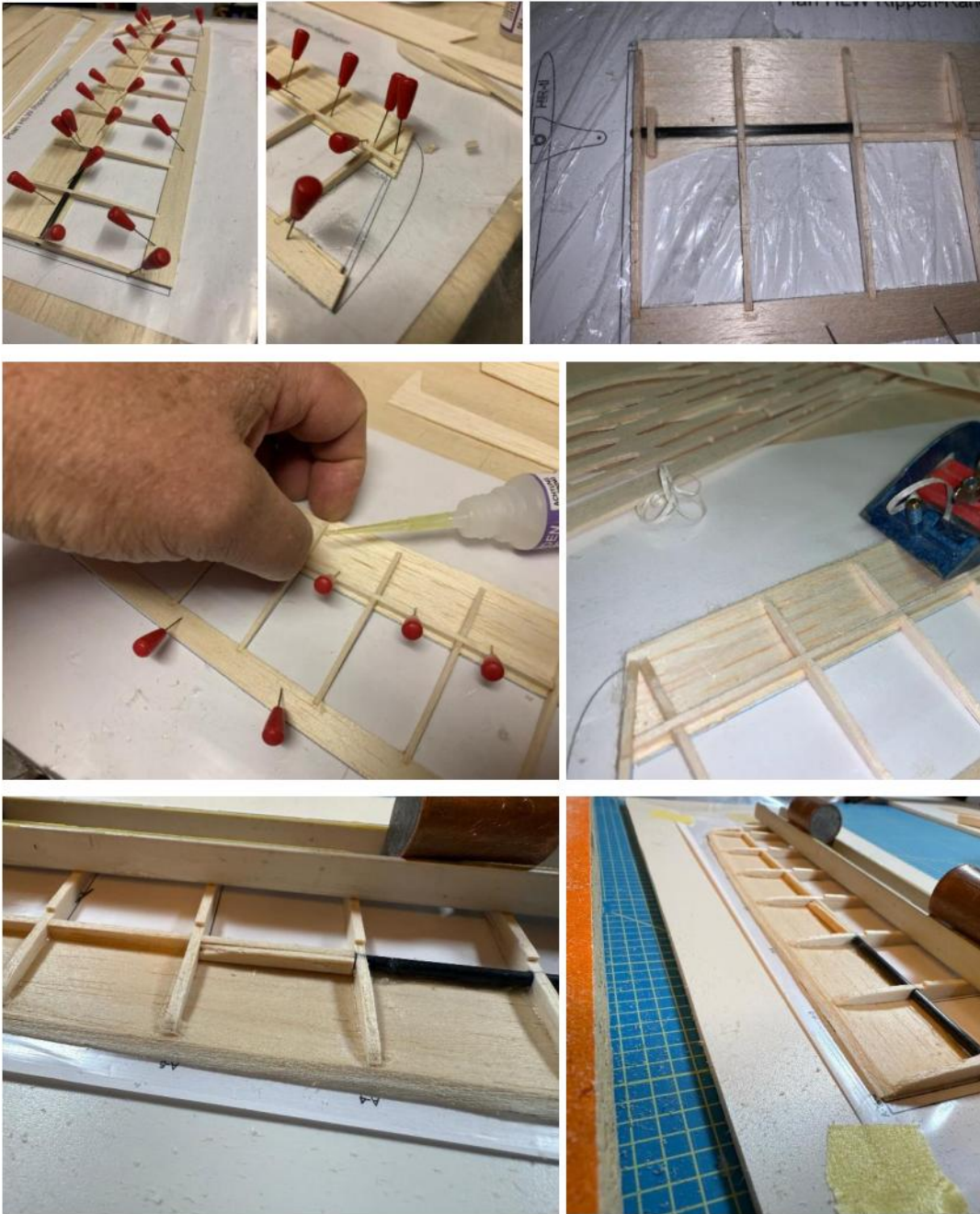
Bring the three ribs for the joiner into position. I do this with pins.

When all parts are in position, place weights on the ribs just ahead of the trailing edge. The underside of the trailing edge will later lie exactly on the airfoil line; the upper side of the trailing edge will be sanded to the airfoil contour after everything has been fully glued.

Then begin by gluing the three joiner ribs and then the web with the ribs onto the sheeting, again with thin CA.

In the bay after the joiner, the web is doubled with a piece of balsa.





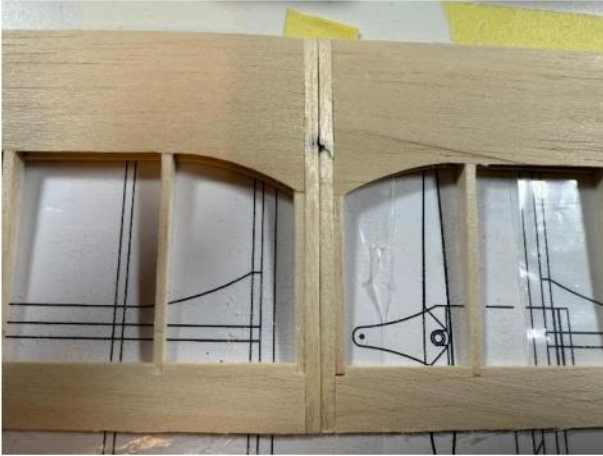
To glue the ribs to the sheeting, briefly remove the weights and press the ribs onto the sheeting. Again use thin CA for the bonding.

After curing, sand the lower sheeting at the nose to a bevel that follows the airfoil contour.

Weight the rear area again just ahead of the trailing edges; then the upper sheeting can be glued on, again with thick or medium CA.

A small gap remains between the carbon tubes and the upper and lower sheeting. I fill that with thick CA.

Glue on the tip bows and the root ribs and sand the entire tail surface to shape.



Sanding the vertical tail

The rudder is slightly shorter at the bottom so it is protected during landing.

First sand both parts evenly over their whole surface so the tip remains about 2 to 3 mm thick and the fin at the bottom remains 6 to 8 mm thick.

Then use a pen to mark the centerline of the trailing-edge thickness.

Shape the fin to the airfoil. Sand the rear of the rudder to about 1 mm thickness.

While sanding, always check both side surfaces alternately so the rudder remains warp-free.

File the recess inside the rudder for the carbon tube slightly hollow until the rudder can be pushed on square and without stress.

The rudder linkage is on the right, the stop is on the left in the direction of flight.



Sand the rear edge of the fin and the front edge of the rudder accordingly so that enough throw, 30 to 35 mm, is possible.

Then cover it, cut the slot for the lever, and glue in the GFRP control horn.

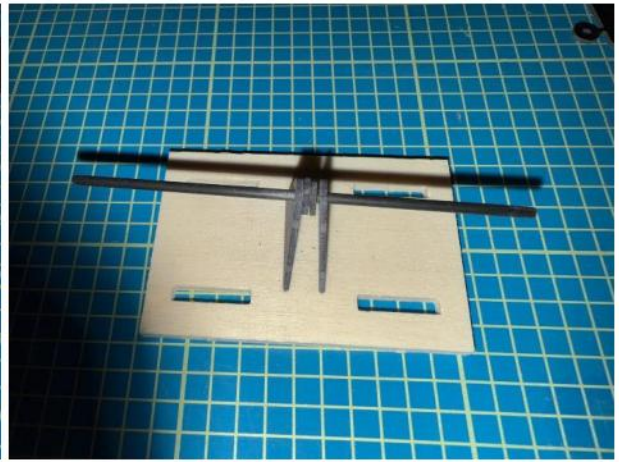
Only later glue the finished rudder to the tube.

Pivot mount

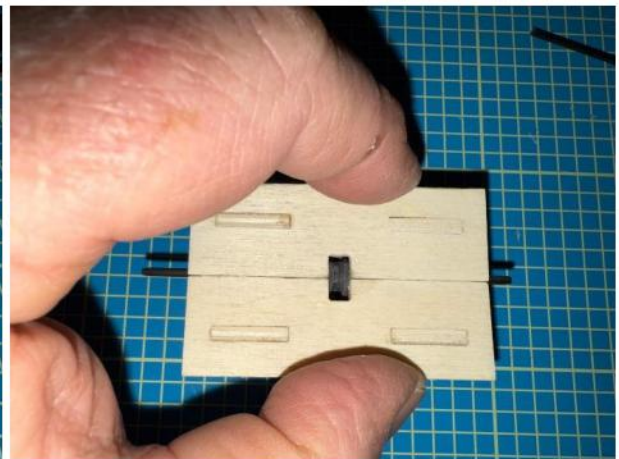
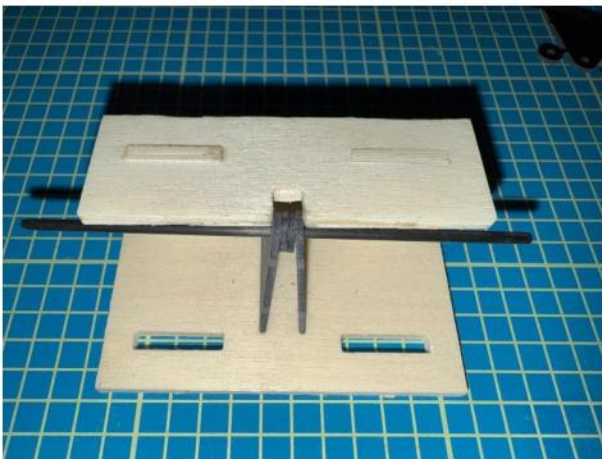
The kit includes all parts needed to build the horizontal-tail pivot mount simply and straight.

Sand all areas that need to be glued.

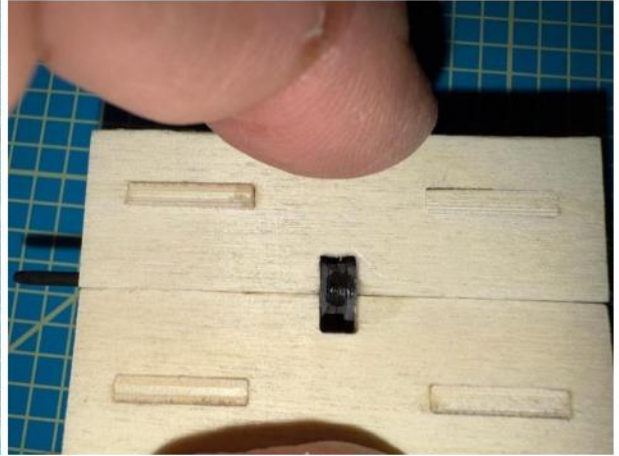
Glue the spacers into the two upper parts so that the groove for the carbon rod is on the



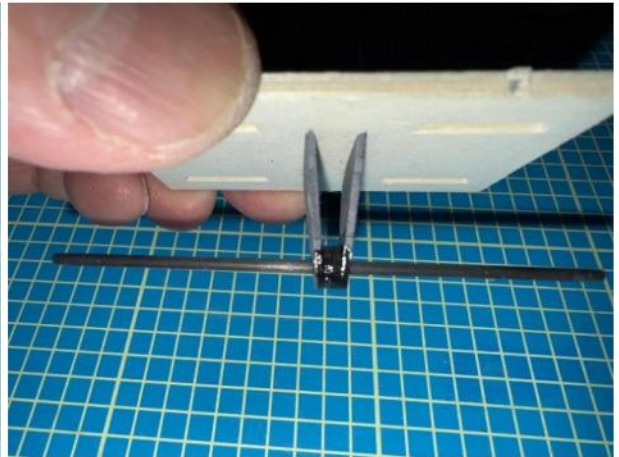
underside.



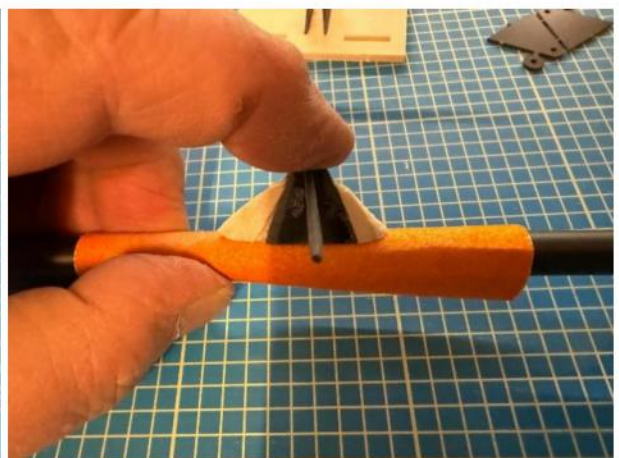
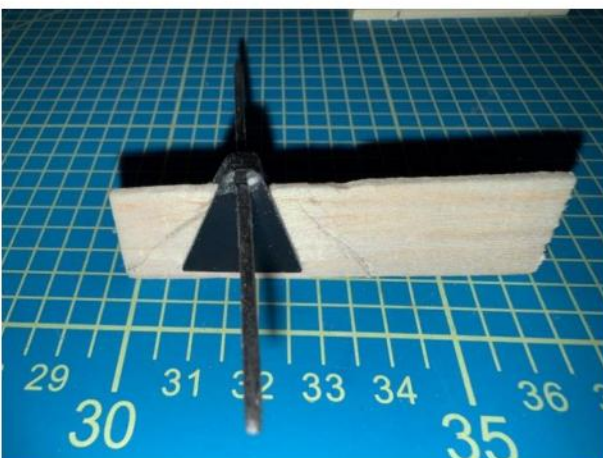
If the parts do not sit closely enough together, sand the small washers a little more. Then secure with a drop of thin CA.

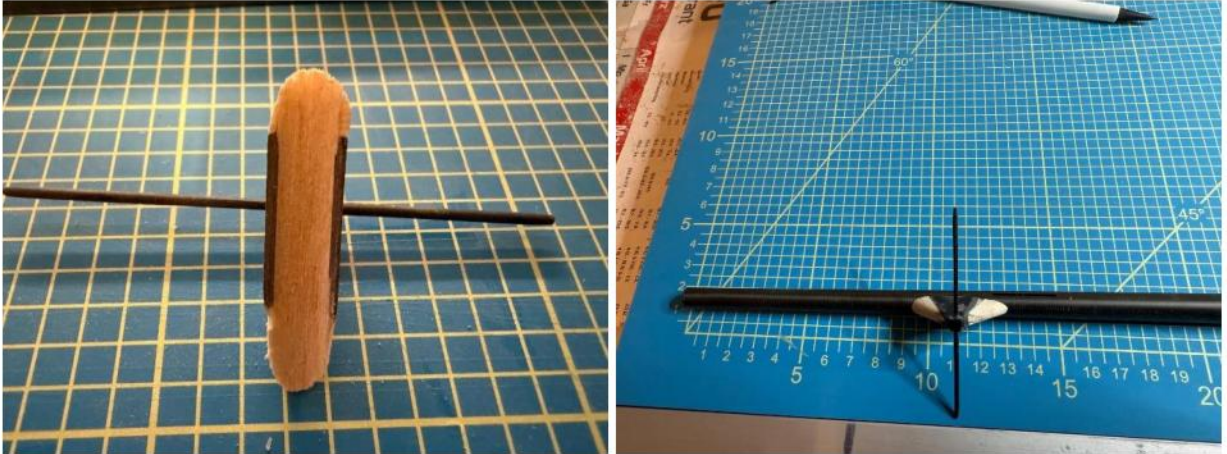


Then saturate the entire upper area with CA and let it cure slowly.
Do not use activator here, as it can weaken the bond.



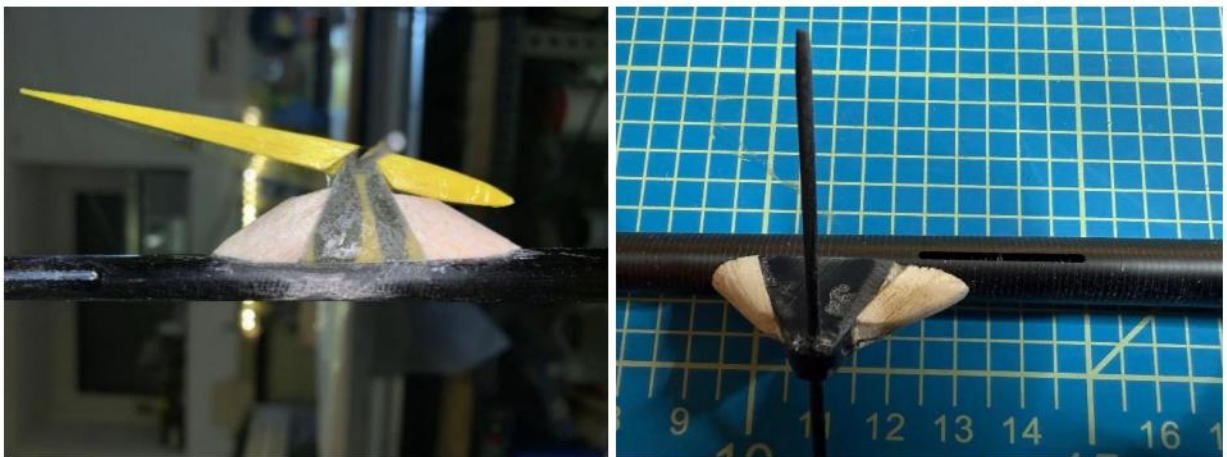
The kit includes matching balsa parts to fill the two side arms and to create an aerodynamic fairing. The balsa filling also improves adhesion and, above all, load transfer into the tube.
Then the underside can be sanded to match the tube. Be very careful that the GFRP arms also show a proper sanding pattern.





Create enough clearance for sufficient elevator throw. Upward, 15 mm should be possible for stall landings. Downward, up to contact with the tube for pull-out from the launch.

For normal flying, plus/minus 10 mm at the trailing edge is enough.



When the tube and the carbon rod are at right angles, sand the tube slightly in that area and glue it with medium CA.

The distance from the tube end to the rod axis is 11 cm. The slot for the exit of

the rudder pushrod sleeve must be positioned horizontally to the side.

Now the Teflon pushrod tube for the linkage can also be glued in.

Insert as thick a steel wire as possible, 0.8 or 1.0 mm.

Keep the sleeve under slight tension inside the fuselage tube.

I bend the steel wire and hook it into the rear of the fuselage tube. I fix the Teflon tube to the outside of the tube with tape after it exits.

Place magnets at short intervals on the outside of the fuselage tube so that contact between the Teflon pushrod tube and the fuselage wall is ensured.

First secure the Teflon pushrod tube at the rear exit opening with tape and glue it into the slot in the carbon tube with thick CA, thereby fixing the Teflon tube. Let it cure well.

Align the magnets outside in a straight line.

At the front, where the tubes exit the carbon tube at about 10 o'clock for rudder and 2 o'clock for elevator, fix them as well under slight tension with thick CA.

Hold the tube almost vertical and let thin CA run from the front along the Teflon tube toward the rear until CA drips out at the end of the tube. Turn the tube over and let CA run forward again. I catch the CA coming out at the front with a paper towel until no more comes. Then lay it flat and allow it to cure fully. It always takes longer than you think.

Coffee break.

Only remove the magnets after curing.

Only then glue in the Teflon tube for the second side in the same way. Ideally, both tubes then exit the front of the tube at about 10 and 2 o'clock.

After curing, immediately insert cleaned 0.6 mm steel rods into the tubes and leave them there. Bend both rods at the rear by about 7 mm at a right angle. Without the steel rods, the Teflon tubes kink very easily during handling and then form a restriction. Avoid this at all costs.

Fuselage

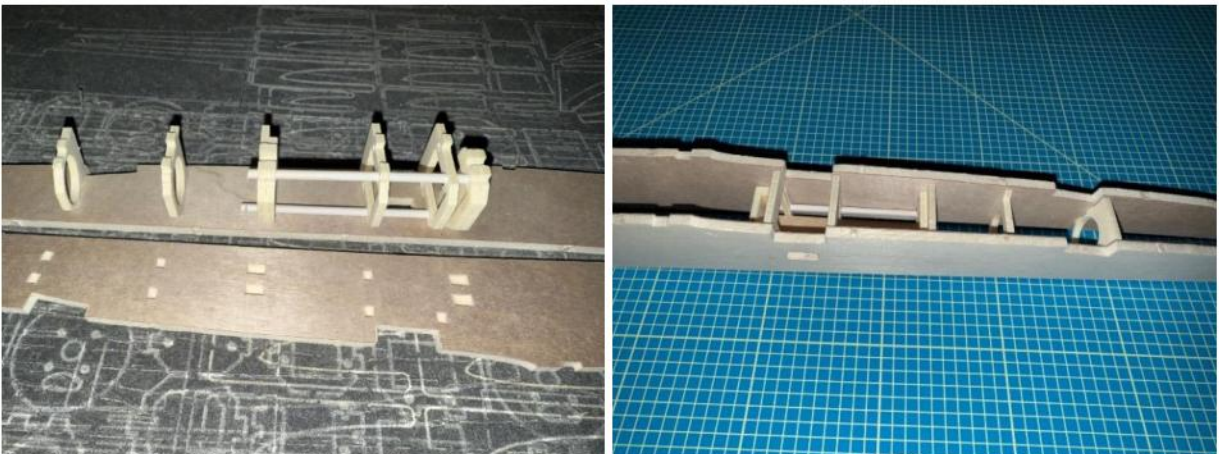
The fuselage side parts of the F5L and F3L are different lengths. On the F3L, the end pieces at the rear must be butt-glued on. They should fit without a gap.

Both fuselages use the same bulkheads except for the motor bulkhead and front bulkhead. On the glider fuselage, you will find the front bulkhead on the milled sheet of the glider nose. There you will also find the plywood plate for the lower closure under the hook. On the electric fuselage, the cutouts for the reset cable are in the bulkheads on the left side of the fuselage. See "Installing the reset button."

With a distance of about 8 cm from the motor bulkhead to the servo tray, all common batteries fit well in the front, and behind the tray there is room for the receiver and



logger. If desired, 3 mm pushrod tubes for the antennas can already be installed now. It is best to insert the guide tubes for the antennas before gluing in the bulkheads. I



route one antenna vertically upward in front of the fuselage tube. The second antenna remains horizontal. Do not push it into the fuselage tube; shielding.

Slide the servo tray to its approximate position, mark it, and then slide it into position when gluing the fuselage parts, but do not glue it yet.



The front bulkhead consists of two parts: the GFRP bulkhead and the support bulkhead that transfers the load into the fuselage. Glue both together before installation. Also glue together each pair of support plates for the blind nuts of the wing bolt mount. Press in the aluminum threaded inserts.

If necessary, sand the carbon fuselage tube into the two rear bulkheads. Then glue the bulkheads and side panels with white glue. While doing so, insert the tube from the rear and make sure everything stays straight.

Be careful not to glue shut the passages for the antennas and linkages.

Glue in 5 x 5 mm triangular strips on the bottom from rear to front. On top, glue 6 x 6 mm triangular strips from the front up to the bulkhead, flush with the upper edges of the fuselage sides.

Do not glue in the lower closing plate of the ballast chamber yet. On the glider, the hook location is also underneath it.





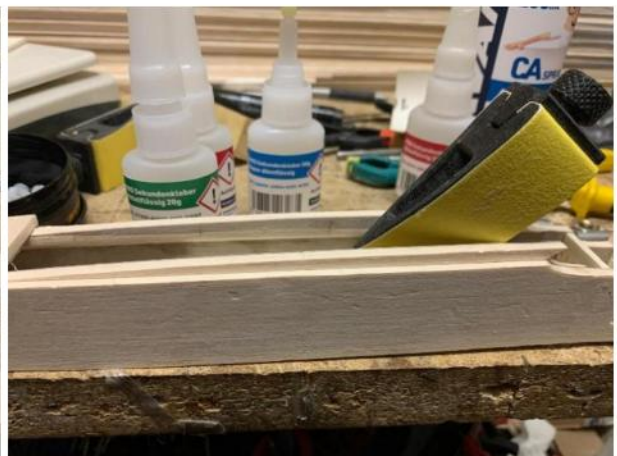
Sand the top triangular strips down to about 2 mm.

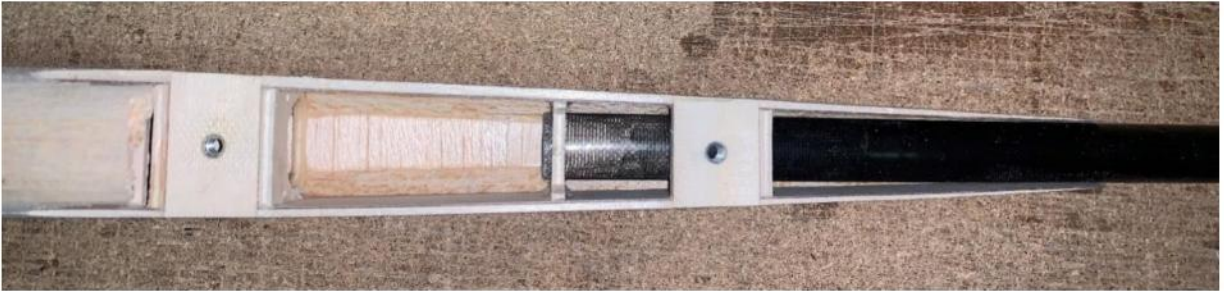
After sanding the projections of the top and bottom triangular strips flush, glue the plywood/balsa top plate at the front.

Then tack the canopy rails in place with very little CA. They must be released again later.

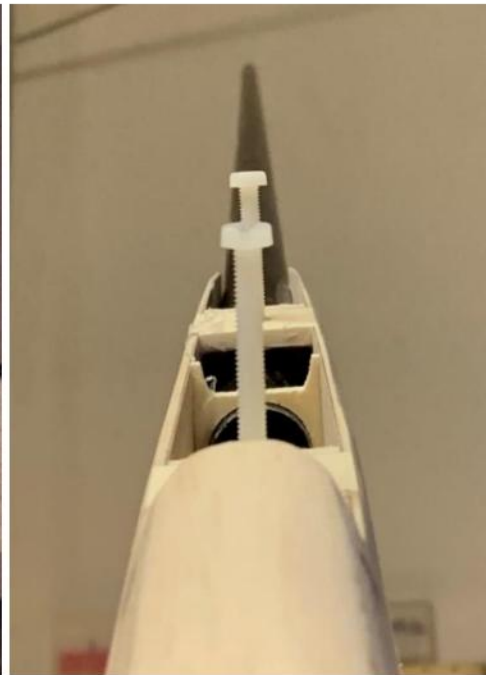
Then glue on the 6 mm canopy block.

Close the underside of the fuselage with the 4 mm balsa sheets, grain across the fuselage.





Sand the rear wing-bolt plate on top flush with the airfoil contour. Because of the angle, the nylon screw will later lie on the top of the wing in line with the airfoil contour.

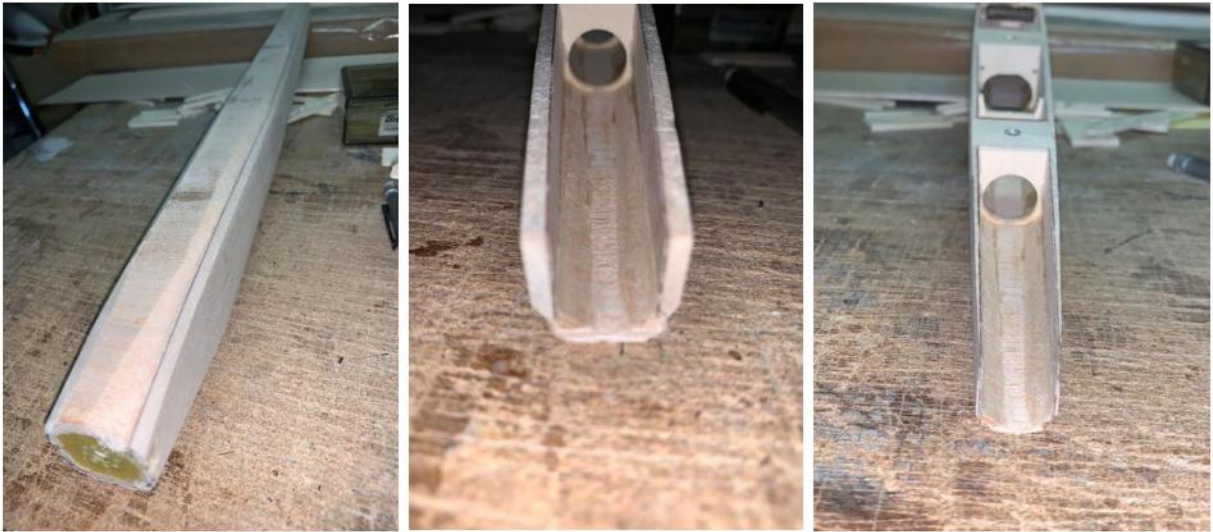


To align and glue in the wing bolt mounts, screw in long bolts, sight along them over the fuselage tube to check straightness, and then glue the mounts in that alignment,

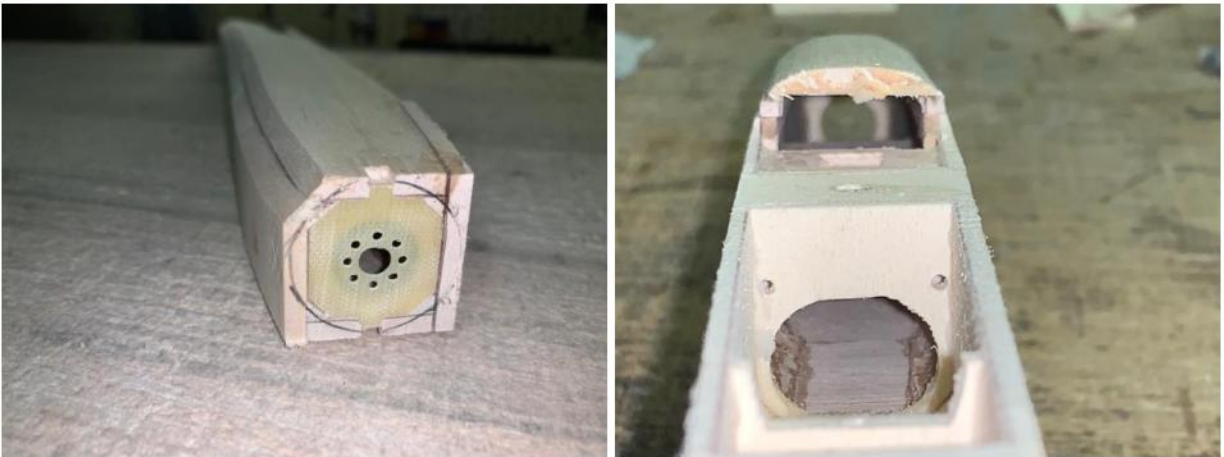
not the tube.

Sanding: I recommend my video on sanding a fuselage on a belt sander:
https://www.youtube.com/watch?v=EoudXPh_d4I&t=98s

On the underside, sand the edges to about 45 degrees until the plywood starts to show through. At the rear, I sand the balsa away on the sides and bottom so it tapers to the plywood. Adapt the rear inner triangular strips to the contour of the tube.



Round the front and upper side of the fuselage wherever possible. Keep checking from the rear so the sides of the future canopy do not become too thin.



A nice front fuselage contour is easiest to achieve if, in between, either the F5L motor sleeve or the F3L nose has already been built.

Motor sleeve

It now has an additional ring because some spinners need one more ring for a clean transition. For the GM spinner, the spare ring is not absolutely necessary. Assemble the rings in numerical order.

Thread the rings onto the 0.8 mm steel wires, press them together, and glue them with CA.

Check that the steel wires remain vertical and parallel.

Then sand the sleeve to shape. For that, I clamp the glued motor sleeve in a drill using an 8 mm screw.





Sand it so that the full 34 to 35 mm diameter remains at the base as much as possible and a smooth transition to the 30 mm spinner is created at the front.

After sanding, seal the outside and inside with CA.

All holes are sized so that the screws have a little grip. That is enough for temporary fixation during sanding.

For correct motor installation, carefully enlarge the screw holes with a 3 mm round file; assembly will then be easier.

I do not glue in the motor sleeve, because then a new sleeve can still be adapted to another motor if needed.

On the glider, the nose is glued on first and only then is the fuselage contour sanded.

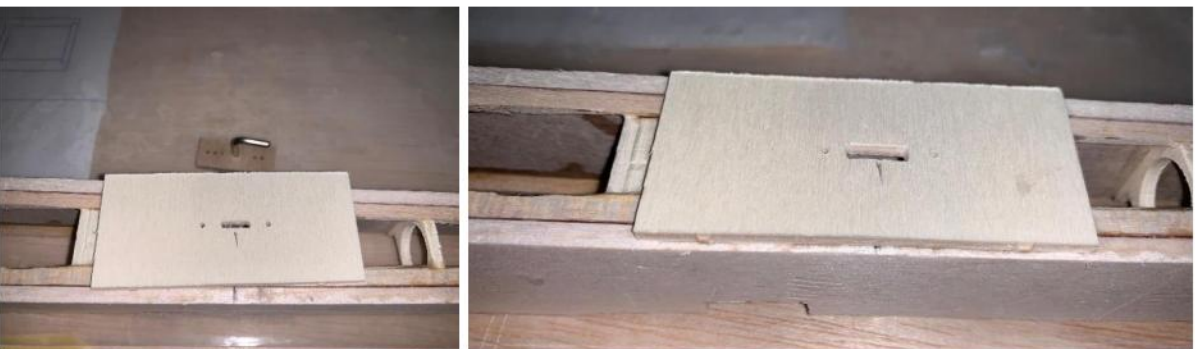




On the underside of the glider fuselage, mark the center of gravity and break through the bulkhead that is in the way of the hook plate.

Position and glue the plywood closing plate 2 mm behind the center of gravity. The hook can later be inserted from above. The hook can then be shifted 2 mm forward or backward quickly.

Now, as with the motor fuselage, close the front and rear with the 4 mm plates and sand



everything to final shape.



Now work continues on both fuselages again.
Open the fuselage hatch with a razor blade.



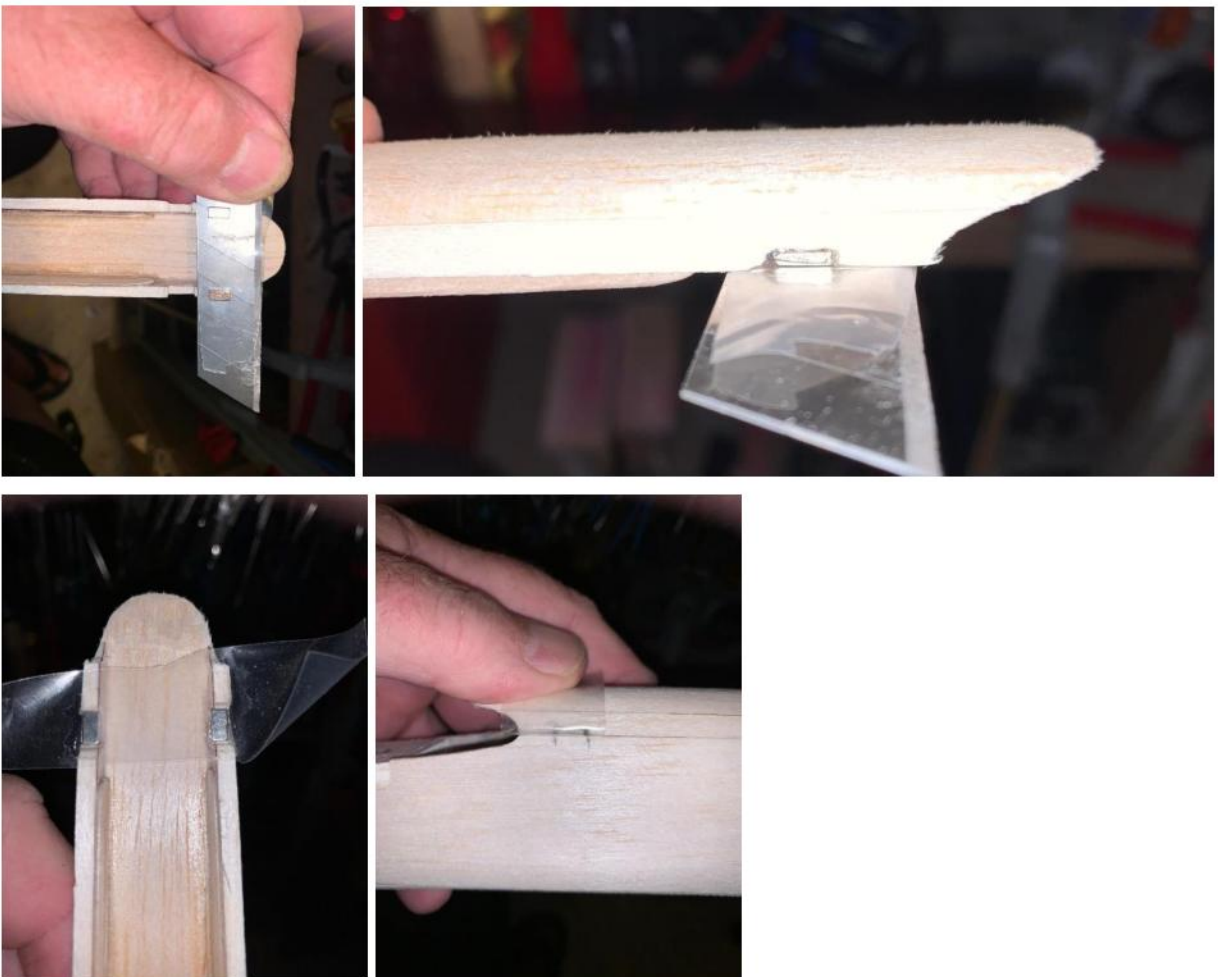
Clean up the seating area and sand it until the hatch fits seamlessly.
Then fit and glue in the canopy tongue with about 5 to 6 mm projection.
Fit and glue the thin plywood strip, the canopy guide, into the side of the canopy.
Leave space for the canopy magnets.





You will almost certainly have to shorten or adapt the guide strips slightly in the area of the servo arms so the servo arm is not obstructed. About 3 mm projection is enough. Once the servos are permanently installed, adjust it accordingly.

Using a knife blade covered with a small piece of film makes it very easy to glue the magnets in straight.



I glue them in with thick CA. Any gaps that form on the outside are filled with CA. Let it cure well before removing the film.

The fuselage can now be sanded to final shape.

Once the fuselage has been covered, continue with joining fuselage and tail and with RC installation.

Installing the reset button

In the marked bulkhead there is an opening intended for the button wires; otherwise the cable will be in the way when adding ballast.

Feed the cable from inside to outside without the button attached, and only then solder it to the button.



Before that, bend the switch contacts flat and insulate them, otherwise they will later interfere in the ballast chamber and the lead could cause a short circuit.

For the Altis V4+ you need a 3-pin connector cable. The red wire can be removed. Solder the black and yellow wires together as shown in the photo. With the original Altis telemetry cable, the red and black wires are used.

For the GliderKeeper Pico you need a 4-pin connector cable. There you leave plus and minus in place for soldering to the button.

I now pull out the metal tab with pliers.



The push-button triggers the reset on the Altis V4+ or GliderKeeper Pico, so do not hold it down. One click is enough and everything briefly loses power and then boots up again.

Do not use a toggle switch. Both loggers are short-circuit protected, but a permanent short would certainly destroy both loggers.

Fuselage assembly

The pivot mount is already glued to the tube.

Now glue the fin to the tube at a right angle.

For this I plug long tubes onto the pivot mount or the horizontal tail.

Before that, the rudder fin is fully covered. The rudder itself is hinged later.

Gluing the fuselage tube into the fuselage



The tube with horizontal tail, fin, and linkages is already fully glued.

The fuselage pod is fully covered. Roughen the surface of the tube slightly in the area of the two guide bulkheads. I use 5 to 10 minute epoxy to glue in the tube.

Ready for gluing in the carbon tube.



Again I plug carbon tubes or the horizontal tail onto the pivot mount. Carefully thread the tube with the linkages into the guides from the rear.

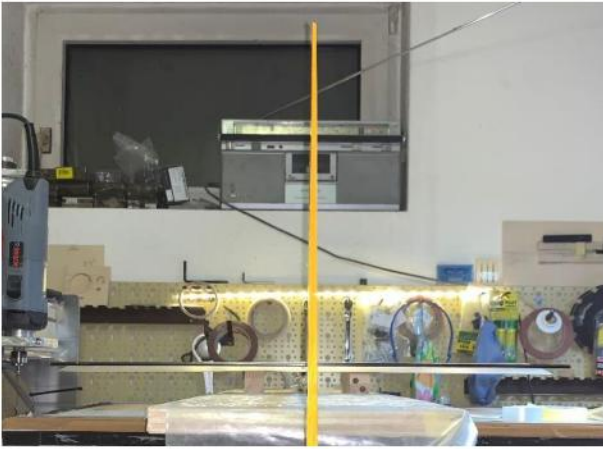
Do not kink anything.

Roughen the tube carefully at the glue areas.

Pull the tube slightly backward, put some adhesive at the edges of the bulkheads and at the fuselage exit, and rotate the tube slightly until adhesive is all around. Then bring the tube into position.

Bolt on wing center section A, sight along it, and align the entire tail cleanly.

Allow it to cure.



Final work and finish

Completing the horizontal and vertical tails

In the left elevator half, mill a slot from below about 6 mm from the root rib, without damaging the carbon tube, so that the elevator control horn can be glued in.

When the elevator halves are pushed together, the GFRP control horn should just clear the fuselage tube.



This allows the elevator pushrod to run straight out of the fuselage.

Bend 0.6 mm steel wire to 90 degrees. About 6 to 8 mm is enough for a secure connection on both rudder and elevator.

The holes in the control horns are pre-drilled to 0.6 mm.

The linkage point on the rudder should be as close as possible to a right angle to the rudder edge so that equal left and right deflection is achieved.



About 30 to 35 mm throw should be possible.

Preparing for covering with film

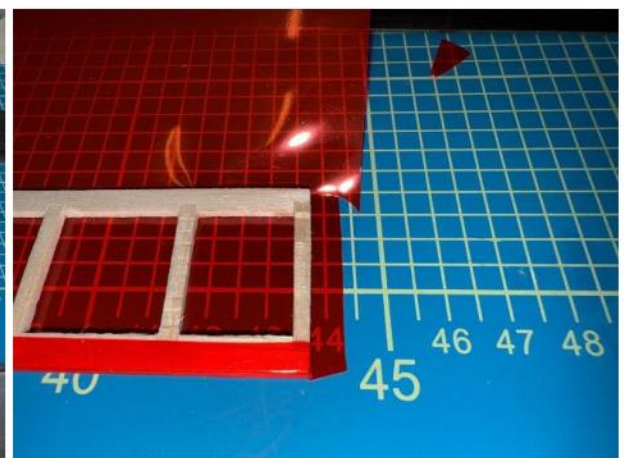
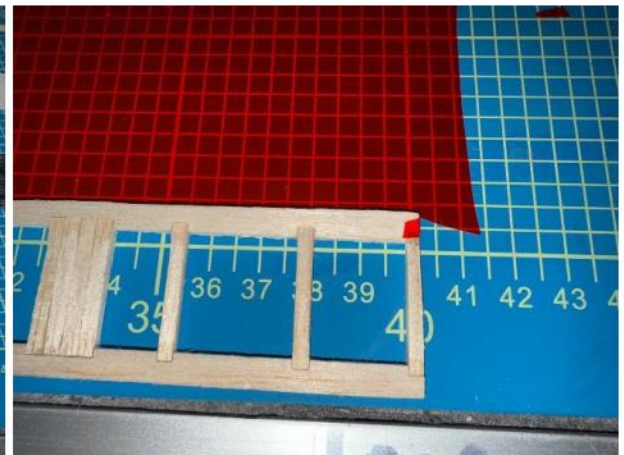
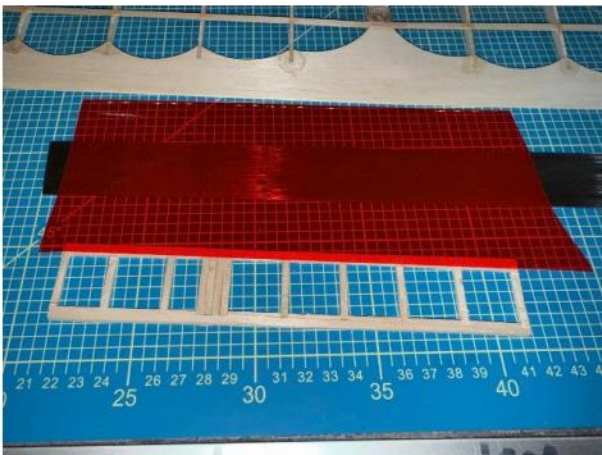
I use a mixture of Clou, thinned 1:1, and a little Oracover adhesive, although that is not essential, and coat all lower rib edges,

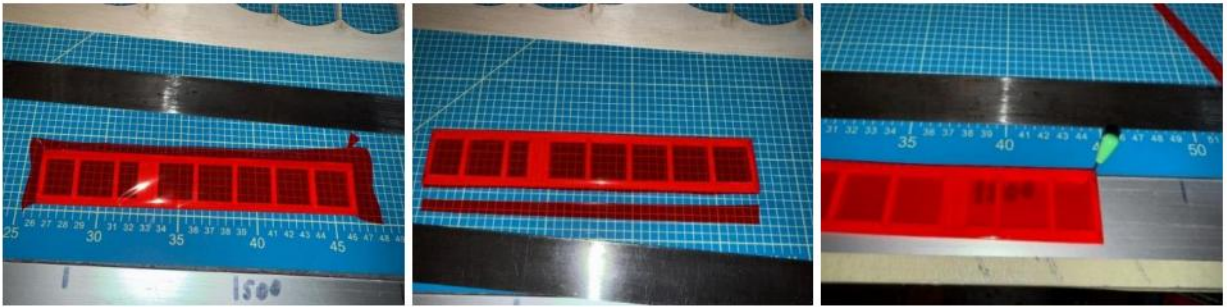
the trailing edges, leading edges, the area around the flaps and servos, and of course the joining ribs. The spoilers as well.



Covering the spoilers

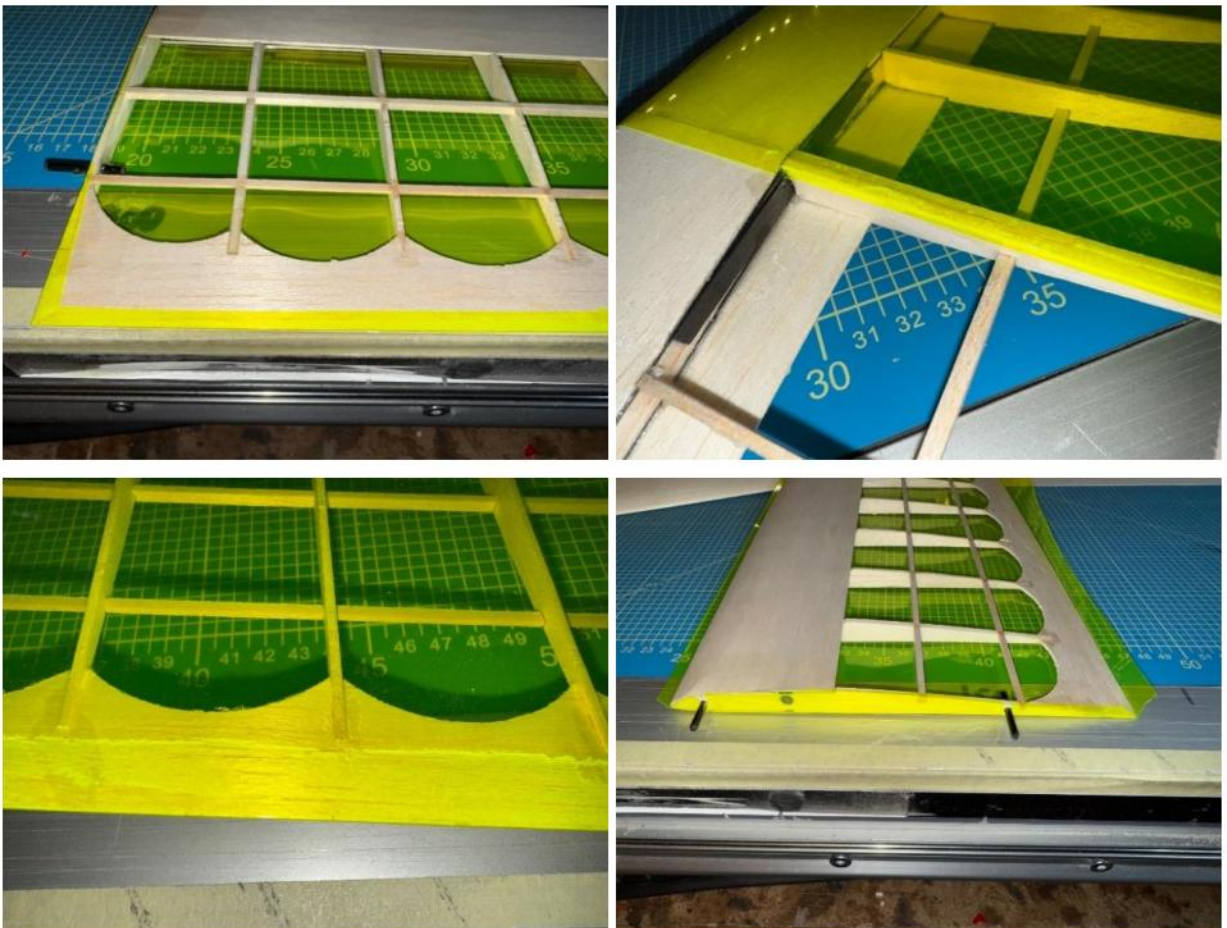
For this I always use a stiff film, for example Oracover chrome.





When covering the spoilers, rudder, or elevator, always prick all corners of each bay very lightly on one side with a thin needle. This allows pressure equalization while ironing and prevents the sections from ballooning. I also immediately cover the parts with a metal straightedge while they cool. Do not iron too hot. Only use enough heat for the film to just tighten. Be careful with different film types.

When covering the wing, first iron down the overlaps at the front and rear, the root

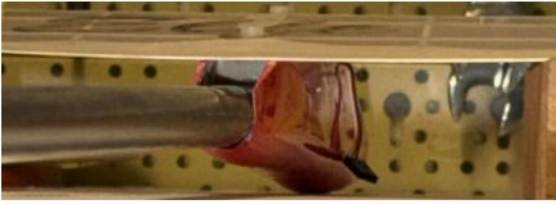


rib, and the transition rib.

Then iron down the underside in the area of the tapered trailing edge. This prevents one-sided tension from building up at the trailing edge when shrinking later.

Then iron down the front over the sheeting. Then carefully iron the ribs and only after that gently shrink the open bays. Keep the temperature only high enough for the film to tighten.

That way the trailing edges stay straight even with this very light structure.



Close the small open bay at the end of the fuselage with a piece of film.



For the flap linkage I use the same magnetic strips as for the canopy latch. I glue them to the flap above the servo arm. On the servo arm I put a small piece of iron, such as florist wire, a strip from a tin can, or something similar. I prefer continuous contact with the flap in every position.

Because of the 0.5 mm air gap under the flap, it can be positioned very precisely with the servo arm.

Glue the pushrod tubes at all bulkhead pass-throughs and, just before the servo, also to the fuselage wall. With the servo arms shown in the photo you have more than enough throw, and the linkage wire runs nicely straight along the fuselage side wall, rudder on the right and elevator on the left in the

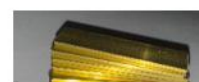


direction of flight.

Ballast

With lead you can achieve about 100 g of additional weight.

Alternatively, with six brass pieces 15 x 2 x 60 mm, about 80 g.



I wrap the lead strips with a strip of tape. This saves you getting lead abrasion on your fingers and also lets you pull the lead strips quickly and easily forward out of the ballast chamber. They are secured with a small balsa block.



RC settings

Power flight: trim for perfectly straight flight with no tendency to climb. Counteract torque with a little rudder.

Motor switch on: for launch and cruising I use about 30 to 40 percent throttle.

I keep the remaining throttle on a slider. For acceleration and against strong wind, about 50 percent. Full throttle only for the final launch burst.

For recovery after the launch burst, maximum down elevator is needed.

Thermal setting: set the rear of the horizontal tail about 0.5 mm high relative to the contour of the tube. Fly as slowly as possible while the Elfe 5.0 still flies straight without dropping a wing. In this setting it shows the weakest lift best and flies at minimum sink.

Distance setting: the horizontal tail is about parallel to the fuselage tube. Trim slightly faster than the thermal setting so it still makes good headway into the wind. I always land in this setting.

Only when the Elfe 5.0 no longer makes progress into the wind in this setting do I use ballast.

Speed setting: trim so that it is just short of tucking under, for fast returns against strong wind and quick descents for a restart.

In this setting, the elevator is about 1 mm down at the rear compared with the distance setting.

This setting is also used for motor flight and for line launch.

Center of gravity: 49 mm behind the leading edge.

Every other flight phase is adjusted only with elevator trim.

Rudder throw: plus/minus 30 mm, 20 to 30 percent expo. Elevator throw: plus/minus 15 mm, aligned parallel to the fuselage tube.

For normal steering, plus/minus 10 mm elevator is sufficient. For stall landings you need correspondingly more elevator throw. Test it.

Spoilers Elevator mix:

On the Elfe 5, the initial pitch-up is now hardly present. Only from about 5 to 10 degrees spoiler deflection does elevator compensation begin.

Then mix in elevator evenly up to about 20 to 25 percent at full spoiler deflection.

With the spoilers vertical, the model may start to oscillate in yaw. Reduce the spoiler travel until the oscillation disappears. I use the 75 degree template for setting it.

The model must continue flying straight at every spoiler position, with no tendency to pitch up or down. Only the speed is adjusted with the spoilers for landing. A slight sink will then occur by itself.

My RC equipment in the years 2022-2025

Spoiler servos: 2x DHV56MG coreless servo, 1.2 kg / 0.10 s / 5.6 g Elevator, rudder: 2x DHV56MG coreless, 1.2 kg / 0.10 s / 5.6 g At 5 V BEC the servos have about 0.9 kg, which is more than enough in every case. Or ChaServo06 for elevator and rudder: improved centering and finer trim.

Power system T-Motors F60 1750 kv: GM 9x6, Aeronaut 8x5, 8x6, CN 9x7 T-Motors F60 1950 kv: GM 9x5, Aeronaut 8x5 ESC: Francy 2 from FLYCOLOR or similar, 30 A. The Francy2 tolerates 35 A for 15 seconds, so it is far from its limit. Throttle: 3 steps, 30 percent, 60 percent, full throttle. 30 to 40 percent for launch and cruising, 3 to 4 A. Half throttle for flying against strong wind, 12 to 15 A. Full throttle only for the last 3 to 5 seconds up to the launch burst, 25 to 30 A.

My batteries:

<https://www.mylipo.de/Lipo-Akku-470mAh-114V-HV-3S-50C-100C-FPV-Parcour-Kabel-Stecker-XL> 42 g

<https://www.mylipo.de/BonkaLipo-Akku-450mAh-114V-HV-3S-80C-160C-FPV-Parcour-XT30> 45 g

<https://www.gaoneng.shop/products/gaoneng-gnb-lihv-3s-11.4v-550mah-1>

00c-xt30-lipo-battery-long-type 45 g

<https://www.voltmaster.de/Multiplex-LiPo-Akku-ROXXY-HV-3S-380mAh-80C> 30 g

In competition I only charge the HV cells to 4.25 V per cell. For training only to 4.2 V per cell. You should be able to make a maximum of three competition launches on one battery charge. After flying, always discharge the packs to 3.75 V per cell; then they last a very long time.

Have fun, good success, and many great experiences with the Elfe.

Salzburg, 18.08.2025 Georg Kraus