

RCPowers SU-34 V4

Build Log

June 2014

General

I got the [V4 plans](#) package and studied them carefully. They looked very accessible, but with some delicate points.

6mm Depron

There was an issue with finding Depron. Near me in Belgium, ~~Europe~~ there is none to be found, but there is "[Noma-Plan](#)" which looks like it's close enough. This stuff can be had in 3 or 6mm thicknesses and the price for 6mm is between 8 and 15€ for a 2.5x0.80 meter sheet. The sheet is split in half so you actually get 2 pieces of foam that are 1.25x0.80m. This fits almost exactly the RCPowers plans, leaving a strip of 0.20x0.80 leftover. In any case, the laser cutter I use only holds 1.10x1.00m so there had to be some trimming. This was no problem for the RCPowers plans which fit nicely into the laser cutter's format.

Sometime later I discovered depron.co.uk which has great prices for real depron!

Some Noma-Plan providers in Brussels:

- [Paint Trade](#): 8€50 per sheet, 10 sheets minimum,
- [Caron Paints](#): 10€50 per sheet, no minimum,
- [Deco Ligot](#): 16€80 per sheet, no minimum.

Remove Marking from the Foam (10 minutes)

Sorry to have to add this out of sequence, since it only occurred to me as I was building...

The foam has branding and technical labelling printed on it. This needs to be removed before painting. Ideally, it would have been removed upon purchase, but ideally doesn't exist when you're me.

Use a paper towel and some methyl alcohol to remove the printing and let it dry before continuing the build...

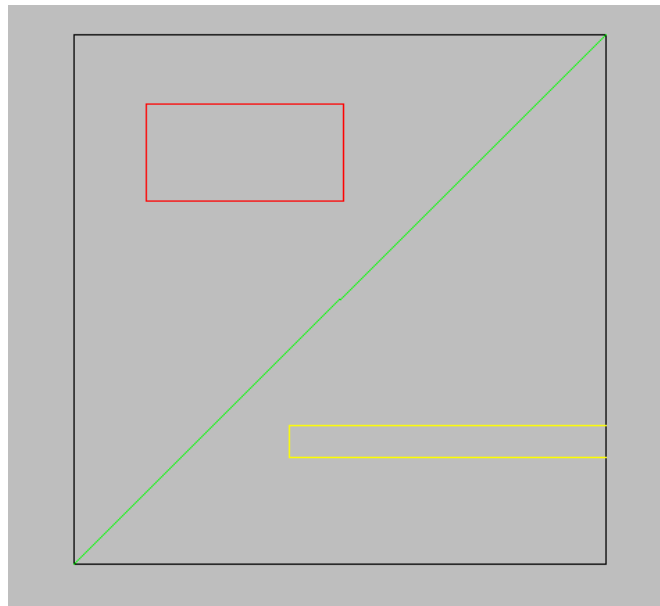
Laser Cutting Process (4 hours preparation then 1 day at the FabLab)

The pdf plans have to be converted to dxf files to be fed to the laser cutter. This is a straightforward process.

1. Open the "untitled" version of the plans in [Inkscape](#). (yes Inkscape can open a pdf). This has to be done for both pages of the plans separately.
2. Clean up the plans so that only the stuff that needs to be laser cut is present. Remove all borders, text, arrows, etc.
3. Save as dxf and close Inkscape.
4. Now, open the dxf file in [Draftsight](#) (free CAD software running on all platforms).
5. Create layers :
 - a. **First Cut**: which will contain all the contours of holes that need to be cut first,
 - b. **Score40p**: which will contain the contours to be scored 40%, i.e. not cut all the way through.

- c. ****correction** Engraving**: which will contain the pocket for the CF rod that traverses the wings
6. Now, carefully go through the plans, removing any stuff that won't be needed, like extra servo bays and score lines for control surfaces that you won't be using.
7. Now select everything and put it in layer-0; this is the last layer that will be cut and is destined to contain the external contours of the parts,
8. Select all the holes that need to be cut out and put them in the "First Cut Layer",
9. Select all the score lines and put them in "Score40p layer",
10. ****correction**** Select the CF rod pocket and put it in the "Engraving layer."
11. Now, go over all the lines and check that there are no "double lines" i.e. one line superimposed over another. This is especially important for the "score" lines and "engraving" area since if the laser passes over them twice, it will cut all the way through.
12. Save the file as dxf, or whatever format your laser cutter requires.
13. Do the same for page 2.

At this point you are ready for laser cutting, but since your laser is probably not the same as mine, you will have to do some tests. Take a scrap of foam and try to cut out a part that has a contour, a hole, and a score line and an engraved pocket. I used this test design:



Test cut design

The red lines are the First Cut layer, the green the score layer, yellow is the engraving layer, and the black line is layer-0.

You need to determine the cutting speed and laser power for cutting through, scoring and engraving.

My values were:

Cutting: speed 50, power 100%

Scoring: Speed 220, power 25%

Engraving: Speed 300, power 15%

You may have to adjust the focus distance of the laser beam to get a nice square cut. I had to reduce the focus distance from the standard 8mm to just under 6mm to get a nice cut with no bevelling.

After you are satisfied with your test results, just put the big Noma Plan plate in the machine and you are Good To Go!

This is what came out 10 minutes later! (By the way, as a not great pilot, I decided to build the SU-34 V4, with just elevons as my first scratchbuild!)



I also cut the motor mount and the control horns in 3mm birch plywood - I made a few extras (the big hook thing at the bottom is for another project)!

The laser settings for the 3mm birch plywood were:

- speed 8, power 100%



Fold the Scored cuts (RCPowers steps 5 & 6) (1 hour)

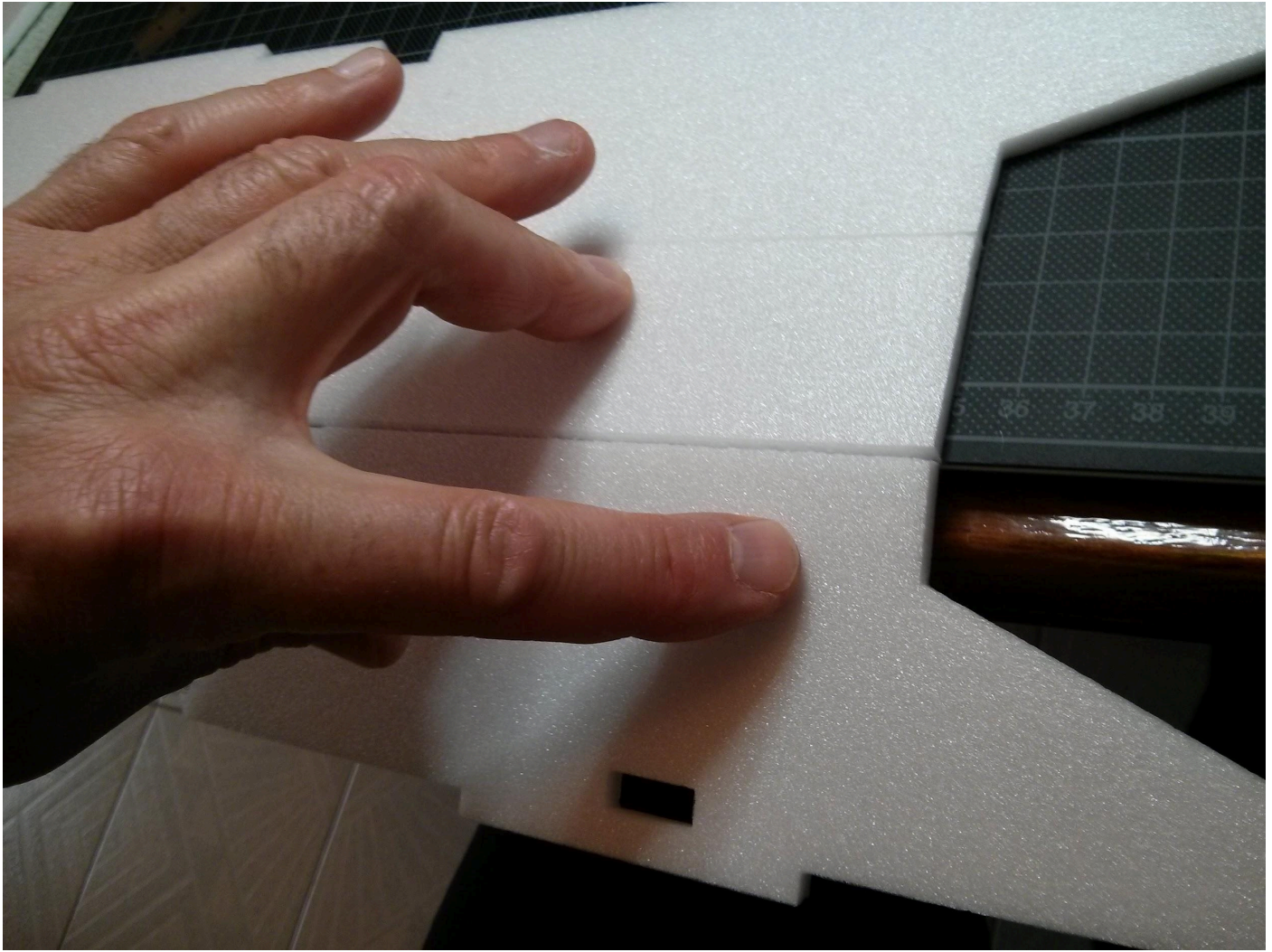
Ok sports fans, we're back after several cycles of flying, crashing, repairing, and so on. Today we do some building!

These are the parts that have scoring on them.



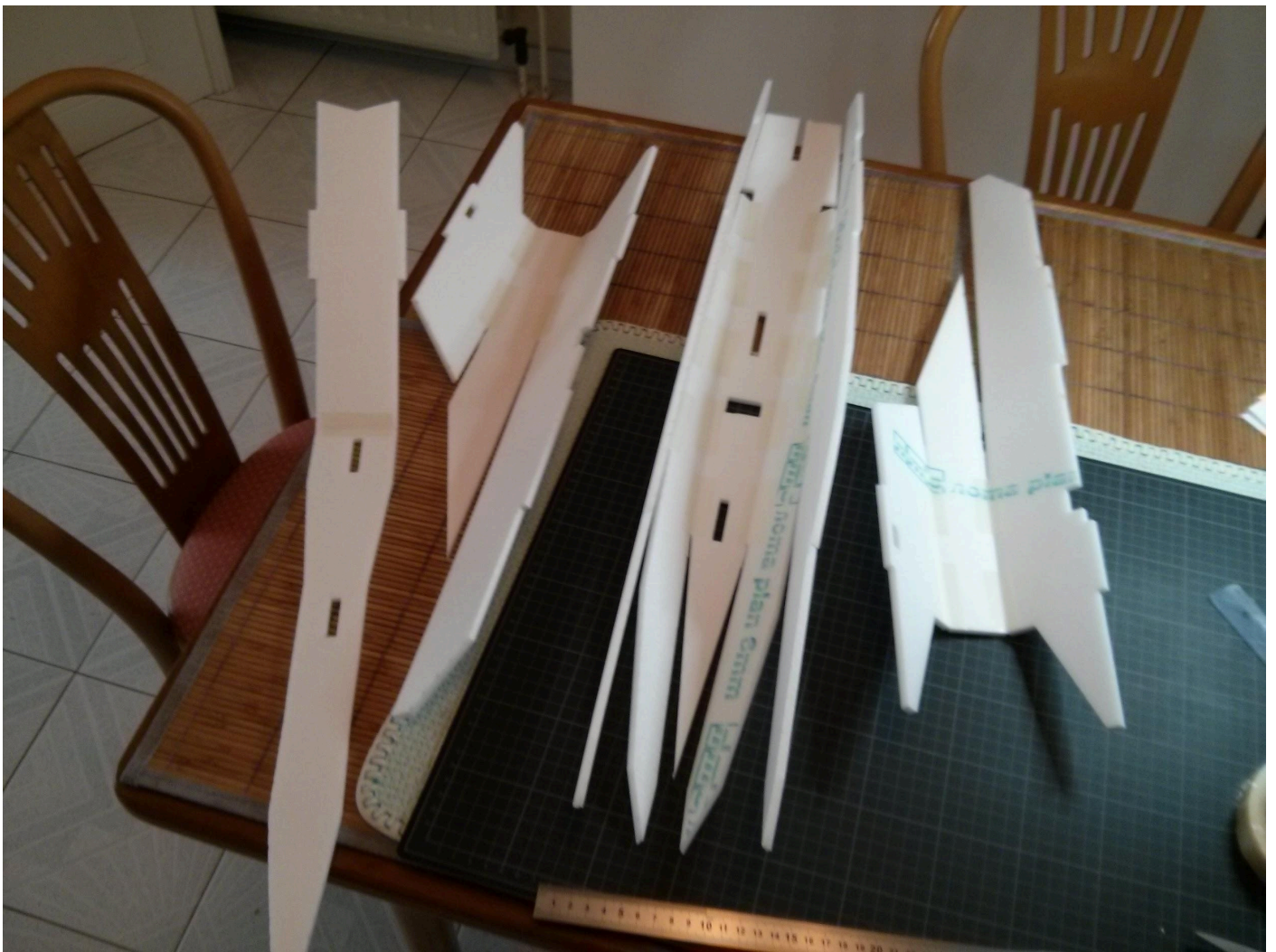
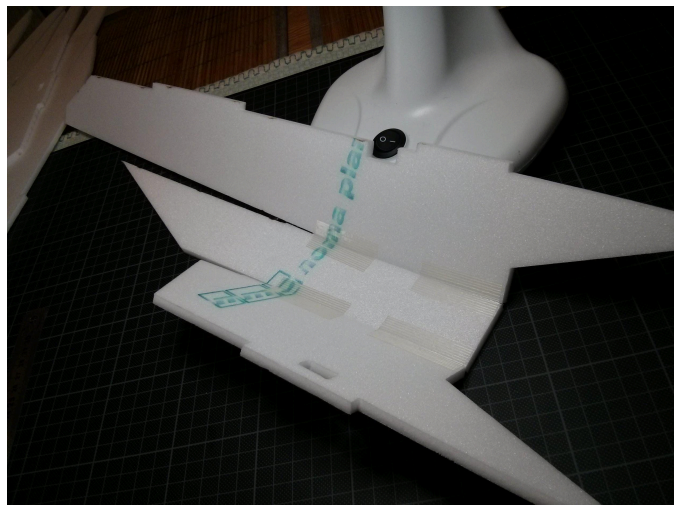
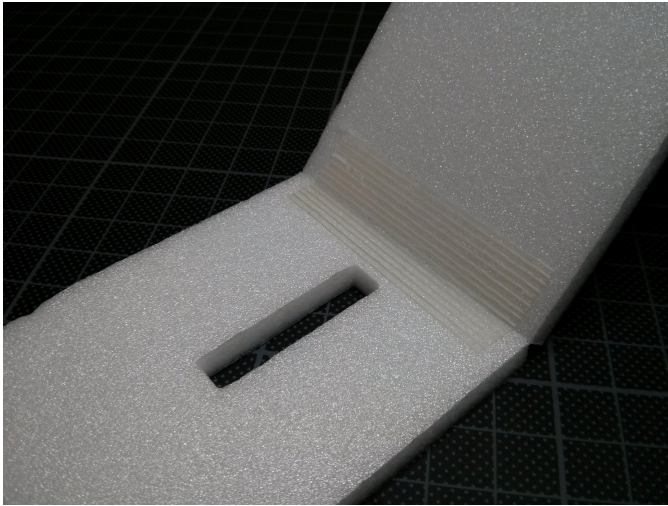
The instructions say to fold back the scored cuts to 45° then reinforce with strapping tape. Despite the RCPowers specific instructions to use **Scotch Strapping tape**, I used brand-X stuff because the Scotch tape is simply impossible to source in Belgium (amazon.fr and amazon.co.uk both list it but neither will ship to Belgium - sorry RCPowers, will this make my plane crash before my bad piloting skills do? ;-)

I did the folding at the edge of the table and cutting mat.



I did all the work on my cutting mat, and used the [Android "Swiss Army Knife"](#) app's bubble level to measure the 45° angle.

NOTE: *The picture on the left below shows the top nose skin hatch folded open at 45°. **DON'T DO THIS ! It's a mistake!** The top hatch has to close which means that it should fold downwards at about 30°. If you make this error, like me, it's not the end of the world - don't slit your wrists, just sand down the opposing edges so that it can close when you get to step 16 further on.*



NOTE: The sharp observer will note in the picture above that there is an asymmetry between the 2 engine tubes. The one on the right, above, has the elevon servo cutout in the correct position, just ahead of the mounting tab on the far right panel; the one on the left has the cutout farther forward! Yes, this is **WRONG**. There is no other word for it! The error was only discovered days later when I was dry fitting the servos! It

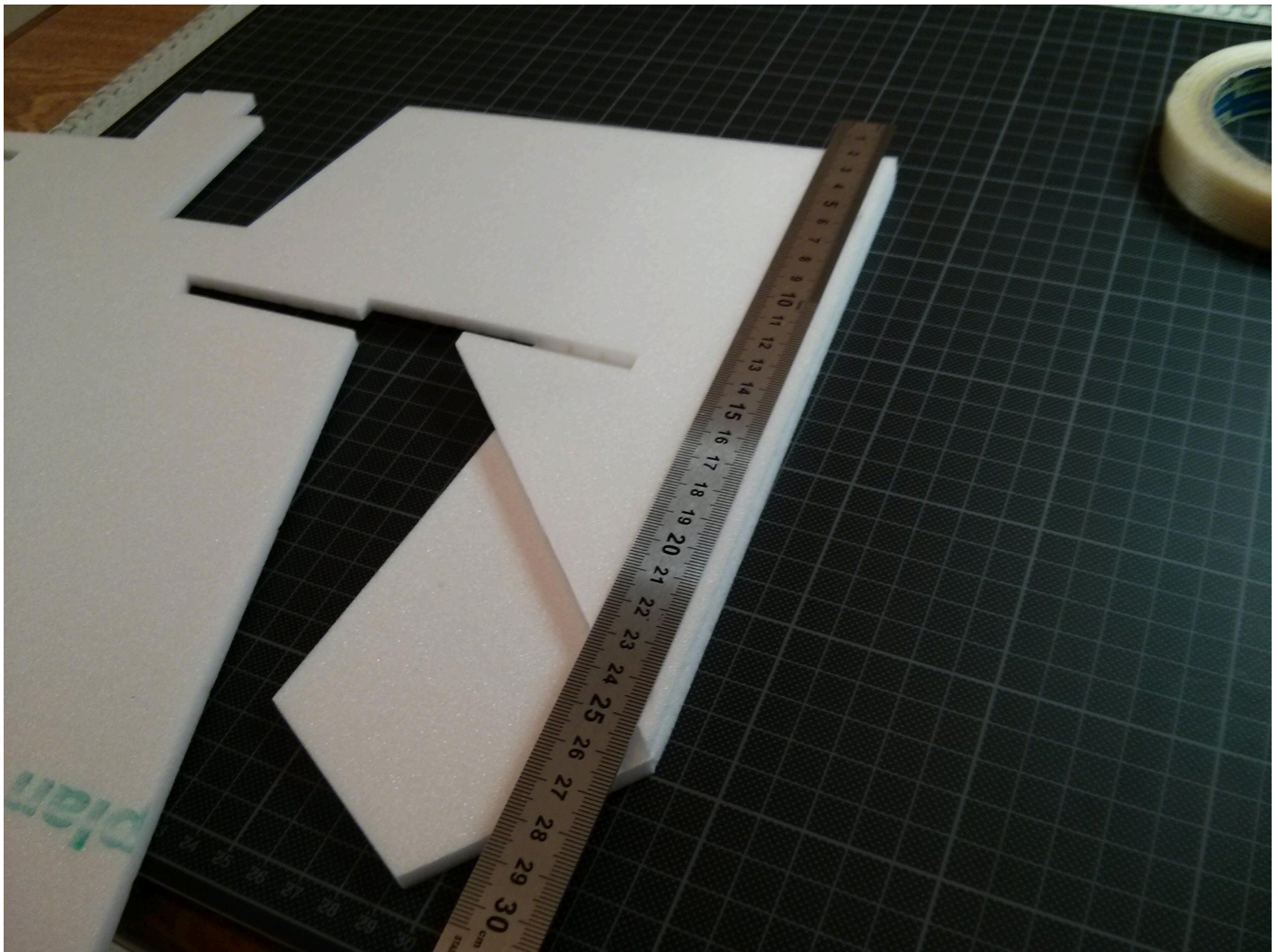
was not a catastrophe, but I did go back and fix up the dxf files! In fact, the **servos slots are INCORRECTLY MARKED in the ORIGINAL RCPowers PLANS** (on the untiled version only)!

The taping worked perfectly. I used 5cm pieces of tape, with 2.5cm spaces, mostly, but it depended on the folds.

Bevel the Control Surfaces (RCPowers steps 11 & 12) (2 hours)

I decided to do this out of sequence because I thought it would be easier to cut each elevon bevel before gluing the 2 wing halves together. Time will tell if this worked out! *(Indeed, this was the right decision! It would have been much harder to do this with the wings in one giant piece - my work-table would have been too small!)*

We have to cut 30° bevels, so that means that we have to create a right triangle with 6mm as one base and the other will be $6 \cdot \tan(30^\circ) = 3.46\text{mm}$. Let's mark this on the edges. Then, fold back the elevon to get ready for the bevel cut.



Cutting foam: I use a scalpel, not an x-acto knife. The advantage is that it is incredibly sharp and makes a really clean cut - the downside is that the blades need to be changed VERY VERY often. I buy them in bags of 50!

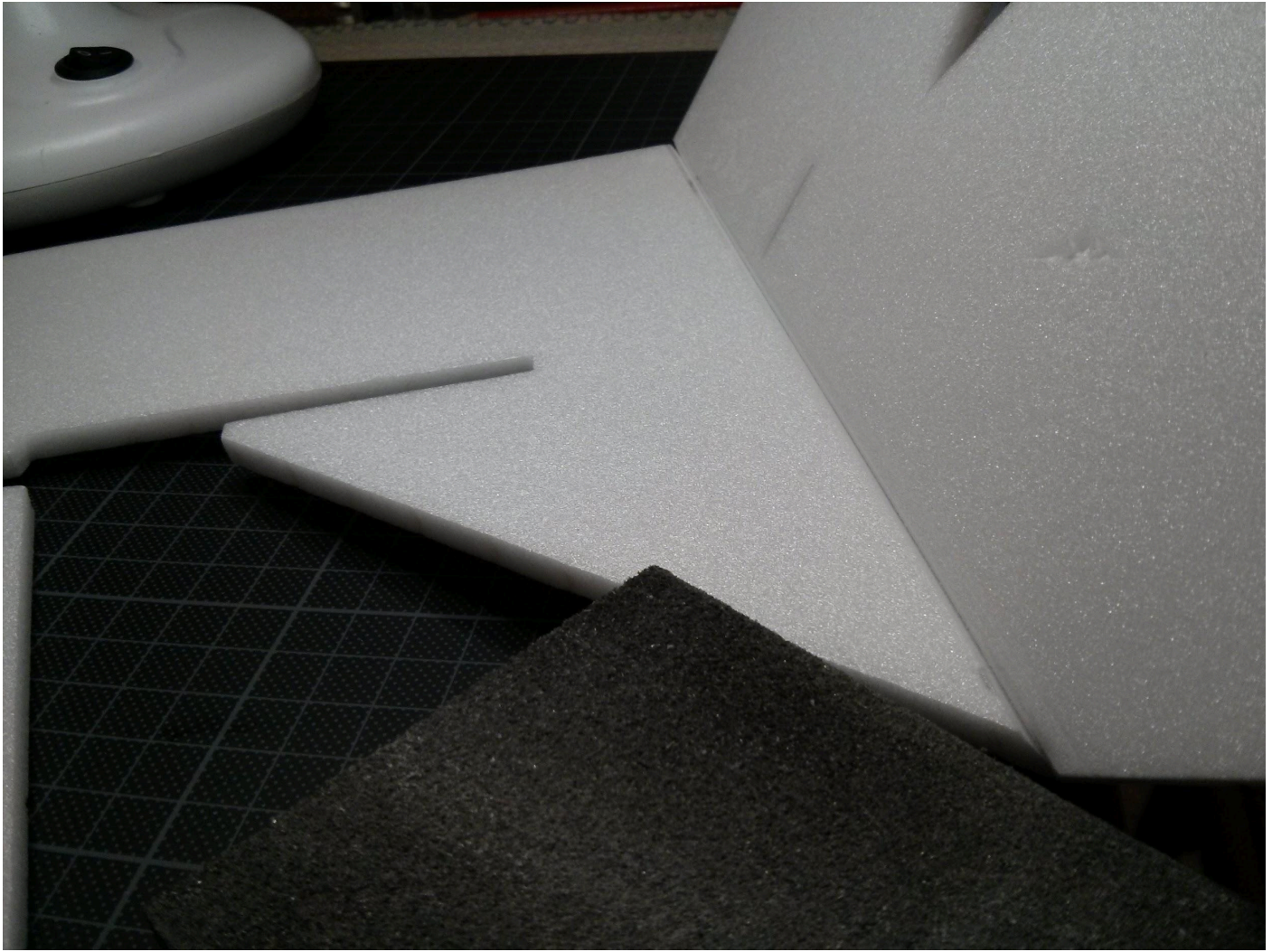


I took a fresh blade for my scalpel for each elevon - that's right 1 blade = 50cm of bevel cut. Don't do this with a dull blade or you'll make a terrible mess. Practice on a scrap first, to be sure!

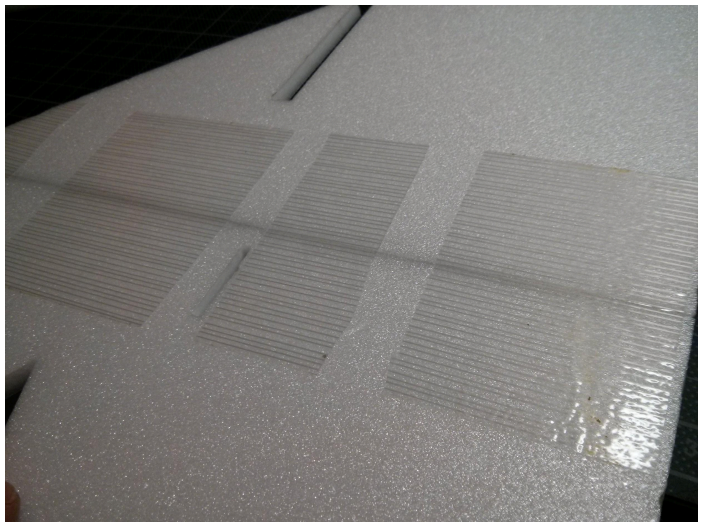
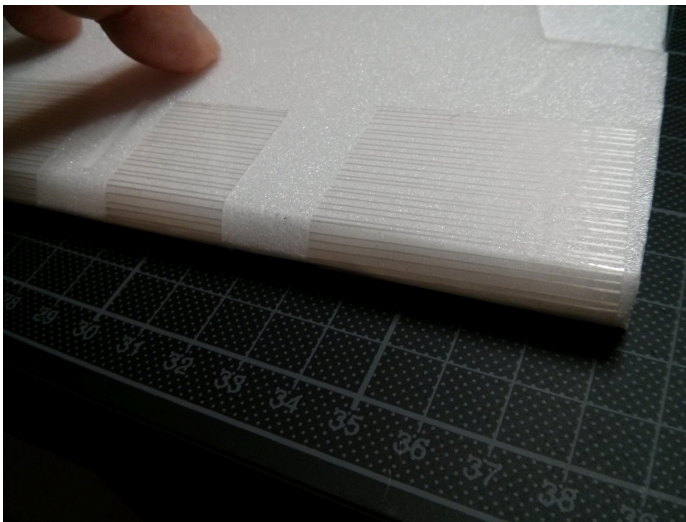
I put the steel ruler as the top guid and the part to cut on the edge of a table. Then I slide the scalpel using my finger against the table edge as a guide to ensure a constant cutting angle.



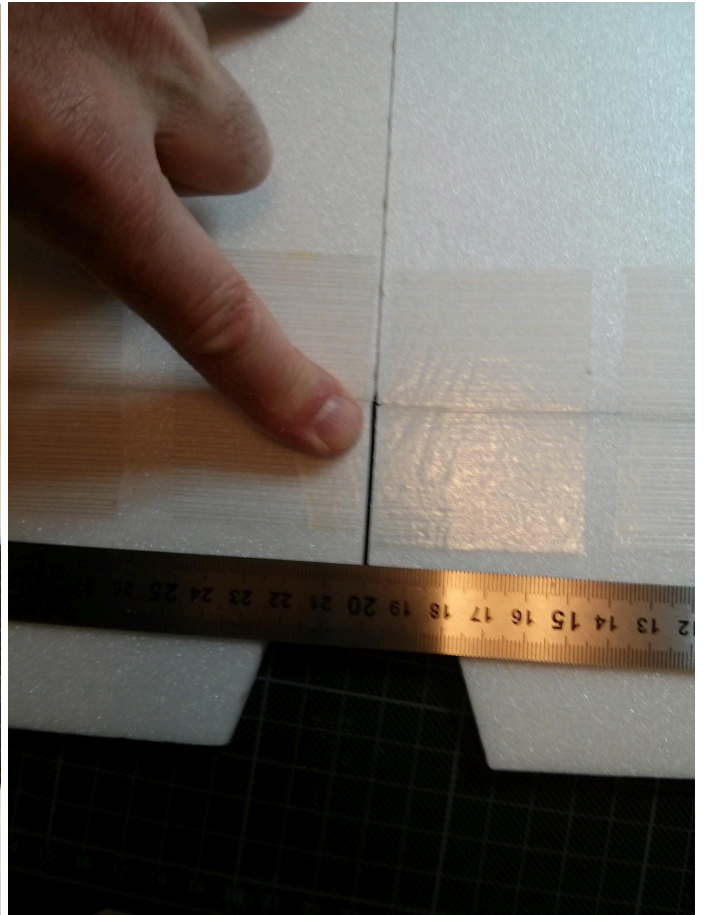
Use a fine or medium grit sanding sponge to smooth out the cut and ensure that you get full deflection!



Taping them up was no problem, take your time, get it right!



After taping them up, I sanded off 1mm on the inside of each elevon to ensure that they don't bind during movement - remember in flight everything will flex!



Glue the Wings Together (RCPowers step 7) (1 hour)

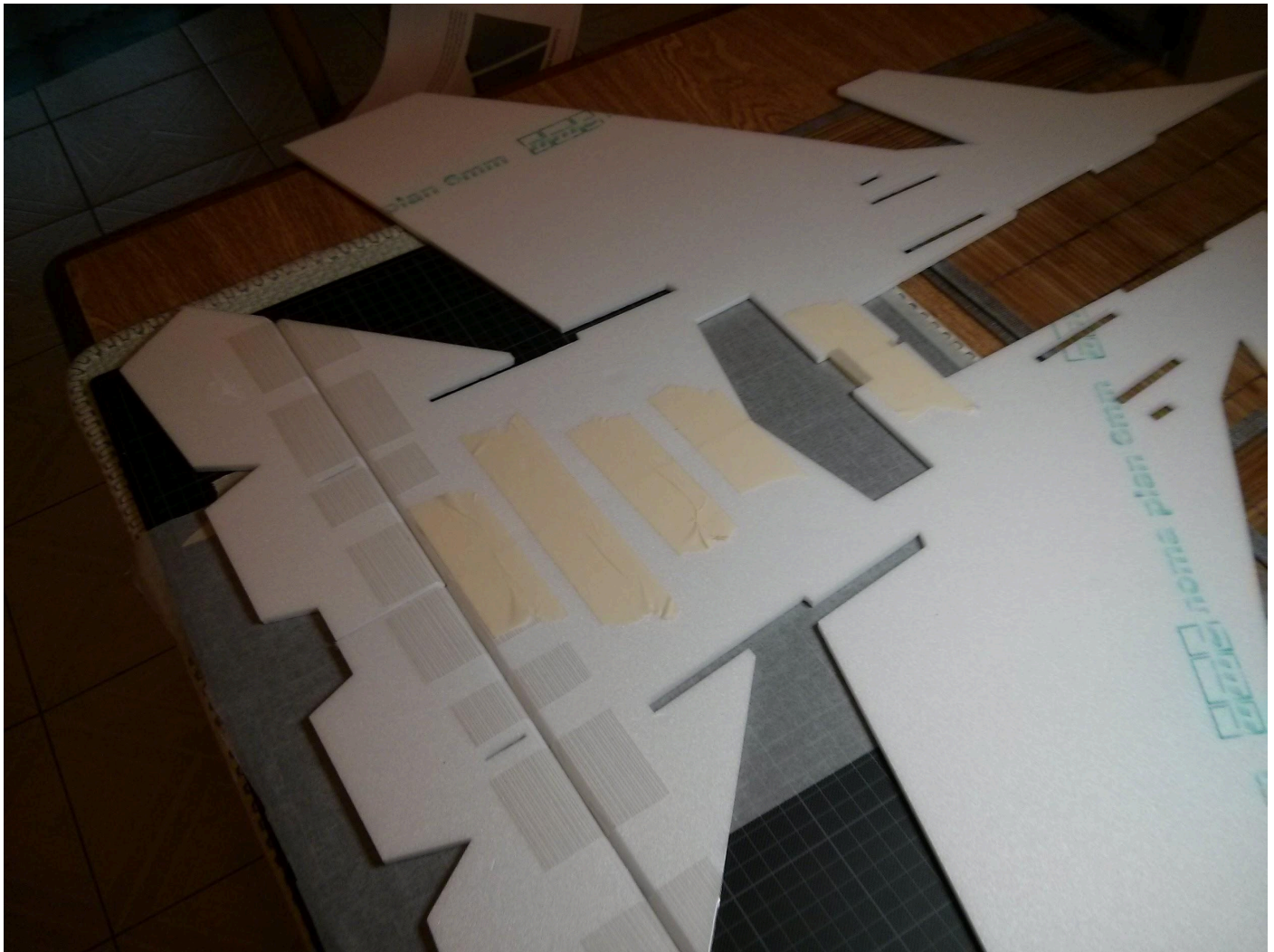
I used BMI 5 minute epoxy.

Don't screw this up - you only get one chance! I did it but made quite a mess, as usual. I am a terrible glue applicator, snif...



Prepare the work surface by protecting it with pastry baking paper to prevent the epoxy from sticking to the cutting mat.

Then, go for it!

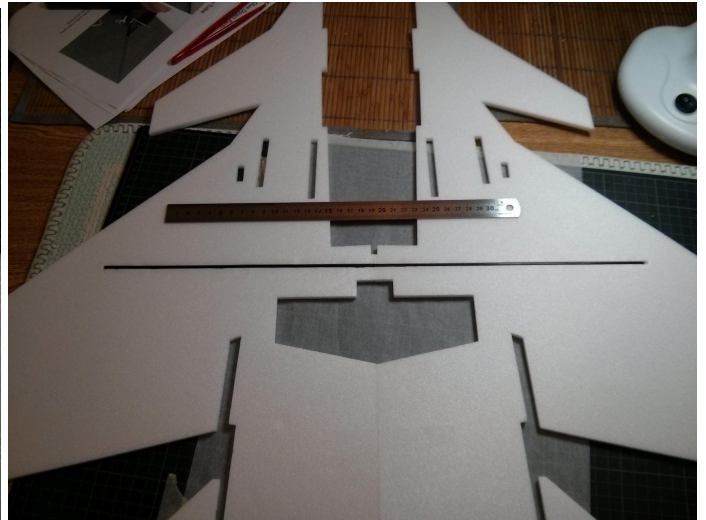
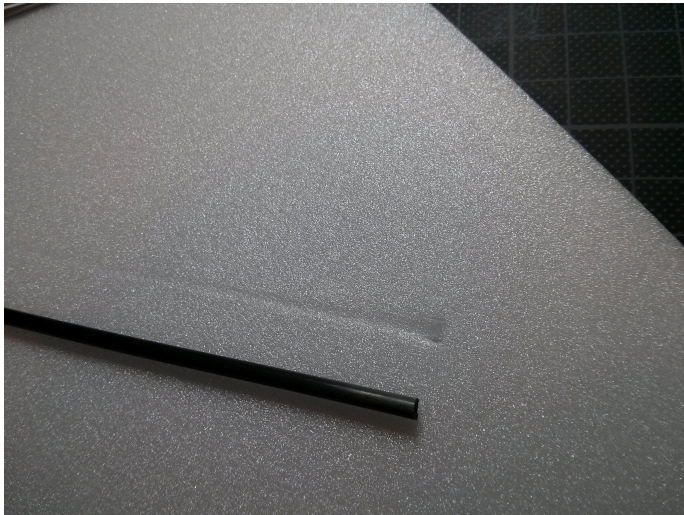


Cut the CF Rod (RCPowers step 8) (15 mins)

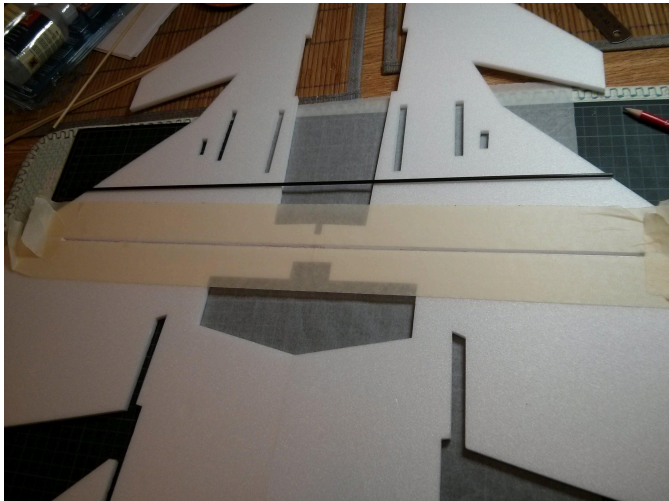
First I measured the scored line on the wings, then I cut the CF rod to 48cm using a dremel disc and wet paper towel as per the RCPowers instructions. This went well.

Dig the trough for the CF Rod (RCPowers step 9) (2 hours)

I did not follow the instructions here. Instead, I laid the CF rod on the wing in the right place and pushed it hard into the foam to leave a nice impression.



Then using a straightedge and a new scalpel blade I made diagonal cuts on each side of the marks to make a trough. This worked well on the first 1/2 of the cut, but failed on the second and I had to dig out the trough with a screwdriver, tweezers, and also with the end of the CF Rod itself.

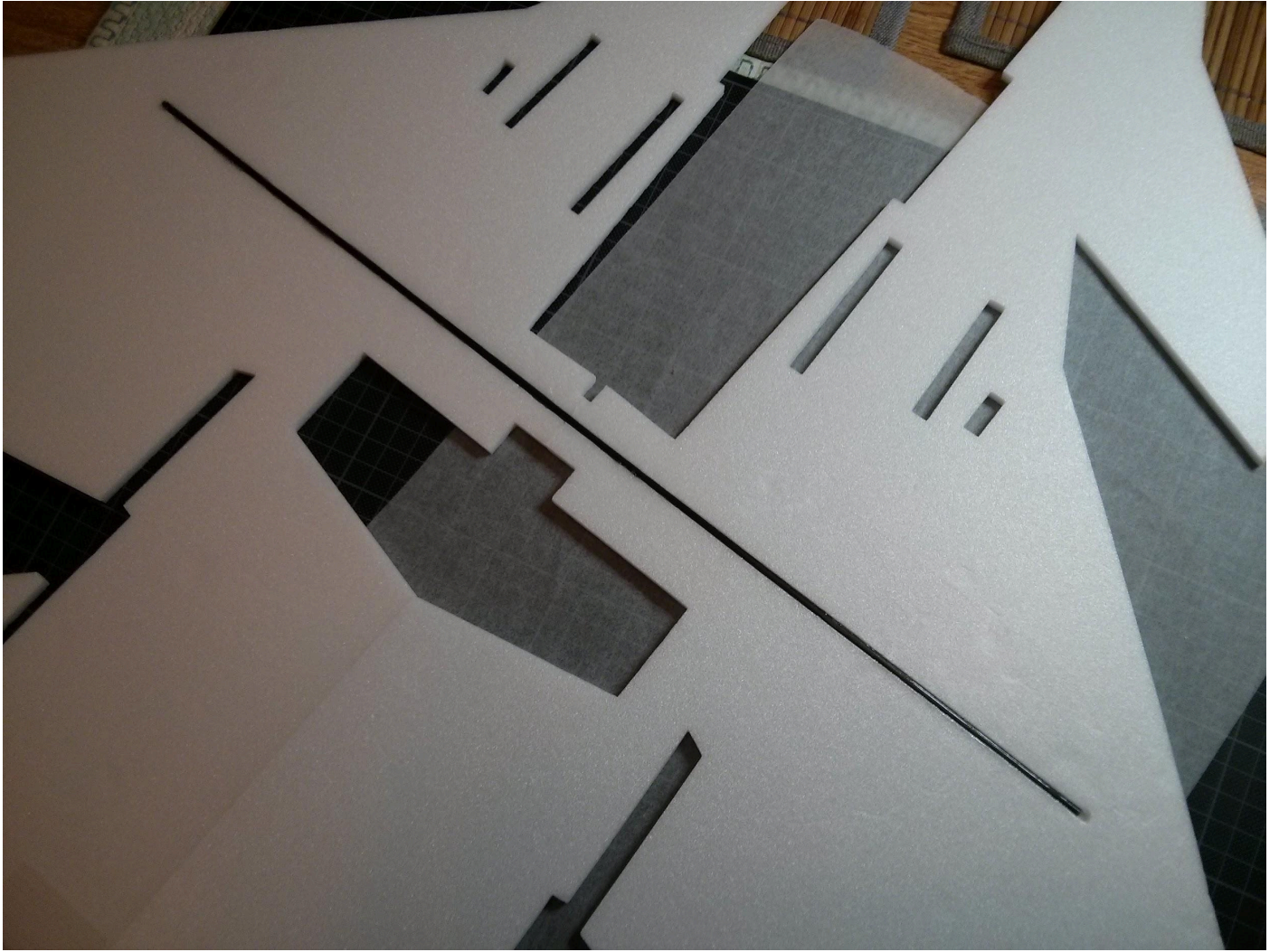


Epoxy gluing it in went as per the instructions. I wore latex gloves while epoxying to avoid making an even worse mess than I would normally make!



Hopefully the masking tape will release easily and not wreck the entire wing set!

Yes it did! I removed the masking tape 20 minutes after setting the rod, +/- 2 mins.



Later, I reinforced the CF rod with some strapping tape.



Put in the Battery Velcro (RCPowers step 13) (1 hour)

While the CF rod epoxy was drying, I forged on ahead to this step. I had to look back at the plans to see where the velcro goes!

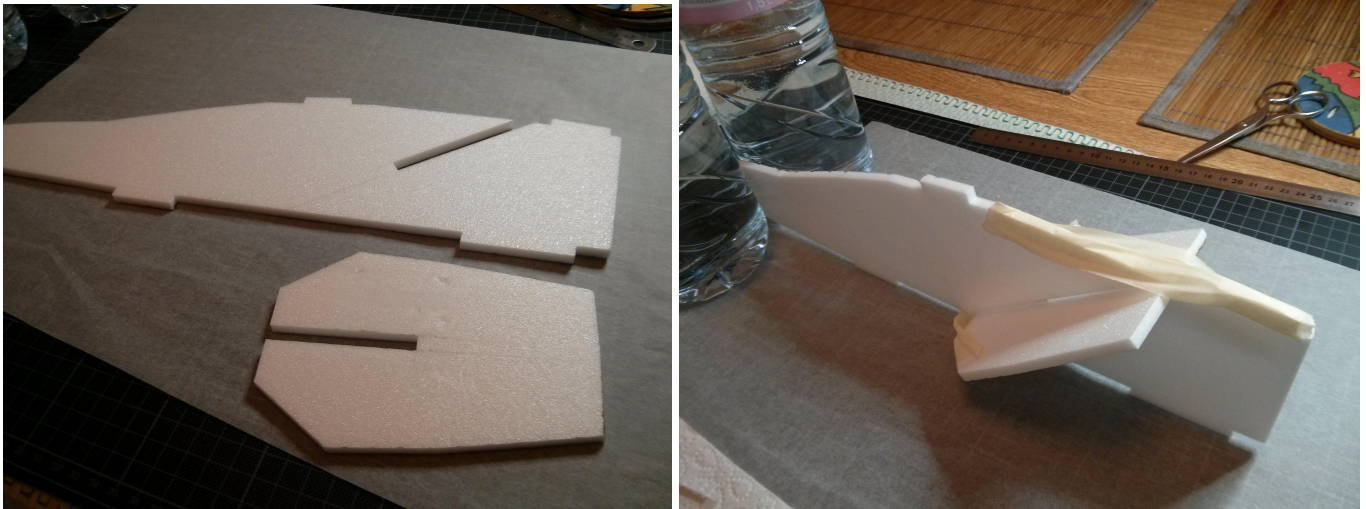
Don't put the velcro over the glue points for the inner nose frame! If you did, just peel it off before assembling the nose later on.



Glue the Inner Nose Frame (RCPowers step 14) (1/2 hour)

Here we see that laser cutting is not perfect. There was some slop in the mounting of the 2 parts to make the inner nose frame. A nice dose of epoxy should fill it. I was planning on using Foam Tac here, but even if that glue is really great, it won't fill gaps, so it's more epoxy, and more gloves and more mess...

I applied the epoxy to the insides of the slots, then stuck the parts together, then used tape to keep them under compression.



Assemble the Nose (RCPowers steps 15 & 16 & 23) (2 hours)

When you're building a model and all is going well you feel so good! But inevitably, at some point all the precision starts to slip away, sometimes slowly, other times all at once, but in any case, all is not as well as before and the thrill of doing it perfectly is suddenly gone.

That's what happened to me in this step. First, the parts didn't seem to quite fit together, then I realized that maybe the hatch was not quite right. So I decided to go with Foam Tac, not epoxy, to be able to make some adjustment before the bonding set... (I thank Marc from [Rabid Models](#) for teaching me about this great goo! I don't know how anyone could build a foamie without it!).



This is not to gain strength, simply for the ease of gluing since Foam Tac allows for some repositioning and drying time is a bit longer. An advantage is that it dries much lighter than epoxy so the model will weigh less. I would recommend it for all the bonds where absolute rigidity is not required. It is very strong and flexible, though!

Anyway, I tried my best here, but all is not longer *perfect* ...snif.

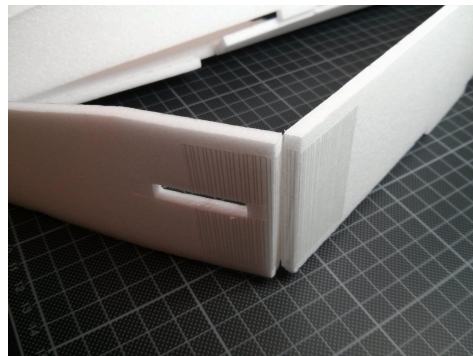
The nose is made up of 3 parts:

- the inner frame,
- the outside bottom and sides
- the top with the hatch



Be sure to test fill all the pieces together before any gluing. In my model, despite the 0.1 precision of the laser cutter, I had to do some trimming to the inner frame to get everything to line up. It's certainly worth taking your time here.

I also did the taping of the hatch out of sequence (step 23) before gluing it on seeing as it seemed a lot easier to do it before it was glued down.



Finally, I glued the inner frame to the outsides bottom and sides and taped it up so that the flex-bends would stick. This worked out ok-ish.



The real killer was getting the top hatch on. At the back there are tabs which have to mate with the sides, but at the middle and front it must be glued down tight. It wasn't easy getting all that to fit together and I'm not sure how well the glued joints are going to hold. We'll just have to live with it and see how it turns out!







Make the Pointy Nose (RCPowers step 17) (3 hours but it seemed like a lifetime...)

Shaking your head is a sign of disapproval, and that's what I'm doing right now. This looks like it will be the make it or break it step. It seems nearly unimaginable to get all those little nose points to glue together into one but I will try.



First, I tried and hand-held fit and learned how it should go together. I couldn't take a picture since both my hands were in use.

Next I used an elastic to hold the middle of the pointy parts together, and some pins and some masking tape. As I was gluing, I cut off the elastics, making STILL more of a mess...

Then I used about 5 sticks of hot glue and made a huge mess. But it stuck together! Maybe I'll be able to smooth out the hot glue once it dries? (doubtful) Nope, I could not smooth it.

There must be a better way of doing this! Maybe trim the foam on the nose parts so they assemble flush? Maybe spot glue it to hold position then weld with Foam Tac?

I should NOT have used hot glue!!! Foam Tac would have produced a MUCH BETTER Result!





NOTE: *This step went really badly. I made a huge mess and I still don't really know why. I'm thinking that there must be a better way of doing this so I am planning on going back to the lab and cutting a few more noses and experimenting. I don't like the way there was no clean fit of the pointy bits, but at this point I am simply relieved that it's done!*

Attach the Motor Mount to the Wings (RCPowers step 19) (1 hour)

It was hard to tell which way was up, but looking at the pictures, particularly in step 20, helped to convince me that the longer section of the mount is on the top - I hope I'm right!

Lining this up and getting it to glue on straight turned out to be a huge challenge. The result was mediocre, not perfectly aligned, but I'm thinking that some sanding later when it comes to installing the motor will make it all ok. I hope so....

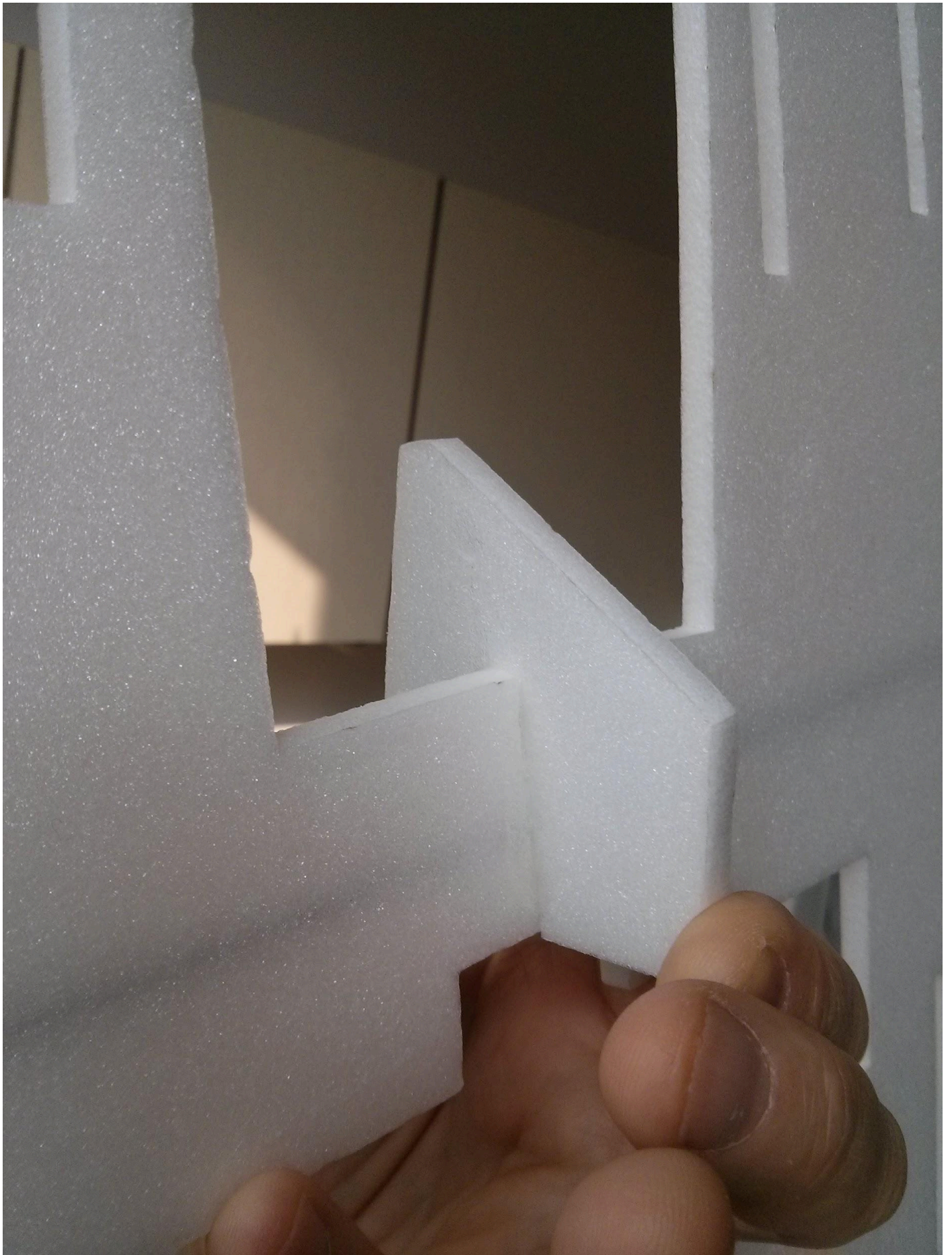
Alas, no! It took me until RCPowers step 29 (Yes I have travelled back in time to this step to warn people from long ago what will happen to them if they don't listen to kind time travelers from the future!) to realize that I had screwed this up... If only I had thought about it a little more I would have done the following:

NOTE: *LOOK AT THIS REMARK BEFORE DOING ANYTHING ELSE !*

Use a Plywood Motor Mount as an Alignment Jig to get the motor mount perfectly aligned!!

Now, back to the present....

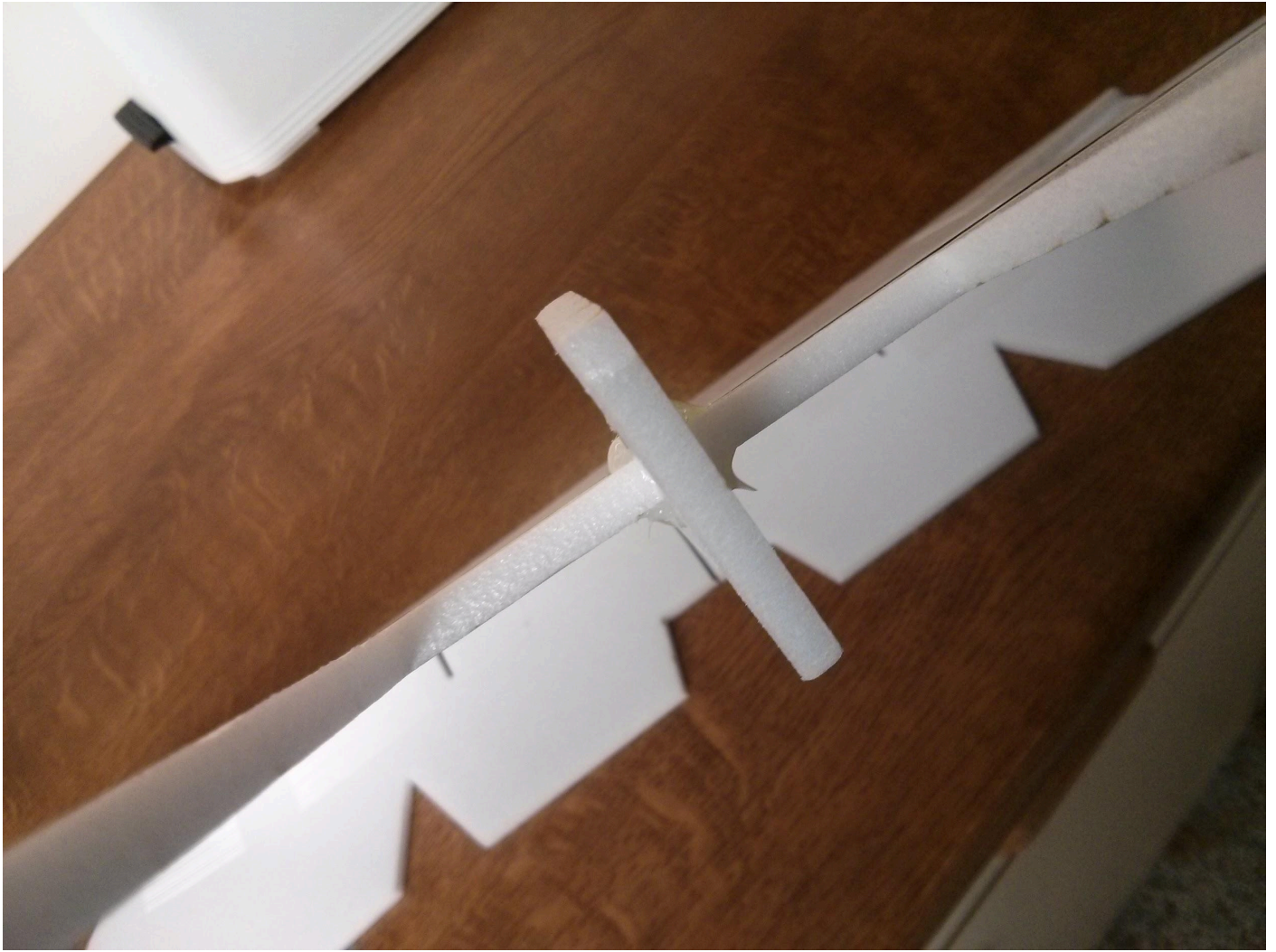
I hand-held the mount in place during the epoxy setting, so as to be sure that the mount was firmly anchored.





After the epoxy hardened, I added some hot glue to be sure that it was a real mess, not just half of one... and this turned out to be a bad idea... **DON'T PUT HOT GLUE** on the **UNDERSIDE** of the **motor mount** because it will prevent the lower part of the nose assembly from sitting flush against the wing... Naturally, *I did put hot glue there* and had to scrape and cut to make the wing fit correctly, sniff...





Why is it so hard to glue things right?

Cleaning up my Mess (4 hours and 2 litres of sweat)

Everyday is a new day and today was no exception. After a good night's sleep, I manned up to the results of yesterday's "work". Honestly, the nose only looked 3/4 as bad as I feared. So with a fresh scalpel blade, tweezers, and other implements of correction, I began cleaning up all that ugly hot glue that seemed to be everywhere it shouldn't be and hardly at all where it should.

I will never use hot-glue for this again. Had I used my old reliable Foam Tac, it would have come out perfect, but I didn't so I'm cleaning.

After a while, I'd cut away some goo and found lots of unglued spots. I tried to sand that hot glue, but that failed. I finally said, "that good enough for government work" and filled any big unglued sections with Foam tac, then covered all the messy joins with clear Scotch tape (yep, swept it under the rug, just like any government worker would do...)



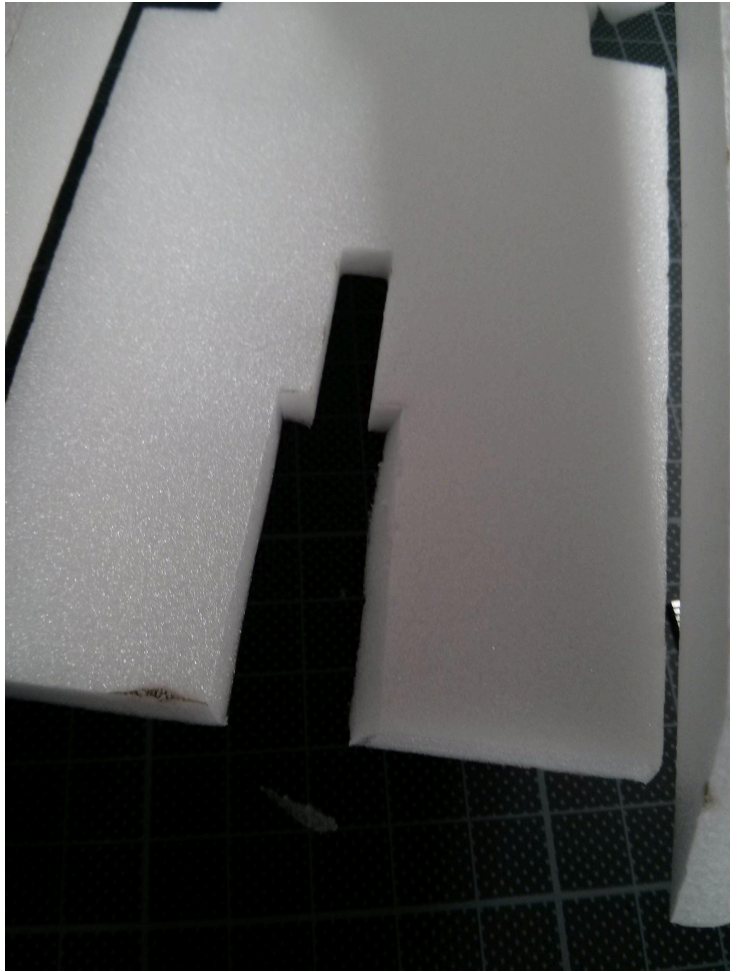
But seriously, I know from experience that spray painting over Scotch tapes looks pretty good so I am hoping this will, too!

Now, let's just turn the page and continue living and BUILDING!

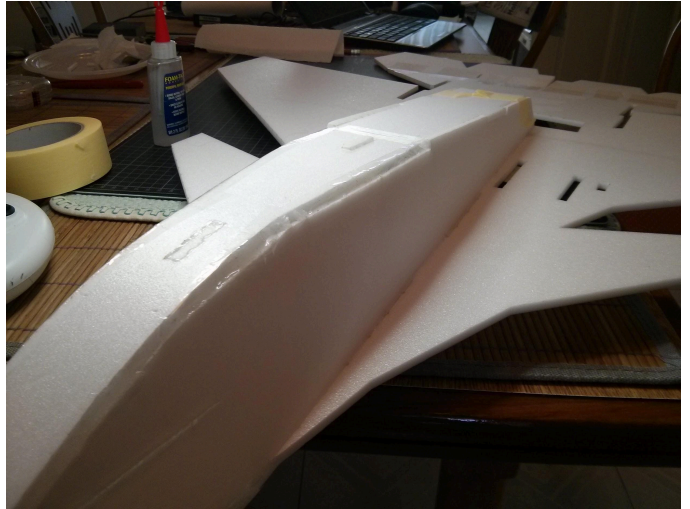
Putting On the Nose (RCPowers step 19) (2 hours)

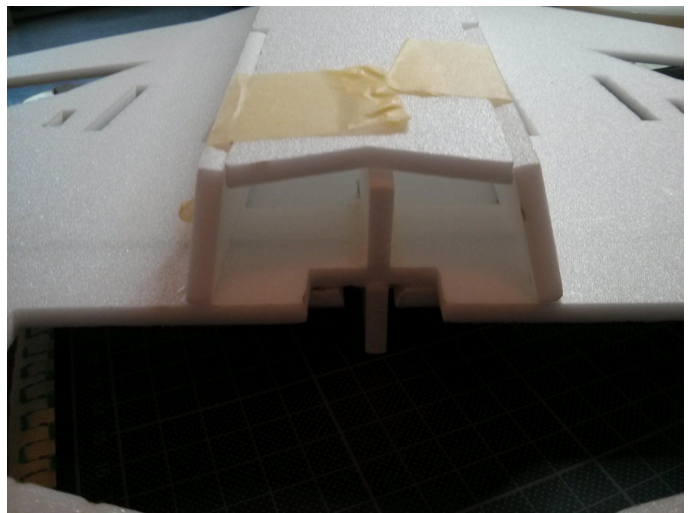
This will be done with Foam Tac - I've had it with epoxy.

After a dry-run to test I found that the hot glue I had put on the motor mount was preventing a flush mount of the rear of the nose. A fresh scalpel blade and a little trimming solved this.



Then, with the wing in position, but slightly shifted downwards, I did my best to run Foam Tac on the glue topside lines, while holding the nose away from contact. No problem so far!





Then, I simply snapped the nose back up, into the locking slots, and Voilà! Not too bad, I said to myself with a sigh of relief... I ran some filets of Foam Tac along the soggy joints then flipped it over for the bottom.

The bottom section glued around the motor mount but at an angle. I wonder if I did this right? I glued it down at the far aft point, then applied strong pressure to bend the foam for the rest of the underside glue line, around 10cm.



Finally, with hopes high, I put the fuselage + wing assembly aside to dry.

Install Engines to Wings & CG Tabs (RCPowers Step 20 & 26) (2 hours)

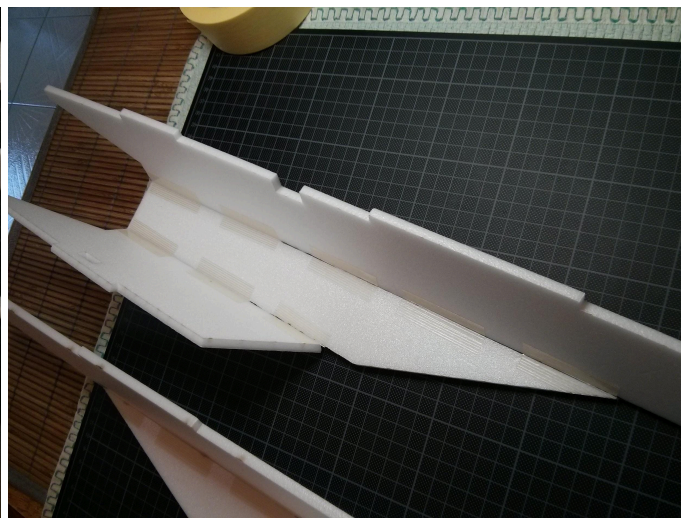
A dry mount showed some funky stuff:

- the lower panels on the engines are not strapping taped down? Should I tape them? I'm guessing yes.
- there are slots aft of the wing and inside the rear stab fixed plane. Why? ...some time later... Ok, I'm an idiot... *those slots are for the tails!!!* Ding-Dong!

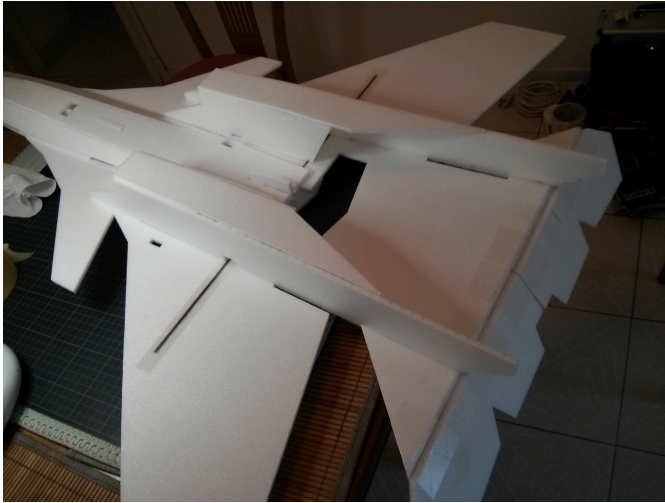


Otherwise, the fit was near perfect!

I searched the instructions to see if there could be a reason for not taping the engine lower panels but found none. So, I decided to strapping tape the rest of the folds in the engines before proceeding to glue them down.



And... Foam Tac saves the day! The engine tubes went on ****PERFECTLY**** !!

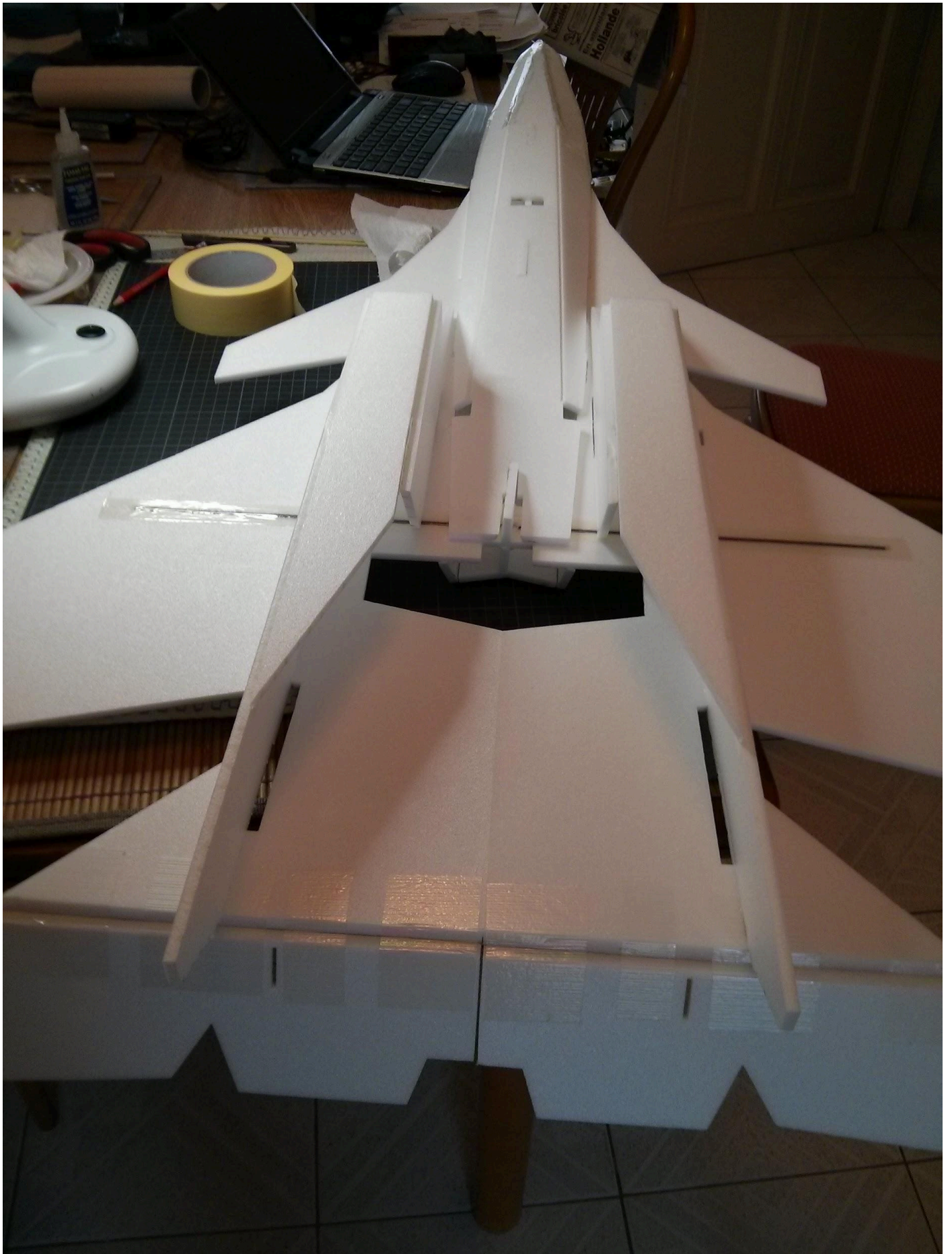


While the plane was upside down to let the glue dry, I put in the CG Tabs (RCPowers Step 26).



NOTE: *In the photo above, you can see that the elevator servo cutout is in the wrong place! At the time, I had no idea and was living in blissful ignorance!*

This model is starting to look SERIOUSLY GOOD!!!



Install the Tails (RCPowers step 21) (1 hour)

Now that I've officially switched to Foam Tac, life is a long tranquil river (it was a movie) !

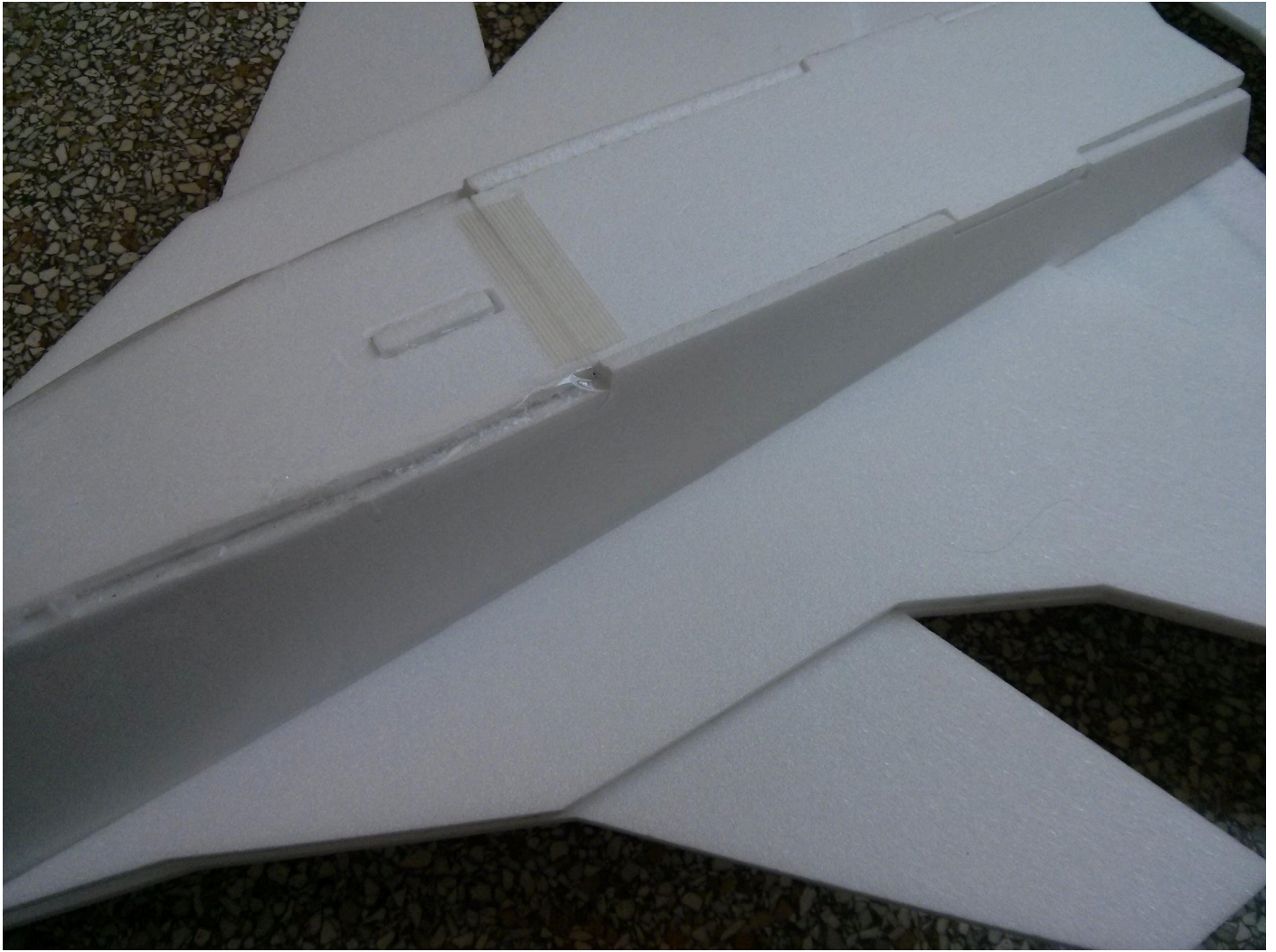
This was done in 2 seconds! and with near perfect symmetry!



KF Airfoil (RCPowers step 24) (2 hours)

Since there were only 2 foam parts left, I decided to skip the cockpit design for now and get the gluing DONE!

First, in the dry-run I noticed that the fuselage joint was gaping open so I decided to bevel sand the inner edges of the airfoils.



Then, a little Foam Tac and that did it!

The Foam Gluing's Done !!!

Can you feel the relief filling the air?



What next?

The instructions continue with a few details, like the magnets for the hatch, and the canopy line, then go on to the motor and servos.

But I think this may be a good time to paint the airframe! Doing it now will save all the trouble of masking off the electronics so I'm doing it - and anyway, I'm waiting to get a shipment of model parts that I will need to finish the SU-34 in any case.

My plan is (note: this plan has been revised at least 5 zillion times since it was first proposed!):

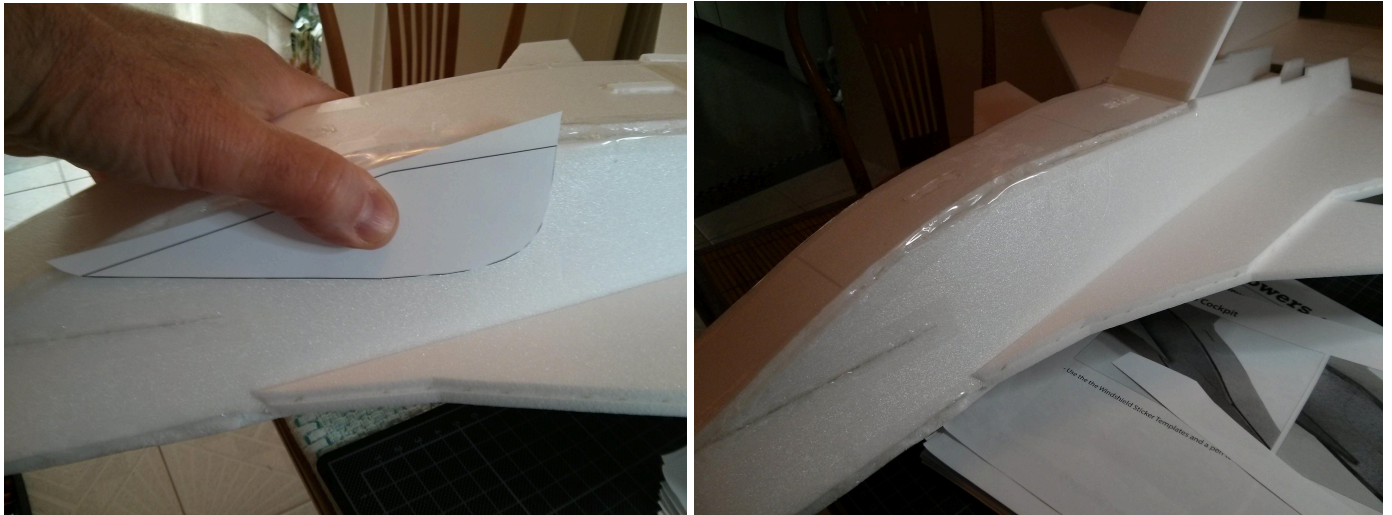
1. put in the magnets (done!)
2. sand down the leading and not trailing edges (done!)
3. then paint the whole thing (done!)
4. put some stickers on to improve the overall look, (cockpit, wing, tail elevon tips) (done!)
5. mount the motor (done!)
6. put in the control horns (after testing them with the control rods and clevis's) (done 3 times!)
7. only then come back to the servos (done!)
8. then set up the rx, esc, motor, throws, rates, expo, ... (done!)

9. then it will be done! (it's done!)

Stick with the Plan, Sick with the Plan ...

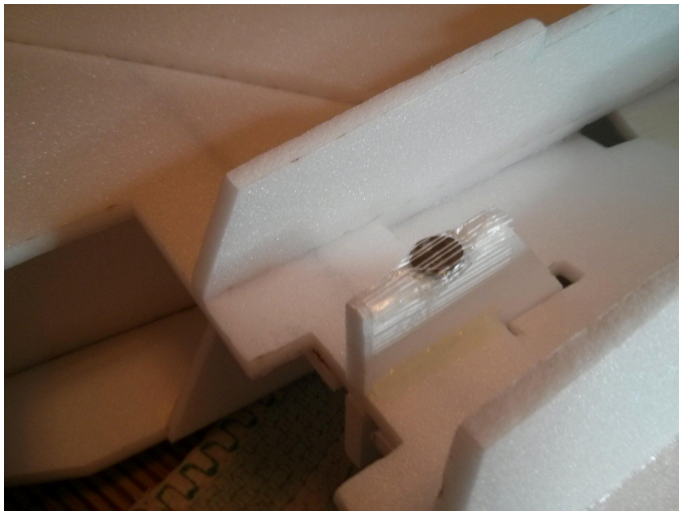
Ok, next I made the cockpit trace as per instructions (RCPowers step 22). (15 mins)

This was a no-brainer and I used applied my full potential at no-brain activity with a pretty good success, I must say with no false modesty.



Then I did the magnets (RCPowers steps 27 & 28) (1 hour)

I used [HobbyKing magnets](#) and this turned out to be a challenge after the relaxing cockpit trace. Gluing to the motor support with hot glue went ok. Then digging out the hole in the hatch was a bit delicate, but I managed. Finally, I little tape and some hot glue and I prayed it was ok!



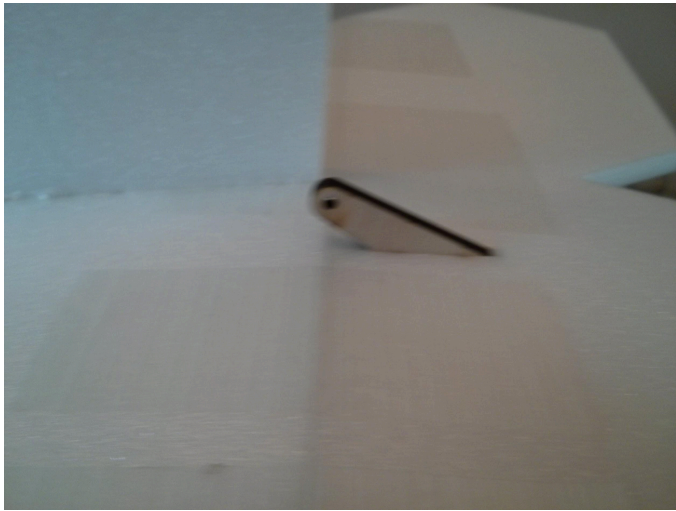
AND IT WAS !!! Boy, that hatch is great! It makes a fantastic ***S N A P*** crack sound when it closes. I did do a little sanding on the inner supports so that it would snap perfectly!!!

What a great feeling of accomplishment these 2 steps gave me, after the depressing glue-sessions of the past few steps...

Then, I tested the control horns fit and some other stuff ... (1/2 hour)

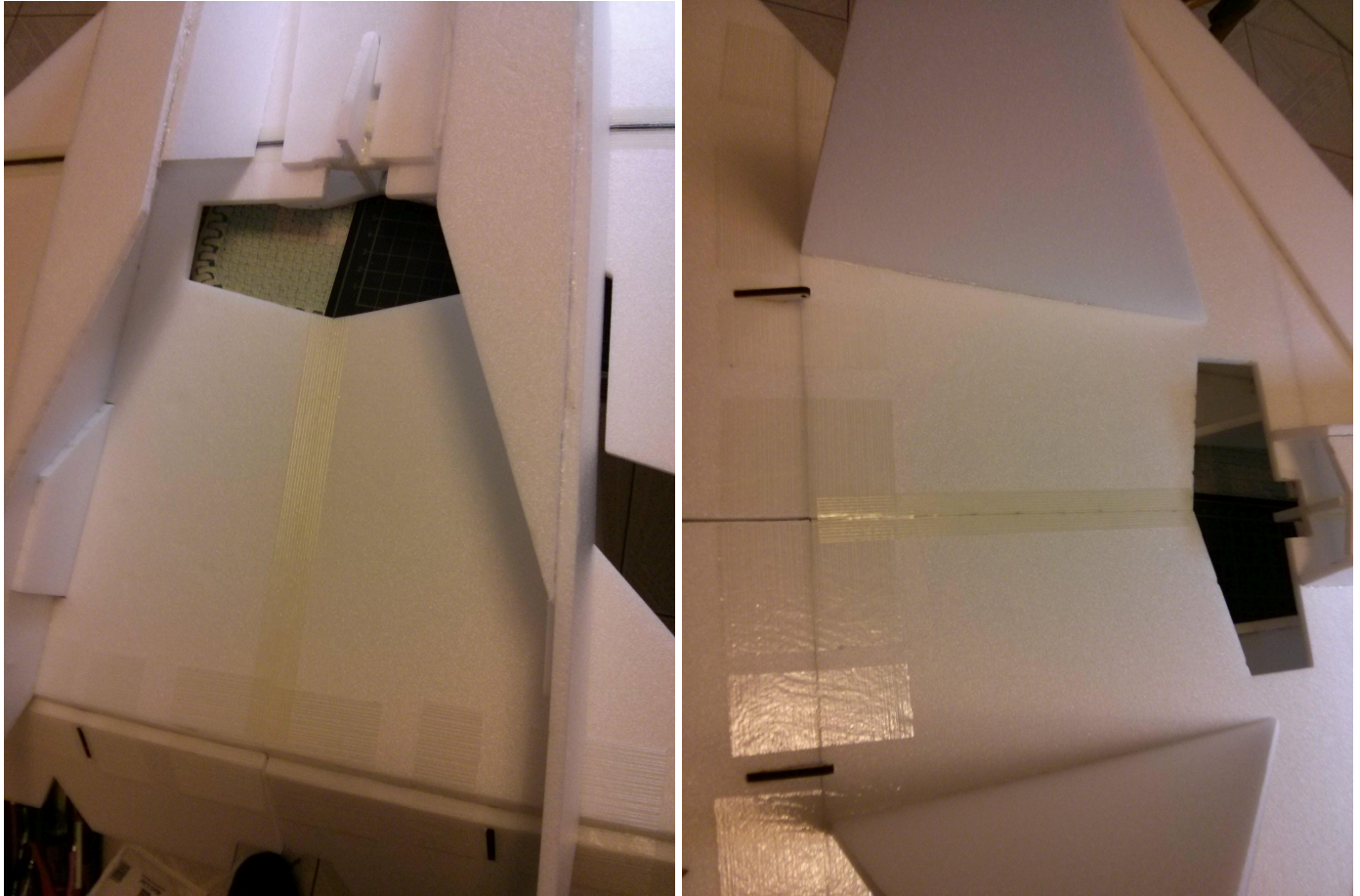
I know this was not the plan, but there's one thing I always say, "Don't follow my advice, Even I never do..." So, they fit perfectly. Nice and snug and the holes are really nicely aligned to the elevon leading edges.

But, to my surprise I discovered the the elevon down throw was encumbered by the ends of the engine tubes! A fresh scalpel blade, a straight-edge, and voilà: Full throw was available to all concerned.



I felt like I was on a roll and decided to check my Super-Loto ticket number... sniff... I'm back so that means I didn't win... But over(?) confident, I forged on!

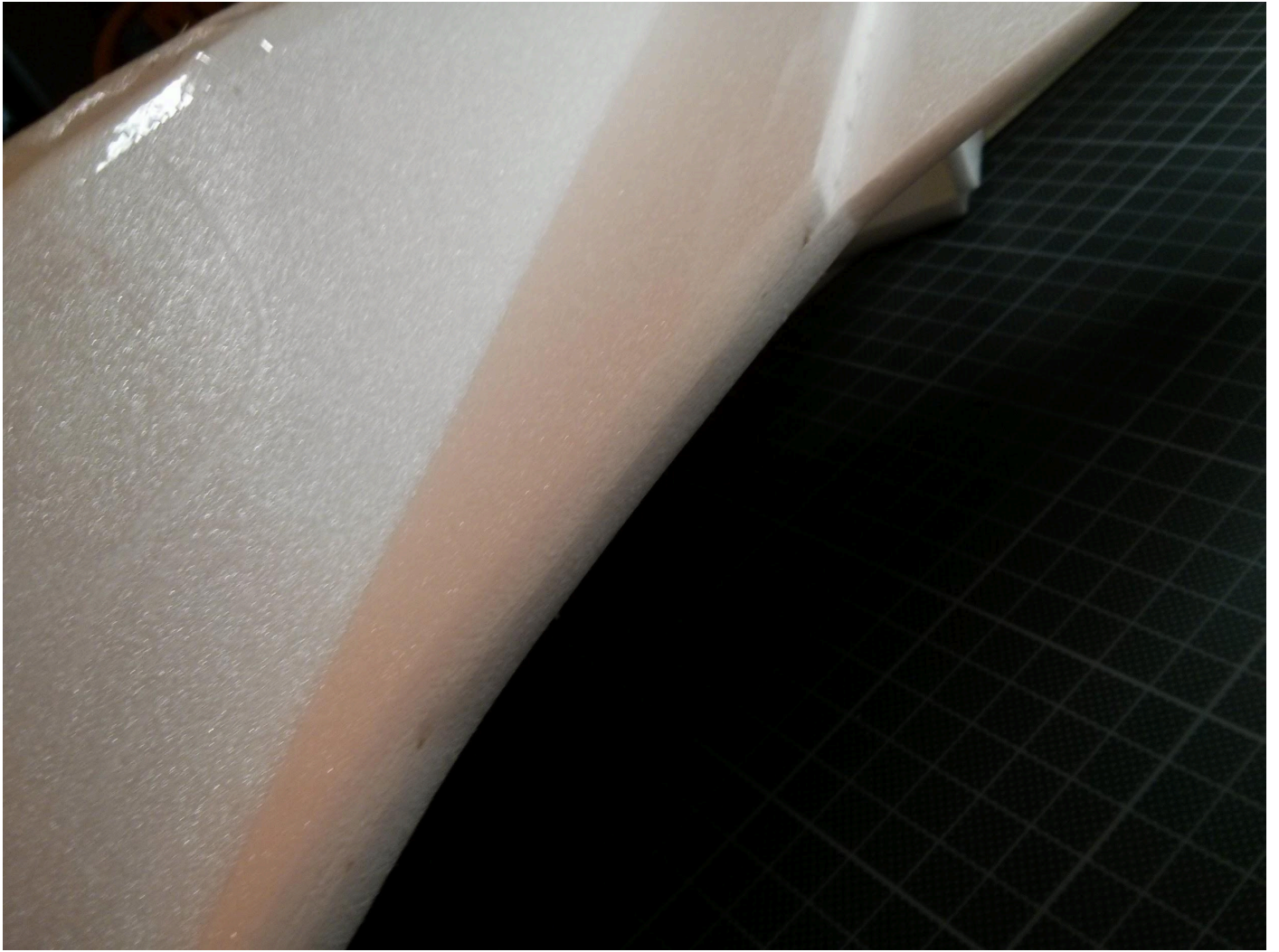
Looking at the joint between the aft portion of the wing halves, I felt like a little brand-X strapping tape could make that a little tougher, so I put it down!

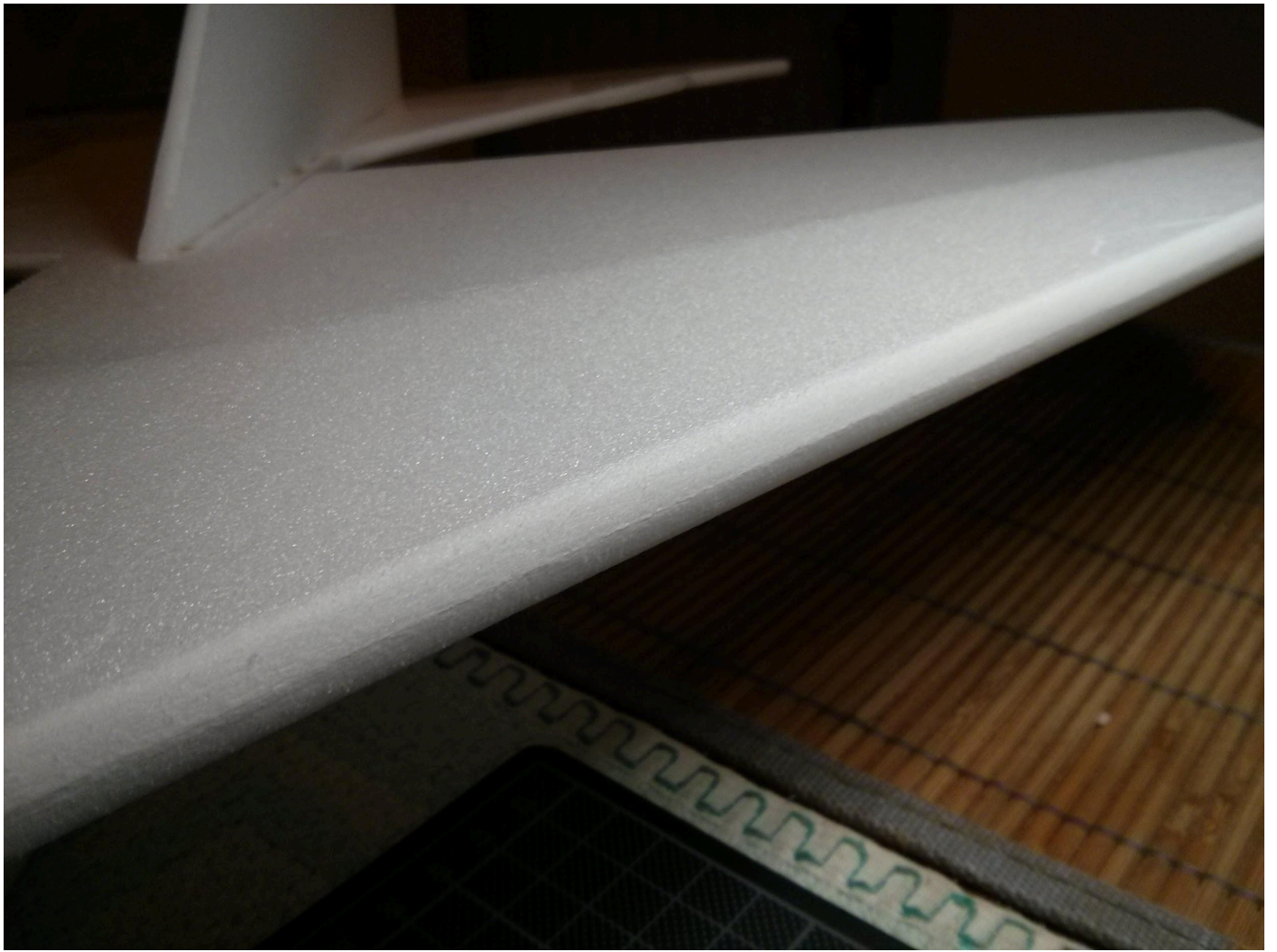


Round the leading Edges (RCPowers step 25) (1 hour)

This was done with 320 grit sandpaper since tests done on scraps showed that using the coarse stuff just ate the foam like the blob that ate Chicago. This was yet another success! I even rounded the "air intakes" on the engine tubes. (Do I get extra-credit for that?)

NOTE: *In the future I will do this step before assembling the parts. It would have been much easier to sand down these parts on the workbench then it was holding the model, supporting the foam and sanding. Luckily I used my feet and hands and did it somehow!*







The plane is looking G R E A T !!

-> correction, the plane *WAS* looking great...

Painting (3 hours, plus a lifetime to recover...)

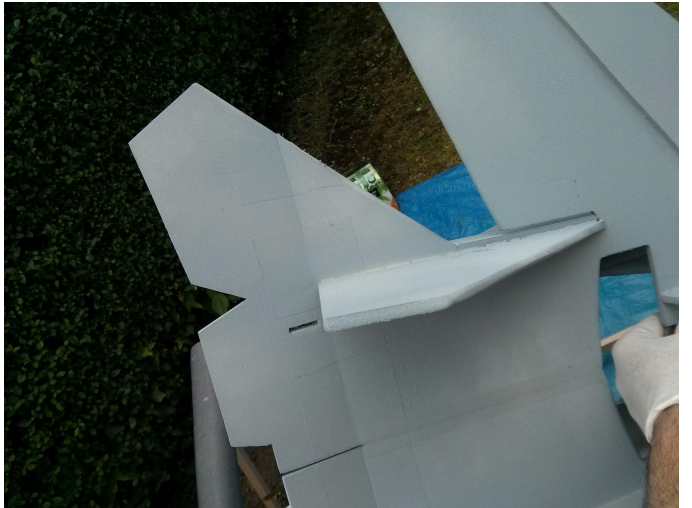
There are so many things that depressed me in this step that I have a hard time writing them down.

- Setting up to paint: I wanted to do this outside, but of course there was more wind than I'd seen 'round here for years, so everything had to be battened down, especially the model... A big tarp to protect the innocent(?) grass, all my reserve of San Pellegrino to prevent it from blowing away, some saw-horses to support the model when I was too tired to hold it, masking tape, marker, and lots of other junk...and especially latex gloves
- Original Paint Scheme: original idea was orange wing undersides, camouflage on top; but it was too hard for me to figure out a way to mask off & paint the underside so I gave up on that and went with:
- Finger-paint scheme: My neighbor's infant child uses finger paints and paints everything one color. I decided that Gray was ideal, not because I like gray, or because it looked warbird-ish, but because I had 2 cans of different shades of gray! This was nearly within my grasp, I thought.
- So, starting with the underside, I sprayed on light gray. Previous tests had shown that the ideal distance was 30cm, since any closer caused the paint to damage(?) or roughen up the foam. When

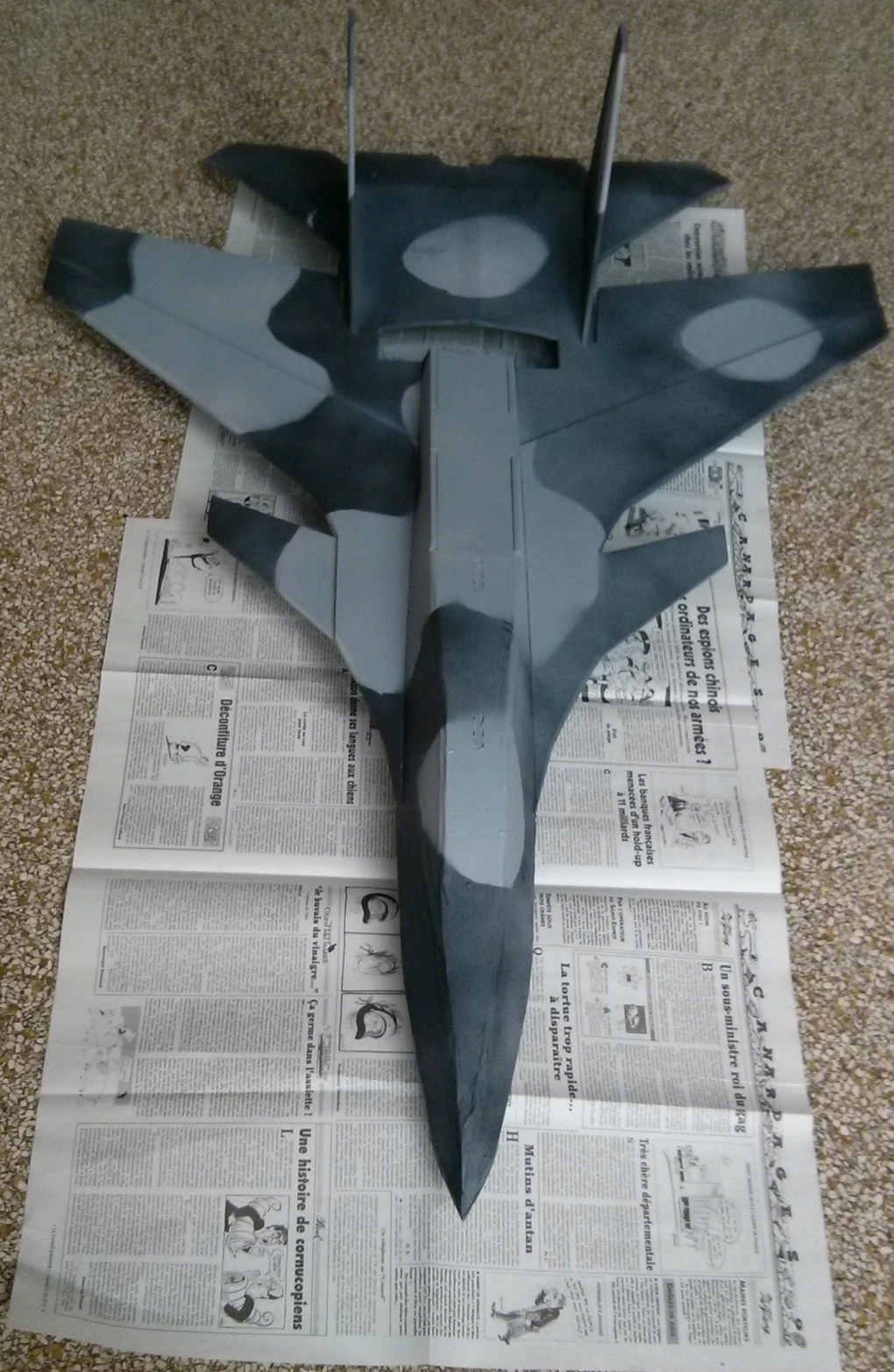
I tried this distance on the model, the wind was so strong that no paint got on it. So I improvised... It was hellish.

- After it was too late I found that I could hold the model from within the motor mount and thus access the entire thing with my can of paint.
- So I sprayed and I sprayed, top and bottom
- All my hopes, few that they were, were now gone; all fears were realized. It was a real mess! I mean really awful. It is embarrassing to have survived to my age and still not be able to spray paint decently. And soon the paint was all gone, and the model was light gray, with various splotches and roughed up spots.
- Needless to say, every defect was now glaringly apparent.
- Next, I cut out some "camouflage masks" in newspaper, sprayed them with a water mist gun (from the gardening dept.) so they would stick to the model, places them on and hoped that the wind would hold off till I could hit the topsides with the dark gray. It did not (hold off).
- Pretty soon the dark gray had covered and after only 2 incidents with the masks blowing away, I had had enough. Yes, enough. No more could I go on.
- The result was fair to poor, in my eyes. I think a 5 year old might have done as well. Let's leave it at that.









Decoration's Done ! (3 hours!)

Well I was busy with other stuff for a while, like flying and crashing planes over the weekend, then work at the lab to prepare my next project, and update some parts....

But all of that is neither here nor there. What counts is that the SU-34 is now fully decorated and the parts I need to put the motor and servos on board have finally arrived!

The white and black are adhesive plastic sheets that I cut out with the scalpel to "fit" (?). The Soviet Russian stars were downloaded from [wikipedia commons](https://commons.wikimedia.org/) and printed on transparent self adhesive plastic with an ink-jet printer. (Don't ask why I put Soviet stars on a non-Soviet jet...).

Here's what she looks like before the electronics goes in !



Install the Motor (RCPowers steps 29 & 30) (3 hours - Don't Laugh!!!)

Installing the motor was not too hard, given my general lack of model building skills, I guess a 5 year old could have done it.

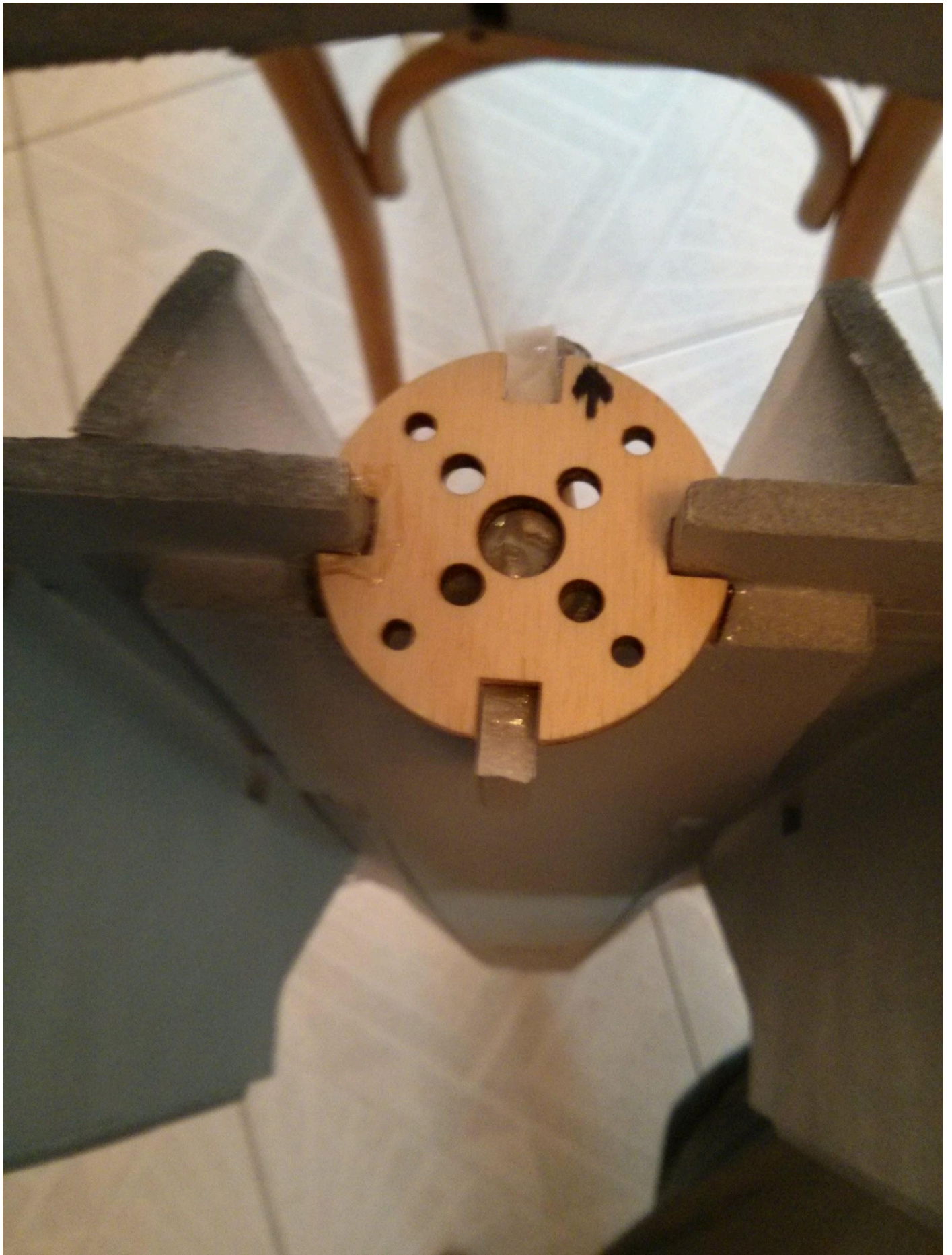
First, I would like to note that I used nuts & bolts not screws to attach the motor to the plywood panel. I prefer extra solid, even if the weight is increased...

Next, how did I get the plywood motor mount? Well, if you paid attention from the beginning, you would know that I laser cut it in 3mm birch plywood. I updated the original version from the RCPowers plans to allow for the M3 mounting bolt. The laser burns the wood and leaves ash, so it's necessary to sand off the burn marks before gluing. **Don't Forget!**

The key point to mounting the motor is **GETTING IT STRAIGHT** ! So first I tried a dry mount with the motor on the panel to see how it sat. It was a bit wobbly so I added some bits of foam behind the plywood, held in with Foam Tac. After a few attempts, the motor was both solid and straight, or as straight as I could get it. I marked the outside of the mount and put an arrow on the plywood to know which way was "up". I put an alignment mark on the top of the propeller slot, too.

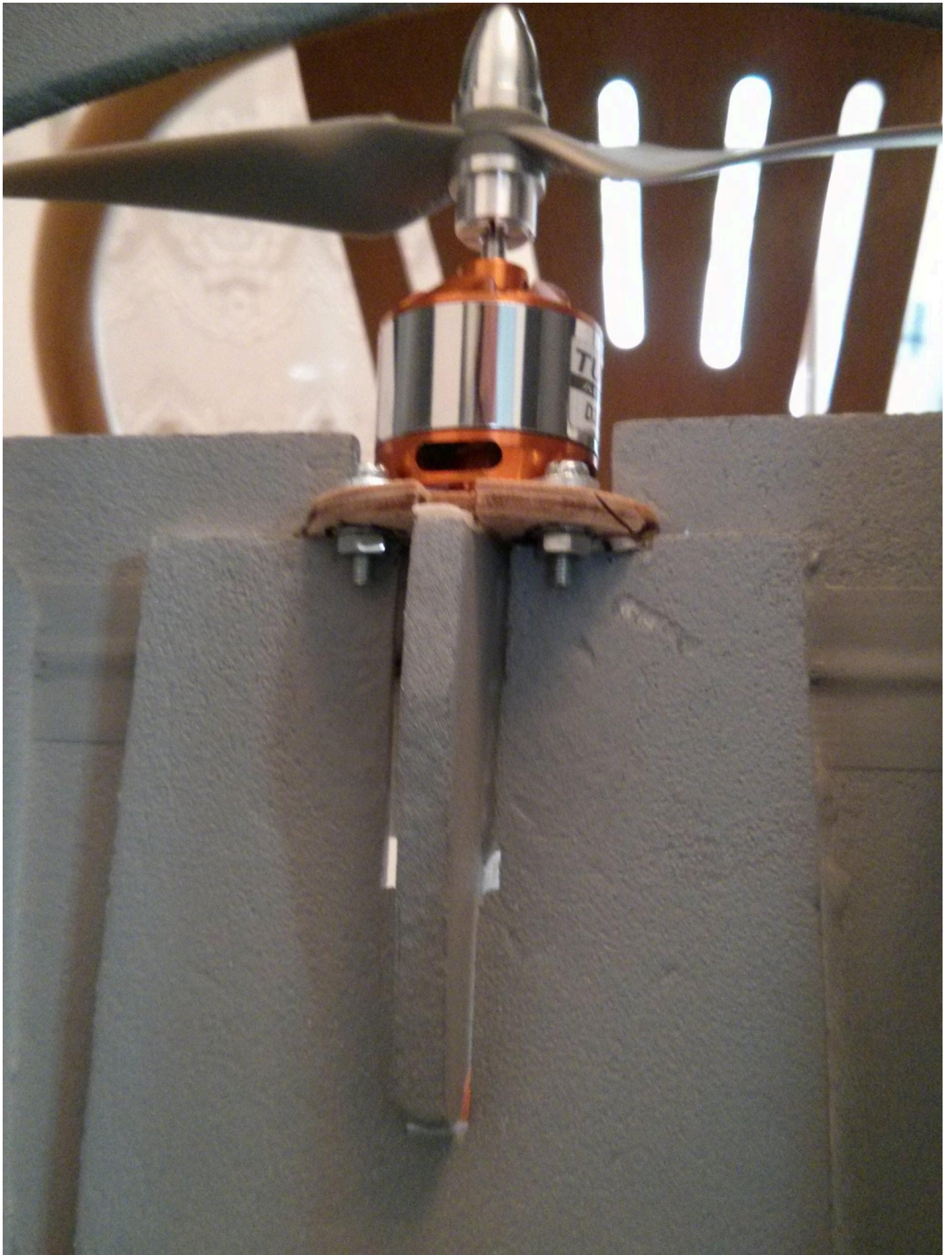
I then removed the motor from the plywood and tested the fit again, with just the plywood mount. It seemed good.

So, there was nothing left but to once again man up to the job at hand: epoxy the mount in place. Miraculously with hardly any damage (except a big epoxy stain on a chair), I was able to get the plywood mount in place!

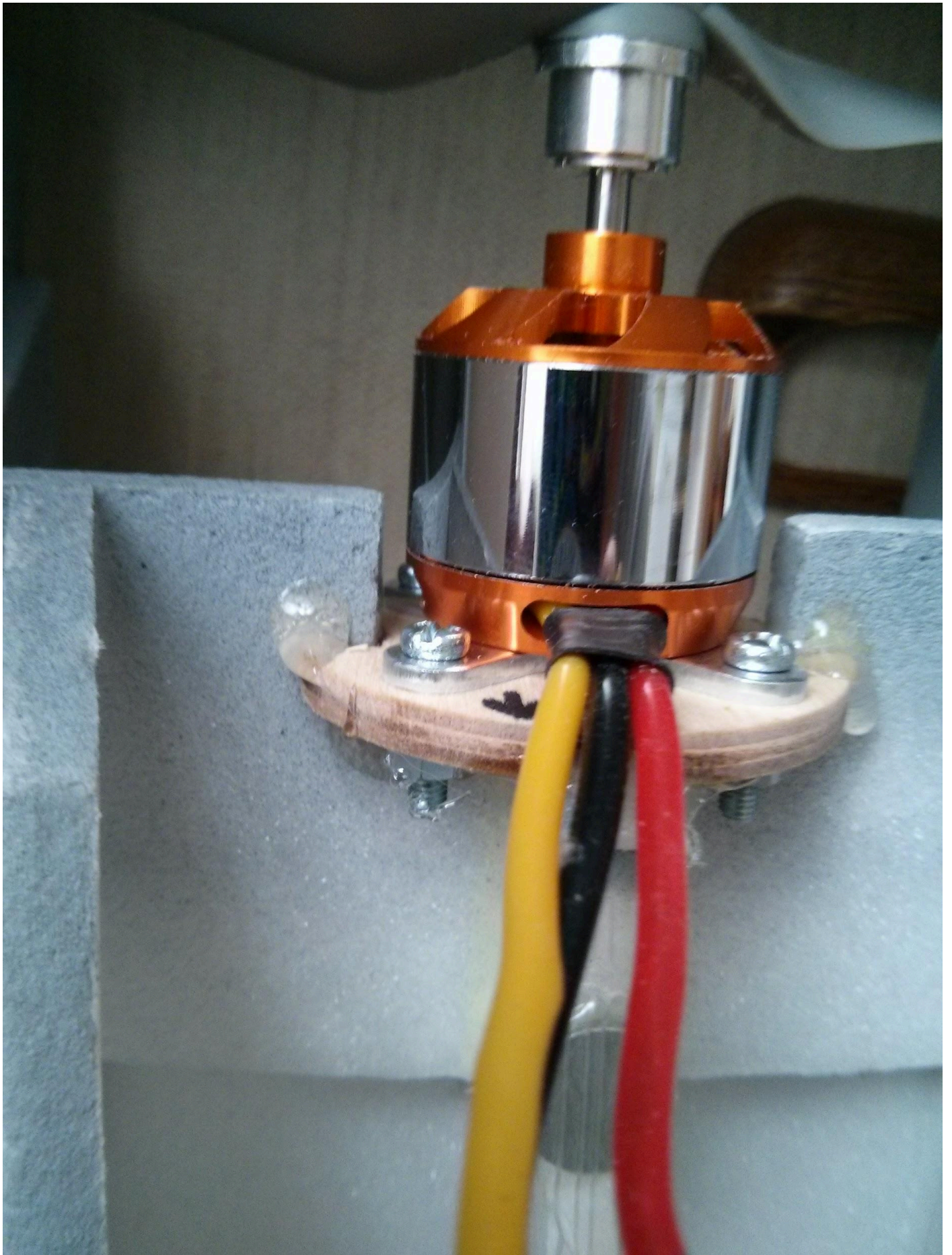


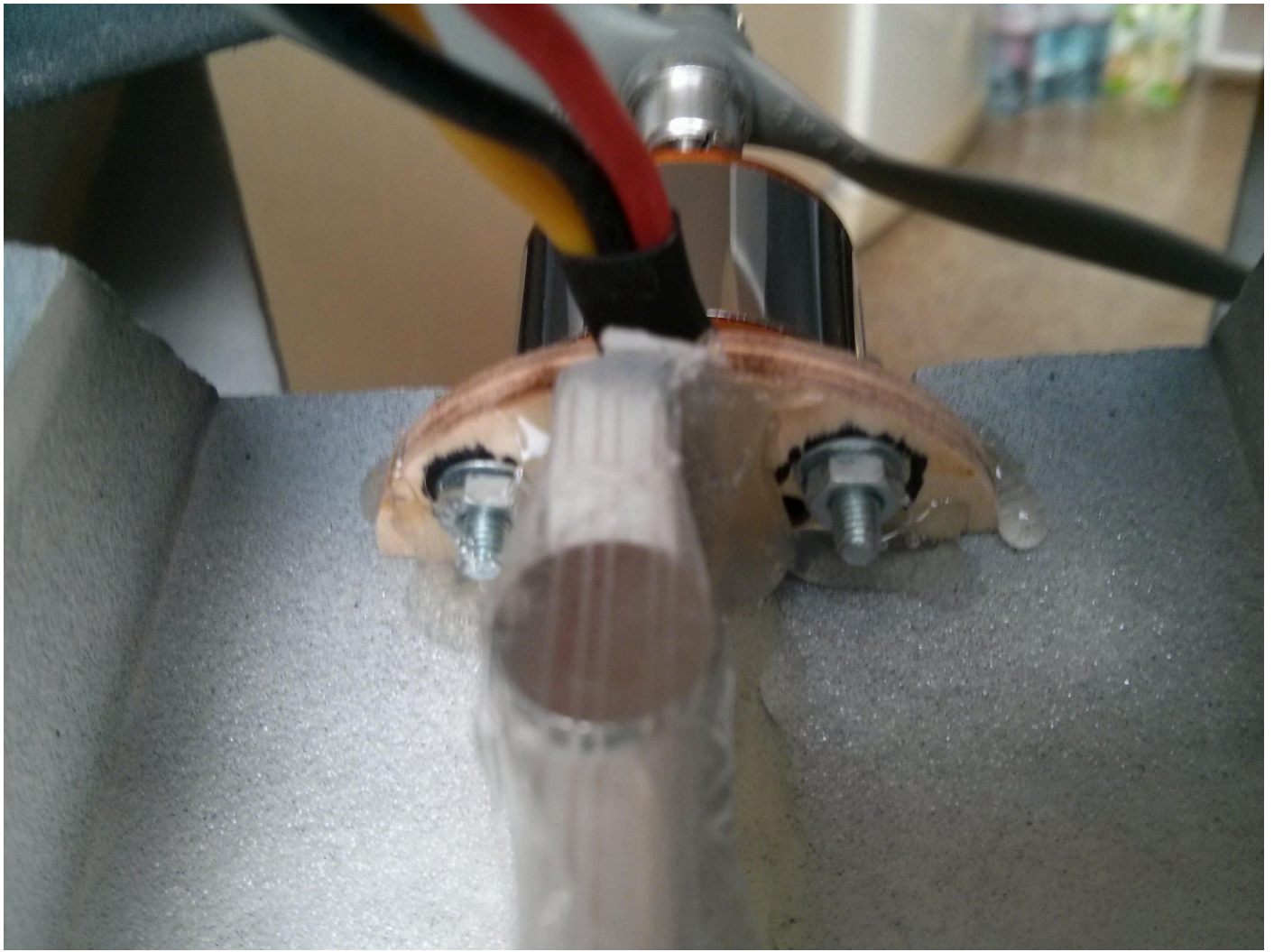
Since I like the motor mount to be STRONG, I decided to reinforce it with some hot glue.

But first I tightened the prop holder with a small screwdriver, and bolted the motor to its little metal mounting plate. I used light thread-lock on the bolts to keep them from vibrating free later on. I then bolted the plate, with the motor and prop, to the wooden panel, again with thread-lock. I used nut & washer behind the panel.



The last step was to add some hot glue to the wood/foam joint. This hardly caused a mess and my fingers were still burnt from previous gluings so I didn't even feel any pain, hardly, at least not physical pain.





Here's the current "look and feel"!

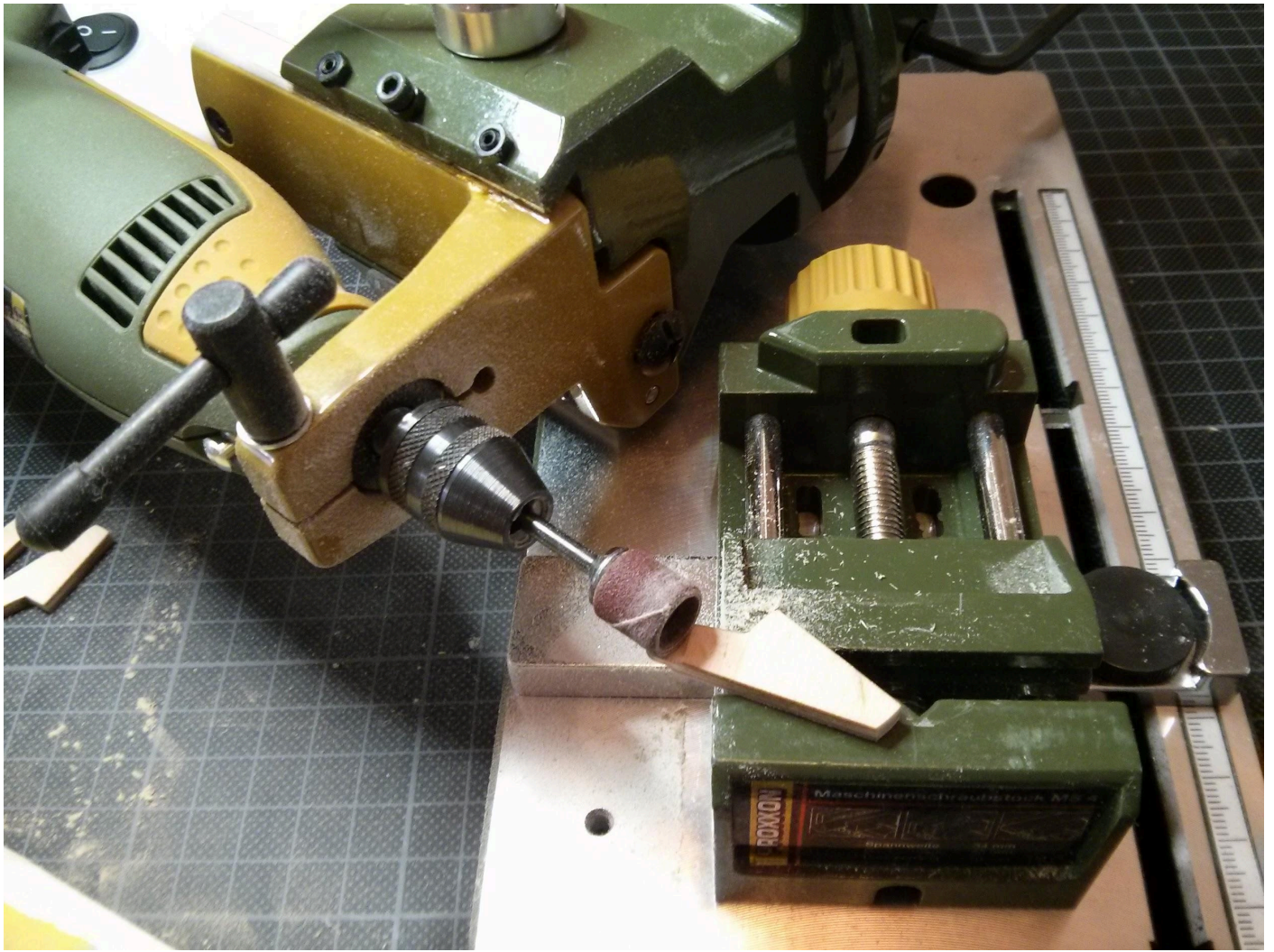


Servo Horns (RCPowers step 31) (1 hour + time invested for future planes)

First where did the servo horns come from, you wonder? From 3mm birch plywood shaped by the laser cutter.

It turns out that 3mm is way too thick for the clevis connectors I was using, so I had to grind down the pivot point. I did this on my [Proxxon](#) drill press (for those who never heard of Proxxon, think Dremel but made of metal, precise and quiet. Much higher quality for the same price, check it out).





Next I sanded down the laser burns since you can't really paint or glue to that.

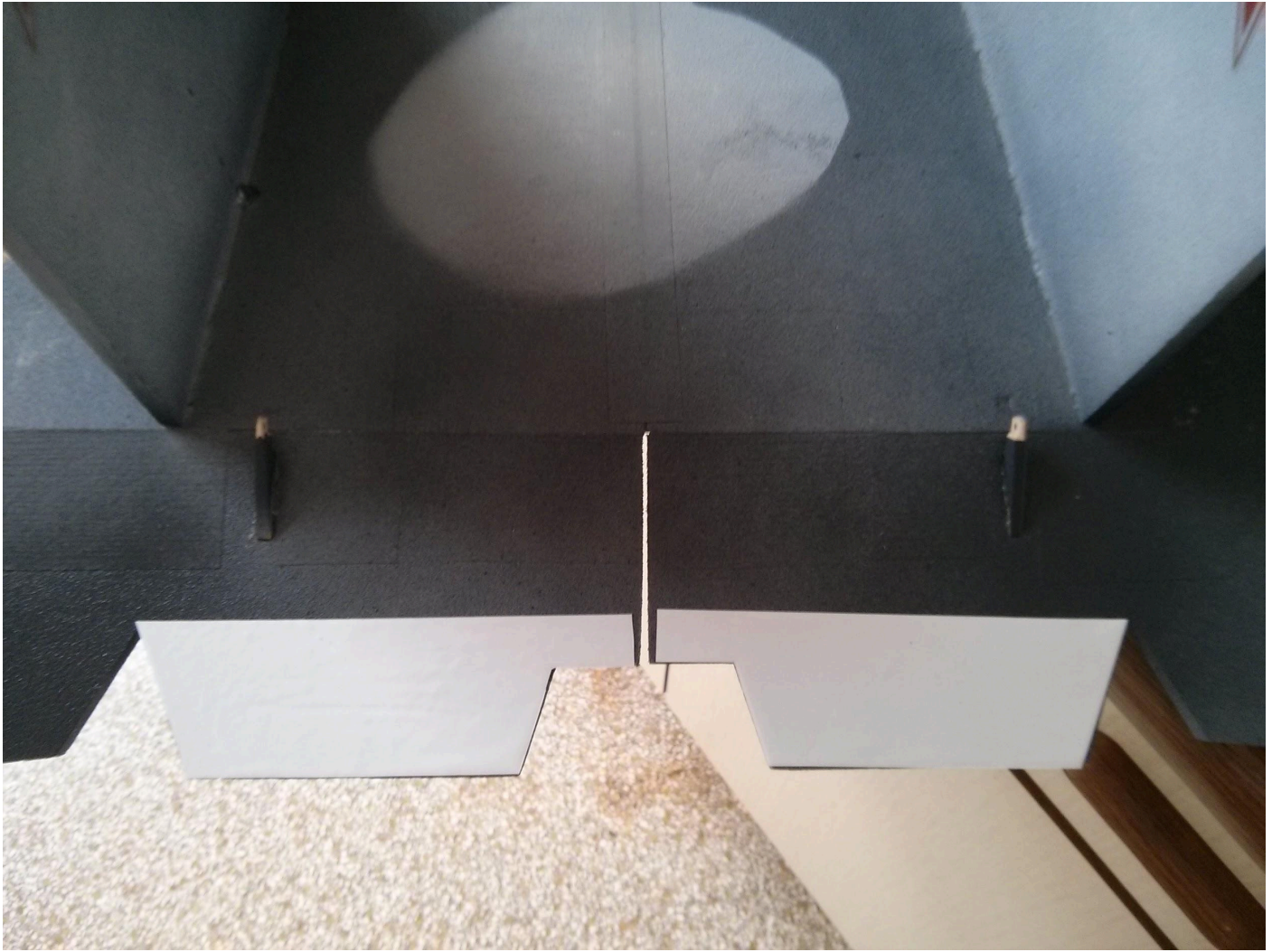


Finally, I masked the glue target areas and spray painted the horns to match my so called "paint job."

I made some extras for future planes, but the time indicated is just for this plane.

Then I glued them in place with Foam Tac - it's plenty strong (I hope)!





Another Mistake!!! (1 hour sigh...)

I glued the servo horns to the wrong side of the elevons!!!!

So I had to carefully remove them, luckily they were only Foam Tac'd in so it was relatively easy. However, the slots were somewhat enlarged by the surgery, so I had to put the new ones in with epoxy ! (egads!)

This in itself wasn't so bad, but what lies beneath....

Prepare the ESC (1 hour)

I decided to use a brand new ESC so I had to get out the soldering station and solder on the connectors and clean up and I also did some other soldering that had been hanging around waiting....

This was uneventful (there's no glue or paint involved!), and I hardly burned my fingers at all!

Servo Installation (RCPowers steps 32 & 33) (5+ hours of hell)

This was always going to be tough, but I never expected it to be this tough. In fact, it was nearly catastrophic! Here's the short version of all that went down:

- ordered control rods on Internet, the shop sent the wrong ones,
- went to a local shop to get other rods, turns out they were too short!
- decided to use 1.5mm rod and Z-bend and collars; the Z-bender kept breaking the rod until there was only EXACTLY enough left...
- the collars wouldn't fit the wooden control horns, required rework,
- the servo wires are too short, but I only discovered that once mounted so it's too late to solder new ones into the servos - I'll have to use extensions...
- After struggling to mount the first servo, and finally getting it mounted, I broke the other servo horn, which you remember was epoxied into the elevon, so it was a mess to remove.
- I ran out of paint, so had to use other colors, almost the same, on the new replacement horn,
- Finally I managed to mount the second servo!
- I am feeling very run down... like I lost a war. The model is looking worse and worse.

So what happened?

I chose to mount the servos on double sided foam tape on the underside of the wing. This is what I usually do on foam planes and it works well. I reinforced the servo with a spot of hot glue just to be sure.

You may wonder how I managed to use double sided tape to mount a servo in a slot, since the tape cannot slide. Indeed, this requires a special technique. The way to do it is to first put the tape on the servo and dry mount it in the slot to be sure that it fits ok and the the horns and rods can be set up correctly. It should fit as tight as possible in the slot. Once you are ABSOLUTELY SURE it's ok, and I mean ABSOLUTELY SURE, since there's no undoing this next step without a huge lot of consequences...so once you are sure, you take the backing off the tape and lightly stick it to some baking paper, which is slightly waxed. You then slide the paper which is under the servo, and the servo into the slot, and finally gently slide out the paper holding the servo in place! Voilà you get a really solid mount that way, and one that can be undone if necessary.

I had to cut a new hole for the port side servo due to an error in the "untiled" version of the plans concerning the servo mounting holes in the engine tubes.

The little plastic servo horns were hand-drilled out to 2mm to accommodate the Z-bend. This went fine, but just as good weather brings rain, so bad times were coming... I used the hole that was second farthest from the servo axis to get good full throws. I dry mounted and tests the throws before drilling.

I had little collars to lock the pushrods and I tried to mount these on the wooden elevon horns but they didn't quite fit. After some screwing around, the starboard rod was mounted and the elevon was centered! I used thread-lock on the nut holding the collar.

All the testing measuring and breaking rods took a long time, hours and hours..

Then, I thought the starboard side would go quickly but not at all! I promptly broke the wooden elevon control horn and had to cut out the epoxy and horn to replace it. This left a huge hole, so I had to use hot

glue to fill it. But in hot gluing I tore off some paint and made some holes and cuts in the elevon's foam! What a mess, again!!! I felt like a small stupid child...

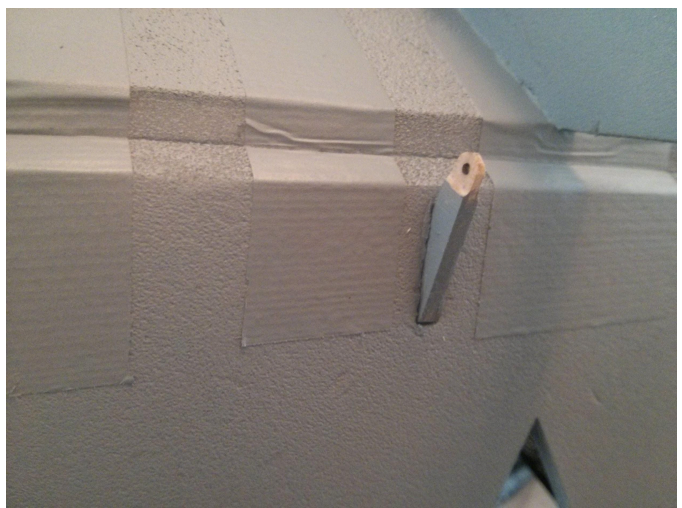
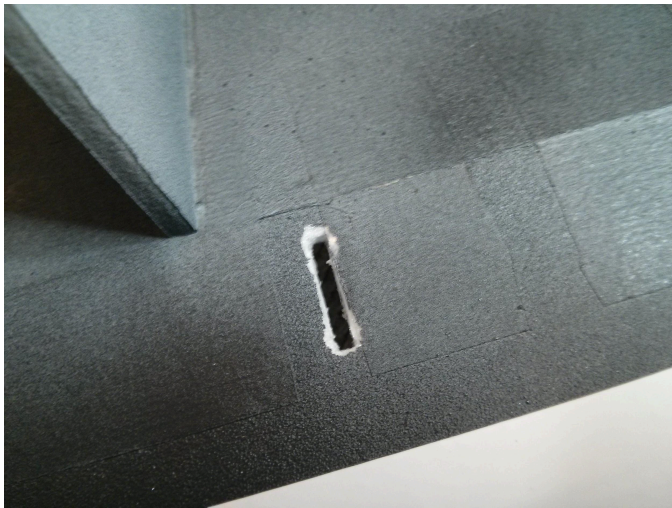
The model was degrading very quickly....

Nevertheless, after nearly 6 hours non-stop modeling, I had the 2 servos mounted and the control throws set.

What a nightmare and what a relief that it's done!

Here're the photos of the massacre! The only thing they don't show is my ever increasing despair as the model degrades, sniff... ;-)

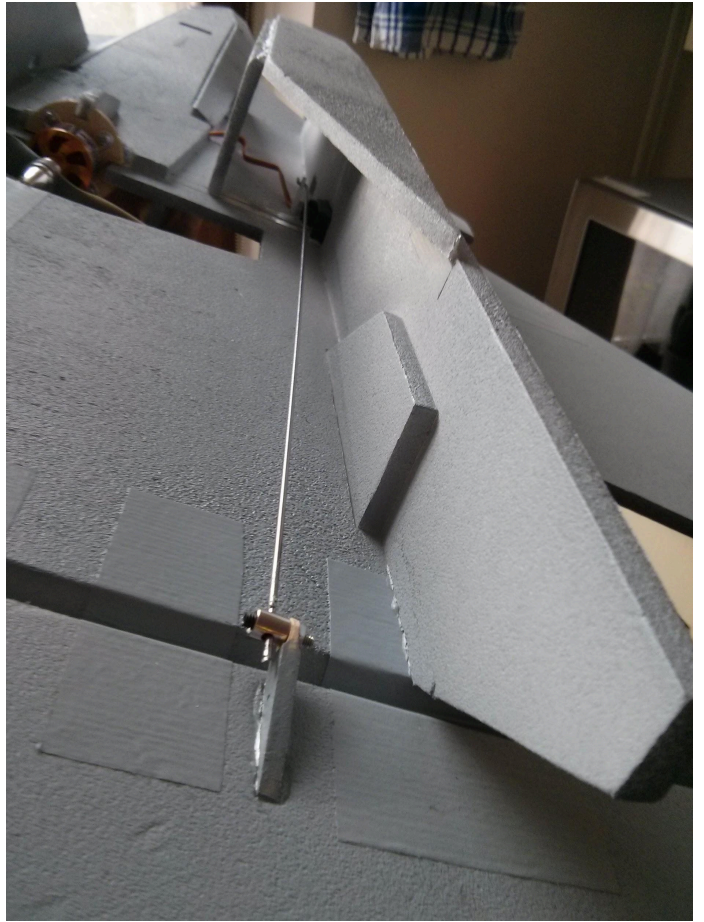
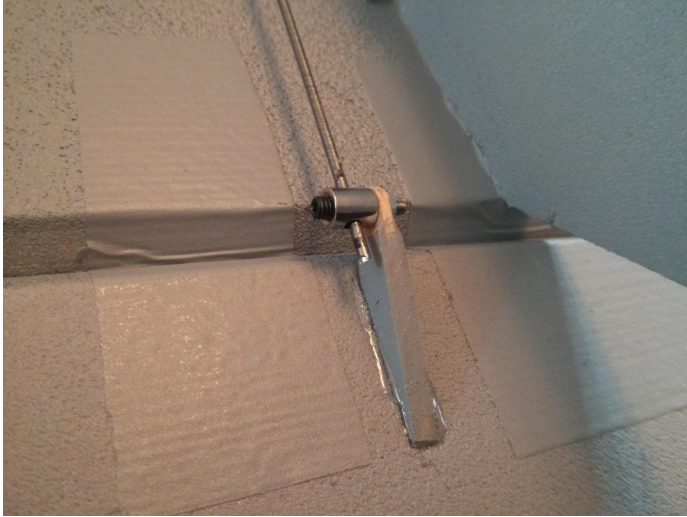
On the left below: the elevon slot after removing the Foam Tac'd horn; on the right the new horn on the bottom, where it should be!



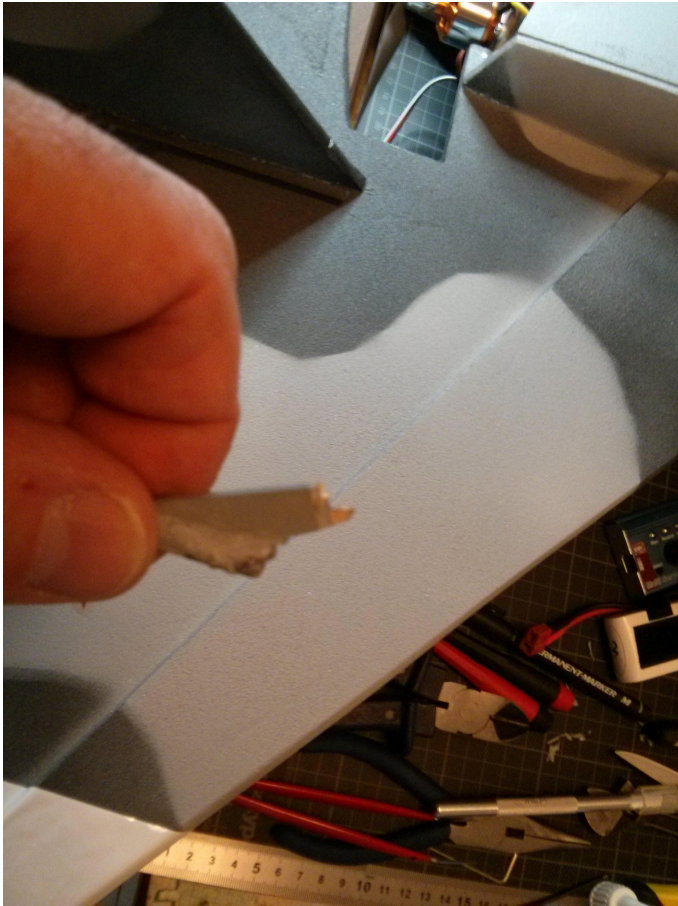
The Z-Bender - A Great Little Tool! and the Z-bend in action!



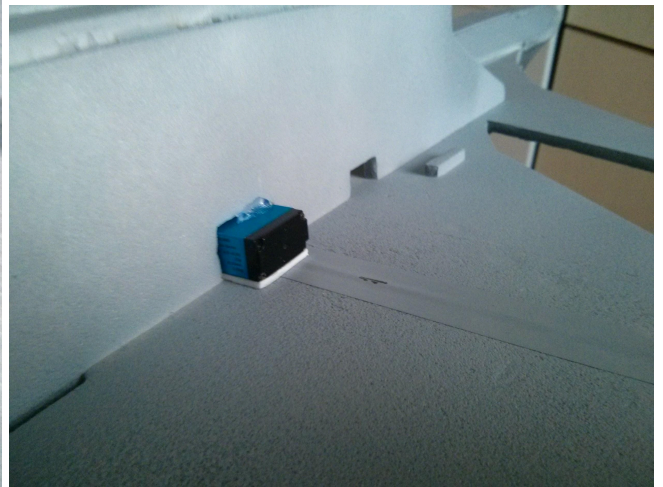
The control horn and locking collar!



The catastrophic broken horn and consequences!



And the repair: the final starboard elevon control assembly! On the right below, the servo mounted on the double sided foam tape with a drop of hot glue for good measure.



Flight Ready (RCPowers step 34 etc.) (2 hours)

As we last read, I was in a state of despair after all the problems and near disasters of the servo install.

Today, however, all that is changed into excitement as the Maiden flight is now next on the schedule.

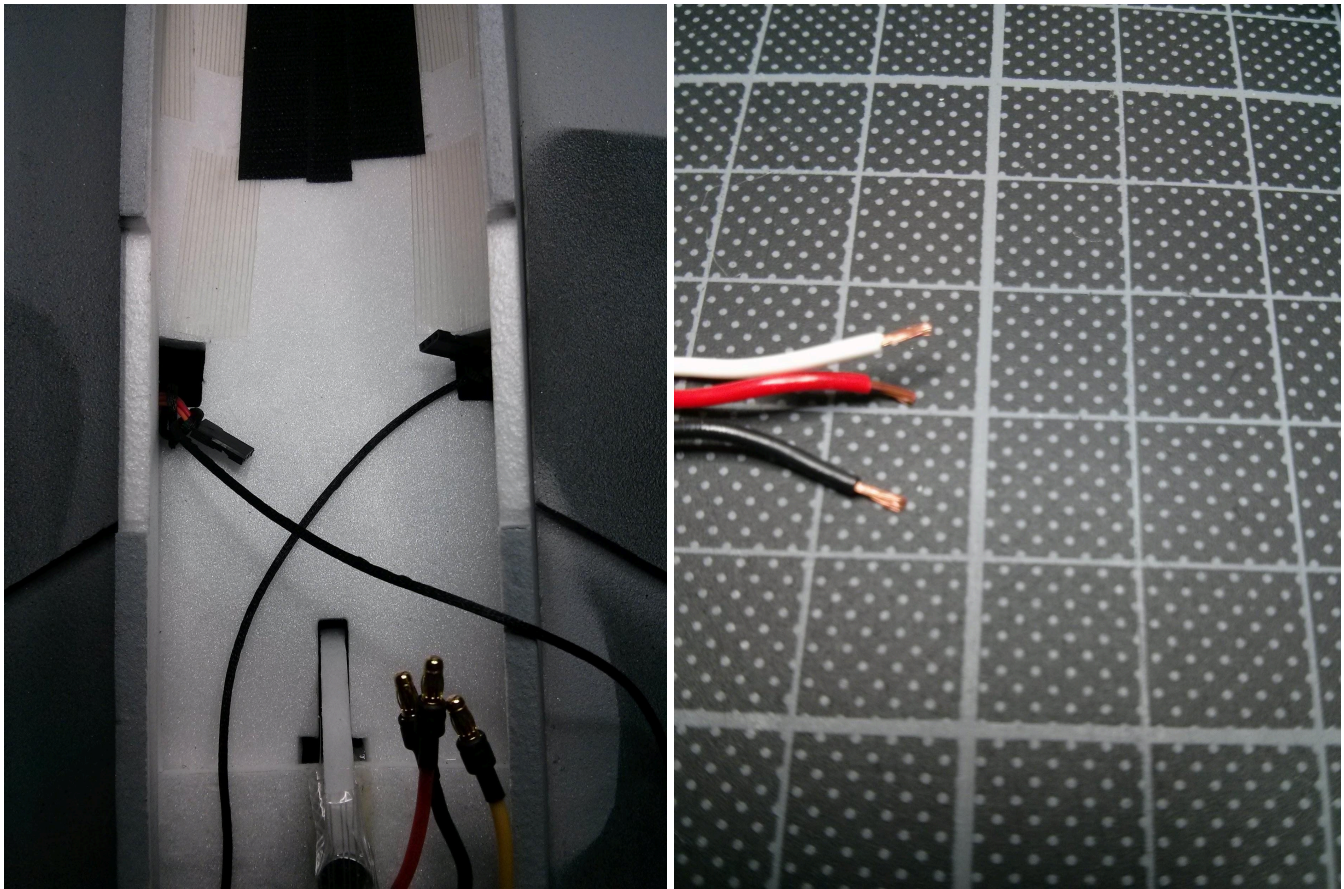
But what did I do then for 2 hours today? I didn't hurry, that's what is most important! Despite the excitement, I stayed calm and went through the list of things needing to be done, and then documented everything!

- I made some servo extension wires since my servo wires were way too short. I have a crimping tool to do that so I don't just buy those over priced pre-made extensions. This is easy and went well.
- I dry fit the ESC, RX, Battery (both 2200 and 1400mAh). I found that the CG could not quite be properly achieved, so I cut away some of the vertical top hatch support to allow the battery to be placed diagonally in the fuselage. This allowed for perfect CG fore/aft and Port/Starboard with both types of battery.
- I velcro'd down the ESC and RX and taped town the loose servo and ESC control wires.
- I checked the elevon throws for binding and set a tiny bit of trim to get it to what I think is neutral (but only the flight test will tell for sure).

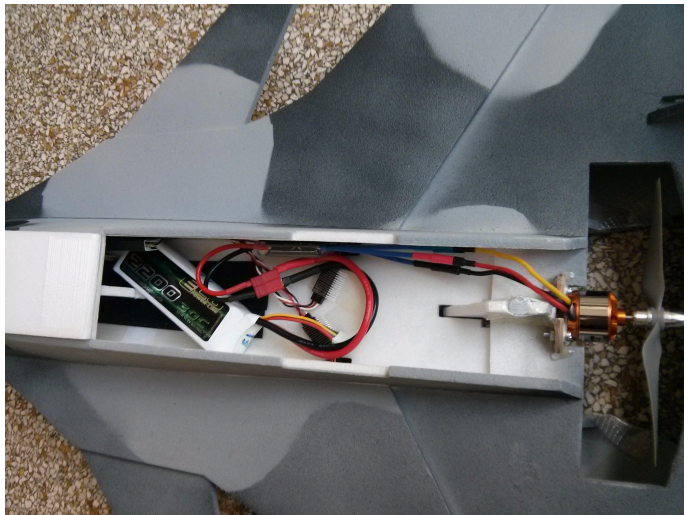
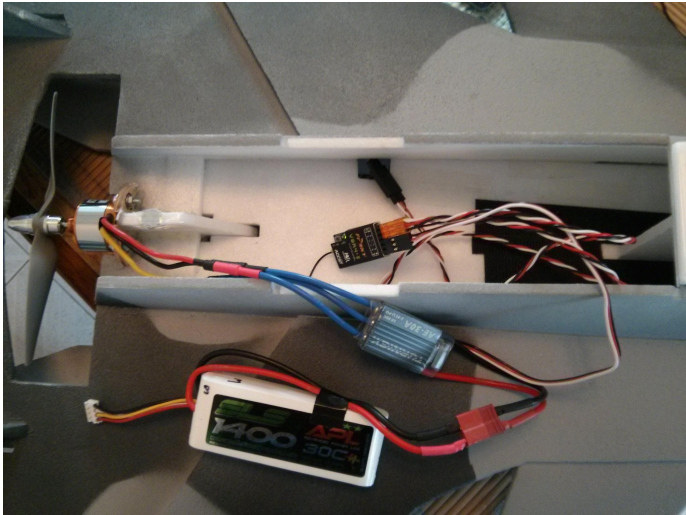
- I spun her up for a battery endurance test. With the 3S 1400MAh lipo, running at 1/3 throttle, 5 minutes left 60% battery capacity available. This allowed me to set my radio timer to 4 minutes flight. This will be adjusted after flight measurements.
- I put some strapping tape skids on the bottom of the engine tubes to prevent landing burn ;-)
- I weighed the plane: total mass 400g without Lipo, with 1400 mAh 520g and with 2200mAh 600g.
- I set up the radio with a nice image!
- I took some pictures to remember how she looked before the first flight!

Here are the pictures and details:

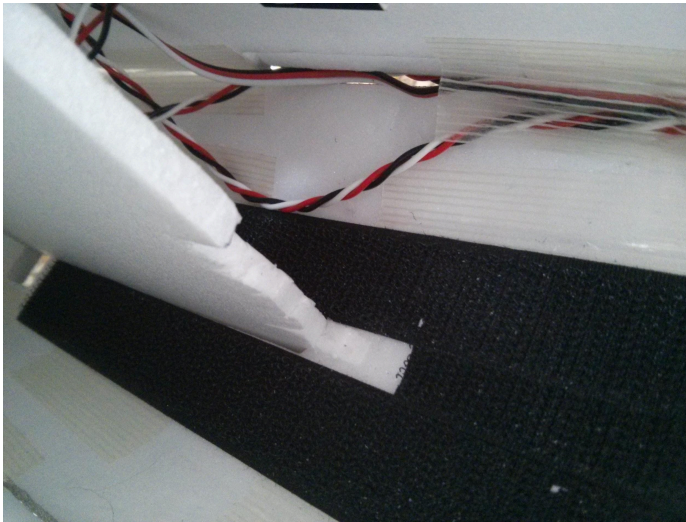
Left: Really short servo wires! Right: when preparing to crimp, strip only a tiny bit of insulation



Left: Dry fitting servo extensions rx, esc; Right: RX, ESC velcro'd in, 1400mAh battery won't quite fit!



Left: cut away some of the hatch support; Right: Prop spinning at 1/3 throttle.



Control Surface Check Model viewed from port side, forward is left in pictures
Left: Full Up Elevator; Right Full Down Elevator.



Left: Full Left Aileron; Right Full Right Aileron.



Note the mixing in the following 4 images!

Left: Full Up Elevator + Full Left Aileron; Right Full Up Elevator + Full Right Aileron.



Left: Full Down Elevator + Full Left Aileron; Right Full Down Elevator + Full Right Aileron.



Left: Spin 'er up! Right: Too cool for school!



Will it still look like this after the maiden??



Maiden Flight !!!

It was absolutely fantastic!!!

Check out [The Maiden Flight Video](#) !!!

Maiden Summary

Well sports fans, we're back with lots of good news about the plane SU-34, and continuing information on my stupidity.

First, I'll be up-front about it: on the 6th flight I crashed it. The damage was moderate but significant.

Next, a short summary of the first flights:

- First, flew with 3S 1400mAh SLS Lipo 120g, flight was perfect in all aspects: easy to hand launch, stable with hands off the stick, good roll rate, excellent climb, excellent glide, 4 minutes flight easily,
- then on a 3S 2200mAh SLS Lipo 200g. It was hard to get the CG exactly right because of the central pillar in the fuselage (see modifications below), but once found, it flew again great. This time we did some slow stuff and it could almost hover! Climb rate was good and roll too. 6 minutes flight very easily;
- Crowd pleasing and coolness were OFF SCALE! Everyone in my club stopped to watch it fly and give compliments! And these guys are all super expert pilots and builders! So that was fun, for an idiot like me...

Why the crash?

- late in the day, sun low behind the final approach,
- someone was standing in the middle of the runway, I took my eyes off the plane to see what he was doing,
- when I looked for the plane, it was only a tiny silhouette against the sun, I was disorientated, it was very low,
- wrong commands and it crashed nose first into the hard dirt of a recently plowed field, then it bounced up into some high wheat...
- 100% my fault!

Other issues:

- I was using a Hobbyking Turnigy AE-30 ESC but it turns out it was defective and was not supplying current regularly to the rx ! **I don't know why I bought ANYTHING at Hobbyking!!** - I have only had trouble with their electronics, and basically everything else. I only got it there because so many people say, "they've changed." Bull! HK has no quality control and I will never shop there again!
- to their credit, after only 90 minutes of online chat with the sales dept, they agreed to reimburse my \$12.75.
- I don't know how anyone gets anything to work from them!
- I will never buy a mechanical or electronic part from them ever again - If I do, please send ninjas to kill me because I will have become a danger to myself!

Modifications and Repairs (2 hours)

First, the central support for the top hatch had to be cleared out because it prevented the correct placement of the Lipo. I made 2 diagonal supports then cut it away.

Next, I added a velcro strap to better hold the lipo in place.

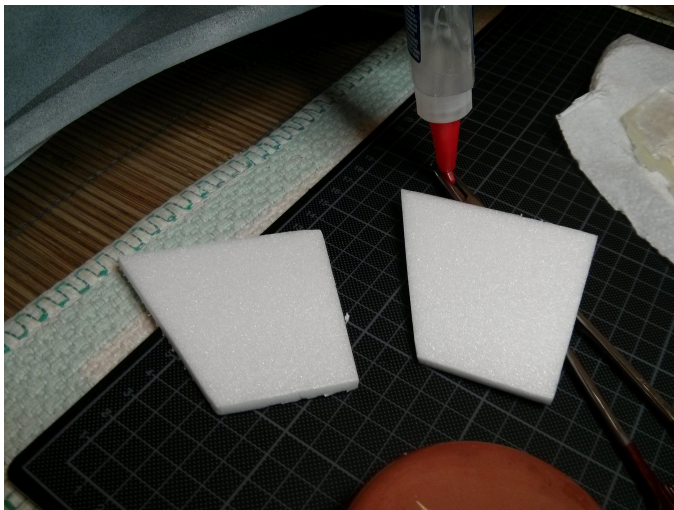
Next, I installed the new ESC and taped down the wires.

Next, I added some Foam Tac and strapping tape to the damaged canard.

Next, I began rebuilding the nose. This is still work in progress.

Then I went out flying... we'll see what happens!

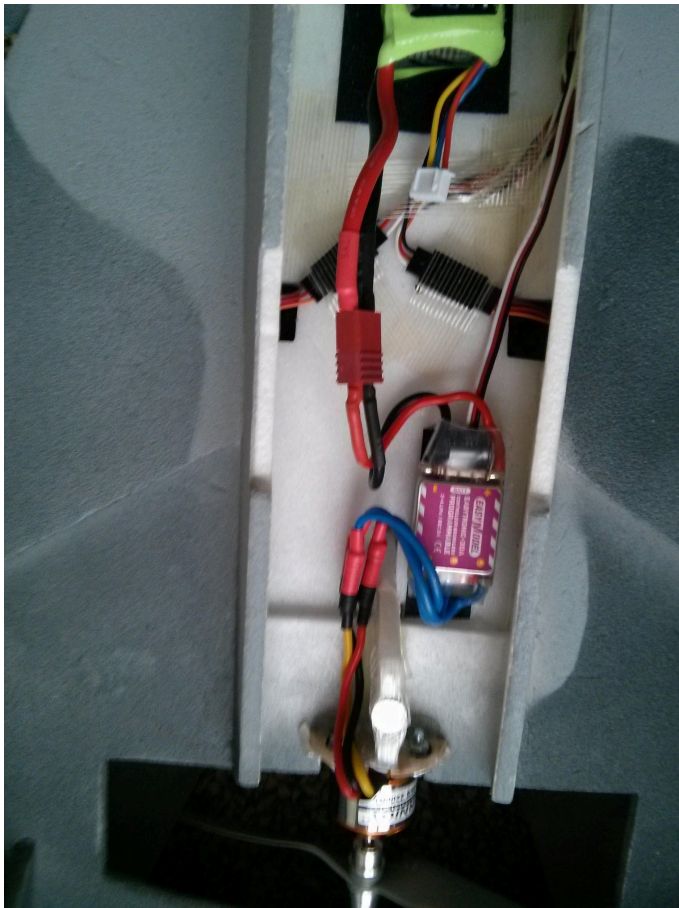
Left: hatch cover supports; Right: New hatch support with central support cut away



Left: Lipo strap seen from below; Right: Lipo strapped down, also diagonal supports and rx mounted



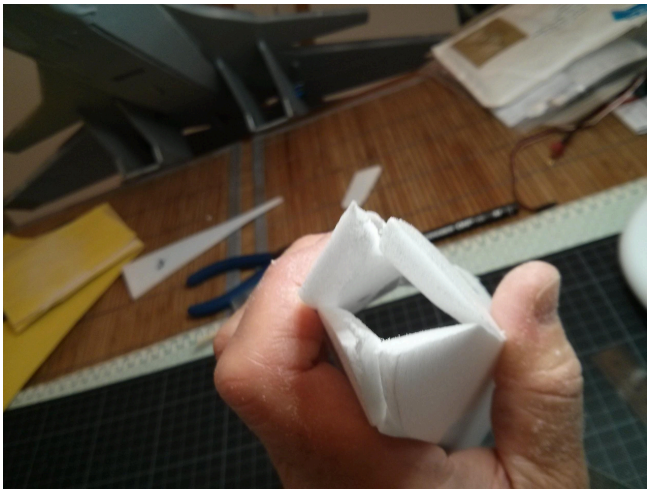
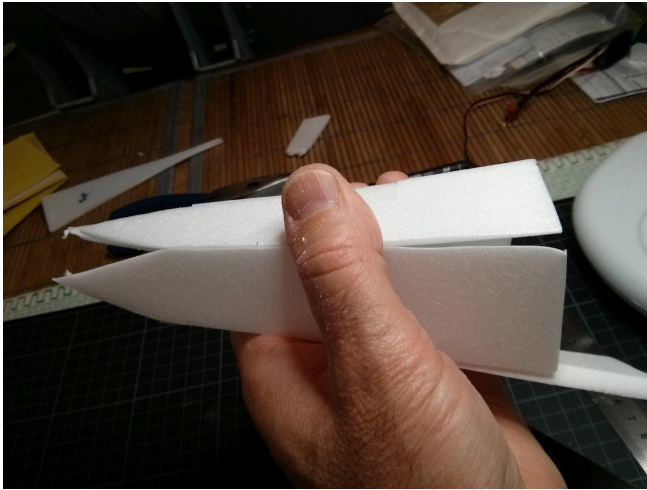
Left: inside the fuselage; Right: canard repair from above



Left: canard repair from below; Right: nose after crash



Next 3 pictures: various views of future replacement nose.



More Flights - no crashes!

A flight with a landing at the end - that's my kind of flight!

I've been out there flying this bird and she's great! I can easily get 6 minutes of flight on my old 3S 2200mAh Lipos and that is a blast.

Hand launching is easy as pie - no torque roll no instability - just perfect! I launch at 1/2 throttle but maybe that's a bit much.

I'm starting to get her dialed in: launch with 85% throws, normal flight with 100% throws, 25% expo, but that is too much I think. Landing is a breeze!

What a great plane!

In the Meantime, I made a Bungee Catapult (off subject)

Yes, I finally finished my [JBC Bungee Launcher](#)!

Here's a [video of the first launches](#) of my Multiplex Twister.

Here's the link to how to build this launcher which in my opinion is the simplest and best on Internet!

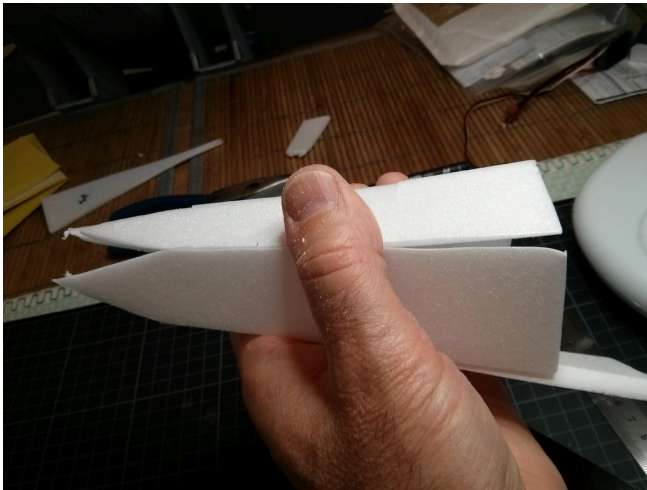
And yes, I realize that this has nothing to do with the building of an RCPowers SU-34 V4 ;-)

A New Nose (3 hours)

Well, it's been a while since I looked at this poor plane. Being retired, I took a couple months off and enjoyed some good times in the South...

But you want to hear about the new nose! Here's where you can see the real beauty of building in foam! Repairs are easy!

As you remember I had previously cut out a new nose:



Now I had to put it onto the model.

The first thing to do was glue it together using my favorite glue: Foam Tac.



Then, I put a reinforcement inside, just like in the original.



Then, I carefully cut the crushed old nose off the plane using a fresh scalpel.



I made the first cut after measuring as best I could. I then had to make some slight adjustments, but a few minutes later it was pretty darn good.

I then Foam Tac'd it onto the the fuselage! It looked pretty cool and was solid!



Next, I added a little strapping tape to reinforce the structure.



And finally, a little spray paint and it's as good as new!





After the paint dries, I'll put some white tape on the topsides and black on the bottoms just to match the rest, then off to fly it some more!

Voilà: RTF !



What a great plane!

Next, more on stuff that may happen - stay tuned!.