3D LabPrint

User Guide

rev. 2018/05

Fully 3d printable

Aichi M6A1 Seiran / Nanzan

scale 1:12, wingspan 1070mm (42.1in)

Aichi M6A1 Seiran / Nanzan

– fully printable R/C plane for your desktop 3Dprinter

Future of flying - Print your own plane.

We are always trying to push our limits and move things further, so every new project is full of improvements for better durability, easier assembly, better geometry solutions and so on. We are passionate about our products and hope you enjoy using them as much as we enjoy developing them, although this print may test your competencies and quality of your printer (welcome to thin wall printing)

The first fully printable airplanes with files prepared for your 3Dprinter, with flight characteristics, comparable or even supperior to classic build model airplane. This is not a dream, now you can print this HI-TECH at home. Simply download and print the whole plane or spare parts anytime you need just for a cost of filament only about $18

Extensive hi-tech 3d structural reinforcement making the model very rigid while maintaining a lightweight airframe and exact airfoil even it's just a plastic. This perfect and exact 3d structure is possible only thanks to additive 3dprinting technology. So welcome to the 21st century of model flying and be the first at your airfield.

Easy to assembly, you don't need any extra tools or hardware, just glue printed parts together and make pushrods for control surfaces. The rest of the assembly is very easy. Simply add brushless motor, ESC, servos and radio system. Don't worry, detailed step by step PDF/VIDEO is included.

You'll get a superb performing airplane with highly efficient powerplant capable of flying 7+ minutes at full throtle and speeds exceeding 110 kph (HP setup). Low stall speed is achieved for easy landing on the other hand.

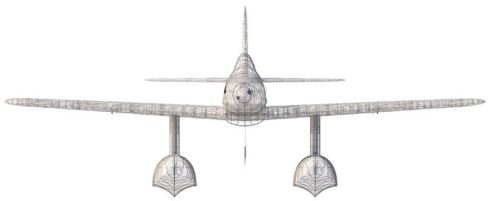
Versions:

Aichi M6A Nanzan

- simpler variant suitable for flying on the grass field means lot of fun. No floats, no rudder, rubber rings for fixing the wing. (many times tested in ACES aircombat)

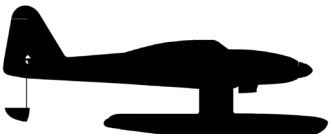
Aichi M6A Seiran

- full and complex version of plane for water take off and landing.



General specifications (HP setup):

Lenght:	910 mm (35,8 in)
Wingspan:	1070 mm (42.12 in)
Height:	380 mm (14.9 in)
Wing area:	22.8 dm2
Wing loading:	66.6 g/dm2
Center of gravity:	74 mm (28,9 in) from leading edge
Airfoil:	LHK508
Print weight:	918 g
Empty weight (w/o battery):	1220 g (920g Nanzan)
Takeoff weight (3s 3000 lipo):	1520 g (1220g Nanzan)
Max takeoff weight:	1800 g
Never exceed speed, VNE:	170 km/h
Design maneuvering speed, VA:	150 km/h
Stall speed, VS:	34 km/h

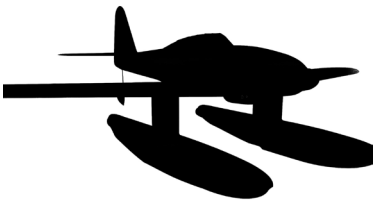


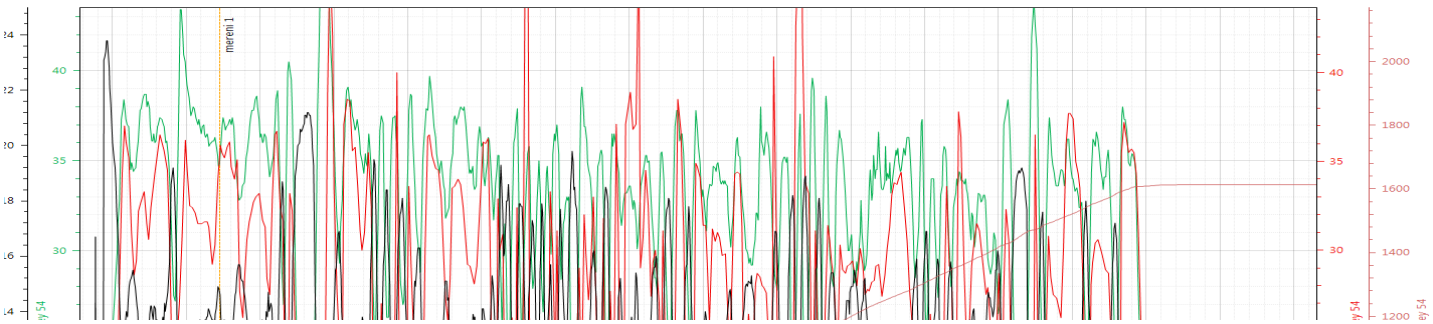
Powerplant

Propeller:	Aeronaut ELP 9x6 or APC 9x6 – 9x7
Motor:	Turnigy D3530/14 1100KV or similar
ESC:	30A Electronic Speed Controller or similar 30-40Amps
Battery:	Li-Pol 3000mAh/3s (11.1V), 238g, 25C

Performance measurement

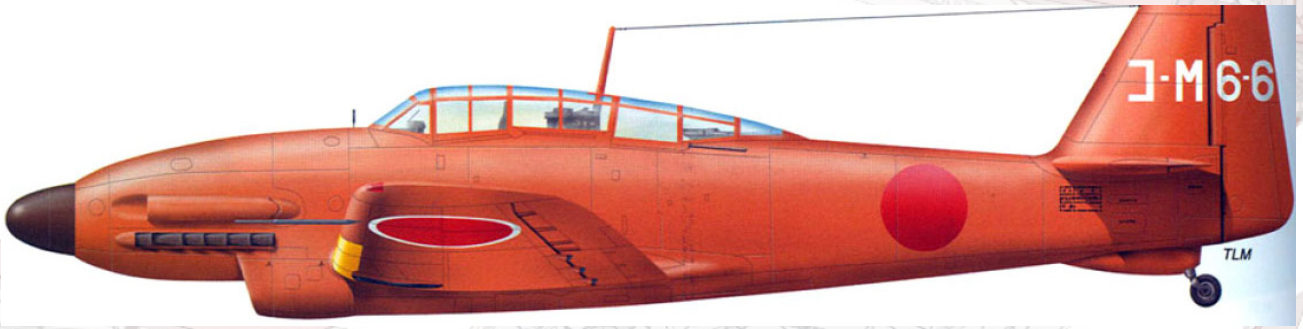
Max speed VH (level flight):	105 km/h – 56.7kn – 65.2mph with APC 9x6
Rate of climb:	20 m/s (5 373 ft/min) with APC 9x6
Flight time (3s 3000mAh/full):	7:40 with APC 9x6 5:30 with APC 9x7.5 7:40 with aeronaut ELP 9x6





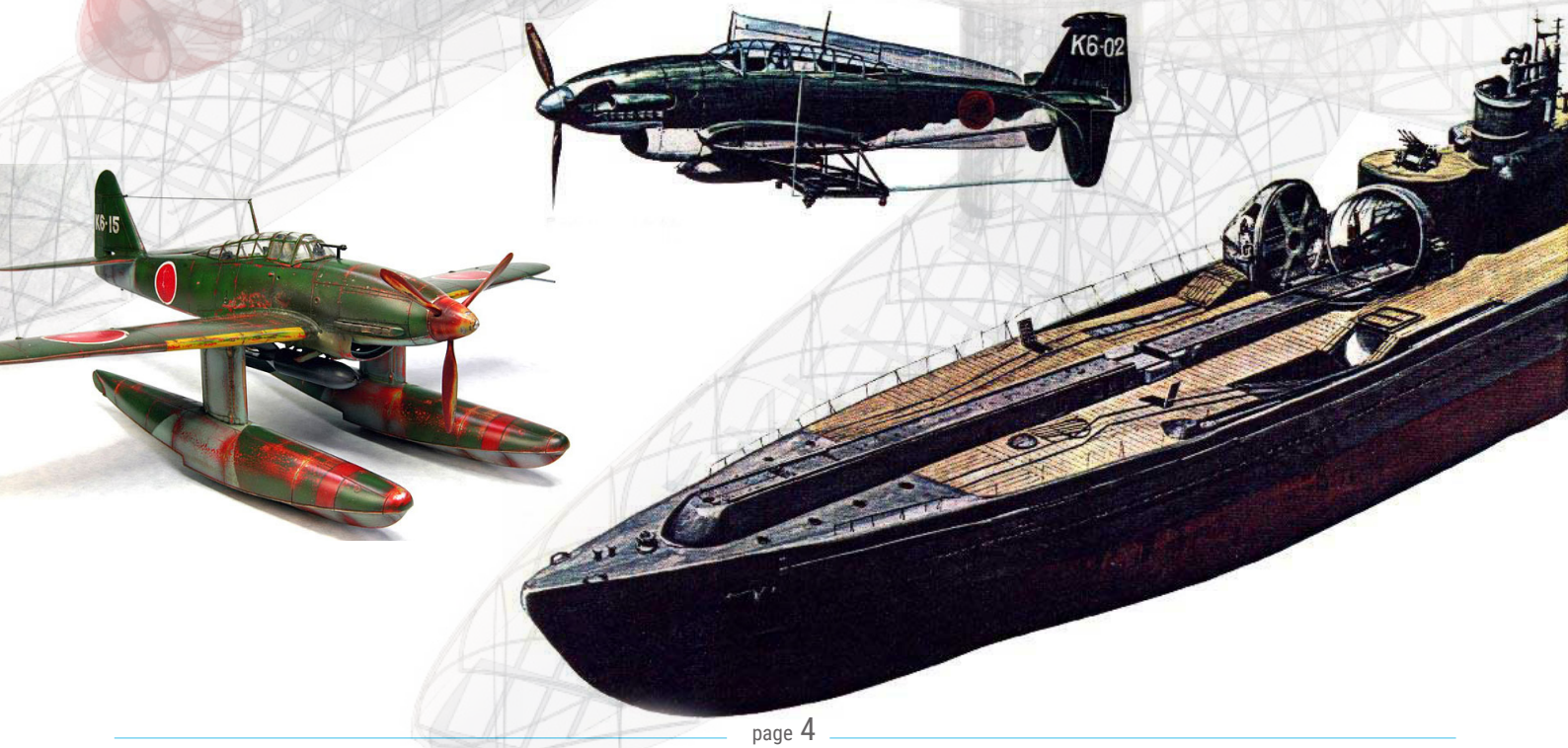
Aichi M6A1 Seiran / Nanzan, History

To equip the submarine aircraft carriers, the Imperial Japanese Navy Air Service requested that Aichi design a folding attack aircraft with a range of 1,500 km (810 nmi) and a speed of 555 km/h (300 kn).



The first production examples of the Seiran were completed in October 1944. Construction of the STo submarines and airplanes was stopped in March 1945, after two submarine aircraft carriers had been completed and a third finished as a fuel tanker.

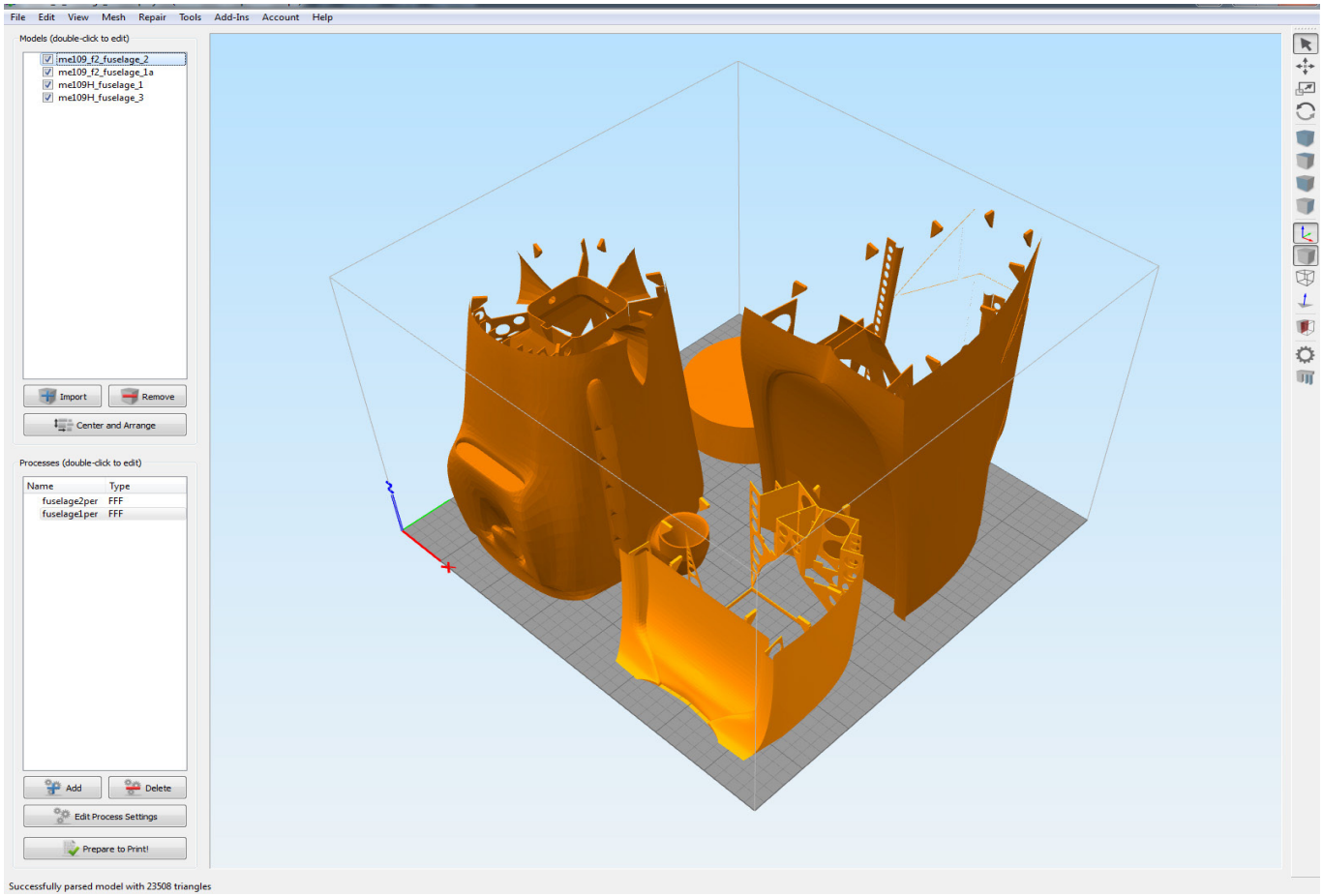
The first mission of the Seiran squadron was to be a surprise air strike on the Gatun locks of the Panama Canal, to cut the main supply line for US forces in the Pacific. When the force was finally ready to set off on their mission against Panama, Japan's increasingly desperate situation led to a change in plan, with the target for the attack, called Operation Hikari (Splendour), being switched to the American base at Ulithi Atoll where forces, including aircraft carriers, were massing in preparation for attacks on the Japanese Home Islands.



Included:

1. STL 3d files

Universal STL files designed to be used with desktop FMD 3d printers and slicer software as Simplify3D (recommended), CURA or MatterControl (these STLs are not compatible with Slic3r).



2. Factory files for Simplify3D slicer

contains all the necessary settings to slice the models along with suggested bed layout. We're using PRUSA i3 ORIGINAL printers so you may need to adjust the basic printing parameters to match your printer or use these files as a start point for you. Please check the Simplify3D

3. Step By Step PDF/VIDEO userguides

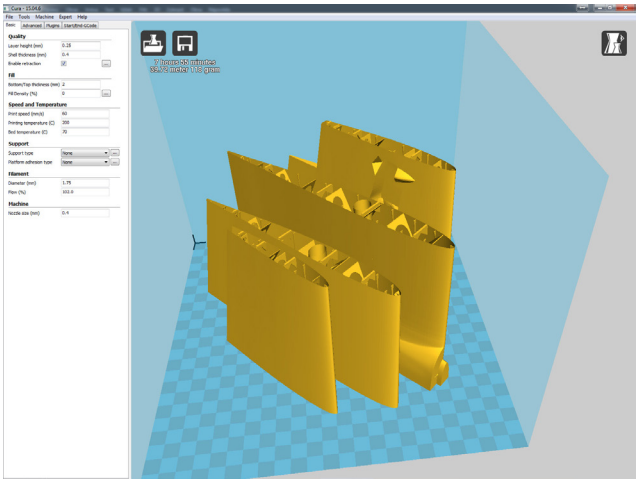
Apart from this userguide, please see the Printing Guide to find some Tips and Advice for airplane printing (Thin Wall Printing).

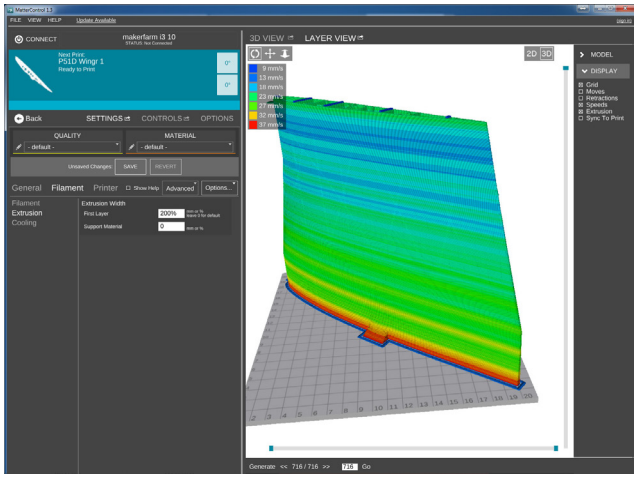
4. Gcodes

Basic Gcodes prepared for direct use, as universal as possible. Should work on i3 style printers, Give it a try, but we can't guarantee that it will work on your printer. You can also easily adjust the retractions if necessary using our guide. 100% compatible with PRUSA i3 ORIGINAL 3d printers.

5. Prepared settings for CURA and MatterControl slicers

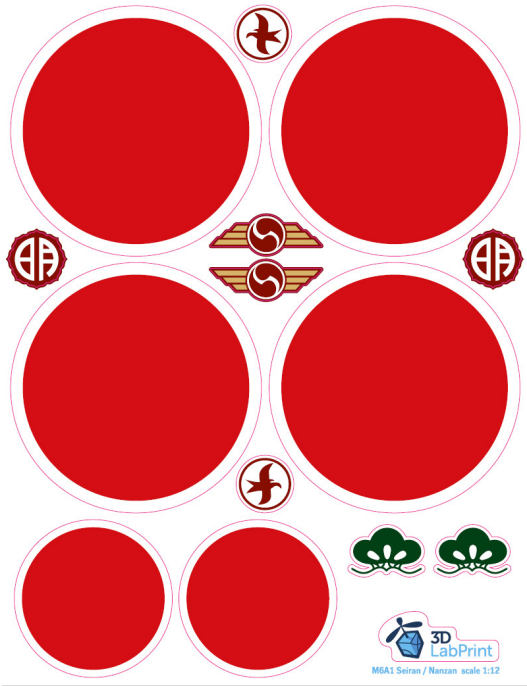
If you for any reason don't like Simplify3D, there is always option to use another free slicer you can use our basic setting (setting files) as a start point and edit it as you need.

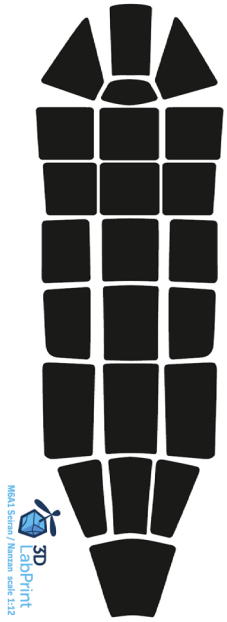




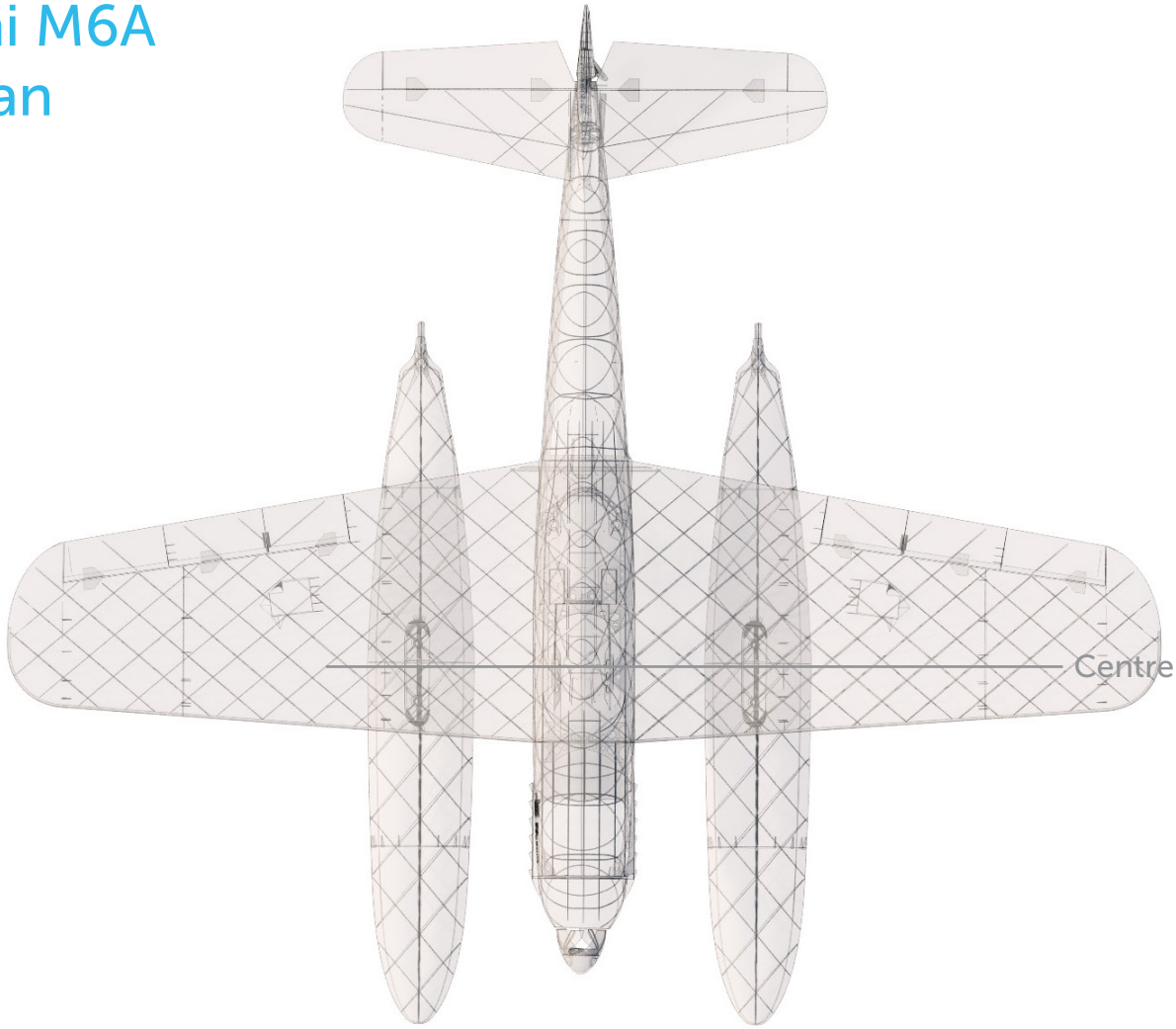
6. Scale markings PDF

Print this PDF in scale on thin self tape advertisement foil and place it on the model as needed, violet cut lines included.





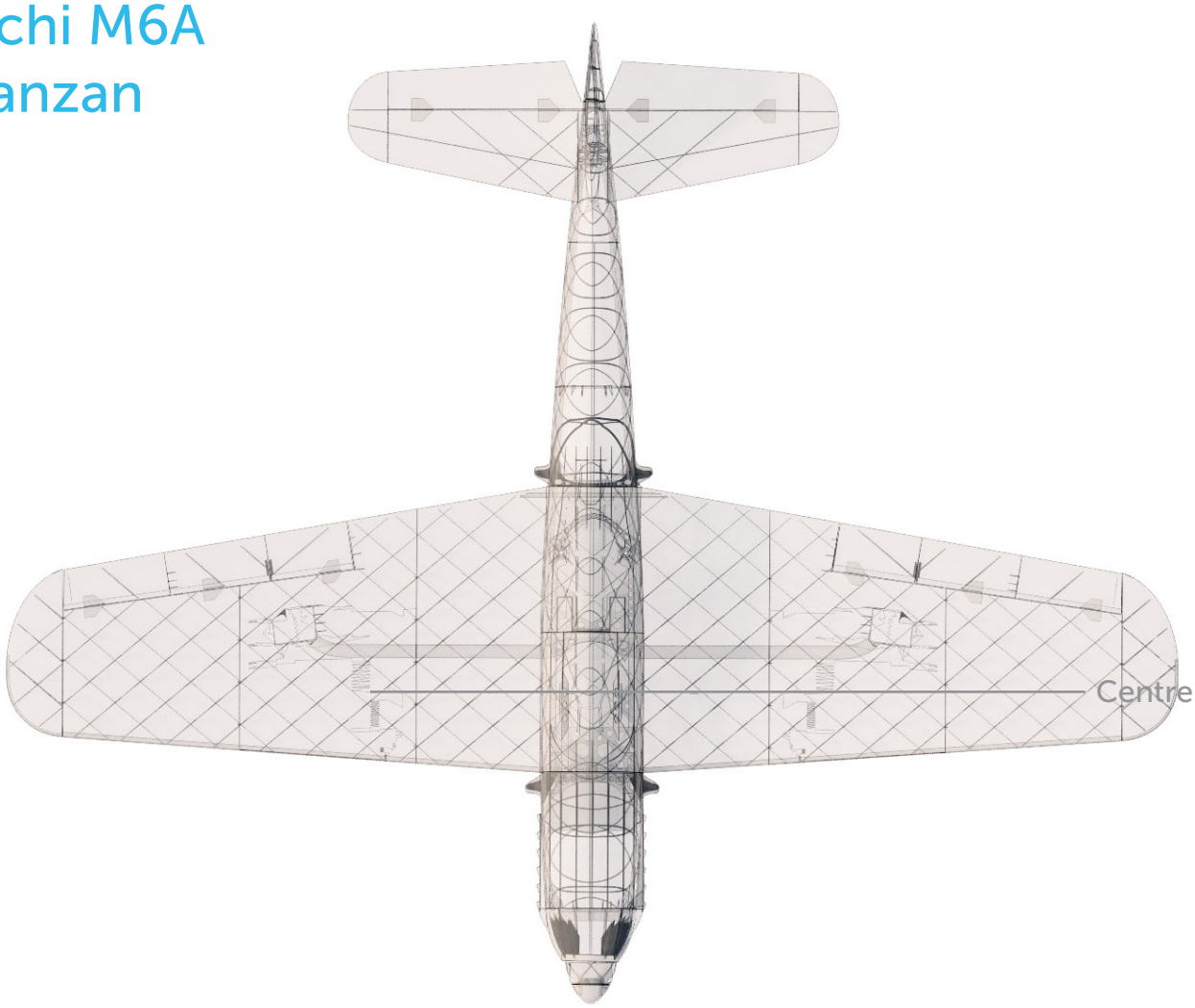
Aichi M6A Seiran



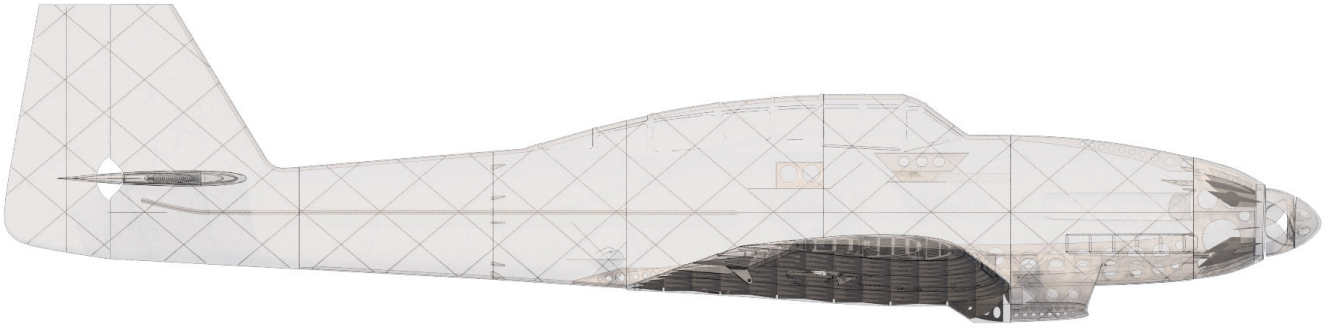
Wing area: 22.8 dm2

Lenght: 910 mm (35,8 in)

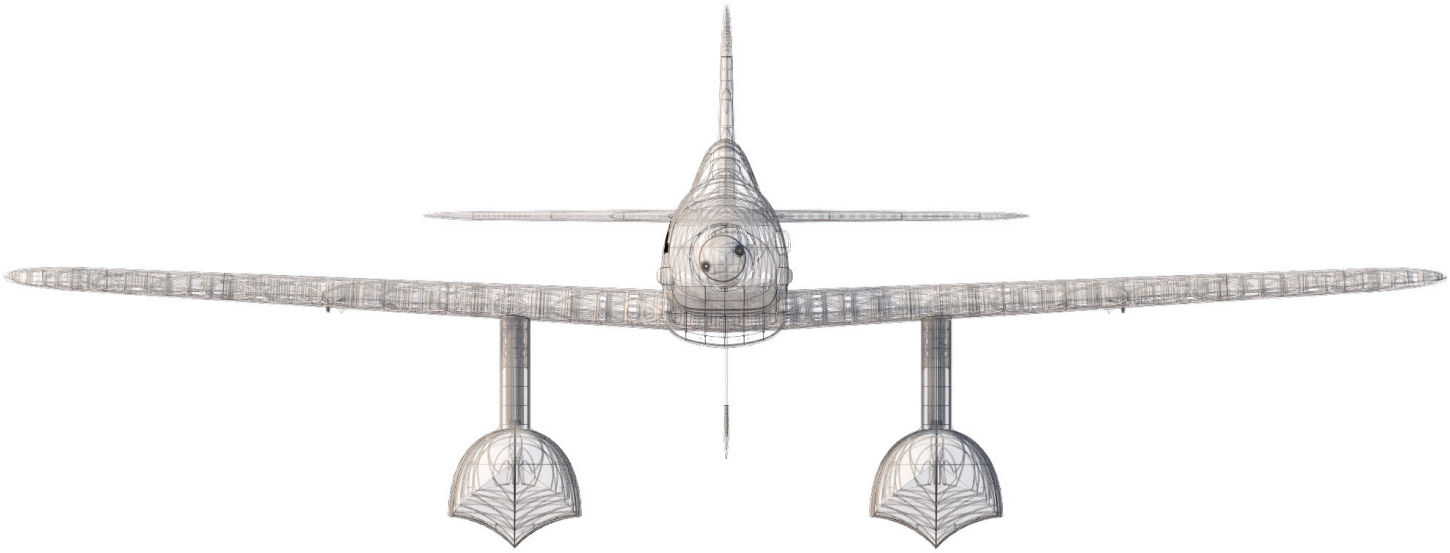
Aichi M6A Nanzan



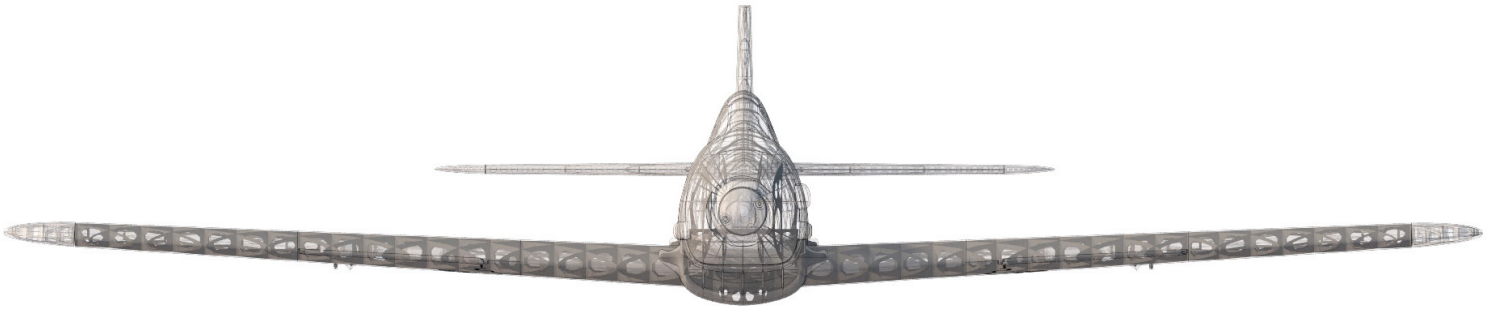
Wing area: 22.8 dm2

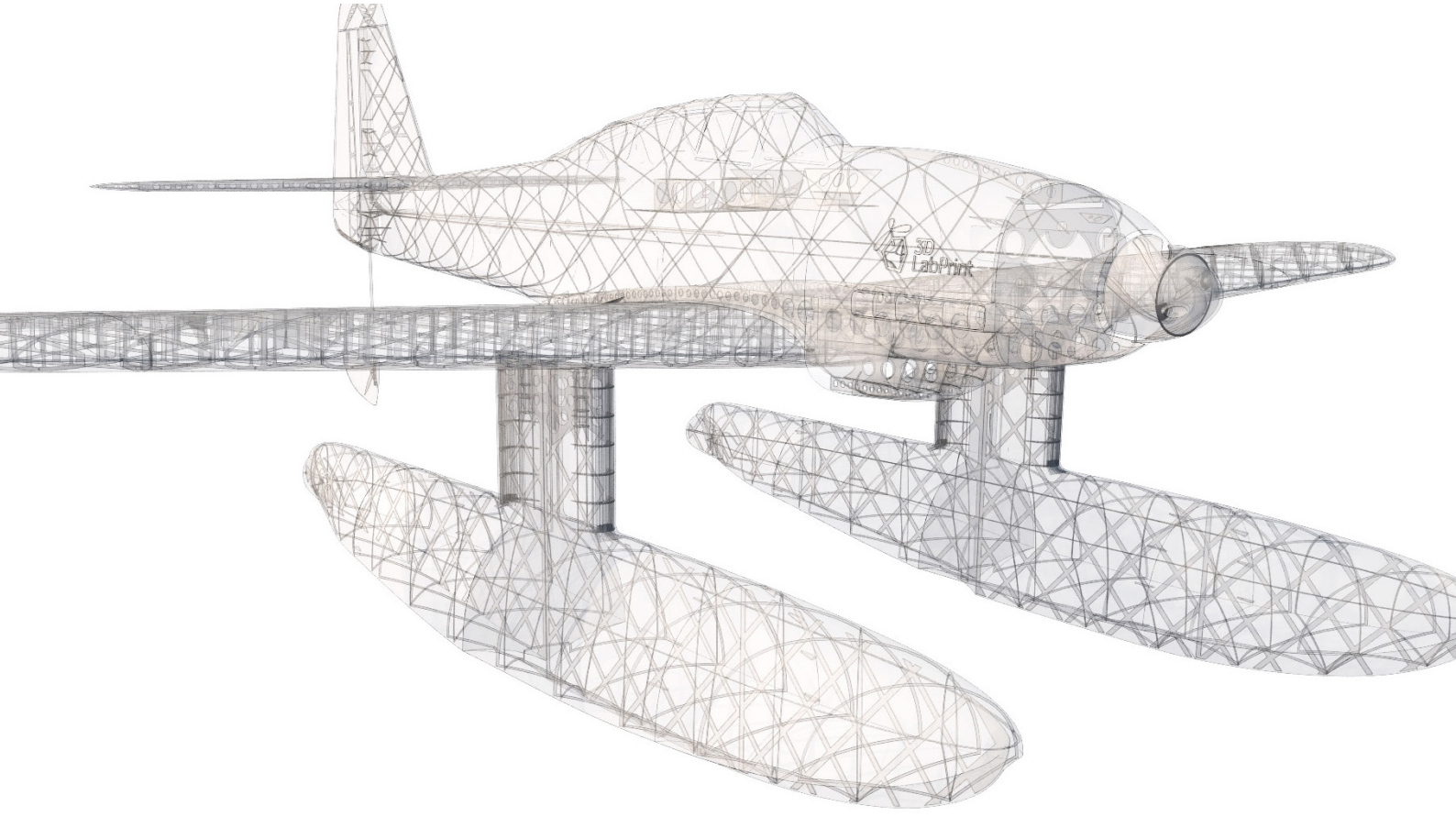


Lenght: 910 mm (35,8 in)



Wing span: 1070 mm (42.12 in)





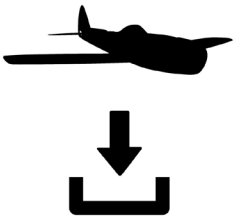
Step By Step PDF/VIDEO userguide

1. Choose airplane at www.3Dlabprint.com, visit our Facebook for latest info.

Basic requirments for Aichi M6A SEIRAN are 200/200/185mm volume (or 250/120/185), nozzle 0.4mm recommended (0.35 or 0.5mm alternativelly). Heated bed recommended.
PLA filament (or PETG, APLA, htPLA, PC-max....) not ABS
If you want to try first, you can download wing test part from our websites or thingiverse, (the biggest part). Or contact support@3dlabprint.com

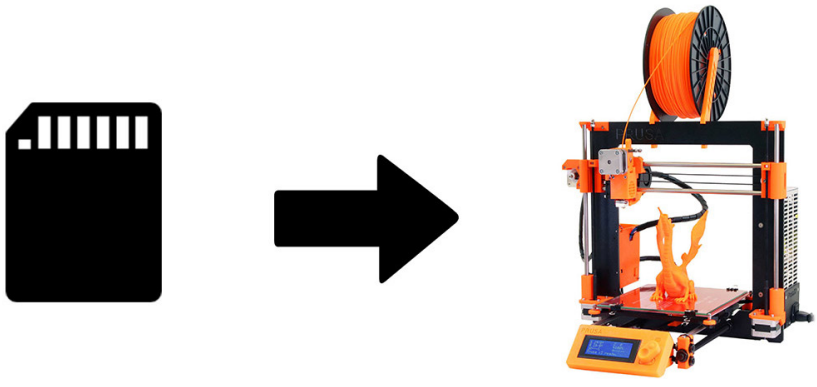
2. Create account, download

You will receive download link to all the zipped files to your email (please check your spam folder if not) or you can log in to your account and download directly from our websites.



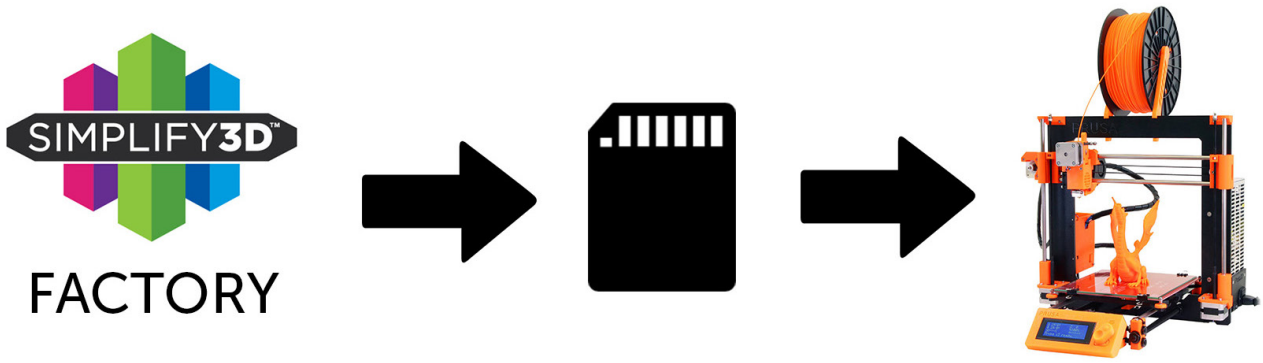
3. Gcodes preparing

option A Gcodes:
if your printer is i3 comptatible you can use prepared gcodes directly. Just save them to the SD card and let the 3d printer do it's job. HE temperature is set to 230°C so the layers well fuse together, you can adjust speed and temperature only through your printer's LCD. If these Gcodes does not work for you, please proceed to the next options.



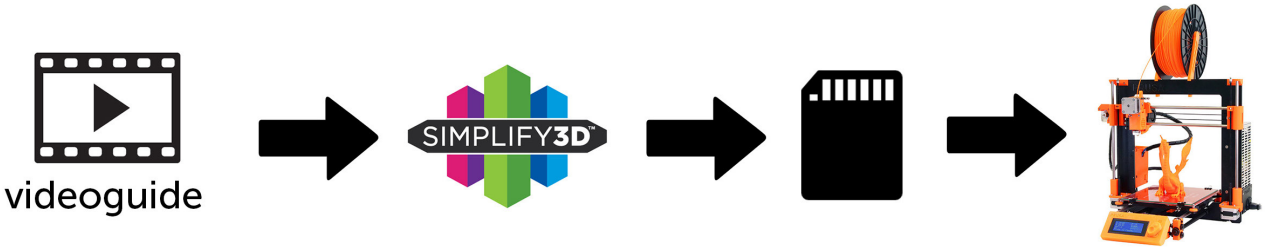
option B Factory files Simplify3D (recommended)

We prepared all you need in these files (FFF process settings, parts layout on bed, etc...)
You can use these settings as a start point adjusting according to your need (adapt for your printer), print single parts you need and so on... Most 3d printers should work just with these settings, but please go through the settings and amend if necessary, we are not liable for any damage resulting from using our settings. If this still does not work for you, please proceed to the next option.

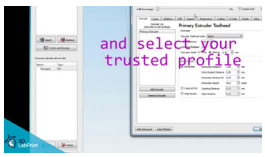


option C Simplify3D manual setting (watch and learn)

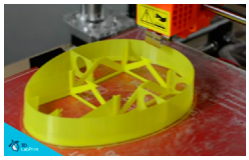
Use our video guide 2 for proper setting... this is very good option and you will learn a lot about Simplify3D and become an 3d printing expert. Of course you spend a lot of time and youtube pause button will become your friend.



AND... please watch our VideoGuides:



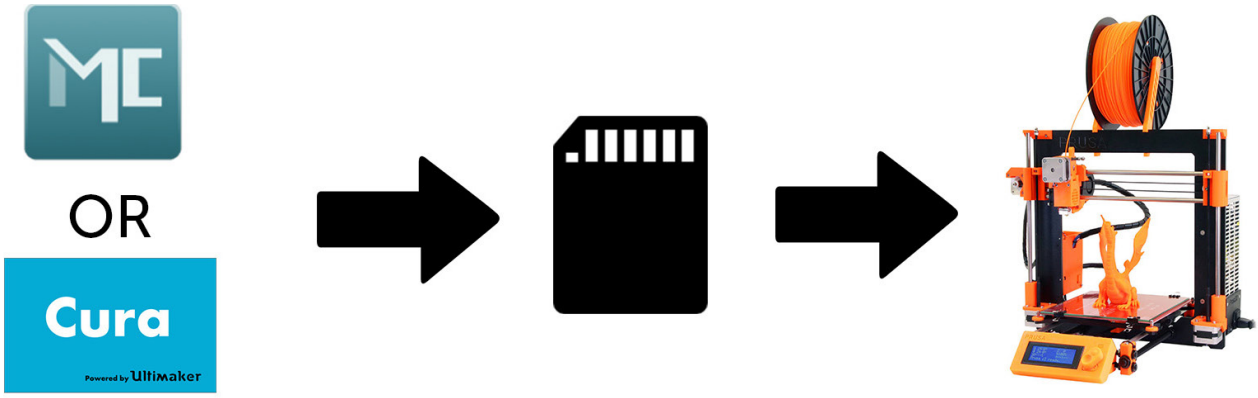
video 2 Simplify3D setting



video about Thin Wall Printing

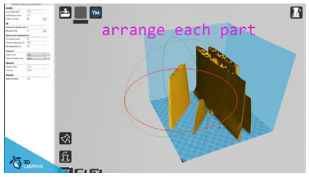
option D CURA or MatterControl

MatterControl and CURA are free and provide good results. The airframe is still strong enough, but don't expect the best quality. Both slicers lacks some very useful features, and finer settings, like multiple processes according to Z height, retraction options, layer start, etc. Please try to find the best extrusion multiplier and temperature for good weight and best
possible layer bonding. Look at parts weight list for proper multiplier settings.
As a starting point you can use our predefined CURA or MC slicer setting file included in the package (always adapt it for your printer, change build volume, filament diameter, etc... according to your printer!!!)

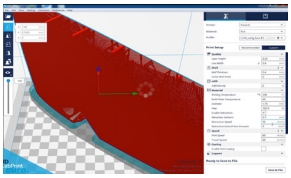


CURA_wing_fuse.ini (wing and fuselage and so on... parts)
CURA_ailer_elev.ini (only ailerons, elevator and rudder parts + fuselage 7)
CURA_thick.ini (motor mount, battery holder, spinner)
OR
MC_wing_fuse.slice (wing and fuselage and so on... parts)
MC_ailer_elev.slice (only ailerons, elevator and rudder parts + fuselage 7)
MC_thick.slice (motor mount, battery holder, spinner)

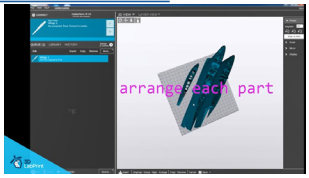
AND... please watch our VideoGuides:



video CURA slicer setting



CURA 2.3.1 import setting



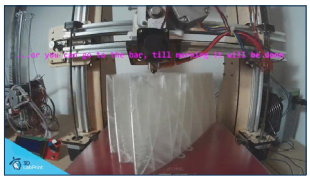
4. Print it

Save the Gcodes to the SD card and insert into your printer. Prepare your printer and start printing, we prefer to use SD than direct USB connection. Note: ABS filament is not suitable for thin wall printing. Scaling the model will lead to unusable result!

Video guide about printing
you will need: PLA filament - good quality and strong PLA (we need good layer bonding)
Strong hair spray (or your favorite adhesive bed surface)
Razor blade

AND... please watch our VideoGuides:

video printing guide



Basic Tips and Advice

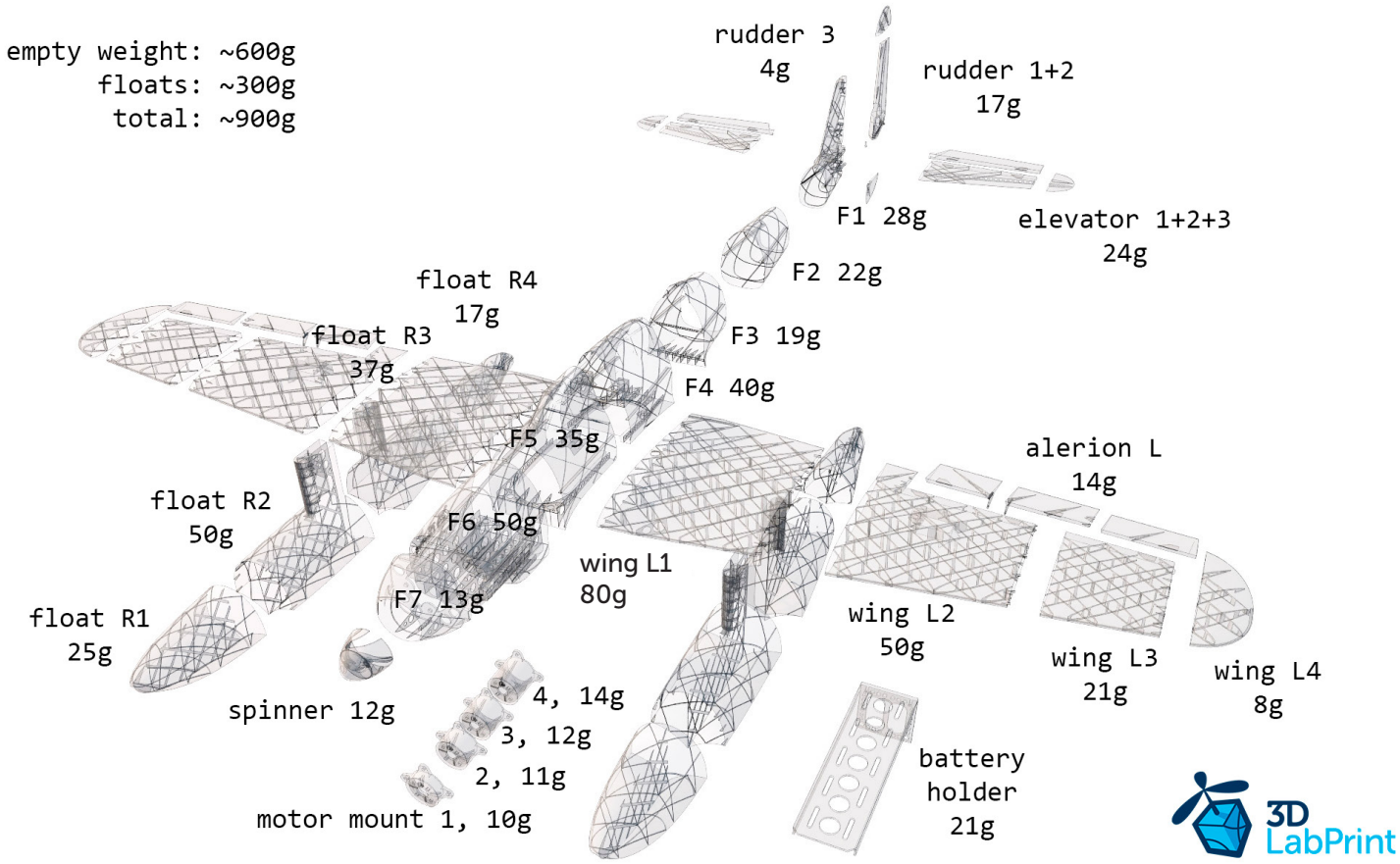
Please Experiment with your extrusion multiplier.
Also HotEnd temperature is very important for strong result, please try increasing the temperature to find the best value (200° up to 260° celsius).
Turn OFF cooling fan for better layer adhesion (HE fan should be ON). We dont need it for thin wall printing. We tried many kinds of filaments and despite it's lower thermal resistance the PLA is still the best choice.
Feel free to experiment with PETG, PC-max by Polymaker looks promissing.
Heated bed is very recommended, 60-70° Celsius (to prevent warping ends).
Looks like any standard quality PLA is good for our planes, but the combination of PLA vs. Extruder vs. HotEnd is what matters the most.
We find some filament colors could have lower layer adhesion and lighter colors doesn't heat so much on the direct sunlight.
Many 3dprinters are on todays market, most of them are capable of printing our airplanes (specific thin wall printing...) suficient volume, heated bed, 0.4mm nozzle.

Please see the Printing Guide:

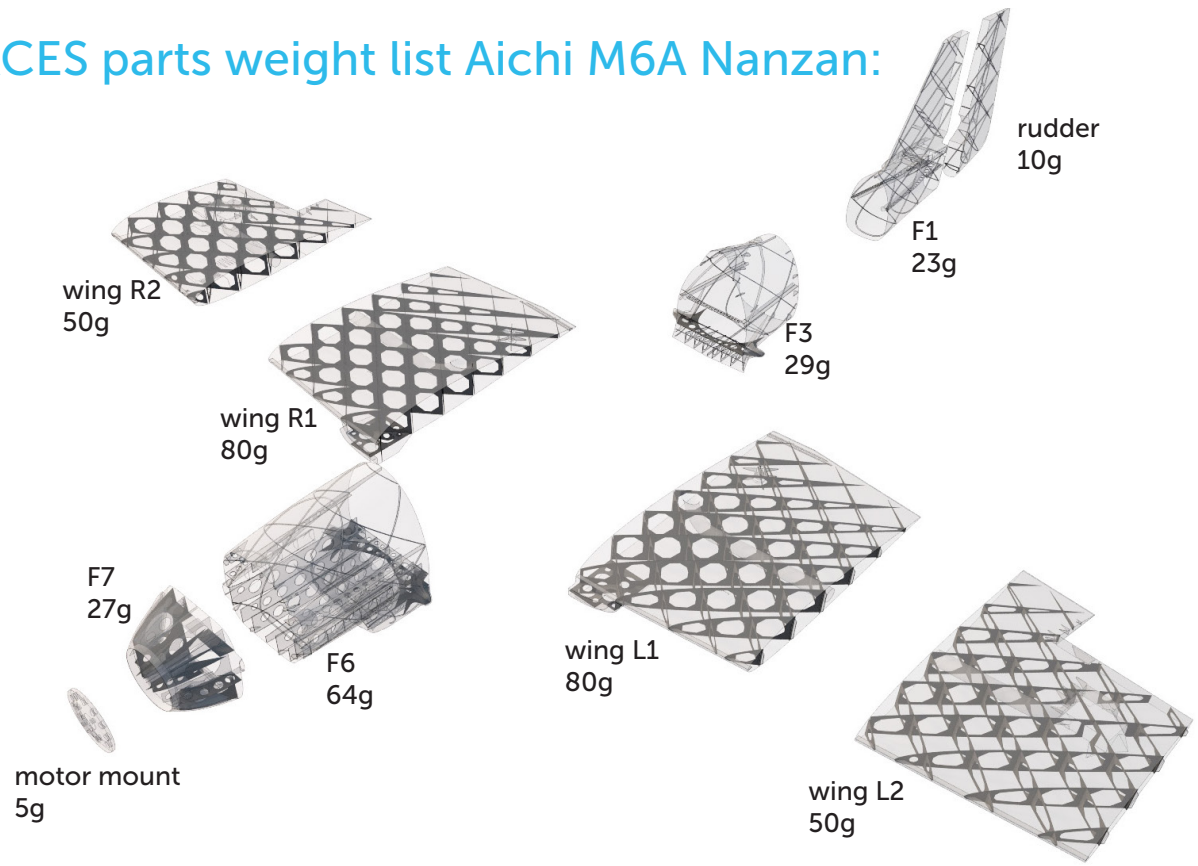
Look at website or Included PDF file
in your downloaded package.

Main parts weight list Aichi M6A Seiran:

empty weight: ~600g
floats: ~300g
total: ~900g



other ACES parts weight list Aichi M6A Nanzan:



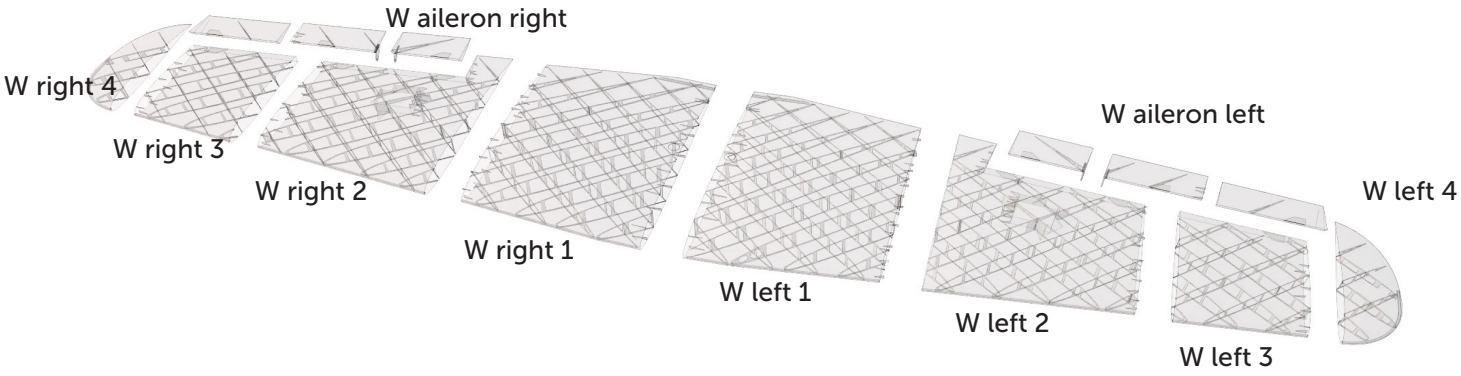
5. Assembly of printed parts

5.1 Wing assembly M6A Seiran

Glue wing parts with CA, use activator and install ailerons on hinges.
We recommend CA Hinge sheet. Please, ailerons and elevators may be different from videoguide, just glue them simply together. Watch the parts aligning.

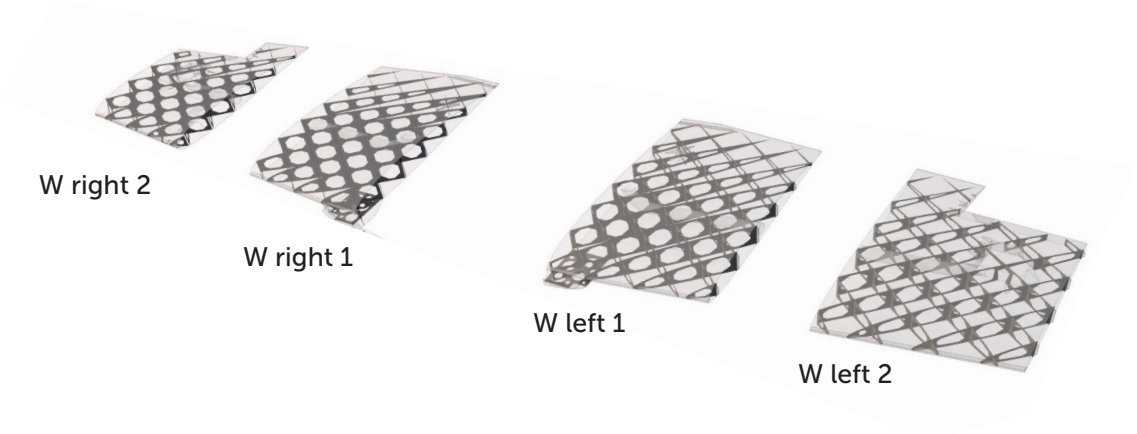
See video guide #4

you will need: CA Glue - medium or similar medium viscosity CA glue
CA Hinge Sheet or similar
Scissors, Snap knife, Some cloth for wiping CA glue...

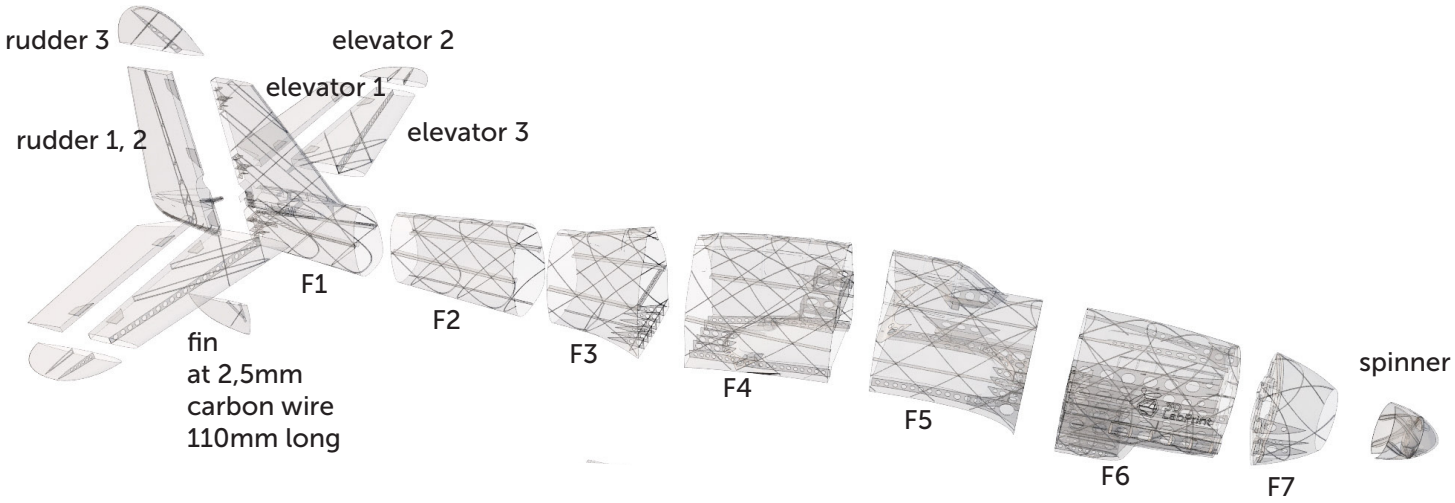


5.1.1 ACES Wing assembling M6A Nanzan

Wing is the same as M6A Seiran version, except there are no holes in sections #2.



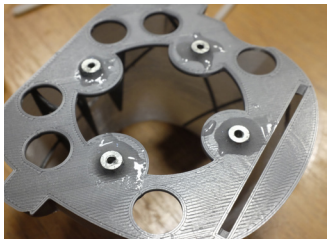
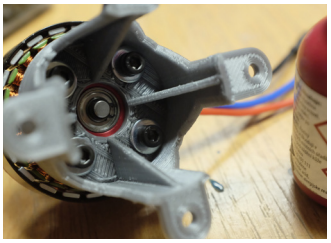
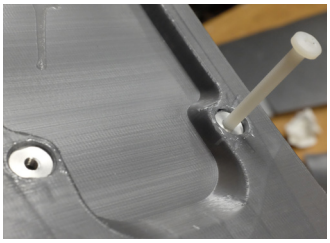
5.2.1 Fuselage assembly M6A Seiran



Now it's a good time to glue the 4x M3 nuts to the fuselage part 7 using a bit of epoxy glue. Clean the threads and try the best fitting motor mount. Glue 2x M4 nuts using the epoxy glue for wing mount to fuselage part 4. Clean the threads and try suitable M4x40 polyamid screws. Trim the parts using knife or sandpaper if necessary. Glue all fuselage parts using CA glue together. Take care glueing the elevator in right position to the fuselage.

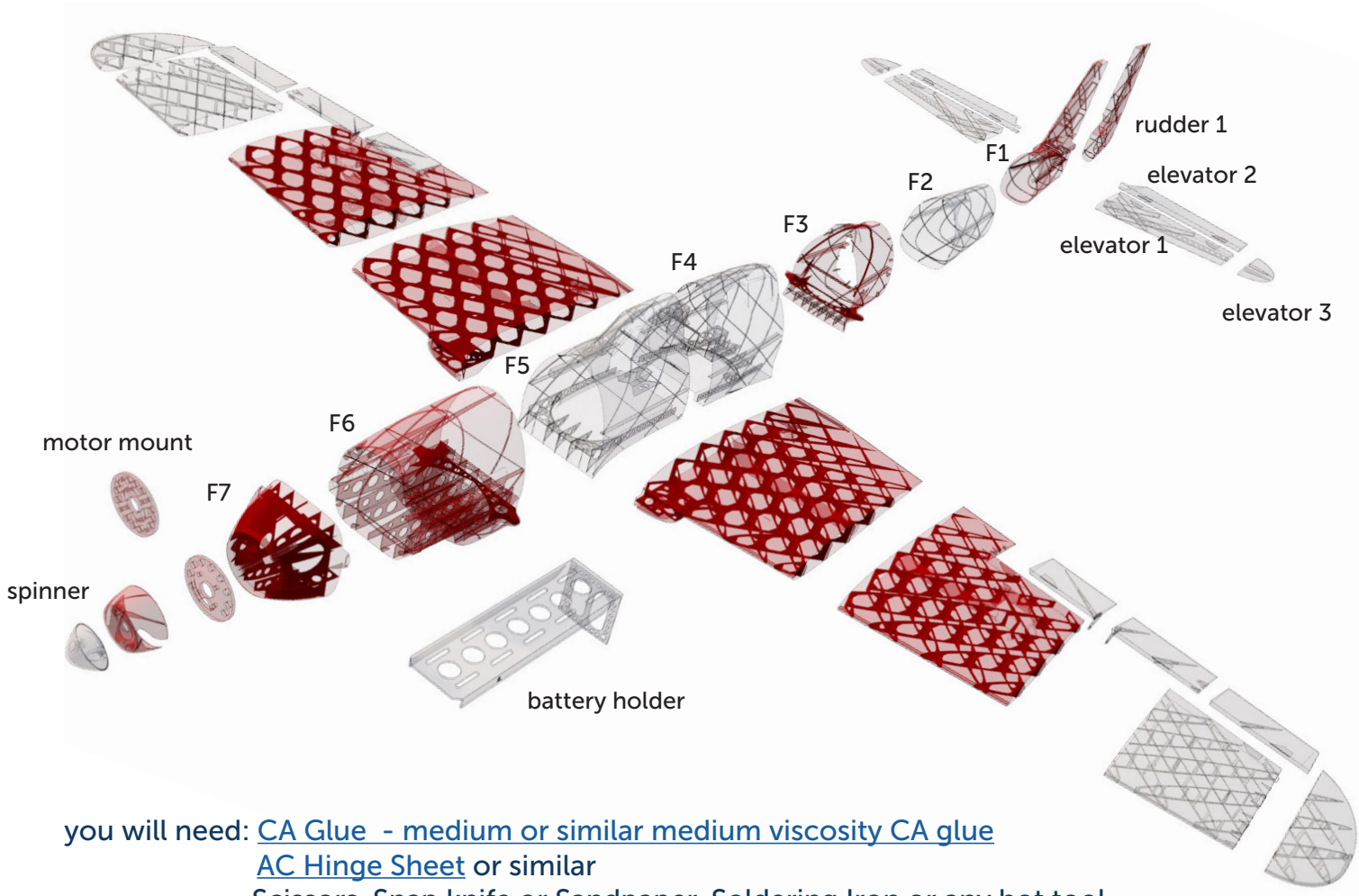
See video guide #5 part1

you will need: CA Glue - medium or similar medium viscosity CA glue
AC Hinge Sheet or similar
4x M3 blind nuts MP-Jet 1035 or Hobbyking M3 nuts or similar
2x M4 blind nuts MP-Jet 1007 AL or Hobbyking M4 nuts or similar
Scissors, Snap knife or Sandpaper, Soldering Iron or any hot tool

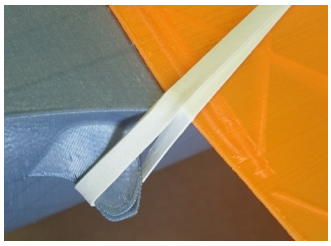





5.2.2 Fuselage assembling M6A Nanzan

The key difference is the simplified motor wall and rubber band wing holders. ACES version doesn't need controlled rudder. Use strong fuselage part F7 and printed motor wall or original alluminium cross holder for better durability.



you will need: CA Glue - medium or similar medium viscosity CA glue
AC Hinge Sheet or similar
Scissors, Snap knife or Sandpaper, Soldering Iron or any hot tool

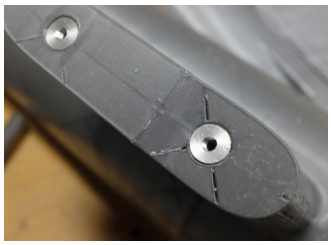


motor mount anealing
in boiled watter

5.2.2 M6A Seiran floats assembly

Trim the parts using knife or sandpaper if necessary. Glue all floats parts together using CA glue. Glue 2x M4 nuts using epoxy glue to each float. Clean the threads and try suitable M4x40 polyamid screws. Apply two-three coats of waterproof varnish to both floats for a perfect seal.

See video guide #5 part2



Recommended motor setups

(or use your own with sufficient thrust and weight)

Eco performance setup

Turnigy D3530/14 1100KV or similar
30A Electronic Speed Controller or similar
Turnigy 3000mAh 3S 20C or similar
propeller two blade 9x6
printed motor mount (size 1, 2, 3 or 4)

High performance setup

Motor – AX-4008Q-620KV
Speed controller (ESC) YEP 40A/6S or similar
Battery 1550mAh/6s – or 2x 1550/3s better (use 2to1 serial connector)
propellers two blade APC 11 x 5,5
printed motor mount (size 3)

ACES performance setup

Motor – Leopard LC3542 600KV RED
Speed controller (ESC) YEP 40A/6S or similar
Battery LiPol 1800-2400mAh/6s
propellers two blade Aeronout CAM Carbon Light 11 x 6 or APC 11 x 5,5
printed anealed motor mount or alluminium original cross mount

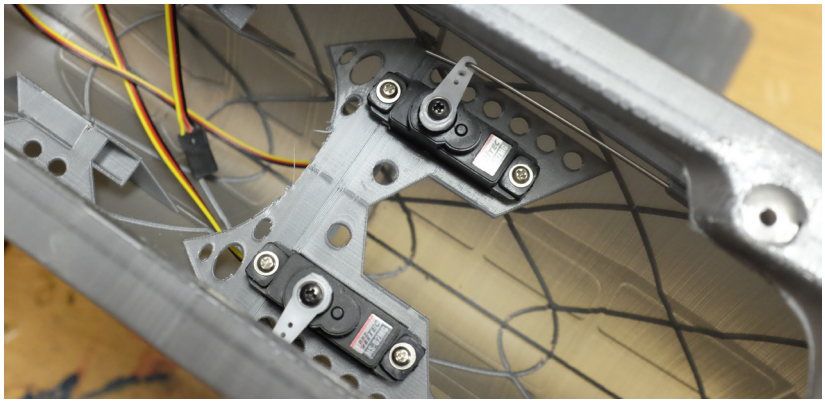
7. R/C Equipment and servo pushrods installation (elevator + rudder installation)

Install prepared RC equipment: Motor, ESC, Servos...
See video guide #6

Nose and motor mount are already tilted to compensate rotating propeller wash. Mount it by mark UP. Test and center all servos with servo tester or transmitter, then install horns in midle position. Use Hitec HS-82MG or any servos sized 30x12x30mm (1.17 x 0.47 x 1.16 inches).

See video guide #8

you will need:
3-4x Hitec HS-82MG or similar 30 x 30 x 12mm servos
2x Servo Lead Extension or similar
Snap knife
4x M4 Screw depends on motor mount
Small screwdriver
Your earlier prepared R/C equipment
2x Steel pushrod, diameter 1.0-1.2mm
Pliers
CA Glue - medium
Activator for CA Glue or similar, but not mechanical is better



8. Final assembly

Refer to your R/C system userguide for installing information.

See video guide #9

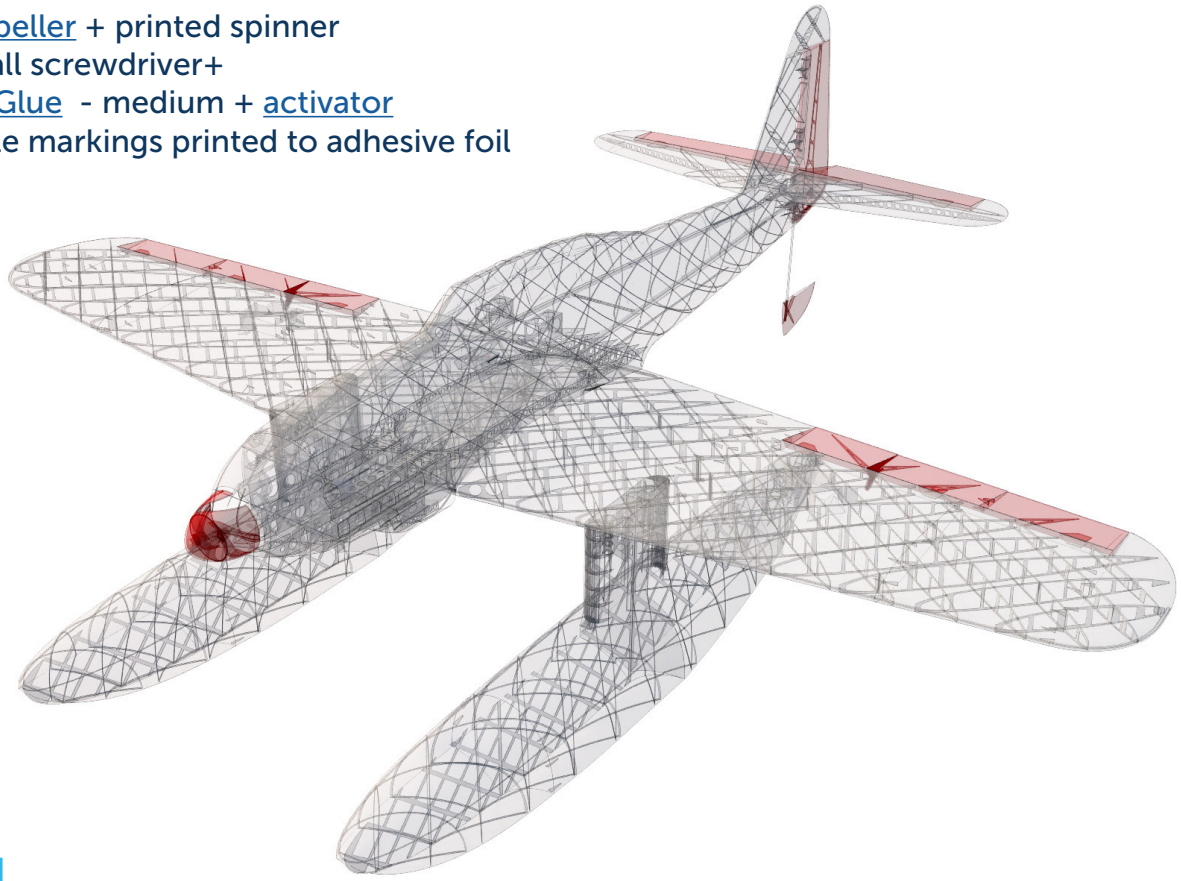
you will need: Your own Rx/Tx system
Battery for your setup...
Velcro strip for Li-Pol battery
Scissors

9. Final completion and setting

Install your reciever, connect batery, setup servos and etc. with your trasmitter, check servo position, then instal propeller.
Make sure that the battery is placed properly and secured with wing battery holder, if battery moves during flight it can shift the center of gravity backwards and aircraft will be uncontrollable! Never set ESC with propeller installed, this could be very dangerous!

See video guide #10

you will need: Your own Rx/Tx system
Battery for your setup...
Foam strip for Li-Pol battery
Scissors
Propeller + printed spinner
Small screwdriver+
CA Glue - medium + activator
Scale markings printed to adhesive foil



10. Go flying

Pre-flight check center of gravity is very important (move it forward for the first flights see CG markings bellow), battery properly charged, ailerons and elevator deflection check, your own flying skills or RC simulator training ...
Accelerate smoothly and keep the direction during taxiing using the rudder, try water taxiing without taking off a few times first. Then accelerate until the plane speeds up, pull the elevator gently and you're in the air. Never try to start from water without fin. Tested, doesn't work. You can also remove floats and land on grass.

Basic to advanced ground handling take-off's and landing for warbirds

Fly video of ACES version M6A Nanzan

11. Pilots Please Attention!

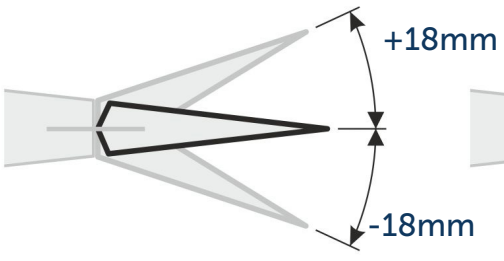
For the first flights we recommend setting the center of gravity to around 5 mm forward of the CG tag - nose heavy, this increases the stability (you can use heavier battery). Increasing expo settings on your transmitter for elevator and ailerons to 80 % calms response from your stick inputs. Also you can decrease elevator and ailerons deflection to calm down the plane. Make sure the battery is well fixed in proper possition. If it moves during flight it will cause shifting of CoG aft and will result in uncontrolable flight behavior.

After gaining some confidence you can balance the plane to the Center of Gravity marks and set Expos to 60 % as shown in the video/instructions... this gains back extra maneuverability.

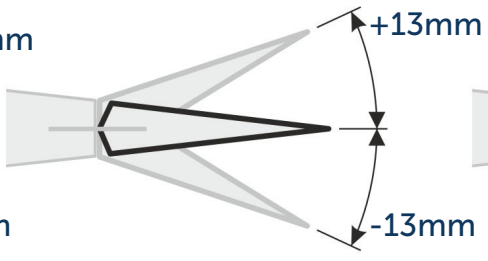
Never fly aft positioned Center of gravity.

Please, use these files only for your own purpose, do not re-distribute or publish. Thank you very much. Enjoy your flight.

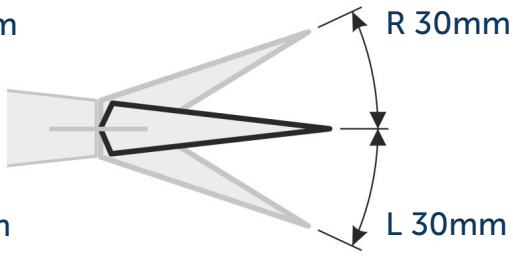
aileron



elevator



rudder



Shopping list

Printing material:	1kg of PLA
RC:	4-5 chanell receiver by your RC system
Motor:	Motor – Leopard LC3542 600KV RED Motor – AX-4008Q-620KV or similar ~100-140g for 6S Li-Pol...
Controller:	Speed controller (ESC) YEP 40A/6S or similar
Battery:	6S Battery LiPol 1800-2400mAh/6s
Servos:	3-4x Hitec HS-81/82 or similar 30 x 30 x 12mm servos 2x servo extension cables 300mm / 12 inch
Glue:	CA Glue - medium or similar medium viscosity CA glue Activator for CA Glue or similar,
Other:	1 mm / 14 AWG pushrod wire or carbon rod fitting screws