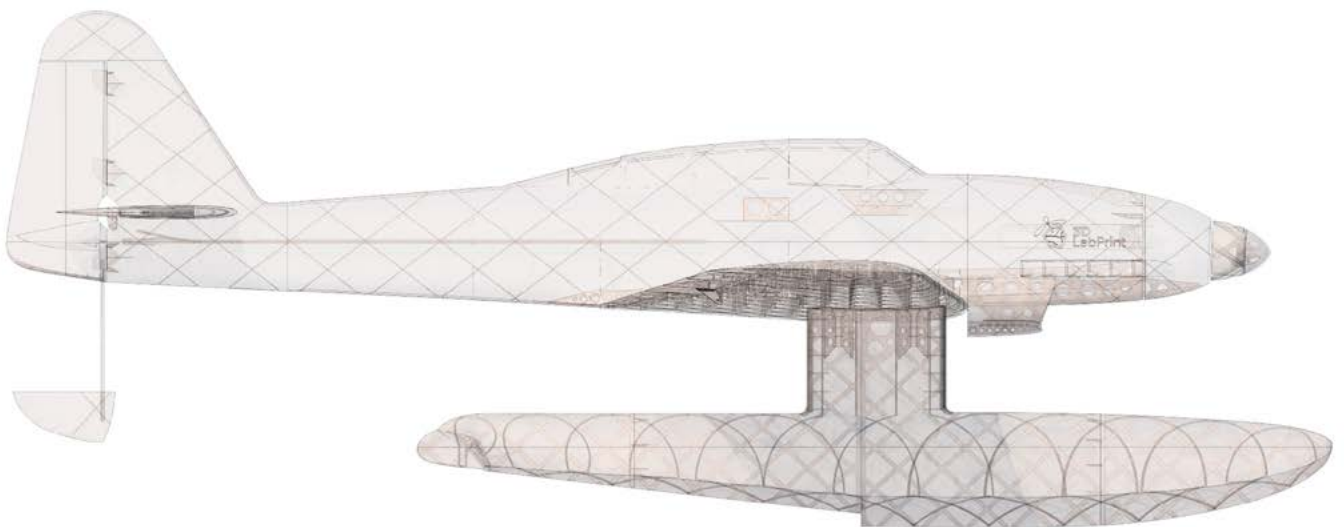![3D LabPrint logo]

User Guide
rev. 2016/12

Fully 3d printable

Aichi M6A1 Seiran

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

Aichi M6A1 SEIRAN – fully printable R/C plane for your desktop 3Dprinter

Future of flying - Print your own plane

We still trying move things further, so this project is again full of other improvements for better durability , easier assembly , better geometry solution and so on..., we hope you en-joy it, although this print may test your competencies to and quality of your printer (welcome to the thin wall printing)

The first fully printable airplanes with suitable files prepared for your 3Dprinter.
Flight charecteristics are comparable or even better than classic build model airplane.
Simply download and then print it anytime you need only for $18 (filament cost).
This is not a dream, now you can print this HI-TECH .... at home, print spar parts, and so on...

Extensive hi-tech 3d structural reinforcement which makes the
model very rigid while still maintaining lightweight airframe and exact airfoil even when it is made only from plastic. This perfect and exact 3d structure is possible only due to aditive 3dprinting technology. So welcome to the 21th century of model flying. Be The first at your airfield.

Easy to assembly, you do not need any extra tool or hardware, you only need to
glue printed parts together and make pushrods for control. 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 will get superb performance airplane with High efficient powerplant which let you fly 7+ minutes at full throtle with the speed exceeding 110 kph (HP setup). On the other hand low stall speed is achived for easy landing.
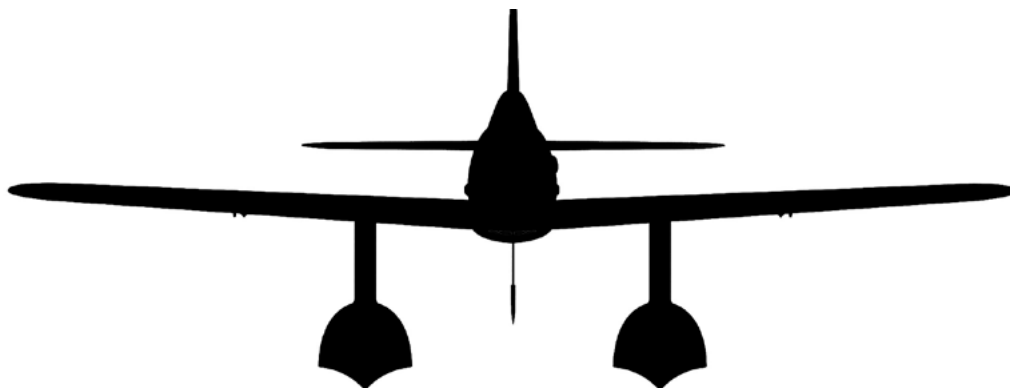
General specifications (HP setup):

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
Takeoff weight (3s 3000 lipo):	1520 g
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

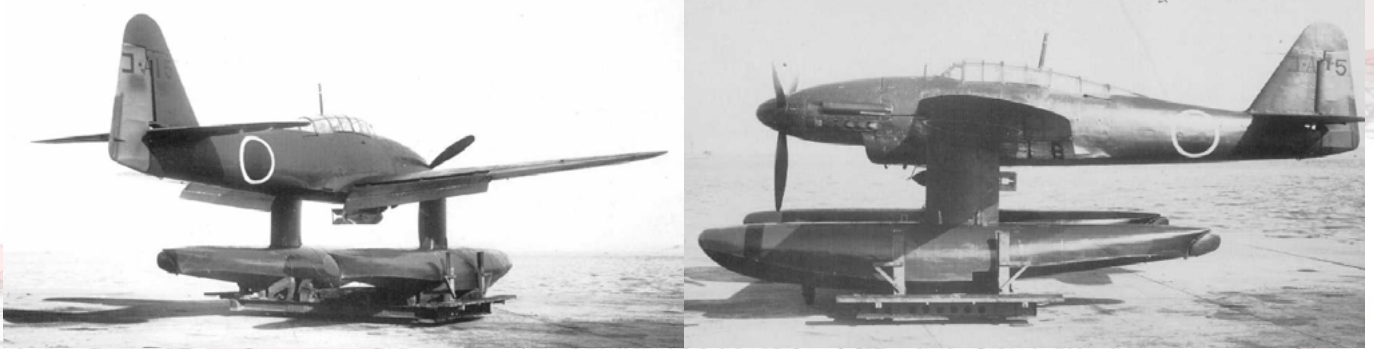Rate of climb: 20 m/s (5 373 ft/min) with APC 9x6

Flight time (3s 3000mAh/full):   7:40 with APC 9x6
5:30 with APC 9x7.5
7:40 with aeronaut ELP 9x6
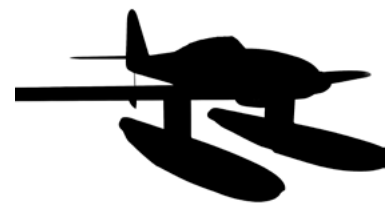
Aichi M6A1 Seiran, History

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 for use with desktop FMD 3d printers and slicer software as Simplify3D (recommend) CURA or MatterControl (this STLs are not compatible with Slic3r).
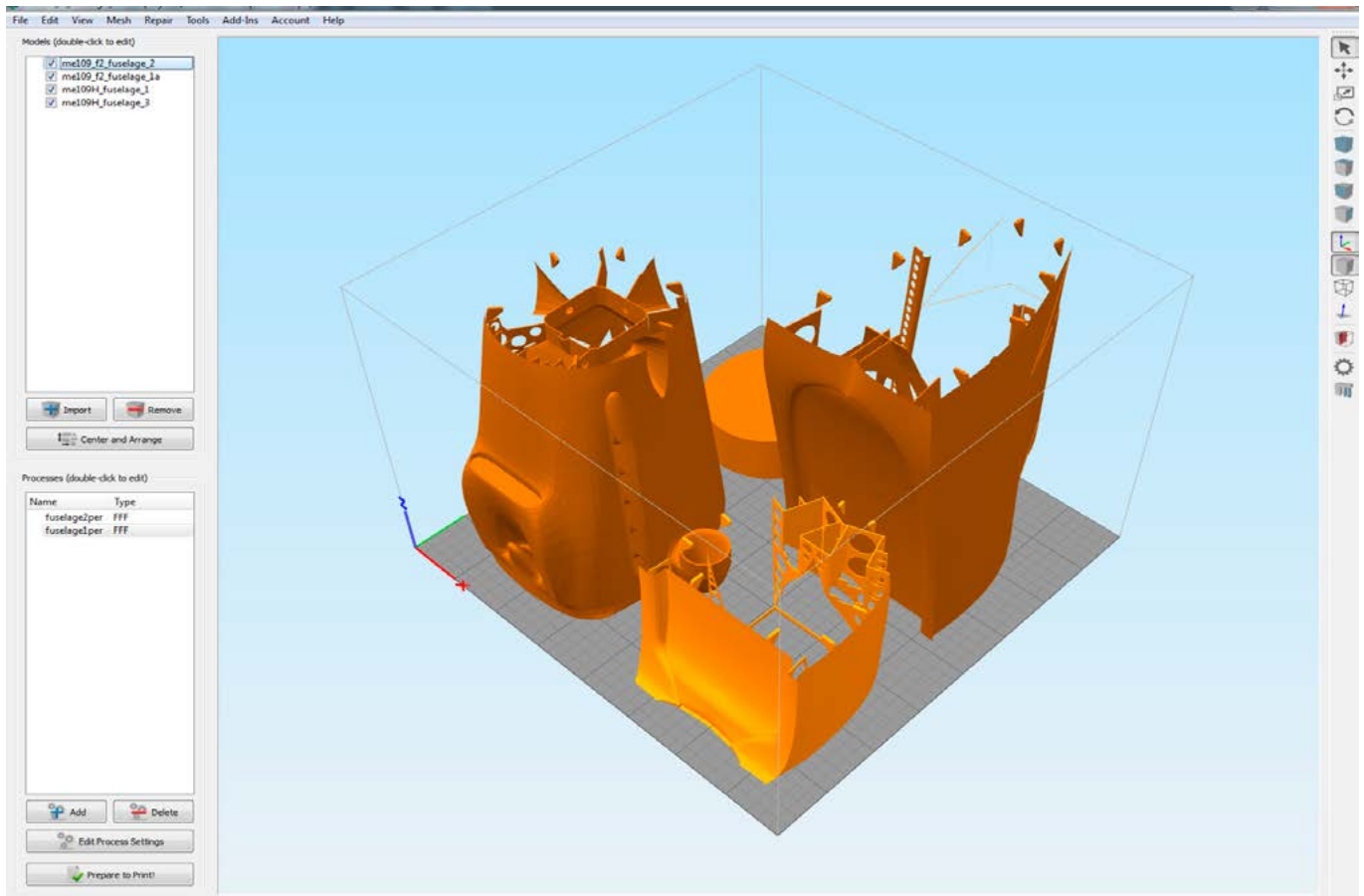
2. Factory files for Simplify3D slicer

with all our setting, this Factory files included all you need, note: we use PRUSA i3 ORIGINAL printers so you may need adjust the basic printing parameters to match your printer or use it as a start point for you, please give a look to Simplify3D

3. Step By Step PDF/VIDEO userguides

Apart from this userguide, please give a look to the Printing Guide with some Tips and Advices for airplane printing (Thin Wall Printing).

4. Gcodes

Basic Gcodes prepared for direct use, so universal as is possible. Should work with i3 style printers, you can try it out, but We can not guarantee that it will work with your printer. 100% works with PRUSA i3 ORIGINAL 3d printers.
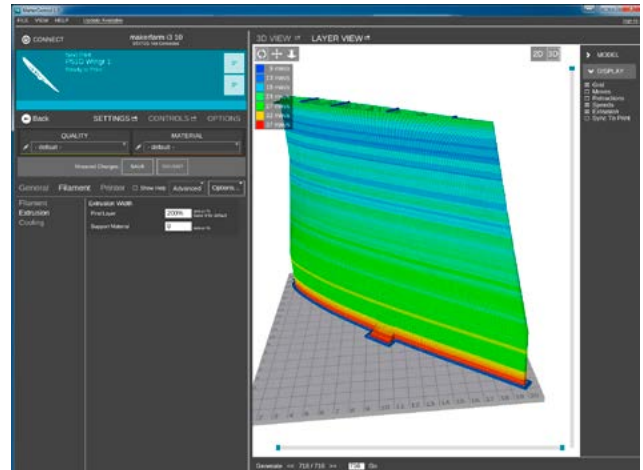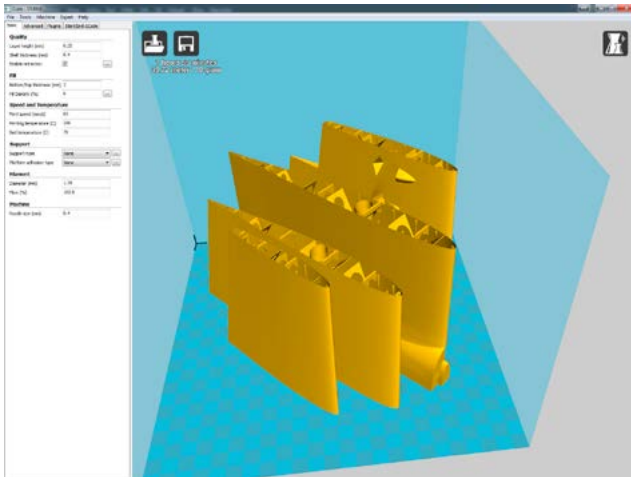

5. Prepared settings for CURA and MatterControl slicers

If you dont like Simplify3D for any reason, there is always possibility 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 scale PDF at thin self tape advertisement foil and place it on the model as needed, violet cut lines included.
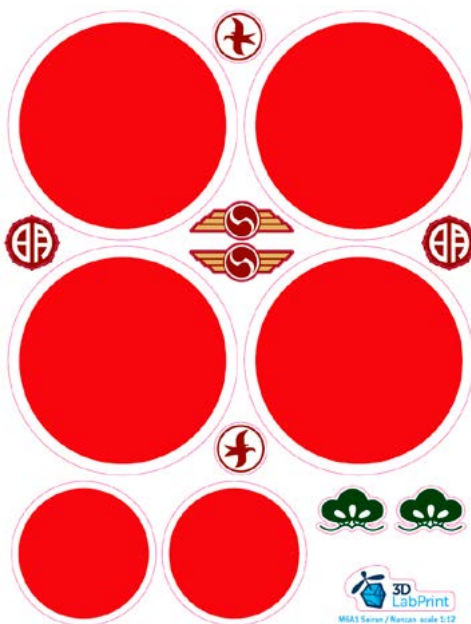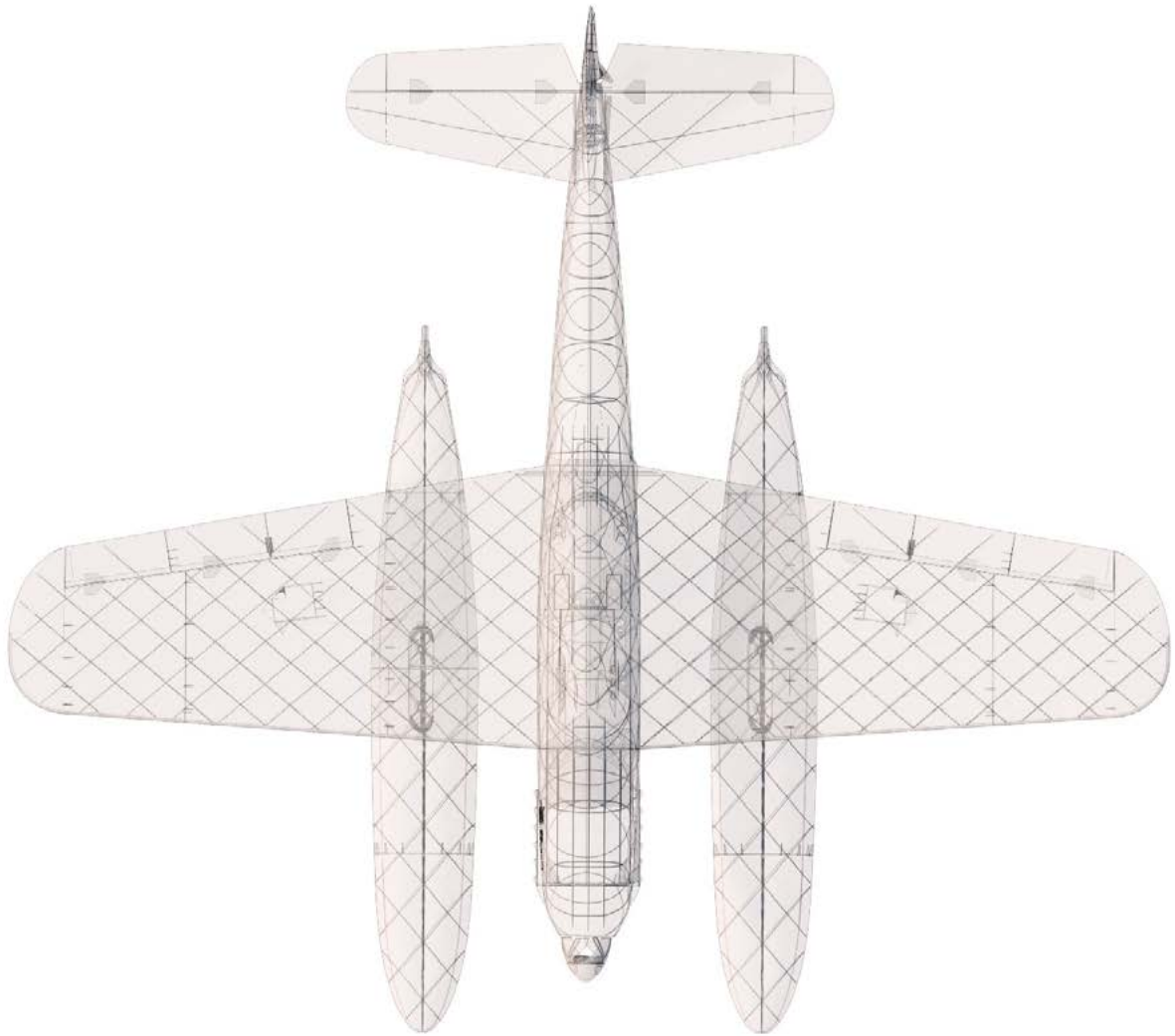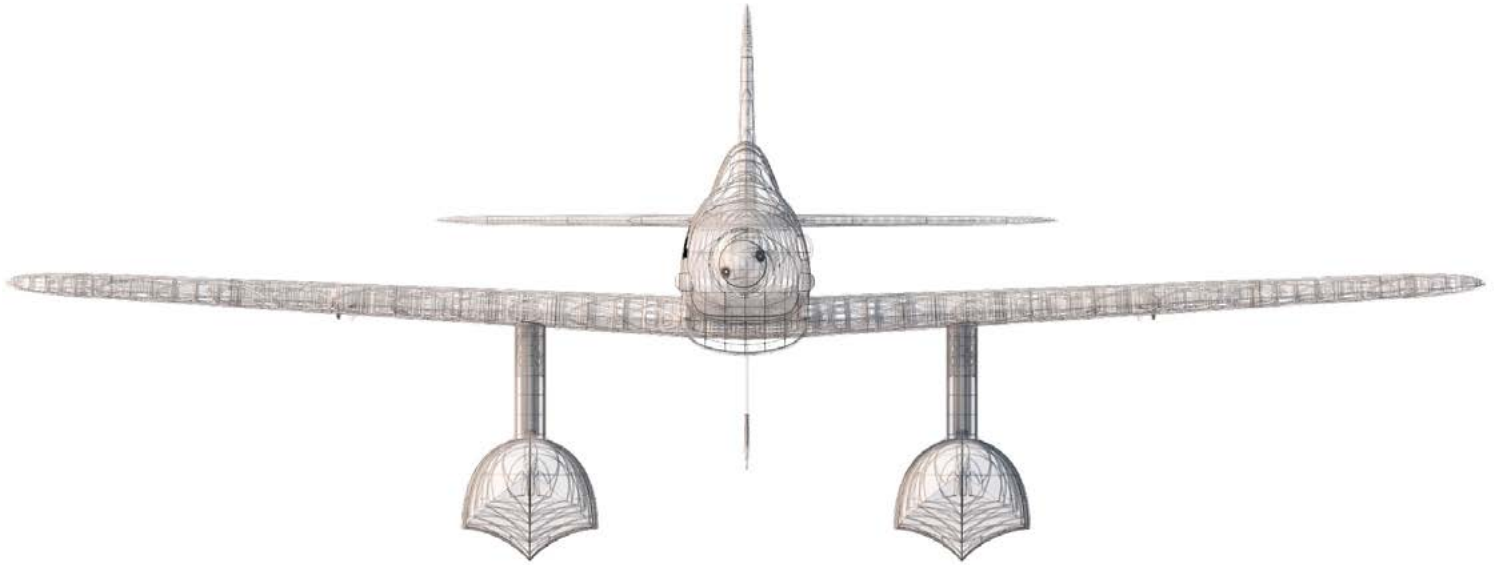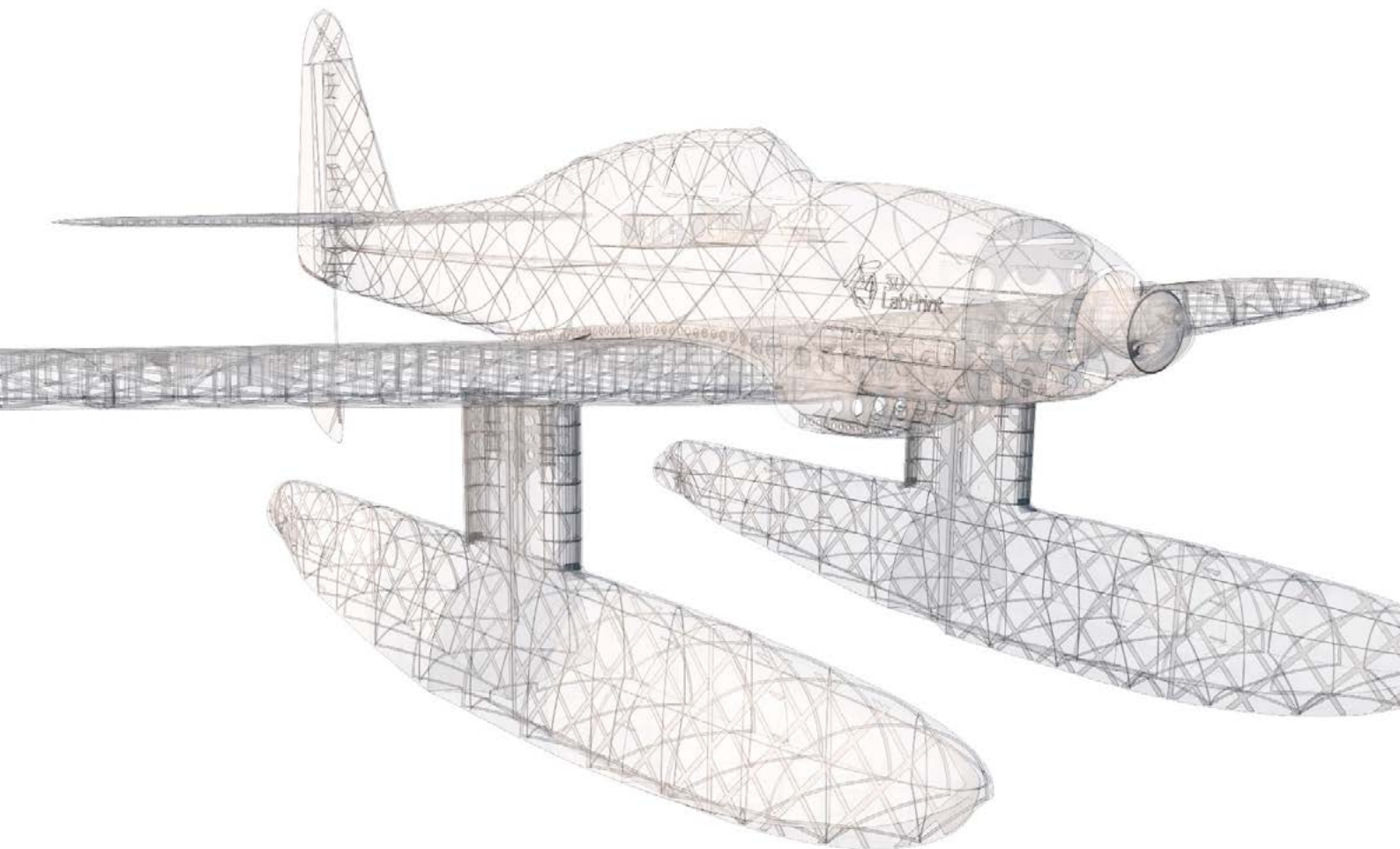
22.8 dm2

910 mm (35,8 in)

1070 mm (42.12 in)

Step By Step PDF/VIDEO userguide

1. Choose airplane at www.3Dlabprint.com, our Facebook for live information.

Basic requirments for Aichi M6A SEIRAN is 200/200/185mm bed (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 feel a little bit confused 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 get download link for all files to your email (zipped)or you can log in to your account and download directly from our websites.
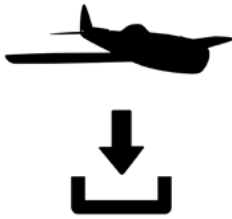
3. Gcodes preparing

options A Gcodes:
if your printer is i3 comptatible you can directly use prepared gcodes, simply save each to SD card and let 3d printer do his job, HE temperature is set to 230°C for best layer bonding, you can edit speed and temperature on your printer LCD only. If Gcodes does not work please proceed to the next options.
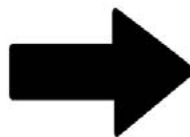
## options B Factory files Simplify3D (recommended)

We prepare all you need in this files (basic FFF, parts arranged and so on...)
You can use this our setting as a start point and edit it as you need (adapt it for your printer), print only parts you need and so on... On most 3d printers it should work as it is, but please give a look to the setting and edit it if is different to your printer, we are not liable for damages resulting from the use of our settings. If this does not work please proceed to the next option.
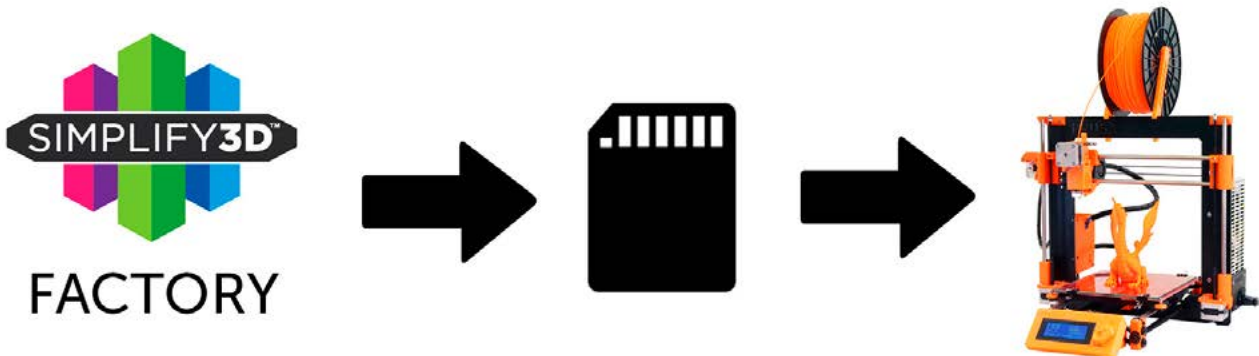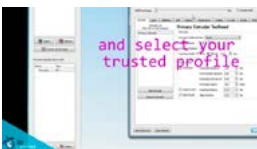

options C Simplify3D manual setting (watch and learn)

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 expert. Of course you spend a lot of time and youtube pause button will become your friend.
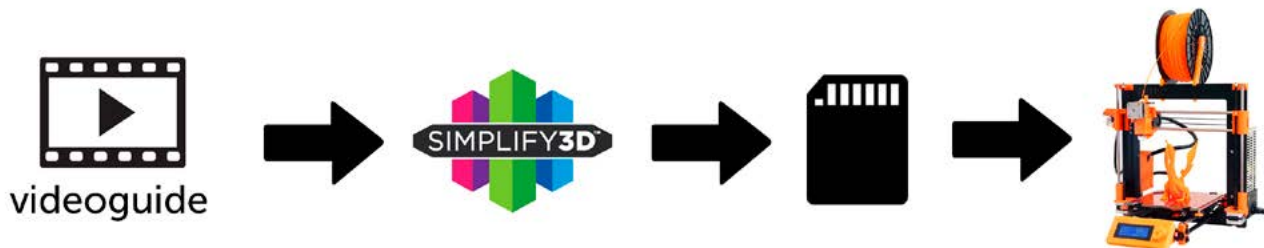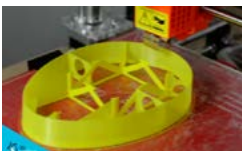

AND... please give a look to VideoGuides:

video 2 Simplify3D setting

video about Thin Wall Printing

options D CURA or MatterControl

MatterControl and CURA are free :-) and also gives very good results and airframe is still strong enough, slicer setting is very easy.

Please try find right extrusion multiplier and temperature for good weight and bets layer bonding, give a look to parts weight list for proper multiplier setting.

You can also use our predefined CURA or MC slicer setting file included in package (always adapt it for your printer, change build volume, filament diameter and so on... depends on 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)
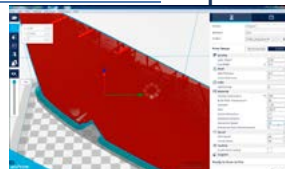MC_thick.slice   (motor mount, battery holder, spinner)
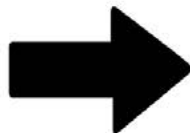
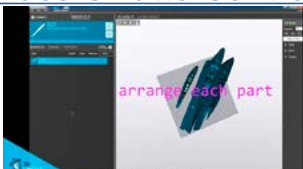## AND... please give a look to VideoGuides:

video CURA slicer setting
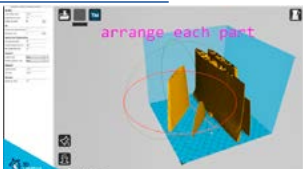
CURA 2.3.1 import setting

video CMatterControl slicer setting

4. Print it

Save generated Gcodes and insert SD card to your printer, prepare your printer and start printing, we prefer to use SD than direct connection via USB Note: ABS filament is not suitable for this. 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 give a look to VideoGuides:

video printing guide
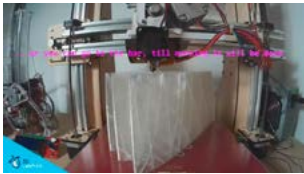
Main parts weight list:

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

rudder 3 4g

rudder 1+2 17g

F1 28g

elevator 1+2+3 24g

F2 22g

float R4 17g

F3 19g

float R3 37g

F4 40g

F5 35g

alerion L 14g

float R2 50g

F6 50g

wing L1 75g

F7 13g

wing L2 50g

float R1 25g

spinner 12g

4, 14g

wing L3 21g

wing L4 8g

3, 12g

2, 11g

battery holder 21g

motor mount 1, 10g
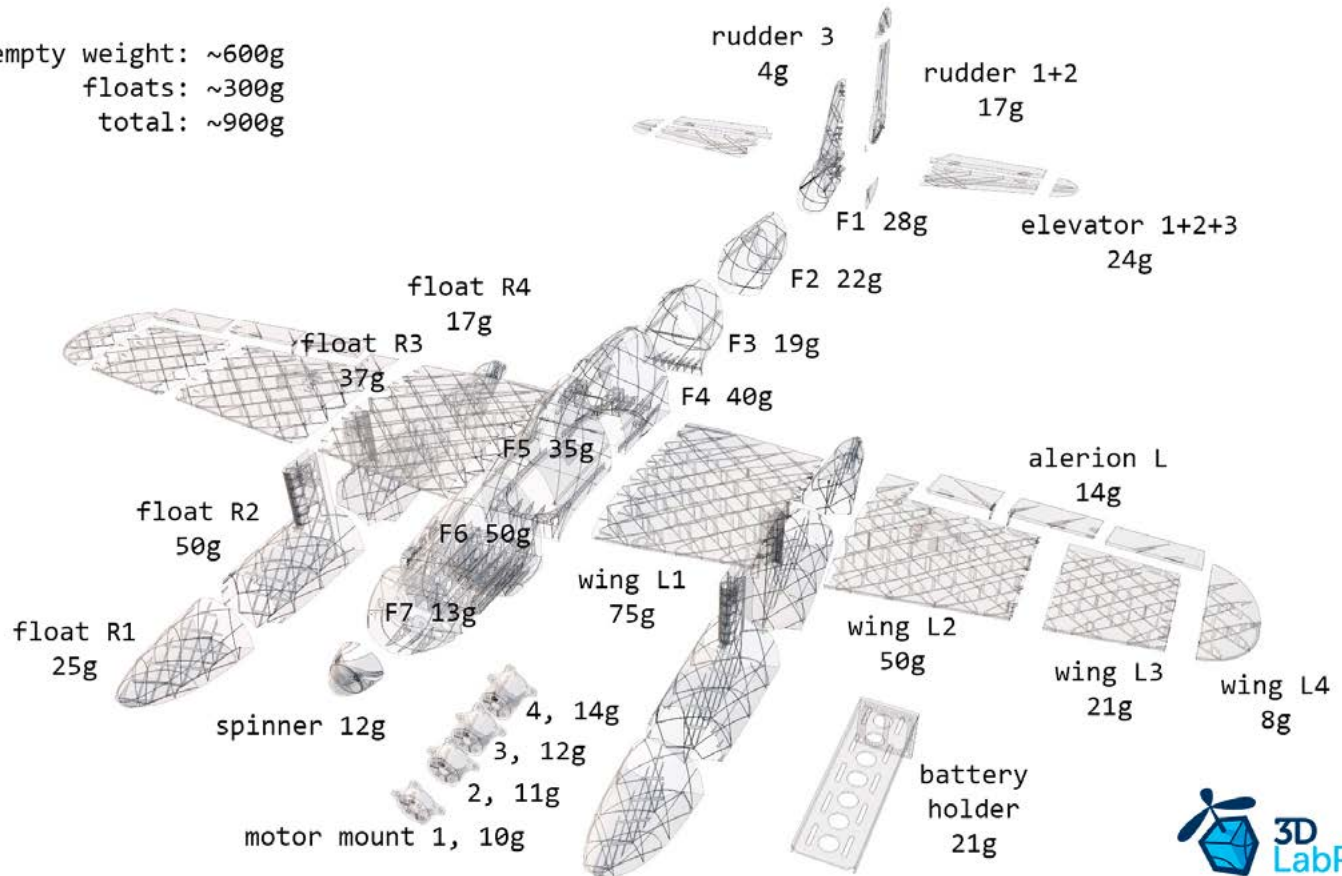
Basic Tips and Advices

Please Experiment with your extrusion multiplier.
Also HotEnd temperature is very important for strong result, please try increase temperature to find the best value (200° up to 260° celsius).
Turn OFF cooling fan for better layer adhesion (HE fan of course ON). We dont need it for our thin wall printing. We try lot of filaments and so far PLA is still the best for our models (2016). You can try aslo PETG and PC-max from polymaker is very promising filament.

Heated bed is very recommended, 60-70° Celsius (print without warping ends).
Looks like any standard quality PLA is perfect for our planes, but it always depends on combination PLA vs. Extruder vs. HotEnd.
We find that some color of filament has lower layer adhesion also.
Nowadays there is lot of 3dprinters on the market, very most of them is OK for printing our airplanes (specific thin wall printing...) suficient volume, heated bed, 0.4mm nozzle.

Please give a look to Printing Guide:

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

5. Assembling printed parts

5.1 Wing assembling

Glue wing parts with CAglue together, use activator and install ailerons by hinges.
We recommend CA Hinge sheet. Please, ailerons and elevators may be different from videoguide, simple glue them together. Be carefull and well-position the parts.

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...
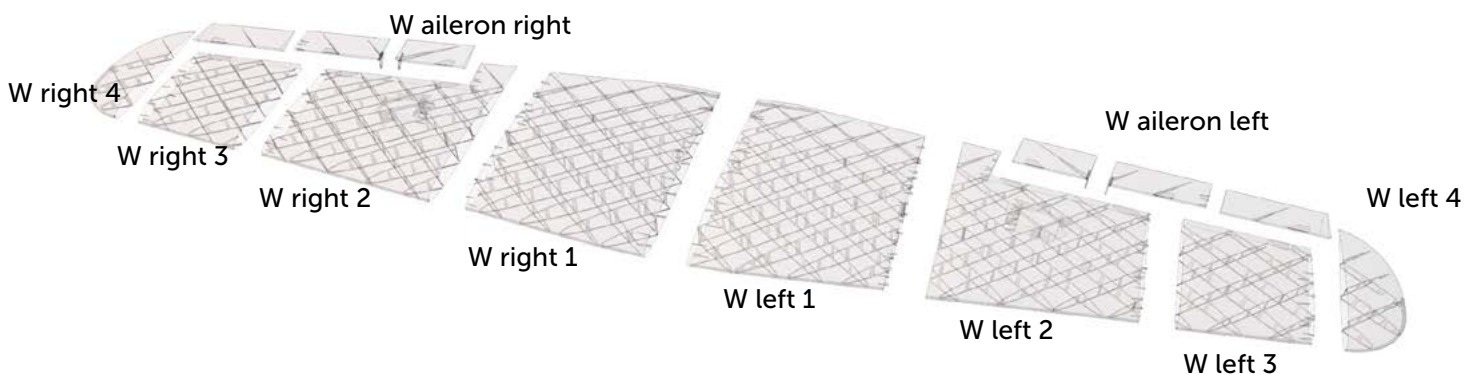
5.2.1 Fuselage assembling

Now is good time for glue 4x M3 nuts to fuselage part 7 by small portion of epoxy glue. Clean the threads and try suitable motor mount. Glue 2x M4 nuts by small portion of epoxy glue for wing attachment to fuselage part 4. Clean the threads and try suitable M4x40 polyamid screws. Fine tune parts shape with knife or sandpaper. Glue all fuselage parts with CAglue together. Carefully observe the position of elevator and glue it to 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

rudder 3
elevator 2
elevator 1
rudder 1, 2
elevator 3
F1
fin
at 2,5mm
carbon wire
110mm long
F2
F3
F4
F5
F6
F7
spinner
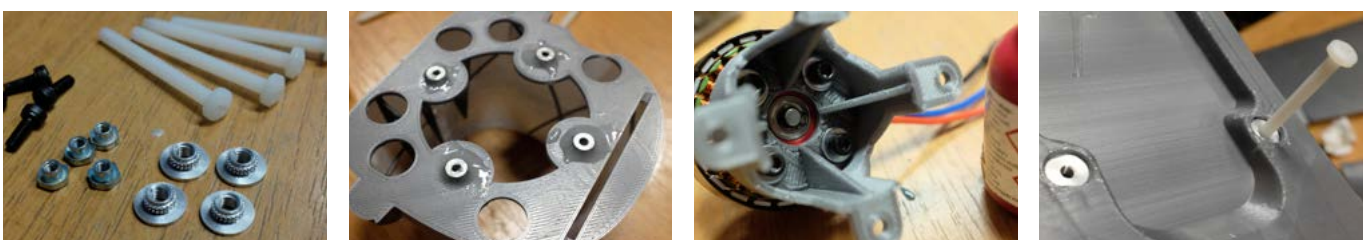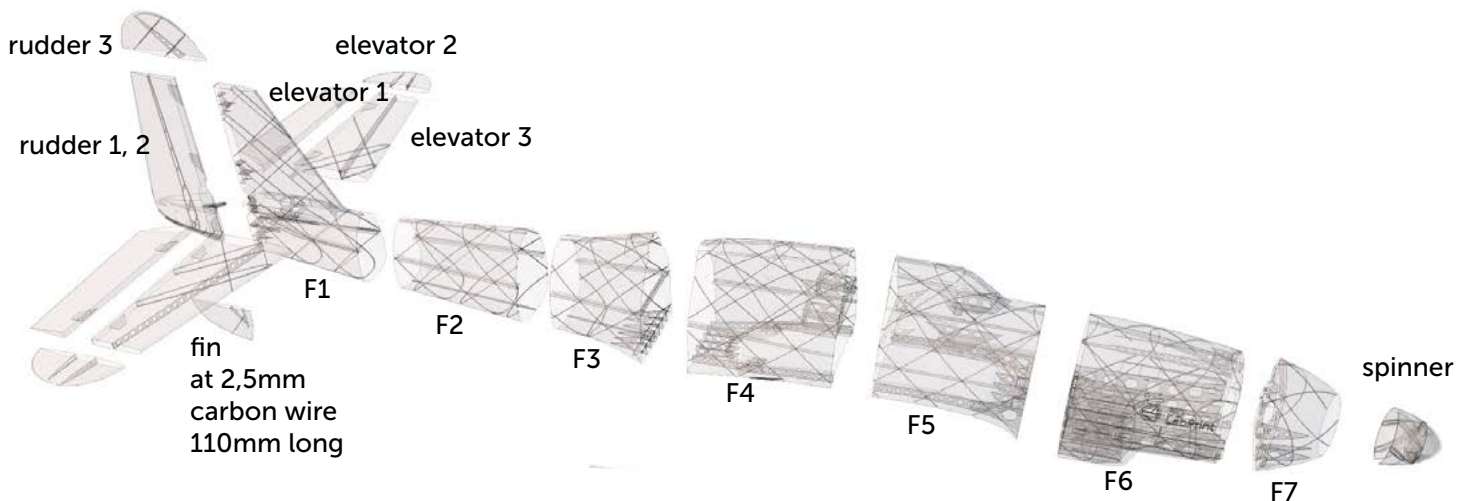
5.2.2 Floats assembling

Fine tune parts shape with knife or sandpaper. Glue all floats parts with CA glue together. Glue 2x M4 nuts by small portion of epoxy glue to each float. Clean the threads and try suitable M4x40 polyamid screws. Apply two-three coats of waterproof varnish at both floats for a perfect seal.

See video guide #5 part2

float 4
float 3
float 2
float 1
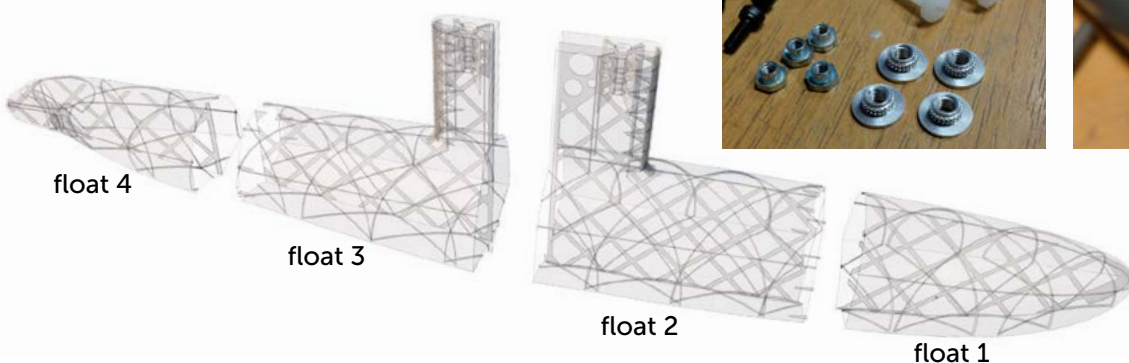
Recommended motor setups
(or use your own with sufficient thrust and weight)

See video guide #6

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
(if you like it hot, yeah)

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 9x7
printed motor mount (size 3)

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

Install prepared RC equipment: Motor, ESC, Servos...
Nose and motor mount are already in angle for compensating rotating propeller stream. 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 with size in millimeters: 30x12x30 in inches: 1.17 x 0.47 x 1.16.

See video guide #8

you will need: 4x Hitec HS-82MG or similar
                     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

Instal 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 shifts the center of gravity backwards and aircraft will be uncontrollable! Never set ESC with instaled propeller, this is 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
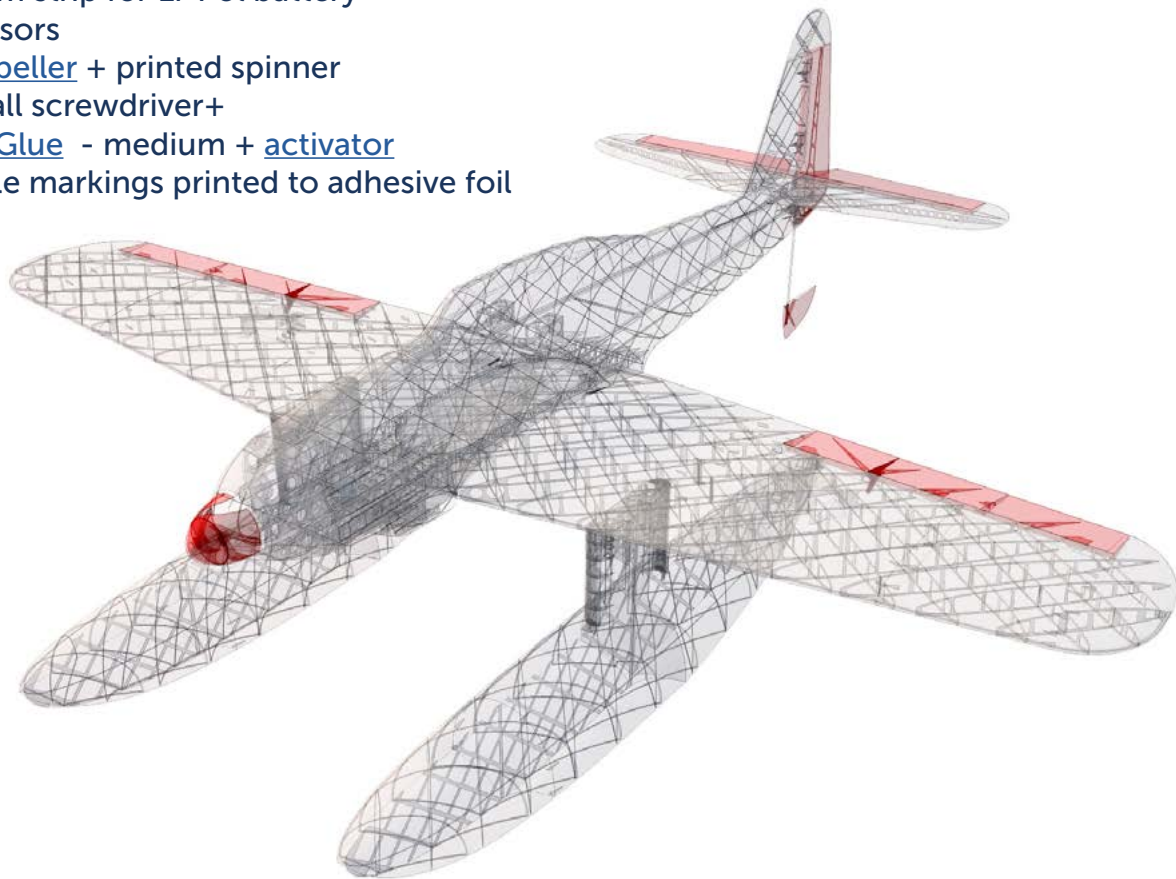
10. Go flying

Before 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 gradually and keep the direction during taxiing by using the rudder, try it first without taking off a few times (taxiing on the water). Then gain speed until the plane speed increased, pull the elevator gently and you're in the air. Never try to start from water without fin. Tested, did not working. For fun flying easy remove floats and land to grass.

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

11. Pilots Please Attention!

For the first flights we recommend set center of gravity of the airplane by about 5 mm forward of the CG tag – nose heavy, this increases the stability (you can use heavier battery). Also is good to increase expo settings on your transmitter for elevator and ailerons to 80 % (this calms response from your stick inputs). Also you can decrease elevator and ailerons deflection. Make sure the battery is well fixed in proper possition if it moves during flight it will cause move CoG aft and will lead to uncontrolable flight behavior.

You can then return to the center of gravity (balance aircraft)the CoG points and expo set to 60 % as stated in the video/instructions... this gain back extra maneuverability when you will be sure with flying your airplane.

Never fly aft positioned Center of gravity.

Please, use this files only for your own purpose, do not send it further. Thank you very much. Enjoy your water flight.