3D LabPrint

User Guide

rev. 2018/03

Fully 3d printable

Vought F4U Corsair

scale ~ 1:6.6 wingspan 1.9m/75in

Vought F4U Corsair– fully printable R/C plane for your desktop 3Dprinter

Future of flying - Print your own plane. Flight video

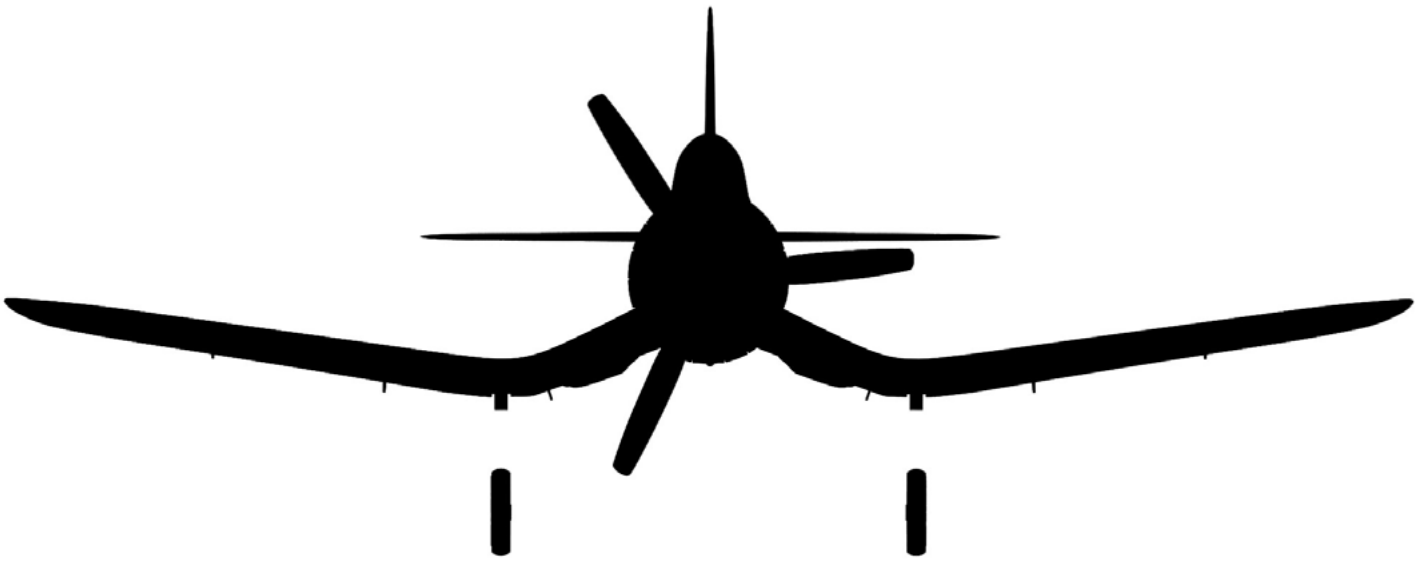
The 1/6.6 scale Spitfire IX has been a great success. Now we're presenting another long awaited warbird in this scale, the F4U Corsair! And once again it is our biggest and most complex project so far. Featuring lots of scale details, like foldable wings, flaps, rotating retractable landing gear, etc...
We hope you enjoy printing, building and flying, although this build will truly test your abilities and your printer quality.

Welcome to the thin wall printing!

The first fully printable airplanes with files prepared right for your desktop 3Dprinter. Flight characteristics are comparable, even superior to classic build model airplane. Simply download and print the whole aircraft or just the spare parts anytime you need. For the cost of filament only (around $60 - 3700g/130 oz). This is not a dream. Now you can print this HI-TECH... at home.

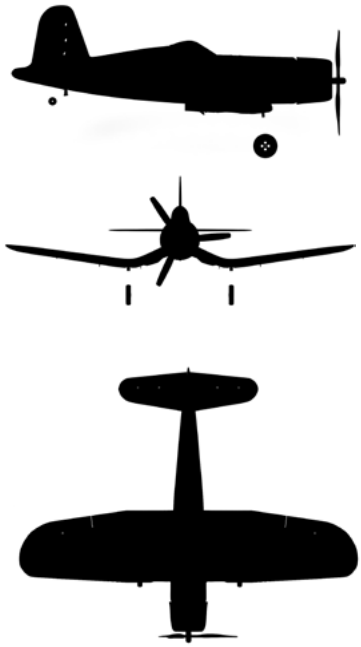
Extensive hi-tech 3d structural reinforcement making the model very rigid yet lightweight. Precisely built airframe and airfoil with machined accuracy means your plane is always true . This perfect and exact 3d structure is possible due to additive 3dprinting technology only. Welcome to the 21th century of RC model flying and be the first at your airfield.

Easy to assemble, you don't need any extra tools or hardware. Just glue the 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. Detailed step by step PDF/VIDEO is included. You will get a superb performing large scale RC warbird.



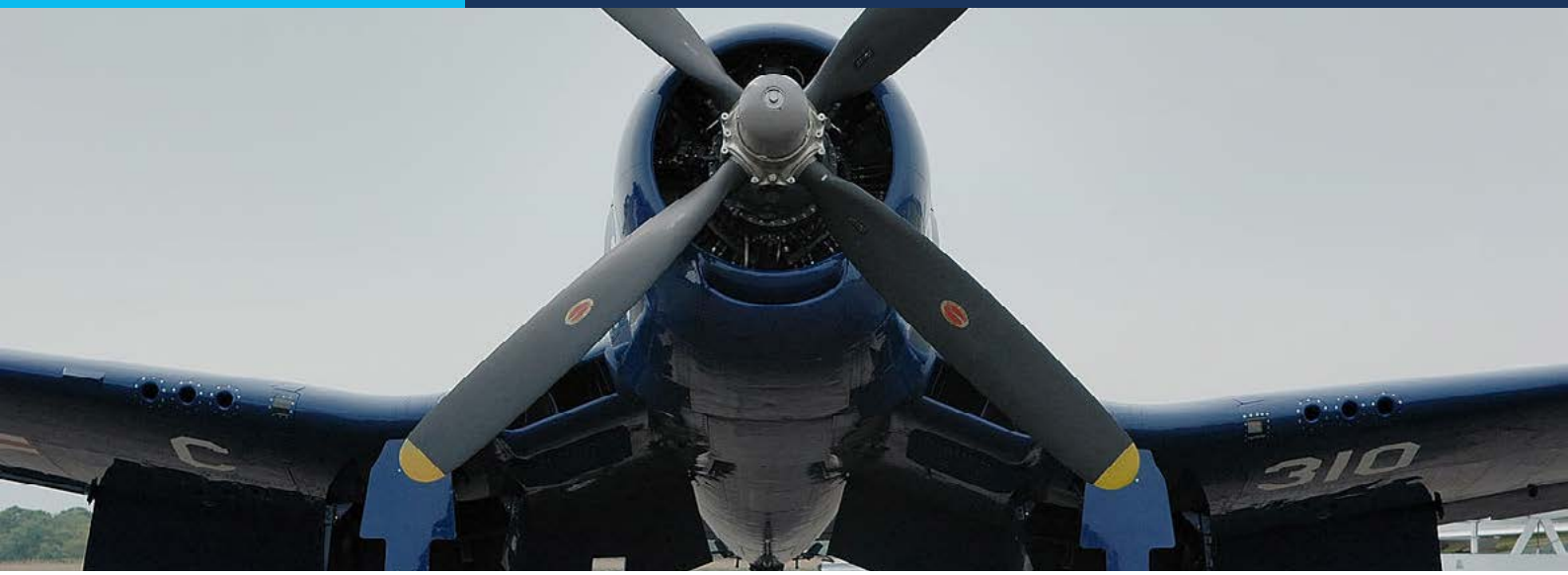
General specifications:

Length:	1520 mm / 60 inch
Wingspan:	1900mm / 75 inch
Height:	698 mm / 27 inch
Wing area:	67.4 dm2 / 5.53 sq ft
Wing loading:	88.3 g/dm2 / 26.3 oz at sq ft
Center of gravity:	115mm / 4.5 in from LE
Airfoil:	3DLabPrint Cor01
Weight of printed parts (w/o wheels):	3710 g / 72.7 oz
Takeoff weight (8s 5000mAh Li-Pol):	5950 g / 130.5 oz
Max takeoff weight:	6400 g / 148.2 oz
Never exceed speed, VNE:	160 km/h / 99.4 mph
Design maneuvering speed, VA:	110 km/h / 74.6 mph
Stall speed, VS(full flaps):	42 km/h / 23.6 mph



Performance measurement:

Max speed VH (level flight):	138 km/h – 75.6kn – 87.0mph
Rate of climb:	24 m/s (5 500 ft/min)
Flight time (8s 5000mAh):	11:00 min (+30% reserve)



Vought F4U Corsair, History

The Vought F4U Corsair is an American fighter aircraft that saw service primarily in World War II and the Korean War.
The Corsair was designed as a carrier-based aircraft, but it came to and retained prominence in its area of greatest deployment: land based use by the U.S. Marines. Due to logistics issues and initial problems with carrier landings, the role of the dominant U.S. carrier based fighter aircraft was thus filled by the Grumman F6F Hellcat, powered by the same Double Wasp engine first flown on the Corsair's first prototype in 1940. The Corsair also served in the U.S. Navy. In addition to its use by the U.S. and British, the Corsair was also used by the Royal New Zealand Air Force, the French Naval Aviation and other, smaller, air forces until the 1960s. Some Japanese pilots regarded it as the most formidable American fighter of World War II, and the U.S. Navy counted an 11:1 kill ratio with the F4U Corsair.

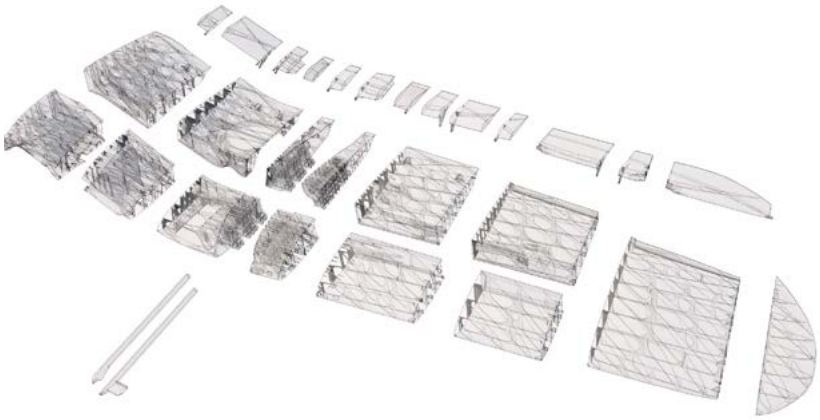
When the Corsair entered service in large numbers with the U.S. Navy in late 1944 and early 1945, it quickly became one of the most capable carrier-based fighter-bombers of World War II. The Corsair served almost exclusively as a fighter-bomber throughout the Korean War and during the French colonial wars in Indochina and Algeria.

The F4U incorporated the largest engine available at the time: the 2,000 hp (1,500 kW) 18-cylinder Pratt & Whitney R-2800 Double Wasp radial. To extract as much power as possible, a relatively large Hamilton Standard Hydromatic three-blade propeller of 13 feet 4 inches (4.06 m) was used.

Included:

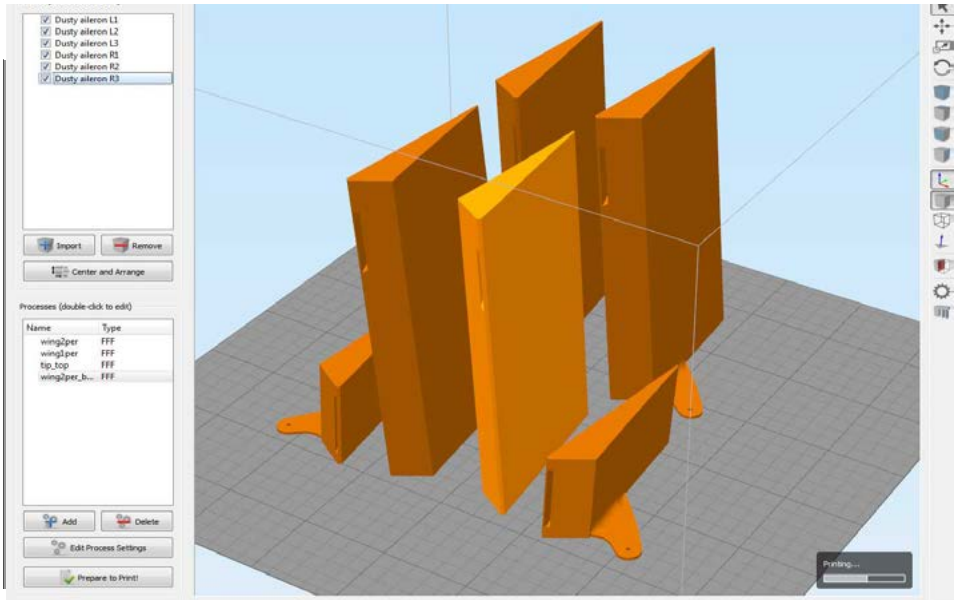
1. STL 3d files

Universal STL files designed for use with desktop FDM 3d printers and slicer software such as Simplify3D (recommended) CURA or MatterControl (these STLs are not compatible with Slic3r or Makerware slicers).



2. Factory files for Simplify3D slicer

the included Factory files contains all the settings you need. Layouts on heatbed, processes, etc. Note: we're using PRUSA i3 ORIGINAL printers so you may need to adjust the basic



printing parameters to match your printer. The Factory files provide a great starting point. Please take a look at Simplify3D. This software is the best choice for our projects.

3. Step By Step PDF/VIDEO userguides

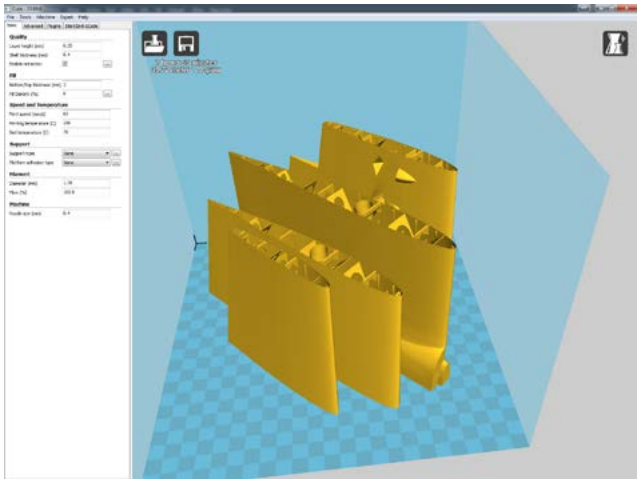
Please use this user guide along with the Printing Guide where you can find Tips and Advice for airplane printing (Thin Wall Printing).

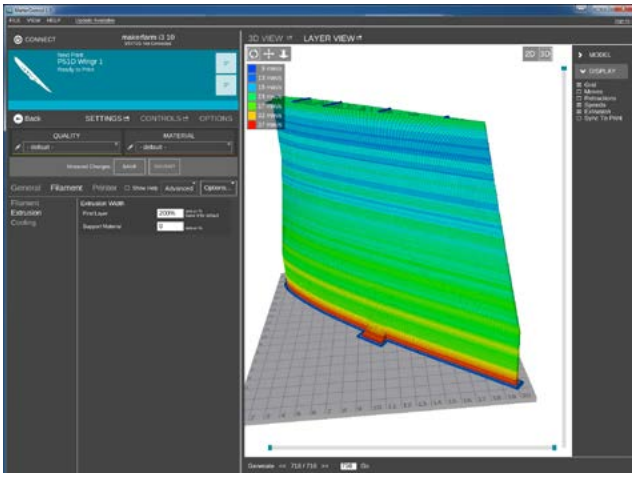
4. Gcodes

Basic Gcodes prepared for direct use. We made it as universal as possible, compatible with PRUSA i3 ORIGINAL and most i3 style printers. Feel free to try it out, but we're not able to guarantee it's gonna work with your printer.

5. Prepared settings for CURA and MatterControl slicers

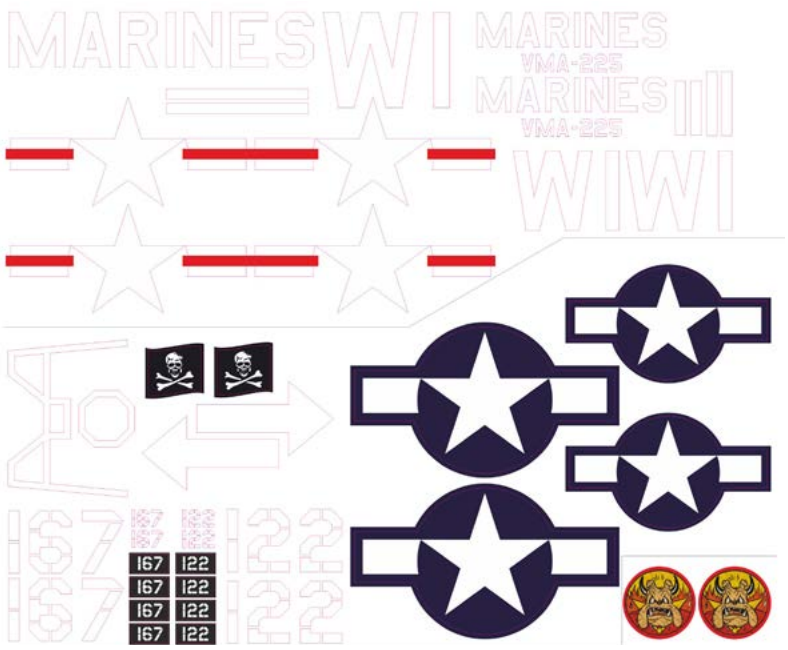
If you can't use Simplify3D for any reason, we provide our basic configuration files for free slicers CURA and MatterControl. Use these as a start point and amend as needed.

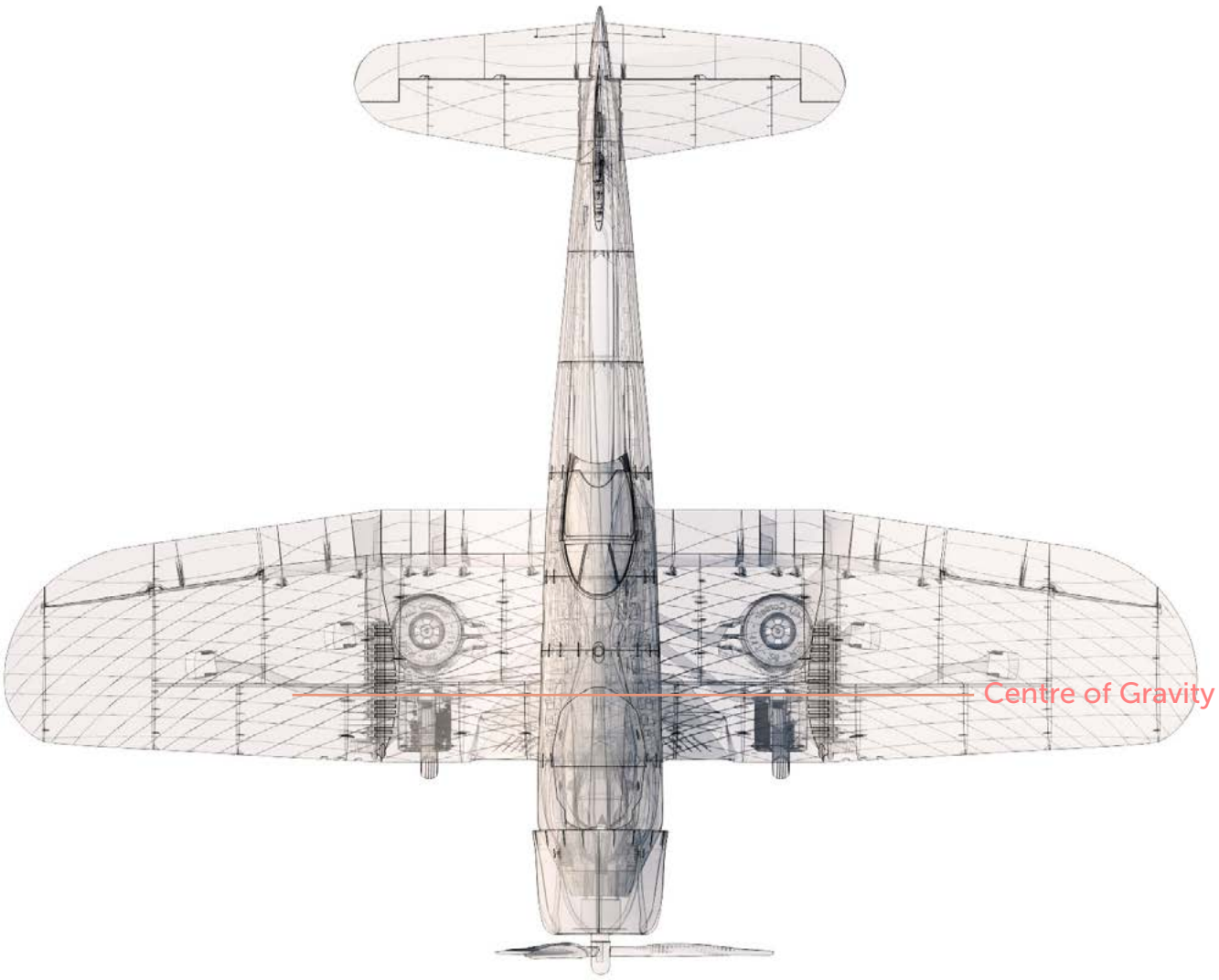




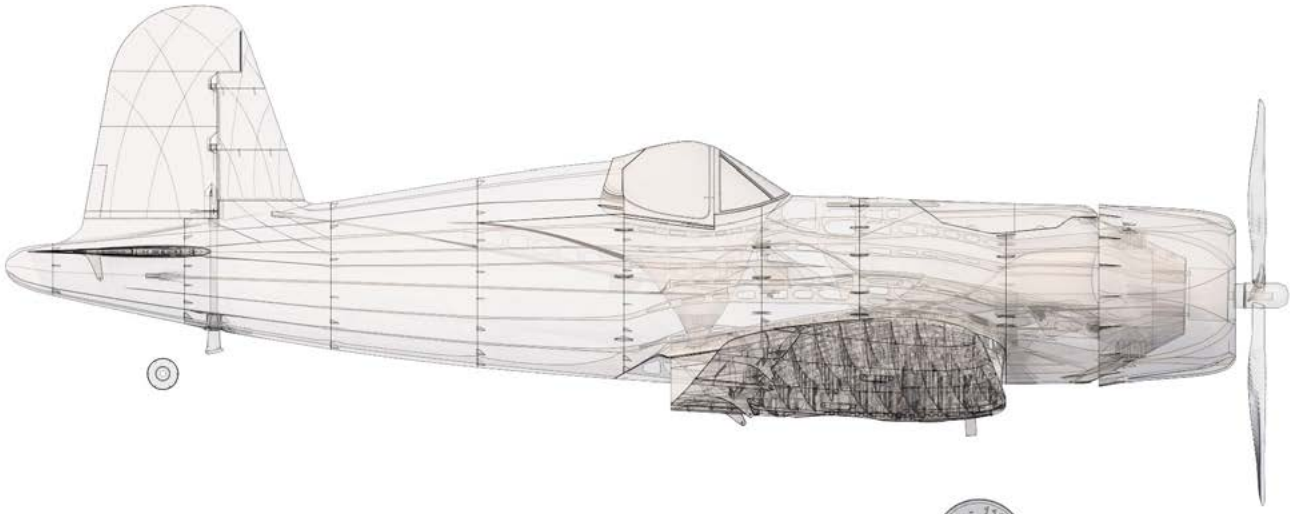
6. Scale markings PDF

Print this PDF on self adhesive foil, cut it and put it on the model according to your preferences.



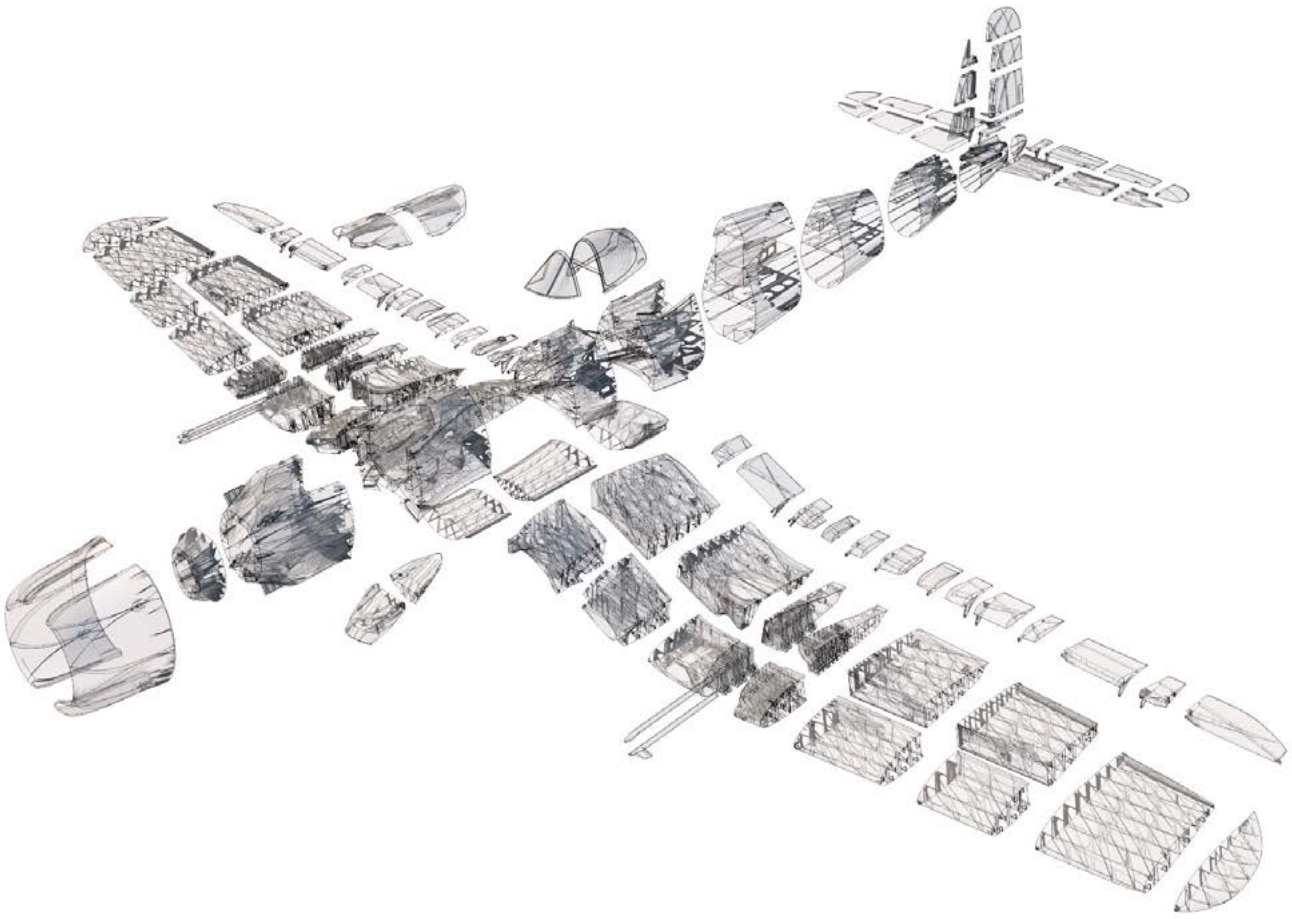


Wing area: 67.4 dm2 / 7.25 sq ft / CoG is 115mm /4.5 in from LE



Lenght: 1520 mm / 60 inch

Wing span: 1900mm / 75 inch



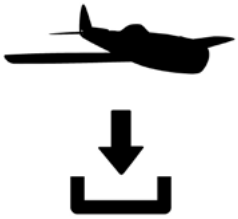
Step By Step PDF/VIDEO userguide (please go through all videos)

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

Basic requirements for F4U Corsair are: 195/195/175mm build volume. Nozzle 0.4mm recommended (0.35 or 0.5mm alternativelly). Heated bed highly recommended.
PLA filament (or PETG, APLA, htPLA, PC-max.... not ABS) and some flex for tires...
If you're unsure your printer can handle this project, download the test part from our FORUM (usually the largest part)

2. Create account, download

You'll get the download link for all zipped files to your email, or log in to your account and download directly from our website. Account is created automatically after checkout.

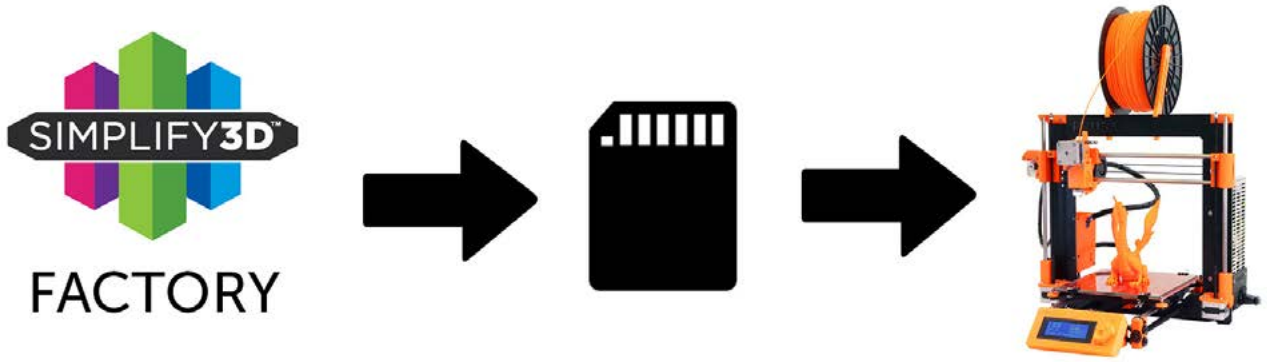


3. Gcodes preparing

option A Gcodes:
If your printer is i3 compatible you can directly use the prepared gcodes. Simply save each to an SD card and let 3d printer do his job. The HE temperature is set to 230°C for the best layer bonding. You can edit speed and temperature on your printer LCD only. If prepared gcodes doesn't work for you, please proceed to the next options...

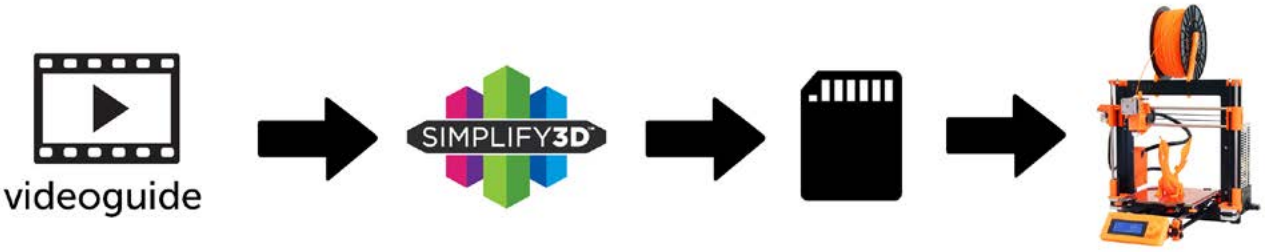
option B FACTORY files for Simplify3D (recommended)

We prepared all you need in the factory files (basic FFF profiles, parts arranged on the bed, etc.) Use our settings as a starting point and edit according to your needs (adapt it for your printer), choose the parts to print etc. Most 3d printers should be ok with files as they are, however if you need some customization, please do so. We are not liable for any damage resulting from the use of our settings. If you still encounter any dificulties, please proceed to the next option.

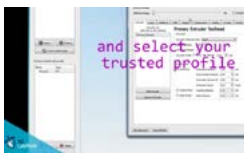


option C Simplify3D manual setting (watch and learn)

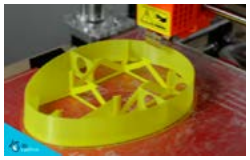
Use our VIDEOGUIDE and how-to to find explanation of proper settings. This is great option to learn a lot about Simplify3D and become a 3d expert. Of course you spend a lot of time and the youtube pause button will become your friend. For simplification we explain only our basic settings for wings and fuselage, please consult our prepared Factory files for the right settings of other parts like motor mounts, landing gears etc.



AND... please look at VideoGuides:



video 2 Simplify3D setting

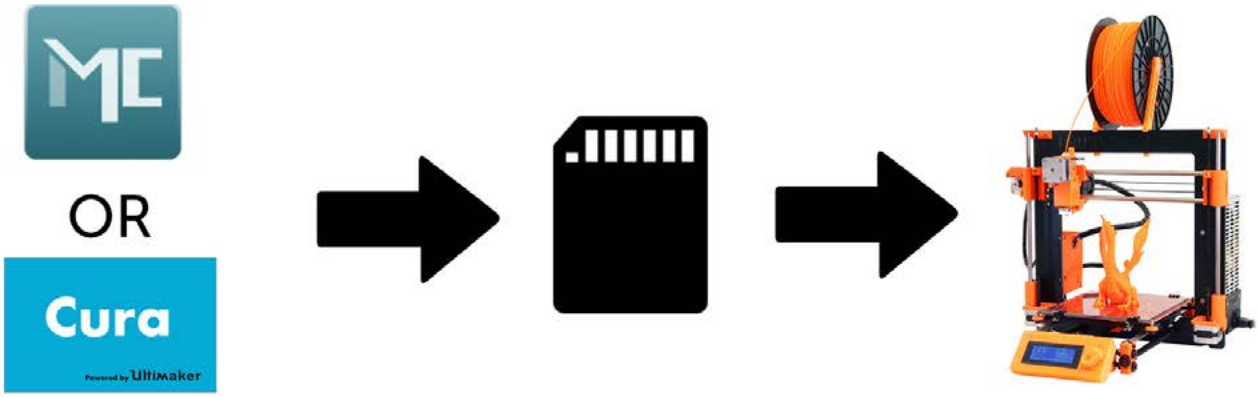


2.1 video about Thin Wall Printing

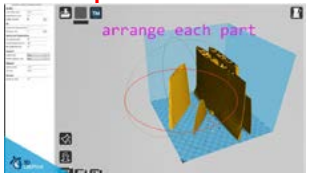
option D CURA or MatterControl (but note: we highly recommend Simplify3D)
MatterControl and CURA slicers are free, while providing very good results and the airframe is still strong enough. The slicer setting is very easy.
Please try to find the right extrusion multiplier and temperature for good weight and best layer bonding. Look at parts weight list for proper multiplier settings.

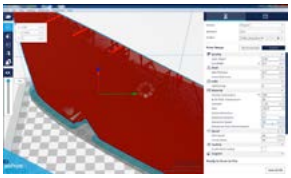
You can also use our predefined basic CURA or MC slicer setting files included in the package (always adapt for your printer, change build volume, filament diameter and so on... depends on your printer!!!) for some thick part you will need to use support structures:
Note: For fuselage 1, wing 3A/B + 4A/B we need to set two perimeters/shells and top layers. (as these parts are very stressed)

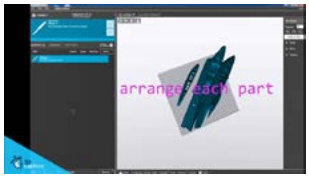
CURA_wing_fuse.ini	(wing and fuselage parts)
CURA_ailer_elev.ini	(only ailerons, elevator and rudder parts)
CURA_thick.ini	(tail landing gear...)
OR	
MC_wing_fuse.slice	(wing and fuselage parts)
MC_ailer_elev.slice	(only ailerons, elevator and rudder parts)
MC_thick.slice	(tail landing gear...)



AND... please look at VideoGuides:







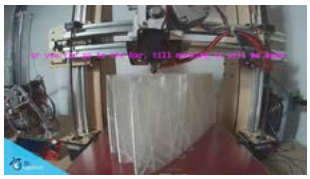
4.1 Print it

Save generated Gcodes and insert SD card to your printer, prepare your printer and start printing. We prefer to use SD rather than a direct connection via USB
Note: ABS filament is not suitable for this. Scaling the model will lead to unusable result!
Note: ninja flex or simmilar fillaments can stick very hard to PEI based surfaces be careful...

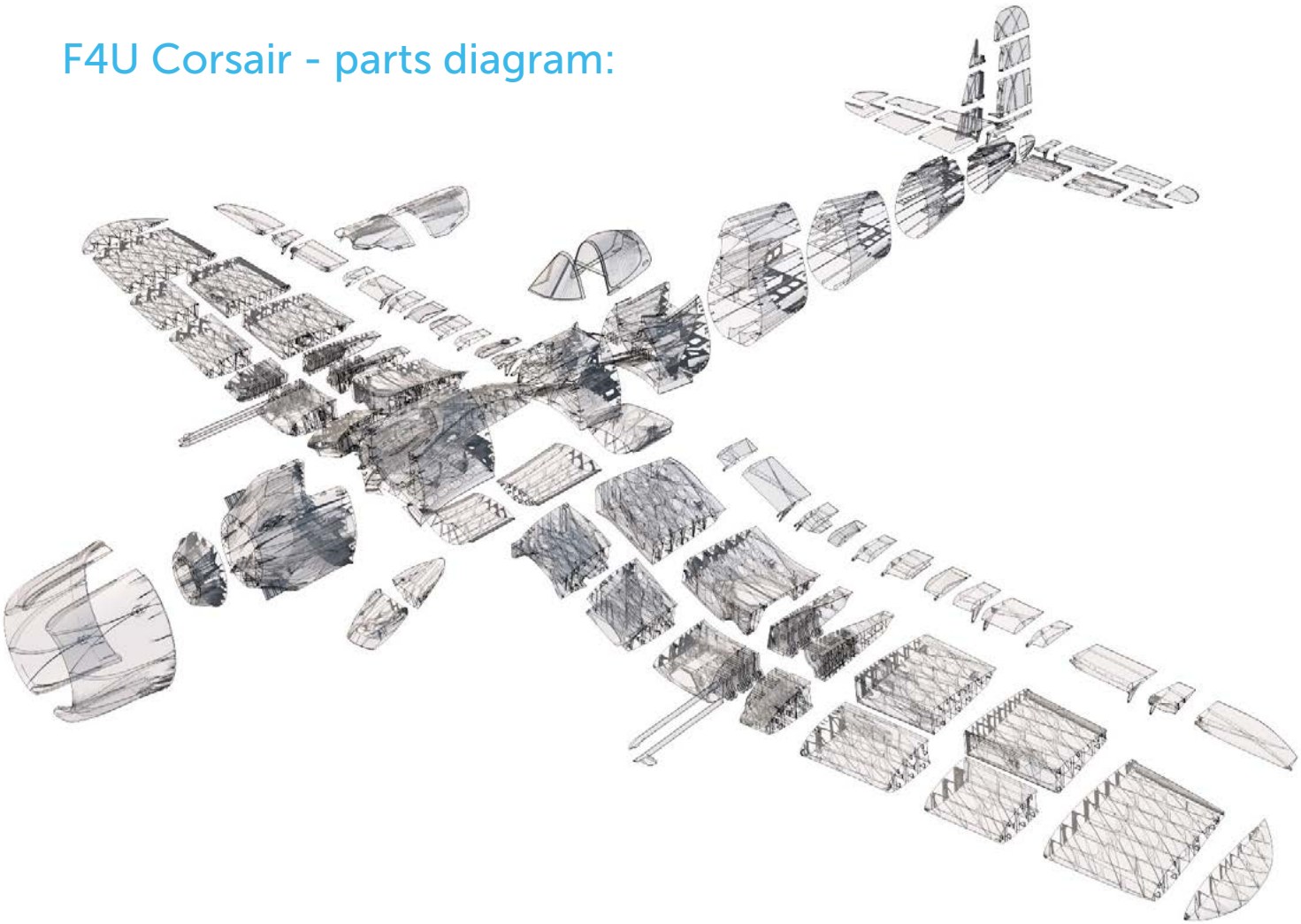
You will need: PLA filament - good quality (we need good layer bonding)
Strong hair spray (or your favorite adhesive bed surface)
Razor blade
(disregard with PEI or simmilar bed surface, Mk2/3...)

AND... please look at VideoGuides:

video printing guide #3



F4U Corsair - parts diagram:



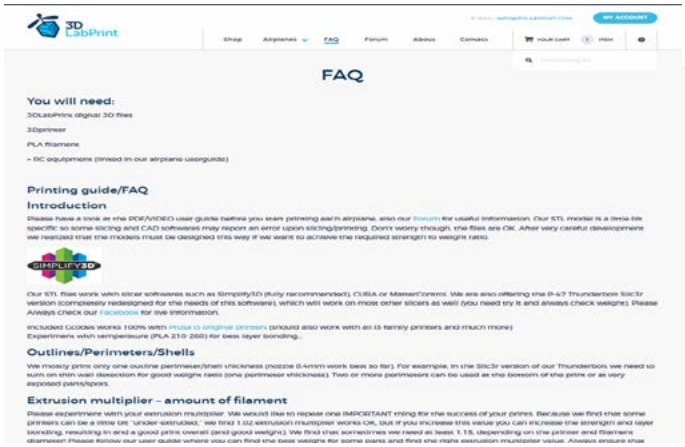
Basic Tips and Advice

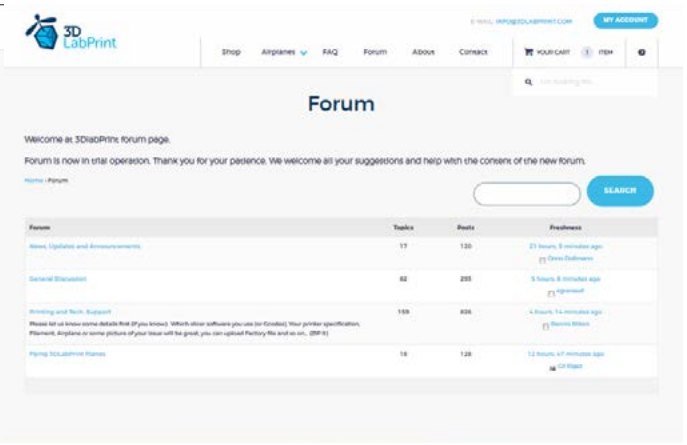
Please check the resulting weight of your parts according to the diagram. Use extrusion multiplier if the weight is different.
HotEnd temperature is very important for a strong result. Please try increasing the temperature to find the best value that works for you (from 215°C up to 260°C).
Turn OFF cooling fan for better layer adhesion (HE fan of course ON). We don't need it as the thin wall parts have large surface to cool down. You can use cooling fan for thick parts...

Heated bed is very recommended, 50-60° 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.
From our experience, some filament colours has lower layer adhesion.
Nowadays there are a lot of 3dprinters on the market, most of them are OK for printing our aircraft (specific thin wall printing...) sufficient volume, heated bed, 0.4 mm nozzle.

Please look at FAQ and our Forum for further information:

or RCGroups 3Dprinted planes Forum





Some advice for rubberlike fillament printing (printable tyre): it is a good IDEA to use some adhesive tape or foil... first layer bonding could be too strong or on the other hand too weak depends what filament is used... (picture:RubberJet - TPE32 245/30 print temperature)

After printed, heat up bed to 80 Celsius and remove tape along with printed tyre, clear the bed with isopropylalcohol...

5. Assembling printed parts

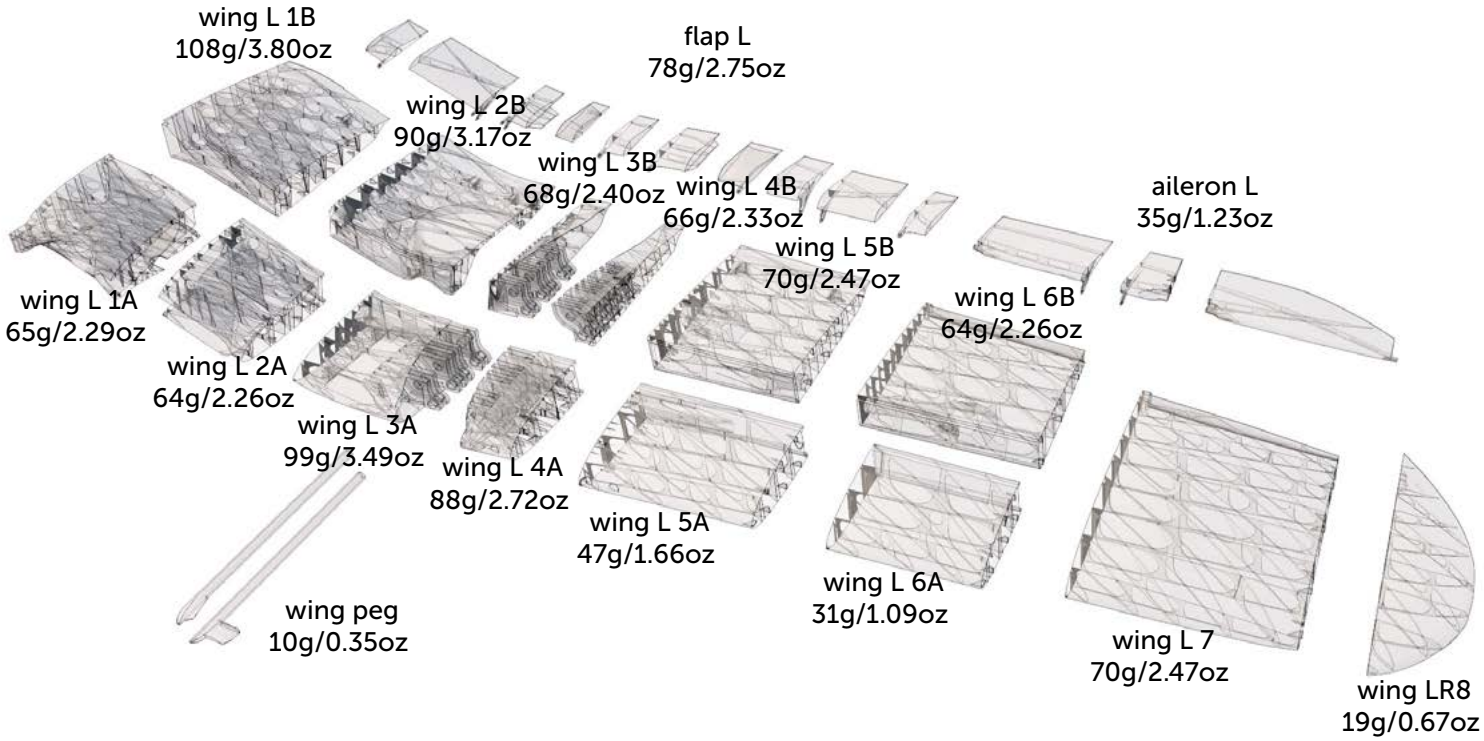
5.1 Wing assembly

Glue wing parts L1-L6 and R1-R6 with CA glue together (position locks will help you), use activator, then glue flaps and ailerons parts together and install it to the wing before RL8 wing part (otherwise the ailerons instalation will be very complicated).

NOTE:
1.Don't glue RL8 parts before you add Ailerons
2.Wing 3A/B and 4A/B must be printed with 2 shell/perimeters and top layers in the peg part (you can use our provided Gcode or Factory files)

Proceed the way shown in videoguide:
See video guide #5.1

you will need: CA Glue - medium or similar medium viscosity CA glue
Activator for CA Glue or similar, but gas presurized aerosol is better
Snap knife



5.2 Fuselage 1 - motor mount annealing

It is a good Idea now to make decision about your preferred setup and way for motor mount. The best way is to try it before you proceed to the next step of gluing Fuselage (or dont glue Fuselage 1 part yet).
You can also tune gap between propeller and engine cowling in three positions.

NOTE:
1.USE ANNEALING for front mount part just heat it for 30+min. in boiling water (or owen). This process increases thermal resistance of this part (heat from motor). see this video
2.Don't use overloaded setups with low efficiency overheating and melting printed parts.
3.Keep the front fuselage free for cooling air.
4.Fuselage1 must be printed with 2 shell/perimeters (use our Gcode or Factory file setting)

F4U_fuselage1

5.3 Fuselage assembly

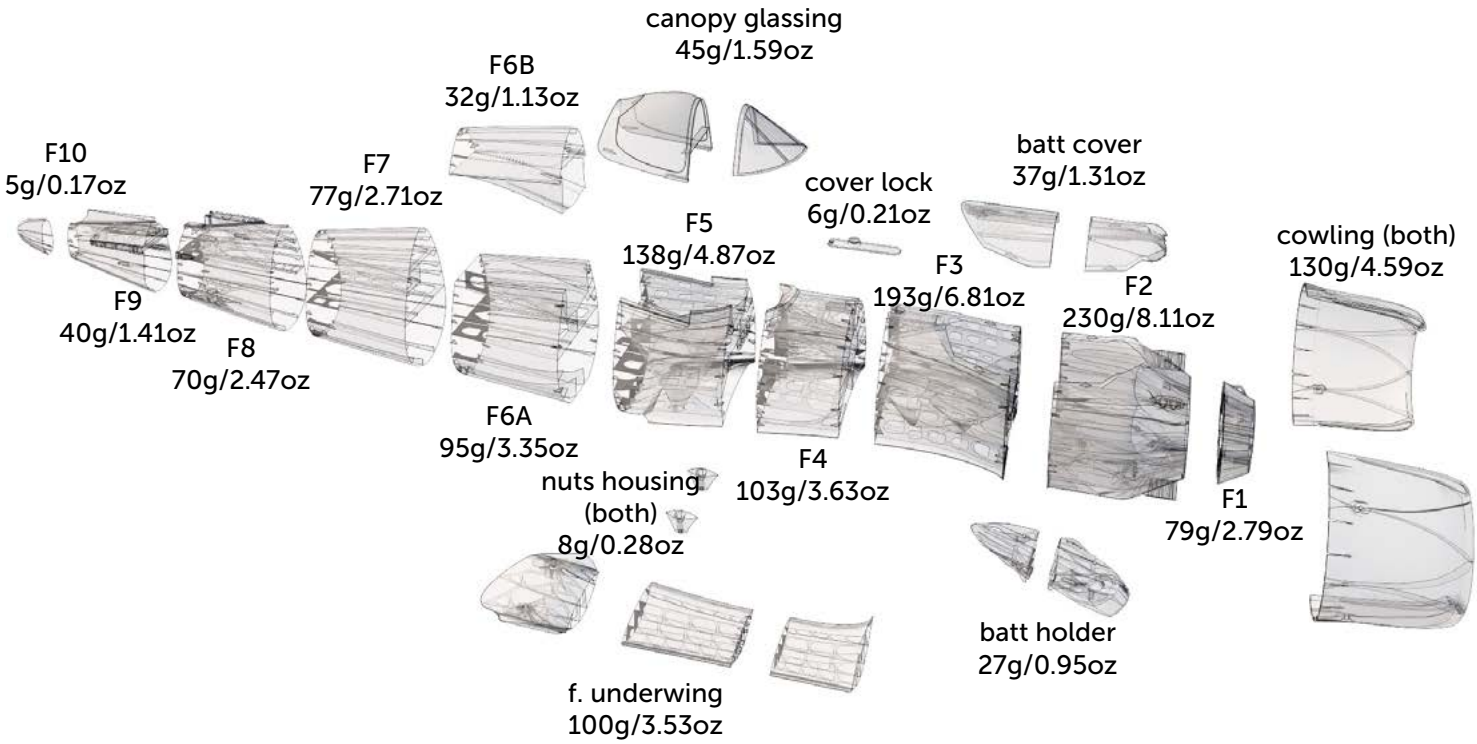
Glue fuselage parts F1-F10 with CA glue together (position locks will help you). You can use snap knife to clear the shape of printed parts, but mostly this is not necessary.
Insert pen spring to battery cover part, insert cover lock, glue both canopy parts together and test a cover lock functionality. insert battery holder to fuselage. Cut and remove plastic from down side of fuselage and at the tail parts for LG instalation.

NOTE:
1.Don't glue the next tail parts yet !!! (for rudder, elevator and horizontal stabilizer proceed to next step)

Proceed the way shown in videoguide:
See video guide #5.3

You will need:

- CA Glue - medium or similar medium viscosity CA glue
- Activator for CA Glue or similar, but gas presurized aerosol is better
- 1x ballpoint pen spring (a spring from old ballpoint pen will work fine)
- Snap knife
- Soldering Iron or any hot tool
- 4x 4/30mm self tapping screw for F1 part (fuselage 1)
- nylon nuts and screws or any 5-6/60mm



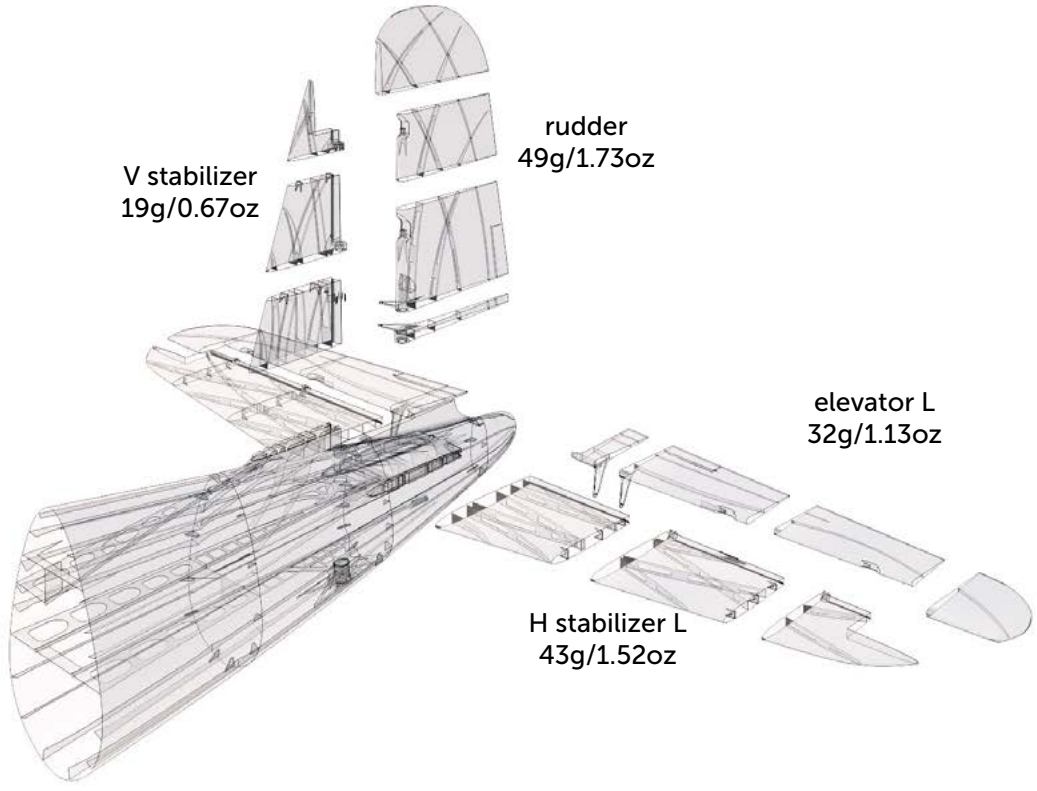
5.4 Fuselage tail - rudder, elevator pushrods and servos

Now it's a good time to install tail stabilizers, elevator, rudder and pushrods. You can use snap knife to clear the shape of printed parts. Assemble the rudder, horizontal stabilizer and elevator parts. Don't glue it to the fuselage yet.
Use 1-1.2 mm / 16AWG pushrod wire for elevator pushrod. Make Z bend or use your preferred pushrods fixing method. We do like these Pushrod Keepers.

NOTE: Proceed exactly as shown in video, dont glue stabilizers to the fuselage before rudder and elevator. If you glue stabilizers to the fuselage before/without rudder and elevator you wont be able to finish the tail part.

Proceed the way shown in videoguide:
See video guide #5.4

You will need:
CA Glue - medium viscosity CA glue
Activator for CA Glue or similar, but gas presurized aerosol is better
1.2 mm /16AWG steel pushrod wires
Wire cutter, Z bend pliers or pliers.
Snap knife

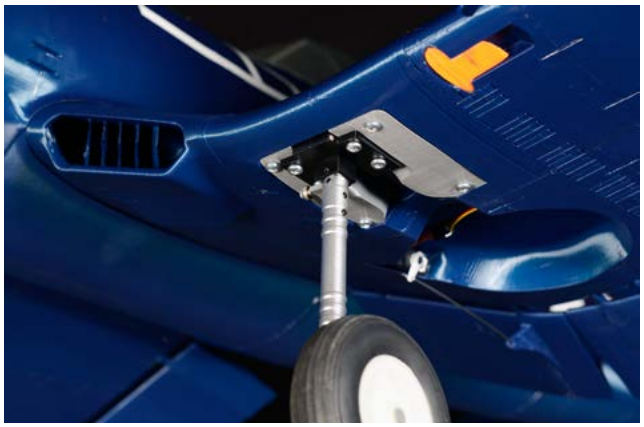


6.1 Servo installation

Our F4U Corsair was designed for 6pcs of mini servos 30x30x12mm. Mount two servos to fuselage. Make Z bend at correct legth of pushrods or use your preferred pushrods fixing method. For wings use servos with extension cables.

Proceed the way shown in videoguide:
See video guide #6.1

You will need:
9x Hitec HS-82 or similar, size: 30 x 30 x 12mm servos
servo extension cables 300mm / 12 inch
1.5 mm /14AWG pushrod wires for ailerons
1.2 mm /16AWG pushrod wires for flaps
Wire cutter, Z bend pliers or pliers.
some gauge (f.e. ruler)



PLA motor mount, We suggest it to be annealed, you can use this way , submerge in water or cook it in owen or simply cover with a lid on your heatbed and heat it up to 100°C for more than 30 minutes.

7.1 Landing gear

Install retracts, legs and wheels. Insert LG housing into the fuselage, rudder axle and tailwheel suspension, you can use OIL for better suspension friction, then link it with rudder - use spring and wire/string (a spring from old ballpoint pen will also work fine)

Proceed the way shown in videoguide, but remember you can choose from 4 options or any suitable retracts and make your own LG housing (feel free to use balsa wood as well):

See video guide #7.1

You will need:

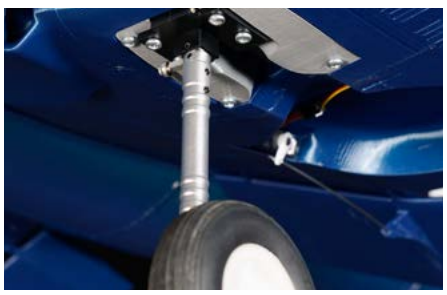
main LG option A:
1x F4U Corsair FMS designed El Retract Set FMSRE005 RC
1x Alloy Oleo Strut 130mm
Type A LG housing + Main wheel tyre and disc (3dprinted)
8x 4/30mm self tapping screw

main LG option B:
1x Turnigy Metal Servoless Twist n Turn Retracts/leg's/wheels 1.20 size
Type B LG housing
8x 4/30mm self tapping screw

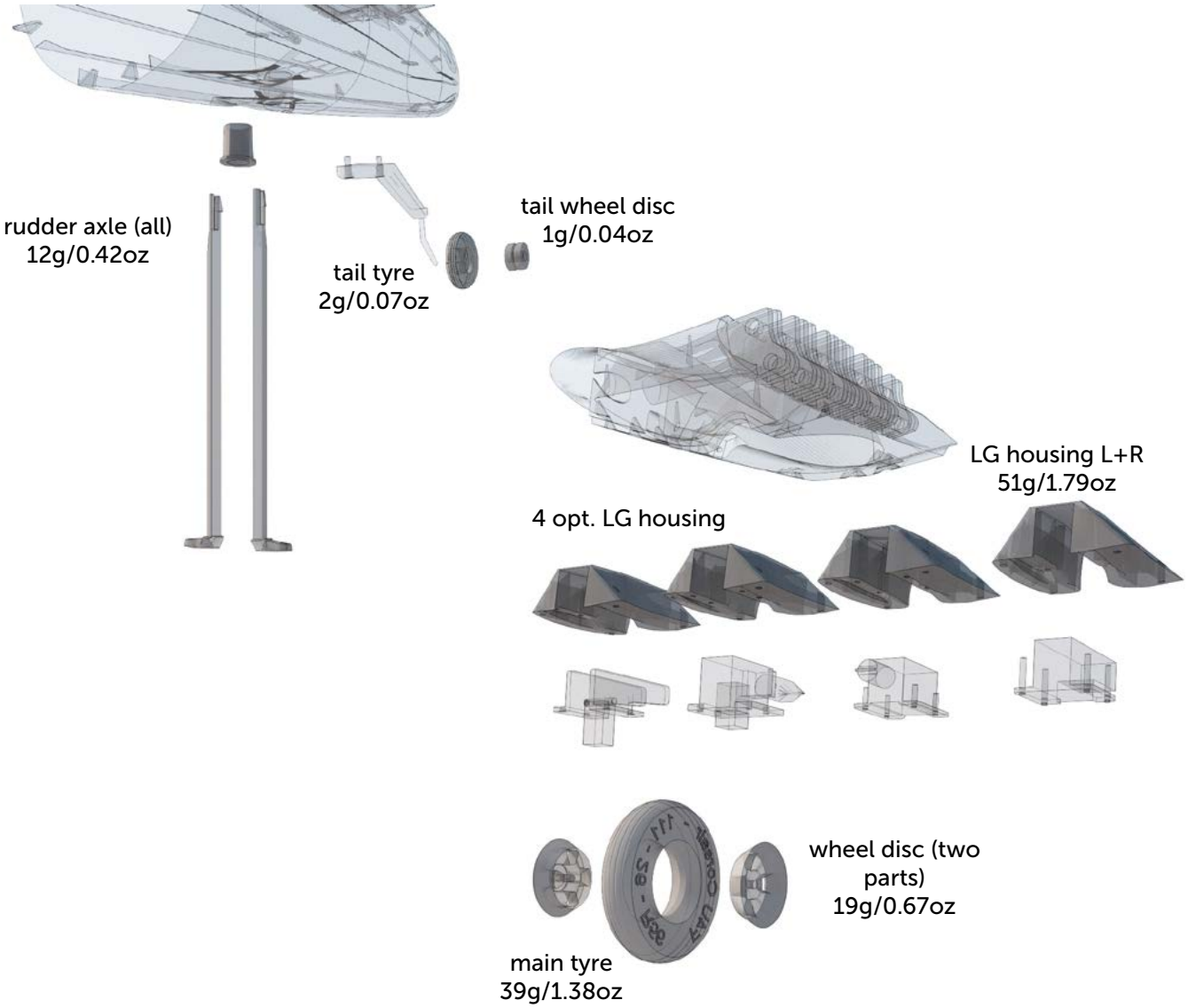
main LG option C (minor wing cut needed):
1x Turnigy Full Metal Servoless Retract with 190mm
included oleo legs are too long, you'll need to cut it or use these legs
1x Alloy Oleo Strut 130mm
Type C LG housing + Main wheel tyre and disc (3dprinted)
8x 4/30mm self tapping screw

main LG option D (for experts only):
2x Servoless Retract with Metal Trunion 44mm x 41mm Mount
1x Alloy Oleo Strut 130mm
Type C LG housing + Main wheel tyre and disc (3dprintded)
8x 4/30mm self tapping screw

NOTE: you will need to make your own rotating mechanism for retracts


Tail wheel:
1x Tail Wheel System. w/ Steering & Spring 60-120 Size or similar
2x self tapping screw
Soldering Iron or any hot tool
you can use any suitable tailwheel system + you can print your own wheel.





8.1 Motor Setup installing

Please refer to 5.2 Fuselage 1 - motor mount.

Important:
Use only annealed PLA for motormount. PLA printed parts without annealing can NOT withstand the motor heat.

See video guide #8.1

Some tested setups:

SETUP A)

Motor:	Turnigy Aerodrive SK3 - 6354-260KV Brushless Outrunner Motor or similar
ESC:	MEZON 120 lite or similar at leats 90A/8s
Battery:	2x Turnigy 5000mAh 4S 25C Lipo Pack w/XT-90 or similar 4s (550g) + XT 90 2in1 series adaptor
Propeller:	Turnigy Type A Beech Wood 3-Blade Propeller 18x8 or 18/10 alternatively Turnigy Gas Wood Propeller 20x10

Sound system: you can use this one

Important:
check motor mount and screws before each flight, don NOT use PLA motor mout without annealing!!!

9.1 Decals

Cut decals from thin advertisement foil or use any local advertisement or graphic company. Stick it at your model by your choice.
This aircraft can be painted with any waterproof acrylic colours.

See video guide #9.1

10.1 Final completion and setting

Install your receiver, connect battery, setup servos and etc. with your trasmitter, check servo position. Set recommended deflection. Check CoG point (CoG is 115mm /4.01 in from the Leading Edgeof wing). As the last step install propeller.

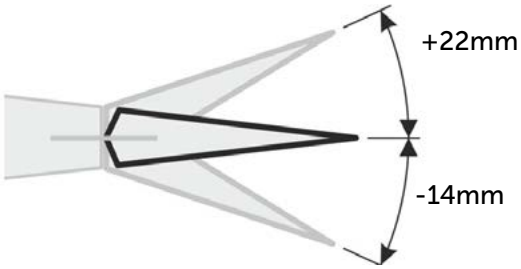
Make sure the battery is placed properly and secured in position. If battery moves during flight it can shift the center of gravity backwards and the aircraft becomes uncontrollable!

See video guide #10.1

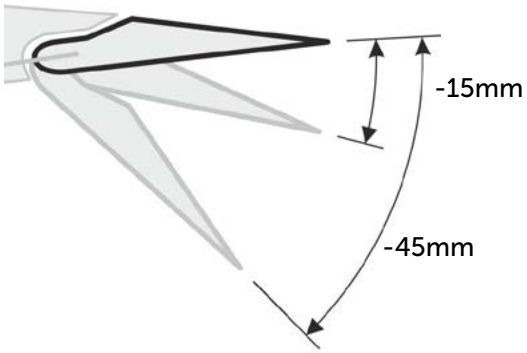
You will need:

your own Rx/Tx system, 11channel (at least 6ch)
nylon nuts and screws or any 5-6/60mm
adhesive velcro strip for Li-Pol battery, ESC and Receiver
battery strap
some gauge (f.e. ruler)

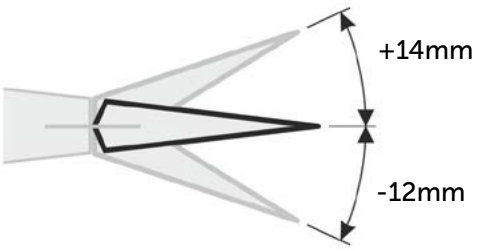
aileron



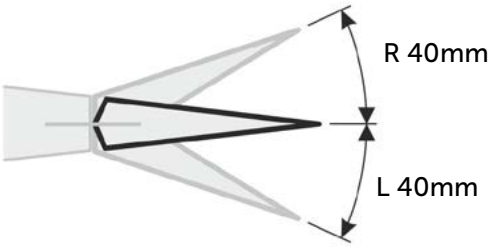
flap



elevator



rudder



10. Pilots Please Attention!

For the first flights we recommend to increase expo settings on your transmitter for elevator and aileron to 60 % (this calms the response from your stick inputs) and you can decrease elevator and ailerons deflection a bit.
Make sure the battery is well fixed in proper position. If it moves during flight it will cause the CoG move aft and can lead to uncontrollable flight behavior.

Check motor mount and screws before each flight...
Do NOT leave this PLA plane on direct summer sun or in car. (max. PLA temp is about 60C)
Spend at leats 10 hours with RC flight simulator before you go out for the first time.

Flight video

Recommended:

Flite test: RC Planes for beginners

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

Never fly aft positioned Center of gravity.

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