Fully 3d printable

Lockheed P-38 Lightning

scale 1:12, wingspan 1410mm (55.5in)
Lockheed P-38 Lightning – 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 enjoy 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 characteristics 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 additive 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 throttle with the speed exceeding 110 kph (HP setup). On the other hand low stall speed is achieved for easy landing.
General specifications (HP setup):

Lenght: 1042mm (41.0in)
Wingspan: 1410mm (55.1in)
Height: 298mm (11.7in)
Wing area: 30.5 dm²
Wing loading: 65.9 g/dm²
Airfoil: aircombat modified
Print weight: 1160g
Empty weight (w/o battery): 1750g
Takeoff weight (3s 3000 lipo): 1980g
Max takeoff weight: 2200g
Never exceed speed, VNE: 205 km/h
Design maneuvering speed, VA: 165 km/h
Stall speed, VS: 34 km/h

Powerplant
Propeller: aeronaut ELP 9/6 or APC 9/6 – 9/7.5
Motor: 2x Turnigy D3530/14 1100KV or similar 3530-35 1100kv
ESC: 30A Electronic Speed Controller or similar 30-40Amps
Battery: Turnigy nanotech 3000 mAh/3s/11.1V, 238g, 25C

Performance measurement
Max speed VH (level flight): 105 km/h – 56.7kn – 65.2mph with APC 9/6
Rate of climb: 20 m/s (5 373 ft/min) with APC 9/6
Flight time (3s 3000mAh/full): 7:40 with APC 9/6
7:40 with aeronaut ELP 9/6
Lockheed P-38 Lightning, History

The Lockheed P-38 Lightning was a World War II American piston-engined fighter aircraft. Developed to a United States Army Air Corps requirement, the P-38 had distinctive twin booms and a central nacelle containing the cockpit and armament. The P-38 was used for interception, dive bombing, level bombing, ground attack, night fighting, photo reconnaissance, radar and visual pathfinding for bombers and evacuation missions and extensively as a long-range escort fighter when equipped with drop tanks under its wings.

The P-38 was used most successfully in the Pacific Theater of Operations and the China-Burma-India Theater of Operations as the aircraft of America’s top aces, Richard Bong (40 victories), Thomas McGuire (38 victories) and Charles H. MacDonald (36 victories). In the South West Pacific theater, the P-38 was the primary long-range fighter of United States Army Air Forces until the appearance of large numbers of P-51D Mustangs, toward the end of the war.

The P-38 was unusually quiet for a fighter, the exhaust muffled by the turbo-superchargers. It was extremely forgiving and could be mishandled in many ways but the rate of roll in the early versions was too slow for it to excel as a dogfighter. The P-38 was the only American fighter aircraft in production throughout American involvement in the war, from Pearl Harbor to Victory over Japan Day. [citation needed] At the end of the war, orders for 1,887 more were cancelled.
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 don't 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
Let print on thin adhesive foil and place on the model as needed, violet cut lines included...
1410mm (55.1in)
Step By Step PDF/VIDEO userguide

1. Choose airplane at [www.3Dlabprint.com](http://www.3Dlabprint.com), our Facebook for live information...

   Basic requirements (P-38 Lightning):
   - min volume 195/195/150mm (250/120/150)
   - nozzle 0.4mm recommended (0.35 or 0.5mm alternatively)
   - 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.

   ![Download](download_icon.png)

3. Gcodes preparing

   Options A Gcodes:
   - if your printer is i3 compatible 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 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 dam-
ages 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)
- 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)
- MC_thick.slice                 (motor mount, battery holder, spinner)

AND... please give a look to VideoGuides:

video CURA slicer 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:
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, 60-70celsius (print without warping ends)
Looks like any standard quality PLA is OK 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 aircrafts (specific thin wall printing...) suicient volume, heated bed, 0.4mm nozzle.

Please give a look to Printing Guide:
5. Assembling printed parts

5.1 Wing assembling
Glue wing parts with CAglue together, use activator and instal ailerons...
Please, ailerons and elevator may differ from videoguide, simple glue them together..
See video guide #4
you will need: CA Glue - medium or similar medium viscosity CA glue
Activator for CA Glue or similar, but not-mechanical is better
AC Hinge Sheet or similar
Scissors
Snap knife
Some cloth for wiping CA glue...

5.2 Fuselage assembling
Glue with CAglue fuselage parts together, use activator, instal elevator, instal peg, fine tune parts shape with knife or sandpaper f.e. when assembling slots for wing and fuselage, first!
fine-tune peg with a hole!!!.
See video guide #5 part1 See video guide #5 part2
you will need: CA Glue - medium or similar medium viscosity CA glue
Activator for CA Glue or similar, but not mechanical is better
AC Hinge Sheet or similar
Scissors
Snap knife or Sandpaper
Soldering Iron or any hot tool
6. RETRACTABLE LANDING GEAR preparing

See video guide #6

you will need:  
- Main Landing gear servoless Retract
- Nose Landing gear servoless Retract
- 2x main LG wheel + nose LG wheel
- 3mm quality LG spruts (spring steel), please ask in local hobby shop or any
- LG wheel stoper
- Tube clutch 3 to 4mm for steerable nose gear, please find any will fit...
- 12 x Self Tapping Screw M3x12mm or similar
- 2x Servo Lead Extension or similar
- Y servo cable or similar
- Screwdriver +
- Hex screwdriver 1.5mm
- Dremell or any steel handsaw
- Soldering Iron or any hot tool

Some recommended motor setups (or use your own with sufficient thrust and weight):

**ECO PERFORMANCE SETUP**  
you will need:  
- 2x [Turnigy D3530/14 1100KV](#) or similar 3530-35 1100kv
- 2x [30A Electronic Speed Controller](#) or similar 30-40Amps
- Male XT60 connector
- [Turnigy 3000mAh 3S 20C](#) or similar 3000-3300/3s
- or 2x 2000/3s (use 2to1 parallel connector)
- [16AWG Wire red and black](#)
- propellers, [scale 3 blade](#) or more efficient two blade 9/6 CW/CCW
- Solder wire and Soldering Iron
- printed motor mount, find the one which fits... (25/19)

**OR HIGH PERFORMANCE SETUP** (if you like it hot, yeah)prop 9/6, 9/7 fast:

you will need:  
- 2x [Motor – AX-4008Q-620KV](#)
- 2x [Speed controller (ESC) – CC Talon 25](#) or similar 25A/6s
- 6x PAIRS, 3.5mm [Gold Connectors](#) - optional
- [Battery 1550mAh/6s](#) – or 2x 1550/3s better (use 2to1 serial connector)
- [16AWG Wire red and black](#)
- Male XT60 connector
- [Shrink Tube black](#)
- Solder wire and Soldering Iron
- [Hands free Holder](#) - optional
- propellers two blade 9/6 CW/CCW
- printed motor mount (25/25)
7. R/C Equipment and servo pushrods installing

Instal prepared RC equipment: Motor, ESC, Servos...
Nose and motor mount are already in angle for compensating rotating propeller stream.
Test and center all servos with servo tester or transmitter, then instal horns in midle position... use HXT900 or any 21x21x23mm
See video guide #7
you will need: 9x 9g Servo HXT900
  12x Servo Lead Extension or similar
  Snap knife
  8x Screw 3/12-30mm depends on motor-mount
  Small screwdriver+
  Your earlier prepared R/C equipment
  6x Self Tapping Screw M3x8mm or similar
  6x Steel pushrod, diameter 1.0-1.2mm
  Pliers
  CA Glue  - medium
  Activator for CA Glue or similar, but not mechanical is better

8. Receiver installing and LG retracts check

Refer to your R/C system userguide for installing information, check if Landing Gear Retracts work OK or if there is some blockage with LG spruts (too deep)
See video guide #8
you will need: Your own Rx/Tx system
  Battery for your setup...
  Velcro strip for Li-Pol battery
  Scissors
  Small screwdriver+
  CA Glue  - medium + activator
9. Final Completion

Instal your reciever, connect batery, setup servos and etc. with your trasmitter, lock 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!!!

See video guide #9
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

!!!Never set ESC with instaled propeller, this is very dangerous!!!

10. Go flying
Before flight check: **center of gravity is very important** (move it forward for the first flights see CG markings and chapter 11 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 runway ) Then gain speed until the plane move up tail part , then pull the elevator gently and you’re in the air.
Big But, it is very useful spend some time in this discusion, very very recommend:
**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 position if it moves during flight it will cause move CoG aft and will lead to uncontrollable 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 CoG!!!

And Please, use this files only for your own purpose, do not send further... Thank you very much