3D LabPrint

User Guide

rev. 2023/02

Fully 3d printable

Hawker
Hurricane MkII

scale 1:12, wingspan 1060 mm / 42.0 inch

LW planes

Hawker Hurricane MkII
## fully printable R/C plane for your desktop 3Dprinter

Fully 3D printable RC model of the classic plane, specially designed as a cheap and easy to build Stable RC model for everyday flying. Many scale details such as airframe plating encourages to create realistic paint jobs. This plane has been designed for printing from PolyLight 1.0 LW-PLA active foaming filament, that allow even the small printed planes to be as light as any other RC plane building technique. Get ready for flying with this great performing flying legend!

The first fully printable airplane 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 $10.

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 throttle and speeds exceeding 80 kph. Low stall speed is achieved for easy landing on the other hand.
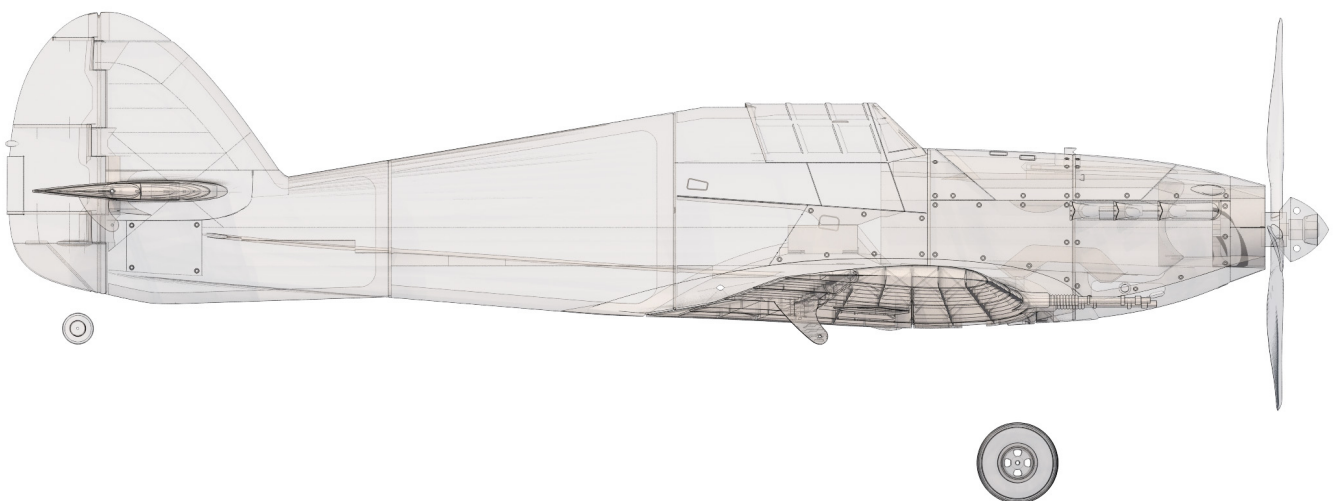
General specifications:

Wingspan:	1060 mm / 41,73 inch
Lenght:	800 mm / 31.5 inch
Height:	205 mm / 8.00 inch
Wing area:	19,57 dm2 / 2.10 square feet
Wing loading:	34.7 g/dm2 / 11.41 oz/square feet
Center of gravity:	60 mm / 2.36 inch from leading edge
Airfoil:	LHK508 modified by 3DLabPrint
Print weight (LW PLA):	321 g / 11.35 oz
Empty weight (w/o battery):	500 g / 17.63 oz
Takeoff weight (4s 1550 lipo):	680 g / 23.98 oz
Max takeoff weight:	880 g / 31.00 oz
Never exceed speed, VNE:	160 km/h / 99 mph
Design maneuvering speed, VA:	80 km/h / 50 mph
Stall speed, VS:	18 km/h /11.2 mph

Recommended setup

Motor:	Leopard LC2830 980KV (for 3-4S setup)
ESC:	20A/3-4S
Propeller:	two blade GWS 9 x 6
Battery:	Li-Pol 1500mAh / 4S
	printed PET motor mount

Performance measurement

|	
Max speed VH (level flight):	105 km/h – 56.7kn – 65.2mph with GWS 9x6
Rate of climb:	20 m/s (5 373 ft/min) with GWS 9x6
Flight time (3s 1300mAh/full):	7:30 with GWS 9x6

Hawker Hurricane MkII

The Hawker Hurricane MkII was a British single-seat fighter aircraft designed and built by Hawker Aircraft Ltd. in the 1930s. It played a crucial role in the defense of Britain during the Second World War, particularly during the Battle of Britain in 1940, where it proved to be an effective and reliable aircraft against German bombers. The Hurricane MkII was powered by a Rolls-Royce Merlin engine, had a top speed of 340 mph. It was a versatile aircraft that could be used for a variety of roles, including air defense, ground attack, and reconnaissance. Overall, the Hawker Hurricane MkII was a vital component of the Royal Air Force's air power during the Second World War and helped to secure victory for the Allies.

Canon version was a variant of the Hawker Hurricane designed specifically for ground attack missions during the Second World War. It was equipped with two powerful 40mm Vickers S guns, which were capable of firing armor-piercing rounds and had a devastating effect on enemy tanks, trains, and other ground targets.
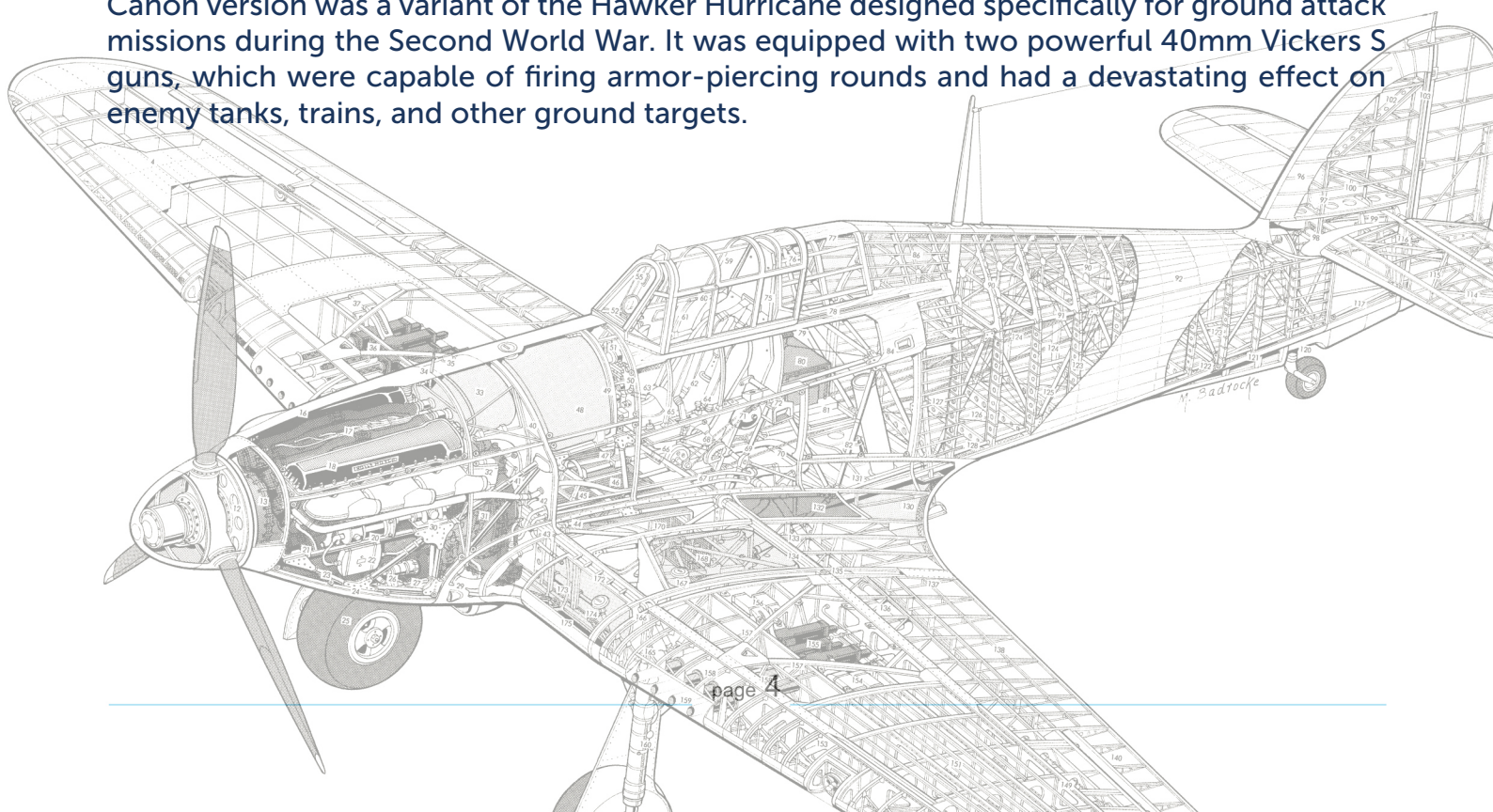
Included:

1. 3MF 3D files (primary)

Used instead of STL files

3MF files can be used instead of standard STL files, but also include information about slicing in the new version of Prusa Slicer (since version 2.4). Open them directly in the Prusa Slicer as a project or import to the slicer of your choice. The files contain settings for printing on a direct drive printer with dimensions 200x200x200 mm, that can be further adapted to suit your printer. The generic settings are compatible with Prusa MK2/3/3S printers.
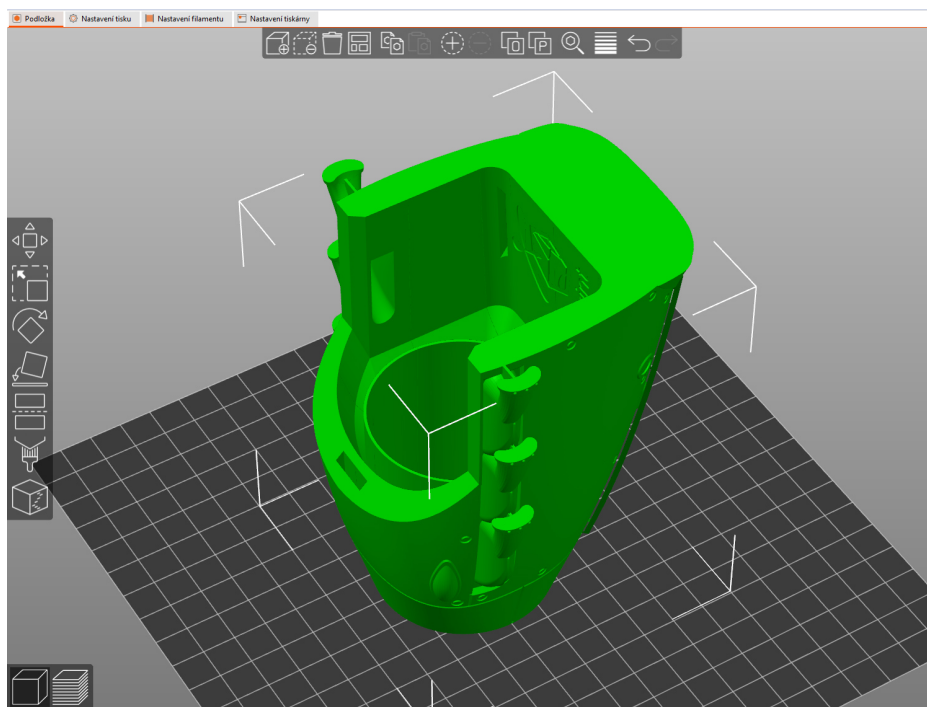
2. STL files - universal for all slicers

STL files are no longer necessary, as 3MF files can be imported to any slicer (Cura, Simplify3D) same as the STL files. Please use the 3MF files instead which contain more information than plain STL.

3. Printing Guide in our Help Section

Apart from this userguide, please see the Printing Guide for PrusaSlicer, Simplify3D or Cura to find some Tips and Advice for airplane printing (Thin Wall Printing).Remember: We use 0 retraction and 0.4-0.5 flow with LW-PLA.

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 it will work on your printer. Wall thickness should be 0.55-0.67mm.

5. Scale markings PDF

You could print and cut the PDF in scale from thin self adhesive advertisement foil and place it on the model as needed.
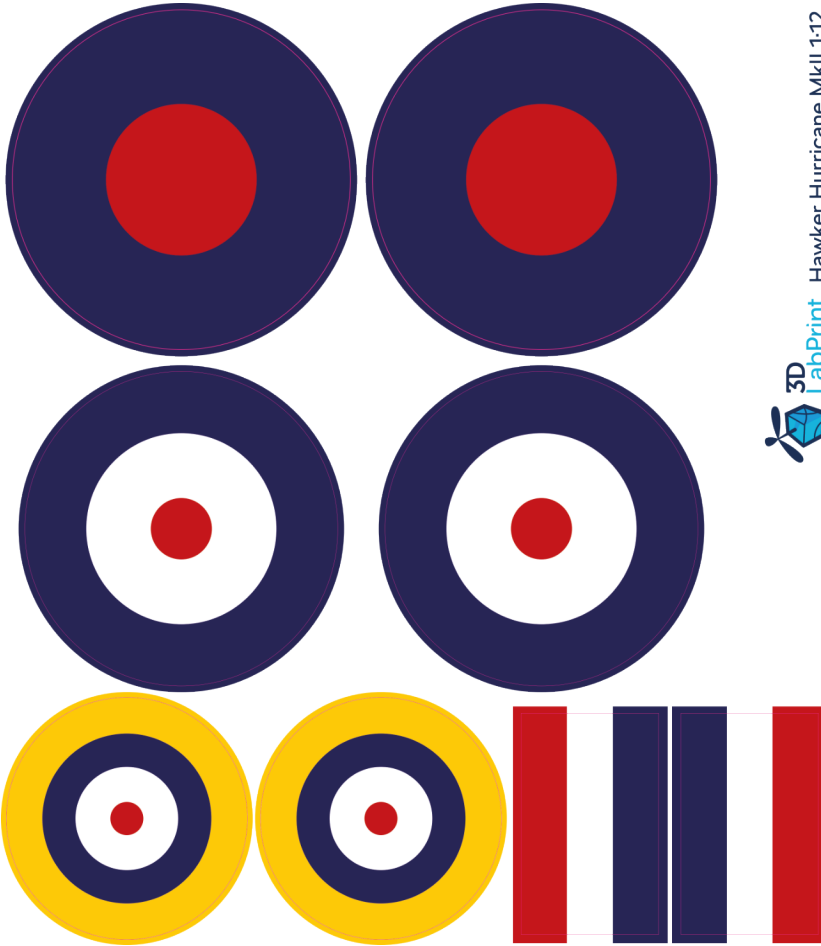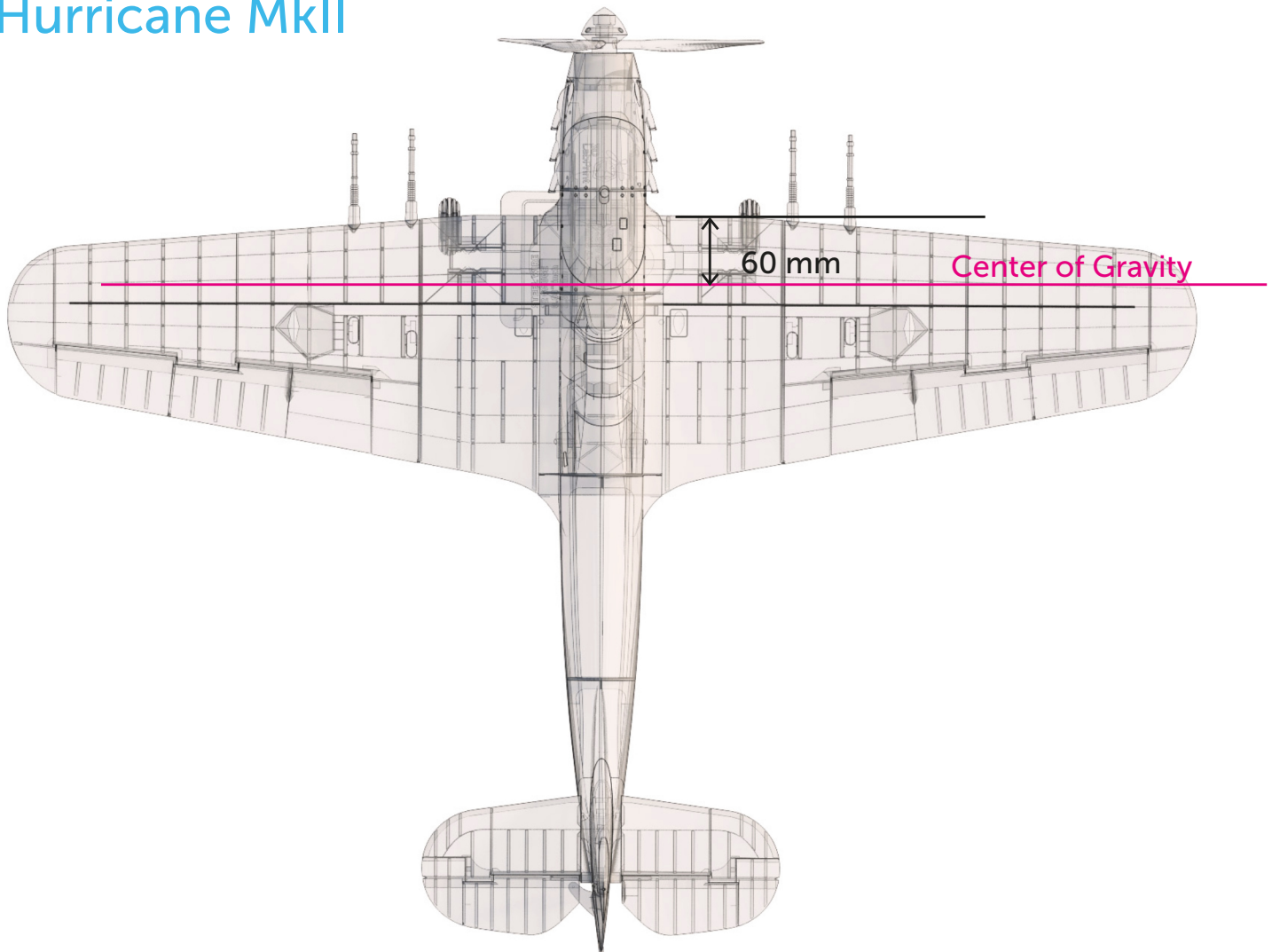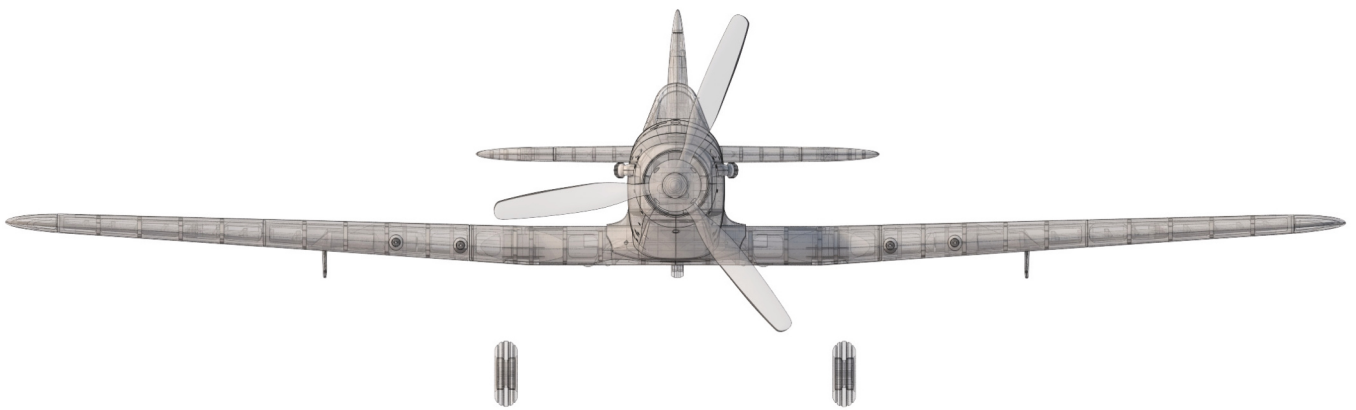

3D LabPrint Hawker Hurricane MkII 1:12
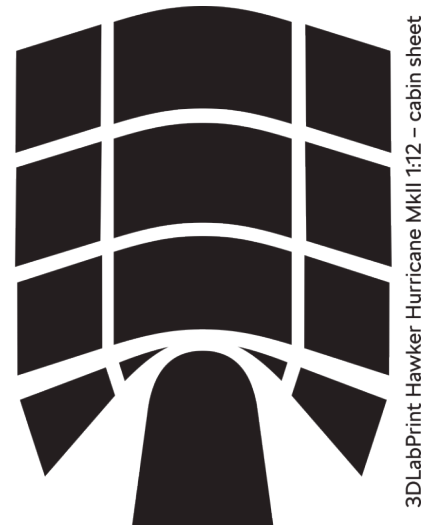
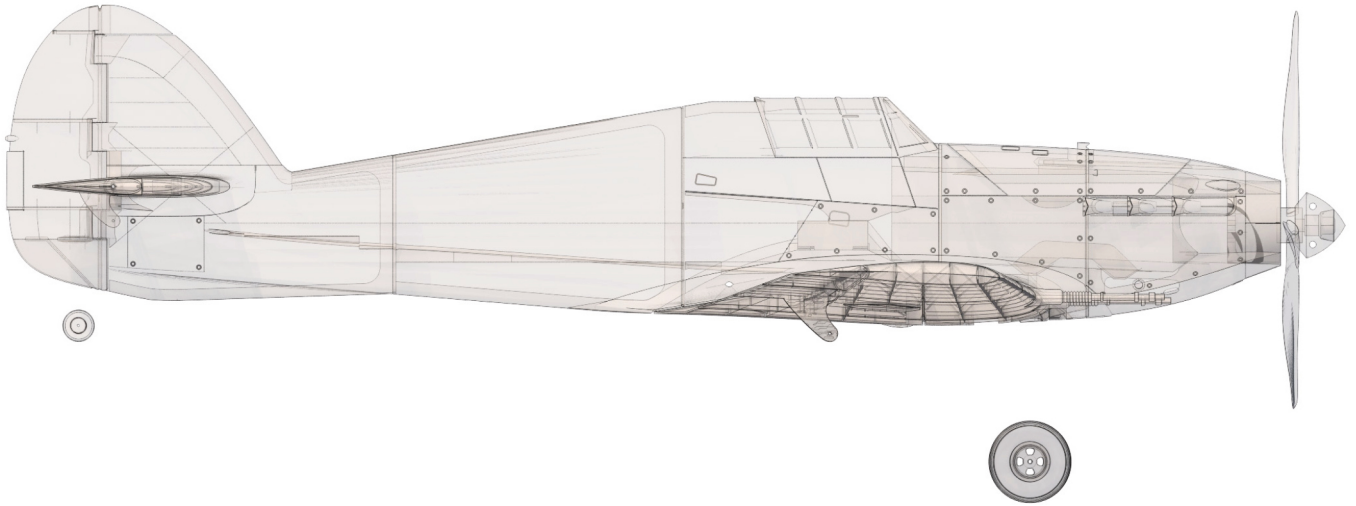3DLabPrint Hawker Hurricane MkII 1:12 – cabin sheet

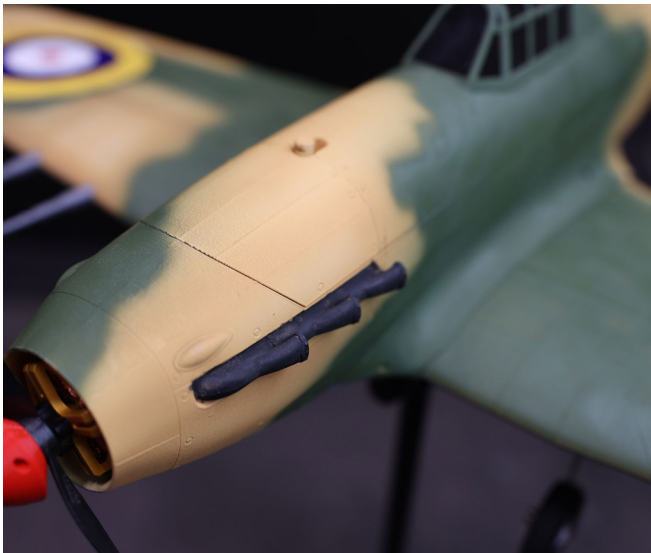# Hawker
Hurricane MkII

60 mm

Center of Gravity

Wing area: 19,57 dm2 / 2.10 square feet

Wingspan: 1060 mm / 41.73 inch

Lenght:800 mm / 31.5 inch

Step By Step PDF/VIDEO userguide

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

Basic requirments for Hurricane MkII are 200/200/195 mm volume, nozzle 0.4mm recommended (0.35 or 0.5mm alternativelly). Heated bed recommended. Designed to be printed with Polylight LW-PLA filament by 3DLabPrint. Contact: support@3dlabprint.com

2. Create account, download

You will receive download link to all the zipped files to your email right after the checkout (please check your spam folder if not). If you are logged in with your account while purchasing the model, you will find the download link in your account's Downloads section on our website. Please contact support@3dlabprint.com if you have trouble getting the files.
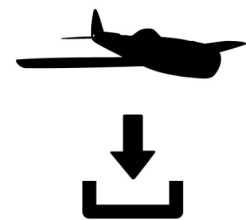
3. Prepare Gcodes

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 240°C so the layers fuse together well, 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.
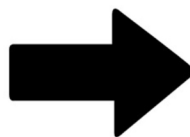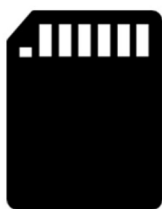
option B Prusa Slicer 3mf files (recommended)

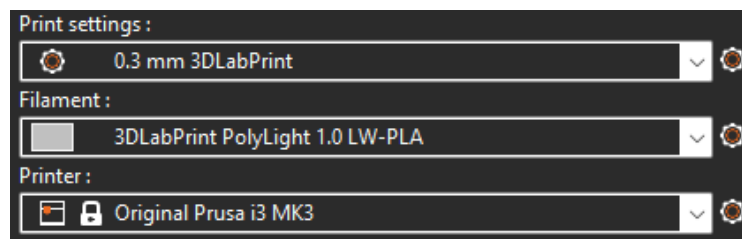Please follow the guide in the Help section of our website about Prusa Slicer setup.
Drag and drop the 3mf file to the Prusa Slicer window and open it as a Project. It will create a Generic 3DLabPrint printer, printing profile and materials. Please use these as a starting point instead of your printer profiles provided by your printer manufacturer. Strong thin-wall printing is a different discipline than printing Benchys what are the stock profiles usually optimized for. Once you tweak your profiles (retractions, etc.) you can easily switch the profile everytime you open the 3mf file. All the slicing tweaks, such as added top/bottom layers etc. are stored in the models below, so it won't be overwritten.
Remember: We are using 0.5 multiplier and 0 retraction with LW-PLA.
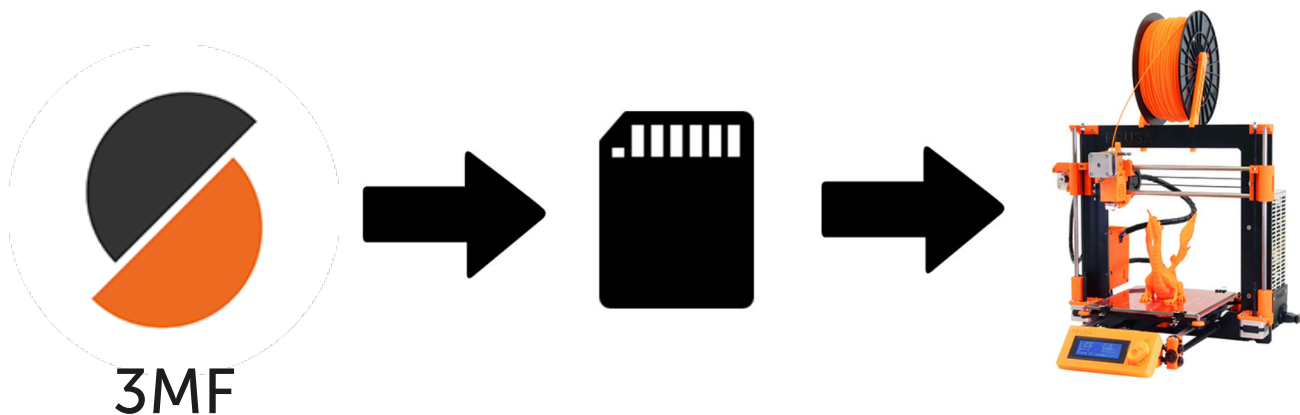
This method is also suitable for other common brands of printers, such as Creality (Enders), BambuLab and other. Prusa Slicer provides all the features we need and the settings are preconfigured in the 3mf files. Use the Print Settings and Filament profiles from our 3mf files and your Printer profile to ensure the compatibility.

Print settings :
0.3 mm 3DLabPrint

Filament :
3DLabPrint PolyLight 1.0 LW-PLA

Printer :
Original Prusa i3 MK3

Note: Simplify3D factory files are no longer provided as 3mf files are full substitute for them.

option C CURA or Simplify3D

CURA and Simplify3D option is for advanced users who insist on using it. There's no advantage compared to Prusa Slicer option but it still remains available. If you struggle with setting up Cura or Simplify3D, please use the option above which provides better results by default. You can import the Prusa Slicer 3mf files just like any other STL files but it won't import any print settings.

Please check our CURA guide or Simplify3D guide. Please visualise our presliced gcodes to see how the result should look like and try to achieve the same in your slicer.
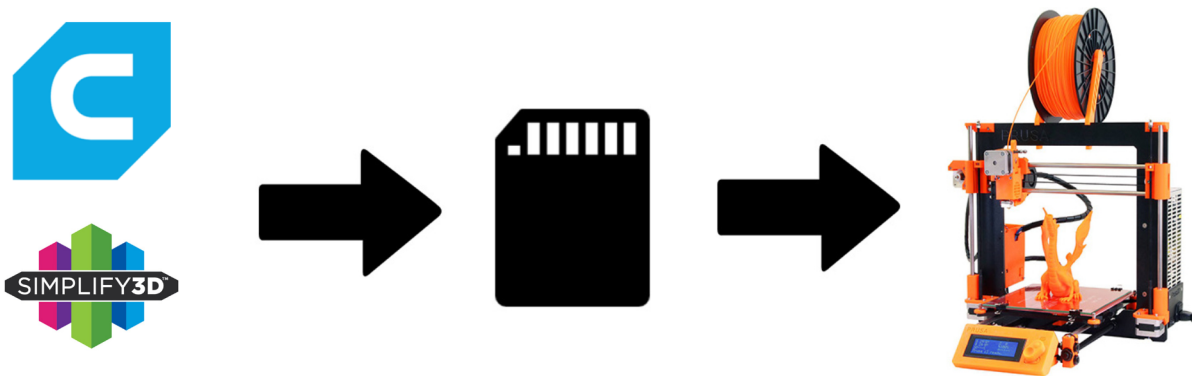
Remember: We are using 0.5 extrusion multiplier and 0 retraction with LW-PLA.

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 card rather than direct USB connection. Scaling the model will lead to unusable result!

you will need: LW-PLA filament - (Polylight LW-PLA)
                3DLac, Strong hair spray, PEI or your favorite adhesive bed surface
                Razor blade

AND... please watch our VideoGuides:
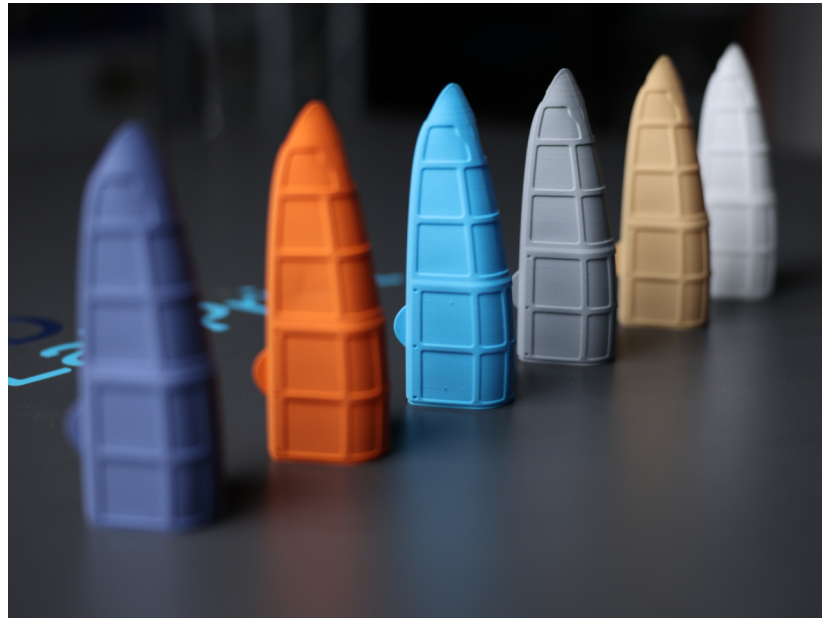
LW planes

Basic Tips and Advice

While stadard PLA filament could be used, this plane has been designed to be printed from foaming LW-PLA that means about 50% weight reduction on printed parts.

Please Experiment with temperature and extrusion multiplier (0.55-0.67mm Wall thickness). Hotend temperature is very important (220° up to 260° celsius). The temperature determines, how much the LW-PLA foams while printing. Cranking up temperature means, you can go lower on multiplier as the material will gain on volume. Turn OFF cooling fan for better layer adhesion (HE fan should be ON). We dont need it for thin wall printing. Heated bed is very recommended, 55-60° Celsius (to prevent warping ends).

Price of the LW-PLA may look a bit steep at first glance, but since we're using 50% less material thanks to the foaming feature, the cost difference is not so high as it looks.
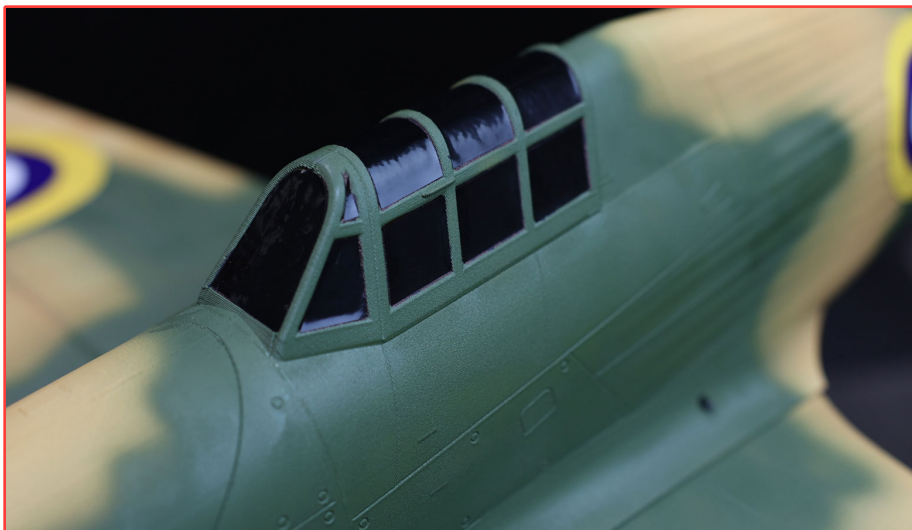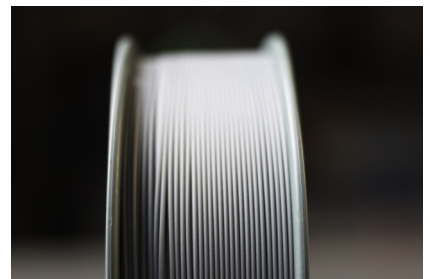
Please see the Printing Guide (Help Section)

How to print PolyLight LW-PLA?

The basic print setup is almost the same as we use for standard PLA. The only difference is in extrusion multiplier set to 0.5 and turning off the retractions completely.

This results in parts with half the weight and still suitable mechanical properties, this model is designed mainly in VASE mode, even that expect some stringing inside and outside in some inpossible spots. Of course you can try to tweak the retractions for less stringing inside the parts, but there's a high risk of clogging the nozzle or throat. Increasing the retraction distance above 1 mm is not recommended at all and leads to nozzle clogs caused by foaming. Cleaning the hairy, but functional parts after printing with retractions completely disabled seems to be more efficient method. The nozzle is permanently pressurized and you don't need to worry about print failures. This method works fine even for bowden printers.

Extrusion multiplier 0,5 has been tested for easy print with massive weight saving around 50%. Feel free to experiment with extrusion multiplier and temperatures at will for the best results on your printer. This airplane is designed for **0.55 - 0.67mm** Wall thickness.
Cosmetic issues of the prints are easily fixed with snap knife or sand paper, as the LW is easily sanded and cut.

5. Assembly of printed parts

5.1 Wing assembly Hawker Hurricane MkII

Glue wing parts L1-L4 together. The new 3DLabPrint lock system will help you. Repeat for the right side. Glue both halves of the wing together and use small PLA pins for advancing. Use the CA glue, (position locks and wing pins will help you to align the parts), and use activator to speed up the glue curing. Press in and glue a piece of PolyAir, PLA, PETG or 1.5 mm carbon rod into the top and bottom openning to create a wing spar and improve the rigidity of the wing.

On a flat surface glue the ailerons L1-L3 and repeat for the right side. Use a filament or suitable 0,8mm - 1,5mm carbon rod as a hinge for the ailerons. Just slide it in, there's no need to glue the hinge for easy aileron or servo replacement. Wall thickness should be 0.55-0.67

Video guide Hawker Hurricane MkII wing assembly

you will need: CA Glue - medium + Activator for CA Glue
PolyAir or PLA filament (alt. carbon, fiberglass, Al or steel wire)
Snap knife, SandPaper Some cloth for wiping CA glue...

R wing completed

aileron L1
4,1g/0.14oz LW

aileron L2
4,0g/0.14oz LW

aileron L3
3,4g/0.12oz LW

wing L1
26,6g/0.94oz LW

wing L2
17,1g/0.60oz LW

wing L3
11,7g/0.41oz LW

wing L4
2,15g/0.08oz LW

wing pins (PLA)

mark for center of the arm
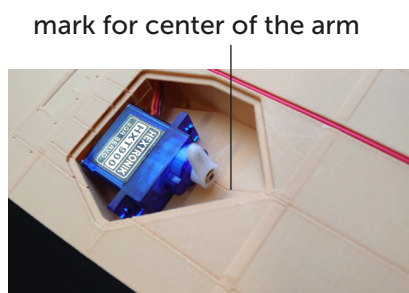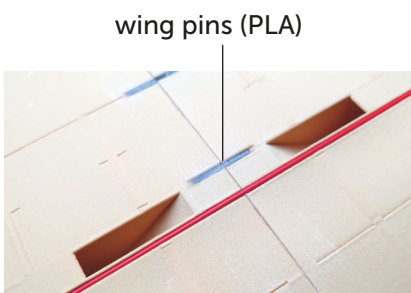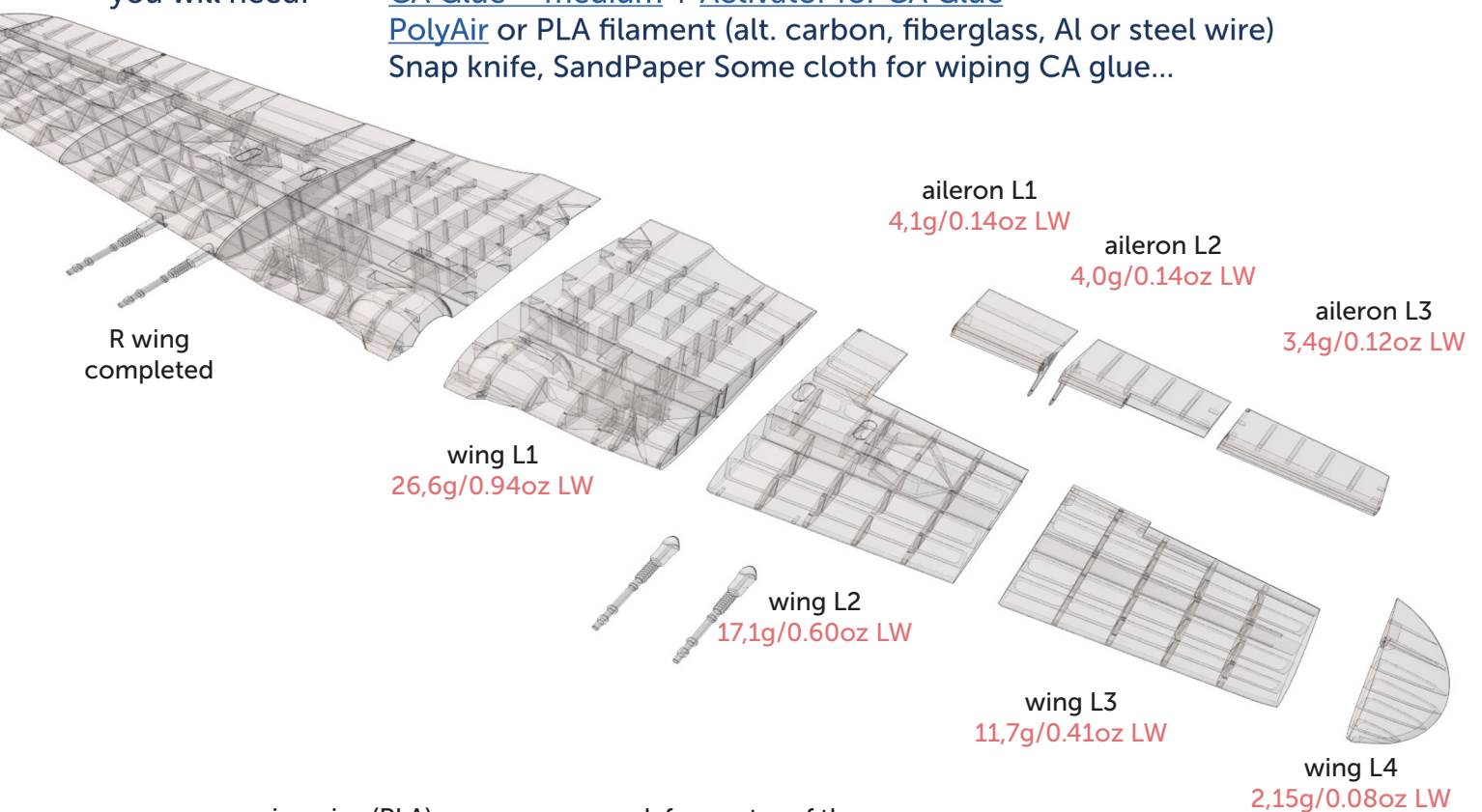
5.2.1 Fuselage assembly Hawker Hurricane MkII

You can use snap knife for cleaning the surface of printed parts, but mostly it is not necessary. Glue fuselage parts F1-F5 with CA glue together. The new 3DLabPrint lock system will help you. Check the alignment of F5 part compared to the wing before glueing. Do not glue rudder part before tail and elevator assembly.
Wall thickness should be 0.55-0.67.
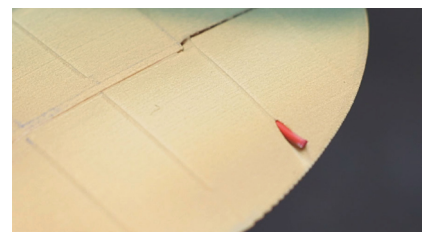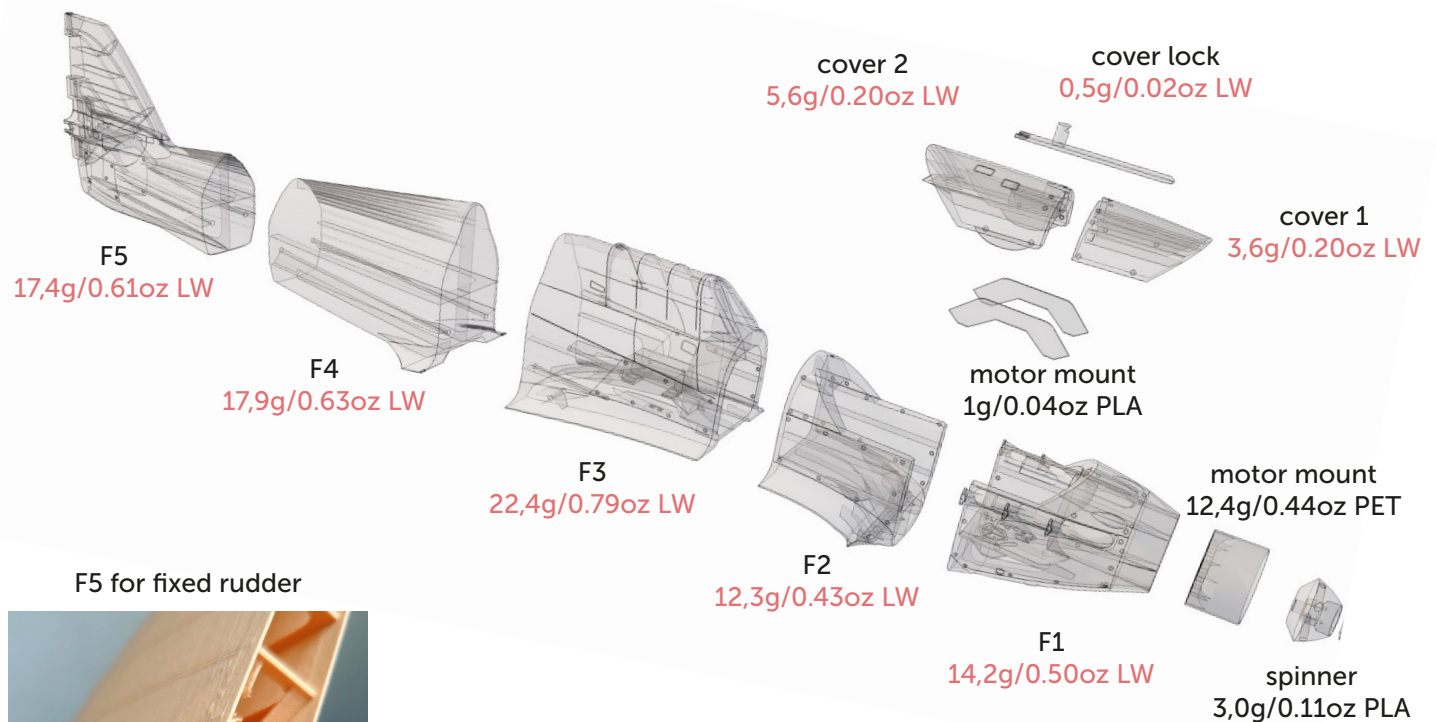For fuselage cover arm use a ball pen spring. Put it to the part 2 and glue with part 1 together.

See video guide Hawker Hurricane MkII fusselage assembly

you will need: CA Glue - medium + Activator for CA Glue
                   Snap knife, SandPaper Some cloth for wiping CA glue...
                   BallPen Spring

cover 2
5,6g/0.20oz LW

cover lock
0,5g/0.02oz LW

cover 1
3,6g/0.20oz LW

F5
17,4g/0.61oz LW

F4
17,9g/0.63oz LW

motor mount
1g/0.04oz PLA

motor mount
12,4g/0.44oz PET

F3
22,4g/0.79oz LW

F2
12,3g/0.43oz LW

F1
14,2g/0.50oz LW

spinner
3,0g/0.11oz PLA

F5 for fixed rudder

ball pen spring
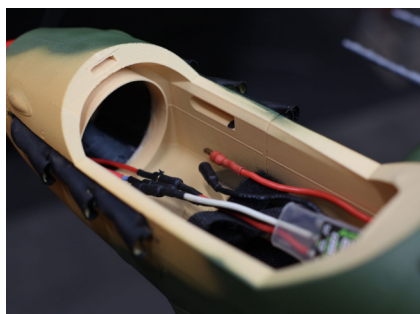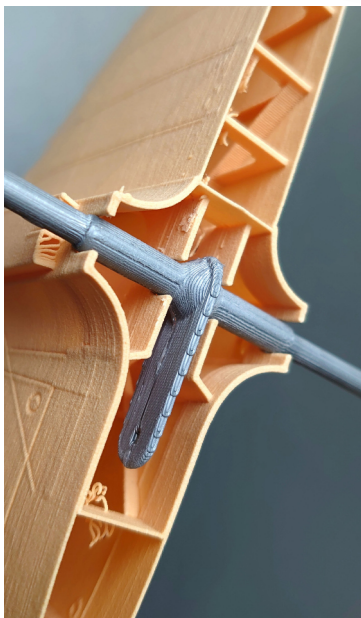
5.2.2 Tail assembly Hawker Hurricane MkII

Glue L1 and L2 parts of the stabilizer and elevator. Glue the stabilizers perfectly perpendicular to the fuselage. Assemble both sides of the elevator with the elevator arm on a flat surface. Make a Z bend on the elevator and rudder 0,8 mm pushrod wire. Mount the elevator assembly to the stabilizer using the piece of PET filament. Elevator should move freely controlled by the pushrod and servo. Push and bend prepared wire for tail drag between R1 and R2 parts of rudder. Glue rudder part together and mount to the fuselage by piece of PET filament. Check the functionality of the elevator and rudder assembly carefully.
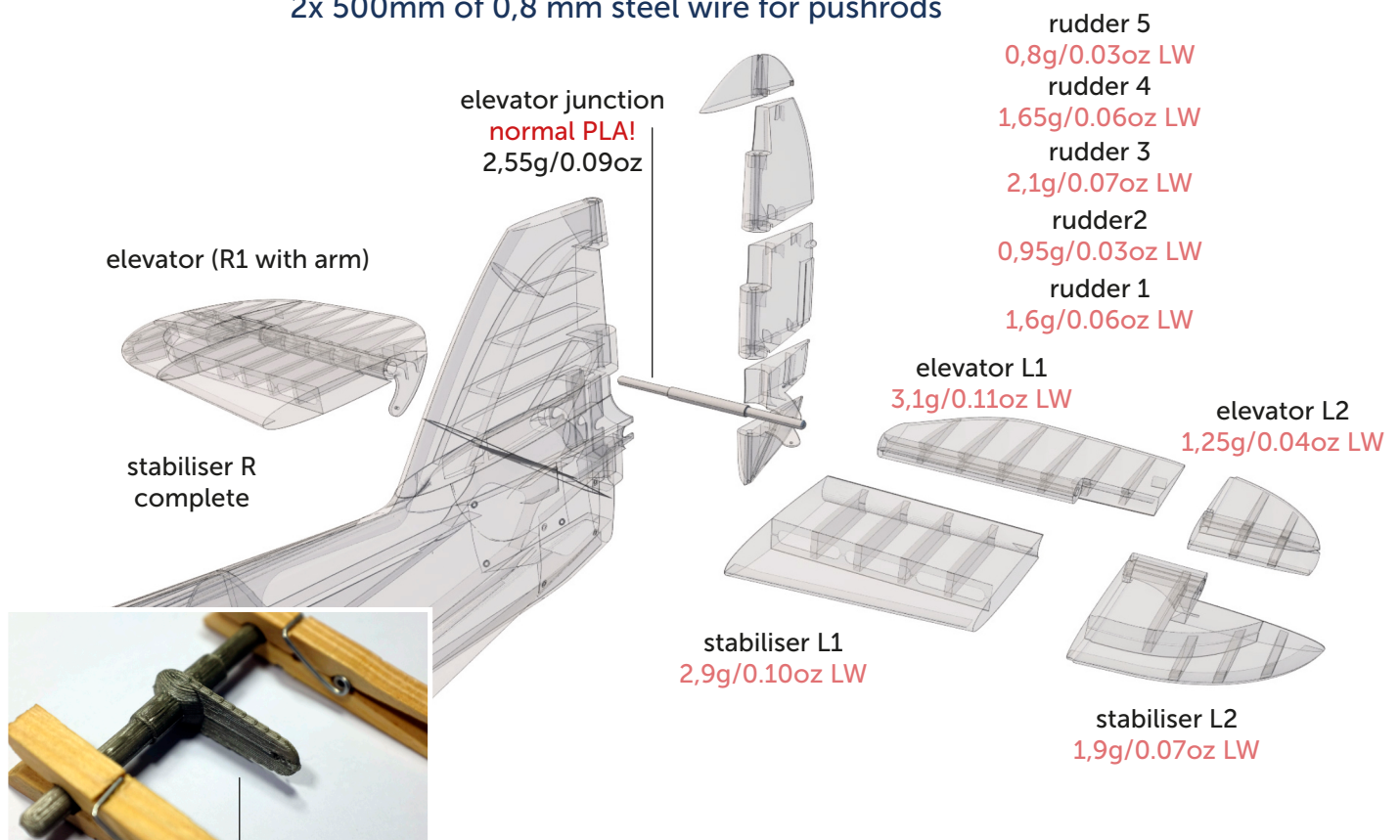
See video guide Hawker Hurricane MkII tail assembly

you will need: CA Glue - medium + Activator for CA Glue
Snap knife, SandPaper Some cloth for wiping CA glue...
2x 500mm of 0,8 mm steel wire for pushrods

rudder 5
0,8g/0.03oz LW
rudder 4
1,65g/0.06oz LW
rudder 3
2,1g/0.07oz LW
rudder2
0,95g/0.03oz LW
rudder 1
1,6g/0.06oz LW

elevator junction
normal PLA!
2,55g/0.09oz

elevator (R1 with arm)

elevator L1
3,1g/0.11oz LW

elevator L2
1,25g/0.04oz LW

stabiliser R
complete

stabiliser L1
2,9g/0.10oz LW

stabiliser L2
1,9g/0.07oz LW

elevator arm only for fixed rudder version – normal PLA!
Tip: After gluing, the elevator coupling is smoothed into a perfect shape using a drill and sandpaper.
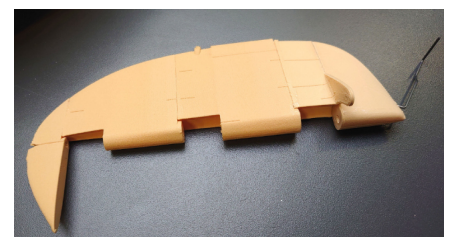
5.2.3 Landing gear assembly Hawker Hurricane MkII

Put gear tyres on the rims. Use the remaining 1mm wire to shape the rear chassis to your taste. Secure the rear wheel against sliding out with a small washer and cover with glue or crimp the small brass servo bushing with pliers. Weave the entire rear wire into the rudder and bend towards the rear. Check the functionality of the landing gear assembly carefully.

See video guide Hawker Hurricane MkII landing gear assembly

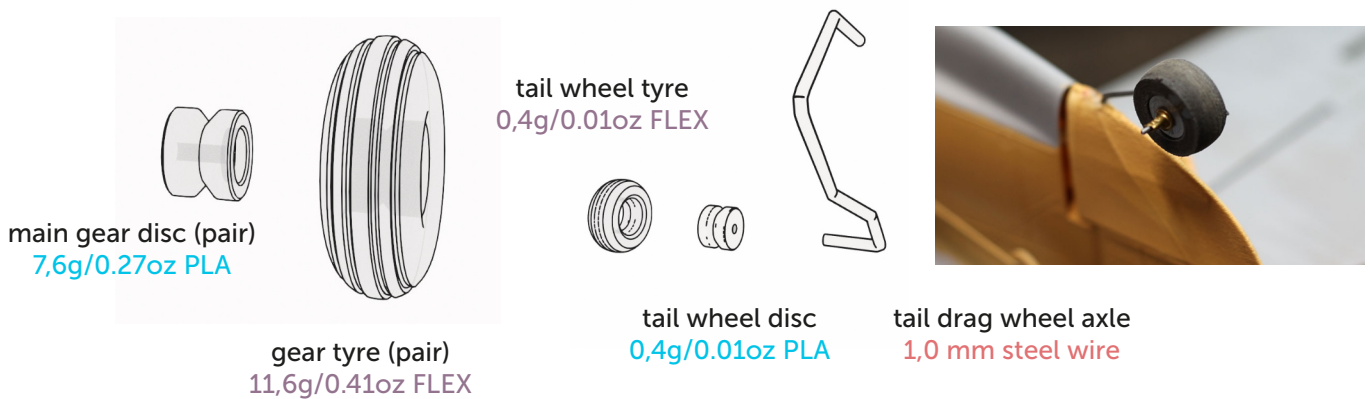you will need: Small piece of 1.2 mm steel wire for tail drag wheel axle

main gear disc (pair)
7,6g/0.27oz PLA

gear tyre (pair)
11,6g/0.41oz FLEX

tail wheel tyre
0,4g/0.01oz FLEX

tail wheel disc
0,4g/0.01oz PLA

tail drag wheel axle
1,0 mm steel wire

RG version

For the version with retractable landing gear, insert the mechanics into the wing and secure with a suitable screw. The complete leg length is 113mm and the wheel diameter is 50mm. Test the functionality of the landing gear.
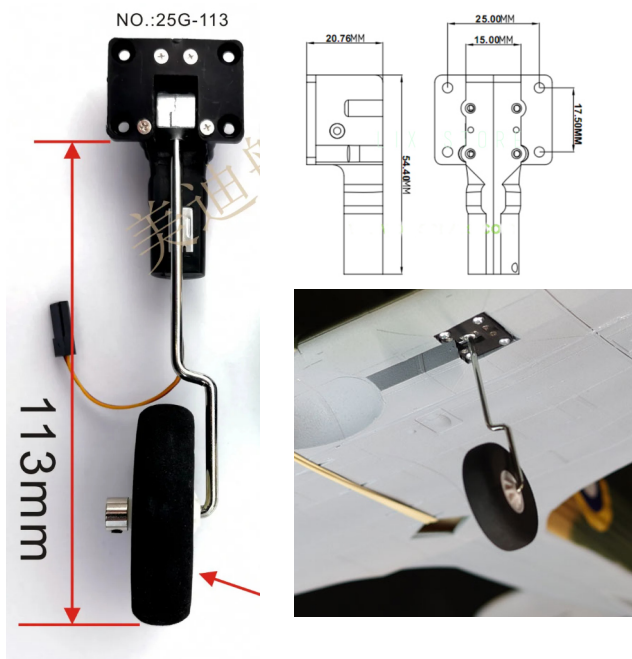
RV version

Fixed landing gear. Bend the chassis 2,0 mm wires according to the template. Insert them into the glued brackets in the wing. Secure the handles and screws.

NO.:25G-113

20.76MM

25.00MM
15.00MM

17.50MM

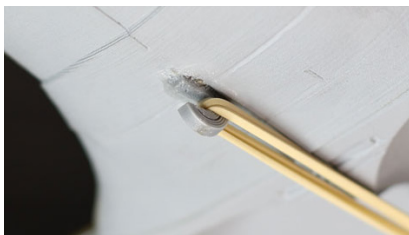54.40M

113mm

5.2.4 Fixing the wing Hawker Hurricane MkII

Classic rubber band fixing

Use 3mm carbon rod, 85 mm back and 115 mm front. Fix the wing by cross rubber. Usable for fixed gear and nogear wings variant.
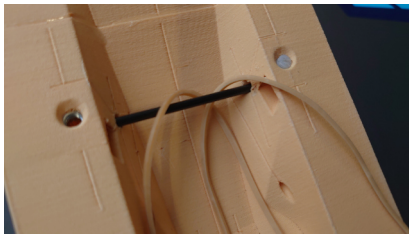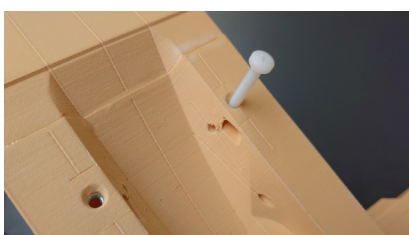

Center hook rubber band fixing

Use 3mm carbon rod, 85 mm for back and glue center hook to the fuselage. Fix the wing by center rubber. Usable for all wings variant.

Screws and nuts

Push two M5 nuts in to the fuselage. Secure with a small piece of hot melt glue. Use 2x M5 nylon screws to secure the wing. Usable for all wings variant.

6. Servo installation

Install the prepared servos to wing servo bays. Use a 1mm steel wire with Z bends as a linkage between the servos and aileron control horns. Elevator servo will be fixed by servo holder or directly glued in the fuselage.

See video guide Hawker Hurricane MkII servo assembly

you will need: 4x HXT900 or any similar sized servos
23x12x26 mm / 0.74x0.42x0.78 inches
Servo cable extension
Snap knife, Z pliers
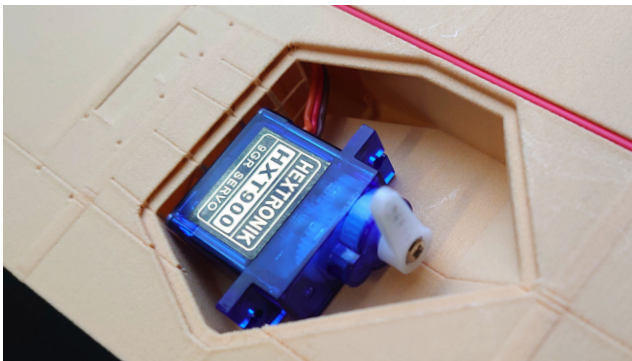
7. Motor & ESC & battery holder

Fix the battery by velcro tape and mount it in the front of the fuselage, find the perfect balance and CG position by moving it. Mount the motor using 4x M3 screws and nuts to the printed universal motor holder 16 x 19mm. For long motors you can flip the holder to the front (as at picture). Glue universal motor mount with motor into the fuselage in right position.

See video guide motor setup

you will need:
4x M3x4mm screws + washers

LW planes setup (230W)

Motor: any 2830 / 1000KV, opt1, opt2 or similar
ESC: any 20A/3-4s, opt1, opt2 or similar
Propeller: two blade 9 x 6 or opt1 or any 9/5-6 CCW
Battery: 1300 - 1500mAh / 4s
Batt. connector: XT60 or Gold Conn
printed PET mount 16 x 19 mm

8. Painting/marking and Final assembly/setting

See video guide Details

Another advantage of Polylight LW-PLA is that it can be dyed with almost anything. The surface for self-adhesive decals is ideally treated with a clear acrylic spray varnish. Use your imagination and send us photos of your aircraft on social networks.

See video guide Final setting

Refer to your R/C system userguide for setup information.
you will need: Your own Rx/Tx system
   Velcro strip & Rubber Bands (for wing)

Install your reciever, connect battery, setup servos and etc. with your trasmitter, check servo position, then install propeller.

Make sure the battery is positioned properly and secured with velcro or battery holder, if battery moves during flight it can shift the center of gravity backwards and aircraft will become uncontrollable! Never set ESC with propeller installed, this could be very dangerous!

aileron
+15mm
-12mm

elevator
+15mm
-15mm
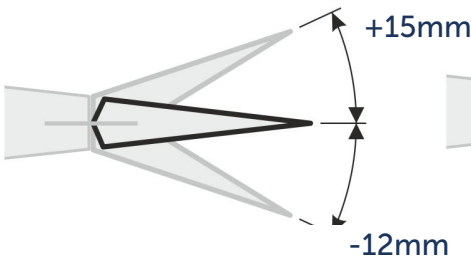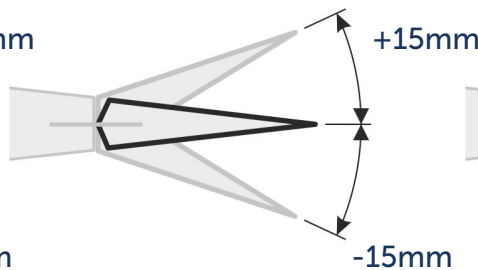
rudder
L 30mm
R 30mm
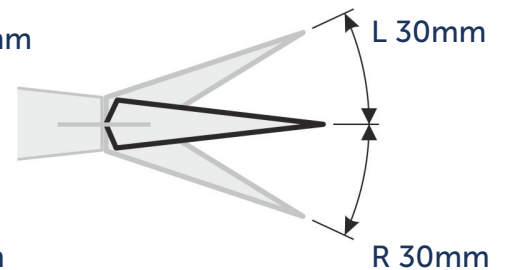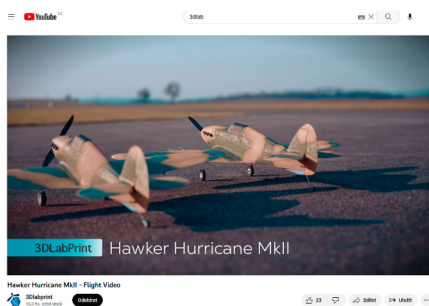
9. Go flying

Pre-flight check center of gravity is very important (move it 5mm forward for the first flights), battery properly charged, ailerons and elevator deflection check, your own flying skills or RC simulator training ...

Flight video of Hawker Hurricane MkII

10. 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, rudder 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 redistribute or publish. Thank you very much. Enjoy your flight.

Enjoy the fun together!

Piper J-3 Cub is the next of new LW Planes series designed for easy and cheap flying. The build is simple even for a beginner. It's very low weight, easy assembly and fantastic flight characteristics makes this model an ideal plane for beginner RC pilots.

Very suitable for dads and kids. Children will learn some modern building skills and technology and most of all have fun. This is the reason, why every dad should have a 3D printer at home.

This model has been completely designed with the new PolyLight LW-PLA material in mind.

Parts printed from this LW-PLA are light, easily sanded and glued together. This model requires only about 300g of this material, that means it's a very cheap build. In case of accident, parts can be easily reprinted with just a filament cost.

We've been testing this material for a years before this plane was released... The material is using an active foaming technology to achieve lightweight, low density PLA parts. At around 230°C this material will start foaming, increasing its volume by nearly 3 times.

Almost all parts of this plane should be printed from LW-PLA (some specific parts needs PLA or PETg).

Shopping list

Printing material:	Polylight LW-PLA a few of PLA or PETg (elevator arm, motor mount, landing gear, …)
RC:	R/C system, 4-6 or more chanels
Motor:	2830/1000KV, opt1, opt2 or similar
Propeller:	two blade 9 x 6 or opt1 or any 9/5-6 CCW
ESC:	any 20A/3-4s, opt1, opt2 or similar
Battery:	1300 -1500mAh/3-4s +connectors XT60 or Gold Conn
Servos:	4x HXT900 or any similar sized servos 23x12x26 mm / 0.82x0.47x0.86 inches Servo cable extension Snap knife, Z pliers
Glue:	CA Glue - medium + Activator for CA Glue
Retractable gear:	25g Retractable Landing Gear with metal shaft with JR Plug for RC Fixed-wing airplane DIY parts (ALIEXPRESS)
Other:	2x 1mm or 0.8 mm pushrod wire 4x M3x4mm screws + washers (motor) Small piece of 1.2 mm steel wire for tail drag wheel axle 0.5m spring-steel wire 2,0mm (fixed LG) 8x Self-tapping screw 3x10mm (for RG or fixed LG) 2x office rubber band (wing) 2x M5 screw and nut, nylon (wing)