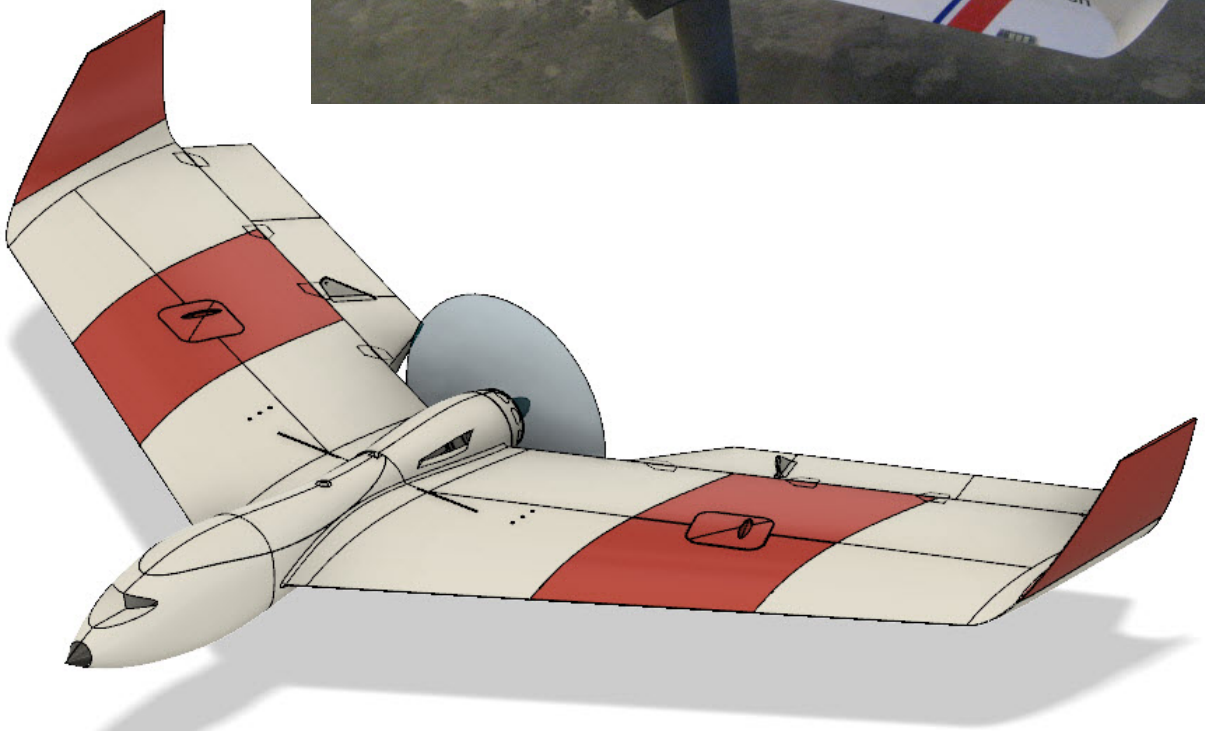
SlingBlade

High Performance Flying Wing



Wingspan 1041mm (41")

Donald Wright

Here's a flying printing project that is quick and satisfying. Flying wings are unique in that there is little to no fuselage and no empennage. This typically means less drag, lighter wing loading, faster speeds and more maneuverability. However, flying wings suffer from being more sensitive to CG than typical airplanes and they can be hard to successfully maiden. This is where a proven design and setup is very helpful.

A high performance flying wing is a lot of fun and will be the envy of the flying field. Follow this manual for printing and setup and you'll be rewarded with with a plane that will be your "go to" plane regardless of outside conditions. Windy days is where this design eats; add a stabilized RX and fly when everyone else is grounded.

This design also includes options for installing lighting using LED boards. This expands the flight conditions into dusk and even night flying for top gun pilots.

Let's get to it.

If you have questions or run into trouble, visit the 3DLabGang forums and find the dedicated thread for this project.

Bill of Materials (note hyperlinks for suggestions)

1. Your favorite quality PLA printing material. Use a brand that you've trusted before and know the printing parameters for. The supplied "Gcode" files are files that have been set up for Prusa type machines at a size of 200x200x200 and use 3D Mars White PLA. You may find that these files work without any modification. If you need to make parameter changes you might want to start with the supplied "factory" files. These are Simplify 3D files and a great way to understand the "single line" printing processes and how the particular Gcodes were arrived at. Otherwise, the supplied STL files are also supplied as well as "ini" files for basic Cura settings.
2. Motor – A good quality park 450 size motor is recommended. We're looking for about 320-330 watts. This will give us about 140-150 watts per pound for outstanding performance.
3. Battery – Any good quality 3S 2200mah battery will do. Typical size is 27mm x 34mm x 105mm. 30C minimum, higher C ratings helps with battery life, minimizes "puffing" and heat.

4. ESC – Any good quality ESC will work. 40Amp minimum size recommended. The design uses only two servos, so the BEC will not be overworked at all.
5. RX/TX – A programmable radio that allows for "delta" wing configuration is one alternative. A preferred configuration is to use a receiver that allows on board delta configuration and also offers gyro stabilization such as this Lemon RX.
6. Clear PLA – This is used for lenses when you want to make a lighted version of the SlingBlade.
7. PETG Plastic – This is used in two places, the motor mount (for strength and higher heat tolerance) and the canopy latch (for flexibility) However PETG can be tougher to find the correct parameters for printing. PLA can be used in place of both with care. Any color.
8. Propeller - APC 8 x 6EP Thin Electric PUSHER Propeller A non-pusher propeller may be used, but extra care must be taken to make sure the prop nut is tight and stays tight. A drop of blue locktite helps. Pusher props ensure the nut tightens itself if the hub slips.
9. Servos – 2X - 12g Digital Metal Gear Sub-Micro Servo The molded servo recesses are for this size servo – so make sure they are this size or smaller. Digital servos are a better choice when gyro/stabilization is used and metal gears are better for withstanding rough landings.
10. Various bits of wire for pushrods and some screws for motor mounts etc. Velcro and a battery strap are needed.
11. Decal Sheets - if you wish to use the included graphics. This Decal Suggestion may also be found on Ebay.
12. LED Boards - RobotShop or Hobby King these boards are bright and color selectable so you don't have to worry about what color ends up where before you do the wiring.
13. Carbon – you'll need a short piece of carbon rod, 1 to 1-1/2mm diameter x 250mm to install in the wing pockets for tie-in. And you'll need 2x of flat, about 1mm x 3mm x 480mm for wing reinforcement. If these are not available you should be able to come up with some substitutes – wire or glass fiber will work too.
14. Servo Extensions – 2x 150-200mm long

General specifications

Length: 558mm (22in) nose to spinner – 762mm (30mm) OA
Wingspan: 1041mm (41in)
Height: 146mm (5.75in)
Wing area: 31.29 dm2
Wing loading: 35.21 g/dm2
Airfoil: semi-symmetrical
Print weight: @600 g
Empty weight (w/o battery): 935g
Takeoff weight (3s 2200 lipo): 1105g

Flying Wings - wiki

Flying wings have been experimented with throughout the last century with mild success. Even though the promise of more efficient flight looks great on paper, the reality for full scale aircraft is one compromise. Often the wing must be increased in thickness to accommodate pilot, engines, etc. and this can eliminate the sought after advantages. But the real problem has always been one of control, effective rudder (yaw) control is a challenge and the designs are pitch sensitive and prone to CG problems.

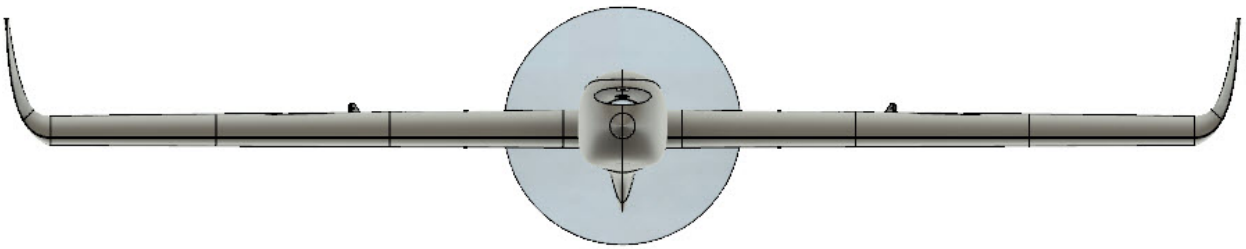
Fly-by-wire for modern aircraft have overcome many of these control problems as the computer now does the driving by interpreting the pilot's intentions and making the needed changes in control surfaces.

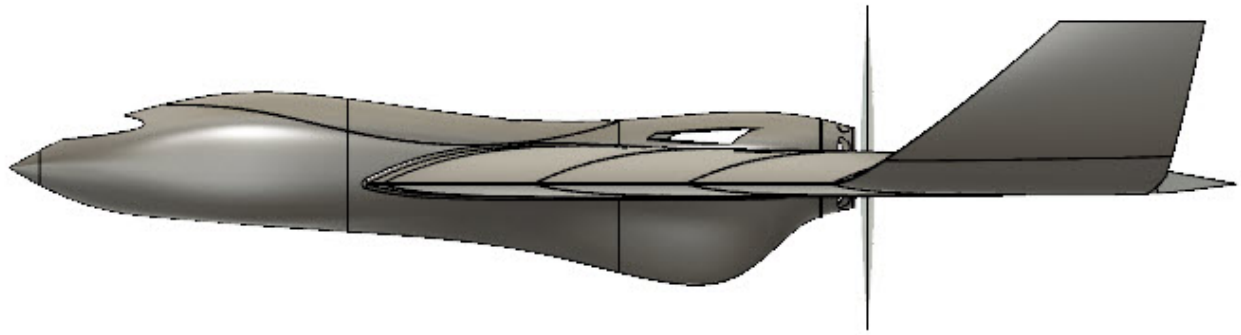
Our models don't have to adhere to strict safety and control constraints that full scale aircraft do, our flight envelope is considerably smaller. Modern electronics have also impacted our RC model wings. Aileron and Elevator mixing in our radios and has resulted in "Delta" wing configurations turning our once dedicated "ailerons" in "elevons".

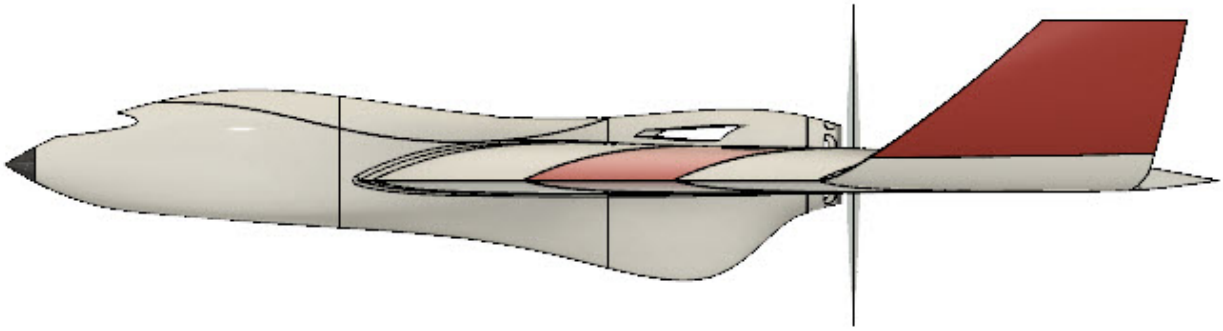
Yaw control is typically not controlled by a dedicated rudder, the aircraft is turned by a method called "bank and crank". The very same method used by most model fliers of performance aircraft. As one's piloting skill increases we tend to move from the classic high wing trainer aircraft to low wing, higher speed, more maneuverable airframes. Where a rudder is effective for low speed turns on high lift craft with inherent stability, higher speed turns as on jets, warbirds and wings are typically accomplished by rolling the aircraft left or right, the "bank" then pulling back on the stick, the "crank".

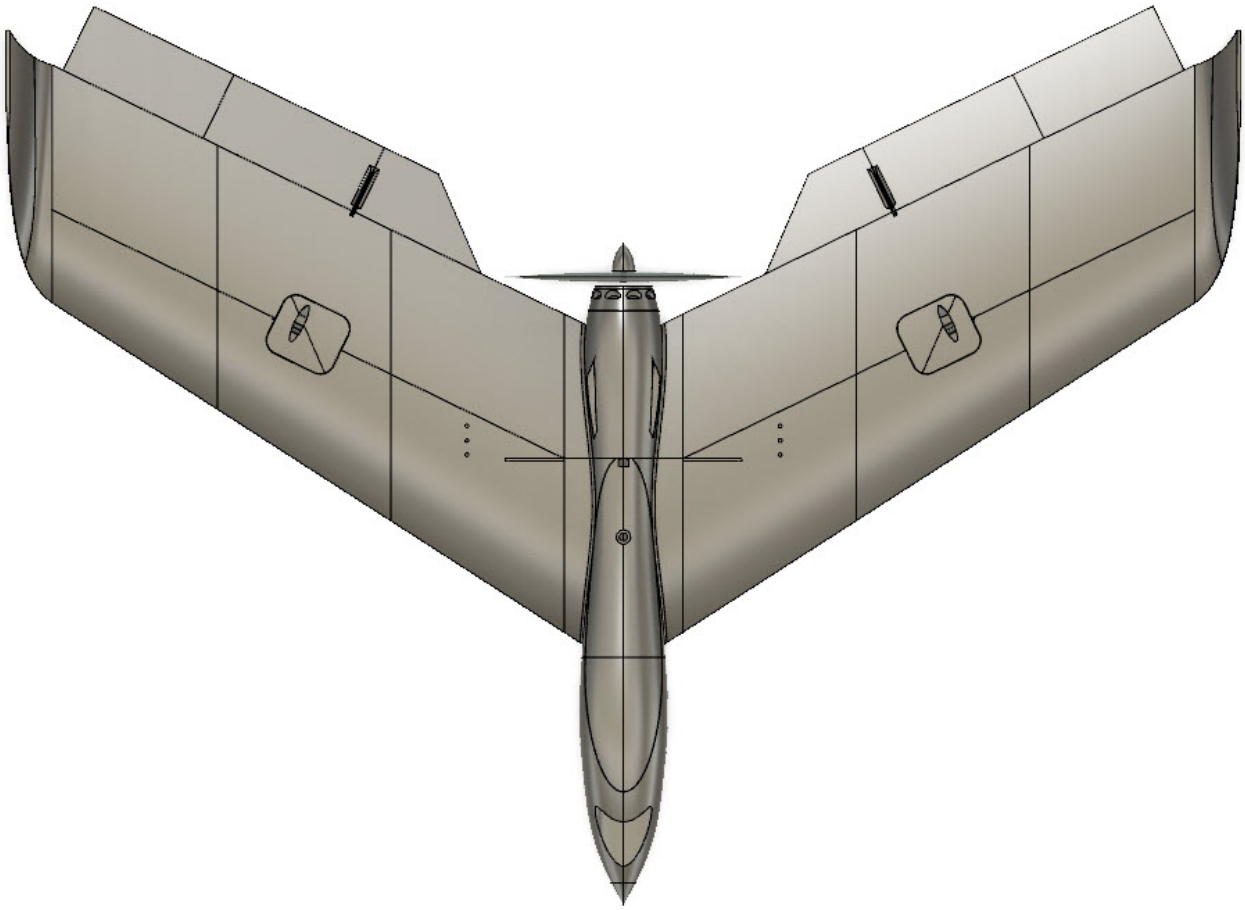
Many lightweight RC models such as warbirds, EDFs (jets) and flying wings have no rudder control at all. Flight control is achieved strictly though three surfaces, left and right ailerons and an elevator. In the case of flying wings, only two surfaces, the ailerons. These re-purposed flight control surfaces move in opposite directions for roll and in unison for pitch. The radio, or in some cases, the receiver, mix these two functions in varying degrees based on the pilots input. The right stick (mode 2) works as usual however, up and down for elevator, right and left for aileron.

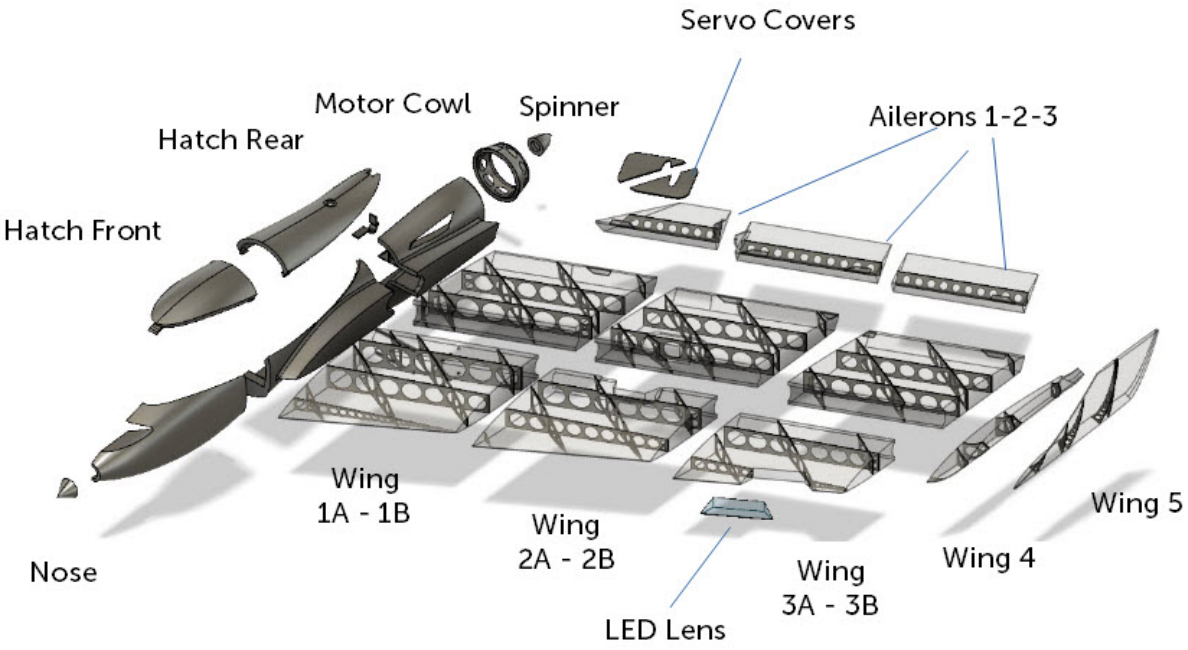
This model is not for beginning RC pilots. The assumption is that you've successfully maidened and flown typical bank and crank airframes and possibly a foam wing or two. Regardless, the builder must understand the flight regime of flying wings and also have a firm grasp on the necessary programming options of their radio and/or receiver. The latest receivers are inexpensive and have "delta" wing mixing built in as an option, plus, many are now gyro equipped and offer a level of stabilization that was unavailable just a short decade ago. Install one of these in your wing (if not all your planes) and you will be rewarded with rock solid "as if on rails" flying.

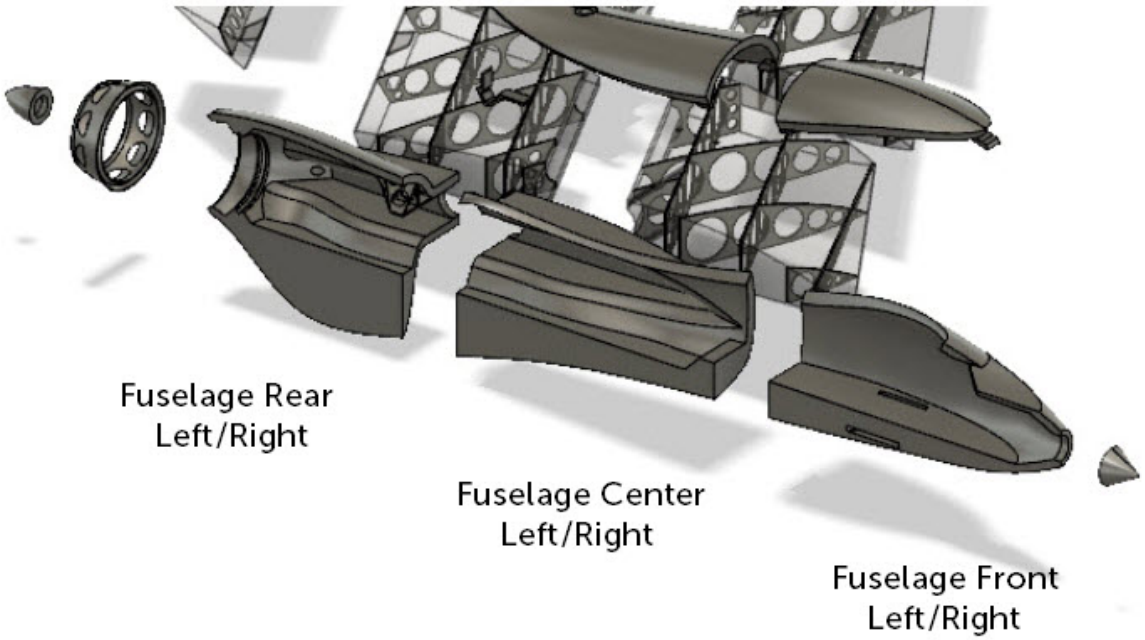









Servo Covers
Motor Cowl
Spinner
Hatch Rear
Ailerons 1-2-3
Hatch Front
Wing
1A - 1B
Wing
2A - 2B
Wing 5
Nose
Wing 4
Wing
3A - 3B
LED Lens


Fuselage Rear
Left/Right
Fuselage Center
Left/Right
Fuselage Front
Left/Right

Print Weights -

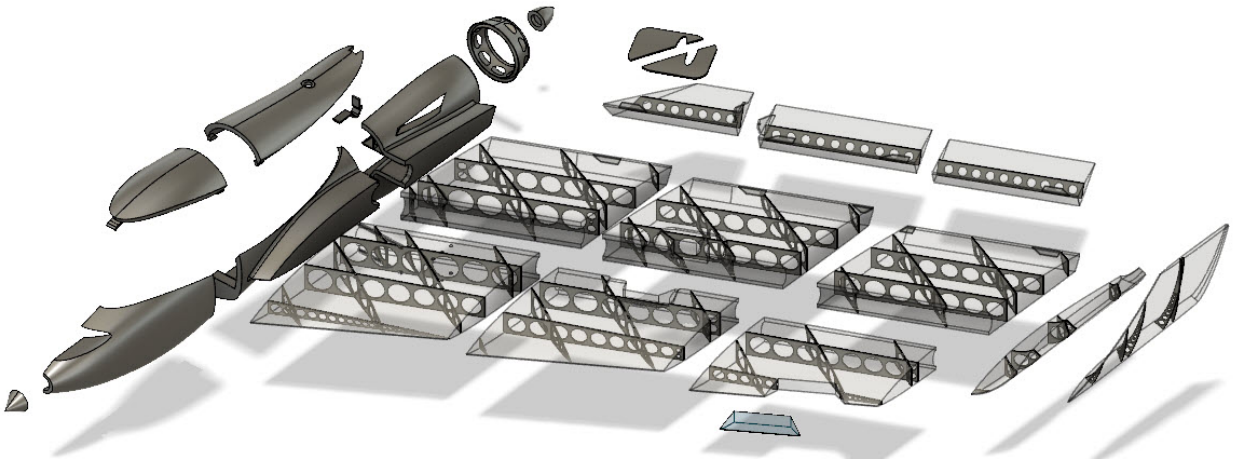
These are guideline weights - adjust your EXTRUSION MULTIPLIER in order to get close to the recommended weights.

Wing #5 – 13g	Aileron #1 - 10g
Wing #4 – 7g	Aileron #2 - 14g
Wing #3A – 23g	Aileron #3 - 12g
Wing #3B – 32g	Fuselage Front - 31g
Wing #2A – 31g	Fuselage Center - 27g
Wing #2B – 34g	Fuselage Rear – 28g
Wing #1A - 38g	
Wing #1B - 34g	

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.

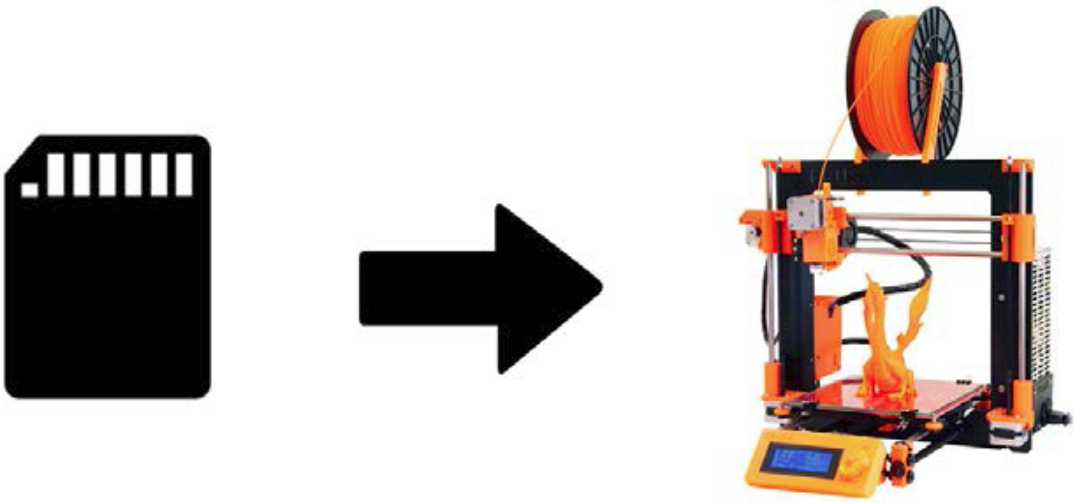
6.Decal Sheet PDF

Printing

1. Gcodes Preparing

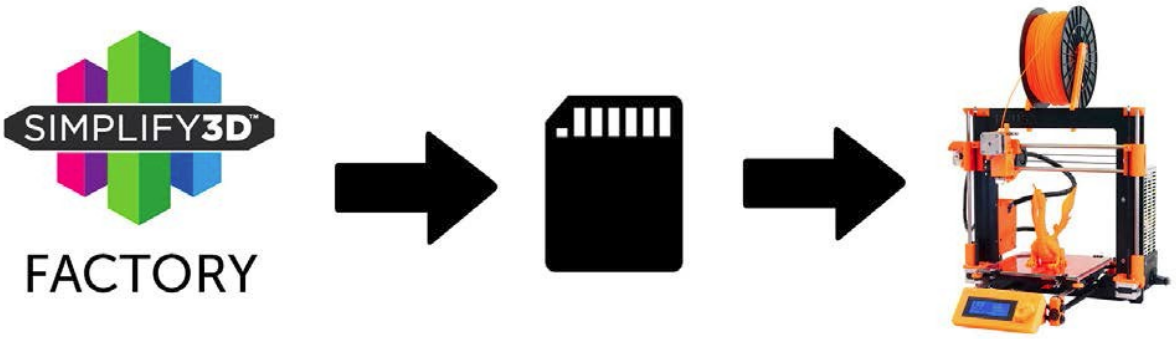
Options A Gcodes:

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.



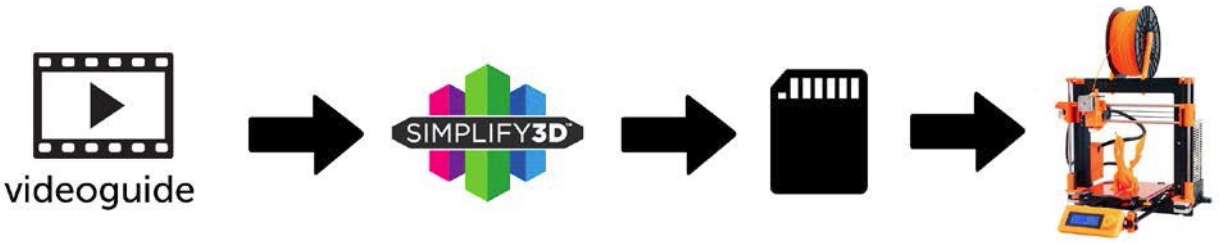
Options B Factory files Simplify3D (recommended)

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 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 a 3d expert. Of course you spend a lot of time and YouTube pause button will become your friend.



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.

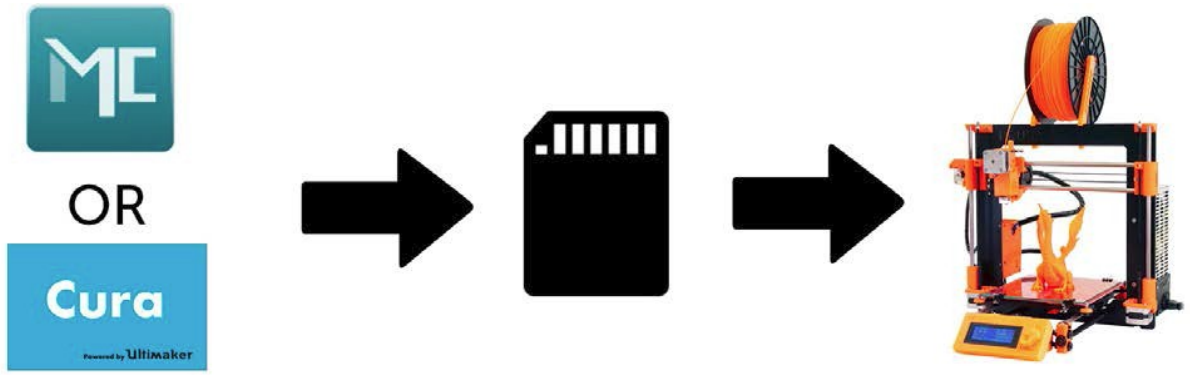
Please try find right extrusion multiplier and temperature for good weight and best layer bonding, give a look to parts weight list for proper multiplier setting.

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)

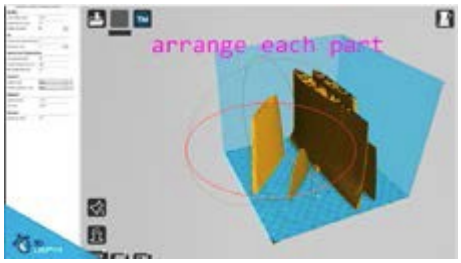
OR

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)

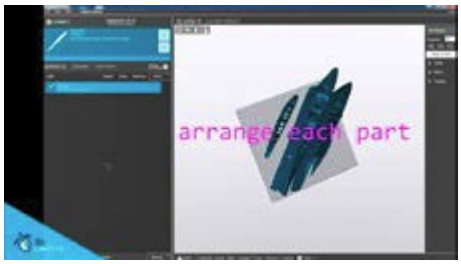


AND... please give a look at these VideoGuides;

Video Cura slicer setting



Video Matter Control slicer setting



2. 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 or 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 (similar to this 3D LabPrint Spitfire)

Basic Tips and Advice

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 (Hot End fan ON of course) we don't need it for our thin wall printing...

We tried a lot of filaments and so far PLA is still the best for our models (2016).
You can try also PETG and PC-max from Polymaker is very promising filament.

HEATED BED is very recommended, 60-70celsius (print without warping ends) (but please read personal note below)

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, always check if you are printing in a solid color.

Nowadays there is lot of 3dprinters on the market, most of them are OK for printing our aircraft (specific thin wall printing...) sufficient volume, heated bed, 0.4mm nozzle.

3D LabPrint Printing Guide

More on Printing Parts

Most all of this project is printed using the "single" line printing technique as outlined by 3DLabPrint . Essentially there is "no infill" selected, and only 1 layer on outside, 0 on top or bottom on most parts. Simplify3D (and other software may) allow for the creation of special options, such as 2 outside layers up to 1mm then only 1 thereafter. This allows for a little thicker edge where parts are glued together.

You will also find that printing the ailerons, horns down, with 6 bottom layers creates a solid control horn.

Layer height – 0.2mm for most parts

Layer height – 0.1 for light lenses

Layer height – 0.1 for motor mount – 4 layers top and bottom, 5 outside layers, 50% infill

Layer height – 0.1 for hatch latch – solid infill

Nozzle Diameter - 0.4 mm

Personal Printing Note From the SlingBlade Designer:

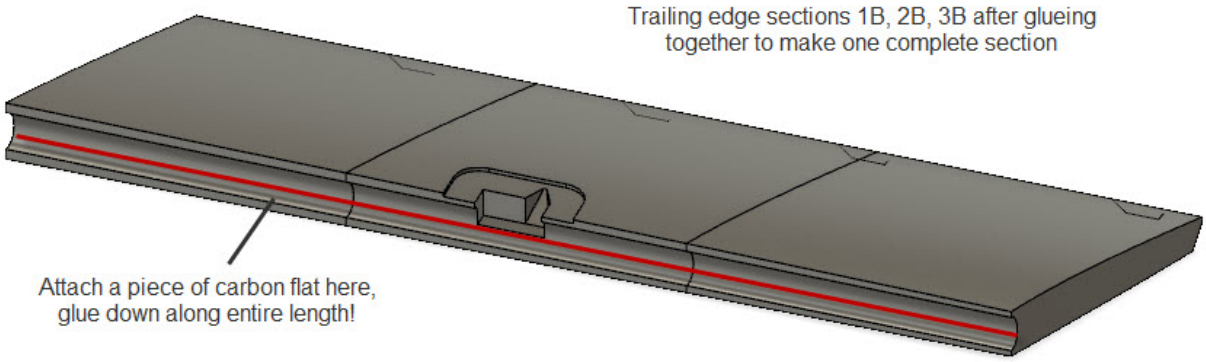
I've found that keeping a high bed temp (60c+) with thin parts causes radial shrinkage (5mm-20mm above the bed) during longer prints. My best printing now uses a low heat (35C) bed temp. I print on 3M Blue Original Painter's tape which I squeegee down

on glass with a credit card. A slower first layer speed (60%) at the proper height, gives a great bond for the duration of the print. Make sure the temperature for your particular brand of PLA bonds each layer well. This may change slightly with different colors within the same brand. Accuracy with our prints depends on a tight, well setup machine, quality manufactured filament (diameter tolerance) and lastly accurate temperature management. (Insulation on the hot end (such as a silicone cover or cotton padding) helps the controller keep a rock steady temperature)

3. Assembling printed parts

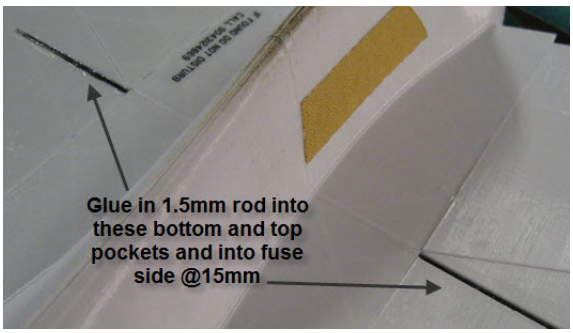
- Note: Assembly suggestion – I've found this glue to be excellent and a much cheaper alternative to hobby shop comparables. Works with accelerator, safe for PLA, bonds almost instantly with a bit of pressure, safe for some foams. Otherwise, you can use your favorite hobby shop medium CA, I like to use the foam safe due to lower fumes and its much more versatile.
- Note: Assembly suggestion – The use of true 3M Brand blue painter's tape is recommended for many assembly processes. As mentioned above, I also use it for bed adhesion and it works perfectly 99.9% of the time. When assembly portions of wing, I simply cut squares of the tape (I buy the 1.88" width) and use two or three squares as temporary "hinges" between two parts. I carefully line up the parts and squeegee the tape down using an old credit card. Then I open the parts like a book and carefully apply the glue, close the book, double check alignment and apply moderate pressure for a few seconds. Peel the tape off before it the glue kick completely to prevent leaving a stuck blue blemish. Super simple and effective.
- I also use a full sheet of 180-220 grit sandpaper laid upon a flat surface to "dress" the mating surfaces of parts before assembly. This ensures there are no printing "artifacts" that might prevent good joint closures.

1. Wings assembly – First assemble the wing "B" parts, 1B, 2B, 3B together.
2. Now assemble wing "A" parts, 1A, 1B, 1C – make sure of careful alignment.
3. For extra strength glue a piece of thin carbon rod or ribbon below the servo pocket on the "B" half the length of the assembly. See picture below.

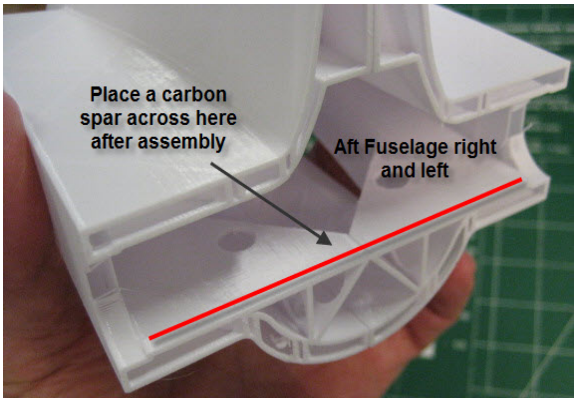


4. Again, using the noted "tape hinge" technique described above, assemble the "A" Leading Edge to the "B" trailing edge.
5. Same technique, assemble the wing tip "5" part to the wing "4" part.
6. Same technique, assemble the "4/5" parts to the end of the wing assembly. You should now have two complete wings.
7. Aileron assembly. Straightforward, this is best accomplished on a flat surface, you can use a cooking parchment paper under to prevent the parts for sticking to the bench.
8. Hinge installation – it's easier to install the ailerons at this time. Use your favorite CA Hinges for fastening ailerons to back of wings. Be sure to "flex" the ailerons downward to get the correct hinge gap before applying glue. I use regular thin CA to make sure it wicks into the pocket. Don't apply kicker if possible and let harden naturally. "kicking" the CA flashes the CA and results in a crusty hinge that does not flex as well.
9. Lighting – If you've chosen to use the lighted leading edge option, now is the time to solder your light boards and feed the wires through the wing. You'll notice the hole in the fuse is round the servo tunnel is oval, this leaves enough room to feed your wires into the fuselage. There is also a hole on the trailing edge of the fuse for tail lights, and you can even apply lights to the wingtips and feed the wire though the wing. Once the light boards are in place on the leading edge, you can install the printed lenses.
10. Fuselage assembly. Use the sandpaper technique described above to ensure the mating surfaces are true. A few strokes is all that's needed usually. Assemble the left half front, center and rear. Then assemble the right half, front center and rear.

11. Place the motor mount in one half of the fuselage (lugs forward) and test two halves together. Separate and apply glue sparingly to one half, quickly assemble and align, use tape squares to secure temporarily.
12. Glue the motor cowl on the back of the fuse.
13. Using the tape hinge technique, align one wing the fuselage, open and apply glue, paying particular attention to making sure there is a bead of glue over the ribs. Repeat for the remaining wing.
14. Wing reinforcement – cut four short pieces of carbon rod to fit within and extend into the fuselage and wing pockets. Apply generous amount of CA and slip the rods into position. See picture.



15. Fuselage reinforcement – cut a short piece of carbon rod and glue underneath the rear fuselage cross member. See picture.



16. Glue nose on fuselage.
17. Hatch – Glue halves together and test fit on fuse. You might have to lightly block sand the latch end to get it to fit with the length.
18. Latch – Use an X-acto knife to clean up the latch and then glue it into position on the underside of the hatch. Test fit. You might need to "clean up" a few areas in order to get a perfect closure.

Airframe is now complete!

Final assembly -

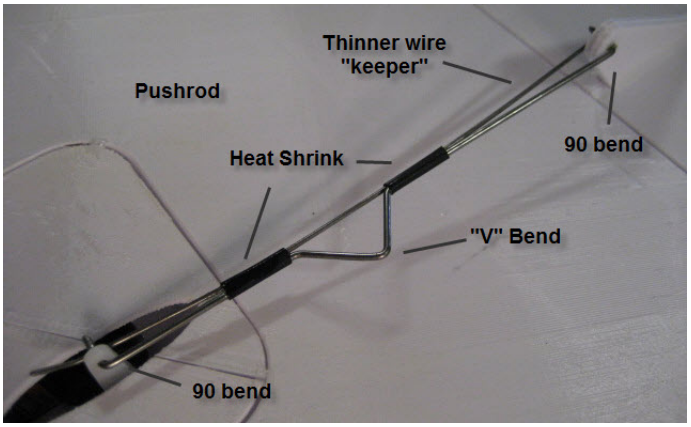
1. Bind your RX on the bench, connect the ESC and motor (prop off of course) and determine correct motor direction. Mark the wires and disconnect. Due to the

depth of fuselage you will need to feed the ESC wires through the motor mount, connect the motor and pull the wire back into the fuselage.

2. Attach the motor to the mount using four small sheet metal type screw. Socket headed screws such as these in a 9/16" length are perfect – and as they advertise these screws are very useful in many applications. I also place four small washers under each motor lug to insulate the motor from the mount – you may need this anyway to get more clearance for the prop.
3. Attach the prop. If you aren't using a "pusher" prop, make sure the nut is tight, a dab of blue Loctite ensures this.
4. With Velcro on the bottom of the ESC, fit the unit within the side wing pocket and press down.
5. Using the supplied mounting foam, press the RX into place just behind the battery shelf.
6. Apply a strip of Velcro onto the battery area.
7. Feed a battery strap through the fuselage slot.
8. Attach the servo extensions to the servos. I use a short piece of heat shrink around the connectors to ensure they stay firmly together. Feed through the servo lead tunnel and attach to the RX.
9. Ensure that you are using an adequate servo arm (the shortest possible) and that it is firmly attached. Fit the servo into the pocket and use a small application of medium CA on either side to hold in place. Just a short ribbon is enough, we want to be able to nibble it out if we need to replace a servo.
10. Fit the servo covers into place and use a very small dab of CA to hold them there.
11. Bend your servo push-rods as shown. You may have to use a pin vise and drill bit to clean out the aileron holes to the perfect size. Extra care taken here will ensure a control surface without slop and precision in the air. I don't like "Z" bends – they are hard to make accurately and they "enlarge" the hole while trying the get them into place. My preferred method is to make a hard right angle bend where needed and use another piece of smaller diameter wire as a "keeper." See picture – once you use this method you'll appreciate how easy it is and especially for installation and removal. Also notice the extra "V" bend in the

pushrod, this is a tried and true method for accurately adjusting the length during the installation.

12. Adhere 220 sandpaper cutouts on both sides of the "launch fin" for a great grip during hand launching.

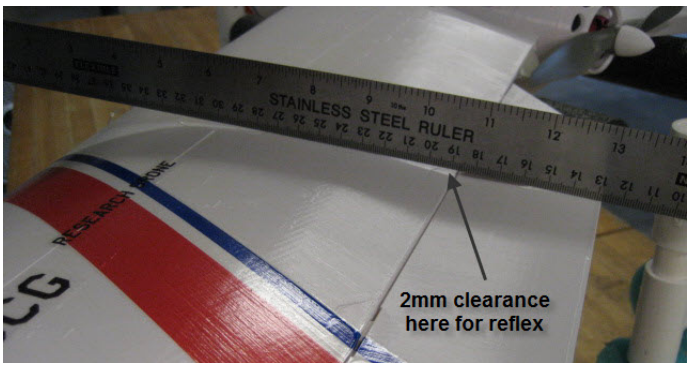


Setup

1. Configure your RX or TX for "delta" wing configuration and verify correct movement of the surfaces with the intended stick movements. If your RX is stabilized, then you also need to ensure the correct surface movements visa-vie air frame movements. Hopefully this is not your first gyro setup, but if it is, be absolutely positive that you understand and have the parameters set up correctly. A stabilized plane with incorrect surface setups will not fly, a hand launch stabilized plane will crash immediately! (I've seen this happen more than once – not me, a friend. ;-).
2. Spektrum File – If you are using Spektrum equipment and the Lemon Plus RX, the included .SPM files will get you a long way toward finalizing your setup. You can read about how to load .SPM files here.
3. Control surface throws – High Rate – 1-1/4" (32mm)up and down, 30% Expo. Low Rate – 1" up and down (25mm), 30% Expo. Yes, that's a lot – but during a hand launch, you want full control movements for those initial seconds, after that the expo will tame down the movements for smooth flight. You may find launching on high rates and switching to low rates after settling in will be beneficial.
4. Center of Gravity (CoG) – is very important on flying wings as there is no tail to help counteract an imbalanced airframe. There are three molded in "dots" on the top of bottom of the wings. The center dot is the CoG on this model. Balance this center dot on your finger tips to find the CoG. Slightly forward of the center dot for maiden flights are suggested, aft of center dot for

experienced pilots wanting quicker controls. The distance between the front and rear dots is the "range" of CoG. Move outside of this range at your own risk. Battery movement and a spot of lead might be necessary to get the proper CoG. The design assumes using a typic al 3S 2200 Lipo battery.

5. Neutral Control Surface Setup – Most flying wing maiden failures are due to improper neutral control setup. Most think that the ailerons need to be "inline" with the airfoil shape, that is incorrect. The initial flight MUST be with a slight amount of "reflex" in the ailerons. See picture. With a straightedge along the pushrod, there should be 2mm of "daylight" between straightedge and hinge line. For extra credit, there should be 2-1/2mm of daylight on the right aileron if using a conventional prop, or the left if using a pusher prop – this counteracts for torque.



Livery

I like to paint my planes with a coat of Minwax Polycrylic a modified urethane product that goes on thin, dries quickly without brush marks, sands easy if needed. Being a urethane, it is essentially an adhesive, which I feel adds a bit of strength to printed planes by "filling" in the record grooves of the printing process.

A coat of clear and then use any rattle can paint for graphics as wanted. Or use the supplied PDF, water slide decals, and your inkjet printer to make perfect professional looking graphics. Another coat of clear seals the decal edges once applied. Have fun here and personalize your SlingBlade or a fleet of them.

Flying

For a successful maiden flight you need several things in your favor.

- Correctly setup airframe
- Confirmed CoG

- Confirmed Neutral Flight control surfaces.
- Fully charged battery
- Wind in your face
- Proper Launch Technique

The first four have been covered and are obvious. Wind in your face indicates that you're going to launch "into the wind" this increases our "airspeed" and decreases our "ground speed." Increased airspeed gives us lift and surface control, decreased ground speed minimizes damage if the worst happens. The SlingBlade is not afraid of wind, so you don't be either. It will penetrate and cut through when other planes are left in their cars.

Proper Launch Technique – is just that. You can't limp wrist this bird and expect to have success. Attention to a proper launch is critical EVERY TIME!

- Radio on a neck strap lanyard, that way you can one hand the throttle.
- Feet together
- Arm outstretched overhead
- Bird balanced between thumb and forefinger. A good solid grip (you applied your sandpaper, right?)
- Nose pointed upward 30 degrees from horizontal. (this is important, find out what 30 degrees looks like) WINGS LEVEL!
- Now, in one fluid motion, like throwing a baseball, step forward and chuck the bird hard upward into that 30 degree incline, while advancing the throttle to full.
- A proper launch into the wind will have the bird arc over to level flight while you're putting your hand on the right stick ready to pull elevator. If you've done it right, you don't lose altitude.

I've seen so many hand launch birds go in on launch due to not paying attention or developing a good launch technique. A weak chuck and the plane will stall and pancake into the ground. Arm not extended and you hit your own head or hat with the left wing. Wings not level, she veers off left or right, stall and crash. Advancing throttle too late or not enough. Getting freaked out and over-correcting, the plane flops around like a fish, stalls and goes in. This is not you!

A hand launched bird has the benefits of being lightweight with better aerodynamics due to no landing gear. These smaller birds are cheap and most of all, fun. That's what its all about right?

Plus, there's an added benefit – noise! We don't usually have noise with electric planes. The SlingBlade sounds like a hot nitro in the air. The prop "chops" the slipstream coming off the wings and the printed wings resonate – the result is satisfying hot and low passes down the runway.

Time Lapsed Videos

Watch these videos on printing suggestions on the typical parts.

Test Flights Typical Wing Section Spinner Servo Hatches Left Rear Fuselage Left Center Fuselage

Left Front Fuselage Access Hatch Motor Cowl Ailerons

Innovation

Sure, there are a lot of flying wings out there, the simplest type of flying there is. But there are not many 3D Printed flying wings yet. This design explores the state of the art while having fun doing it. The generous hatch area, sleek design, and lighting capability all add to a unique flying experience. You may have noticed a "hole" in the hatch, this is for an FPV antenna. If you are interested in seeing some modifications to this airframe for FPV, sign on to the dedicated forum and let us know – if there is enough interest I'll modify a nose for a camera.

All the best, Don – and the 3DLabGANG

P.S. I'm also a writer. If you are a reader of suspense novels you will enjoy my book, "Found Money." Available on Amazon

An elegant and simple design is the result of an investment of sweat equity from the designer. Please honor that investment and keep these files private. Thank you.