KAIER FALCON

Printing and Assembly Instruction

I. Introduction and requirement

Kaier Falcon is designed to be a high speed aircraft. The aerodynamic form and structure make it light and strong that a 2216 1100kv motor could power it up to 100km/h with maneuverability, not just gliding around.

Specification:

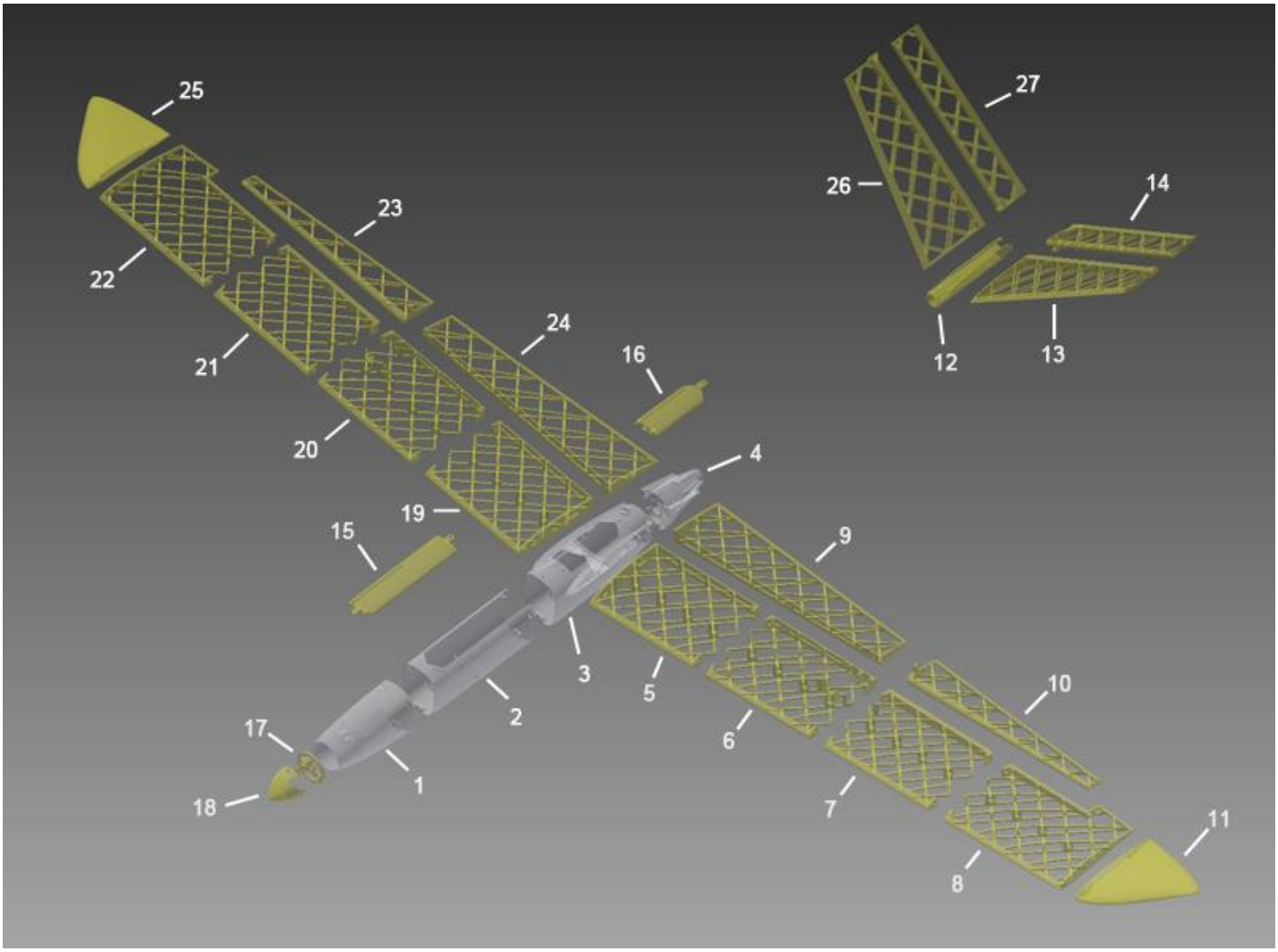
Wingspans: 1200mm
Weight (with recommended parts): 850g
Max-speed: over 100km/h

You will need:

2216 1100kv motor
30A ESC
3S 2200mAh battery
10" folding prop and spinner
3x9g servos
4ch radio system
12mm x 400mm carbon tube
(x2) 4mm x 50mm carbon tube
60 M2x6mm bolts and nuts (or 30 + glue)
Piano wire and 2mm carbon tube for pushrods
Corvering film

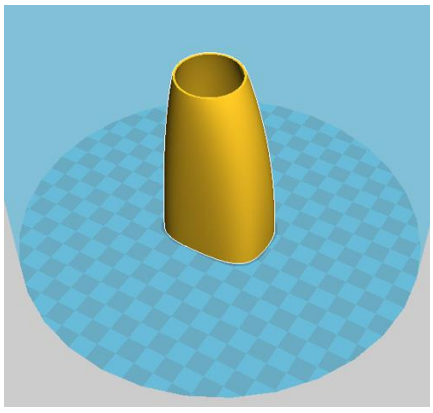
II. 3D Printing

There are 27 parts needs to be printed. The whole design is seperated into small parts in order to make printing easier and in case crashing happens, more parts will survive.



Please read the marking in the image above.
Here is the printing instruction:

1. **Part number 1**
   File name: **fuselage_part_1.stl**
   Print settings recommended:
   - Layer height: 0.2mm
   - Support: Disable
   - Platform adhension: brim
   - Print orientation: <image>



2. **Part number 2**
   File name: **fuselage_part_2.stl**
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   - Support: Disable
   - Platform adhension: brim
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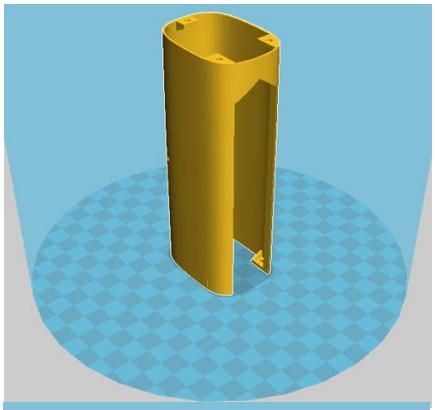

3. **Part number 3**
   File name: **fuselage_part_3.stl**
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   - Support: Disable
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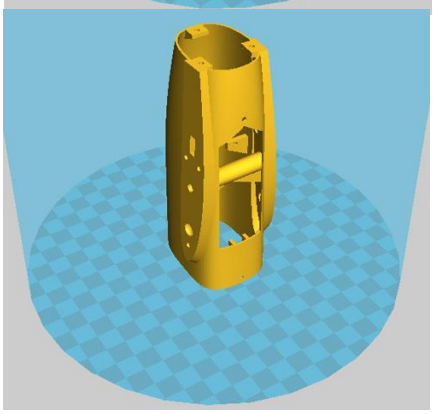

4. **Part number 4**
   File name: **fuselage_part_4.stl**
   Print settings recommended:
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   - Support: Disable
   - Platform adhension: brim
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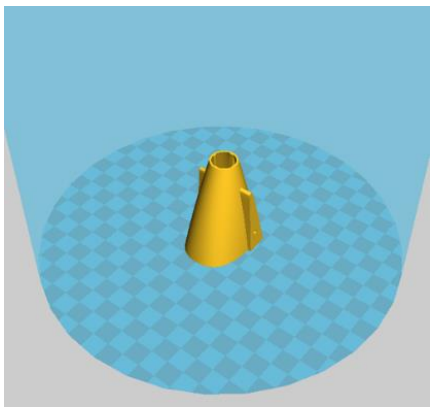
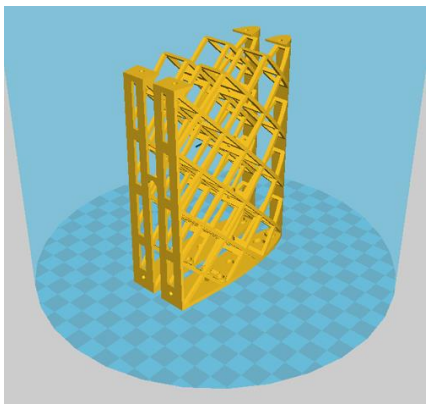


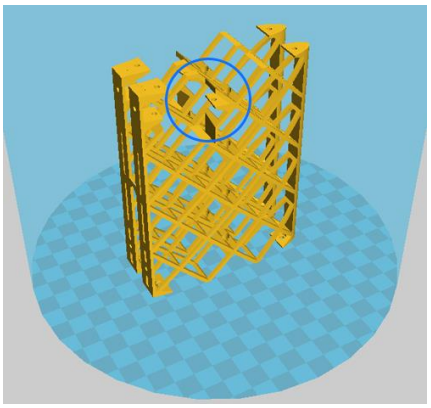
5. **Part number 5 + 19**
   File name: **wing_part_1_PV.stl**
   This file is designed for printing both of
   the parts. If you want to print each of
   them, please use file
   wing_part_1.stl,
   then mirror it to get the part 19.

   Print settings recommended:
   - Layer height: 0.25mm
   - Support: Disable
   - Platform adhension: brim
   - Print orientation: <image>



6. **Part number 6 + 20**

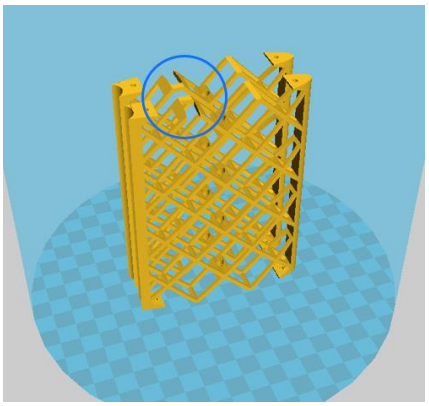
File name: **wing_part_2_PV.stl**
If you want to print each of them, please use file wing_part_2.stl, then mirror it to get the part 20.



Print settings recommended:
- Layer height: 0.25mm
- Support: Disable
- Platform adhension: brim
- Print orientation: <image>

7. **Part number 7 + 21**

File name: **wing_part_3_PV.stl**
If you want to print each of them, use file wing_part_3.stl, then mirror get the part 21.



please
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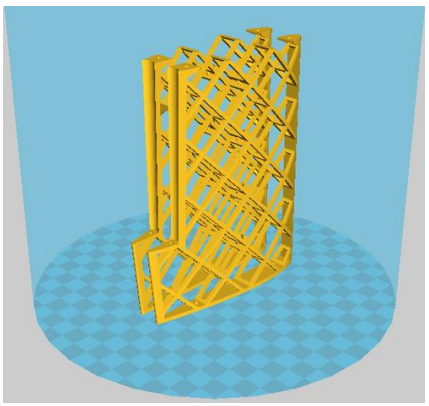
Print settings recommended:
- Layer height: 0.25mm
- Support: Disable
- Platform adhension: brim
- Print orientation: <image>

8. **Part number 8 + 22**

File name: **wing_part_4_PV.stl**
If you want to print each of them, use file wing_part_4.stl, then mirror get the part 22.

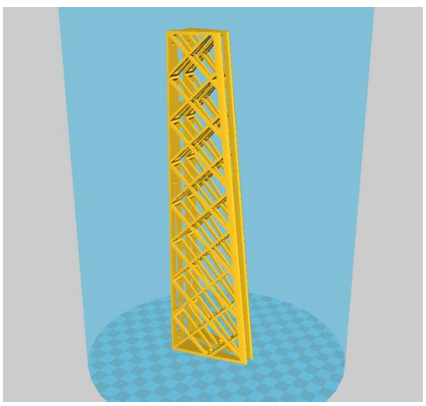


please
it to

Print settings recommended:
- Layer height: 0.25mm
- Support: Disable
- Platform adhension: brim
- Print orientation: <image>

9. **Part number 9 + 24**

File name: **wing_part_5_PV.stl**
If you want to print each of them, use file wing_part_5.stl, then mirror get the part 24.

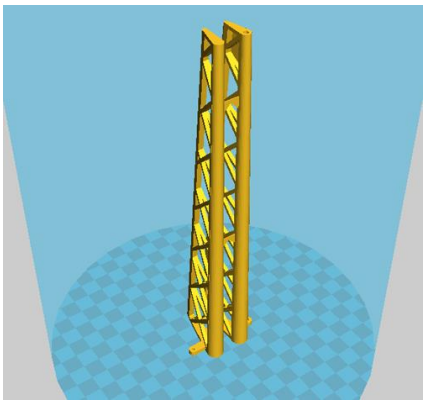


please
it to

Print settings recommended:
- Layer height: 0.25mm
- Support: Disable
- Platform adhension: brim
- Print orientation: <image>

10. Part number 10 + 23

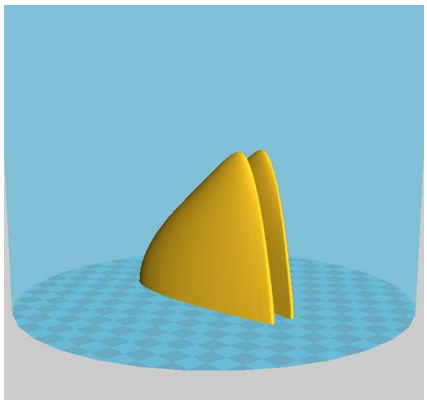
File name: **wing_aileron_PV.stl**
If you want to print each of them, use file wing_aileron.stl, then mirror it to get the part 23.



Print settings recommended:
- Layer height: 0.25mm
- Support: Disable
- Platform adhension: brim
- Print orientation: <image>

11. Part number 11 + 25

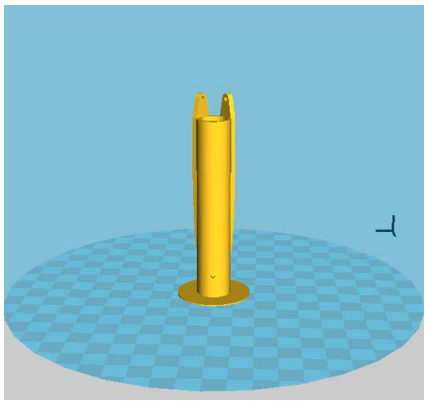
File name: **wing_tip_PV.stl**
If you want to print each of them, use file wing_tip.stl, then mirror it to the part 25.



Print settings recommended:
- Layer height: 0.2mm
- Support: Disable
- Platform adhension: brim
- Print orientation: <image>

12. Part number 12

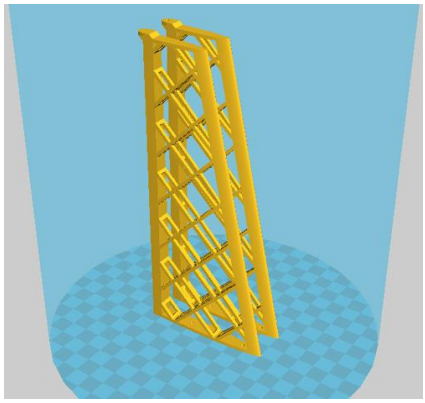
File name: **V_tail_shaft_PV.stl**
A thick brim is already added to the bottom. In case you need the original
design, please use file V_tail_shaft.stl



Print settings recommended:
- Layer height: 0.2mm
- Support: Disable
- Platform adhension: none
- Print orientation: <image>

13. Part number 13 + 26

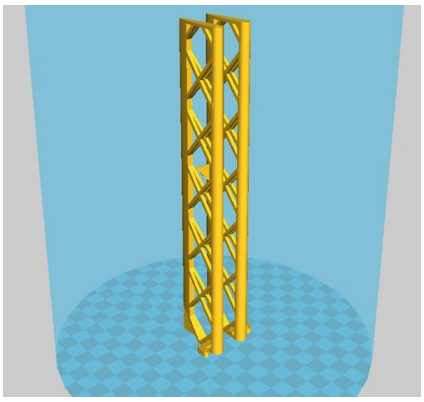
File name: **V_tail_part_1_PV.stl**
If you want to print each of them, use file V_tail_part_1.stl, then mirror it to get the part 26.



Print settings recommended:
- Layer height: 0.25mm
- Support: Disable
- Platform adhension: brim
- Print orientation: <image>

14. Part number 14 + 27

File name: **V_tail_part_2_PV.stl**
If you want to print each of them, use file V_tail_part_2.stl, then mirror to get the part 27.

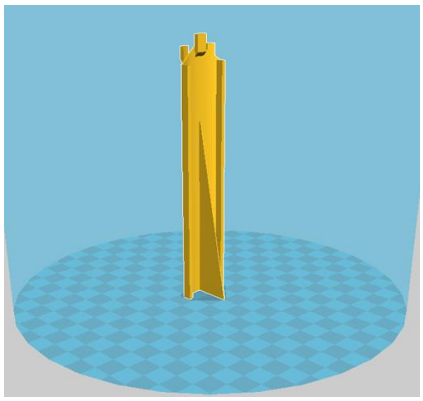


Print settings recommended:
- Layer height: 0.25mm
- Support: Disable
- Platform adhension: brim
- Print orientation: <image>

please
it

15. Part number 15

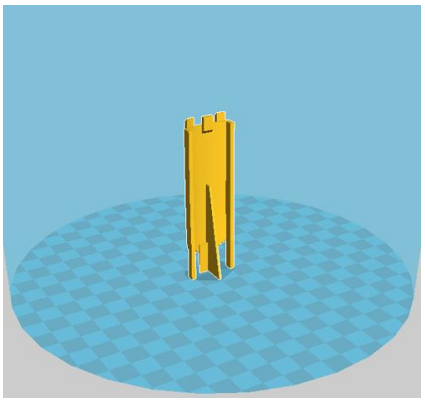
File name: **fuselage_lid_1_PV.stl**
This part needs to get support by design.
In case you need the original part without support, please check file fuselage_lid_1.stl



Print settings recommended:
- Layer height: 0.2mm
- Support: Disable
- Platform adhension: brim
- Print orientation: <image>

16. Part number 16

File name: **fuselage_lid_2_PV.stl**
This part needs to get support by design.
In case you need the original part without support, please check file fuselage_lid_2.stl

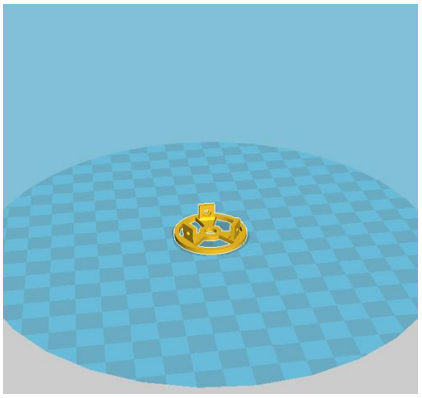


Print settings recommended:
- Layer height: 0.2mm
- Support: Disable
- Platform adhension: brim
- Print orientation: <image>

17. Part number 17

File name: **spinner_support.stl**
This spinner is only for 3 blades propeller.

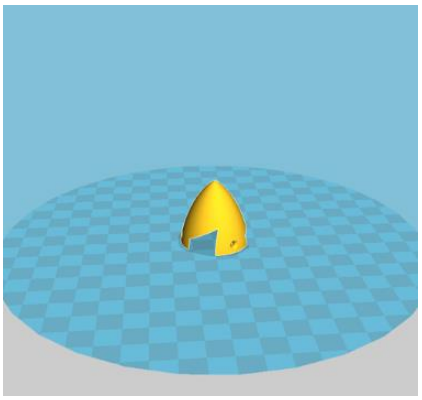
Print settings recommended:
- Layer height: 0.2mm
- Support: Disable
- Print orientation: <image>



18. Part number 18

File name: **spinner_head.stl**
This spinner is only for 3 blades propeller.

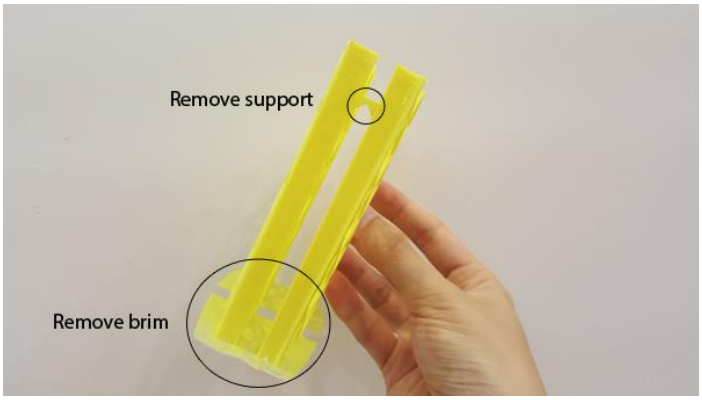
Print settings recommended:
- Layer height: 0.2mm
- Support: Disable
- Print orientation: <image>

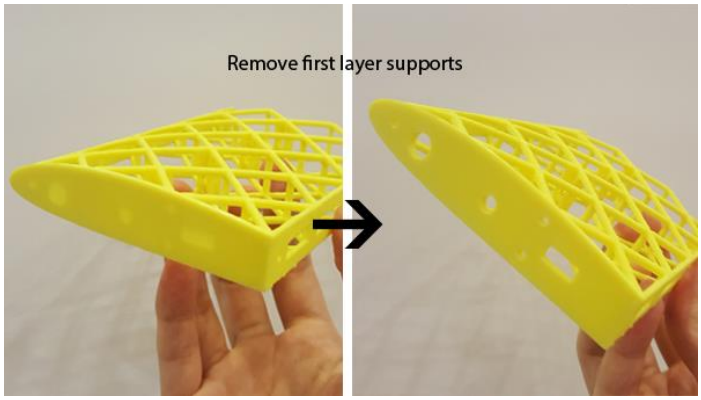


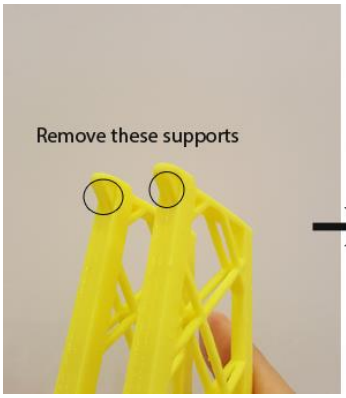
III. Assembly

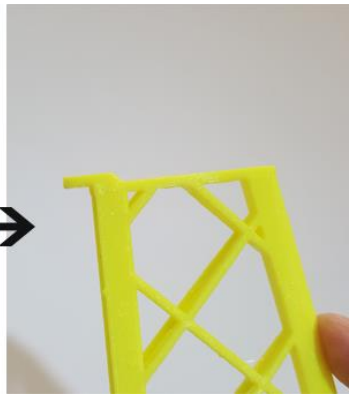
You need these tools:
- Screw driver (for M2 bolt) with magnetic tip
- Paper cutter knife
- Lighter
- Glue
- A piece of 3D print filament

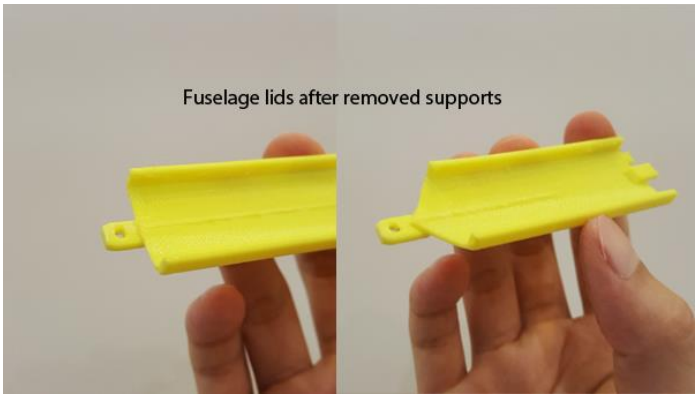
1. **Prepare the 3d printed part.**
   - Firstly, you need to remove all brims ,supports on the parts.

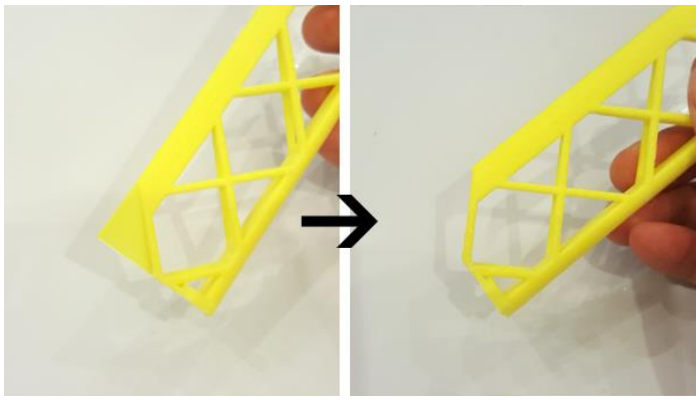




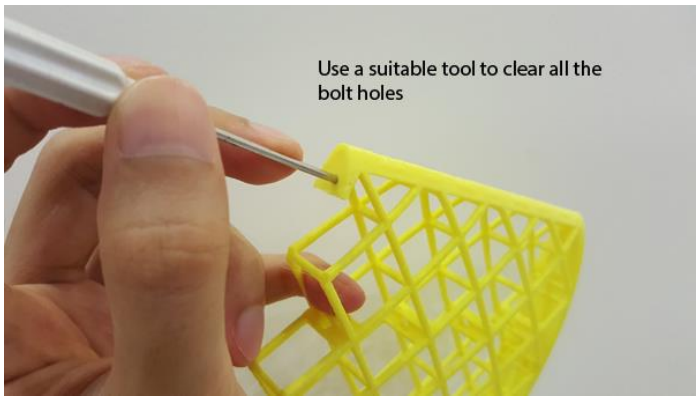




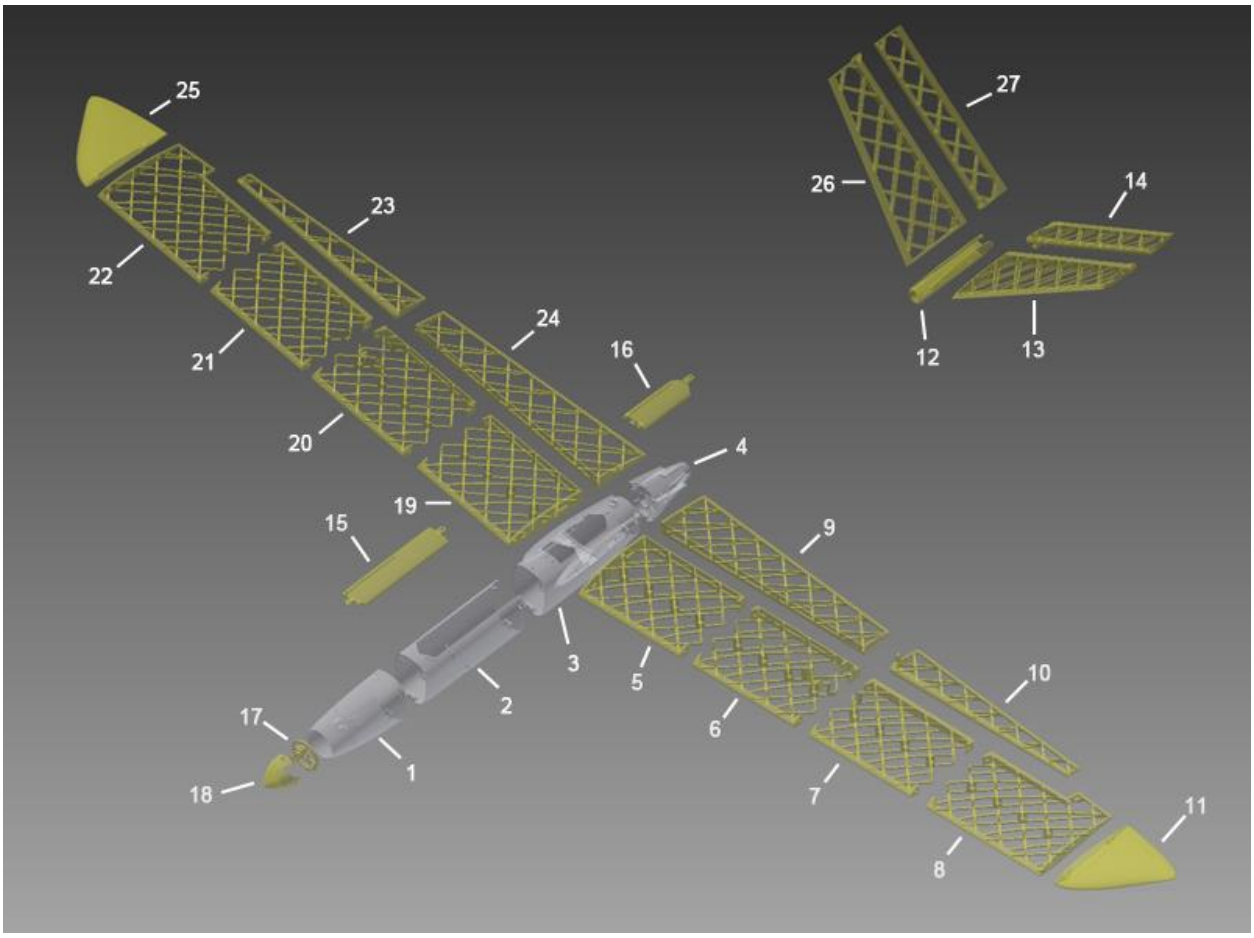




- Clear bolt holes on all the parts, this will help bolting a lot easier.

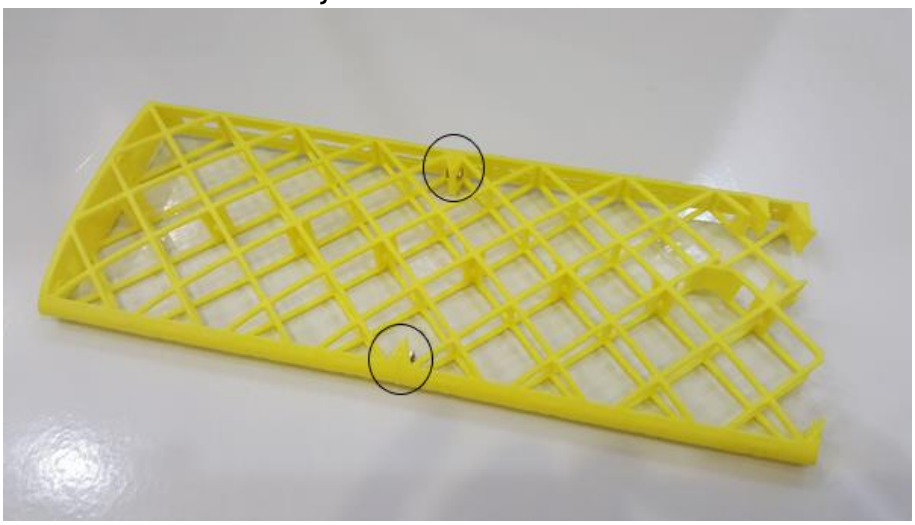


2. **Assembly**
   The aircraft has a tidy form. Therefore **the assembly needs to follow process given below**. Please do it step by step.
   ** Most of the parts are designed to use M2 bolt and nut for reliable joins. In case you want to use glue to save time, you should make sure the joins are strong enough by your own experience.*



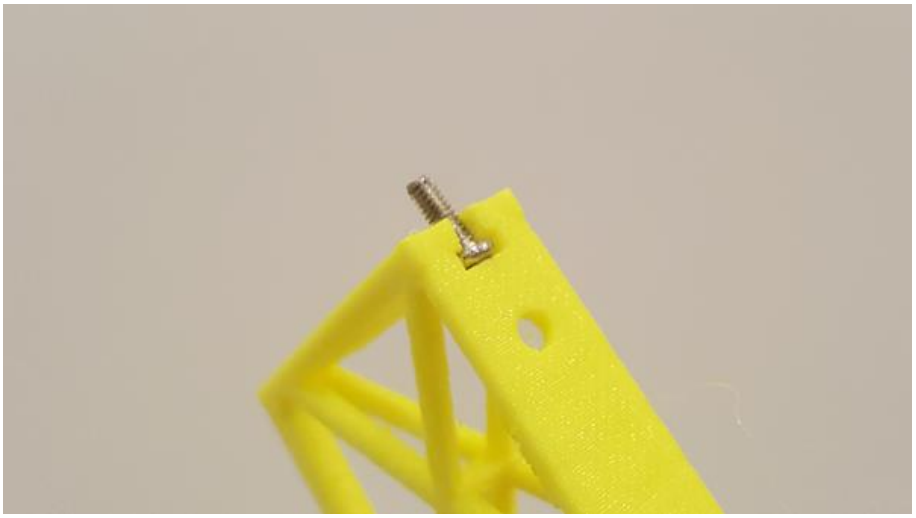
2.1 Join part 5 to 6

- Use 2 bolts and nuts to join them



2.2 Place a bolt into part 9

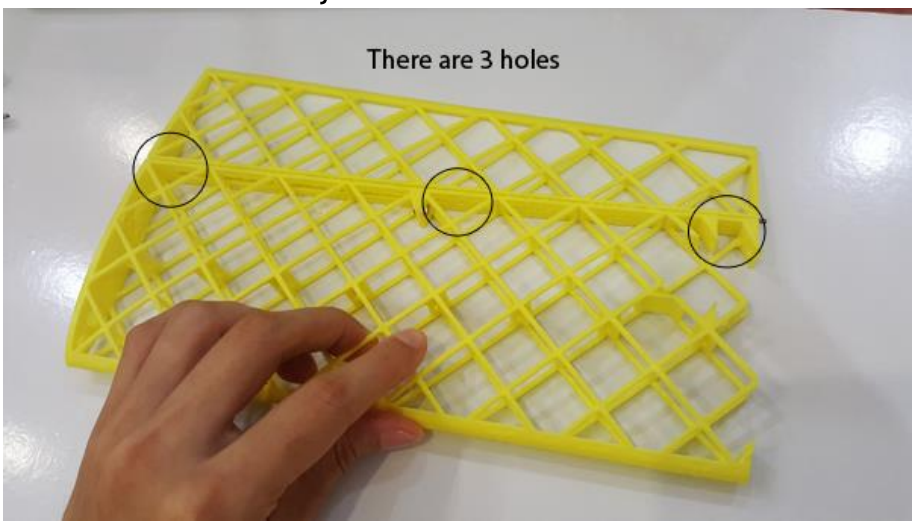
- Use lighter to heat up the bolt and place it to part 9 as shown below. The bolt head needs to be fully sunk into the hole.



* This bolt will be used for mouting aileron to the wing.

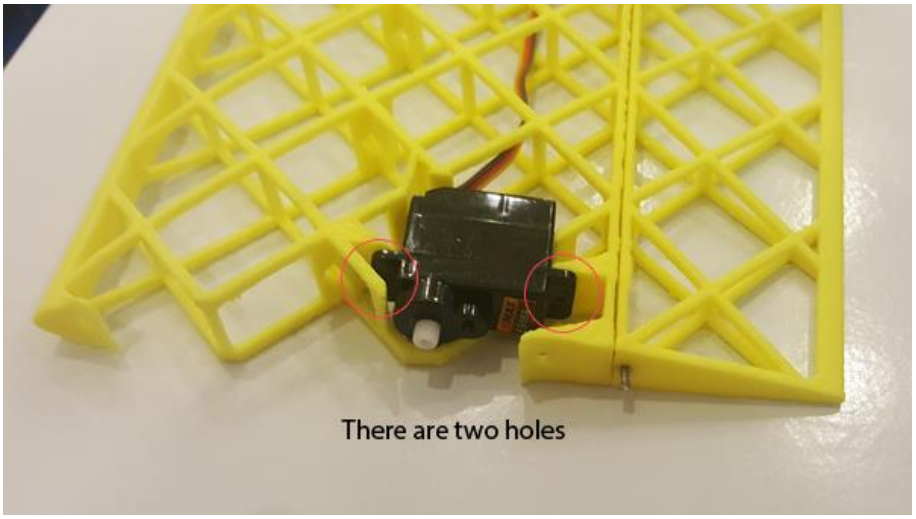
2.3 Join part 9 to part 5 - 6

- Use 3 bolts and nuts to join them

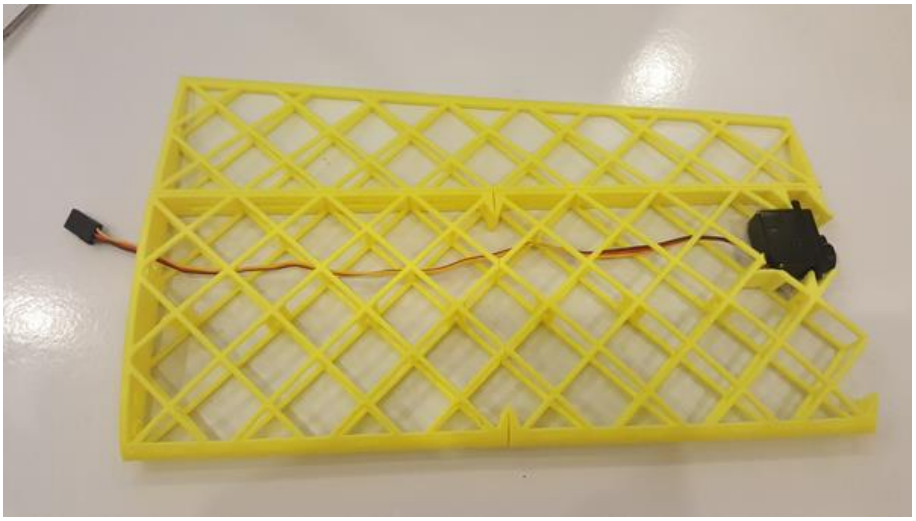


2.4 Mount a servo to part 6

- Use 2 bolts and nuts to mount a 9g servo to part 6. This servo controlls the aileron.

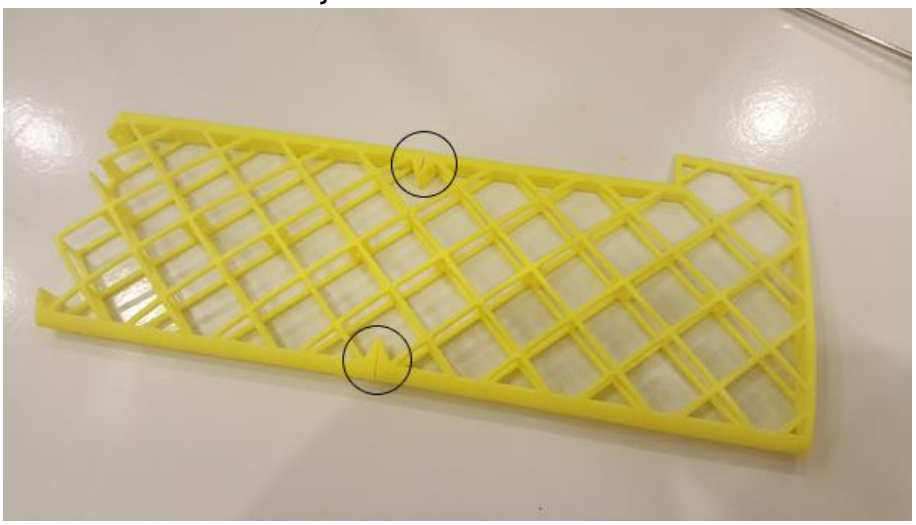


- Pass the wire through the parts as shown below:



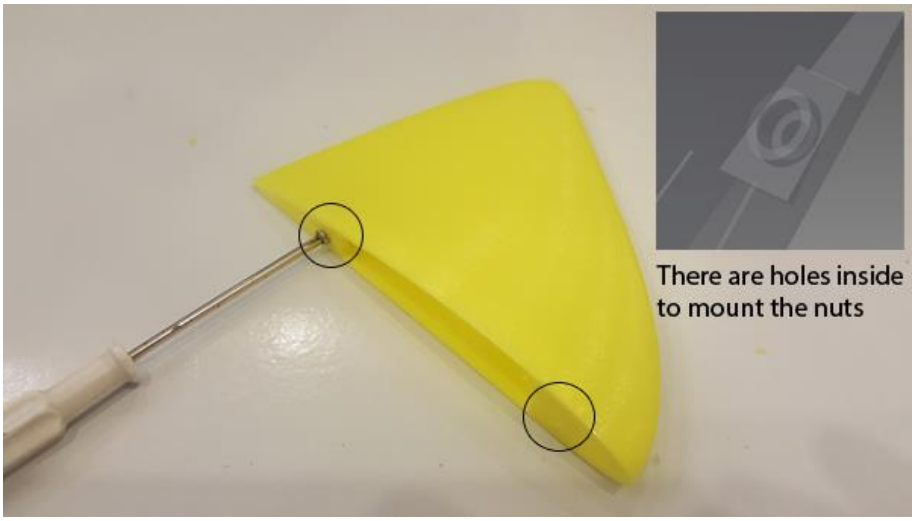
2.5 Join part 7 to 8

- Use 2 bolts and nuts to join them

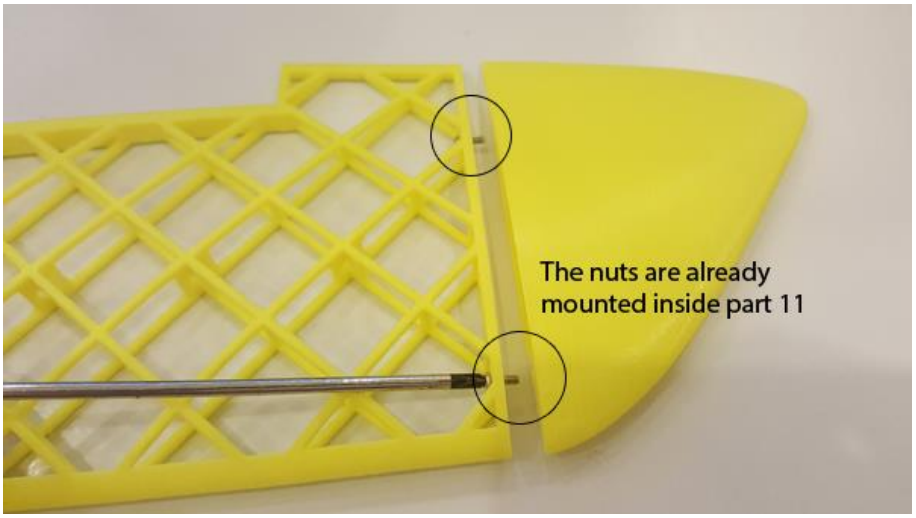


2.6 Join part 11 to 8

- Put 2 nuts to the holes inside of part 11 and using a bolt to screw them until they are tightly sunk inside the holes, then gently remove the bolt. The nuts should be mounted to the holes.

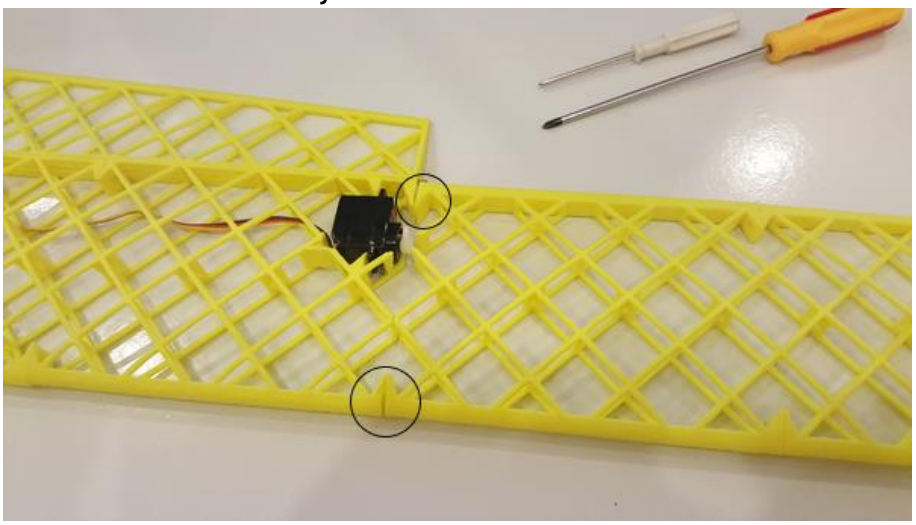


- Put bolts into 2 holes of part 8 and join them with part 11.



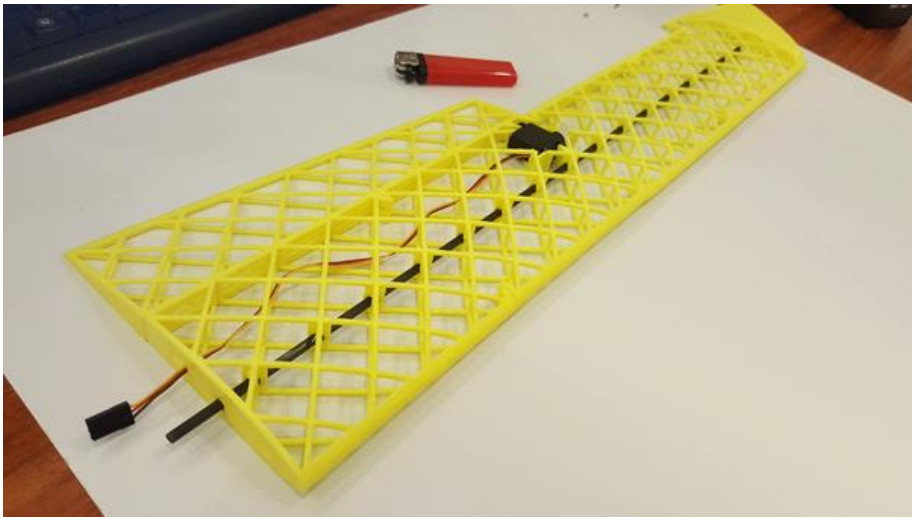
2.7 Join part 6 to 7

- Use 2 bolts and nuts to join them.



2.8 Put 4mm x 500mm carbon tube into the wing

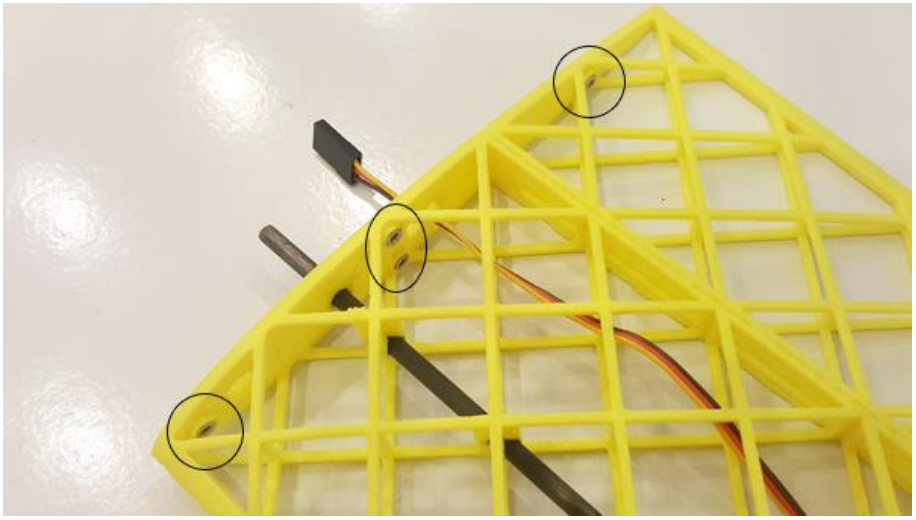
- Carefully put the carbon tube into the wing through the holes as shown below:



* If the holes are tight then don't try to put it hardly, you might break the tube. Use lighter to heat up the tube tip and try again.

2.9 Mount nuts in holes on part 5 and 9

- Put 4 nuts to the holes of part 5 and 9 and using a bolt to screw them until they are tightly sunk inside the holes, then gently remove the bolt.



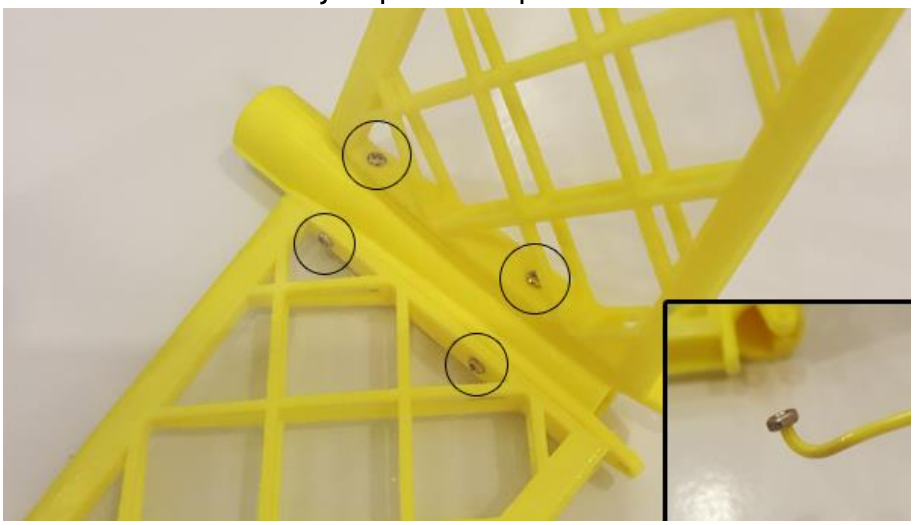
** When you cover the wing with film you no longer can touch to these points, that's why we need to mount the nuts first.*

2.10 Do the same for part 19, 20, 21, 22, 24, 25

- Do the same steps (2.1 to 2.9) to the other-side wing parts.

2.11 Join part 26, 13 to part 12

- Use 2 bolts and nuts to join part 16 to part 12 as describe below:

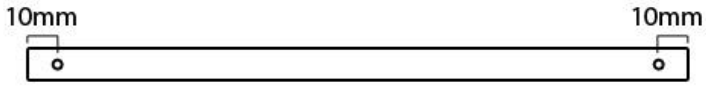


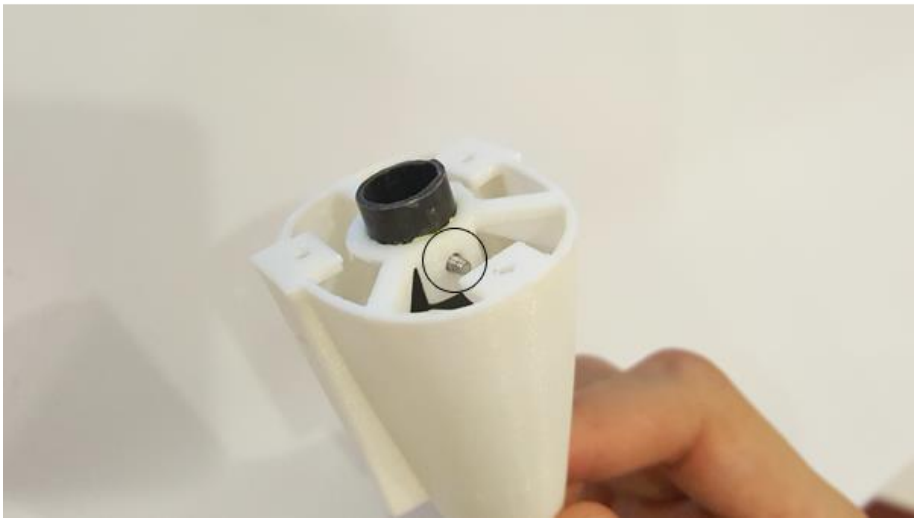
* You should need a tool to hold the nuts and put them inside part 12 for bolting. Simply use a piece of filament as shown above.

- Do the same to part 13.

2.12 Join the tail carbon tube to part 4

- The carbon tube need to be drilled two holes as shown below.
- Put the tube into part 4 and align the holes for bolting.

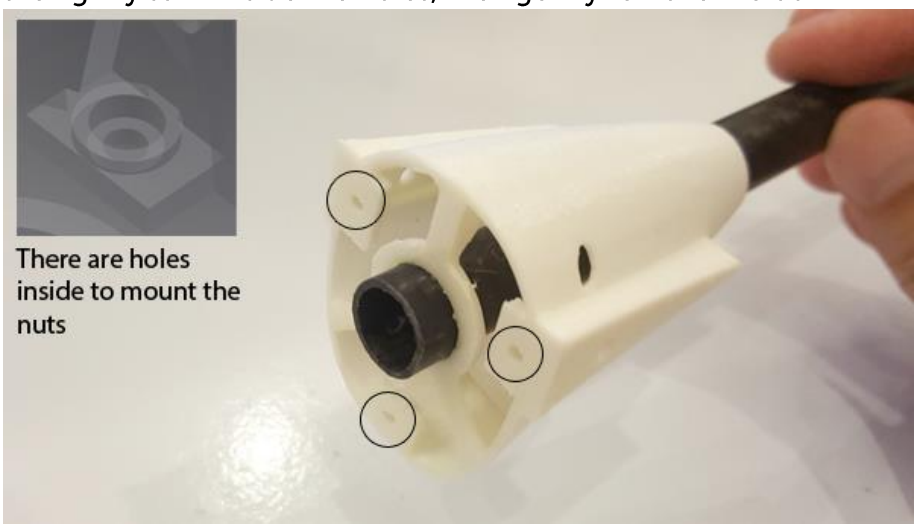




* In case it's hard for you then try to use glue but make sure they are tightly joined.

2.13 Join part 3 to part 4

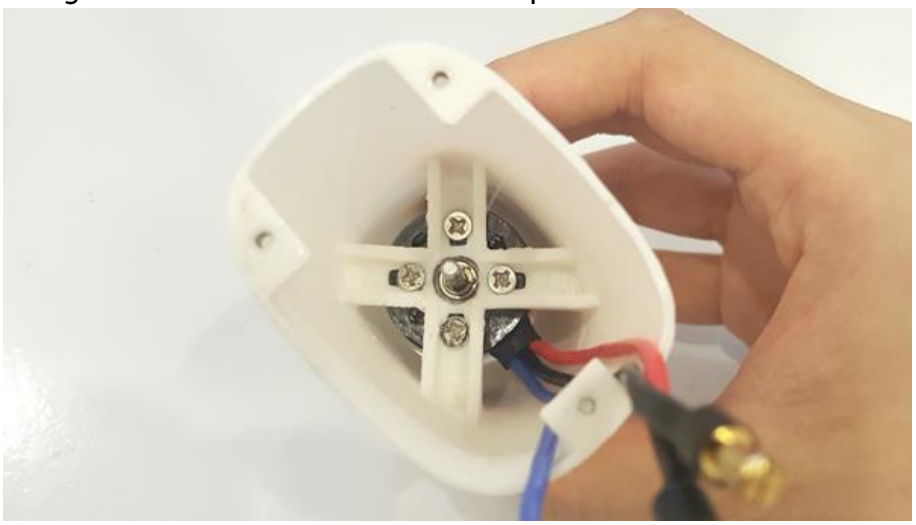
- Put 3 nuts to the holes of part 4 and using a bolt to screw them until they are tightly sunk inside the holes, then gently remove the bolt.



- Put 3 bolts into holes of part 3 and join them with part 4.

2.14 Mount motor to part 1

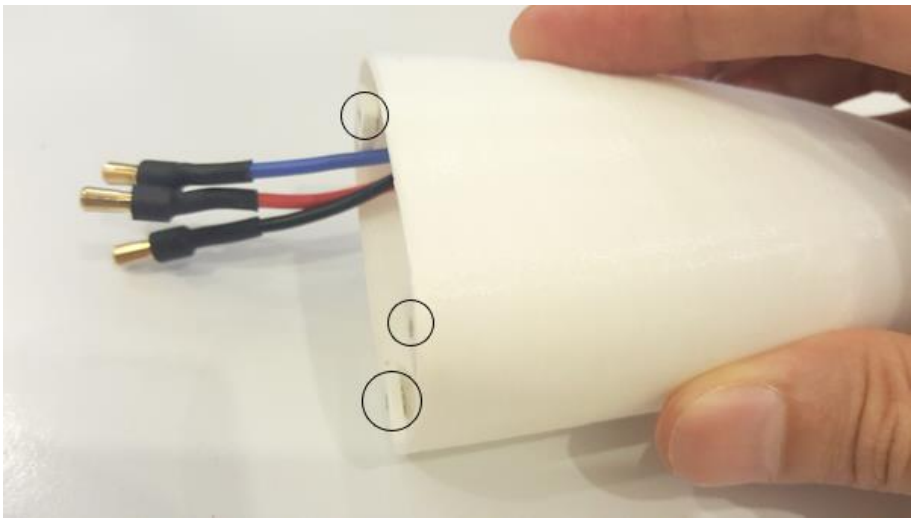
- Using 4 screws to mount the motor to part 1.



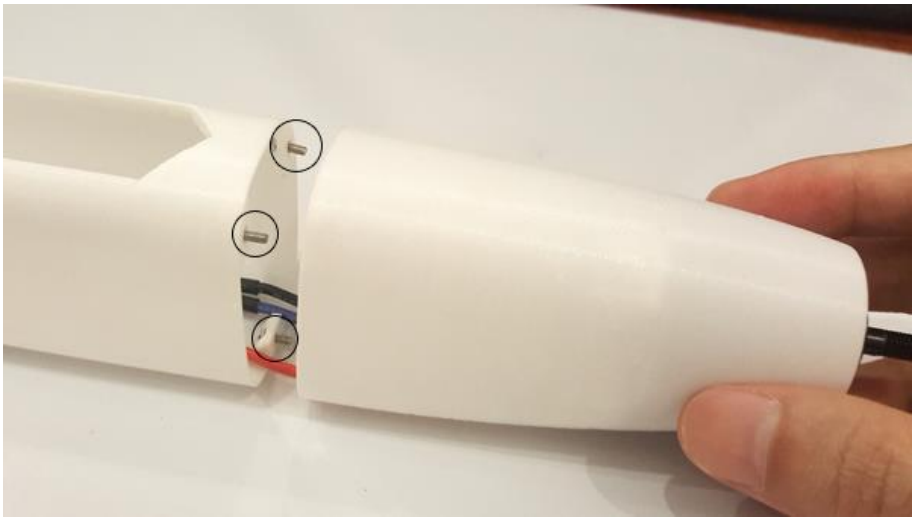
* In case your motor generates much of heat that could melt the mount area, you should add heat resistance material between the motor and the mounting part.

2.15 Join part 1 and part 2

- Put 3 nuts to the holes of part 1 and using a bolt to screw them until they are tightly sunk inside the holes, then gently remove the bolt. The nuts should be mounted to the holes.

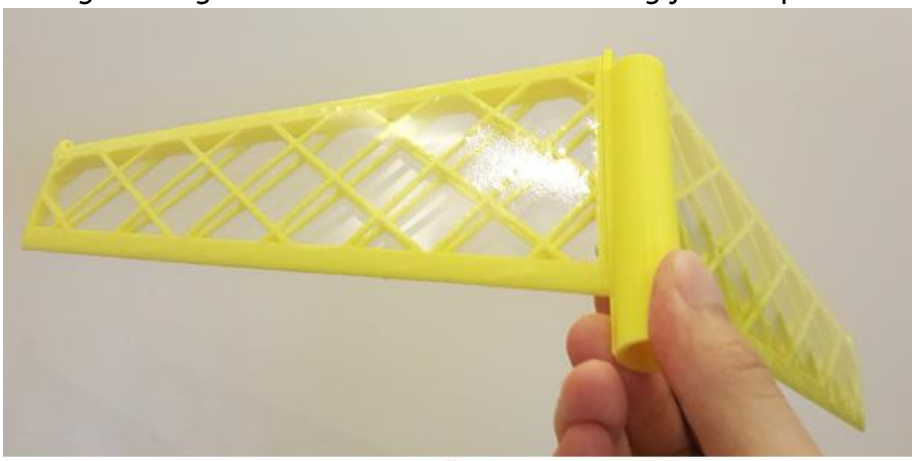


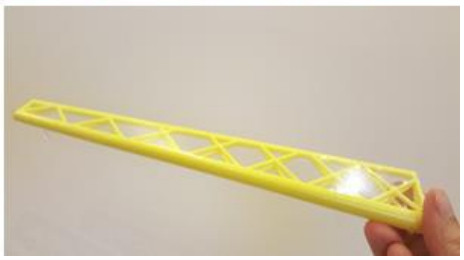
- Put 3 bolts into part 2 and join them with part 1.



2.16 Cover part 10, 23, 26, 13, 27, 14 with film

- Use the film to cover around the parts, make sure they are fit and tight.
- Use lighter or glue to make the films stick strongly to the parts.





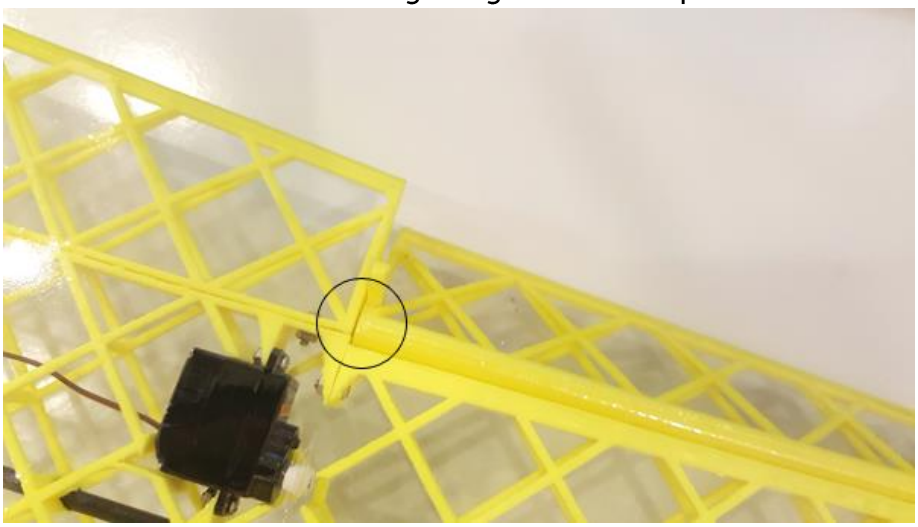
2.17 Mount part 14/27 to part 13/26 (Vtail)

- Use two bolt and screwing them through part 14/27 to part 13/26

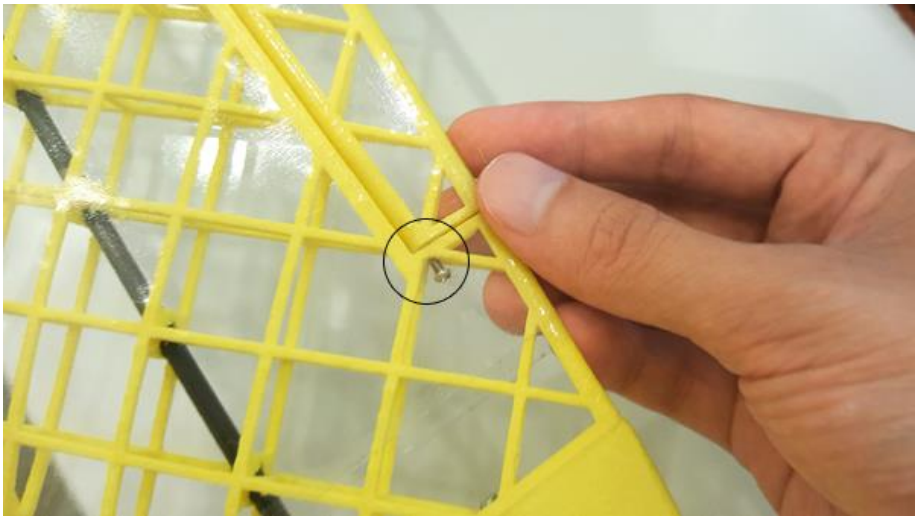
* Make sure the tails can move freely.
* The pushrod connector must be underneath.

2.18 Mount part 10 and 23 (ailerons) to the wings

- Mount the ailerons to the wing using the bolts on part 9 and 24.



- Use two bolts and screwing them through the wing to the other side of the ailerons.



* Make sure the ailerons can move freely.

2.19 Join the tail carbon tube to part 12

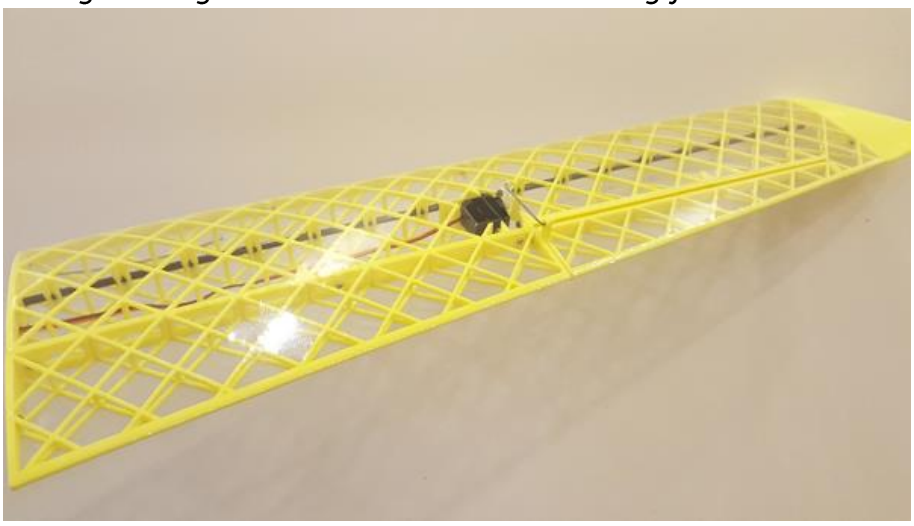
- Put the tube into part 12 and align the holes for bolting.

* Use the same tool as step 2.11 to hold the nut and put it into part 12.

* In case it's hard for you then try to use glue but make sure they are tightly joined.

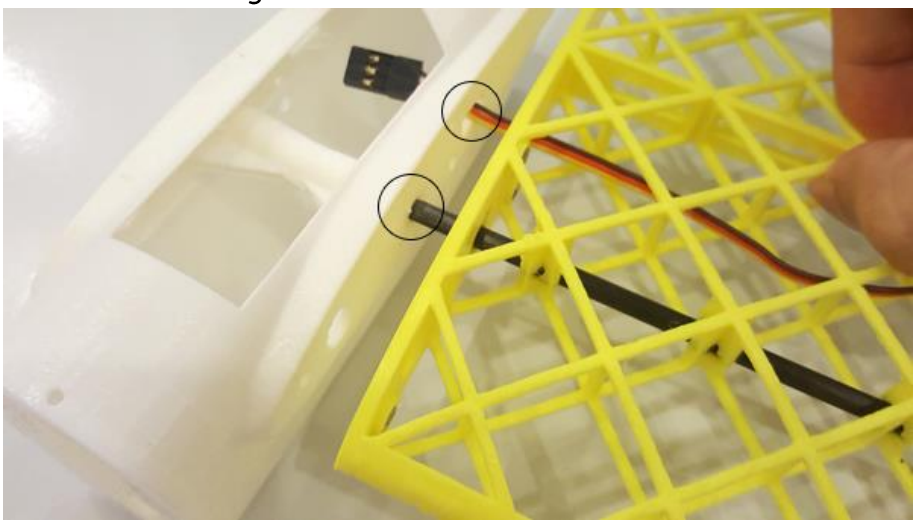
2.20 Cover the wings with film.

- Use the film to cover around the wings. Make sure they are fit and tight.
- Use lighter or glue to make the films stick strongly.



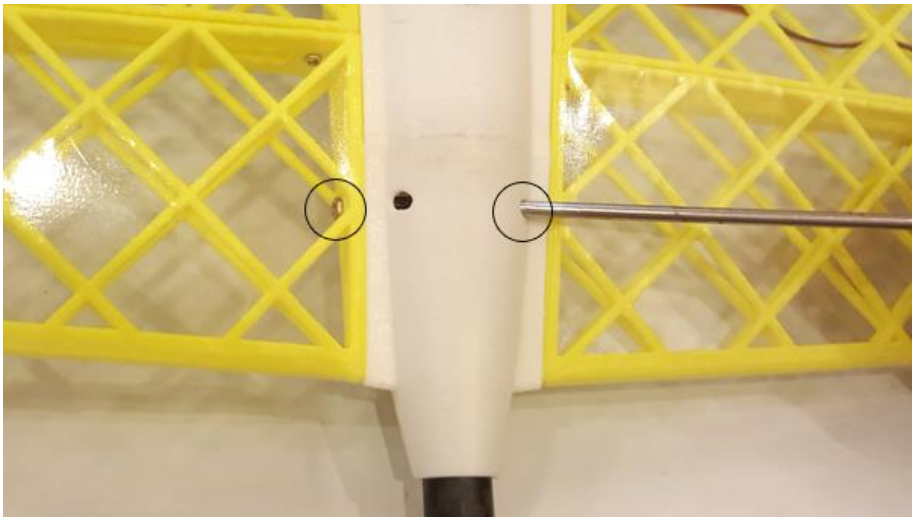
2.21 Join the wings to the fuselage (part 3 + 4)

- Put the servo wire into the fuselage, then put the carbon tube into the hole on the fuselage as shown below:

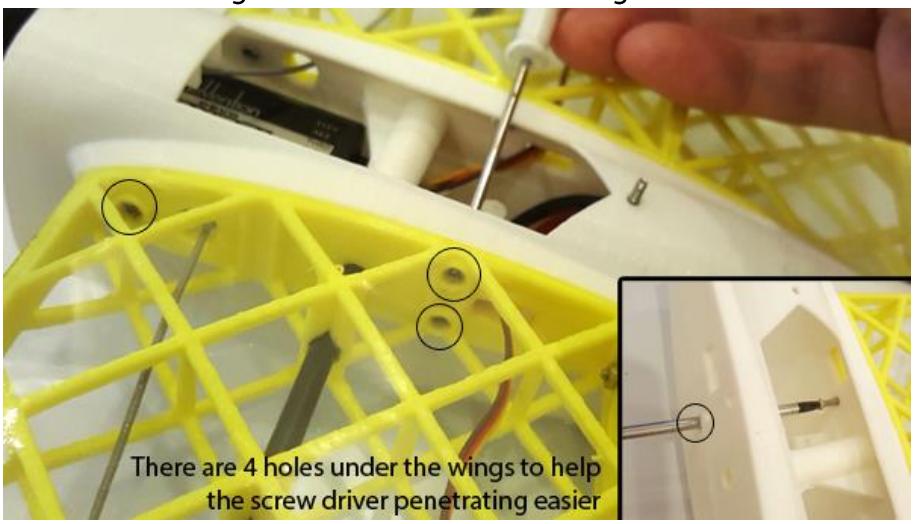


* If the hole is too tight, use lighter to heat up the tube head and try again. Make sure **the tube penetrates 20mm** into the hole on fuselage.

- Put a bolt on the screw driver (with magnetic tip), then put it through the hole on part 4 to the nut on part 9 and fasten it.



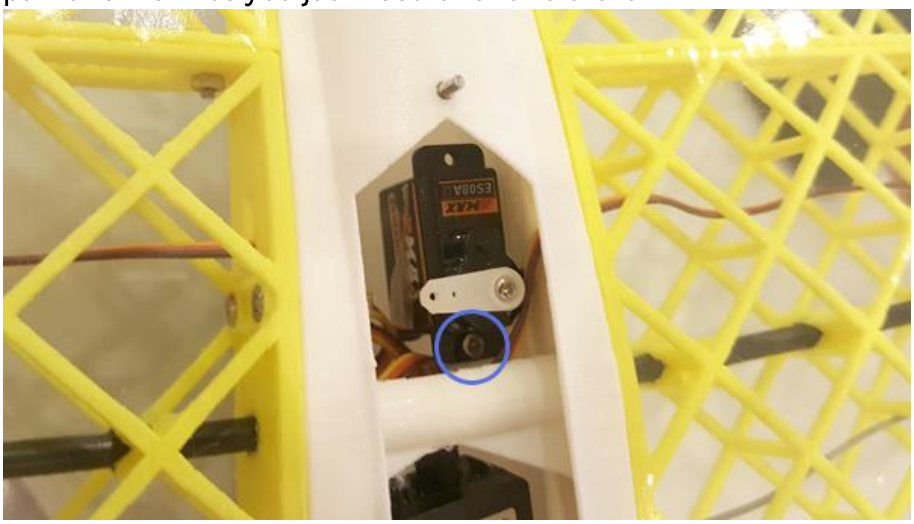
- Put 3 bolts through the other holes on fuselage and fasten them.



- Do the same for the other-side wing.

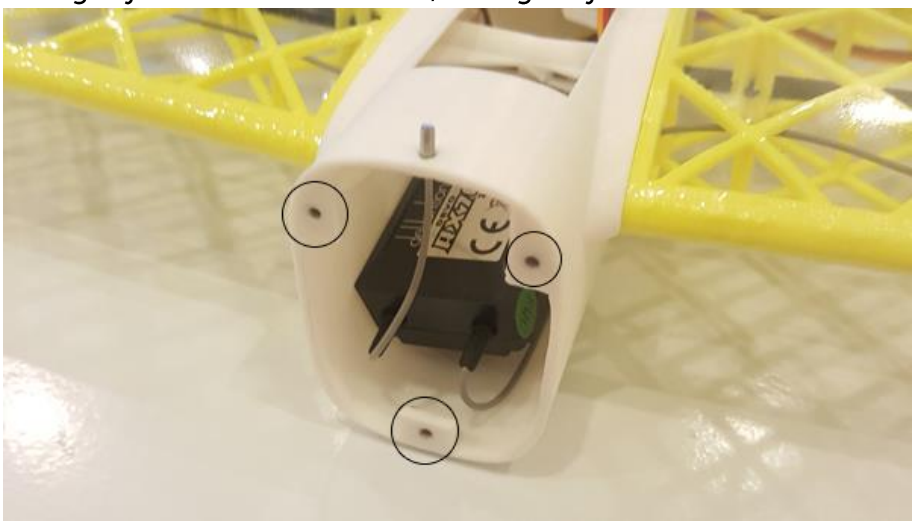
2.22 Mount 9g servo to the fuselage (to control the V-tail)

- If you want both rudder and elevator functions, mount two servos to the part 3. Otherwise you just need one for elevator.

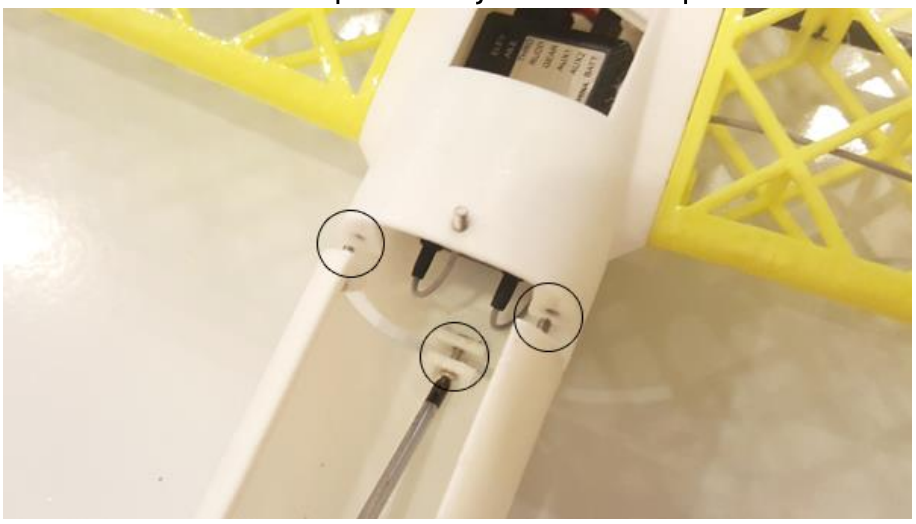


2.23 Join part 2 to part 3

- Put 3 nuts to the holes of part 3 and using a bolt to screw them until they are tightly sunk inside the holes, then gently remove the bolt.

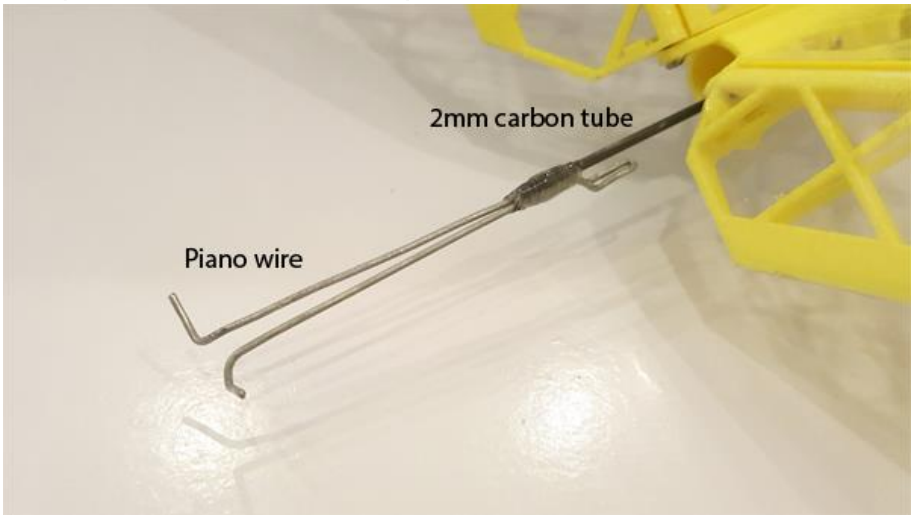


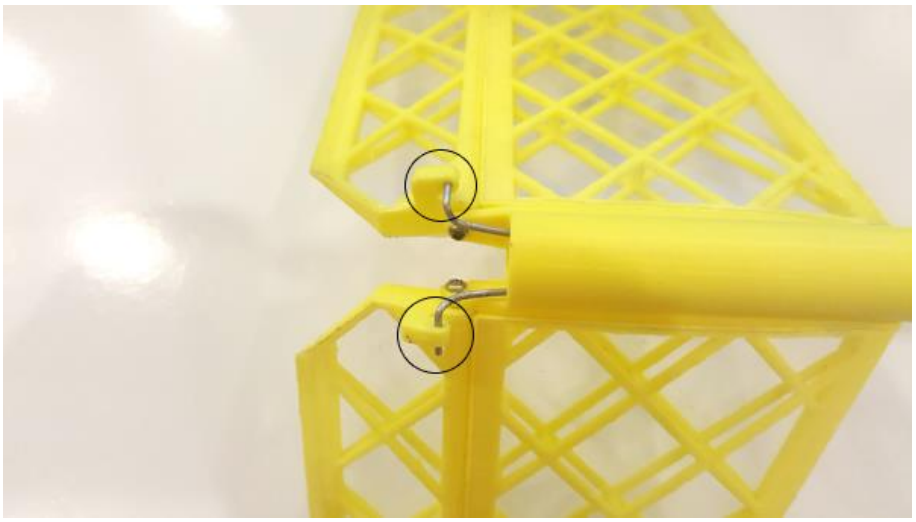
- Put bolts into 3 holes of part 2 and join them with part 3.



2.24 Setup pushrod for V-tail

- Use piano wire and make the pushrod as shown below:



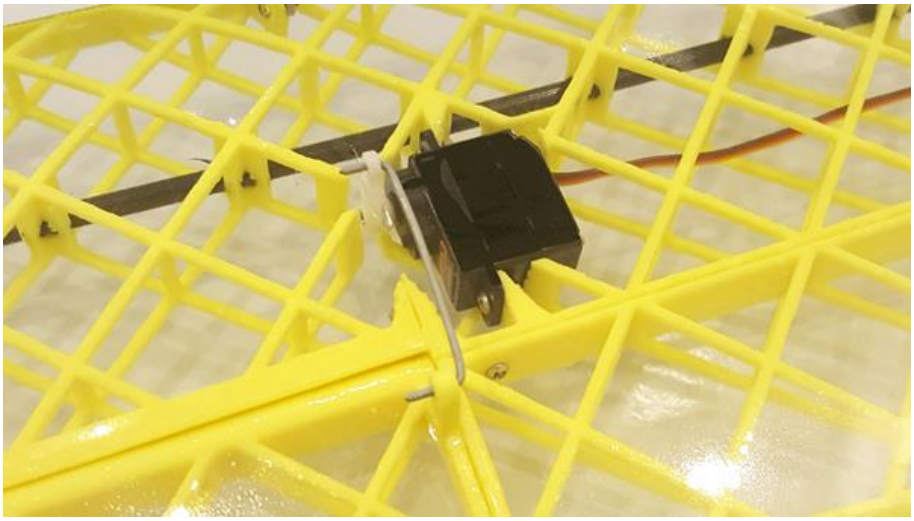


* This is only for elevator function. If you also want rudder function, separate it into 2 pushrod.

- Connect the other side to the servo and test.

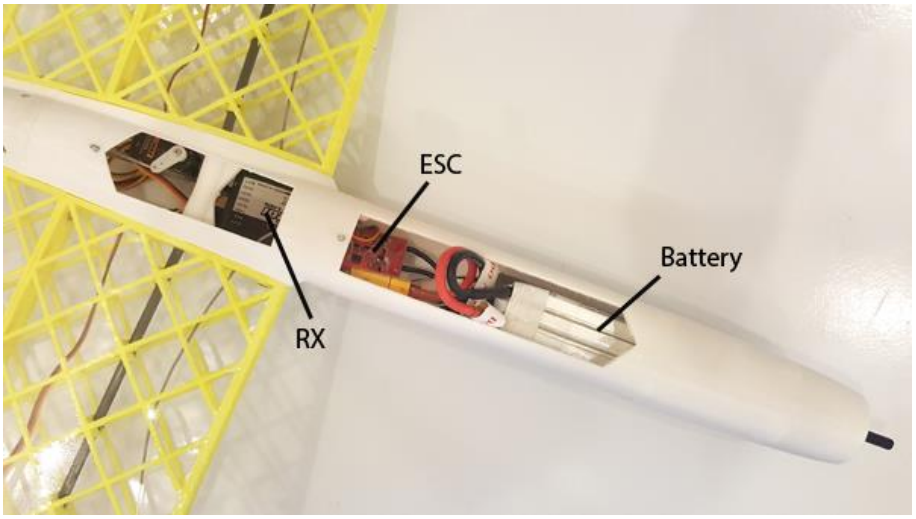
2.25 Setup pushrod for aileron

- Use piano wire and make the pushrod as shown below:



2.26 Setup RX, ESC, Battery

- Place them as shown below



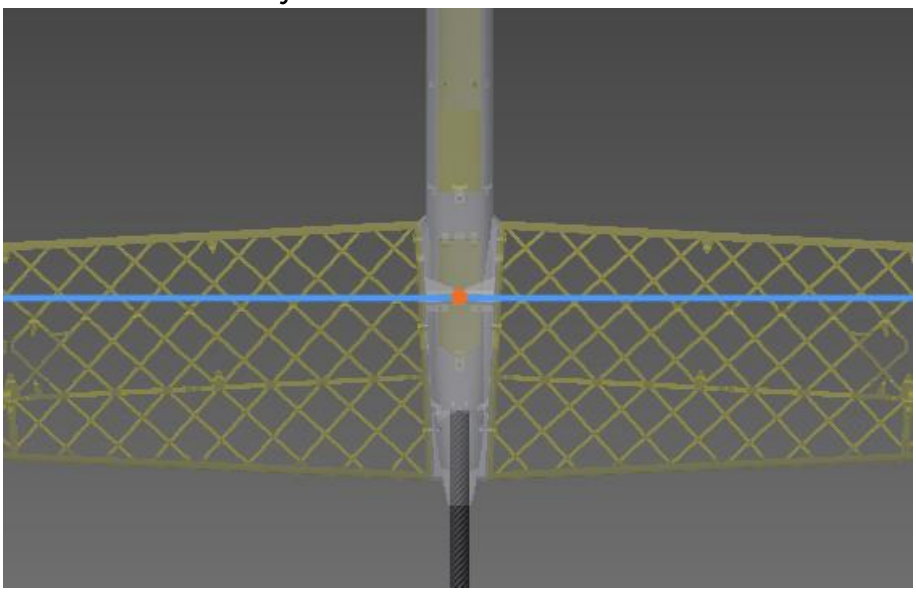
* Make sure they are fixed with tape except the battery.

2.27 Mount propeller to motor

- Make sure the propeller will rorate in the right direction.

2.28 Balancing the aircraft

- The Center of Gravity of the aircraft is the red dot as shown below:



***** it lays on the carbon tubes position.

- Adjust the battery position to make the aircraft balanced. Then fix the battery with tape.

2.29 Close the lids

- Place a bolt upside down into the hole as shown below, then use glue to fix its position.

- Then use nuts to close the lids.

IV. Take off and Landing

The total weight (with recommended RC parts) is around 850g, then the motor needs to generate over 1000g of thrust for best performance. As the requirement on the first page, you are recommended to use 2216 1100kv motor and a suitable foldable propeller.

- To take off, pull max throttle and throw it with 23 degrees angle.
- For landing, find a high grass area.

Thank you!