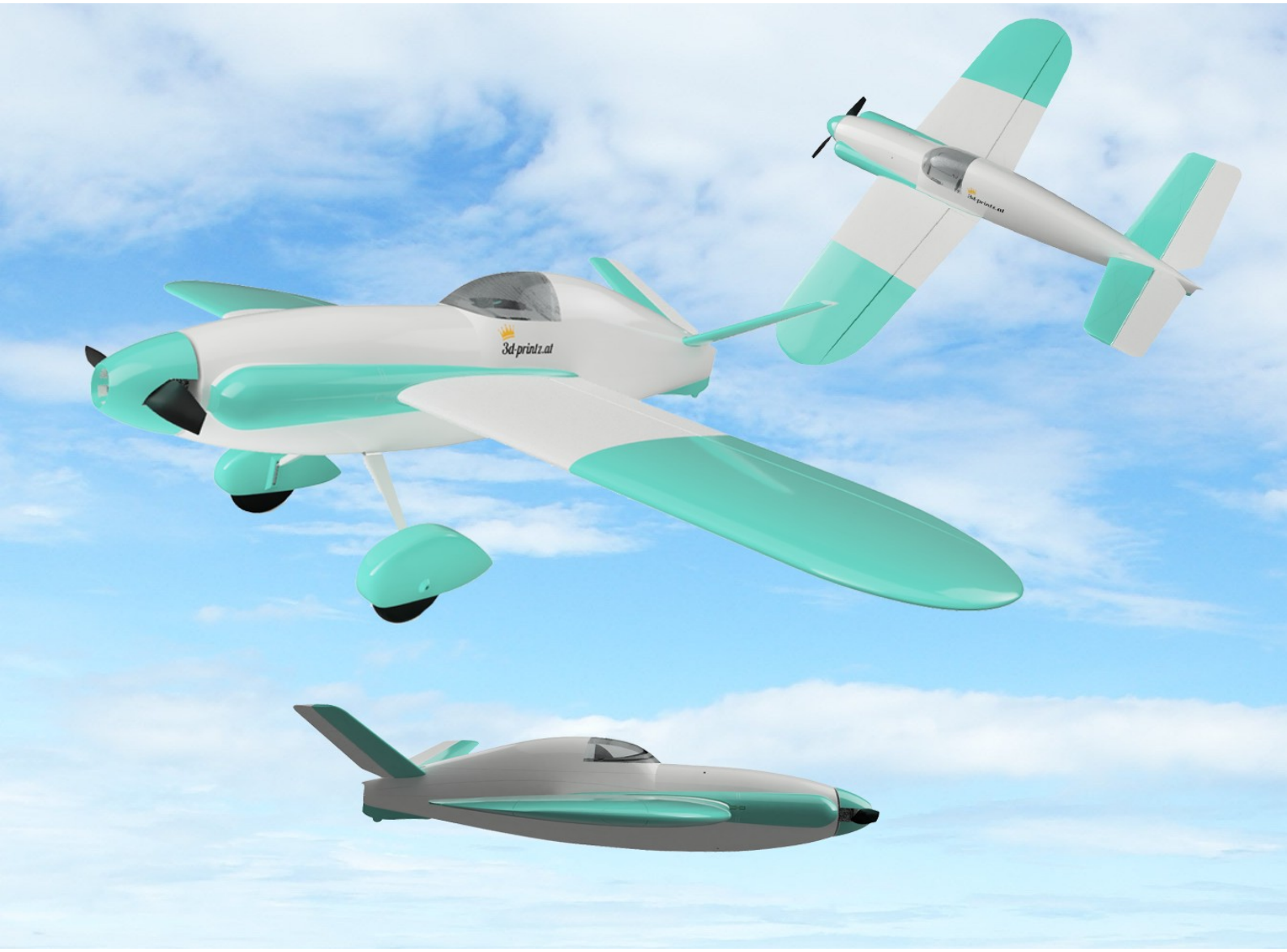
Chester Swee' Pea

3d-printed Micro Airracer



Span	735mm
AUW	550-680g
Airfoil	NACA 0010 symmetric
Center of Gravity	60mm behind leadingedge
Materials	LW-PLA, PLA, PETG, TPU

Babyplane or Racingmonster?

The Swee' Pea appears at first glance to be a typical baby plane - a bit chubby, round, somewhat adorable. One would gladly lend a hand in burping her after refueling. However, the truth is quite different - the Swee' Pea was designed by its creator, Art Chester, for use in high-speed air races and first took to the skies in 1947. Tragically, it would only take 2 years before a crash involving the Swee' Pea claimed its creator's life.
With a mere wingspan of 5.11m and a weight of 268kg, the Swee' Pea could accelerate to speeds of up to 290 km/h with its 63kW powerplant.

What prompted us to create this remarkable machine as a 3D-printable model? Well, on the one hand, it's certainly the unique appearance - but also the yearning for a small, swift, enjoyable aircraft that could not only fit in the trunk when assembled but even in one or the others backpack. The Chester Swee' Pea is simply an incredibly endearing chubby-cheeked aircraft, promising endless fun at the field and in the park.

Materials needed?

6mm Carbontube (1-2mm thickness)	700mm
2mm Carbonrod + 1mm Carbonrod	each ca. 600mm
4mm Carbontube (1mm thickness)	ca. 150mm, 2x
LW-PLA	ca. 300g
regular PLA	ca. 100g
TPU soft/medium	<20g
Microservos f.e. Hitec HS50	3-4 pcs (rudder optional)
RX of your choice (5ch)	1 Stk
Battery 1000-1800 mah 4S (Motor)	1 Stk
f.e.Motor zB BR2212 + ESC 25-35A BEC	1 Stk
Servopushrods	100cm
CA & Accellerator	Different viscosities

Printsettings

The following settings are recommendations. Your individual, optimal settings will heavily depend on the material used, your printer, ambient temperature, humidity, and so on. Please consider them as guidelines and feel free to experiment. The default settings were created on a Prusa i3 MK3S with a 0.4 nozzle.

Category		A	B	C	D	E
Material		LW-PLA	LW-PLA	PLA	PETG	TPU
Layerheight (mm)		0,25	0,25	0,2	0,25	0,2
bottomlayers		2	2	3	3	4
toplayers		3	3	4	4	4
walls		2	1	1	3	2
Infill		3,00% Gyroid	0%	25,00%	100%	5%
Nozzletemp		235°C	235°C	215°C	230°C	240°C
Bedtemp		60°C	60°C	60°C	80°C	50°C
Flow (%)		55,00%	55,00%	100,00%	100%	120%
Cooling		50,00%	50,00%	100,00%	30%	70-90%
Brim		yes	yes	none	yes	no
Support		none	none	none	no	no
Linewidth		0,45	0,45	0,45	0,45	0,45

Feel free to experiment with walllinecount, infill or wallthickness!

Printsettings

Once you've defined the A, B, and C profiles in your slicer, you can start slicing the parts. We recommend printing the LW-PLA parts individually when using active foaming LW-PLA!

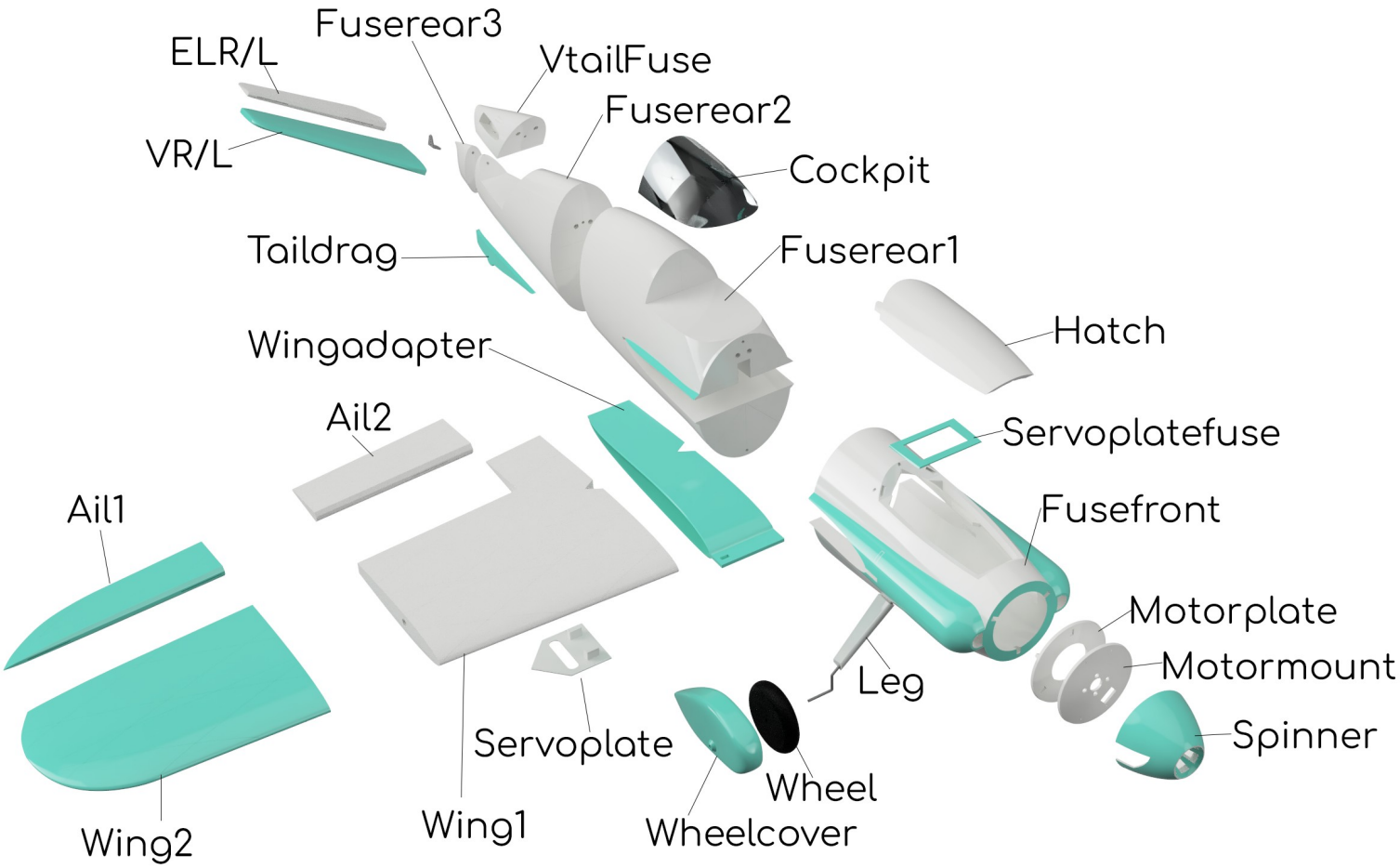
Part	Category	additional Settings
Cockpit	B	2 outer Walls
Fusefront	A	
Fuserear	B	
Ailerons	C	0% Infill
ELL + ELR	C	0% Infill
Gearbits	A	
Hatch	A	
Legs	A	
Motormount	D	
Motorplate	C	100% Infill
Servoplates	C	
Taildrag	A	
TPUhinge	E	
VL+VR	B	
Vtailfuse	B	8% Infill Gyroid
Wheel	E	
Wheelcover	A	
Wingadapter	C	
WingLR 1-2	B	
Wingsecure	C	
Controllhorn	C	

The STL files are already in the correct orientation for perfect printing without support structures!

*For optimal results, add a "heightrangemodifier" to avoid printing some lines in mid-air (0 bottom and top layers from 1mm to part height -1mm). The prints come out well even without modifiers, but if you're as meticulous as I am, you'll use them ;) You can also simply use the attached .3mf files, which are ready with heightrangemodifiers!

Don't forget the additional settings for some parts! If you feel the need to reinforce certain areas, feel free to use some "meshmodifiers" or individual processes. Our test aircraft were printed using the settings mentioned above without any additional reinforcement!

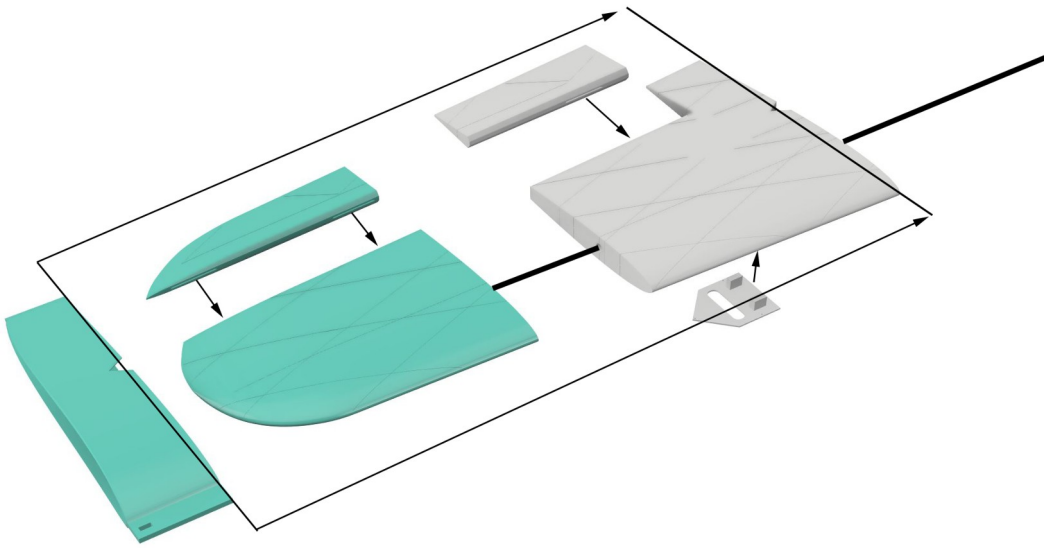
Explosionview



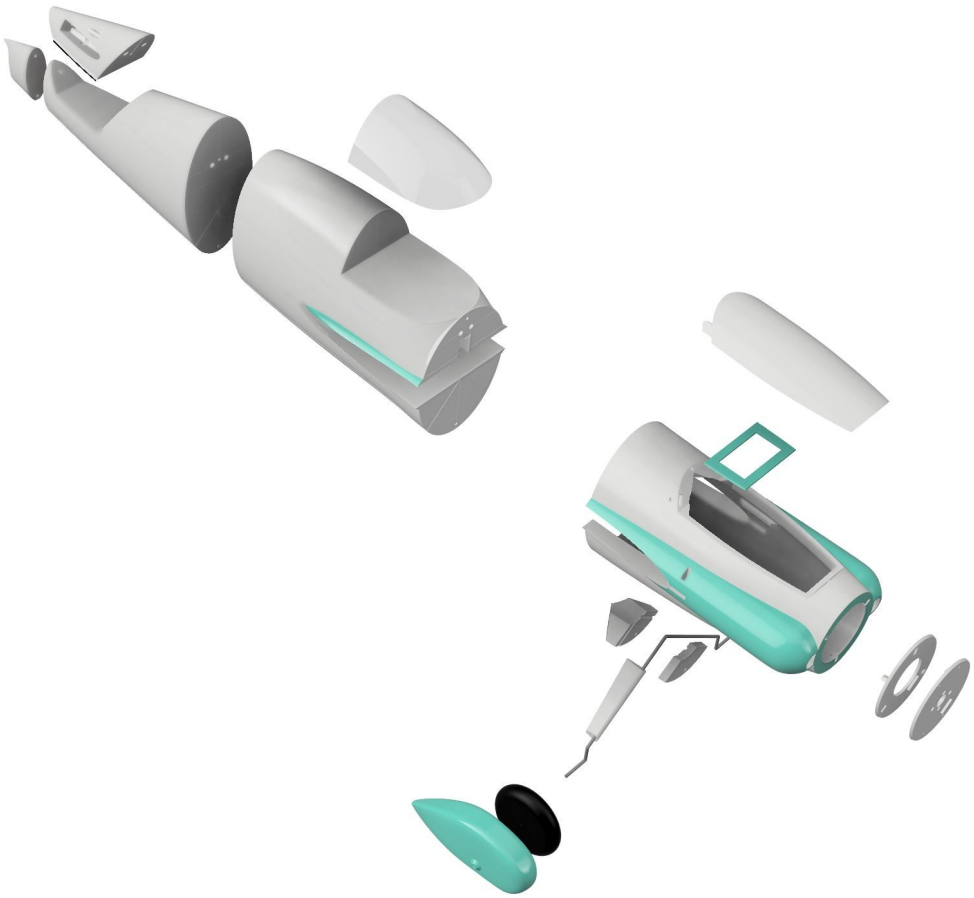
Wings

The wings can be built either removable or fixed. The assembly process is quite straightforward:

- Glue Wing1 and Wing2 together (use a 6mm carbon tube as a guide).
- Slide the wing adapter onto the wing from the wingtip until the edge of the wing half and the wing adapter are flush (the wing adapter fits snugly on the wing). Secure with a few drops of thin super glue to prevent slipping.
- Glue both wing halves together, including the wing adapters (remember the 6mm carbon tube). The wing adapters should touch and can also be glued together.
- Assemble the ailerons and affix them to the wings using TPU hinges.

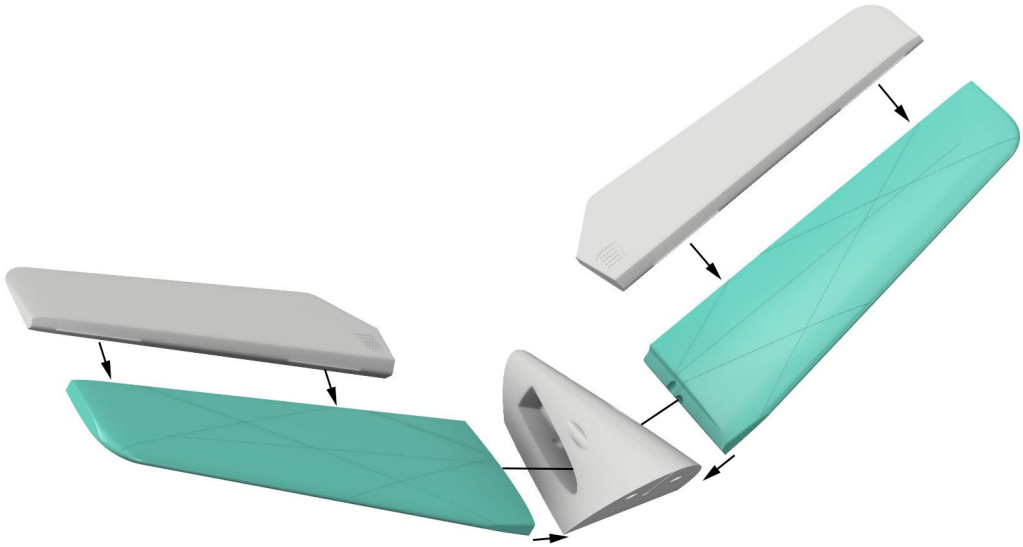


Fuselage



Glue Fusefront with Fuserear 1+2 - use 1 & 2mm carbon rods as guiding rails.

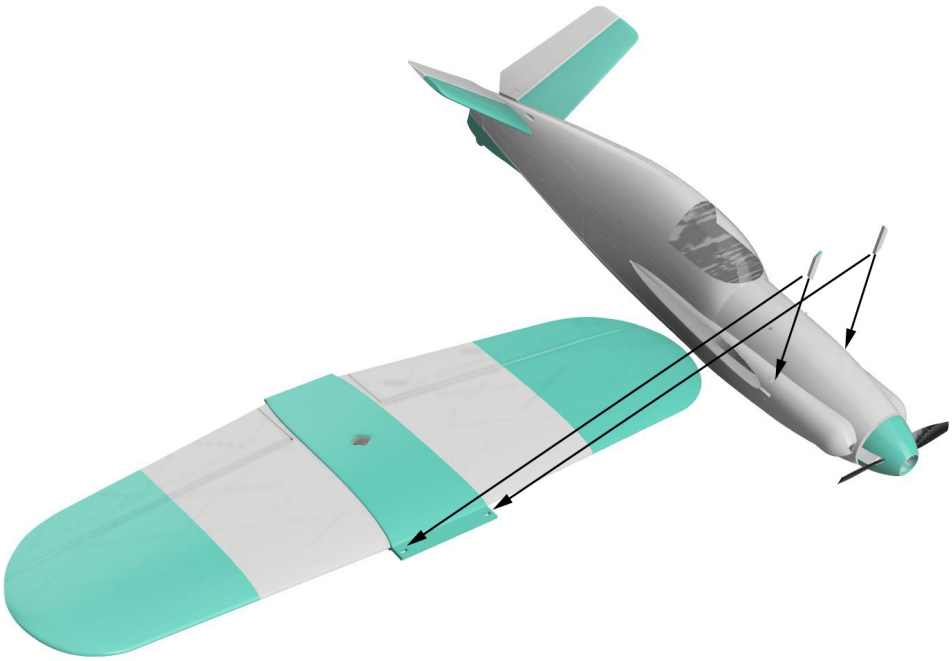
- The upper recess is for the 2mm rod, the lower one for the 1mm rod.
- Now "FuseVtail" can be inserted into the corresponding recess to then thread the 1 & 2mm carbon rods through it and glue "FuseVtail".
- Attach and glue Fuserear3, glue the tail drag at a right angle.
- Adhere Servoplatefuse into the fuselage (pay attention to markings).
- Bend the 2mm wire according to the template, slide on "leg" beforehand. Insert the bent wire into the groove in "Gearbit1," place "Gearbit2" on top, and secure with plenty of super glue.
- Now glue the resulting landing gear block to the fuselage, slide on the wheels and wheel wells, securing them with thick super glue.
- Glue the cockpit flush into the corresponding recess.



Check the fit of the 4mm carbon tubes and trim if necessary. Insert the tubes into VL and VR, and check the fit of the tail halves in the provided recesses. Then glue the tail halves together using medium-viscosity super glue.

Caution! Insert VR first, then VL, due to the overlap of the parts!

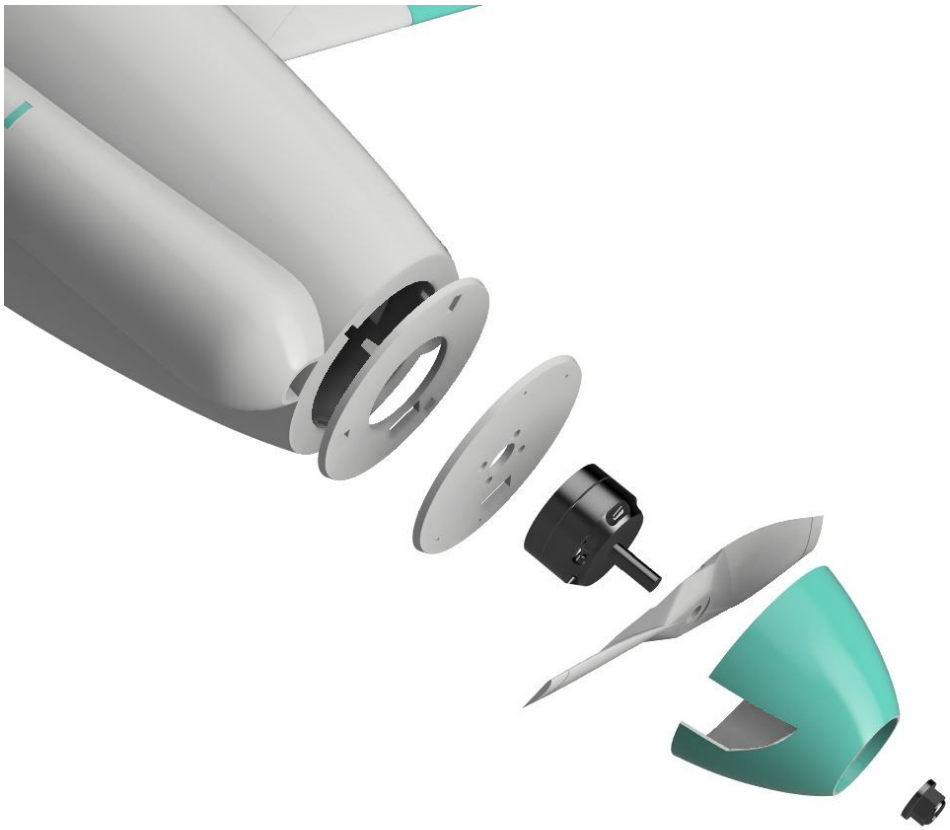
Secure wings



As previously mentioned, the wings can be permanently glued or designed to be removable. For better access in case of servo damage, a removable option is advantageous.

For this, the wings are held in place in the fuselage using 2 securing pins.

Motorinstallation



The "Motorplate" is glued to the "Fusefront" (pay attention to the teeth). Then, attach the motor to the "Motormount." The "Motormount" has 4 recesses for screws. Use a hot piece of piano wire to create corresponding holes in the "Motorplate," then secure the Motormount to the plate using small driver screws (e.g., servo mounting screws).

The spinner is optimized for a 6x4" propeller in combination with a BR2205 motor and is shaped to achieve optimal cooling.

Disclaimer:

Please exercise caution with printed propellers and spinners, and always ensure that the parts are well-balanced. Test them with ample safety precautions to avoid injuries! As printed propellers and spinners can be hazardous, we explicitly state that we DO NOT RECOMMEND printing and using them, and we are not responsible for any damages caused by faulty propellers or spinners.
However, we do use them in our prototypes, and under the right circumstances, they can work well. Print them using PLA with sufficient support structures.

CG, Throws, Maiden

Center of Gravity
A good center of gravity (CG) for the maiden flight is approximately 60mm behind the leading edge (measured at the midpoint of the wing). The wing spar lines up precisely with this height – you can use the spar line as a reference for positioning.

Throws

Ailerons:		+/-15mm
Rudder	:	+/-15mm
		(rechts: linkes Ruder geht nach oben, rechtes nach unten)
Elevator:		+/- 12mm

The Swee' Pea is an agile chubby-cheeked aircraft, so help yourself a bit with your transmitter's EXPO function – 30% is a good starting point.

First Flight

Once the center of gravity is set and control surface deflections are correct, you can release your Swee' Pea into its element. Depending on the power setup, ½ to ¾ throttle should be sufficient to gain altitude quickly. For the very first launch, I personally prefer hand-launching as it allows me to give the model a good initial thrust and some altitude.

We wish you loads of fun with the Chester Swee' Pea!