


Build Guide - Model 11: Sandy

3D printed radio controlled
2WD scale model.

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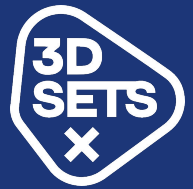
Version 1.0



Sandy – version 1.0 technical specs.

- Dimensions: 44 cm length, 24 cm width, 18.5 cm height
- Model weights roughly 2 kg (including battery)
- Permanent rear wheel drive, locked axle (easy to build) or opened differential (more complex, better handling)
- Remote controlled steering and speed control
- Suspension with real springs and dampers for good on/off-road capabilities
- Reduction gearbox with 1:10 gear ratio





Before you start

- Get ready all tools.
- Buy necessary parts that cannot be printed (screws, bearings, motor etc.), these parts are listed on next page.
- Make sure that your **printer is calibrated** well – print our “calibration part” to ensure that you can fit bearings on shafts properly! Calibration part is located on “Print 0 - Calibration”.
- Use **higher printing temperatures** – use about 210-215°C for PLA to have firm layer adhesion!
- Use some **heat-resistant filament** (PC Blend, ASA..) for specific drive train parts noted later in this Guide!

- Build guide is divided on steps and subassemblies. Subassembly is a sequence, where you will make some independent sub-part like gearbox, axles etc. Later you will install subassembly in the car.

- Model 11: Sandy includes 2 different wheel designs. Both designs shares the same tire dimension, so feel free to choose the right design for you:
 - For “Wheel G”, print plates with “Wheel A” in name.
 - These wheels are easy to build

 - For “Wheel B”, print plates with “Wheel B” in name.
 - These wheels are more complex





Are you **new** to the Radio Controlled models?

Don't worry, Radio Controlled (RC) models are not as complicated as they can look! However, it's a good to know some basics before you will start buying parts.

Most mechanical parts in our products will be 3d printed on your own printer, so we will focus here on RC electronics.

On-line beginners guides:

- [Steemit.com](https://www.steemit.com) – a basic introduction to RC car models
- [Instructables.com](https://www.instructables.com) – another beginners guide, general (not focused on car models)
- [Youtube](#) – a nice video showing RC electronic basics

If you have any questions regarding our models, feel free to ask us (or other 3dsets builders) on our Facebook discussion group, available here: [Facebook – 3D Sets](#)





Sandy – version 1.0: What do you need?

- **LINKS for PARTS PURCHASE!** ➔ list of required non-printed parts is here (continuously updated): [click for non-printed parts spreadsheet](#)
- Print Filament: To print this model you will need around 2000 g of print filament in total. We print our models from PLA material. If you will use a 540DC motor, you should use **ASA/PC Blend filament for Motor Pulley and Motor Frame**, as it has better temperature resistance. You can use variable color for chassis and body. Tested and recommended filament: [Fillamentum PLA Extrafill](#) or [Prusament PLA](#).
- The recommended drive is a **brushless motor** (with \varnothing 35 mm diameter and 29 mm maximum(!) length) or 540 DC motor (min. 55T). The 540DC motor is much slower (e.g. better for kids), but requires frequent cool downs – the 540 motor is not suitable for permanent extreme load. The Brushless motors are way more powerful and efficient, and can withstand longer continuous driving. **For 540DC motor you will also need a metal pinion gear “14T with 0.6 Module”** (you don’t need this gear for the Brushless motor!).
- **Timing belts** for belted gearbox (1/10 ratio):
 - **60XL 0.25 – 2 pcs**; standard toothed belt 6,35 mm wide, 30 teeth
 - **80XL 0.25 – 2 pcs**; standard toothed belt 6,35 mm wide, 40 teeth
- Passive heatsink for 540DC motor – small, with short ribs
- Steering servo in standard size (39x19,5x38,5mm) & **Servo extension cable (~ 10 cm long)**
- Speed controller (ESC) max size 40x30x25mm
- Ball Bearing 10x15x4 mm - 6700: 20pcs. (- 7 pcs. with no-differential)
- Shock - Coil springs, inner diameter max 18mm, length 55-85mm: 4 pcs. (preferably with stiffer springs)
- Tires – you can use these tyres sizes on Model 11: Sandy:
 - Front Wheels – **maximum outer diameter 90 mm, maximum width 31 mm**, rim diameter 1.9 or 2.2 inches
 - Rear Wheels – **maximum outer diameter 100 mm, maximum width 46 mm**, rim diameter 2.2 inches
 - **Please follow these dimensions**, otherwise the tyres could collide with fenders or axle arms!
- 7.2V Battery with dimensions max 138x48x26mm
- Electric connectors: 2 pairs (battery connectors, motor <-> ESC connectors)
- Twin cable & soldering equipment
- Clear Binding Covers, or any transparent foil up to 0,5 mm thick – material for “Glass”.
- Grease and Thread Locker for securing fasteners on moving parts

Sandy – version 1.0: Required hardware

Screws and nuts (in metric size):

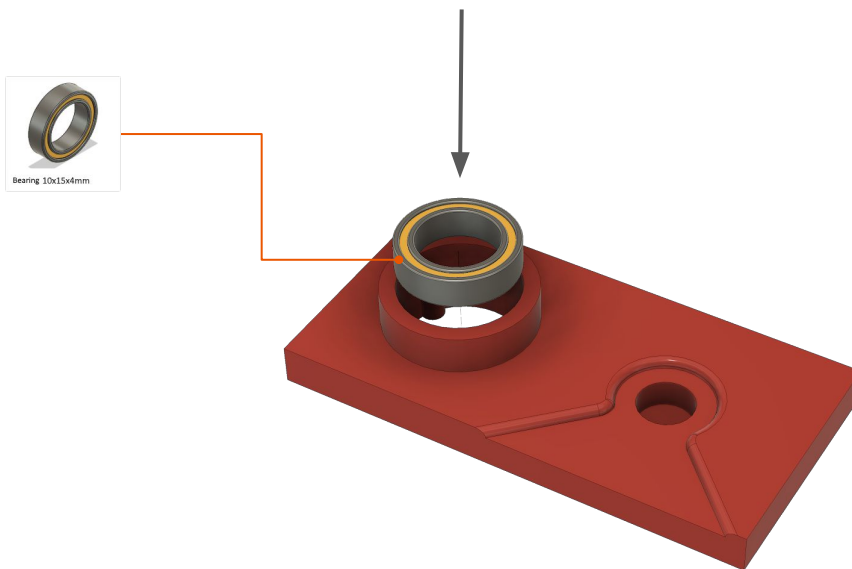
- M2x6: 55 or 15 pcs.
- M2x8: 24 or 44 pcs.
- M2x10: 9 pcs.
- M2x12: 15 pcs.
- M2x16: 7 pcs.
- M3x6: 10 pcs.
- M3x8: 25 pcs.
- M3x10: 25 pcs.
- M3x12: 31 pcs
- M3x14: 7 pcs.
- M3x16: 22 pcs.
- M3x20: 4 pcs.
- M3 nuts: 20 pcs.
- M3 locknuts: 4 pcs.



with “wheels B” - 55 pcs., with “wheels G” - 15 pcs.
with “wheels B” - 24 pcs., with “wheels G” - 44 pcs.

Check 3d printer calibration!

Please at first test whether the bearing can be inserted into the calibration part. If you have problems or the bearing fits too loose, please make sure that the printer is properly calibrated. Dimensions of the printed parts should match dimensions of the 3d model.



Sandy – Cockpit & Interior

In this procedure you will assemble the cockpit of the car and Interior.

Required print plates:

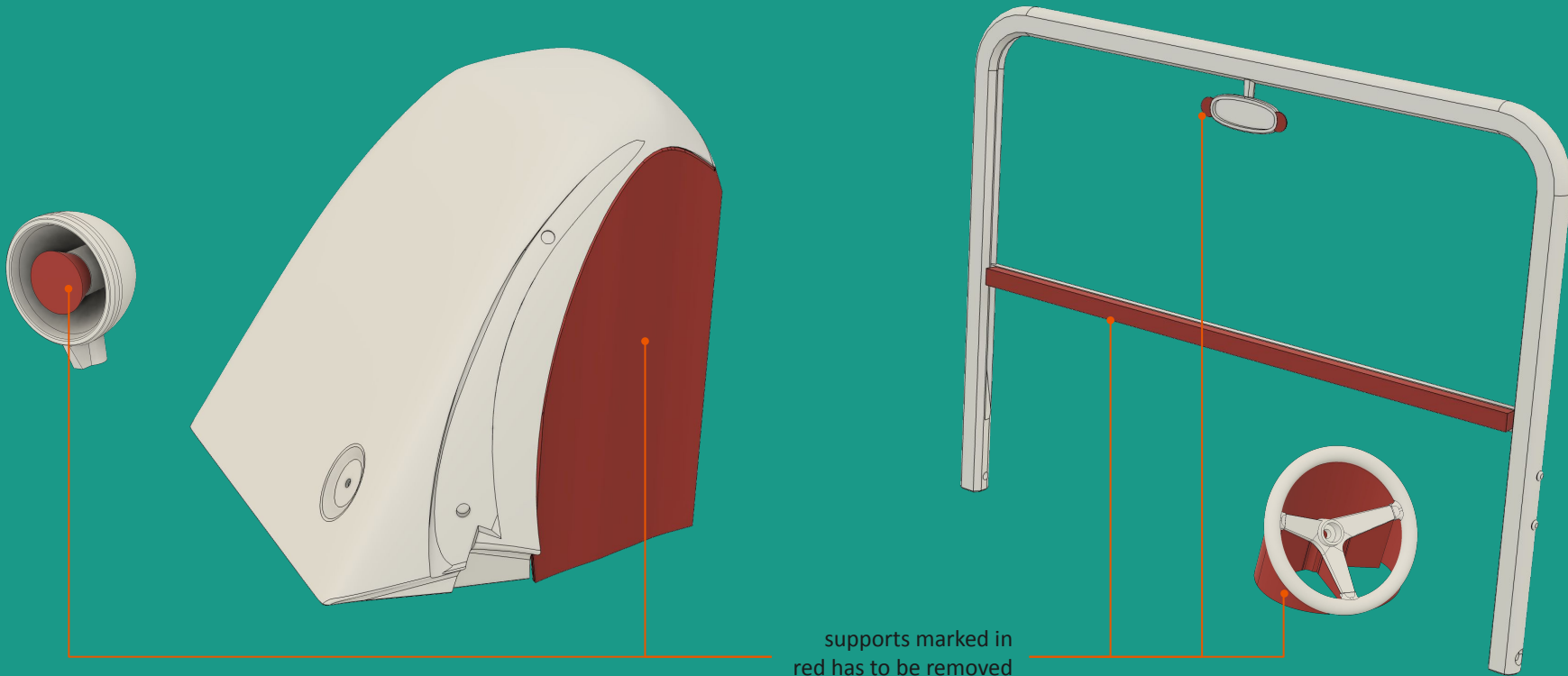
- “Print 0 - Calibration”
- “Print 1 - Cockpit - 1”
- “Print 2 - Cockpit - 2”
- “Print 3 - Cockpit - 3”
- “Print 4 - Interior - 1”
- “Print 5 - Interior - 2 - Dashboard Speed Dial”
- “Print 6 - Dashboard”
- “Print 7 - Body Front”
- “Print 8 - Body Rear”
- “Print 9 - Body Fender”
- “Print 11 - Roll Barr + Window Frame + Lights”
- “Print 12 - Windows Glass template”

Non-printed parts:

- Screw M2x6: 3 pcs.
- Screw M2x8: 4 pcs.
- Screw M2x10: 2 pcs.
- Screw M2x12: 3 pcs.
- Screw M2x16: 2 pcs.
- Screw M3x8: 8 pcs.
- Screw M3x10: 10 pcs.
- Screw M3x12: 9 pcs.
- Screw M3x20: 3 pcs.
- Nuts M3: 5 pcs.

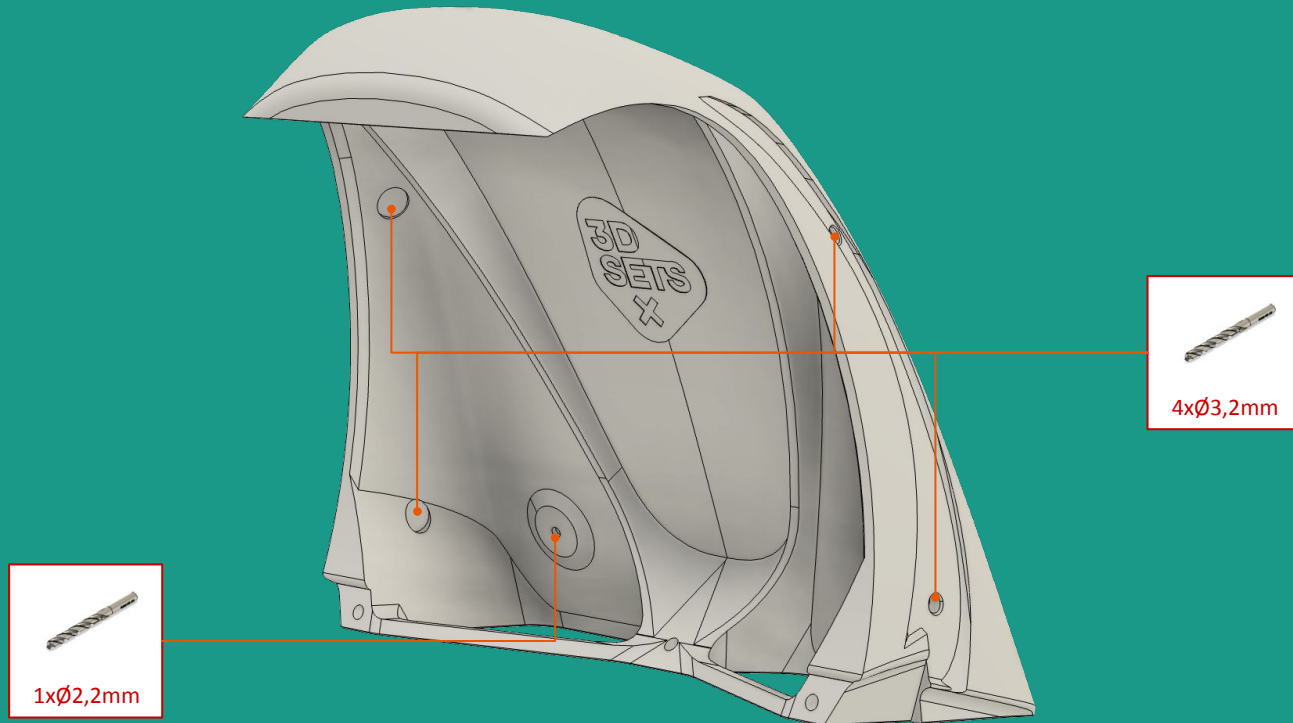
Postprocessing – removing supports

Before you start building, carefully remove printing supports (marked red) integrated to specific parts rendered below. You can use pliers and sharp knife to make the procedure easier. Be very careful as you can harm yourself!



Postprocessing – drilling holes

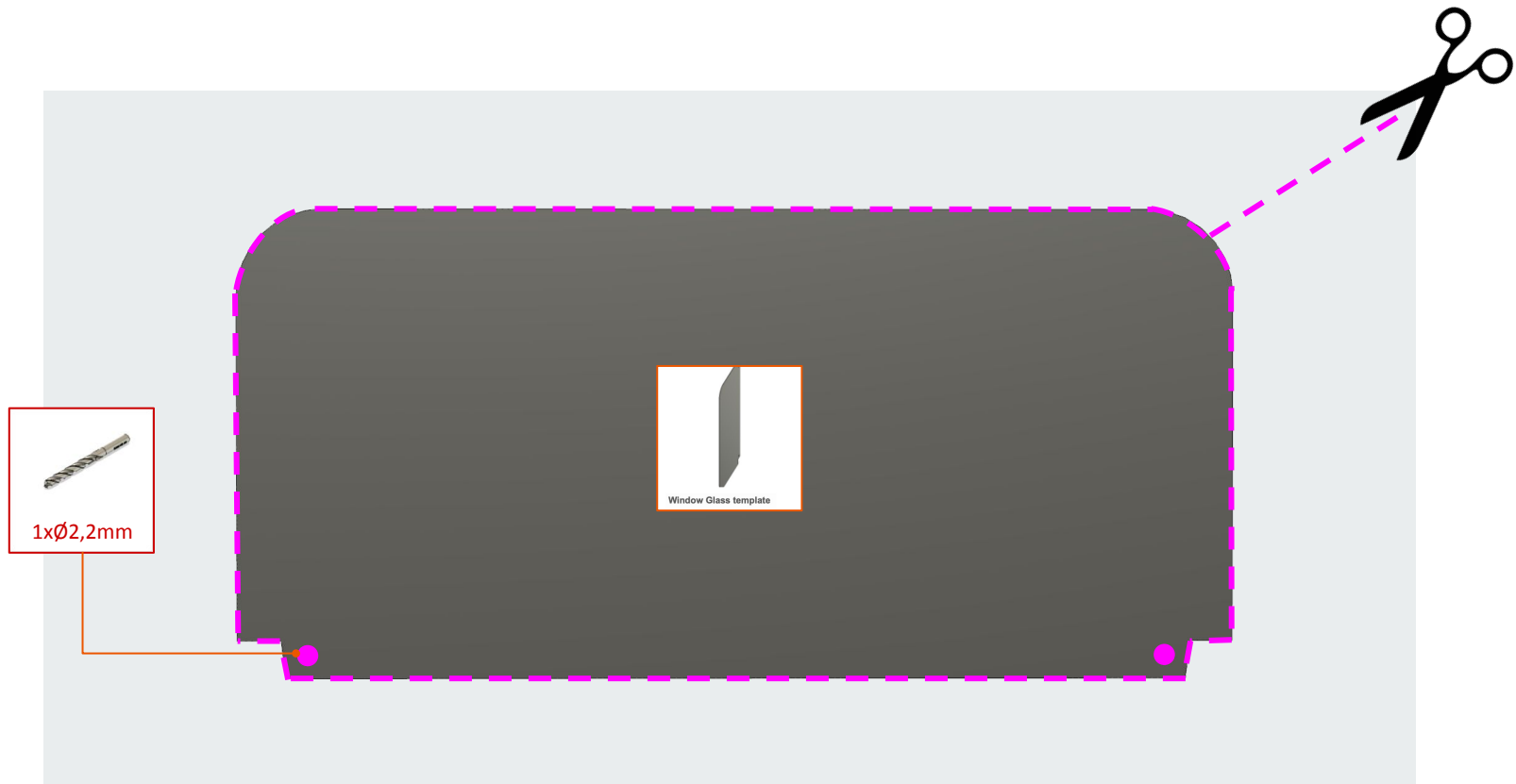
Please carefully drill through the marked holes that have not been printed through to make printing easier. Side holes are not printed through for better surface quality of this body part.



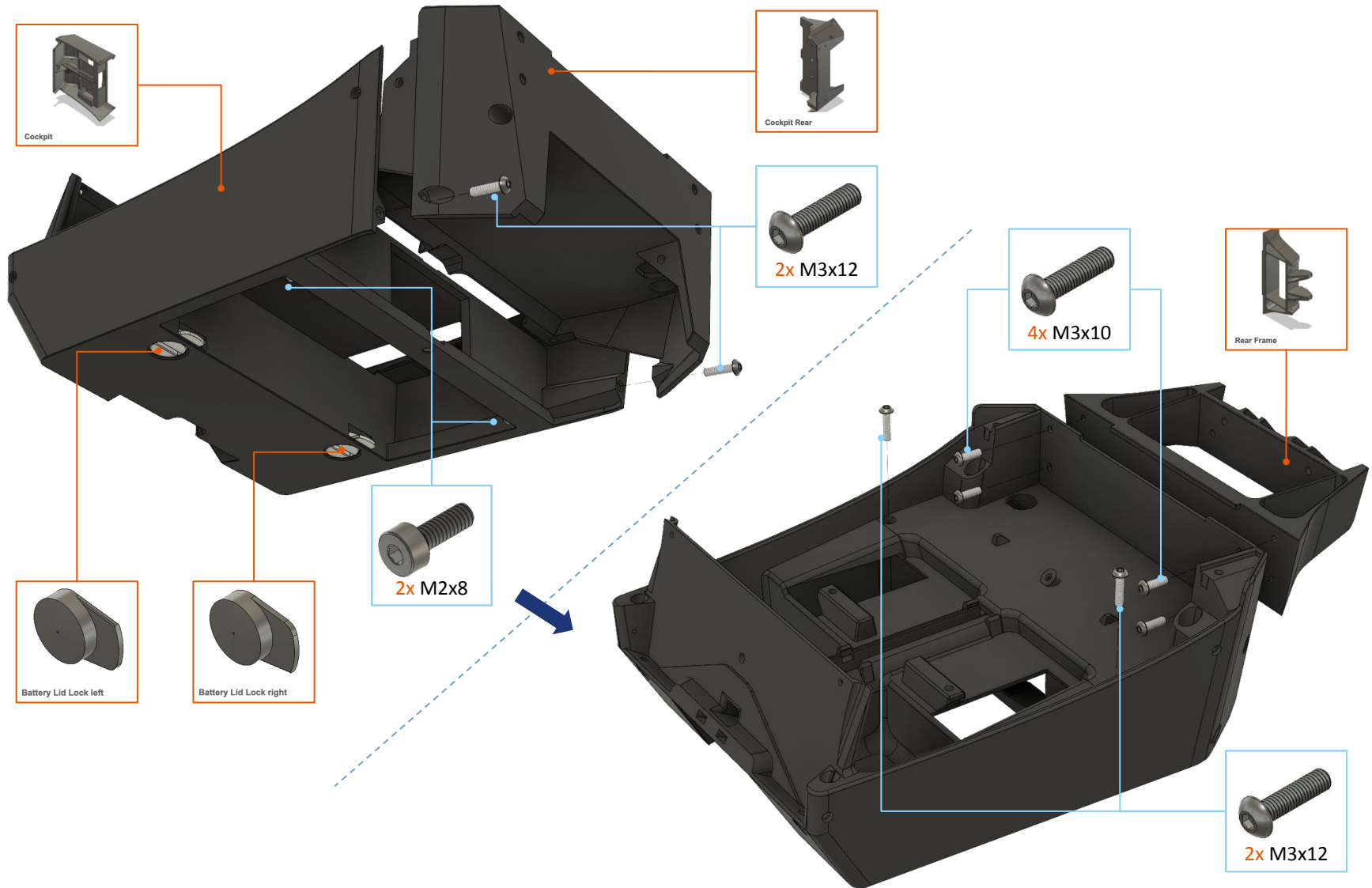
Glass

At first, you will make a “glass” from any transparent foil up to 0.5 mm thick. Thicker material is more durable than thinner, but we found that “Clear Binding Covers” are OK.

Place the printed template on the foil, sketch the shape to foil and then cut the foil by scissors or sharp knife.

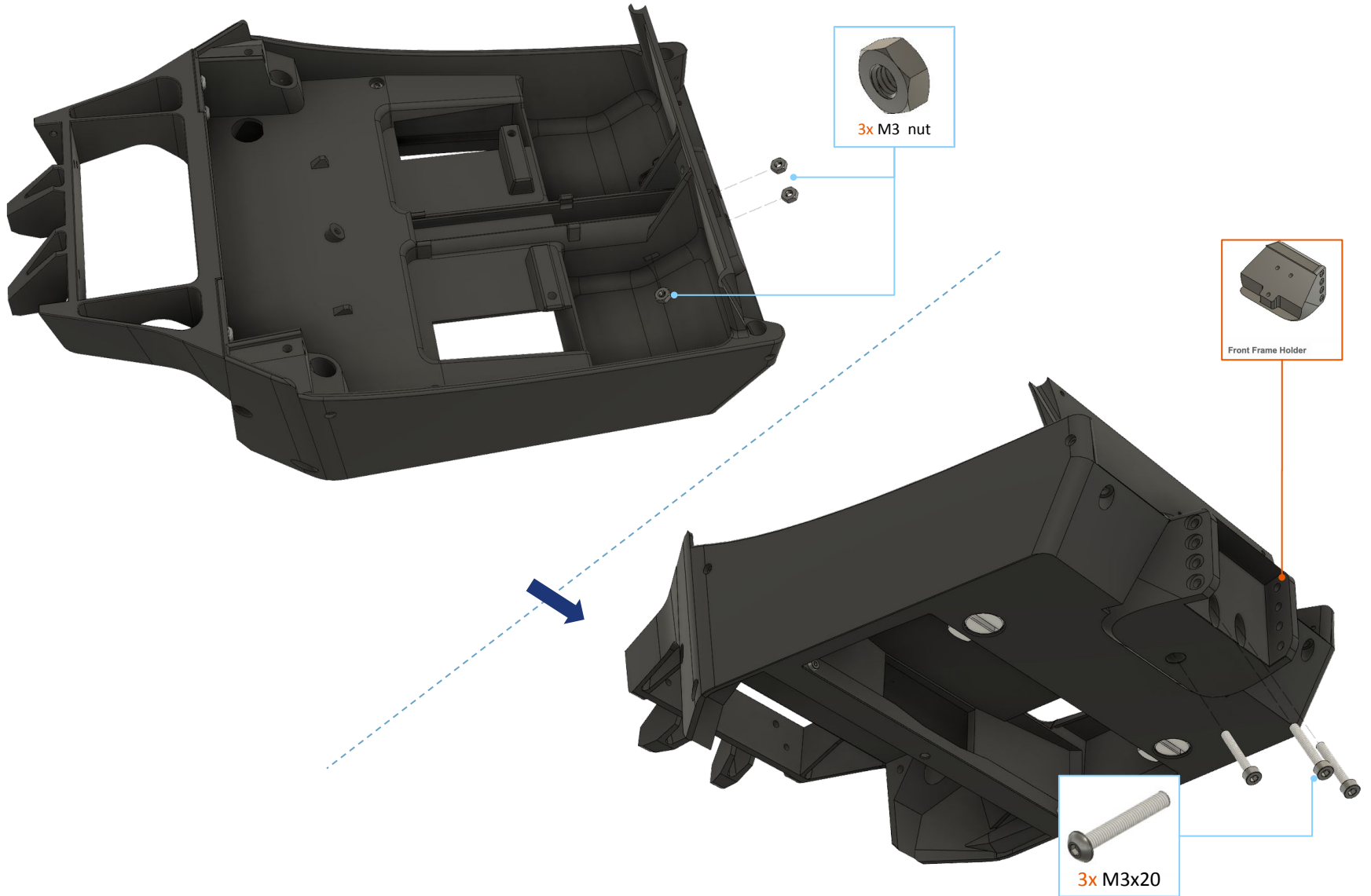


Cockpit 1/2

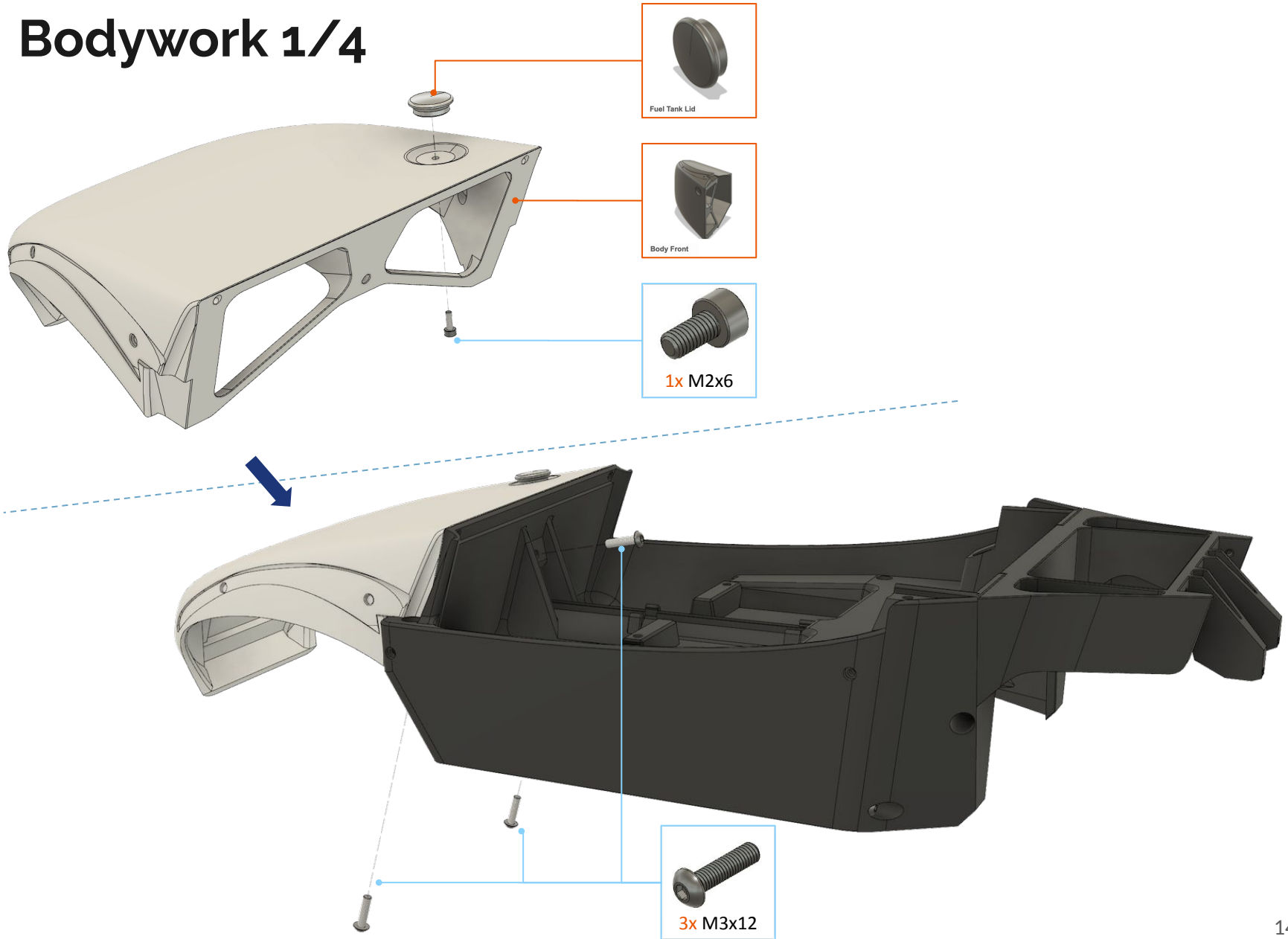




Cockpit 2/2

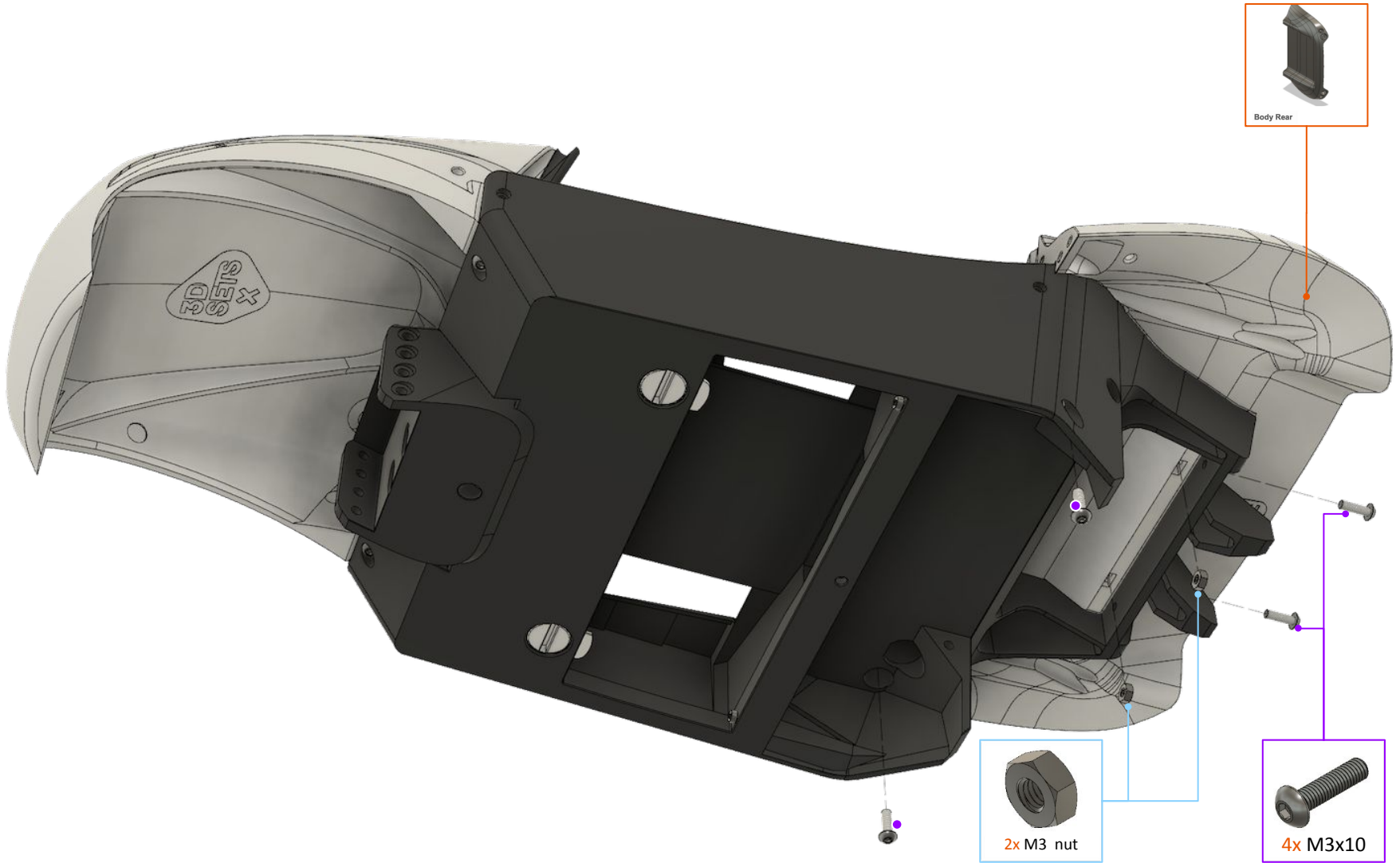


Bodywork 1/4

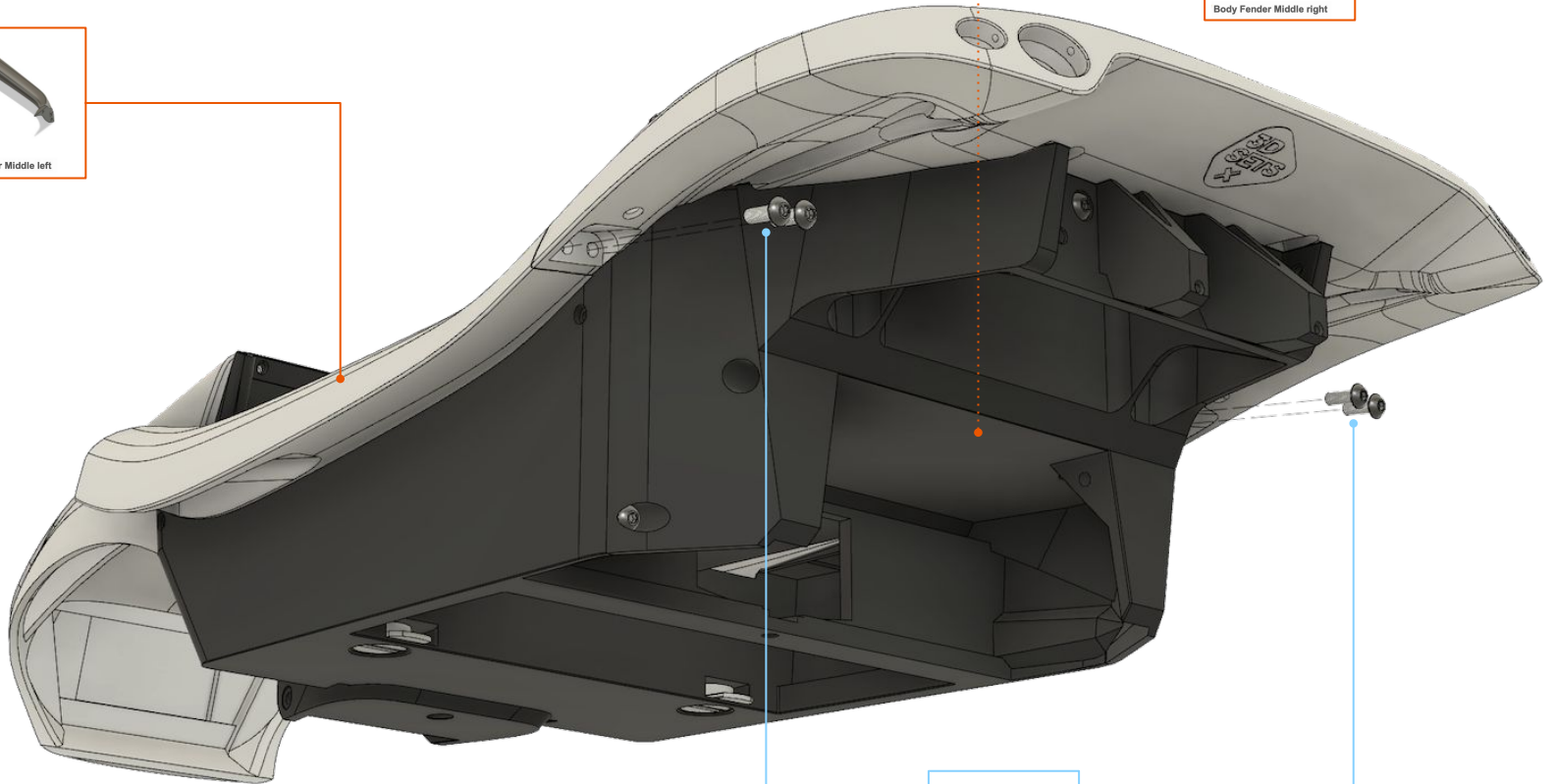




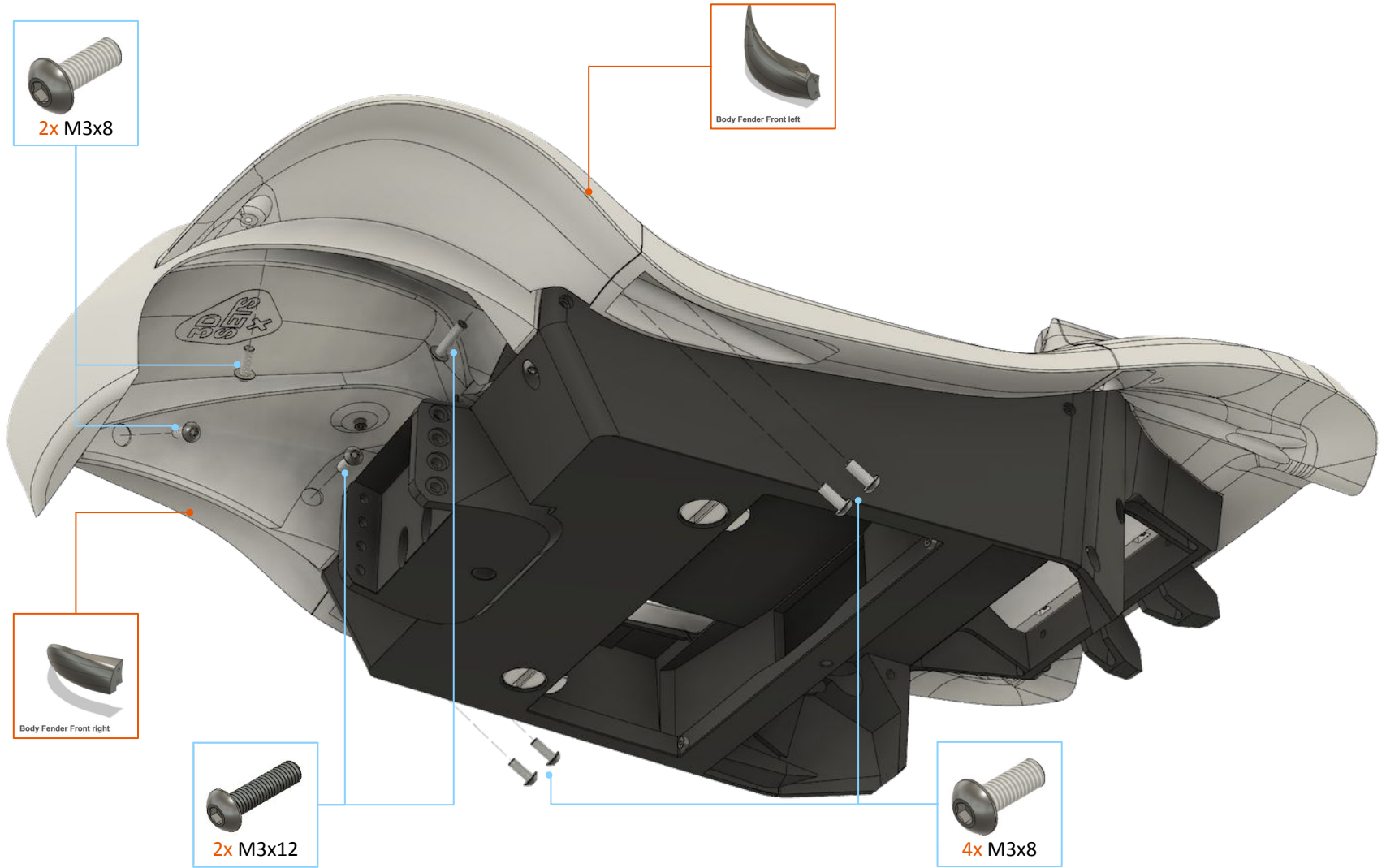
Bodywork 2/4



Bodywork 3/4

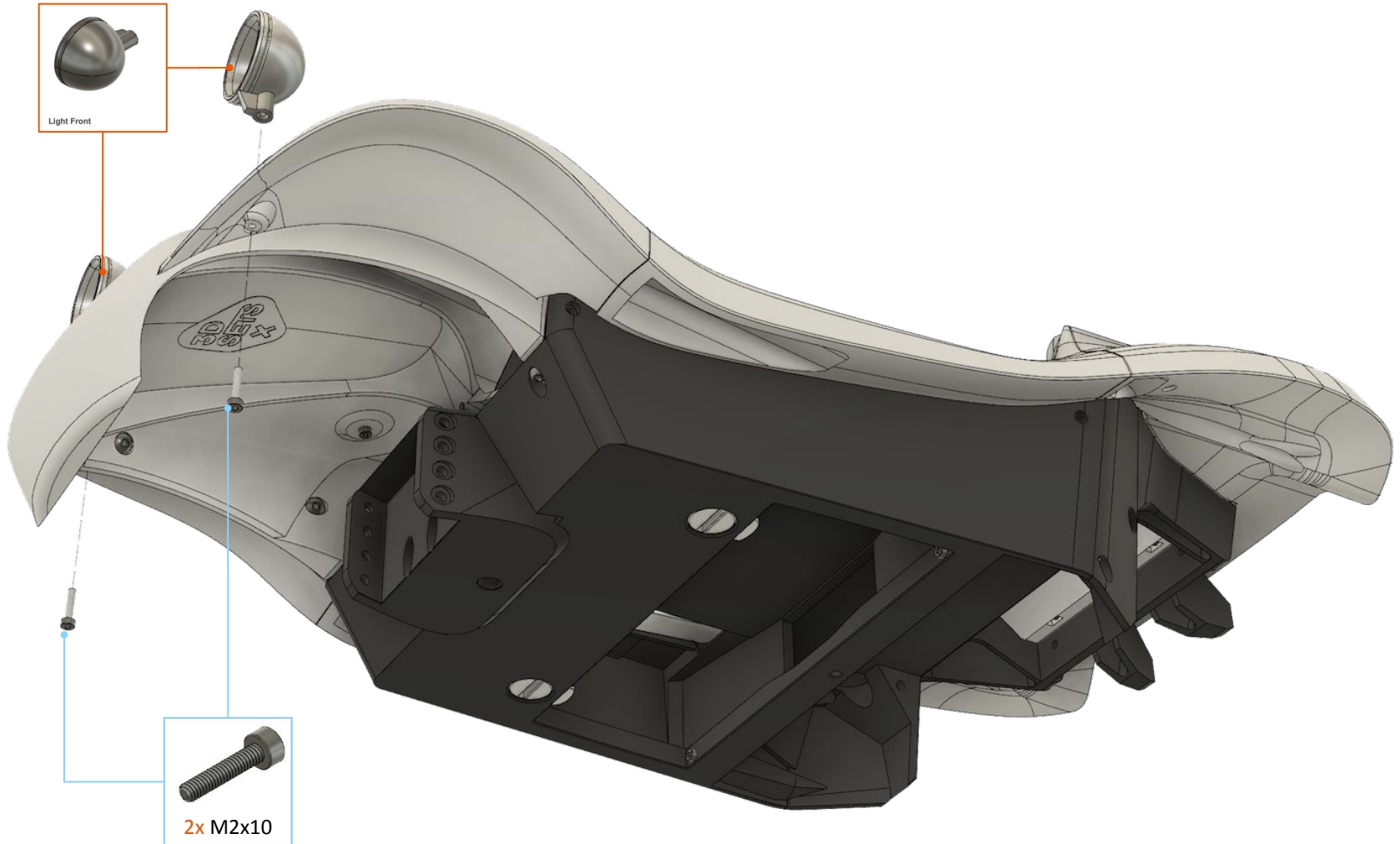


Bodywork 4/4

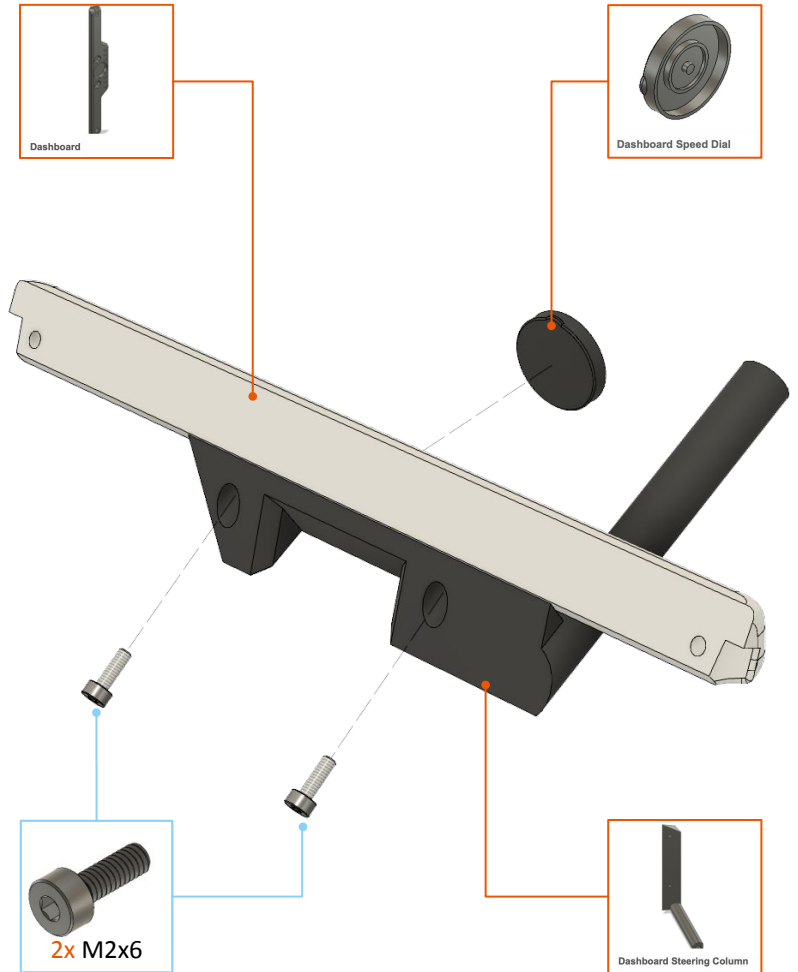




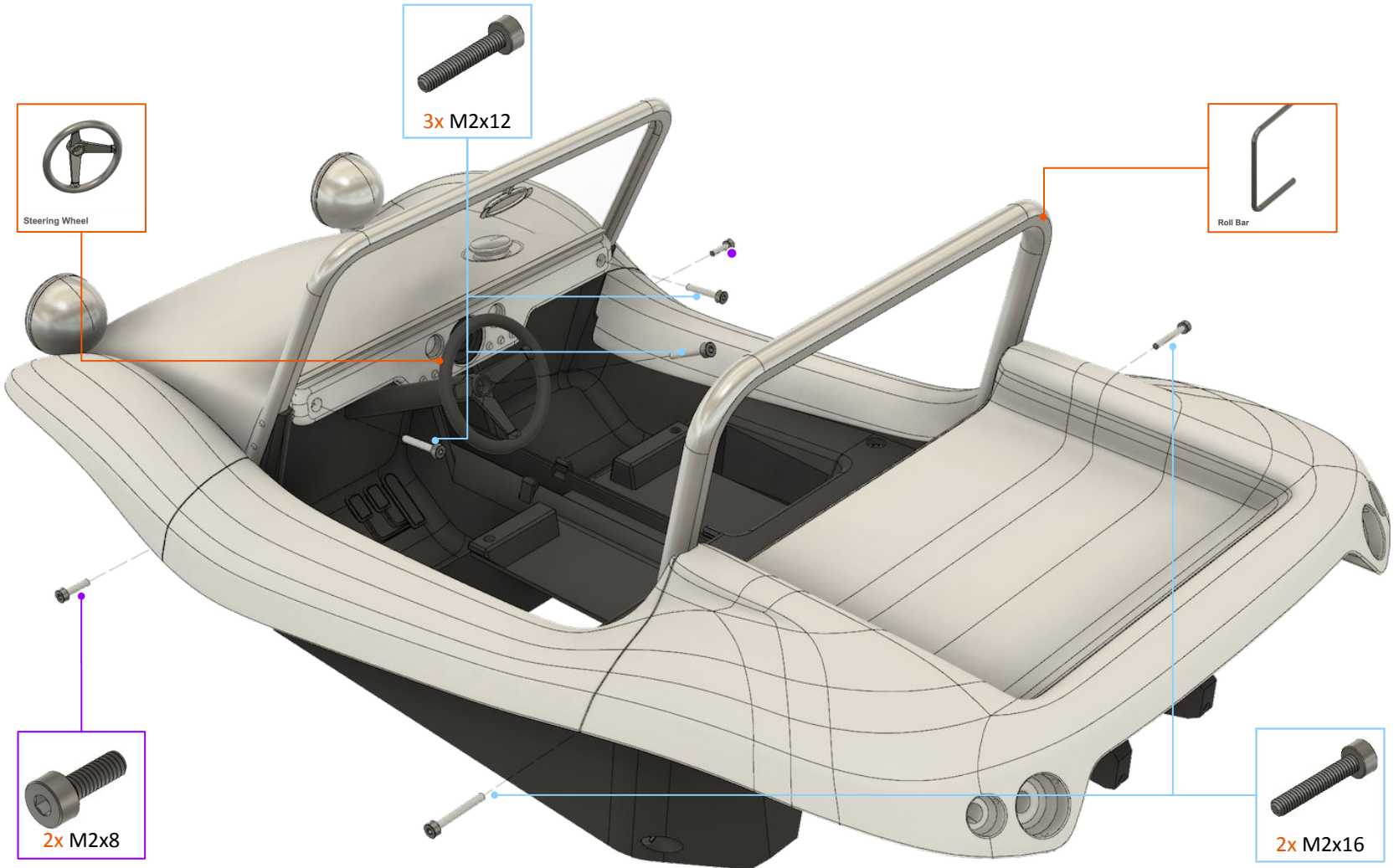
Front Lights



Window & Dashboard 1/2



Window & Dashboard 2/2



Engine

In this procedure you will assemble the Engine. To complete this task, get ready all necessary parts:

Required print plates:

- “Print 13 - Carburetor”
- “Print 14 - Exhaust + Engine Block”
- “Print 15 - Engine - 1”
- “Print 16 - Engine - 2 - Engine Belt and Pulleys”

Non-printed parts:

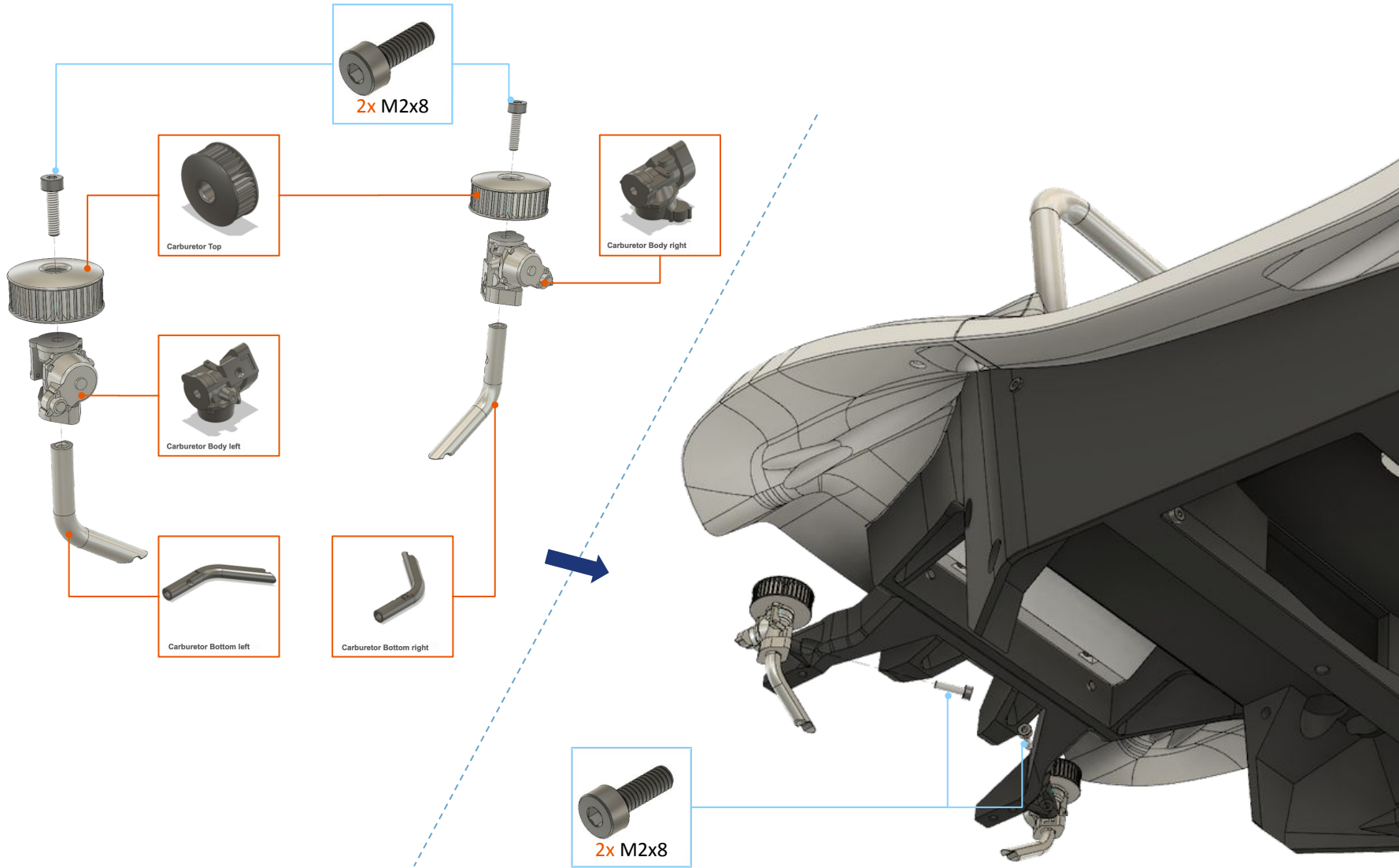
- Screw M2x6: 4 pcs.
- Screw M2x8: 4 pcs.
- Screw M2x10: 5 pcs.
- Screw M2x12: 6 pcs.
- Screw M2x16: 2 pcs.
- Screw M3x6: 2 pcs.
- Screw M3x12: 3 pcs.



Engine 1/5

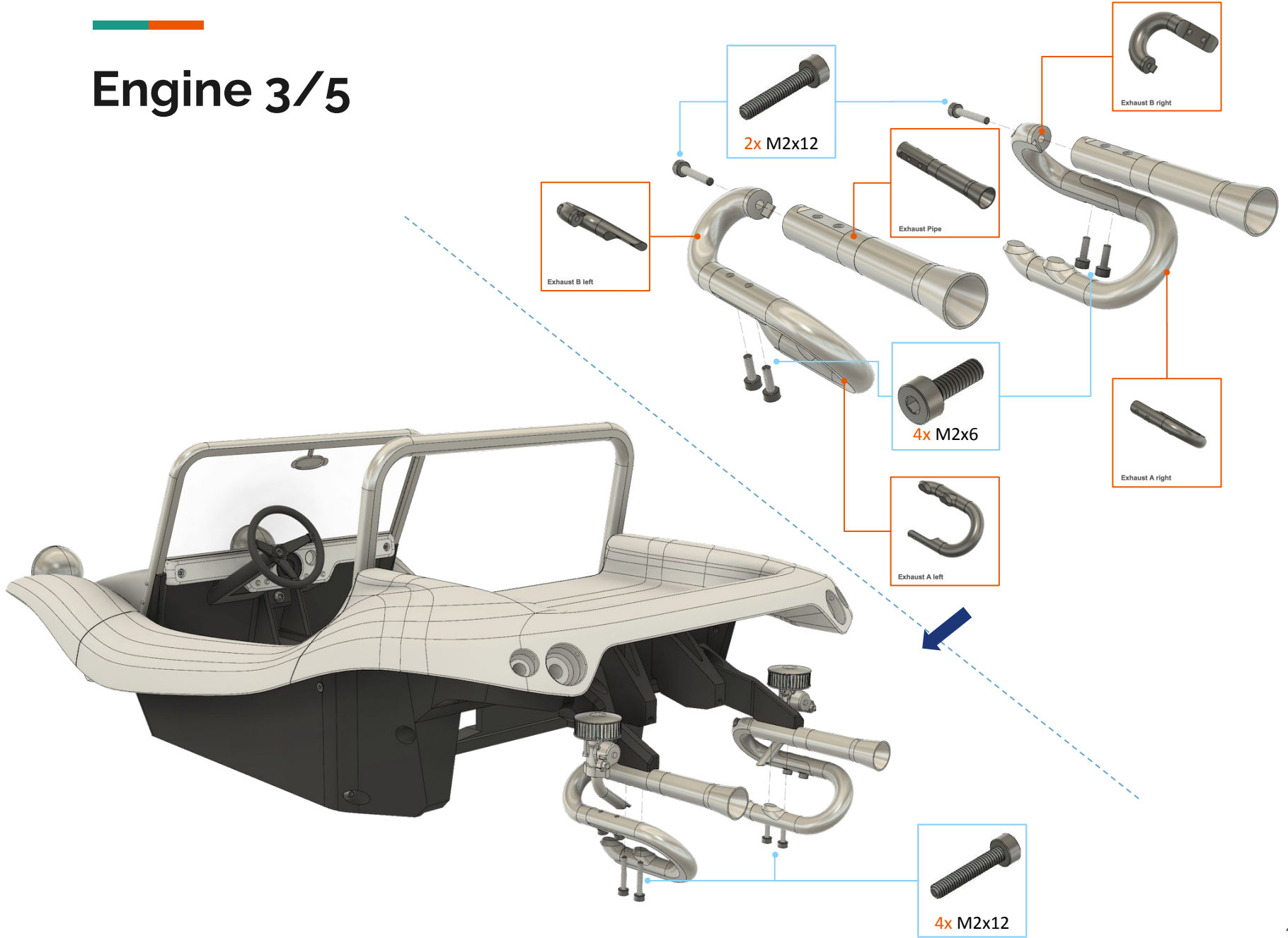


Engine 2/5

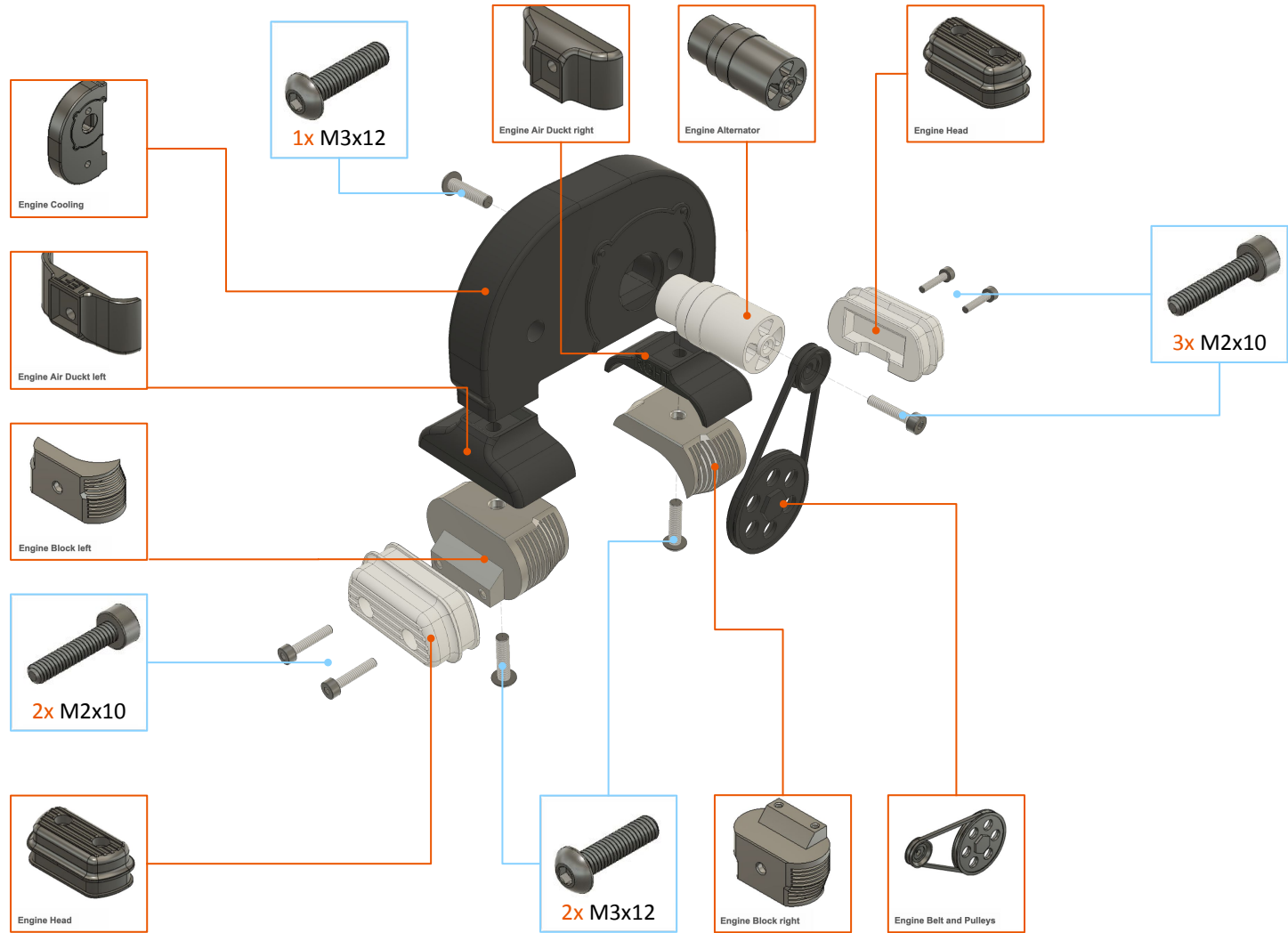




Engine 3/5



Engine 4/5





Engine 5/5



Axle Arms

In this procedure you will assemble the Axle Arms and Steering Rods. These parts consists of “arms” and “ball joints” and they need to be pressed together.

Required print plates:

- “Print 0 - Calibration”
- “Print 17 - Front Axle - 1”
- “Print 18 - Front Axle - 2”
- “Print 19 - Rear Axle - 1”
- “Print 20 - Rear Axle - 2”

Non-printed parts:

- Grease
- Any Hammer or Vise (for pressing)

Arms + Ball joints

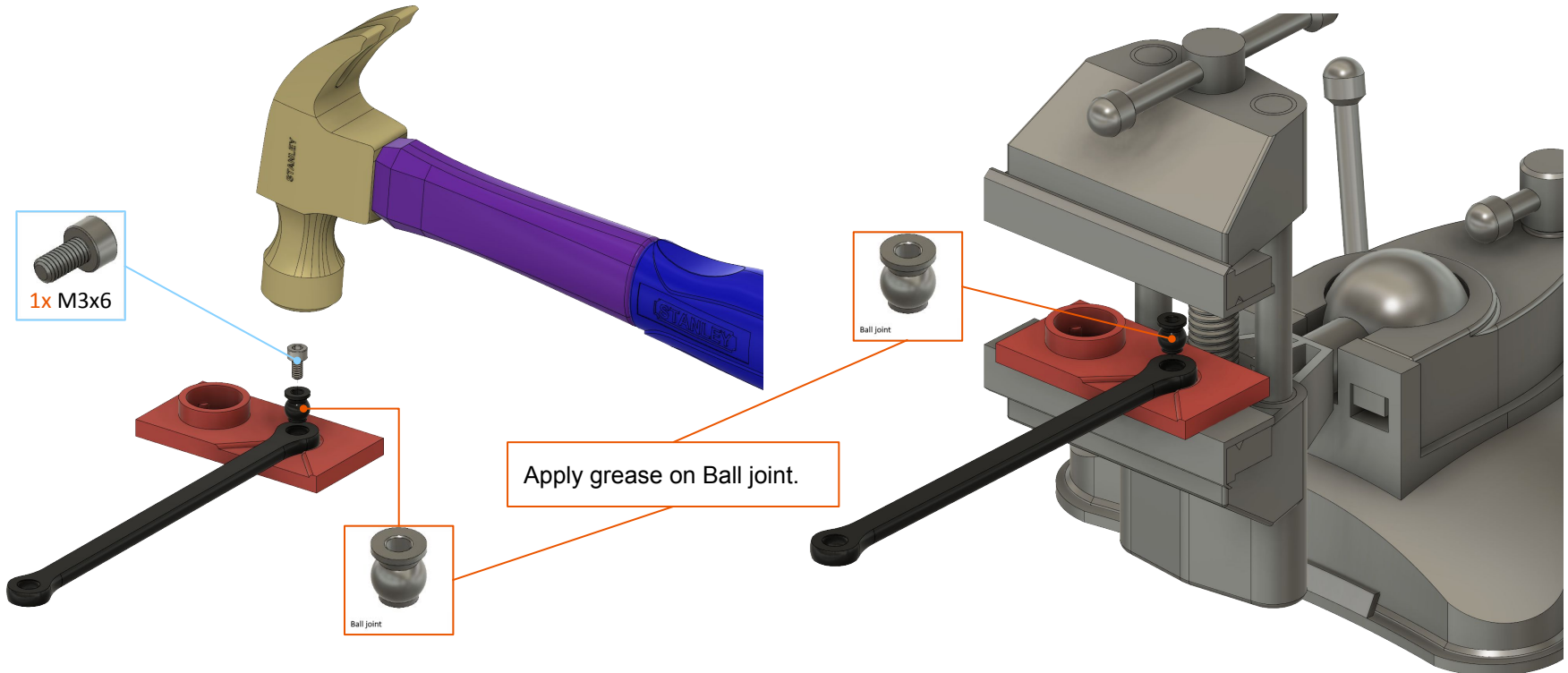
Option A: use a hammer

Be careful as you can break the arm if you use too much force!

Press Ball joints in arm ends. Pay attention to combine parts correctly!
Ball joints requires correct orientation on specific arms – check next page!

Option B: use a Vise

This is a preferred method as you can proceed slowly.

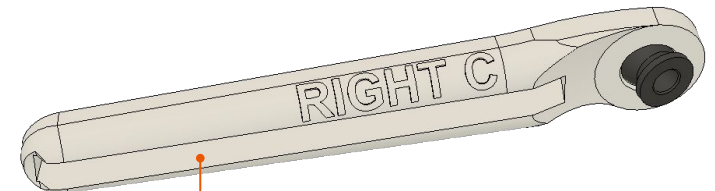
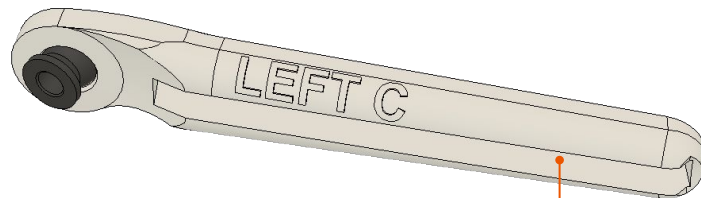
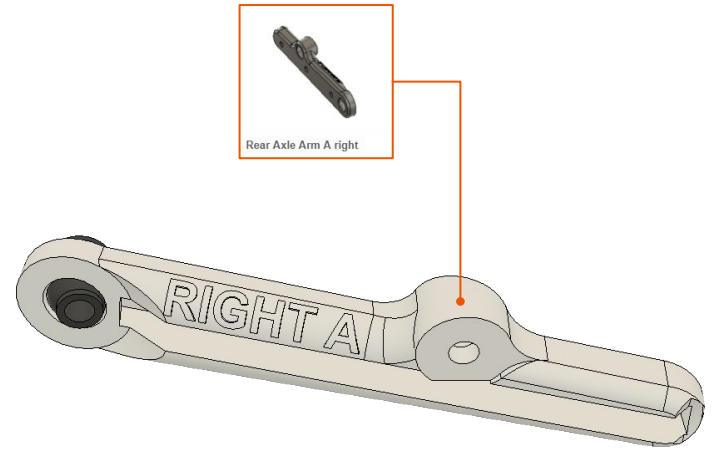
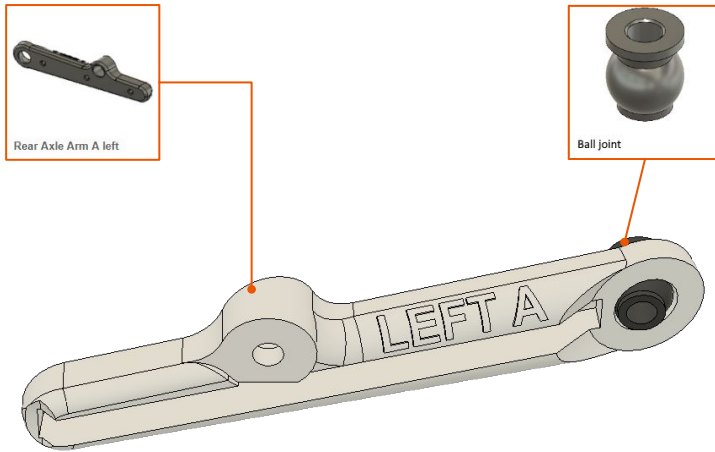


[See this step on YouTube video](#)



Rear Arms + ball joints

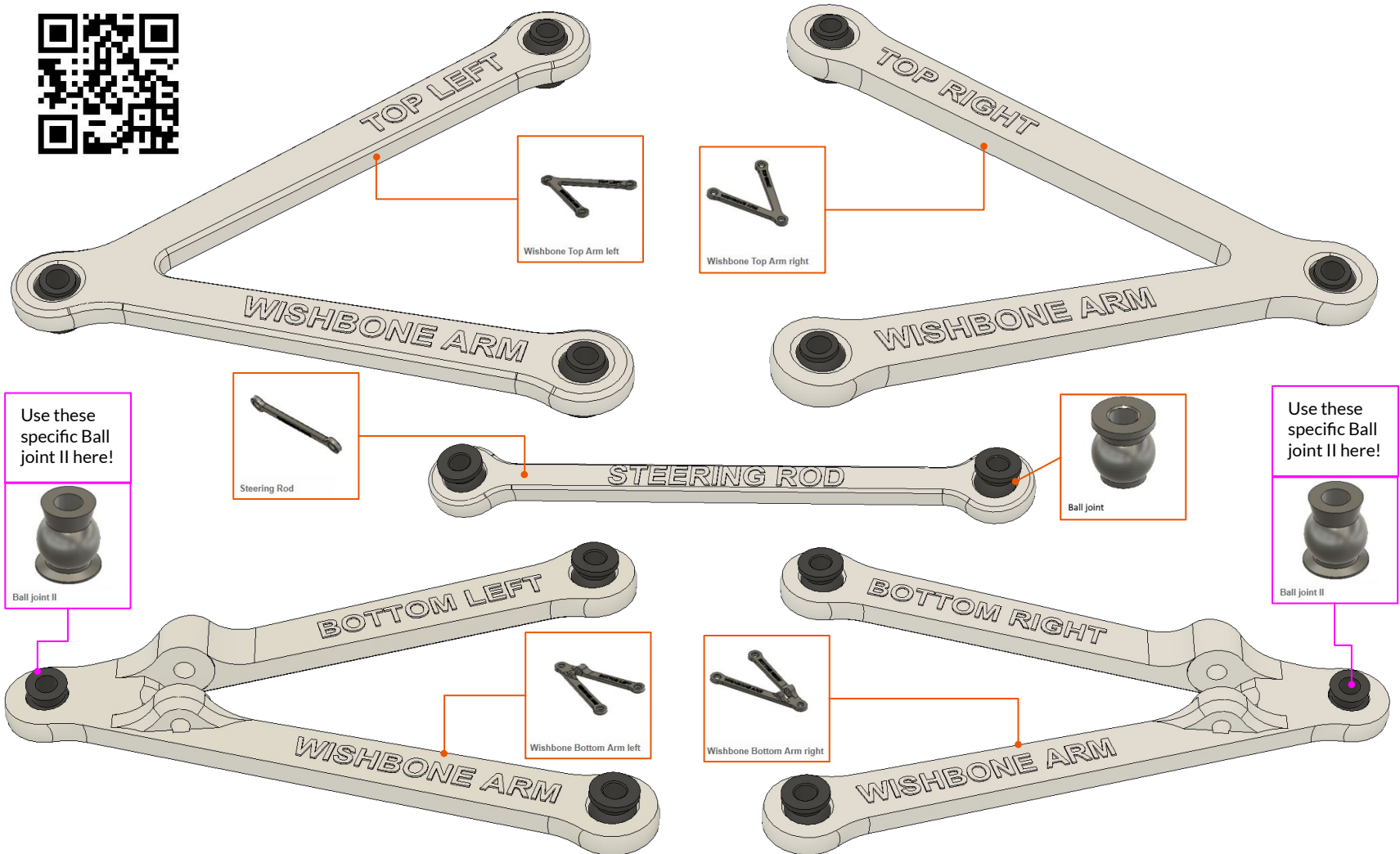
On the pictures below are rendered final Rear Arms assemblies. Please note that some Rear Arms requires opposite Ball joint orientation!





Front Arms + ball joints

On the pictures below are rendered final Front Arms assemblies. Please note that some Front Arms requires opposite Ball joint orientation!
See 3D view for better readability: [click to 3D view](#)



Subassembly – Front axle

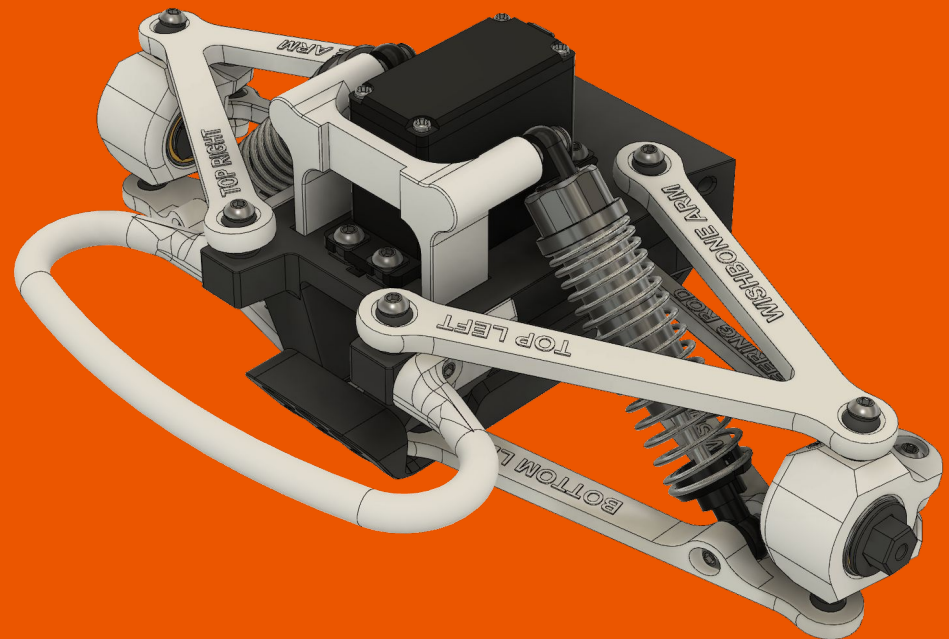
In this procedure you will assemble the Front axle. The axle assembly includes an independent suspension system, steering servo and front bumper (optional).

Required print plates:

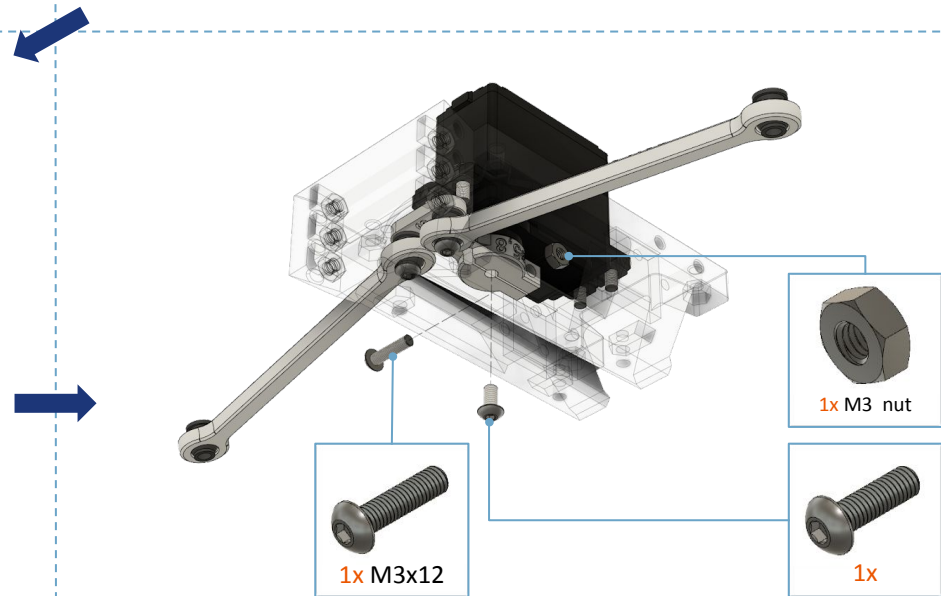
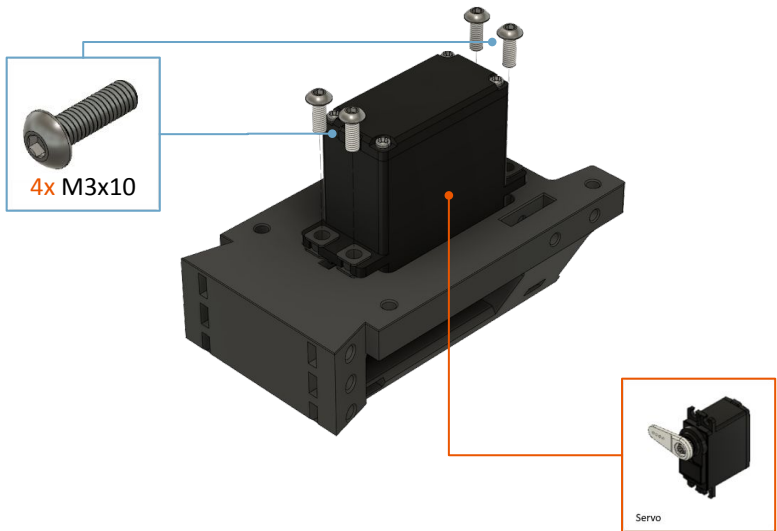
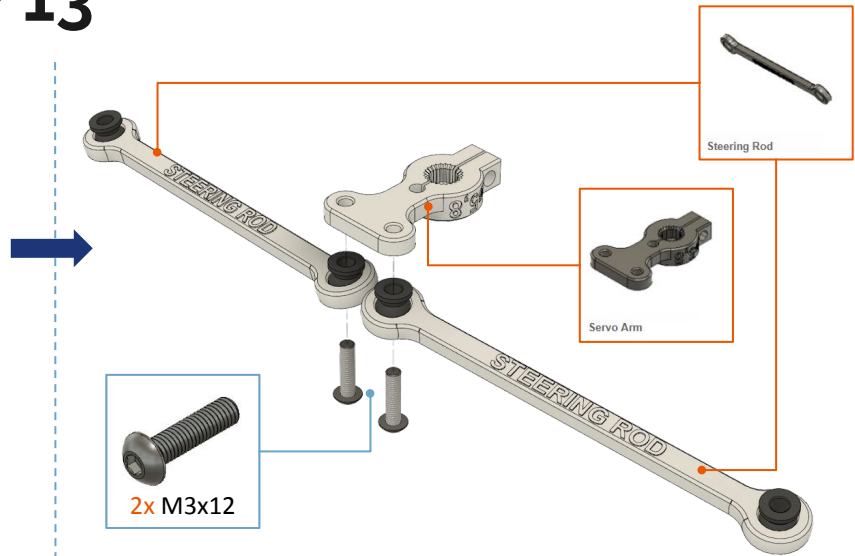
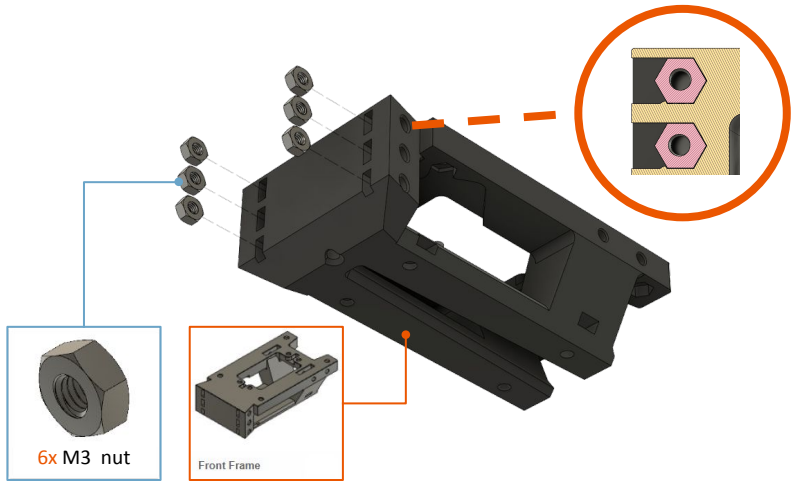
- “Print 17 - Front Axle - 1”
- “Print 18 - Front Axle - 2”
- “Print 19 - Bumper Front”

Non-printed parts:

- Screw M3x10: 4 pcs.
- Screw M3x12: 10 pcs.
- Screw M3x14: 2 pcs.
- Screw M3x16: 14 pcs.
- Nut M3: 15 pcs.
- Locknut M3: 4 pcs.
- Bearing: 4 pcs.
- Grease

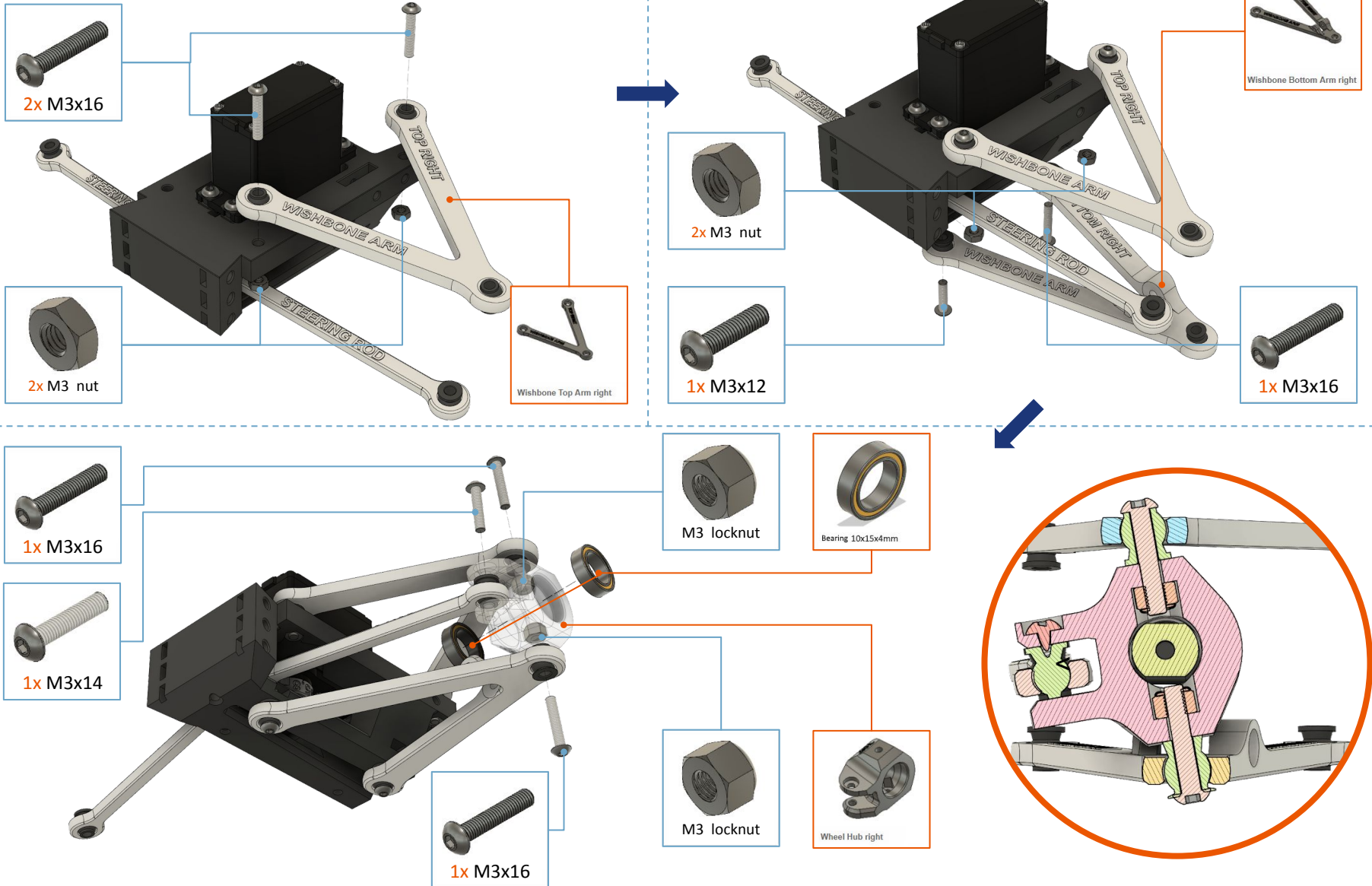


Front Axle – step 1-4/13

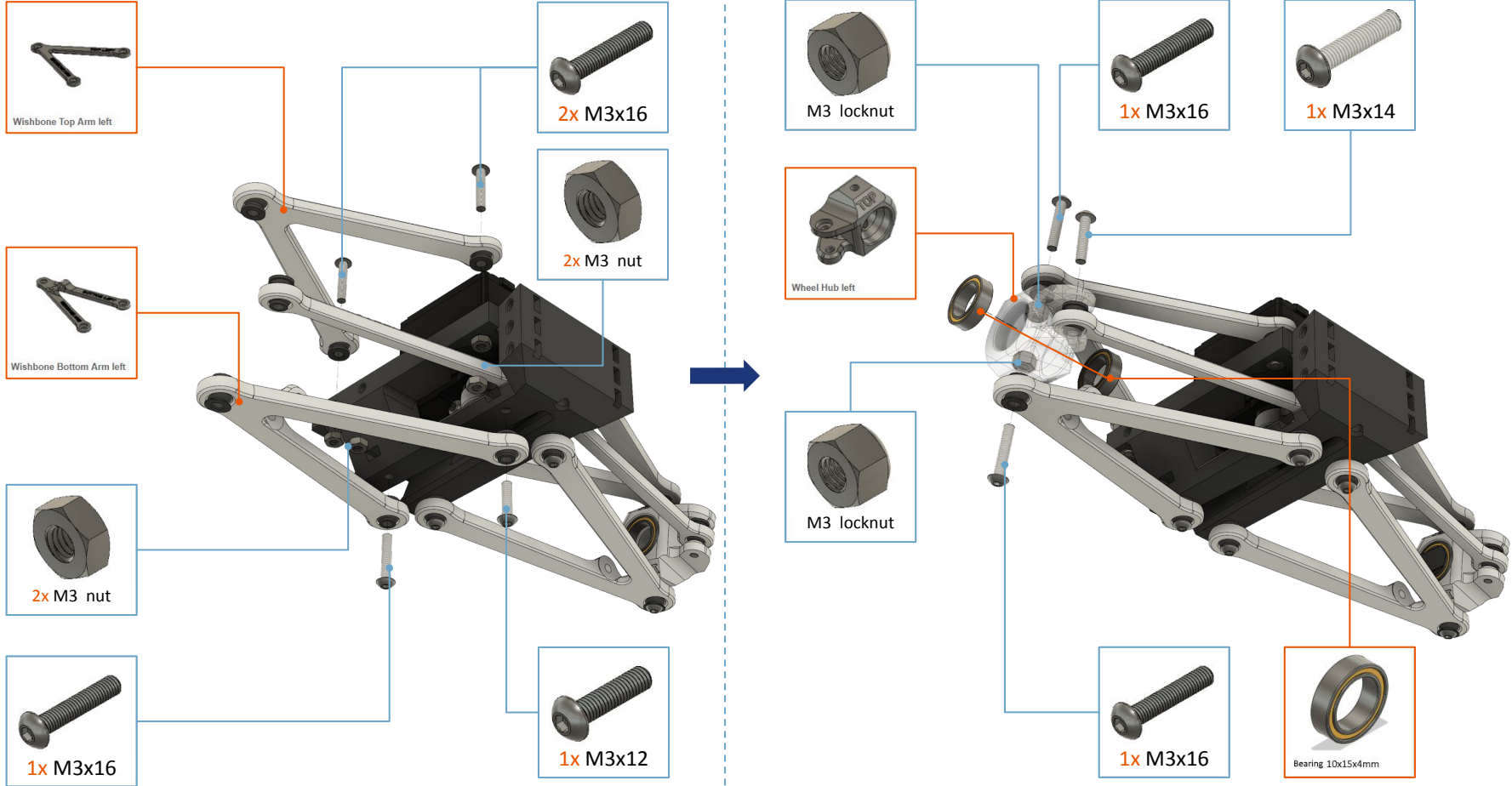


Front Axle – step 5-7/13

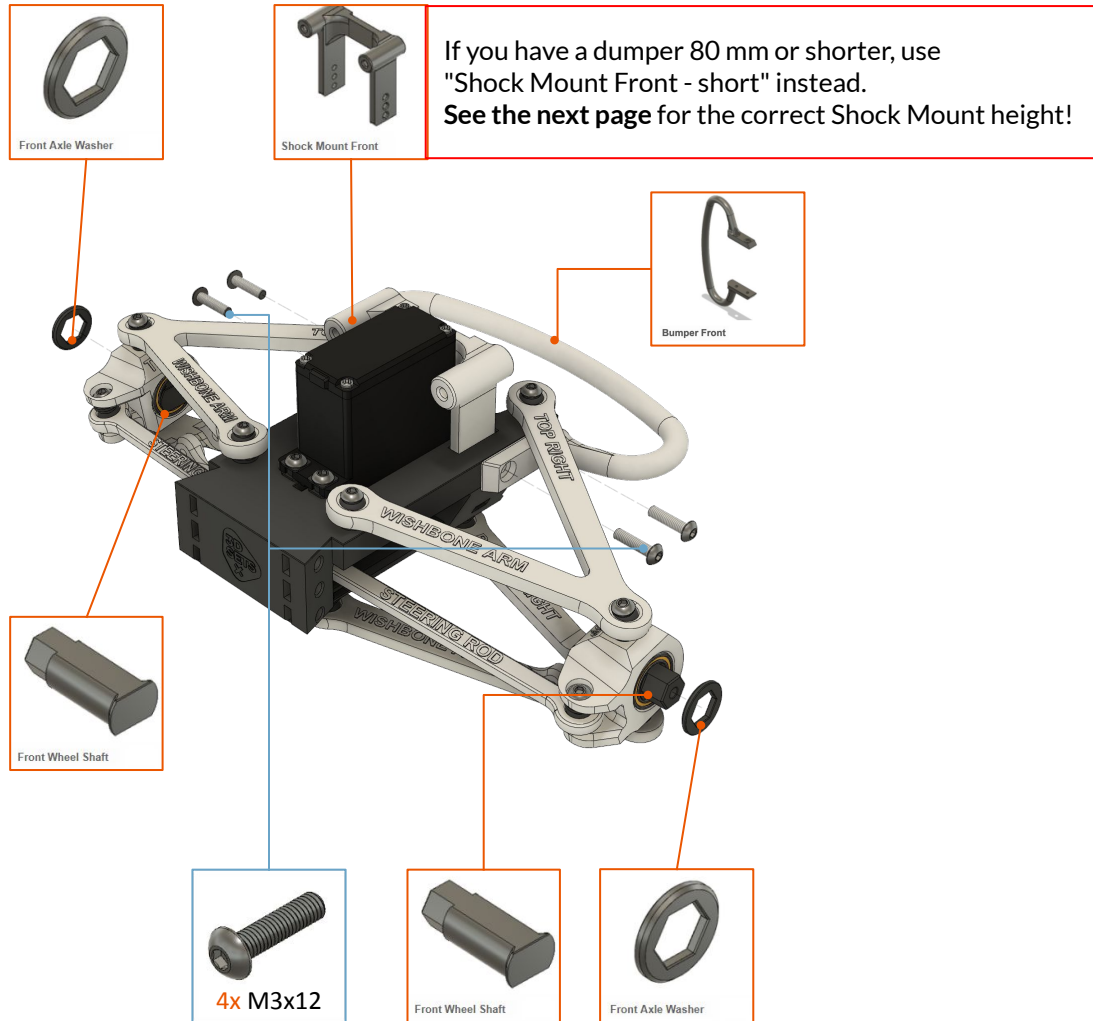
Please make sure that the parts are oriented correctly!



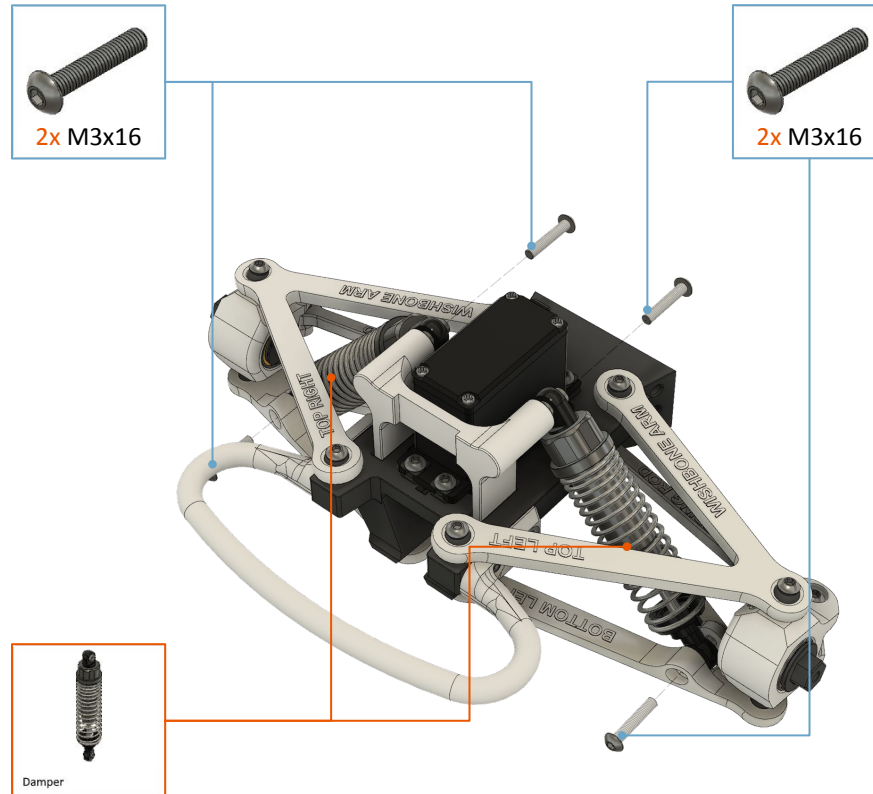
Front Axle – step 8-9/13



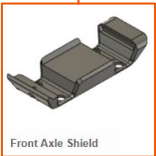
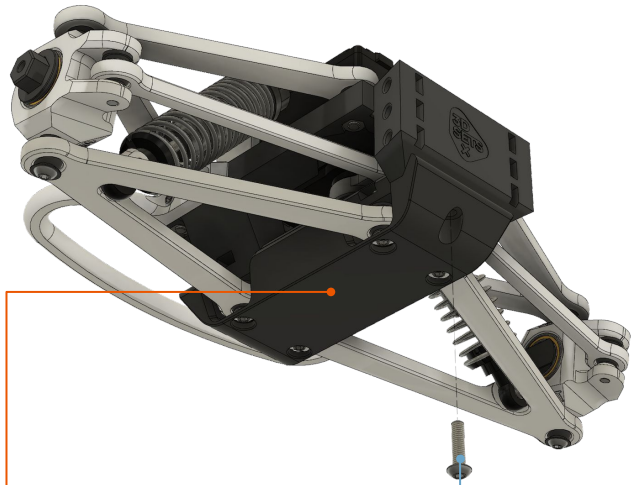
Front Axle – step 10/13



Front Axle – step 11/13



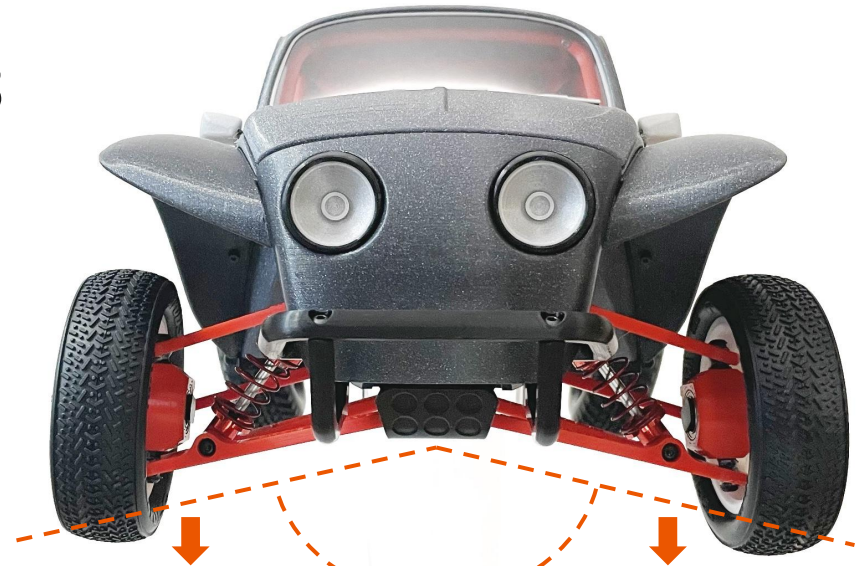
Front Axle – step 12-13/13



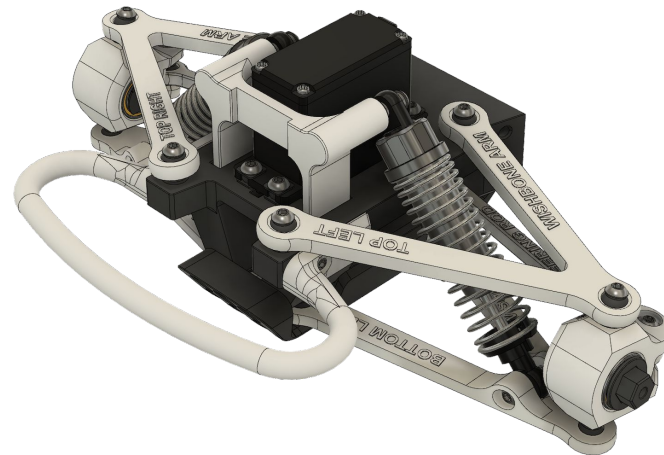
Front Axle Shield



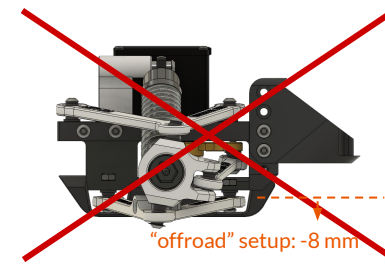
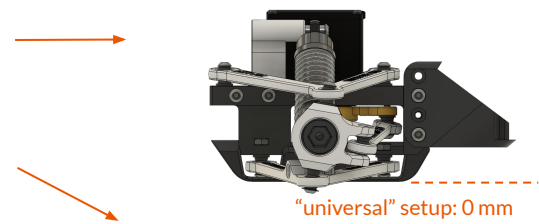
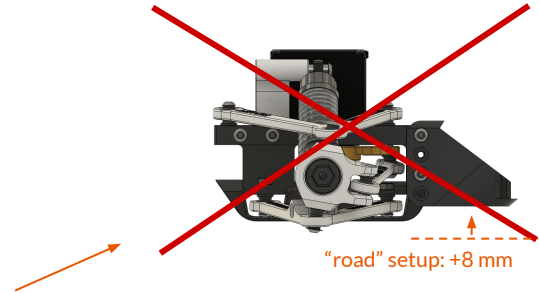
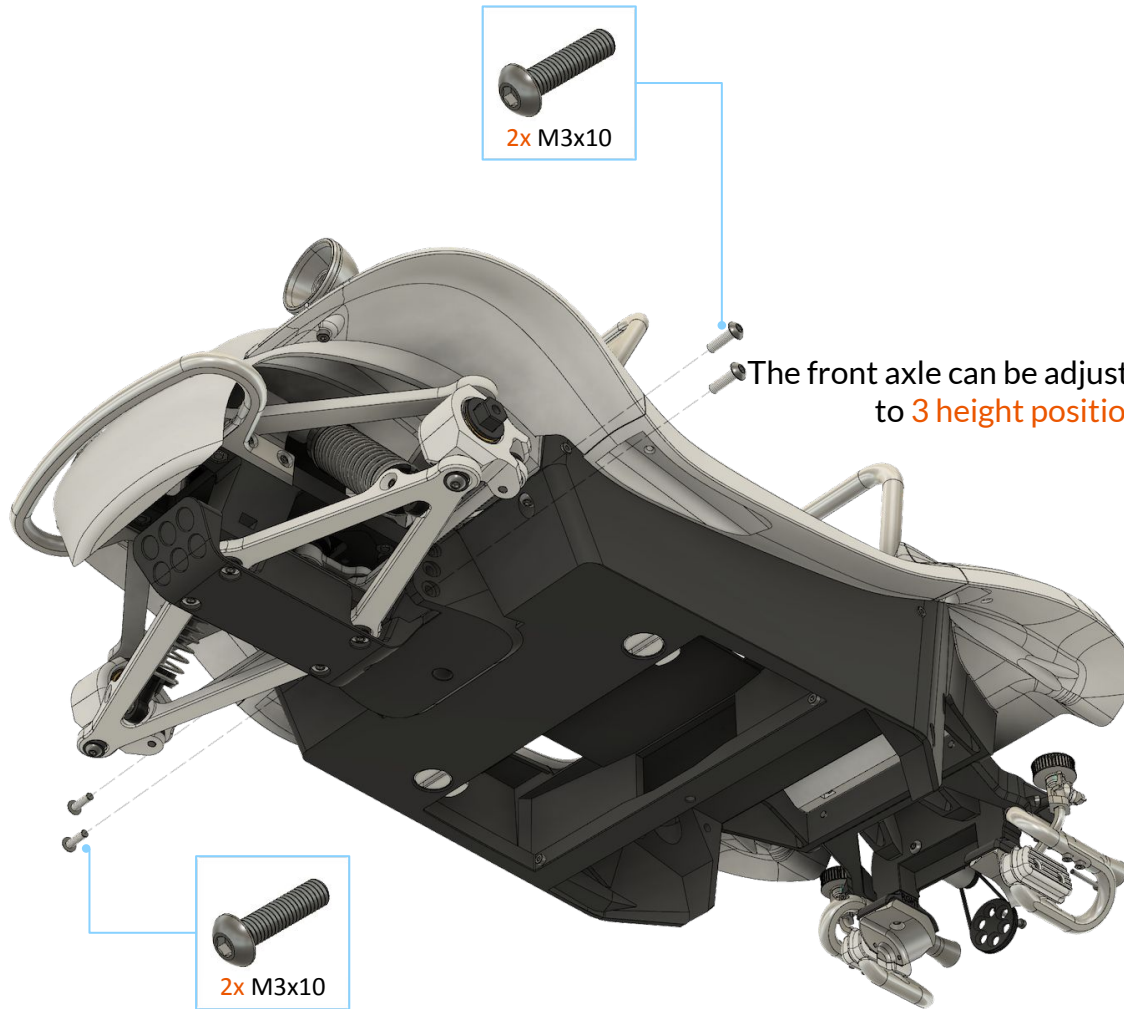
1x M3x12



The axle arms must be completely lowered in the unloaded position – adjust the height of the Shock Mount.



Installation of the Front Axle in the body



Subassembly – Rear axle

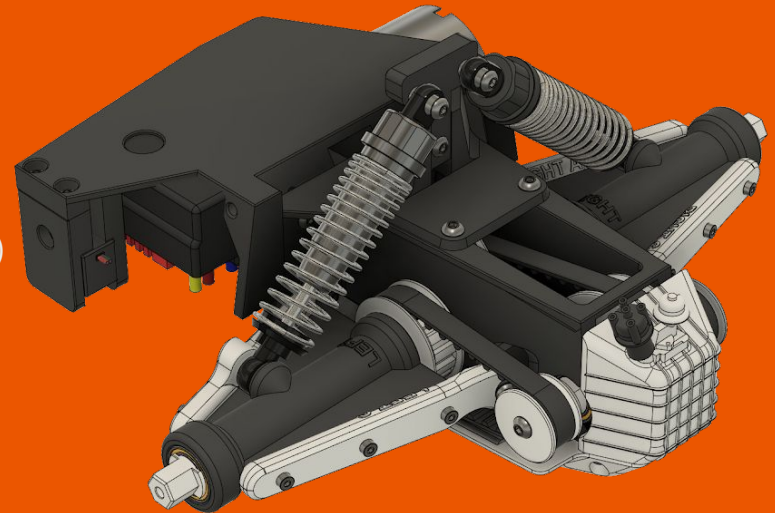
In this procedure you will assemble the Rear Axle. The axle assembly includes half-axles, transmission belts and engine mount.

Required print plates:

- “Print 20 - Rear Axle - 1 - differential (or no differential)”
- “Print 21 - Rear Axle - 2 - differential (or no differential)”
- ”Print 21b - Rear Axle - Brushless Motor 35x29mm”
- “Print 22A - Rear Axle - 3” (versions for various filaments)
- “Print 23A - Rear Axle - 4” (version for various filaments)
- “Print 24 - Rear Axle - 5”

Non-printed parts:

- Screw M2x6: 2 pcs.
- Screw M2x8: 12 pcs.
- Screw M2x10: 1 pcs.
- Screw M3x6: 5 pcs. (-2 pcs. with brushless motor)
- Screw M3x8: 7 pcs. (+4 pcs. with brushless motor)
- Screw M3x10: 4 pcs.
- Screw M3x12: 8 pcs. (+1 pcs. with brushless motor)
- Screw M3x14: 3 pcs.
- Screw M3x16: 4 pcs.
- Screw M3x20: (+1 pcs. with brushless motor)
- Nut M3: 2 pcs. (+1 pcs. with brushless motor)
- Bearing: 16 pcs. (-7 pcs. with no-differential)
- Belt 80XL: 2 pcs.
- Belt 60XL: 2 pcs.
- Grease

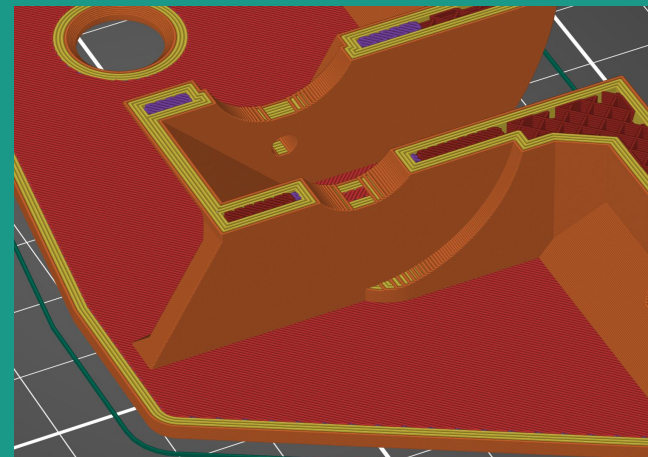
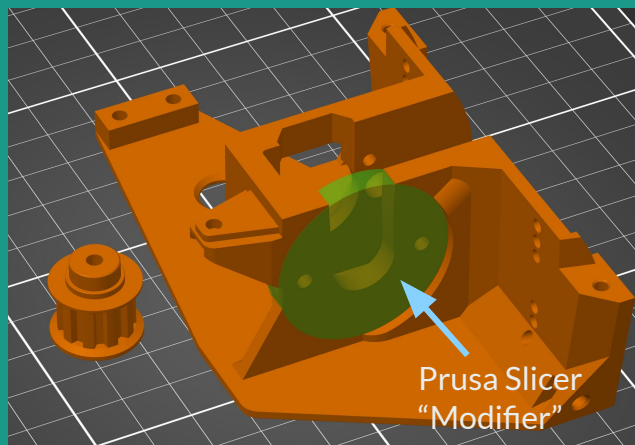


Rear Axle: important – heat resistant filament requirements

When using the 540 motor, a “heat resistant” material, such as ASA or PC Blend, must be used to print “X” and “Y” parts. ASA is easy to print and affordable, PC Blend is a high performance filament but more difficult to print.

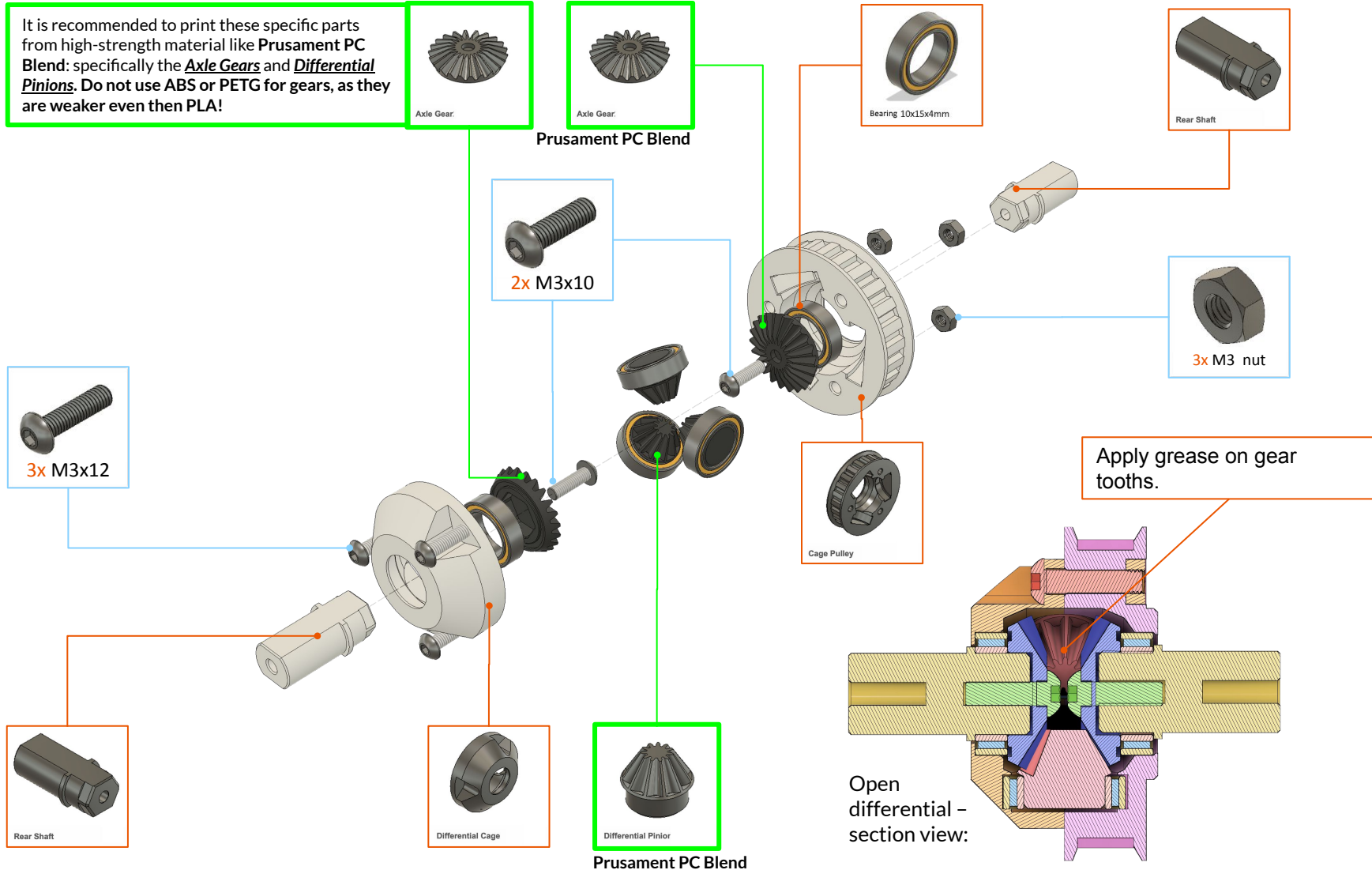
We also recommend using a modifier that sets 100% infill in the engine compartment - eg as shown in the figure. You can find more about modifiers here: https://help.prusa3d.com/en/article/modifiers_1767. This modifier is used in the supplied .3mf files. Other settings for these parts are:

- ASA or PC Blend
- Use “Brim”
- Perimeters: 4
- Infill density: 20%
- Infill type: grid

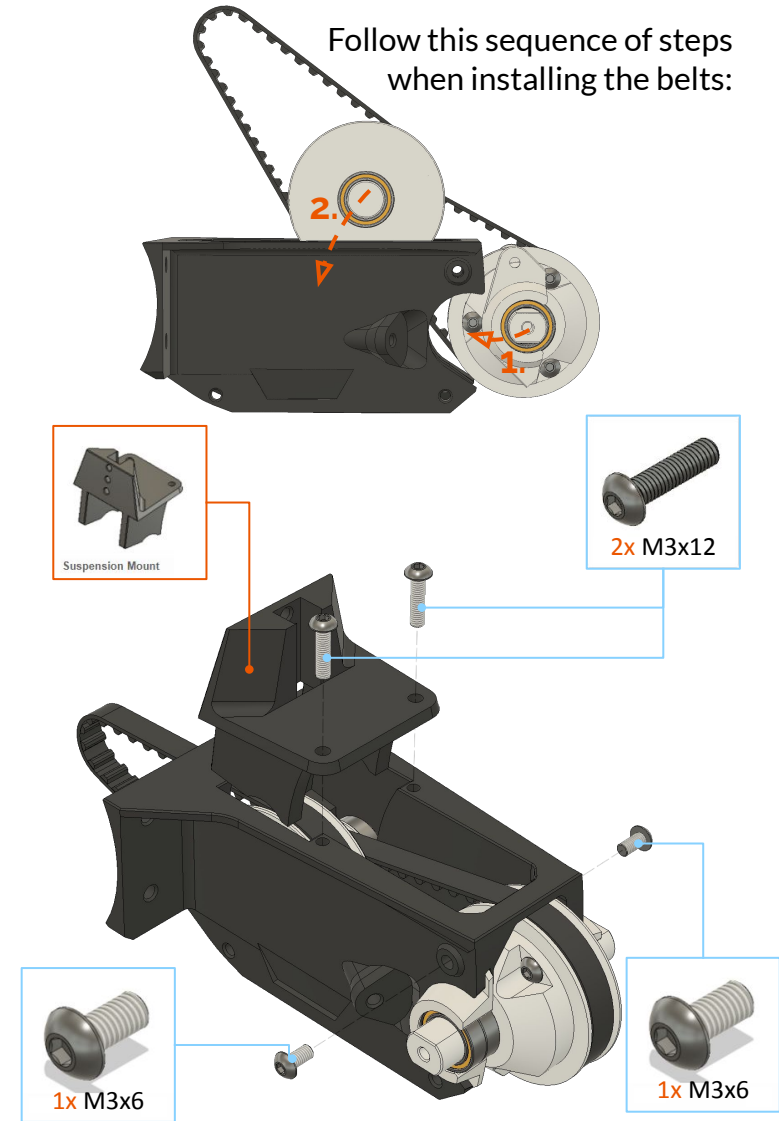


Rear Axle (with differential) – step 1/12

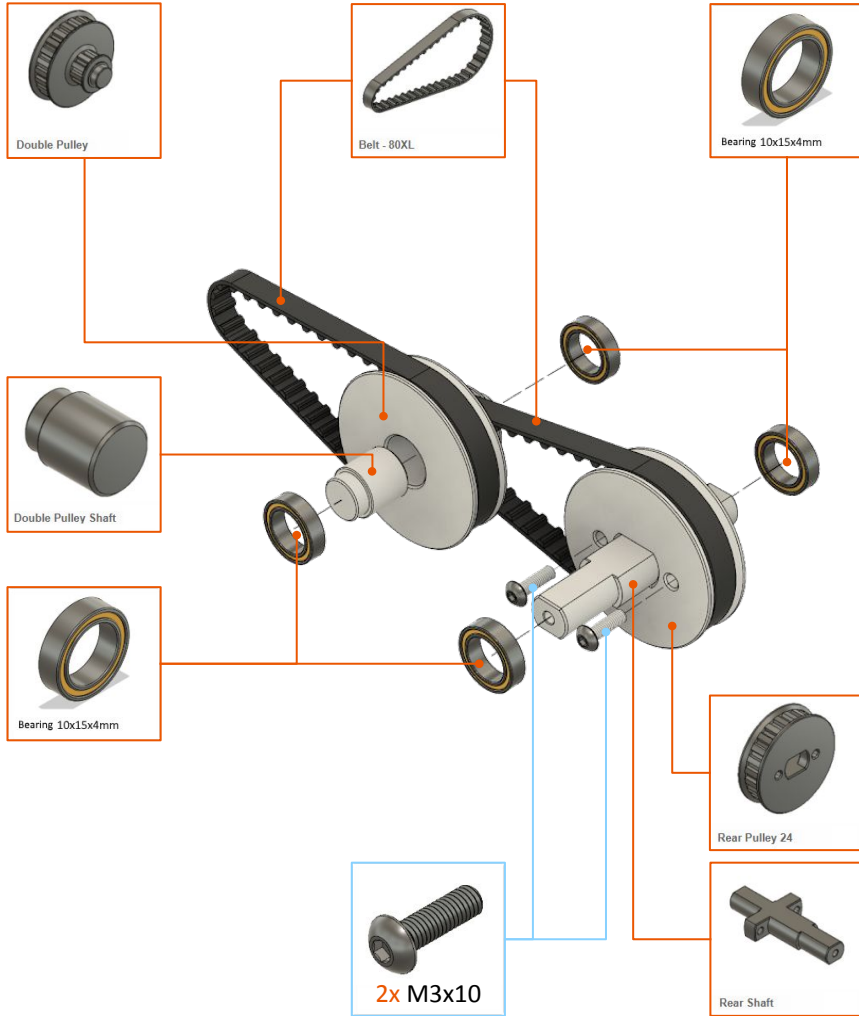
It is recommended to print these specific parts from high-strength material like **Prusament PC Blend**: specifically the **Axle Gears** and **Differential Pinions**. Do not use ABS or PETG for gears, as they are weaker even than PLA!



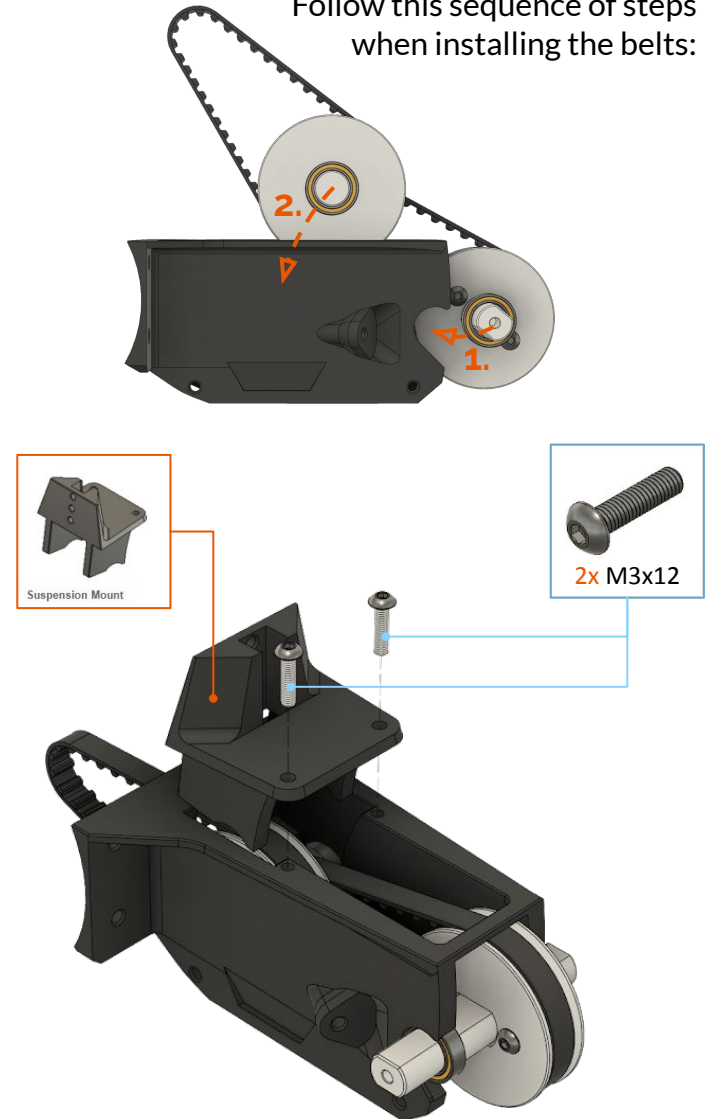
Rear Axle (with differential) – step 2-3/12



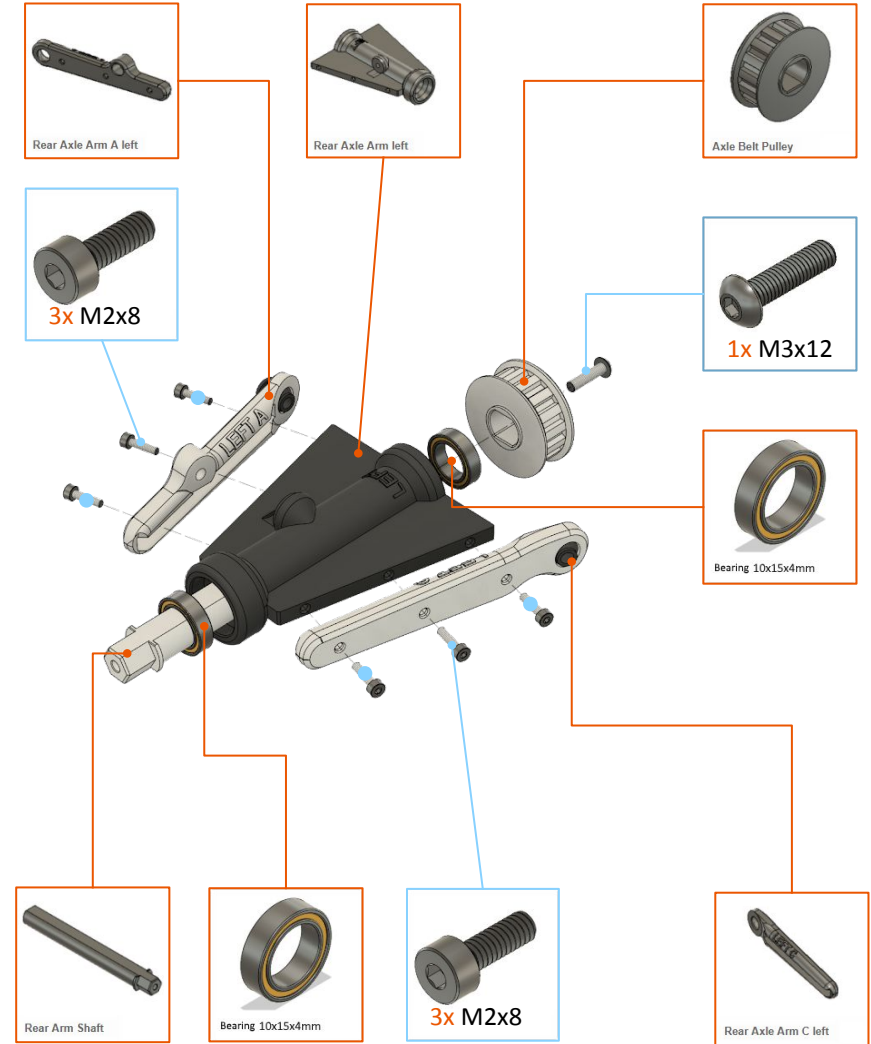
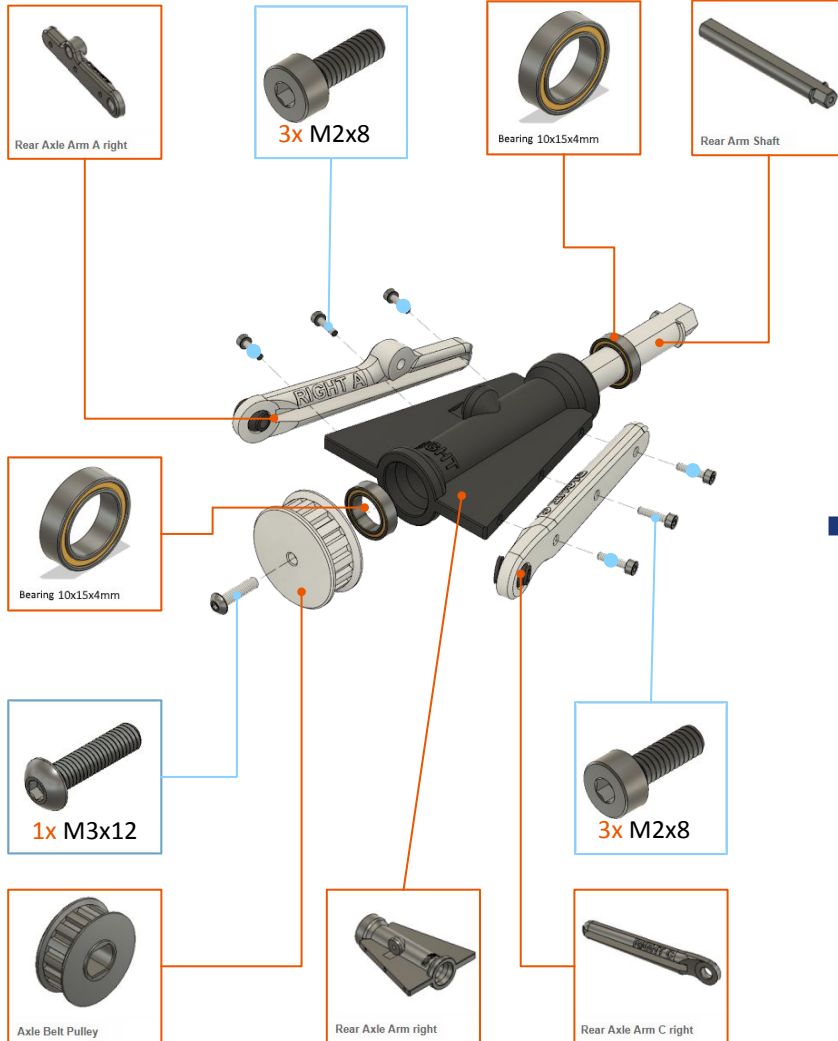
Rear Axle (no differential)- step 1-2/12



Follow this sequence of steps when installing the belts:



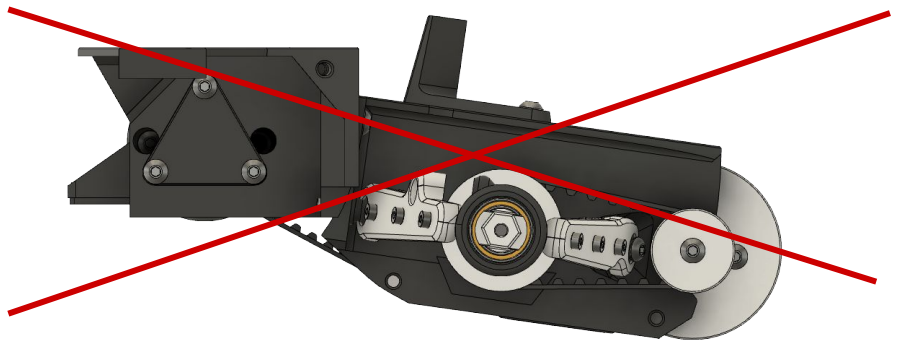
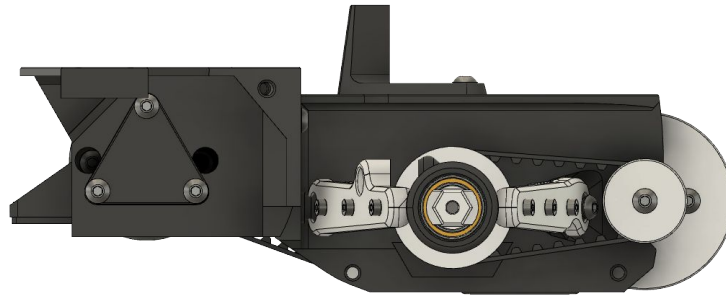
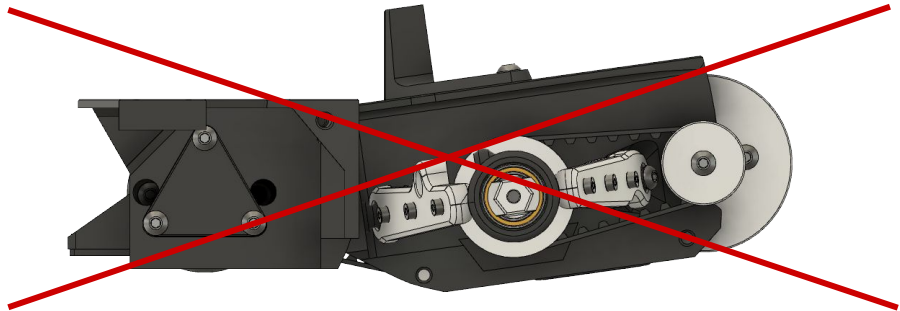
Rear Axle – step 4-5/12



Rear Axle – step 6/12 - height position

In the following steps, please pay attention to the mutual assembly of the "Motor Frame" and "Axle Frame" parts.

The parts can be bolted together in **three different positions** (or angles), the choice of which **affects the position (height) of the rear wheel axles** relative to the body.



Rear Axle – step 6/12 – brushed (DC) motor variant



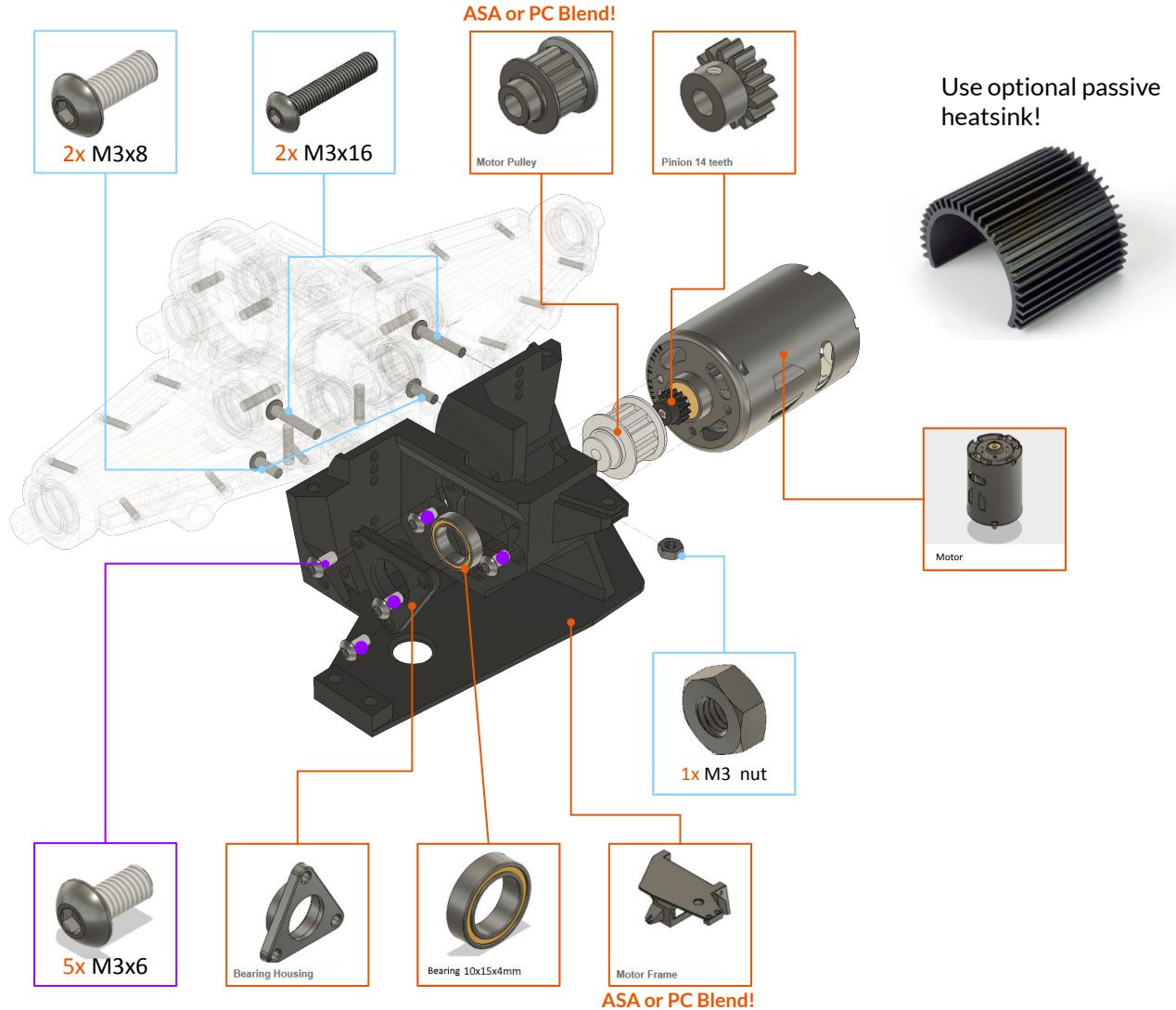
10 minutes of driving

For 540DC motor – 10 min of continuous driving, then 10 minutes cool down! Use heat resistant filament!

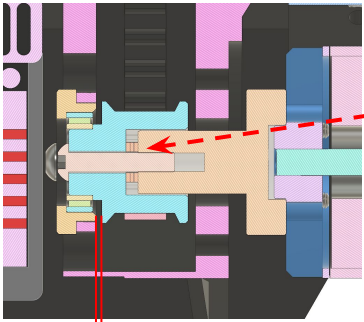


10 minutes of cool down

For high-performance, continuous driving use [brushless setup](#) instead.

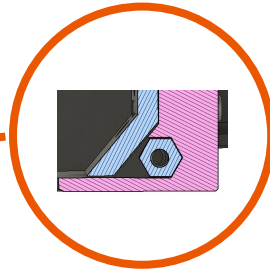
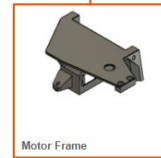
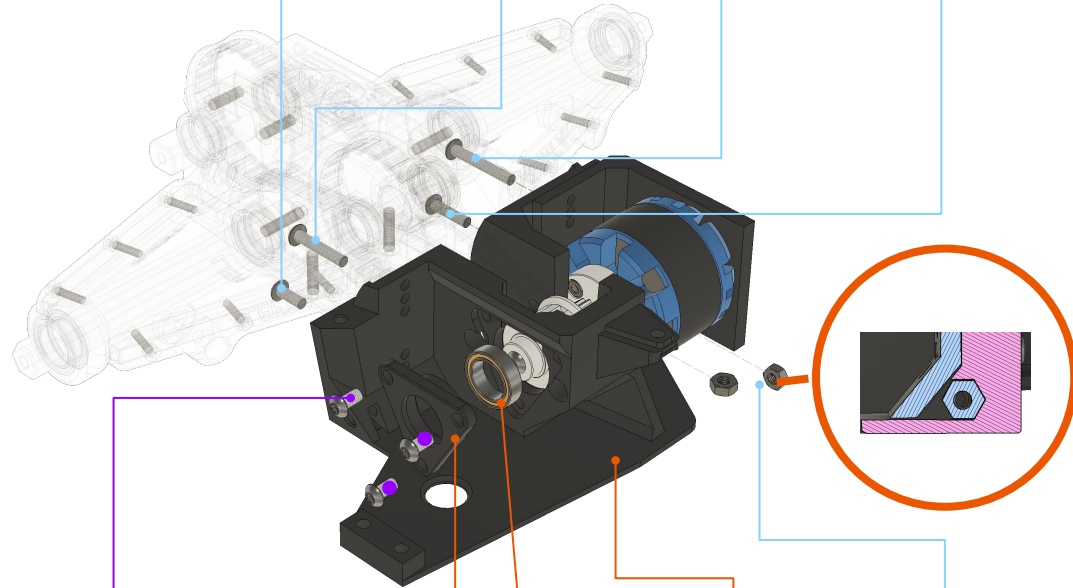
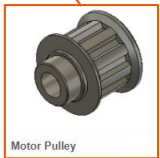
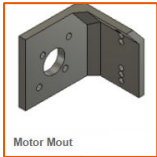


Rear Axle – step 6/12 - brushless motor variant

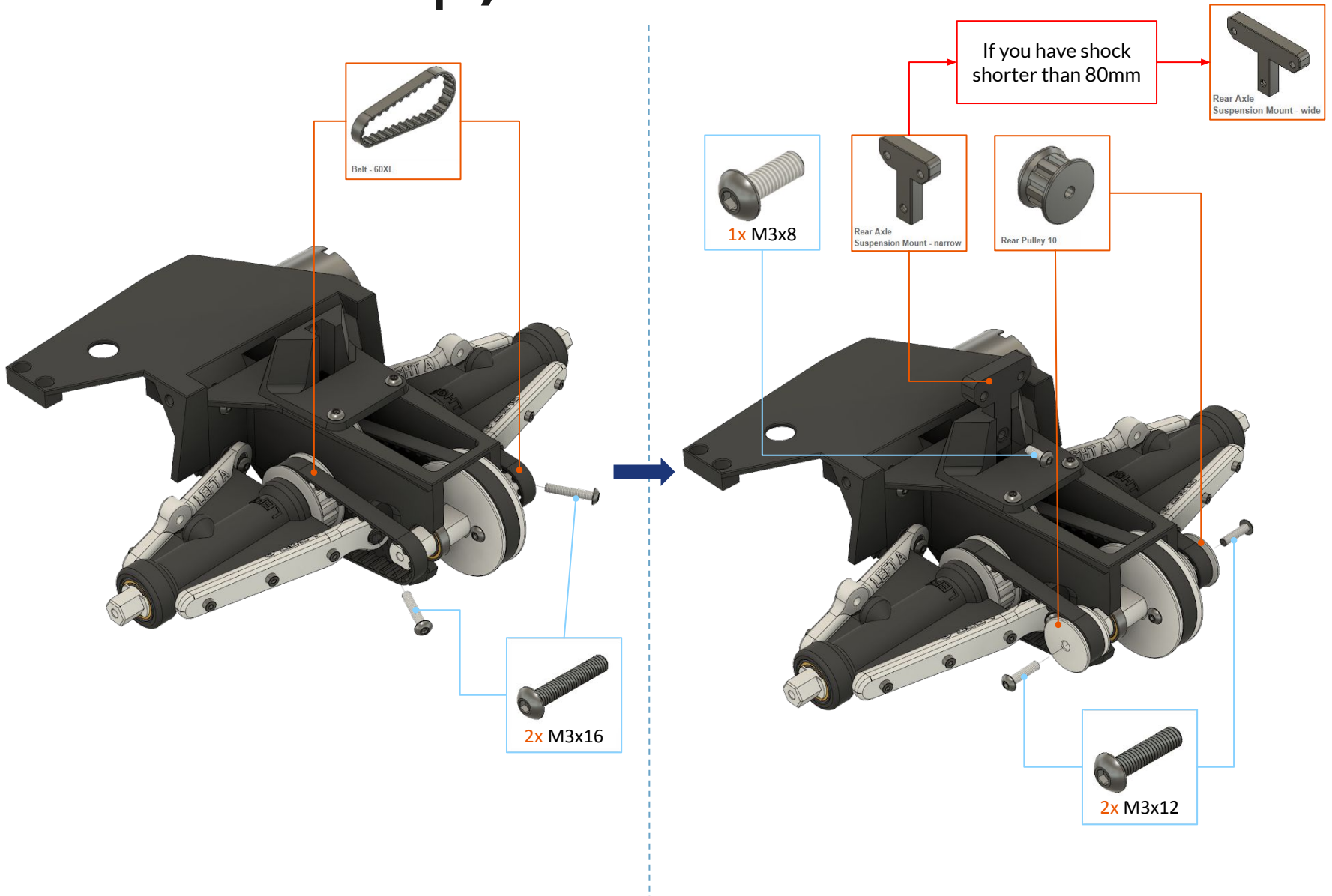


If you use motor shorter than 29mm, use washers for centering the Motor Pulley.

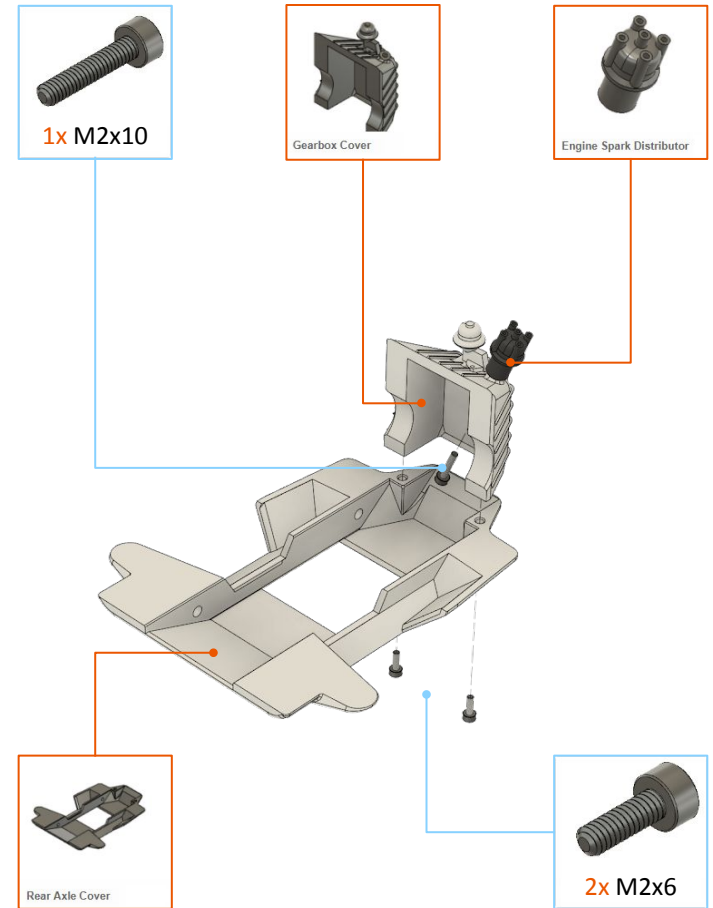
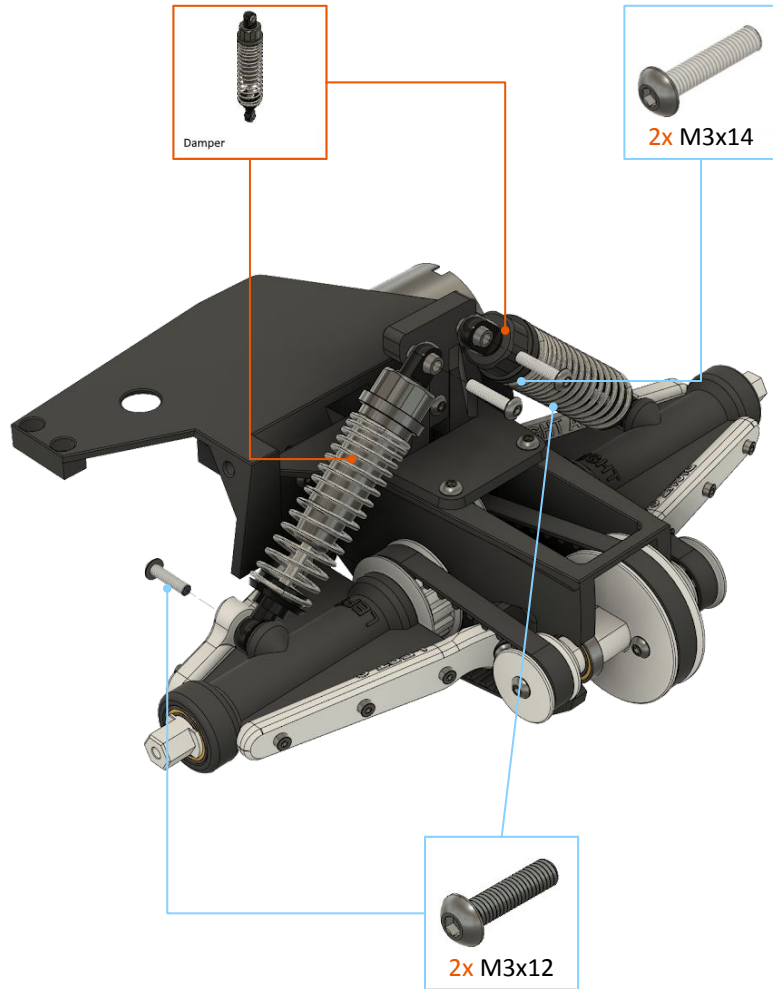
Clearance
1 mm max.!



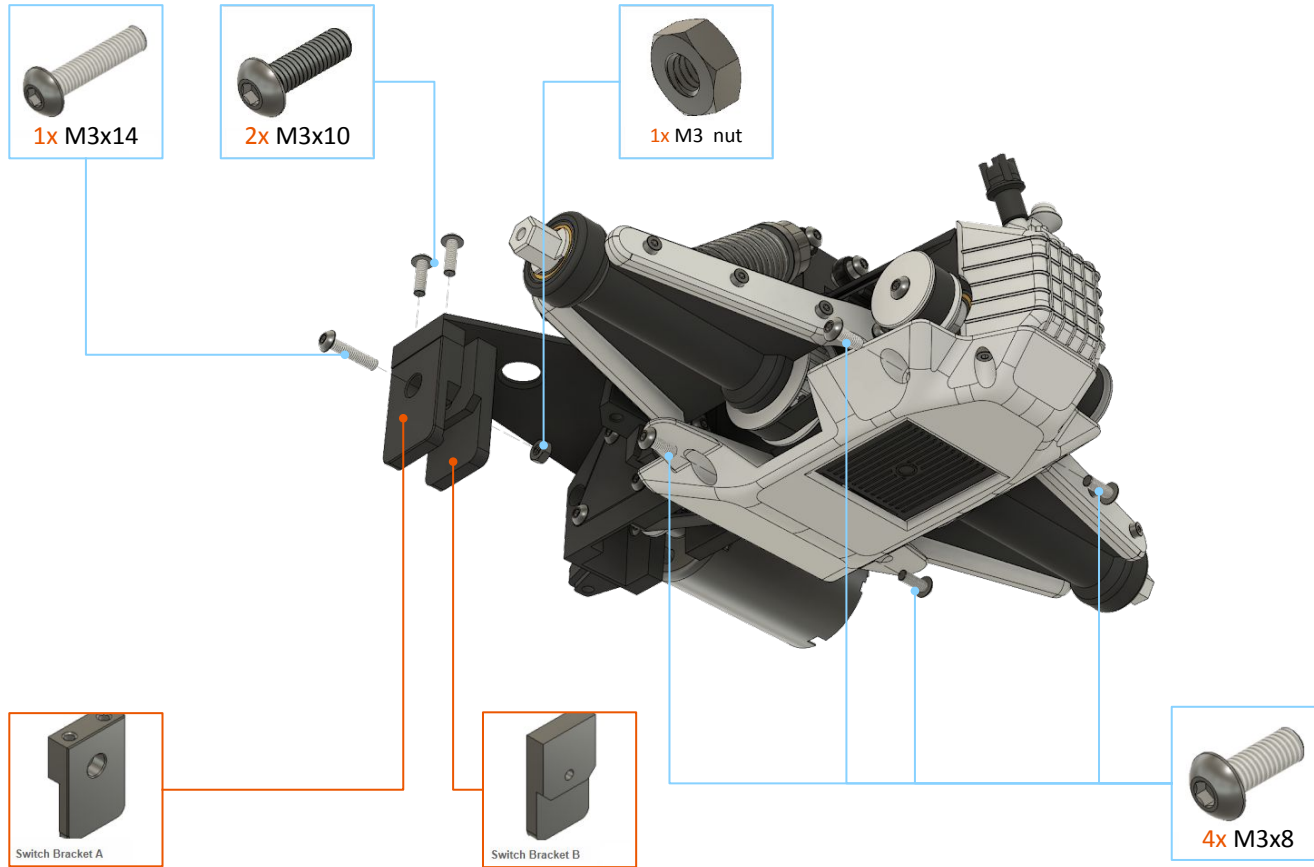
Rear Axle – step 7-8/12



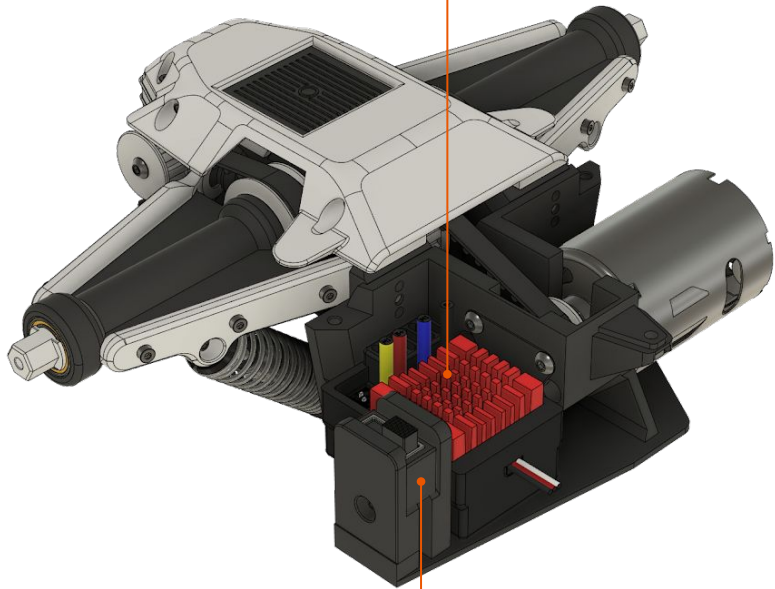
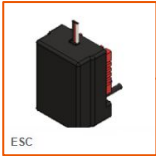
Rear Axle – step 9-10/12



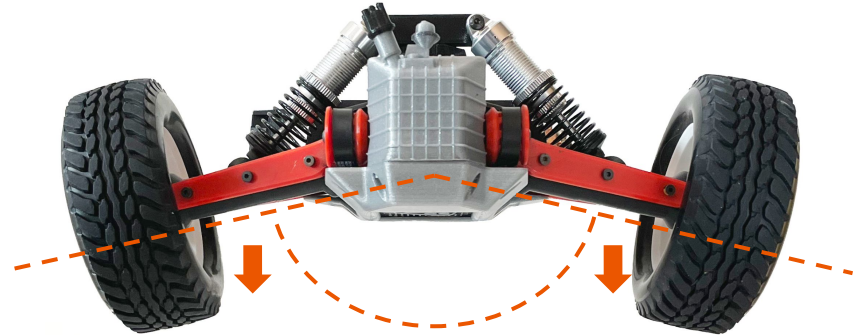
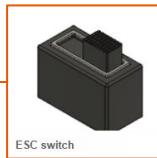
Rear Axle – step 11/12



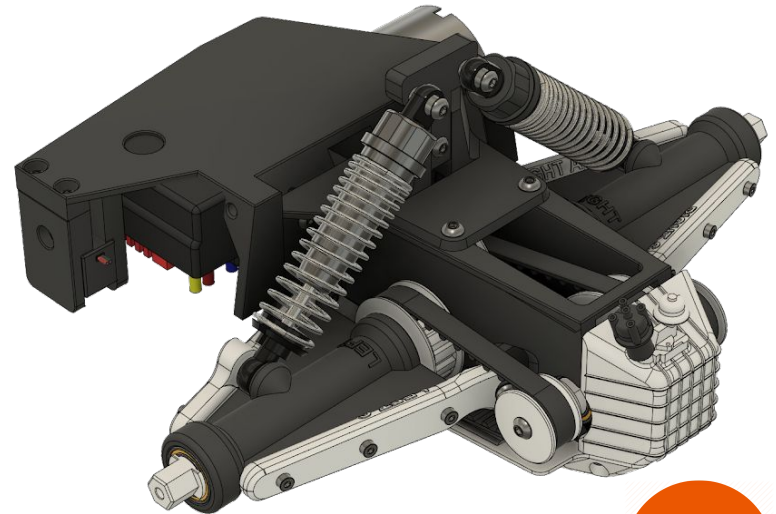
Rear Axle – step 12/12



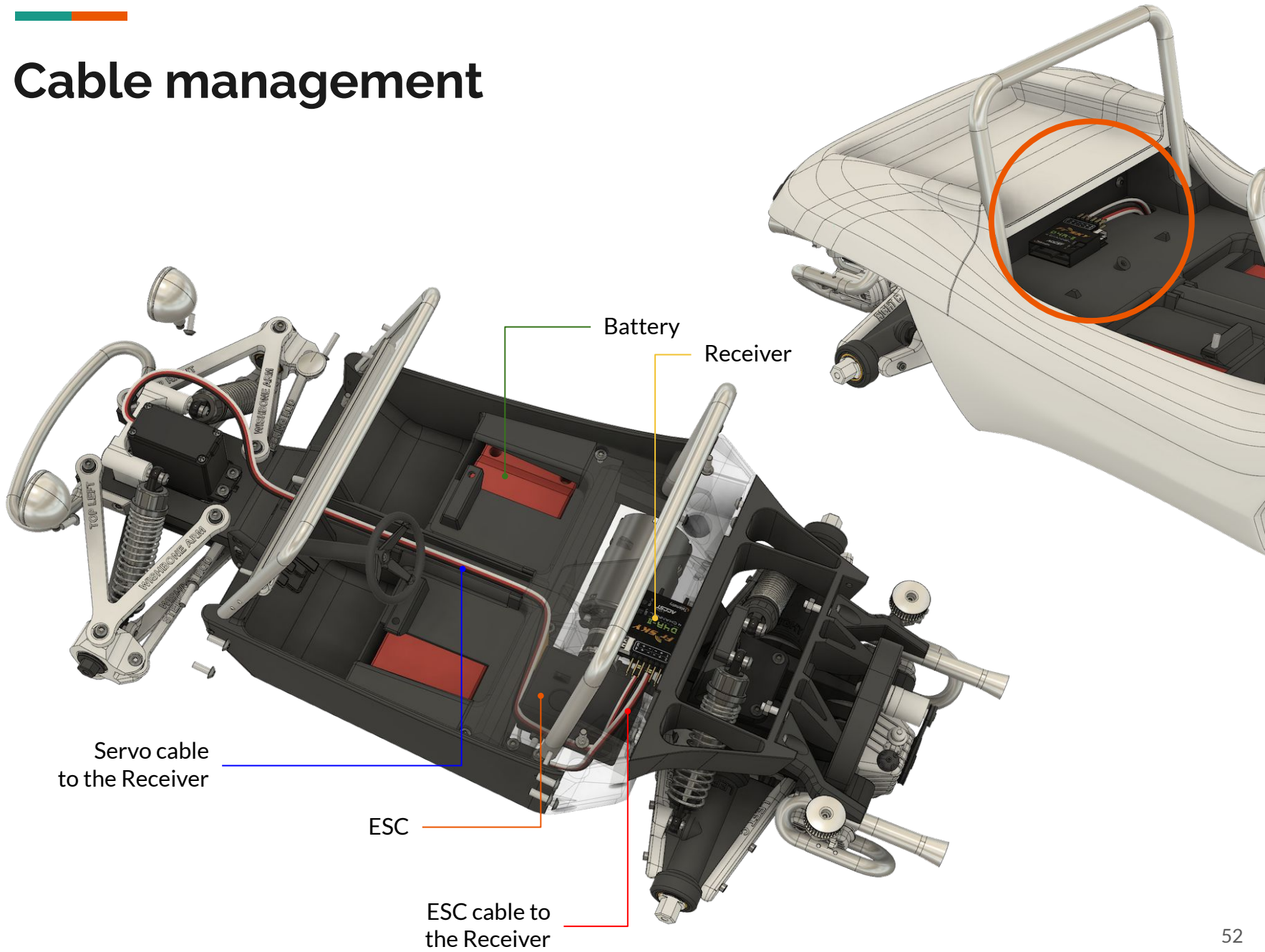
Secure the switch by clamping it inside the holder.



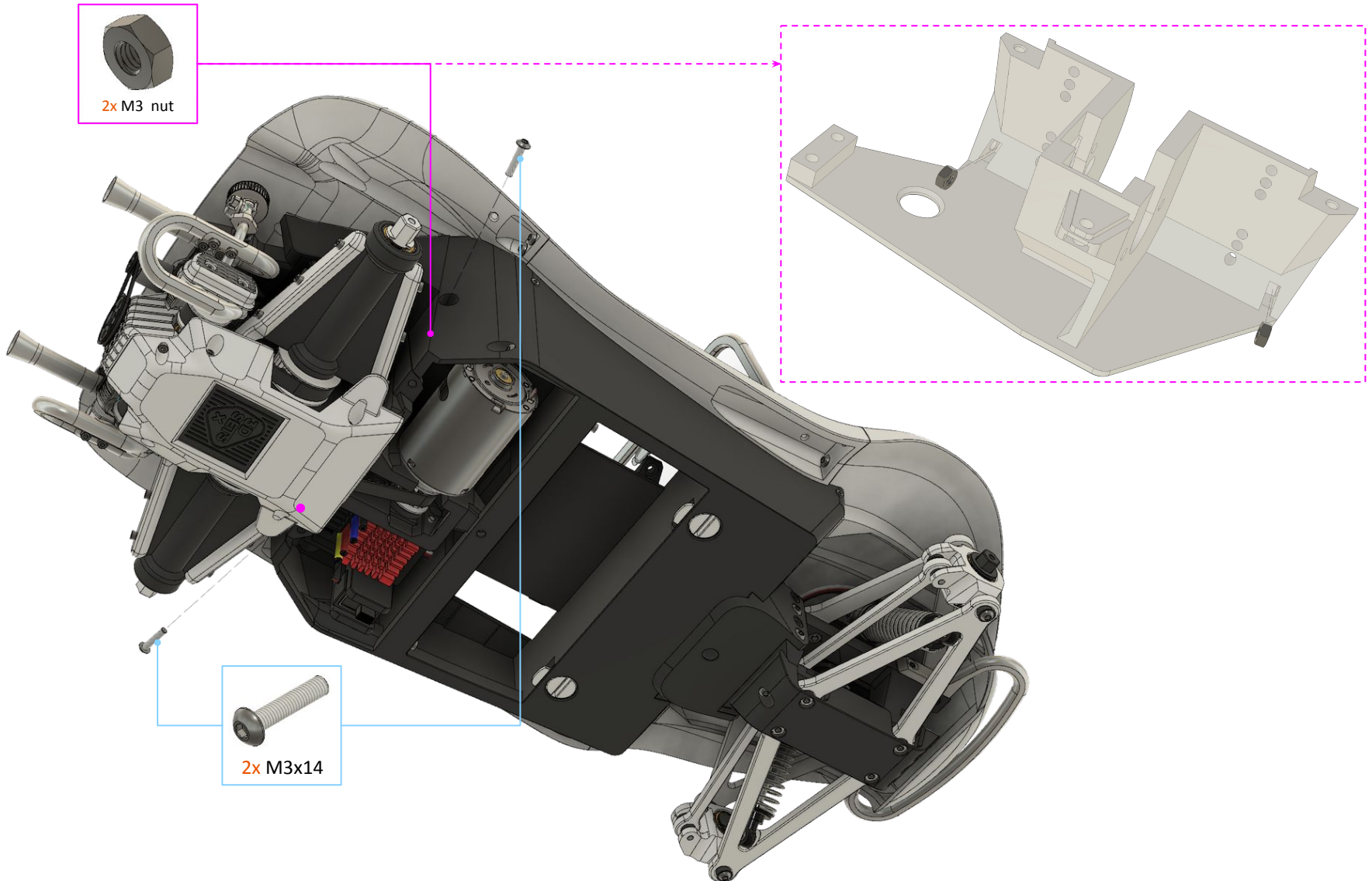
The axle arms must be completely lowered in the unloaded position – adjust the height of the Shock Mount.



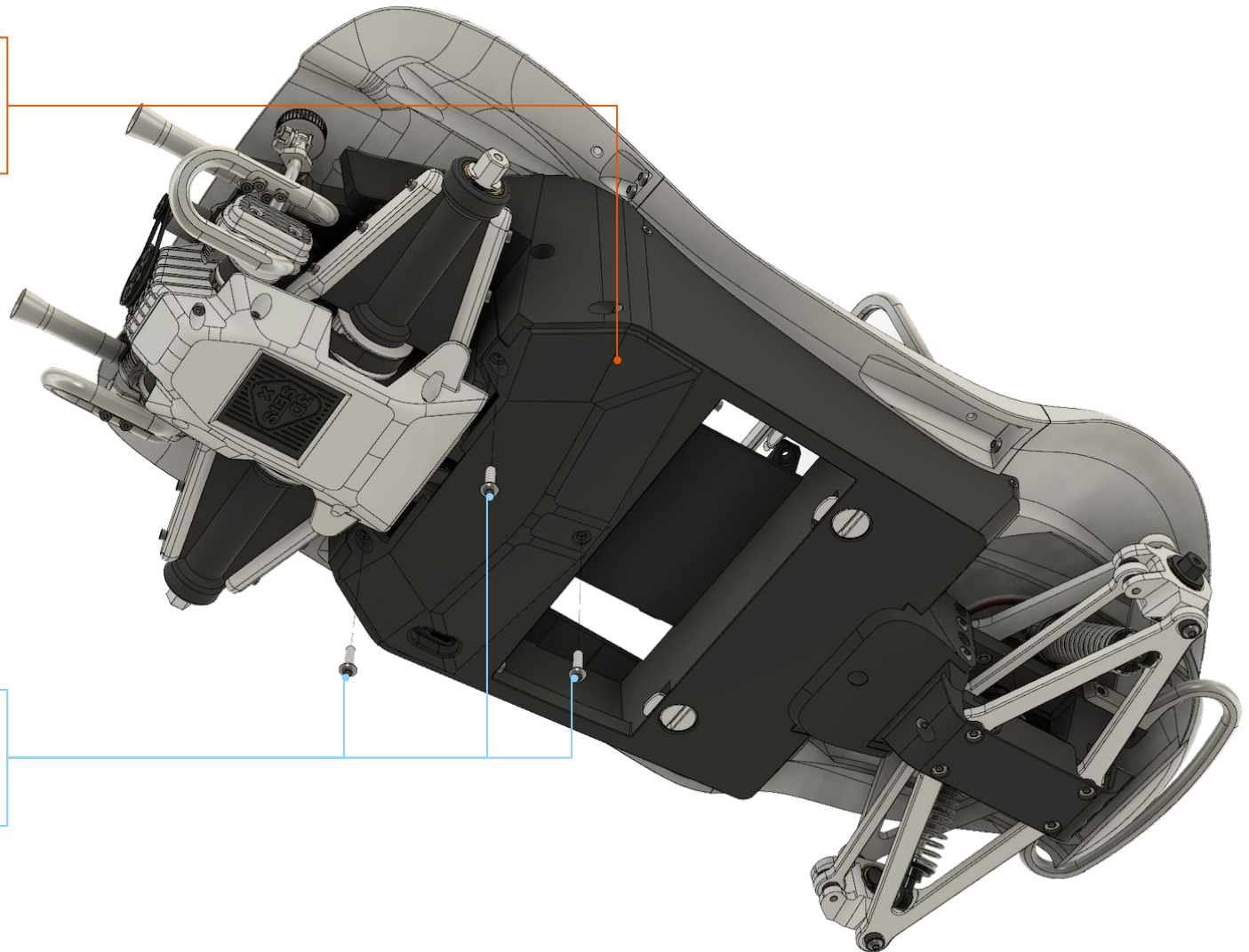
Cable management



Installation of the Rear Axle in the body



Installation of the Rear Axle in the body



Seats & Gear Shift

In this procedure you will assemble the Seats and Gear Shift. To complete this task, get ready all necessary parts:

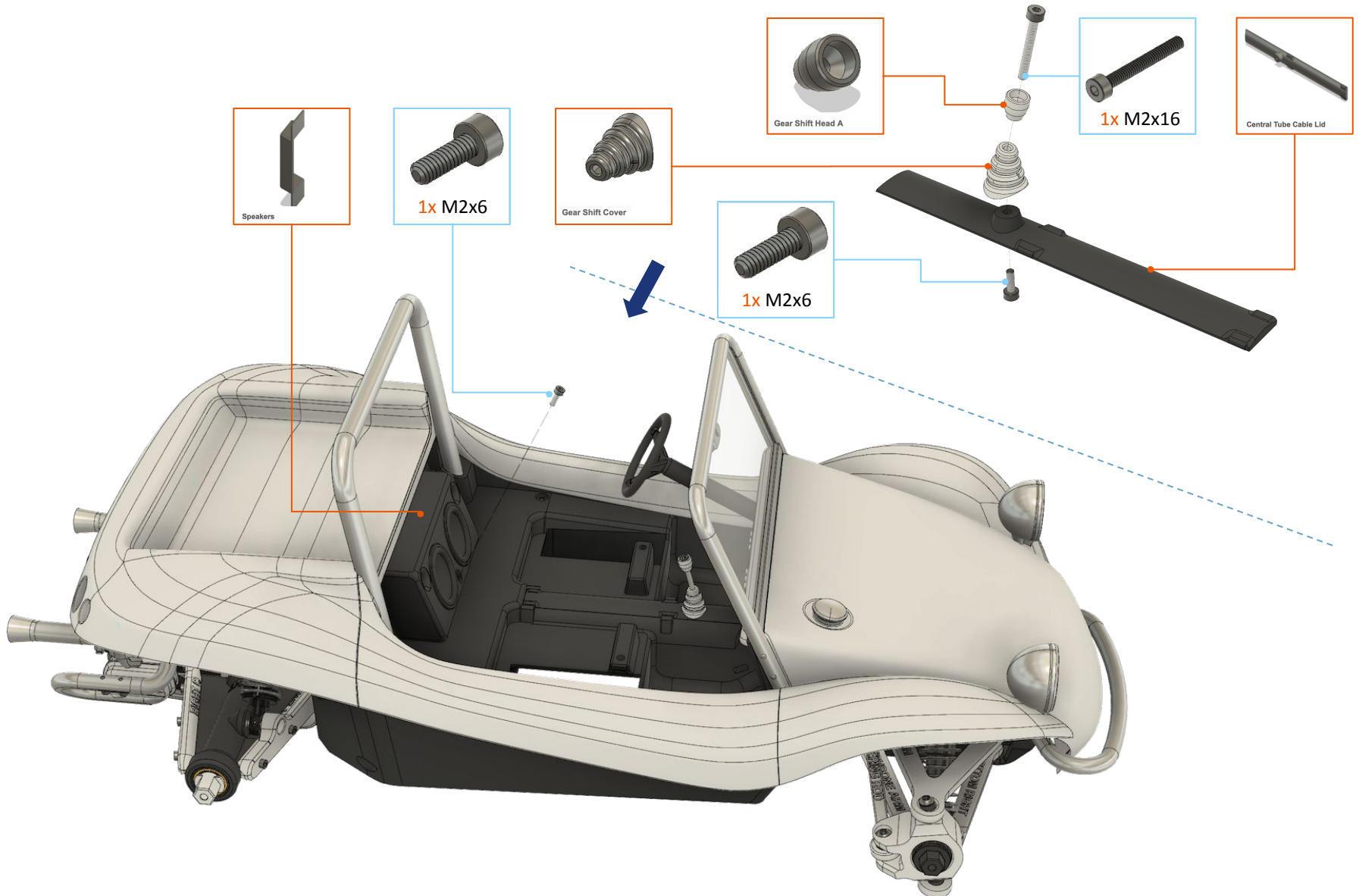
Required print plates:

- “Print 4 - Interior - 1”
- “Print 25 - Seats”

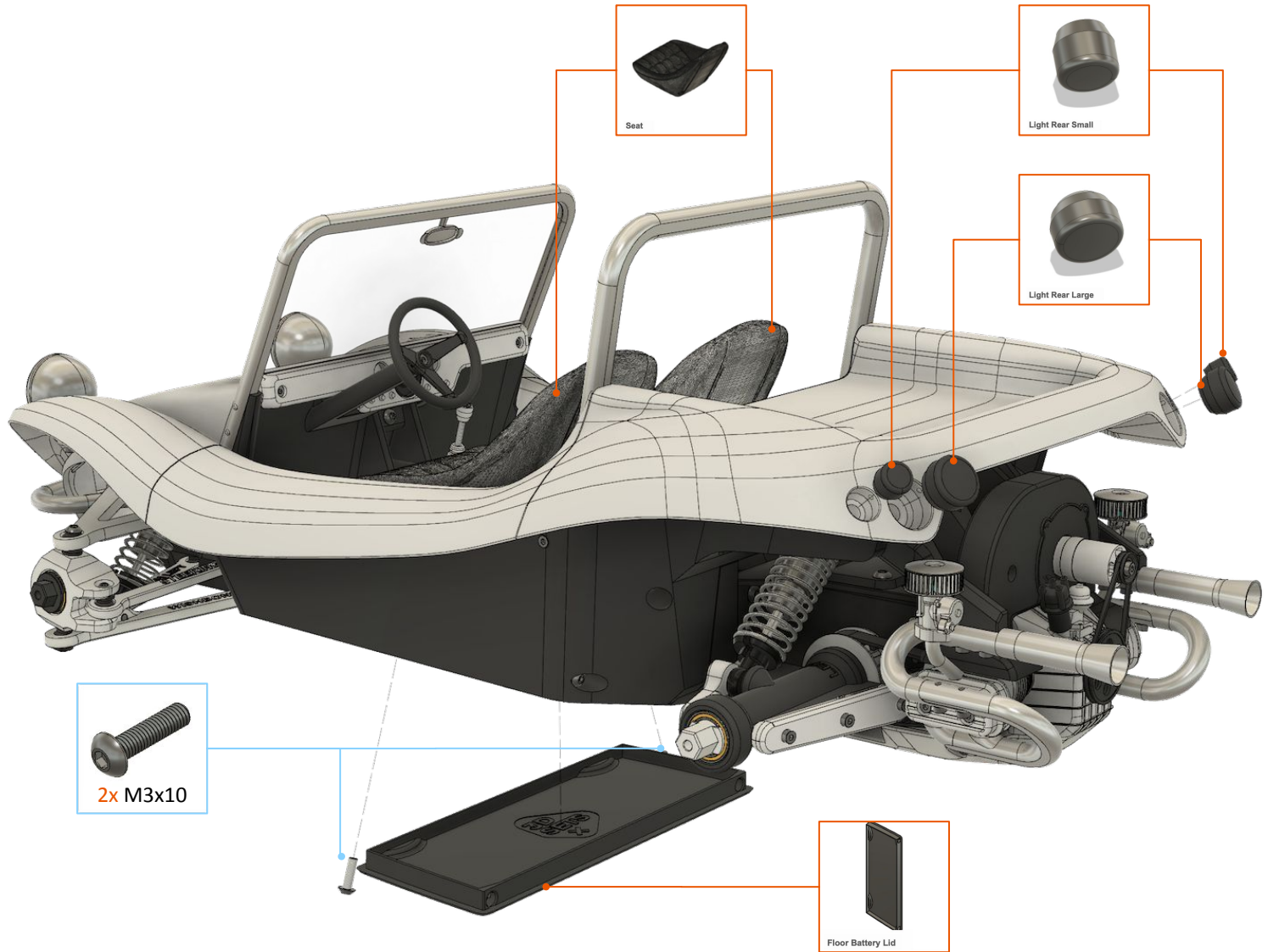
Non-printed parts:

- Screw M2x6: 1 pcs.
- Screw M2x16: 1 pcs.
- Screw M3x10: 4 pcs.

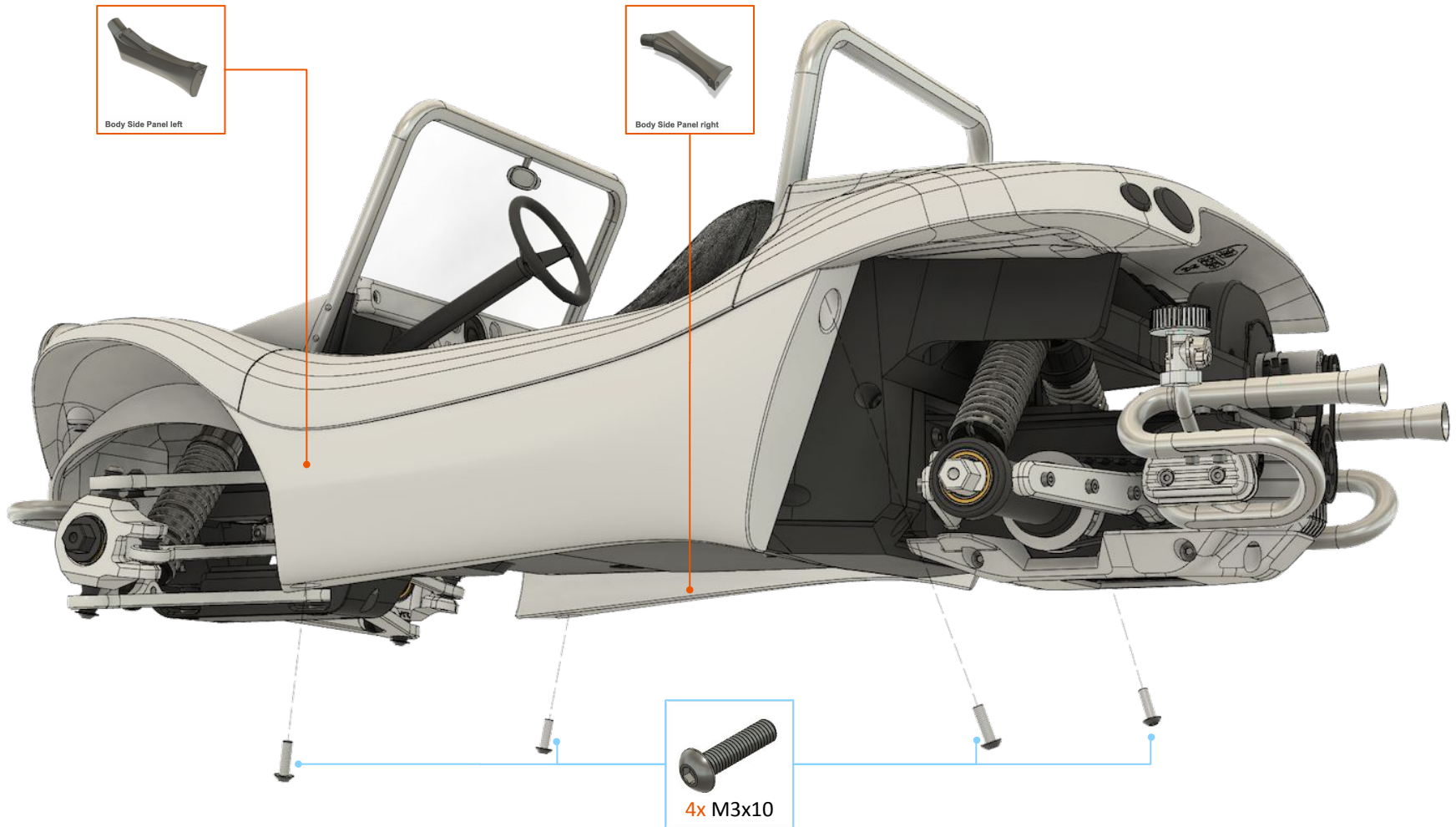
Seat & Gear Shift



Seats, Rear Lights & Battery Cover



Body Side Panels (optional)



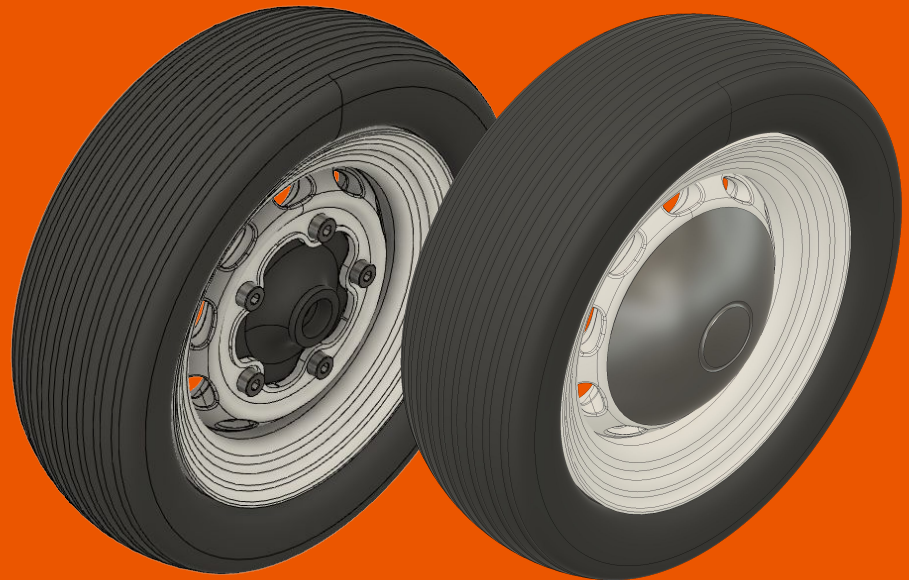
Subassembly – Wheels

Now you will assemble wheels. You can choose between two different wheel designs:

Wheel G – easy to build casted alloy wheel:



Wheel B – classic style steel rim with optional hub cap:





Subassembly – Wheel G

- Front Wheel Tyres – maximum outer diameter 90 mm, maximum width 31 mm, rim diameter 1.9 or 2.2 inches
- Rear Wheel Tyres – maximum outer diameter 100 mm, maximum width 46 mm, rim diameter 2.2 inches

Wheel G:

Required print plates for Tyre 1.9 - FRONT:

- Print 34 - Wheel B - Front - tyre 1.9 normal

Required print plates for Tyre 2.2 - Narrow - FRONT:

- Print 35 - Buggy Wheel A - Front - tyre 2.2 narrow

Required print plates for Tyre 2.2 - Wide - REAR:

- Print 36 - Buggy Wheel A - Rear - tyre 2.2 wide

Wheel G:

Non-printed parts:

- Screw M2x8: 20 pcs.



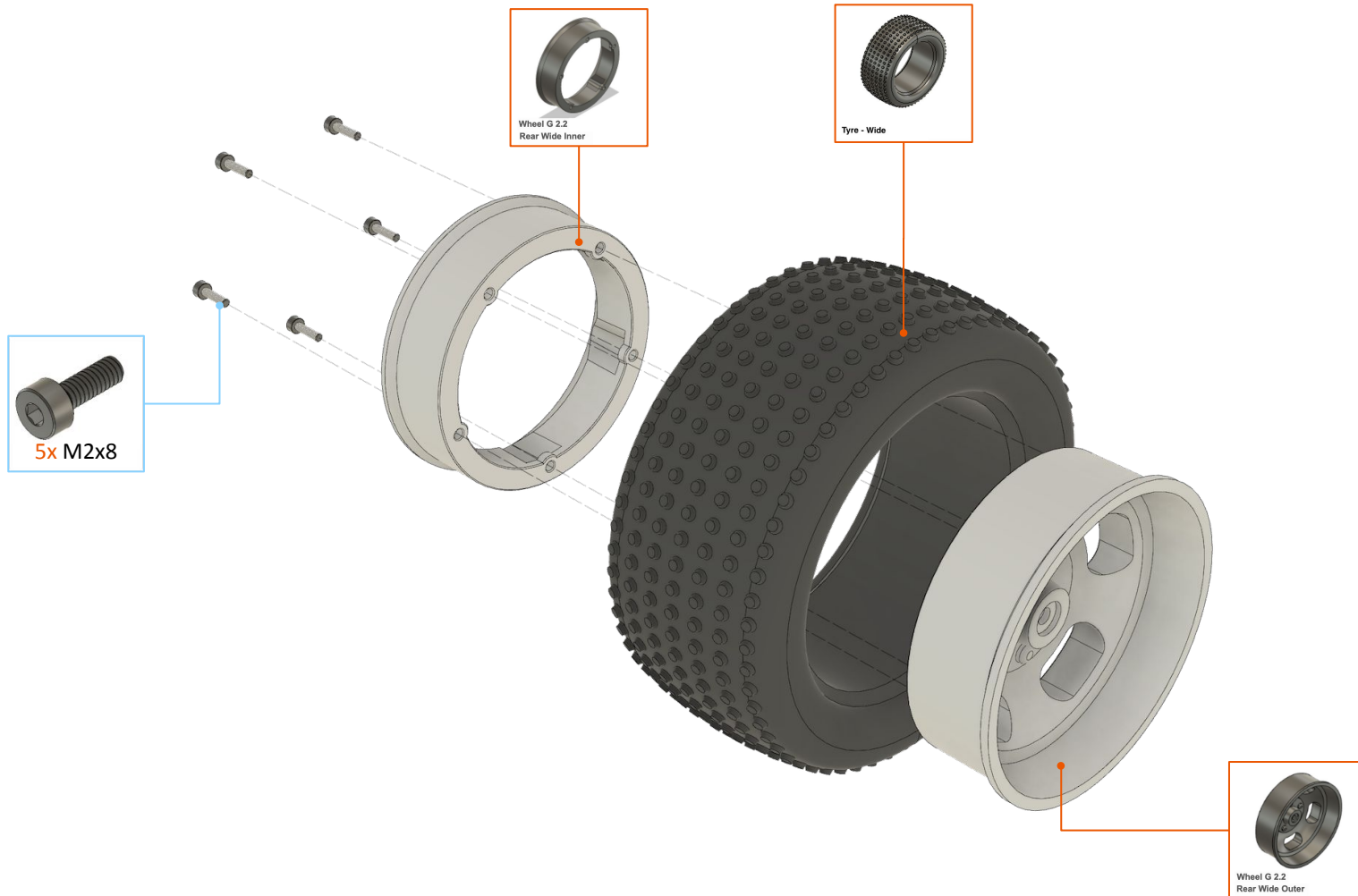


Wheel G - Front Narrow/Normal





Wheel G - Rear Wide





Subassembly – Wheel B

- Front Wheel Tyres – maximum outer diameter 90 mm, maximum width 31 mm, rim diameter 1.9 or 2.2 inches

- Rear Wheel Tyres – maximum outer diameter 100 mm, maximum width 46 mm, rim diameter 1.9 or 2.2 inches

Wheel B:

Required print plates for Tyre 1.9:

- Print 27 - Wheel B - Front - tyre 1.9 normal
- Print 28 - Wheel B - Rear - tyre 1.9 normal

Required print plates for Tyre 2.2 - Narrow:

- Print 29 - Wheel B - Front - tyre 2.2 narrow

Required print plates for Tyre 2.2 - Wide:

- Print 30 - Wheel B - Rear - tyre 2.2 wide

Wheel B:

Required print plates (for all type tyre):

- Print 31 - Wheel B - Center
- Print 32 - Wheel B - Hub
- Print 33 - Wheel B - Hub Cap

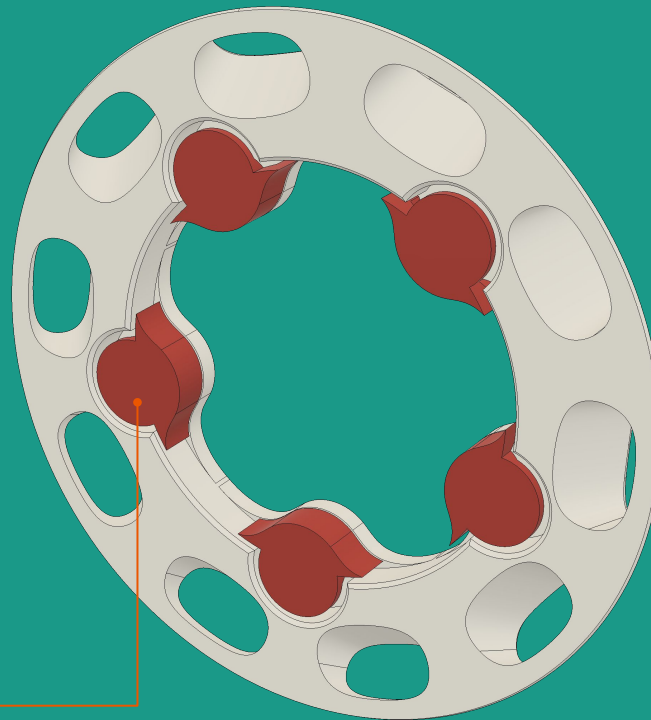
Non-printed parts:

- Screw M2x6: 40 pcs.



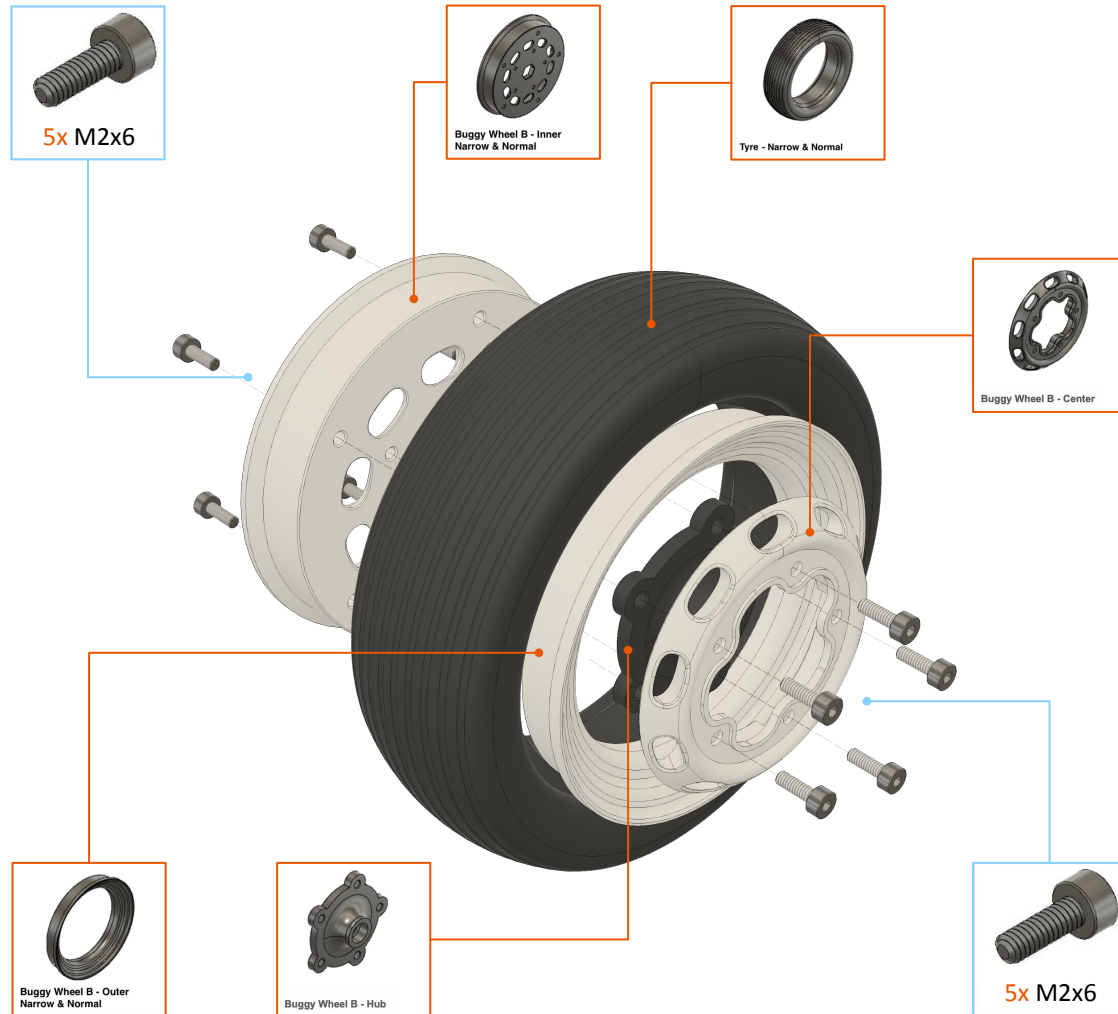
Postprocessing – removing supports

Before you start building Wheel B, carefully remove printing supports (marked red) integrated to specific parts rendered below. You can use pliers and sharp knife to make the procedure easier. Be very careful as you can harm yourself!

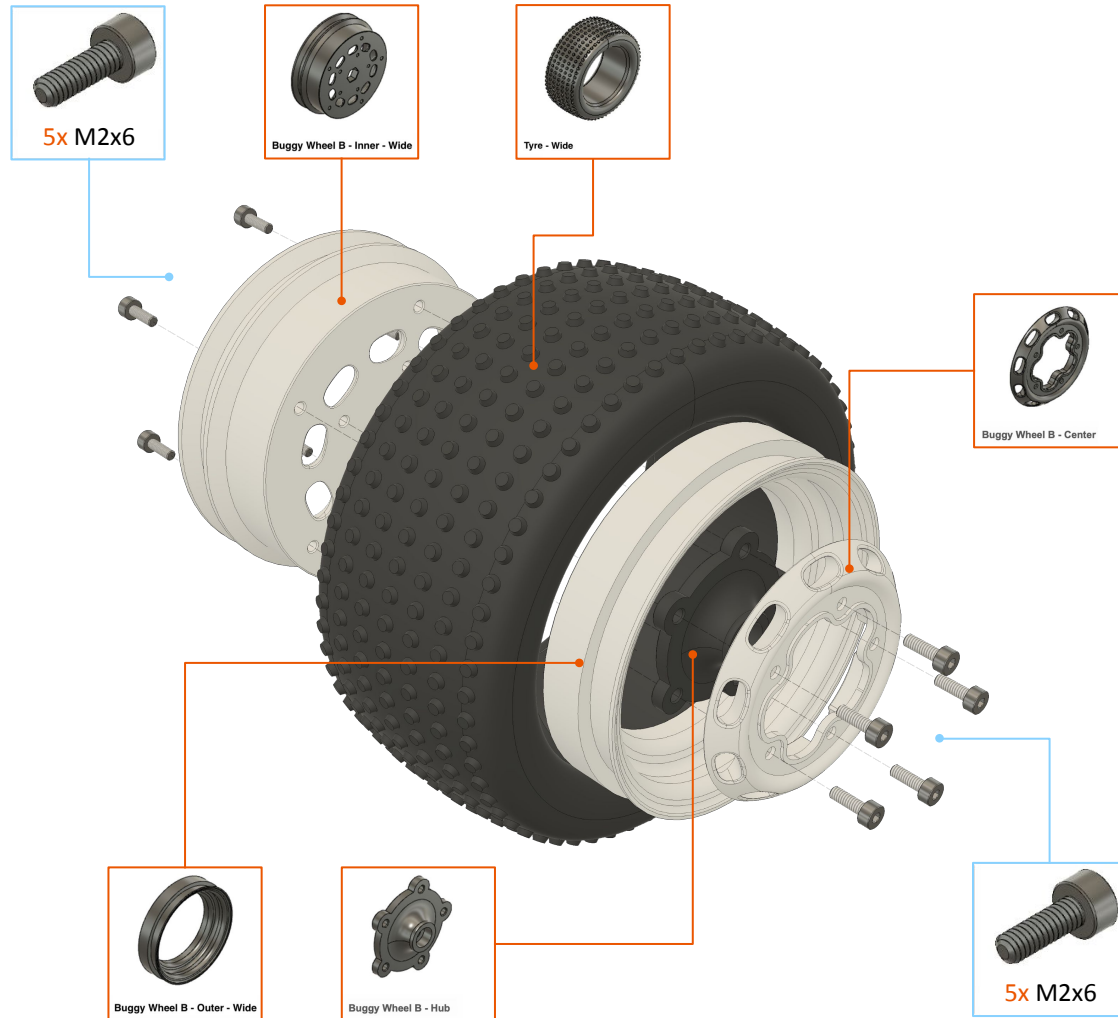


supports marked in red has to be removed

Wheel B - Narrow & Normal



Wheel B - Wide



Mounting the Wheels

In this procedure you will mount the Wheels. To complete this task, get ready all necessary parts:

Required print plates:

- “Print 33 - Wheel B - Hub Cap” for Wheel B

Non-printed parts:

- Screw M3x16: 4 pcs.



Buggy: Wheels G

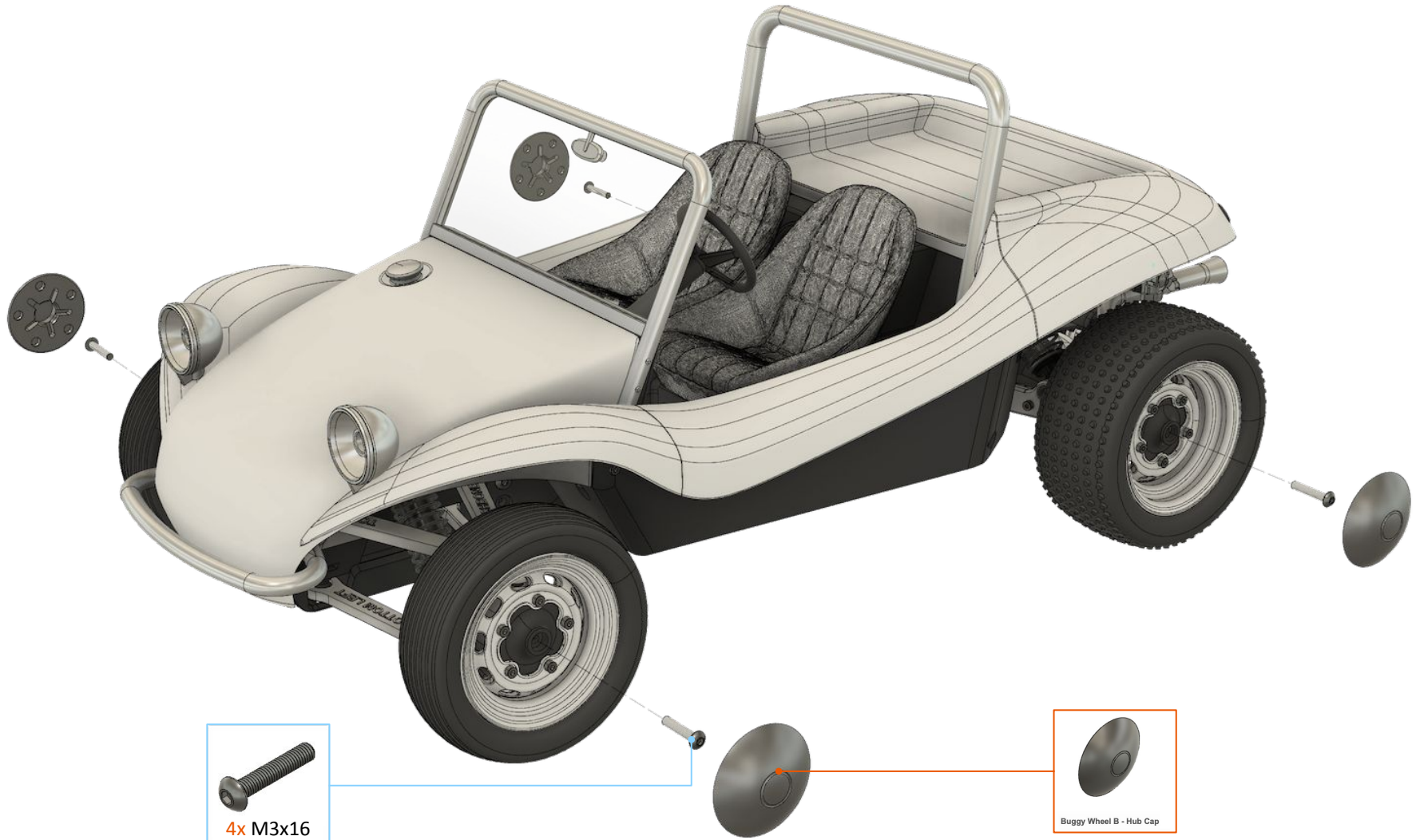




Buggy: Wheels A



Buggy: Wheels B



4x M3x16

Buggy Wheel B - Hub Cap



Buggy: Wheels B





Sandy - general tips

- Always use a proper battery charger. Bad charging of the Li-Pol battery may lead to a risk of fire!
- Disconnect the battery when the model is not used. The small switch on the ESC doesn't disconnect the battery and the ESC may draw a small amount of current even in OFF-state.
- Do not go into water unless you have waterproof electronics!