



Building manual v0.1

Frame Assembly 1



Materials:

- 32 x Nut 8 M8
- 32 x DIN 912 M8 20mm
- 12 x DIN 912 M8 16mm X
- 2 x Profile 4080 1440mm
- 1 x Profile 4080 1620
- 1 x Profile 4080 1700
- 4 x Brackets 80x80
- 4 x Top brackets

Notes:

- use a DIN 875 to make the corners square
- assembly on a flat surface

Frame Assembly 2



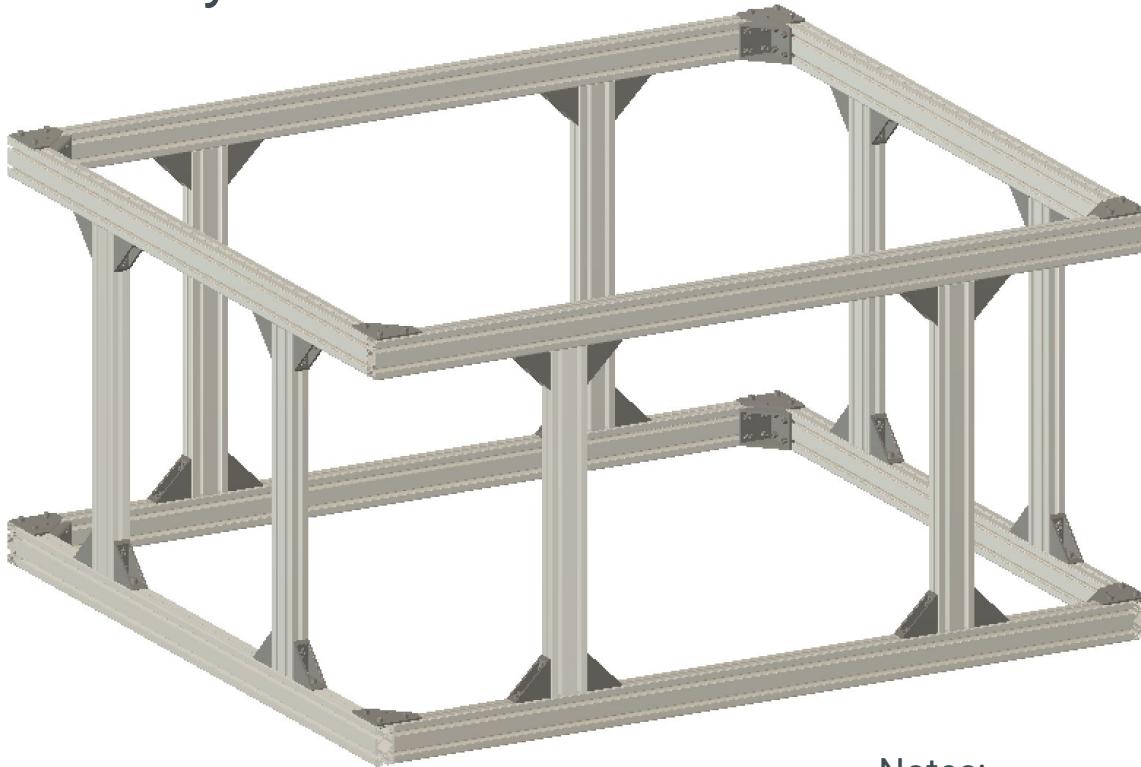
Materials:

- 32 x Nut 8 M8
- 32 x DIN 912 M8 20mm
- 12 x DIN 912 M8 16mm X
- 2 x Profile 4080 1440mm
- 1 x Profile 4080 1620
- 1 x Profile 4080 1700
- 4 x Brackets 80x80
- 4 x Top brackets

Notes:

- It is a copy of the frame assembly 1

Frame Assembly 3



Materials:

- 128 x Nut 8 M8
- 128 x DIN 912 M8 20mm
- 8 x Profile 4080 700mm
- 32 x Brackets 40x80

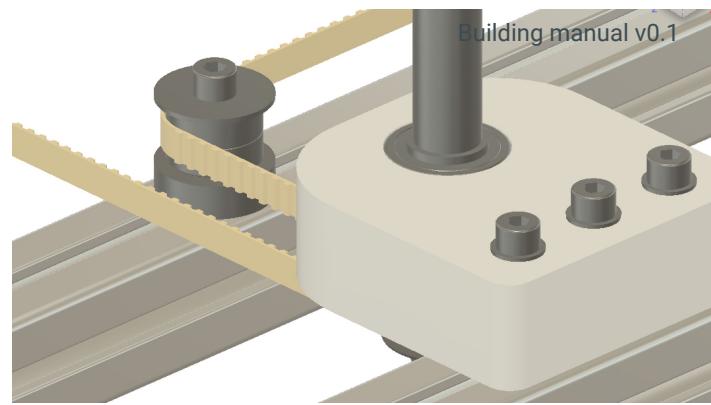
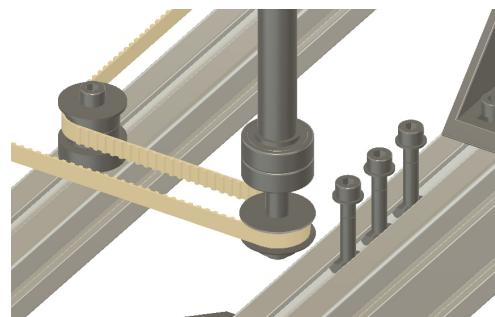
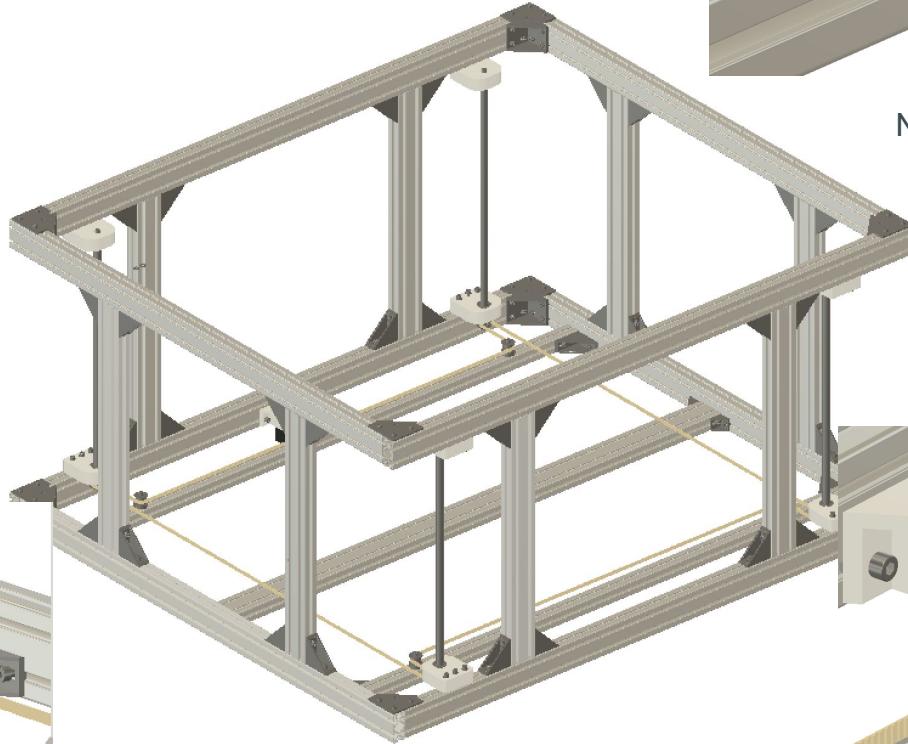
Notes:

- From the longest side, the distance between a pillar and the side is 385
- From the shortest side, the distance between a pillar and the side is 340

Z Axis Assembly

Materials:

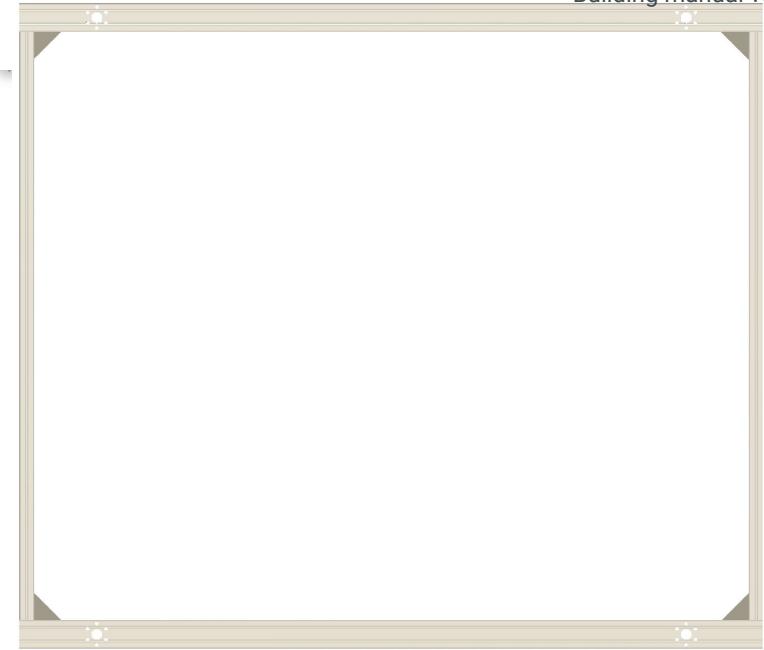
- 8 x Z Holder POM
- 16 x 6301 Ball Bearings
- 4 x 20mm 4 Pitch Lead Screw 1000mm
- 1 x Closed Belt 6000mm
- 1 x Stepper Nema 24
- 1 x Nema 24 Z Holder POM
- 5 x Pulley T5 10mm 24
- 6 x DIN 912 M8 30mm
- 24 x DIN 912 M8 40mm
- 42 x Washers M8 30mm
- 12 x Washers M8
- 12 x 628 ball bearings
- 4 x DIN 984 M4
- 4 x DIN 912 M4 25mm
- 24 x Nut 8 M8
- 4 x Brackets 40x40
- 4 x Brackets 40x80
- 8 x DIN 912 M8 16mm
- 16 DIN 912 M8 20mm



Notes:

- Make sure the belt is tensioned to allow a fluid movement between all the axis
- Keep an equal distance between the POM holders

Lower Bed Assembly



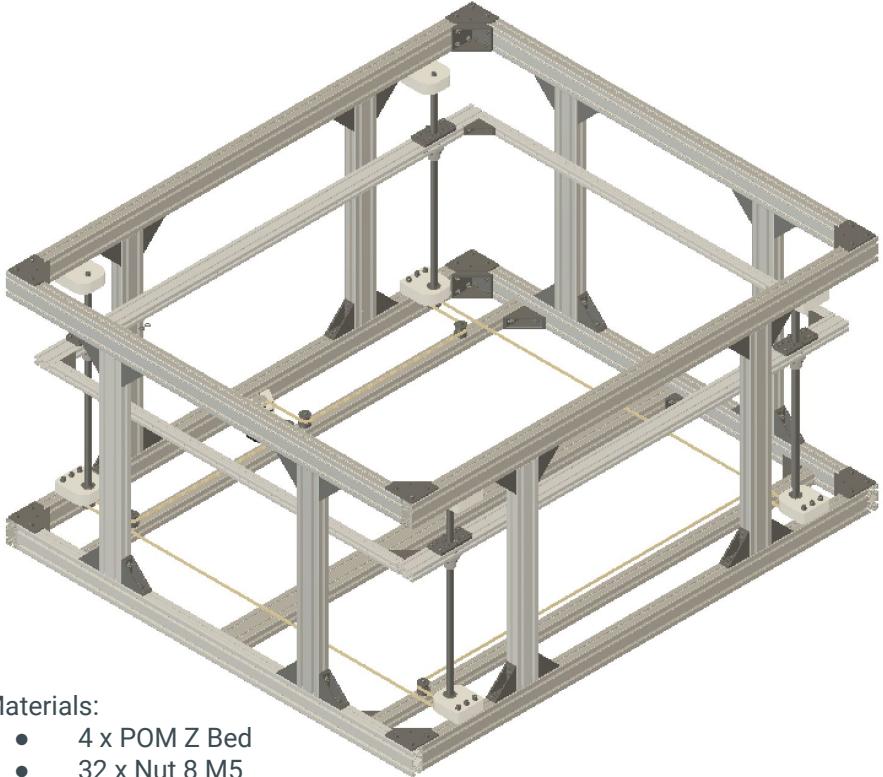
Materials:

- 2 x Profile 3060 1590mm, pre-drilled
- 2 x Profile 3030 X 2 1259mm, pre-drilled
- 16 x DIN 912 M6 20mm X 16
- 16 x Nut8 M6
- 4 x Bracket 30x60

Notes:

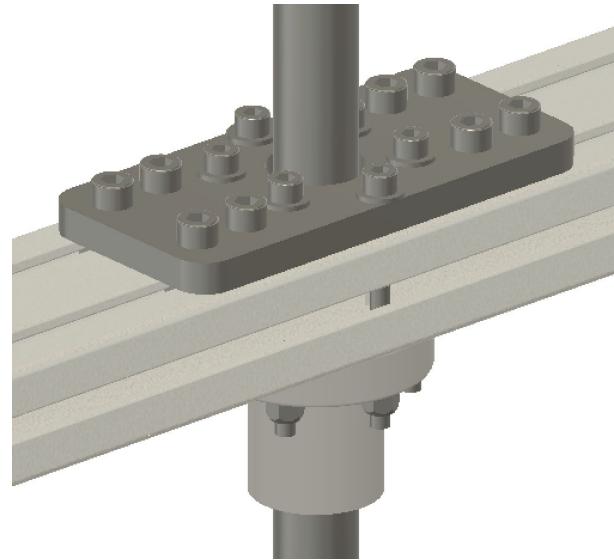
- use a DIN 875 to make the corners square
- assembly on a flat surface

Lower Bed Installation



Materials:

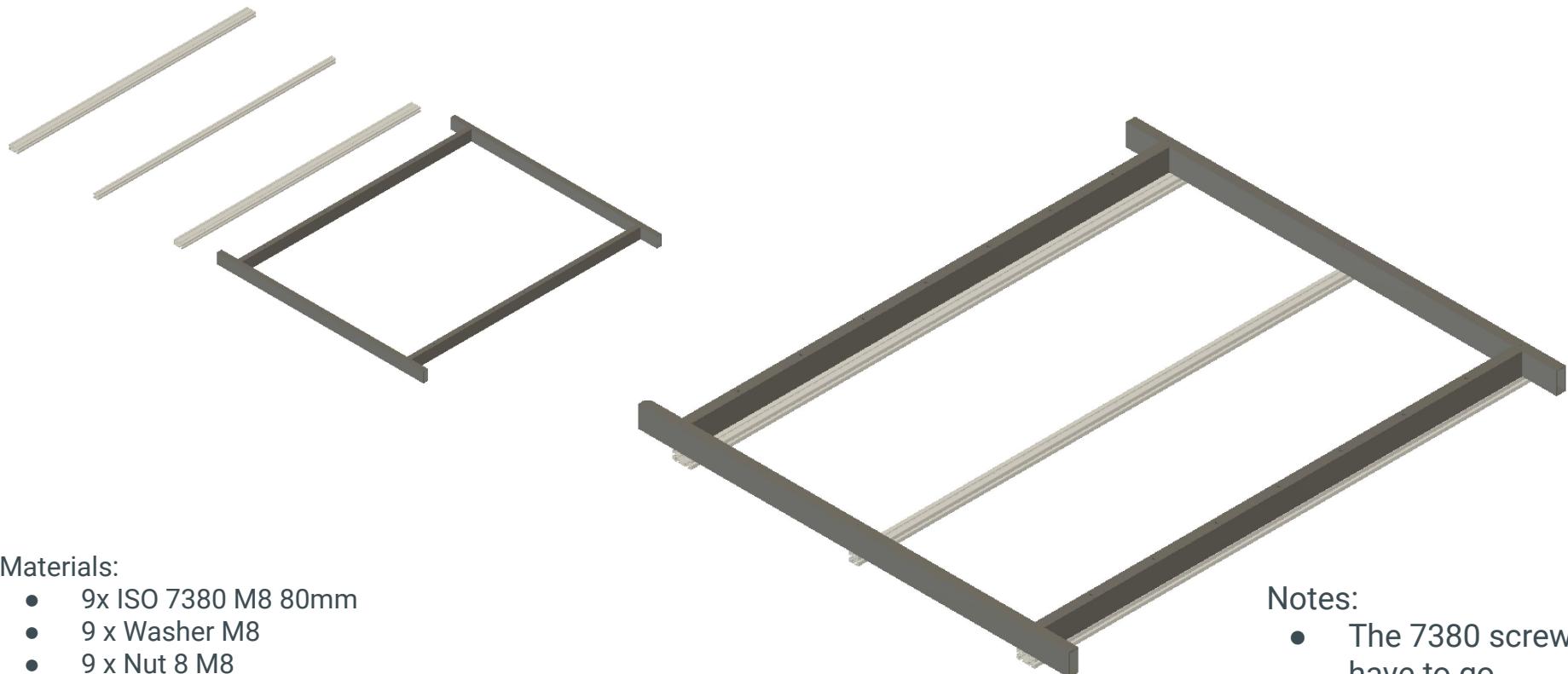
- 4 x POM Z Bed
- 32 x Nut M5
- 32 x DIN 912 M5 20mm
- 4 x Brass Nut TR20 4mm Pitch
- 24 x DIN 912 M5 70mm
- 24 x DIN 985 M5
- 32 x Washers M5



Notes:

- Lose the belt, make the lower bed flat by rotating the lead screws and then close the belt again

Upper Bed Assembly



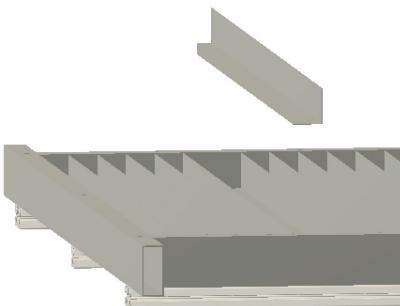
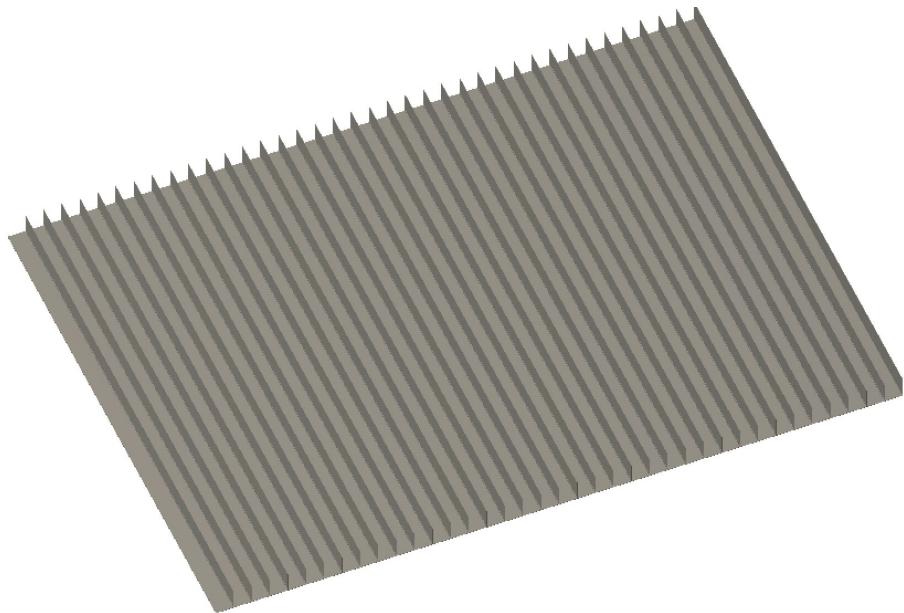
Materials:

- 9x ISO 7380 M8 80mm
- 9 x Washer M8
- 9 x Nut 8 M8
- 2 x 70x30mm Rectangle profile 1530mm
- 2 x 70x30mm Rectangle profile 1379mm
- 2 x Profile 6030 1590mm
- 1 x Profile 3030 1590mm

Notes:

- The 7380 screws have to go through the 70x30 profiles

Upper Bed Lamella



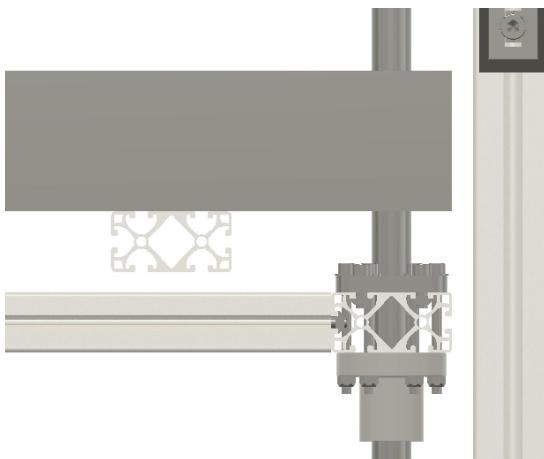
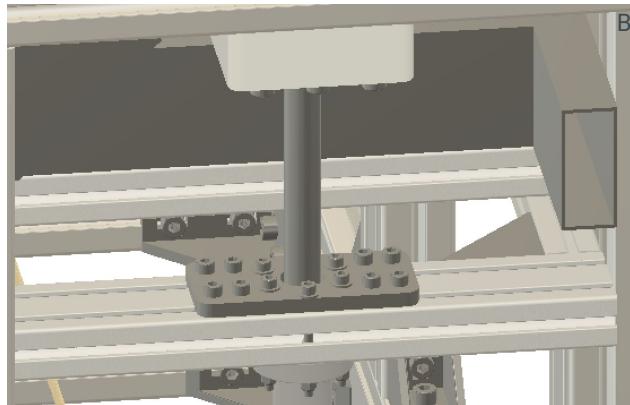
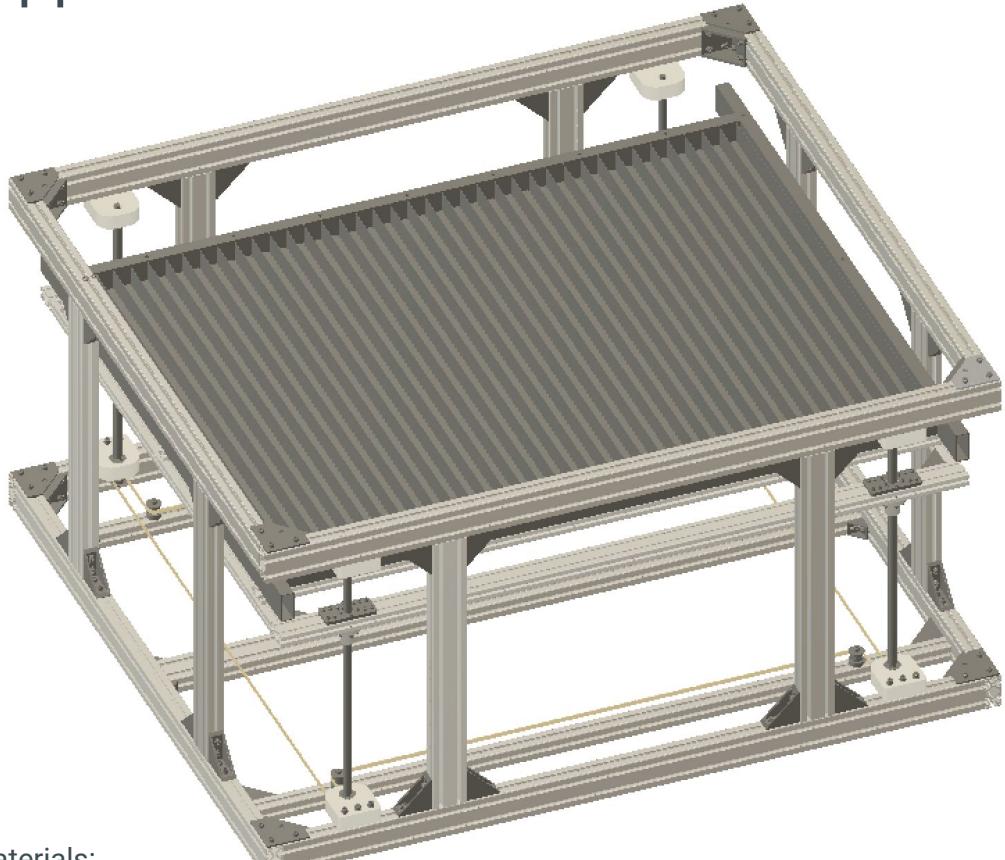
Materials:

- 10m x Double Side Tape, strong type
- 38 x Alu brackets 30x70x0.8mm 1500mm

Notes:

- Manually cut the brackets to fit the dimension of the upper bed
- Put the tape on the three underneath profiles
- Try to attach the brackets parallel to the bed frame

Upper Bed Installation



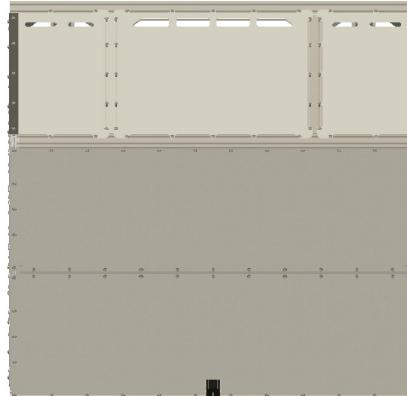
Notes:

- Align the upper bed with the lower bed
- Fix one corner and use it as a reference
- Manually drill the holes on the corners

Materials:

- DIN 933 M8 150mm X 4
- Washer M8 30mm X 4
- DIN 985 X 4

Inner Enclosure



Materials:

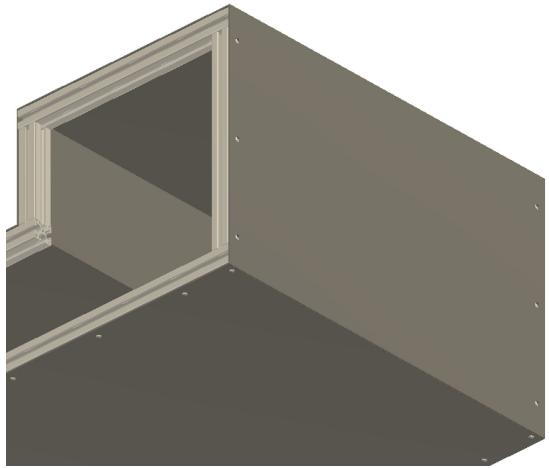
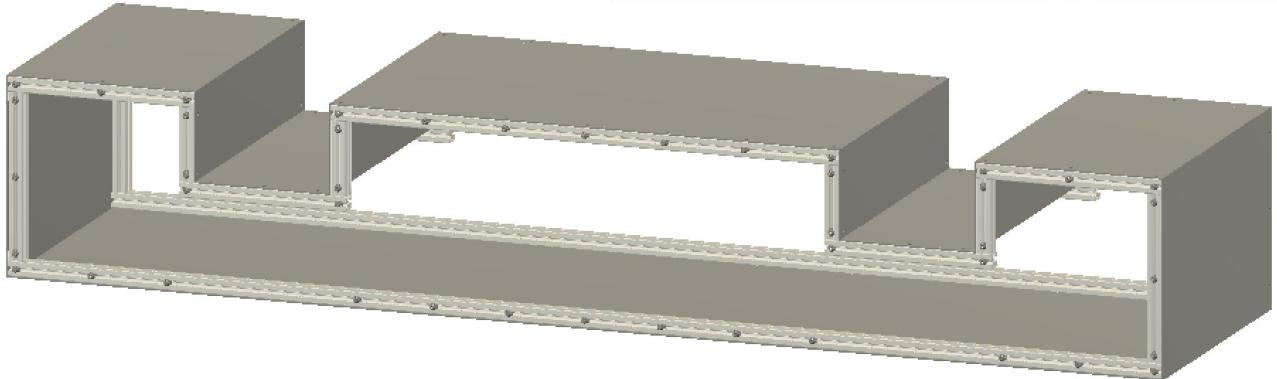
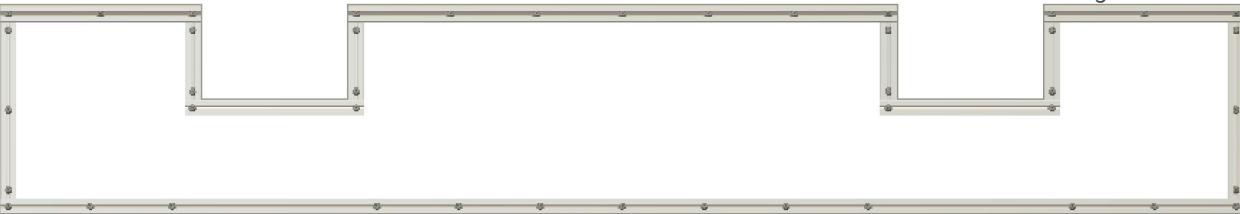
- 4 x Alu Brackets 40x40x2mm
- 214 x Nut 8 M8
- 214 x ISO 7380 M8 12mm
- 40 x DIN 912 M8
- 40 x DIN 985 M8
- 12 x Side Alu Plates
- 2 x Bottom Alu Plates

Notes:

- Slightly move the side and bottom 4080 profiles to fit the aluminium plates
- The plates with smaller holes are attached to the back
- Drill the 40x40 brackets by marking the hole positions from the side panels
- The bottom back plate has an hole for the motor

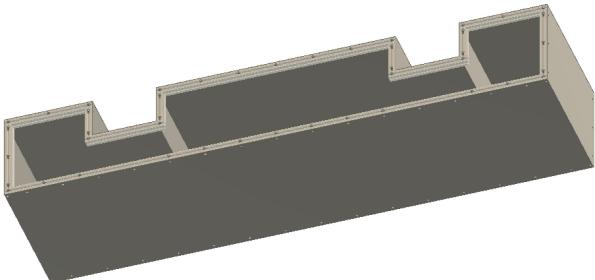
Exhaust Assembly

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Materials:

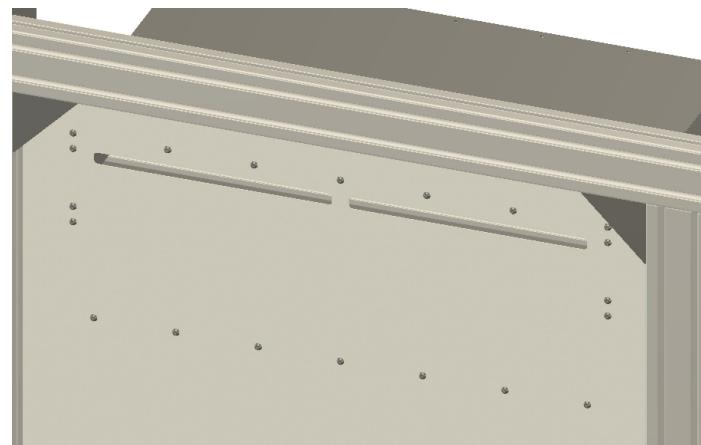
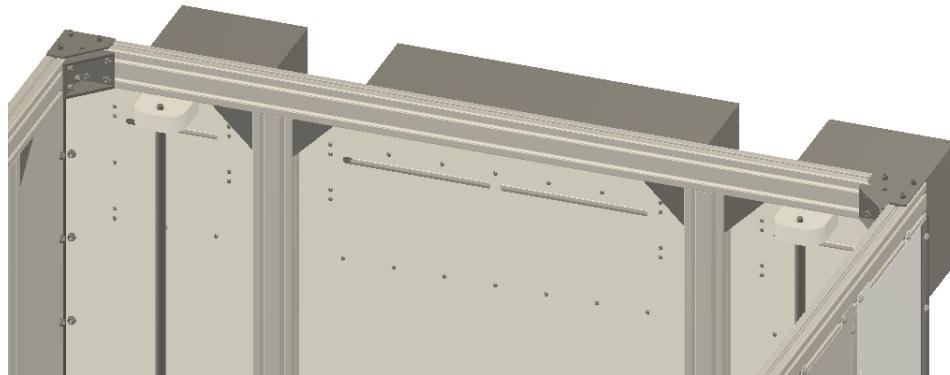
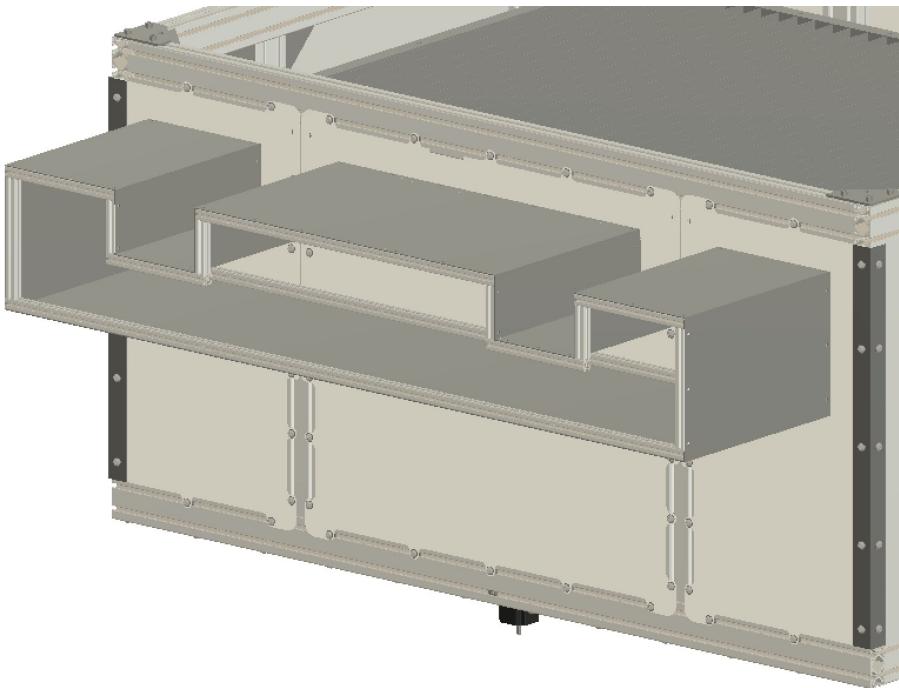
- 2 x Alu Profile 2020 1520mm
- 4 x Alu Profile 2020 229mm
- 8 x Alu Profile 2020 95mm
- 4 x Alu Profile 2020 220mm
- 4 x Alu Profile 2020 215mm
- 2 x Alu Profile 2020 670mm
- 100 x ISO 7380 M5
- 100 x Nut 5 M5
- 12 x Exhaust Alu Plates



Notes:

- Glue all the outside corners with any other Alu Bracket (eg scrap pieces of 40x40x2mm)

Exhaust Installation



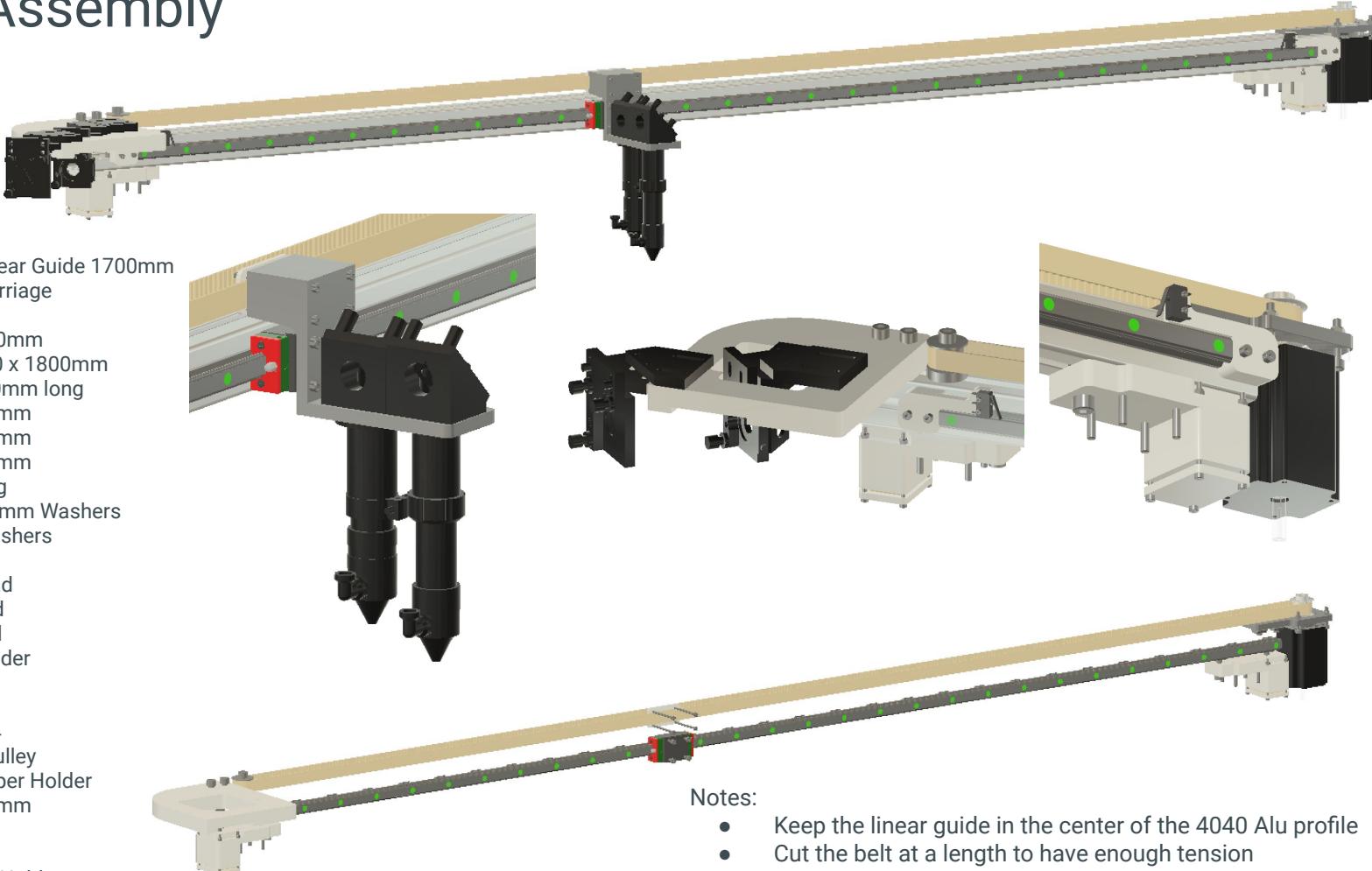
Notes:

Materials:

- 50 x ISO 7380 M5
- 50 x Nut 5 M5

- Attach the Exhaust from the internal side of the machine
- Place beforehand the Nut 5 M5 in position

X Axis Assembly



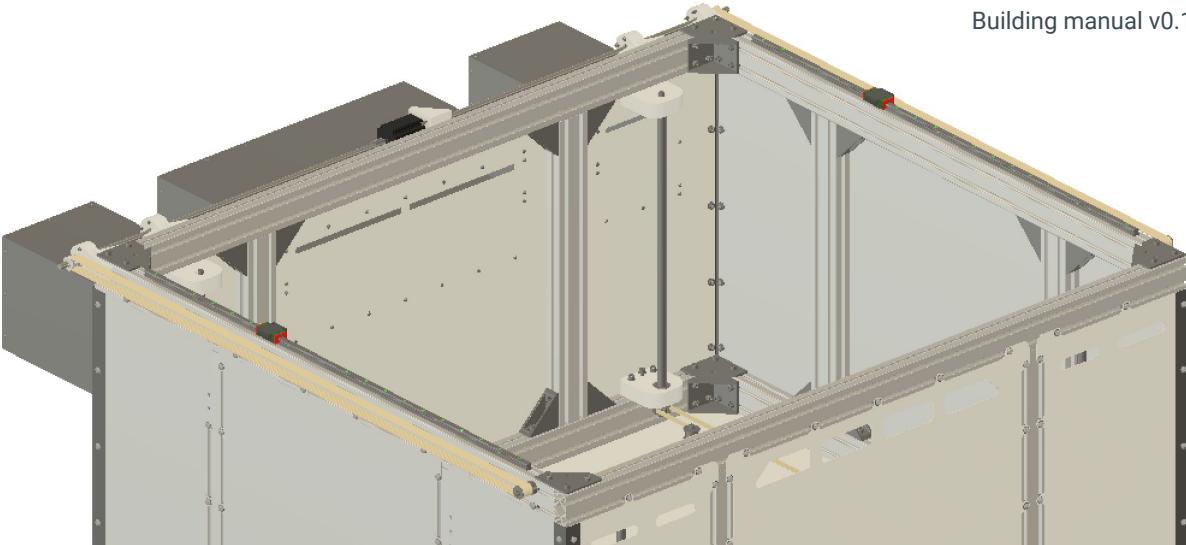
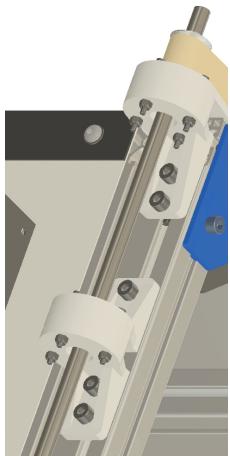
Materials:

- 1 x HGR 15mm Linear Guide 1700mm
- 1 X HGH 15mm Carriage
- 29 x Nut 4 M8
- 29 x DIN 912 M4 20mm
- 1 x Alu Profile 4040 x 1800mm
- 1 x T5 16mm, 4000mm long
- 1 x DIN 912 M8 40mm
- 4 x DIN 912 M8 35mm
- 8 x DIN 912 M3 60mm
- 2 x 608 Ball Bearing
- 5 x WS9240 M8 30mm Washers
- 2 x DIN 125 M8 Washers
- 6 x X-Axis POM
- 2 x POM Laser Head
- 1 x CO2 Laser Head
- 1 x Yag Laser Head
- 1 x POM Mirror Holder
- 1 x 2nd Mirror CO2
- 1 x 2nd Mirror YAG
- 1 x X-axis Nema 24
- 1 X 16mm T5 16 pulley
- 1 x Alu X-axis Stepper Holder
- 4 x DIN 912 M4 30mm
- 4 x DIM 985 M4
- 2 x Endstops
- 2 x POM Endstops Holders

Notes:

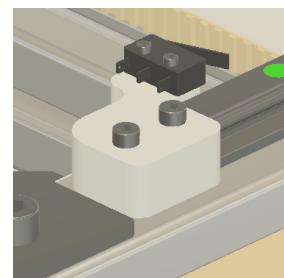
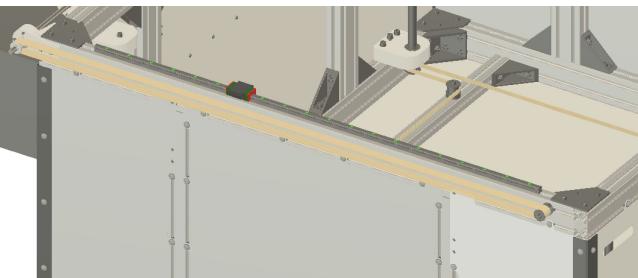
- Keep the linear guide in the center of the 4040 Alu profile
- Cut the belt at a length to have enough tension
- Put the green caps on the guide after the assembly

Y Axis Installation



Materials:

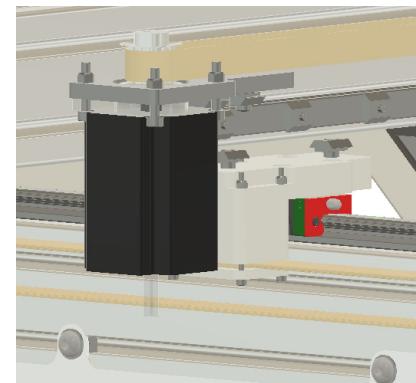
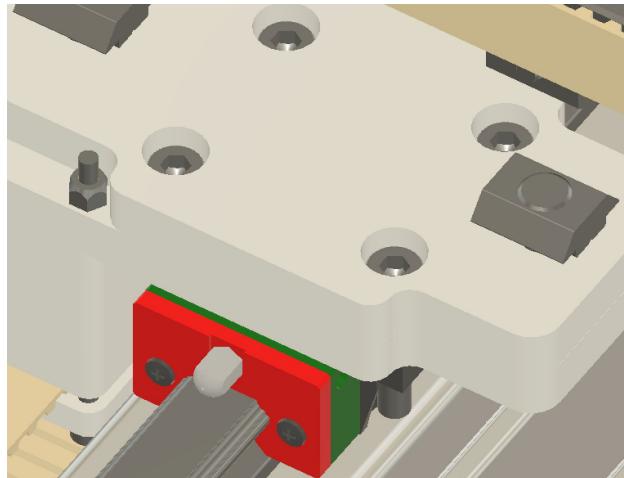
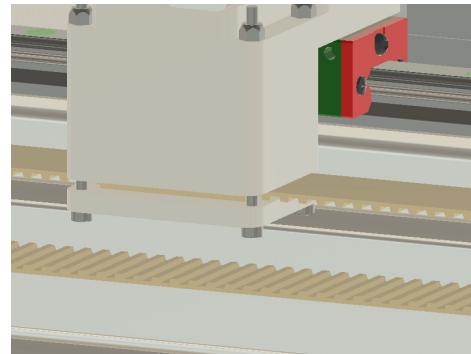
- 1 x 12mm Linear Rod 860mm
- 1 x 12mm Linear Rod 840mm
- 1 x Nema 24 Stepper
- 1 x POM Y-Axis Stepper Holder
- 8 x POM Y-Rod Holder
- 4 x POM Y-Bearing Holder
- 4 x 628 Ball Bearing
- 2 x Belt T5 20mm, 2500mm
- 2 x HGR 15mm linear guide 1200mm
- 2 x HGW 15mm Carriage
- 2 x Pulley T5 20mm 16
- 12 x DIN 912 M4 30mm
- 12 x DIN 985 M4
- 20 x DIN 912 M8 20mm
- 20 x Nut 8 M8
- 4 x 608 Ball Bearing
- 2 x DIN 912 M8 40mm
- 4 x DIN 125 Washers
- 10 x WS2940 M8 Washer 30mm
- 2 x Coupler 8mm to 12mm
- 4 x Endstop
- 4 x POM Endstop Holder
- 48 x DIN 912 M4 20mm
- 48 x Nut 8 M5



Notes:

- Keep the linear guide in the center of the 4040 Alu profile
- Cut the belt at a length to have enough tension
- Put the green caps on the guide after the assembly
- Hammer the 12mm rod inside the bearing carefully

X Axis Installation



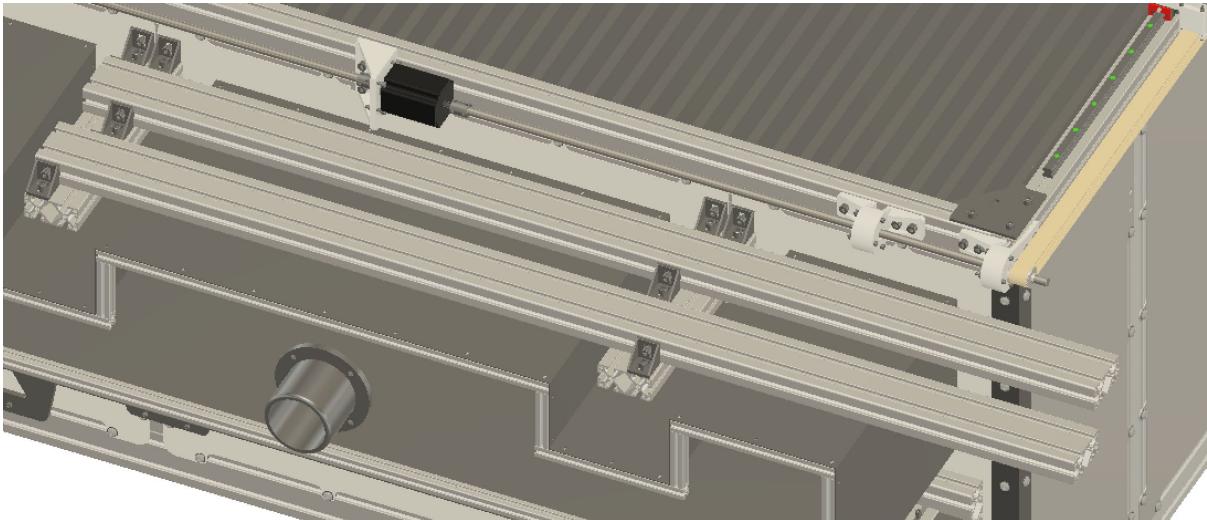
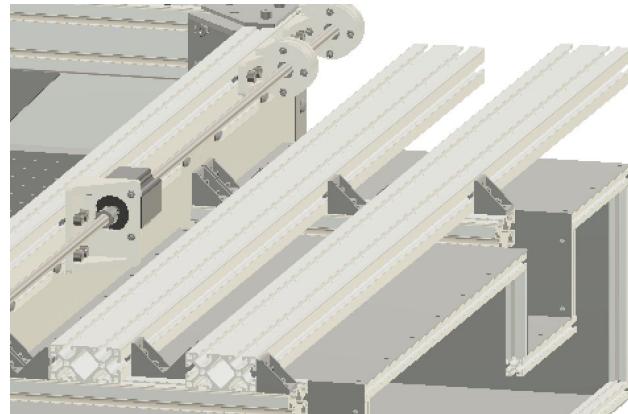
Materials:

- 8 x DIN 912 M4 25mm

Notes:

- Move the Y-bearing holder to increase/decrease the tension
- Use a DIN 875 to make sure the X-Axis is perpendicular to the Y-Axis, close the belts afterwards

Laser Frame Installation



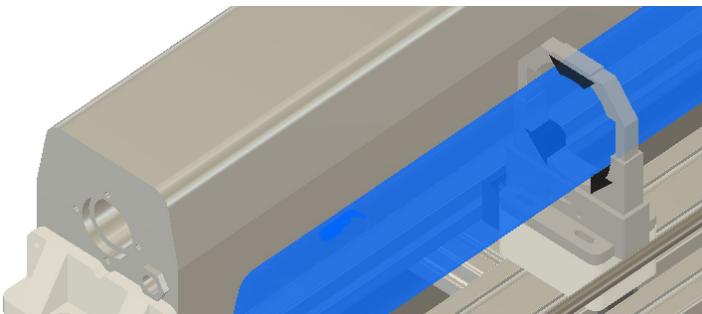
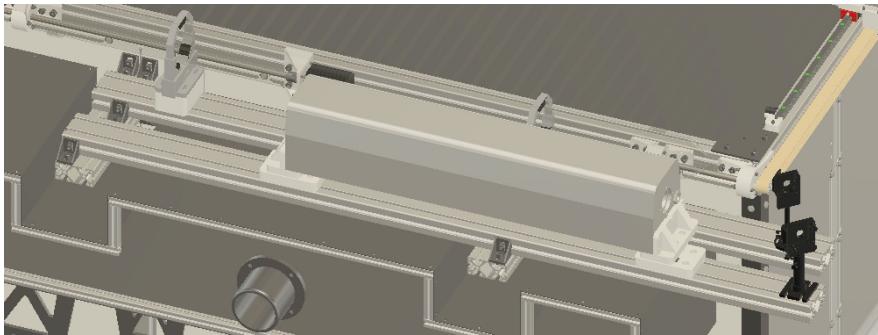
Materials:

- 2 x 4080 Alu Profile 340mm
- 1 x 4080 Alu Profile 1500mm
- 1 x 4080 Alu Profile 1540mm
- 2 x 80x80 Bracket
- 12 x 40x40 Bracket
- 16 x DIN 912 M8 20mm
- 24 x DIN 916 M8 16mm
- 40 x Nut 8 M8

Notes:

- Make sure the surface of the 4080 1500/1540mm is parallel to the surface of the frame

Laser Installation



Materials:

- 1 x C02 Laser Tube
- 1 x Yag Cavity
- 1 x First Mirror C02
- 1 x First Mirror YAG
- 4 x DIN 912 M5
- 4 x Nut 8 M5
- 16 x Nut 8 M5
- 16 x DIN 912 M8 25mm
- 2 x POM C02 Holder
- 2 x C02 Tube Holder
- 4 x POM Yag Holder



Notes:

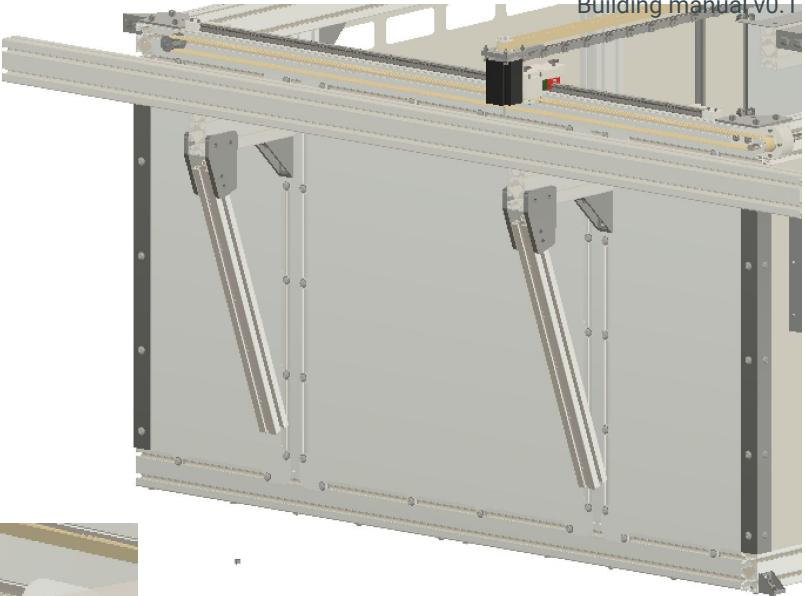
- Be careful with the glass tube, it can break very easily
- Position the laser tube brackets as written on the tube
- Position the YAG laser as close as possible to the 1st mirror

Body Frame Sides



Materials:

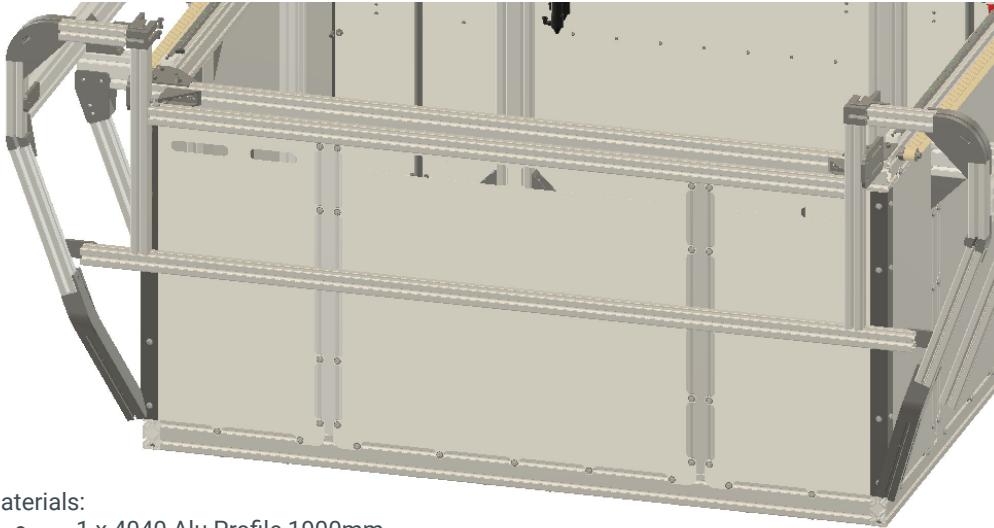
- 2 x 4080 Alu Profile 1900mm
- 4 x 4040 Alu Profile 550mm
- 4 x Side 3D Printed Holders
- 8 x Bracket 40x80
- 64 X DIN 912 M8 20mm
- 64 X Nut 8 M8



Notes:

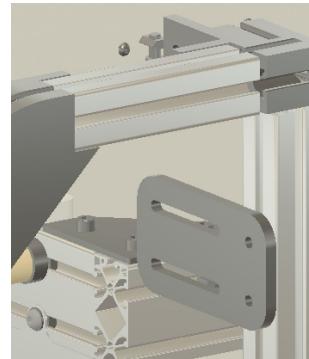
- 2 of this frame are needed for both sides of the machine
- Don't tight too much the 3d printed parts
- The height of the short 4080 profiles is 80mm from the top frame

Body Frame Front



Materials:

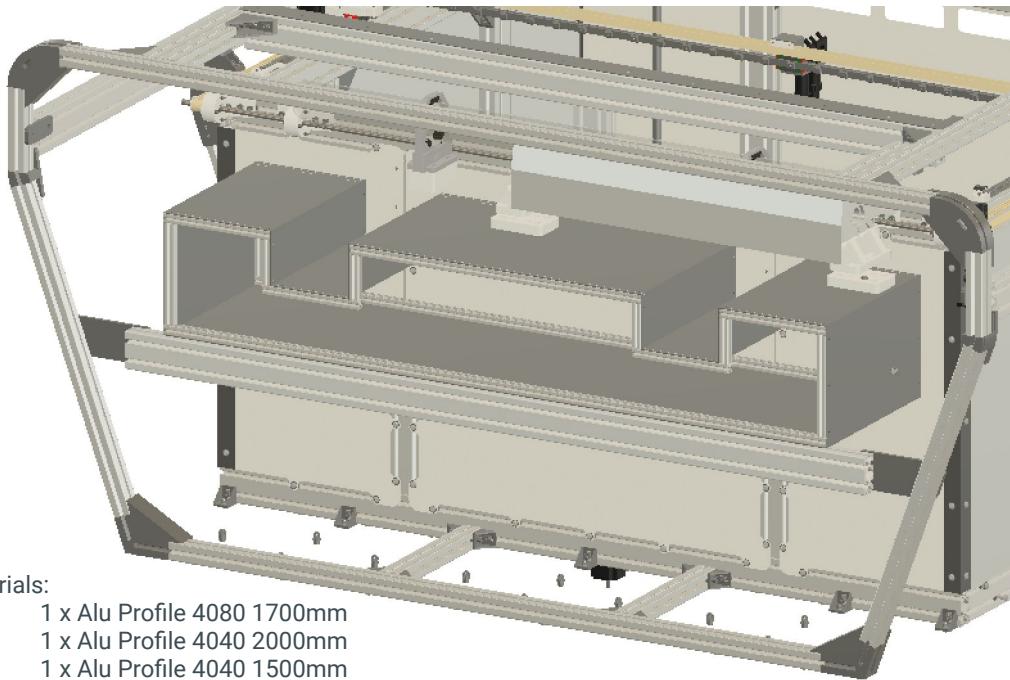
- 1 x 4040 Alu Profile 1900mm
- 2 x 4040 Alu Profil 480mm
- 2 x 4040 Alu Profil 350mm
- 2 x 4040 Alu Profil 177mm
- 2 x 4040 Alu Profil 150mm
- 4 x Nut 8 M8
- 16 x DIN 912 M8 20mm
- 6 x POM Front Frame Holder
- 2 x 3D Printed Round Shoulders
- 2 x 3D Printed Fillet
- 2 x 3D Printed Top Corner
- 2 x 3D Printed Front Legs
- 16 x DIN 912 M8 20mm
- 16 x Nut 8 M8



Notes:

- Don't tighten too much the 3d printed parts

Body Frame Back



Materials:

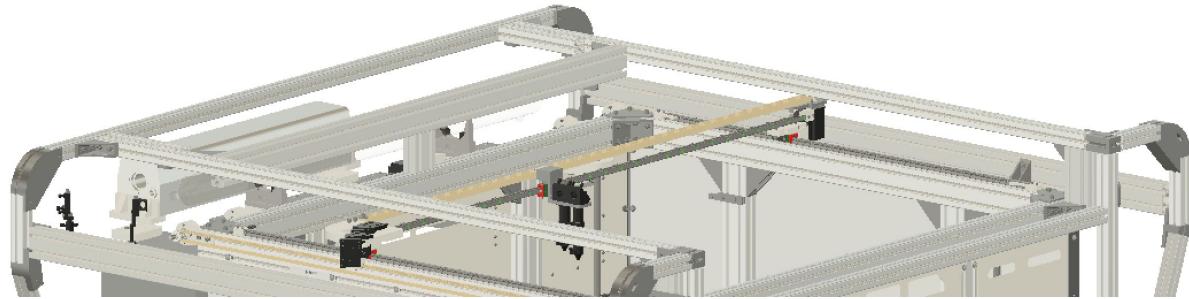
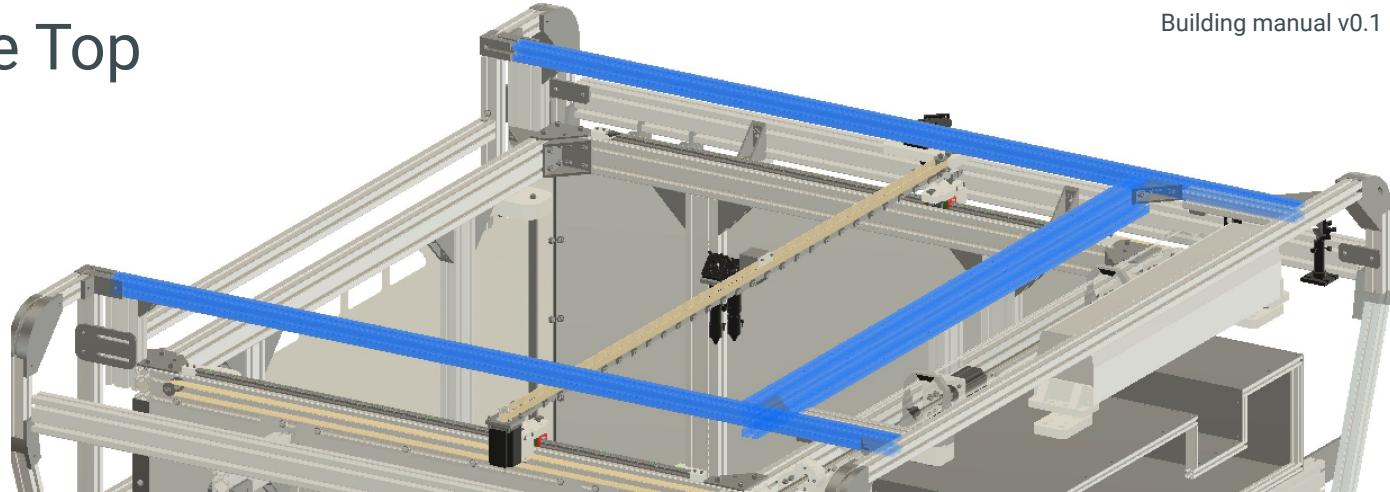
- 1 x Alu Profile 4080 1700mm
- 1 x Alu Profile 4040 2000mm
- 1 x Alu Profile 4040 1500mm
- 2 x Alu Profile 4040 700mm
- 2 x Alu Profile 4040 177mm
- 2 x Alu Profile 4040 350mm
- 4 x POM Back Frame Holder
- 2 x 3D Printed Fillet
- 2 x 3D Printed Round Shoulders
- 2 x 3D Printed Square Shoulders
- 9 x Bracket 40x40
- 29 x DIN 912 M8 16mm
- 29 x Nut 8 M8



Notes:

- Eventually short the Alu Profiles in case they are too long

Body Frame Top



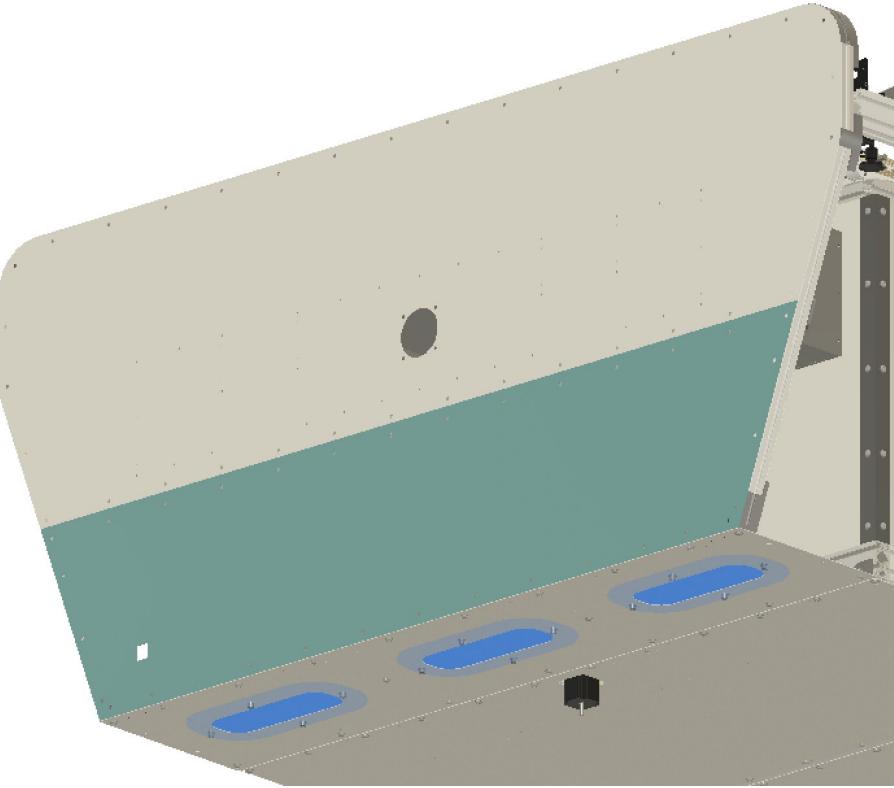
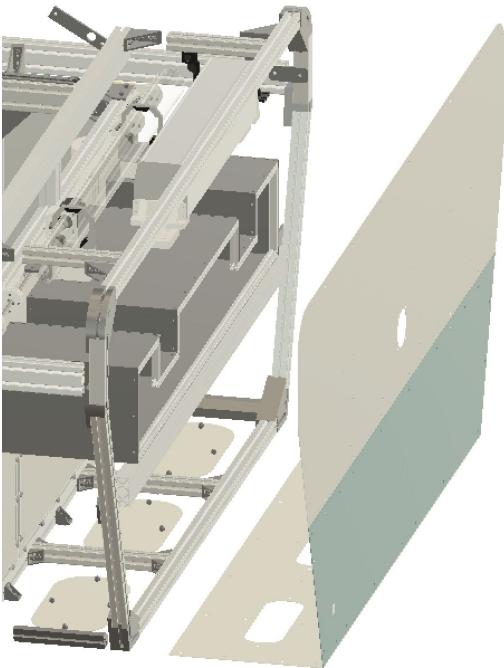
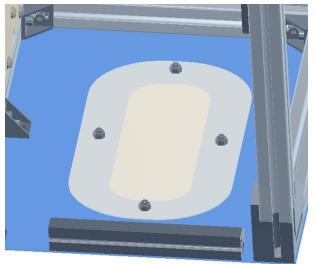
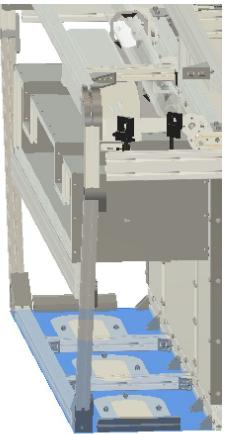
Materials:

- 1 x Alu Profile 4080 1589mm
- 1 x Alu Profile 4080 99mm
- 2 x Alu Profile 4040 1900mm
- 2 x Alu Profile 4040 250mm
- 2 x POM Holder Top Frame
- 4 x Bracket 40x80
- 4 x Bracket 40x40
- 8 x DIN 912 M8 16mm
- 16 x DIN 912 M8 20mm
- 24 x Nut 8 M8

Notes:

- Eventually short the Alu Profiles in case they are too long

Housing Back



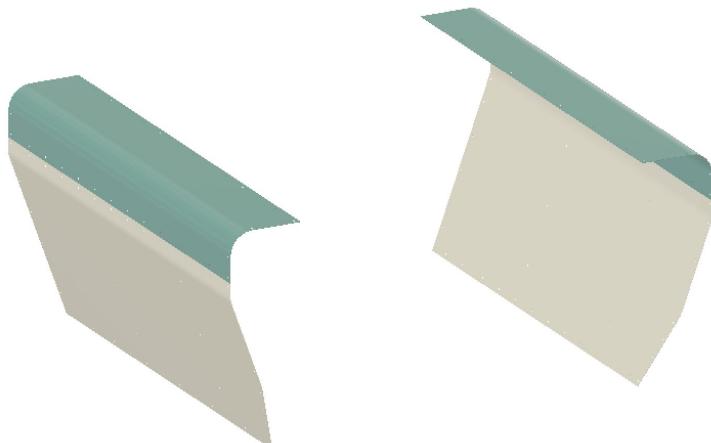
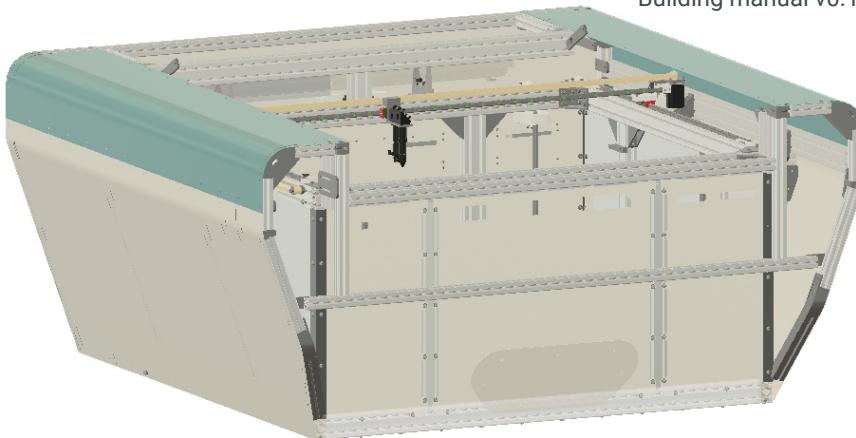
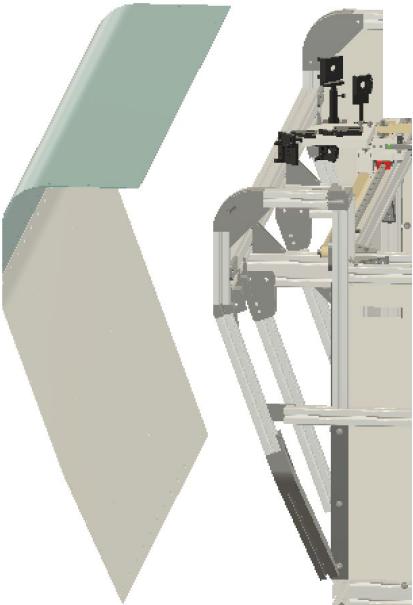
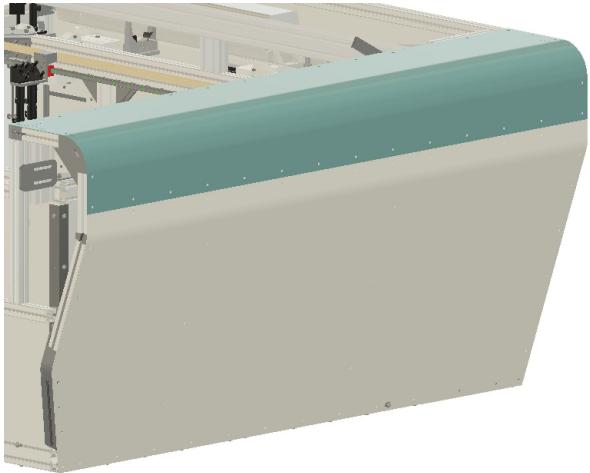
Materials:

- 1 x Alu Plate Back Top
- 1 x Alu Plate Back Bottom
- 1 x Alu Plate Bottom
- 3 x Alu Plate Bottom Air Intake
- 2 x 3D Printed Back Bracket
- 69 x ISO 7380 M8 12mm
- 69 x Nut 8 M8
- 12 x DIN 912 M8 16mm
- 12 x DIN 125 Washer M8
- 12 x DIN 985 M8
- 50 x ISO 7380 M5
- 50 x Nut 5 M5

Notes:

- Place beforehand the Nut 8 M8 to facilitate the screwing

Housing Sides



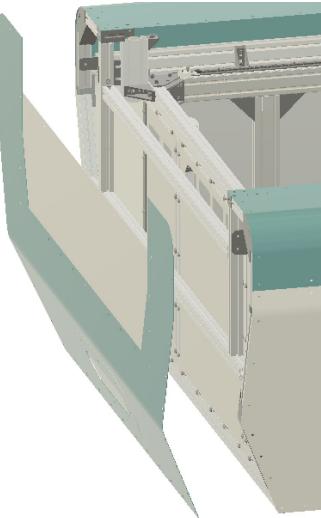
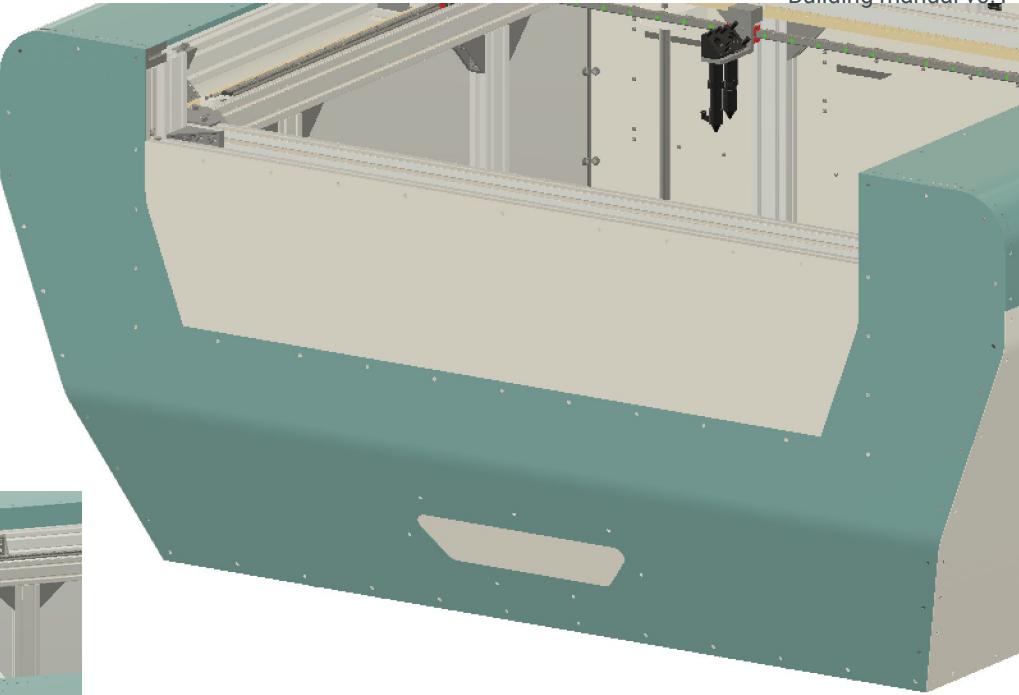
Materials:

- 2 x Alu Plate Side Bottom
- 2 x Alu Plate side Top
- 144 x ISO 7380 M8 12mm
- 144 x Nut 8 M8

Notes:

- Place beforehand the Nut 8 M8 to facilitate the screwing
- 3D Print some special spacers for the bottom screws

Housing Front



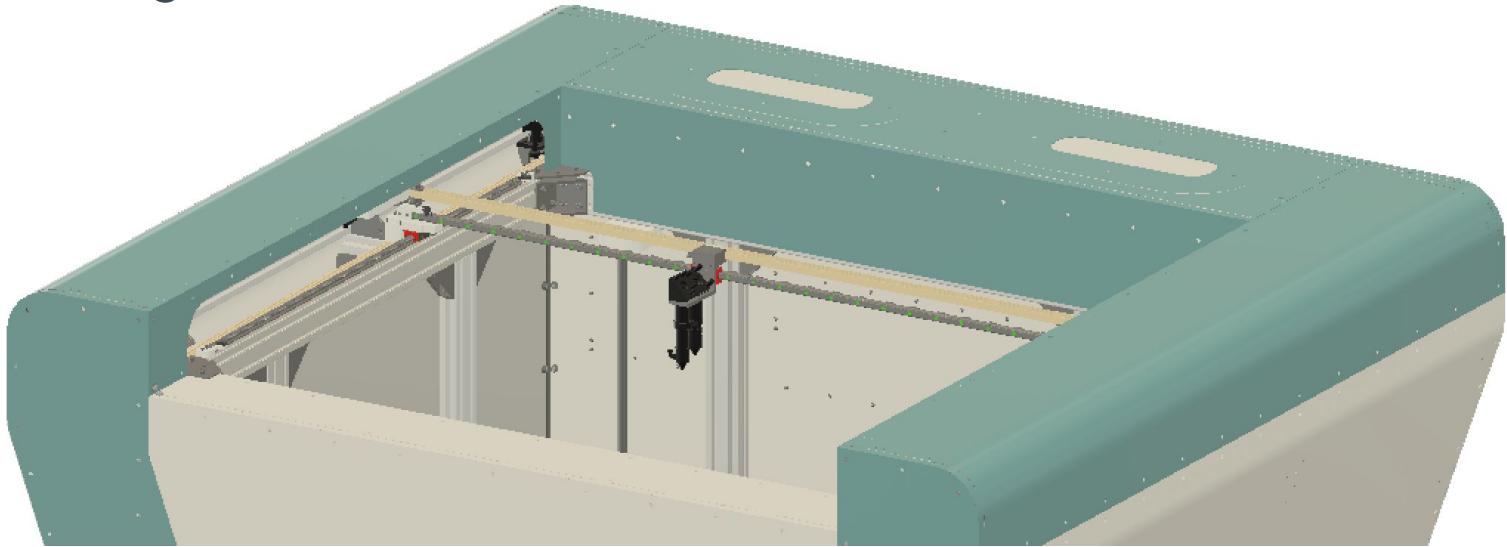
Materials:

- 1 x Alu Plate Front
- 1 x Alu Plate Front Center
- 1 x Alu Air Intake Front
- 67 x ISO 7380 M8 12mm
- 67 x Nut 8 M8

Notes:

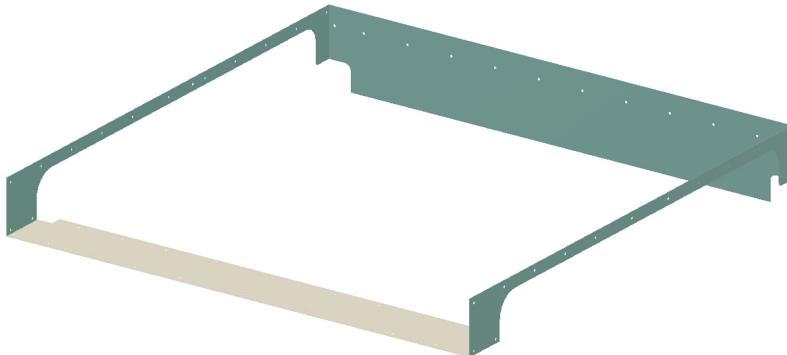
- Place beforehand the Nut 8 M8 to facilitate the screwing

Housing Inside



Materials:

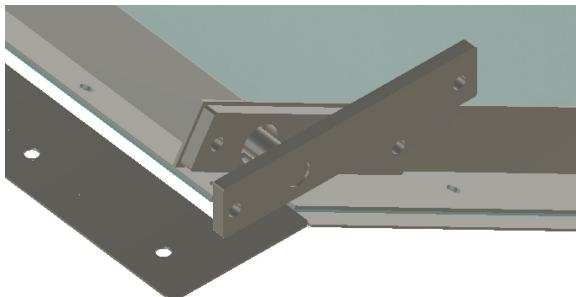
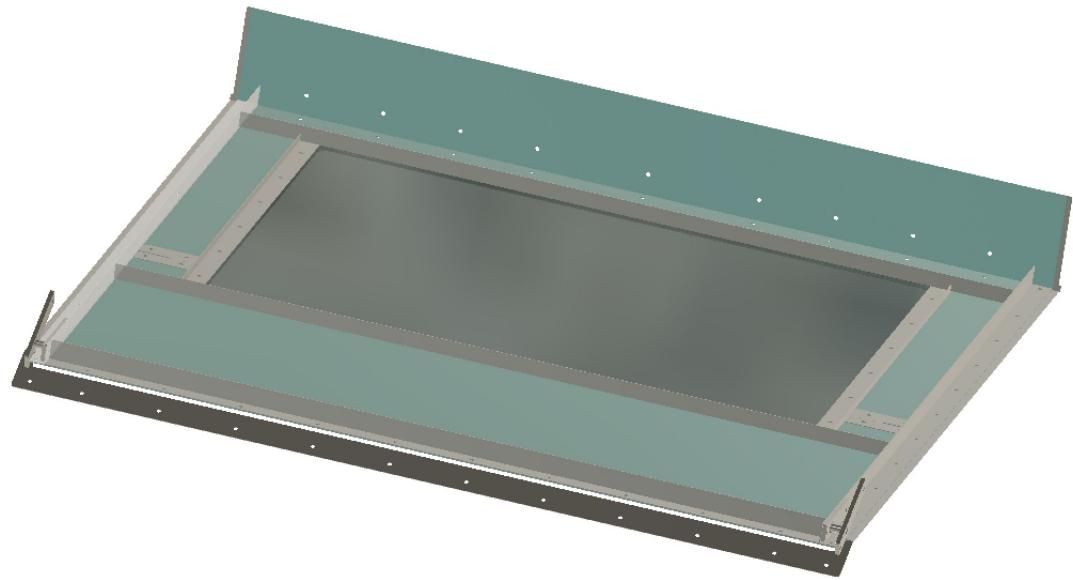
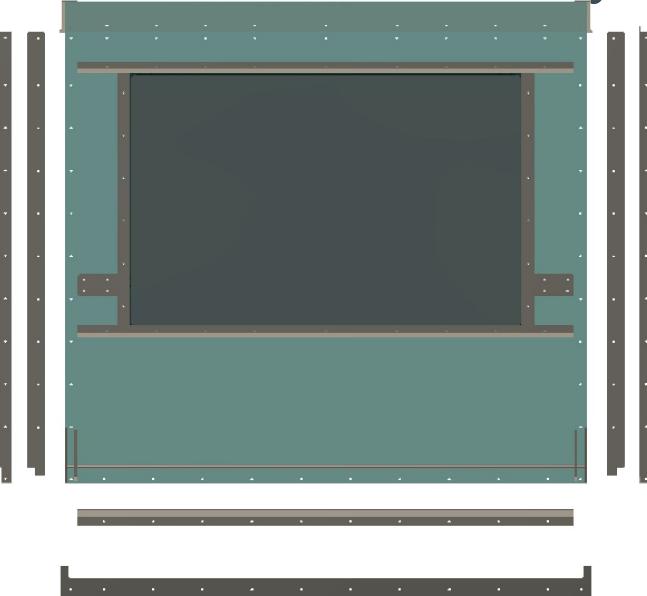
- 1 x Alu Plate Front Top
- 1 x Alu Inside Back
- 1 x Alu Inside Side
- 48 x ISO 7380 M8 12mm
- 48 x Nut 8 M8



Notes:

- Place beforehand the Nut 8 M8 to facilitate the screwing

Window Assembly



Materials:

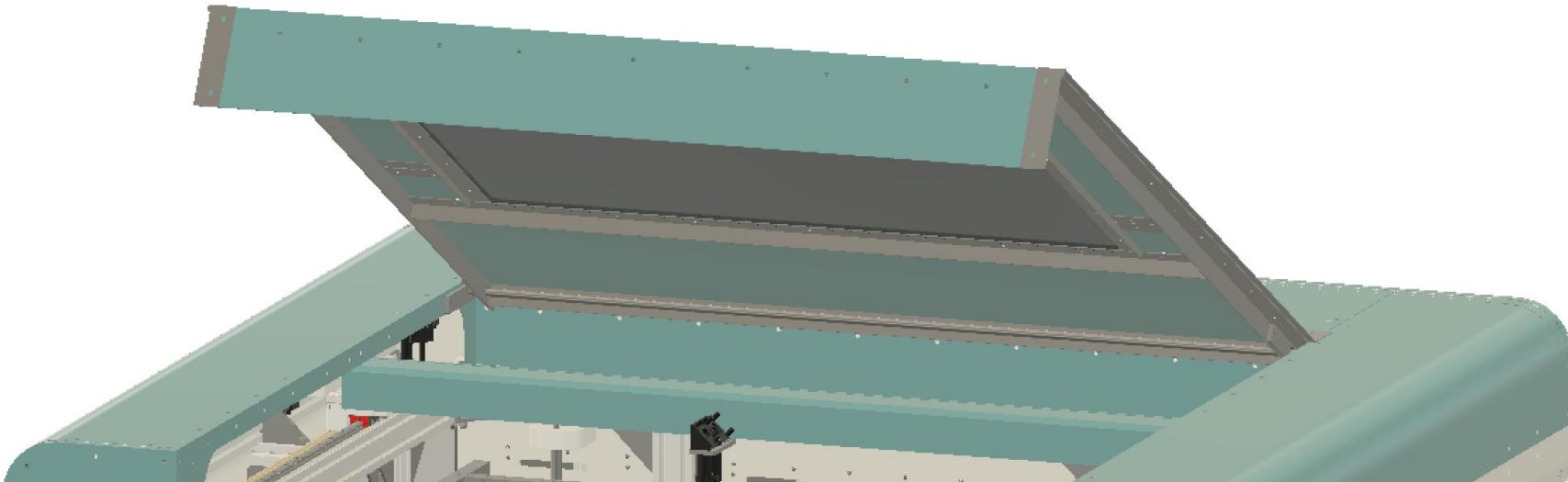
- 1 x LaserVision 1200x900mm 6mm P1P12
- 1 x Alu Plate Window Front
- 1 x Alu Plate Window Back
- 2 x Alu Plate Window Connector
- 1 x Linear Rod 15mm 2000mm
- 2 x POM Window Holder
- 4 x Ball Bearing 6802
- 82 x ISO 7380 M8 20mm
- 82 x DIN 985 M8
- 82 x DIN 125 M8
- 4 x Alu Bracket 30x40 x 1500mm
- 4 x Alu Bracket 40x40 x 2000mm
- 6 x Alu Plate Window cover

Notes:

- Drill manually the window bracket checking the holes with the CNC milled plates
- Sandwich and screw the P1P12 with double side tape in between

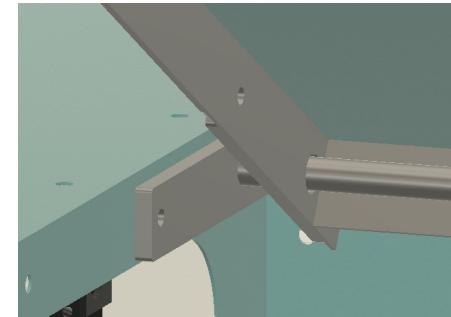
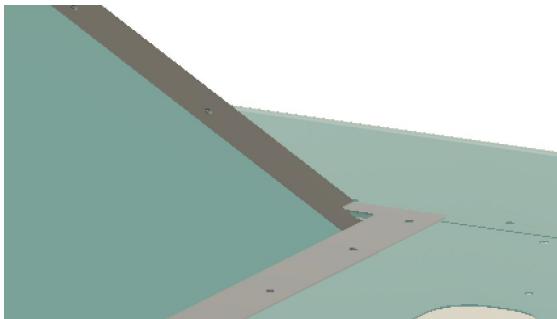
Window Installation

Building manual v0.1



Materials:

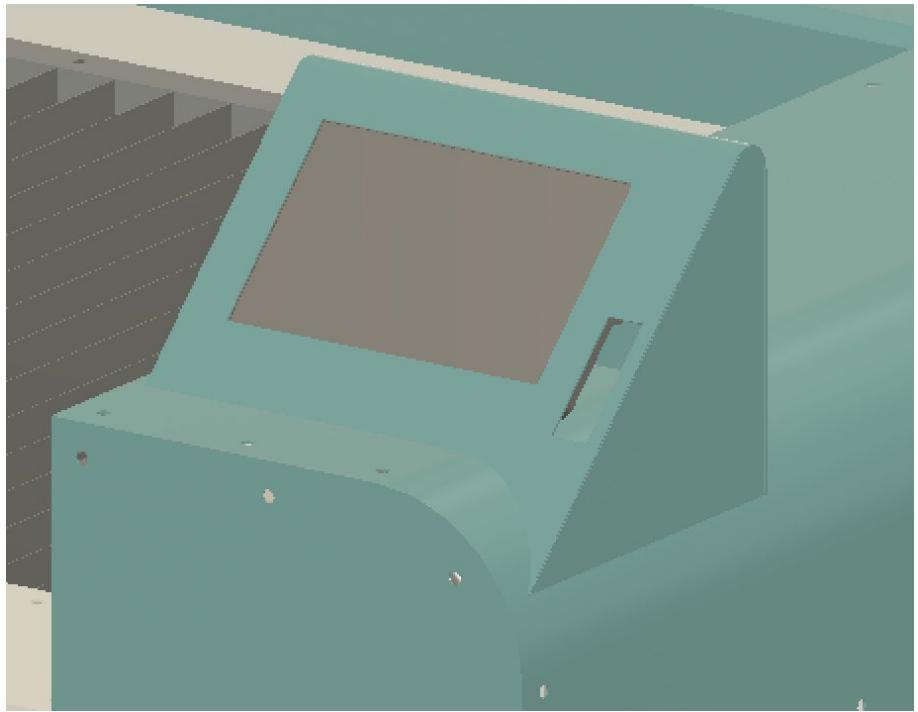
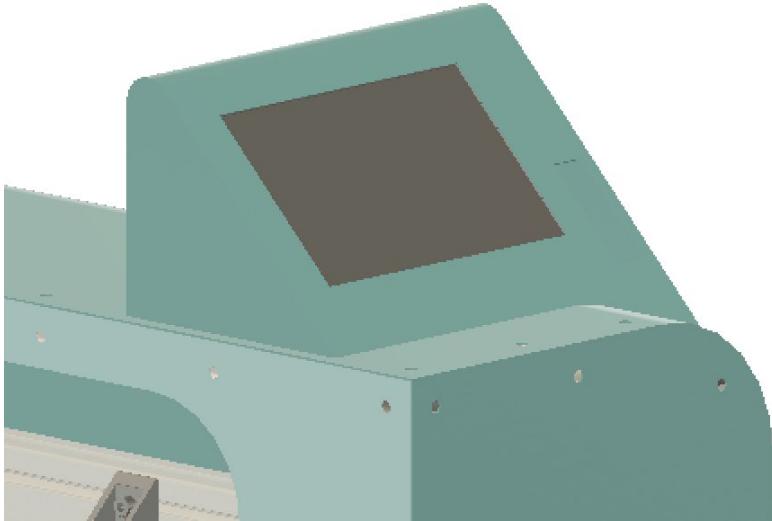
- 4 x Nut 8 M8
- 4 x DIN 933 M8 20mm
- 2 x POM Window Holder
- 2 x Hydraulic Spring
250N 250-500mm
- 4 x DIN 912 M8 30mm
- 4 x DIN 985 M8
- 8 x DIN 125 Washer M8



Notes:

- Attach the hydraulic springs as last step

Tablet Installation



Materials:

- 1 x Alu Tablet Enclosure With Tablet
- 1 x Bracket 40x80
- 1 x ISO 7380 20mm
- 1 x DIN 912 80mm
- 2 x DIN 985 M8

Notes:

- Drill manually an hole to the shoulder to fix the tablet enclosure using a 40x80 bracket