ROBOLAUNCH CLOUDY MK2 MANUFACTURING GUIDE
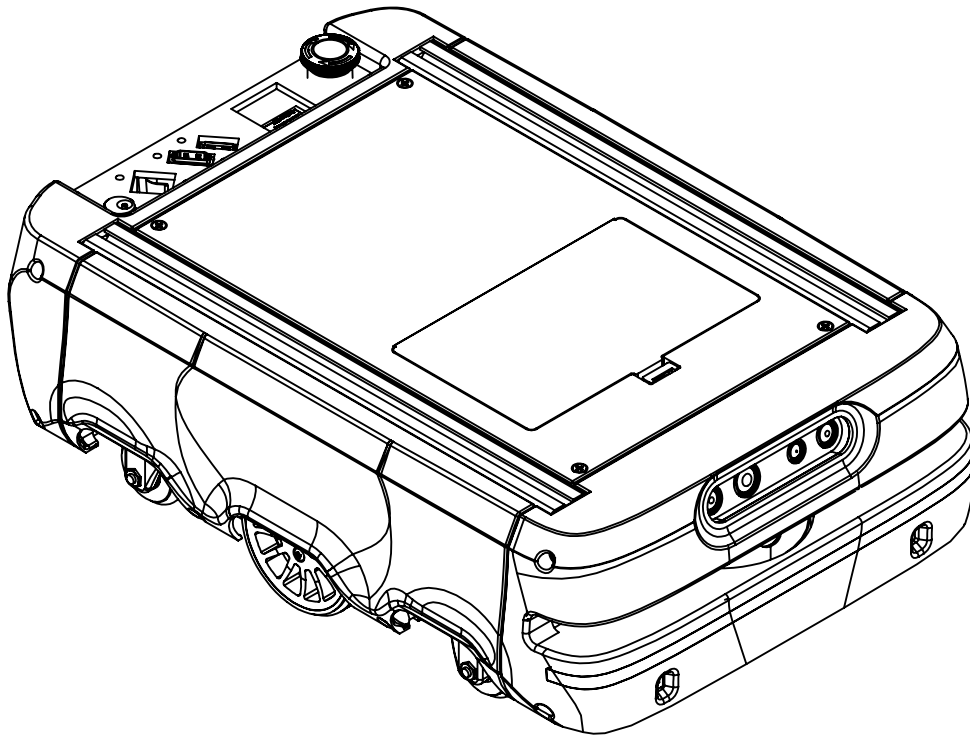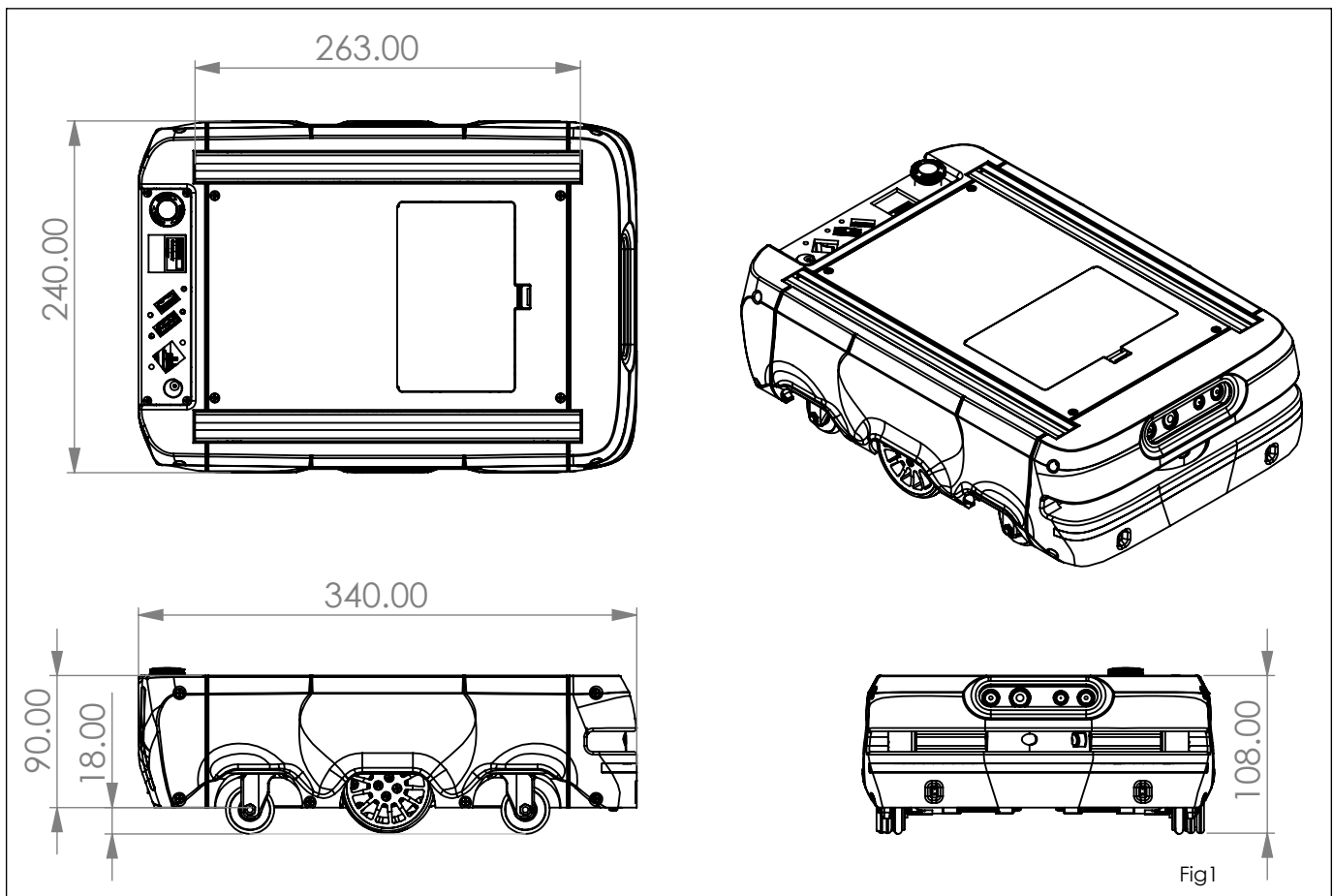
1. OVERVIEW

1.1 Dimensions

Dimensions of the robot shown below fig1
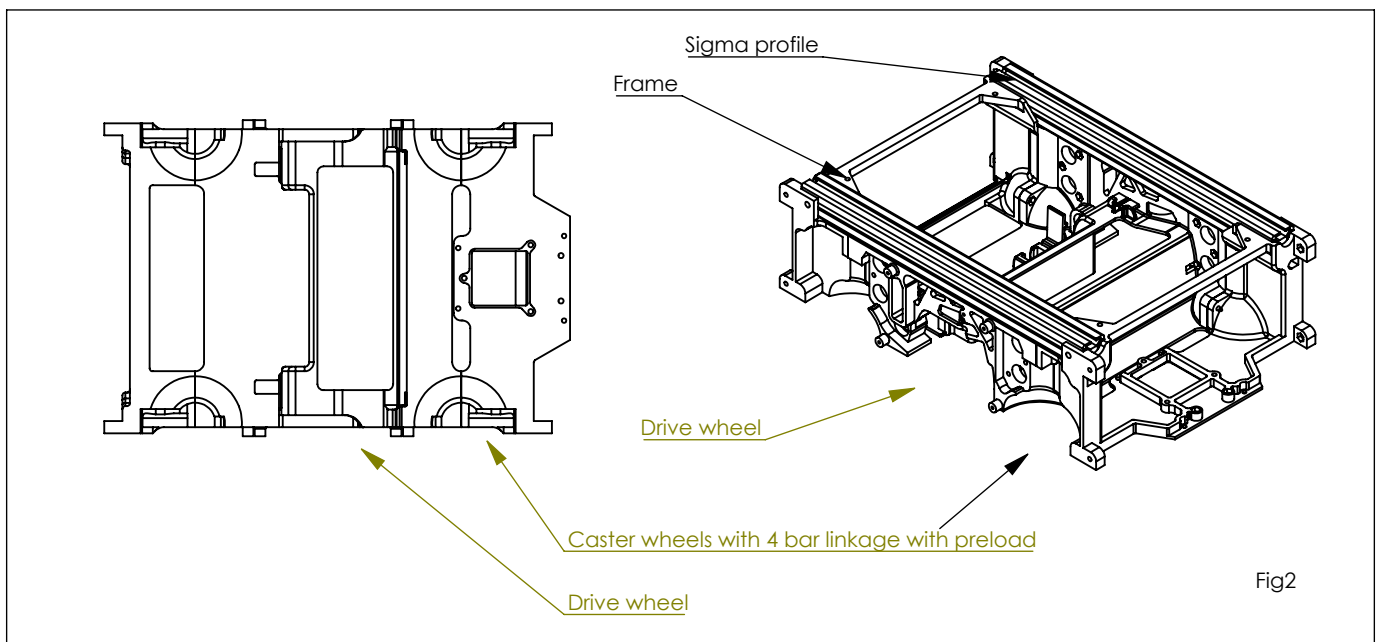

Fig1

## 1.2 Mechanical layout

FRAME

Cloud2 frame has 3 piece chassis reinforced with aluminum sigma profiles. Able to handle 20kgs of payload
Drive train consist of a drive wheel between two caster wheels making a total of 4 caster wheels and 2 drive wheels.(fig2)

Sigma profile

Frame

Drive wheel

Caster wheels with 4 bar linkage with preload

Drive wheel

Fig2

CASTER WHEELS

Caster wheels are spring preloaded 4 bar linkage to ensure constant contact with ground.
Ball bearings are used for all hinges and rotating components.
Orings are used as tires on wheels for smooth operation (fig3)

Ball bearings

A

C

A-A (1 : 2)

C

A

Ball bearings

O-ring tire

C-C (1 : 2)

fig3
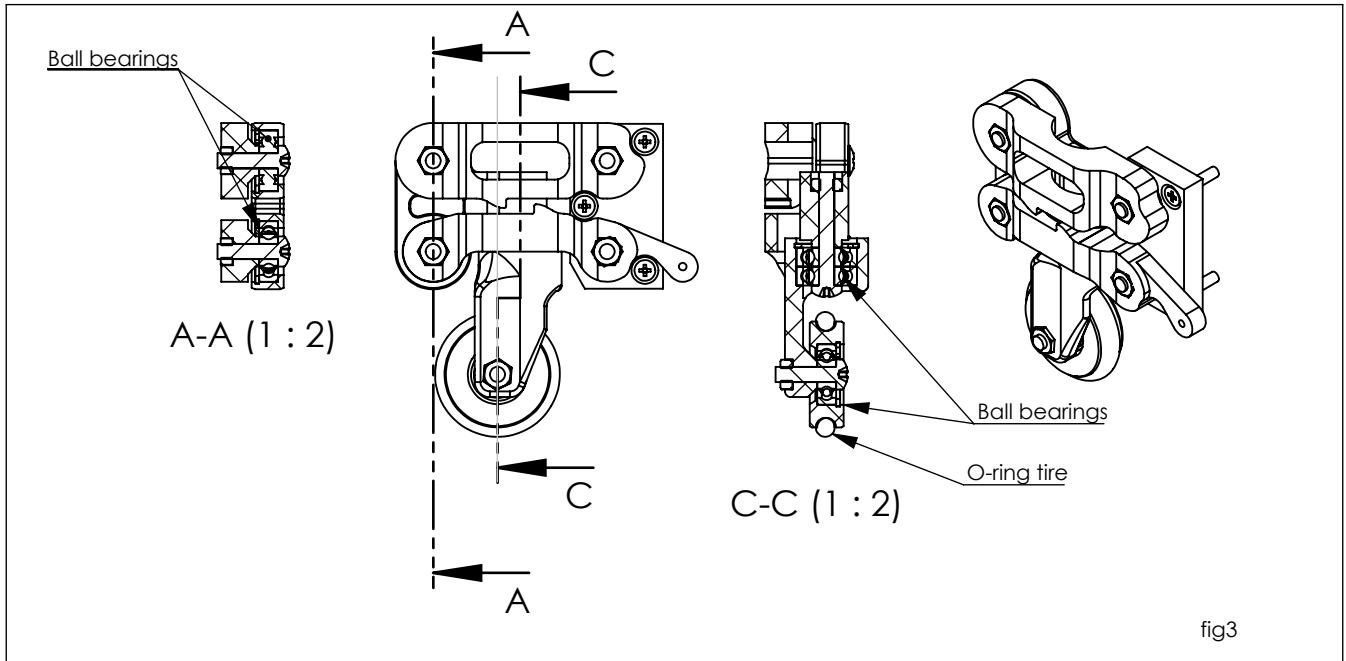
DRIVE WHEELS

Drive wheels are belt driven, reduction ratio is i:3.15. Ratio can be customised by advanced users by custom sized pulleys. Belt tension can be adjusted via screws shown below.(fig4)

Preload spring connection

Belt tensioner bolts

Motor

D

D

Belt tensioner bolts

*Wheel not shown

Wheel

auxillary encoder holder

fig4

wheel hub

Preloaded hinge bearings

Encoder with magnet

Belt

*Wheel not shown

D-D (1 : 1.5)

*Some parts hidden to show interior
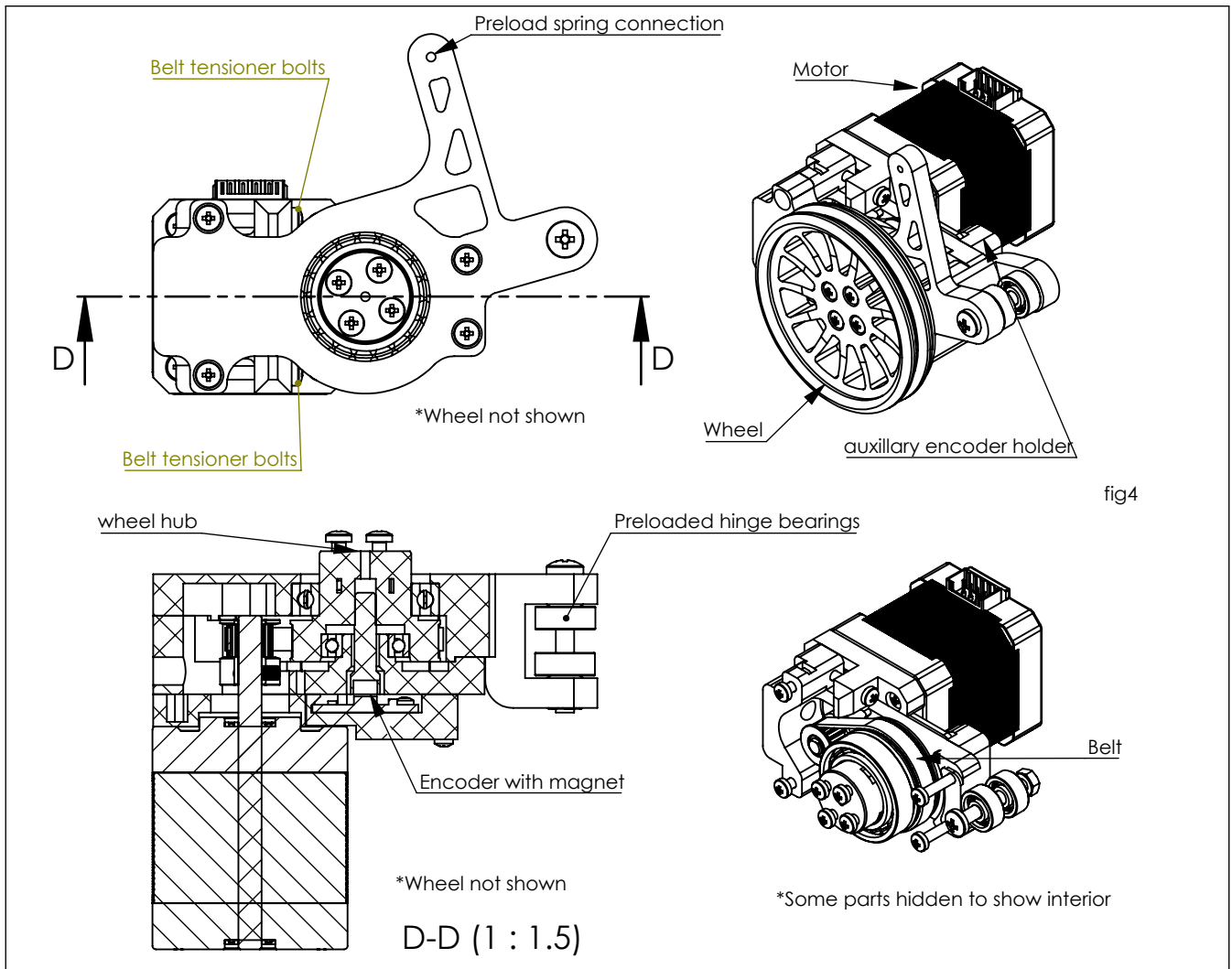
2 - BILL OF MATERIALS

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	0404_033	Middle frame	1
2	0401_001	Caster wheel	2
3	Bearing SKF - 624 - 4 x 13 x 5		36
4	Circlip DIN 472 - 16 x 1		16
5	0401_003	Caster wheel	2
6	Hexagon Nut ISO 4032 - M3 - W - N		45
7	0401_004	Caster wheel	4
8	O-ring D25_30 d5		4
9	0401_005	Caster wheel	2
10	0401_006	Caster wheel	2
11	0404_012	Caster fixture	4
12	ISO 7045 - M3 x 20 - Z - 20N		54
13	ISO 7046-1 - M3 x 16 - Z - 16N		16
14	0404_024	Front frame	1
15	sigma20x20		2
16	0404_017	Caster wheel	2
17	0404_018	Caster wheel	2
18	0404_070	Caster wheel	2
19	0404_020	Caster wheel	2
20	0404_028_50T	Drive wheel pulley	2
21	0404_029	Motor Flange	2
22	0404_030	Drive train	2
23	0404_031	Drive train	1
24	O-ring D45_50 d5		4
25	ISO - 4032 - M3 - W - N		35
26	AS5600 v1.step		2
27	0404_034	Sensor magnet holder	2
28	0404_035	Wheel sensor holder	2
29	Tapping screw DIN 7049-ST2.9x16-C-H-N		20
30	17HS8401		2
31	16 teeth pulley GT2 6mm		2
32	GT2 122T BELT 6mm		2
33	0404_032	Wheel	2
34	0404_039	Rc module holder	1
35	0404_060	Drive train	1
36	ISO 7045 - M3 x 12 - Z - 12N		18
37	RP-lidar-A1		1
38	flysky ia6b		1
39	Arduino_Uno		1
40	Arduino_Uno_CNC_Shield_V3		1
41	sensor_shield		1
42	0404_037	Electronics box	1

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
43	80x15 fan		1
44	0404_050	PC card holder	1
45	Raspberry Pi 4		1
46	0404_042	Power box	1
47	0404_044	Front panel (COSMETIC)	1
48	Intel D435i		1
49	led sticker 8led		4
50	VL6180X-Time_of_Flight_Sensor.stp	PART-VL6180X-Time_of_Flight_Sensor-DESC	2
51	0404_046	Front lighting (COSMETIC)	1
52	0404_047	Rear panel (COSMETIC)	1
53	Push Button Switch E-Stop mini D16		1
68	OLED Display 128x64		1
69	GX12-2P v2		1
70	Push_btn^Pushbutton M12		1

MANUFACTURING PART LIST

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	0404_033	Middle frame	1
2	0401_001	Caster wheel	2
5	0401_003	Caster wheel	2
7	0401_004	Caster wheel	4
9	0401_005	Caster wheel	2
10	0401_006	Caster wheel	2
11	0404_012	Caster fixture	4
16	0404_014	Rear frame	1
17	0404_024	Front frame	1
19	0404_017	Caster wheel	2
20	0404_018	Caster wheel	2
21	0404_070	Caster wheel	2
22	0404_020	Caster wheel	2
23	0404_028_50T	Drive wheel pulley	2
24	0404_029	Motor Flange	2
25	0404_030	Drive train	2
27	0404_031	Drive train	1
34	0404_034	Sensor magnet holder	2
35	0404_035	Wheel sensor holder	2
41	0404_032	Wheel	2
47	0404_039	Rc module holder	1
48	0404_060	Drive train	1
56	0404_037	Electronics box	1
58	0404_050	PC card holder	1
60	0404_042	Power box	1

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
61	0404_044	Front panel　　(COSMETIC)	1
65	0404_046	Front lighting　　(COSMETIC)	1
66	0404_047	Rear panel　　(COSMETIC)	1
73	0404_054	Rear lighting　　(COSMETIC)	2
74	0404_053	Rear Lighting　　(COSMETIC)	1
82	0404_051	Power box	1
83	0404_052	Battery cap (COSMETIC)	1
84	0404_064	Side panel (COSMETIC)	1
87	0404_055	Side Panel (COSMETIC)	1
89	0404_067	Battery bottom (COSMETIC)	1
90	0404_049	Top panel (COSMETIC)	1

All of the robot parts are completely 3d printable. We recommend using maximum 0.6mm nozzle and setting maximum 0.32mm layer thickness for printing non cosmetic parts for faster printing while maintaining minimum required dimensional tolerances. We recommend using PLA for all parts. For custom applications requiring more durable materials ABS, PETG or other high strength material can be used. Cosmetic parts are bodywork parts, thinner layer thickness and slower printing speed may be preferred for better surface finish.

MECHANICAL HARDWARE LIST

PART NUMBER	DESCRIPTION	QTY.
ISO 7045 - M3 x 8 - Z - 8N		8
ISO 7045 - M3 x 10 - Z - 10N		6
ISO 7045 - M3 x 12 - Z - 12N		16
ISO 7045 - M3 x 16 - Z - 16N		8
ISO 7046-1 - M3 x 16 - Z - 16N		16
ISO 7045 - M3 x 20 - Z - 20N		4
ISO 7045 - M3 x 25 - Z - 25N		4
ISO 7045 - M4 x 12 - Z - 12N		4
ISO 7045 - M4 x 16 - Z - 16N		20
ISO 7045 - M4 x 30 - Z - 30N		6
Hexagon Nut ISO 4032 - M3 - W - N		54
Hexagon Nut ISO 4032 - M4 - W - N		26
Tapping screw DIN 7049-ST2.2x6.5-C-H-N		12
Tapping screw DIN 7049-ST2.2x13-C-H-N		4
Tapping screw DIN 7049-ST2.9x9.5-C-H-N		9
Tapping screw DIN 7049-ST2.9x6.5-C-H-N		4
Tapping screw DIN 7049-ST2.9x16-C-H-N		4
Bearing SKF - 61800 - 10 x 19 x 5		2
Bearing SKF - 61804 - 20 x 32 x 7		2
Bearing SKF - 634 - 4 x 16 x 5		28
Bearing SKF - 624 - 4 x 13 x 5		4
Circlip DIN 472 - 16 x 1		16

PART NUMBER	DESCRIPTION	QTY.
O-ring D25_30 d5		4
O-ring D45_50 d5		4
sigma20x20		2
17HS8401		2
16 teeth pulley GT2 6mm		2
GT2 122T BELT 6mm		2
6s1p 18650 battery box 1		1

Battery size should not exceed 25x70x123(HxWxL) if using standard part model.

ELECTRONIC HARDWARE LIST

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
33	AS5600 v1.step		2
51	RP-lidar-A1		1
52	flysky ia6b		1
53	Arduino_Uno		1
54	Arduino_Uno_CNC_Shield_V3		1
55	sensor_shield		1
57	80x15 fan		1
59	Raspberry Pi 4		1
62	Intel D435i		1
63	led sticker 8led		4
64	VL6180X-Time_of_Flight_Sensor.stp	PART-VL6180X-Time_of_Flight_Sensor-DESC	2
67	Push Button Switch E-Stop mini D16		1
68	OLED Display 128x64		1
69	GX12-2P v2		1
73	0404_054	Rear lighting (COSMETIC)	2
74	0404_053	Rear Lighting (COSMETIC)	1
76	USB Type A - panel mount		1
77	hdmi_f_chassis		1
78	PJ-011A	CONN PWR JCK 2.1 X 6.0MM PNL MNT	1
79	12mm pushbutton		1

3 - ASSEMBLY GUIDE

PREPARING PARTS

Before assembling, all the parts must be cleaned of support structures. Mounting surfaces and holes must be levelled of imperfections.
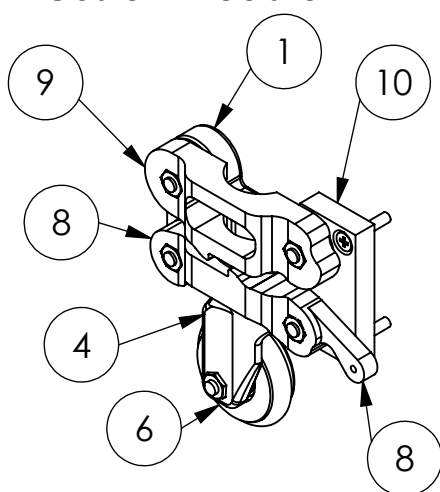
Tools required for part preparations;
- Pliers
- Utility knife
- flat head screwdriver

Follow step by step guide for complete mechanical systems assembly.

Tools required for assembly:
- Philips screwdriver
- Small assembly hammer
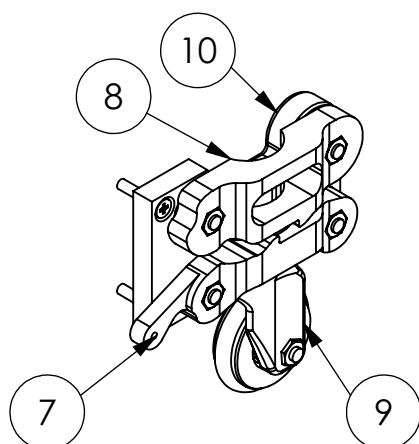- Pliers

STEP 1: Gather parts; Caster wheels left

* Hardware not shown
* 2 left caster wheel assemblies per robot is required, list on the right is BOM per assembly

ITEM NO.	PART NUMBER	QTY.
1	0401_001	1
2	Bearing SKF - 634 - 4 x 16 x 5	7
3	Circlip DIN 472 - 16 x 1	4
4	0401_003	1
5	Hexagon Nut ISO 4032 - M4 - W - N	6
6	0401_004	1
7	O-ring D25_30 d5	1
8	0401_005	1
9	0401_006	1
10	0404_012	1
11	ISO 7045 - M4 x 30 - Z - 30N	1
12	ISO 7045 - M4 x 16 - Z - 16N	5
13	ISO 7046-1 - M3 x 16 - Z - 16N	3

## Caster wheels right

* Hardware not shown
* Only different parts are marked
* 2 right caster wheel assemblies per robot is required, list on the right is BOM per assembly

ITEM NO.	PART NUMBER	QTY.
1	Bearing SKF - 634 - 4 x 16 x 5	7
2	Circlip DIN 472 - 16 x 1	4
3	Hexagon Nut ISO 4032 - M4 - W - N	6
4	0401_004	1
5	O-ring D25_30 d5	1
6	0404_012	1
7	0404_017	1
8	0404_018	1
9	0404_070	1
10	0404_020	1
11	ISO 7045 - M4 x 16 - Z - 16N	5
12	ISO 7046-1 - M3 x 16 - Z - 16N	3
13	ISO 7045 - M4 x 30 - Z - 30N	1

STEP 2: Assemble nuts

Assemble nuts in their hexagonal pockets shown below, tap lightly with assembly hammer if recessary. Nuts should fit tightly.
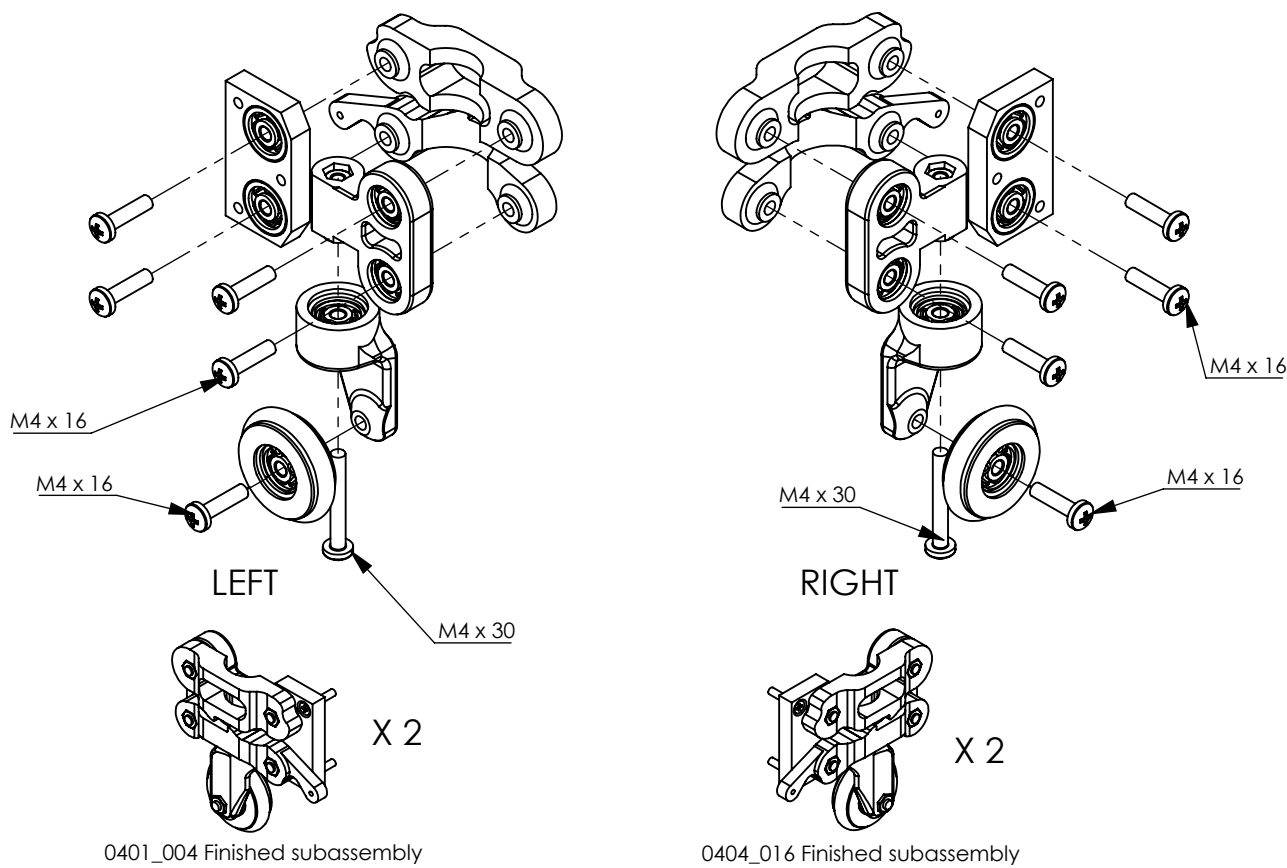
LEFT

RIGHT
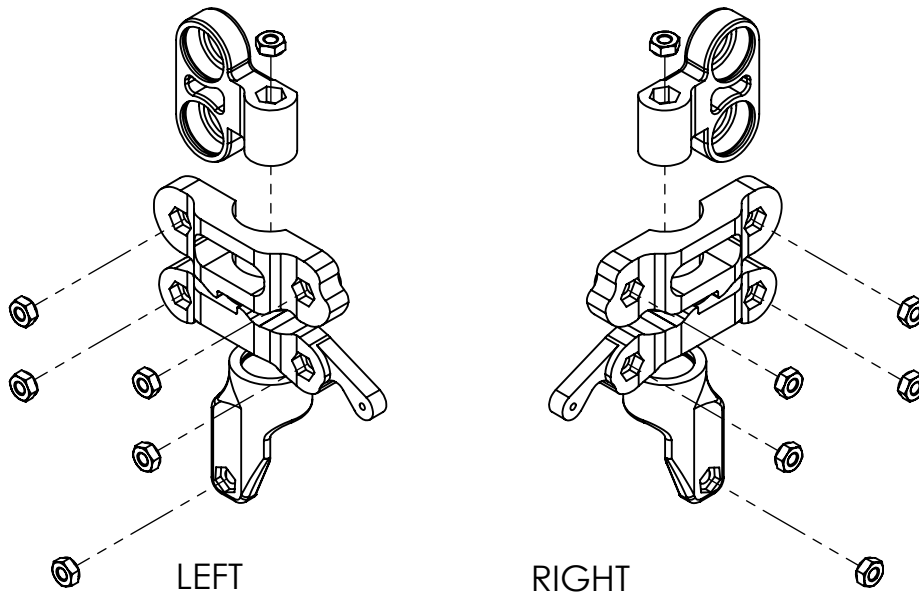
STEP 3: Assemble Bearings

Mount bearings in the pockets, tap lightly with assembly hammer if required. when tapping make sure using force on correct ring on the bearing so that forces are not transmitted through rolling elements. these forces will cause dents in the raceway paths, known as true brinelling.

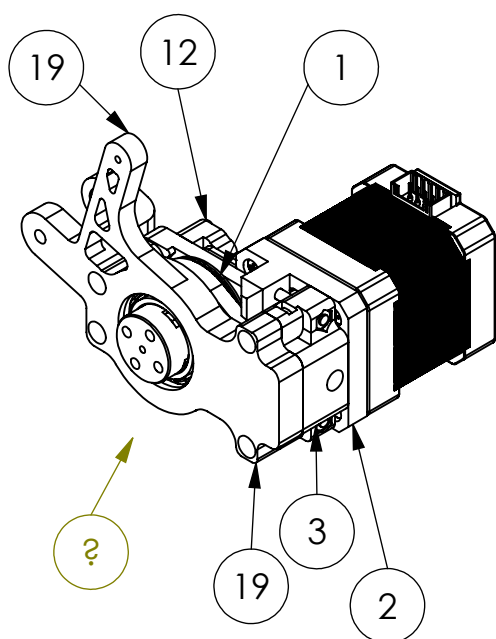Lock bearings with circlips using circlip pliers for bores. Note that some bearings dont have circlip grooves

No circlip

No circlip

LEFT

RIGHT
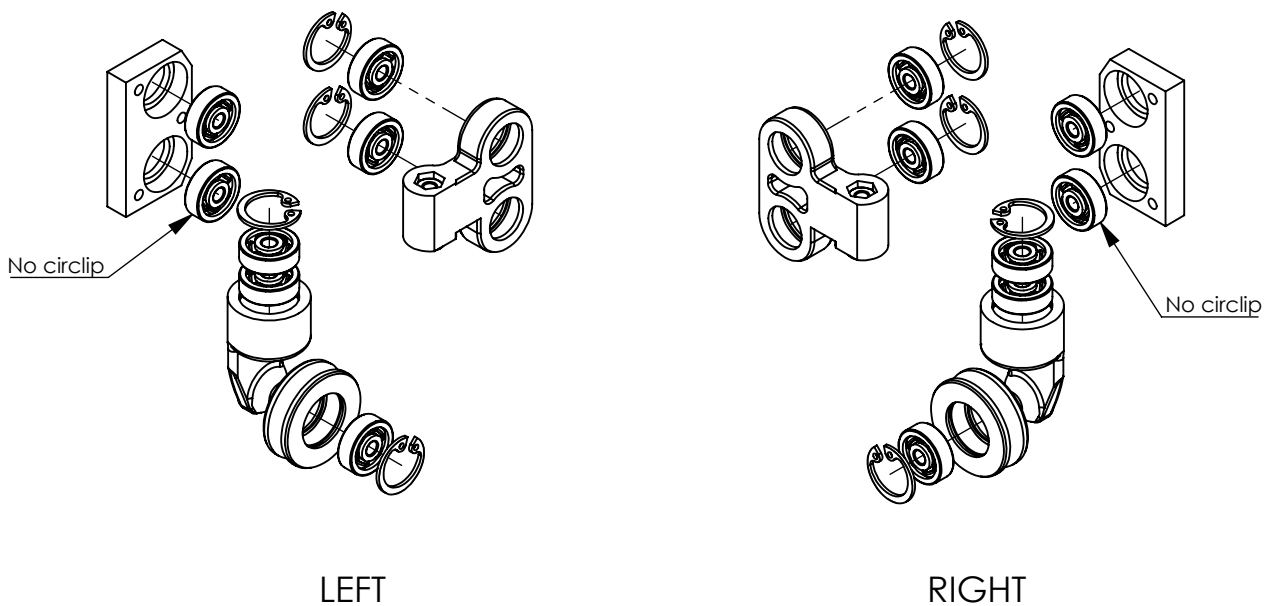
STEP 4: Caster Assembly

Assemble components together using ISO 7045 M4x16 and ISO 7045 M4 x 30 bolts using philips screwdriver.

M4 x 16
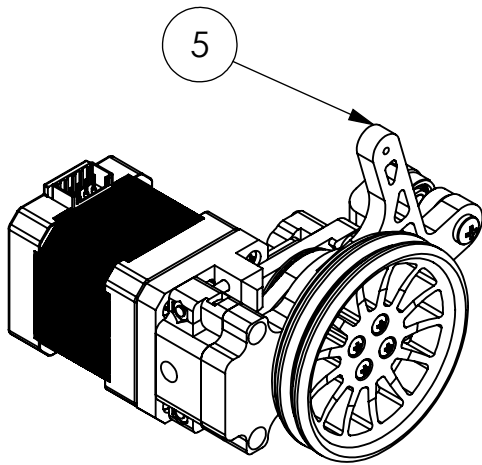
M4 x 16

M4 x 16

LEFT

M4 x 30

0401_004 Finished subassembly

M4 x 16

M4 x 16

M4 x 30

RIGHT

X 2

X 2

0404_016 Finished subassembly

STEP 5: Gather parts; Drive wheel left

ITEM NO.	PART NUMBER	QTY.
1	0404_028_50T	1
2	0404_029	1
3	0404_030	1
4	Bearing SKF - 61804 - 20 x 32 x 7	1
6	Bearing SKF - 61800 - 10 x 19 x 5	1
8	ISO - 4032 - M3 - W - N	10
9	ISO - 4032 - M4 - W - N	1
10	AS5600 v1.step	1
11	0404_034	1
12	0404_035	1
13	Tapping screw DIN 7049-ST2.2x6.5-C-H-N	2
14	Tapping screw DIN 7049-ST2.2x13-C-H-N	2
15	17HS8401	1
16	16 teeth pulley GT2 6mm	1
17	GT2 122T BELT 6mm	1
19	0404_060	1
20	ISO 7045 - M3 x 8 - Z - 8N	4
21	ISO 7045 - M3 x 25 - Z - 25N	2
22	ISO 7045 - M3 x 10 - Z - 10N	2
25	ISO 7045 - M3 x 20 - Z - 20N	2

* Hardware not shown
* 1 drive wheel left assembly per robot is required, list on the right is BOM per assembly

Drive wheel left

ITEM NO.	PART NUMBER	QTY.
1	0404_028_50T	1
2	0404_029	1
3	0404_030	1
4	Bearing SKF - 61804 - 20 x 32 x 7	1
5	0404_031	1
6	O-ring D45_50 d5	2
7	Bearing SKF - 61800 - 10 x 19 x 5	1
8	Bearing SKF - 624 - 4 x 13 x 5	2
9	ISO - 4032 - M3 - W - N	10
10	ISO - 4032 - M4 - W - N	1
11	AS5600 v1.step	1
12	0404_034	1
13	0404_035	1
14	Tapping screw DIN 7049-ST2.2x6.5-C-H-N	2
15	Tapping screw DIN 7049-ST2.2x13-C-H-N	2
16	17HS8401	1
17	16 teeth pulley GT2 6mm	1
18	GT2 122T BELT 6mm	1
19	0404_032	1
20	ISO 7045 - M3 x 8 - Z - 8N	4
21	ISO 7045 - M3 x 25 - Z - 25N	2
22	ISO 7045 - M3 x 10 - Z - 10N	2
23	ISO 7045 - M3 x 12 - Z - 12N	4
24	ISO 7045 - M3 x 20 - Z - 20N	2
25	ISO 7045 - M4 x 30 - Z - 30N	1

* Hardware not shown
* Only different part is marked
* 1 drive wheel left assembly per robot is required, list on the right is BOM per assembly

STEP 6: Assemble nuts

Assemble ISO 4032 M3 and ISO 4032 M4 nuts in their hexagonal pockets shown below, tap lightly with assembly hammer if necessary. Take caution not damaging parts. Nuts should fit tightly.
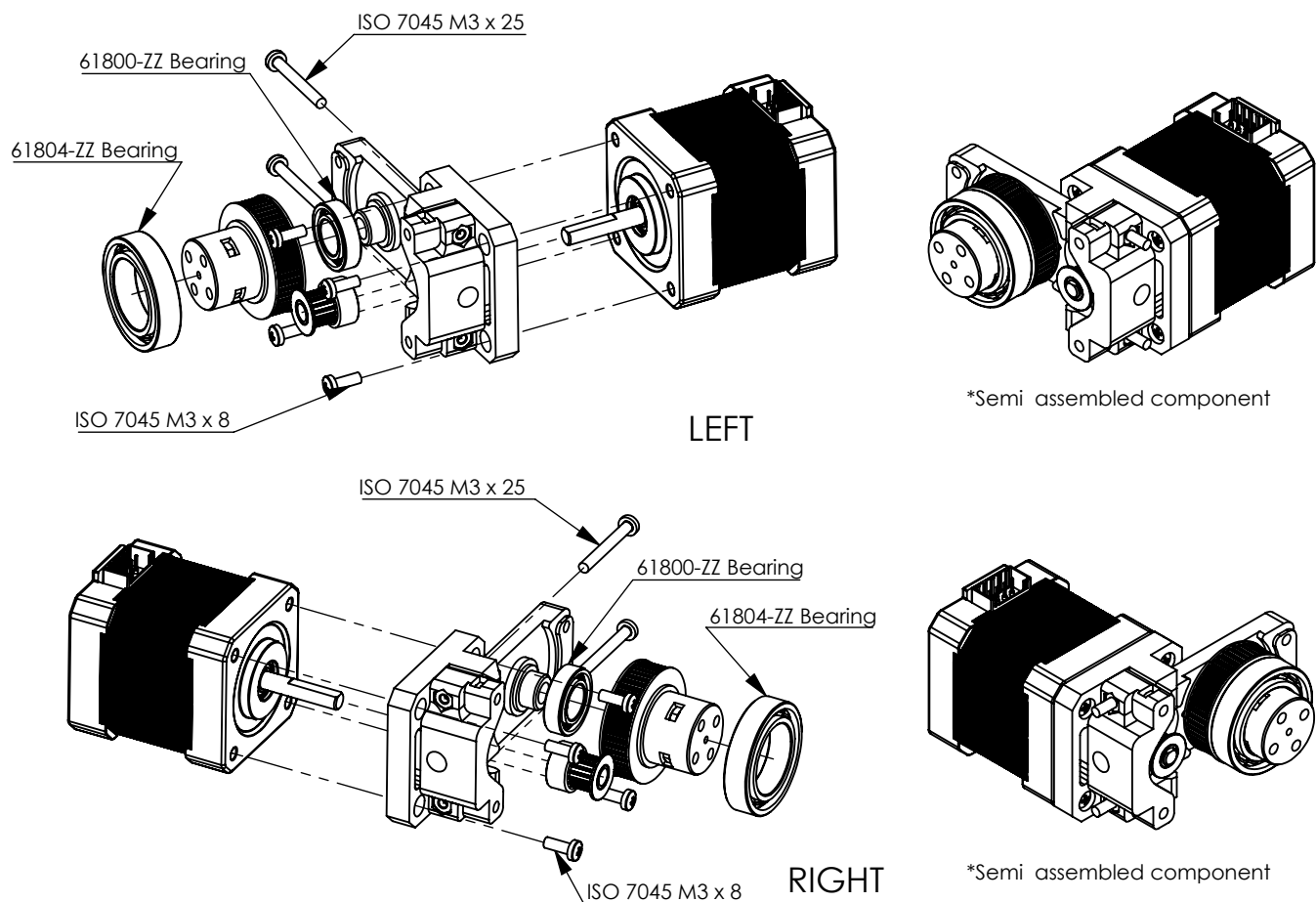

LEFT   RIGHT
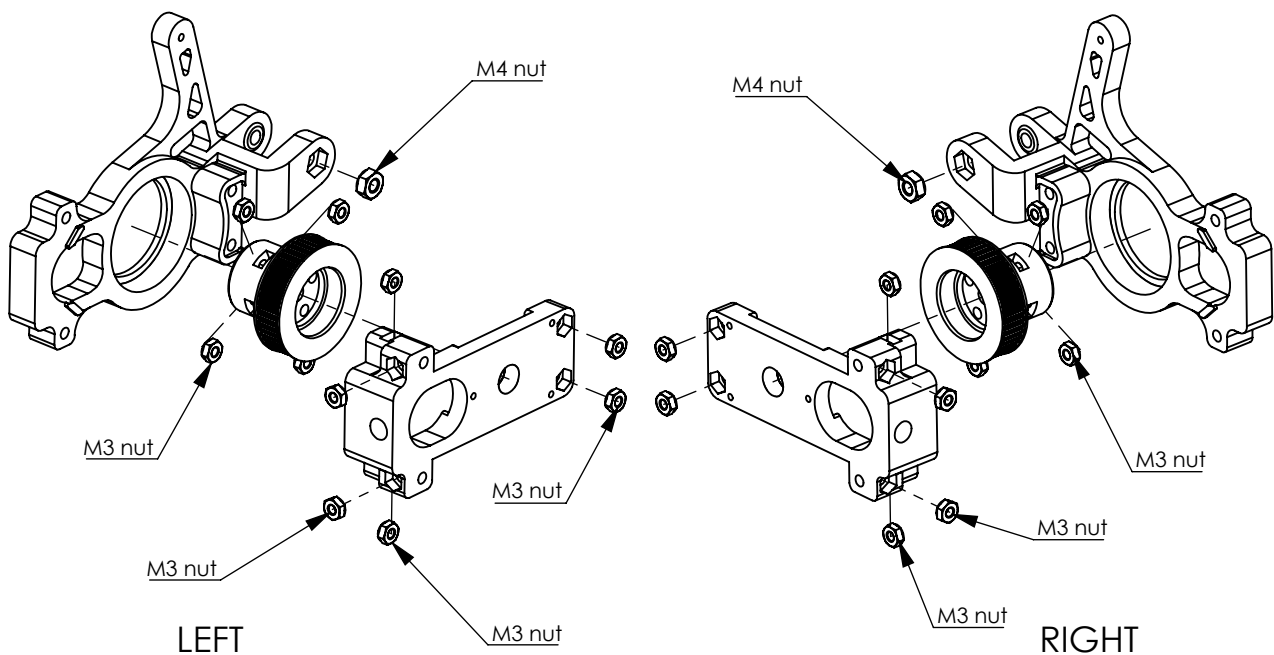
STEP 7: Tensioner motor mount assembly

Slide motor mount into drive gearbox frame slot as shown in the picture, There should be no backlash and parts should fit tightly. Use assembly hammer if required, take caution not to damage the parts.

LEFT

RIGHT
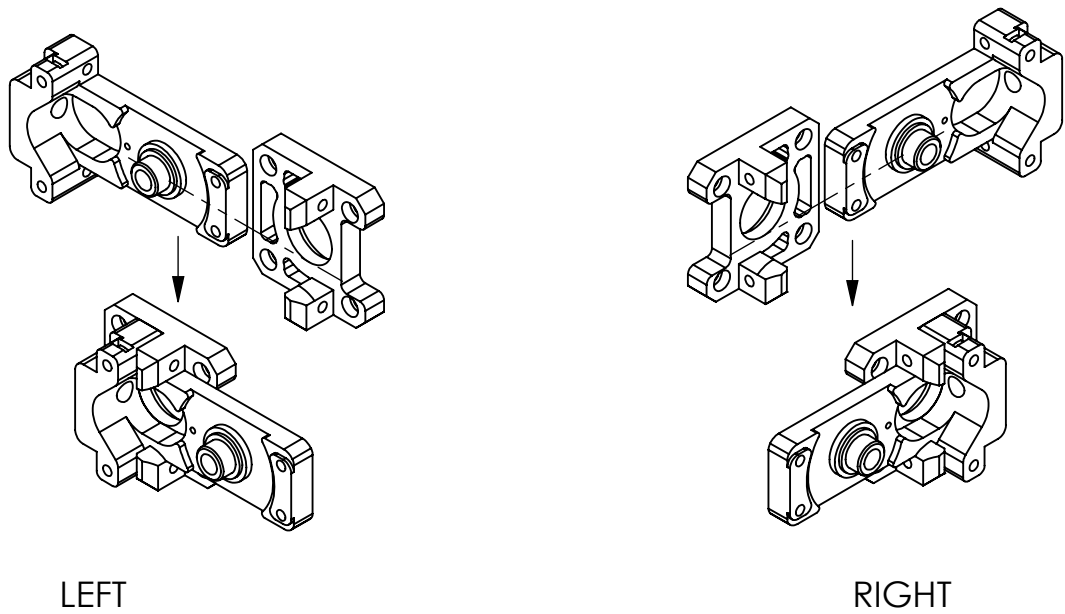
STEP 8: Motor and pulley assembly

Assemble motor, motor pulley and 50T pulley with bearings. Assemble belt tensioning screws loose as possible for belt adjustment, do not tighten at this stage. Motor connector pins must be towards up

ISO 7045 M3 x 25

61800-ZZ Bearing

61804-ZZ Bearing

ISO 7045 M3 x 8

LEFT

*Semi assembled component

ISO 7045 M3 x 25

61800-ZZ Bearing

61804-ZZ Bearing

ISO 7045 M3 x 8

RIGHT

*Semi assembled component

STEP 9: Belt and gearbox case assembly