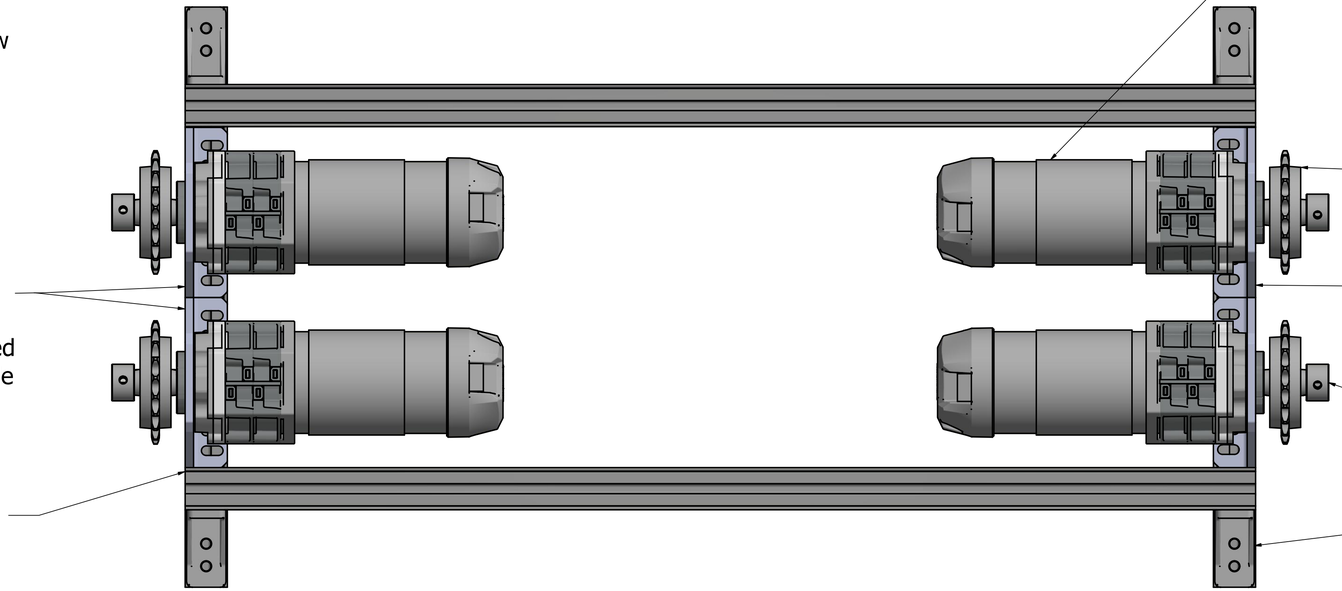
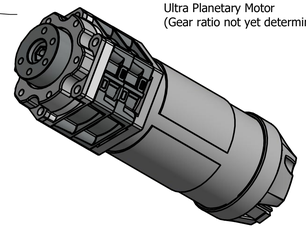
Top View

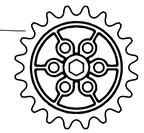
Brackets
are flush to
Each other
and centered
on short side



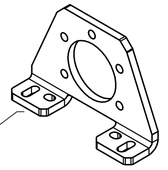
Ultra Planetary Motor
(Gear ratio not yet determined)



20 Tooth
Sprocket (4 total)

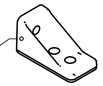


Bent Motor Bracket
(4 total)

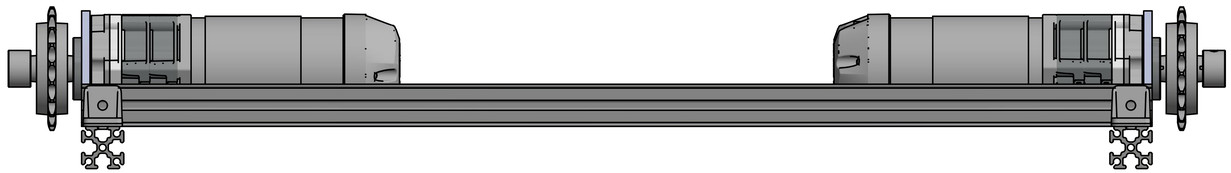


Shaft Collar
(4 total)

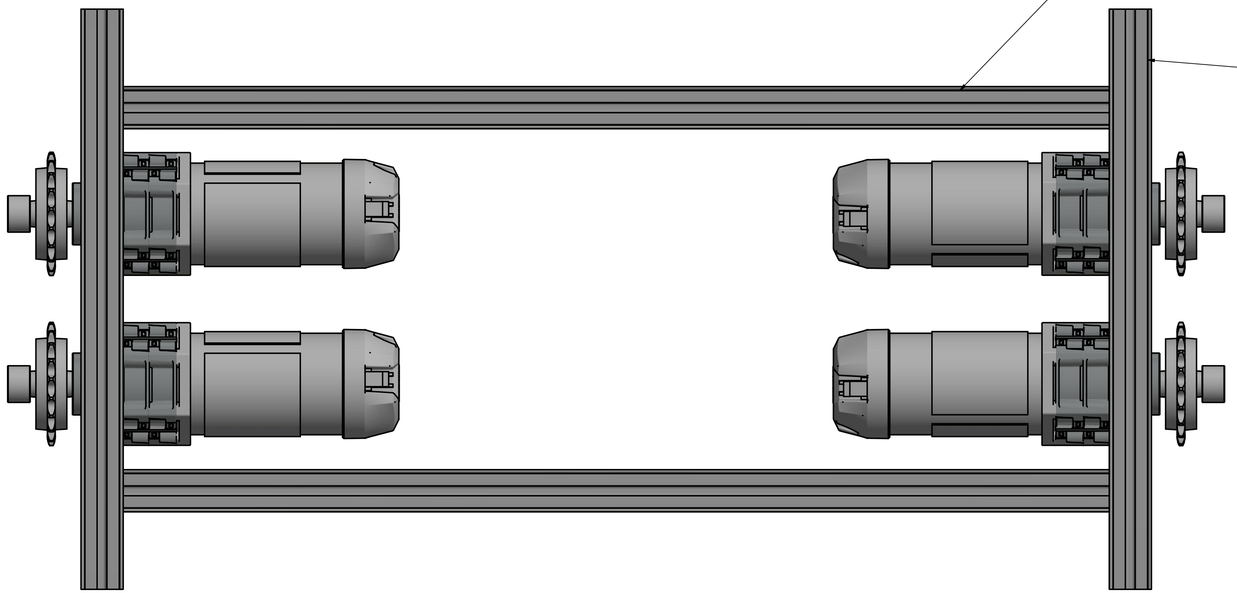
1x2 Lap Bracket
(8 total --
4 for this assembly,
4 to attached to Drive Train)



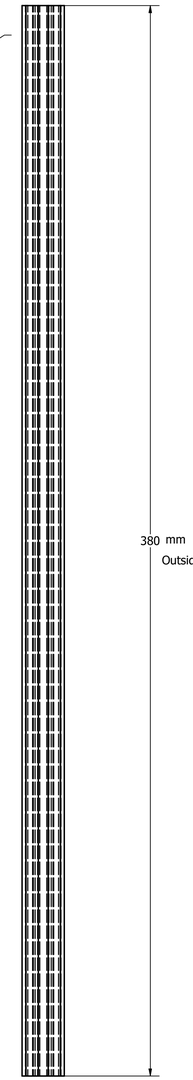
Side View



Bottom View

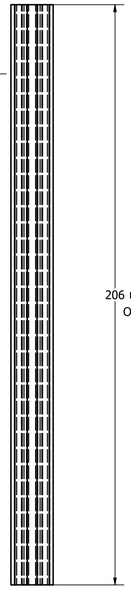


Cut Extrusion Long
Side
(2 total)

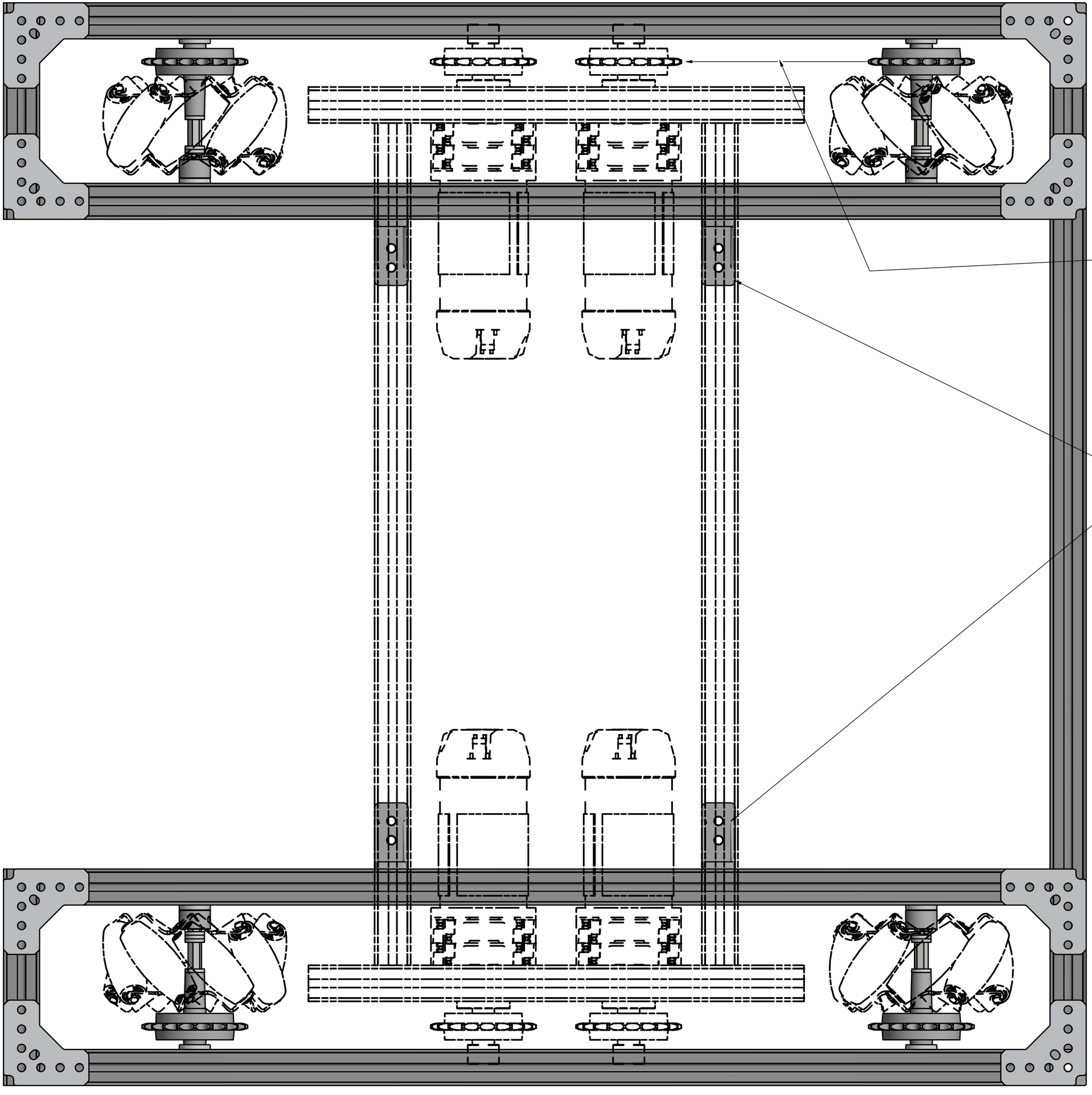


380 mm
Outside Cut

Cut Extrusion Short
Side
(2 total)



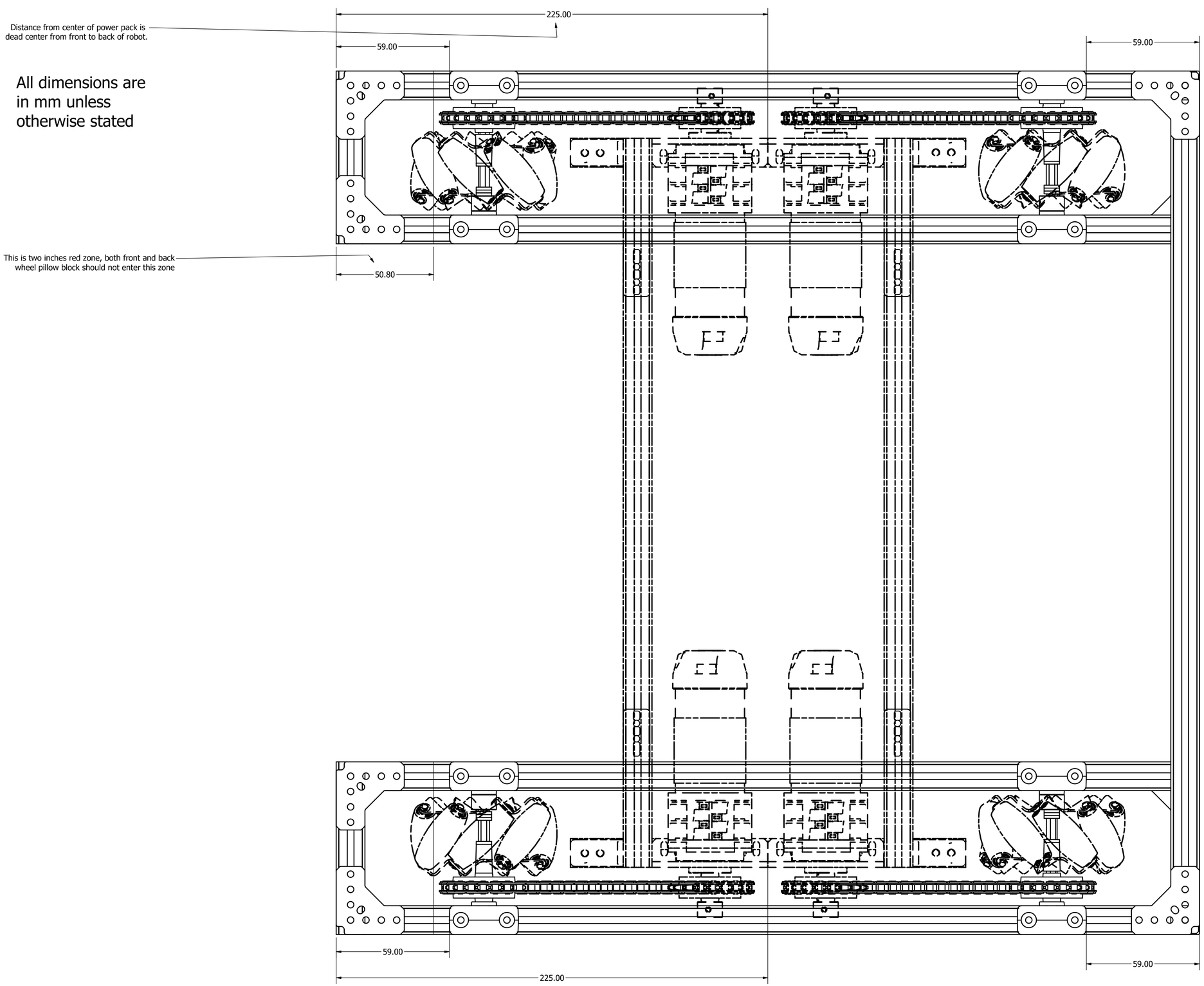
206 mm
Outside Cut



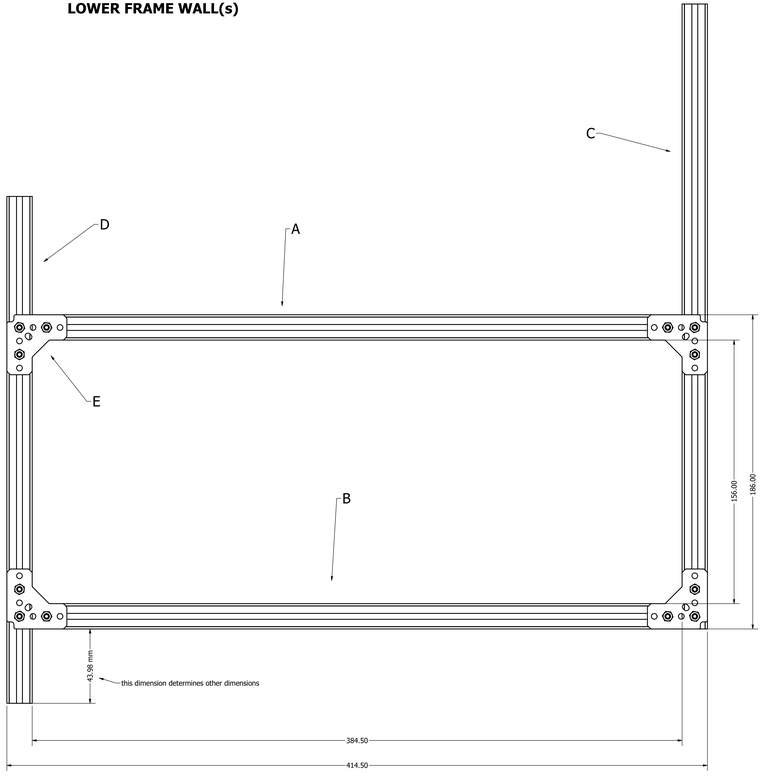
Gears on Power pack
and drive train
should be in line
as close as they can be made.

Assembled with 4
1x2 Lap Brackets
on the underside
of the drivetrain.

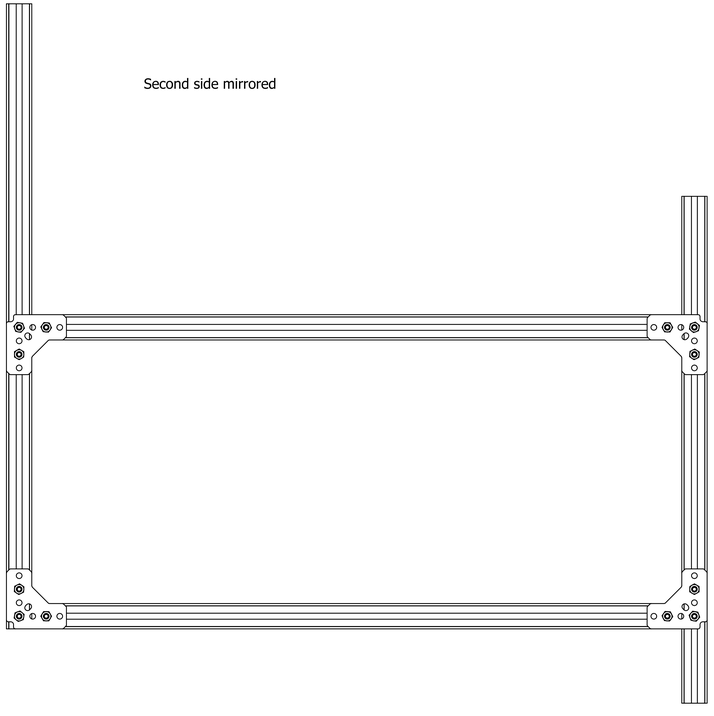
All dimensions are in mm unless otherwise stated

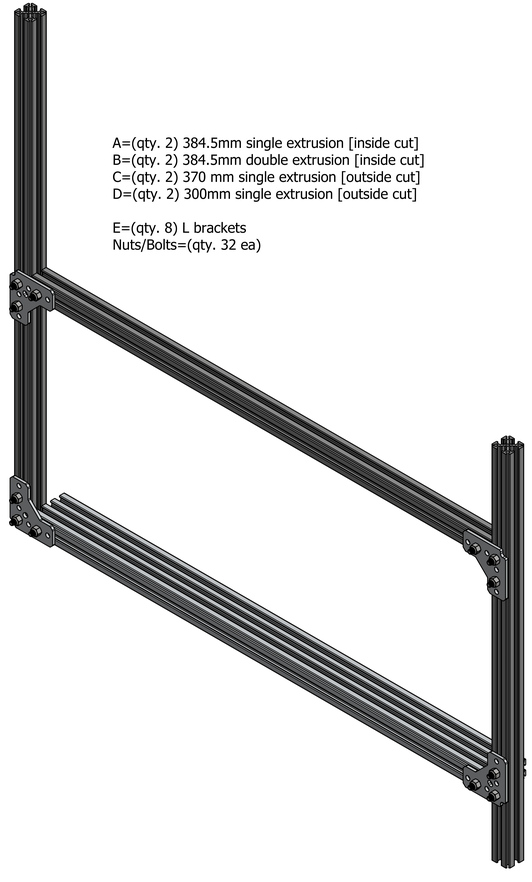


LOWER FRAME WALL(s)



Second side mirrored

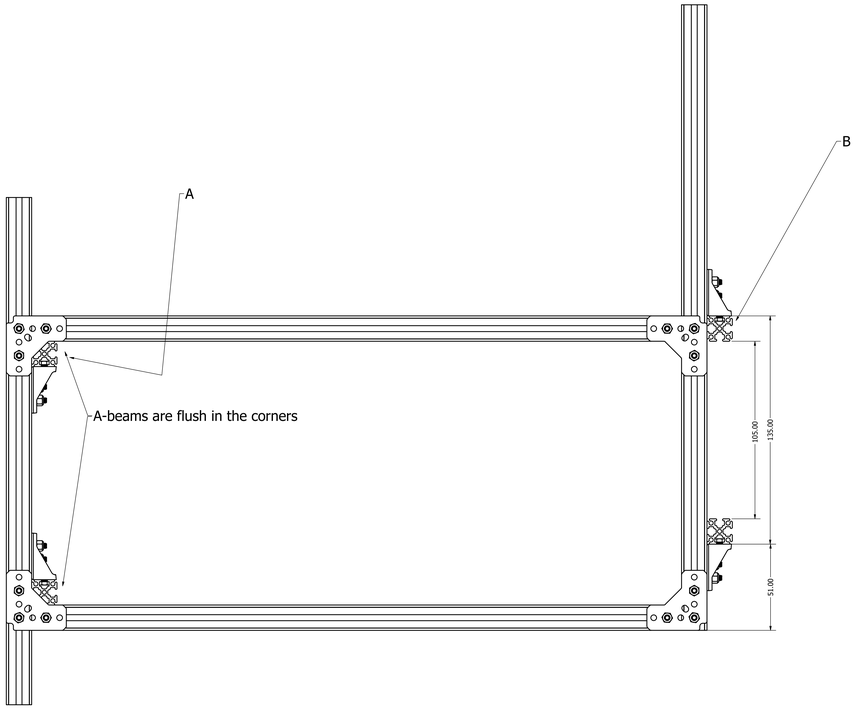




A=(qty. 2) 384.5mm single extrusion [inside cut]
B=(qty. 2) 384.5mm double extrusion [inside cut]
C=(qty. 2) 370 mm single extrusion [outside cut]
D=(qty. 2) 300mm single extrusion [outside cut]

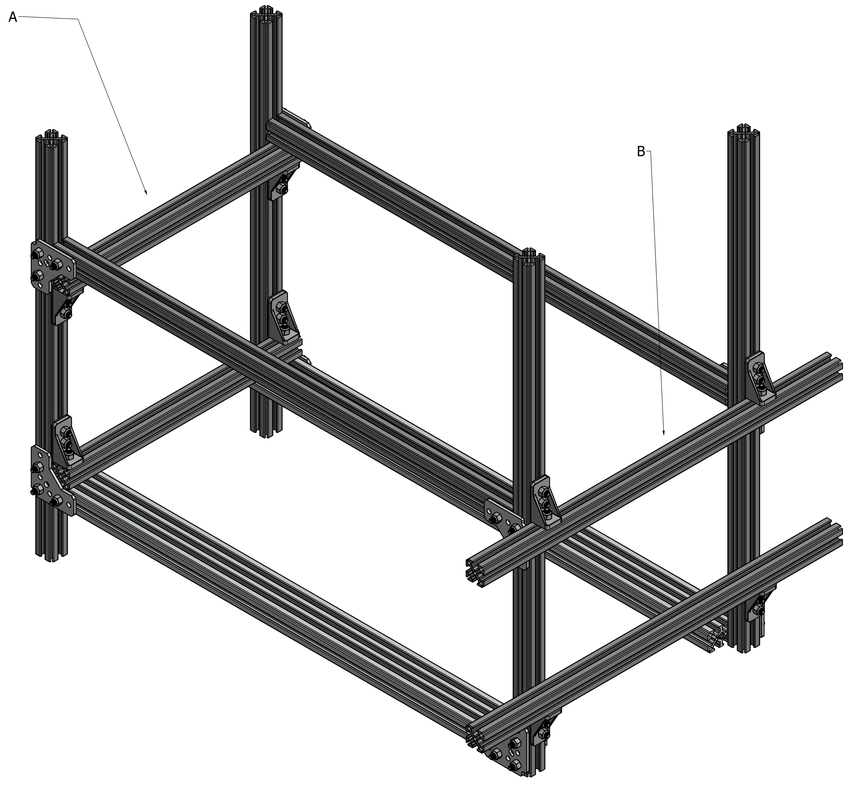
E=(qty. 8) L brackets
Nuts/Bolts=(qty. 32 ea)

LOWER FRAME BOX ASSEMBLY

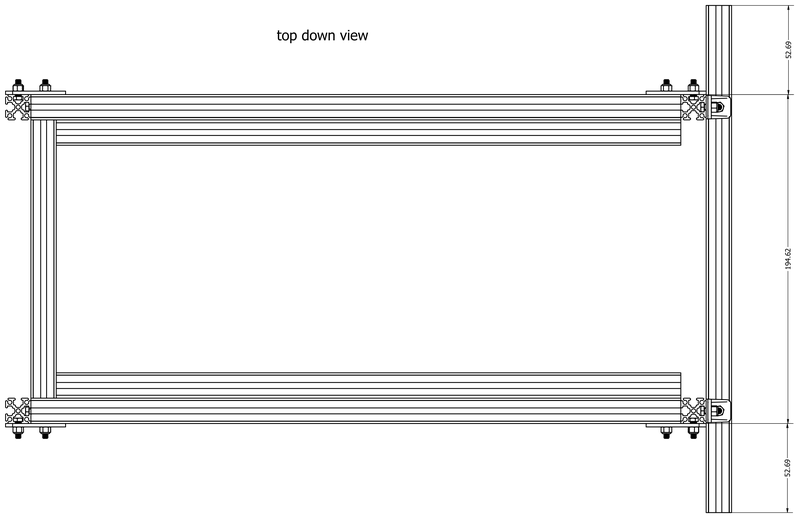


A=(qty. 2) 194.62mm single extrusion [inside cut]
B=(qty. 2) 300mm single extrusion [outside cut]

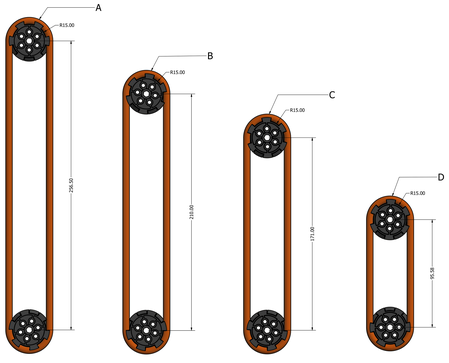
Lap brackets (qty. 8)
Nuts/Bolts (qty 24.)



top down view



front



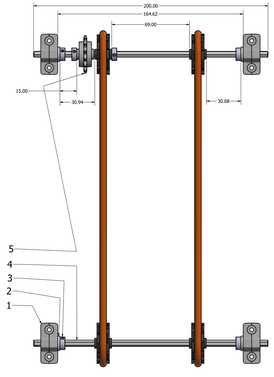
Basic Length of PolyCord is
PI (3.14) x Diameter -- This covers a full circle or two halves of each end.
Add the 2 x length of the center to center
** **Best to cut slightly bigger**, then stretch and trim once assembled on the full robot.

Each of the below include two 30 mm pulleys with the below PolyCord.

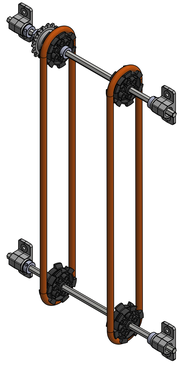
A. -- qty 2 -- 607.2 mm -- Elevator Poly Cord
B. -- qty 2 -- 514.2 mm -- Shooter input Poly Cord
C. -- qty 2 -- 436.2 mm -- Lower Transition Poly Cord
D. -- qty 3 -- 285.4 mm -- Ramp Transition Poly Cord

30 mm Pulleys -- qty 18

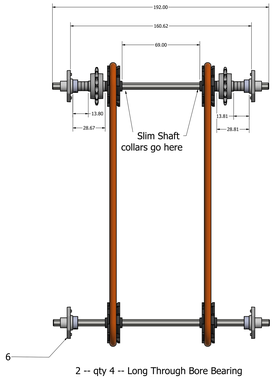
ELEVATOR POLYCORD ASSEMBLY
A assembly



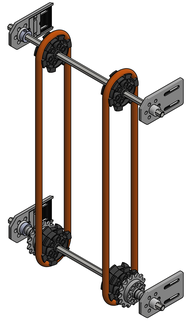
1 -- qty 4 -- Pillow Block
2 -- qty 4 -- Long Through Bore Bearing
3 -- qty 6 -- Slim Shaft Collar
4 -- qty 2 -- 200 mm long Hex Shaft
5 -- qty 1 -- 15 tooth sprocket



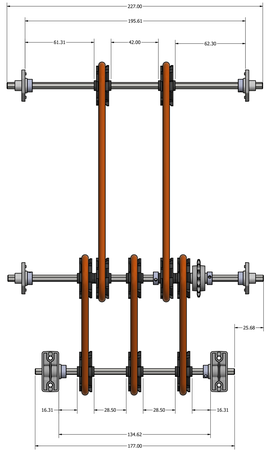
SHOOTER RAMP POLYCORD ASSEMBLY
B assembly

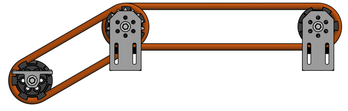


2 -- qty 4 -- Long Through Bore Bearing
3 -- qty 6 -- Slim Shaft Collar
4 -- qty 2 -- 192 mm long Hex Shaft
5 -- qty 2 -- 15 tooth sprocket
6 -- qty 4 -- Indexible Motion Bracket

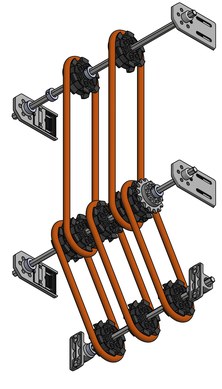


LOWER SECTION POLYCORD ASSEMBLY
C & D combined assembly

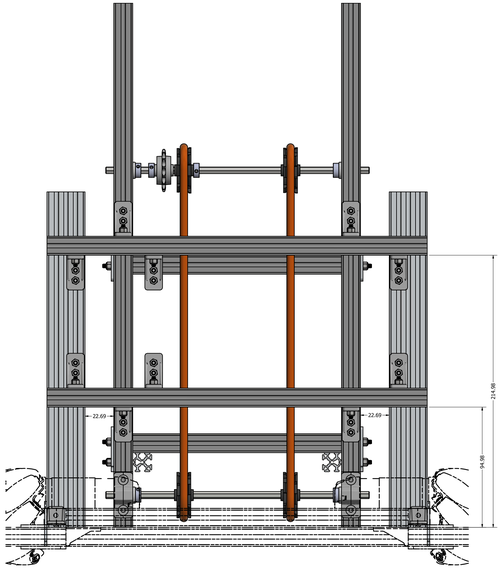


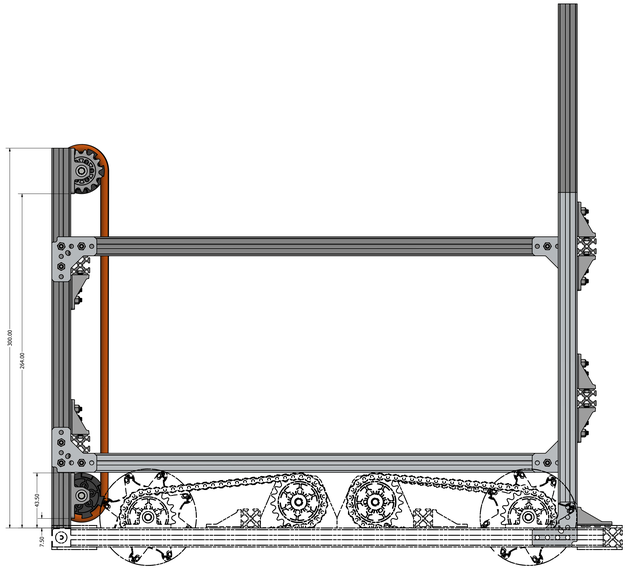


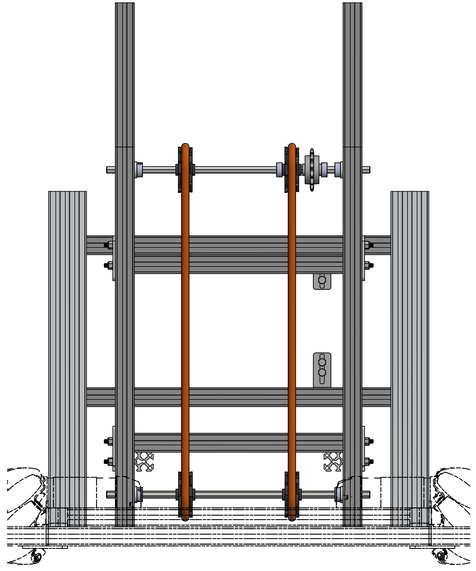
1 -- qty 2 -- Pillow Block
2 -- qty 6 -- Long Through Bore Bearing
3 -- qty 8 -- Slim Shaft Collar
4 -- qty 2 -- 227 mm long Hex Shaft
4 -- qty 1 -- 177 mm long Hex Shaft
5 -- qty 1 -- 15 tooth sprocket
6 -- qty 4 -- Indexible Motion Bracket

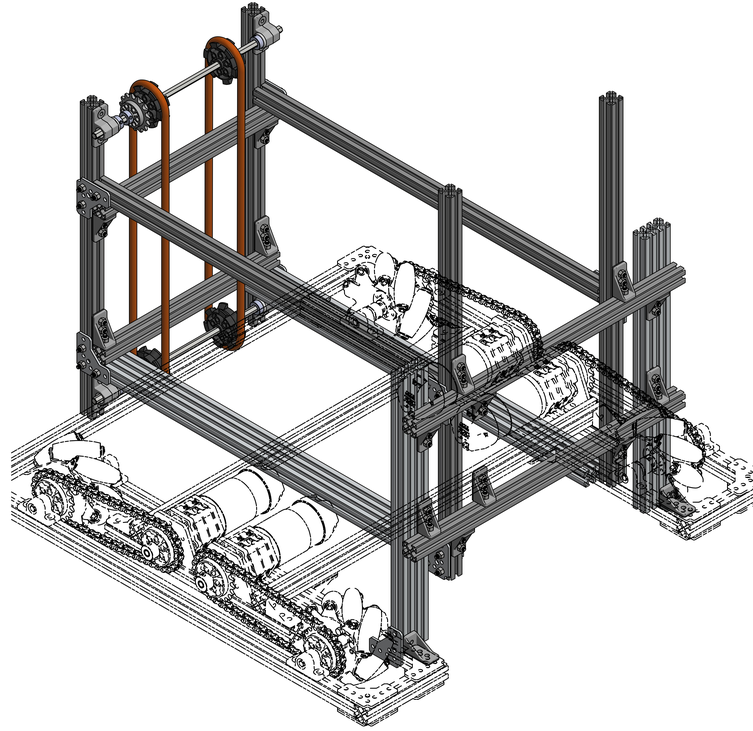


Frame to Drive Train and Elevator Assembly

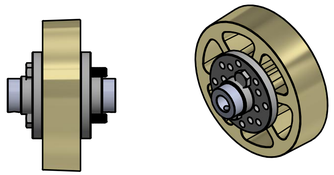


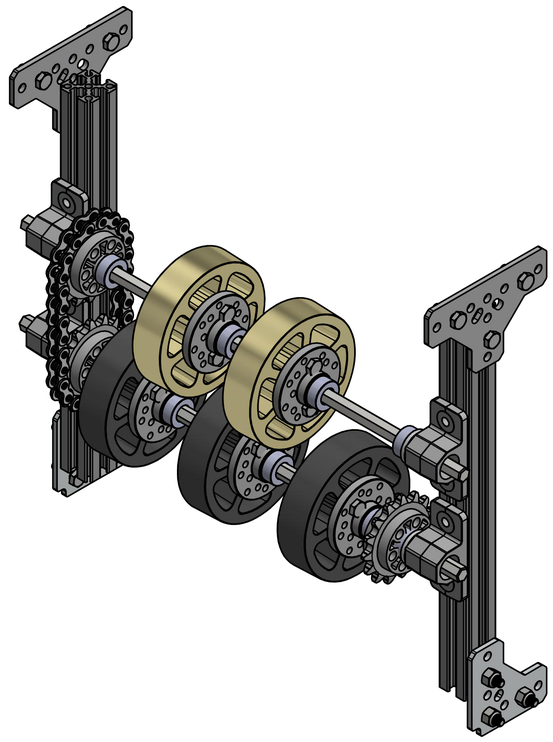


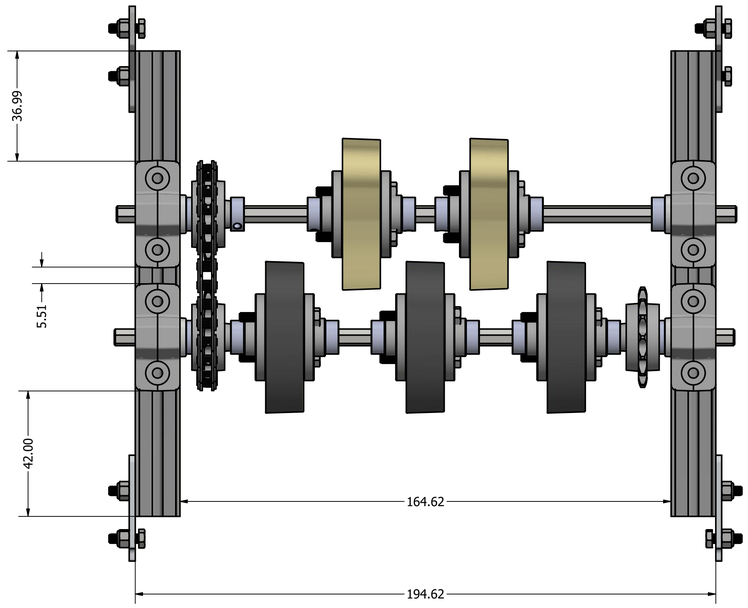




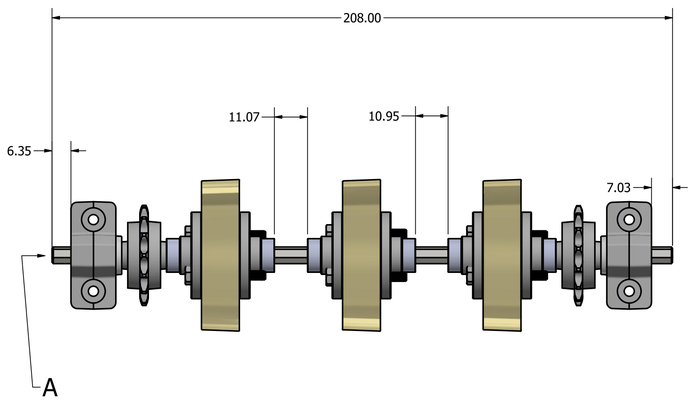
ELEVATOR HELPER WHEEL(s) ASSEMBLY

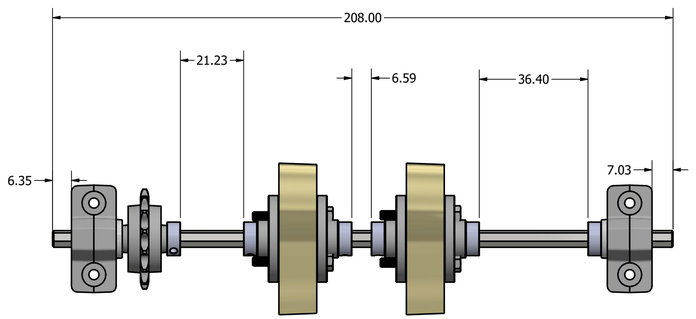


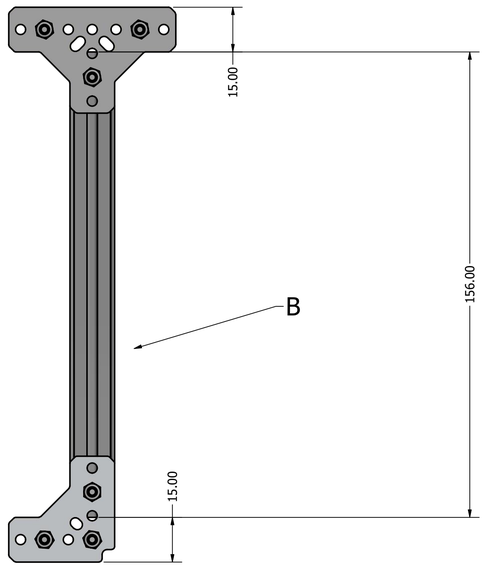




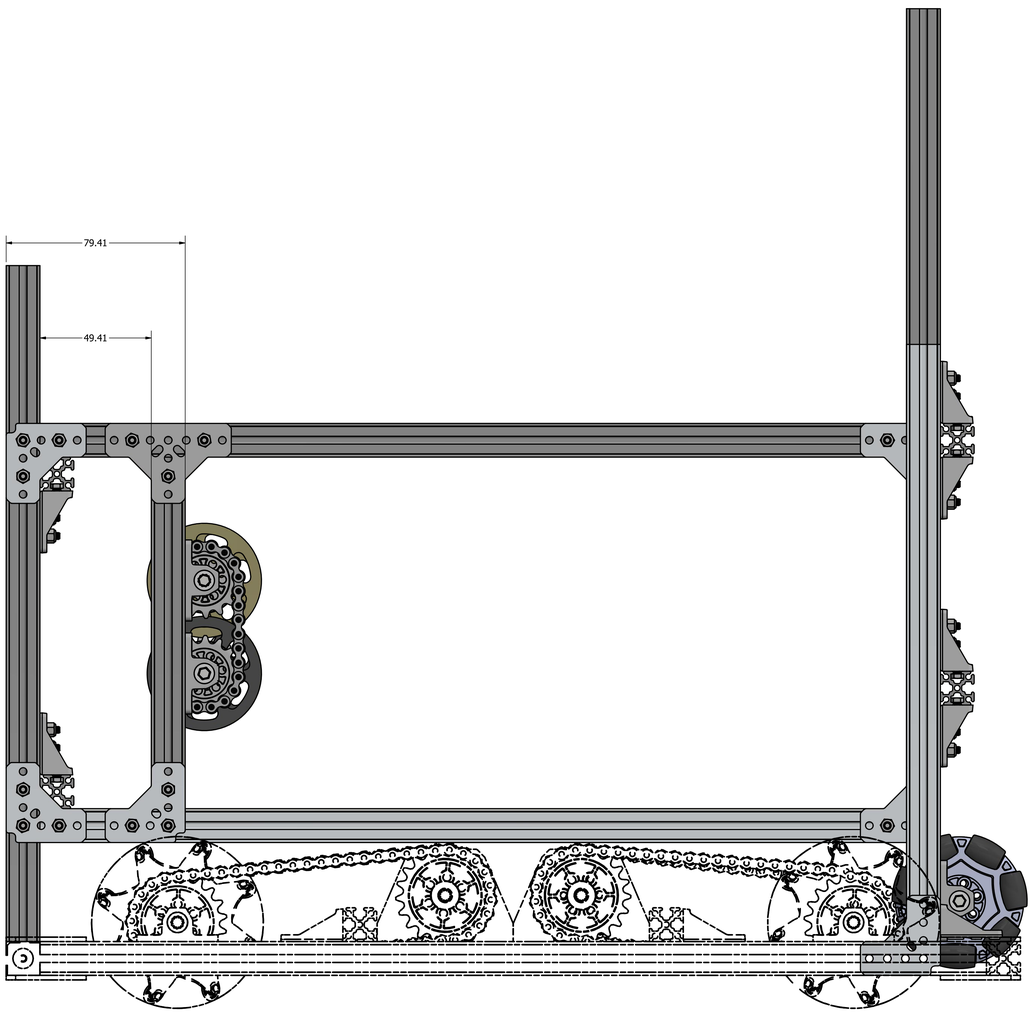
A= 208mm hex shaft (qty. 2)
B=156mm extrusion (qty. 2)
bearing long (qty. 4) Rev-41-1329
15 tooth sprocket (qty. 3) Rev-41-1339
slim shaft collar (qty. 12) Rev-41-1629
universal hub (qty. 10) Rev-41-1883
2 in compliant wheel (qty. 5) Andymark thing
pillow block (qty. 4) Rev-41-1317
L bracket (qty. 2) Rev-41-1480
T bracket (qty. 2) Rev-41-1483
bolts 25mm (qty. 10) Rec-41-1715

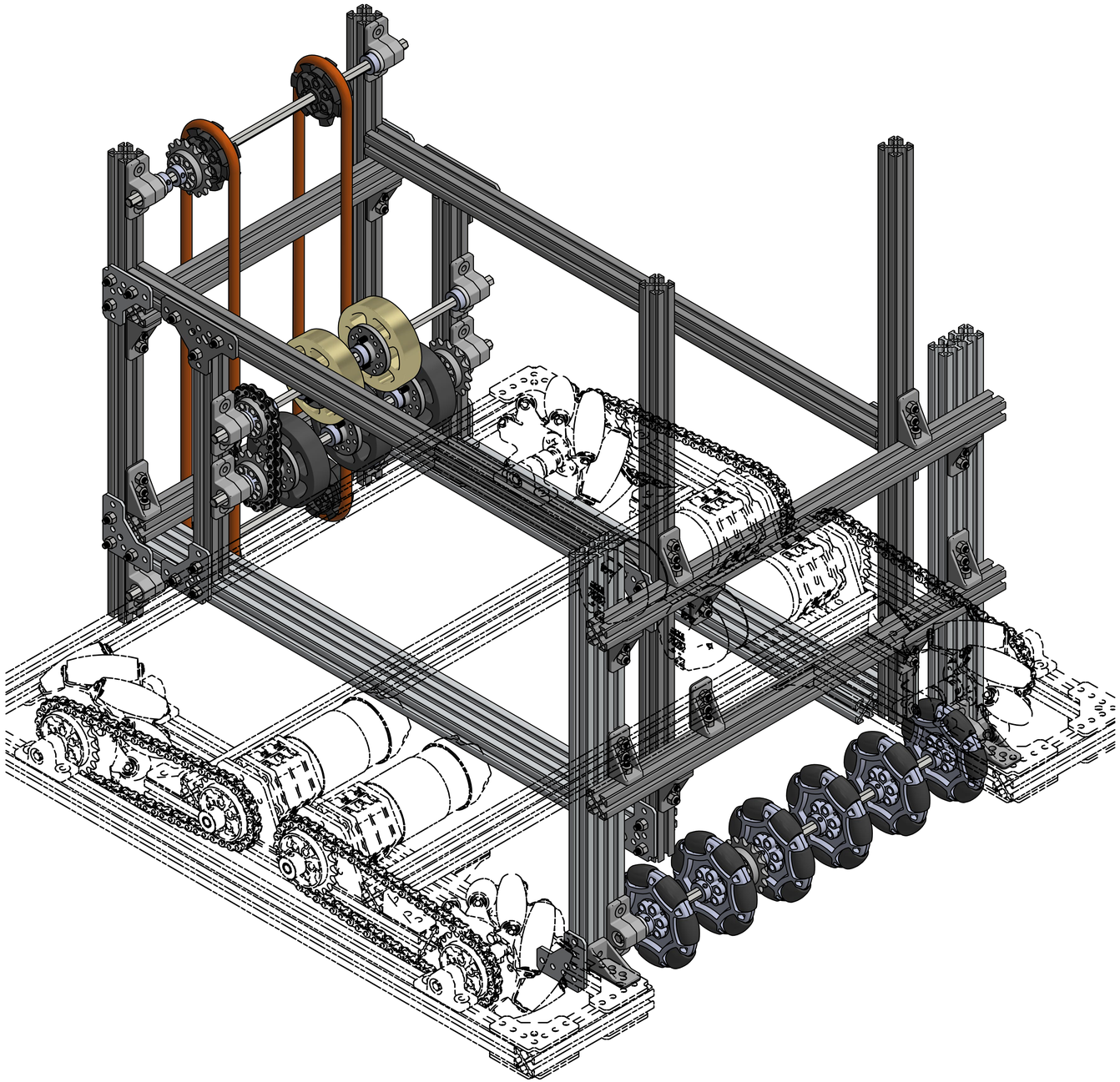






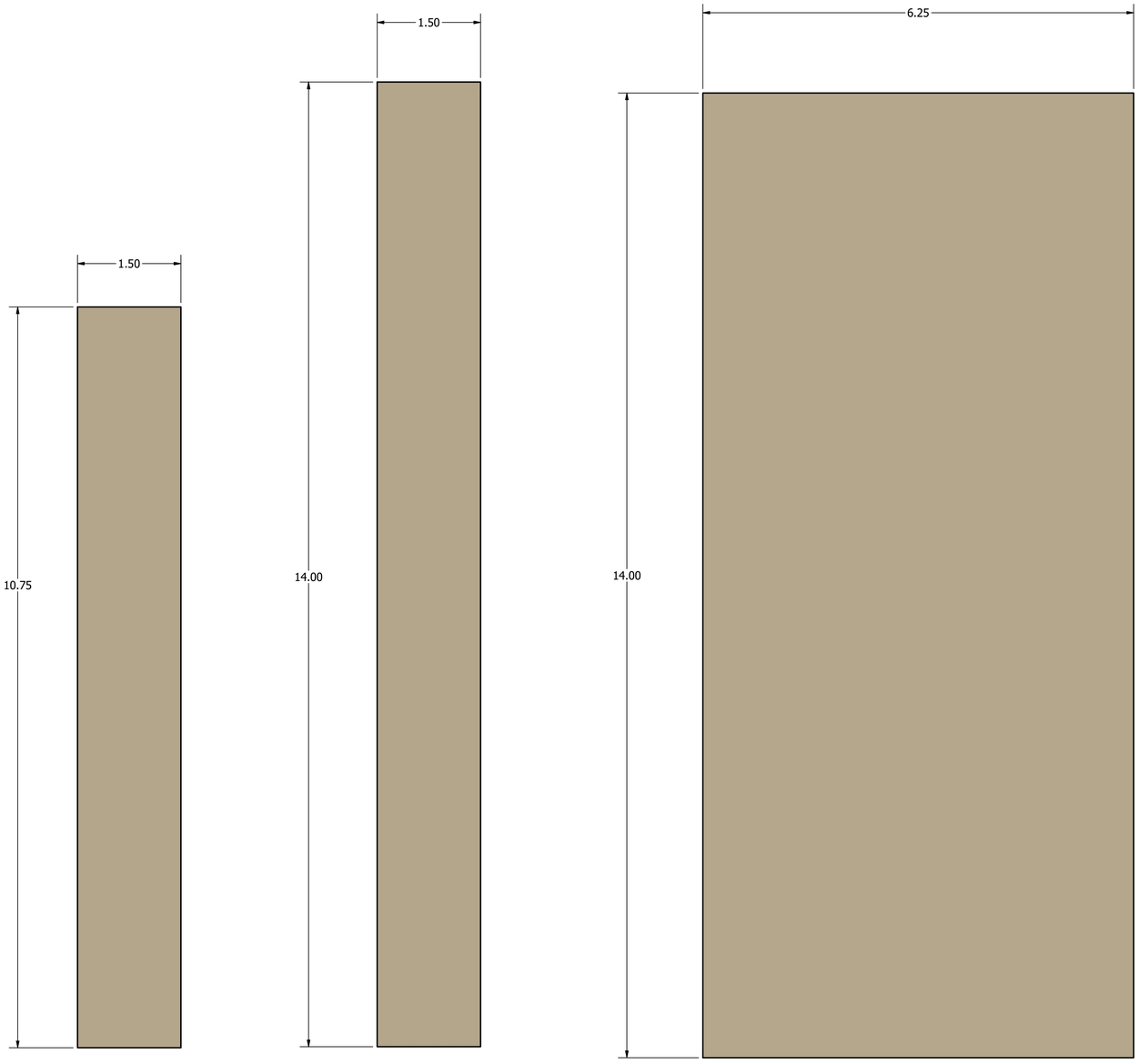
HELPER ELEVATOR WHEELS TO FRAME ASSEMBLY





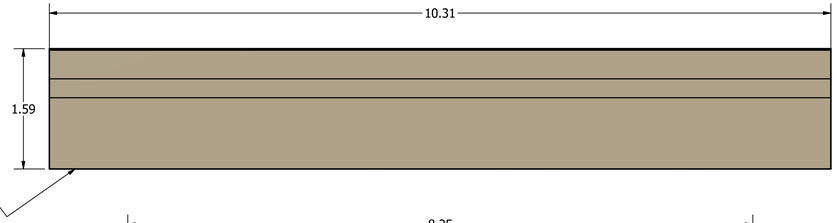
SHOOTER POLYCARB

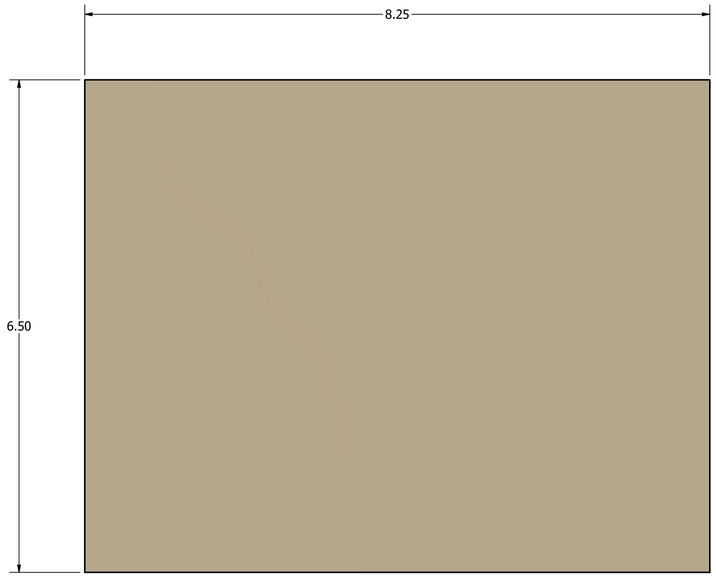
I made the sides taller and cut off the "fingers".
The sizes were made for easy measurement.
All three of these pieces (floor and 2 sides) will flush against the back (nearest the elevator).
This should make assembly easier, have the ability to drill holes higher than the ring in order to hold the sides on.



LOWER SECTION POLYCARB

Cut 3 of these so they have room to make a mistake and try again.
Cut some small polycarb pieces so they can practice heating and bending
before they get to the real thing.

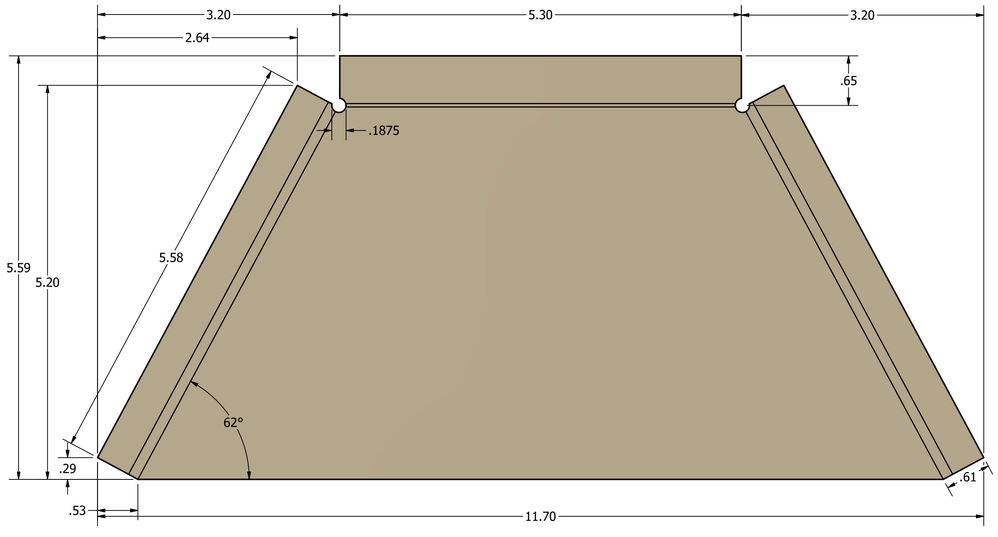




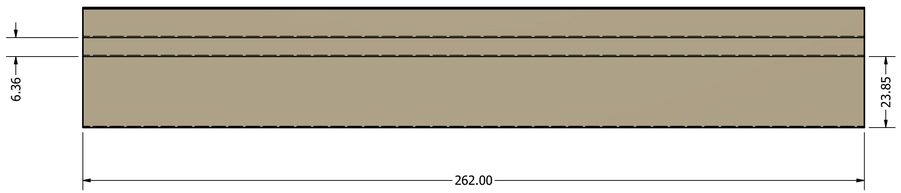
Suggest cutting 2 of these. One to have in case we just need to bend it at the shop.
I gave enough measurements so you can figure out the best way to cut.

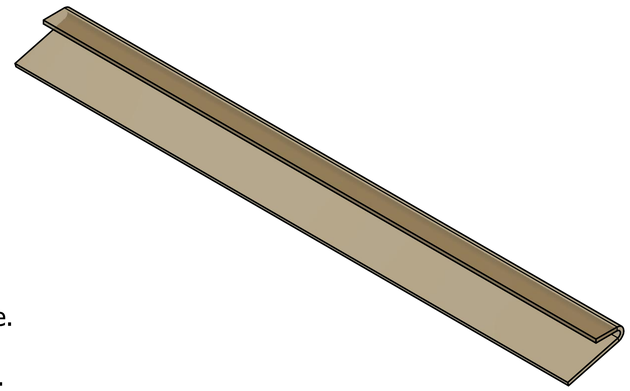
I would start by sketching the 11.7 in by 5.6 in rectangle, then you can take measurements off of the corners.

NOTE: Where the top tab and the side tabs meet, just draw straight lines to intersect then drill a 3/16 or 1/4 in hole where they meet to reduce stress at the bend point.



LOWER POLYCARB BENDING





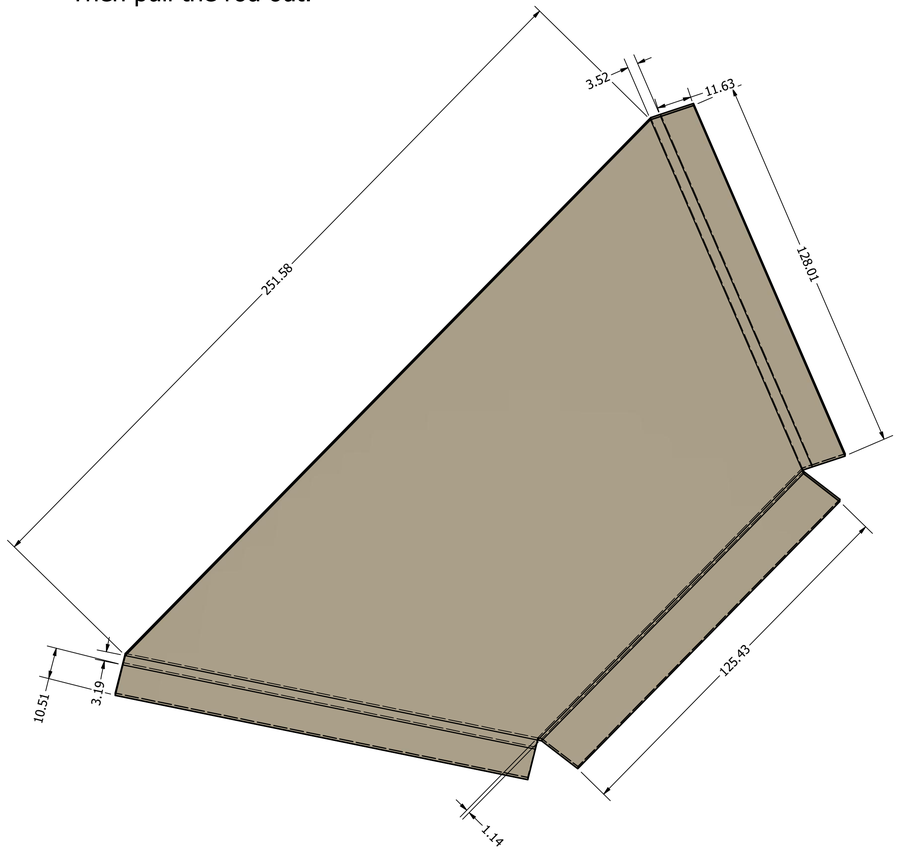
To bend this piece you will need either a heat gun or an oven.
Also either an ~1/8 rod longer than the piece or a 5mm hex rod.
Oven:

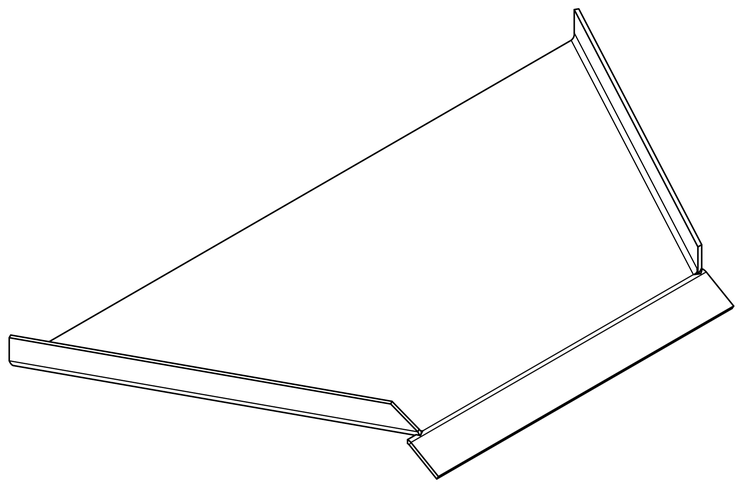
1. Place piece in oven on lowest setting. Check every 5 minutes to see if it is pliable. (note use gloves)
2. When pliable, place on a table and lay the above rod between the 2 dashed lines.
3. With a fork, spoon, screw driver or other utensil, and fold the small section over the rod. Attempt to make it even along the length.

Heat Gun:

1. Clamp the long side to a bench.
2. Place the rod between the two lines.
3. Heat the underside and bend small section over the rod as it becomes compliant.

After bending -- Either hold in place and let cool.
You can use a cool damp cloth to run along the bend to cool it.
Then pull the rod out.





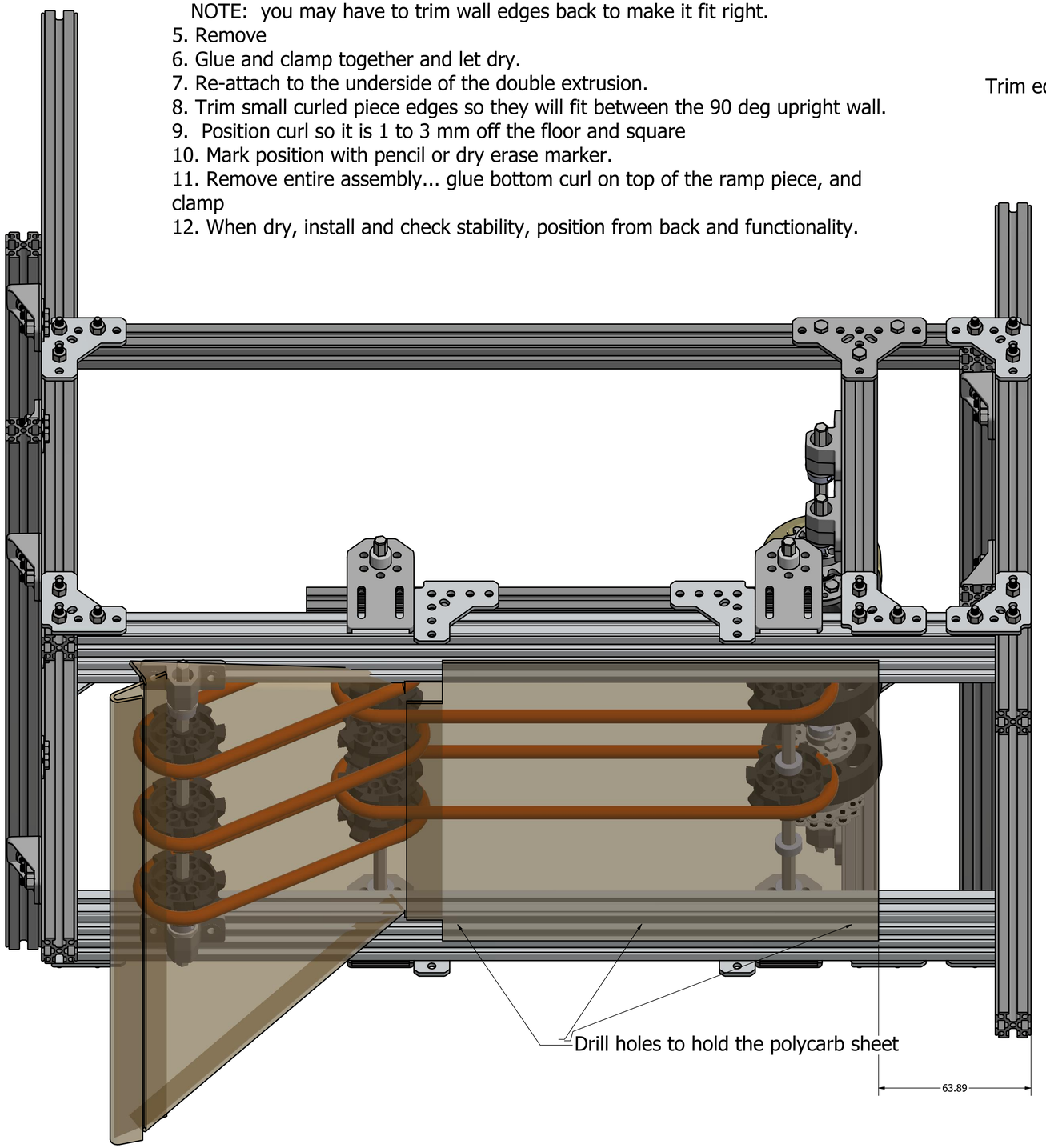
To bend the trapezoid plate:
You can use the above instructions and bend the sides over a table edge to 90 degrees.
Bend the tab in the opposite direction approximately 30 degrees.

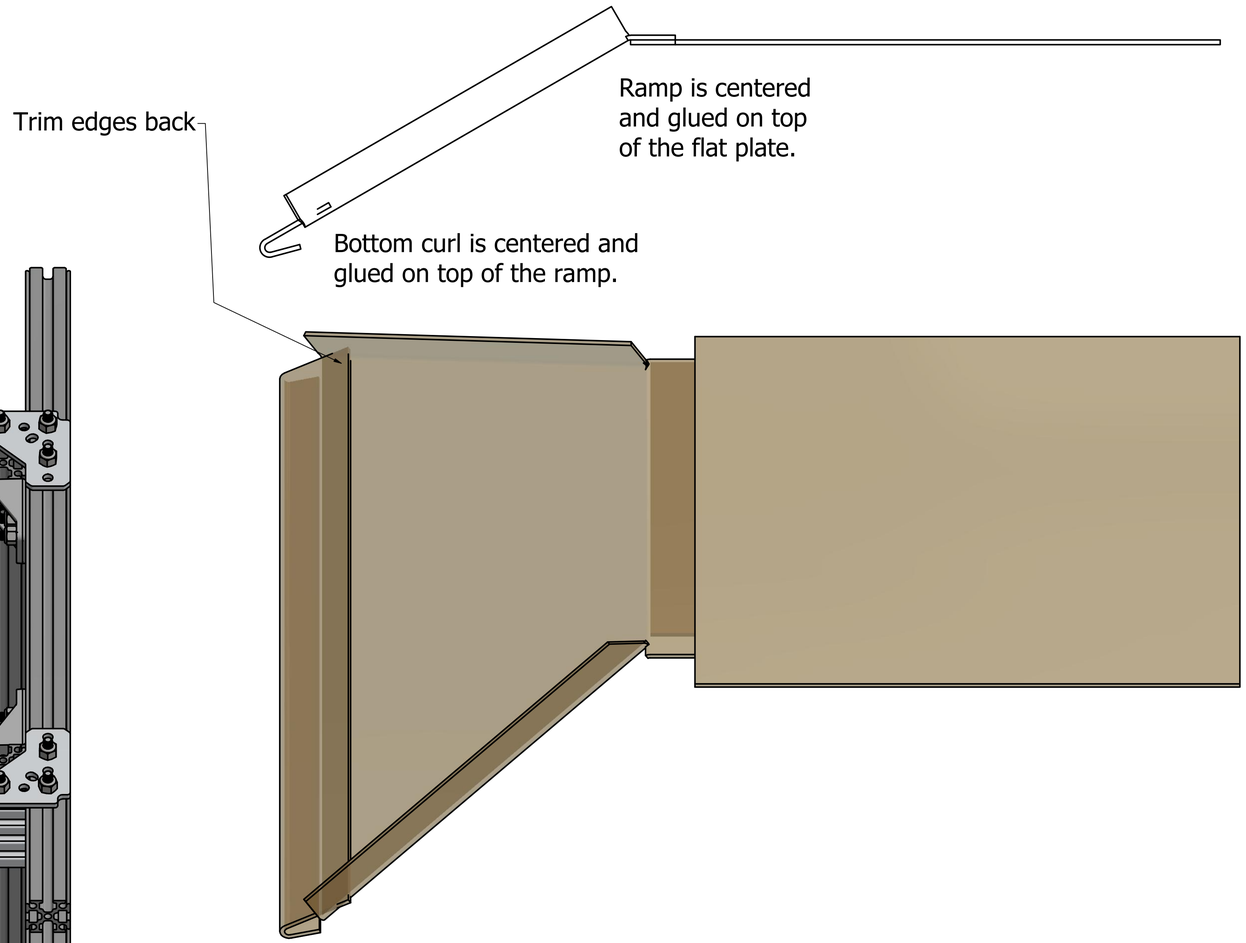
We might just bend these at the shop if a mentor can go in to do this.

NOTE: make sure the connection between the sides and the tab is round (run a drill bit at the point they meet to reduce stress points.

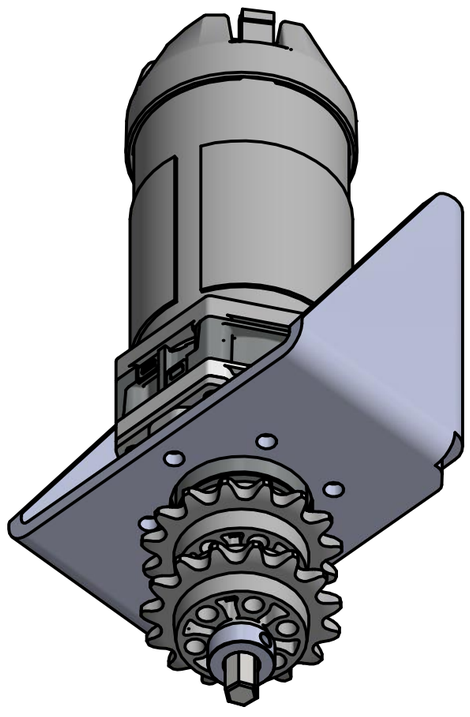
Assembly order

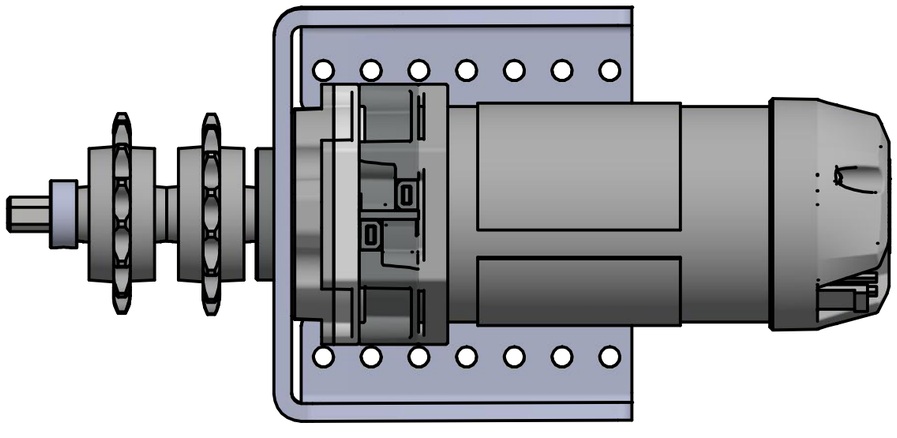
1. Center flat plate under double extrusion.
2. Mark spots for 3 holes on one side, then drill.
3. Add bolts and tighten to hold and repeat measurement and drilling for the other side.
4. Center triangle 30 deg tab on top of the flat plate
   Mark position with pencil or dry erase marker
   NOTE: you may have to trim wall edges back to make it fit right.
5. Remove
6. Glue and clamp together and let dry.
7. Re-attach to the underside of the double extrusion.
8. Trim small curled piece edges so they will fit between the 90 deg upright wall.
9. Position curl so it is 1 to 3 mm off the floor and square
10. Mark position with pencil or dry erase marker.
11. Remove entire assembly... glue bottom curl on top of the ramp piece, and clamp
12. When dry, install and check stability, position from back and functionality.





LOWER POLYCORD MOTOR ASSEMBLY





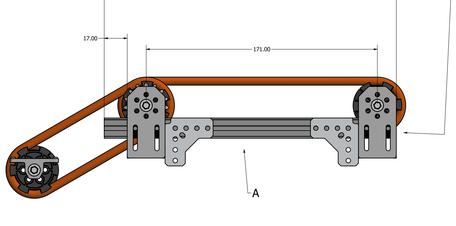
long reach mounting bracket (qty. 1) Rev-41-1625
15 tooth sprocket (qty. 2) Rev-41-1339
slim shaft collar (qty. 1) Rev-41-1629
52mm hex shaft (qty. 1)

1.

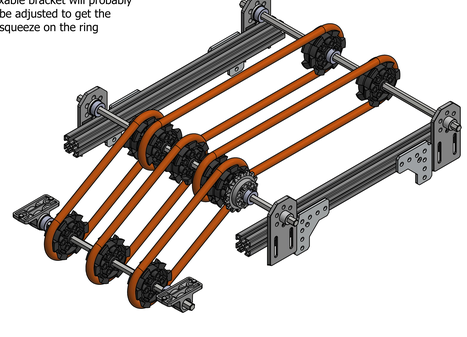
LOWER POLYCORD WITH SUPPORT ASSEMBLY

use the polycord assembles C&D from polycarb assemblies and attach mounting beams

A=216mm extrusion (qty. 2)
L bracket (qty. 4) Rev-41-1480
polycord and axle assemblys (qty. 1)

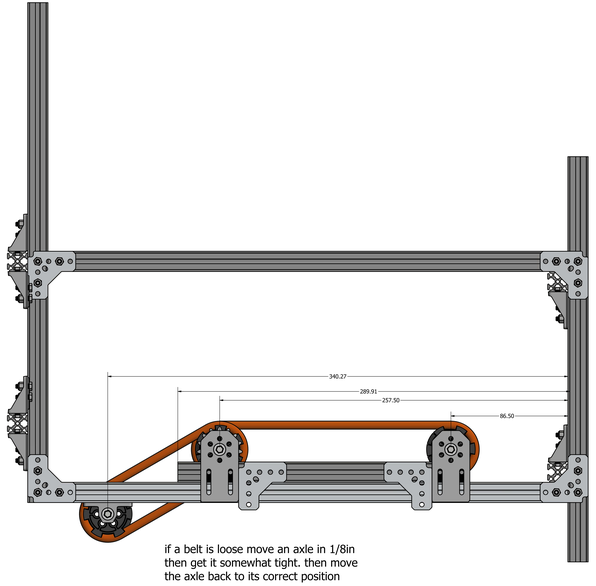


when you finish making the robot, the indexable bracket will probably need to be adjusted to get the correct squeeze on the ring

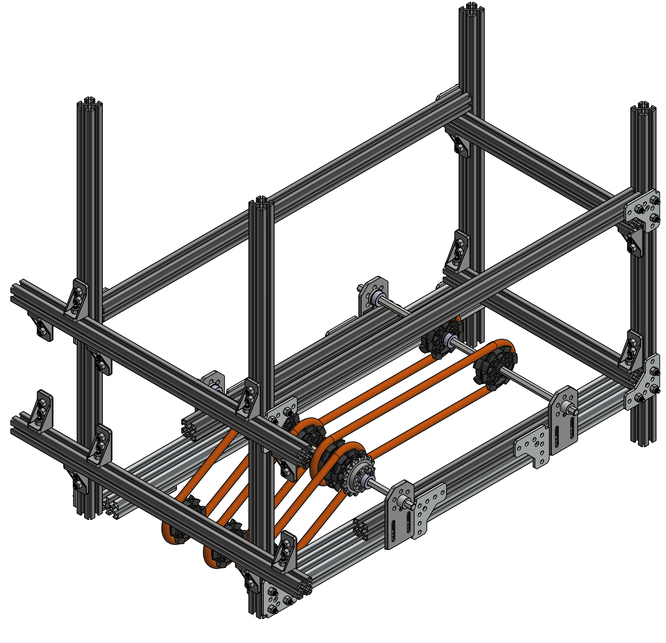


2.

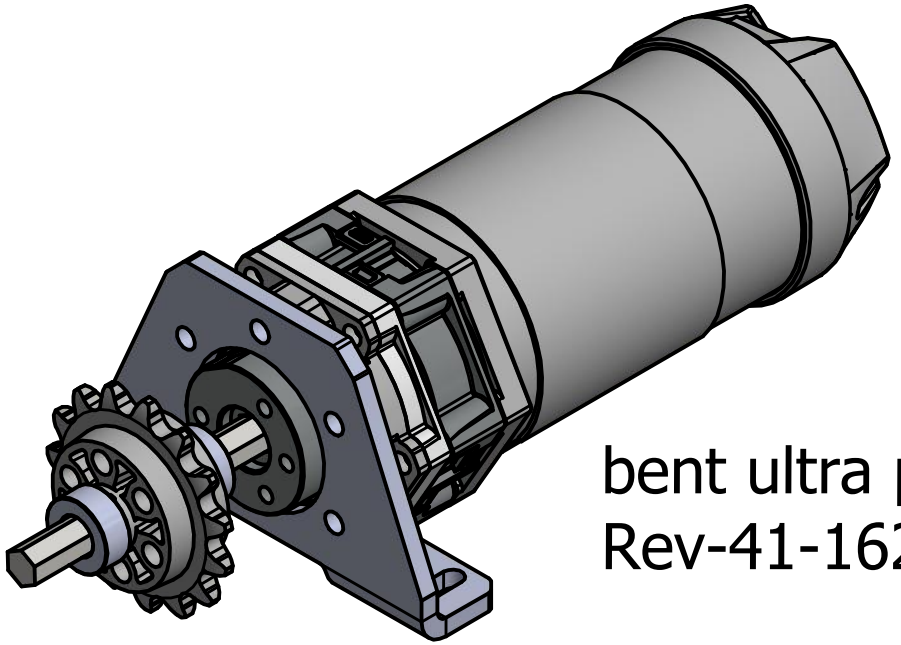
LOWER POLYCORD ADDED TO FRAME ASSEMBLY



if a belt is loose move an axle in 1/8in then get it somewhat tight. then move the axle back to its correct position

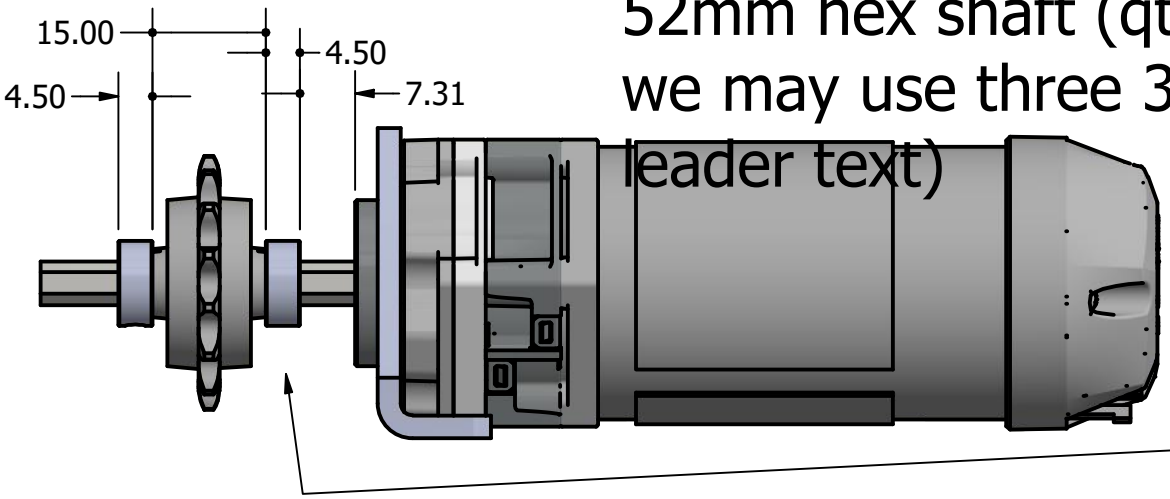


FEEDER MOTOR



bent ultra planetary motor mounting bracket (qty. 1) Rev-41-1623

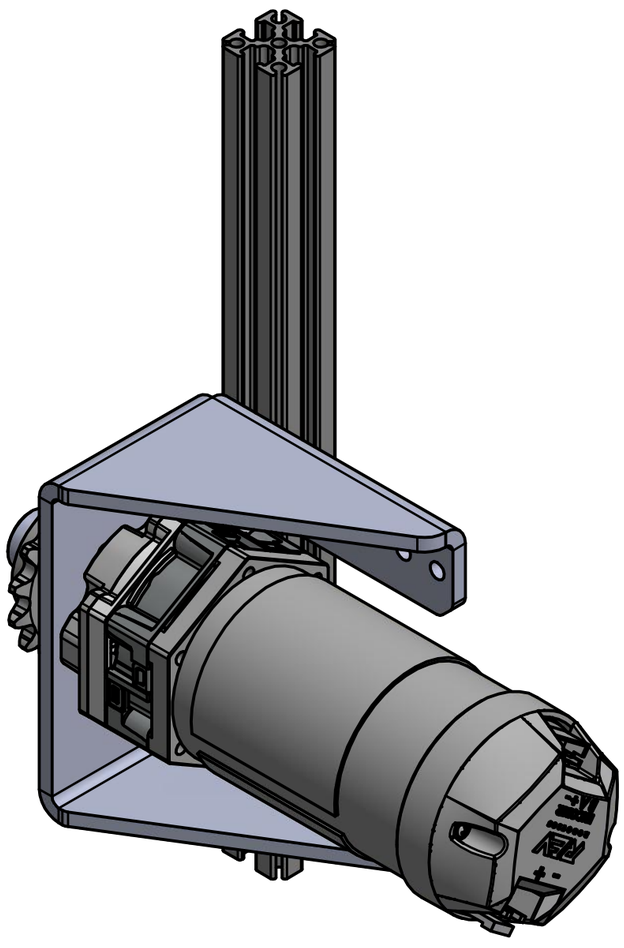
slim shaft collar (qty. 2) Rev-41-1629
15 tooth sprocket (qty. 1) Rev-41-1339
ultra planetary motor 1 stage (qty. 1) ratio tbd
52mm hex shaft (qty. 1)
we may use three 3mm spacers instead of a collar (see leader text)

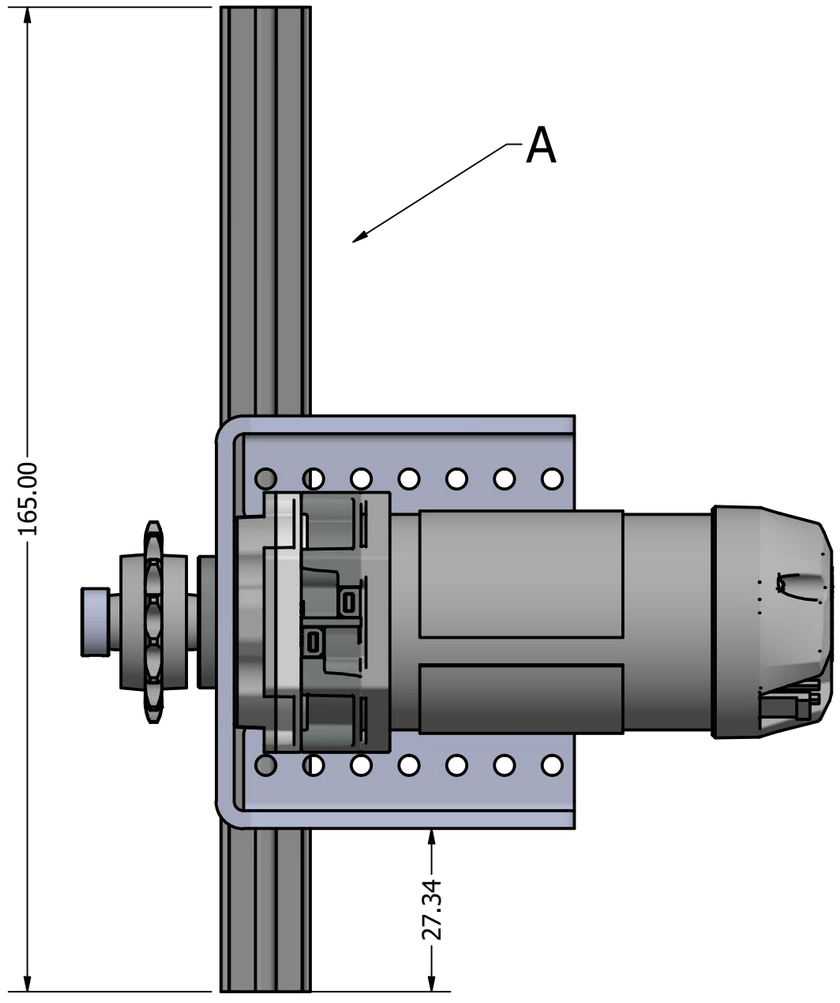


it may be better and easier to build if you use four 3mm spacers instead of a shaft collar to hold the sprocket at a set distance.

INTAKE MOTOR ASSEMBLY

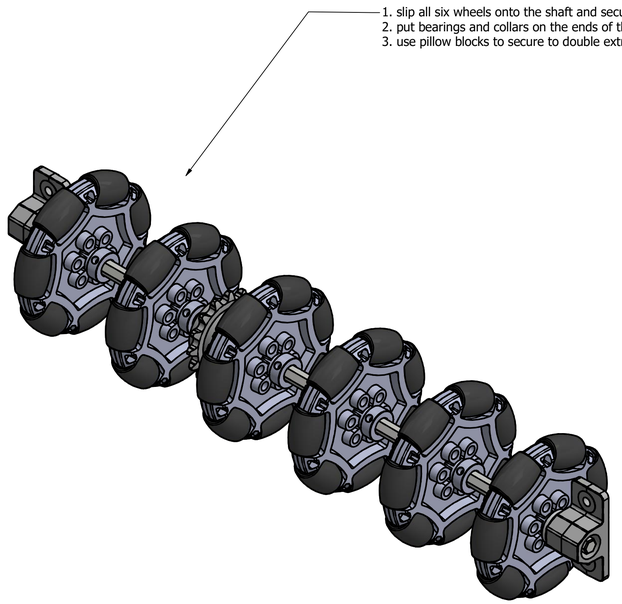
A=165mm extrusion (qty. 1) [outside cut]
long reach ultra planetary mount bracket Rev-41-1625
ultra planetary motor 1 stage (qty. 1) ratio tbd
15 tooth sprocket (qty. 1) Rev-41-1339
slim shaft collar (qty. 1) Rev-41-1629
30mm hex shaft (qty. 1) -- Note, can be longer.



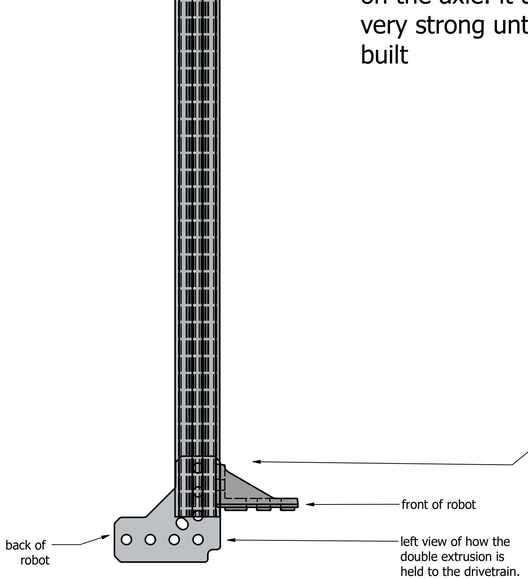


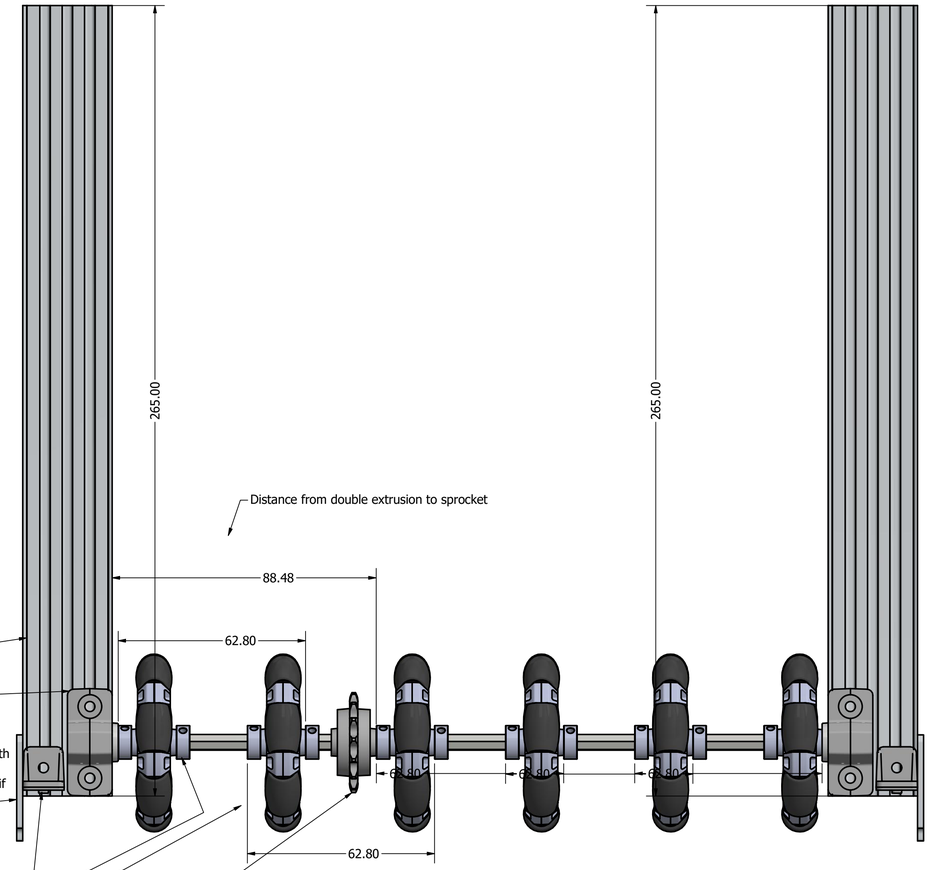
INTAKE ASSEMBLY

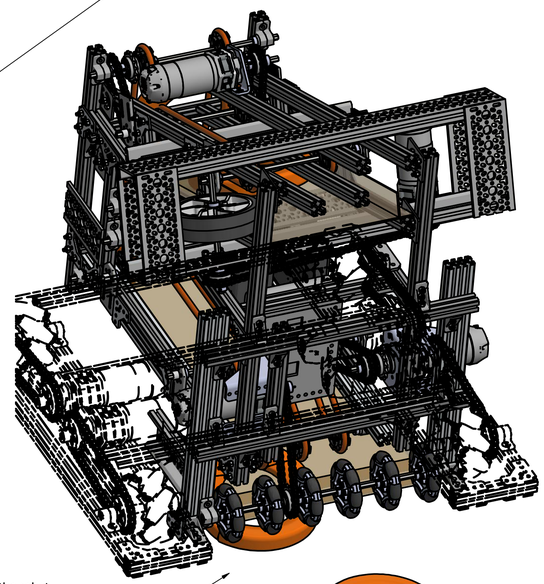
It would be best to remove the L bracket on the drivetrain and put the lap bracket directly on the extrusion. But if the drivetrain is too weak then you could put the L bracket back and put the lap bracket on top of the L bracket.



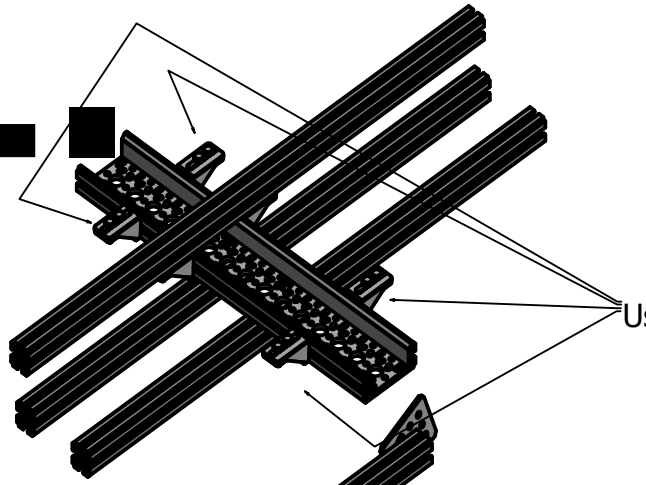
Note: You should probably put the extrusion on the drivtrain, and then put on the axle. it double extrusion will not be very strong until the rest of the frame is built



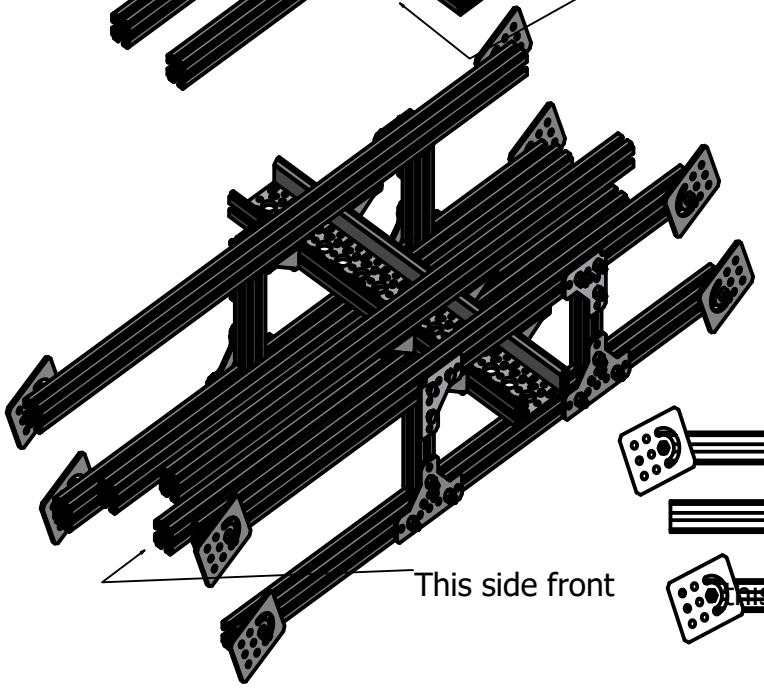




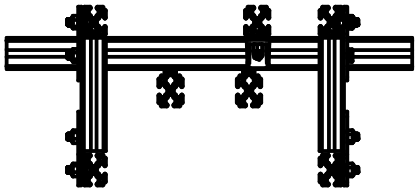
1. SHOOTER ROOF to WALL(s) ASSEMBLY

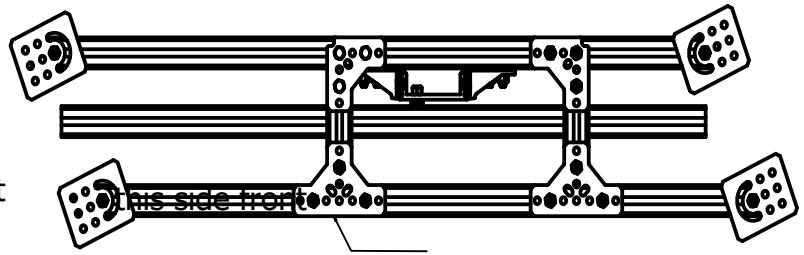


Use these four lap brackets to secure the shooter roof assembly to the shooter ramp frame



This side front





This side front

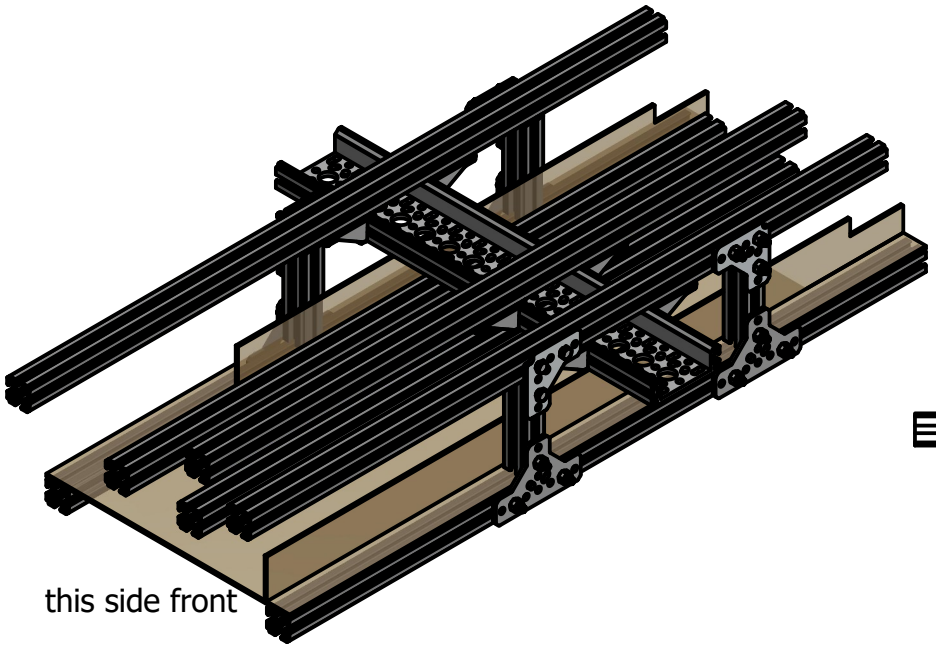
This bracket needs to be removed before install.

Or, inside brackets can be used instead. (probably better option)

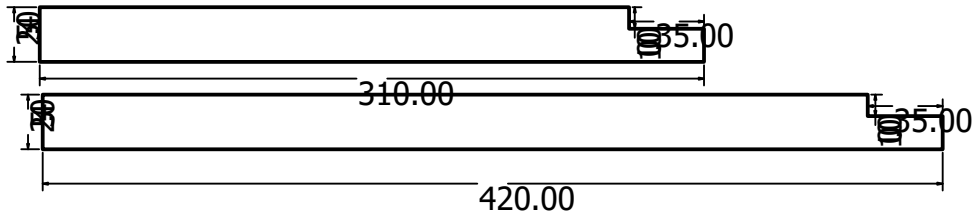
SHOOTER RAMP POLYCARB ADDITIONS

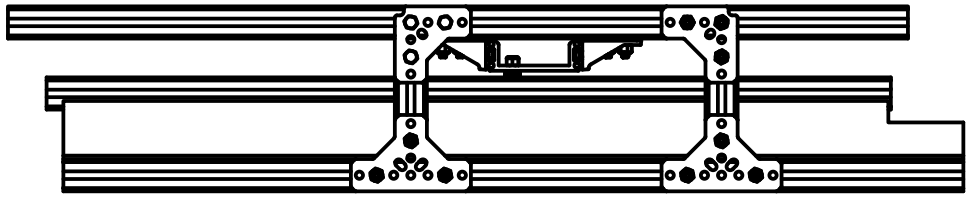
2.

walls and polycarb (qty. 1)



The back of the walls will be cut back because the ring does not need to be supported way in the back

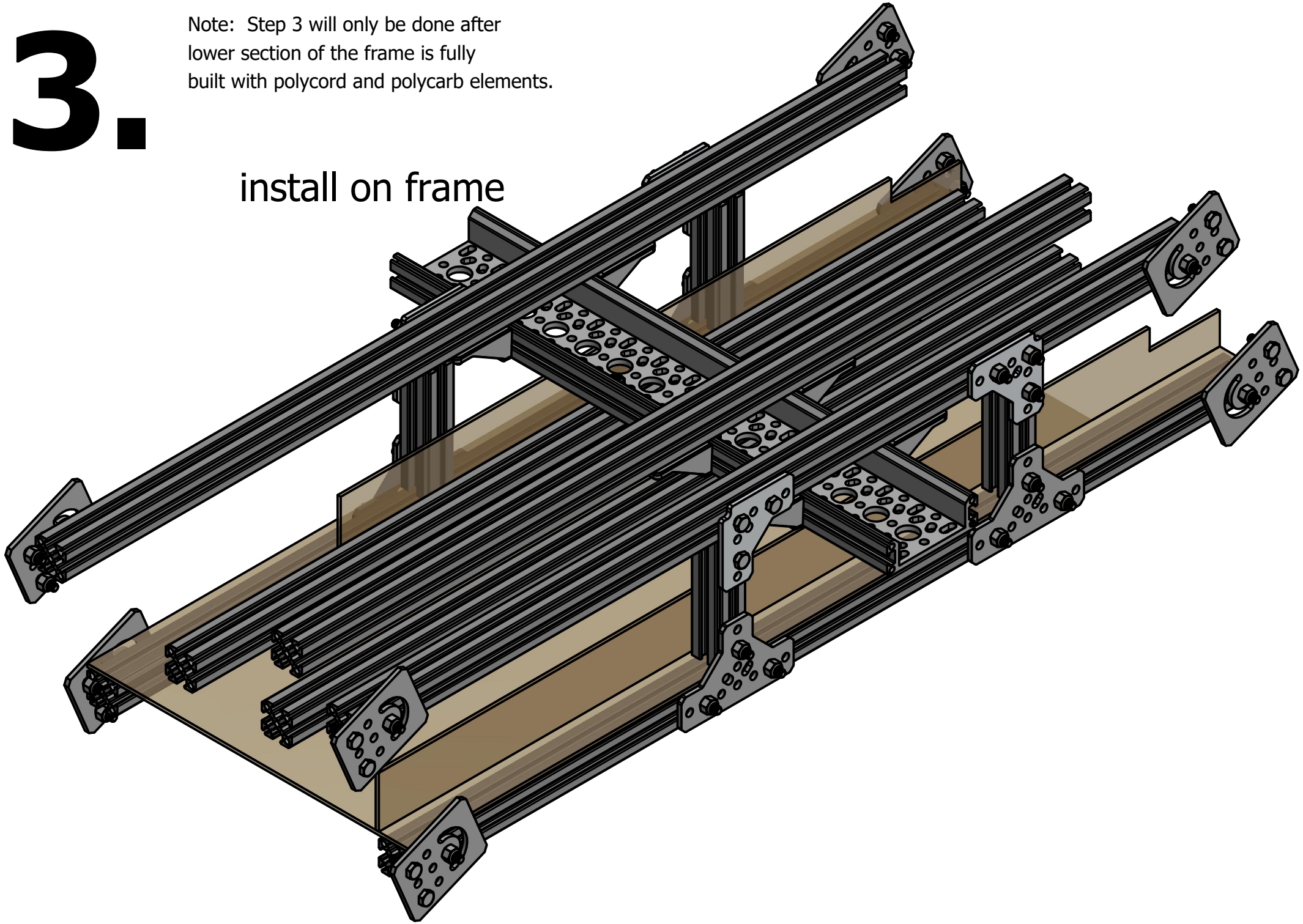




3.

Note: Step 3 will only be done after lower section of the frame is fully built with polycord and polycarb elements.

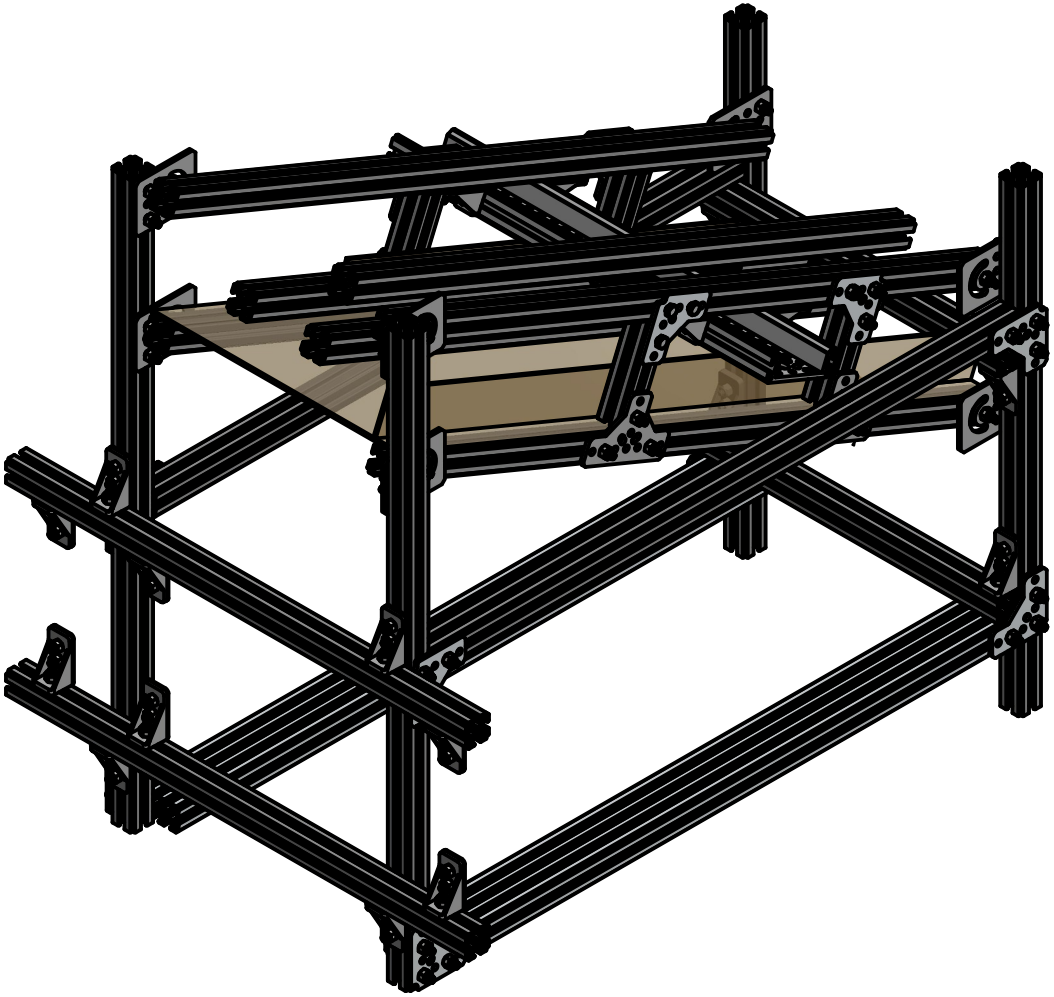
install on frame

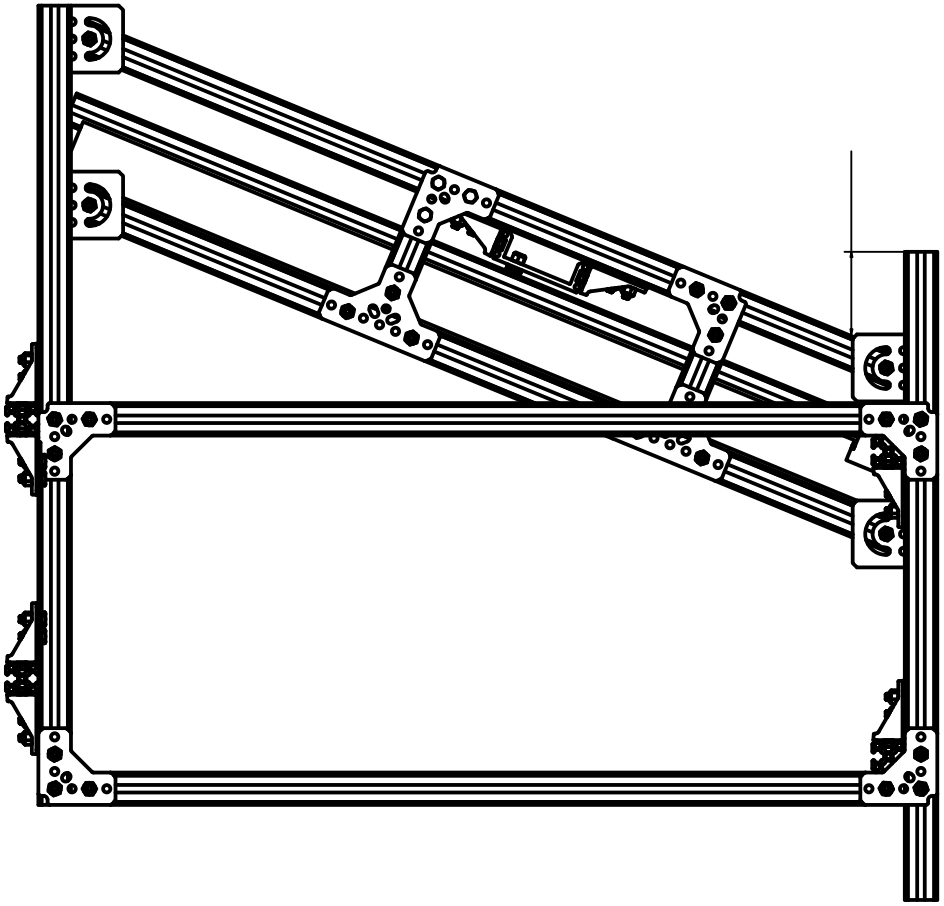


SHOOTER ASSEMBLY ADDED TO LOWER SECTION

Note: Shooter ramp will also have the shooter (wheel/moter) assembly added.

Not Shown here



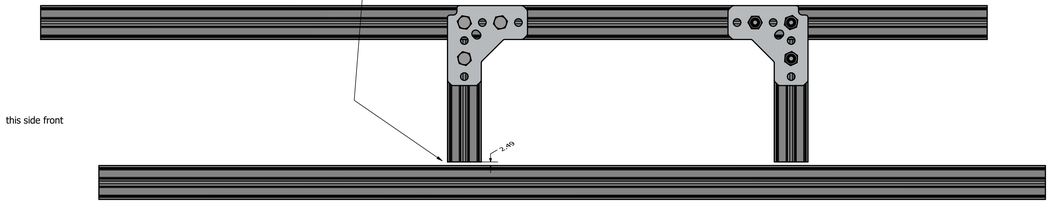


A=(qty. 2) Rev-41-1432
B=(qty. 4) 54.41mm extrusion [inside cut]

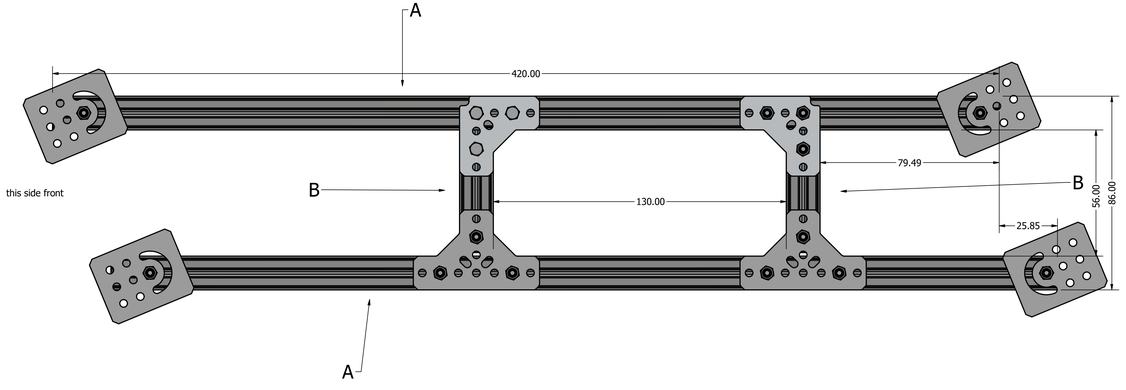
90 degree L bracket (qty. 4) Rev-41-1480
t bracket (qty. 4) Rev-41-1483

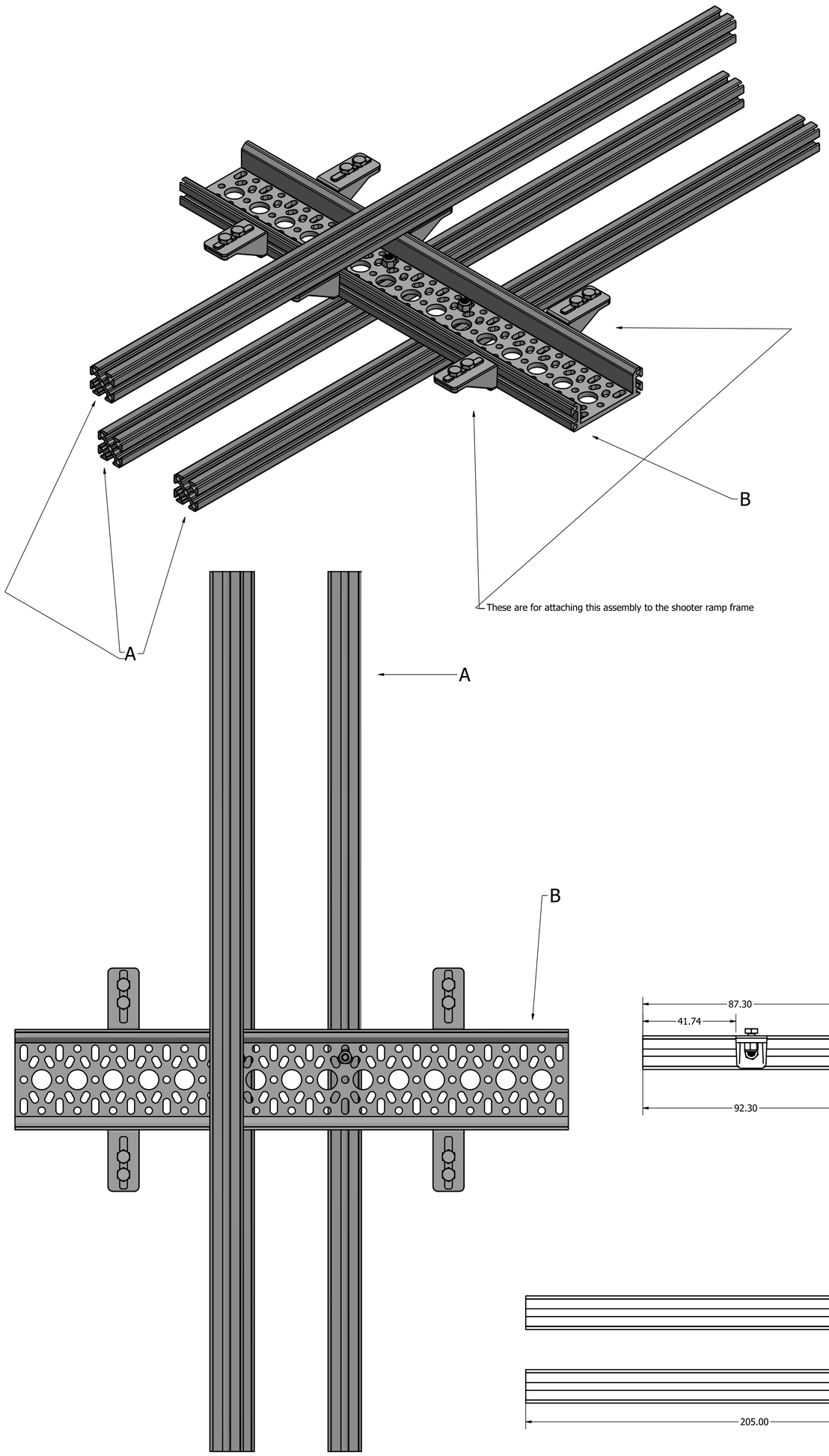
The rear t brackets may have to be replaced with inside corner brackets because the bolts will hit the frame when the shooter assembly in placed in.

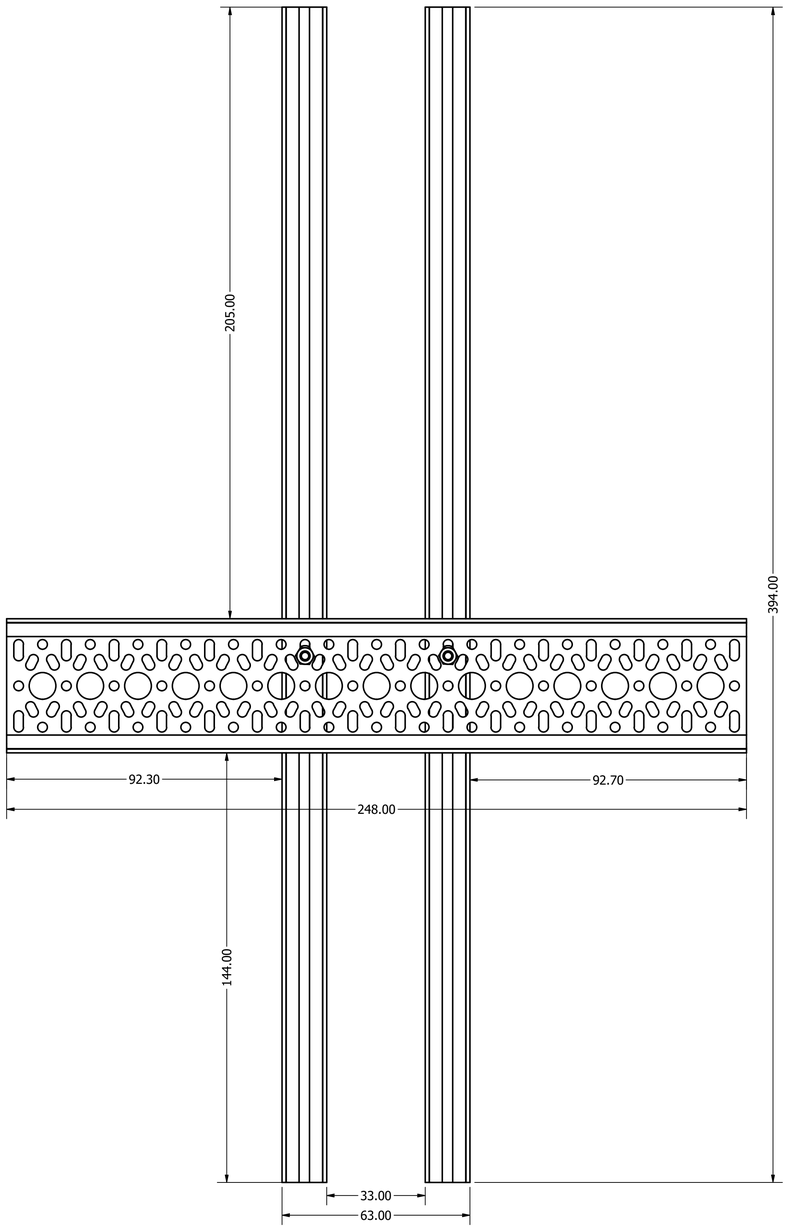
This gap is where the floor will sit. when you make it flush the small piece of extrusion to the top extrusion and make sure that the inside to inside dimension is correct.
just put the t bracket on the bottom. Then get the inside dimension correct and lock the bracket in.

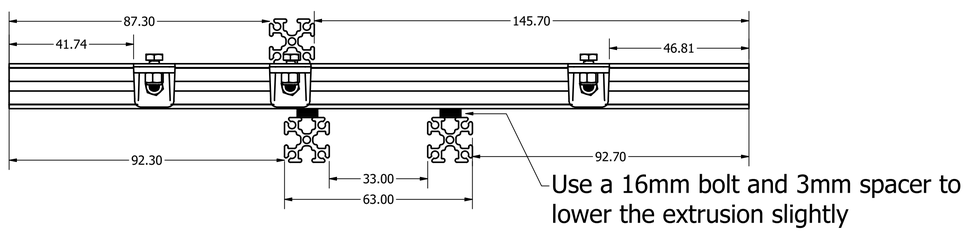


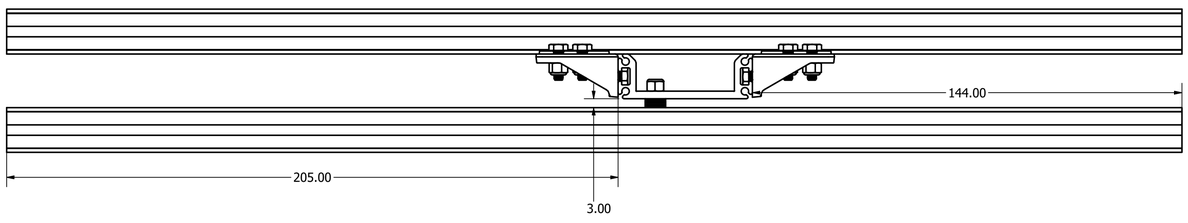
You need to make two of these side frames that are mirror images of each other.









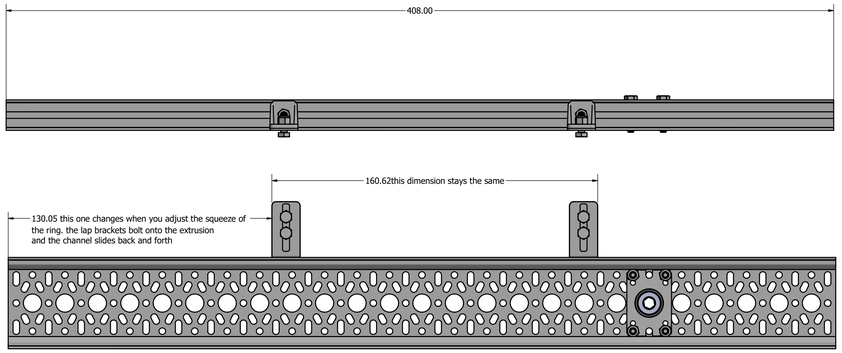


A=(qty. 3) 394mm extrusion [outside cut]
B=(qty. 1) Rev-41-1767
Lap bracket (qty. 6) Rev-41-1321

16mm bolts/nuts (qty. 2) Rev-41-1360
these are for holding the lower extrusions to the c-channel

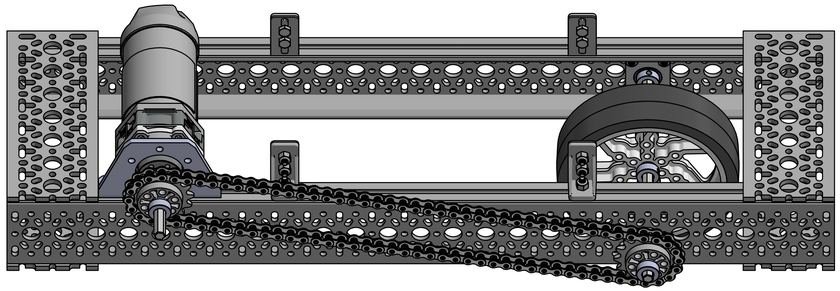
other nuts/bolts (qty. 18)
3mm spacer (qty. 2) Rev-41-1324

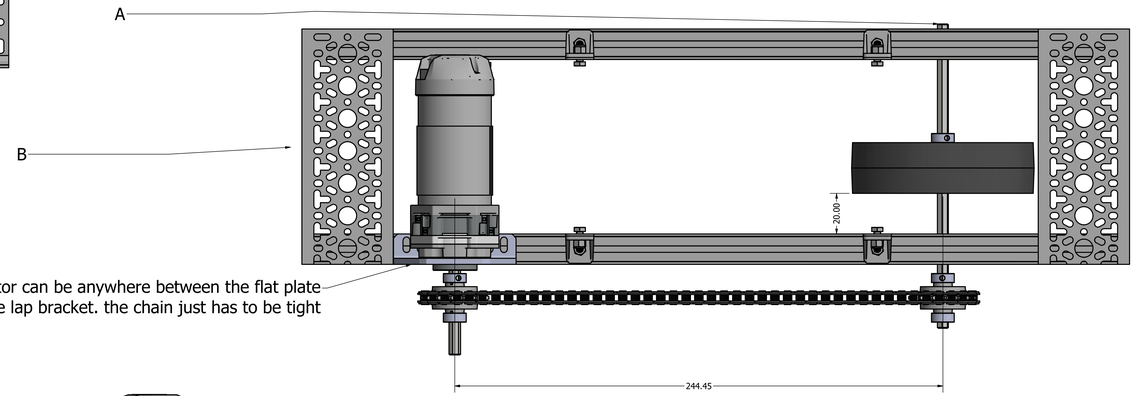
SHOOTER ASSEMBLY



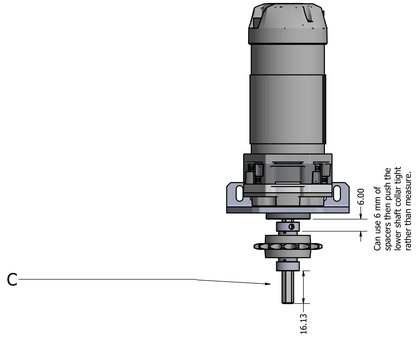
A= 150mm hex shaft [outside cut](qty.1)
B= 116 mm flat plate [outside cut] (qty. 4)
C= 52 mm hex shaft [outside cut] (qty.1)
90mm grip wheel (qty. 1) Rev-41-1267
slim shaft collars (qty. 8) Rev-41-1629
15 tooth sprocket (qty. 2) Rev-41-1339
ultraplantary motor (qty. 1) (1:1)
ultraplanetary mountbracket bent (qty. 1) Rev-41-1623
c-channel (qty. 2) Rev-41-1762
lap bracket (qty. 4) Rev-41-1321
bearing block (qty. 2) Rev-41-1683
chain 23 in (92 links) Rev-41-1365

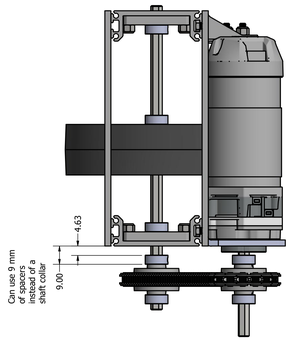
These top pictures are independent looks of what it will look like after it is assembled on the shooter ramp, but see below wheel instructions for a better assembly

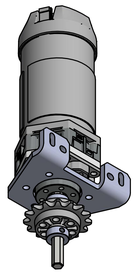


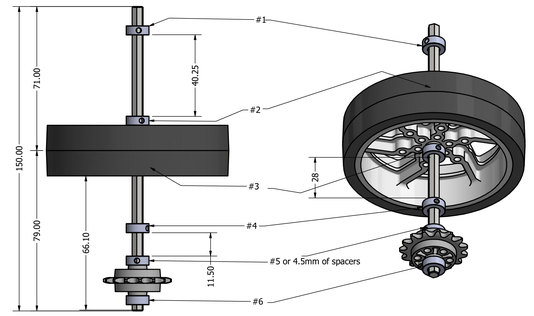


motor can be anywhere between the flat plate and the lap bracket. the chain just has to be tight approximately - tensioning chain will alter it.







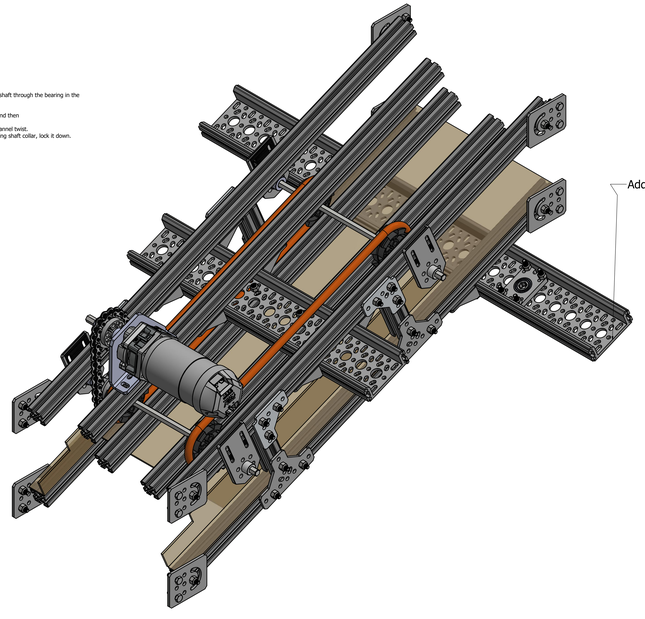


This assembly is multi part measurements not highly important.
This view is to show you all the pieces that will go with the finished shooter wheel.
For Now:
Put the wheel on the shaft with two shaft collars on each side. (#1,2 and #3,4)

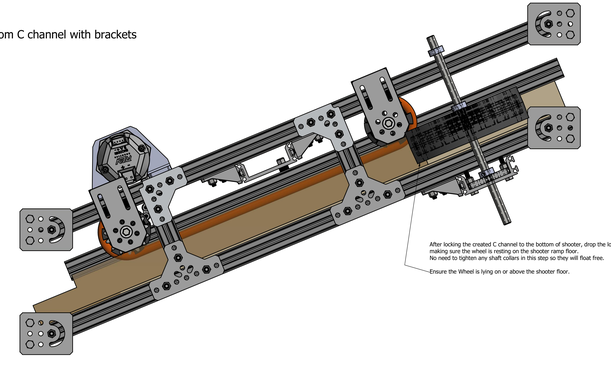
SHOOTER ASSEMBLY

Full instructions for assembly:
These will be repeated for each step in the following pictures.

After locking the created C channel to the bottom of shooter, drop the longer wheel shaft through the bearing in the c-channel making sure the wheel is resting on the shooter ramp floor.
Place the top C channel on.
Thread the hex shaft through the top bearing until the shaft just peeks out the top and then
a. Lock shaft collar #1 tight to the bearing.
b. Press shaft collar # 4 down the the lower bearing and lock it in (don't let the C channel twist.
c. Put shaft collar #5 OR 4.5 mm of spacer on the shaft poking out the bottom. if using shaft collar, lock it down.
d. push the 15 mm sprocket up tight to the spacers/shaft collar
e. Push shaft collar #6 up against the sprocket and lock it down.
f. lift the wheel slighlty off the shooter floor (2 to 3 mm).
g. Lock the #3 shaft collar under the wheel to hold the wheel in this place
h. Lock the #2 shaft collar on top of the wheel tight to the wheel.

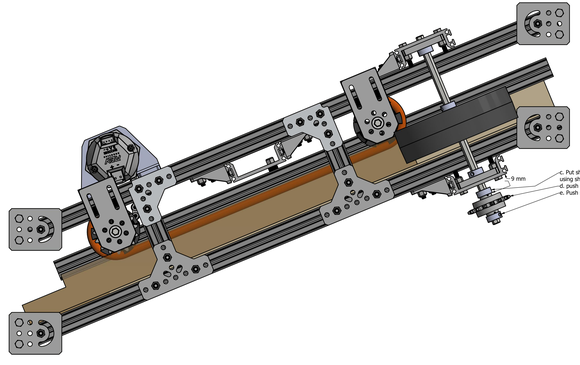


Add Bottom C channel with brackets



After locking the created C channel to the bottom of shooter, drop the longer wheel shaft through the bearing in the c-channel making sure the wheel is resting on the shooter ramp floor.
No need to tighten any shaft collars in this step so they will float free.

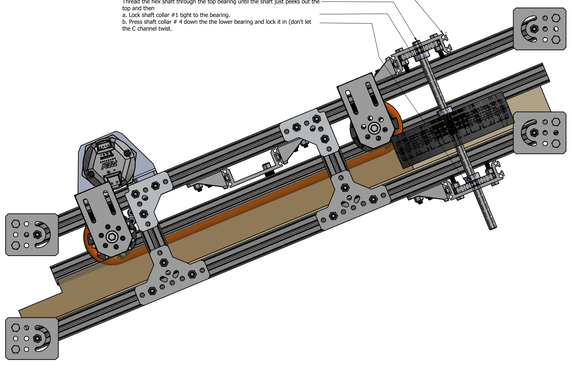
Ensure the Wheel is lying on or above the shooter floor.

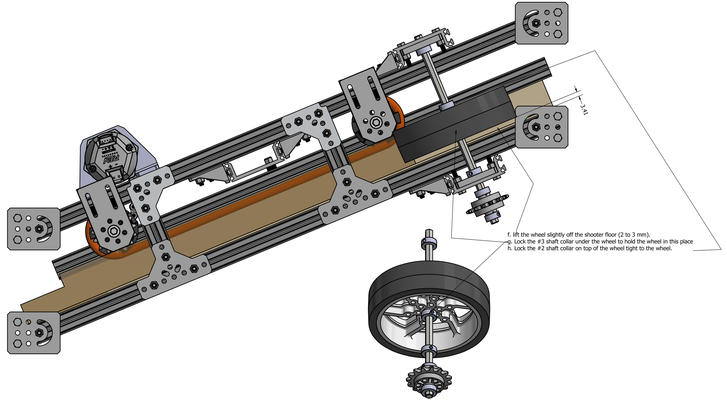


9 mm

c. Put shaft collar #5 OR 4.5 mm of spacer on the shaft poking out the bottom. if using shaft collar, lock it down.
d. push the 15 mm sprocket up tight to the spacers/shaft collar
e. Push shaft collar #6 up against the sprocket and lock it down.

Place the top C channel on.
Thread the hex shaft through the top bearing until the shaft just peeks out the top and then
a. Lock shaft collar #1 tight to the bearing.
b. Press shaft collar # 4 down the the lower bearing and lock it in (don't let the C channel twist.



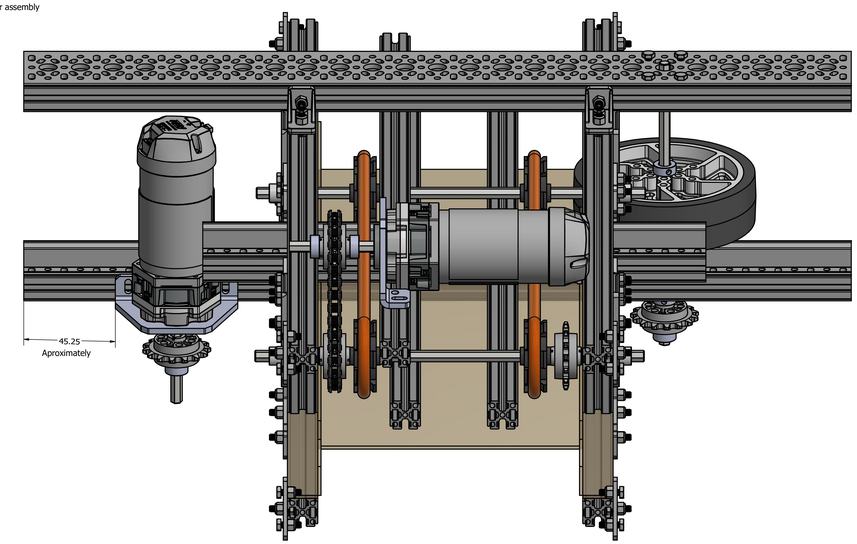


~ 3-6 mm

f. lift the wheel slighlty off the shooter floor (2 to 3 mm).
g. Lock the #3 shaft collar under the wheel to hold the wheel in this place
h. Lock the #2 shaft collar on top of the wheel tight to the wheel.

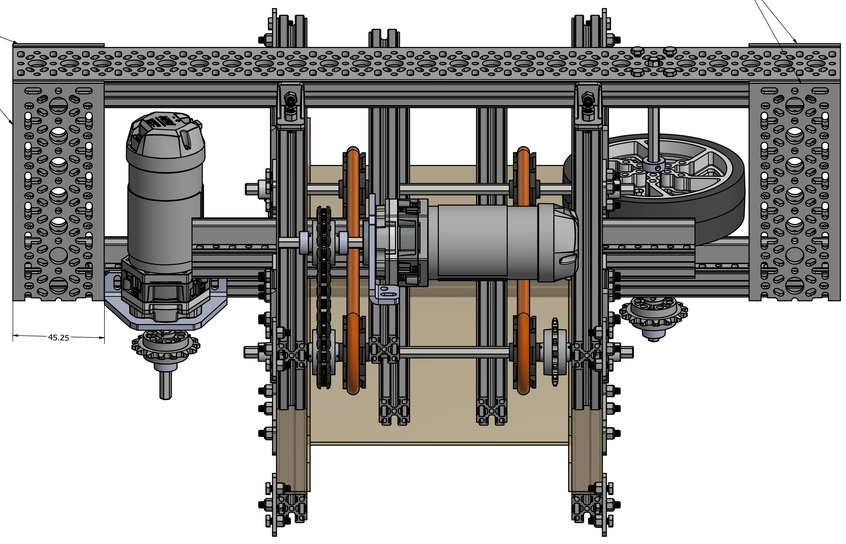
SHOOTER ASSEMBLY

Add Shooter Motor assembly

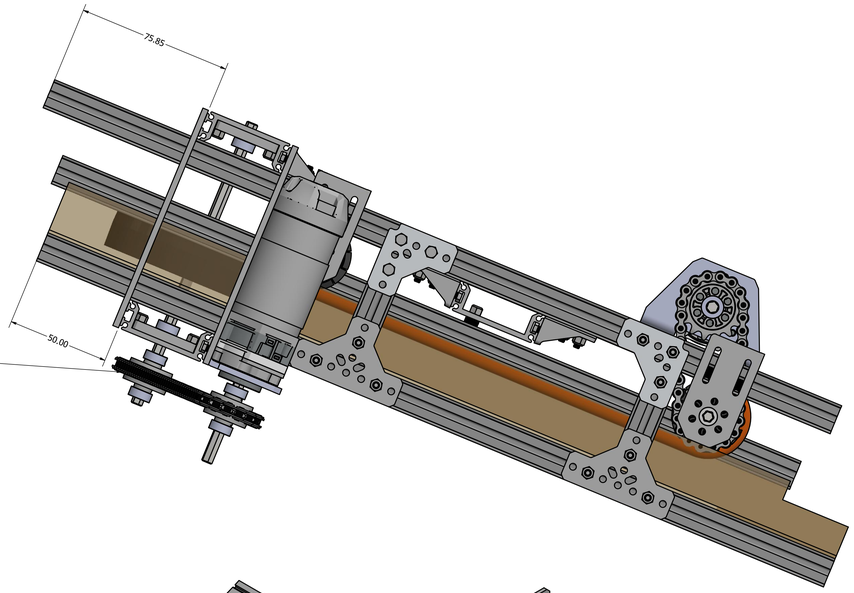


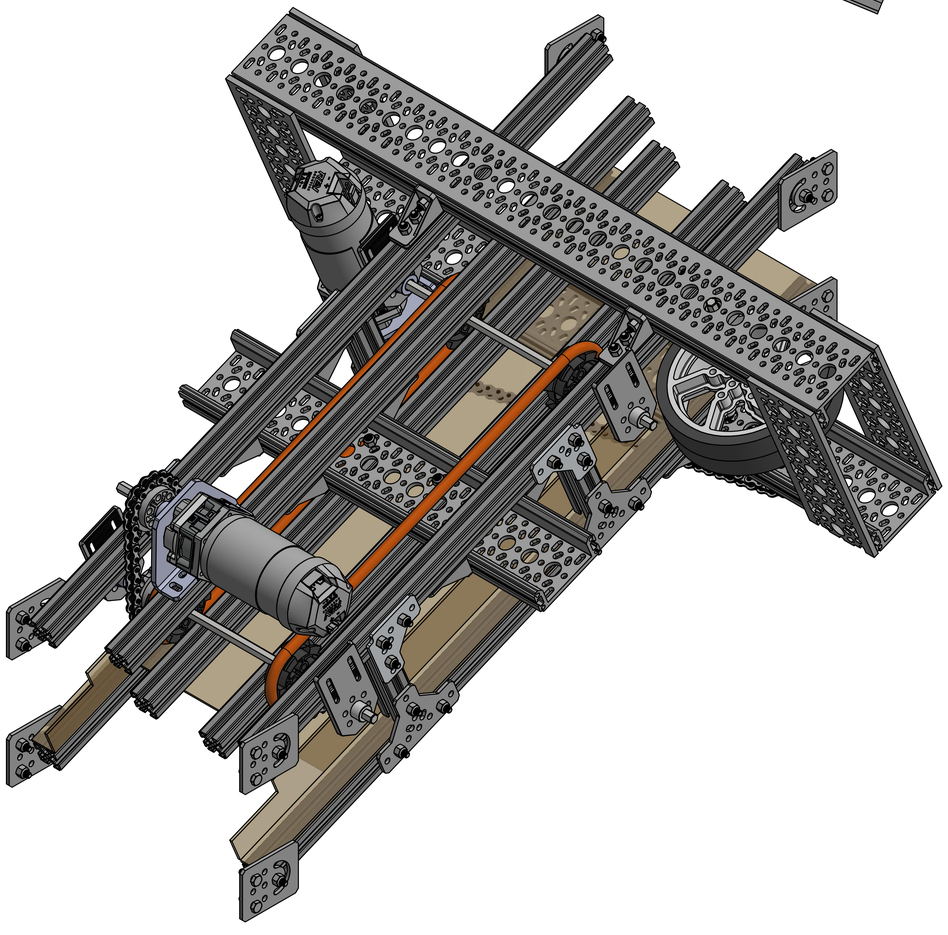
Add flat plates for stability and ensure sides of C channel is flush

Note: It may not be a perfect bolt fit. find what works.
If you find it doesn't work, we can cut and use Extrusion with brackets instead.

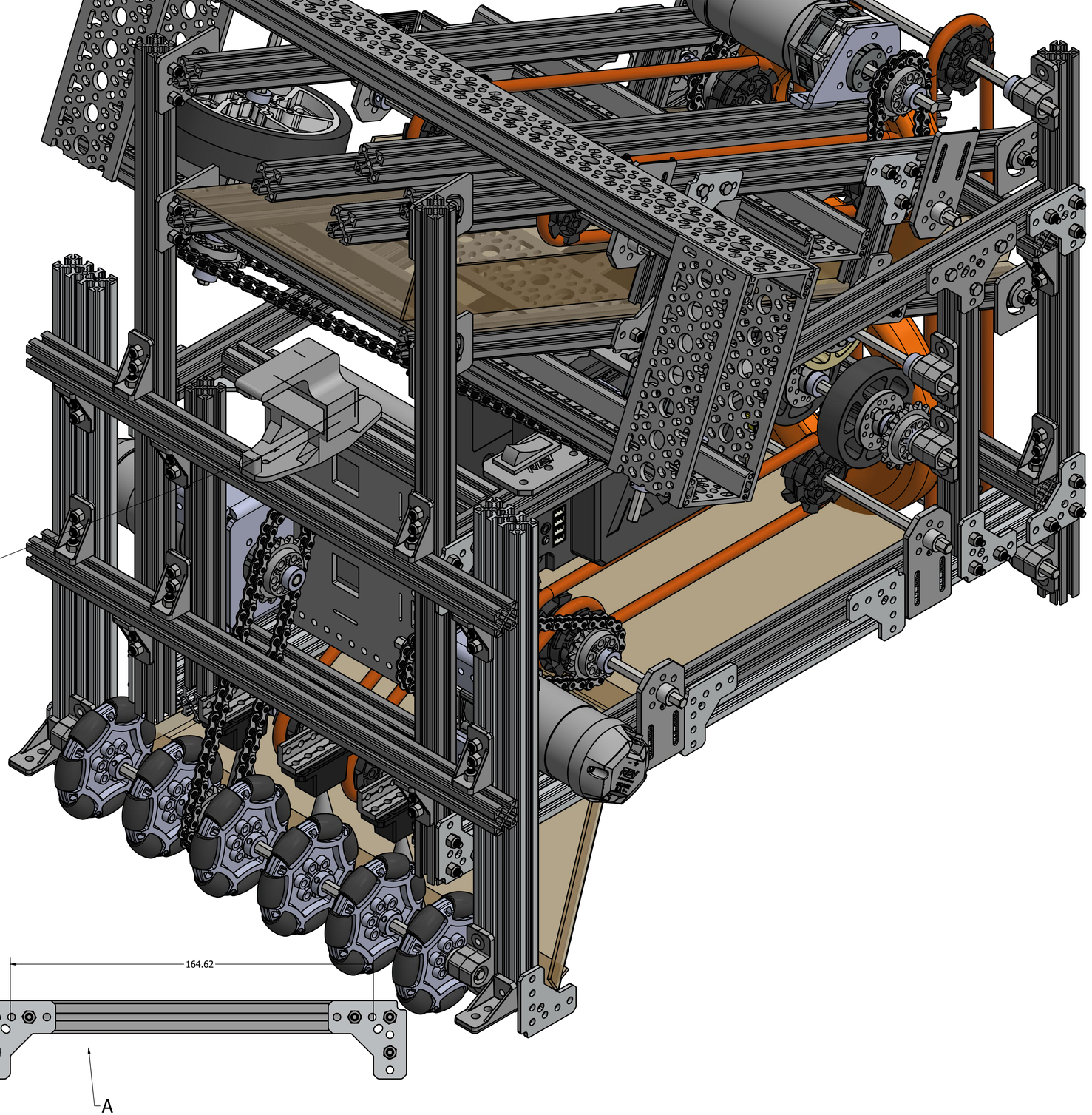


Add Chain
Ensure positioning of C-Channel is correct from front.
Tighten chain by moving motor.

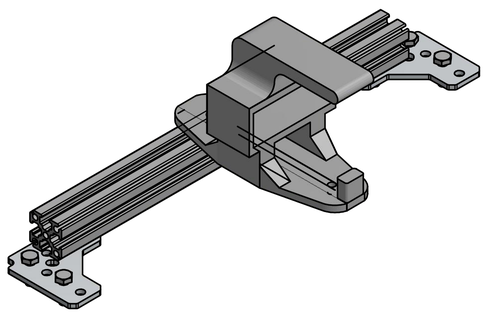


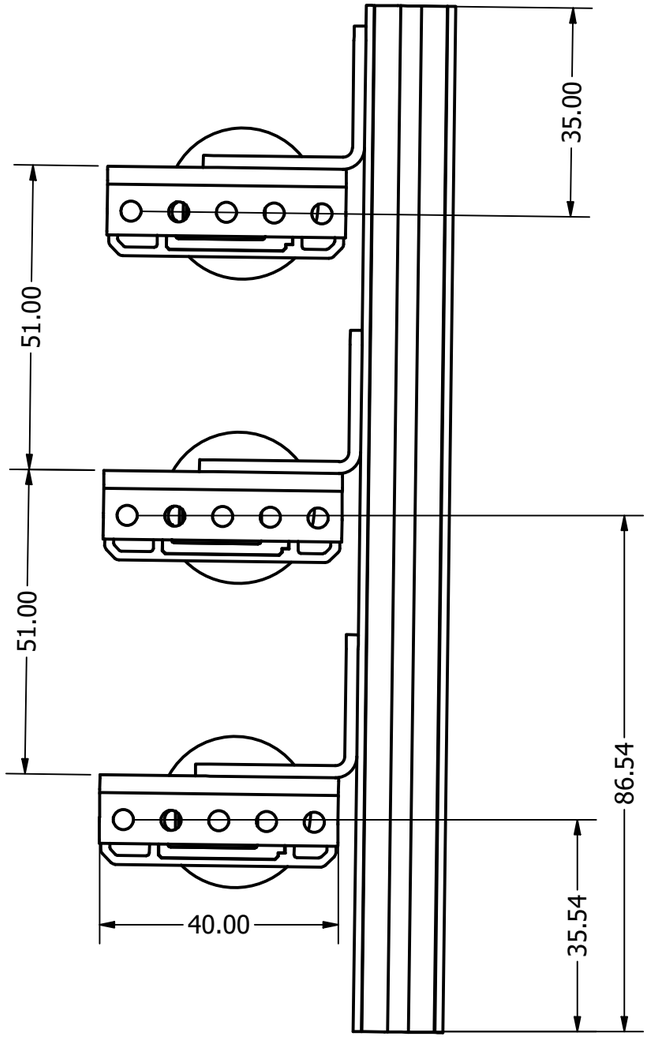


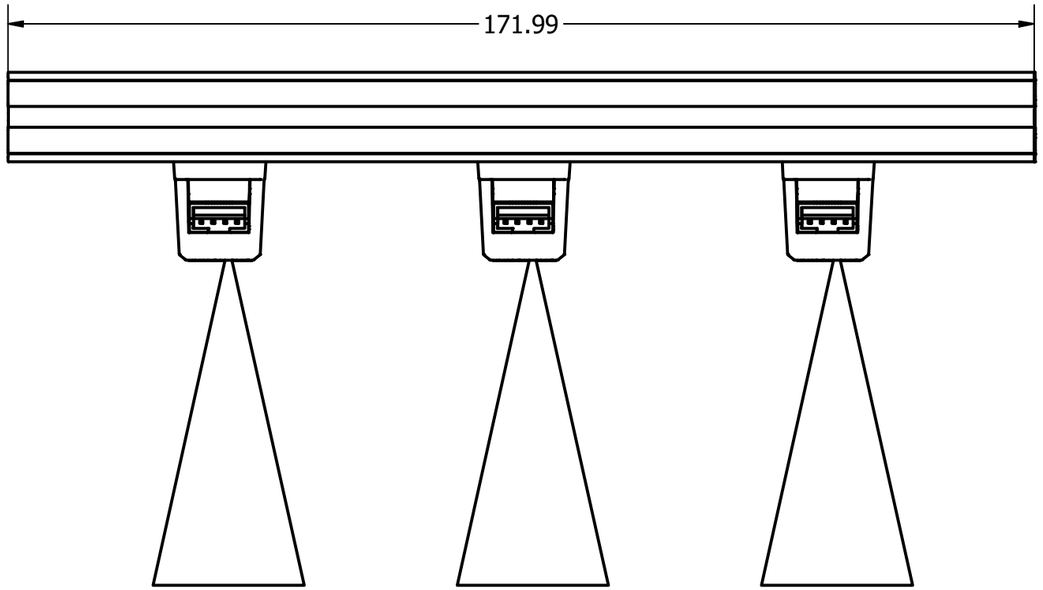
It is the camera that sets the distance from the front of the robot. just put the extrusion in and use the camera mount to set the distance from the from of the robot.

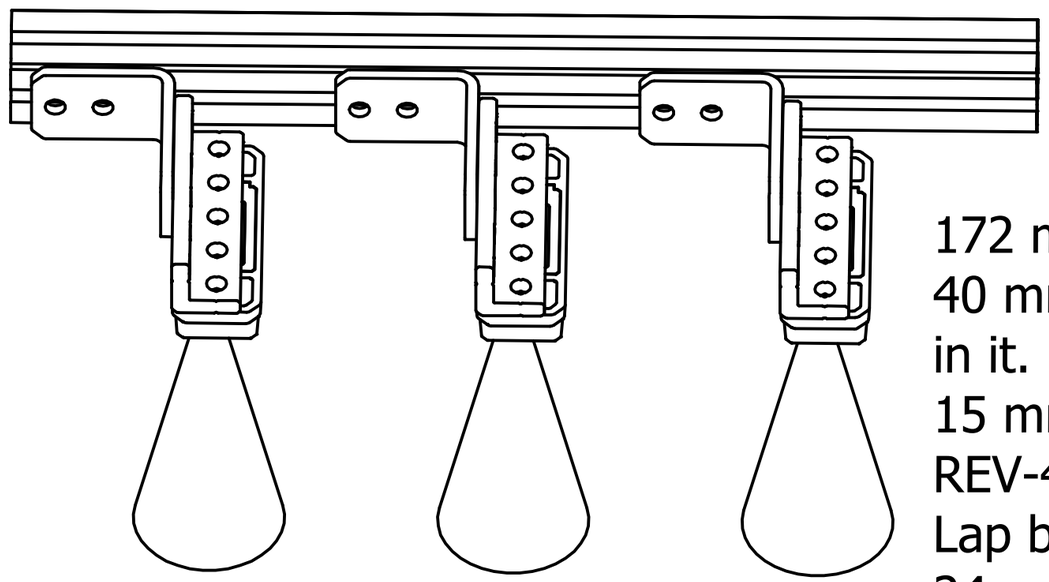


A= 164.62mm extrusion [inside cut] (qty. 1)
L-bracket (qty. 2) Rev-41-1480
camera mount (qty. 1)



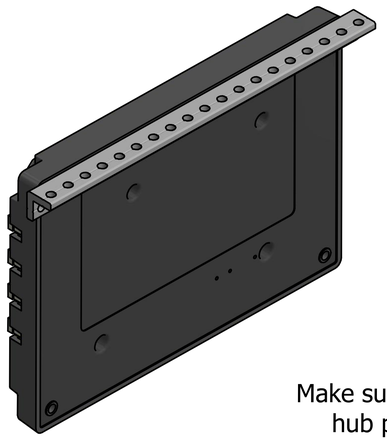


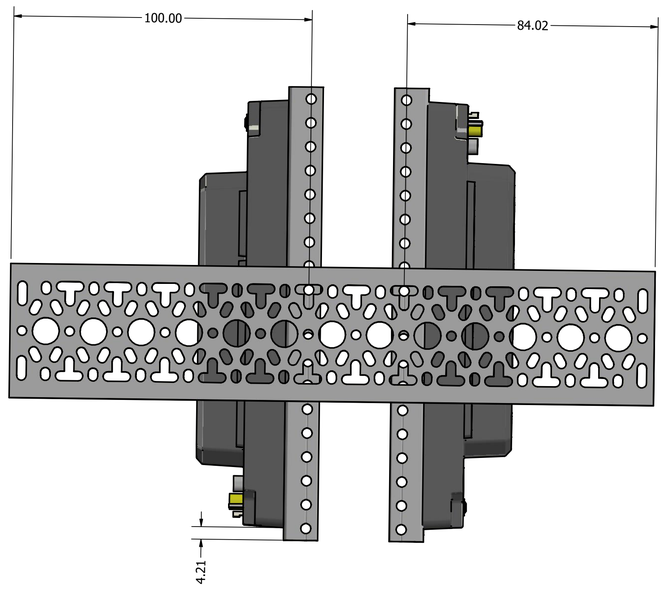


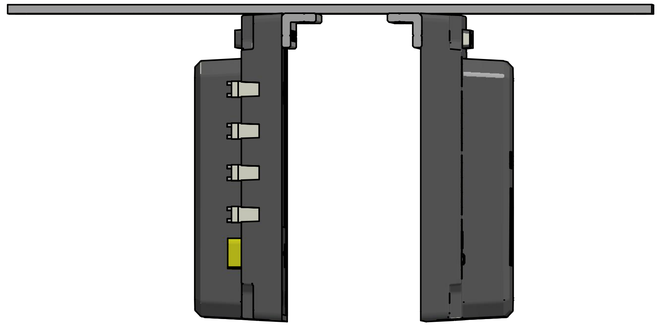


172 mm extrusion (qty 1)
40 mm L channel (qty 3) -- i.e. 5 holes in it.
15 mm inside corner bracket (qty 3) -- REV-41-1479
Lap bracket (qty 2)
24 nuts and bolts

Control hub (qty. 1) Rev-31-1595
Expansion Hub (qty. 1) Rev-31-1153
flat plate (qty. 1) Rev-41-1787
L-beam (qty. 2) Rev-41-1706







Make sure to have the motor ports on one hub point toward the front of the robot and the ones on the other hub toward the back