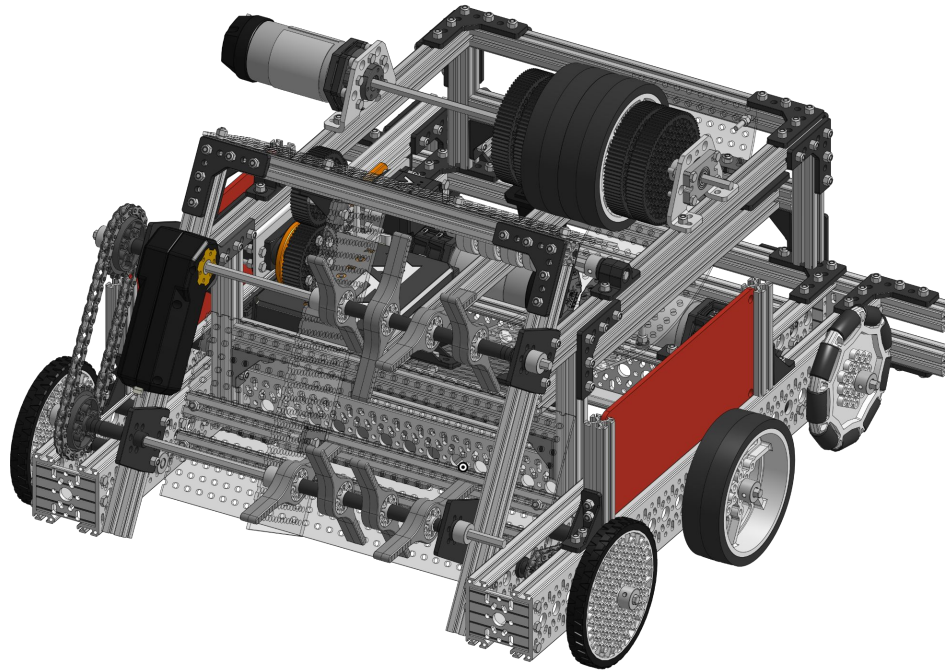




2026-27 REV DUO FTC Starter Bot Build Guide



Bill of Materials					
PART NUMBER	DESCRIPTION	QTY .	PART NUMBER	DESCRIPTION	QTY .
REV-41-1325	1.5mm Spacer	1	REV-41-1190	90mm Omni Wheel	2
REV-41-1338	10 Tooth #25 Sprocket	8	REV-41-1354	90mm Traction Wheel	2
REV-31-1302	12V Slim Battery	1	REV-41-1820	Aluminum Double Servo Arm	1
REV-41-1317	15mm Bearing Pillow Block	2	REV-41-1828	Aluminum Servo Horn V2	1
REV-41-1568	15mm Extrusion - 120mm - 90° Ends	3	REV-41-1166	Battery Holder Plate	1
REV-41-1431	15mm Extrusion - 225mm - 90° Ends	5	REV-31-1595	Control Hub	1
REV-41-1432	15mm Extrusion - 420mm - 90° Ends	9	REV-41-1300	Core Hex Motor	1
REV-41-1485	15mm Metal Bent Servo Bracket V2	2	REV-41-2702	Intake Flap - 5mm Hex - 40A Dark Gray	8
REV-41-1308	15mm Plastic 30 Degree Bracket	2	REV-41-1361	M3 Nyloc Nut	309
REV-41-1305	15mm Plastic 90 Degree Bracket	32	REV-41-1492	M3 Standoff - 40mm	8
REV-41-1320	15mm Plastic Inside Corner Bracket	9	REV-41-1360	M3 x 16mm Hex Cap Screw	32
REV-41-1321	15mm Plastic Lap Corner Bracket	15	REV-41-1124	M3 x 20mm Hex Cap Screw	6
REV-41-1303	15mm Plastic Motion Bracket	4	REV-41-1359	M3 x 8mm Hex Cap Screw	337
REV-41-1304	15mm Plastic Rod End Bracket	2	REV-41-1327	Shaft Collars	24
REV-41-1323	15mm Spacer	12	REV-41-3334	Smart Robot Servo V2 - Balanced	2
REV-41-1340	20 Tooth #25 Sprocket	2	REV-41-2150	Soft (Light Gray) - 5mm Hex Bore - 1in Grip Wheel	4
REV-41-1324	3mm Spacer	33	REV-31-1387	Switch Cable and Bracket	1
REV-41-1767	45mm x 15mm C Channel - 248mm	2	REV-41-1702	Tensioning Bushing - 39mm	8
REV-41-1762	45mm x 15mm C Channel - 408mm	4	REV-41-1329	Through Bore Bearing - Long	9
REV-41-1683	5mm Hex Bearing Block	1	REV-41-1326	Through Bore Bearing - Short	14
REV-41-1362	5mm x 400mm Hex Shaft	4	REV-41-1687	U Channel Endcap	4
REV-41-1348	5mm x 90mm Hex Shaft	6	REV-41-1623	UltraPlanetary Bent Mounting Bracket	2
REV-41-1335	60 Tooth Plastic Gear	2	REV-41-1600	UltraPlanetary Gearbox Kit & HD Hex Motor	3
REV-41-1337	90 Tooth Plastic Gear	4	REV-41-1621	UltraPlanetary Outside Mounting Bracket	2
REV-41-1267	90mm Grip Wheel	4	REV-41-1373	Hook and Loop Fastener - 13.5mm x 2mm	1
REV-41-1365	#25 Roller Chain - 10 ft	1	REV-41-7537	Polycarbonate Sheet - 2mm - 8mm Grid Pattern	1

Cut List

Extrusion can be cut with either a hand-held hacksaw or with a band saw. Be sure that the pieces are properly secured, ideally with clamps, before cutting. Using a circular or chop saw is NOT recommended.

Cut from 15mm Extrusion - 420mm - 90° Ends

Length	QTY	Assembly
323mm	2	Launcher and Feeder
278.5mm	2	Launcher Floor
248mm	3	Drivetrain & Intake
83mm	3	Launcher Floor & Pollen Pusher
70mm	4	Drivetrain
63mm	1	Pollen Pusher

Cut from 15mm Extrusion - 225mm - 90° Ends

Length	QTY	Assembly
218mm	3	Launcher Floor & Launcher and Feeder

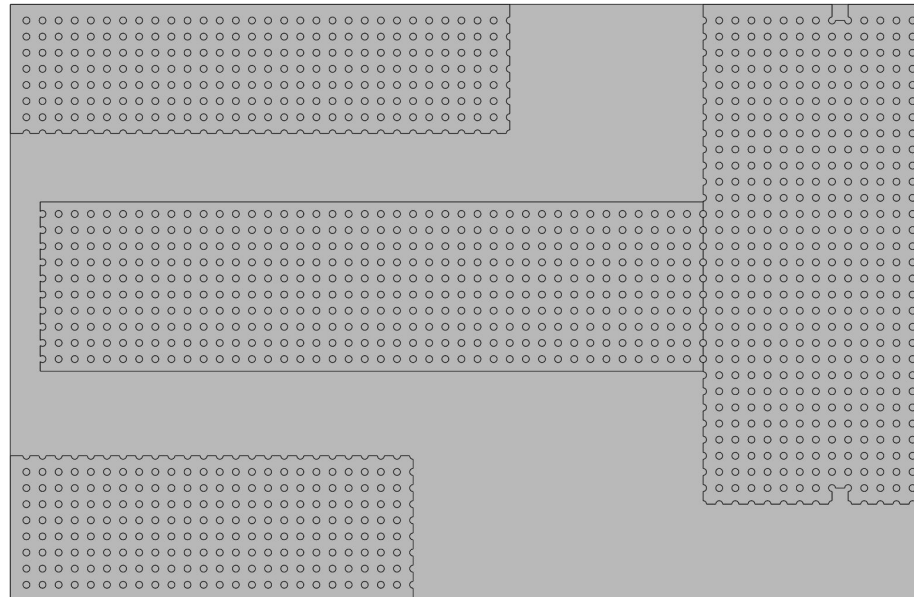
Cut from 5mm x 400mm Hex Shaft

Length	QTY	Assembly
308mm	2	Intake
252mm	2	Feeder & Launcher

**Cut from Polycarbonate Sheet - 2mm - 8mm Grid
Pattern - 456mm x 296mm**

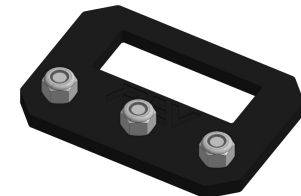
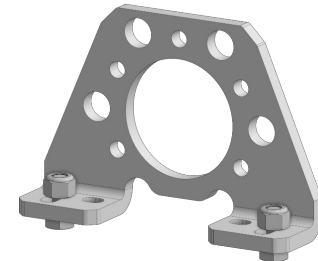
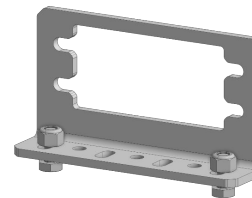
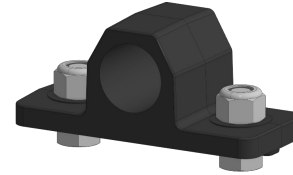
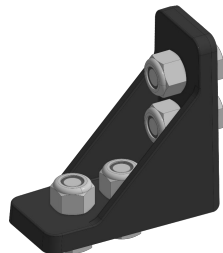
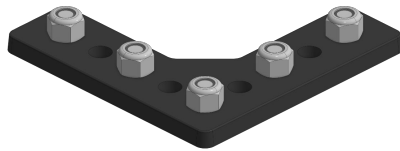
Piece Name	QTY	Assembly
329mm x 84mm	1	Launcher Floor
248mm x 64mm	1	Intake Lid
200mm x 72mm	1	Intake Side
248mm x 112mm	1	Intake Floor

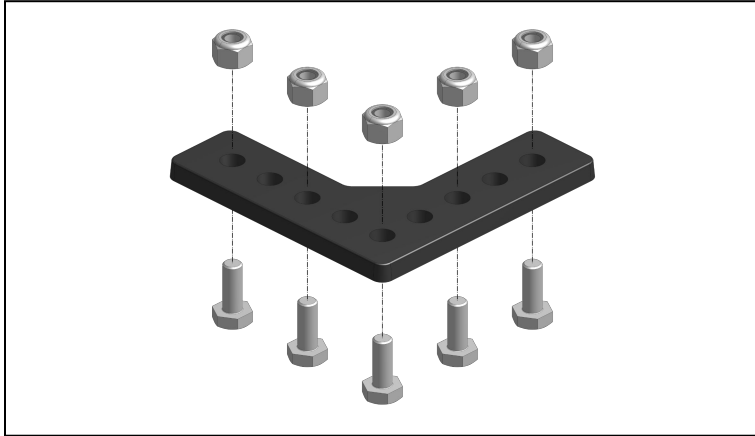
Polycarbonate can be cut with either tin snips or with a band saw.
Below is the recommended layout for the least amount of cuts,



Pre-Loading Brackets

PART NUMBER	DESCRIPTION	QTY
REV-41-1305	15mm Plastic 90 Degree Bracket	28
REV-41-1320	15mm Plastic Inside Corner Bracket	8
REV-41-1321	15mm Plastic Lap Corner Bracket	8
REV-41-1317	15mm Bearing Pillow Block	2
REV-41-1303	15mm Plastic Motion Bracket	4
REV-41-1485	15mm Metal Bent Servo Bracket V2	1
REV-41-1623	UltraPlanetary Bent Mounting Bracket	1
REV-41-1485	15mm Metal Bent Servo Bracket V2	2
REV-31-1387	Switch Bracket	1
REV-41-1359	M3 x 8mm Hex Cap Screws	195
REV-41-1361	M3 Nyloc Nuts	195



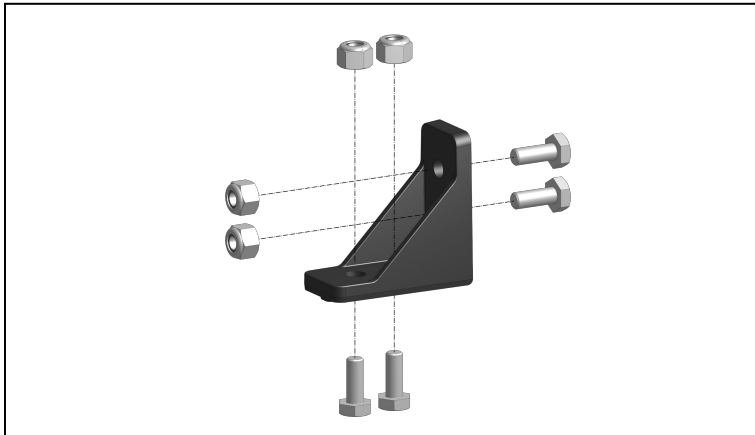


Get:

- 28 - 15mm Plastic 90 Degree Brackets
- 140 - M3 x 8mm Hex Cap Screws
- 140 - M3 Nyloc Nuts

Take a bracket and finger start one hex cap screw and nyloc nut per hole as shown. Pre-load 28 brackets.

Note: The side of the bracket with “ribs” must have the hex cap screw head.



Get:

- 8 - 15mm Plastic Inside Corner Bracket
- 24 - M3 x 8mm Hex Cap Screws
- 24 - M3 Nyloc Nuts

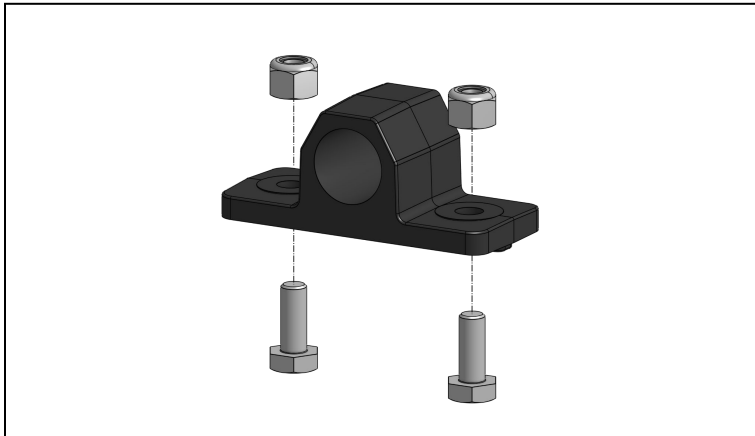
Take a bracket and finger start one hex cap screw and nyloc nut per hole as shown. Pre-load 8 brackets.



Get:

- 8 - 15mm Plastic Lap Corner Bracket
- 8 - M3 x 8mm Hex Cap Screws
- 8 - M3 Nyloc Nuts

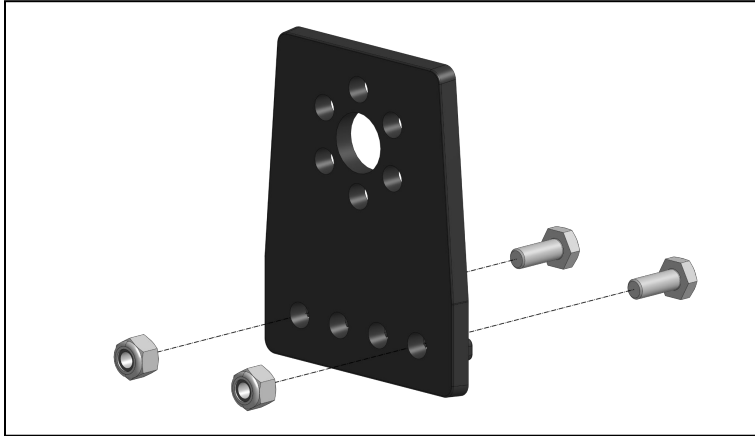
Take a bracket and finger start one hex cap screw and nyloc nut in the short side hole as shown. Pre-load 8 brackets.



Get:

- 2 - 15mm Bearing Pillow Block
- 4 - M3 x 8mm Hex Cap Screws
- 4 - M3 Nyloc Nuts

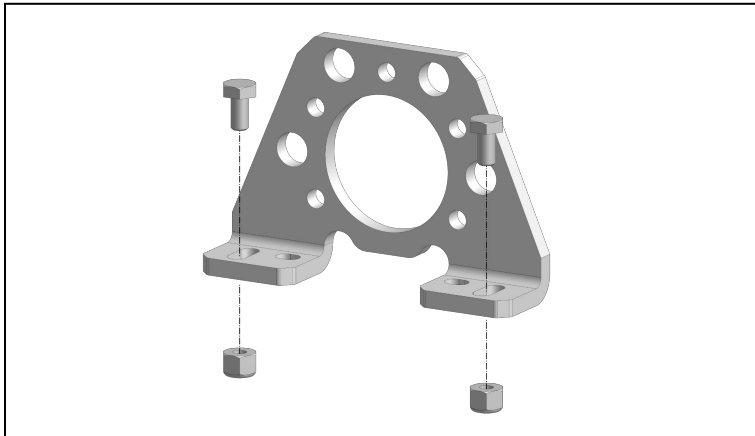
Take a bearing pillow block and finger start one hex cap screw and nyloc nut in each hole as shown. Pre-load 2 bearing blocks.



Get:

- 4 - 15mm Plastic Motion Bracket
- 8 - M3 x 8mm Hex Cap Screws
- 8 - M3 Nyloc Nuts

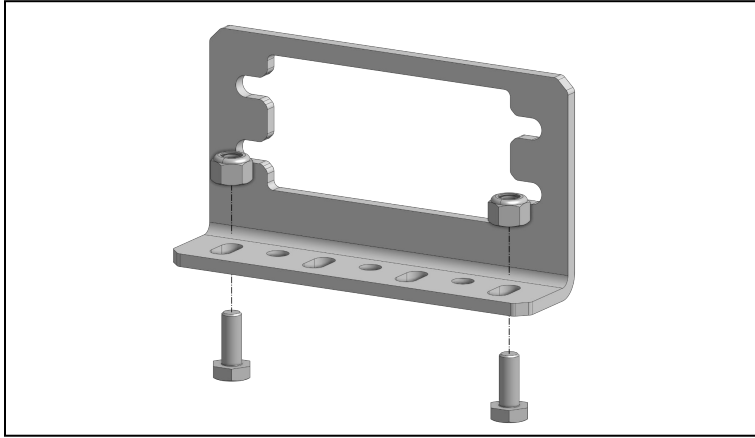
Take a bearing pillow block and finger start one hex cap screw and nyloc nut in each hole as shown. Pre-load 4 brackets.



Get:

- 2 - UltraPlanetary Bent Mounting Bracket
- 4 - M3 x 8mm Hex Cap Screws
- 4 - M3 Nyloc Nuts

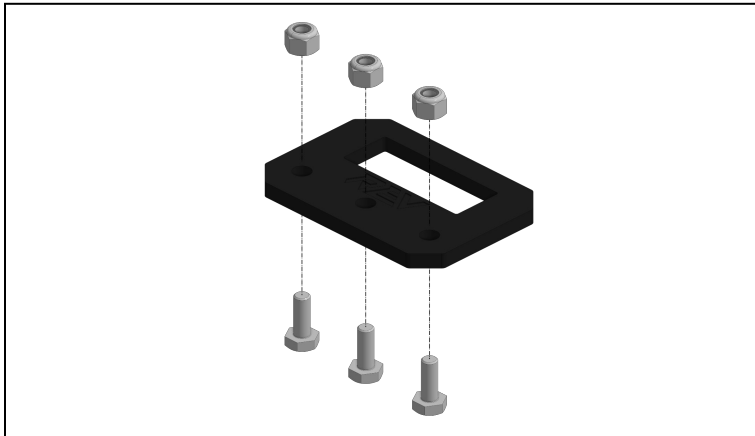
Take a bracket and finger start one hex cap screw and nyloc nut in the short side hole as shown. Pre-load 2 brackets.



Get:

- 2 - 15mm Metal Bent Servo Bracket V2
- 4 - M3 x 8mm Hex Cap Screws
- 4 - M3 Nyloc Nuts

Take a bracket and finger start one hex cap screw and nyloc nut in the short side hole as shown. Pre-load 2 brackets.



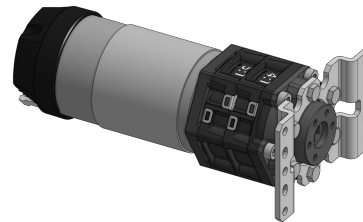
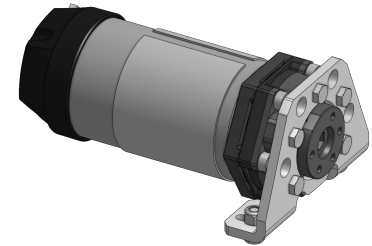
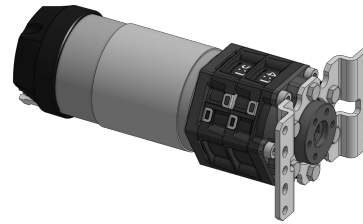
Get:

- 1 - Switch Mounting Bracket
- 3 - M3 x 8mm Hex Cap Screws
- 3 - M3 Nyloc Nuts

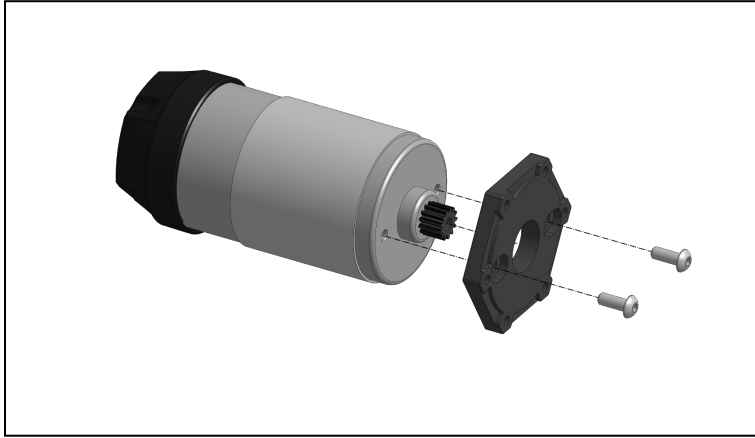
Take a bracket and finger start one hex cap screw and nyloc nut in the short side hole as shown.

UltraPlanetary and HD Motor Assemblies

PART NUMBER	DESCRIPTION	QTY
NA	Pre-Loaded UltraPlanetary Bent Mounting Bracket	1
REV-41-1603	UltraPlanetary 5:1 Cartridge	2
REV-41-1602	UltraPlanetary 4:1 Cartridge	2
REV-41-1607	UltraPlanetary 550 Motor Plate	3
REV-41-1615	UltraPlanetary Output V2	3
REV-41-1291	HD Hex Motor	3
REV-41-1621	UltraPlanetary Outside Mounting Bracket	3
REV-41-1359	M3 x 8mm Hex Cap Screw	17
REV-41-1609	M3 x 30mm Cap Head Screw	12
REV-41-1609	M3 x 10mm Cap Head Screw	6
REV-41-1609	M3 x 8mm Button Head Screw	6



1

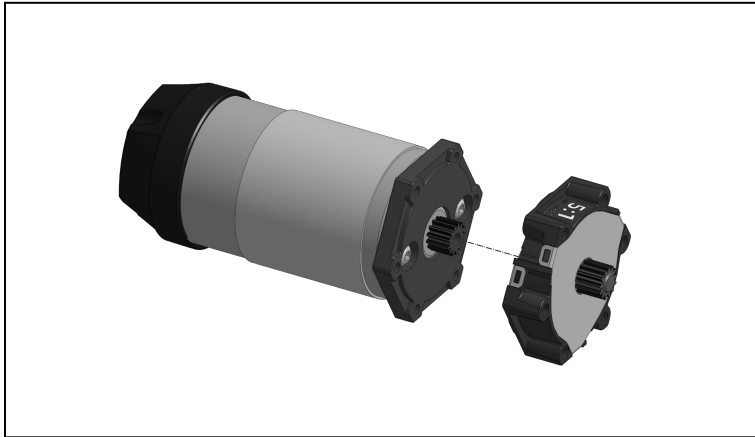


Get:

- 1 - HD Hex Motor No Gearbox
- 1 - UltraPlanetary 550 Motor Plate
- 2 - M3 x 8mm Button head

Slide the motor plate onto the motor. Secure the the motor plate to the motor with two 8mm button head screws.

2

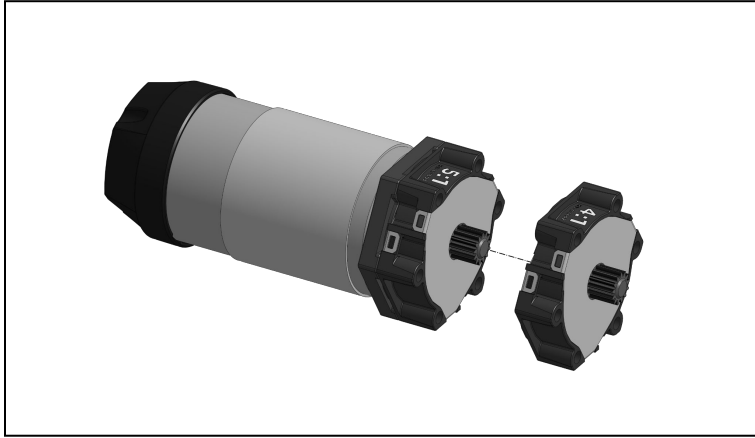


Get:

- 1 - UltraPlanetary Cartridge - 5:1

Slide a 5:1 gear cartridge onto the pinion of the motor.

3

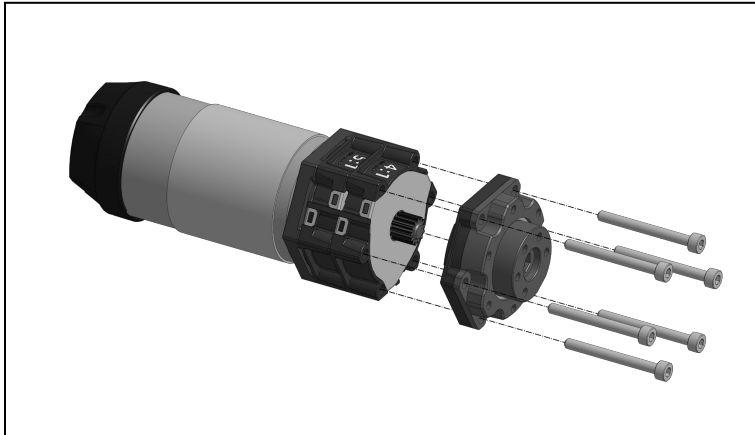


Get:

- 1 - UltraPlanetary Cartridge - 4:1

Slide a 4:1 gear cartridge onto the pinion of the previous 5:1 gear cartridge.

4



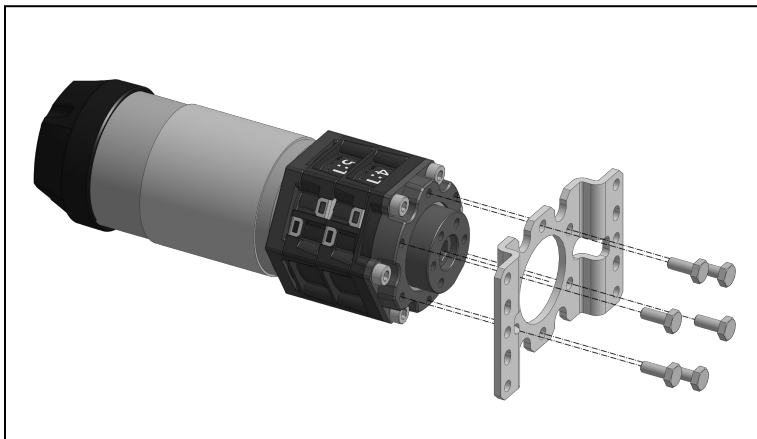
Get:

- 1 - UltraPlanetary Output
- 6 - M3 x 30mm Socket Head Screws

Slide the output onto the pinion of the previous 4:1 gear cartridge. Secure the output with six 30mm socket head screws.

Take care not to over tighten the screws. We recommend applying threadlocker then tighten all screws until the screw heads are touching the output plate or the outermost metal. Tighten screws in a star pattern a 1/4 turn each at a time until the gearbox becomes noticeably harder to spin by hand then back out the screws 1/2 turn.

5

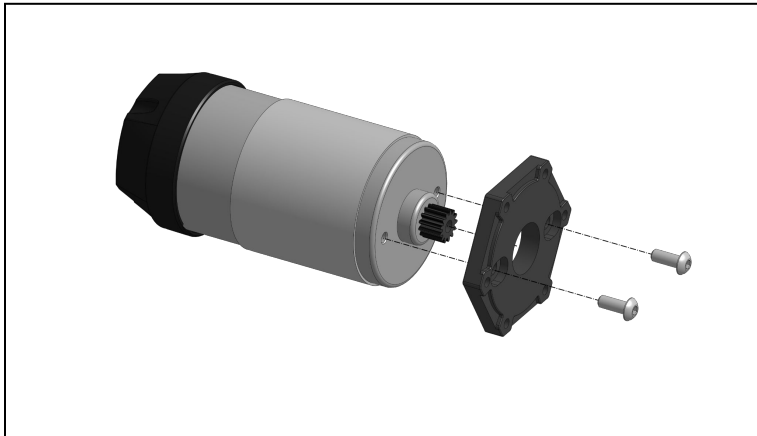


Get:

- 1 - UltraPlanetary Outside Mounting Bracket
- 6 - M3 x 8mm Hex Cap Screws

Secure an outside mounting bracket onto the output with six 8mm hex cap screws.

6

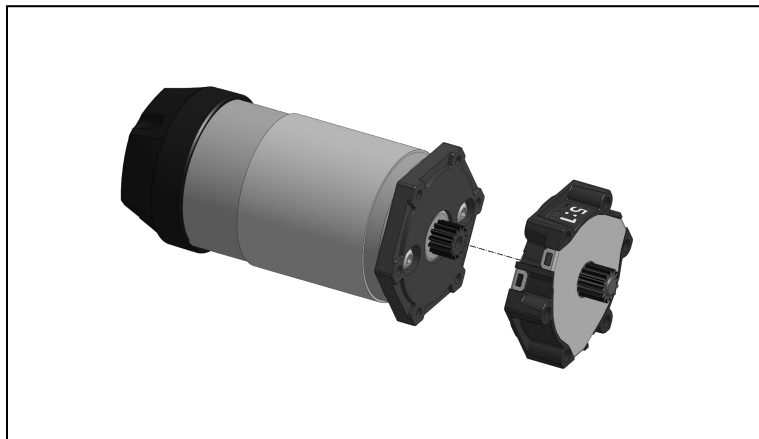


Get:

- 1 - HD Hex Motor No Gearbox
- 1 - UltraPlanetary 550 Motor Plate
- 2 - M3 x 8mm Button head

Slide the motor plate onto the motor. Secure the the motor plate to the motor with two 8mm button head screws.

7

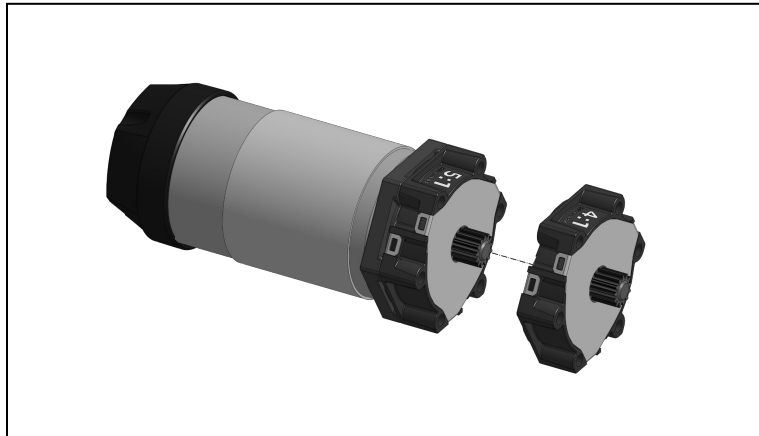


Get:

- 1 - UltraPlanetary Cartridge - 5:1

Slide a 5:1 gear cartridge onto the pinion of the motor.

8

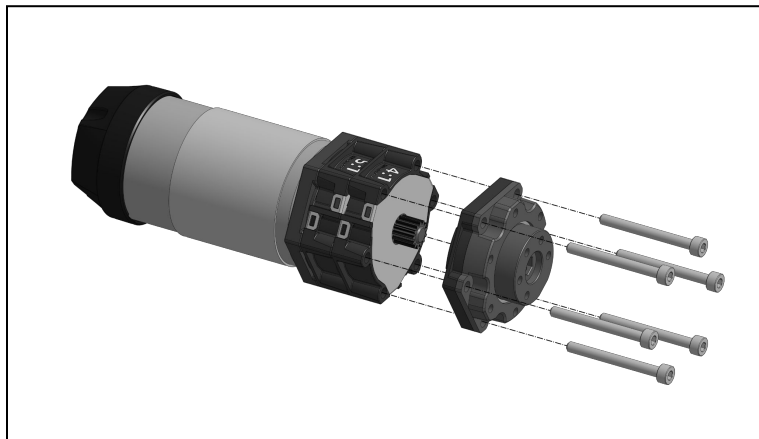


Get:

- 1 - UltraPlanetary Cartridge - 4:1

Slide a 4:1 gear cartridge onto the pinion of the previous 5:1 gear cartridge.

9



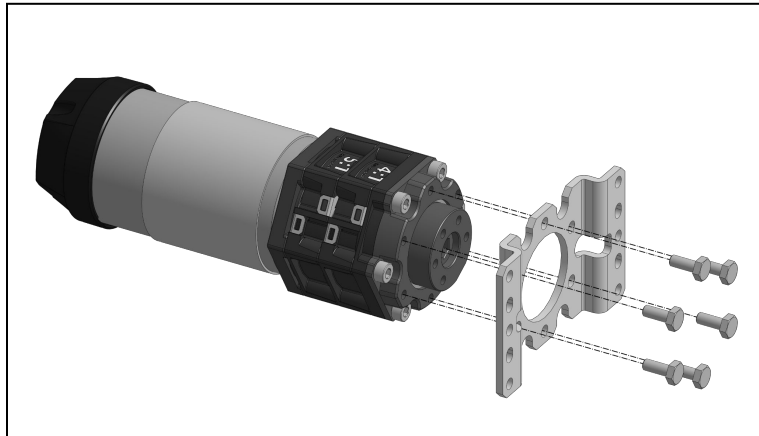
Get:

- 1 - UltraPlanetary Output
- 6 - M3 x 30mm Socket Head Screws

Slide the output onto the pinion of the previous 4:1 gear cartridge. Secure the output with six 30mm socket head screws.

Take care not to over tighten the screws. We recommend applying threadlocker then tighten all screws until the screw heads are touching the output plate or the outermost metal. Tighten screws in a star pattern a 1/4 turn each at a time until the gearbox becomes noticeably harder to spin by hand then back out the screws 1/2 turn.

10

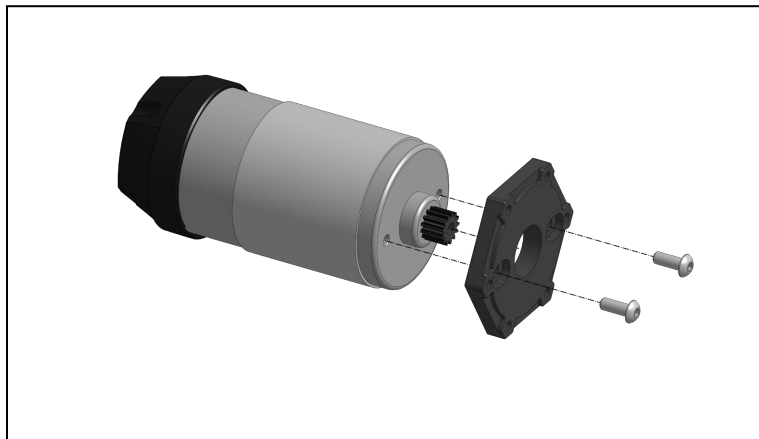


Get:

- 1 - UltraPlanetary Outside Mounting Bracket
- 6 - M3 x 8mm Hex Cap Screws

Secure an outside mounting bracket onto the output with six 8mm hex cap screws.

11

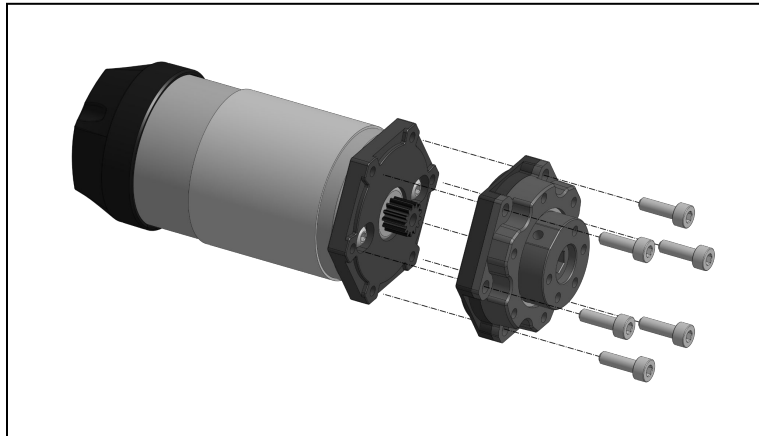


Get:

- 1 - HD Hex Motor No Gearbox
- 1 - UltraPlanetary 550 Motor Plate
- 2 - M3 x 8mm Button head

Slide the motor plate onto the motor. Secure the the motor plate to the motor with two 8mm button head screws.

12

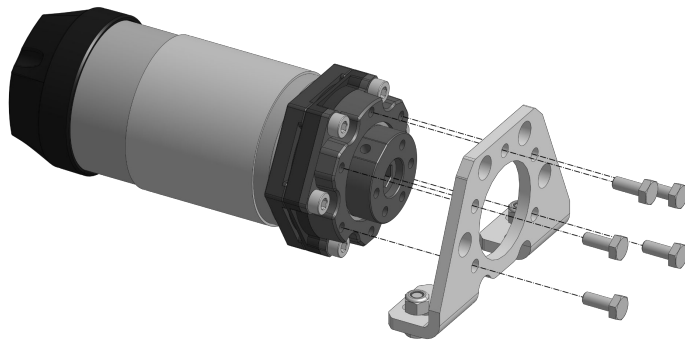


Get:

- 1 - UltraPlanetary Output
- 6 - M3 x 10mm Socket Head Screws

Slide the output onto the pinion of the previous 4:1 gear cartridge. Secure the output with six 10mm socket head screws.

Take care not to over tighten the screws. We recommend applying threadlocker then tighten all screws until the screw heads are touching the output plate or the outermost metal. Tighten screws in a star pattern a 1/4 turn each at a time until the gearbox becomes noticeably harder to spin by hand then back out the screws 1/2 turn.



Get:

- 1 - Pre-Loaded UltraPlanetary Bent Mounting Bracket
- 5 - M3 x 8mm Hex Cap Screws

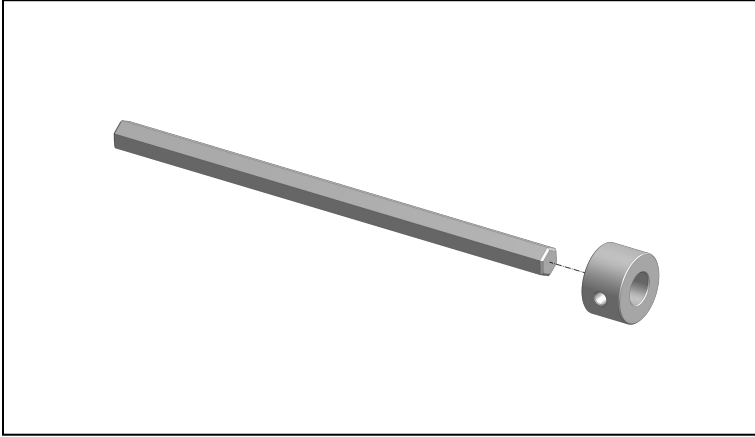
Secure a pre-loaded bent mounting bracket onto the output with five 8mm hex cap screws.

Drive Shaft Assembly

PART NUMBER	DESCRIPTION	QTY
REV-41-1348	5mm x 90mm Hex Shaft	2
REV-41-1190	90mm Omni Wheel	2
REV-41-1324	3mm Spacer	8
REV-41-1326	Through Bore Bearing - Short	6
REV-41-1327	Shaft Collar	4
REV-41-1338	10 Tooth #25 Sprocket	2



1

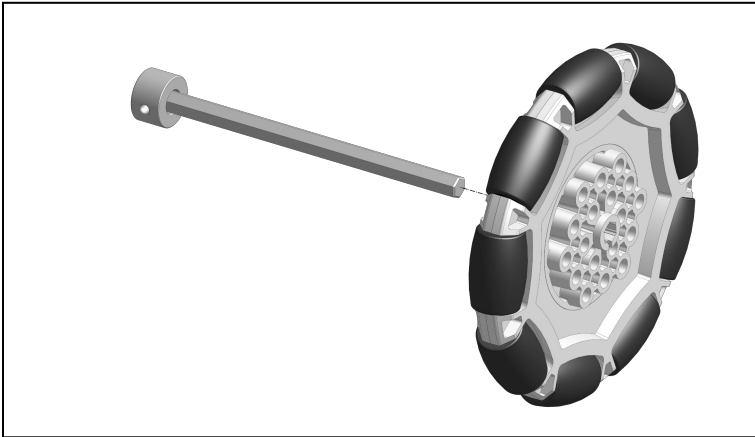


Get:

- 1 - 5mm x 90mm Hex Shaft
- 1 - Shaft Collar

Slide a shaft collar onto the end of a 90mm hex shaft and tighten the set screw.

2

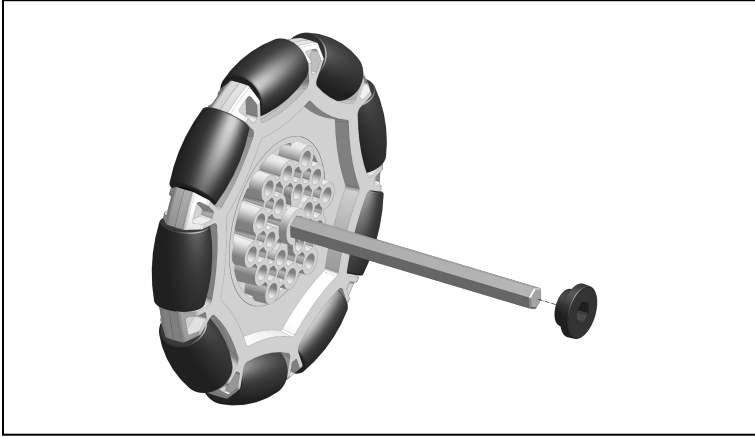


Get:

- 1 - 90mm Omni Wheel

Slide a omni wheel onto the shaft.

3

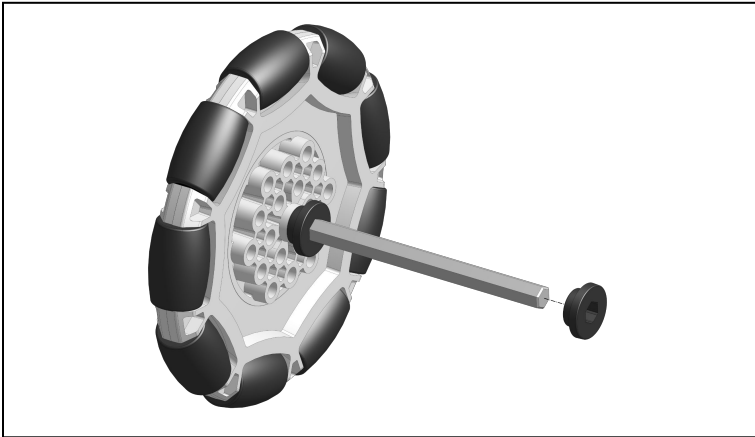


Get:

- 1 - Through Bore Bearing - Short

Slide a short through bore bearing onto the hex shaft.

4

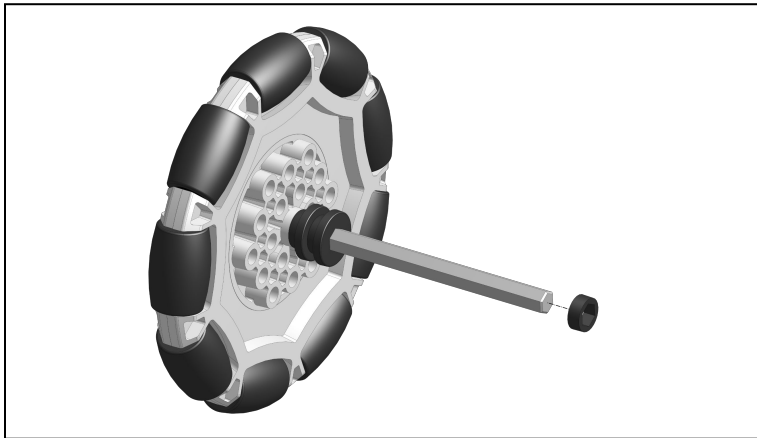


Get:

- 1 - Through Bore Bearing - Short

Slide another short through bore bearing onto the hex shaft.

5

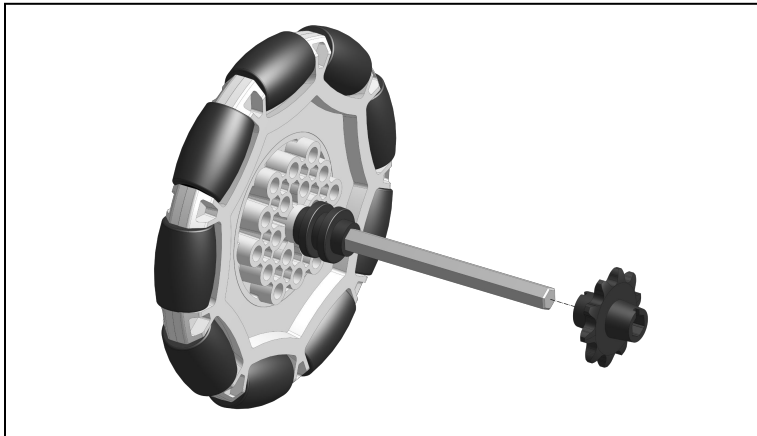


Get:

- 1 - 5mm Hex Shaft Spacer - 3mm

Slide a 3mm spacer onto the hex shaft.

6

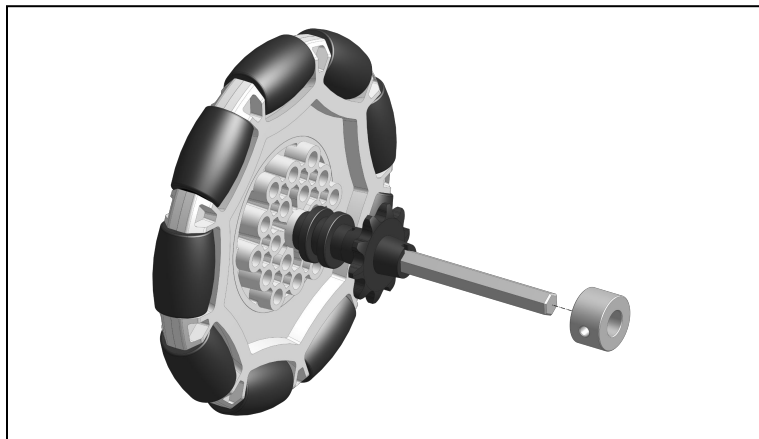


Get:

- 1 - 10 Tooth Plastic #25 Sprocket

Slide a 10 tooth sprocket onto the hex shaft.

7

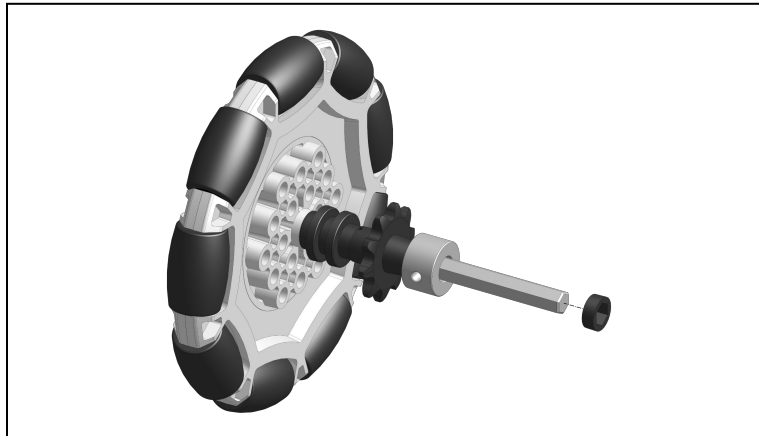


Get:

- 1 - Shaft Collar

Slide a shaft collar onto the hex shaft then tighten the set screw.

8

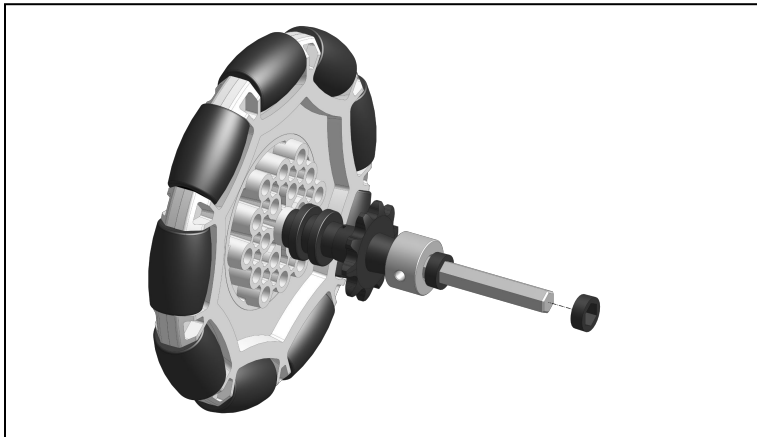


Get:

- 1 - 5mm Hex Shaft Spacer - 3mm

Slide a 3mm spacer onto the hex shaft.

9

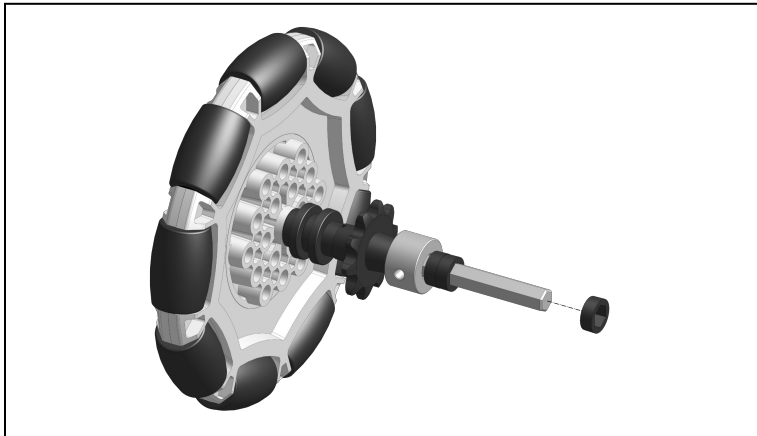


Get:

- 1 - 5mm Hex Shaft Spacer - 3mm

Slide another 3mm spacer onto the hex shaft.

10

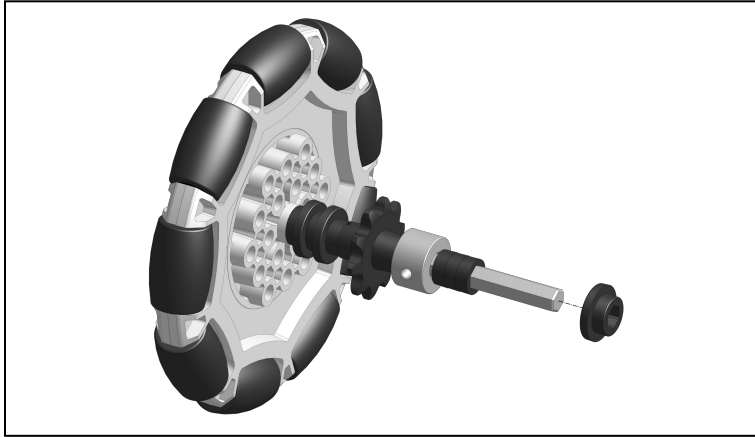


Get:

- 1 - 5mm Hex Shaft Spacer - 3mm

Slide a third 3mm spacer onto the hex shaft.

11

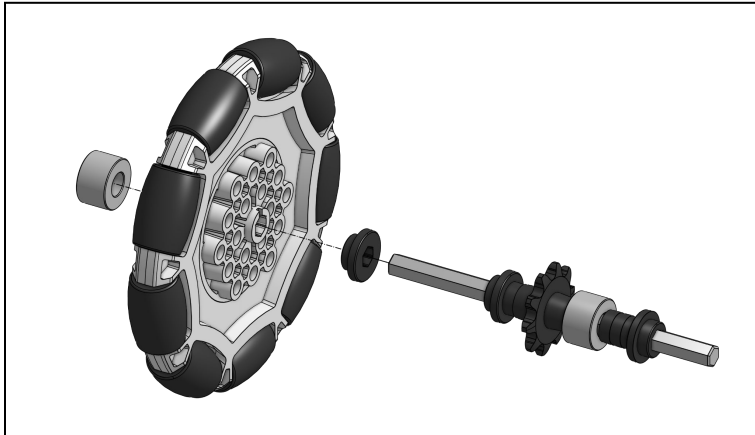


Get:

- 1 - Through Bore Bearing - Short

Slide a short through bore bearing onto the hex shaft.

12



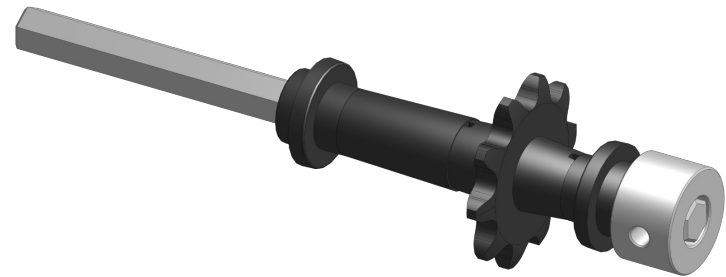
Remove the shaft collar, omni wheel, and short through bore bearing. Set these aside to a later step

Complete these steps twice to have two complete Drive Shaft Assemblies.

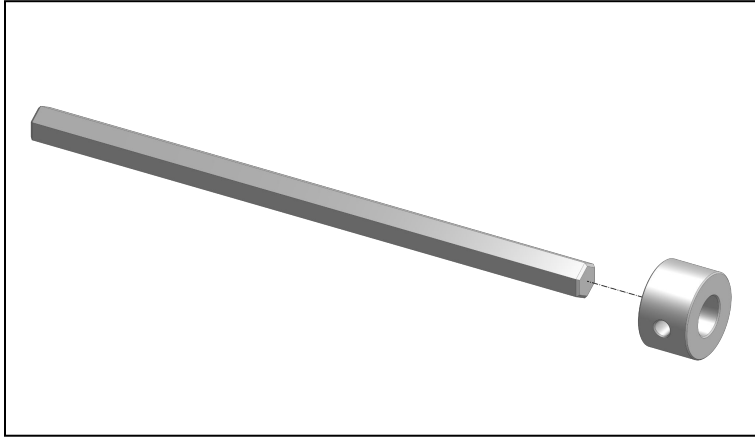
Note: The purpose for adding these originally is for spacing all of the other components down the shaft. These will be added back onto the shaft when assembling the Drivetrain.

Single Sprocket Shaft Assembly

PART NUMBER	DESCRIPTION	QTY
REV-41-1348	5mm x 90mm Hex Shaft	2
REV-41-1323	15mm Spacer	2
REV-41-1324	3mm Spacer	4
REV-41-1326	Through Bore Bearing - Short	4
REV-41-1327	Shaft Collar	2
REV-41-1338	10 Tooth #25 Sprocket	2



1

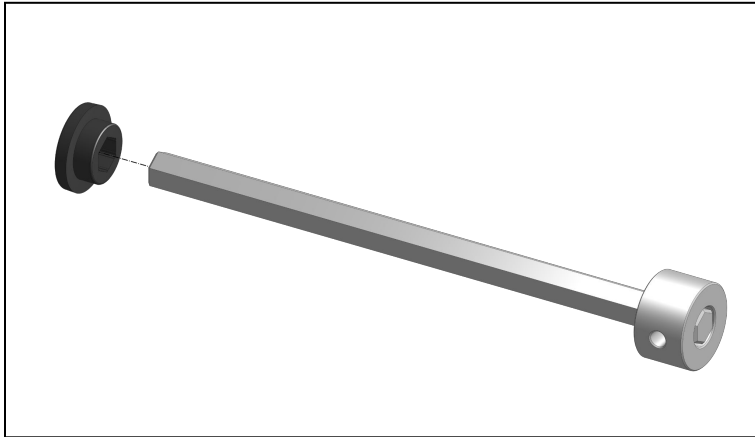


Get:

- 1 - 5mm x 90mm Hex Shaft
- 1 - Shaft Collar

Slide a shaft collar onto the end of a 90mm hex shaft and tighten the set screw.

2

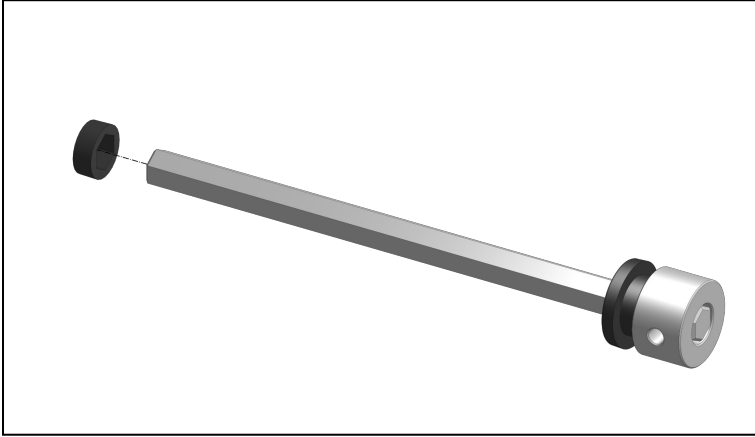


Get:

- 1 - Through Bore Bearing - Short

Slide a short through bore bearing onto the hex shaft.

3

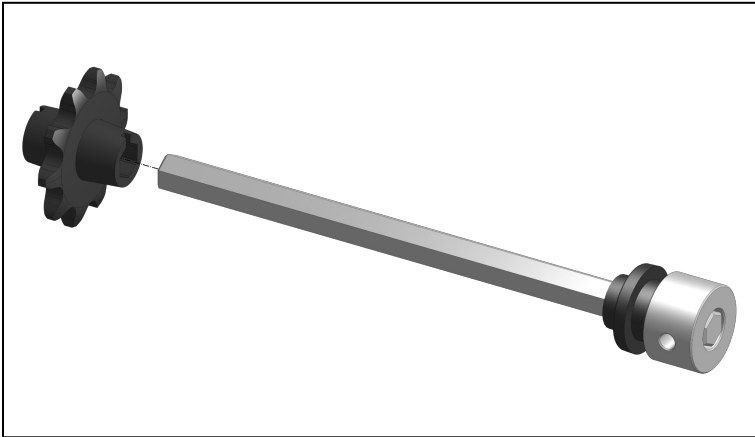


Get:

- 1 - 5mm Hex Shaft Spacer - 3mm

Slide a 3mm spacer onto the hex shaft.

4

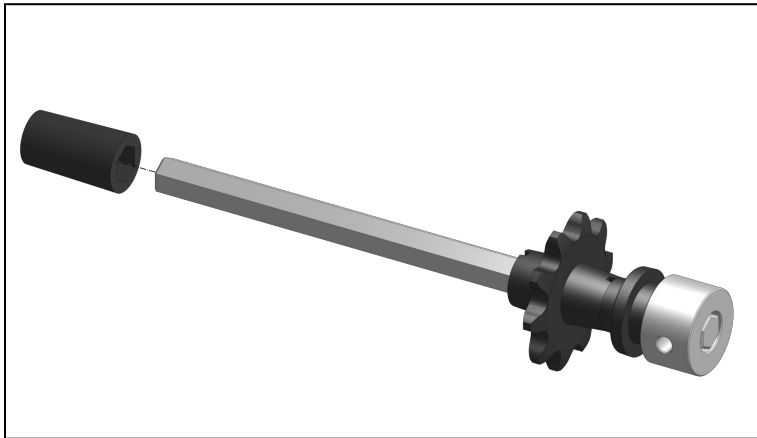


Get:

- 1 - 10 Tooth Plastic #25 Sprocket

Slide a 10 tooth sprocket onto the hex shaft.

5

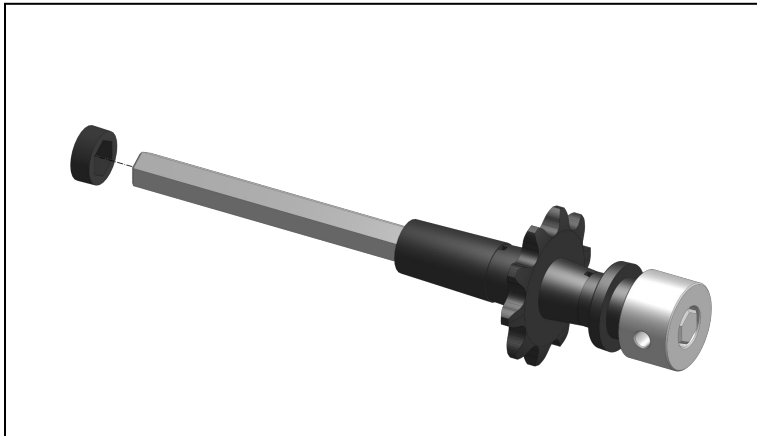


Get:

- 1 - 5mm Hex Shaft Spacer - 15mm

Slide a 15mm spacer onto the hex shaft.

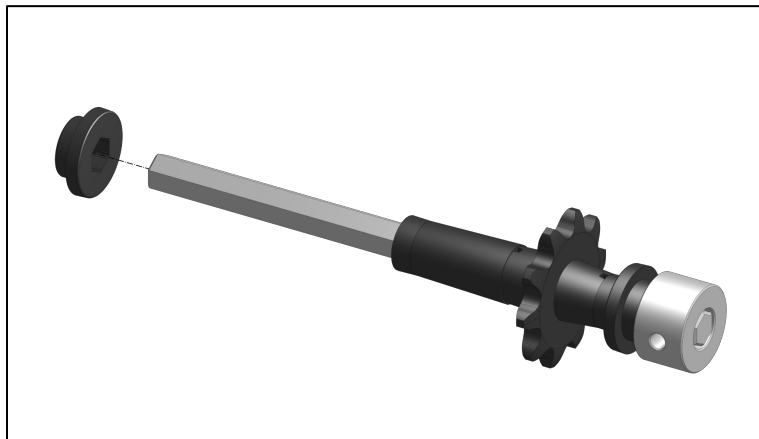
6



Get:

- 1 - 5mm Hex Shaft Spacer - 3mm

Slide a 3mm spacer onto the hex shaft.



Get:

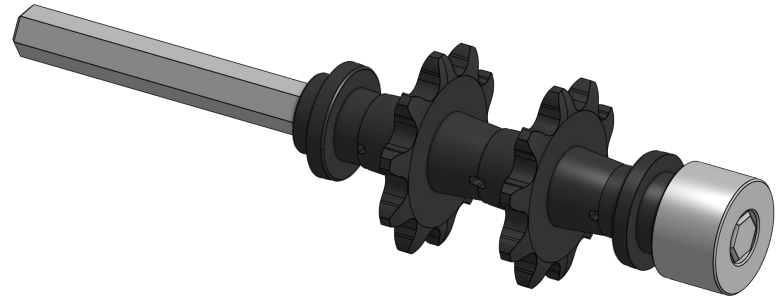
- 1 - Through Bore Bearing - Short

Slide a short through bore bearing onto the hex shaft.

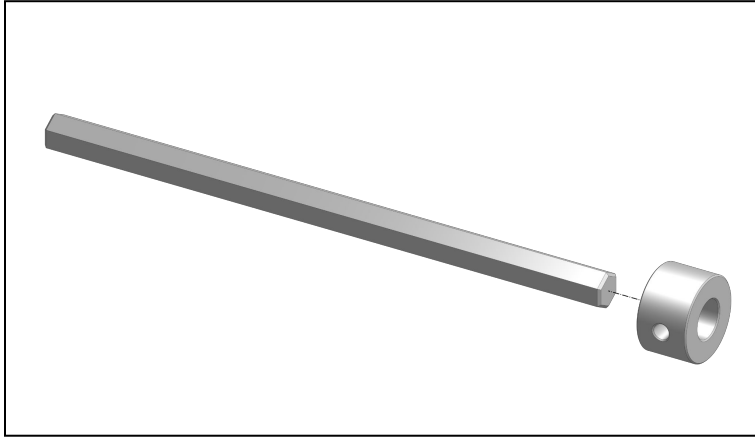
Complete these steps twice to have two complete Single Sprocket Shaft Assemblies.

Double Sprocket Shaft Assembly

PART NUMBER	DESCRIPTION	QTY
REV-41-1348	5mm x 90mm Hex Shaft	2
REV-41-1324	3mm Spacer	4
REV-41-1326	Through Bore Bearing - Short	4
REV-41-1327	Shaft Collar	2
REV-41-1338	10 Tooth #25 Sprocket	4



1

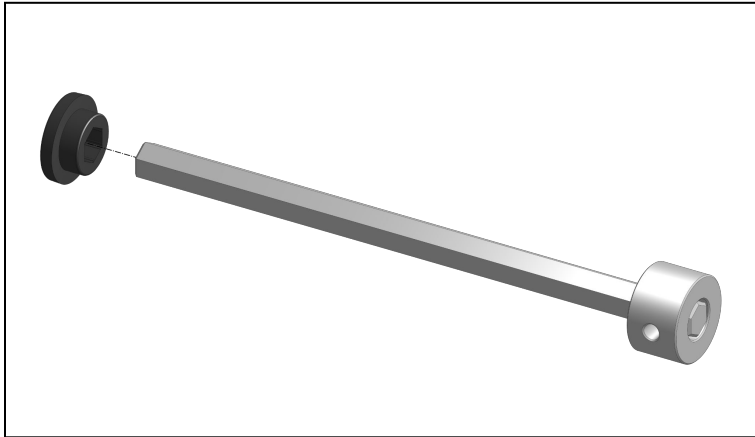


Get:

- 1 - 5mm x 90mm Hex Shaft
- 1 - Shaft Collar

Slide a shaft collar onto the end of a 90mm hex shaft and tighten the set screw.

2

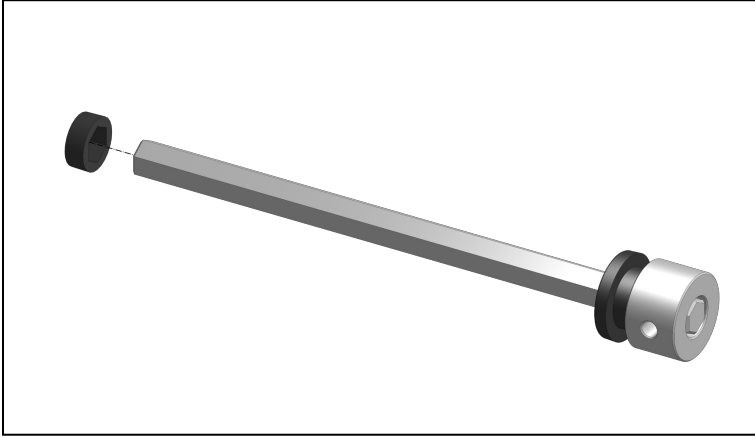


Get:

- 1 - Through Bore Bearing - Short

Slide a short through bore bearing onto the hex shaft.

3

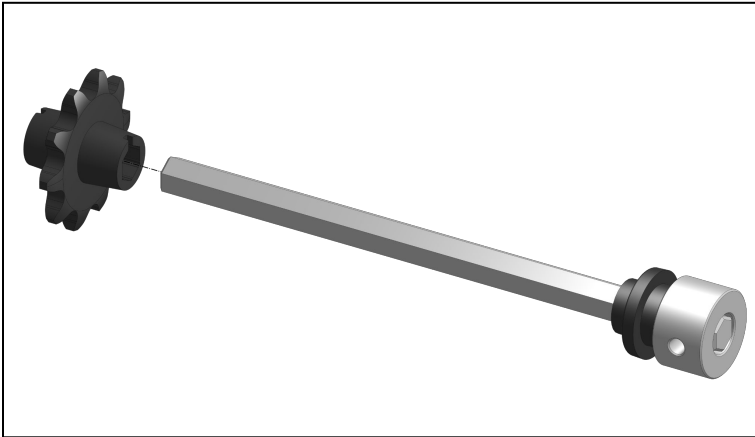


Get:

- 1 - 5mm Hex Shaft Spacer - 3mm

Slide a 3mm spacer onto the hex shaft.

4

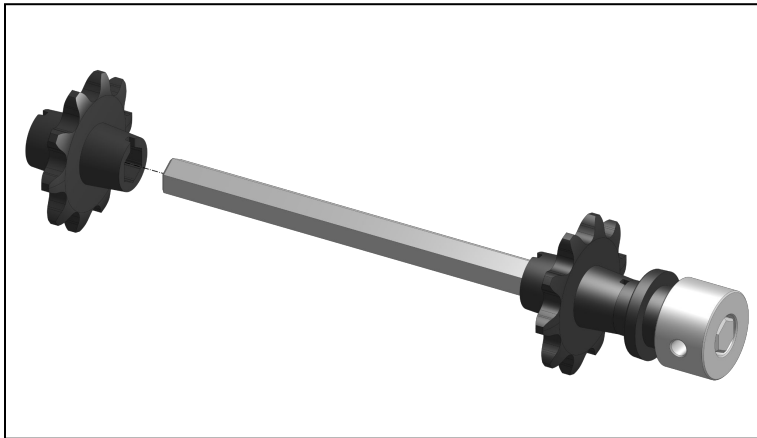


Get:

- 1 - 10 Tooth Plastic #25 Sprocket

Slide a 10 tooth sprocket onto the hex shaft.

5

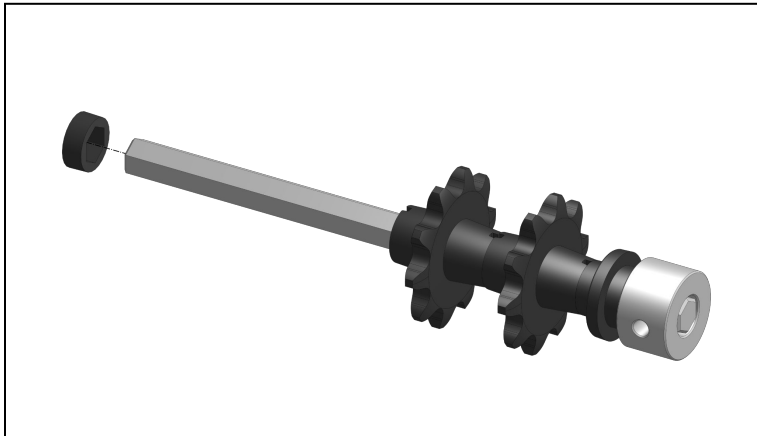


Get:

- 1 - 10 Tooth Plastic #25 Sprocket

Slide another 10 tooth sprocket onto the hex shaft.

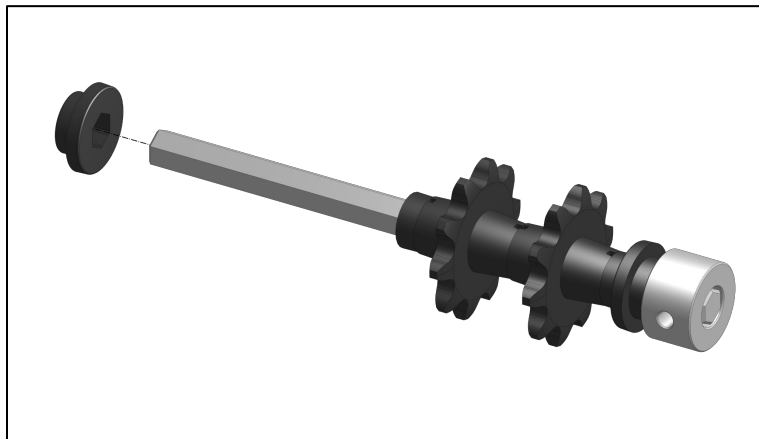
6



Get:

- 1 - 5mm Hex Shaft Spacer - 3mm

Slide a 3mm spacer onto the hex shaft.



Get:

- 1 - Through Bore Bearing - Short

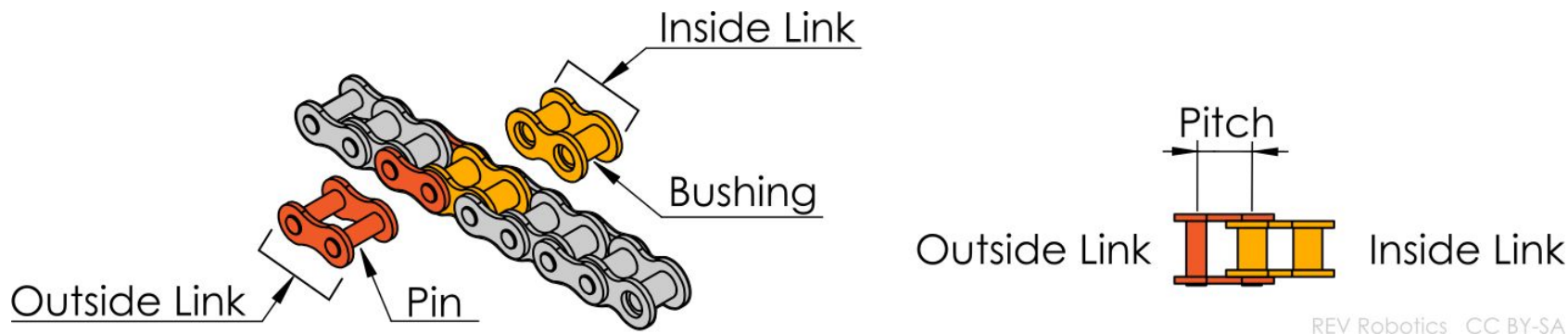
Slide a short through bore bearing onto the hex shaft.

Complete these steps twice to have two complete Double Sprocket Shaft Assemblies.

Chain

Basics of Chain

This drivetrain uses sprockets and chain to transmit motion from the UltraPlanetary Gearbox and Drive Shaft to the rest of the drivetrain. The figure below shows the major components of chain.

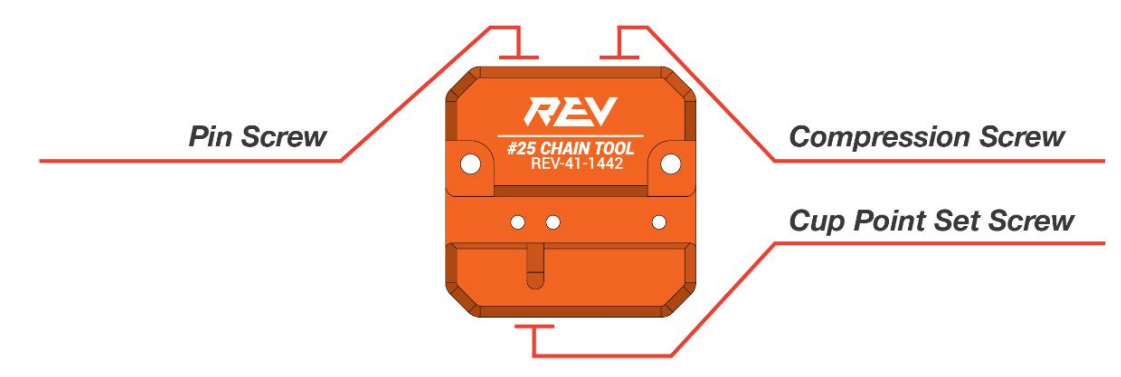


Outside Links consist of two outside plates which are connected by two **pins** that are pressed into each plate. The **pins** in the outside link go through the inside of the hollow **bushings** when the inner and outer links are assembled. The **pins** can freely rotate on the inside of the **bushings**.

Inside Link consist of two inside plates that are connected by two hollow **bushings** which are pressed into each plate. The teeth of the sprocket contact the surface of the **bushings** when the chain is wrapped around a sprocket.

Pitch is the distance between the centers of two adjacent **pins**. The REV 15mm Build System uses #25 (0.25") chain.

Introduction to the Chain Tool



In the FTC Starter Kit is a #25 Chain Tool. This custom-designed tool allows teams to easily break and re-assemble #25 chain. The mandrel is used to push out the chain pin. If using master links, the pin can be completely removed, but the depth guide screw allows the option of partially pressing out the pin and then re-assembling without master links.

Creating the Chain Loop – Resetting Chain Method

For this drivetrain, four chain loops that are 56 links long (14 inches or 35.56 cm in length) are needed. When counting links for chain, both the inner and outer links need to be counted. Counting the number of bushings is another way to get the correct chain length. To successfully reform chain, the total count of links must be an even number with one inner link and one outer link exposed. This allows the chain tool to press the pin back into the bushing, through an inner and outer link, reconnecting the chain. Below are the steps to use the #25 Chain Tool to reset the pin into the chain.

1



Unscrew the Pin Screw and Compression Screw such that they are flush with the chain channel.

Ensure the Cup Point Set Screw is fully engaged in the Chain Tool.

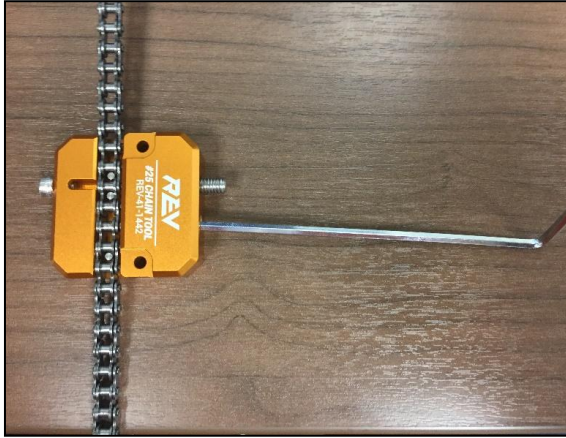
2



Insert #25 chain into the chain channel and align the desired link between the two vertical pins in the channel.

Note: Count 56 bushings from an exposed inner link.

3



Next secure the chain in place with the compression screw. Tighten until the chain cannot shift within the channel.

4

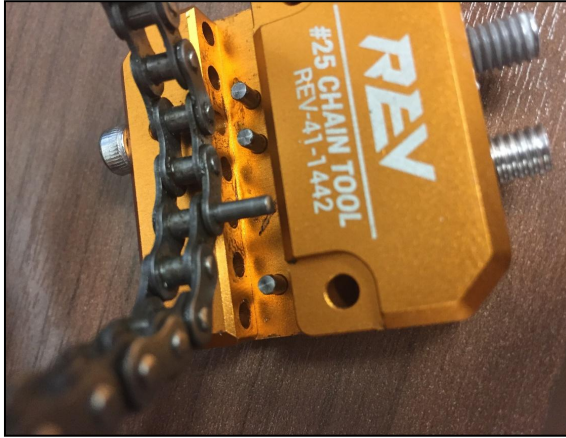


Note: Be careful to not overly push the pin out in this step, it will be impossible to put it back in, and a master link will be needed. As result of manufacturing tolerances, the cup point set crew may be close enough to use as a hard stop for the pin.

Screw the Pin Screw down until the pin almost touches the Cup Point Set Screw. The user should **stop pushing the pin out before it leaves the back plate the outer link**. Considerable pressure will be felt before the pin comes all the way out. Removing the chain from the tool to check if the pin is fully unseated from the bushing is recommended.

The final result will be the pin still partially connected to the chain (see photo as example).

5

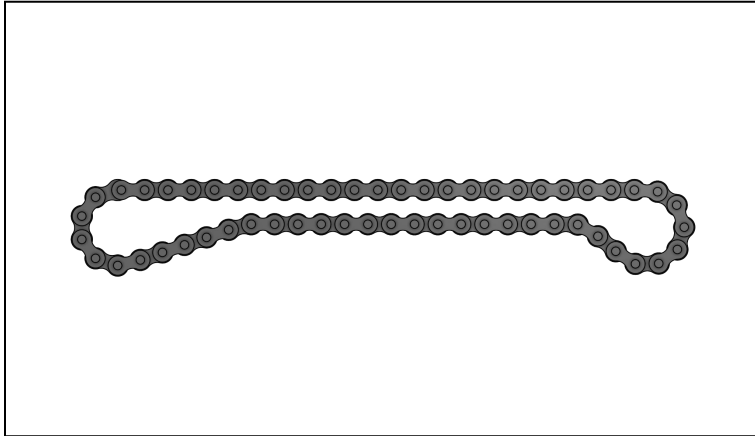


Put the Inner Link bushing into the Outer Link. Align the Pin in the Compression Screw hole.

6

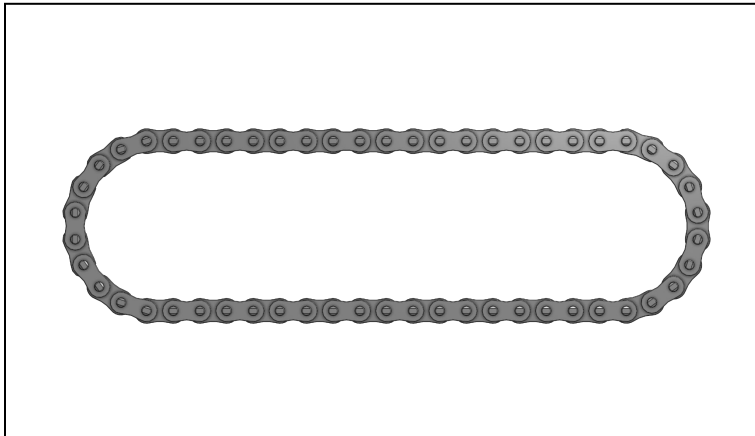


Turn the Compression Screw until the Pin is fully seated back into the chain channel.



56 Link Chain Assembly

Repeat the previous steps until you have four 56 Link Chain.

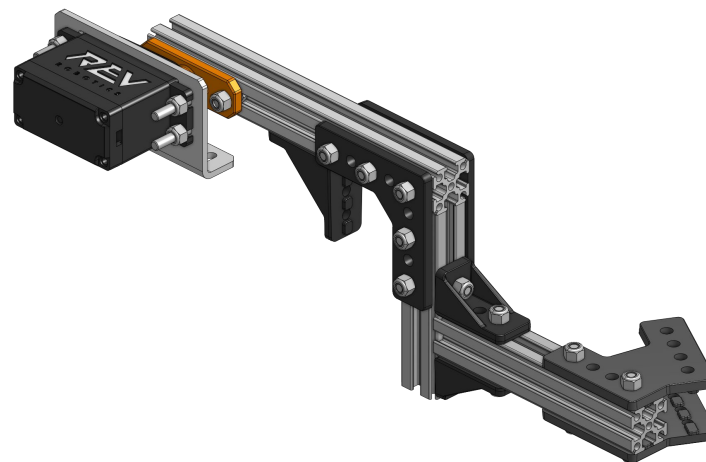


54 Link Chain Assembly

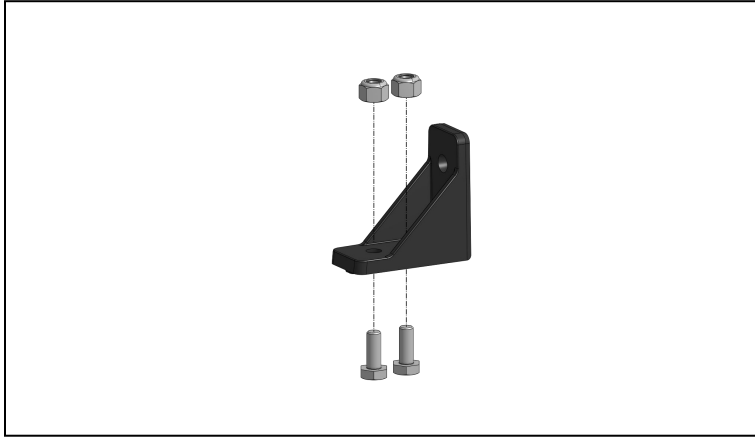
Repeat the previous steps until you have one 54 Link Chain.

Pollen Pusher Assembly

PART NUMBER	DESCRIPTION	QTY
NA	Pre-Loaded 15mm Metal Bent Servo Bracket V2	1
NA	Pre-Loaded 15mm Plastic 90 Degree Bracket	2
NA	Pre-Loaded 15mm Plastic Lap Corner Bracket	2
NA	15mm Extrusion - Cut to 63mm	1
NA	15mm Extrusion - Cut to 83mm	1
REV-41-3334	Smart Robot Servo V2 - Balanced	1
REV-41-1320	15mm Plastic Inside Corner Bracket	1
REV-41-1568	15mm Extrusion - 120mm - 90° Ends	1
REV-41-1321	15mm Plastic Lap Corner Bracket	4
REV-41-1308	15mm Plastic 30 Degree Bracket	2
REV-41-1820	Aluminum Double Servo Arm	1
REV-41-1359	M3 x 8mm Hex Cap Screw	11
REV-41-1360	M3 X 16mm Hex Cap Screws	4
REV-41-1361	M3 Nyloc Nuts	14



1

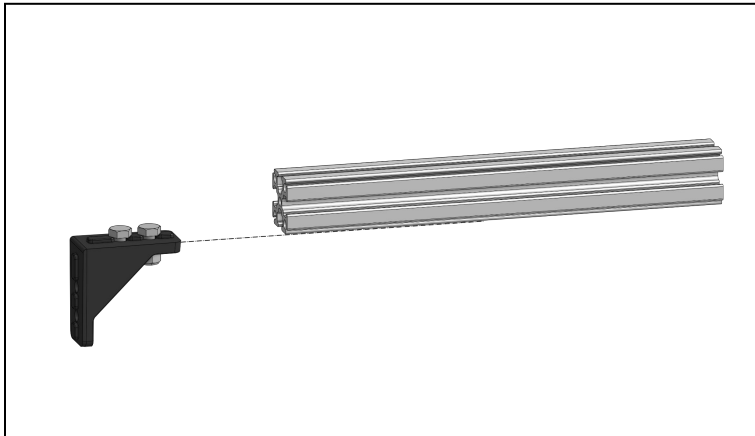


Get:

- 1 - 15mm Plastic Inside Corner Bracket
- 2 - M3 x 8mm Hex Cap Screws
- 2 - M3 Nyloc Nuts

Take a inside corner bracket and finger start one hex cap screw and nyloc nut into the two holes as shown.

2

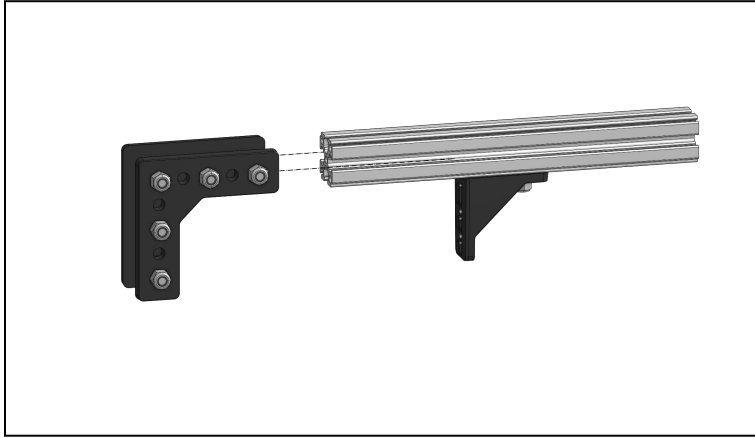


Get:

- 1 - 15mm Extrusion - 120mm
- 1 - Pre-Loaded Inside Corner Bracket from the previous step

Slide the pre-loaded bracket halfway down the extrusion. Tighten the nuts, but you might need to adjust the location after installed on the drivetrain.

3

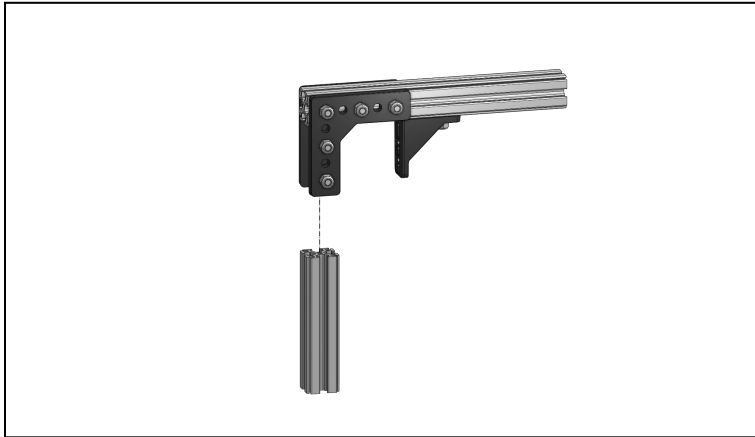


Get:

- 2 - Pre-Loaded 90 Degree Brackets

Slide the pre-loaded brackets onto extrusion, flush with the end of the extrusion.

4



Get:

- 1 - 15mm Extrusion - Cut to 63mm

Slide the extrusion onto the pre-loaded brackets.

5

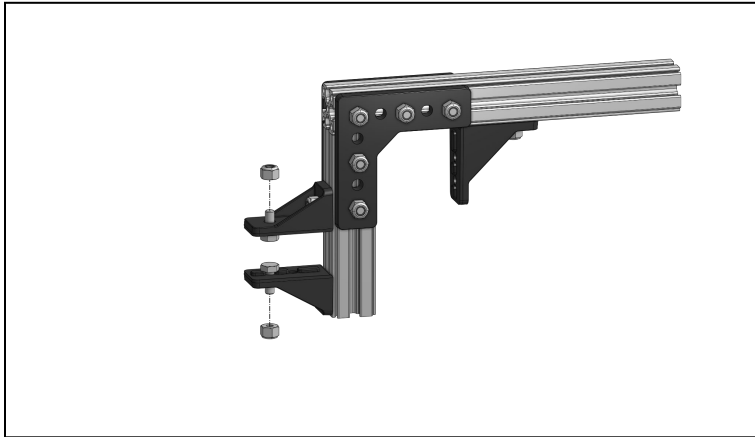


Get:

- 2 - Pre-Loaded Lap Corner Bracket

Slide the pre-loaded brackets onto extrusion as shown. Leave a gap between the two brackets for a 15mm extrusion.

6

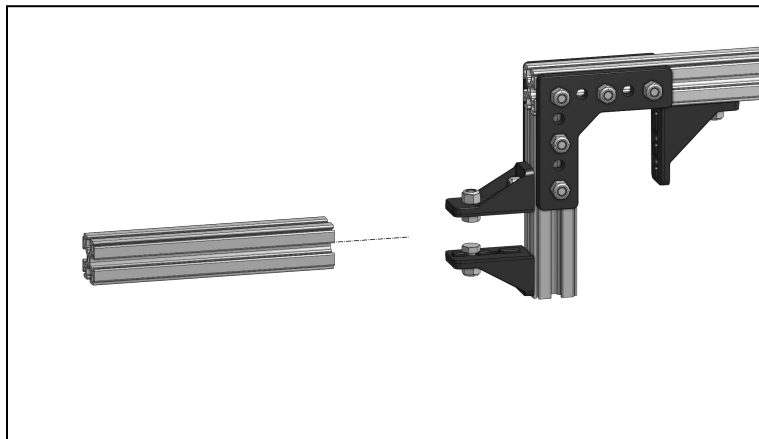


Get:

- 2 - M3 x 8mm Hex Cap Screws
- 2 - M3 Nyloc Nuts

Finger start one hex cap screw and nyloc nut into the hole as shown on each lap corner bracket.

7

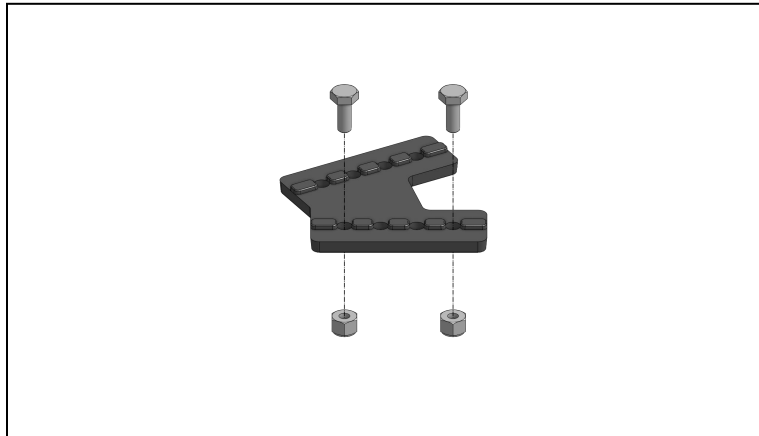


Get:

- 1 - 15mm Extrusion - Cut to 83mm

Slide the extrusion onto the pre-loaded brackets.

8

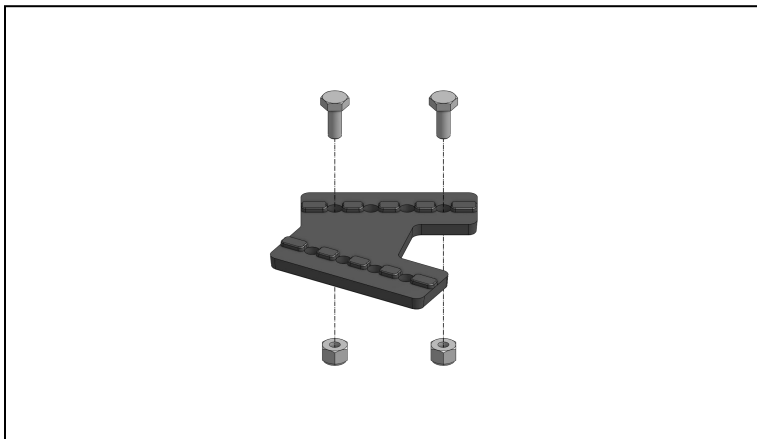


Get:

- 1 - 15mm Plastic 30 Degree Bracket
- 2 - M3 x 8mm Hex Cap Screws
- 2 - M3 Nyloc Nuts

Take a 30 degree bracket and finger start one hex cap screw and nyloc nut into the two holes as shown.

9



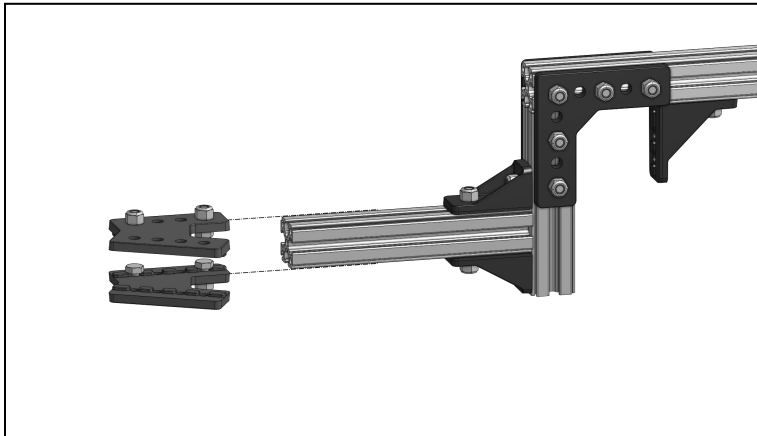
Get:

- 1 - 15mm Plastic 30 Degree Bracket
- 2 - M3 x 8mm Hex Cap Screws
- 2 - M3 Nyloc Nuts

Take a 30 degree bracket and finger start one hex cap screw and nyloc nut into the two holes as shown.

Note: These screws should be pre-loaded into opposite holes than the bracket in the previous step.

10

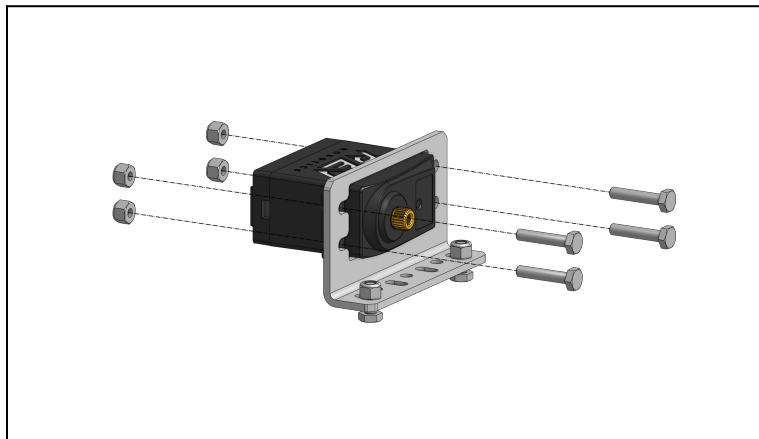


Get:

- 2 - Pre-Loaded 90 Degree Brackets

Slide the pre-loaded brackets onto extrusion, flush with the end of the extrusion.

11

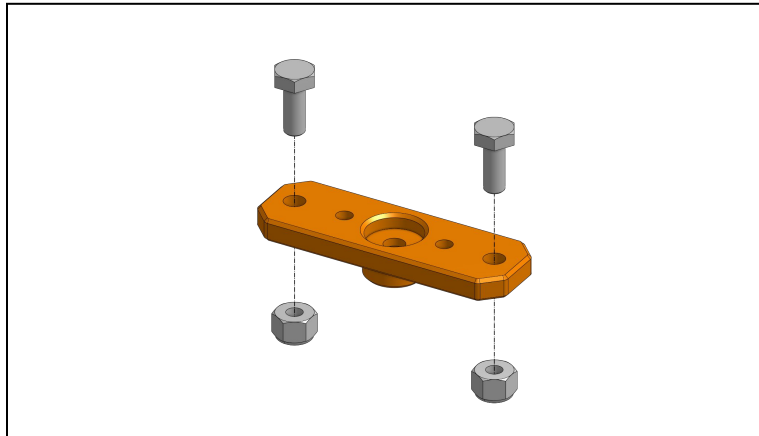


Get:

- 1 - Pre-Loaded Metal Bent Servo Bracket
- 1 - Smart Robot Servo V2 - Balanced
- 4 - M3 x 16mm Hex Cap Screw
- 4 - M3 Nyloc Nuts

Insert a servo into a pre-loaded bracket as shown. Use four 16mm hex cap screws and nyloc nuts to secure the servo to the bracket.

12

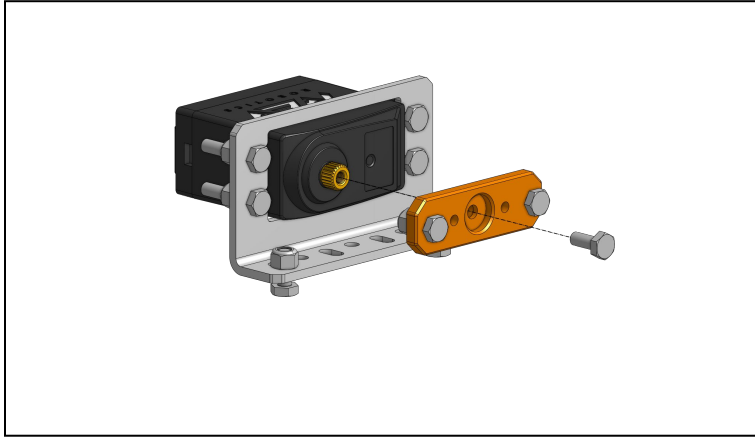


Get:

- 1 - Aluminum Double Servo Arm
- 2 - M3 x 8mm Hex Cap Screw
- 2 - M3 Nyloc Nuts

Take a double servo arm and finger start one hex cap screw and nyloc nut into the two holes as shown.

13

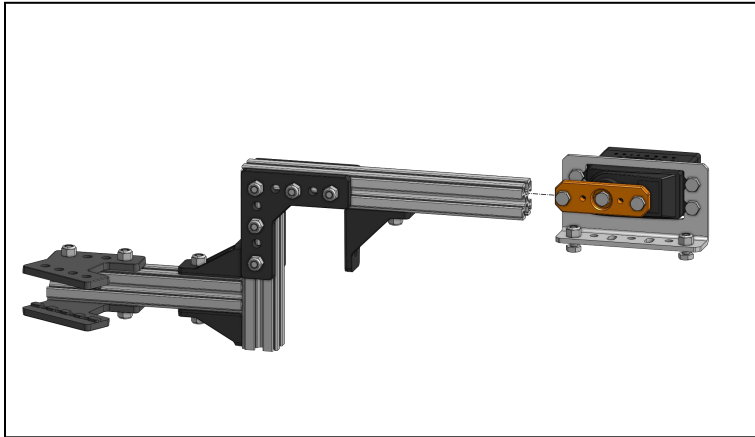


Get:

- 1 - Pre-loaded Aluminum Double Servo Arm
- 1 - M3 x 8mm Hex Cap Screw

Press the pre-loaded servo arm onto the servo as shown. Use a hex cap screw to secure the servo arm to the servo.

14

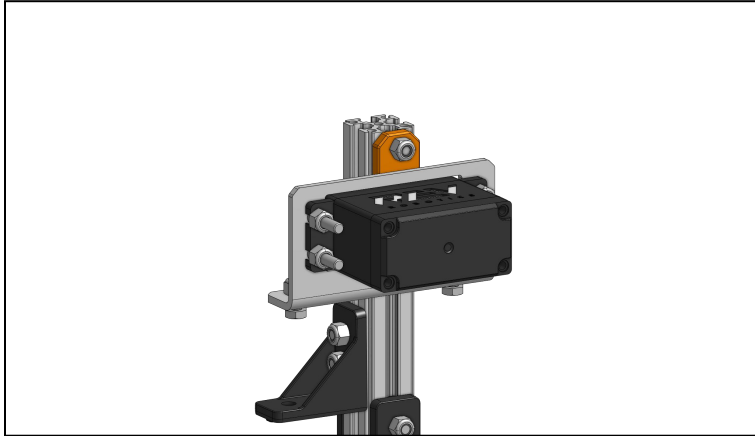


Get:

- 1 - Servo Arm Assembly
- 1 - Servo Assembly

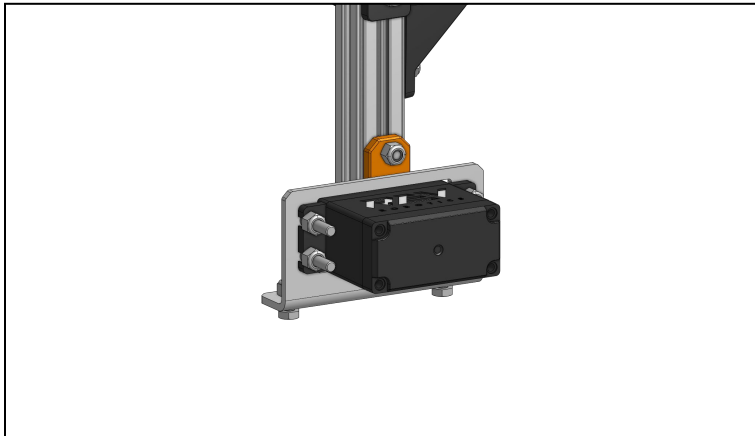
Slide the servo arm extrusion onto the servo aluminum servo arm, the end of the extrusion should be flush with the servo arm.

15



Rotate the servo until nut on the aluminum servo arm is exposed, then tighten the nut.

16

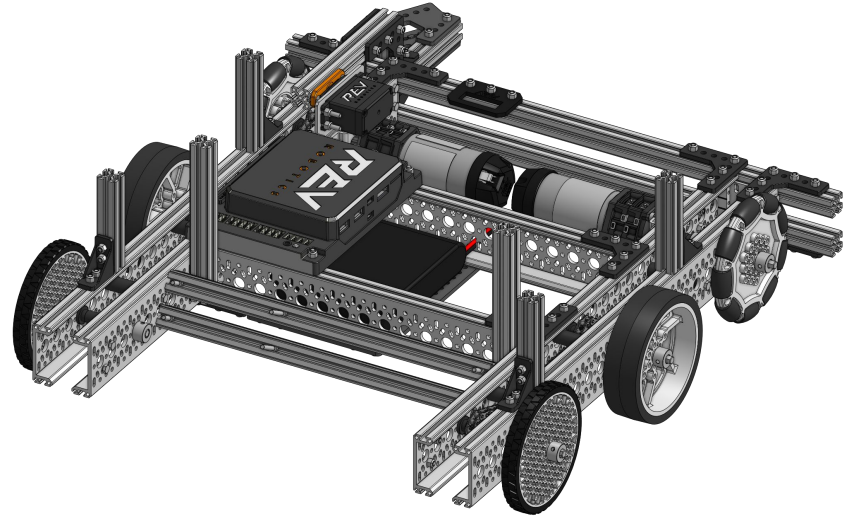


Rotate the servo until the other nut on the aluminum servo arm is exposed, then tighten the nut.

Set this assembly aside for installation during the drivetrain assembly.

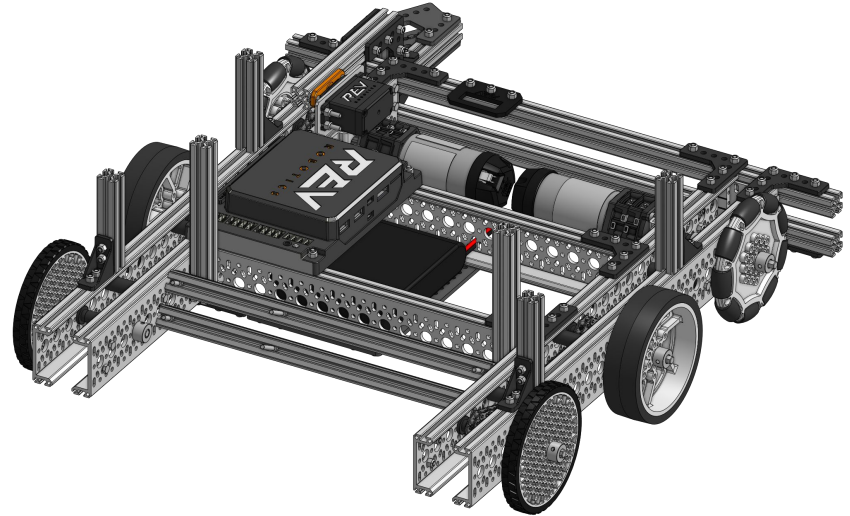
Drivetrain Assembly

PART NUMBER	DESCRIPTION	QTY
N/A	Pollen Pusher Assembly	1
N/A	20:1 UltraPlanetary Gearbox and HD Hex Motor	2
N/A	Drive Shaft Assembly	2
N/A	Single Sprocket Shaft Assembly	2
N/A	Double Sprocket Shaft Assembly	2
N/A	56 Link #25 Chain	4
N/A	Pre-Loaded 15mm Plastic 90 Degree Bracket	13
N/A	15mm Extrusion - Cut to 248mm	2
N/A	15mm Extrusion - Cut to 70mm	4
N/A	Pre-Loaded Switch Bracket	1
N/A	Pre-Loaded 15mm Plastic Inside Corner Bracket	4
REV-31-1595	Control Hub	1
REV-41-1568	15mm Extrusion - 120mm - 90° Ends	2
REV-41-1432	15mm Extrusion - 420mm - 90° Ends	2
REV-41-1492	M3 Standoff - 40mm	8
REV-41-1702	Tensioning Bushing - 39mm	8

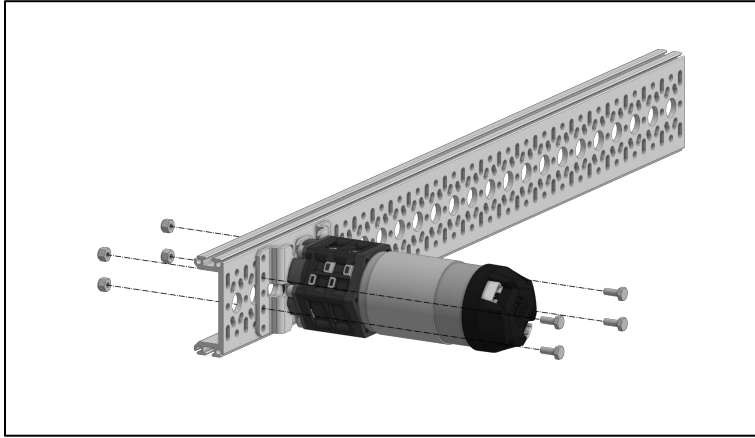


Drivetrain Assembly Cont.

PART NUMBER	DESCRIPTION	QTY
REV-41-1327	Shaft Collar	0
REV-41-1305	15mm Plastic 90 Degree Bracket	2
REV-41-1166	Battery Holder Plate	1
REV-31-1302	12V Slim Battery	1
REV-41-1373	Hook and Loop Fastener - 13.5mm x 2mm	1
REV-41-1190	90mm Omni Wheel	2
REV-41-1354	90mm Traction Wheel	2
REV-41-1267	90mm Grip Wheel	2
REV-41-1329	Through Bore Bearing - Long	4
REV-41-1326	Through Bore Bearing - Short	2
REV-41-1359	M3 x 8mm Hex Cap Screw	0
REV-41-1361	M3 Nyloc Nuts	0
REV-41-1360	M3 x 16mm Hex Cap Screw	0
REV-41-1687	U Channel Endcap	2
REV-41-1762	45mm x 15mm C Channel - 408mm	4
REV-41-1767	45mm x 15mm C Channel - 248mm	2



1

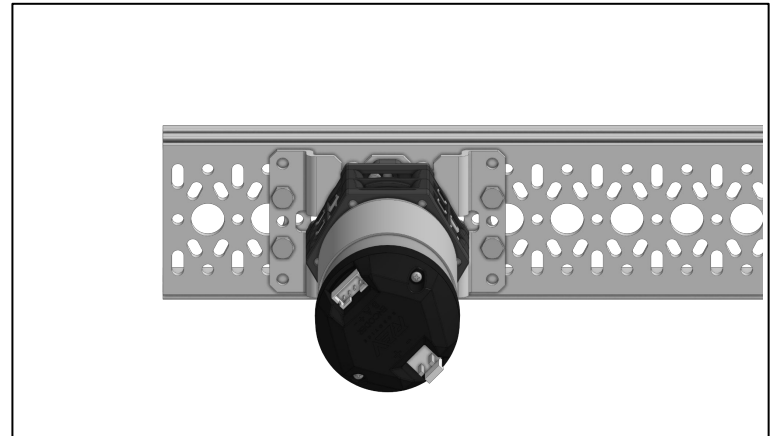
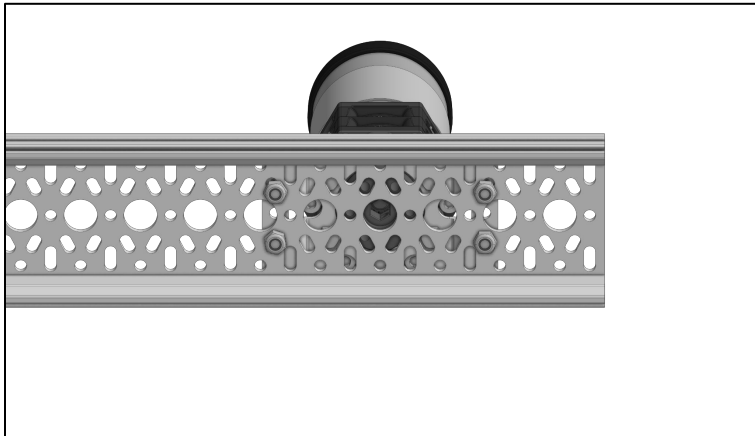


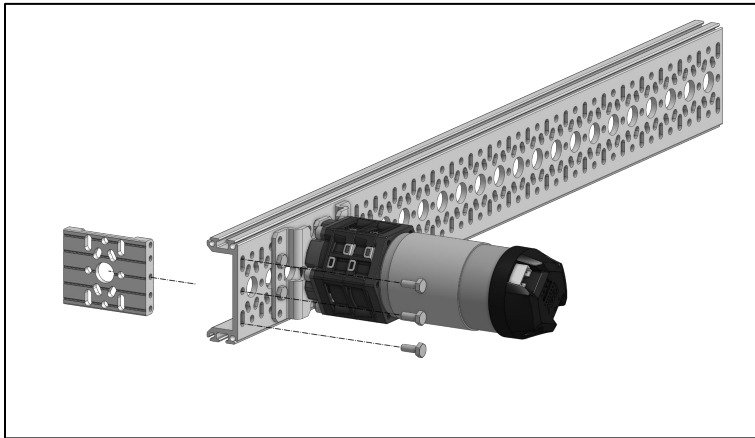
Get:

- 1 - 20:1 UltraPlanetary Gearbox and Motor
- 1 - 45mm x 15mm C Channel - 408mm
- 4 - M3 x 8mm Hex Cap Screws
- 4 - M3 Nyloc Nuts

Line up the output of the gearbox with the fourth hole from the end of the c channel.

Secure the gearbox and motor to the c channel with four screws and nyloc nuts.

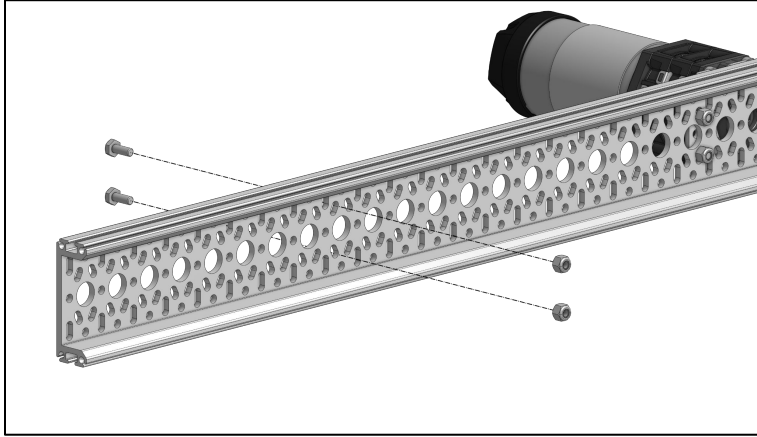




Get:

- 1 - U Channel Endcap
- 3 - M3 x 8mm Hex Cap Screws

Slide a u channel endcap into the c channel as shown then secure it with three screws.

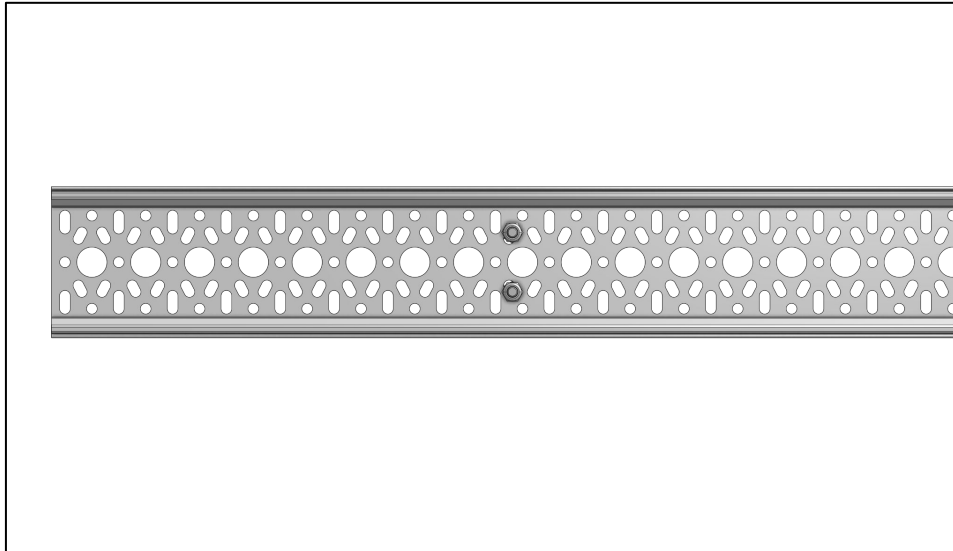


Get:

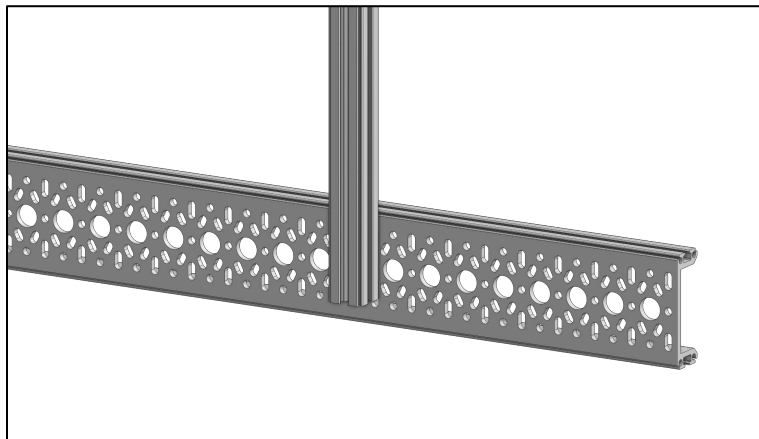
- 2 - M3 x 8mm Hex Cap Screws
- 2 - M3 Nyloc Nuts

In the two holes shown, finger start one hex cap screw and nyloc nut into each hole.

Note: The Hex Cap head should be on the same side of the c channel as the motor.



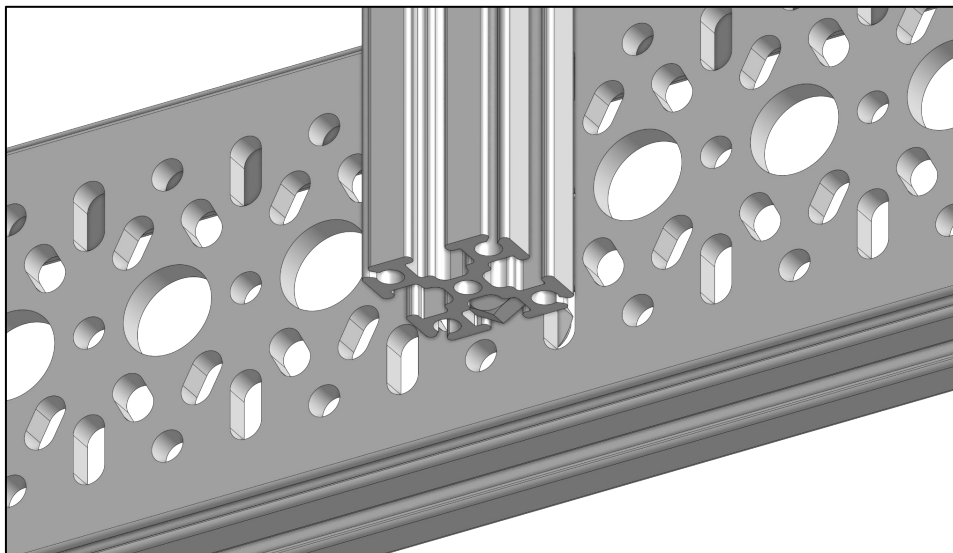
4

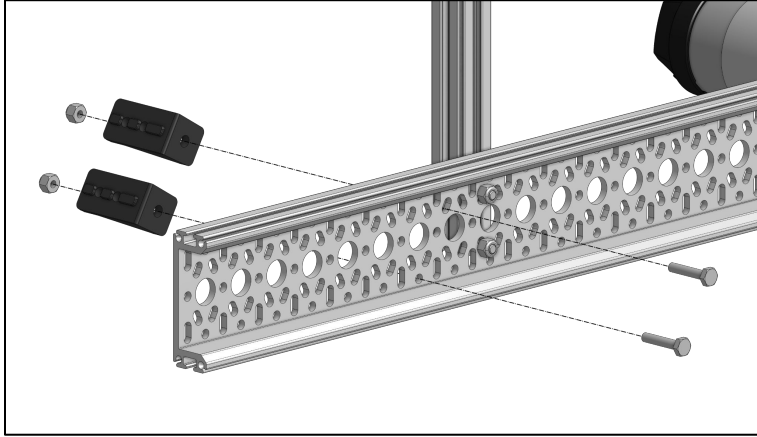


Get:

- 1 - 15mm Extrusion - 120mm

Slide the extrusion onto the screws from the previous step. The end of the extrusion should be just past the end of the screw. There should be 86mm of the extrusion extending past the c channel.



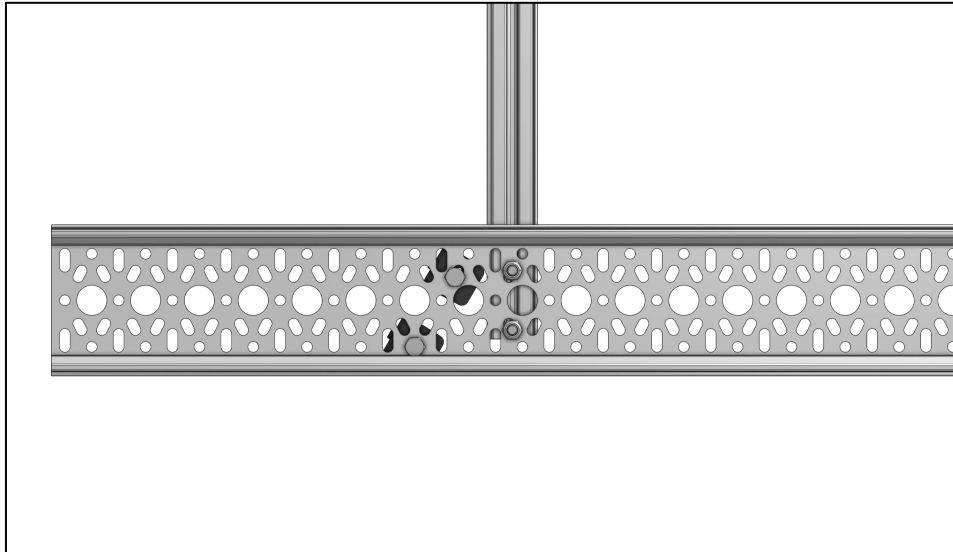


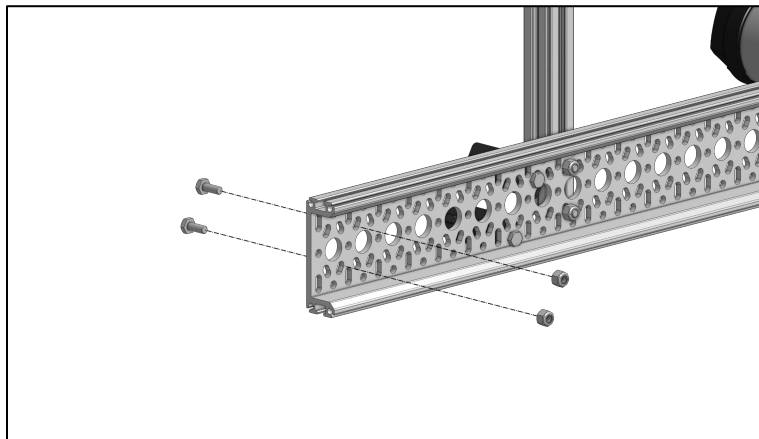
Get:

- 2 - 15mm Plastic Lap Corner Bracket
- 2 - M3 x 16mm Hex Cap Screws
- 2 - M3 Nyloc Nuts

In the two holes shown, secure a lap corner bracket.

Note: It's recommended to tighten the nut enough that you can barely still rotate the bracket. This will be helpful in later steps.



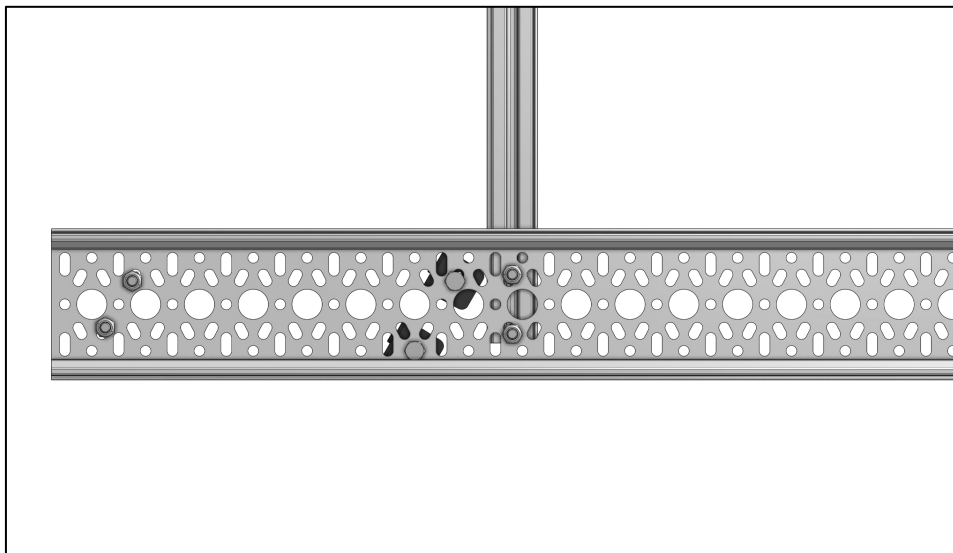


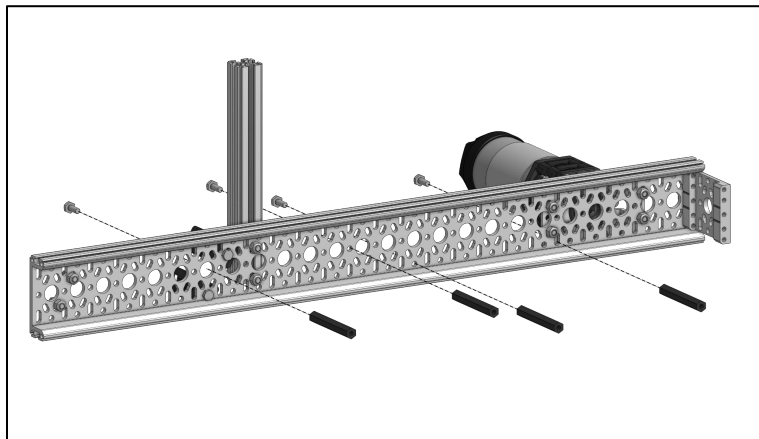
Get:

- 2 - M3 x 8mm Hex Cap Screws
- 2 - M3 Nyloc Nuts

In the two holes shown, finger start one hex cap screw and nyloc nut into each hole.

Note: The Hex Cap head should be on the same side of the c channel as the motor.

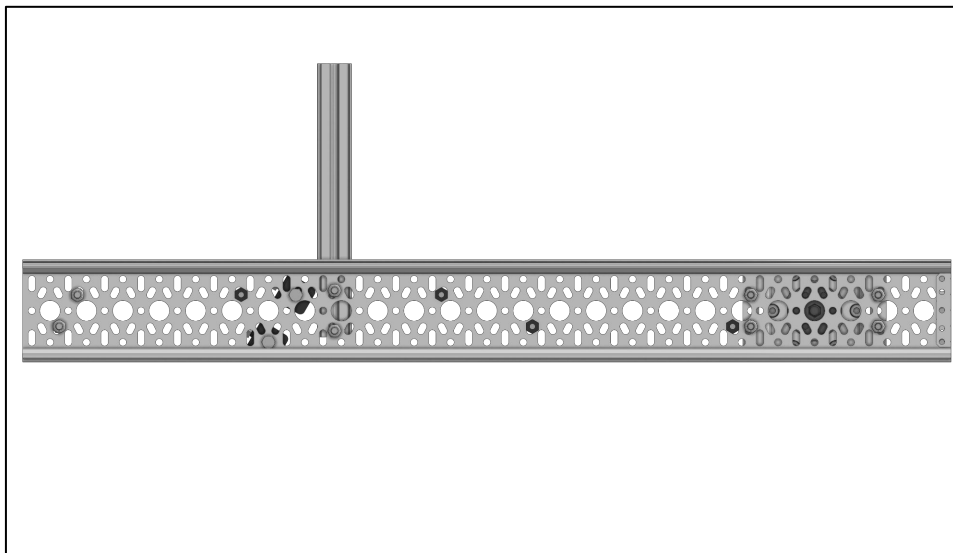


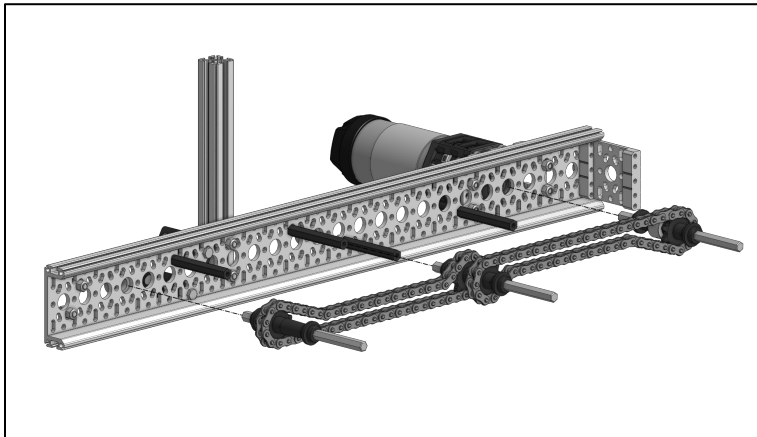


Get:

- 4 - M3 Standoff - 40mm
- 4 - M3 x 8mm Hex Cap Screws

In the locations shown, secure four standoffs with hex cap screws.

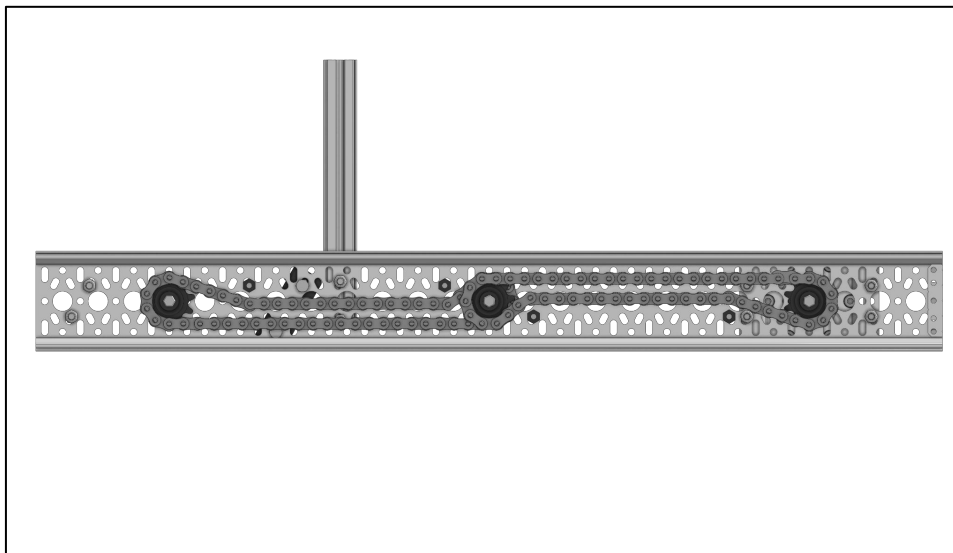




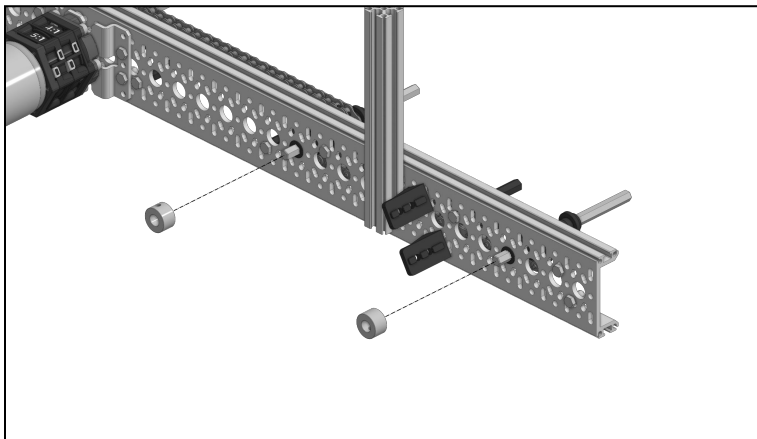
Get:

- 1 - Drive Shaft Assembly
- 1 - Single Sprocket Shaft Assembly
- 1 - Double Sprocket Shaft Assembly
- 2 - 56 Link #25 Chain

Loop the two 56 link chains around sprockets on all three shafts as shown. Insert the shafts into the locations shown with the drive shaft inserted into the motor output. Route the chains around the standoffs as shown.



9

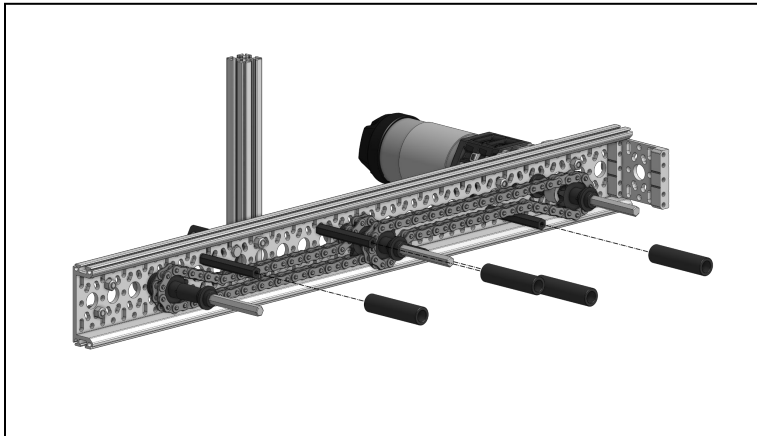


Get:

- 2 - Shaft Collar

Secure the single and double sprockets shafts with shaft collars.

10

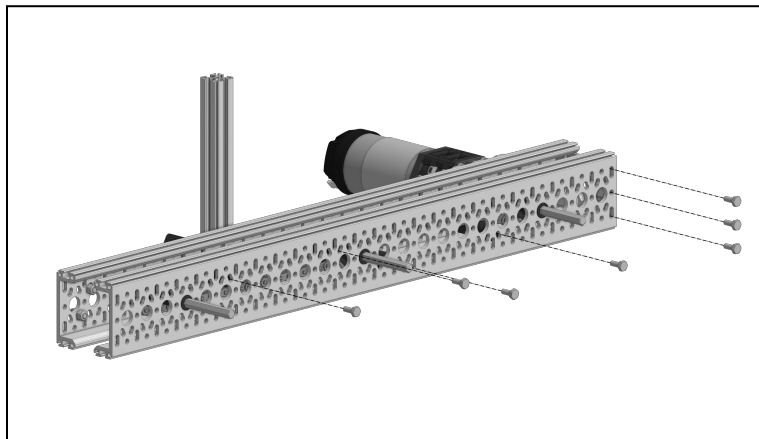


Get:

- 4 - Tensioning Bushing - 39mm

Slide tensioning bushings onto the standoffs. You may need to adjust the chain around the bushing to fully slide the bushing onto the standoff.

11

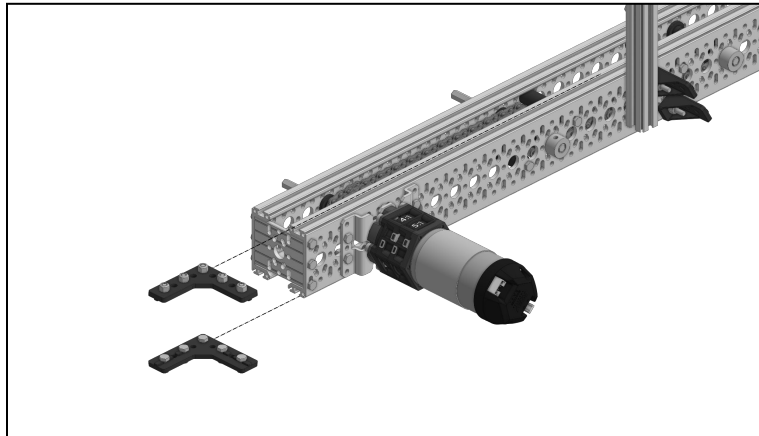


Get:

- 1 - 45mm x 15mm C Channel - 408mm
- 7 - M3 x 8mm Hex Cap Screws

Secure another c channel over the shafts. Use seven screws, four for the standoffs and three into the u channel endcap.

12

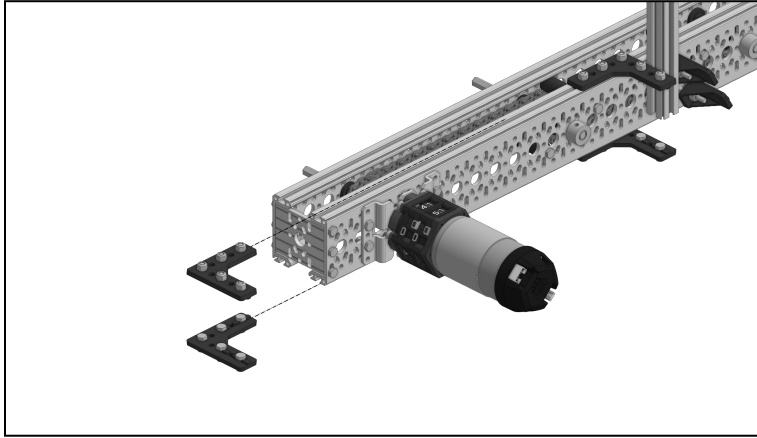


Get:

- 2 - Pre-Loaded 90 Degree Bracket

Slide the pre-loaded brackets onto the c channel with the motor attached, do not tighten the nuts yet.

13



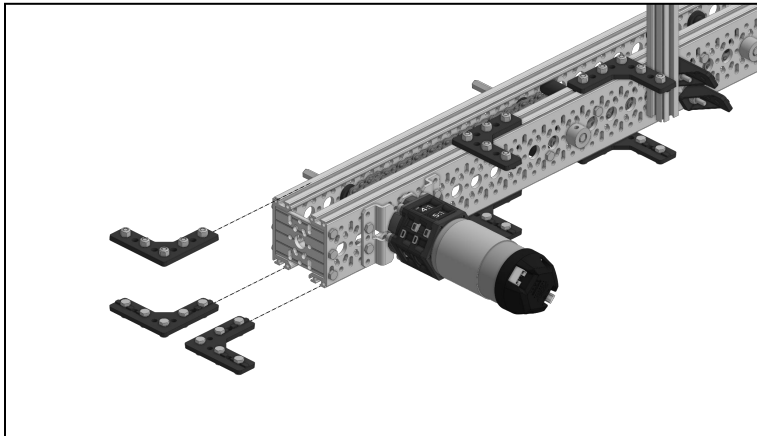
Get:

- 2 - Pre-Loaded 90 Degree Bracket

Slide two pre-loaded brackets onto the c channel with the motor attached, do not tighten the nuts yet.

Note: These brackets are in a different orientation from the previous brackets.

14

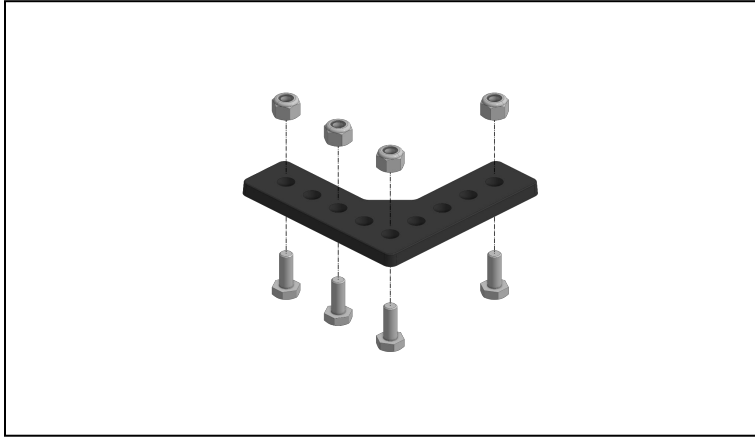


Get:

- 3 - Pre-Loaded 90 Degree Bracket

Slide three more pre-loaded brackets onto the end of c channel as shown, leaving the three screws extended out. Tighten the two nuts on the c channel.

15



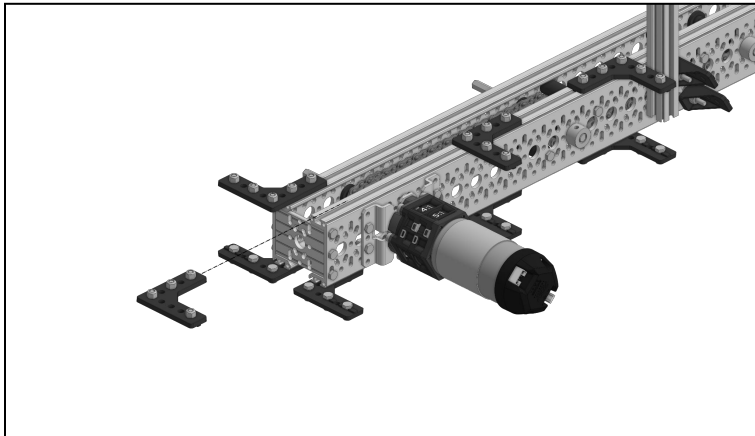
Get:

- 1 - 15mm Plastic 90 Degree Brackets
- 4 - M3 x 8mm Hex Cap Screws
- 4 - M3 Nyloc Nuts

Take a bracket and finger start one hex cap screw and nyloc nut per hole as shown.

Note: The side of the bracket with “ribs” must have the hex cap screw head.

16

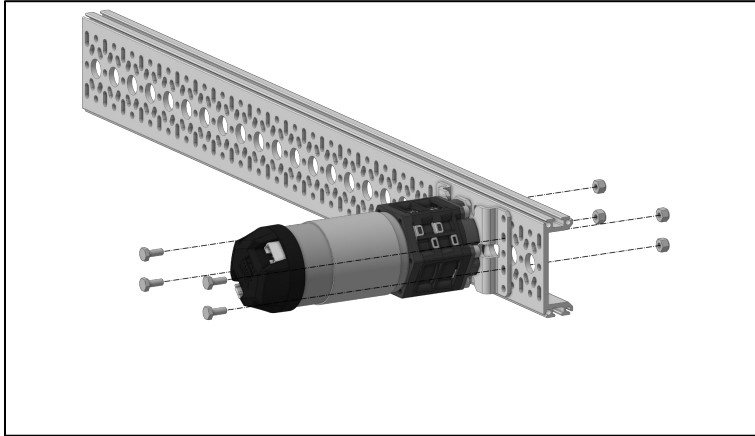


Get:

- 1 - Pre-Loaded 90 Degree Bracket from previous step

Slide the pre-loaded bracket from the previous step onto the end of c channel as shown, leaving the two screws extended out. Tighten the other nuts on the bracket connecting it to the c channel.

Set this aside for a later step.

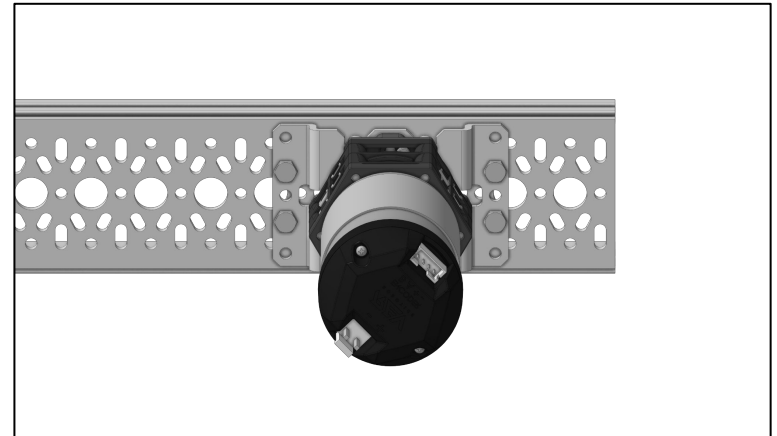
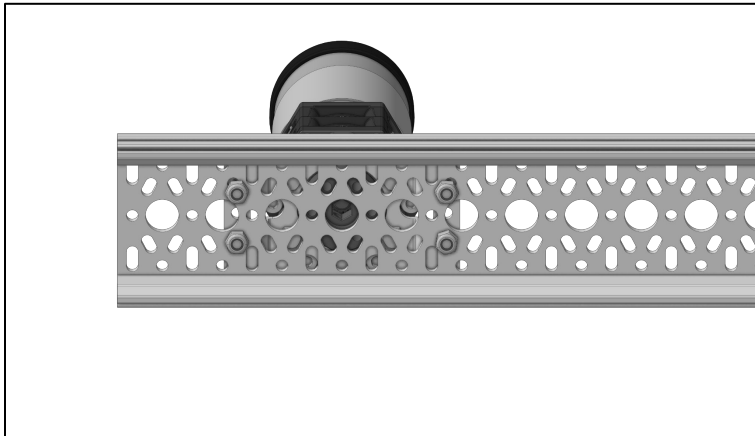


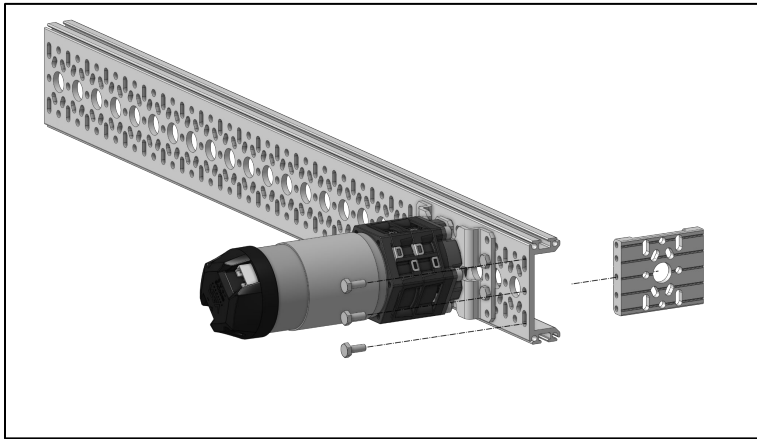
Get:

- 1 - 20:1 UltraPlanetary Gearbox and Motor
- 1 - 45mm x 15mm C Channel - 408mm
- 4 - M3 x 8mm Hex Cap Screws
- 4 - M3 Nyloc Nuts

Line up the output of the gearbox with the fourth hole from the end of the c channel.

Secure the gearbox and motor to the c channel with four screws and nyloc nuts.

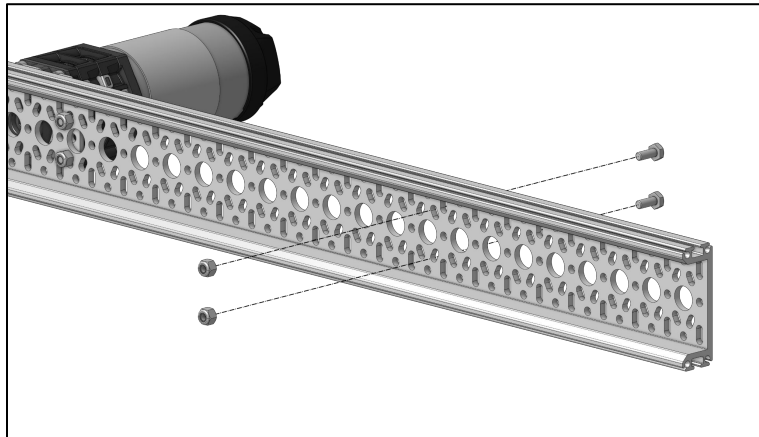




Get:

- 1 - U Channel Endcap
- 3 - M3 x 8mm Hex Cap Screws

Slide a u channel endcap into the c channel as shown then secure it with three screws.

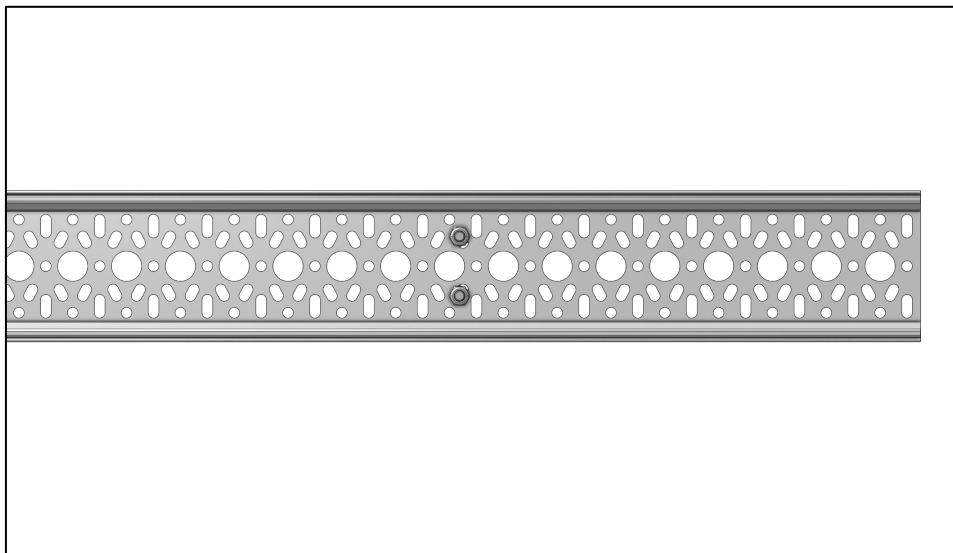


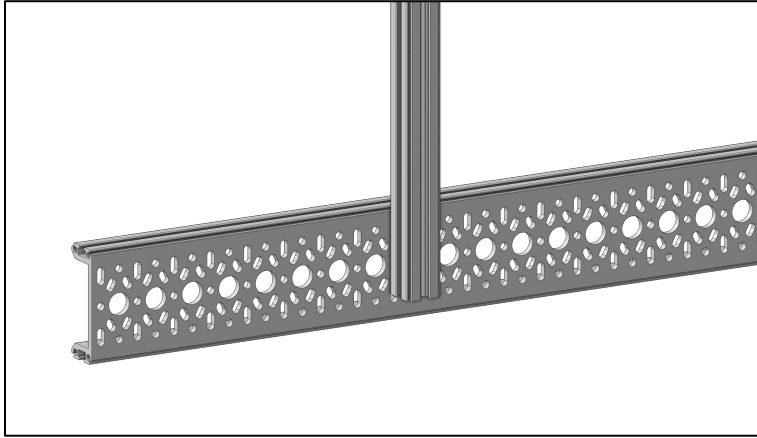
Get:

- 2 - M3 x 8mm Hex Cap Screws
- 2 - M3 Nyloc Nuts

In the two holes shown, finger start one hex cap screw and nyloc nut into each hole.

Note: The Hex Cap head should be on the same side of the c channel as the motor.

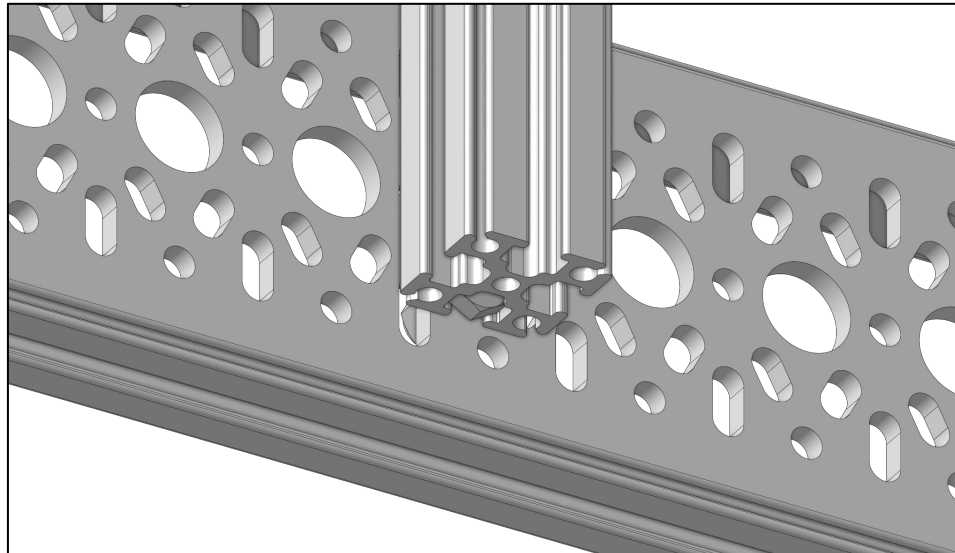


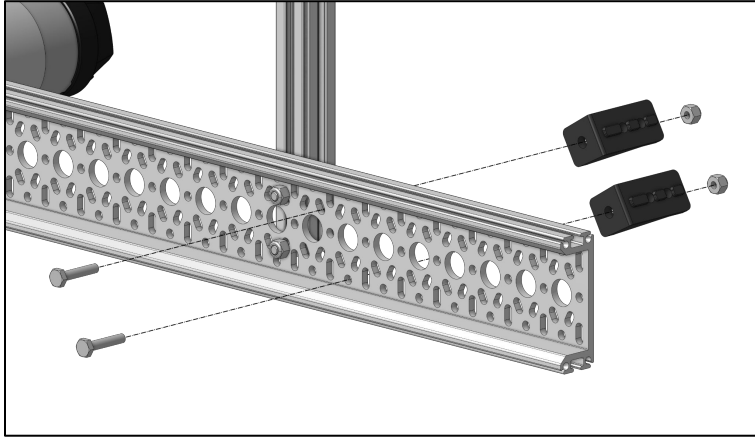


Get:

- 1 - 15mm Extrusion - 120mm

Slide the extrusion onto the screws from the previous step. The end of the extrusion should be just past the end of the screw. There should be 86mm of the extrusion extending past the top of the c channel.



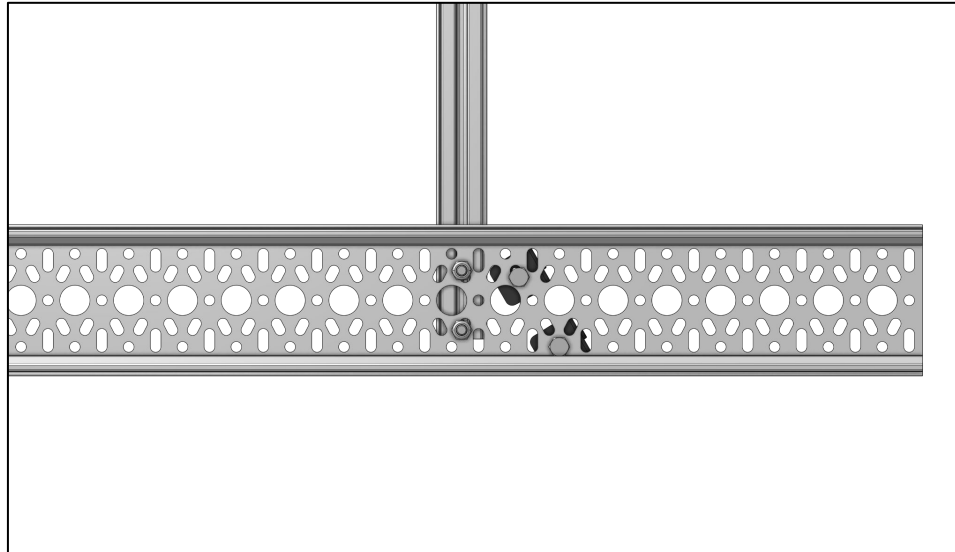


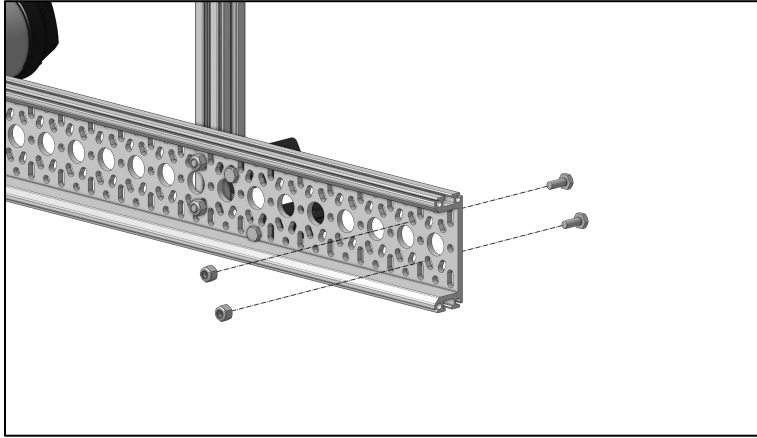
Get:

- 2 - 15mm Plastic Lap Corner Bracket
- 2 - M3 x 16mm Hex Cap Screws
- 2 - M3 Nyloc Nuts

In the two holes shown, secure a lap corner bracket.

Note: It's recommended to tighten the nut enough that you can barely still rotate the bracket. This will be helpful in later steps.



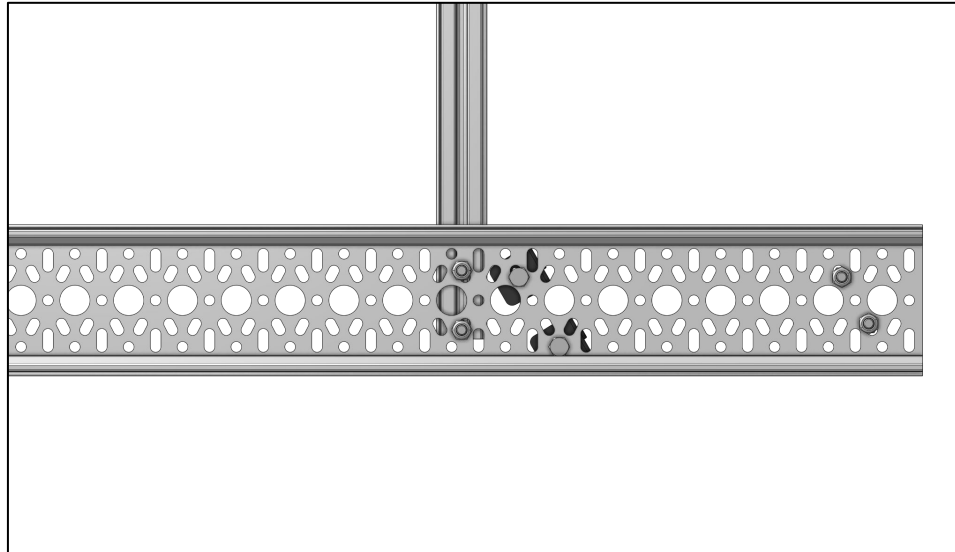


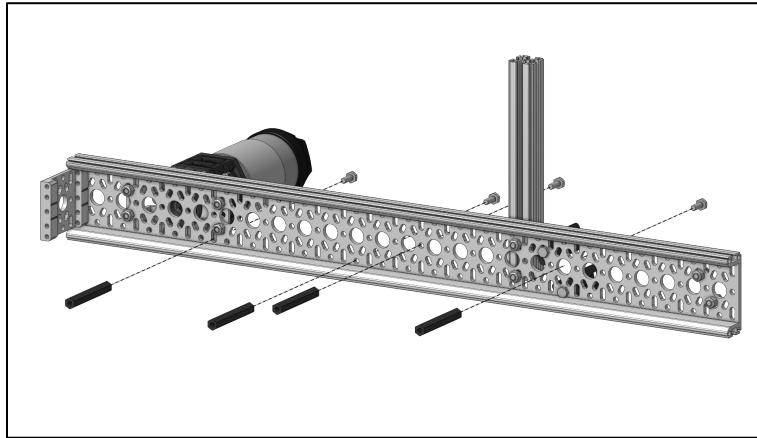
Get:

- 2 - M3 x 8mm Hex Cap Screws
- 2 - M3 Nyloc Nuts

In the two holes shown, finger start one hex cap screw and nyloc nut into each hole.

Note: The Hex Cap head should be on the same side of the c channel as the motor.

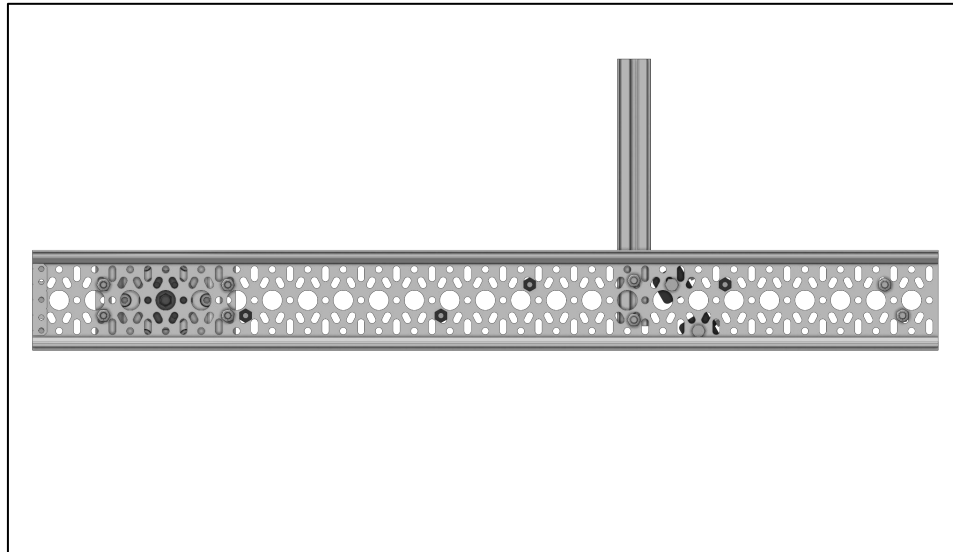


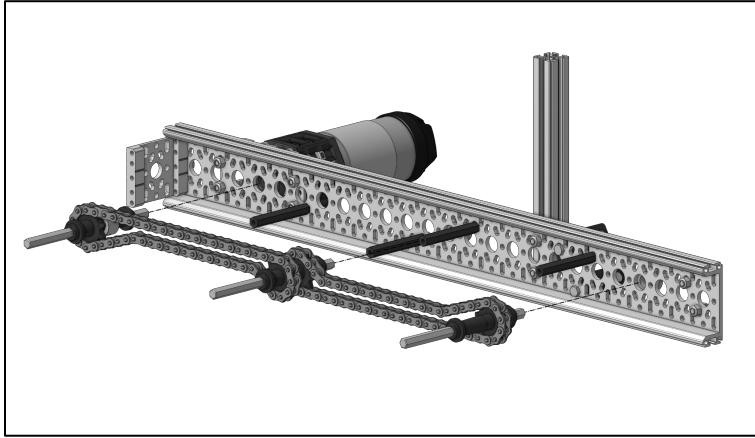


Get:

- 4 - M3 Standoff - 40mm
- 4 - M3 x 8mm Hex Cap Screws

In the locations shown, secure four standoffs with hex cap screws.

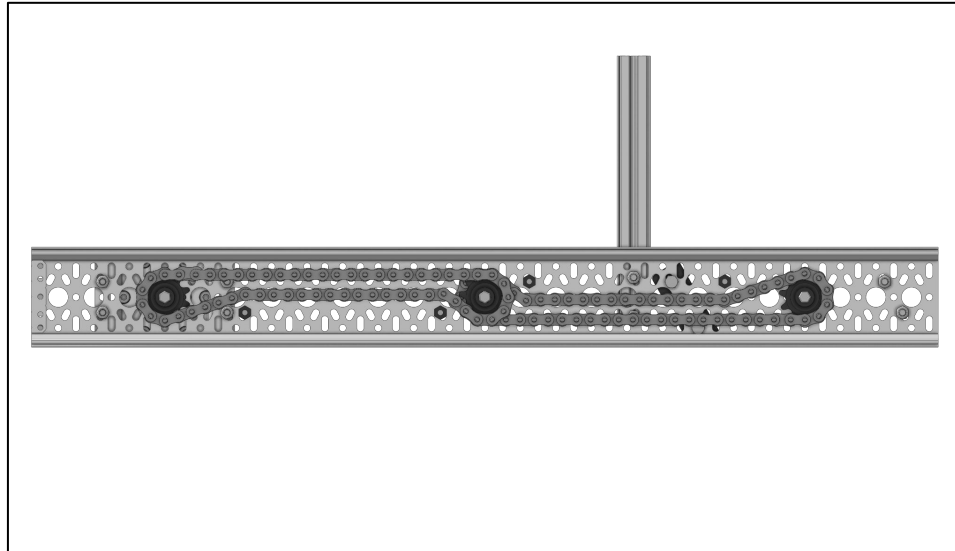




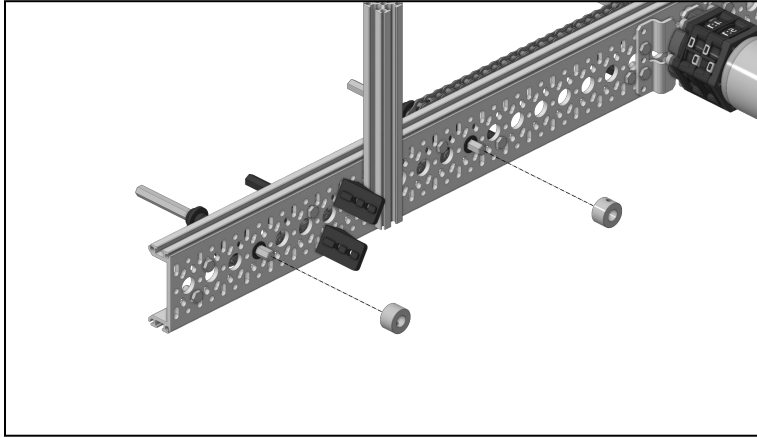
Get:

- 1 - Drive Shaft Assembly
- 1 - Single Sprocket Shaft Assembly
- 1 - Double Sprocket Shaft Assembly
- 2 - 56 Link #25 Chain

Loop the two 56 link chains around sprockets on all three shafts as shown. Insert the shafts into the locations shown with the drive shaft inserted into the motor output. Route the chains around the standoffs as shown.



24

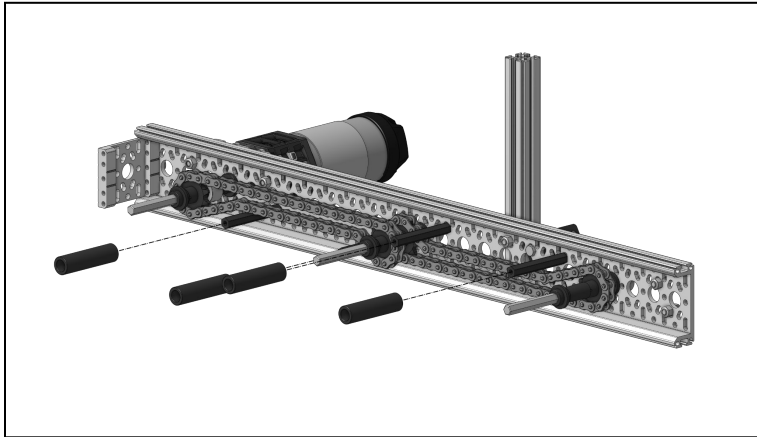


Get:

- 2 - Shaft Collar

Secure the single and double sprockets shafts with shaft collars.

25

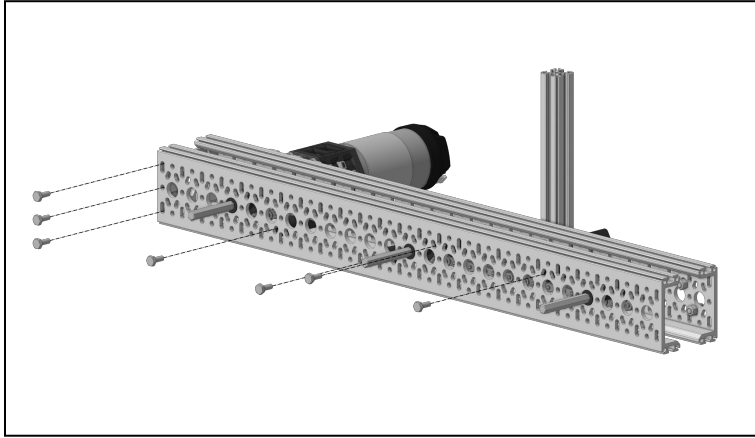


Get:

- 4 - Tensioning Bushing - 39mm

Slide tensioning bushings onto the standoffs. You may need to adjust the chain around the bushing to fully slide the bushing onto the standoff.

26

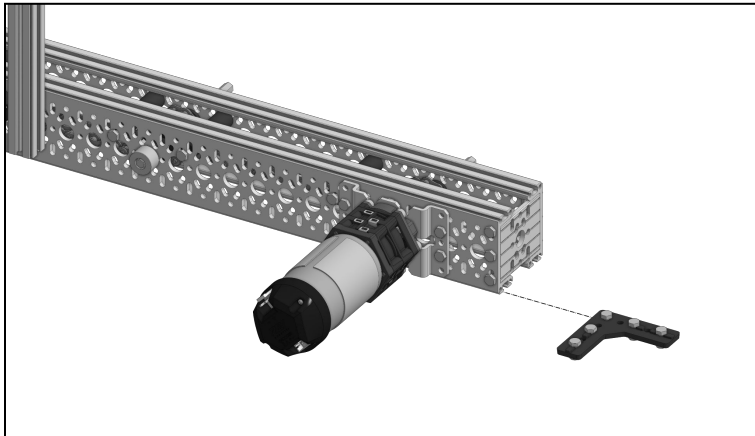


Get:

- 1 - 45mm x 15mm C Channel - 408mm
- 7 - M3 x 8mm Hex Cap Screws

Secure another c channel over the shafts. Use seven screws, four for the standoffs and three into the u channel endcap.

27

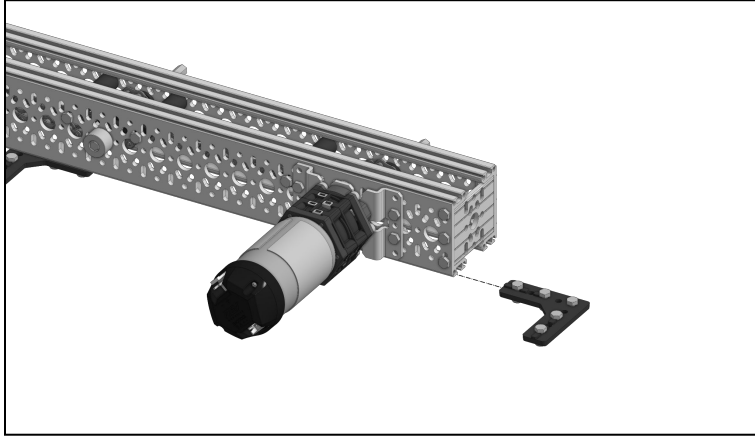


Get:

- 1 - Pre-Loaded 90 Degree Bracket

Slide the pre-loaded bracket onto the c channel with the motor attached, do not tighten the nuts yet.

28



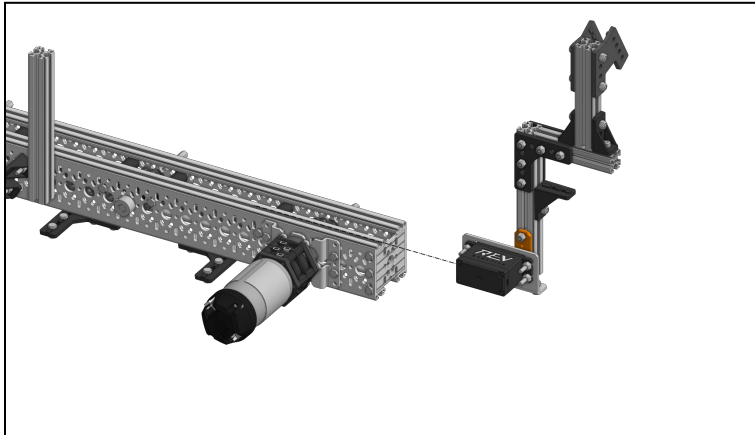
Get:

- 1 - Pre-Loaded 90 Degree Bracket

Slide another pre-loaded bracket onto the c channel with the motor attached, do not tighten the nuts yet.

Note: This bracket are in a different orientation from the previous bracket.

29

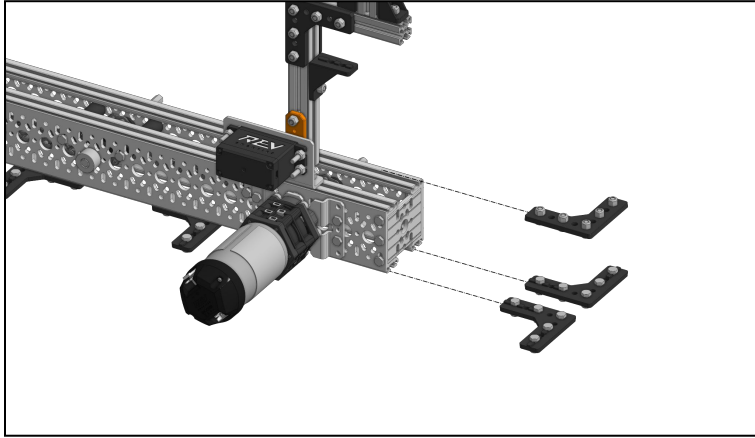


Get:

- 1 - Pollen Pusher Assembly

Slide the pollen pusher servo bracket onto the same c channel. With the arm down, the u channel endcap should be between the inside corner bracket and extrusion. Adjust the servo bracket or inside corner bracket to allow the arm to move up and down freely.

30

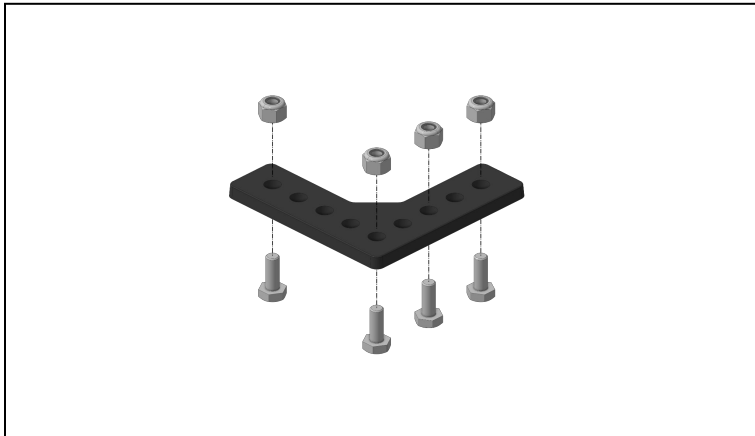


Get:

- 3 - Pre-Loaded 90 Degree Bracket

Slide the pre-loaded bracket from the previous step onto the end of c channel as shown, leaving the two screws extended out. Tighten the other nuts on the bracket connecting it to the c channel.

31



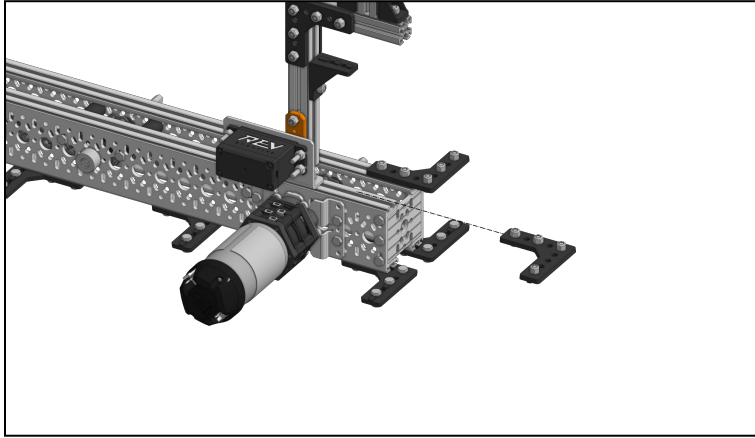
Get:

- 1 - 15mm Plastic 90 Degree Brackets
- 4 - M3 x 8mm Hex Cap Screws
- 4 - M3 Nyloc Nuts

Take a bracket and finger start one hex cap screw and nyloc nut per hole as shown.

Note: The side of the bracket with “ribs” must have the hex cap screw head.

32

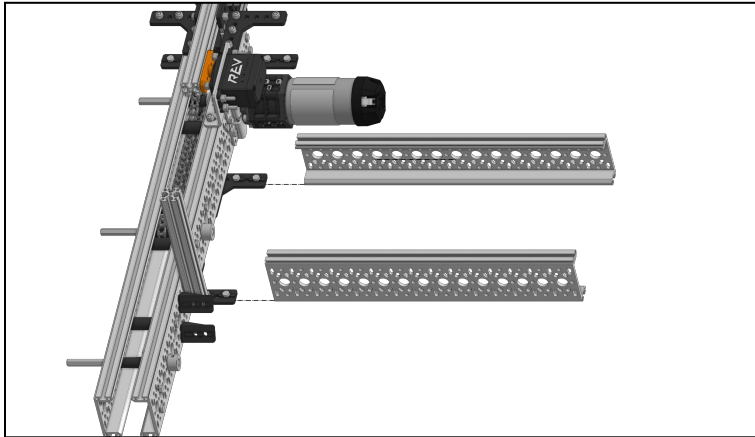


Get:

- 1 - Pre-Loaded 90 Degree Bracket from previous step

Slide the pre-loaded bracket from the previous step onto the end of c channel as shown, leaving the two screws extended out. Tighten the other nuts on the bracket connecting it to the c channel.

33

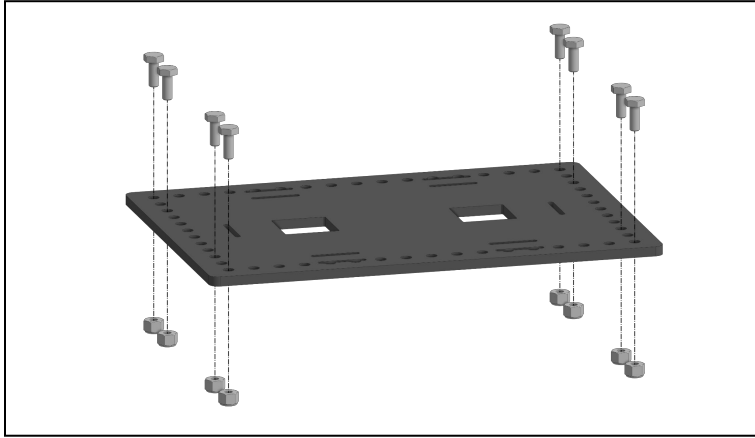


Get:

- 2 - 45mm x 15mm C Channel - 248mm

Slide a 248mm c channel onto the two brackets as shown. Tighten the two nuts on each bracket holding these two c channel.

34

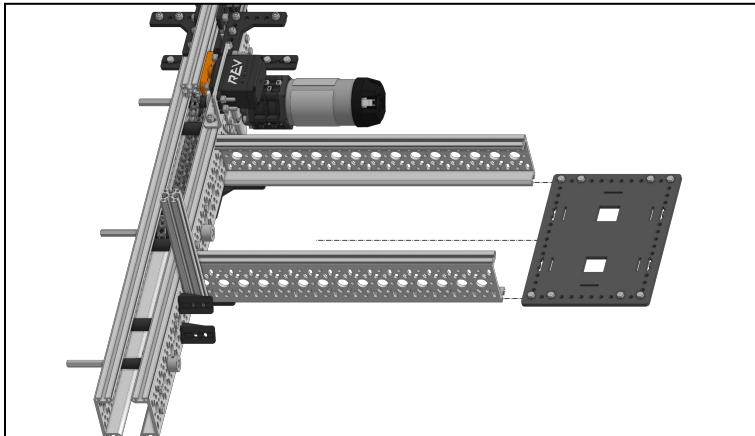


Get:

- 1 - Battery Holder Plate
- 8 - M3 x 8mm Hex Cap Screws
- 8 - M3 Nyloc Nuts

Take a battery holder plate and finger start one hex cap screw and nyloc nut in each hole shown.

35

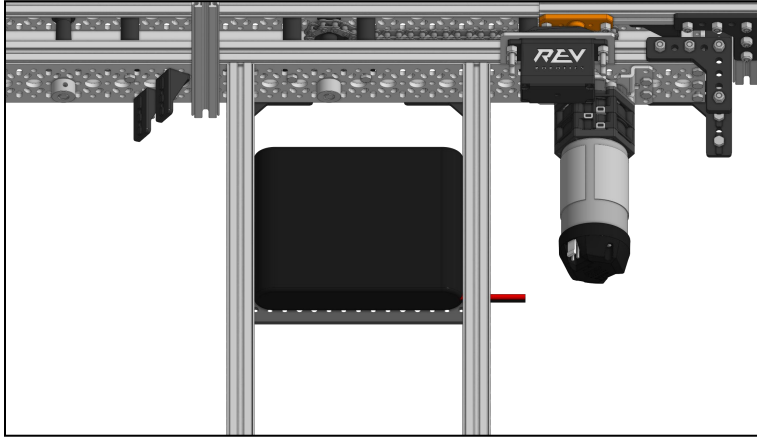


Get:

- 1 - Pre-Loaded Battery Holder Plate from previous step

Slide the battery holder plate onto the two c channel as shown. The bracket should slide all the way against the 90 degree brackets. Tighten the nuts on the battery holder plate.

36



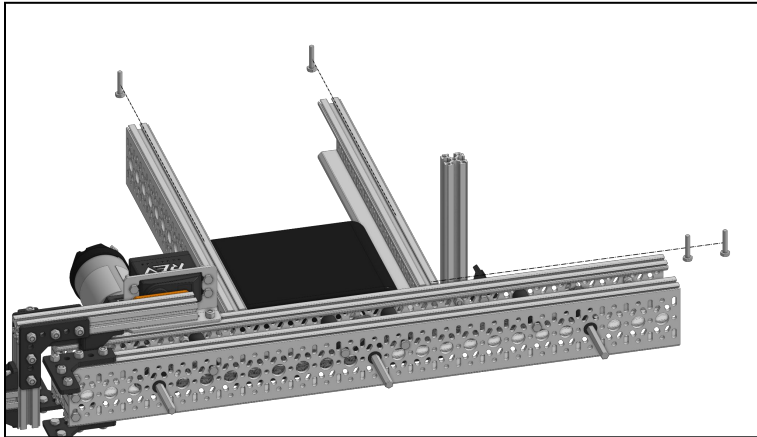
Get:

- 1 - 12V Slim Battery
- 1 - Hook and Loop Fastener

Using strips of hook and loop fastener create a harness for the battery.

Note: We recommend removing the battery after creating the harness for safety. The rest of this guide will show the battery installed for orientation purposes.

37

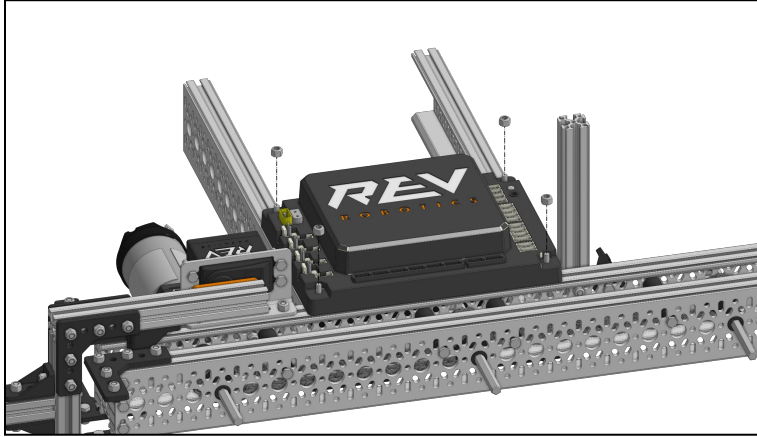


Get:

- 4 - M3 x 16mm Hex Cap Screws

Slide a 16mm screw into the two 248mm c channel. Slide two 16mm screws into the the c channel with the motor attached.

38

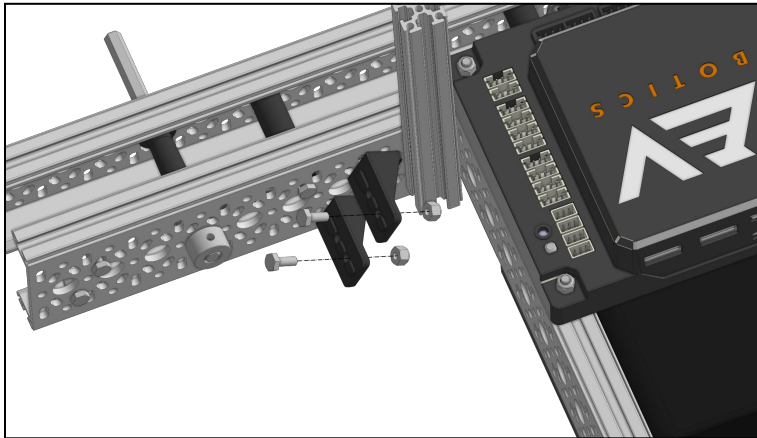


Get:

- 1 - Control Hub
- 4 - M3 Nyloc Nuts

Slide your Control Hub onto the four 16mm screws from the previous step. Use four nyloc nuts to secure the Control Hub.

39

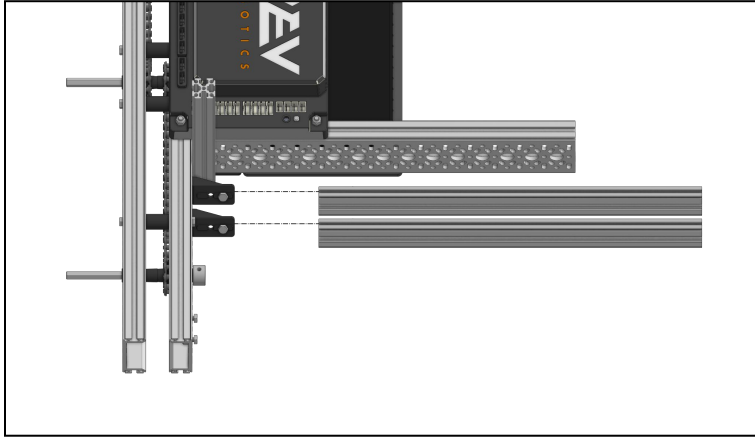


Get:

- 2 - M3 x 8mm Hex Cap Screws
- 2 - M3 Nyloc Nuts

Finger start one hex cap screw and nyloc nut into each lap corner bracket as shown.

40

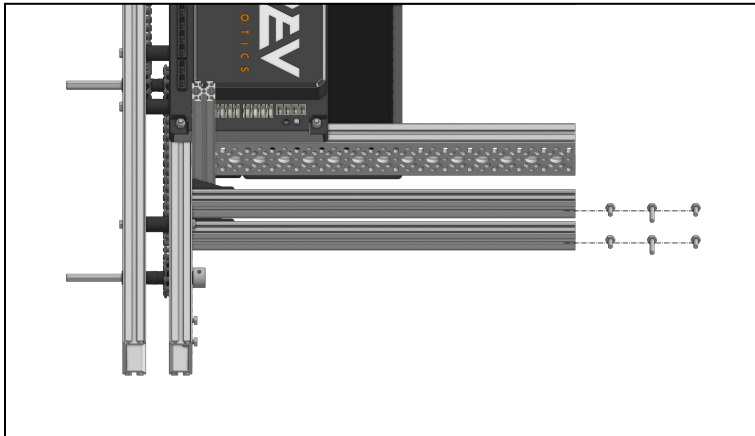


Get:

- 2 - 15mm Extrusion - Cut to 248mm

Slide the extrusion onto the two pre-loaded lap corner brackets.

41

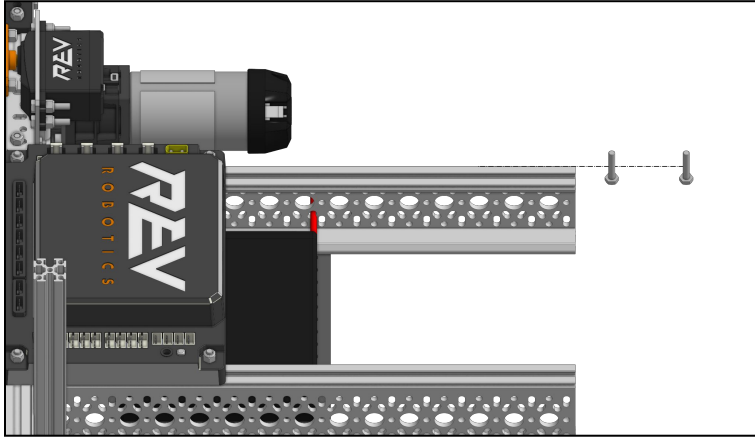


Get:

- 4 - M3 x 8mm Hex Cap Screws
- 2 - M3 x 16mm Hex Cap Screws

Slide a 8mm screw, then a 16mm screw, then another 8mm screw into each extrusion as shown.

42

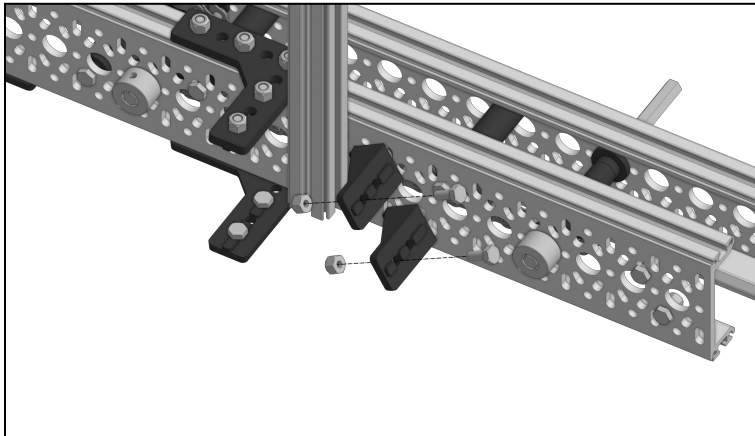


Get:

- 2 - M3 x 16mm Hex Cap Screws

Slide two 16mm screws into the 248mm c channel closer to the motor.

43

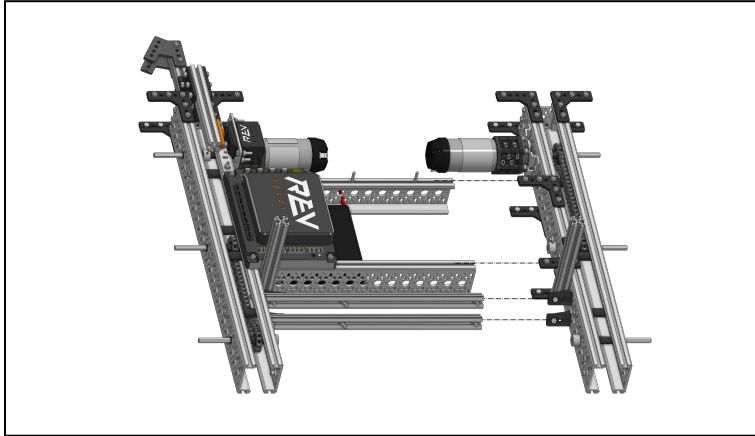


Get:

- 1 - Drive Rail from Step 16
- 2 - M3 x 8mm Hex Cap Screws
- 2 - M3 Nyloc Nuts

On the other drive rail that you have set aside, finger start one hex cap screw and nyloc nut into each lap corner bracket as shown.

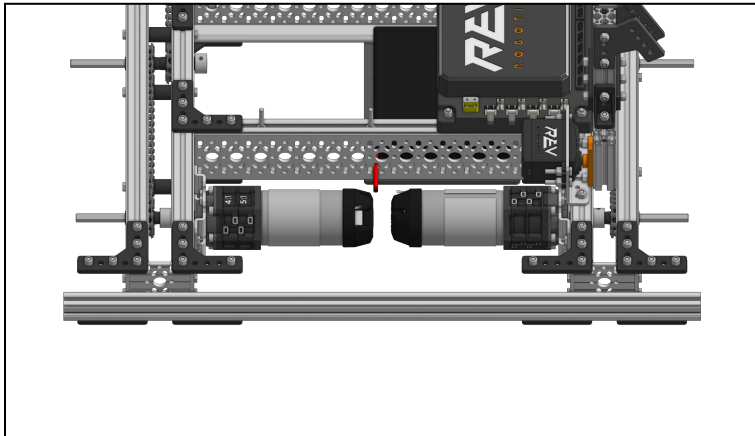
44



Connect the two driver rails together. Align the two 248mm c channel and four 90 degree brackets. Align the two 248mm extrusion with the lap corner brackets. Tighten all these nuts to secure the rails together.

Note: It's important to ensure your driver rails are square. You can use something flat against or stand the rails on the ends without endcaps to help.

45



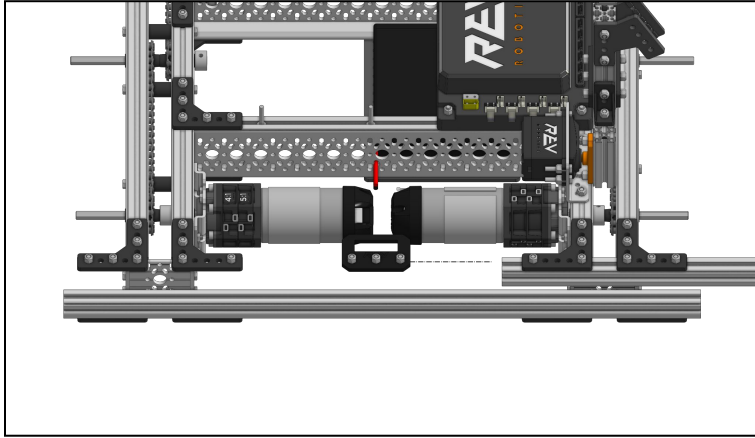
Get:

- 1 - 15mm Extrusion - 420mm

Slide the extrusion onto the four pre-loaded brackets as shown. Tighten these nuts.

Note: The extrusion should be flush against the end of the c channel and endcaps. Adjust the two nuts and screws holding the 90 brackets if there is a gap.

46



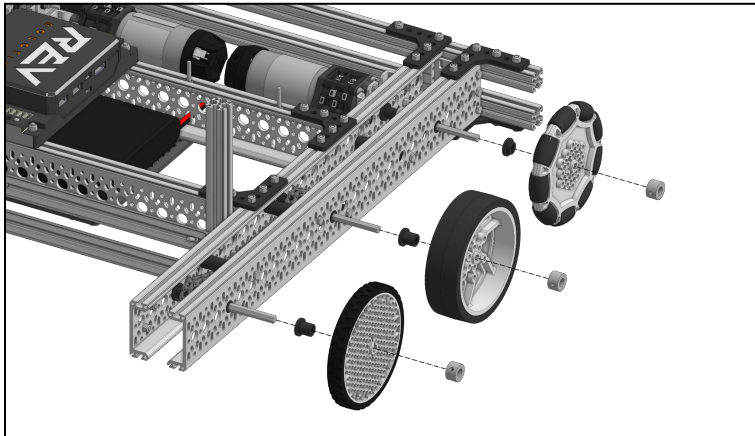
Get:

- 1 - Pre-Loaded Switch Bracket
- 1 - 15mm Extrusion - 420mm

Slide the extrusion onto two of the pre-loaded brackets as shown, then slide the pre-loaded switch bracket onto the 420mm extrusion. Slide the extrusion onto the remaining two brackets. The switch bracket should be against the right side 90 degree brackets. Tighten these nuts.

Note: The extrusion should be flush against the end of the c channel and endcaps. Adjust the two nuts and screws holding the 90 brackets if there is a gap.

47

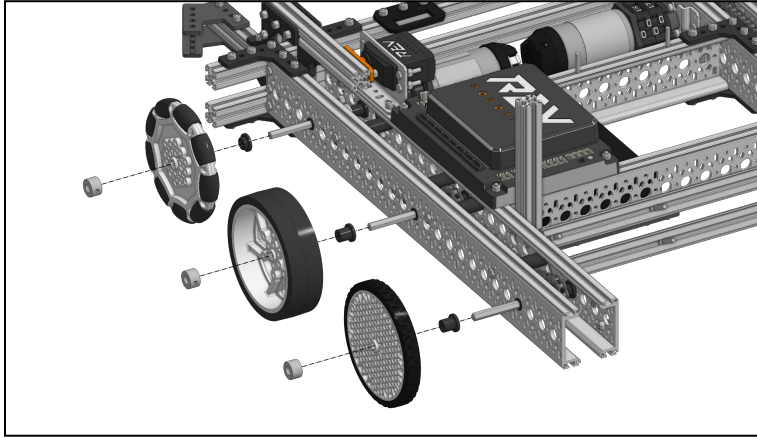


Get:

- 1 - Through Bore Bearing - Short
- 2 - Through Bore Bearing - Long
- 1 - 90mm Omni Wheel
- 1 - 90mm Grip Wheel
- 1 - 90mm Traction Wheel
- 3 - Shaft Collar

Slide a short through bore bearing and omni wheel onto the drive shaft, then a long through bore bearing onto the two remaining shafts. Then slide a grip wheel onto the middle shaft and a traction wheel onto the remaining shaft. Secure all wheels with shaft collars.

48

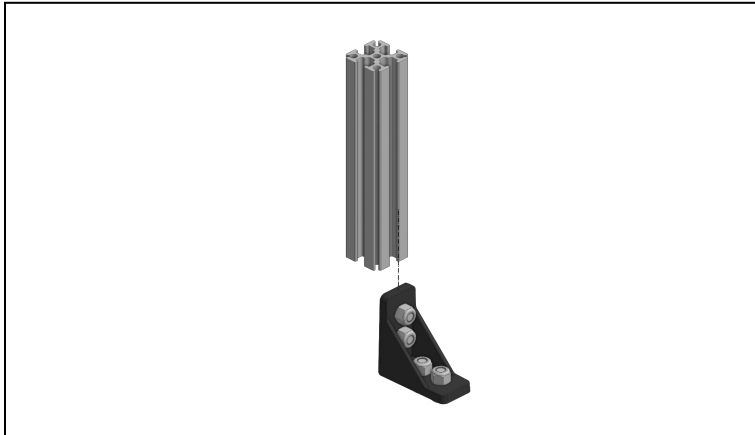


Get:

- 1 - Through Bore Bearing - Short
- 2 - Through Bore Bearing - Long
- 1 - 90mm Omni Wheel
- 1 - 90mm Grip Wheel
- 1 - 90mm Traction Wheel
- 3 - Shaft Collar

Slide a short through bore bearing and omni wheel onto the drive shaft, then a long through bore bearing onto the two remaining shafts. Then slide a grip wheel onto the middle shaft and a traction wheel onto the remaining shaft. Secure all wheels with shaft collars.

49



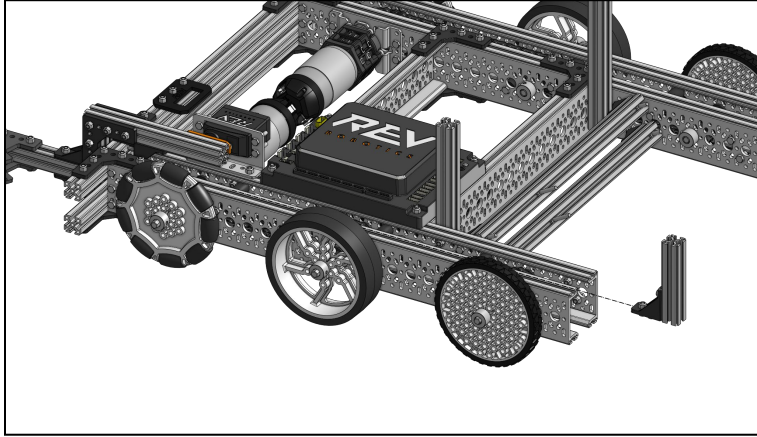
Get:

- 4 - Pre-Loaded Inside Corner Bracket
- 4 - 15mm Extrusion - Cut to 70mm

Slide a pre-loaded inside corner bracket onto a 70mm extrusion. The end of the extrusion should be flush with the bottom of the bracket.

Complete this step four times.

50

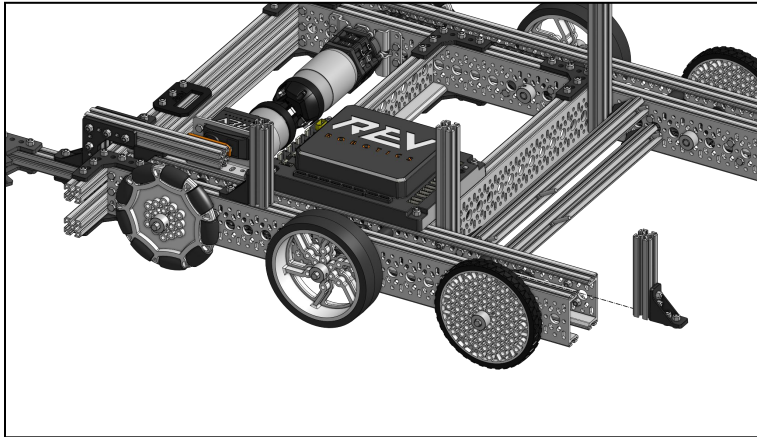


Get:

- 1 - 70mm Extrusion with Pre-Loaded Inside Corner Bracket

Slide one of the extrusion with pre-loaded inside corner bracket onto the outside c channel with the bracket facing the pollen picker as shown.

51

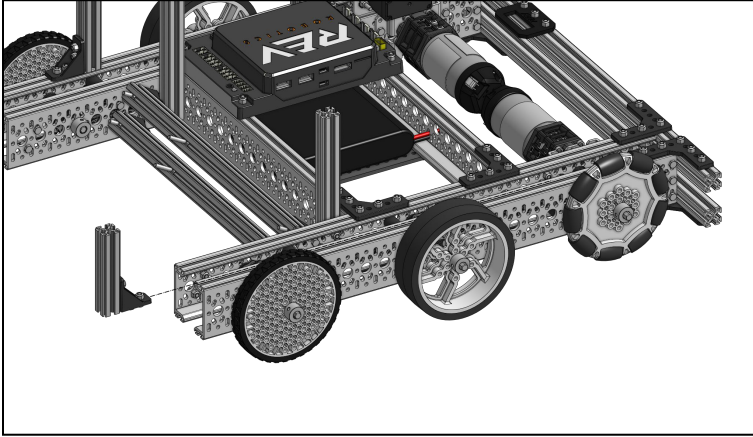


Get:

- 1 - 70mm Extrusion with Pre-Loaded Inside Corner Bracket

Slide one of the extrusion with pre-loaded inside corner bracket onto the outside c channel with the bracket facing away from the previous one.

52

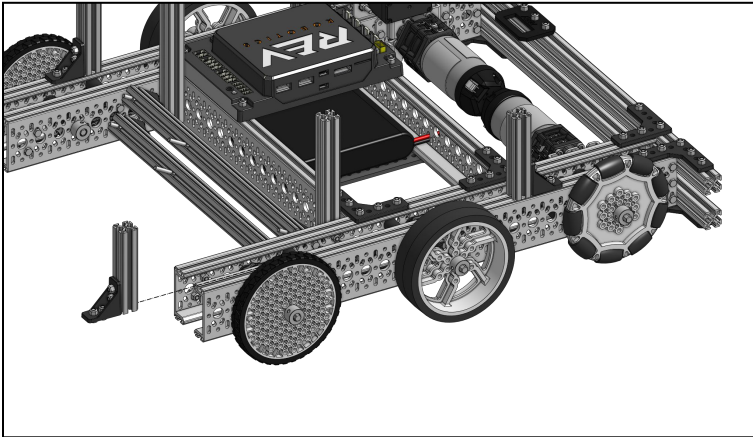


Get:

- 1 - 70mm Extrusion with Pre-Loaded Inside Corner Bracket

Slide one of the extrusion with pre-loaded inside corner bracket onto the outside c channel mirroring the orientation on the other drive rail as shown.

53



Get:

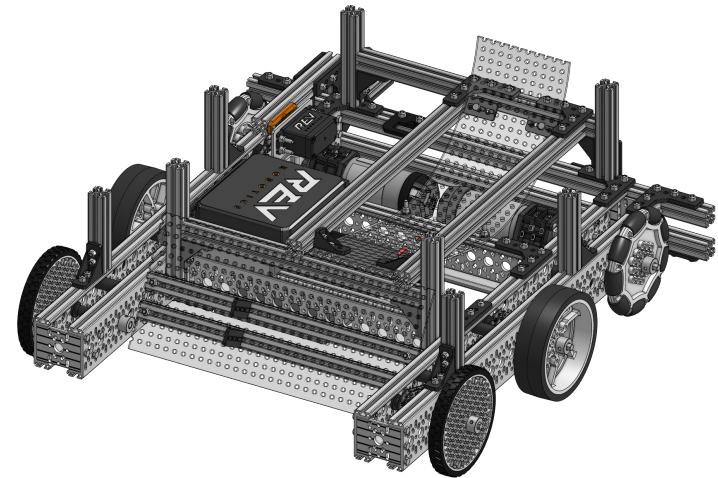
- 1 - 70mm Extrusion with Pre-Loaded Inside Corner Bracket

Slide one of the extrusion with pre-loaded inside corner bracket onto the outside c channel with the bracket facing away from the previous one.

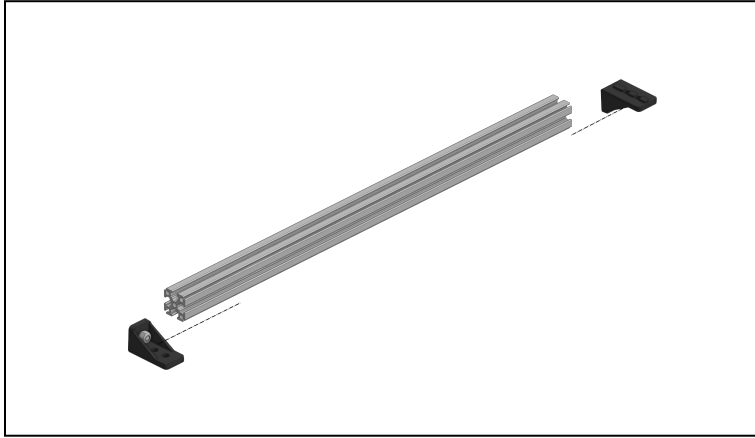
Set the Drivetrain aside for a later step.

Launcher Floor Assembly

PART NUMBER	DESCRIPTION	QTY
N/A	Pre-Loaded 15mm Plastic Lap Corner Bracket	6
N/A	Pre-Loaded 15mm Plastic 90 Degree Bracket	4
N/A	Pre-Loaded 15mm Plastic Inside Corner Bracket	4
N/A	15mm Extrusion - Cut to 278.5mm	2
N/A	15mm Extrusion - Cut to 218mm	2
N/A	15mm Extrusion - Cut to 83mm	2
N/A	Launcher Floor Cut Polycarbonate	1
N/A	Intake Floor Cut Polycarbonate	1
REV-41-1361	M3 Nyloc Nuts	12
REV-41-1360	M3 x 16mm Hex Cap Screw	4
REV-41-1324	3mm Spacer	2
REV-41-1321	15mm Plastic Lap Corner Bracket	2



1



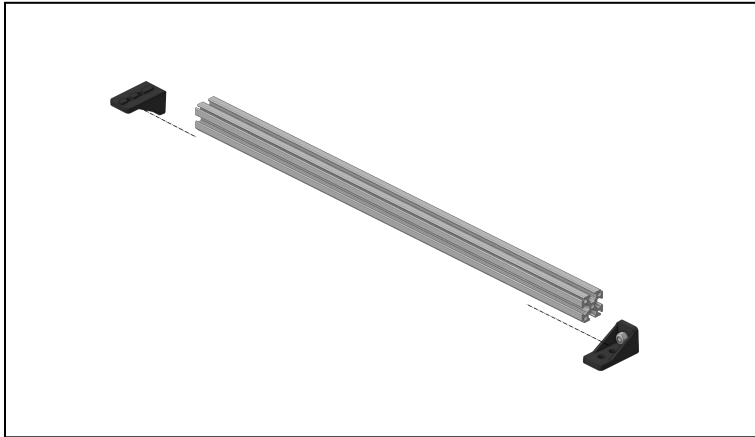
Get:

- 2 - Pre-Loaded Lap Corner Bracket
- 1 - 15mm Extrusion - Cut to 278.5mm

Slide a pre-loaded lap corner bracket into each end of the extrusion. The flat sides of the brackets should be facing opposite each other as shown.

Note: It's recommended to tighten the nut enough that you can barely still rotate the bracket. This will be helpful in later steps.

2



Get:

- 2 - Pre-Loaded Lap Corner Bracket
- 1 - 15mm Extrusion - Cut to 278.5mm

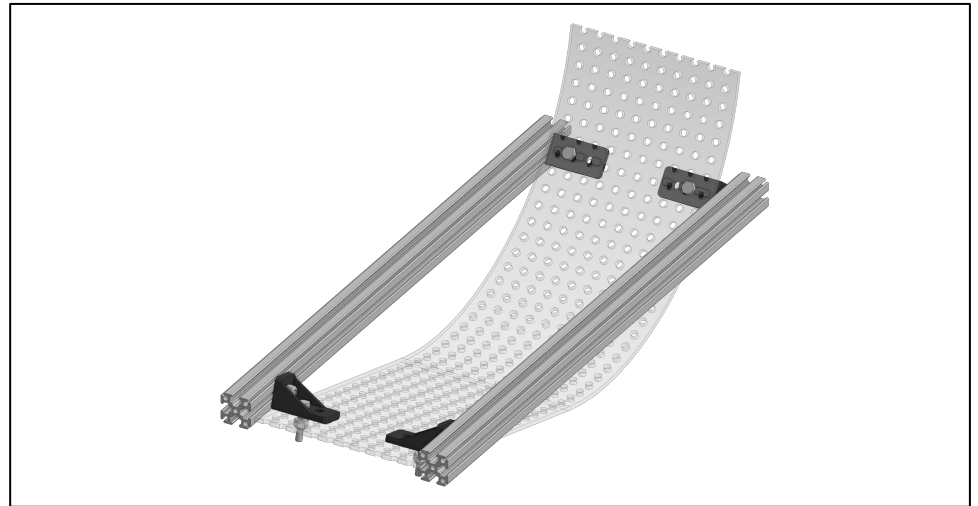
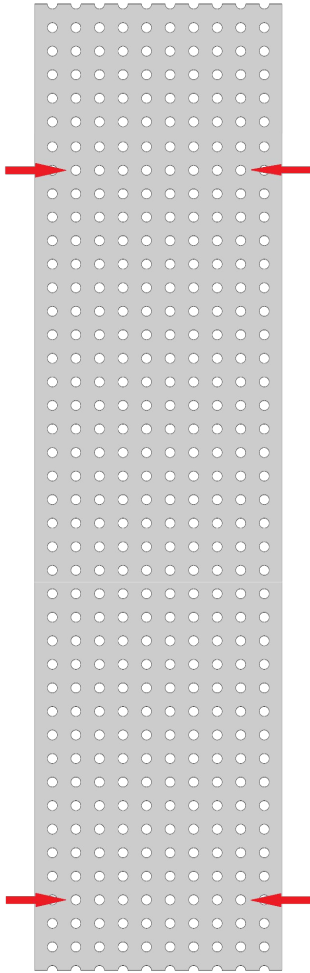
Slide a pre-loaded lap corner bracket into each end of the extrusion. The flat sides of the brackets should be facing opposite each other as shown.

Note: It's recommended to tighten the nut enough that you can barely still rotate the bracket. This will be helpful in later steps.

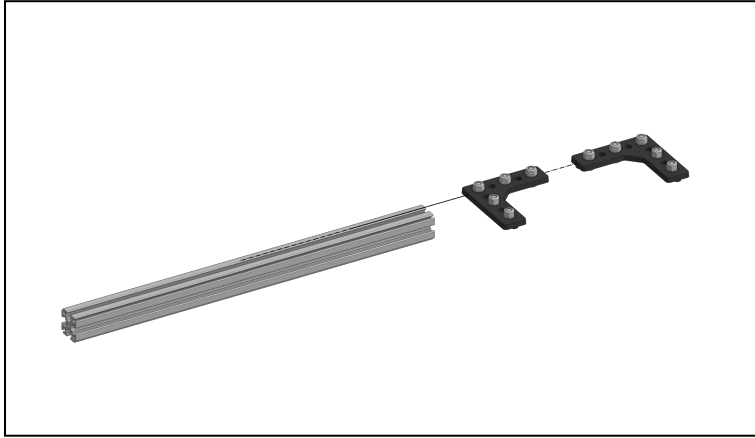
Get:

- 1 - Launcher Floor Cut Polycarbonate
- 4 - M3 x 16mm Hex Cap Screws
- 4 - M3 Nyloc Nuts

Attach the two extrusion with brackets to the launcher floor polycarbonate with 16mm screws and nyloc nuts. Bend the polycarbonate into the shape shown below so the indicated holes align with the lap corner brackets.



4

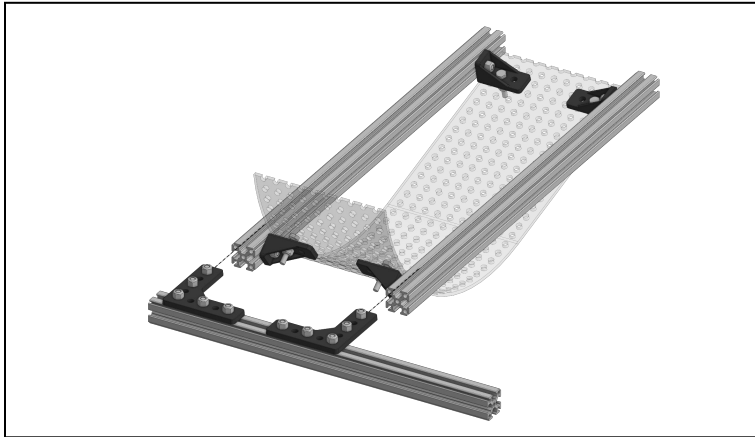


Get:

- 1 - 15mm Extrusion - Cut to 218mm
- 2 - Pre-Loaded 90 Degree Bracket

Slide two pre-loaded brackets onto the extrusion as shown.

5

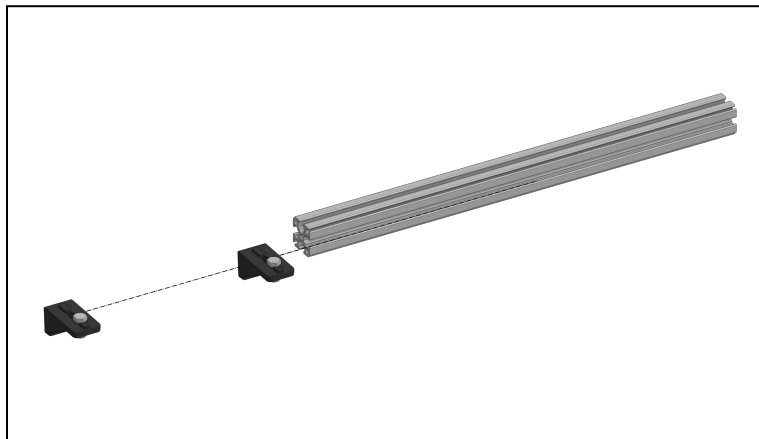


Get:

- 1 - 15mm Extrusion with brackets from previous step

Slide the extrusion with the brackets onto the long polycarbonate side.

6

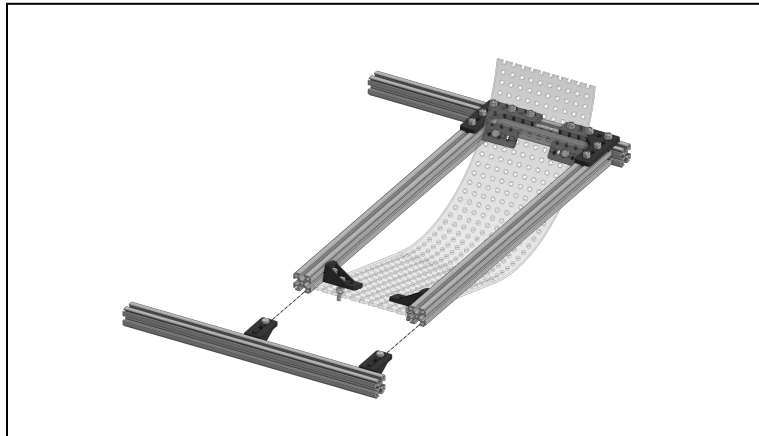


Get:

- 2 - Pre-Loaded Lap Corner Bracket
- 1 - 15mm Extrusion - Cut to 218mm

Slide two pre-loaded lap corner brackets onto the extrusion.

7

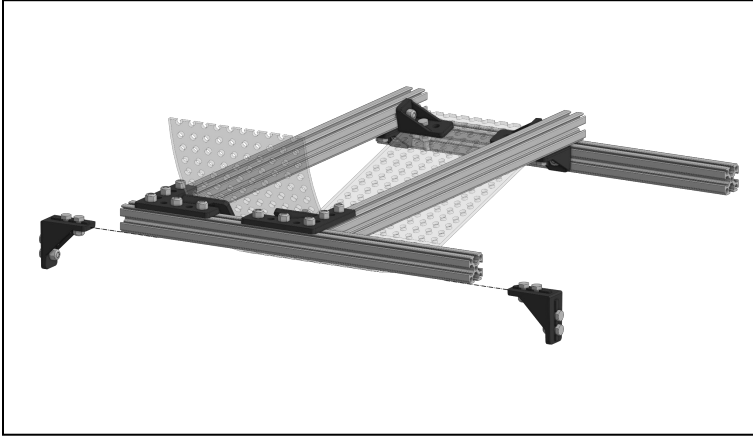


Get:

- 1 - 15mm Extrusion with brackets from previous step

Slide the extrusion with the lap corner brackets onto the short polycarbonate side.

8

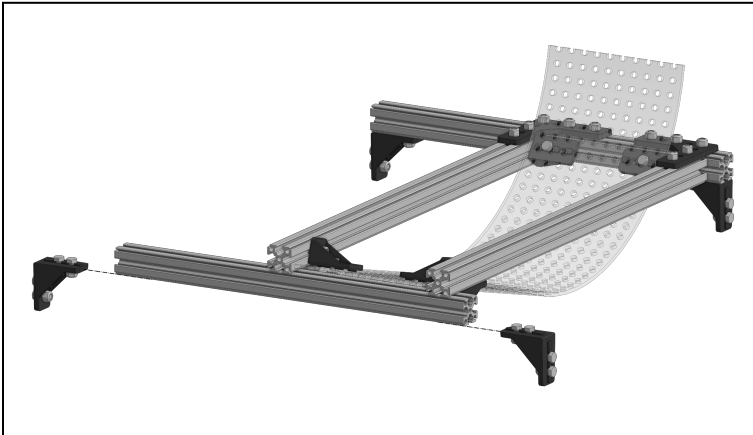


Get:

- 2 - Pre-Loaded Inside Corner Bracket

Slide a pre-loaded inside corner bracket into each end of the extrusion as shown.

9

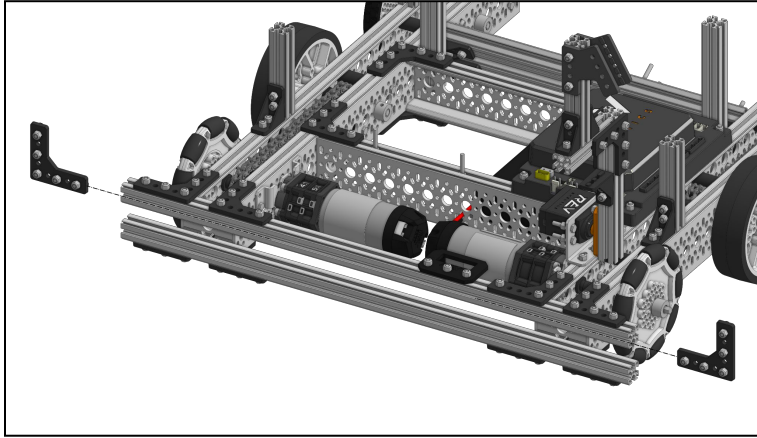


Get:

- 2 - Pre-Loaded Inside Corner Bracket

Slide a pre-loaded inside corner bracket into each end of the extrusion as shown.

10

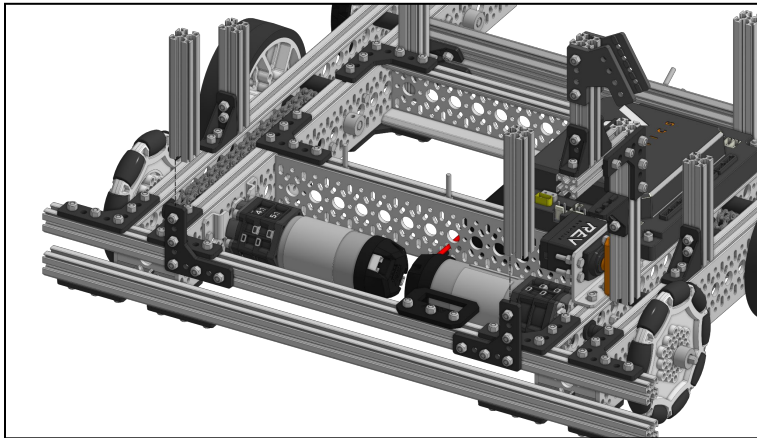


Get:

- 2 - Pre-Loaded 90 Degree Bracket

Slide a pre-loaded 90 degree bracket onto the top 420mm extrusion. The brackets should line up with the empty hole on the 90 degree brackets.

11

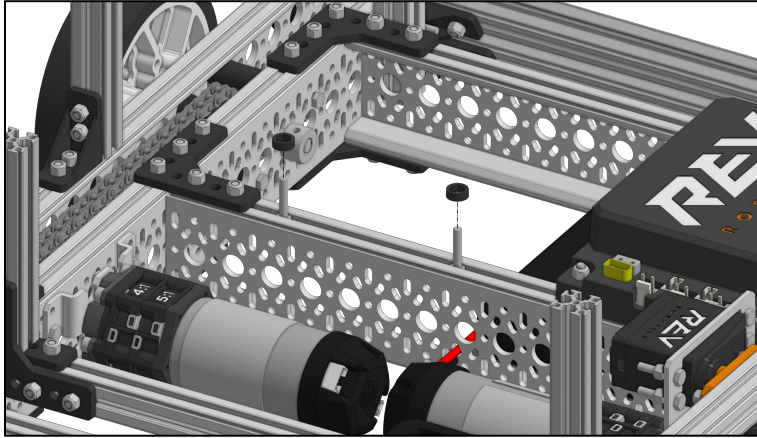


Get:

- 2 - 15mm Extrusion - Cut to 83mm

Slide extrusion onto the two brackets from the previous step.

12

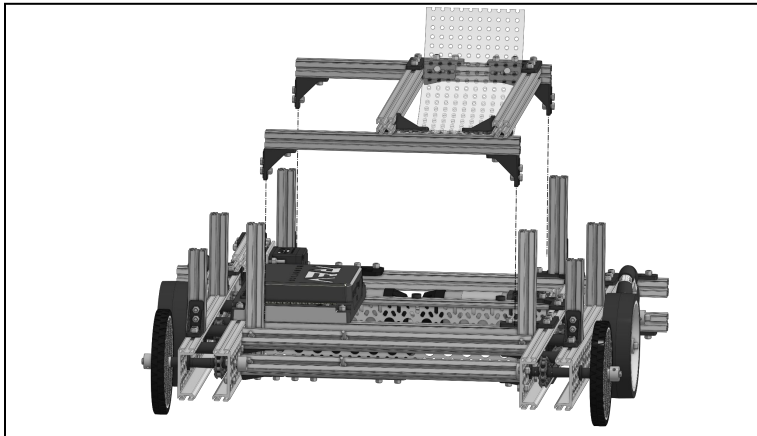


Get:

- 2 - 3mm Spacers

Slide 3mm spacers onto the 16mm screws as shown.

13



Get:

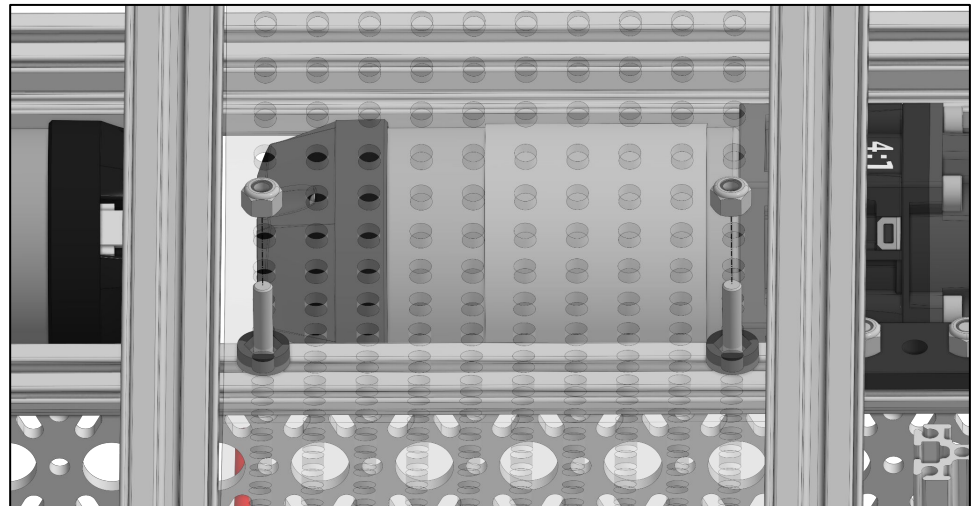
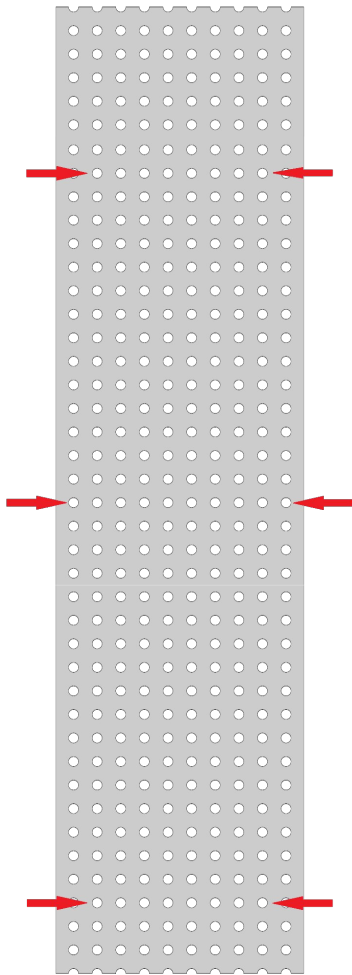
- 1 - Launcher Floor Assembly

Slide the launcher floor assembly onto the four upright extrusion.

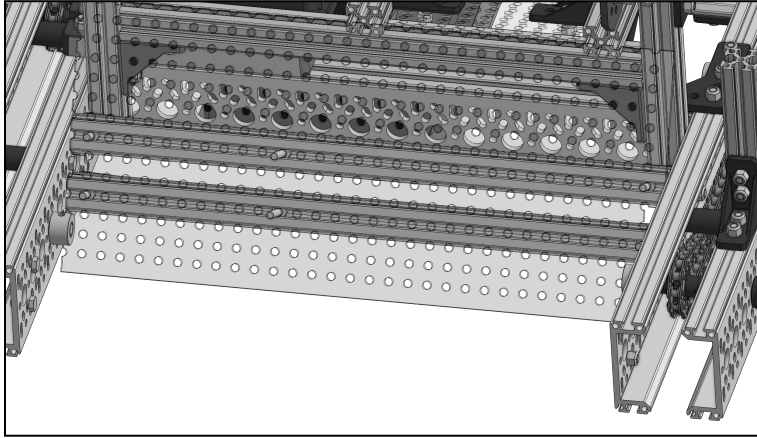
Get:

- 2 - M3 Nyloc Nuts

Align the launcher floor so the holes indicated with the middle arrows slide over the 16mm screws. Secure the floor with nyloc nuts.



15

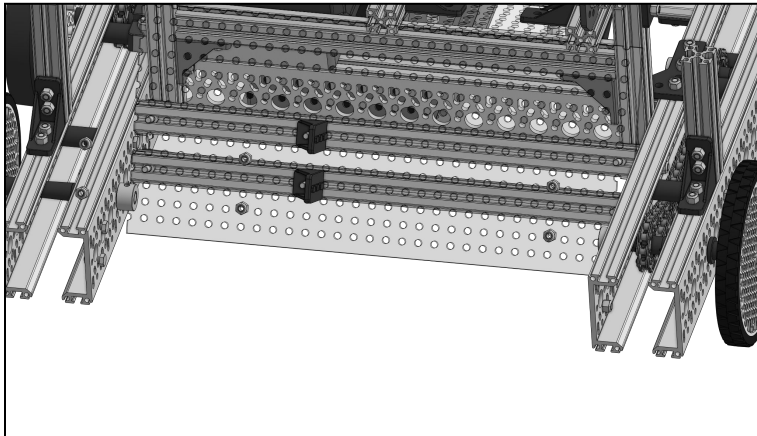


Get:

- 1 - Intake Floor Cut Polycarbonate

Align the intake floor so the screws go through the 4th and 7th holes from the bottom edge. The cutouts for the drivetrain standoff screws should be in between the two extrusion.

16



Get:

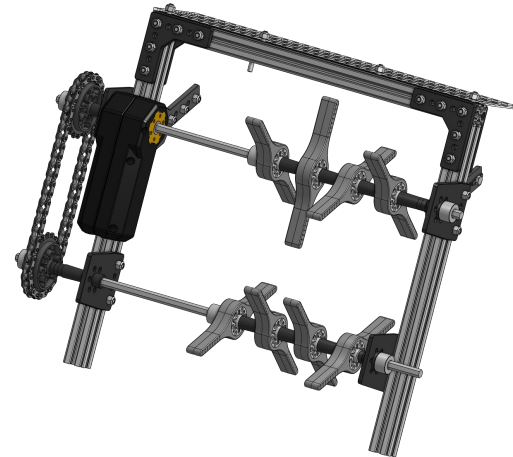
- 2 - Lap Corner Bracket
- 6 - M3 Nyloc Nuts

Slide a lap corner bracket onto both 16mm screws then secure the intake floor with six nyloc nuts.

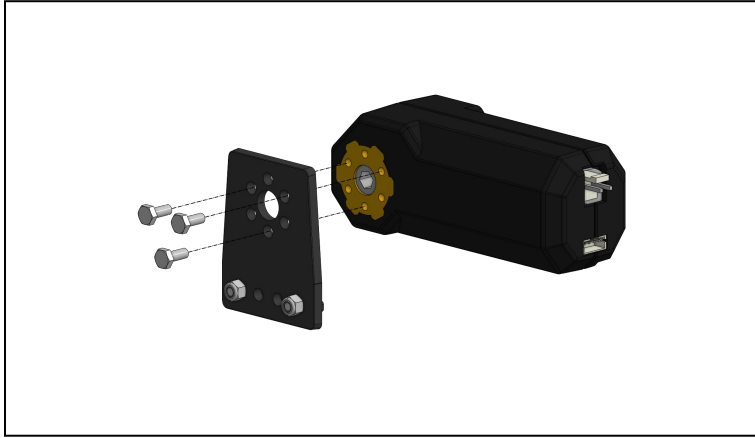
Set the Drivetrain aside for future steps.

Intake Assembly

PART NUMBER	DESCRIPTION	QTY
N/A	Pre-Loaded 15mm Plastic Motion Bracket	4
N/A	Pre-Loaded 15mm Plastic 90 Degree Bracket	4
N/A	5mm Hex Shaft - Cut to 308mm	2
N/A	15mm Extrusion - Cut to 248mm	1
N/A	Intake Lid Cut Polycarbonate	1
REV-41-1300	Core Hex Motor	1
REV-41-1323	15mm Spacer	9
REV-41-1324	3mm Spacer	7
REV-41-1340	20 Tooth #25 Sprocket	2
REV-41-1327	Shaft Collar	6
REV-41-2702	Intake Flap - 5mm Hex - 40A Dark Gray	8
REV-41-1329	Through Bore Bearing - Long	3
REV-41-1431	15mm Extrusion - 225mm - 90° Ends	2
REV-41-1304	15mm Plastic Rod End Bracket	2
REV-41-1359	M3 x 8mm Hex Cap Screw	13
REV-41-1361	M3 Nyloc Nuts	12



1

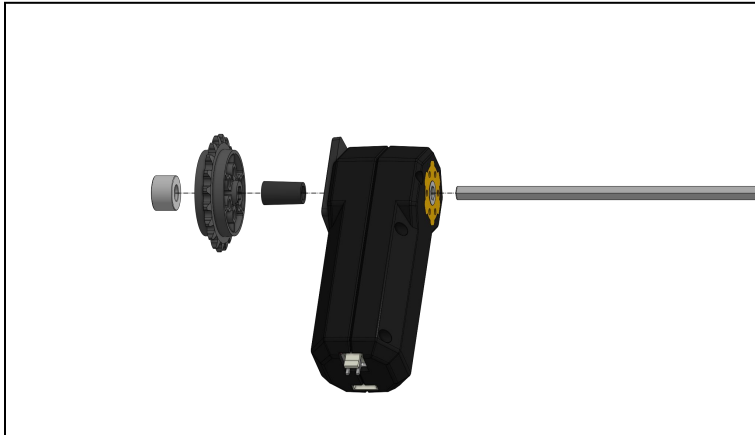


Get:

- 1 - Core Hex Motor
- 1 - Pre-Loaded Motion Bracket
- 3 - M3 x 8mm Hex Cap Screws

Secure a pre-loaded motion bracket to a core hex motor with three screws as shown. The motion bracket's pre-loaded screw heads show be on the motor side of the bracket.

2

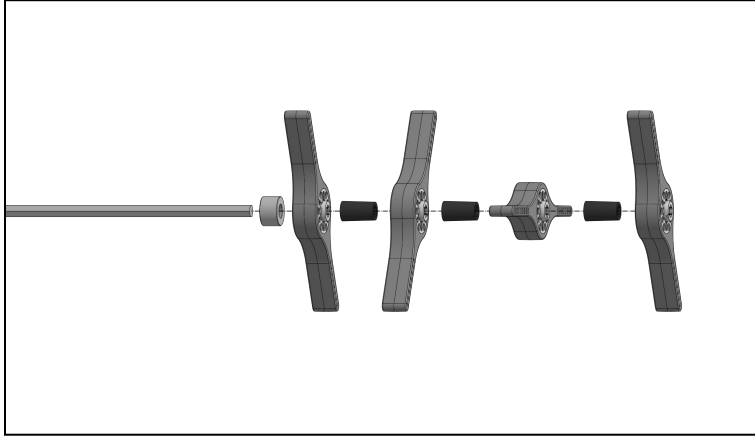


Get:

- 1 - 5mm Hex Shaft - Cut to 308mm
- 1 - Core Hex Motor with Bracket
- 1 - 15mm Spacer
- 1 - 20 Tooth Plastic #25 Sprocket
- 1 - Shaft Collar

On one end of the 308mm hex shaft slide on the core hex motor and bracket, then a spacer, then a 20 tooth sprocket, then shaft collar on the very end of the shaft.

3

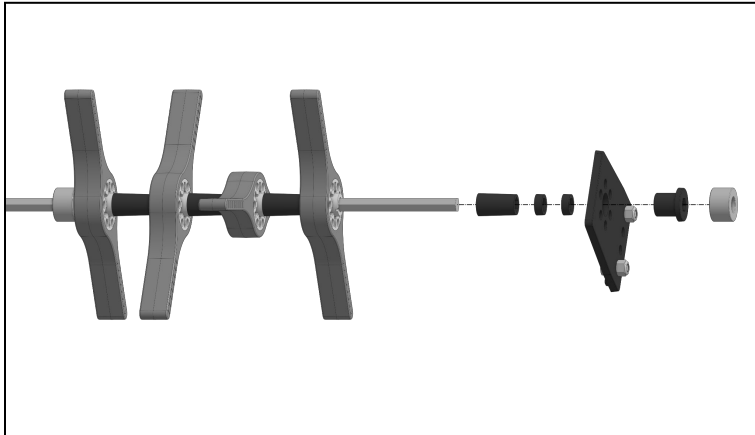


Get:

- 4 - 5mm Hex - Intake Flap
- 3 - 15mm Spacer
- 1 - Shaft Collar

On the other end of the 308mm hex shaft side from the previous step, slide a shaft collar, then alternate a flap wheel and spacer in the order shown. Rotate the flap wheels one side clockwise to the previous one to create a spiral of flaps as shown.

4



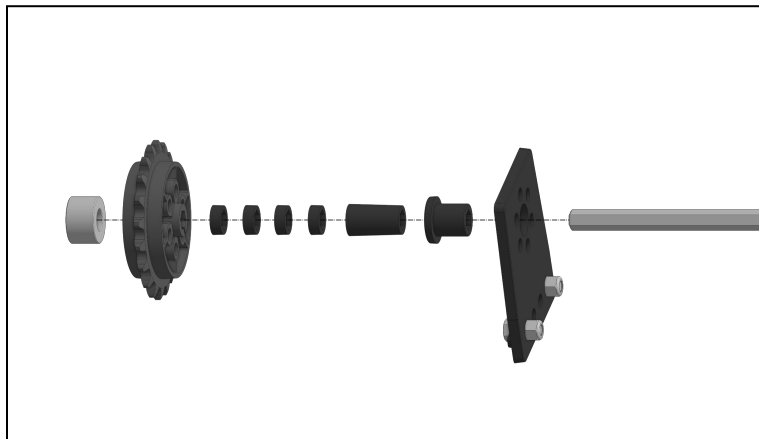
Get:

- 1 - 15mm Spacer
- 2 - 3mm Spacers
- 1 - Pre-Loaded Motion Bracket
- 1 - Through Bore Bearing - Long
- 1 - Shaft Collar

Continue to slide another 15mm spacer, then two 3mm spacers, then a pre-loaded motion bracket with the screw heads facing the motor, then a long through bore bearing through the motion bracket, then finally secure the end of the shaft with a shaft collar.

Set this shaft aside for a future step.

5

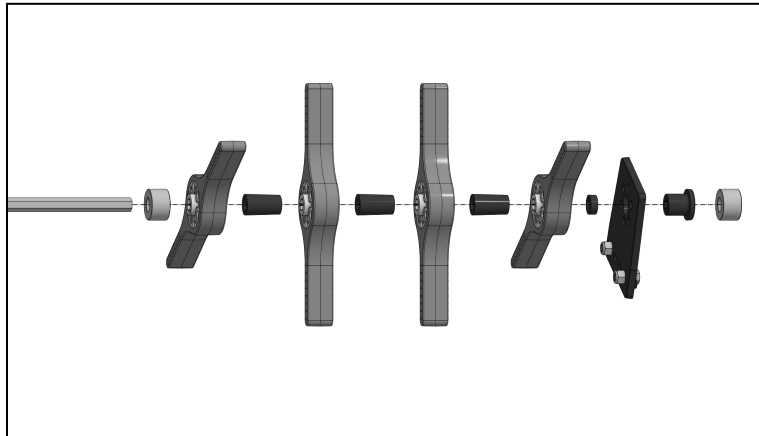


Get:

- 1 - 5mm Hex Shaft - Cut to 308mm
- 1 - Pre-Loaded Motion Bracket
- 1 - Through Bore Bearing - Long
- 1 - 15mm Spacer
- 4 - 3mm Spacers
- 1 - 20 Tooth Plastic #25 Sprocket
- 1 - Shaft Collar

On one end of the another 308mm hex shaft slide on a pre-loaded motion bracket with the screw heads on the left side as pictured, then a long through bore bearing through the motion bracket, then a 15mm spacer, then four 3mm spacers, then a 20 tooth sprocket, then shaft collar on the very end of the shaft.

6

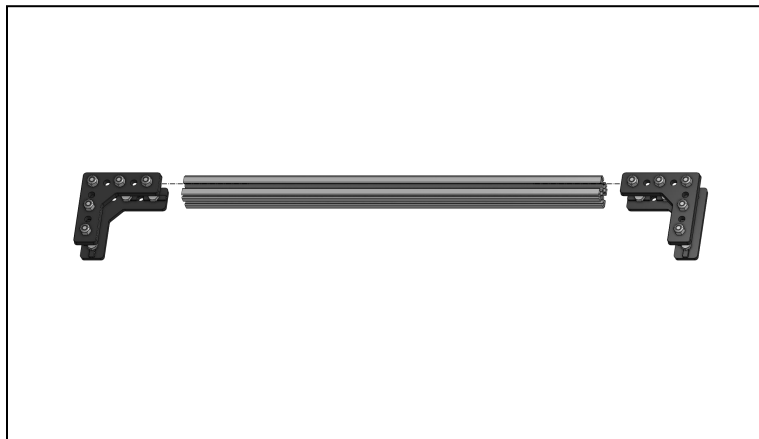


Get:

- 4 - 5mm Hex - Intake Flap
- 1 - Through Bore Bearing - Long
- 1 - Pre-Loaded Motion Bracket
- 3 - 15mm Spacer
- 1 - 3mm Spacer
- 2 - Shaft Collar

On the other end of the 308mm hex shaft side from the previous step, slide a shaft collar, then alternate a flap wheel and spacer in the order shown. Rotate the 2nd and 3rd flap wheels one side clockwise to the 1st and 4th ones to create the pattern shown, then a 3mm spacer, then a pre-loaded motion bracket with the screw heads on the right side as pictured, then a long through bore bearing through the motion bracket, then secure the end of the shaft with a shaft collar. Set this shaft aside for a future step.

7

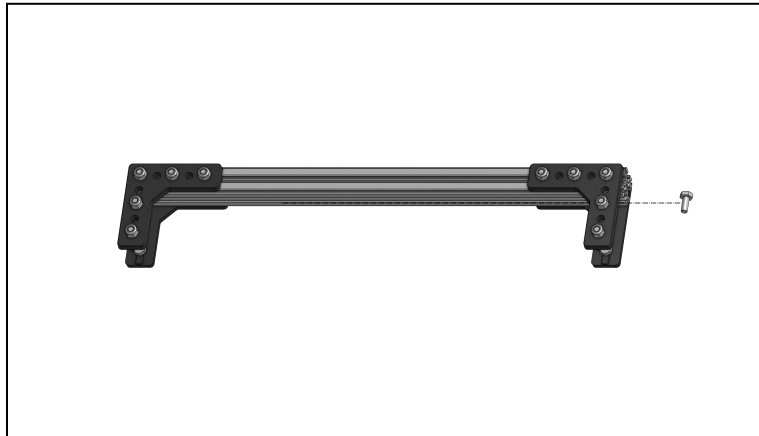


Get:

- 1 - 15mm Extrusion - Cut to 248mm
- 4 - Pre-Loaded 90 Degree Bracket

Slide four pre-loaded 90 degree brackets onto a 248mm extrusion. Tighten the three screws and nuts on each bracket.

8



Get:

- 1 - M3 x 8mm Hex Cap Screw

Slide a screw onto the extrusion to be used in final assembly.

Note: You can use a small amount of tape or a nut to keep this screw from sliding around. You will just need to remove the tape or nut later during that step.

9

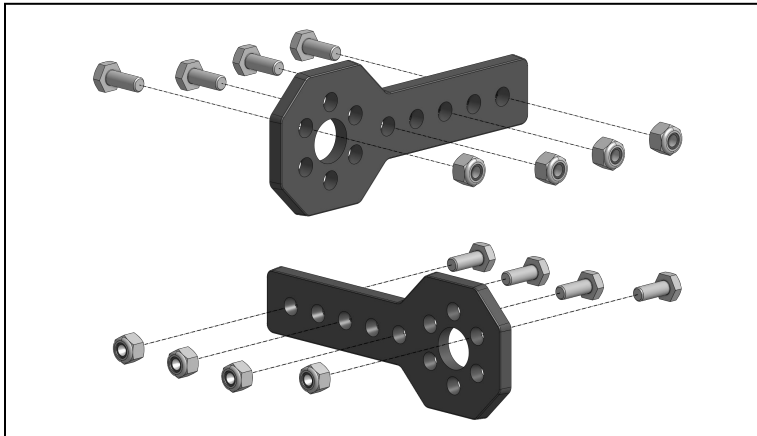


Get:

- 2 - 15mm Extrusion - 225mm

Slide two 225mm extrusion onto the pre-loaded 90 degree brackets. Tighten the two screws and nuts on each bracket.

10



Get:

- 2 - 15mm Plastic Rod End Bracket
- 8 - M3 x 8mm Hex Cap Screws
- 8 - M3 Nyloc Nuts

Take a rod end bracket and finger start one hex cap screw and nyloc nut per hole as shown.

Take another rod end bracket and finger start one hex cap screw and nyloc nut per hole as shown to create a mirrored bracket from the first.

11



Get:

- 2 - Pre-Loaded Rod End Bracket from the previous step

Slide the two pre-loaded rod end brackets onto the extrusion as shown. Do not yet tighten the nuts on these brackets.

12



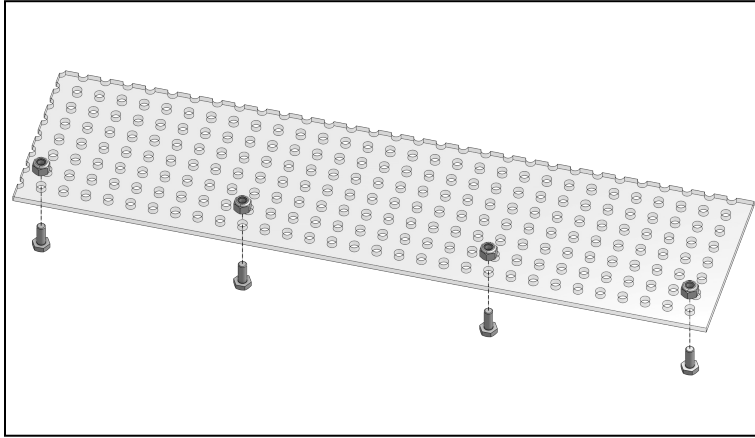
Get:

- 1 - Intake Shaft with Motor
- 1 - Intake Shaft without Motor
- 1 - 54 Link #25 Chain

Loop a 54 link chain around the two intake shaft's 20 tooth sprockets then slide the motion brackets onto the extrusion as shown.

Note: The upper shaft's motion brackets should be on the outside of the extrusion and the lower shaft's should be on the inside. If you are not able to do this you will need to flip a motion bracket so the screw heads are on the correct side.

13

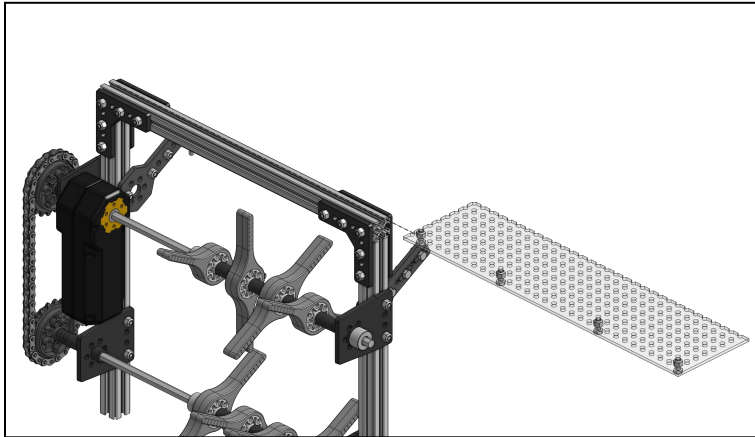


Get:

- 1 - Intake Lid Cut Polycarbonate
- 4 - M3 x 8mm Hex Cap Screws
- 4 - M3 Nyloc Nuts

Take the intake lid and finger start one hex cap screw and nyloc nut per hole as shown.

14



Get:

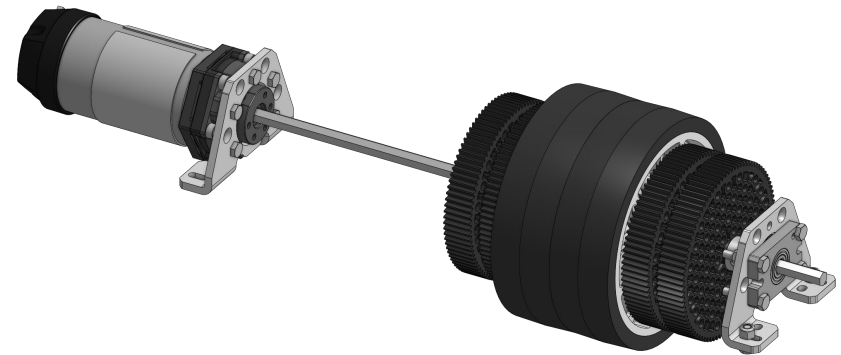
- 1 - Pre-Loaded Intake Floor Cut Polycarbonate

Slide the intake lid onto the extrusion as shown. Tighten the nuts as shown.

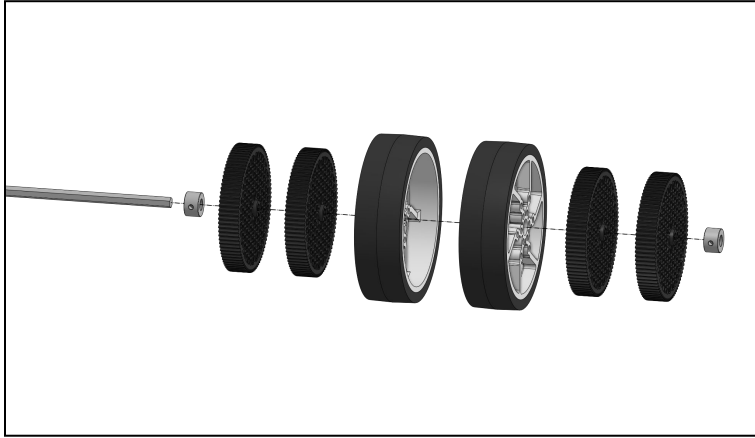
Set the intake aside for a later step.

Launcher Flywheel Assembly

PART NUMBER	DESCRIPTION	QTY
N/A	1:1 UltraPlanetary Gearbox and HD Hex Motor	1
N/A	5mm Hex Shaft - Cut to 252mm	1
N/A	Pre-Loaded UltraPlanetary Bent Mounting Bracket	1
REV-41-1327	Shaft Collars	2
REV-41-1267	90mm Grip Wheel	2
REV-41-1337	90 Tooth Plastic Gear	4
REV-41-1683	5mm Hex Bearing Block	1
REV-41-1360	M3 x 16mm Hex Cap Screw	4
REV-41-1361	M3 Nyloc Nut	4
REV-41-1324	3mm Spacer	2
REV-41-1325	1.5mm Spacer	1



1

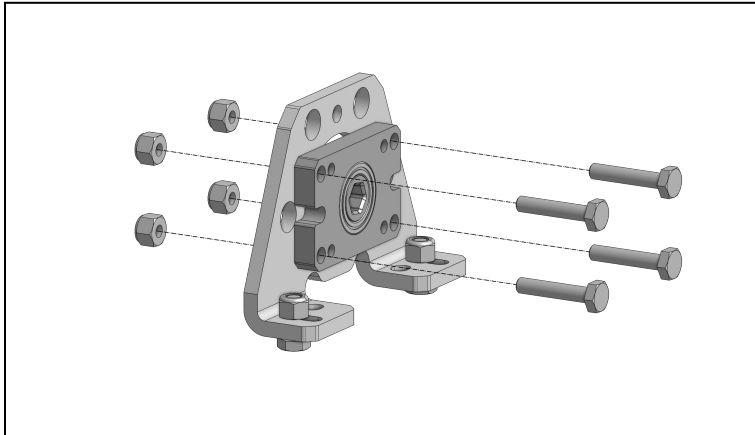


Get:

- 1 - 5mm Hex Shaft - Cut to 252mm
- 2 - Shaft Collar
- 4 - 90 Tooth Plastic Gear
- 2 - 90mm Grip Wheel

On one end of the 252mm hex shaft slide on a shaft collar, then two 90 tooth gears, then two 90mm grip wheels, then two more 90 tooth gears, then finally secure flywheel with a shaft collar. Leave approximately 30mm of the shaft exposed for the next steps.

2

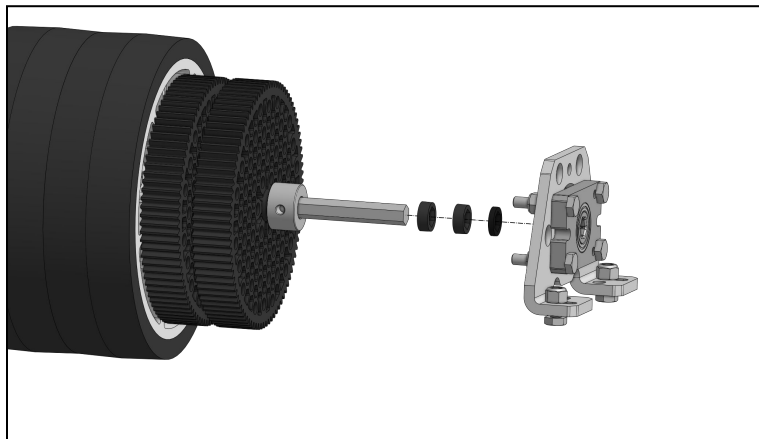


Get:

- 1 - Pre-Loaded UltraPlanetary Bent Mounting Bracket
- 1 - 5mm Hex Bearing Block
- 4 - M3 x 16mm Hex Cap Screws
- 4 - M3 Nyloc Nuts

Secure a 5mm hex bearing block to a pre-loaded bent mounting bracket with 16mm screws and nyloc nuts as shown.

3

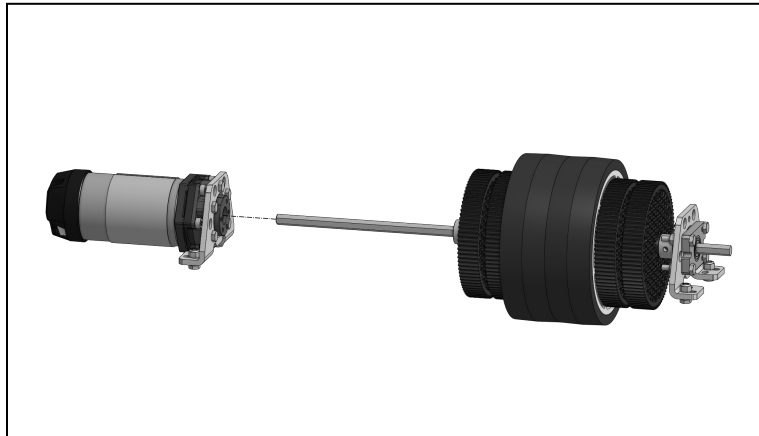


Get:

- 1 - Bent Mounting Bracket with Bearing from the previous step
- 2 - 3mm Spacer
- 1 - 1.5mm Spacer

Continue to slide on two 3mm spacer, the a 1.5mm spacer, then the pre-loaded bracket with the bearing block as shown.

4



Get:

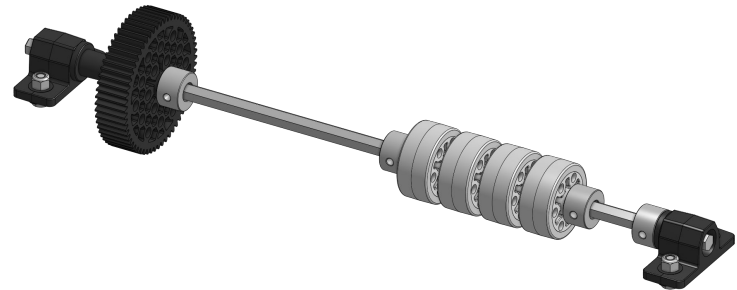
- 1 - HD Hex Motor with 1:1 Output

Insert the flywheel shaft into the motor with the 1:1 output.

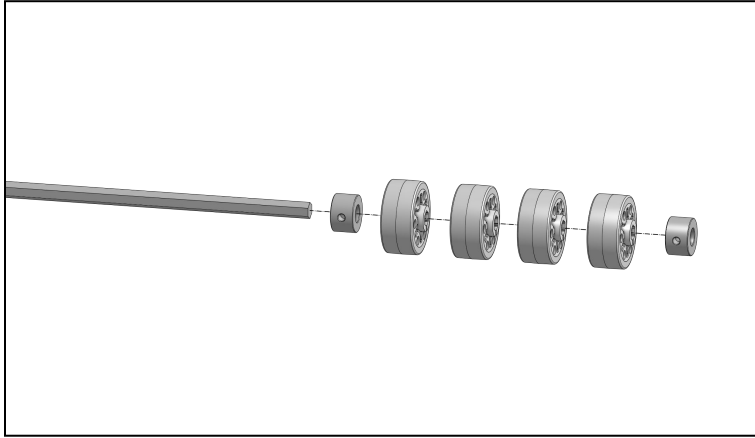
Set this aside for a later step.

Feeder Roller Shaft Assembly

PART NUMBER	DESCRIPTION	QTY
N/A	5mm Hex Shaft - Cut to 252mm	1
N/A	Pre-Loaded 15mm Bearing Pillow Block	2
REV-41-1327	Shaft Collars	4
REV-41-2150	Soft (Light Gray) - 5mm Hex Bore - 1in Grip Wheel	4
REV-41-1329	Through Bore Bearing - Long	2
REV-41-1323	15mm Spacer	1
REV-41-1335	60 Tooth Plastic Gear	1



1

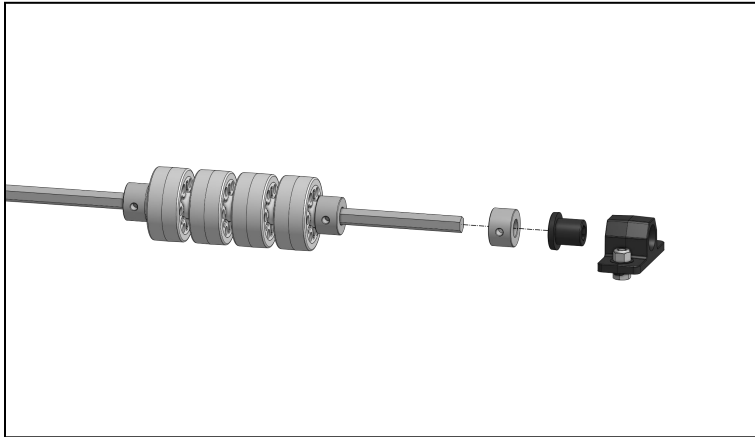


Get:

- 1 - 5mm Hex Shaft - Cut to 252mm
- 2 - Shaft Collar
- 4 - 5mm Hex Bore - 1in Grip Wheels

On one end of the 252mm hex shaft slide on a shaft collar, then four 1in grip wheels, then a shaft collar. Leave approximately 42mm of the shaft exposed for the next steps.

2



Get:

- 1 - Pre-Loaded Bearing Pillow Block
- 1 - Shaft Collar
- 1 - Through Bore Bearing Long

Continue to slide on a shaft collar, then a long through bore bearing, then a pre-loaded pillow bearing block onto the through bore bearing.



Get:

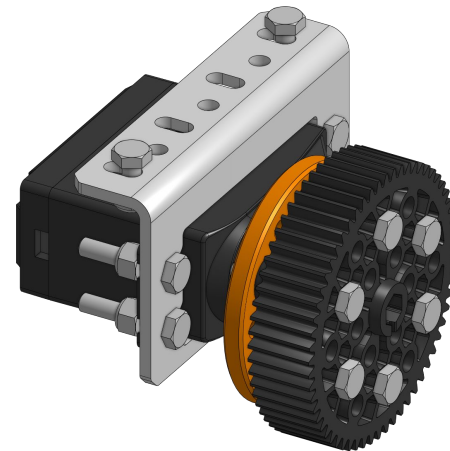
- 1 - Pre-Loaded Bearing Pillow Block
- 1 - Shaft Collar
- 1 - Through Bore Bearing Long
- 1 - 60 Tooth Plastic Gear
- 1 - 15mm Spacer

On the other end of the 252mm hex shaft side from the previous step, slide a shaft collar, then a 60 tooth gear, then a 15mm spacer, then a long through bore bearing, then a pre-loaded pillow bearing block onto the through bore bearing.

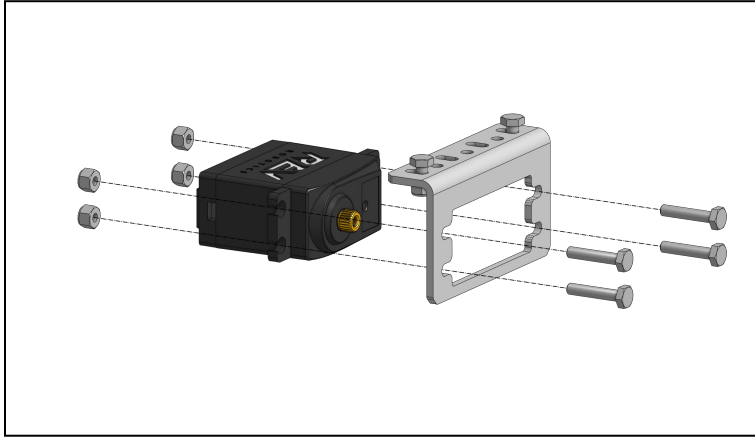
Set this aside for a future step.

Feeder Servo Assembly

PART NUMBER	DESCRIPTION	QTY
N/A	Pre-Loaded Metal Bent Servo Bracket V2	1
REV-41-3334	Smart Robot Servo V2 - Balanced	1
REV-41-1828	Aluminum Servo Horn V2	1
REV-41-1324	3mm Spacer	6
REV-41-1359	M3 x 8mm Hex Cap Screw	1
REV-41-1360	M3 X 16mm Hex Cap Screws	4
REV-41-1124	M3 x 20mm Hex Cap Screw	6
REV-41-1361	M3 Nyloc Nuts	4
REV-41-1335	60 Tooth Plastic Gear	1



1

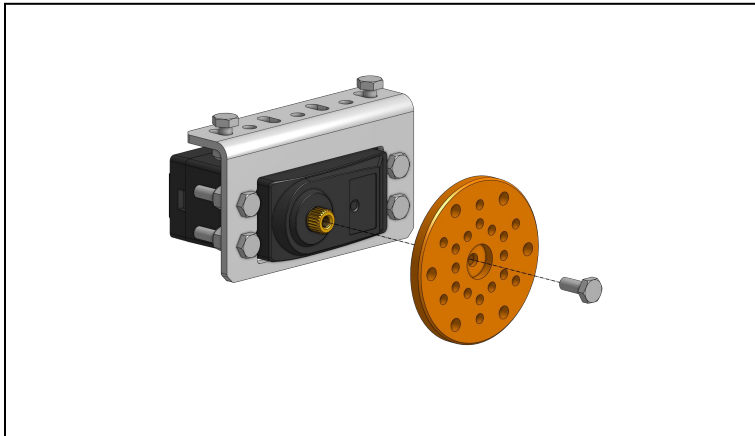


Get:

- 1 - Pre-Loaded Metal Bent Servo Bracket
- 1 - Smart Robot Servo
- 4 - M3 x 16mm Hex Cap Screws
- 4 - M3 Nyloc Nuts

Secure a servo to a pre-loaded bent servo bracket with 16mm screws and nyloc nuts as shown.

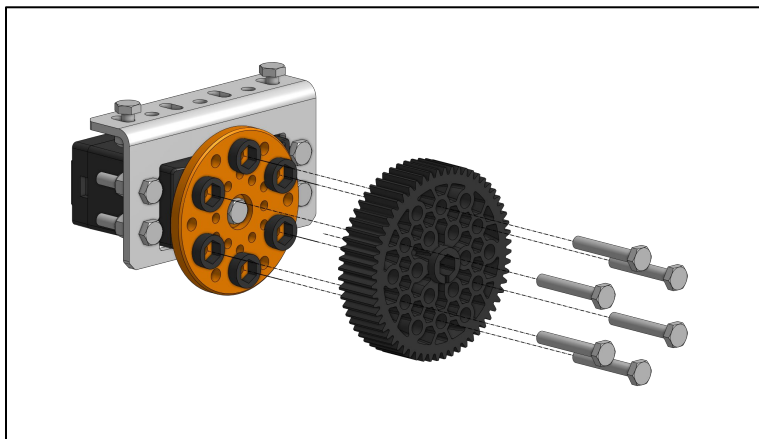
2



Get:

- 1 - Aluminum Servo Horn
- 1 - M3 x 8mm Hex Cap Screws

Secure a aluminum servo horn to the servo with a screw.



Get:

- 1 - 60 Tooth Plastic Gear
- 6 - 3mm Spacer
- 6 - M3 x 20mm Hex Cap Screws

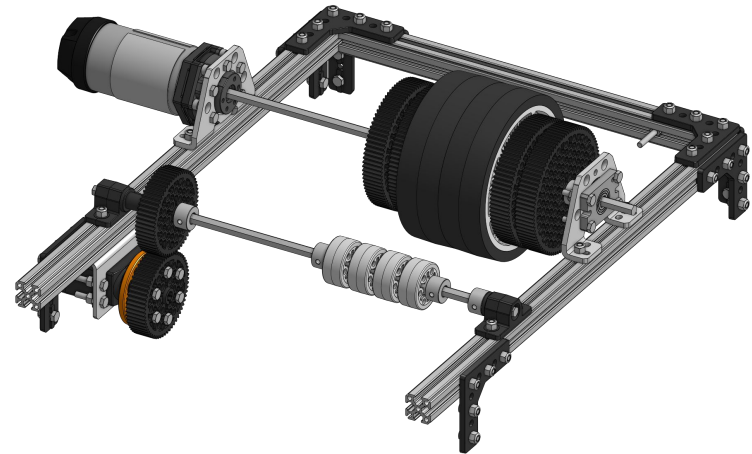
Secure a 60 gear to the servo horn with six screws and 3mm spacers between the gear and the horn.

Note: You might find it easier to insert all six screws through the gear then hold it upright and slide the spacers over each screw. Then align the screws with servo horn holes and then tighten each screw.

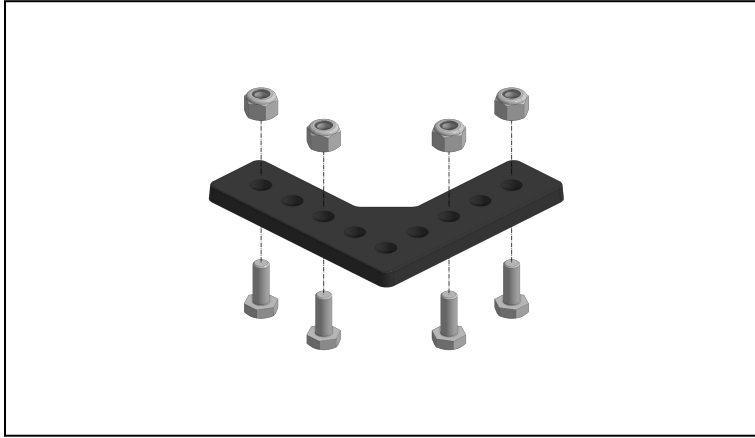
Set this aside for a future step.

Launcher and Feeder Assembly

PART NUMBER	DESCRIPTION	QTY
N/A	Launcher Flywheel Assembly	1
N/A	Feeder Assembly	1
N/A	Feeder Servo Assembly	1
N/A	Pre-Loaded 15mm Plastic 90 Degree Bracket	6
N/A	15mm Extrusion - Cut to 218mm	1
N/A	15mm Extrusion - Cut to 323mm	2
REV-41-1305	15mm Plastic 90 Degree Bracket	2
REV-41-1359	M3 x 8mm Hex Cap Screw	8
REV-41-1360	M3 X 16mm Hex Cap Screws	2
REV-41-1361	M3 Nyloc Nuts	8



1



Get:

- 2 - 15mm Plastic 90 Degree Brackets
- 8 - M3 x 8mm Hex Cap Screws
- 8 - M3 Nyloc Nuts

Take a bracket and finger start one hex cap screw and nyloc nut per hole as shown. Pre-load 2 brackets.

Note: The side of the bracket with “ribs” must have the hex cap screw head.

2



Get:

- 1 - 15mm Extrusion - Cut to 218mm
- 2 - Pre-Loaded 90 Degree Bracket from the previous step

Slide the pre-loaded brackets from the previous step onto the 218mm extrusion. Leave the empty hole and two lower screws exposed for the next steps.

3



Get:

- 2 - Pre-Loaded 90 Degree Bracket (These have all 5 screws)

Slide the pre-loaded 90 degree brackets with all five screws onto the extrusion as shown. Leave three screws exposed for the next steps.

4



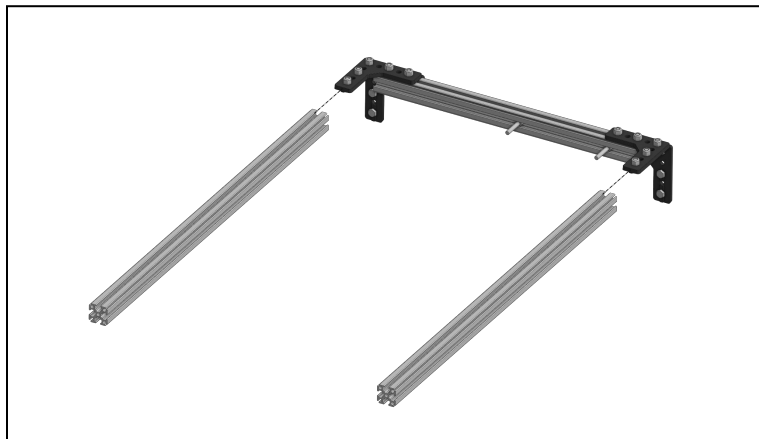
Get:

- 2 - M3 x 16mm Hex Cap Screws

Slide two 16mm screws onto the extrusion as shown to be used in later steps.

Note: You can use a small amount of tape or a nut to keep this screw from sliding around. You will just need to remove the tape or nut later during that step.

5



Get:

- 2 - 15mm Extrusion - Cut to 323mm

Slide the 323mm extrusion onto the three screws of the upper 90 brackets. The ends of these extrusion should be lined up with the empty holes of the 90 degree brackets on the back side of the 218mm extrusion.

6

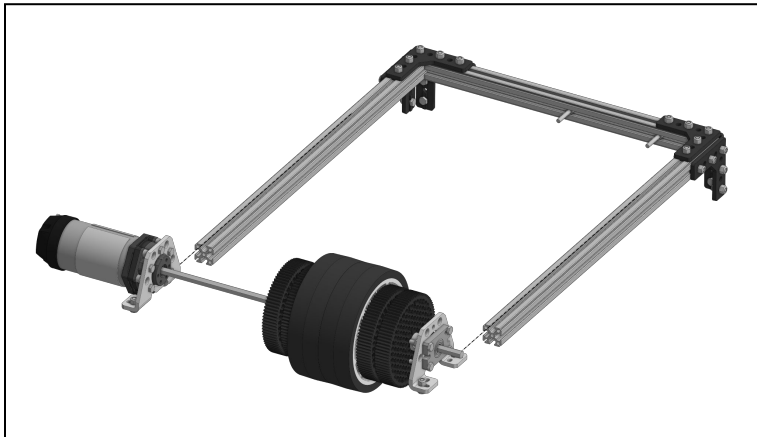


Get:

- 2 - Pre-Loaded 90 Degree Bracket

Slide two more pre-loaded 90 degree brackets onto the 323mm extrusion as shown.

7



Get:

- 1 - Launcher Flywheel Assembly

Slide the two bent mounting brackets on the launcher assembly onto the 323mm extrusion as shown. Do not tighten these screws yet.

8

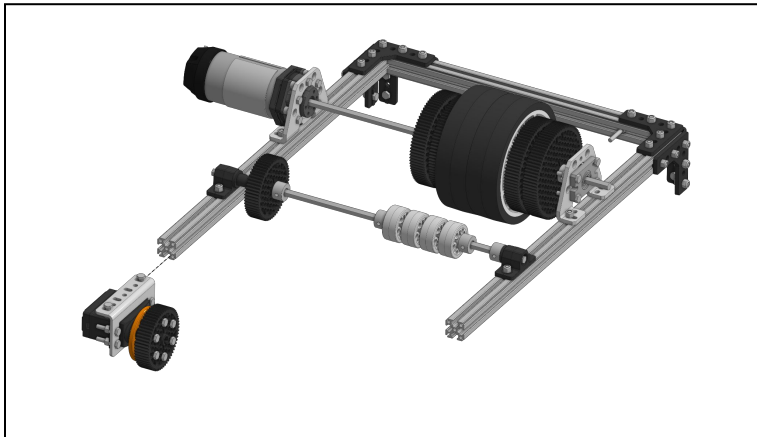


Get:

- 1 - Feeder Assembly

Slide the two pillow bearing blocks on the feeder assembly onto the 323mm extrusion as shown. Do not tighten these screws yet.

9



Get:

- 1 - Feeder Servo Assembly

Slide the feeder servo assembly onto the 323mm extrusion as shown. Do not tighten these screws yet.

10



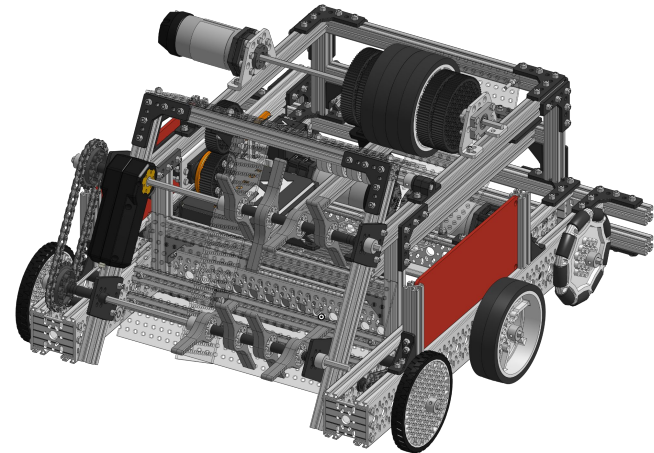
Get:

- 2 - Pre-Loaded 90 Degree Bracket

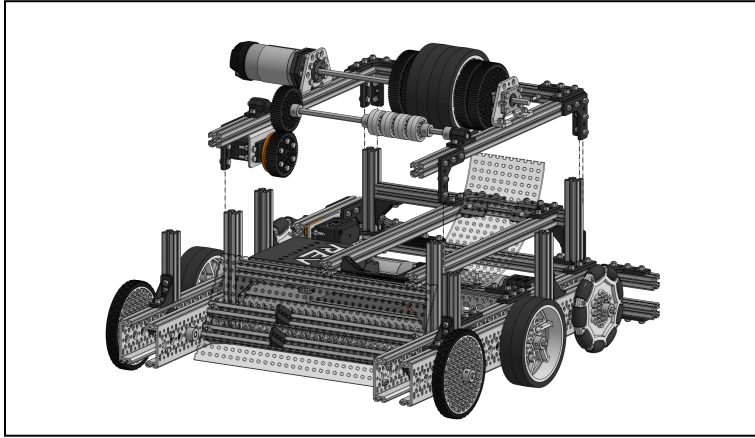
Slide two more pre-loaded 90 degree brackets onto the 323mm extrusion as shown. Do not tighten these screws yet.

Final Assembly

PART NUMBER	DESCRIPTION	QTY
N/A	Launcher and Feeder Assembly	1
N/A	Intake Assembly	1
N/A	Intake Side Cut Polycarbonate	1
REV-41-1321	15mm Plastic Lap Corner Bracket	1
REV-41-1687	U Channel Endcap	2
REV-41-1359	M3 x 8mm Hex Cap Screw	11
REV-41-1360	M3 X 16mm Hex Cap Screws	2
REV-41-1361	M3 Nyloc Nuts	6



1

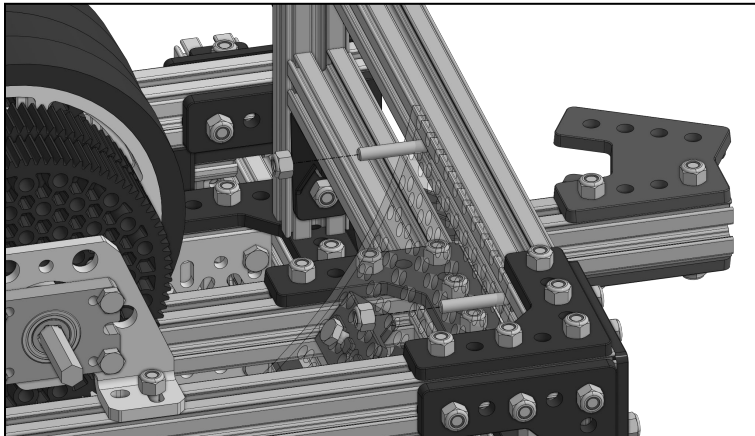


Get:

- 1 - Launcher and Feeder Assembly

Slide the six 90 degree brackets of the launcher and feeder assembly onto the upright extrusion on the drivetrain. Tighten all nuts.

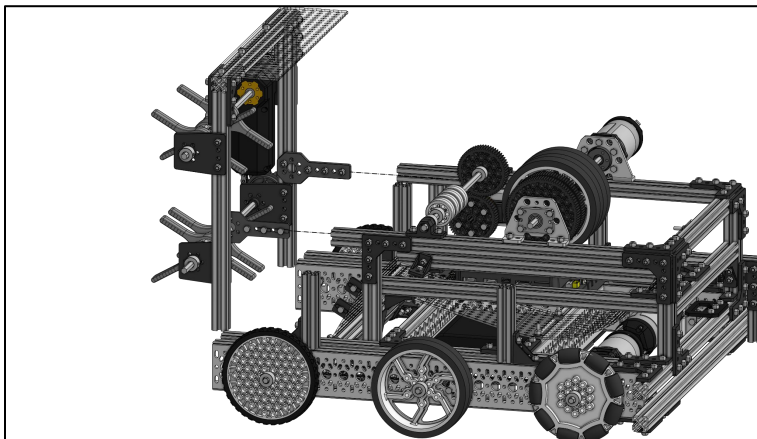
2



Get:

- 2 - M3 Nyloc Nuts

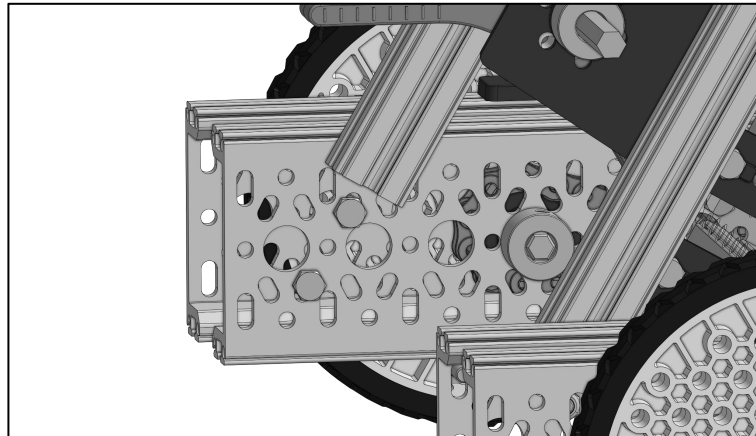
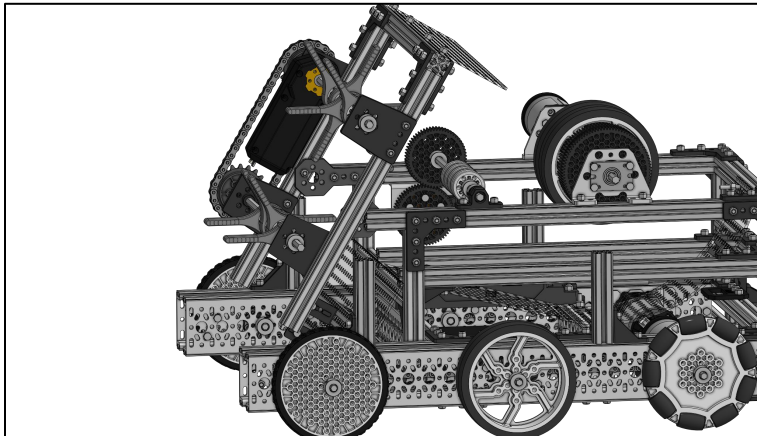
Bend the launcher floor back and then onto the 16mm screws on the launcher and feeder assembly. Secure the floor with two nyloc nuts.



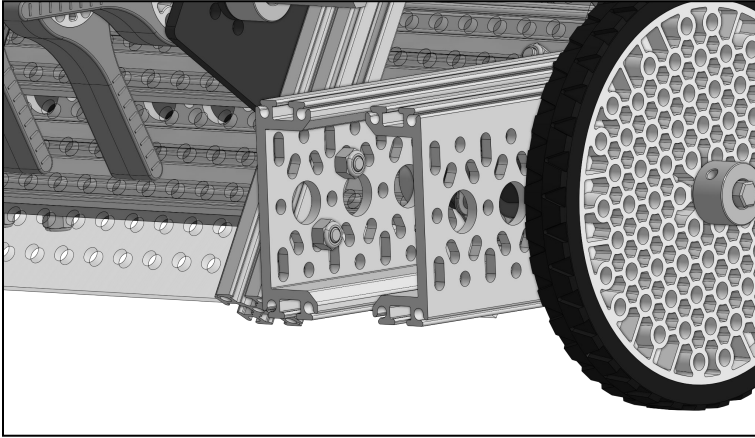
Get:

- 1 - Intake Assembly

Slide the rod end brackets on the intake assembly down to motion brackets. Slide the rod end brackets and intake onto the launcher assembly. Then tilt the intake and slide it down onto the pre-loaded screws on the drivetrain. The end of the intake extrusion should be extending just past the bottom of the drivetrain c channel and the intake lid should be just above the feeder wheels. Tighten all nuts.

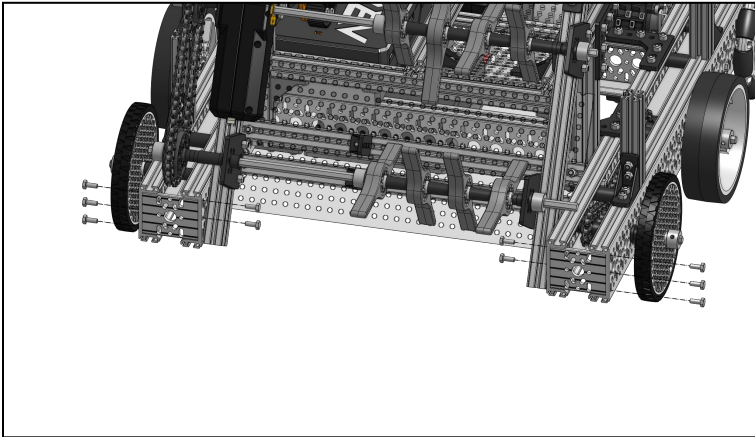


4



Use a wrench to tighten the nuts and screws on drivetrain c channel.

5

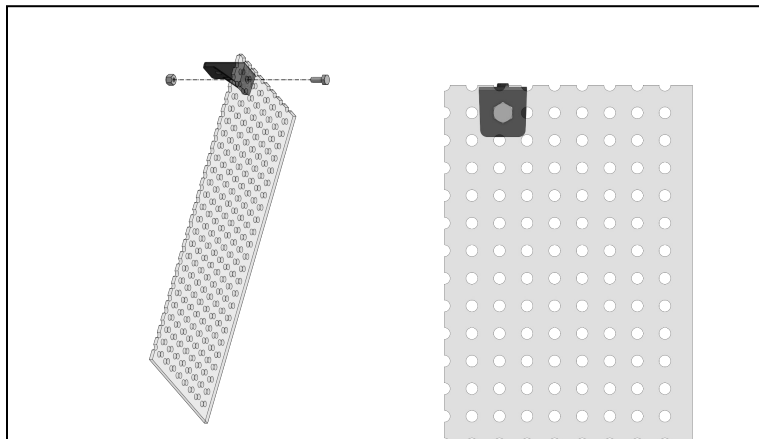


Get:

- 2 - U Channel Endcap
- 10 - M3 x 8mm Hex Cap Screws

Install u channel endcaps into the end of the drivetrain. Use two screws on the inside of the drive rails and three screws on the outside.

6

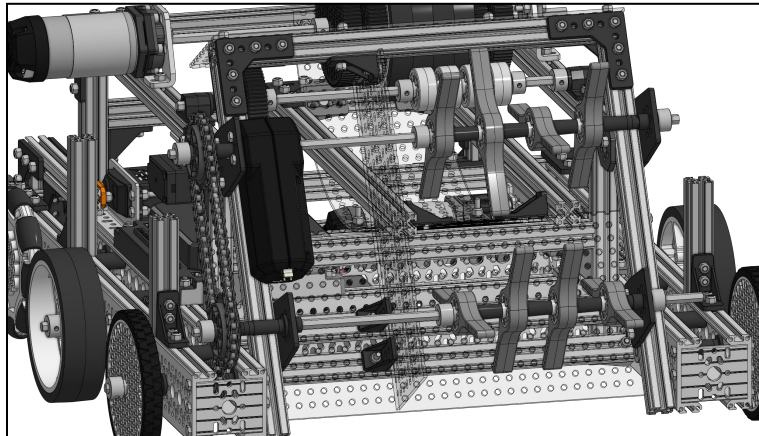


Get:

- 1 - Intake Side Cut Polycarbonate
- 1 - 15mm Plastic Lap Corner Bracket
- 1 - M3 x 8mm Hex Cap Screws
- 1 - M3 Nyloc Nuts

Secure a lap corner bracket onto the intake side polycarbonate with a screw and nyloc nut.

7

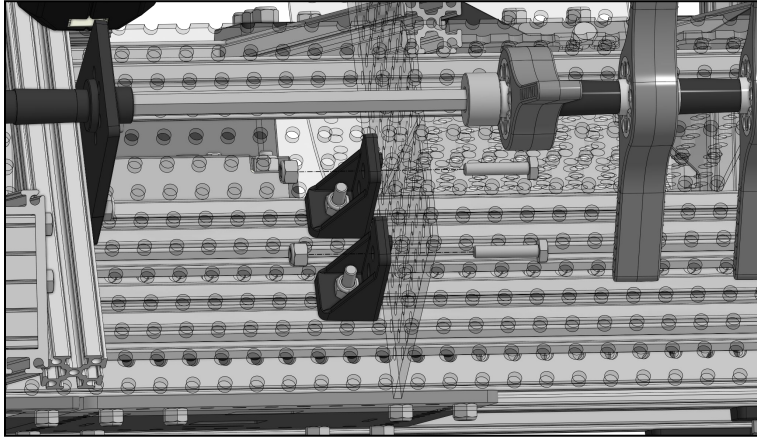


Get:

- 1 - M3 Nyloc Nuts

Slide the intake side onto the 8mm screw in the top of the intake. Adjust the location of the intake side so it is lined up with the two lap corner brackets on the intake floor. Secure the intake side with a nyloc nut.

8

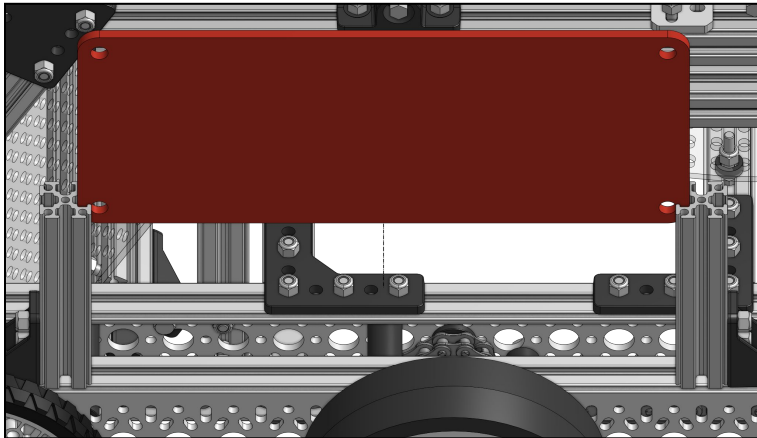


Get:

- 2 - M3 x 16mm Hex Cap Screws
- 2 - M3 Nyloc Nuts

Secure the intake side to the two lap corner brackets with two 16mm screws and nyloc nuts.

9



Adjustable Robot Sign Holders originally designed for 7"x3" Signs but can be adjusted for your teams preference. To adjust the sign holders, loosen the two nuts securing the insider corner brackets to the drive rail and slide the holders to your desired width and location.

You are done!



2026-27 REV DUO FTC Starter Bot Build Guide

