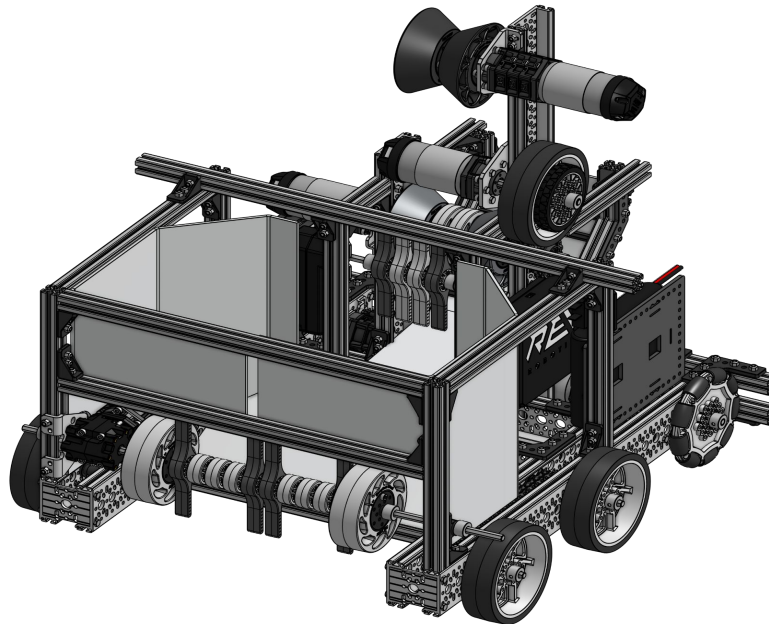




2026 REV DUO FGC Starter Bot Build Guide



Bill of Materials								
PART NUMBER	DESCRIPTION	QTY.	PART NUMBER	DESCRIPTION	QTY.	PART NUMBER	DESCRIPTION	QTY.
REV-41-2703	Intake Flap - 5mm Hex - 60A Black	6	REV-41-1602	UltraPlanetary Cartridge - 4:1	1	REV-41-1326	Through Bore Bearing - Short	16
REV-41-2701	Intake Flap - 5mm Hex - 30A Light Gray	2	REV-41-1601	UltraPlanetary Cartridge - 3:1	3	REV-41-1324	3mm Spacer	16
REV-41-2150	Soft - 5mm Hex Bore - 1in Grip Wheel	6	REV-41-1568	15mm Extrusion - 120mm	2	REV-41-1323	15mm Spacer	2
REV-41-2080	Ultra 90 Degree Gearbox	1	REV-41-1492	M3 Standoff - 40mm	14	REV-41-1321	15mm Plastic Lap Corner Bracket	28
REV-41-2038	MAXHub - 5mm Hex - Plastic	12	REV-41-1480	15mm Metal 90 Degree Bracket V2	2	REV-41-1317	15mm Bearing Pillow Block	2
REV-41-2035	2" Compliant Wheel - 5mm Hex Bore - Soft	2	REV-41-1433	15mm Metal Bent Core Hex Motor Bracket V2	1	REV-41-1310	15mm Plastic 135 Degree Bracket	3
REV-41-1767	45mm x 15mm C Channel - 248mm	4	REV-41-1432	15mm Extrusion - 420mm - 90° Ends	9	REV-41-1305	15mm Plastic 90 Degree Bracket	16
REV-41-1762	45mm x 15mm C Channel - 408mm	5	REV-41-1431	15mm Extrusion - 225mm	4	REV-41-1300	Core Hex Motor	1
REV-41-1713	M3 x 6mm Hex Cap Screw	3	REV-41-1430	15mm Extrusion - 150mm - 45° Ends	2	REV-41-1291	HD Hex Motor No Gearbox	6
REV-41-1702	Tensioning Bushing - 39mm	8	REV-41-1387	Switch Cable and Bracket	1	REV-41-1267	90mm Grip Wheel	5
REV-41-1687	U Channel Endcap	4	REV-41-1365	#25 Roller Chain	1	REV-41-1190	90mm Omni Wheel	2
REV-41-1683	Hex Bearing Block	1	REV-41-1362	5mm x 400mm Hex Shaft	3	REV-41-1166	Battery Holder Plate	1
REV-41-1624	UltraPlanetary Flat Mounting Bracket	1	REV-41-1361	M3 Nyloc Nut	232	REV-41-1124	M3 x 20mm Hex Cap Screw	4
REV-41-1623	UltraPlanetary Bent Mounting Bracket	2	REV-41-1359	M3 x 8mm Hex Cap Screw	298	REV-31-1595	Control Hub	1
REV-41-1621	UltraPlanetary Outside Mounting Bracket	3	REV-41-1350	60mm Traction Wheel	1	REV-31-1302	12V Slim Battery	1
REV-41-1615	UltraPlanetary Female 5mm Hex Output V2	6	REV-41-1348	5mm x 90mm Hex Shaft	6	REV-31-1153	Expansion Hub	1
REV-41-1609	UltraPlanetary Hardware Pack	1	REV-41-1347	5mm x 75mm Hex Shaft	2	REV-21-6564	Cone Wheel - 2in to 3in - MAXSpline - Medium	2
REV-41-1609	UltraPlanetary Hardware Pack	6	REV-41-1339	15 Tooth #25 Sprocket	2	REV-21-6550	Cone Wheel - 2in to 3in - MAXSpline - Hard	2
REV-41-1608	UltraPlanetary 550 Motor Pinion Gear - 13 Tooth	6	REV-41-1338	10 Tooth #25 Sprocket	8	REV-21-2452	Compliant Wheel - 3in - MAXSpline - Soft	2
REV-41-1607	UltraPlanetary 550 Motor Plate	6	REV-41-1329	Through Bore Bearing - Long	6		Coroplast Sheets	3
REV-41-1603	UltraPlanetary Cartridge - 5:1	4	REV-41-1327	Shaft Collars	26			

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
185mm	4	Final Assembly
308mm	2	Final Assembly
50mm	2	Launcher
60mm	2	Launcher

Cut from Corrugated Plastic Sheets

Piece Name	QTY	Assembly
Launcher Hood and Hopper Floor	4	Hood/Hopper
Hopper Side Left	1	Hood/Hopper
Hopper Side Right	1	Hood/Hopper

Cut from 5mm x 400mm Hex Shaft

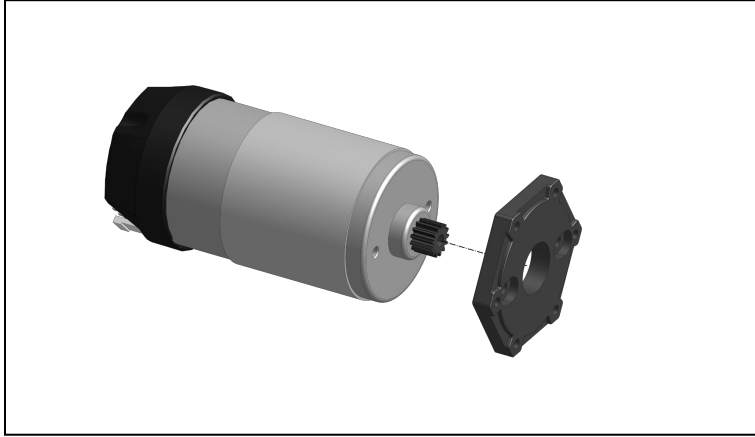
Length	QTY	Assembly
185mm	2	Launcher

UltraPlanetary & HD Hex Motors

PART NUMBER	DESCRIPTION	QTY
REV-41-1603	UltraPlanetary 5:1 Cartridge	4
REV-41-1602	UltraPlanetary 4:1 Cartridge	1
REV-41-1601	UltraPlanetary 3:1 Cartridge	3
REV-41-1607	UltraPlanetary 550 Motor Plate	6
REV-41-1615	UltraPlanetary Output V2	6
REV-41-1291	HD Hex Motor	6
REV-41-1621	UltraPlanetary Outside Mounting Bracket	3
REV-41-1623	UltraPlanetary Bent Mounting Bracket	1
REV-41-1624	UltraPlanetary Flat Mounting Bracket	1
REV-41-1359	M3 x 8mm Hex Cap Screw	26
REV-41-1609	M3 x 40mm Cap Head Screw	6
REV-41-1609	M3 x 30mm Cap Head Screw	12
REV-41-1609	M3 x 20mm Cap Head Screw	6
REV-41-1609	M3 x 10mm Cap Head Screw	14
REV-41-1609	M3 x 8mm Button Head Screw	12
REV-41-1361	M3 Nyloc Nuts	2
REV-41-1347	5mm X 75mm Hex Shaft	2
REV-41-2080	Ultra 90 Degree Gearbox	1
REV-41-2081	5mm Hex Shaft, 20mm	1
REV-41-2082	UltraPlanetary Face Mount Spacer	1
REV-41-2080	M3 x 40mm Socket Head Screw	4



1

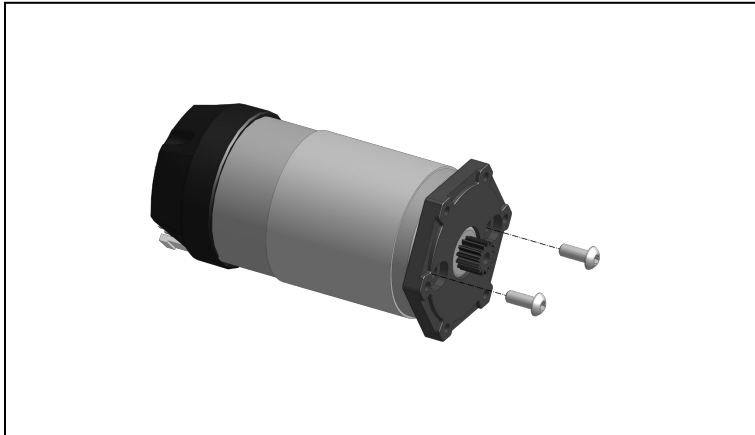


Get:

- 1 - HD Hex Motor No Gearbox
- 1 - UltraPlanetary 550 Motor Plate

Slide the UltraPlanetary motor plate onto the HD Hex motor.

2

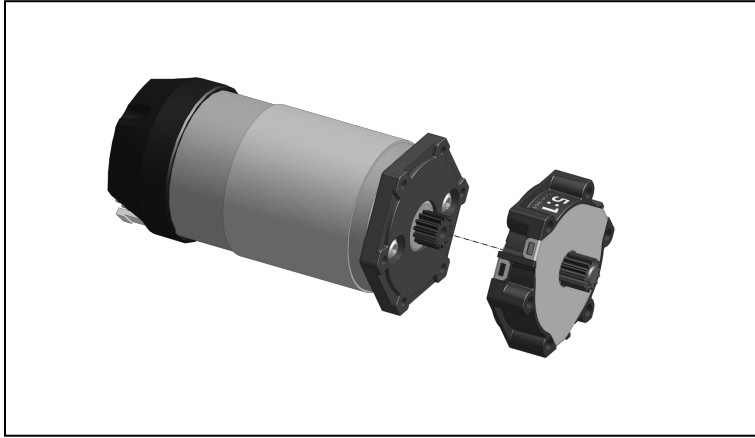


Get:

- 2 - M3x8mm Button head

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

3

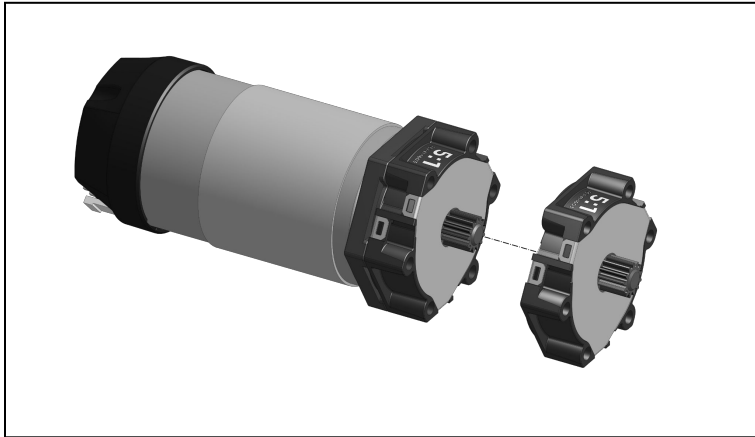


Get:

- 1 - UltraPlanetary Cartridge - 5:1

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

4

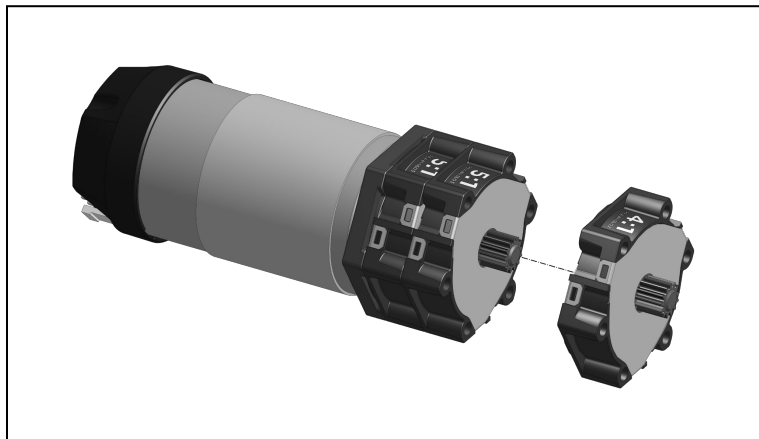


Get:

- 1 - UltraPlanetary Cartridge - 5:1

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

5

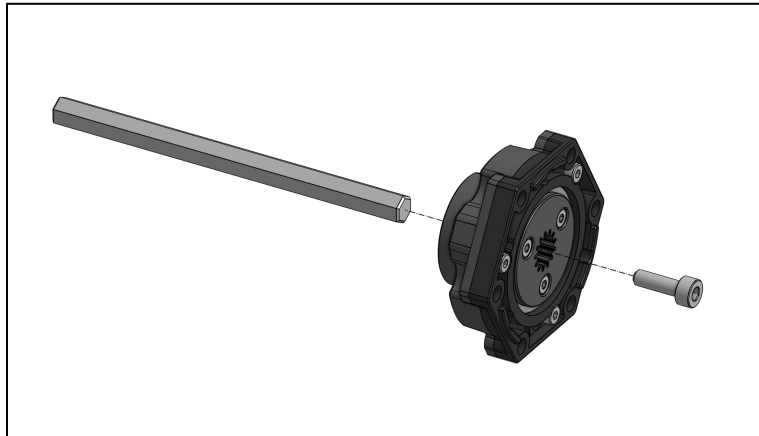


Get:

- 1 - UltraPlanetary Cartridge - 4:1

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

6

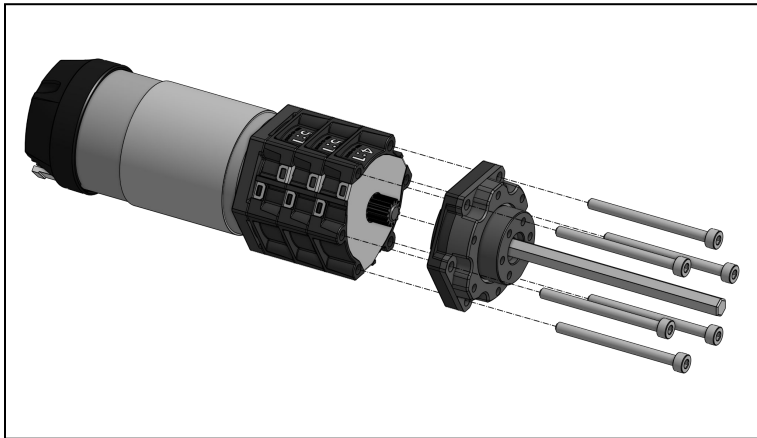


Get:

- 1 - 5mm x 75mm Hex Shaft
- 1 - UltraPlanetary Female 5mm Hex Output Cartridge V2
- 1 - M3x10mm Socket Head

Insert the tapped end of the 75mm hex shaft through the UltraPlanetary output. Screw a 10mm socket head screw into the end of the hex shaft to prevent it from pulling back through the output.

7



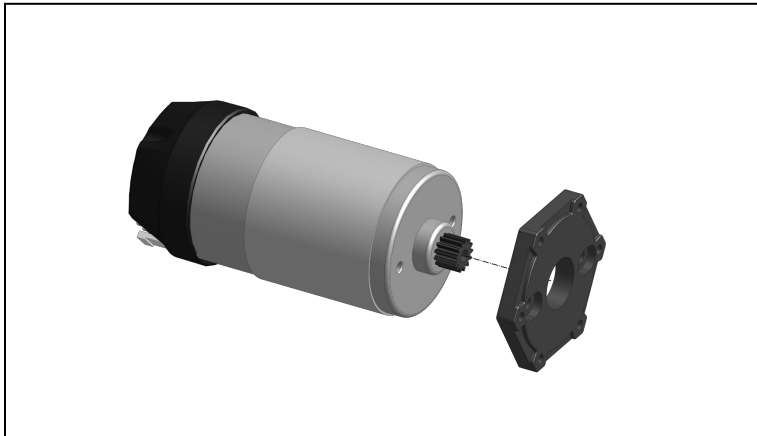
Get:

- 1 - UltraPlanetary Output with Hex Shaft
- 6 - M3x40mm Socket Head Screws

Slide the UltraPlanetary output onto the pinion of the previous 4:1 gear cartridge. Secure the output with six 40mm 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.

8

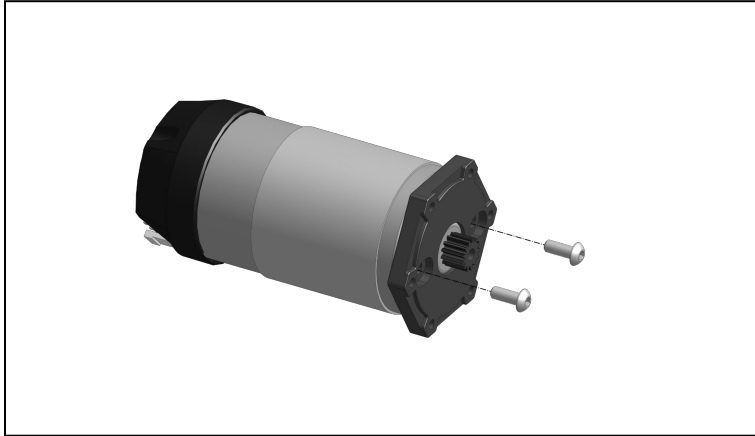


Get:

- 1 - HD Hex Motor No Gearbox
- 1 - UltraPlanetary 550 Motor Plate

Slide the UltraPlanetary motor plate onto the HD Hex motor.

9

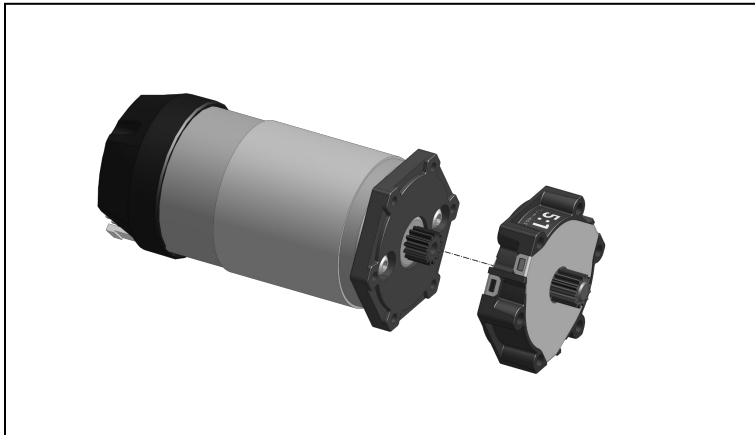


Get:

- 2 - M3x8mm Button head Screws

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

10

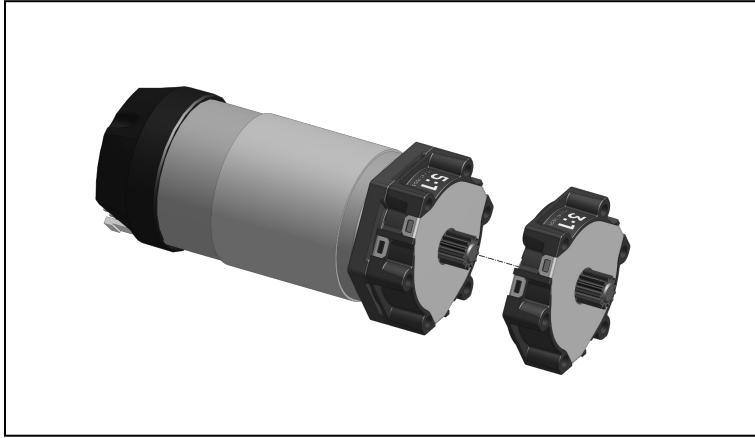


Get:

- 1 - UltraPlanetary Cartridge - 5:1

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

11

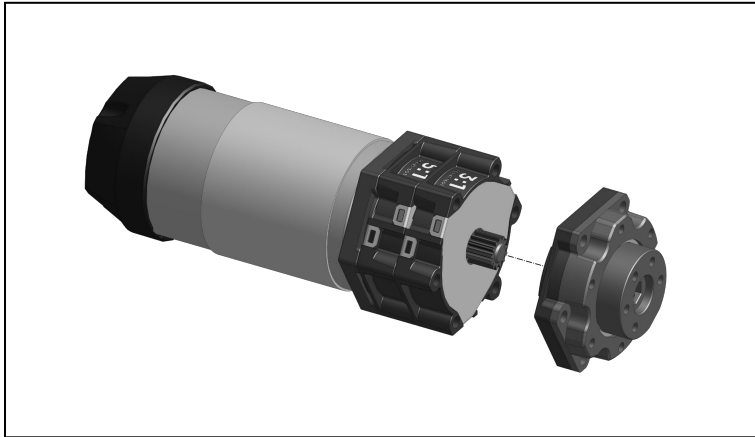


Get:

- 1 - UltraPlanetary Cartridge - 3:1

Slide a 5:1 gear cartridge onto the pinion of the previous 3:1 gear cartridge.

12

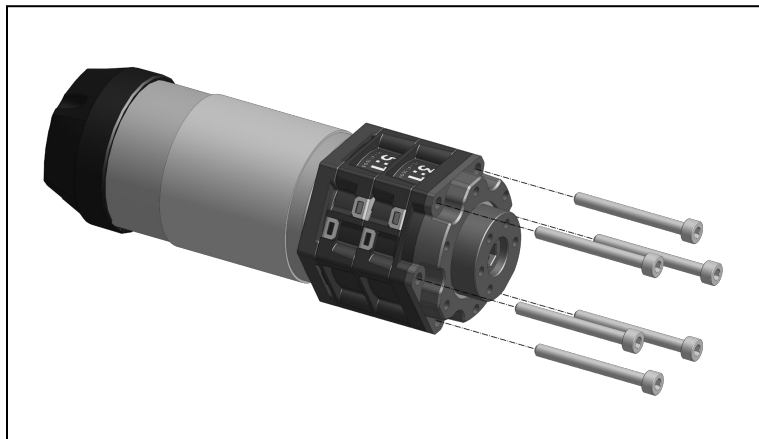


Get:

- 1 - UltraPlanetary Female 5mm Hex Output Cartridge V2

Slide the UltraPlanetary output onto the pinion of the previous 3:1 gear cartridge.

13



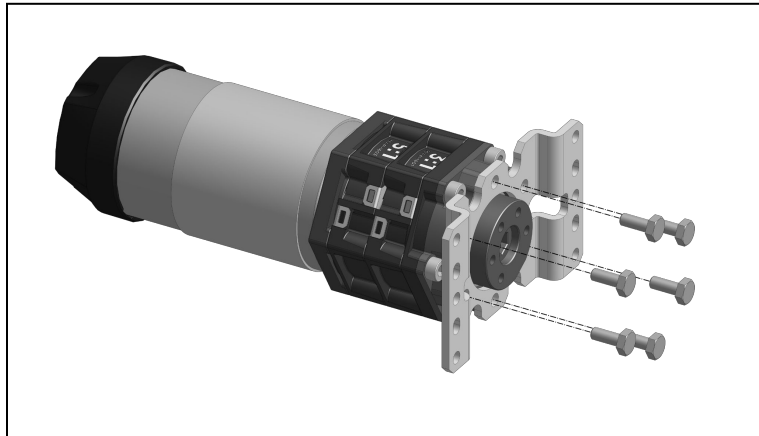
Get:

- 6 - M3x30mm Socket Head Screws

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.

14

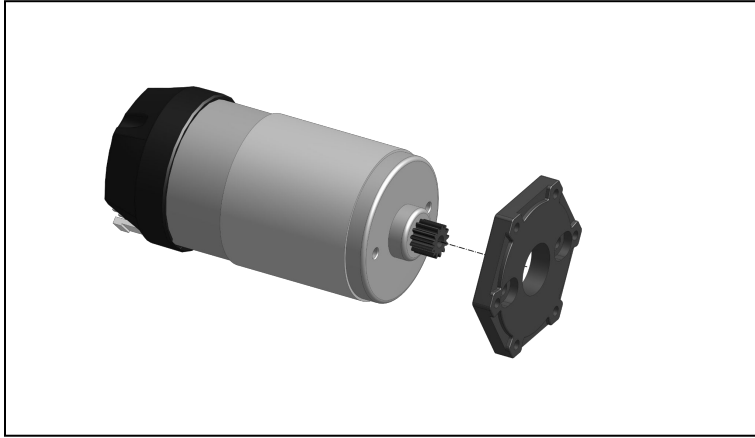


Get:

- 1 - UltraPlanetary Outside Mounting Bracket
- 6 - M3x8mm Hex Cap Screws

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

15

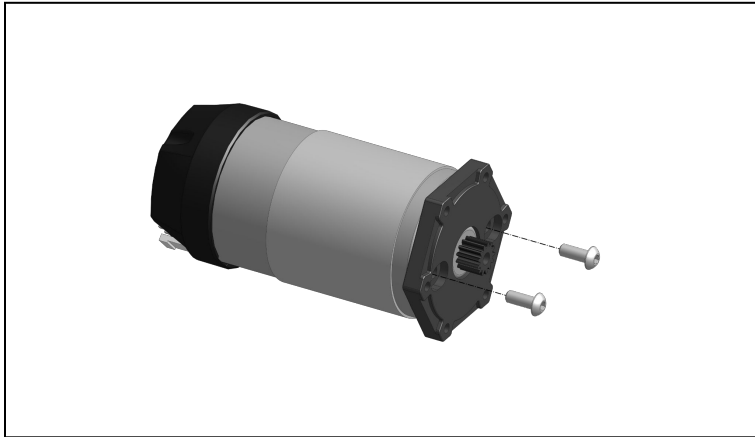


Get:

- 1 - HD Hex Motor No Gearbox
- 1 - UltraPlanetary 550 Motor Plate

Slide the UltraPlanetary motor plate onto the HD Hex motor.

16

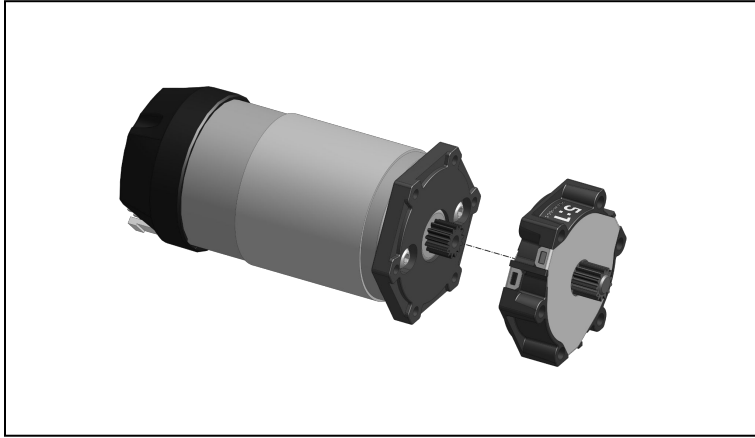


Get:

- 2 - M3x8mm Button head Screws

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

17

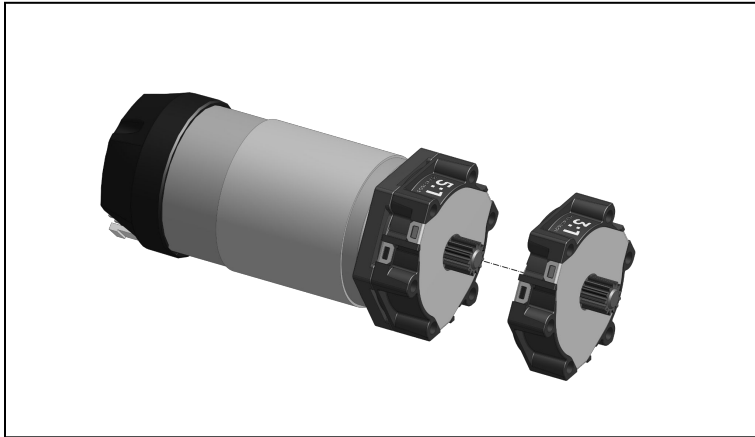


Get:

- 1 - UltraPlanetary Cartridge - 5:1

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

18

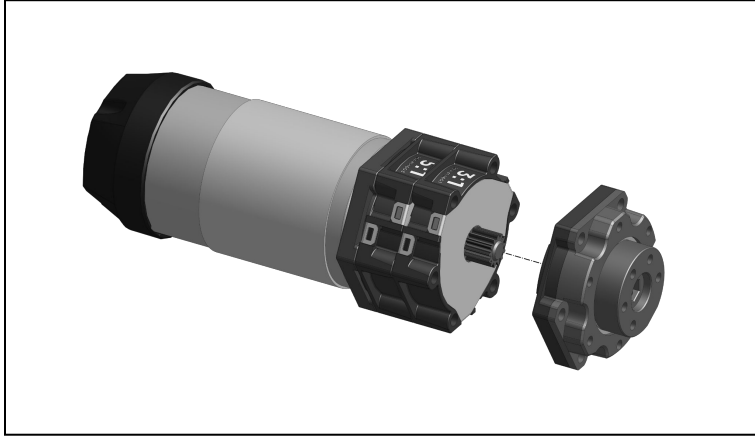


Get:

- 1 - UltraPlanetary Cartridge - 3:1

Slide a 5:1 gear cartridge onto the pinion of the previous 3:1 gear cartridge.

19

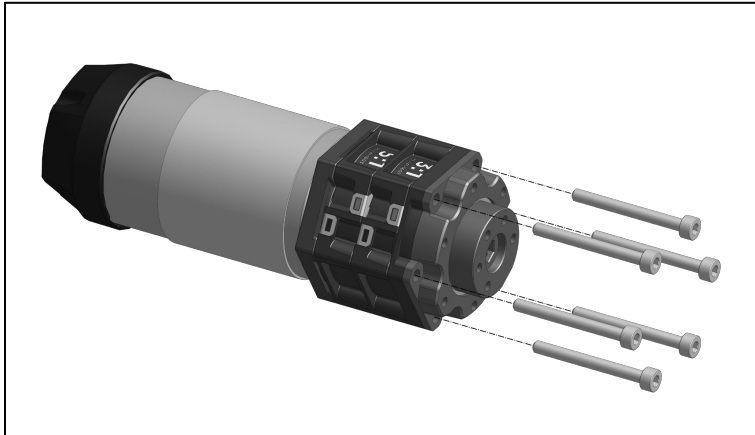


Get:

- 1 - UltraPlanetary Female 5mm Hex Output Cartridge V2

Slide the UltraPlanetary output onto the pinion of the previous 3:1 gear cartridge.

20



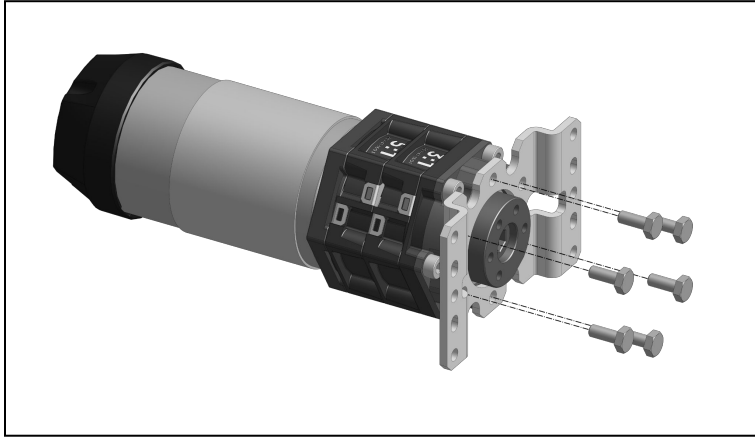
Get:

- 6 - M3x30mm Socket Head Screws

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.

21

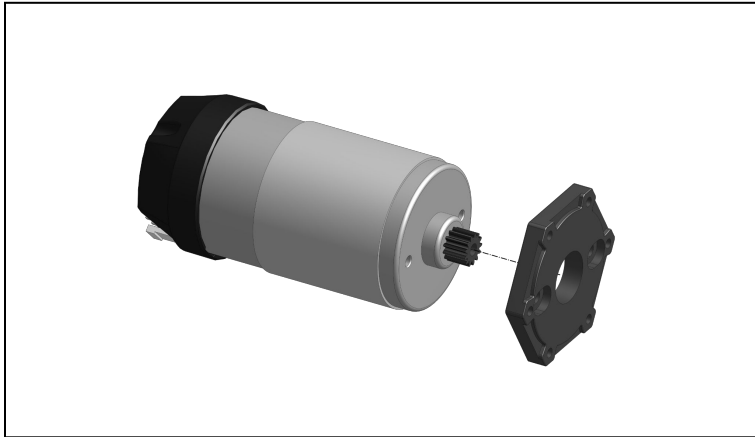


Get:

- 1 - UltraPlanetary Outside Mounting Bracket
- 6 - M3x8mm Hex Cap Screws

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

22

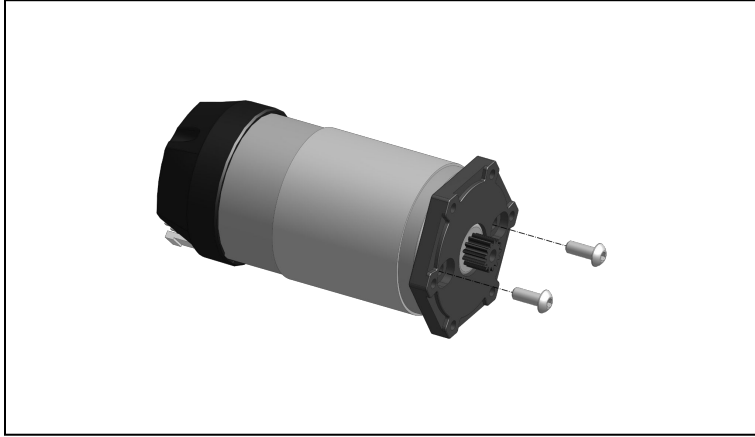


Get:

- 1 - HD Hex Motor No Gearbox
- 1 - UltraPlanetary 550 Motor Plate

Slide the UltraPlanetary motor plate onto the HD Hex motor.

23

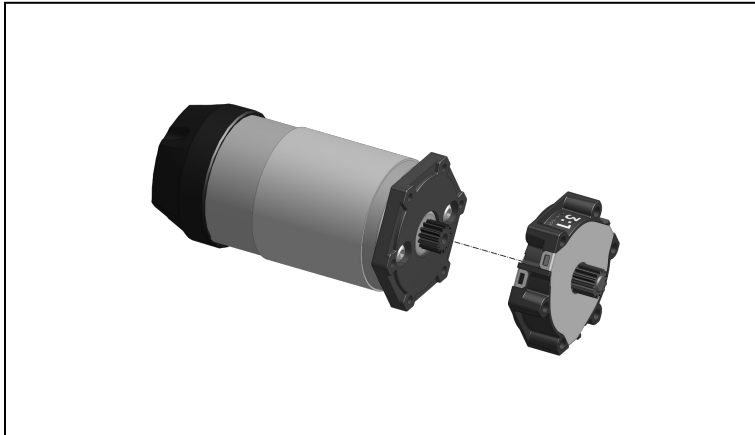


Get:

- 2 - M3x8mm Button head Screws

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

24

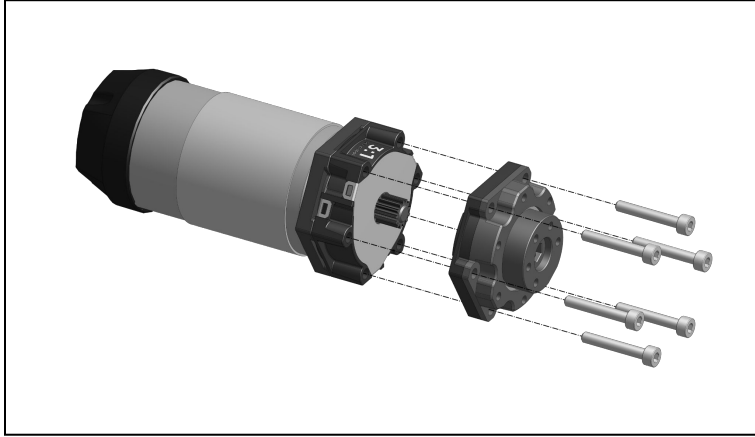


Get:

- 1 - UltraPlanetary Cartridge - 3:1

Slide a 3:1 gear cartridge onto the pinion of the motor.

25



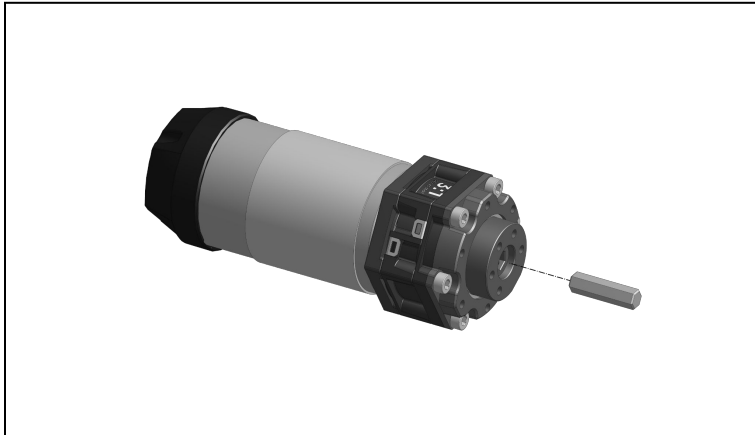
Get:

- 1 - UltraPlanetary Female 5mm Hex Output Cartridge V2
- 6 - M3x20mm Socket Head Screws

Slide the UltraPlanetary output onto the pinion of the previous 3:1 gear cartridge. Secure the output with six 20mm 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.

26

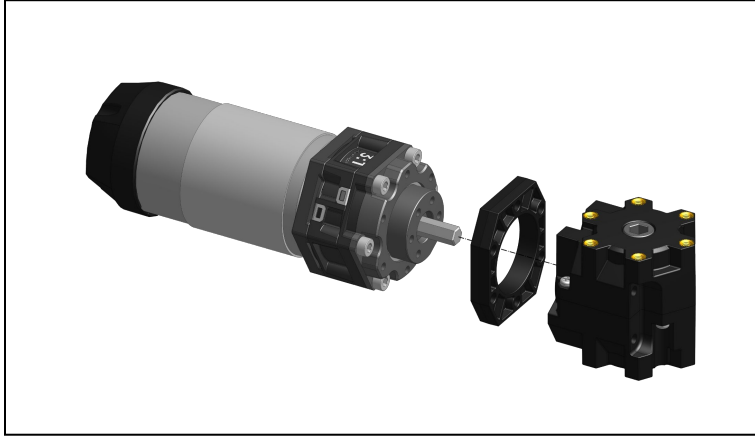


Get:

- 1 - 5mm x 20mm Hex Shaft

Insert the hex shaft into the output.

27

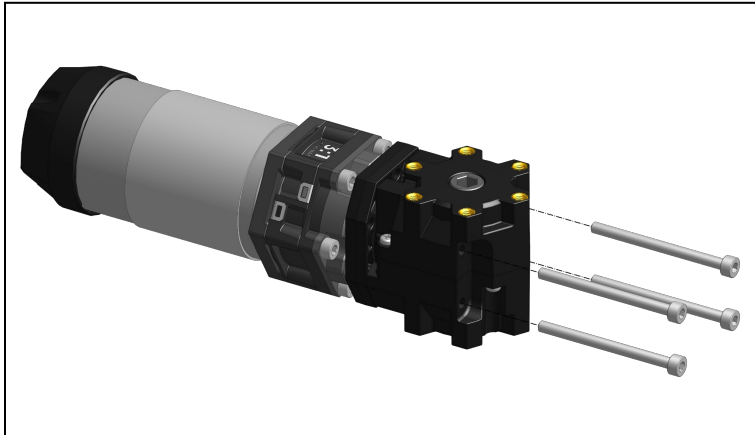


Get:

- 1 - UltraPlanetary Face Mount Spacer
- 1 - Ultra 90 Degree Gearbox

Slide the spacer onto the output then slide the gearbox onto the hex shaft.

28

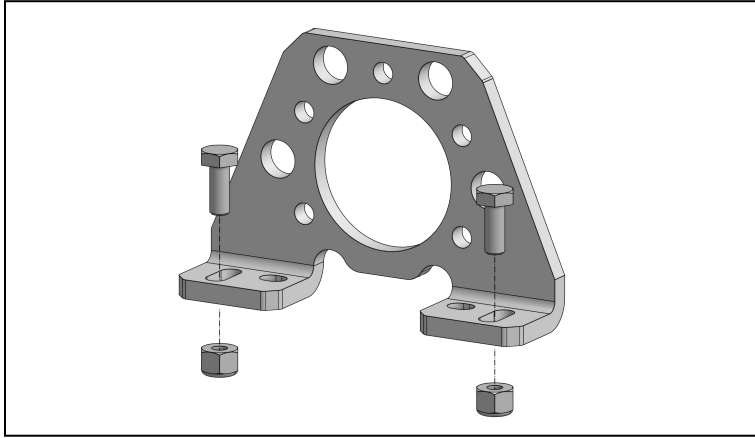


Get:

- 4 - M3x40mm Socket Head Screw

Secure the output with four 40mm socket head screws.

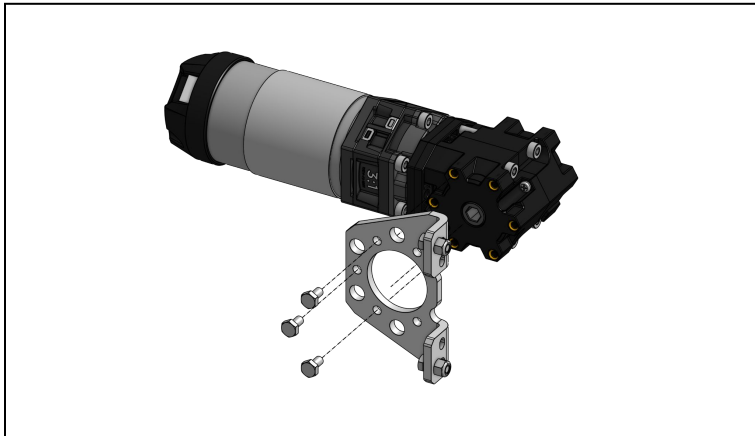
Take care not to over tighten the screws. We recommend applying threadlocker then tighten all screws until the screw heads are touching the output plate or the outermost metal. Tighten screws in a star pattern a 1/4 turn each at a time until the gearbox becomes noticeably harder to spin by hand then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



Get:

- 1 - UltraPlanetary Bent Mounting Bracket
- 2 - M3x8mm Hex Cap Screws
- 2 - Nyloc Nuts

Take a bracket and finger start one hex cap screw and nyloc nut per hole as shown. The head of the hex cap screw should be on the inside portion of the bracket.



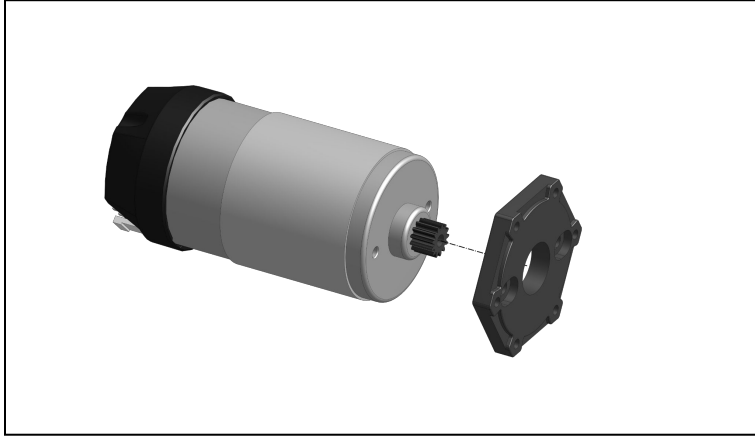
Get:

- 1 - Pre-Loaded UltraPlanetary Bent Mounting Bracket
- 3 - M3x6mm Hex Cap Screws

Secure the bracket onto the 90 degree gearbox with six 6mm hex cap screws.

Note: DO NOT use 8mm screws.

29

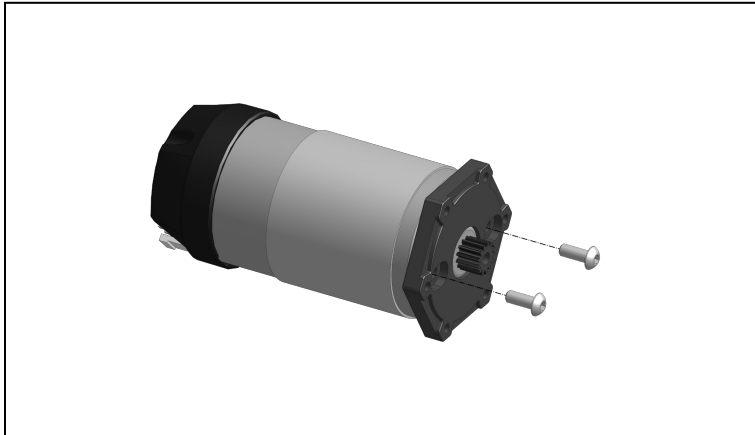


Get:

- 1 - HD Hex Motor No Gearbox
- 1 - UltraPlanetary 550 Motor Plate

Slide the UltraPlanetary motor plate onto the HD Hex motor.

30

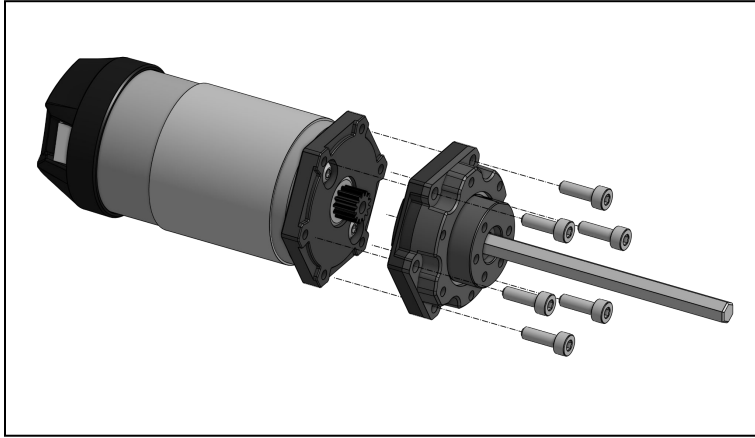


Get:

- 2 - M3x8mm Button head Screws

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

31

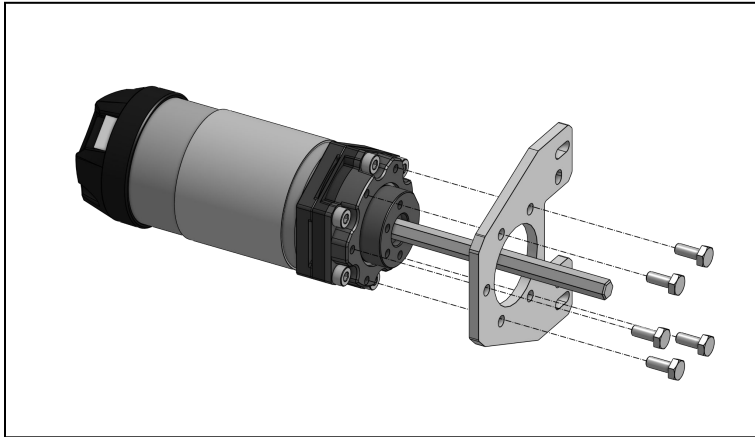


Get:

- 1 - UltraPlanetary Output with Hex Shaft
- 6 - M3x10mm Socket Head Screws

Slide the UltraPlanetary output onto the pinion of the motor. Secure the output with six 10mm socket head screws.

32

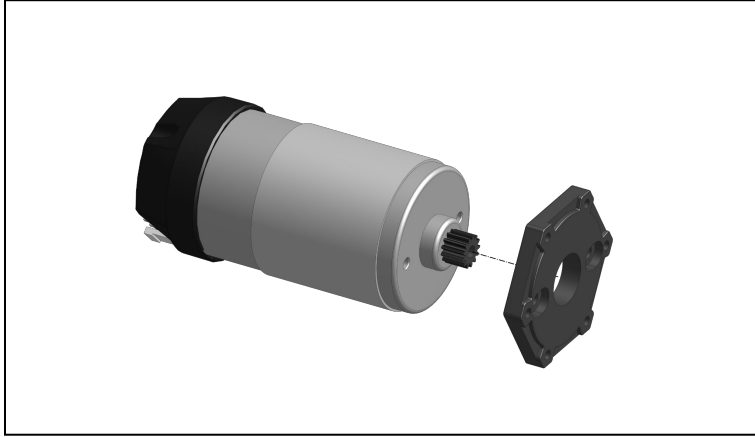


Get:

- 1 - UltraPlanetary Flat Mounting Bracket
- 6 - M3x8mm Hex Cap Screws

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

33

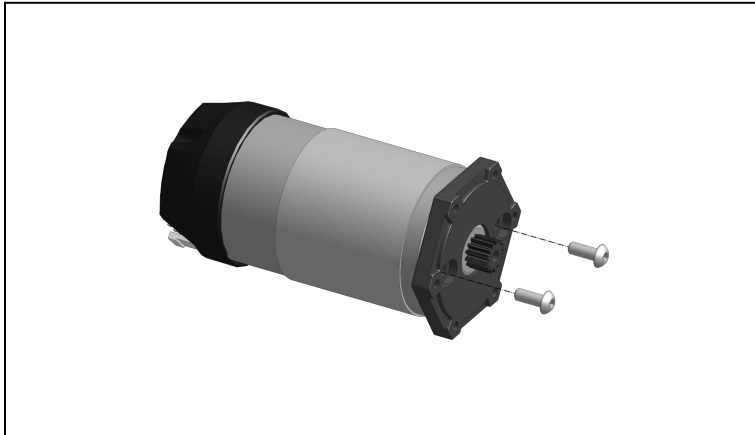


Get:

- 1 - HD Hex Motor No Gearbox
- 1 - UltraPlanetary 550 Motor Plate

Slide the UltraPlanetary motor plate onto the HD Hex motor.

34

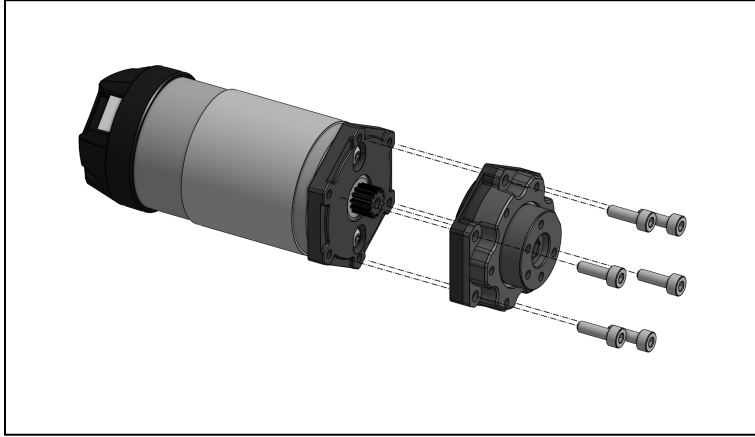


Get:

- 2 - M3x8mm Button head Screws

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

35

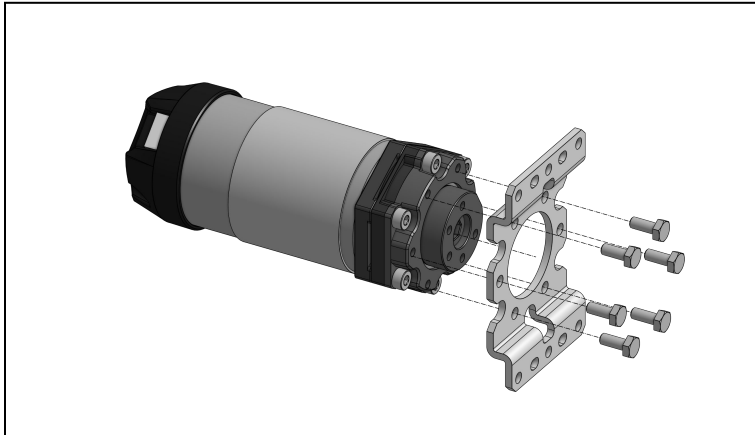


Get:

- 1 - UltraPlanetary Female 5mm Hex Output Cartridge V2
- 6 - M3x10mm Socket Head Screws

Slide the UltraPlanetary output onto the pinion of the motor. Secure the output with six 10mm socket head screws.

36



Get:

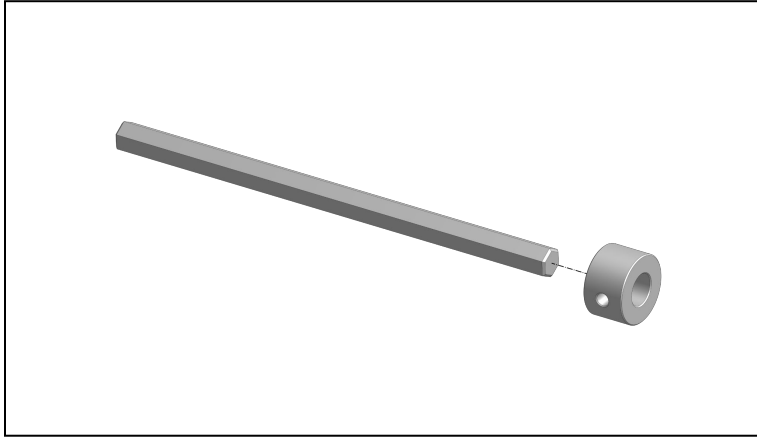
- 1 - UltraPlanetary Outside Mounting Bracket
- 6 - M3x8mm Hex Cap Screws

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

Drive Shaft

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

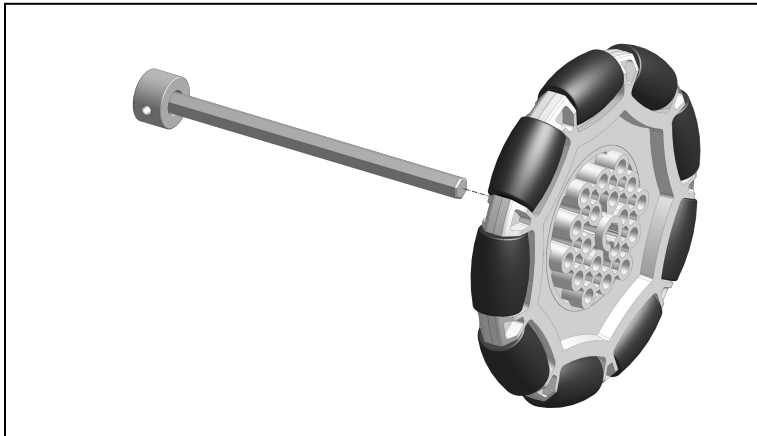




Get:

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

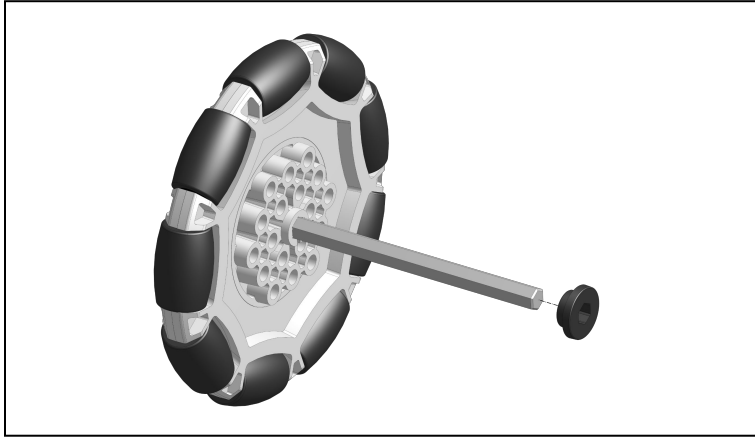
Slide a shaft collar onto the end of a 90mm hex shaft and tighten the set screw.



Get:

- 1 - 90mm Omni Wheel

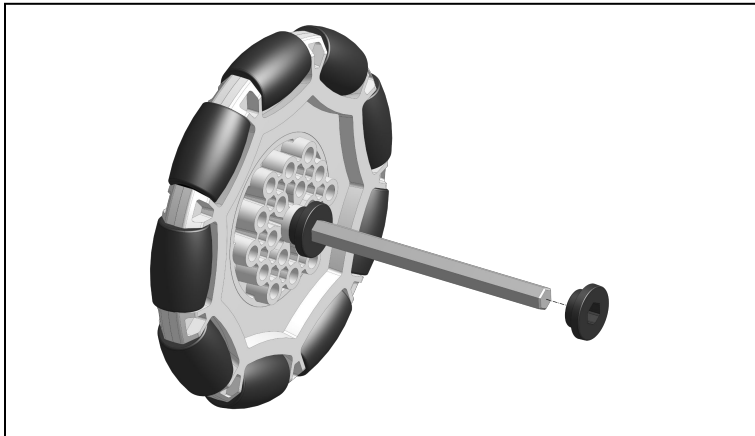
Slide a omni wheel onto the shaft.



Get:

- 1 - Through Bore Bearing - Short

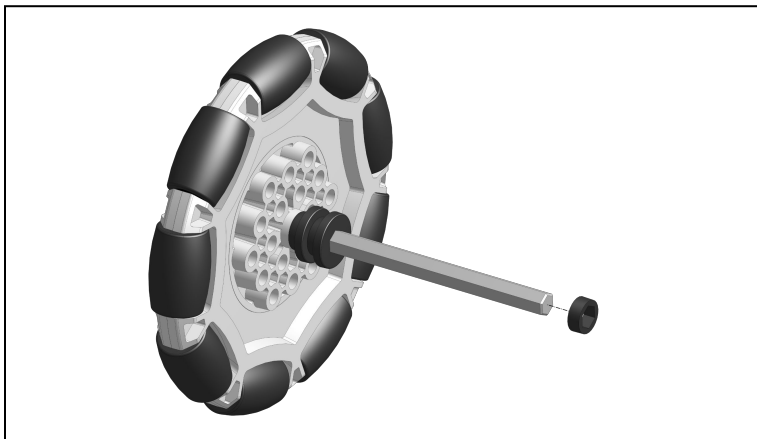
Slide a short through bore bearing onto the hex shaft.



Get:

- 1 - Through Bore Bearing - Short

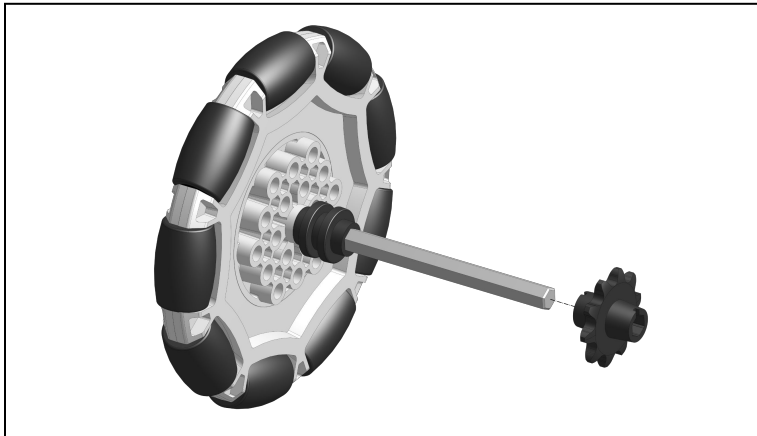
Slide another short through bore bearing onto the hex shaft.



Get:

- 1 - 5mm Hex Shaft Spacer - 3mm

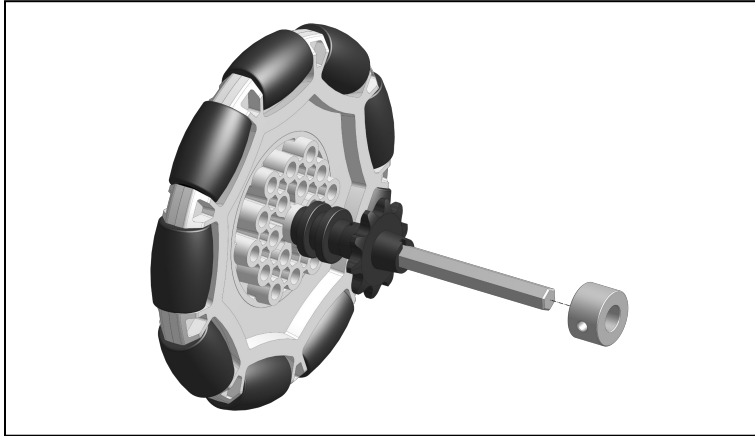
Slide a 3mm spacer onto the hex shaft.



Get:

- 1 - 10 Tooth Plastic #25 Sprocket

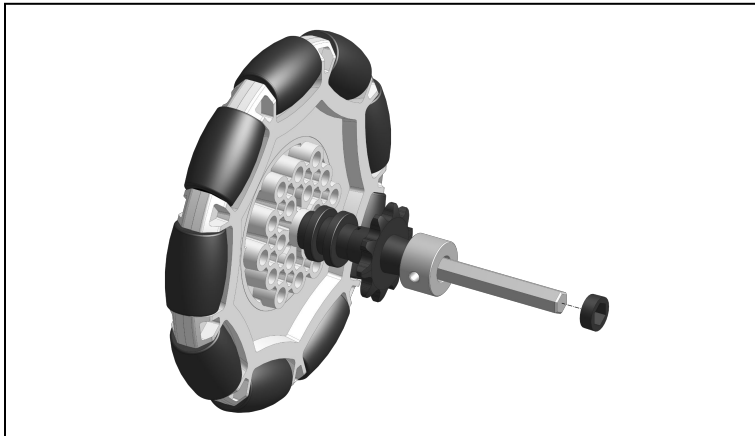
Slide a 10 tooth sprocket onto the hex shaft.



Get:

- 1 - Shaft Collar

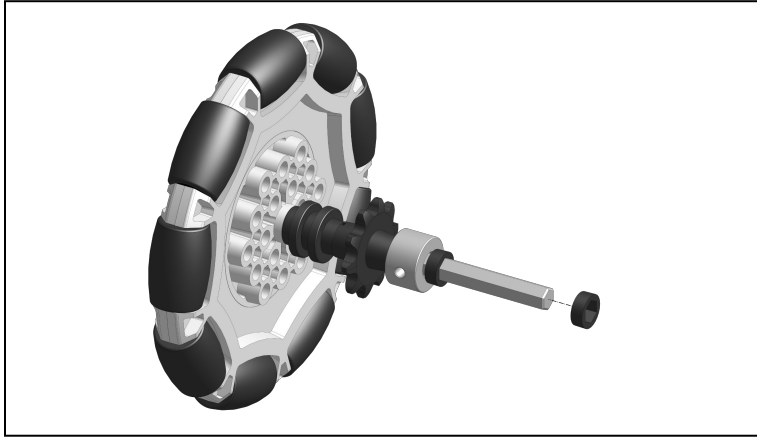
Slide a shaft collar onto the hex shaft then tighten the set screw.



Get:

- 1 - 5mm Hex Shaft Spacer - 3mm

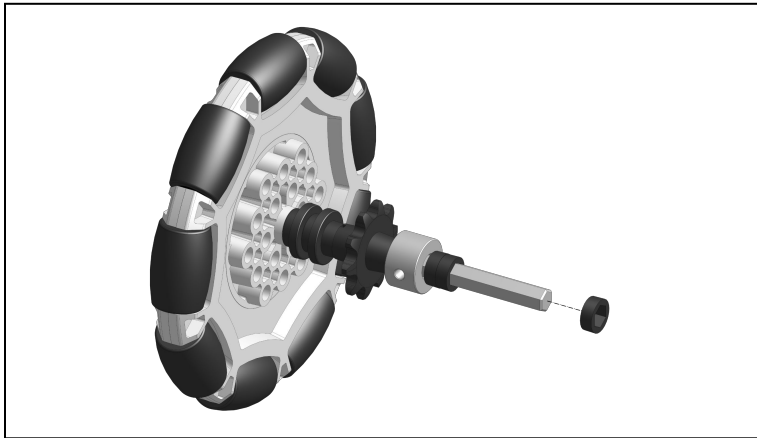
Slide a 3mm spacer onto the hex shaft.



Get:

- 1 - 5mm Hex Shaft Spacer - 3mm

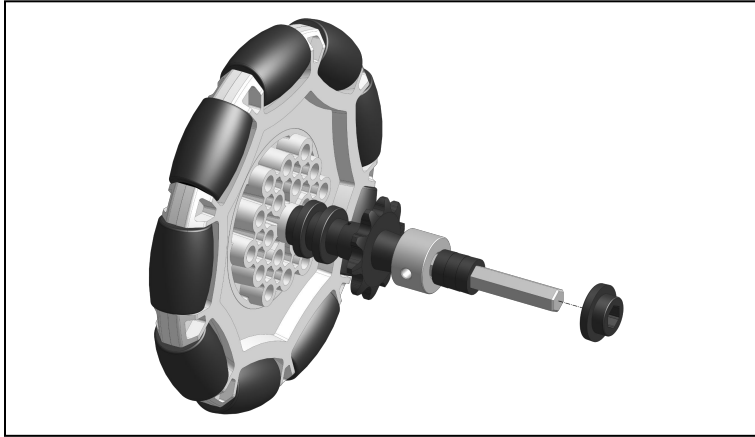
Slide another 3mm spacer onto the hex shaft.



Get:

- 1 - 5mm Hex Shaft Spacer - 3mm

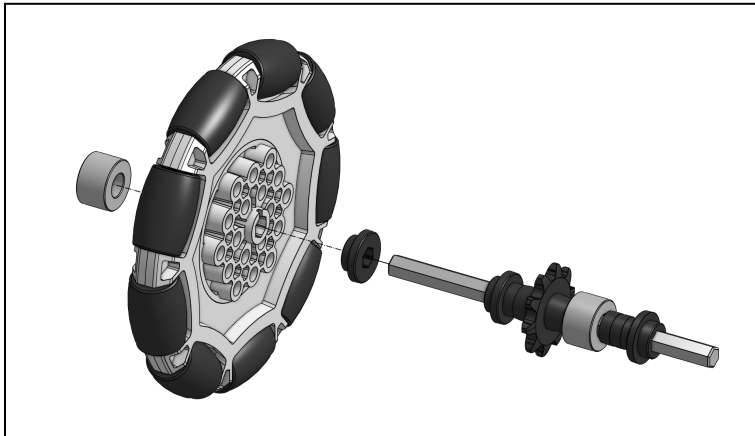
Slide a third 3mm spacer onto the hex shaft.



Get:

- 1 - Through Bore Bearing - Short

Slide a short through bore bearing onto the hex shaft.



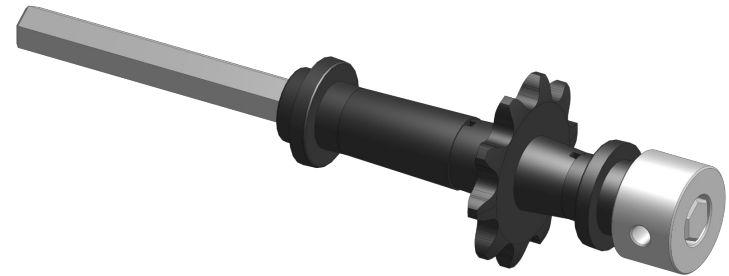
Remove the shaft collar, omni wheel, and short through bore bearing. Set these aside to a later step

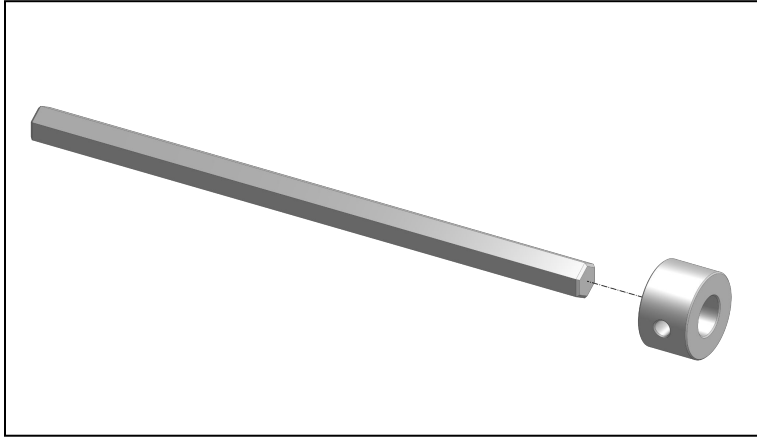
Complete these steps twice to have two complete Drive Shaft Assemblies.

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

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

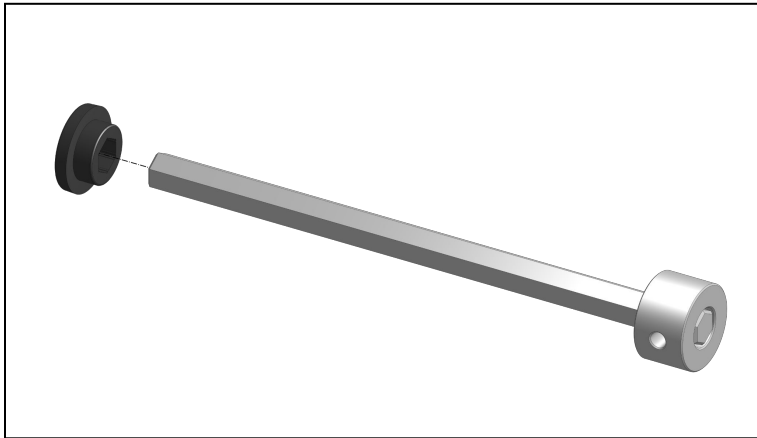




Get:

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

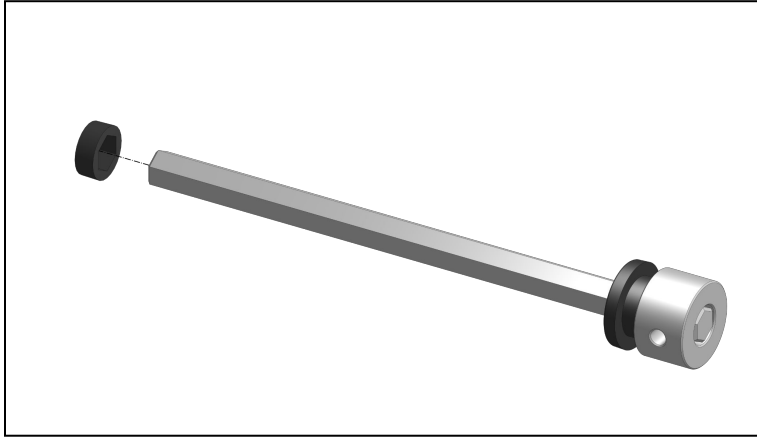
Slide a shaft collar onto the end of a 90mm hex shaft and tighten the set screw.



Get:

- 1 - Through Bore Bearing - Short

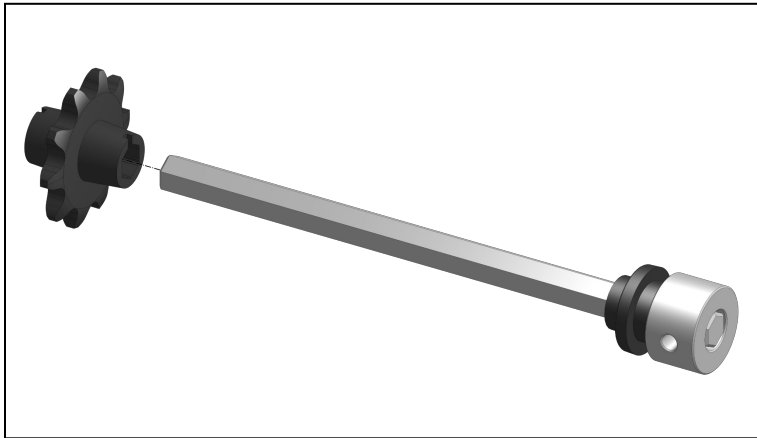
Slide a short through bore bearing onto the hex shaft.



Get:

- 1 - 5mm Hex Shaft Spacer - 3mm

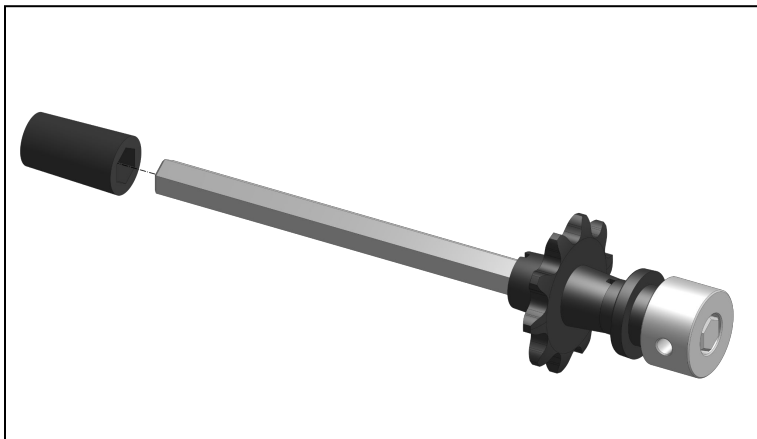
Slide a 3mm spacer onto the hex shaft.



Get:

- 1 - 10 Tooth Plastic #25 Sprocket

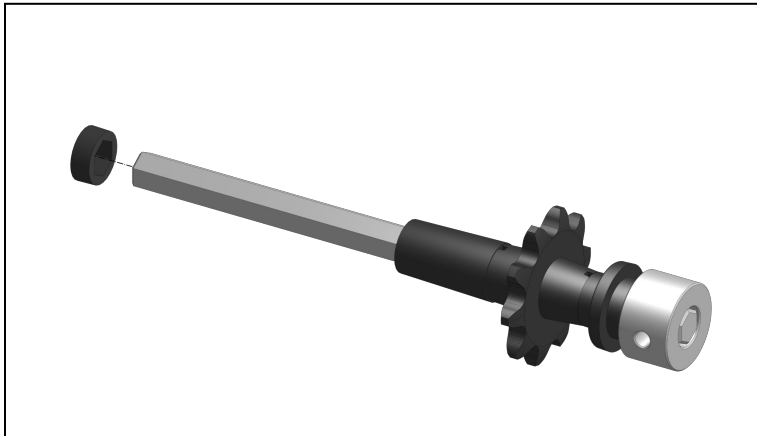
Slide a 10 tooth sprocket onto the hex shaft.



Get:

- 1 - 5mm Hex Shaft Spacer - 15mm

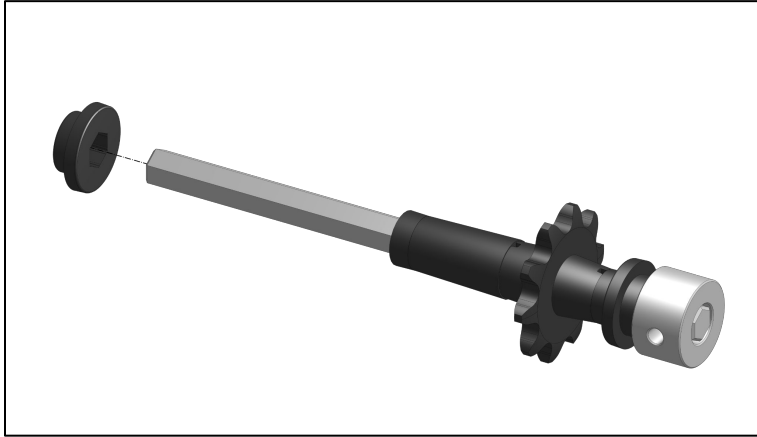
Slide a 15mm spacer onto the hex shaft.



Get:

- 1 - 5mm Hex Shaft Spacer - 3mm

Slide a 3mm spacer onto the hex shaft.



Get:

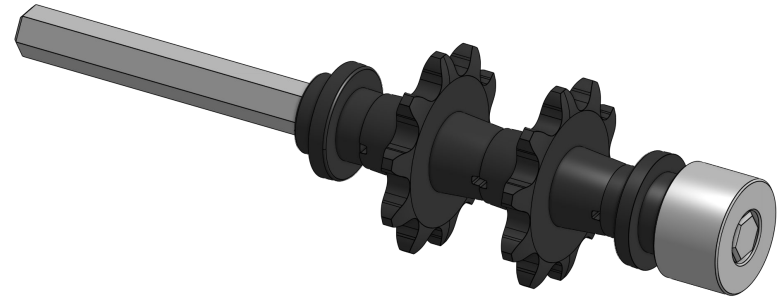
- 1 - Through Bore Bearing - Short

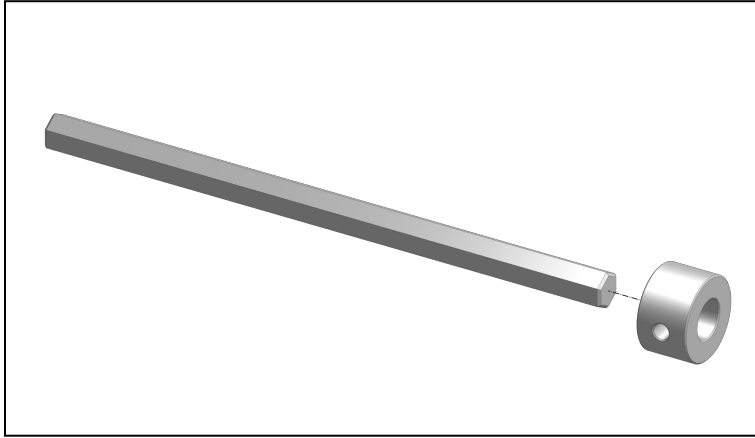
Slide a short through bore bearing onto the hex shaft.

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

Double Sprocket Shaft

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

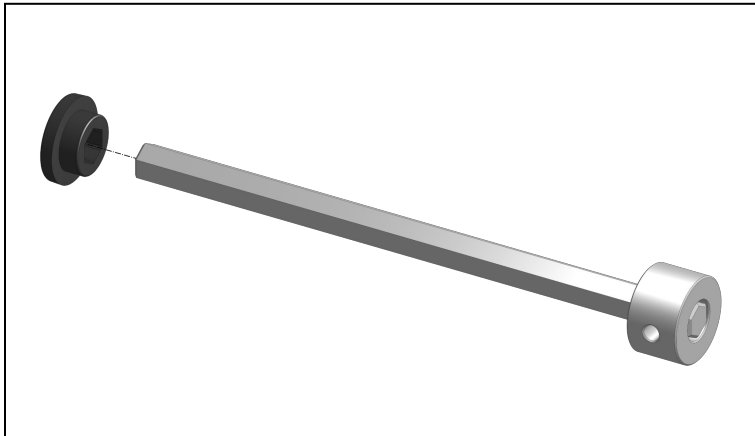




Get:

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

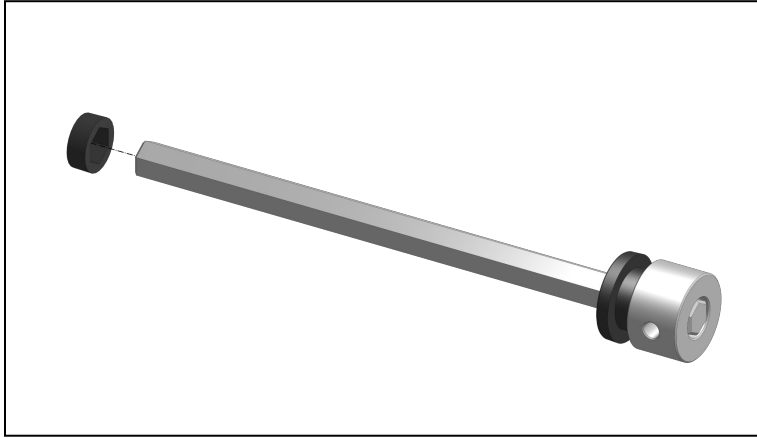
Slide a shaft collar onto the end of a 90mm hex shaft and tighten the set screw.



Get:

- 1 - Through Bore Bearing - Short

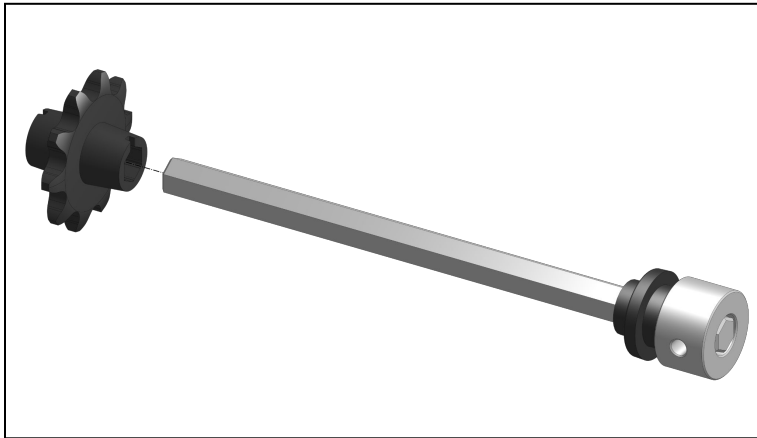
Slide a short through bore bearing onto the hex shaft.



Get:

- 1 - 5mm Hex Shaft Spacer - 3mm

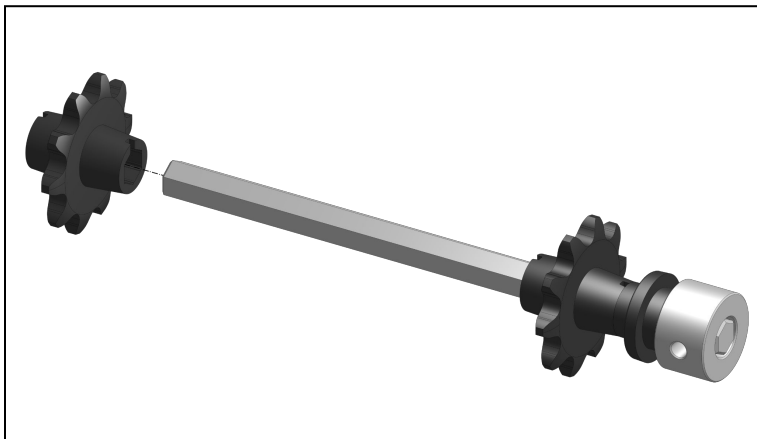
Slide a 3mm spacer onto the hex shaft.



Get:

- 1 - 10 Tooth Plastic #25 Sprocket

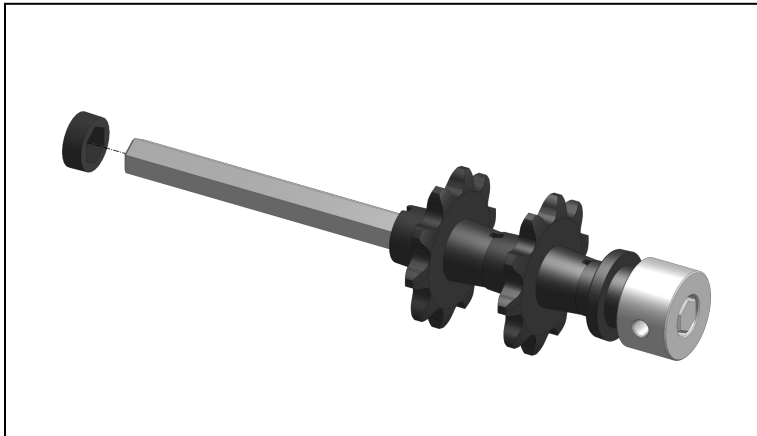
Slide a 10 tooth sprocket onto the hex shaft.



Get:

- 1 - 10 Tooth Plastic #25 Sprocket

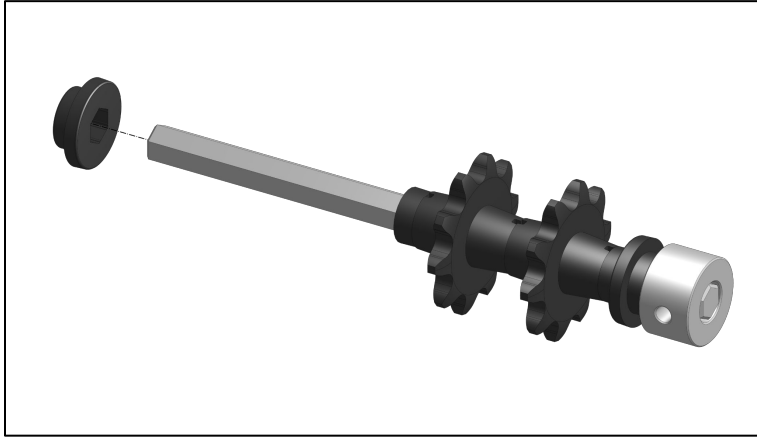
Slide another 10 tooth sprocket onto the hex shaft.



Get:

- 1 - 5mm Hex Shaft Spacer - 3mm

Slide a 3mm spacer onto the hex shaft.



Get:

- 1 - Through Bore Bearing - Short

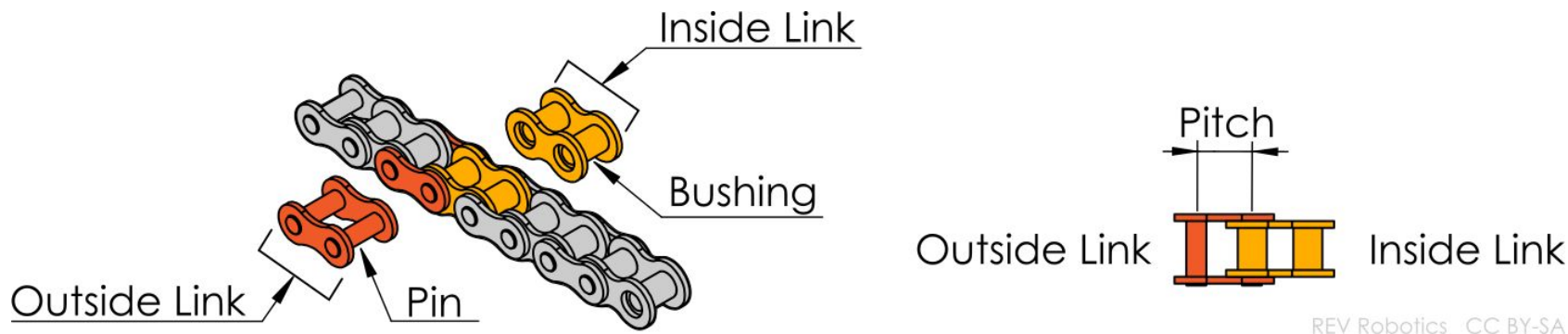
Slide a short through bore bearing onto the hex shaft.

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.

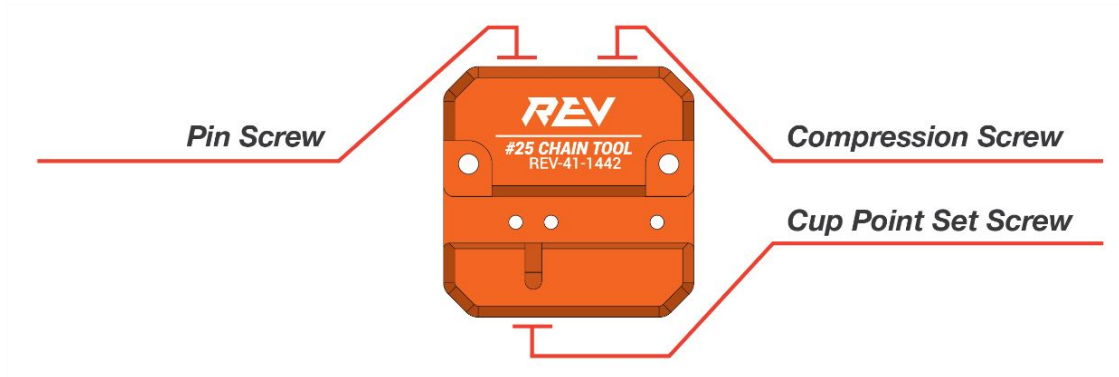


Outside Links consist of two outside plates which are connected by two **pins** that are pressed into each plate. The **pins** in the outside link go through the inside of the hollow **bushings** when the inner and outer links are assembled. The **pins** can freely rotate on the inside of the **bushings**.

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.



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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.

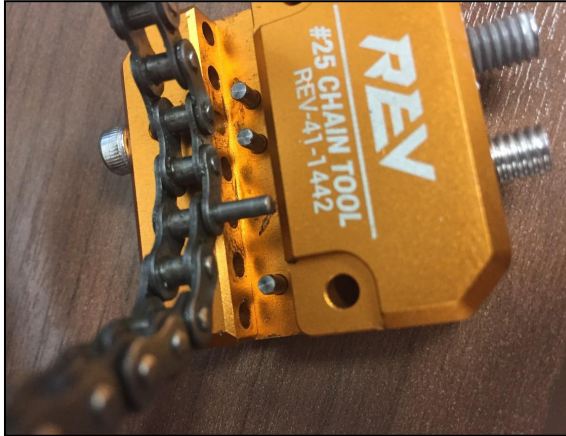
The final result will be the pin still partially connected to the chain (see photo as example).



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5

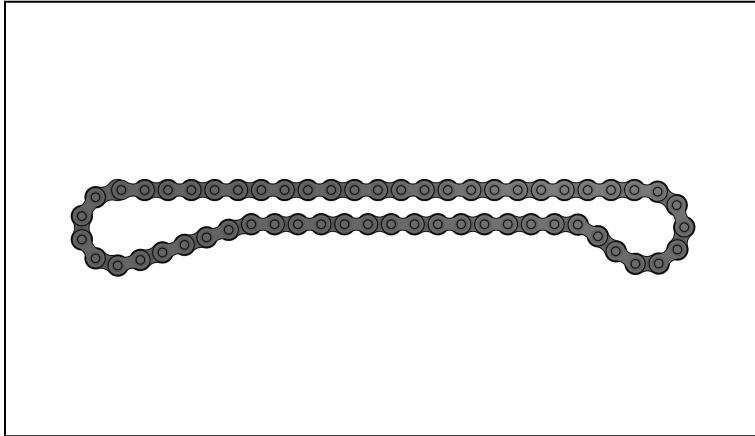


Put the Inner Link bushing into the Outer Link. Align the Pin in the Compression Screw hole.

6

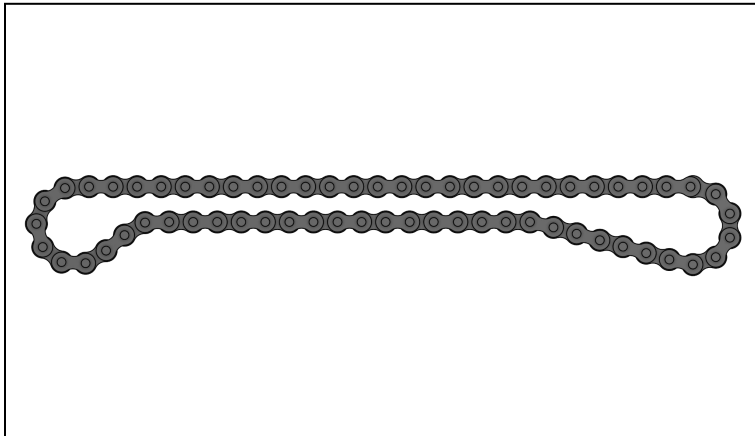


Turn the Compression Screw until the Pin is fully seated back into the chain channel.



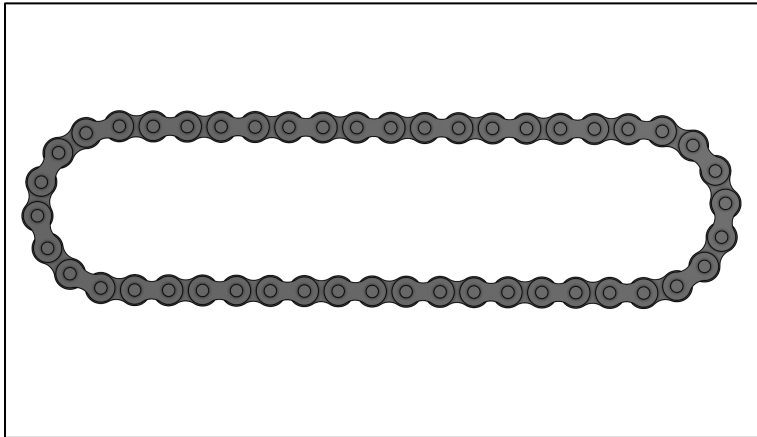
56 Link Chain Assembly

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



62 Link Chain Assembly

Repeat the previous steps until you have two 62 Link Chain.

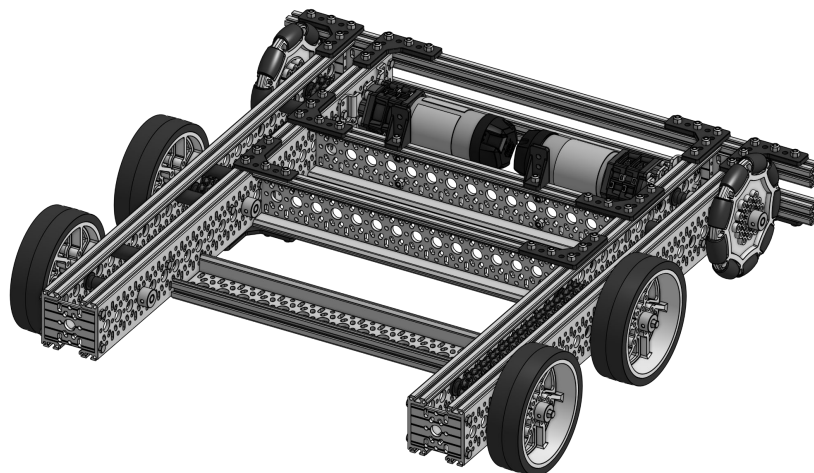


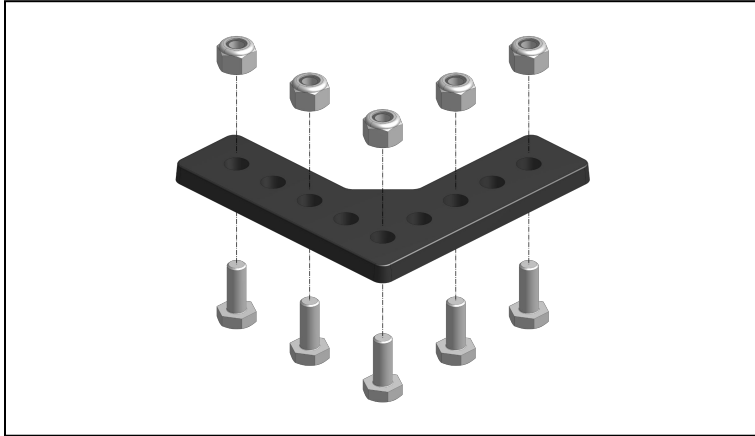
46 Link Chain Assembly

Repeat the previous steps step until you have one 46 Link Chain.

Drivetrain Assembly

PART NUMBER	DESCRIPTION	QTY.
N/A	15:1 UltraPlanetary Gearbox and 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 Chain Assembly	2
N/A	62 Link Chain Assembly	2
REV-41-1305	15mm Plastic 90 Degree Bracket	16
REV-41-1329	Through Bore Bearing - Long	4
REV-41-1326	Through Bore Bearing - Short	2
REV-41-1327	Shaft Collar	6
REV-41-1267	Grip Wheel - 90mm	2
REV-41-1359	M3 x 8mm Hex Cap Screw	132
REV-41-1361	M3 Nyloc Nuts	100
REV-41-1492	M3 Standoff - 40mm	8
REV-41-1687	U Channel Endcap	4
REV-41-1702	Tensioning Bushing - 39mm	8
REV-41-1762	45mm x 15mm C Channel - 408mm	4
REV-41-1767	45mm x 15mm C Channel - 248mm	3
REV-41-1305	15mm Plastic 90 Degree Brackets	16
REV-41-1480	15mm Metal 90 Degree Bracket V2	2
REV-41-1321	15mm Plastic Lap Corner Bracket	2



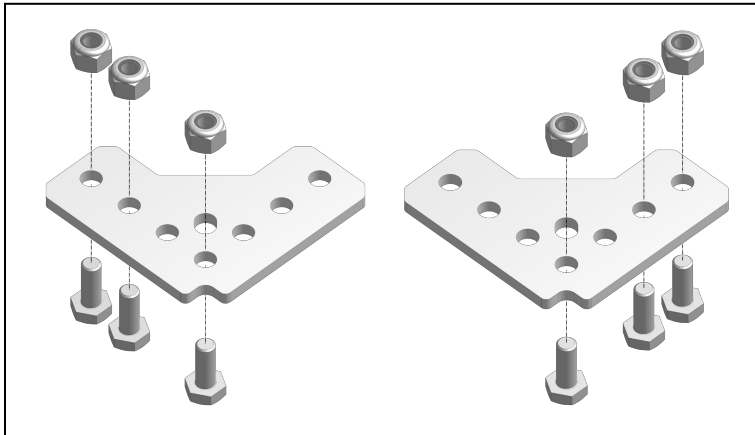


Get:

- 16 - 15mm Plastic 90 Degree Brackets
- 80 - M3x8mm Hex Cap Screws
- 80 - M3 Nyloc Nuts

Take a bracket and finger start one hex cap screw and nyloc nut per hole as shown. Pre-load 16 brackets.

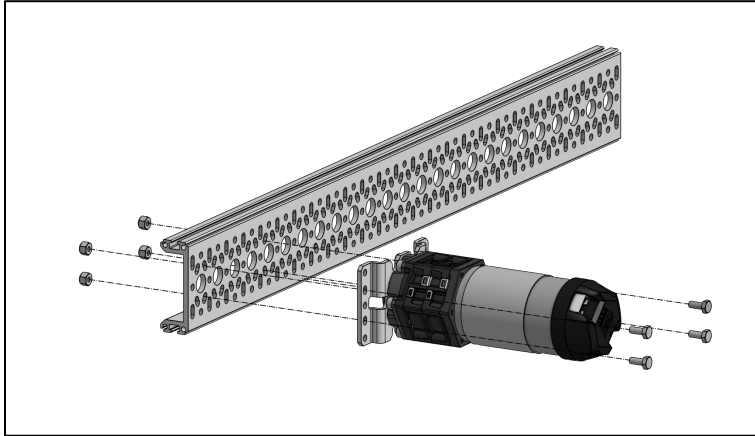
Note: The side of the bracket with “ribs” must have the hex cap screw head.



Get:

- 2 - 15mm Metal 90 Degree Bracket V2
- 6 - M3x8mm Hex Cap Screws
- 6 - M3 Nyloc Nuts

Take a bracket and finger start one hex cap screw and nyloc nut per hole as shown. Do this two brackets so that you have a mirror copy of each.

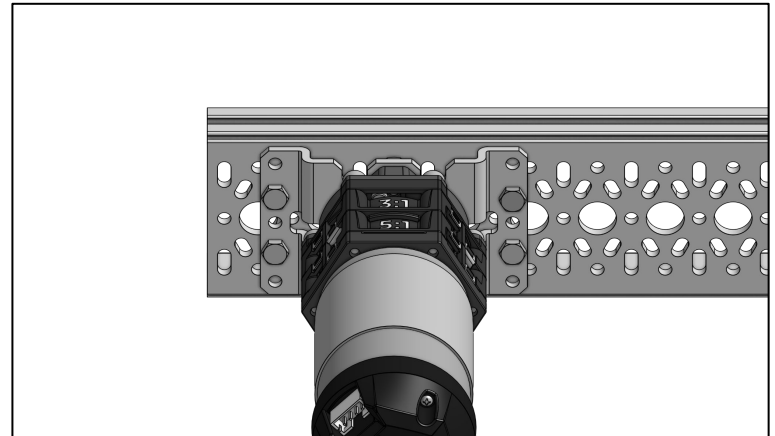
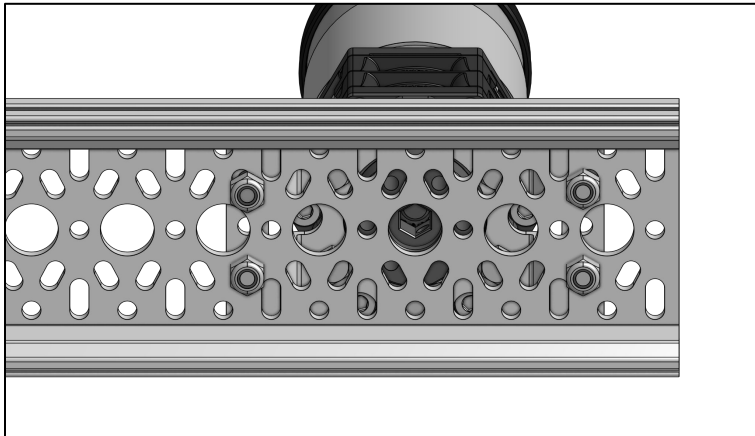


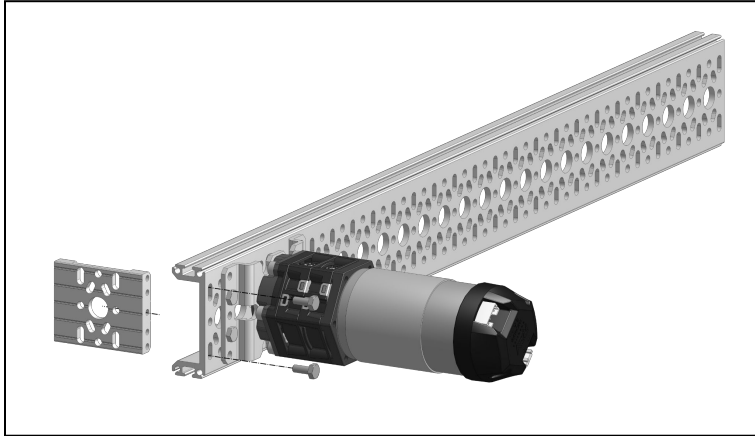
Get:

- 1 - 15:1 UltraPlanetary Gearbox and Motor
- 1 - 45mm x 15mm C Channel - 408mm
- 4 - M3x8mm Hex Cap Screws
- 4 - M3 Nyloc Nuts

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

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

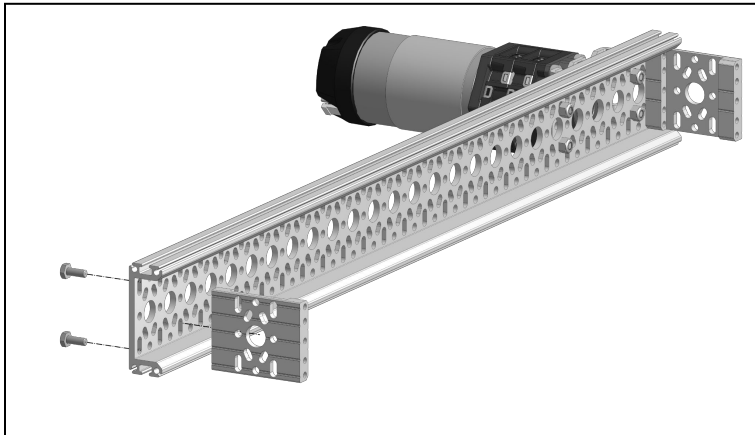




Get:

- 1 - U Channel Endcap
- 2 - M3x8mm Hex Cap Screws

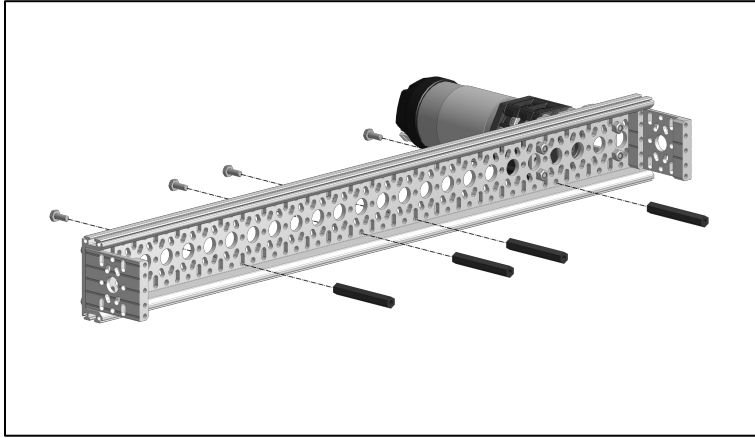
Secure a u channel endcap to the end of the c channel with two screws.



Get:

- 1 - U Channel Endcap
- 2 - M3x8mm Hex Cap Screws

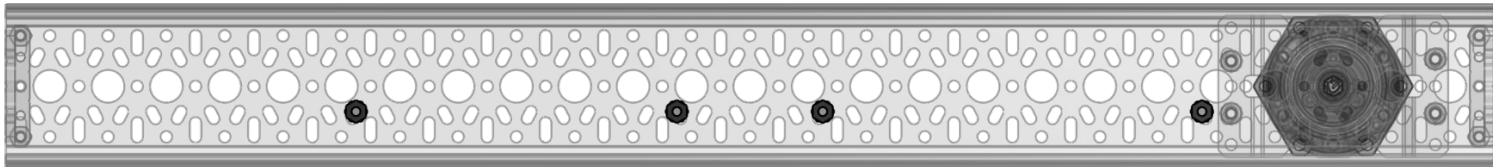
Secure another u channel endcap to the other end of the c channel with two screws.

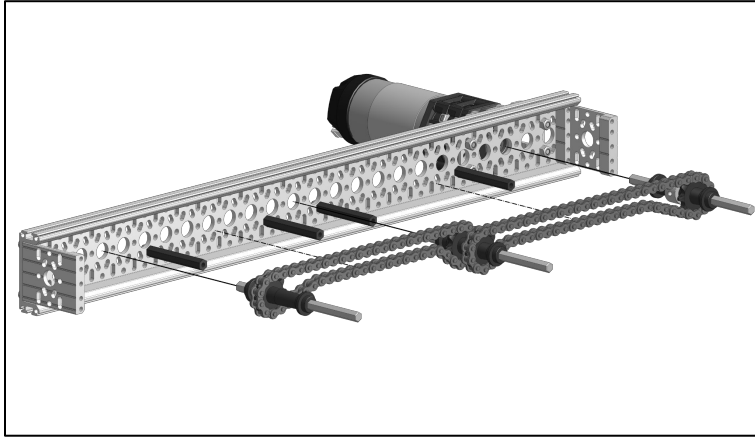


Get:

- 4 - M3 Standoff - 40mm
- 4 - M3x8mm Hex Cap Screws

Using the guide below, attach a 40mm standoff to the locations shown.

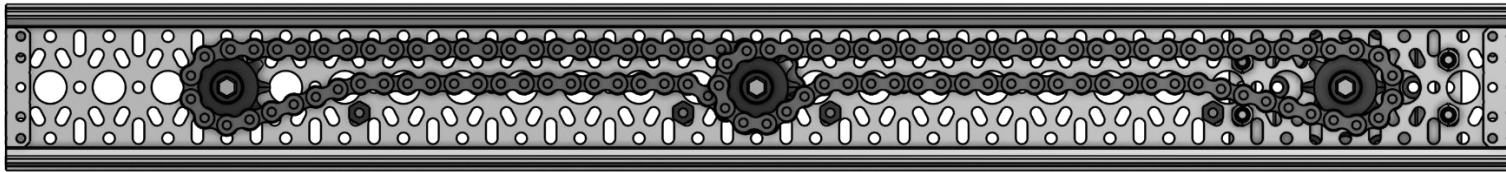


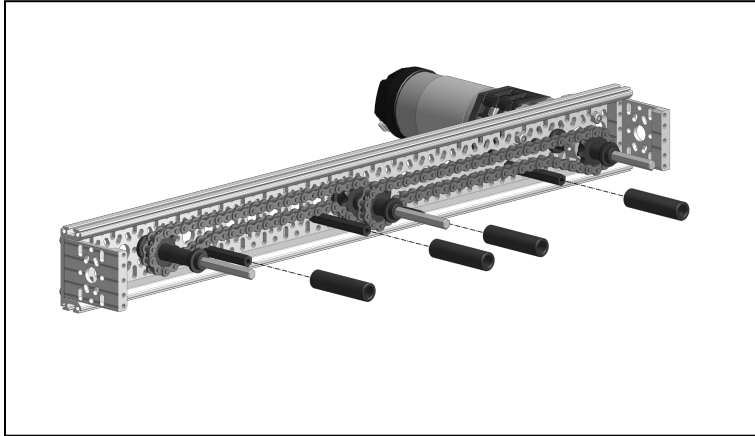


Get:

- 1 - Drive Shaft Assembly
- 1 - Double Sprocket Shaft Assembly
- 1 - Single Sprocket Shaft Assembly
- 1 - 56 Link Chain Assembly
- 1 - 62 Link Chain Assembly

Loop the 56 link chain around the single sprocket shaft and the lower sprocket on the double sprocket shaft, then loop the 62 link chain around the drive shaft and the upper sprocket on the double sprocket shaft. Insert the shafts into the locations shown with the drive shaft inserted into the motor output.

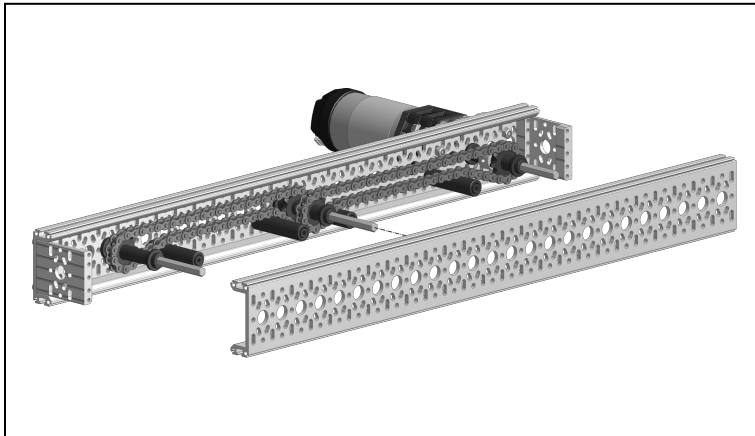




Get:

- 4 - Tensioning Bushing - 39mm

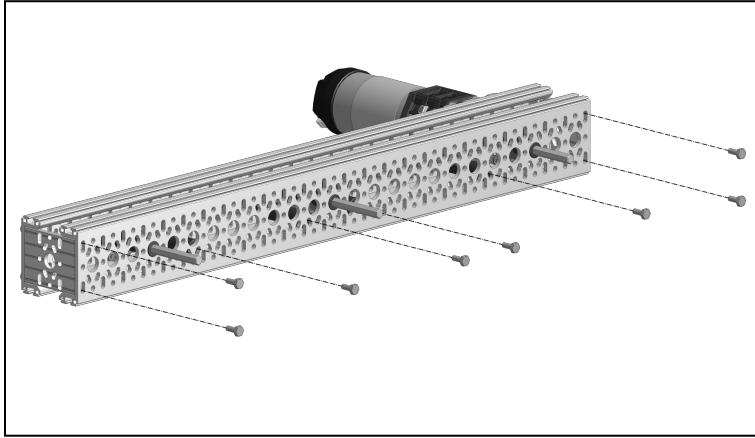
Slide the bushings onto the standoffs under the chain.



Get:

- 1 - 45mm x 15mm C Channel - 408mm

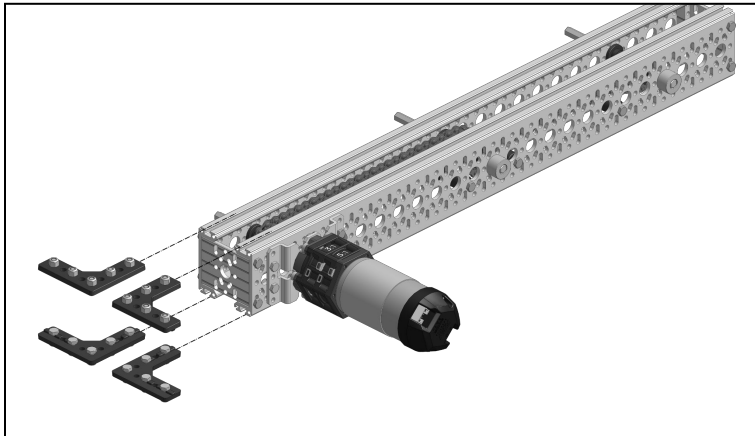
Slide a 2nd c channel onto the shafts, lining it up with the endcaps.



Get:

- 8 - M3x8mm Hex Cap Screws

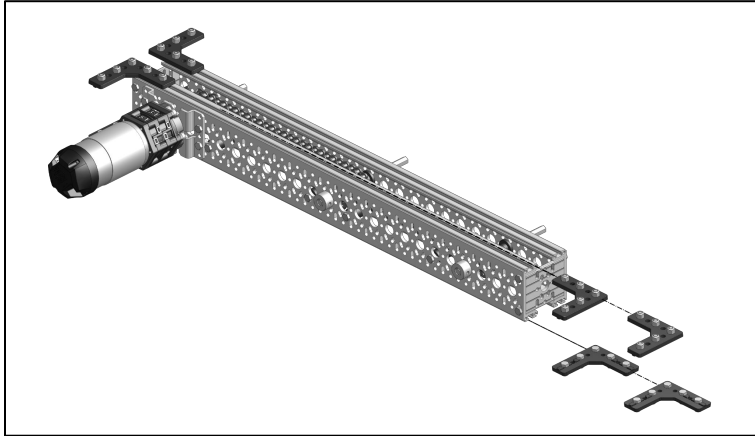
Secure the c channel with a screw into each standoff and two into each endcap.



Get:

- 4 - Pre-Loaded 90 Degree Brackets

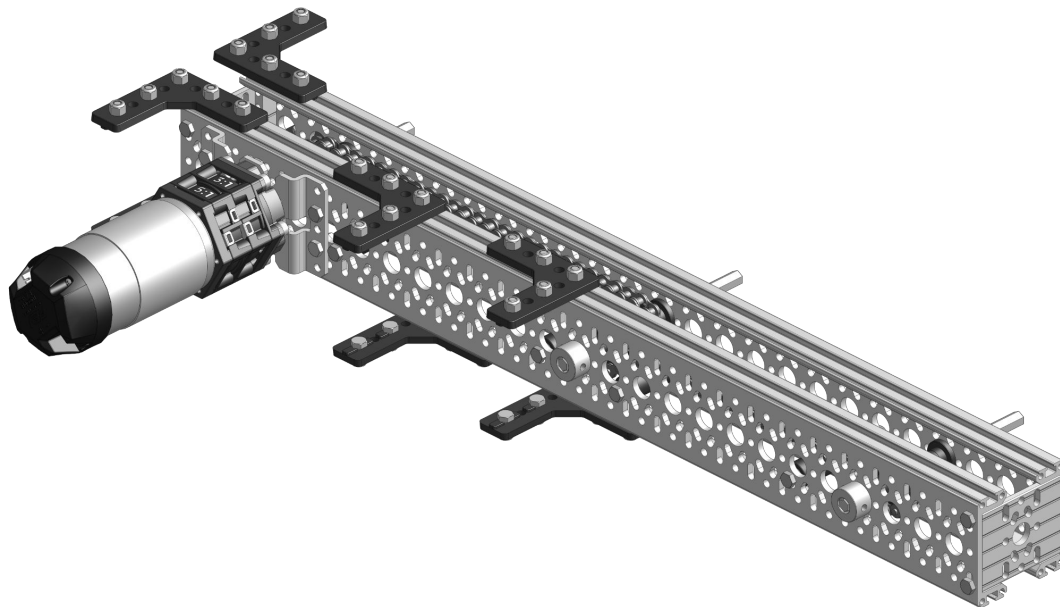
Slide four 90 degree brackets onto the c channel as shown. Leave three of the pre-loaded screws exposed for extrusion in a later step.

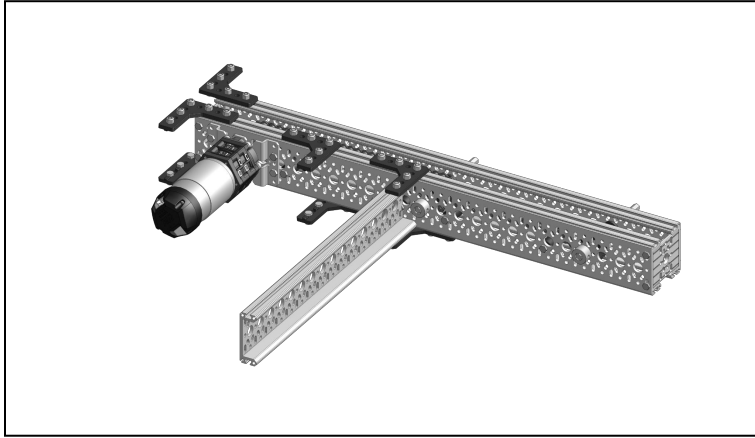


Get:

- 4 - Pre-Loaded 90 Degree Brackets

Slide four 90 degree brackets onto the c channel as shown. Take note of the orientation of the upper two brackets and how the lower two are rotated the other direction. Leave two of the pre-loaded screws exposed for c channel in a later step.

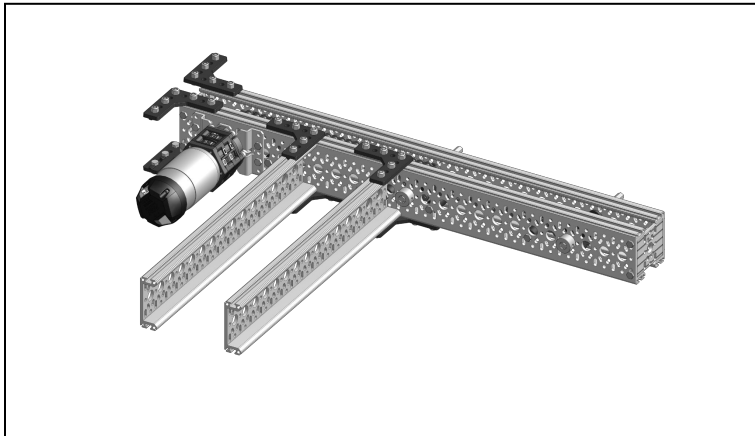




Get:

- 1 - 45mm x 15mm C Channel - 248mm

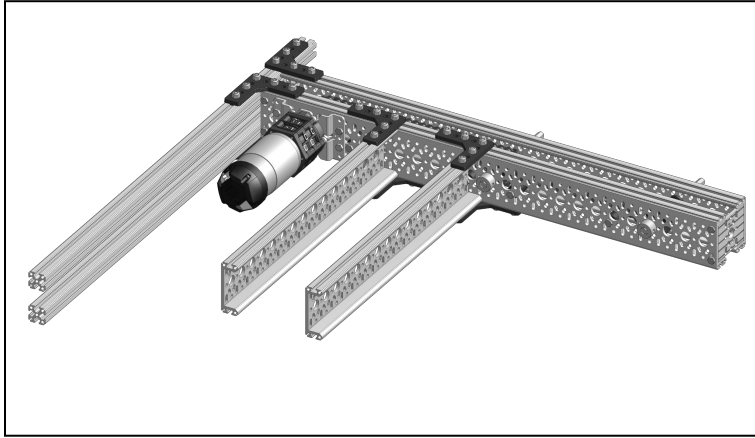
Slide a 248mm c channel onto the pair of 90 degree brackets shown.



Get:

- 1 - 45mm x 15mm C Channel - 248mm

Slide a 248mm c channel onto the pair of 90 degree brackets shown.



Get:

- 2 - 15mm Extrusion - 420mm - 90° Ends

Slide a 420 mm extrusion through the lower 90 degree brackets as shown then do the same for the upper brackets. You may need to loosen the brackets to allow more space for the extrusion. Once complete the extrusion should be fully against both c channel.

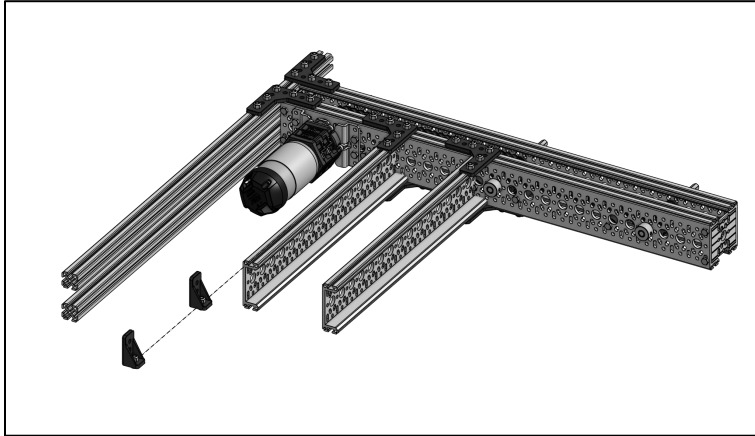
Note: We recommend not tightening the three screws on the bracket yet. This will make connecting the other drive rail easy in later steps.



Get:

- 2 - 15mm Plastic Lap Corner Bracket
- 2 - M3x8mm Hex Cap Screws
- 2 - M3 Nyloc Nuts

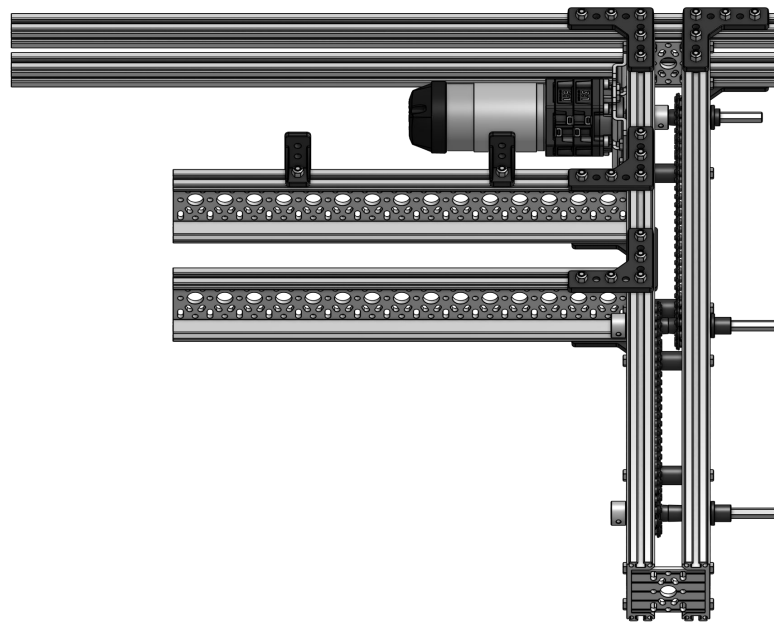
Take a bracket and finger start one hex cap screw and nyloc nut in the short side hole as shown. Pre-load two brackets.

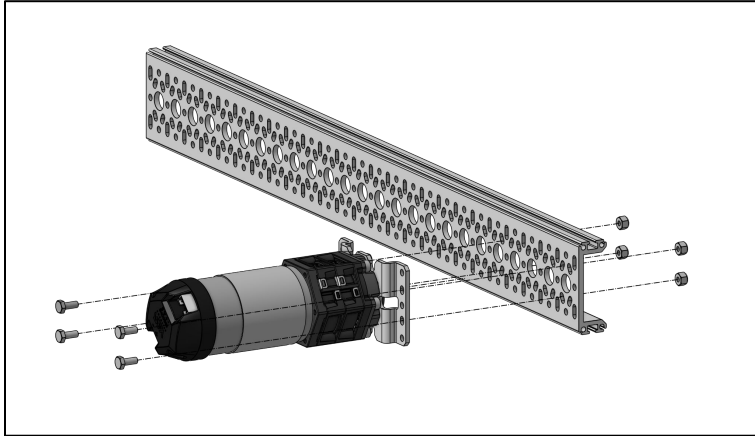


Get:

- 2 - Pre-Loaded Lap Corner Bracket

Slide the two pre-loaded lap corner bracket on the middle c channel. Keep these loose for you to adjust later.



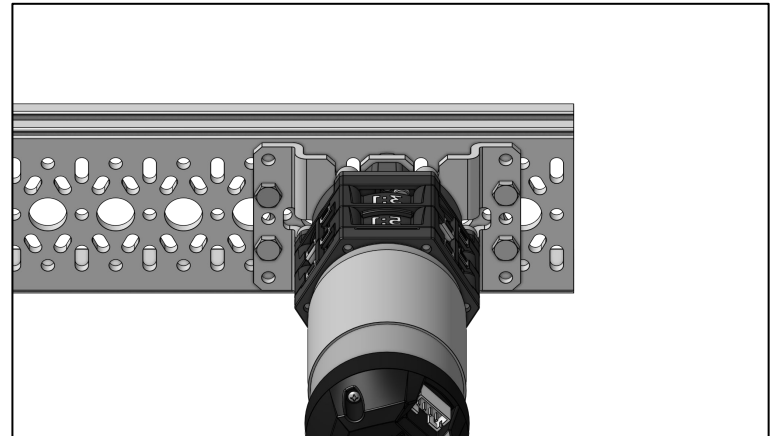
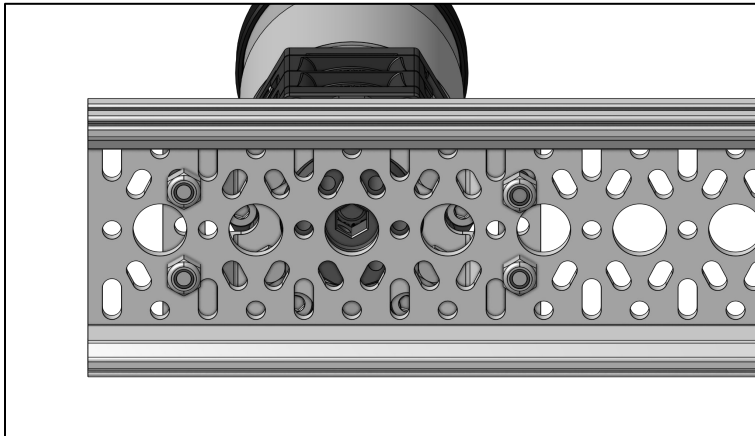


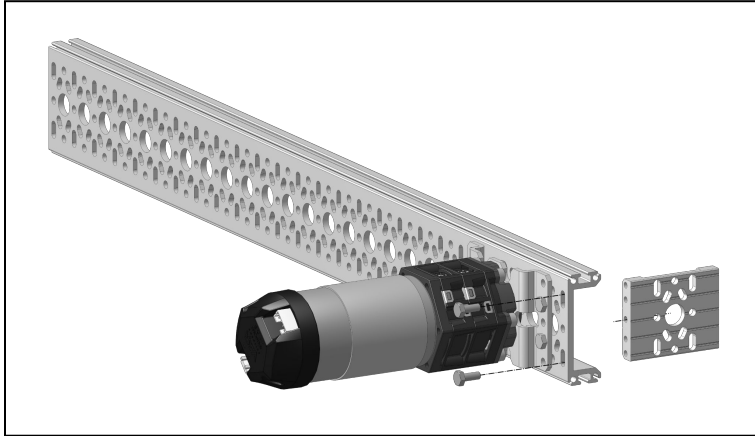
Get:

- 1 - 15:1 UltraPlanetary Gearbox and Motor
- 1 - 45mm x 15mm C Channel - 408mm
- 4 - M3x8mm Hex Cap Screws
- 4 - M3 Nyloc Nuts

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

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

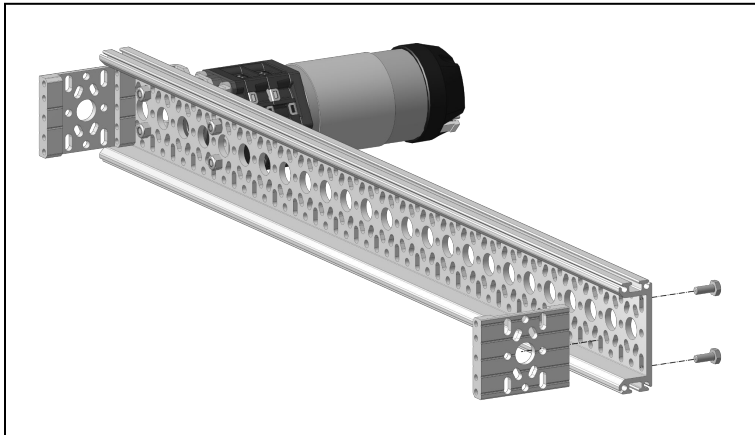




Get:

- 1 - U Channel Endcap
- 2 - M3x8mm Hex Cap Screws

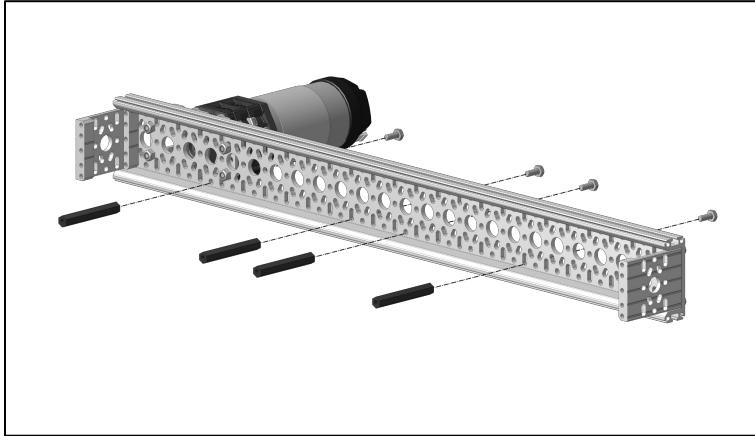
Secure a u channel endcap to the end of the c channel with two screws.



Get:

- 1 - U Channel Endcap
- 2 - M3x8mm Hex Cap Screws

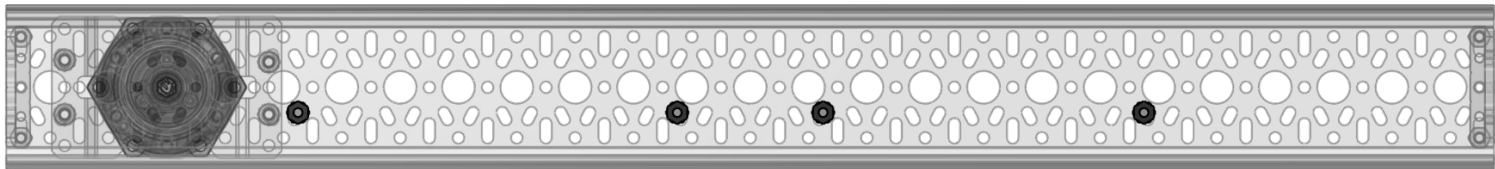
Secure another u channel endcap to the other end of the c channel with two screws.



Get:

- 4 - M3 Standoff - 40mm
- 4 - M3x8mm Hex Cap Screws

Using the guide below, attach a 40mm standoff to the locations shown.

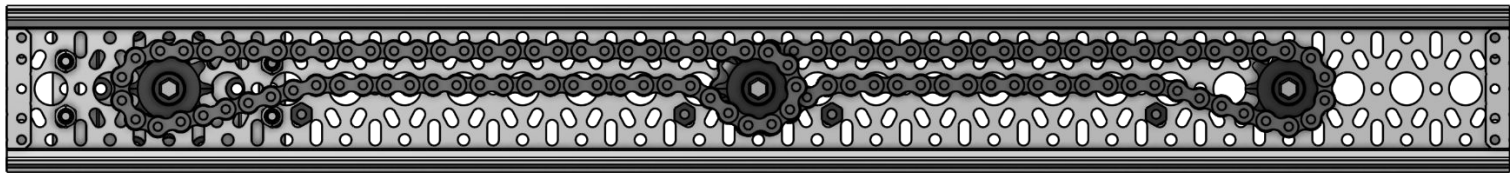


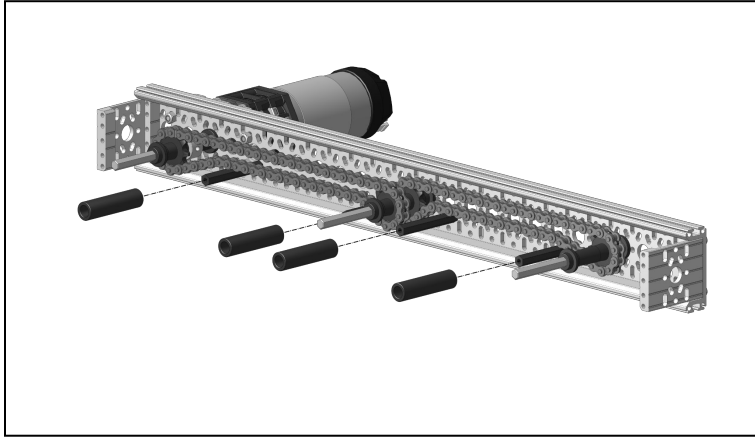


Get:

- 1 - Drive Shaft Assembly
- 1 - Double Sprocket Shaft Assembly
- 1 - Single Sprocket Shaft Assembly
- 1 - 56 Link Chain Assembly
- 1 - 62 Link Chain Assembly

Loop the 56 link chain around the single sprocket shaft and the lower sprocket on the double sprocket shaft, then loop the 62 link chain around the drive shaft and the upper sprocket on the double sprocket shaft. Insert the shafts into the locations shown with the drive shaft inserted into the motor output.

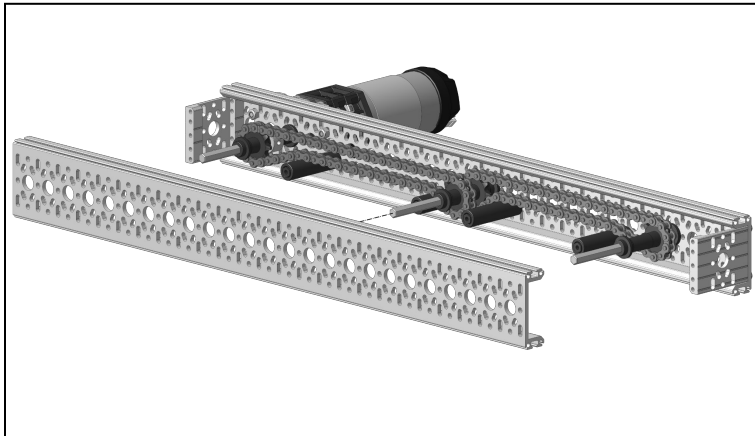




Get:

- 4 - Tensioning Bushing - 39mm

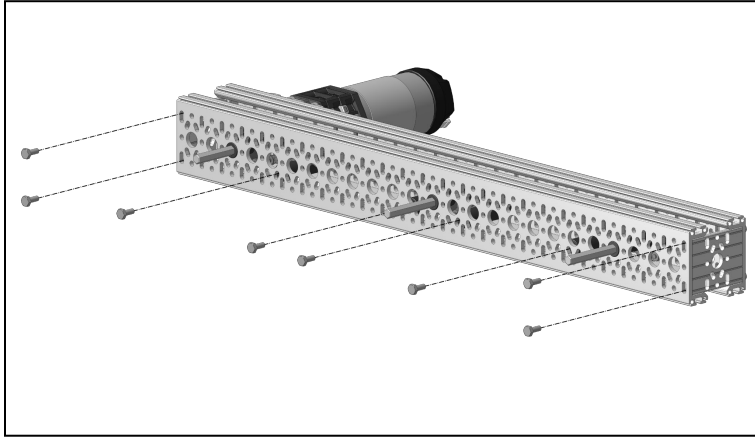
Slide the bushings onto the standoffs under the chain.



Get:

- 1 - 45mm x 15mm C Channel - 408mm

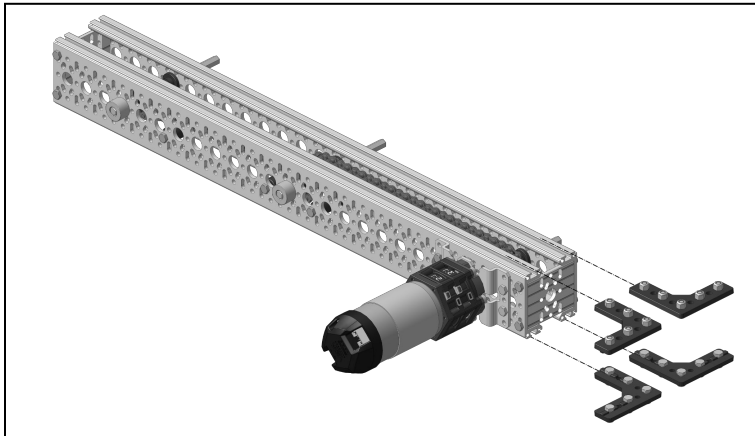
Slide a 2nd c channel onto the shafts, lining it up with the endcaps.



Get:

- 8 - M3x8mm Hex Cap Screws

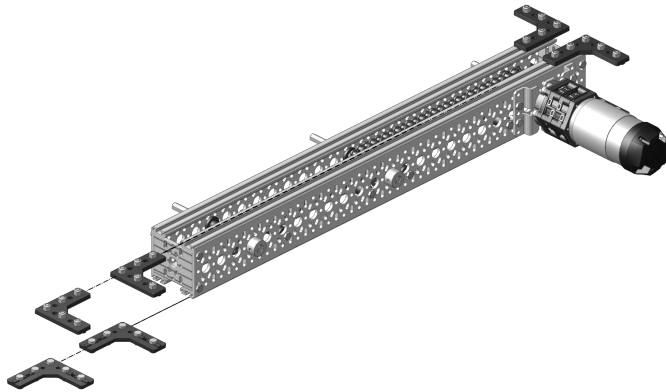
Secure the c channel with a screw into each standoff and two into each endcap.



Get:

- 4 - Pre-Loaded 90 Degree Brackets

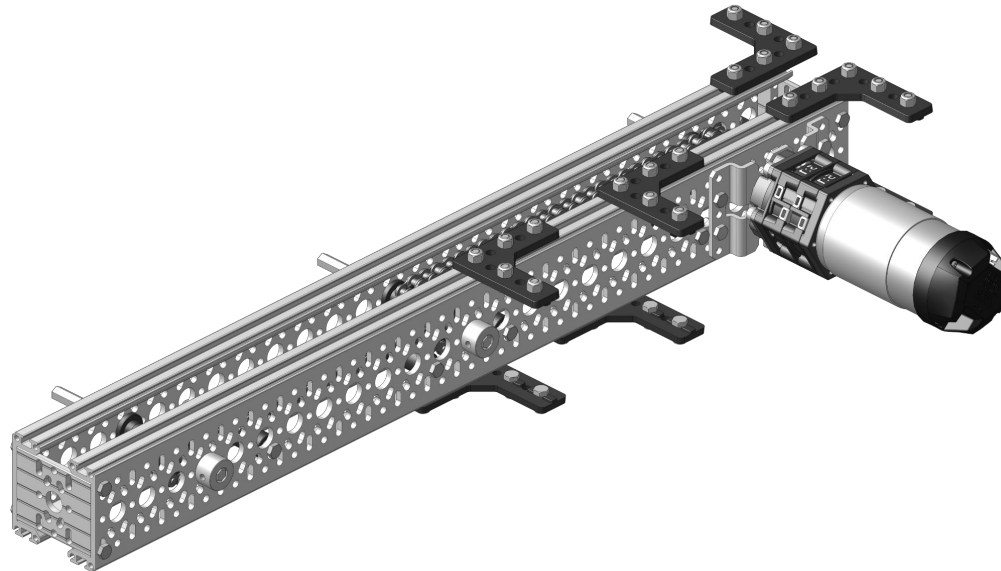
Slide four 90 degree brackets onto the c channel as shown. Leave three of the pre-loaded screws exposed for extrusion in a later step.

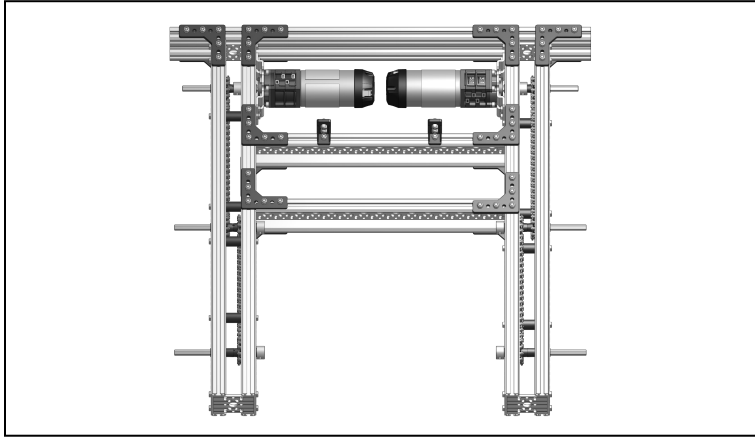


Get:

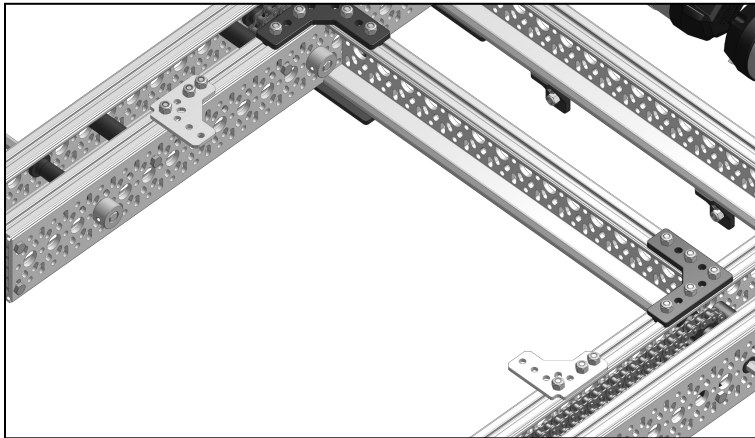
- 4 - Pre-Loaded 90 Degree Brackets

Slide four 90 degree brackets onto the c channel as shown. Take note of the orientation of the upper two brackets and how the lower two are rotated the other direction. Leave two of the pre-loaded screws exposed for c channel in a later step.





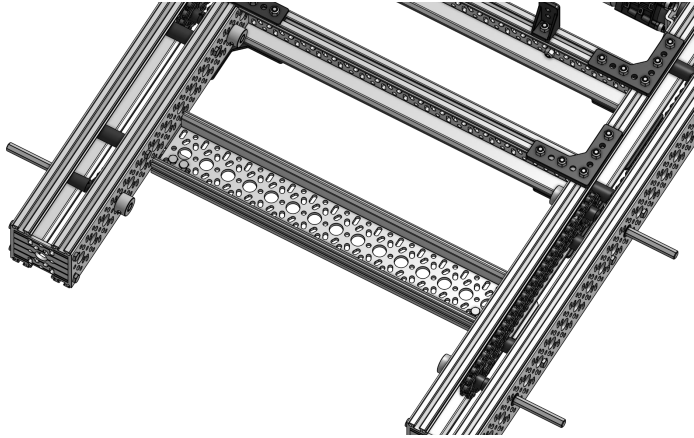
Connect the two drive rails together. Line up the extrusion and c channel with the 90 degree brackets. Center the extrusion so that there is an equal amount on both sides of the drive rails. Tighten all screws on the 16 90 degree brackets.



Get:

- 2 - Pre-Loaded Metal 90 Degree Brackets

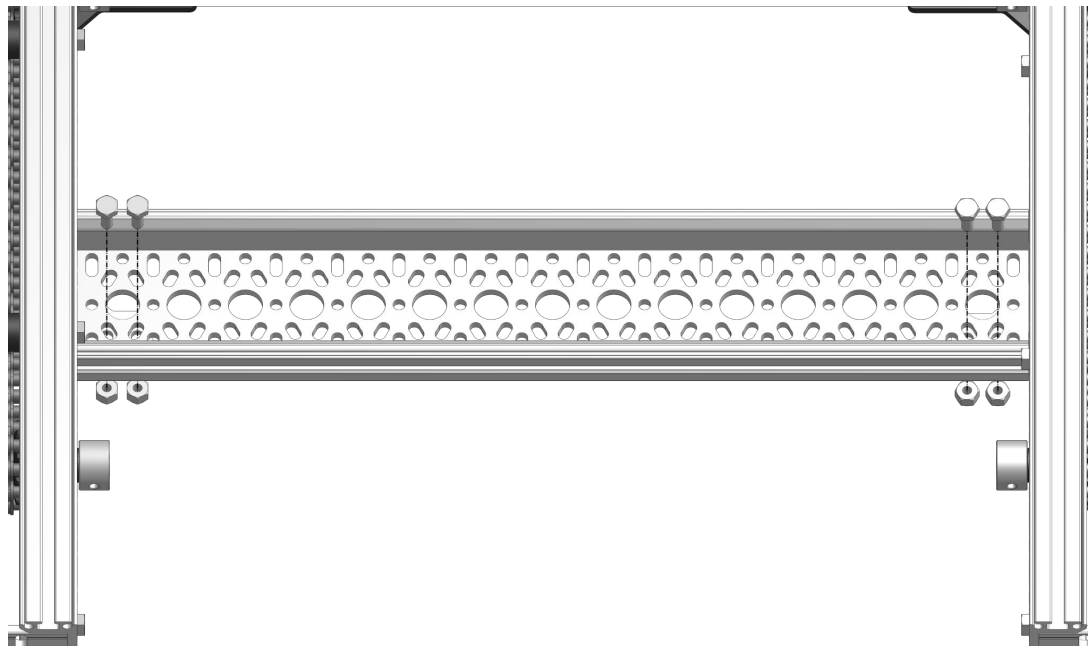
Flip the drivetrain over so the lap corner brackets are facing down. Slide the pre-loaded metal 90 degree brackets onto the c channel as shown.

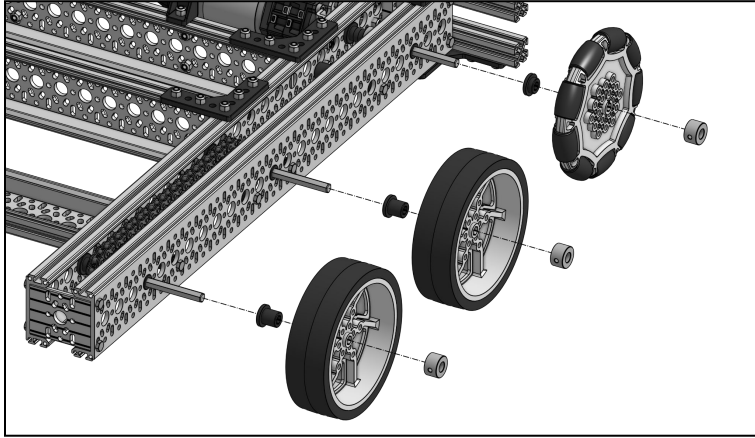


Get:

- 1 - 45mm x 15mm C Channel - 248mm
- 4 - M3x8mm Hex Cap Screws
- 4 - M3 Nyloc Nuts

Flipping the drivetrain back over, install a 248mm c channel onto the metal 90 degree brackets with two screws and nyloc nuts.

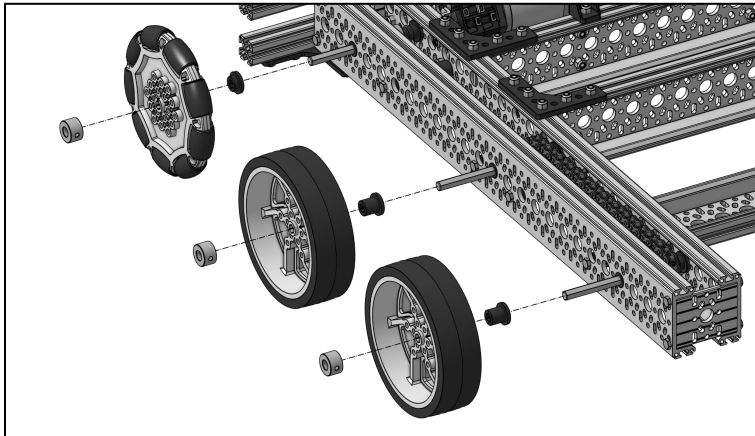




Get:

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

Slide a short through bore bearing and omni wheel onto the drive shaft, then secure them with a shaft collar. Onto the two remaining shafts slide a long through bore bearing and a grip wheel. Secure both wheels with a shaft collar.



Get:

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

Slide a short through bore bearing and omni wheel onto the drive shaft, then secure them with a shaft collar. Onto the two remaining shafts slide a long through bore bearing and a grip wheel. Secure both wheels with a shaft collar.

Launcher Assembly

BOM Part 1 of 2

PART NUMBER	DESCRIPTION	QTY
N/A	15:1 UltraPlanetary Gearbox and Motor	1
N/A	1:1 UltraPlanetary Gearbox and Motor	1
N/A	1:1 UltraPlanetary and Motor with Flat Mounting Bracket	1
N/A	100:1 UltraPlanetary and Motor	1
N/A	5mm Hex Shaft Cut to 185mm	1
N/A	15mm Extrusion Cut to 60mm	2
N/A	15mm Extrusion Cut to 50mm	2
N/A	46 Link Chain Assembly	1
N/A	15 Tooth Plastic #25 Sprocket	2
N/A	M3 x 20mm Socket Head Screws	4
REV-41-1317	15mm Bearing Pillow Block	1
REV-41-1321	15mm Plastic Lap Corner Bracket	10
REV-41-1327	Shaft Collar	10
REV-41-1329	Through Bore Bearing - Long	1
REV-41-1326	Through Bore Bearing - Short	1
REV-41-1331	15 Tooth Plastic Gear	2
REV-41-1359	M3 x 8mm Hex Cap Screw	74
REV-41-1124	M3 x 20mm Hex Cap Screw	2
REV-41-1361	M3 Nyloc Nuts	61

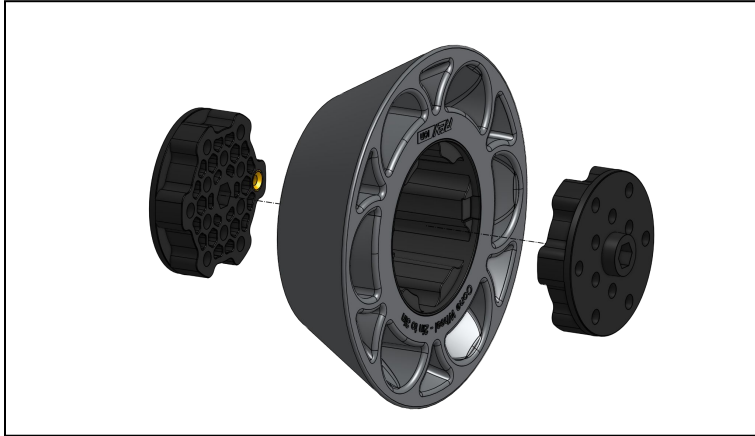


Launcher Assembly

BOM Part 2 of 2

PART NUMBER	DESCRIPTION	QTY
REV-41-1431	15mm Extrusion - 225mm	2
REV-41-1568	15mm Extrusion - 120mm	3
REV-41-1430	15mm Extrusion - 150mm - 45° Ends	2
REV-41-1433	15mm Metal Bent Core Hex Motor Bracket V2	1
REV-41-2702	5mm Hex Bore - Hard - Flap Wheel	2
REV-41-2702	5mm Hex Bore - Medium - Flap Wheel	2
REV-21-6564	Cone Wheel - 2in to 3in - MAXSpline - Medium	2
REV-21-6550	Cone Wheel - 2in to 3in - MAXSpline - Hard	2
REV-41-2038	MAXHub - 5mm Hex - Plastic	8
REV-41-2035	2in - 5mm Hex Bore - Soft - Compliant Wheel	2
REV-41-1767	45mm x 15mm C Channel - 248mm	1
REV-41-1762	45mm x 15mm C Channel - 408mm	1
REV-41-1683	5mm Hex Bearing Block	1
REV-41-1267	Grip Wheel - 90mm	1
REV-41-1350	60mm Traction Wheel	1
REV-41-1623	UltraPlanetary Bent Mounting Bracket	1
REV-41-1310	15mm Plastic 135 Degree Bracket	3
REV-31-1153	Expansion Hub	1



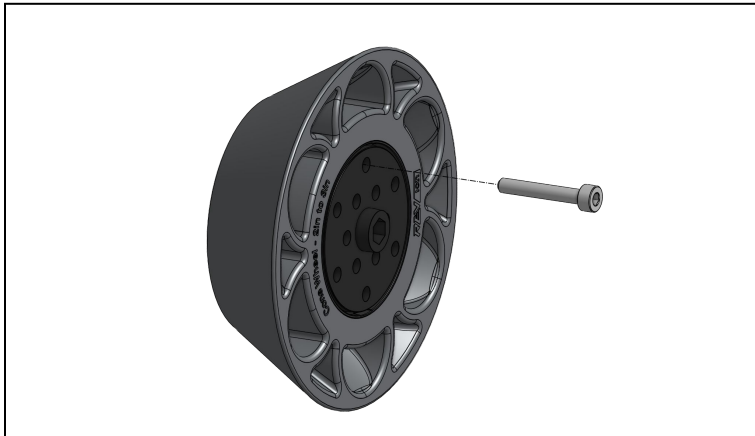


Get:

- 2 - Cone Wheel - 2in to 3in - MAXSpline - Medium
- 2 - Cone Wheel - 2in to 3in - MAXSpline - Hard
- 8 - MAXHub - 5mm Hex - Plastic

Insert a 5mm hex MAXHub into each side of the cone wheel. Make sure to offset the threaded inserts of the MAXHubs.

Do this four times with the two medium and two hard cone wheels.

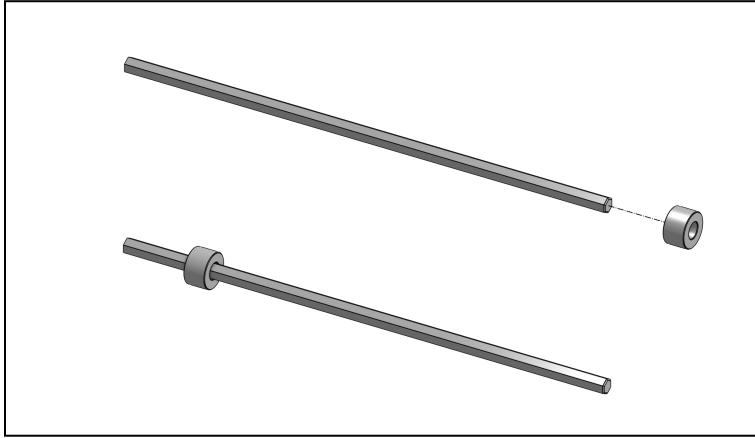


Get:

- 4 - M3x20mm Socket Head Screws(leftover from a UltraPlanetary Hardware Pack)

Secure the two MAXHubs together by inserting a 20mm screw through an unthreaded hole of a one MAXHub into the threaded insert of the other MAXHub.

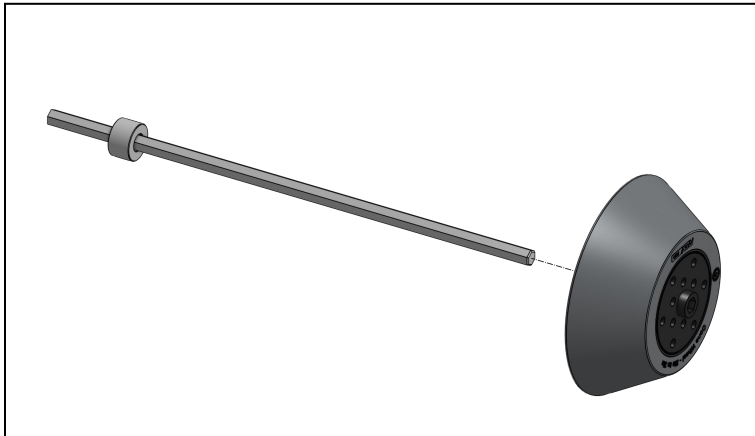
Do this four times with all cone wheels.



Get:

- 1 - 5mm Hex Shaft Cut to 185mm
- 1 - Shaft Collar

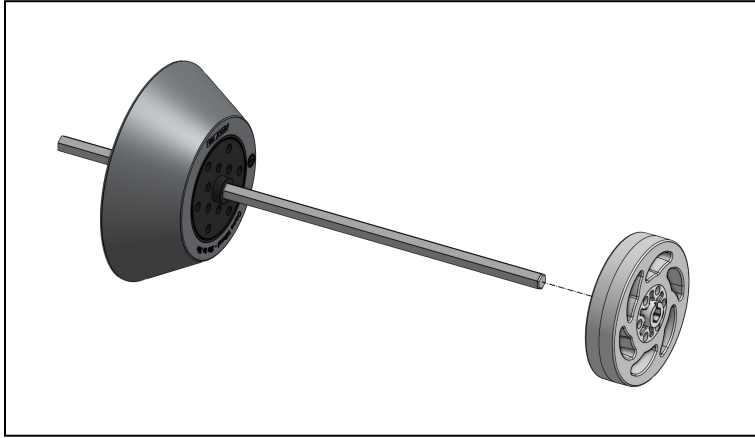
Slide a shaft collar onto the cut hex shaft as shown and tighten the set screw. You will need to adjust this later.



Get:

- 1 - Medium Cone Wheel with MAXHub

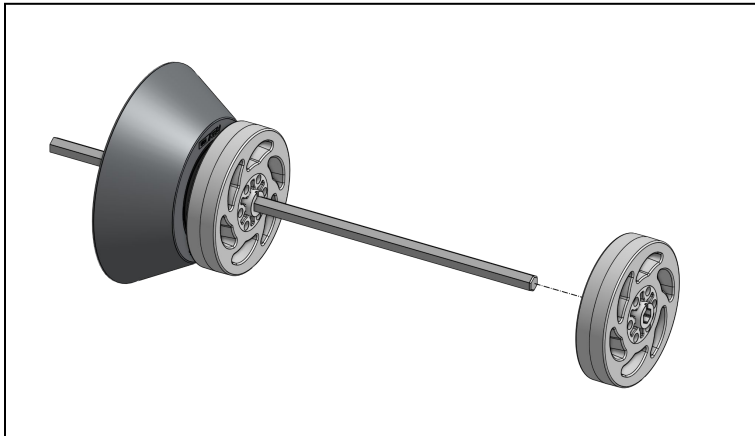
Slide the cone wheel onto the hex shaft.



Get:

- 1 - 2in - 5mm Hex Bore - Soft - Compliant Wheel

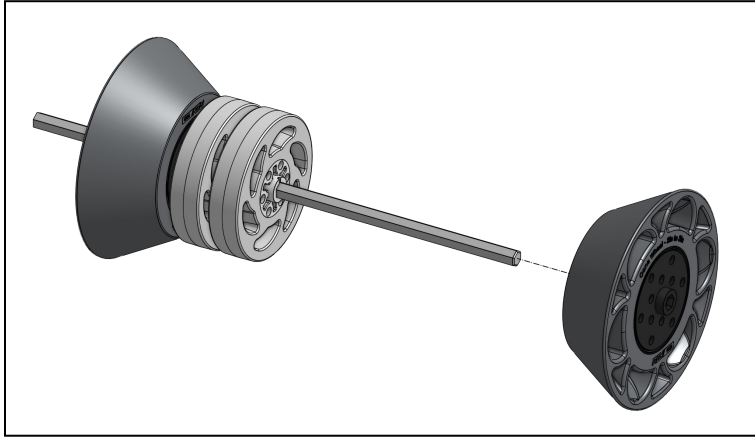
Slide the compliant wheel onto the hex shaft.



Get:

- 1 - 2in - 5mm Hex Bore - Soft - Compliant Wheel

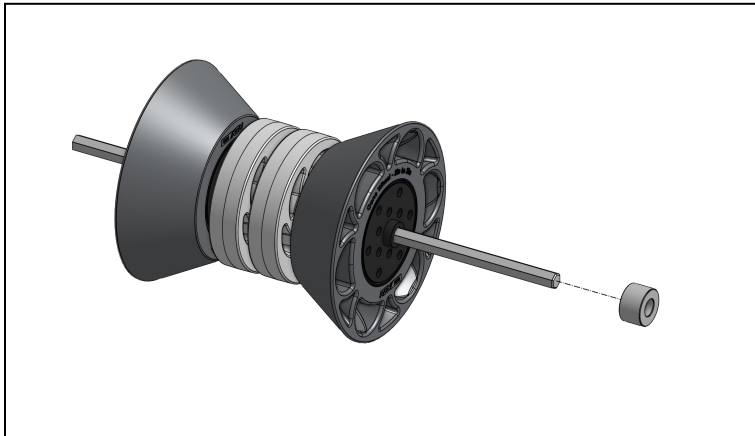
Slide the compliant wheel onto the hex shaft.



Get:

- 1 - Medium Cone Wheel with MAXHub

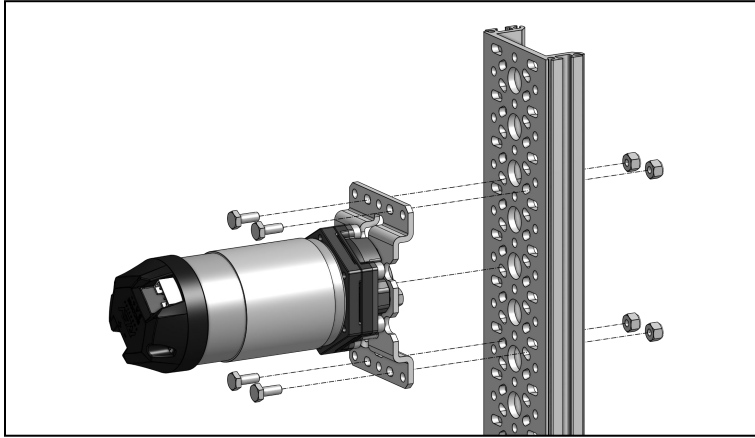
Slide the cone wheel onto the hex shaft. Note the flipped orientation to the first cone wheel.



Get:

- 1 - Shaft Collar

Slide a shaft collar onto the hex shaft as shown and tighten the set screw. You will need to adjust this later.

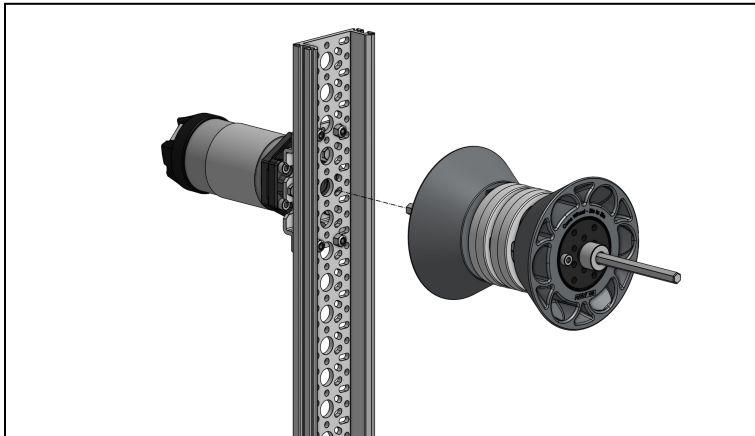


Get:

- 1 - 1:1 UltraPlanetary Gearbox and Motor
- 1 - 45mm x 15mm C Channel - 248mm
- 4 - M3x8mm Hex Cap Screws
- 4 - M3 Nyloc Nuts

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

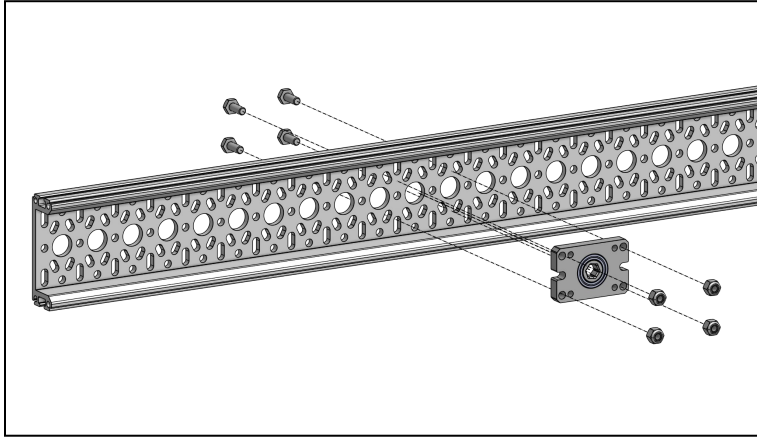
Secure the gearbox and motor to the c channel with four screws and nyloc nuts.



Get:

- 1 - Hex Shaft with Cone Wheels

Insert the hex shaft into the gearbox output. You may need to just the adjust the wheels and shaft collars to make sure the shaft is fully seated into the output.

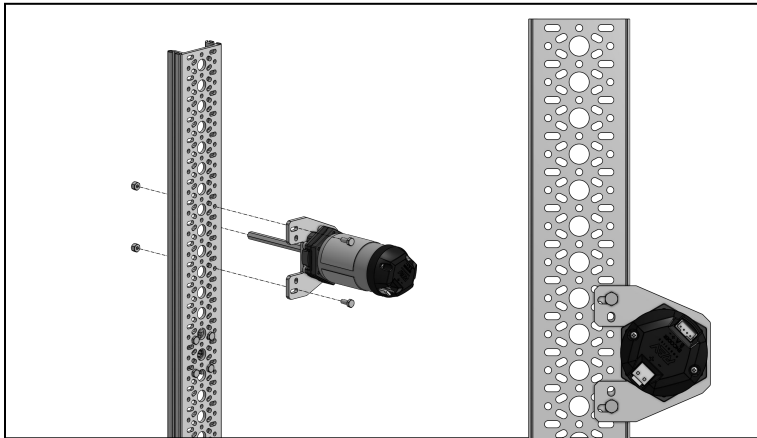


Get:

- 1 - 5mm Hex Bearing Block
- 1 - 45mm x 15mm C Channel - 408mm
- 4 - M3x8mm Hex Cap Screws
- 4 - M3 Nyloc Nuts

Line up the bearing block with the 11th hole from the end of the c channel.

Secure the bearing block to the c channel with four screws and nyloc nuts.



Get:

- 1 - 1:1 UltraPlanetary and Motor with Flat Mounting Bracket
- 2 - M3x8mm Hex Cap Screws
- 2 - M3 Nyloc Nuts

On the same c channel from previous step install the motor with flat mounting bracket and hex shaft. From opposite end you counted for the bearing block, count 10 center holes. Install the motor so that it lines up between the 10th and 9th holes.

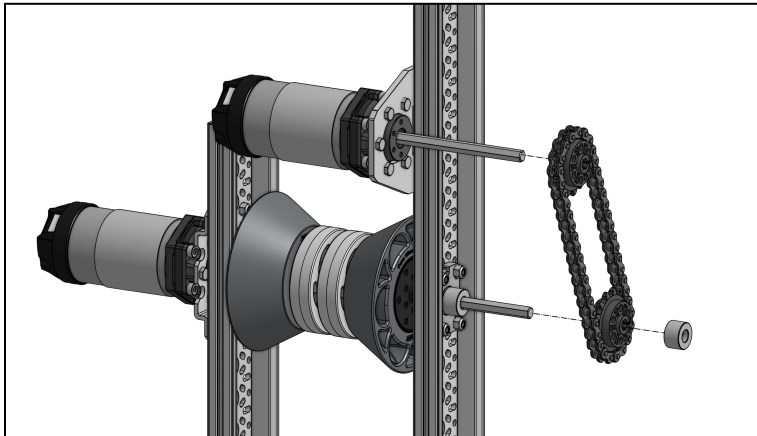
The screws will be through the small holes above the 8th and 11th center holes.



Get:

- 1 - Shaft Collar

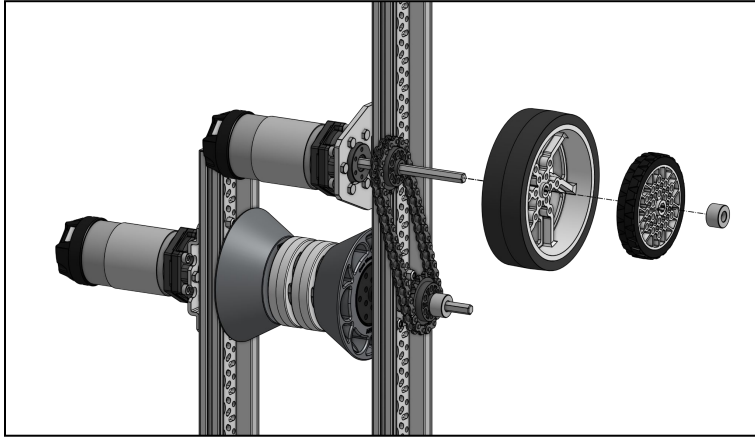
Combine the two c channel together, sliding the cone wheel shaft through the bearing block. Secure the shaft with a shaft collar.



Get:

- 1 - 46 Link Chain
- 2 - 15 Tooth Plastic #25 Sprocket
- 1 - Shaft Collar

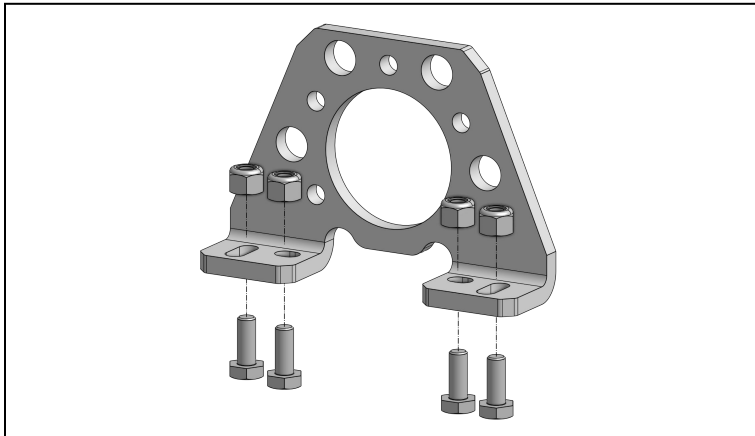
Loop the chain around two 15 tooth sprockets and slide them onto both shafts. On the cone wheel shaft slide on a shaft collar to secure the lower sprocket.



Get:

- 1 - Grip Wheel - 90mm
- 1 - 60mm Traction Wheel
- 1 - Shaft Collar

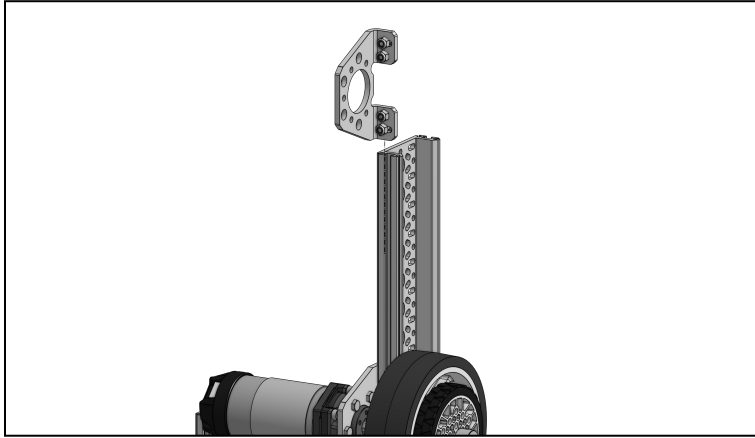
On the upper shaft, slide a 90mm grip wheel and a 60mm traction wheel. Secure these wheels with a shaft collar.



Get:

- 1 - UltraPlanetary Bent Mounting Bracket
- 4 - M3x8mm Hex Cap Screws
- 4 - M3 Nyloc Nuts

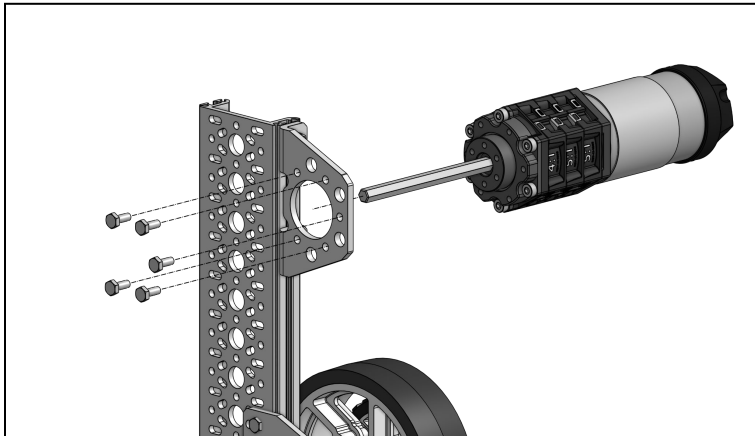
Take a bracket and finger start one hex cap screw and nyloc nut per hole as shown.



Get:

- 1 - Pre-Loaded UltraPlanetary Bent Mounting Bracket

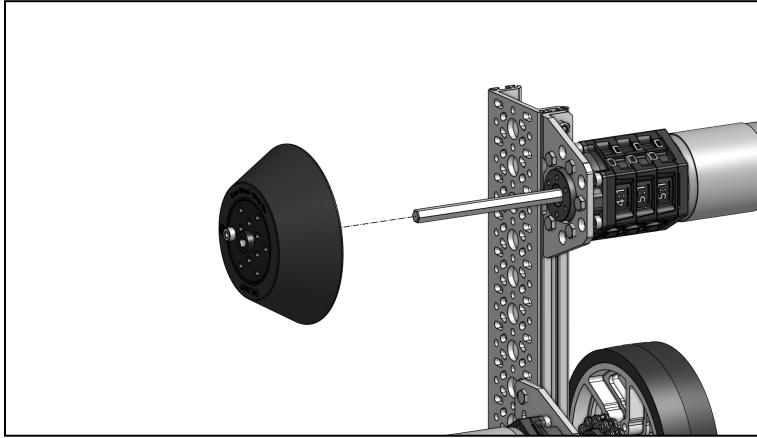
Slide the pre-loaded bracket onto the taller c channel. Line up the edge of the bracket with the end of the c channel. Take note of the orientation of the bracket as shown. Tighten all four nuts.



Get:

- 1 - 100:1 UltraPlanetary and Motor
- 5 - M3x8mm Hex Cap Screws

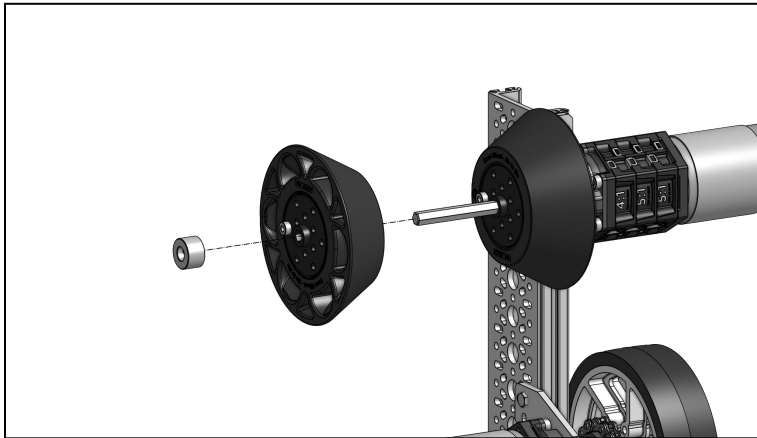
Insert the UltraPlanetary and motor through the bent mounting bracket as shown. Secure the motor to the bracket with five screws.



Get:

- 1 - Hard Cone Wheel with MAXHub

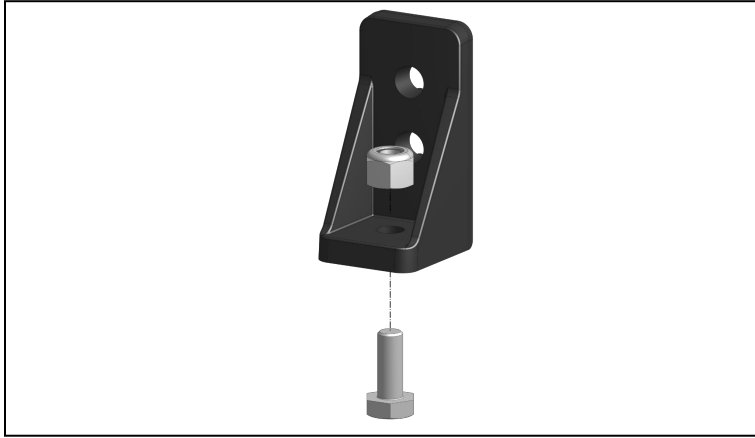
Slide the cone wheel onto the hex shaft.



Get:

- 1 - Hard Cone Wheel with MAXHub
- 1 - Shaft Collar

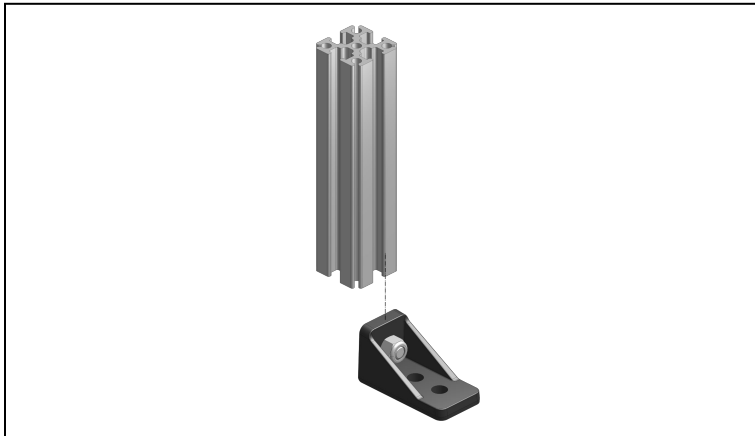
Slide the cone wheel onto the hex shaft. Note the flipped orientation to the first cone wheel. Secure the wheels with a shaft collar.



Get:

- 2 - 15mm Plastic Lap Corner Bracket
- 2 - M3x8mm Hex Cap Screws
- 2 - M3 Nyloc Nuts

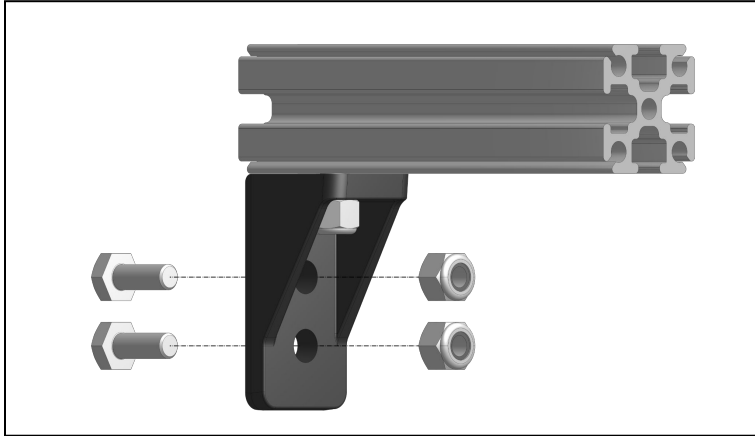
Take a bracket and finger start one hex cap screw and nyloc nut in the short side hole as shown. Pre-load two brackets.



Get:

- 2 - 15mm Extrusion Cut to 60mm

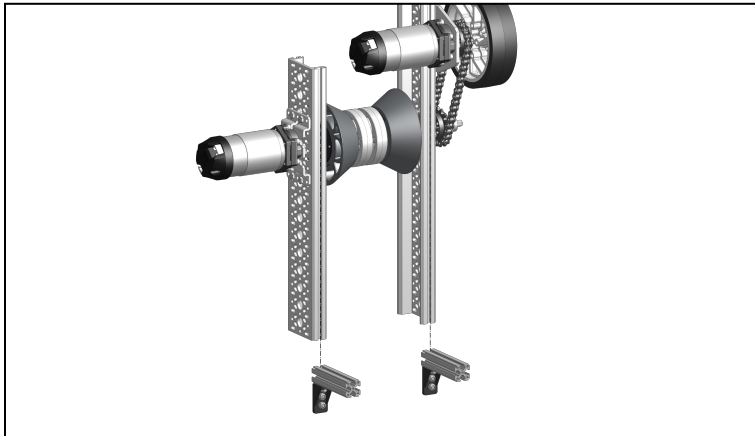
Slide a pre-loaded bracket onto the 60mm extrusion. Line up the long edge of the bracket with the end of the extrusion then tighten the nut. Do this twice.



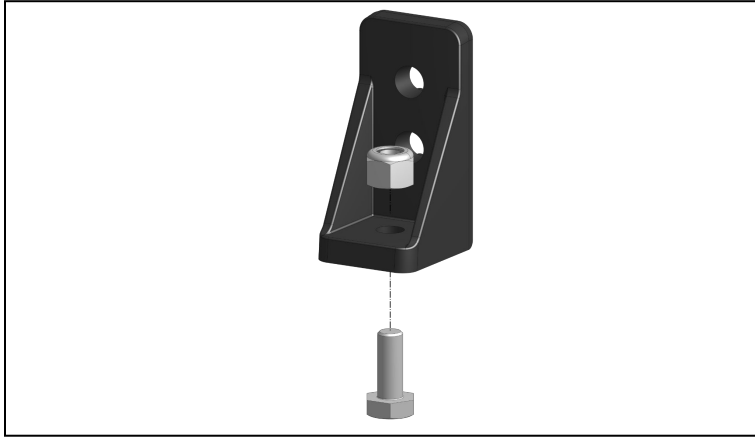
Get:

- 4 - M3x8mm Hex Cap Screws
- 4 - M3 Nyloc Nuts

Finger start one hex cap screw and nyloc nut in each hole on the long side as shown. Pre-load both brackets and extrusion.



Slide both extrusion on the c channel as shown. These should line up just under the upper motor. Tighten the screws to keep them from moving but you may need to adjust these brackets later.



Get:

- 1 - 15mm Plastic Lap Corner Bracket
- 1 - M3x8mm Hex Cap Screws
- 1 - M3 Nyloc Nuts

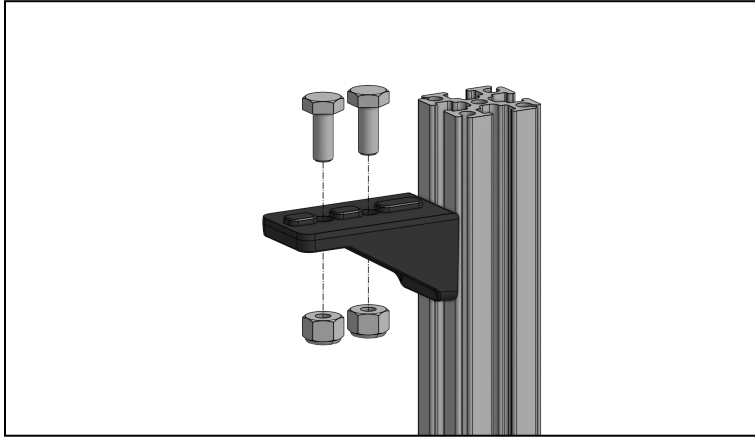
Take a bracket and finger start one hex cap screw and nyloc nut in the short side hole as shown.



Get:

- 1 - Pre-Loaded Lap Corner Bracket
- 1 - 15mm Extrusion - 225mm

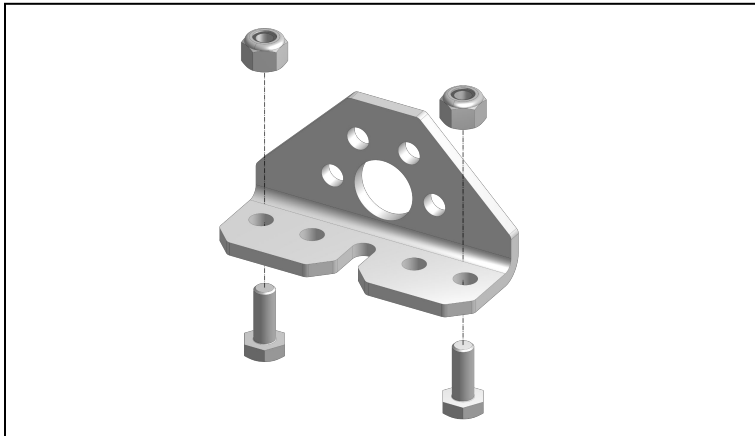
Slide the bracket onto the extrusion. Measure 15mm from the long side of the bracket to the end of the extrusion then tighten the nut.



Get:

- 2 - M3x8mm Hex Cap Screws
- 2 - M3 Nyloc Nuts

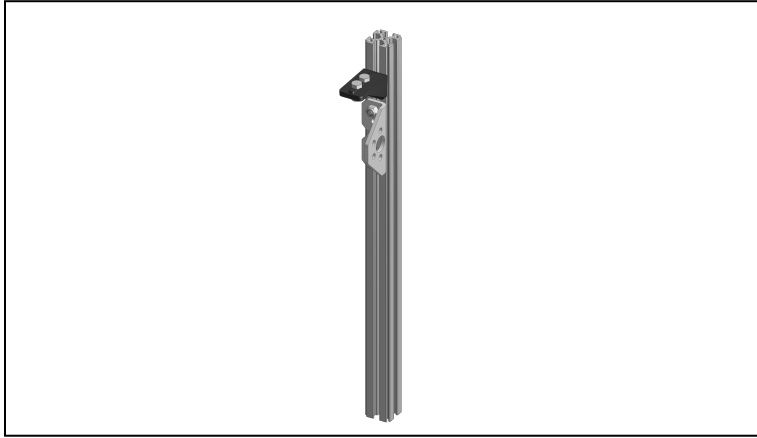
Finger start one hex cap screw and nyloc nut in each hole on the long side as shown.



Get:

- 1 - 15mm Metal Bent Core Hex Motor Bracket V2
- 2 - M3x8mm Hex Cap Screws
- 2 - M3 Nyloc Nuts

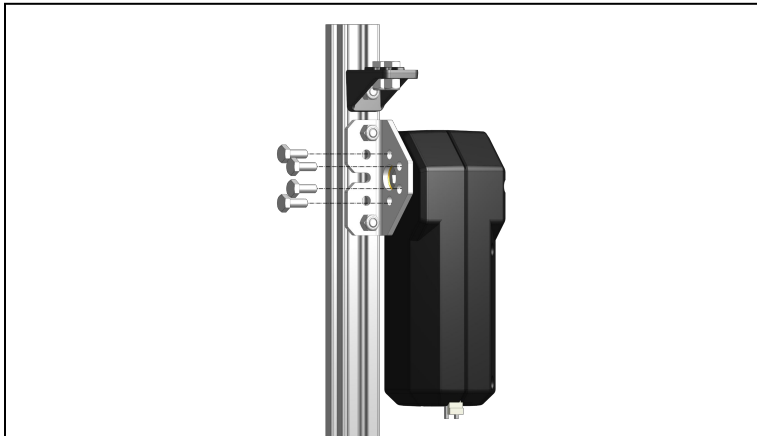
Take a bracket and finger start one hex cap screw and nyloc nut into each outside hole of the bracket as shown.



Get:

- 1 - Pre-Loaded Bent Core Hex Motor Bracket

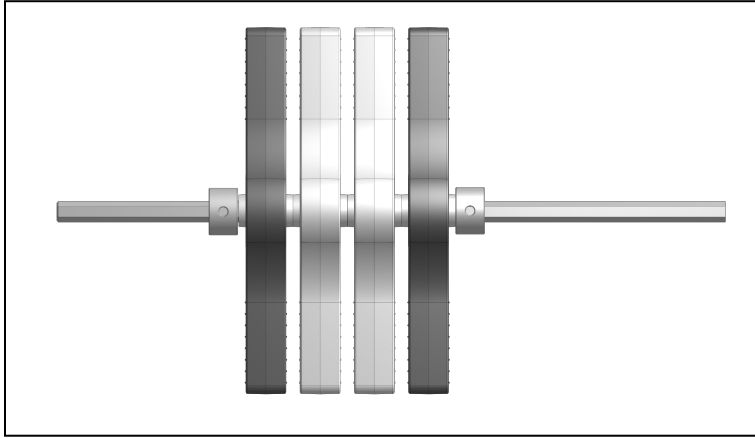
Slide the pre-loaded bracket onto the the extrusion up against the lap corner bracket. Tighten the screws.



Get:

- 4 - M3x8mm Hex Cap Screws
- 1 - Core Hex Motor

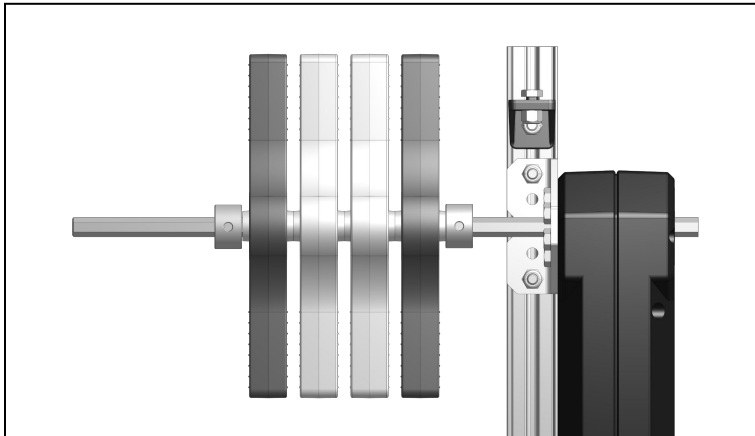
Attach a Core Hex motor to the bracket with four screws.



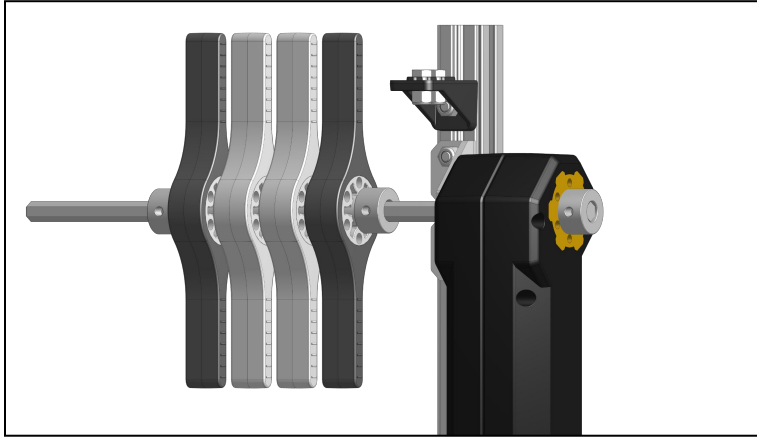
Get:

- 1 - 5mm Hex Shaft Cut to 185mm
- 2 - 5mm Hex Bore - Medium - Flap Wheel
- 2 - 5mm Hex Bore - Hard - Flap Wheel
- 2 - Shaft Collar

Slide onto the shaft two medium flap wheel, the a hard flap wheel on each side of the medium wheels. Then secure the wheels with a shaft collar on each side.



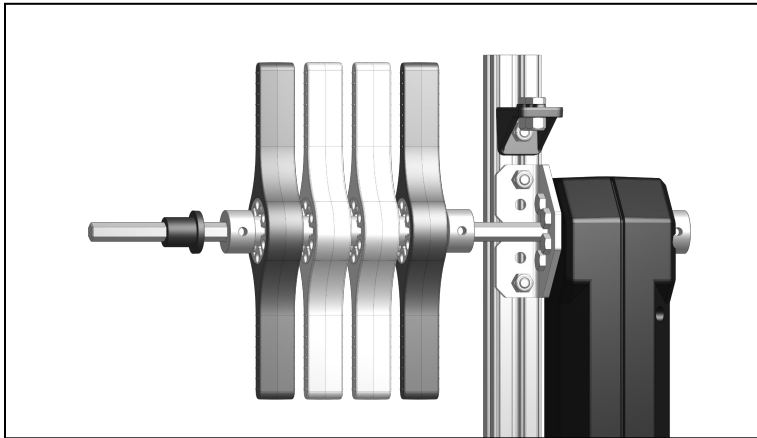
Slide the shaft with flap wheels through the Core Hex motor.



Get:

- 1 - Shaft Collar

Secure the shaft with a shaft collar on the right side of the Core Hex motor.



Get:

- 1 - Through Bore Bearing - Long

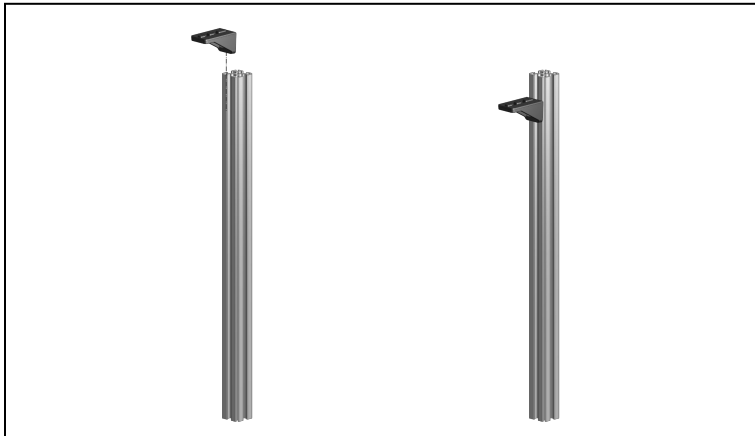
Slide a long through bore bearing onto left side of the hex shaft, opposite of the Core Hex motor.



Get:

- 1 - 15mm Plastic Lap Corner Bracket
- 1 - M3x8mm Hex Cap Screws
- 1 - M3 Nyloc Nuts

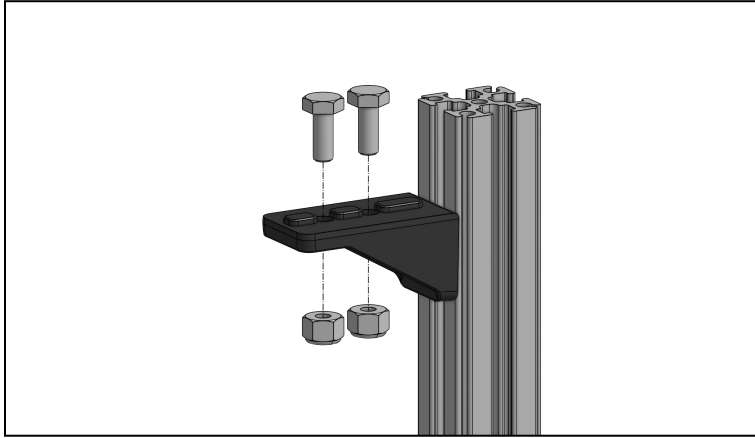
Take a bracket and finger start one hex cap screw and nyloc nut in the short side hole as shown.



Get:

- 1 - Pre-Loaded Lap Corner Bracket
- 1 - 15mm Extrusion - 225mm

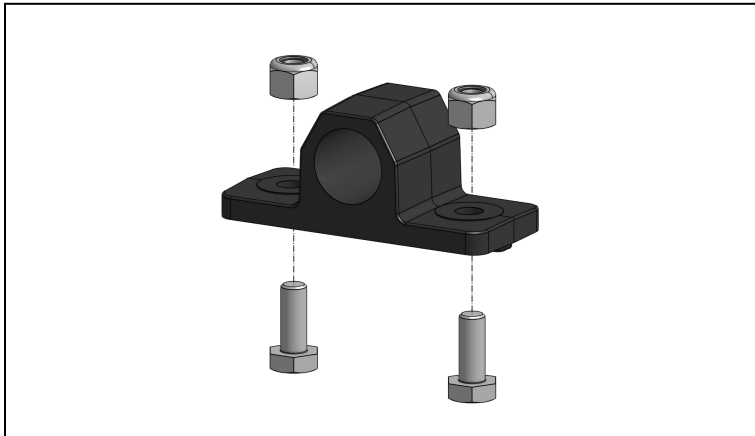
Slide the bracket onto the extrusion. Measure 15mm from the long side of the bracket to the end of the extrusion then tighten the nut.



Get:

- 2 - M3x8mm Hex Cap Screws
- 2 - M3 Nyloc Nuts

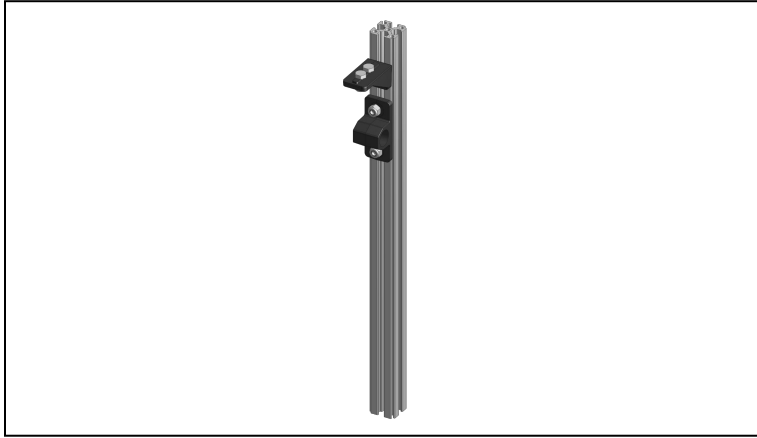
Finger start one hex cap screw and nyloc nut in each hole on the long side as shown.



Get:

- 1 - 15mm Bearing Pillow Block
- 2 - M3x8mm Hex Cap Screws
- 2 - M3 Nyloc Nuts

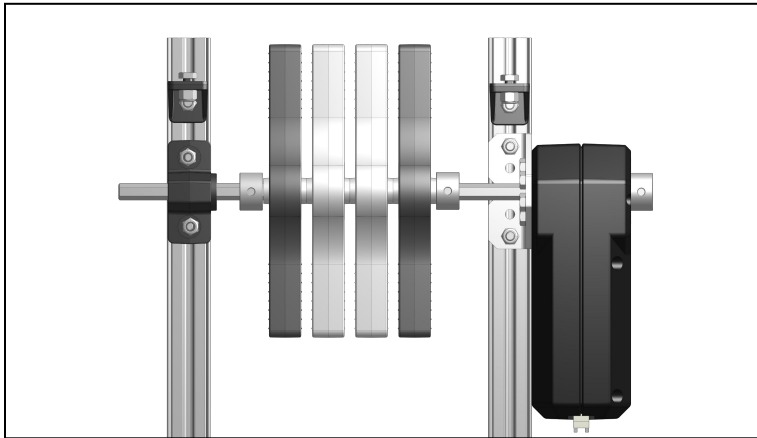
Take a bearing pillow block and finger start one hex cap screw and nyloc nut in each hole as shown.



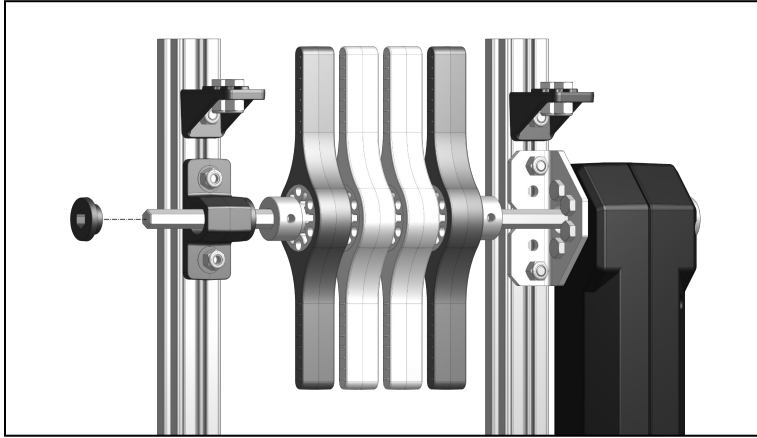
Get:

- 1 - Pre-Loaded Bearing Pillow Block

Slide the pre-loaded bearing pillow block onto the extrusion, do not yet tighten the screws.



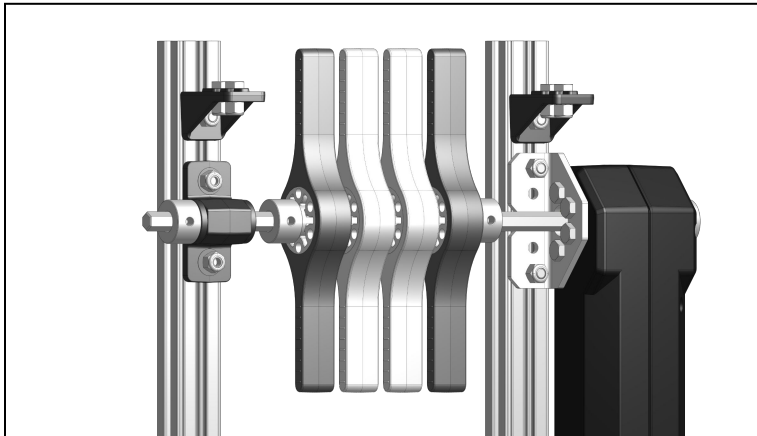
Slide the extrusion onto the hex shaft with flap wheels. Adjust the the bearing pillow block so that the shaft is level, then tighten the screws.



Get:

- 1 - Through Bore Bearing - Short

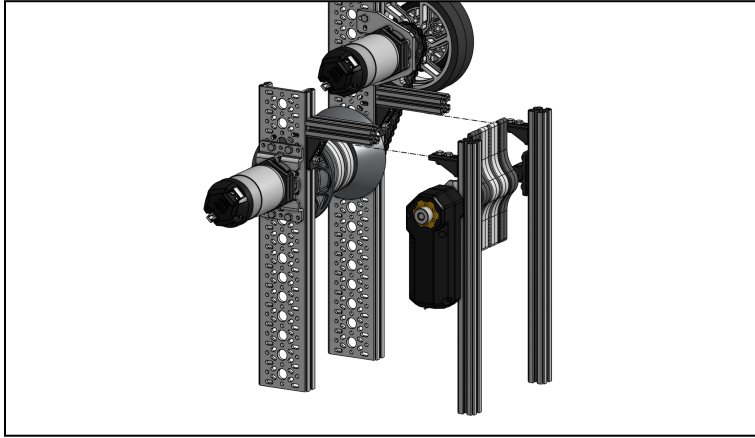
Slide a short through bore bearing onto left side of the hex shaft and insert the bearing into the bearing pillow block.



Get:

- 1 - Shaft Collar

Secure the shaft with a shaft collar on the left side of the short through bore bearing.



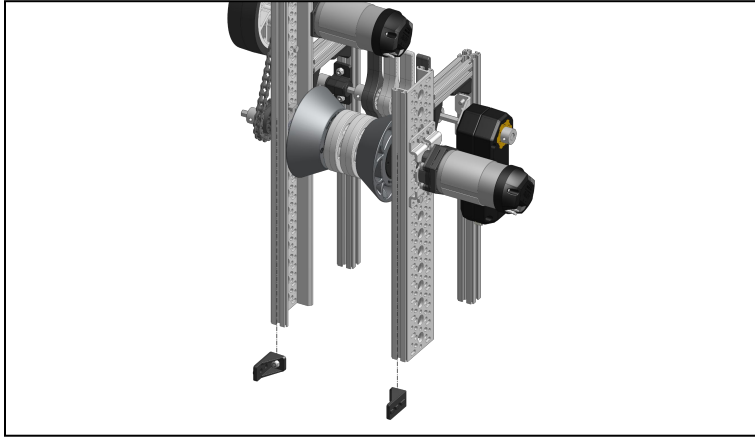
Slide the Core Hex motor assembly onto the 60mm extrusion of the flywheel assembly. Adjust any brackets so the extrusion and c channel sit flat. The flap wheel shaft and cone wheel shaft should be level with each other at this point. If they are not adjust any brackets need to ensure they are level.



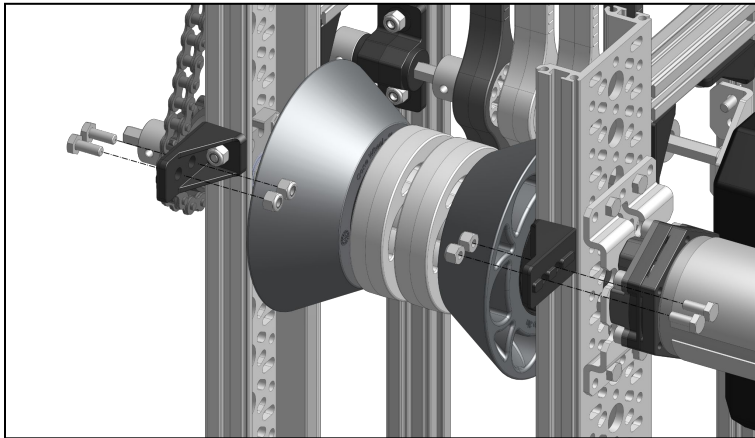
Get:

- 2 - 15mm Plastic Lap Corner Bracket
- 2 - M3x8mm Hex Cap Screws
- 2 - 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 two brackets.



Slide the pre-loaded lap corner brackets onto the c channel so they sit just above the center of the cone wheels. Tighten the nuts.



Get:

- 4 - M3x8mm Hex Cap Screws
- 4 - M3 Nyloc Nuts

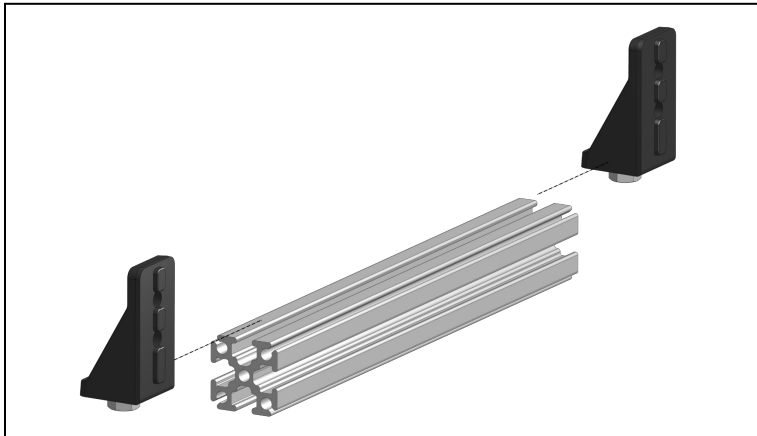
Finger start one hex cap screw and nyloc nut in each hole on the long side as shown.



Get:

- 2 - 15mm Plastic Lap Corner Bracket
- 2 - M3x8mm Hex Cap Screws
- 2 - M3 Nyloc Nuts

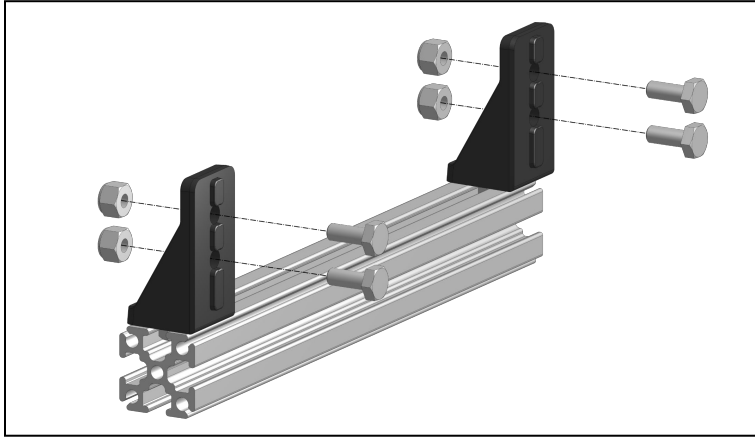
Take a bracket and finger start one hex cap screw and nyloc nut in the short side hole as shown. Pre-load two brackets.



Get:

- 1 - 15mm Extrusion - 120mm

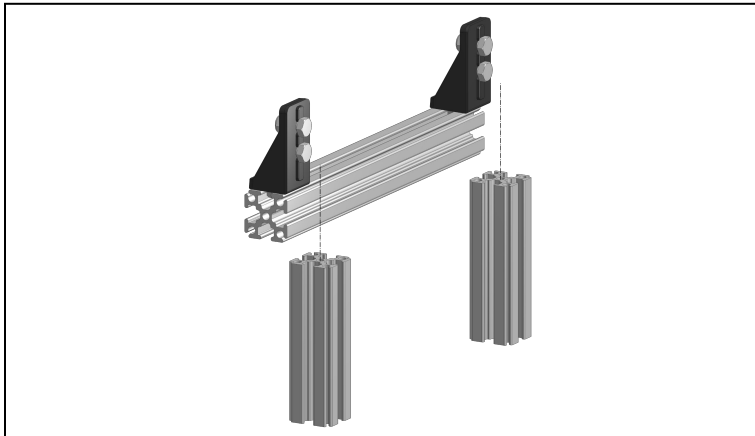
Slide a pre-loaded bracket onto each end of the extrusion, then tighten the nuts.



Get:

- 4 - M3x8mm Hex Cap Screws
- 4 - M3 Nyloc Nuts

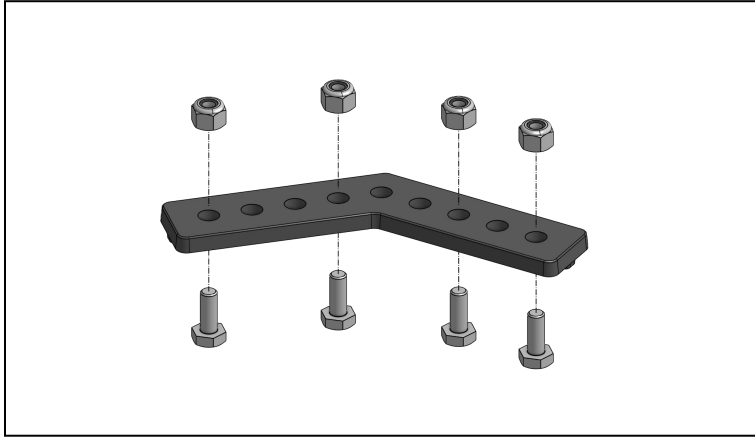
Finger start one hex cap screw and nyloc nut in each hole on the long side as shown.



Get:

- 2 - 15mm Extrusion Cut to 50mm

Slide the extrusion onto the lap corner brackets so that the ends of the 50mm extrusion is flush with the bottom of the 120mm extrusion. Tighten all the nuts.

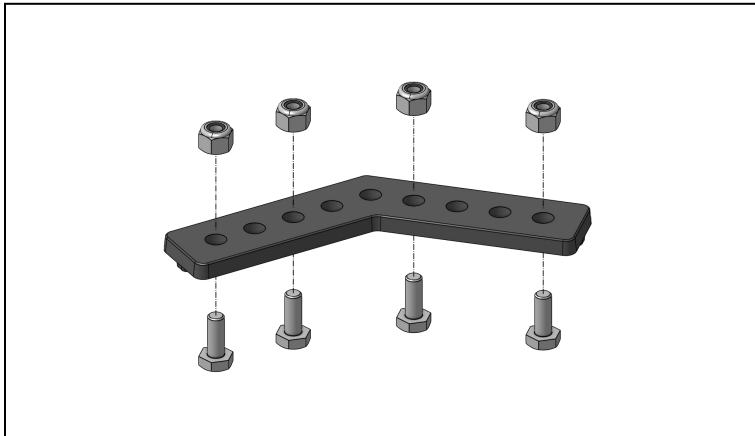


Get:

- 1 - 15mm Plastic 135 Degree Bracket
- 4 - M3x8mm Hex Cap Screws
- 4 - M3 Nyloc Nuts

Take a bracket and finger start one hex cap screw and nyloc nut into the 1st and 4th hole from the left side of the bracket and 1st and 3rd hole from the right side of bracket.

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

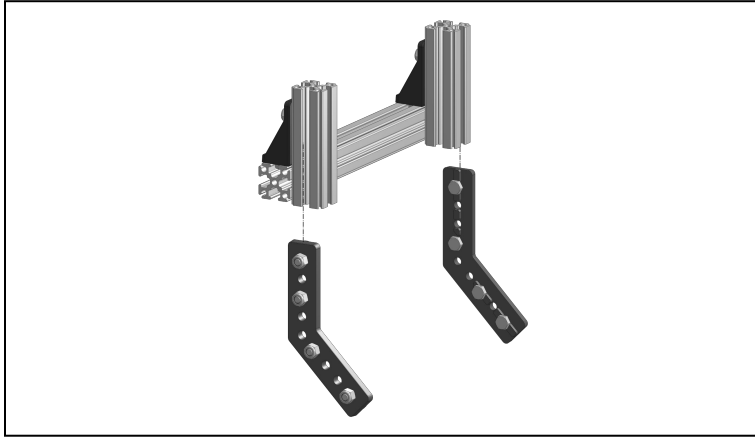


Get:

- 1 - 15mm Plastic 135 Degree Bracket
- 4 - M3x8mm Hex Cap Screws
- 4 - M3 Nyloc Nuts

Take a bracket and finger start one hex cap screw and nyloc nut into the 1st and 3rd hole from the left side of the bracket and 1st and 4th hole from the right side of bracket.

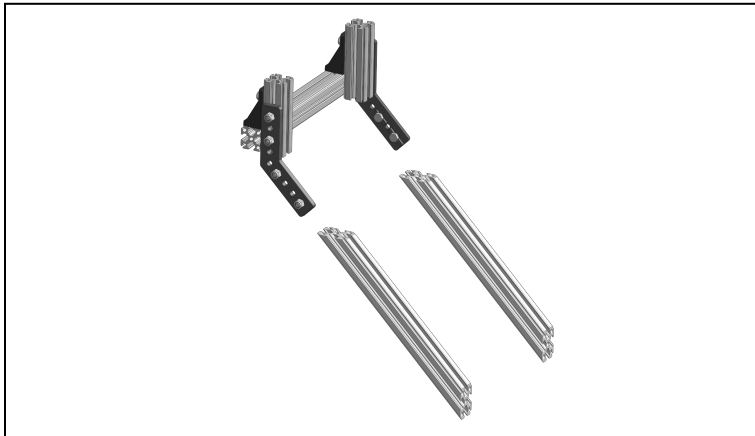
Note: The side of the bracket with “ribs” must have the hex cap screw head.



Get:

- 2 - Pre-Loaded 135 Degree Brackets

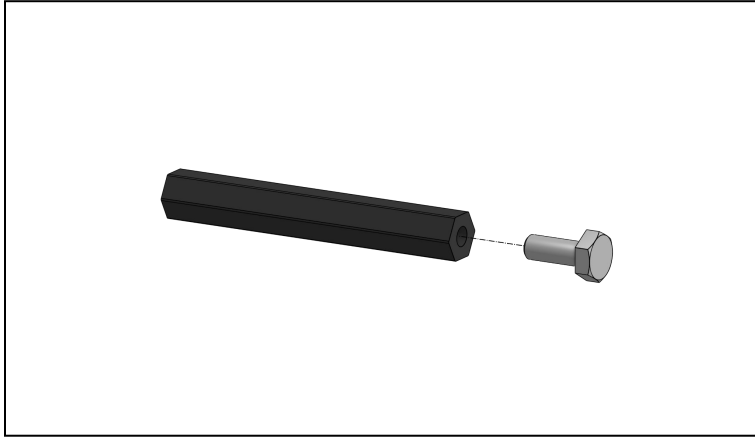
Slide the 1st and 3rd sides of the pre-loaded brackets onto the 50mm extrusion, do not yet tighten the screws.



Get:

- 2 - 15mm Extrusion - 150mm - 45° Ends

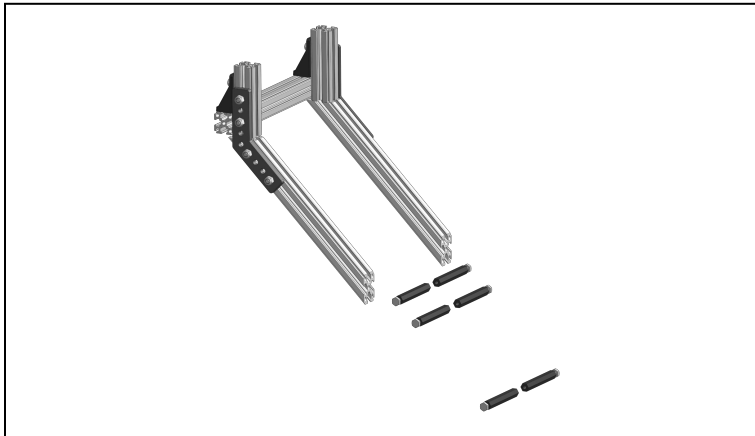
Slide the extrusion onto 1st and 4th sides of 135 degree brackets. The 45° end should be flush with the ends of the 50mm extrusion. Tighten all nuts.



Get:

- 6 - M3 Standoff - 40mm
- 6 - M3x8mm Hex Cap Screws

Take a standoff and finger start one hex cap screw one end. Do this six times.



Get:

- 6 - Pre-Loaded Standoffs

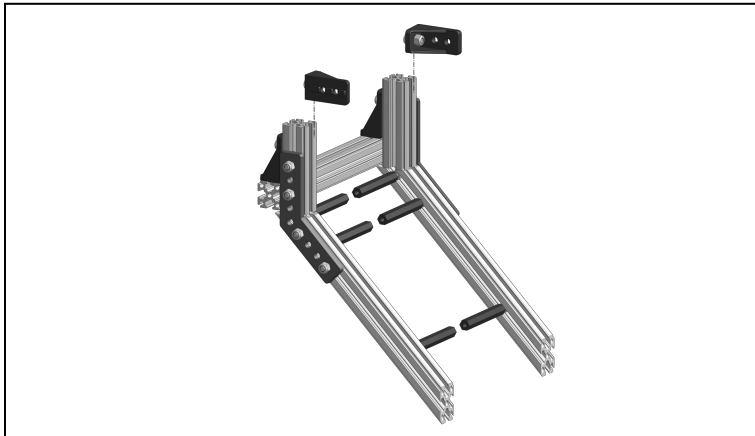
Slide three pre-loaded standoffs into the inside of the of the extrusion with 45° ends. Rotate the standoffs with a 5.5mm combination wrench to tighten them into place.



Get:

- 2 - 15mm Plastic Lap Corner Bracket
- 2 - M3x8mm Hex Cap Screws
- 2 - M3 Nyloc Nuts

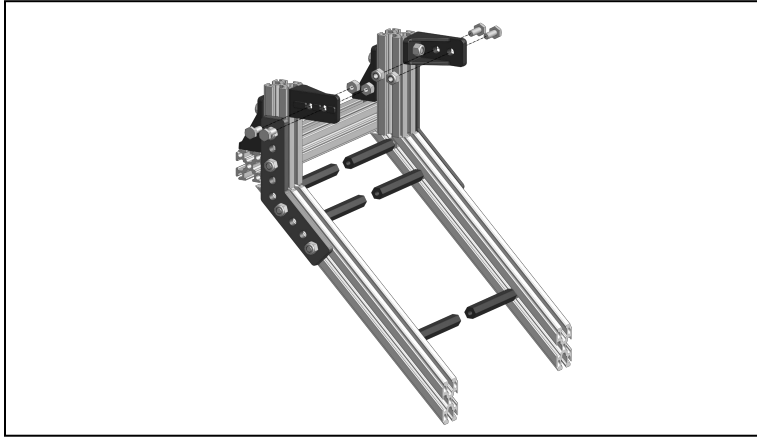
Take a bracket and finger start one hex cap screw and nyloc nut in the short side hole as shown. Pre-load two brackets.



Get:

- 1 - 15mm Extrusion - 120mm

Slide a pre-loaded bracket onto each 50mm extrusion, then tighten the nuts.



Get:

- 4 - M3x8mm Hex Cap Screws
- 4 - M3 Nyloc Nuts

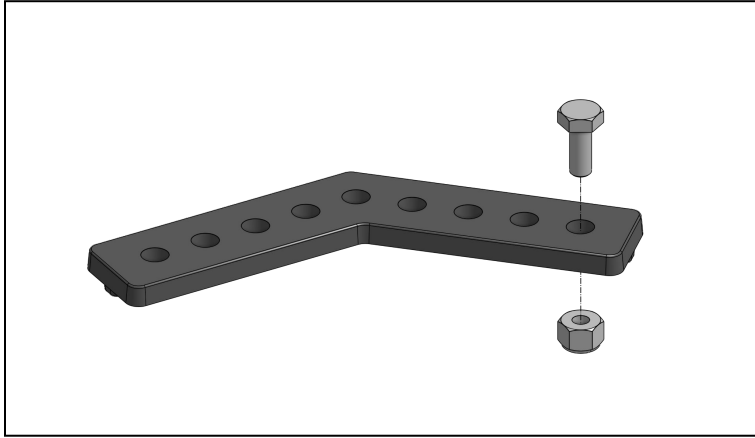
Finger start one hex cap screw and nyloc nut in each hole on the long side as shown.



Get:

- 2 - 15mm Extrusion - 120mm

Slide the extrusion onto the lap corner brackets, do not yet tighten the screws.



Get:

- 1 - 15mm Plastic 135 Degree Bracket
- 1 - M3x8mm Hex Cap Screws
- 1 - M3 Nyloc Nuts

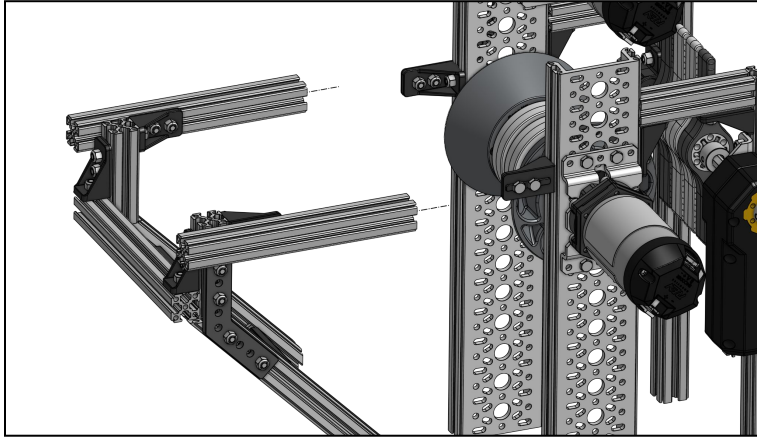
Take a bracket and finger start one hex cap screw and nyloc nut in one hole on the end of the bracket as shown. For this bracket the head of the screw should be on side of the bracket that does NOT have the "ribs."



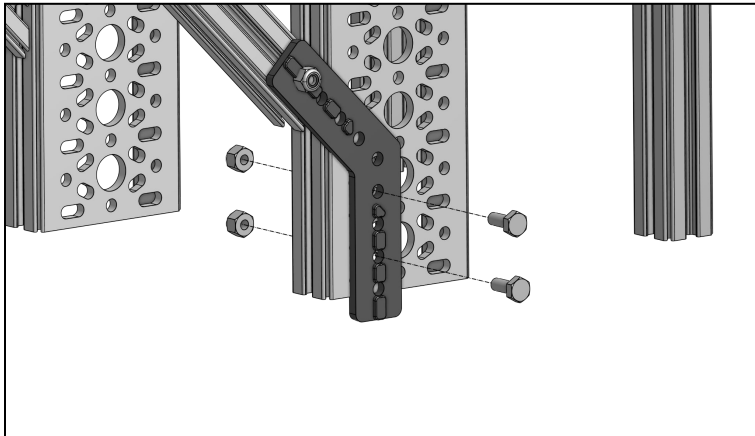
Get:

- 1 - 2 - Pre-Loaded 135 Degree Brackets

Slide the pre-loaded bracket onto the extrusion with 45° ends, do not yet tighten the screw.



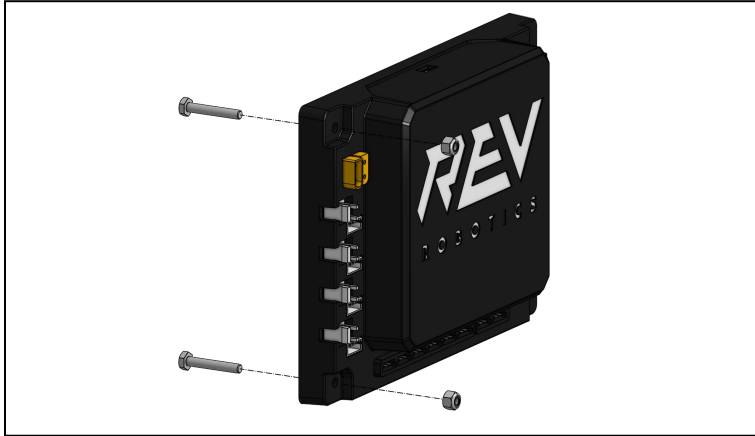
Slide the 120mm extrusion onto the pre-loaded lap corner brackets on the flywheel c channel. Tighten all nuts.



Get:

- 2 - M3x8mm Hex Cap Screws
- 2 - M3 Nyloc Nuts

Adjust the 135 degree bracket so that 2nd and 4th holes line up with the holes in the c channel. Attach the bracket to the c channel with two hex cap screws and nyloc nuts, then tighten the nut on the extrusion.



Get:

- 1 - Expansion Hub
- 2 - M3x20mm Hex Cap Screws
- 2 - M3 Nyloc Nuts

In the two left mounting holes of the Expansion Hub finger start one 20mm hex cap screw and nyloc nut as shown.



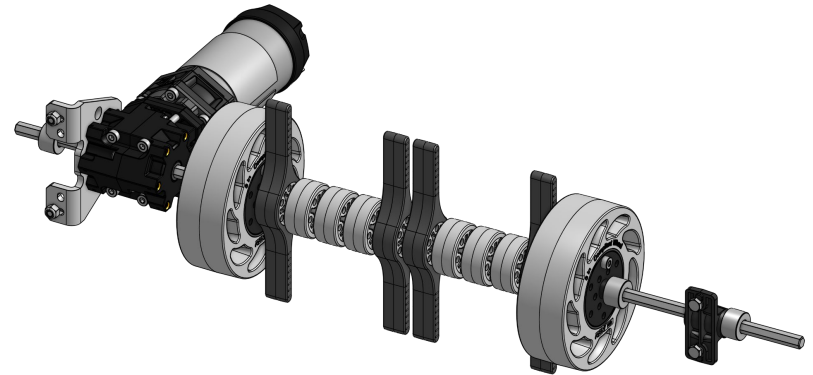
Get:

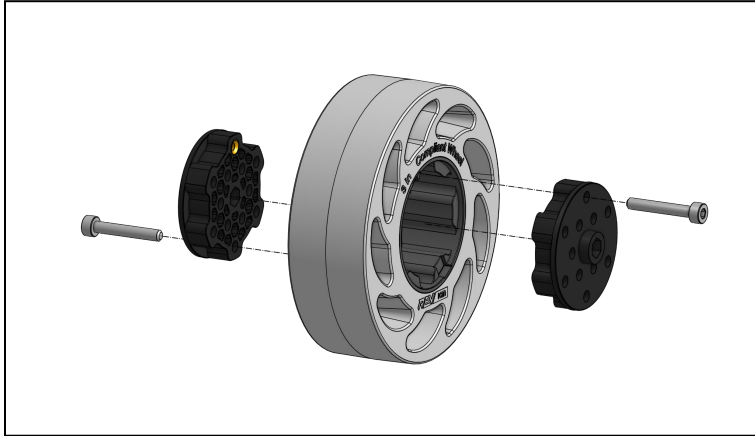
- 1 - Pre-Loaded Expansion Hub

Slide the Expansion Hub onto the extrusion as shown. The Expansion Hub should be just below the chain and 15 tooth sprocket of the flywheel. Tighten all nuts.

Intake Assembly

PART NUMBER	DESCRIPTION	QTY
N/A	90 Degree Gearbox and Motor Assembly	1
N/A	M3 x 20mm Socket Head Screws	4
REV-41-1362	5mm x 400mm Hex Shaft	1
REV-41-1327	Shaft Collar	4
REV-41-1329	Through Bore Bearing - Long	1
REV-41-1326	Through Bore Bearing - Short	1
REV-41-1359	M3 x 8mm Hex Cap Screw	2
REV-41-1361	M3 Nyloc Nuts	2
REV-41-2702	5mm Hex Bore - Hard - Flap Wheel	2
REV-41-2150	1in Grip Wheel - 5mm Hex Bore - Soft	6
REV-41-2038	MAXHub - 5mm Hex - Plastic	4
REV-21-2452	3in Compliant Wheel - MAX Bore -30A Soft	2
REV-41-1317	15mm Bearing Pillow Block	1
REV-41-1623	UltraPlanetary Bent Mounting Bracket	1



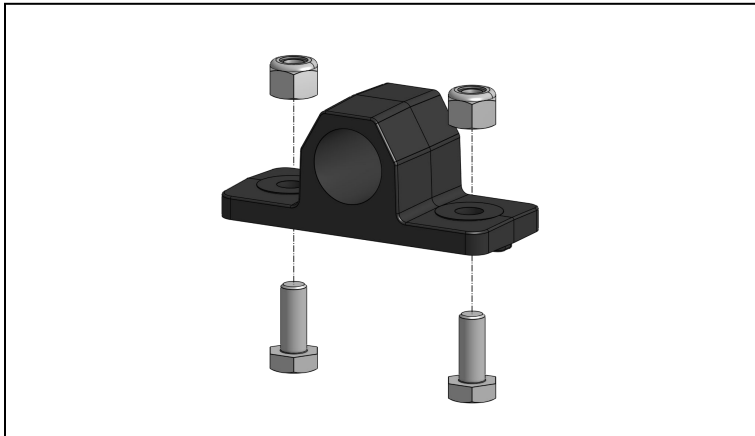


Get:

- 2 - 3in Compliant Wheel - MAX Bore -30A Soft
- 4 - MAXHub - 5mm Hex - Plastic
- 4 - M3x20mm Socket Head Screws(leftover from a UltraPlanetary Hardware Pack)

Insert a 5mm hex MAXHub into each side of the compliant wheel. Make sure to offset the threaded inserts of the MAXHubs. Secure the two MAXHubs together by inserting a 20mm screw through an unthreaded hole of a one MAXHub into each threaded insert of the other MAXHub.

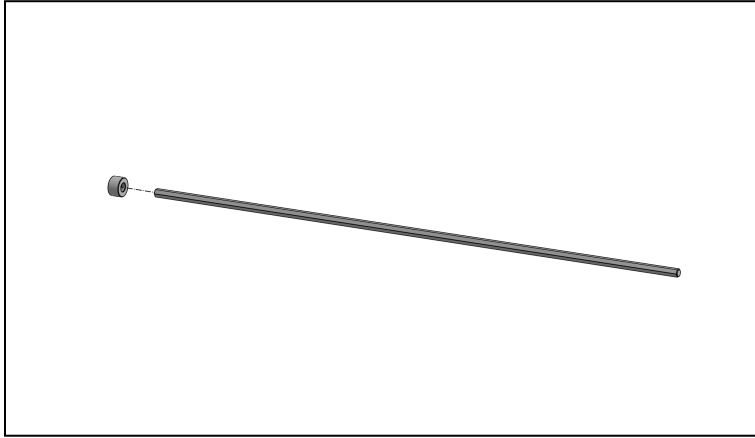
Do this twice with both Compliant wheels.



Get:

- 1 - 15mm Bearing Pillow Block
- 2 - M3x8mm Hex Cap Screws
- 2 - M3 Nyloc Nuts

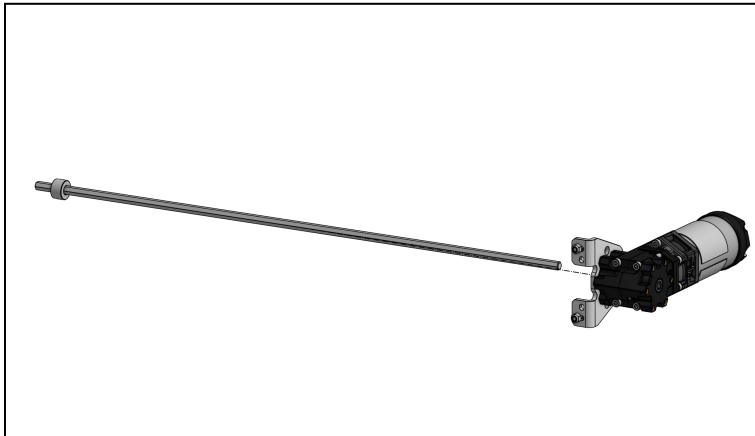
Take a bearing pillow block and finger start one hex cap screw and nyloc nut in each hole as shown.



Get:

- 1 - 5mm x 400mm Hex Shaft
- 1 - Shaft Collar

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



Get:

- 1 - 90 Degree Gearbox and Motor Assembly

Slide the hex shaft through the 90 degree gearbox.



Get:

- 1 - Shaft collar

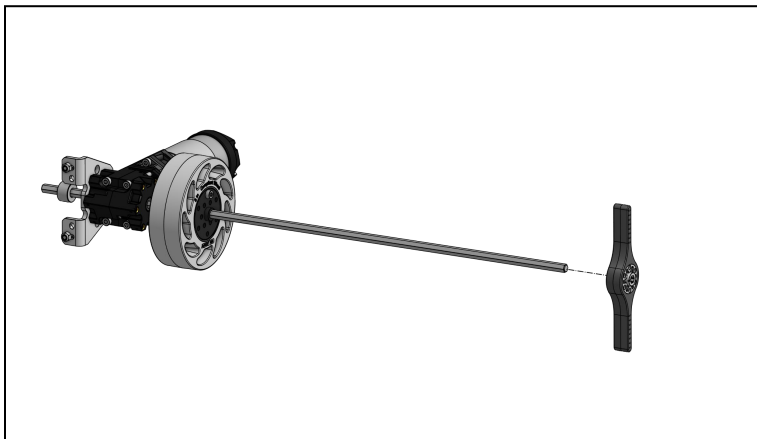
Slide a shaft collar onto the hex shaft, do not yet tighten the set screw.



Get:

- 1 - 3in Compliant Wheel with MAXHubs

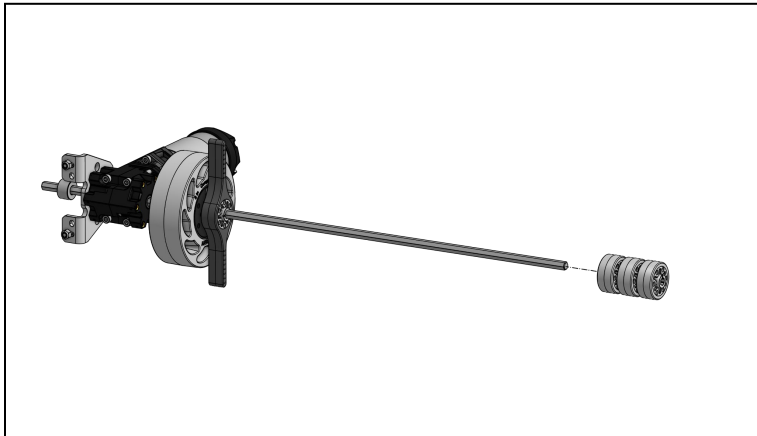
Slide a 3in compliant wheel onto the hex shaft.



Get:

- 1 - 5mm Hex Bore - Hard - Flap Wheel

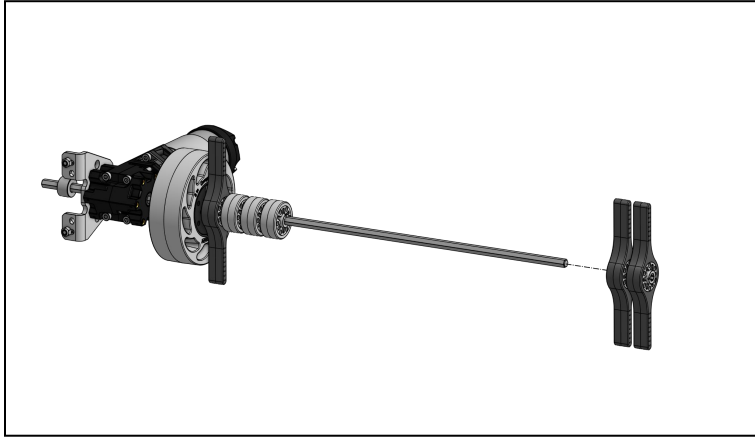
Slide a hard flap wheel onto the hex shaft.



Get:

- 3 - 1in Grip Wheel - 5mm Hex Bore - Soft

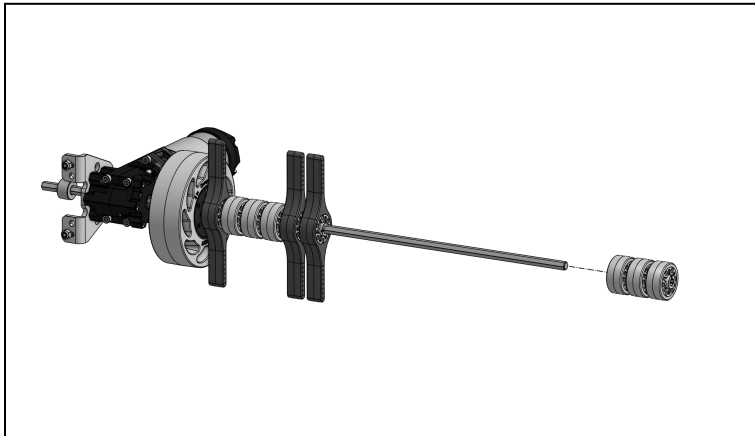
Slide three 1in grip wheels onto the hex shaft.



Get:

- 2 - 5mm Hex Bore - Hard - Flap Wheel

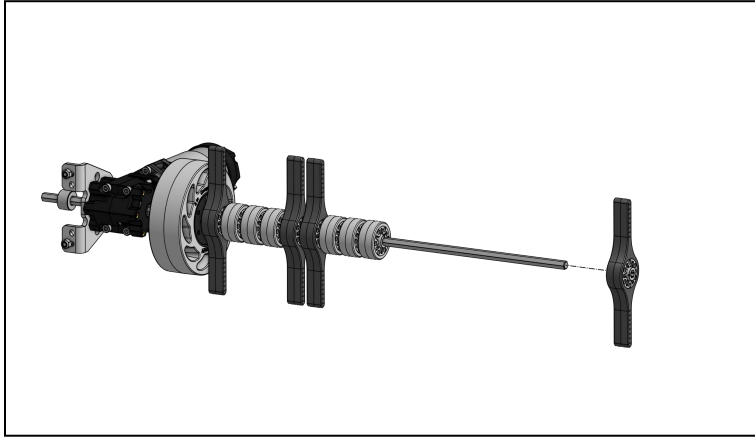
Slide two hard flap wheels onto the hex shaft.



Get:

- 3 - 1in Grip Wheel - 5mm Hex Bore - Soft

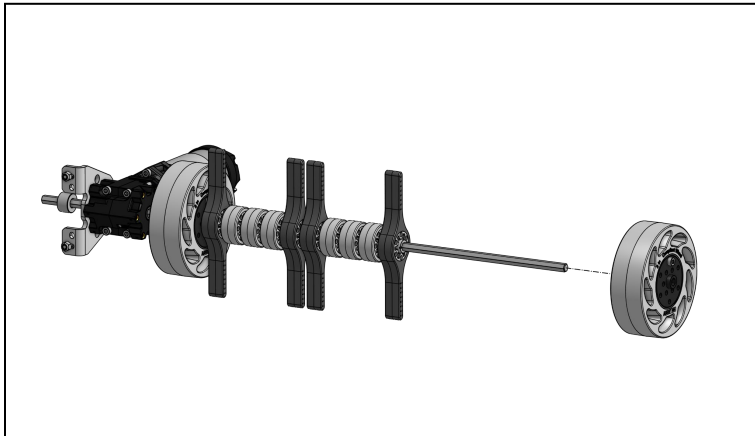
Slide three 1in grip wheels onto the hex shaft.



Get:

- 1 - 5mm Hex Bore - Hard - Flap Wheel

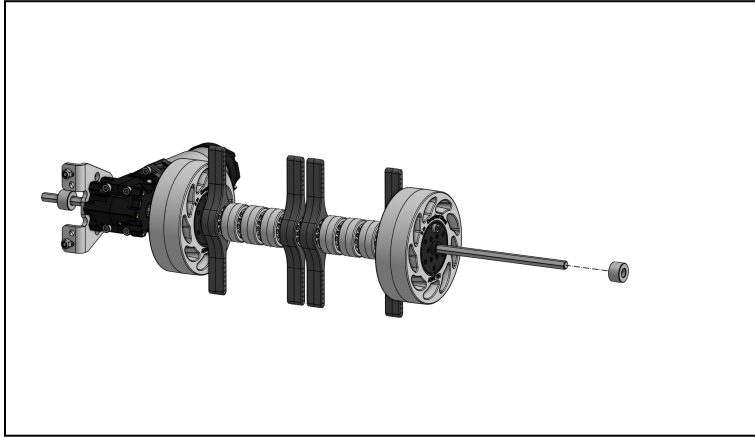
Slide a hard flap wheel onto the hex shaft.



Get:

- 1 - 3in Compliant Wheel with MAXHubs

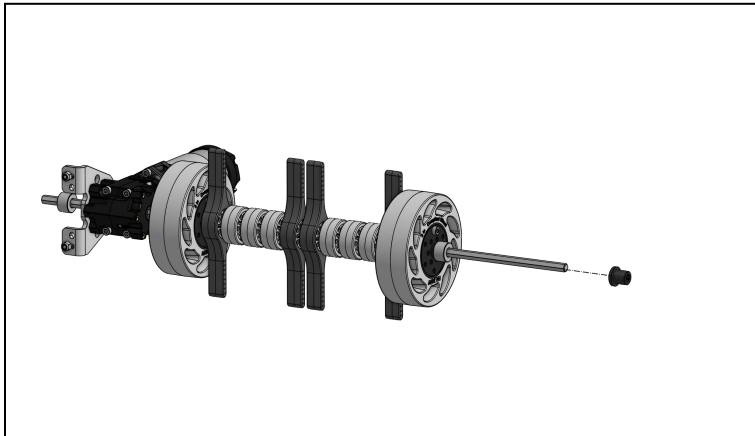
Slide a 3in compliant wheel onto the hex shaft.



Get:

- 1 - Shaft collar

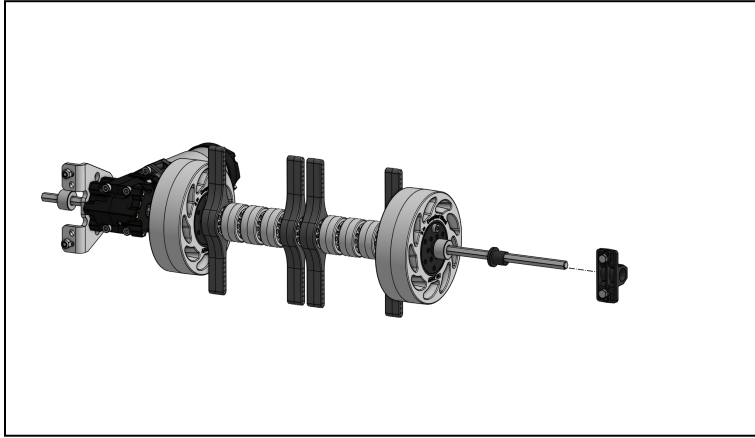
Slide a shaft collar onto the hex shaft, do not yet tighten the set screw.



Get:

- 1 - Through Bore Bearing - Long

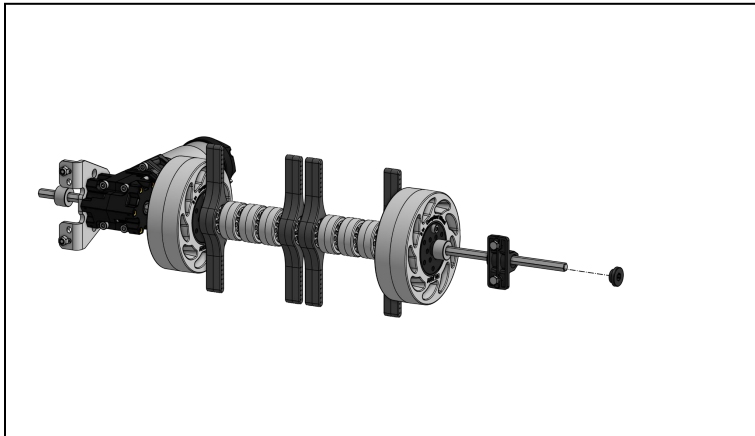
Slide a long through bore bearing onto the hex shaft.



Get:

- 1 - Pre-Loaded Bearing Pillow Block

Slide a pre-loaded bearing pillow block onto the hex shaft and over the long through bore bearing.



Get:

- 1 - Through Bore Bearing - Short

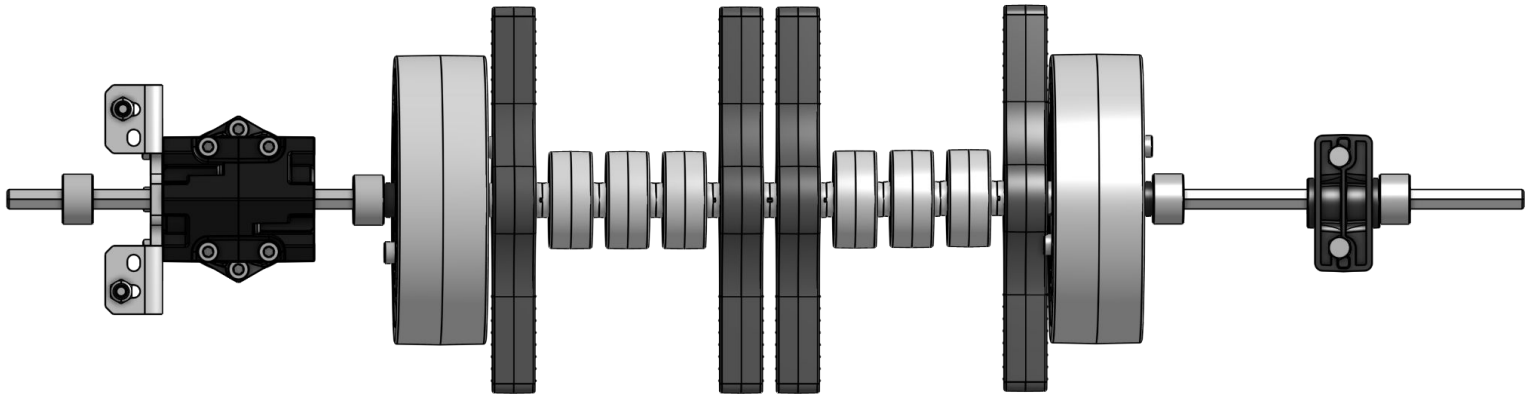
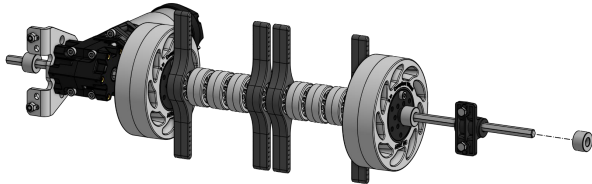
Slide a short through bore bearing onto the hex shaft and into the bearing pillow block.

Get:

- 1 - Shaft Collar

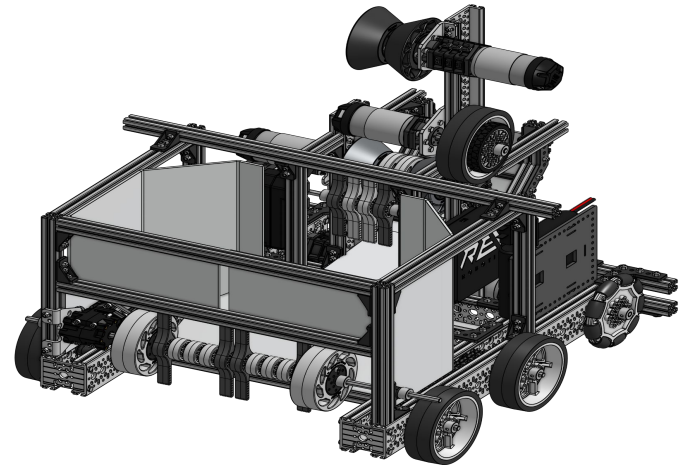
Slide a shaft collar onto the hex shaft, so not yet tighten the set screw.

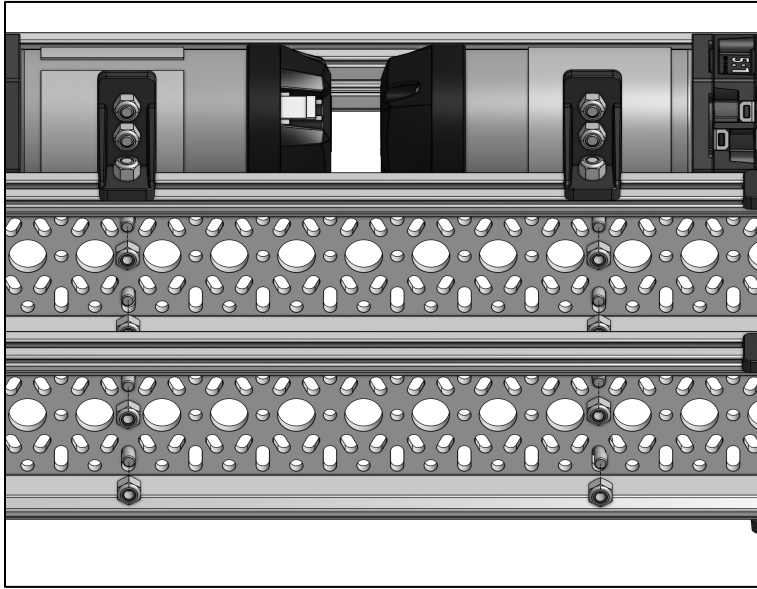
Adjust the items on the hex shaft to match the spacing below.



Final Assembly

PART NUMBER	DESCRIPTION	QTY
N/A	Launcher Assembly	1
N/A	Launcher Hood and Hopper Floor	1
N/A	Hopper Side Left	1
N/A	Hopper Side Right	1
N/A	Intake Assembly	1
N/A	15mm Extrusion Cut to 185mm	4
N/A	15mm Extrusion Cut to 308mm	2
REV-41-1432	15mm Extrusion - 420mm	1
REV-41-1431	15mm Extrusion - 225mm	2
REV-31-1595	Control Hub	1
REV-41-1387	Switch Cable and Bracket	1
REV-31-1302	12V Slim Battery	1
REV-41-1166	Battery Holder Plate	1
REV-41-1321	15mm Plastic Lap Corner Bracket	16
REV-41-1359	M3 x 8mm Hex Cap Screw	65
REV-41-1124	M3 x 20mm Hex Cap Screw	2
REV-41-1361	M3 Nyloc Nuts	67
REV-41-1161	Zipties	



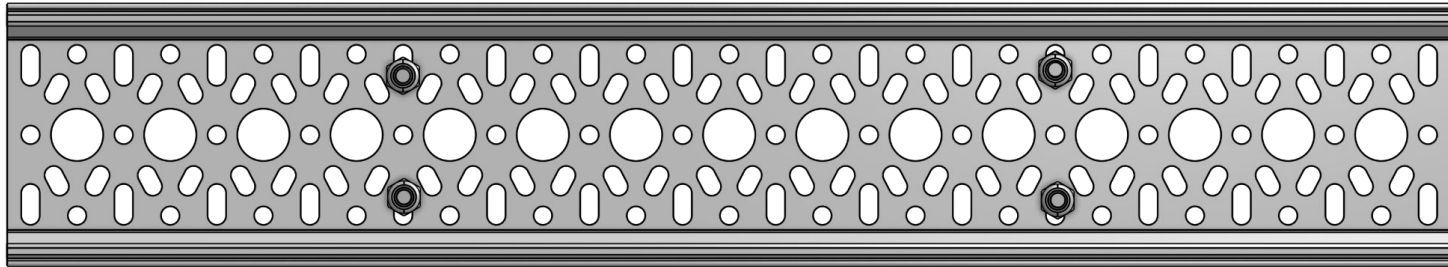


Get:

- 12 - M3x8mm Hex Cap Screws
- 12 - M3 Nyloc Nuts

In the holes shown on the lower image, finger start one hex cap screw and nyloc nut. The head of the hex cap screw should be on the flat side of the c channel.

Adjust the lap corner brackets on the drivetrain to be in line with the above screws, then tighten the nut on the short side of the bracket. Then finger start one hex cap screw and nyloc nut in each hole on the long side of both lap corner brackets as shown.



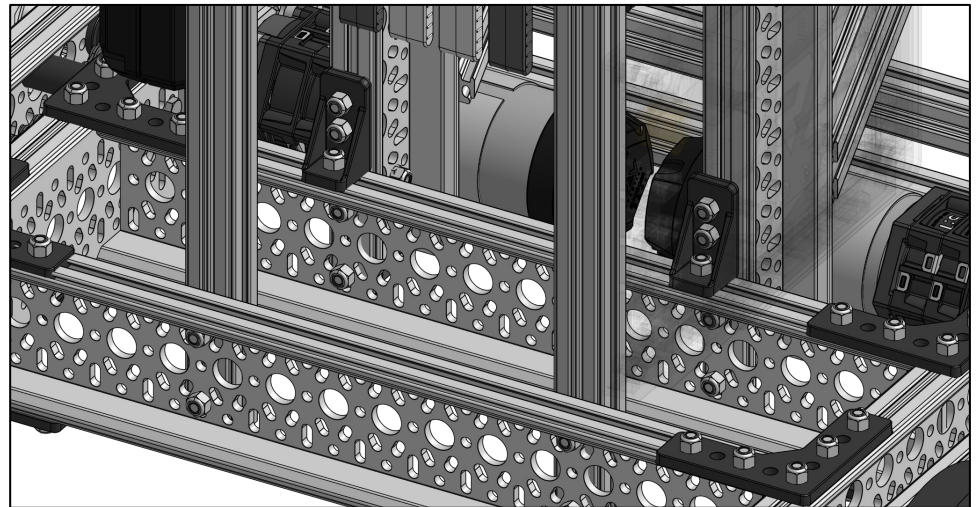


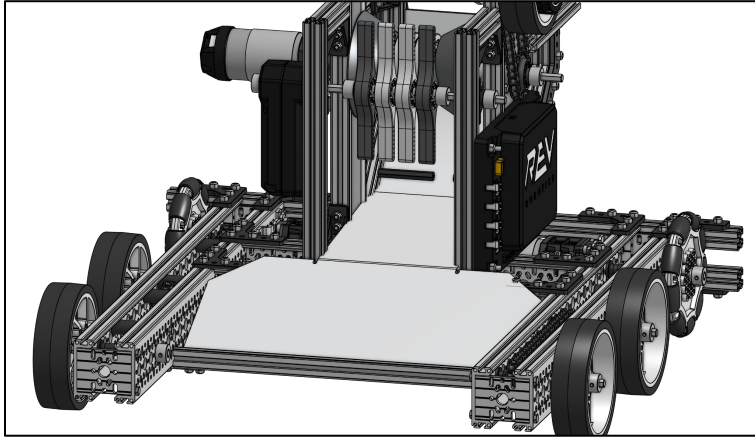
Get:

- 1 - Launcher Assembly

Slide the launcher assembly onto the 12 screws from the previous step. The ends of the extrusion and c channel of the launcher should be flush with the bottom of the c channel of the drivetrain. Tighten all 12 nuts.

Note: We recommend two people complete this step, one to hold the launcher assembly and another to tighten the screws.





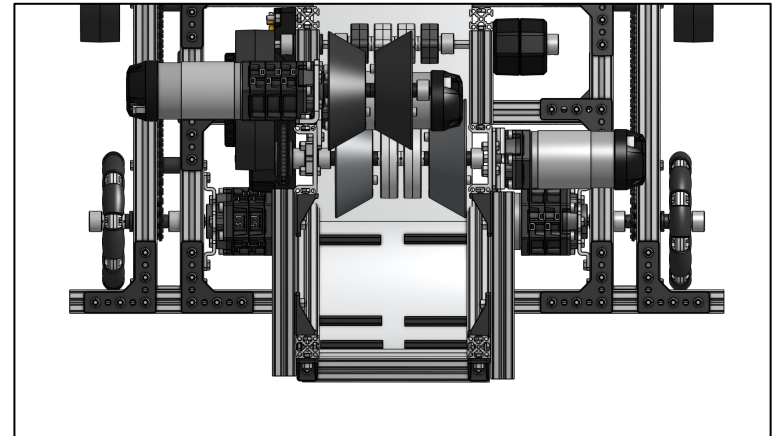
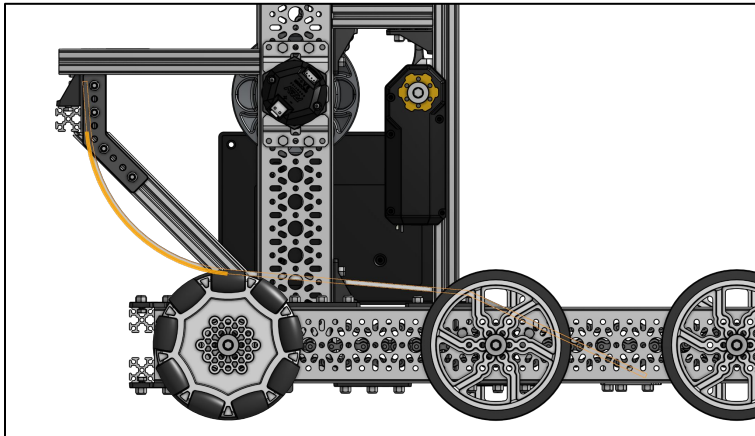
Get:

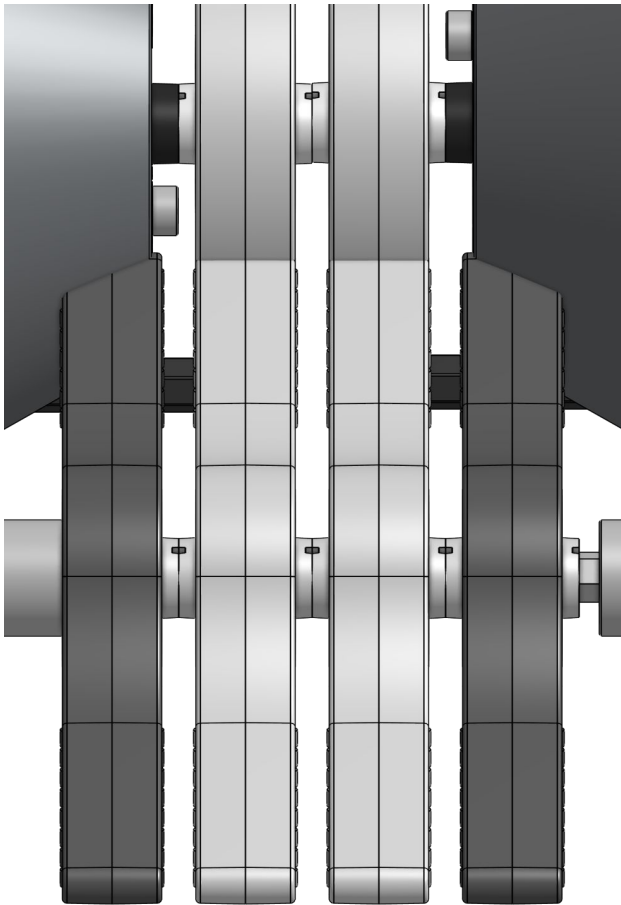
- 1 - Launcher Hood and Hopper Floor

Insert the cutout for the launcher hood and hopper floor through the launcher assembly, underneath the standoffs and then in front of the 120mm extrusion of the hood supports.

The hopper floor should sit inside the lip of the flat c channel on the drivetrain.

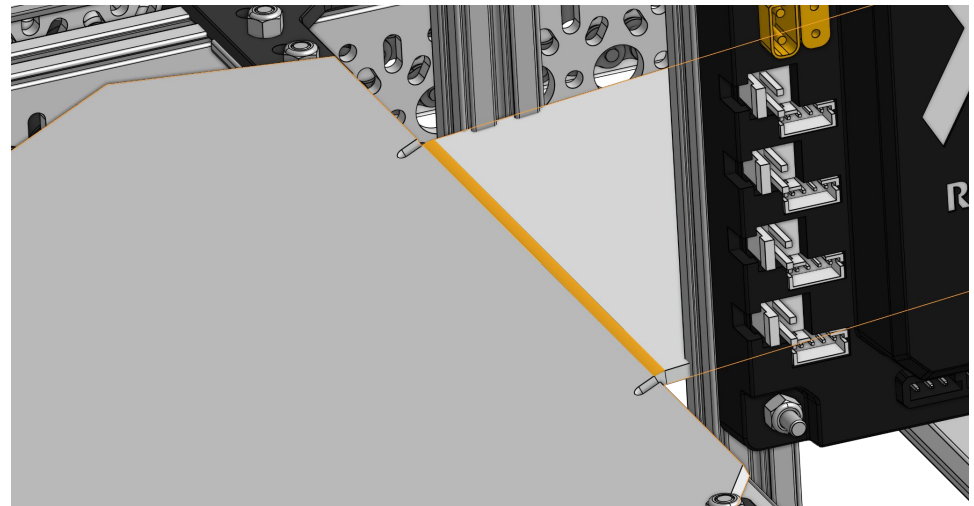
We recommend not attaching the hood yet. Some teams may want to attach the hood at this step, please reference the adjustment steps at the end of this guide and use WILDFIRE to ensure your compression is ideal throughout the whole path of the hood.





Rotate the flap wheels on the launcher assembly so they make contact with the flywheel. Using a cutting tool, trim the flap wheel so that they glide past the flywheel while barely not making contact. The hard flap wheels should be cut at an angle to mimicking the angle of the cone wheel. Trim both ends of the flap wheels.

If your hopper floor is not sitting inside the c channel, you can make a very shallow cut along the location shown below to along the corrugated plastic to bend. Be very careful to not cut through the corrugated plastic, only the surface material needs to be cut to provide a bend guide.





Get:

- 2 - 15mm Plastic Lap Corner Bracket
- 2 - M3x8mm Hex Cap Screws
- 2 - 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 two brackets.

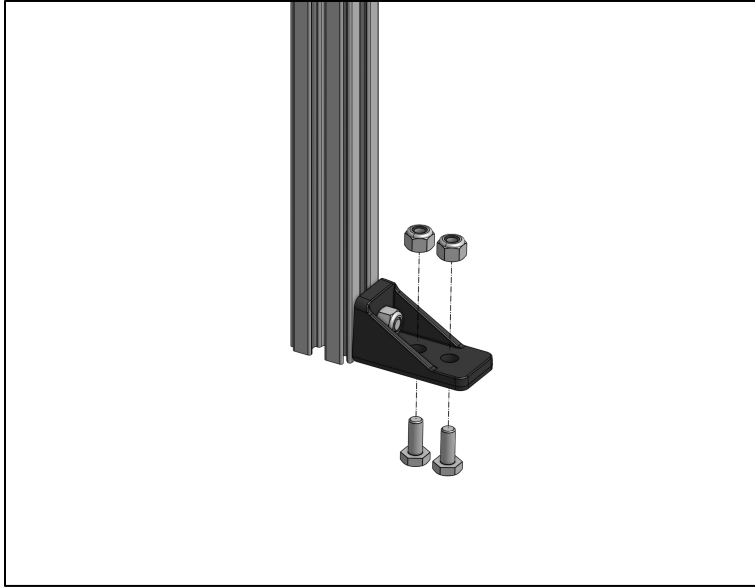


Get:

- 2 - 15mm Extrusion Cut to 185mm
- 2 - Pre-Loaded Lap Corner Bracket

Slide the lap corner bracket onto the end of the 185mm extrusion so the flat portion of the long side is flush with the end of the extrusion but the “ribs” are still protruding. Tighten the nut.

Do this twice.

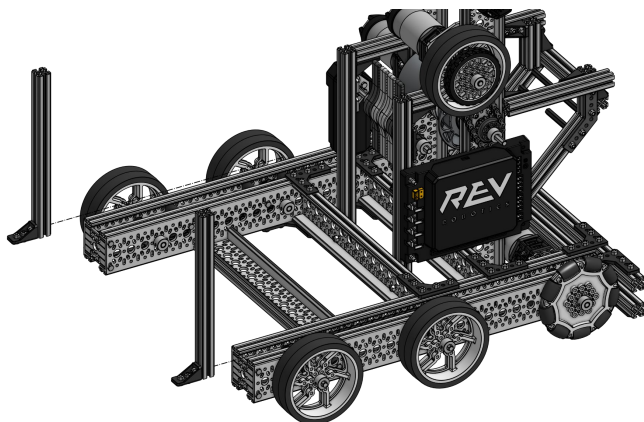


Get:

- 4 - M3x8mm Hex Cap Screws
- 4 - M3 Nyloc Nuts

Finger start one hex cap screw and nyloc nut in each hole on the long side as shown.

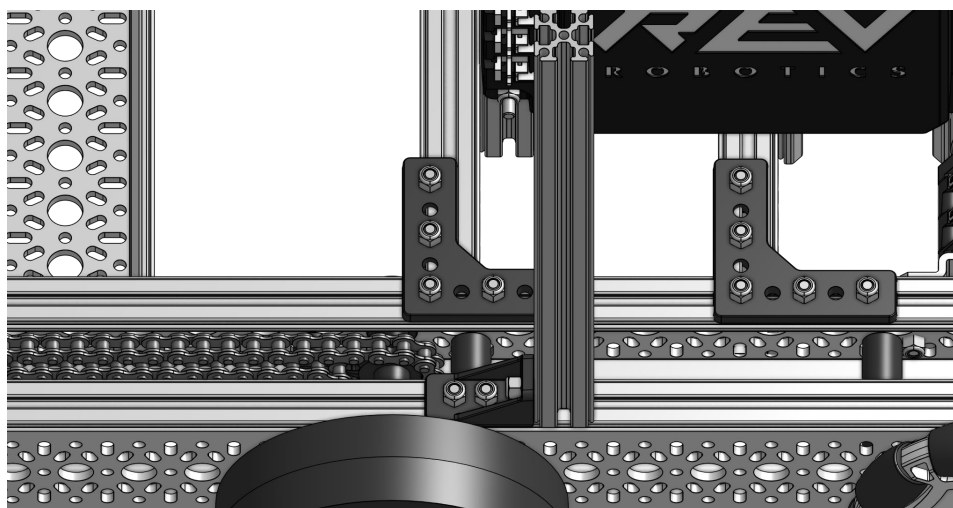
Do this twice.

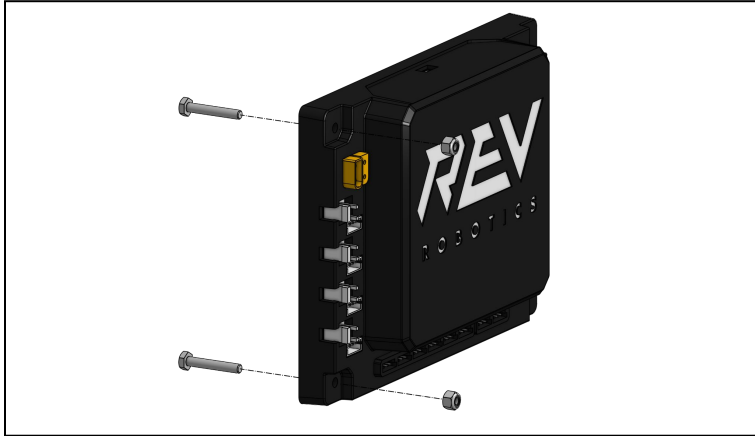


Get:

- 2 - Extrusion with Pre-Loaded Brackets

Slide both lap corner brackets onto the outside c channel of the drivetrain rails. They should line up just behind the upright extrusion of the launcher assembly as shown in the below image. Tighten all nuts.





Get:

- 1 - Control Hub
- 2 - M3x20mm Hex Cap Screws
- 2 - M3 Nyloc Nuts

In the two left mounting holes of the Control Hub finger start one 20mm hex cap screw and nyloc nut as shown.

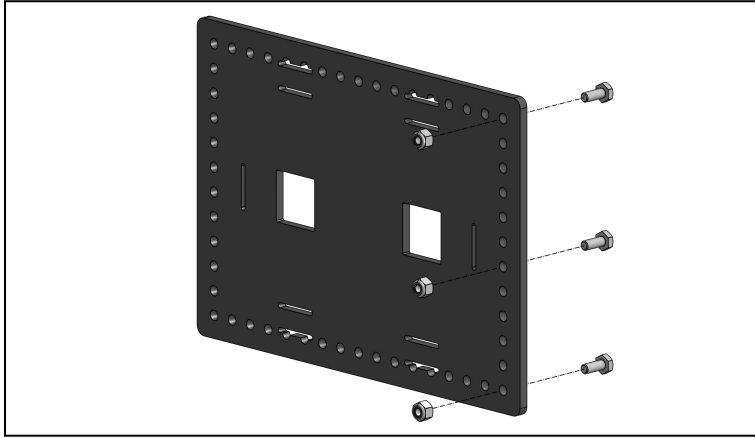


Get:

- 1 - Pre-Loaded Control Hub

Slide the Control Hub onto the left extrusion as shown. Tighten all nuts.

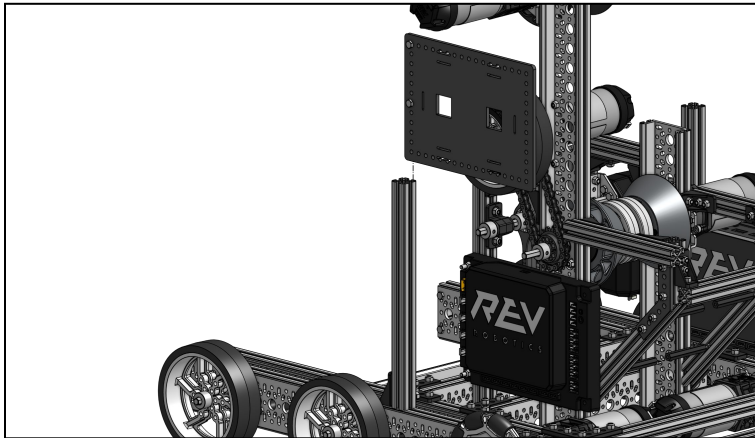
Note: The launcher assembly is hidden in this image for clarity.



Get:

- 1 - Battery Holder Plate
- 3 - M3x8mm Hex Cap Screws
- 3 - M3 Nyloc Nuts

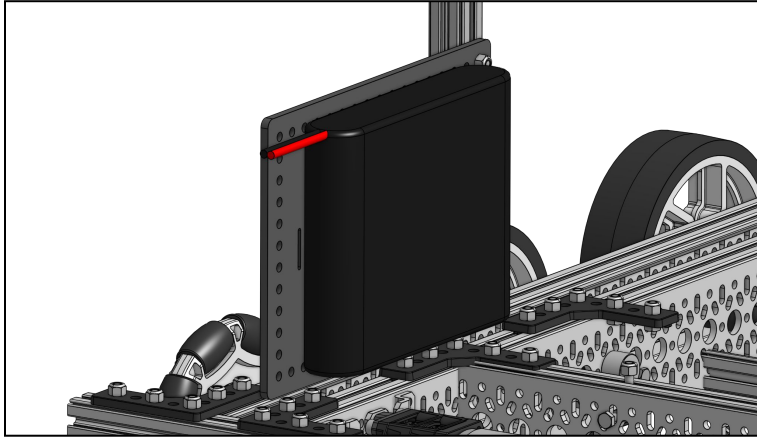
In three mounting holes of a battery holder plate finger start one 8mm hex cap screw and nyloc nut as shown.



Get:

- 1 - Pre-Loaded Battery Holder Plate

Slide the battery holder plate onto the extrusion as shown. Tighten all nuts.

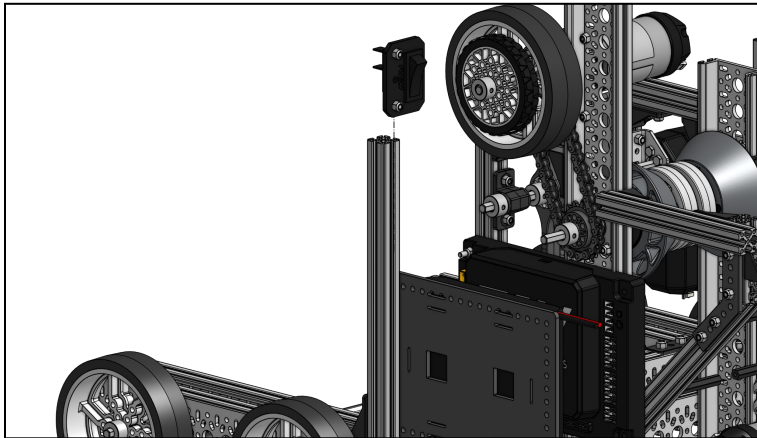


Get:

- 1 - 12V Slim Battery
- 1 - Hook and Loop Fastener (not imaged)

Hold the battery against the plate, then use two strips of hook and loop fastener(not imaged) to create a harness to securely hold the battery to the plate.

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.



Get:

- 1 - Switch Cable and Bracket
- 2 - M3x8mm Hex Cap Screws
- 2 - M3 Nyloc Nuts

Pre-load the switch bracket, then slide it down the extrusion next to the battery holder plate. Tighten all nuts.



Get:

- 2 - 15mm Plastic Lap Corner Bracket
- 2 - M3x8mm Hex Cap Screws
- 2 - 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 two brackets.

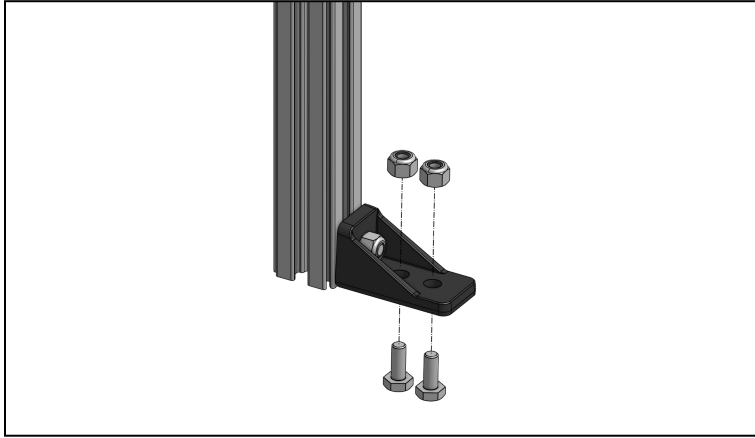


Get:

- 2 - 15mm Extrusion Cut to 185mm
- 2 - Pre-Loaded Lap Corner Bracket

Slide the lap corner bracket onto the end of the 185mm extrusion so the flat portion of the long side is flush with the end of the extrusion but the “ribs” are still protruding. Tighten the nut.

Do this twice.

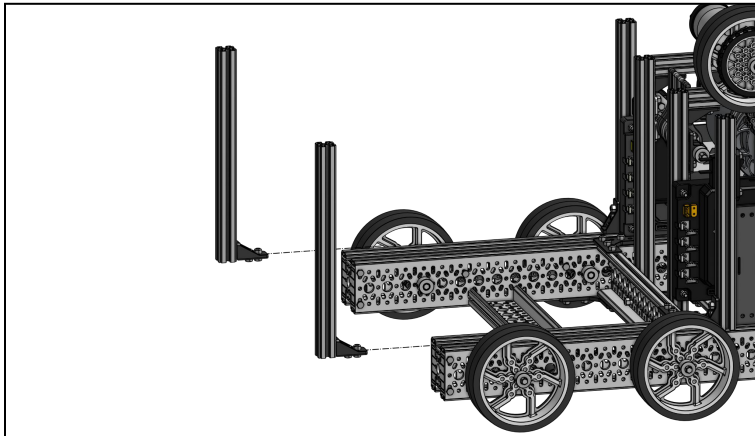


Get:

- 4 - M3x8mm Hex Cap Screws
- 4 - M3 Nyloc Nuts

Finger start one hex cap screw and nyloc nut in each hole on the long side as shown.

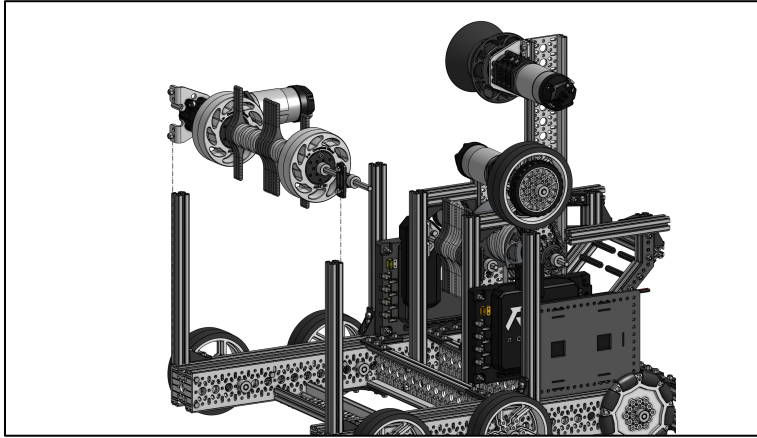
Do this twice.



Get:

- 2 - Extrusion with Pre-Loaded Brackets

Slide both lap corner brackets onto the outside c channel of the drivetrain rails. The extrusion should be flush with the end of the c channel. Tighten all nuts.



Get:

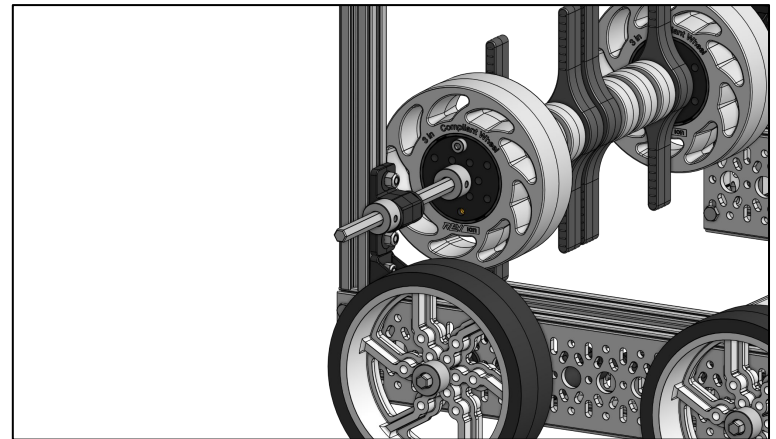
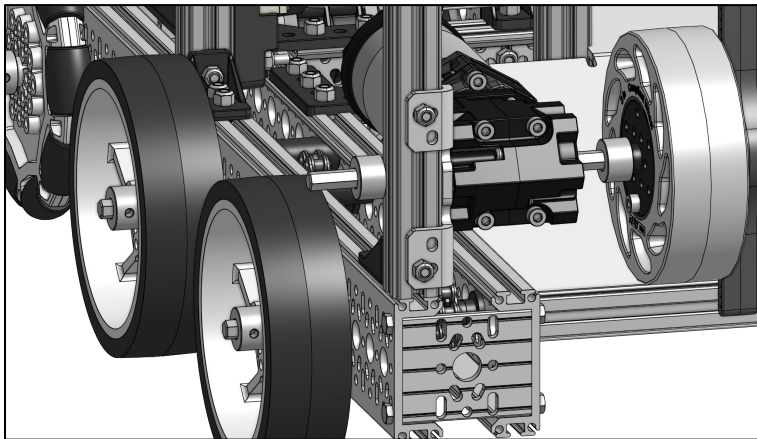
- 1 - Intake Assembly

Slide the intake assembly onto the two extrusion from the previous step.

The bent UltraPlanetary bracket should be on the outside of the left extrusion. The shaft collar should be on the outside of the upright extrusion as shown.

The bearing pillow block should be on the inside of the right extrusion as shown.

Tighten all nuts.

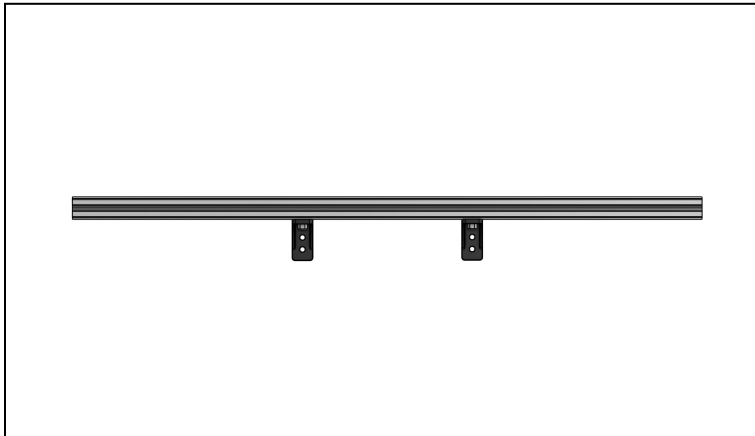




Get:

- 2 - 15mm Plastic Lap Corner Bracket
- 2 - M3x8mm Hex Cap Screws
- 2 - 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 two brackets.

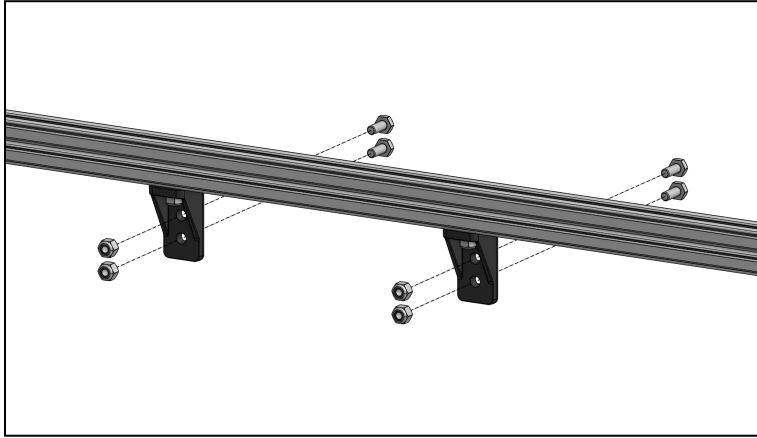


Get:

- 1 - 15mm Extrusion - 420mm
- 2 - Pre-Loaded Lap Corner Bracket

Slide the two pre-loaded lap corner brackets onto the extrusion as shown. Tighten all nuts.

Note: Use the upright extrusion of the launcher to determine the spacing between the two brackets.



Get:

- 4 - M3x8mm Hex Cap Screws
- 4 - M3 Nyloc Nuts

Finger start one hex cap screw and nyloc nut in each hole on the long side as shown.



Get:

- 2 - 15mm Plastic Lap Corner Bracket
- 2 - M3x8mm Hex Cap Screws
- 2 - 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 two brackets.



Get:

- 2 - Pre-Loaded Lap Corner Bracket

Slide the two pre-loaded lap corner brackets onto the extrusion as shown. Tighten all nuts.

Note: Use the upright extrusion of the hopper to determine the spacing between the two brackets.



Get:

- 4 - M3x8mm Hex Cap Screws
- 4 - M3 Nyloc Nuts

Finger start one hex cap screw and nyloc nut in each hole on the long side as shown.

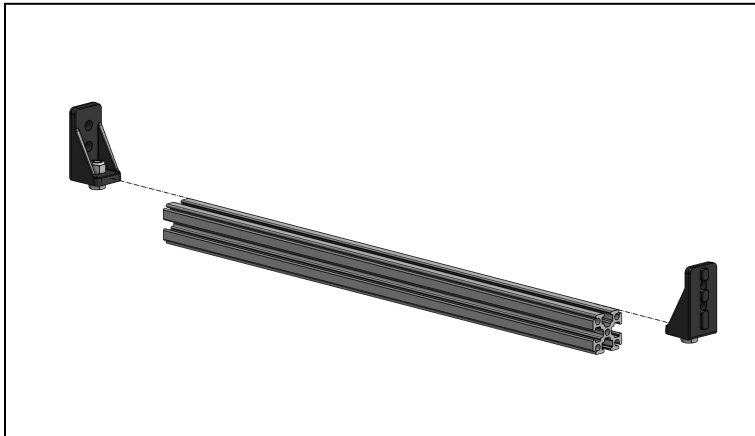
Set aside for a later step.



Get:

- 2 - 15mm Plastic Lap Corner Bracket
- 2 - M3x8mm Hex Cap Screws
- 2 - M3 Nyloc Nuts

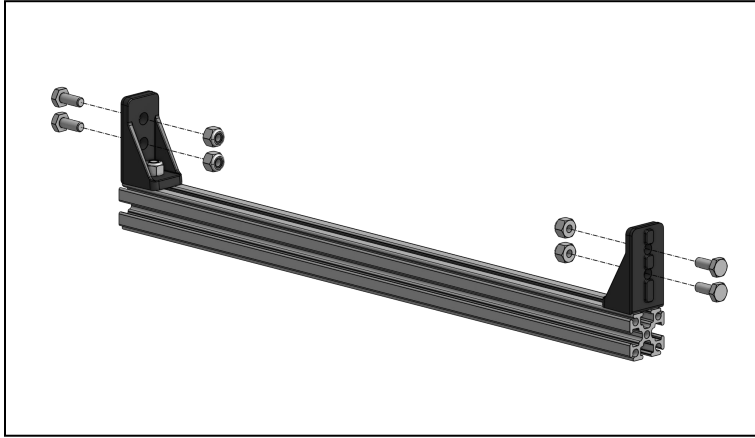
Take a bracket and finger start one hex cap screw and nyloc nut in the short side hole as shown. Pre-load two brackets.



Get:

- 1 - 15mm Extrusion - 225mm
- 2 - Pre-Loaded Lap Corner Brackets

Slide a pre-loaded bracket onto each end of the extrusion, then tighten the nuts.



Get:

- 4 - M3x8mm Hex Cap Screws
- 4 - M3 Nyloc Nuts

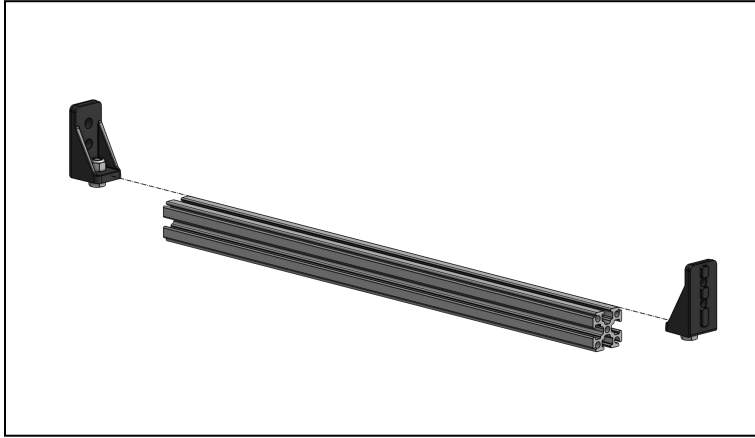
Finger start one hex cap screw and nyloc nut in each hole on the long side as shown.



Get:

- 2 - 15mm Plastic Lap Corner Bracket
- 2 - M3x8mm Hex Cap Screws
- 2 - M3 Nyloc Nuts

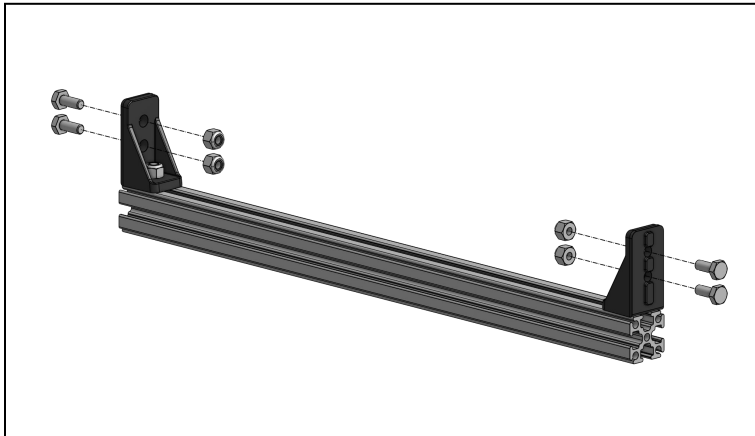
Take a bracket and finger start one hex cap screw and nyloc nut in the short side hole as shown. Pre-load two brackets.



Get:

- 1 - 15mm Extrusion - 225mm
- 2 - Pre-Loaded Lap Corner Brackets

Slide a pre-loaded bracket onto each end of the extrusion, then tighten the nuts.



Get:

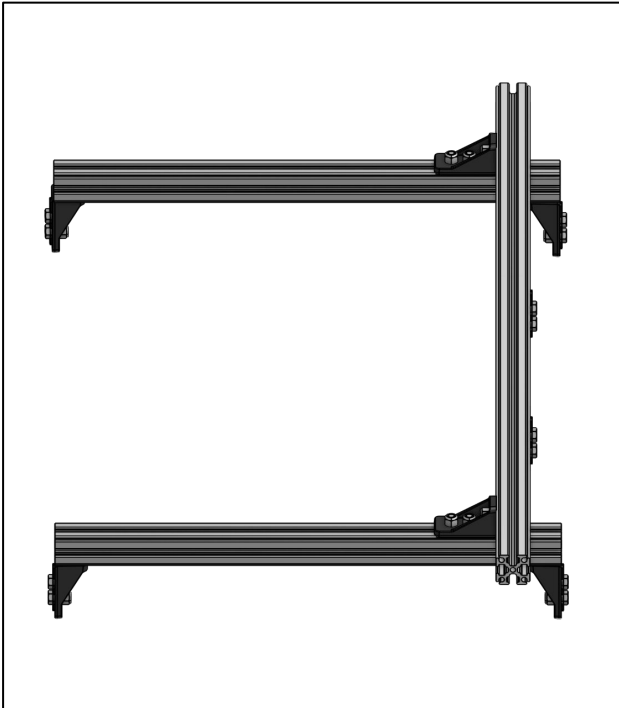
- 4 - M3x8mm Hex Cap Screws
- 4 - M3 Nyloc Nuts

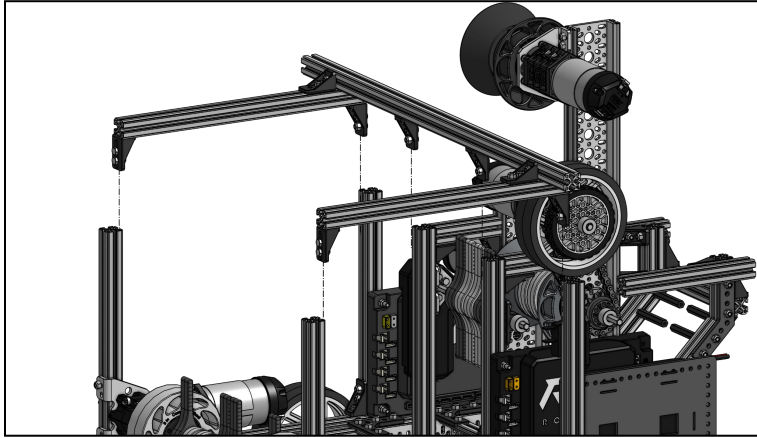
Finger start one hex cap screw and nyloc nut in each hole on the long side as shown.

Get:

- 1 - 420mm Extrusion with 4 Pre-Loaded Brackets
- 2 - 225mm Extrusion with 2 Pre-Loaded Brackets

Slide the two 225mm extrusion onto the outside lap corner brackets, do not yet tighten the nuts.





Get:

- 1 - Extrusion with Pre-Loaded Brackets

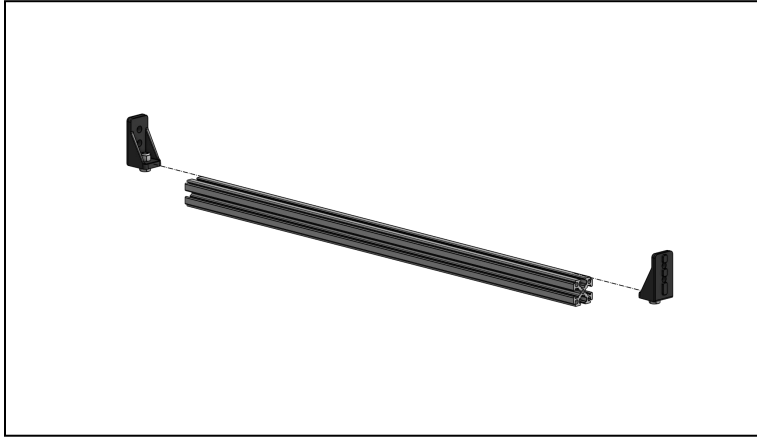
Slide the extrusion onto four upright extrusion of the hopper and then the two upright of the launcher assembly. Tighten all nuts



Get:

- 2 - 15mm Plastic Lap Corner Bracket
- 2 - M3x8mm Hex Cap Screws
- 2 - 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 two brackets.



Get:

- 1 - 15mm Extrusion Cut to 308mm
- 2 - Pre-Loaded Lap Corner Brackets

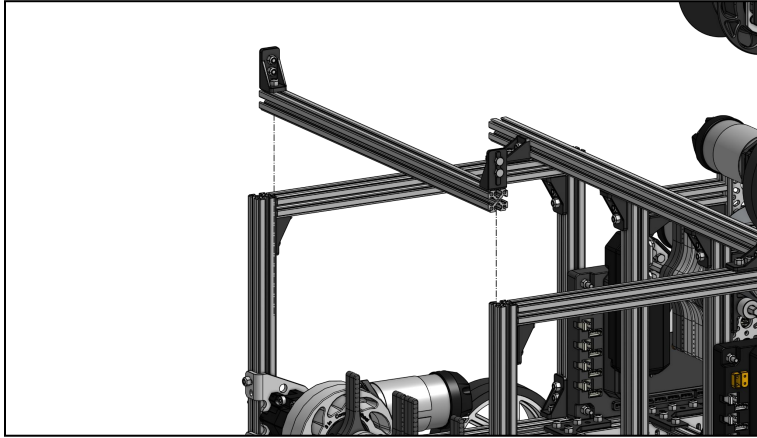
Slide a pre-loaded bracket onto each end of the extrusion, then tighten the nuts.



Get:

- 4 - M3x8mm Hex Cap Screws
- 4 - M3 Nyloc Nuts

Finger start one hex cap screw and nyloc nut in each hole on the long side as shown.



Get:

- 1 - 308mm Extrusion with 2 Pre-Loaded Brackets

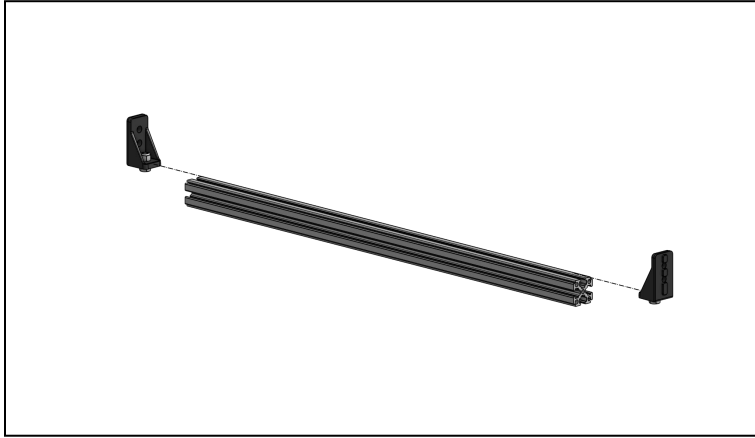
Slide the brackets down the upright extrusion of the hopper as shown. The extrusion should be just above the tips of the flap wheels on the intake assembly. Tighten all nuts.



Get:

- 2 - 15mm Plastic Lap Corner Bracket
- 2 - M3x8mm Hex Cap Screws
- 2 - 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 two brackets.



Get:

- 1 - 15mm Extrusion Cut to 308mm
- 2 - Pre-Loaded Lap Corner Brackets

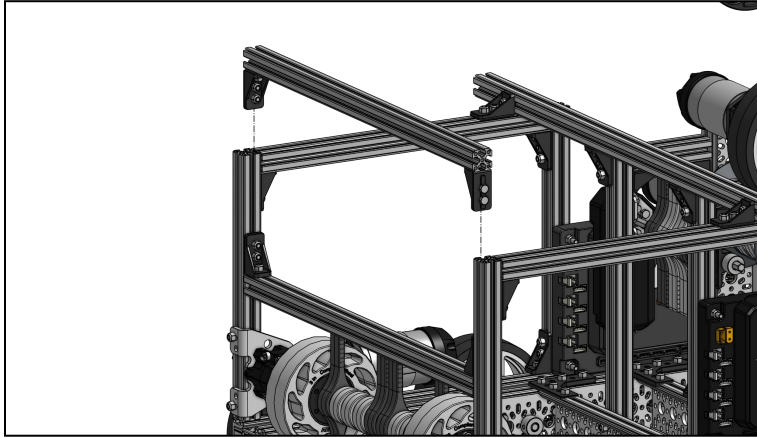
Slide a pre-loaded bracket onto each end of the extrusion, then tighten the nuts.



Get:

- 4 - M3x8mm Hex Cap Screws
- 4 - M3 Nyloc Nuts

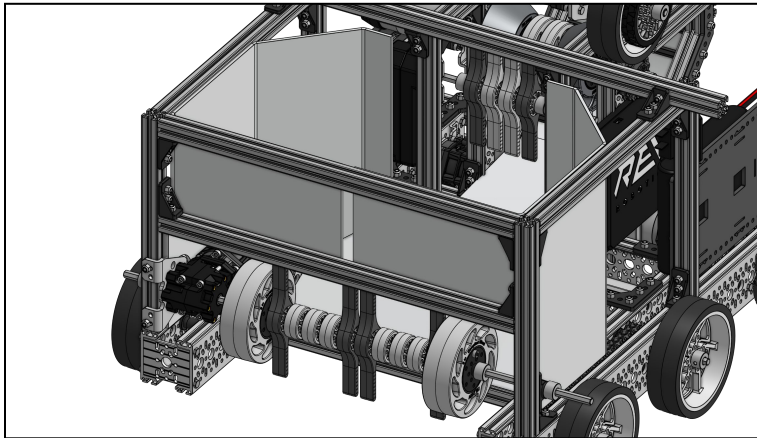
Finger start one hex cap screw and nyloc nut in each hole on the long side as shown.



Get:

- 1 - 308mm Extrusion with 2 Pre-Loaded Brackets

Slide the brackets down the upright extrusion of the hopper so that the edge of the extrusion is flush with the tops of the upright extrusion. Tighten all nuts.



Get:

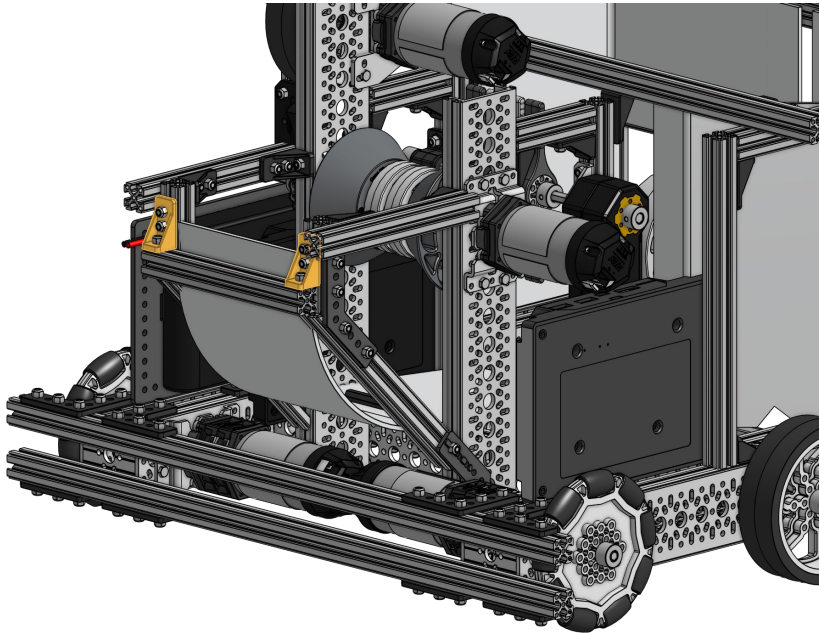
- 1 - Hopper Side Left
- 1 - Hopper Side Right
- Zipties as needed

Install the sides of the hopper using zip ties in each corner of the hopper and ends of the corrugated plastic.

Adjusting Launcher Vertical Compression

Get:

- Zipties as needed



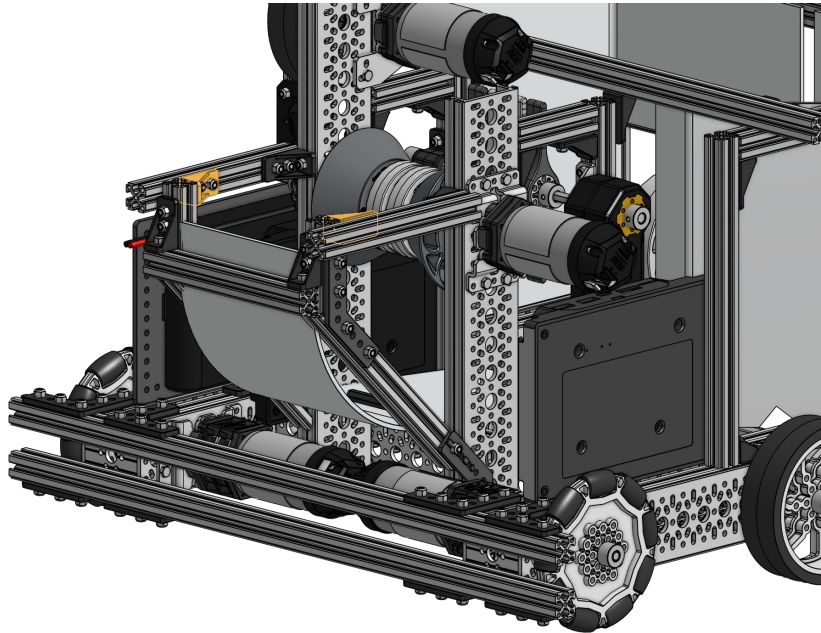
Place WILDFIRE in your hood and move it along the path of the launcher. Look for any area the WILDFIRE does not maintain contact with the hood and the flywheel. Loosen the lap corner brackets highlighted in this image to adjust the hood in the vertical direction. Do this until the WILDFIRE maintains contact with the hood and flywheel throughout the entire path.

Once you have finished adjusting the hood to the standoffs and horizontal 120mm extrusion with zipties.

Adjusting Launcher Horizontal Compression

Get:

- Zipties as needed



Place WILDFIRE in your hood and move it along the path of the launcher. Look for any area the WILDFIRE does not maintain contact with the hood and the flywheel. Loosen the lap corner brackets highlighted in this image to adjust the hood in the horizontal direction. Do this until the WILDFIRE maintains contact with the hood and flywheel throughout the entire path.

Once you have finished adjusting the hood to the standoffs and horizontal 120mm extrusion with zipties.



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