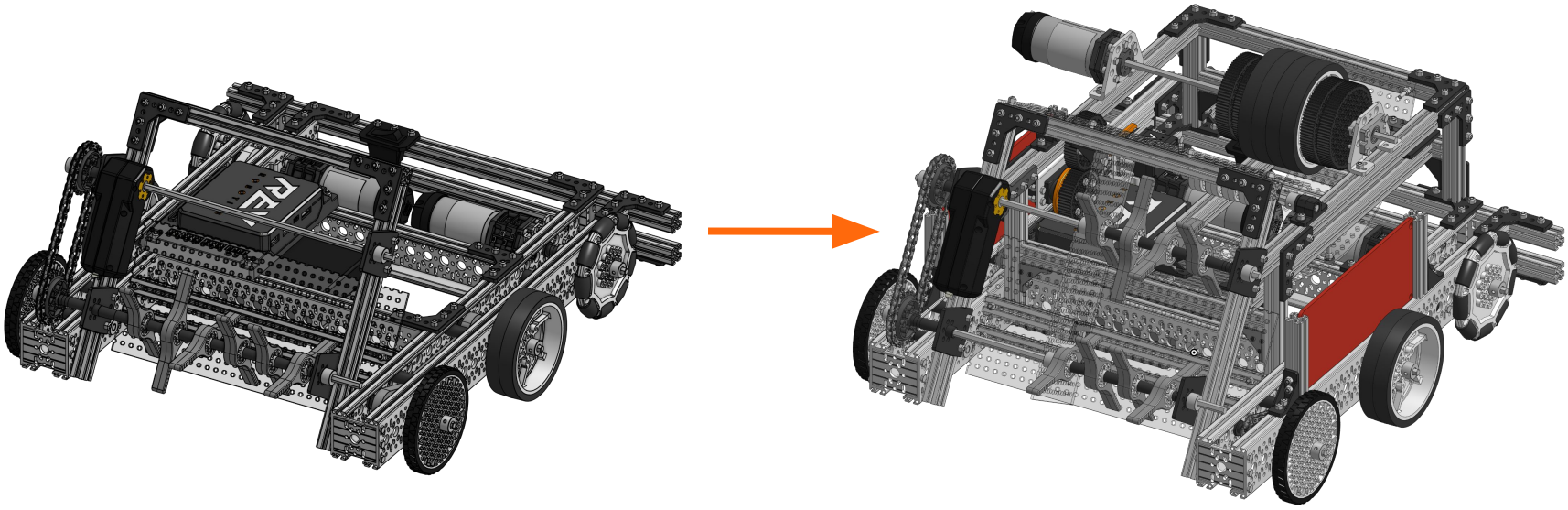
# 2026-27 REV DUO FTC Starter Bot Base Upgrade Build Guide



| Bill of Materials | | | | | |
|---|---|---|---|---|---|
| PART NUMBER | DESCRIPTION | QTY. | PART NUMBER | DESCRIPTION | QTY. |
| REV-41-1325 | 1.5mm Spacer | 1 | REV-41-1337 | 90 Tooth Plastic Gear | 4 |
| REV-41-1317 | 15mm Bearing Pillow Block | 2 | REV-41-1820 | Aluminum Double Servo Arm | 1 |
| REV-41-1568 | 15mm Extrusion - 120mm - 90° Ends | 3 | REV-41-1828 | Aluminum Servo Horn V2 | 1 |
| REV-41-1431 | 15mm Extrusion - 225mm - 90° Ends | 3 | REV-41-2702 | Intake Flap - 5mm Hex - 40A Dark Gray | 2 |
| REV-41-1432 | 15mm Extrusion - 420mm - 90° Ends | 8 | REV-41-1361 | M3 Nyloc Nut | 267 |
| REV-41-1485 | 15mm Metal Bent Servo Bracket V2 | 2 | REV-41-1360 | M3 x 16mm Hex Cap Screw | 22 |
| REV-41-1308 | 15mm Plastic 30 Degree Bracket | 2 | REV-41-1124 | M3 x 20mm Hex Cap Screw | 6 |
| REV-41-1305 | 15mm Plastic 90 Degree Bracket | 12 | REV-41-1359 | M3 x 8mm Hex Cap Screw | 260 |
| REV-41-1320 | 15mm Plastic Inside Corner Bracket | 9 | REV-41-1327 | Shaft Collars | 8 |
| REV-41-1321 | 15mm Plastic Lap Corner Bracket | 11 | REV-41-3334 | Smart Robot Servo V2 - Balanced | 2 |
| REV-41-1304 | 15mm Plastic Rod End Bracket | 2 | REV-41-2150 | Soft (Light Gray) - 5mm Hex Bore - 1in Grip Wheel | 4 |
| REV-41-1323 | 15mm Spacer | 1 | REV-41-1329 | Through Bore Bearing - Long | 2 |
| REV-41-1324 | 3mm Spacer | 12 | REV-41-1623 | UltraPlanetary Bent Mounting Bracket | 2 |
| REV-41-1683 | 5mm Hex Bearing Block | 1 | REV-41-1600 | UltraPlanetary Gearbox Kit & HD Hex Motor | 1 |
| REV-41-1362 | 5mm x 400mm Hex Shaft | 2 | REV-41-7537 | Polycarbonate Sheet - 2mm - 8mm Grid Pattern | 1 |
| REV-41-1335 | 60 Tooth Plastic Gear | 2 | | | |

# Cut List

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

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

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

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

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

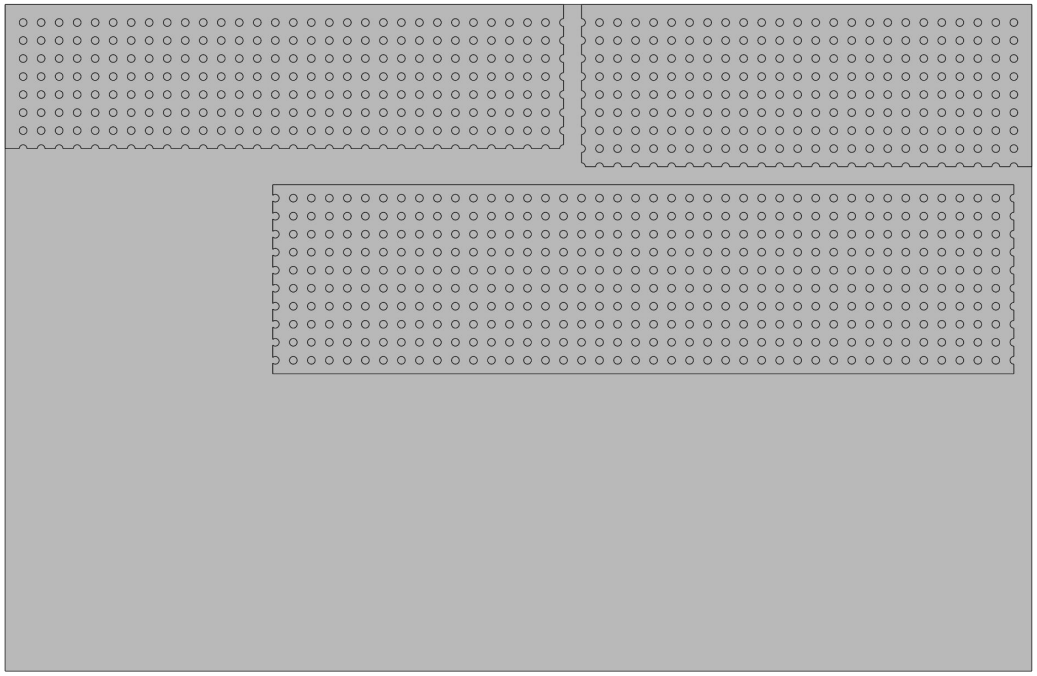
**Cut from 5mm x 400mm Hex Shaft**

| Length | QTY | Assembly |
|---|---|---|
| 252mm | 2 | Feeder & Launcher |

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

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

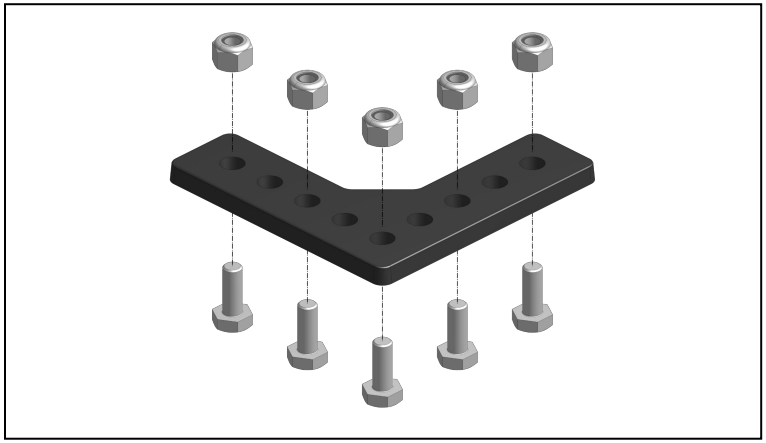
Polycarbonate can be cut with either tin snips or with a band saw. Below is the recommended layout for the least amount of cuts,



# Pre-Loading Brackets

| PART NUMBER | DESCRIPTION | QTY. |
|---|---|---|
| REV-41-1305 | 15mm Plastic 90 Degree Bracket | 10 |
| REV-41-1320 | 15mm Plastic Inside Corner Bracket | 8 |
| REV-41-1321 | 15mm Plastic Lap Corner Bracket | 8 |
| REV-41-1317 | 15mm Bearing Pillow Block | 2 |
| REV-41-1485 | 15mm Metal Bent Servo Bracket V2 | 1 |
| REV-41-1623 | UltraPlanetary Bent Mounting Bracket | 1 |
| REV-41-1485 | 15mm Metal Bent Servo Bracket V2 | 2 |
| REV-41-1359 | M3 x 8mm Hex Cap Screws | 195 |
| REV-41-1361 | M3 Nyloc Nuts | 195 |



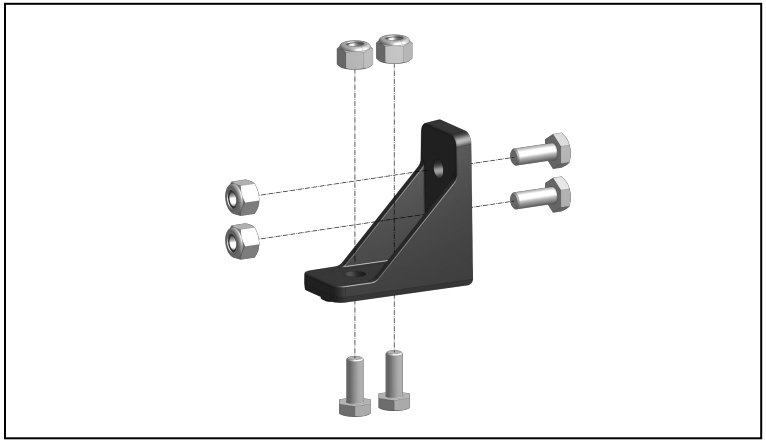


Get:

- 10 - 15mm Plastic 90 Degree Brackets
- 50 - M3 x 8mm Hex Cap Screws
- 50 - M3 Nyloc Nuts

Take a bracket and finger start one hex cap screw and nyloc nut per hole as shown. Pre-load 10 brackets.

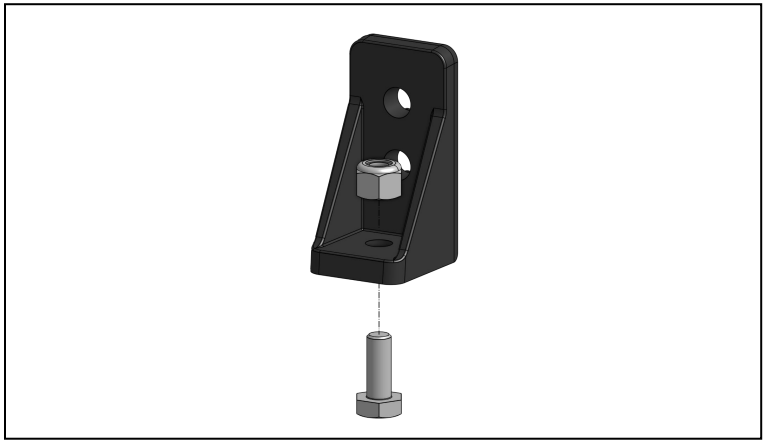
Note: The side of the bracket with “ribs” must have the hex cap screw head.



Get:

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

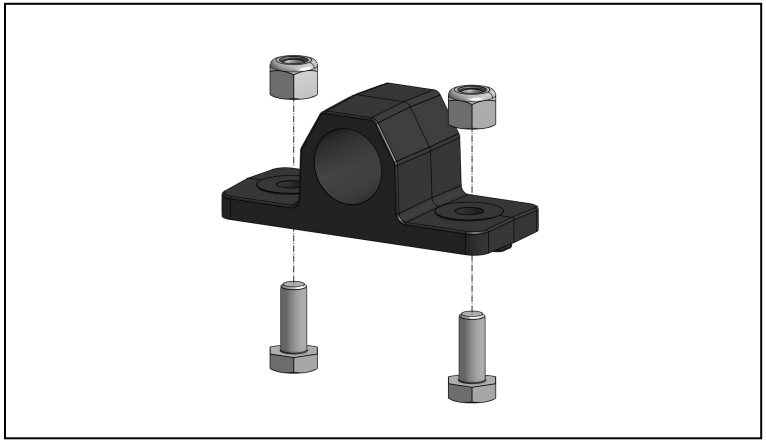
Take a bracket and finger start one hex cap screw and nyloc nut per hole as shown. Pre-load 8 brackets.



Get:

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

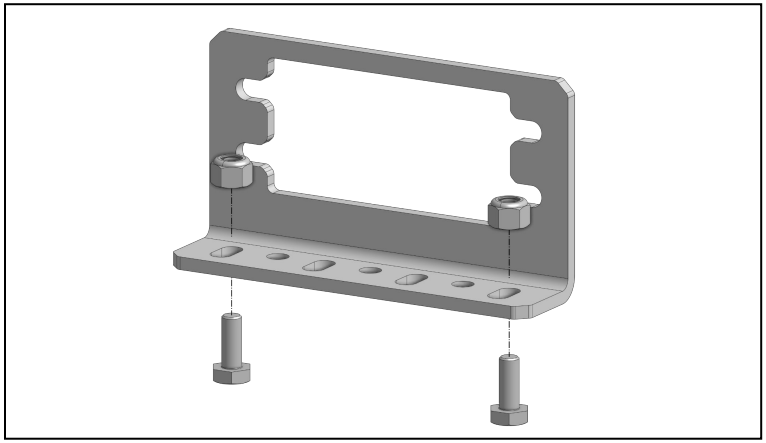
Take a bracket and finger start one hex cap screw and nyloc nut in the short side hole as shown. Pre-load 8 brackets.



Get:

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

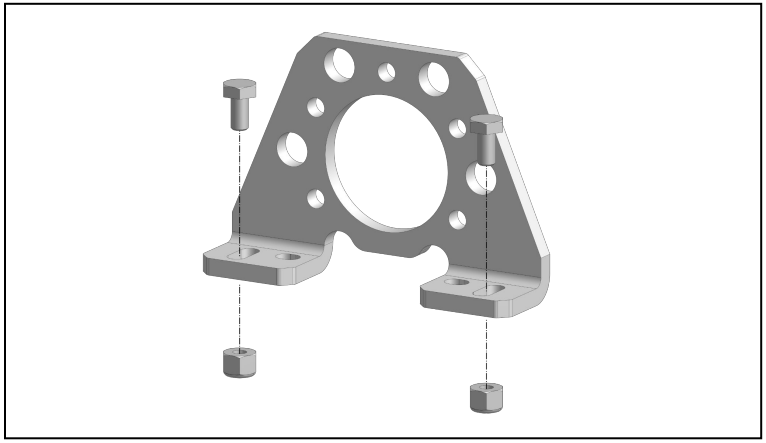
Take a bearing pillow block and finger start one hex cap screw and nyloc nut in each hole as shown. Pre-load 2 bearing blocks.



Get:

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

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



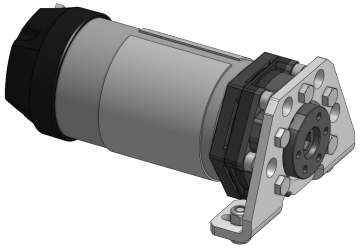
Get:

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

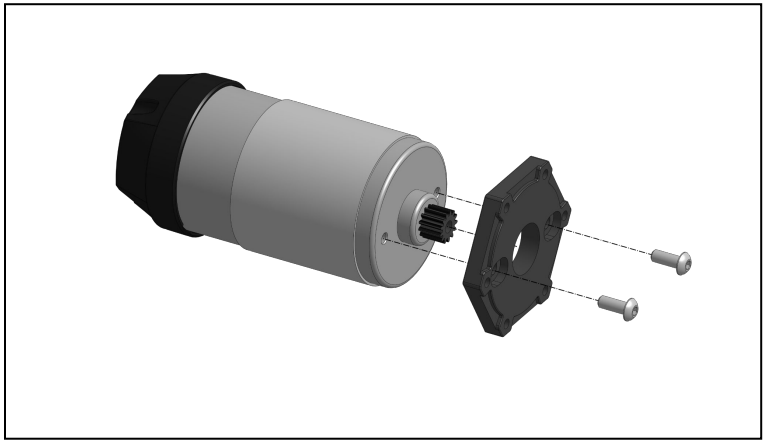
Take a bracket and finger start one hex cap screw and nyloc nut in the short side hole as shown. Pre-load 2 brackets.

# UltraPlanetary and HD Motor Assemblies

| PART NUMBER | DESCRIPTION | QTY. |
|---|---|---|
| NA | Pre-Loaded UltraPlanetary<br>Bent Mounting Bracket | 1 |
| REV-41-1607 | UltraPlanetary 550 Motor Plate | 1 |
| REV-41-1615 | UltraPlanetary Output V2 | 1 |
| REV-41-1291 | HD Hex Motor | 1 |
| REV-41-1359 | M3 x 8mm Hex Cap Screw | 5 |
| REV-41-1609 | M3 x 10mm Socket Cap Head Screw | 6 |
| REV-41-1609 | M3 x 8mm Button Head Screw | 2 |



1

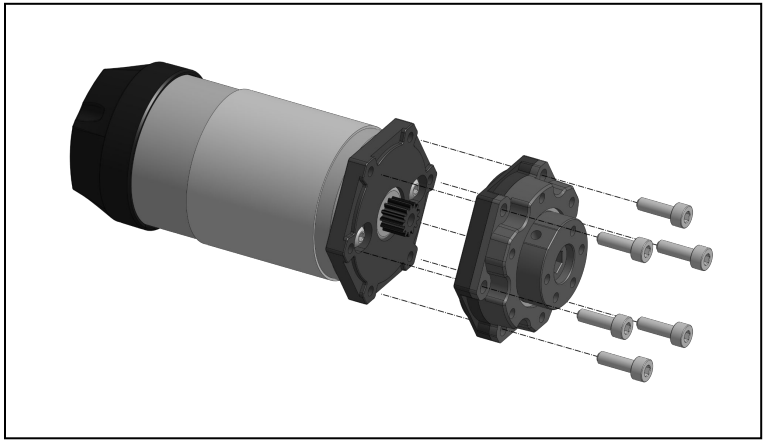


Get:

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

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

2



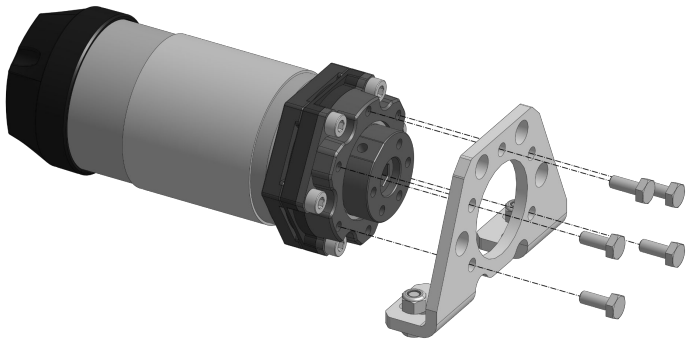
Get:

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

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

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

3



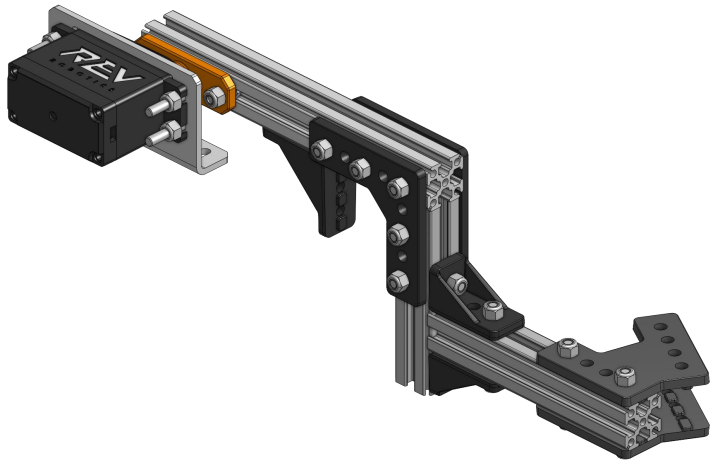
Get:

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

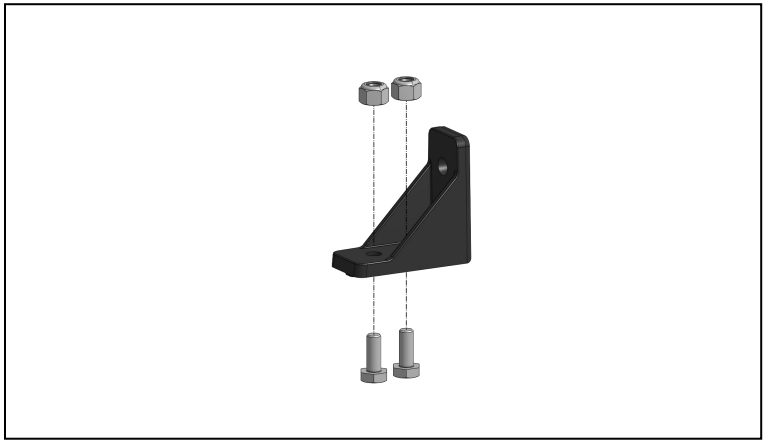
Secure a pre-loaded bent mounting bracket onto the output with five 8mm hex cap screws.

# Pollen Pusher Assembly

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



1

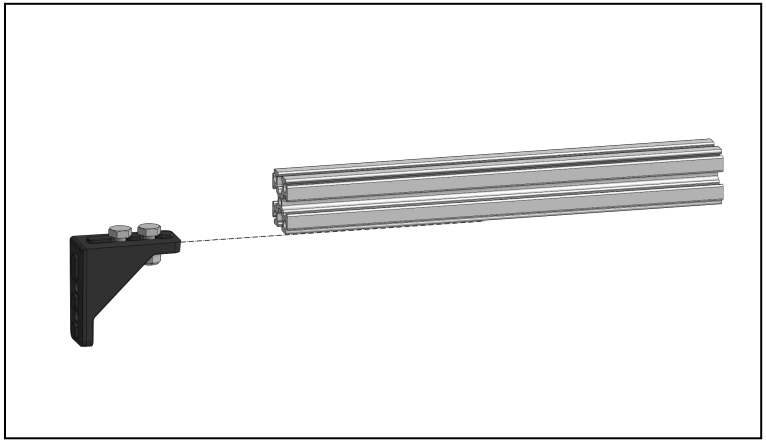


Get:

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

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

2

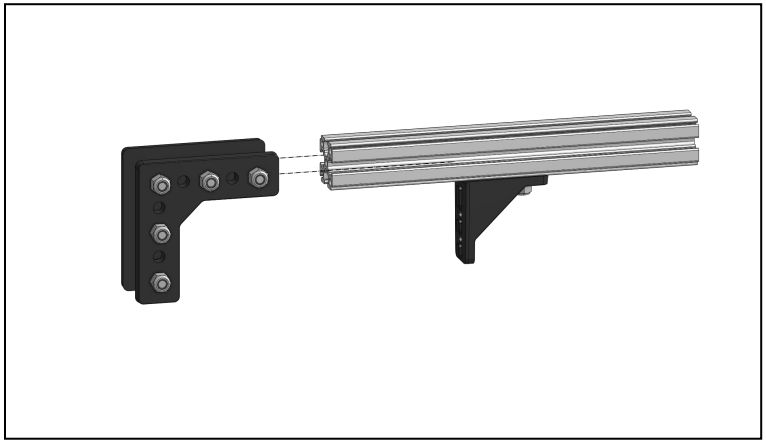


Get:

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

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

3

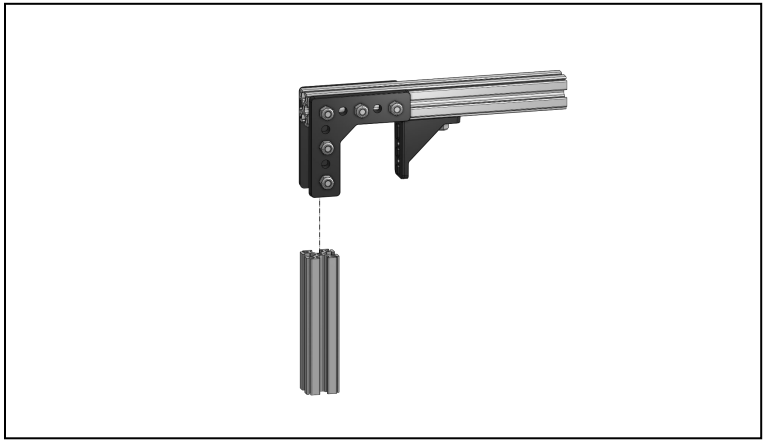


Get:

- 2 - Pre-Loaded 90 Degree Brackets

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

4

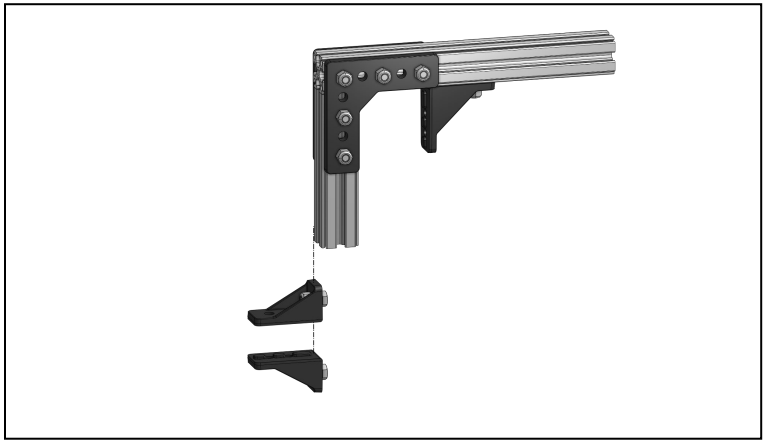


Get:

- 1 - 15mm Extrusion - Cut to 63mm

Slide the extrusion onto the pre-loaded brackets.

5

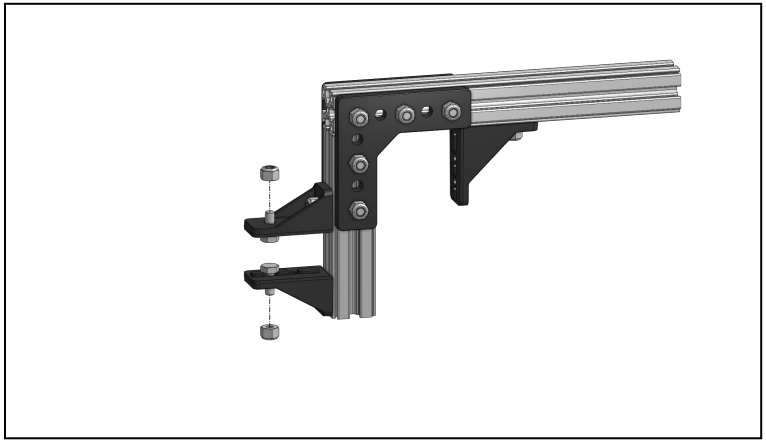


Get:

- 2 - Pre-Loaded Lap Corner Bracket

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

6

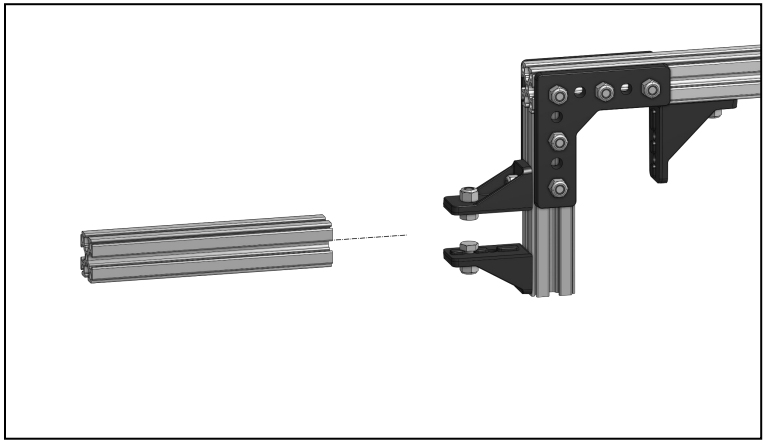


Get:

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

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

7

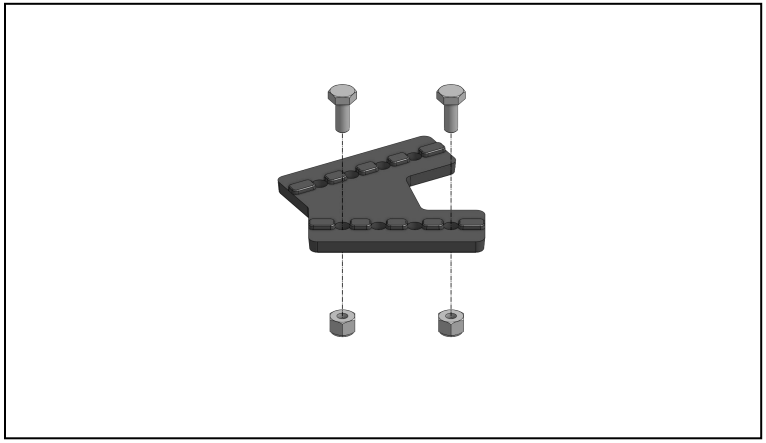


Get:

- 1 - 15mm Extrusion - Cut to 83mm

Slide the extrusion onto the pre-loaded brackets.

8

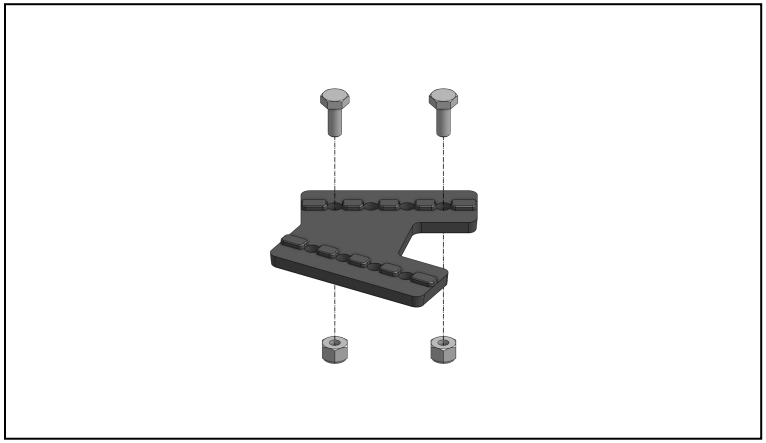


Get:

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

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

9



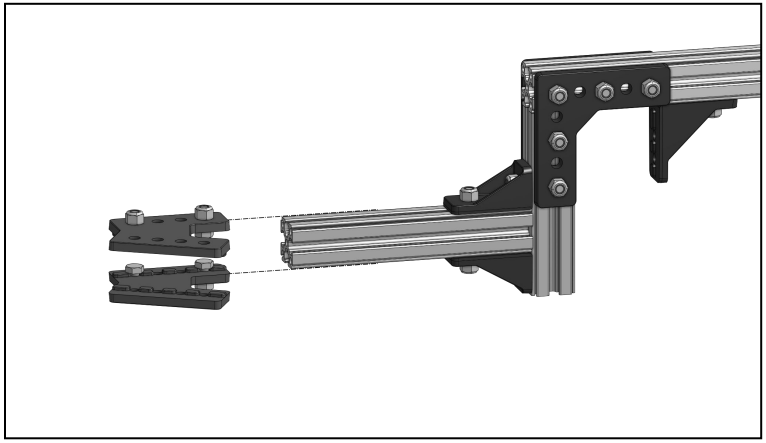
Get:

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

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

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

10

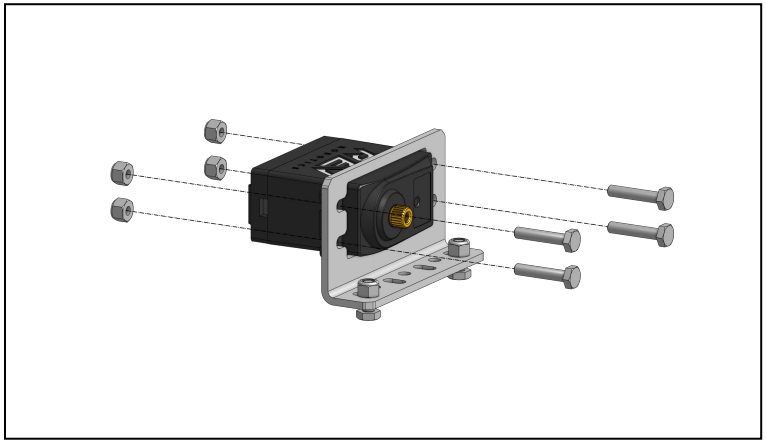


Get:

- 2 - Pre-Loaded 90 Degree Brackets

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

11

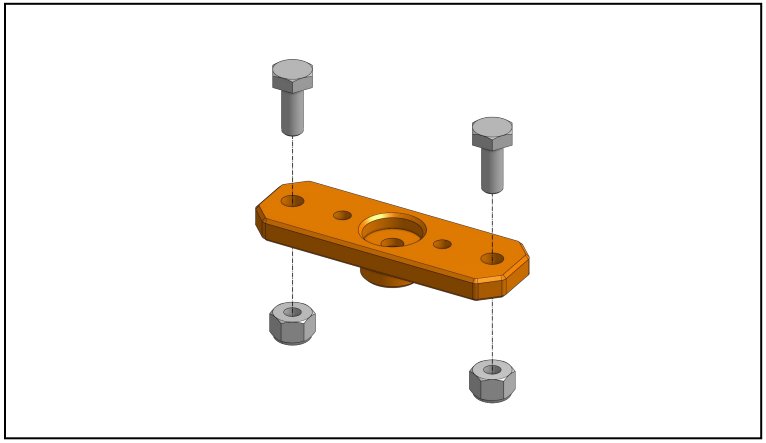


Get:

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

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

12

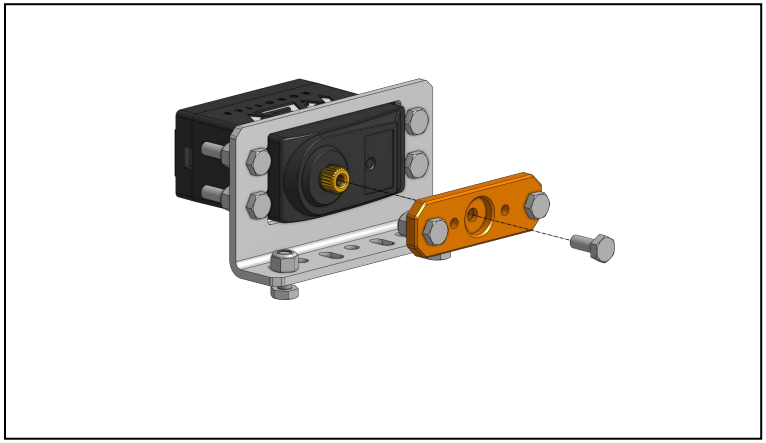


Get:

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

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

13

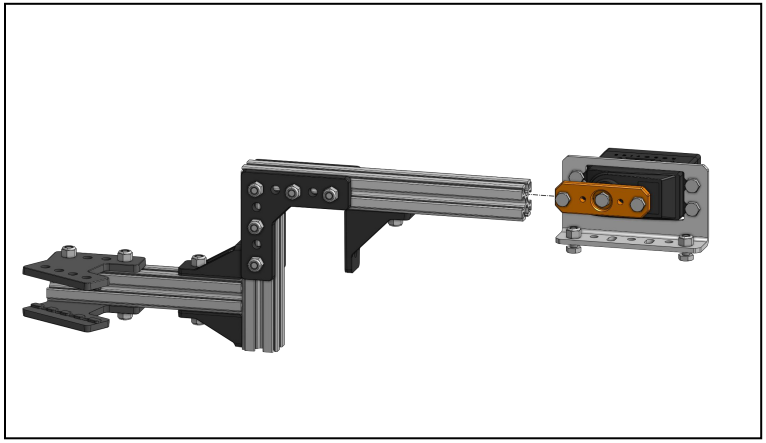


Get:

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

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

14

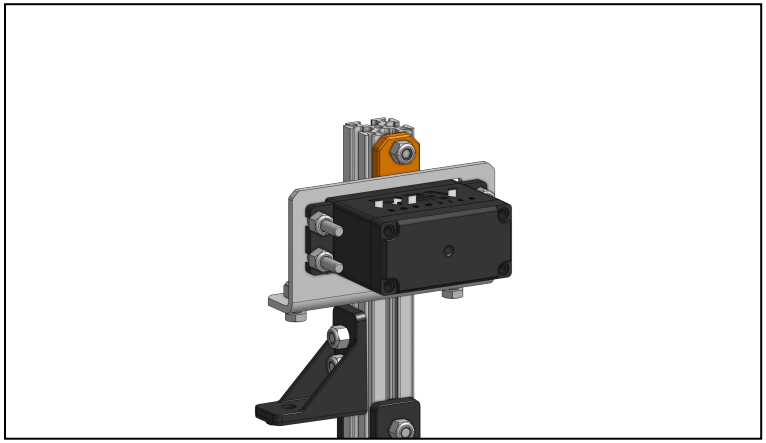


Get:

- 1 - Servo Arm Assembly
- 1 - Servo Assembly

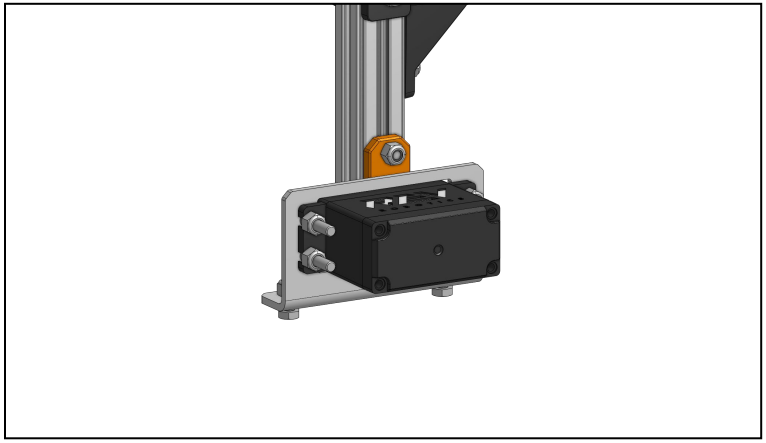
Slide the servo arm extrusion onto the servo aluminum servo arm, the end of the extrusion should be flush with the servo arm.

15



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

16

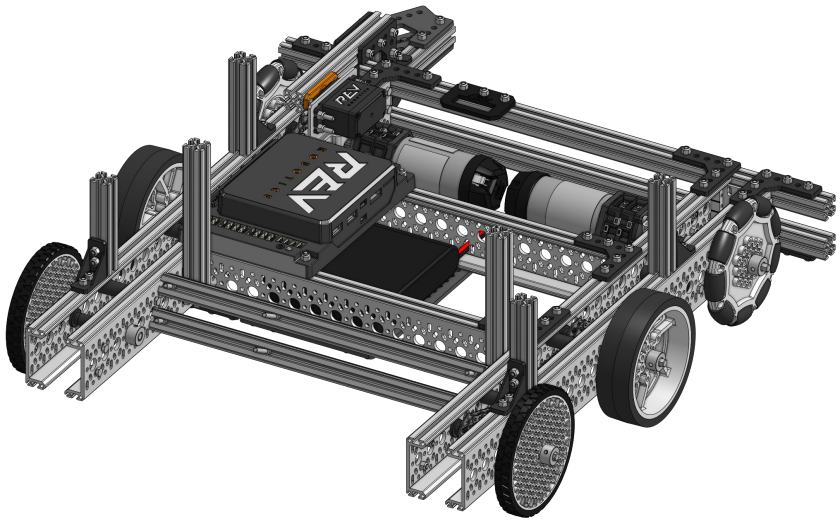


Rotate the servo until the other nut on the aluminum servo arm is exposed, then tighten the nut.

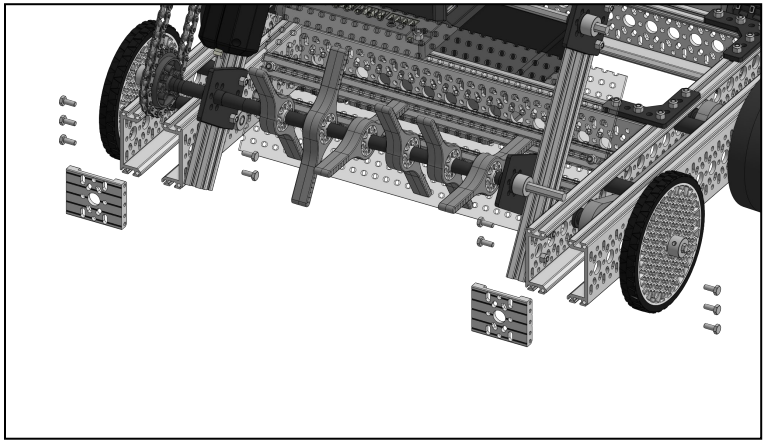
Set this assembly aside for installation during the drivetrain assembly.

# Drivetrain Assembly

| PART NUMBER | DESCRIPTION | QTY |
|---|---|---|
| N/A | Pollen Pusher Assembly | 1 |
| N/A | 15mm Extrusion - Cut to 70mm | 4 |
| N/A | Pre-Loaded 15mm Plastic Inside Corner Bracket | 4 |
| REV-41-1568 | 15mm Extrusion - 120mm - 90° Ends | 2 |
| REV-41-1359 | M3 x 8mm Hex Cap Screw | 16 |
| REV-41-1361 | M3 Nyloc Nuts | 16 |
| REV-41-1360 | M3 x 16mm Hex Cap Screw | 2 |

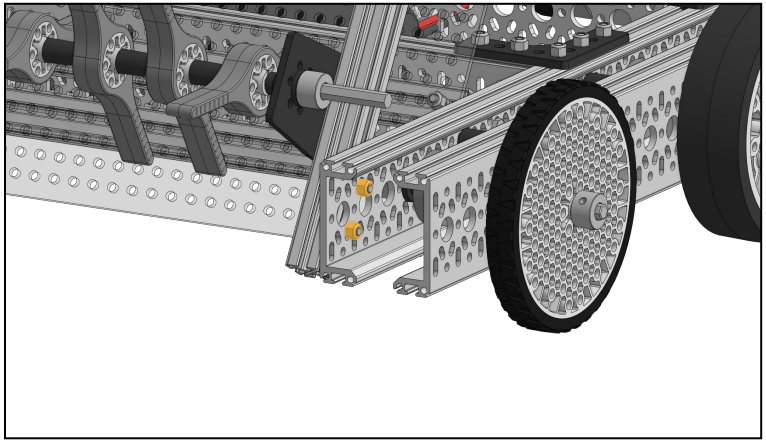


1



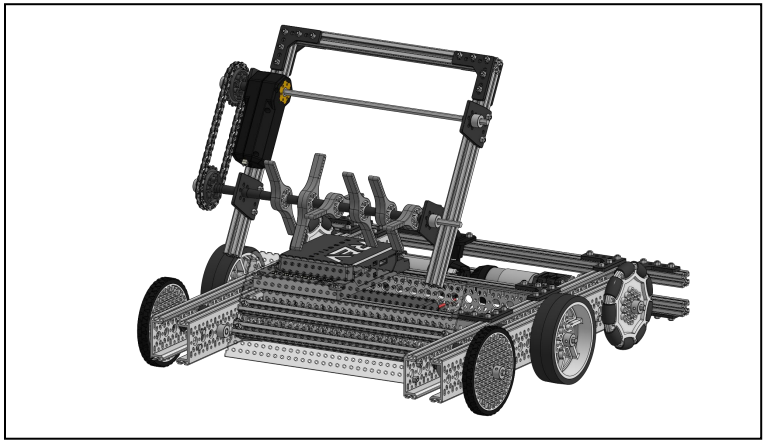
Remove the five screws in both u channel endcaps, then remove the endcaps.

2



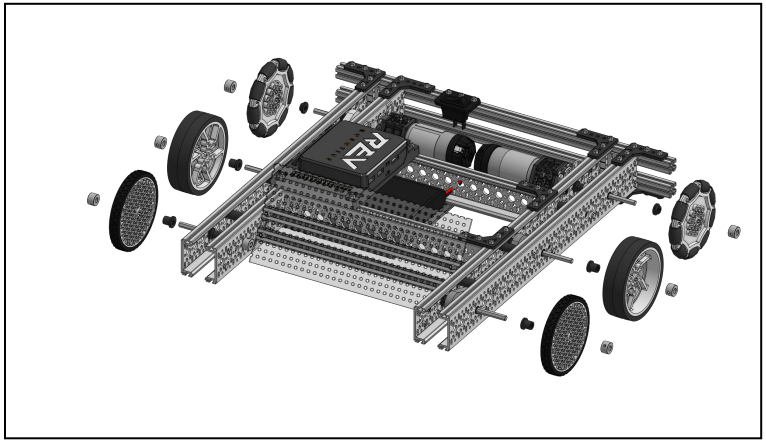
Loosen the four nuts and screws holding intake assembly.

3



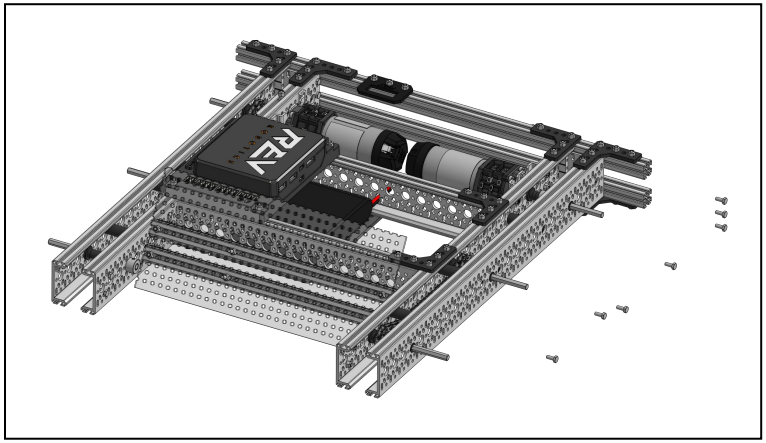
Remove the intake assembly and set aside for intake section.

4



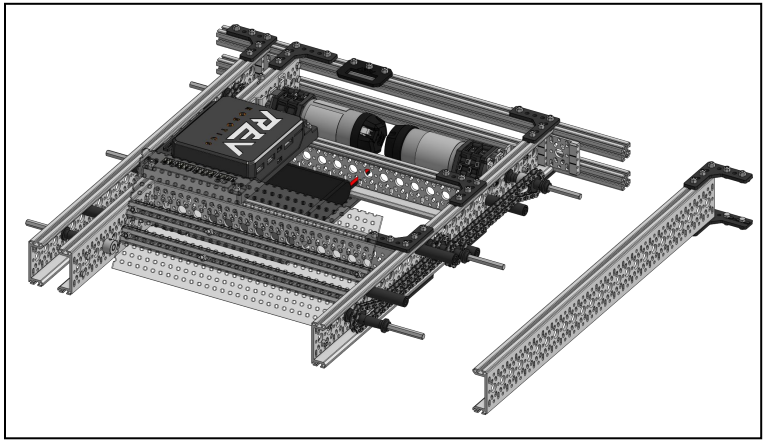
Loosen the shaft collars then remove the wheels and through bore bearings.

5



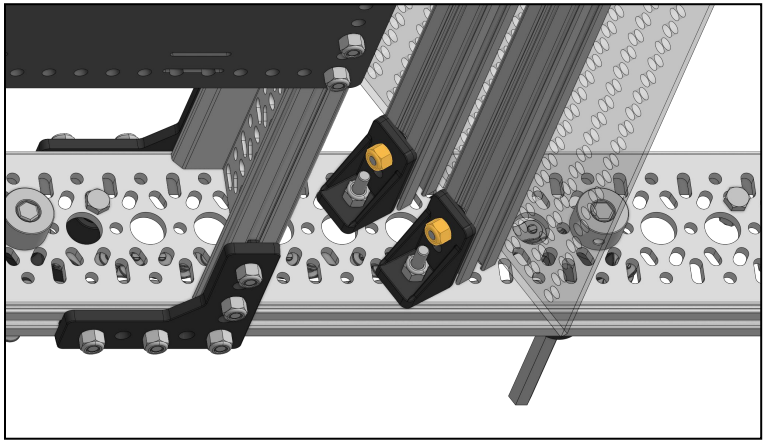
Remove the seven hex cap screws securing the c channel on the right side of the drivetrain.

6



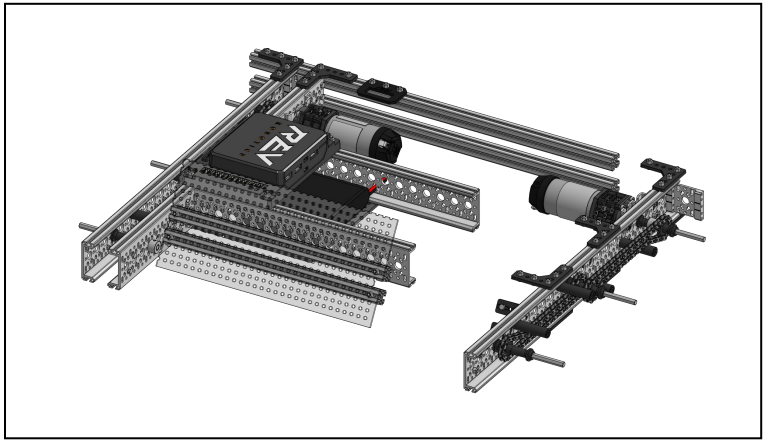
Loosen the three nuts and screws on the top 90 degree bracket holding the c channel to the extrusion, then do the same for the bottom 90 degree bracket. Then slide the c channel off the extrusion.

7



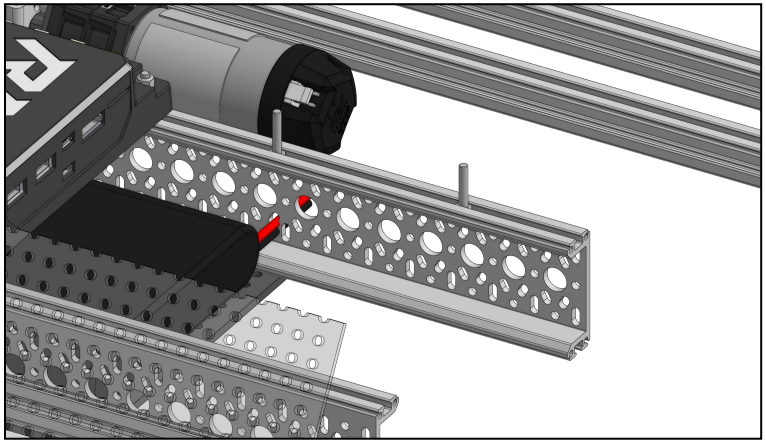
Loosen the nuts and screws securing the intake supports to the lap corner brackets.

8




Loosen the three nuts and screws on the six 90 degree brackets holding the right drive rail to the rest of the drivetrain. Then separate the drive rail from the rest of the drivetrain.

9

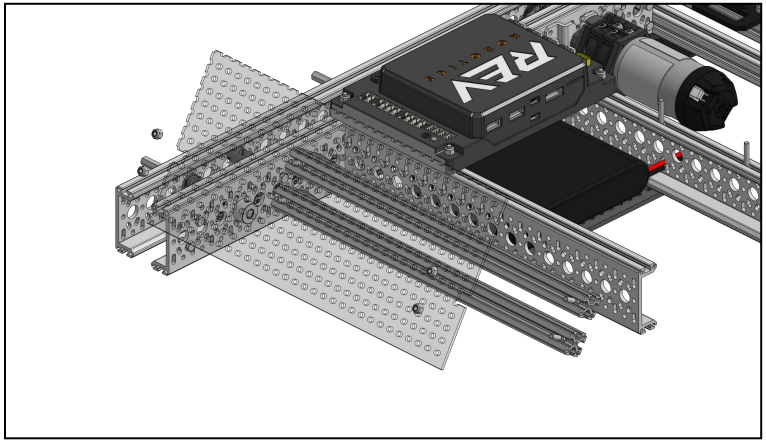


Get:

- 2 - M3 x 16mm Hex Cap Screws

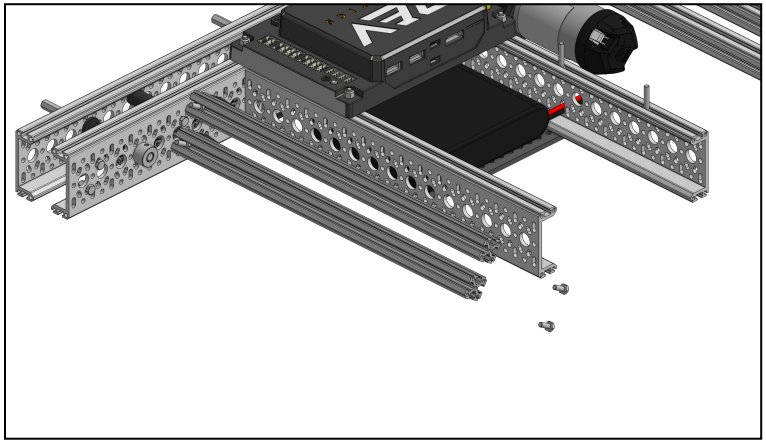
Slide two 16mm screws onto the c channel as shown.

10



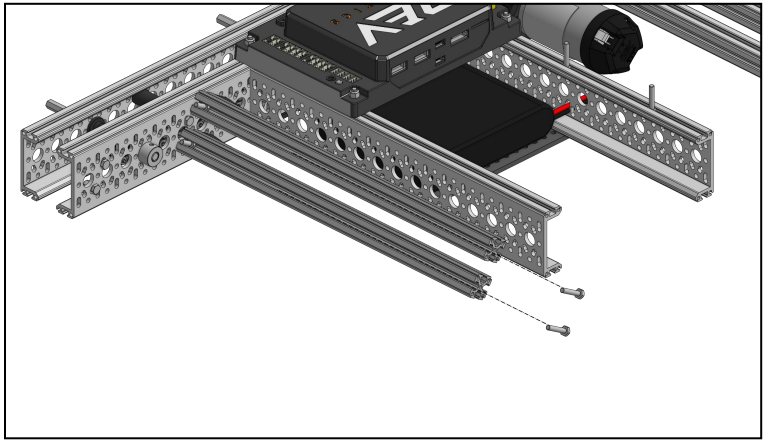

Loosen the four nuts and screws securing the intake floor polycarbonate then remove the polycarbonate.

11



Remove the two right 8mm hex cap screws from the intake supports. Set these aside to slide back onto the drivetrain in a later step.

12

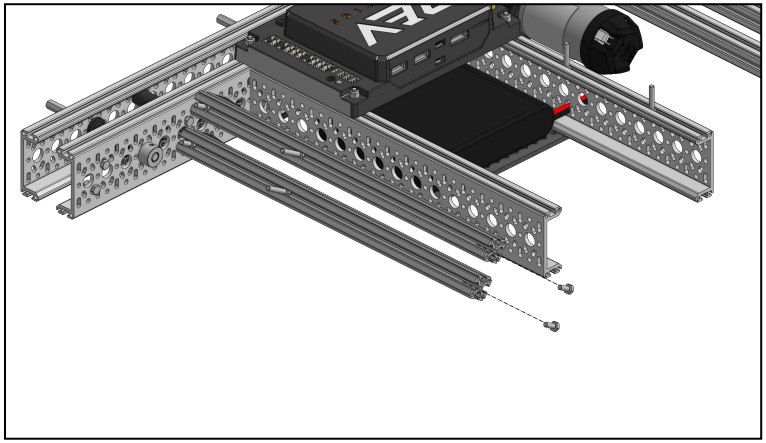


Get:

- 2 - M3 x 16mm Hex Cap Screws

Slide a 16mm screw onto each intake support extrusion.

13

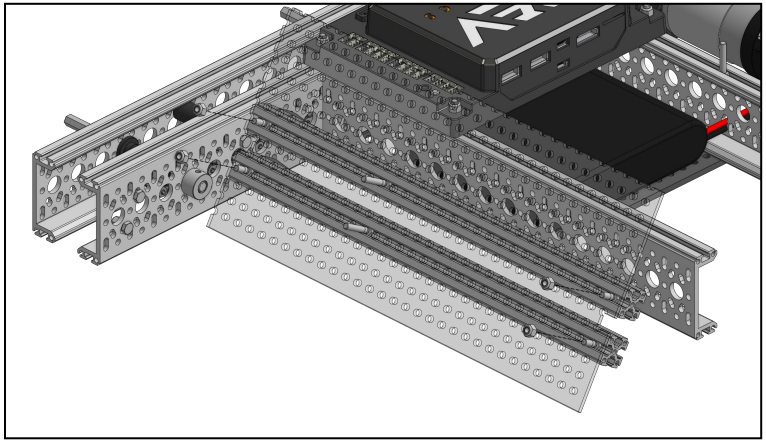


Get:

- 2 - M3 x 8mm Hex Cap Screws from step 11

Slide the 8mm screws back onto the intake supports.

14

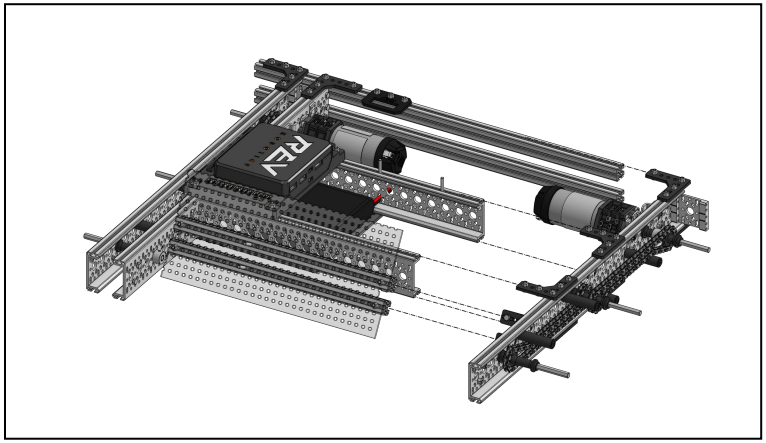


Get:

- 1 - Intake Floor Polycarbonate
- 4 - M3 Nyloc Nuts

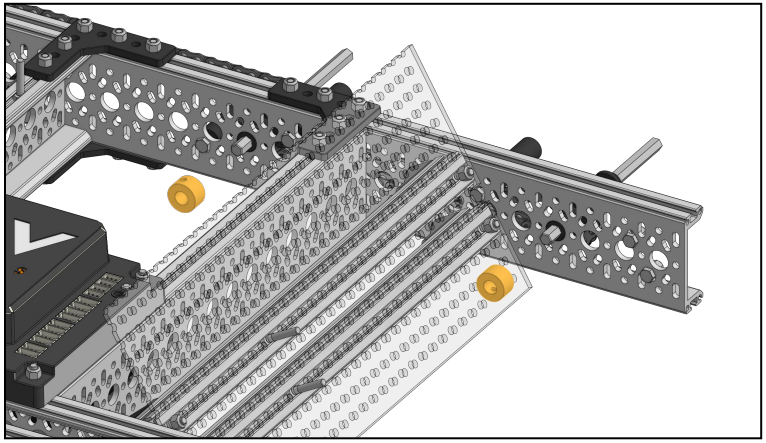
Slide the intake floor back onto the intake supports. The 16mm screws should be through the 11th holes from the left side of the intake floor polycarbonate. Replace the nyloc nuts on the 8mm screws and tighten them.

15



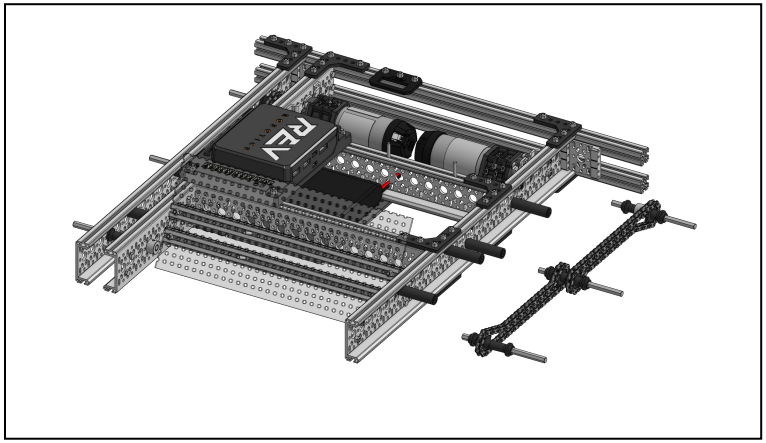
Replace the right drive rail then tighten all the nuts.

16



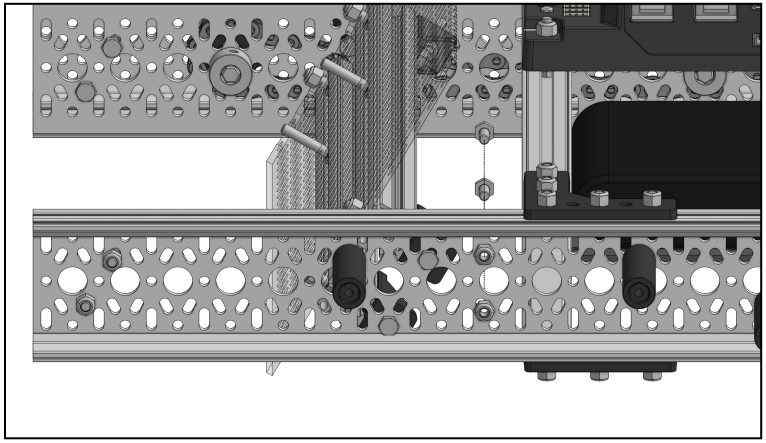
Loosen and remove the two shaft collars on the double sprocket and single sprocket shafts.

17



Remove the chain and shafts from the driverail.

18

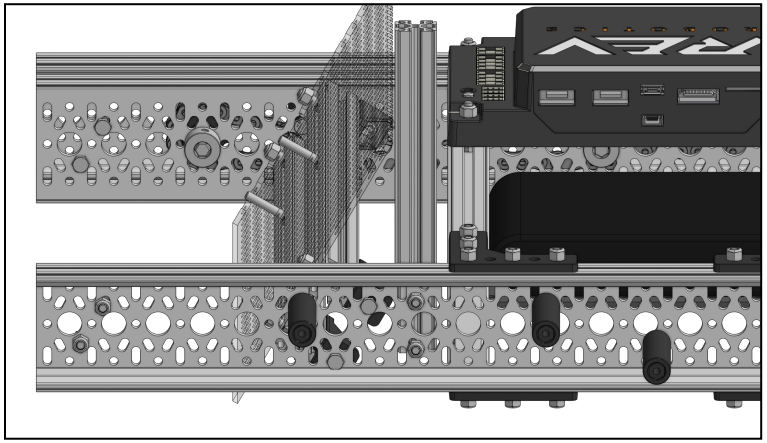


Get:

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

Finger start a hex cap screw and nyloc in the two holes shown.

19

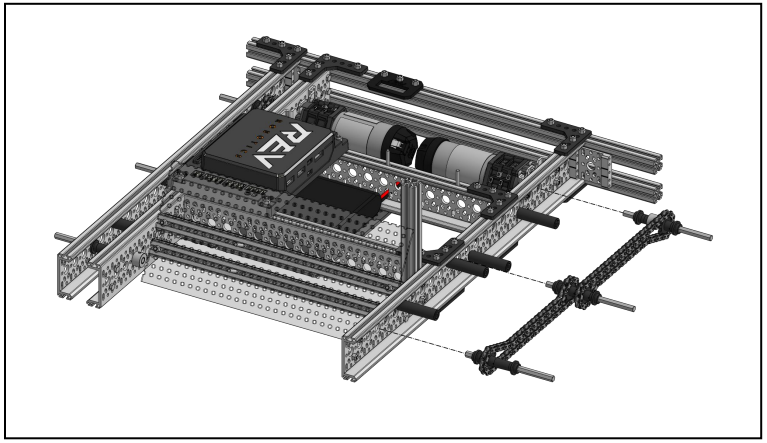


Get:

- 1 - 15mm Extrusion - 120mm

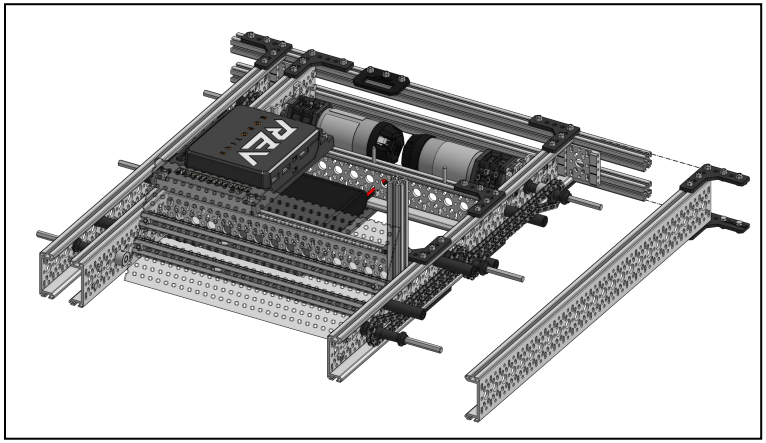
Slide the extrusion onto the screws from the previous step. The end of the extrusion should be just past the end of the screw. There should be 86mm of the extrusion extending past the top of the c channel.

20



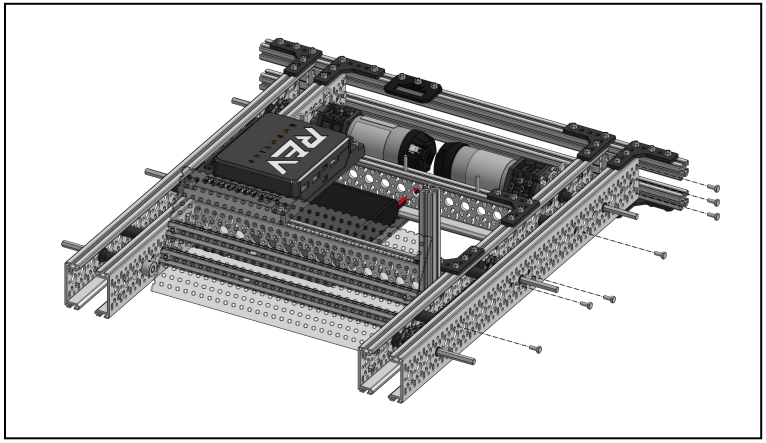
Replace the chain and shafts to the driverail. Then replace the shaft collars on the back side of the shafts.

21



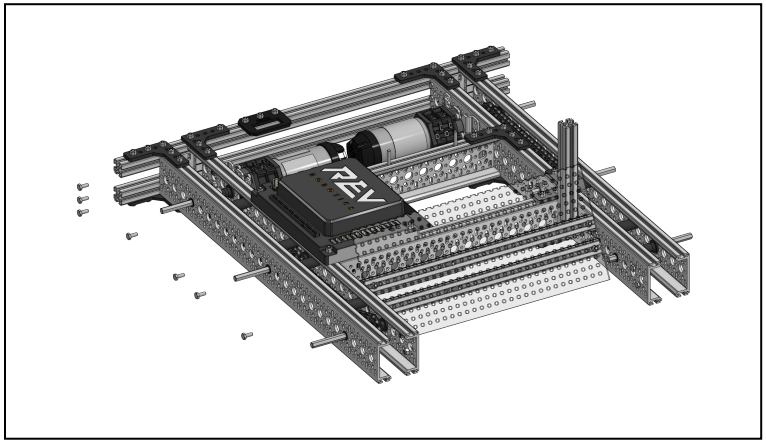
Replace the c channel from step c channel with the two 90 degree brackets from step 6. Then tighten the nuts and screws.

22



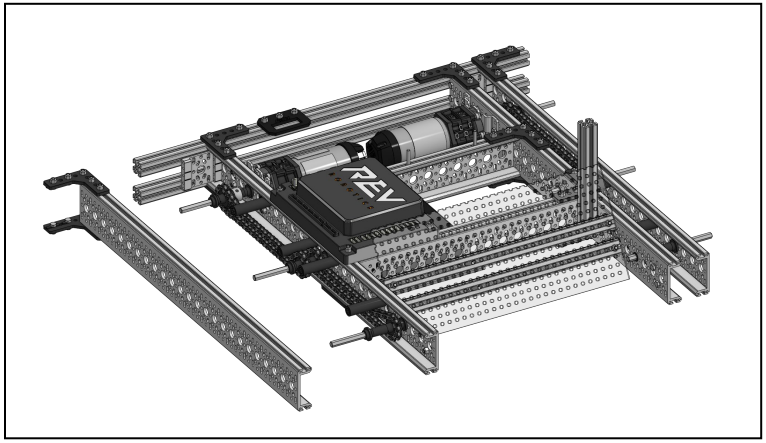
Replace the seven screws securing the c channel to the endcap and standoffs.

23



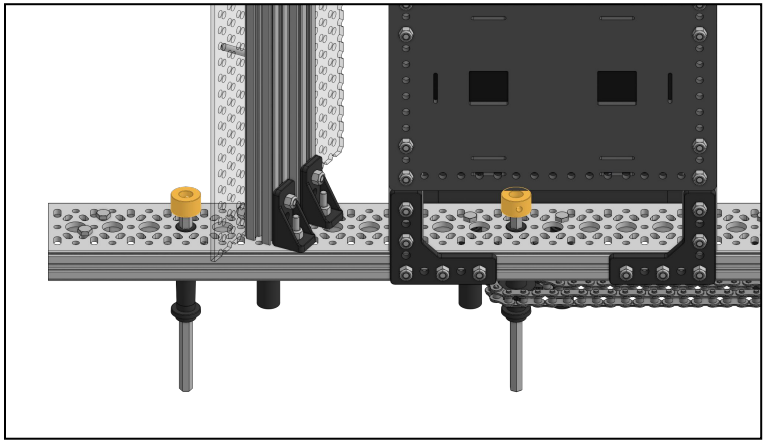
Remove the seven hex cap screws securing the c channel on the left side of the drivetrain.

24



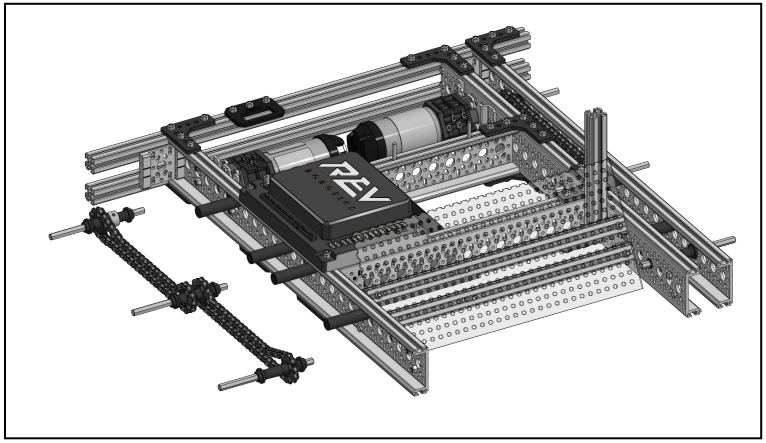
Loosen the three nuts and screws on the top 90 degree bracket holding the c channel to the extrusion, then do the same for the bottom 90 degree bracket. Then slide the c channel off the extrusion.

25



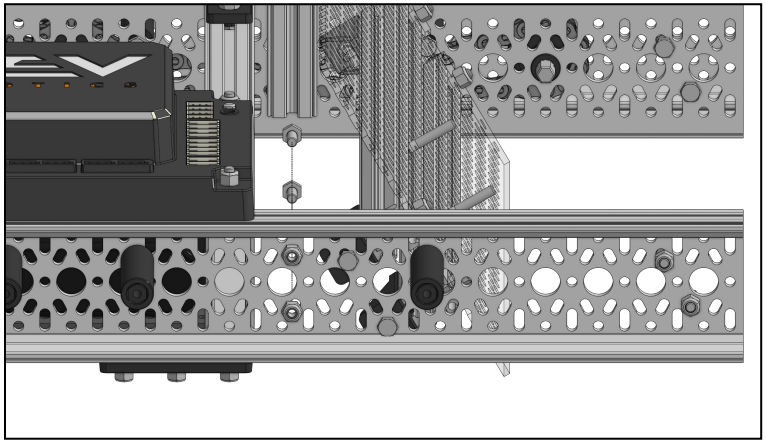
Loosen and remove the two shaft collars on the double sprocket and single sprocket shafts.

26




Remove the chain and shafts from the driverail.

27

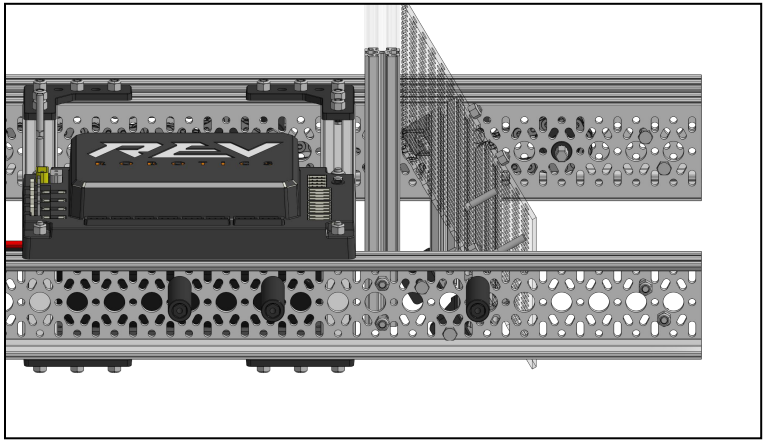


Get:

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

Finger start a hex cap screw and nyloc in the two holes shown.

28

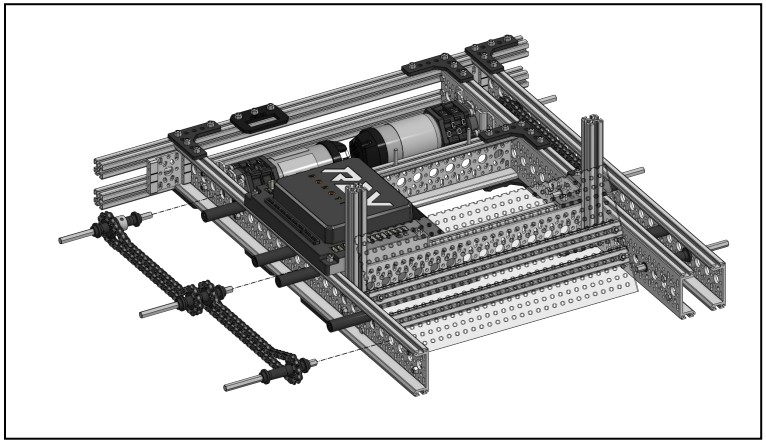


Get:

- 1 - 15mm Extrusion - 120mm

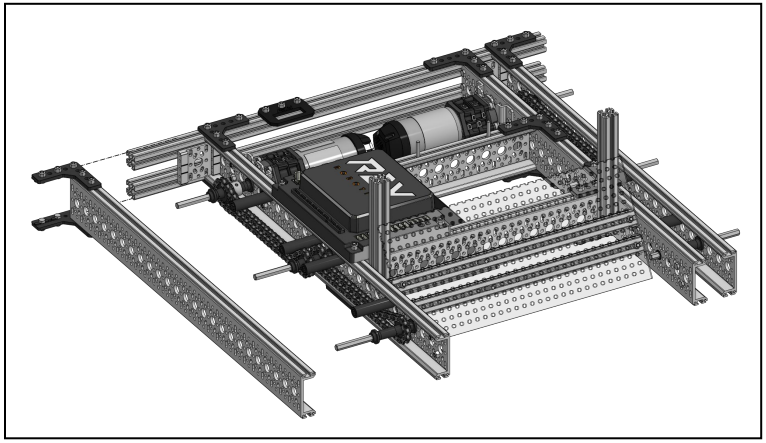
Slide the extrusion onto the screws from the previous step. The end of the extrusion should be just past the end of the screw. There should be 86mm of the extrusion extending past the top of the c channel.

29



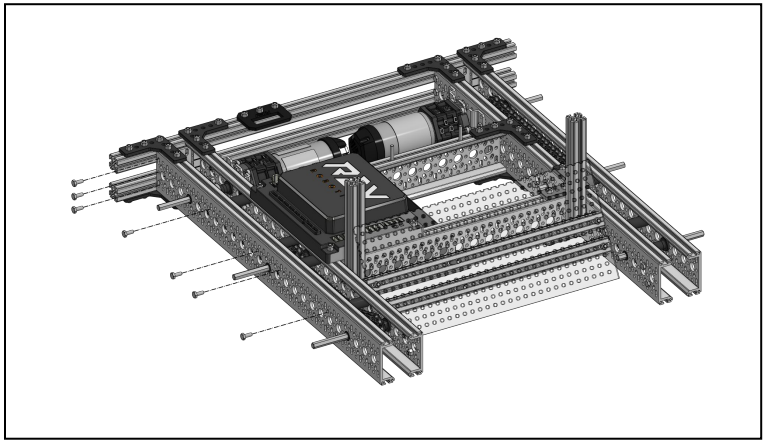
Replace the chain and shafts to the driverail. Then replace the shaft collars on the back side of the shafts.

30



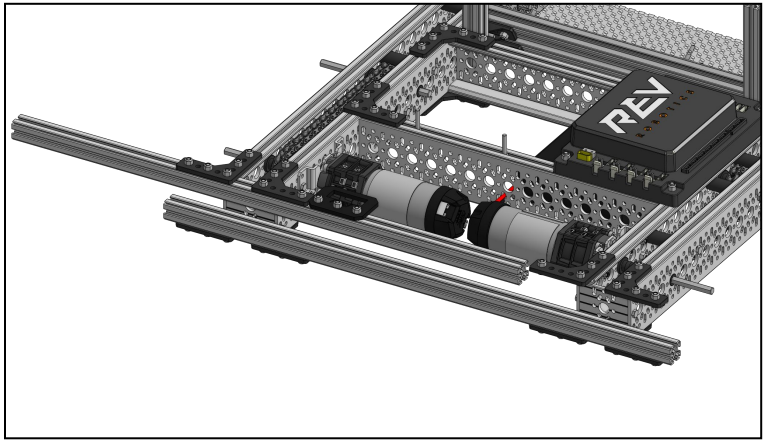
Replace the c channel from step c channel with the two 90 degree brackets from step 24. Then tighten the nuts and screws.

31



Replace the seven screws securing the c channel to the endcap and standoffs.

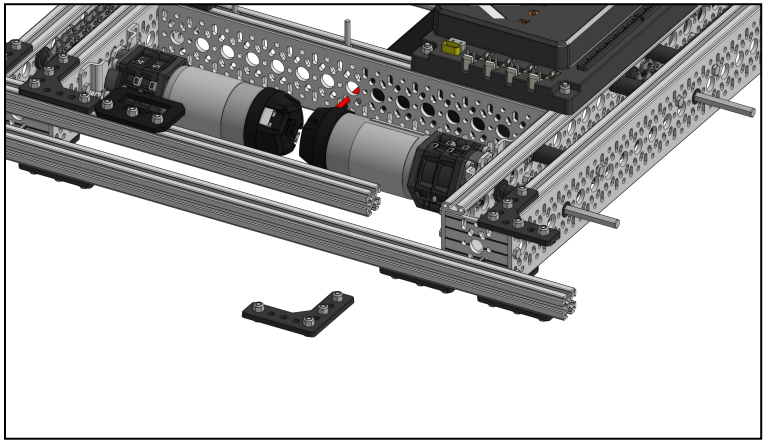
32



Loosen the 10 screws on the 90 brackets holding the top extrusion. Slide it to the left so that completely clears the two brackets on the right.

You may need to also loosen the switch bracket.

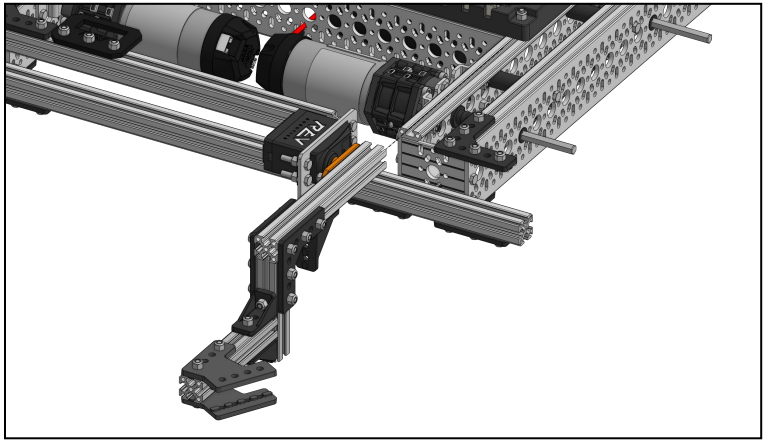
33



Loosen the two remaining nuts and screws on the left 90 degree bracket and slide it off the c channel.

Please not: If your inside 90 degree brackets do have the middle nyloc nut and screw, this is the best step to remove them.

34

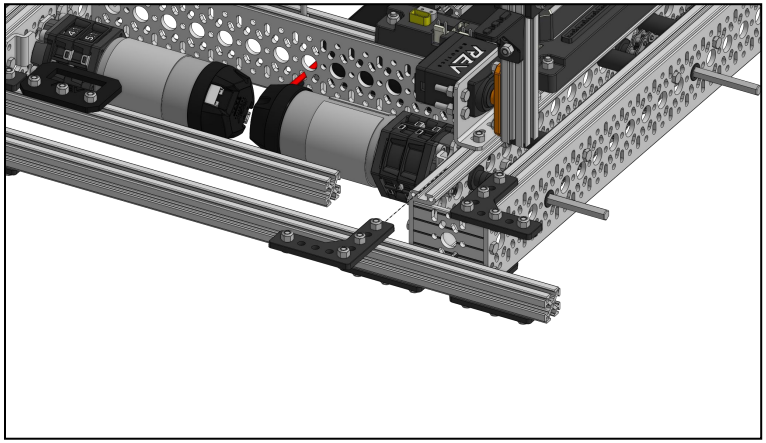


Get:

- 1 - Pollen Pusher Assembly

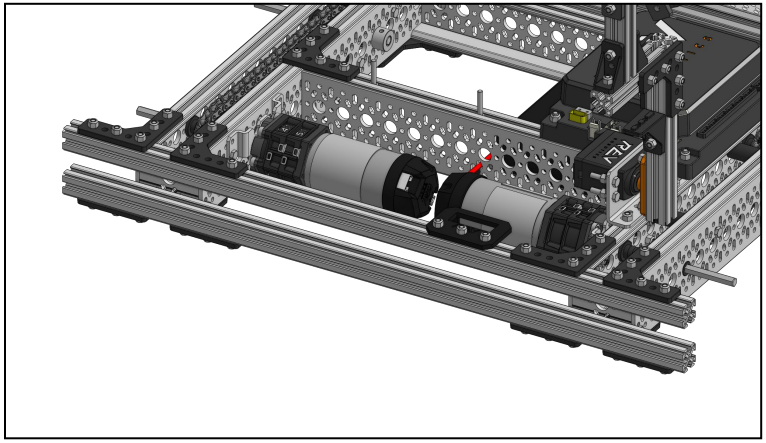
Slide the pollen pusher servo bracket onto the same c channel.

35



Replace the 90 degree bracket from step 33. Tighten the two nyloc nuts and screws, making sure there is still clearance for the extrusion to slide back onto the bracket.

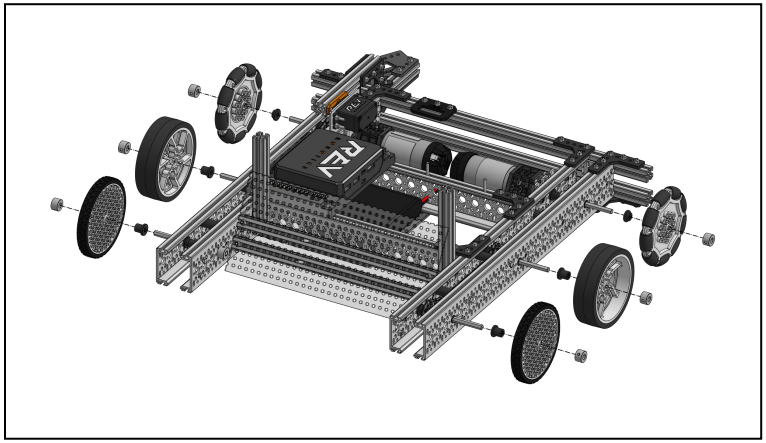
36



Slide the top extrusion back through the right 90 degree brackets then tighten all nuts.

Lower the pollen pusher arm, the u channel endcap and top extrusion should be between the inside corner bracket and 63mm extrusion on the pollen pusher. Adjust the servo bracket or inside corner bracket to allow the arm to move up and down freely.

37



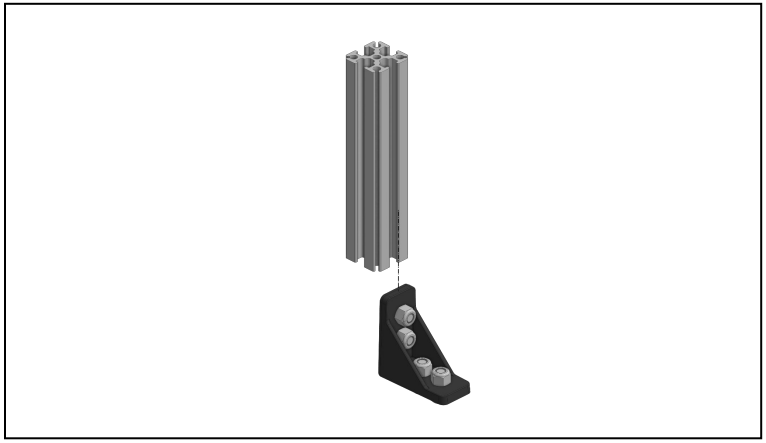
Get:

- 2 - Through Bore Bearing - Short
- 4 - Through Bore Bearing - Long
- 2 - 90mm Omni Wheel
- 2 - 90mm Grip Wheel
- 2 - 90mm Traction Wheel
- 6 - Shaft Collar

Replace the through bore bearings and wheels onto the drivetrain.

Please note: The short through bore bearing goes onto the drive shaft with the omni wheel.

38



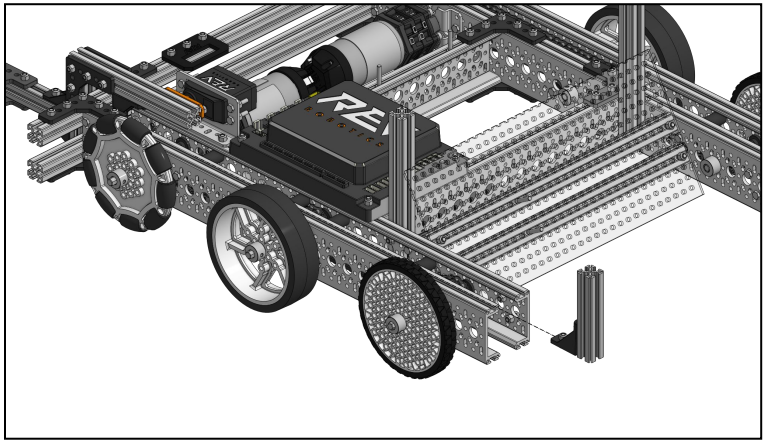
Get:

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

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

Complete this step four times.

39

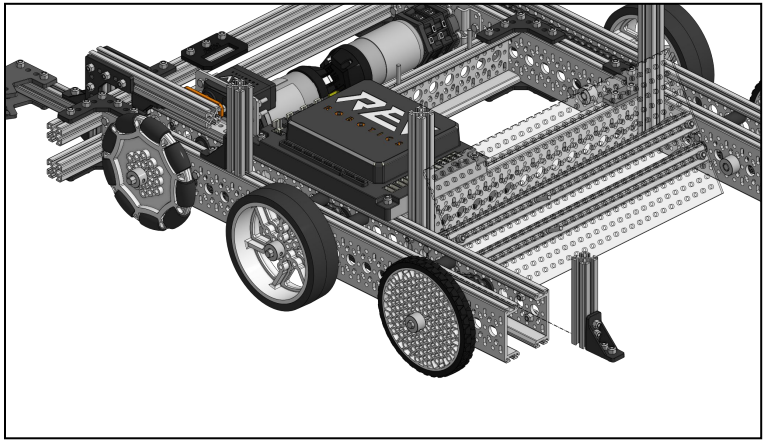


Get:

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

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

40

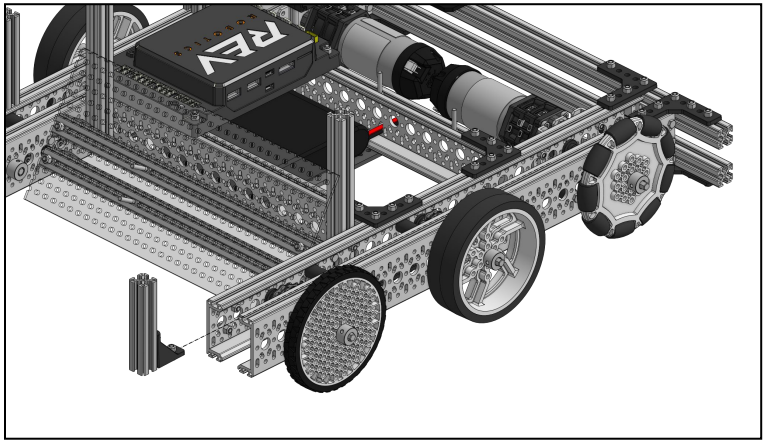


Get:

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

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

41

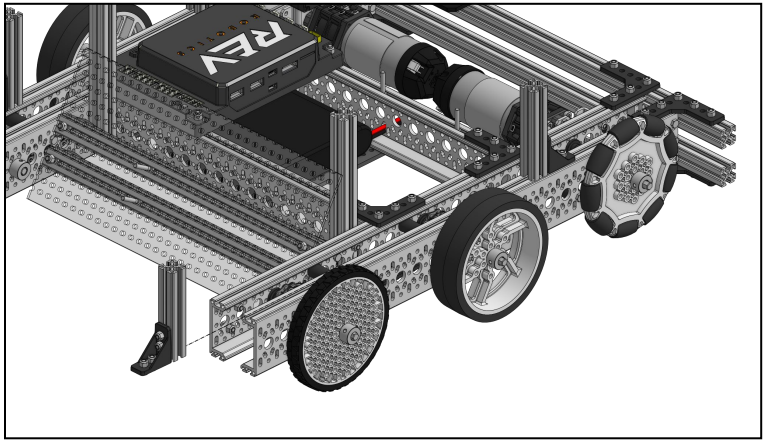


Get:

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

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

42



Get:

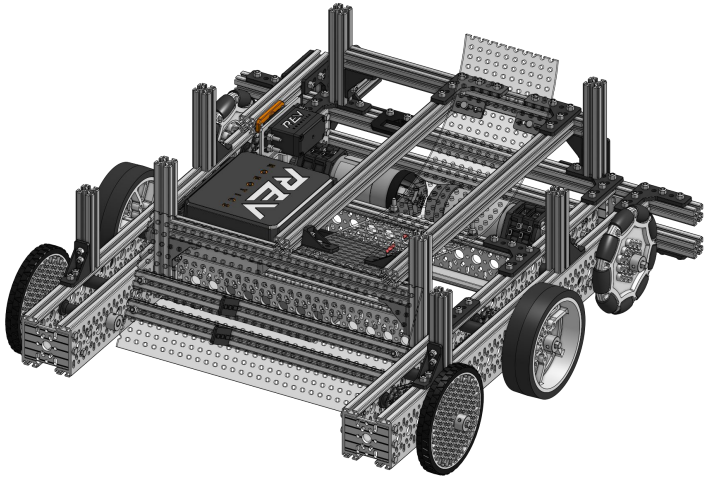
- 1 - 70mm Extrusion with Pre-Loaded Inside Corner Bracket

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

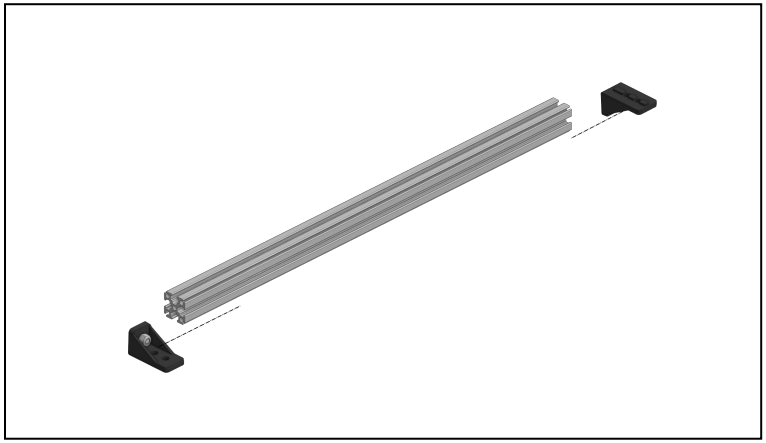
Set the Drivetrain aside for a later step.

# Launcher Floor Assembly

| PART NUMBER | DESCRIPTION | QTY. |
|---|---|---|
| N/A | Pre-Loaded 15mm Plastic Lap Corner Bracket | 6 |
| N/A | Pre-Loaded 15mm Plastic 90 Degree Bracket | 4 |
| N/A | Pre-Loaded 15mm Plastic Inside Corner Bracket | 4 |
| N/A | 15mm Extrusion - Cut to 278.5mm | 2 |
| N/A | 15mm Extrusion - Cut to 218mm | 2 |
| N/A | 15mm Extrusion - Cut to 83mm | 2 |
| N/A | Launcher Floor Cut Polycarbonate | 1 |
| REV-41-1361 | M3 Nyloc Nuts | 8 |
| REV-41-1360 | M3 x 16mm Hex Cap Screw | 4 |
| REV-41-1324 | 3mm Spacer | 2 |
| REV-41-1321 | 15mm Plastic Lap Corner Bracket | 2 |



1



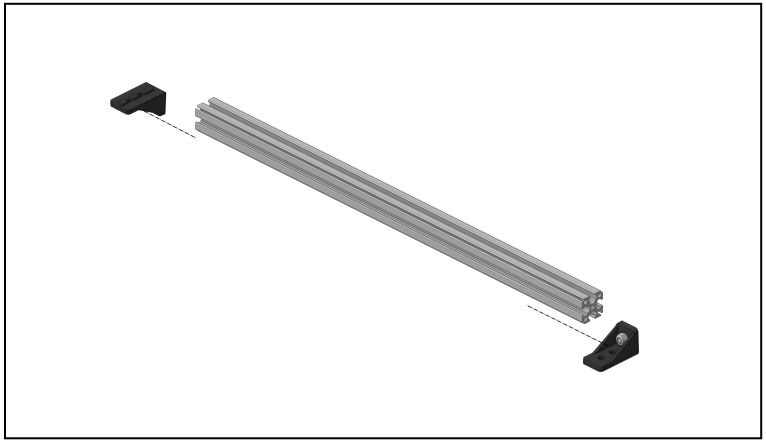
Get:

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

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

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

2



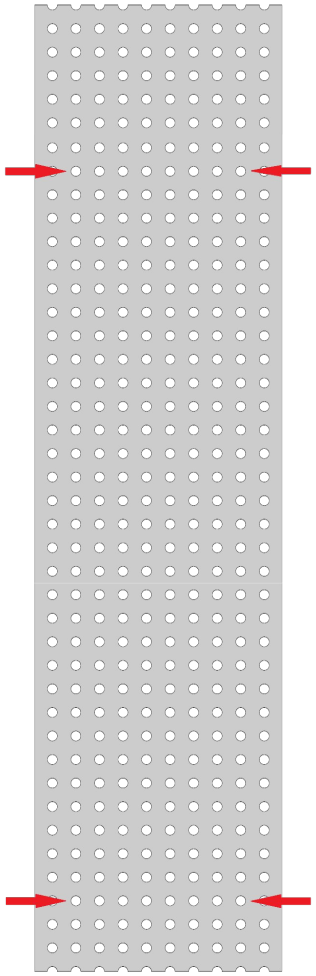
Get:

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

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

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

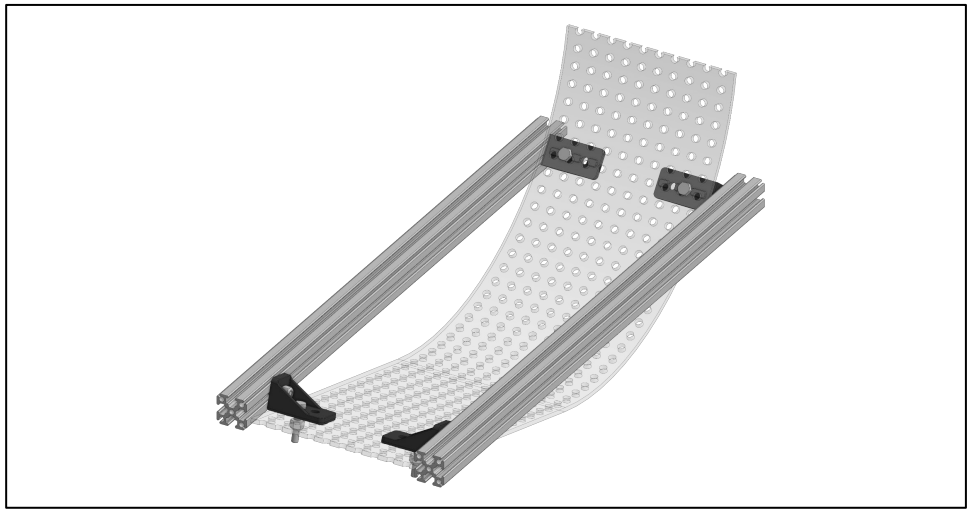
3



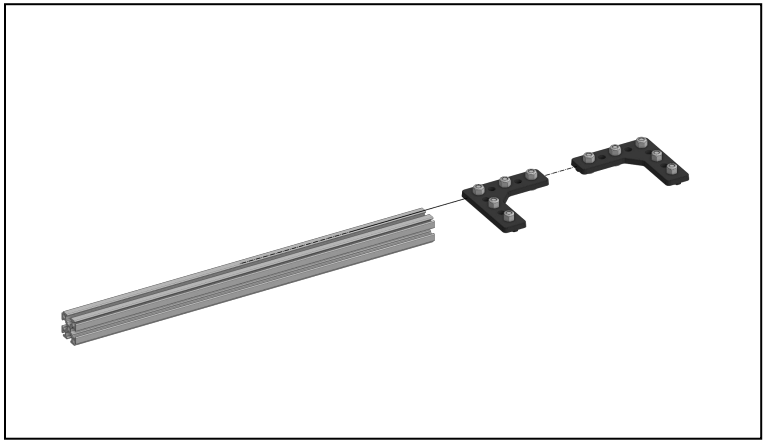
Get:

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

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



4

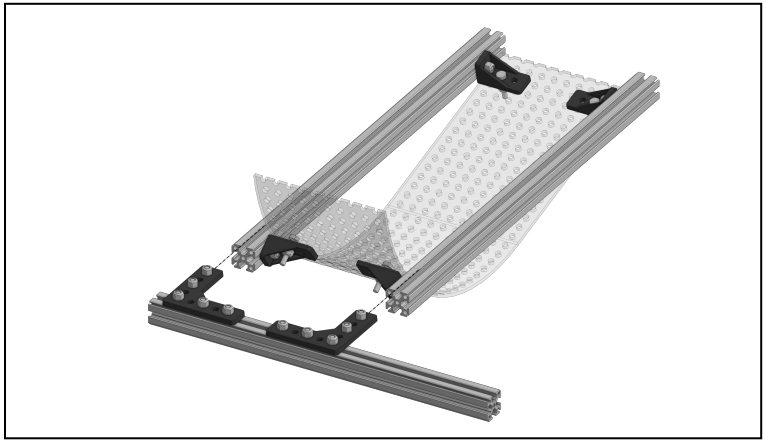


Get:

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

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

5

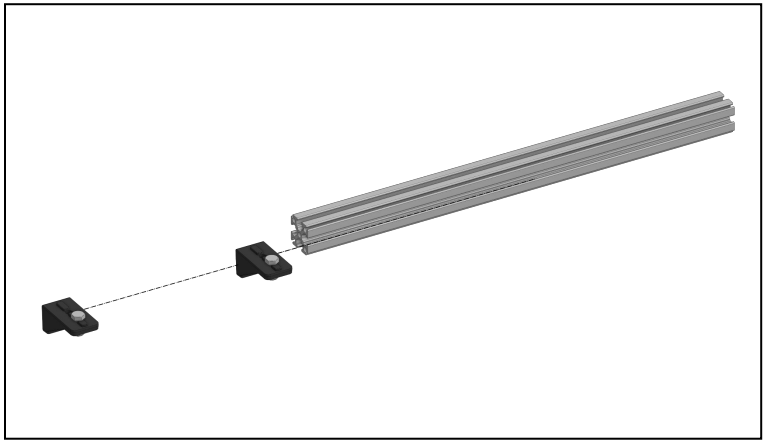


Get:

- 1 - 15mm Extrustion with brackets from previous step

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

6

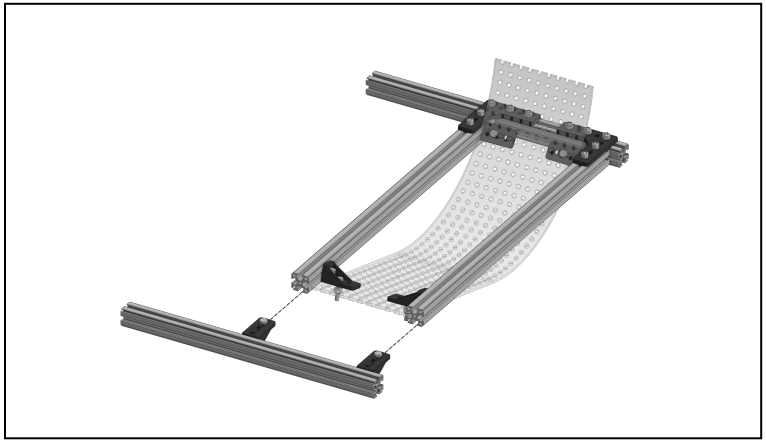


Get:

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

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

7

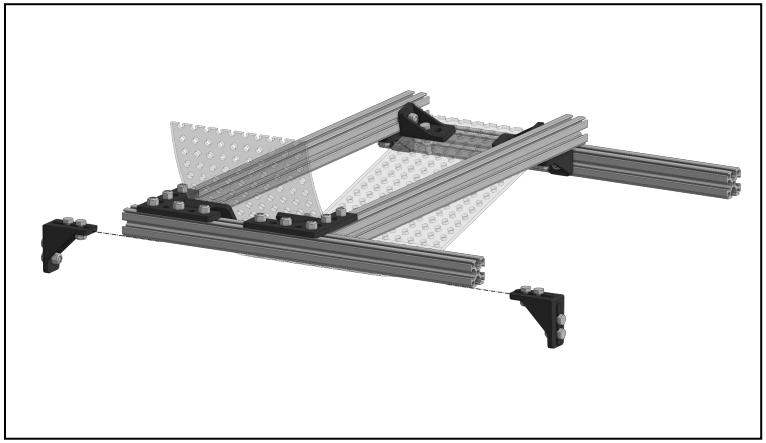


Get:

- 1 - 15mm Extrustion with brackets from previous step

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

8

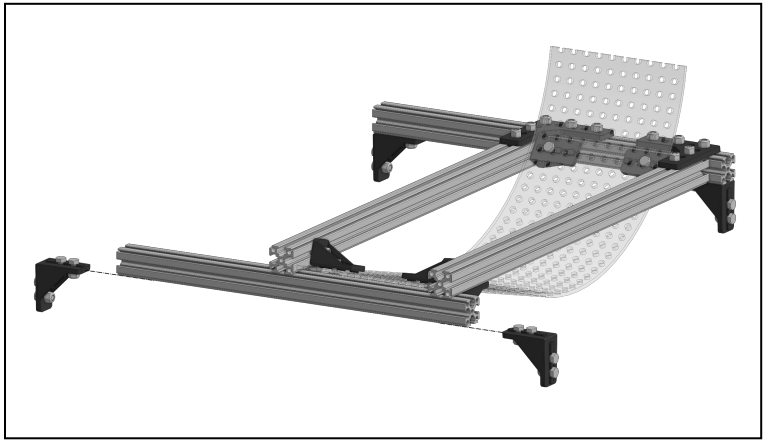


Get:

- 2 - Pre-Loaded Inside Corner Bracket

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

9

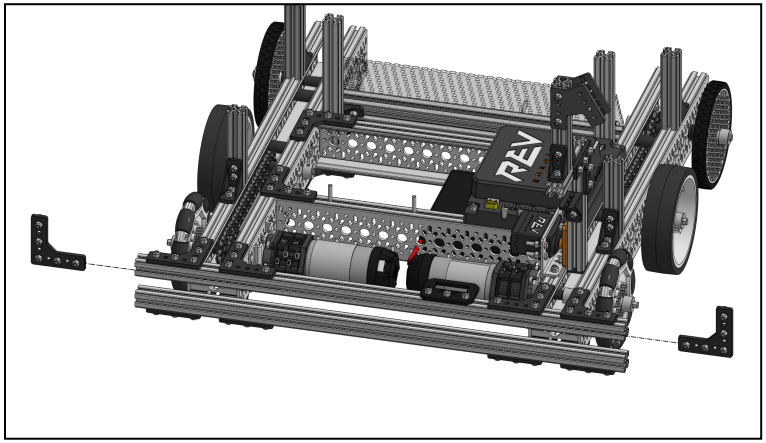


Get:

- 2 - Pre-Loaded Inside Corner Bracket

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

10

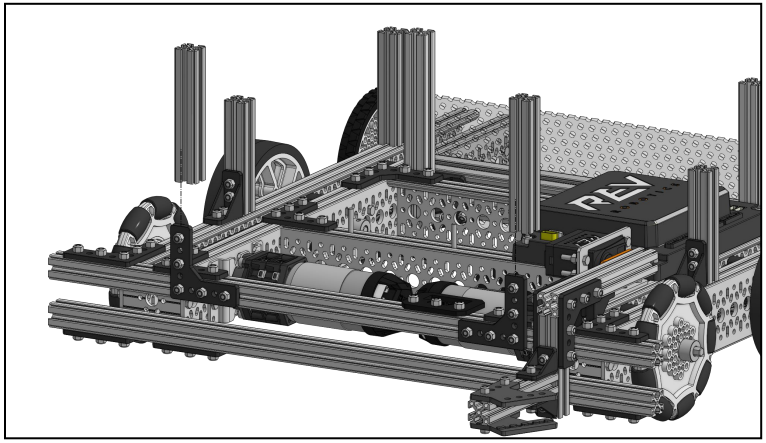


Get:

- 2 - Pre-Loaded 90 Degree Bracket

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

11

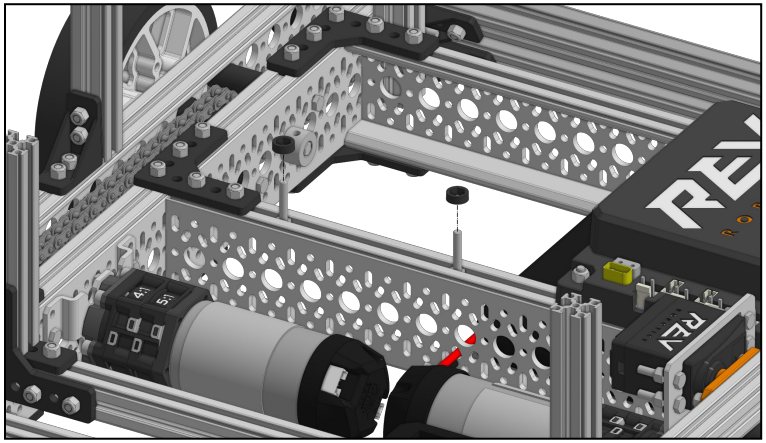


Get:

- 2 - 15mm Extrusion - Cut to 83mm

Slide extrusion onto the two brackets from the previous step.

12

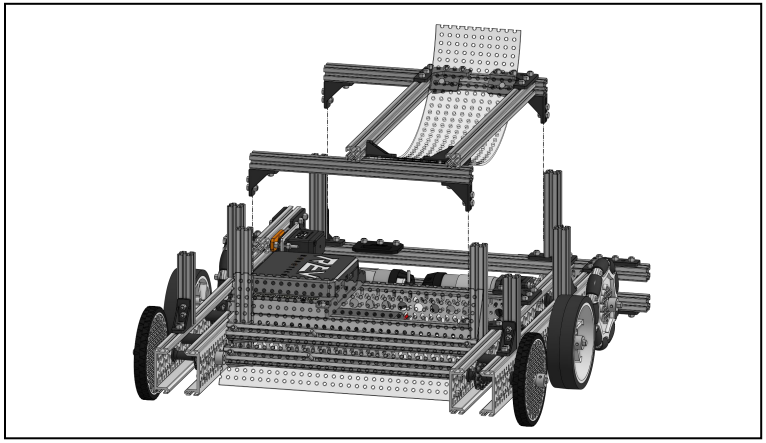


Get:

- 2 - 3mm Spacers

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

13

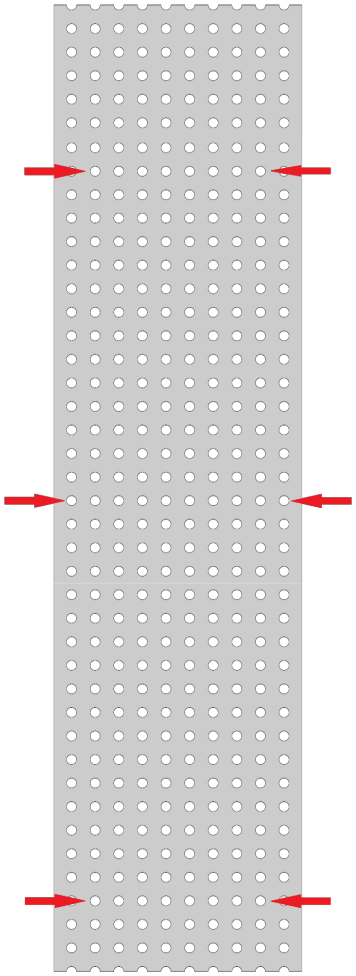


Get:

- 1 - Launcher Floor Assembly

Slide the launcher floor assembly onto the four upright extrusion.

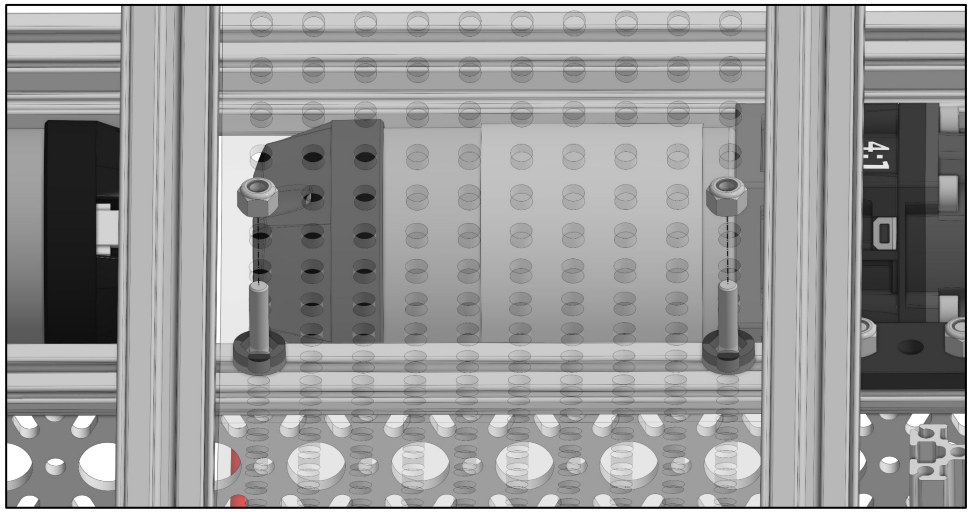
14



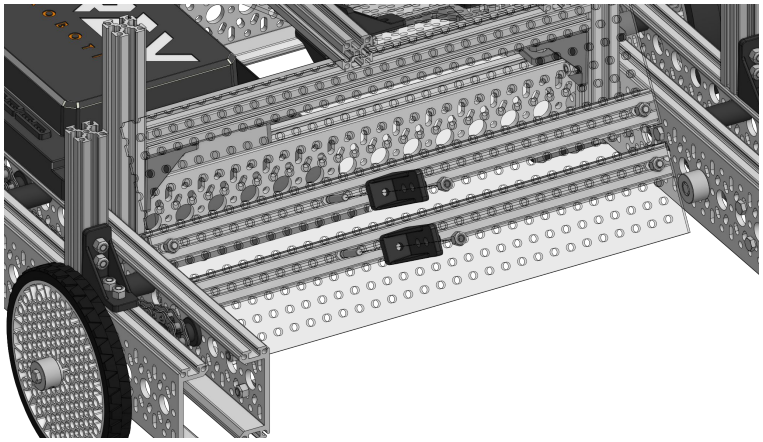
Get:

- 2 - M3 Nyloc Nuts

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



15



Get:

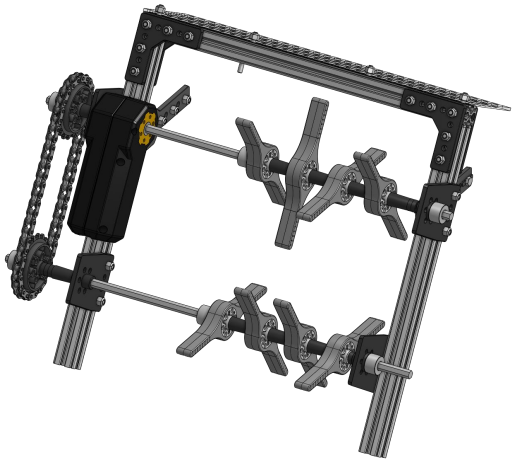
- 2 - Lap Corner Bracket
- 2 - M3 Nyloc Nuts

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

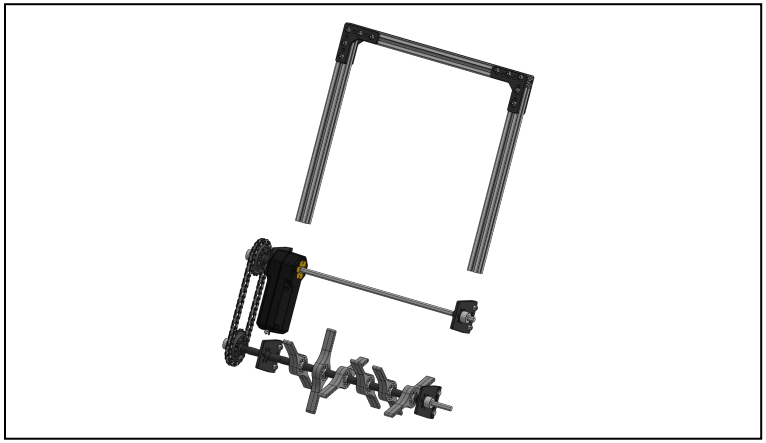
Set the Drivetrain aside for future steps.

# Intake Assembly

| PART NUMBER | DESCRIPTION | QTY. |
|---|---|---|
| N/A | Intake Lid Cut Polycarbonate | 1 |
| REV-41-1324 | 3mm Spacer | 2 |
| REV-41-1327 | Shaft Collar | 2 |
| REV-41-2702 | Intake Flap - 5mm Hex - 40A Dark Gray | 2 |
| REV-41-1304 | 15mm Plastic Rod End Bracket | 2 |
| REV-41-1359 | M3 x 8mm Hex Cap Screw | 13 |
| REV-41-1361 | M3 Nyloc Nuts | 12 |

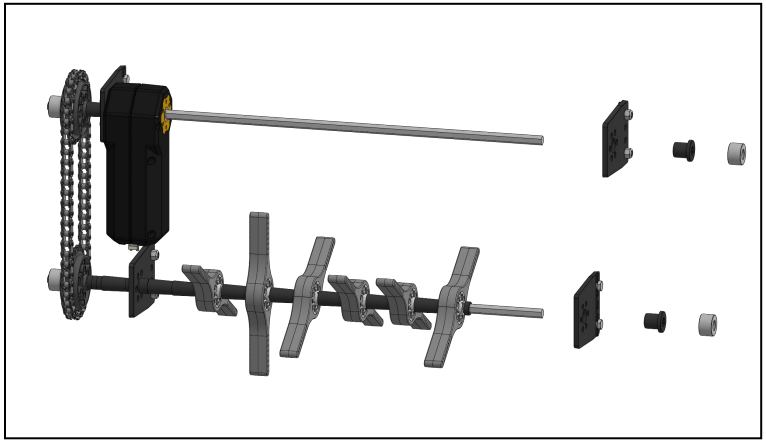


1



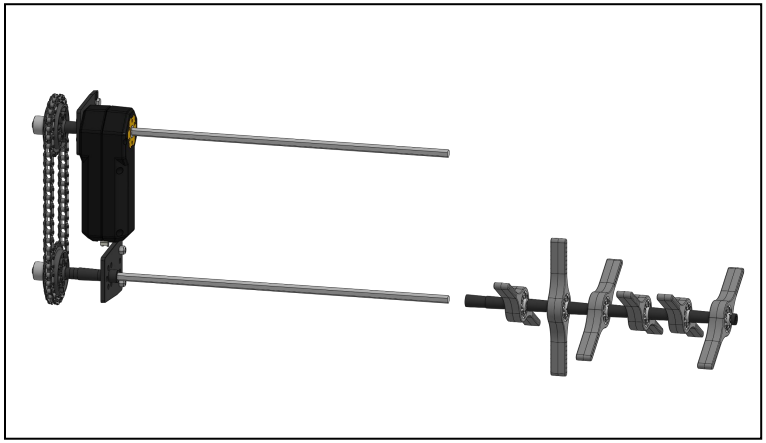
Loosen the two nuts and screws on the four motion brackets then remove the two shafts.

2



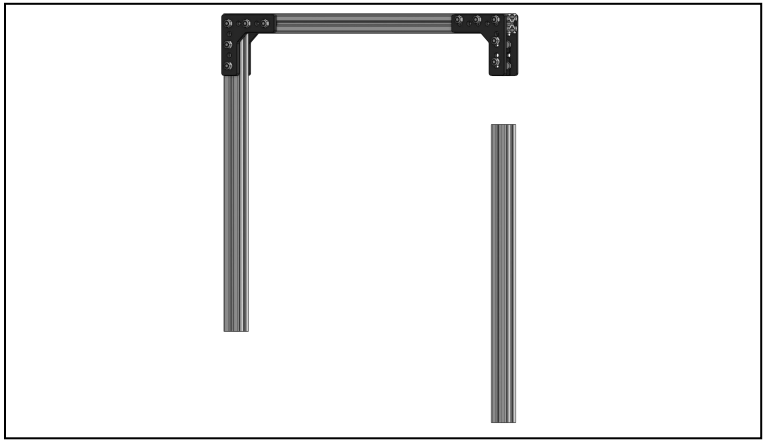
Remove the shaft collars, through bore bearings, and the motion brackets from the two shafts.

3



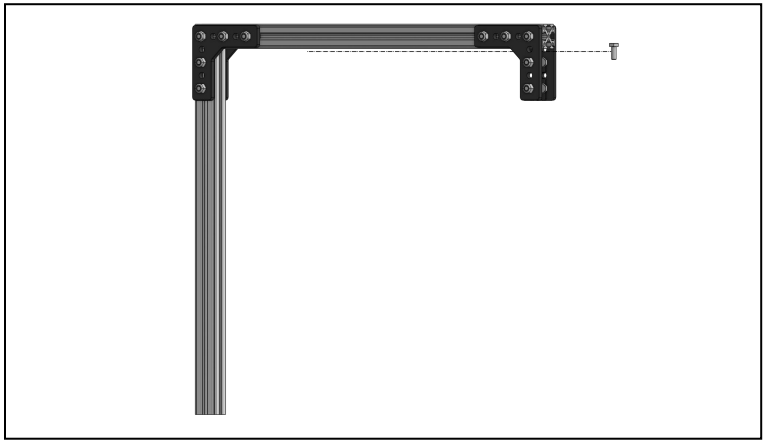
Remove the flap wheels and spacers from the lower shaft.

4



loosen the two nuts and screws on the two 90 degree brackets holding the right extrusion, then remove the extrusion.

5

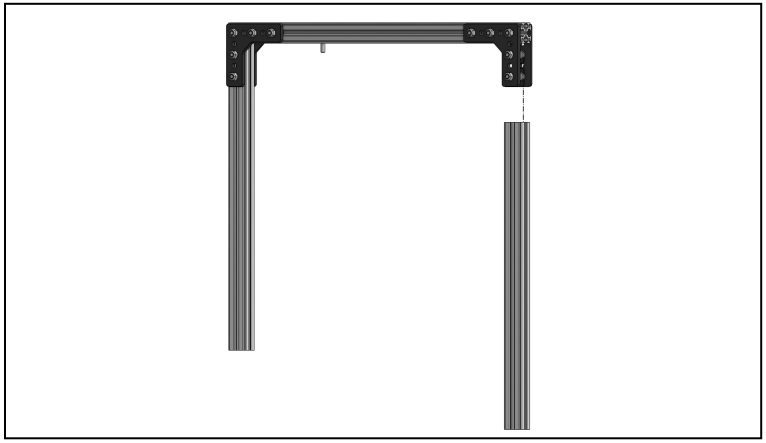


Get:

- 1 - M3 x 8mm Hex Cap Screw

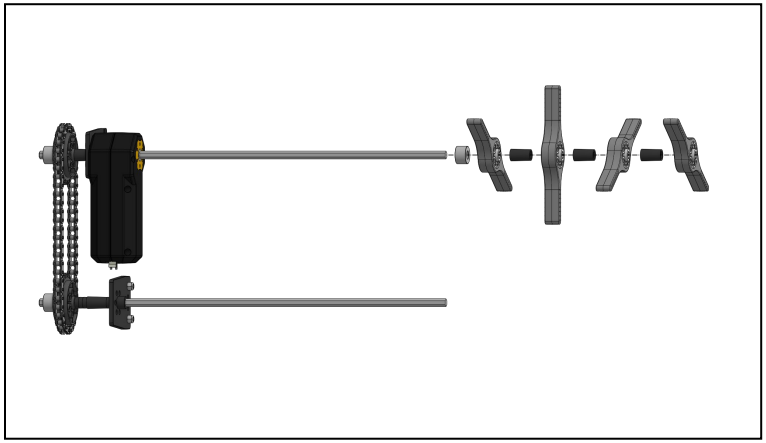
Slide a 8mm screw onto the c channel as shown.

6



Replace the extrusion and tighten the nuts and screws.

7

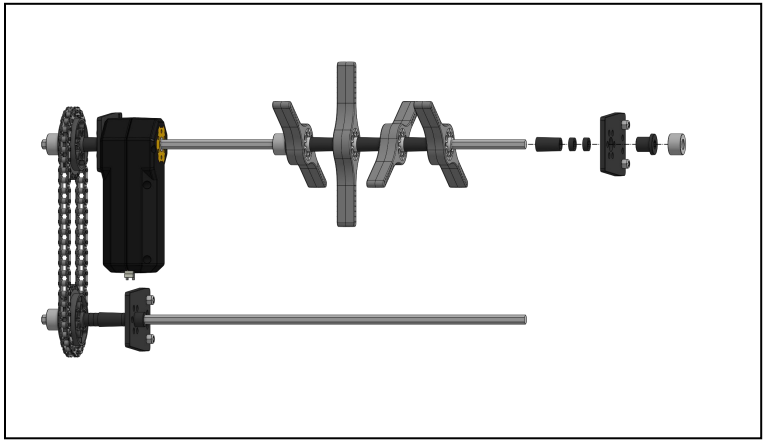


Get:

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

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

8

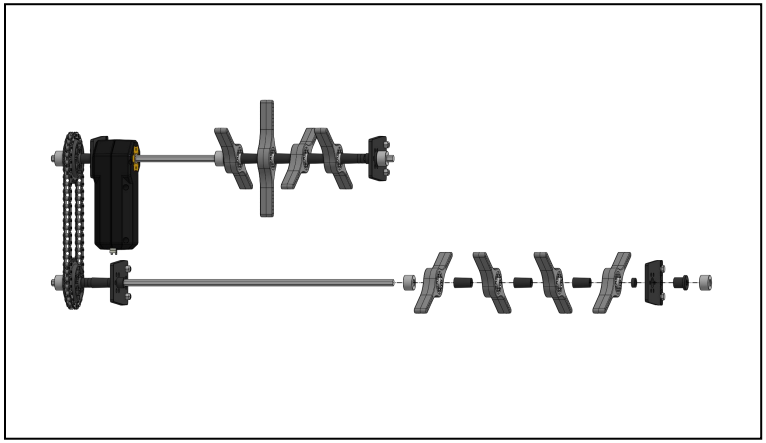


Get:

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

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

9

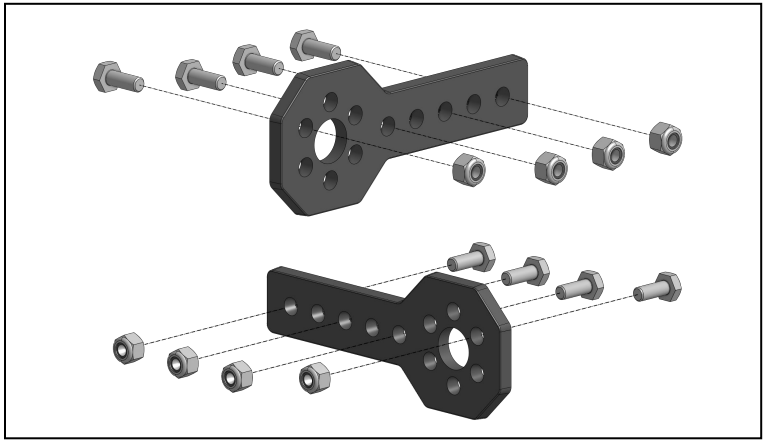


Get:

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

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

10



Get:

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

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

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

11

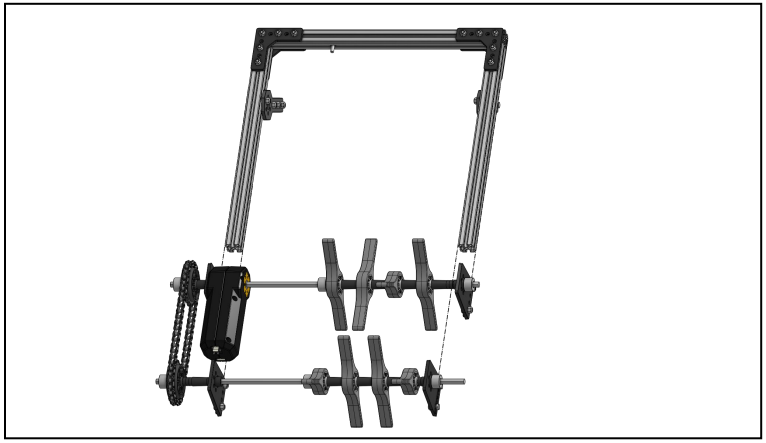


Get:

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

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

12



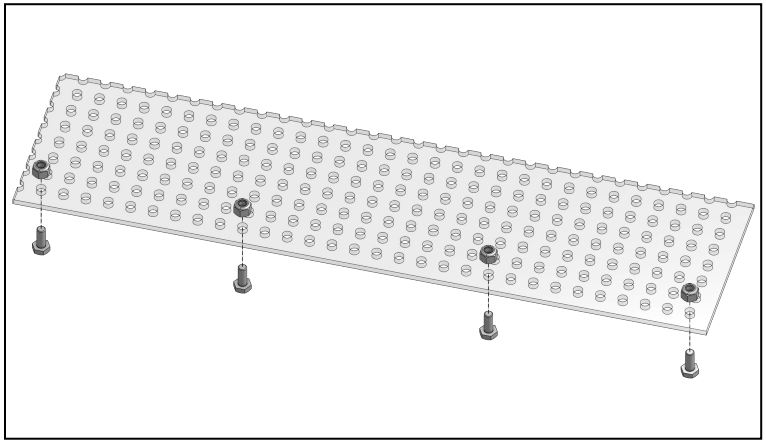
Get:

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

Slide the motion brackets onto the extrusion as shown.

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

13

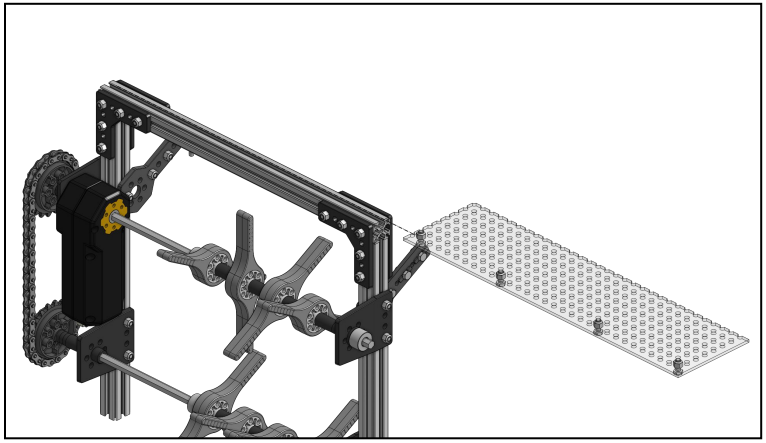


Get:

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

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

14



Get:

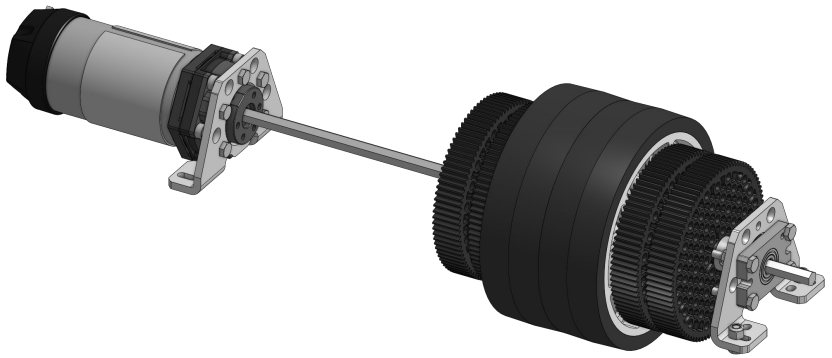
- 1 - Pre-Loaded Intake Floor Cut Polycarbonate

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

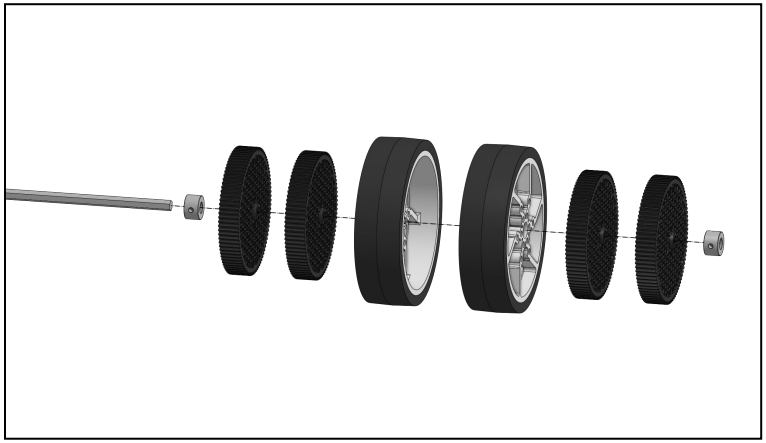
Set the intake aside for a later step.

# Launcher Flywheel Assembly

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



1

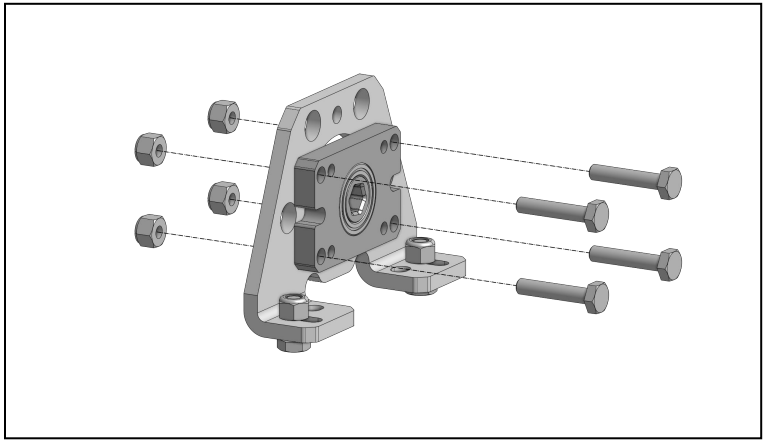


Get:

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

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

2

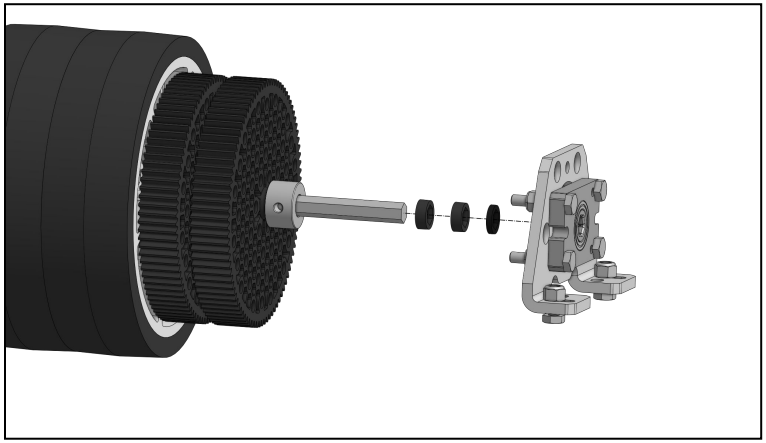


Get:

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

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

3

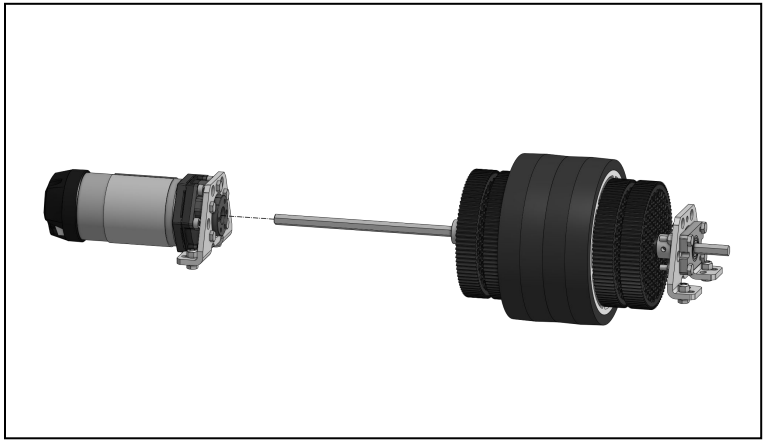


Get:

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

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

4



Get:

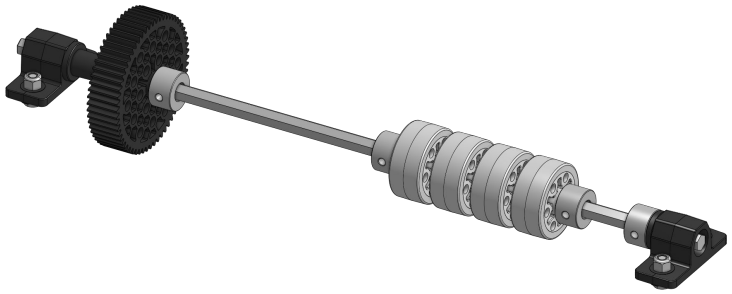
- 1 - HD Hex Motor with 1:1 Output

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

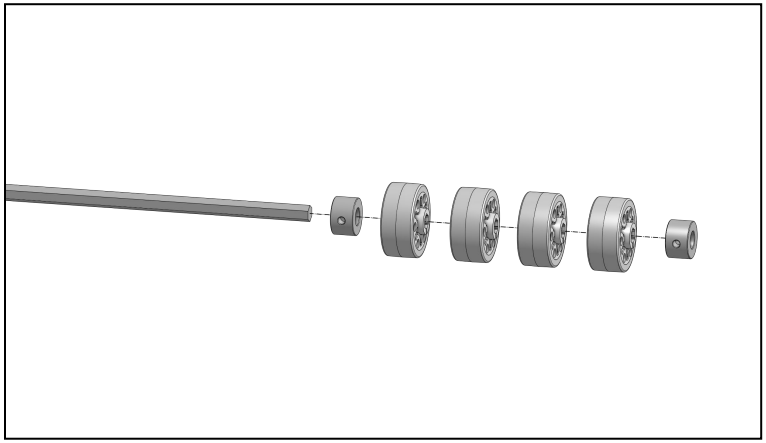
Set this aside for a later step.

# Feeder Roller Shaft Assembly

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



1

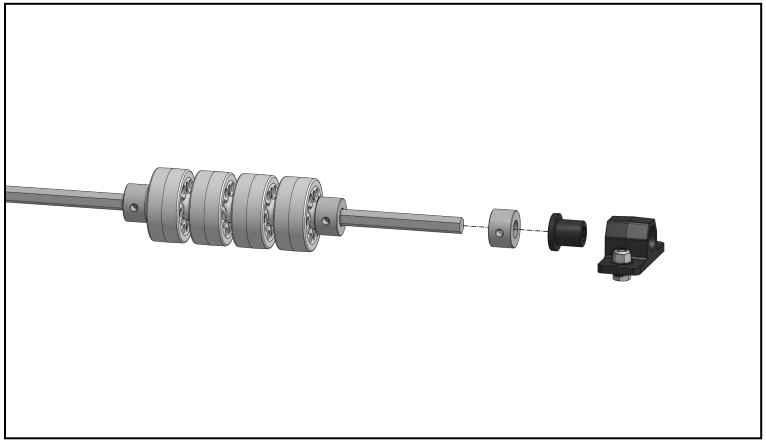


Get:

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

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

2

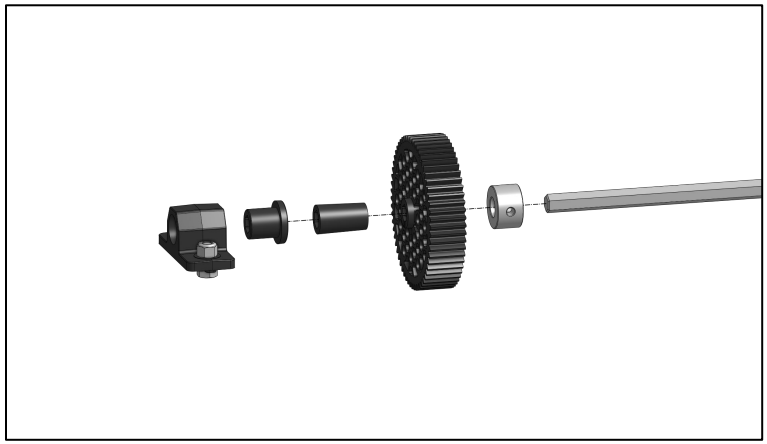


Get:

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

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

3



Get:

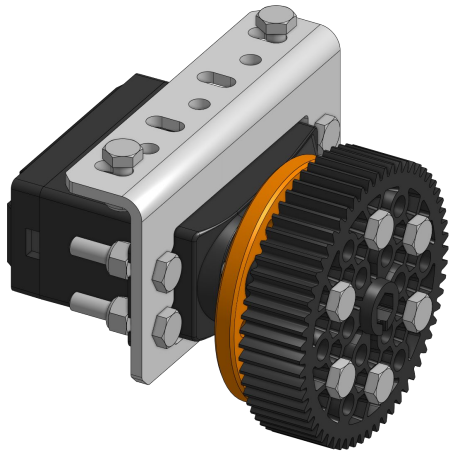
- 1 - Pre-Loaded Bearing Pillow Block
- 1 - Shaft Collar
- 1 - Through Bore Bearing Long
- 1 - 60 Tooth Plastic Gear
- 1 - 15mm Spacer

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

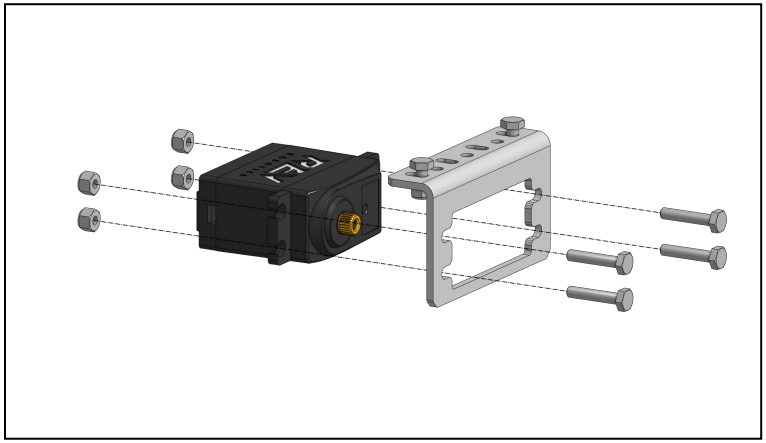
Set this aside for a future step.

# Feeder Servo Assembly

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



1

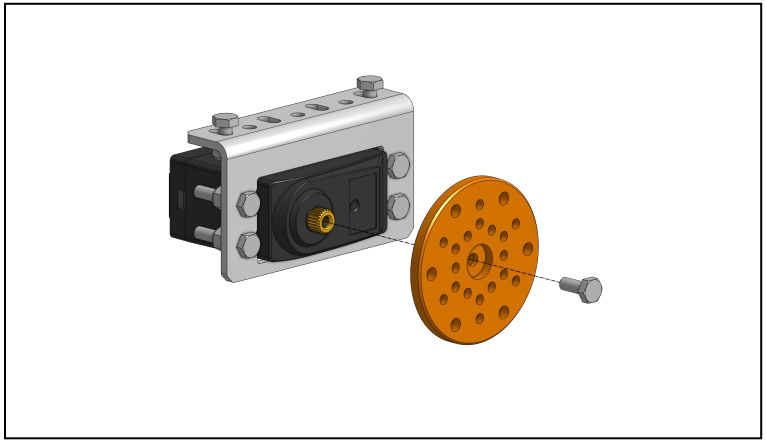


Get:

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

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

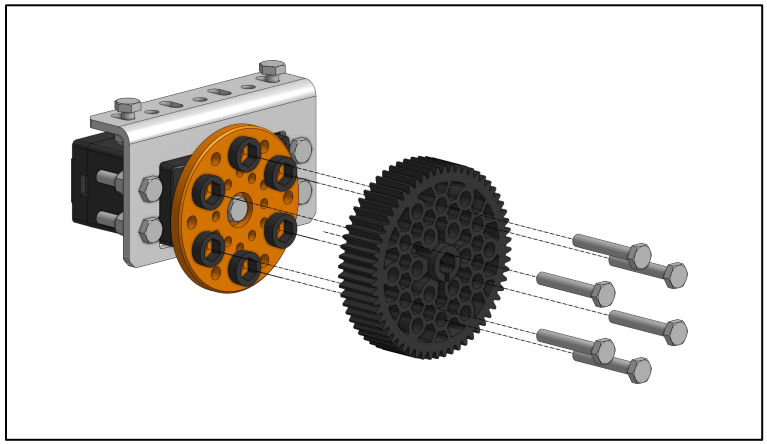
2



Get:

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

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



Get:

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

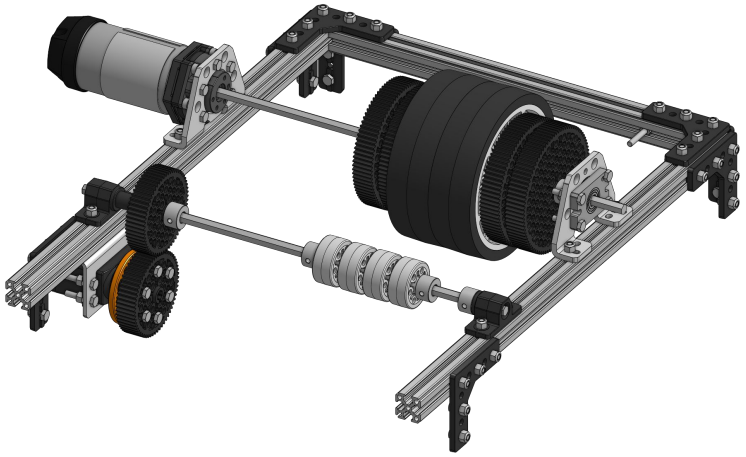
Secure a 60 gear to the servo horn with six screws and 3mm spacers between the gear and the horn.

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

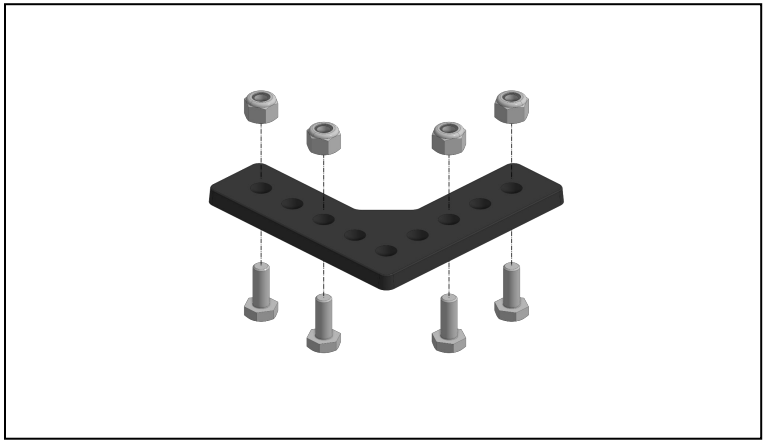
Set this aside for a future step.

# Launcher and Feeder Assembly

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



1



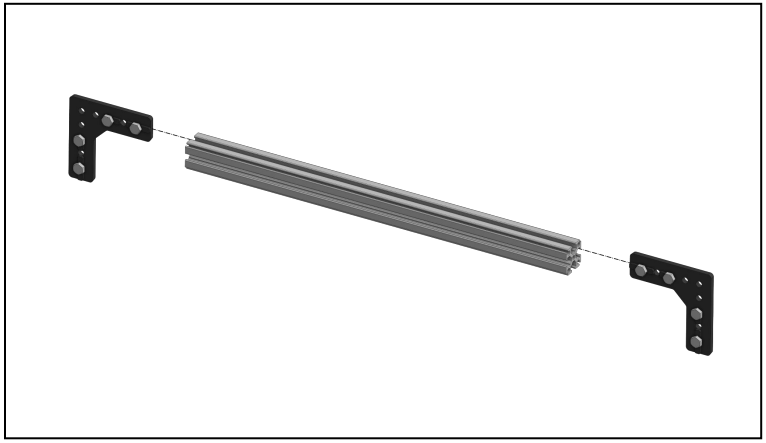
Get:

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

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

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

2

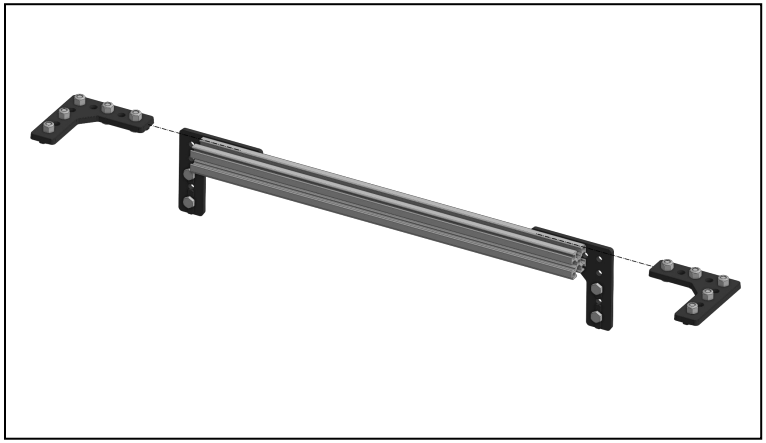


Get:

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

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

3

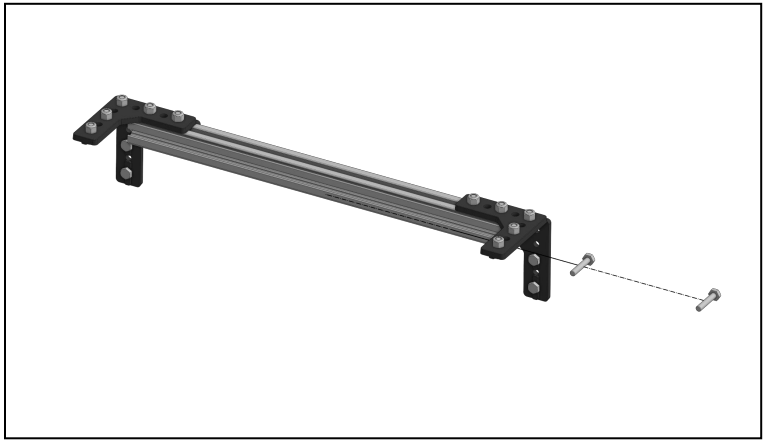


Get:

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

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

4



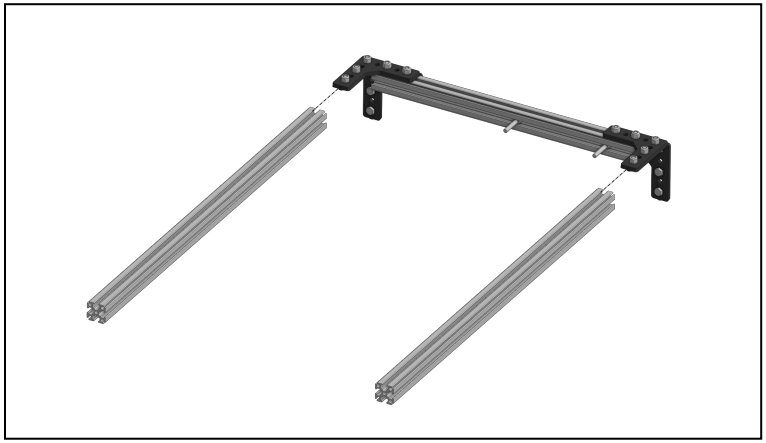
Get:

- 2 - M3 x 16mm Hex Cap Screws

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

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

5

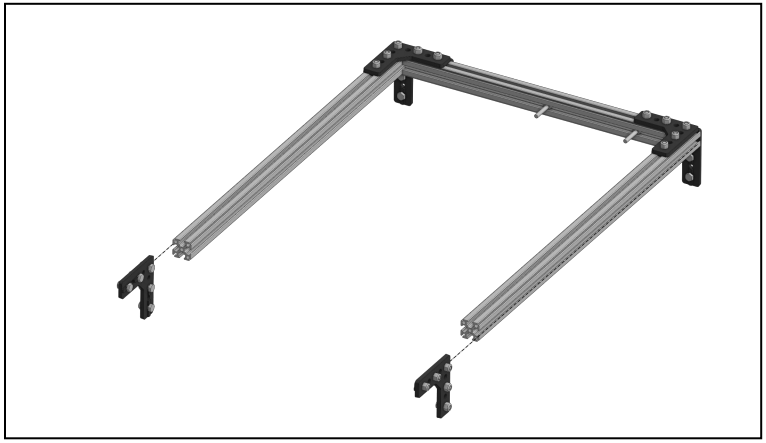


Get:

- 2 - 15mm Extrusion - Cut to 323mm

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

6

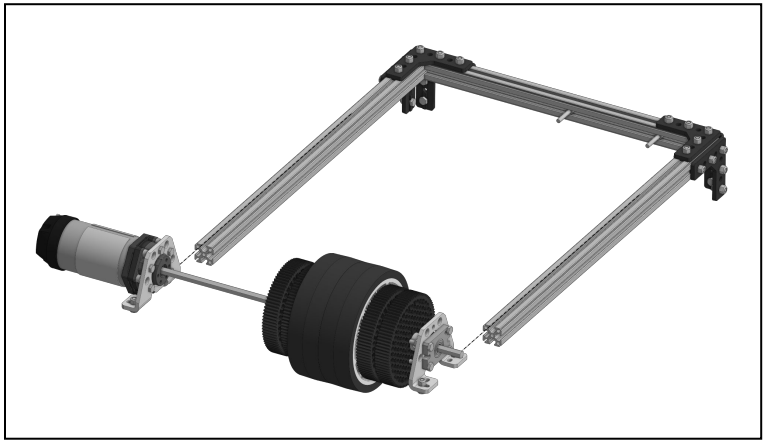


Get:

- 2 - Pre-Loaded 90 Degree Bracket

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

7

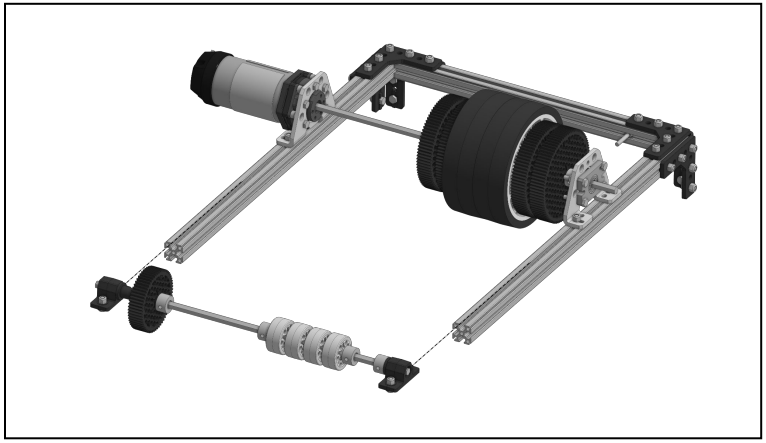


Get:

- 1 - Launcher Flywheel Assembly

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

8

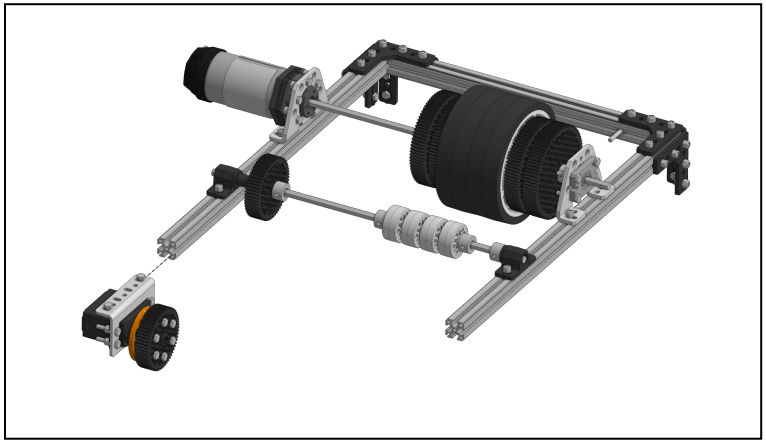


Get:

- 1 - Feeder Assembly

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

9

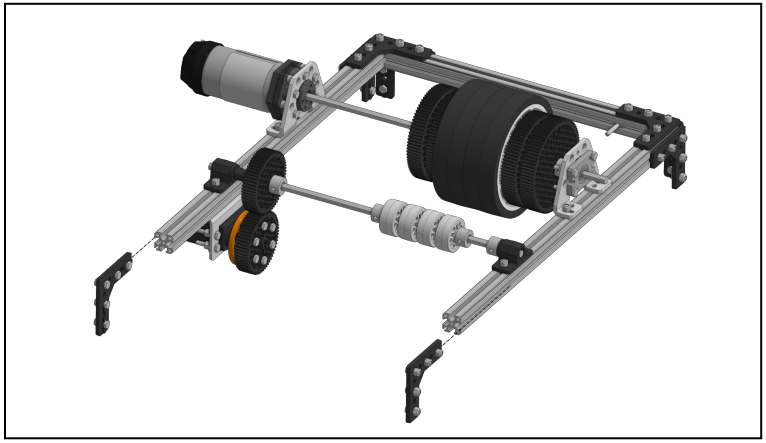


Get:

- 1 - Feeder Servo Assembly

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

10



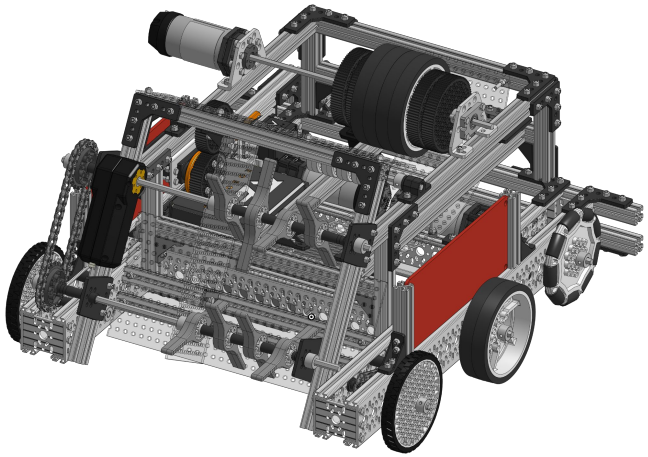
Get:

- 2 - Pre-Loaded 90 Degree Bracket

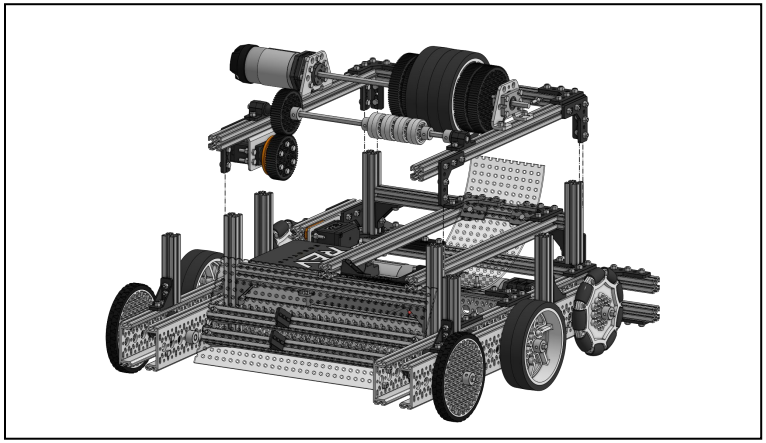
Slide two more pre-loaded 90 degree brackets onto the 323mm extrusion as shown. Do not tighten these screws yet.

# Final Assembly

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



1

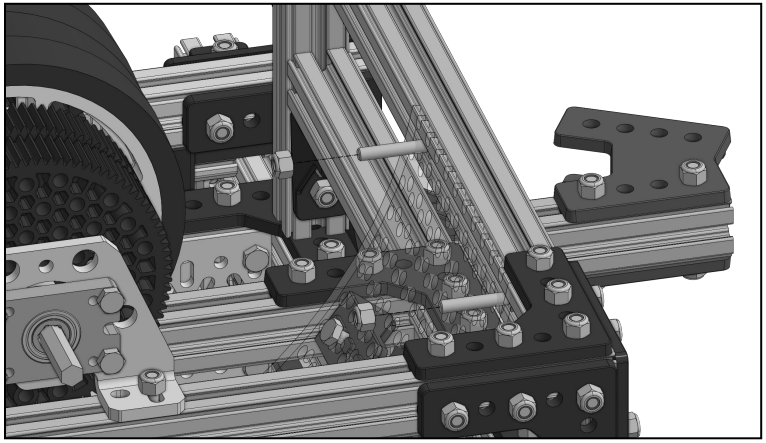


Get:

- 1 - Launcher and Feeder Assembly

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

2

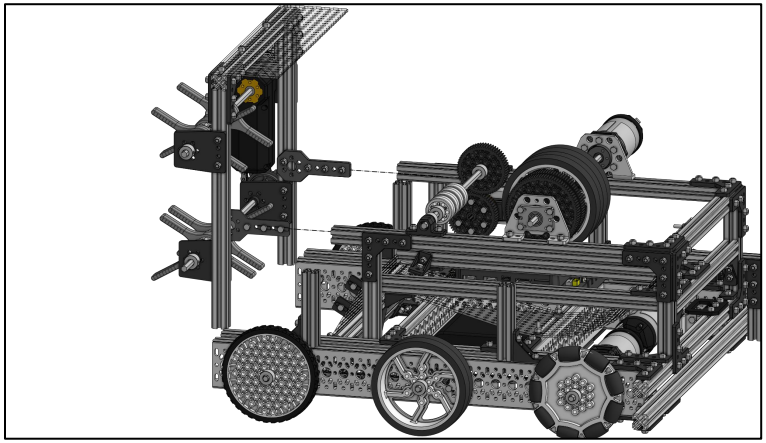


Get:

- 2 - M3 Nyloc Nuts

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

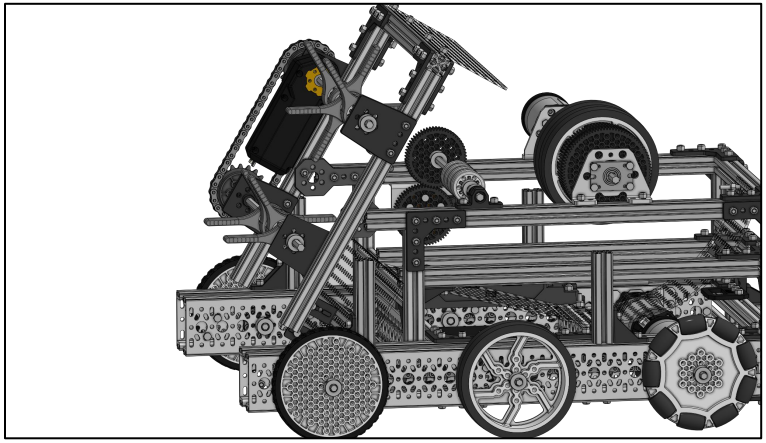
3

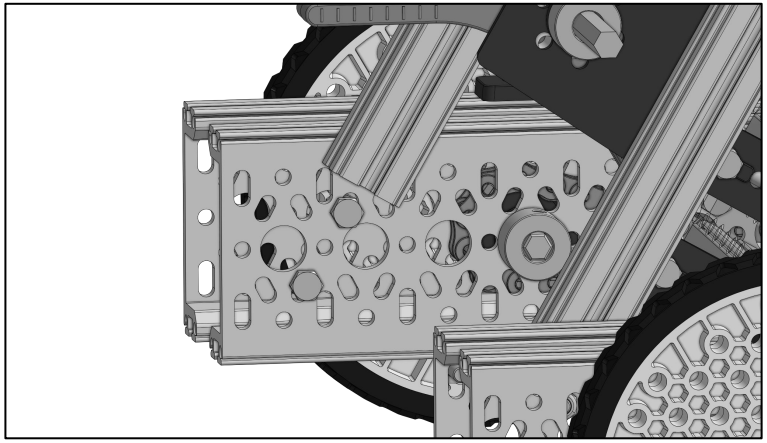


Get:

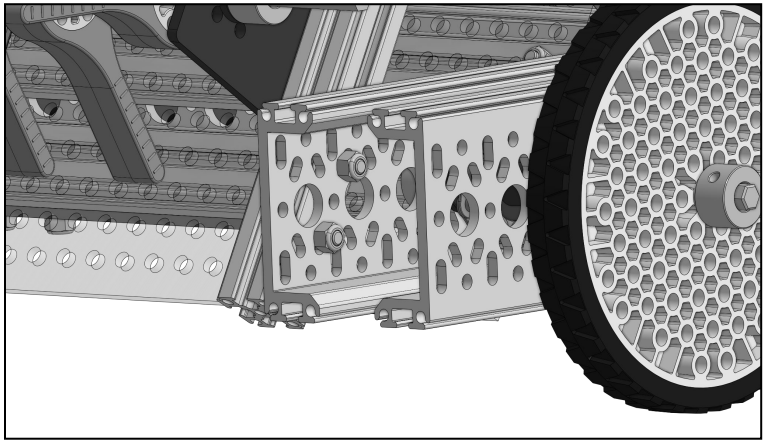
- 1 - Inatake Assembly

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



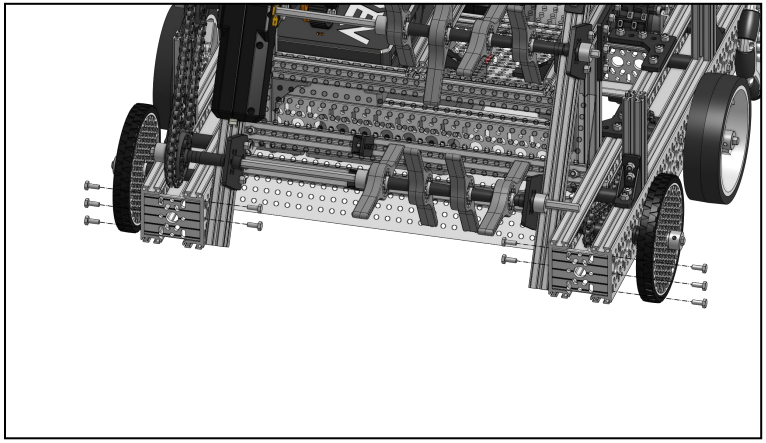


4



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

5

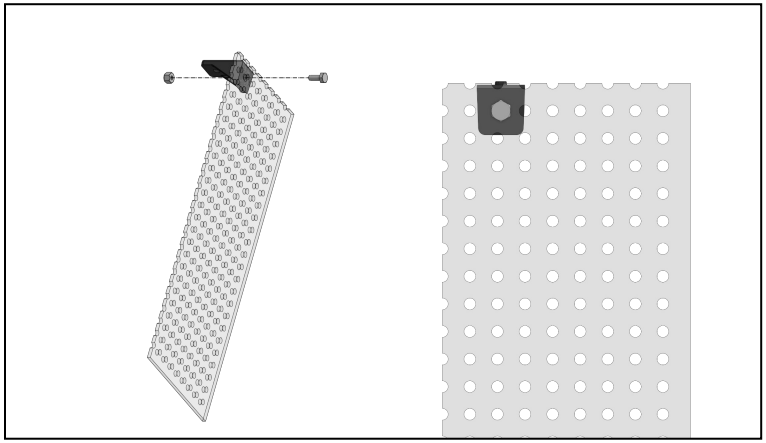


Get:

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

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

6

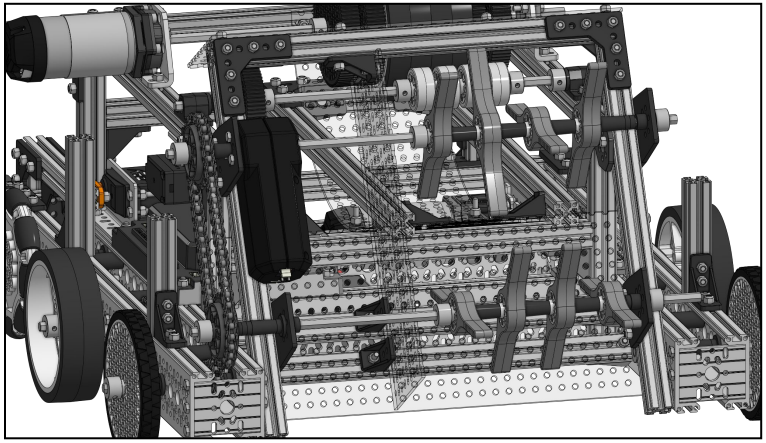


Get:

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

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

7

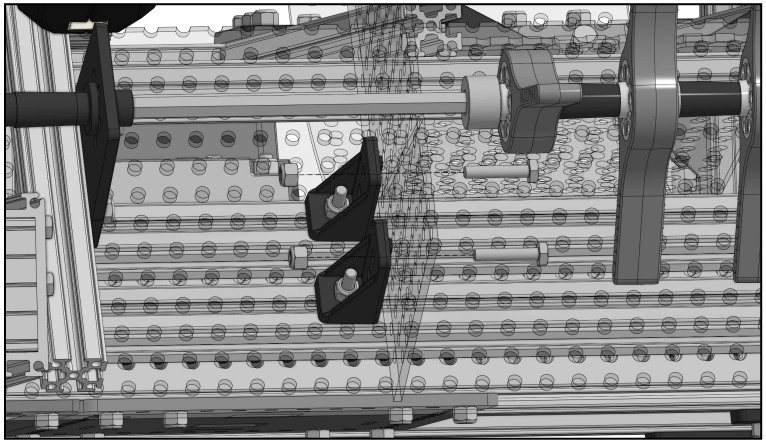


Get:

- 1 - M3 Nyloc Nuts

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

8

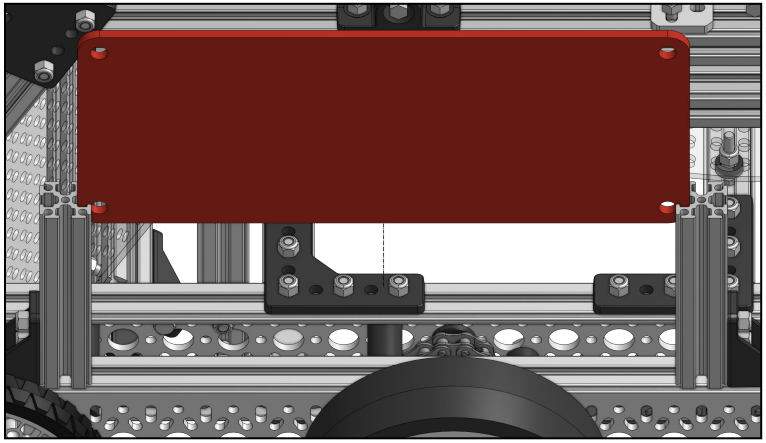


Get:

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

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

9



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

You are done!

# 2026-27 REV DUO FTC Starter Bot Base Upgrade Build Guide

