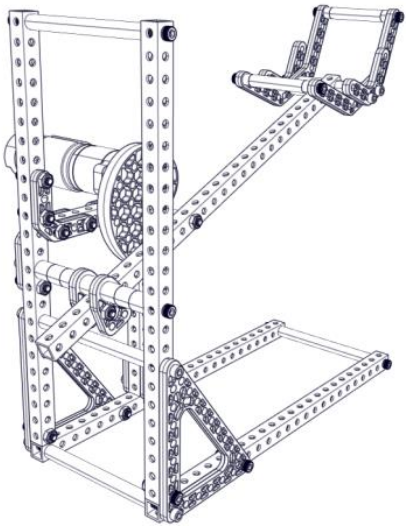
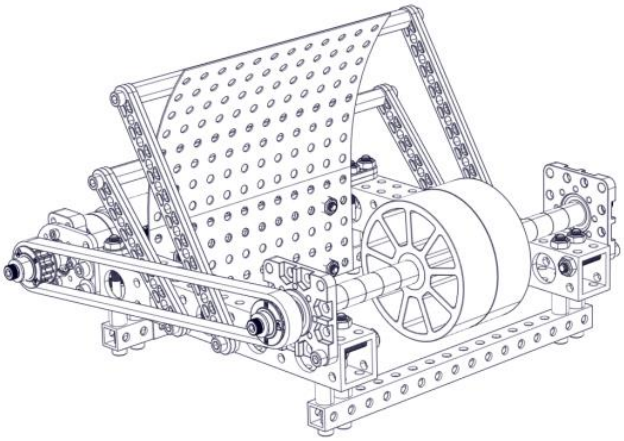
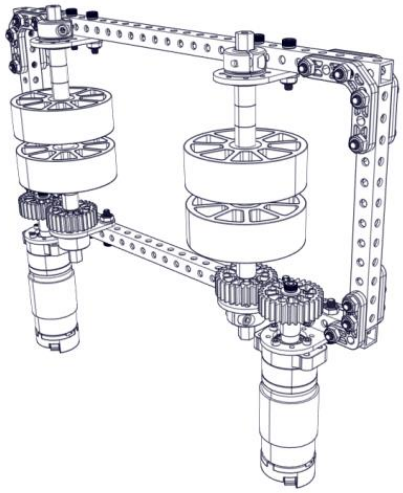
ROBITS Launchers Expansion

(am-5659)

Assembly Guide







Revision #	Date	Author	Purpose
0	9/29/2025	E. Scime	Original Document

P. Yeung	10/13/2025
Reviewer Name	Date Reviewed

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Parts & Tools

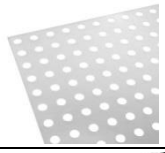
Recommended Tools List

Component	Part #	QTY	Photo
5/32″ Ball End Hex Driver	am-2751	1	
2.5mm Ball End Hex Driver	am-3724	1	
3/8 Combination Wrench	am-4961	1	
5/16 Nut Driver	am-1273	1	

Parts List

Component	Part #	QTY	Photo
0.5″ 10-32 Socket Head Cap Screw	am-1002	5	
1.5″ 10-32 Socket Head Cap Screw	am-1014	10	
2.5″ 10-32 Socket Head Cap Screw	am-1024	5	
#10 Washer	am-1026	15	
1.25″ 10-32 Socket Head Cap Screw	am-1041	20	
0.75″ 10-32 Socket Head Cap Screw	am-1047	10	
1.75″ 10-32 Socket Head Cap Screw	am-1048	5	
1″ 10-32 Socket Head Cap Screw	am-1056	20	

Component	Part #	QTY	Photo
2.25″ 10-32 Socket Head Cap Screw	am-1156	5	
8mm M3 Socket Head Cap Screw	am-1500	10	
4″ Cable Tie	am-1589_black	100	
3/8″ Hex 1 Part Collar Clamp	am-1637	4	
1″ Nylon Screw Spacer	am-1696	5	
0.5″ Nylon Screw Spacer	am-1697	10	
0.125″ Aluminum Shaft Spacer	am-1742	5	
0.25″ Aluminum Shaft Spacer	am-1698	5	
0.5″ Aluminum Shaft Spacer	am-1699	15	
0.25″ Nylon Screw Spacer	am-1700	5	
1″ Long 10-32 Standoff	am-1701	2	
2″ Long 10-32 Standoff	am-1702	2	
4″ Long 10-32 Standoff	am-1704	4	
0.125″ Nylon Screw Spacer	am-1732	5	

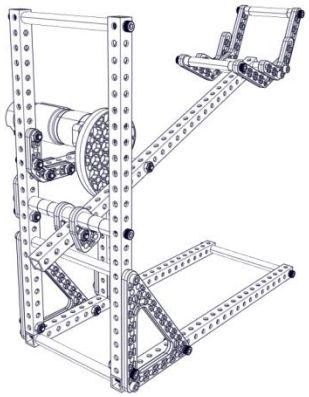
Component	Part #	QTY	Photo
3″ Compliant Wheel, 3/8 Hex, 35A	am-3946_green	4	
3/8″ Hex Bearing	am-4489	4	
14T Pulley, 3/8″ Hex, Half	am-4960_half	4	
15.5″ x 6″ x 0.03″ Perforated PC Sheet	am-4964a	1	
1/2" x 1/2" x 4″ ROBITS Tube	am-5001-0400	1	
1/2" x 1/2" x 6″ ROBITS Tube	am-5001-0600	2	
1/2" x 1/2" x 8″ ROBITS Tube	am-5001-0800	2	
1/2" x 1/2" x 12″ ROBITS Tube	am-5001-1200	4	
1/2" x 1/2" x 14″ ROBITS Tube	am-5001-1400	2	
1″ x 1″ x 8″ ROBITS Tube	am-5002-0800	2	
ROBITS Hex Shaft, 4″	am-5003-0400	1	

Component	Part #	QTY	Photo
ROBITS Hex Shaft, 8″	am-5003-0800	2	
ROBITS Hex Shaft, 10″	am-5003-1000	1	
3x3 Corner Gusset	am-5005_3x3	7	
5x5 Corner Gusset	am-5005_5x5	2	
7x9 Triangle Gusset	am-5007_7x9	2	
1x4 Beam	am-5011_1x4	1	
1x8 Beam	am-5011_1x8	2	
1x12 Beam	am-5011_1x12	2	
1x16 Beam	am-5011_1x16	1	
Side Motor Mount	am-5012	1	
Side Bushing Carrier	am-5013	2	
30T Gear	am-5020_30	4	
Single Motor Bearing Mount	am-5022	2	

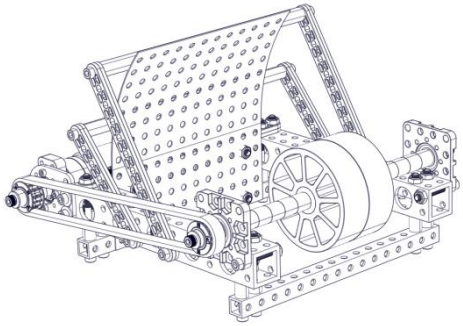
Component	Part #	QTY	Photo
Rubber Band	am-5024_black	50	
93T 5mm HTD Belt	am-5209_93T	1	
1:1 NeveRest Hex Gearmotor	am-5550_0100_001	1	
50.9:1 NeveRest Hex Gearmotor	am-5550_0100_051	1	
12″ Encoder Cable	am-3926-1200	2	
Adhesive Foam Rubber, 10ft	am-5611-10	1	
3″ Stealth Wheel, 3/8 Hex, 35A	am-4718_green	4	
3″ Stealth Wheel Flywheel Plate	am-5436	4	
0.75″ 10-24 Threadforming Screw	am-1123	24	
2x3 L Gusset	am-5004_2x3	2	
Snail Cam, 5″	am-5046	1	
10-32 Nylock Jam Nut	am-1063	30	

Assembly

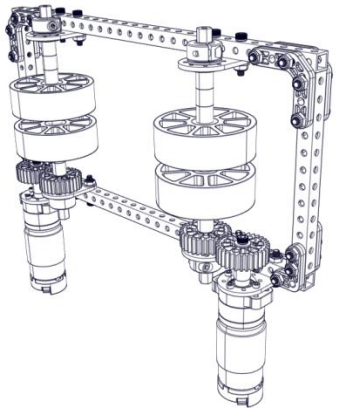
The intermediate mobility kit can be assembled in a variety of different ways, though there are 3 primary configurations this kit is built to support:



- **Catapult (Page 9) -** This catapult concept uses stored energy and a cam to wind the arm back and rapidly release. Catapults are often very repeatable and are compatible with a variety of payloads. Changing variables such as cradle shape, arm length, elastic strength, and release angle can allow you to customize this concept for a wide range of launch dynamics.



- **Hooded Flywheel (Page 17) -** This flywheel concept uses the rotational energy of the wheel to accelerate an object against a curved hood. Hooded flywheel systems often generate a rotational spin (top/backspin) on an object that can change how that object travels through the air. This concept is adjustable by varying wheel spacing, wheel type, and hood wrap angle.

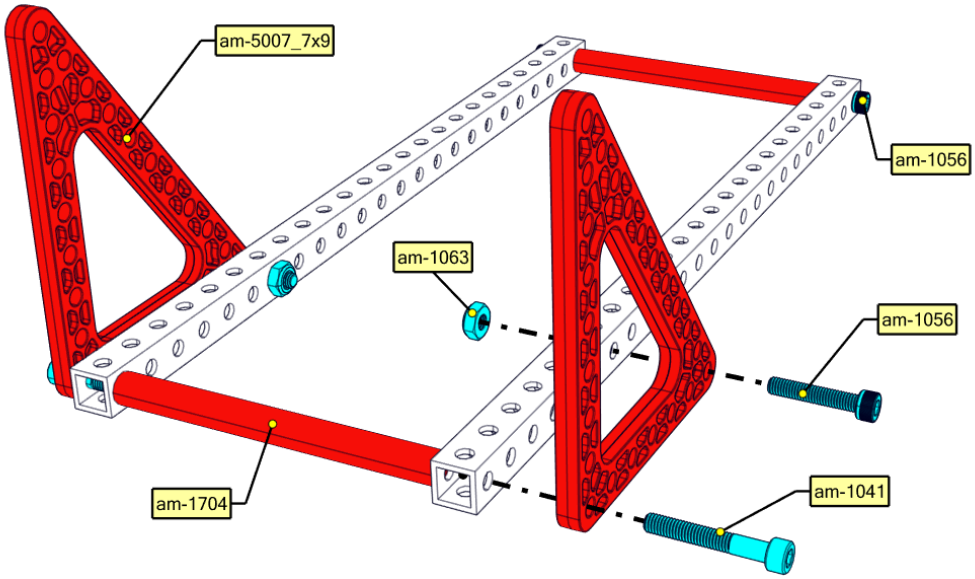


- **Double Axle Flywheel (Page 25) -** This flywheel concept uses a pair of wheels spinning in opposite directions to accelerate an object. Double axle flywheel systems oftentimes produce interesting dynamics to objects as they pass through the system. Wheels spinning at the same rate can prevent objects from spinning/curving through the air while varying the rate can cause different spin and trajectory changes. This concept is adjustable by varying wheel spacing, type, and velocity.

Both the Hooded Flywheel and the Double Axle flywheel can use compliant or stealth wheels. Use stealth wheels with the included stealth wheel flywheel weights to improve launch consistency. See how to assemble them on Page 31.

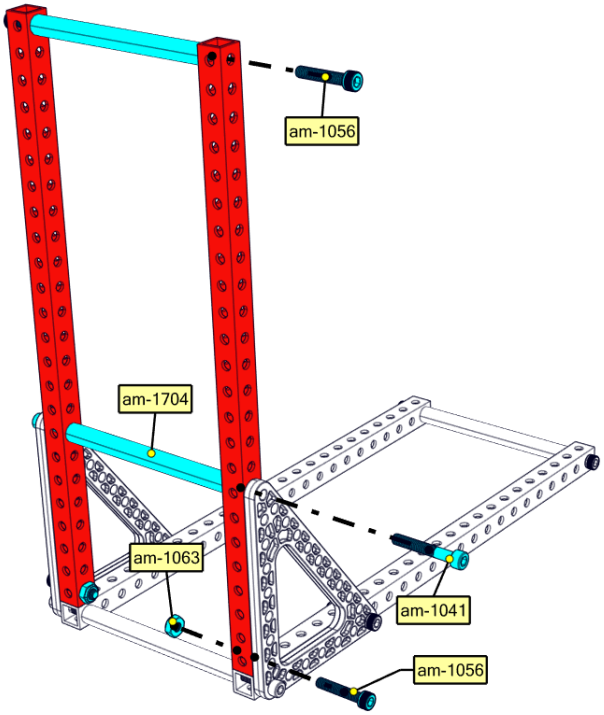
Catapult Assembly – Step 1

Assemble the base of the catapult assembly by connecting [2] 0.5" x 0.5" x 12" ROBITS tubes (am-5001-1200) using [2] 4" 10-32 standoffs (am-1704), [2] 7x9 triangle gussets (am-5007_7x9), [4] 1" screws (am-1056), [2] 1.25" screws (am-1041), and [2] 10-32 nylock nuts (am-1063).



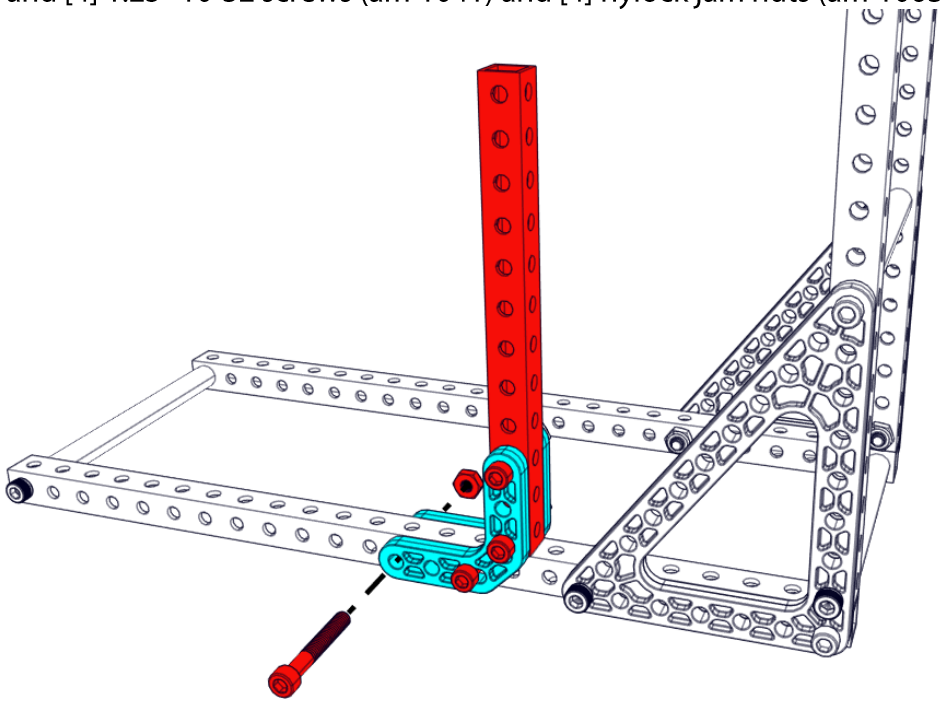
Catapult Assembly – Step 2

Attach [2] 0.5" x 0.5" x 12" ROBITS tubes (am-5001-1200) to the base using [2] 4" 10-32 standoffs (am-1704), [2] 7x9 triangle gussets (am-5007_7x9), [4] 1" screws (am-1056), [2] 1.25" screws (am-1041), and [2] 10-32 nylock nuts (am-1063).



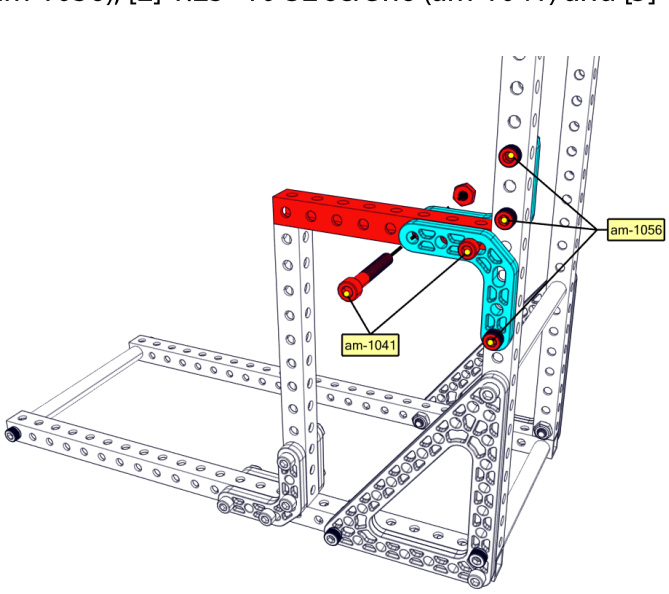
Catapult Assembly – Step 3

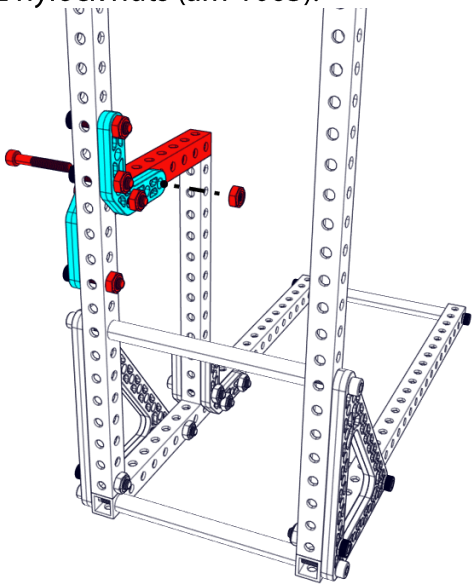
Attach [1] 0.5″ x 0.5″ x 6″ ROBITS tube (am-5001-0600) using [2] 3x3 corner gussets (am-5005_3x3) and [4] 1.25″ 10-32 screws (am-1041) and [4] nylock jam nuts (am-1063).



Catapult Assembly – Step 4

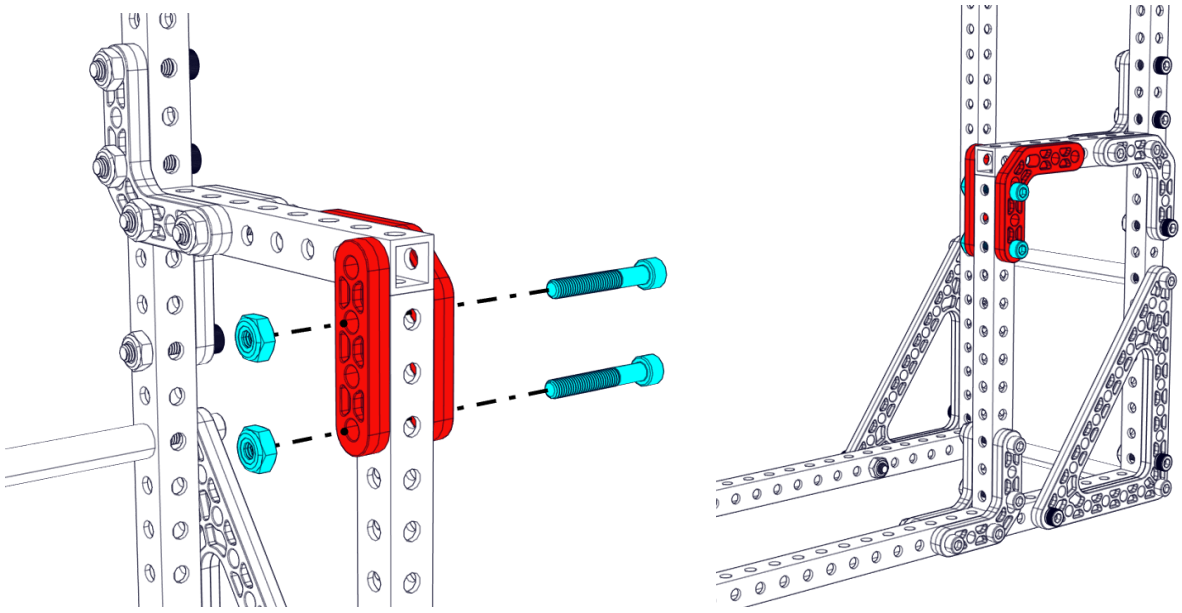
Connect [1] 0.5″ x 0.5″ x 4″ ROBITS tube (am-5001-0400) to the side of the assembly using [2] 3x3 corner gussets (am-5005_3x3) in opposite orientations. Secure with [3] 1″ 10-32 screws (am-1056), [2] 1.25″ 10-32 screws (am-1041) and [5] 10-32 nylock nuts (am-1063).





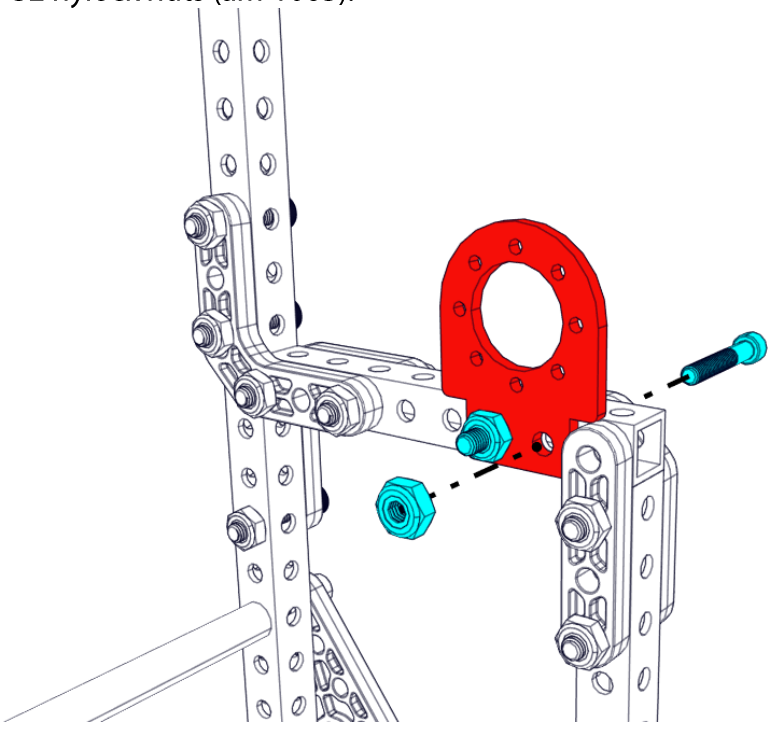
Catapult Assembly – Step 5

Attach [1] 3x3 corner gusset (am-5005_3x3) and [1] 1x4 beam (am-5011_1x4) using [2] 1.25" 10-32 screws (am-1041) and [2] nylock nuts (am-1063).



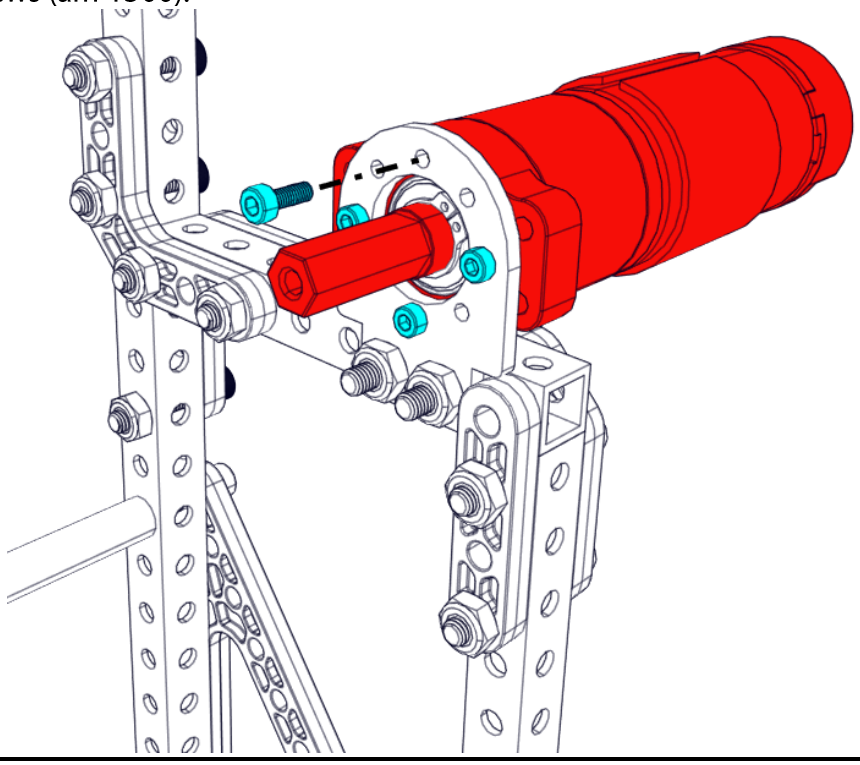
Catapult Assembly – Step 6

Affix [1] ROBITS Motor Mount (am-5012) to the assembly using [2] 1.25" 10-32 screws (am-1041) and [2] 10-32 nylock nuts (am-1063).



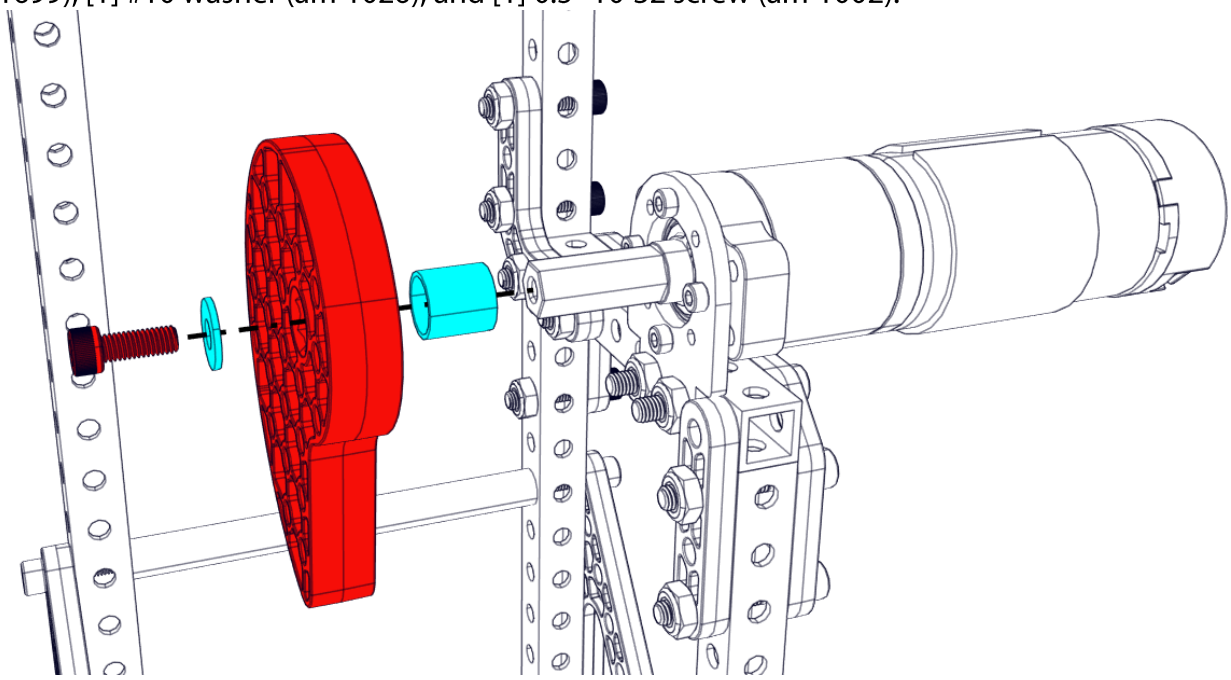
Catapult Assembly – Step 7

Attach [1] Neverest 50.9:1 gearmotor (am-5550_0100_051) to the motor mount using [4] 8mm M3 screws (am-1500).



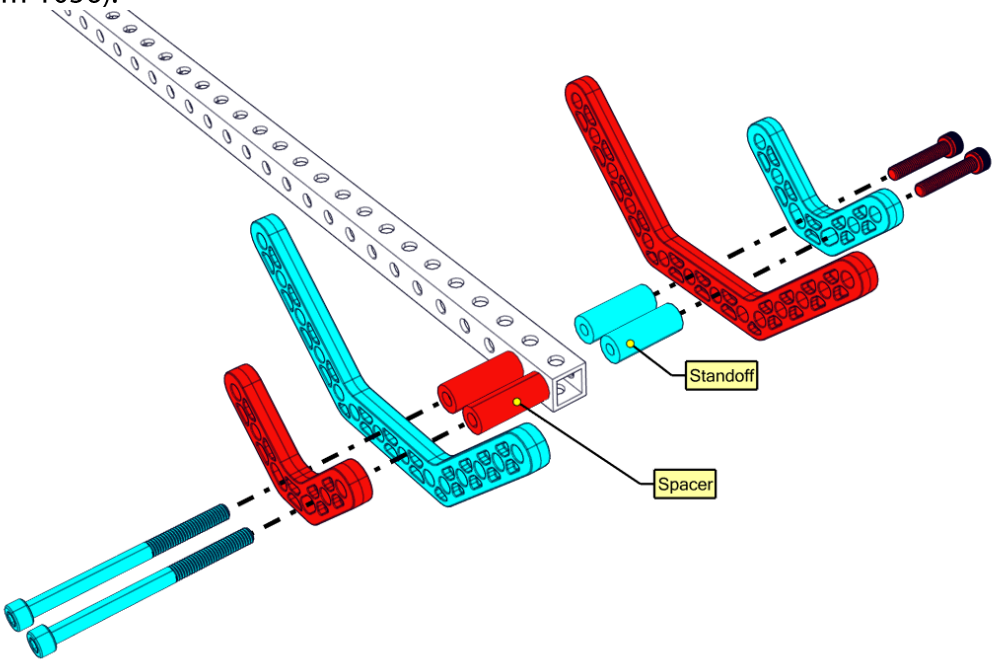
Catapult Assembly – Step 8

Attach [1] snail cam (am-5046) to the NeveRest motor with [1] 0.5" long shaft spacer (am-1699), [1] #10 washer (am-1026), and [1] 0.5" 10-32 screw (am-1002).



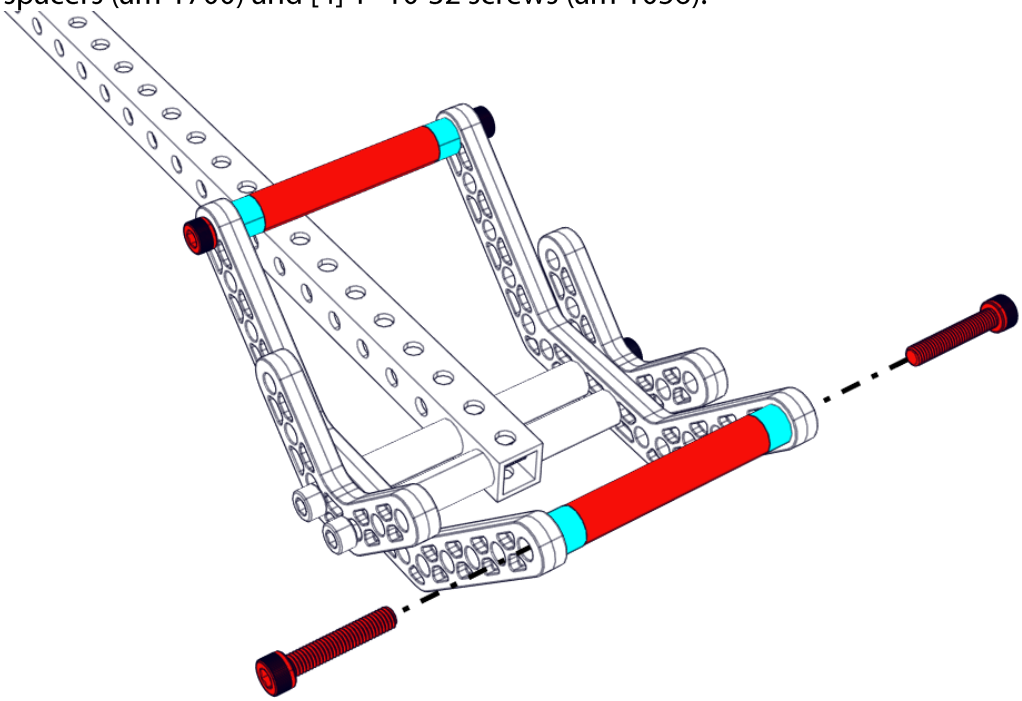
Catapult Assembly – Step 9

At the end of [1] 0.5" x 0.5" x 14" ROBITS tube (am-5001-1400), create a cradle assembly using [2] 5x5 corner gussets (am-5005_5x5), [2] 3x3 corner gussets (am-5005_3x3), [2] 1" screw spacers (am-1696), [2] 1" standoffs (am-1701), [2] 2.5" 10-32 screws (am-1024), and [2] 1" 10-32 screws (am-1056).



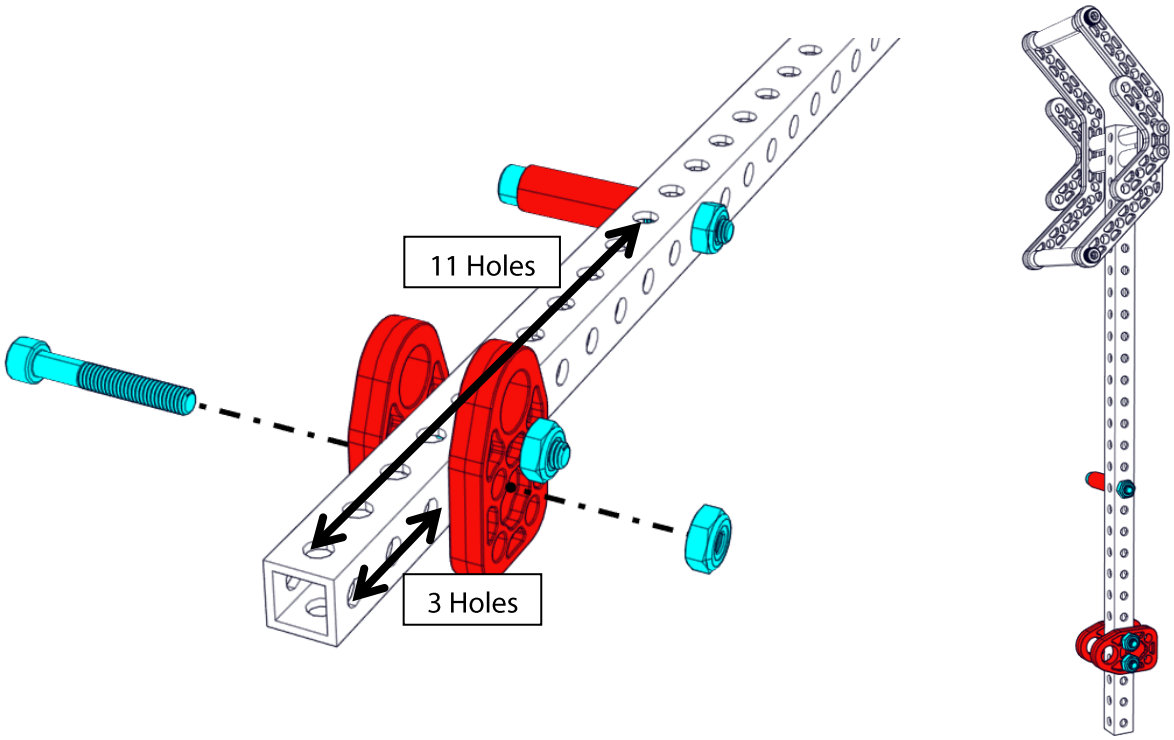
Catapult Assembly – Step 10

Complete the claw assembly by affixing [2] 2" standoffs (am-1702) at either end using [4] 0.25" screw spacers (am-1700) and [4] 1" 10-32 screws (am-1056).



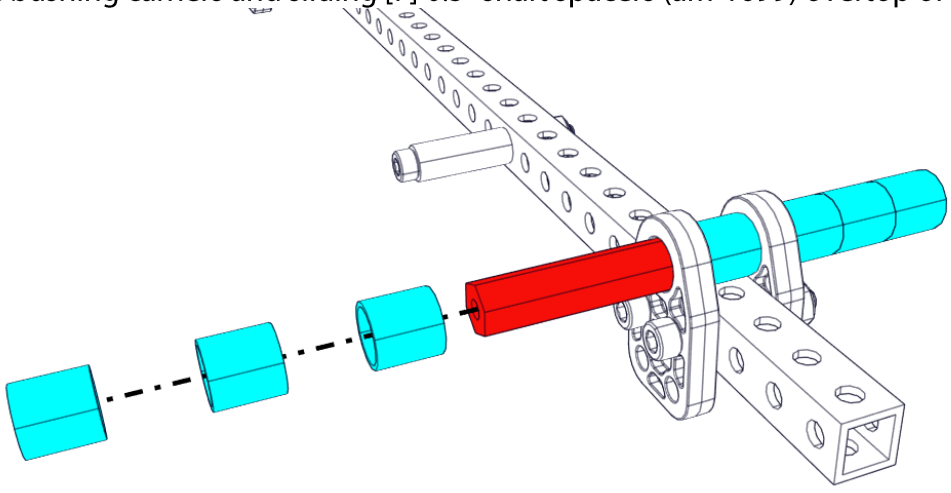
Catapult Assembly – Step 11

On the opposite end of the tube, attach [2] side bushing carriers (am-5013) using [2] 1.25" 10-32 screws (am-1041) and [2] nylock nuts (am-1063). Then, attach [1] 1" screw spacer (am-1696) using [1] 1.75" 10-32 screw (am-1048) and [1] nylock nut (am-1063).



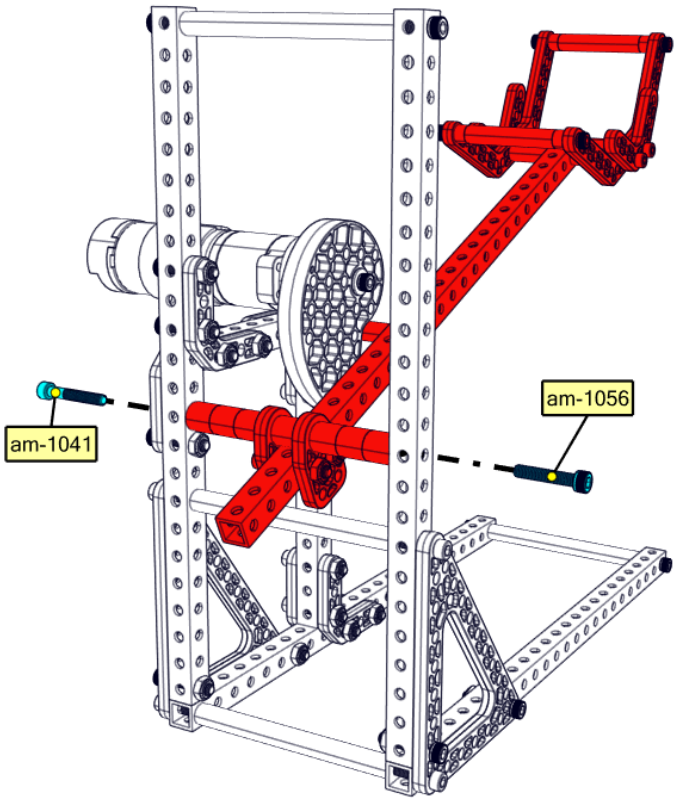
Catapult Assembly – Step 12

Create the pivot bar for the catapult by inserting [1] 4" ROBITS hex shaft (am-5003-0400) through the bushing carriers and sliding [7] 0.5" shaft spacers (am-1699) overtop of it.



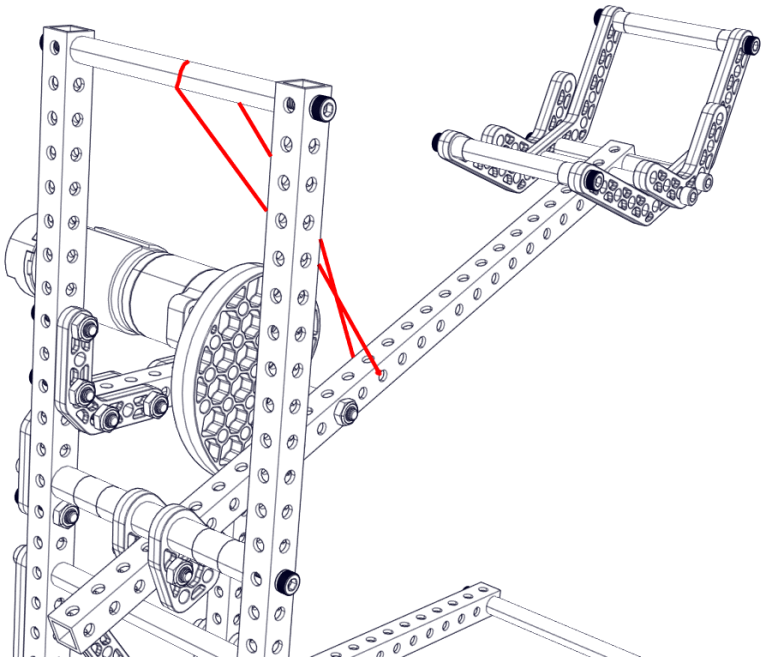
Catapult Assembly – Step 13

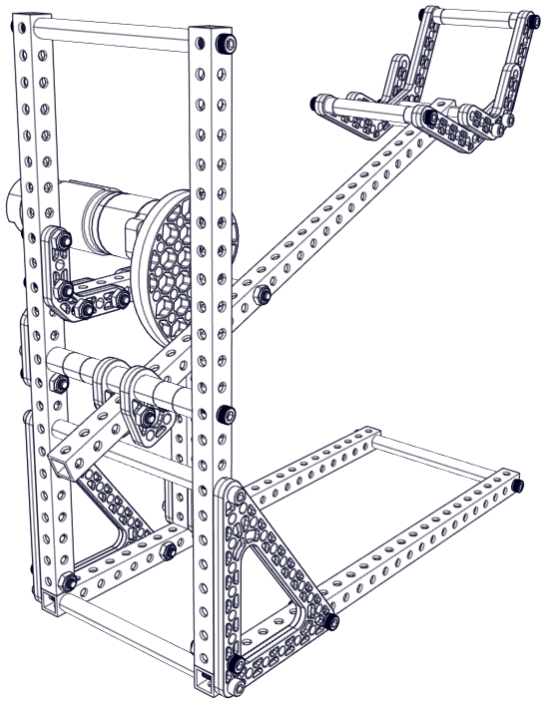
Pin the catapult in place using [1] 1″ 10-32 screw (am-1056) and [1] 1.25″ 10-32 screw (am-1041).



Catapult Assembly – Step 14

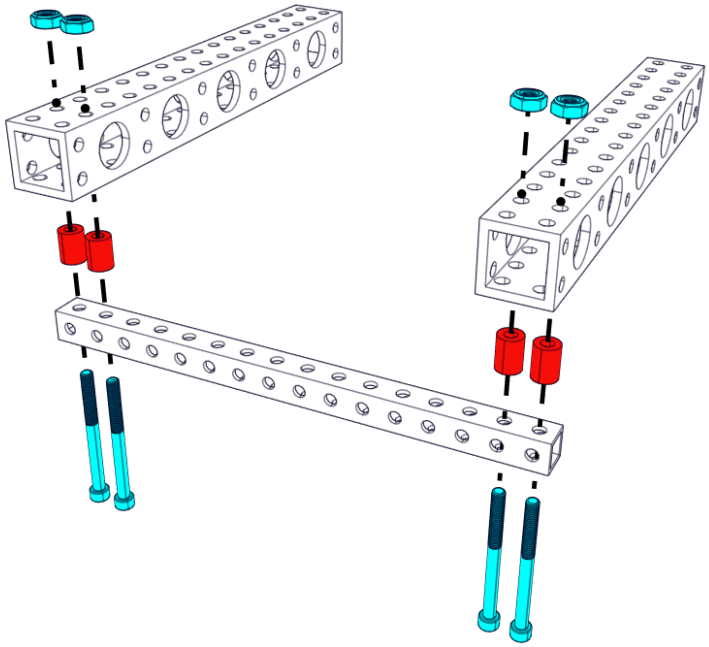
Place rubber bands between the outer frame and the catapult arm to spring-load it as shown. It is recommended to fasten the rubber bands in place using cable ties, but there is no recommendation for where to place the bands along the catapult arm. Placement should be changed depending on the weight of the projectile being launched and the number of rubber bands used. Play around with it to find the right location for your usage.





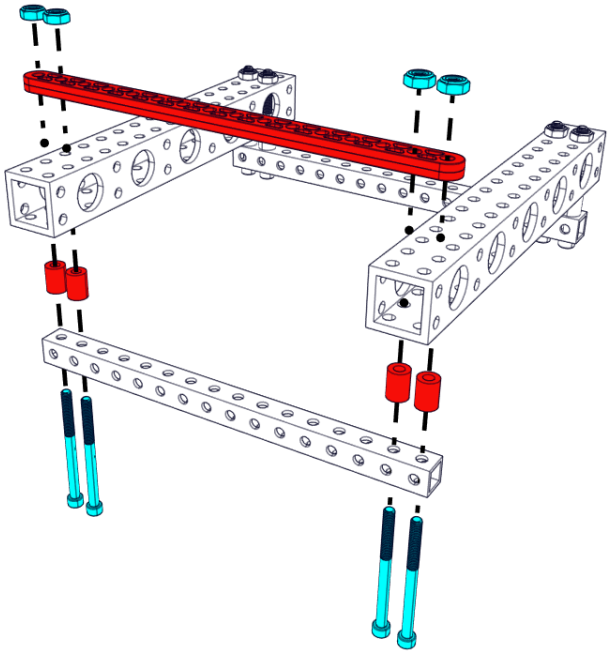
Hooded Flywheel – Step 1

Connect [2] 1″ x 1″ x 8″ ROBITS tubes (am-5002-0800) with [1] 0.5″ x 0.5″ x 8″ (am-5001-0800), [4] 0.5″ screw spacers (am-1697), [4] 2.25″ 10-32 screws (am-1156), and [4] nylock nuts (am-1063).



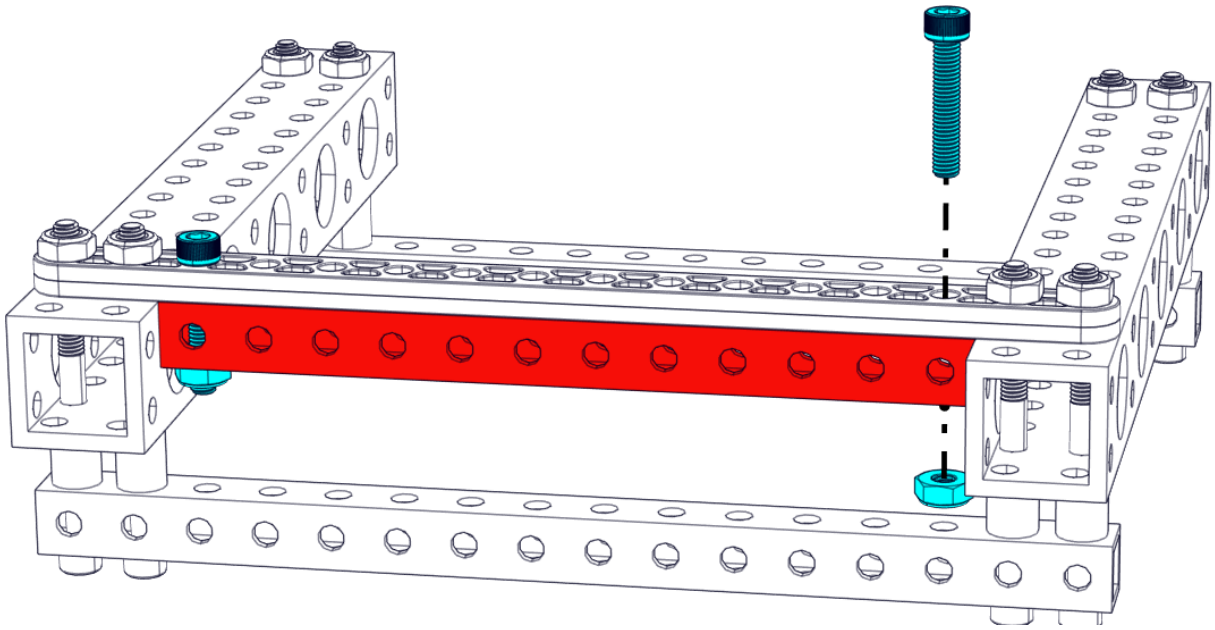
Hooded Flywheel – Step 2

On the other side of the assembly, place [1] 0.5″ x 0.5″ x 8″ ROBITS tube (am-5001-0800) along with [1] 1x16 ROBITS beam (am-5011_1x16) using [4] 0.5″ screw spacers (am-1697), [4] 2.5″ 10-32 screws (am-1024), and [4] nylock nuts (am-1063).



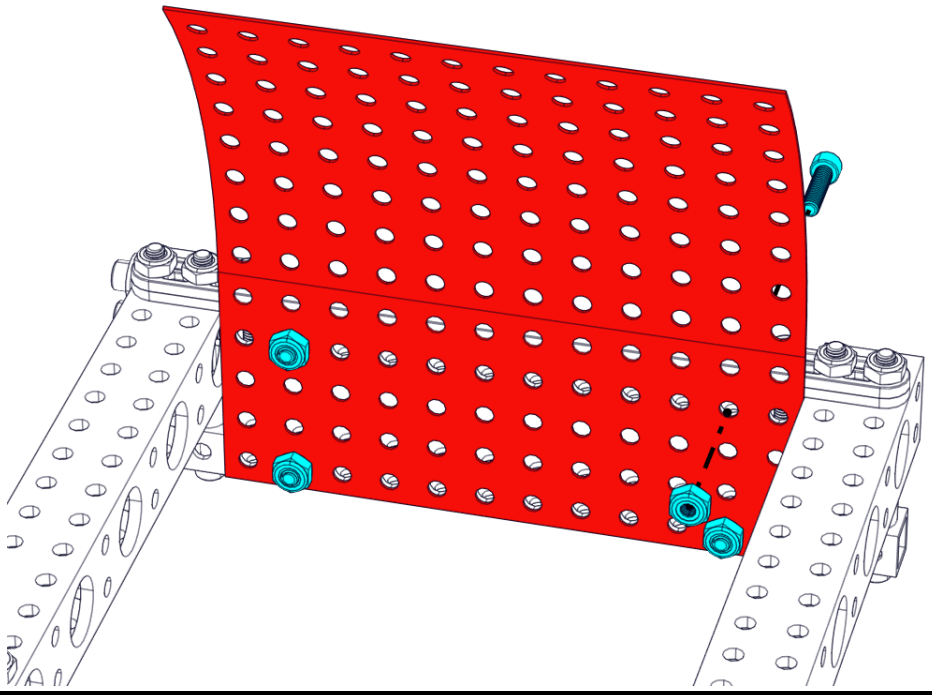
Hooded Flywheel – Step 3

Connect [1] 0.5" x 0.5" x 6" ROBITS tube (am-5001-0600) to the beam using [2] 1" 10-32 screws (am-1056) and [2] nylock nuts (am-1063).



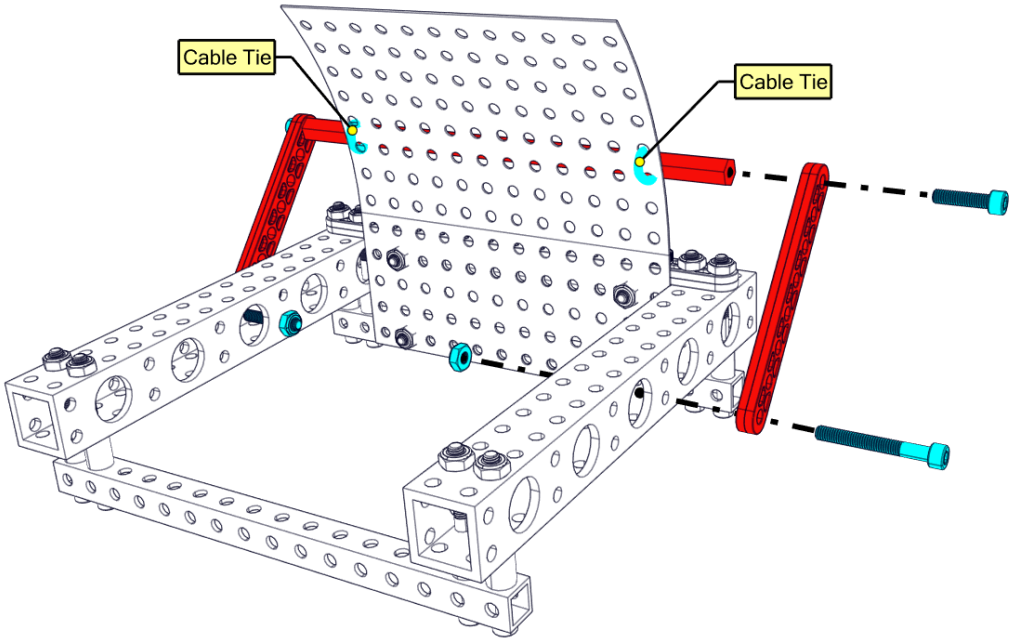
Hooded Flywheel – Step 4

Create the hood using a small section of the perforated polycarbonate sheet, cutting it to size as shown and securing it to the assembly using [4] 0.75" screws (am-1047) and [4] nylock nuts (am-1063). Additional sheets can be used to increased hood stiffness if desired.



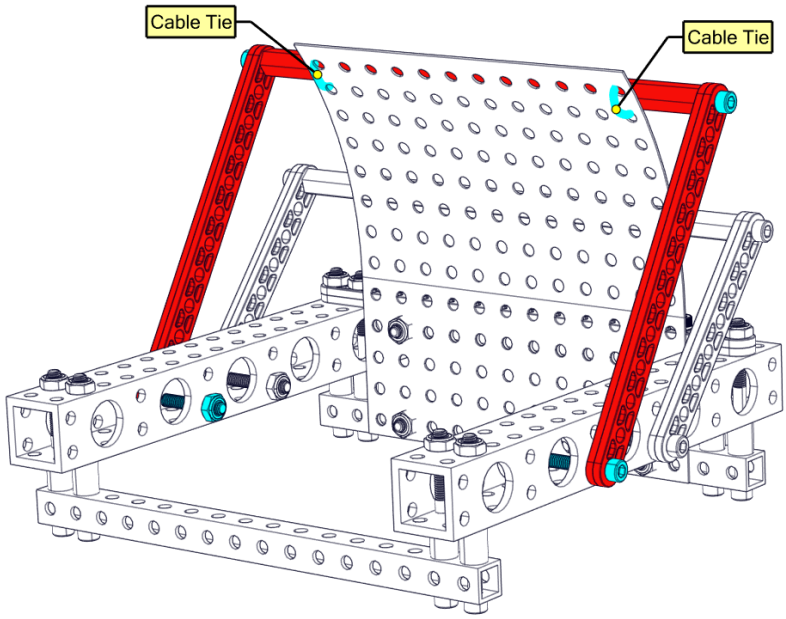
Hooded Flywheel – Step 5

Using [2] 1x8 ROBITS beams (am-5011_1x8), [1] 8″ hex shaft (am-5003-0800), [2] 0.75″ 10-32 screws (am-1047), [2] 1.5″ 10-32 screws (am-1014), and [2] nylock nuts (am-1063), create a backrest for the hood. Make sure the launcher hood is bent in the correct direction. Use [2] cable ties to affix the hood to the hex shaft.



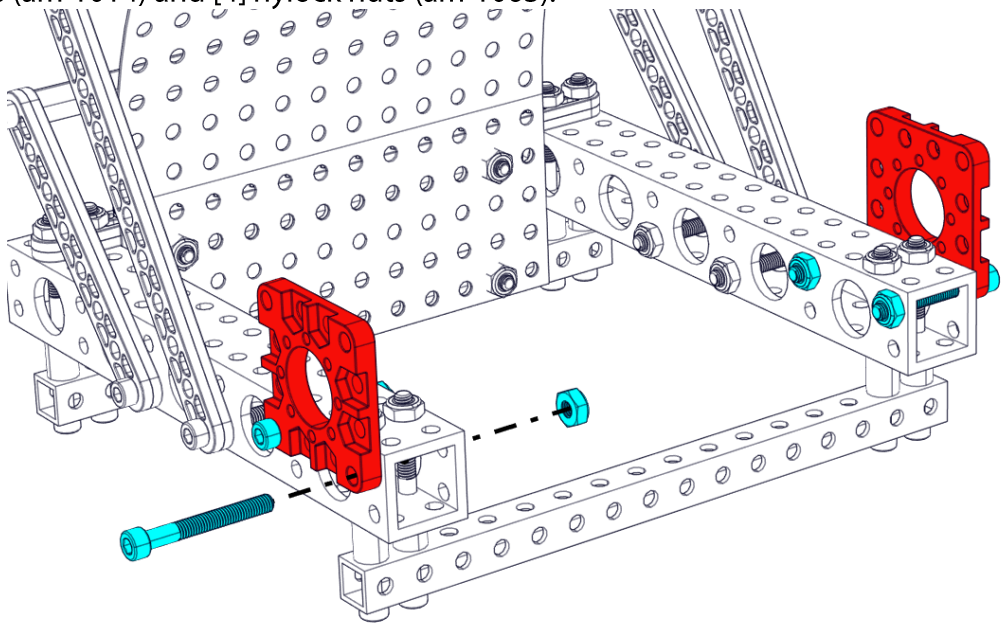
Hooded Flywheel – Step 6

Using [2] 1x12 ROBITS beams (am-5011_1x12), [1] 8″ hex shaft (am-5003-0800), [2] 0.75″ 10-32 screws (am-1047), [2] 1.5″ 10-32 screws (am-1014), and [2] nylock nuts (am-1063), create a second backrest for the hood. Use [2] cable ties to affix the hood to the hex shaft.



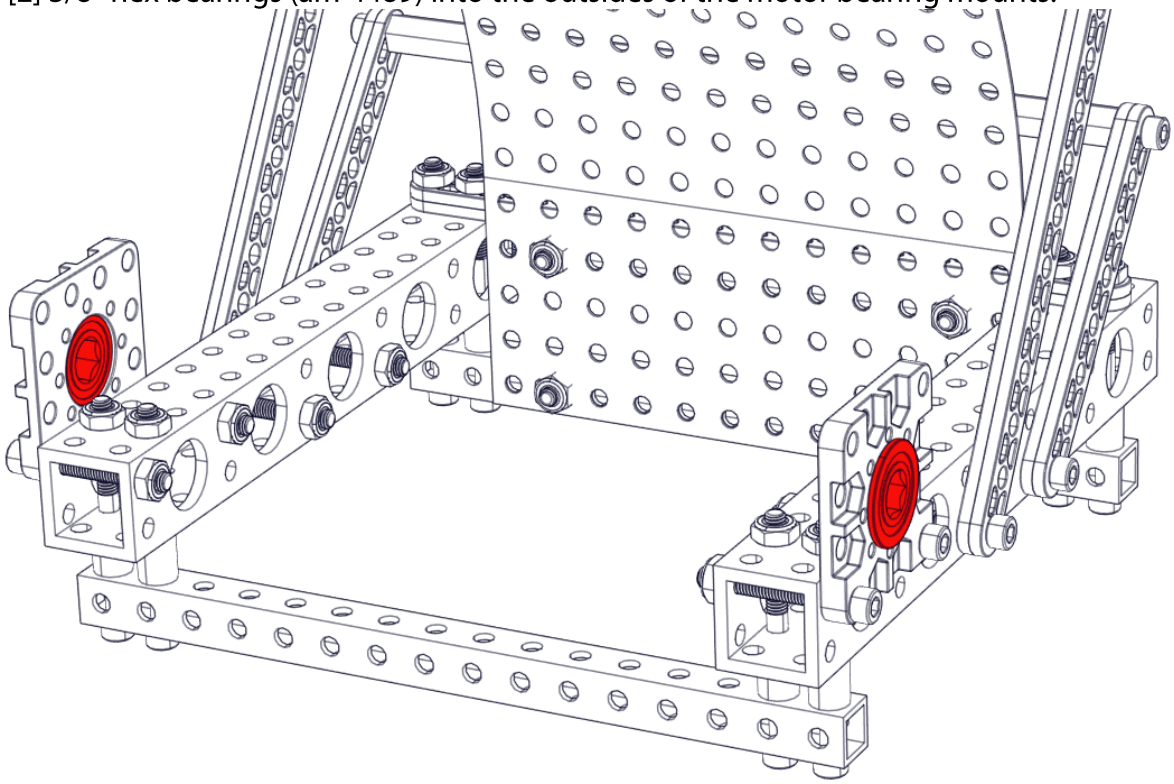
Hooded Flywheel – Step 7

Attach [2] ROBITS solo motor bearing mounts (am-5022) to the assembly using [4] 1.5″ 10-32 screws (am-1014) and [4] nylock nuts (am-1063).



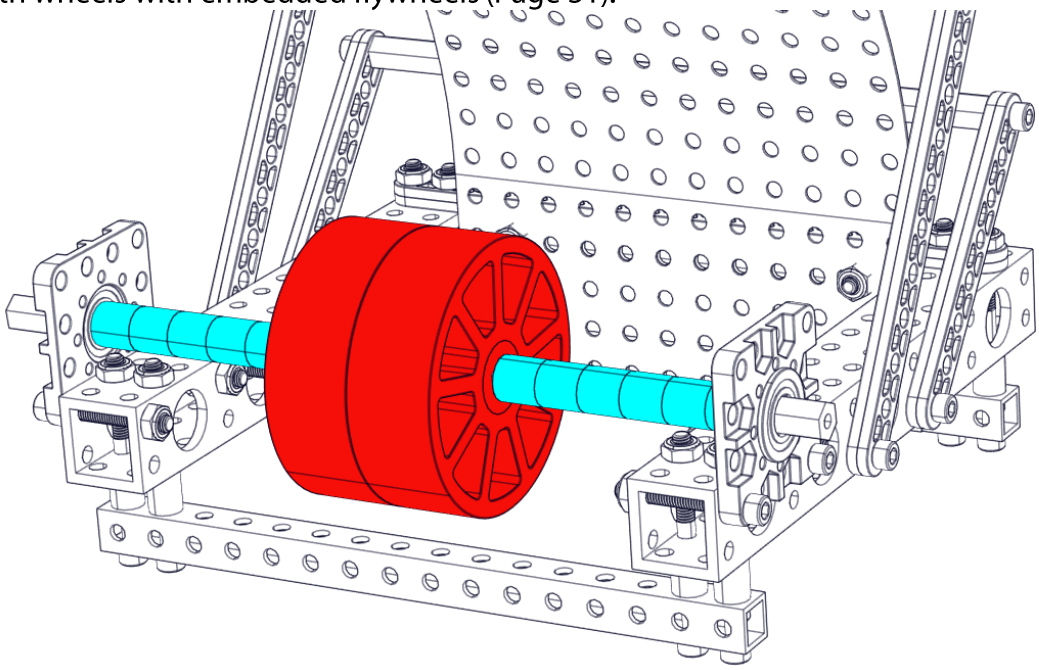
Hooded Flywheel – Step 8

Insert [2] 3/8″ hex bearings (am-4489) into the outsides of the motor bearing mounts.



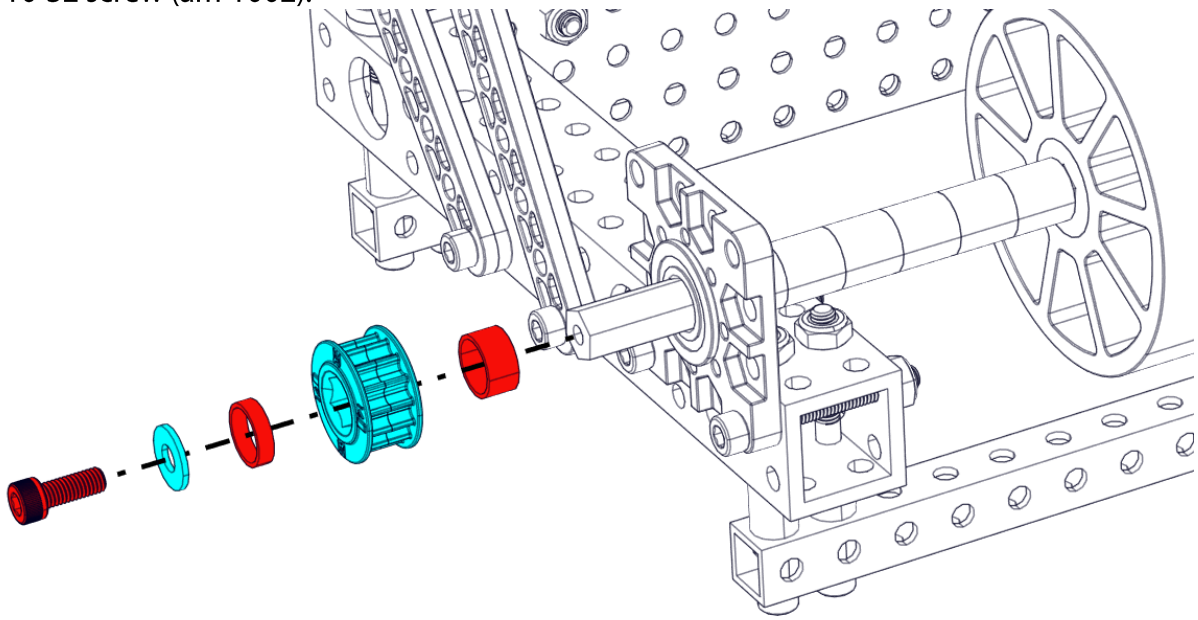
Hooded Flywheel – Step 9

Slide [1] 10" ROBITS hex shaft (am-5003-1000) through the bearings, placing [2] 3" compliant wheels (am-3946) in the center and holding them in place with [12] 0.5" shaft spacers (am-1699), [6] on each side of the compliant wheels. The compliant wheels can be swapped out for stealth wheels with embedded flywheels (Page 31).



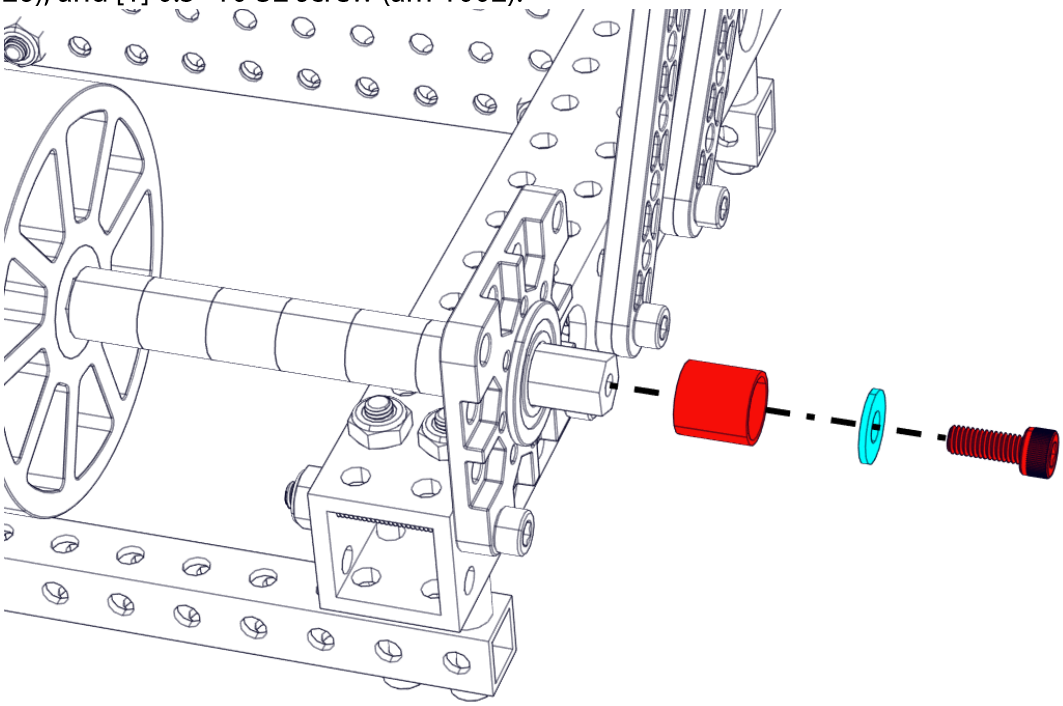
Hooded Flywheel – Step 10

On one end of the shaft, secure it with [1] 0.25" shaft spacer (am-1698), [2] 14 tooth pulley halves (am-4960_half), [1] 0.125" shaft spacer (am-1742), [1] #10 washer (am-1026), and [1] 0.5" 10-32 screw (am-1002).



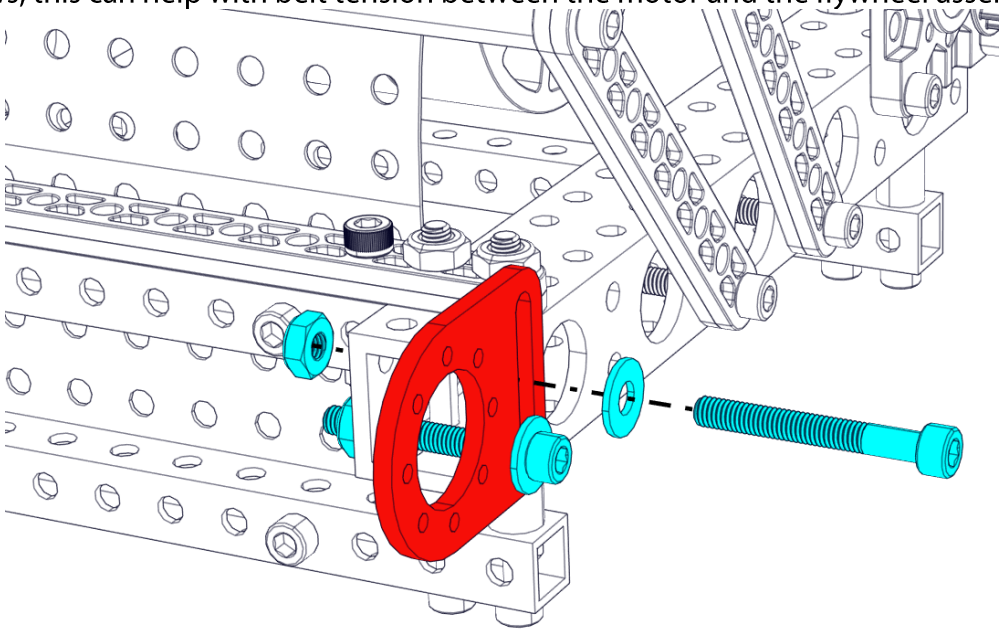
Hooded Flywheel – Step 11

Secure the other side of the shaft with [1] 0.5" shaft spacer (am-1699), [1] #10 washer (am-1026), and [1] 0.5" 10-32 screw (am-1002).



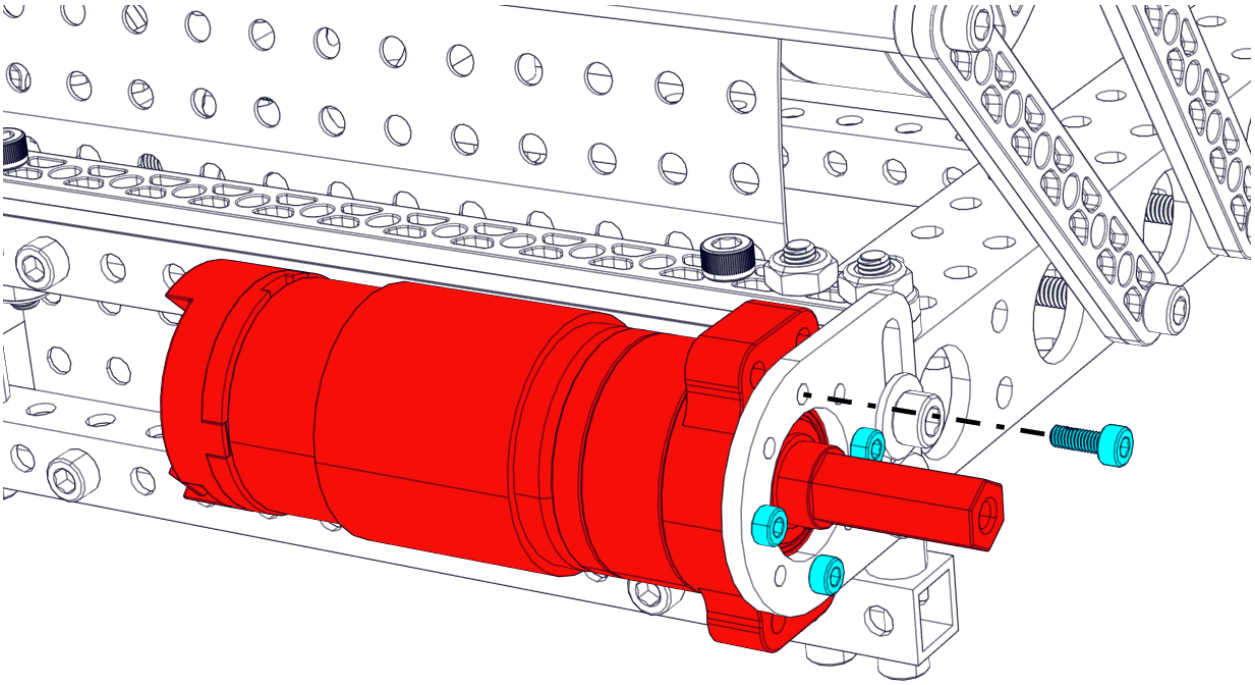
Hooded Flywheel – Step 12

At the rear of the assembly behind the hood, attach [1] ROBITS slotted motor mount (am-5033) as shown using [2] 1.5" 10-32 screws (am-1014), [2] #10 washers (am-1026), and [2] nylock nuts (am-1063). The mount location can be adjusted by loosening and retightening the screws, this can help with belt tension between the motor and the flywheel assembly.



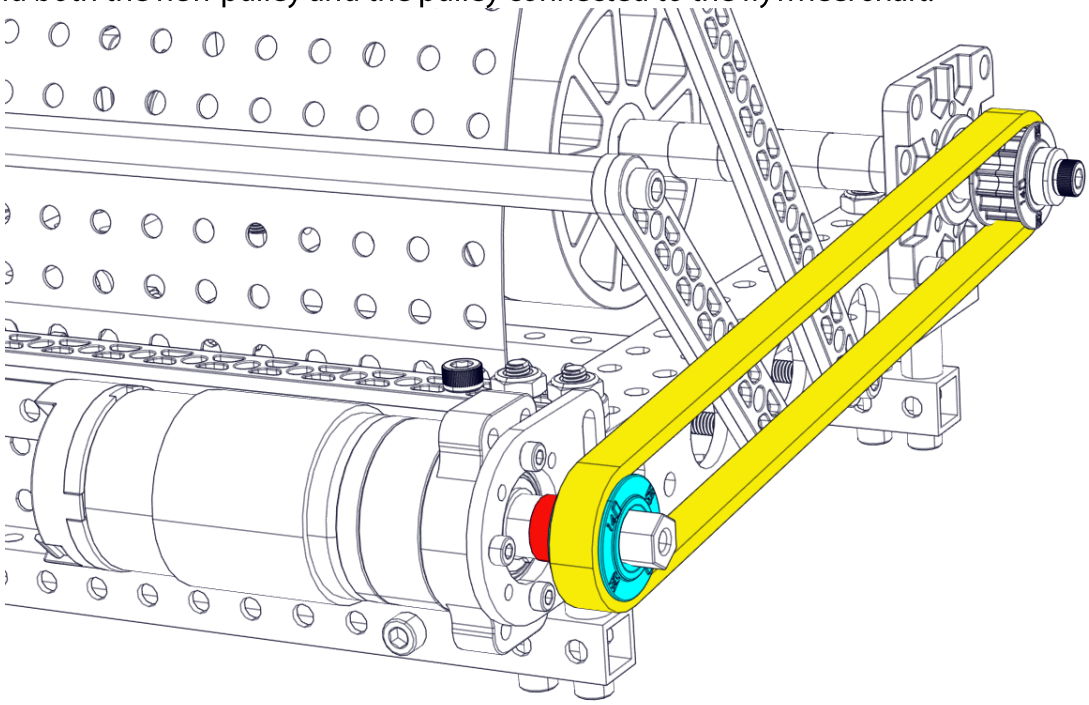
Hooded Flywheel – Step 13

Attach [1] NeveRest Hex 1:1 (am-5550_0100_001) to the motor mount using [4] 8mm M3 screws.



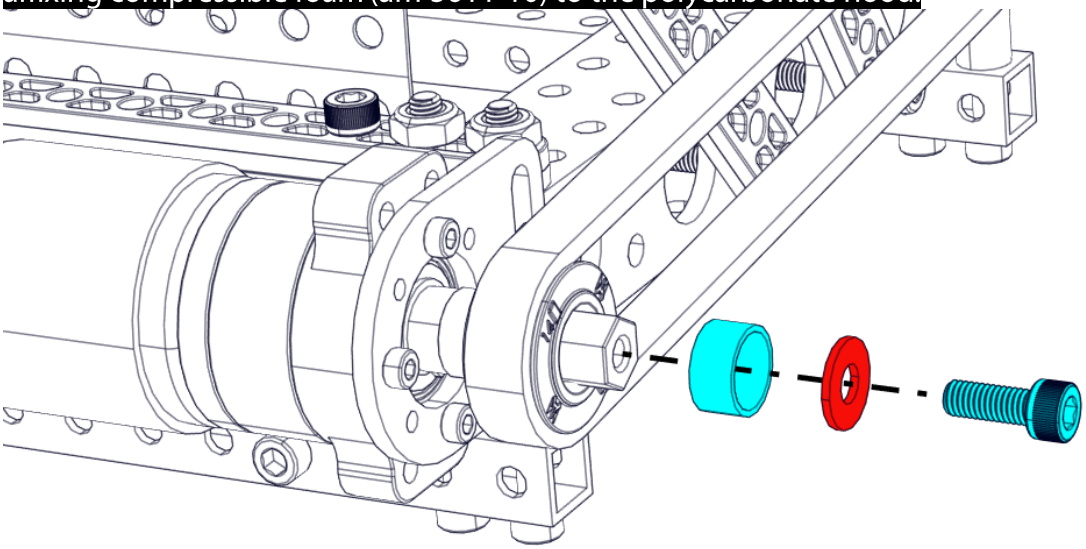
Hooded Flywheel – Step 14

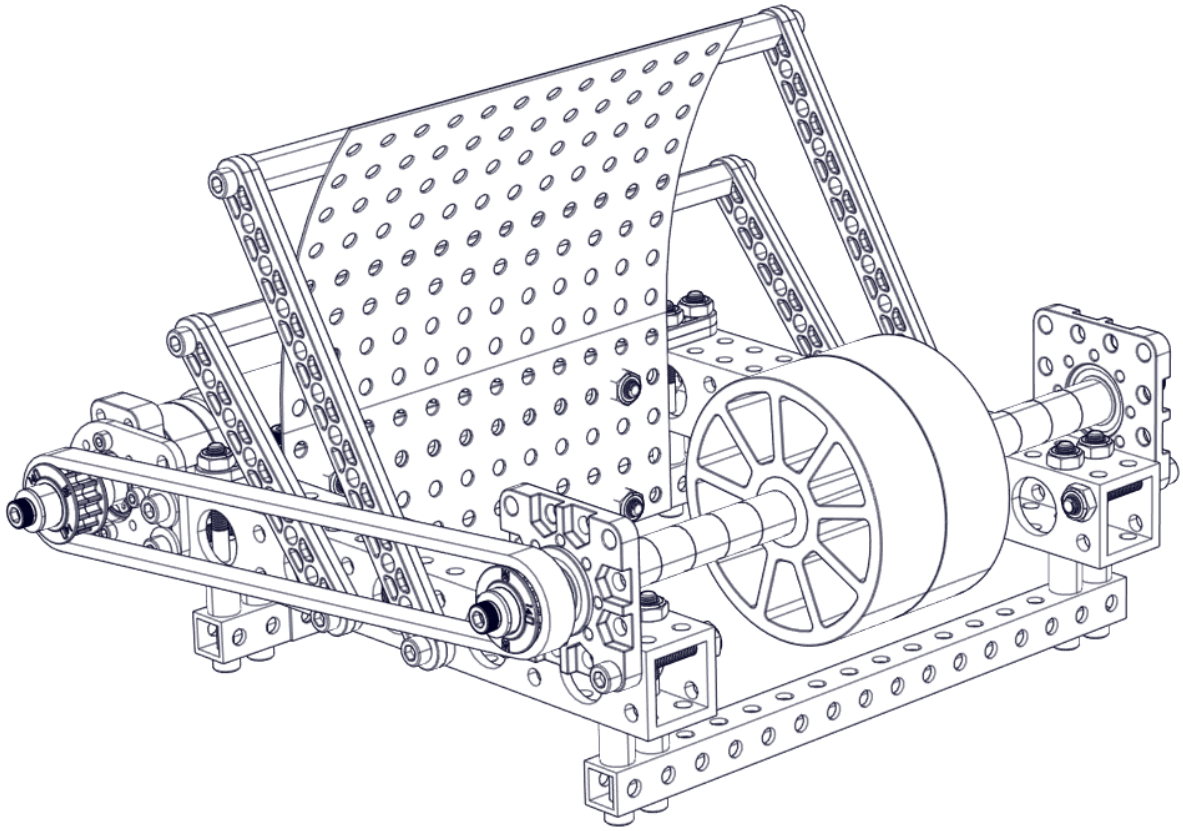
Slip [1] 0.25" shaft spacer (am-1698) and [2] 14 tooth pulley halves (am-4960_half) onto the motor shaft. When putting on the pulley, make sure to wrap [1] 93 tooth belt (am-5209_93T) around both the new pulley and the pulley connected to the flywheel shaft.



Hooded Flywheel – Step 15

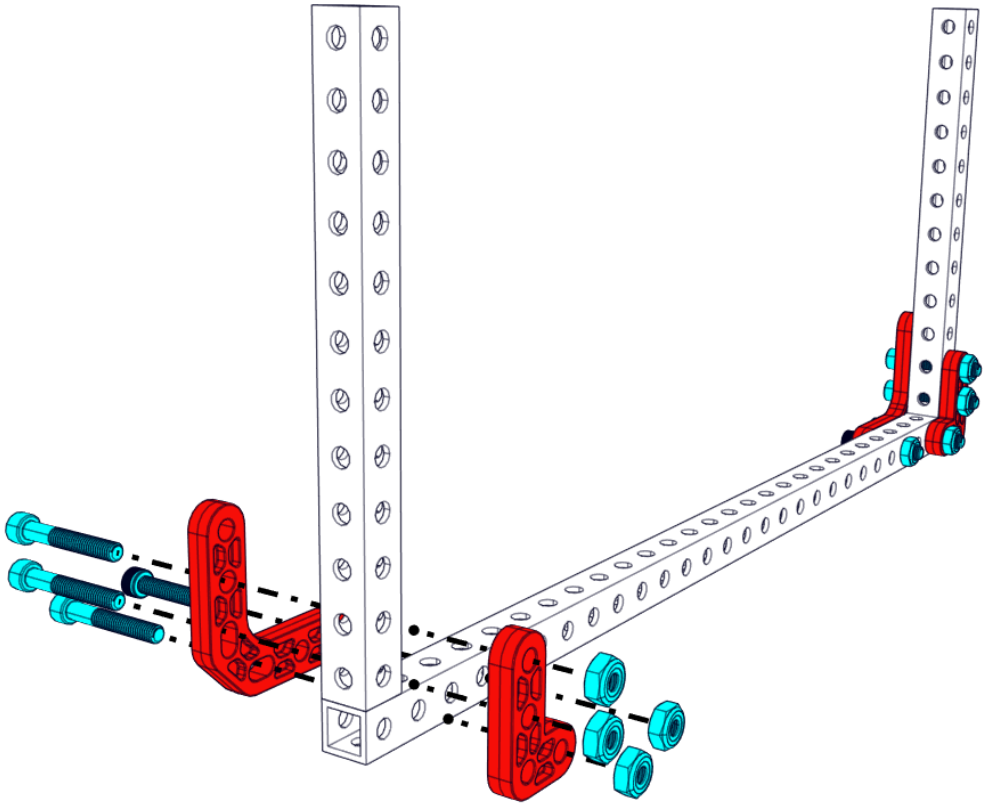
Secure the pulley in place with [1] 0.25" shaft spacer (am-1698), [1] #10 washer (am-1026), and [1] 0.5" 10-32 screw (am-1002). Note: the compression on this launcher can be adjusted by affixing compressible foam (am-5611-10) to the polycarbonate hood.

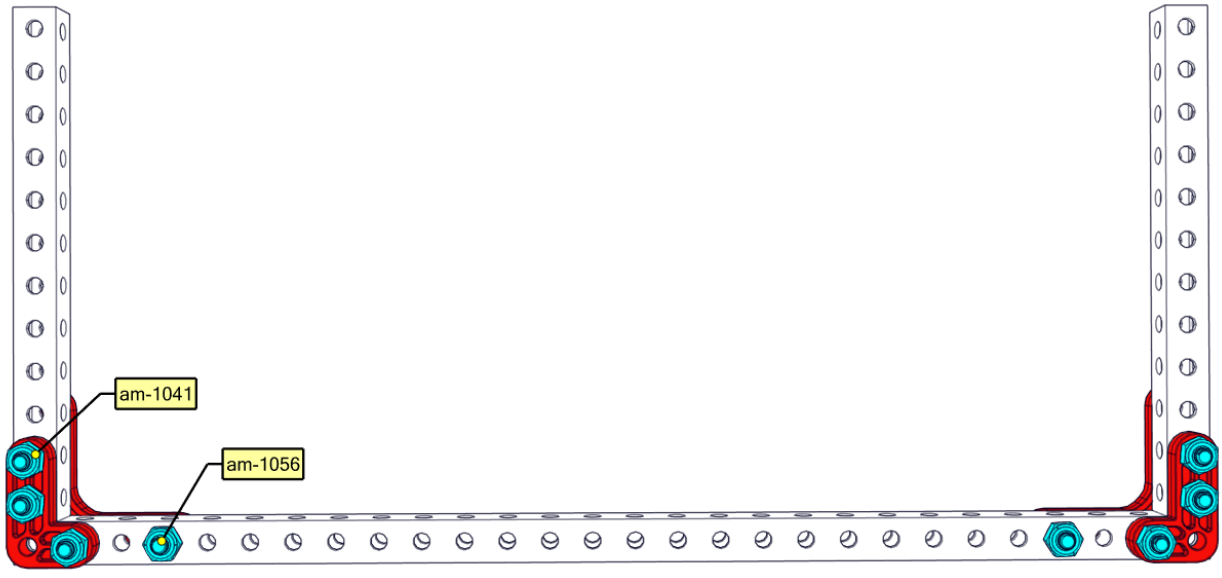




Double Axle Flywheel – Step 1

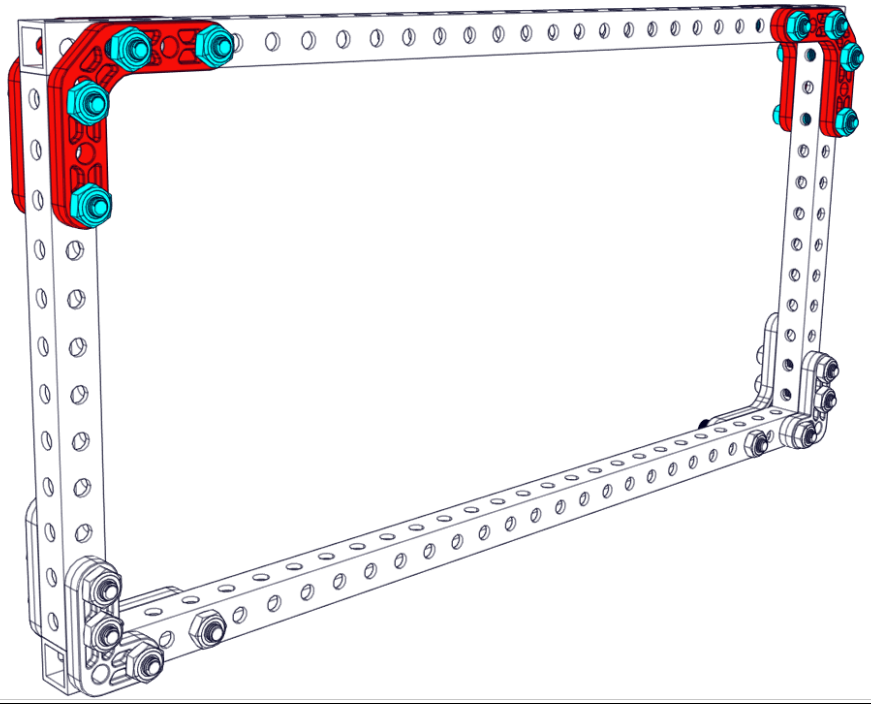
Build the lower half of the frame by connecting [2] 0.5" x 0.5" x 6" ROBITS tubes (am-5001-0600) to [1] 0.5" x 0.5" x 14" ROBITS tube (am-5001-1400) using [2] 2x3 L Gussets (am-5004_2x3), [2] 3x3 Corner Gussets (am-5005_3x3), [6] 1.25" 10-32 screws (am-1041), [2] 1" 10-32 screws (am-1056), [8] nylock nuts (am-1063).





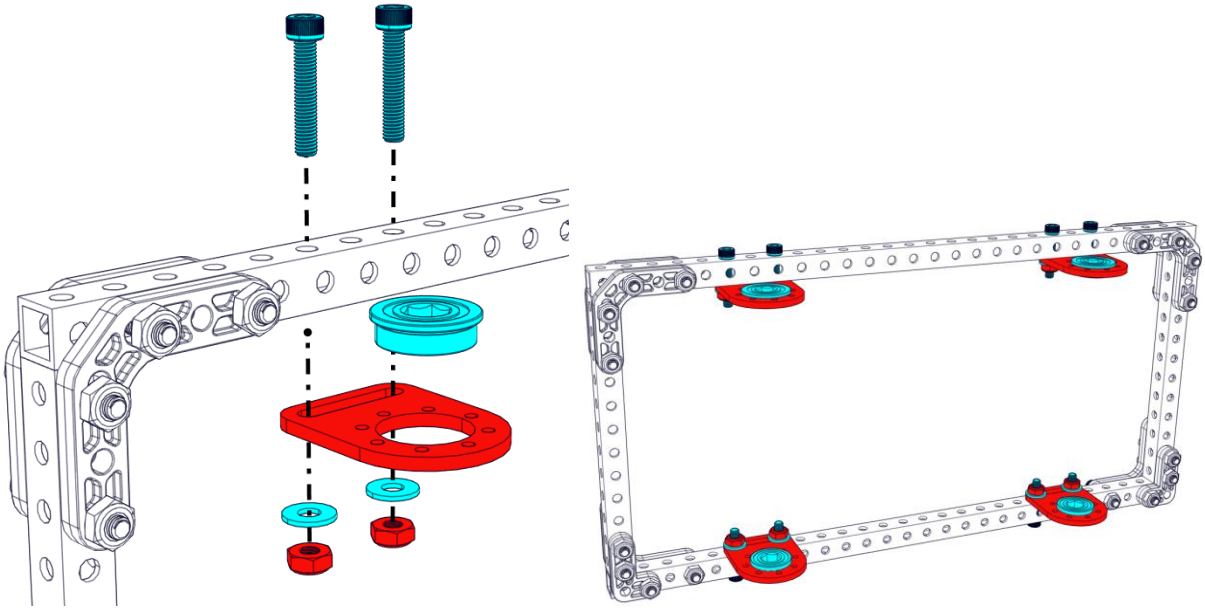
Double Axle Flywheel – Step 2

Attach [1] 0.5" x 0.5" x 14" ROBITS tube (am-5001-1400) to complete the frame using [4] 3x3 Corner Gussets (am-5005_3x3), [8] 1.25" 10-32 screws (am-1041), [8] nylock nuts (am-1063).



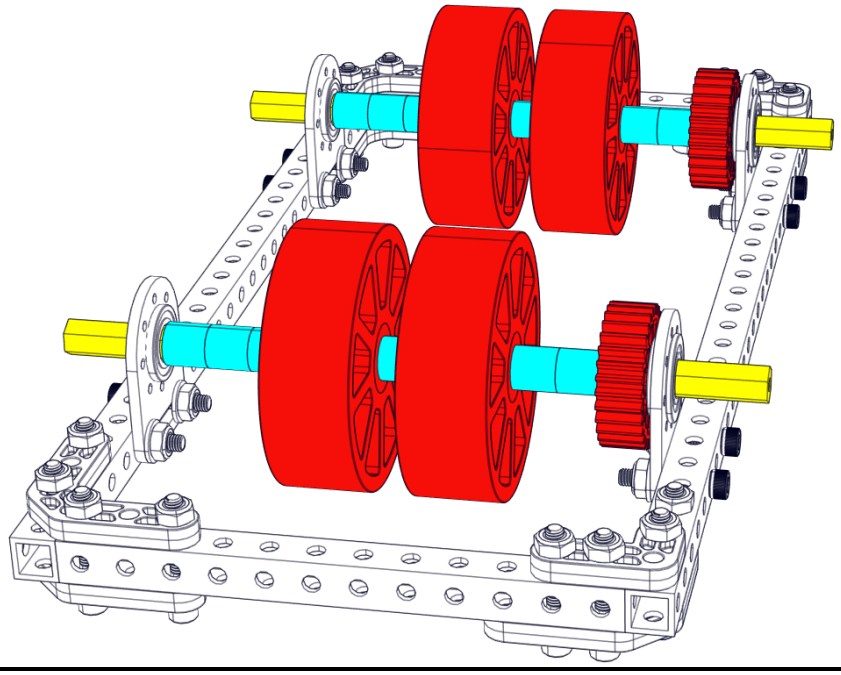
Double Axle Flywheel – Step 3

At all four corners of the frame, attach [1] ROBITS Slotted Motor Mount (am-5033) using [2] 1" 10-32 screws (am-1056), [2] #10 washer (am-1026), and [2] nylock nuts (am-1063). Insert [1] 3/8" hex bearing (am-4489) into each motor mount.



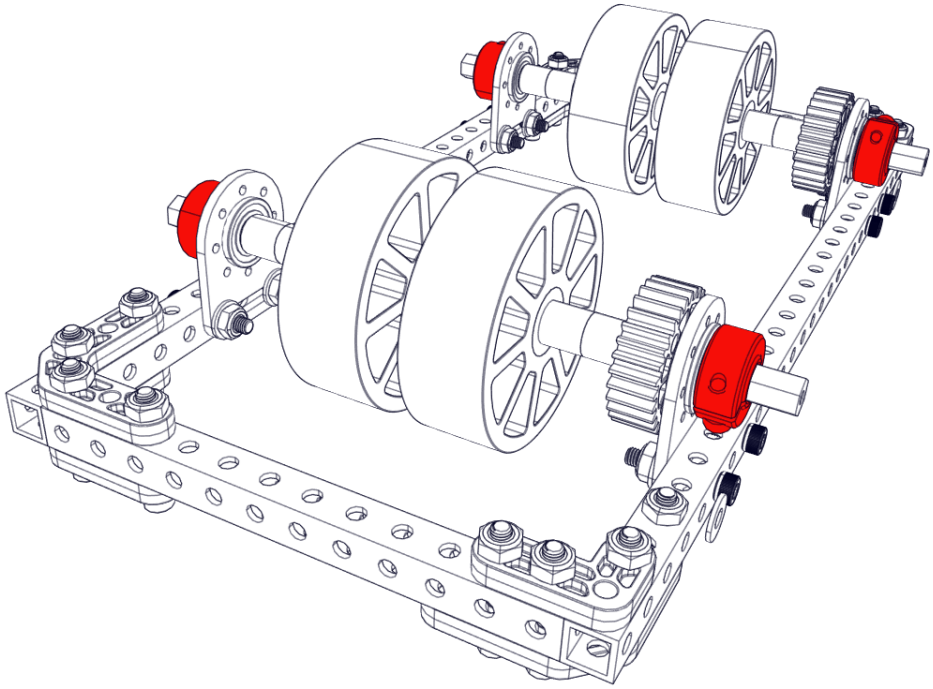
Double Axle Flywheel – Step 4

Slide [1] 8″ hex shaft (am-5003-0800) through each set of bearings, placing [6] 0.5″ shaft spacers (am-1699), [2] 3″ compliant wheels (am-3945), and [1] 30 tooth gear (am-5020_30) on each shaft. The compliant wheels can be swapped out for stealth wheels with embedded flywheels (Page 31).



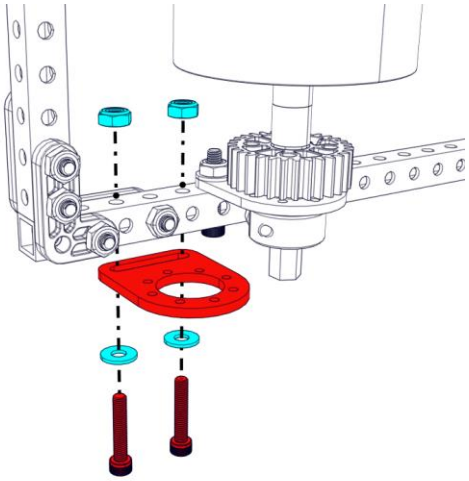
Double Axle Flywheel – Step 5

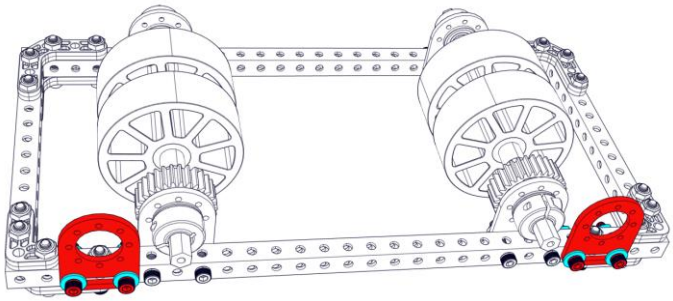
Secure both launcher axles in place using [4] 3/8″ hex collar clamps (am-1637). Tighten them completely.



Double Axle Flywheel – Step 6

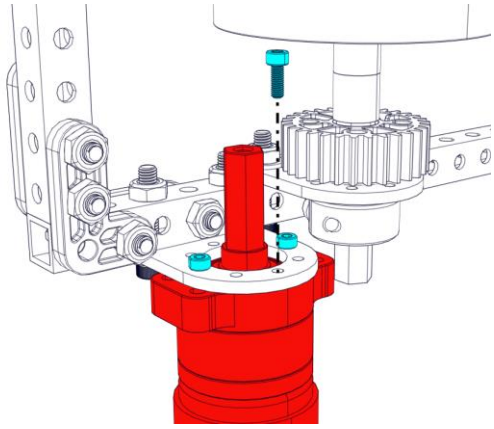
On the side of the frame with the L gussets, attach [2] more ROBITS Slotted Motor Mounts (am-5033) using [4] 1" 10-32 screws (am-1056), [4] #10 washer (am-1026), and [4] nylock nuts (am-1063).

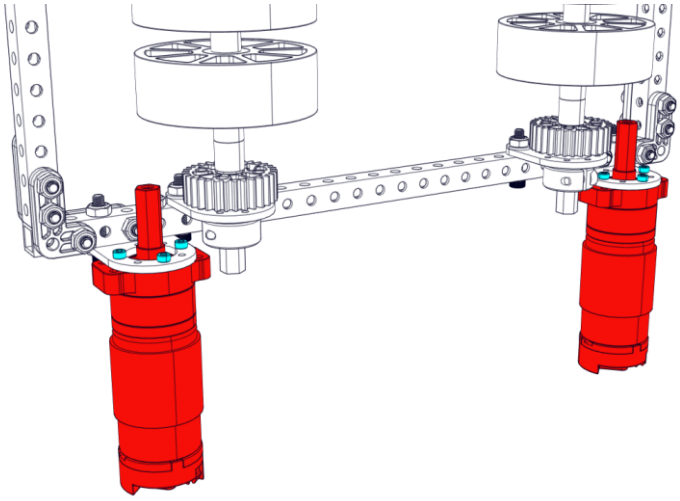




Double Axle Flywheel – Step 7

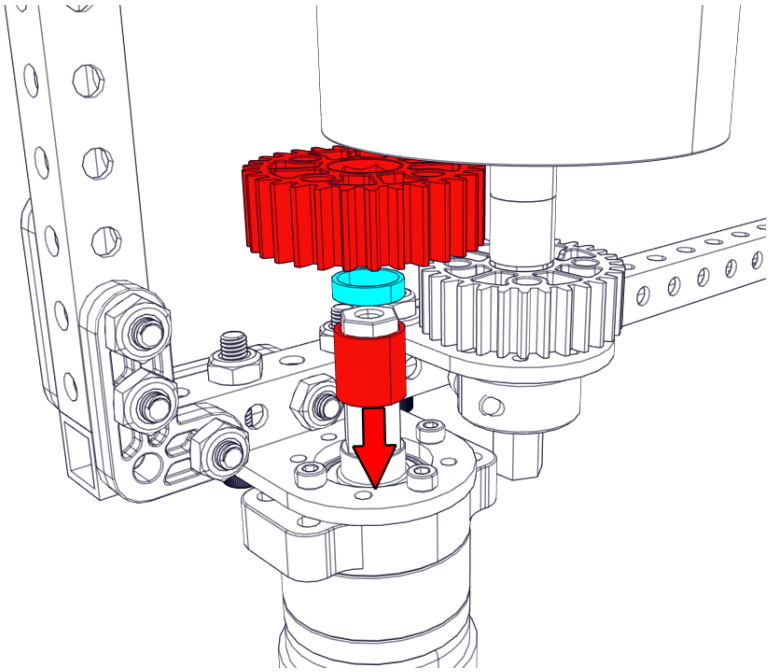
Attach [2] NeveRest Hex 1:1 gearmotors (am-5550_0100_001) to the motor mount using [6] 8mm M3 screws.





Double Axle Flywheel – Step 8

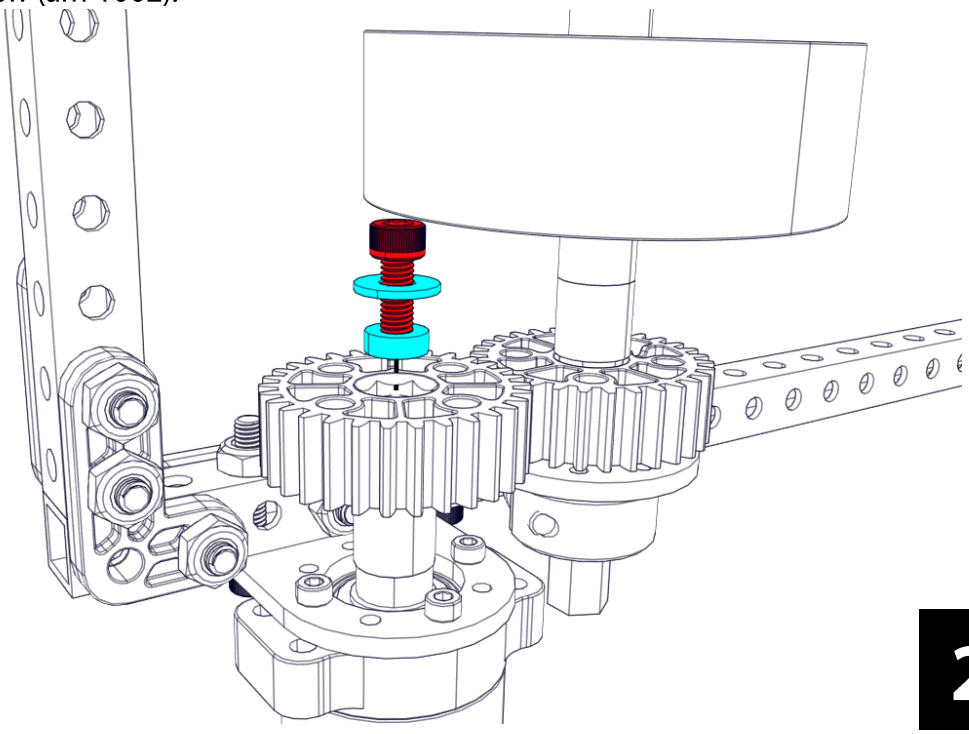
Onto each motor shaft, slip [1] 0.5" shaft spacer (am-1699) , [1] 0.125" shaft spacer (am-1742), and [1] 30 tooth gear (am-5020_30).



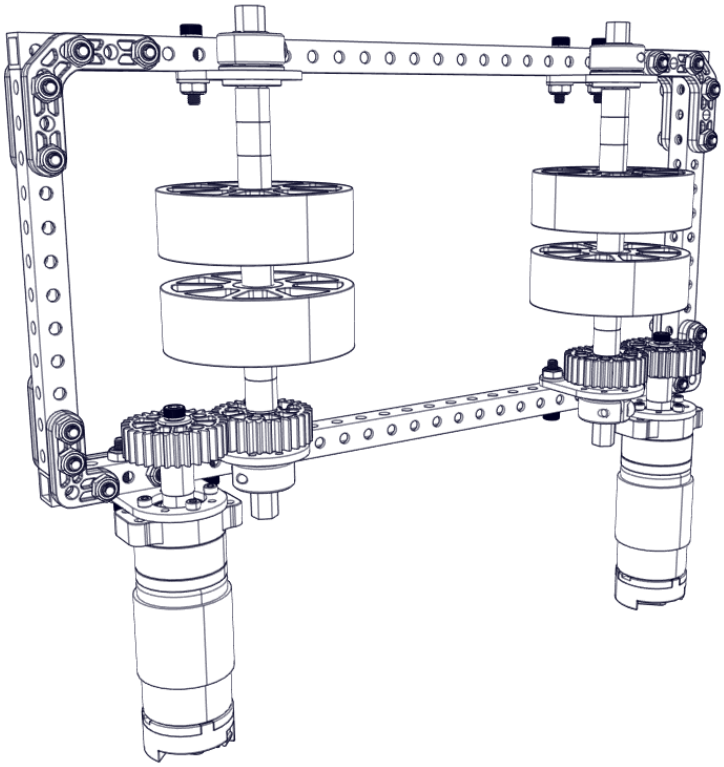
2X

Double Axle Flywheel – Step 9

Secure the gears using [1] 0.125" screw spacer (am-1732), [1] #10 washer (am-1026), and [1] 0.5" 10-32 screw (am-1002).



2X



Stealth Wheel Flywheel Addon

To assemble a Stealth wheel with flywheel, simply slide [1] Flywheel Plate (am-5436) into the pocketed side of [1] 3" Stealth Wheel (am-4718) and secure it in place using [6] 10-24 Threadforming screws (am-1123). These will require more effort than normal to screw in, since they have to cut the threads through the plastic!