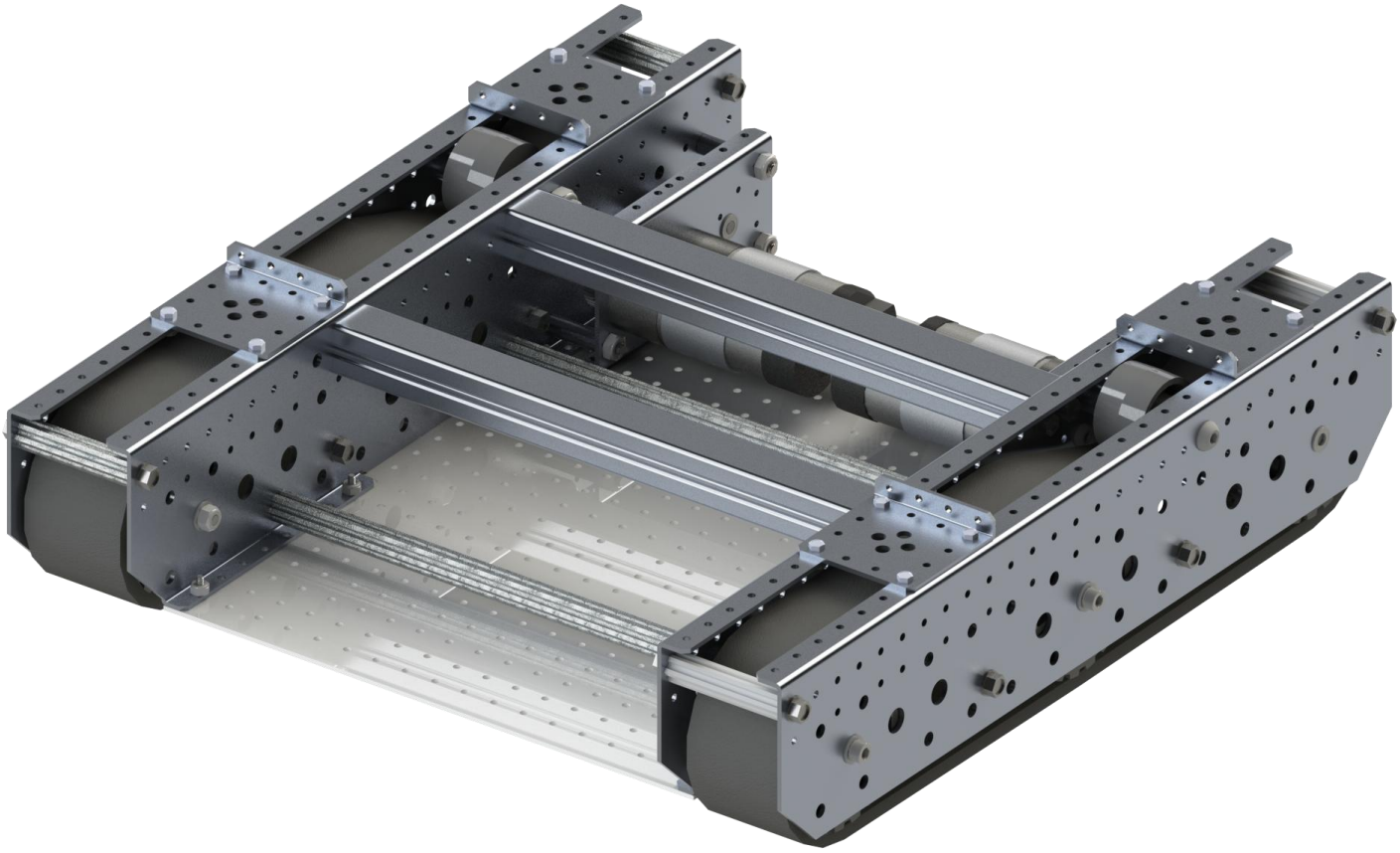
TreadRunner

Tank Tread Style Chassis – Assembly Guide



Popular Variants:

TreadRunner w/ 40:1 NeveRests (BTTBT41)

TreadRunner w/ 60:1 NeveRests (BTTBT61)

Additional Support Available

We encourage customers to seek product information at **AndyMark.com**, contact us via e-mail at **support@andymark.com**, or call Toll-Free **877-868-4770** with questions about any of our products.

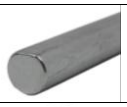
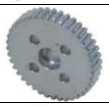
2021

10-27-21: Internal Draft Release
10-29-21: Public Release

TreadRunner Recommended Hand Tool List - Not Included

Component	Part Number	QTY	Part Photo
3/32 in. Allen Driver	am-3173	1	
5/32 in. Allen Driver	am-2751	1	
2 mm Allen Wrench	am-1495	1	
5 mm Allen Wrench	am-1180	1	
5/16 in. Nut Driver	am-1273	1	
1/4 in. Nut Driver	am-3677	1	
3/8 in. Nut Driver	am-3877	1	
1/4 in. – 5/16 in. Open End Wrench	am-3174	2	
1/2 in. - 9/16 in. Open End Wrench	am-2746	1	
3/8 in. - 7/16 in. Open End Wrench	am-2745	1	
5/8 in. Open End Wrench		1	

Product #	Description	Qty	Image
am-1102	1/4-20 Nylock Nut	8	
am-1111	M6 -1 Nylock Nut	4	
am-1266	10-24 x 1.25 in. Thread Forming Screw	18	
am-1289	4x6 mm Nylon Bushing	6	
am-1310	1/4-20 x 0.75 in. Thread Forming Screw	28	
am-1417	M6-1 x 75 mm Socket Head Cap Screw	4	
am-1419	6-32 Nylock Nut	32	
am-1420	1/4-20 x 1.75 in. Button Head Cap Screw	8	
am-1443	M3-0.5 x 5 mm Socket Head Cap Screw	24	
am-1451	0.625 OD 0.382 ID 0.750 Long Aluminum Spacer	4	
am-1509	M8 Nylock Nut	2	
am-1510	M8 x 1.25 mm x 80 mm Button Head Cap Screw	2	
am-1563	6-32 x 0.50 in. Hex Head Screw	32	
am-1565	6-32 x 1 in. Thread Patch Hex Head Screw	24	
am-2768	Grease Packet	1	
am-2992	Hall Effect Encoder Cable	4	
am-3215a	6 mm D Bore Double Boss Nub with Set Screw	8	

am-3226-100	6 mm D Shaft 100 mm Long	2	
am-3377	6 mm x 12 mm x 4 mm Flanged Bearing	14	
am-3392_Inside	Chassis Inside Plate	2	
am-3392_Outside	Chassis Outside Plate	2	
am-3393	FIRST Tech Challenge Chassis 4x4 Plate	4	
am-3394	Perforated Polycarbonate Belly Pan	1	
am-3395	11.25 in. Long Peanut	2	
am-3398	11.25 in. Long Churro	2	
am-3399	63 mm Long Churro	8	
am-3405	PicoBox Duo Plate	2	
am-3406	PicoBox Spacer	8	
am-3407	40 Tooth PicoBox Gear	6	
am-3413a	6 mm Round Bore Double Boss Nub with Set Screw	4	
am-3426	0.50 OD 0.242 ID 0.354 Long Aluminum Spacer	2	
am-3963	TreadRunner Tread	2	
am-3967_half	Pulley Half	12	
am-3978	Letter O Size Split Point Drill	1	
am-3979	8 mm Bore Roller	2	

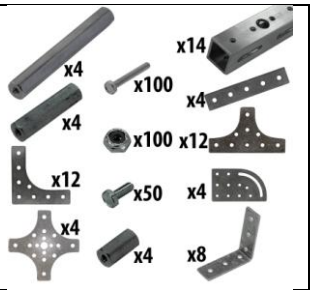
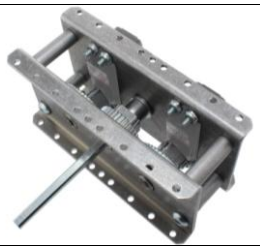
And Based on Selections. Note that TreadRunner is not compatible with NeveRest Orbital Gearboxes.

am-2964a	NeveRest Classic 40 Gearmotor	4	

OR

am-3103	NeveRest Classic 60 Gearmotor	4	

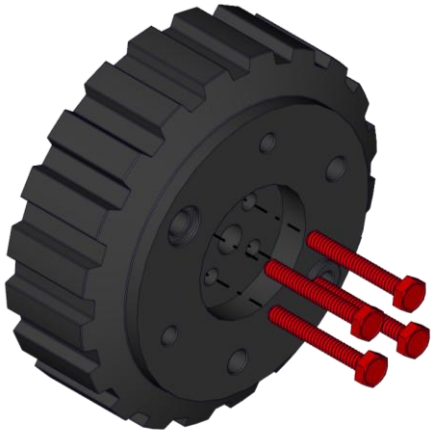
Useful Additions for your TreadRunner

am-3730	S3 Extrusion Basic Framing Kit	For adding building arms, linkages, and upper structure. S3 can be used as supports for arms and even arms themselves with the use of nylon bushings. The gussets, standoffs, and screws let you build the upper structure you need for game play.	
am-4136	S3 Linear Motion Kit	This bundle of products allows you to build linear motion onto S3 Extrusion you already have. This gets you on your way to an elevator.	
am-3908	PicoBox Twin Servo	Combine the power of two servos into one output shaft. Out of alloted motors? Need to reseve your motors for your drive train? Take advantage of high strenght servos for objectives like indexing objects.	
am-3450	PicoBox Twin Turbo	To spin or move something very fast, use a PixoBox Twin Turbo to combine two NeveRest bare motors for a HIGH speed output shaft, perfect for sending objects flying.	
am-3461b	NeveRest Orbital 3.7:1	For intake rollers full of Compliant Wheels or SpinTakes, you need those items moving FAST. This NeveRest attatched with chain or belts can help you have a "Touch to Own" mentality on your game objects.	

Pulley Assembly

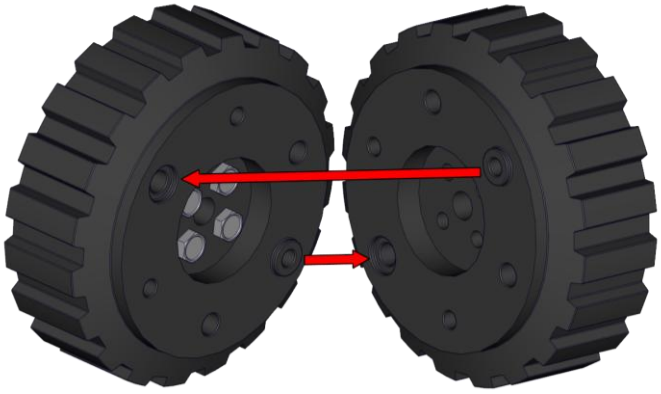
Step 1: Inset a round bore nub (am-3413a) into the outside face of a pulley halve (am-3967_half). A 5/8 in. wrench will hold the nub in place while securing.

Step 2: Secure the Nub by inserting four 6-32 x 1 in. Thread Patch Hex Head Screws (am-1565) through the inside of a the same pulley half and screwing them into the Nub with a 1/4 in. driver or wrench.

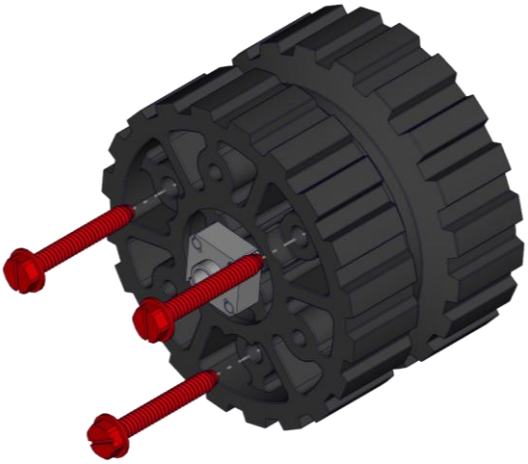


Step 3: Ensure the 10-32 set screw is pre started into the nub. (Lost set screws? Get more as am-1342.)

Step 4: Interlock a blank pulley halve with the Nub attached pulley half using the built in protrusions and pockets.



Step 5: Secure the pulley halves together with three 10-24 x 1.25 in. Thread Forming Screws (am-1266.) 5/16 in. nut driver and wrench can be used to tighten these.



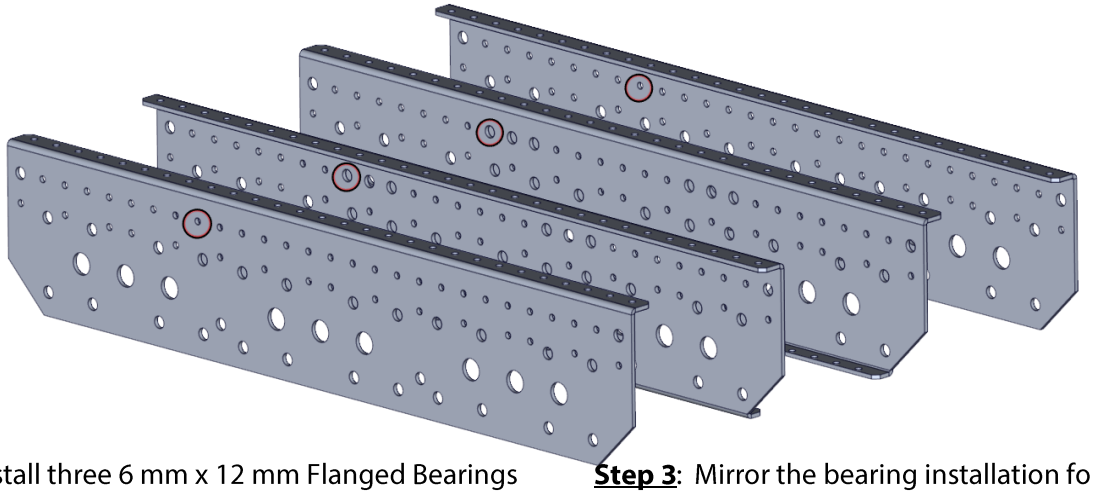
Step 6: Install a 4 mm x 6 mm Flanged Nylon Bushing (am-1289) into the blank pulley assembly.

Step 7: Perform these steps with four Round Double Boss Nubs (am-3413a) and two double boss D-bore nubs (am-3215a), to create six total pulley assemblies.

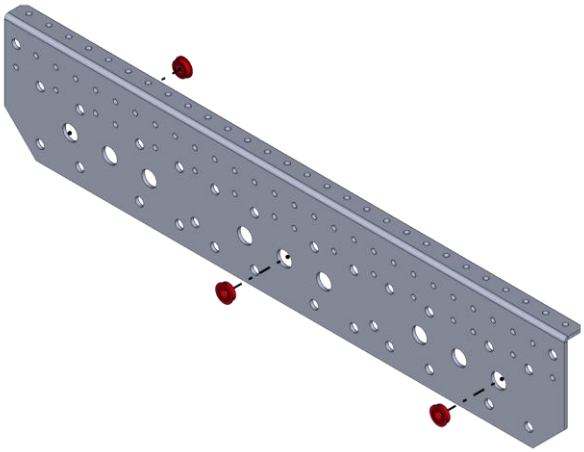
6X

Plate Preparation & Bearing Install

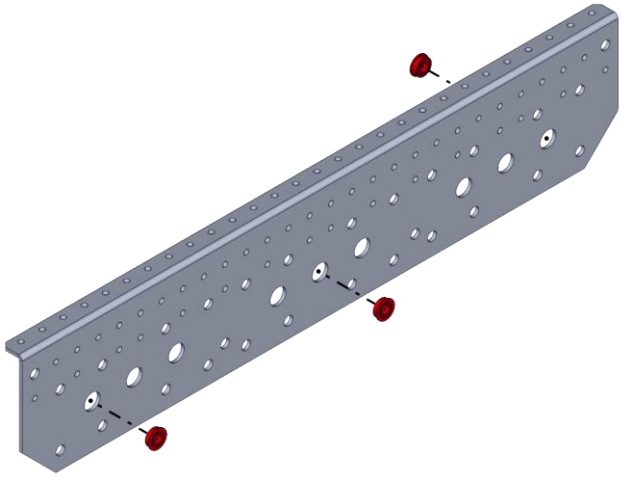
Step 1: The TileRunner Plates need modified for their use as TreadRunner plates. Use the included Letter-O Drill Bit (am-3978) to increase the size of the 9th hole in from either end on each plate. Line plates up as shown.



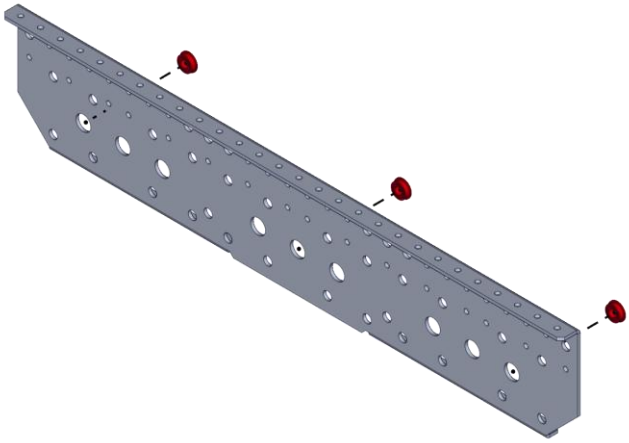
Step 2: Install three 6 mm x 12 mm Flanged Bearings (am-3377) into an outside plate (am-3392_Outside). The left most bearings' flange is on the same side as the plate flange. The middle and right bearing are installed from the opposite side.



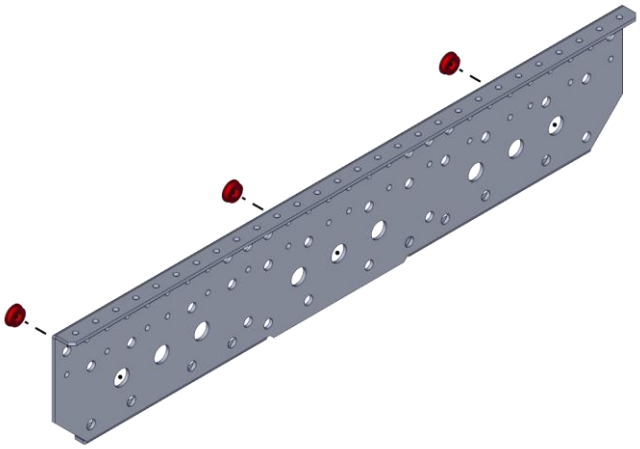
Step 3: Mirror the bearing installation for the second outside plate and three additional bearings.



Step 4: Install three bearings into an Inside Plate (am-3392_Inside.) All bearings are installed with flanges opposite the long continuous plate flange.

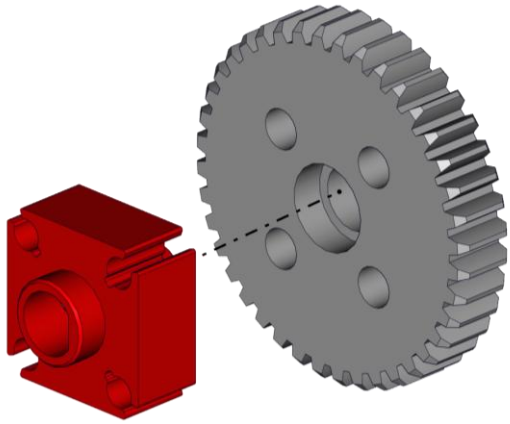


Step 5: Mirror the bearing installation on the remaining inside plate with three additional 6 mm bearings.

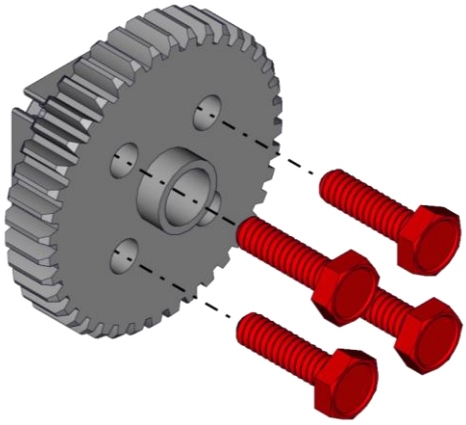


PicoBox Gear Assembly

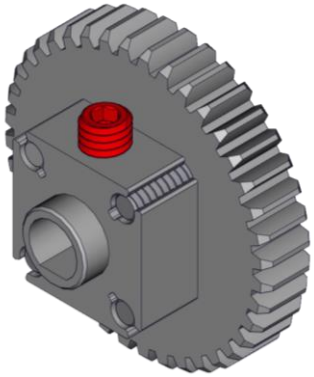
Step 1: Insert 6 mm D Bore Double Boss Nub into a 40 Tooth PicoBox Gear (am-3407.) **TIP:** Use a 5/8 in. wrench to hold the nub in place while securing it with screws.



Step 2: Secure the Nub by inserting four 6-32 x 0.50 in. Thread Patch Hex Head Screws (am-1563) through the four holes of the gear and tightening them into the nub with a 1/4 in. driver and wrench.



Step 3: Ensure the 10-32 set screw is pre started into the nub with

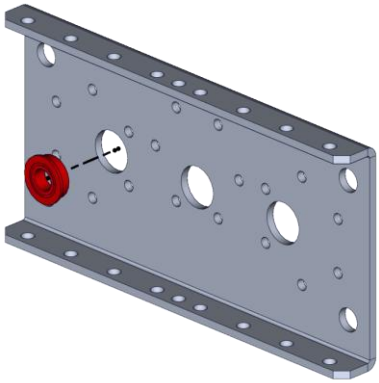


Step 4: Repeat steps one through three to create six total gear-nub assemblies.

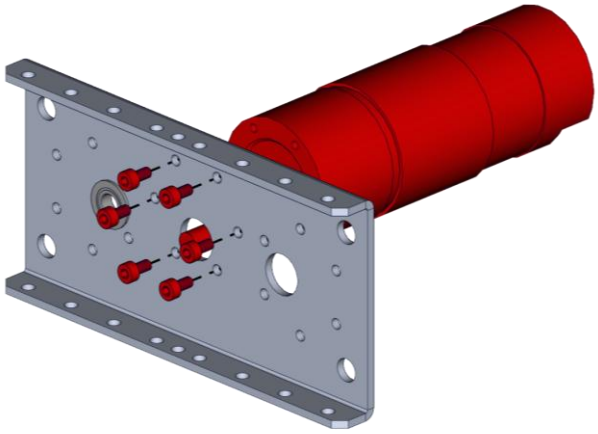
6X

TreadRunner PicoBox Assembly

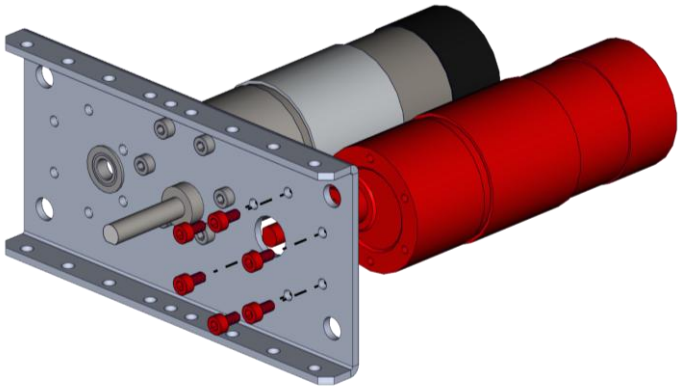
Step 1: Insert a 6 mm x 12 mm Flanged Bearing into the PicoBox Duo Plate (am-3405). The bearing flange and plate flanges are on the same side of the plate.



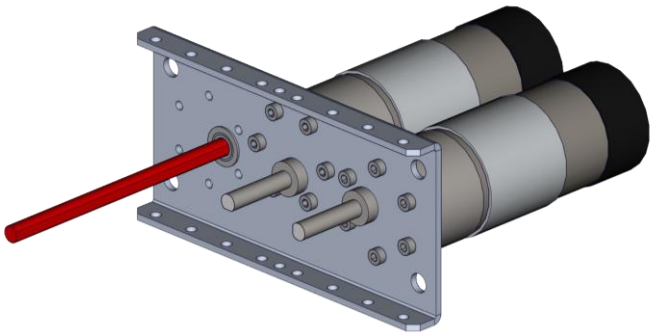
Step 2: Secure the first NeveRest to the plate using six M3-0.5 x 5mm Socket Head Cap Screws (am-1443.)

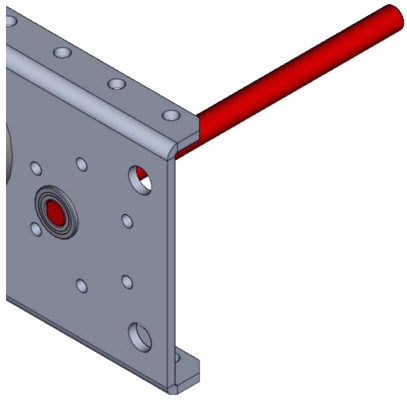


Step 3: Secure the second NeveRest Gearmotor with six more of the same sized screws.

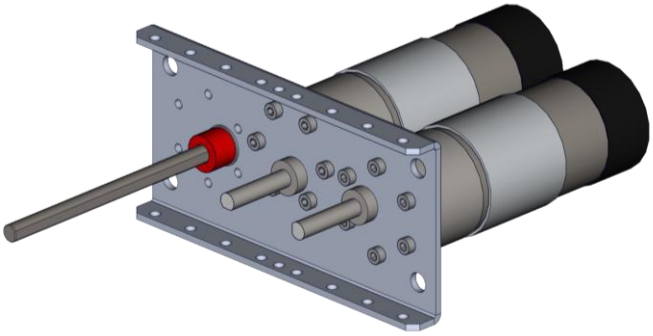


Step 4: Insert the 100mm Long 6mm D Shaft (am-3226-100) into the flanged bearing. The shaft must be flush with the back of the bearing.

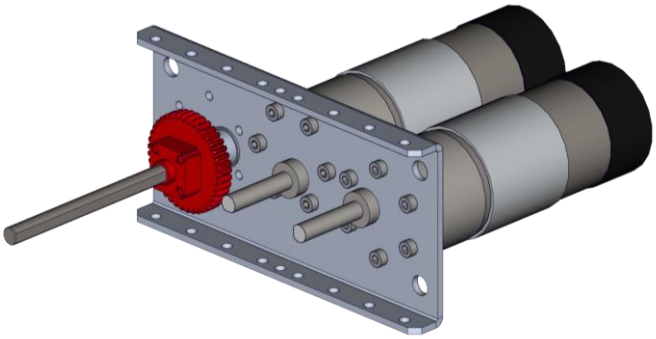




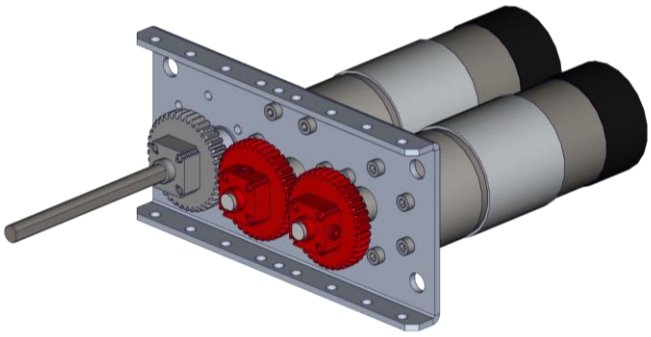
Step 5: Place a 0.50 in. OD x 0.242 in. ID x 0.354 in. Long Aluminum Spacer (am-3426) onto the 6 mm D shaft, flush against the bearing.



Step 6: Place one of the Gear-Nub Assemblies onto the 100 mm D Shaft. The gear will be flush with the spacer.

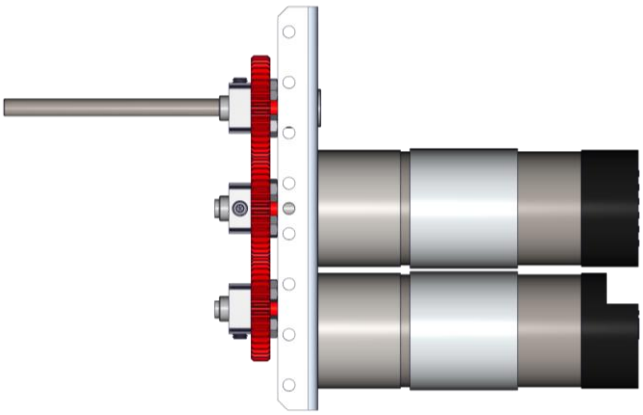


Step 7: Add two more Gear-Nub Assemblies to the gearbox, one on each NeveRest Gearmotor Shaft.

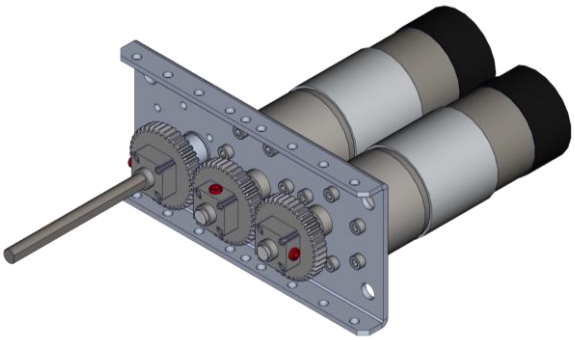


TreadRunner PicoBox Assembly Cont.

Step 8: Ensure the gears are aligned by viewing them from above.

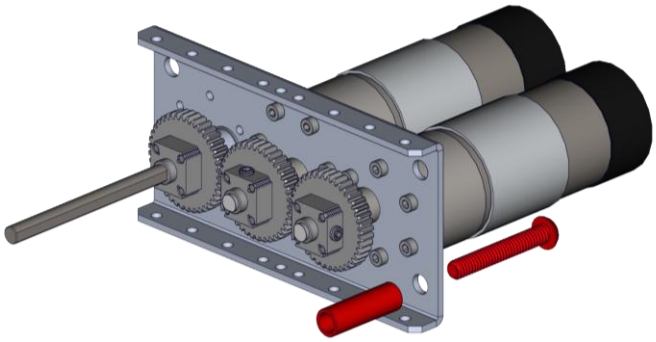


Step 9: Tighten the set screw for each Gear-Nub Assembly with the 3/32 in. Allen Driver.

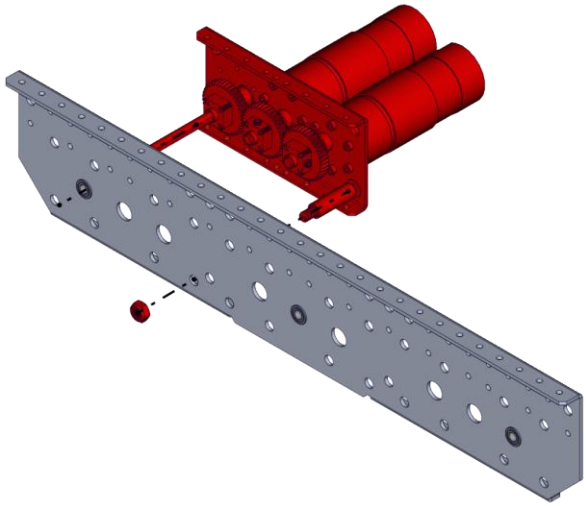


PicoBox - Inner Plate Assembly

Step 1: Insert a 1/4-20 Button Head Cap Screw (am-1420) through the bottom right mounting hole, and place a PicoBox Spacer (am-3406) over the screw.

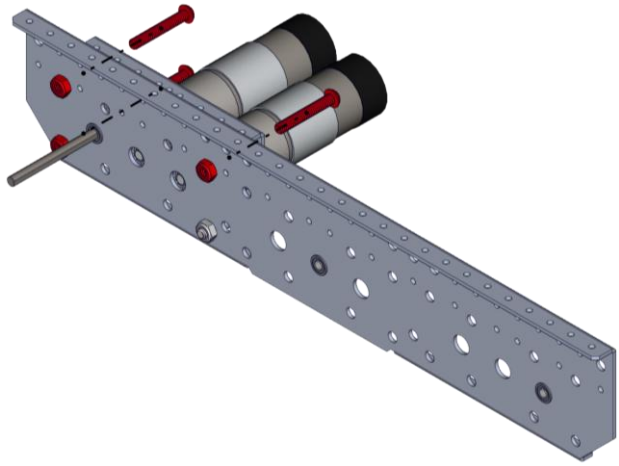


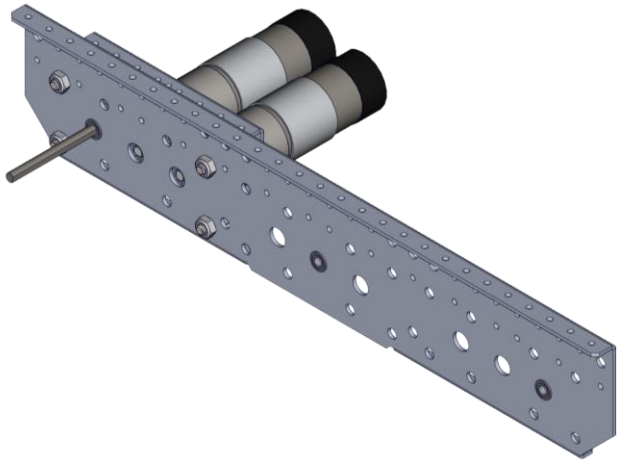
Step 2: Join the Inside Plate and PicoBox Assembly. Insert the 1/4-20 Button Head Cap Screw into the fourth hole from the left on the bottom row of holes of the Inside Plate. The PicoBox Output Shaft will insert through the left bearing of the plate. Finger tighten a 1/4-20 Nylock Jam Nut (am-1102) on the 1/4-20 Button Head Cap Screw.



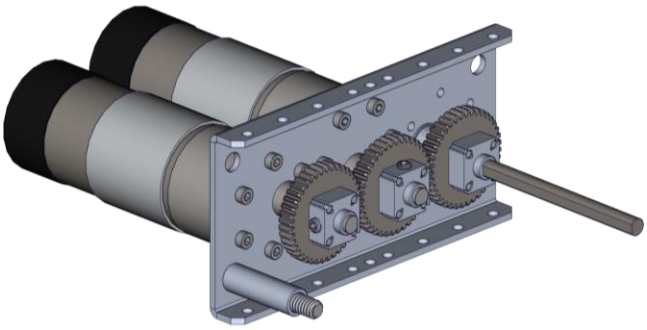
PicoBox - Inner Plate Assembly Cont.

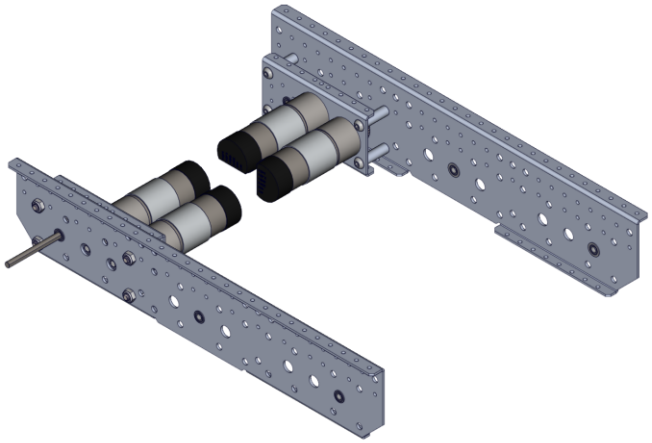
Step 3: Insert three more 1/4-20 x 1.75 in. Button Head Cap screws through the PicoBox Plate, Aluminum Spacers and Inside Plate, securing them with three additional 1/4-20 Nylock Jam Nuts. Now fully tighten the 1/4-20 screws using a 5/32 in. Allen Driver and 7/16 in. Wrench.





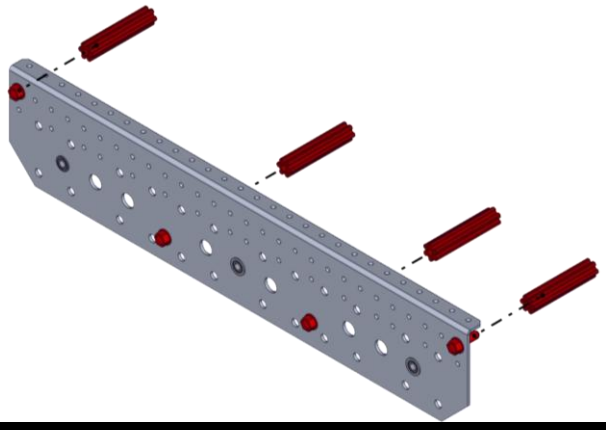
Step 4: Use the same steps, mirrored, to create and combine the opposite handed PicoBox Gearbox and PicoBox-Inside Plate assembly.

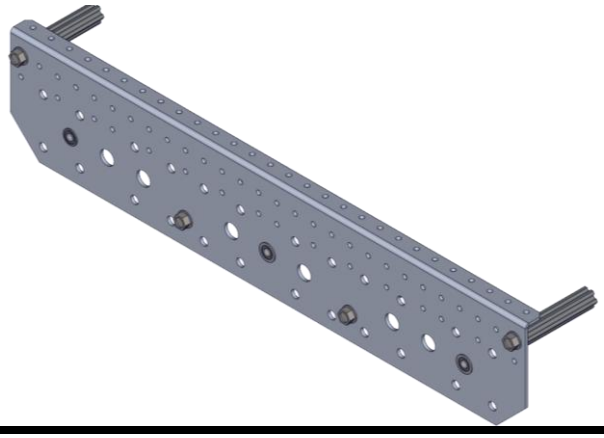




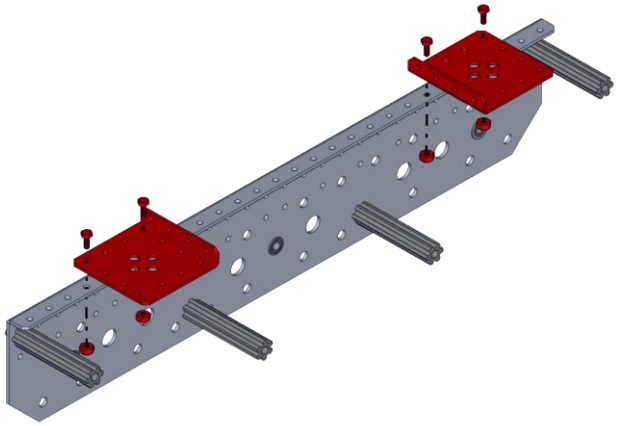
TreadRunner Assembly

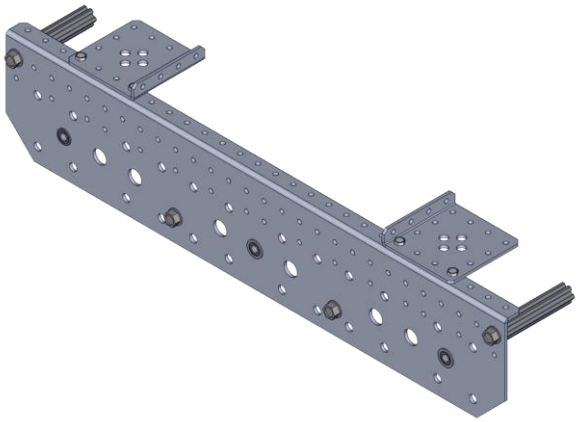
Step 1: Secure four 63 mm Churros (am-3399) to the outside plate with four 1/4-20 x 0.75 in. Thread Forming Screws (am-1310). Hold the churros with a 1/2 in. wrench and drive the screws with a 3/8 in. wrench. Use the top left most and right most holes for two of the Churros. The remaining two churros are placed in the holes near the center, slightly above the bottom row of holes.



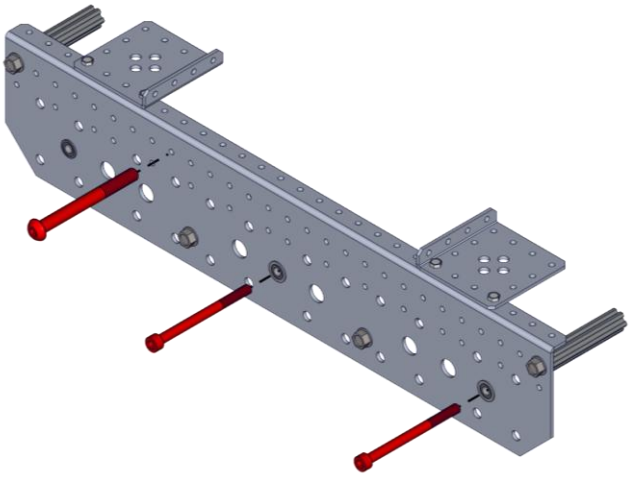


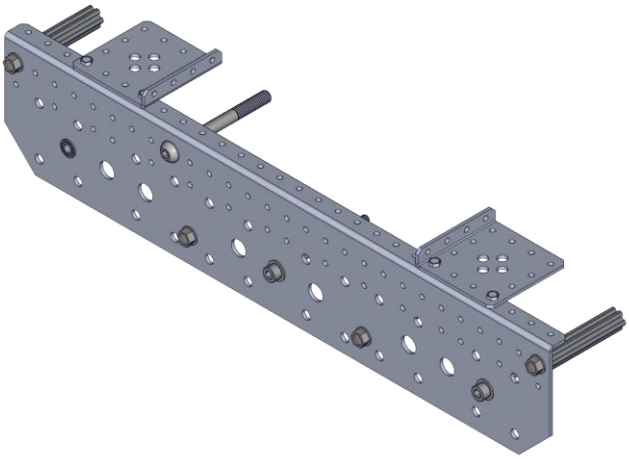
Step 2: Secure two 4x4 Chassis Plates (am-3393) to the Outside Plate using 6-32 x 0.50 in. Thread Patch Hex Head Screws (am-1563) and 6-32 Nylock Nuts (am-1419.) Use two nuts and screws per plate. These can be placed or moved to any location you prefer, keeping in mind clearance is needed for the tensioner pulley. A 5/16 in. wrench will hold the Nylock Nuts.



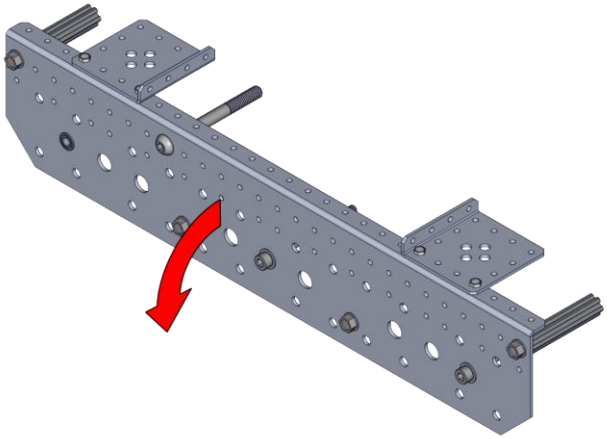


Step 3: Insert M6-1 x 75 mm Socket Head Cap Screws (am-1417) through the center and right bearing. Also install an M8-1.25 mm x 80 mm Button head Cap Screw (am-1510) through the hole you drilled in the Plate Preparation & Bearing Install steps. These screws will be called **axles** going forward.

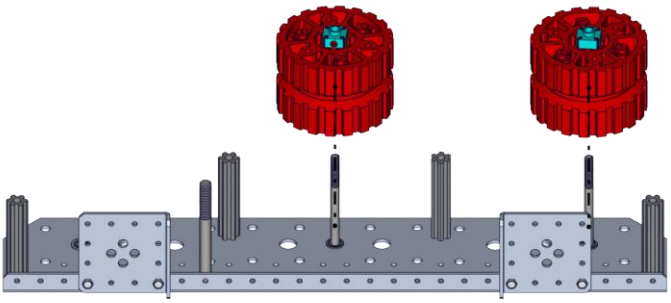




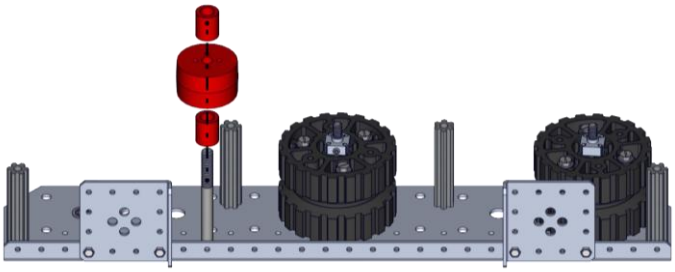
Step 4: Lay the assembly flat on the screw heads with the top flange towards you.



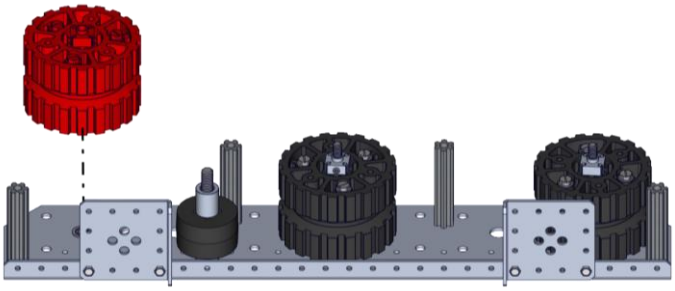
Step 5: Place two Round Bore Nub Pulley Assemblies on the center and right axles, Nylon bushing side first.



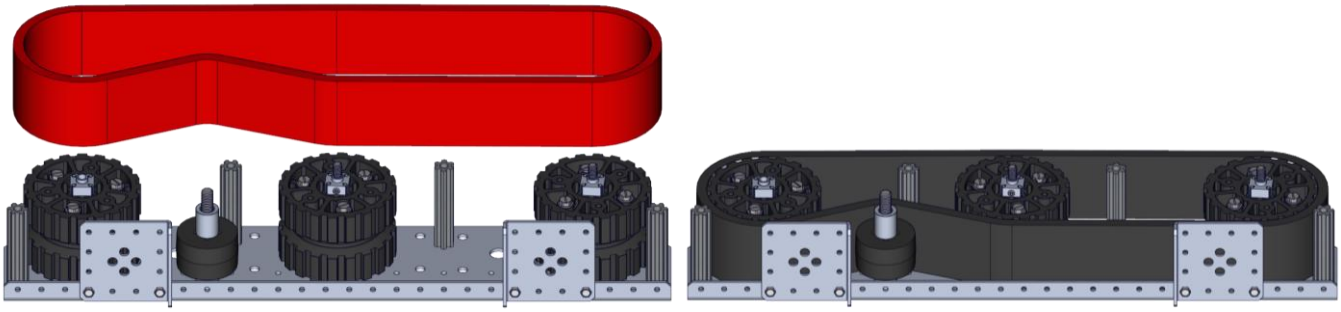
Step 6: On the tensioner axle, place a 0.75 in. Long Aluminum Spacer (am-1541) followed by an 8 mm Bore Roller (am-3979), and a second 0.75 in. long spacer.



Step 7: Set the D Bore Nub Pulley Assembly over the last bearing. It wont stay in place when we add the belt, and that's okay, this is just to get it into the right area.

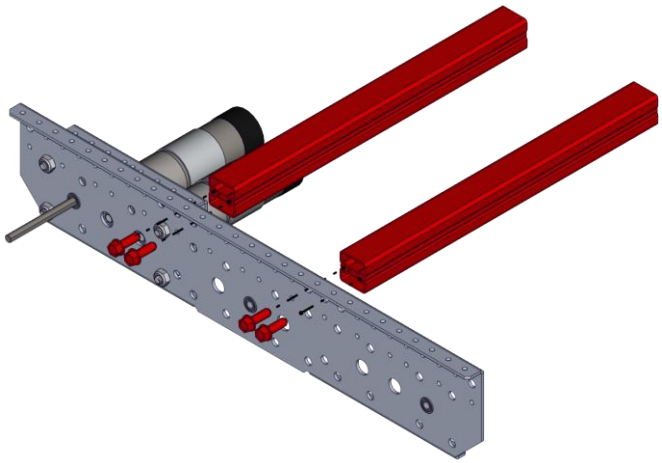


Step 8: Place the TreadRunner Tread (am-3963) around the three main pulley assemblies, and under the tensioner pulley.

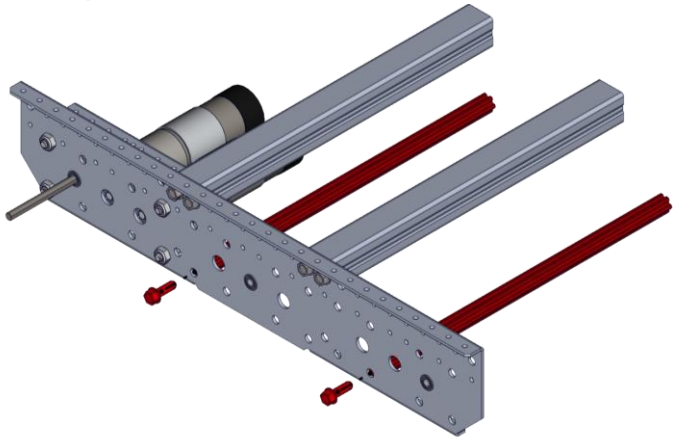


Step 9: Using the same steps as 1 through 8, create an opposite sided copy of the module. Set the modules aside for later steps.

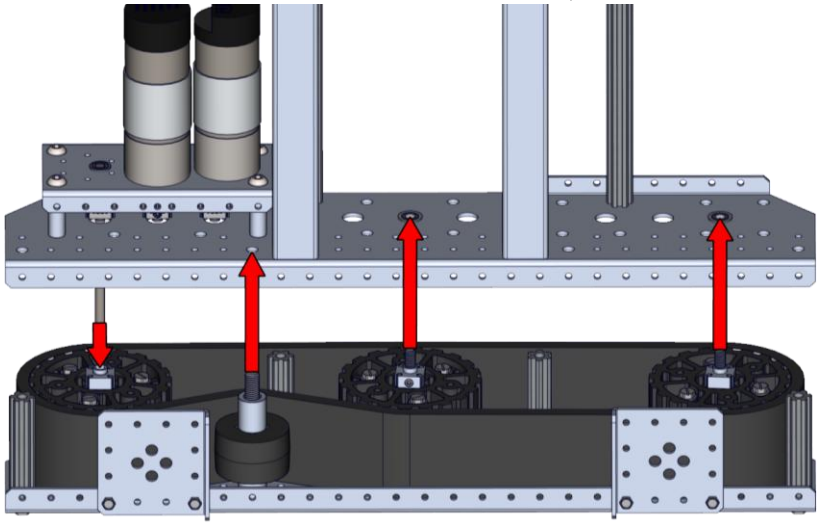
Step 10: Secure two 11.25 in. Long Peanuts (am-3395) to the first Inside Plate with four 1/4-20 Thread Forming Screws. Their location is based on prefereence.



Step 11: Secure two 11.25 in. Long Churros (am-3398) to the same inside plate with two 1/4-20 Thread Forming Screws. Their location is also preference based.

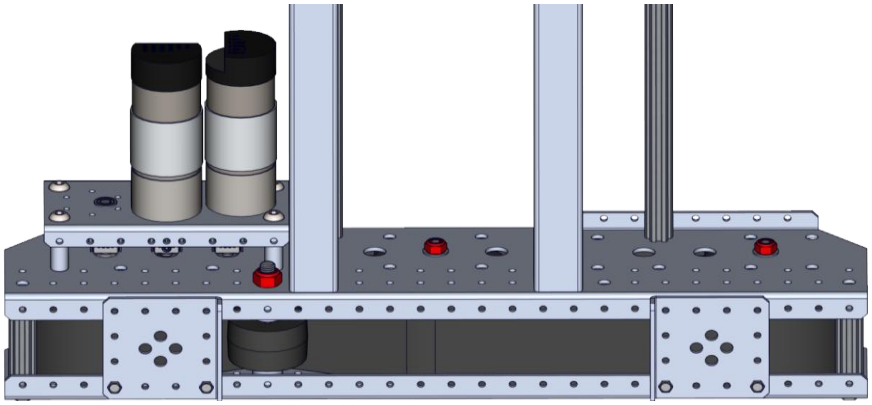


Step 12: Holding the Inside Plate Assembly by the left peanut, guide the Inside Plate and Outside Plate Assemblies together. Start by lining up the PicoBox output shaft with the D Bore Pulley Assembly. Line up the remaining three axles. Open ended wrenches can be used to persuade shafts and pulley assemblies to their correct position.



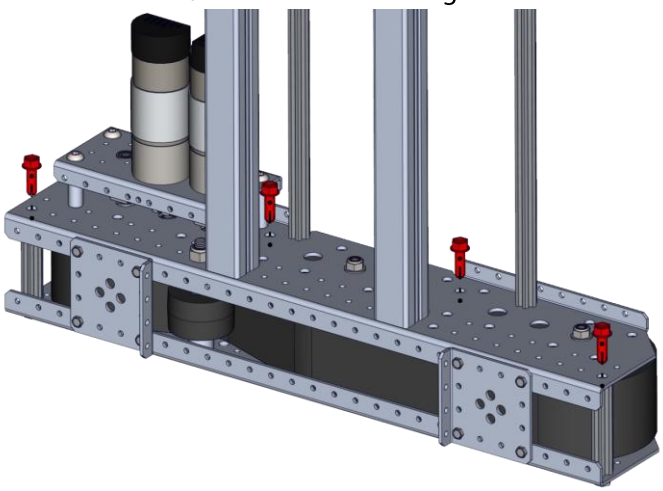
After joining, the end of the PicoBox output shaft will be flush with the left bearing on the outside plate.

Step 13: Loosely tighten an M8 Nylock Jam Nut (am-1509) onto the Tensioner Axle and M6 Nylock Nuts (am-1111) on the other aAles.

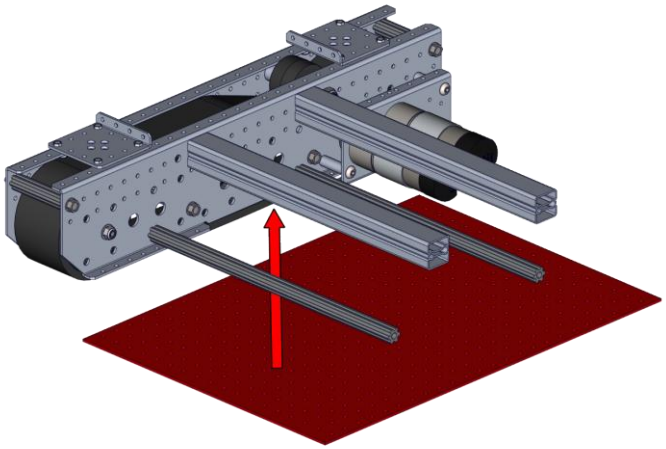


Step 14: Secure the 4x4 Chassis Plates to the Inside Plate with two 6-32 screws and two 6-32 Nylock Nuts each.

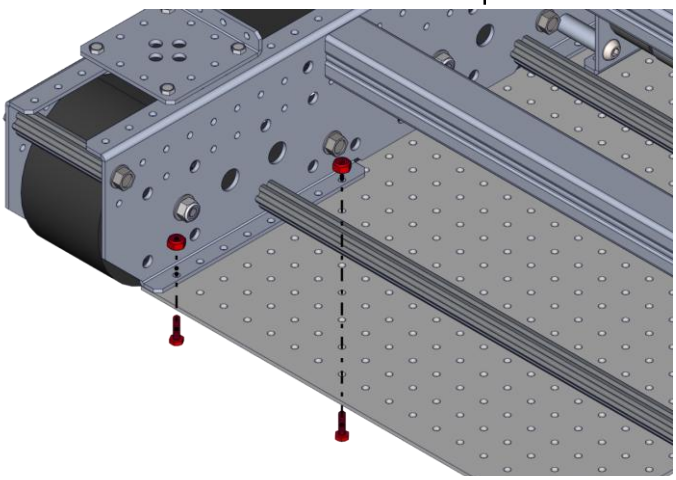
Step 15: Secure the four 63 mm Churros to the inside plate with four 1/4-20 Thread Forming Screws.



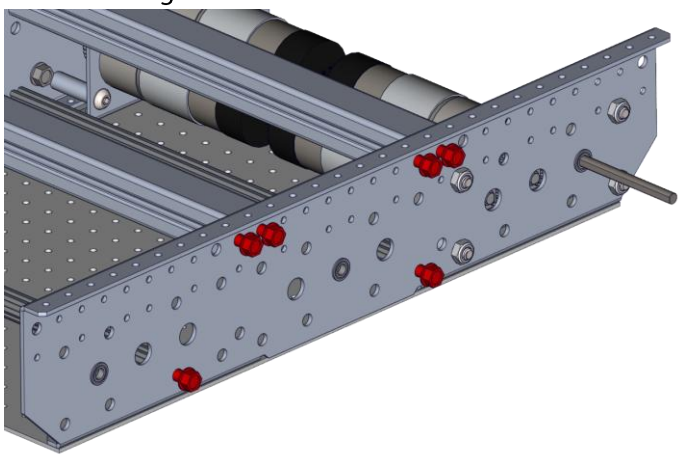
Step 16: If you choose to use it, align the Belly Pan (am-am-3394) with the assembly.



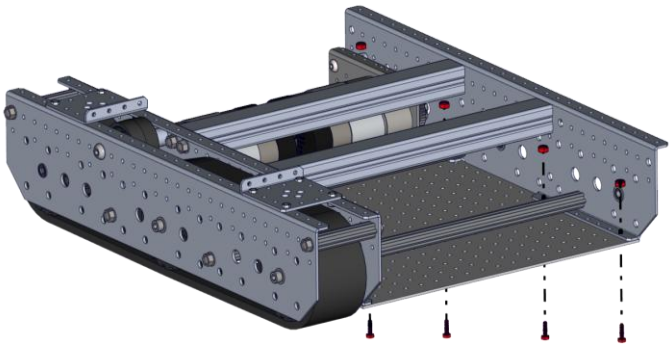
Step 17: The Belly Pan is secured to each flange with two 6-32 Socket Head Cap Screws and two 6-32 Nylock Nuts. The hardware location is based on preference



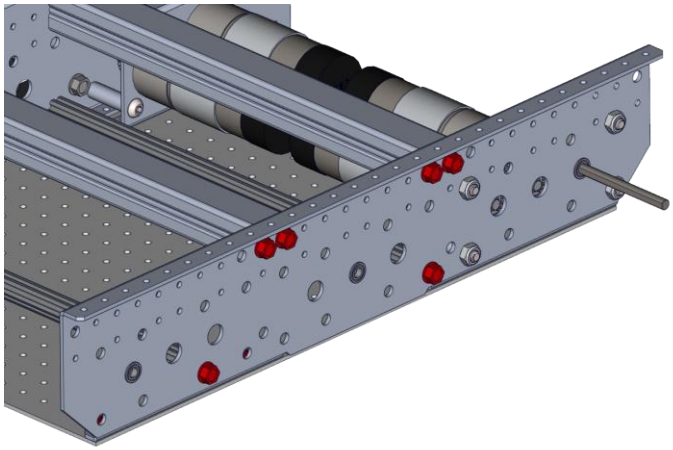
Step 18: Using six 1/4-20 Thread Forming Screws, loosely attach the second Inside Plate Assembly to the 11.25 in. Long Peanut and Churro.



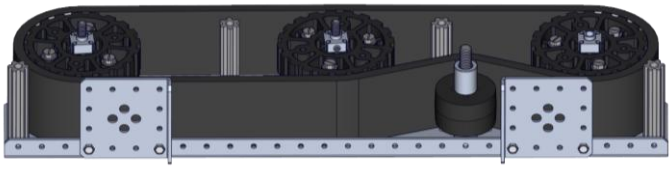
Step 19: Secure the Belly Pan to the second Inside Plate Flanges, using two 6-32 x 0.5 in. Screws and two 6-32 Nylock Nuts per flange.



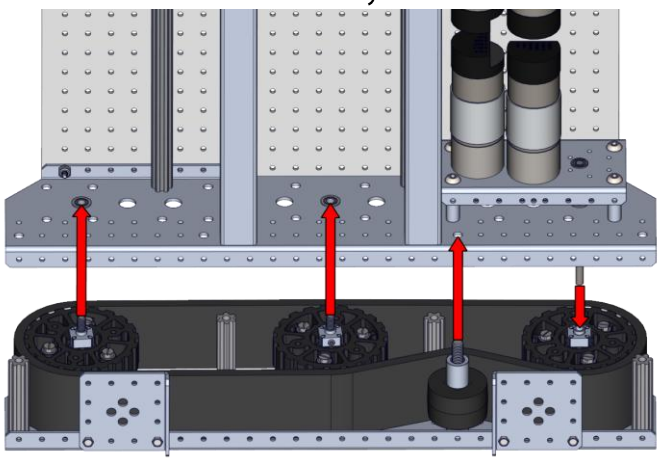
Step 20: Finish tightening the 1/4-20 Thread Forming Screws.



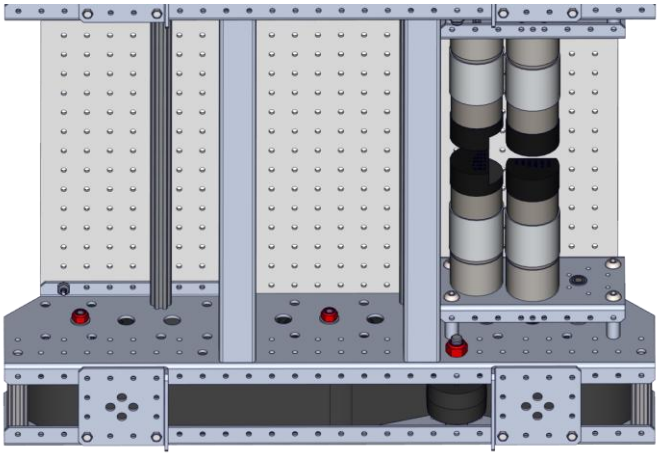
Step 21: Place the second Outside Plate Assembly flat resting on the screw heads.



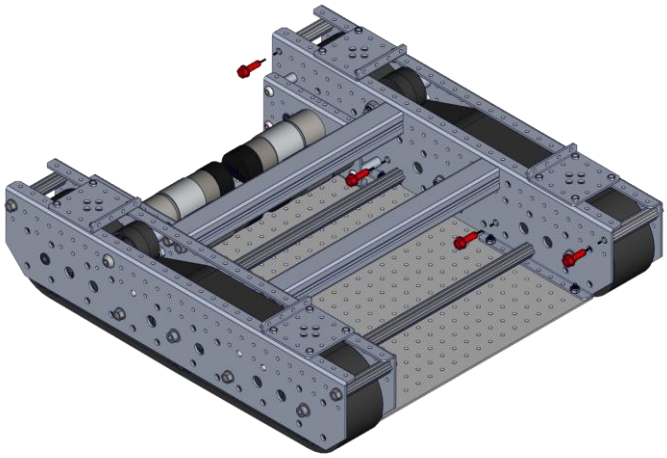
Step 22: Join together the almost completed chassis and the Outside Plate Assembly.



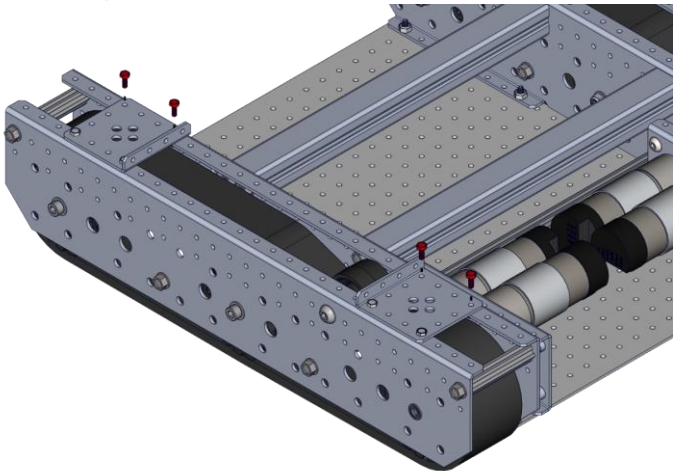
Step 23: Loosely secure the assemblies with two M6 Nylock Nuts and one M8 Nylock Nut onto their respetive axles.



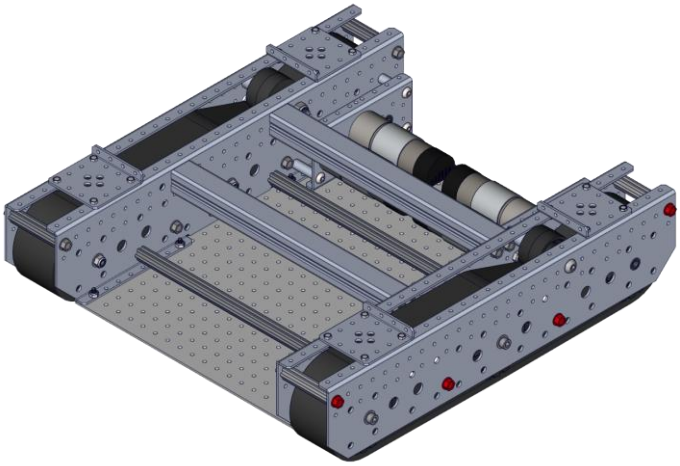
Step 24: Loosely tighten the Outside and Inside Plates together with four 1/4-20 Thread Forming Screws into the four 63 mm Churros.



Step 25: Use four 6-32 x 0.50 in. Socket Head Cap screws and four 6-32 Nylock Nuts to secure the remaining two 4x4 Chassis Plates to the Inside Plate.

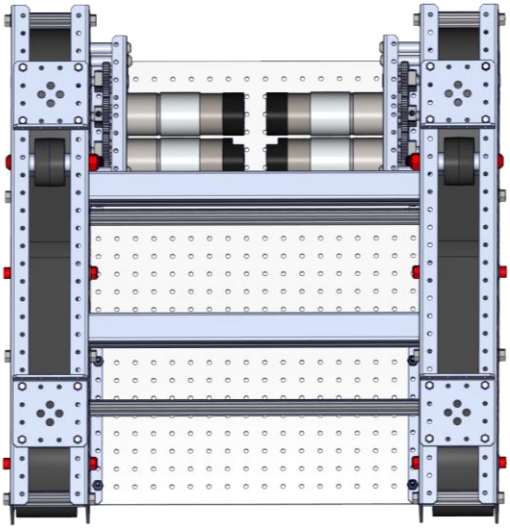


Step 26: Finish tightening the 1/4-20 Thread Forming Screws.

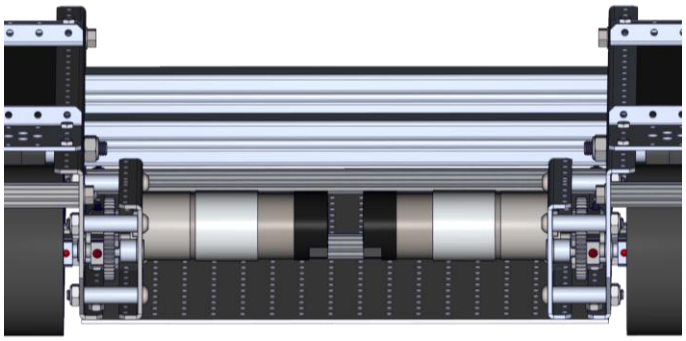


Step 27: Work your way around the chassis, ensuring all other 1/4-20 Thread Forming Screws have been fully tightened.

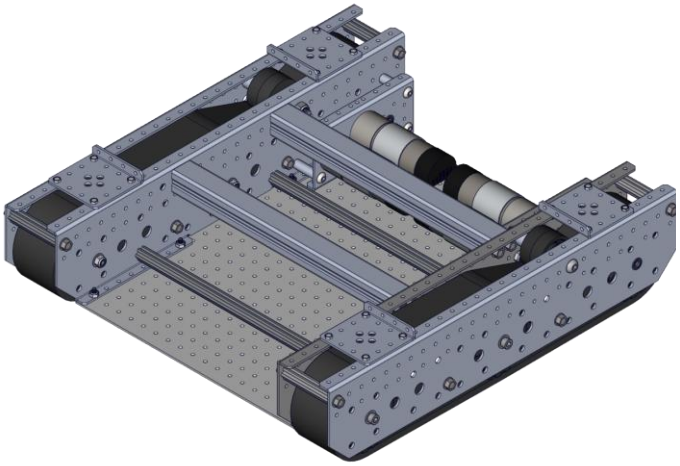
Step 28: Tighten up the M6 and M8 axles. These should be snug but still freely spin. Over tightening these six axles can cause extra wear and stress on components, causing performance of your TreadRunner to suffer.



Step 29: Double check that all Nub Set Screws have been tightened.



Step 30: Admire your work.



Next Steps: Your TreadRunner is now complete. Look back at page 5 for some useful additions for your TreadRunner. You can add additional structure to your chassis using S3 Extrusion and Gussets. Use Additional NeveRests and Wheels for making arms, intakes, and even more!