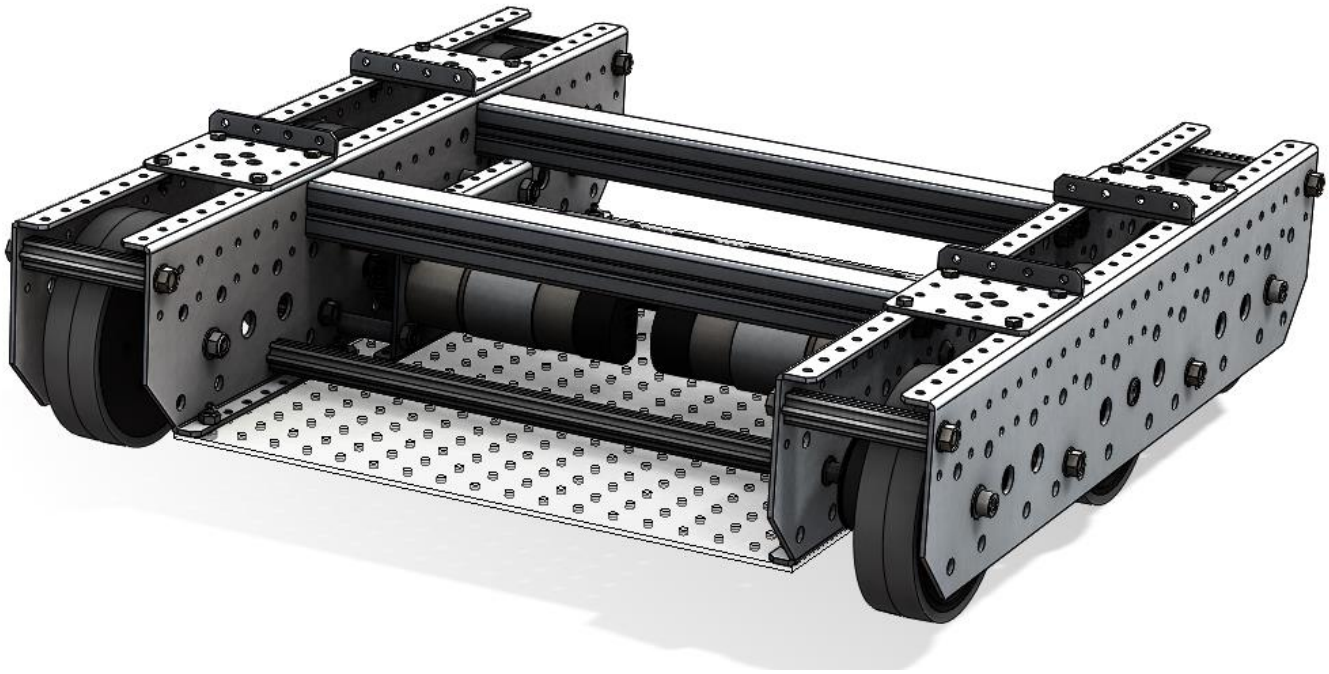
User Guide

TileRunner Six Wheel Drive



Popular Variants:
TileRunner Original 6WD (BT6S84E)
TileRunner Bulldozer (BT6S56E)
TileRunner GTO (BT6S62E)
TileRunner Hulk (BT6PB4E)
TileRunner Omni Wheels (BT6OC4E)

Additional Instructions 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.

2018 Updates

Updated PicoBox sets with added details about assembling a TileRunner GTO

2019 Updates

9-1-19: Updated instructions to match the new 6-32 Hex Head hardware; M3 NeveRest Mounting bolts are now 5mm long instead of 6mm; added detail to help clarify build steps; added assembly instructions for variants.

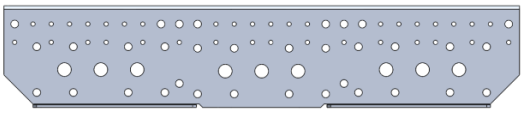
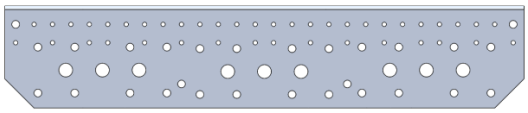
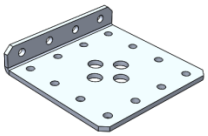
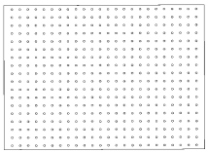
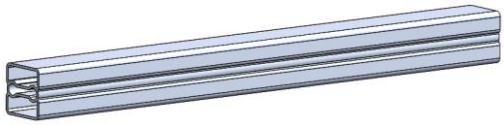
2020 Updates

10-19-20: Updated instructions for increased configurations

TileRunner Recommended Hand Tool List (not included)

Component	Part Number	QTY	Part Photo
3/32” Allen Driver	am-3173	1	
5/32" Allen Driver	am-2751	1	
2.5mm Allen Wrench	am-1288	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” – 5/16” Open End Wrench	am-3174	2	
1/2" - 9/16" Open End Wrench	am-2746	1	
3/8"-7/16" Open End Wrench	am-2745	1	

TileRunner Frame Bill of Materials

Part Number	Component	Quantity	Part Photo
am-3392_Inside	Chassis Inside Plate	2	
am-3392_Outside	Chassis Outside Plate	2	
am-3393	4x4 Plate	4	
am-3394	Belly Pan	1	
am-3395	Peanut, 11.25"	2	
am-3398	Churro, 11.25"	2	
am-3399	Churro, 63mm	8	
am-1443	Socket Head Cap Screw, M3-0.5 x 5mm	24	
am-1310	Self-Tapping Screw, 1/4-20 x 0.75 in	28	
am-1563	Hex Head Thread Patch, 6-32 x 0.5 in	32	
am-1419	Nut, Nylock, 6-32	32	

TileRunner Common Drive Bill of Materials

Part Number	Component	Quantity	Part Photo
am-1102	Nut, Nylock Jam 1/4-20	8	
am-1420	Button Head Cap Screw, 1/4-20 x 1.75 in	8	
am-1563	Hex Head Thread Patch, 6-32 x 0.5 in	32	
am-3215a	6mm D Bore Double Boss Nub w/Set Screw	8	
am-3226-100	6mm D Shaft, 100mm, plated	2	
am-3377	6x12x4 Flanged Bearing	14	
am-2768	Grease Packet	1	

TileRunner 6WD Bill of Materials

Part Number	Component	Quantity	Part Photo
am-3401_half	24 Tooth HTD Pulley, 6mm Bore, Half	12	
am-3404	24 Tooth HTD Pulley Extension	2	
am-3378	Belt, Timing, HTD 5mm pitch, 9mm wide, 93 Tooth	4	
am-1437	Hex Head Cap Screw, 6-32 x 1.25	16	
am-1111	Nut, Nylock M6-1.0	4	
am-1417	Socket Head Cap Screw, M6-1 x 75mm	4	
am-3424	Spacer, aluminum, 0.257 in ID x 5/16 in OD x 1/4 in long	4	
am-3425	Spacer, aluminum, 8mm OD x 6.15mm ID x 15mm long	2	
am-3413a	6mm Round Bore Double Boss Nub w/Set Screw	4	
am-1424	Hex Head Cap Screw, 6-32 x 0.75 in	8	

TileRunner 6WD Wheel Options

Code	Part Number	Component	Quantity	Part Photo
S4	am-2648_orange	4” Stealth Wheel 8mm Bore Orange 40 Durometer	6	
S5	am-2648_Blue	4” Stealth Wheel 8mm Bore Blue 50 Durometer	6	
S6	am-2648_Blk	4” Stealth Wheel 8mm Bore Black 60 Durometer	6	
S8	am-2648	4” Stealth Wheel 8mm Bore Gray 77 Durometer	6	
PB	am-3612	4” Performance Wheel with Nub Bore	6	
	am-2611	10 ft of Green Grippy Tread, 1” Wide	1	
OC	am-2648_Blk	4” Stealth Wheel 8mm Bore Black 60 Durometer	2	
	am-1424	6-32 x 0.75” Hex Head Machine Screw	8	
	am-2948	FTC 4 Inch Aluminum Omni Wheel with 8mm Bore	4	
C5	am-3563_blue	4” Compliant Wheel 8mm Bore Blue 50 Durometer	6	
C6	am-3563_black	4” Compliant Wheel 8mm Bore Black 60 Durometer	6	

TileRunner 6WD NeveRest Options

Code	Part Number	Component	Quantity	Part Photo
6	am-3103b	Gearmotor, NeveRest 60, with Encoder, and Female JST VH, 2-pin	4	
	am-2992	Hall Effect Encoder Cable with 4-pin Connector	4	
	am-3406	PicoBox Spacer	8	
	am-3426	Spacer, Aluminum, 0.242” id, 0.50” od x 0.354” Long	2	
	am-3405	PicoBox Duo Plate	2	
4	am-2964b	Gearmotor, NeveRest 40, with Encoder, and Female JST VH, 2-pin	4	
	am-2992	Hall Effect Encoder Cable with 4-pin Connector	4	
	am-3406	PicoBox Spacer	8	
	am-3426	Spacer, Aluminum, 0.242” id, 0.50” od x 0.354” Long	2	
	am-3405	PicoBox Duo Plate	2	

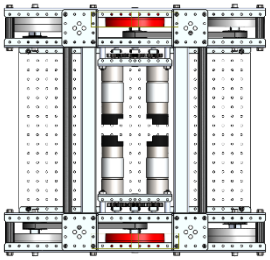
TileRunner 6WD NeveRest Options

Code	Part Number	Component	Quantity	Part Photo
2	am-3637b	Gearmotor, NeveRest Orbital 20, with Encoder, and Female JST VH, 2-pin	4	
	am-2992	Hall Effect Encoder Cable with 4-pin Connector	4	
	am-3406	PicoBox Spacer	8	
	am-3426	Spacer, Aluminum, 0.242” id, 0.50” od x 0.354” Long	2	
	am-3476	PicoBox GEO Plate	2	
P	am-3476	PicoBox GEO Plate	2	
	am-3405	PicoBox Duo Plate	2	
	am-3475	PicoBox MEO Plate	4	
	am-3423	PicoBox Uno Plate	4	
	am-3406	PicoBox Spacer	16	
	am-3426	Spacer, Aluminum, 0.242” id, 0.50” od x 0.354” Long	8	

TileRunner 6WD Gear Options

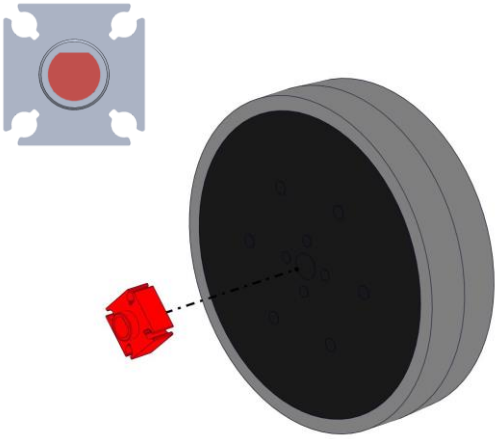
Code	Part Number	Component	Quantity	Part Photo
1	am-3407	40 Tooth PicoBox Gear	6	
A	am-3408	35 Tooth Gear for PicoBox	4	
	am-3409	45 Tooth Gear for PicoBox	4	
E	am-3407	40 Tooth PicoBox Gear	6	
	am-3408	35 Tooth Gear for PicoBox	4	
	am-3409	45 Tooth Gear for PicoBox	4	

Center Wheel Assembly Instructions (QTY 2)

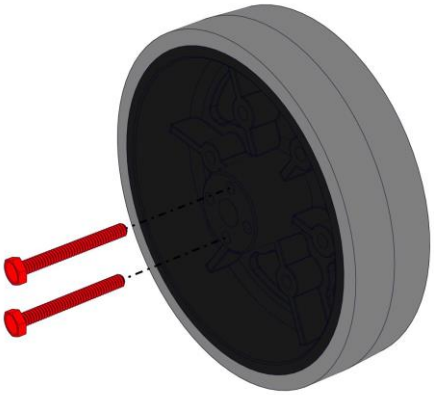


NOTE: This subassembly applies to any 6WD TileRunner configuration utilizing a Stealth, Performance, or Compliant Wheel as the center wheel. See Page 20 for Performance Wheel Assembly Instructions.

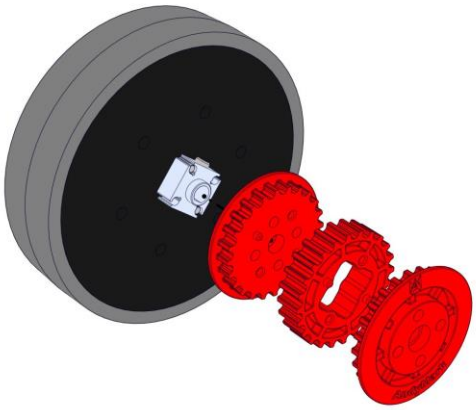
Step 1: Place a 6mm D-Bore Double Boss Nub (am-3215a) into the center bore of a 4" 8mm Bore Wheel on the flat side of the wheel.



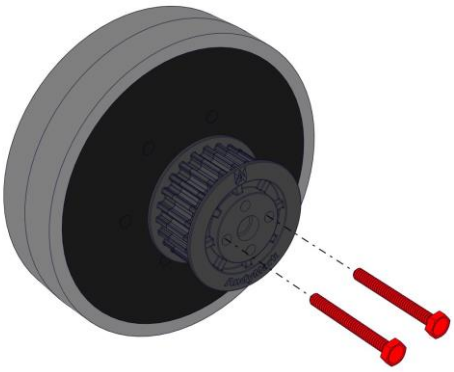
Step 2: Flip the wheel over and secure the Nub to the wheel by threading two 6-32 x 1.25 in Hex Head Screws (am-1437) into the Nub. Be sure to place the 6-32 screws in opposite holes of the wheels.



Step 3: Place a 24 Tooth HTD Pulley Extender (am-3404) between two 24 Tooth HTD Pulley Halves (am-3401_half), and place all three components onto the boss of the Nub.



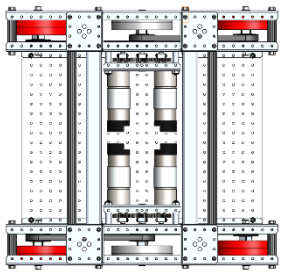
Step 4: Align the bolt circles of the Nub and the Pulley Assembly, and secure the pulley by threading two 6-32 x 1.25 in Hex Head Screws (am-1437) into the Nub. Be sure to thread the screws into the opposite holes that were used to secure the Nub to the Wheel.



Repeat one more time to make 2 total Center Wheel Assemblies.

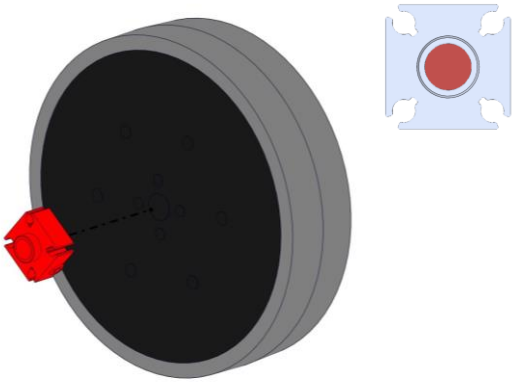
2X

Corner Wheel Assembly Instructions (QTY 4)

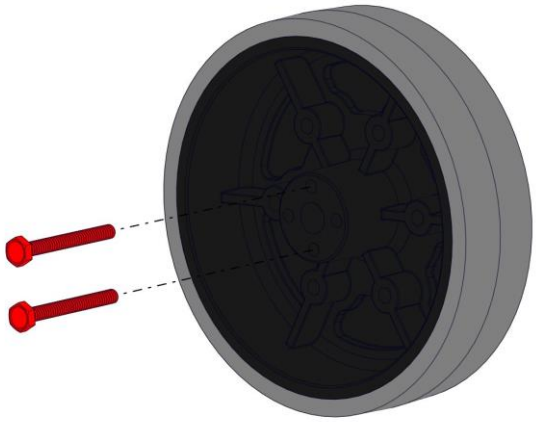


NOTE: This subassembly applies to any 6WD TileRunner configuration utilizing a Stealth, Performance, Compliant, or Omni Wheel [with alternate instructions in brackets] at the corners.

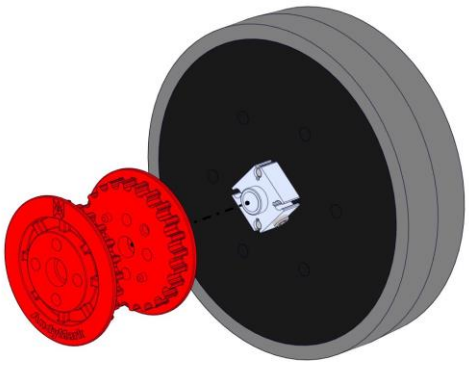
Step 1: Place a 6mm Round Bore Double Boss Nub (am-3413a) into the center hole of a 4" 8mm Bore Wheel on the flat side of the wheel [either side of the Omni Wheel].



Step 2: Flip the wheel over and secure the Nub to the wheel by threading two 6-32 x 1.25 in Hex Head Screws (am-1437) [6-32 x 0.75” Hex Head Screws (am-1424)] into the Nub. Be sure to place the 6-32 screws in opposite holes of the wheels.



Step 3: Place two 24 Tooth HTD Pulley Halves (am-3401_half) onto the boss of the Nub.



Step 4: Align the bolt circles of the Nub and the Pulley Assembly, and secure the pulley by threading two 6-32 x 0.75 in Hex Head Screws (am-1424) [6-32 x 0.75” Hex Head Screws (am-1424)] into the Nub. Be sure to thread the screws into the opposite holes that were used to secure the Nub to the Wheel.

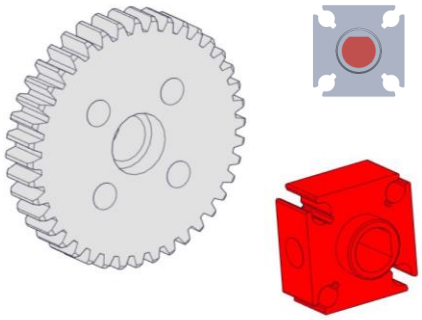
Repeat 3 more times to make 4 total Corner Wheel Assemblies.

4X

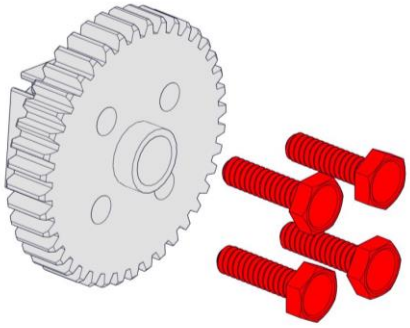
PicoBox Gear Assembly Instructions

NOTE: The following assembly instructions depict the 40 Tooth PicoBox Gear (am-3407) but also apply to the 35 Tooth Gear (am-3408) and/or the 45 Tooth Gear (am-3409) if you have selected to utilize the alternate gearset.

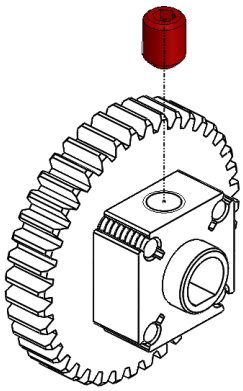
Step 1: Place a 6mm D-Bore Double Boss Nub (am-3215a) into the center bore of a PicoBox Gear and align the bolt circles of the Nub and the Gear.



Step 2: Flip the gear over and secure the Nub to the gear by threading four 6-32 x 0.5 in Hex Head Screws (am-1563) into the Nub. AndyMark suggests starting with a ¼" Nut Driver and finishing with a ¼" open wrench. Use Vice Grips, Pliers, or Channel Locks to hold the nub while tightening the screws.



Step 3: Ensure that a #10-32 Set Screw is partially threaded into the Nub.



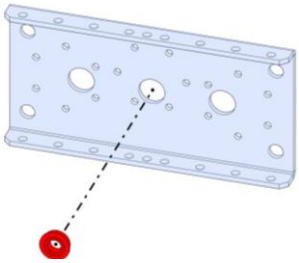
NOTE: If utilizing the 1:1 gear ratio using 40 Tooth gears, follow the above instructions a total of 6 times. If utilizing the alternate gearset for a 1.28:1 ratio, affix nubs to four 35 Tooth Gears and two 45 Tooth Gears. If utilizing the alternate gearset for a 1:0.78 ratio, affix nubs to two 35 Tooth Gears and four 45 Tooth Gears.

Repeat steps 1-3 to make 6 total Gear Assemblies.

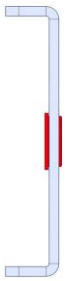
6X

PicoBox and Chassis Assembly Instructions

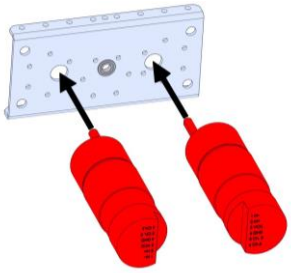
Step 1: Press a 6x12x4 Flanged Bearing (am-3377) into the center 12mm hole of a PicoBox Duo Gearbox Plate (am-3405) or PicoBox GEO Gearbox Plate (am-3476). **NOTE: Use the Duo plate if using NeveRest Classic gearmotors and use the GEO plate if using NeveRest Orbital gearmotors.**



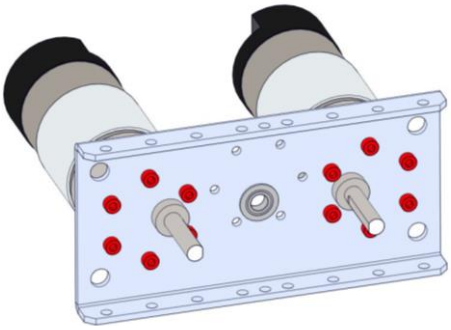
NOTE: Make sure the flange of the bearing is on the same side of the plate as the flanges, and is flush against the sheet metal of the gearbox plate.



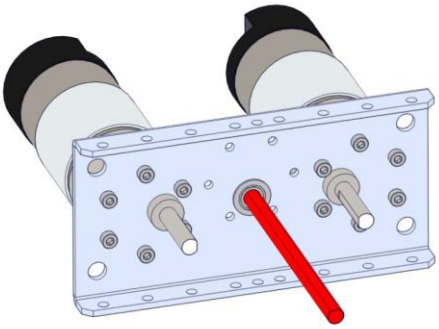
Step 2: Insert a NeveRest gearmotor into the remaining 12mm holes of the PicoBox Duo gearbox plate or the 22mm holes of the PicoBox GEO plate, opposite of the flanges on the gearbox, and line up the threaded holes on the end of the motor with the bolt-circle holes of the gearbox plate.



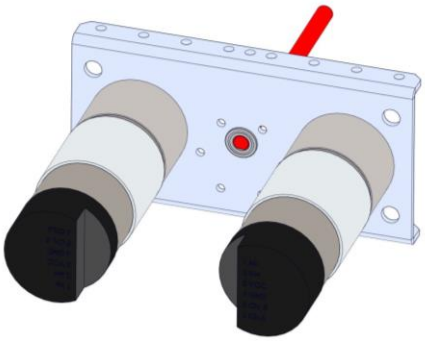
Step 3: Install six M3 x 0.5 x 5mm long SHCS (am-1443) in each NeveRest gearmotor to secure it to the gearbox plate. **Note: Only four screws are used per motor if using NeveRest Orbital gearmotors.**



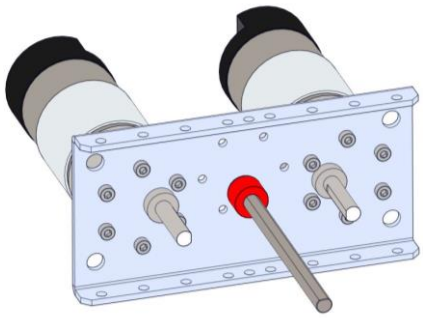
Step 4: Install the 6mm D-Shaft (am-3226-100) into the center bearing on the PicoBox Plate.



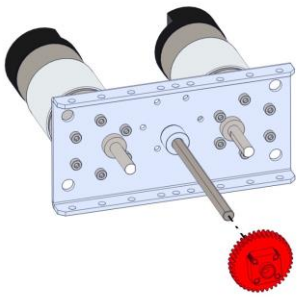
Step 5: Ensure that the end of the shaft is flush with the end of the bearing.



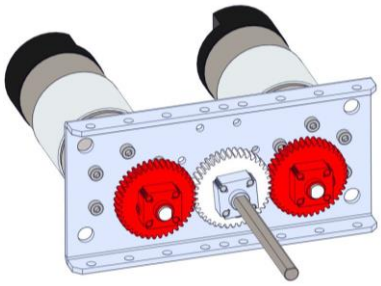
Step 6: Install the 9 mm long Aluminum Spacer (am-3426) on the center axle up against the previously installed bearing.



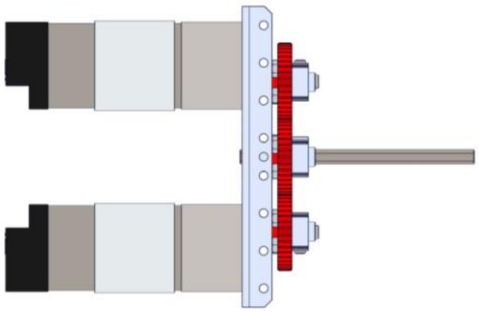
Step 7: Install one Gear Assembly onto the center axle of the gearbox. Be sure to place the boss of the Gear against the spacer. **Note: If using the alternate gearset, this gear should be the one you only made two of.**



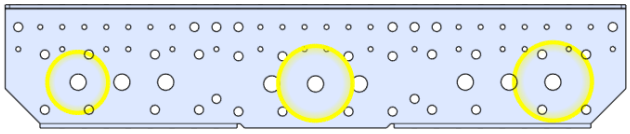
Step 8: Install a Gear Assembly onto each of the NeveRest Motor shafts. **Note: If using the alternate gearset, these gears should be the ones you made four of.**



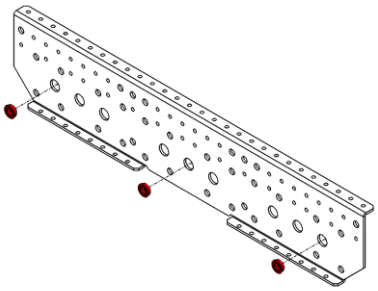
Step 9: Ensure that all of the gears are aligned with each other and tighten the #10-32 Set screws to lock all the gear assemblies in place.



Step 10: Locate the bearing holes on the Tile Runner Chassis. Use the following holes on the chassis for the standard 6WD configuration:

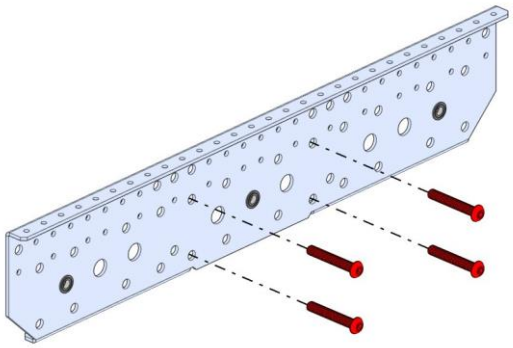


Step 11: Press three 6x12x4 Flanged Bearings (am-3377) into the indicated holes from step 10 in the TileRunner Inside Plate (am-3392_Inside) on the same side of the plate that has two separate flanges. Make sure the bearing flanges are flush against the sheet metal.

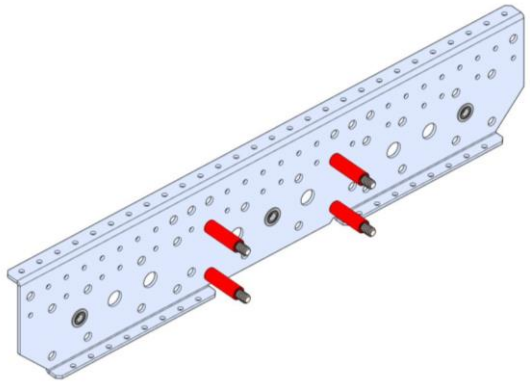


PicoBox and Chassis Assembly Instructions

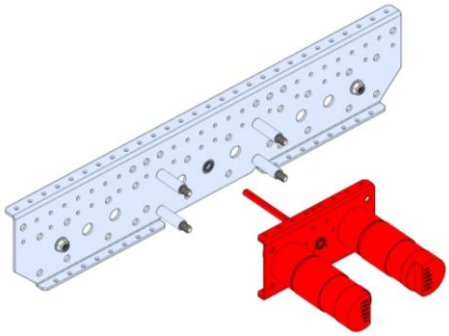
Step 12: Insert four 1/4-20 x 1.75" Button Head Screws (am-1420) into the side of the Inside Plate with a single solid flange.



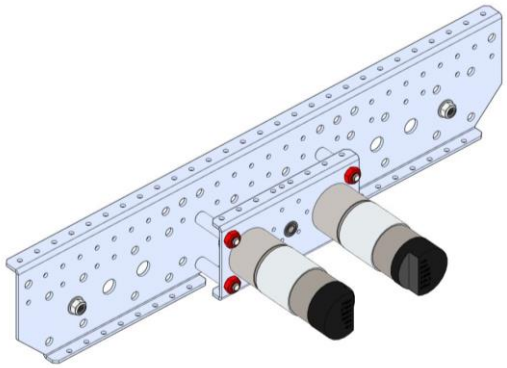
Step 13: Place a PicoBox Spacer (am-3406) over each of the four 1/4-20 screws on the side of the Inside Plate with two flanges.



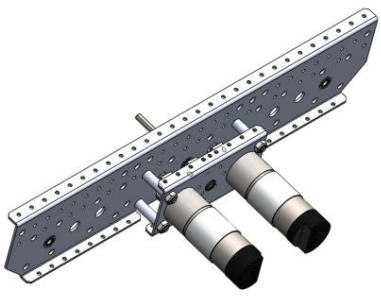
Step 14: Insert the Center Axle of the Gearbox Assembly into the center bearing on the TileRunner Inside Plate. Align the four 1/4-20 screws with the four 0.25 in holes on the PicoBox Plate and push the assembly together until the PicoBox Plate is flush with the PicoBox Spacers.

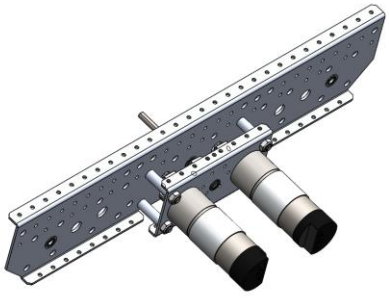


Step 15: Secure with four 1/4-20 Nylock Jam Nuts (am-1102).



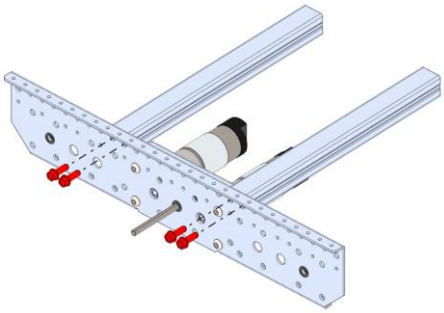
Step 16: Repeat Steps 1-15 to create another PicoBox - TileRunner Inside Plate Assembly.



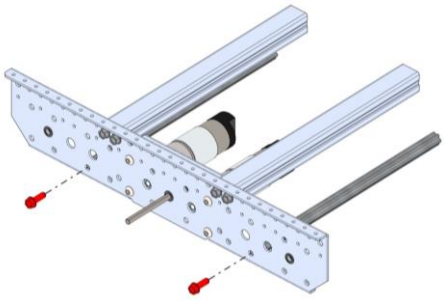


PicoBox and Chassis Assembly Instructions

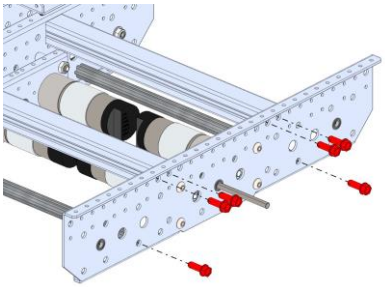
Step 17: Attach two 11.25" Peanut Extrusions (am-3395) to one PicoBox - TileRunner Inside Plate Assembly (on the same side of the plate as the PicoBox) at the indicated attachment points below using four 1/4-20 x 0.75" Self-Tapping Screws (am-1310).



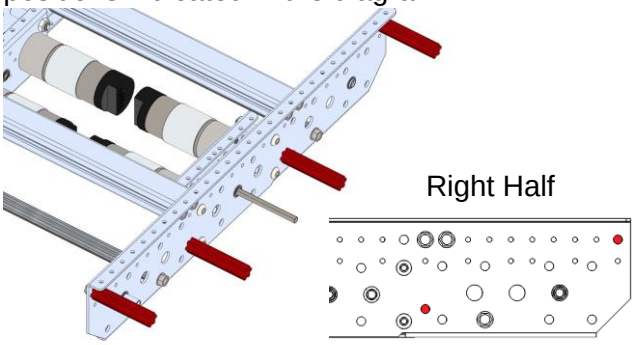
Step 18: Attach two 11.25" Churro Extrusions (am-3398) to the PicoBox - TileRunner Inside Plate Assembly (on the same side of the plate as the PicoBox) at the indicated attachment points below using four 1/4-20 x 0.75" Self-Tapping Screws (am-1310).



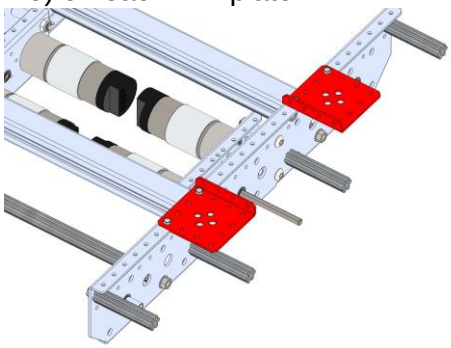
Step 19: Connect the two PicoBox - TileRunner Inside Plate Assemblies together, ensuring the gearboxes are both on the inside of the chassis, and secure using six 1/4-20 x 0.750" Self-Tapping Screws (am-1310) .



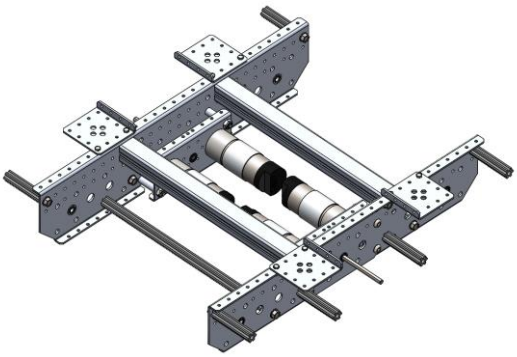
Step 20: Attach four 63mm Churro Extrusions (am-3399) to one of the Inside Plates using 1/4-20 Self-Tapping Screws (am-1310) in the positions indicated in the diagram.



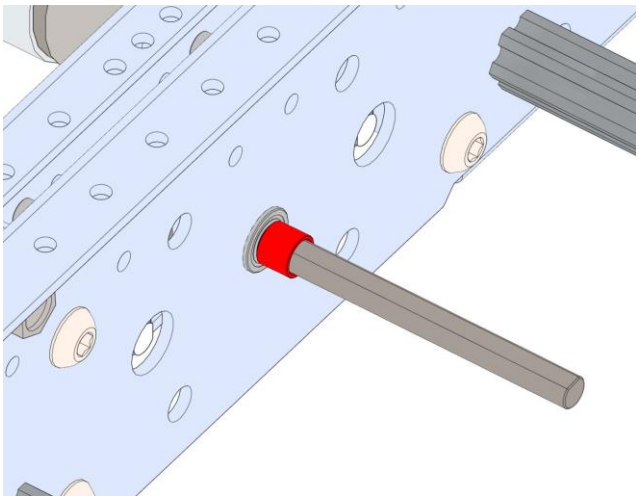
Step 21: Attach two 4x4 Plates (am-3393) to the Inside Plate using two 6-32 x 0.5" Hex Head Screws (am-1436) and two 6-32 Nylock Nuts (am-1419) on each 4x4 plate.



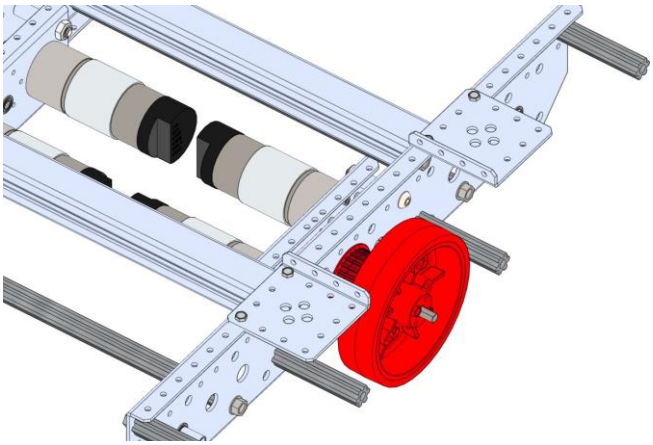
Step 22: Repeat steps 20 and 21 to add 63mm Churros and 4x4 Plates to the other side.



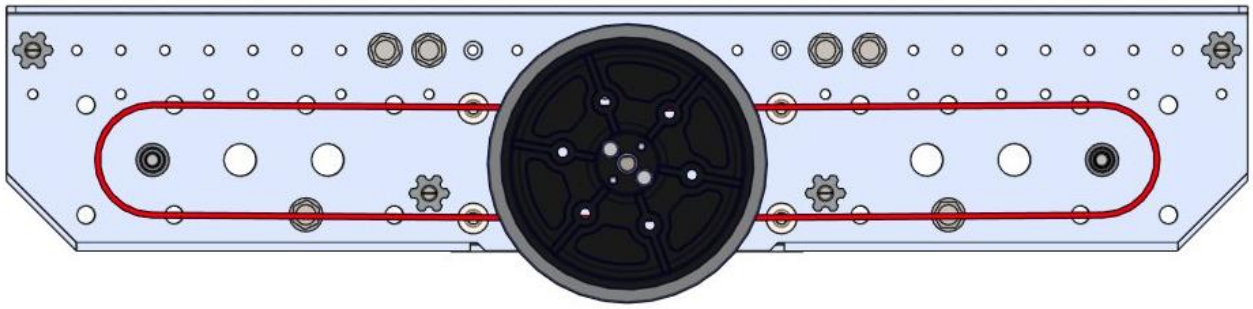
Step 23: Install a 0.25 in long Aluminum Spacer (am-3424) onto the Center Shaft.



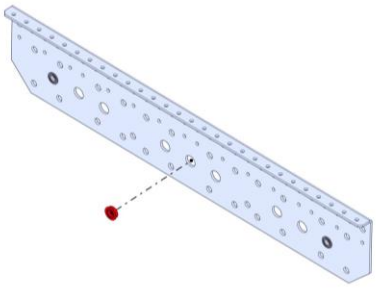
Step 24: Install the Center Wheel Assembly onto this shaft and over the spacer such that it is flush with the bottom of the cavity in the pulley. Lock the wheel in place using the #10-32 set screw on the Nub.



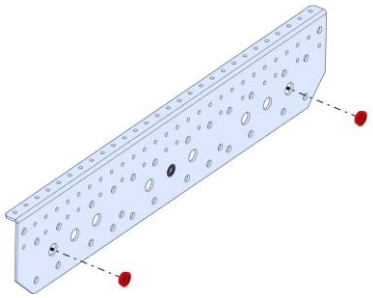
Step 25: Wrap two 93 Tooth Belts (am-3378) around the Pulley on the Center Wheel Assembly. Be sure to wrap the belts around the lower Churro Extrusions in the drive module so they can be installed on the Outer Wheel Assemblies.



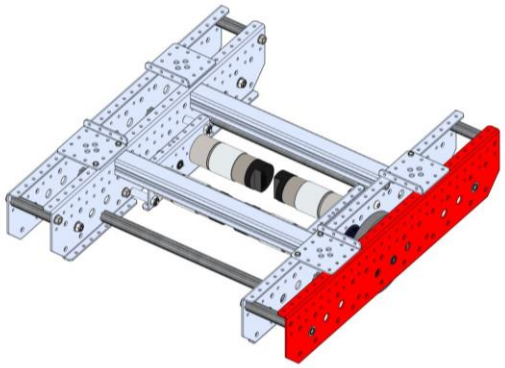
Step 26: Press a 6x12x4 Flanged Bearing (am-3377) into the center 12mm hole of the Outside Plate (am-3392_Outside). The flange on the bearing should be on the same side of the plate that has the flange. Make sure that the bearing flange is flush against the sheet metal.



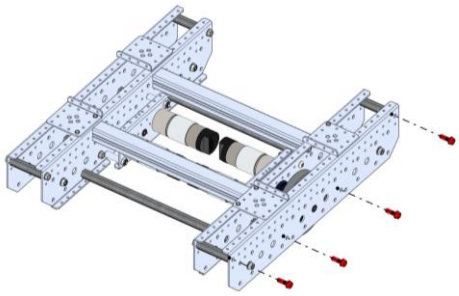
Step 27: Flip the plate over and press two more bearings into the end-most 12mm holes of the Outside Plate. The flange on the bearing should be on the side opposite the flange on the sheet metal. Make sure that the bearing flanges are flush against the sheet metal.



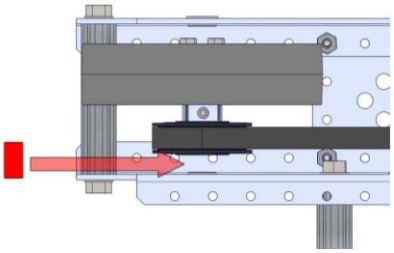
Step 28: Slide the Center Axle into the center bearing previously installed into the Outside Plate, and make sure the flange of the Outside Plate points toward the chassis.



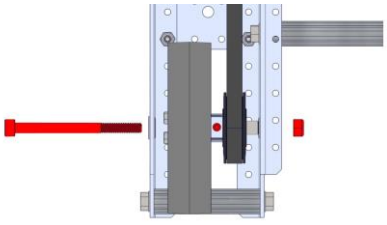
Step 29: Secure the Outside Plate to the chassis by threading four 1/4-20 Self-Tapping Screws (am-1310) into the four 63mm Churro Extrusions on the Drive Module. Be careful not to pinch the belts while installing the Outside Plate. **Note: Leave these screws slightly loose.**



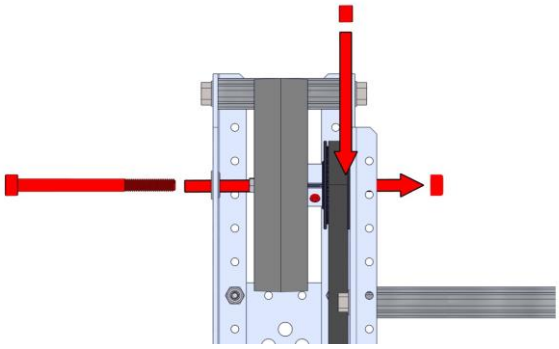
Step 30: Place a 15mm long Aluminum Spacer (am-3425) into the center cavity of the pulley in an Outer Wheel Assembly, and place the assembly in between one of the Inside and Outside plates ensuring the outermost belt wraps around the pulley. The belt should sit parallel to the plates.



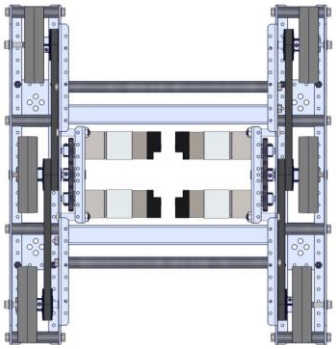
Step 31: Insert a M6 x 75mm SHCS (am-1417) into the bearing of the Outer Plate, through the Outer Wheel Assembly and aluminum spacer, and through the bearing on the Inside Plate. Secure the bolt using an M6 Nylock nut (am-1111). Do not overtighten – the bolt should move freely in the bearing. Lock the wheel in place using the #10-32 set screw on the Nub.



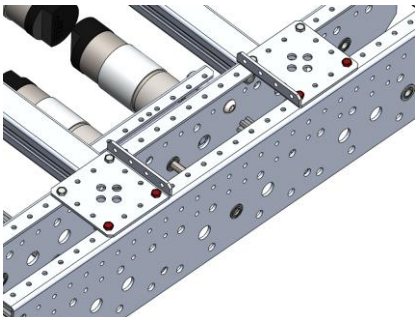
Step 32: Repeat Steps 31-32 for the Outer Wheel Assembly on the other end of this half of the chassis using a 0.25 in long Aluminum Spacer (am-3424) between the pulley and the bearing on the Inside Plate.



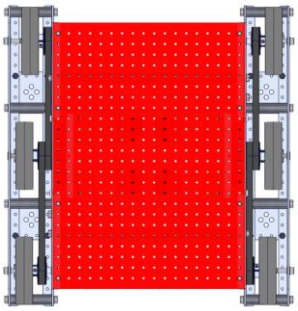
Step 33: Repeat Steps 23-32 to assemble the other half of the drivetrain. Be sure to use the same length aluminum spacers on each Outer Wheel Assembly at each end of the chassis to ensure the wheel spacing is symmetrical.



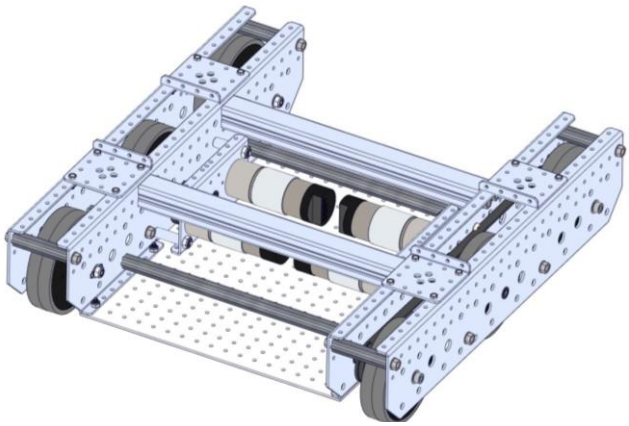
Step 34: Attach the 4x4 Plates (am-3393) to the Outer Plates using two 6-32 x 0.5 in Hex Head Screws (am-1436) and two 6-32 Nylock Nuts (am-1419) on each 4x4 Plate. **Note: Once installed, tighten the screws left loose in Step 29.**



Step 35: Install the Belly Pan (am-3394) onto the bottom flanges of the Inside Plates, and secure with eight 6-32 x 0.5 in Hex Head Screws (am-1436) and eight 6-32 Nylock Nuts (am-1419). Install the screws and nuts at each end of the two flanges on each Inside Plate.



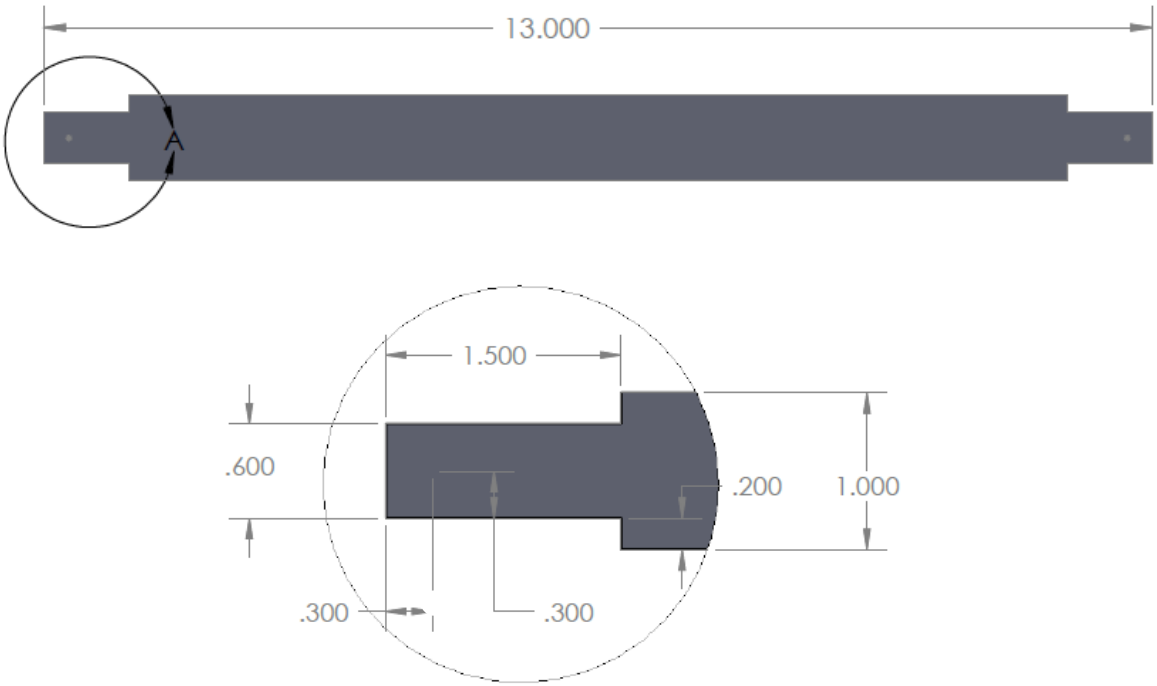
Step 36: Congratulations! You now have a complete TileRunner 6WD Chassis.



TileRunner Performance Wheel Tread Assembly Instructions:

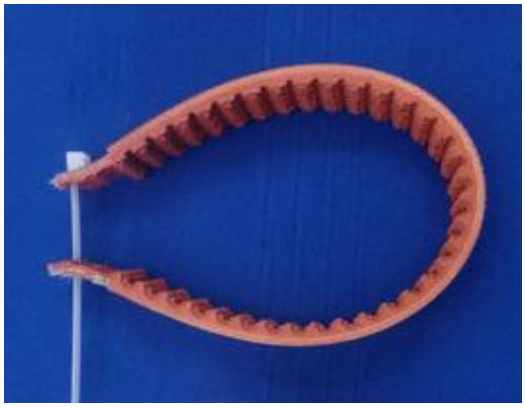
Component	Part Number	Quantity	Part Photo
am-3612	4 in Performance Wheel with Nub Bore	6	
am-2611	10 ft. of Green Grippy Tread	1	

Step 1: Cut tread to a length long enough to wrap around the wheel with a 1” overlap. Narrow each end of the tread about 3/16” on each side, leaving about 1/2" to 5/8" tab centered on the tread. This allows excess length of tread to fit through the slot and into the center of the wheel. To make assembly easier, it is also useful to sand down the tread on the narrowed ends. Make one hole on each end centered at minimum 0.25” away from the end of the tread to allow a ziptie to pass through.

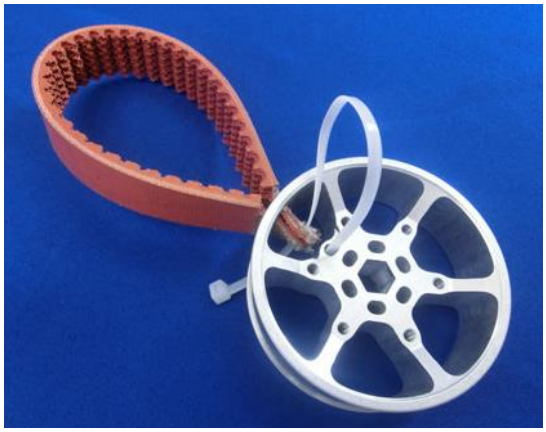


TileRunner Performance Wheel Tread Assembly Instructions:

Step 2: Put both ends of the tread together with the rubber sides facing each other. Place a strong ziptie (am-1189 recommended) through the holes in the tread. Do not connect and close the ziptie yet!



Step 3: Thread the ziptie and the ends of the tread through the slot on the performance wheel.



Step 4: Flip the tread so the rubber side is facing outwards and wrap around wheel.

Step 5: Secure zip tie to the anchor point between the wheel spokes.

Note: Tread shown is for illustrative purposes only