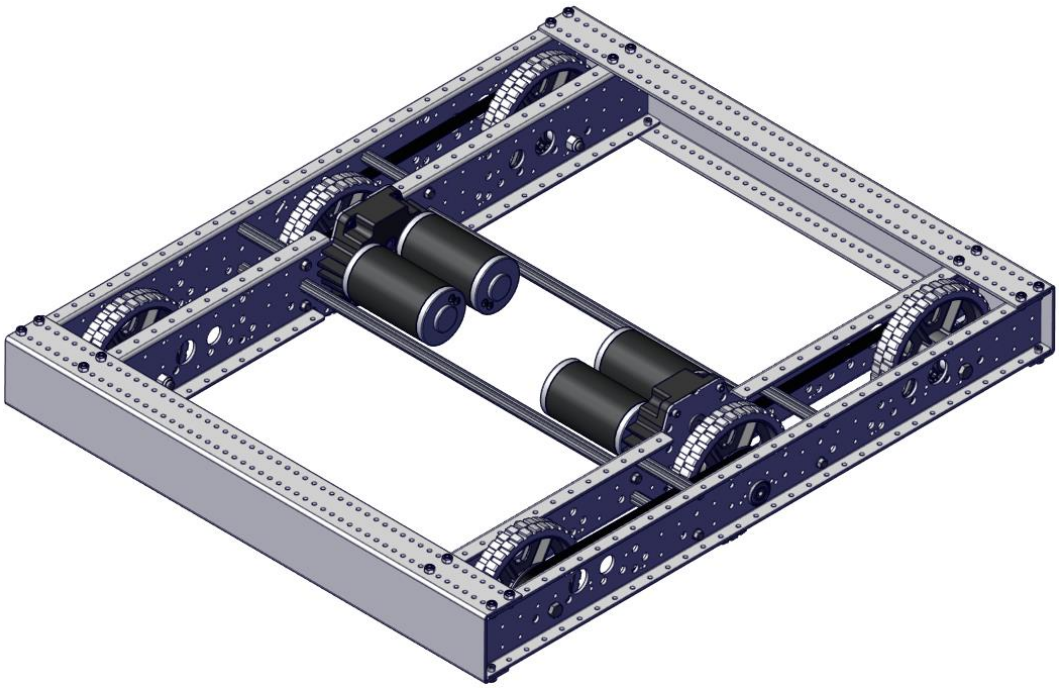
User Guide

AM14U6 Chassis Base Kit for the FIRST® Robotics Competition



K26 Version – January 10th 2026

AndyMark – Your Robot Parts Experts

AndyMark, Inc. was founded in 2004 by Andy Baker and Mark Koors to design and sell unique mechanical parts for competition and educational robotics. Through their volunteer work at *FIRST*® Robotics Competition events they identified a niche market and began designing and selling robotics components for *FIRST*® teams. At that time, many designs were being shared and re-created, but finding the correct fabrication resources for these parts was difficult for some *FRC* teams. AndyMark has been a proud supplier to the *FIRST*® Robotics Competition since 2005.

AndyMark's staff has over 200 years of FIRST team experience, and provides staffing services to many robot competition events throughout the year. Our Kokomo, Indiana home provides a central location for quick distribution across North America, as well as international shipping to over 100 countries.

Additional Instructions Available

We encourage customers to seek product information at **AndyMark.com**, contact us via e-mail at **support@andymark.com**, or call at **765-868-4779** with questions about any of our products.

Detailed assembly tips and instructional videos can be found at **AndyMark.com/FRCVideos**. Additional resources, layout prints, and CAD are available on the **AndyMark.com/KOP** web page.

AM14U6 Recommended Hand Tool List (not included)

Component	Part Number	QTY	Part Photo
Hammer	Available at your local hardware store.	1	
Cordless Drill or Driver	Available at your local hardware store.	1	
Metal Cutting Saw	Available at your local hardware store.	1	
3/8" Magnetic Nut Setter	am-2755	1	
1/4" Magnetic Nut Setter	am-4607	1	
9/16" Socket, 3/8" Drive	am-2743	1	
3/8" Socket, 3/8" Drive	am-2740	1	
5/32" Ball End Hex Bit Driver	am-2751	1	
3/8" Drive Quick Release Ratchet	am-2753	1	
1/2" - 9/16" Open-End Wrench	am-2746	1	
Tape Measure	am-4986	1	

AM14U6 System Overview

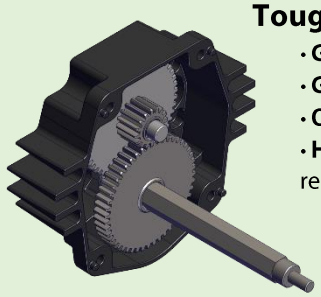
The AM14U6 system designed by AndyMark engineers is a fully customizable drive platform for the *FIRST*® Robotics Competition. The Kit of Parts Drive Chassis is a 6-Wheel Drive (6WD) AM14U6 configuration engineered to withstand the rigors of this year's game challenge. The AM14U6 Drive Chassis Kit includes standard AndyMark products and is designed to be compatible with other AndyMark products. There are many ways to use the parts included in this kit.

- Utilize these step by step instructions to quickly build the standard drive chassis.
- Take advantage of convenient built-in features to convert to another pre-engineered drive solution.
- Take the existing parts and pieces included and re-design them in a new way

Gearbox Overview

Each AM14U6 Chassis Base Kit includes two (2) AndyMark ToughBox Mini S Gearboxes, unassembled (TB2C8XUX). Each ToughBox Mini S includes the parts needed to mount two 2.5" CIM motors (am-0255) or NEO Brushless Motors (am-4258a). The gearbox also includes holes for optional encoders such as the USDigital E4T Optical Encoder (am-3132) or REV Thru Bore Hex Encoder (am-4650) on either the inside or the outside of the chassis.

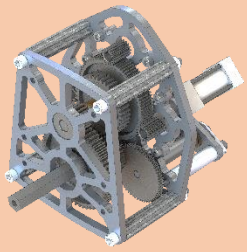
INCLUDED



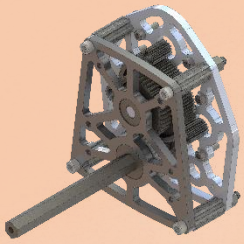
ToughBox Mini S Gearbox

- **Gear Profile:** 20 DP, 14.5° pressure angle
- **Gear Material:** Cold-formed 4140 Steel
- **Output Shaft:** 1/2" Hex
- **Housing Material:** Nylon 6/6 with long fiber reinforcements

OPTIONAL



EVO Shifter 2-Speed



EVO Slim Single Speed

ToughBox Micro S
For use with Mecanum

Gear Ratio Specifications:

To change the drive speed of the AM14U6, different gear ratios can be used in the ToughBox Mini S. To change the ratio and drive speed, the standard 19 tooth Small Cluster Gear and 45 tooth Large Output Gear will need to be replaced with two gears totaling 64 teeth. ***The higher the ratio, the slower the output speed.***
More information about these optional gears can be found at "AndyMark.com/TBmini".

Ratio	8mm Gear	Lg. Cluster	Sm. Cluster	Lg. Output	AM14U6 Speed**
5.95:1	**14T**	**50T**	**24T**	**40T**	**18.0 ft/sec**
7.31:1	**14T**	**50T**	**21T**	**43T**	**14.7 ft/sec**
8.45:1 (included)	**14T**	**50T**	**19T**	**45T**	**12.7 ft/sec**
10.71:1	**14T**	**50T**	**16T**	**48T**	**10.0 ft/sec**
12.75:1	**14T**	**50T**	**14T**	**50T**	**8.4 ft/sec**

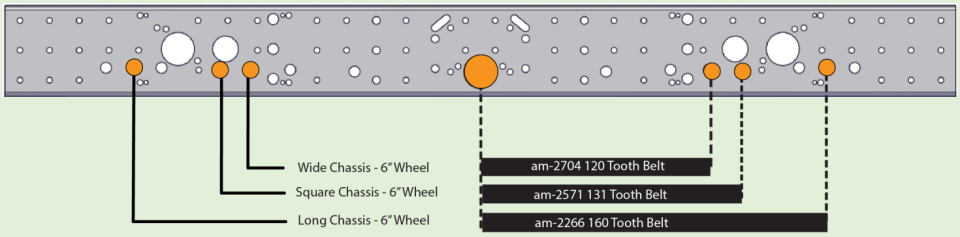
**AM14U6 speed estimation is based on calculations using 6" wheels, and one CIM motor per TB Mini S running at 4100 rpm, or 75% of free speed.

Powertrain Specifications

The AM14U6 Kit of Parts Chassis Base Kit includes Gates HTD belts and the parts needed to build a 6" 6-wheel drive chassis with a direct drive center wheel in three recommended frame sizes. Other belt sizes are available on **AndyMark.com** or through Gates to allow for many more configurations.

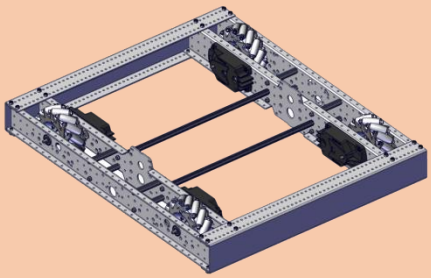
INCLUDED

120, 131, and 160 Tooth Gates Belts for 3 recommended sizes

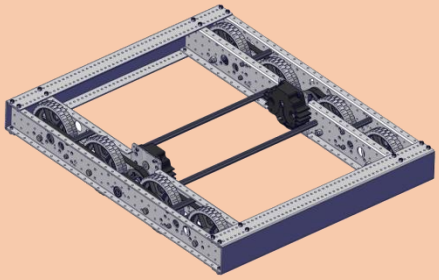


Additionally, the AM14U6 parts can be used in other popular drive configurations as well. **Direct Drive Mecanum Wheels** and **8-Wheel Drive** can both be built by using the frame in this kit and swapping out some of the parts. For details on how to change your drive system visit **AndyMark.com/AM14U6**

OPTIONAL



Mecanum Drive



8-Wheel Drive

Wheel Overview

Included in the Drive Base Kit are 6" 80A HiGrip Wheels. These wheels are made of high-strength polycarbonate with an 80A urethane tread. These wheels provide long-lasting grip throughout the competition season. Many other wheels can be used as an alternative with minor adjustments to the plate spacing and layout.

INCLUDED

6" HiGrip Wheels
am-0940b

OPTIONAL

DuraOmni Wheels
am-3154

Performance Wheels
am-0095b

SmoothGrip Wheels
am-0144a

Plus many other 4", 6", and 8" options.

For full information please visit AndyMark.com

Wheel and Belt Assembly Bill of Materials

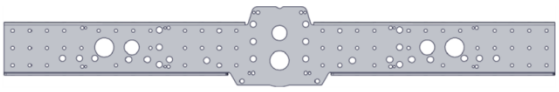
Component	Part Number	Quantity	Part Photo
6" HiGrip Wheel	am-0940b	6	
½" Hex Hub	am-2568	2	
Gates HTD 15mm wide, 160 Tooth Belt for Long Chassis	am-2266	4	
Gates HTD 15mm wide, 120 Tooth Belt for Wide Chassis	am-2704	4	
Gates HTD 15mm wide, 131 Tooth Belt for Square Chassis	am-2571	4	
Pulley Half, 42 Tooth	am-2234a-half	8 Pairs 16 Halves	
Wheel Screw Kit – (am-14U6_CK7)			
10-12 x 1.5" Thread Forming Screws	am-1654	50	
Bearing Kit – (am-14U6_CK8)			
1614ZZ Bearing	am-0209	8	
FR8ZZ Bearing	am-0030	2	

ToughBox Mini S Bill of Materials – Build two per drive base

Component	Part Number	Quantity	Part Photo
TB Mini S Housing	am-0650	1	
½" Hex Output Shaft Encoder Pin Ready	am-4722	1	
TB Mini S Small Hex Shaft	am-0152	1	
TB Mini Kit 1– am-14U6_TM1			
50 Tooth, 3/8" Hex Gear	am-4720	1	
14 Tooth, 8mm CIM Gear	am-0034	2	
19 Tooth, 3/8" Hex Gear	am-3645	1	
45 Tooth, 1/2" Hex Gear	am-4712	1	
¼"Dowel Pin	am-1323	1	
TB Mini Kit 2 – am-14U6_TM2			
R6ZZ Bearing	am-0516	2	
FR6ZZ Bearing	am-0028	1	
FR8ZZ HexHD Bearing	am-2986	1	
Red Tacky Grease Pack	am-2768	1	
TB Mini Kit 3 – am-14U6_TM3			
2x2x10mm Machine Key	am-1121	2	
5/16" Washer	am-1009a	4	

8mm Retaining Clip	am-0033	2	
10-32 x 0.625" SHCS with Nylon Thread Lock Patch	am-1120	4	
10-32 x 0.75" SHCS	am-1047	4	
10-32 Nylock Nut	am-1042	4	
1/2" E-Clip Ring	am-0206	1	

AM14U6 Chassis Frame Bill of Materials

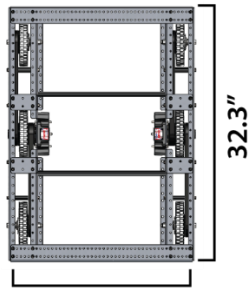
Component	Part Number	QTY	Part Photo
AM14U Family End Plate	am-3920	2	
AM14U6 Outer Plate	am-3921b	2	
AM14U6 Inner Plate	am-3922b	2	
500 Churro, 24"	am-3101-2	2	
AM14U6 – Churro Screw Kit – am-14U6_CK1			
1/4-20 x 0.75" Thread Rolling Screw	am-1310	20	
AM14U6 – Axle Kit – am-14U6_CK2			
3/8-16 x 4.25" HHS Bolt	am-1297	4	
3/8-16 Nylock Nut	am-1054	4	
AM14U6 – Spacer Kit – am-14U6_CK3			
0.570" Hex Spacer	am-1305	2	
Plastic Spacer 0.280"	am-1306	4	
Plastic Spacer 0.850"	am-1307	4	
AM14U6 – Frame Hardware Kit – am-14U6_CK4			
10-32 x 0.5" SHCS	am-1002	24	
10-32 Nylock Nut	am-1042	24	
AM14U6 Churro Kit – am-14U6_CK5			
500 Churro, 3.375"	am-2569	8	

Frame Diagrams & Cut Lines:

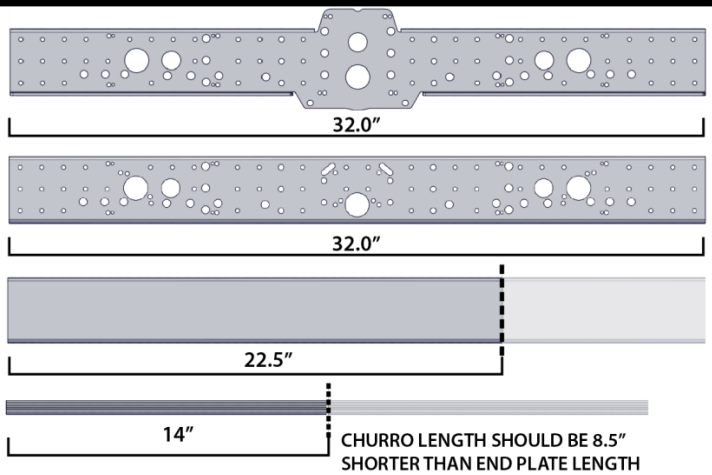
The AM14U6 is designed for multiple configurations. Chassis pieces **should be measured** and cut down to size; some possible configurations are shown below. Ensure that your final frame size complies with all current rules. Belts for recommended **LONG, SQUARE** and **WIDE** configurations are included in the full AM14U6 Kit**.** The rest of this guide will use images of the long configuration.

NOTE: Use the "SQUARE CHASSIS" size if building the 2026 KitBot. See firstinspires.org/kitbot for more information.

LONG CHASSIS



NOTE: Ensure your final frame size complies with all FRC robot perimeter rules.



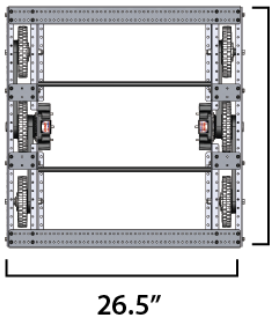
NO CUTS ARE NEEDED ON THE INNER PLATE OR OUTER PLATE

CUT 8.5" OFF ONE END OF BOTH END PLATES

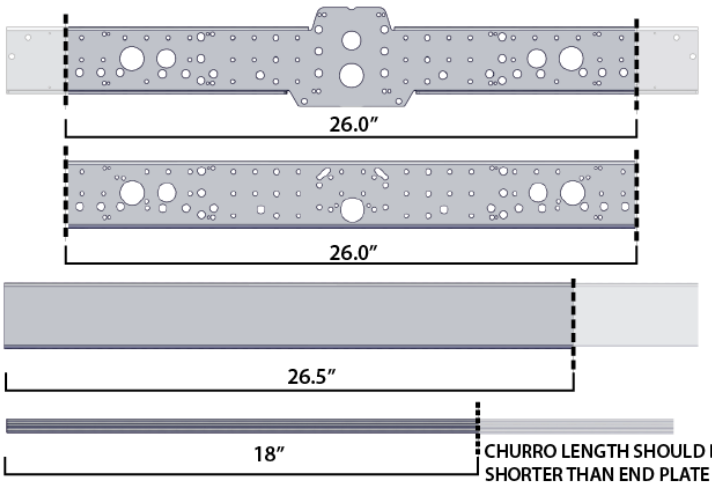
CUT CHURRO TO 14"

CHURRO LENGTH SHOULD BE 8.5" SHORTER THAN END PLATE LENGTH

SQUARE CHASSIS



NOTE: Ensure your final frame size complies with all FRC robot perimeter rules.



CUT 3" OFF OUTER PLATES ON BOTH ENDS

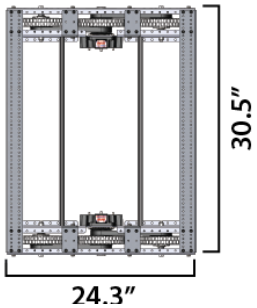
CUT 3" OFF INNER PLATES ON BOTH ENDS

CUT 4.5" OFF ONE END OF BOTH END PLATES

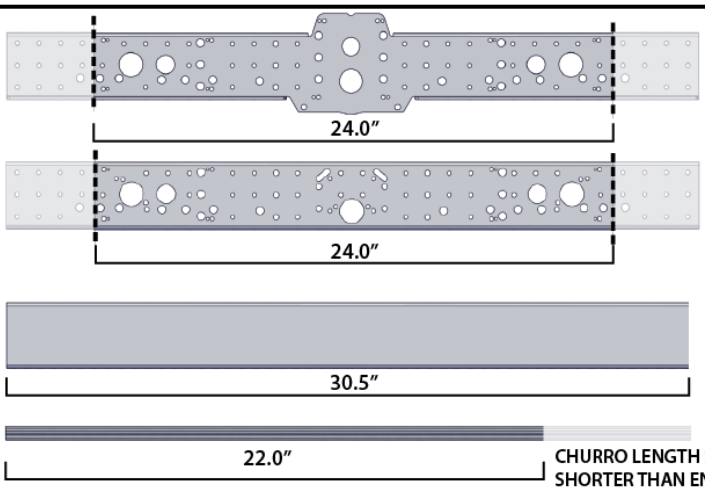
CUT CHURRO TO 18"

CHURRO LENGTH SHOULD BE 8.5" SHORTER THAN END PLATE LENGTH

WIDE CHASSIS



NOTE: Ensure your final frame size complies with all FRC robot perimeter rules.



CUT 4" OFF OUTER PLATES ON BOTH ENDS

CUT 4" OFF INNER PLATES ON BOTH ENDS

CUT 0.5" OFF ONE END OF BOTH END PLATES

CUT CHURRO TO 22.0"

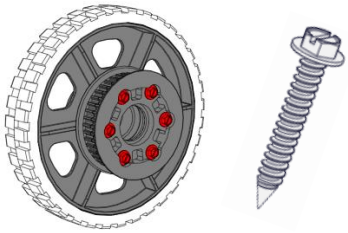
CHURRO LENGTH SHOULD BE 8.5" SHORTER THAN END PLATE LENGTH

6” HiGrip Wheel and Pulley Assembly Instructions

Outer Wheels (QTY 4)

Step 1: Add two pulley halves (am-2234a-half) to the wheel (am-0940b).

Step 2: Using six 10-12 x 1.5” (am-1654) thread forming screws, attach the pulley halves to the wheel.



Step 3: Press two 1614ZZ bearings (am-0209) into the wheel/pulley, one into each side.

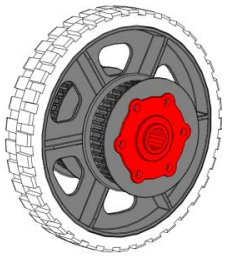
4X

NOTE: Tighten the screws in a star pattern to ensure the pulley aligns evenly on the wheel.

Center Wheels (QTY 2)

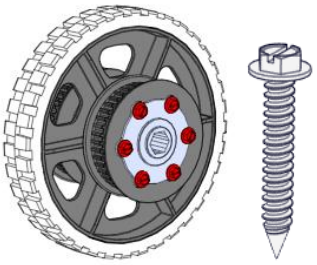
Step 1: Add two pulley halves (am-2234a-half) to the wheel (am-0940b).

Step 2: Insert one ½” Hex Hub (am-2568) into the pulley on one side of the wheel.

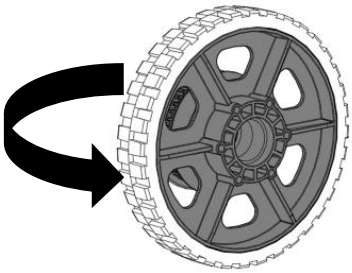


Step 3: Add six 10-12 x 1.5” (am-1654) thread forming screws to attach the pulley and hub to the wheel.

NOTE: Tighten the screws in a star pattern to ensure the pulley aligns evenly on the wheel.

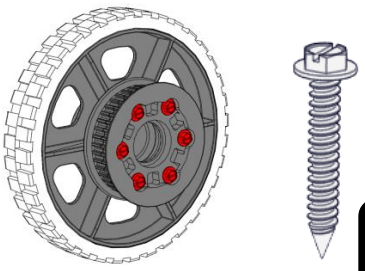


Step 4: Flip wheel over.



Step 5: Add two more pulley halves (am-2234a-half) to the wheel.

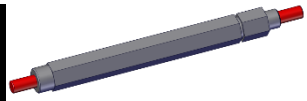
Step 6: Using six 10-12 x 1.5” (am-1654) thread forming screws attach the pulley halves to the wheel.



2X

ToughBox Mini S Assembly Instructions – Build 2 gearboxes

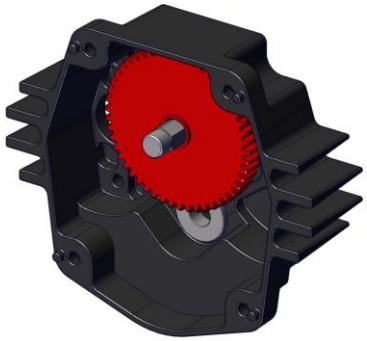
Optional Encoder Pin Install: Thoroughly clean off any oil on the encoder pins. Using super glue, add an encoder pin to either end of the encoder shaft. Let the glue dry. For more information on choosing encoders and pin locations please visit AndyMark.com/TBMini



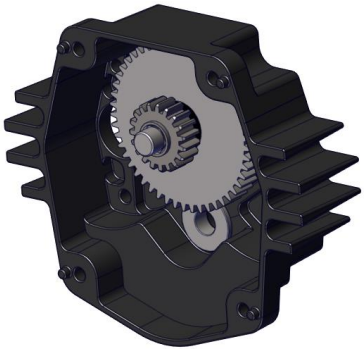
Step 1: Press two R6ZZ bearings (am-0516) into the two center holes of the TB Mini S Housing (am-0650). Ensure they are fully seated and inserted all the way into the housing.

Step 2: Insert the TB Small Hex Shaft (am-0152) into R6ZZ bearing closest to the flat edge of the housing.

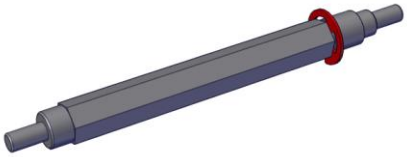
Step 3: Place the 50 tooth gear (am-4720) on the TB Small Hex Shaft.



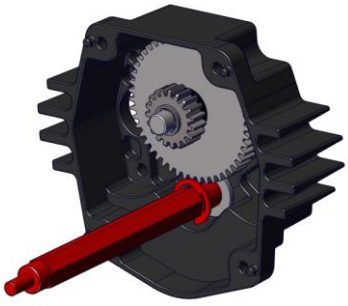
Step 4: Place the 19 tooth gear (am-3645) on the TB Small Hex Shaft.



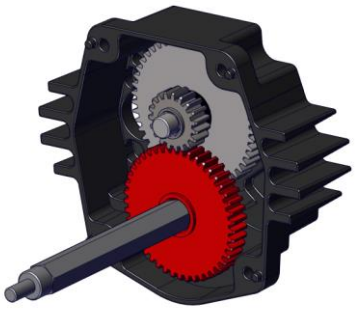
Step 5: Tap the 1/2" E-Clip (am-0206) into the groove on the TB Hex Output Shaft.



Step 6: Insert the end closest to the E Clip of the TB Hex Output Shaft into the other R6ZZ bearing.



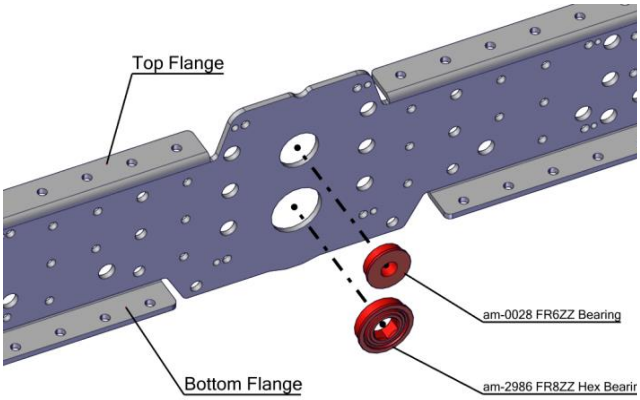
Step 8: Place the 45 Tooth Gear (am-4712) on TB Hex Output Shaft.



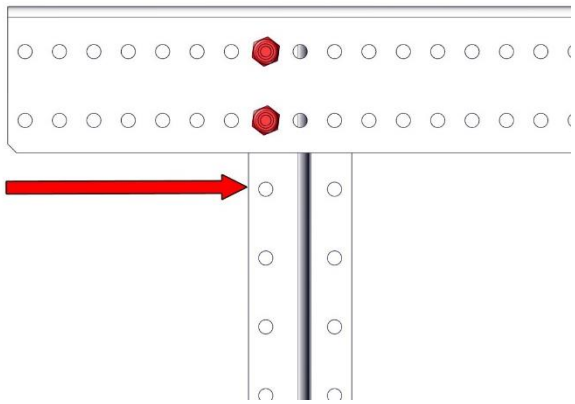
Step 9: Apply Red Tacky Grease (am-2768) to all of the gear teeth.

Chassis Assembly Instructions

Step 1: Press a FR6ZZ (am-0028) and a FR8ZZ-HexHD (am-2986) bearing into the center holes on each Inside Plate (am-3922b). Make sure the **bearing flanges are on the same side** as the bottom flange of the Inside Plate.

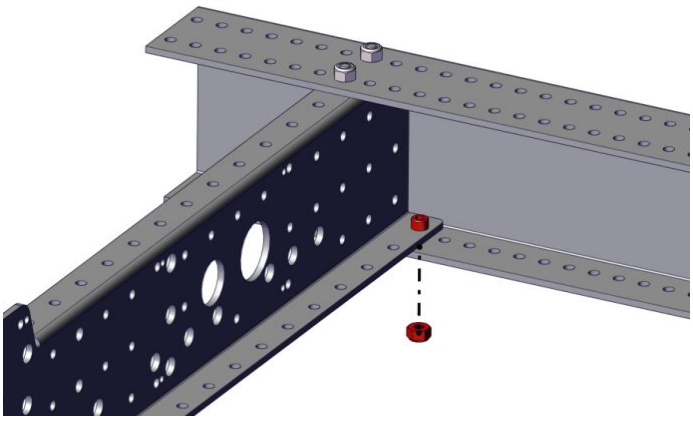


Step 2: Attach the top flange of an Inside Plate to the top (large) flange of an End Plate (am-3920) at the 8th hole in from the end with two 10-32 x 0.500 socket head screws (am-1002) and two 10-32 Nylock nuts (am-1042).

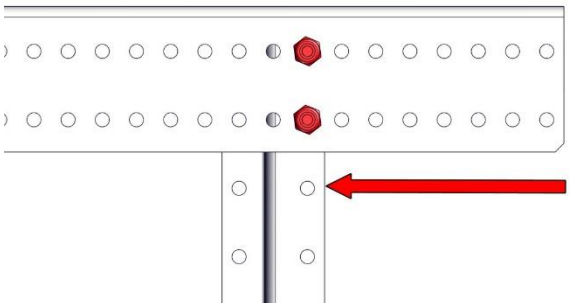


NOTE: The top flange of the Inside Plate should point toward the short side of the End Plate

Step 3: Secure the bottom flange to the End Plate with an additional 10-32 x 0.500 socket head screw and 10-32 Nylock nut.

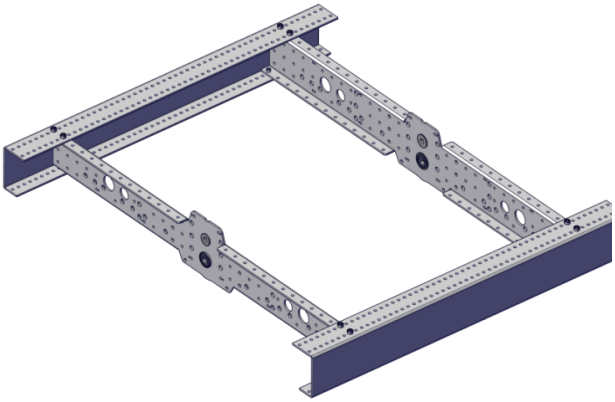


Step 4: Repeat steps 2-3 on to attach the other Inside Plate to the End Plate.

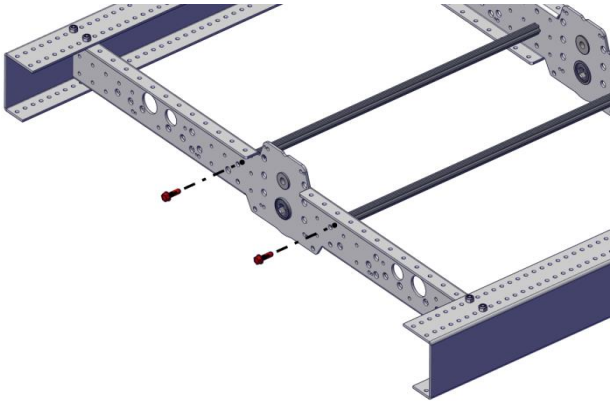


NOTE: The top flange of the Inside Plate should point toward the short side of the End Plate

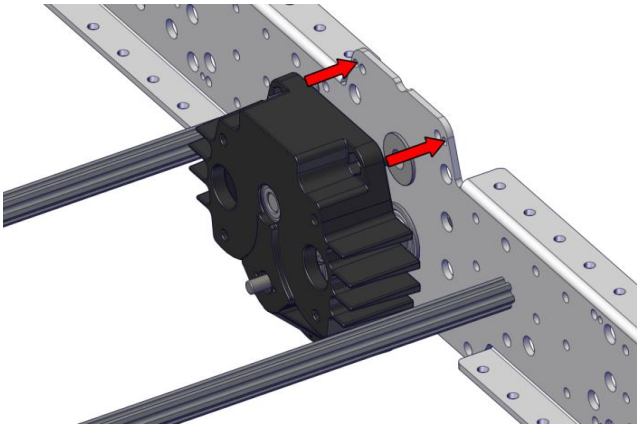
Step 5: Attach the other End Plate to the other end of the Inside Plates. If building the 2026 KitBot, this plate will be cut into two 5" sections. Reference the KitBot Instructions for more detail.



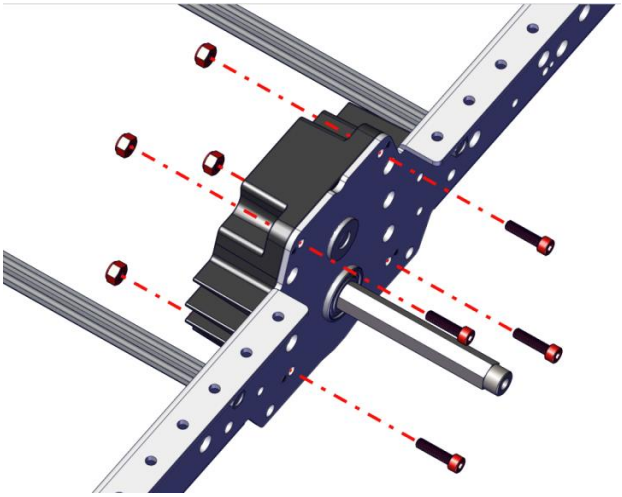
Step 6: Attach the two (cut to length) Long Churros between the Inside Plates using four ¼-20 x 0.750" thread forming screws (am-1310). A ½" wrench can be used to hold the churro while tightening.



Step 7: Place one ToughBox Mini S onto each Inner Plate ensuring the shafts are inserted into the flanged side of the bearings, and using the plastic studs to align the housing. The top flange of the Inside Plate will be facing away from the gearbox.

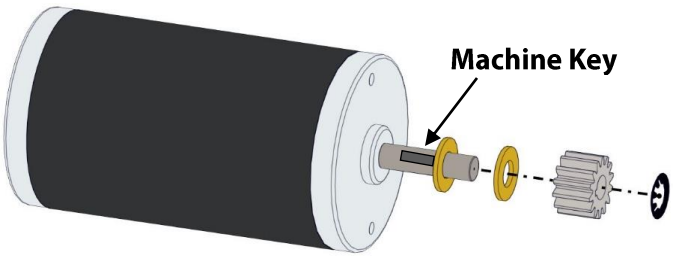


Step 8: Attach one ToughBox Mini S to each Inside Plate with four 10-32 x 0.75"SHCS (am-1047) and four 10-32 Nylock nuts (am-1042). The nuts will fit into the hex pockets on the ToughBox Mini S housing and will hold the nut while tightening.



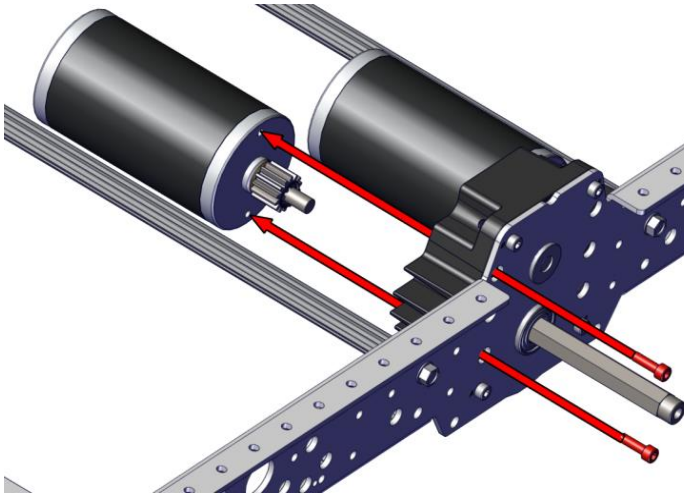
NOTE: Be careful not to overtighten these screws. The gears should spin freely when the shaft is rotated by hand.

Step 9: Slide two 5/16" washers (am-1009a) onto each CIM motor shaft against the round boss of the motor. **Place the Machine Key (am-1121) into the keyway of the motor shaft**. Slide the 14 tooth (am-0034) gear onto the shaft up to the washers, while aligning the keyway of the gear to the key. Use a socket to press the 8mm Retaining Clip (am-0033) onto the face of the gear, with the tabs of the clip pointing toward the motor shaft.

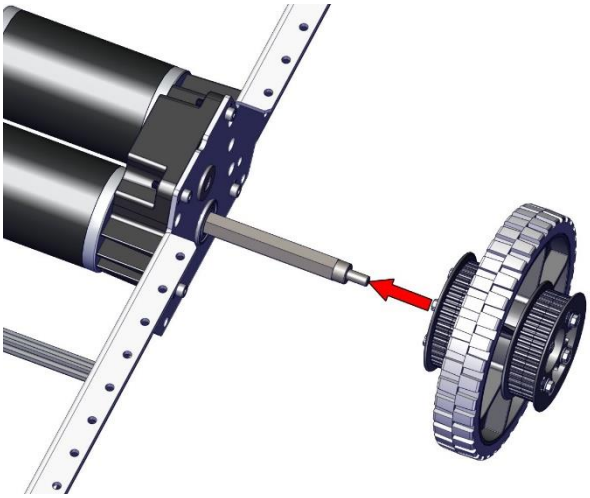


NOTE: Each drive gearbox can accept up to 2 motors. Repeat this step for each motor.

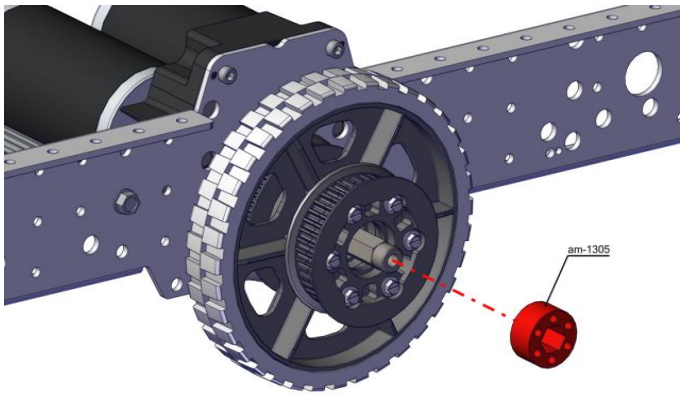
Step 10: Line up the CIM motors with the mounting holes in each ToughBox Mini S. Secure each motor with gears installed to the ToughBox Mini S housing using two 10-32 x 0.625" SHCS w/ Nylon Patch (am-1120).



Step 11: Place a Center Wheel Assembly onto each ToughBox Mini S Hex Output Shaft with the aluminum hub facing towards the Inside Plate.



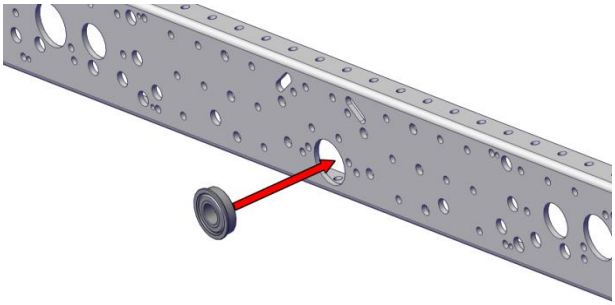
Step 12: Place the Hex Spacer (am-1305) onto each ToughBox Mini S Hex Output Shaft and press into the round cavity in the pulley. The shaft will help align the spacer hex bore with the wheel hub hex bore.



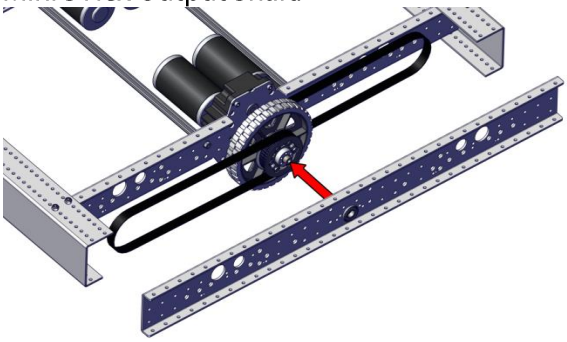
Step 13: Select the appropriate belts for your chassis configuration, and loop one belt over each Pulley on each Center Wheel Assembly.

The long chassis requires 160 tooth belts (am-2266). The wide chassis requires 120 tooth belts (am-2704). The square chassis requires 131 tooth belts (am-2571).

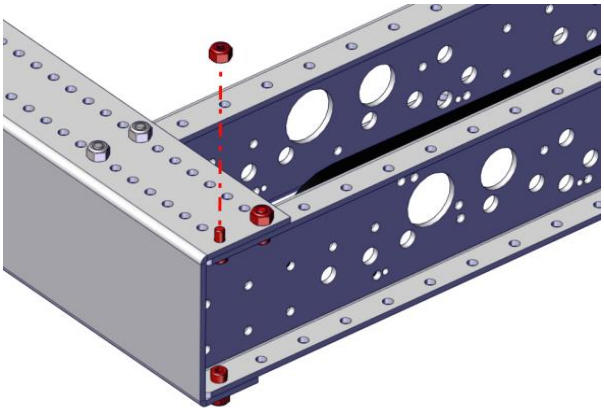
Step 14: Press the FR8ZZ Bearing (am-0030) into the center hole of each Outside Plate (am-3921b). The bearing flange will be on the side **opposite** the plate flanges to ensure the bearings do not fall out during operation.



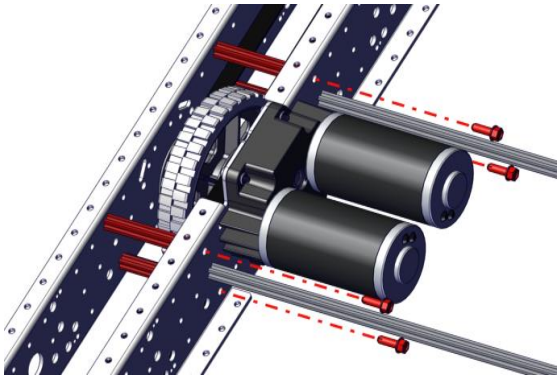
Step 15: Place each Outside Plate into the ends of both End Plates with the flanges of the Outside Plate pointing away from the Inside Plate. Ensure the Bearing is aligned to and installed on the ToughBox Mini S Hex Output Shaft.



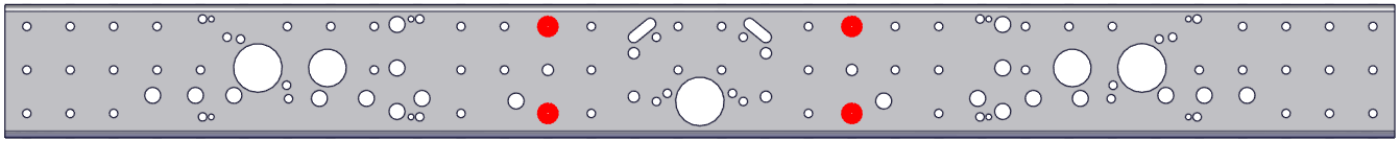
Step 16: Secure the Outside Plates to each End Plate using six 10-32 x 0.500 socket head screws (am-1002) and six 10-32 Nylock nuts (am-1042).



Step 17: Attach four 3.375" Churro Standoffs (am-2569) (see below for recommended locations) with 1/4-20 x 0.75" Thread Forming Screws (am-1310) onto each Inside Plate. A 1/2" wrench can be used to hold the churro while tightening. Make sure to loop belts over the churro to ensure the belts have a straight path from axle to axle.

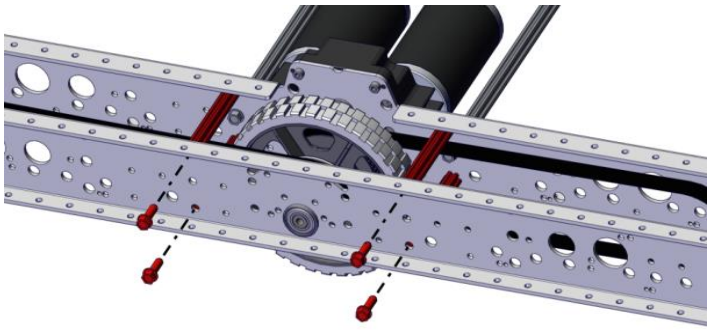


Recommended Support Churro Locations



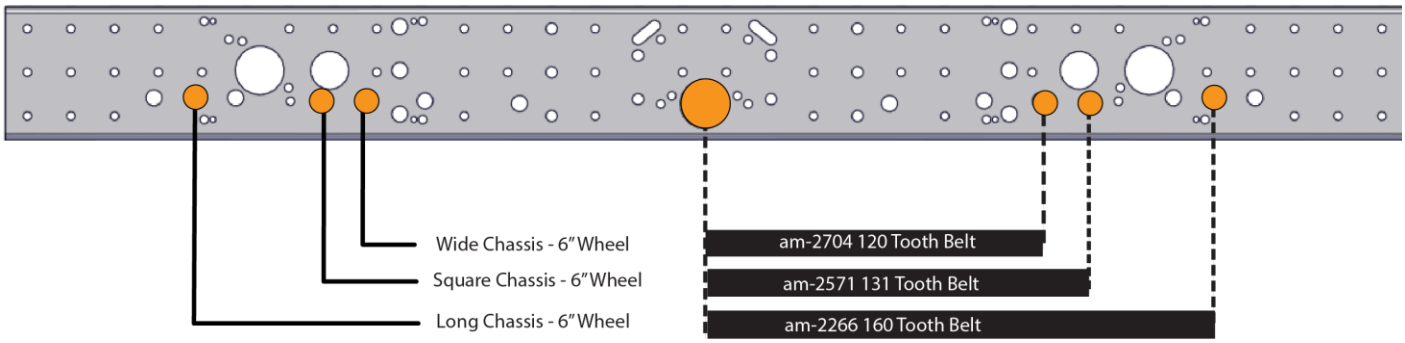
NOTE: The Churro Standoffs are intended to help with the structure of the chassis. Be sure to install four per side.

Step 18: Secure the Outside Plates to each Churro Standoff using 1/4-20 x 0.75" thread forming screws (am-1310). A 1/2" wrench can be used to hold the Churro Standoffs while tightening.



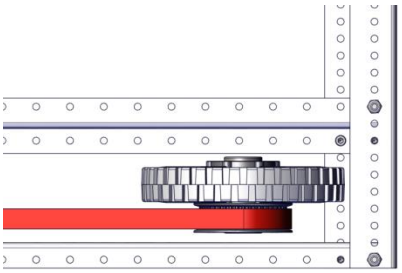
Step 19: There are different axle bolt locations for each chassis configuration. Locate the hole to match the chosen belt and frame size.

Hole Diagram for 6" Wheels



NOTE: Axle bolts must be installed from the outside of the chassis. If they are inserted into the Inside Plate first, the standard bumper hardware will not fit.

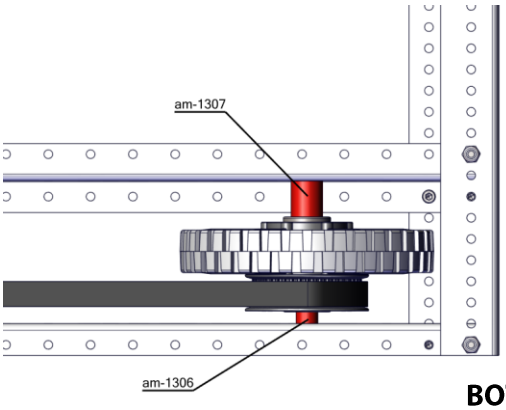
Step 20: Take an Outer Wheel Assembly, loop the belt onto the pulley, and insert the wheel between the Inside and Outside Plates. Ensure the belts are straight. One end will have the pulley closer to the outside plate, the other closest to the inside plate.



BOTTOM VIEW

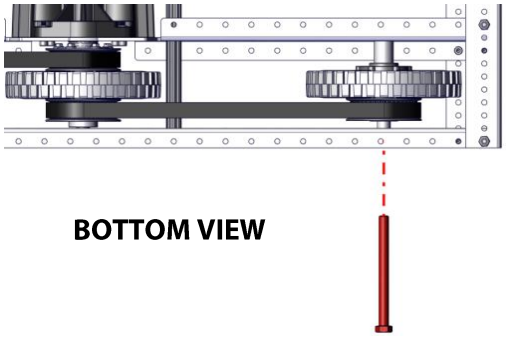
NOTE: The belts should be parallel to the side plates.

Step 21: For the pulleys that are closest to the Outside Plate, the Short Axle Spacer (am-1306) will be closest to the outside plate. The Long Axle Spacer (am-1307) will be closest to the inside plate.



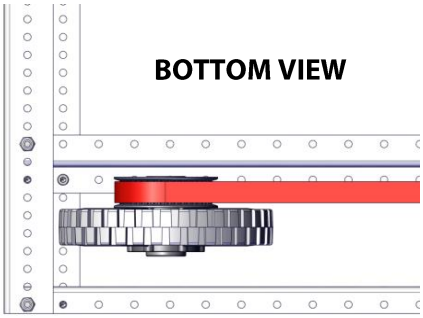
BOTTOM VIEW

Step 22: There are different axle bolt locations for each chassis configuration. Slide a ⅜" axle bolt (am-1297) through the spacers and wheel assembly, with the head of the bolt on the outside of the chassis.



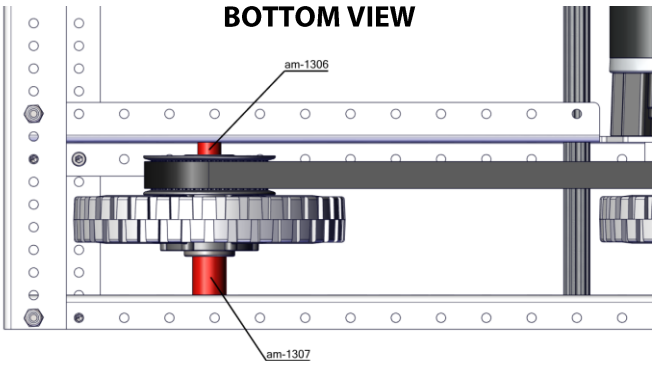
BOTTOM VIEW

Step 23: Add another Outer Wheel Assembly to the other end of the chassis. Loop the belt onto the pulley and insert the assembly between the Inside and Outside Plates. This assembly should have its pulley facing opposite of the first assembly.

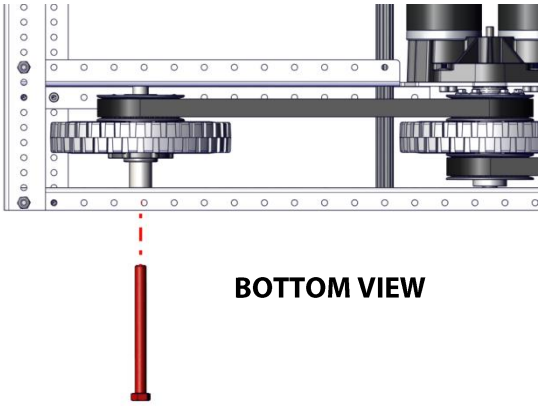


BOTTOM VIEW

Step 24: For the belt runs that are closest to the Inside Plate, the Short Axle Spacer (am-1306) will be closest to the Inside Plate. The Long Axle Spacer (am-1307) will be closest to the Outside Plate.

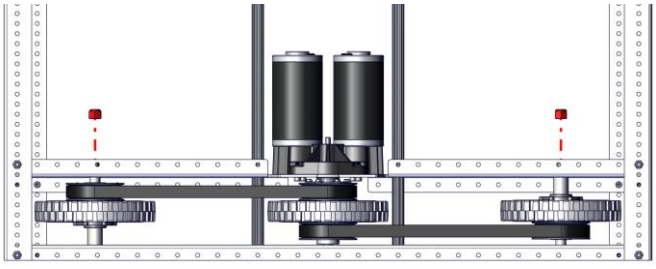


Step 25: Slide a ⅜" axle bolt (am-1297) through the spacers and wheel assembly, with the head of the bolt on the outside of the chassis.



BOTTOM VIEW

Step 26: Install one ⅜-16 Nylock Nut (am-1054) on each Axle Bolt. Tighten the bolt and nut until the spacers just begin to touch Inside and Outside Plates. The wheels should still easily turn, and the axle bolts should be able to spin with a light turn of a wrench.



BOTTOM VIEW

Step 27: Repeat steps 19 through 26 to install wheels on other side of chassis.