

Open Source Rover: Wheel Assembly Instructions

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1 Machining/Fabrication

1.1 Wheel Drilling

Parts/Tools Necessary

Item	Ref	Qty	Image	Item	Ref	Qty	Image
Traxxas Wheels	S30	6		Center/Starter Drill			
Hand Drill/Drill Press				Drill #23			

Drill holes in the wheels indicated by Figure 1 using the center drill and drill # 23¹. The important dimension is that the two holes are as close to 0.770 in apart as possible. We found that the shown geometry allowed us to get the holes as straight in as possible. Normally for these through holes you would use drill #25, but in order to give a little extra tolerance we recommend a few steps up from that, something around drill #23. Test the holes with the 4mm Clamping Hub **S14** to make sure the holes align as shown in 1. If not you can file the holes out slightly in the direction necessary or attempt to re-drill them depending on how close. Repeat this for all 6 of the wheels. .

¹The wheel is meant to normally mount using one bolt through the middle of the rim. This will not work as the rover sees very high torque at the wheel and this will be hard to attach to any part with only one bolt and have the wheel not slip. Because of that we will drill two holes on either side to mount to the motor hub clamp as shown in Figure 1



Figure 1: Match drilling the wheels

1.2 Clamping hub cutting

Parts/Tools Necessary

Item	Ref	Qty	Image	Item	Ref	Qty	Image
4mm Circular Clamping Hub	S14	4		Metal Hacksaw or Bandsaw	N/A	N/A	
Vice Clamp or C clamps	N/A	N/A					

The clamping hub **S14** are used to attach the motor shaft to the wheel rim. Band saw or hand saw down the channel already made in the clamping hub **S14**, continuing down until there is around 0.08 in before hitting the wall. This dimension does not need to be very precise, just make sure not to go too thin. Use the drawing 2 to eyeball how deep through the part you should go. Repeat for all quantity (6) of the 4mm Clamping hubs **S14**²

²This system sees a very high amount of torque. The current design of this clamping hub has too much metal and doesn't deform around the motor shaft enough to grab and hold against such high torque. If we remove enough of that metal when you clamp on the screw it will cause the whole piece to deform around the motor shaft and hold it tighter

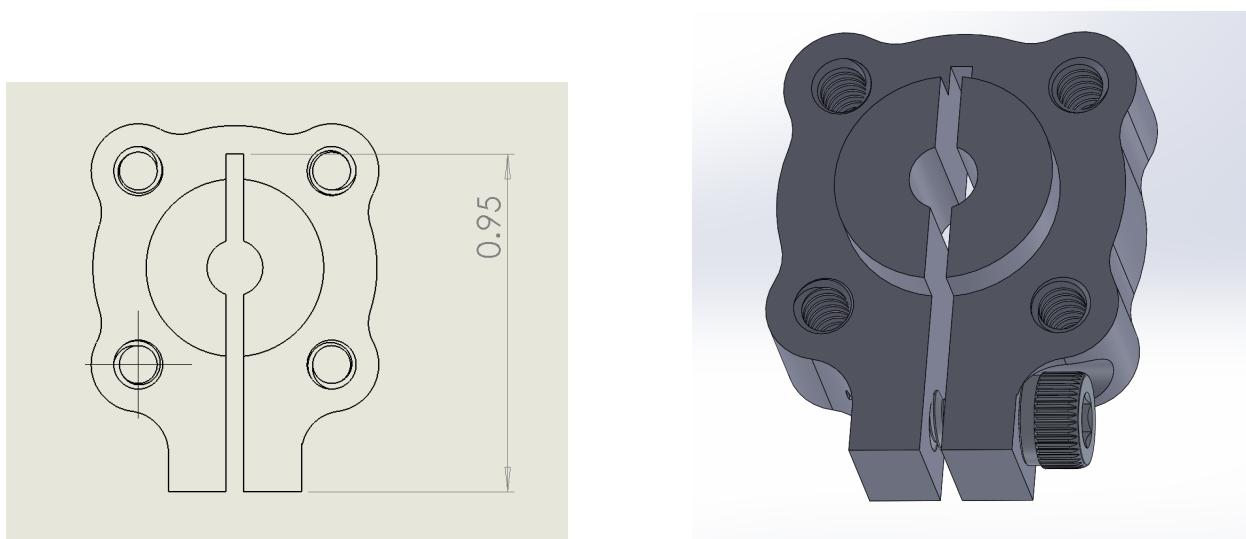


Figure 2: Hub Cutting Dimensions

2 Mechanical/Structural Assembly

2.1 Base Wheel

Next we will build the wheel assemblies, which are divided into the middle wheels and corner wheel assemblies. The first part will be the same for all 6, then built upon for 4 more to make the corner wheels.

Parts/Tools Necessary

Item	Ref	Qty	Image	Item	Ref	Qty	Image
3 Inch Channel	S2	6		Gearmotor w/relative Encoder	E5	6	
4mm Circular Clamping Hub	S14A	6		6-32 x 1/4 Button head Screw	B1	24	
25mm Clamping Hub	S25	6		6-32 x 1.25 Button head Screw	B7	12	
Traxxas Wheels	S30A	6		Allen Key set	N/A	1	
Loctite 2 part Epoxy	S34	1		5/16 Wrench	N/A	1	

1. **Motor Mount:** Start by taking motor **E5**, clamping mount **S25**, 3 inch channel **S2**, and screws **B1** to assemble the motor into the channel as shown in Figure 3. Make sure to slide the motor all the way up to the top of the gearbox in the clamping hub.
2. **Clamping Hub attachment/Apply Loctite Epoxy:** Now take the modified 4mm clamping hub **S14A** and clamp it around the motor shaft as shown. We recommend using Loctite 2 part Epoxy **S34** to to the motor shaft and clamping hub at their interface³

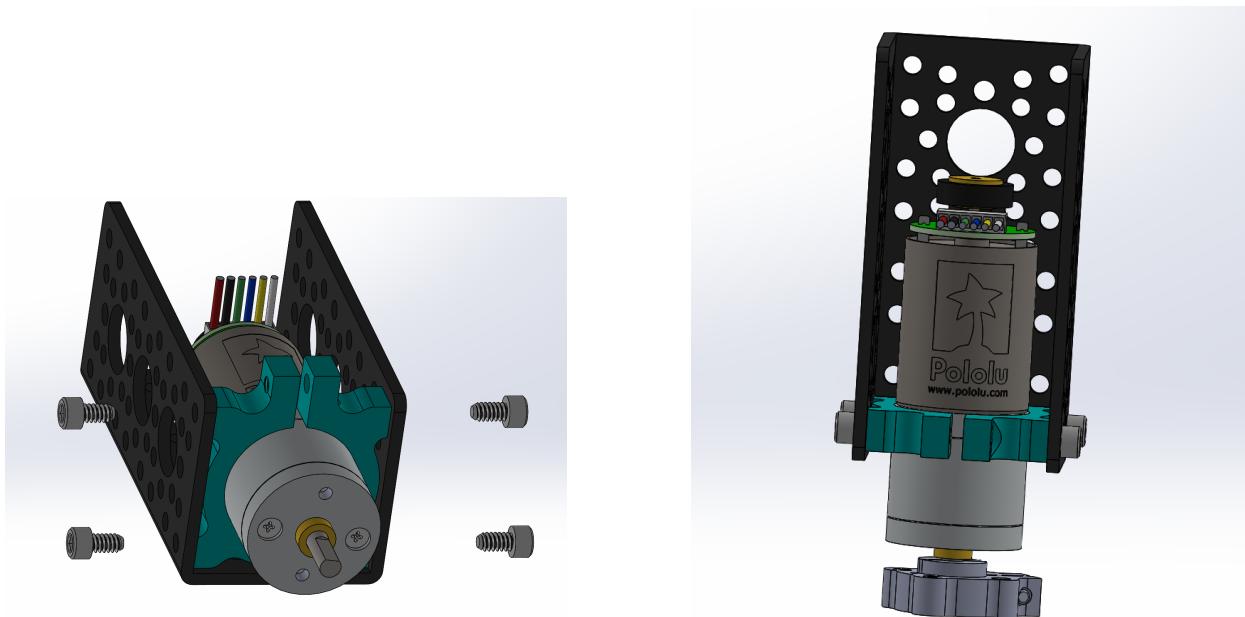


Figure 3: Wheel Step 1

3. **Attaching the Wheel:** Take the wheels **S30A** and **B7**⁴ using the holes drilled into the wheel rim earlier attach the wheel to the clamping hub around the motor shaft.

³This will help hold the high torque of the system and keep from slipping, but it means that your motor will have the clamping hub permanently attached onto it.

⁴This screw might need to be a shorter one, it will depend on the depth of the rim on the Traxxas rim, which changes based on which wheel model you get



Figure 4: Wheel Step 2

With that the base wheel assembly should be done, repeat this exact process for all 6 of the wheels.

2.2 Corner Wheels

Now we need to make the four corner wheels, building up off of what was made for the base wheel assemblies. We need to extend the attachment point upwards for the corner wheel, it is important that the axes of the corner motor is directly above the middle of the wheel, so we will need to extend our mechanical attachment to make this possible.

Parts/Tools Necessary

Item	Ref	Qty	Image	Item	Ref	Qty	Image
3 Inch Channel	S2	4		#6-32 x 1/4 Screw	B1	76	
4.5 Inch Channel	S4	4		#6-32 x 1/2 Screw	B3	8	
Channel Connector	S6	16		6-32 x 3/8 Threaded Standoff	T3	4	
0.25 Circular Clamping Hub	S12	4		Allen Key Set	N/A	1	
48 Tooth Plain Bore Gear	S26	4		5/16 Wrench	N/A	1	
Loctite	S36						

1. **Channel Attachments 1:** Take the 3 inch channel **S2**, two channel connectors **S6**, and screws **B1** to attach the channels as shown.

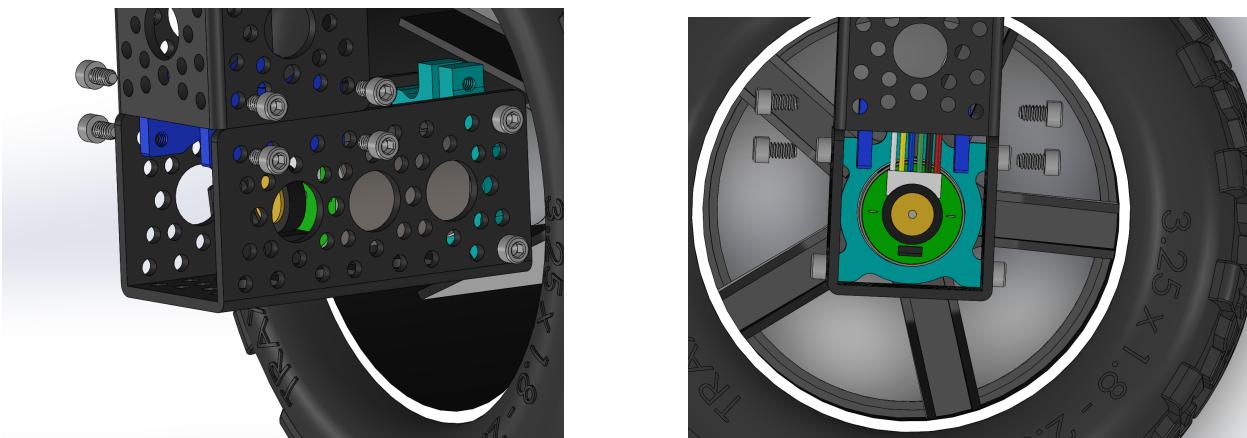


Figure 5: Corner Wheel Step 1

2. **Channel Attachments 2:** Take the 4.5 inch channel **S4**, two channel connectors **S6**, and screws **B1** to attach the channels as shown.

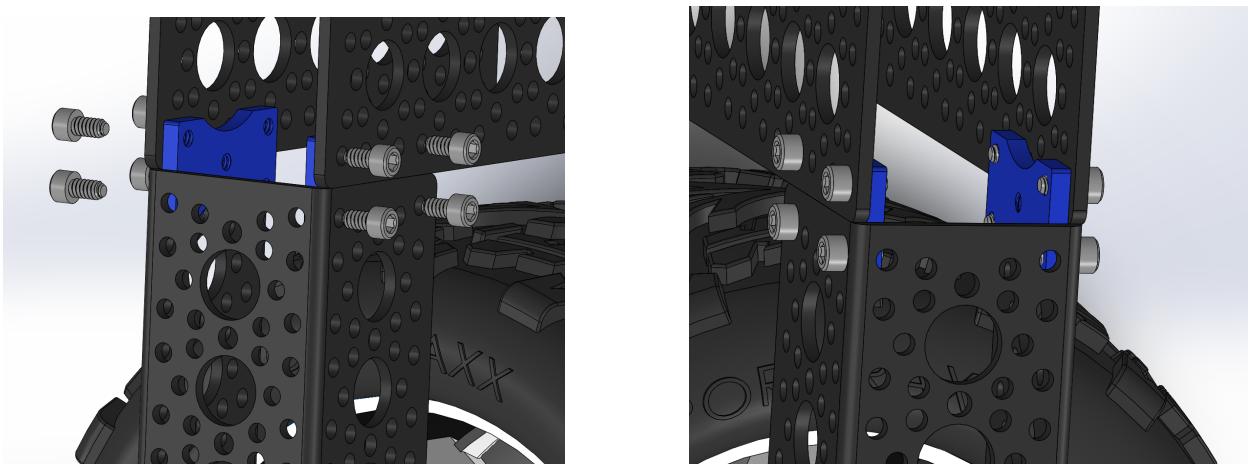


Figure 6: Corner Wheel Step 2

3. D-Clamping Hub Attachment: Using screws **B1** attach the 0.25 Inch Clamping hub **S12** and the plane bore gear **S26** to the channel.

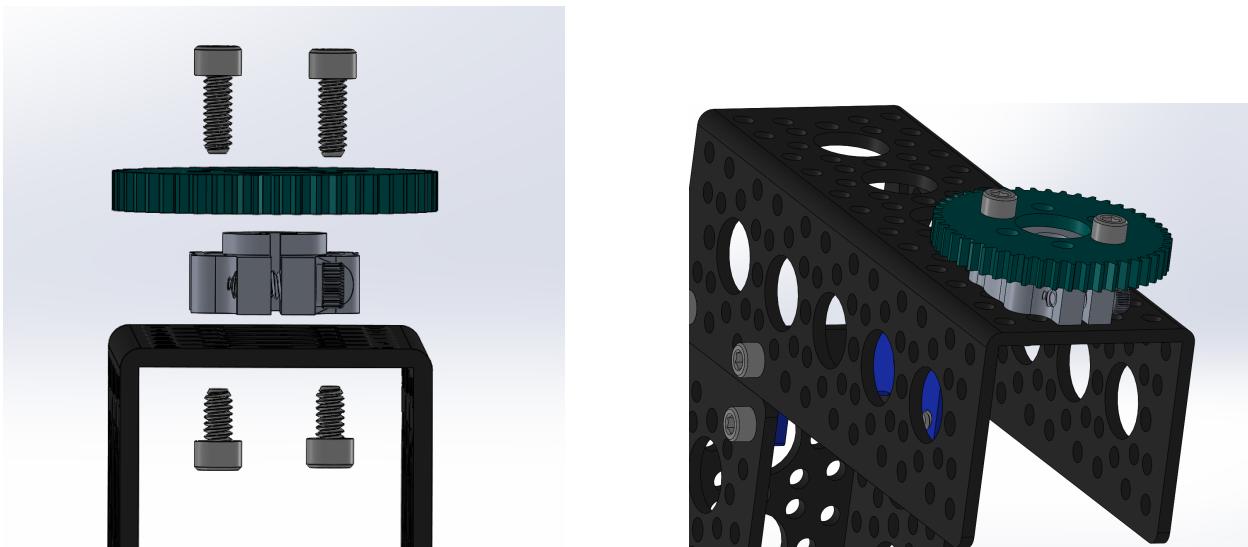


Figure 7: Corner Wheel Step 3

4. Hard stop mount In order to keep the wheels from spinning too far in either direction we install a physical hard stop in the system. Using standoff **T3** and screw **B1** and Loctite **Need number for Loctite** attach the hard stop to the channel. Make sure to use the correct mounting hole or it will not line up with the encoder mount/hard stops.

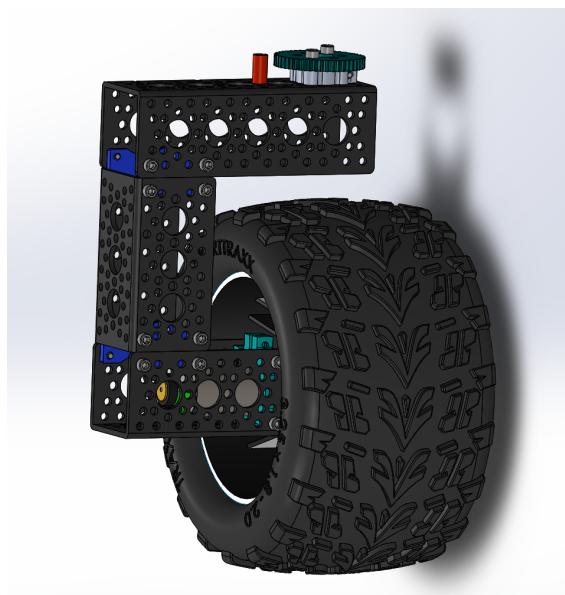
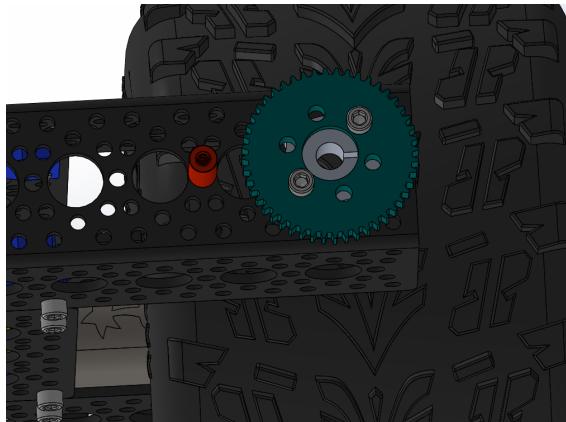


Figure 8: Corner Wheel Step 3