



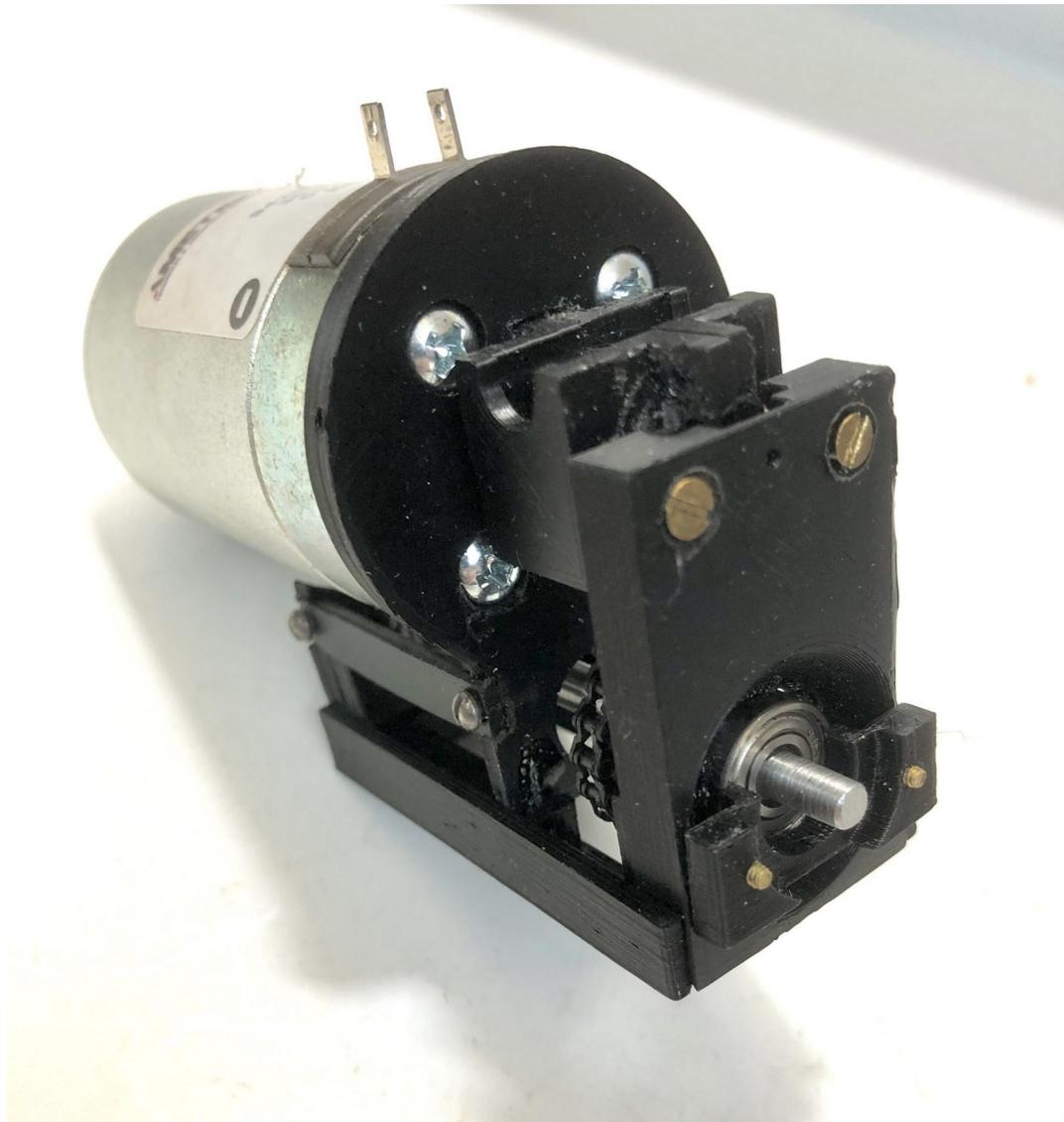
All Nation Road Engine Power Drive Train

Description, Parts List & Assembly



Manufacturer Of The Famous All-Nation "O" Scale Equipment

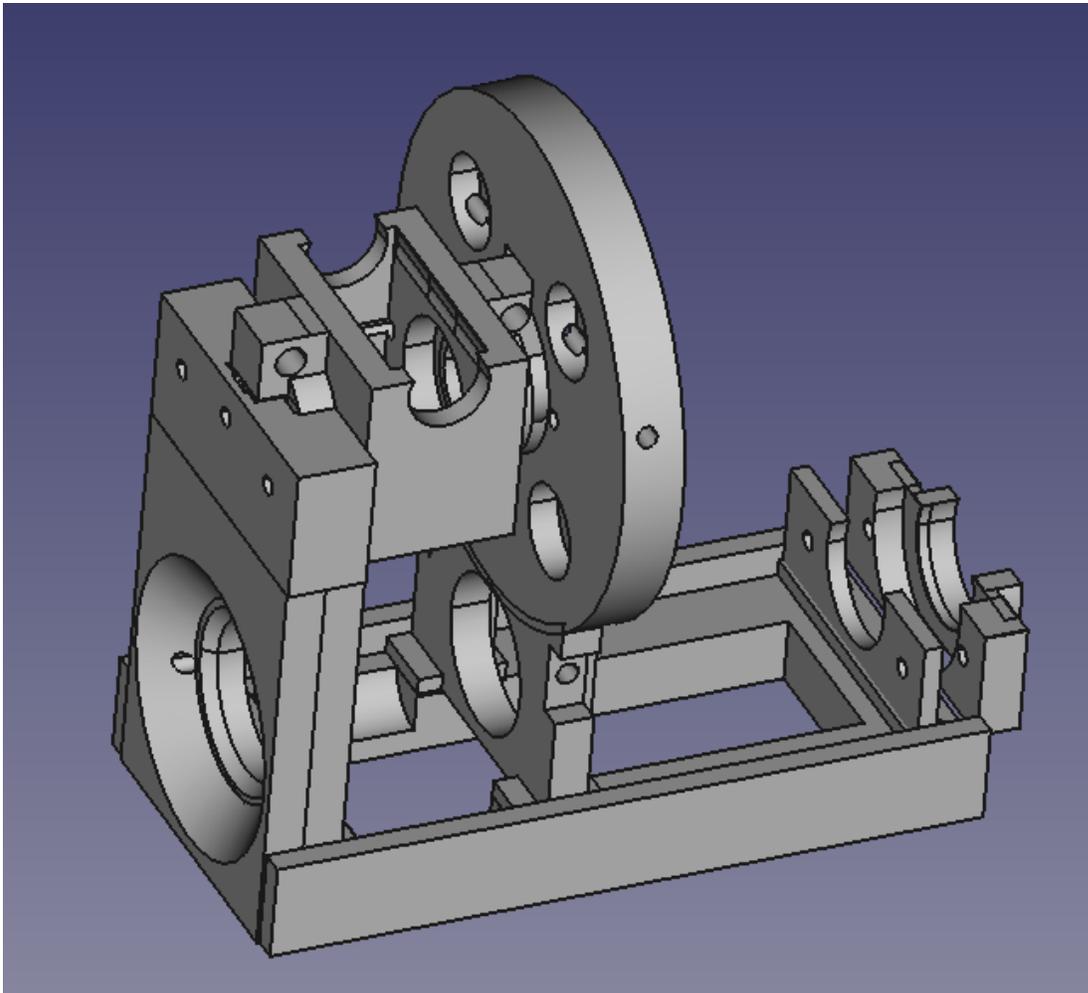
The implementation of this mechanism incorporates 2 sprockets and 1 chain drive powered by a 30 vdc motor measuring 64mm in length and 40 mm in diameter. The overall length of the mechanism is approximately 112 mm.



The following description will be about the transmission structure as the motor is generic and superfluous to this discussion. Other motors will work with the appropriate mounting plate and hole alignment.

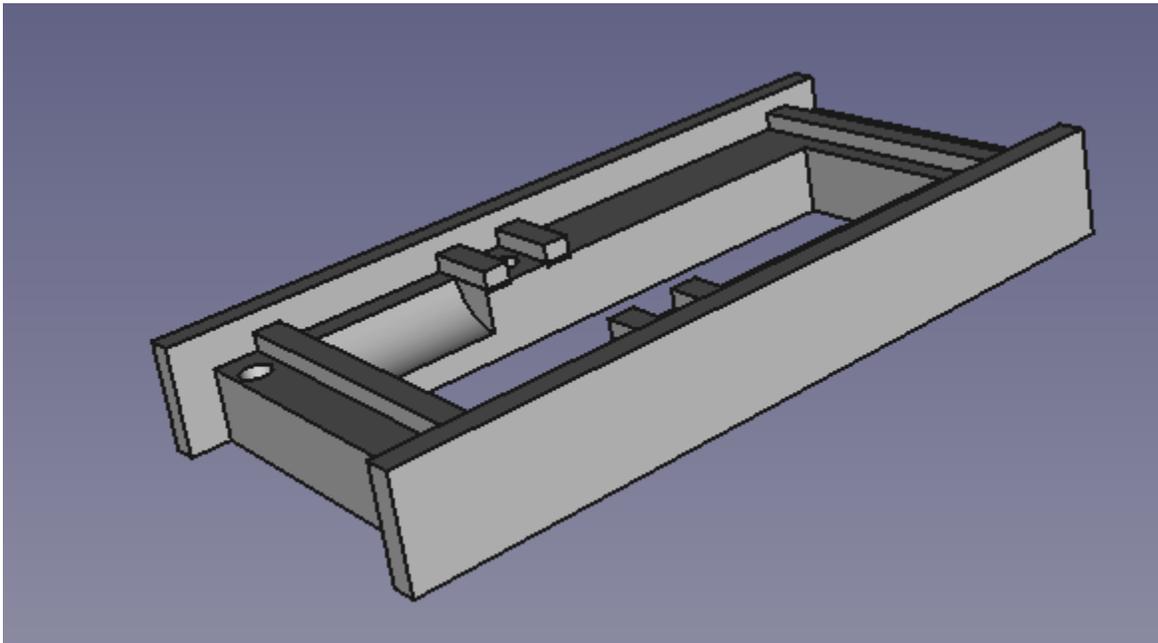
The power output is smooth through the transition of 12 sprocket teeth on the motor shaft and 18 teeth on the main drive shaft for a 2:3 ratio and provides the option of powering a single truck or dual power trucks on a given locomotive.

The following is a perspective view of the parts that make up the mechanism in the CAD program.

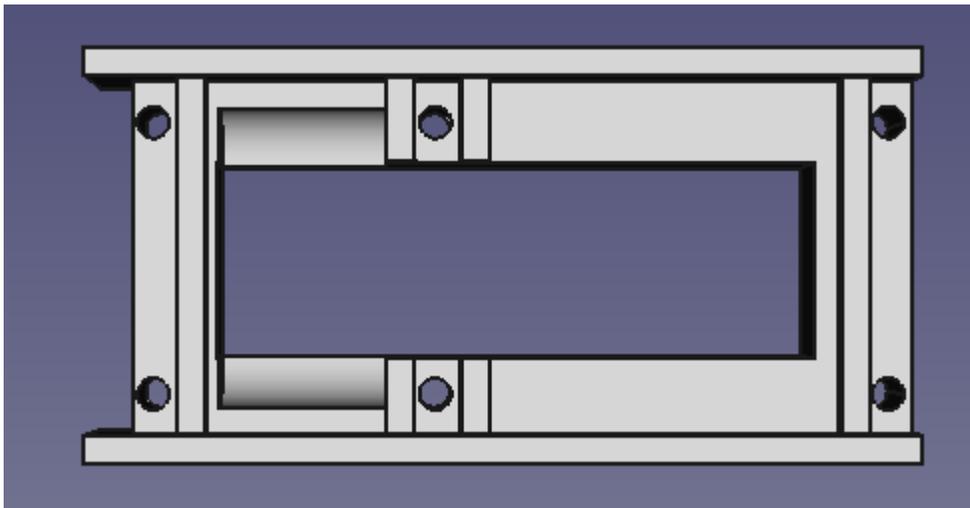


Rather than simply listing all the parts, it is easier to visually see and identify each component with pictures.

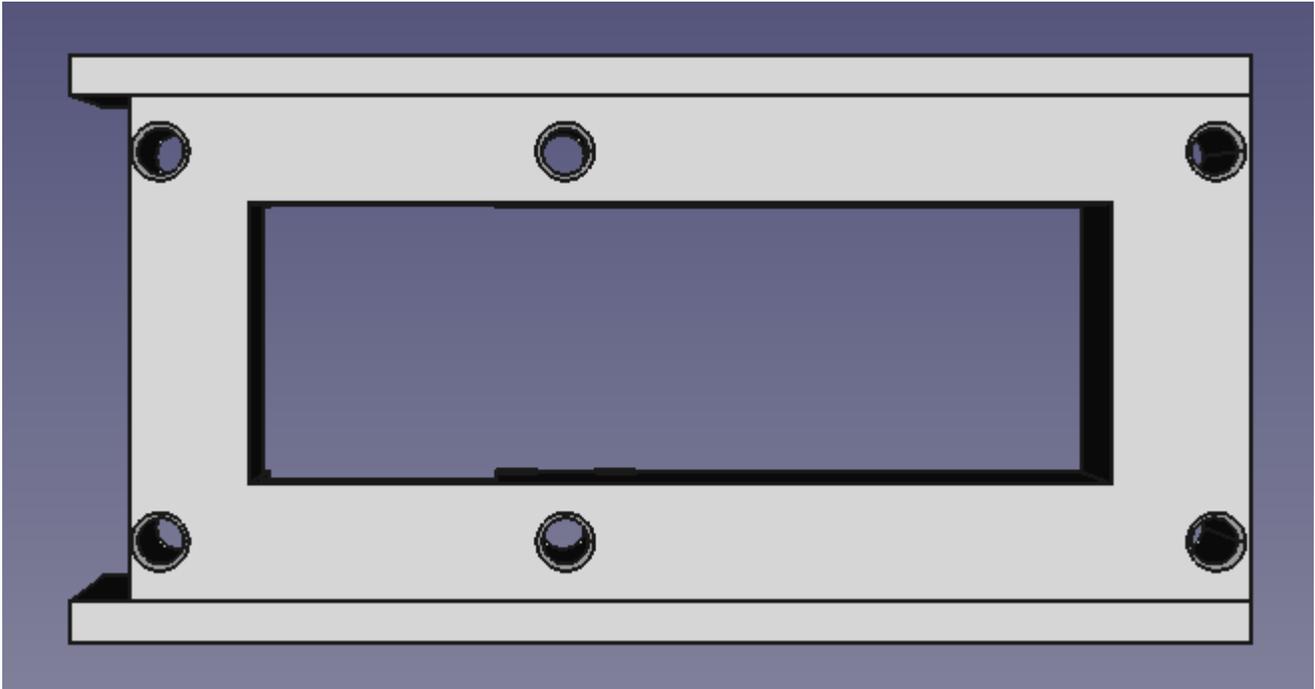
The first piece is the side view of the base.



A top down view of the base illustrates positioning of the vertical components that mount to the base.

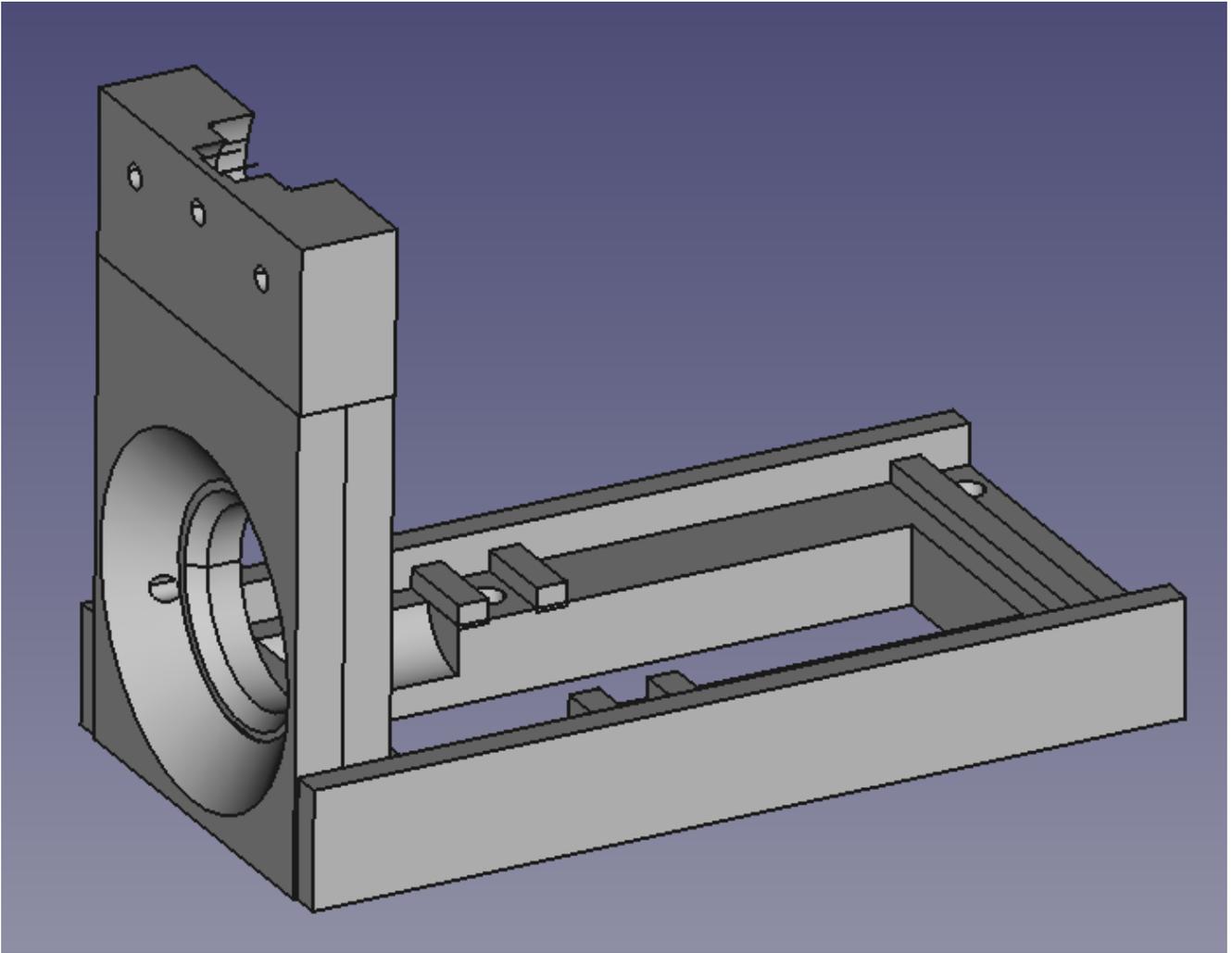


Finally, a view from the bottom showing the 6 clearance holes for the 2-56 x 5/16" Flat Head machine screws. The holes can be counter sunk from the bottom if it is desired them to be flush.

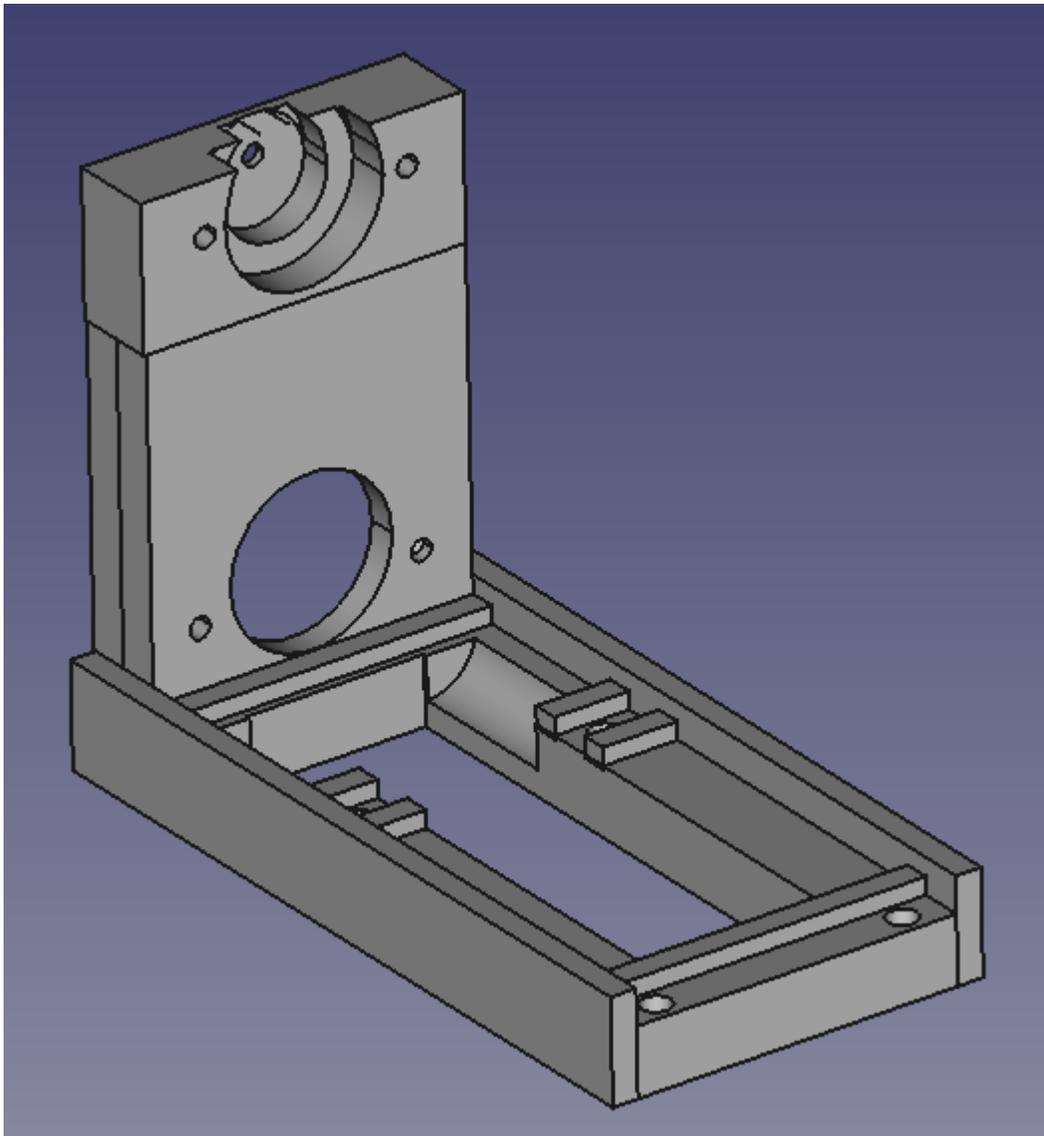


The main structural members will be displayed next.

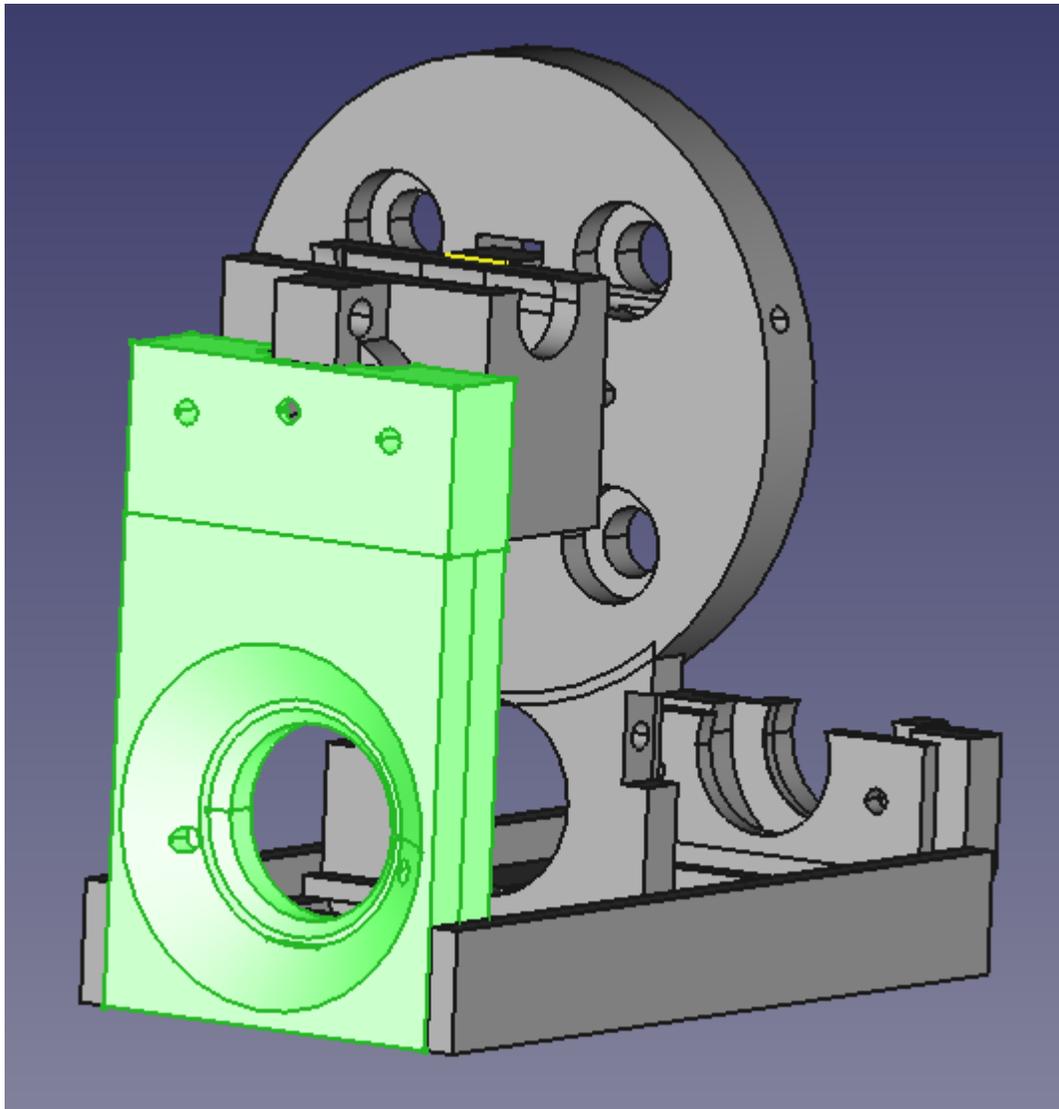
The next 2 graphics are for clarity positioning the front plate on the base. The top down angular view illustrates the cut outs for the upper bearing sprocket housing.



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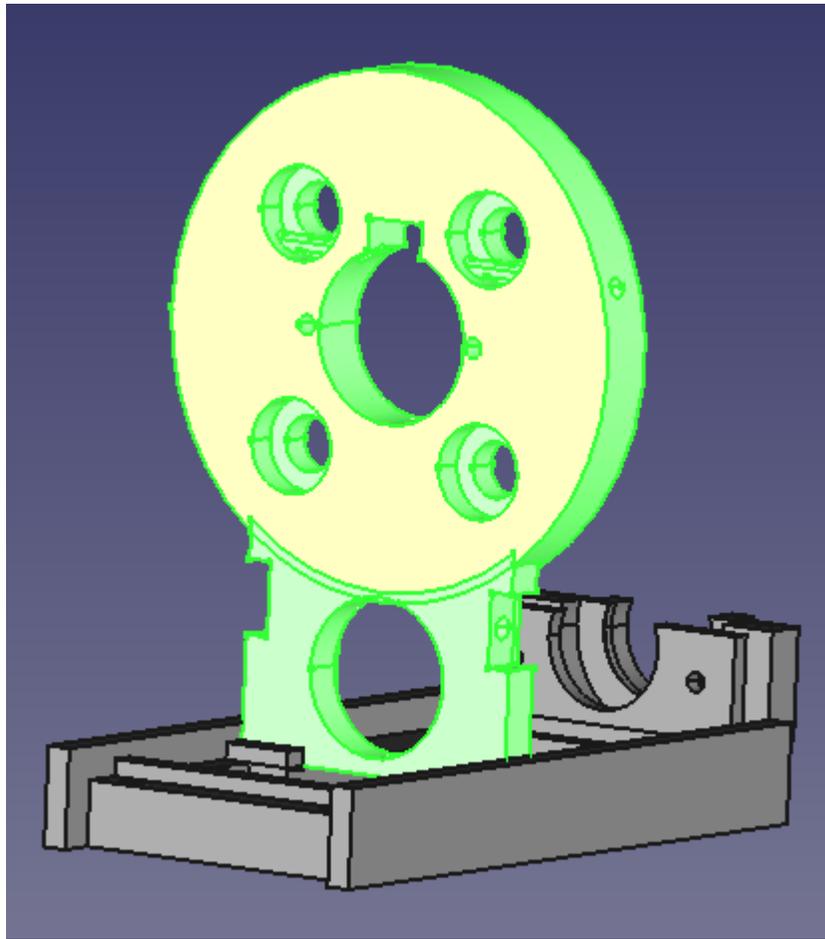


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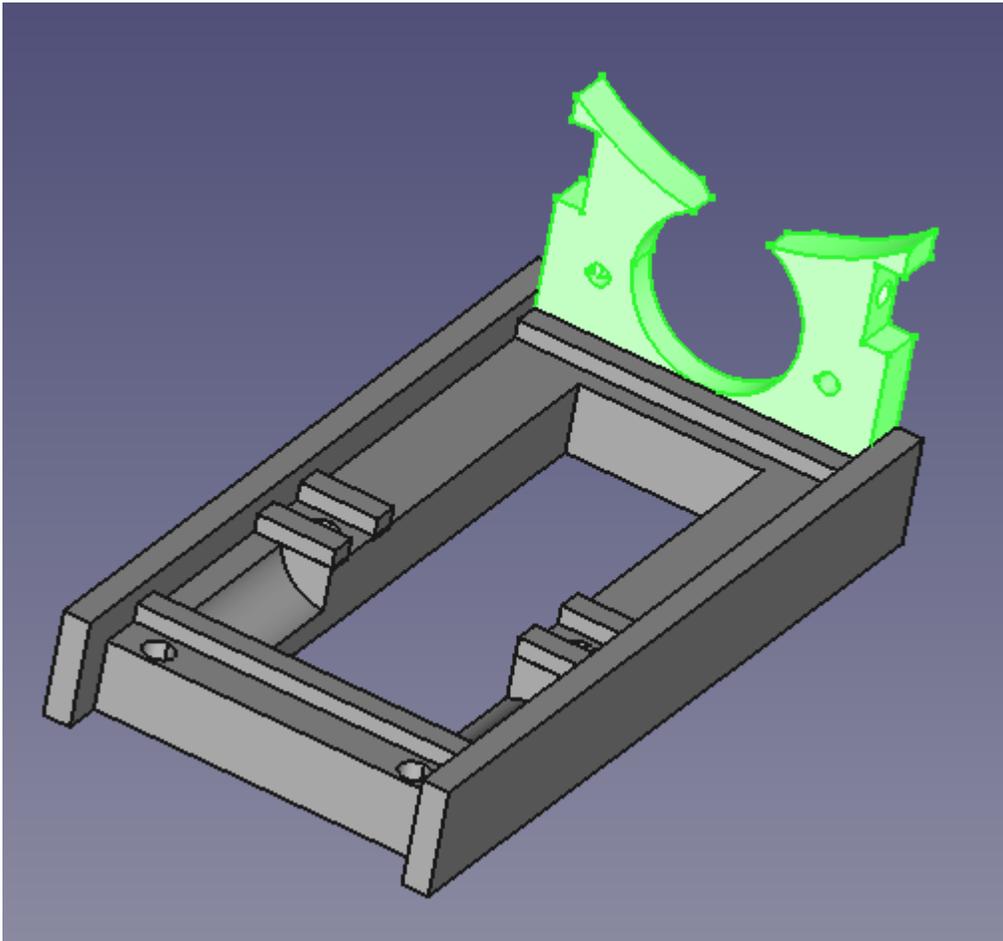
The next part is the middle plate that mounts once again perpendicular to the base plate.

Like the front plate, the middle plate must be tapped for the 2-56 screws and positioned in the track guides. Starting from the bottom, the large cylindrical hole is just a pass through opening from the main drive shaft. On either side of the opening are 2 more holes on each side that must be tapped for mounting the stabilizing side bars with 2-56 x 5/16" flat head machine screws of which there are 4. Side bars attach the middle and back plates to maintain stability and squareness.



The 4 primary motor mounting has clearance holes for mounting the motor. There are four (4) 6-32 screws used to mount the motor.

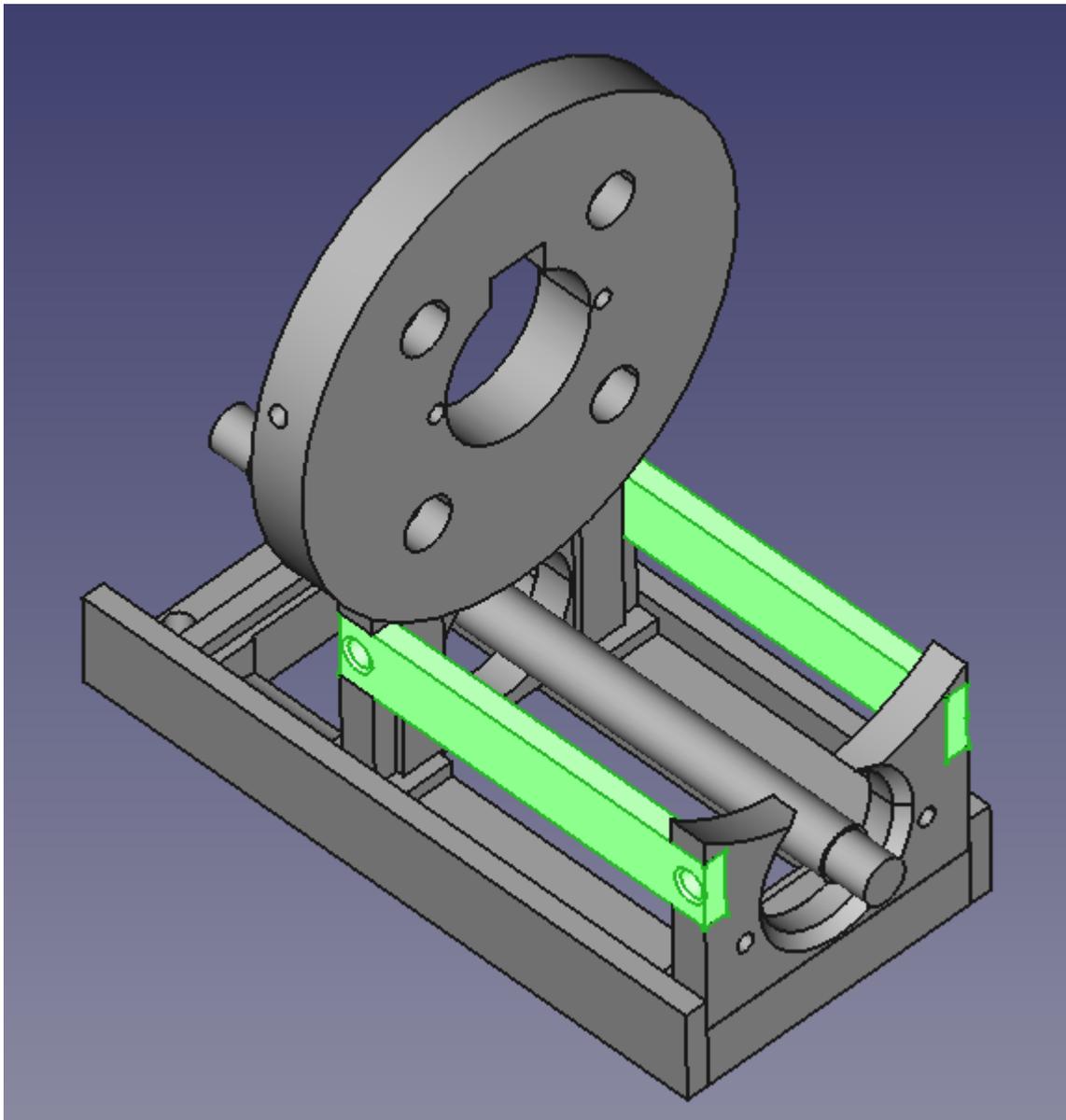
The last component known as the back plate has a cradle rest for the motor end and is only a supporting member, not a motor mount point.



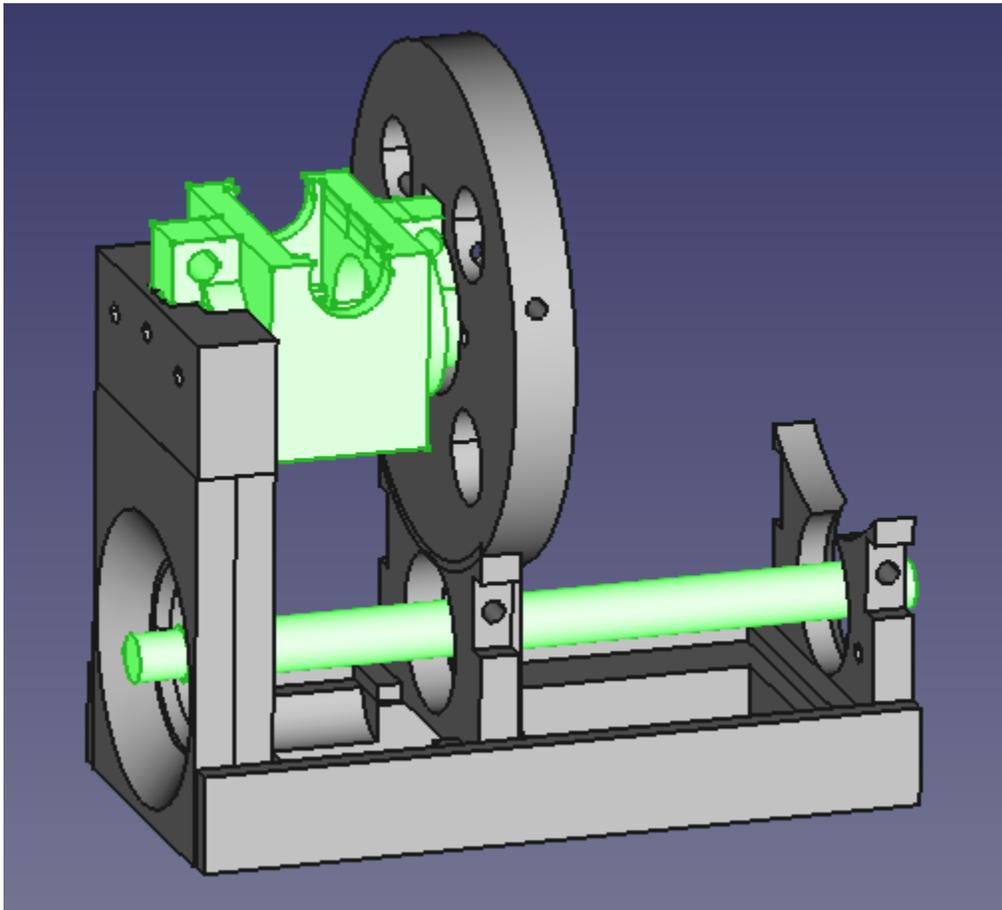
The large cylindrical hole takes the 2nd main drive shaft bearing and is a press fit. The holes on the bottom must also be tapped for the 2-56 mounting screws and this piece sits on top of the base plate. Holes for mounting the side bars must also be tapped for a 2-56 screw.

The following graphic shows the Side Bars attached to the middle and back plates.

The holes on the side bars can be chamfered slightly for counter sinking the 2-56 screws.

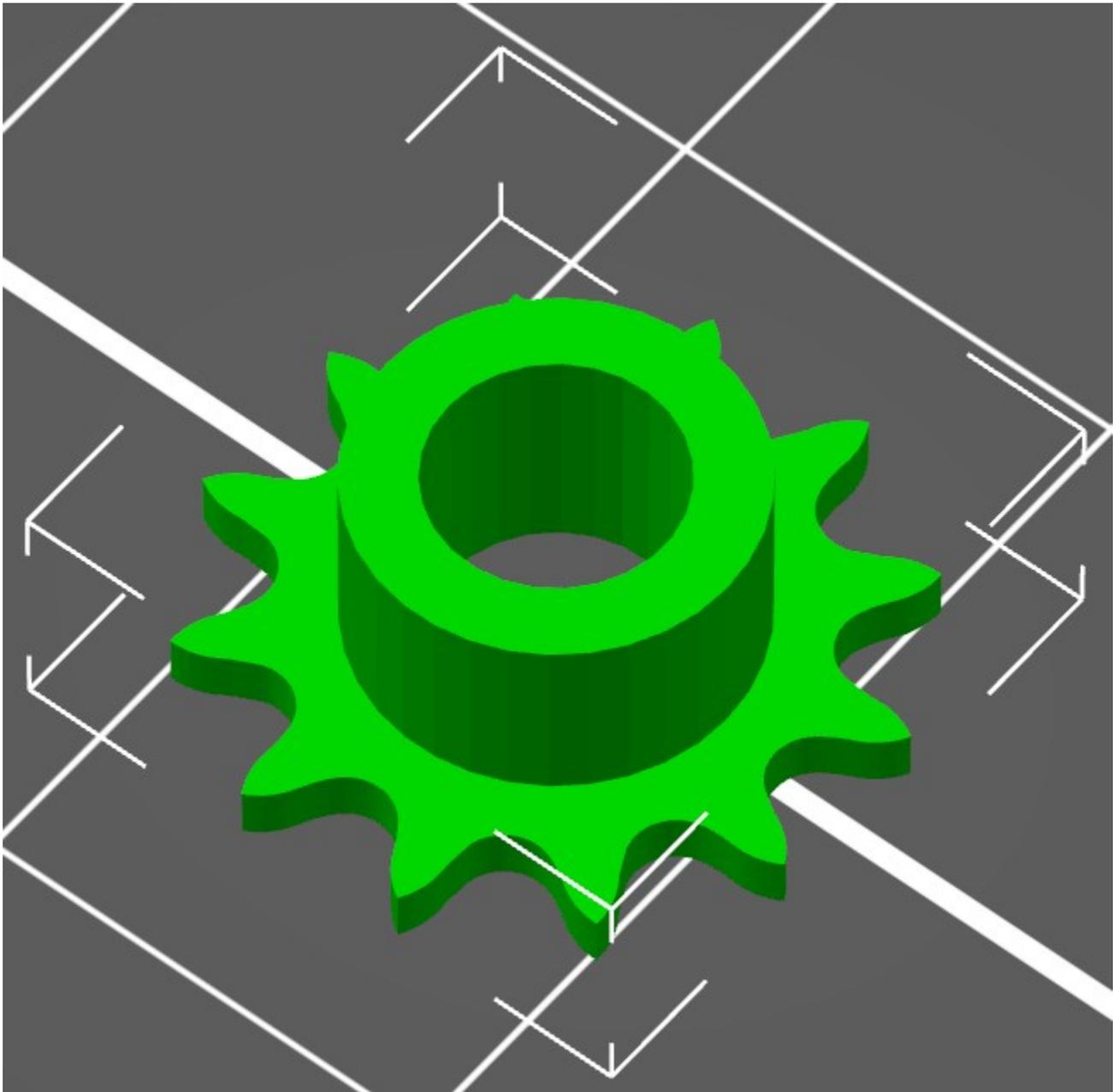


The next phase of discussion involves the transmission components and drive train process.



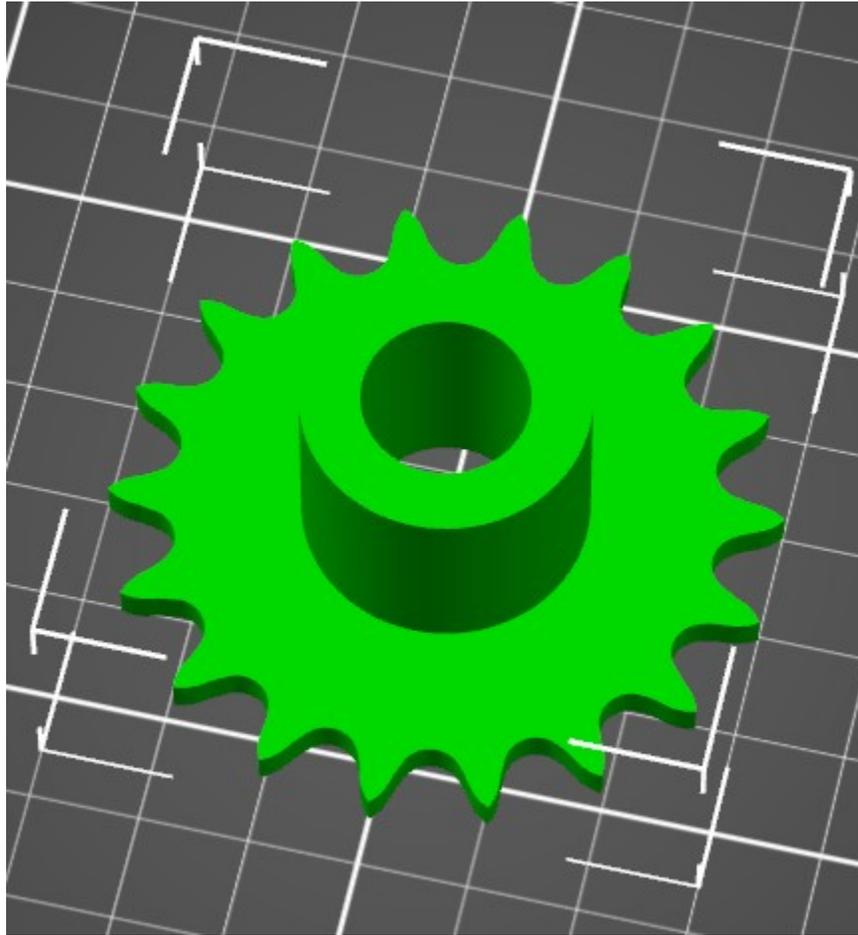
As pictured above, the drive shaft position is shown without the installation of the bearings. What follows next are the installation of the sprockets. The main drive shaft has a sprocket containing 18 teeth and an ID of 3/16". The position on the drive shaft is such that the diameter of the shaft is 3/16" as is the ID of the main drive shaft bearings. The ends of the main drive shafts are machined to accommodate the use of universal joints. Larger U-joints can be used straight on a 3/16" shaft, but in this case we opted to go for the smaller shorter in length universal.

The sprocket housing contains 2 bearings for the motor shaft and the sprocket located between the bearings. This sprocket contains a total of 12 teeth press fit onto the shaft and later CA glued onto the shaft once alignments with testing have been done during steps of the assembly.



The transmission utilizes 1 ladder chain such that the ratios on the sprockets provision a smooth transmission of rotational power to the main drive shaft from extremely low operating speeds to scale speeds provided a good power supply is used to run the motor.

The sprocket on the main drive shaft has 18 teeth.

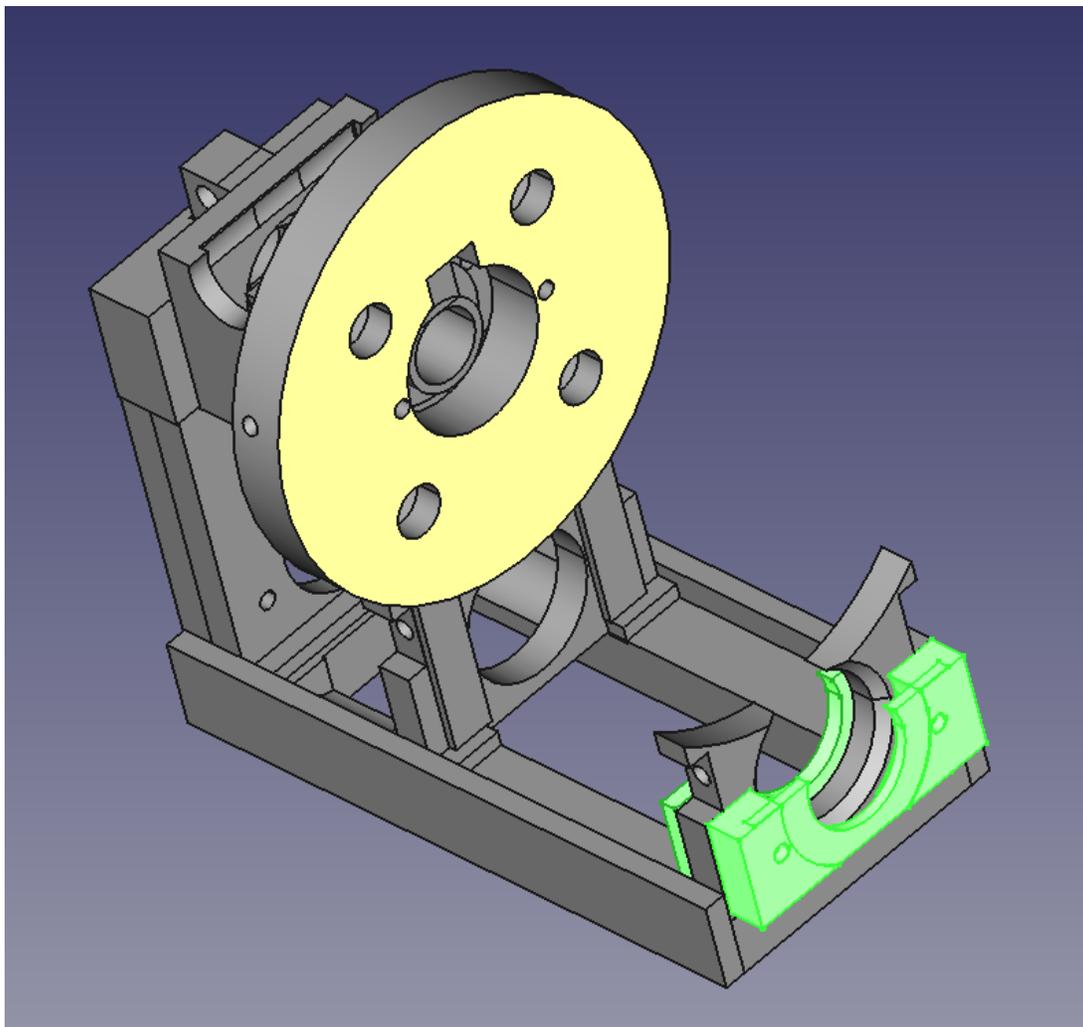


This summary completes the description of the transmission components. It is recommended to manually assemble the mechanism and test it to make sure nothing is binding.

Given the design of this mechanism, the modeler can take prerogatives to modify or improve on certain aspects. For example, instead of gluing the sprockets on the shafts, the preference might be to pin them. In the case of the larger main drive shaft sprocket, drilling and tapping it for an 0-80 screw may insure that it does not slip on the shaft under load. There are always multiple paths to the same goal. Rather than using the u-joints fitted close to the outside of the main drive shaft bearings, to prevent any lengthy horizontal shifting, a shaft collar with a set screw could do the same task.

The modeler may also want to use a #50 drill bit to clean out the holes prior to tapping for the 2-56 screws as sometimes the depth needs to come clean. Be sure though, when drilling your work, to hold the fixture perfectly vertical and centered. All parts are ABS so they drill and tap nicely compared to PLA which tends to be gummy.

While the main drive shaft bearing can be cemented in place on the end plates, we also provide end caps with both ends secured with 1-72 machine screws. The diameter of the main drive shaft ends are approximately 3.95mm for a larger U-joint connection and 70mm in length.



PARTS LIST

- 1 30.3 vdc motor
- 1 6" chain
- 1 12-teeth sprocket motor shaft
- 1 18-teeth sprocket main drive shaft
- 2 Main drive shaft bearings
- 2 Motor shaft drive bearings #4073

Screws

- 2 2-56 x 1/2" Flat Head Screws
- 10 2-56 x 5/16 Flat Head Screws
- 4 1-72 x 1/2 Round Head Screws
- 4 6-32 x 3/8" Round Head Screws

3D Printed Parts

- Sprocket Housing
- 2 Side Bar
- 1 Motor Mount Middle Plate
- 2 Main Bearing Cover Caps
- 1 Front Plate
- 1 Base Plate
- 1 Back Plate