

The Wolverine Assembly Manual
Jeffrey Peisner

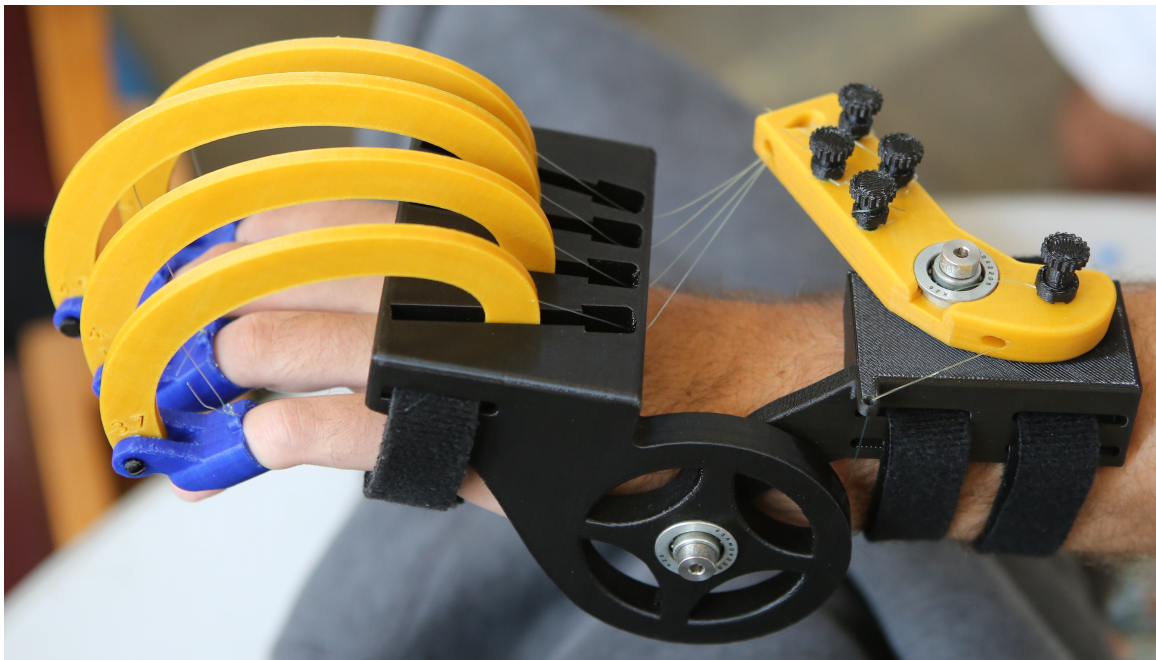


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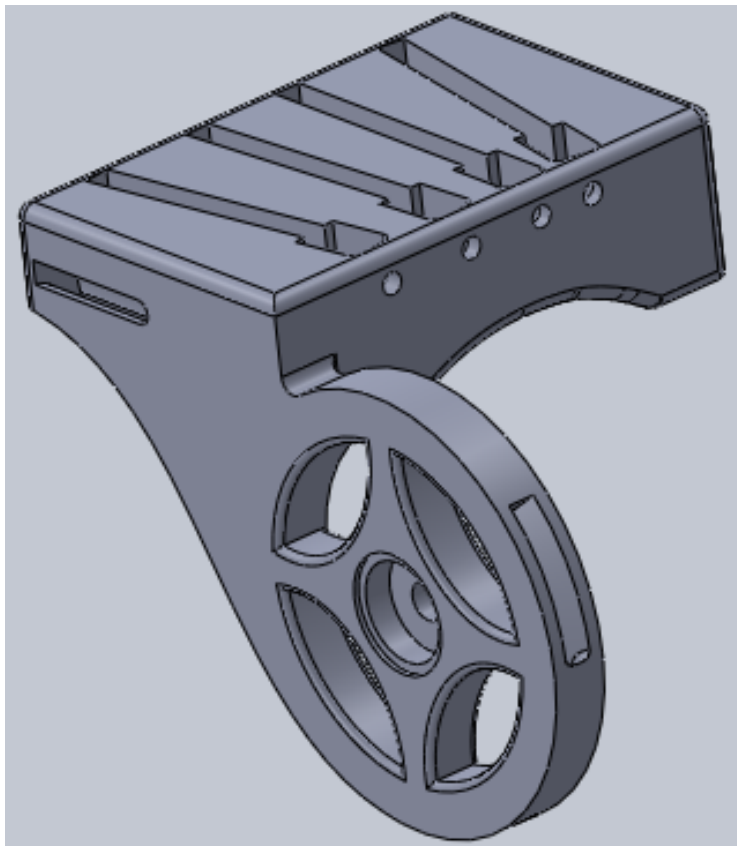
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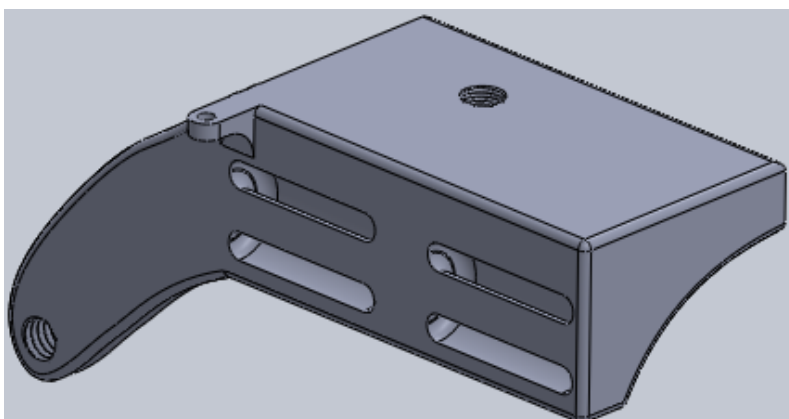
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3D Printed Parts List

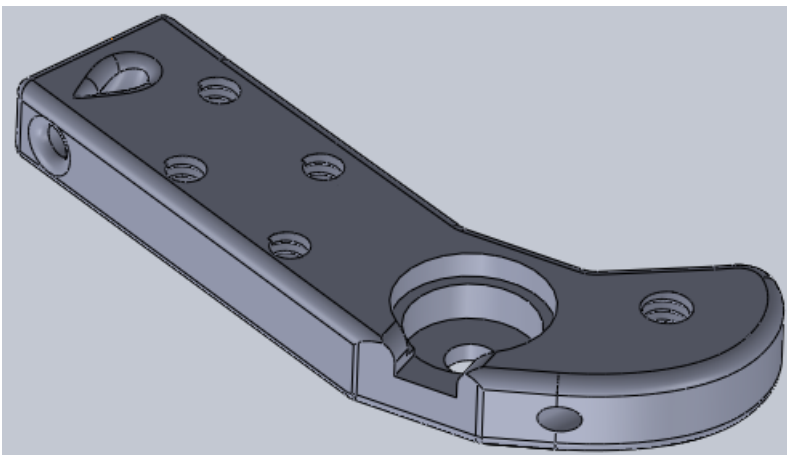
Hand:



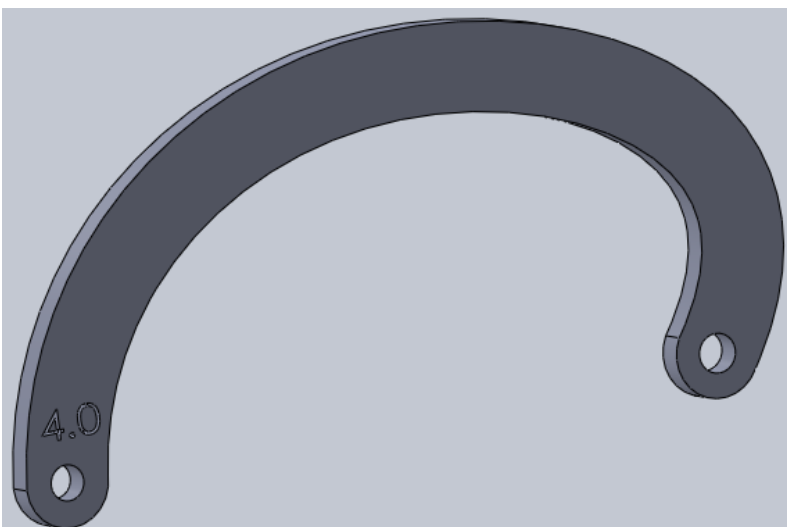
Forearm:



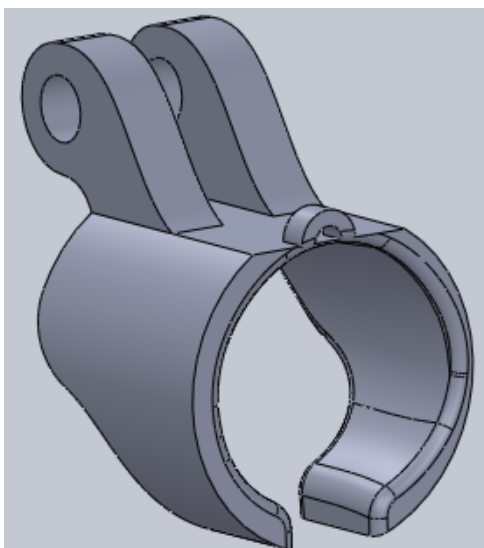
Lever:



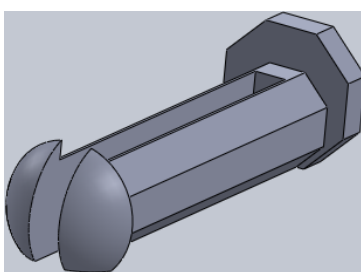
Flange:



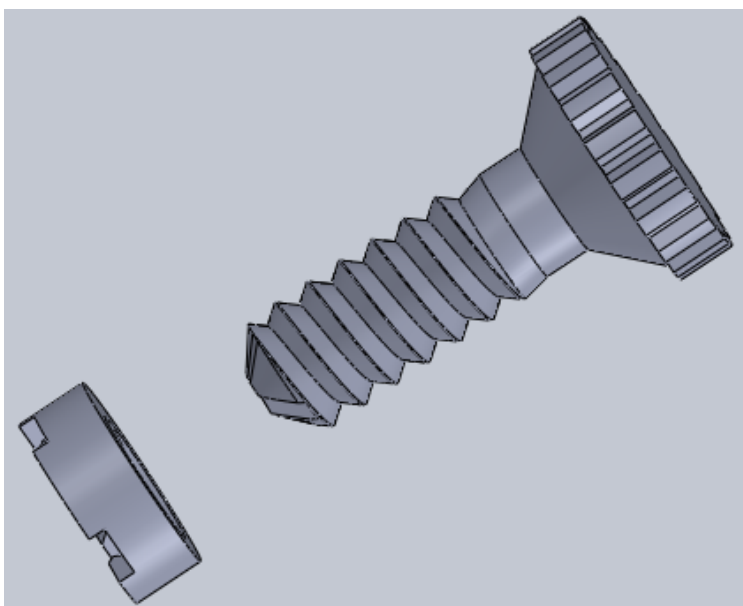
Finger:



Bolt:



Pin & Collar (There are two sizes—0.20" and 0.25" diameter):



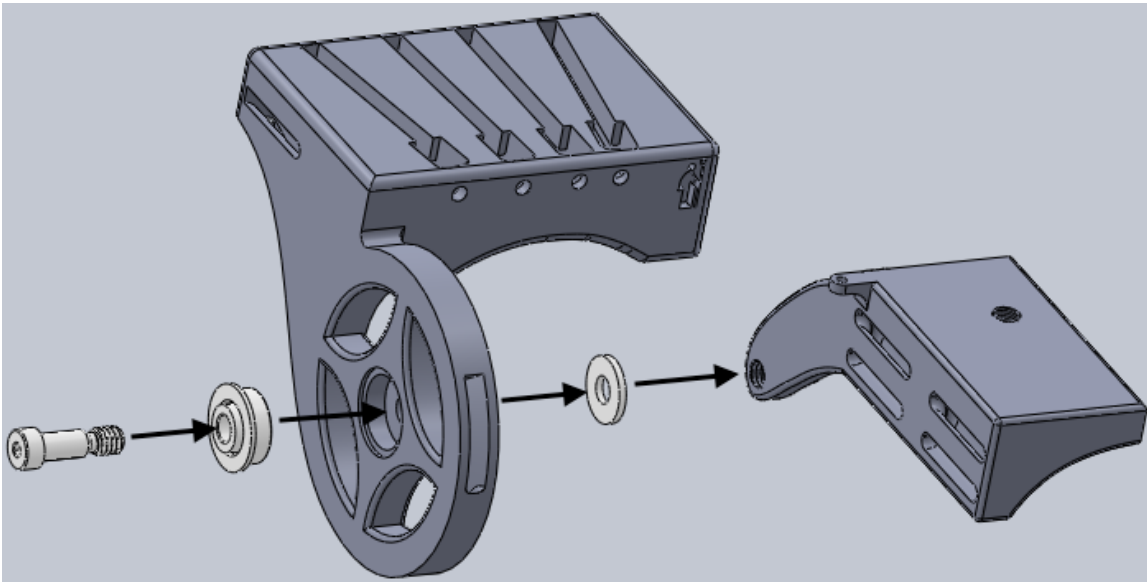
Non 3D Printed Parts List

1. 2x Steel Ball Bearing—Flanged open for 1/4" shaft diameter, 11/16" OD, 5/16" wide: <http://www.mcmaster.com/#6383k213/=y9k9bg>
2. 2x Stainless Steel Shoulder Screw with Same-Size Thread—1/4" Diameter x 1/2" Long Shoulder, 1/4"-20 Thread:
<http://www.mcmaster.com/#91273a302/=y9k556>
3. 18-8 Stainless Steel Dowel Pin—3/16" Diameter, 5/16" Length:
<http://www.mcmaster.com/#90145a502/=y9k7u7>
4. 2x 1/4" Screw Size Washer—0.26" ID, 0.625" OD:
<http://www.mcmaster.com/#90770a029/=ya2xt1>
5. Fishing line—Monofilament, at least 12lb test
6. Velcro or similar hook and loop strapping

Note: McMaster links are only recommendations. Same or similar hardware can be found elsewhere.

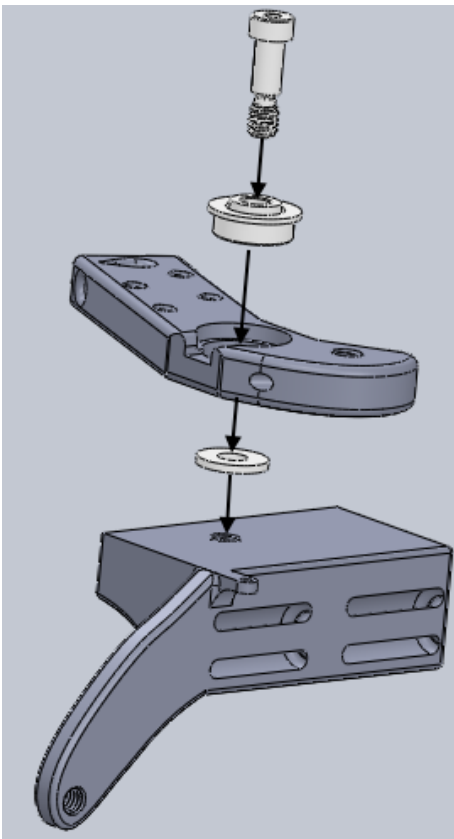
Assembly Instructions

Step 1: Attach Hand to Forearm with the Ball Bearing and Shoulder Screw



Make sure the ball bearing is firmly pressed in to the middle of the wheel before you put the shoulder screw in.

Step 2: Attach Lever to Forearm with the Ball Bearing and Shoulder Screw



Step 3: Sizing

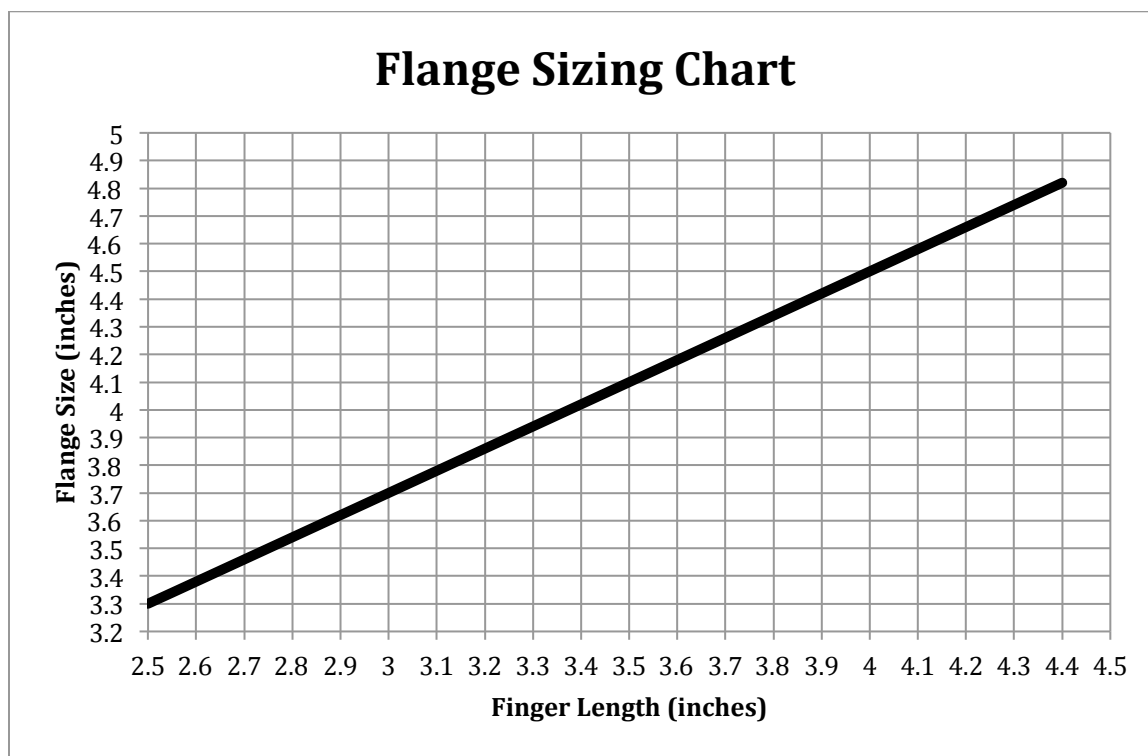
This is by far the trickiest part of putting the Wolverine together. The device will feel the most natural when the flanges and fingers are sized correctly to your hand.

Step 3a: Sizing the Fingers

We have yet to determine a proven method of sizing the fingers beyond guess and check. Our sizes range from 7.5-9.5 in 0.5 increments. Most fingers will fit these sizes. The finger piece should fit snugly in the middle phalanx of each finger. I have 0.25 increments and more sizes beyond the range on Thingiverse. Please contact me if you need a custom size.

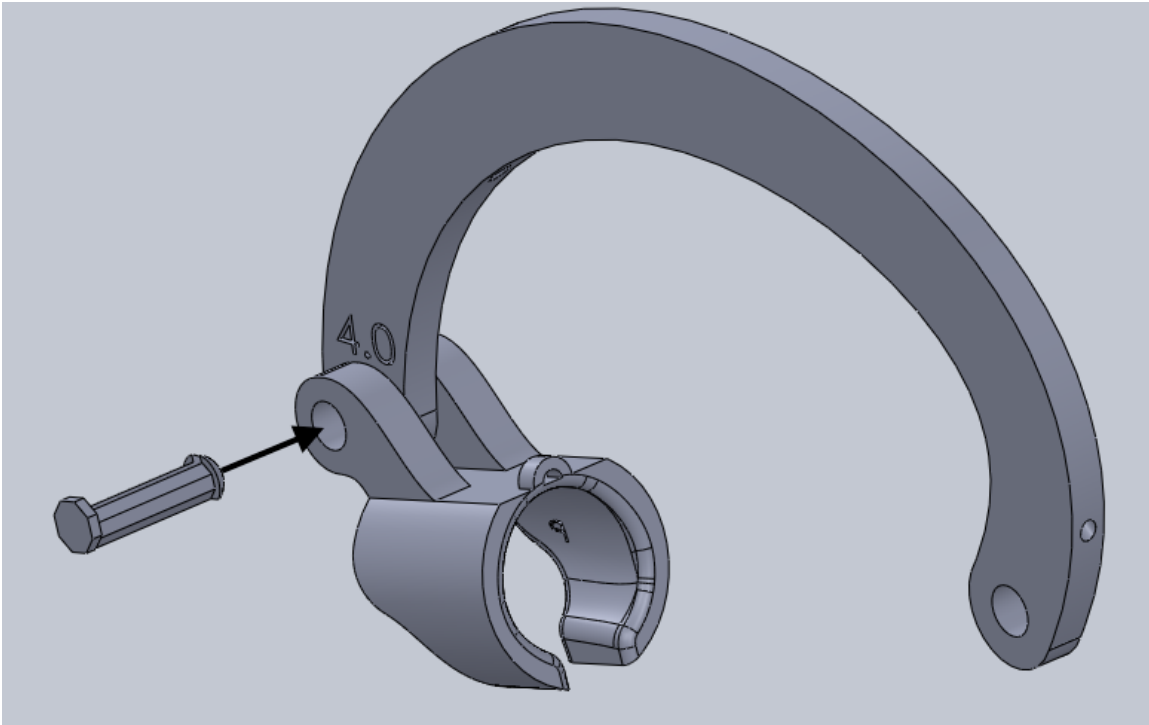
Step 3b: Sizing the Flanges

Measure the distance in inches from the base knuckle to the tip of each finger. See below to correlate each finger length to a flange size (distance from hole to hole):



This data was experimentally discovered, and there is room for error in sizing flanges to finger size. Please try on at least a whole size (0.1" increments) above and below what this chart says. I also have half sizes (0.05" increments) on my hard drive. Please contact me if you would like a specific size that is not on Thingiverse.

Step 4: Connecting the Fingers to the Flanges with a 3D printed bolt:



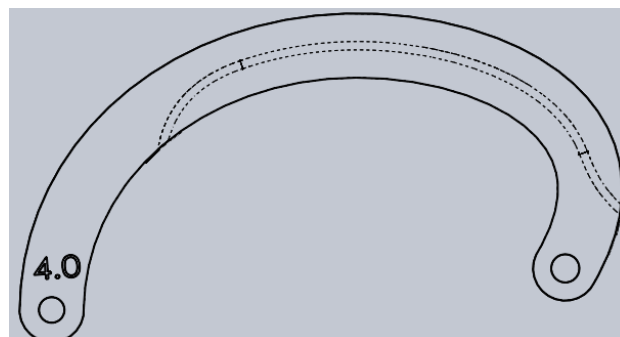
Make sure you connect it to the end of the flange that has its size etched into it.

Step 5: Tying the fishing line to the finger and threading it through:

Because we use fishing line, a special knot must be used. Fishing line does not hold well with every-day knots because it doesn't have enough friction to hold its form. However, it is because of this low friction that fishing line works very well for the Wolverine as it has to pass through each flange. Below is the simplest knot, a clinch knot, you can tie that will hold, but many more advanced knots can be used.

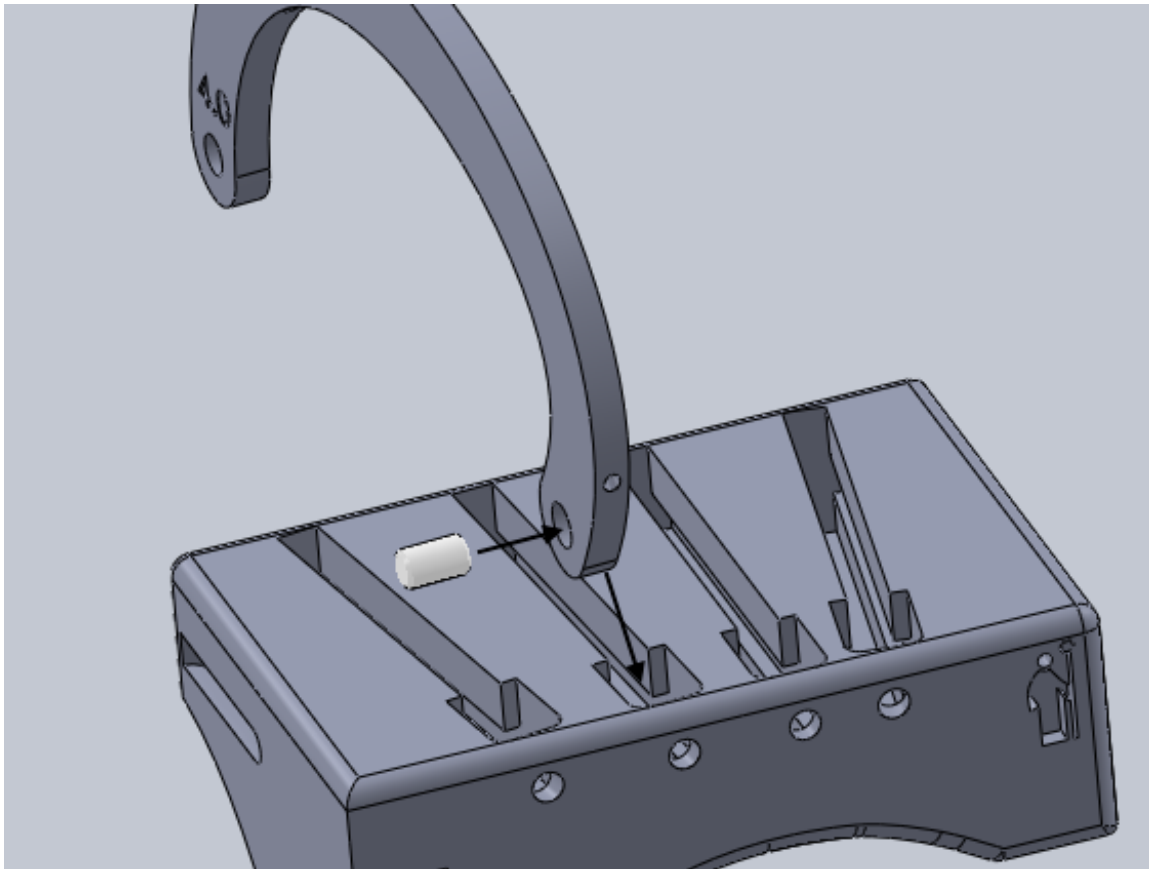
<http://www.instructables.com/id/How-To-Tie-a-Clinch-Knot-1/>

Tie this knot to the loop on each finger, and thread it through the tunnel inside each flange to the back. Make sure you have at least 8" of fishing line after it has threaded through the flange.

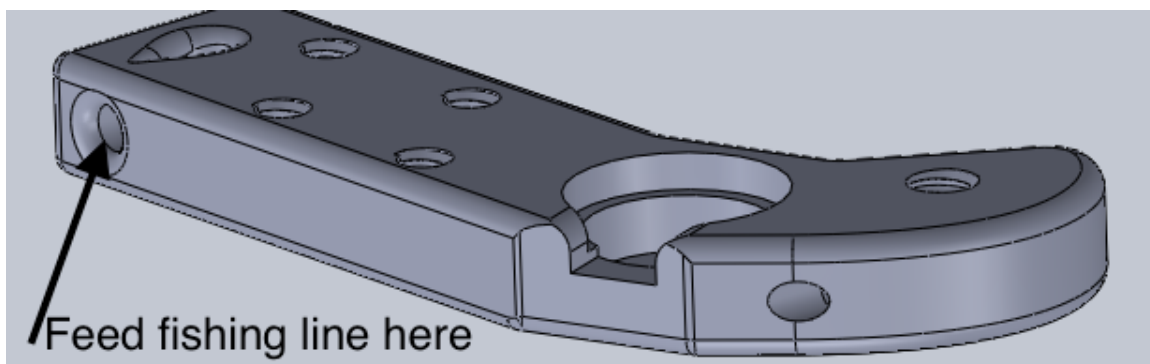


Step 6: Putting each Flange into the top of the Hand:

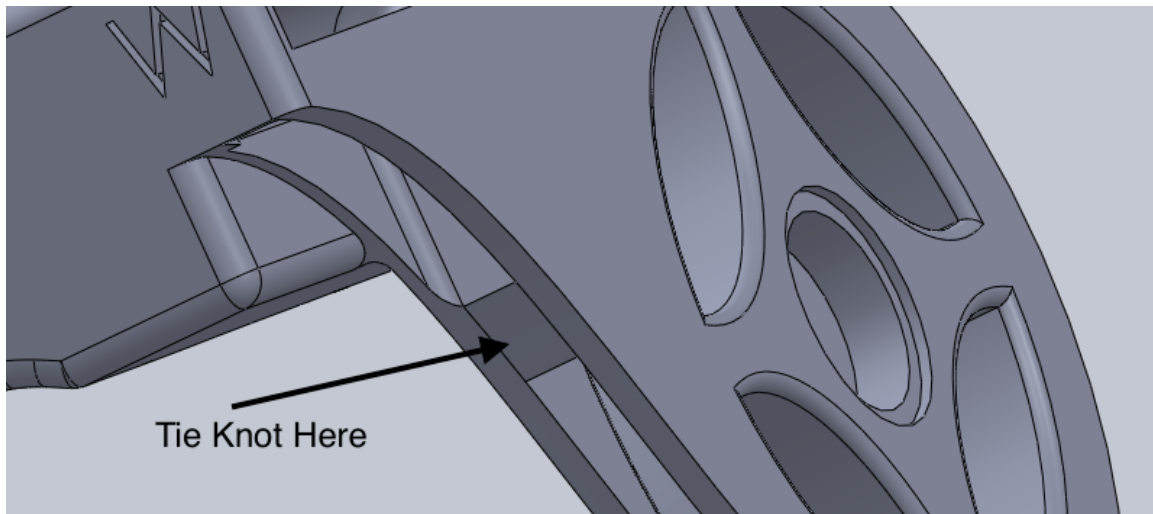
Slide a dowel pin in the back hole of each flange and put it in the back of the hand piece. The flange can only come in and out with a dowel pin in the back of the hand.



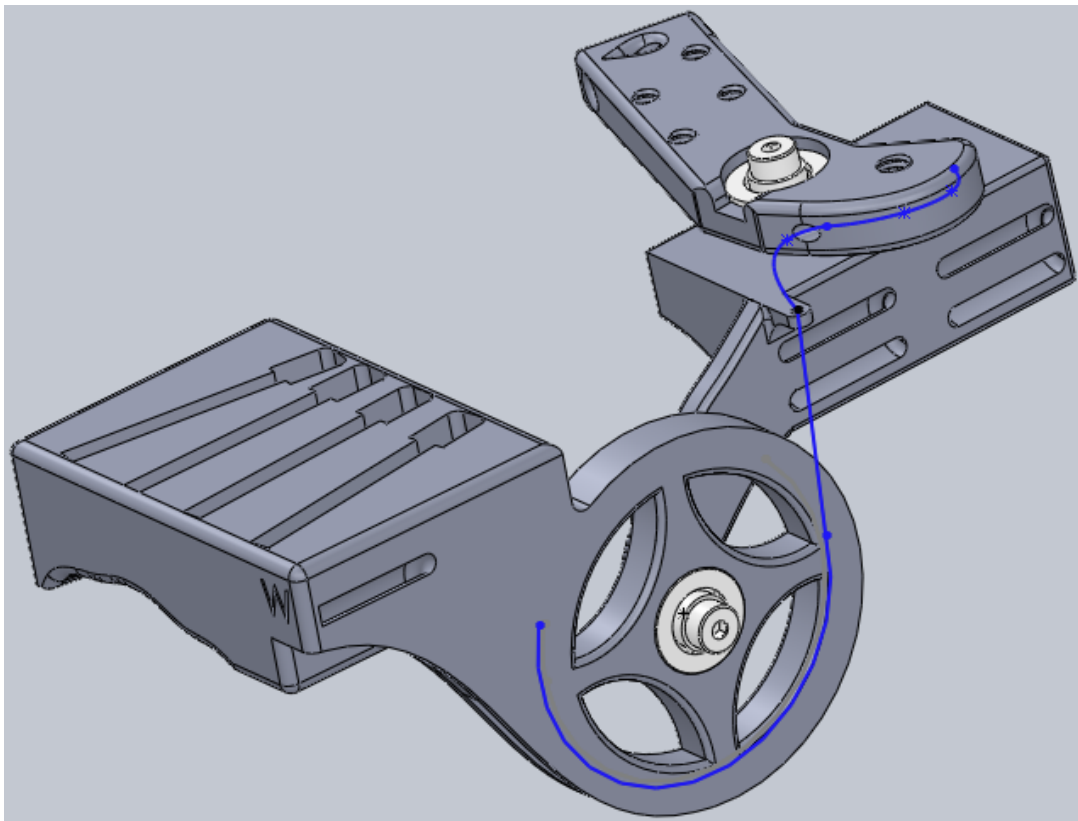
Once the flange is in. Feed the excess fishing line through the holes in the back of the hand to the opening on the long side of the lever.

**Step 7: Tying the Wheel to the Lever**

There is a short covered area at the front end of the wheel. Tie a knot here with at least a foot of fishing line to spare.



Feed the fishing line through the wheel and up through the forearm to the lever.

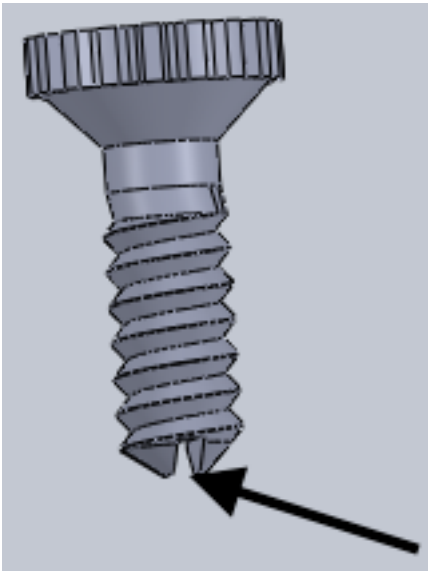


Leave excess fishing line once it has fed through the lever. We will use it in the next step.

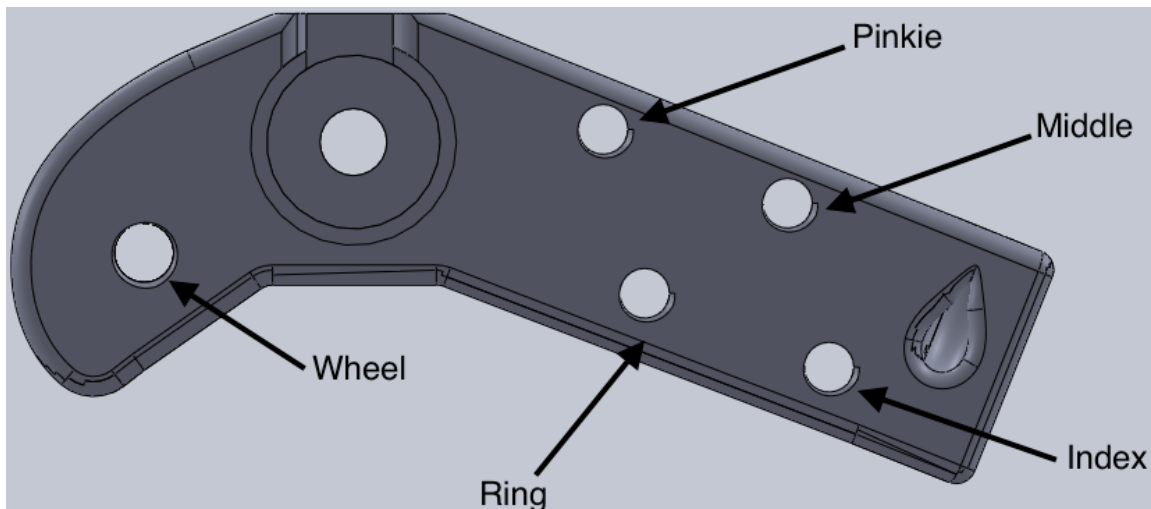
Step 8: Fastening the fishing line to the Lever

We will now connect all of the fishing line to the lever. This is a very tricky step because it may take a few tries to get the length correct. This design uses a guitar

string-like method to be able to adjust tension on all the fishing line. Notice the notch at the bottom of the pins.



First screw the collar around each of the pins. Next, press and twist the four 0.2" pins into their designated slot with the fishing line for its designated finger in the notch.



Do the same thing for the 0.25" pin and collar with the fishing line attached to the wheel. Twist the pin for the wheel until ideal range of motion is achieved for the wrist. Lower the collar to the lever. Twist each finger until ideal and equal tension is reached for all fingers. Lower all collars to the lever.