

TinkerCAD Simple Hand Tutorial for Choitek Megamark Robot

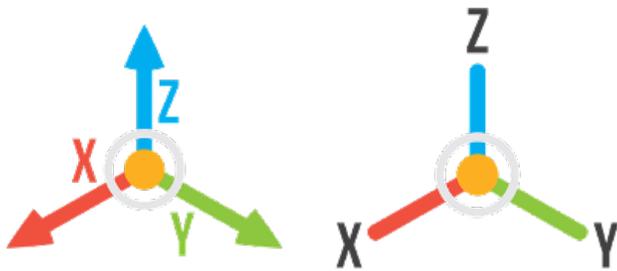
Tinkercad is a free, simple, online 3D design and 3D printing app for everyone by Autodesk. Tinkercad is used by designers, hobbyists, teachers, and kids, to make toys, prototypes, home decor, Minecraft models, jewelry – the list is truly endless!



The purpose of this tutorial is to introduce you on how to use TinkerCAD and create a **simple 3D printable hand for the Choitek Megamark robot**. Go ahead and get started by going to the official TinkerCAD website and making yourself a free TinkerCAD account. Note that you will need to provide some basic information, and be sure to choose a password that you can easily remember.

Basic Navigation

TinkerCAD is 3D design software. This means that in your view, you are able to navigate in **three separate dimensions, X, Y, and Z**:



In these three dimensions, basic navigation amounts to **panning**, **rotating**, and **zooming**.

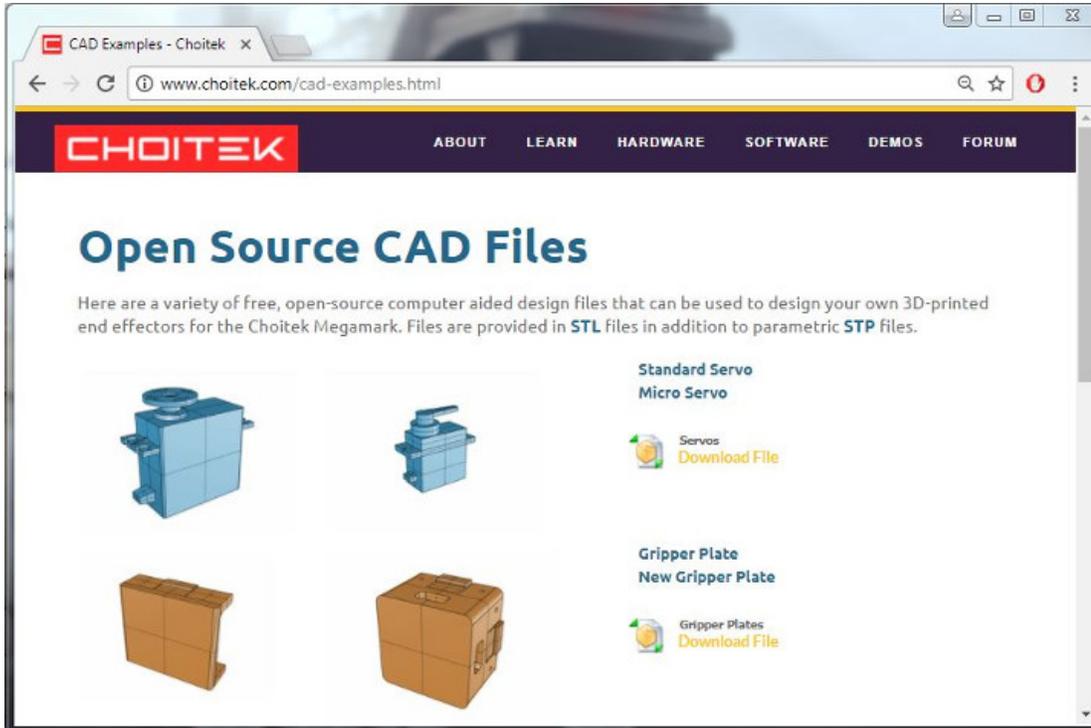
- **Rotating the Camera:** Hold the `Right Mouse Button` and move the mouse.
- **Panning the Camera:** Hold `Shift + Right Mouse Button` and move the mouse.
- **Zooming the Camera:** Scroll the `MouseWheel` back and forth.

NOTE: If you are using a touchpad with limited mouse buttons, the below controls also work:

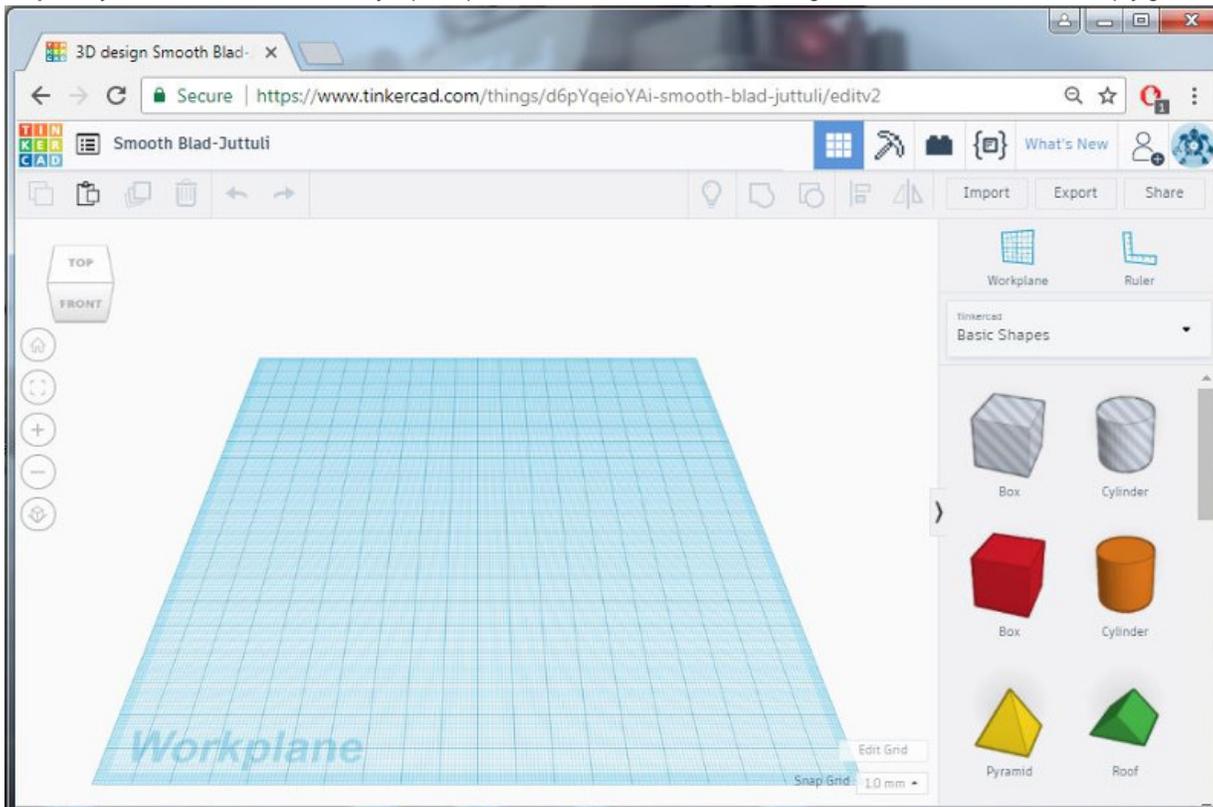
- **Rotating the Camera:** Hold `Ctrl + Left Mouse Button` and move the mouse.
- **Panning the Camera:** Hold `Ctrl + Shift + Left Mouse Button` and move the mouse.
- **Zooming the Camera:** Put two fingers on the `TouchPad` back and forth.

Creating a Simple Hand Compatible for the Megamark Robot

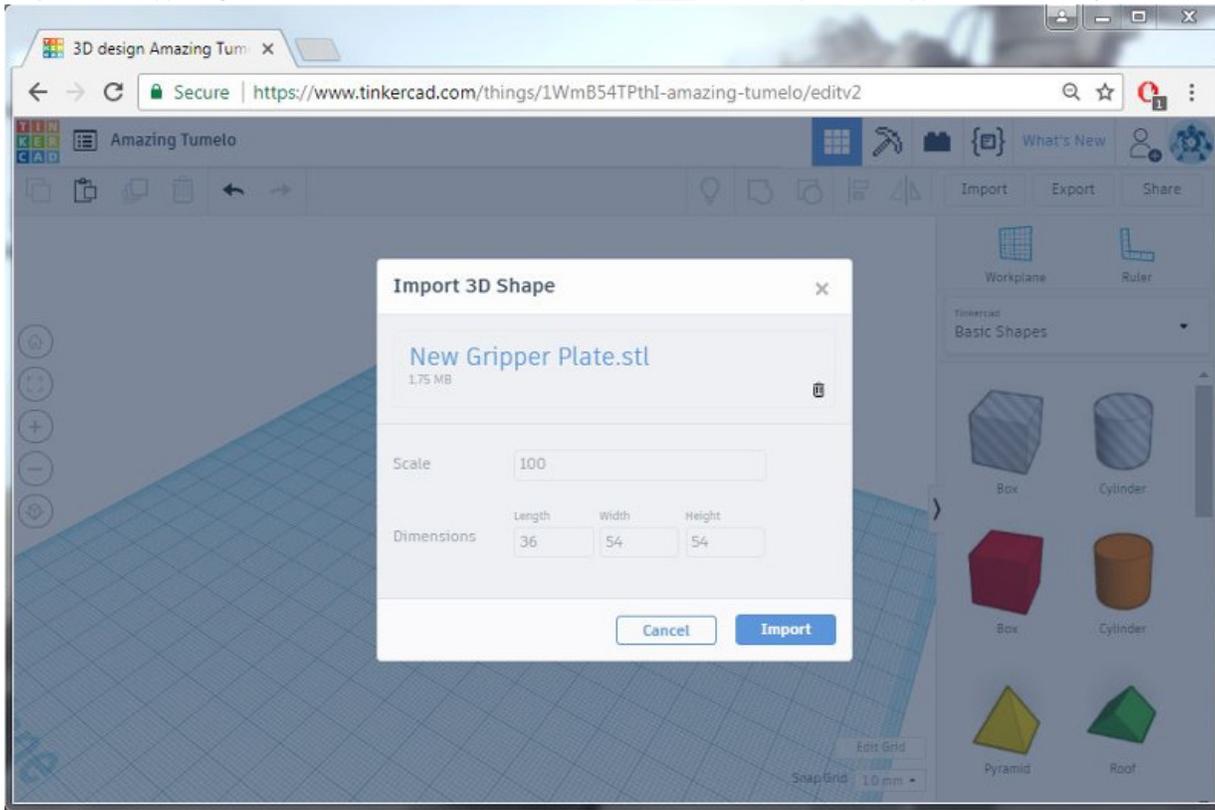
Step 1: Go to the official Choitek website and download the CAD examples. In particular, we are interested in the **Gripper Plate STL file**:



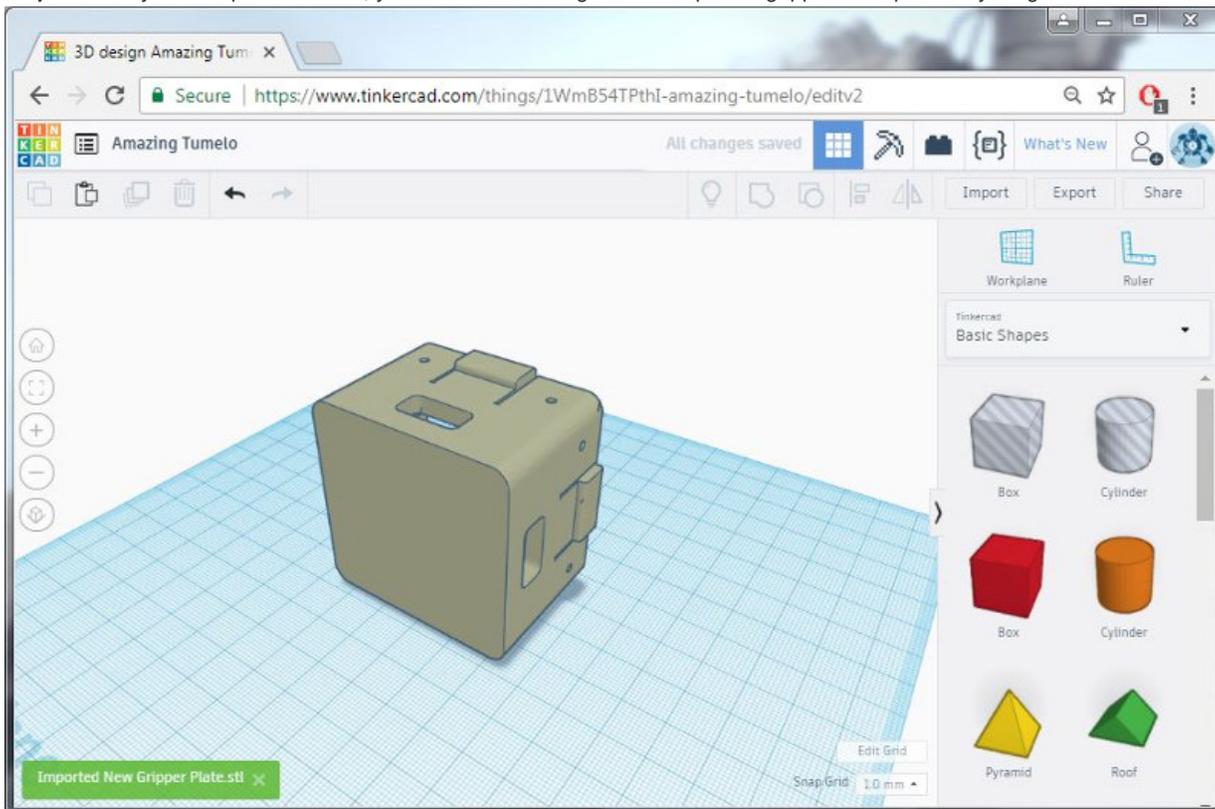
Step 2: If you have not done so already, open up Tinkercad and create a new design. You should see a blank, empty grid:



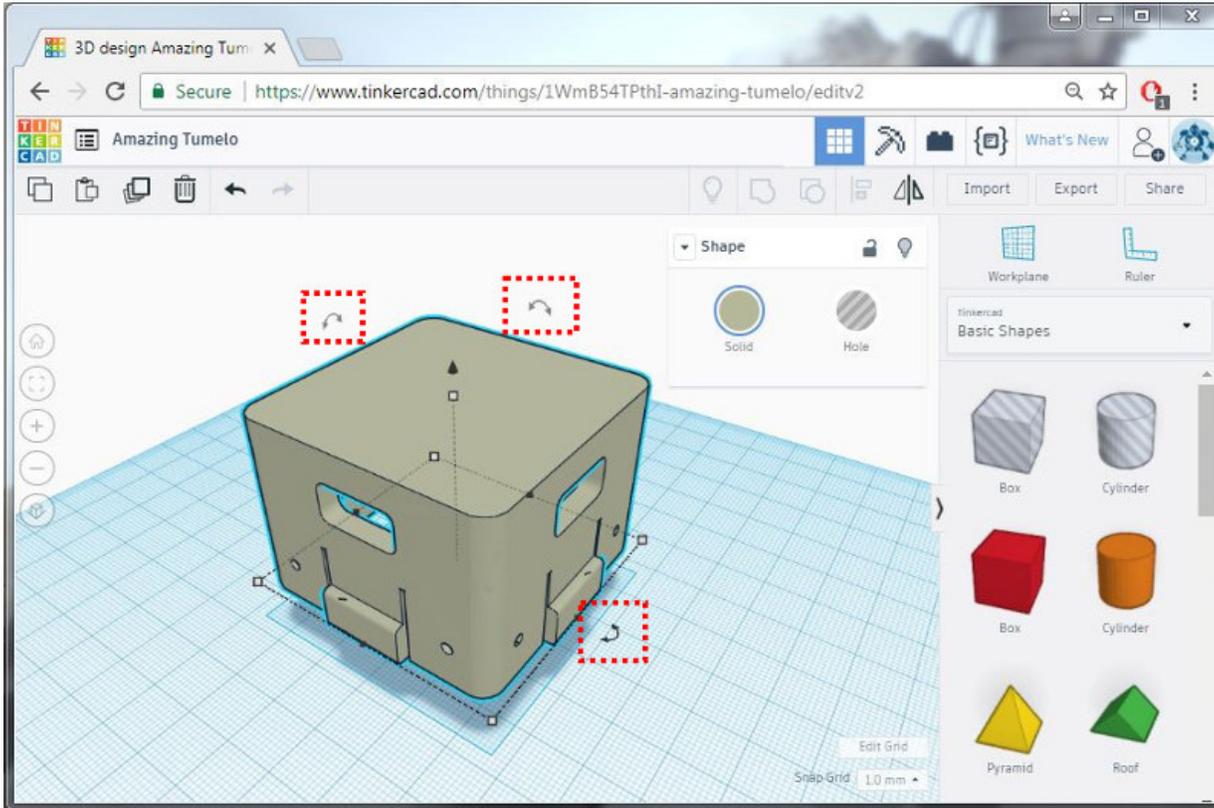
Step 3: In the upper right hand corner of the screen, click on the **Import** button. Import the Gripper Plate STL file you downloaded earlier.



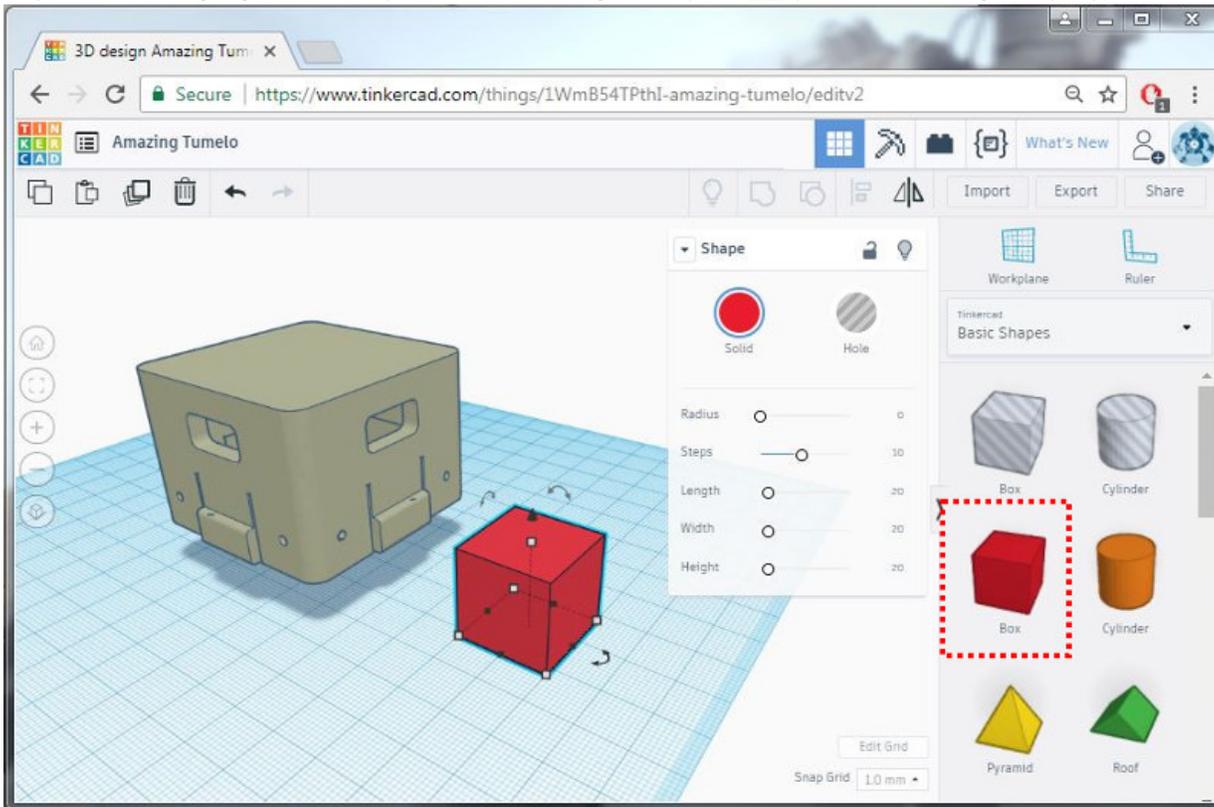
Step 4: Once you've imported the file, you should see a Megamark-compatible gripper base plate on your grid.



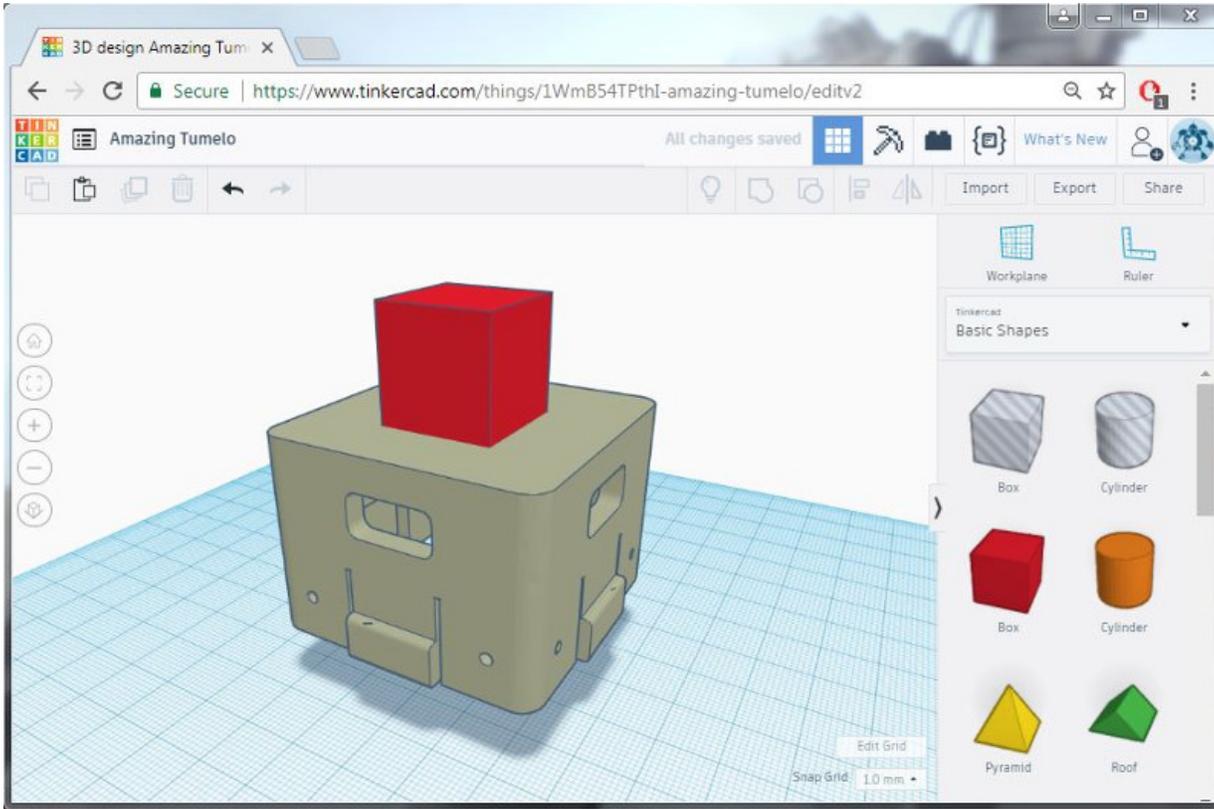
Step 5: If the gripper plate is not oriented upright, orient it upright by clicking on the gripper plate and then using the **object rotate tools**:



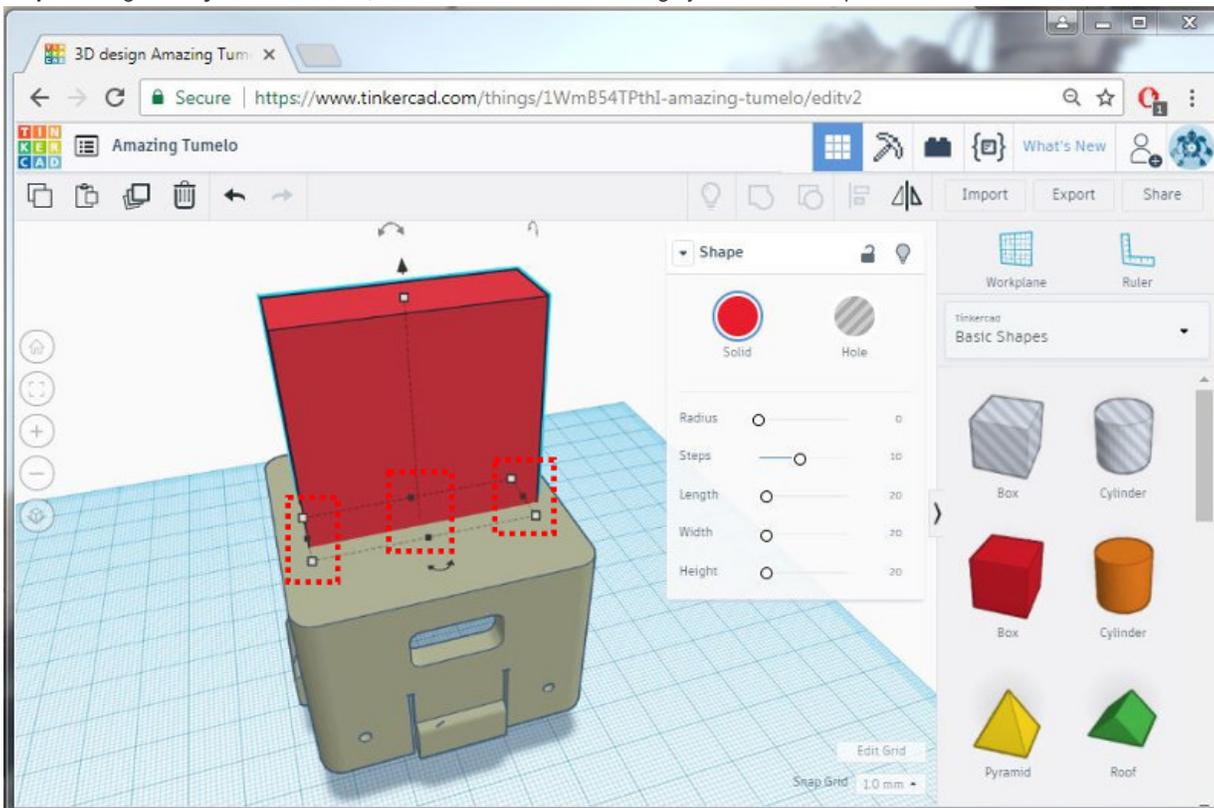
Step 6: Now we are going to create the palm of the hand. Drag and drop the **cube** primitive from the right shapes pane onto the work area.



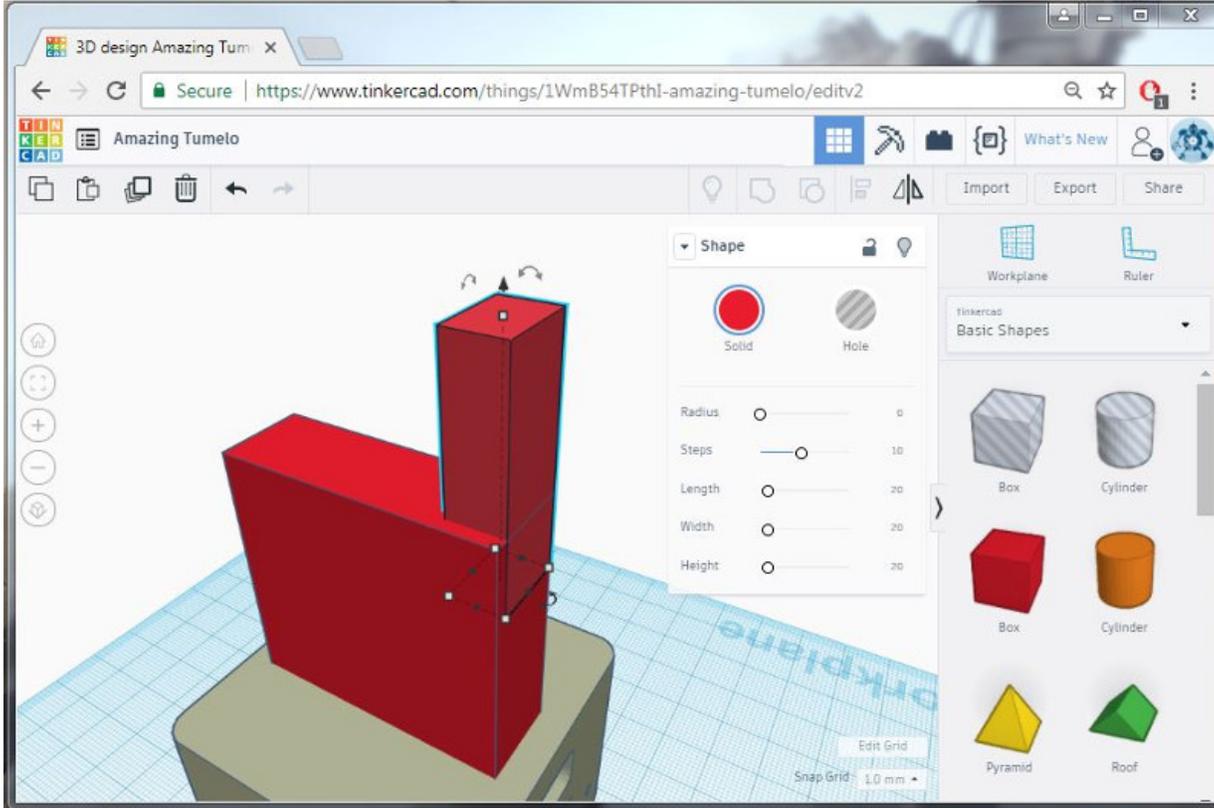
Step 7: Using the **object move tools**, move the cube on top and center of the gripper plate. (To move the object laterally, simply hold the mouse on the object and drag the cube around. To move the object vertically, click on the small triangular arrow icon on top of the cube.)



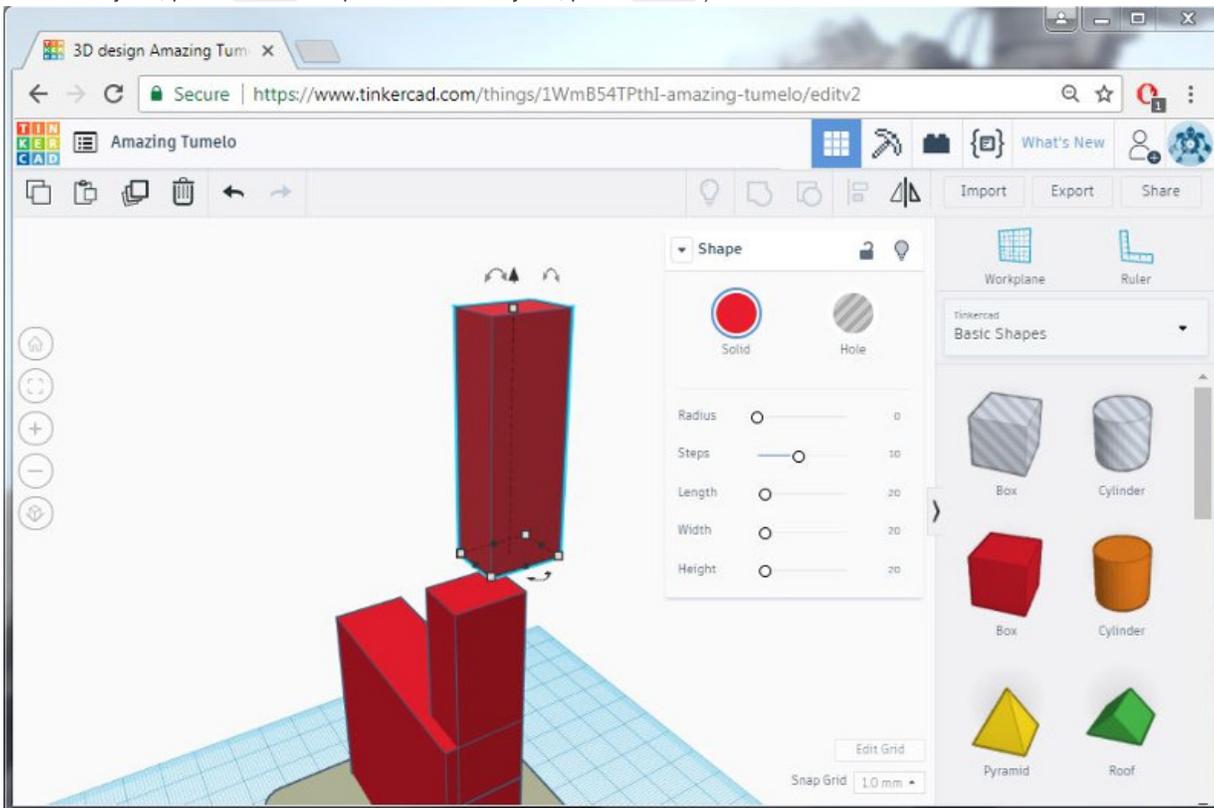
Step 8: Using the **object scale tools**, stretch the cube until it is roughly the size of the palm of the hand.



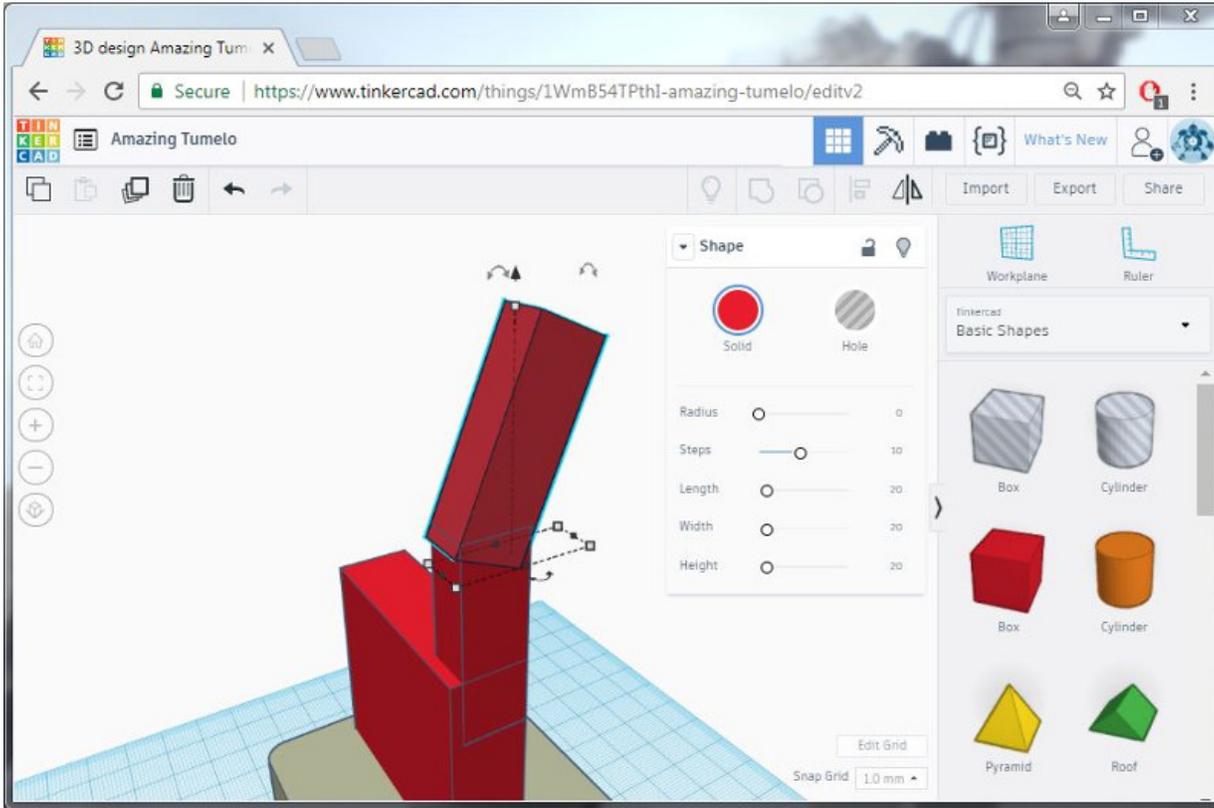
Step 9: Now, using the exact same methods to create the palm, create a finger base and position it on the top right edge of the palm.



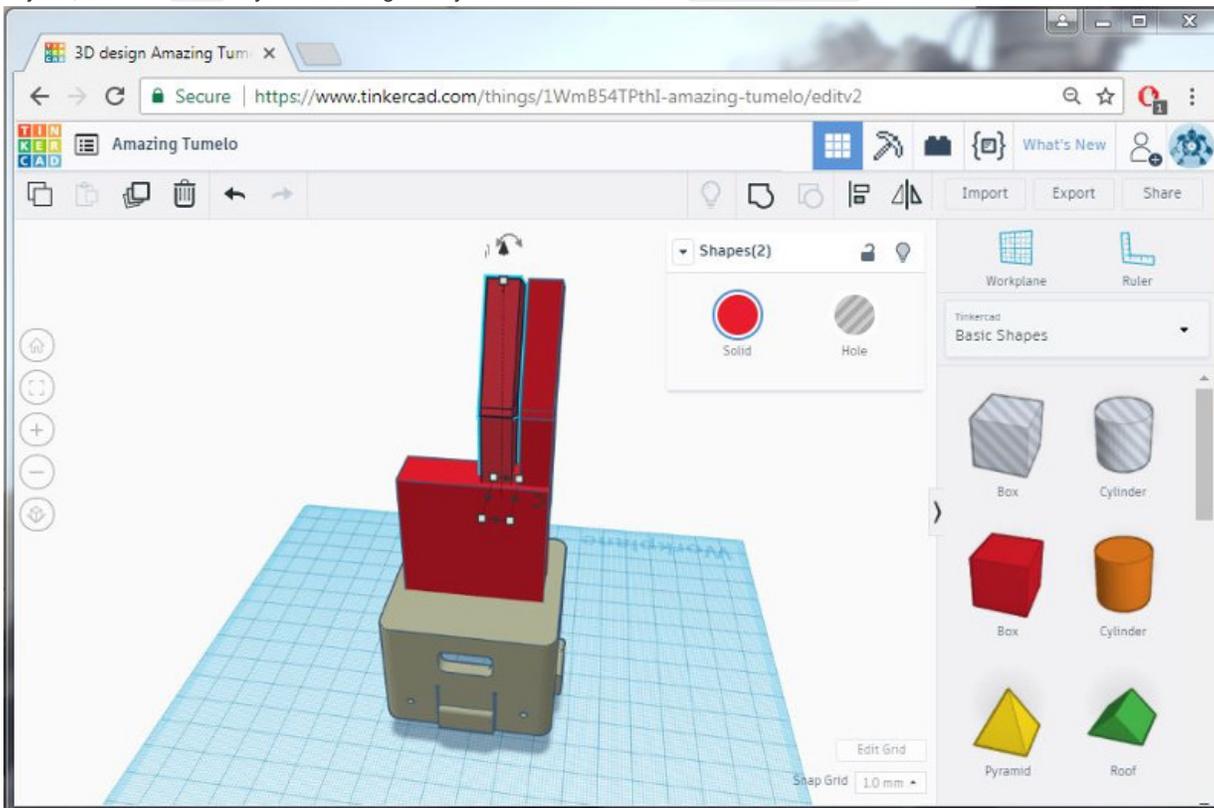
Step 10: We are going to make the finger double jointed. To do this, copy and paste the first finger piece and move it up slightly. (To copy selected objects, press $Ctrl+C$. To paste selected objects, press $Ctrl+V$.)



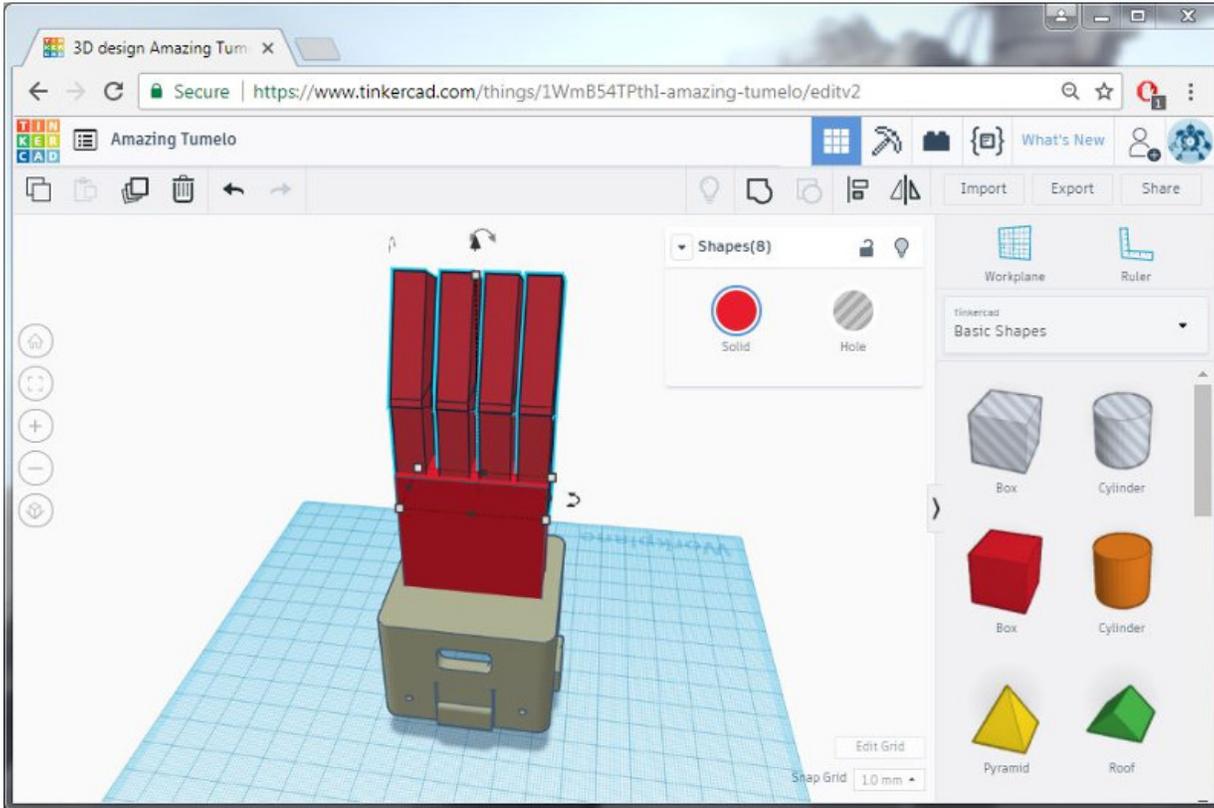
Step 11: Now, rotate the second finger piece slightly forward to make a finger joint.



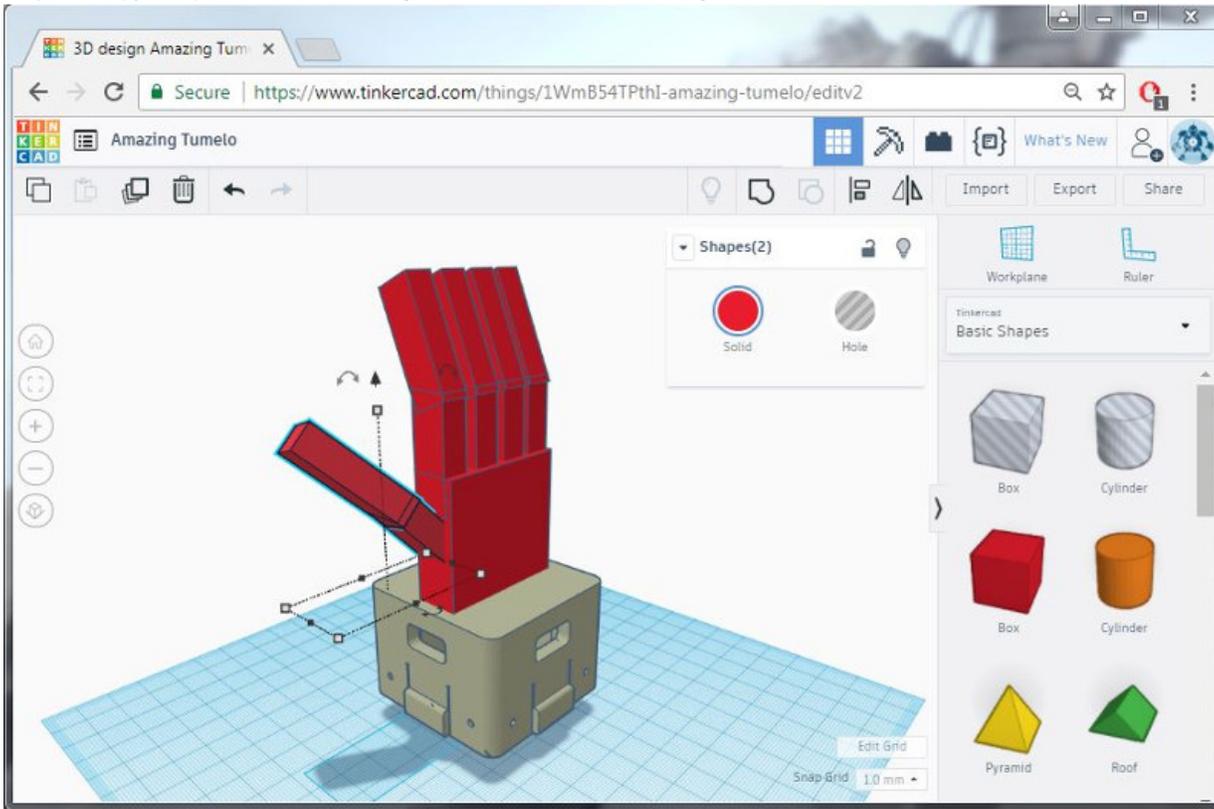
Step 12: Using the same technique as before, select both finger pieces, copy them, paste them, and move them slightly left. (To multi-select objects, hold the **Shift** key while clicking on objects. You also hold the **Left mouse click** button and move the mouse to draw a selection box.)



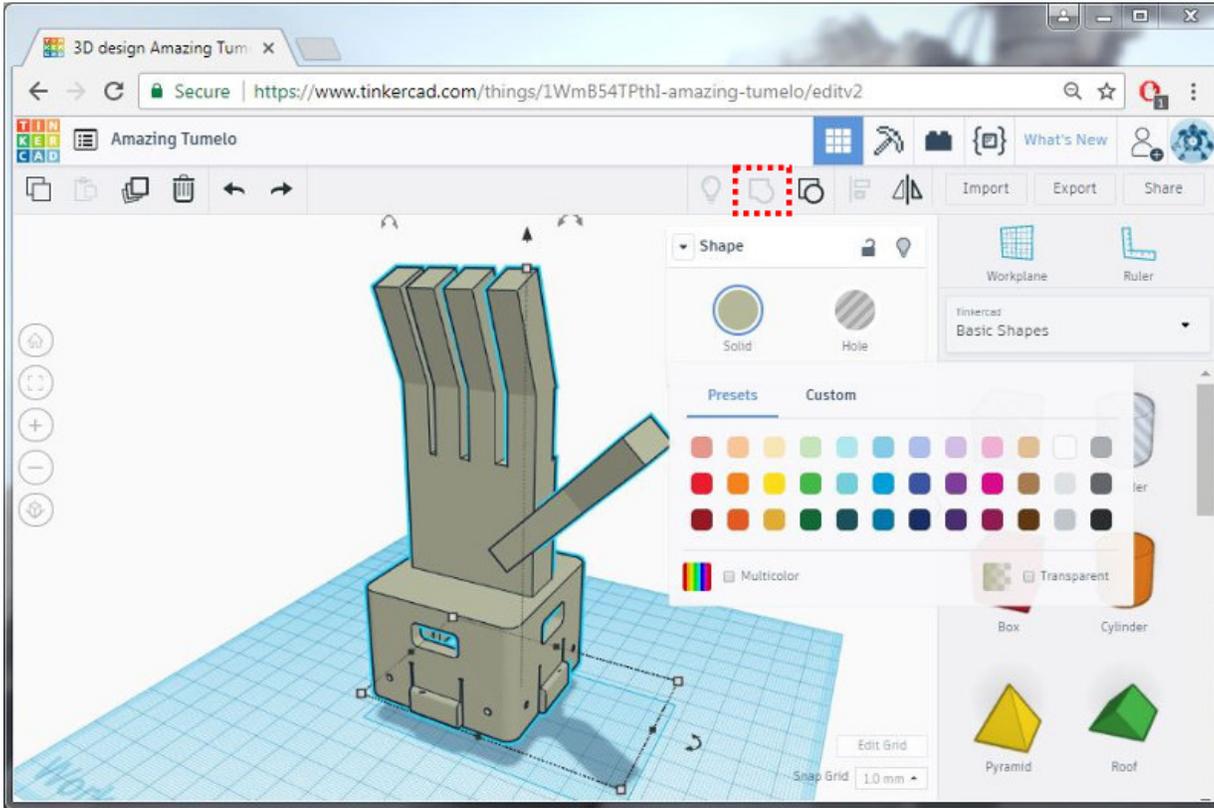
Step 13: Repeat the previous step two more times to create a total of 4 jointed fingers on top of the palm.



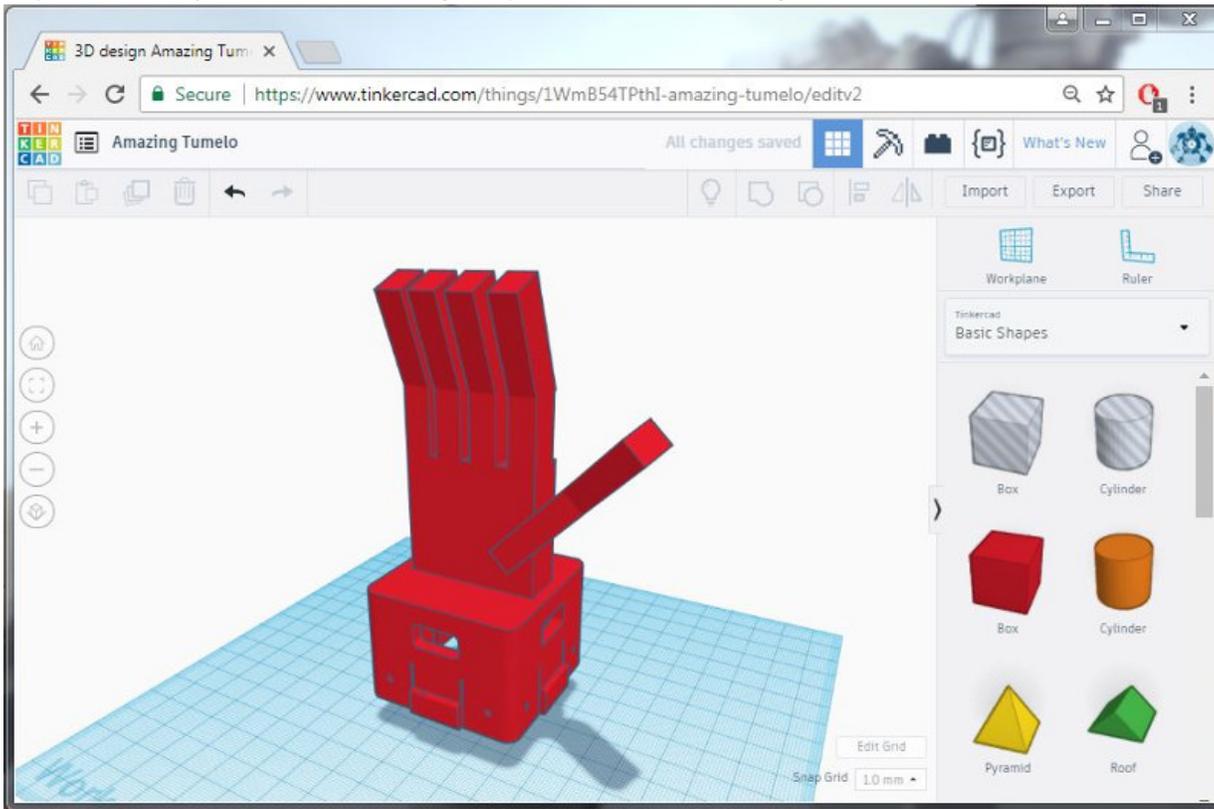
Step 14: Copy and paste the left-most finger, rotate it down about 45 degrees, and move it down to create the thumb.



Step 15: Select all the objects in the screen and group them together using the Group button on the upper right hand corner of the screen.



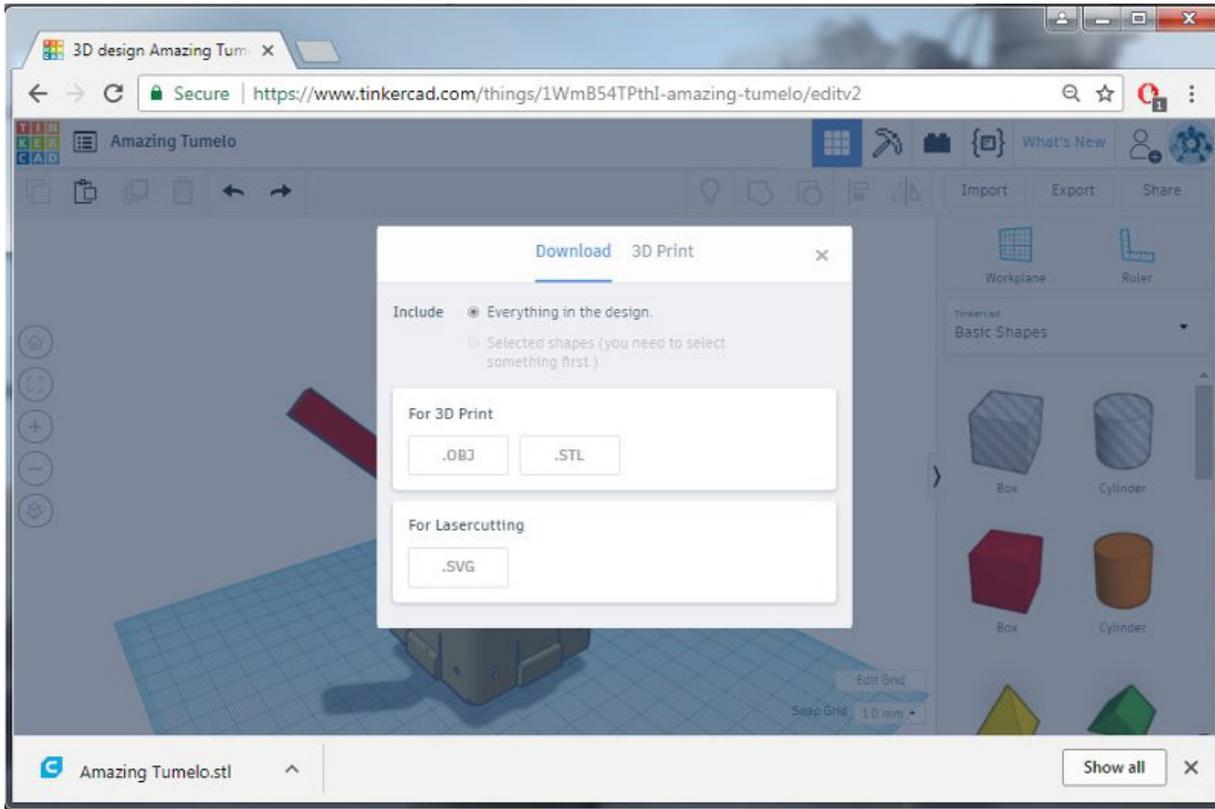
Step 16: And voila, you are now done creating a simple hand for the Choitek Megamark robot!



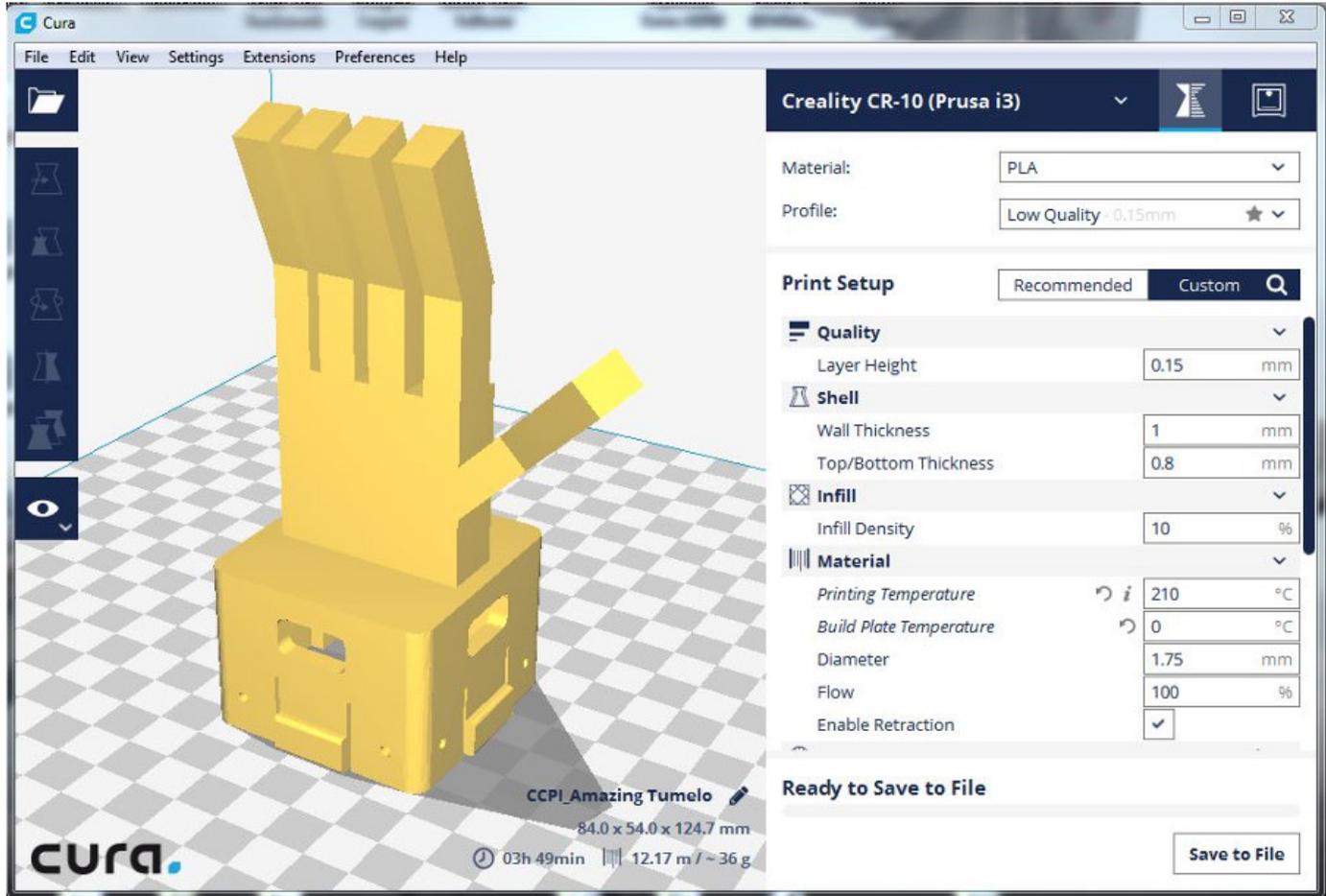
3D Printing the Simple Hand

Now, we are ready to 3D print our creation and bring into real life.

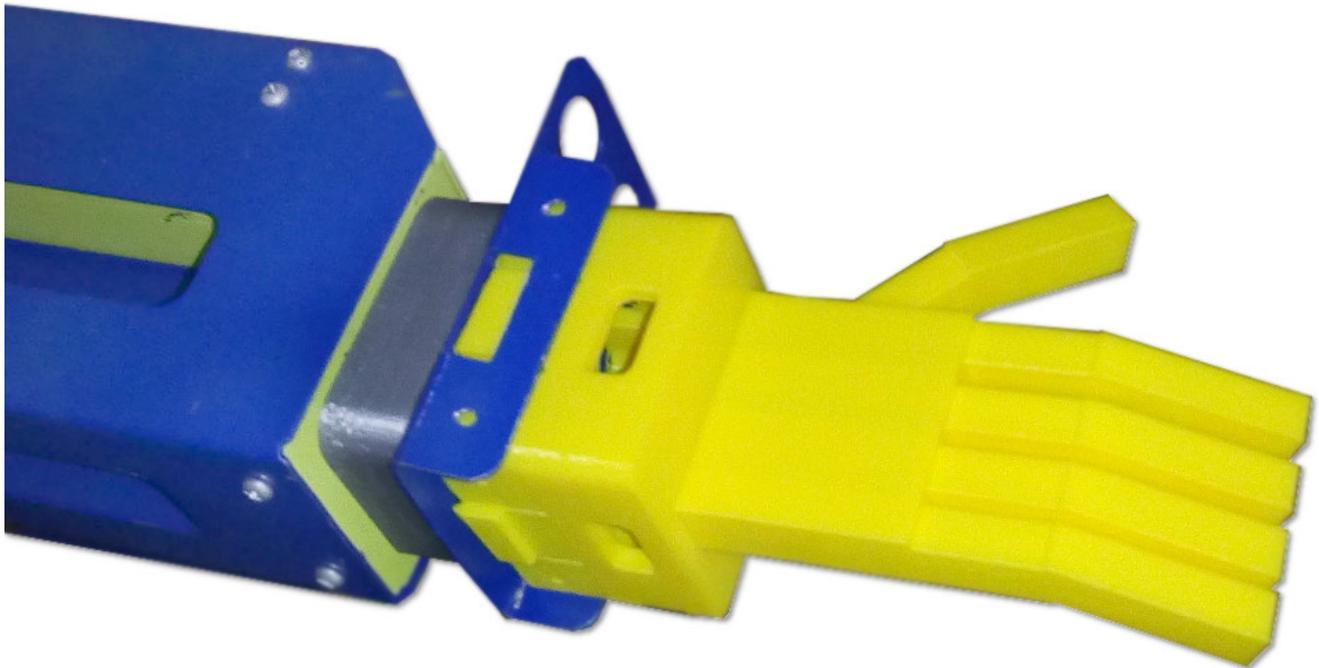
Step 17: In the upper right hand corner of the screen, click on the **Export** button. Choose the **STL** file format.



Step 18: Load up your favorite 3D Printing software and import your exported STL file from TinkerCAD. (We use **Cura** in the example below.)



Step 19: 3D print your simple robot hand and attach it onto the Choitek Megamark robot.



Congratulations! Feel free to use your newfound knowledge to create whatever kind of end effector you want - the possibilities are endless!