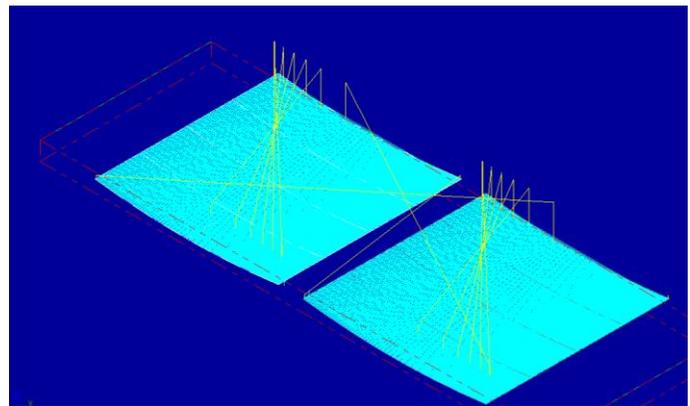
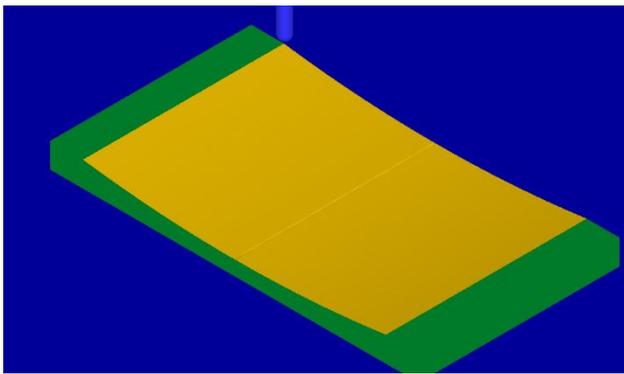
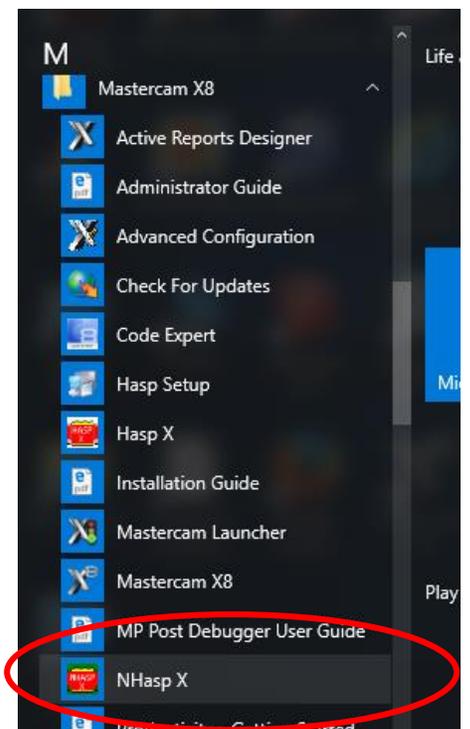


# MasterCAM for Sculpted Bench

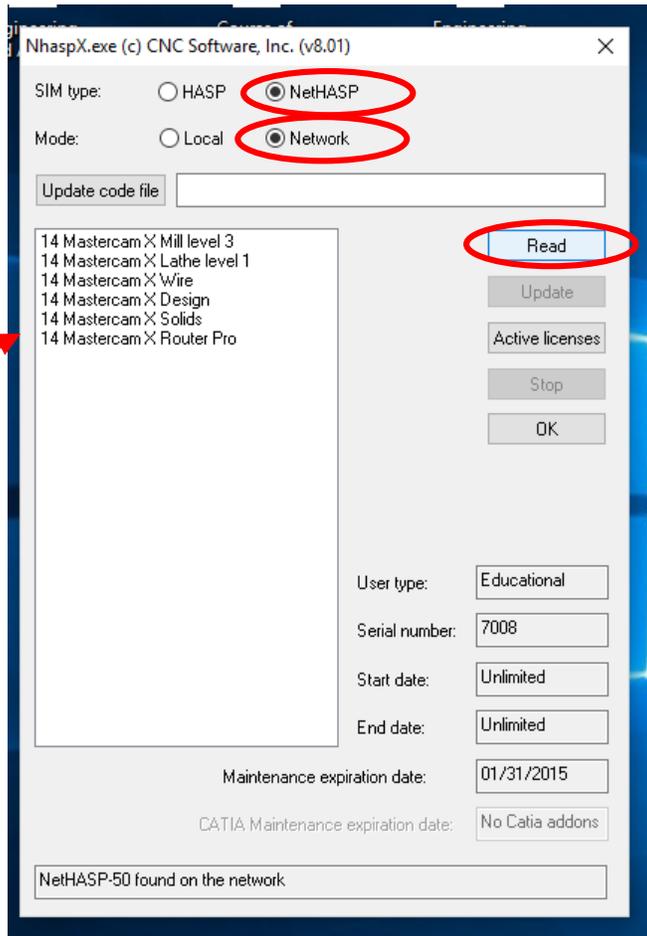


Check to make sure the nethasp is working/turned on to network.

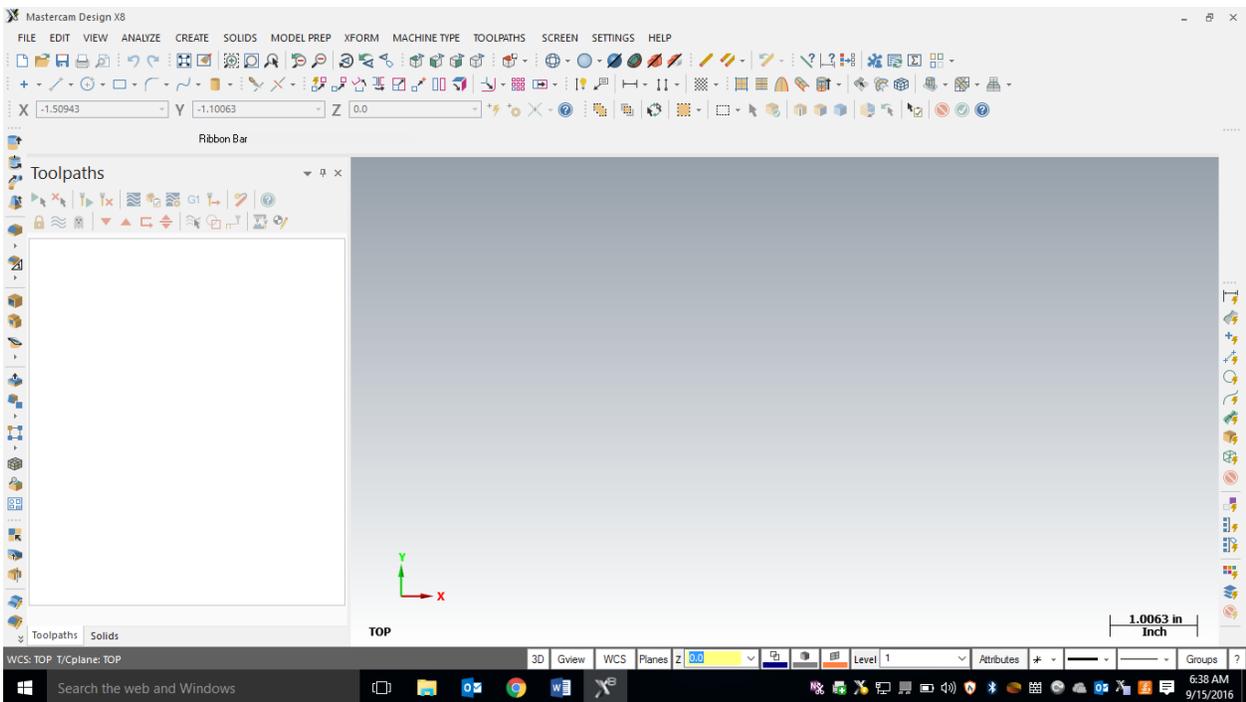
Go to ALL APPS/Mastercam x8/nethasp



After the computer “reads” the nethasp, these programs should show up. If not ask your instructor.

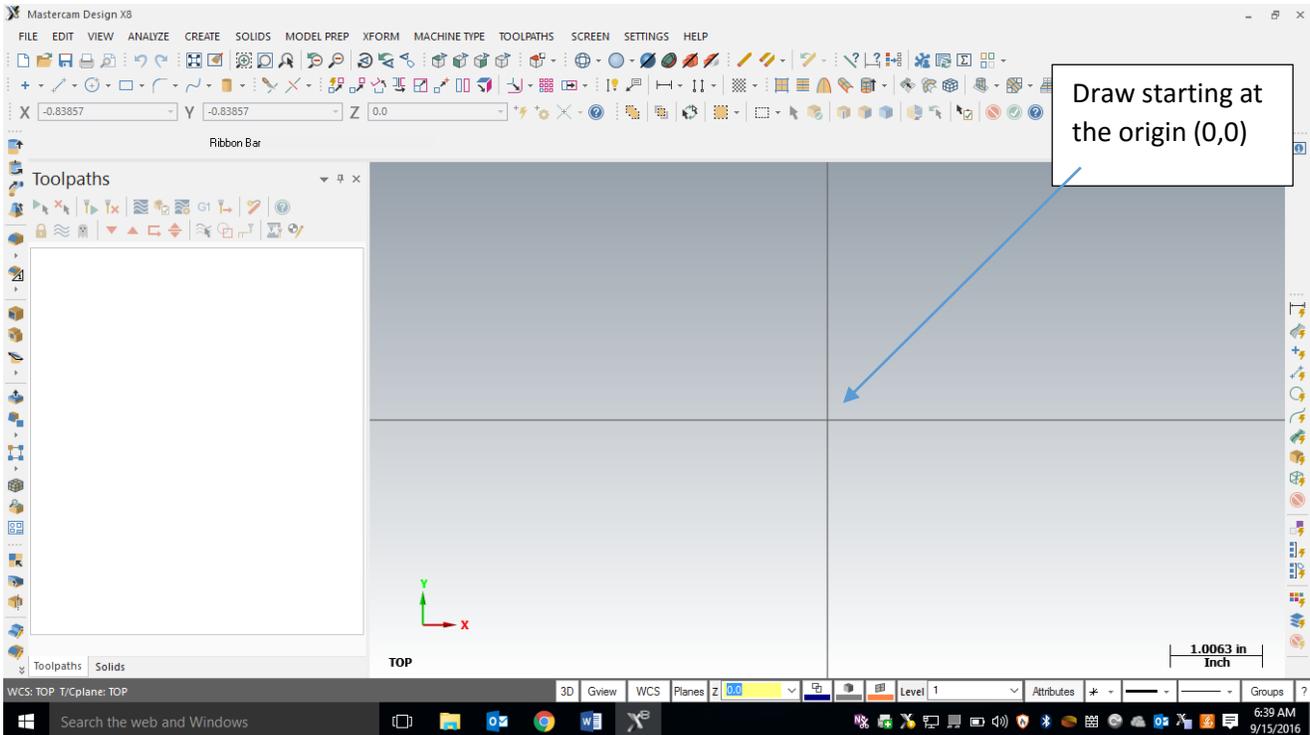


Open the MasterCAM application, it should look something like below.

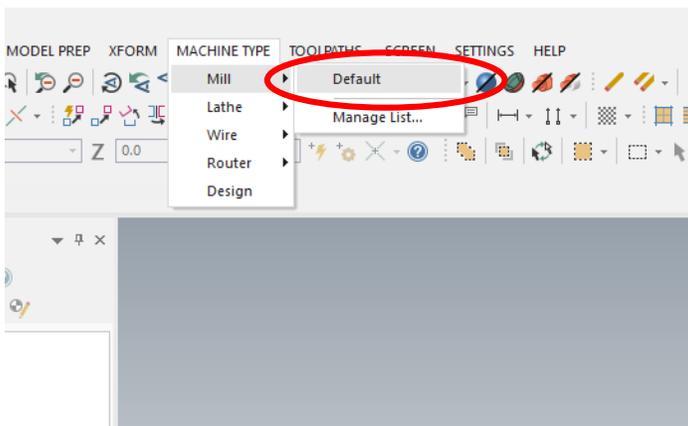


First thing is to figure out what you are making....Using the measurements from your plans or your adjusted measurements from your plans, you will draw your geometry (geometry is a generic term for lines, arcs, etc. in a computer drawing program). This geometry must be drawn in the 1<sup>st</sup> quadrant of the coordinate system, so positive x and y. The placement of the geometry matters since we will later be cutting out the part using the CNC Router. The CNC Router uses the coordinates from where you draw the geometry.

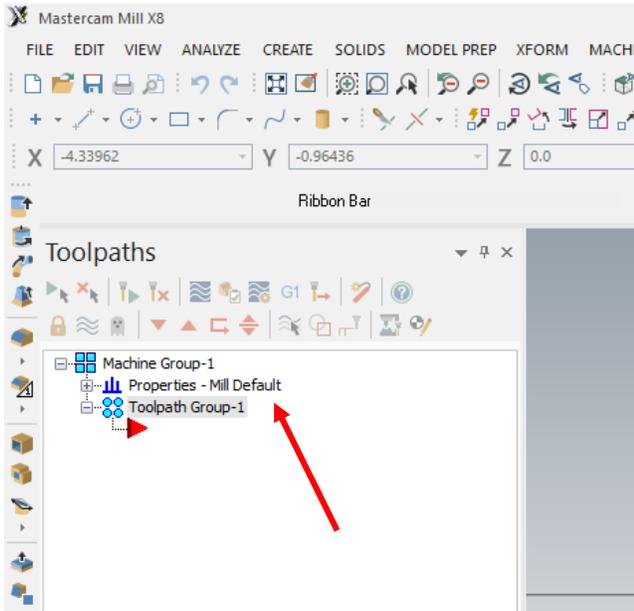
**F9 will display the x/y axis such as:**



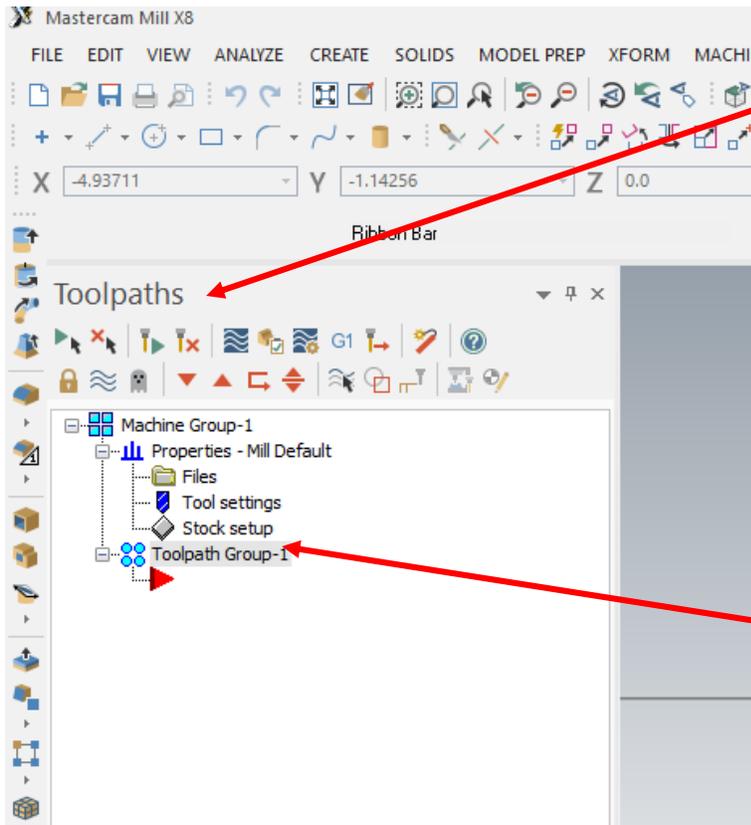
To start a project, we need to set our specific CNC router and set up the stock sizes. MasterCAM can write NC code for different manufacturers of CNC equipment. Our router is called a Forest Scientific Velocity 3 axis mill. MasterCAM will write the correct type of code as long as we pick the correct machine definition. Currently the only computer with this machine definition is the one hooked to the CNC router, so please just pick the default, then your instructor will change it at the CNC machine. This is a critical first step, without a machine definition, the CNC router will crash....litterly the tool bit will dive into the table top. **Goto Machine Type/Mill/Default.**



The result: there should be one machine group (“Machine Group -1”) that says “Properties – Mill Default”, if there is other Machine Groups, right-click and delete them.

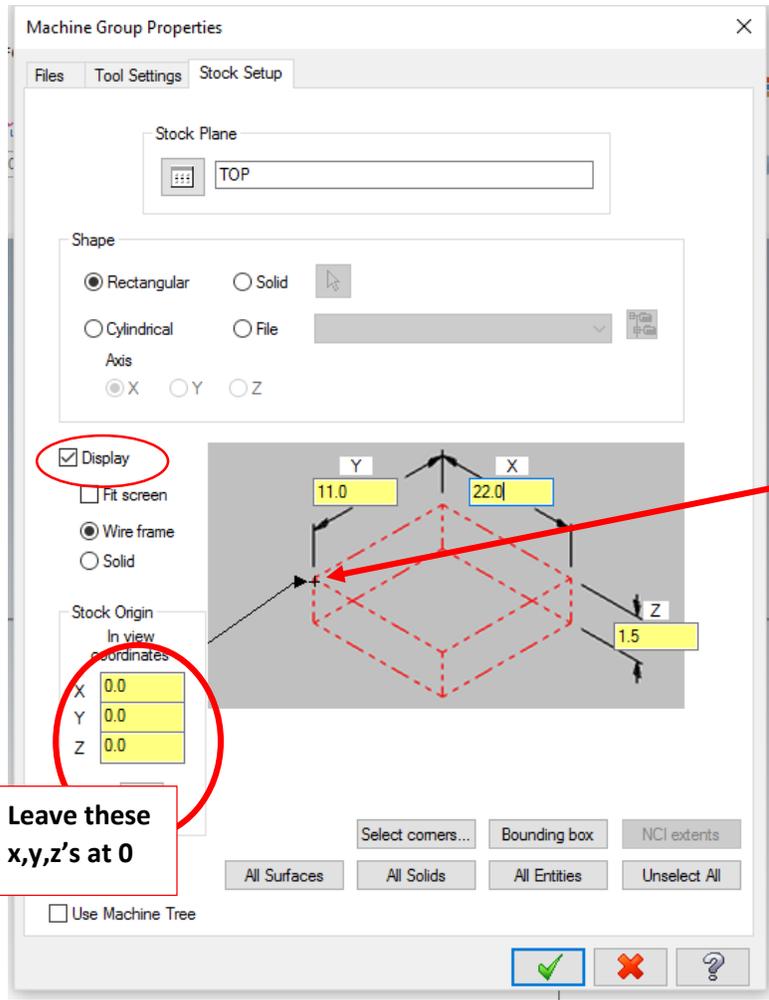


## Stock Setup



The Toolpath Operations Manager is the tool palette that is docked on the left of the screen. It is titled “Toolpaths.” This displays all the specific information about the tool paths (what the CNC router will cut).

Expand the properties tab in the Toolpath manager. Then click on stock setup.



Setup the stock:

Enter the measurements for your piece, I'm putting in 11 (y), 22 (x), 1.5 (z) for my measurements for the project. I'm not including the extra stock for the screws to hold it down to the router.

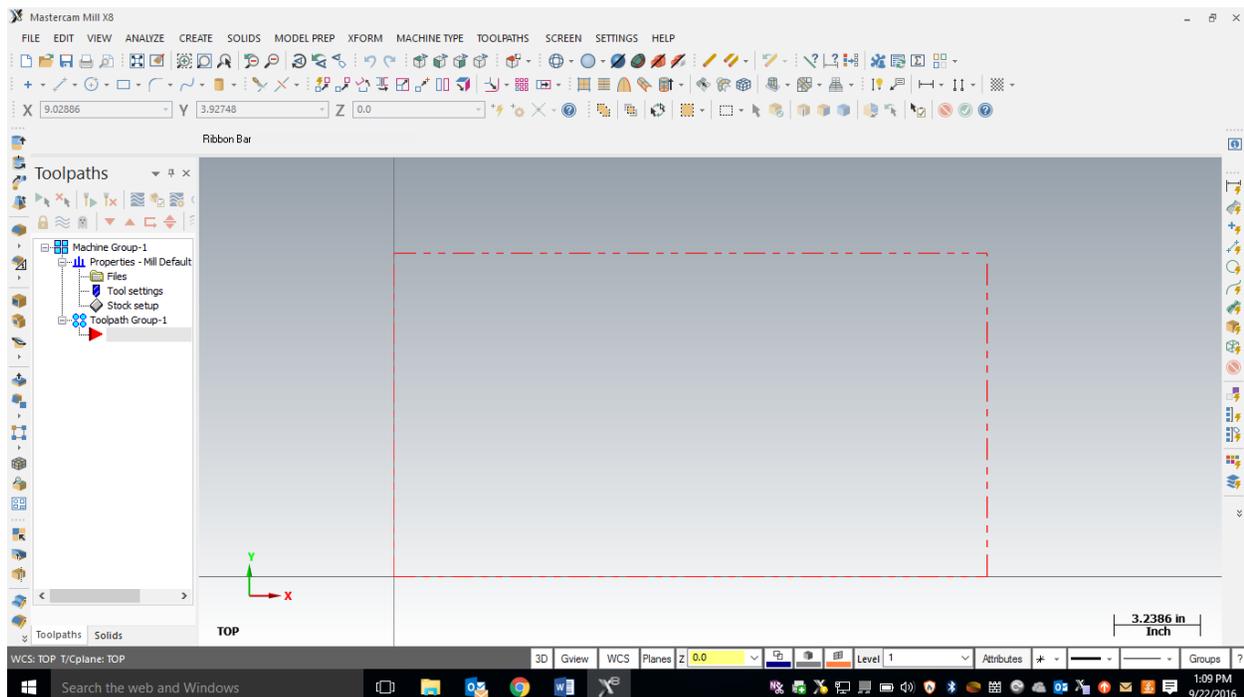
Set the stock origin by clicking on this corner.

Check "Display"

Click the Green Check Mark (OK)

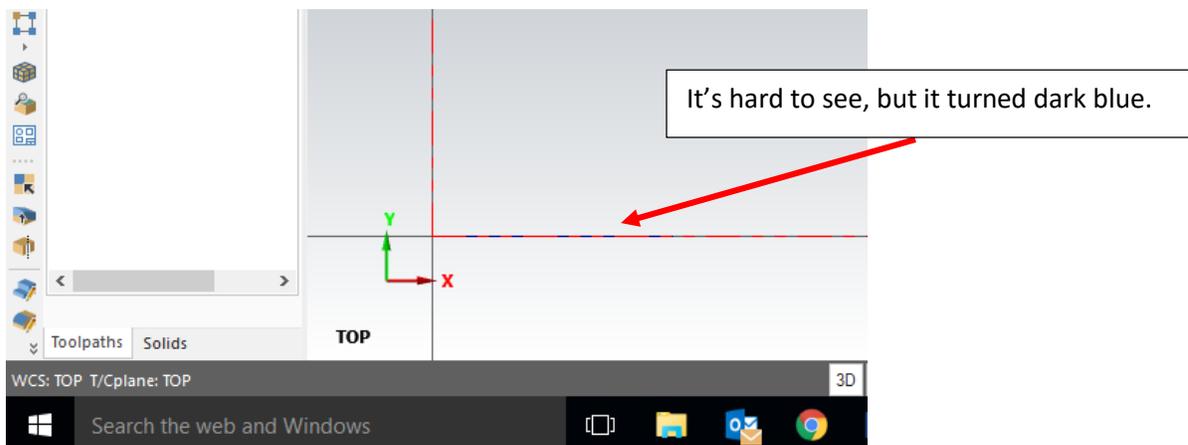
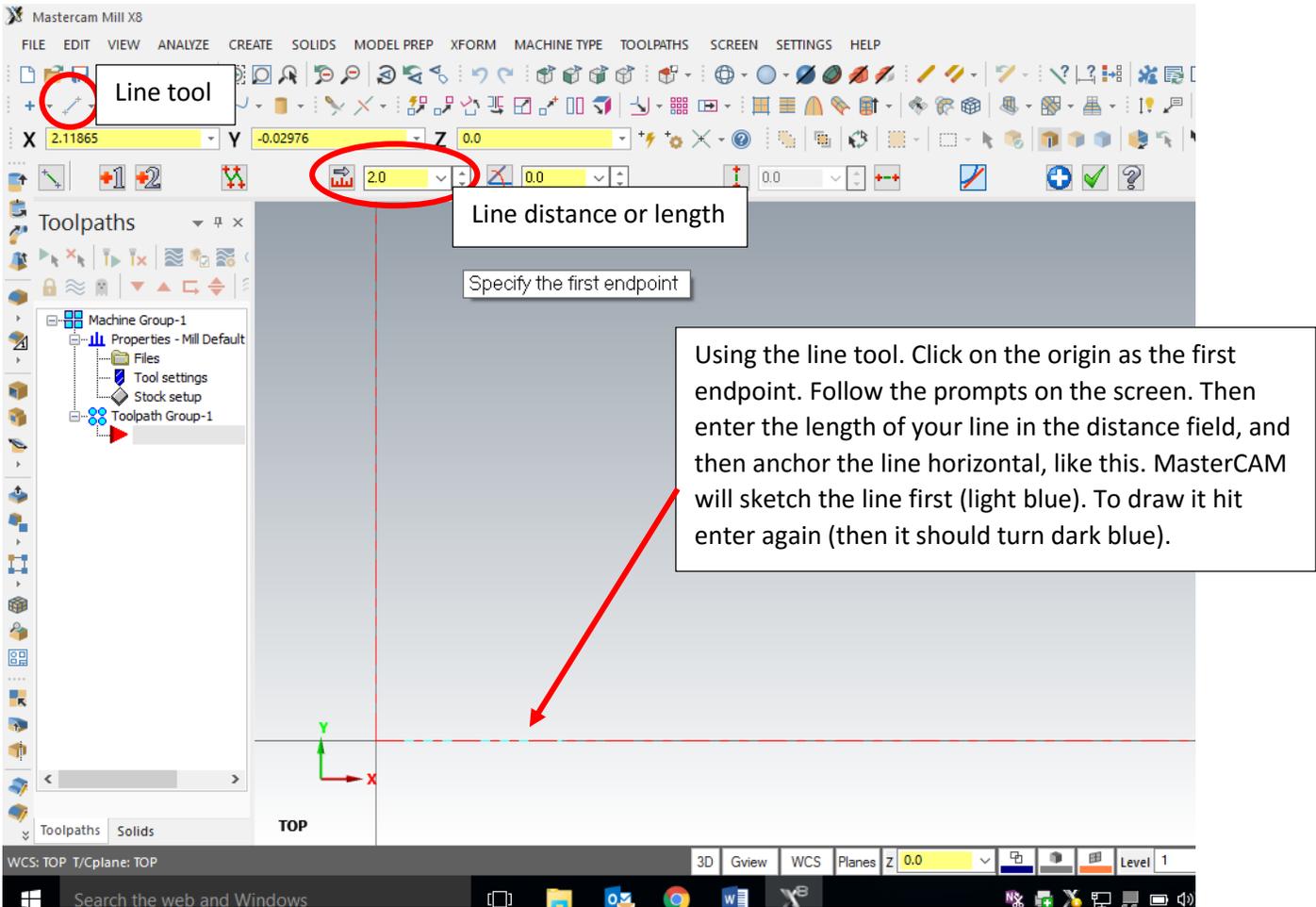
Leave these  
x,y,z's at 0

After you click ok in the stock setup, you should see a red dashed rectangle that represents your stock. Zoom in or out so that you see the whole piece. If you hit F9 on the keyboard, that will display the x,y,z axis.



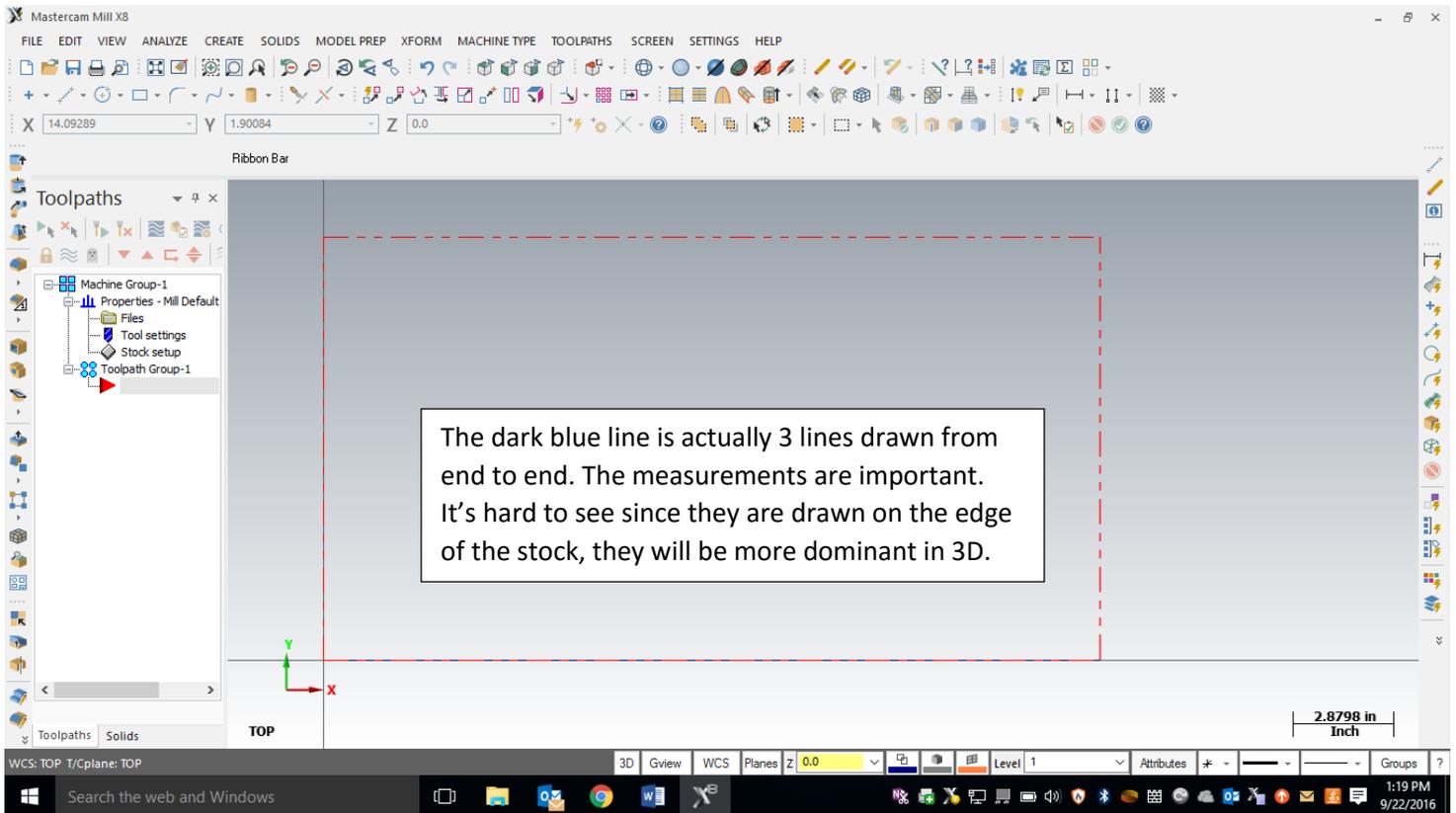
## Entering Geometry

It's time to start drawing some geometry, so figure out the measurements you want to cut on your piece. I'm going to start with the measurements that bound the sculpted seat. I'm going to start the sculpted seat 2" from the sides and go  $\frac{1}{2}$ " deep in the middle of the seat. That should be enough measurements to build the geometry. Using the line tool, start at the origin and draw a line from the edge of the seat to where the sculpted seat will start (2" in my case).

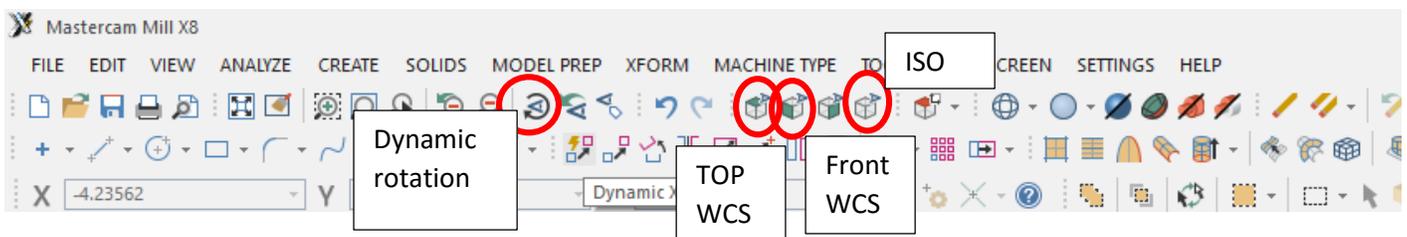


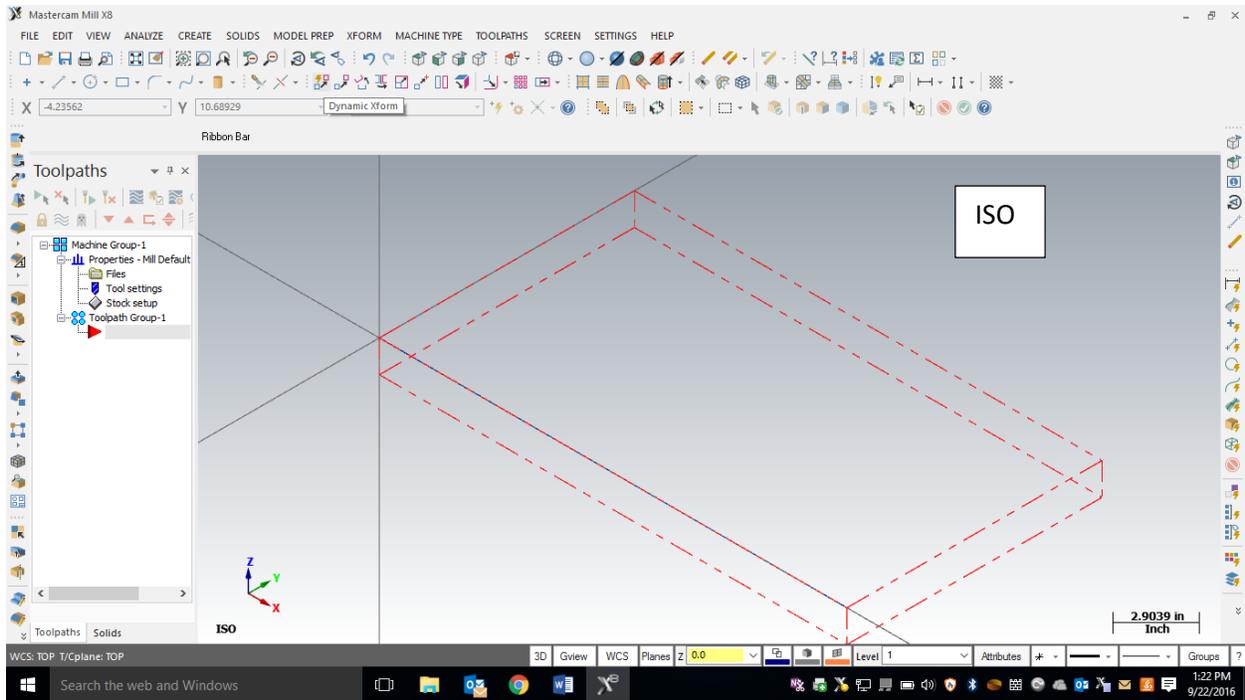
Then do the same procedure to draw across the front of the seat. This time we are going to start at the end of the last line and draw across the distance we want the sculpted part to be (18" in my example). After the second line is drawn, draw a third line from the end of the second to the edge of the seat (2" in the example).

Result:



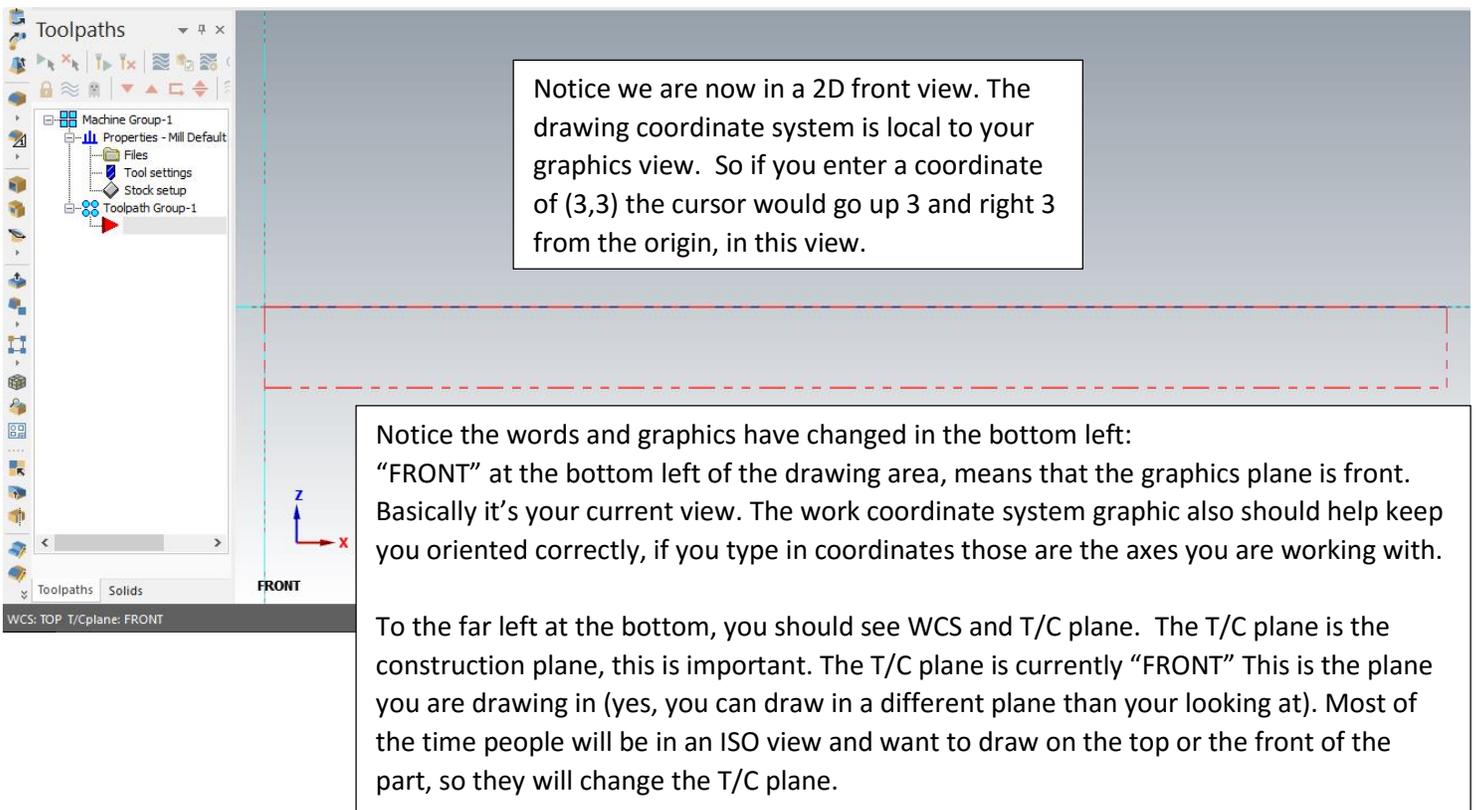
After you have the above 3 lines, it's time to go into 3D. The dynamic rotation tool will let you rotate the view, or you can use the front WCS and/or top WCS buttons to go between different views.



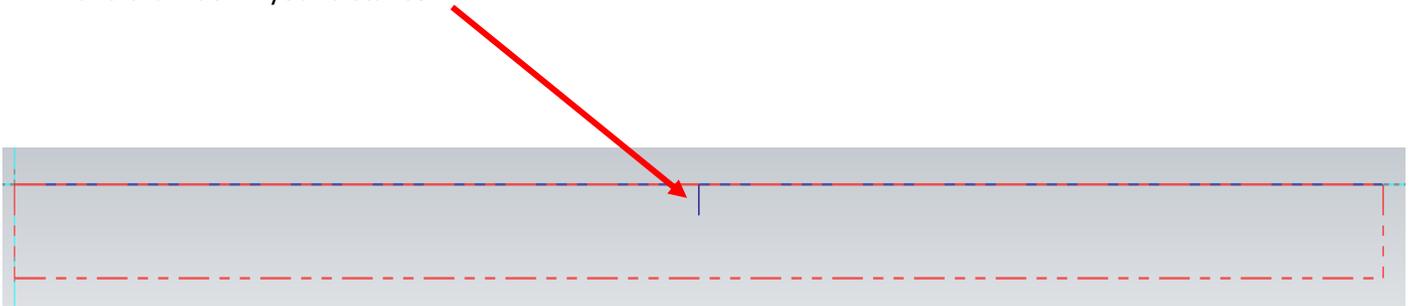


Once you are familiar with the dynamic rotation, front, iso, and top view buttons. Please to the **front view**.

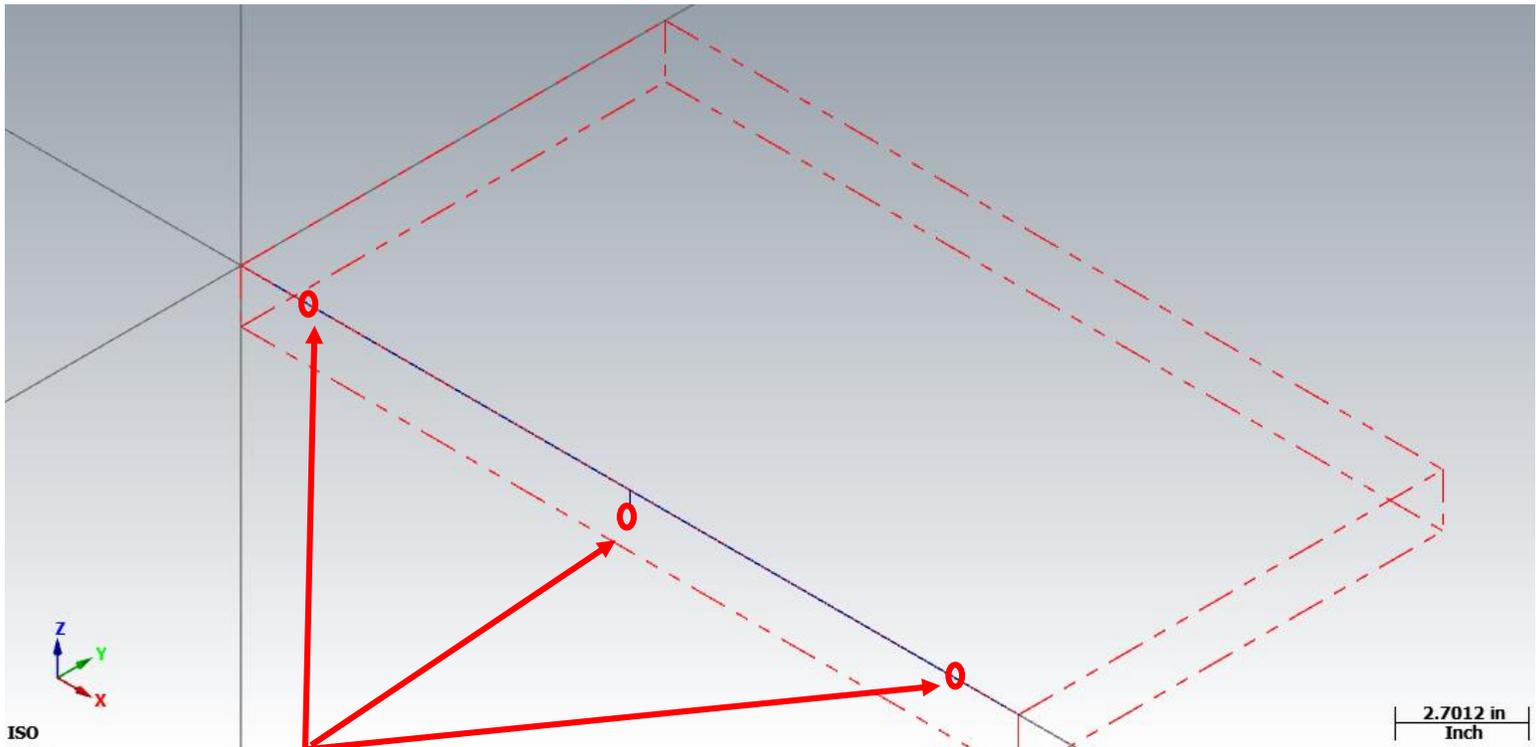
Result:



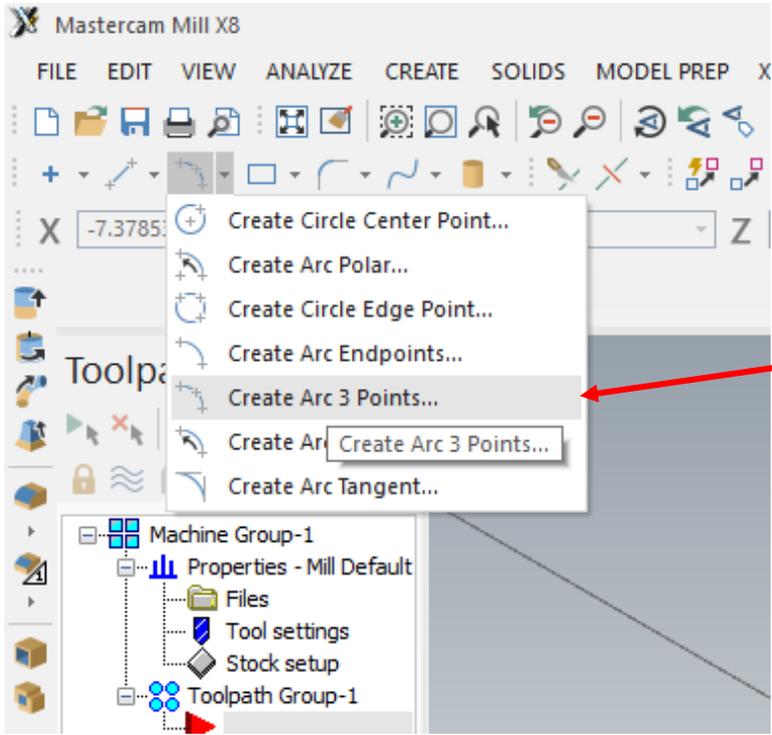
Now we want to draw a line from the top, middle of the seat down to the bottom of the sculpted part of the seat. In my example that will be  $\frac{1}{2}$ ". So get the line tool, and click on the center of the center line, and draw down your distance.



If you rotate the view with dynamic rotation or hit the ISO button, it should look like this:



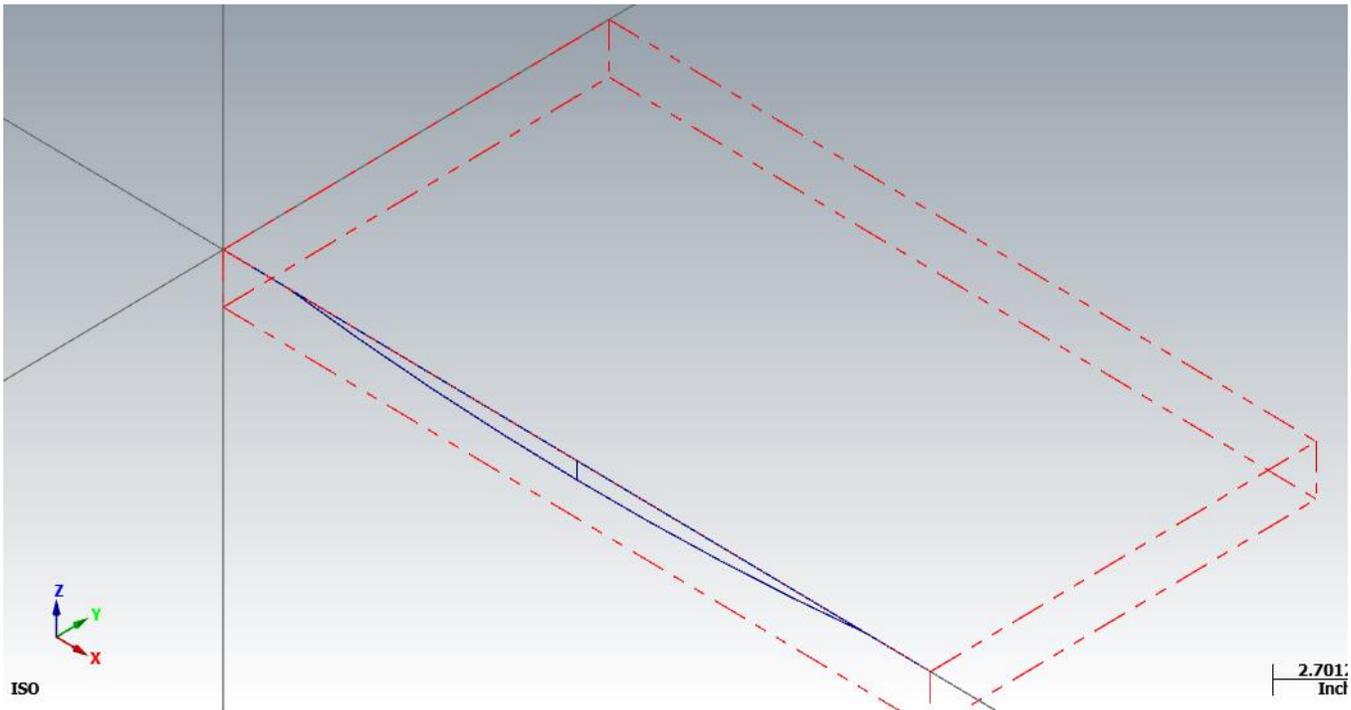
Now we are going to draw a 3-point arc from the end of the middle line, to the end of the vertical line, and then to the other end of the middle line.



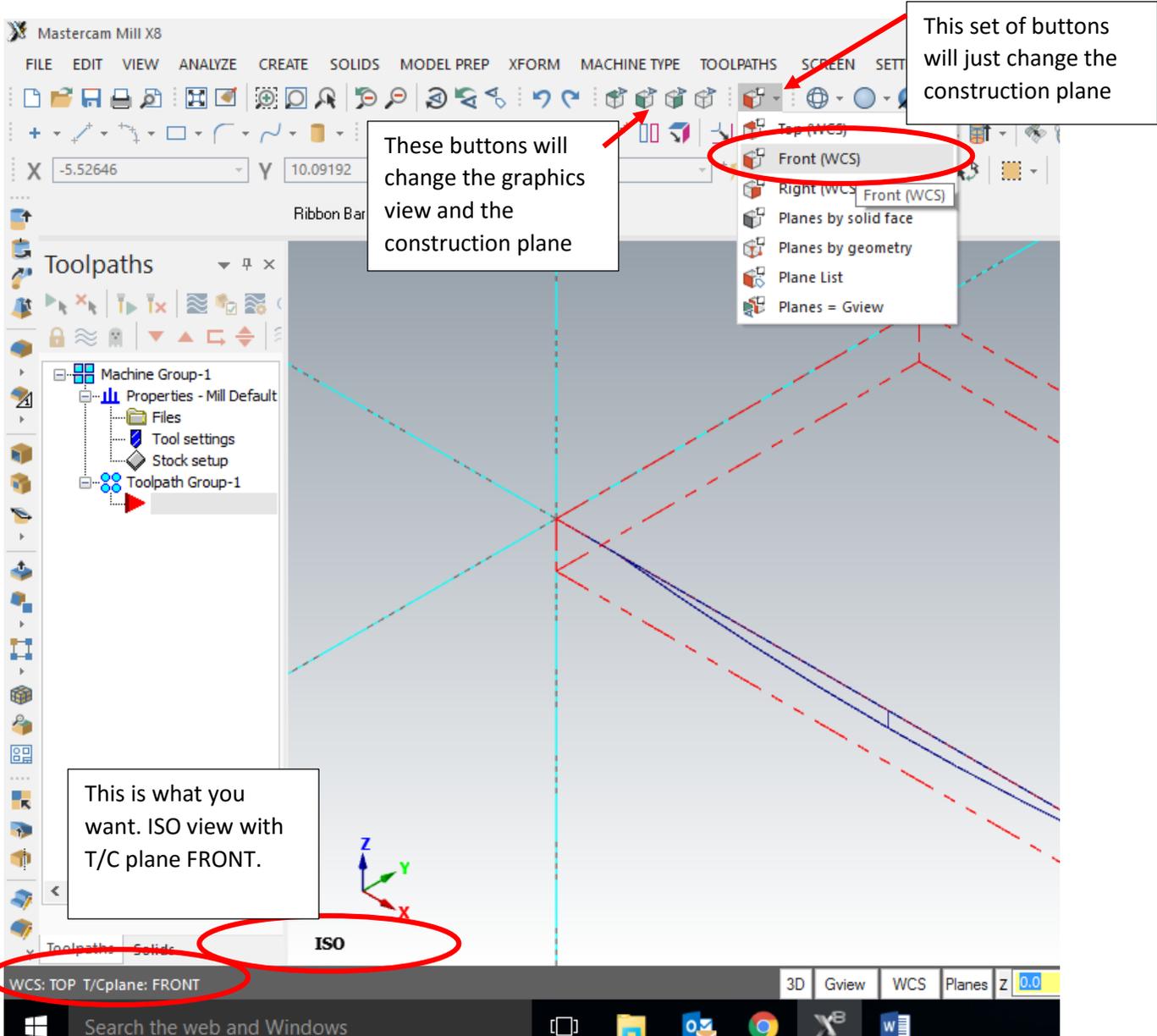
Please click on the 3-point arc tool.

Then click on the 3 points I described above. MCAM will sketch it, then hit enter again to draw the arc.

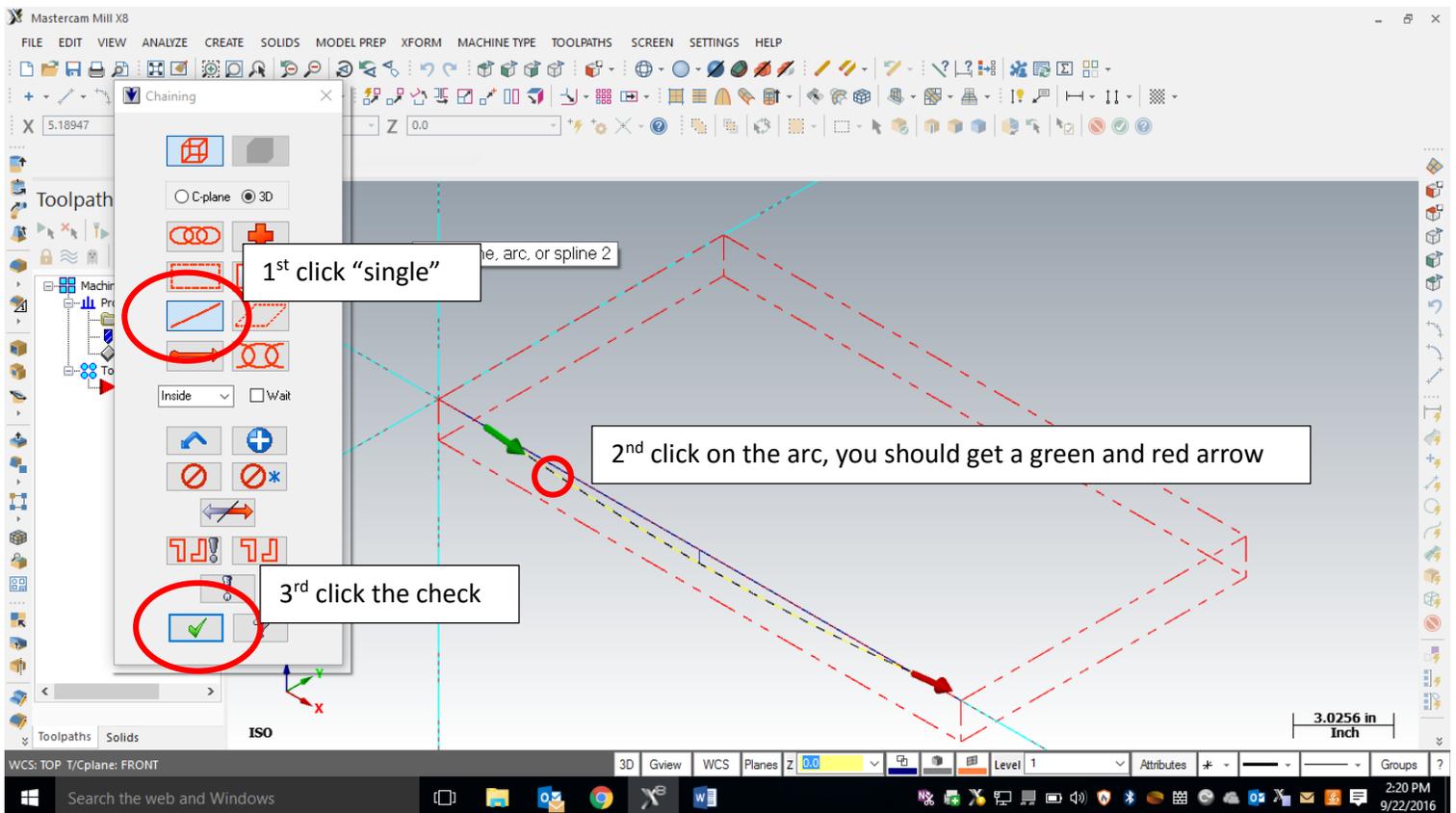
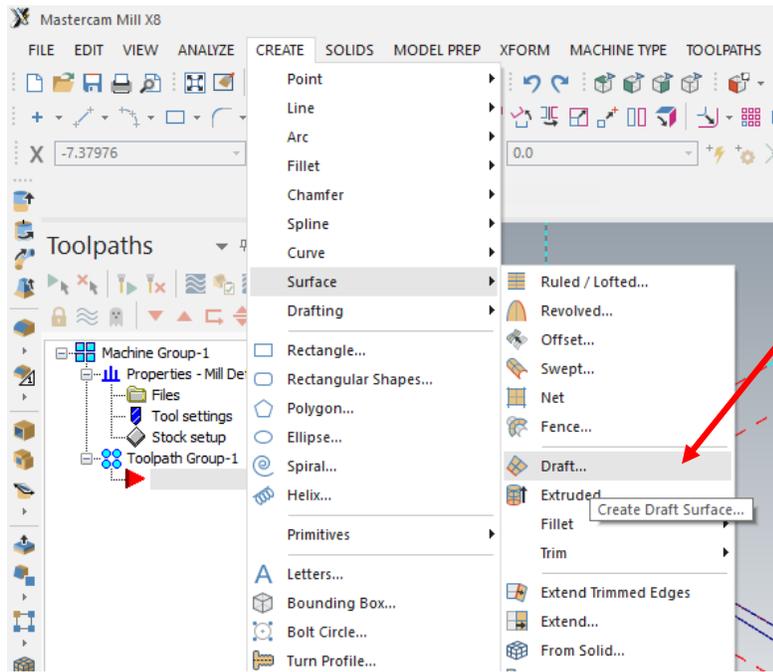
Result:



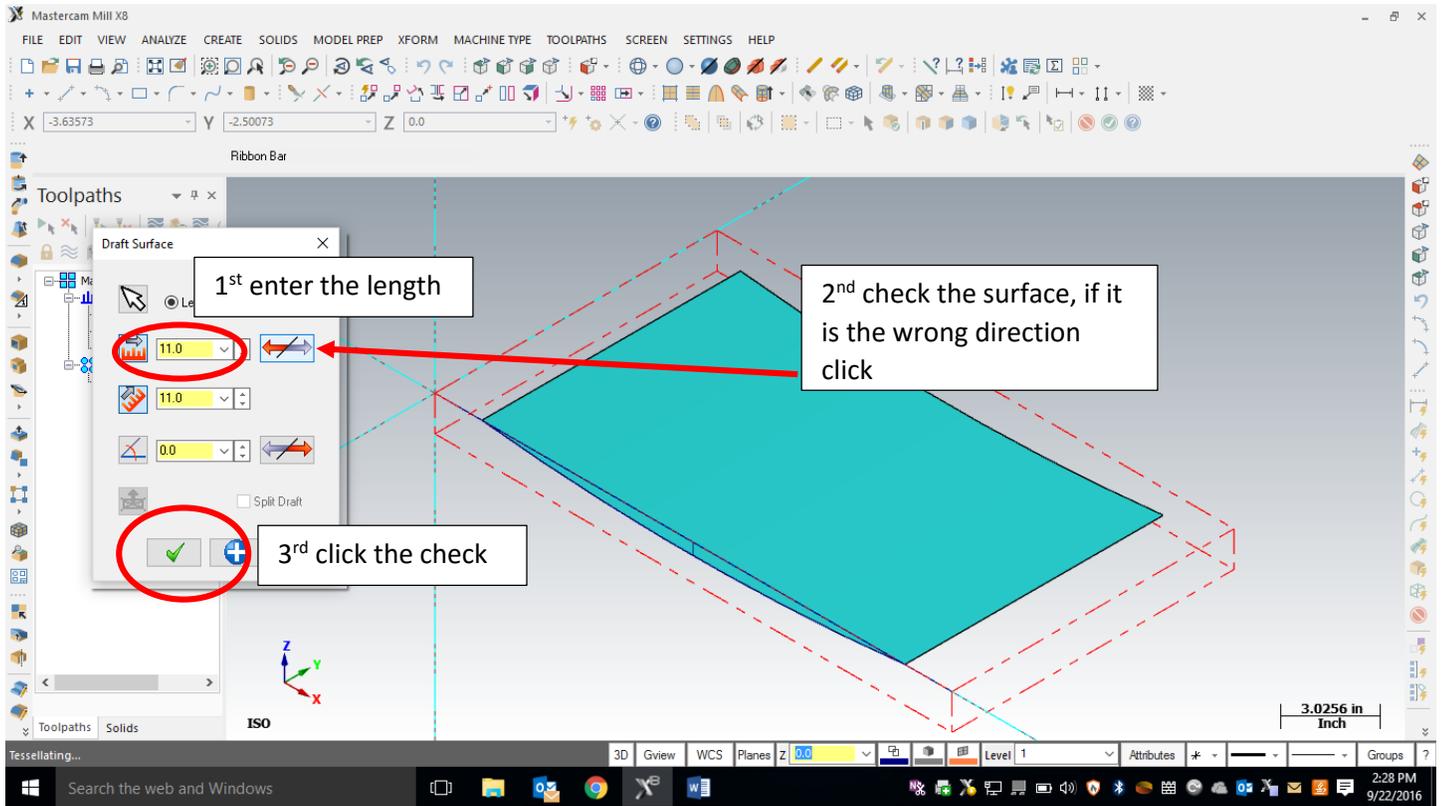
The next step is to create a surface from the arc. This is a simple surface called a draft surface. For MasterCAM to draw it correctly, there is a little bit of prep-work first. I like to be in an ISO view so I can see everything, but when you go to an ISO view your C/T plane (construction plane) is generally set to top. If we draft a surface in a top construction plane, the surface will go up or down, but we want it to go forward or back, so we need to change our C/T plane to front while in an ISO view. So go to an ISO view. Then change the C/T plane to front with the Front construction plane button.



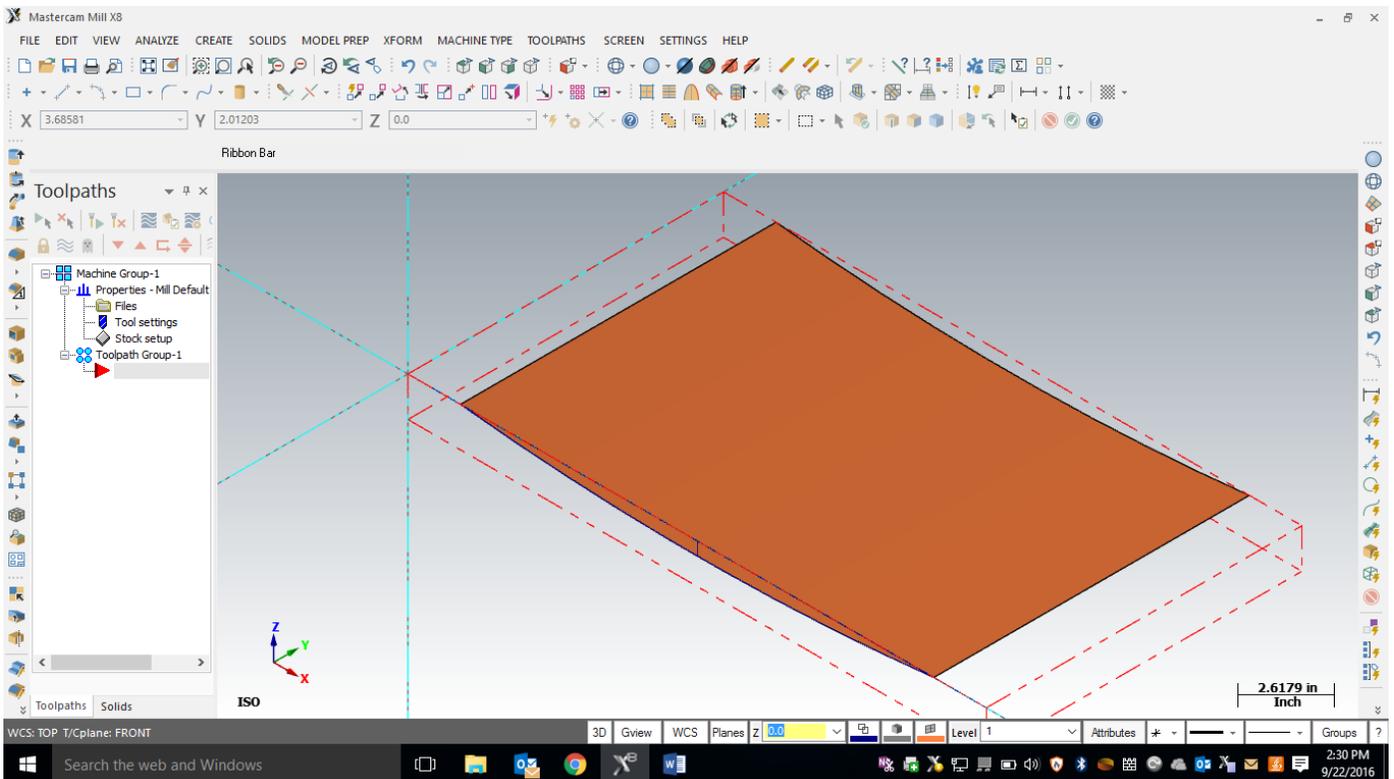
Next, we can create the surface. Go to Create/surface/draft



Then:



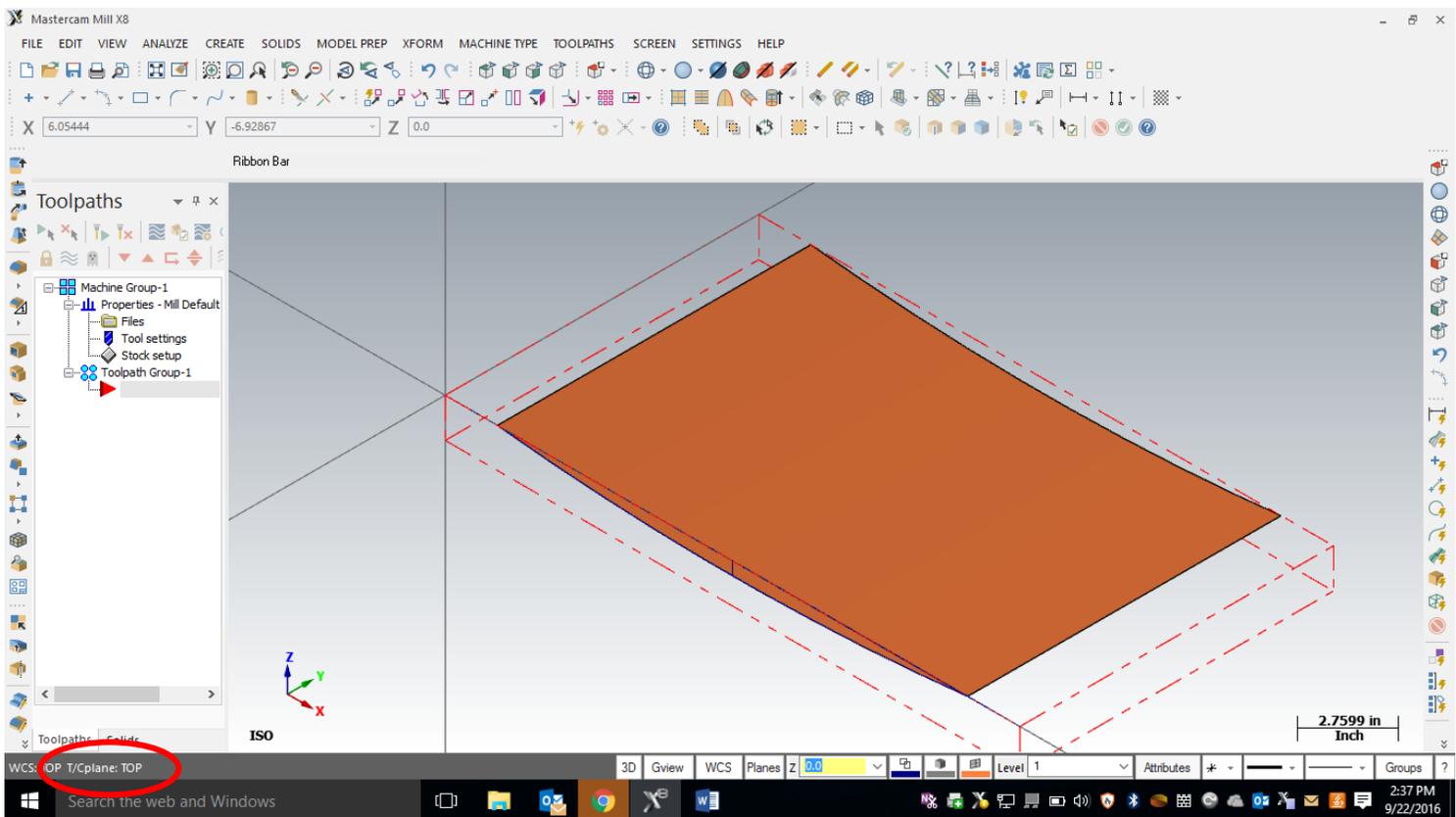
You now have a surface to assign toolpaths too. Result:



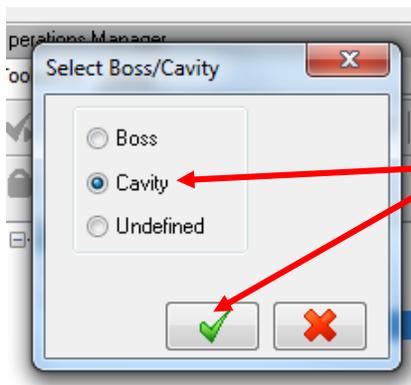
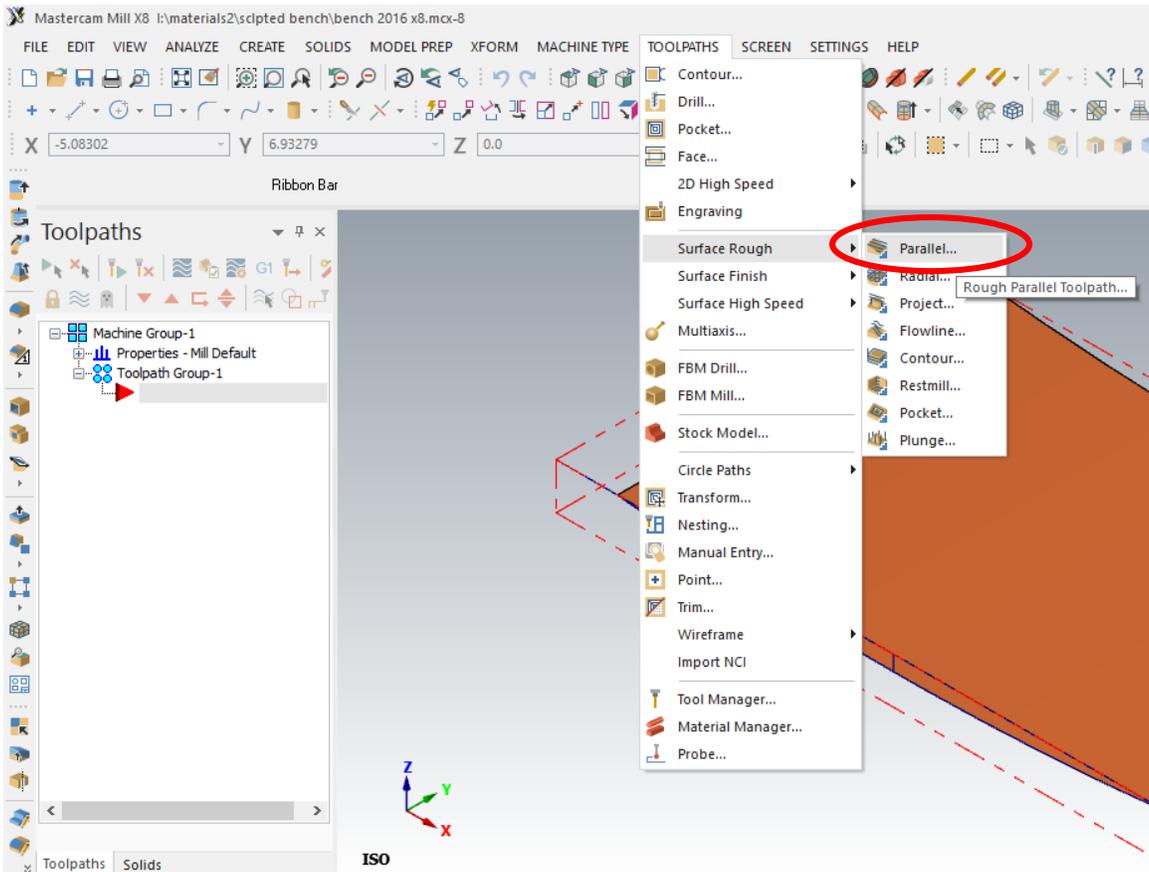
# Toolpaths:

For 3D geometry such as we have, there are 2 main types of tool paths. The first one is a surface rough toolpath. In a surface rough toolpath the tool bit will try to “hog-out” the majority of the material in a timely manner. The path usually only will follow one surface. The same surface can be used a drive surface for the finish pass too. The drive surface is the surface the tool bit is trying to cut to and shape. A finish toolpath will try to make the surface as smooth as possible. There are settings we can change to adjust the ridges left. This toolpath will take a long time to actually cut.

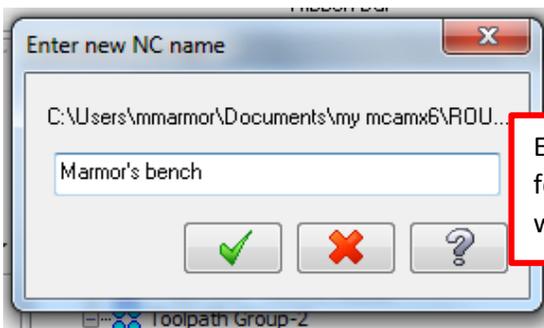
Before you assign any toolpaths, **the construction plane must be set to top.** If not the tool will try to cut the front of the workspace. So you probably can just change your C/T plane to top, or if you want to go to top view first then an ISO, that should work too.



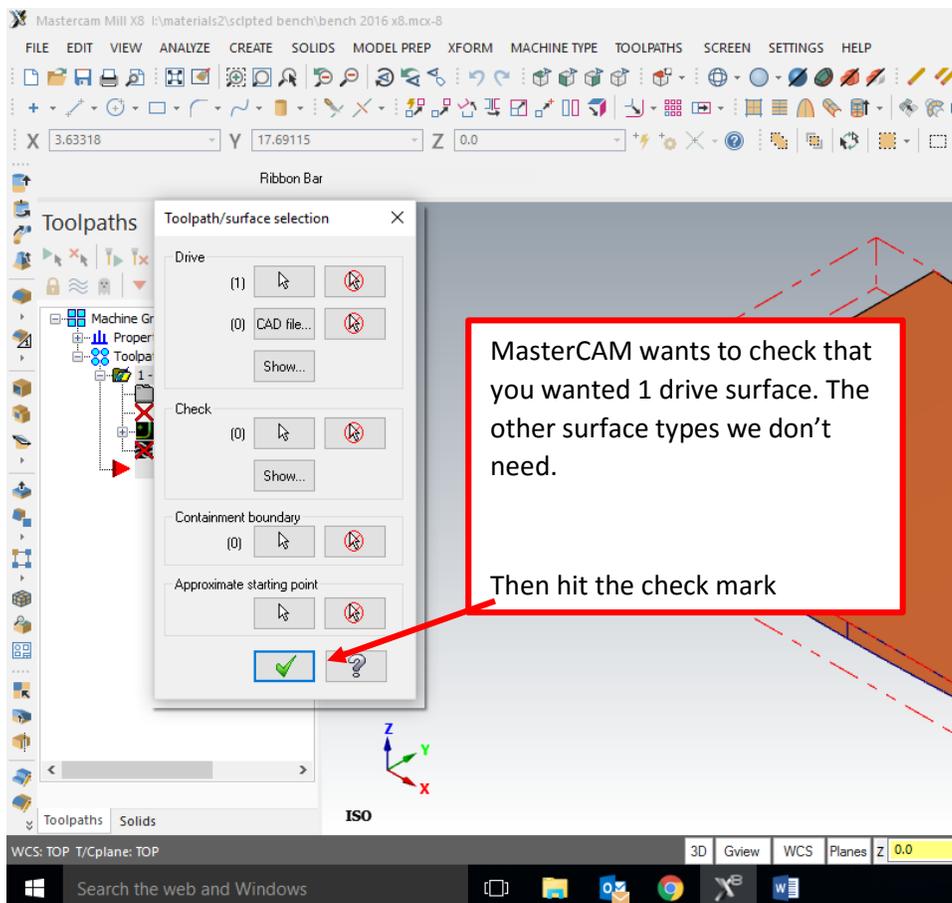
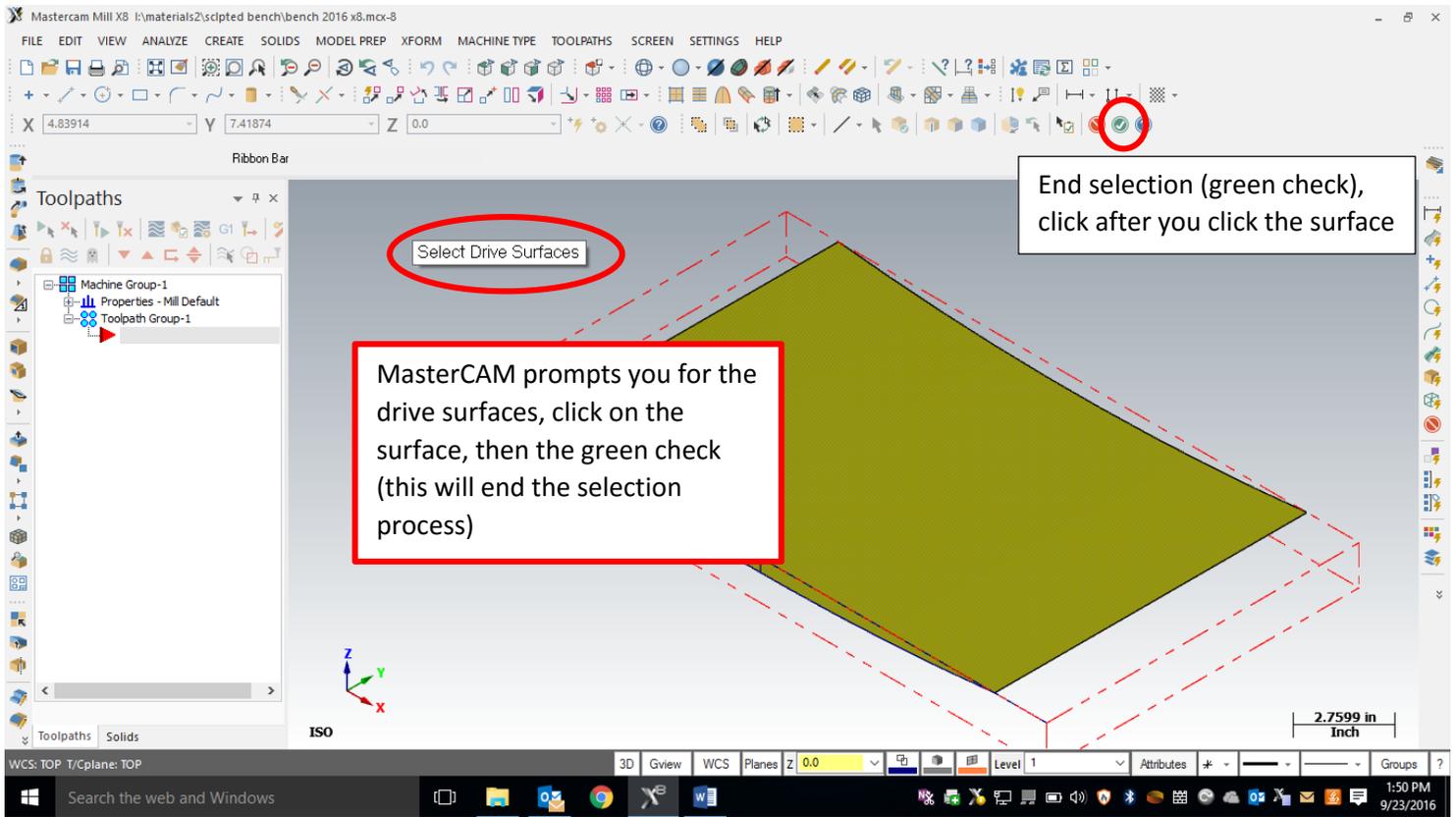
To start the toolpaths, go to Toolpaths/Surface Rough/Parallel

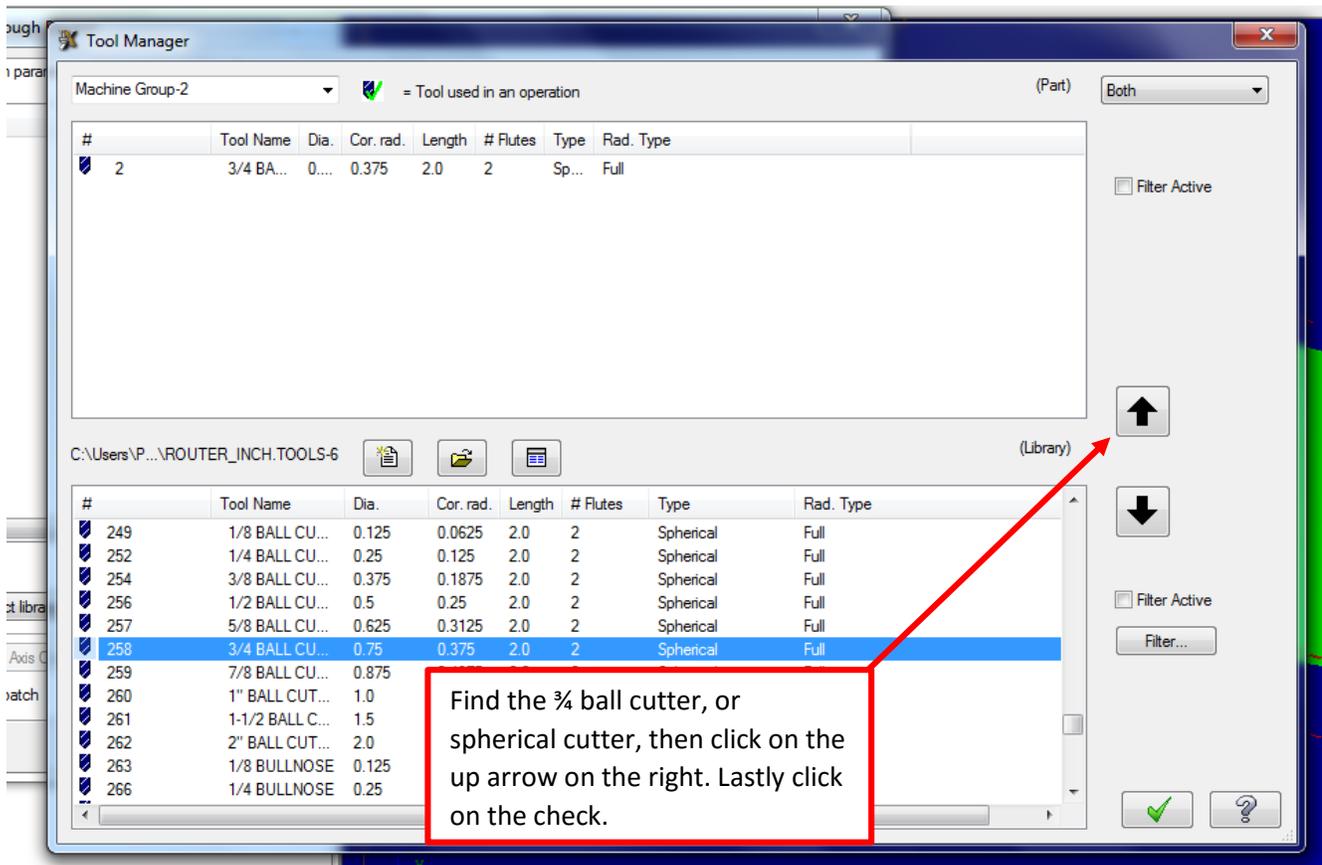
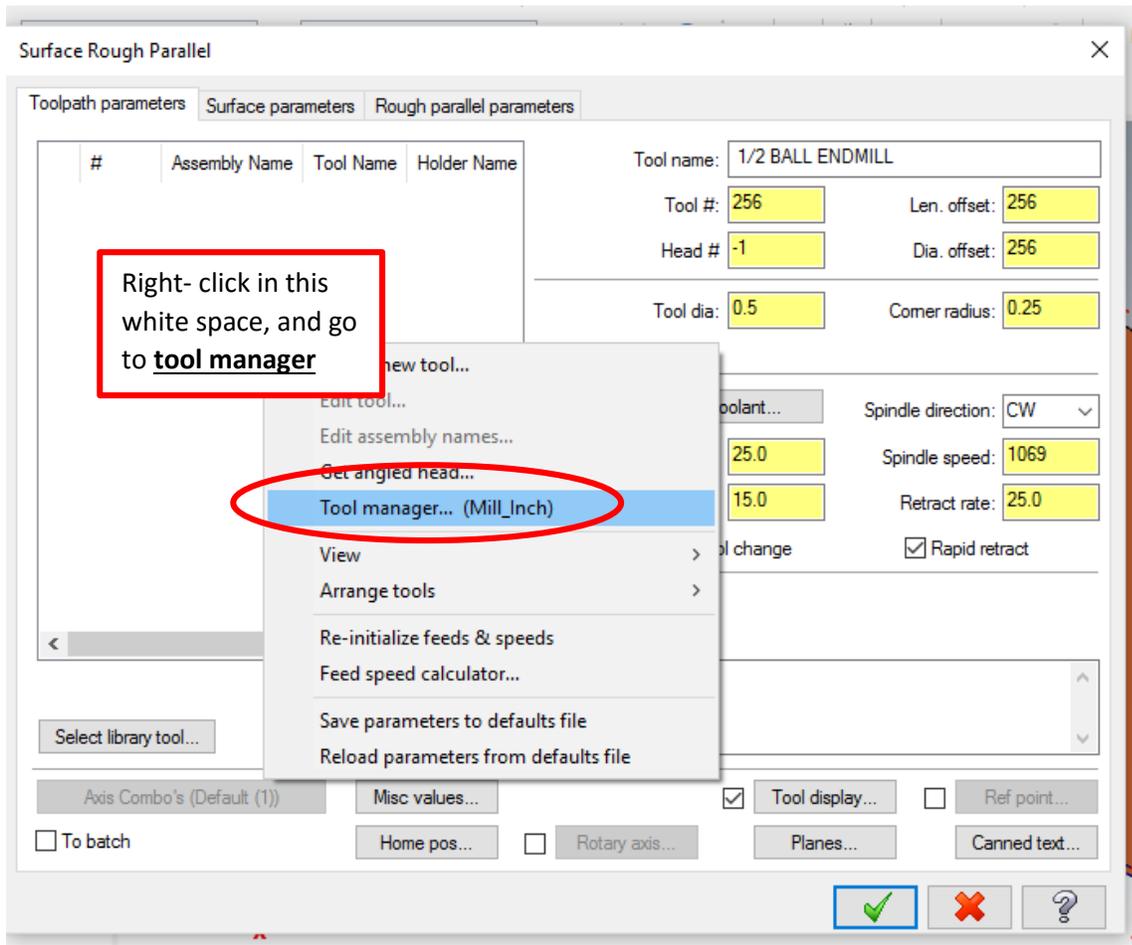


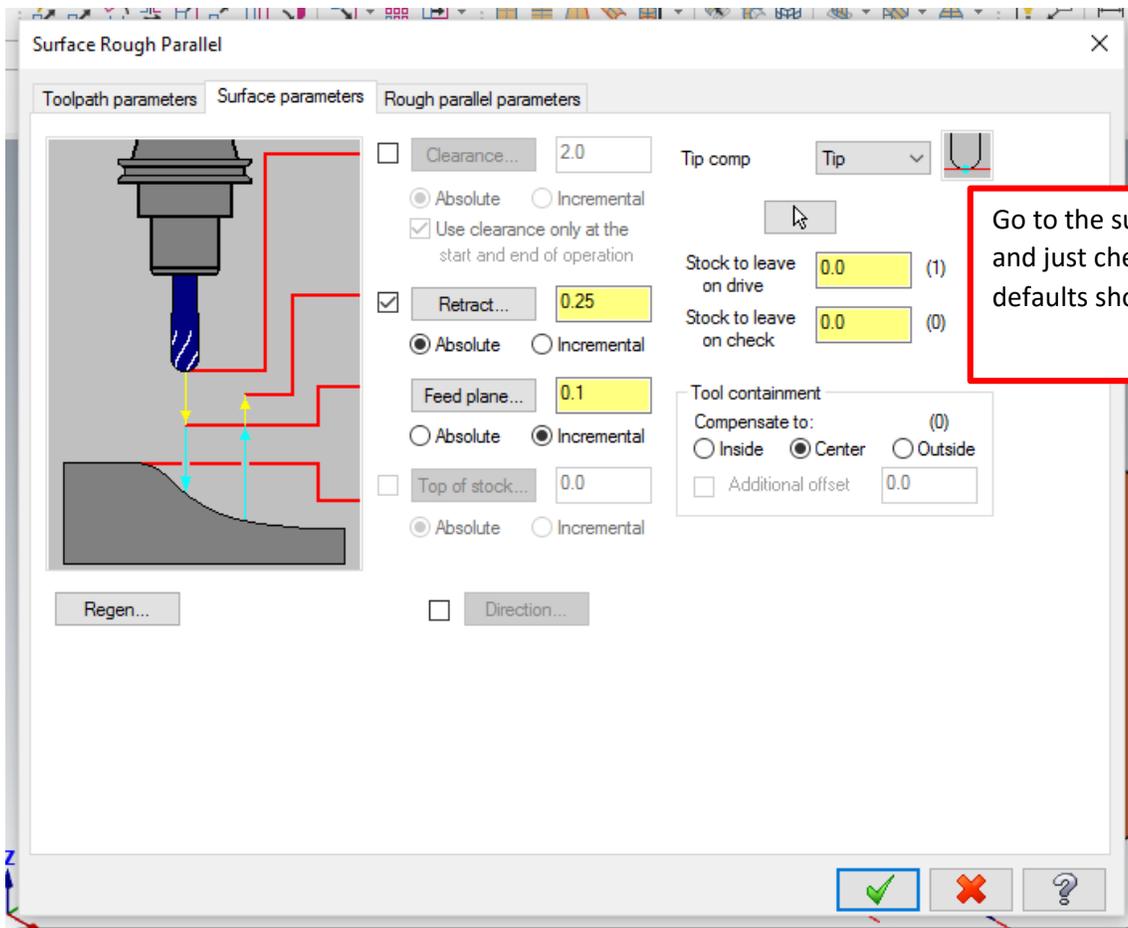
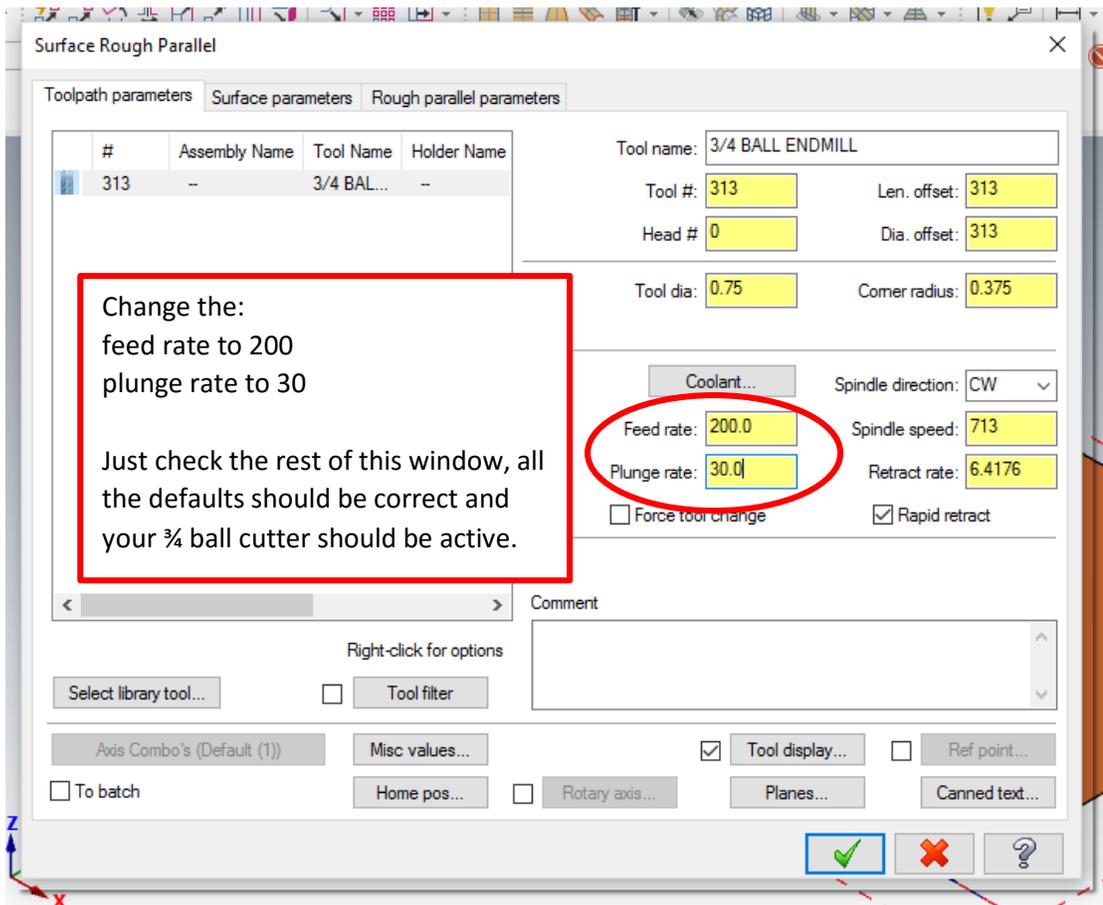
Click cavity, then the check

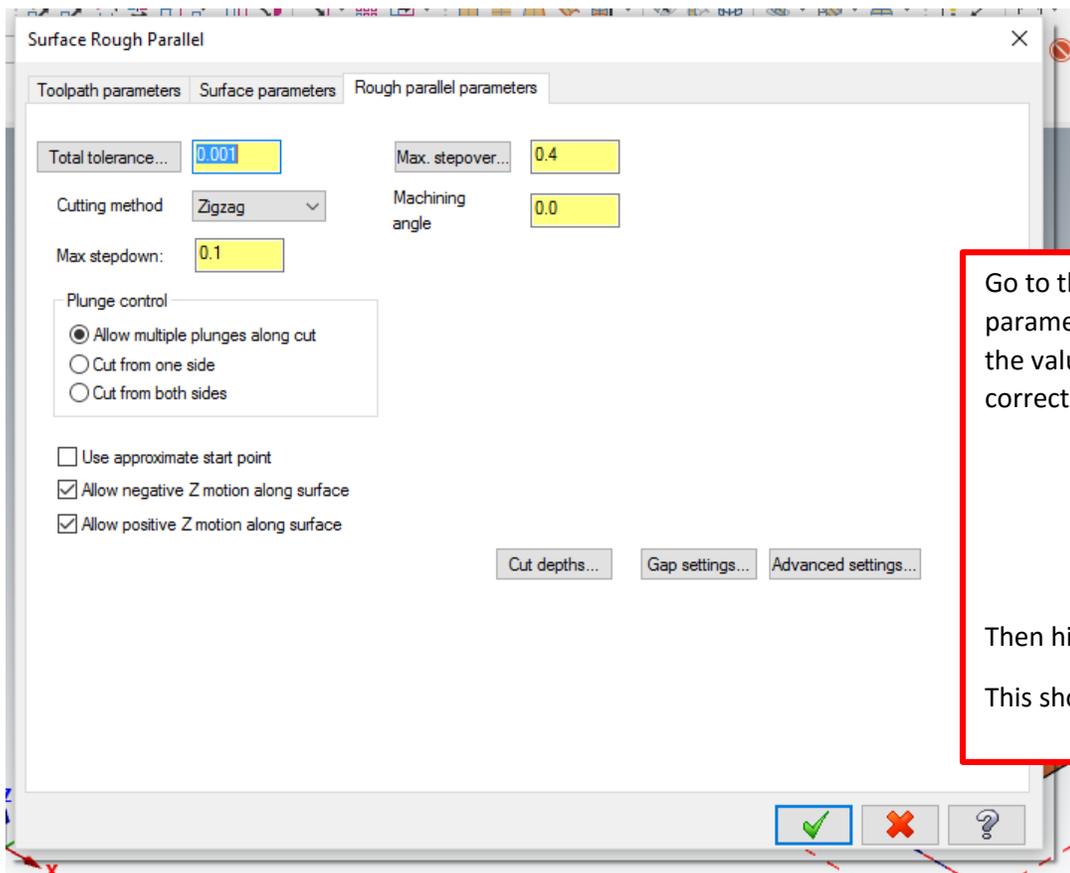


Enter an appropriate name for the toolpath in this window







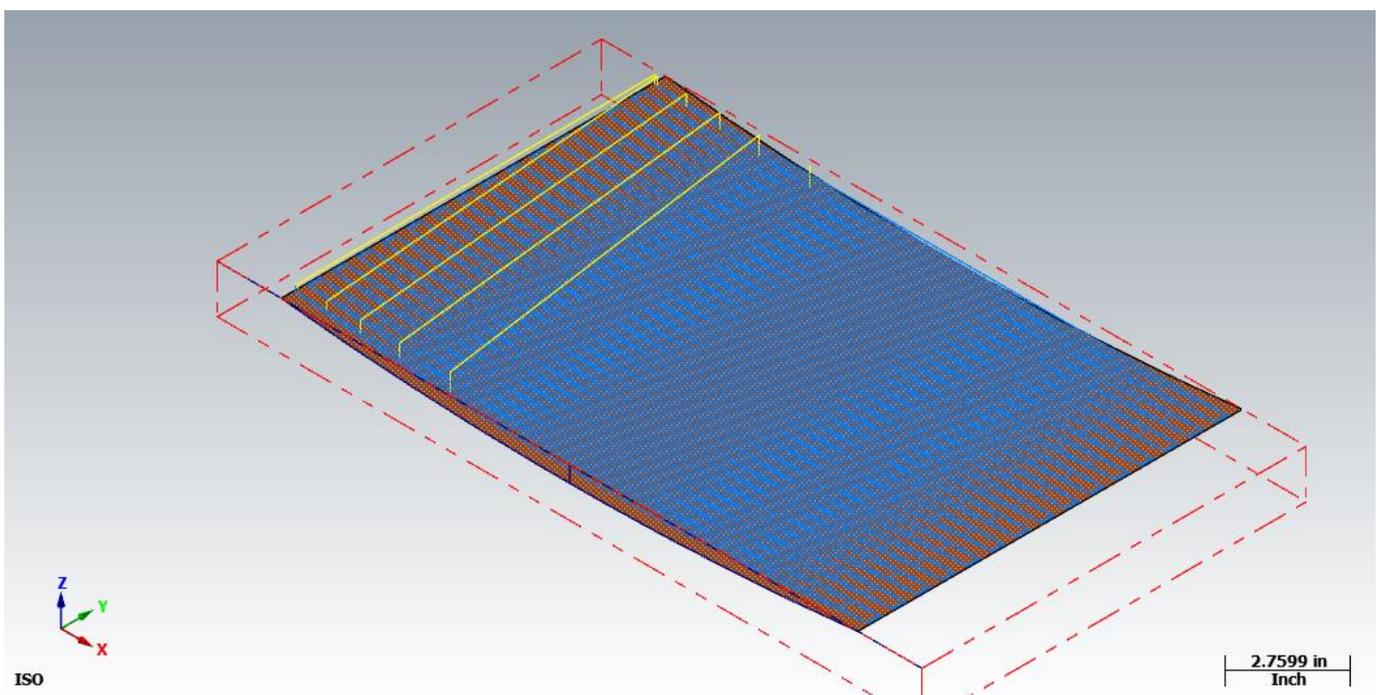


Go to the rough parallel parameters tab, and just check the values, the defaults should be correct.

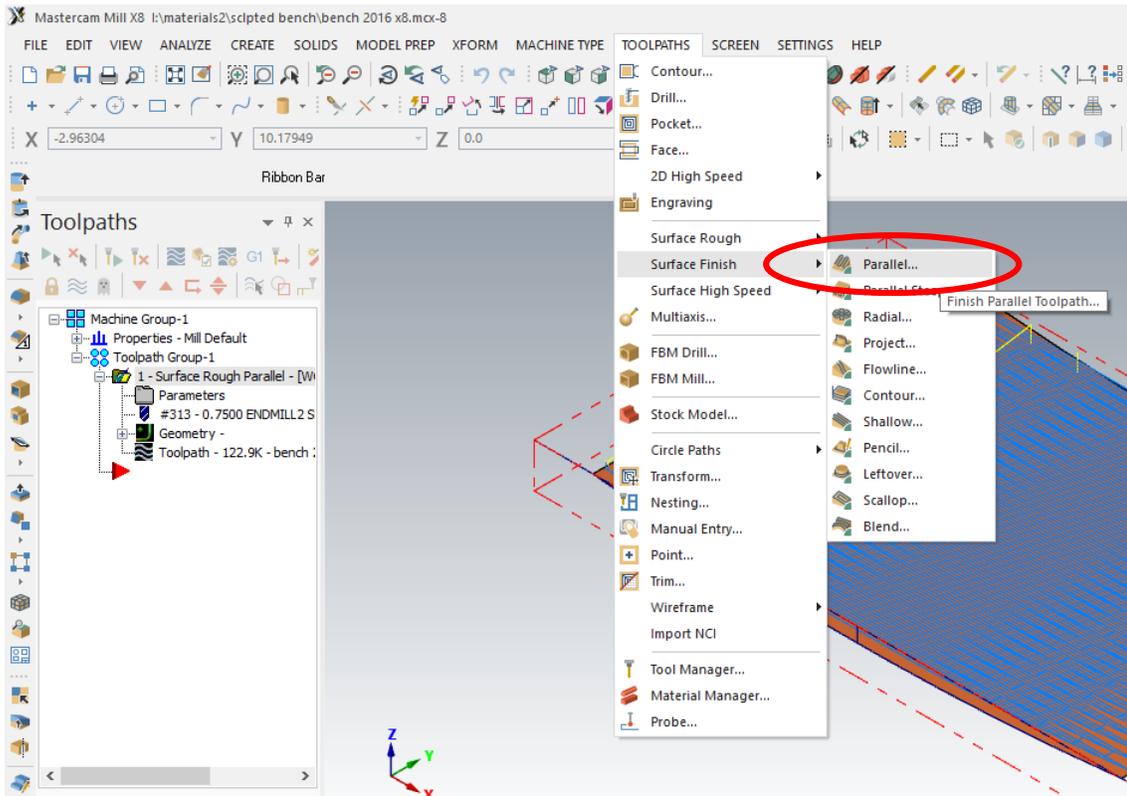
Then hit the check

This should draw the toolpath

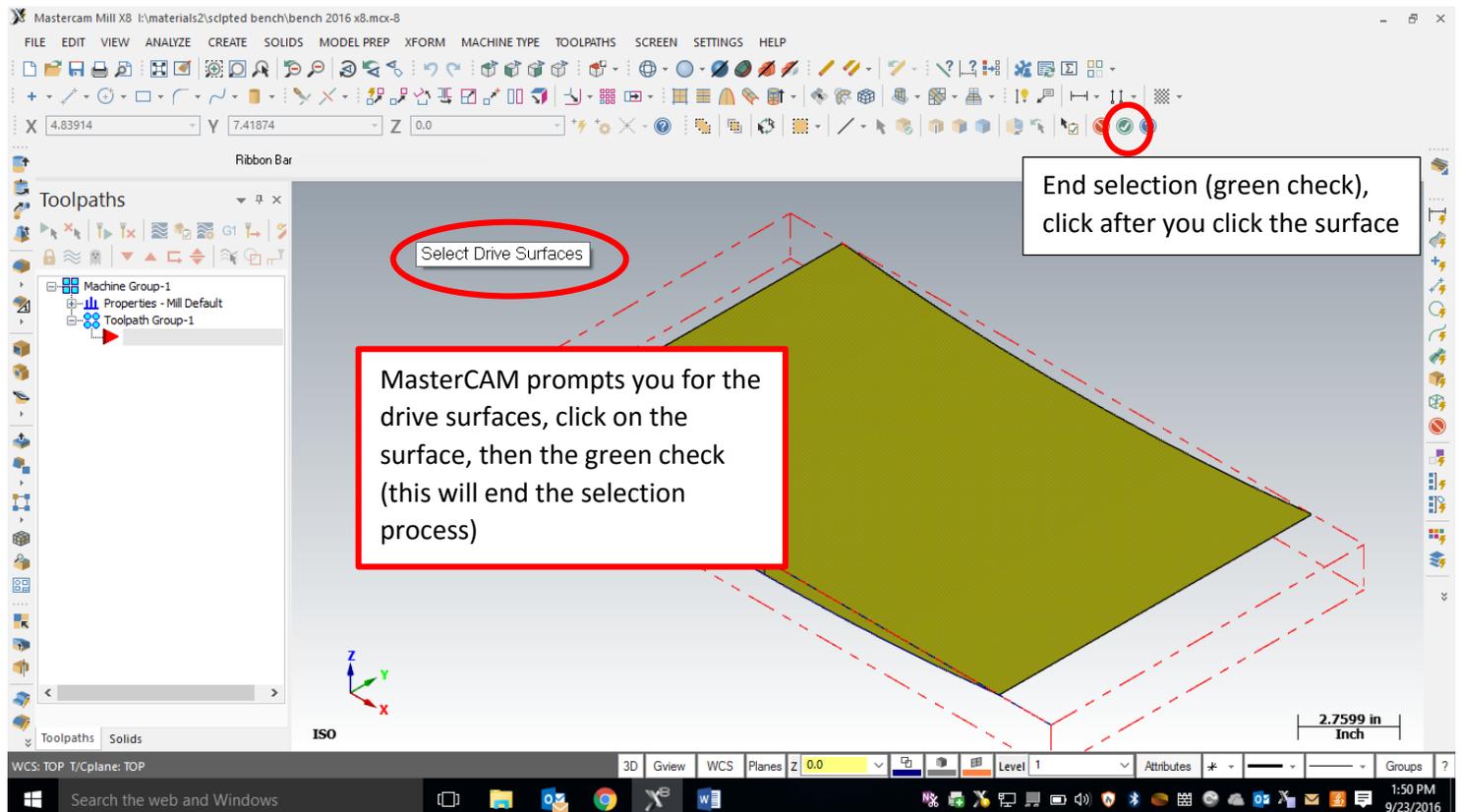
Result: After you hit OK, you should see masterCAM draw the toolpaths. The blue lines represent the center of the  $\frac{3}{4}$ " cutter when it is cutting material, and the yellow lines represent the center of the cutter when it moves between geometry.

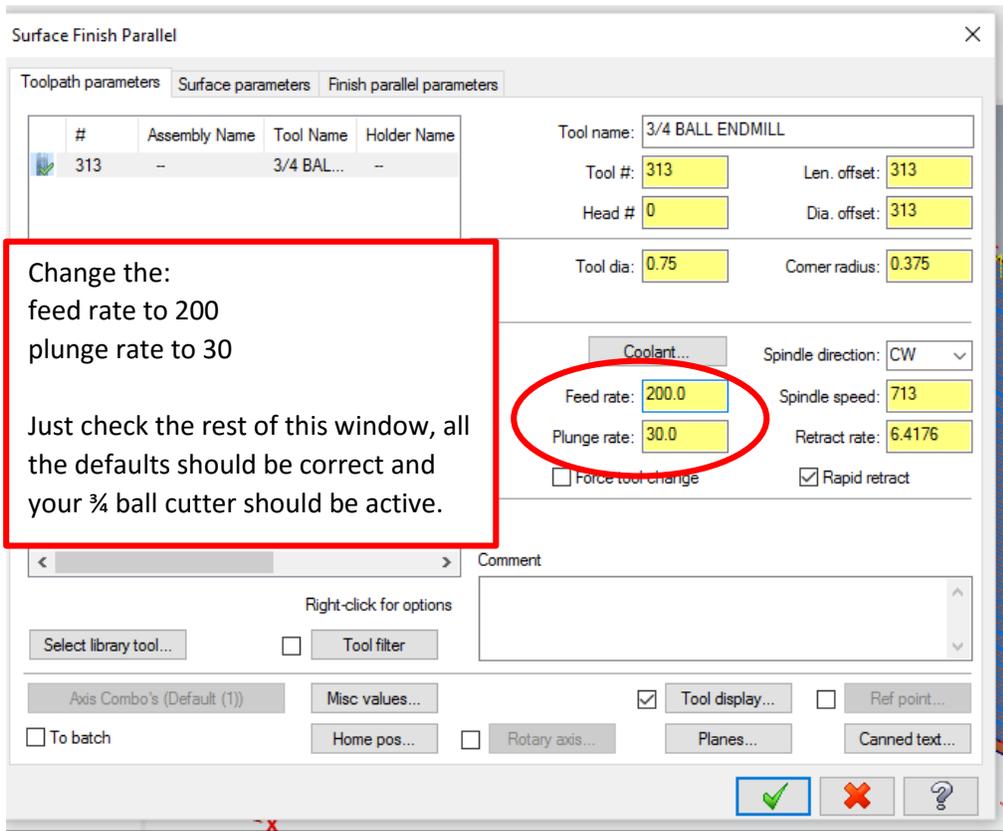
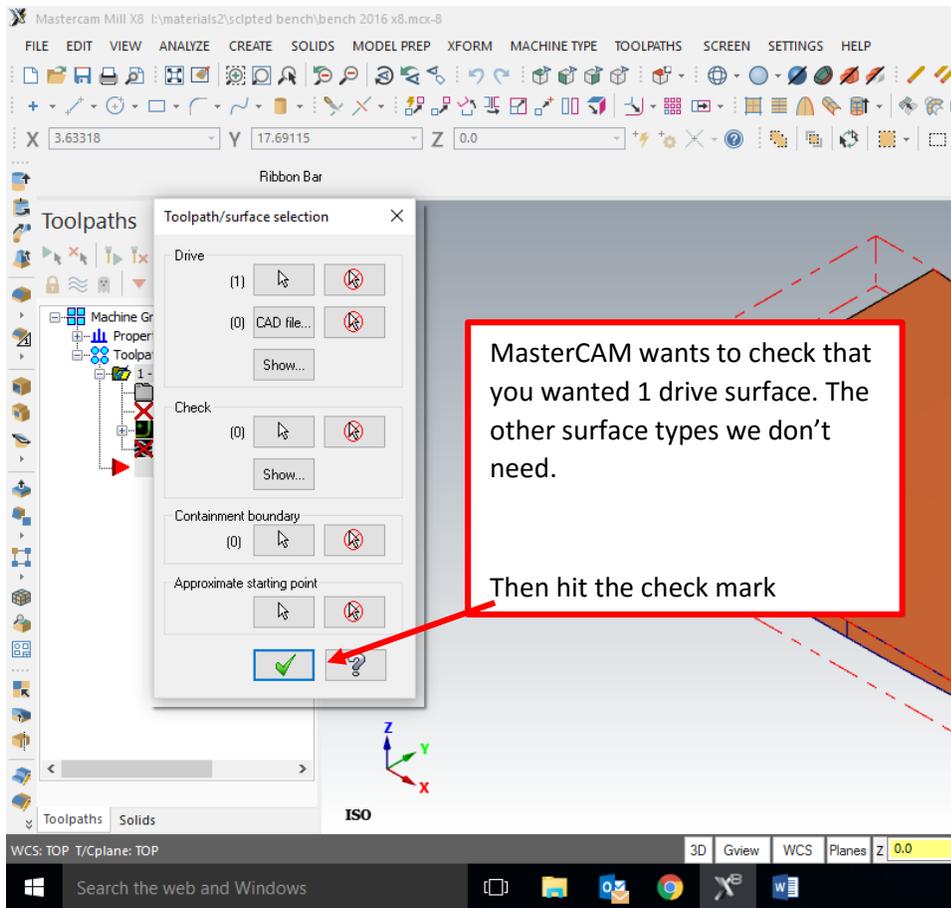


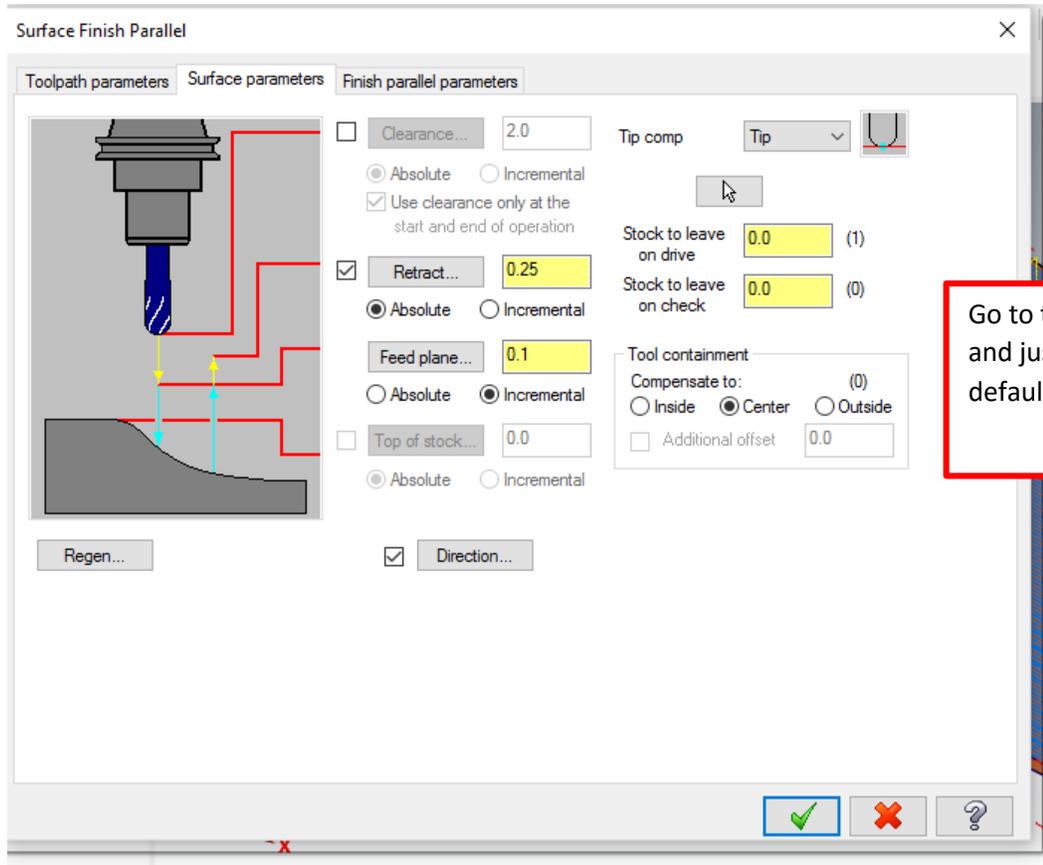
Time for the finish toolpath. Go to toolpaths/surface finish/parallel



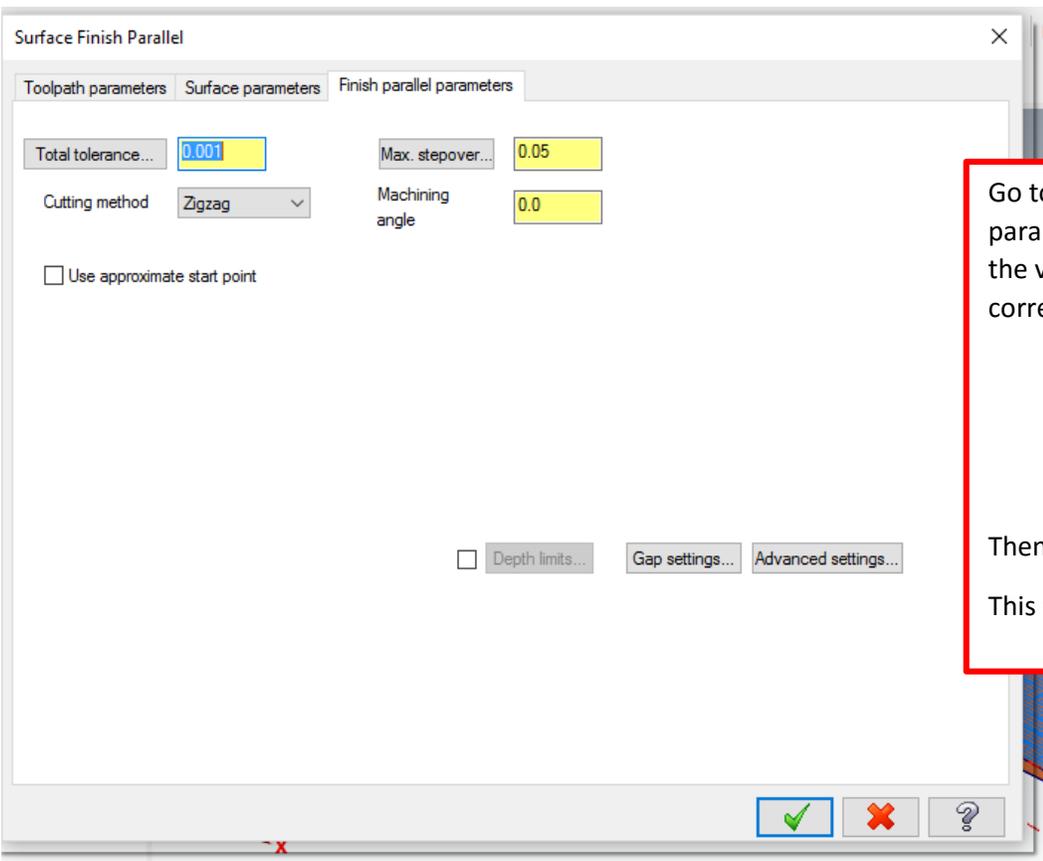
The geometry selection process is the same from the rough toolpath.







Go to the surface parameters tab, and just check the values, the defaults should be correct.

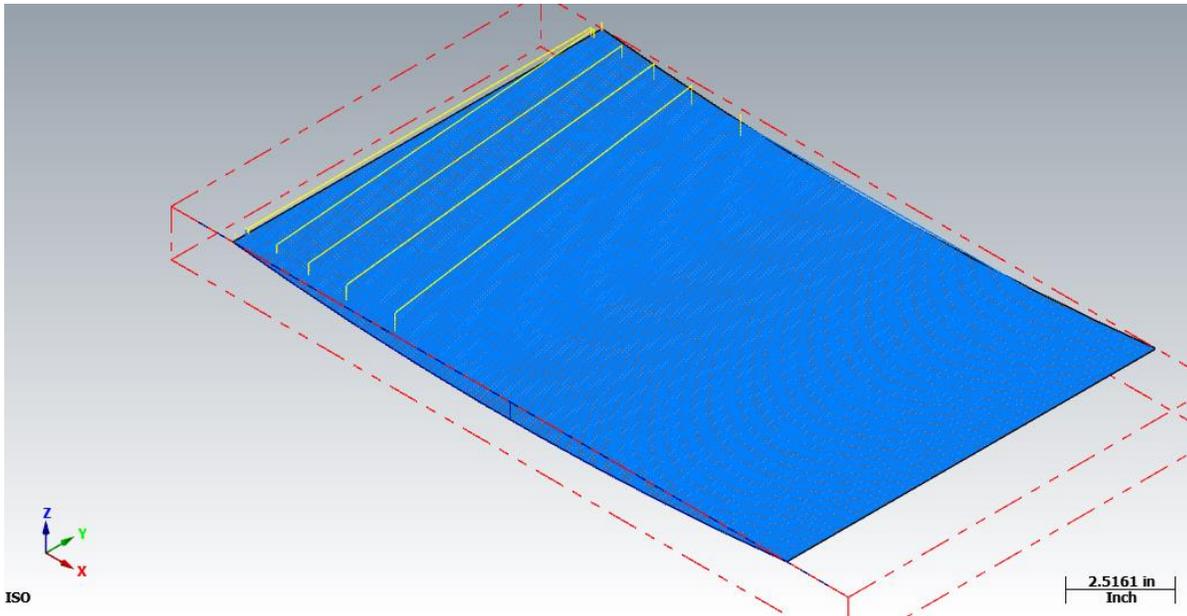


Go to the finish parallel parameters tab, and just check the values, the defaults should be correct.

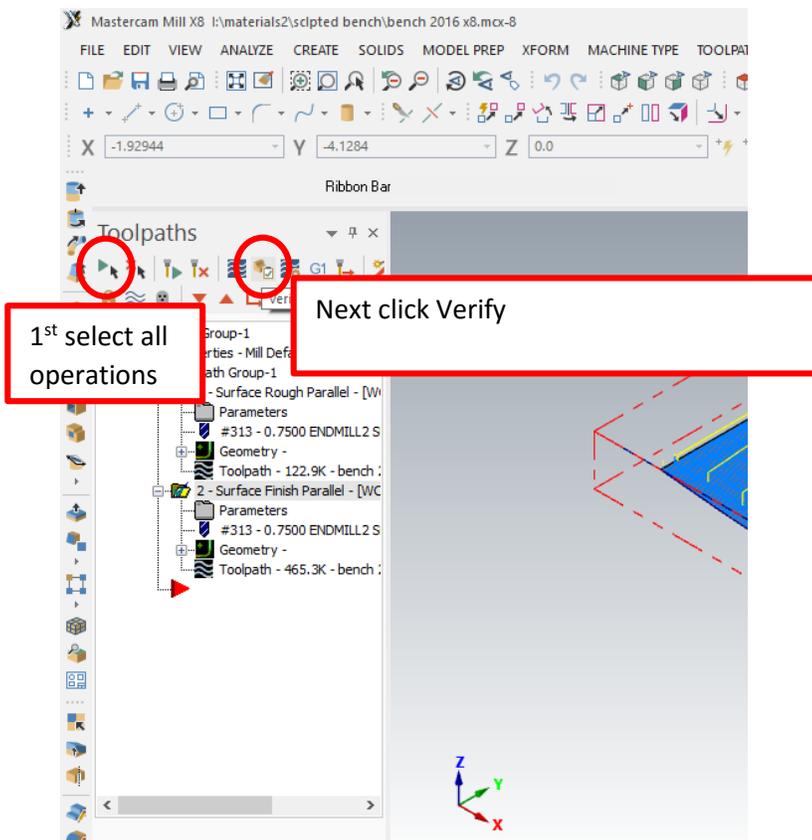
Then hit the check

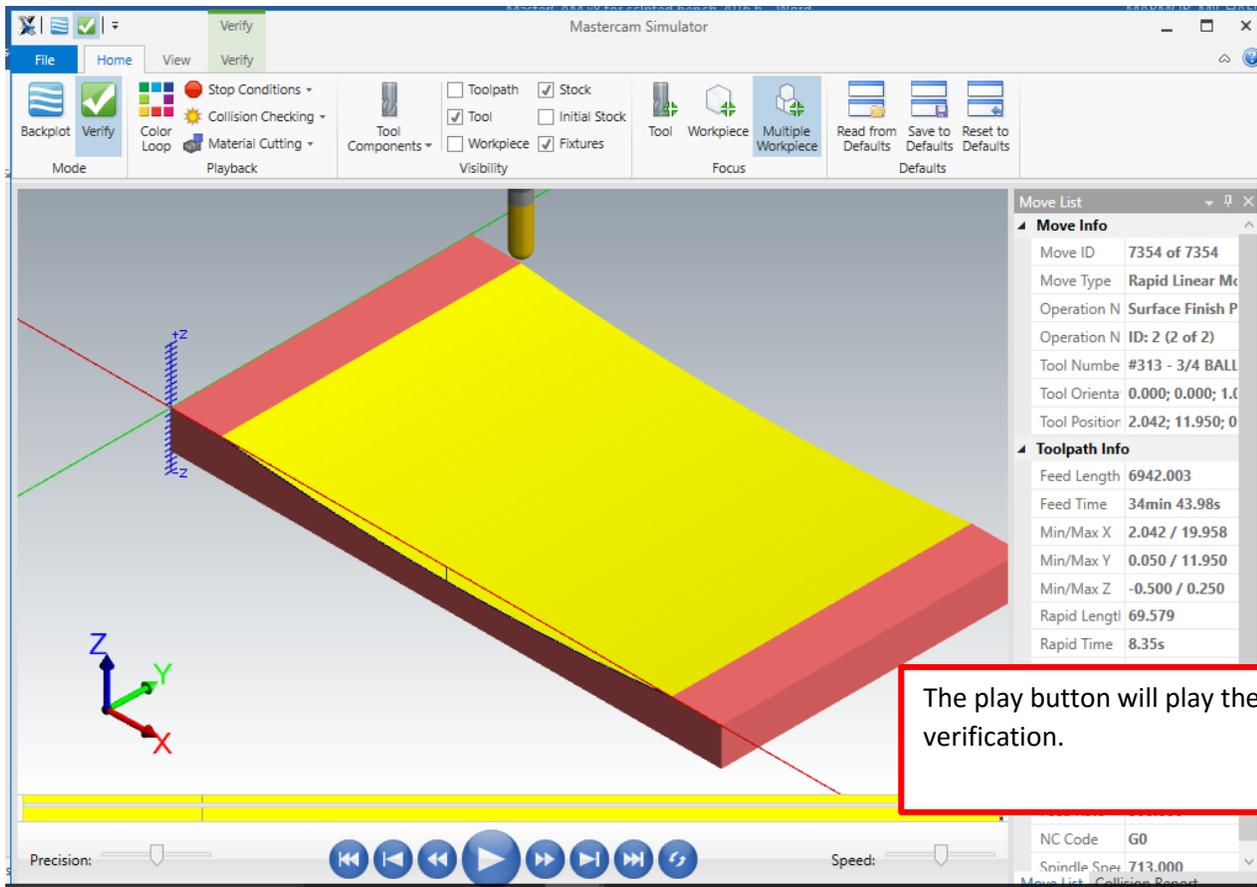
This should draw the toolpath

Result: After you hit OK, you should see masterCAM draw the toolpaths. The blue lines represent the center of the 3/4" cutter when it is cutting material, and the yellow lines represent the center of the cutter when it moves between geometry.



To verify the toolpath, please select all Toolpaths in the operations toolpath manager and click verify.





After you hit the play button, and you should see your part cut out virtually. Please show your Mr. Marmor.