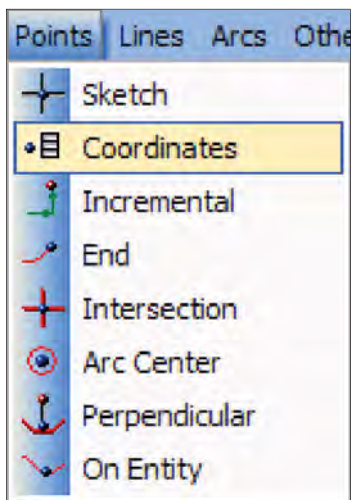


## FAQ #33: How do I use 4th Axis Wrapping?

**Q:** I'm unsure how to convert my Y axis into an A, and how to get it to output angle measurements instead of my usual units. How do I do this?

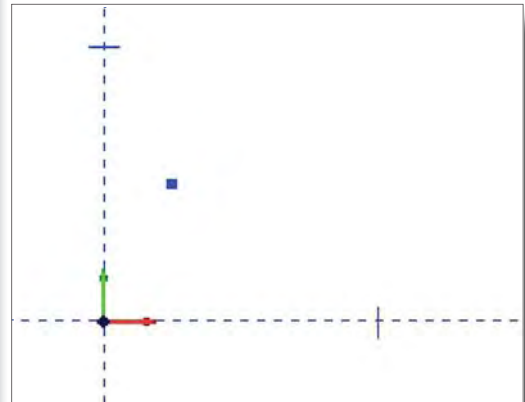
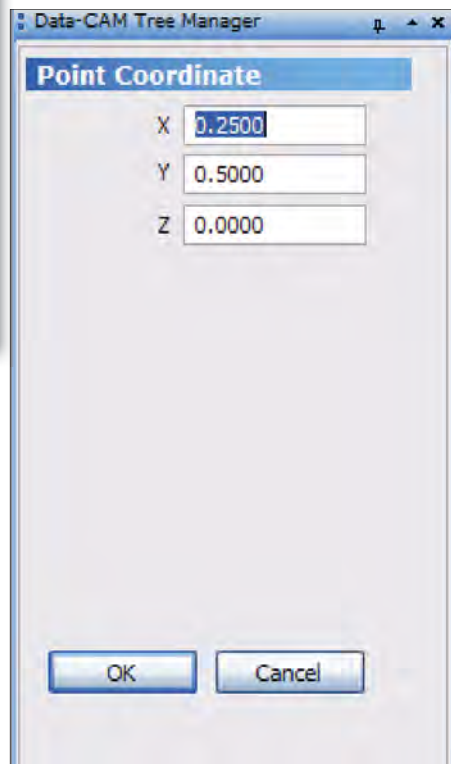
**A:** It's actually far simpler than it sounds. Essentially what is required to use 4th axis wrapping is that the machine setups and post processor are configured to use it. If they are not, contact the post processor department at 727-489-0003 for a version of your post processor that is. Follow these steps for a quick overview.

**Step 1:** As with any part in BobCAD-CAM, there needs to be a shape to cut. This exercise uses a row of 4 diamonds.

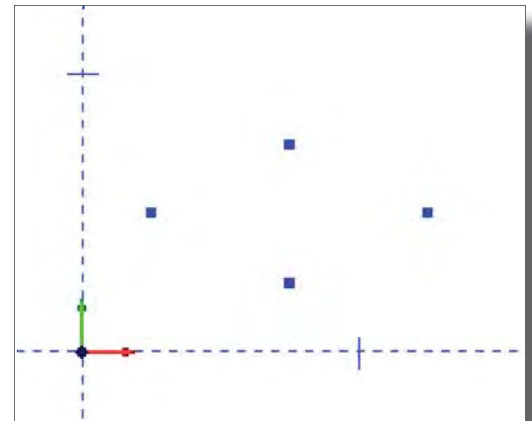


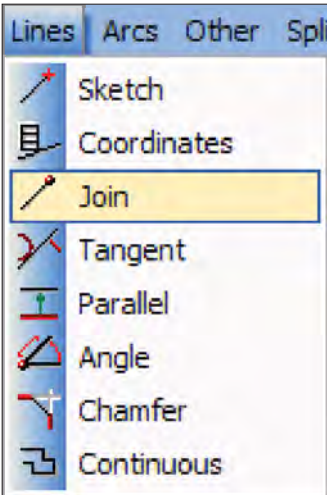
Click on **Point** in the main menu and choose **Coordinates**.

In the **Data-CAM Tree Manager**, enter in .25 for **X**, .5 for **Y**, and 0 for **Z**. Click **OK** and a point will appear on the screen.

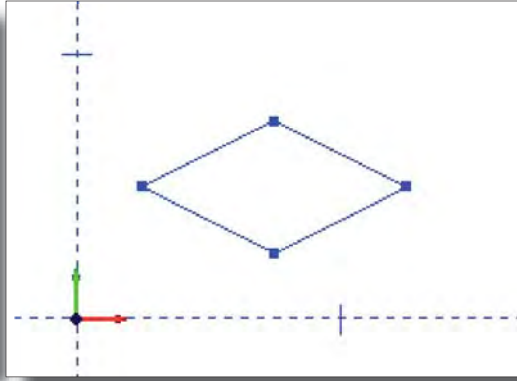


Change the **X** coordinate to 1.25 and click **OK** again. Another point will be drawn. Place two more points at X0.75, Y0.75, and X0.75, Y0.25. The points should be arranged in a diamond like the picture here.

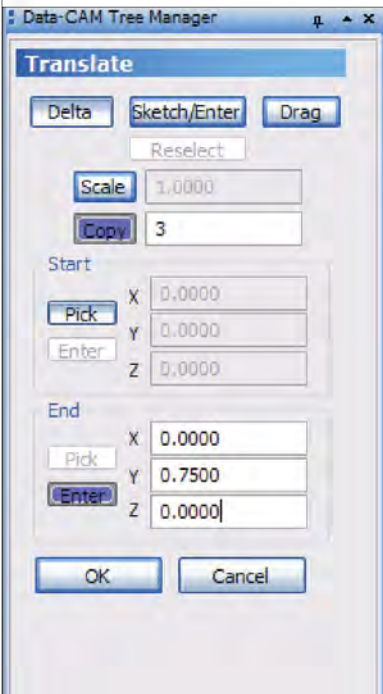




Click on the **Lines** menu at the top of the screen and choose **Join**. Click on the points to join all four into a diamond shape.

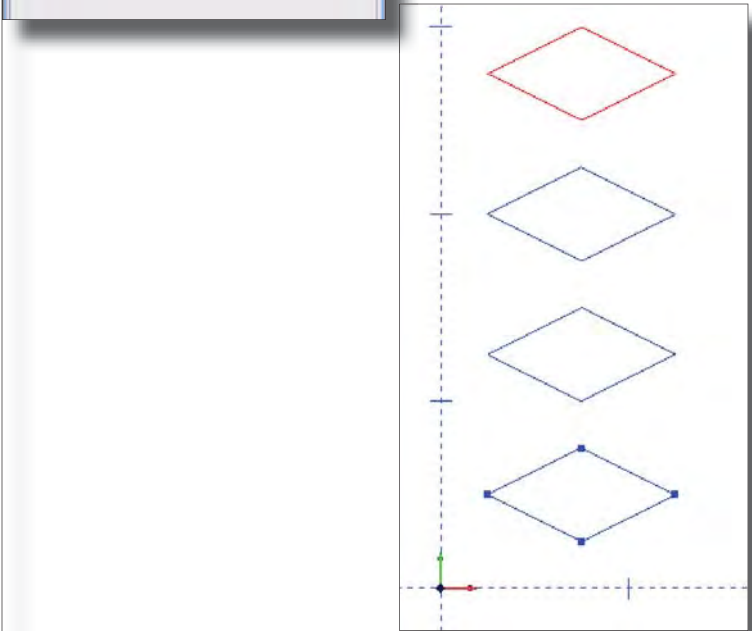
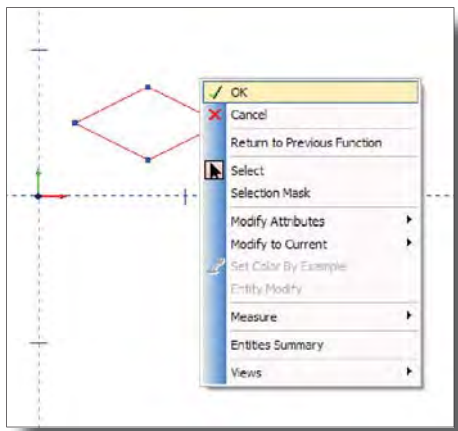
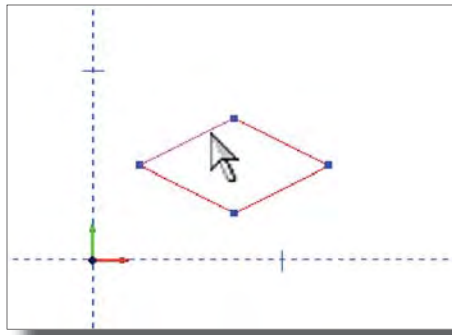


Since there will be four diamonds cut around the part, choose **Translate** from the **Utilities** menu.



In the **Data-CAM Tree Manager**, click on **Delta** at the top, and click on **Copy**. Put in 3 in the copy field. Under **End**, put in 0.75 in **Y**. Click **OK**.

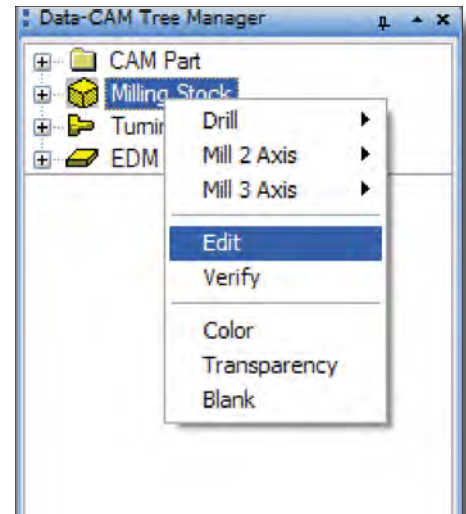
Hold the Shift key on the keyboard and click anywhere on the diamond to get it highlighted. Right click anywhere in the **Workspace** and choose **OK** from the menu that will appear.



Click **OK** one more time in the **Data-CAM Tree Manager** and BobCAD-CAM will make the copies of the diamond.

**Step 2:** Right click on **Milling Stock** in the CAM tree and choose **Edit** from the menu. The **Stock** dialog will appear.

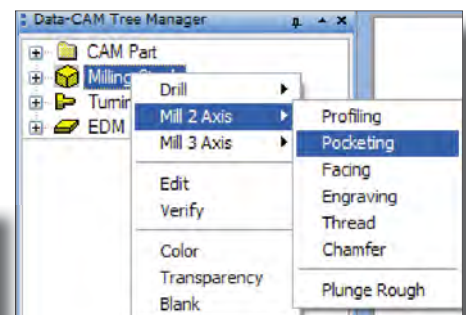
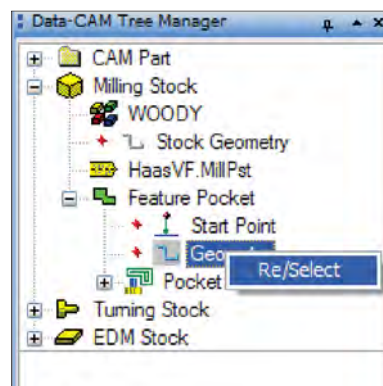
In the dialog, set the **Type** to **Cylindrical Stock** and the **Stock Diameter** to 1.5. Set the **Rapid Plane** to .1 to give the part clearance for rapid moves. Click on **X** for the **Rotary Axis** and then click **OK**. The stock will be set up for wrapping on the 4th axis for this part.



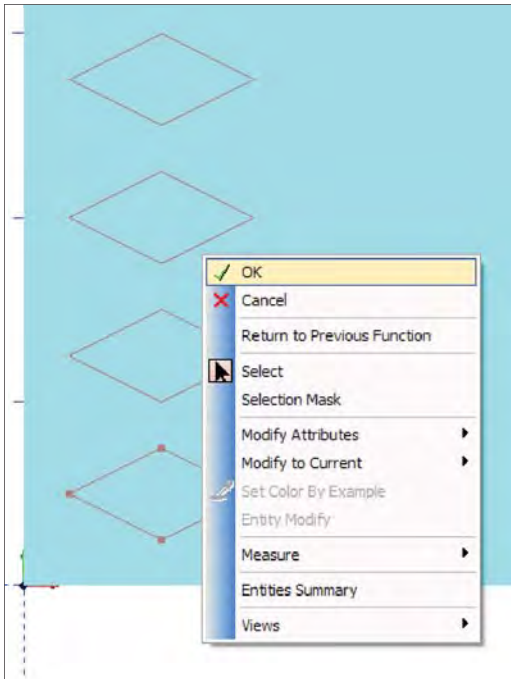
For most parts, setting up the stock is all that is required to wrap on the 4th axis. As in this example, the geometry should be drawn in the +X and +Y quadrant of the **Workspace** in order to avoid cutting where there is no stock.

**Step 3:** Since the drawing is made and the stock is set up, the feature to cut all 4 diamonds at once can be set up. Right click on **Milling Stock** and hover the cursor over **Mill 2 Axis**. From the fly-out menu, choose **Pocketing**.

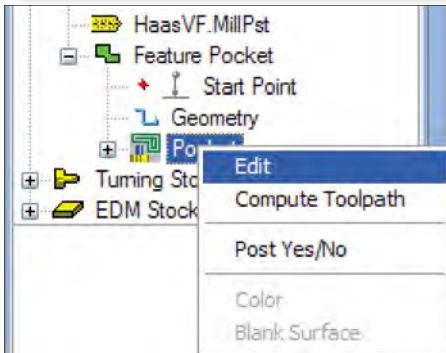
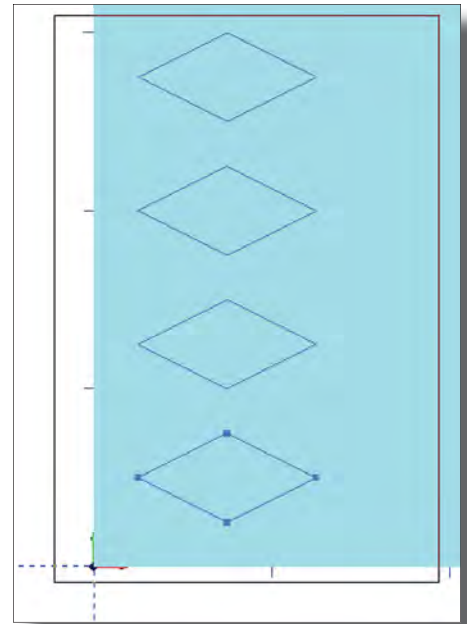
A new **Feature Pocket** will be inserted into the tree. Underneath it, right click on **Geometry** and choose **Re/Select**.



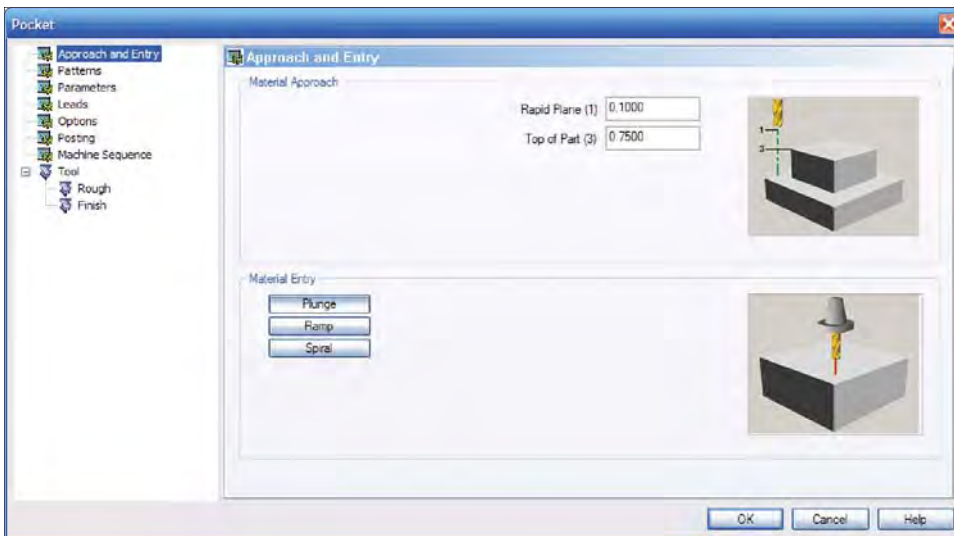
BobCAD-CAM will automatically be placed into Selection mode. Hold the left mouse button down and click a little away from the diamonds in the **Workspace**. Drag a box around all 4 diamonds and then let go of the mouse button.



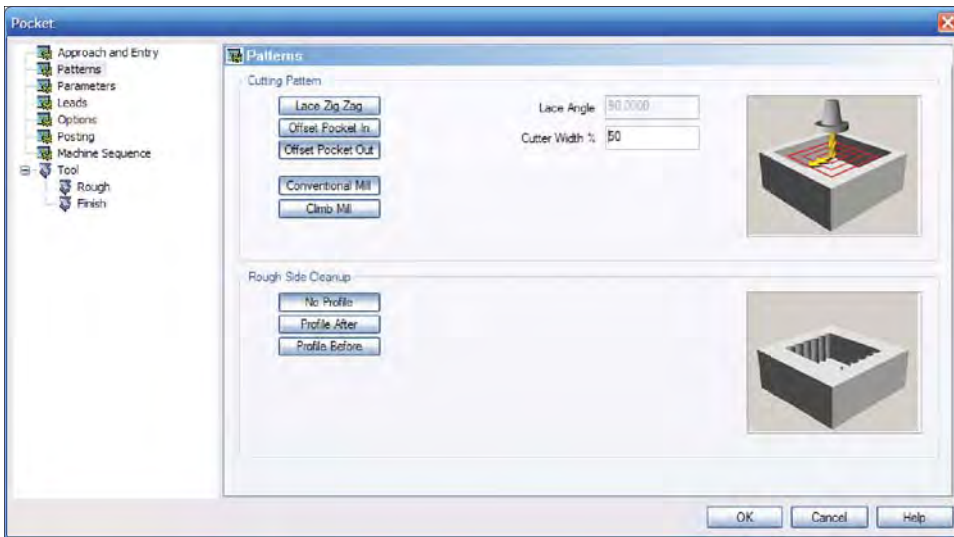
When all of the diamonds are highlighted, right click anywhere in the **Workspace** and choose **OK** from the menu. The feature will use this geometry to generate toolpath with.



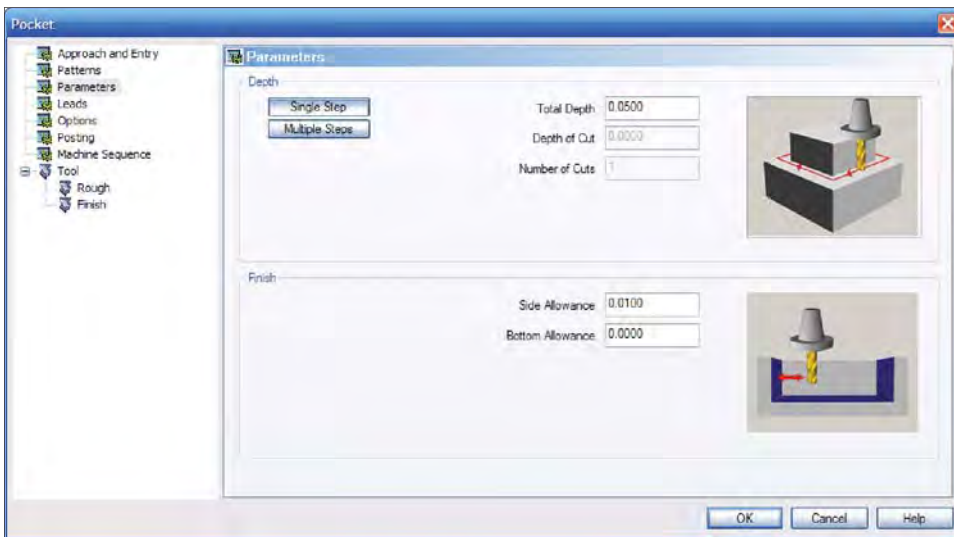
Right click on **Pocket** in the feature and choose **Edit**. The **Pocket** dialog box will appear to change the parameters for the toolpath.



In **Approach and Entry**, the settings are inherited from the **Stock** dialog. Notice that the **Rapid Plane** and the **Top of Part** are the same as were set in the last step.

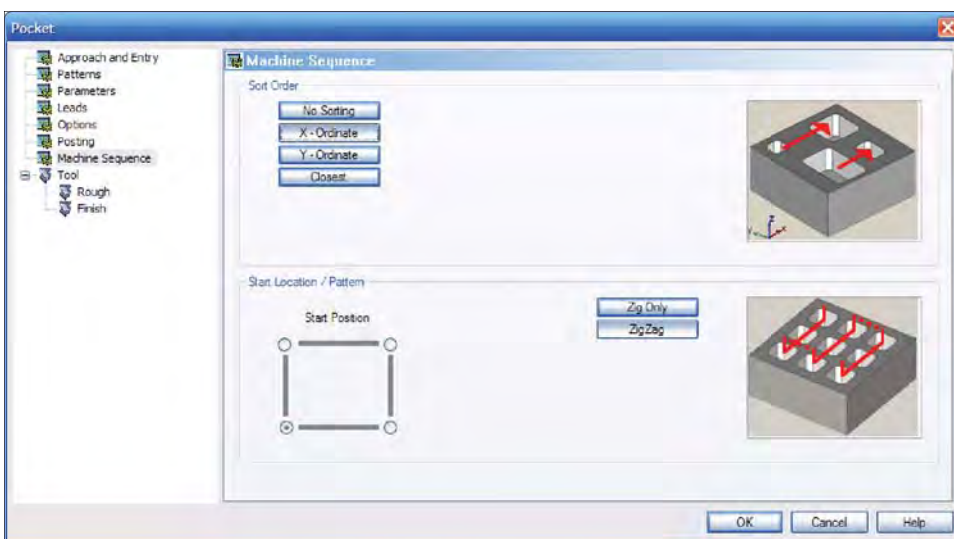


In the **Patterns** page, set the **Cutting Pattern** to **Offset Pocket Out**. The tool will plunge in the center of each diamond and spiral out in offsets until it gets to the edge of each of them.

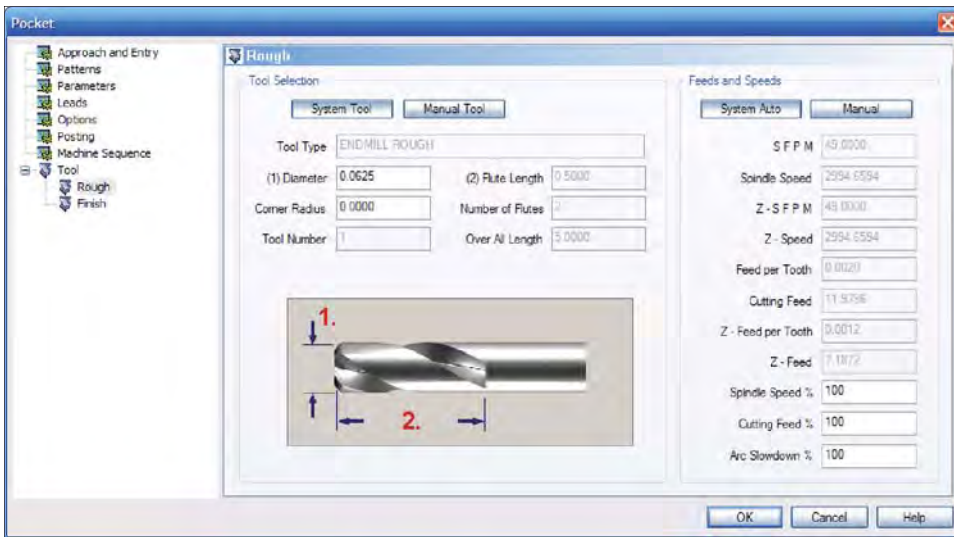


In the next page, **Parameters**, Set the **Total Depth** to 0.05. Set the **Side Allowance** to .01 to leave that much for the finishing tool to remove.

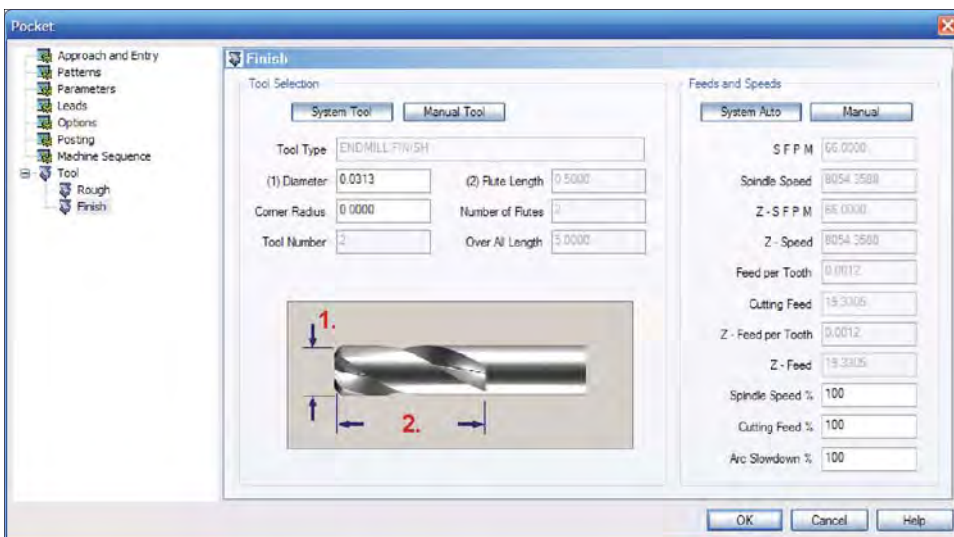
The **Leads**, **Options**, and **Posting** pages need no changes from the default values for the example, so we can skip them for now.



In the **Machine Sequence** page, set the **Sort Order** to **X-Ordinate**. This will normally machine the pockets in rows along X. This example only has one column of pockets, so it will get them in order. If **No Sorting** were set, it would order them in the same way as they were highlighted when the geometry were set.

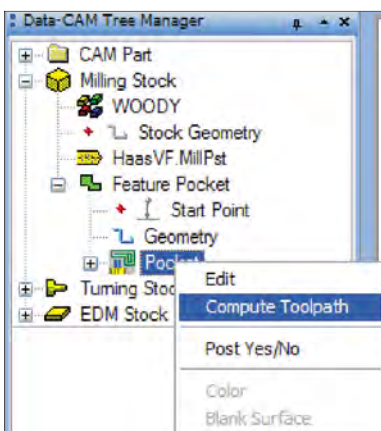


In **Rough**, set the **Diameter** to 0.0625 to machine the diamonds with a 1/16" tool.

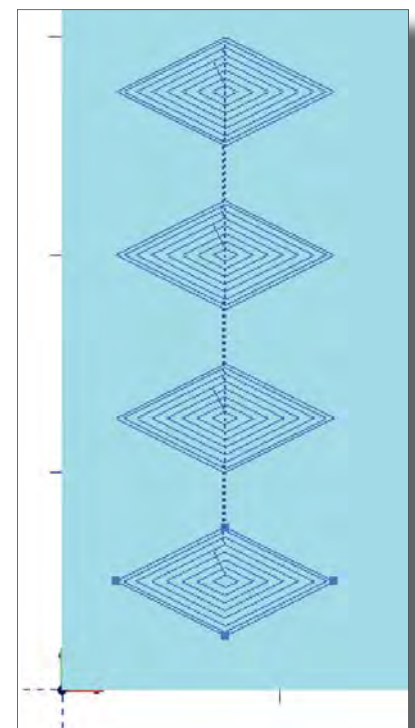


Set the **Diameter** in the **Finish** page to 0.0313 to finish with a 1/32" tool.

Click **OK** at the bottom of the dialog to have BobCAD-CAM accept the changed settings.



**Step 4:** Right click on **Pocket** once more and choose **Compute Toolpath**. BobCAD-CAM will generate the toolpath for all 4 diamonds at once because all 4 were selected for the geometry in the same feature.



**Step 5:** All that remains is to generate the NC code to see the 4th axis wrap of the code. Right click on **Milling Tools** under **CAM Part** in the tree and choose **Post**. The code will appear in the **Posting** tab of the **Layer-UCS-Post Manager**.

