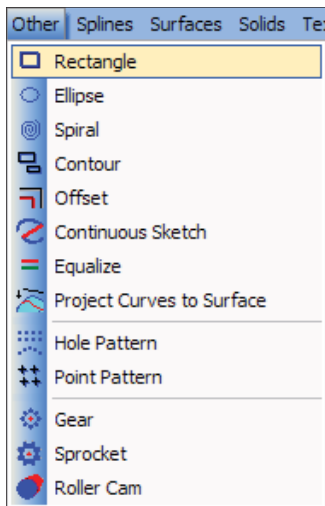


## FAQ #37: How do I use the new plunge roughing?

**Q:** I've heard of plunge roughing before, but I've never done it. What's it really for, and how does it work, and why would I use it?

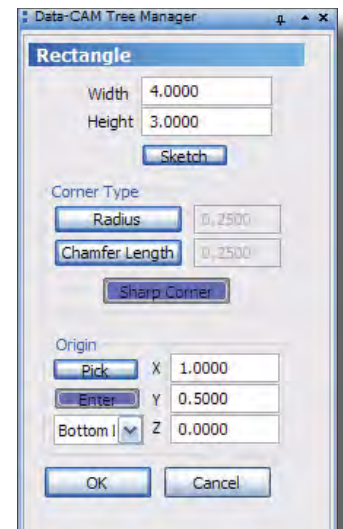
**A:** Plunge roughing is a new toolpath for BobCAD-CAM V23 that can remove a lot of material and do it very fast on the machine. It only requires a tool that can plunge directly into the material, and it steps over and plunges down again until the bulk of the material has been removed. It almost works like a series of peck drills that can plunge directly to depth, then step over and repeat. "Why" is simple - on some geometries, it can represent around a 40% decrease in roughing cycle time. We've actually observe cycle times decrease from 15% to 257% under certain circumstances. There are two different plunge roughing features types in BobCAD-CAM, one for 2D geometry and one for 3D geometry.

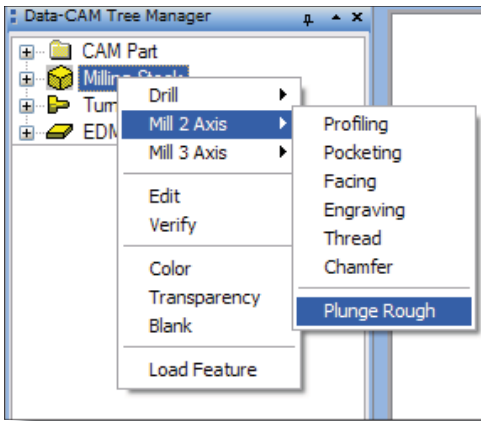
To use the 2D plunge roughing features in BobCAD-CAM V23, follow these steps:



**Step 1:** These features require geometry to be drawn before toolpath can be produced. This example will use a simple rectangle and plunge to a constant depth. To begin, click on **Other** in the main menu and choose **Rectangle**.

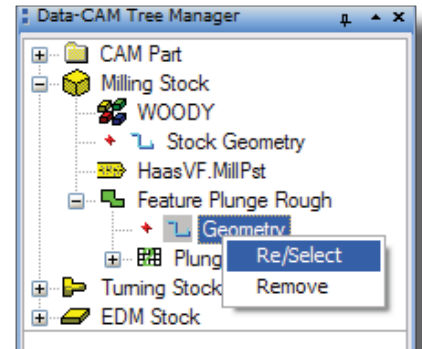
In the dialog that will appear in the **Data-CAM Tree Manager**, put in 4 for the **Width** parameter, 3 for **Height**, and click the **Sharp Corner** button. In the **Origin** section, click the **Enter** button and set the drop-down list to **Bottom**. Type in 1 for **X** and .5 in **Y**. Click **OK** and a rectangle will be drawn in the **Workspace**.



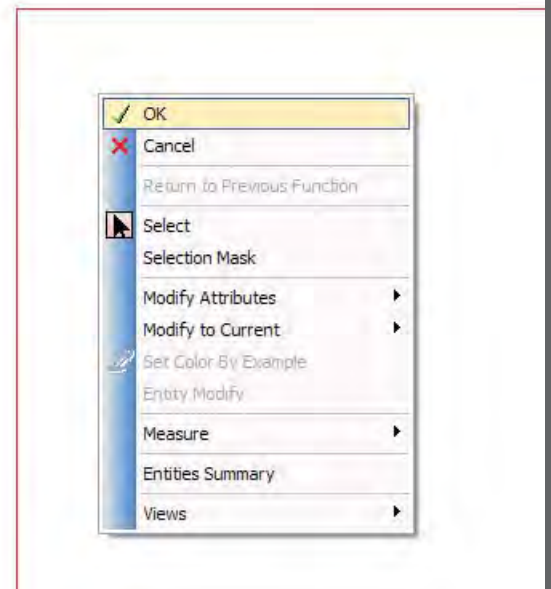
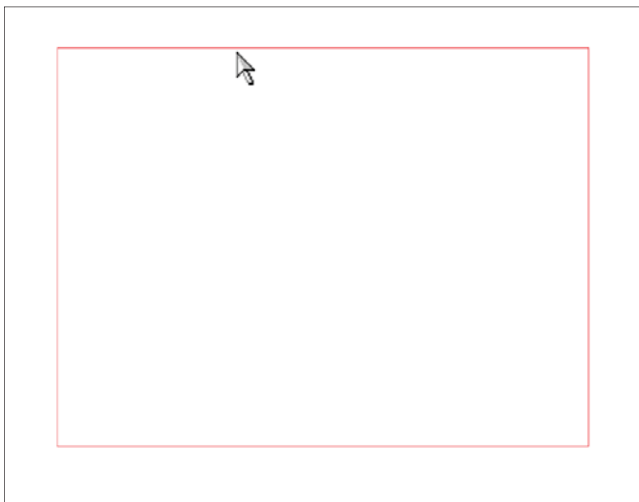


**Step 2:** In the **Data-CAM Tree Manager**, right click on **Milling Stock**. In the list, hover the cursor over **Mill 2 Axis** and choose **Plunge Rough**. A new **Feature Plunge Rough** feature will be added to the tree.

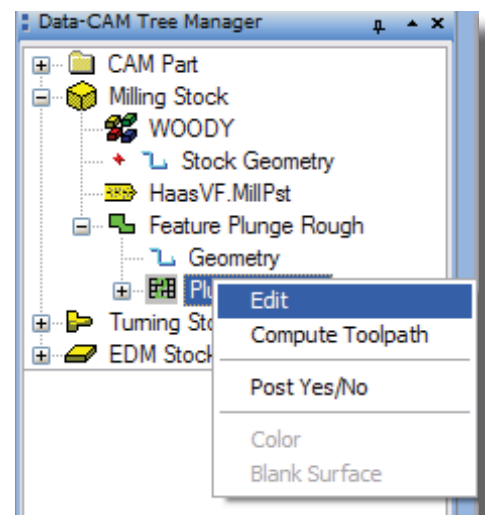
Right click on **Geometry** in the new feature and choose **Re/Select**.



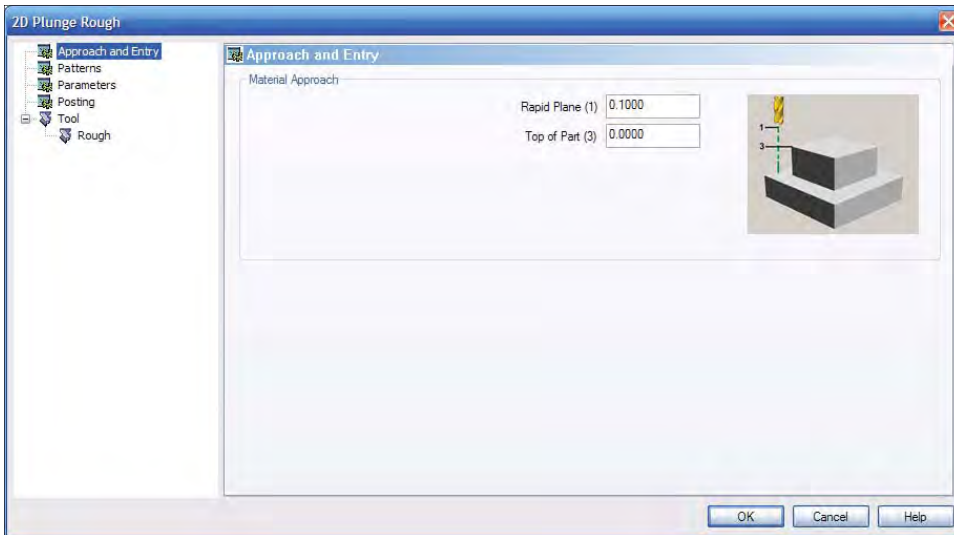
In the **Workspace**, hold the Shift key down on the keyboard and click anywhere on the rectangle. It should highlight all the way around. When it does, right click anywhere in the **Workspace** and choose **OK** from the menu that will appear. The geometry will be associated with the feature.



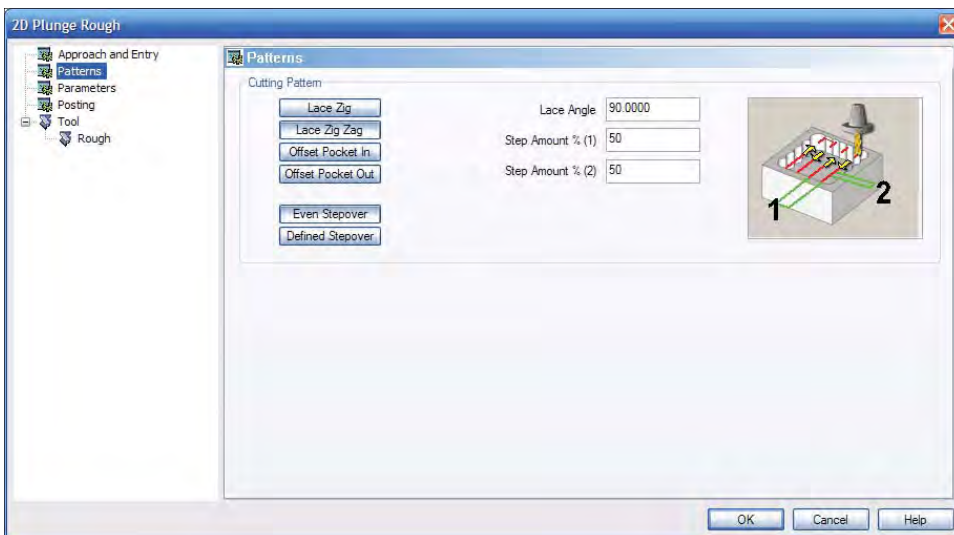
**Step 3:** Right click on **Plunge Rough** in the feature and choose **Edit**. The **2D Plunge Rough** dialog will appear.



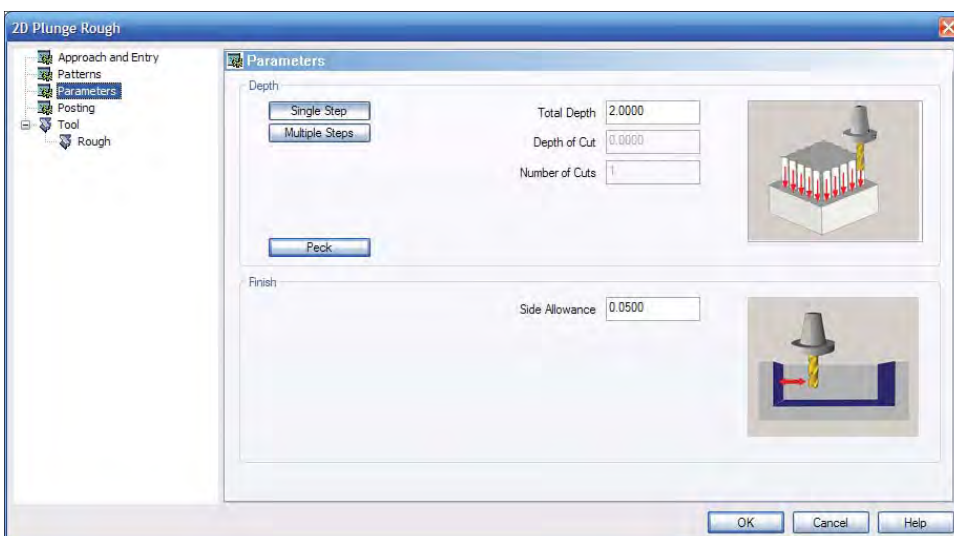
The dialog will contain a tree to the left with different categories of items that can be edited.



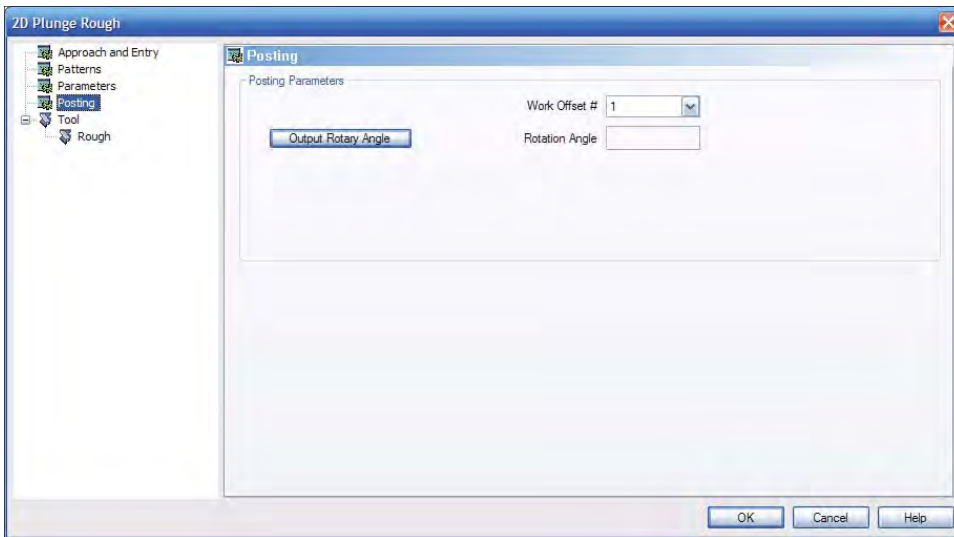
In the **Approach and Depart** category, the defaults are fine.



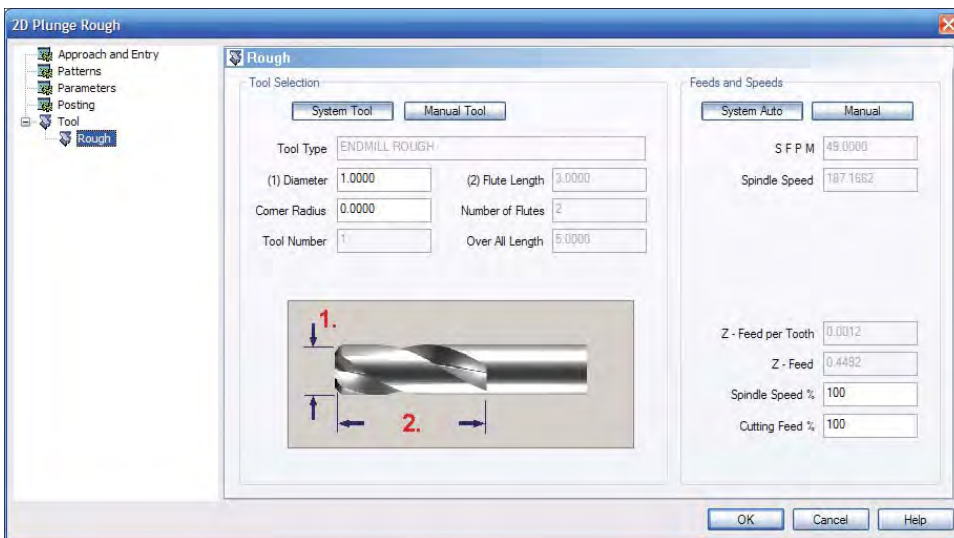
In the **Patterns** category, set the **Cutting Pattern** to **Lace Zig Zag**, leave the **Lace Angle** at the default 90 and the **Step Amount % (1)** and **Step Amount % (2)** to 50. The default **Even Step Over** is also **OK** for this example because there's no need to divide up the number of passes from the default.



In **Parameters**, Set the **Depth** to **Single Step**. The **Total Depth** should be changed to 2 in order to plunge all the way down to the bottom of the pocket. The rest of the default are **OK**.



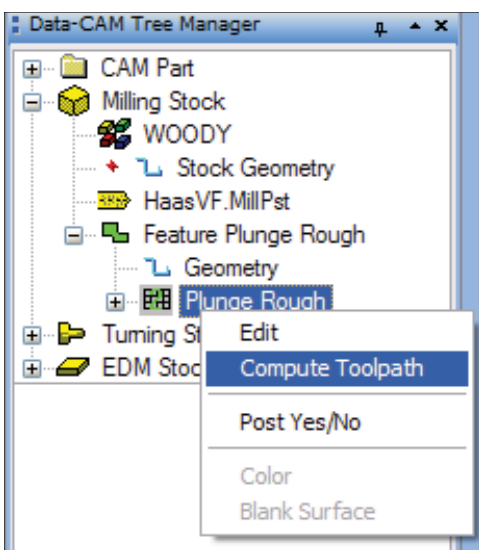
Since this example is not indexing on the 4th axis, the items under Posting can be left as they are.



In the **Rough** item under **Tool**, set the **Diameter** to 1 and the **Corner Radius** to 0 to use a 1" end mill.


*Note: On the machine, the end mill must be center-cutting or it will probably break on the initial plunge.*

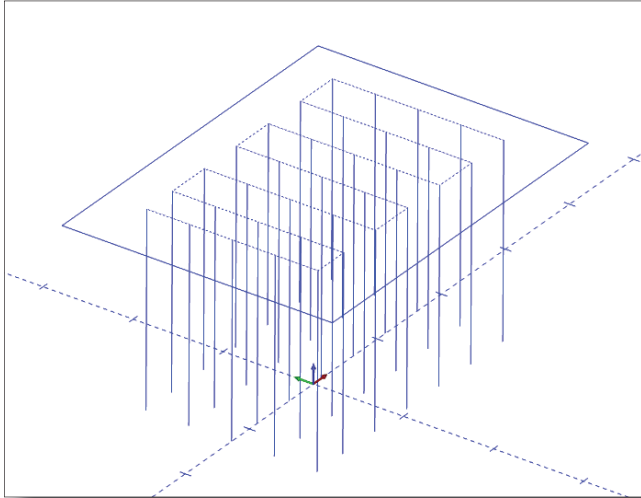
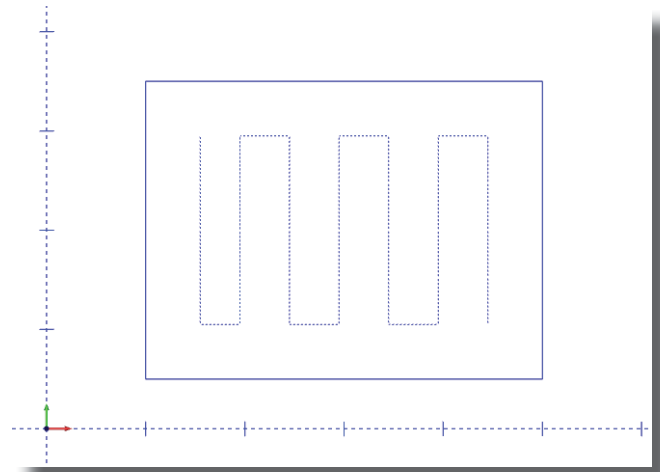
Click **OK** and BobCAD-CAM will accept the settings for the feature.



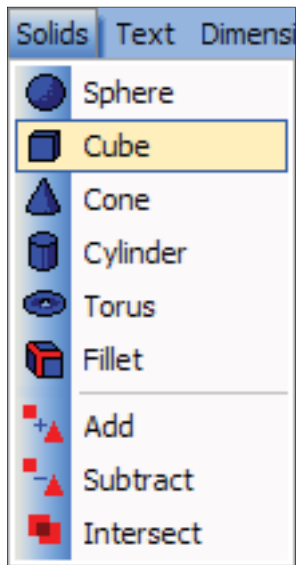
**Step 4:** At this point, the geometry is associated and the settings for the feature are complete. Right click on **Plunge Rough** in the feature again and choose **Compute Toolpath**. BobCAD-CAM will generate the roughing path and display the result.

In the default **Top** view, the toolpath will resemble a normal pocketing toolpath.

Rotate the view with the **Rotate** icon  on the **View** toolbar and it will show that the actual toolpath is quite different from a pocket.

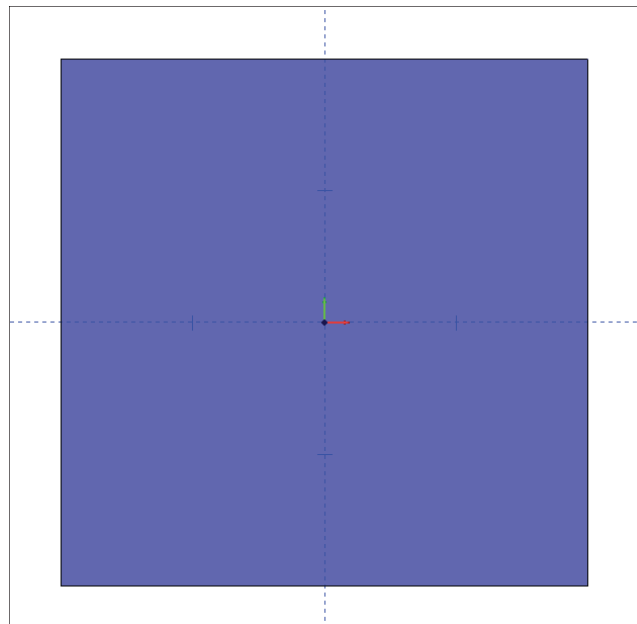
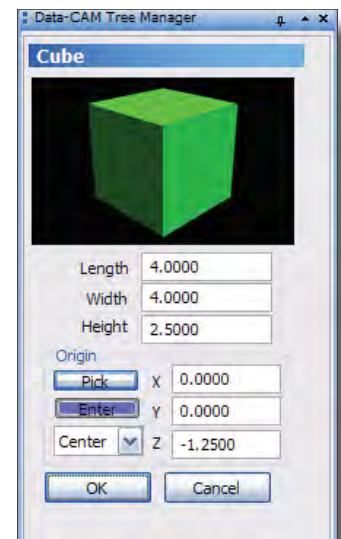


To use the 3D plunge roughing features in BobCAD-CAM V23, follow these steps:

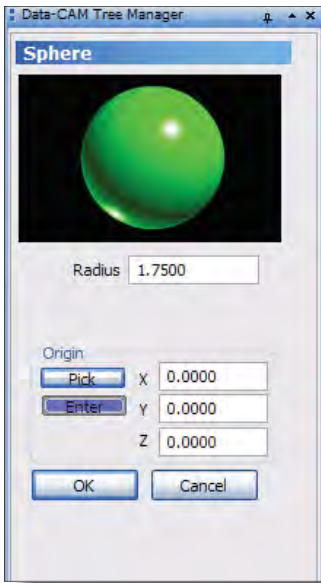


**Step 1:** These features require geometry to be drawn before toolpath can be produced. To begin click on **Solids** in the main menu and choose **Cube**.

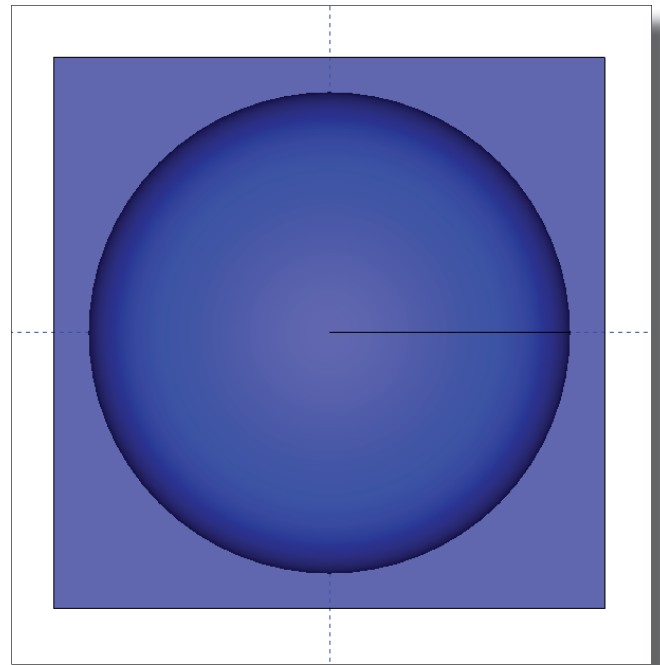
In the dialog that will appear in the **Data-CAM Tree Manager**, input 4 for both the **Length** and **Width** and 2.5 in **Height**. Under **Origin**, click **Enter** and choose **Center** from the drop-down list. Leave the **X** and **Y** at 0 and enter -1.25 in **Z**. Click **OK** and a cube will be drawn in the **Workspace**.



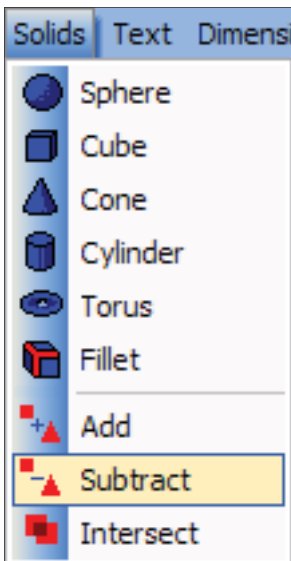
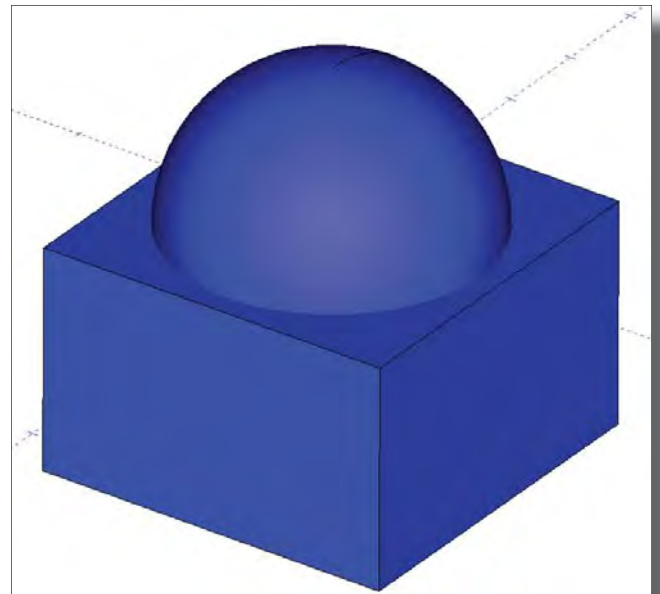
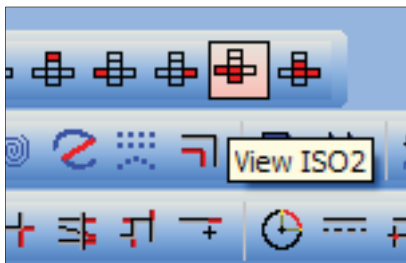
**Step 2:** Click on **Solids** in the main menu again, but choose **Sphere**.



In the **Sphere** dialog in the **Data-CAM Tree Manager**, set the **Radius** to 1.75. Under **Origin**, leave the settings at their defaults. Click **OK** and a sphere will be drawn in the **Workspace** centered in the middle of the top surface of the cube.

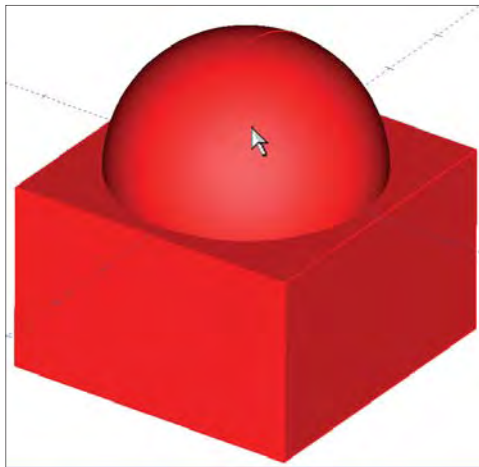
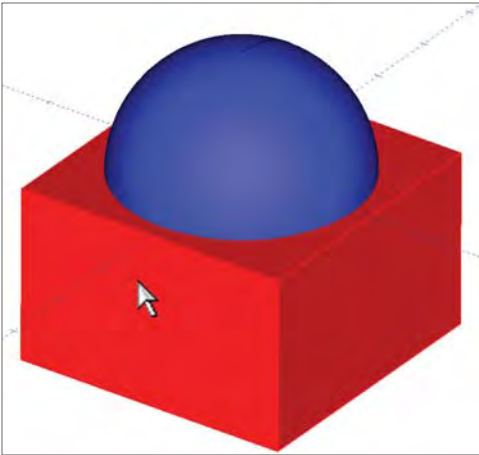


The depth of the solids is difficult to see in the default **Top** view. Click on the **View ISO2** icon in the **Views** toolbar at the top of the screen. The view in the **Workspace** will be rotated to a roughly 3/4 perspective and will show the depth much better.



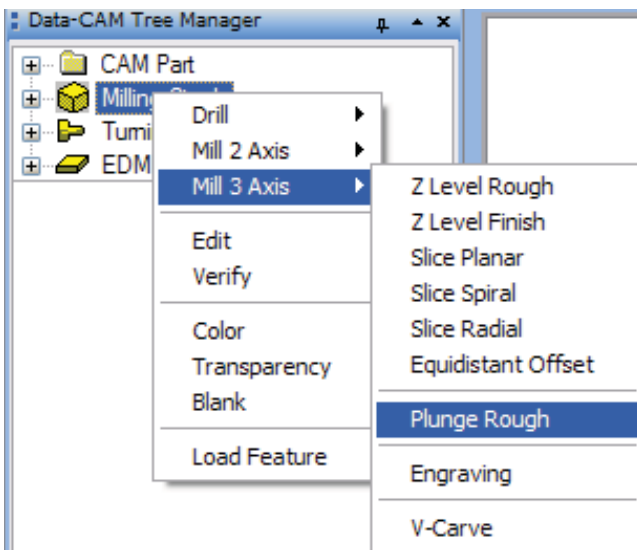
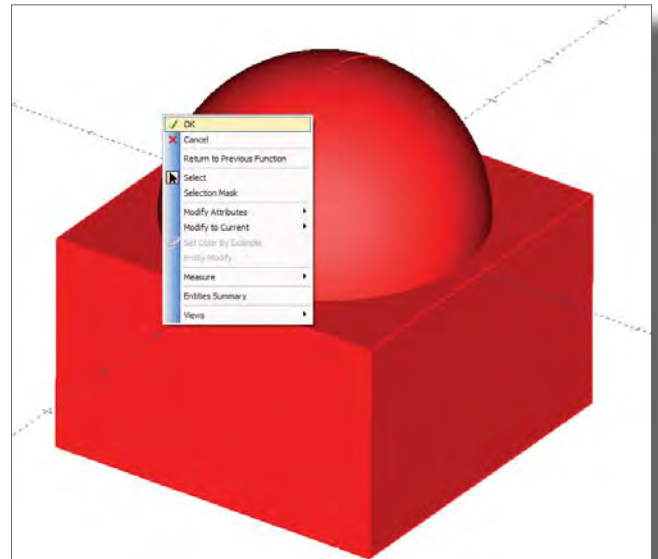
**Step 3:** To finish the geometry for the example, the sphere will need to be removed from the cube to leave a cavity. Click on **Solids** in the main menu one more time and choose **Subtract**.

The **Subtract** function takes no parameters other than the geometry. Click on the cube in the **Workspace** first, and then on the sphere.

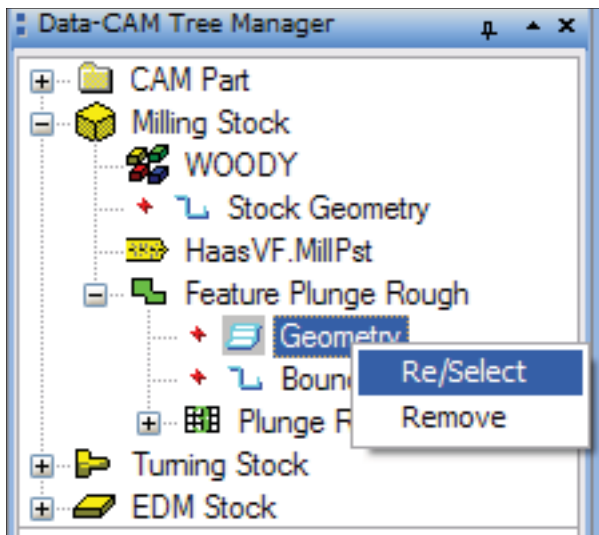


When both are highlighted, right click anywhere in the **Workspace** and choose **OK** from the menu

BobCAD-CAM will remove the sphere from the cube and leave a spherical cavity in it.

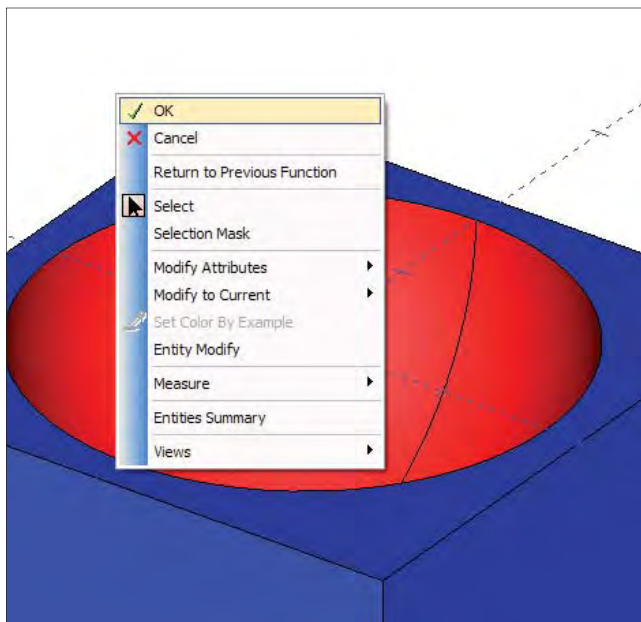
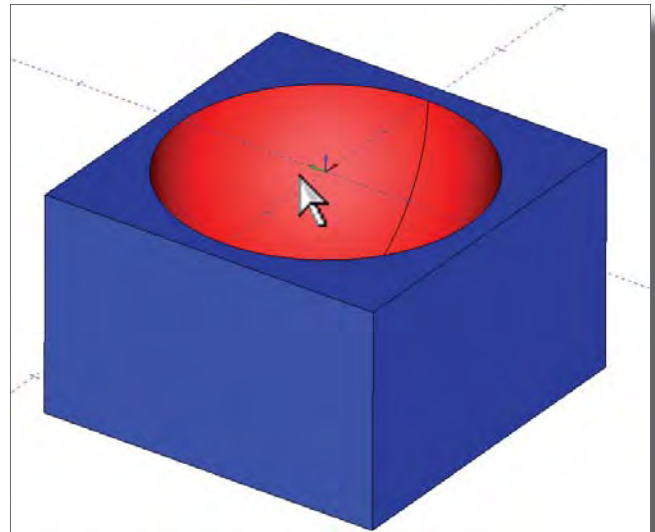


**Step 4:** Right click on **Milling Stock**. Hover the cursor over **Mill 3 Axis** and choose **Plunge Rough** from the menu.



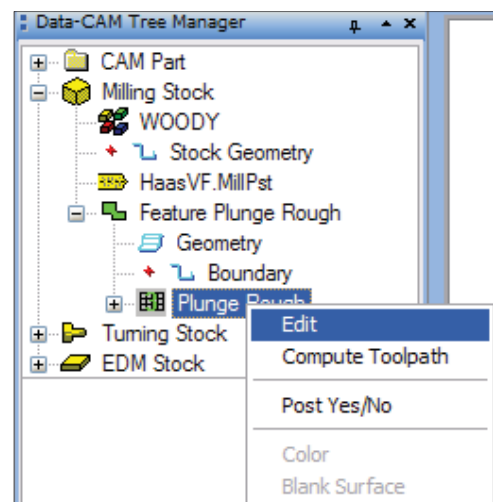
A new **Feature Plunge Rough** will be inserted into the tree. Right click on **Geometry** under it and choose **Re/Select** from the menu.

In the **Workspace**, click on the surface that makes up the cavity.

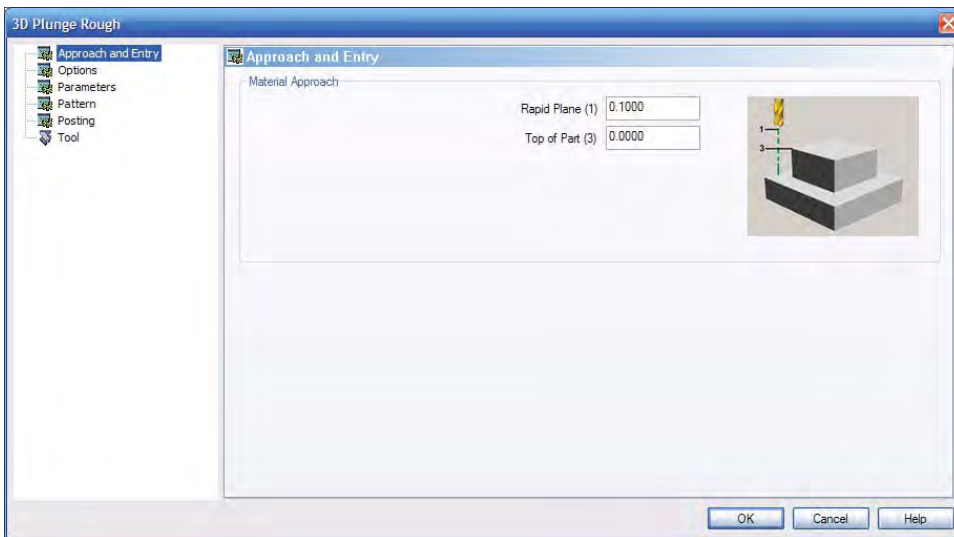


The cavity surface will highlight. Right click anywhere in the **Workspace** and choose **OK** from the menu that will appear, and the geometry will be associated with the feature in the tree.

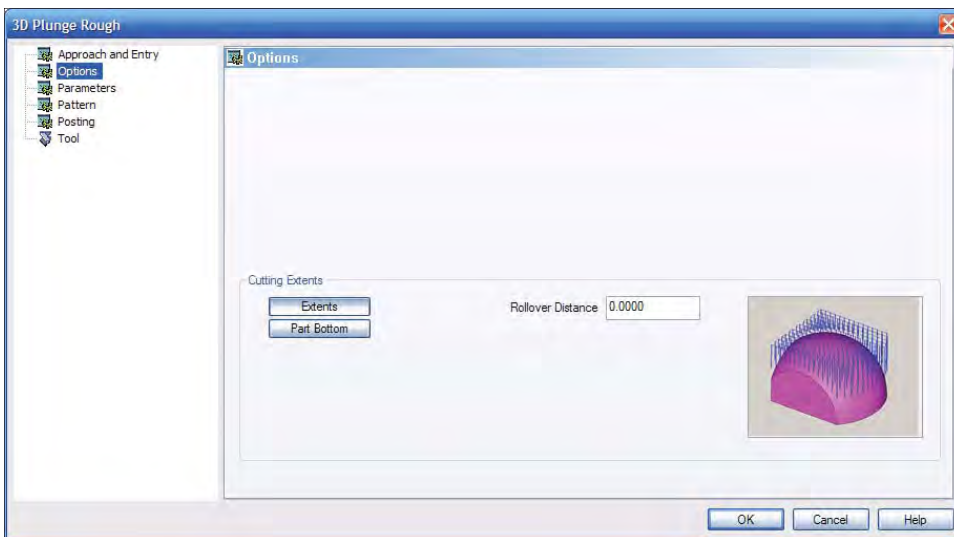
Right click on **Plunge Rough** under the feature and choose **Edit**. The **3D Plunge Rough** dialog will appear.



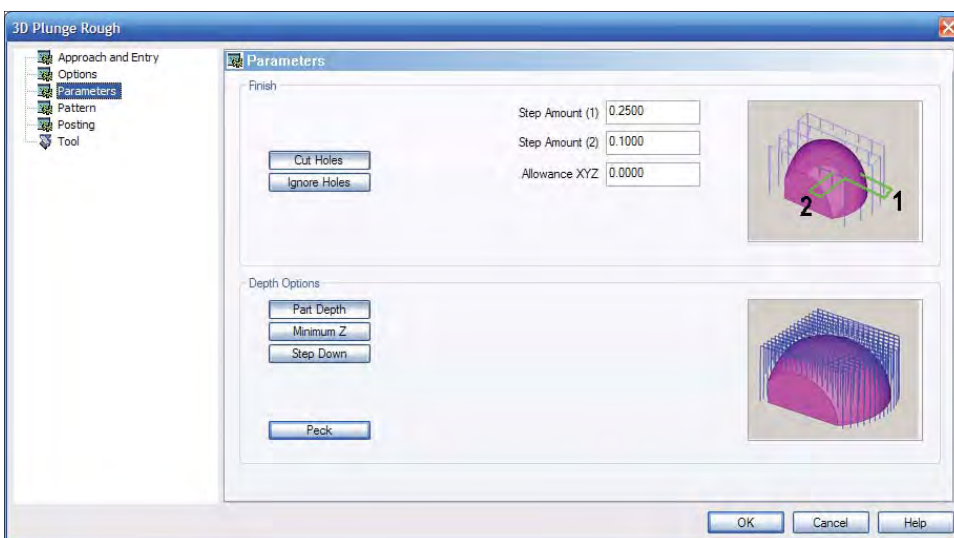
The dialog will contain a tree to the left with different categories of items that can be edited.



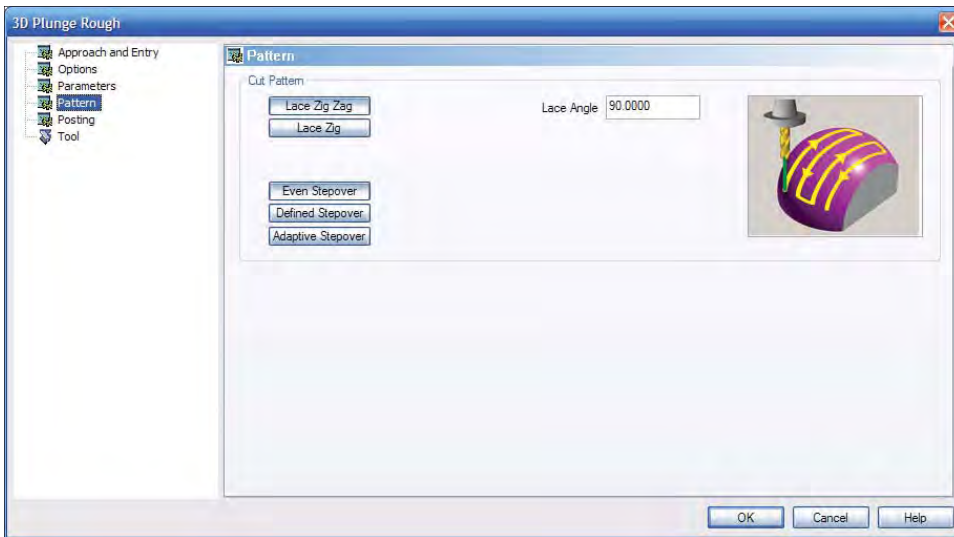
In the **Approach and Depart** category, the defaults are fine.



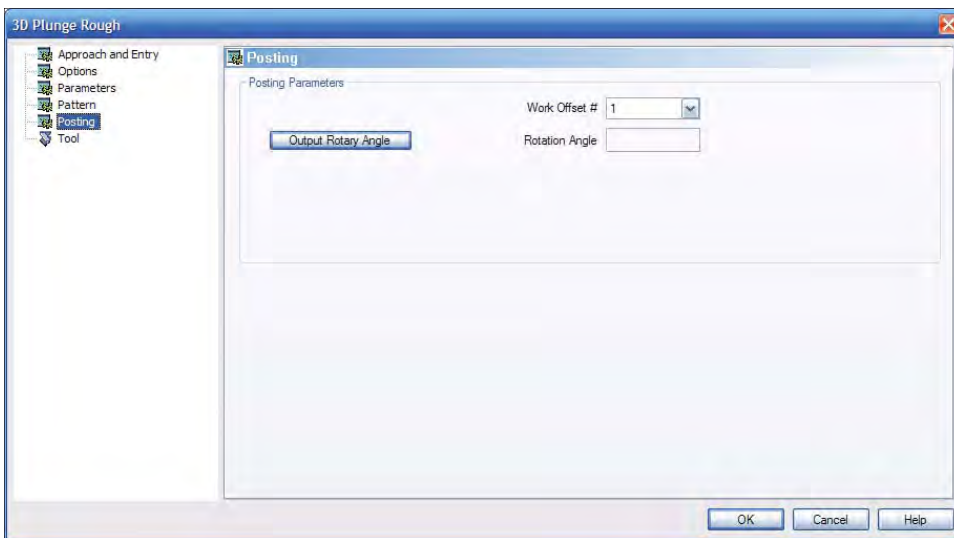
In the **Options** category, choose **Extents** to have the toolpath stop at the X/Y boundaries of the selected geometry.



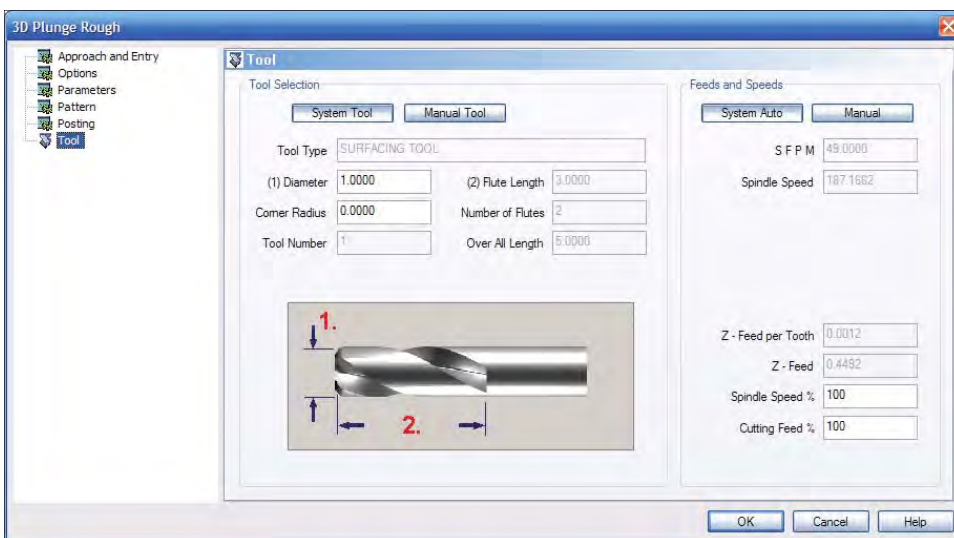
Under **Parameters**, set the **Step Amount (1)** to .25 and the **Step Amount (2)** to .1. There are no holes, so the **Cut Holes** can be left as it is. In **Depth Options**, leave **Part Depth** set to make sure the toolpath goes all the way down in the cavity.



In **Pattern**, leave the options at the defaults. The **Lace Angle** is good at 90 degrees, and there is no need to divide up the toolpath into any divisions beyond the defaults.



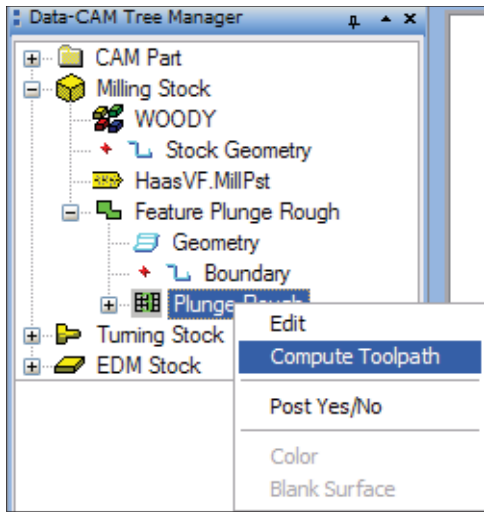
Since there will be no 4th axis indexing in this example, all of the settings in **Posting** can be left at their defaults.



In **Tool**, set the **Diameter** to 1 and leave the **Corner Radius** at 0 to use a 1" end mill.

*Note: On the machine, the end mill must be center-cutting or it will probably break on the initial plunge.*

Click **OK** to have BobCAD-CAM accept the settings.



**Step 5:** Right click on **Plunge Rough** in the tree and choose **Compute Toolpath**. BobCAD-CAM will generate the tool movement and display it in the **Workspace**.

