

LESSON 9: 2D TOOLPATHS

In this lesson we'll learn how to use GravoStyle's 2D engraving feature to engrave our work with our vector outlines filled. We'll use the finished logo that we vectorized and scanned in lesson 8. Our finished job is shown in Figure 9-1.

The concepts that we'll learn are how to:

- ... Engrave a job with a 2D fill
- ... How to preview the fill in the WYSIWIRE screen
- ... How to preview the actual tool paths in the machining preview window

Our job's specifications are:

- ... Completed Job Filename: 2D Filled Colt Logo.gnh
- ... Logo Filename: Finished Colt Logo.gnh (from previous lesson)
- ... Plate: 8 inches by 8 inches with a ¼ inch margin
- ... Material: Gravoply 2, red cap over a white core
- ... Logo size and position: 6 inches wide, centered vertically and horizontally on the plate



Figure 9-1 Finished Job

Our job plan is to:

- ... Open the logo (Finished Colt Logo.gnh) from the previous lesson
- ... Resize the logo to the specifications of this job
- ... Center the job vertically and horizontally on the plate
- ... Select the cutting tool and specify the cutting depth
- ... View the job in the WYSIWIRE screen
- ... Enter the Machining window and set our cutting parameters
- ... View the actual cutting tool paths in the Machining window's "Preview" window.

STEP 1: OPEN THE LOGO FILE

We'll begin by opening the file "Finished Colt Logo.gnh" from the previous lesson. The job will open with the 8 inch by 8 inch plate size and ¼ inch border that we specified for that lesson's job.

Let's make sure that our job is entirely selected and that we're viewing it in GravoStyle's "Wire contours" mode.

STEP 2: RESIZE THE LOGO

Now we'll size the logo so that it's six inches wide. We'll grab one of the corner handles of the selection and start dragging it. While we're dragging, we'll press the "F2" key on the keyboard and GravoStyle's "Scaling" dialog window will open (Figure 9-2).

We'll enter the width of 6 inches, make sure that "Keep ratio" is checked and click on "OK". Our logo will now be resized the value we entered. (Note that pressing the "F2" while dragging opens similar appropriate windows for most moving and resizing operations that are done by dragging.)

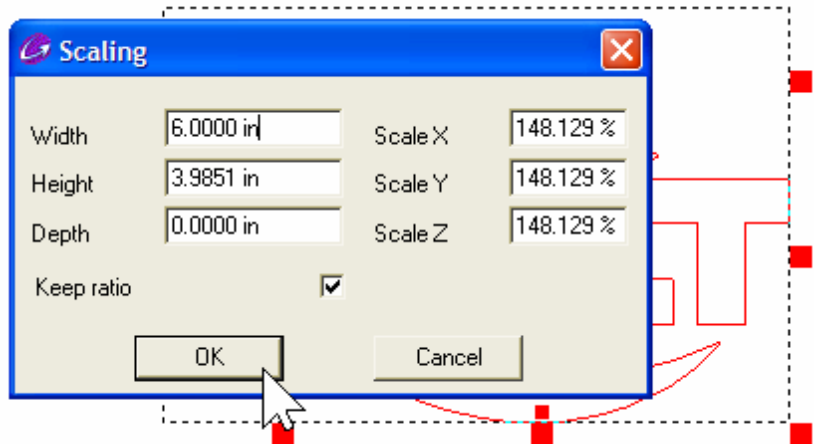


Figure 9-2 "Scaling" Dialog Window Activated by Pressing "F2" While Dragging

STEP 3: CENTER THE LOGO

We'll click on the "Alignment tools" icon (Figure 9-3) and the GravoStyle's pallet of alignment tools will open (Figure 9-4).

In Figure 9-4, the cursor is pointing at the tool that will center the selection (in this case, our entire logo) from top-to-bottom on the 8 by 8 inch plate. The tool immediately to the left will center the selection from side-to-side within the plate. We'll click on both of them, and our logo will now

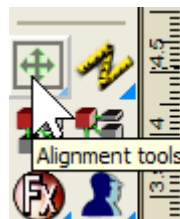


Figure 9-3

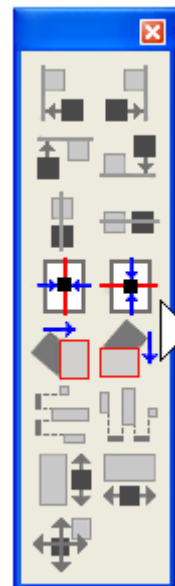


Figure 9-4 Alignment Tools Pallet

be sized and positioned to the specifications of the job (Figure 9-5).

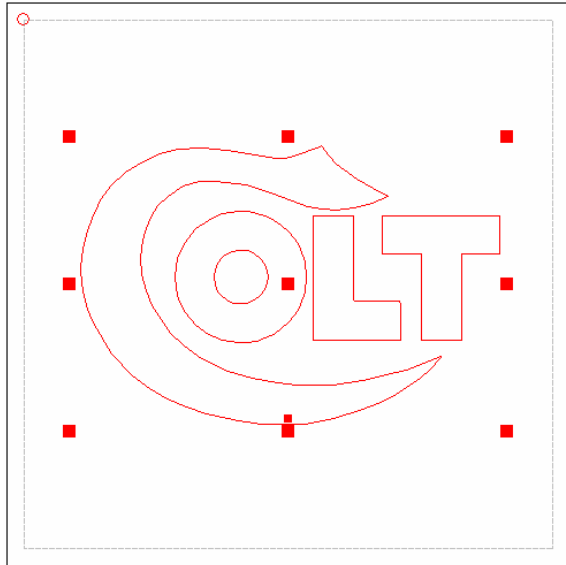


Figure 9-5 Logo Resized and Centered

Look Further

Note that the vertical and horizontal centering tools and the two tools directly below them (horizontal and vertical alignment) are the only available tools in the alignment tool pallet. All of the other tools are grayed out. This is because these 4 available tools require only one selected object and their reference for alignment are the borders of our material and the horizontal and vertical axes of the material. Our selection is grouped; it therefore behaves as one object and so can be serviced by these tools.

All of the other tools in this pallet require at least two selected objects and the alignment reference is one of the objects.

As an experiment, we can ungroup the logo (don't forget to regroup it when we're done), select the logo (ungrouped) and we'll see that all of the other tools are now available

STEP 4: SELECT 2D FILL AND THE CUTTING TOOL

We'll now click on the "Colors" tool icon to open the "Machining tools" window. There, we'll select tool "0" (black) to match the color of our logo's contours and click on

"Properties" to open the "Tool Properties" window (Figure 9-6).

All of the engraving we've done in previous lessons were in "Plotting", or outline mode. This time, we'll specify 2D, or filled, engraving.

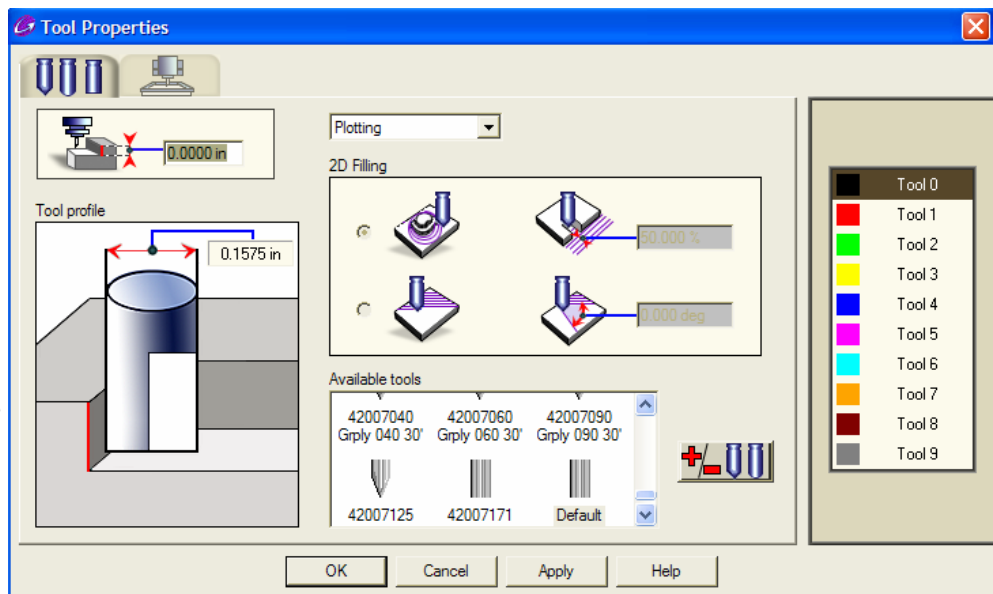


Figure 9-6 Tool Properties Window

We'll open the drop-down window (Figure 9-7) to select our 2D engraving and we'll see that there are two choices: 2D on surface and 2D in bottom. The difference between them is where the final job will be faithful to the contours of the logo - the top surface of the material, or at the bottom of the cut. (Remember, unless we use an end mill cutter, the tool is tapered.) Since GravoStyle 2 requires a cutting depth of only .003 inches, the difference here probably won't be critical, but we'll follow good practice and specify "2D on surface".

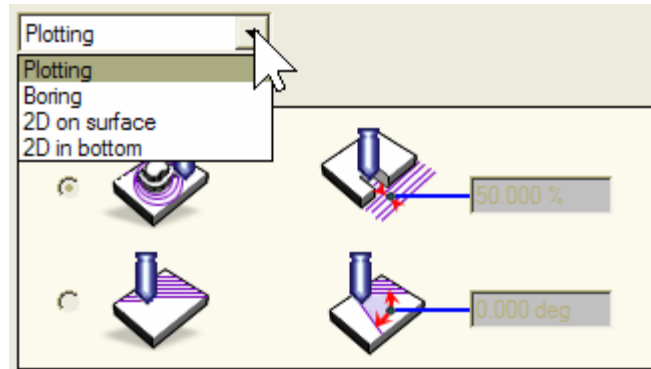


Figure 9-7 Engraving Mode Drop-Down Window

Now we have to select our fill, and we have two choices. We can choose to fill by having the cutter move in straight lines only (hatch fill) or by having the cutter motion follow the outlines of the contours (contour fill).

We'll choose a contour fill. Why? Because a contour fill is usually more time efficient. The tool will follow the outlines of the logo's contours and will have very few, if any, reversals of the path of the tool. If we were to choose a hatch fill, the tool would be constantly reversing its direction of motion with a consequently longer engraving time. We'll click in the dot (it's called a radio button) next to the contour fill icon and we'll accept the default of 50% (of tool diameter) for the overlap for successive passes (Figure 9-8).

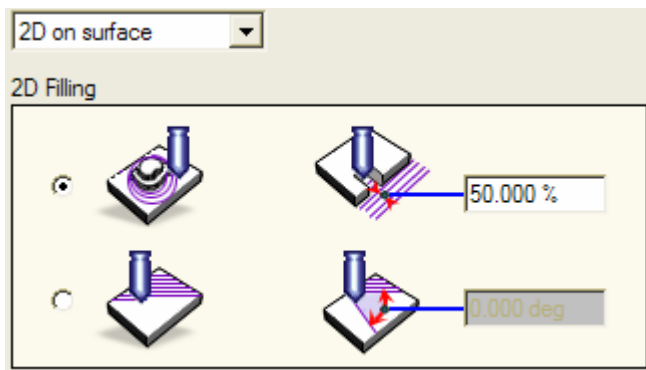


Figure 9-8 Contour Fill Selected

Look Further

A hatch fill would generally be chosen for surface diamond drag engraving. When we select a hatch fill, GravoStyle will have the cutting tool automatically end the engraving with a finish pass which will follow the contours all-around to result in clean, sharp outlines.

Now to choose the cutting tool. We prefer to have just one tool to engrave the job in one pass. We have to compromise the desire to use a large diameter tool for speed in removing material with the desire to have sharp corners in the "L" and "T" of the logo's lettering and the bottom tip of the "C". We'll try a 0.090. We'll select the 42007090 cutting tool and enter our

cutting depth of 0.003 inches. Our tool properties window will look as it appears in Figure 9-9.

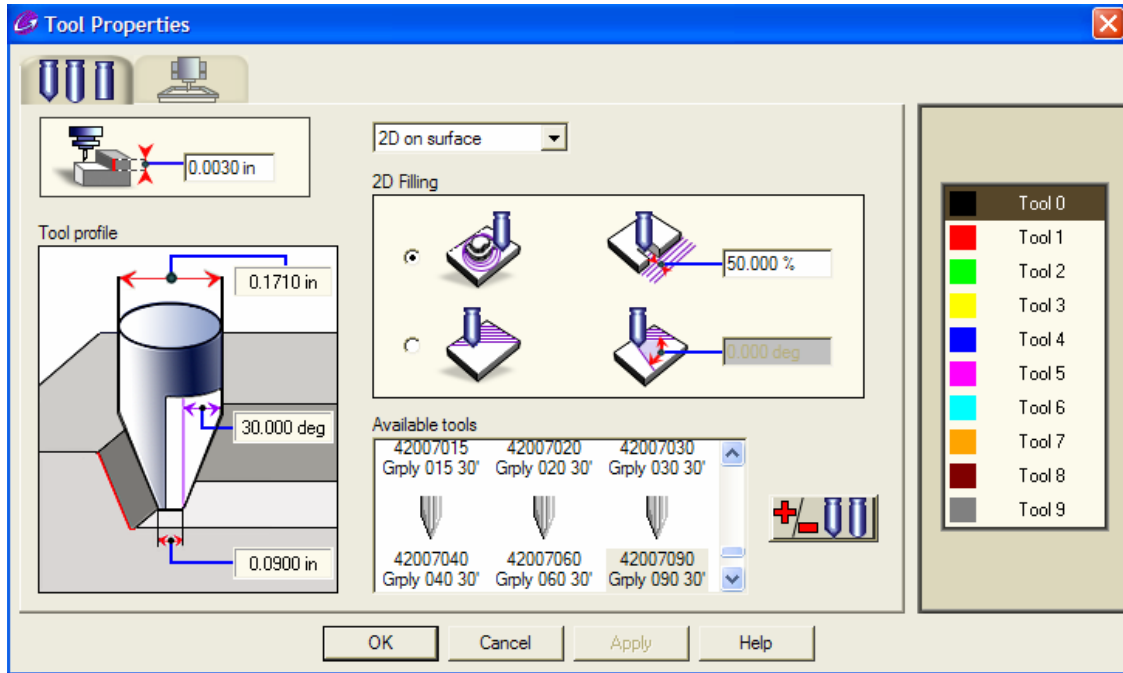


Figure 9-9 Tool Properties Window With 2d Filling Selected

STEP 5: THE WYSIWIRE WINDOW

We'll now close the open dialog windows and enter the WYSIWIRE window (Figure 9-10).

We can see at once that the corners are too rounded, and we'll have to try a cutter with a smaller diameter. We could try to change the tool in the WYSIWIRE window, but we won't. Instead, we'll close WYSIWIRE and return to the tool properties window to make the change there.

Why? Changing the tool size in WYSIWIRE is fine for outline, or plotting engraving, but doing it in the tool properties window and *then* returning to WYSIWIRE gives us much greater accuracy when we're looking to see if everything *fills* correctly.

After we make the change by selecting the 42007060 tool in the tool properties window, we'll re-enter WYSIWIRE and our job will look as it is shown in Figure 9-11.

We can see that the corners are much crisper with the .060 inch diameter tool, and we'll use it for our job.



Figure 9-10 WYSIWIRE Window, 0.090 Diameter Tool



Figure 9-11 WYSIWIRE Window, 0.030 Diameter Tool

We're still in the WYSIWIRE window and we'll select a Gravoply 2 #365 material to see how our finished job will actually look (Figure 9-1).

STEP 6: THE MACHINING WINDOW

We'll close the WYSIWIRE window and return to GravoStyle's main screen. We'll click on the "Machining" icon of the top tool bar and enter the machining window.

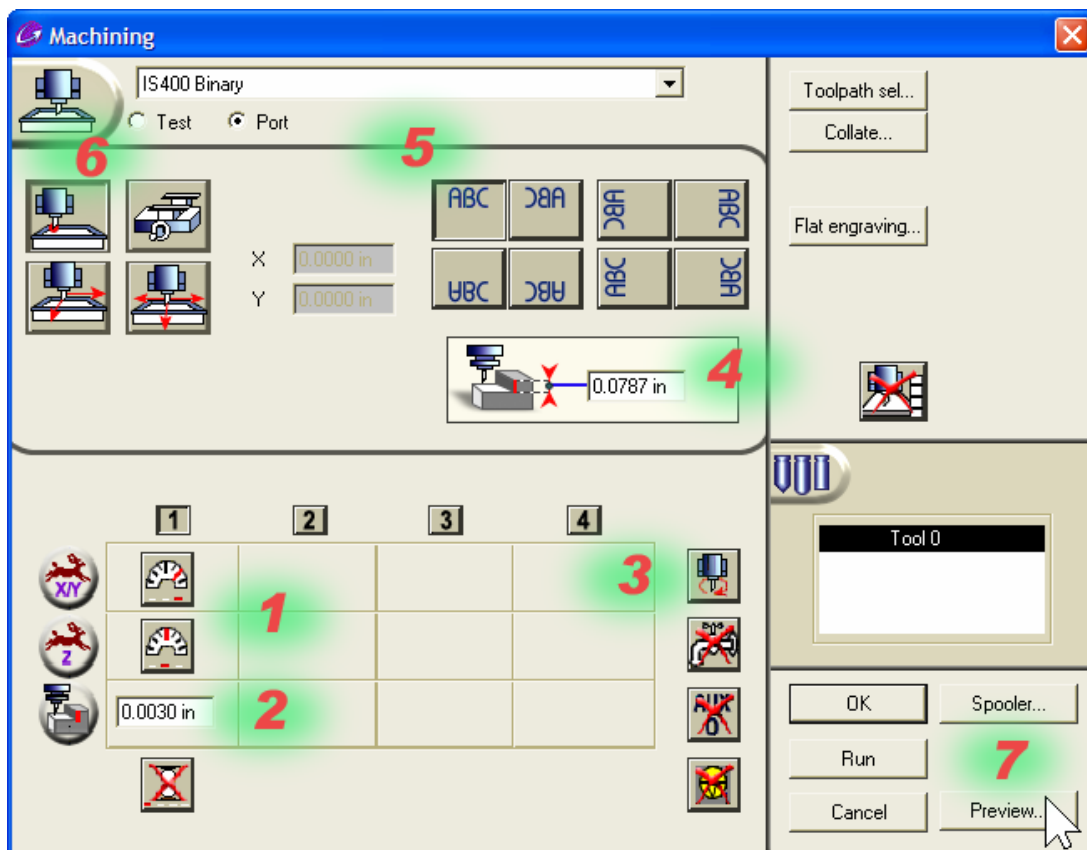


Figure 9-12 Machining Window

We'll make sure that the correct entries are made (Figure 9-12). We'll:

1. Set our X-Y and Z axes speeds
2. Make sure that our cutting depth of 0.003 inches is entered
3. Make sure that the tool spindle motor will be turned on
4. Make sure that the lift-over height is OK

5. Make sure that the job orientation on the table is set correctly
 6. Make sure that the table's origin is correct (upper-left corner in our case)
- And,
7. We'll click on the "Preview" button.

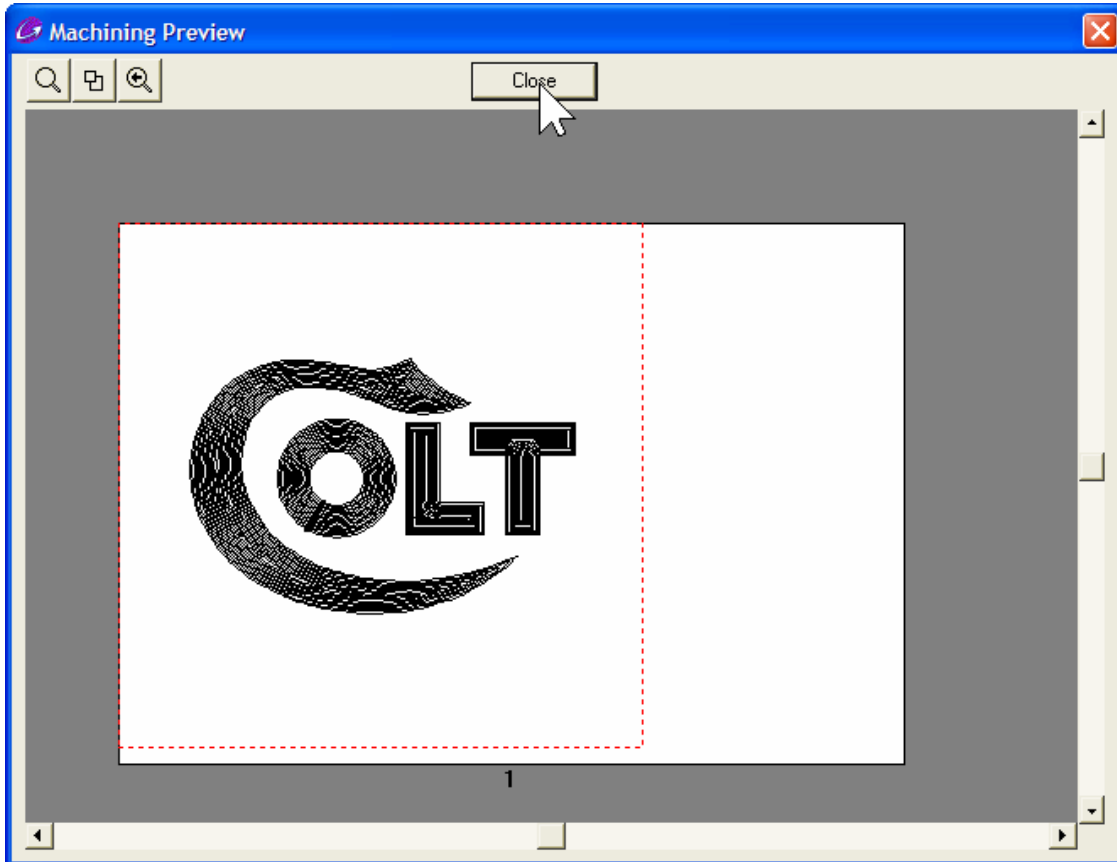


Figure 9-13 Machining Preview Window

When we enter the preview window, our job will be shown with a representation of the actual paths that the cutting tool will take. We can use the zoom tools at the top-left of the preview window to get a closer, and accurate view of the cutting paths at any place in our job. This can be an invaluable tool when we have to engrave intricate jobs where we're concerned about how small details will be engraved.

Figure 9-14 is an zoomed-in view of part of the “C” and parts of the letters “O” and “L”. The cutting tool’s paths are clear and depict exactly how the job will be machined.

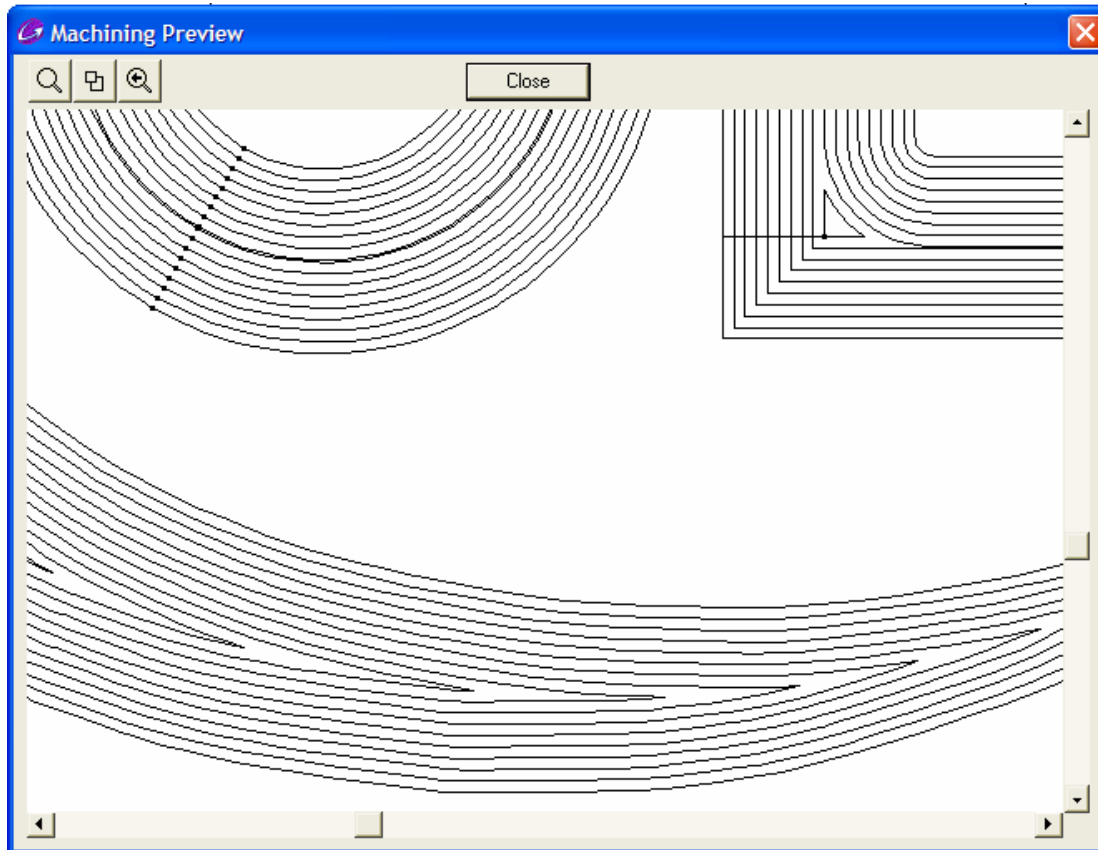


Figure 9-14 Enlarged View Showing Cutting Tool Paths

We're now finished with this lesson.

DON'T FORGET TO SAVE YOUR JOB!



WHAT WE'VE LEARNED:

In this job we've learned:

- ... How to resize objects with precision using the F2 key while dragging
- ... How to center our work on our material using GravoStyle's alignment tools
- ... The difference between 2D on surface and 2D on bottom types of fill
- ... The difference between contour and straight line (hatch) fills
- ... How to specify a 2D fill
- ... How to use WYSIWIRE to preview the effects of tool size on fill characteristics
- ... How to view the actual cutting paths of the tool using the machining window's preview screen