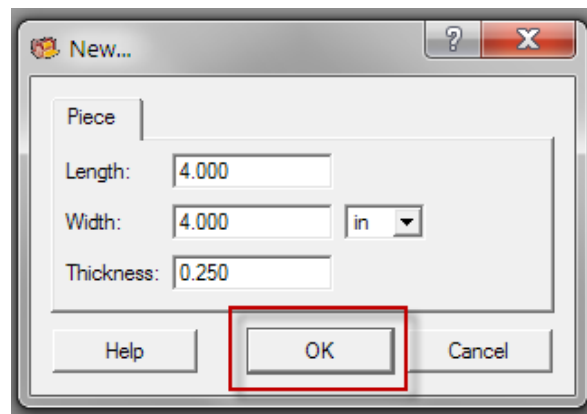

This document creates a basic drawing using the path offset, and trim tool in the advanced 2D drawing product and then using the copy offset tool replicates the vectors to cut multiple copies of the drawing.

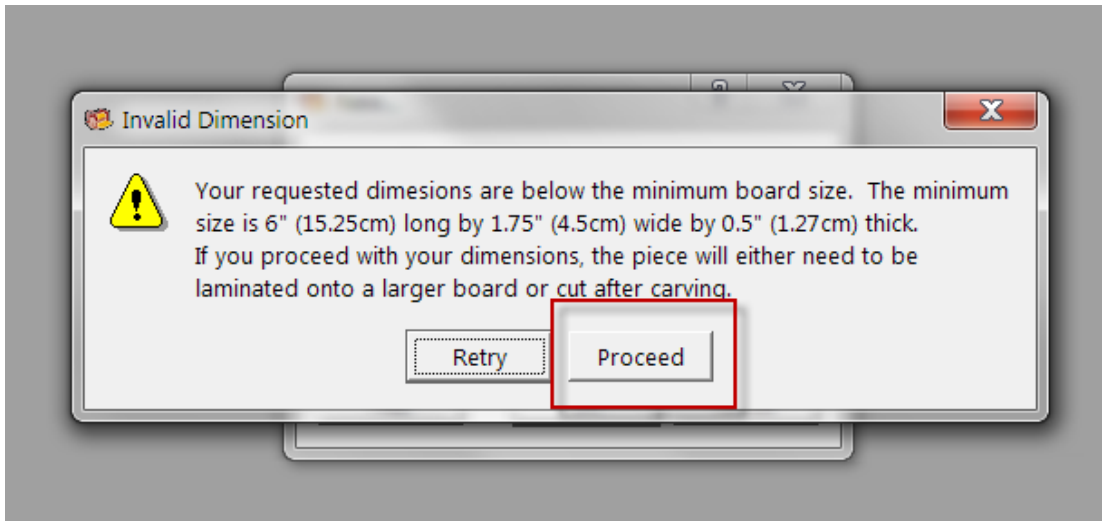
Open the designer and create a new project.



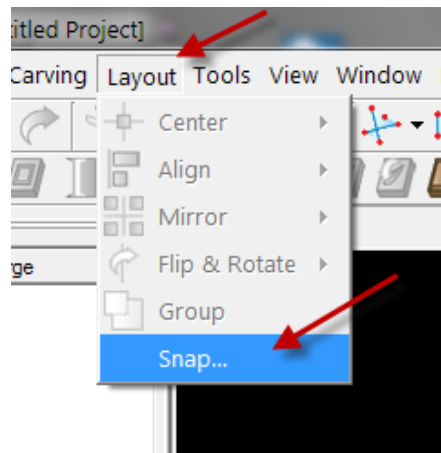
Set the board size to 4" x 4" x .25" for this project. Click OK to continue.



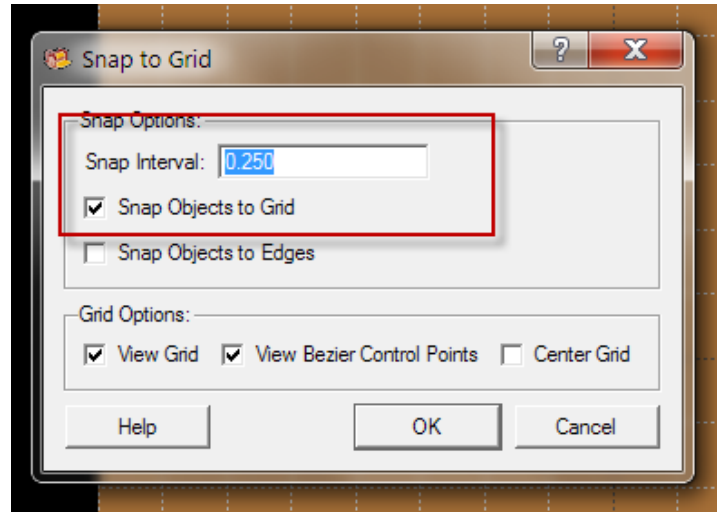
Select **Proceed** to accept that you will be using a carrier board to meet the minimum size requirements.



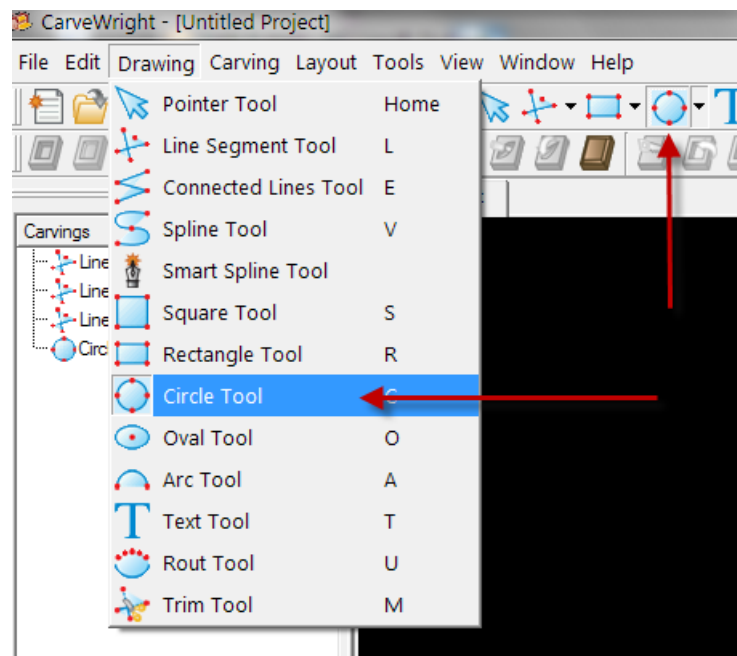
Drop down the **Layout Menu** and select **Snap**.



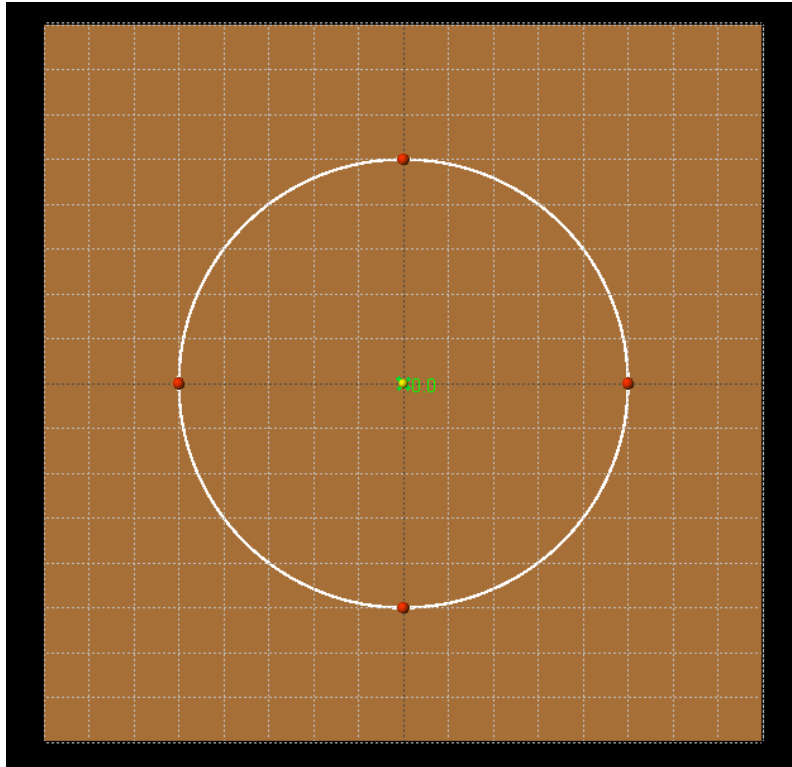
Since we are working with a small piece, set the grid to **.25** and make sure **Snap Objects to Grid** is checked.



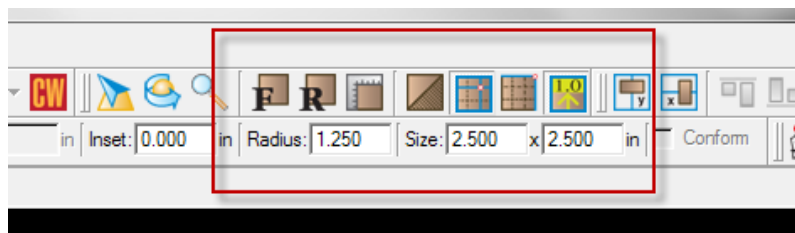
Now we will draw a circle in the center of the board 2.5" in diameter. Select the **Circle Tool**. This tool is on the **Drawing Menu** and it may be on the **Tool Bar** depending on how your system is setup.



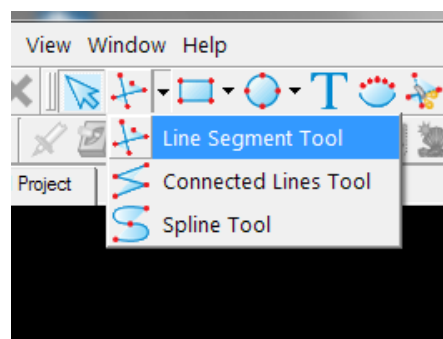
With the **Circle Tool** selected, click on the center of the work piece and drag the circle until it is 2.5" in diameter.



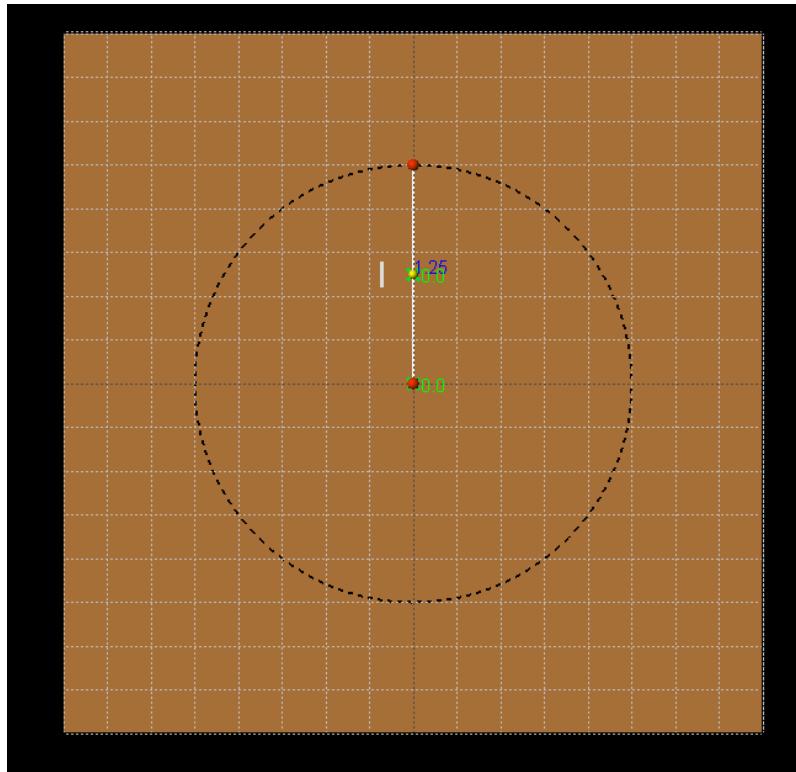
Since Snap to Grid is turned on the center of the circle should be at 0,0. the size of the circle is shown in the main tool bar:



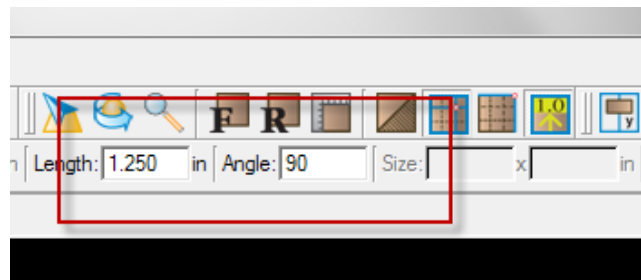
If the size is not correct you can change the radius or the size and get the circle to be 2.5" in diameter. Now select the **Line Segment Tool**.



Place the cursor in the center of the circle and draw a vertical line from the center of the circle to the top of the circle.

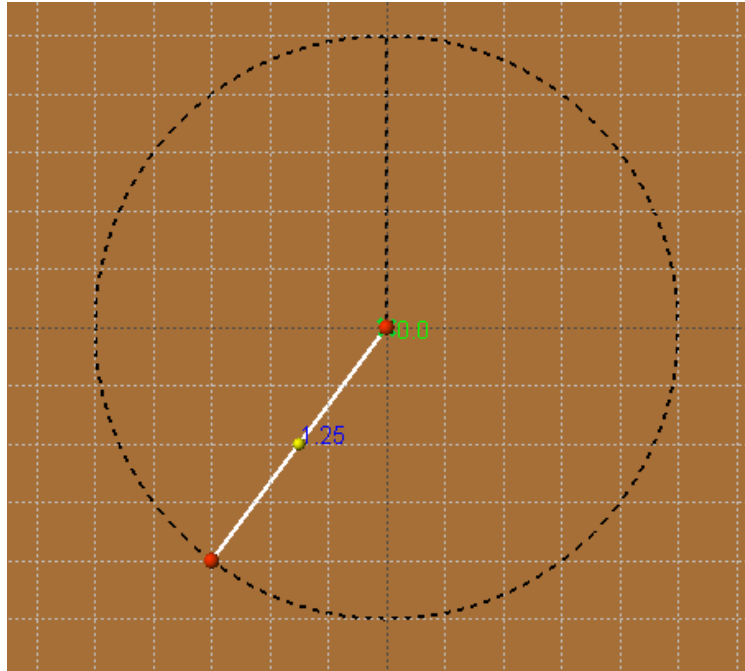


You will see the dimensions of the line and its angle in the tool bar.

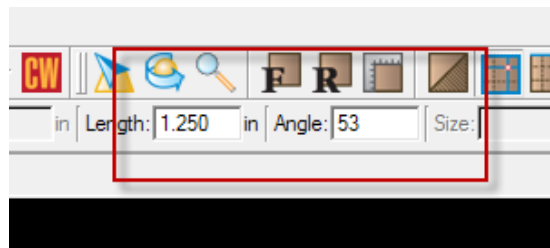


Click outside the circle to deselect the line and select the line segment tool again. It is important that you deselect the line and reselect the line segment tool in order to draw another line that is not connected to the vertical line. If you simply click the end of the first line and continue drawing the system will create one vector by combining the two segments into one continuous vector. That will create a problem for what we will be doing later.

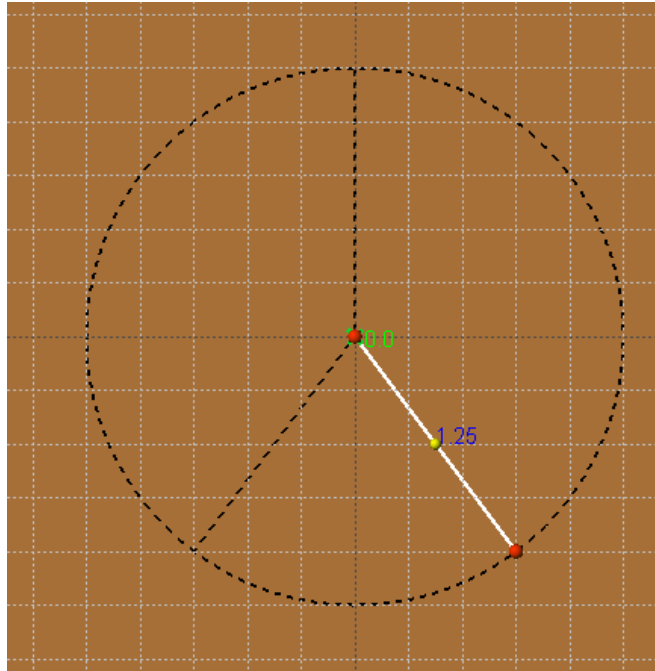
Click on the center point of the circle and draw a line to the lower left at about a 45 degree angle.



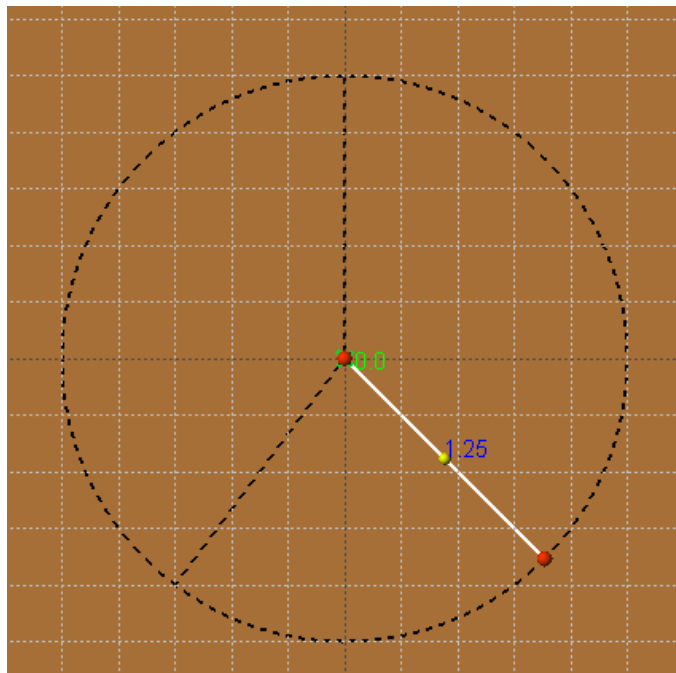
The tool bar will show the line length and the angle of the line. In this case it is 53 degrees.



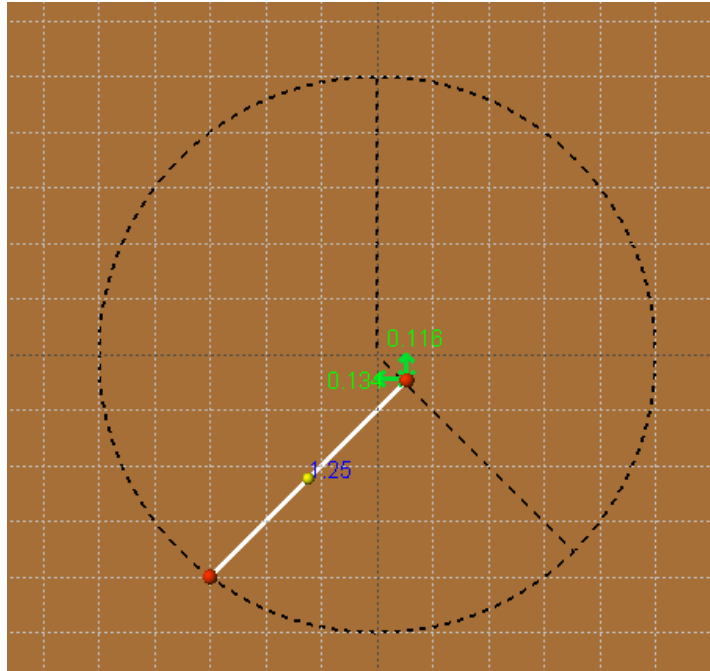
Now repeat these steps and draw another line to the lower right forming an upside down 'Y'.



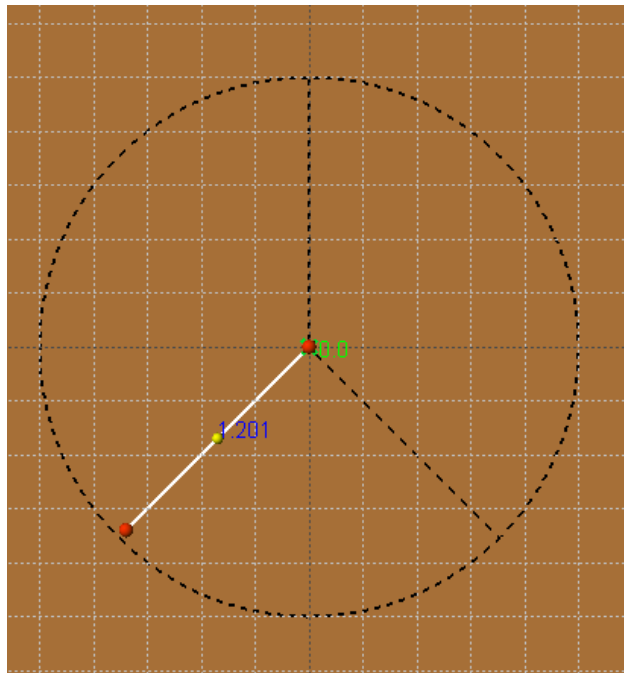
This line will also have a 53 degree angle due to the snaps in place when we drew the lines. With the line selected click in the angle field and change the angle to 45 degrees. press enter to accept the new value and the line will shift slightly to the new angle.



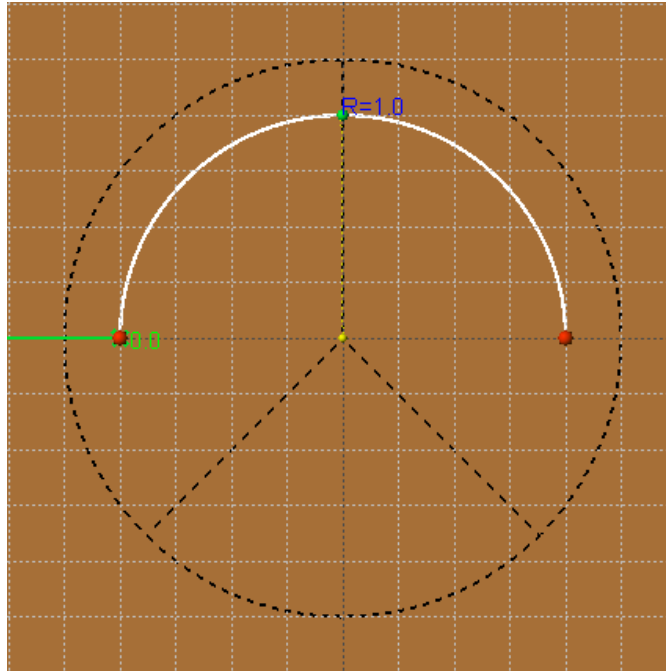
Now select the left line and repeat the process. You will probably get something that looks like the next image. Instead of the end of the line on the circle shifting the point in the middle shifted.



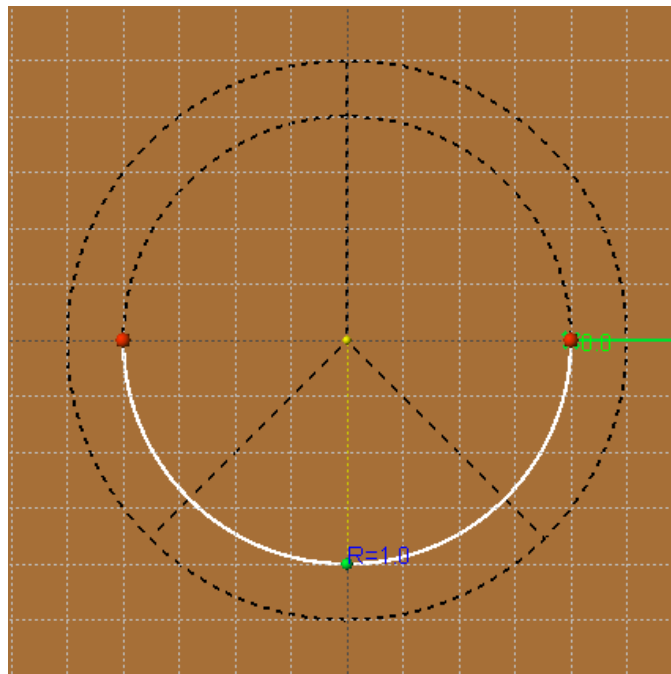
Simply click on the end of the line that moved and drag it back to the center and the line will be properly aligned. Note that the line will be shortened slightly but for what we will do next it will not matter.



Deselect the line and select the **ARC Tool**. Place your cursor on the grid just inside the left side of the circle and draw an arc to the right side of the circle. You should have a semicircle like the one below.

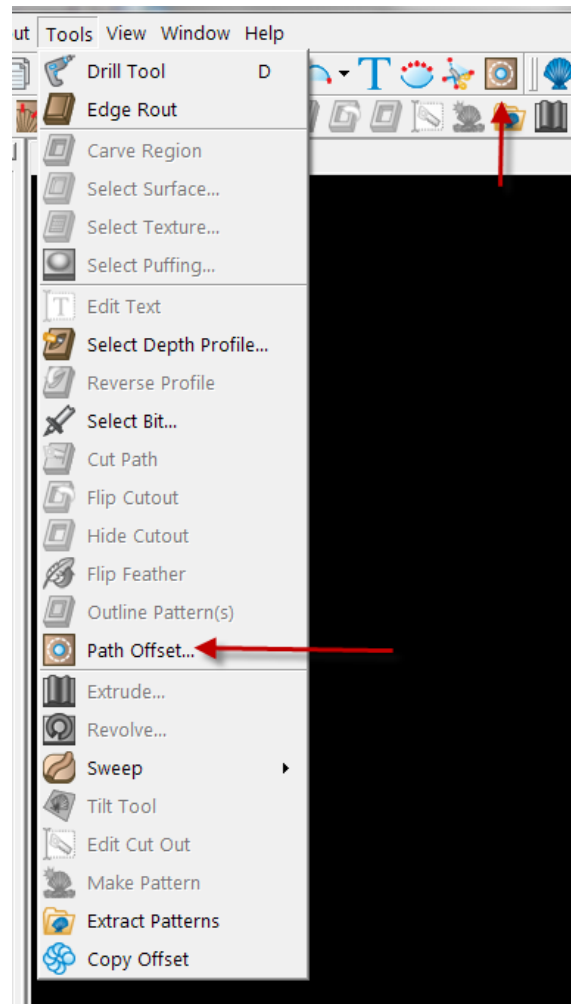


Deselect this arc and select the Arc Tool again and draw another arc this time from the right side to the left side. This will draw a downward arc creating the bottom half of a circle with a diameter of 2.0". If the ends do not snap exactly where you expect you can delete the arc and try again or you can drag the end point to the correct snap point and adjust the radius by dragging the midpoint.



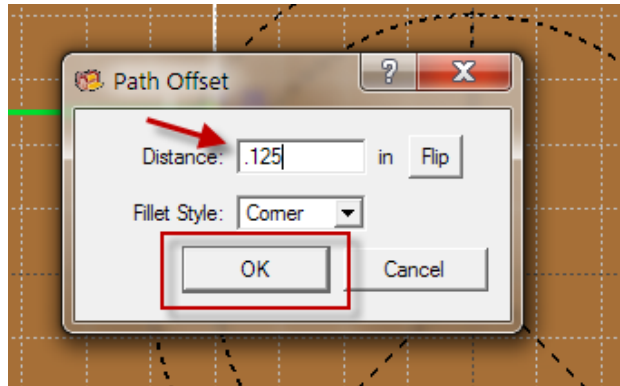
We now have a circle with an inner circle made up of two half circles and three line segments that make up an upside down "Y". Next we are going to use the path offset tool and the trim tool to create a peace symbol with the interior sections being .25" wide; the same as the width of the circle.

Select one of the line segments. I will start with the vertical segment. Select that segment and then select the Path Offset tool.

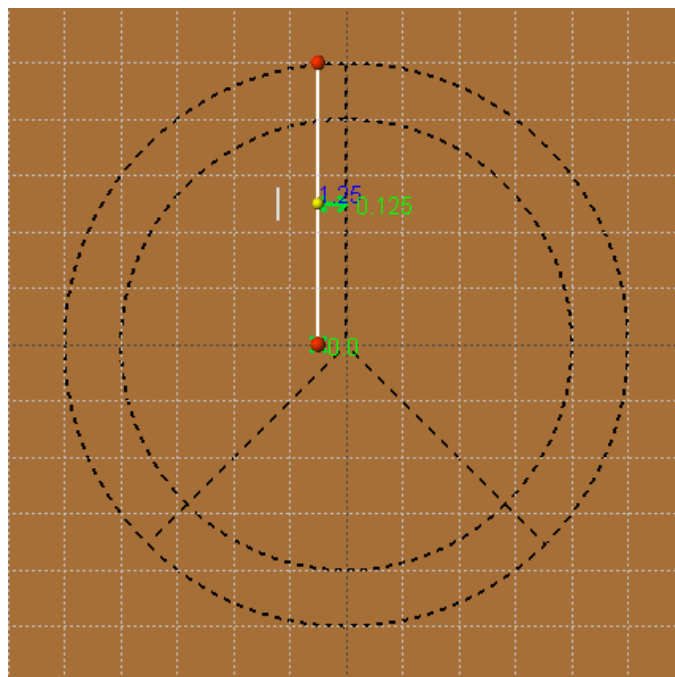


When you select the path offset tool the following window will appear. The default offset is 1". we want to create a pair of lines .25" wide so we need to create two lines, one on each side of our original line that are .125" away from the original line.

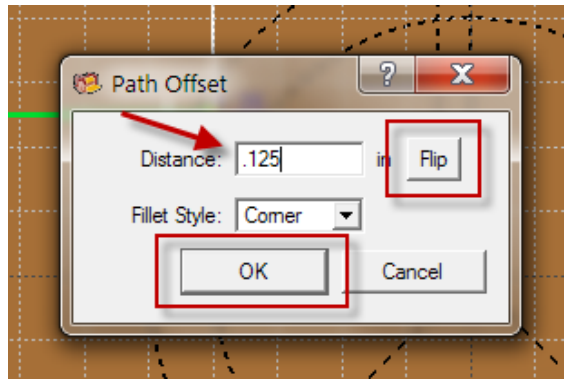
Enter .125 in the distance field and click **OK**.



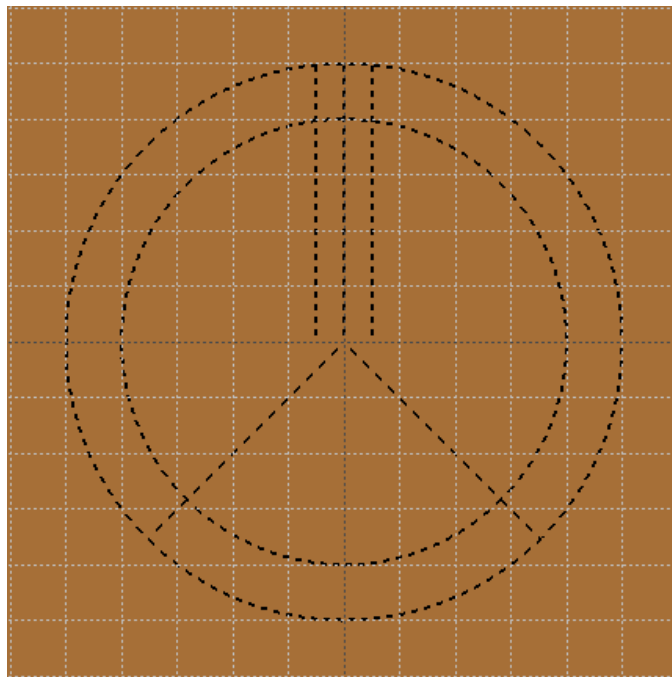
This is the result:



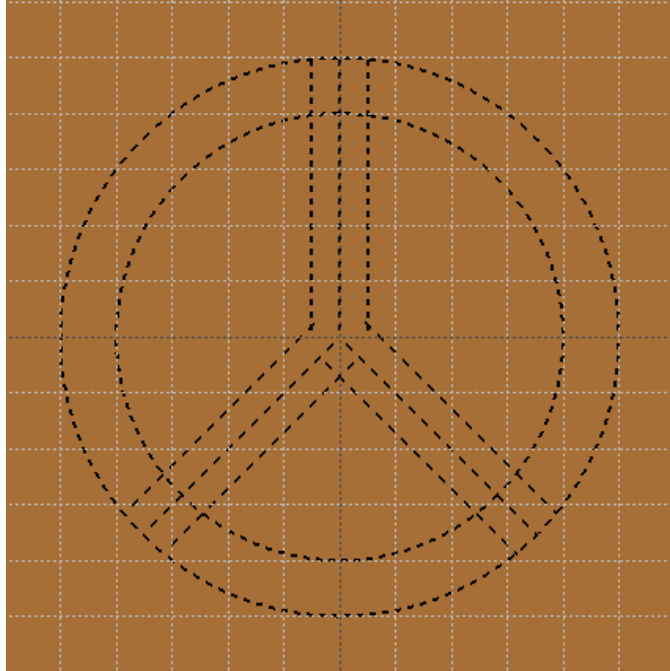
Now select the original line again and click the **Path Offset** tool again. Enter .125 in the offset value. Click the **FLIP** button to switch sides of the offset and then click **OK**. Entering a value of -.125 will do the same thing; it is your choice which is easier.



This is the result.



Now repeat these steps selecting the angled lines at the bottom of the drawing. You should end up with this:

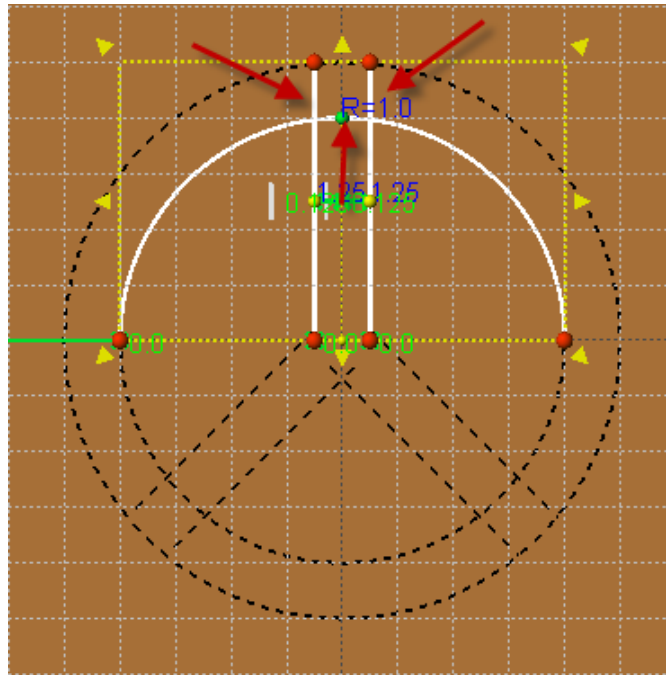


Now we need to clean up our drawing. First we will select each of the original three lines that we drew as they were for position and reference. Next we will use the trim tool to delete the portions of the vectors where they overlap.

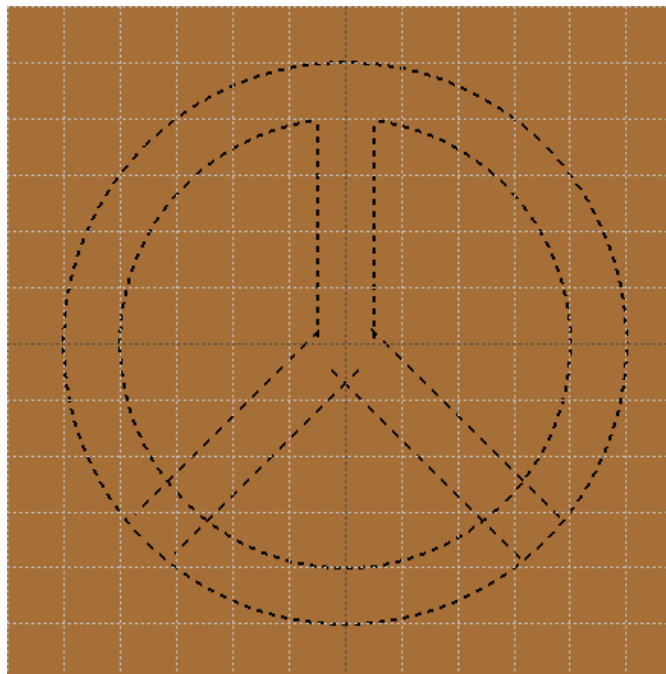
Delete the original three vectors that we drew. Select each vector and press the Delete Key or right click and select delete from the popup menu.

Now trim the overlapping vectors. Select the top half of the inner circle. Press the <CTRL> key and select the two vertical vectors that cross the circle.

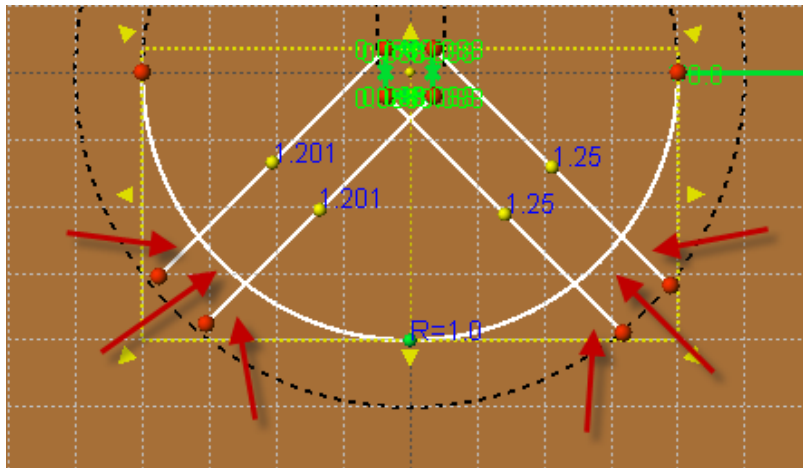
Click on the portion of the selected vectors that you want to delete. The arrows point to the unwanted vectors.



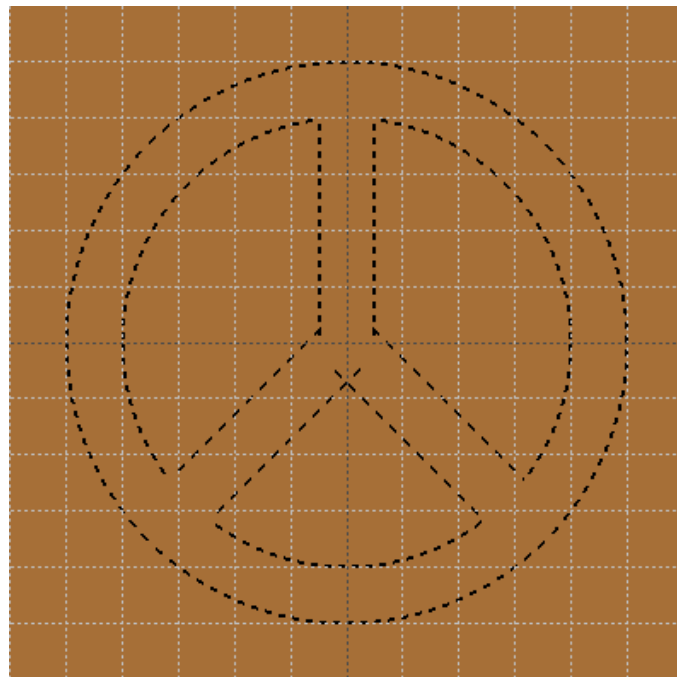
This is what results.



Now repeat the steps with the lower vectors. Use the trim tool to remove the overlapping vectors identified by the red arrows.

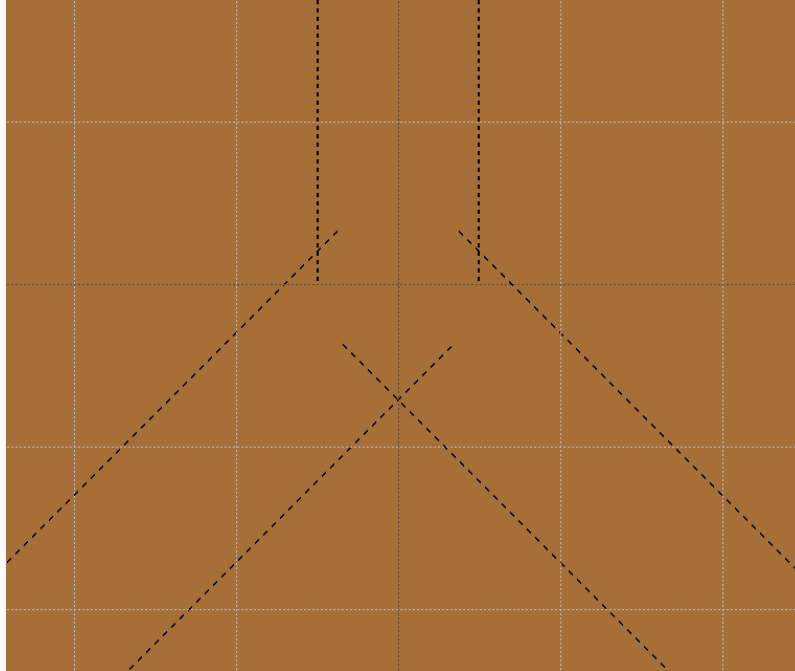


This is what you should have at this point.

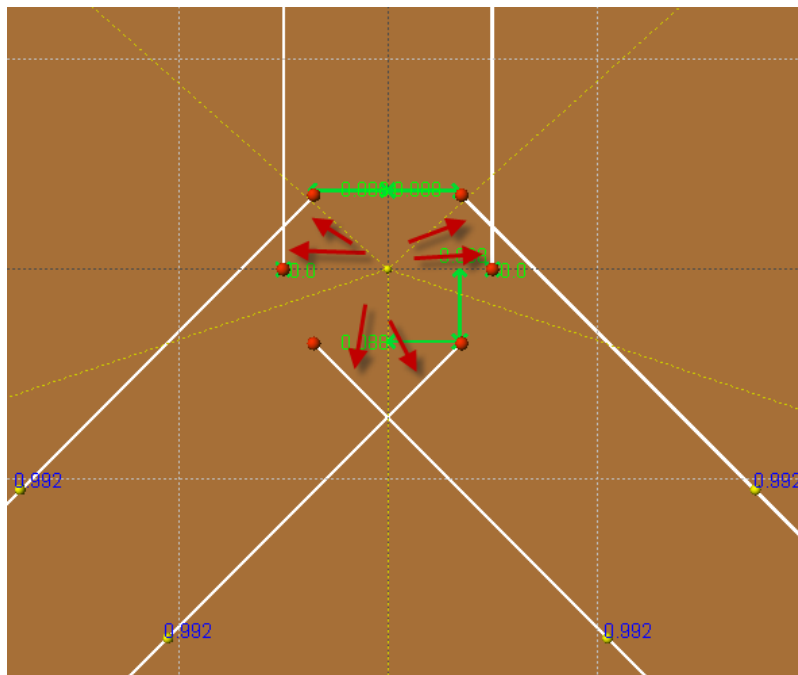


Now our drawing is almost finished. there are still some overlapping vectors in the center and if you examine the drawing you can see that the top half of the vectors are not connected to the bottom half were we drew the two semicircle s to make the inner circle. We had to draw the circle in that way since the trim tool does not work on a circle. This is what you see if you click the two vertical vectors.

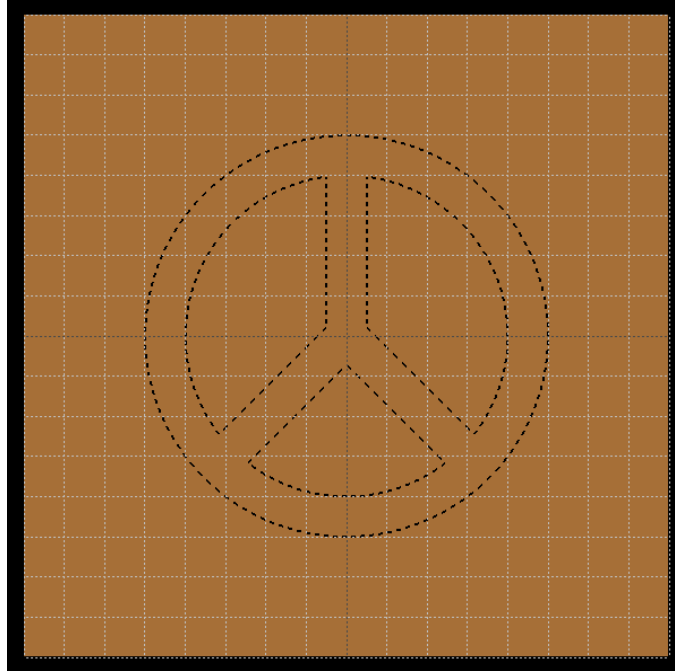
In order to trim the vectors in the center it will be necessary to zoom in to the center of the drawing.



Now select all of the overlapping vectors by holding the <CTRL> key and clicking in each of the overlapping vectors.



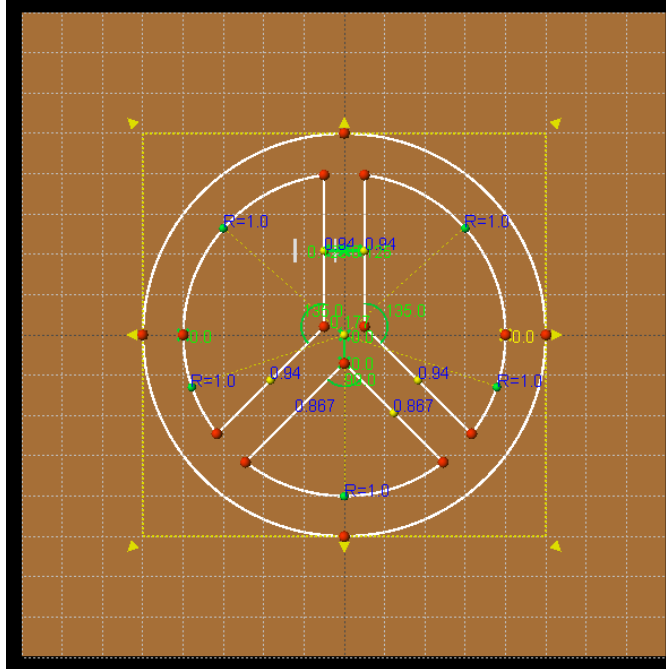
Use the trim tool to remove the overlapping vectors identified by the red arrows.



This is our completed drawing. Save this with a name that is meaningful to you. I called mine Peace_Symbol.

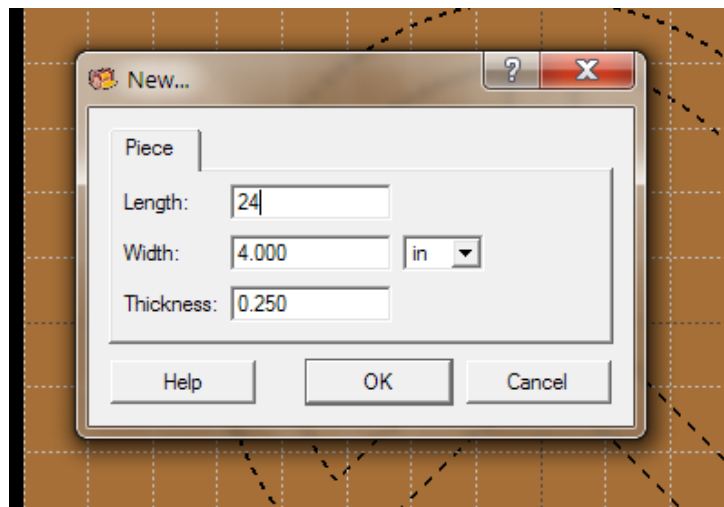
Now let's create a new project that uses this drawing to cut a number of these pieces into a larger piece of material. Let's use a piece of material 4" x 24" x .25".

If it is not open, open the file Peace_Symbol.mpc. Draw a box around all of the drawing or select all of the vectors in the drawing.

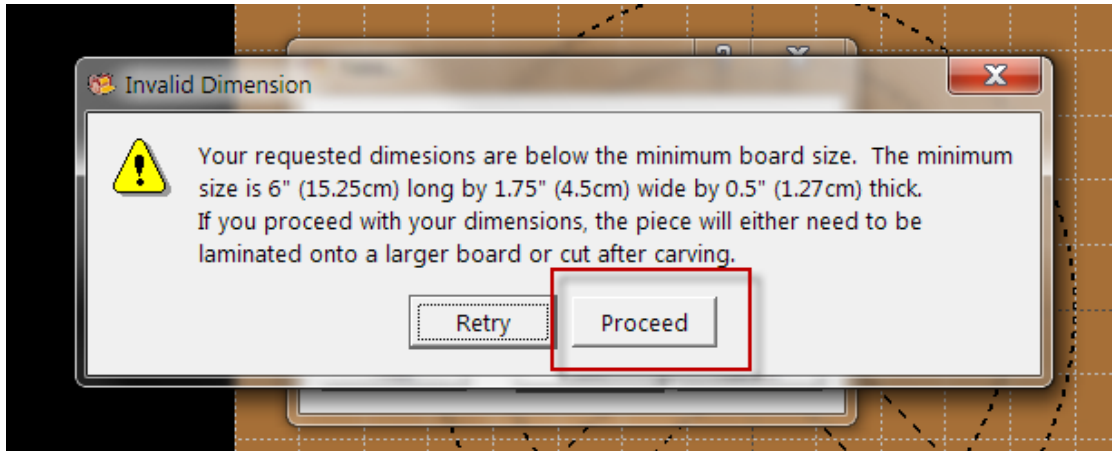


Now copy all of the vectors either by pressing <CTRL> and C or by selecting the copy option from the file menu. This will place a copy of the vectors on the windows Clipboard.

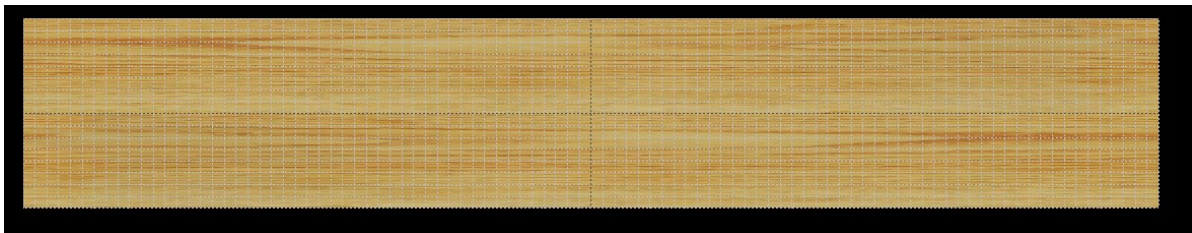
Now select **File->New** to create a new file.



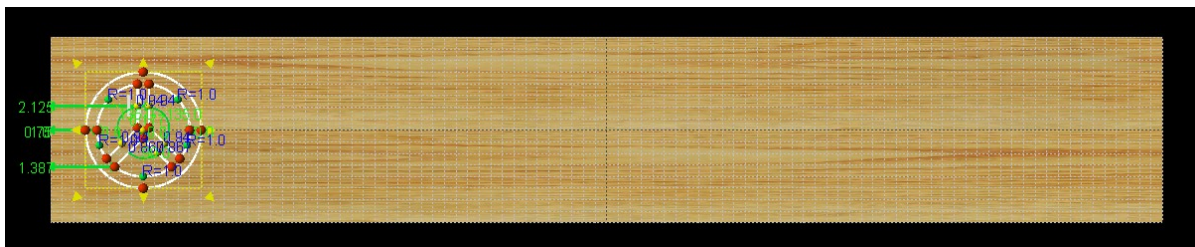
Set the length to 24" and leave the width 4" and thickness at .250". Click OK.



Click proceed to acknowledge that we will use a carving sled to get meet the minimum thickness.



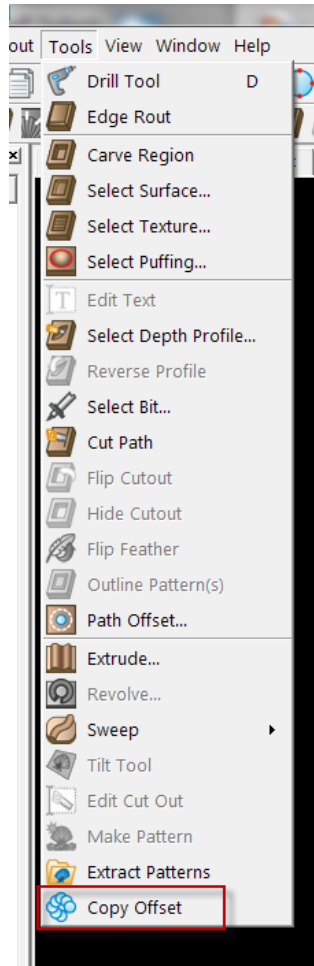
This is our new project. **Press <CTRL> V** or select **File->Paste** from the main menu to copy the vectors from the clipboard to our new project.



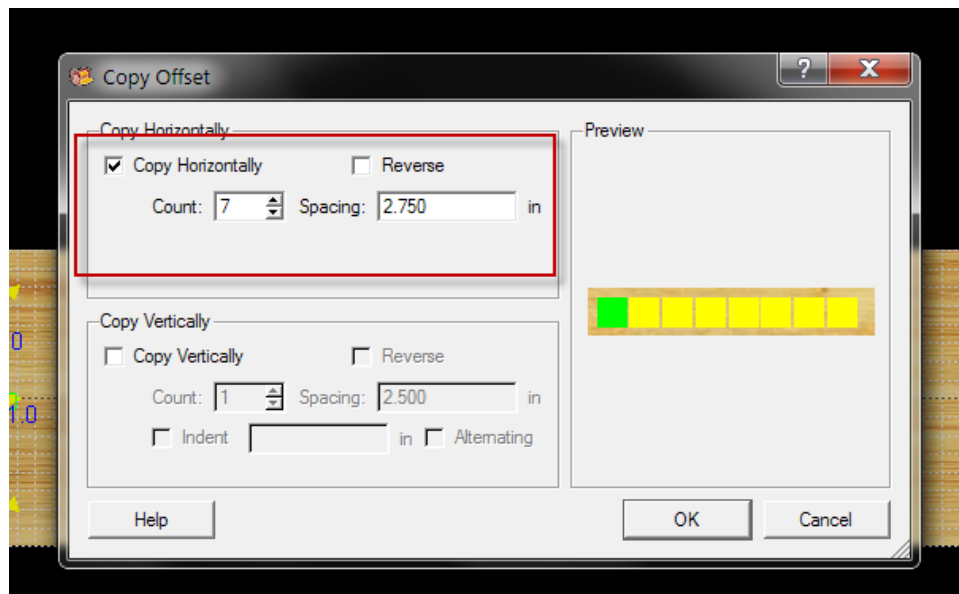
There is now one copy of our design on the board. We will use the **Copy Offset** tool to copy the vectors along the remaining area of the board.

Our drawing is 2.5" wide. If we use the .125" cutting bit to cut around the outside that will make the width of the carving 2.75" wide. We can probably add 7 additional carvings to our board.

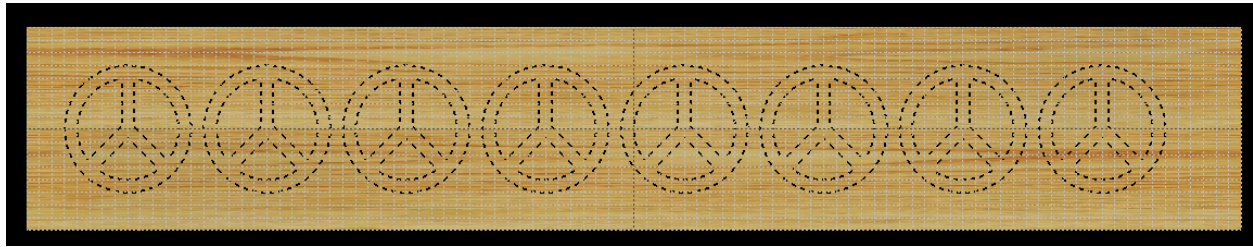
With all of the vectors selected select the Copy Offset tool from **Tools->Copy Offset**.



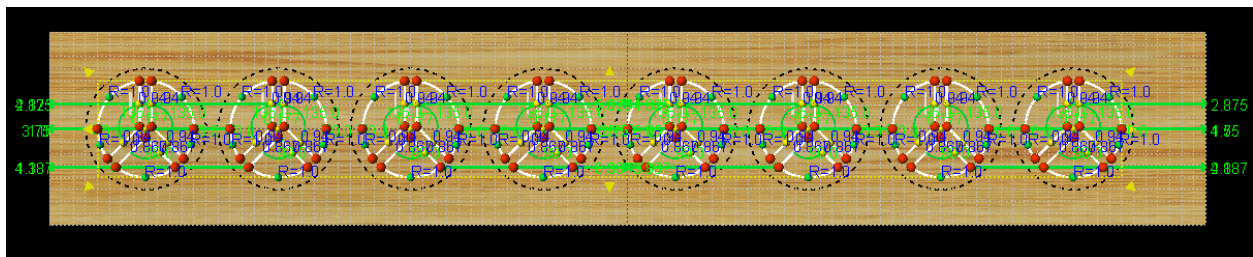
Now Check the box for horizontal copy, enter 7 for the number of copies and 2.750" for the offset.



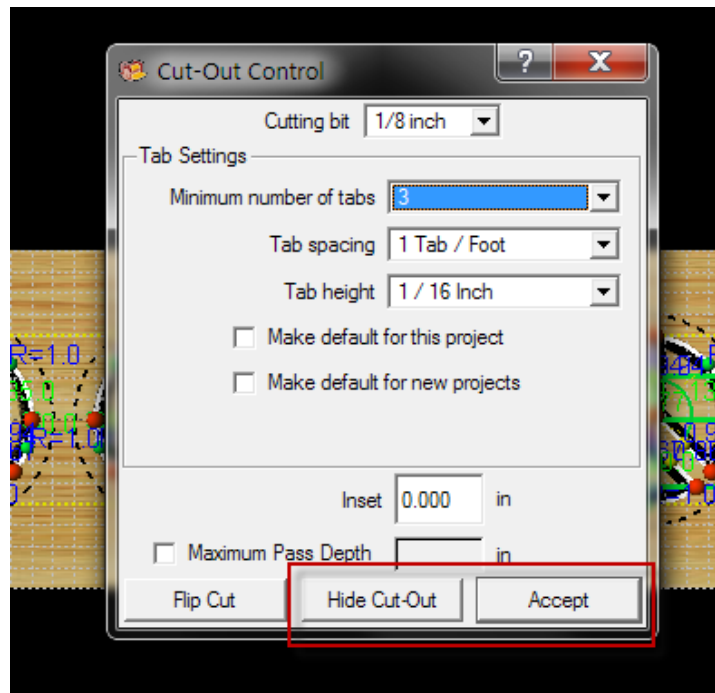
We now have eight copies of our drawing arranged across the board.



All that remains is to create the cut paths to cut the symbols out. Select the inside vectors first.

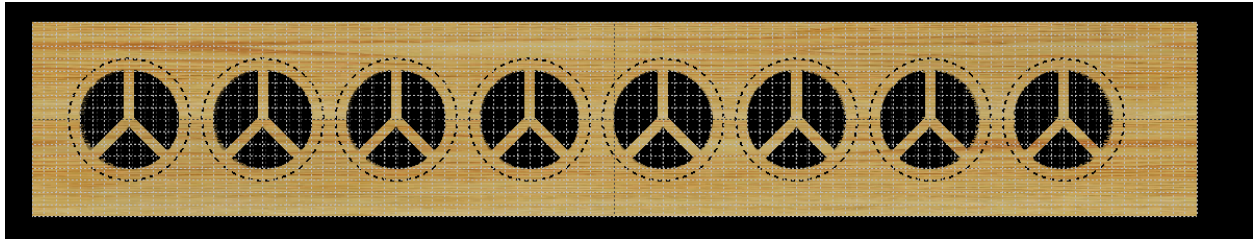


Select Tools->Cut Path to define the cut path.



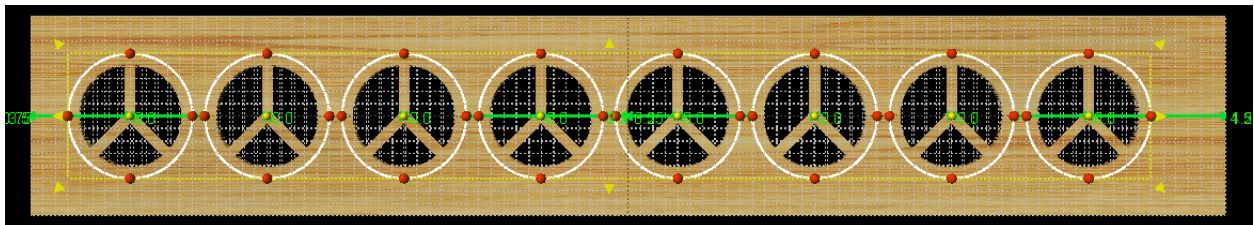
Select the bit to use. I used the 1/8 inch bit for this since we are using .25" material. If you are using double sided tape to hold the material down on the carrier board you may be able to get by with no

tabs. Clicking **Hide Cut-Out** will remove the cutouts from the screen so you can see how the project will look. Click **Accept**.

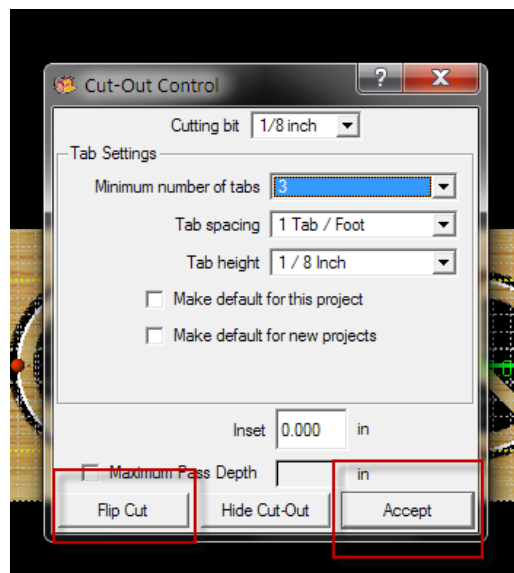


This is the project with the interior cut out.

Now select the outside circles.



Select Tools->Cut Path. Use the same settings that you used for the interior cuts. Click **Flip Cut** to cut on the outside of the vector. The default is to cut on the inside.



This is the finished project.

