



TRAINING PROJECTS

PART WIZARD2 QUICK START TUTORIAL

Part Wizard2 is the Design and Toolpathing Software shipped with the ShopBot PRT to help you get from your idea to cutting file.

This quick tutorial will take you through the 3 steps to get from idea to part file when using the ShopBot Part Wizard design and toolpathing (Computer Aided Design (CAD)/Computer Aided Machining (CAM)) software included with your ShopBot PRTalpha:

1. Design (put the idea into the computer):

- Layout the design with the drawing tools in the ShopBot Part Wizard

2. Tool Path (tell the computer how to cut it out)

- Compensate for the bit
- Determine the path the ShopBot follows when cutting out the design
- Set order of cut for designs created in Part Wizard

3. Generate ShopBot Part (.sbp) files:

- Part Wizard generates the code that the ShopBot Control software needs to run your part files

NOTE: Part Wizard saves information about the design and toolpaths as .art files, and generates .sbp files for the ShopBot Control software to read. You must save the .art files you created in Part Wizard in order to modify any designs or cutting files.

You run the ShopBot Part (.sbp) file with the ShopBot Control software also included with your ShopBot PRT.

A Full Manual for Part Wizard was installed on your computer when you installed the software. To access the manual: From Part Wizard's Main menu, click on **Help>Part Wizard Manual - PDF**. Once the pdf file is open, you can click on the Tab labeled "Bookmarks", and it will display the contents. Click on any subject to jump to that page. Or, you can print out the 188 pages and use the index to find answers to your questions. (You can go to www.adobe.com for a free download of the Adobe reader.)

If you have a need to find the manual on your computer, from **My Computer**, click on **Local Drive (C:)> Program Files>ShopBot> Part Wizard2>Custom>HTML>pwmanual.pdf**.

FOR THE BEST RESULTS, OPEN UP PART WIZARD2 AND FOLLOW ALONG WITH THIS TUTORIAL!!!

This is a very basic intro and does not show any of the special features of the software.

There are also small tutorials that include ideas about doing Inlays and the Alignment options found in this section.

Check out the Plasma section of the Manual for another Part Wizard Tutorial.

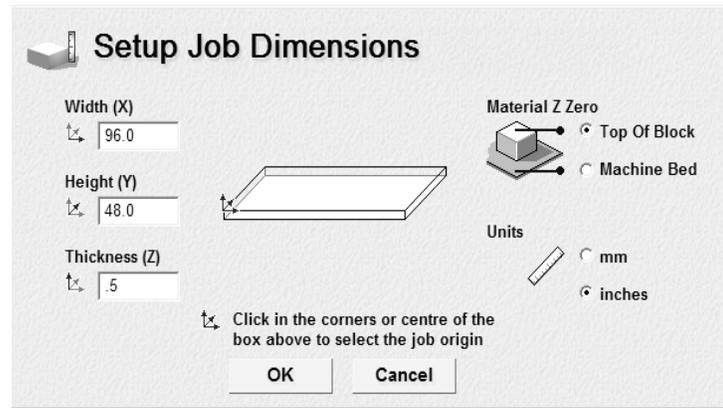
A more extensive Part Wizard Tutorial follows this quick summary. Also, check the website for more tutorials.

STEP 1: DESIGN THE FILE IN PART WIZARD

WHEN PART WIZARD FIRST OPENS, CLICK ON THE "CREATE NEW MODEL" OPTION TO GET TO THIS SCREEN.

Use **SetUp Job Dimensions** to set the Size of the Material that you will be working with, including

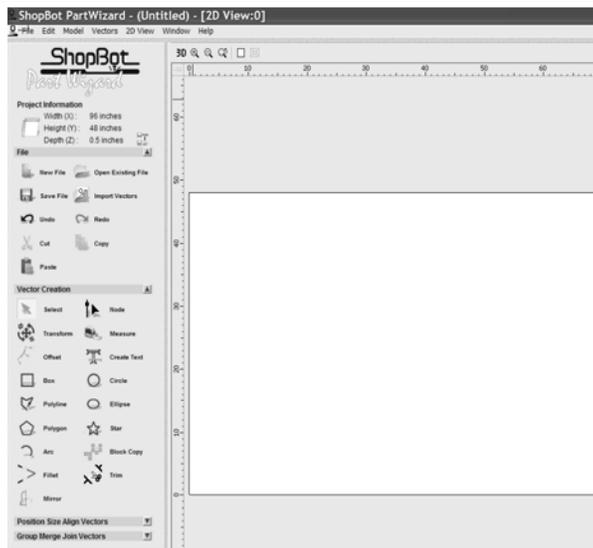
- Units (inches or mm)
- Width (X dimension)
- Height (Y dimension)
- Thickness (Z dimension)
- Z-Zero (Top of block)
- Origin for X and Y



In this example, we will design for a 4 x 8 sheet of plywood that is .5" thick. First step is to make sure you are working in inches (Click on the inches button found under Units).

Enter the size of a standard 4 x 8 sheet of half inch thick plywood:
 Width: 96
 Height: 48
 Thickness: .5

Set the Material Z Zero to Top of Block. Just trust for now.

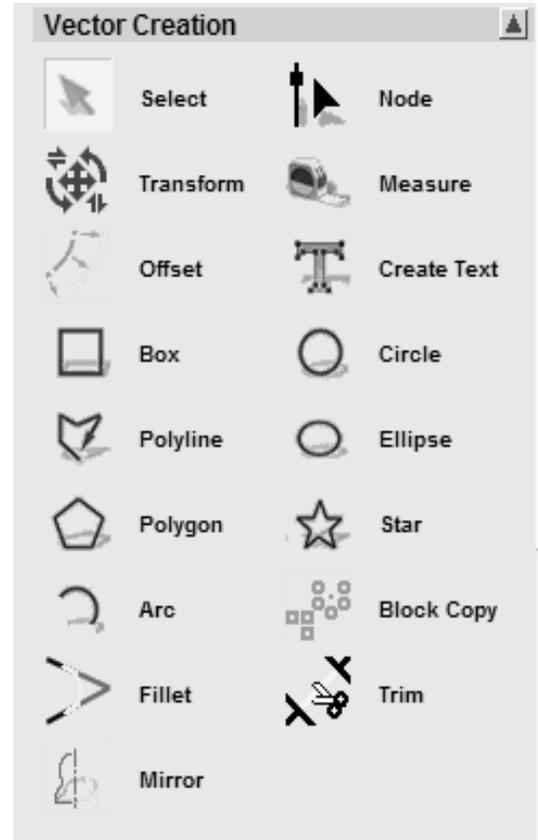


Note the tabs at the bottom left corner of the screen ...click on the **Assistant** Tab to design.

The Assistant screen comes up.

- The right hand side is a virtual representation of your material. Where you place a part or design on this virtual material is where it will cut out on the real material.
- On the left side of the Assistant screen, **Vector Creation** displays your tools to design the parts or art. Anything that you "draw" on the virtual screen (lines, box, circles, text, etc.) is a "vector".
- There are also icons that help your work with your **File**, such as **Save** the file, **Copy** and **Paste** objects, **Import Vector** designs or artwork from other programs (.dxf, .dwg, .eps, .ai formats among those accepted).
- Note that the **Project Information** (size of the material) is posted just under the Part Wizard logo. It's easy to change the size of the material: from the Main menu bar: click on **Model>Set Size**.

Use **Vector Creation** to access the drawing tools and place a design on the 2D screen



Click on the **Box** icon to draw a box or square



The **Rectangle Creation** Screen comes up
Click on **SHOW HELP** for more information about how to fill in the blanks

Fill-in the following numbers:

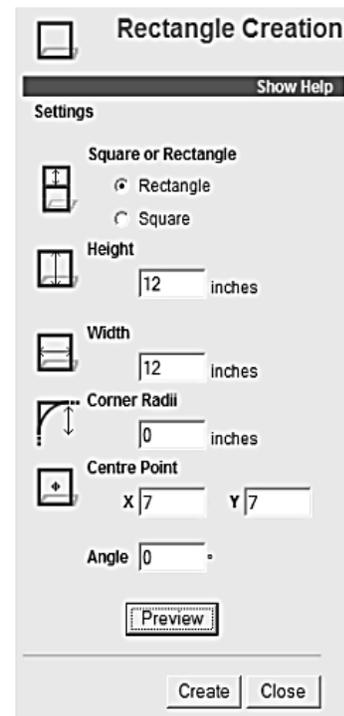
- Height: 12
- Width: 12
- Center point: X:7 Y:7

Click on the **Preview** button to see if it is in the right place and is the right size

You should have a box that is 12" square, with the lower left corner 1" from the edge of the material.

If no, then make the necessary changes and **Preview** again

If yes, then click on the **Create** button once
If you click **Create** more than once, you will have two squares sitting on top of each other



To make another square:

Fill-in the following changes:

Height: 12

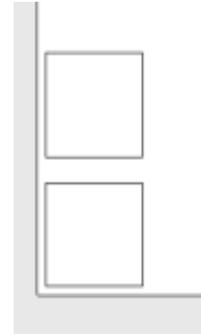
Width: 12

Center point: X:7 Y:22

Preview, then click on the **Create** button **only once**.

Close the Rectangle Creation Screen

You should now have two boxes on your design screen.



Click on the **Circle** icon to draw a Circle



When the **Circle Creation** Screen comes up, fill-in the following numbers;

Circle Center: X:22 Y:7

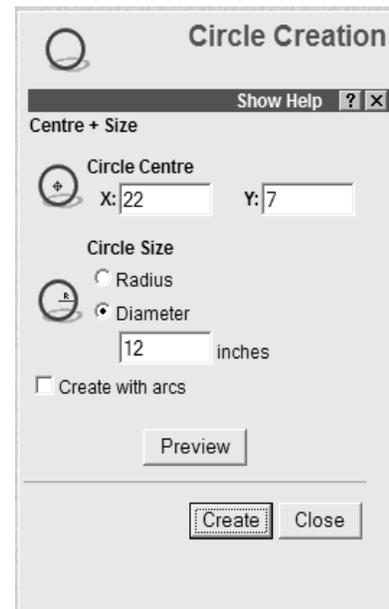
Circle Size:

(Click on the radio button for **Diameter** rather than **Radius**) Diameter: 12

Preview: You should have a 12" circle that is to the right of the bottom box

Adjust if necessary

Click on the **Create** button. Only click it once, or you will have two circles sitting on top of each other



To make a second circle:

Fill-in the following changes:

Circle Center: X:22 Y:22

Circle Diameter: 12

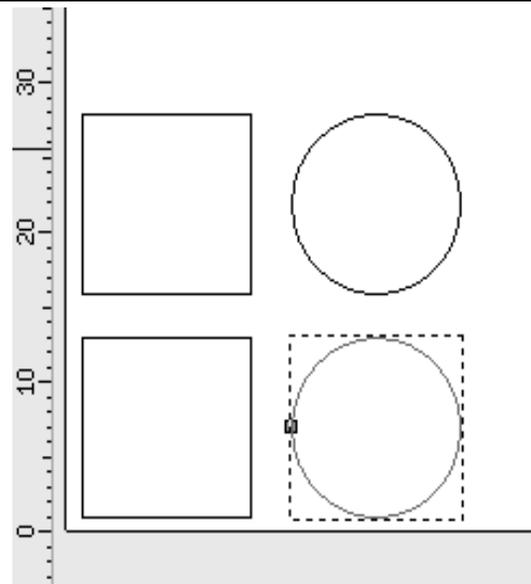
Click on the **Preview** button

You should now have two circles in addition to two boxes on your design screen

If no, then make the necessary changes

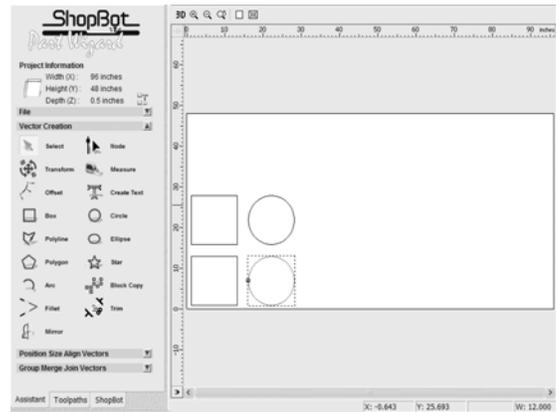
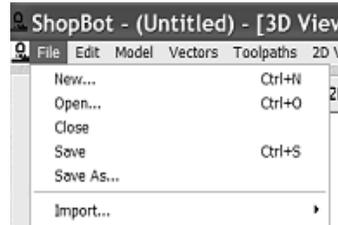
If yes, then click on the **Create** button once

Close the Circle Creation Screen



You have finished Step 1 (Design) , and are going to move to Step 2 (Toolpath)

Now would be a good time to **Save** the .art program in a location where you can find it



A brief side lecture about Saving your work.

There is nothing more frustrating than creating a file, then not being able to find it again after you have saved it. So, now is a good time to develop a method for where you save things on your computer.

One technique is to create a new folder  for EVERY customer or project you have.

Then, put EVERYTHING related to that customer or project into that folder: Part Wizard (.art) Design files, ShopBot Part (.sbp) files, any artwork they may have sent you, etc.

Another technique is to put all of your artwork (.art) files in one location, and your ShopBot part (.sbp) files in another folder. When you load the ShopBot Control software, it puts a folder called SBParts in your C: drive. You could put everything there if you want, or you can create another big folder called Part Wizard artwork, or ShopBot Files, or.....

The first time that you click on the Save icon  Save File it will bring up a screen that says: **Save As:**



If the folder you want to save into does not come up, then use the down arrow next to the name to bring up the correct folder. For example, if you wish to save everything in SBParts, it is in the C: Drive.

Click on the icon  to create a new folder within the larger folder. Give it a name you can remember and click on Open

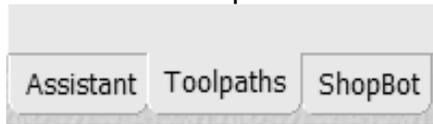
Give the .art file a name you can remember (for example: tutorial) and Save

The next time you click on Save, it will overwrite the last version of the file without asking where to Save it.

Hint for the future: If you have a complicated design file, you may want to save a back up copy of the .art file before you start the next step. Use SAVE AS and give the .art file another name.

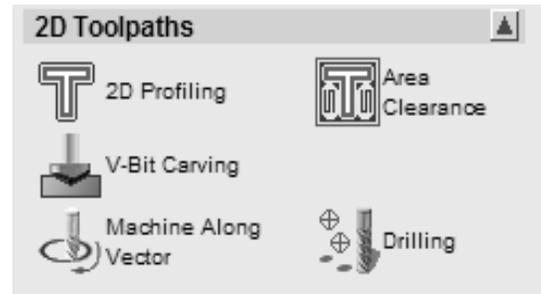
STEP 2: TOOLPATH THE DESIGN

Click on the Toolpath Tab.



You will use **Toolpaths** to:

- choose a machining style
- choose the correct bit (you may have to add information about your bit to the tool library)
- name and calculate the toolpath



The 2D Toolpathing options are:

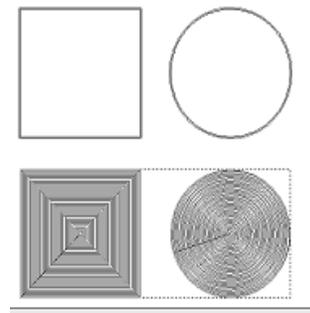
Profiling: Moves the cut line outside (or inside) the design line the radius of the bit so that the part (or hole) ends up the size you want.

Area Clearance: Pockets out the inside of the design.

Machine Along Vector: Cuts out right along the design line (vector).

V-Carve Text: 10 fonts can be V-carved for an engraved look. The 10 fonts were installed when you installed the software, and can be found at the top of the font list on your computer.

Drill: Puts drill points the diameter of the bit in the center of the chosen object.



For this example, we are going to **Profile** the top square and circle, and **Area Clear** the bottom square and circle

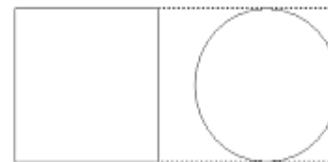
Select the top square and rectangle either by doing a

Sweep select

- Put the cursor above and to the left of the top square and circle
- Hold down the left mouse button and draw a "boundary box" completely around the top square and circle.
- Release the mouse button. Both objects should turn magenta (pink) and a dotted line box surround both objects

Or

- Click on a line of the top square
- Hold down the SHIFT key
- Click on the line of the top circle
- Both objects should turn magenta (pink) and a dotted line box surround both objects

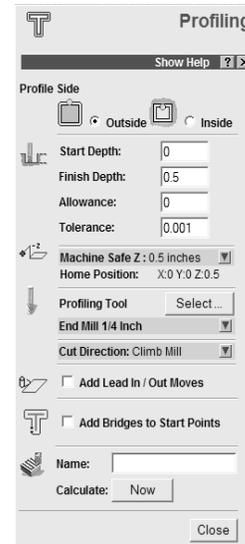
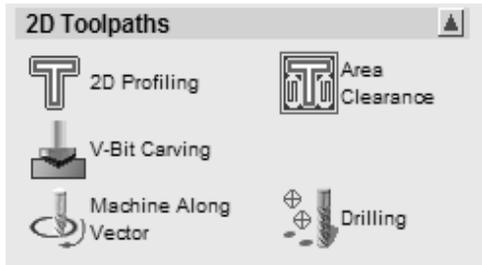


Note: If an object turns red instead of magenta, it means there is more than one copy of the object in that location. FIX: Click anywhere else to deselect the objects, click (not sweep select) on the "red" object and hit the "Delete" button on the keyboard. If there is still a circle or square there, hit delete again. Nothing there now? Oops.

Find the UNDO icon  under FILE to replace the object you just deleted. Select square and circle again and proceed.

CUT OUT THE TOP CIRCLE AND SQUARE

Open up the **Profiling Toolpath** screen by clicking on the **2D Profiling** icon under the **2D Toolpaths** heading.



The **Profile Side** is set to the **Outside** if you want to end up with parts the size that you drew them. If you wanted a hole the size that you drew it, you would click on **Inside**.

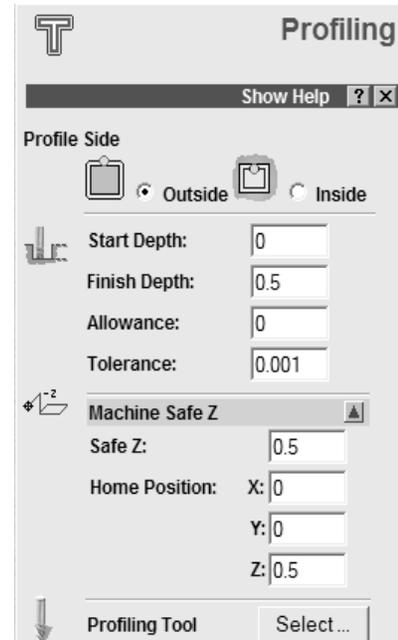
The **Start Depth** is the surface of the material. Leave it at 0.

The **Finish Depth** is how deep it will cut into the material from the top of the material. In **Profiling**, the software defaults to the thickness of the material entered when the Model was set up. It can be changed as needed. The value is entered as a positive number.

Leave the **Tolerance** at .001

Click on the down arrow next to **Machine Safe Z** to set the distance above the material during positioning moves, and the location that the router head will go to in between cutting (**Home**). The software will make sure **Safe Z** and **Home Z** match (trust us on this). It defaults to 1 inch, but .5 saves time and is usually OK if you have set the Z origin at the surface of the material when you set up the Model.

Click on the **Select** button next to **Profiling Tool** to choose the bit.

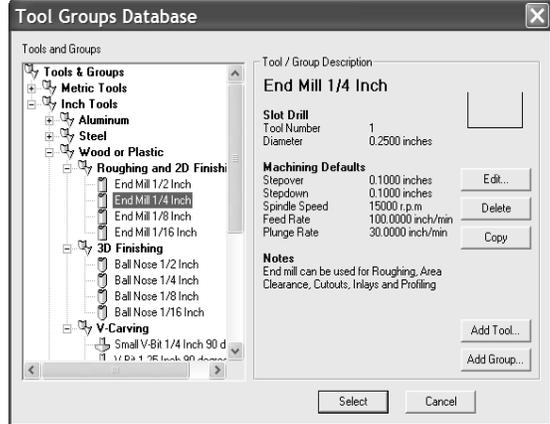


Clicking on the **Select** Button brings up the list of Tools available to you. If you are just starting out, the **Tools and Groups** list may need to be expanded. Just click on the plus sign next to the group (**Wood or Plastic**).

When the **Wood or Plastic** list has been expanded, Expand the **Roughing and 2D Finishing** list.

Click on the **1/4 inch end mill** as the tool of choice.

When you are first starting out, you will have to **Edit** the tools in the library to set them up for ShopBot.



Click on the **Edit** button to bring up the screen to the right

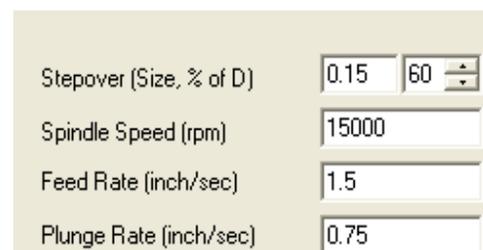
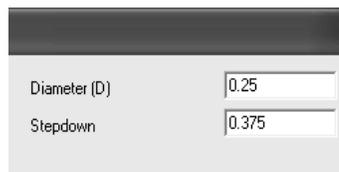
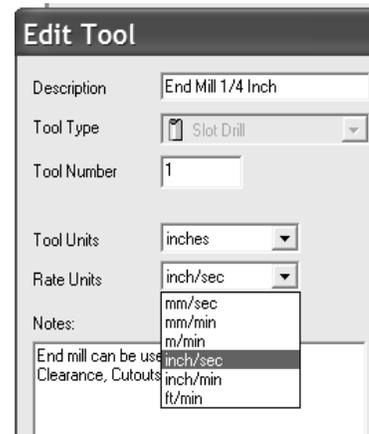
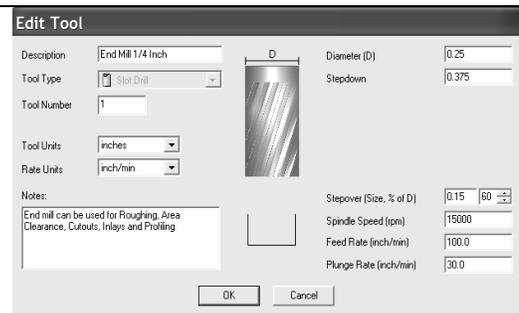
This is where you set information such as:

- **Tool Units** (inches)
- **Rate Units** (inches/sec) *This is VERY important*
- Diameter of the bit (**Diameter = .25**)
- How deep you want the ShopBot to cut in each pass (**Stepdown = .375**). (A rule of thumb for wood is never to make a single pass greater than 1.5 times the diameter of the bit. The software will figure out how many passes it takes to cut to the Finish Depth you set in the Profiling screen)
- How much you want each pass in the clearing routines to overlap (**Stepover = 60%**)
- Speed of the spindle or router (**Spindle Speed = 15000**) (This is just a holder and does not really set the speed)
- How fast the ShopBot moves through the material when cutting (**Feed rate = 1.5 inches/sec**)
- How fast the ShopBot plunges into the material when cutting (**Plunge rate = .75 inches/sec**) *The feed rate and plunge rate are slow for the PRTalpha, but start here until you get comfortable with the system*

When all is set, click **OK**

Then click the **Select** Button to select the tool

Note how the **End Mill 1/4 Inch** name has come up on the **Profiling** Screen



You can set the **Cut Direction** to Climb Mill or Conventional by clicking on the down arrow. The software defaults to Climb Mill (the cut direction and the rotation of the router bit are the same), which will usually give you a smoother cut. *Hint: if you look at the part, and look at the scrap, and the scrap looks smoother than the part, try changing the cut direction.*

For now, do not worry about
 Add Lead In Moves or
 Add Bridges to Start Points

Give the toolpath a **Name** you can remember. This name should have enough information that you can remember which toolpath does what when you are generating your ShopBot part file in Step 3.

Calculate: Now

Close the screen

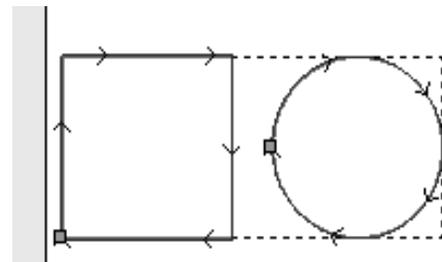
The toolpath to the outside of the original design will appear on the design screen

The Cut Direction is indicated by the arrows

You can use the magnifying glass to zoom in on it



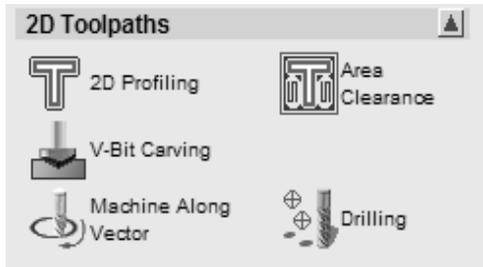
Click on the glass with the + in it, then sweep select the area you want to zoom in on. Click on the blank page to get the entire screen back, or zoom out with the - glass.



POCKET THE BOTTOM SQUARE AND CIRCLE

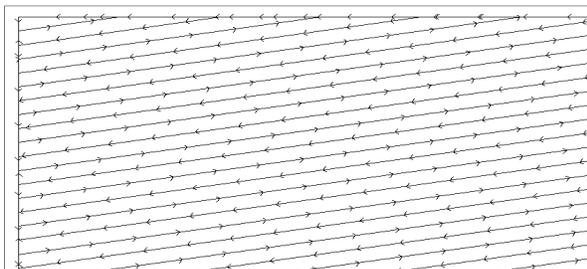
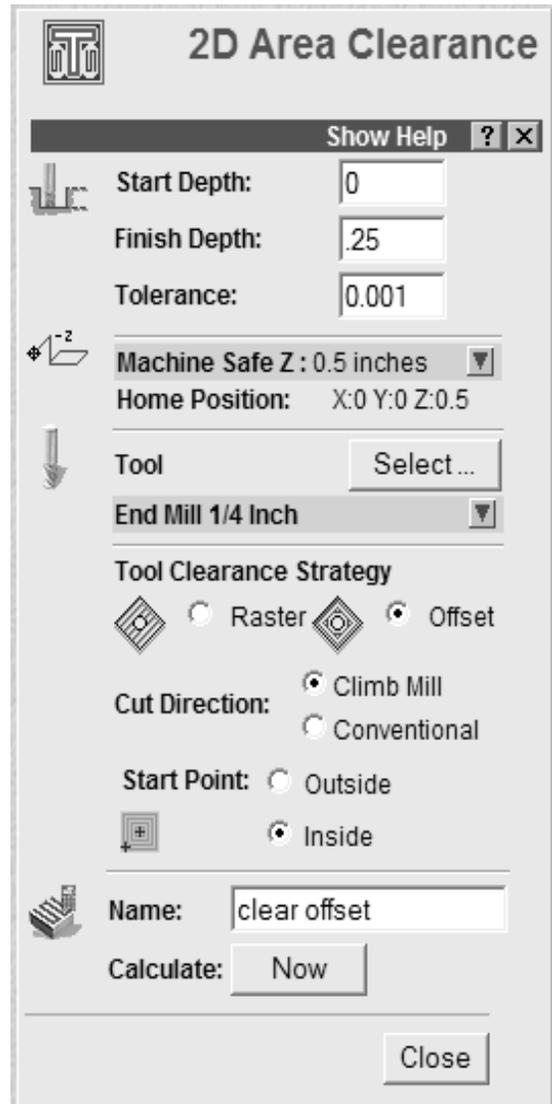
Select the bottom square and circle. If you've forgotten how, the instructions are on page 6.

Open up the **2D Area Clearance** screen by clicking on the **Area Clearance** icon under the **2D Toolpaths** heading.

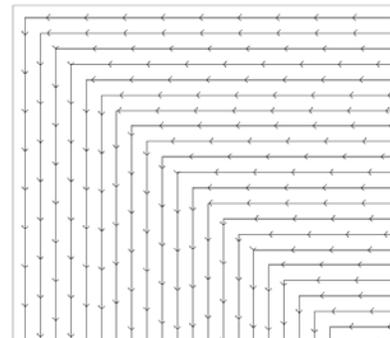


Fill in the blanks

- **Start Depth :** 0
- **Finish Depth:** .25 (just pocketing, not cutting all the way through)
- **Tolerance:** .001
- **Safe Z** and **Home Z** match
- **Tool: Select:** End Mill 1/4 Inch (same bit as before)
- **Strategy:**
 Offset will follow the contours of the object
 Climb mill usually gives a cleaner cut. For safety's sake, start at the inside of the objects.
 Raster goes back and forth with a finish pass at the end. Try it for fun.
- **Name:** clear (something you can remember)
- **Calculate: Now**
- **Close**



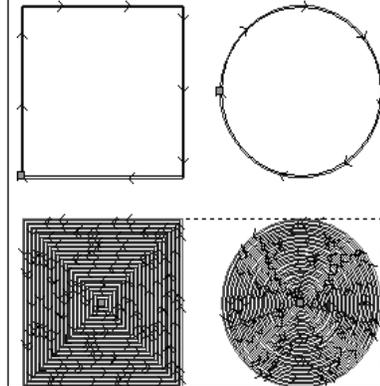
RASTER AT 10 DEGREES OF ANGLE



OFFSET STARTING AT INSIDE

Both toolpaths are now visible in the 2D mode

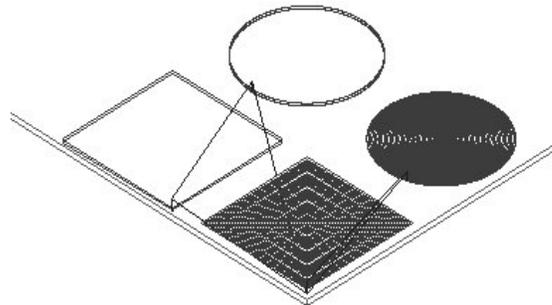
To see how it would look in 3D, click on the **3D** icon at the top of the page



In the isometric view, you can see where the home position is (lower left corner), the positioning or jog moves to get to a new location, and the cut moves of the Profile and Area Clearance toolpaths.

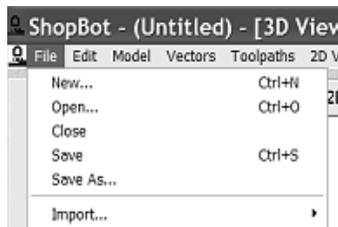
You can look at the toolpaths from other perspectives by clicking on the X, Y or Z view at the toolbar at the top of the page.

To get back to the 2D mode, click on **2D**.

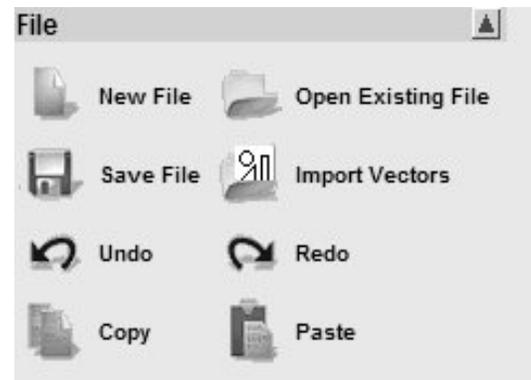


You have finished Step 2 (Toolpathing), and are going to move to Step 3 (Generating the ShopBot part (.sbp) file)

Now would be a good time to **Save** the .art program again in a location where you can find it



or



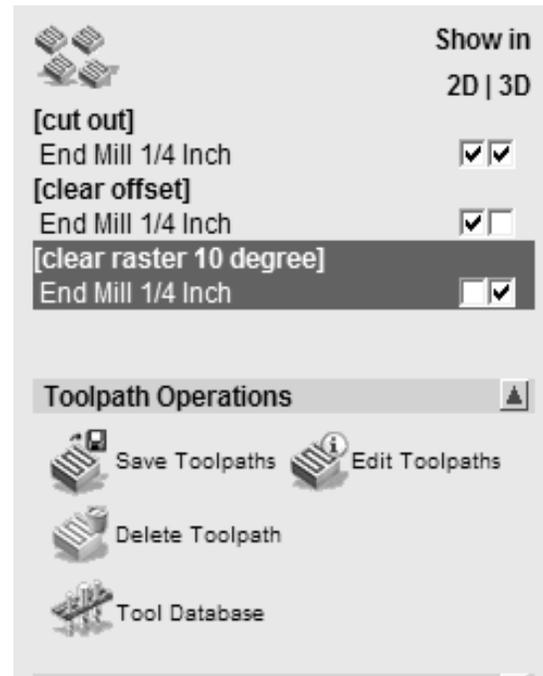
STEP 3: GENERATE A SHOPBOT PART (.SBP) FILE

When the **ToolPaths** Tab at the bottom of the Left Hand side of the screen is selected, all of the toolpaths that have been created are displayed



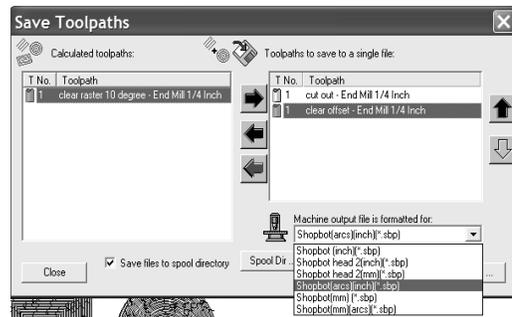
Click on **Save Toolpaths** under **Toolpath Operations** to start the process to generate a ShopBot Part (.sbp). This .sbp file is the program that the ShopBot Control software will use to cut out the parts.

If the names of the icons (**Save Toolpaths**, etc.) are not shown, click on the down arrow to display the names.

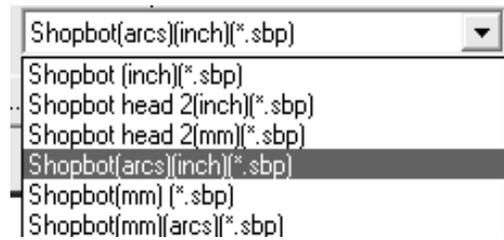


TO GENERATE THE SHOPBOT PART FILE

- Use the right and left arrows to move all the files that you want in the same ShopBot Part (sbp) over to the right screen
- Only files cut with the same bit can be put in the same sbp file
- Determine correct order of cut by using the up and down arrows to move toolpaths from first to last (top to bottom) on right hand screen



- Select the correct format for your **Machine output file**. Use the down arrow to see all the options. Use inches if your Model was set for inches, and mm if your Model was set for mm. ShopBot (arc)(inch) will usually generate a smaller file (fewer lines of code) if there are a lot of circles and arcs in the toolpaths.
- Click on the **Save Button** to open up the folder where you want to save this .sbp file

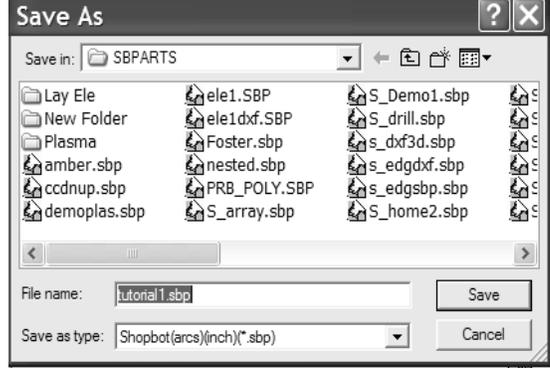


A good place to save to is your SPPARTS folder that is loaded into the C drive of your computer when you load the ShopBot Control Software.

If you wish, you can add new subfolders to this folder by clicking on the icon below.



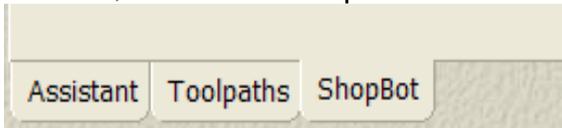
Then you can sort your projects by customer or project name. You can save both the .art and the .sbp files in the same folder for easy access later.



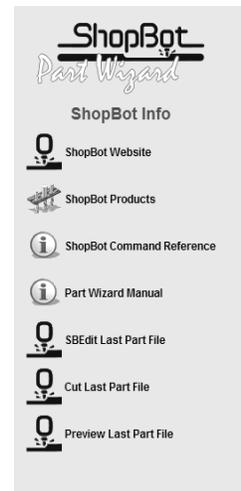
ONCE YOU CLICK ON THE SAVE BUTTON, THE ONLY INDICATION THAT THE .SBP FILE HAS BEEN GENERATED AND SAVED IS THAT IT GOES BACK TO THE PREVIOUS SCREEN

You have Designed, Toolpathed and Generated an sbp file with Part Wizard. Close the Save Toolpaths screen and save your .art file again.

If you would like to Preview your .sbp file in the ShopBot Control software, click on the ShopBot Tab



Click on Preview Last Part File to open up the Control software and have a look at the file. Go ahead and play with the Control software for awhile.



P.S. TO IMPORT A FILE FROM ANOTHER PROGRAM

(.dxf, .dwg, .eps, .ai)

- Click on the **Import Vectors** icon to get your 2D file
- To work on individual parts of the imported file, you must first **Ungroup** the object.
- Use the **Vector Editing** tools to edit, place and refine your design
- You must be in **Select** mode to select the object or **Node Editing** mode to edit individual nodes and spans. To toggle between modes on an object, hit the **N** key on the keyboard.
- You can toolpath the imported object just like one you drew in Part Wizard

