Introduction

The OMAX 5555 Jetmachining Center is a precision abrasive jet machining tool. It cuts complex parts out of most materials including metal, plastic, glass, ceramics, stone and composites.

Cutting parts on the OMAX is a three step process;

1) Drawing and toolpath generation
2) Machine setup
3) Cutting

This tutorial explains step 1, drawing and toolpath generation with OMAX's custom software Layout. The function of this tutorial is not to provide a comprehensive explanation of the Layout software. A more comprehensive understanding of the software can be achieved through the help feature found in the top menu bar.

To complete this tutorial you'll need a .dxf file of the part you wish to make. The .dxf file can be created by any 2D vector based drawing software, or any 3D modeling software. The part must be designed to fit within the dimensions of the material you would like to cut.

It is highly recommended that you open Layout and perform the steps listed in this tutorial at the same time that you are reading it.

Troubleshooting:

Throughout the document you can always refer to the document Troubleshooting with Intelli-MAX LAYOUT for help with any issues you may encounter while developing the toolpaths for your respective part.

Icons:

Throughout this tutorial you will notice a number of icons to quickly notify you of important points within our tutorials. For more information on our icons Click Here

Importing and Cleaning .dxf Files

From the desktop of any thin client computer in think[box] locate and select from the start menu

Intelli-MAX Layout Standard

The icon looks like the image on the right
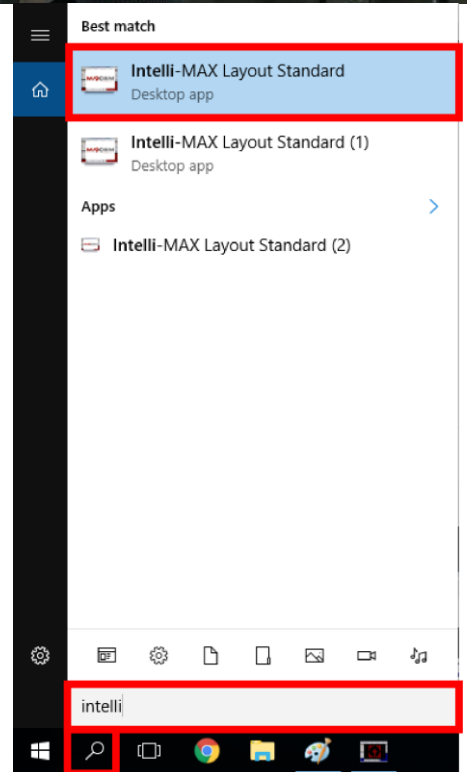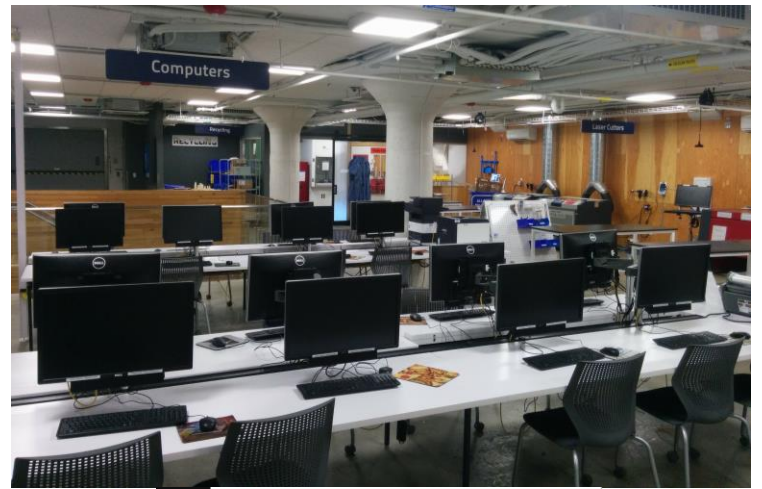
Intelli-MAX Layout Standard:

Intelli-MAX Layout Standard is used to prepare your file geometry for the waterjet cutter by cleaning up and manipulating vectors as well as generating toolpaths. This software works best with .**dxf** files, which are exported by most 2D and 3D design softwares.

Throughout this tutorial we will be referring to 3 toolbars

1. **Edit and Draw**
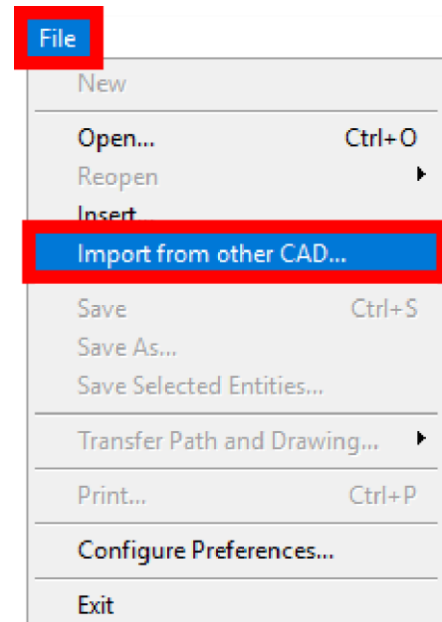2. **Special**
3. **Lower toolbar**
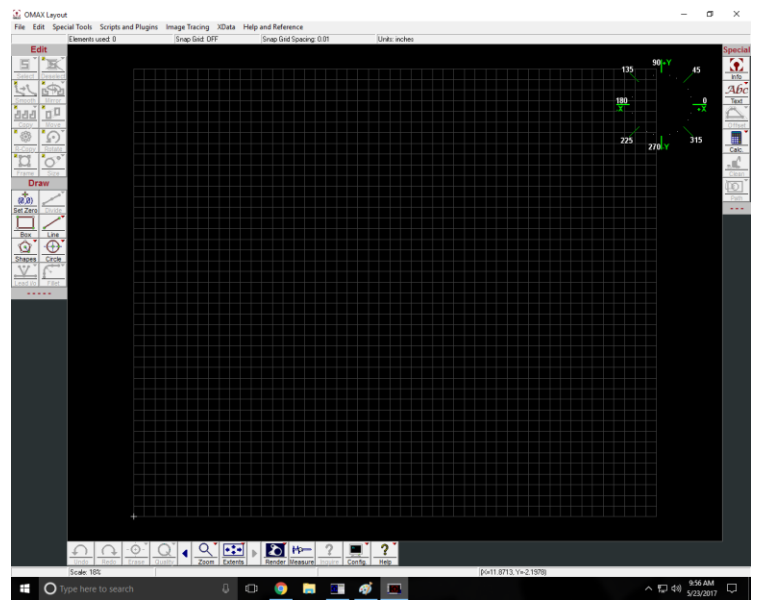
Import your file:

On the top of the Layout window, locate and import your .dxf file from the cloud, a flash drive or email.

Left click **File >>** Left click **Import from other CAD...**

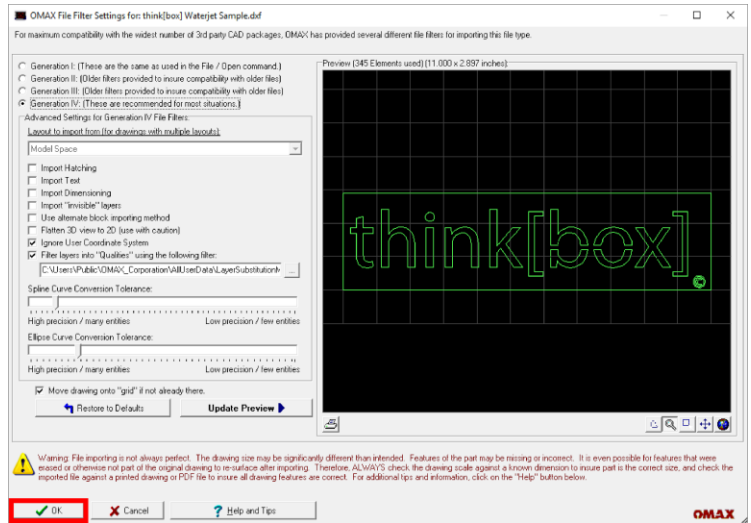Once you locate your file

Left click **Open**

Your design file will now be opened in the OMAX File Filter Settings window. The default settings usually work well for most files.

On the bottom of the OMAX File Filter Settings window locate and

Left click **OK**

File Import Issues:

Warning: File importing is not always perfect. The scale of the drawing may be significantly different than intended. Features of the part may be missing or incorrect. It is even possible for features that were erased or otherwise not part of the original drawing to resurface after importing.

Always check the drawing scale against a known dimension to insure the part is the correct size, and check the imported file against a printed drawing or PDF file to insure all drawing features are correct.

For additional tips and information file importing, click on the "Help" button or consult with a Fabrication Student Worker.
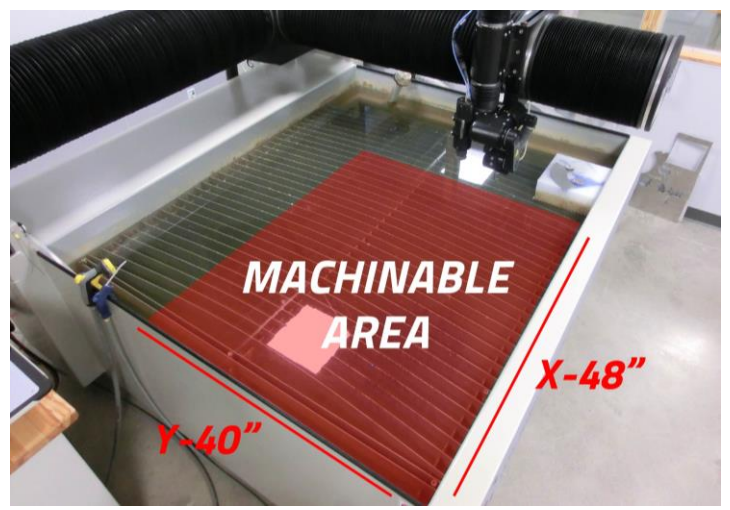
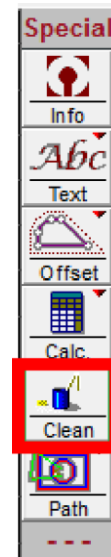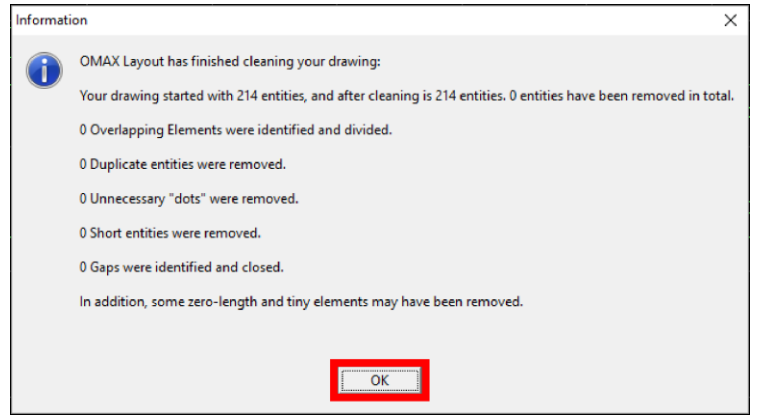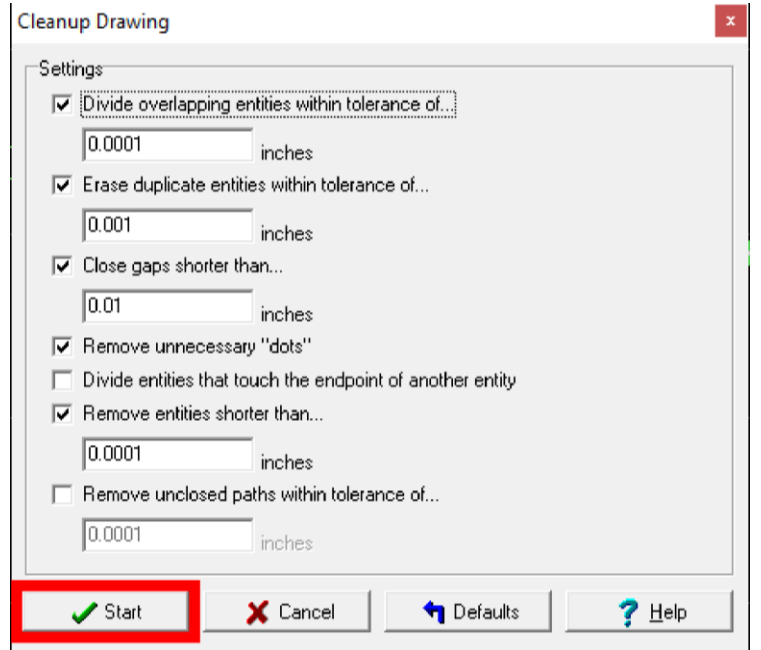|	
Machinable area: The maximum machinable area for the waterjet cutter is **48 inches along the X axis** **40 inches along the Y axis** Your design must **completely** fit within this boundary for you to be able to machine your parts.	
Cleaning your drawing: The next step is to clean your drawing. Cleaning the drawing removes unnecessary points from the curves and lines of your drawing making it easier for the waterjet cutter to travel along the various paths. In the **Special toolbar** on the right side of the window, locate and Left click **Clean**	
The default settings in the Cleanup Drawing window usually works well for most files. Locate and Left click **Start**	
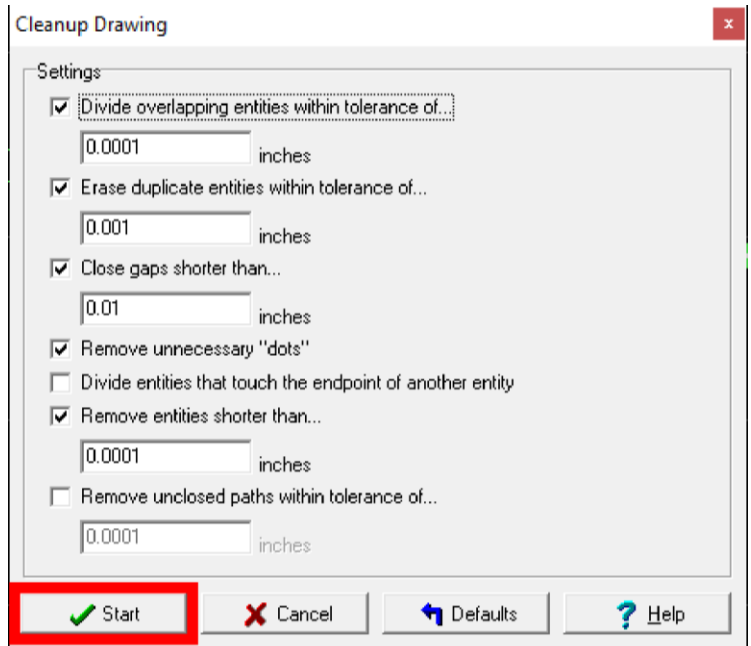
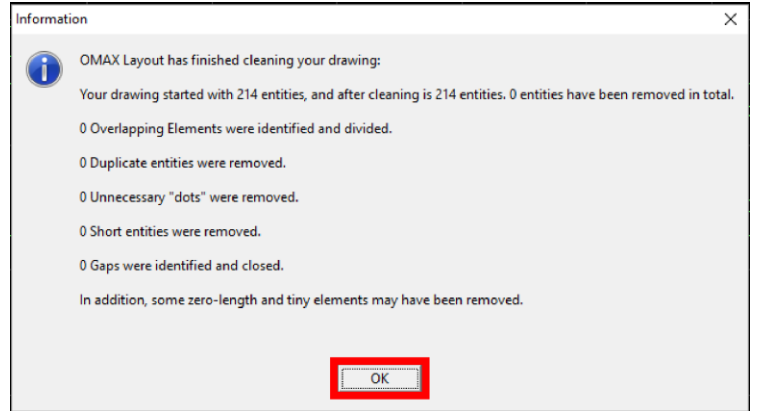|	
Review the Information window to check that the clean function completely cleaned most or all geometries. Locate and Left click **OK**	Information ✕ ⓘ OMAX Layout has finished cleaning your drawing: Your drawing started with 214 entities, and after cleaning is 214 entities. 0 entities have been removed in total. 0 Overlapping Elements were identified and divided. 0 Duplicate entities were removed. 0 Unnecessary "dots" were removed. 0 Short entities were removed. 0 Gaps were identified and closed. In addition, some zero-length and tiny elements may have been removed. [OK]
Repeat the cleaning procedure to verify that all problem geometries were resolved. Locate and Left click **Clean >>** Left click **Start**	Cleanup Drawing ✕ Settings ☑ Divide overlapping entities within tolerance of… 0.0001 inches ☑ Erase duplicate entities within tolerance of… 0.001 inches ☑ Close gaps shorter than… 0.01 inches ☑ Remove unnecessary "dots" ☐ Divide entities that touch the endpoint of another entity ☑ Remove entities shorter than… 0.0001 inches ☐ Remove unclosed paths within tolerance of… 0.0001 inches [✔ Start] [✗ Cancel] [↰ Defaults] [? Help]
In the Information window verify that 0 entities have been removed. Left click **OK** There may be remaining entities that were not resolved.	Information ✕ ⓘ OMAX Layout has finished cleaning your drawing: Your drawing started with 214 entities, and after cleaning is 214 entities. 0 entities have been removed in total. 0 Overlapping Elements were identified and divided. 0 Duplicate entities were removed. 0 Unnecessary "dots" were removed. 0 Short entities were removed. 0 Gaps were identified and closed. In addition, some zero-length and tiny elements may have been removed. [OK]

The Edit and Draw toolbars

Capabilities: Note the various geometry manipulation and creation controls on the left **Edit and Draw toolbars**. Though it is possible to create designs in OMAX Layout, we highly	

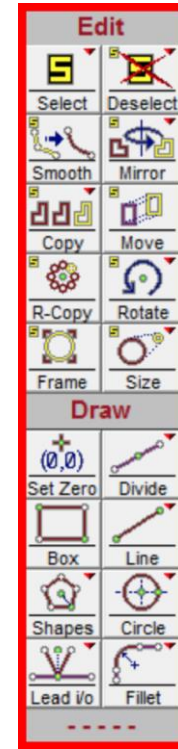|	
suggest using other software and importing your design rather than creating it from scratch in Layout. Acceptable Programs for creating designs: ● Adobe Illustrator ● CorelDraw	
Some icons have a small red "carrot" in the upper right corner. Any icon that has this symbol has additional options available when it is right clicked. Many of the steps in this tutorial utilize these "hidden" features, but keep in mind that this tutorial is not exhaustive and there are frequently other ways to accomplish a given task.	
Selecting Parts of your Design: Next, you will be selecting parts of your design and assigning cut qualities that define the edge finish. On the **Edit toolbar** on the left side of the screen locate and Right click **Select >>** Left click **Window** This tool allows you to select sections of your design by clicking twice, once in each opposing corner of your design. Note the other selection options available. Selected parts of your design will turn yellow. Unwanted design elements can be removed by selecting them with the **Window selection tool** and then pressing delete on the keyboard.	
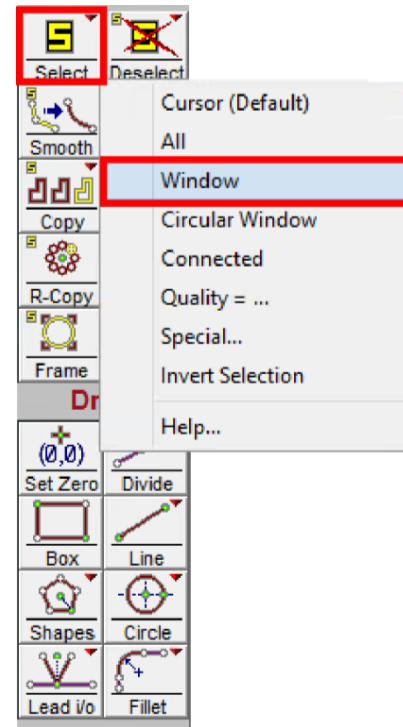
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To learn more about the various functionalities of the Edit and Draw toolbars consult the help feature embedded into the Layout software. On the top of the Layout window locate and Left click **Help and Reference**	
Deselecting Parts of your Design : The **Deselect** tool can be used in the same manner as the **Select** tool. Deselected geometry will turn green. Right click **Deselect** >> Left click **Window**	
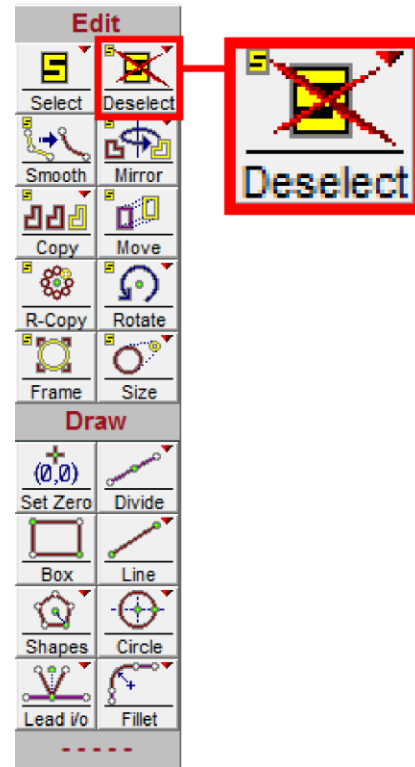
Selecting Cutting Quality

Cutting: We will now select the quality of cut through your part. As a general rule, higher qualities improve the edge finish at the expense of machining time, use more abrasive, and cost. You may select other qualities.	
With your whole design or the desired portions of your design selected, locate the **toolbar** at the bottom of the screen and Right click **Quality** >> Left click **All** This allows you to assign a cut quality to the elements selected in the previous step.	
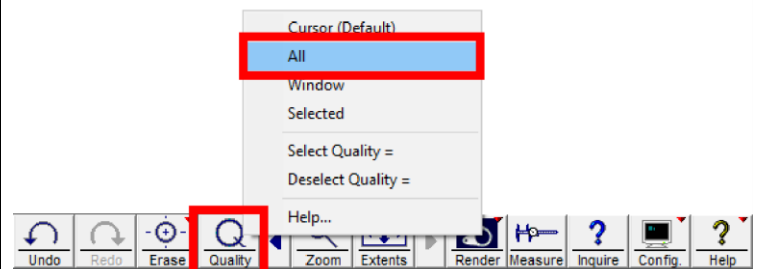
|	
Available Qualities: Cut **3** is adequate for most applications. Increasing cut quality will increase the time and abrasive material used and will increase the cost to machine. On the bottom of the window in the **Available Qualities toolbar**, locate and Left click **3** **For information on our prices** Click Here **and scroll to the bottom of the page.**	
Verify that sections of your design have the desired cut quality. On the left side of the screen in the **Edit toolbar** locate and Right click **Deselect** >> Left click **All** Previously selected parts of your design should now be the same magenta color as the cut quality **3** button. If you have different cut qualities in one job, each quality will be represented by a different color.	
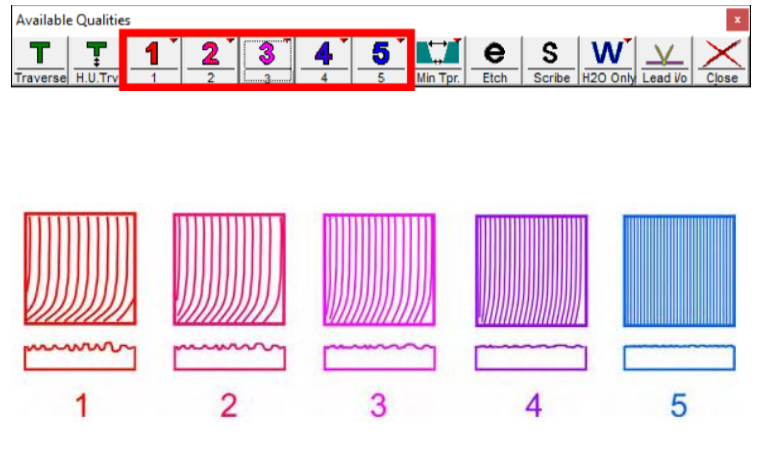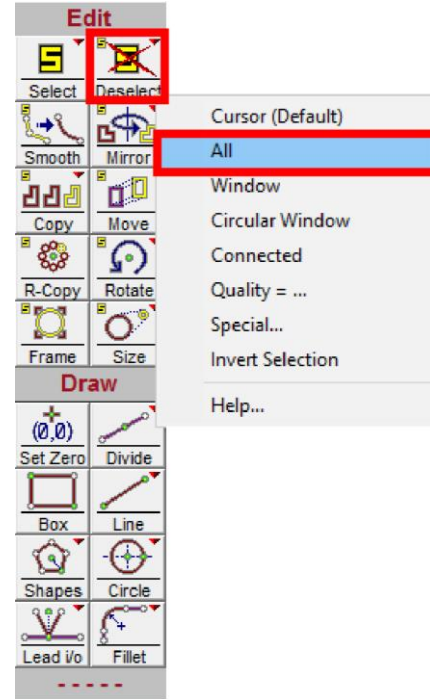
Selecting Etching Quality

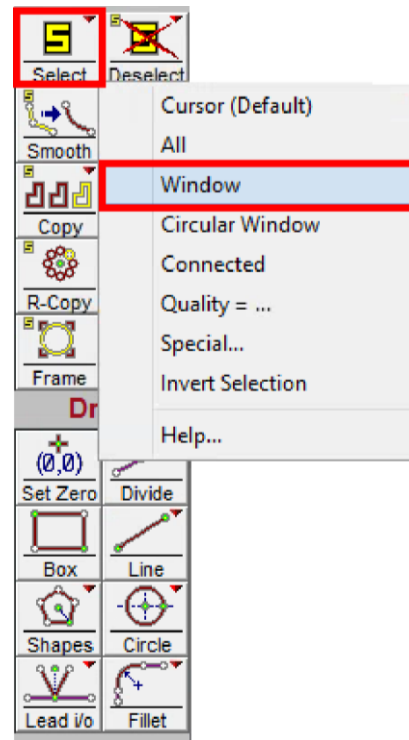|	
Etching Capabilities: While the OMAX Abrasive Waterjet is capable of cutting through several inches of almost any material, it is also capable of lightly etching the surface. Etching is used to engrave patterns, logos or artwork onto the surface of metal or other materials. While this is not a precision operation, it is useful for artistic purposes.	

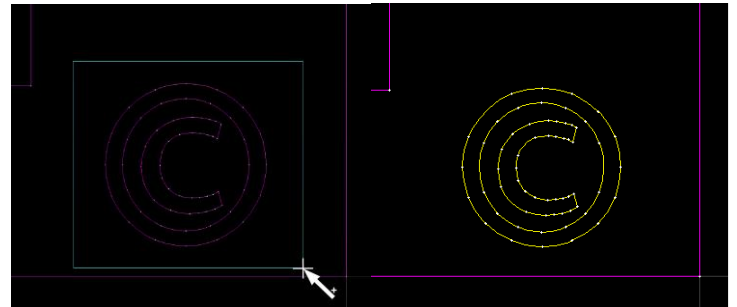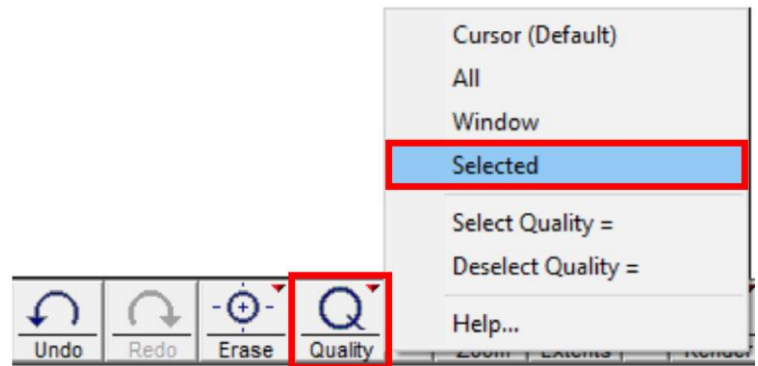|	
In this next step we will create some etch lines. On the left side of the screen in the **Edit toolbar** locate and Right click **Select** >> Left click **Window**	
Selecting Parts: The selection cursor will appear on the screen as a crosshair to denote where your selection will begin. Select the copyright symbol at the bottom right of the thinkbox logo by left clicking once in each opposing corner. The selected copyright symbol should now be yellow.	
Assign Quality: To assign an etch quality to your selection, at the bottom of your screen locate and Right click **Quality** >> Left click **Selected**	
At the bottom of the screen in the Available Qualities window locate and Left click **Etch**	
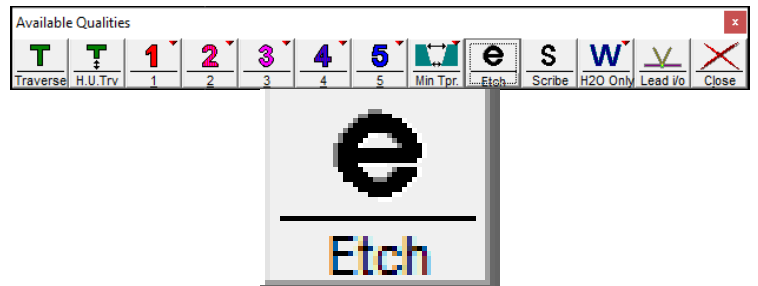
On the left side of the screen in the **Edit toolbar** locate and

Right click **Deselect >>** Left click **All**

The copyright symbol should now be a grey color.
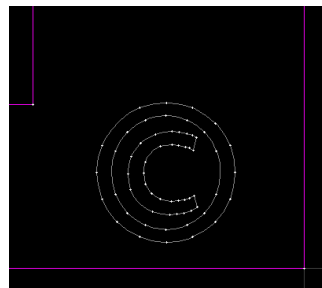
Generating Tool Paths

Creating a path:

Selecting this option allows the User to determine the route the cutting nozzle will take between the various geometries of your job.
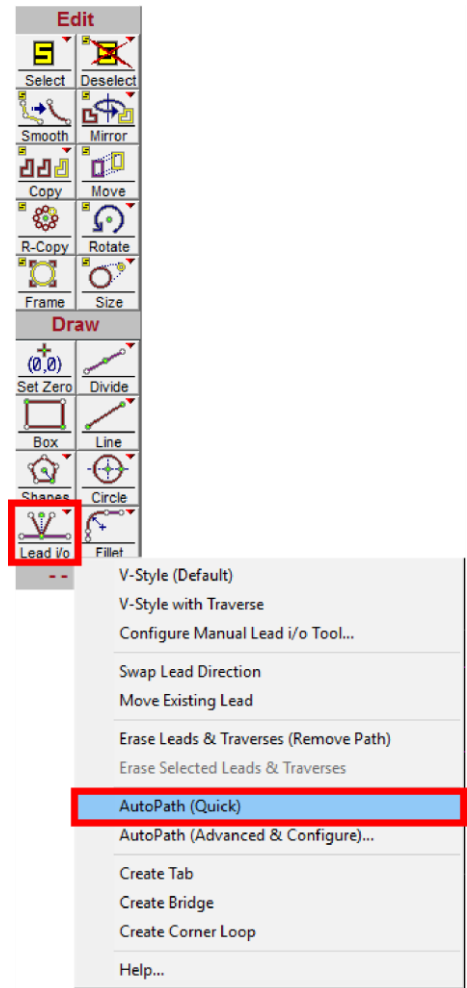
On the left side of the screen in the **Draw toolbar**, locate and

Right click **Lead i/o >>** Left click **Auto-path (Quick)**

This lets the *Software determine* the best route the cutting nozzle will take between the various geometries of your job.

To create your own path:

right click **Lead i/o >>** Left click **Auto-path (Advanced & Configure)**

Adding Tabs

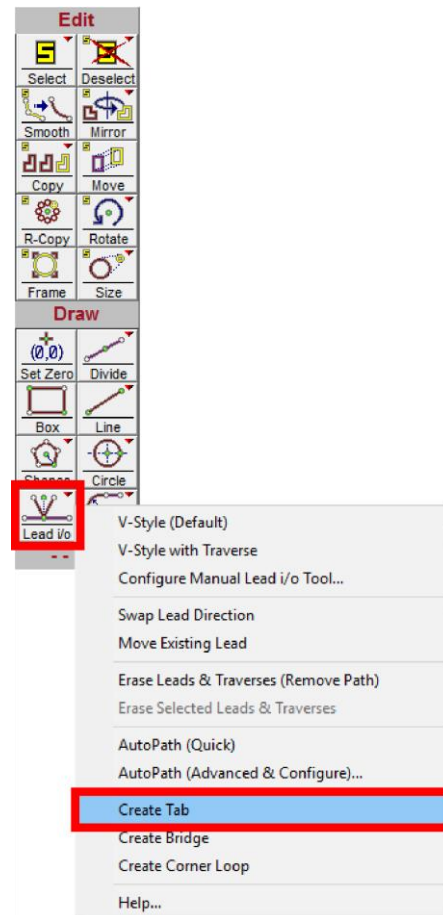|	
What are tabs: The next step focuses on adding tabs to your design. Tabs are small pieces of your material that are left behind after cutting and keep your design attached to the larger workpiece. Tabs perform multiple functions: ● Tabs prevent accidental shifting of the design during machining. ● They also secure regions of the design that are smaller than the spacing between the vertical slats in the catcher tank and prevent them from falling in. ● As a general rule of thumb, all cut outs should have at least **1** tab.	
On the left side of the screen in the **Draw toolbar** locate and Right click **Lead i/o >>** Left click **Create Tab**	
Placing tabs: With the tab tool selected place tabs on the **perimeter** of your design by Left clicking. For faster access to the tab tool use the hotkey **ctrl+T**	
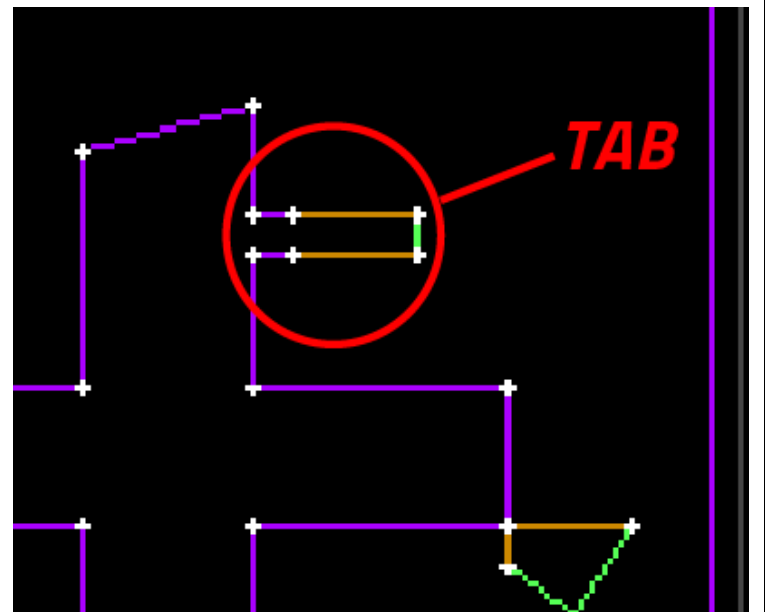
- Place at least **2** tabs along the perimeter of your design. - Be sure that your tabs are **offset** from each other to prevent your workpiece from twisting.	
Tab Size: Once you have clicked Tab Tools window will appear in the bottom left hand corner of your screen. Here you are given the opportunity to adjust the size of your tabs: Left click **Options** Here you have the opportunity to change overall tab dimensions, but be aware, the default setting are appropriate for most applications. **For issues placing tabs** consult the OMAX 5555 Troubleshooting document or find a Fabrication Student Worker to assist you.	

Leads color

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What are leads: Leads are commonly used to gradually feed the cutting tool into and out of a profile using line and/or arc elements. In Omax Layout leads are represented as Orange lines. These are locations where the cutting nozzle takes time to pierce through the workpiece before it begins to cut your design. **Verify Leads:** Always verify your lead-in and lead-out configurations in Layout. Failure to do so could result in unfavorable results.	
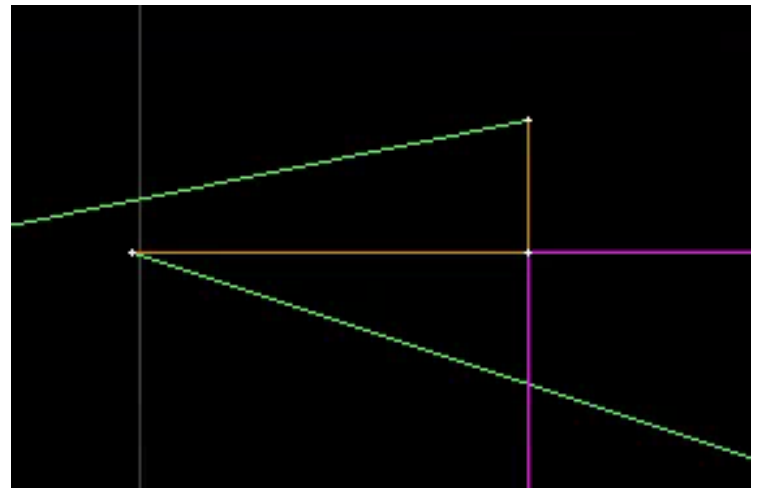
Other Line Color Designations:

Red/Purple/Blue lines represent elements that will be cut and their color represents cut quality.

Solid Green lines represent machine traverses, or movements of the cutting nozzle when it is paused.

Dotted Green lines represent "heads up" traverses, or movements where the cutting nozzle raises above the workpiece before moving to the next desired cut.

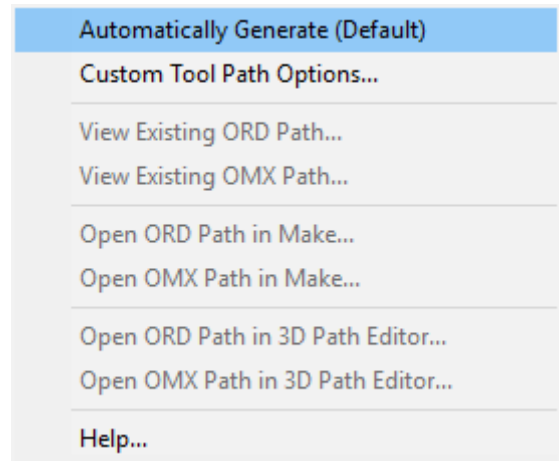**For more Information on colors in the Layout consult** Line Color Designation document
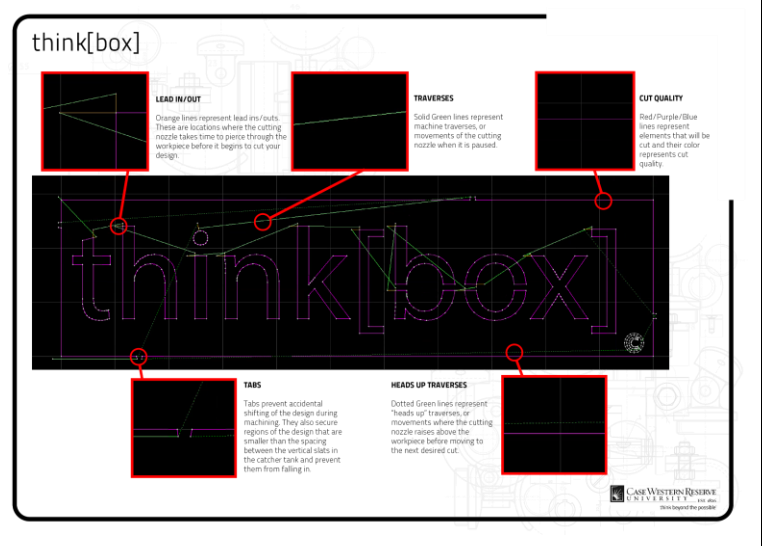
Generating a Path

Automatically Generate Path Start:

On the right side of the screen locate and

right click **Path Start >> Automatically Generate (Default)**

Pick Start:

The Preview window will open and the cursor will turn into a **+ symbol** with the word **PICK START** beneath it. This allows you to select where the machine will begin the toolpath.

Locate and left click the beginning of the **green line** at the lower left of your design.

If the you are unable to pick a starting point consult the OMAX 5555 Troubleshooting document or find a Fabrication Student Worker to assist you.
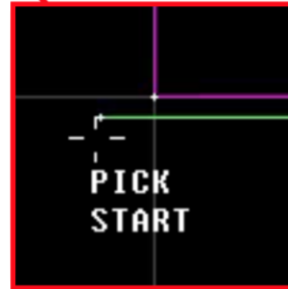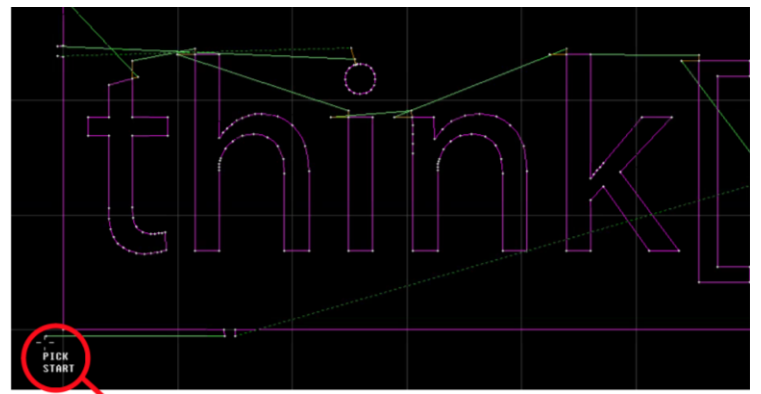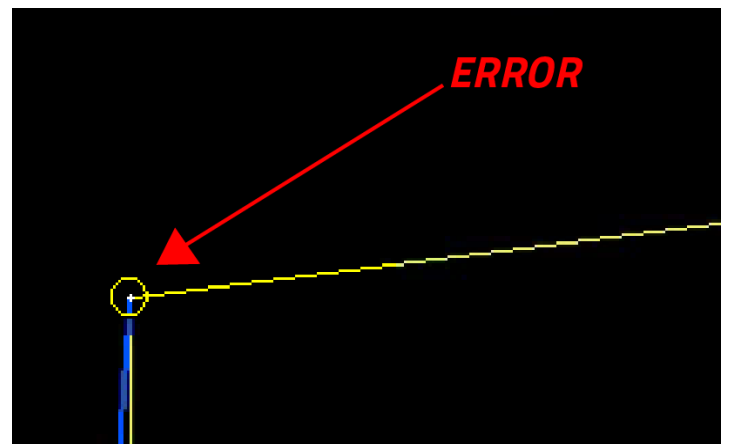

Check for Errors:

The toolpath will generate. Depending on your geometry, errors can occur preventing toolpath generation. Errors will be noted by a yellow circle highlighting the problem area.

Multiple errors can be shifted through by clicking the right and left arrow in the zoom tools box. Errors will prevent you from proceeding with path generation and must be resolved to continue.

You can return to the main window to swap/move leads or change part of your geometry in order to resolve errors by

Left clicking **Reject**

If the toolpath displays errors or otherwise fails to generate, consult the OMAX 5555 Troubleshooting document or find a Fabrication Student Worker to assist you.

ERROR
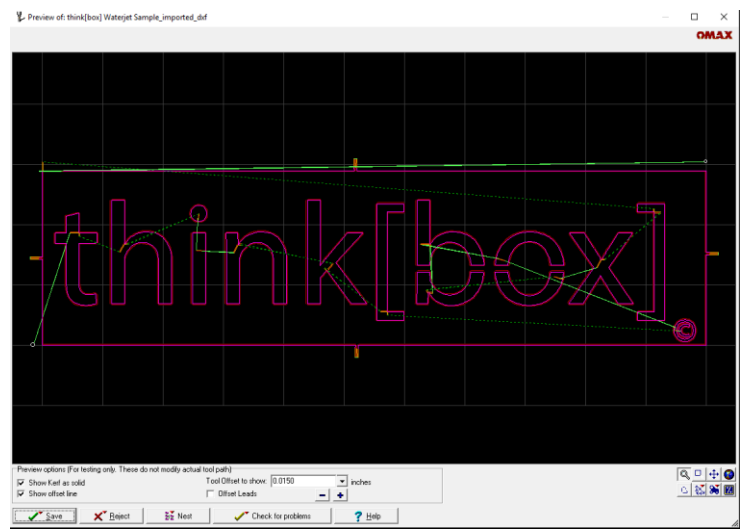
Check for Problems: If no errors are immediately flagged and the toolpath successfully generates, a preview window will open showing the toolpath. Even if a toolpath is generated, you **must** check again for potential errors. Along the bottom of the Preview window locate and Left click **>> Check for problems**	
In the upper left corner of the preview window locate the small window displaying three possible errors types. Each color corresponds with the respective problem. **If these numbers are not 0**, consult the <u>OMAX 5555 Troubleshooting</u> document or consult a Fabrication student worker.	

Saving Files

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How to save your files: The computer attached to the OMAX 5555 Jetmachining Center is not a <u>thin client</u> so in order to upload your files onto that computer you must locate and Right click **Save >>** Left click **Save as .ORD, under a new name...** **Save your file to a flash drive or email it to yourself.** **Reject** will cancel the toolpath generation and close the window. Reasons to hit reject can be found in the <u>OMAX 5555 Troubleshooting</u> document.	
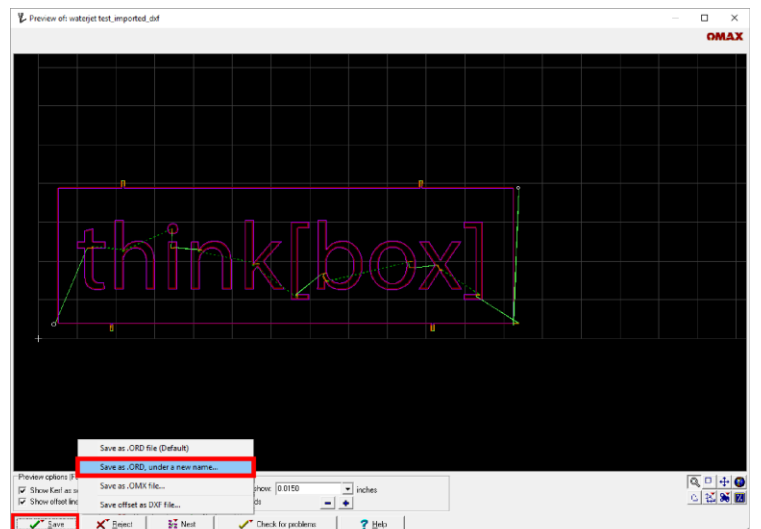
This concludes the layout portion of the waterjet tutorial; you're ready to begin running the machine! Head on over to [OMAX 5555 - Tutorial: Machine Setup and Machining with OMAX Make](#) to begin cutting your parts.	