



# OMAX Operator Training

## Session 1

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**OMAX Corporation  
Technical Publications  
21409 72nd Avenue South  
Kent, WA, USA 98032**

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# Topics

- Welcome and Introductions
- Session Objectives
- OMAX JetMachining Center Overview
- Steps in Making Parts
- OMAX Learning Resources
- OMAX Software
- Machining Steps





# Training Materials

What's included in the training packet

# Training Materials

- Training packet
  - ✓ Course outline
  - ✓ USB flash drive
    - ✓ OMAX User's Guide
    - ✓ Installation/Maintenance Guide
    - ✓ Intelli-Visor Overview
    - ✓ X-Data Overview
    - ✓ This Training Guide
  - ✓ Safety Checklist
  - ✓ Safety glasses



# OMAX JetMachining Center Overview

OMAX equipment and the part cutting process



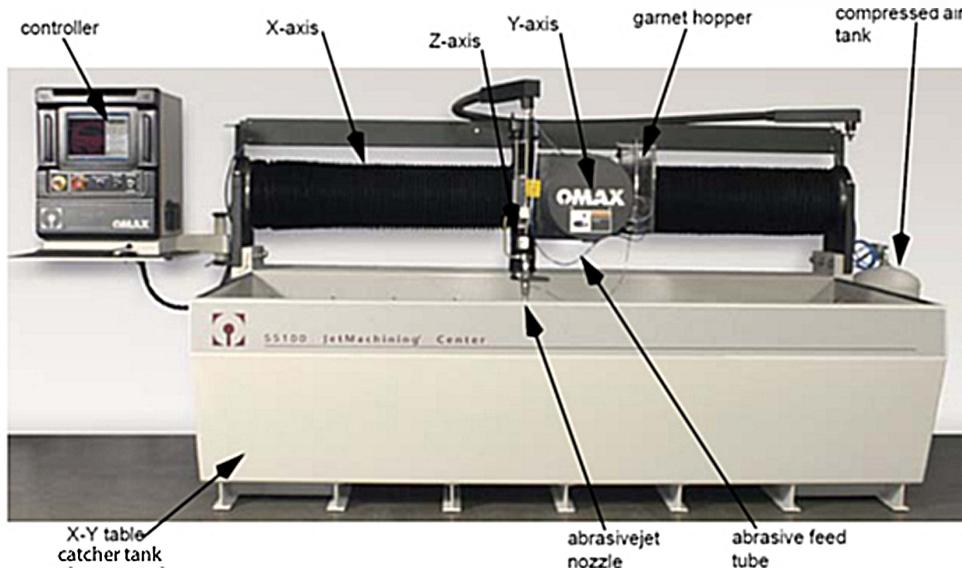
# OMAX JetMachining System

- PC Controller
  - Communication hardware
  - Intelli-MAX Premium software
- OMAX direct drive pumps
  - Provides power to cut
  - Types (EnduroMAX, OMAX)
  - Various pump pressure capabilities
- High-pressure system
  - Delivers water/abrasive to nozzle to produce the waterjet parts



# OMAX JetMachining System

- Tables
  - Various sizes
  - Styles (bridge vs. cantilever)



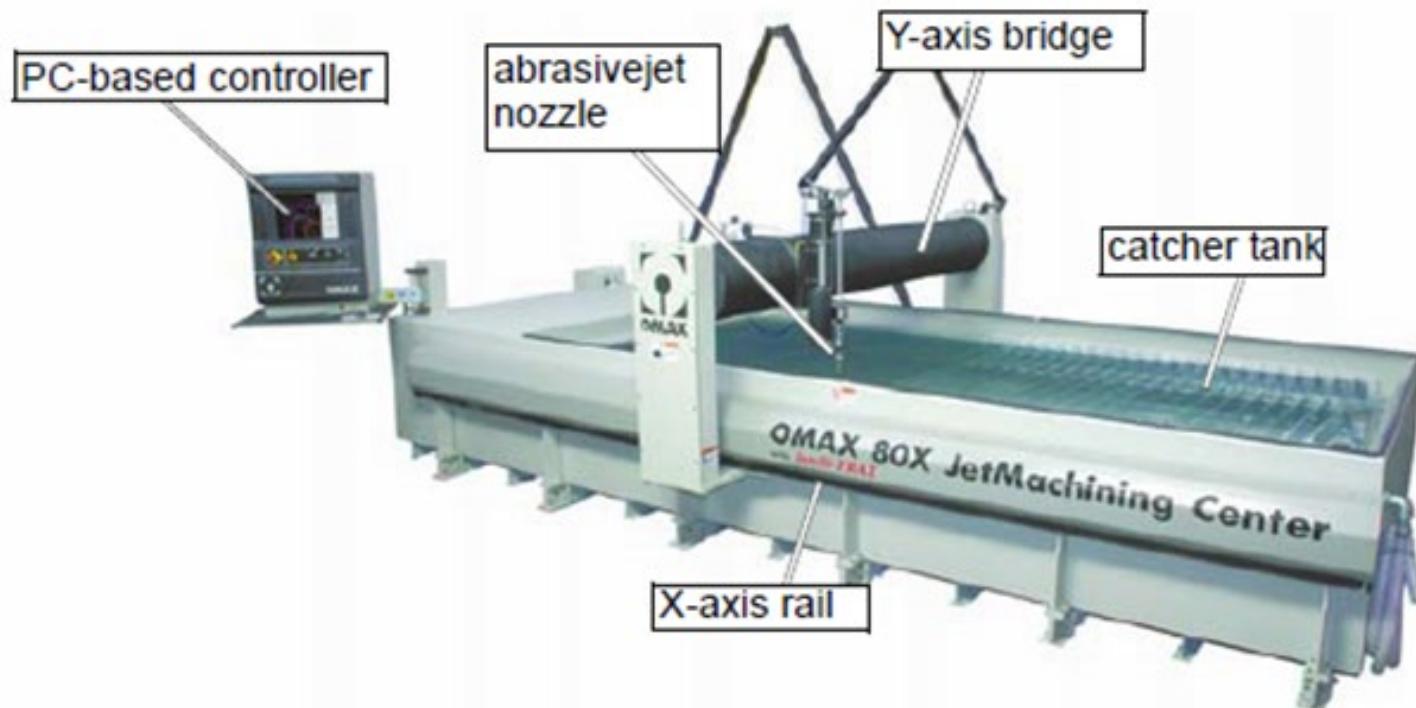
# OMAX JetMachining System

- OMAX PC controller & table – cantilever style machine



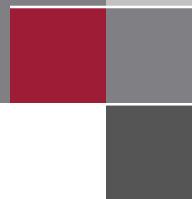
# OMAX JetMachining System

- OMAX PC controller & table – bridge style machine



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# OMAX JetMachining System



		OMAX TABLES														
		X-Axis Cutting Distance														
Y-Axis Cutting Distance		26"	27"	52"	55"	59"	100"	118"	120"	157"	160"	240"	320"	400"	480"	560"
	26"	2626, XP		2652												
	27"															
	55"				5555		55100									
	59"															
	60"								60120							
	79"															
	80"										80X, 80160	80X-1	80X-2	80X-3	80X-4	80X-5
	120"										120X/S	120X	120X-1	120X-2	120X-3	120X-4
	160"											160X	160X-1	160X-2	160X-3	

# OMAX JetMachining System

- Z-axis options
  - Motorized Z-Axis
  - Tilt-A-Jet
  - A-Jet (Articulating Jet)

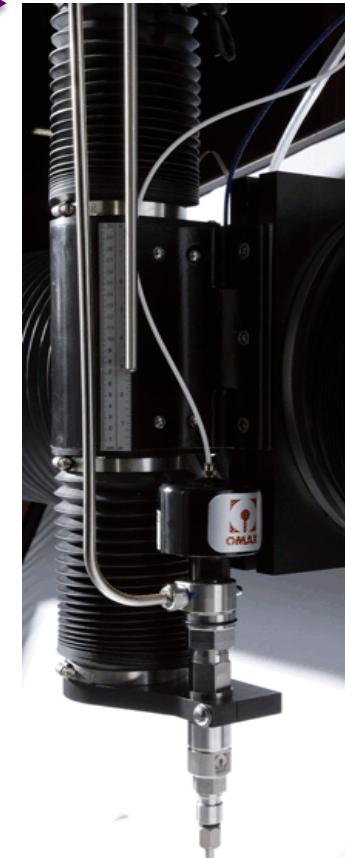


59.5° of cutting angle



9° of cutting angle

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# OMAX JetMachining System

- Nozzle Assemblies
  - MAXJET 5i integrated diamond
  - MAXJET 5 (older model)

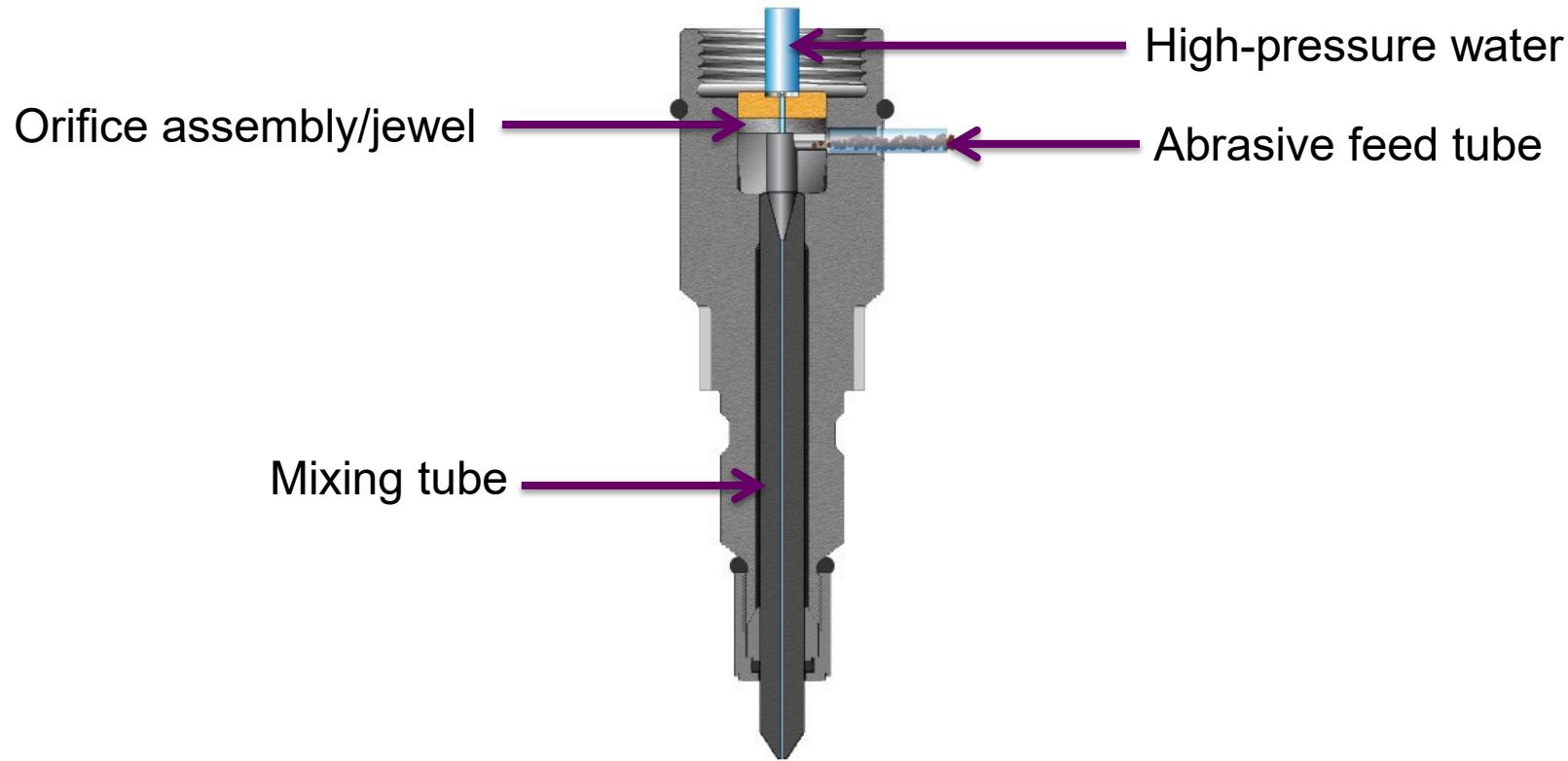


- Example sizes:
  - .015 orifice
  - .030 mixing tube
  - .042 mixing tube



# OMAX JetMachining System

- MAXJET 5i integrated diamond



# OMAX JetMachining System

- Nozzle Assemblies

- MAXJET 5 MiniJets
  - Smaller kerf
- MAXJET 5 Water Only



.010 orifice/.021 Mixing Tube  
.007 orifice/.015 Mixing Tube



# OMAX JetMachining System

- Abrasive hoppers
  - 25 lb. hopper
  - Bulk feed hoppers
    - Automated abrasive fill system
    - Available in multiple sizes
      - 100 lb.
      - 600 lb.
      - 2,000 lb.
    - Supplies the 25 lb. abrasive hopper automatically by air-controlled feed line



25 lb. hopper

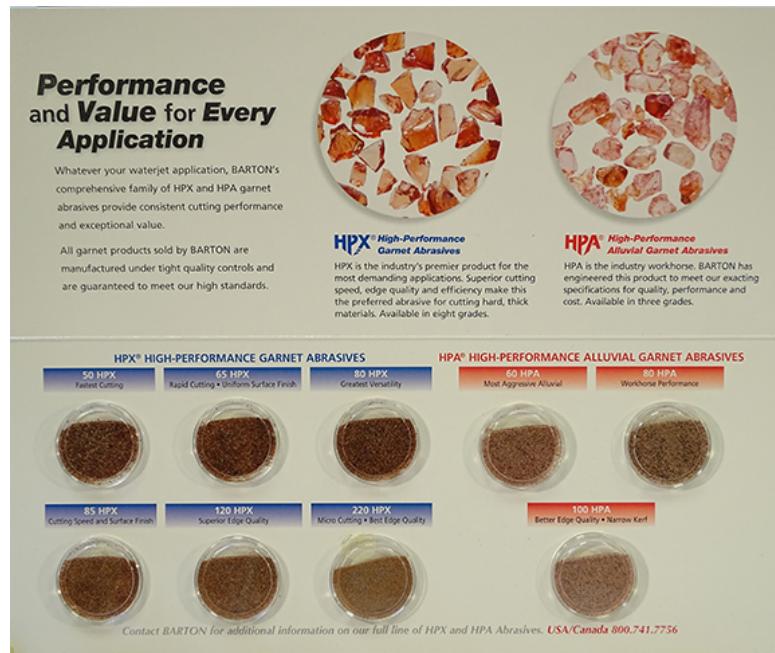
Bulk feed hopper



# OMAX JetMachining System

- Abrasives
  - different types
  - different mesh sizes

<https://www.barton.com/waterjet-applications/waterjet-abrasives/>



Visit the Barton website for the latest products available

OIR – keyword “abrasive”

[WWW.OMAX.COM](http://WWW.OMAX.COM)

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# OMAX JetMachining System

**Barton Abrasive Value Calculator**

By Barton International

Open iTunes to buy and download apps.

View In iTunes

This app is designed for both iPhone and iPad

**Free**

Category: Business  
Released: Jun 19, 2012  
Version: 1.0  
Size: 5.3 MB  
Languages: English, Spanish  
Seller: Barton Mines Company, LLC  
© 2012 Barton International  
Rated 4+

Compatibility: Requires iOS 3.0 or later. Compatible with iPhone, iPad, and iPod touch.

**Customer Ratings**

We have not received enough ratings to display an average for the current version of this application.

**Description**

Designed for iPad and iPhone, the free Barton Abrasive Value Calculator lets Abrasive Waterjet shop owners determine the garnet abrasive that offers the best value for their waterjet cutting projects.

Barton International Web Site ▾ Barton Abrasive Value Calculator Support ▾ ...More

**Screenshots**

iPhone | iPad

Back BARTON

Shop Information

Weeks per Year: 50

Days per Week: 5

Hours per Day: 12

Number of Cutting Heads: 5

Hourly Abrasive Usage per Cutting Head (lbs): 45

Hourly Shop Rate per Cutting Head (\$):

<https://itunes.apple.com/us/app/barton-abrasive-value-calculator/id533087069?mt=8>

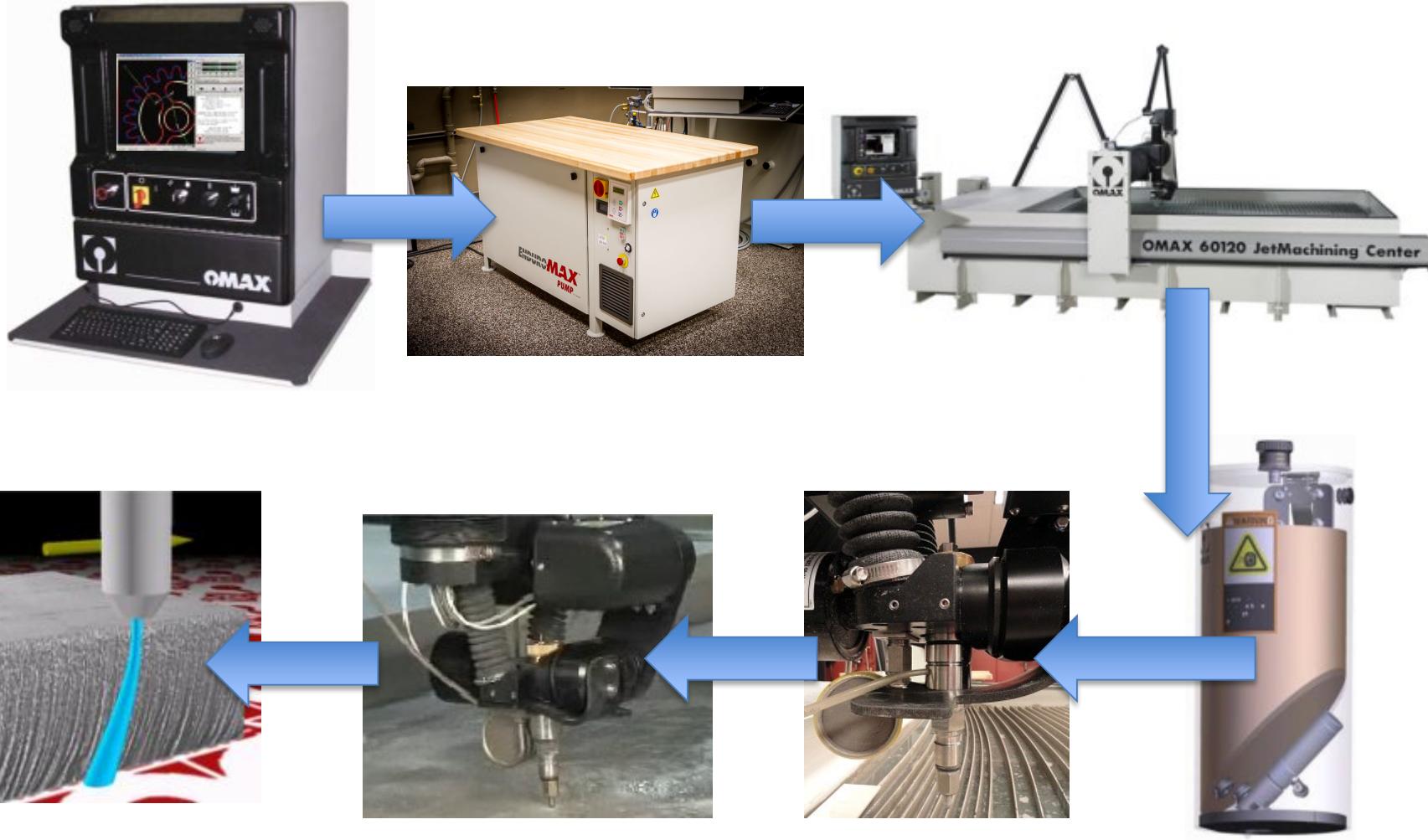
# OMAX JetMachining System

- EnduroMAX high-pressure pump



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# OMAX JetMachining System



# OMAX JetMachining System

## How does the OMAX system cut parts?

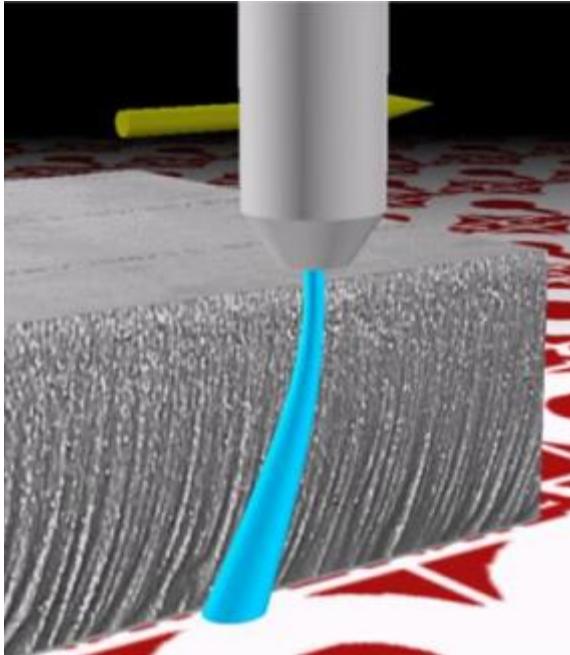
- ❑ The OMAX software creates a machine tool path file from a CAD drawing file.
- ❑ The EnduroMAX Pump generates ultra high-pressure (UHP) water, up to 60,000 pounds per square inch (psi).
- ❑ The pressurized water travels through the UHP system of tubing and fittings to the nozzle (cutting head ).
- ❑ A jewel with a tiny orifice (typically .014"), located in the nozzle assembly, creates backpressure and forces water through the orifice at high velocity (over 2500 ft. per second) .

# OMAX JetMachining System

- ❑ Abrasive is drawn into the nozzle assembly and mixes with the water to create a cutting medium (slurry).
- ❑ The water and abrasive slurry exits the mixing tube (typically .030" internal diameter) at high velocity to cut the part.
- ❑ The OMAX machine nozzle (cutting head) follows the machine tool path per X, Y, and Z coordinates specified in the OMAX **MAKE** machining file.
- ❑ The nozzle speed determines the final part edge quality/finish.

# OMAX JetMachining System

- Demonstration: OMAX Jet Simulator

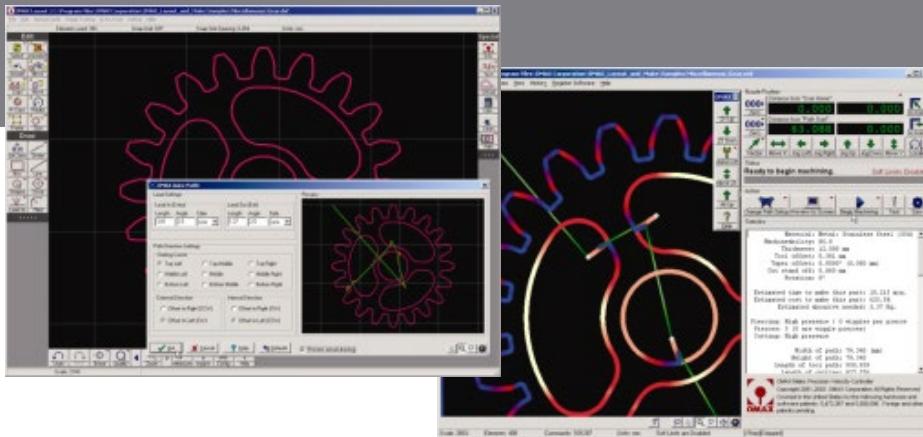


- Start
- All programs
- OMAX **LAYOUT & MAKE**
- OMAX Jet Simulator



# Intelli-MAX Premium Software

## Installation and Registration



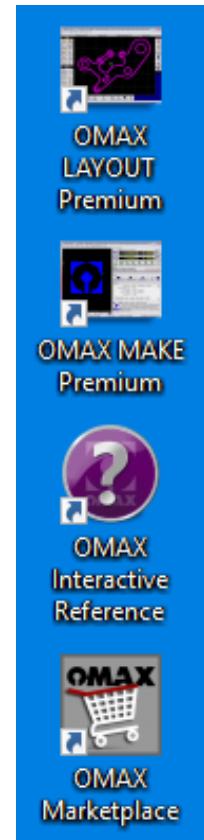
# Installing the Intelli-MAX Software

## Installing the software

- The OMAX Intelli-MAX software can be downloaded from the OMAX Support Site (available to customers only).
- When upgrading to a new version of the software, *use the installer to uninstall any previous versions* of the software.
  - The OMAX installer will retain unique machine configuration settings.
- Follow the installation wizard instructions.
  - Use the defaults in the installation process.

## How do I know the software is installed?

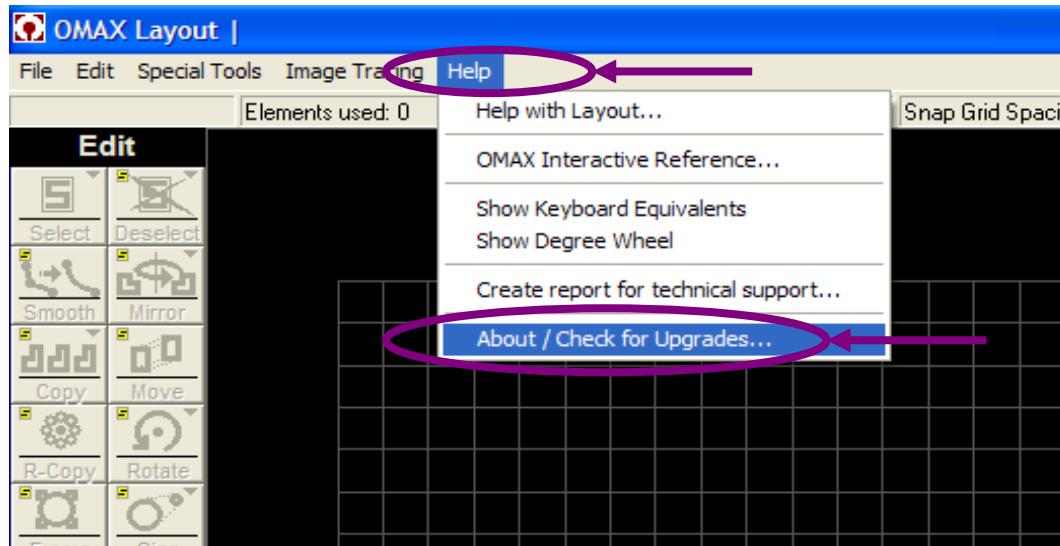
- After the installation process, you should see 4 icons on your desktop.
  - **OMAX LAYOUT Premium**
  - **OMAX MAKE Premium**
  - **OMAX Interactive Reference (OIR)**
  - **OMAX Marketplace**



OIR – *keywords “software updates”*

Which version of the software am I running?

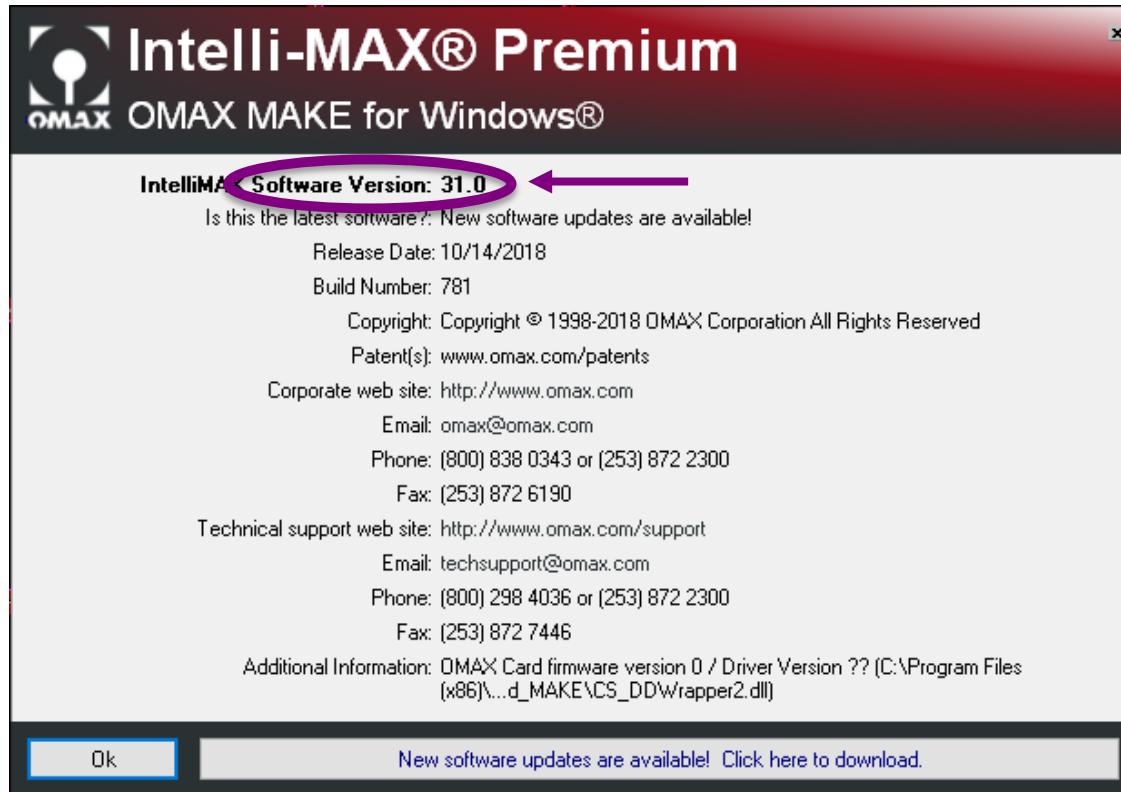
- In OMAX LAYOUT or MAKE, click Help on the main menu.
- Click **About/Check for Upgrades**.



OIR – keywords “software updates”

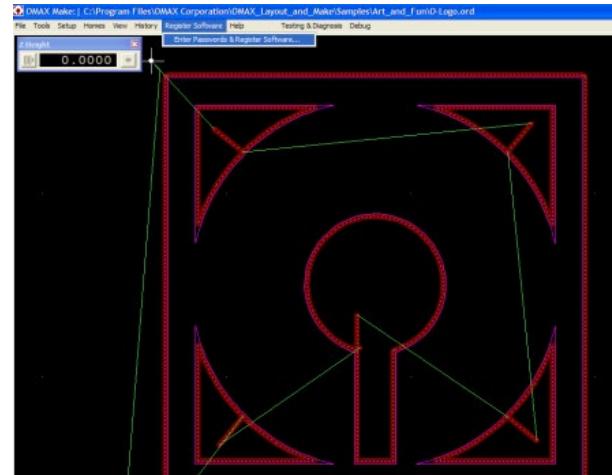
## Help > About/Check for Upgrades

This dialog box will display the version you are using.



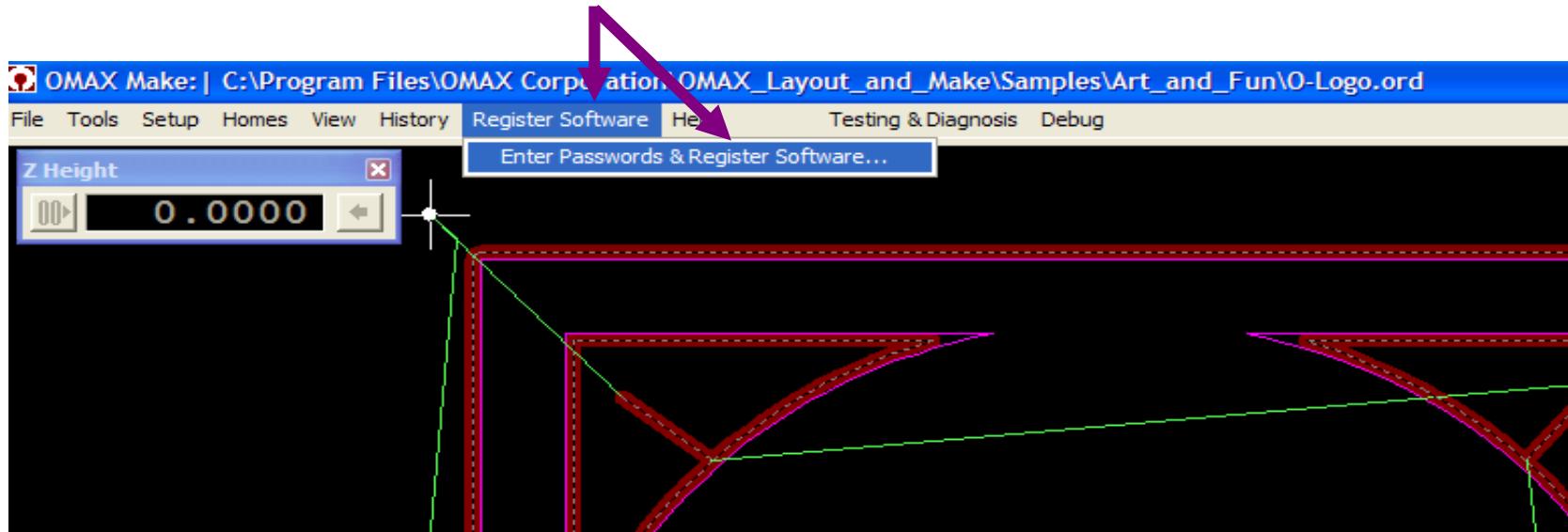
# OMAX Software

- Registering the Intelli-MAX software
  - Once the **LAYOUT** and **MAKE** software is installed on a computer, it must be registered to activate certain functions such as costing.



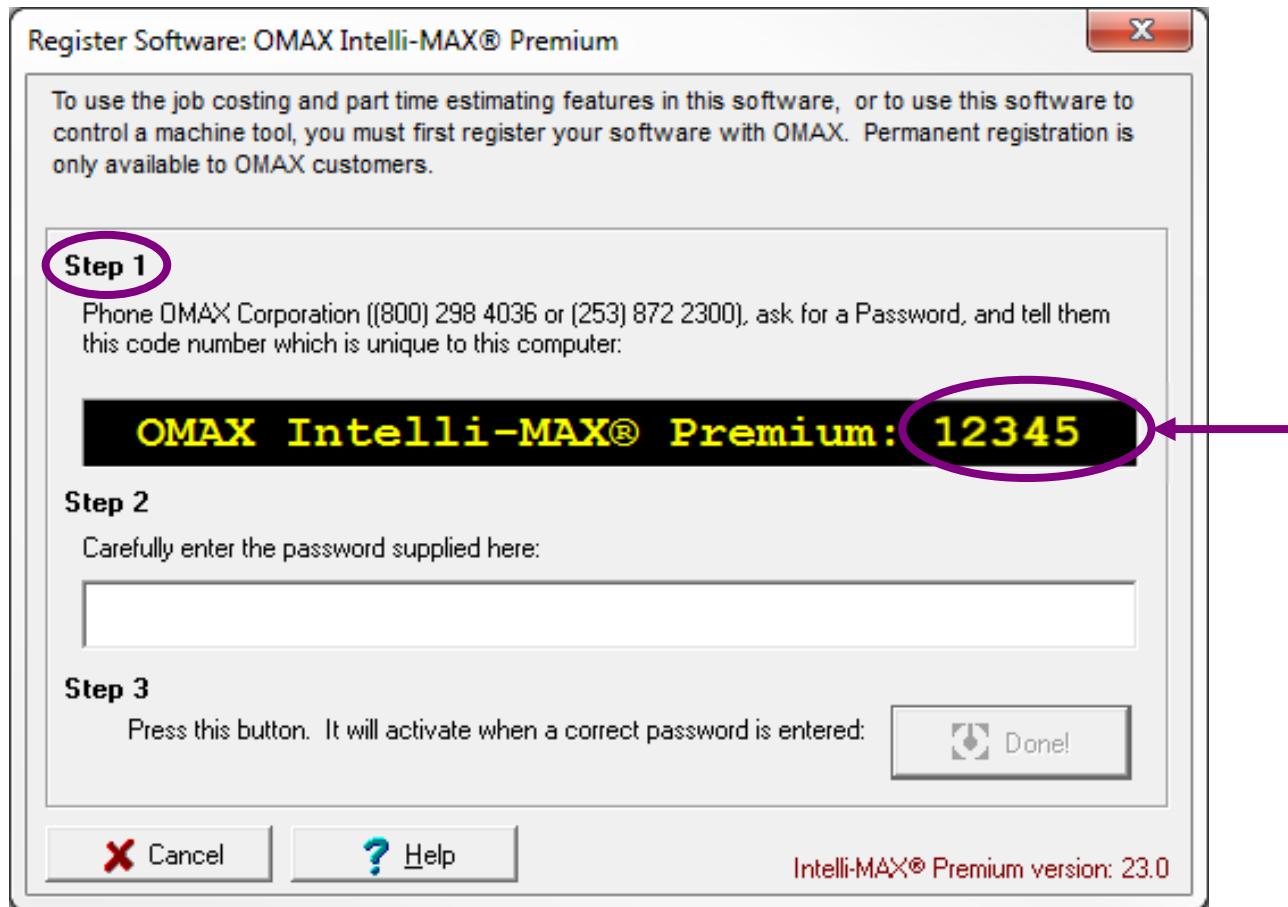
# OMAX Software

- To register the software
  - Open OMAX MAKE.
  - Click **Register Software**.
  - Click **Enter Passwords & Register Software**.



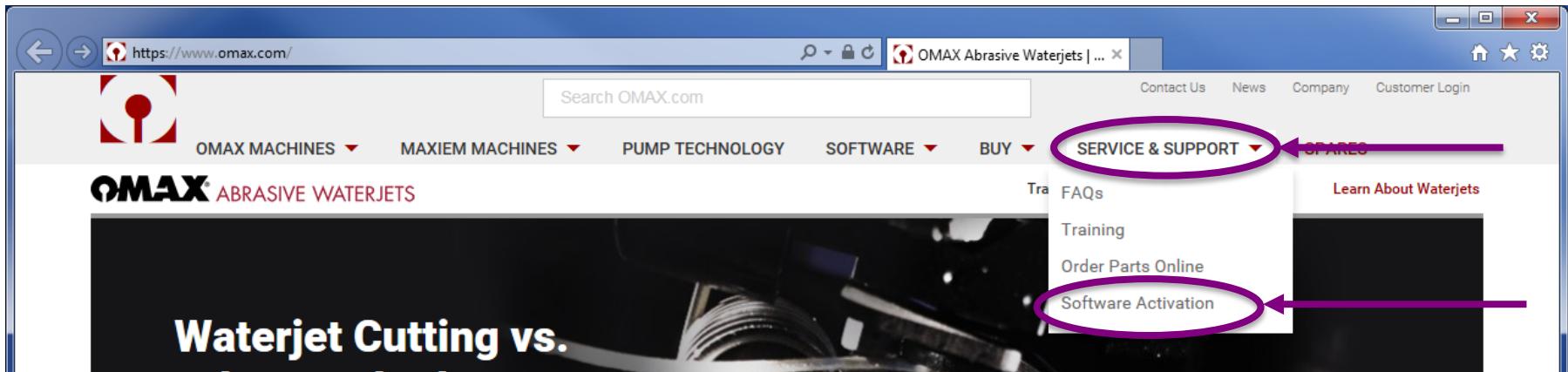
# OMAX Software

- A yellow code will appear under Step 1.



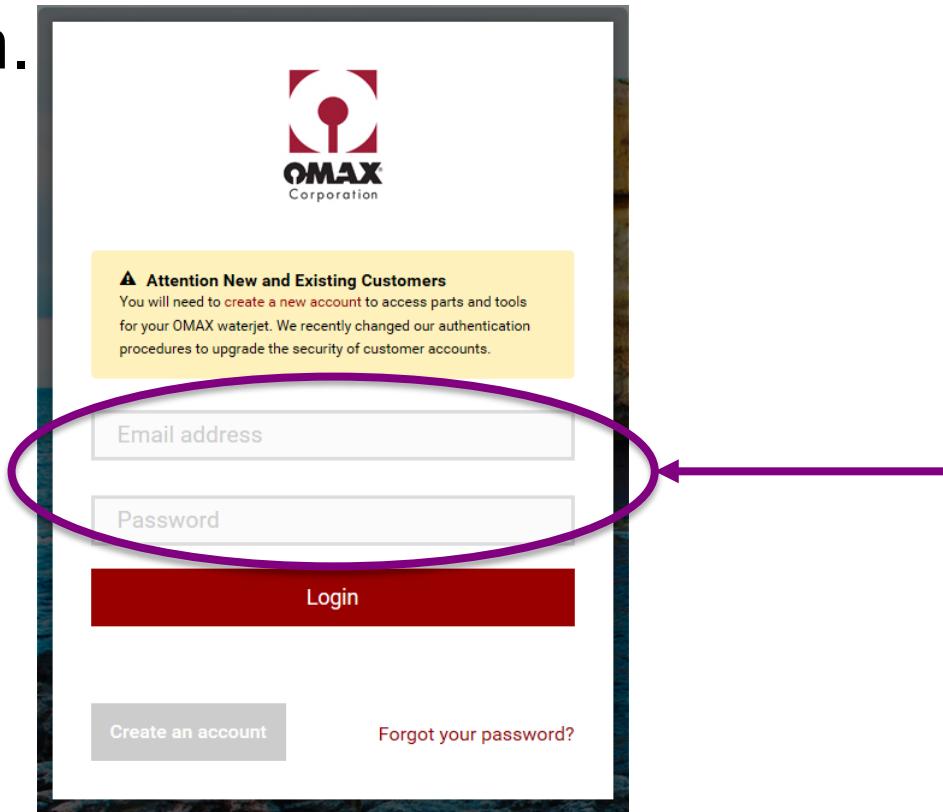
# OMAX Software

- Go to <http://www.omax.com>.
- From the **Service & Support** menu, choose **Software Activation**.



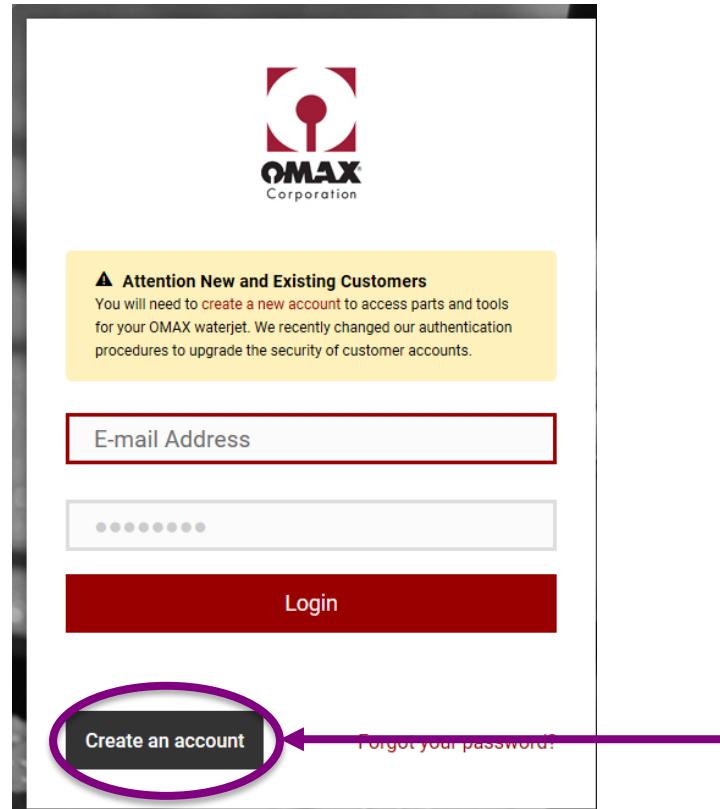
# OMAX Software

- Log in using your email address and password.
- Click Login.



# OMAX Software

- If you do not have an OMAX support account, click the **Create an Account** button and follow the on-screen instructions.



# OMAX Software

– Click **Activate My Software.**

The screenshot shows a web browser window for the OMAX Software Activation Portal at <https://softwareactivation-dev.omax.com/>. The page title is "Software Activation Portal". The navigation menu includes links for HOME, ACTIVATE LICENSE, VIEW ACTIVATIONS, DOWNLOAD SOFTWARE, and TRAINING@OMAX.COM. The main content area displays "My Information" with fields for "Logged In As" (training@omax.com) and "Your Organization" (OMAX Training). Below these, under the "Actions" section, is a prominent red button labeled "Activate My Software". A large purple oval surrounds this button, and a purple arrow points from the top right towards it, indicating the user action required.

# OMAX Software

– Click Intelli-MAX Premium.

The screenshot shows the OMAX website's software activation section. At the top, there is a navigation bar with links for HOME, ACTIVATE LICENSE, VIEW ACTIVATIONS, DOWNLOAD SOFTWARE, and TRAINING@OMAX.COM. Below the navigation bar, the OMAX logo and the text "ABRASIVE WATERJETS" are displayed. On the right side of the page, there is a "Translate Site" dropdown set to English. The main content area has a heading "License My Software" and a sub-instruction "Click the software below to begin activation - Step 1". Below this, three software options are listed: "Intelli-MAX Standard", "Intelli-MAX Premium", and "Intelli-CAM". The "Intelli-MAX Premium" option is circled with a purple oval, and a purple arrow points from the text above to this circled option.

# OMAX Software

- Enter the registration code.
- Verify the date shown in the Your PC Date.

## License My Software

Click the software below to begin activation - Step 1

Intelli-MAX Standard

Intelli-MAX Premium

Intelli-CAM

Please enter the registration information below - Step 2

License Expires: Never

Registration Code:

Your PC Date:

I Agree to the Terms of the [License Agreement](#)

**Submit**

Register Software: OMAX Intelli-MAX® Premium

To use the job costing and part time estimating features in this software, or to use this software to control a machine tool, you must first register your software with OMAX. Permanent registration is only available to OMAX customers.

**Step 1**  
Phone OMAX Corporation ((800) 298 4036 or (253) 872 2300), ask for a Password, and tell them this code number which is unique to this computer:  
**OMAX Intelli-MAX® Premium : 12345**

**Step 2**  
Carefully enter the password supplied here:

**Step 3**  
Press this button. It will activate when a correct password is entered:

Cancel      Help      Done!

Intelli-MAX® Premium version: 23.0

- Check **I Agree to the Terms of the License Agreement** box.
- Click the **Submit** button.

Please enter the registration information below - Step 2

License Expires: Never 

Registration Code:

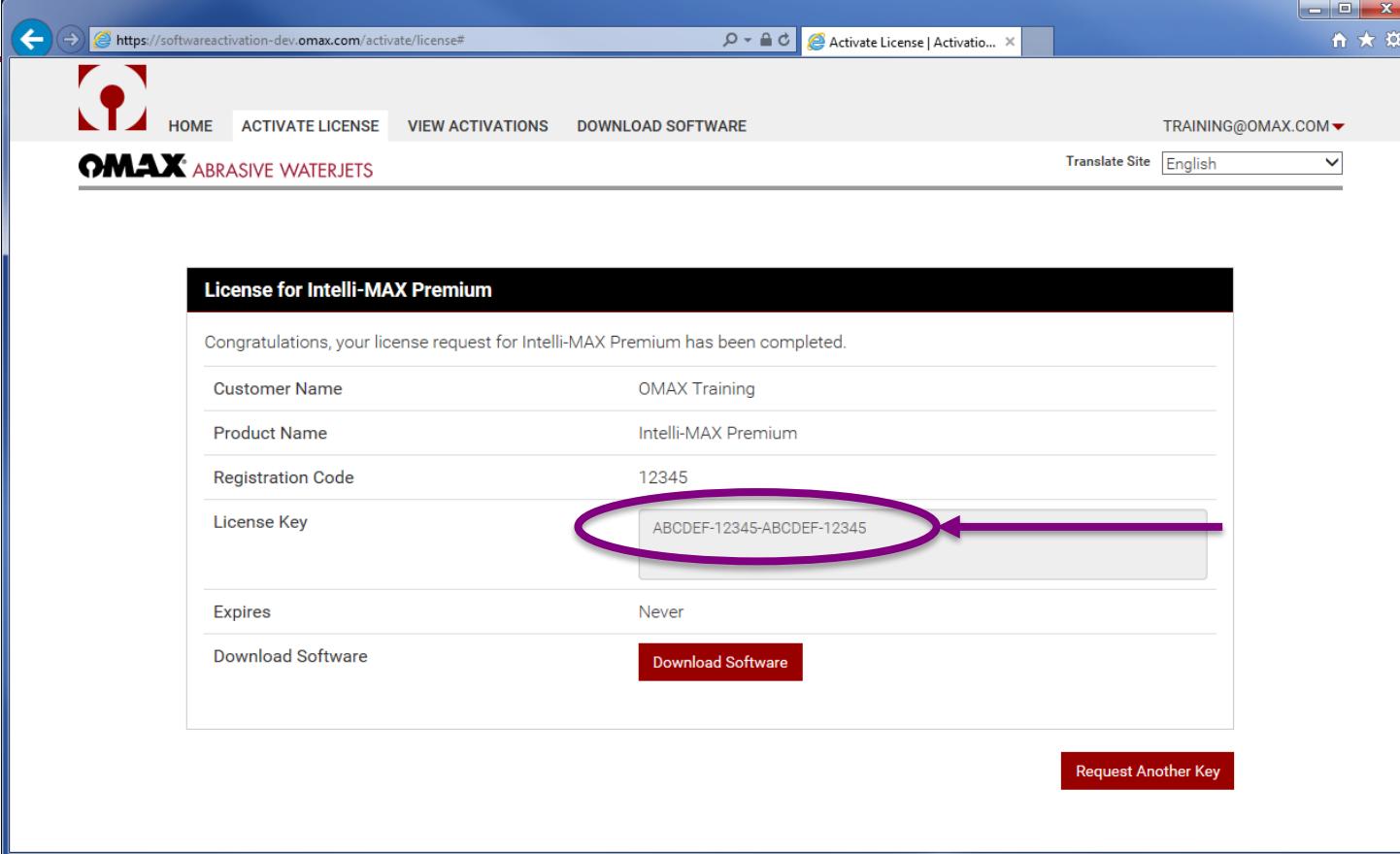
Your PC Date:  

  Agree to the Terms of the [License Agreement](#)



# OMAX Software

– Copy the License Key from this page.



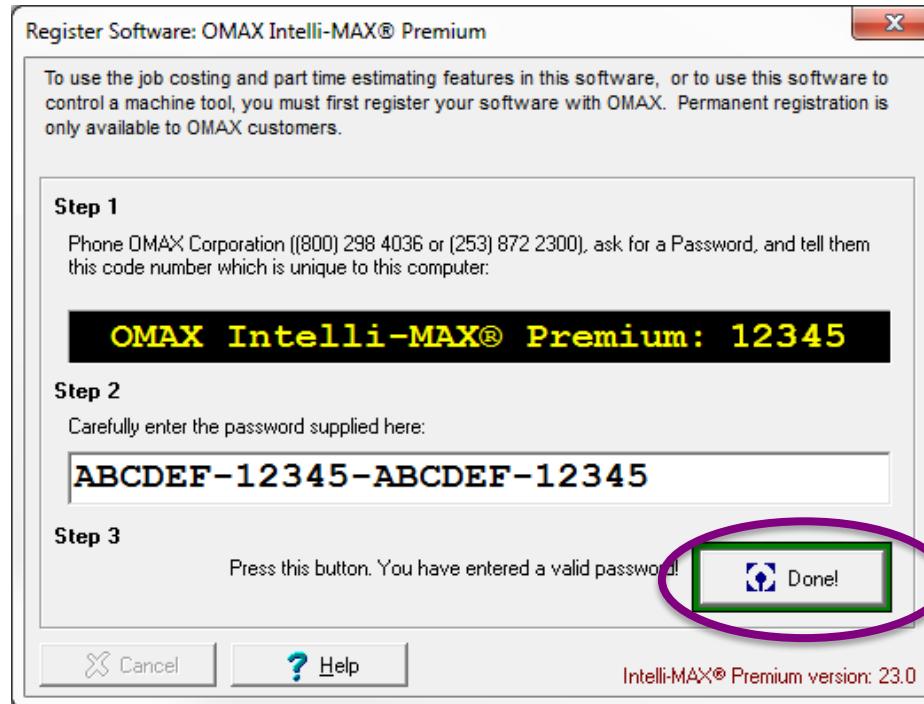
The screenshot shows a web browser window displaying the OMAX software activation page. The URL in the address bar is <https://softwareactivation-dev.omax.com/activate/license#>. The page title is "Activate License | Activation". The header includes links for HOME, ACTIVATE LICENSE, VIEW ACTIVATIONS, DOWNLOAD SOFTWARE, and an email link TRAINING@OMAX.COM. A "Translate Site" dropdown shows "English". The main content area has a black header "License for Intelli-MAX Premium". Below it, a message says "Congratulations, your license request for Intelli-MAX Premium has been completed." A table lists the following information:

Customer Name	OMAX Training
Product Name	Intelli-MAX Premium
Registration Code	12345
License Key	ABCDEF-12345-ABCDEF-12345
Expires	Never
Download Software	<a href="#">Download Software</a>

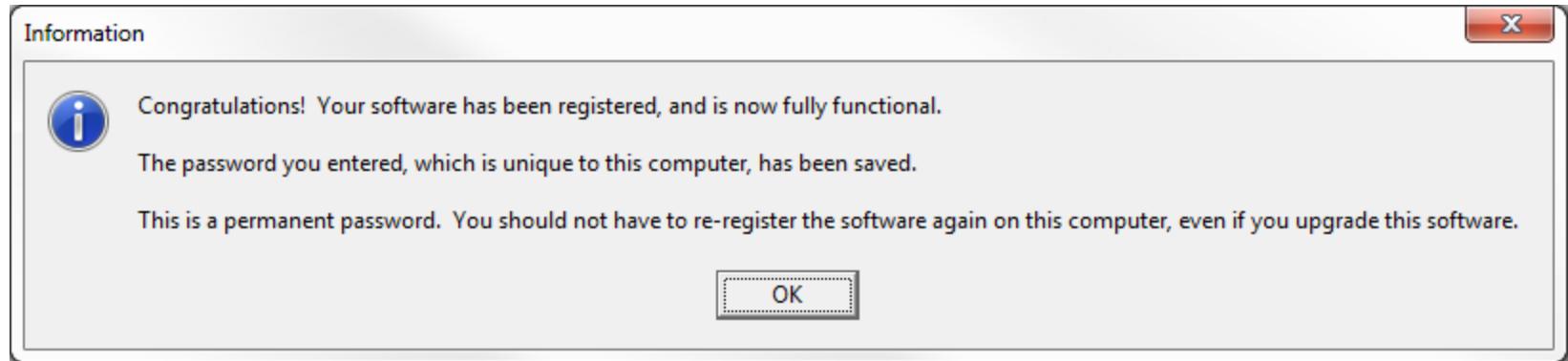
A large purple oval highlights the "License Key" field, which contains the value "ABCDEF-12345-ABCDEF-12345". An arrow points from the text "Copy the License Key from this page." to this highlighted field. At the bottom right of the content area is a red button labeled "Request Another Key".

# OMAX Software

- Paste the License Key into the Intelli-MAX software registration dialog box.
- Click **Done**.



## – Your software is registered!



# OMAX Software

- Other software registration notes
  - The default for software registration is 45 days.
  - Permanent passwords are issued when the machine is released by OMAX accounting.
  - Each computer requires its own password.
  - Re-registration is not usually required when upgrading a previously installed, registered version of the software.
  - Passwords must be entered on the same calendar date issued, or they are no longer valid.



# OMAX Learning Resources

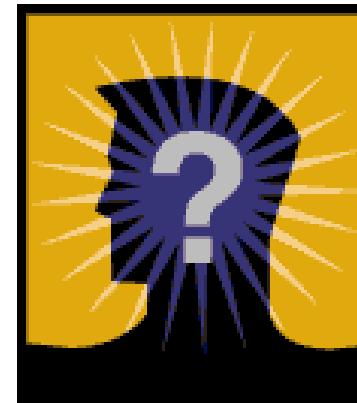
## OMAX Interactive Reference (OIR)



# OMAX Interactive Reference (OIR)

- Instant help when you want it on the topic you are working with
- Over 1,500 pages of information to help you with anything you need to know about the software

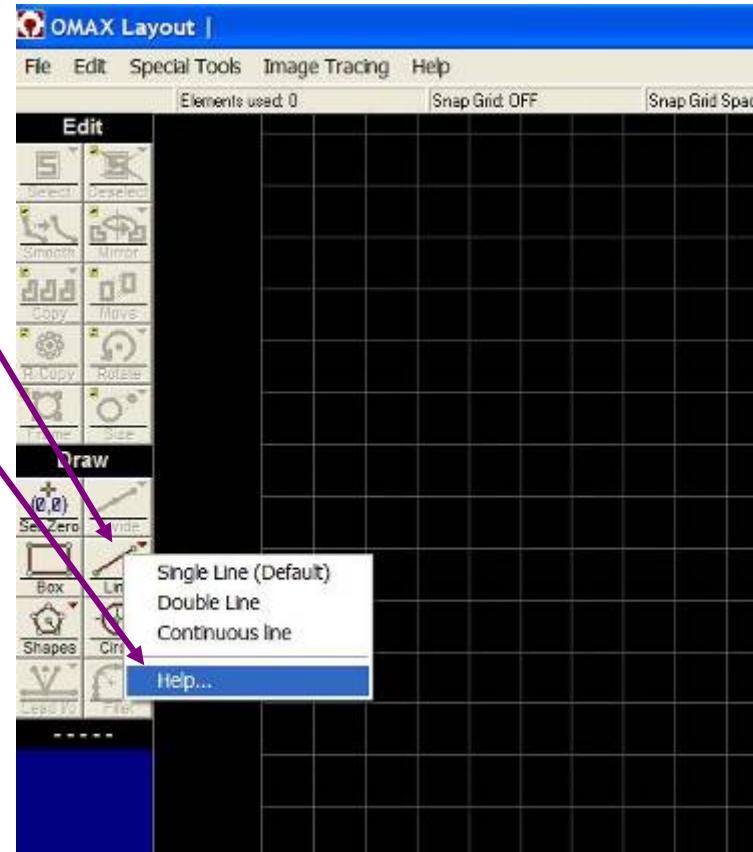
- » Intuitive
- » Interactive
- » Help file



- *Links to the help file on the feature that you are working with!*

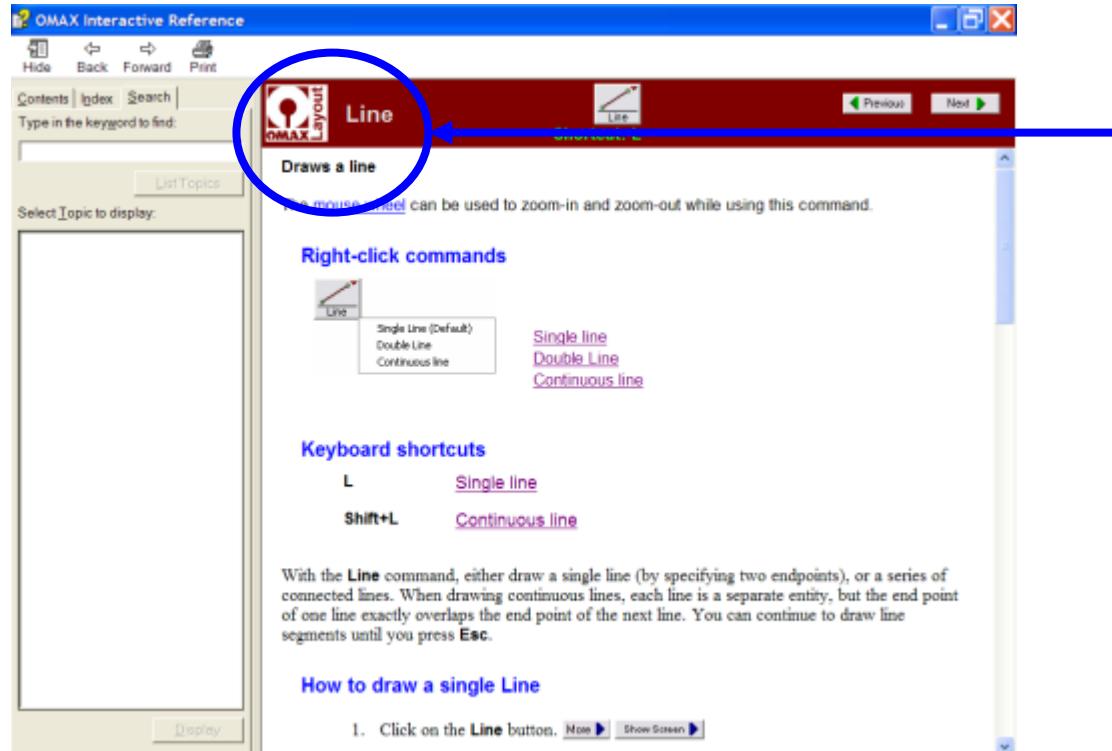
# OMAX Interactive Reference

- Example – If you are working with the Line drawing tool
- Click Help



# OMAX Interactive Reference

- The help link takes you directly to the **Line** help page with instructions on how to draw lines.



# OMAX Interactive Reference

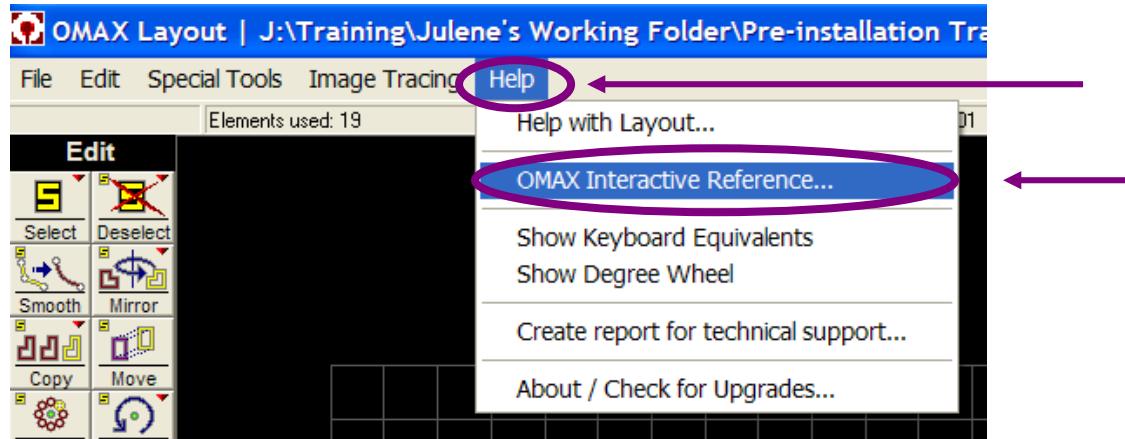
- Other ways to access the OIR

- From your desktop



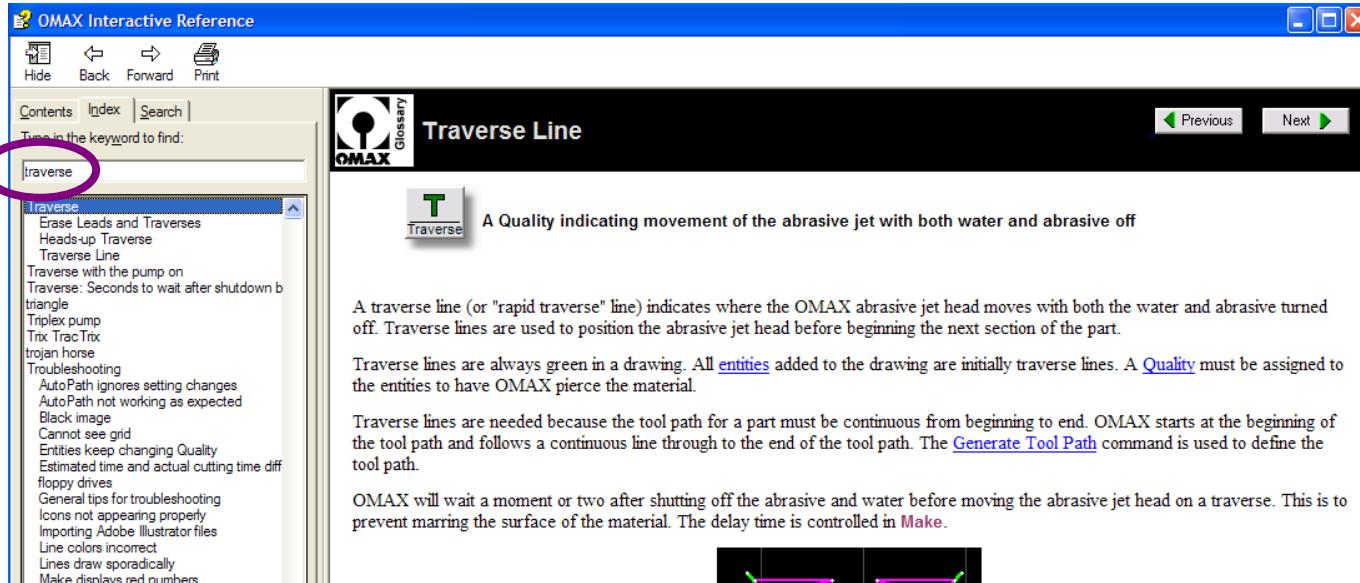
Click the OMAX reference icon

- From the OMAX LAYOUT or MAKE menu



# OMAX Interactive Reference

- Type keywords to search for help topics.



OIR – keyword “traverse”

[WWW.OMAX.COM](http://WWW.OMAX.COM)

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# OMAX Support Site

The OMAX Support Site (Dashboard) provides access to software, manuals, the eLearning portal, marketing materials and many other resources.

To create an account on the Support Site

1. Open an internet browser.
2. Go to [www.omax.com](http://www.omax.com).
3. Click **Customer Login**.

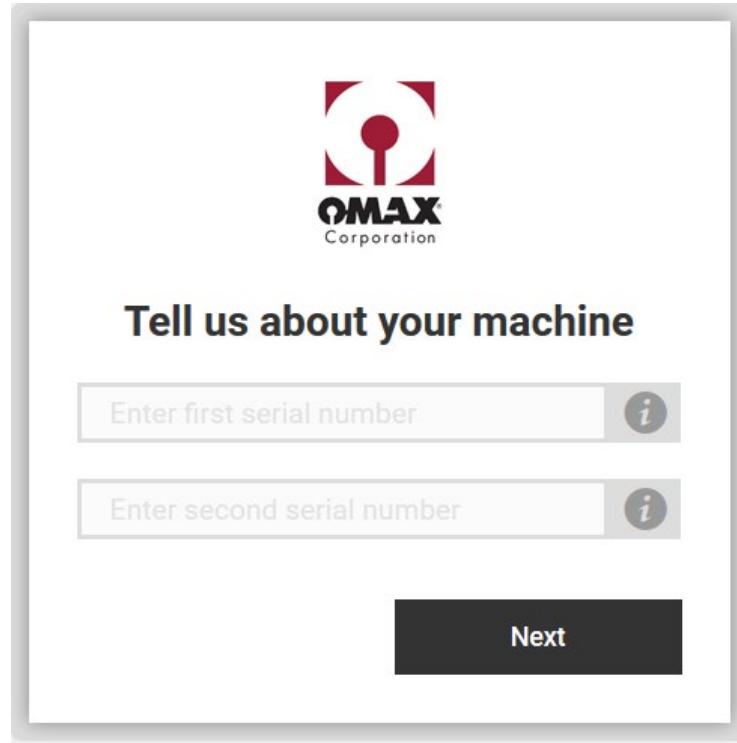


A screenshot of the OMAX website's navigation bar. It includes the OMAX logo, search bar, and links for International Distributors, Contact Us, Customer Login, Spare Parts, and a shopping cart. A red arrow points to the "Customer Login" link.

# OMAX Support Site

4. Follow the on-screen instructions.

See the eLearning Quick Start Guide, or watch the [“How to Use the eLearning Portal”](#) recorded webinar.





# Terminology

## Communicating in Waterjet Speak

# Terminology

- Drawing – a series of lines and arcs
- DXF File – a **drawing exchange file** containing a drawing and path elements

Example: Airplane.dxf

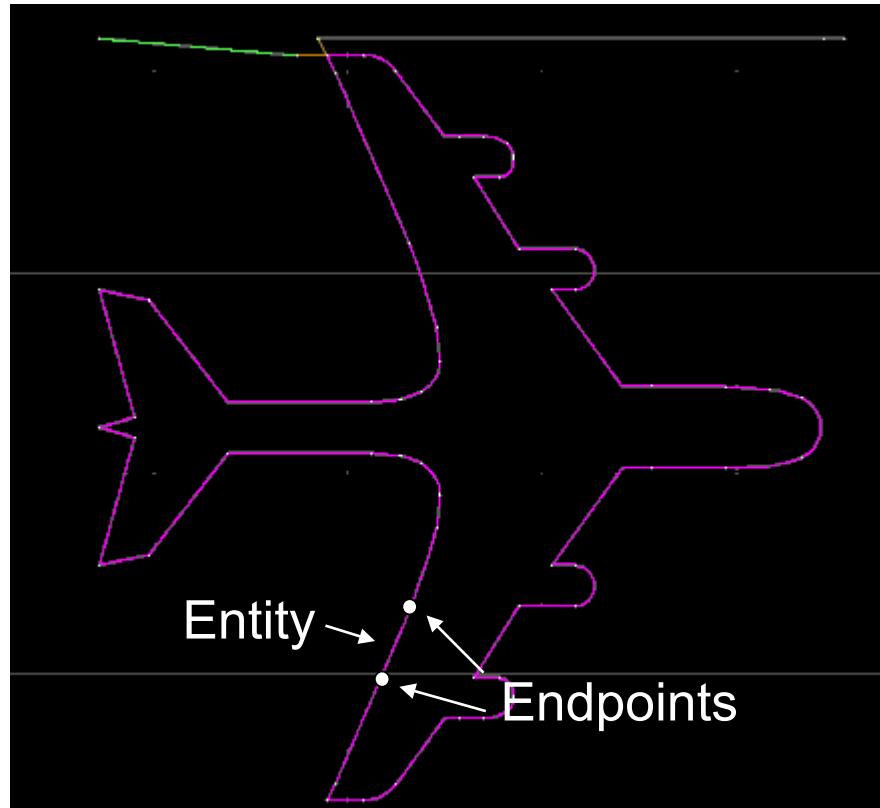


.DXF file icon



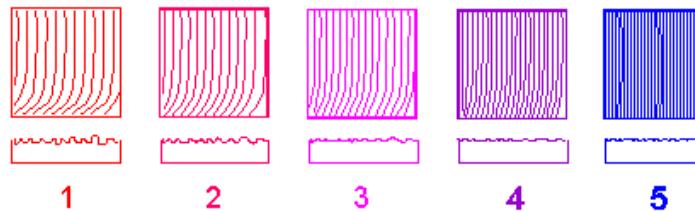
# Terminology

- Entity or element – refers to each segment within a line or arc (defined as the solid geometry between two points)
- Endpoint – refers to one end of a given entity; shown as white dots

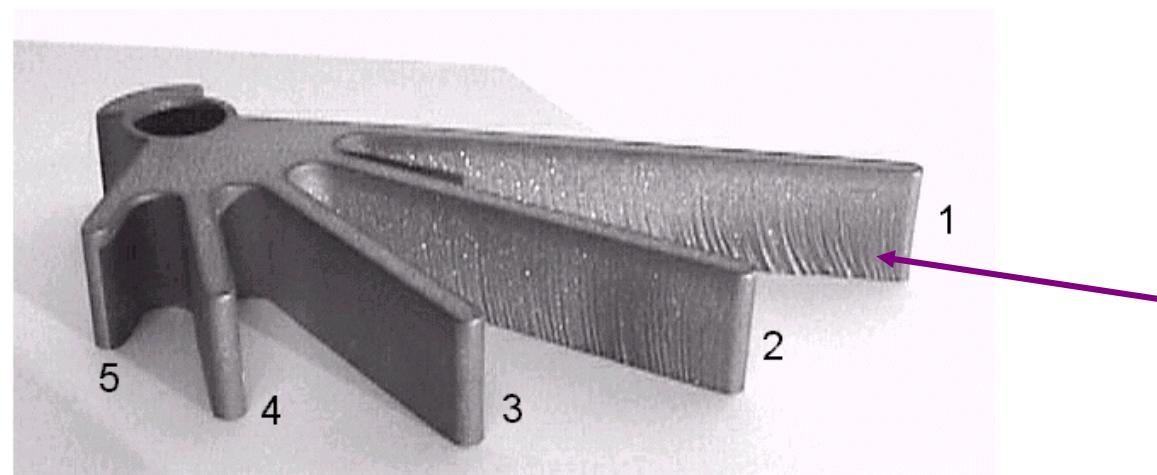


# Terminology

- Quality – refers to the machined edge finish of the part



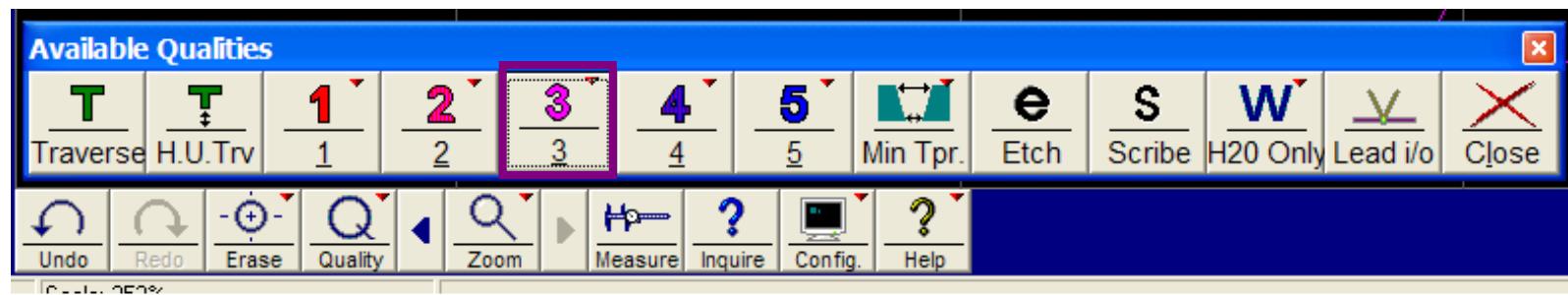
*Notice also that as the Quality numbers get lower, the surface finish gets rougher.*



OIR – keyword “Quality (LAYOUT)”

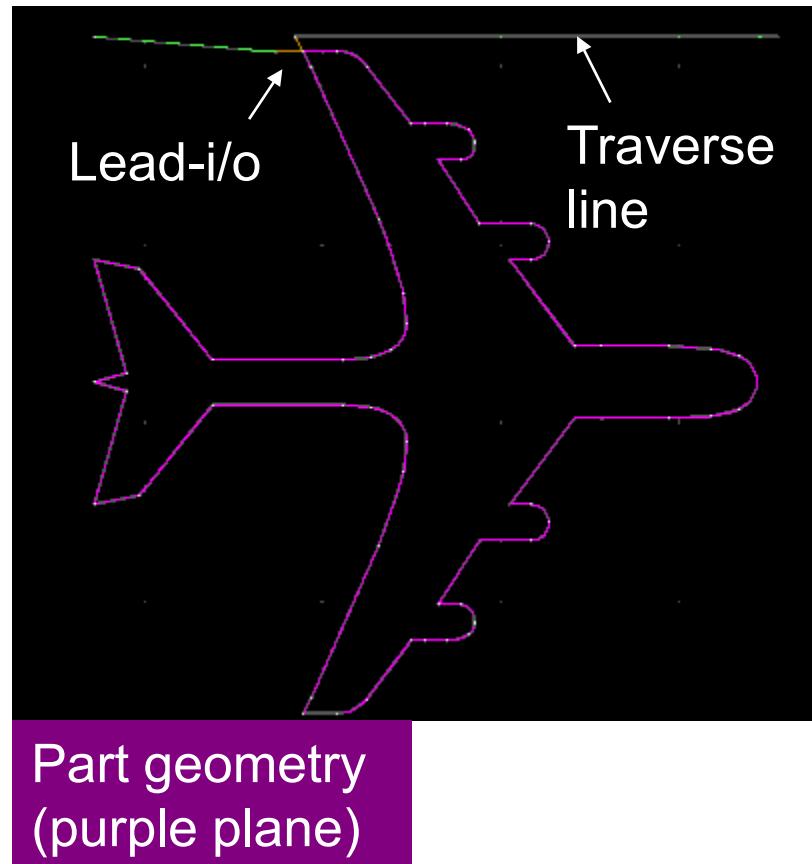
# Terminology

- Quality Tools – commands for setting the quality of entities in the drawing



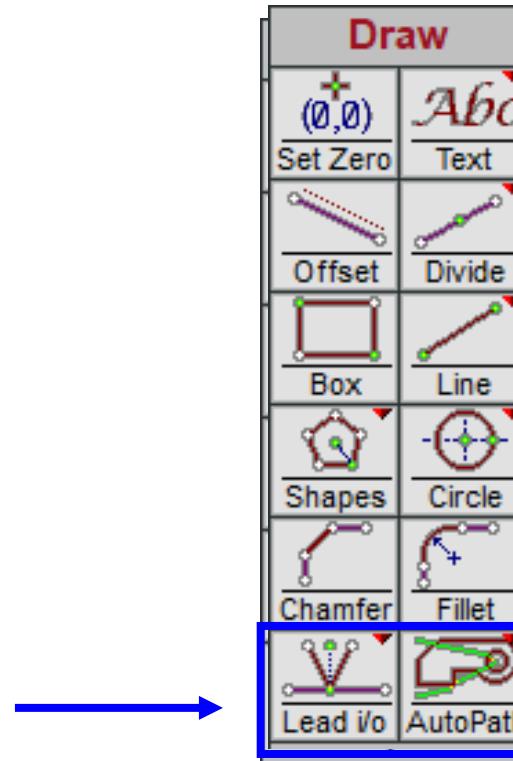
# Terminology

- Path Elements – refers to the pierce and exit points, and lines where the nozzle moves but does not cut, and the geometry of the part
- Consists of
  - **Lead ins and Lead outs**
  - **Traverses**
  - and **Part geometry**



# Terminology

- **Path elements** are added to the drawing using **drawing**, **Lead i/o**, and **AutoPath** drawing tools.

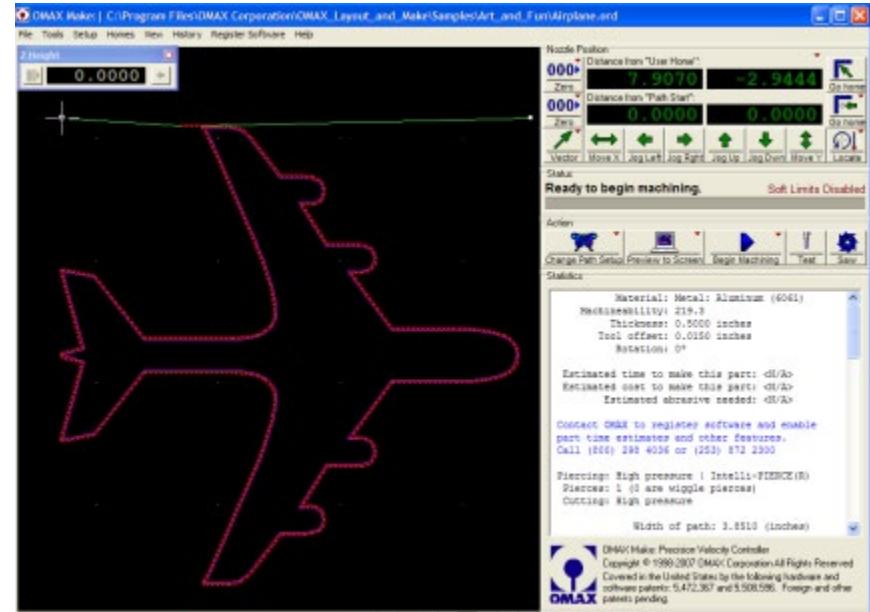


OIR – keyword “Lead i/o”

# Terminology

- **ORD File** – the **OMAX Routed Data** file contains data that commands the OMAX machine to move in the X and Y directions in motor step increments, and to activate the cutting head.

The **MAKE** software uses the ORD file to machine the part.



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# Terminology

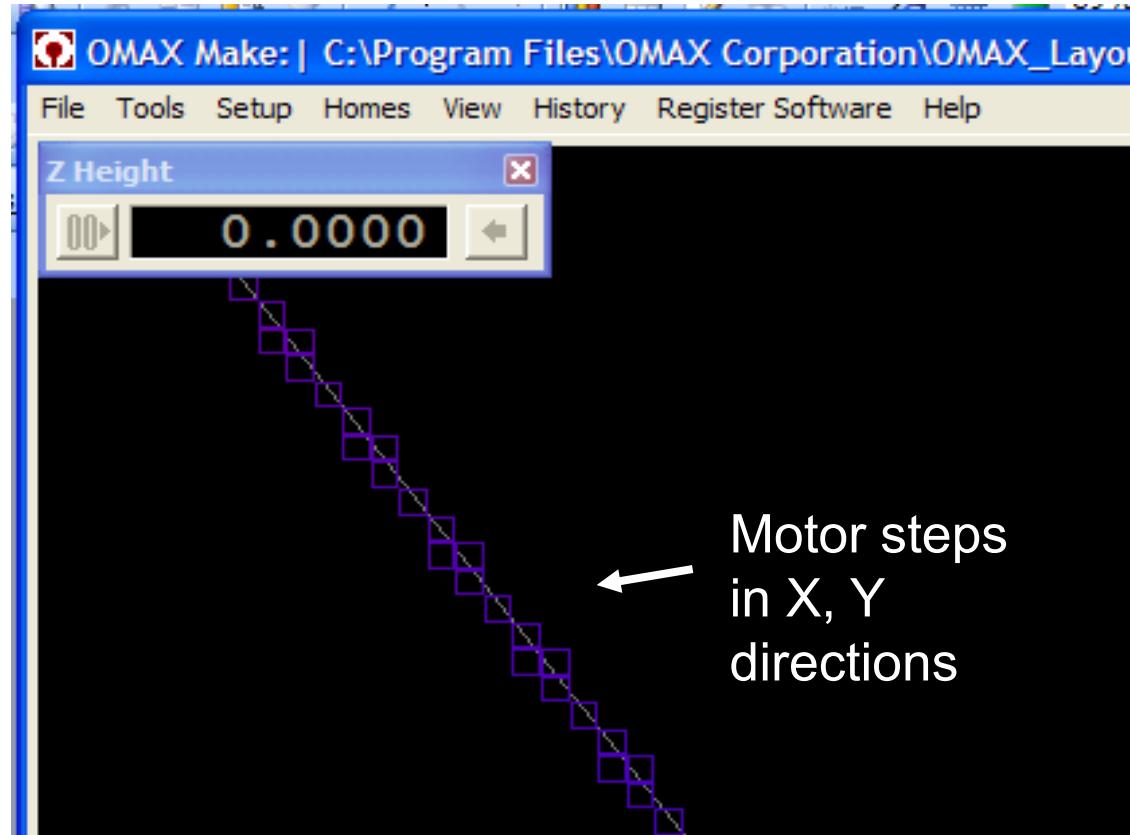
- **OMX File** – the **OMX** file contains **eXtra** data that commands the OMAX machine to move in the X,Y, and Z directions and to execute other commands programmed into the path (such as a pause point).

The **MAKE** software uses the OMX file to machine the part with the extra commands in it.



# Terminology

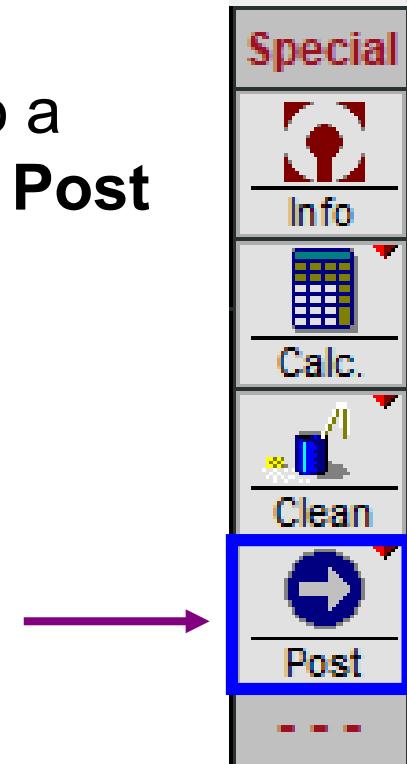
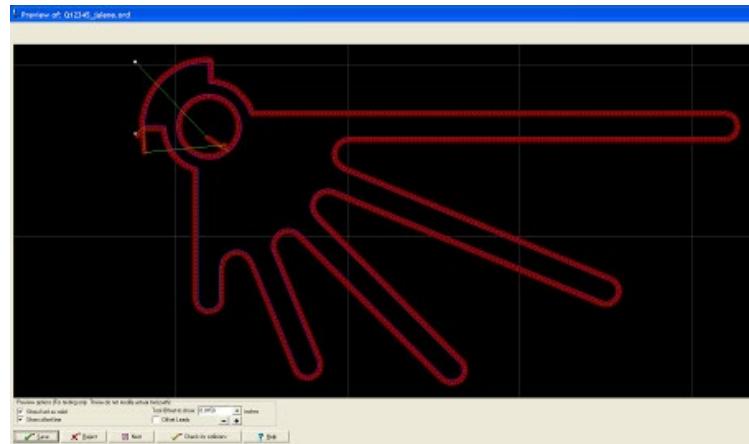
- What is a motor step?



OIR – keyword “ORD”

# Terminology

- Machine Tool Path – refers to the ORD or OMX file data (the X, Y, Z motor steps or other commands) used by OMAX **MAKE** to move the machine to make a part
  - The drawing file (DXF) is converted to a machine file (ORD or OMX) using the **Post** tool in **LAYOUT**.



OIR – keyword “post”

# Terminology

- Kerf – the width of the material eroded away by the waterjet stream (the gap width)
  - Normally equals the width of the mixing tube used in the nozzle assembly
  - Example: kerf = .030" when using a .030" mixing tube



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OIR – keyword “kerf”

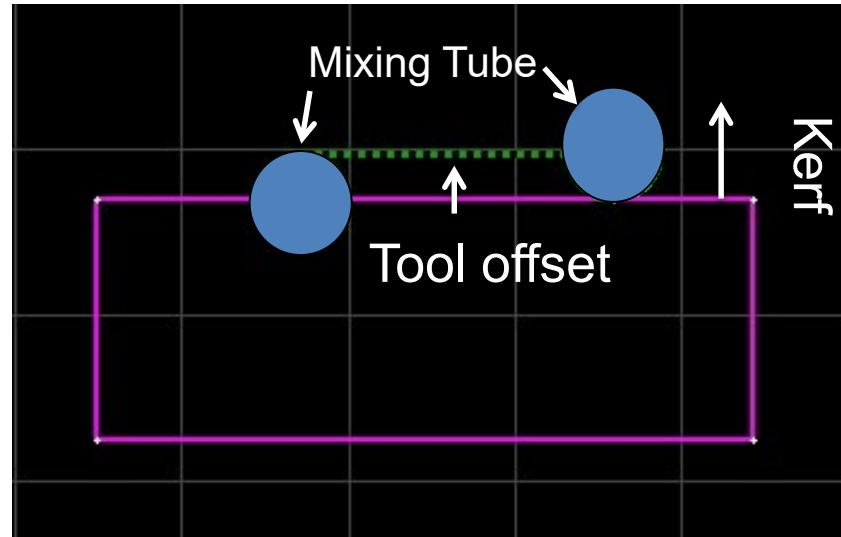
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# Terminology

- Tool Offset – the distance the nozzle is shifted away from the geometry to compensate for the width of the jet stream/kerf
  - The tool offset normally equals half of the width of the mixing tube ( .015" when the mixing tube is .030 ").

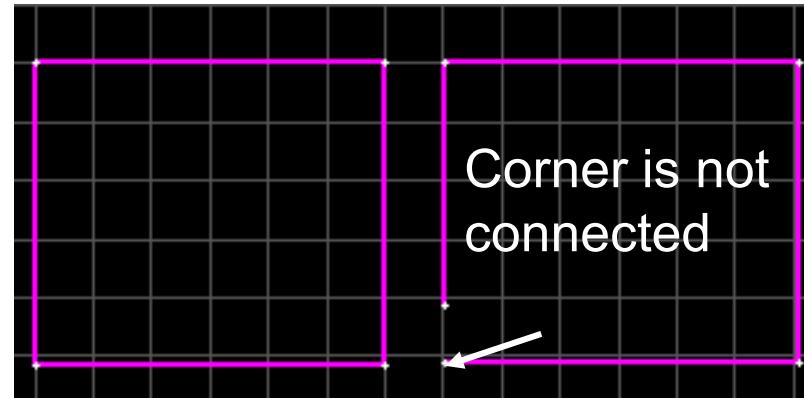


OIR – keywords “path”, “offset”

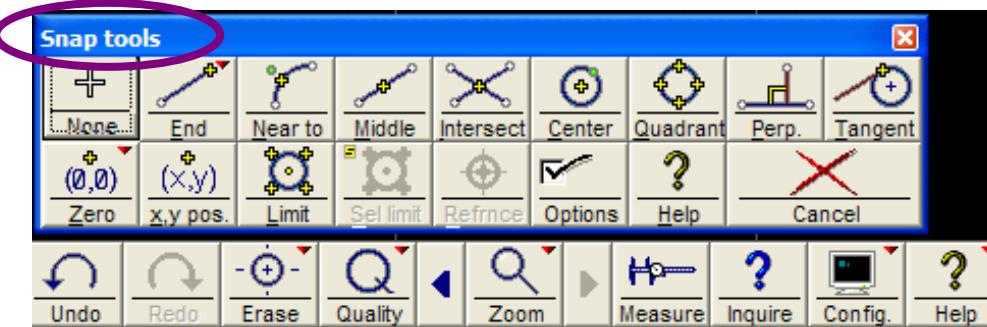
# Terminology

- Snap Tool – tools that automatically place geometry at a specific point when activated

Entity end points are connected, or “snapped” together.



Used to make sure geometries are connected to specific points in the drawing



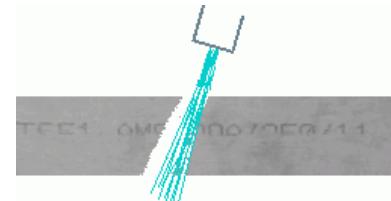
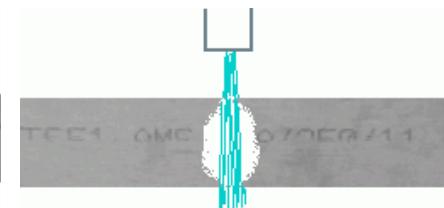
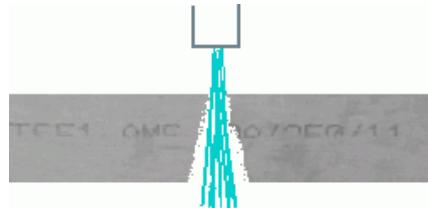
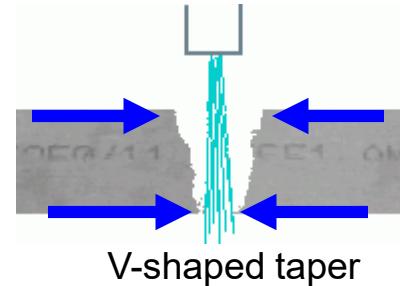
OIR – keyword “snap”

# Terminology

- Taper – the difference in the width of the cut made by the waterjet from the top of the part to the bottom

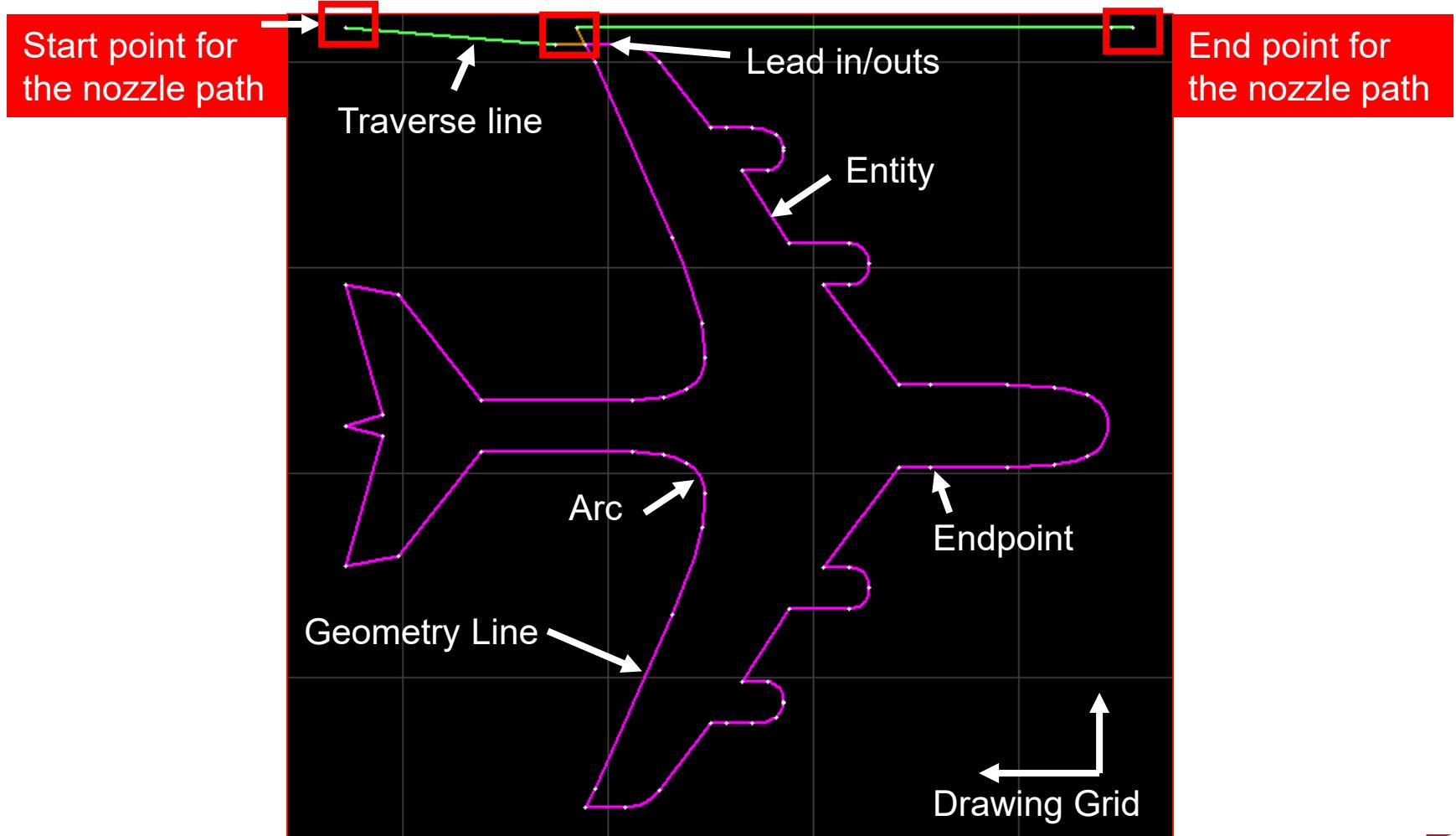
Taper is inherent in all waterjet parts.

There are different types of taper.



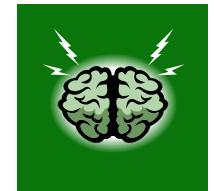
OIR – keyword “taper”

# Anatomy of a Drawing



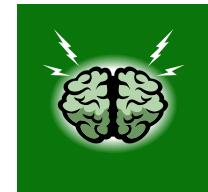
# Review Point

1. What is the file extension for the Drawing Exchange File that we create in OMAX **LAYOUT**?
2. What is the file extension for the OMAX Routed Data file we use in **MAKE** to cut the part?
3. What is the file type that contains eXtra data in it?
4. What is taper?
5. Does every waterjet part have taper?



# Review Point

- 6. What is the “kerf”
- 7. What term do we use to represent the distance the nozzle is moved over so it doesn’t cut into the geometry of our part?





# Steps in Making Parts

The process of making parts from start to finish



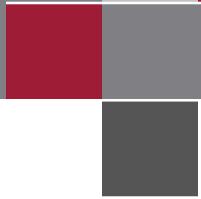
# Making a Part from Start to Finish

## Video - How to Make a Part with OMAX Intelli-MAX Software

- <http://www.omax.com/news/playvideos/id/169>



# Steps in Making Parts



- **Intelli-MAX LAYOUT**

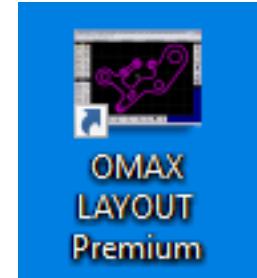
**Step 1:** Obtain/create a Drawing File (DXF file).

**Step 2:** Assign machining Qualities (edge finish).

**Step 3:** Clean the drawing.

**Step 4:** Add Path elements to the drawing & save it.

**Step 5:** Create the Machine Tool Path file (ORD/OMX).



- **Intelli-MAX MAKE**

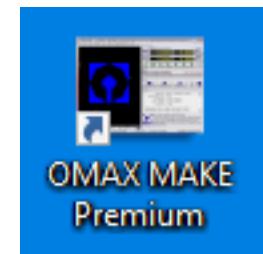
**Step 6:** Start up the machine.

**Step 7:** Configure Machine Settings.

**Step 8:** Open and configure the ORD/OMX file.

**Step 9:** Load and clamp the material.

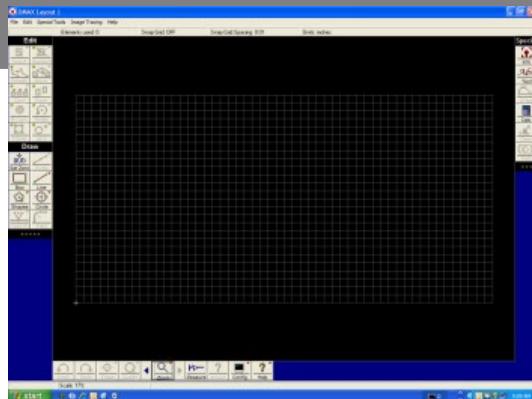
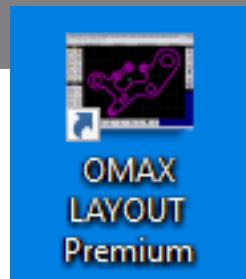
**Step 10:** Begin machining and cut the part.





# Intelli-MAX LAYOUT Software

What **LAYOUT** does and how to use it

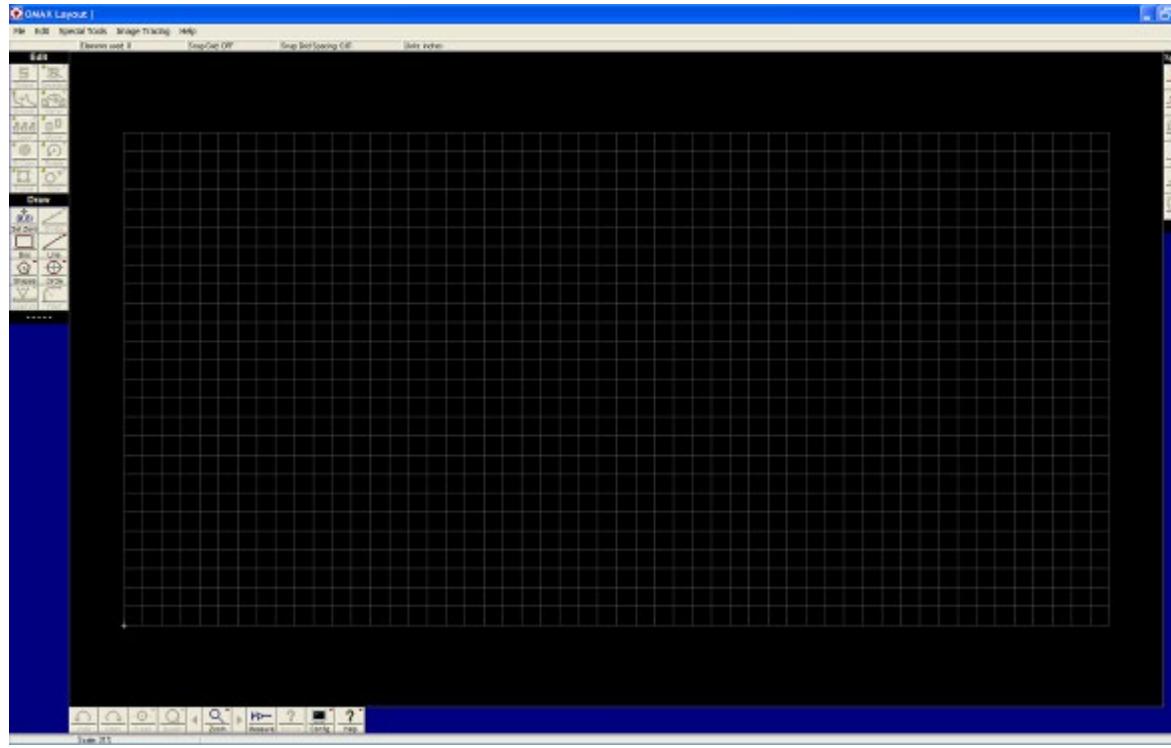


# LAYOUT Software

- What does the **LAYOUT** software do?
  - **LAYOUT** is the **OMAX CAD** (Computer Aided Drawing) software program.
  - It provides users with Drawing, Editing, and Special tools for creating, importing, modifying, and pathing drawings that can be machined on the OMAX JetMachining Center.
  - The purpose of **LAYOUT** is to draw a map for the OMAX machine to follow when cutting a part.

# LAYOUT Software

- Drawing area – where you create or edit drawings/DXF files



OIR – keyword “display”

# LAYOUT Navigation

## Drawing area

- The drawing area is configurable
  - Set your units of measure
  - Set your drawing grid size
  - Set drawing grid color
  - Set other display preferences such as zoom, file backups, and other options

OIR – keyword “display”

# LAYOUT Navigation

## Drawing area configuration

- To change settings
  - Click **File > Configure Preferences > Display** and/or **Snap/Reference Grids**, or
  - Right-click the **Config.** icon on the toolbar.
  - Specify your units of measure – inches, millimeters or other.
- Specify a grid in the background or leave it blank.
  - The grid can be set up to correspond to your table size, however the drawing grid is independent of the cutting area. (You can place your material anywhere in the cutting area on the table.)

OIR – keyword “display”

# LAYOUT Navigation

## How to navigate in the **LAYOUT** drawing window

- Zoom in and out in the drawing area using the mouse.
- Zooms to the point where the pointer is placed on the screen
  - Click = zoom in
  - Right-click = zoom out
  - Wheel button (if available)
    - rotate forward = zoom in
    - rotate backward = zoom out
- Hold down the **SHIFT** key when zooming to slow it down by 10X.

# LAYOUT Navigation

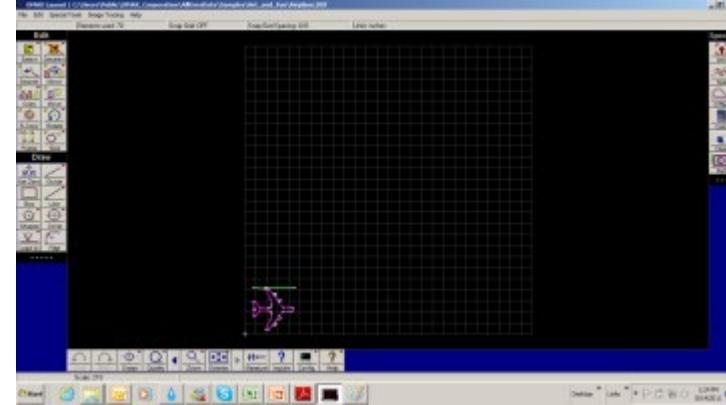
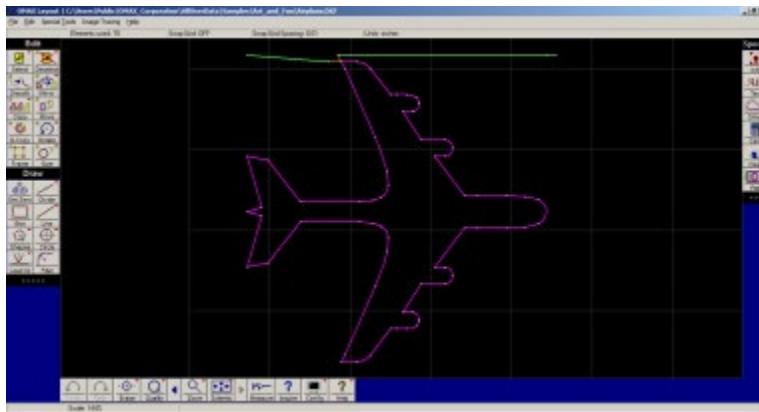
## Centering drawings in the LAYOUT drawing window

- The **HOME** key centers the drawing in the window, or you can click on the **Extents** icon.
- The **END** key centers the entire drawing area in the window.



Home

End

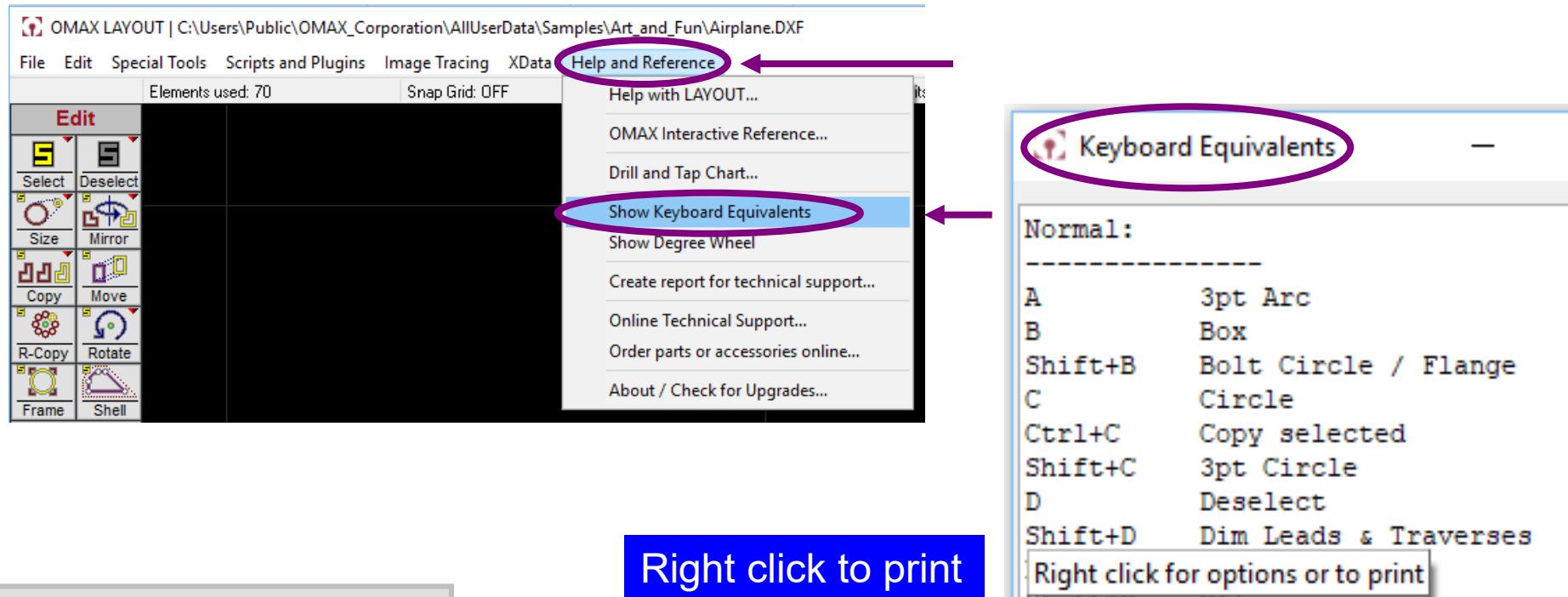


# LAYOUT Navigation

- If you hover the pointer over an icon, it displays a pop-up with a brief explanation of the function.
- **Click** an icon to activate the default tool.
- Pressing the **ESC** key deactivates a tool.
- Pressing the **Space Bar** repeats the previous function.

# LAYOUT Navigation

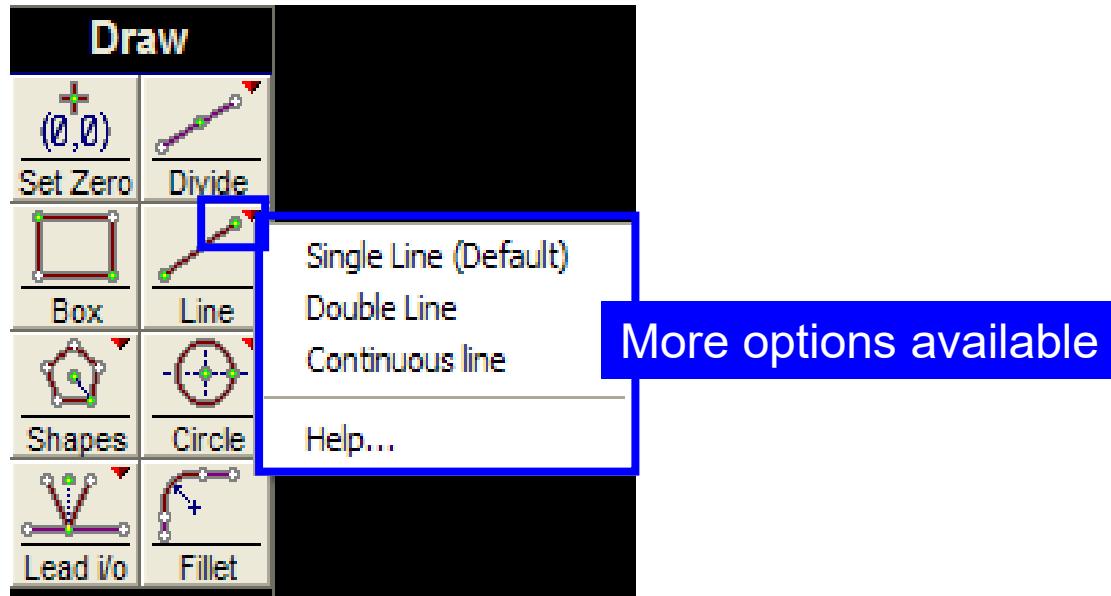
- Use **Keyboard Shortcuts** to activate functions instead of using the mouse.
  - Help and Reference > Show Keyboard Equivalents



OIR – keyword “shortcuts”

# LAYOUT Navigation

- A small red triangle inside an icon indicates more options are available for that function.
  - **Right-click** the red triangle to see more options.
  - **Click** an option to activate the function.

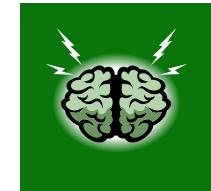


# Review Point

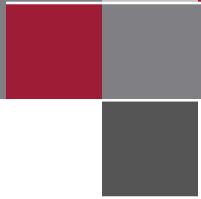
- What we've covered so far
  - Major components of the OMAX equipment
  - How the OMAX machine works to cut parts
  - How to install and register the OMAX software
  - Learning resources available through the OMAX help system (the OIR)
  - The basic steps involved in making parts on the OMAX
  - OMAX Terminology
  - OMAX **LAYOUT** Navigation

# Review Point

1. How many basic steps are there to making parts on the OMAX?
  - a. 15
  - b. 10
  - c. 9
  - d. 2
2. What do the little red triangles in the **LAYOUT** icons mean?
3. Which key on the keyboard would I press if I wanted to center my drawing in the drawing window?



# Steps in Making Parts



## • Intelli-MAX LAYOUT

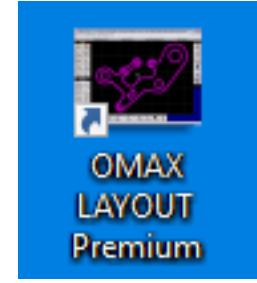
**Step 1:** Obtain/create a Drawing File (DXF file).

**Step 2:** Assign machining Qualities (edge finish).

**Step 3:** Clean the drawing.

**Step 4:** Add Path elements to the drawing & save it.

**Step 5:** Create the Machine Tool Path file (ORD/OMX).



## • Intelli-MAX MAKE

**Step 6:** Start up the machine.

**Step 7:** Configure Machine Settings.

**Step 8:** Open and configure the ORD/OMX file.

**Step 9:** Load and clamp the material.

**Step 10:** Begin machining and cut the part.



# Step 1: Drawing Files

## What is a drawing file?

- Drawing files are simply files that contain lines and arcs that represent something (shapes, geometry, other) that you want to cut.
- Drawing files are commonly saved with a .dxf extension (**Drawing exchange Format**).
- DXF is a standard file format that is commonly used to exchange files between different CAD (Computer Aided Drawing) systems.
- The OMAX **LAYOUT** software stores all drawing files as standard DXF files.

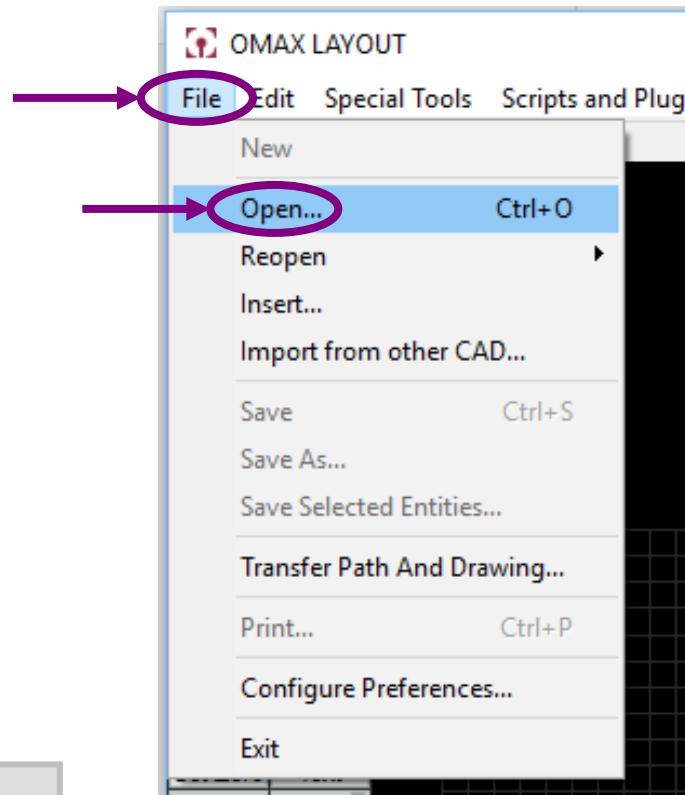
# Step 1: Drawing Files

- There are three primary ways to get a drawing or DXF file
  1. Open an ***existing*** drawing file that is already saved in the system.
  2. Create a ***new*** drawing using OMAX LAYOUT CAD drawing tools from scratch.
  3. ***Import*** a drawing file into LAYOUT from another CAD system.

# Step 1: Drawing Files

To open an existing file in **LAYOUT**

- Click **File**, then click **Open**



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OIR – keyword “open”

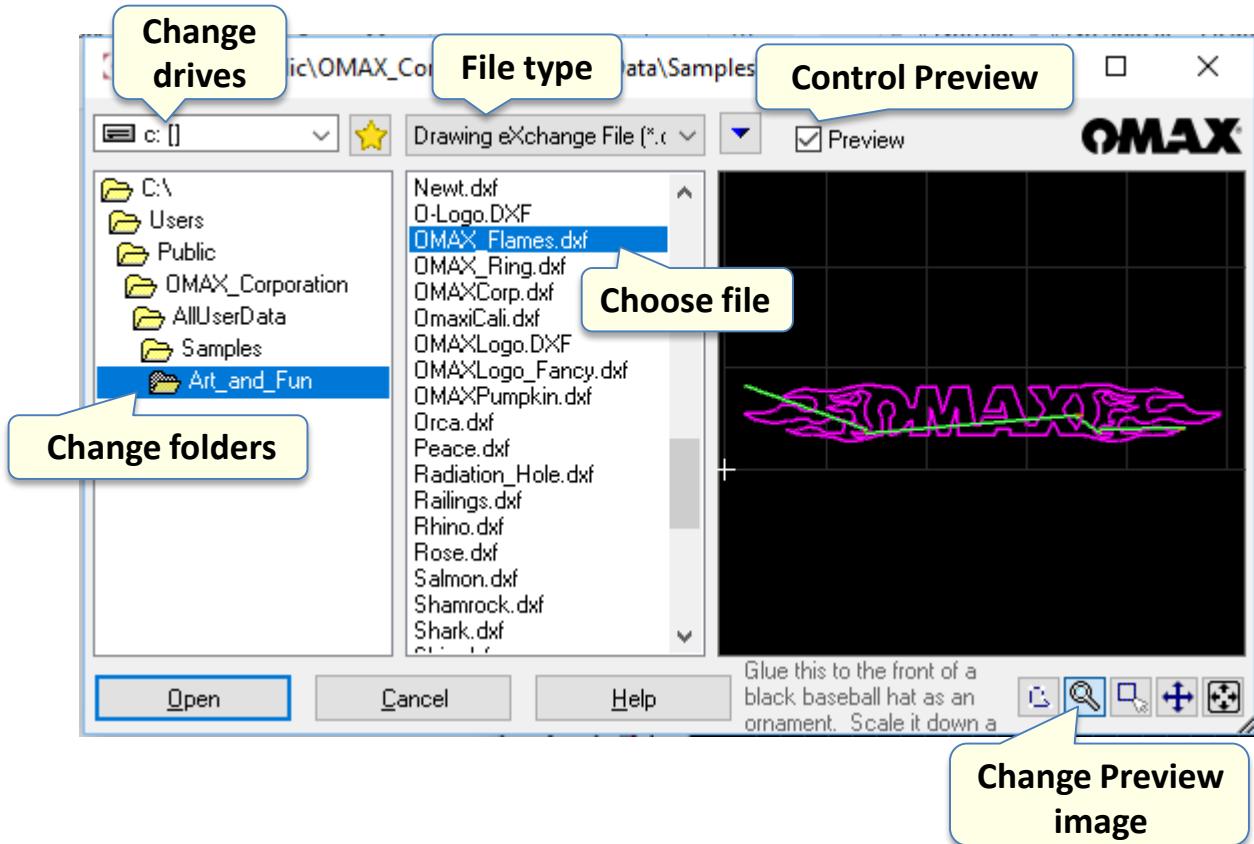
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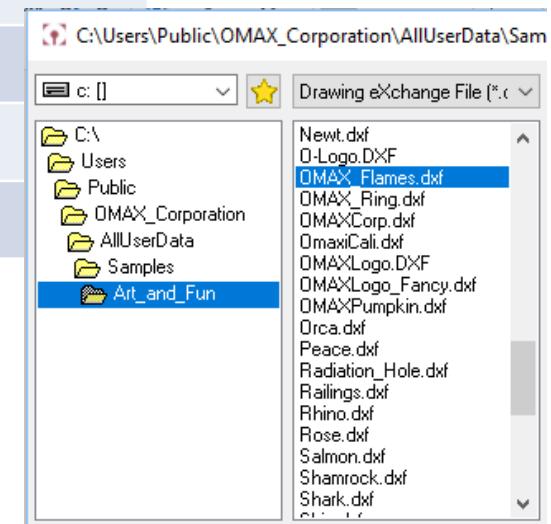
# Step 1: Drawing Files

## OMAX Viewer



# Step 1: Drawing Files

Windows XP	Windows Vista or 7	Windows 8 and 10
C:\	C:\	C:\
Program Files	Users	Users
OMAX Corporation	Public	Public
OMAX_LAYOUT_and_MA KE	OMAX_Corporation	OMAX_Corporation
Samples	AllUserData	AllUserData
[select folder]	Samples	Samples
	[select folder]	[select folder]



## Practice

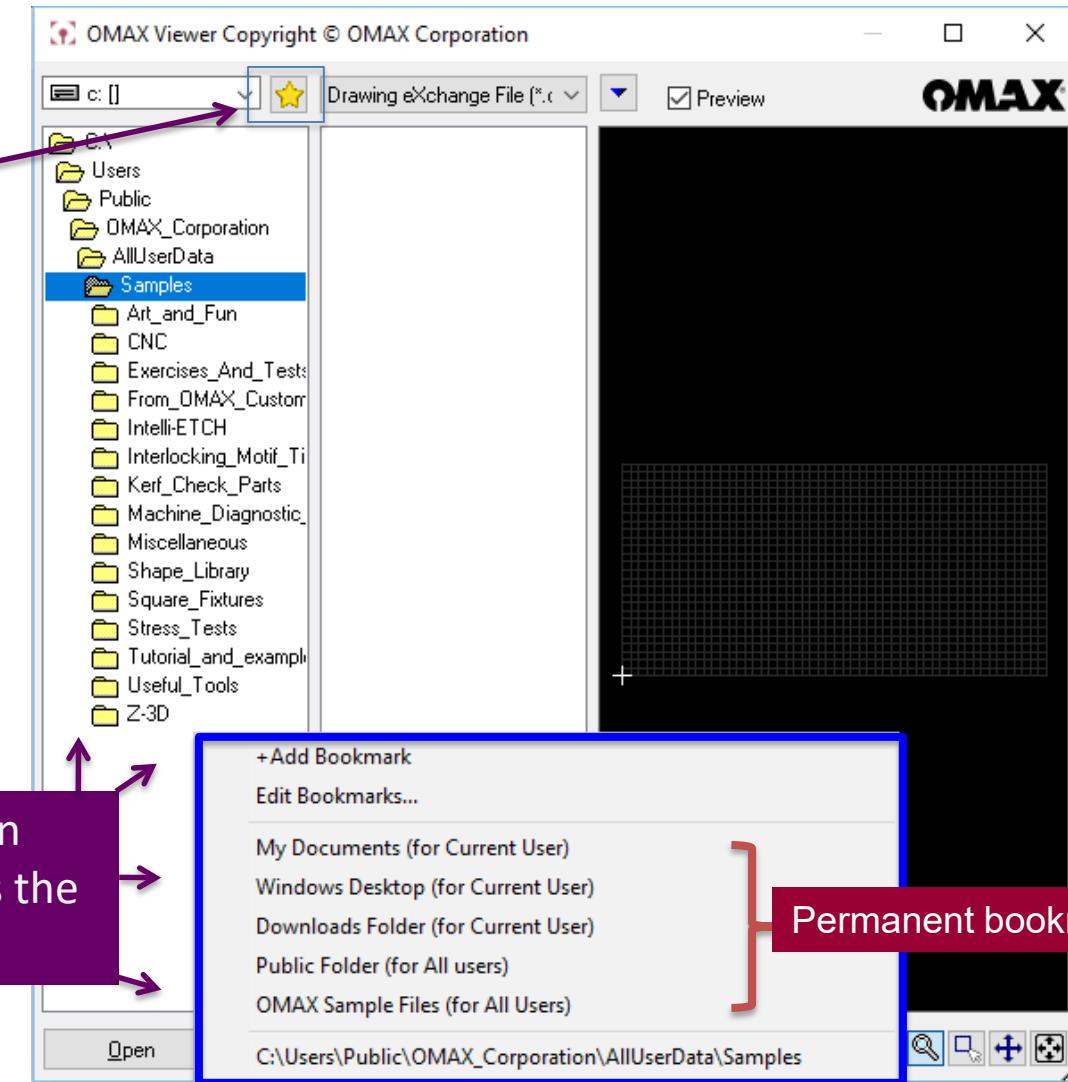
- Open an existing file in OMAX LAYOUT in Samples/Art\_and\_Fun.

# Step 1: Drawing Files



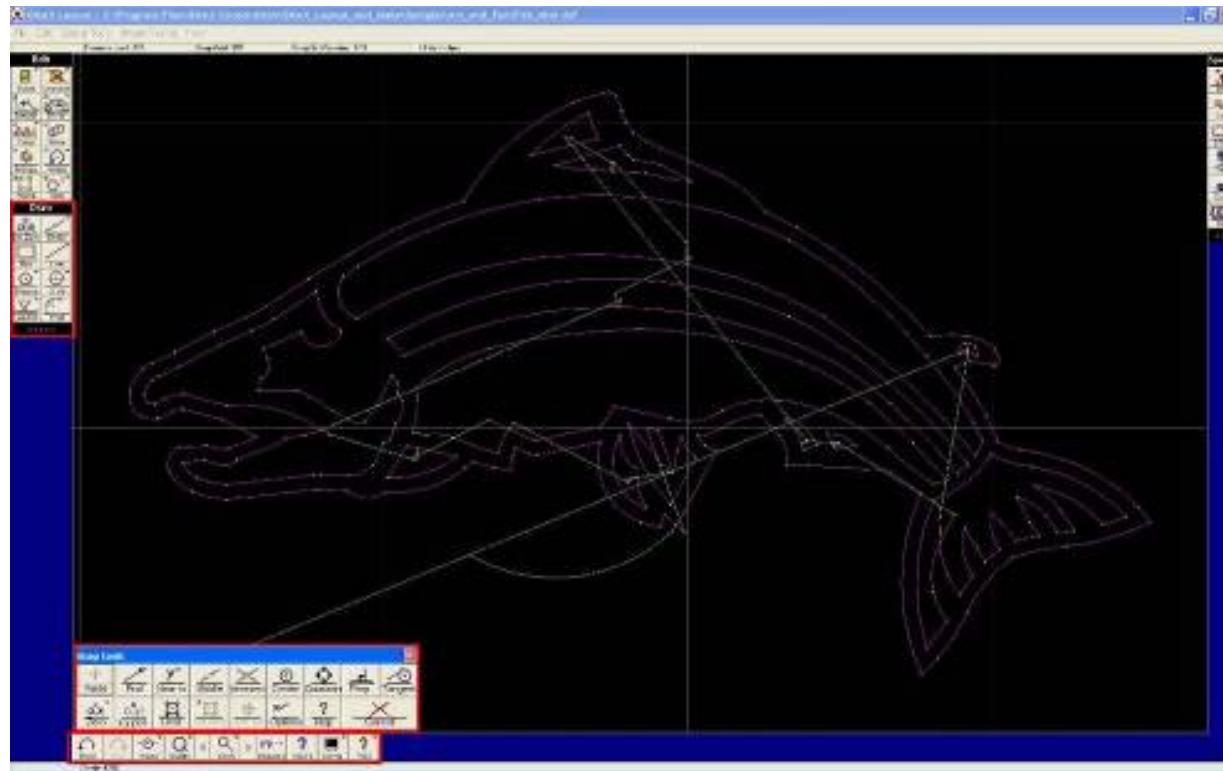
-OR-

Right-click anywhere in this column to displays the “Bookmark” page.



# Step 1: Drawing Files

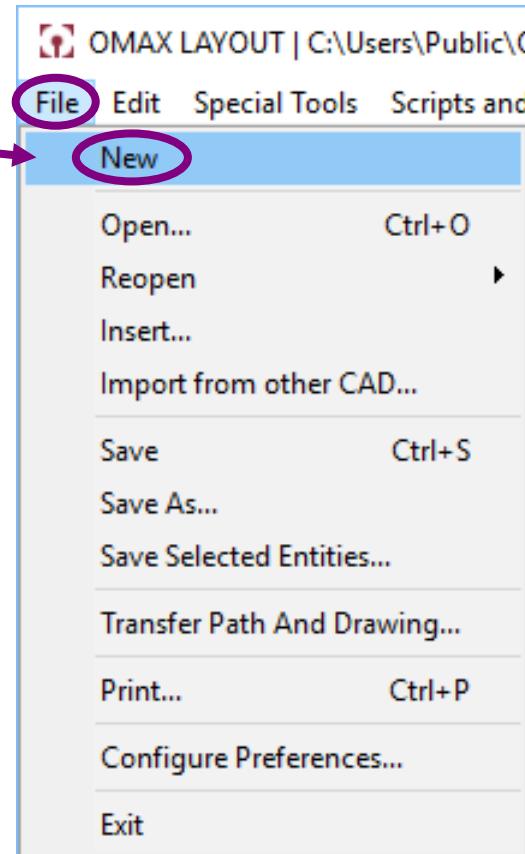
- The **LAYOUT** software provides sufficient tools to create and edit new and existing drawing files (DXF) if no other drawing program is available.



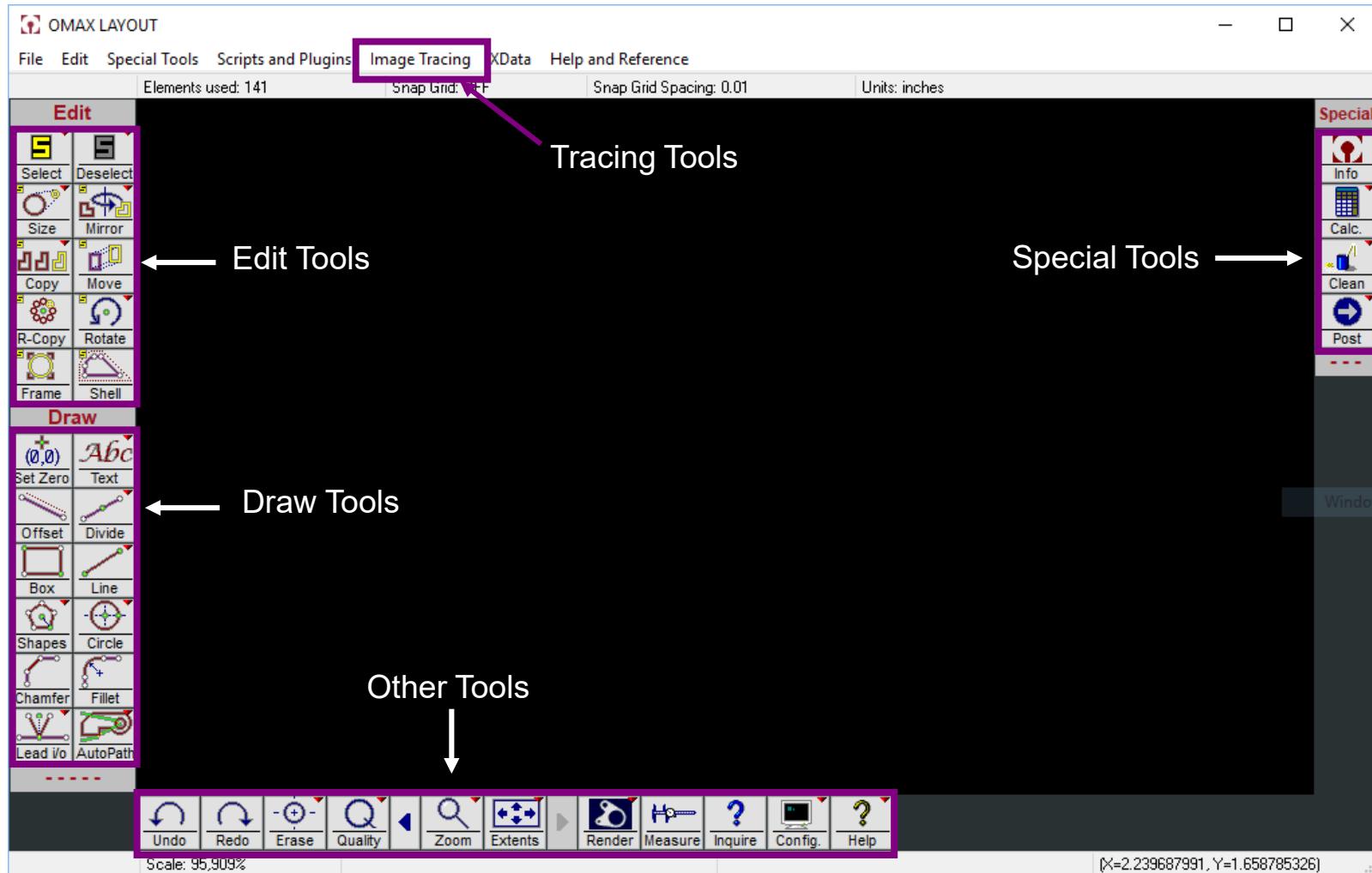
# Step 1: Drawing Files

To create a new drawing file

- Click **File**
- Click **New**



# Step 1: Drawing Files



# Step 1: Drawing Files

- Drawing Command Section Basics
  - Draw lines, arcs, and shapes
    - Freehand
    - Specify dimensions
  - Use Snap Tools
    - Securing end points
    - Specify connections
    - Completed entities

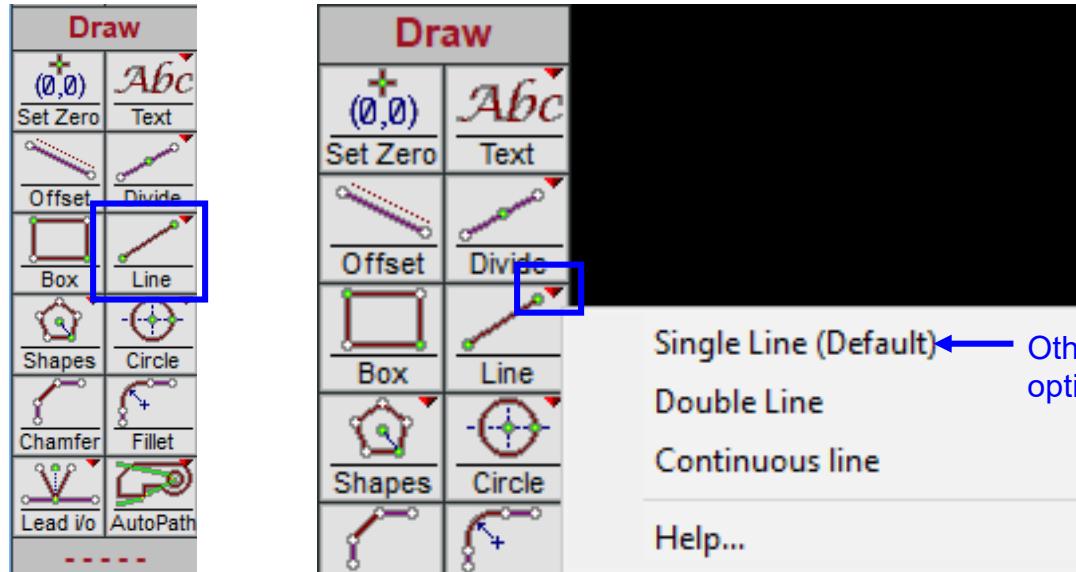
OIR – keyword “Draw”

# Step 1: Drawing Files

- Drawing Lines - Freehand
  - Click the Line Draw tool to activate it.
  - Move the pointer into the drawing area – note the pointer changes to +From.
  - Click the point in the drawing area you want to start drawing the line – note the pointer changes to +To.
  - Move the pointer to the point in the drawing area you want to draw the line to.
  - Click the destination point to terminate the line.

# Step 1: Drawing Files

- Click to active the *default Line tool*.
  - If there is a little **red** triangle in the drawing tool box, **Right-click** will display a list of other Line drawing tools.

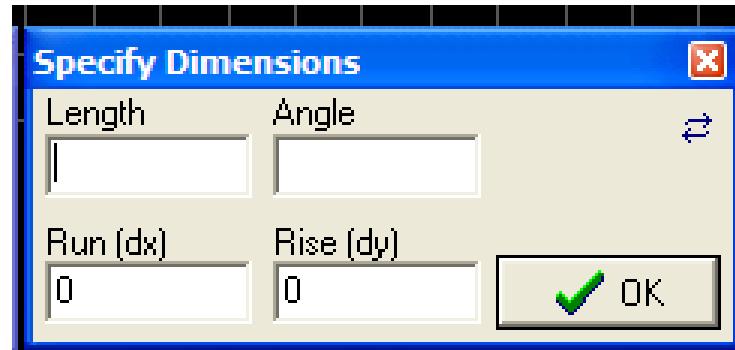


## Practice

Draw a *freeform line* using **LAYOUT**.

# Step 1: Drawing Files

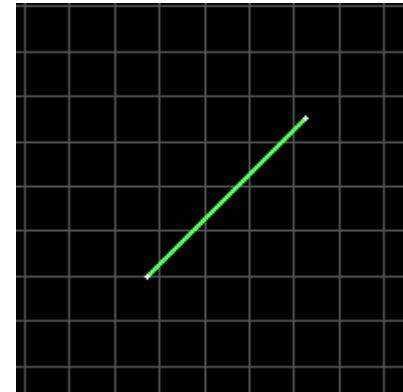
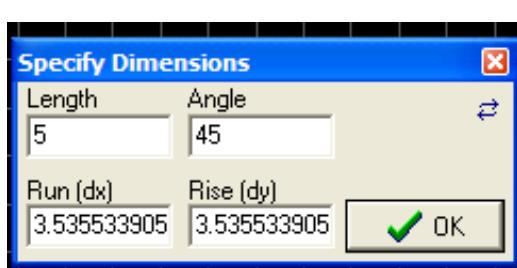
- Draw a line to a specified dimension.
  - Click the Line draw tool to activate it.
  - Move the pointer into the drawing area.
  - Click the point in the drawing area you want to start drawing the line.
    - *Note - a **Specify Dimensions** dialog box opens at the bottom of the drawing screen.*



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# Step 1: Drawing Files

- Press the **Tab** key or click to move your pointer to the length or angle space in the dialog box.
- Type in the desired length and/or angle.
- Press the **Enter** key (or click OK) to draw the line.



## Practice

*Draw a 5-inch line at a 45-degree angle using **LAYOUT**.*

# Step 1: Drawing Files

- Draw a line connected to another line using **Snap Tools**.
  - Click the Line draw tool to activate it.
  - Move the pointer into the drawing area.
    - Note - the **Snap tools** bar opens at the bottom of the drawing screen.



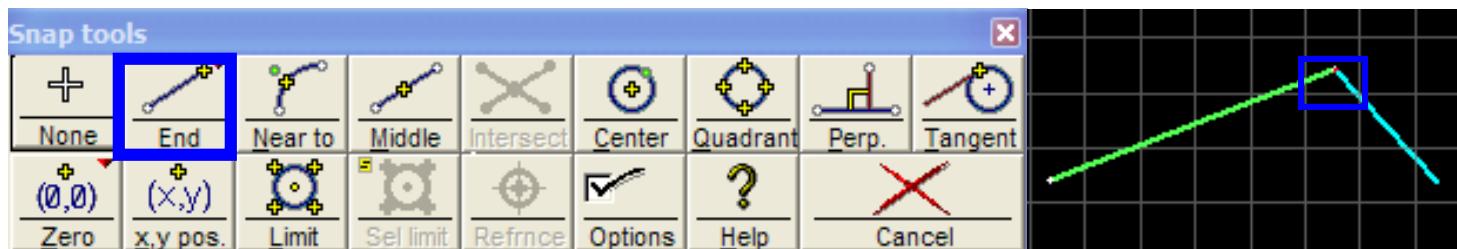
OIR – keyword “snap”

# Step 1: Drawing Files

- Click the applicable **Snap tool** to activate it.
- Move the pointer to the geometry you want to “snap to” and click it to begin drawing the line.
- Move your pointer to the end point of your line, or activate another **Snap tool** and click the geometry you want to terminate the line on.

## Practice

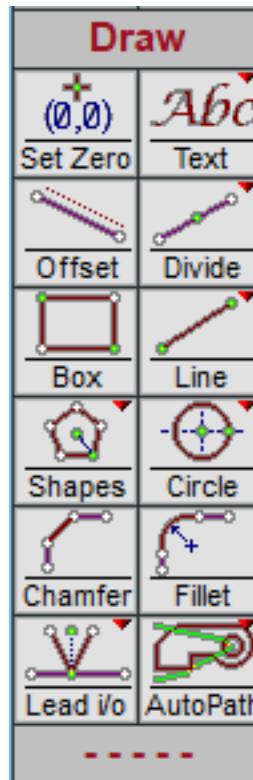
*Draw a 2<sup>nd</sup> line connected to the end of an existing entity.*



The new line is connected to the end point of the first line.

# Step 1: Drawing Files

- Other Drawing tools in LAYOUT
  - Circles
  - Box
  - Fillet
  - Shapes
  - Divide
  - Lead i/o
  - Set Zero



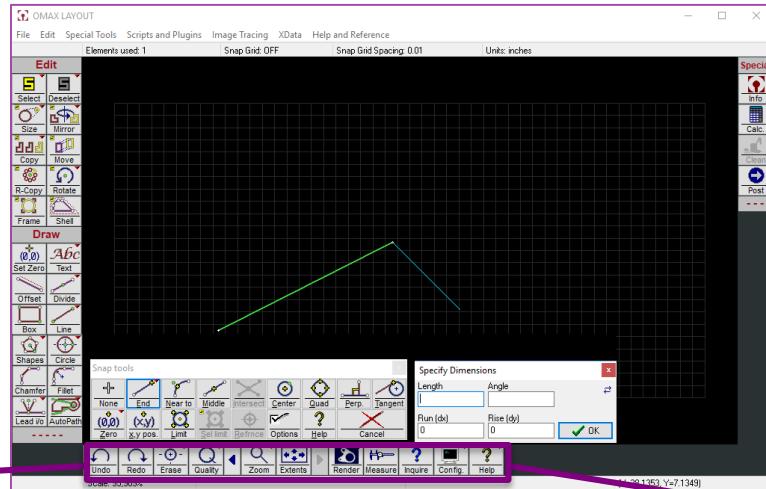
## Practice

- *Draw a box using the Box tool.*
- *Change the corners on the box to a radius using the Fillet tool.*
- *Draw a circle inside the box using the Circle tool.*

OIR – keyword “Draw commands”

# Step 1: Drawing Files

- Other helpful tools
  - Undo and Redo
  - Erase
  - Measure
  - Inquire



OIR – keywords “undo, redo, measure, inquire”

# Step 1: Drawing Files

- Undo and Redo
  - “Undoes” or cancels the last action. Redo recreates the last action.
- Erase
  - Allows you to erase entities
- Measure
  - Measures the straight-line distance between two points
- Inquire
  - Provides information about an entity, and allows some changes to be made in an entity

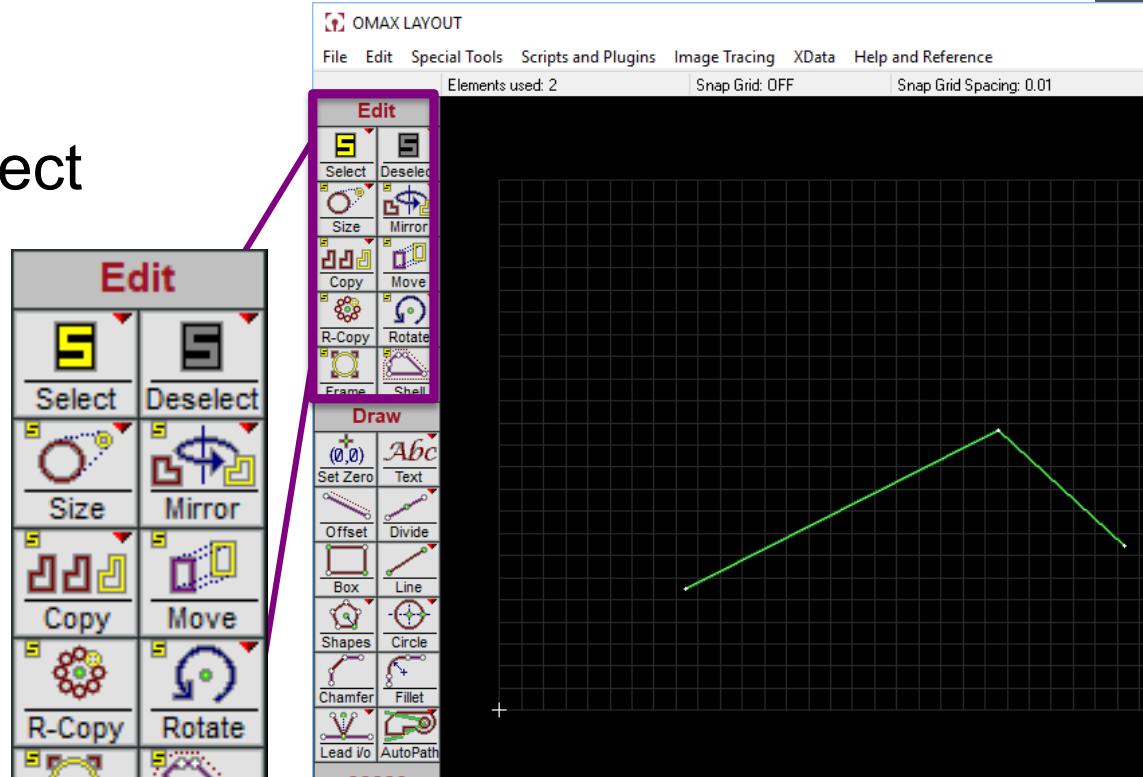


## Practice

*Draw some geometry and try out each of the tools.*

# Step 1: Drawing Files

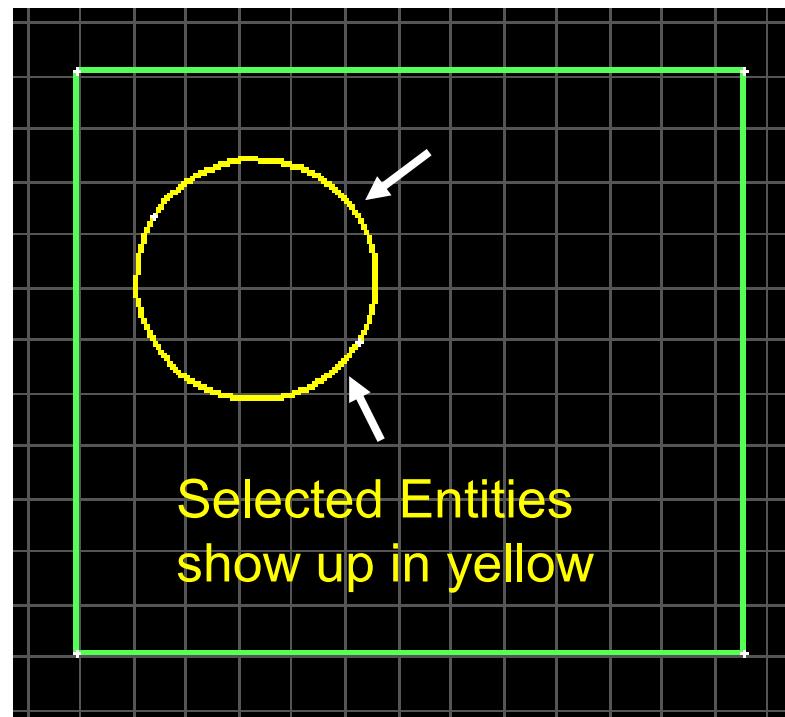
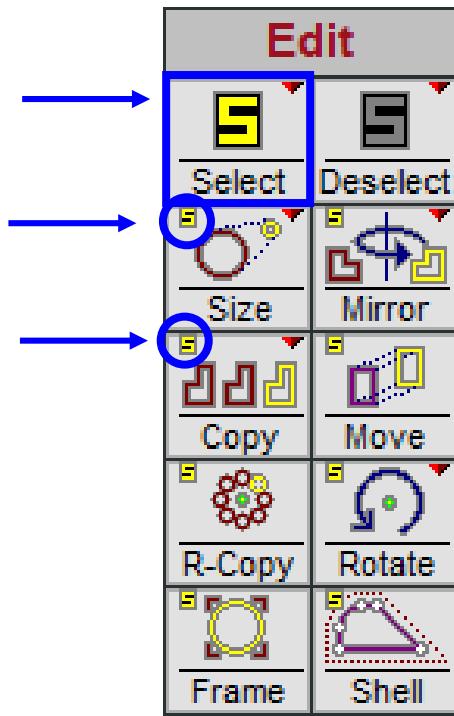
- Editing Tools
  - Select/Deselect
  - Size
  - Mirror
  - Copy
  - Move
  - Rotate Copy
  - Rotate
  - Frame
  - Shell



OIR – keyword “edit commands”

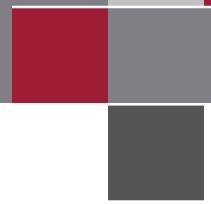
# Step 1: Drawing Files

- **Select** means to highlight specific entities within the drawing using the **Select** editing tool.



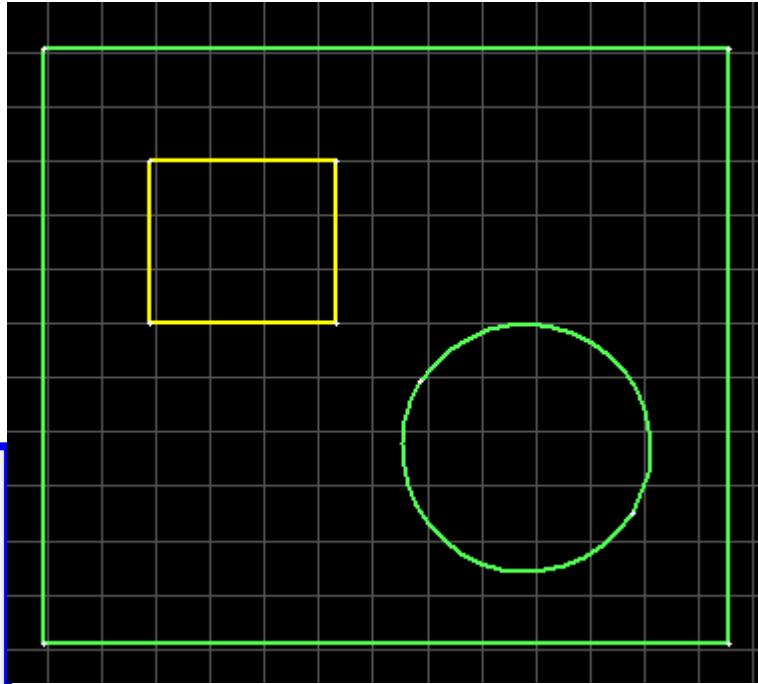
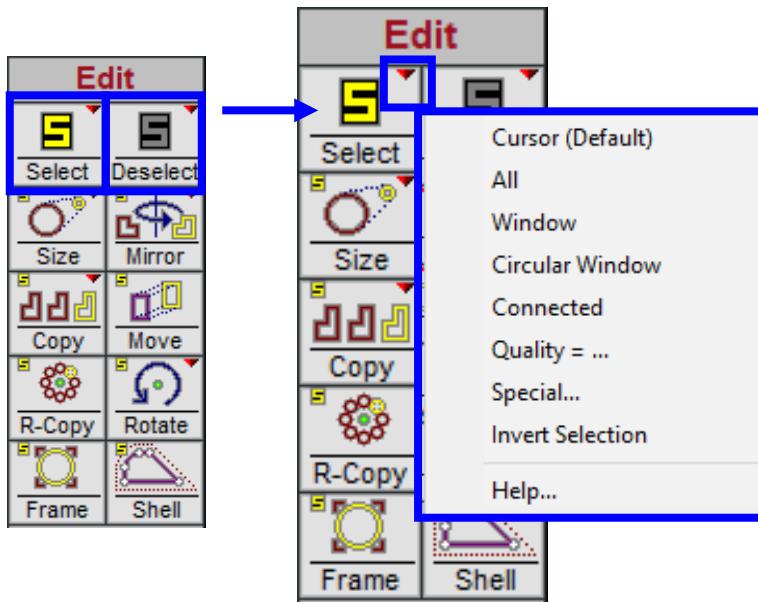
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# Step 1: Drawing Files



## Practice

- Use the Select and Deselect default tools.
- View the Select and Deselect tool options.



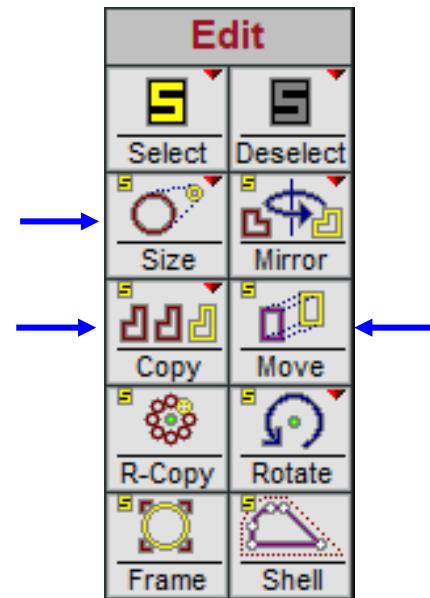
OIR – keywords “select, deselect”

# Step 1: Drawing Files

- **Edit Tools**
  - **Copy** – creates one or more copies of selected entities
  - **Move** – moves selected entities to a different location
  - **Size** – changes the size of selected entities

## Practice

- *Draw a box with a circle and smaller box inside the box.*
- *Use the **Copy** command to make a small box inside the bigger box.*
- *Use the **Move** command to move the circle outside the box.*
- *Use the **Size** command to make the circle  $\frac{1}{2}$  the original size.*



OIR – keywords “edit commands, copy, move, size”

# Step 1: Drawing Files

## Importing files from other CAD systems

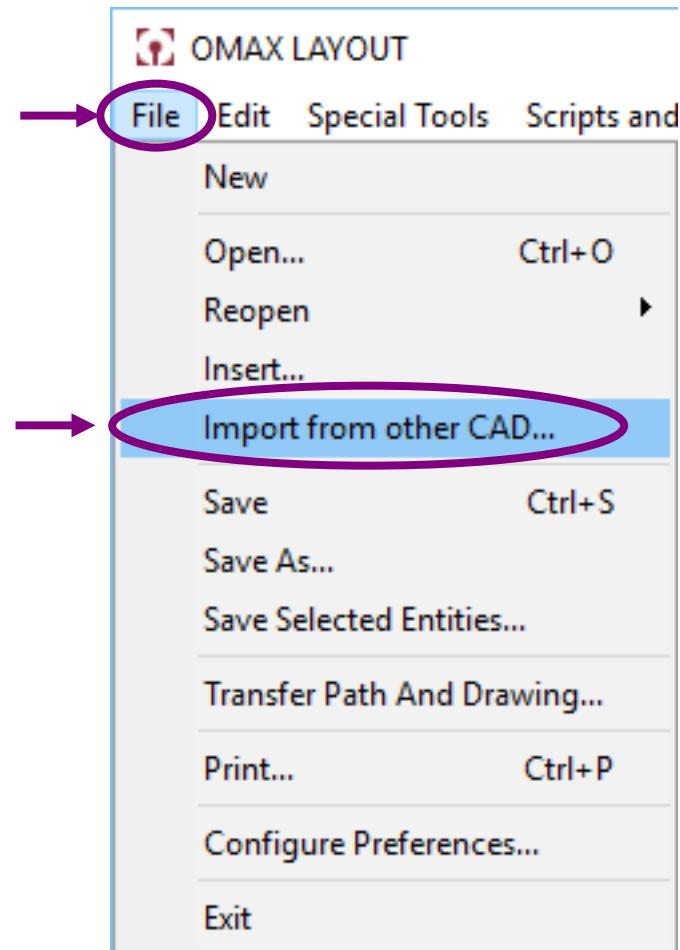
- *Importing* refers to bringing a drawing into OMAX **LAYOUT** that was created in another CAD program.
- There are a number of file types that can be imported into **LAYOUT** including .dxf, .dwg, .dwf, .igs and many other types.
- The Import tool in OMAX **LAYOUT** runs files created in other CAD systems through filters prior to opening as a .DXF in **LAYOUT**.

OIR – keyword “import”

# Step 1: Drawing Files

## How to import a file

- In **LAYOUT**, click **File**, then click **Import from Other CAD**.
- Select the file you want to import.
  - This opens the **Import file from other CAD** window



OIR – keyword “import”

# Step 1: Drawing Files

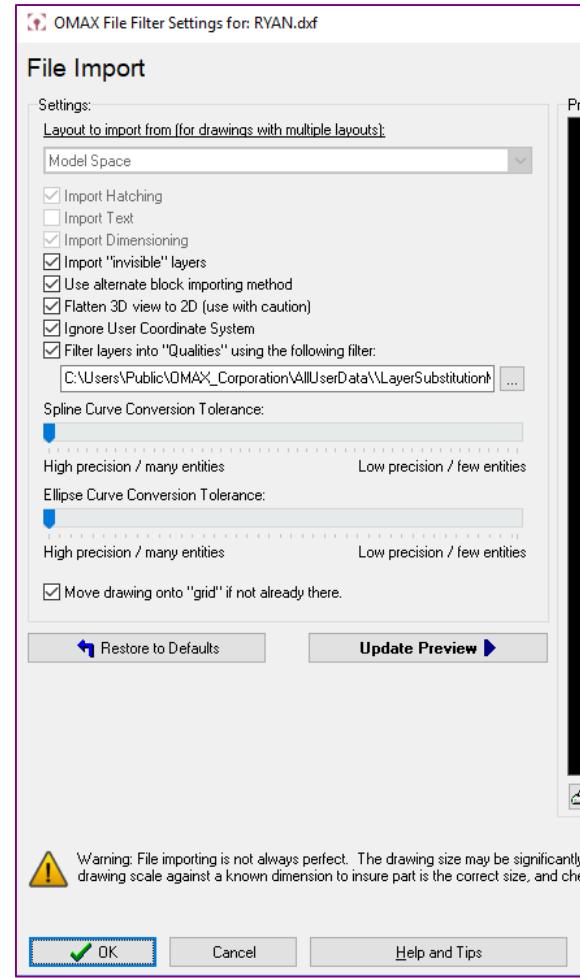
## Import dialog box

- Filter choices
- Advanced filter options
- Drawing settings
- Drawing preview window

Have a file that won't import?

Send to:

[techsupport@omax.com](mailto:techsupport@omax.com)



OIR – keyword “import”

# Step 1: Drawing Files

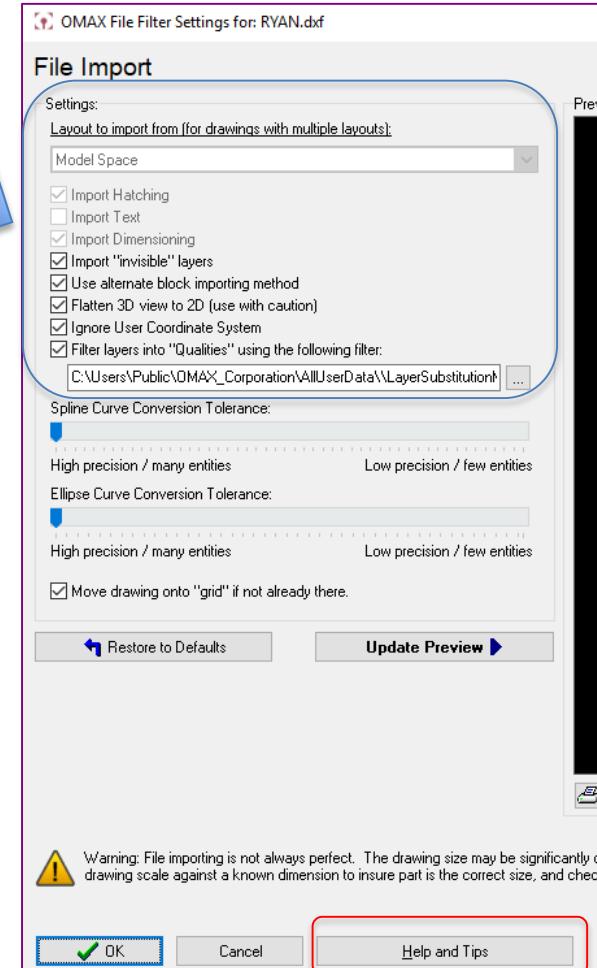
Want to know what all the **Settings** options do?

Click **Help and Tips**

OIR – keyword “import”

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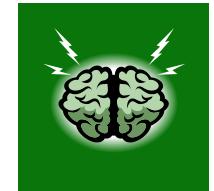
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# Step 1: Drawing Files

## Step 1 Review

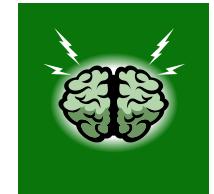
1. What are the three ways to get a drawing file into **LAYOUT?** (fill in the blanks)
  - a. Open an \_\_\_\_\_ drawing file that is already saved in the system.
  - b. Create a \_\_\_\_\_ drawing using **LAYOUT CAD** drawing tools.
  - c. \_\_\_\_\_ a drawing into **LAYOUT** from another CAD system.



# Step 1: Drawing Files

1. How do you know when you need to use the **Select** tool for editing your drawing?
2. Where would you look to find a list of file types that can be imported into **LAYOUT**?
3. List 3 file types that can be imported that were not in these slides.

- 
- 
- 



# Steps in Making Parts

## • Intelli-MAX LAYOUT

**Step 1:** Obtain/create a Drawing File (DXF file).

**Step 2:** Assign machining Qualities (edge finish).

**Step 3:** Clean the drawing.

**Step 4:** Add Path elements to the drawing & save it.

**Step 5:** Create the Machine Tool Path file (ORD/OMX).



## • Intelli-MAX MAKE

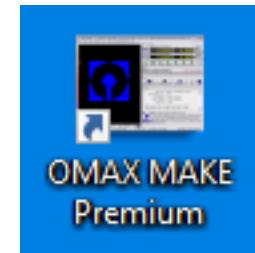
**Step 6:** Start up the machine.

**Step 7:** Configure Machine Settings.

**Step 8:** Open and configure the ORD/OMX file.

**Step 9:** Load and clamp the material.

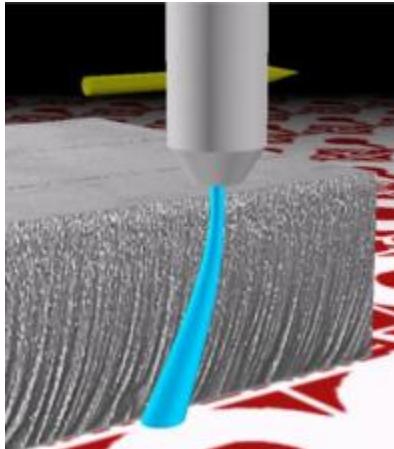
**Step 10:** Begin machining and cut the part.



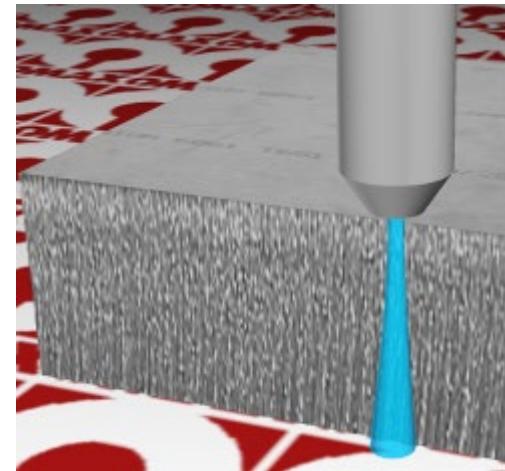
# Step 2: Assign Quality (edge finish)

## Assign Cut Qualities

- Machining Qualities tell the nozzle how fast or how slow to move to achieve a certain part edge finish.



Faster – rougher part edge



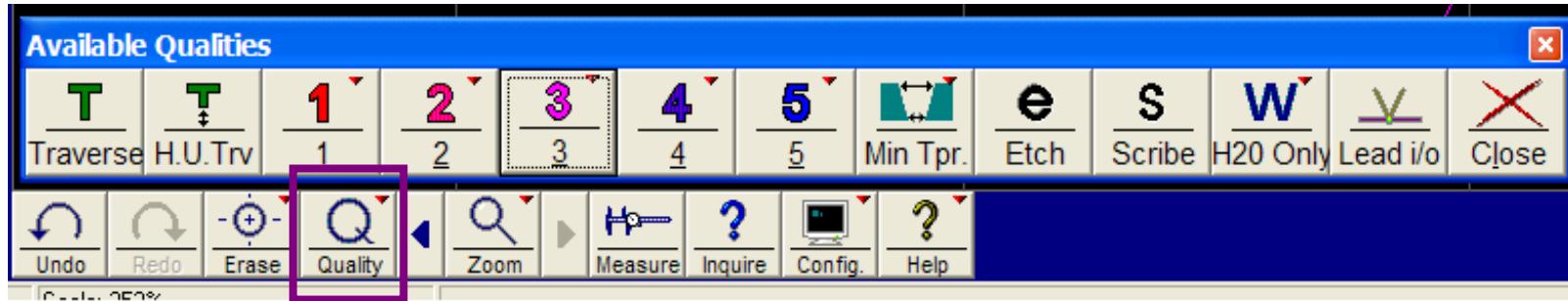
Slower – smoother part edge

OIR – keyword “Quality”

# Step 2: Assign Quality (edge finish)

## Available Qualities tool bar

- Click the Q (Quality) icon to activate the **Available Qualities** tool bar, or right-click to see more options.

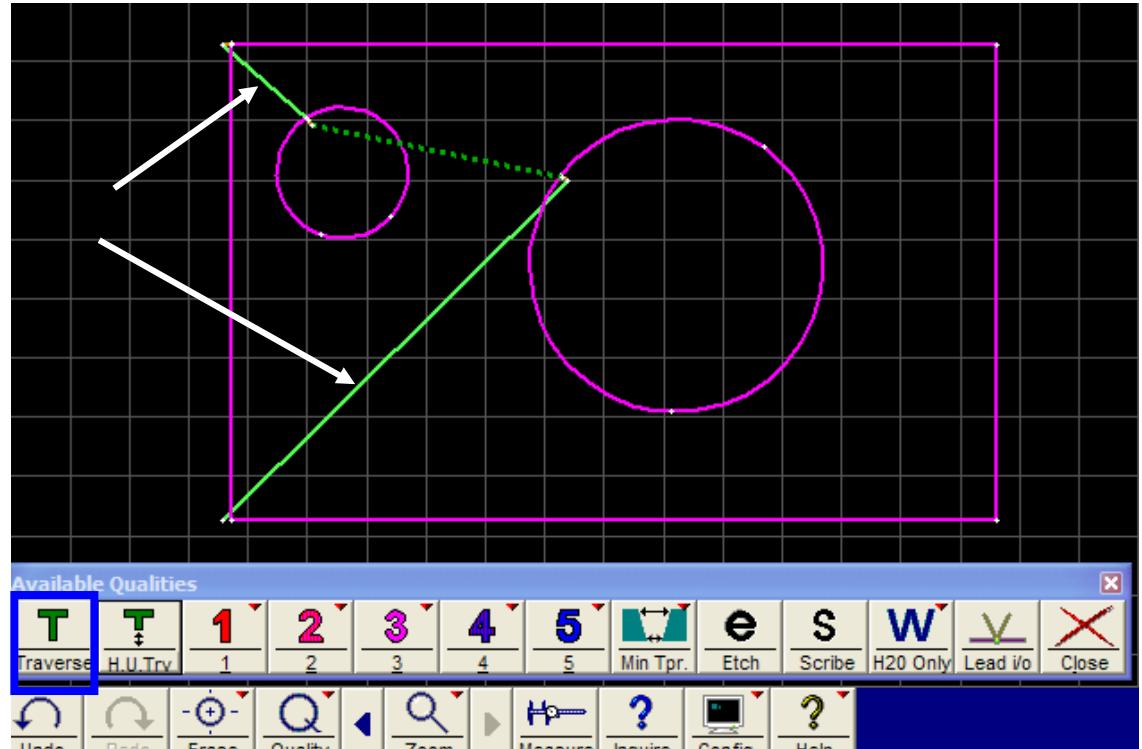


OIR – keyword “Quality”

# Step 2: Assign Quality (edge finish)

## Traverse

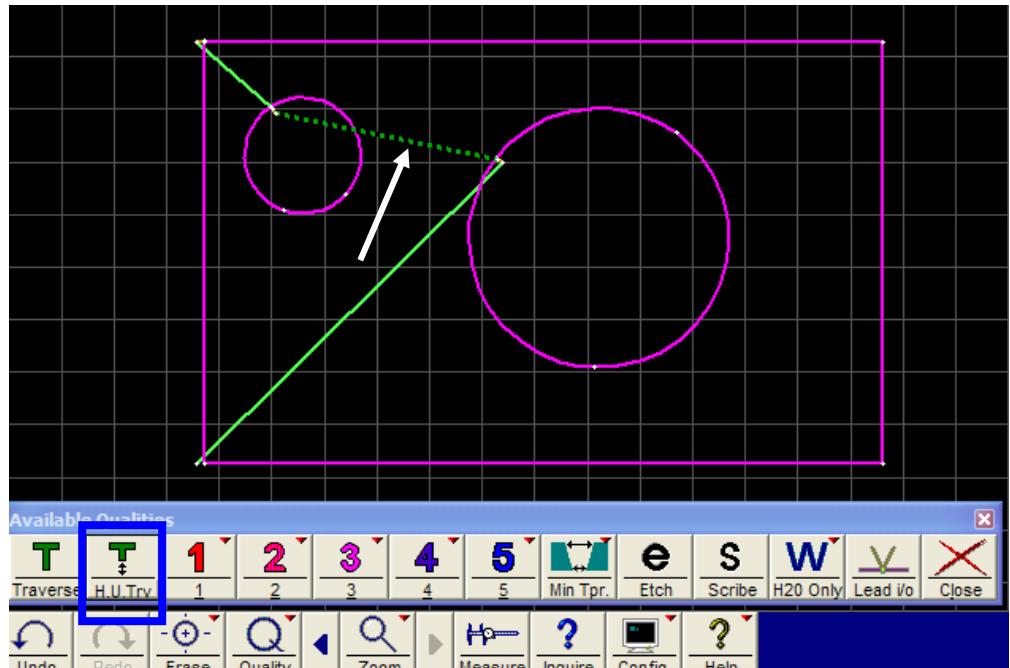
- Solid green line
- Moves the nozzle without cutting
- Part of the nozzle travel path



# Step 2: Assign Quality (edge finish)

## Heads-up Traverse

- Dotted green line
- Commands the nozzle to raise first, then move without cutting to the next point, then lower
- Used to avoid nozzle collisions

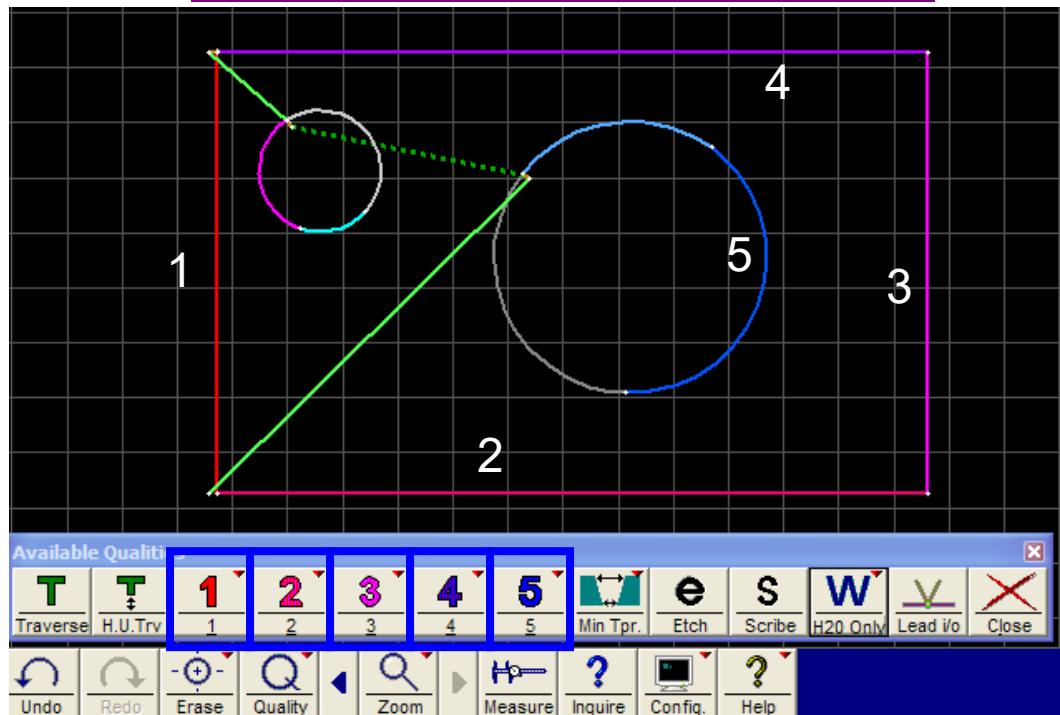


# Step 2: Assign Quality (edge finish)

## Qualities 1-5

- Different colors for different qualities
- Number and color on the toolbar correspond to colored entities in the part
- Higher number tells nozzle to go slower, lower number tells it go faster

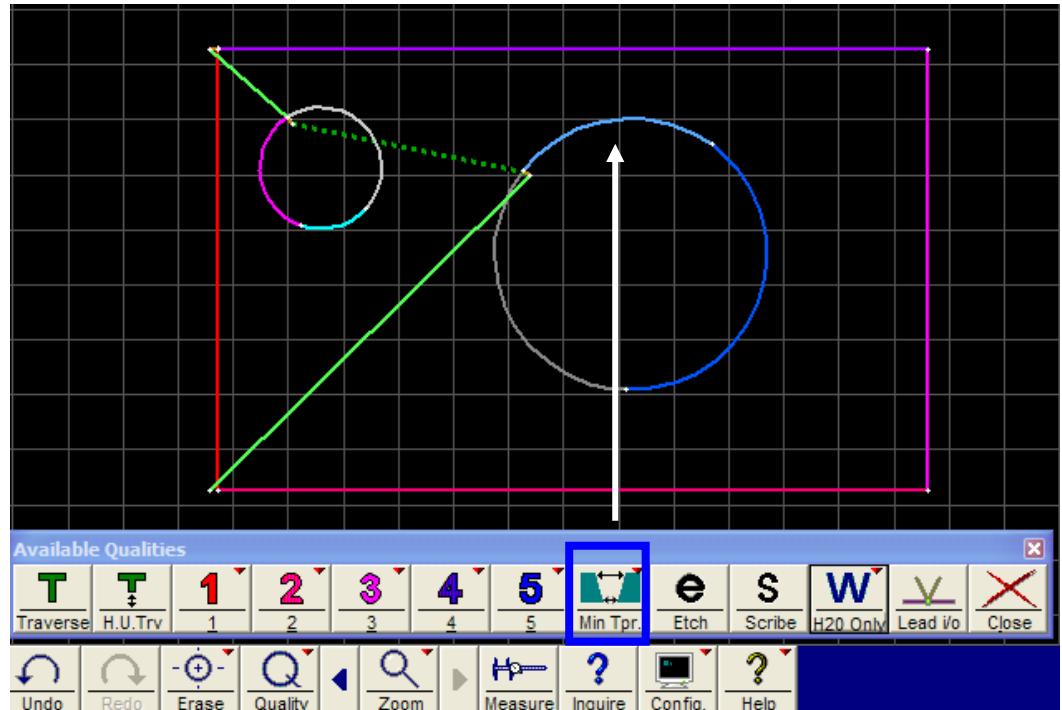
Higher number = smoother finish  
Lower number = rougher finish



# Step 2: Assign Quality (edge finish)

## Minimum Taper

- Moves even slower than a Q5
- Used when you want to minimize taper and you don't have a Tilt-A-Jet

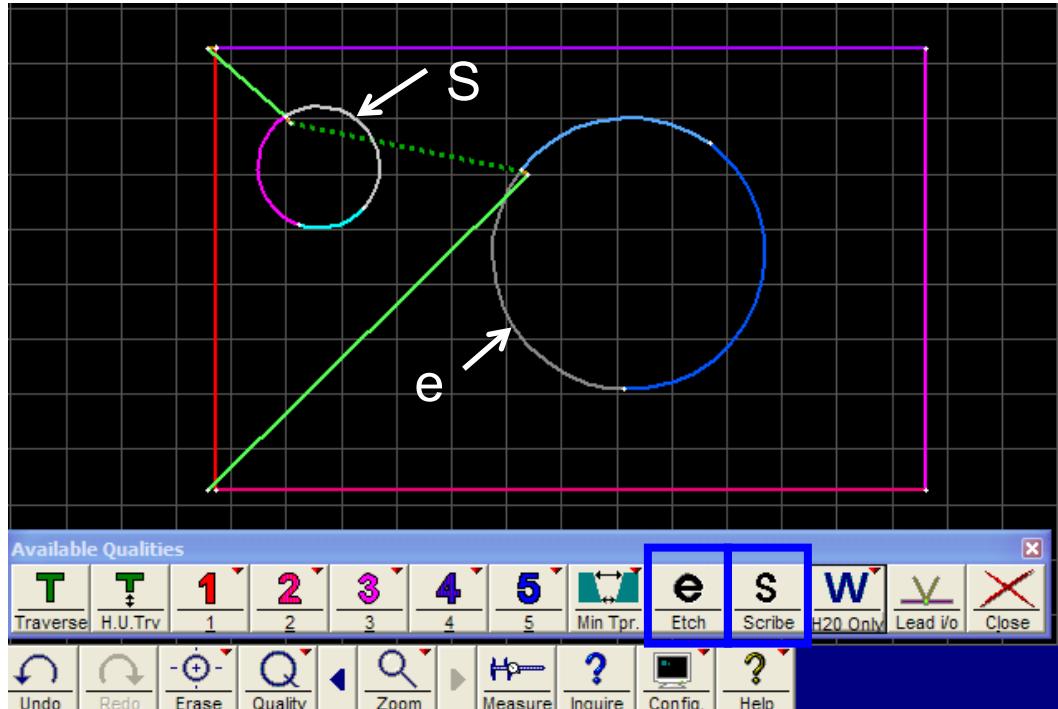


**Caution!** increases cutting time significantly.

# Step 2: Assign Quality (edge finish)

## Etch and Scribe

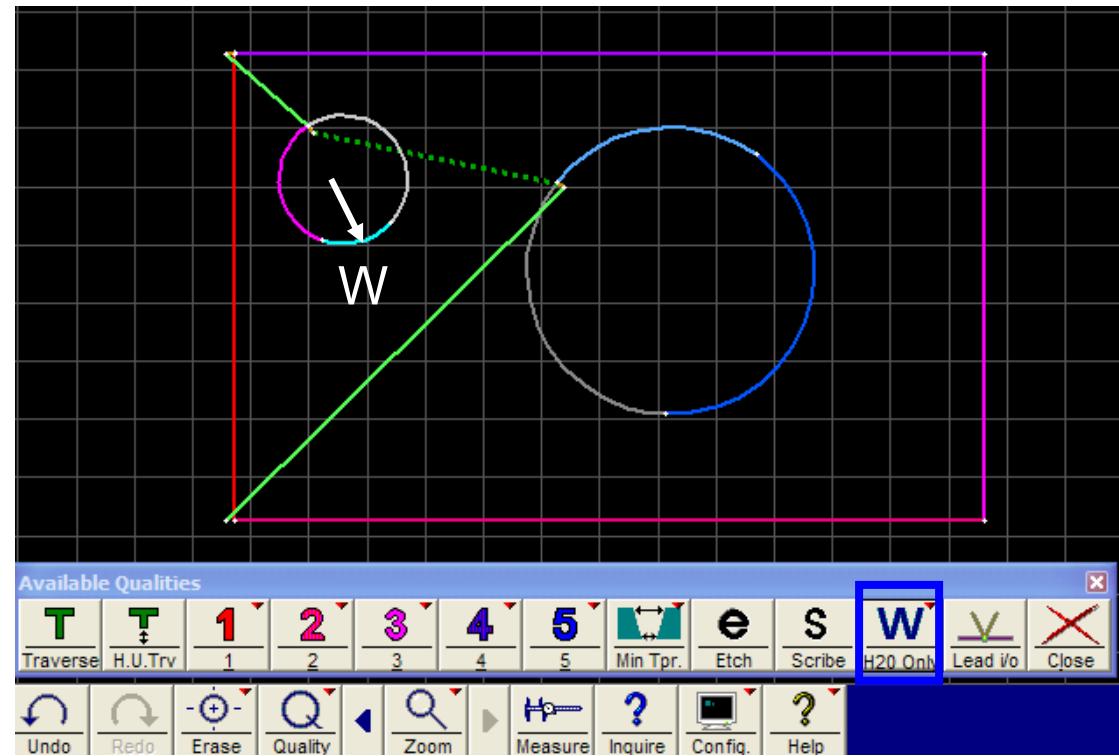
- Move faster than **Q1**
- Specify inches per minute in **MAKE** to determine depth of cut
- **Etch** uses abrasive, **Scribe** only uses water
- Etch and Scribe do not use a tool offset



# Step 2: Assign Quality (edge finish)

## Water Only

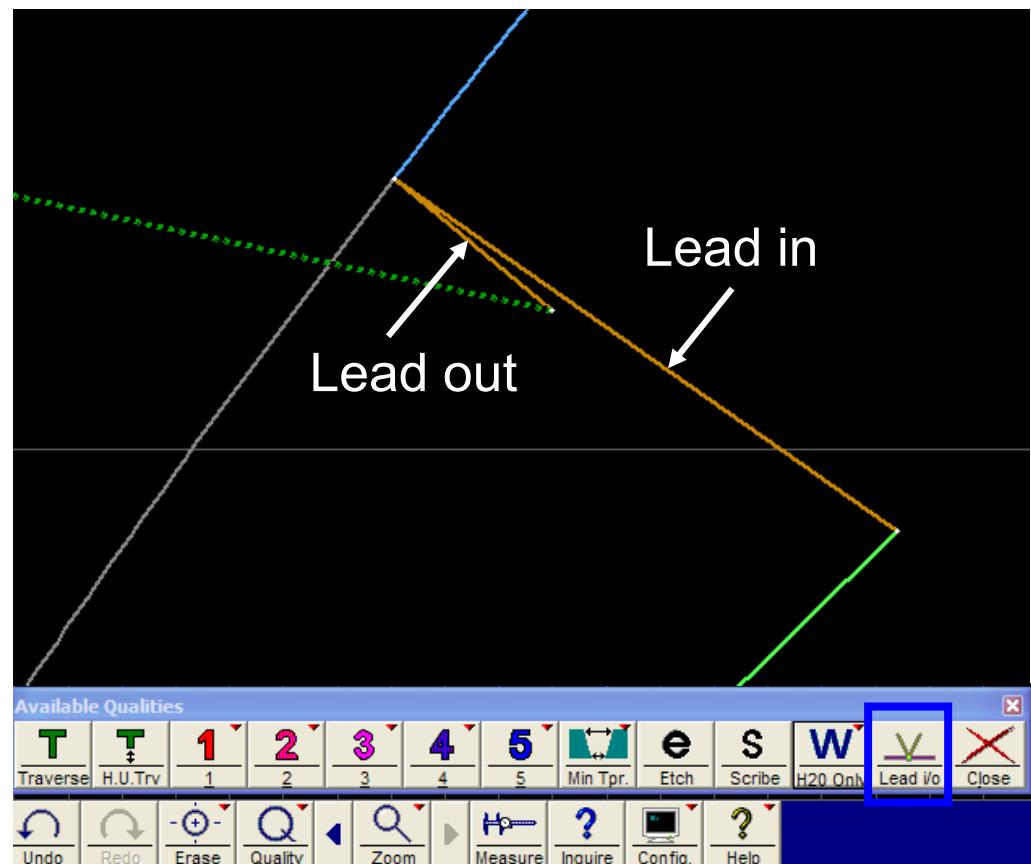
- Used in cutting softer materials that can be pierced using only a high-pressure water such as sponge or foam.
- Use a water-only nozzle to get a better cut.



# Step 2: Assign Quality (edge finish)

## Lead ins and Lead outs (brown)

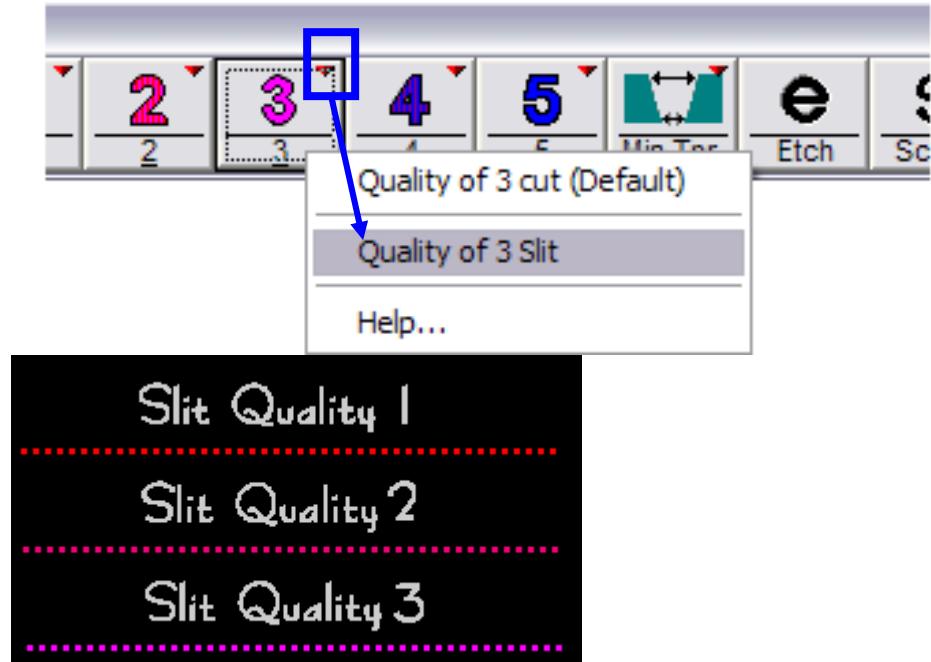
- Lead ins (usually drawn longer) use water and abrasive to pierce the material leading into the cutting process.
- Lead outs (usually drawn shorter) allow the jet stream to catch up and finish the cut before turning off abrasive and water.



# Step 2: Assign Quality (edge finish)

## Slit Quality

- There is no tool offset applied to cutting these lines (the nozzle travels down the center of the line).
- Right-click to access the slit quality.
- Displayed as dotted or dashed lines.
- Used for common line cutting.

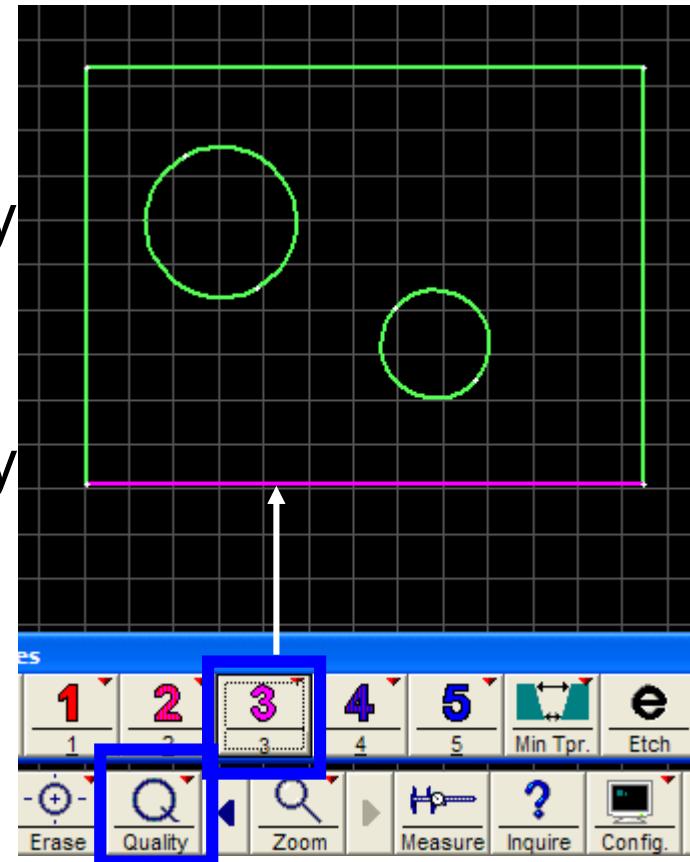


OIR – keyword “slit”

# Step 2: Assign Quality (edge finish)

## How to assign a Quality

- Open a drawing in **LAYOUT**.
- Click to activate the Quality toolbar (or you can right-click for more options).
- Click the machining Quality icon.
- Click the entity to assign the Quality selected.

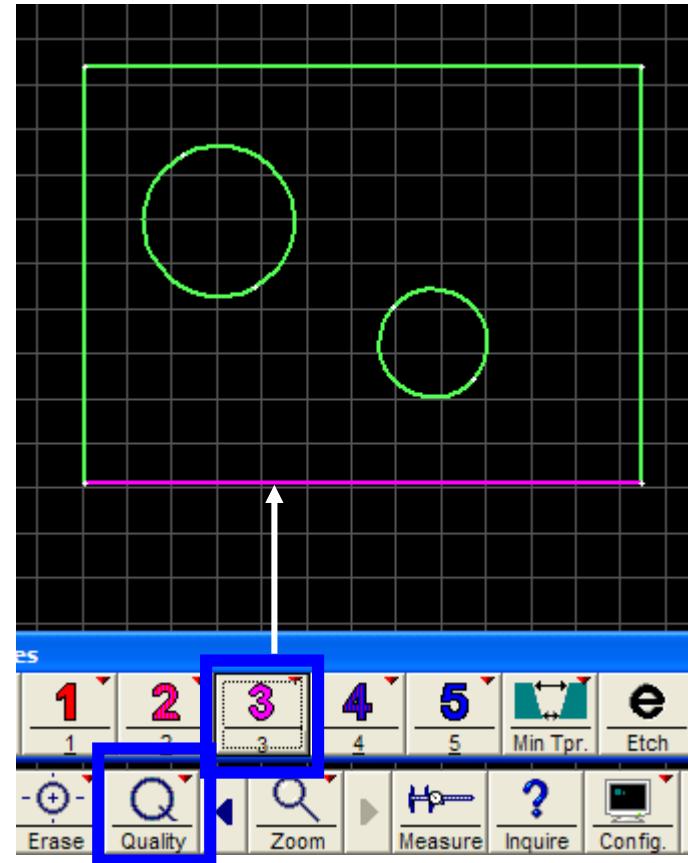


OIR – keyword “quality”

# Step 2: Assign Quality (edge finish)

## Assigning a Quality Practice

- *Draw a box with 2 circles in it using the drawing tools.*
- *Assign each entity a different cut quality using the Quality tools.*



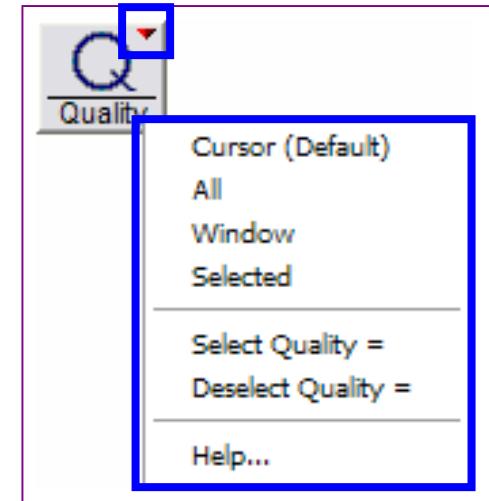
# Step 2: Assign Quality (edge finish)

## Other methods to assign a Quality

- Other options (right-click the Quality tool) OR,
- Use keyboard shortcuts such as
  - **Q** for Quality (then type the applicable quality number you want – e.g. Q3 for quality 3)
  - **QA** for Quality All
  - **QW** for Quality Window

## Practice

- *Assign machining qualities using other options.*



# Step 2: Assign Quality (edge finish)

## Review

1. What does the **Quality** tool in **LAYOUT** allow you to do?
  - a. Assign machining qualities to entities in the drawing.
  - b. Assign part accuracies to entities in the drawing.
  - c. Make the drawing look more colorful.
  - d. None of the above.
  
2. A Quality of 1 results in
  - a. A very smooth edge finish on the part.
  - b. A medium smooth edge finish on the part.
  - c. A very rough edge finish on the part.
  - d. Nothing – it doesn't affect edge finish on the part.



# Activities to try on your own

1. Install Intelli-MAX Premium on a computer.
  - a) Call or Email the trainer with the yellow registration code to obtain a password ([training@omax.com](mailto:training@omax.com)).
  - b) Register the software on the computer.
2. Watch the video “How to Make a Part.”
3. Create a new drawing using OMAX **LAYOUT**.
4. Assign two or more machining qualities to the drawing you created using the Quality tools.
5. Use the Select, Deselect, and a couple of the other editing tools such as Copy or Move to make changes to your drawing.



# Activities to try on your own

6. Save your drawing as a DXF file and email it as an attachment to your trainer before the next scheduled session.
7. Look up the keyboard shortcut for drawing a circle.
8. Email or call your trainer with any questions.
  - Email: \_\_\_\_\_
  - Phone: \_\_\_\_\_





# OMAX Operator Training

## Session 2

# Session Topics

- Session 2
  - Welcome back
  - Session objectives
  - Review and questions from Session 1
  - OMAX LAYOUT Software continued
  - Wrap up Session 2

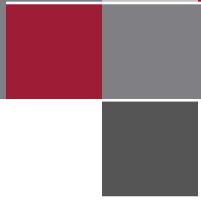
# Session 1 Review



- **Session 1 Activities**

- ✓ Install and register the Intelli-MAX Software.
- ✓ Create a new drawing in **LAYOUT**.
- ✓ Assign machining qualities to the drawing in **LAYOUT**.
- ✓ Experiment with the editing tools.
- ✓ Save the DXF file.
- ✓ Email the file to your trainer.
- ✓ Look up shortcut key for circle.

# Steps in Making Parts



- ## Intelli-MAX LAYOUT

**Step 1:** Obtain/create a Drawing File (DXF file).

**Step 2:** Assign machining Qualities (edge finish).

**Step 3: Clean the drawing.**

**Step 4:** Add Path elements to the drawing & save it.

**Step 5:** Create the Machine Tool Path file (ORD/OMX).



- ## Intelli-MAX MAKE

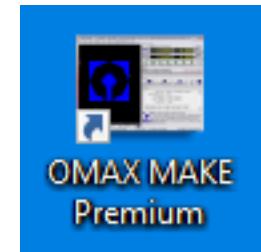
**Step 6:** Start up the machine.

**Step 7:** Configure Machine Settings.

**Step 8:** Open and configure the ORD/OMX file.

**Step 9:** Load and clamp the material.

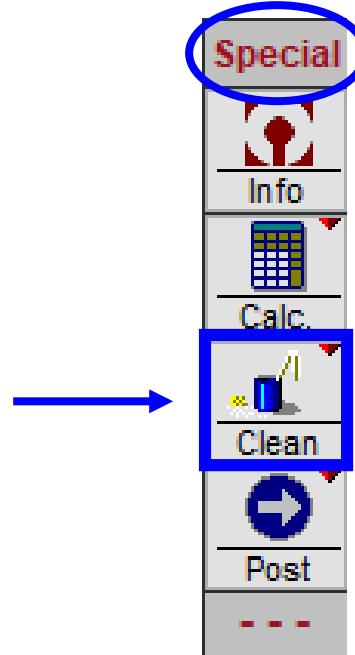
**Step 10:** Begin machining and cut the part.



# Step 3: Clean the Drawing

## Clean the Drawing

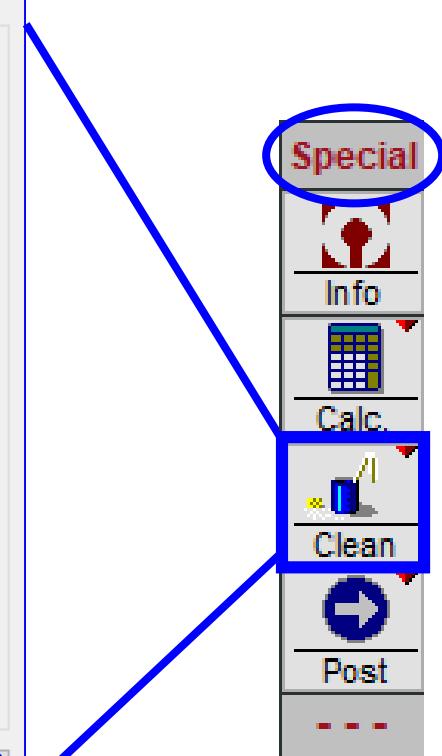
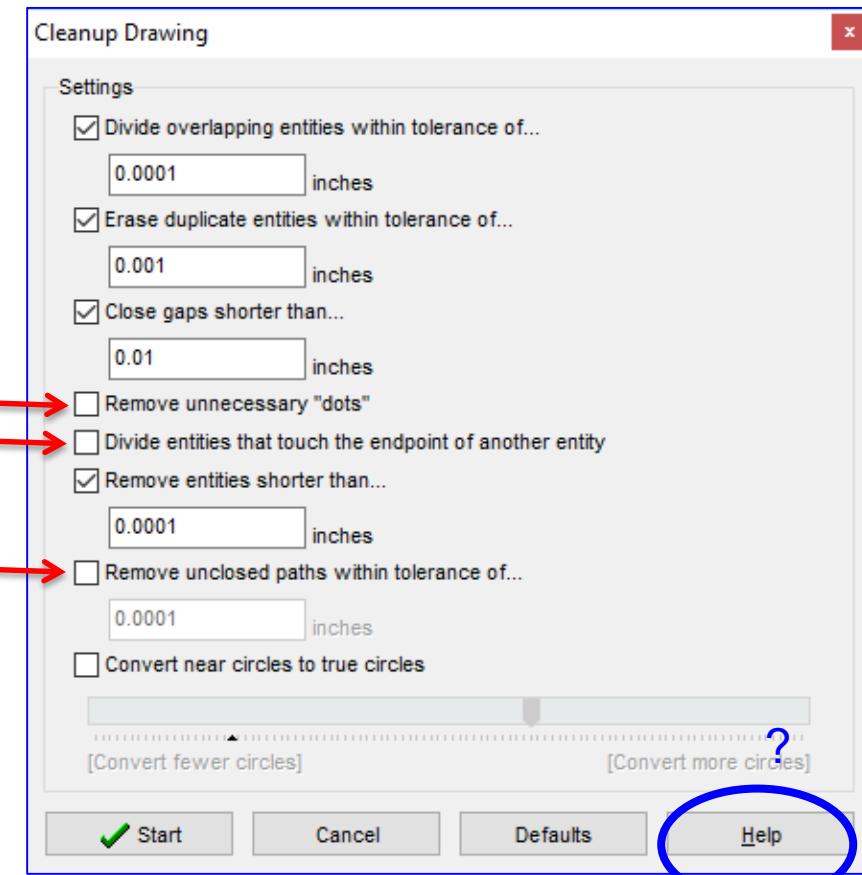
- Run the **Clean** tool on the DXF file.
- Fixes problems that are hard to find
  - Duplicate entities
  - “Garbage” entities
  - Gaps
  - Extra “dots”



# Step 3: Clean the Drawing

- **Clean Tool Options**

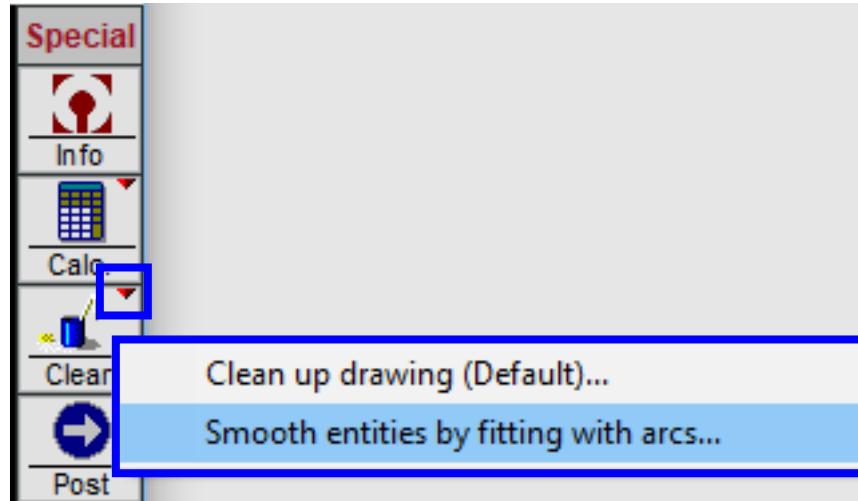
Leave  
unchecked  
unless you  
are sure you  
want these  
cleaned.



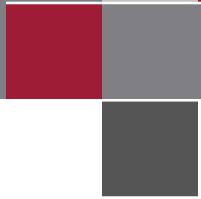
# Step 3: Clean the Drawing

## Practice

- Run the **Clean** tool on an imported file and review results.
- Open a DXF file and create a small gap in an entity, and draw a line over an existing line. Run the **Clean** tool and review results.



# Steps in Making Parts



## • Intelli-MAX LAYOUT

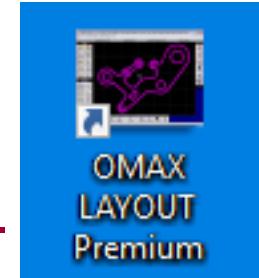
**Step 1:** Obtain/create a Drawing File (DXF file).

**Step 2:** Assign machining Qualities (edge finish).

**Step 3:** Clean the drawing.

**Step 4:** Add Path elements to the drawing & save it.

**Step 5:** Create the Machine Tool Path file (OR/OMX).



## • Intelli-MAX MAKE

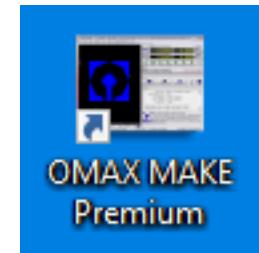
**Step 6:** Start up the machine.

**Step 7:** Configure Machine Settings.

**Step 8:** Open and configure the ORD/OMX file.

**Step 9:** Load and clamp the material.

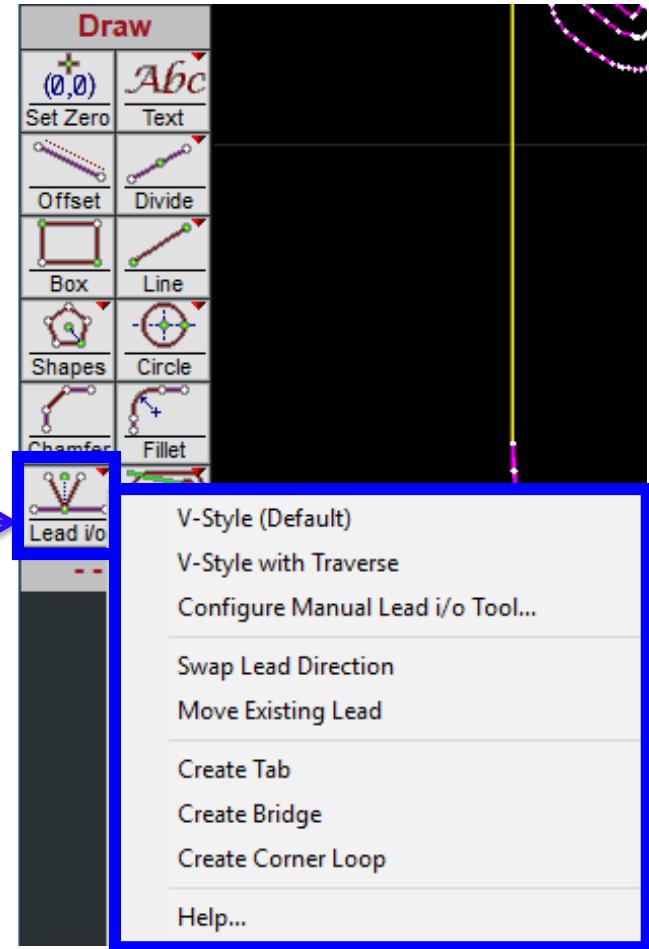
**Step 10:** Begin machining and cut the part.



# Step 4: Add Path Elements to the Drawing

## Path Elements

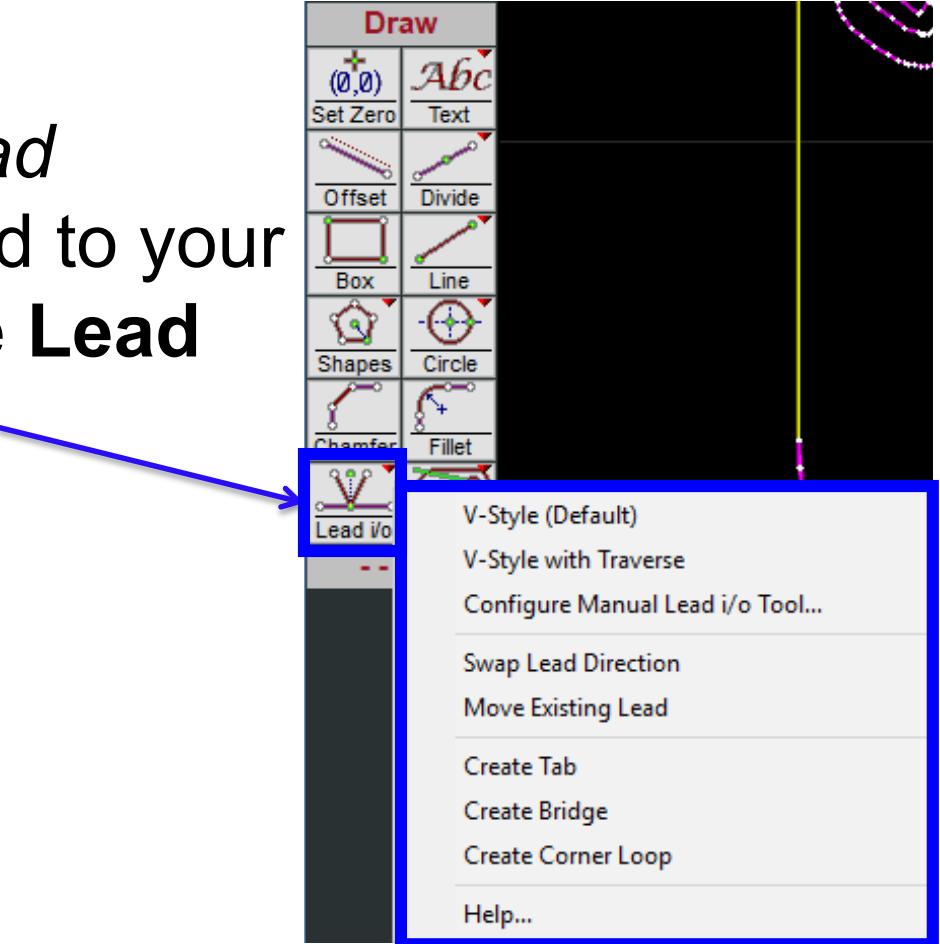
- The nozzle travel path consists of 3 elements
  - Geometry of your part
  - Traverses
  - Lead ins and Lead outs (pierce and exit points)



OIR – keywords “lead i/o”

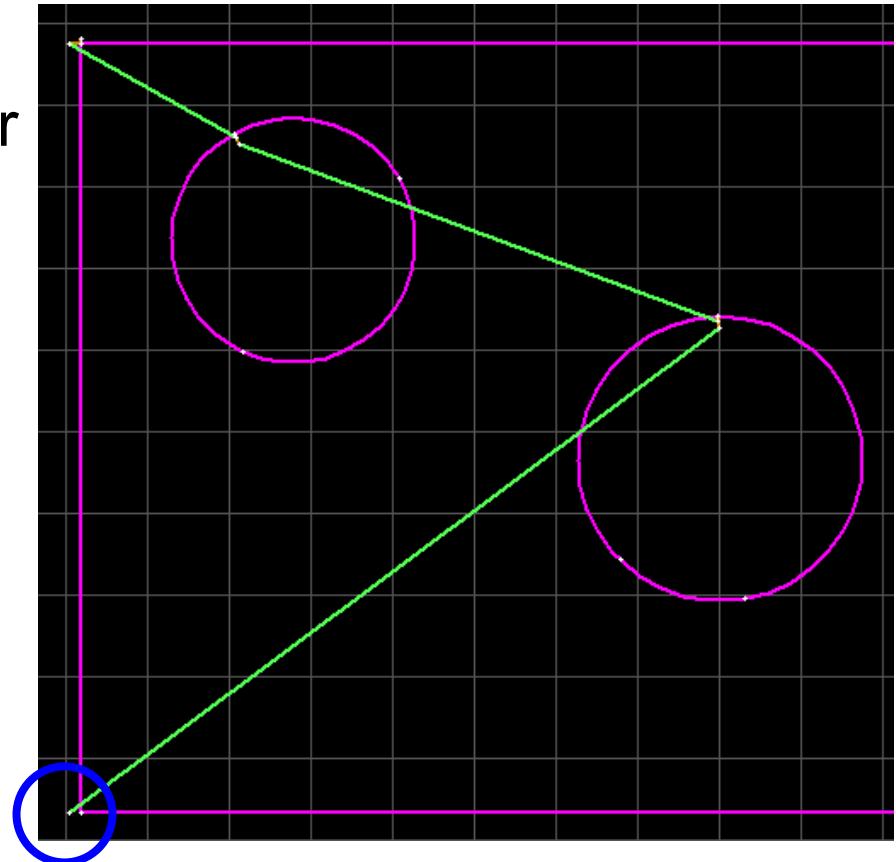
# Step 4: Add Path Elements to the Drawing

- *Traverses and lead ins/outs* are added to your drawing using the **Lead i/o** drawing tools.



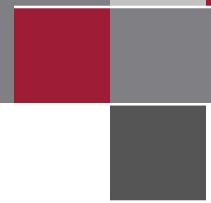
# Step 4: Add Path Elements to the Drawing

- **Traverses**
  - Can be lines or arcs
  - Color – green (solid or dashed)
  - Tell the machine to move the nozzle without turning on the water and/or abrasive
  - Typically connect to lead ins/outs

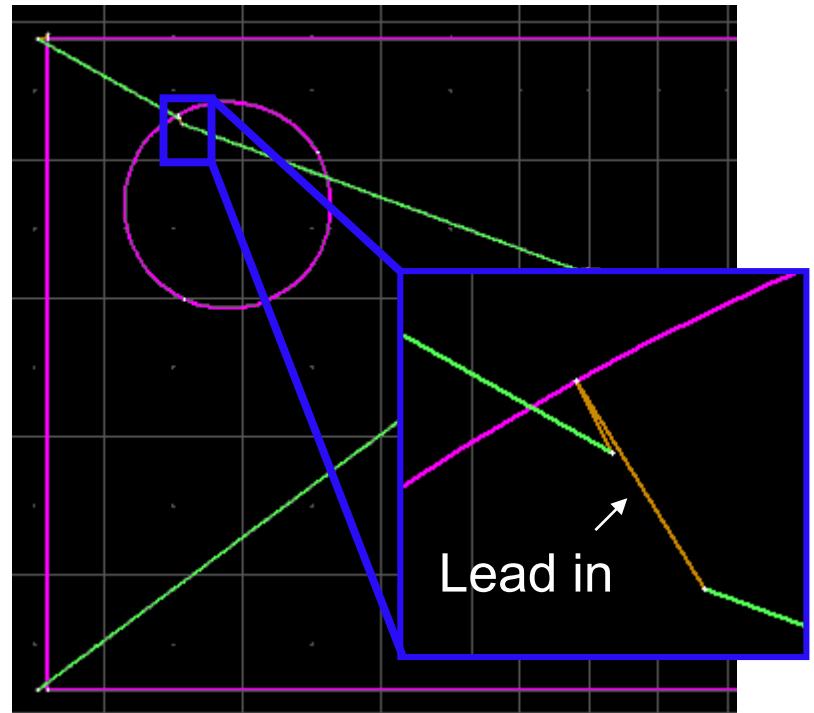


OIR – keyword “traverse”

# Step 4: Add Path Elements to the Drawing

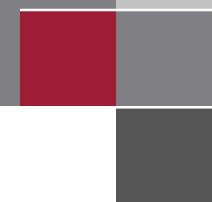


- Lead ins (brown)
  - Pierce points
  - Typically drawn longer
  - Tell the machine to turn on water and abrasive and pierce the material
  - Connected to lead outs
  - Determine nozzle travel direction

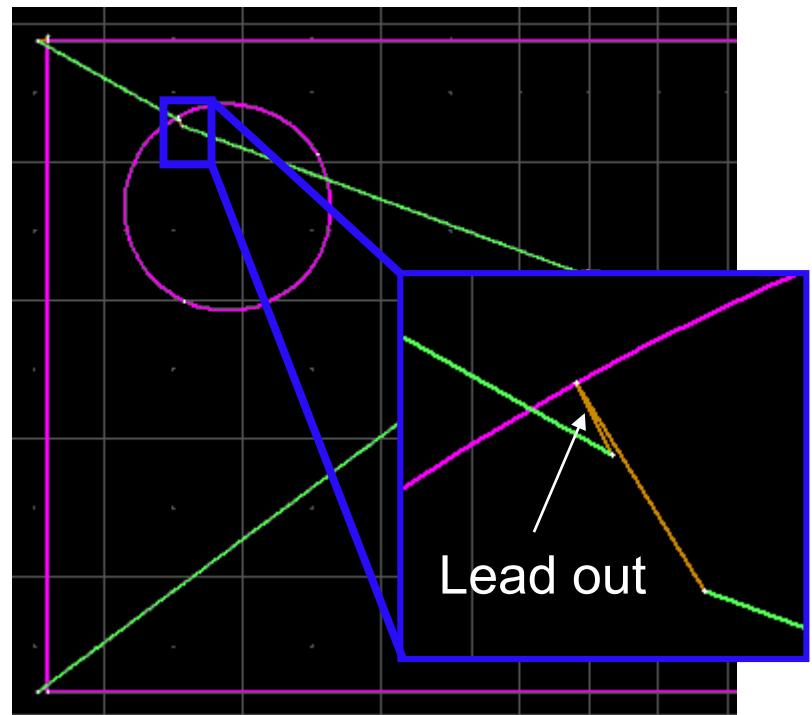


OIR – keyword “lead i/o”

# Step 4: Add Path Elements to the Drawing



- Lead outs (brown)
  - Exit points
  - Typically drawn shorter
  - Tell the machine to turn off the abrasive and water and follow to the next command
  - Connected to lead ins



# Step 4: Add Path Elements to the Drawing

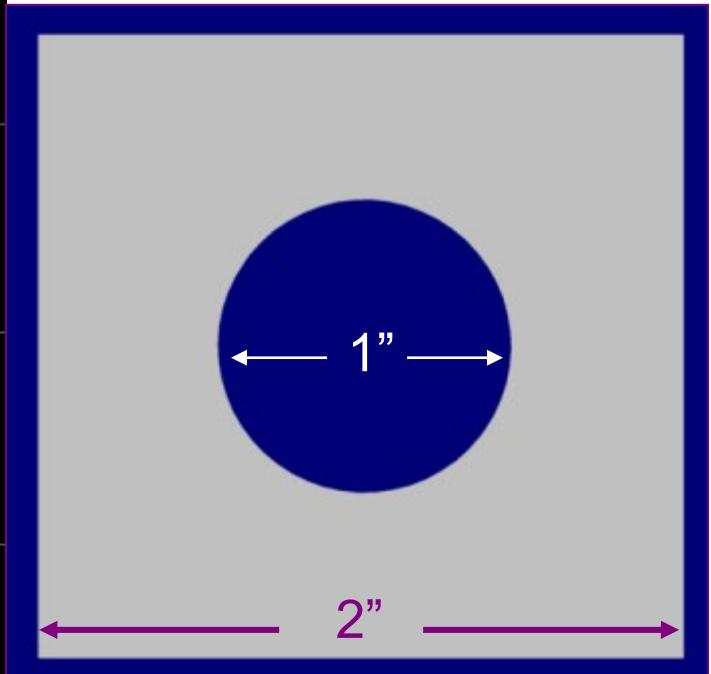
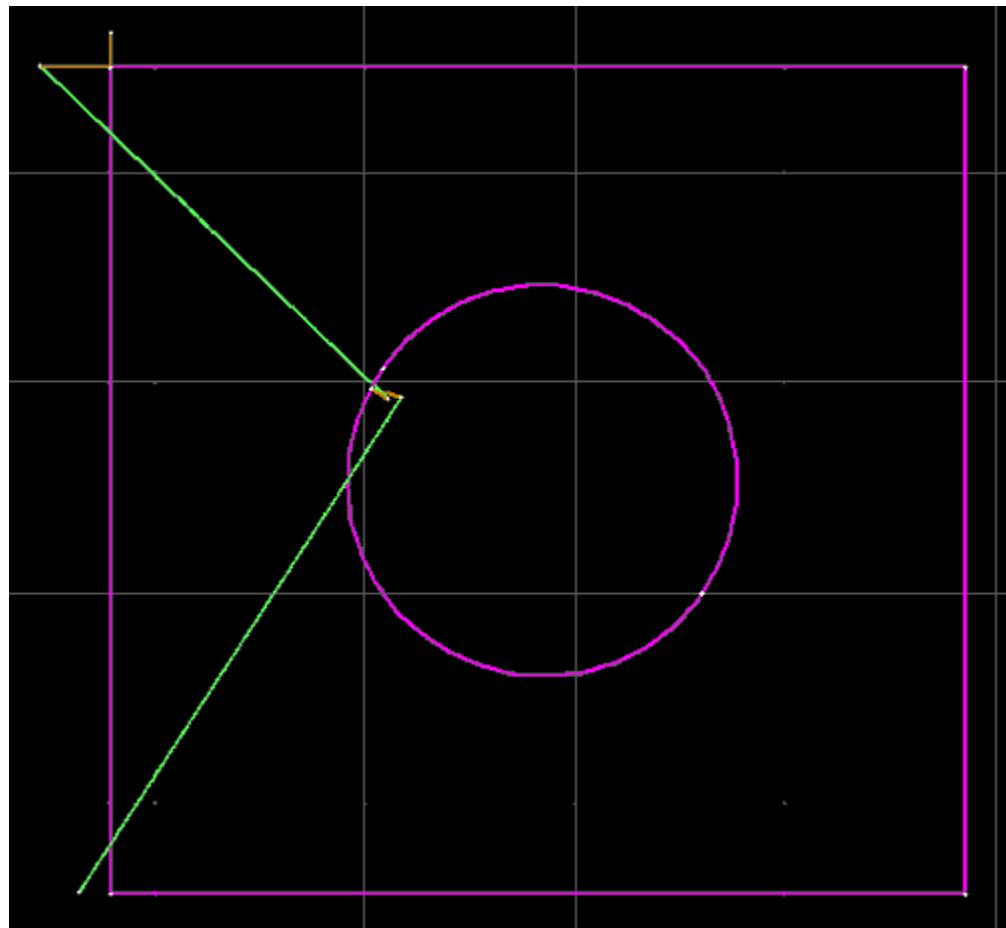
## Best Practices for Adding Path Elements

- Place your lead i/o on the side of the geometry you want to cut out (place them in the scrap).
- Route the nozzle path to cut internal geometries first (keeps material stable during the cutting process).
- Draw your lead in *longer* and your lead out *shorter* (helps you know which direction the nozzle is traveling).
- Draw the path to avoid traveling over already cut pieces (slugs) that may cause nozzle “collisions.”
- Draw your lead i/o and traverse lines to minimize nozzle travel (saves time when cutting).
- For best offset performance, avoid small entities in inside corners.

# Step 4: Add Path Elements to the Drawing

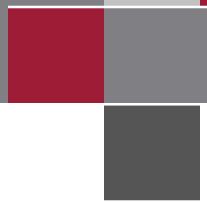
- Specify a narrow angle and use lines for your lead i/o to minimize machine marks where the nozzle finishes cutting.
- The software is configured by default to cut to the left of the geometry.
  - *Internal* geometries should cut to the left in a counterclockwise direction (ccw).
  - *External* geometries should cut to the left in a clockwise direction (cw).
- The machine path will automatically route the nozzle in the direction of least resistance (the least sharp turn).
  - How you draw your lead i/o will affect the direction the nozzle travels (clockwise or counterclockwise).

# Step 4: Add Path Elements to the Drawing



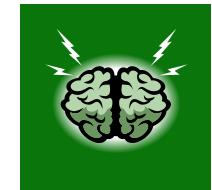
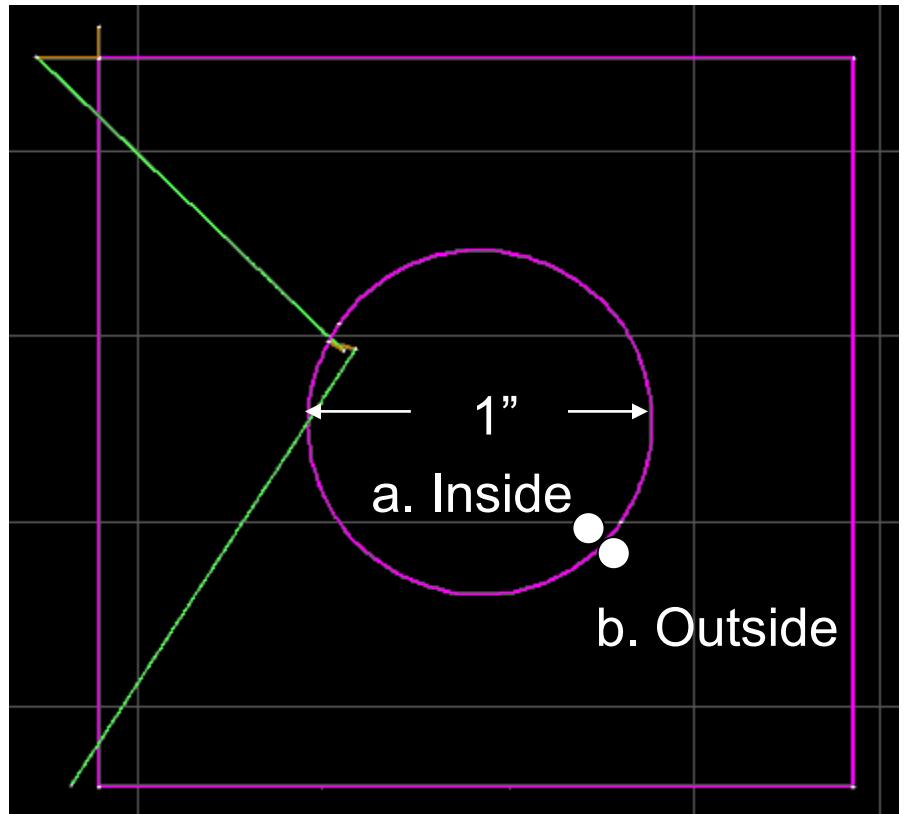
Final Part

# Step 4: Add Path Elements to the Drawing



## Lead ins (on internal geometry)

- Pierce on the inside.
- The software tool offset is programmed by default to cut to the *left* side of our geometry.
- **Q:** Looking at this internal circle, which side of the geometry do we want the nozzle to cut on?

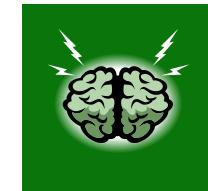
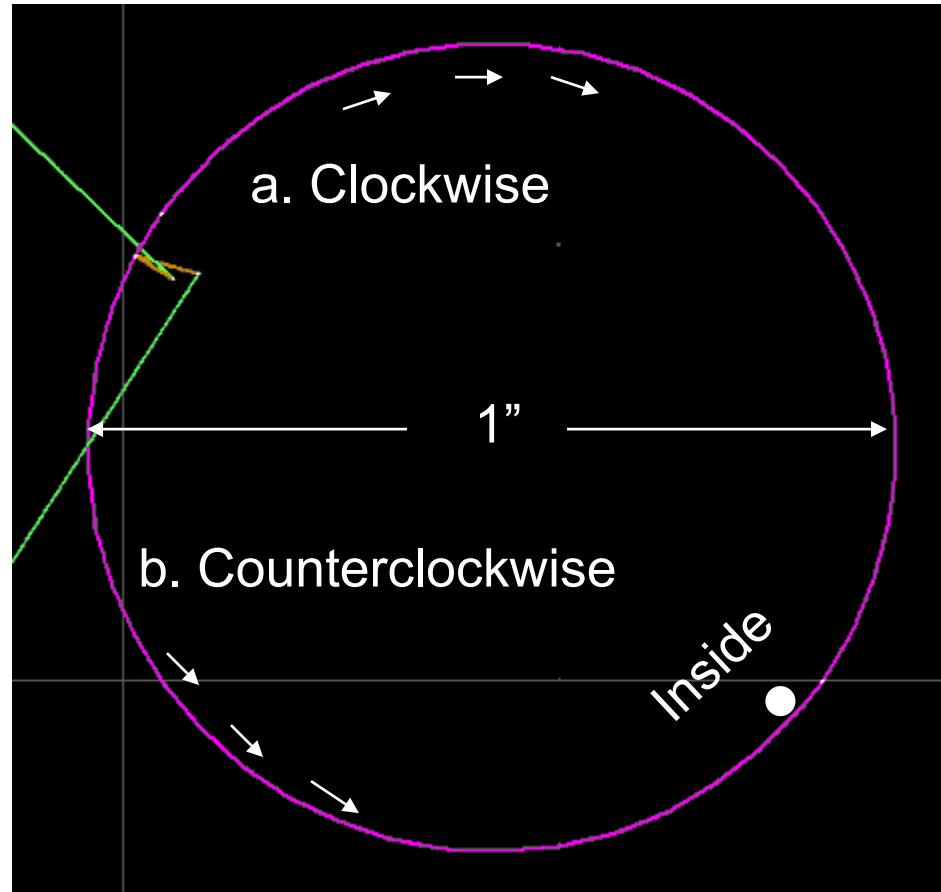


# Step 4: Add Path Elements to the Drawing

Lead ins (on *internal* geometry)

**A:** Cut on the *inside* to maintain our hole diameter at 1 inch.

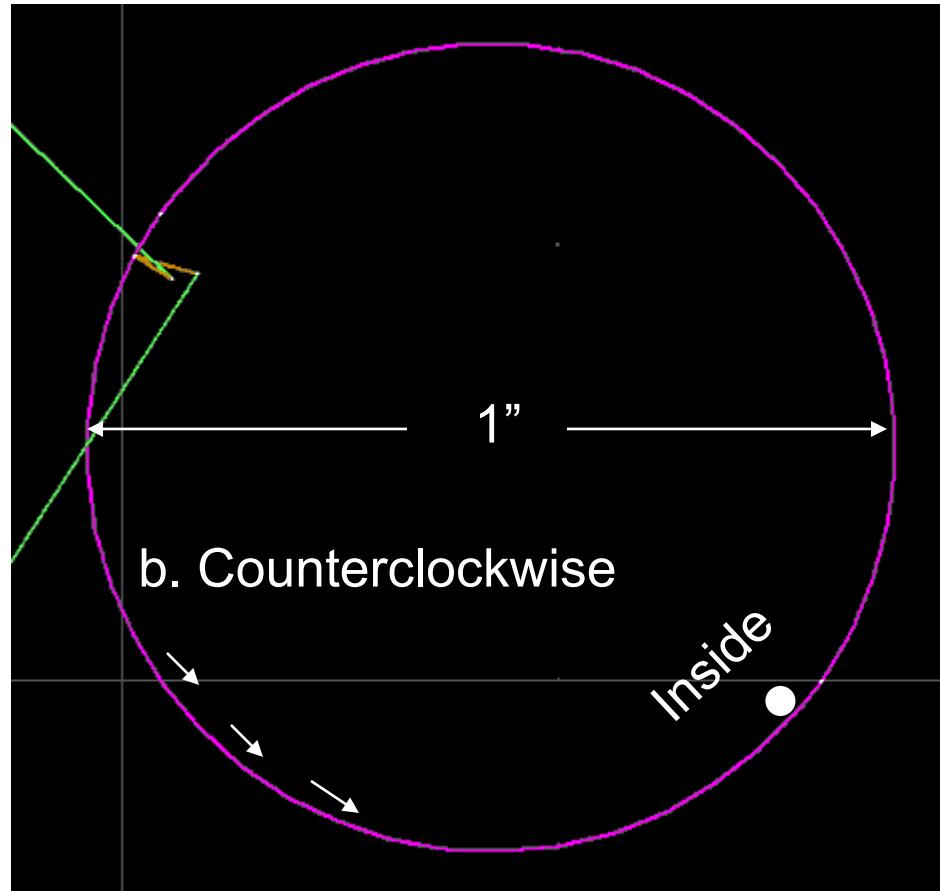
**Q:** Which direction should the nozzle travel if we want it to cut *inside* the circle, knowing it will cut to the left of our geometry?



# Step 4: Add Path Elements to the Drawing

Lead ins (on internal geometry)

**A:** Travel in *b. counter-clockwise* direction so it cuts to the inside of internal geometry.

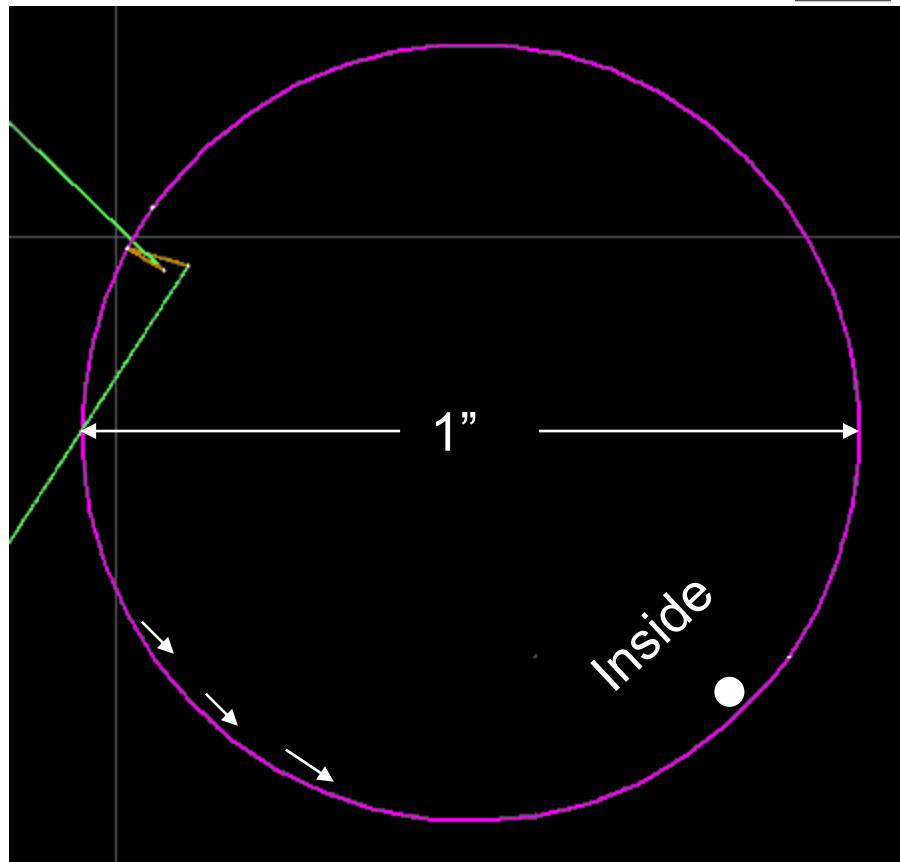


# Step 4: Add Path Elements to the Drawing



## Lead ins (internal geometry)

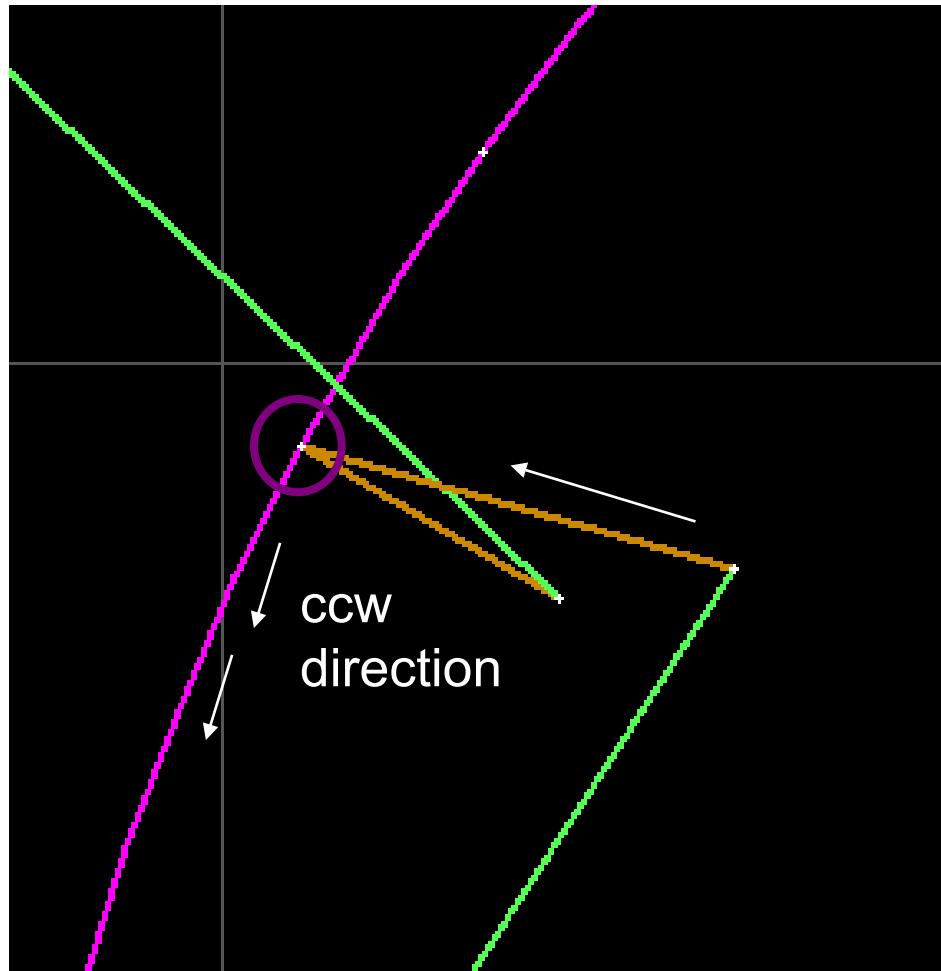
- Draw the lead in longer than the lead out.
- Place the pierce point in the scrap (inside).
- Cut in a counter-clockwise direction (ccw) so the nozzle offsets and cuts on the inside of the geometry.



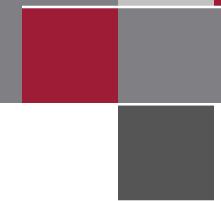
# Step 4: Add Path Elements to the Drawing

## Lead ins (internal geometry)

- Draw the lead in so the least sharp turn points in the counter-clockwise (ccw) direction on internal geometry.
- Point the lead in the direction you want the nozzle to travel.

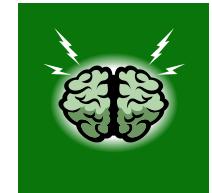
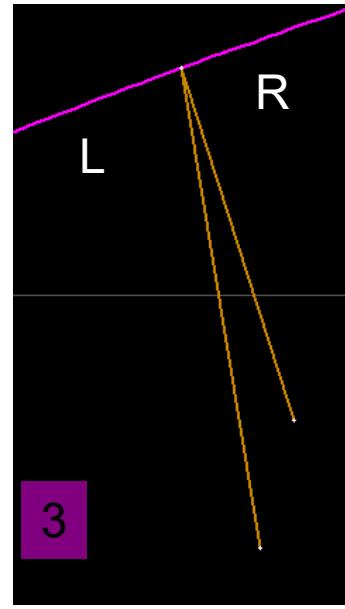
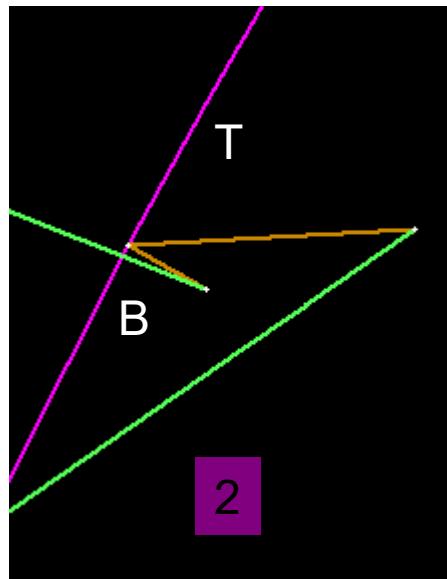
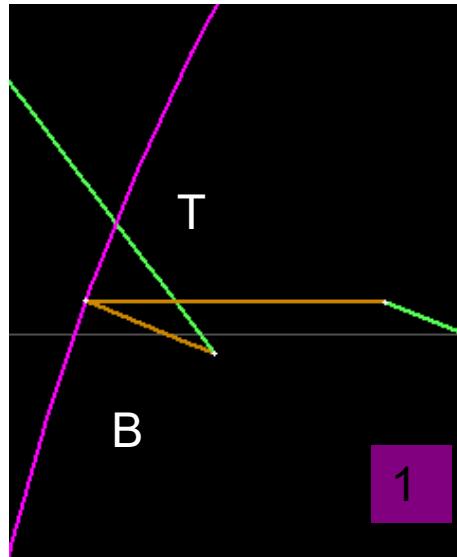


# Step 4: Add Path Elements to the Drawing

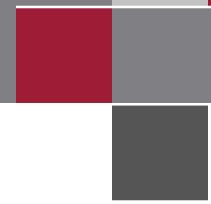


## Lead ins on internal geometry

**Q:** Which direction will the nozzle travel in each of these examples of internal geometry?



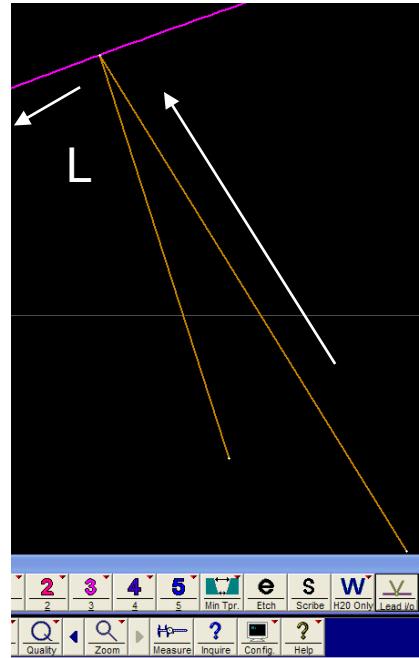
# Step 4: Add Path Elements to the Drawing



To fix a Lead in that is pointing the wrong direction

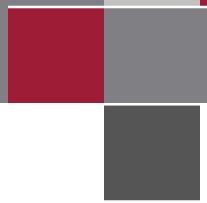


If the Lead in is  
drawn in the  
wrong direction

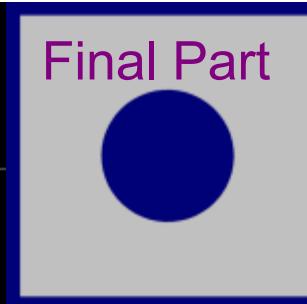
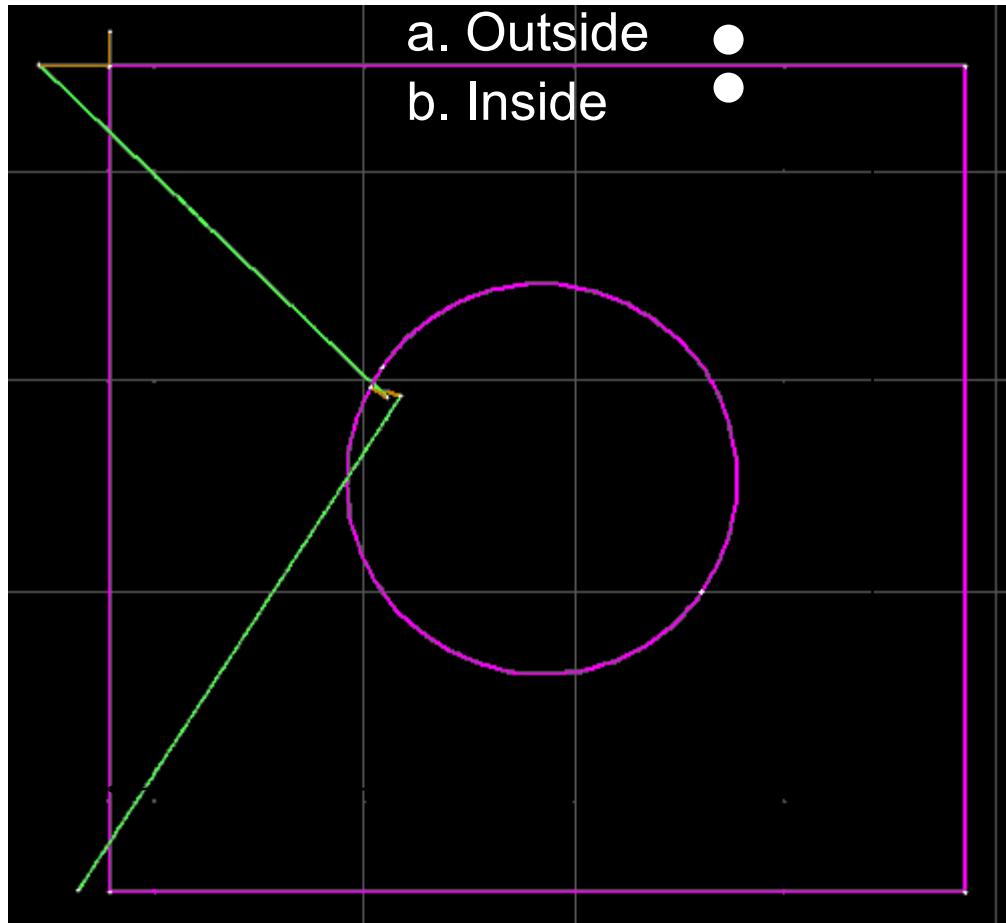


Use the “Swap Lead” option in the Lead i/o tools to switch the lead in and lead out.

# Step 4: Add Path Elements to the Drawing

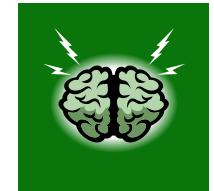


## External Geometry

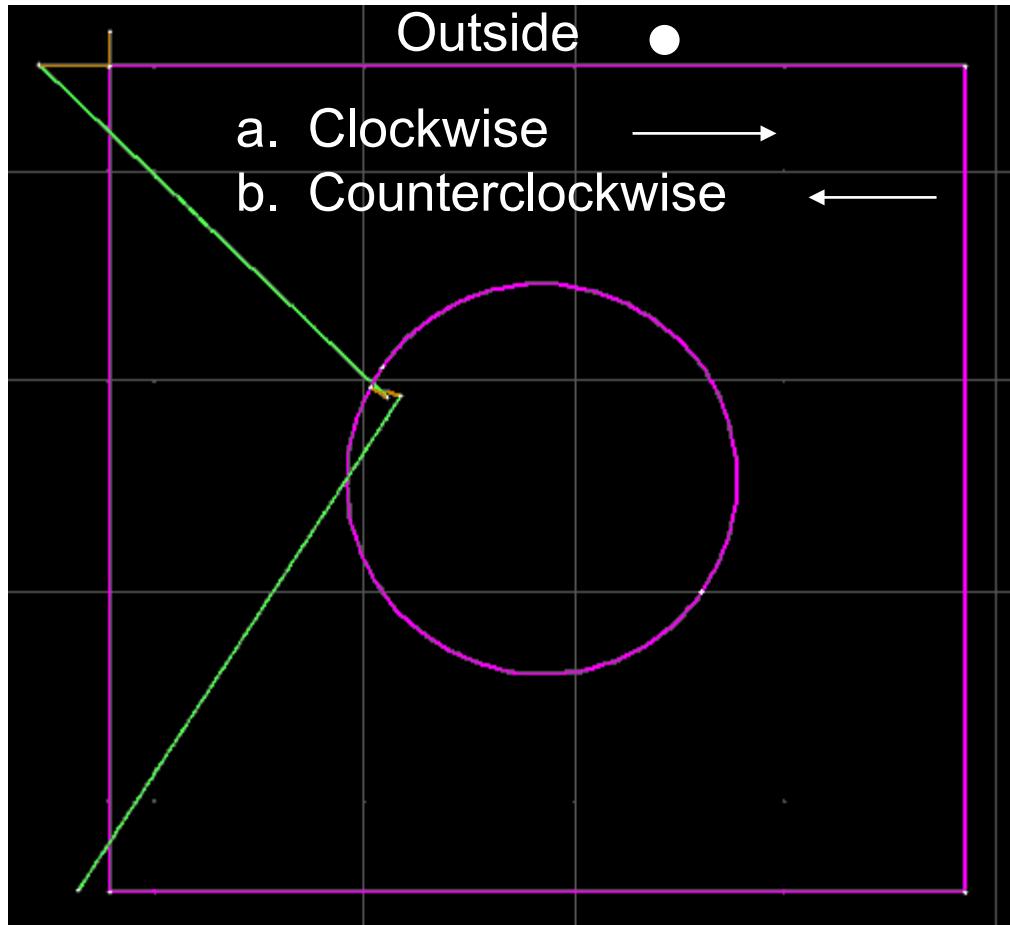


**Q:** Which side of the external geometry (the box) do we want the nozzle to cut if we want to maintain our part dimension as drawn?

- a. Outside
- b. Inside

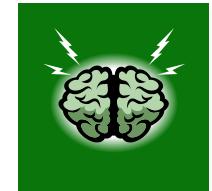


# Step 4: Add Path Elements to the Drawing

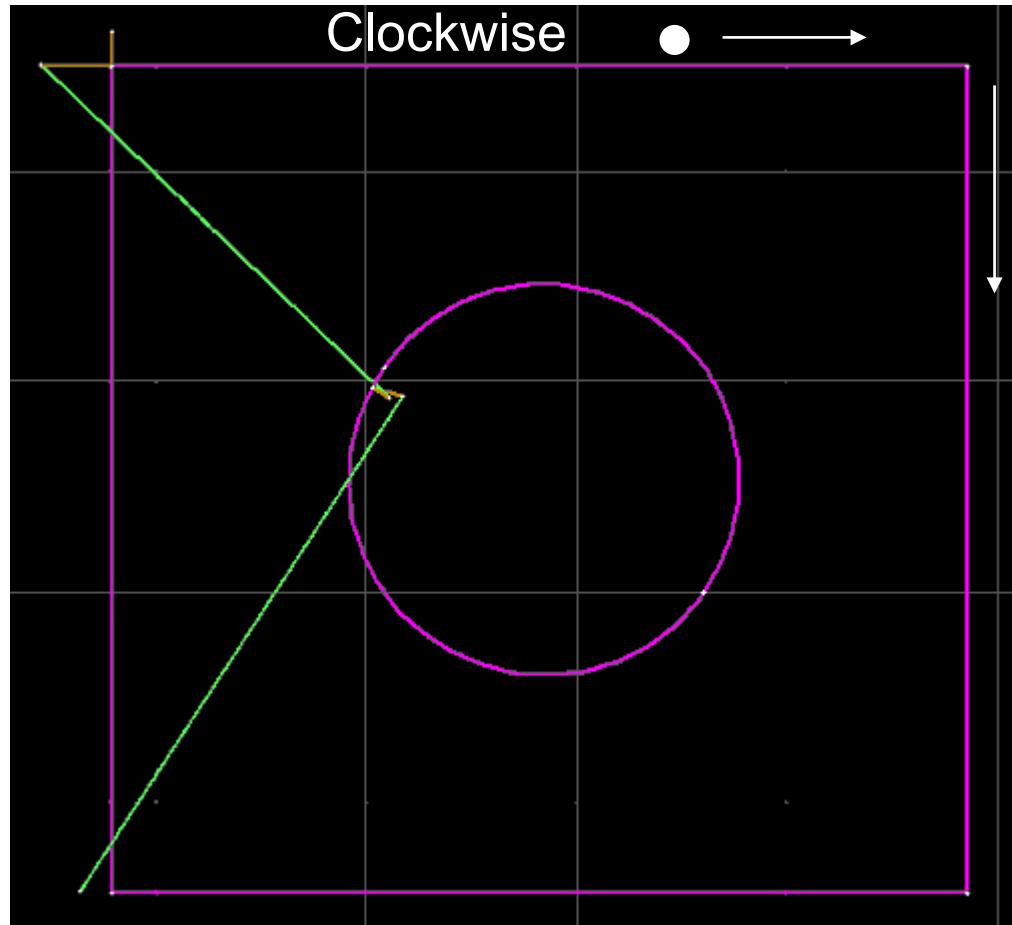


**A:** We want to cut on the *outside* of the box.

**Q:** Which direction does the nozzle need to travel so that it cuts on the outside of the box?  
a. Clockwise  
b. Counterclockwise

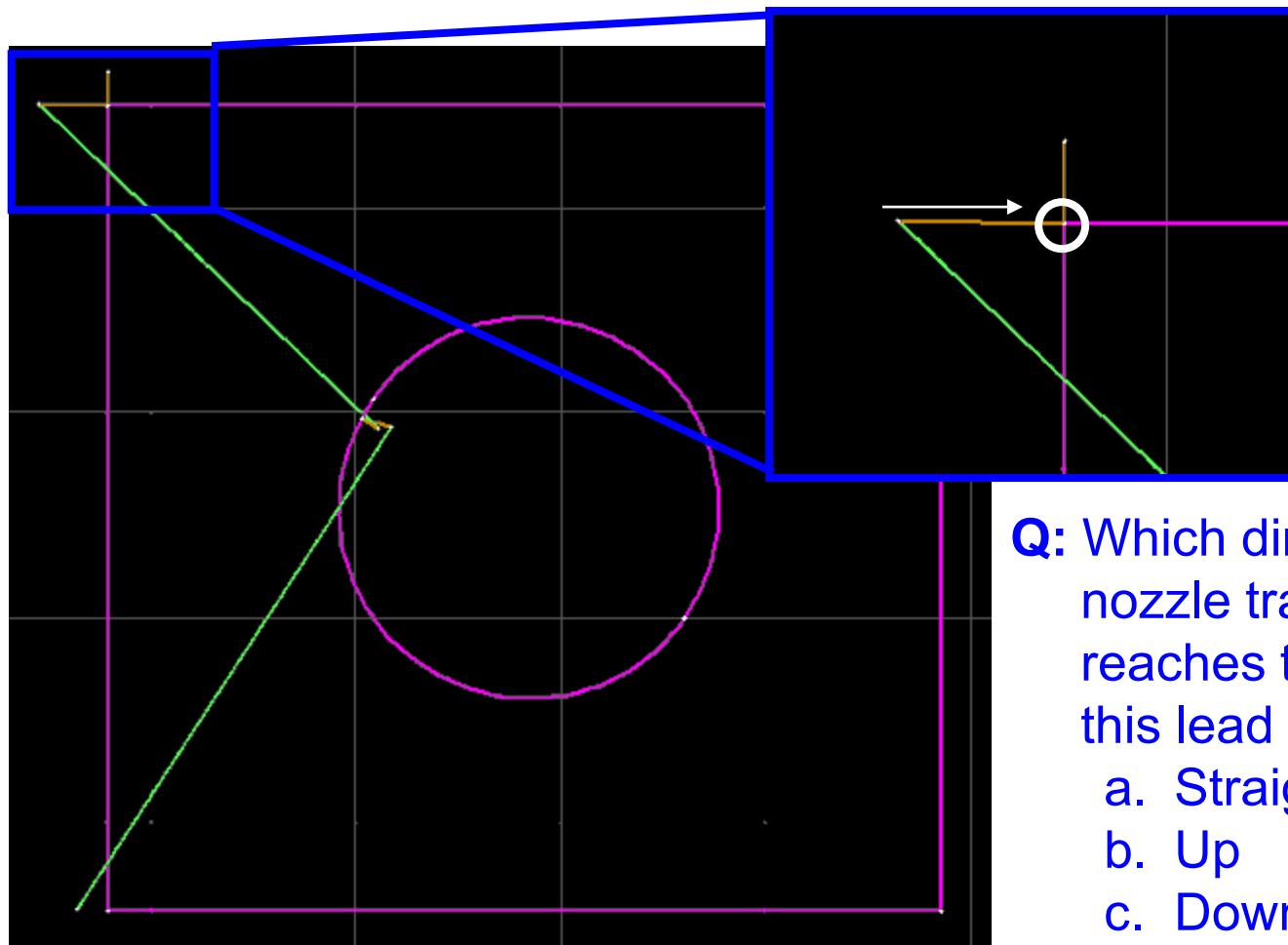


# Step 4: Add Path Elements to the Drawing



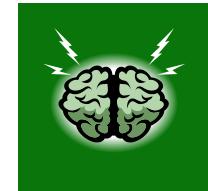
**A:** We want the nozzle to travel in the *clockwise* (cw) direction on the *external* geometry so that with the nozzle programmed to offset to the left, it will cut on the outside of the geometry.

# Step 4: Add Path Elements to the Drawing

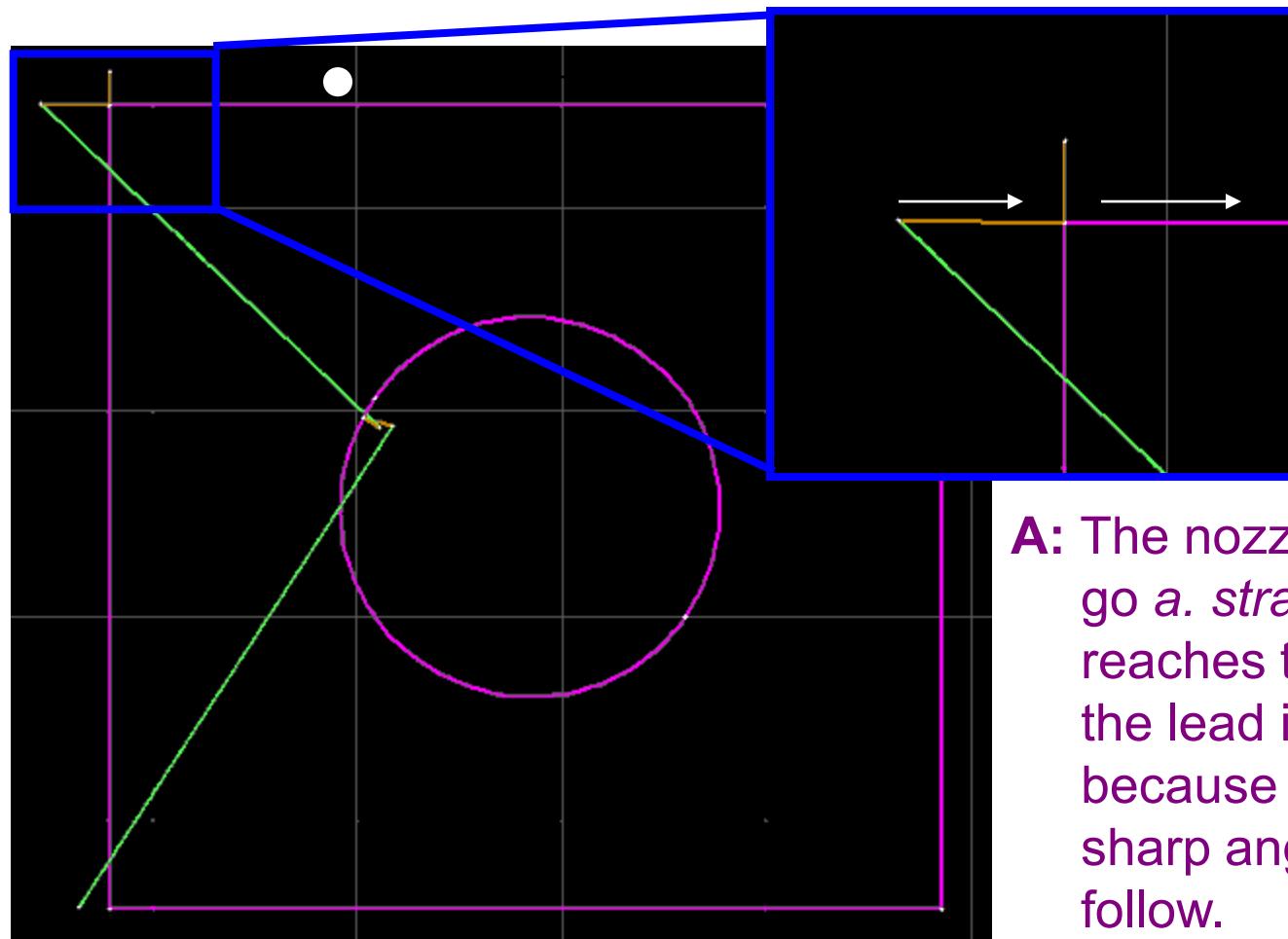


**Q:** Which direction will the nozzle travel when it reaches the endpoint of this lead in?

- a. Straight
- b. Up
- c. Down

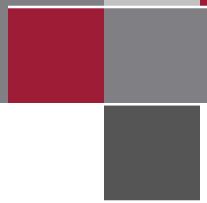


# Step 4: Add Path Elements to the Drawing



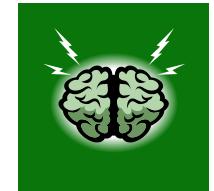
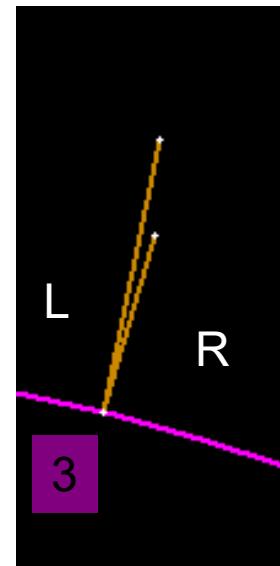
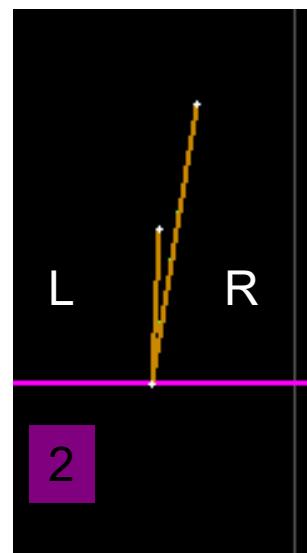
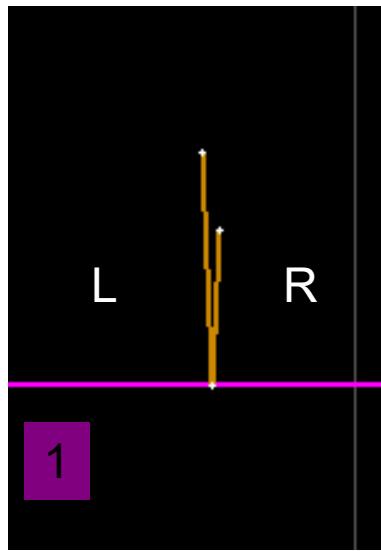
**A:** The nozzle will continue to go a. *straight* when it reaches the endpoint of the lead in in this drawing because it is the least sharp angle or turn to follow.

# Step 4: Add Path Elements to the Drawing

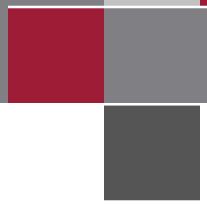


## Lead ins on External Geometry

**Q:** Which direction will the nozzle travel in each of these examples of external geometry?



# Step 4: Add Path Elements to the Drawing



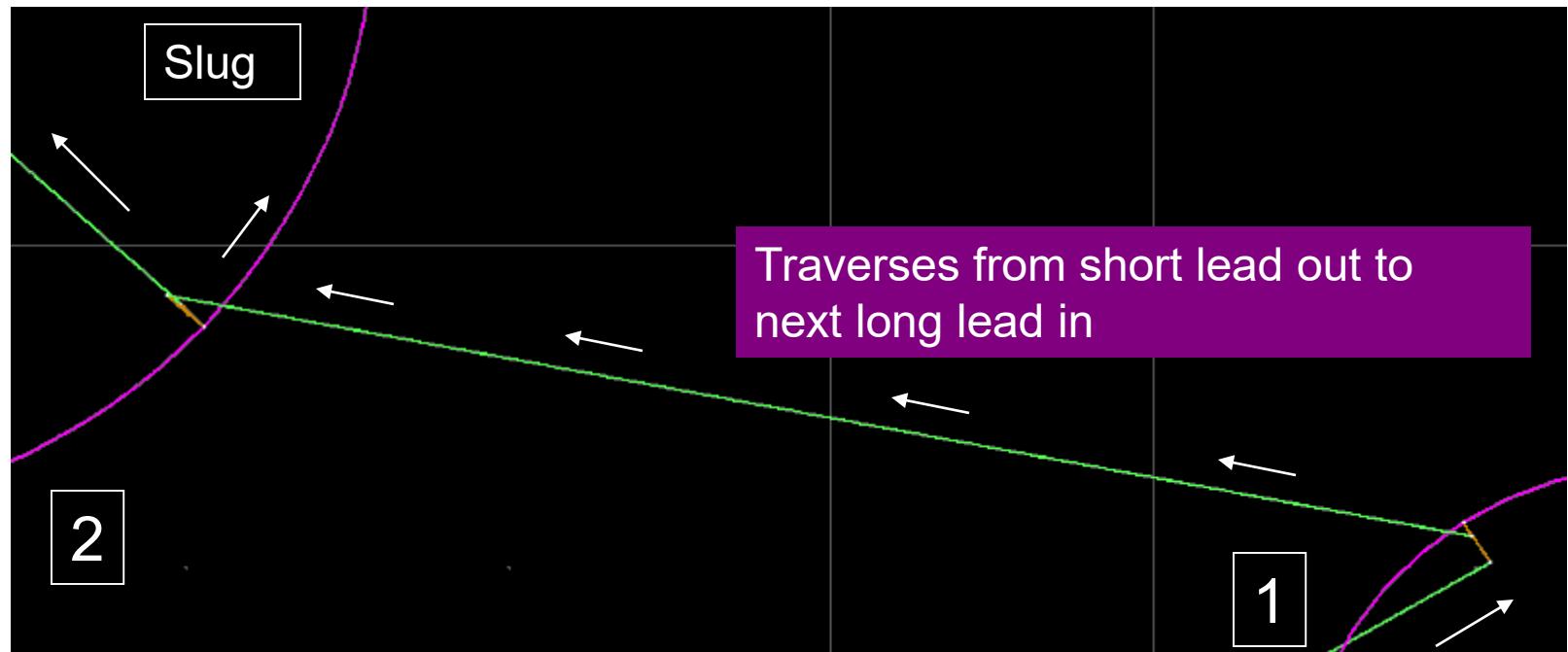
## Placing Lead ins and Lead outs

When the nozzle finishes cutting the geometry, it follows the short lead out and turns off the abrasive then the water. Then the nozzle follows the traverse to the next long lead in.

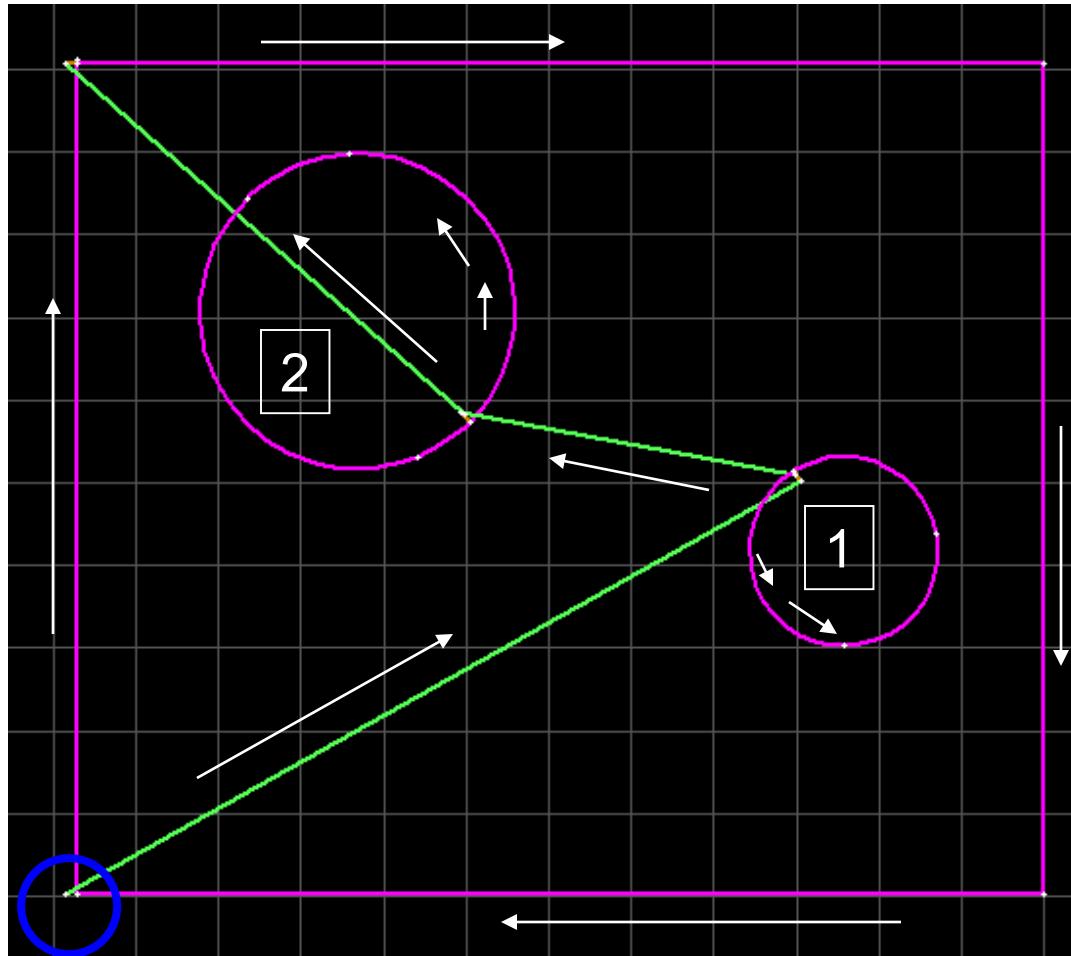
In addition to placing the lead i/o on the side of the geometry you want to cut out (the scrap), you also want to place it so when you move to the next traverse you *avoid traveling over already cut pieces (slugs) that may cause nozzle “collisions.”*

# Step 4: Add Path Elements to the Drawing

Avoid traveling over something already cut.



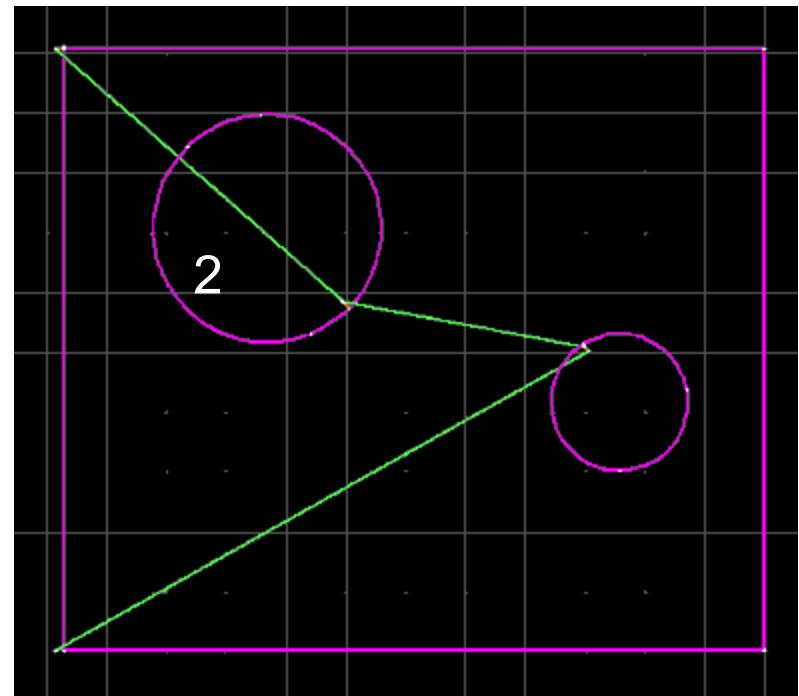
# Step 4: Add Path Elements to the Drawing



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# Step 4: Add Path Elements to the Drawing

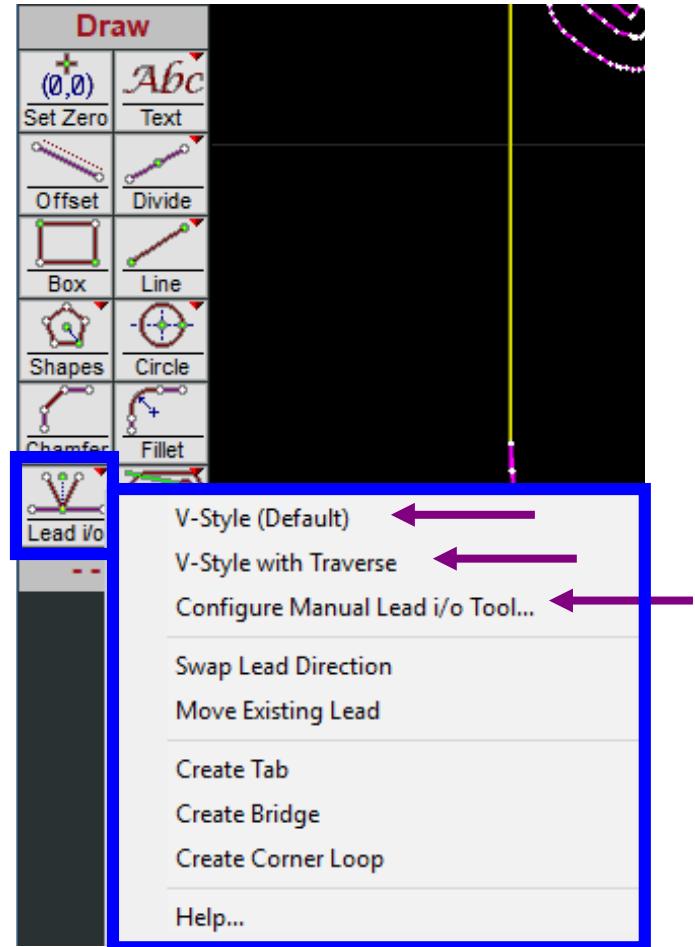
- Options to avoid a potential collision in circle 2
  - Move the lead in/out to the opposite side of the circle.
  - Change the traverse to a heads-up traverse.
  - Move the lead in/out on the box to the lower left or the top right of the box.



# Step 4: Add Path Elements to the Drawing

## Manual Lead i/o Tools

- Path elements can be added by drawing lines manually and assigning the applicable machining qualities.
- Components can be added manually using the **V-Style tools**.
- These manual tools can be configured using **Configure Manual Lead i/o Tool**.



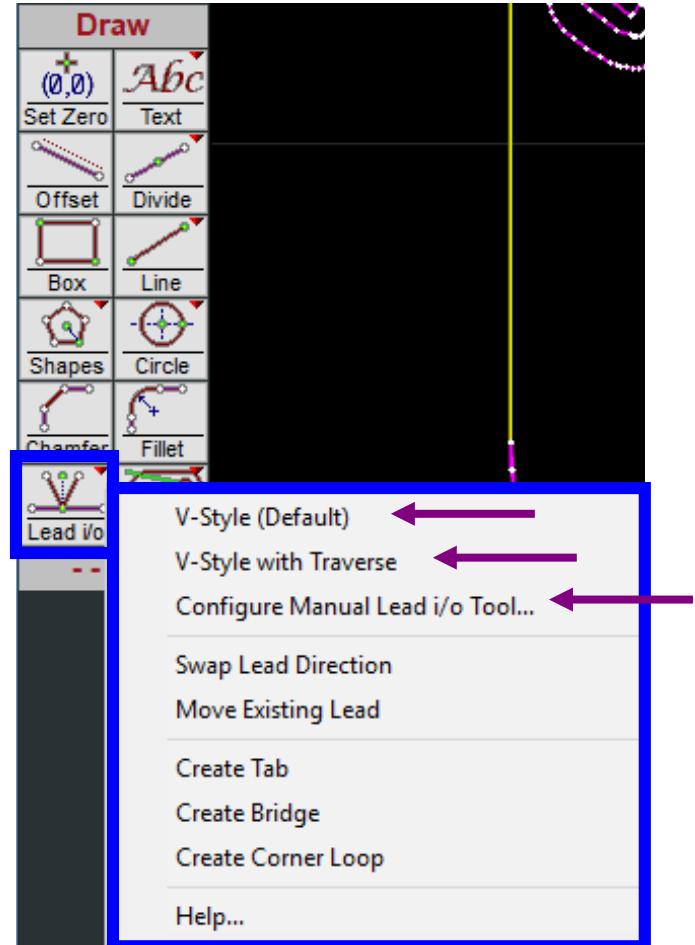
OIR – keywords “lead i/o”

# Step 4: Add Path Elements to the Drawing

## Manual Lead i/o Tools

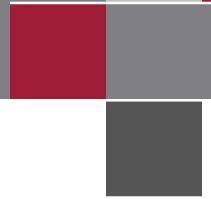
### Practice

- *Draw a box with 2 circles in it and assign the drawing a machining quality of 3.*
- *Add a V-Style Lead i/o on internal and external geometry.*



OIR – keywords “lead i/o”

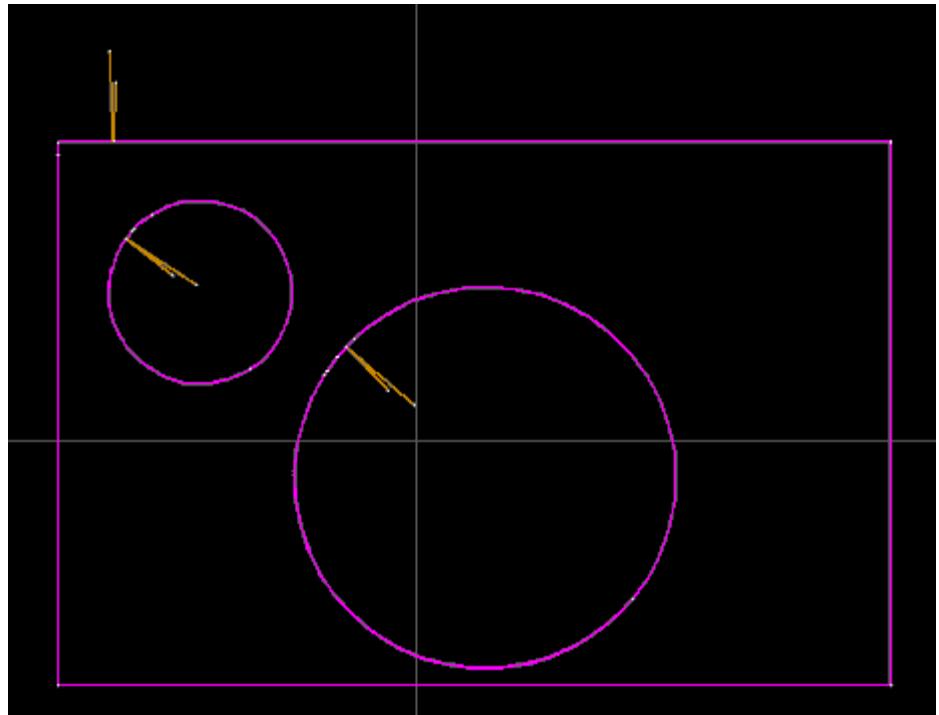
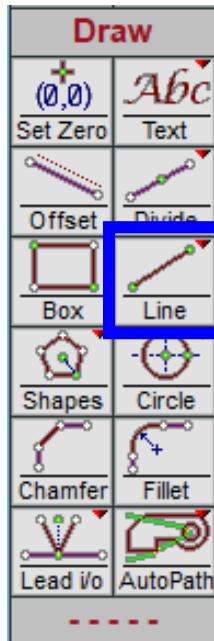
# Step 4: Add Path Elements to the Drawing



## Manual Lead i/o Tools

### Practice

- *Draw traverses using the **Line** drawing tool (see next page).*



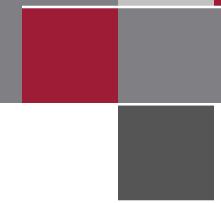
OIR – keywords “traverse”

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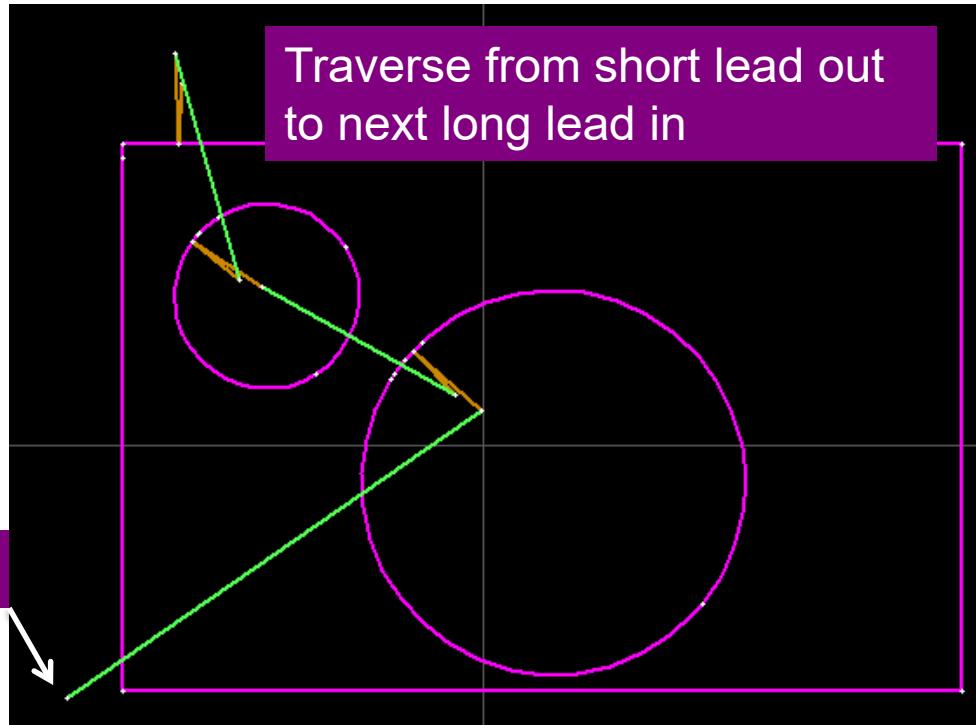
400739F



# Step 4: Add Path Elements to the Drawing

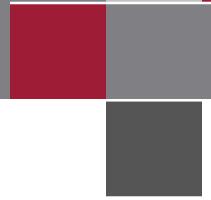


## Manual Lead i/o Tools



OIR – *keywords “traverse”*

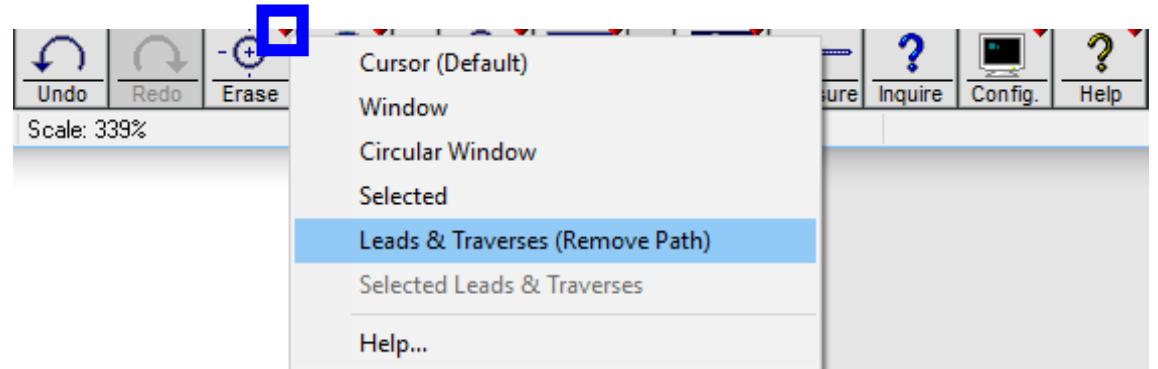
# Step 4: Add Path Elements to the Drawing



## Manual Lead i/o Tools

### Practice

- *Erase leads and traverses in the previous drawing using the **Erase Leads & Traverses** tool.*



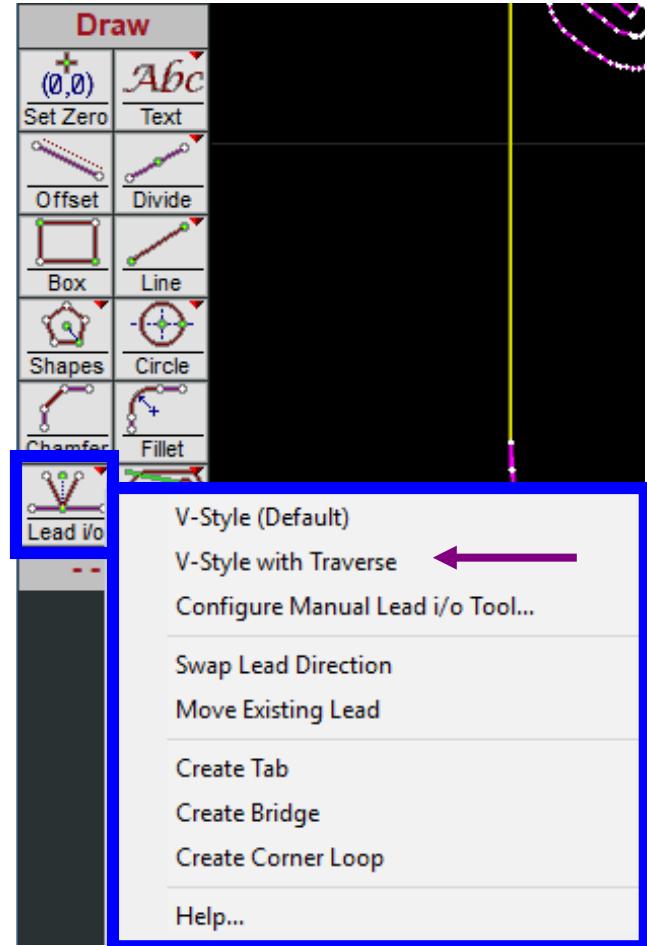
OIR – keywords “lead i/o”

# Step 4: Add Path Elements to the Drawing

## Manual Lead i/o Tools

### Practice

- *Add leads and traverses using the V-Style with Traverse tool.*

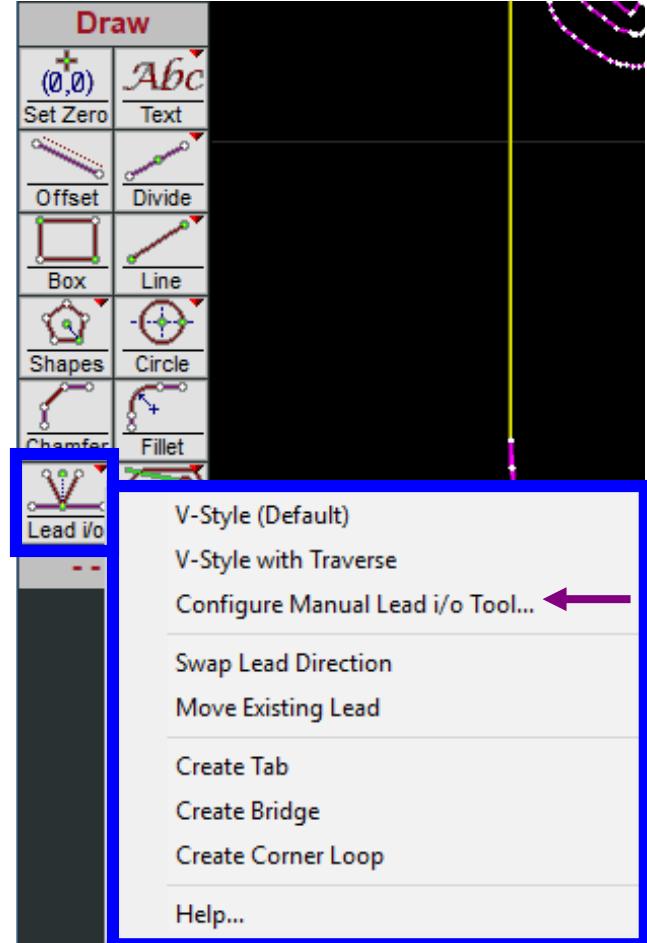


OIR – keywords “lead i/o”

# Step 4: Add Path Elements to the Drawing

## Manual Lead i/o Tools

**Configure Manual Lead i/o Tool**



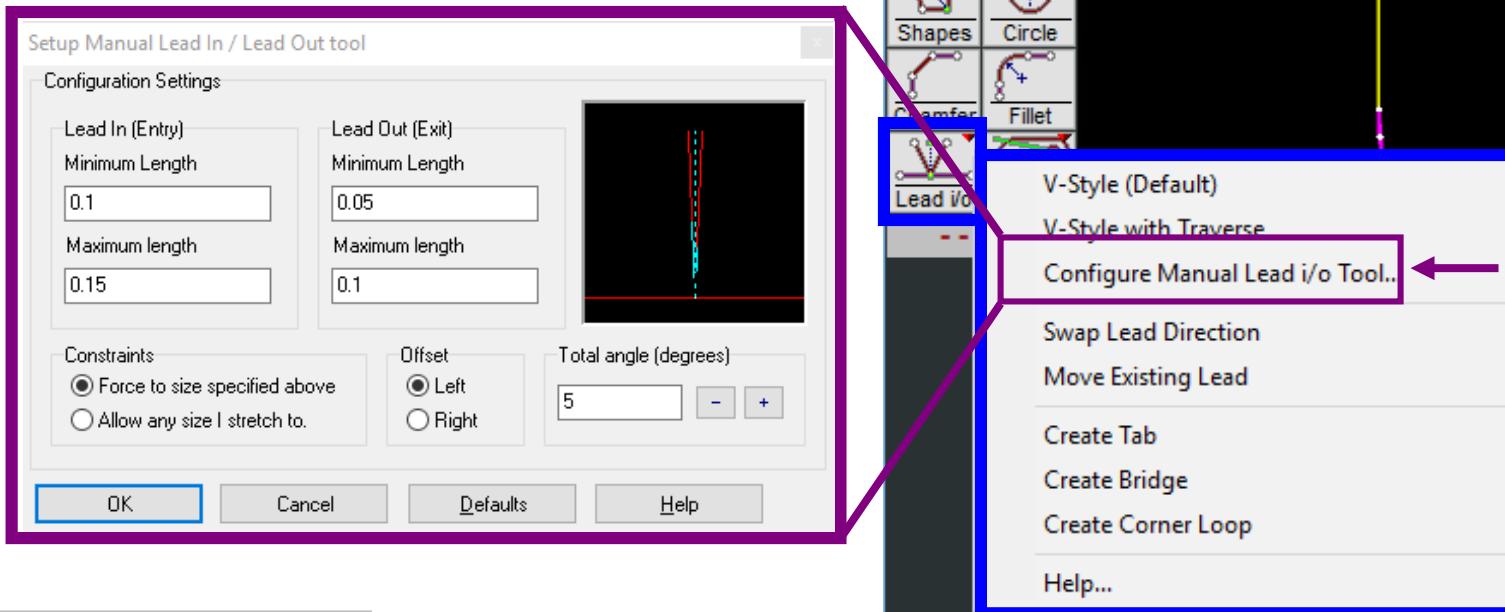
OIR – keywords “lead i/o”

# Step 4: Add Path Elements to the Drawing

## Manual Lead i/o Tools

Review contents of screen

- **Configure Manual Lead i/o Tool**

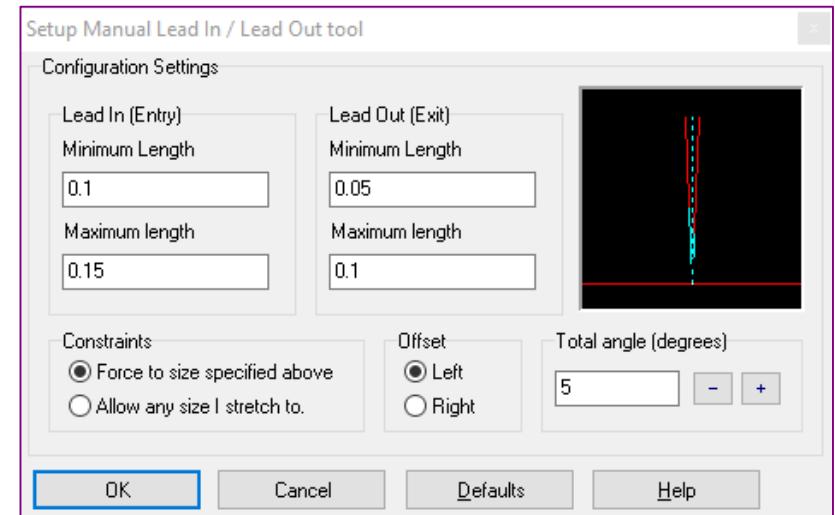


OIR – keywords “lead i/o”

# Step 4: Add Path Elements to the Drawing

## Configure Manual Lead i/o Tool

- Lead in/out lengths
- Stretch or constrain
- Offset (defaults to the left)
- Angle of the Lead in/out



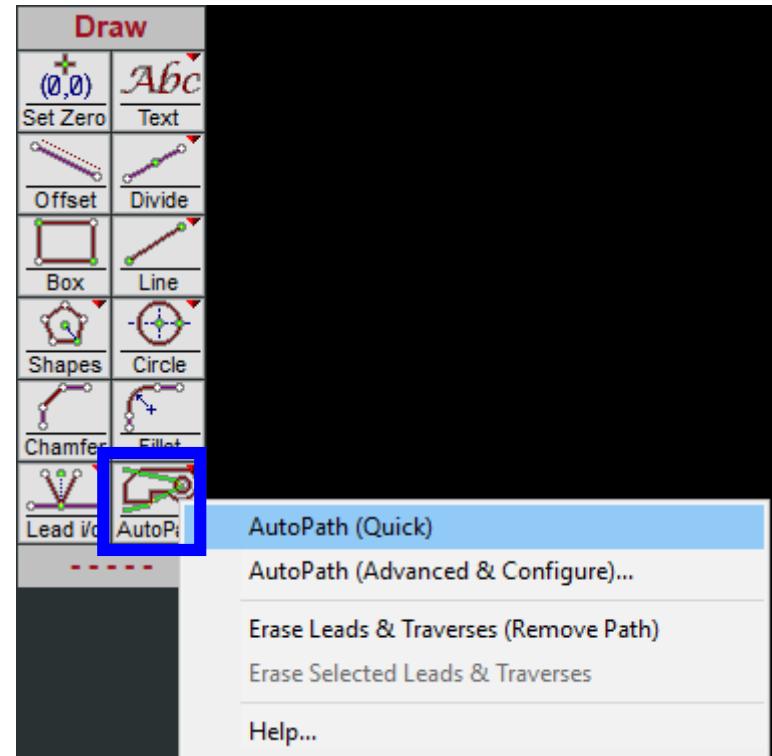
- Best practice – leave at default settings

# Step 4: Add Path Elements to the Drawing

## Automated Lead i/o Tools

### Practice

- *Erase leads and traverses in the previous drawing using the **Erase Leads & Traverses** tool.*
- *Add leads and traverses using **AutoPath (Quick)**.*



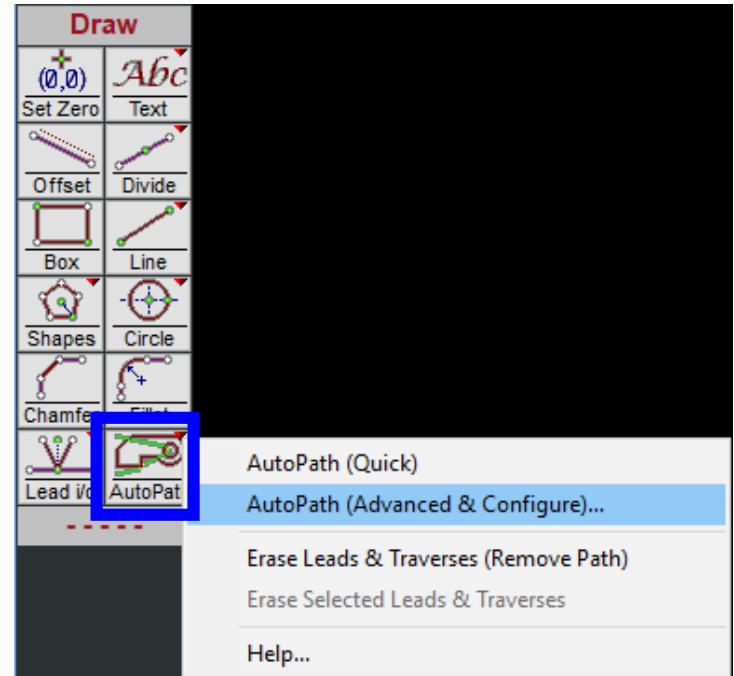
OIR – keyword “autopath”

# Step 4: Add Path Elements to the Drawing

## Automated Lead i/o Tools

### Practice

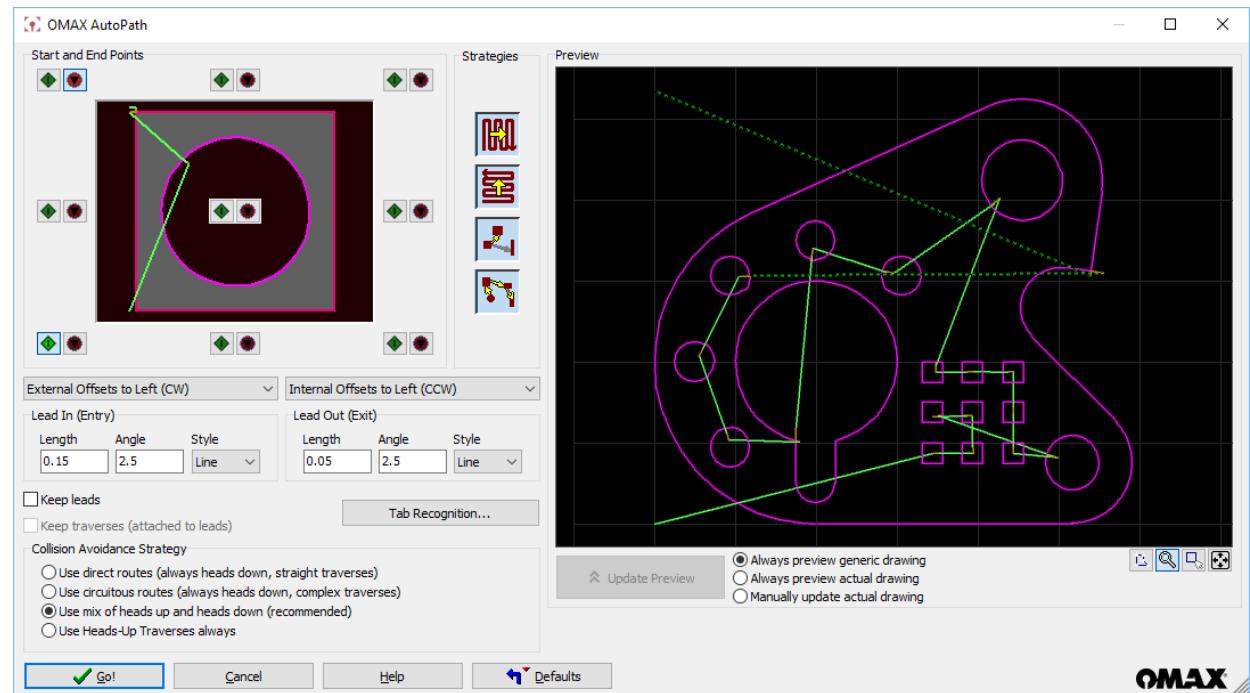
- *Erase leads and traverses in the previous drawing using the **Erase Leads & Traverses** tool.*
- *Add leads and traverses using **AutoPath (Advanced & Configure)**.*
- *Review different settings and methods available.*



# Step 4: Add Path Elements to the Drawing

## Automated Lead i/o Tools AutoPath Advanced & Configure

- *Lead length*
- *Starting point*
- *Offset*
- *Direction*
- *Path choice*
- *Preview path*



OIR – keyword “autopath”

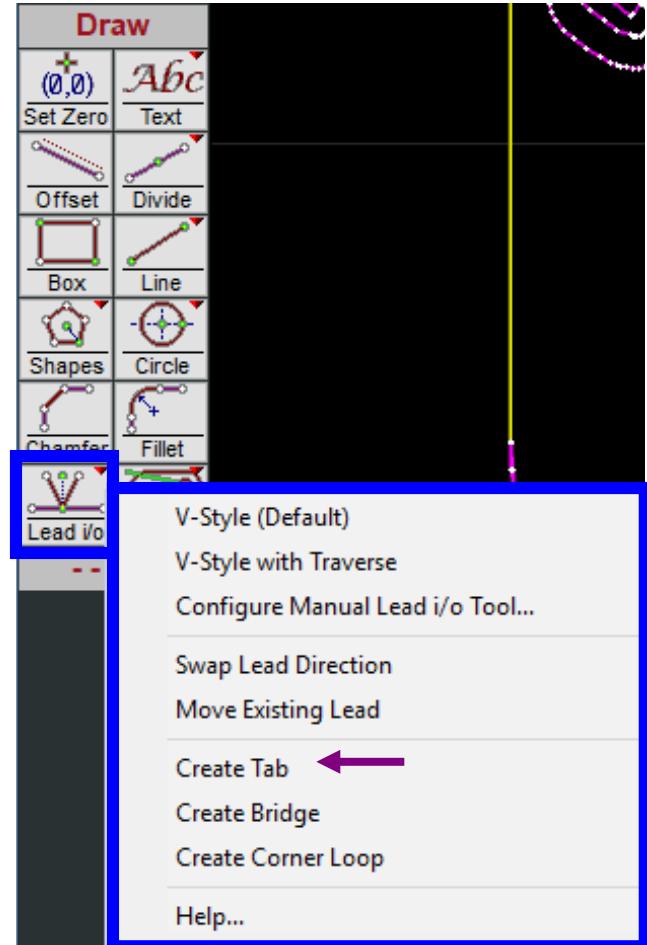
# Step 4: Add Path Elements to the Drawing

## Lead i/o – Create Tab

- Tabs keep a part connected to the material.

## Practice

- *Add a tab to the existing drawing using the **Create Tab** tool.*
- *Access the tab **Help** screen.*

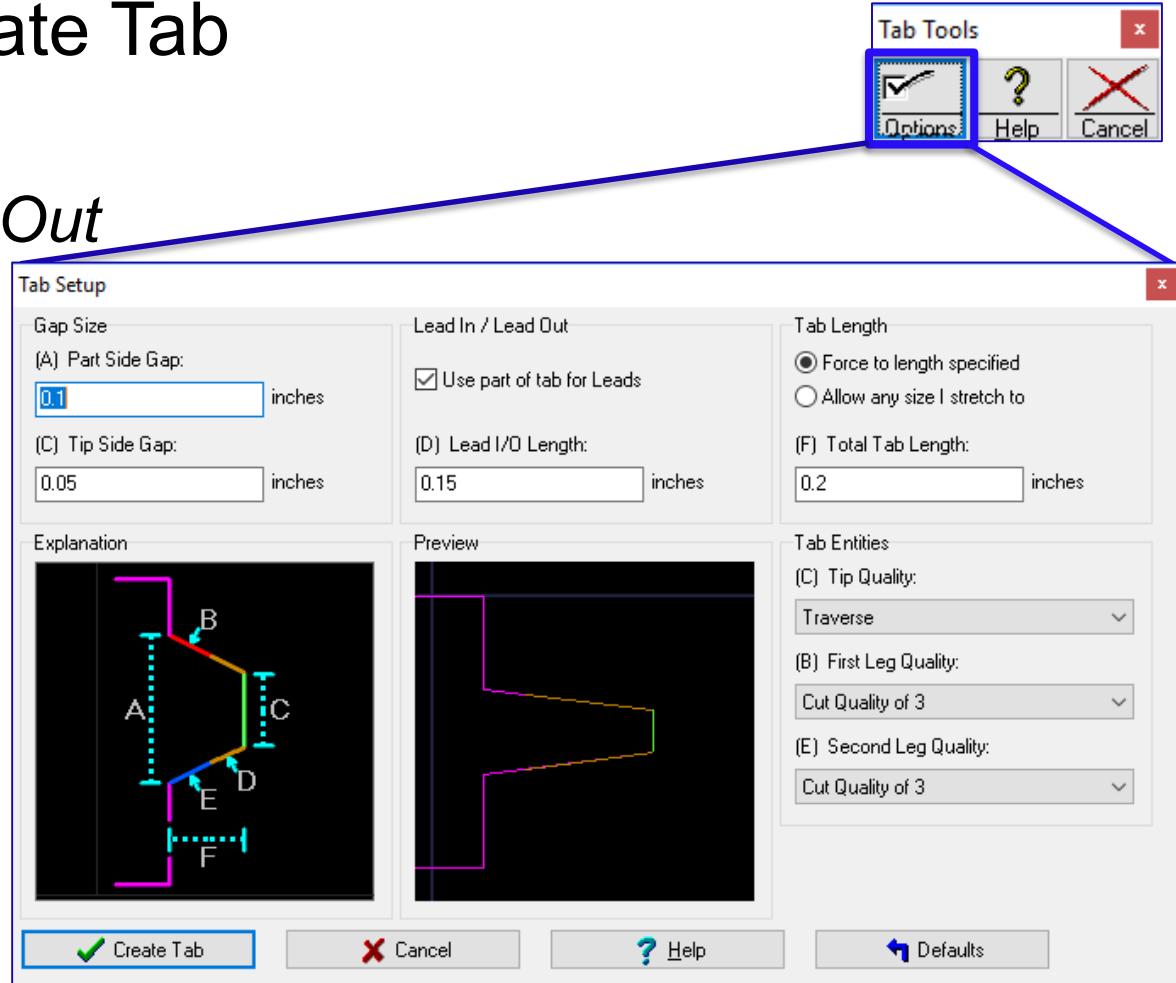


OIR – keyword “tab”

# Step 4: Add Path Elements to the Drawing

## Lead i/o - Create Tab

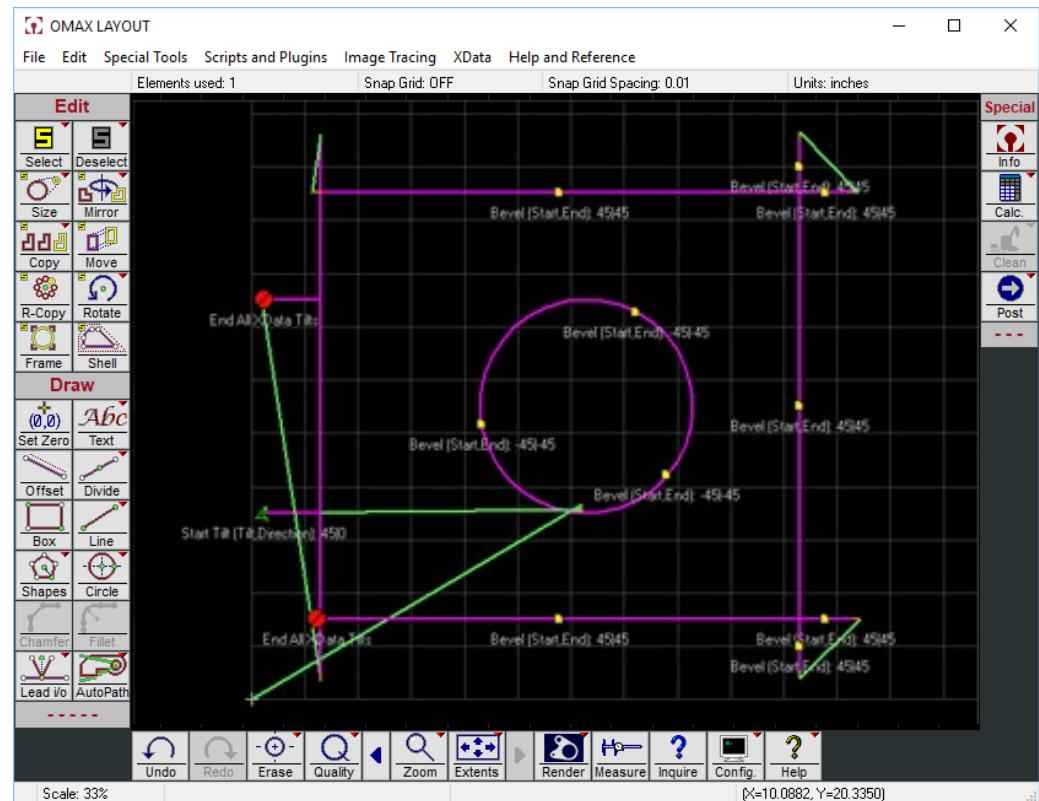
- *Gap Size*
- *Lead In/Lead Out*
- *Tab Length*
- *Tab Entities*



OIR – keyword “tab”

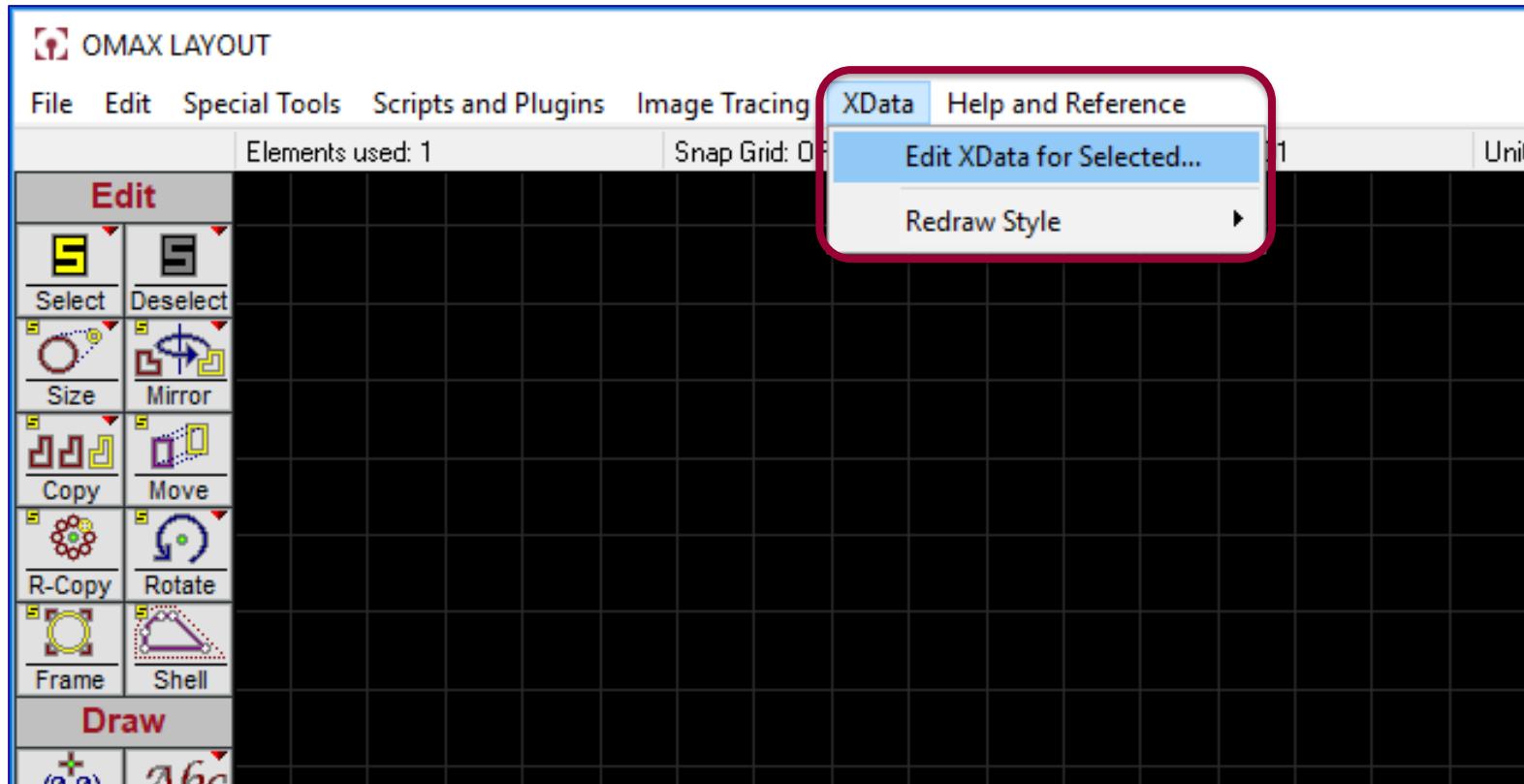
# Step 4: Add XData to the Path

- **XData** is eXtra Data that can be assigned to entities in **LAYOUT** to command specific actions in the tool path.



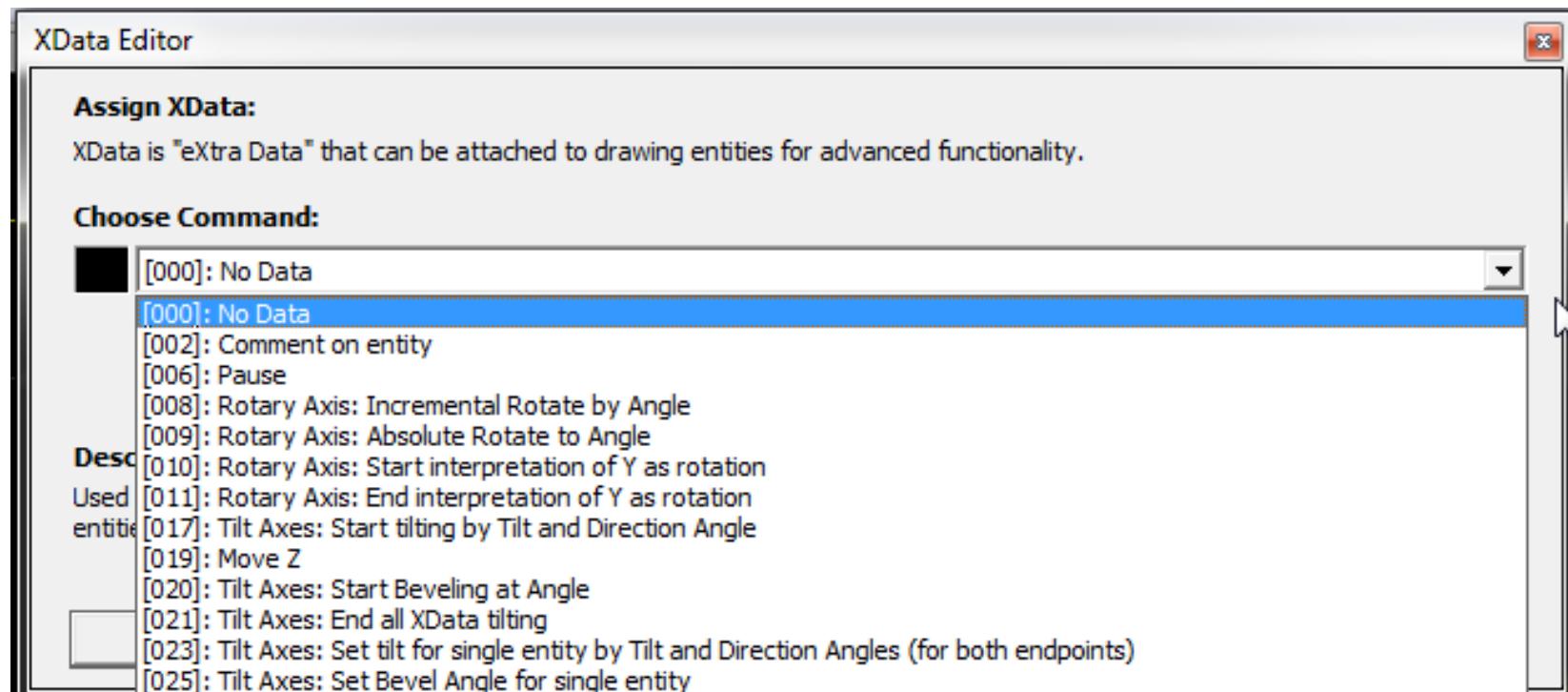
# Step 4: Add XData to the Path

- The XData menu is in the main menu of LAYOUT.



# Step 4: Add XData to the Path

- **XData Editor** – lists commands available

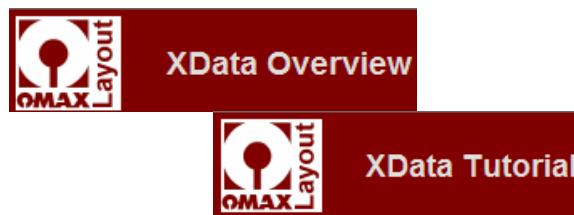


# Step 4: Add **XData** to the Path

- Examples of how **XData** is used
  - Add pause points
  - Add a comment to an entity
  - Specify a different cut speed for an entity/entities
  - Command rotary axis movement
  - Specify nozzle tilt
  - and MORE...

# Step 4: Add **XData** to the Path

- Prerequisites for using **XData** - must have
  - Understanding of how the **XData** command is designed to work prior to using it
    - Consult the OMAX Interactive Reference (OIR)



The screenshot shows the OMAX Interactive Reference (OIR) software interface. At the top, there is a menu bar with icons for Hide, Back, Forward, and Print. Below the menu is a navigation bar with links for Contents, Index, and Search. A search input field contains the text "XData". Underneath the search bar, there is a section titled "Select Topic to display:" containing a scrollable list of topics. The topic "XData" is highlighted in the list.

Topic
Bitstream Recording Overview
Bitstream Stitching
Creating Parametric Shapes
Developer's Guide: Contents
Etch tips
Extending Make with External Application
G-code and OMAX
Lead / Lag
Live View
NON OMAX.ORD Files
OIR Change Log
OMAX G-code Parser
OMAX Routed Data (ORD) file format
OMX file format specification
Open (Change Path Setup)
pause
Programming coordinated Z motion
scribe
Statistics
String
Structure of the OMAX DXF file
Taper Compensation
Tilt-A-Jet (Accessories)
Tips for Cutting Tubes
Writing post processors for OMAX and M...
<b>XData</b>
XData
XData Command Functions
XData in OMX Files
XData Tutorial

# Step 4: Common XData Commands

- [002] – Comment on Entity
  - Allows a comment to display on entities in the **LAYOUT** drawing or tool path

[002] –  Comment on Entity

## Comments and Text Attributes

[002] –  Comment on Entity

# Step 4: XData – Comment on Entity Example



Must cut with mini-jet or resize for larger nozzle

“Must cut with mini-jet or size for larger nozzle”

400739F

# Step 4: XData Z-Axis Commands

- [019] – Move Z Command
  - Moves the Z-axis vertically (no horizontal movement).
    - Positive (+) number moves Z up
    - Negative (-) number moves Z down

[019] –  Move Z

## Z-Axis Commands

[019] –  Move Z

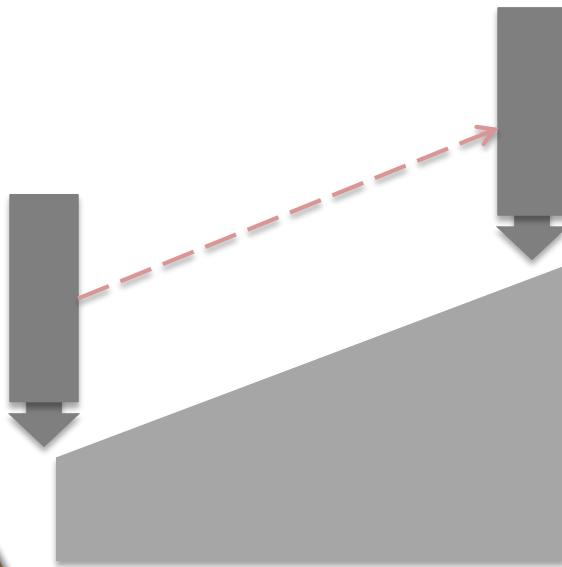


*See the OIR for warnings related to using this command.*

# Step 4: Z-axis Movement Comparison

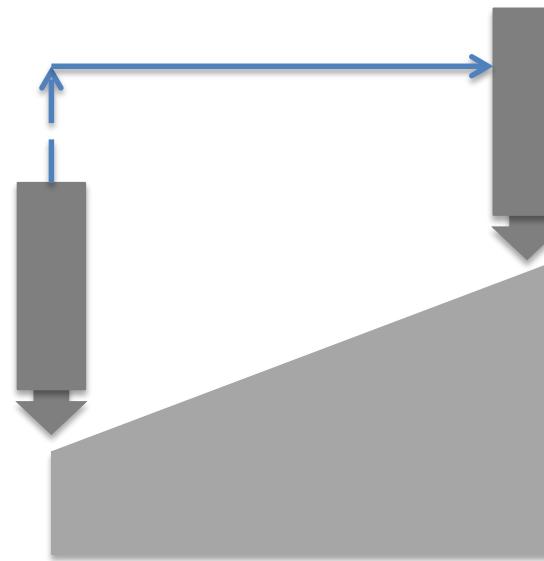
Z movement if programmed  
with the 3D Path Editor

Moves X,Y, and Z while cutting  
(can vector)



Z movement if programmed  
with XData

Moves Z up or down only  
Relays stay active.

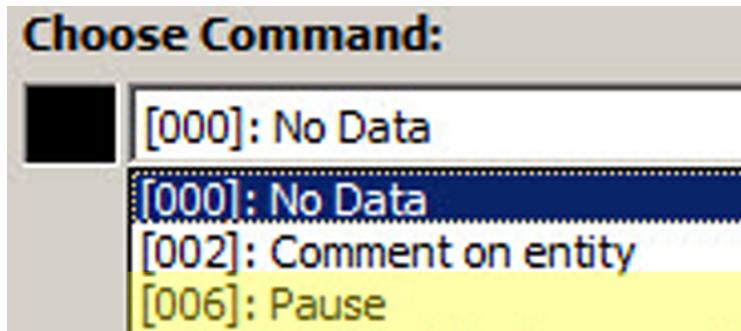


*See the OIR for warnings related to using this command.*

# Step 4: XData Speed and Pause Commands

- [006] – Pause Command

[006] –  Pause



- The pause will occur at the exact location specified (the starting point of the entity with Pause assigned).
- Operator must press **Continue** for the machine to continue on the path.



*See the OIR for notes related to using this command.*

# XData Command

- [000] – No Data
  - No **XData** is assigned
    - Used to remove **XData** from an entity - simply set its **XData** to be "No Data"

[\[000\] – No Data](#)

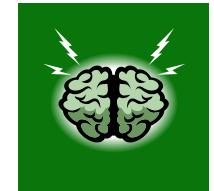
## Step 4: Best Practices When Using **XData**

- Avoid auto pathing when working with **XData**.
- You cannot assign more than one **XData** item on a given entity.
- You must select an entity or entities before you can assign **XData**.
- All files with **XData** must be saved as OMX files when they are converted to machine tool files.

# Step 4: Add the Path Elements to the Drawing

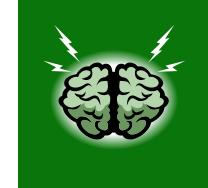
## Review

1. Which of the following items are elements of the nozzle travel path?
  - a. Traverses
  - b. Lead ins and Lead outs
  - c. Part geometry
  - d. All of the above
  
2. Which **LAYOUT** drawing tool do we use to add a V-Style Lead in and Lead out?
  - a. Line
  - b. V
  - c. Tab
  - d. Lead i/o

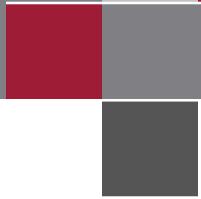


# Step 4: Add the Path Elements to the Drawing

3. On *internal geometry*, we typically want to pierce and cut on which side of the geometry?
  - a. Inside
  - b. Outside
  - c. It depends on the part
4. Which Lead in/out tool shows you previews of various path options ?
  - a. V-Style or V-Style with Traverse
  - b. AutoPath Quick
  - c. AutoPath Advanced & Configure
  - d. Create Tab



# Steps in Making Parts



- **Intelli-MAX LAYOUT**

**Step 1:** Obtain/create a Drawing File (DXF file).

**Step 2:** Assign machining Qualities (edge finish).

**Step 3:** Clean the drawing.

**Step 4:** Add Path elements to the drawing & save it.



**Step 5: Create the Machine Tool Path file (ORD/OMX).**

- **Intelli-MAX MAKE**

**Step 6:** Start up the machine.

**Step 7:** Configure Machine Settings.

**Step 8:** Open and configure the ORD/OMX file.

**Step 9:** Load and clamp the material.

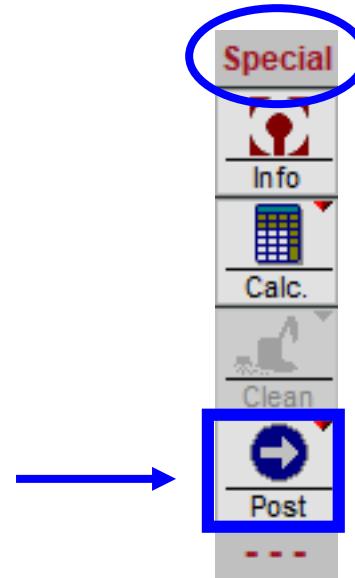
**Step 10:** Begin machining and cut the part.



# Step 5: Create the Machine Tool Path File

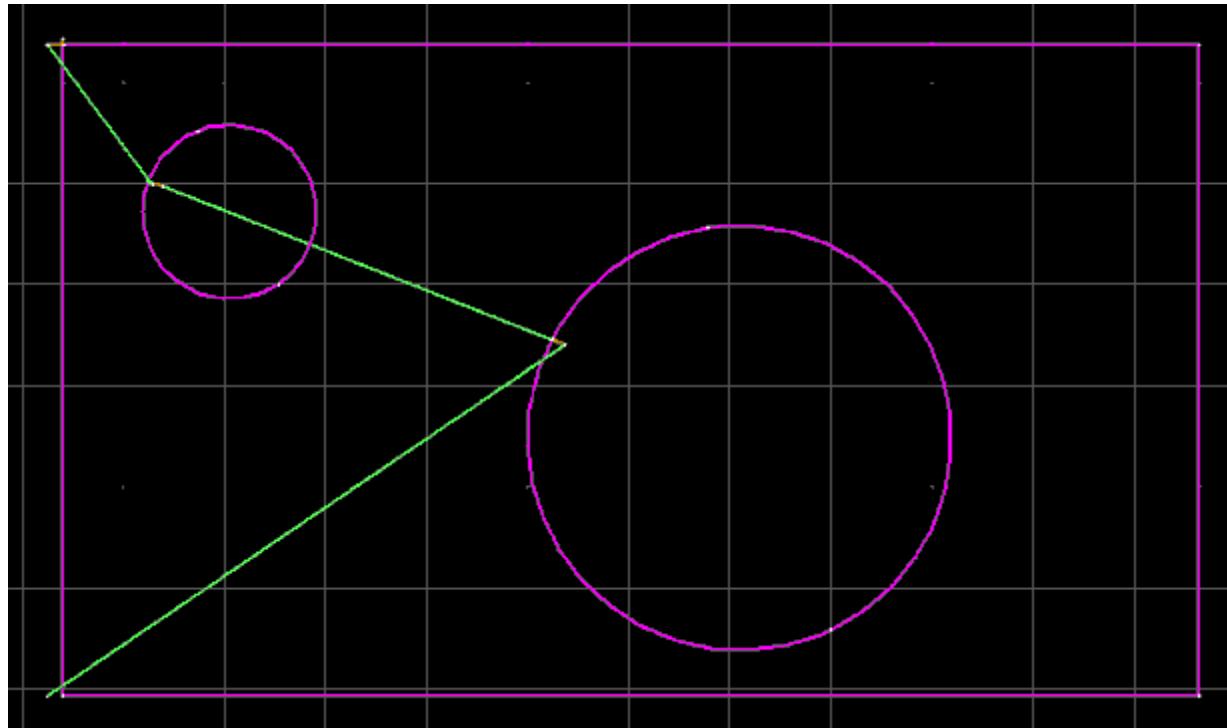
## Create the Machine File (ORD/OMX file)

- Open a saved DXF drawing file.
- Run the **Post** tool.
- Perform quality checks.
- Save the ORD/OMX file.



# Step 5: Create the Machine Tool Path File

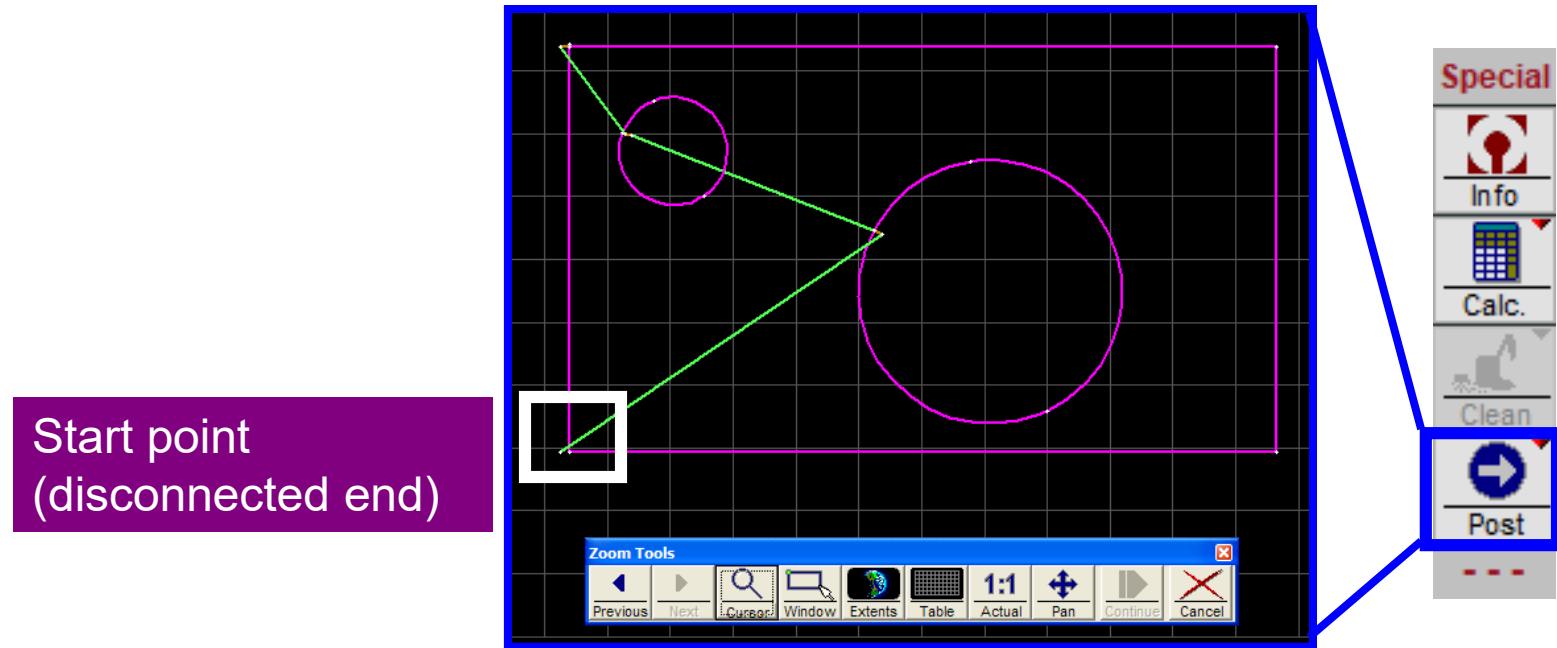
Task 1: Open a saved DXF drawing file that has path elements added to it.



# Step 5: Create the Machine Tool Path File

## Task 2: Run the **Post** tool.

- When you click the **Post** tool, **Zoom Tools** opens.
- Click the Start point.

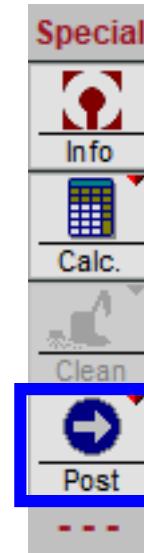


# Step 5: Create the Machine Tool Path File



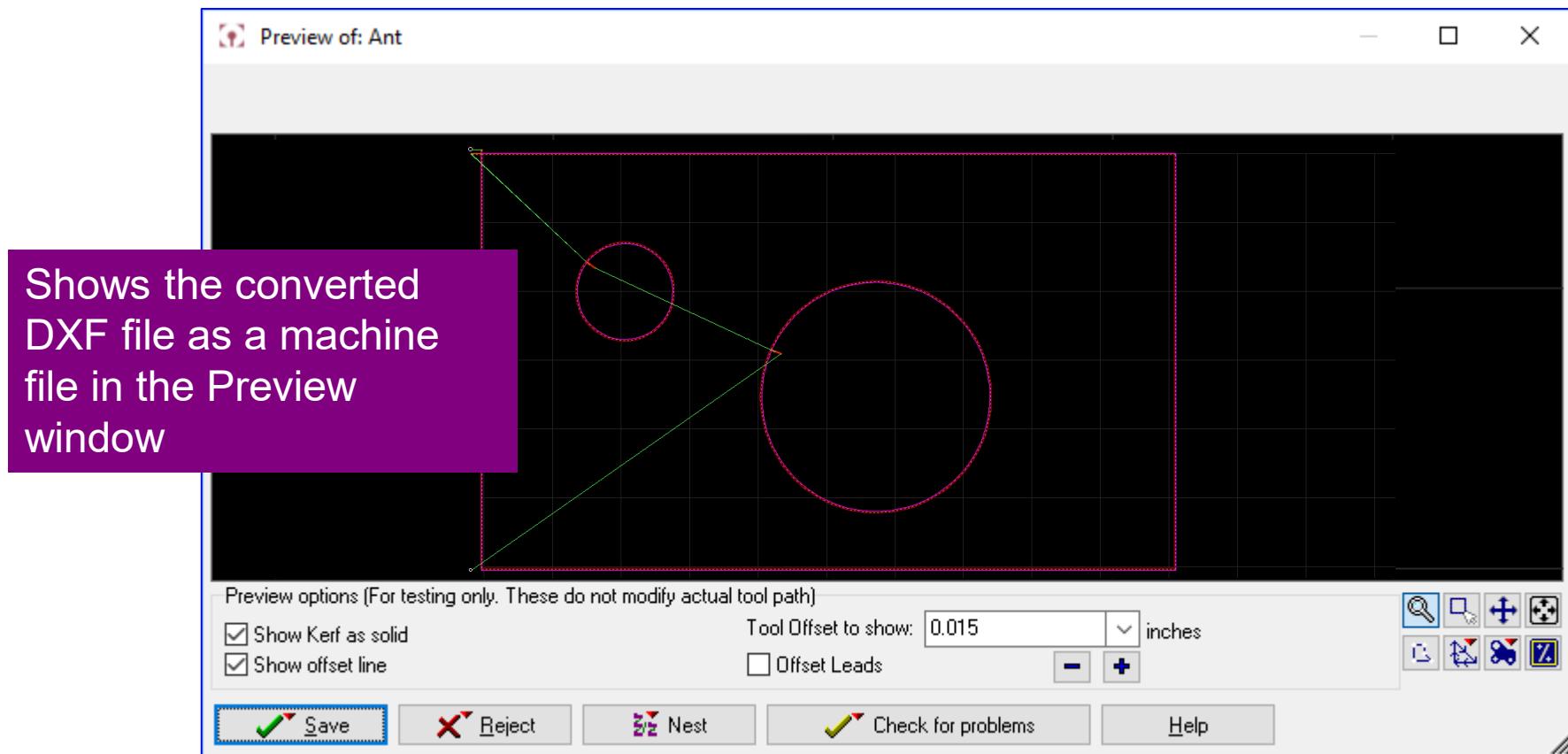
## Practice

- *Run the **Post** tool on a test DXF file (click for default tool).*
- *Pick the start point in the DXF file.*
- *Review the Preview window.*



# Step 5: Create the Machine Tool Path File

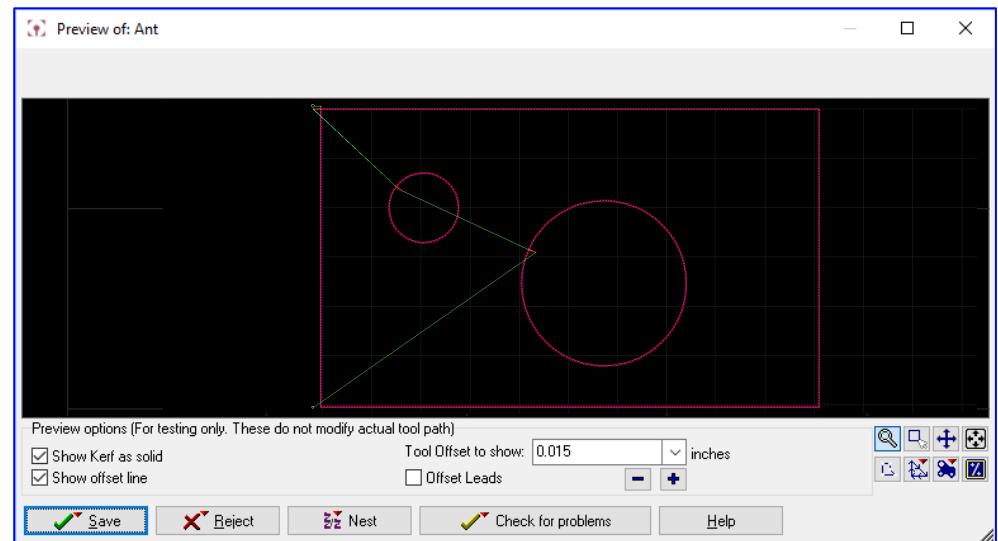
## Preview Window



# Step 5: Create the Machine Tool Path File

## Preview Window Quality Checks

- Identify path errors
- Render as solid
- Verify tool offset
- Check for problems



# Step 5: Create the Machine Tool Path File

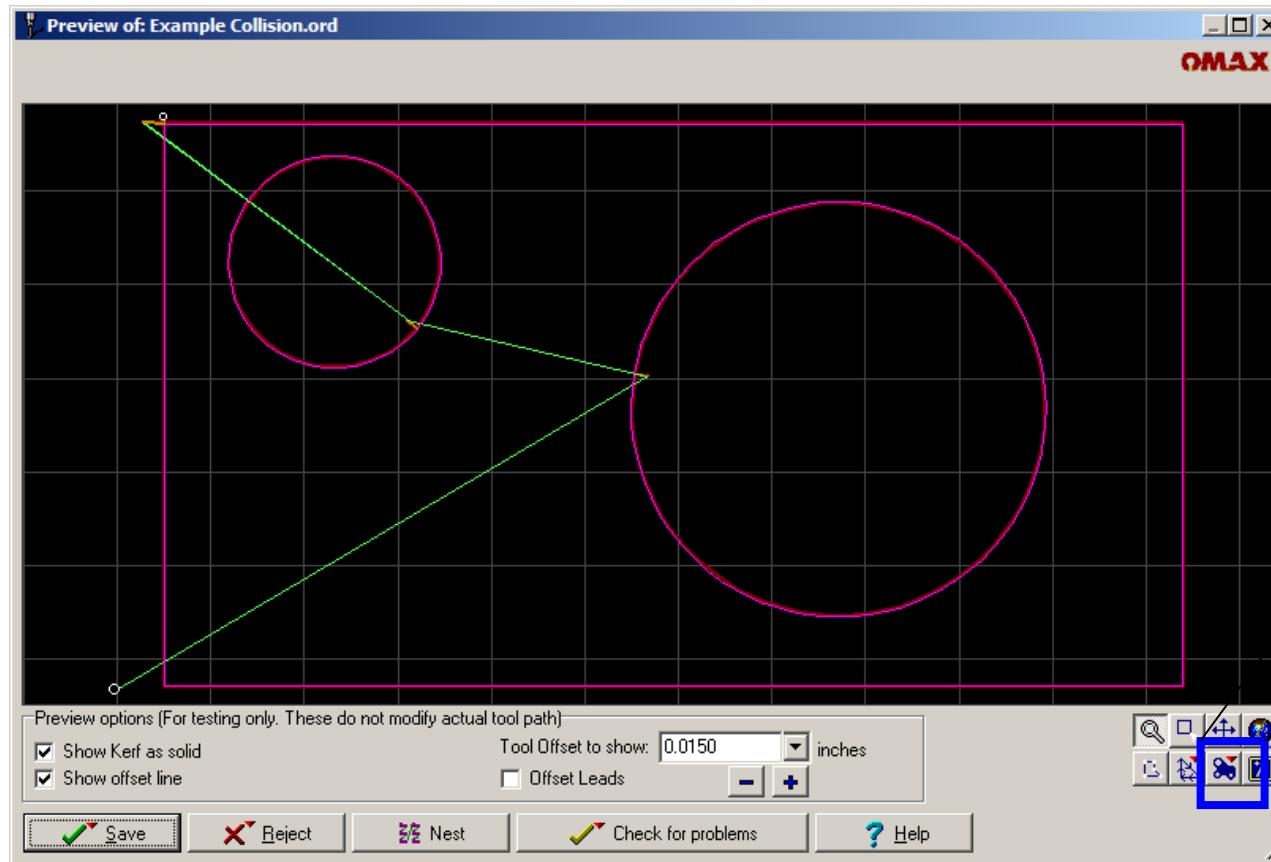


## Practice

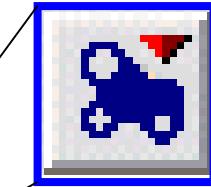
- *Run the **Post** special tool.*
- *In the Preview window show and discuss each of the following quality checks*
  - **Render as solid**
  - **Verify tool offset** (using arrows, kerf, and tool offset settings)
  - **Check for problems**

# Step 5: Create the Machine Tool Path File

Perform quality checks in Preview



Render as solid



# Step 5: Create the Machine Tool Path File

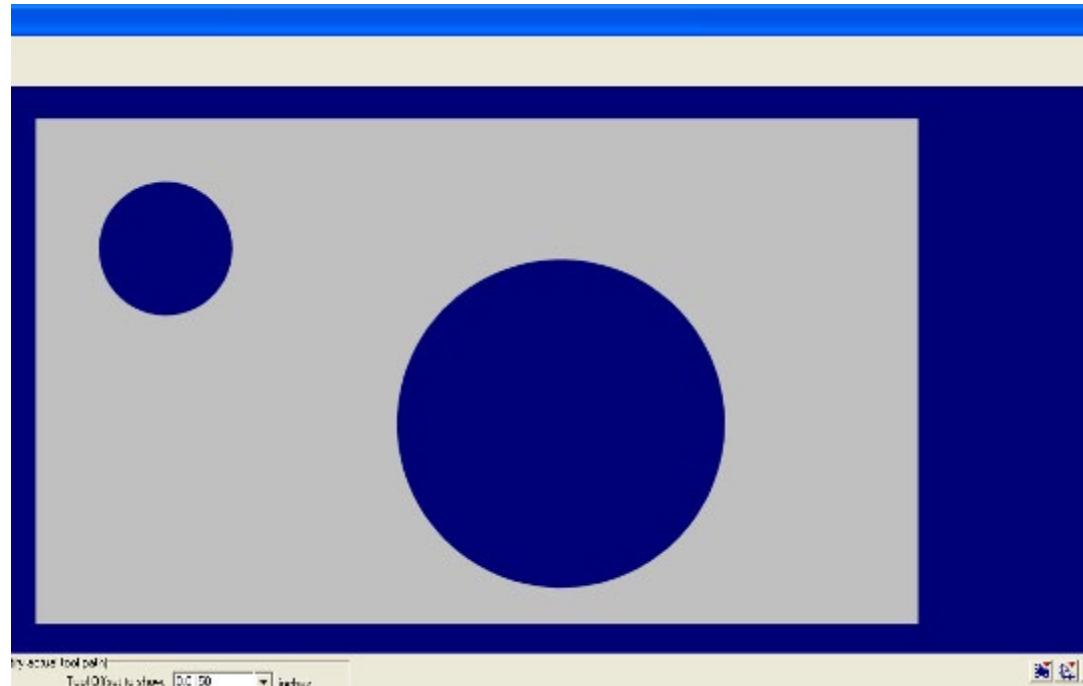


## Perform quality checks in Preview

Practice

*Run the **Render as Solid** quality check.*

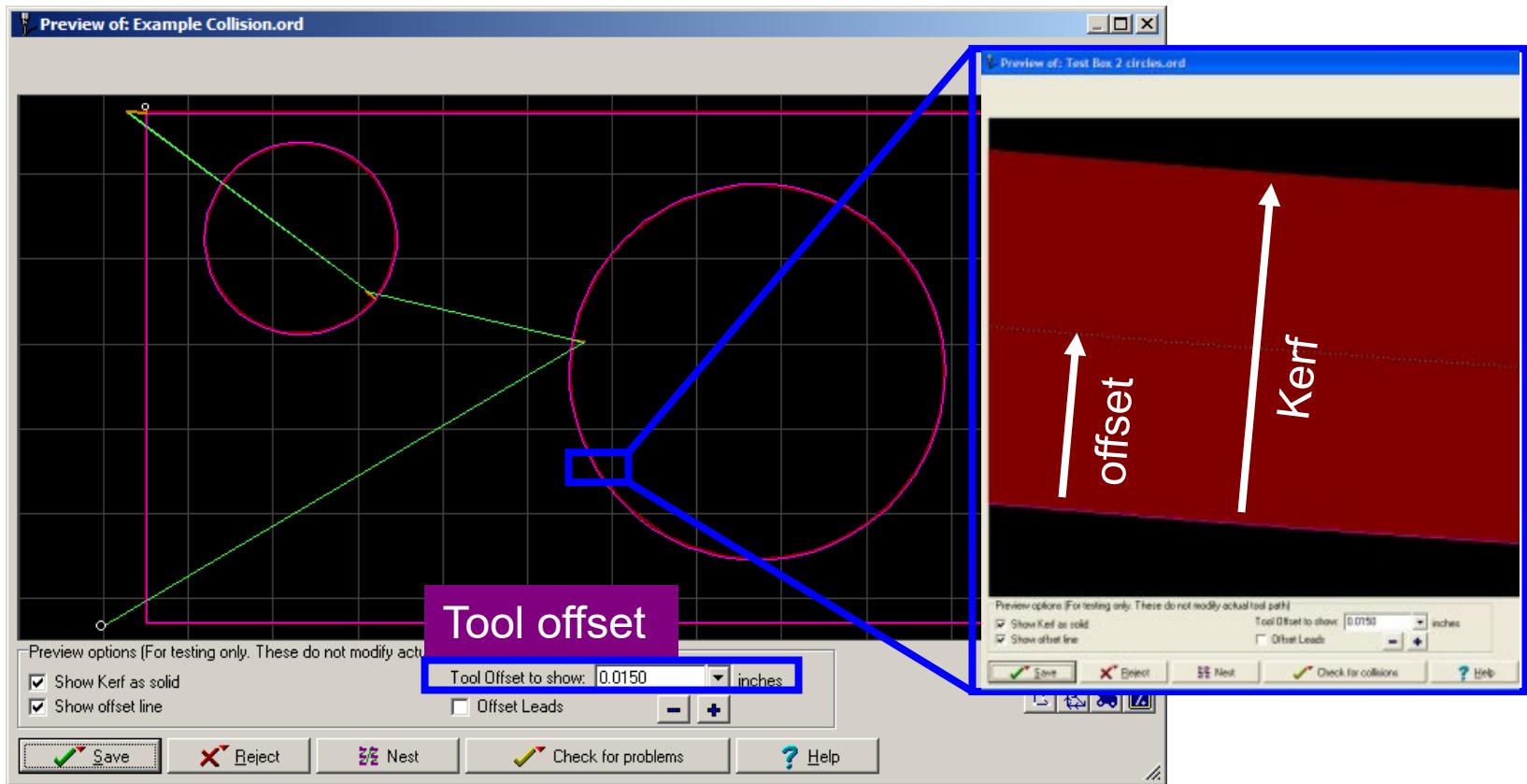
Render as Solid won't work if you have tabs in your drawing!



OIR – keyword “render”

# Step 5: Create the Machine Tool Path File

Perform quality checks in Preview

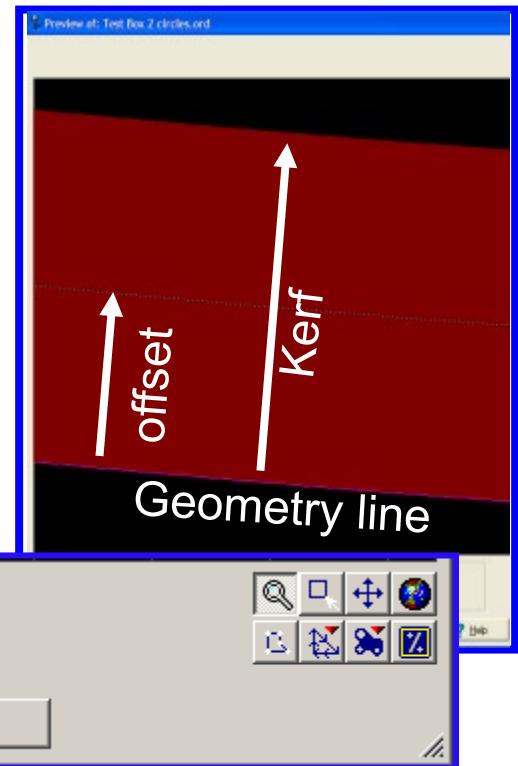


# Step 5: Create the Machine Tool Path File

## Perform quality checks in Preview

### Practice

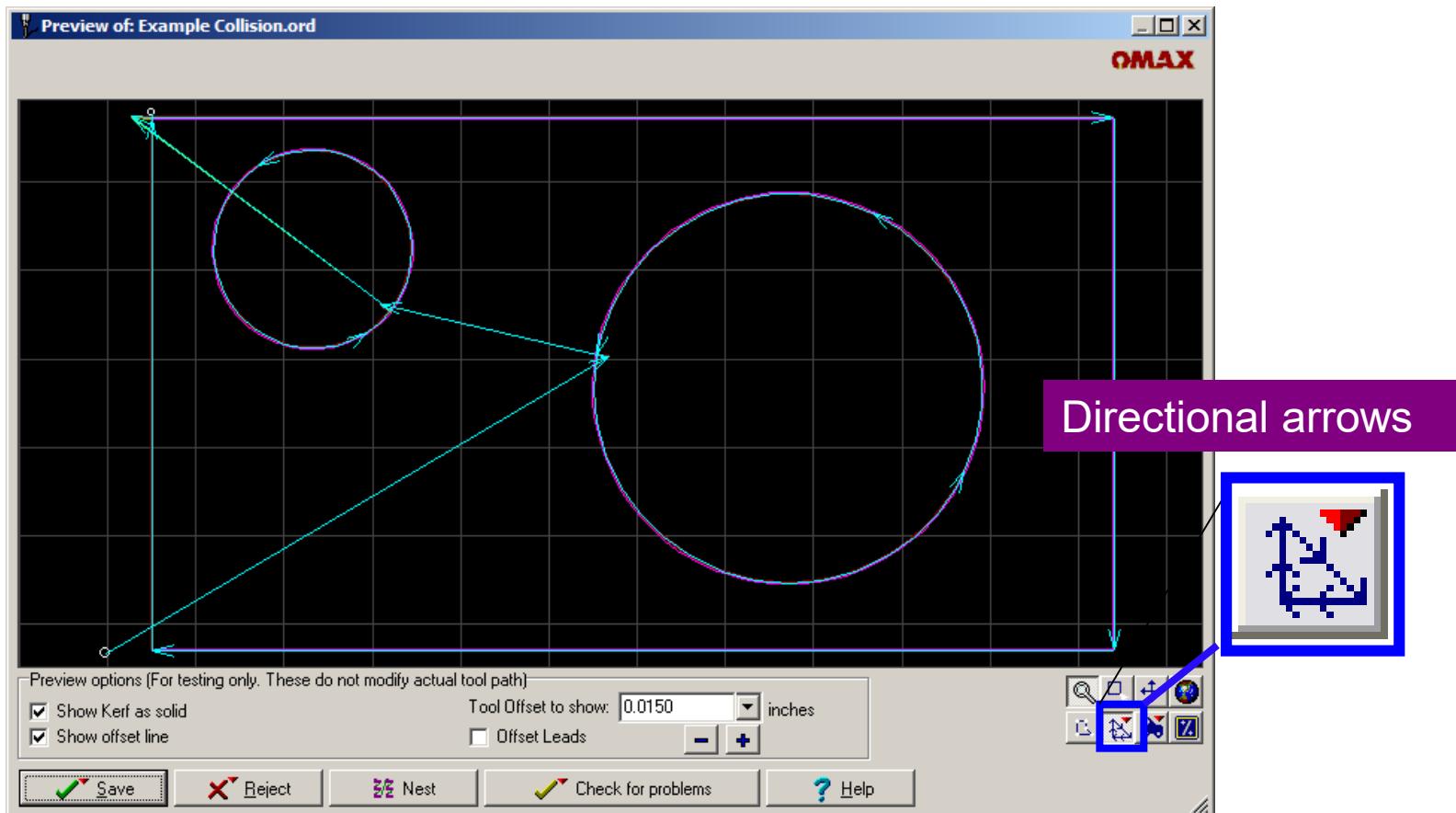
*Run the **Post** tool and change the **Tool Offset** to see how the kerf width changes.*



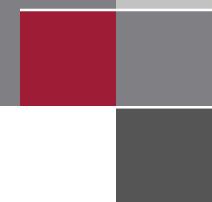
OIR – keyword “offset”

# Step 5: Create the Machine Tool Path File

## Perform quality checks in Preview



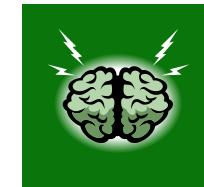
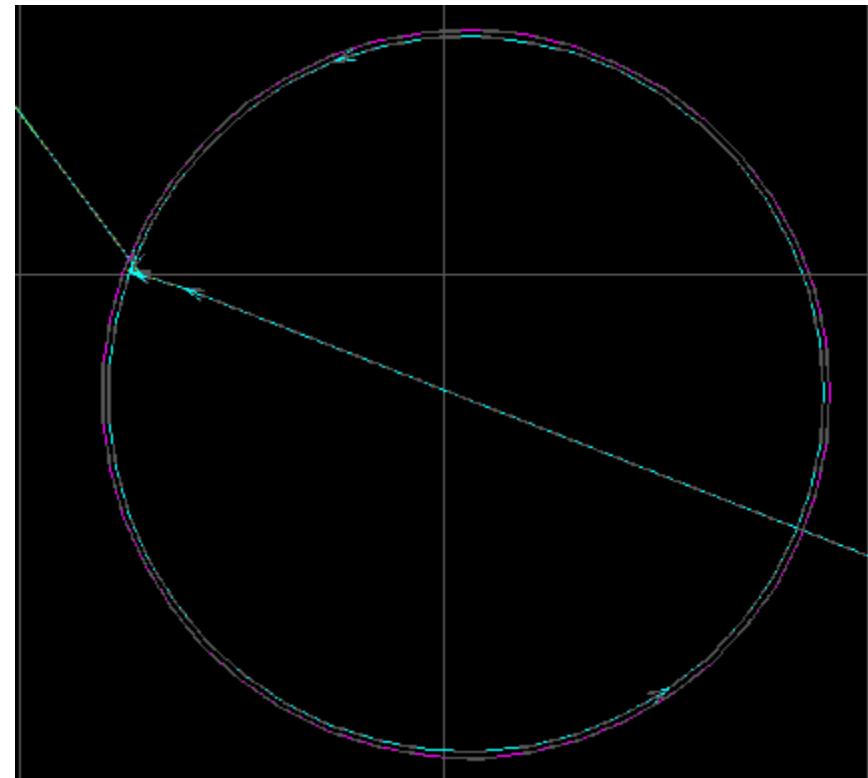
# Step 5: Create the Machine Tool Path File



## Perform quality checks in Preview

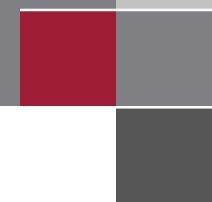
**Q:** Which direction should the nozzle travel when cutting internal geometry?

- a. Clockwise
- b. Counterclockwise



OIR – keyword “path”

# Step 5: Create the Machine Tool Path File

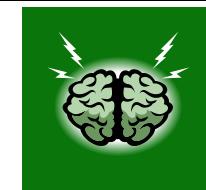
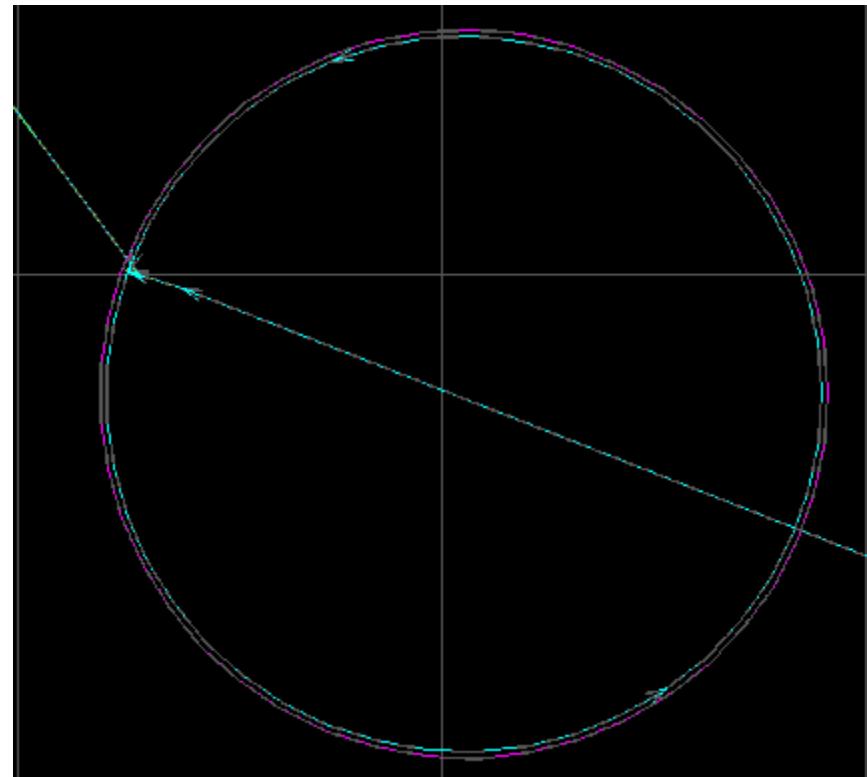


## Perform quality checks in Preview

**A:** The nozzle should travel in the *b. counter-clockwise direction* to cut internal geometry on the inside.

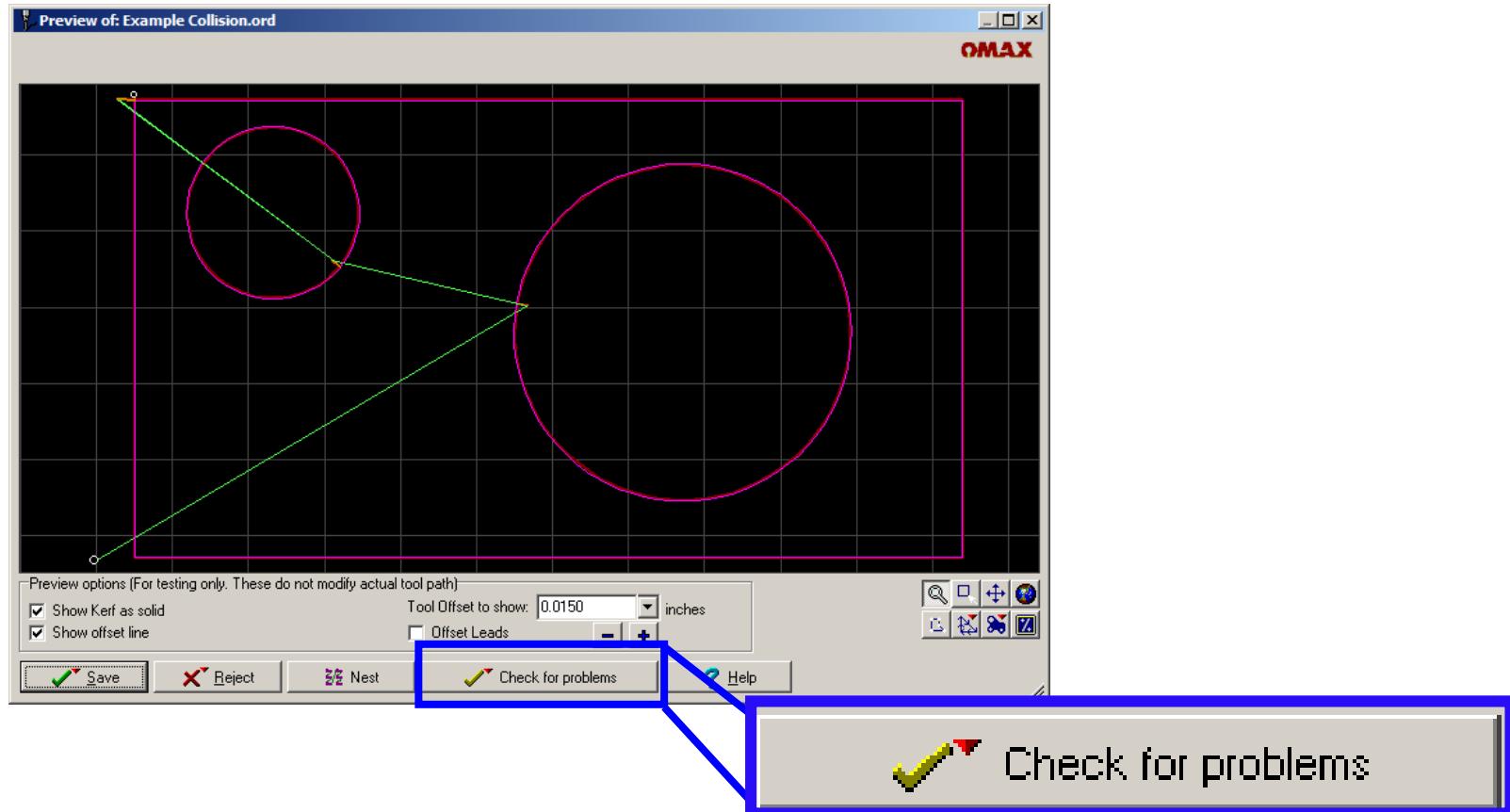
### Practice

- *Run the **Post** tool.*
- *Activate the **Arrow** tool.*
- *Discuss the benefits of the tools.*

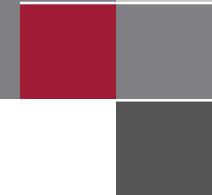


# Step 5: Create the Machine Tool Path File

## Perform quality checks in Preview

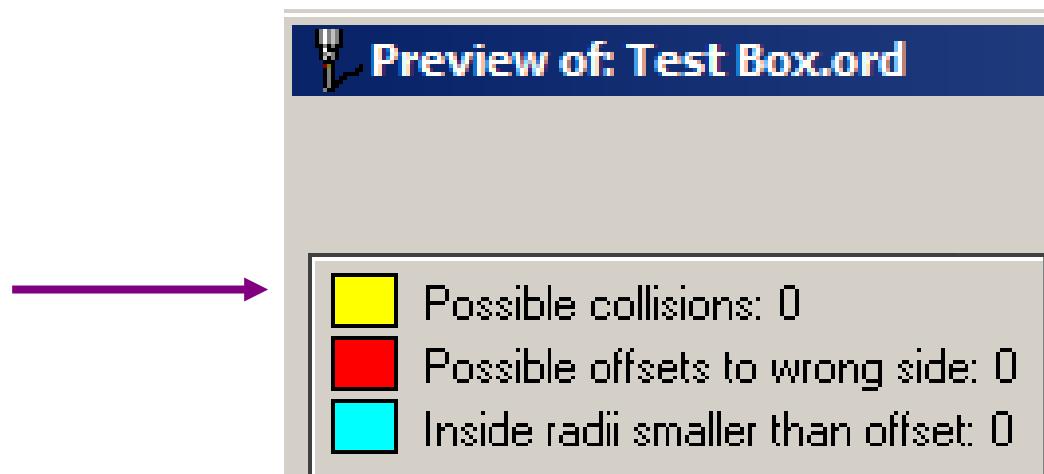


# Step 5: Create the Machine Tool Path File



## Practice

- Run the **Post** tool on a known good part (no collisions).
- Run the **Check for Problems** tool.



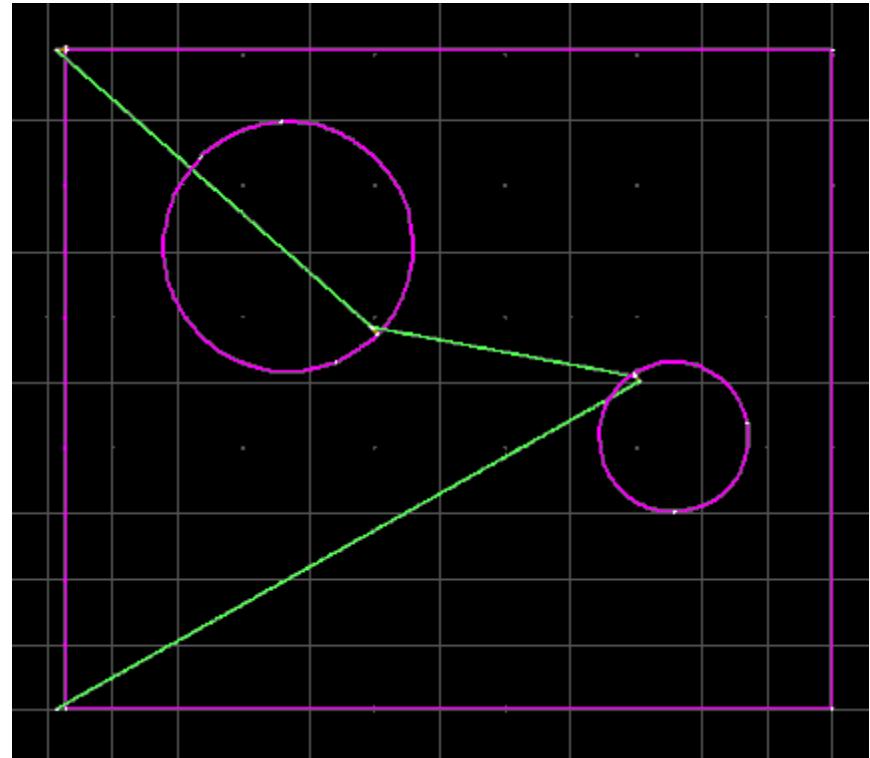
OIR – keyword “collision”

# Step 5: Create the Machine Tool Path File

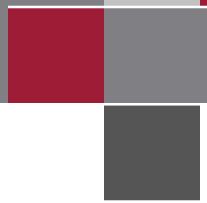


## Practice

- *Run the **Post** tool on a DXF file that has a potential collision point.*
- *Run the **Check for Problems** tool.*

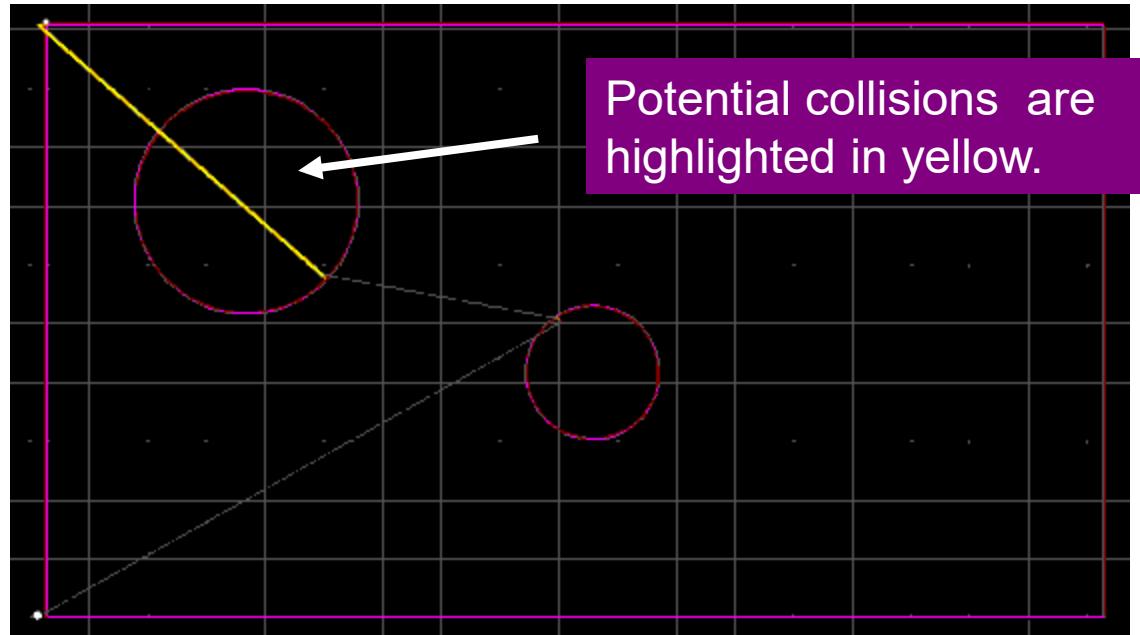


# Step 5: Create the Machine Tool Path File

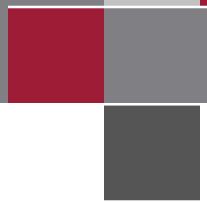


## Performing quality checks in Preview

**Q:** What would you do to avoid or fix this potential collision?

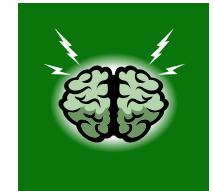
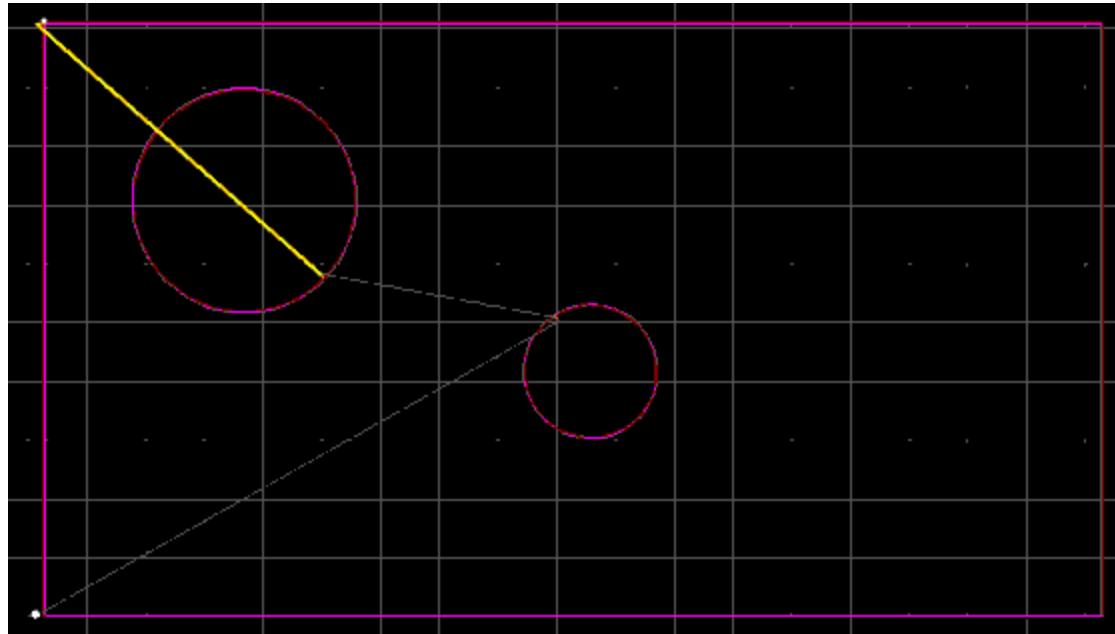


# Step 5: Create the Machine Tool Path File

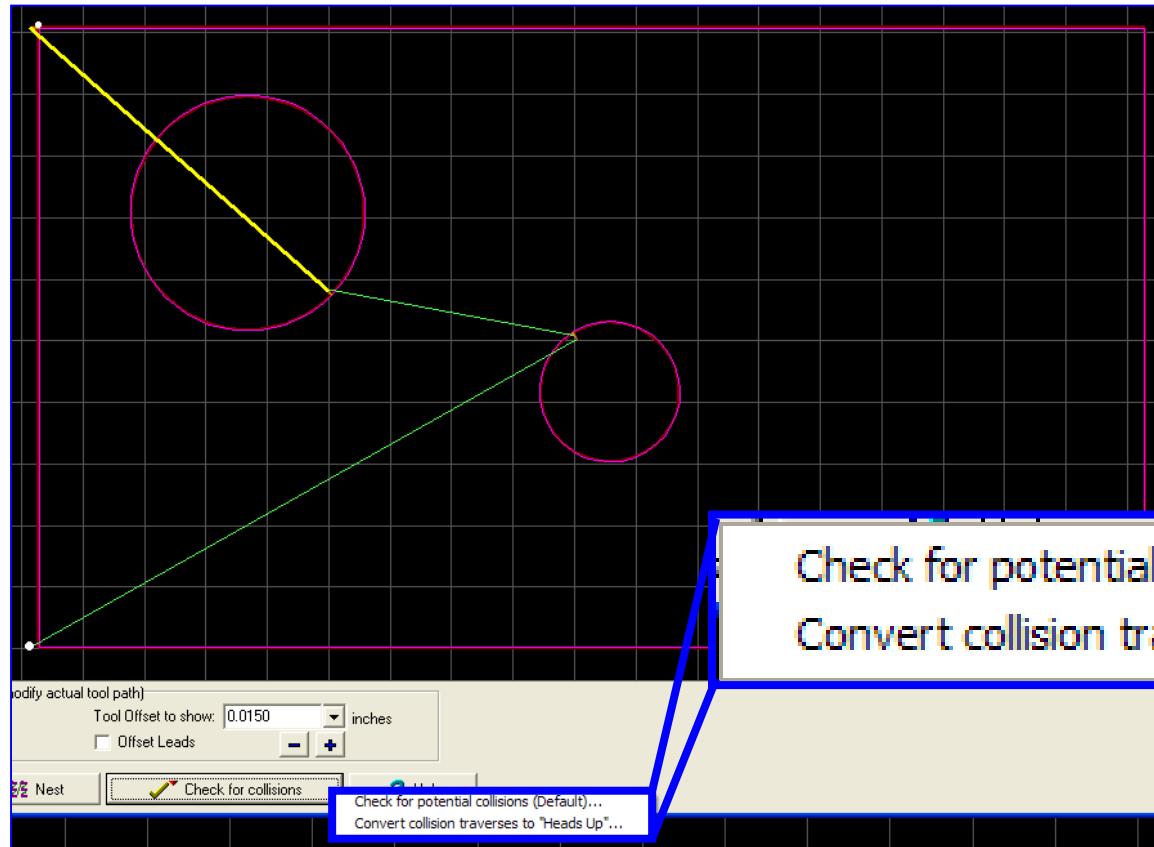


## A: Options to avoid or fix potential collision points

- a. Fix the DXF drawing by moving the lead in/out point.
- b. Move the traverse.
- c. Change the entity to a “heads-up traverse” quality.



# Step 5: Create the Machine Tool Path File

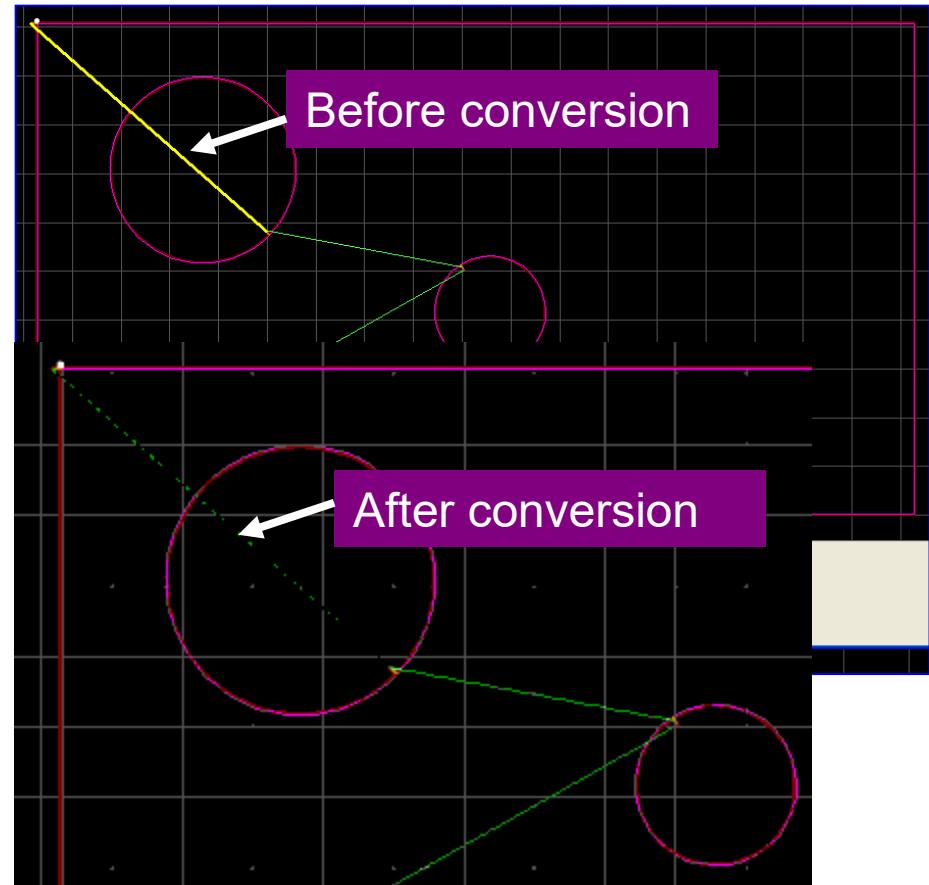


Right-click for option to convert collision points to “Heads Up” traverse.

# Step 5: Create the Machine Tool Path File

## Practice

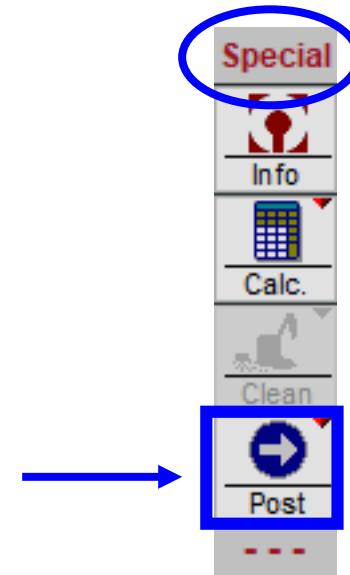
- Run the **Post** tool on a DXF file that has a potential collision point.
- Run the **Check for Problems** tool.
- Convert the potential collision to a heads-up traverse.



# Step 5: Create the Machine Tool Path File

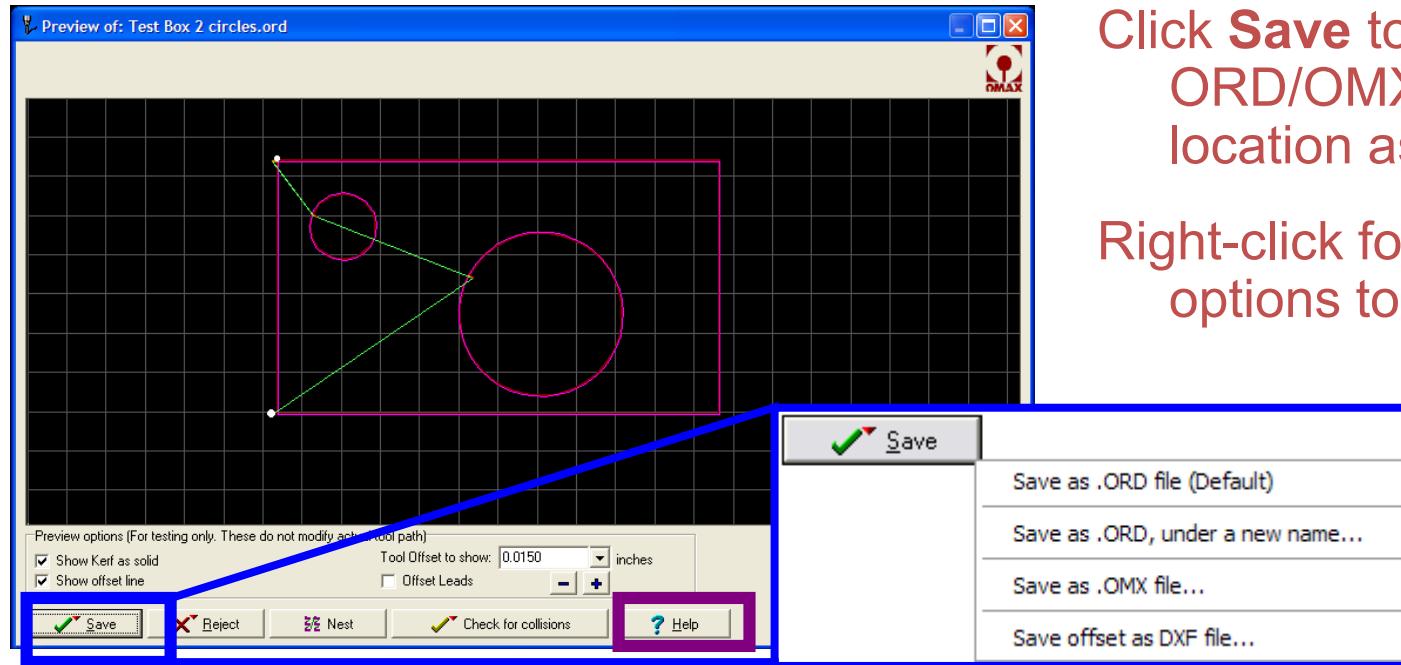
## Creating the Machine File ORD/OMX Overview

- Task 1: Open a saved DXF drawing file.
- Task 2: Run the Post tool.
- Task 3: Perform quality checks.
- Task 4: Save the ORD/OMX file.



# Step 5: Create the Machine Tool Path File

- Save the file from the Preview window.



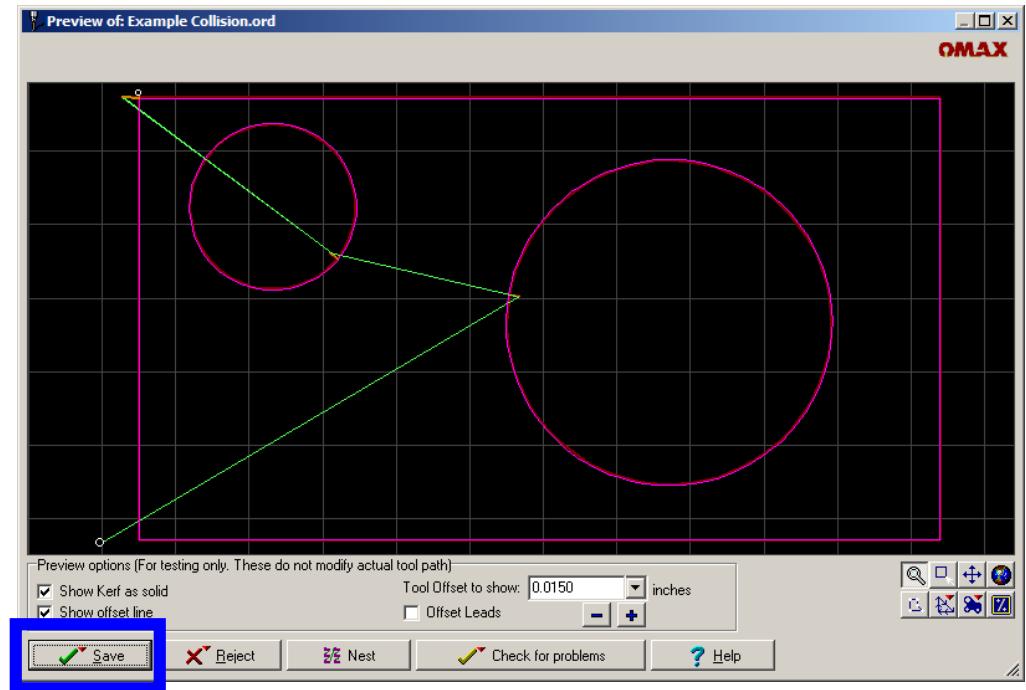
Click **Save** to save the  
ORD/OMX file in same  
location as the DXF file.

Right-click for more  
options to save files.

# Step 5: Create the Machine Tool Path File

## Practice

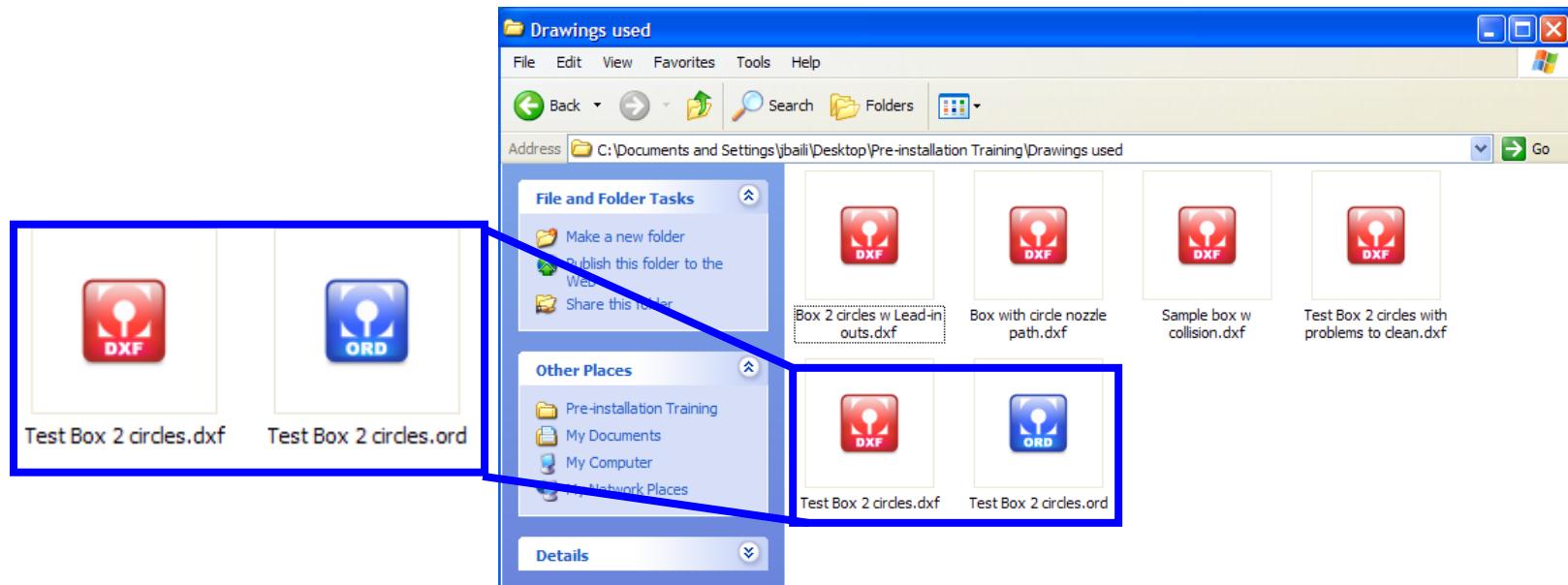
- Run the **Post** special tool.
- Click **Save** to save the ORD file in same location as the DXF file.
- To save as an OMAX file, right-click **Save** and choose **Save as OMAX**.



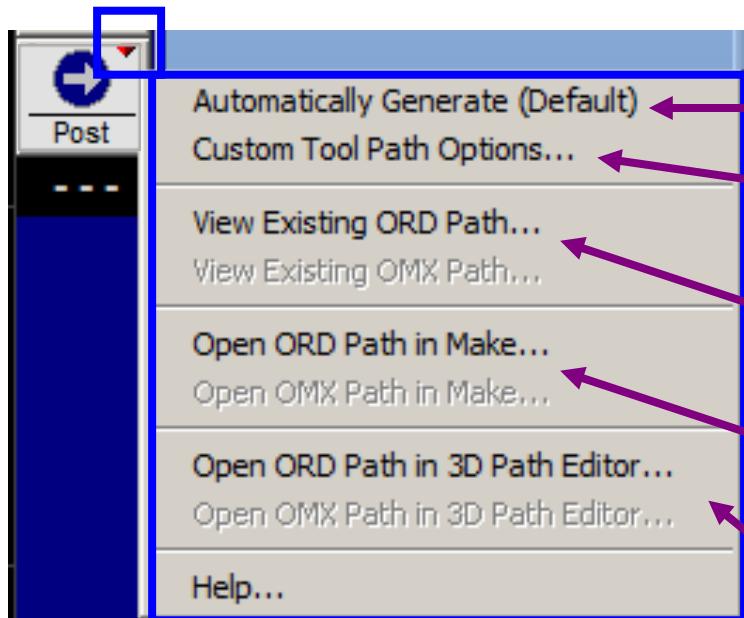
# Step 5: Create the Machine Tool Path File

## Practice

*Find the DXF and ORD or OMX file icons.*



# Step 5: Create the Machine Tool Path File



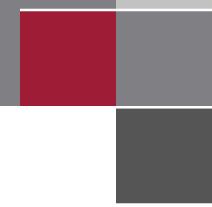
- Post tool options**
- Default Path tool
  - Custom Path options (use with caution)
  - Display the ORD/OMX path after it has been saved
  - Open the ORD/OMX file in **MAKE**
  - Opens the ORD/OMX file in 3D Path Editor

# Step 5: Create the Machine Tool Path File

## Practice Steps 1-5 in **LAYOUT**

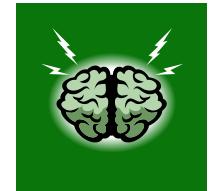
- *Create a new drawing using **LAYOUT** drawing tools (DXF file).*
- *Assign machining qualities to the entities in the drawing.*
- *Run the **Clean** tool.*
- *Add a nozzle travel path using the automatic pathing tools (**Lead i/o** tools).*
- *Add a comment to an entity in the drawing using **XData** commands.*
- *Save the DXF file.*
- *Run the **Post** tool and save as an OMX file.*

# Step 5: Create the Machine Tool Path File



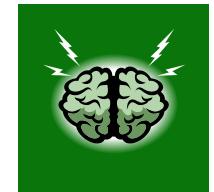
## Review

1. Which special tool do we use to do tasks such as erase duplicate entities and/or close tiny gaps in our drawings?
  - a. Lead i/o
  - b. Clean
  - c. Post
  
2. Which special tool converts the DXF drawing file to a machine file?
  - a. Lead i/o
  - b. Special
  - c. Post
  - d. Clean



# Step 5: Create the Machine Tool Path File

3. Which of the following are quality checks you should perform when previewing your part in the preview window?
  - a. Check the tool offset
  - b. Render as solid
  - c. Check for problems
  - d. All of the above
  - e. None of the above
  
4. What are the 4 primary tasks performed in creating a machine tool path?
  1. \_\_\_\_\_
  2. \_\_\_\_\_
  3. \_\_\_\_\_
  4. \_\_\_\_\_



# Help on Tool Pathing and Other Topics



Training Videos

◀ Previous      Next ▶

## Layout Videos

- [Beginner Exercises](#) - also see OMAX help page: [Beginner Exercises](#)
- [Intermediate Exercises](#) - also see OMAX help page: [Intermediate Exercises](#)
- [Advanced Exercises](#) - also see OMAX help page: [Advanced Exercises](#)
- [Expert Exercises](#) - also see OMAX help page: [Expert Exercises](#)
- [Nesting Parts](#) - also see OMAX help page: [About Nesting](#)
- [Using 3 Point Arc and Fillet Commands to Clean up Drawings](#) - also see OMAX help pages: [Arc](#) and [Fillet](#)
- [Collision Detection and Prevention](#) - also see OMAX help page: [Check for Collisions](#)
- [Using Bookmarks to Find Your Favorite Directories](#) - also see OMAX help page: [Edit Bookmarks](#)
- [Introduction to Parametric Shapes](#) - also see OMAX help page: [Parametric Shape](#)
- [Pathing Tools](#) - also see OMAX help page: [Generate Tool Path](#)
- [Diagnosing Problems with Tool Paths](#) - also see OMAX help page: [Generate Tool Path](#)
- [Mirror and Rotate Commands](#) - also see OMAX help pages: [Mirror](#) and [Rotate](#)
- [The Smooth Command](#) - also see OMAX help page: [Smooth](#)
- [Smoothing Part II - More Techniques](#) - also see OMAX help page: [Smooth](#)
- [Snaps](#) - also see OMAX help page: [Snap Toolbar](#)
- [A Unique Use for the Tool Offset](#) - also see OMAX help page: [Offset](#); For a more sophisticated solution, also see [Design to Cut](#).
- [Image Tracing Tools](#) - also see OMAX help page: [Overview of Image Tracing](#)
- [Image Tracing Part II](#) - also see OMAX help page: [Overview of Image Tracing](#)
- [Creating Your Own Tool Path Fonts](#) - also see OMAX help page: [Creating Your Own Fonts for Layout](#)
- [Extending and Trimming Lines](#) - also see OMAX help page: [Extending an Existing Entity](#)
- [Trimming and Extending Lines, Part II](#) - also see OMAX help page: [Extending an Existing Entity](#)
- [Starting and Ending a Tool Path at the Same Spot](#) - also see OMAX help page: [Tool Paths Ending where They Start](#)

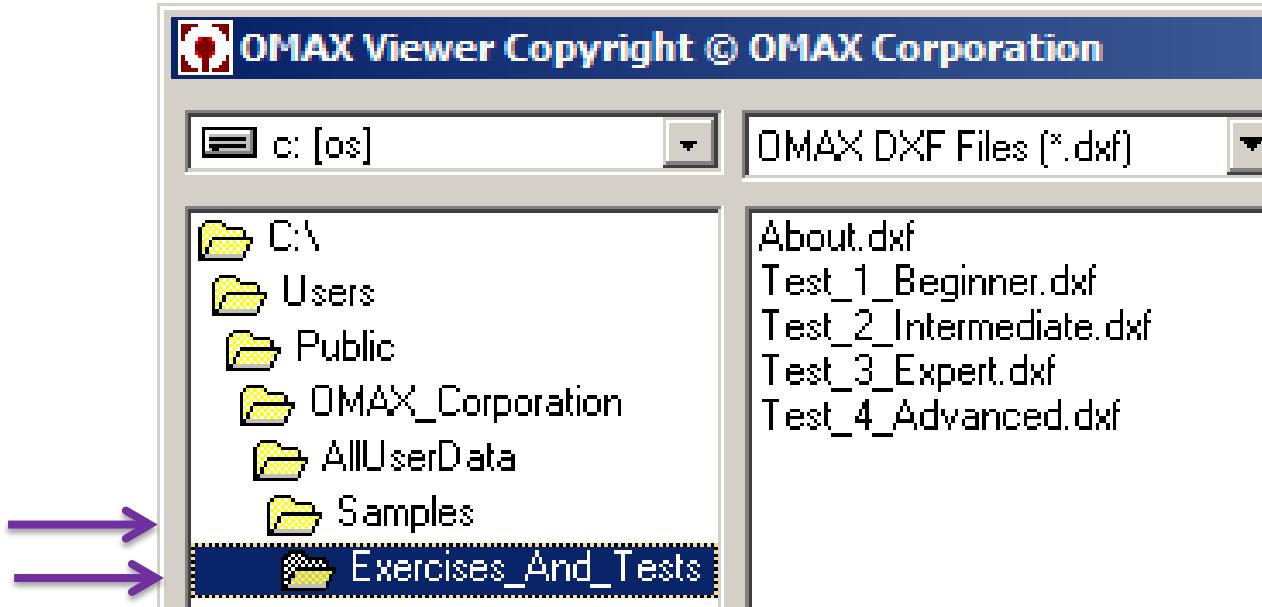
Adobe  
Flash  
Player is  
required  
for the  
videos.

OIR – keywords “videos, training”

# Drawing Exercises

## Samples > Exercises\_And\_Tests

Experiment with the drawing and editing tools by completing these drawing exercises.



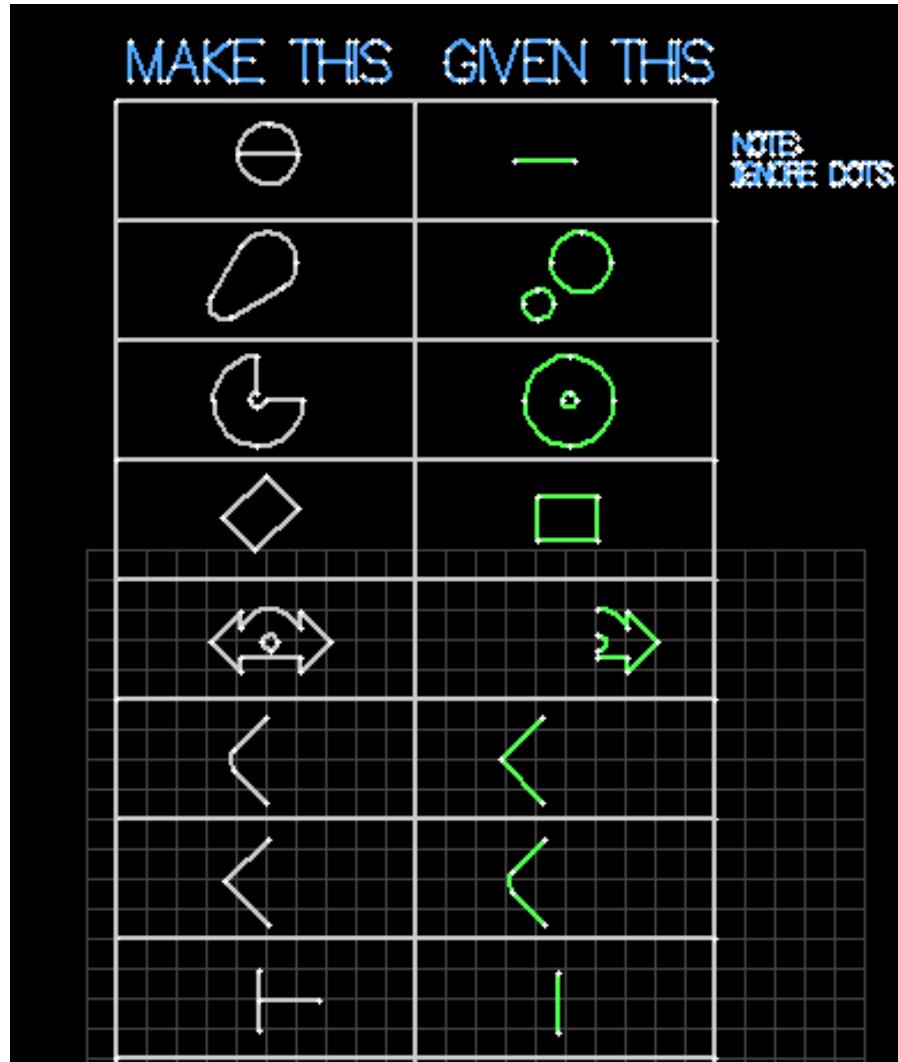
# Drawing Exercises

Test\_1\_Beginner.dxf

Want help?

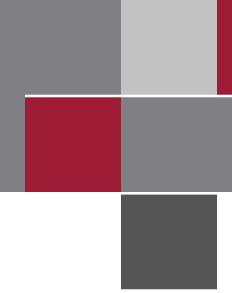
Watch videos to see one way to draw each of the geometries.

See Keyword “Videos” in the OIR, -OR- see the software section of the eLearning Portal



OIR – keyword “exercises”

# Additional Features in OMAX LAYOUT



## Other tools in OMAX LAYOUT

- **Image Tracing** – capability to manually or automatically trace pixilated images
- **Text Tools** – capability to create text in drawings
- **Nesting** – capability to nest parts (cut multiple paths in one drawing)

Explore these on your own. Watch the videos or read the information about each feature in the eLearning Portal.

# Session Activities to Do on Your Own

## Activities

1. Create a new DXF file.
2. Add Machining Qualities to the drawing using the **LAYOUT** Quality tools.
3. Run the **Clean** tool on the DXF file.
4. Add nozzle path elements using one of the **Lead i/o** tools (use one of the automated tools if you want to).
5. Save the DXF drawing file.
6. Add an **XData** command to an entity in the path.
7. Run the **Post** tool to convert the DXF file to a machine tool path preview file.

# Session Activities to Do on Your Own

8. Perform the following quality checks on the ORD preview file
  - Render as solid
  - Check the tool offset
  - Check for problems
9. Use the directional arrows to verify your nozzle is cutting on the correct side of each of the geometries in your drawing.
10. Save the OMX file.
11. Email the OMX file to your trainer as an attachment.
  - Email address \_\_\_\_\_
  - Call if questions \_\_\_\_\_ 253-872-2300 \_\_\_\_\_
12. Practice with the drawing exercises.





# OMAX Operator Training

## Session 3

# Session Topics

- Welcome back
- Session objectives
- Review and questions from Session 2
- Introduction to the Intelli-MAX **MAKE** software
- Machine Startup and Shutdown Checklists
- Contact information for after installation
- Wrap up Session 3

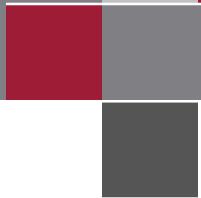


# Session 2 Activities Review

- ✓ Create a DXF drawing file.
- ✓ Assign machining qualities to the drawing in **LAYOUT**.
- ✓ Run the **Clean** tool.
- ✓ Save the DXF file.
- ✓ Add the nozzle path elements to the drawing.
- ✓ Add **XData** to the drawing file.
- ✓ Run the **Post** tool.
- ✓ Perform quality checks in the Preview.
- ✓ Save the OMX file and email to your trainer.



# Steps in Making Parts



- **Intelli-MAX LAYOUT**

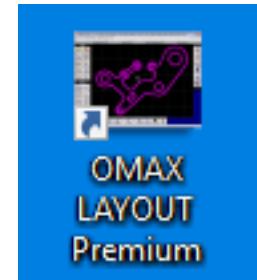
**Step 1:** Obtain/create a Drawing File (DXF file).

**Step 2:** Assign machining Qualities (edge finish).

**Step 3:** Clean the drawing.

**Step 4:** Add Path elements to the drawing & save it.

**Step 5:** Create the Machine Tool Path file (ORD/OMX).



- **Intelli-MAX MAKE**

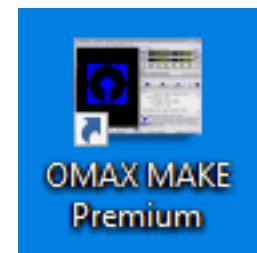
**Step 6:** Start up the machine.

**Step 7:** Configure Machine Settings.

**Step 8:** Open and configure the ORD/OMX file.

**Step 9:** Load and clamp the material.

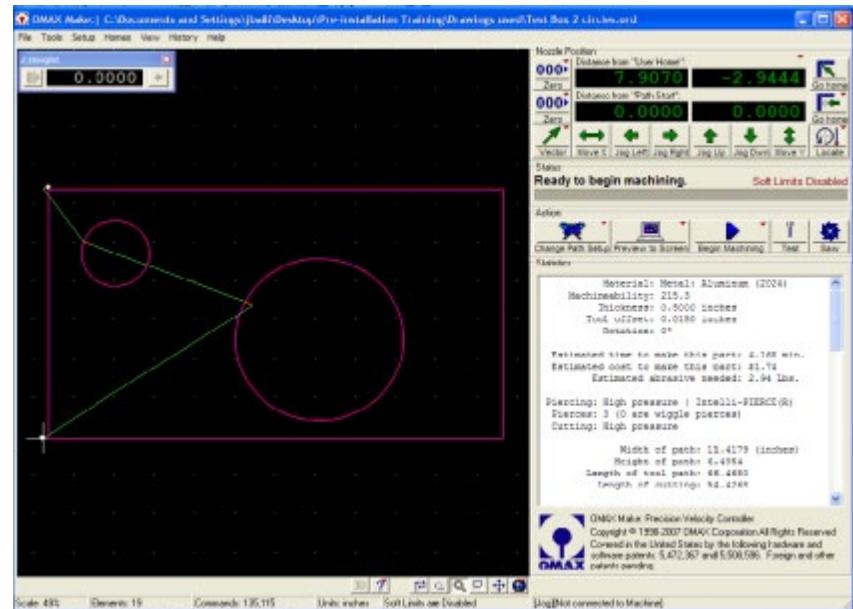
**Step 10:** Begin machining and cut the part.



# Introduction to MAKE Software

## MAKE Software

- Controls the movement and actions of the OMAX JetMachining Center
- The PC sends the motor control commands that move the nozzle and controls the timing of abrasive and high-pressure water events.

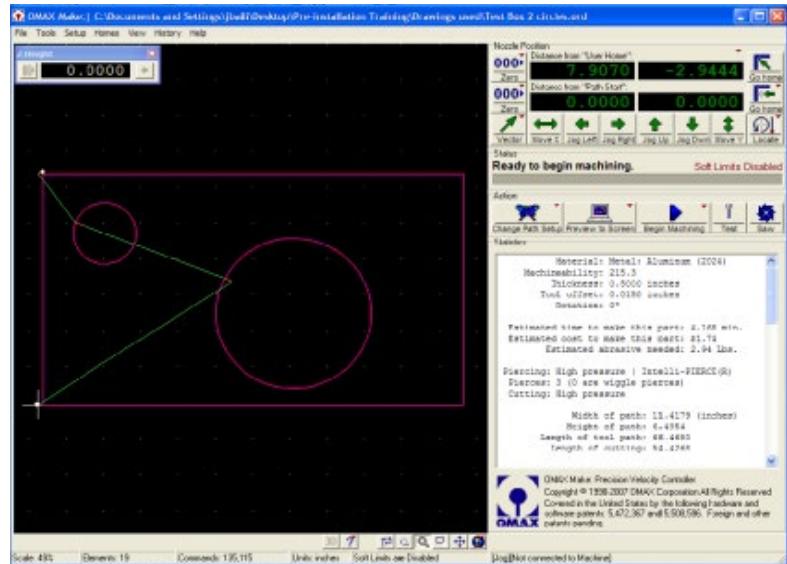


OIR – keyword “MAKE Help Contents”

# Introduction to MAKE Software

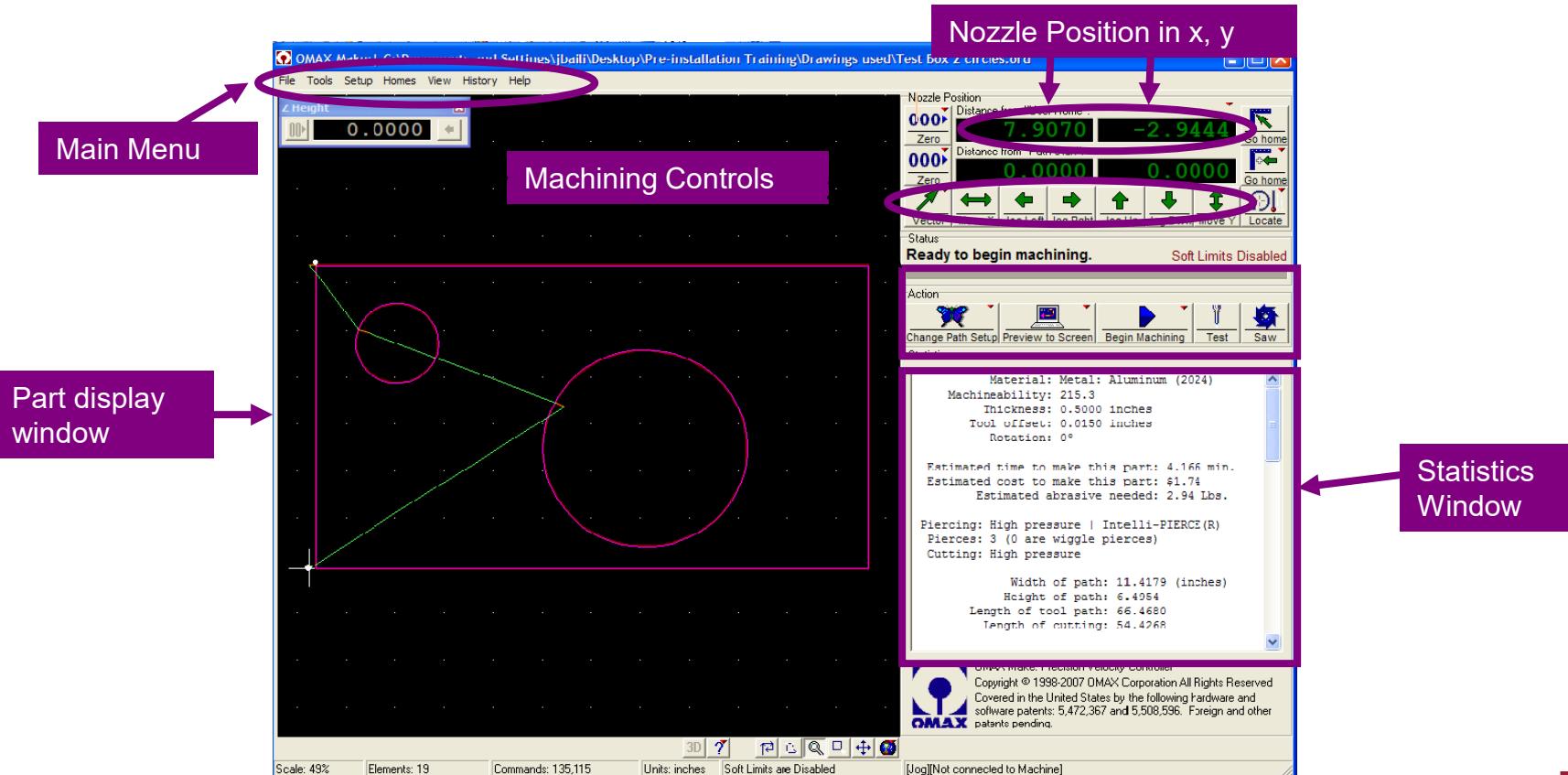
## MAKE Software lets you:

- Set specific controls on your machine
- Specify material set up for each part you cut
- Change variables in your machining process, such as abrasive mesh size, nozzle orifice size, abrasive flow rate and more
- Track part status and statistics, and create reports



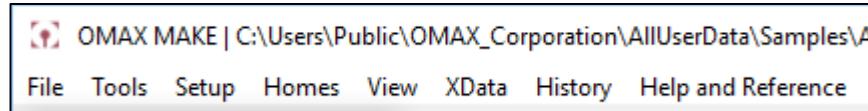
# Introduction to MAKE Software

## Elements in the MAKE Software Window



# Introduction to MAKE Software

## MAKE Main Menu

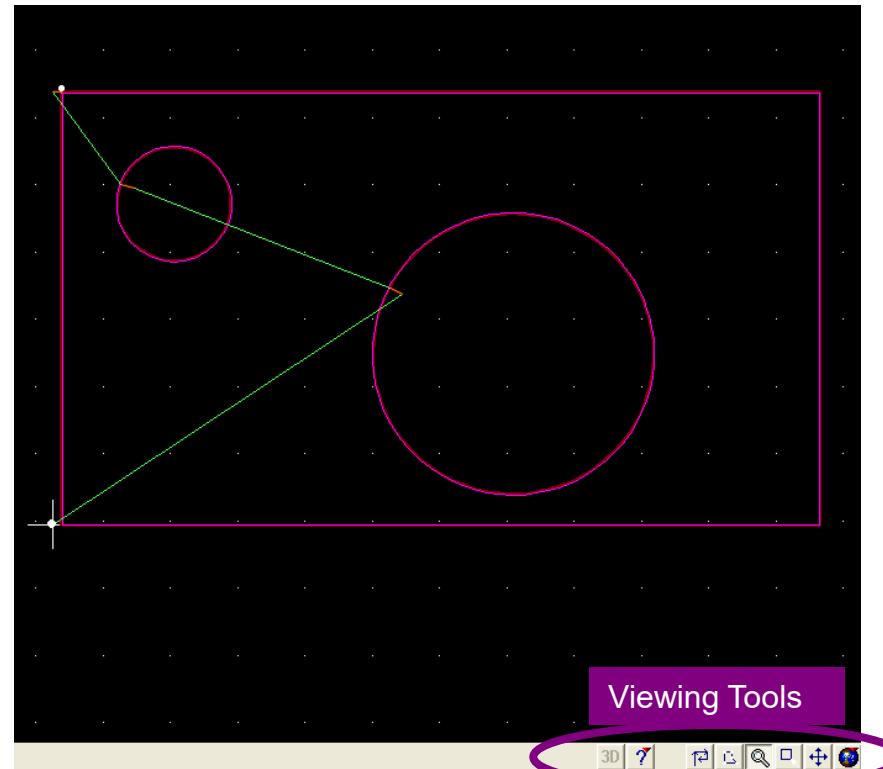


- Gives you access to the various functions available in **MAKE** such as:
  - Open & configure files
  - Print statistics
  - Configure machine settings
  - Set nozzle positions (Homes)
  - View nozzle position data
  - Access part or machine history
  - Access the OMAX Interactive Reference (OIR) Help system

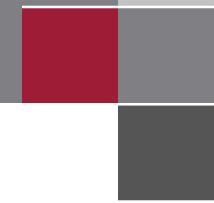
# Introduction to MAKE Software

## MAKE Part Display Window

- Displays the current ORD file in different views
  - Drawing view (default)
  - Motor steps
  - Path sequence
  - Speed
  - Velocity profile
- Shows nozzle position as the part is being cut

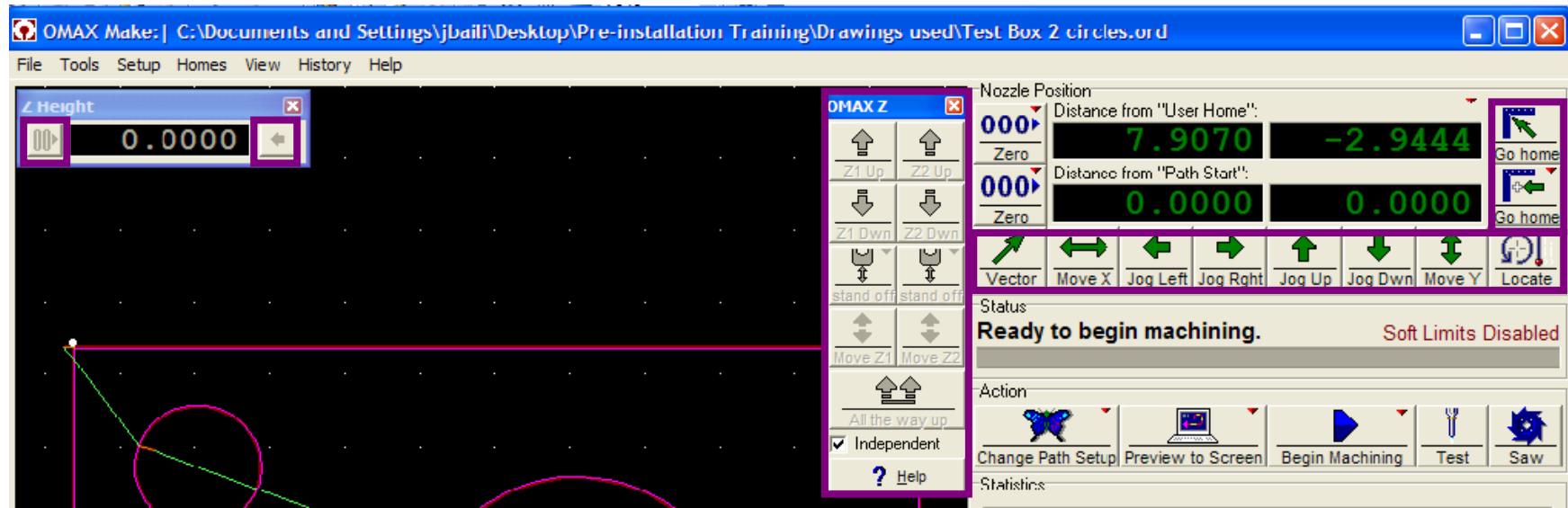
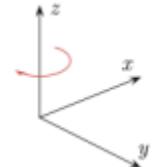


# Introduction to MAKE Software



## MAKE Positioning Controls

- Used to move the cutting head in the X, Y, and Z directions



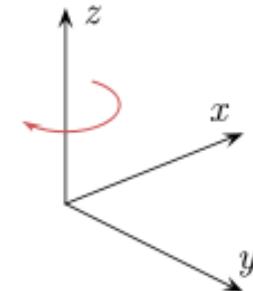
OIR – keywords “move, jog, homes”

# Introduction to MAKE Software

## MAKE Positioning Controls

- You can also use the numeric keypad on your keyboard to jog the machining head. When **Num Lock** is **OFF**, use the following keys to jog.

Jog up (Y+)  
↑  
Jog left (X-)  
←  
Jog right (X+)  
→  
Jog down (Y-)  
↓



OIR – keywords “keyboard shortcuts”

# Introduction to MAKE Software

## MAKE Positioning Controls

- When the Num Lock is turned **ON**

- 7 - Z-axis up
- 1 - Z-axis down

Finer increments

- 9 – Z-axis up
- 3 – Z-axis down



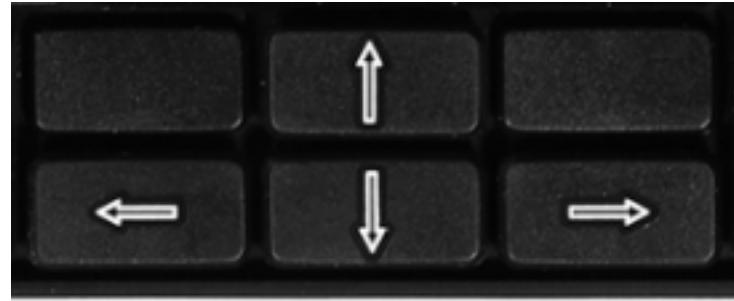
See OIR for details

OIR – *keywords “keyboard shortcuts”*

# Introduction to MAKE Software



## MAKE Positioning Controls



↑ Y-axis up (Y+)  
↓ Y-axis down (Y-)

→ X-axis right (X+)  
← X-axis left (X-)

See OIR for details

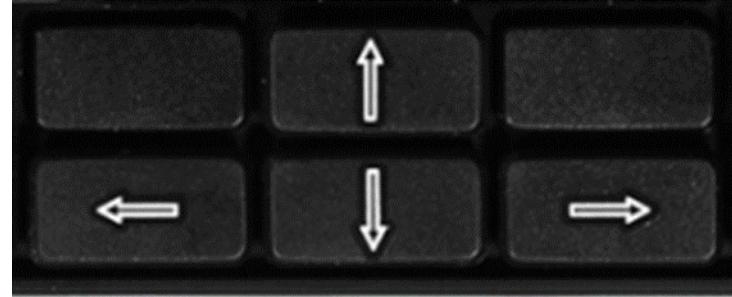
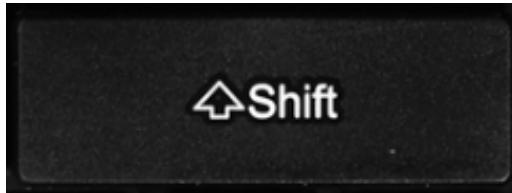
OIR – *keywords “keyboard shortcuts”*

# Introduction to MAKE Software



## MAKE Positioning Controls

- Press **Shift** and the desired direction key to move the Z-axis more rapidly



See OIR for details

OIR – *keywords “keyboard shortcuts”*

# Introduction to MAKE Software

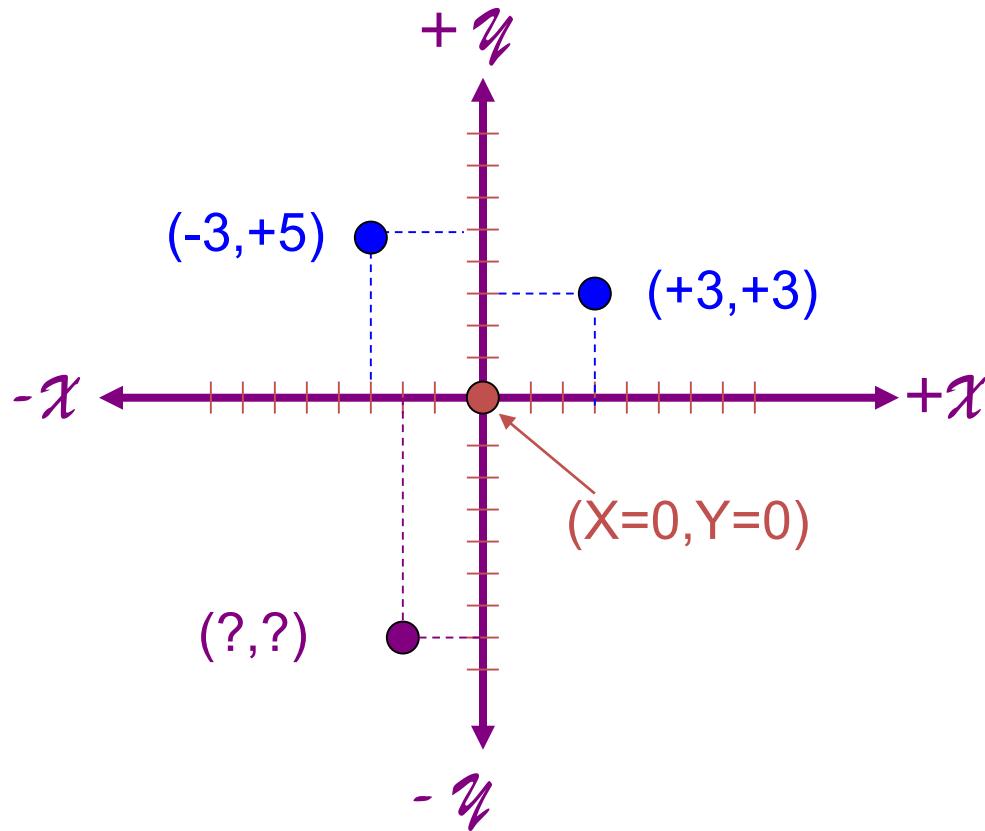
## Nozzle position

- Refers to a specific point where the nozzle is located in the machine.
- The specific nozzle location point is referenced using X-Y coordinates.
- The X-Y coordinates measure distance from some reference point (called a “Home”).



# Introduction to OMAX MAKE Software

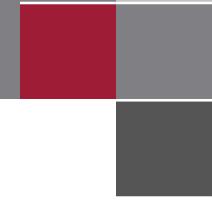
## MAKE – 2-dimensional coordinate system



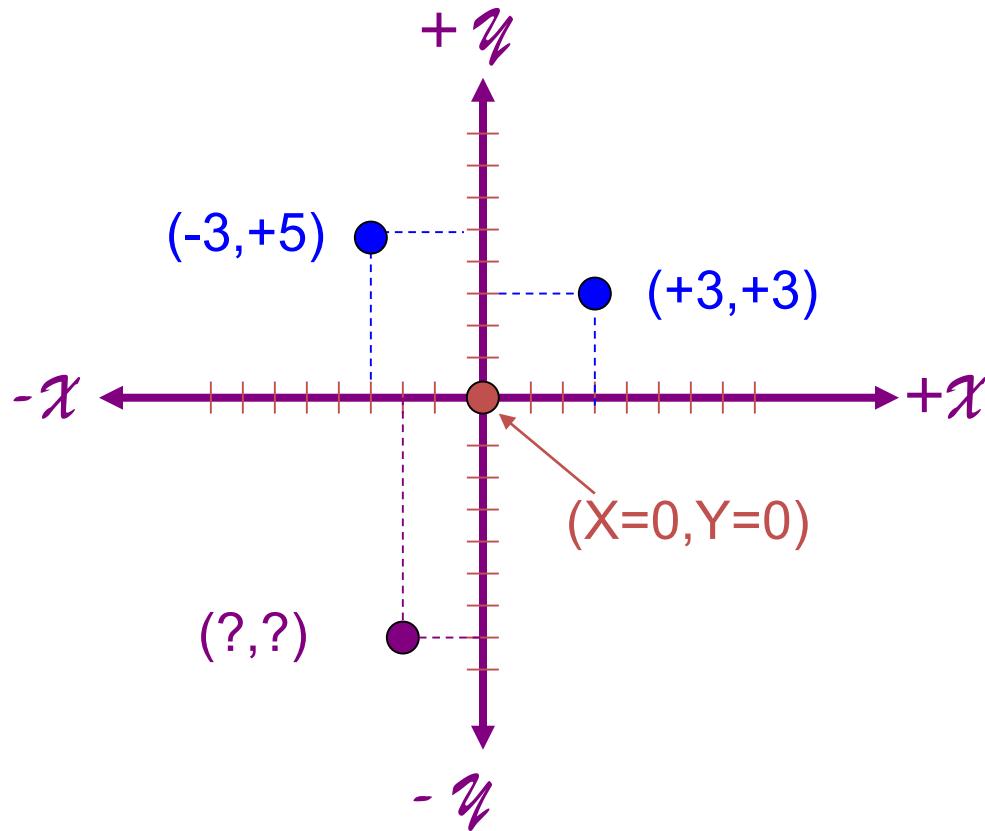
All points in the grid have an associated X-Y coordinate.



What are the X, Y coordinates of the purple dot?



## MAKE – 2-dimensional coordinate system

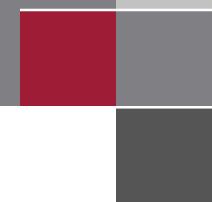


A: The X, Y coordinates of the **purple** dot are

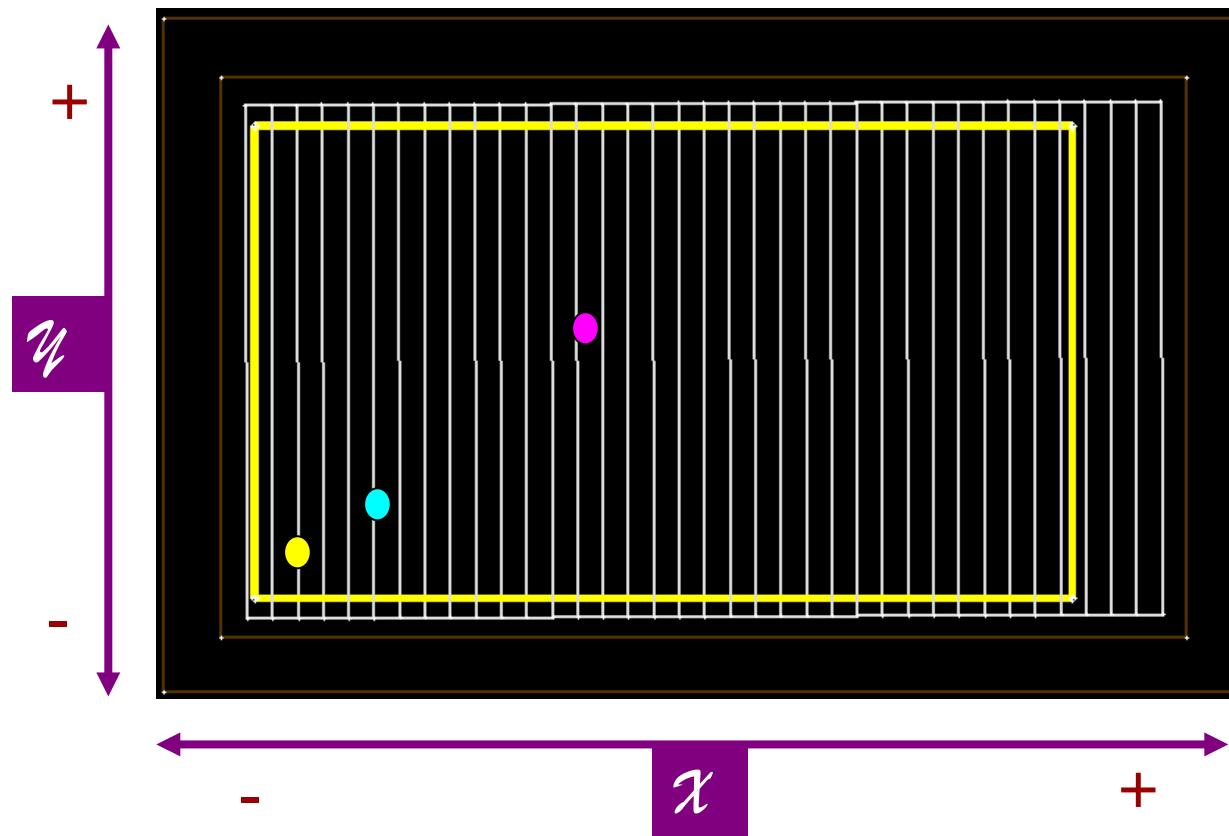
$X = -3$  and  $Y = +5$

$(-3, +5)$

# Introduction to MAKE Software



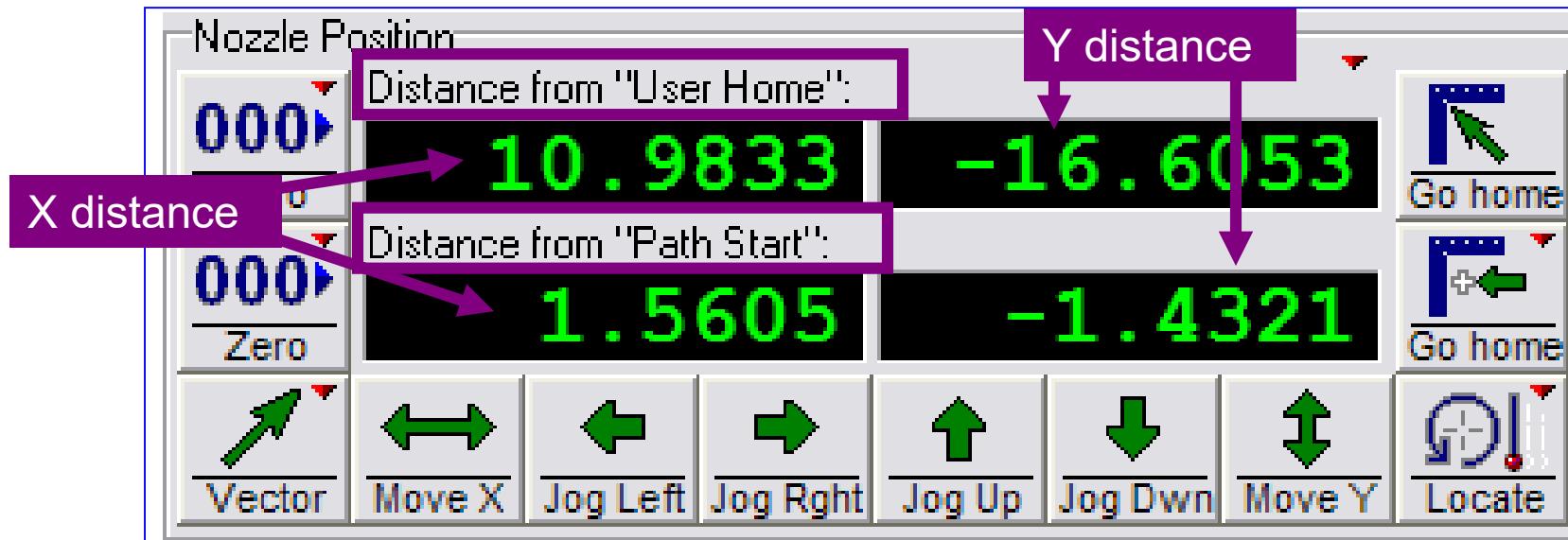
## MAKE – X-Y Coordinates



# Introduction to MAKE Software

## MAKE Nozzle Position Display

- Tells the distance (X and Y) from where the nozzle is currently positioned to a specific **Home** location

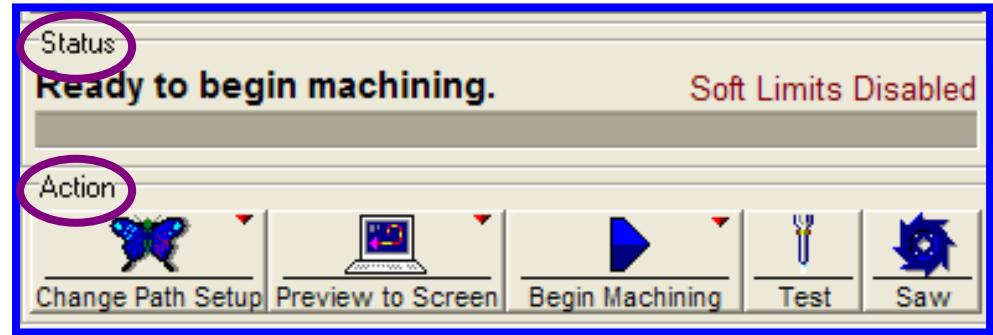


# Introduction to MAKE Software



## MAKE Machining Controls

- Status
- Change Path Setup
- Preview to Screen
- Begin Machining
- Test
- Saw

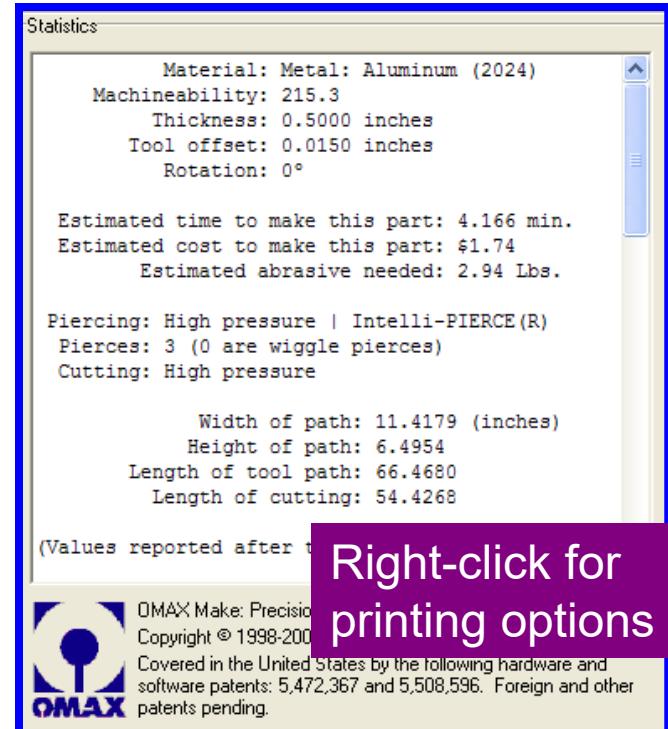


OIR – keywords “machining controls”

# Introduction to MAKE Software

## MAKE Statistics Window

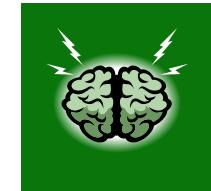
- Gives specific statistics about the part file you open
  - Material Type
  - Machinability
  - Material Thickness
  - Tool Offset
  - Time to make the part
  - Cost to make the part
  - Estimated abrasive needed



OIR – keyword “statistics”

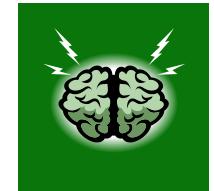
# Review

1. In the **MAKE** window, where would we find information about how long it will take to cut the part?
  - a. Machining Controls
  - b. Part Display Window
  - c. Statistics Window
  - d. Nozzle Position Displays
2. Which machining control button would we use to move the nozzle left on the X-axis?
  - a. Jog up
  - b. Jog Left
  - c. Vector
  - d. Jog Right



# Review

3. Which part of the **MAKE** window tells us where the nozzle is positioned in reference to a specific home location?
  - a. Statistics Window
  - b. Part Display Window
  - c. Machining Controls
  - d. Nozzle Position Displays
4. Which of the following does not command machine activity?
  - a. Saw
  - b. Test
  - c. Preview
  - d. Begin Machining
  - e. None of the above



# Steps in Making Parts

- **OMAX Intelli-MAX LAYOUT**

**Step 1:** Obtain/create a Drawing File (DXF file).

**Step 2:** Assign machining Qualities (edge finish).

**Step 3:** Clean the drawing.

**Step 4:** Add Path elements to the drawing & save it.

**Step 5:** Create the Machine Tool Path file (ORD/OMX).



- **OMAX Intelli-MAX MAKE**

**Step 6:** Start up the machine.

**Step 7:** Configure Machine Settings.

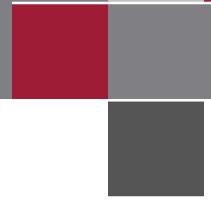
**Step 8:** Open and configure the ORD/OMX file.

**Step 9:** Load and clamp the material.

**Step 10:** Begin machining and cut the part.



# Step 6: Start Up the Machine



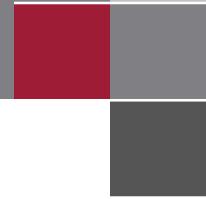
## Machine Startup

- Safety First!
  - Safety Checklist
  - User's Guide Safety Section

OMAX JetMachining® Center Safety Checklist		Date _____
<b>Safety Labels and what they mean</b>		
Station is rated _____		
Eye Protection		
Runy debris cloud label		
DANGER - Keep hands away from jet		
DANGER - Do not touch		
DANGER - 450 VAC		
<b>Safety Equipment (if any)</b>		
Water or nozzling		
Cutting under water		
Approved safety goggles & eye protection		
Tight fitting clothing, no loose clothing, no jewelry, no loose fitting clothes		
Wear hearing aids or medical attention for any disabilities, injury		
Proper clothing for work environment		
Proper shoes		
Use the correct gauge (MP)		
Remove power from equipment when not in use		
Operate equipment after reading equipment manual and receiving qualified instruction		
Start pump and air compressor before turning on equipment		
Start pump and air compressor when all side panels are in place		
Turn off equipment when not in use		
Immediately notify your supervisor if hoses are found in living fittings or connections		
Never use compressed air to clean your skin, hair, or clothes or to move objects or structures		
Do not drink or eat while working near equipment or during equipment operation		
Following maintenance activities, clear all tools and rags from around the equipment before		
<b>Safety Precautions (DANGER)</b>		
Never open or do maintenance on the equipment with the main disconnect off or while the pump is operating. Just because the pump is off does not mean the equipment is off.		
Do not drink or eat while working near equipment or during equipment operation		
<b>Equipment Safety Features</b>		
Emergency stop button (DC Controller and Pump)		
Emergency stop button (Pump and software addition)		
VFD / GEN run mounted controller and circuit breaker (short circuit protection to the pump and air compressor)		
Overload protection for the pump and air compressor		
Emergency stop button (DC Controller and Pump)		
Emergency stop button (Pump and software addition)		
VFD / GEN run mounted controller and circuit breaker (short circuit protection to the pump and air compressor)		
Overload protection for the pump and air compressor		
Student Name _____		Signature _____
<small>* By signing this document I acknowledge that I have read and reviewed this OMAX Safety Checklist and understand items contained herein. This document will be signed on the first class day of the semester.</small>		



# Step 6: Start Up the Machine



## Machine Startup

- Refer to the *OMAX JetMachining Center User's Guide* for instructions on machine startup.



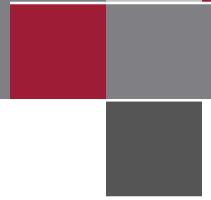
**Startup Checkoff Sheet**  
Use the following checkoff sheet to ensure that all equipment is operating correctly. For more detailed startup instructions, refer to the *OMAX JetMachining Center Operator's Guide*.

**WARNING!** Safety First - Always wear safety glasses when operating your OMAX JetMachining Center.

1.  Main breaker box POWERED ON.  
2.  Bleed valves CLOSED for bulk hopper.  
3.  Air supply valve OPENED.  
4.  Water supply valve OPENED. Verify water pressure.  
5.  High-pressure pump POWERED ON. Verify that pump LED screen becomes active.  
6.  Charge Pump POWERED ON. Verify cooling flow from 3 white tank hoses.  
7.  PC Controller POWERED ON.  
8.  Bulk feed hopper PRESSURIZED (if applicable).  
9.  OMAX "Male" STARTED.  
10.  Table AUTO HOMED to ensure that absolute home position is correct.  
11.  Nozzle POSITIONED between slats, 1 to 2 inches (2.54 - 5.1 cm) above the water level.  
12.  Nozzle low-pressure water test STARTED. Click "Test", "Low", and "Water".  
13.  Straight and narrow jet stream VERIFIED while pinching the abrasive feed tube.  
14.  RPM and Pressure ADJUSTED and RECORDED from the pump LCD screen.  
15.  Nozzle low-pressure test STOPPED.  
16.  Nozzle high-pressure test STARTED. Click "Test", "High", and "Water".  
17.  Straight and narrow jet stream VERIFIED while pinching the abrasive feed tube.  
18.  RPM and Pressure ADJUSTED and RECORDED from the pump LCD screen.

3-22 400430-01v

# Step 6: Start Up the Machine

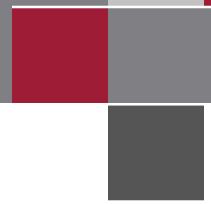


## Nozzle Position and Homes

- Four types of **Homes** used on the OMAX
  1. **Absolute** Home
  2. **User** Home
  3. **Path Start** Home
  4. **User-defined** Homes

OIR – keyword “homes”

# Step 6: Start Up the Machine



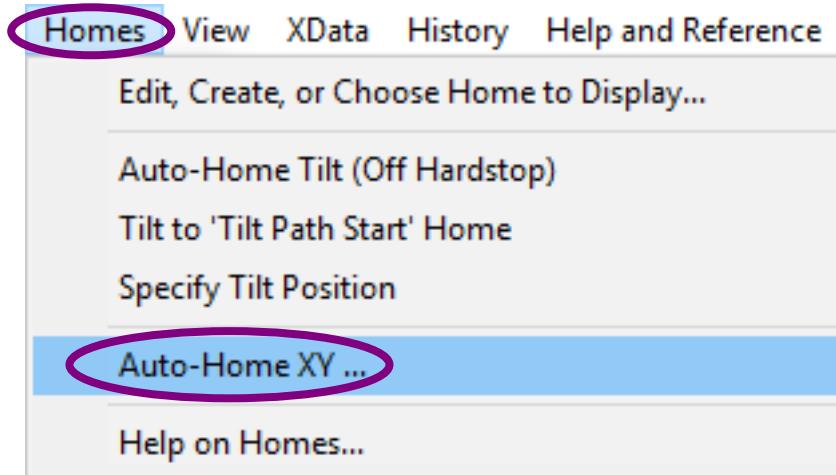
## Nozzle Position

- Absolute Home
  - Mechanical limits of the physical X and Y axes on the machine
  - X=0, Y=0 mechanically
  - The machine absolutely cannot move any further than this in the X or Y direction
  - Every other **Home** position we set uses the **Absolute Home** as its reference point

# Step 6: Start Up the Machine

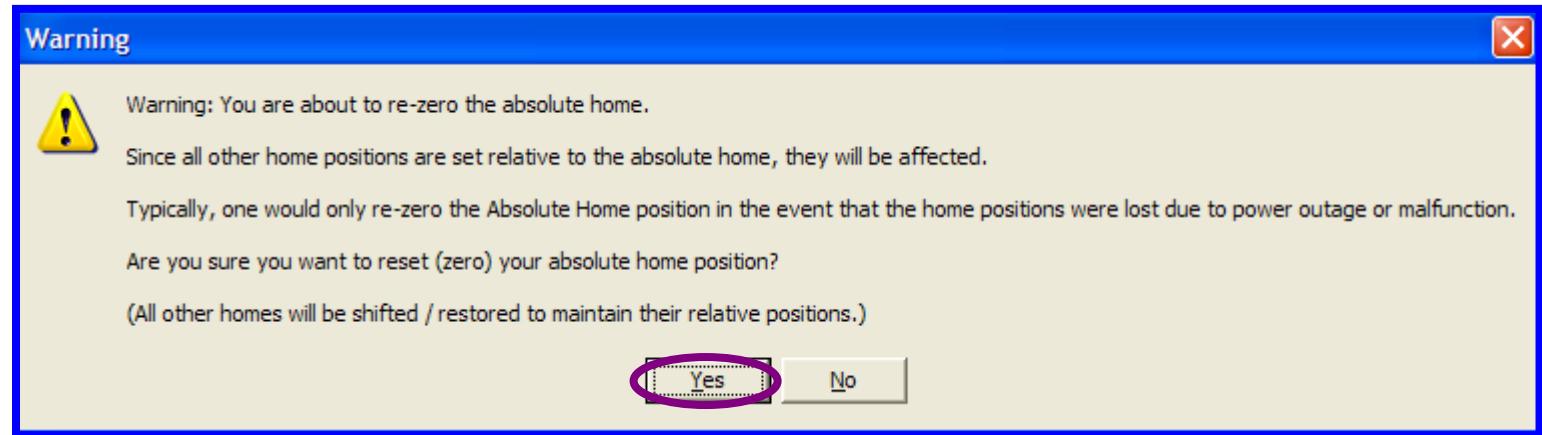
## Setting Absolute Home Using Auto Home

- Move the nozzle to within 1 foot square of your machine's homing position
- Raise the Z-axis to avoid obstacles
- Click **Homes > Auto-Home XY**



# Step 6: Start Up the Machine

- Re-zero Absolute Home



# Step 6: Start Up the Machine

## Homes

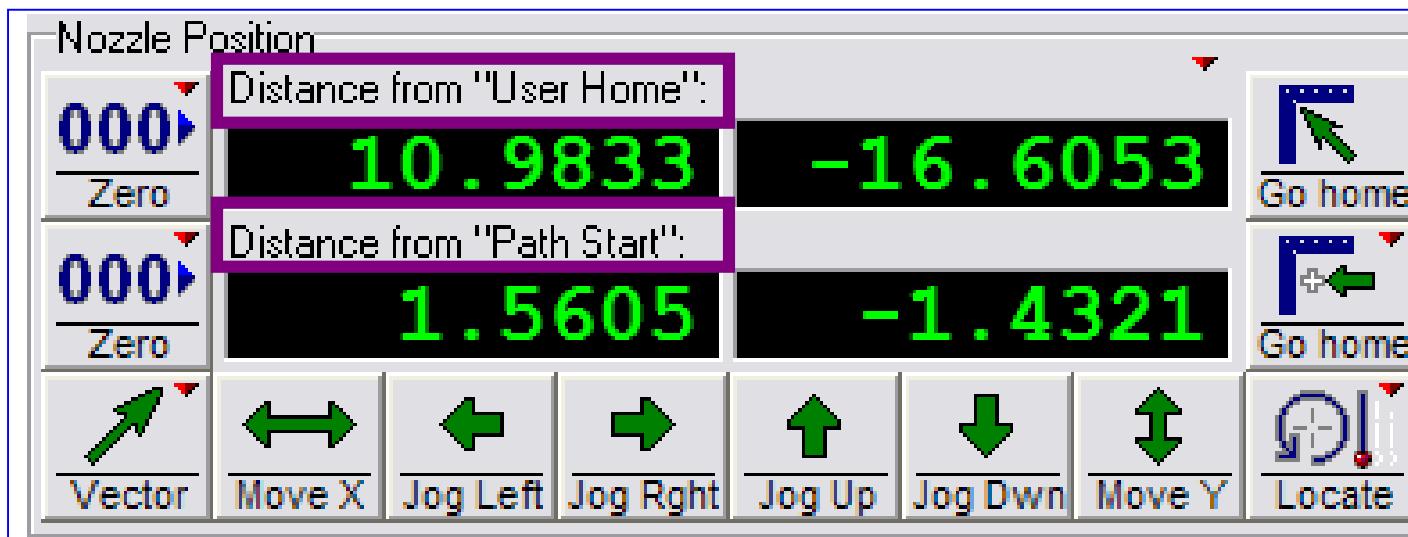
- User Home markers for various nozzle positions.
- Path Start Home.
- You can set up to 100 **User-defined Homes** in **MAKE**.
- There is 1 generic User-defined Home.



# Step 6: Start Up the Machine

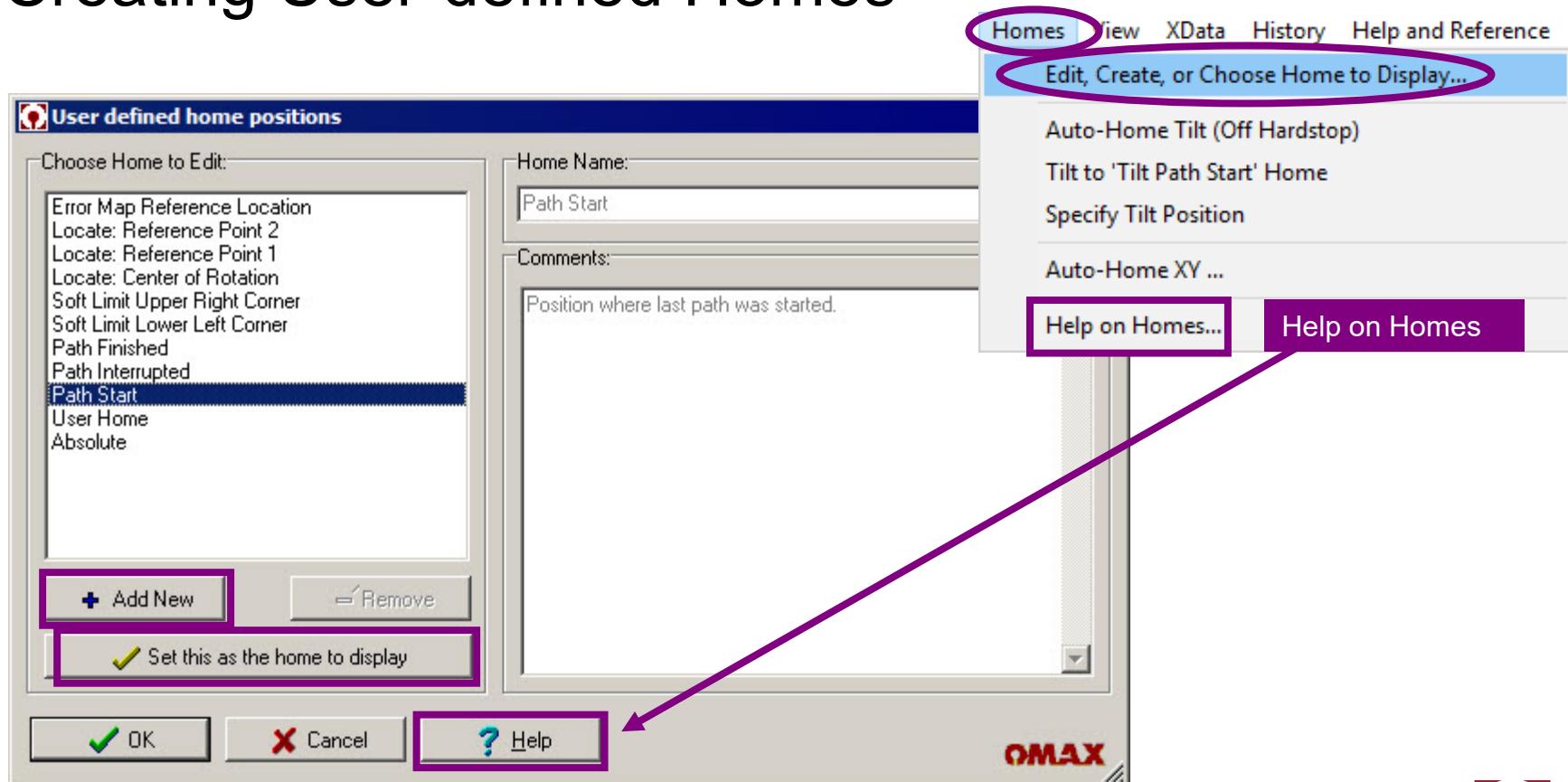
## Nozzle Position Display

- The top row always displays the generic “User Home.”
- You can choose which **Home** to display in the second row.



# Step 6: Start Up the Machine

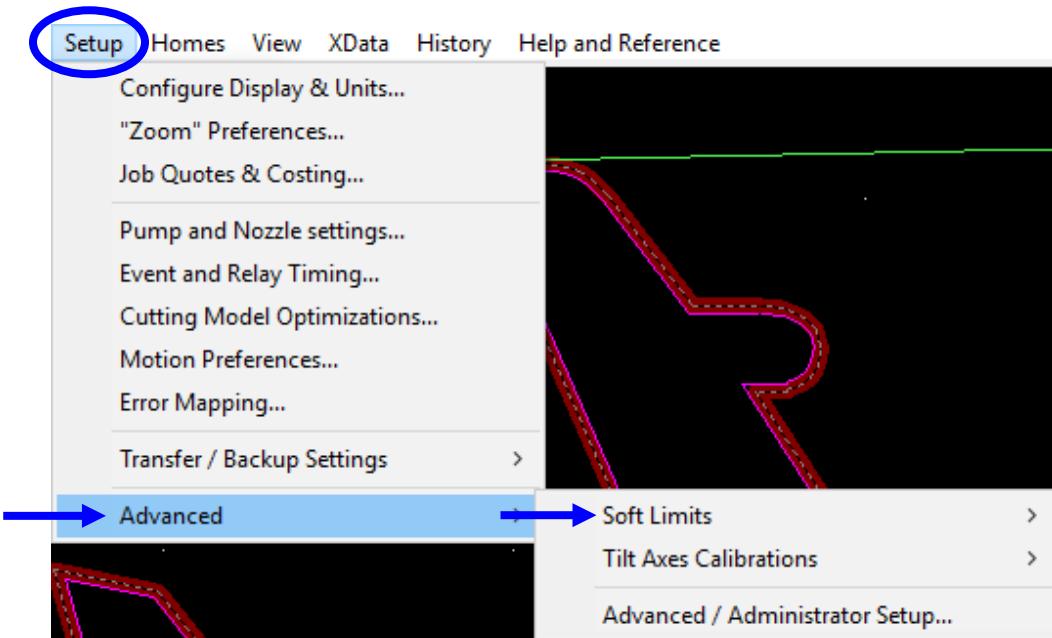
## Creating User-defined Homes



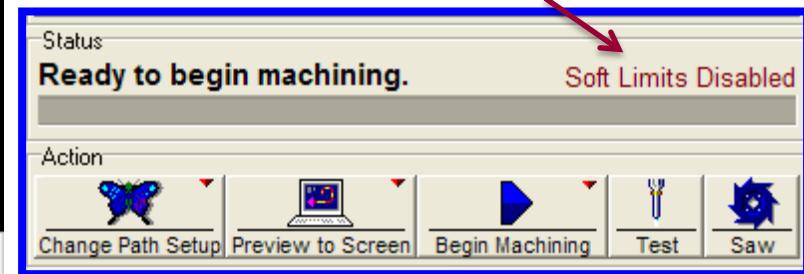
# Step 6: Start Up the Machine

Verify Soft Limits are turned on (enabled)

- **Soft limits** are limits you establish so the Z-axis and nozzle do not crash into obstacles.

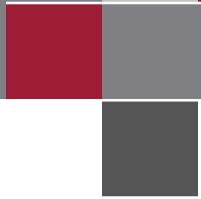


If soft limits are not turned on, you will see this message.



OIR – keywords “Soft limits”

# Steps in Making Parts



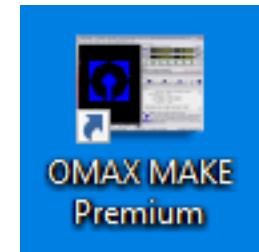
- ## Intelli-MAX LAYOUT

- Step 1:** Obtain/create a Drawing File (DXF file).
- Step 2:** Assign machining Qualities (edge finish).
- Step 3:** Clean the drawing.
- Step 4:** Add Path elements to the drawing & save it.
- Step 5:** Create the Machine Tool Path file (ORD/OMX).



- ## Intelli-MAX MAKE

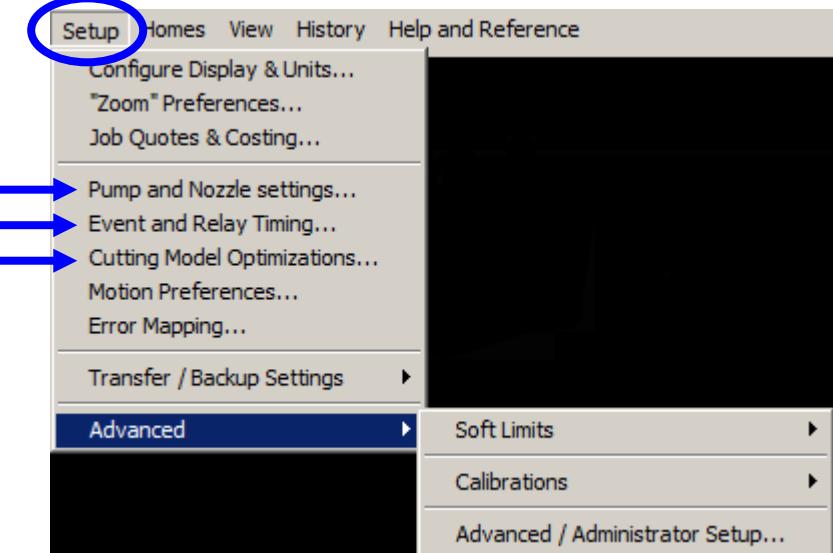
- Step 6:** Start up the machine.
- Step 7: Configure Machine Settings.**
- Step 8:** Open and configure the ORD/OMX file.
- Step 9:** Load and clamp the material.
- Step 10:** Begin machining and cut the part.



# Step 7: Configure Machine Settings

## Configure Machine Settings in **MAKE**

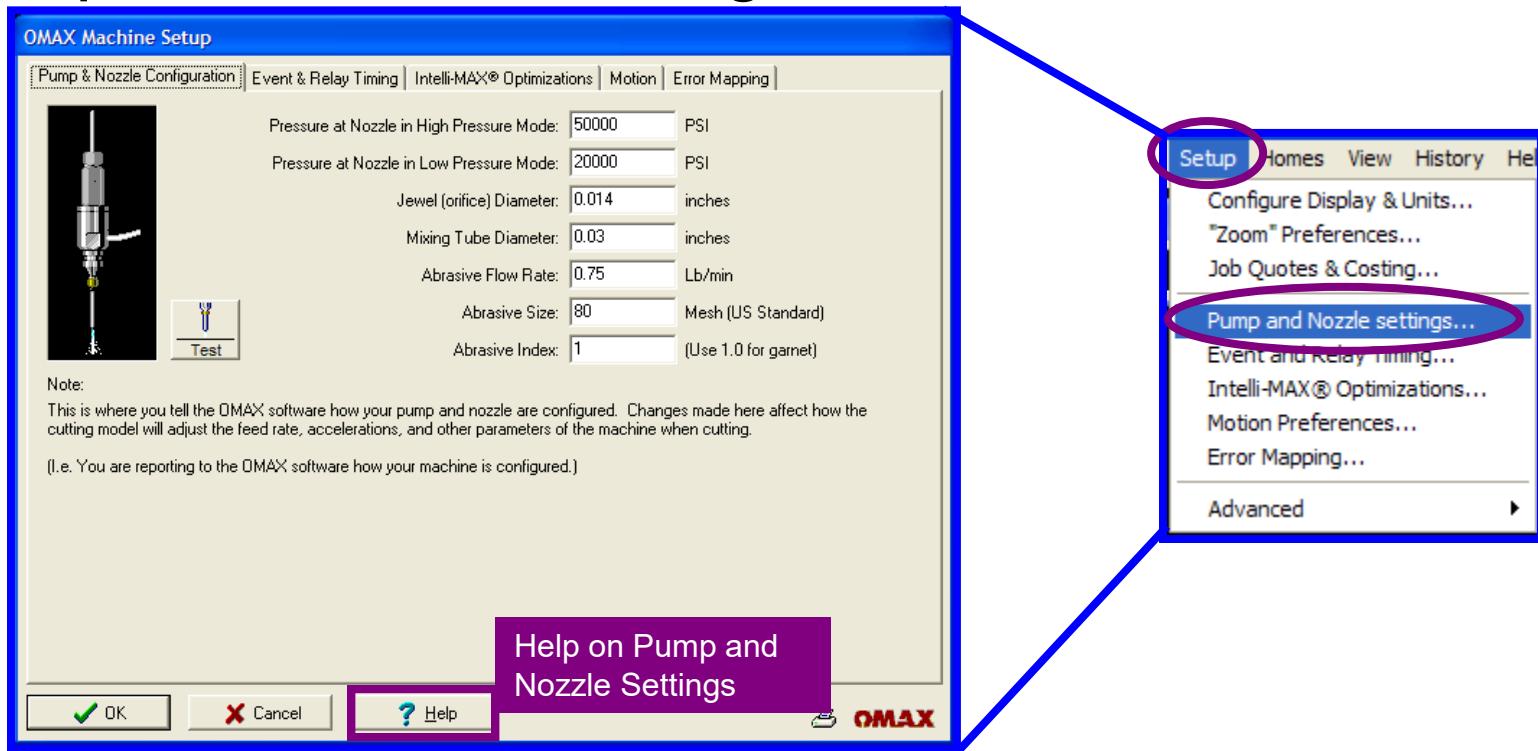
- Pump and Nozzle settings
- Event and Relay Timing
- Cutting Model Optimizations



OIR – keywords “MAKE menu”

# Step 7: Configure Machine Settings

## Pump and Nozzle Settings



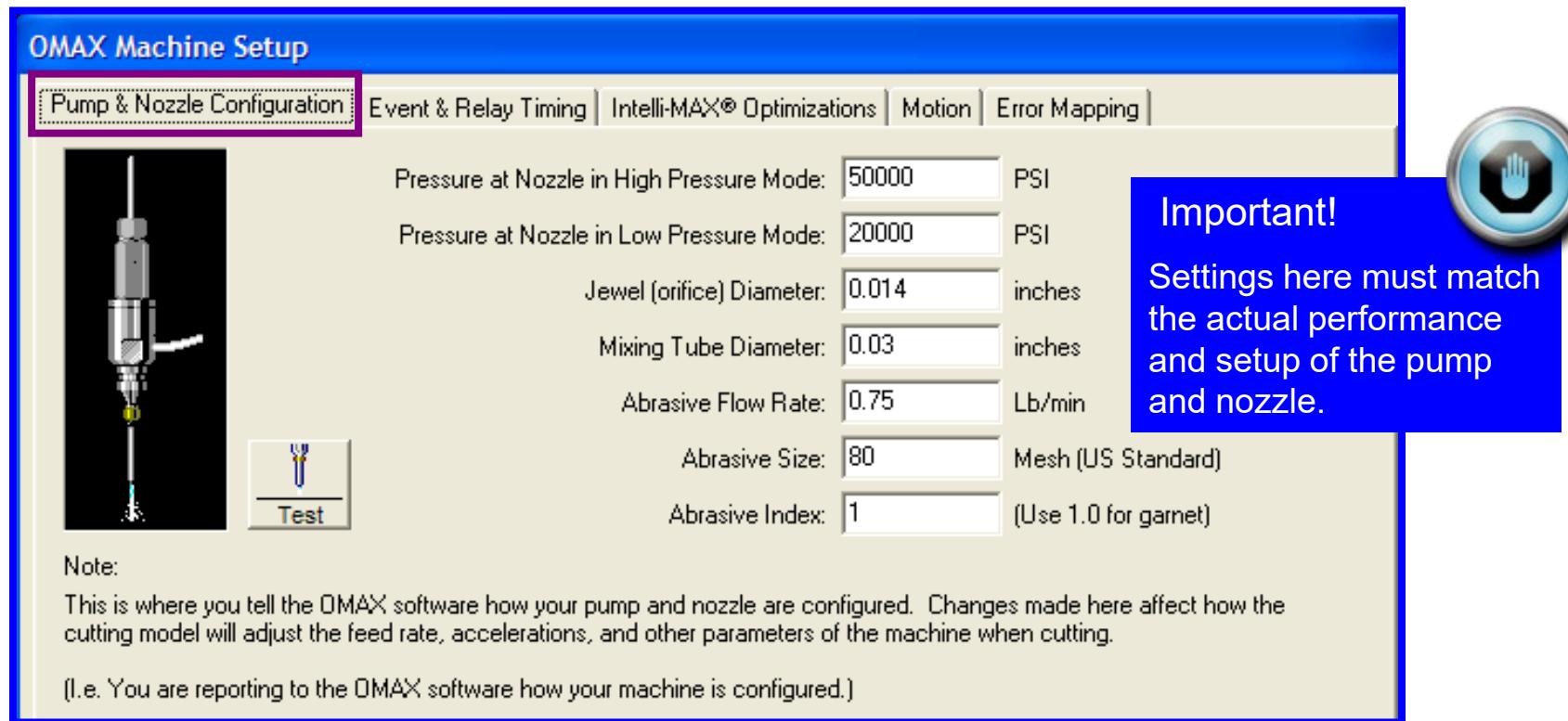
OIR – keywords “Pump and Nozzle configuration”

# Step 7: Configure Machine Settings

## Pump and Nozzle Settings

**OMAX Machine Setup**

Pump & Nozzle Configuration | Event & Relay Timing | Intelli-MAX® Optimizations | Motion | Error Mapping



**Important!**  
Settings here must match the actual performance and setup of the pump and nozzle.



Note:  
This is where you tell the OMAX software how your pump and nozzle are configured. Changes made here affect how the cutting model will adjust the feed rate, accelerations, and other parameters of the machine when cutting.  
(I.e. You are reporting to the OMAX software how your machine is configured.)

# Step 7: Configure Machine Settings

## Event and Relay Timing

The screenshot shows the OMAX Machine Setup software interface. On the left is a dialog box titled "Event & Relay Timing" under the "OMAX Machine Setup" tab. The dialog contains settings for various machine transitions:

	High Pressure	Low Pressure
Cut:	Delay after nozzle fires before abrasive turns on: 0.2	0.2
	Additional delay to allow jet to stabilize before proceeding: 0.5	0.5
	Time to clear abrasive from nozzle when finished cutting: 0.5	0.5
Etch:	Delay after nozzle fires before abrasive turns on: 0.2	0.2
	Additional delay to allow jet to stabilize before proceeding to start: 0.3	0.3
	Time to run nozzle after etch to clear abrasive from nozzle: 0.5	0.5
Scribe:	Delay after nozzle fires before moving: 0.1	0.1
Water Only:	Delay after nozzle fires before moving: 1	1
Traverse:	Seconds to wait after shutdown before traverse: 1	1
Other:	Pump warm up delay before first move: 3	
	High pressure to Low pressure delay: 3	
	Low pressure to High pressure delay: 1	

At the bottom of the dialog are buttons for "OK", "Cancel", and "Help". A "Restore Timing to Defaults" button is also present.

To the right of the dialog is a vertical menu bar with the following options:

- Setup (highlighted with a blue oval)
- Home
- View
- History
- Help

Below the menu bar, the following options are listed:

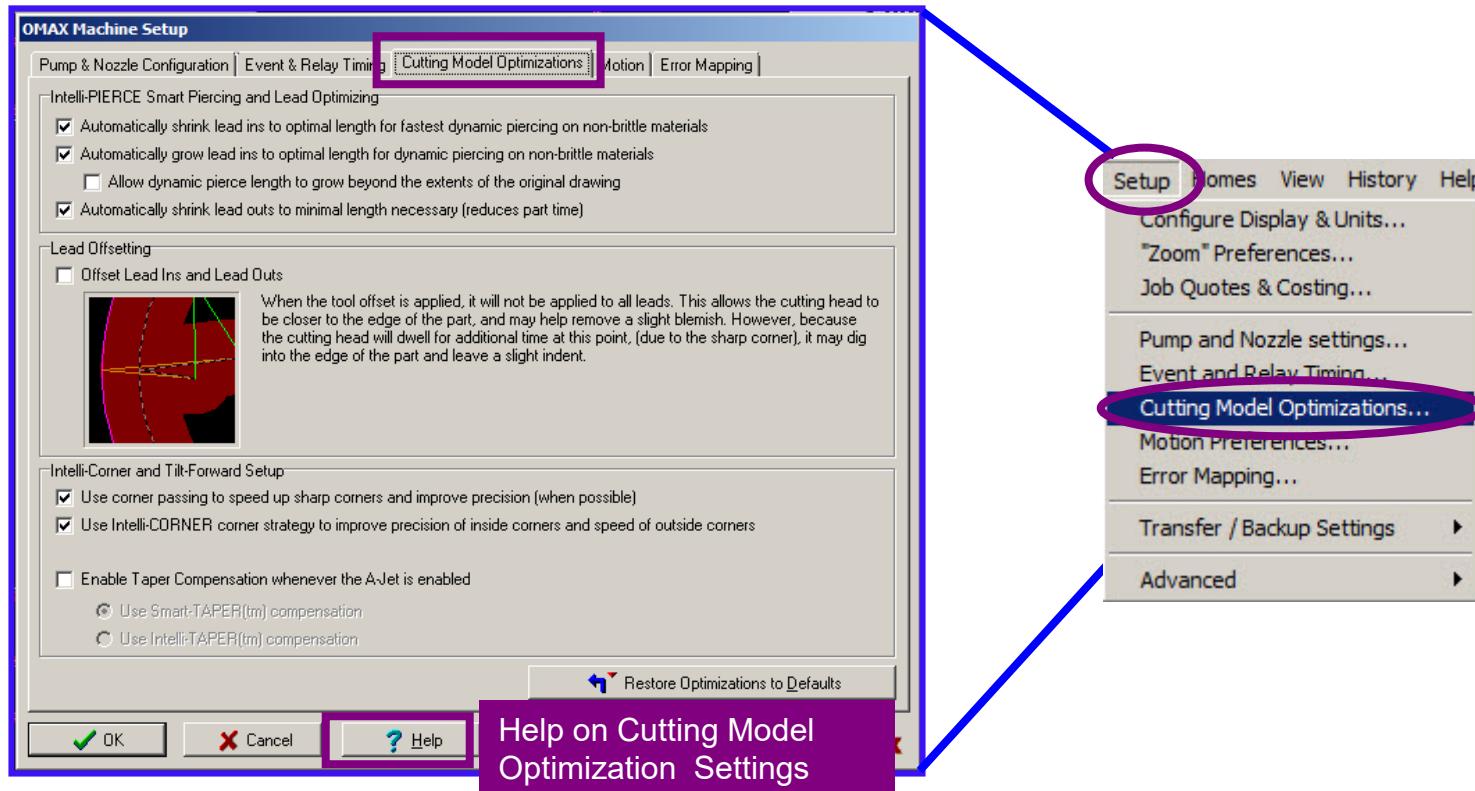
- Configure Display & Units...
- "Zoom" Preferences...
- Job Quotes & Costing...
- Pump and Nozzle settings...
- Event and Relay Timing...** (highlighted with a blue oval)
- Intelli-MAX® Optimizations...
- Motion Preferences...
- Error Mapping...
- Advanced

A purple callout box at the bottom center points to the "Event and Relay Timing..." option in the menu, with the text "Help on Event and Relay Timing Settings".

OIR – keyword “event”

# Step 7: Configure Machine Settings

## Cutting Model Optimizations



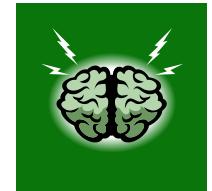
OIR – keyword “Intelli”

# Step 7: Configure Machine Settings

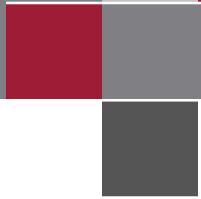


## Review

1. What are the 3 areas you need to configure or verify settings on each day during startup?
  - a. Motion Controls
  - b. Cutting Model Optimizations
  - c. Pump and Nozzle Settings
  - d. Event and Relay Timing
2. Why is it so important to enter actual data into the **Pump and Nozzle** settings each day?
3. How do you access the OMAX Machine Setup pages in **MAKE**?

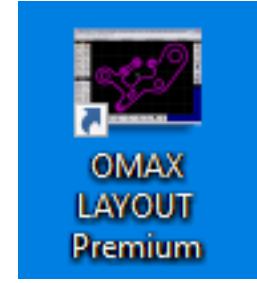


# Steps in Making Parts



- ## Intelli-MAX LAYOUT

- Step 1:** Obtain/create a Drawing File (DXF file).
- Step 2:** Assign machining Qualities (edge finish).
- Step 3:** Clean the drawing.
- Step 4:** Add Path elements to the drawing & save it.
- Step 5:** Create the Machine Tool Path file (ORD/OMX).



- ## Intelli-MAX MAKE

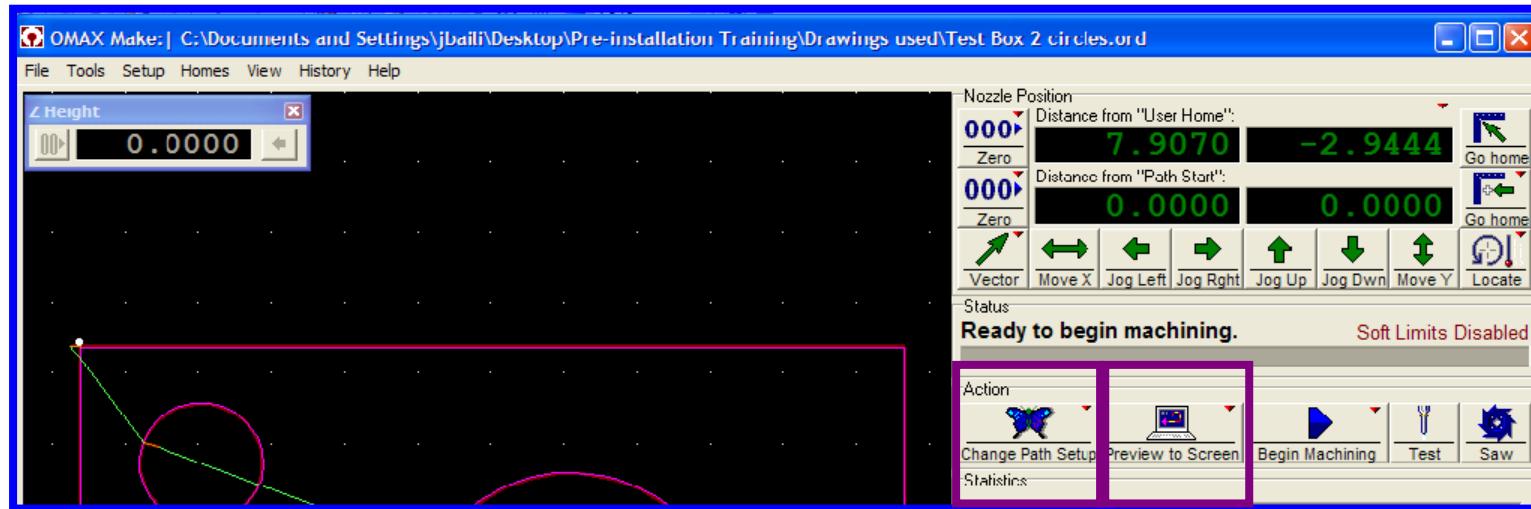
- Step 6:** Start up the machine.
- Step 7:** Configure Machine Settings.
- Step 8:** Open and configure the ORD/OMX file.
- Step 9:** Load and clamp the material.
- Step 10:** Begin machining and cut the part.



# Step 8: Open & Configure the ORD/OMX File

## Open and Configure the ORD/OMX file

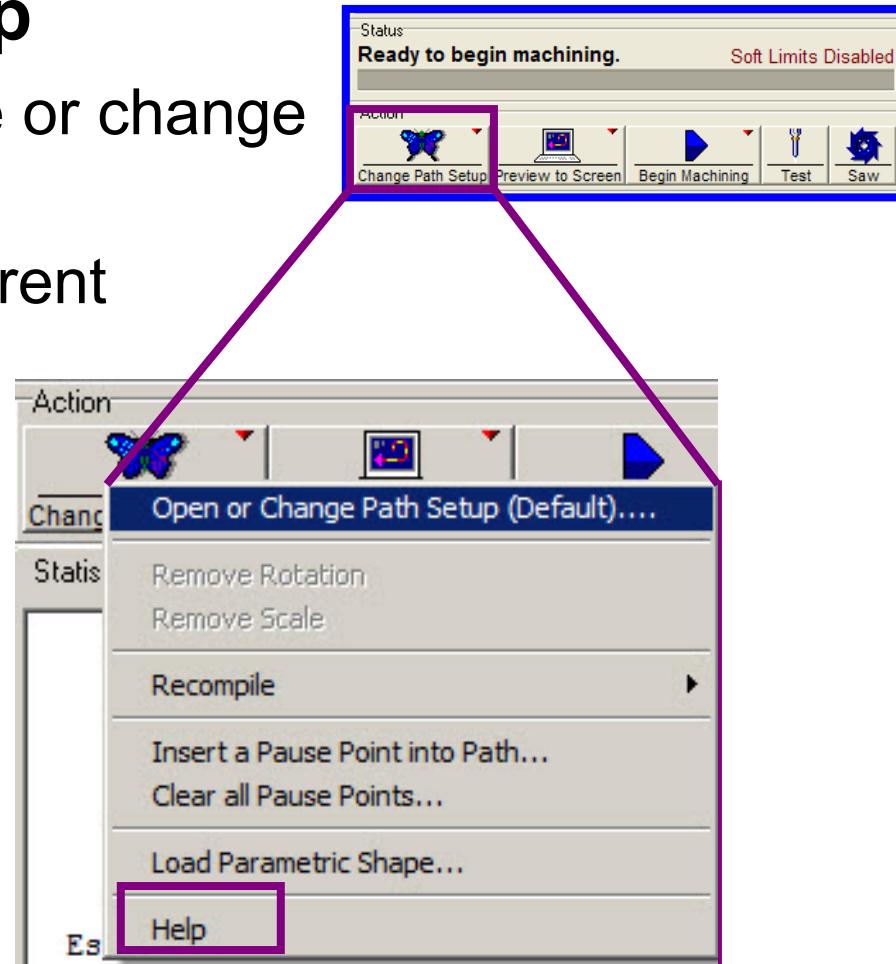
- Change Path Setup (same as **File > Open**)
- Preview to Screen



# Step 8: Open & Configure the ORD/OMX File

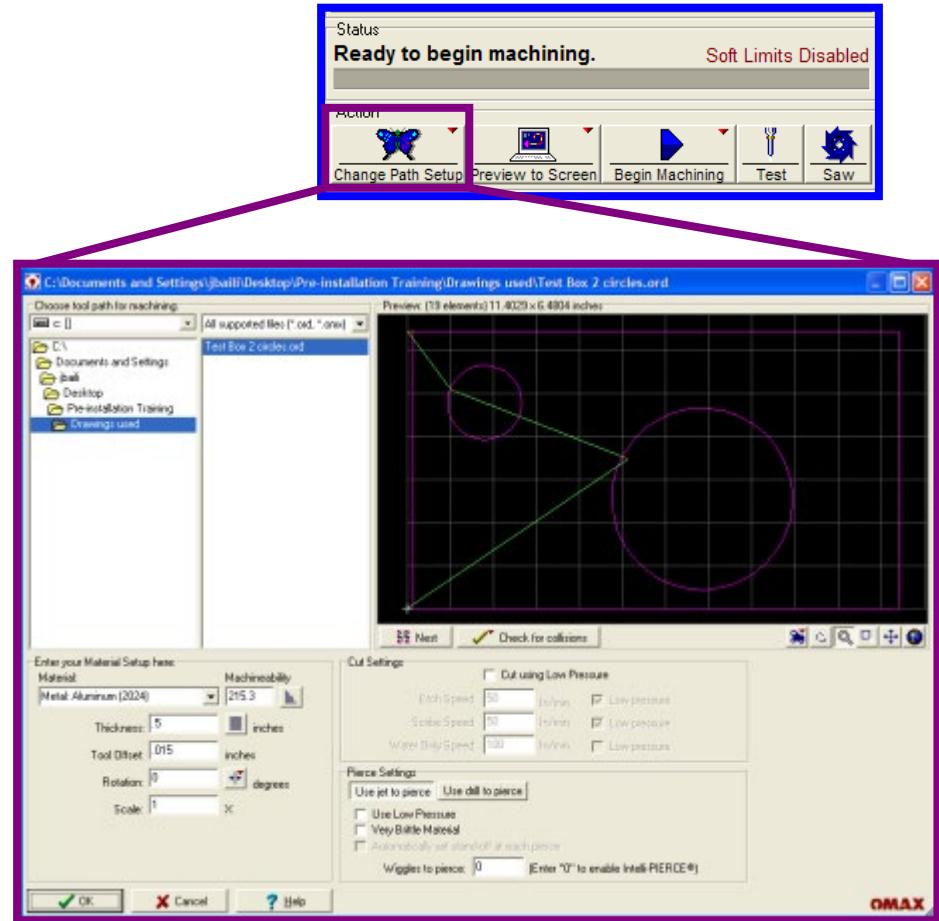
## Change Path Setup

- Open a machine file or change part setup.
- Recompile in a different machining quality.
- Access Help.



# Step 8: Open & Configure the ORD/OMX File

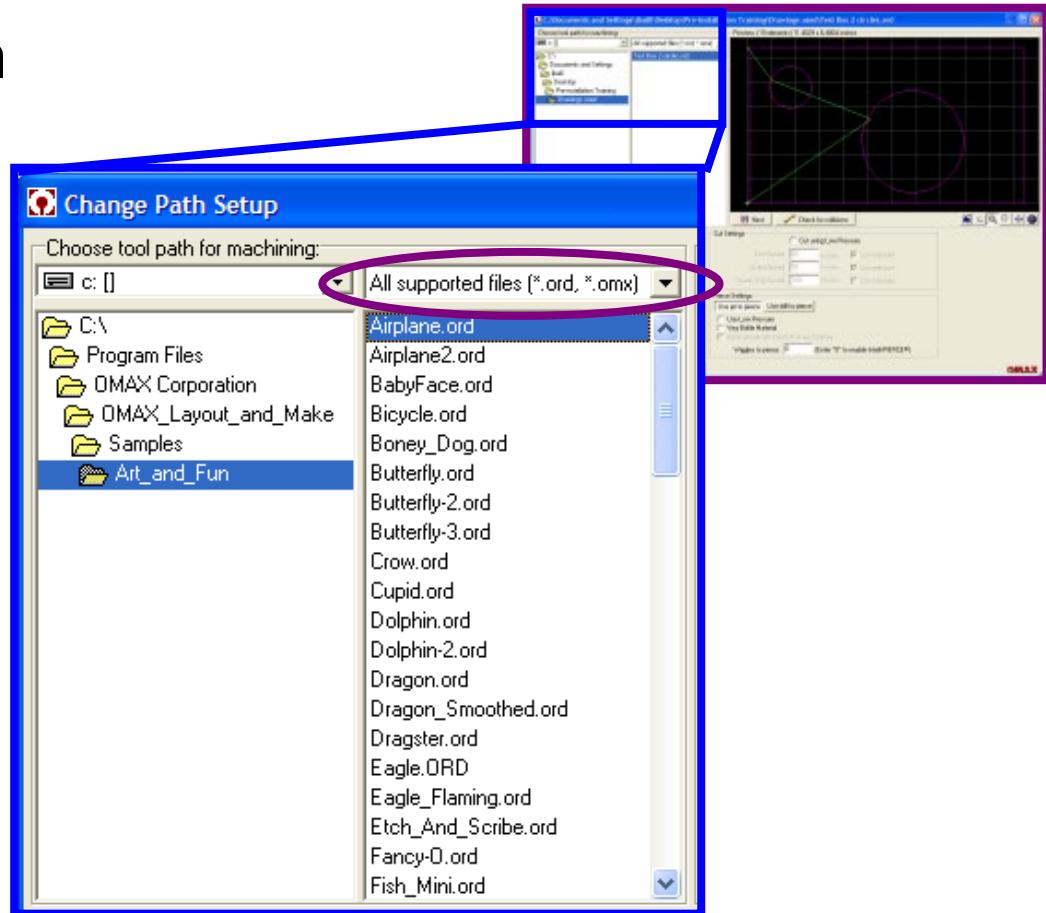
- Open a machine file.
- Specify material setup.
- Preview the part file.
- Specify cut settings.
- Specify pierce settings.
- Activate accessories (such as Tilt-A-Jet, A-Jet, or Terrain Follower).



# Step 8: Open & Configure the ORD/OMX File

## Open a Machine File

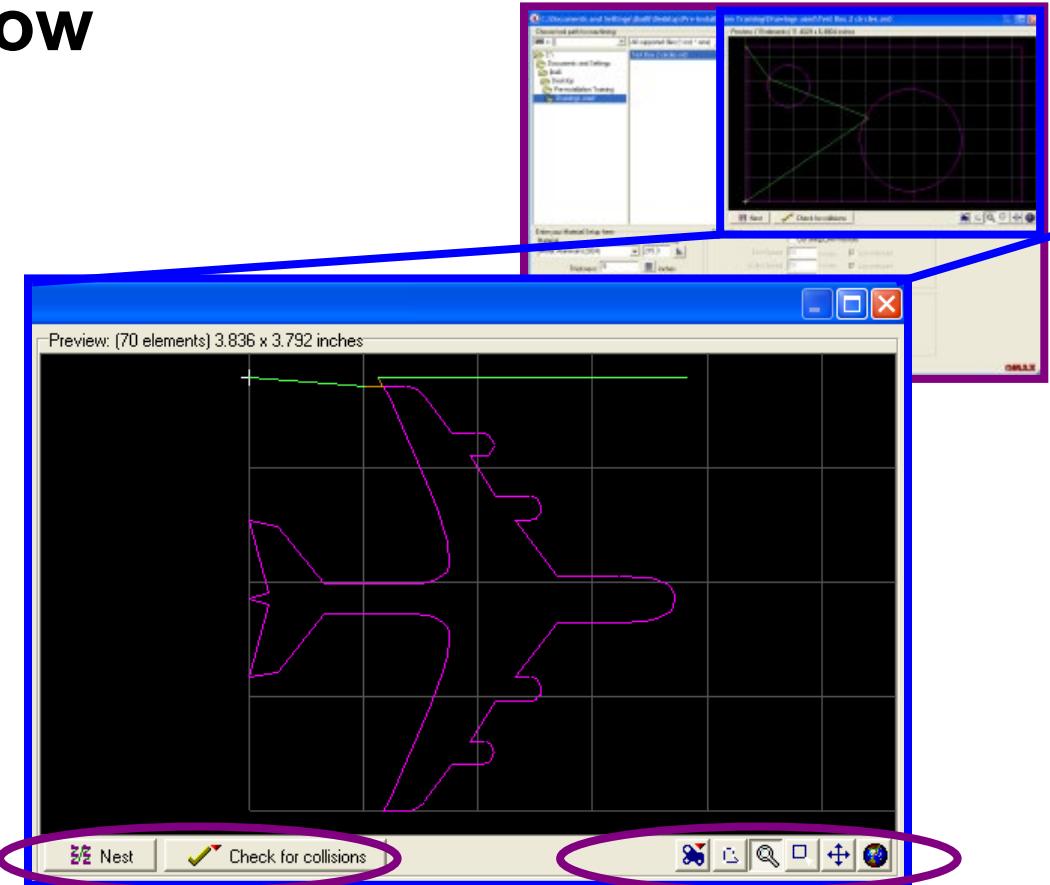
- Here is where you can select a different file for machining.
- Note the files listed in the right are all ORD or OMX files.



# Step 8: Open & Configure the ORD/OMX File

## Part Preview Window

- Preview the part
- Check for collisions
- Nest
- Zoom Tools

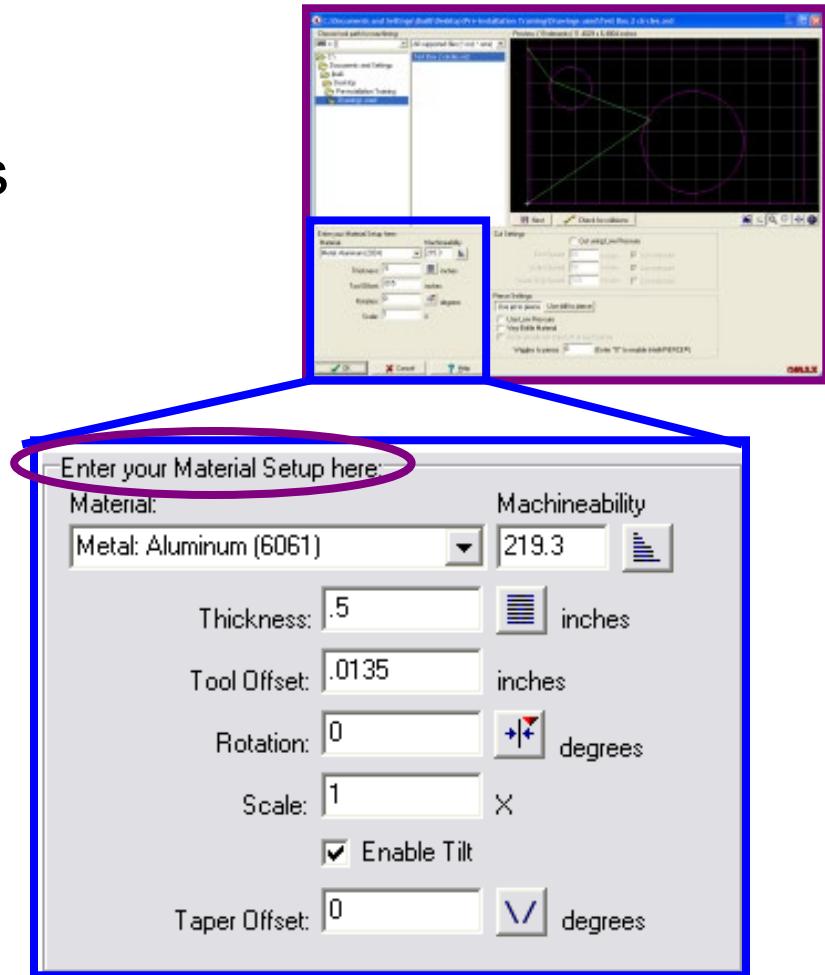


# Step 8: Open & Configure the ORD/OMX File

## Enter Material Setup

- Select material type
- Specify material Thickness
- Specify Tool Offset
- Set Rotation
- Set Scale
- Enable the Tilt-A-Jet or A-Jet & specify Taper Offset (if applicable)

**NOTE:** New material may be added if it is not in the selection tool.

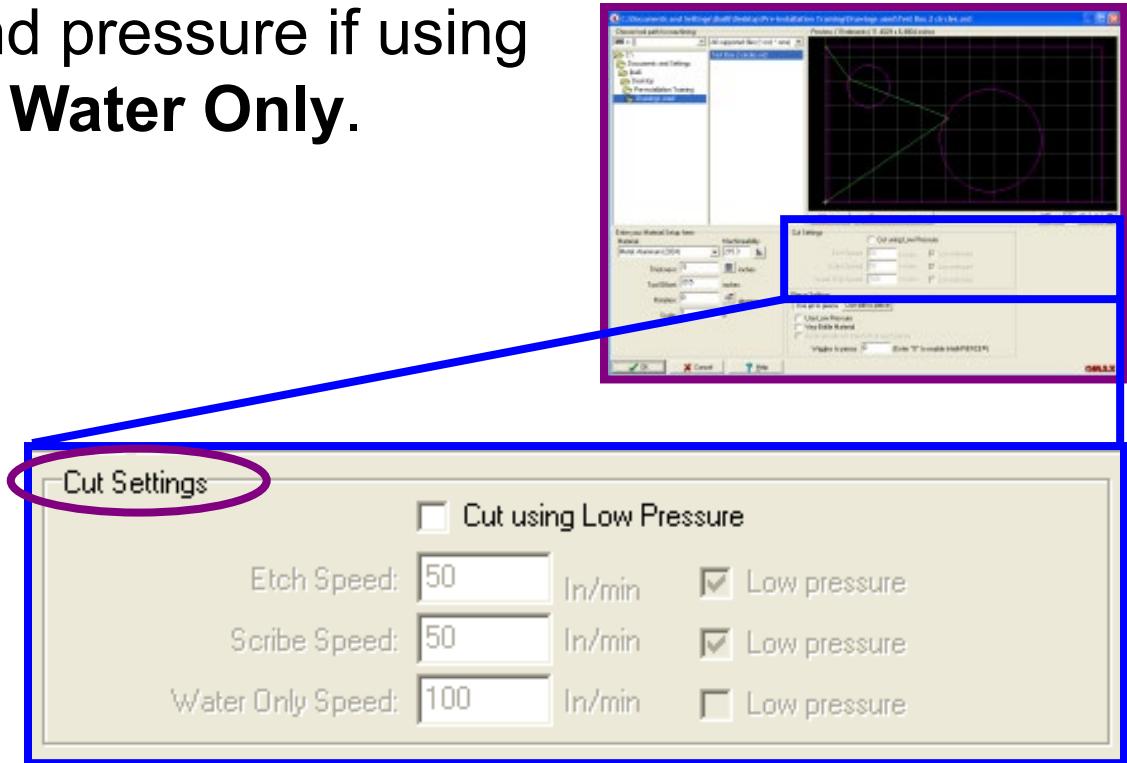


OIR – keyword “Material Setup”

# Step 8: Open & Configure the ORD/OMX File

## Cut Settings

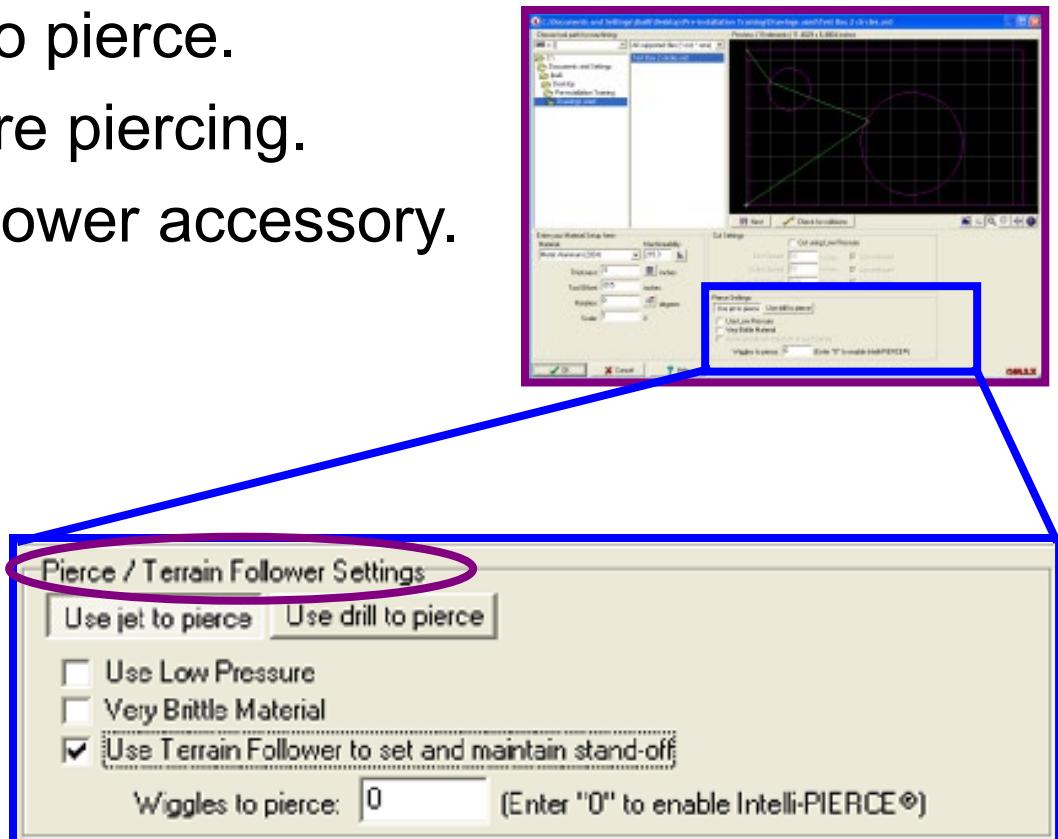
- Adjust speed and pressure if using **Etch, Scribe or Water Only.**



# Step 8: Open & Configure the ORD/OMX File

## Pierce Settings

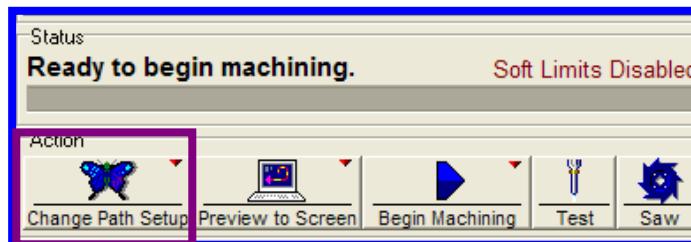
- Specify jet or drill to pierce.
- Enable low pressure piercing.
- Enable Terrain Follower accessory.



# Step 8: Open & Configure the ORD/OMX File

## Practice

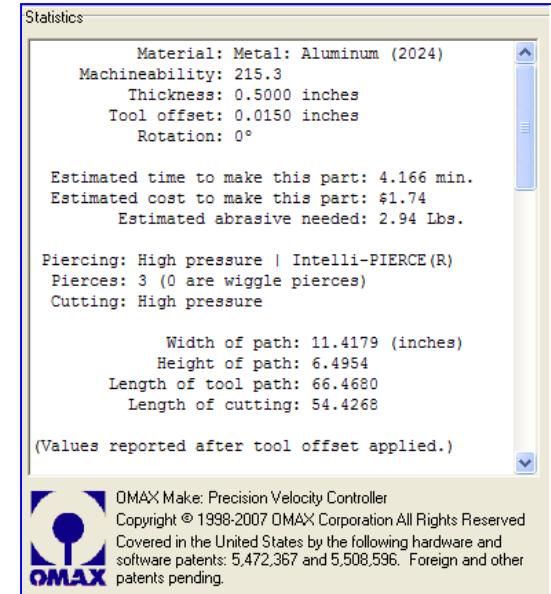
- *Open **MAKE**.*
- *Click **Change Path Setup**.*
- *Review each area of the **Change Path Setup** window.*
  - *Find and open a new file.*
  - *Change **Material Setup**.*
  - *Review **Cut and Pierce Settings**.*
  - *Compile the part in **MAKE**.*



# Step 8: Open & Configure the ORD/OMX File

## Practice

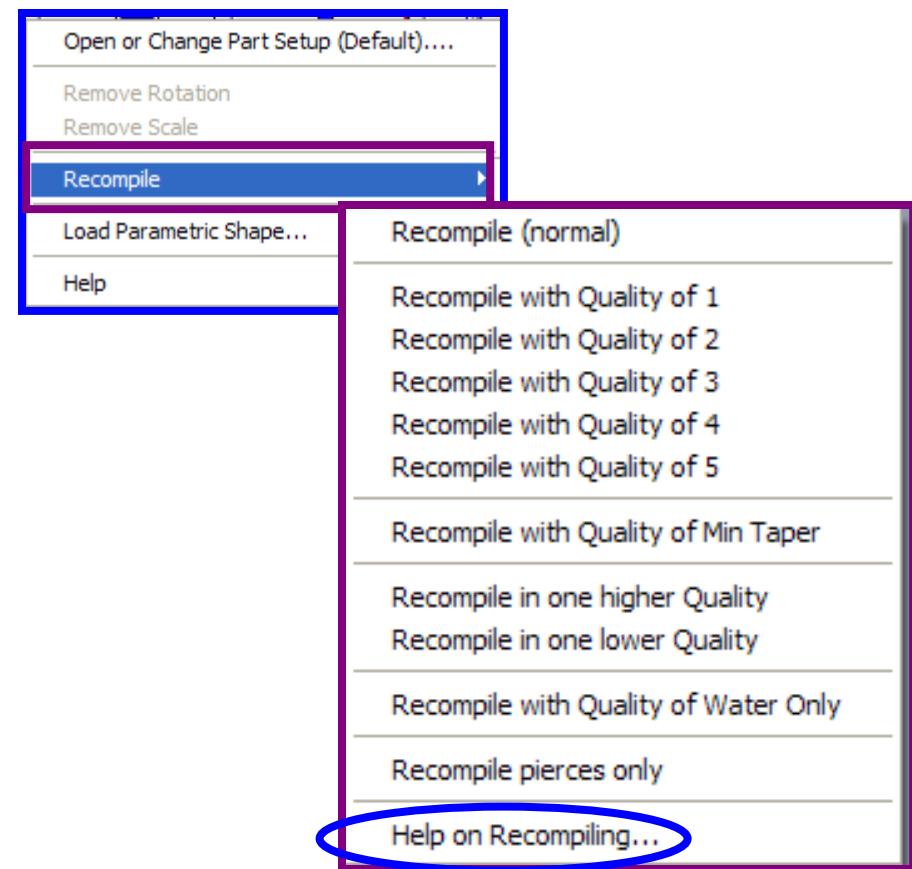
- *Review the **Statistics** window for the new part.*
- *Open **Change Path Setup**.*
  - *Change **Material Type** and **Thickness**.*
  - *Open the part in **MAKE**.*
- *Review the **Statistics** window for the part with different material type and thickness – observe the changes.*



# Step 8: Open & Configure the ORD/OMX File

## Recompile Options

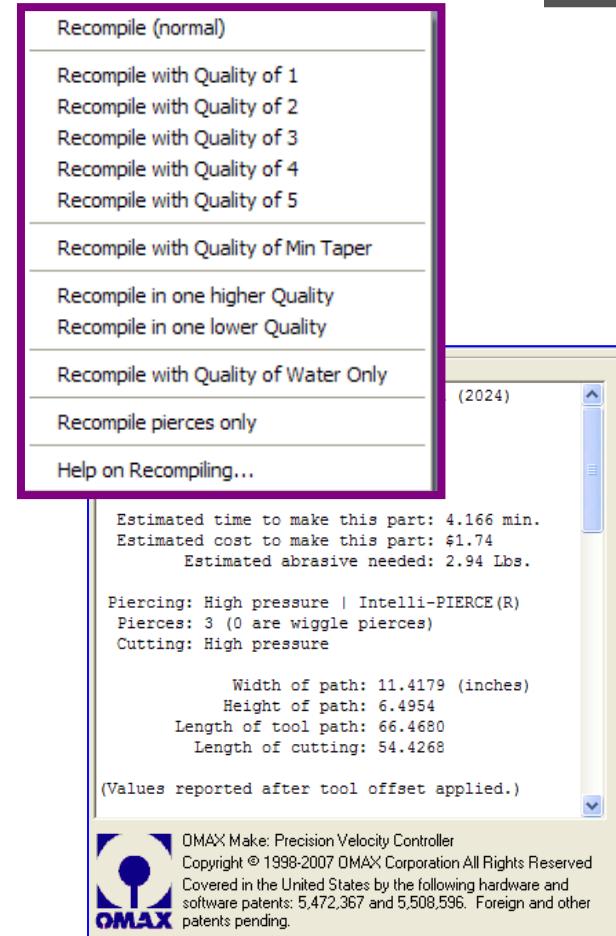
- Change the machining quality of the part in **MAKE** using **Recompile**.



# Step 8: Open & Configure the ORD/OMX File

## Practice

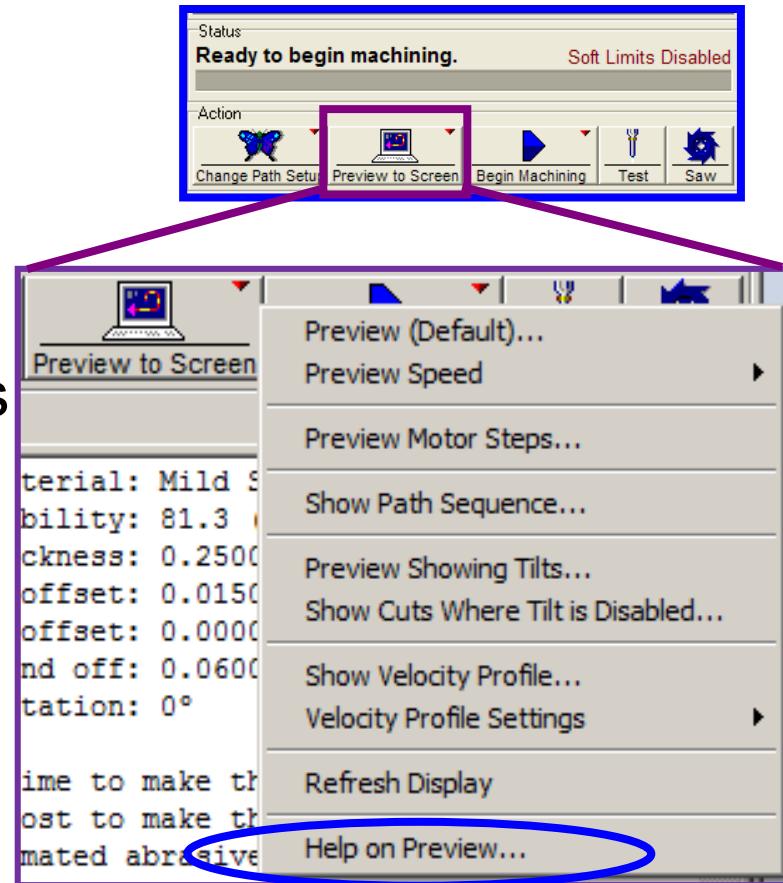
- *Open a machine file in MAKE.*
- *Review the data in the **Statistics** window for the part.*
- *Recompile the part using a different machining quality.*
- *Review the data in the **Statistics** window for the part – what changed?*



# Step 8: Open & Configure the ORD/OMX File

## Preview to Screen

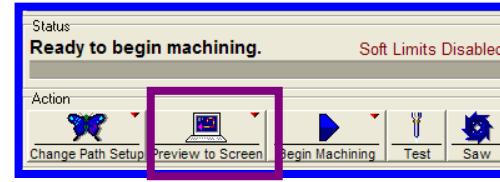
- Preview (Default)
  - Preview Speed
- Motor Steps
- Path Sequence
- Preview Showing Tilts
- Show Cuts Where Tilt is Disabled
- Velocity Profile
  - Velocity Profile Settings
- Help



# Step 8: Open & Configure the ORD/OMX File

## Preview Options

- **Preview speed** - adjusts the speed of the default preview option
- **Motor Steps** - displays each motor step (approximately 0.005") – zoom to 5,000% to view
- **Path Sequence** – adds numbers to each section of the tool path following a traverse
- **Show Tilts** – shows 3D pattern if tilt is in the path
- **Velocity Profile** – shows the speed of the nozzle in color and height as a 3D model

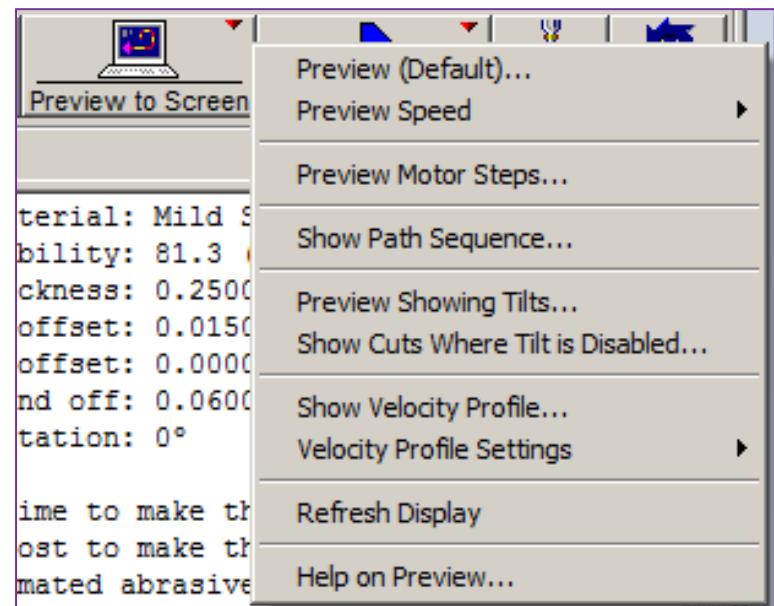


OIR – keywords “preview to screen”

# Step 8: Open & Configure the ORD/OMX File

## Practice

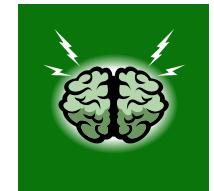
- *Open a machine file in MAKE*
- *Preview using the following*
  - *Preview (Default)*
  - *Preview Motor Steps*
  - *Show Path Sequence*



# Step 8: Open & Configure the ORD/OMX File

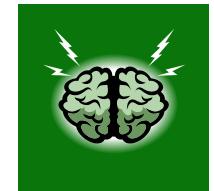
## Review

1. Which of the following controls or actions do we use to open and configure a machine file?
  - a. Setup
  - b. Homes
  - c. Change Path Setup
  - d. Preview to Screen
  
2. What is one way to get to the **Material Setup** area in **MAKE**?



# Step 8: Open & Configure the ORD/OMX File

3. Which control or activity would you choose if you wanted to see the motor step view of a part?
  - a. Change Path Setup
  - b. Preview to Screen
  - c. Setup
  - d. Homes
  
4. Which area of the **MAKE** screen do you find information on about how much time it will take to make a part?



# Steps in Making Parts

- **Intelli-MAX LAYOUT**

**Step 1:** Obtain/create a Drawing File (DXF file).

**Step 2:** Assign machining Qualities (edge finish).

**Step 3:** Clean the drawing.

**Step 4:** Add Path elements to the drawing & save it.

**Step 5:** Create the Machine Tool Path file (ORD/OMX).



- **Intelli-MAX MAKE**

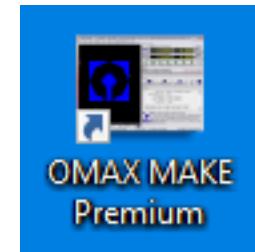
**Step 6:** Start up the machine.

**Step 7:** Configure Machine Settings.

**Step 8:** Open and configure the ORD/OMX file.

**Step 9: Load and clamp the material.**

**Step 10:** Begin machining and cut the part.

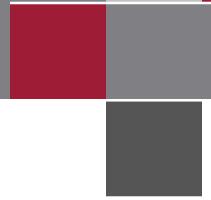


# Step 9: Load and Clamp Material

## Loading and Clamping Material Tasks

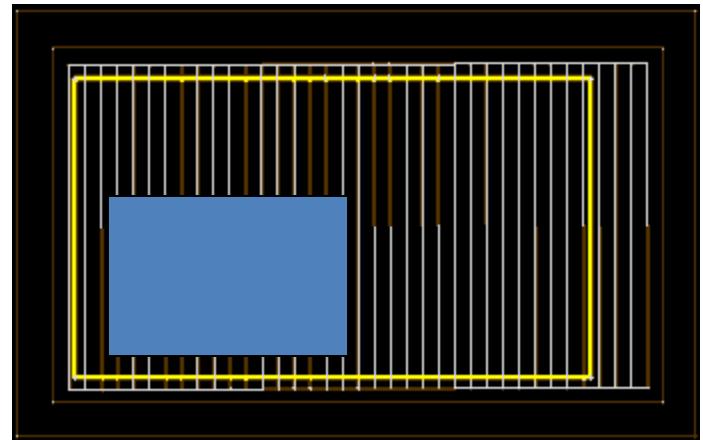
- Task 1: Place the material in the machine.
- Task 2: Clamp the material in the machine.
- Task 3: Position the nozzle for machining.

# Step 9: Load and Clamp Material



## Task 1: Place material in the tank.

- Move the nozzle out of the way before loading material in the tank.
- Lower the water level in the tank so it is lower than the top of the slats.
- Place material “logically” on the slats in the tank for cutting.



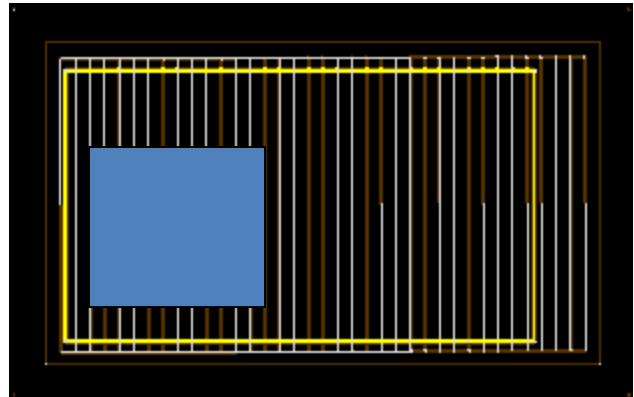
**Caution**

**Slats may be sharp.**

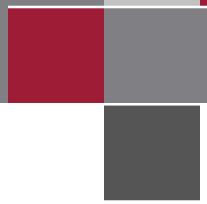
# Step 9: Load and Clamp Material

## What does *logical placement* of the material mean?

- Within the cutting area
- Accessible to the operator
- Lay the material flat
- No obstructions for the cutting head
- Can be clamped for stability
- On sacrificial material (such as waterjet brick) if applicable



# Step 9: Load and Clamp Material



## Task 2: Clamp the material in the tank.

- Securely fasten the material for cutting to keep it from moving, vibrating, floating, tipping, or falling into the tank.

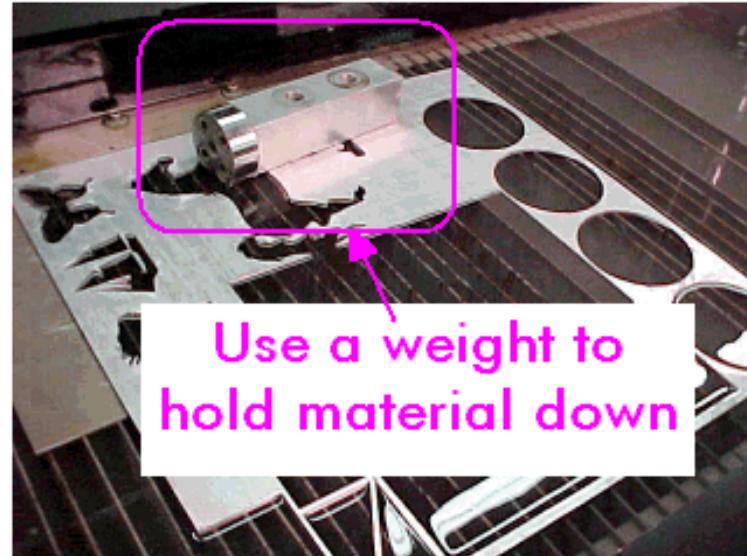
### NOTE

*Insufficient clamping may result in inaccuracies in finished parts.*

# Step 9: Load and Clamp Material

## Securing Materials in the Tank

- Place a heavy weight on top of the material to keep it from floating.



- Ensure weights or clamps used will not interfere with motion of cutting head.

# Step 9: Load and Clamp Material

- Clamp the material against the side of the tank.

Bar clamps

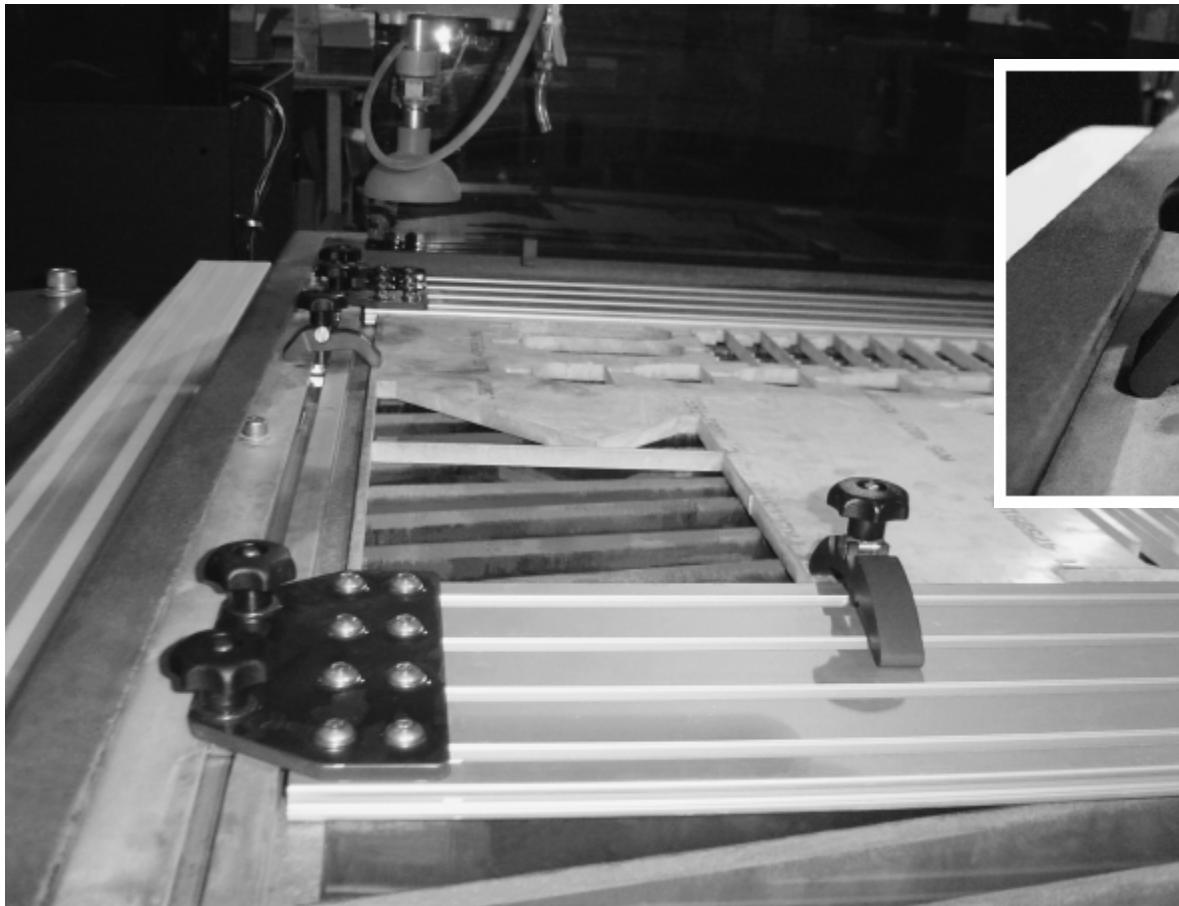


## NOTE

*Do not secure materials against the slats.*

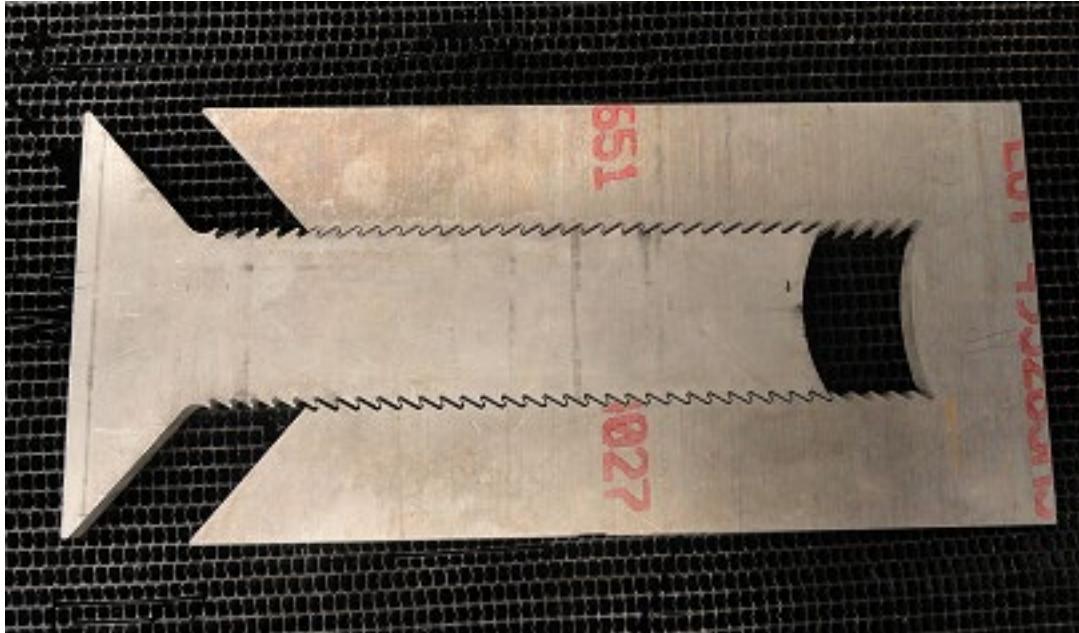
# Step 9: Load and Clamp Material

- **Best Practice - use a Material Holding Kit**



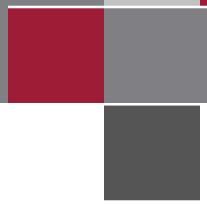
# Step 9: Load and Clamp Material

- Use other types of material holding systems.



*Make this one on the OMAX!*

# Step 9: Load and Clamp Material



## More Ideas

- Flat plates
- Quick grips
- C-clamps
- Weights
- Waterjet Brick



What else might work for securing materials in the tank?



# Step 9: Load and Clamp Material

Reference Dr. Olsen's article

*Fixturing for abrasive jet machining*

[http://www.thefabricator.com/WaterjetCutting/WaterjetCutting\\_Article.cfm?ID=1238](http://www.thefabricator.com/WaterjetCutting/WaterjetCutting_Article.cfm?ID=1238)

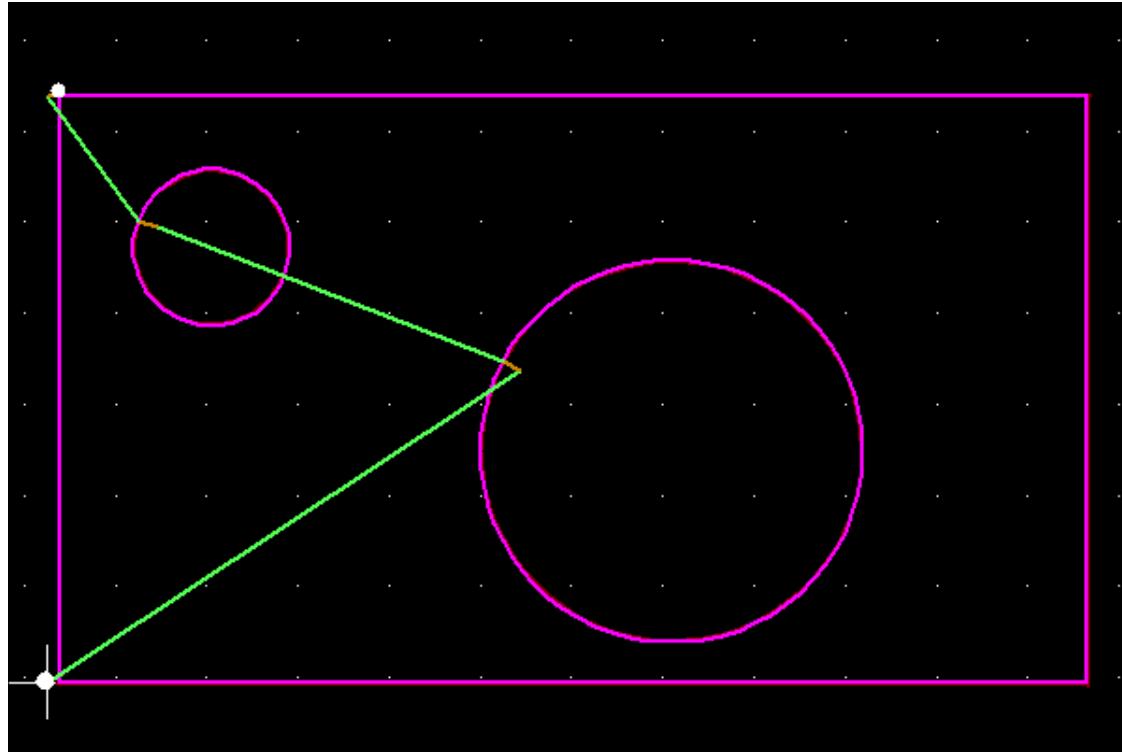
# Step 9: Load and Clamp Material

## Task 3: Position the Nozzle for Cutting.

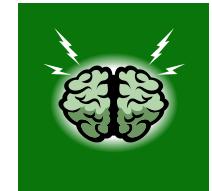
- Move the nozzle to the location you want to start the nozzle travel path from.
- The machine will move around the path beginning from the start point (white cross) in the ORD file.

# Step 9: Load and Clamp Material

Example ORD file and machine path



Where is the  
start point in this  
machine path?

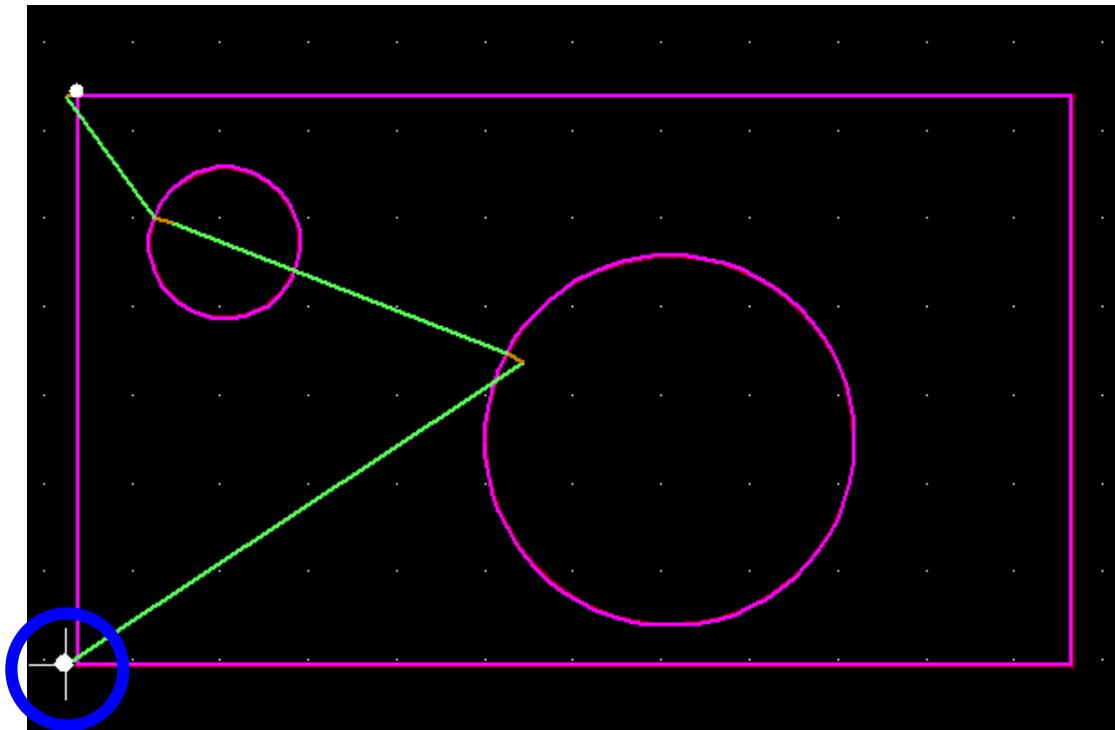


# Step 9: Load and Clamp Material

## Exercise: ORD file preview of a part

Part dimensions  
6 inches tall  
10 inches long

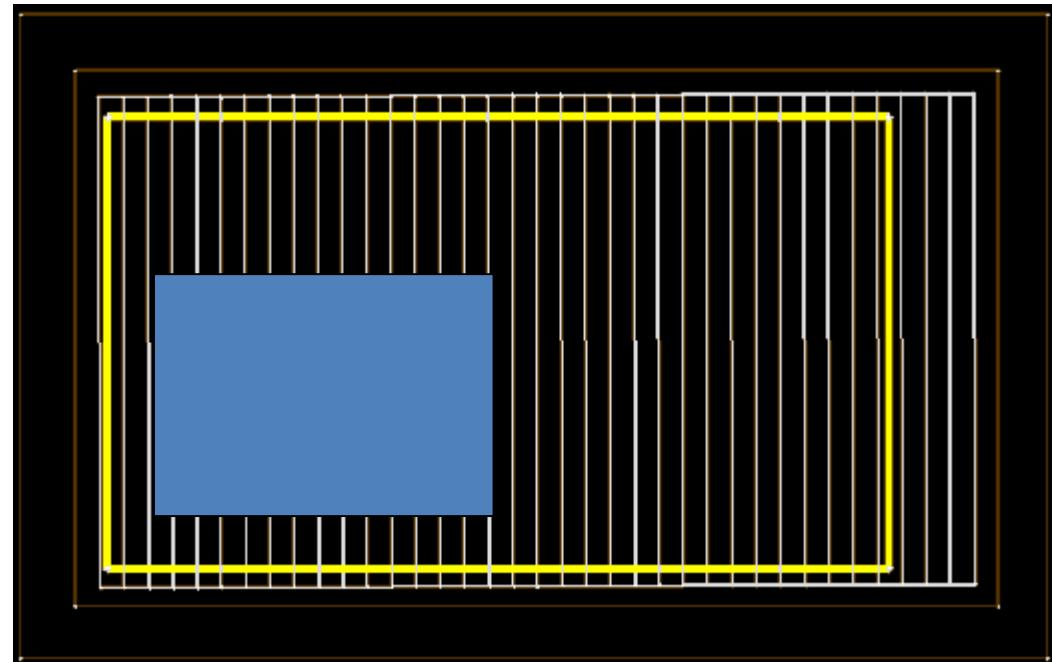
Start Point



# Step 9: Load and Clamp Material

The material is loaded and clamped in the tank.

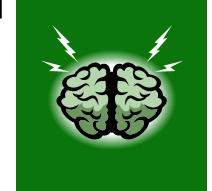
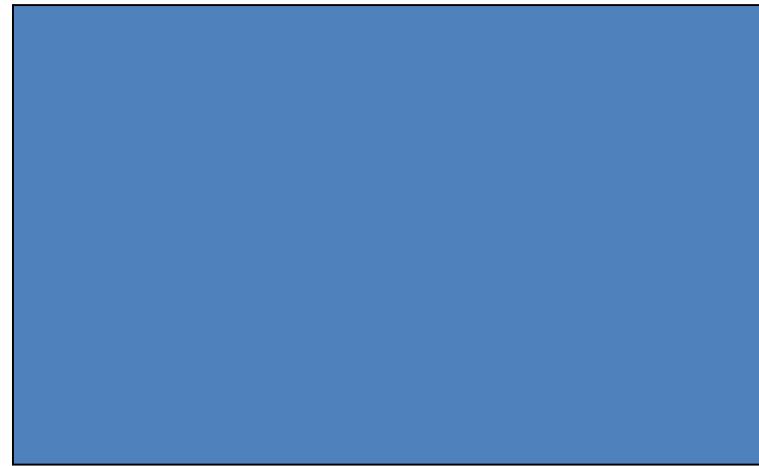
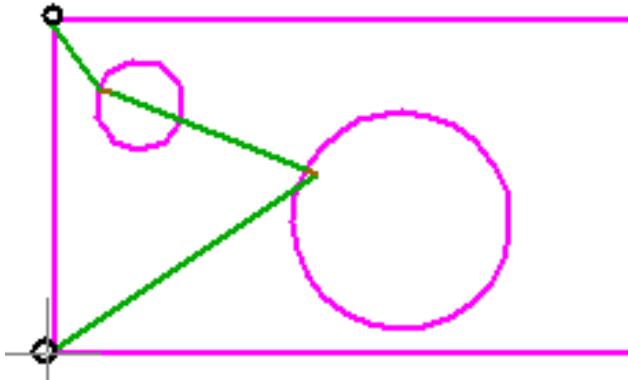
Material dimensions  
8 inches tall  
12 inches long



# Step 9: Load and Clamp Material



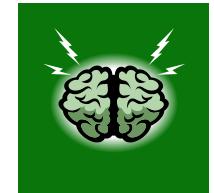
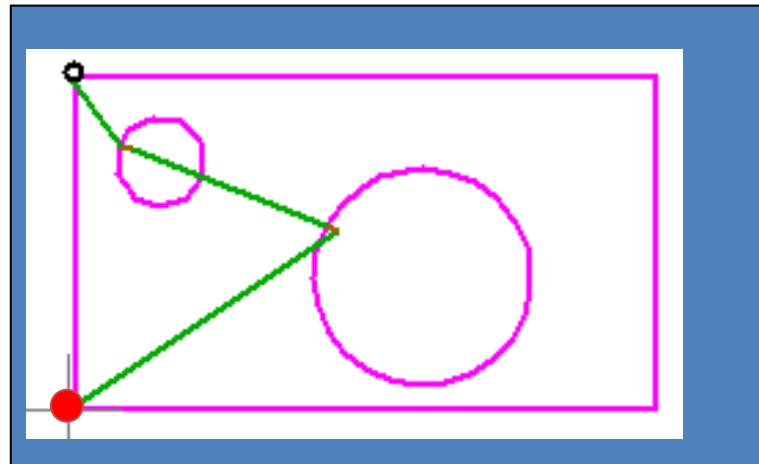
Given the previous part and material dimensions, where on the material would you place the nozzle on the material to begin machining?



# Step 9: Load and Clamp Material

## Nozzle Start Position

You would place the nozzle so the whole part could be cut out of the material.

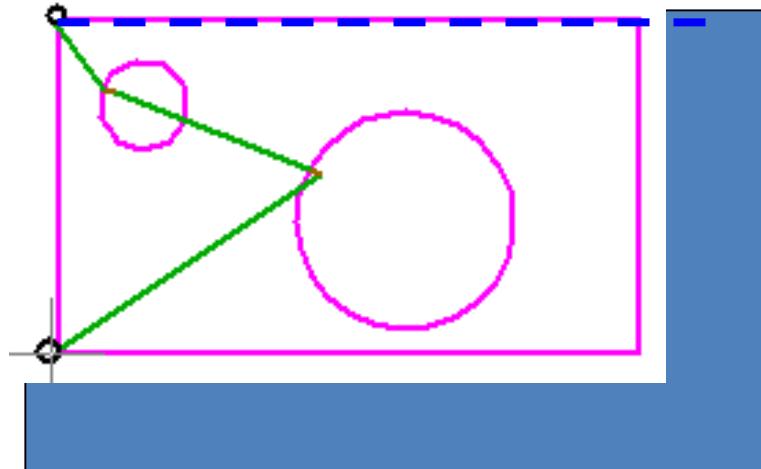


# Step 9: Load and Clamp Material

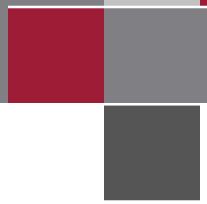


## Nozzle Positioning Best Practices

- Position for best material utilization and part quality
  - Reduce material scrap
  - Reduce risk of damage



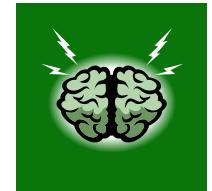
# Step 9: Load and Clamp Material



## Review

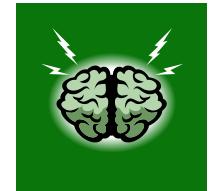
1. Give one example of what is meant by placing the material logically in the tank.
  
2. What are the three tasks involved in Step 9 of the process, Load and Clamp Material?

1. \_\_\_\_\_
  
2. \_\_\_\_\_
  
3. \_\_\_\_\_

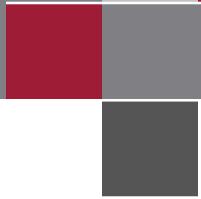


# Step 9: Load and Clamp Material

3. Why should you make sure the material is securely clamped or fixtured in the machine before it is cut?
  
4. What is one consideration for positioning the nozzle for cutting a part?

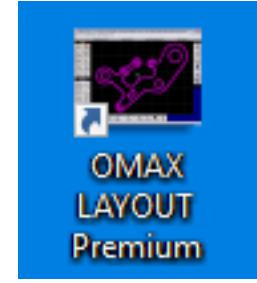


# Steps in Making Parts



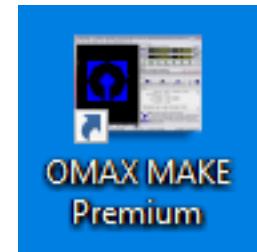
- ## Intelli-MAX LAYOUT

- Step 1:** Obtain/create a Drawing File (DXF file).
- Step 2:** Assign machining Qualities (edge finish).
- Step 3:** Clean the drawing.
- Step 4:** Add Path elements to the drawing & save it.
- Step 5:** Create the Machine Tool Path file (ORD/OMX).

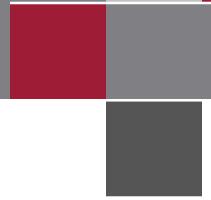


- ## Intelli-MAX MAKE

- Step 6:** Start up the machine.
- Step 7:** Configure Machine Settings.
- Step 8:** Open and configure the ORD/OMX file.
- Step 9:** Load and clamp the material.
- Step 10:** Begin machining and cut the part.



# Step 10: Machine the Part



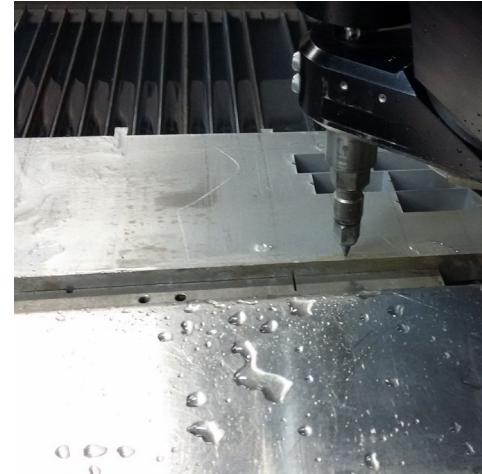
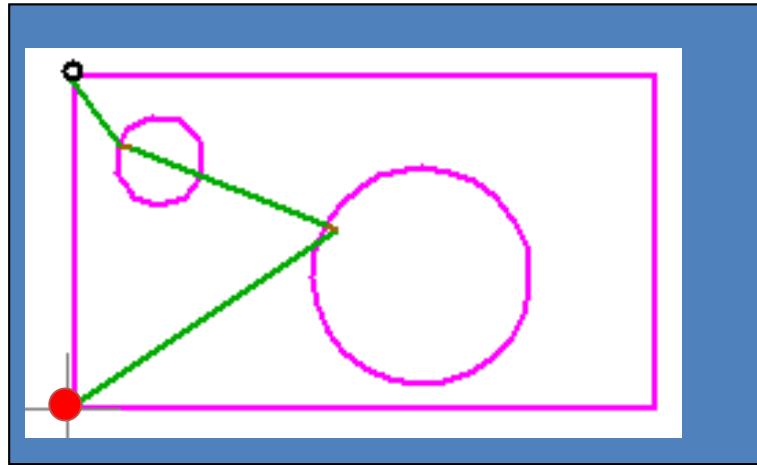
## Machining Tasks

- Task 1: Set the nozzle position at the starting point.
- Task 2: Set the nozzle stand-off.
- Task 3: Do a dry run of the tool path.
- Task 4: Put the splash guard on the nozzle.
- Task 5: Raise the water level.
- Task 6: Activate the cutting process.
- Task 7: Remove the cut part(s) from the machine.



# Step 10: Machine the Part

**Task 1: Set the nozzle position at the starting point.**

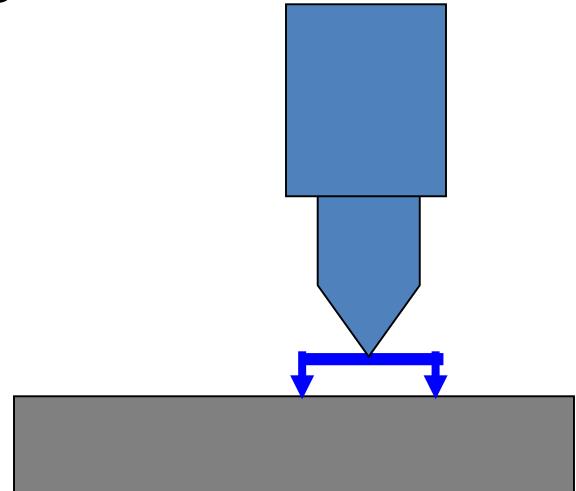


# Step 10: Machine the Part



## Task 2: Set the nozzle stand-off.

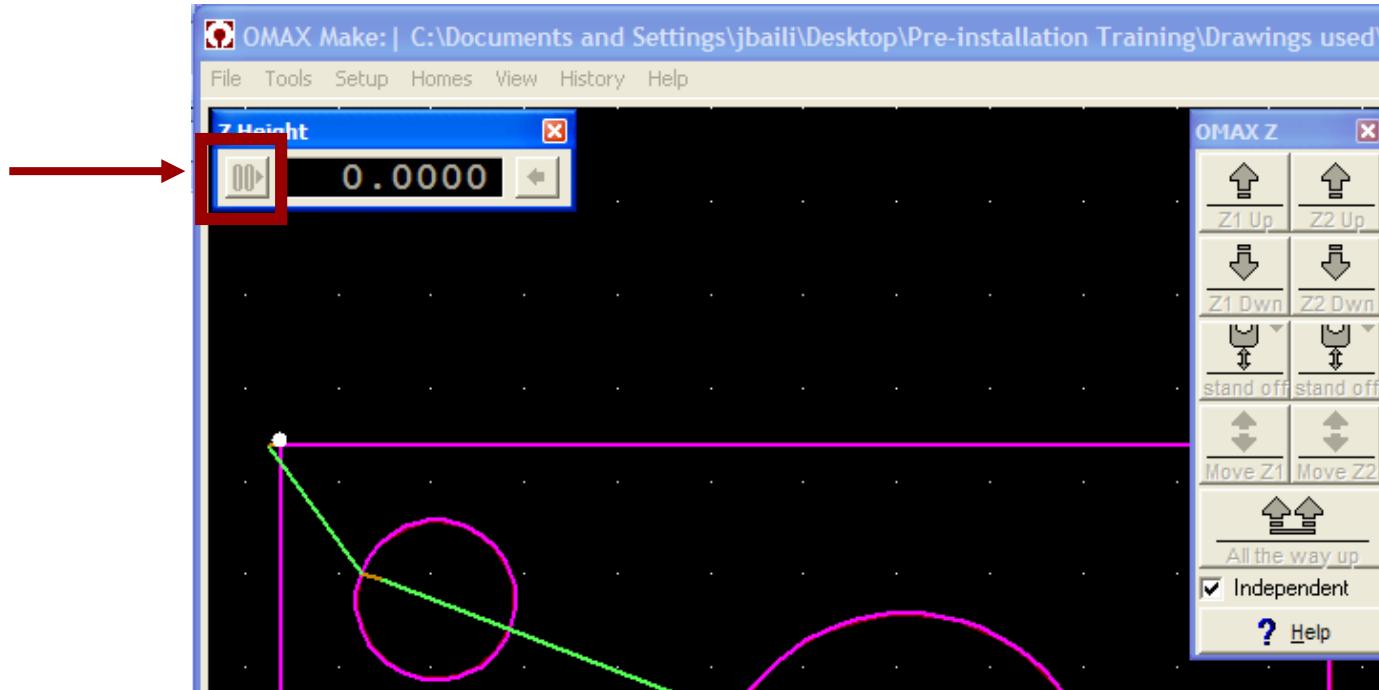
- Stand-off is the distance between the material surface and the tip of the mixing tube in the nozzle.
- Can set using a feeler gauge
  - .040" for standard Z-axis
  - .060" for a Tilt-A-Jet
  - .080" for an A-Jet



# Step 10: Machine the Part

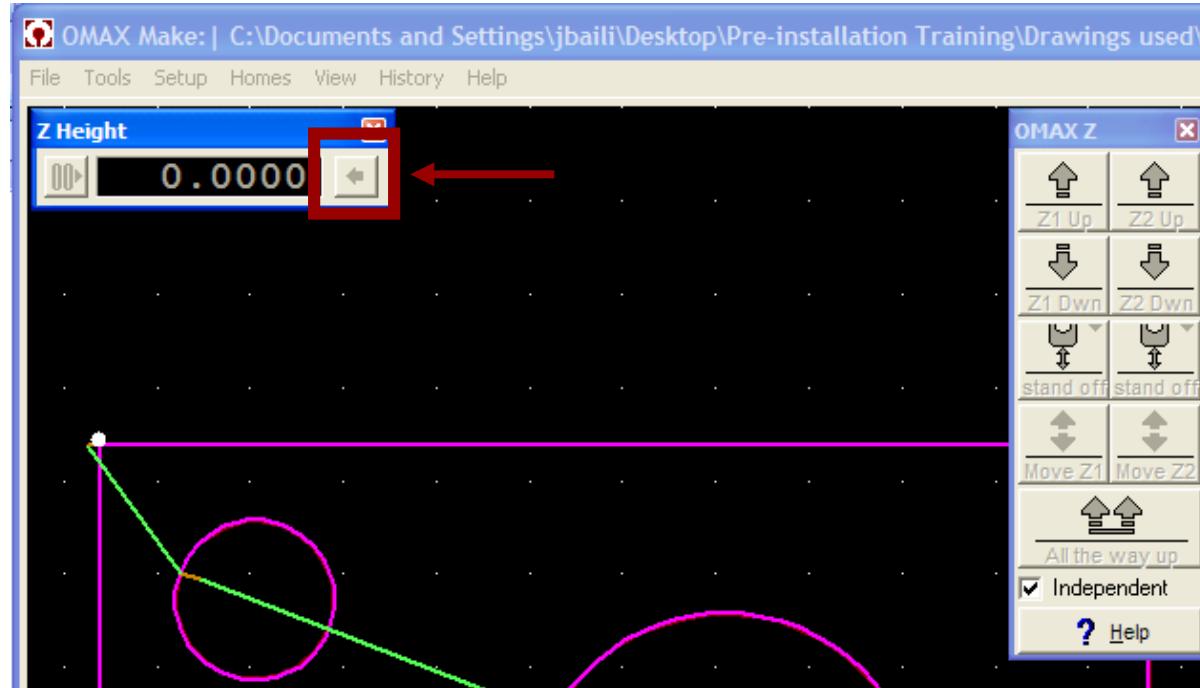
Once the stand-off is measured:

- Click to zero the **Z Height** counter in **MAKE**.

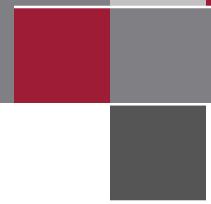


# Step 10: Machine the Part

- Click the button on the right to move the nozzle back to Z = Zero in **MAKE**.

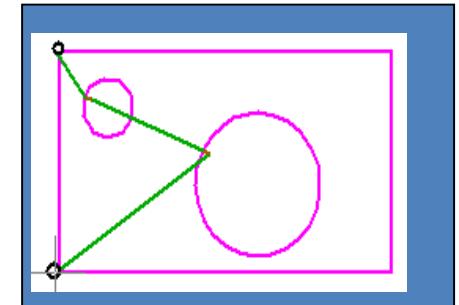


# Step 10: Machine the Part



## Task 3: Do a dry run of the tool path.

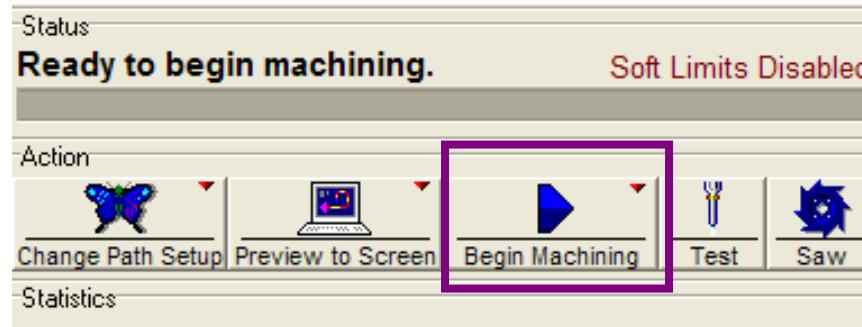
- Goes through all the cutting motions without turning on the water or abrasive
- Quality check prior to cutting the part
  - Verify the part will fit on the material
  - Verify the start point
  - Verify the nozzle will not hit any fixturing
  - Verify the nozzle stand-off is sufficient so the nozzle won't run into the material (if an uneven surface)



OIR – *keywords “dry run”*

# Step 10: Machine the Part

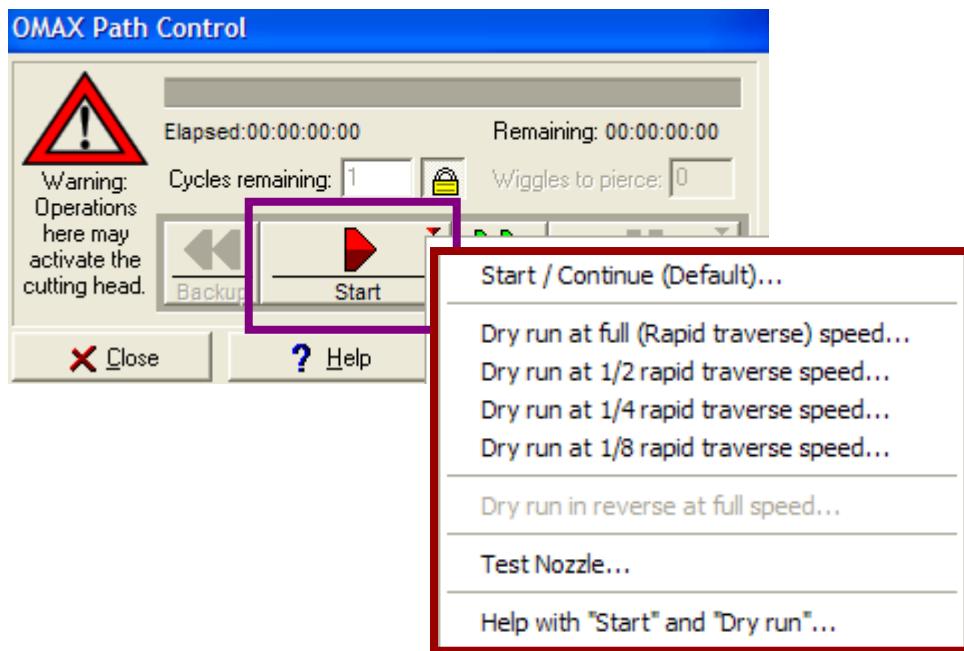
- To access the dry run option in **MAKE**, click **Begin Machining**.



- This will bring up the machining activation controls.

# Step 10: Machine the Part

- In the machining activation controls window, right-click Start.

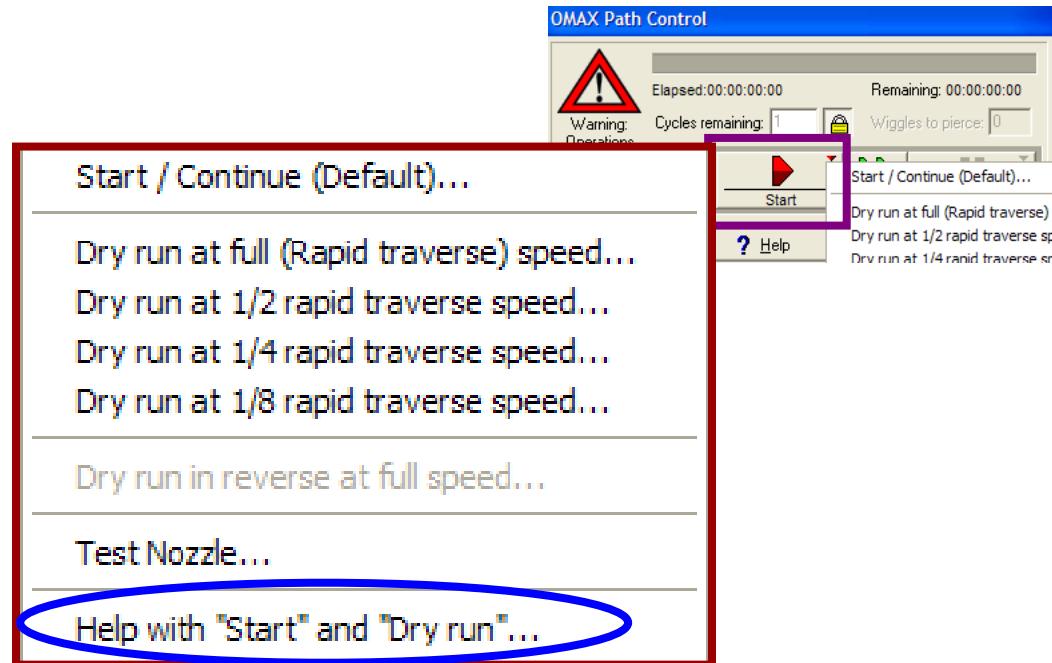


## Warning

Do not left-click the Start button here as this will activate the cutting head.

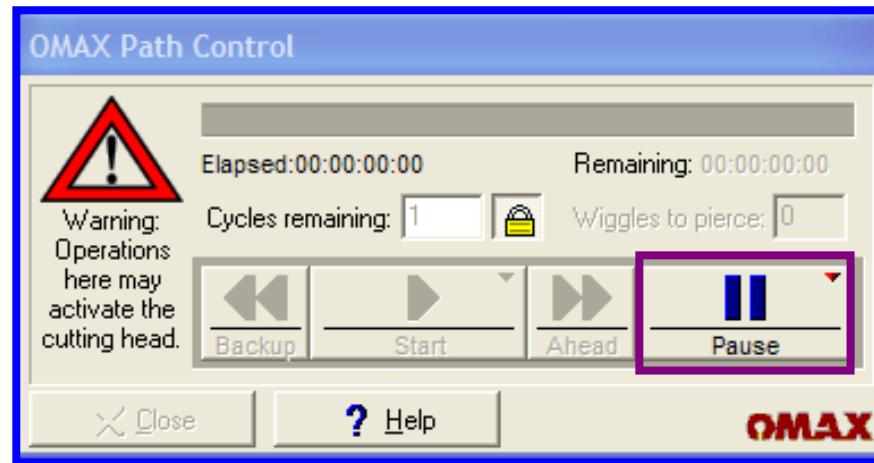
# Step 10: Machine the Part

- Right-clicking the **Start** button brings up a list of dry run options to choose from.



# Step 10: Machine the Part

- Click the **Pause** button in the software (or on the Controller on the machine) if you see potential problems during the dry run process – this will stop machine movement and will shut off the water to the nozzle.



# Step 10: Machine the Part

- Move the nozzle back to the **Path Start home** position when you are finished with the dry run.

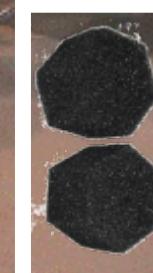
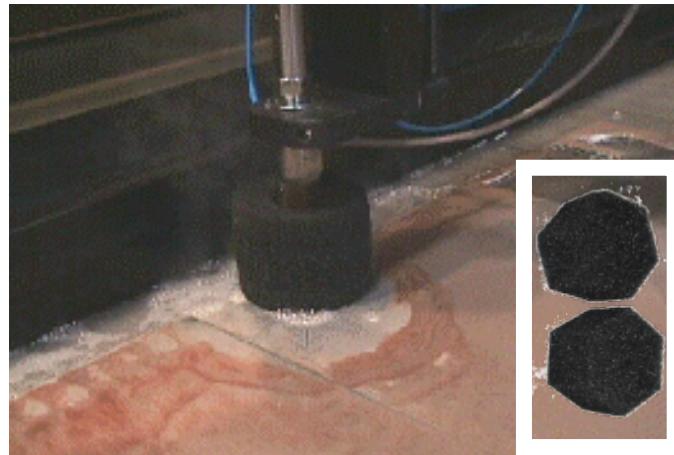


# Step 10: Machine the Part



## Task 4: Put the splash guard on the nozzle.

- Putting the splash guard on the nozzle prevents splash-back that can damage the machine.
- Always use a splash guard and cut under water when possible.



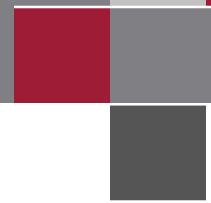
OIR – keyword “muff”

# Step 10: Machine the Part

- To put the splash guard on the nozzle
  - Close any machining functions in OMAX **MAKE**.
  - Raise the nozzle Z-height about three inches.
  - Slide the splash guard up onto the nozzle body just so the bottom is about even with the tip of the mixing tube on the nozzle.

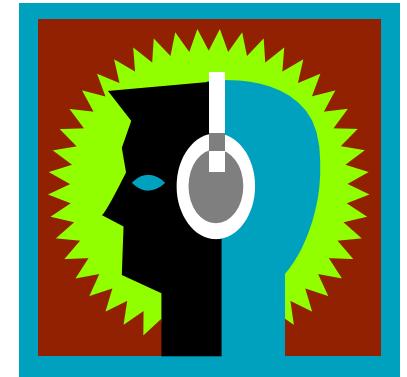


# Step 10: Machine the Part



## Task 5: Raise the water level.

- Raising the water level to about  $\frac{1}{2}$  to  $\frac{3}{4}$  an inch above the material surface so you can cut under water:
  - Reduces noise levels
  - Reduces particulate contamination

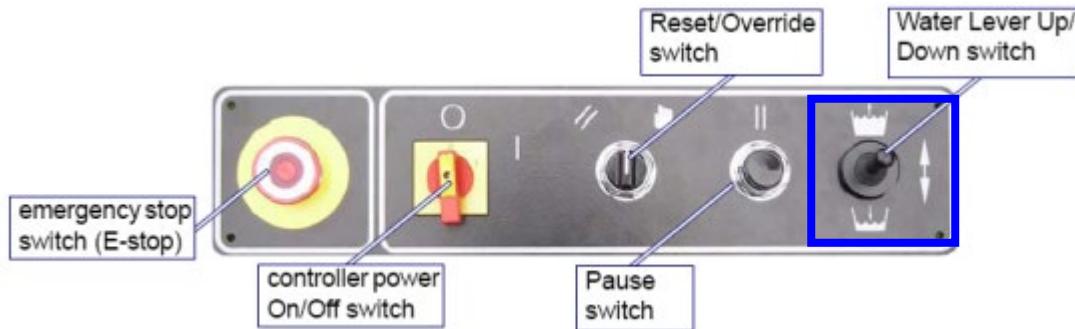


### NOTE

*Raising the water level too high may cause the machine to “burp.”*

# Step 10: Machine the Part

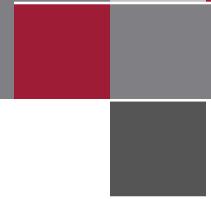
- To raise the water level, raise and hold the water level handle on the front of the PC Controller cabinet.



## Water Level

Raises ( $\uparrow$ ) and lowers ( $\downarrow$ ) the water in the catcher tank to cover/uncover the material being cut.

# Step 10: Machine the Part



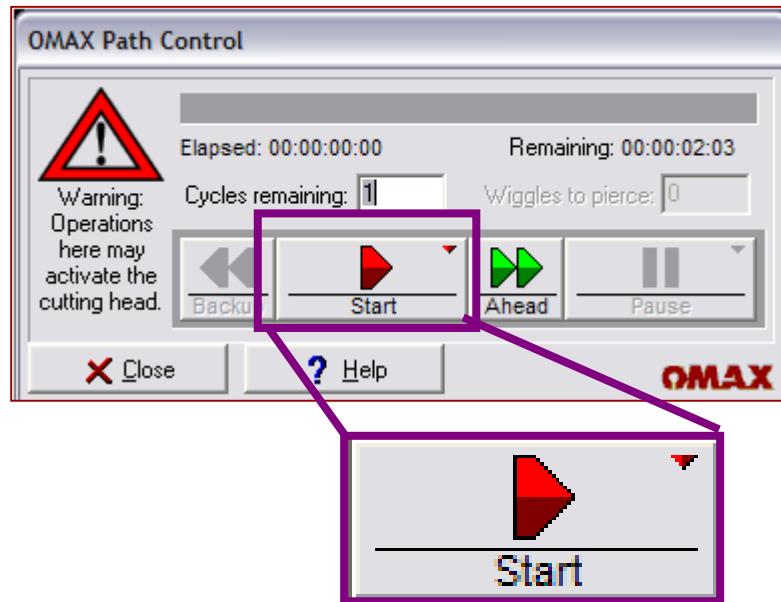
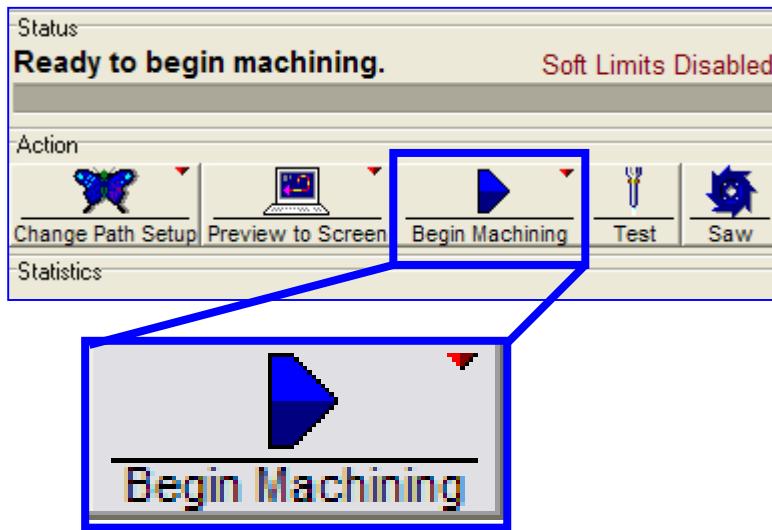
## Task 6: Begin machining the part.

- Pre-machining checklist
  - ✓ Ear protection on?
  - ✓ Eye protection on?
  - ✓ Anyone or anything near the nozzle that could be hit when the nozzle moves?
  - ✓ Is there enough abrasive to make the part?
  - ✓ Is the nozzle positioned at the start of the path?
  - ✓ Is the charge pump turned on?



# Step 10: Machine the Part

- To activate the machining process, click **Begin Machining**, and then click **Start**.



# Step 10: Machine the Part

Start machining the part.

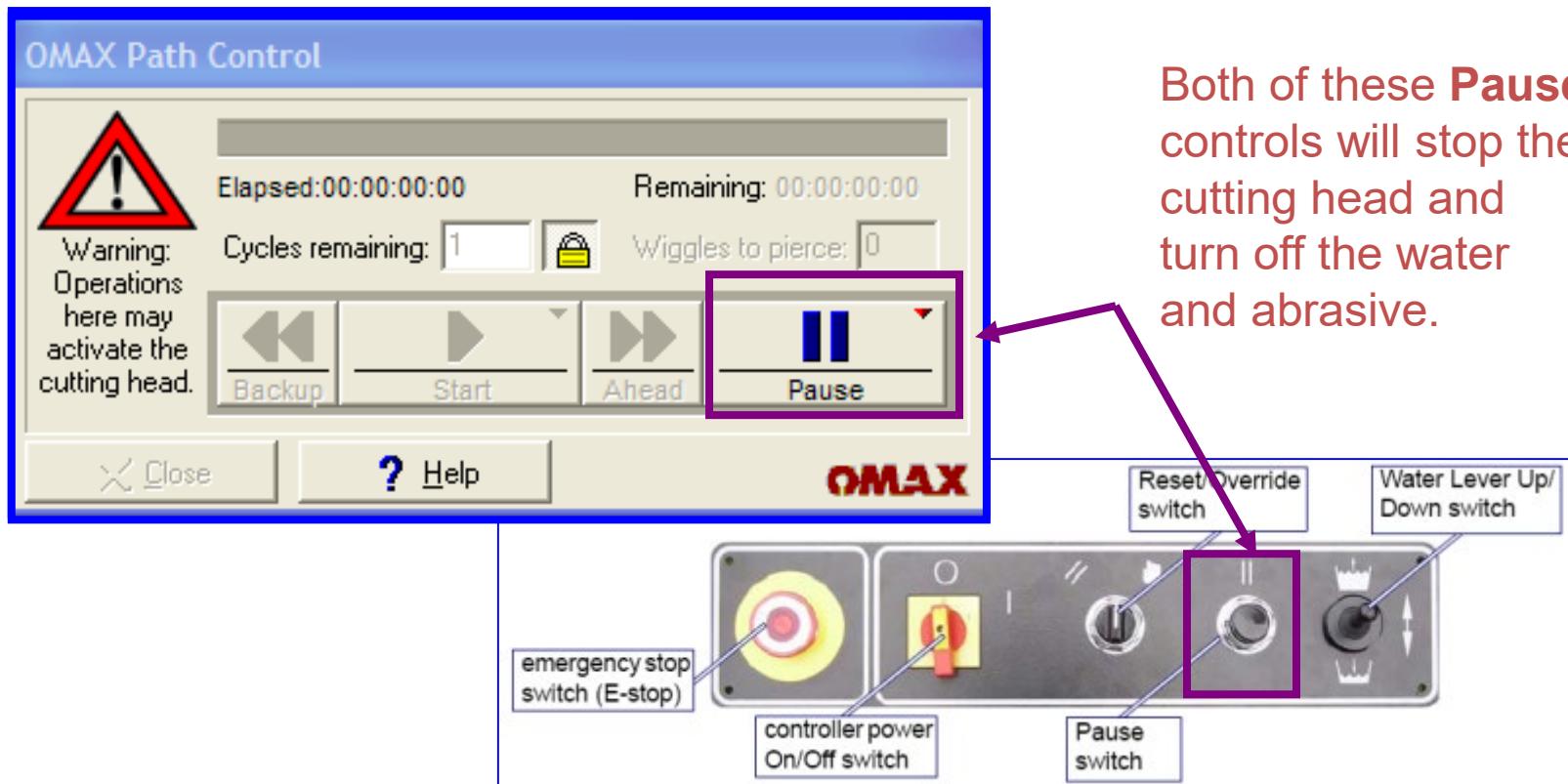


**Warning**

**Left-clicking the Start button will activate the cutting head and start the machining process.**

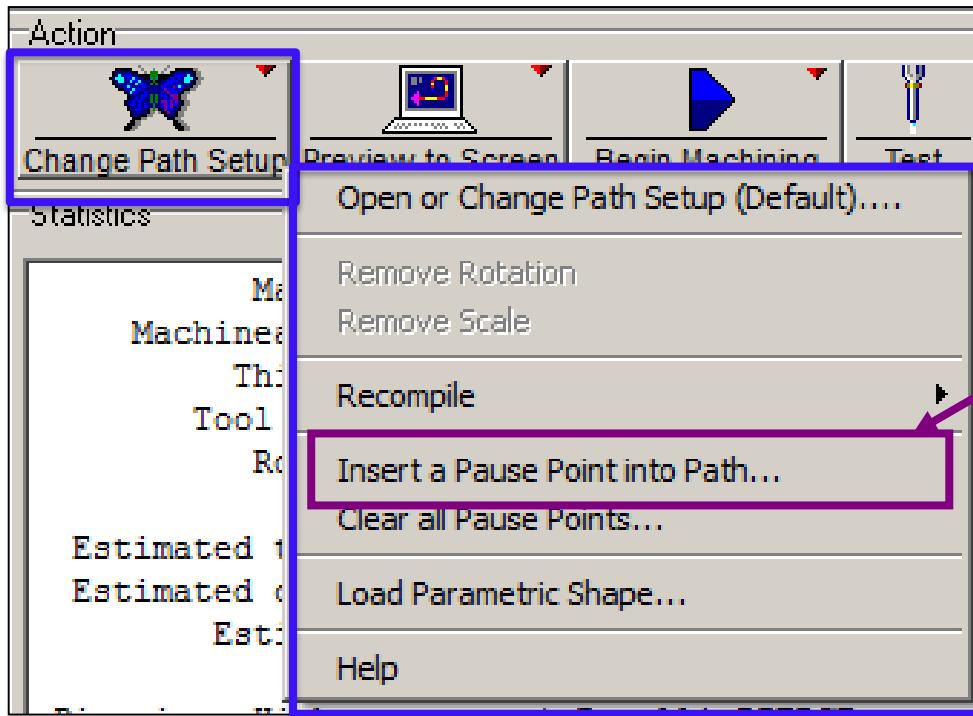
# Step 10: Machine the Part

If you need to pause...



# Step 10: Machine the Part

If you need to pause...



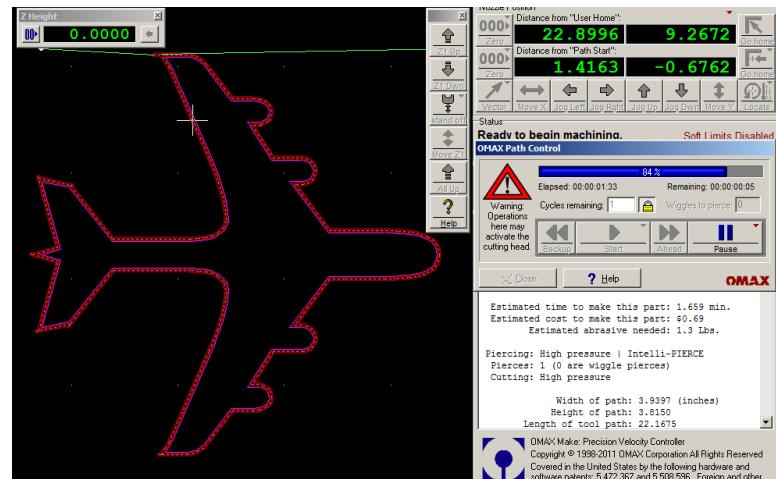
You can program temporary pause points into your path prior to machining.

You can add permanent pause points using **XData** commands in **LAYOUT**.

OIR – keywords “pause points”

# Step 10: Machine the Part

- Watch the part being machined.
  - Stay in the area.
  - If the machine must be paused for any reason, press the **Pause** button.
  - The white cross on the **MAKE** Preview window will move to reflect the current position of the nozzle on the part.

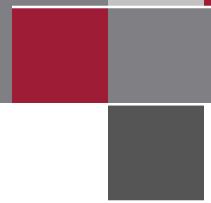


# Step 10: Machine the Part

- Raise or lower water level if necessary.
- Monitor the abrasive level and add as needed.
- Listen to the OMAX – it makes a distinct sound when it is cutting.
- Check the part periodically.



# Step 10: Machine the Part

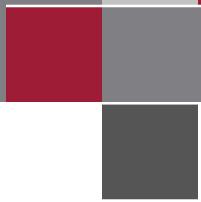


## Task 7: Remove the cut part from the machine.

- Close any machining function windows in **MAKE**.
- Lower the water level.
- Rinse excess abrasive off the material.
- Raise the nozzle Z-height.
- Move the nozzle out of the way (if needed).
- Remove and inspect the part.



# Steps in Making Parts



- **OMAX LAYOUT**

**Step 1:** Obtain/create a Drawing File (DXF file).

**Step 2:** Assign machining Qualities (edge finish).

**Step 3:** Clean the drawing.

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**Step 5:** Create the Machine Tool Path file (ORD/OMX).



- **OMAX MAKE**

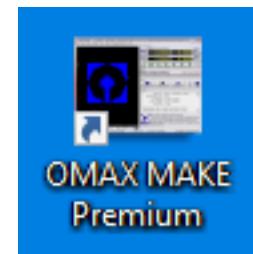
**Step 6:** Start up the machine.

**Step 7:** Configure Machine Settings.

**Step 8:** Open and configure the ORD/OMX file.

**Step 9:** Load and clamp the material.

**Step 10:** Begin machining and cut the part.



# Next steps

- Practice drawing.
- Cut test parts.
- Follow documented procedures and safety practices at all times.

Questions? Use the resources! If needed, contact [OMAX Technical Support](#).