



MAXIEM Operator Training



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

OMAX Corporation is continually improving their equipment to bring you the best in abrasivejet machining technology. For that reason, your MAXIEM JetMachining Center may differ slightly from what is described in this document. If you have any questions, please feel free to contact us at 1-800-838-0343 or e-mail us at techsupport@omax.com. You can also receive technical support on-line at: <http://www.omax.com/support> (user name and password required for access)

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Overview



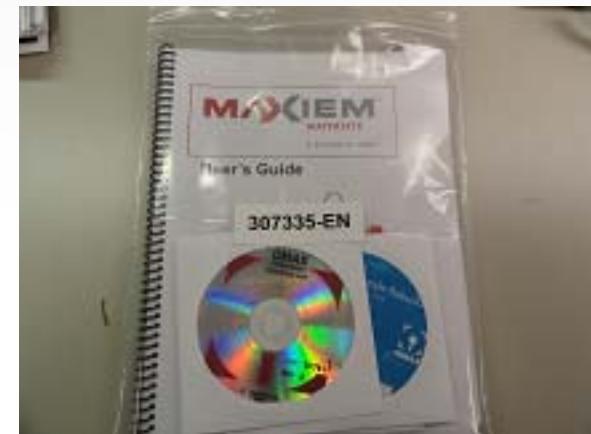
- Welcome and introductions
- Training objectives
- MAXIEM JetMachining Center system overview
- Steps in making parts
- Learning resources
- MAXIEM Intelli-MAX Standard Software
 - Layout
 - Make





Training Materials

What's included in the training packet



Training Materials



- ✓ Course outline
- ✓ MAXIEM Instructional Kit
 - ✓ Nozzle Rebuild DVD
 - ✓ Pump Rebuild DVD
 - ✓ ADO Alignment DVD
 - ✓ Exploded Diagrams
 - ✓ WJTA Warning cards
- ✓ Copy of this PowerPoint Presentation
- ✓ Safety Checklist





MAXIEM JetMachining Center System Overview

Equipment components and the part cutting process

MAXIEM JetMachining Center Overview



- **Table**
 - Purpose
 - Sizes
 - Components
- **Controller**
 - Purpose
 - Software

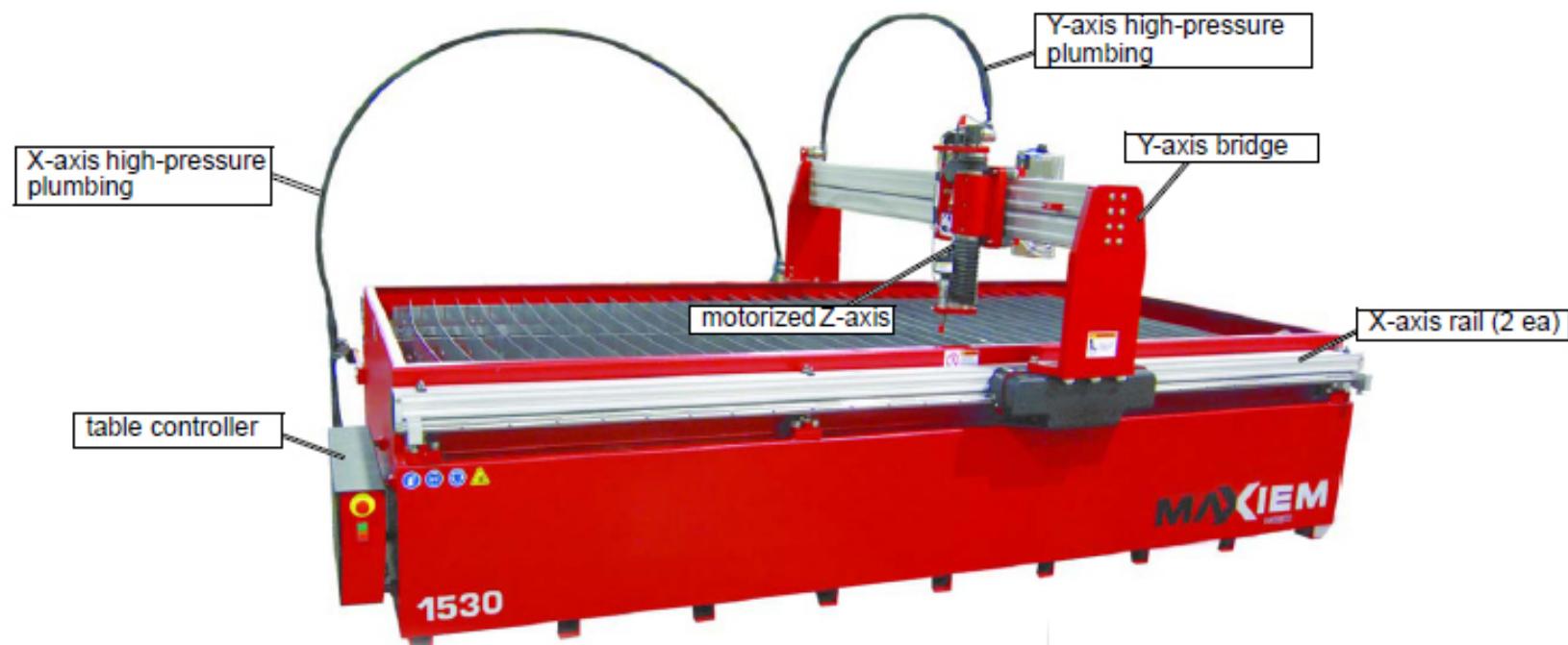


MAXIEM JetMachining Center Overview



The MAXIEM Cutting Table

X-, Y-, and Z-axis Motion System



MAXIEM JetMachining Center Overview



- Nozzles
 - Purpose
 - Types
 - MAXJET 5
 - MAXJET 5i
 - MiniJet nozzles
 - Water Only nozzle
- Direct drive pumps
 - Purpose
 - Sizes (M20, M30, M40)



MAXIEM JetMachining Center Overview



- Abrasive Delivery Systems
 - Purpose
 - Sizes (25 lbs, bulk feed)
- High-pressure System
 - Purpose
 - Components (tubing, fittings, swivels)



MAXIEM JetMachining Center Cutting



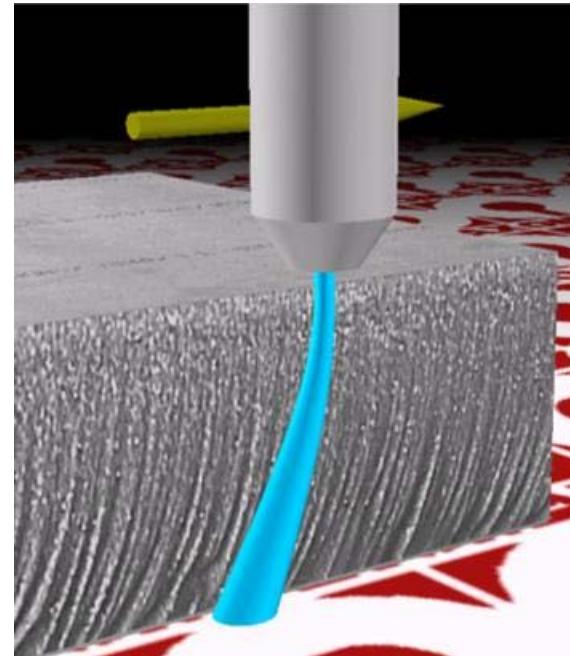
- ❑ The MAXIEM software creates a machine tool path file from a CAD drawing file.
- ❑ The MAXIEM direct drive pump generates ultra-high pressure (UHP) water, up to 50,000 pounds per square inch (psi).
- ❑ The pressurized water travels through the high-pressure system of tubing and fittings to the cutting head (nozzle).
- ❑ A jewel with a tiny orifice (typically .014 in.) in the nozzle assembly, creates backpressure and forces water through the orifice at high velocity.
- ❑ 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 in. internal diameter) at high velocity (over 2500 feet per second) to cut the part.
- ❑ The machine nozzle (cutting head) follows the machine tool path along X, Y, and Z coordinates specified in the **Make** machining file.
- ❑ The nozzle speed determines the edge quality/finish of the part.



Edge Quality

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WATERJETS

- Exercise: Jet Simulator





Intelli-MAX Software Suite

Installation and Registration

Installing Intelli-MAX Standard



- The Intelli-MAX Software Suite is preinstalled
 - Additional seats of software can be purchased if needed.
- Download upgrades from the MAXIEM support site
- Use the installer to uninstall any previous versions of the software when upgrading
 - The installer will retain unique machine settings
- Follow the Install Wizard instructions
 - Install using the defaults in the process



keyword “software”

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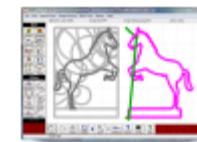
14

Installing Intelli-MAX Standard



How do I know the software is installed?

- After the installation process, you should see three icons on your desktop
 - **Intelli-MAX Layout Standard**
 - **Intelli-MAX Make Standard**
 - **MAXIEM Parts Online**



MAXIEM_Make



Shop_MAXIEM



keyword “software”

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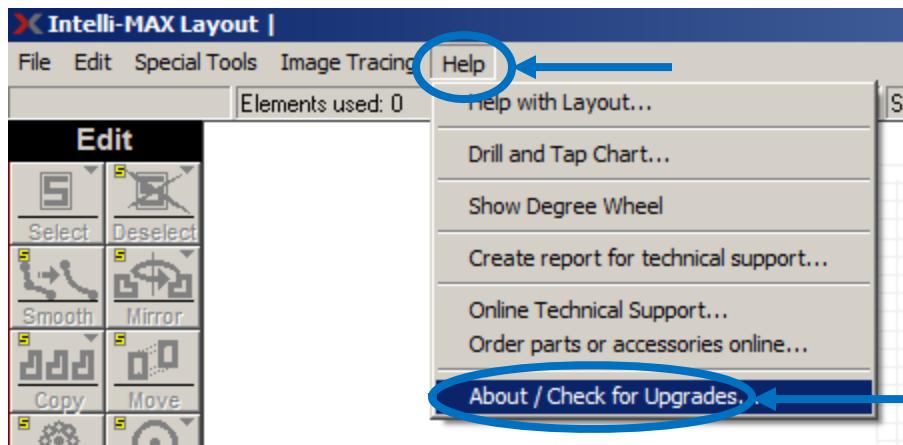
15

Installing Intelli-MAX Standard



Verify the version of software

- In **Layout** or **Make**, click **Help** on the main menu
 - Click **About / Check for Upgrades**



keyword “software”

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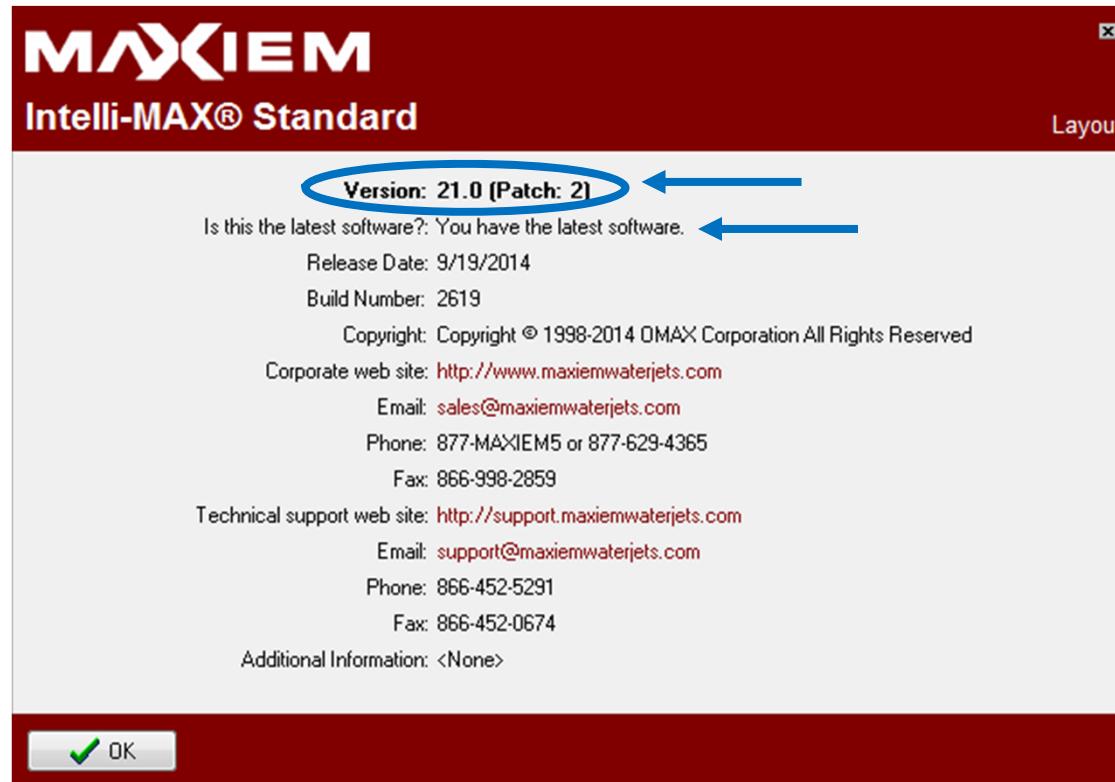


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Installing Intelli-MAX Standard



Help > About / Check for Upgrades

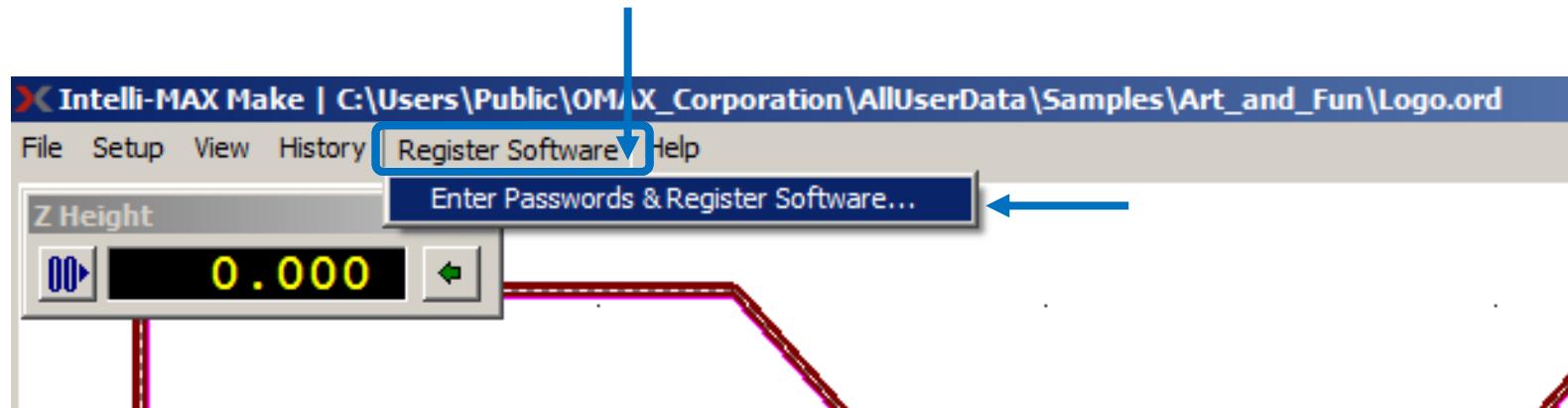


Registering Intelli-MAX Standard



Register the software to enable all features

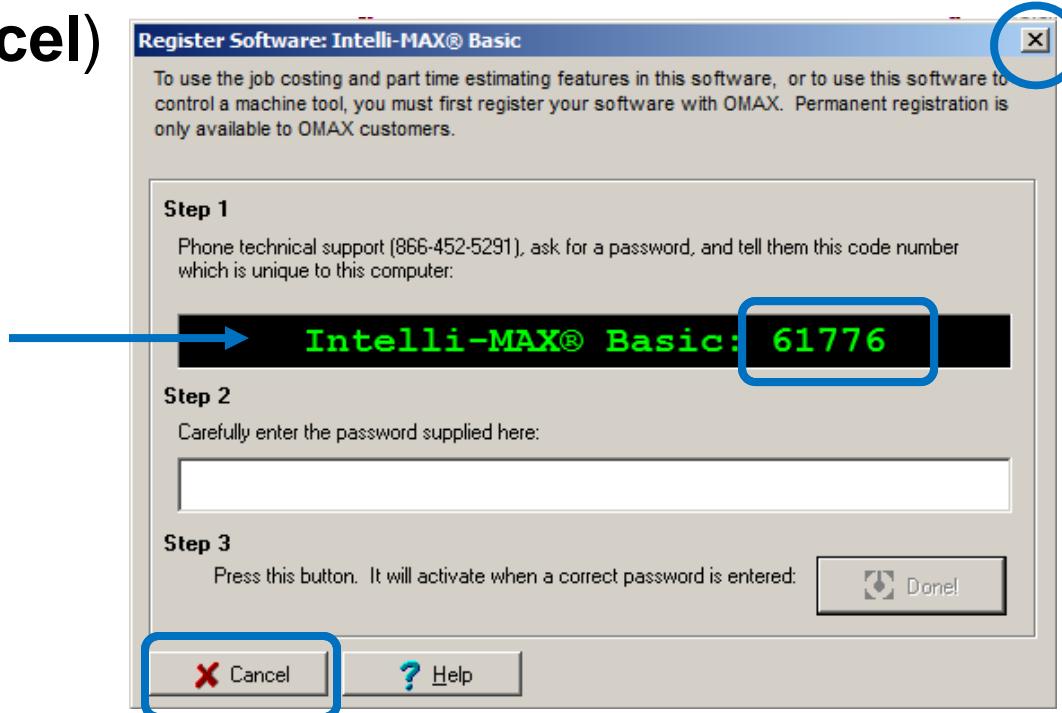
- Open **Make Standard**
- Click **Register Software**
- Click **Enter Passwords & Register Software**



Registering Intelli-MAX Standard



- Write down the **green code** shown in **Step 1**
- Close the registration window (click the X or click **Cancel**)



Registering Intelli-MAX Standard



- Contact Technical Support (800-298-4036) with the green code to get the registration password
- Click **Register Software**, and then click, **Enter Passwords & Register Software**
- Type the password in the **Step 2** password box

Step 1
Phone technical support (866-452-5291), ask for a password, and tell them this code number which is unique to this computer:

Intelli-MAX® Standard: 61359

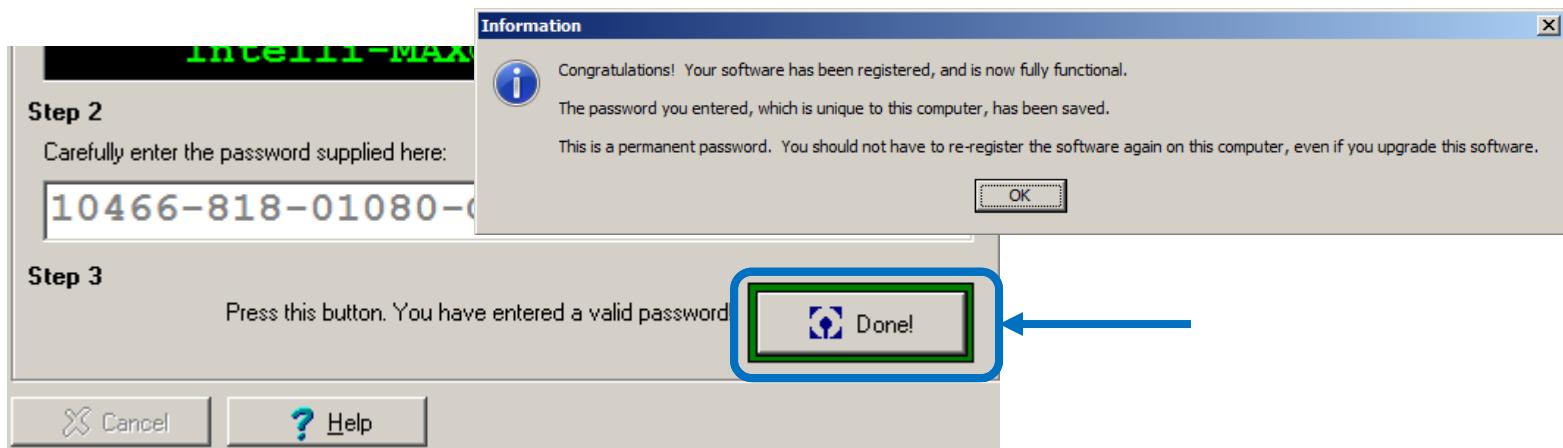
Step 2
Carefully enter the password supplied here:

Enter password here →

Registering Intelli-MAX Standard



- Click **Done** – the button will activate and turn green when a correct password has been entered
- A “Congratulations” window also appears



Registering Intelli-MAX Standard



- Other Notes
 - Permanent passwords are issued when the machine is released by OMAX accounting
 - A separate registration is required for each PC the software is loaded on
 - Passwords must be entered on the same calendar date they are issued or they are no longer valid





MAXIEM Learning Resources

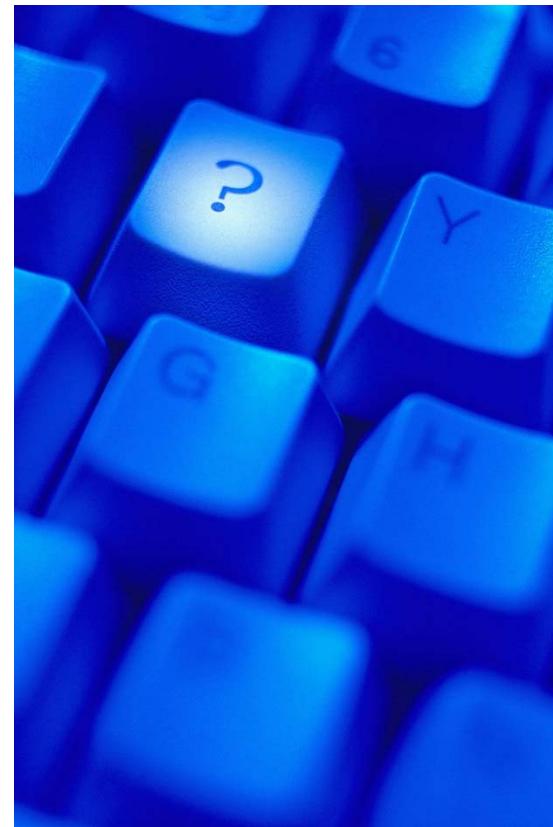
The MAXIEM Help System

MAXIEM Help System



- Help when you want it on the topic you need!

- Intuitive
- Interactive
- Help files

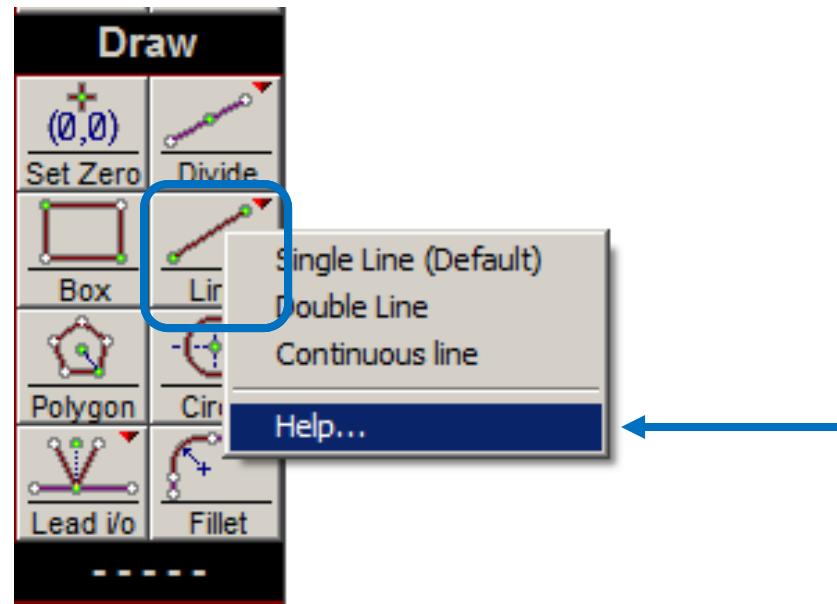


MAXiem Help System

MAXiem
WATERJETS

– Example

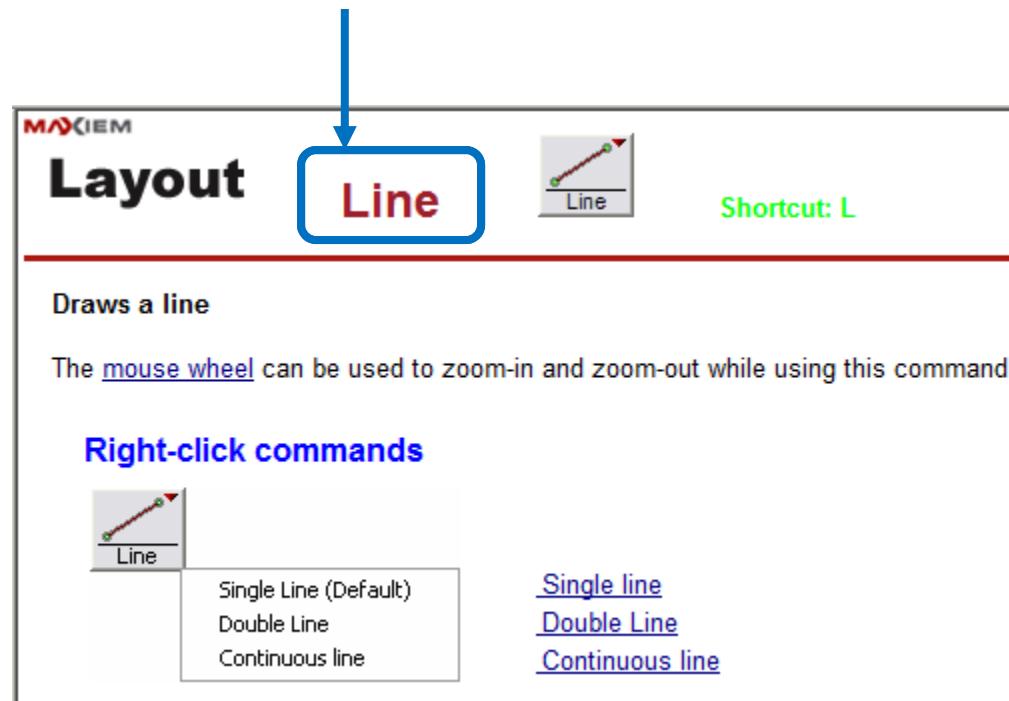
- In Intelli-MAX Layout, you are working with the **Line** tool
- Right-click the **Line** icon, and then click **Help**



MAXIEM Help System



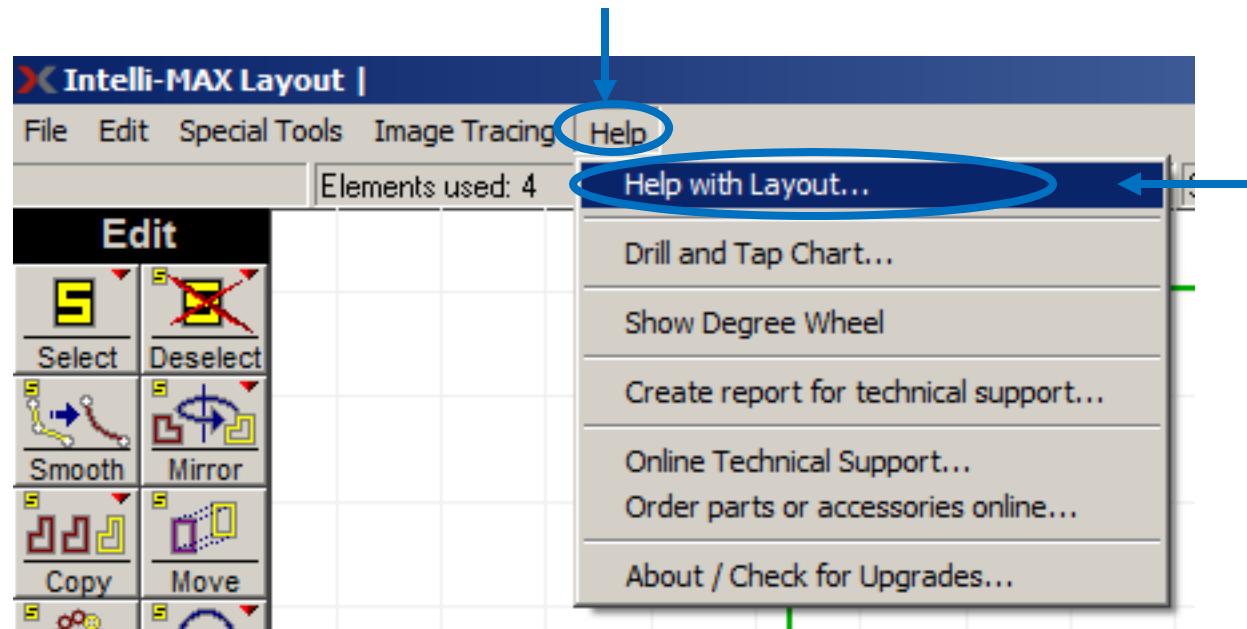
- You go to **Help** on drawing lines



MAXIEM Help System

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WATERJETS

- Other ways to access **Help**
 - From the **Layout Help** menu



MAXIEM Help System



- Type keywords in the **Index** or **Search** tab to find help on a specific topic

The screenshot shows the Intelli-MAX Basic Help System interface. At the top, there's a toolbar with icons for Hide, Back, Forward, Home, and Print. Below the toolbar, a menu bar has tabs for Content, Index (which is highlighted with a blue border), Search, and Favorites. A search input field below the tabs contains the text "traverse". To the right of the search field is a list of search results, with "Traverse Line" being the first item. The main content area displays the definition for "traverse line": "A Quality indicating movement of the abrasive jet with both water and abrasive off". Below this, another definition is partially visible: "A traverse line (or "rapid traverse" line) indicates where the abrasive jet head moves with both the water and". At the bottom left, there's a "help" icon and the text "Keyword 'traverse'".

OMAX Support Site



- The OMAX Support website provides access to software, manuals, training, marketing materials and many other resources
- To create an account on the Support site:
 - Open an internet browser
 - Go to www.omax.com
 - Click **Create Account**

The screenshot shows the OMAX website homepage. At the top right, there is a navigation bar with links: News & Events, Company, Contact Us, Customer Login, and Create Account. A blue arrow points downwards from the 'Create Account' link. Below the navigation bar, there is a horizontal menu with links: OMAX PRODUCTS, MAXIEM PRODUCTS, PUMP TECHNOLOGY, SOFTWARE, BUY & FINANCE, SERVICE & SUPPORT, and PARTS ONLINE. At the bottom of the page, there are three links: OMAX® ABRASIVE WATERJETS, Worldwide Sites (with a globe icon), and Learn About Waterjet Cutting.



OMAX Support Site



- Click **Create Account**

OMAX Support site provides access to software, manuals, training, marketing materials and many other resources, 24 hours a day, 7 days a week. Easy-to-use resources to help maintain your waterjet machine and market your business.

This service is only available for machine owners, distributors, sales and technicians.

Log In

Returning User

Username

[Forgot Username?](#)

Password

[Forgot Password?](#)

Login

Don't Have an Account?

New User

As OMAX Support site user, you have access to valuable OMAX resources.

Please register below. Your request will be reviewed and within two business days you will be given access.

Create an Account



OMAX Support Site



- Fill in the **Create Account** form
- Click **Register**
- Your request will be reviewed and you will be notified by e-mail within two business days when your account is activated

Support Home > Create Account

Create Account
Please complete the information below. All fields marked with * are required. You will receive an email confirmation once the form is submitted.

OMAX Account Number:
If unknown, put in zero

First Name*: Last Name*:

Email*:

Account Login
Username*:
Minimum of 7 characters

Password*: Re-Enter Password:
Strong passwords mix lowercase, capitals, numbers and special characters like \$, ! or @. Password length is 6-16 characters.

Company
Company*: Business Address*:

City*: State/Province*: Zip/Postal Code*:

Phone*: Country*:
(please choose one

By registering for an OMAX Support Account, you agree to

1. Credit all images and materials to OMAX.
2. Follow all guidelines outlined in the OMAX Style Guide. Current style guide is found in the footer menu in Support area.

98713 *partnet*
Type the two words: CAPTCHA
This field is used to prevent automated submissions.

Register





Steps in Making Parts

The process of making a part



Steps in Making Parts



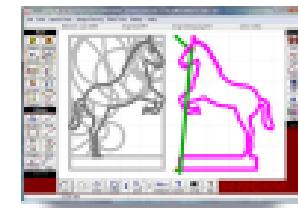
• Intelli-MAX Layout

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

Step 2: Assign machining Qualities (edge finish).

Step 3: Clean and save the drawing.

Step 4: Add Path Elements to the drawing and save it.



MAXIEM_Layout

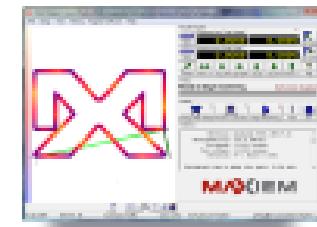
Step 5: Create the Machine Tool Path file (ORD/OMX file).

• Intelli-MAX Make

Step 6: Start up the machine.

Step 7: Configure Machine Settings.

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



MAXIEM_Make

Step 9: Load and clamp the material.

Step 10: Begin machining and cut the part.

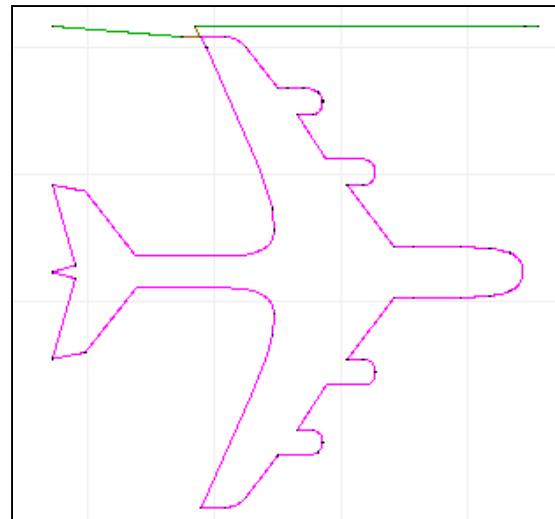


Terminology



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

Example: Airplane.dxf



.dxf file icon



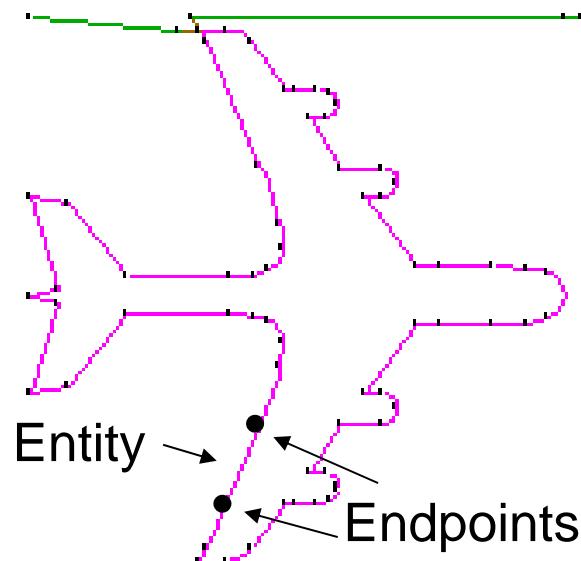
MAXIEM_FileType_DXF



Terminology

MAXIEM
WATERJETS

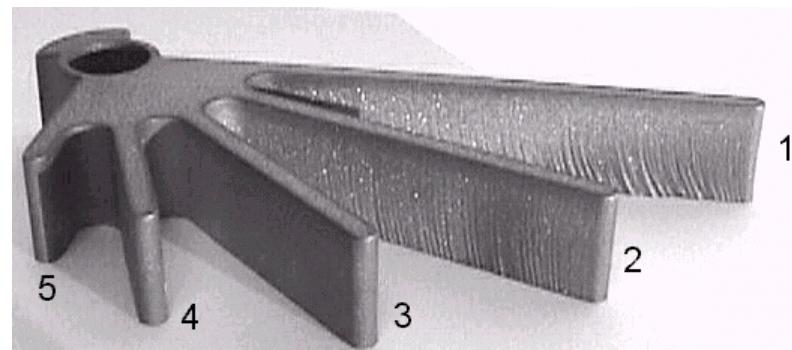
- **Entity or element** – refers to each segment within a line or arc (defined as the solid geometry between two points)
- **Endpoints** – dots designate the end of a given entity



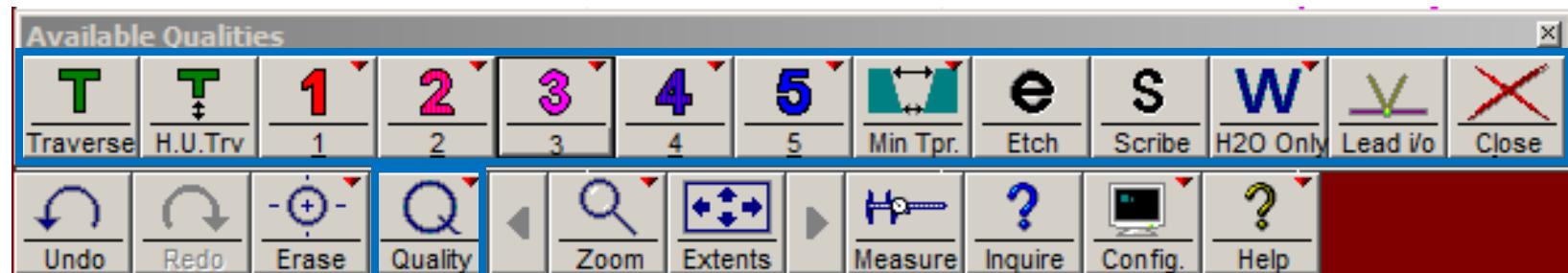
Terminology

MAXIEM
WATERJETS

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



- Quality tools – commands for setting the quality



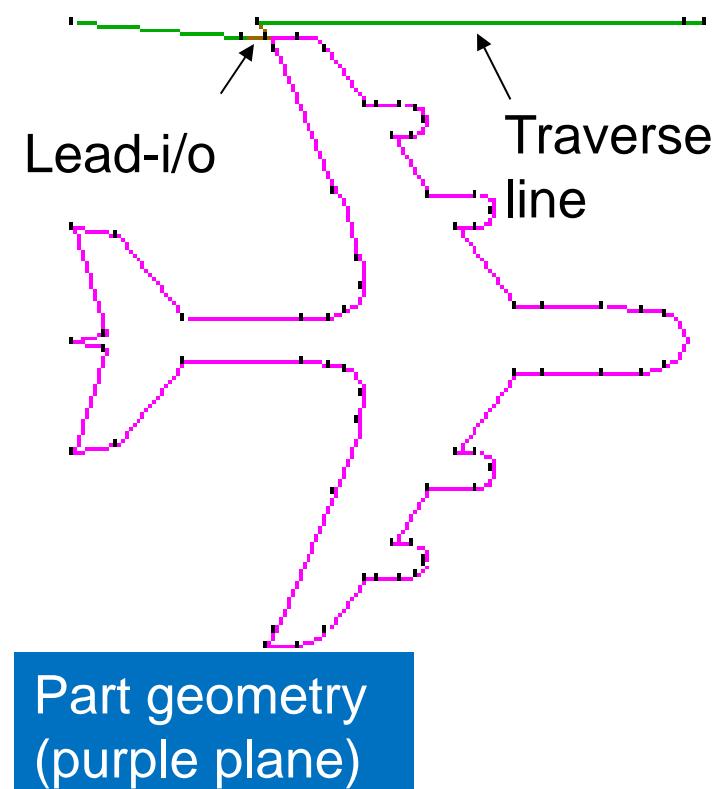
MAXIEM
WATERJETS

Terminology

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WATERJETS

Path Elements

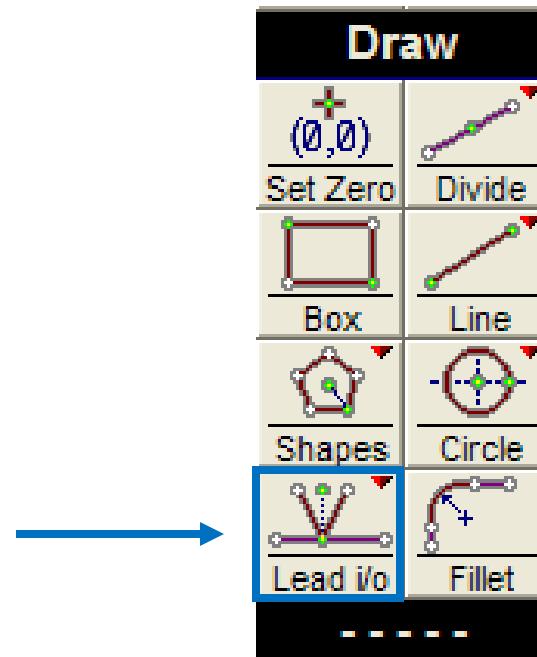
- Pierce and exit points,
- Lines where the nozzle moves but does not cut
- Part geometry
 - Consists of **Lead ins** and **Lead outs**, **Traverses**, and the **part geometry**



Terminology

MAXIEM
WATERJETS

- The path elements are added to the drawing using the **Lead i/o** drawing tools

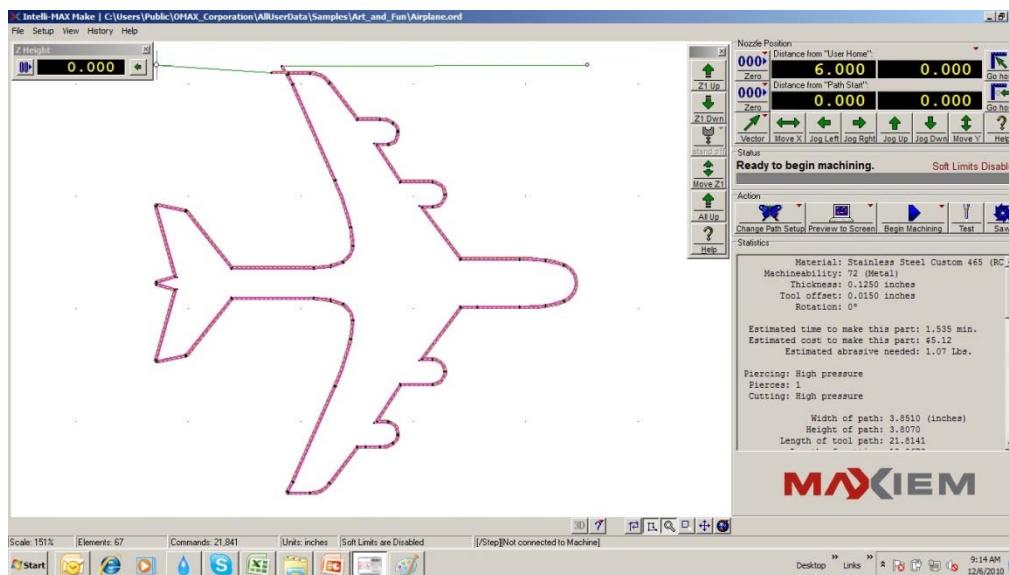


Keyword “lead i/o”

Terminology



- **ORD file** – the OMAX Routed Data file contains data that commands the MAXIEM machine to move the nozzle in the X and Y directions in motor step increments

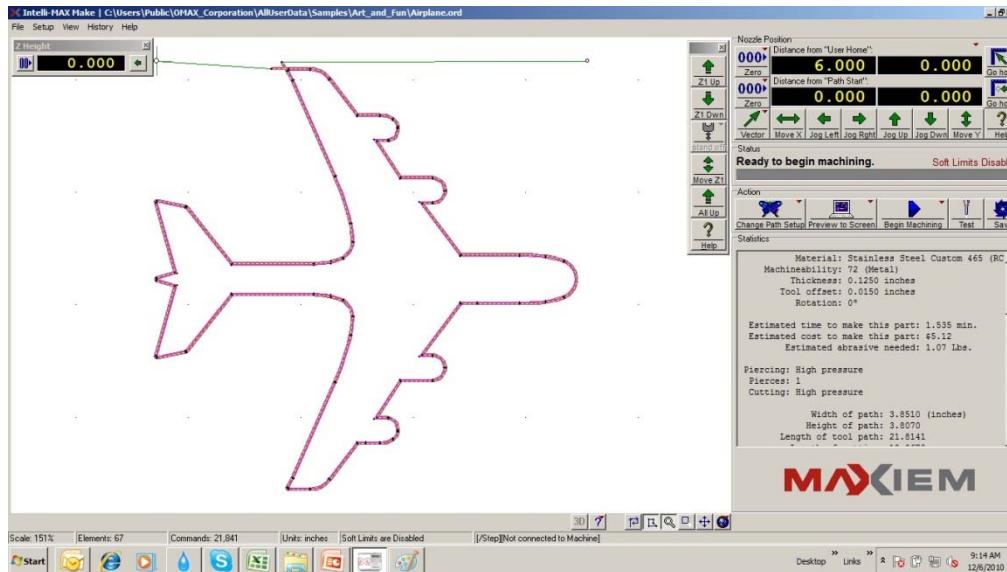


MAKE uses the .ord
file to machine the
part

Terminology



- **OMX file** – the OMX file contains eXtra data that commands the MAXIEM machine to do extra movements such as tilt, pause, speed up, etc.



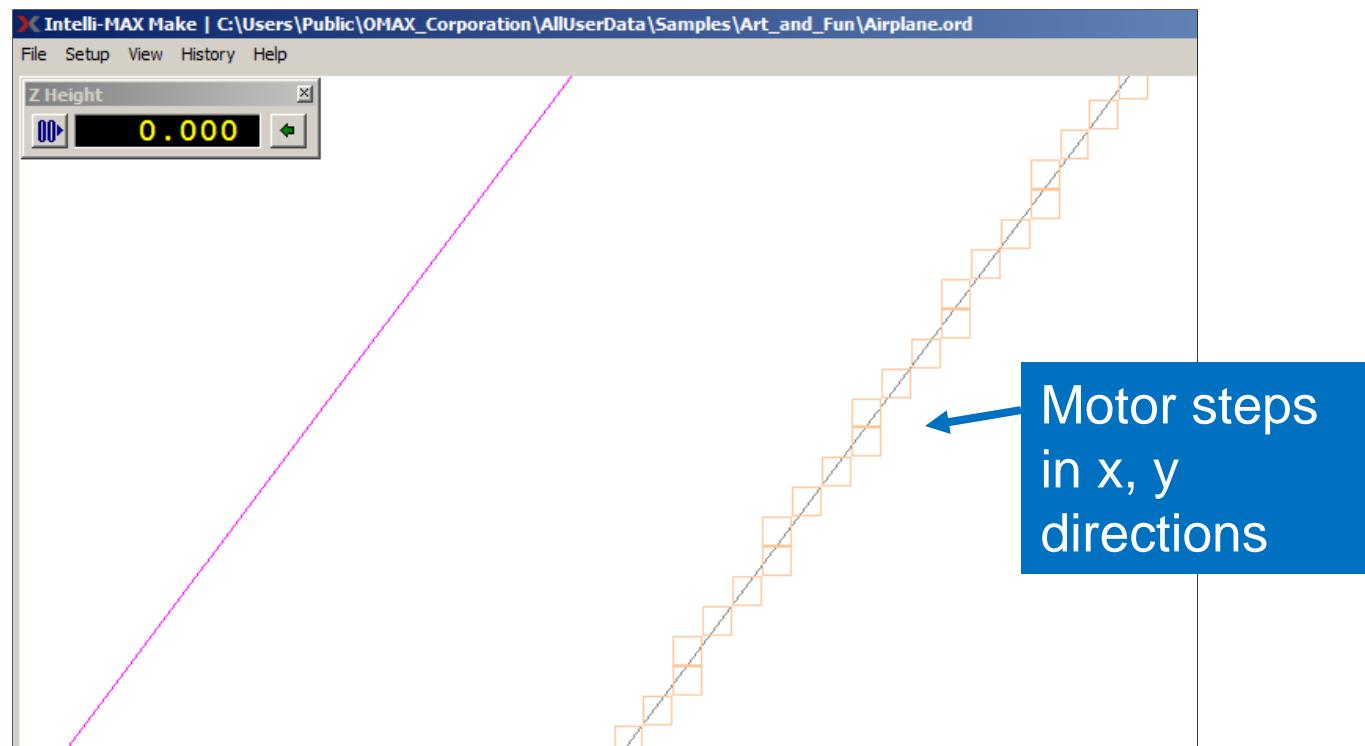
MAKE uses the
OMX file to machine
the part with eXtra
data in it



Terminology



- **ORD file** – preview of the motor steps in **Make**

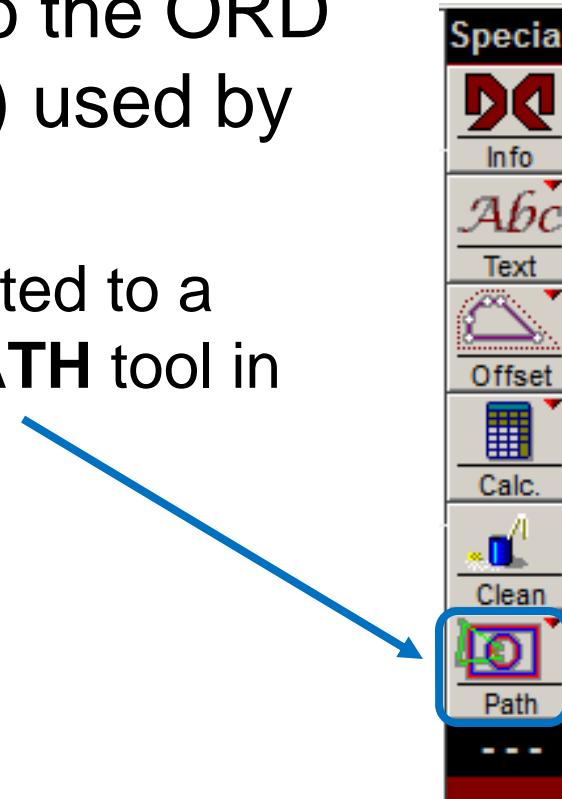


Keyword ".ord"

Terminology



- **Machine tool path** – refers to the ORD file data (the x, y motor steps) used by **Make** to machine a part
 - The drawing (.dxf) file is converted to a machine (.ord) file using the **PATH** tool in **Layout**



Keyword “path”

Terminology

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WATERJETS

- **Kerf** – the width of the material eroded away by the abrasive waterjet stream
 - The kerf normally equals the width of the mixing tube used in the nozzle assembly (e.g. - .030 in. when using a .030 in. mixing tube)



Keyword “kerf”

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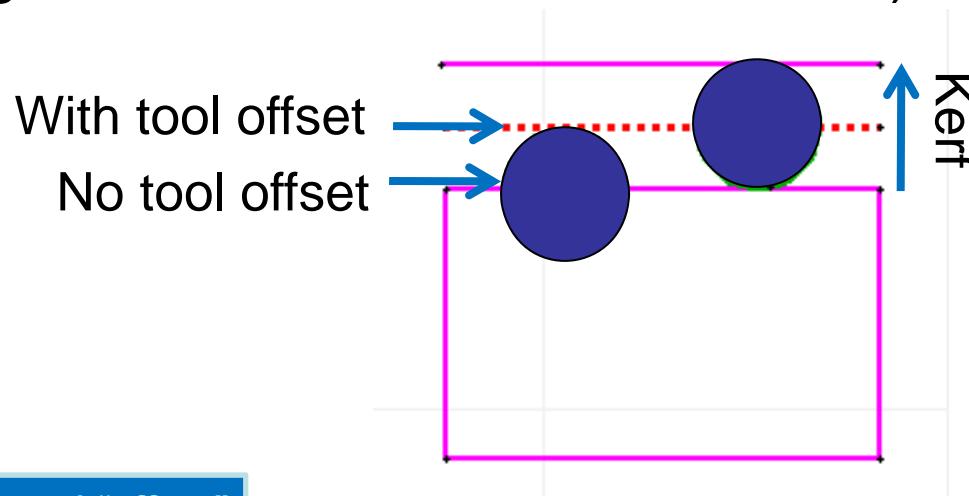
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WATERJETS

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Terminology

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WATERJETS

- **Offset** – the distance the nozzle is shifted away from the geometry to compensate for the width of the jet stream
 - The offset normally equals half of the width of the kerf (e.g. - .015 in. when kerf is .030 in.)



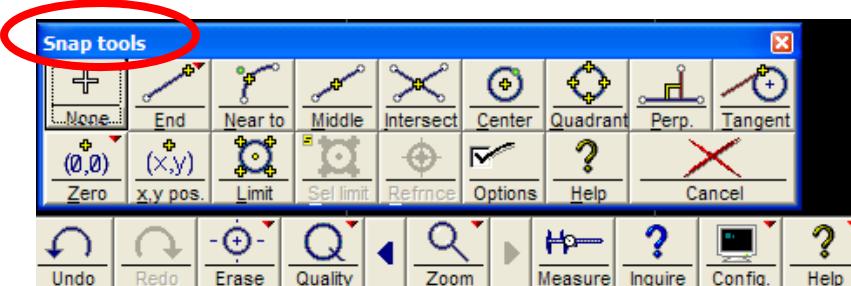
Keyword “offset”

Terminology

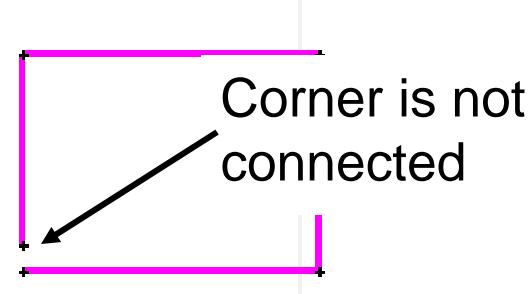
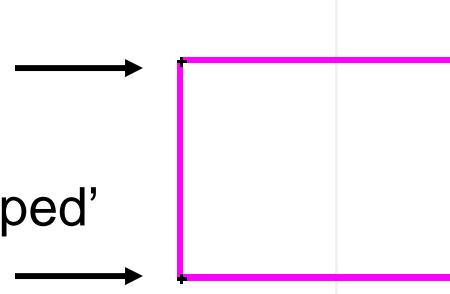
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- **Snap tools** – drawing tools that automatically connect geometry at some point when used

Used to make
sure geometries
are connected
in a drawing



Corners are
Connected, or 'snapped'



Keyword “snap”

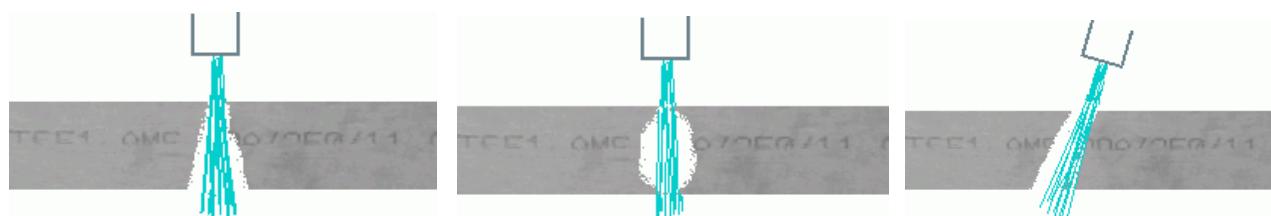
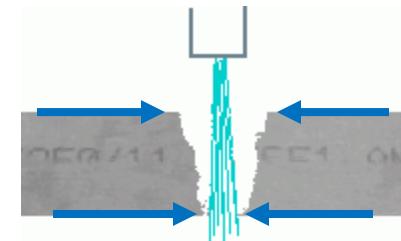
Terminology

MAXIEM
WATERJETS

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

Taper is inherent in all waterjet parts

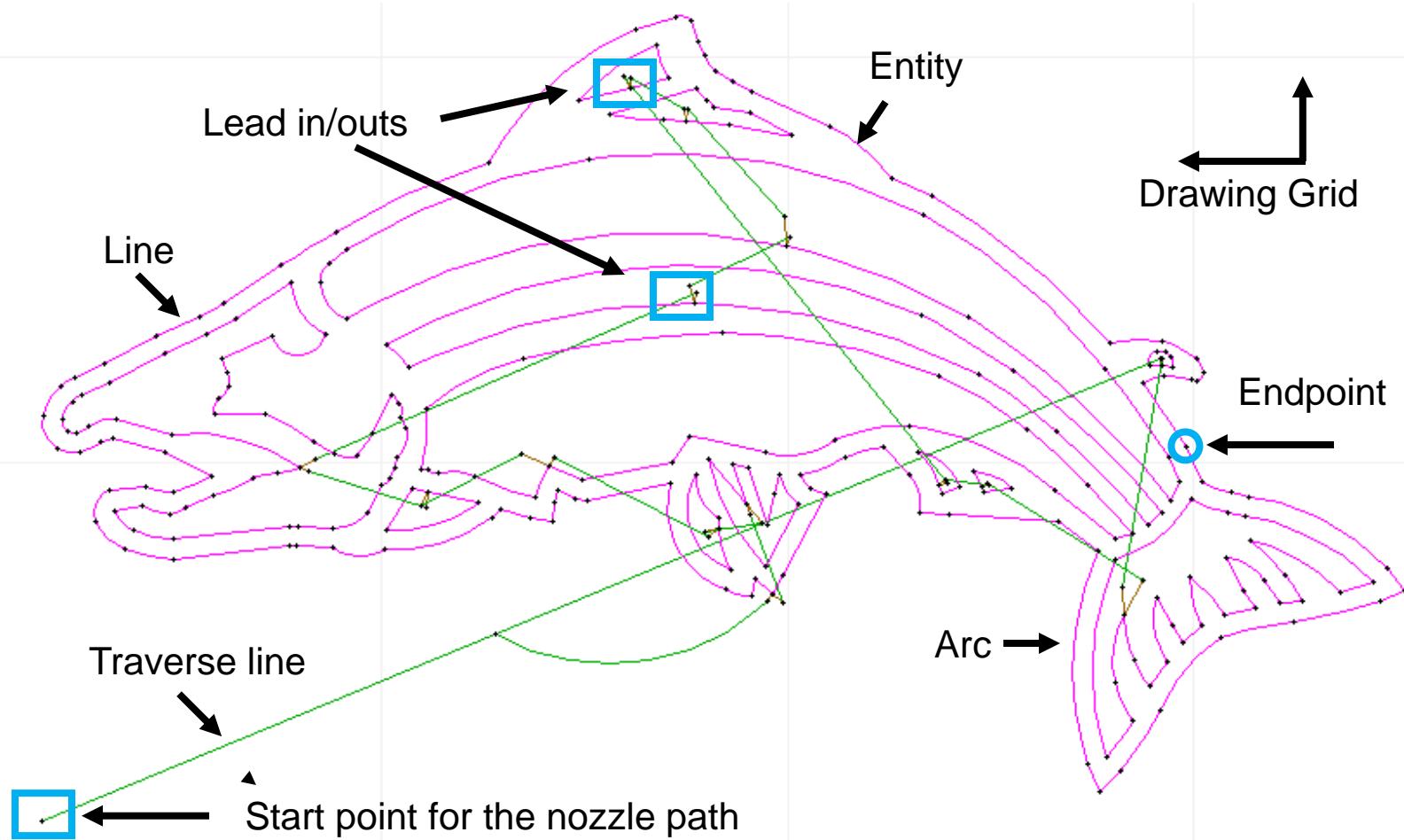
There are different types of taper...



Keyword “taper”

Anatomy of a Drawing

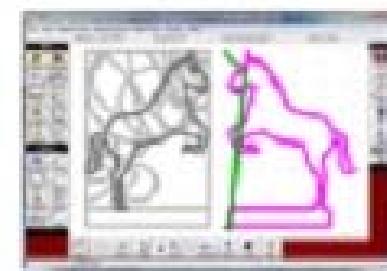
MAXIEM
WATERJETS





Intelli-MAX Layout Standard

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

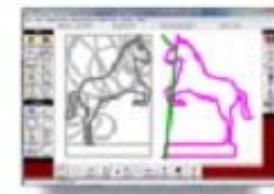


MAXIEM_Layout

Layout Standard



- What does **Layout Standard** do?
 - **Layout** is the 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 MAXIEM JetMachining Center
 - The purpose of **Layout** is to draw a map for the MAXIEM machine to follow when cutting



Keyword “Layout”

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MAXIEM_Layout

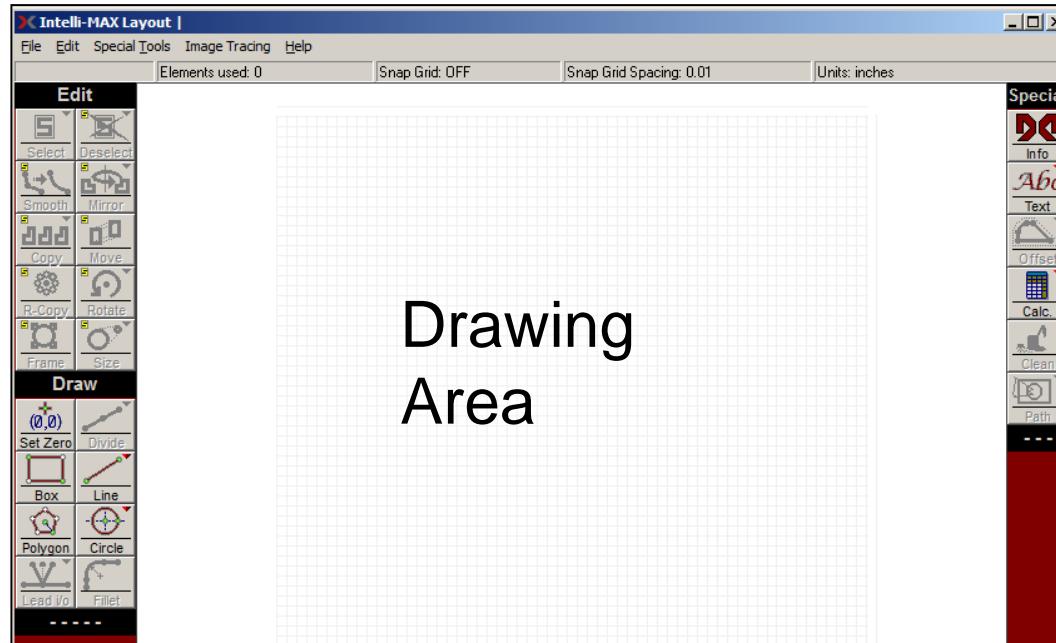


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Layout Standard



- Drawing area - where you import, create or edit drawings (DXF files)



Keyword “display”

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Layout Navigation



Drawing area

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



Keyword “display”

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Layout Navigation



Drawing area configuration

- To change configuration settings
 - Click **File > Configure Preferences > Display tab** and/or **Snap/Reference grid tab**
 - Right-click the **Configure** icon at the bottom of the screen
- Specify a grid in the background or leave it blank
 - Specify your units of measure – inches, millimeters or other
 - 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)

Layout Navigation



How to get around in the **Layout** drawing area

- Zoom in and out in the drawing area using the mouse
 - Zoom to the point where the pointer is placed on the screen
 - Click = zoom in
 - Right-click = zoom out
 - Wheel button (if available)
 - Wheel forward = zoom in
 - Wheel backward = zoom out



Keywords “zoom (layout)”



Layout Navigation



How to get around in the **Layout** drawing area

- Hold down the Shift key when zooming to slow down by 10X
- Pan
 - Hold both mouse buttons down to pan around in drawing area



Keyword “pan”

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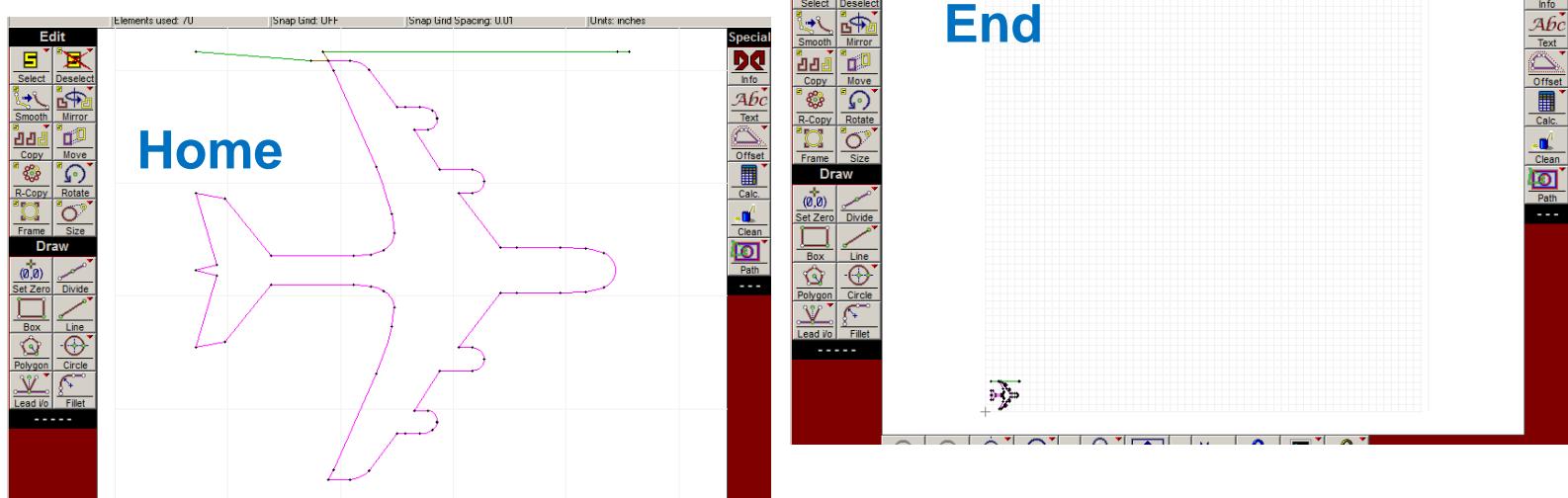
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Layout Navigation



Centering drawings in the **Layout** drawing area

- Pressing the **Home** key centers the drawing in the drawing area
- Pressing the **End** key centers the entire drawing area in the window



Layout Navigation

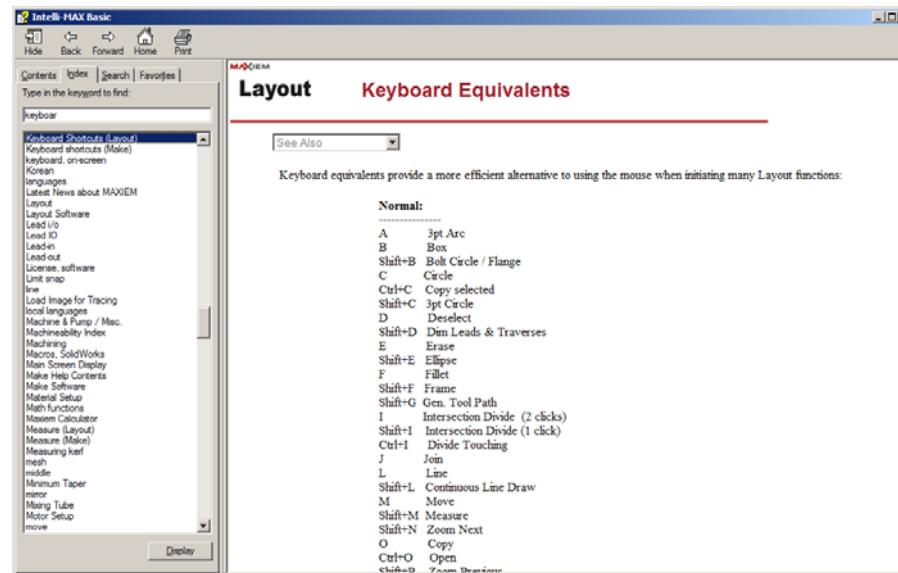


- If you hover the pointer over an icon, it displays a brief explanation of that function
- **Click** an icon to activate the default function
- Pressing the **ESC** key cancels a function
- Pressing the **Spacebar** repeats the previous function

Layout Navigation



- Use Keyboard shortcuts to activate functions instead of using the mouse
 - Help > Help with Layout

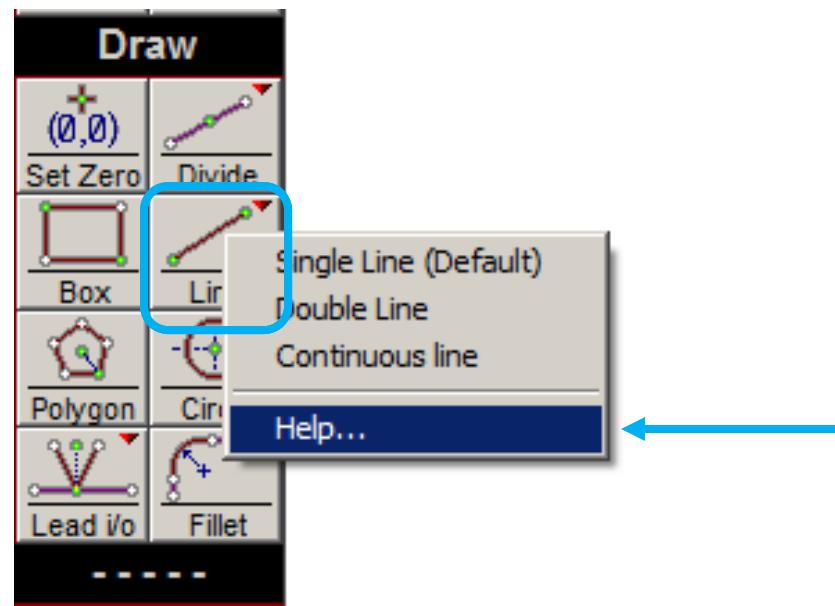


Keywords “keyboard shortcuts (Layout)”

Layout Navigation

MAXiem
WATERJETS

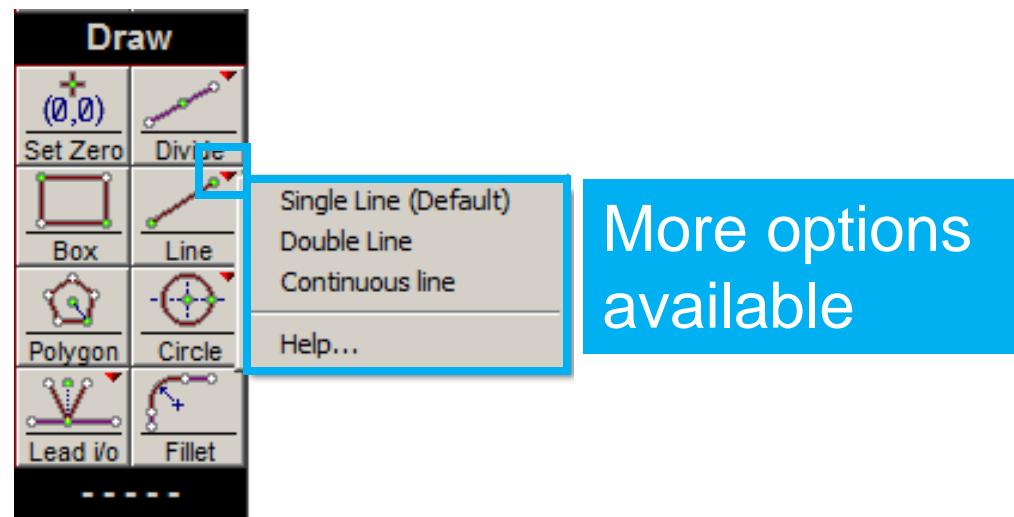
- Keyboard shortcuts are also listed in the **Help** for each command or tool



Layout Navigation

MAXIEM
WATERJETS

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



Review Point 1



- What we've covered so far
 - The major components of the MAXIEM equipment
 - How the MAXIEM machine works to cut parts
 - How to install and register the Intelli-MAX software
 - Learning resources available through the Help system
 - The basic steps involved in making parts on the MAXIEM
 - Terminology
 - Layout navigation



Review Point 1 Questions



Q1: How many basic steps are there to making parts on the MAXIEM?

- a. 15
- b. 10
- c. 9
- d. 2

Q2: What is the 'kerf'?

Q3: 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?



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Steps in Making Parts



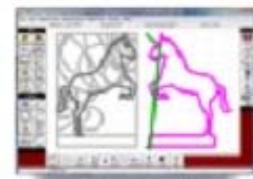
• Intelli-MAX Layout

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

Step 2: Assign machining Qualities (edge finish).

Step 3: Clean and save the drawing.

Step 4: Add Path Elements to the drawing and save it.

Step 5: Create the Machine Tool Path file (ORD/OMX file).  • [MAXiem_Layout](#)

• 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) that you want to cut
- Drawing files are commonly saved with a **.dxf** extension (**D**rawing **e**Xchange **F**ormat)
- **DXF** is a standard file format that is commonly used to exchange files between different CAD (Computer Aided Drawing) systems
- **Layout** stores all drawing files as standard **DXF** files



Keyword “dxf”

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Step 1: Drawing Files



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

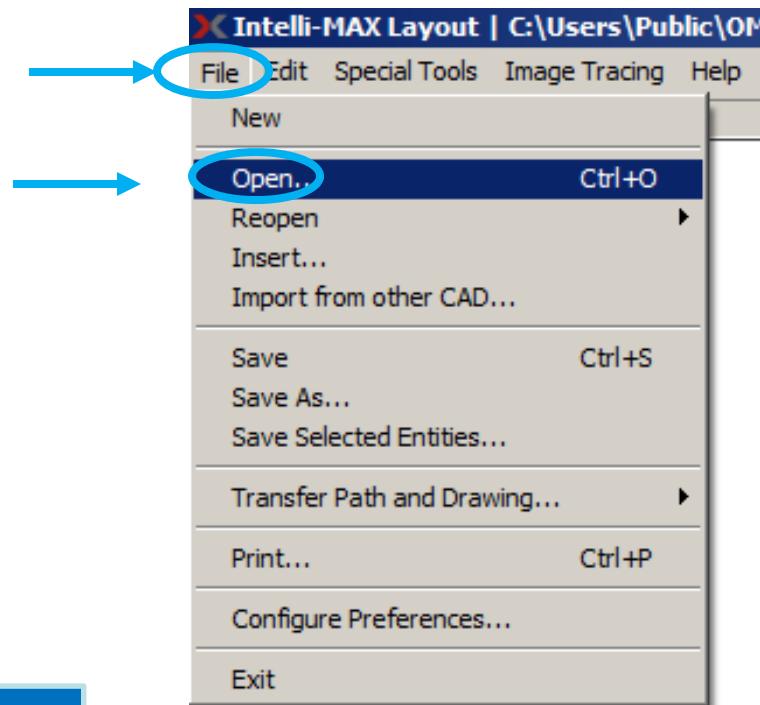


Step 1: Drawing Files



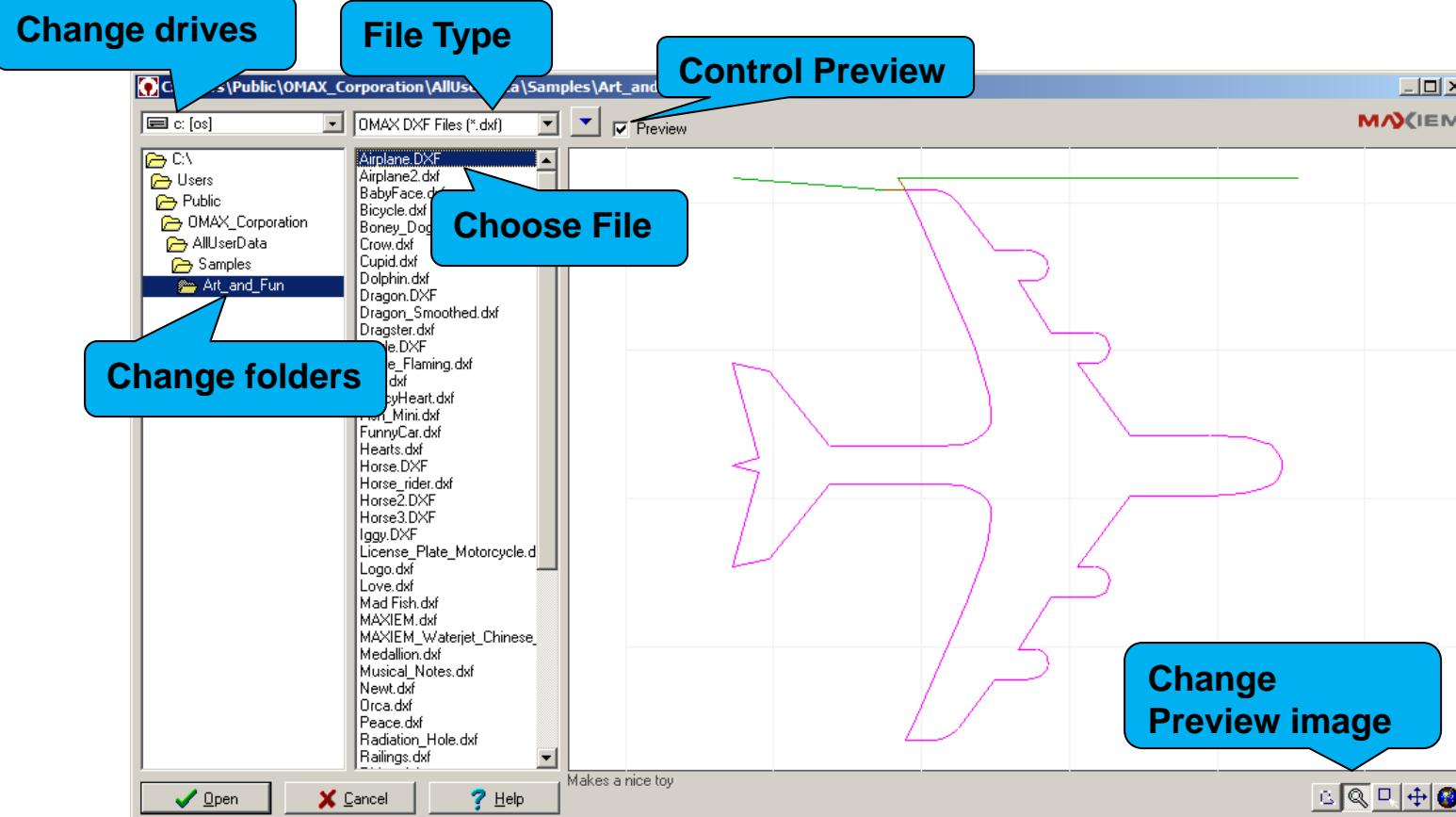
To open an existing file in **Layout**

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



Keyword “open”

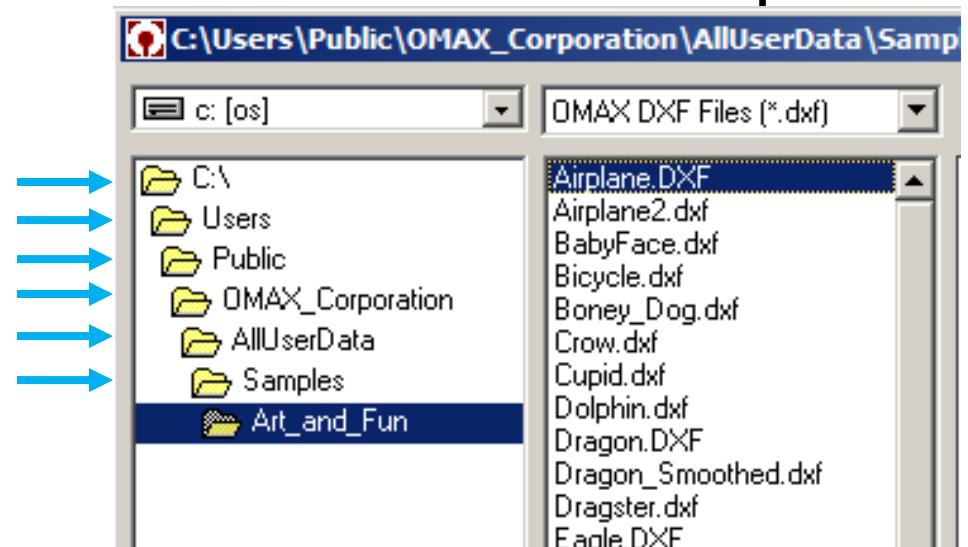
Step 1: Drawing Files



Step 1: Drawing Files



- All existing files are located in folders in this path (in Windows 7):
 - C:/
 - Users
 - Public
 - OMAX Corporation
 - AllUserData
 - Samples...(select applicable folder)



Exercise

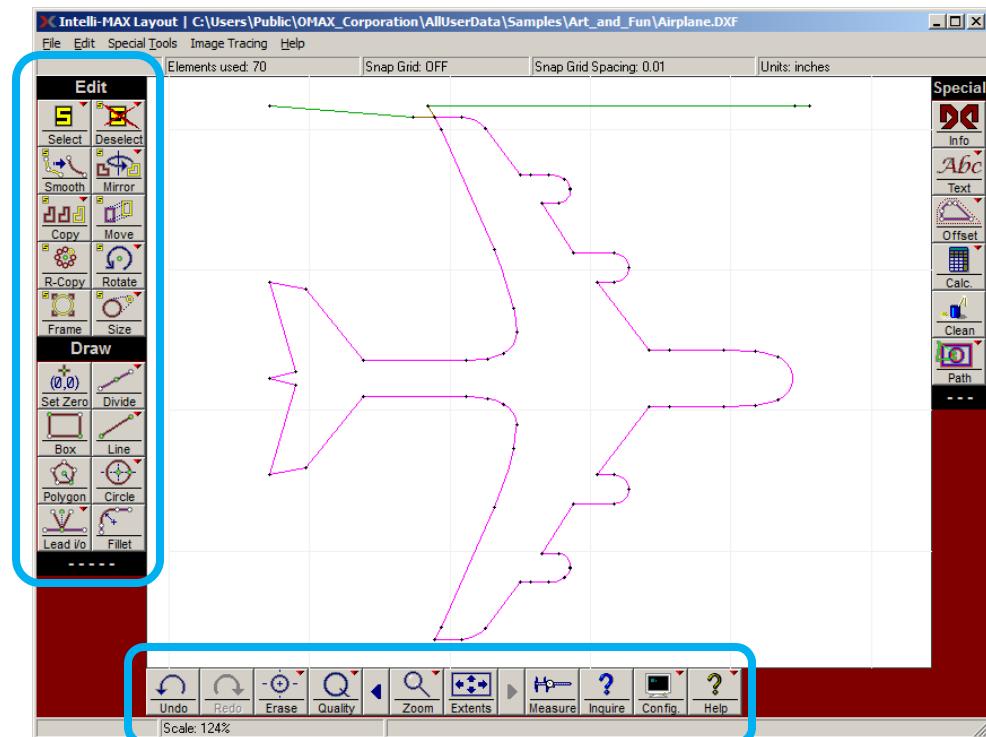
- o Open an existing file in **Layout** in Samples/Art_and_Fun



Step 1: Drawing Files



- **Layout** provides sufficient tools to create and edit drawing files (DXF) if no other drawing program is available

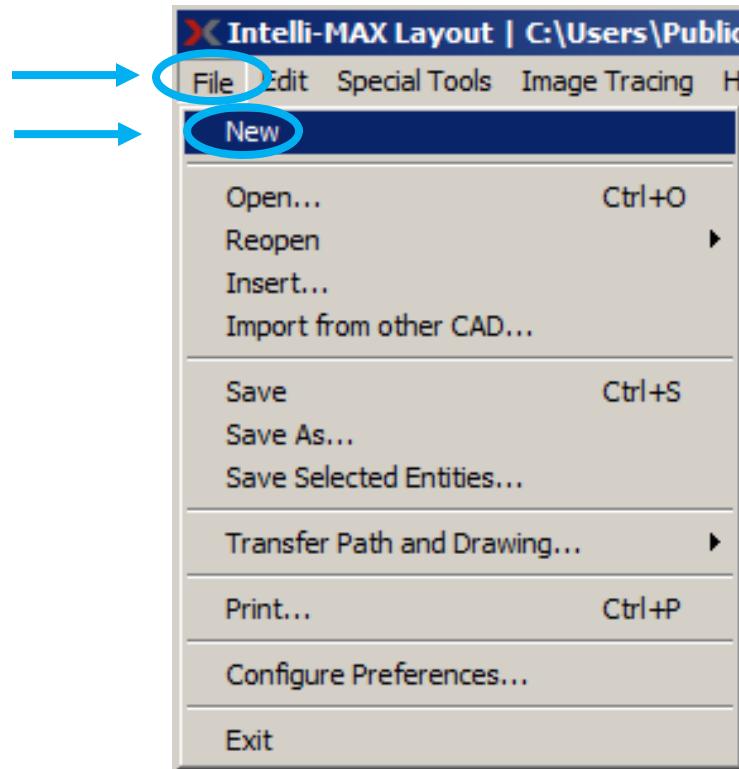


Step 1: Drawing Files



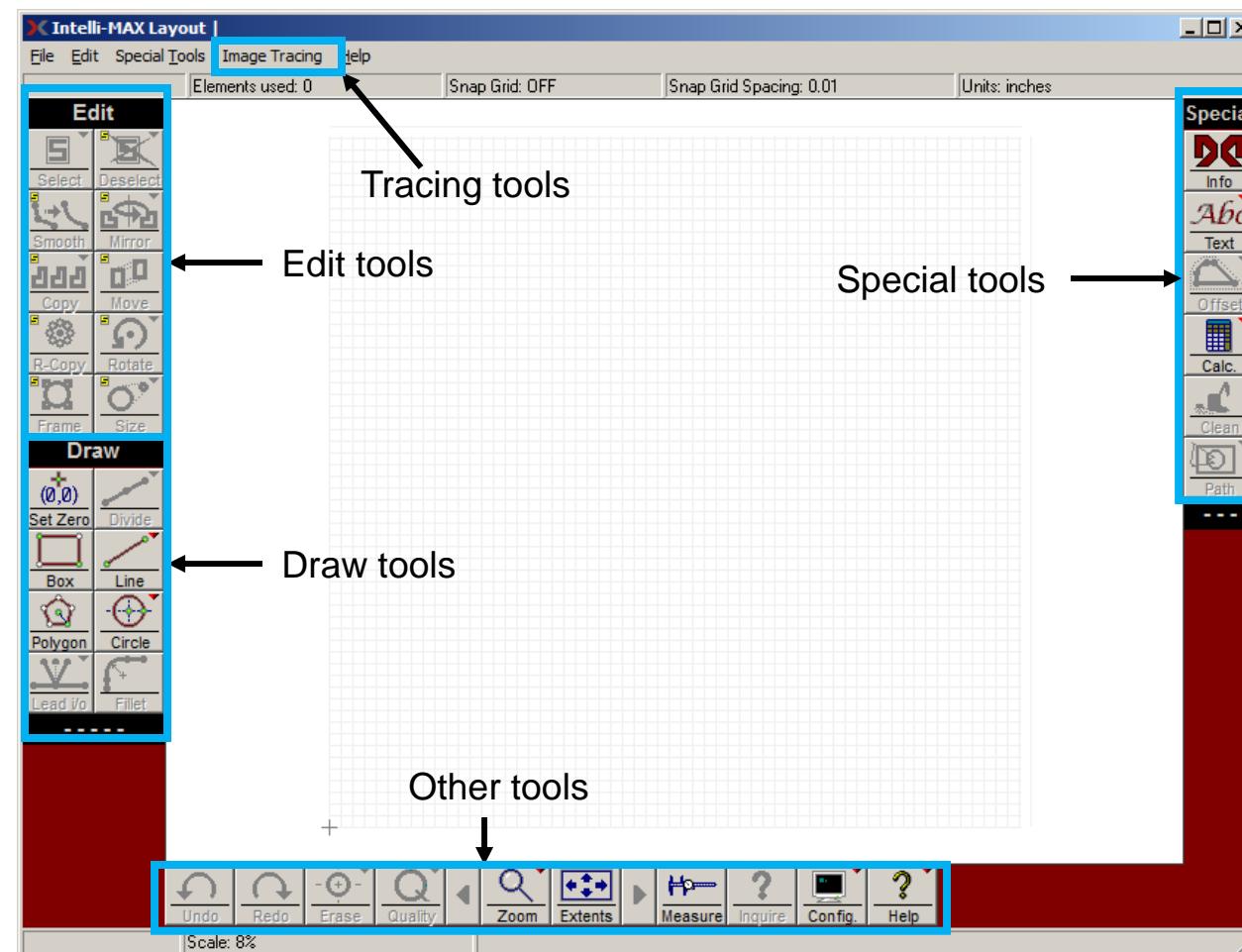
To create a new drawing file

- Click **File**, and then click **New**



Step 1: Drawing Files

MAXiem
WATERJETS



Step 1: Drawing Files



- Drawing Section Basics
 - Drawing lines, arcs, and shapes
 - Freeform
 - Specified Dimensions
 - Using **Snap tools**



Keywords “*drawing commands*”



Step 1: Drawing Files



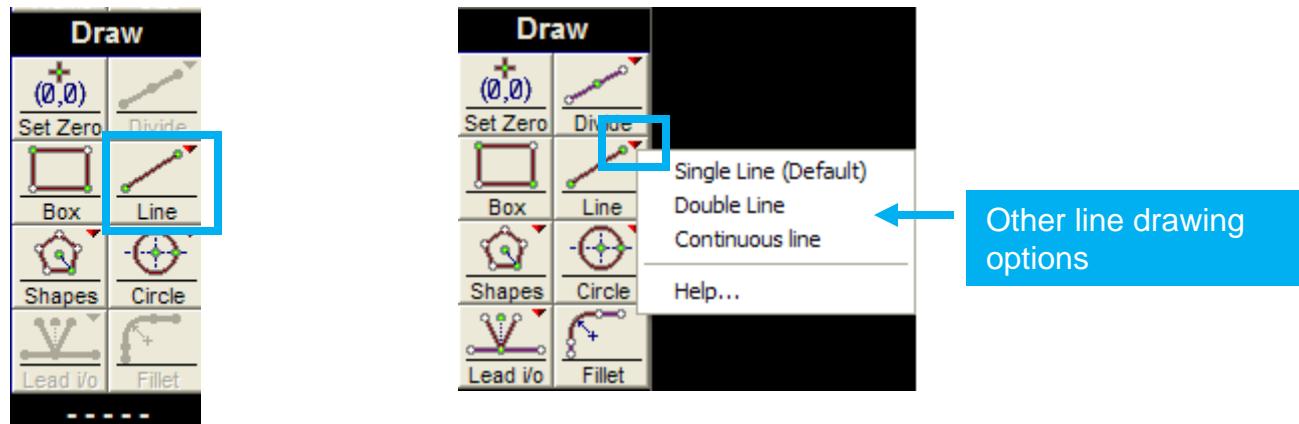
- Drawing Free-form lines
 - Click the Line tool to activate it
 - Move the pointer into the drawing area – note the pointer changes to +From
 - Click a point in the drawing area to start drawing the line – note the pointer changes to +To
 - Move the pointer to a point you want to draw the line to
 - Click the destination point to terminate the line



Step 1: Drawing Files



- Click the toolbar icon to select the **Line** tool
 - If there is a little red triangle on the icon, right-click to see a list of other **Line** tools



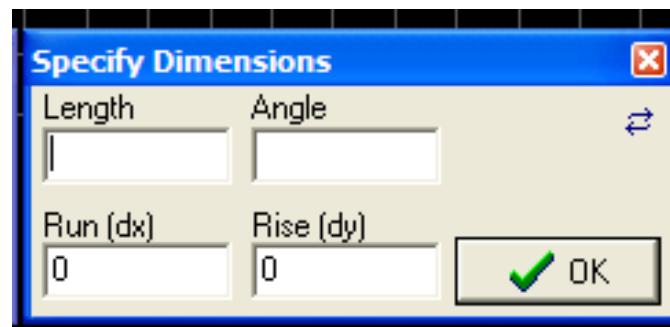
Exercise - draw a freeform line using Layout



Step 1: Drawing Files



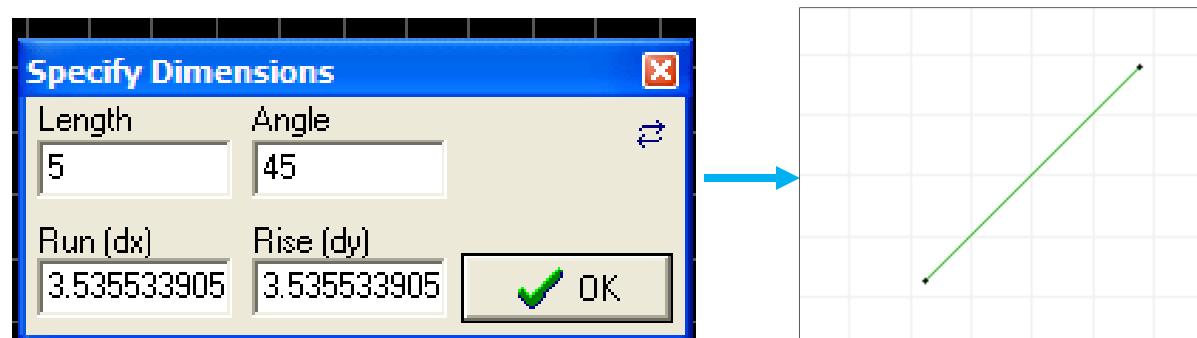
- Drawing a line to a *specified dimension*
 - Click the **Line** tool to select it
 - Click the point you want to start drawing the line
 - a **Specify Dimensions** dialog box opens at the bottom of the drawing area



Step 1: Drawing Files



- Press the Tab key, or move your pointer to the **Length** or **Angle** box.
- Type the desired length or angle
- Press **Enter** or click **OK** to draw the line



Exercise

Draw a 5 inch line at a 45 degree angle using Layout



Step 1: Drawing Files

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- Draw a line connected to another line using **Snap tools**
 - Click the **Line** tool to select it
 - Move the pointer into the drawing area
 - *Note - the **Snap tools** toolbar opens up at the bottom of the drawing screen*

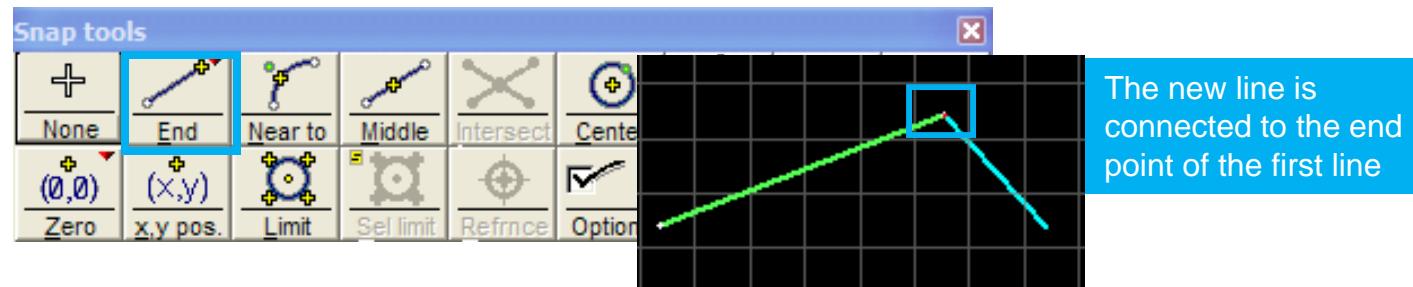


Keywords “snap toolbar”

Step 1: Drawing Files



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



Exercise

Draw a second line connected to the end of an existing entity

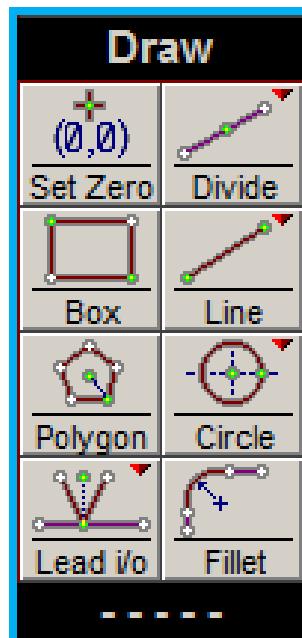


Step 1: Drawing Files



- Other Draw tools

- Circle
- Box
- Fillet
- Polygon
- Divide
- Lead i/o
- Set Zero



Exercise

- *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*

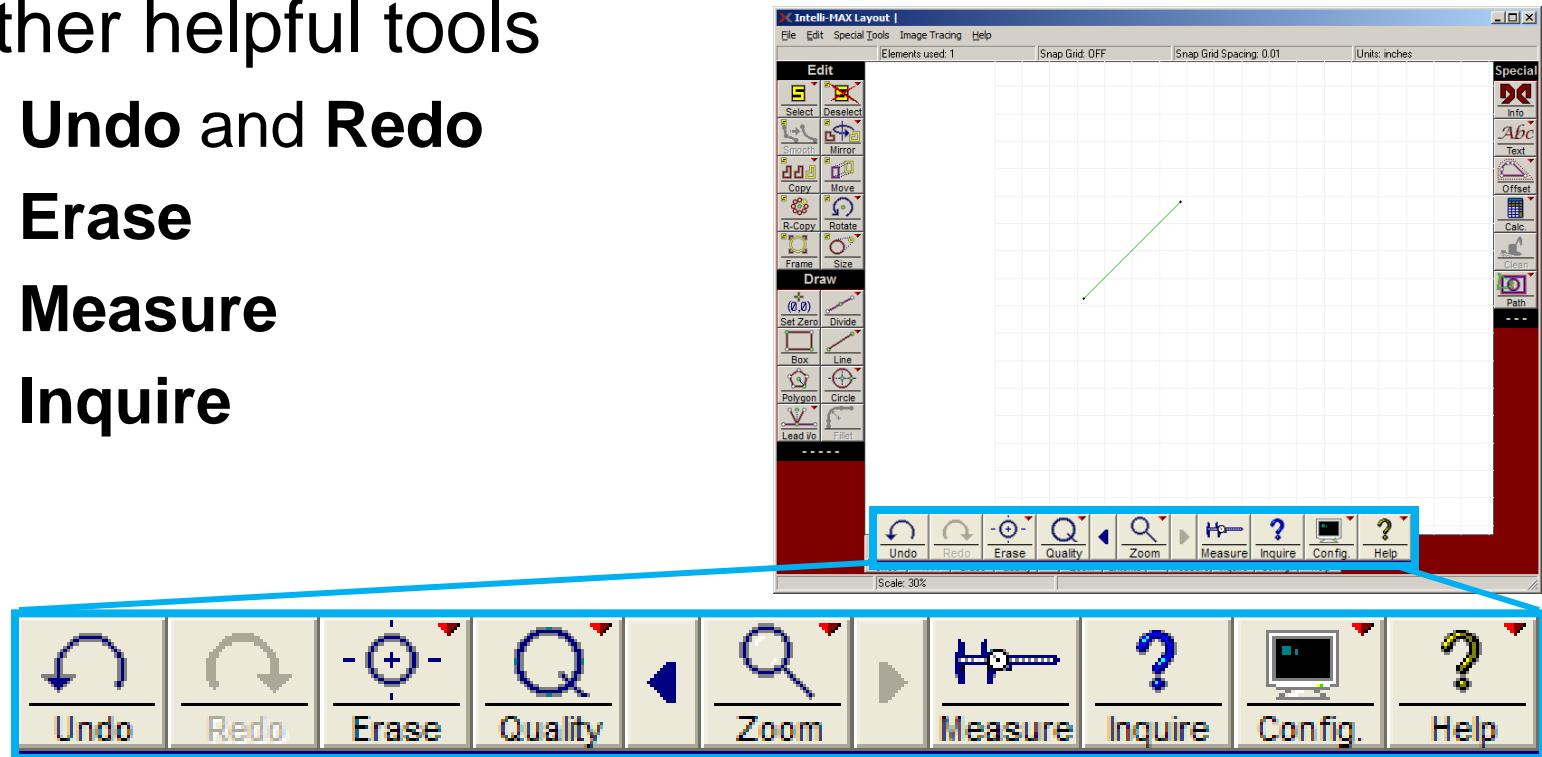


Keywords “drawing commands”

Step 1: Drawing Files



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



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



Exercise

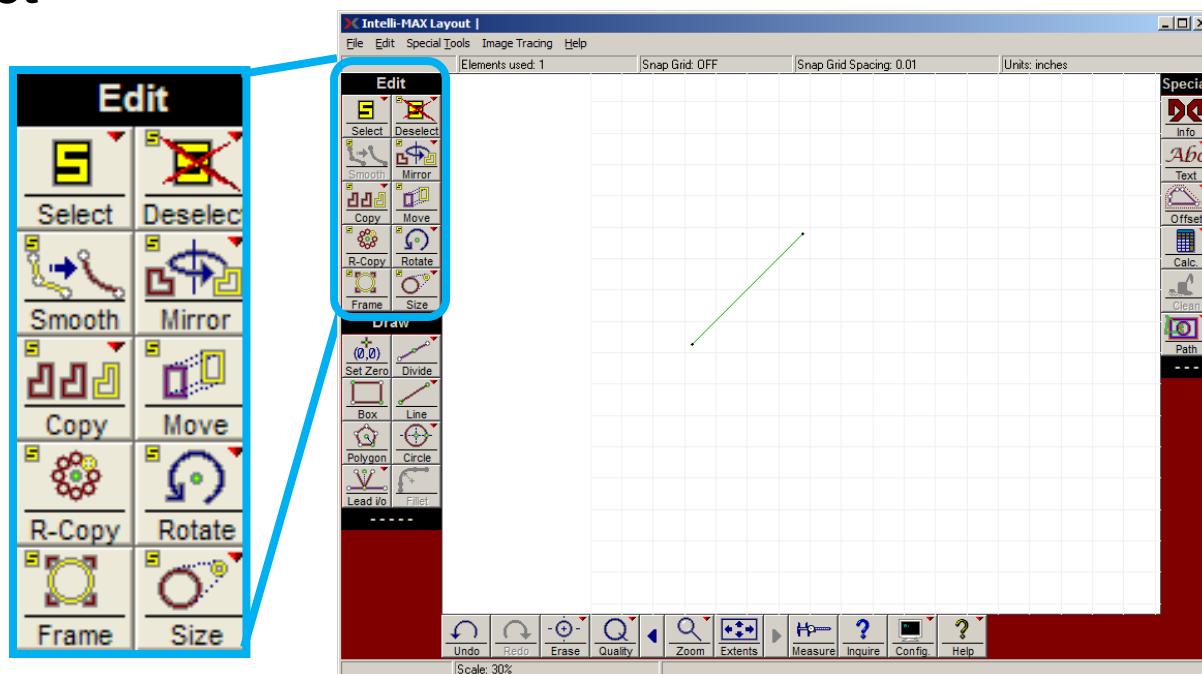
Demonstrate using these tools



Step 1: Drawing Files

MAXIEM
WATERJETS

- **Edit tools**
 - Select/Deselect
 - Smooth
 - Mirror
 - Copy
 - Move
 - R-Copy
 - Rotate
 - Frame
 - Size

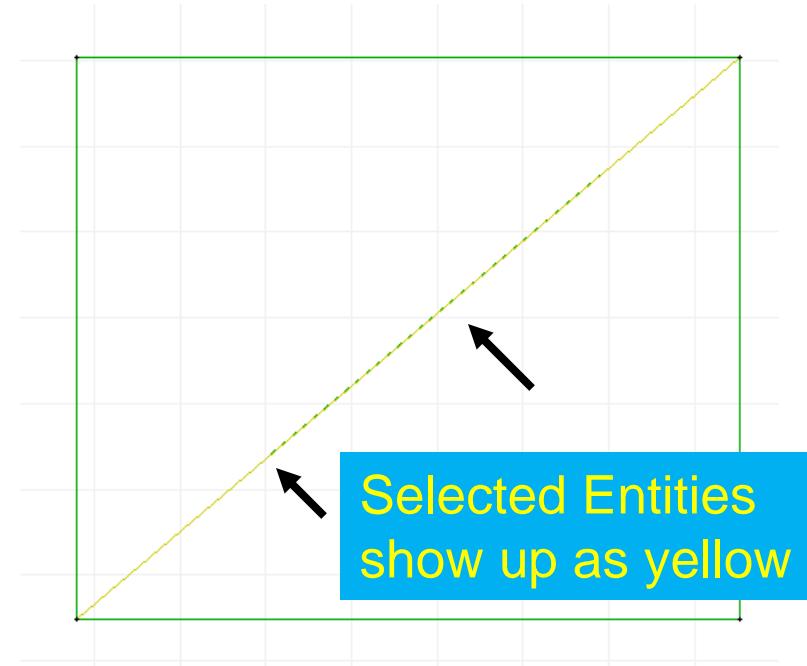
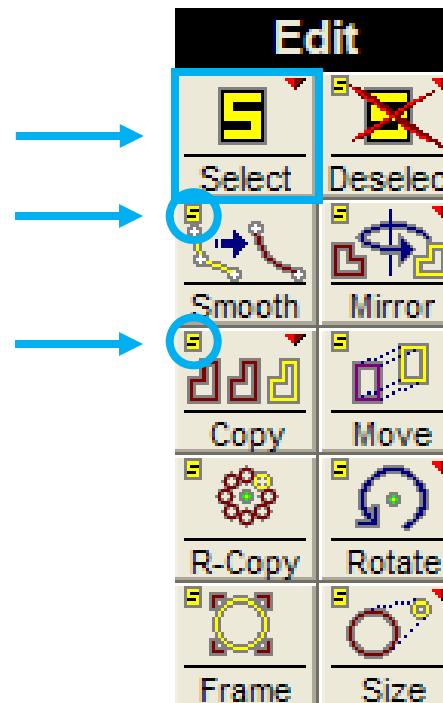


Keywords “edit commands”

Step 1: Drawing Files



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

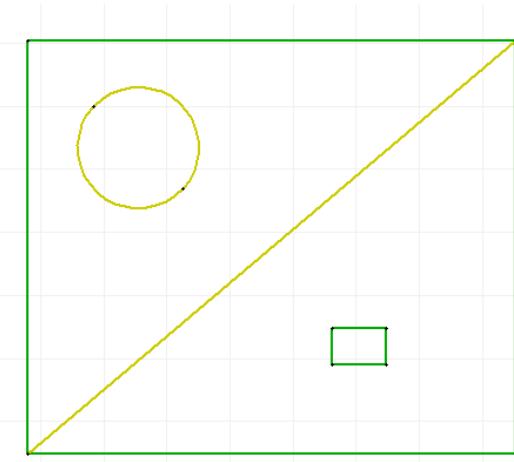
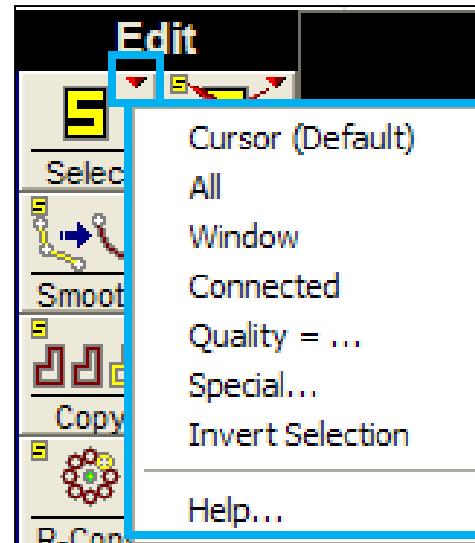
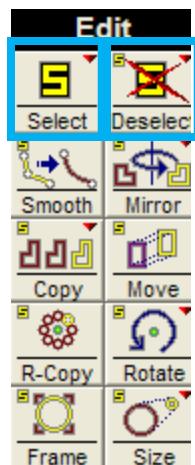


Step 1: Drawing Files

MAXiem
WATERJETS

Exercise

- Practice with the **Select** and **Deselect** default tools
- Practice with the **Select** and **Deselect** tool options



Keywords “select, deselect”

Step 1: Drawing Files



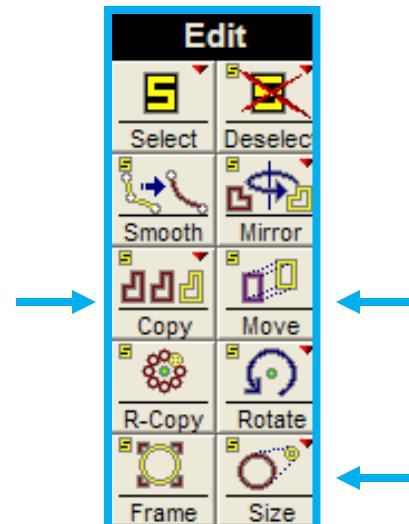
- **Edit tools**
 - **Copy** – creates one or more copies of selected entities
 - **Move** – moves selected entities to a different location
 - **Size** – changes the size of selected entities

Exercise

- 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



Keywords “edit commands, copy, move, size”



Step 1: Drawing Files



Importing files from other CAD systems

- *Importing* refers to bringing a drawing into **Layout** created in another CAD program
- Many file types can be imported into **Layout** including .dxf, .dwg, .dwf, .ai and others.
- The **Import** tool in **Layout** runs files from other CAD systems through filters prior to opening as a DXF in **Layout**



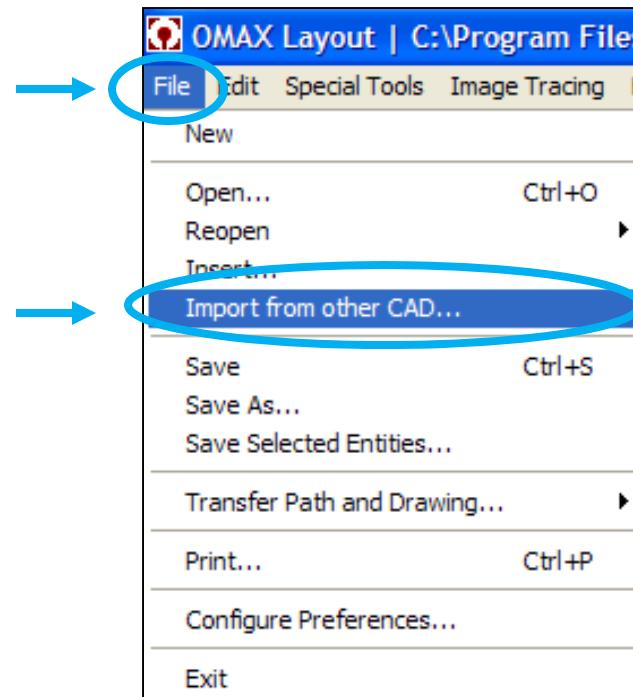
Keyword “import, file formats supported”

Step 1: Drawing Files



How to import a file

- In **Layout**, click **File**, and then click **Import from Other CAD**
- Choose the file you want to import to open the **Import** dialog box



Keyword “import”

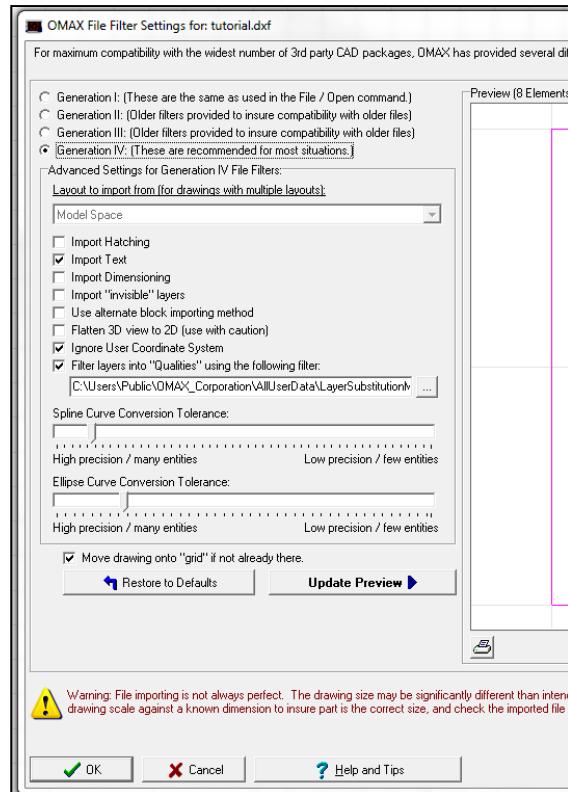
Step 1: Drawing Files



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



Keyword "import"

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Step 1: Drawing Files



Step 1 Review

Q1: There are three ways to create a drawing file in **Layout** – do you remember what they are?

1. Open an _____ drawing file that is already saved in the system
2. Create a _____ drawing using **Layout** drawing tools
3. _____ a drawing file into **Layout** from another CAD system



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Step 1: Drawing Files



Step 1 Review

Q2: How do you know when you need to use the **Select** tool for editing your drawing?



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Steps in Making Parts



• Intelli-MAX Layout

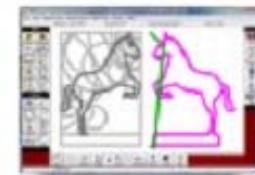
Step 1: Obtain/create a Drawing File (DXF file).

Step 2: Assign machining Qualities (edge finish).

Step 3: Clean and save the drawing.

Step 4: Add Path Elements to the drawing and save it.

Step 5: Create the Machine Tool Path file (ORD/OMX file). [MAXiem_Layout](#)



• Intelli-MAX Make

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Step 9: Load and clamp the material.

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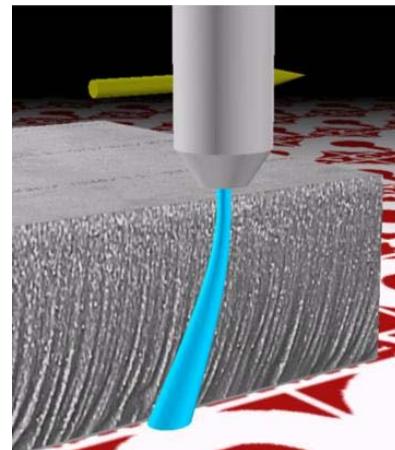


Step 2: Assign Cut Qualities

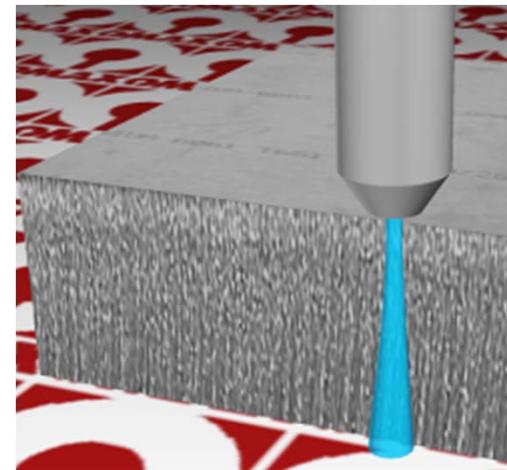


Assign cut qualities to a drawing

- Cut qualities tell the nozzle how fast or slow to move to achieve a certain edge finish



Faster – rougher part edge



Slower – smoother part edge



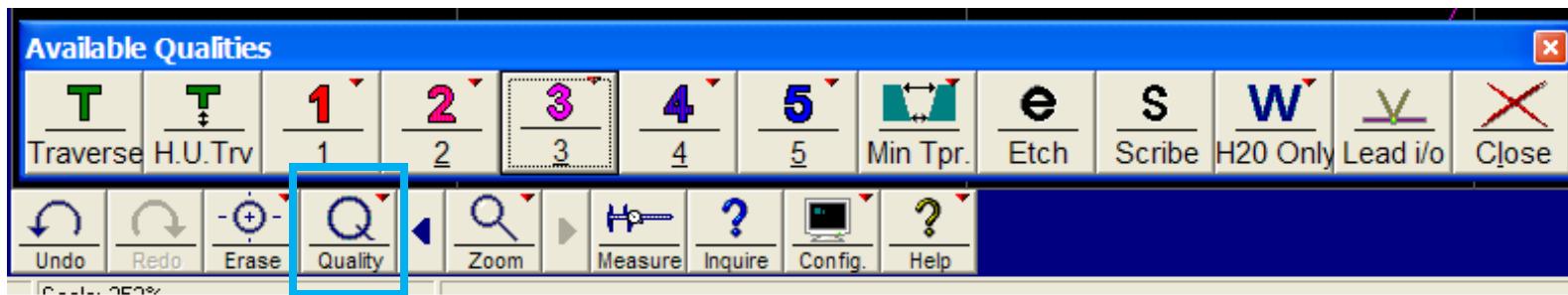
Keywords “quality, quality numbers”

Step 2: Assign Cut Qualities



Available Qualities tool bar

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



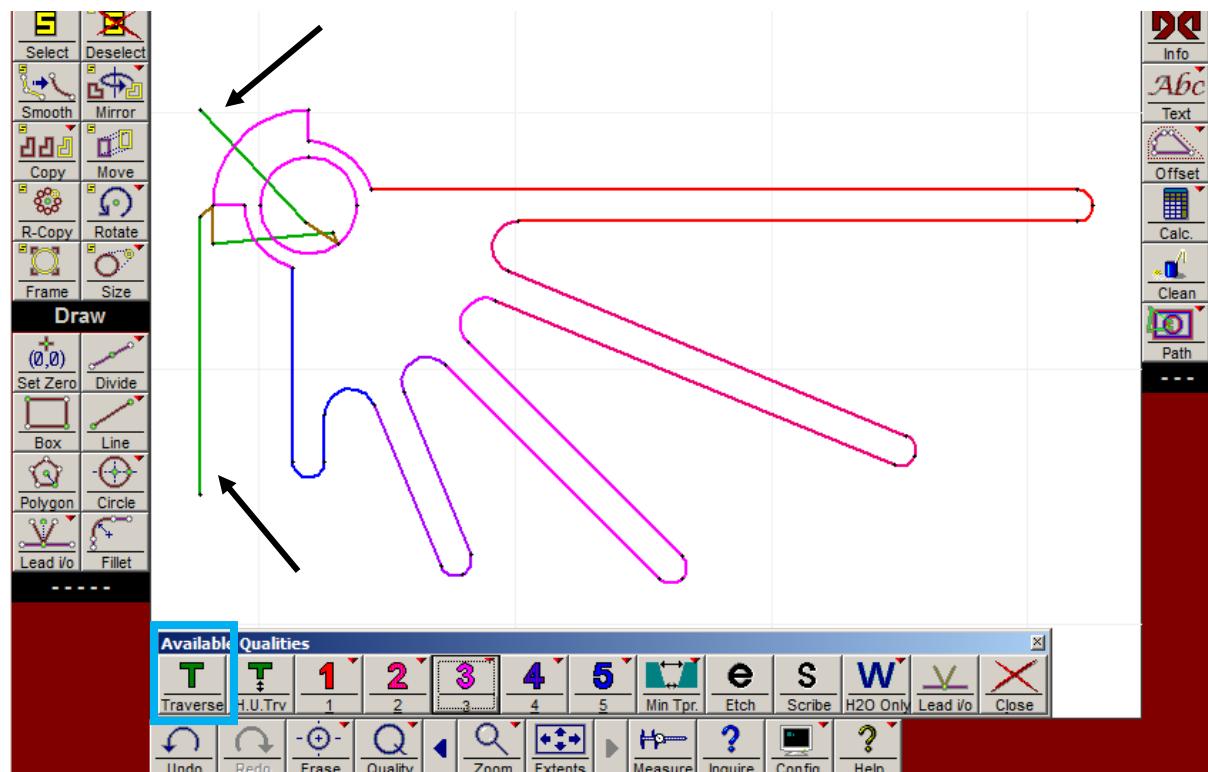
Keywords “quality, quality numbers”

Step 2: Assign Cut Qualities

MAXiem
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Traverse

- Solid green line
- Moves the nozzle without cutting
- No water, no abrasive

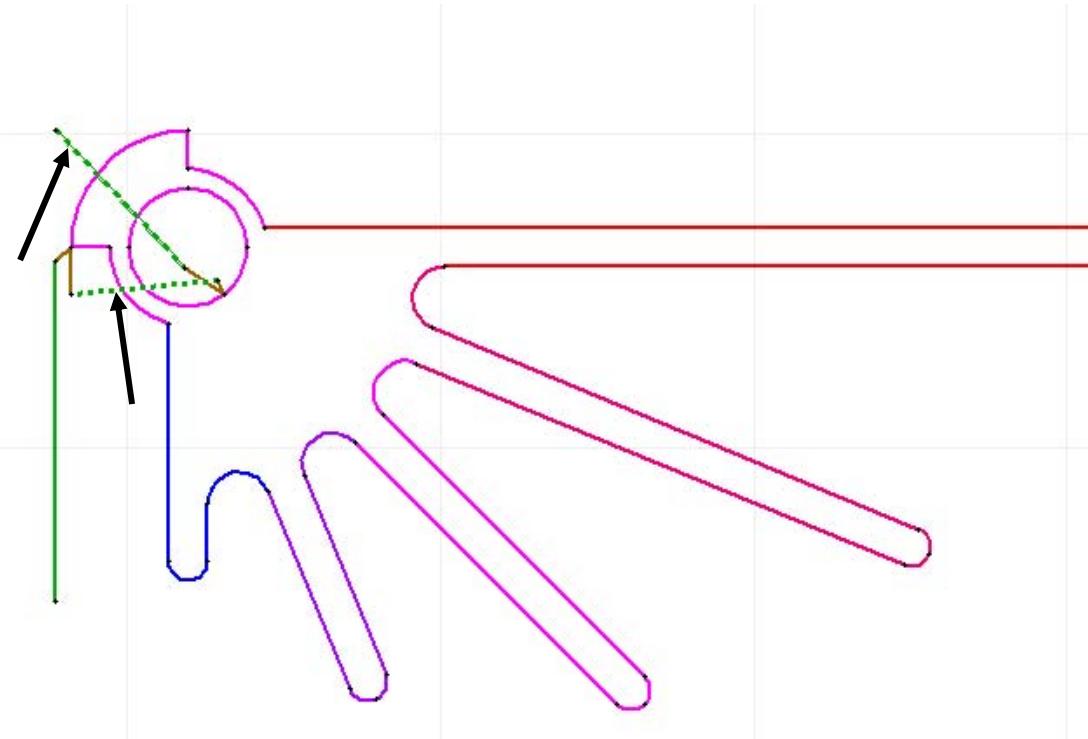


Step 2: Assign Cut Qualities

MAXIEM
WATERJETS

Heads-up traverse

- Dotted green line
- Cutting head raises first, then moves to the next point without cutting, then lowers
- Used to avoid nozzle collisions



Available Qualities		1	2	3	4	5	Min Tpr.	e	s	w	Lead i/o	Close
Traverse	H.U.Trv	1	2	3	4	5	Min Tpr.	e	s	w	Lead i/o	Close

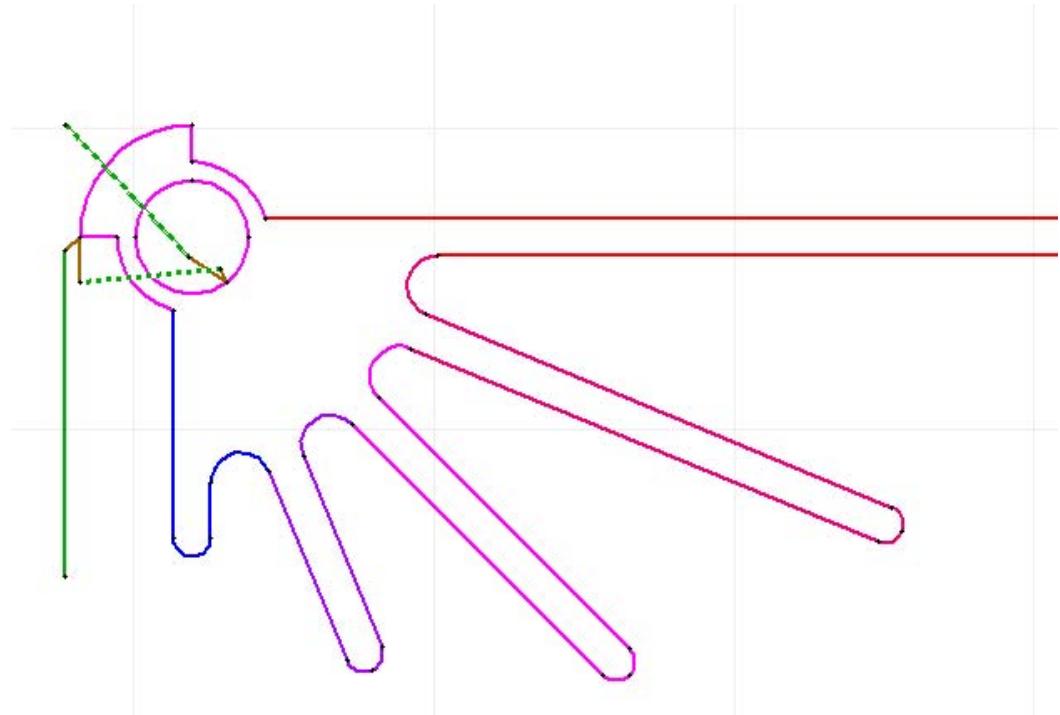
MAXIEM
WATERJETS

Step 2: Assign Cut Qualities

MAXIEM
WATERJETS

Qualities 1-5

- Different colors for different qualities
- Number and color on the toolbar corresponds to colored entities in the part



Higher number = higher quality
Lower number = lower quality

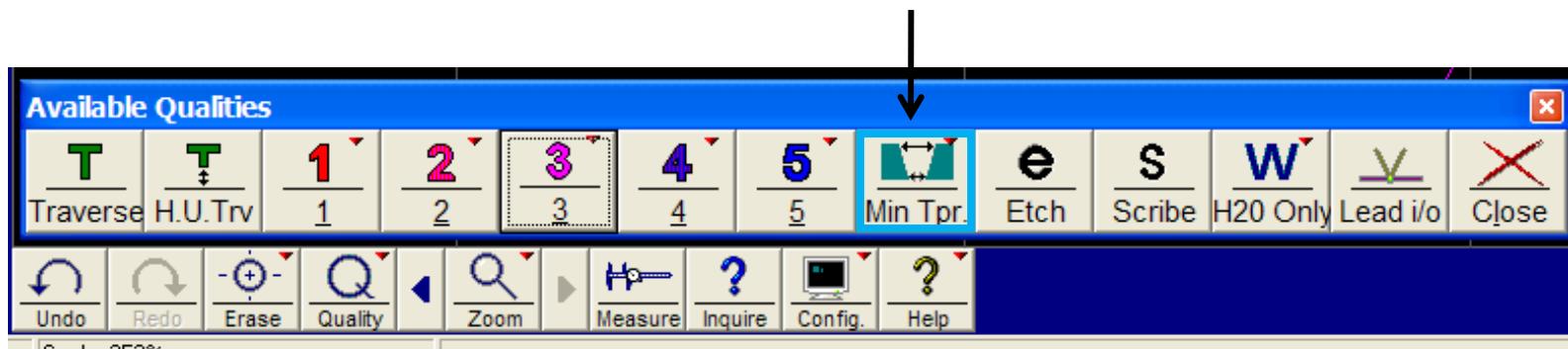
MAXIEM
WATERJETS

Step 2: Assign Cut Qualities

MAXIEM
WATERJETS

Minimum Taper

- Moves even slower than a Q5
- Used when you want to minimize taper
- **Caution!** increases cutting time significantly!



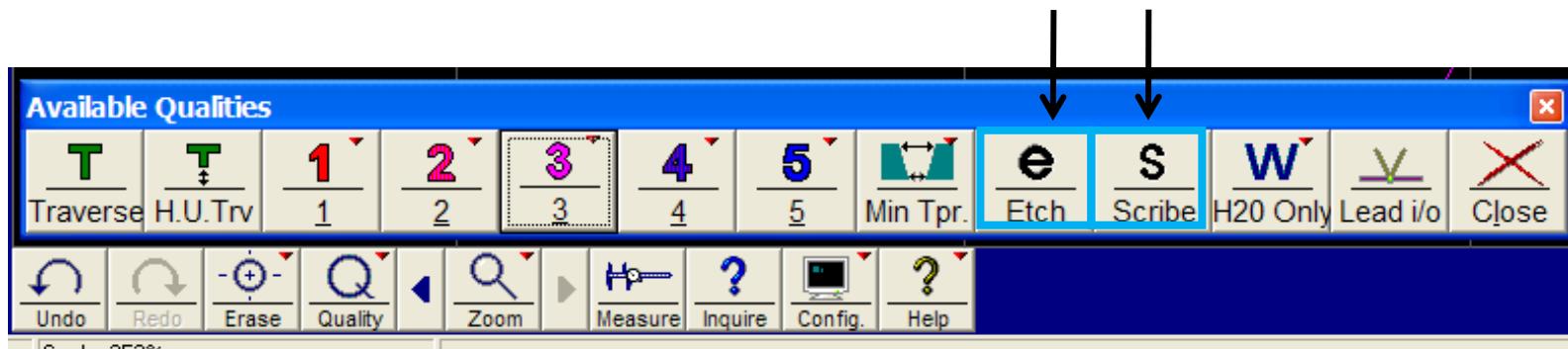
MAXIEM
WATERJETS

Step 2: Assign Cut Qualities

MAXiem
WATERJETS

Etch and Scribe

- Move faster than Q1
- Inches per minute determines depth of cut
- **Etch** uses abrasive, **Scribe** uses water only



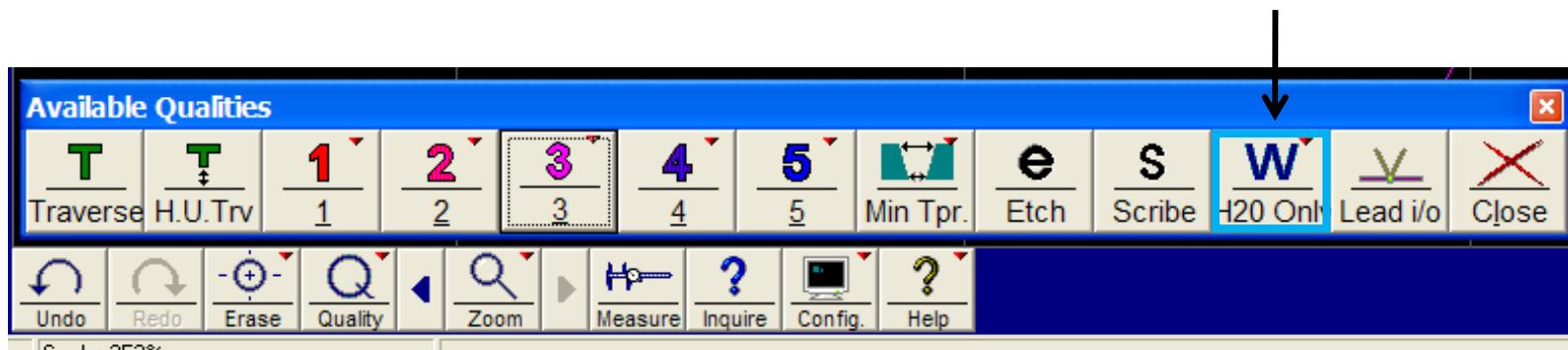
MAXiem
WATERJETS

Step 2: Assign Cut Qualities



Water Only

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

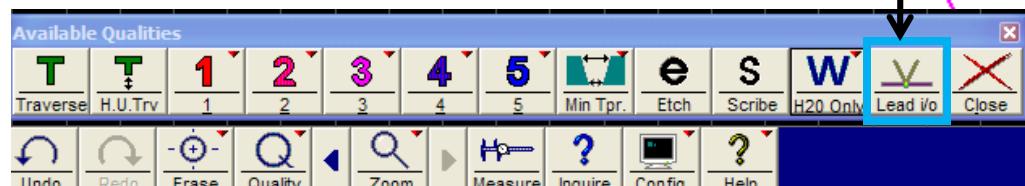
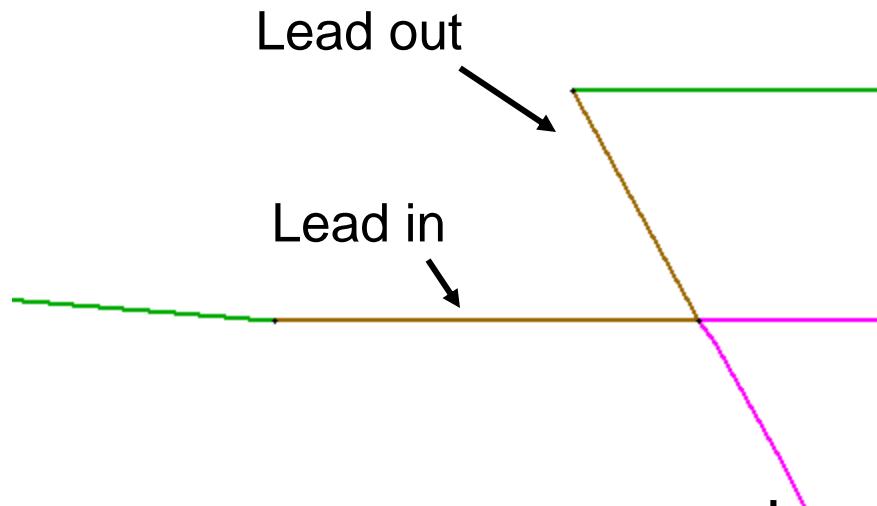


Step 2: Assign Cut Qualities

MAXIEM
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Lead in and Lead outs

- Drawn in **brown**
- Lead ins (usually drawn longer) use water and abrasive to pierce the material before cutting
- Lead outs (usually drawn shorter) allow the jet stream to catch up and finish the cut before turning off the water and abrasive



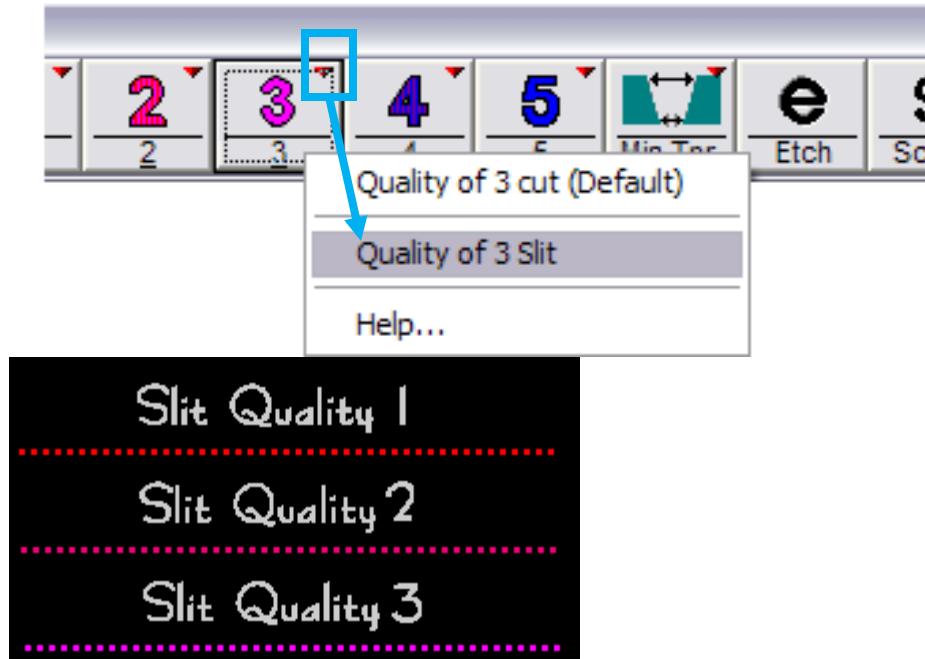
MAXIEM
WATERJETS

Step 2: Assign Cut Qualities



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



Keyword "slit"

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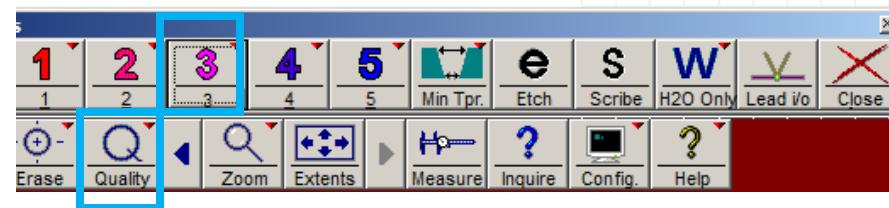
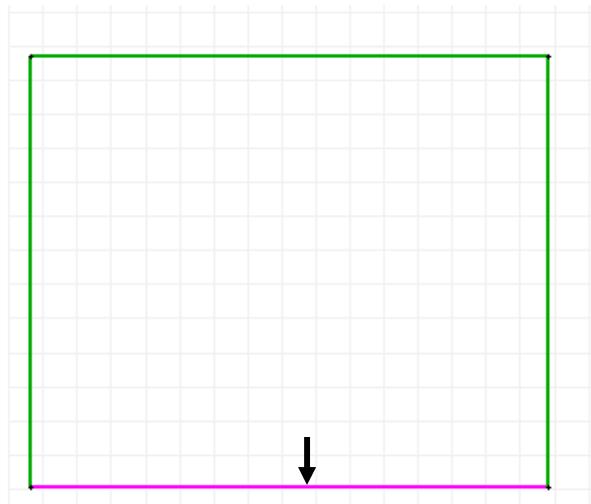
100

Step 2: Assign Cut Qualities



How to assign **Qualities**

- Open a drawing in **Layout**
- Click to select the **Quality** tool bar (or right-click for more options)
- Click the **Quality** icon you want
- Click an entity to assign it the quality you selected

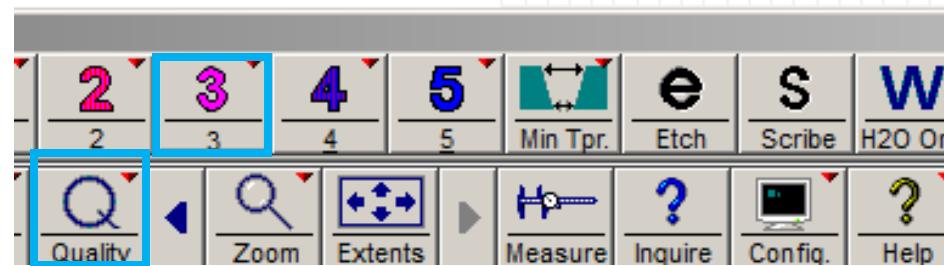
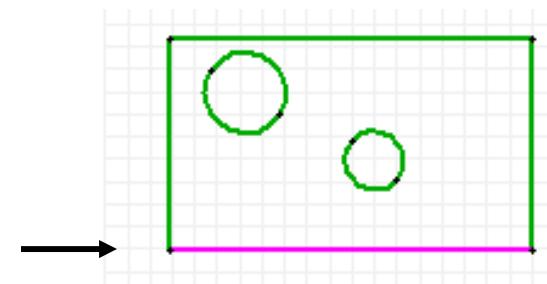


Step 2: Assign Cut Qualities

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Exercise

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



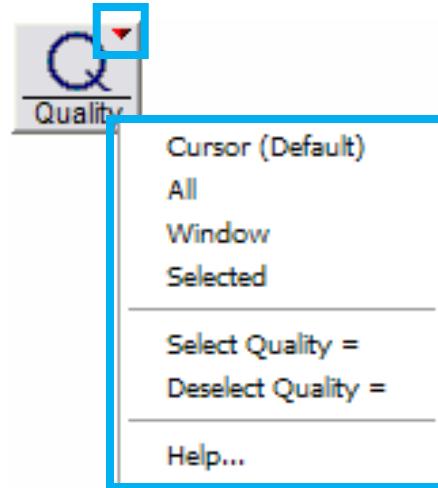
Keyword “quality”

Step 2: Assign Cut Qualities



Other methods to assign qualities

- Right-click the **Quality** icon
- Use keyboard shortcuts such as:
 - **Q** for **Quality** (type the **Quality** number you want – for example, Q3 for quality 3)
 - **QA** for **Quality All**
 - **QW** for **Quality Window**



Exercise

- *Assign machining qualities using other options*

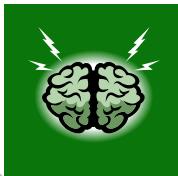


Step 2: Assign Cut Qualities



Quality toolbar 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



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Session 1: Activities



1. Install the Intelli-MAX Software Suite on a PC or laptop.
 - a) Give the trainer the registration code to obtain a password.
 - b) Register the software
2. Create a new drawing using **Layout**.
3. Assign two or more machining qualities to the drawing you created using the **Quality** toolbar.
4. Use the **Select**, **Deselect**, and a couple of the other editing tools such as **Copy** or **Move**, to make changes to your drawing.
5. Look up the keyboard shortcut for drawing a circle



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Steps in Making Parts



• Intelli-MAX Layout

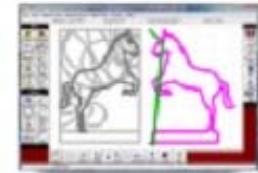
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MAXiem_Layout

• Intelli-MAX Make

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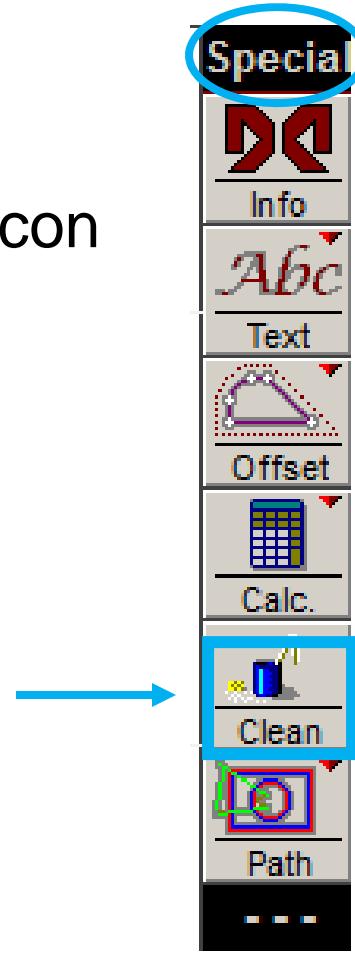


Step 3: Clean and Save the Drawing



Clean and Save the DXF drawing file

- Open a saved DXF drawing file
- On the **Special** toolbar, click the **Clean** icon



Keyword “clean”

Step 3: Clean and Save the Drawing



Exercise

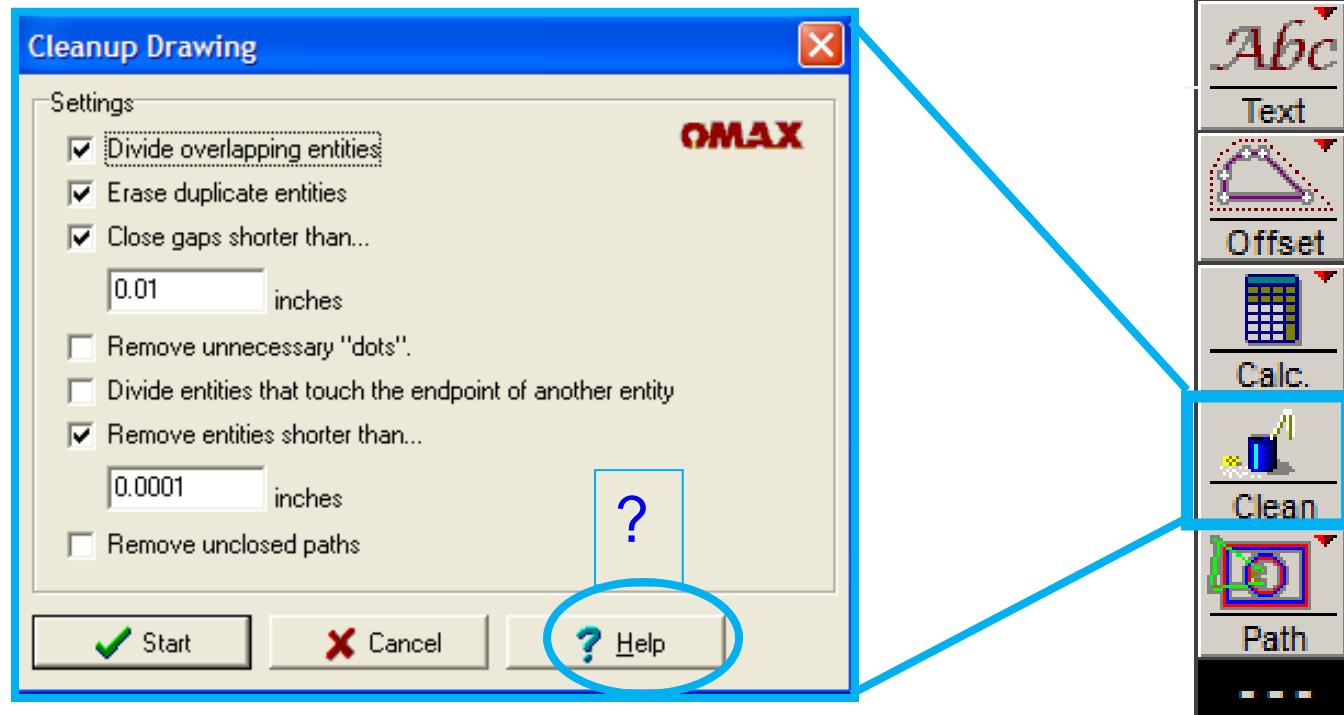
- Run the **Clean** tool on the test box.dxf drawing and review results
- Open a new DXF file with known problems and run the **Clean** tool and review results



Step 3: Clean and Save the Drawing

MAXiem
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- Click the **Clean** icon to choose cleanup settings



Steps in Making Parts



• Intelli-MAX Layout

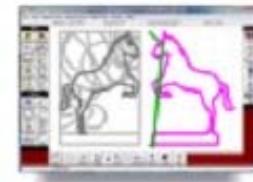
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MAXIEM_Layout

• Intelli-MAX Make

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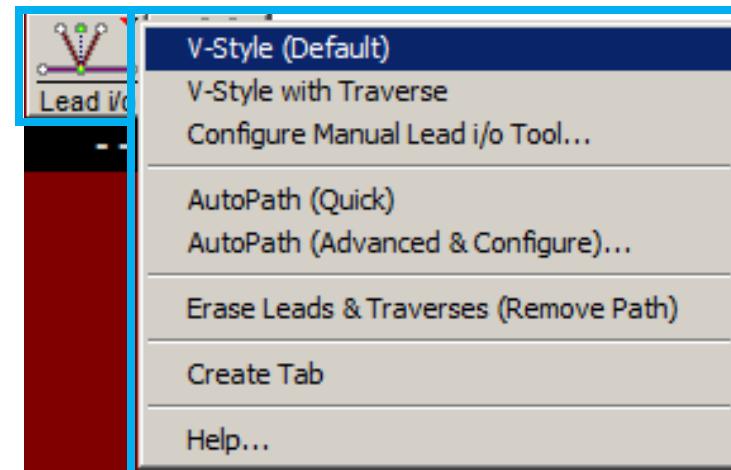


Step 4: Add the Nozzle Path to the Drawing



Nozzle path

- The nozzle travel path consists of 3 components:
 - **Geometry** of your part
 - **Traverse lines**
 - **Lead in and Lead outs** (pierce and exit points)
- Traverse lines and lead in/out are added to your drawing using the **Lead i/o** tool



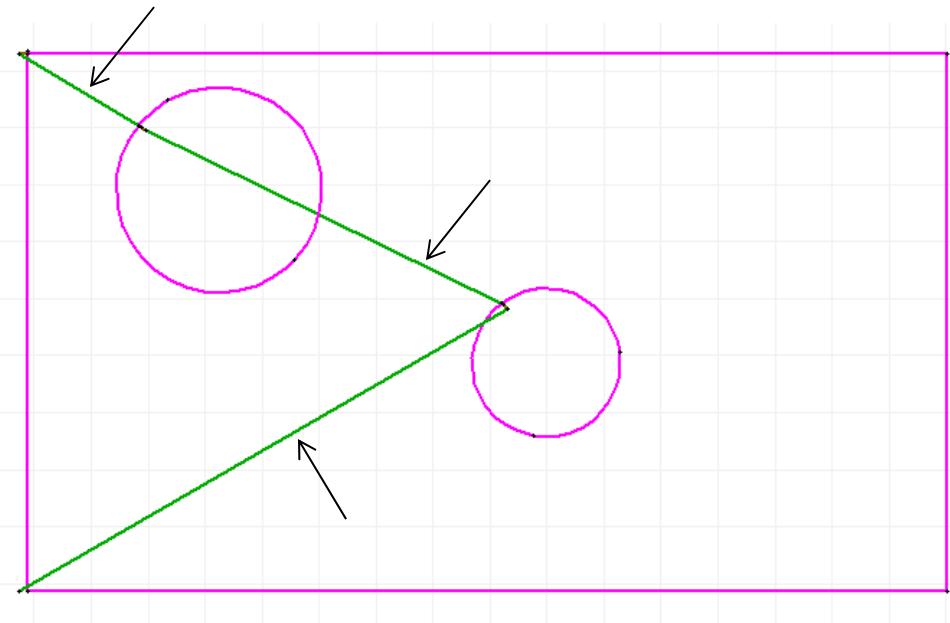
Step 4: Add the Nozzle Path to the Drawing

MAXIEM
WATERJETS

Nozzle path

- **Traverses**

- Can be lines or arcs
- Color – green (solid or dashed)
- Move the nozzle without turning on the water and/or abrasive
- Typically connect to lead in/outs



Keyword “traverse”

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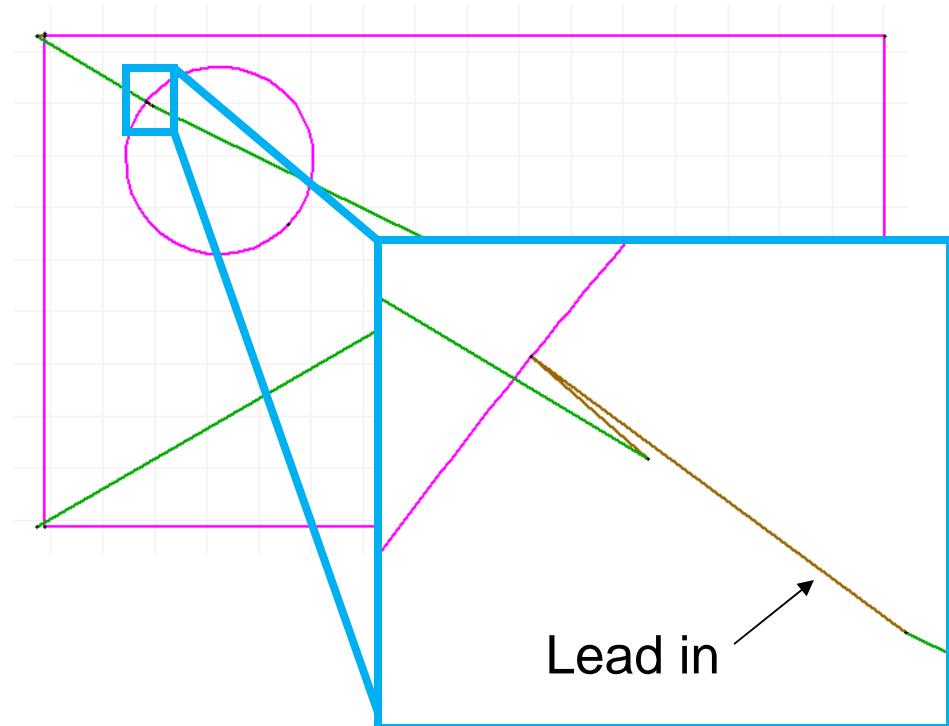
Step 4: Add the Nozzle Path to the Drawing

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WATERJETS

Nozzle path

- **Lead ins**

- Pierce points
- Typically drawn longer
- Turn on water and abrasive and pierce the material
- Connected to lead outs
- Determines nozzle travel direction



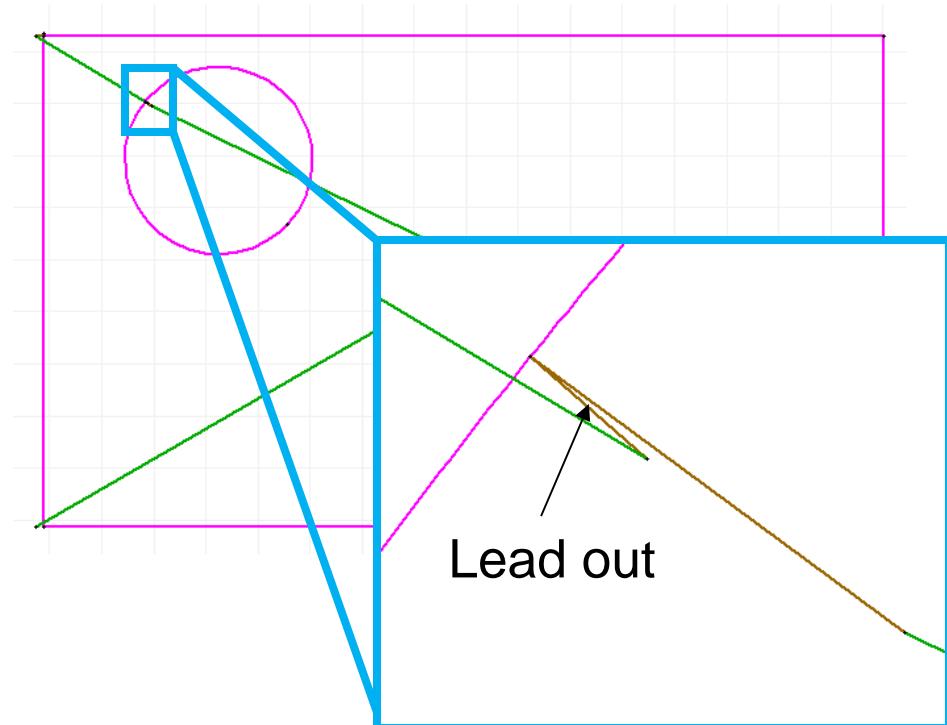
Keyword "lead i/o"

Step 4: Add the Nozzle Path to the Drawing

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Nozzle path

- **Lead outs**
 - Exit points
 - Typically drawn shorter
 - Turn off the water and abrasive and proceed to the next command
 - Connected to lead ins



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Step 4: Add the Nozzle Path to the Drawing



Best practices for adding the nozzle path

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



Step 4: Add the Nozzle Path to the Drawing

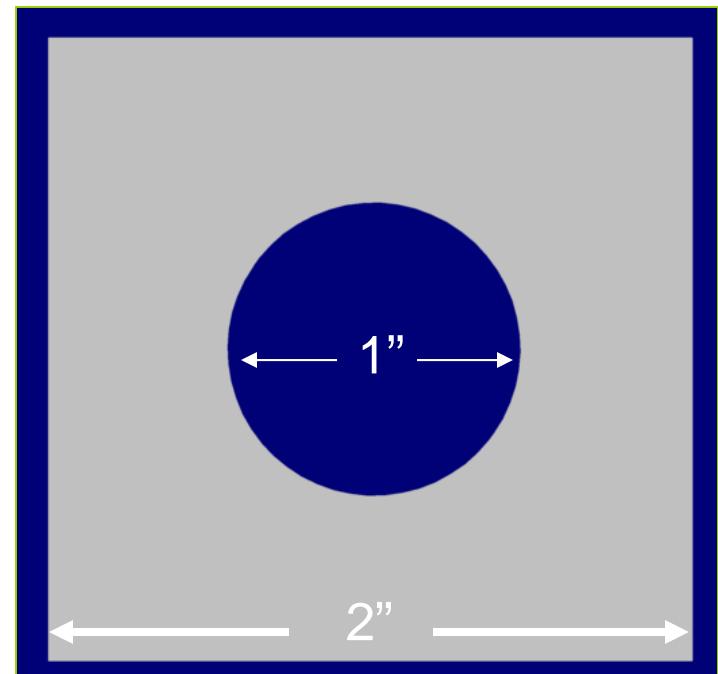
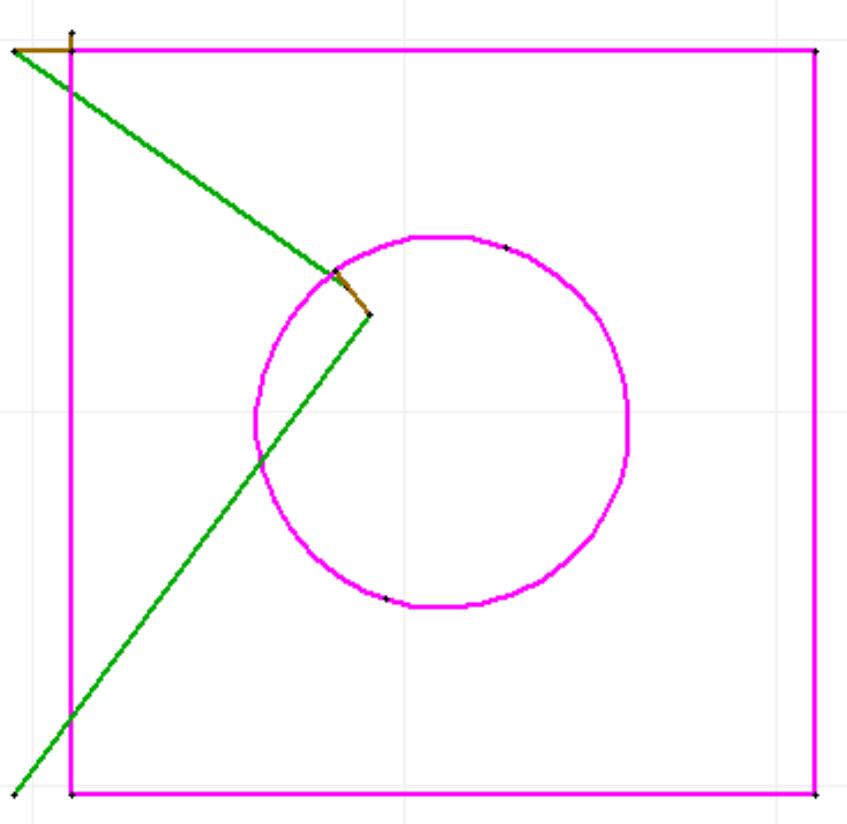


- Specify a narrow angle and use lines for your lead i/o to minimize machine marks where the nozzle finishes cutting
- The software will cut to the left of the line, by default
 - Internal geometries are cut to the left (counterclockwise)
 - External geometries are cut to the right (clockwise)
 - The 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) – point the lead in the direction you want the path to go
 - For best offset performance, avoid small entities in inside corners



Step 4: Add the Nozzle Path to the Drawing

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Final Part

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WATERJETS

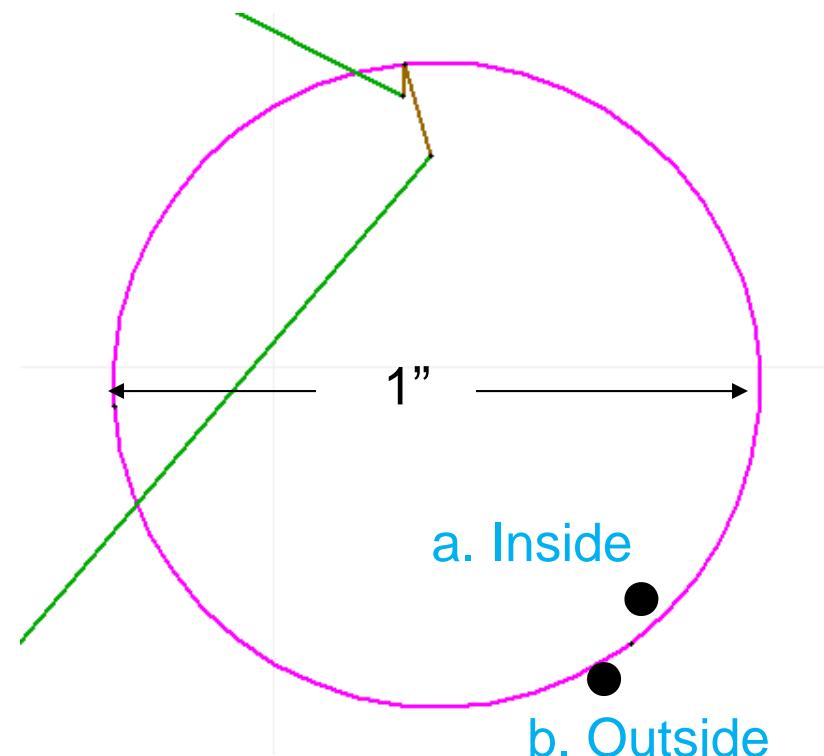
Step 4: Add the Nozzle Path to the Drawing

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WATERJETS

Lead ins

(on *internal* geometry)

- Pierce on the inside
- The tool offset is programmed to cut to the left side of the line by default
- Q: If we look at this circle, which side do we want the nozzle to cut on?



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Step 4: Add the Nozzle Path to the Drawing

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Lead ins

(on *internal* geometry)

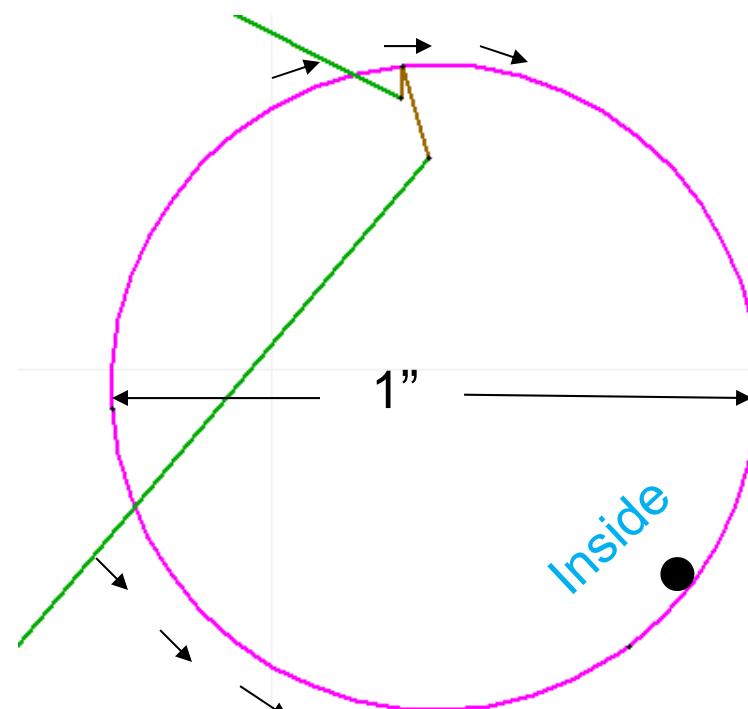
A: Cut on the *inside* to maintain our hole diameter at 1 inch

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 line?



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a. Clockwise



b. counterclockwise

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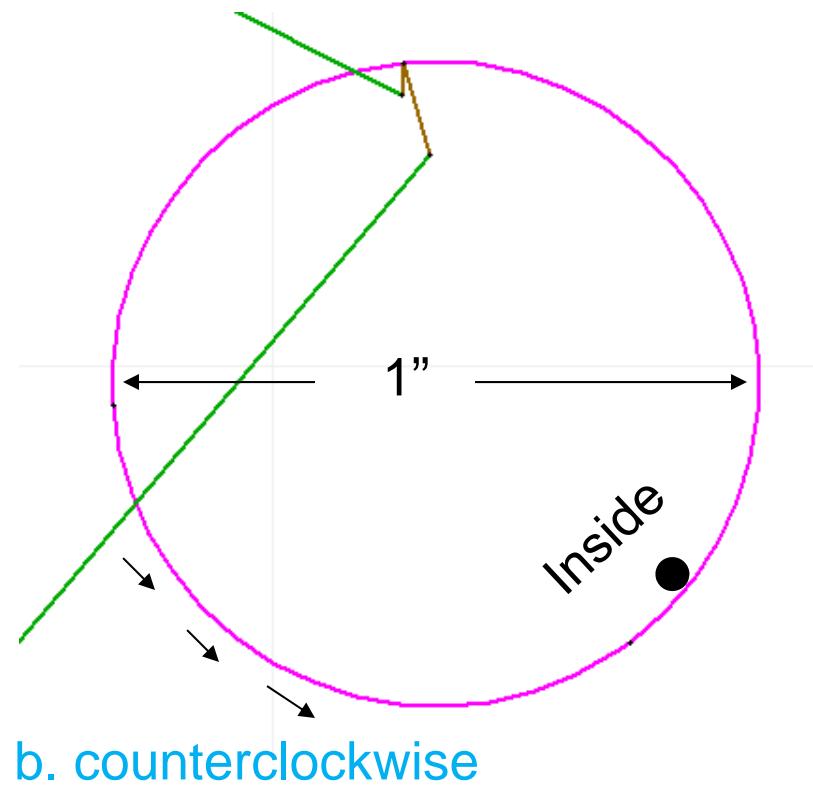
Step 4: Add the Nozzle Path to the Drawing

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Lead ins

(on *internal* geometry)

A: Travel in a b.
counterclockwise direction
so it cuts to the inside of
internal geometry



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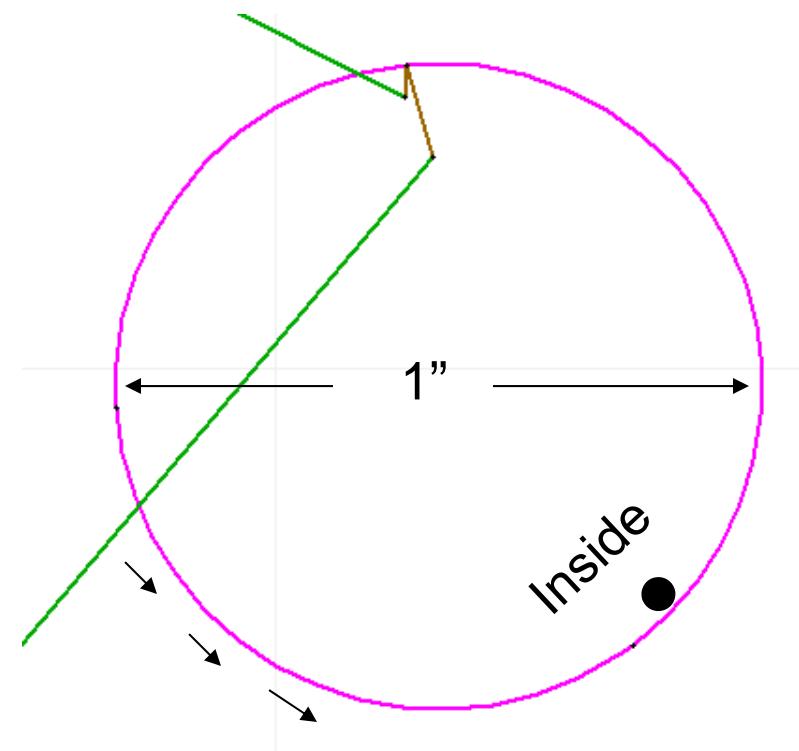
Step 4: Add the Nozzle Path to the Drawing

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Lead ins

(on *internal* geometry)

- Draw lead in longer than lead out
- Place pierce point in the scrap (inside)
- Cut in a counterclockwise direction so it cuts on the inside of the geometry



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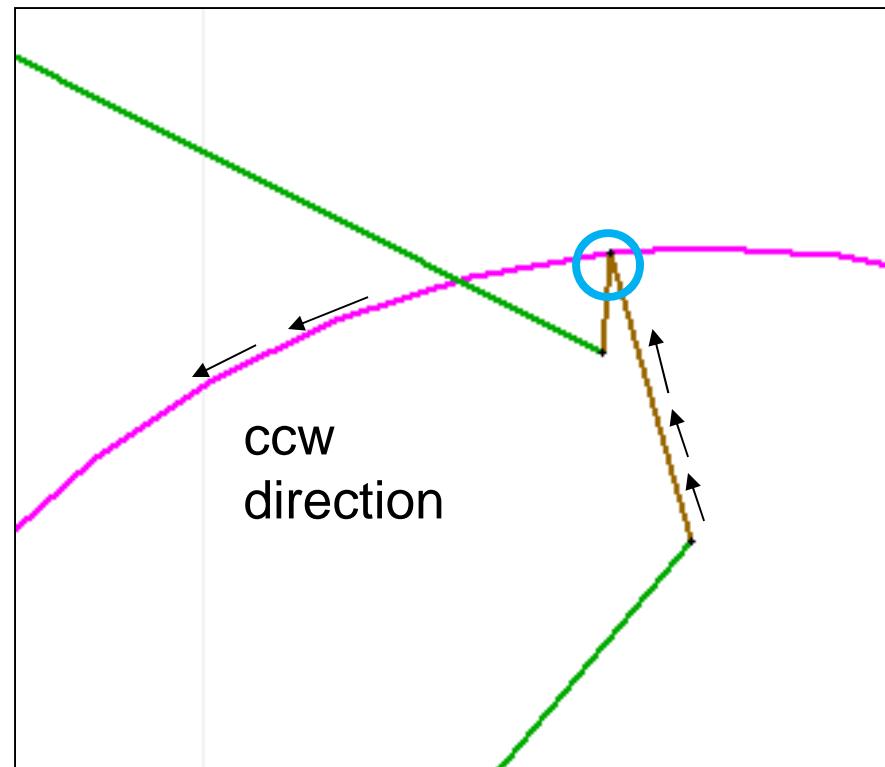
Step 4: Add the Nozzle Path to the Drawing

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Lead ins

(on *internal* geometry)

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



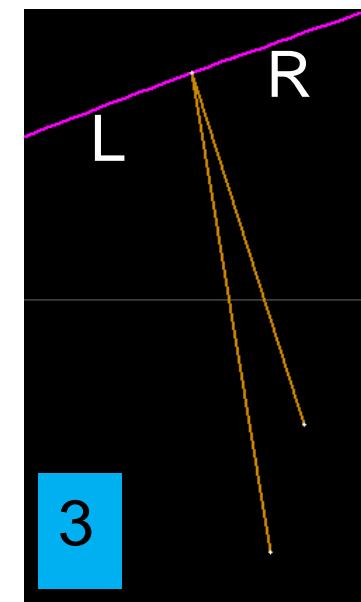
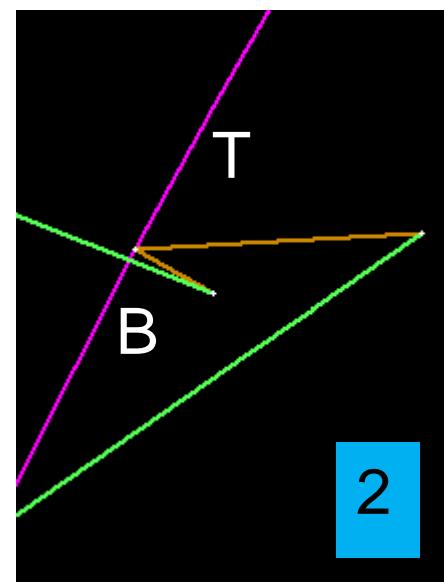
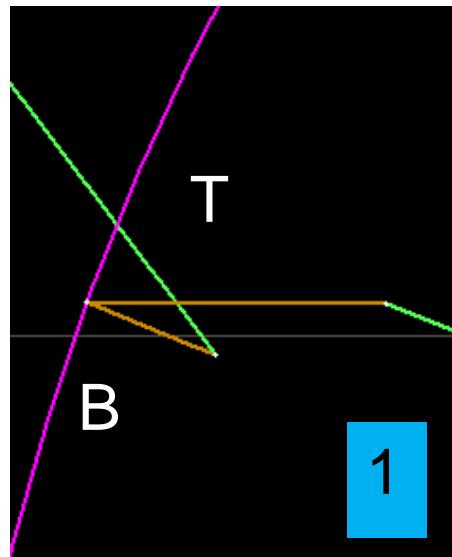
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Step 4: Add the Nozzle Path to the Drawing



Lead ins on *internal* geometry

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



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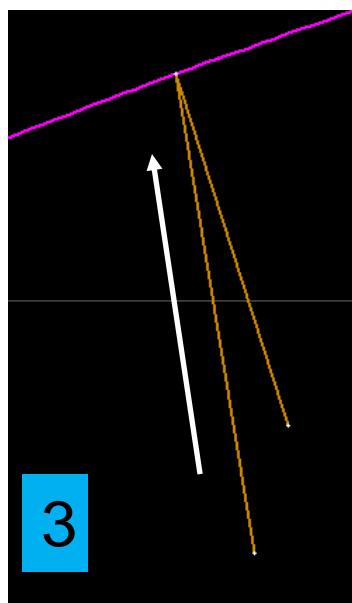


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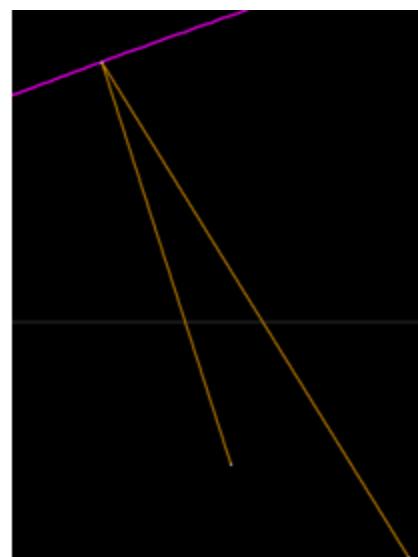
Step 4: Add the Nozzle Path to the Drawing

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How to fix a **lead in** if it is cutting on the wrong side



Lead in drawn in
the wrong direction

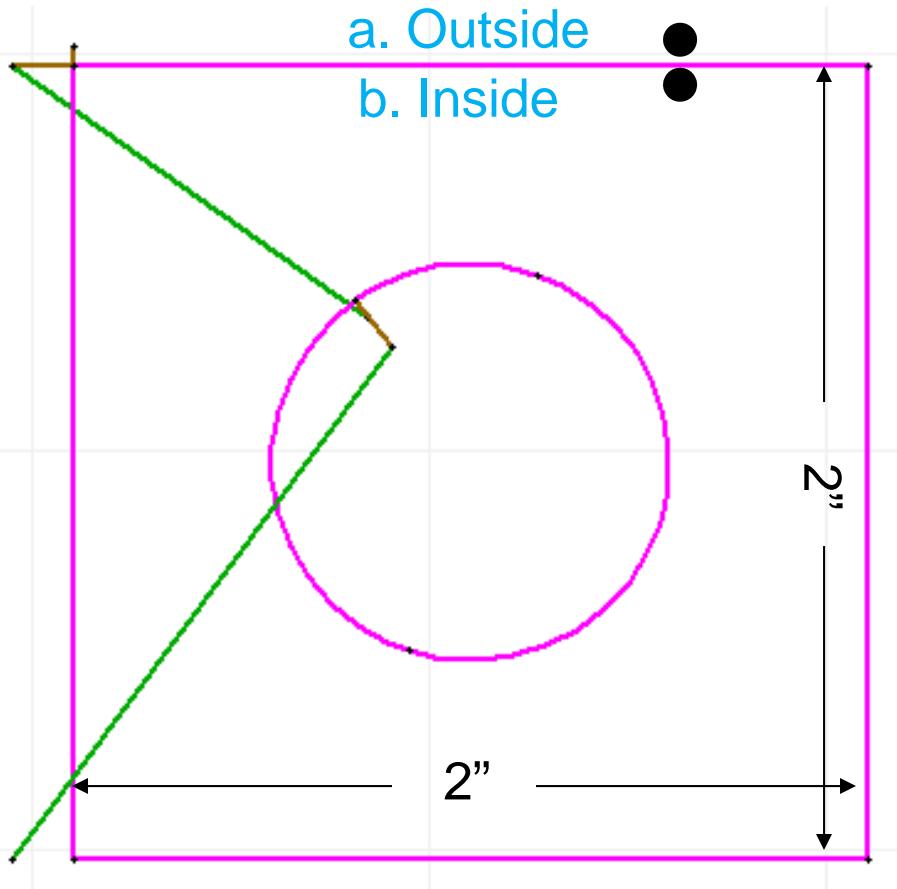


Use the **Swap Lead
Direction** tool

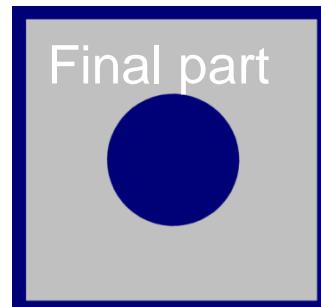
MAXIEM
WATERJETS

Step 4: Add the Nozzle Path to the Drawing

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WATERJETS



- a. Outside
- b. Inside



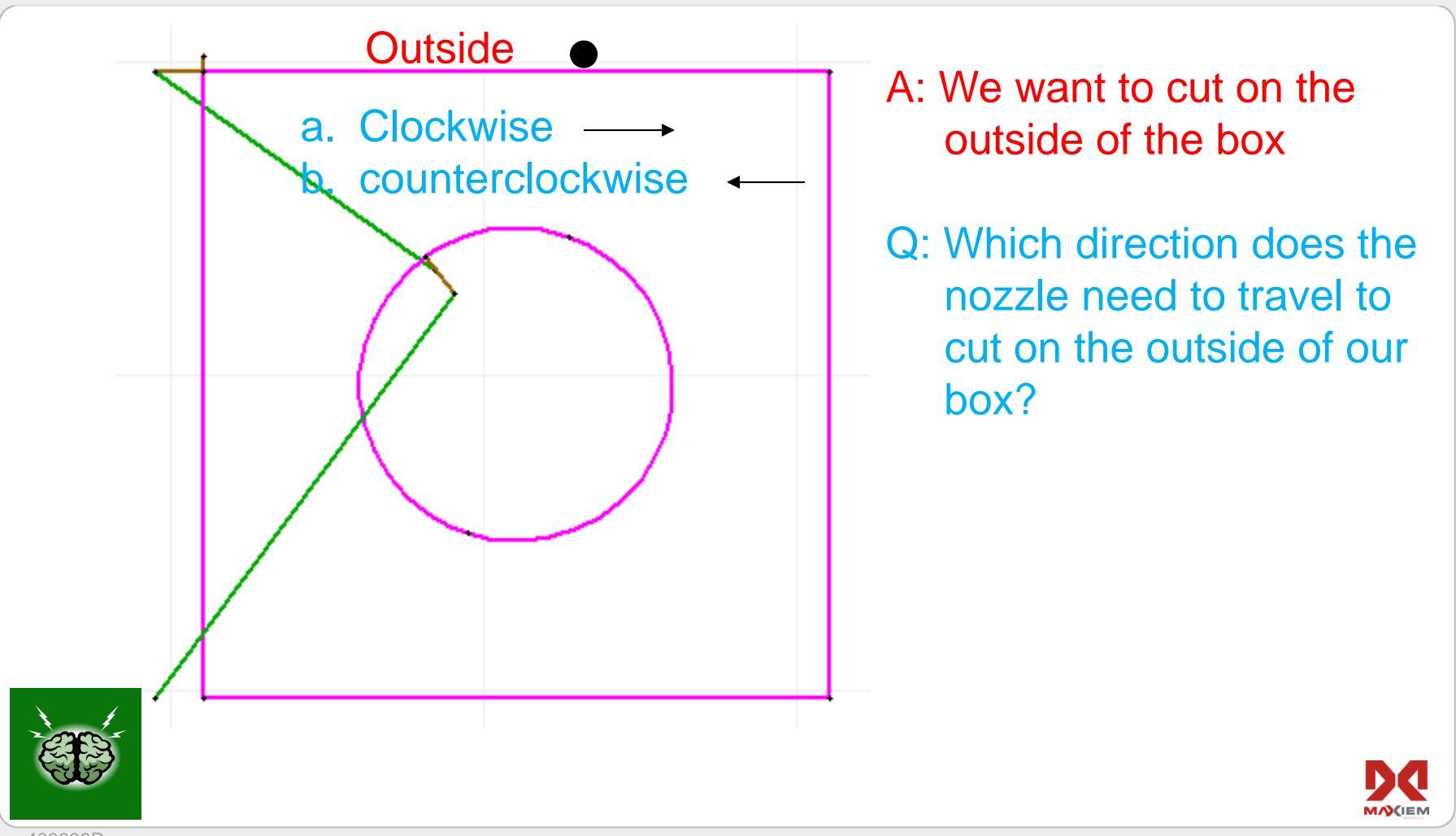
Q: Which side of the *external* geometry (the box) do we want the nozzle to cut if we want to maintain our part dimension as drawn?

- a. Outside
- b. Inside

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Step 4: Add the Nozzle Path to the Drawing

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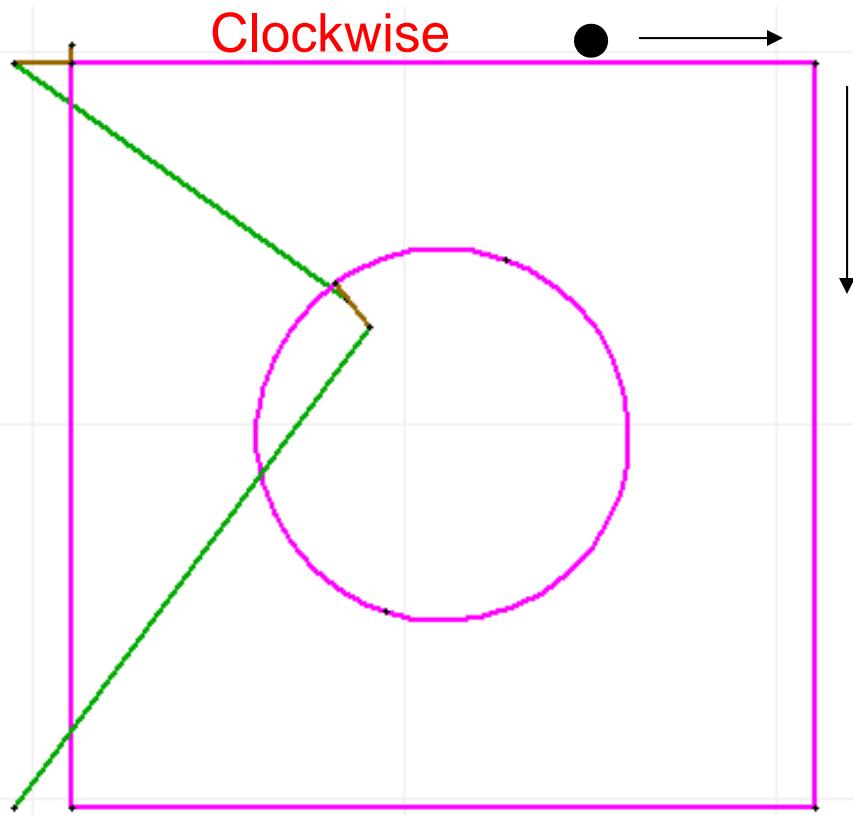
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Step 4: Add the Nozzle Path to the Drawing

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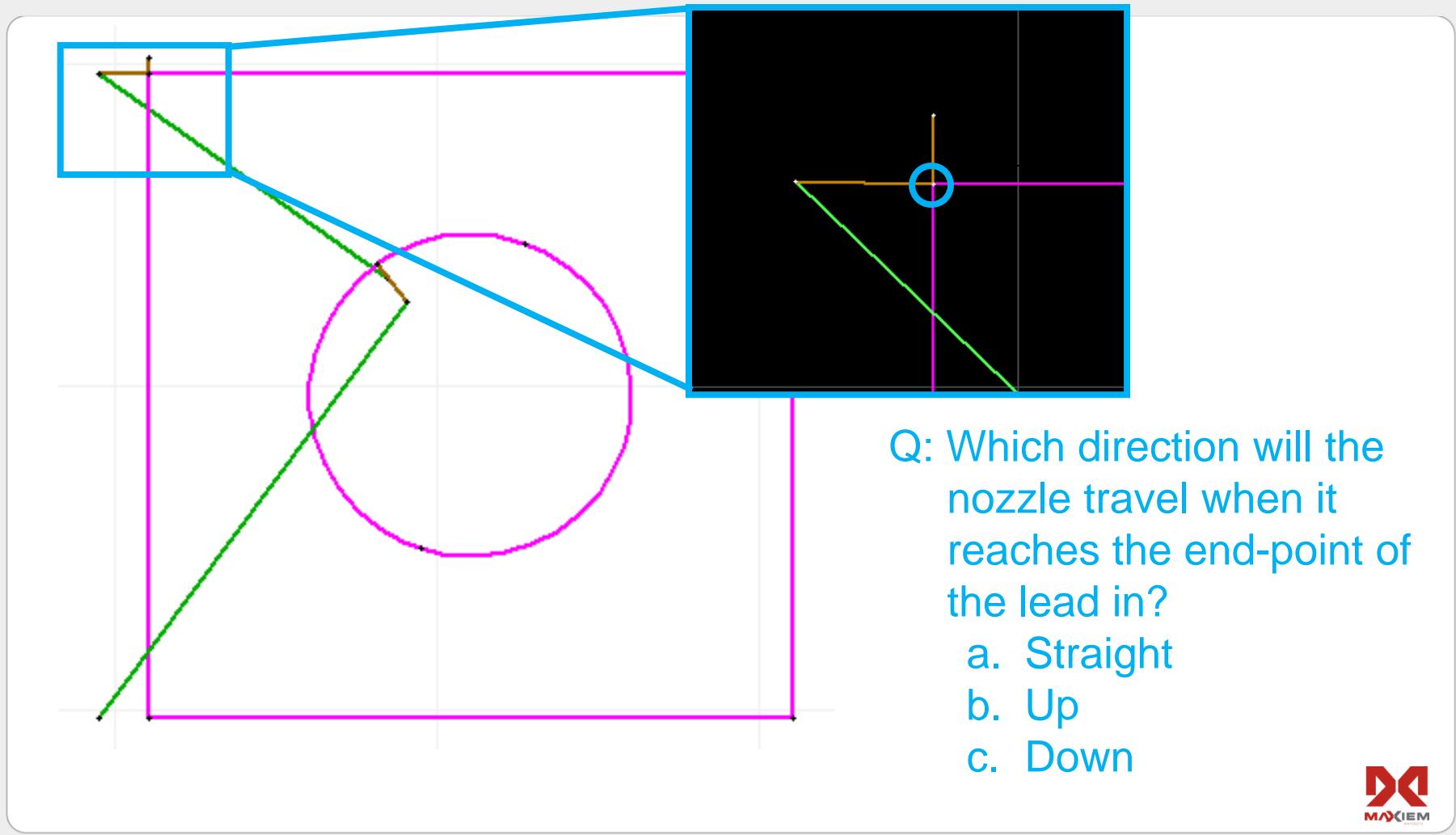


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A: We want the nozzle to travel in the *clockwise* direction on *external* geometry so the kerf is on the left, or outside the geometry

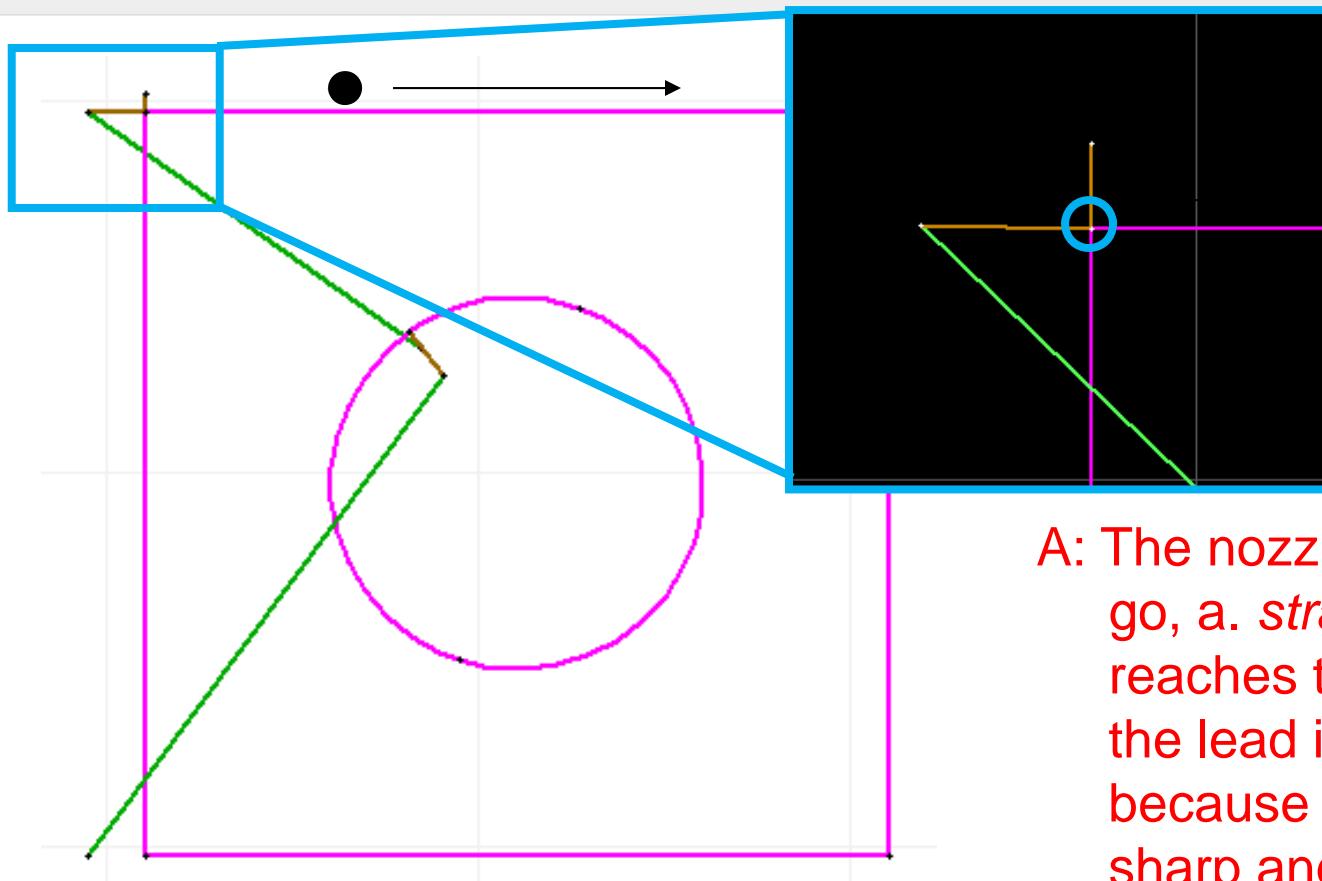
Step 4: Add the Nozzle Path to the Drawing

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Step 4: Add the Nozzle Path to the Drawing

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

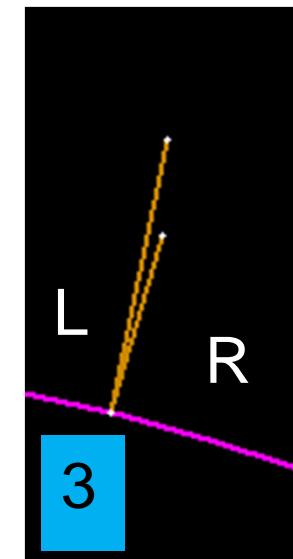
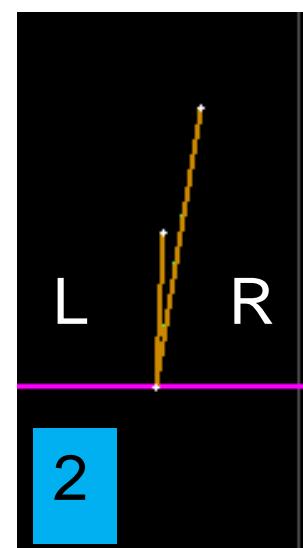
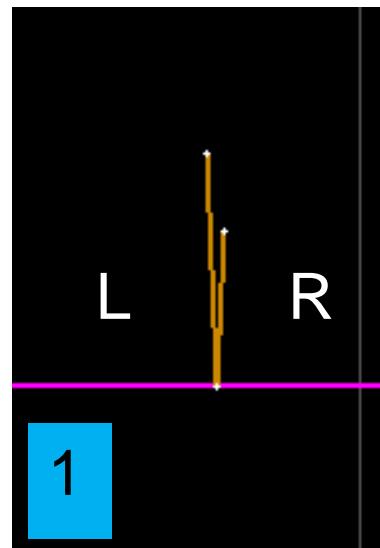
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Step 4: Add the Nozzle Path to the Drawing



Lead ins on *external* geometry

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



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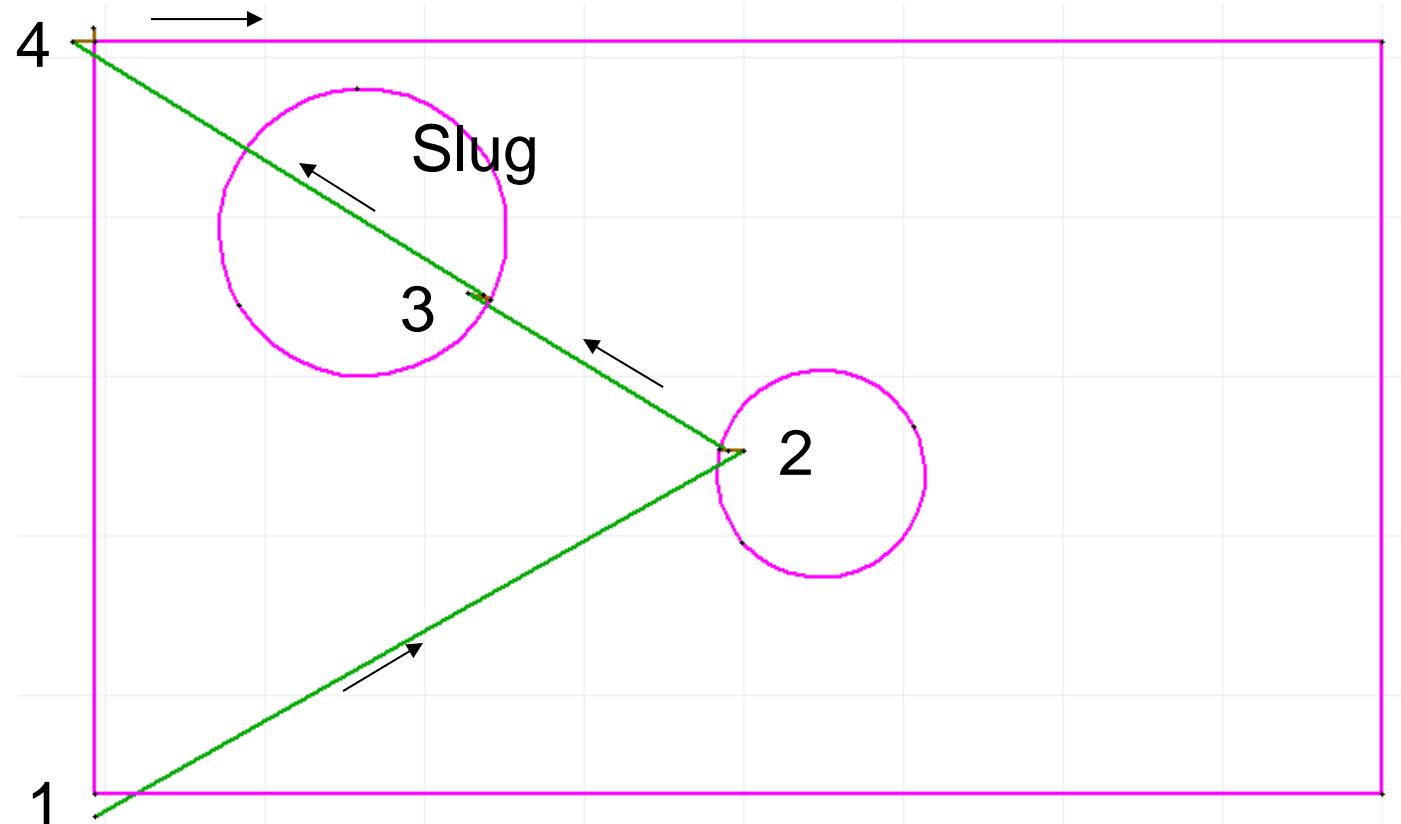


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Step 4: Add the Nozzle Path to the Drawing

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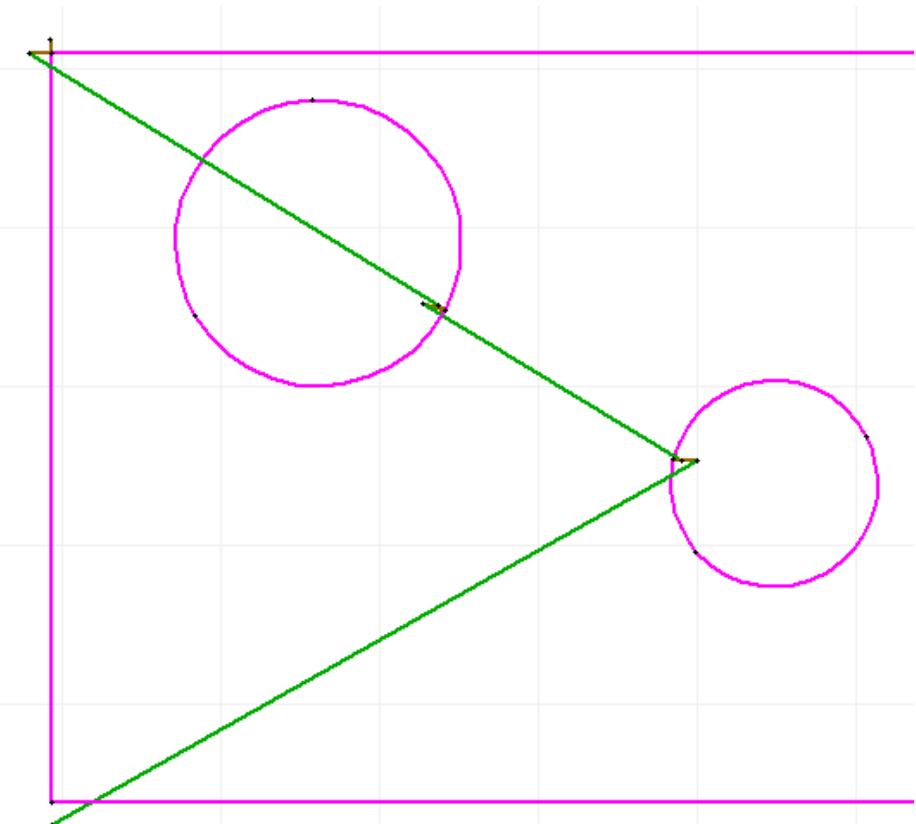
Avoid traveling over something already cut



Step 4: Add the Nozzle Path to the Drawing

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- To avoid a potential collision with the slug:
 - Move the lead in/out to the opposite side of the circle
 - Change the traverse line to a heads-up traverse
 - Move the lead in/out on the box to the lower left or the top right of the box



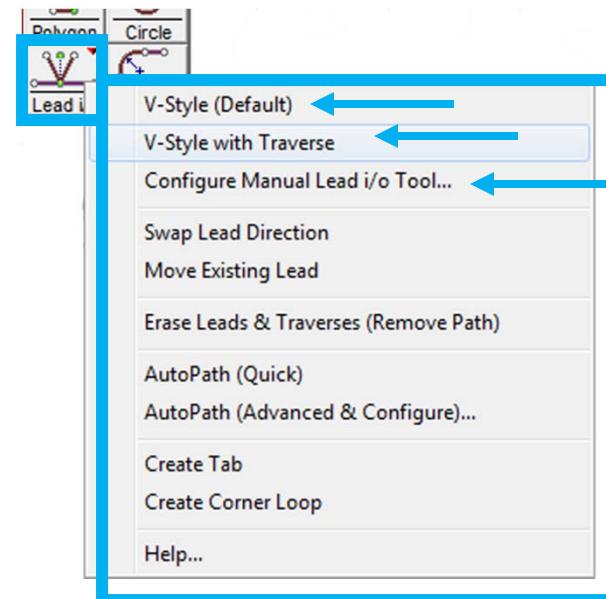
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Step 4: Add the Nozzle Path to the Drawing



Manual Lead i/o tools

- The nozzle travel path 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 the **Configure Manual Lead i/o Tool**



Keyword “lead i/o”

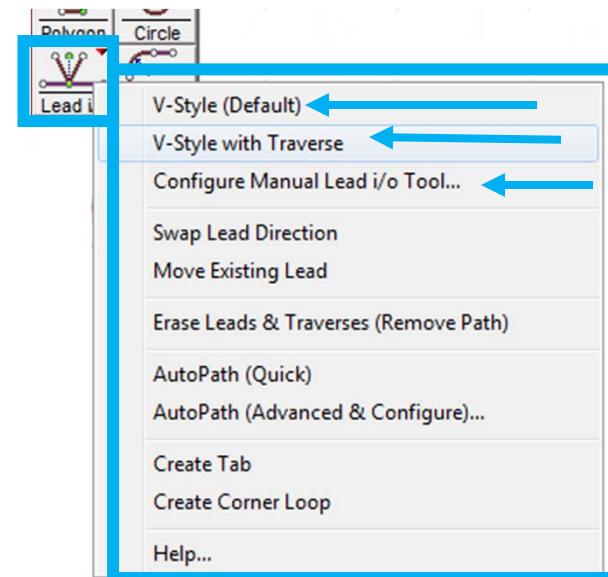
Step 4: Add the Nozzle Path to the Drawing



Manual Lead i/o tools

Exercise

- *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*



Keyword “lead i/o”

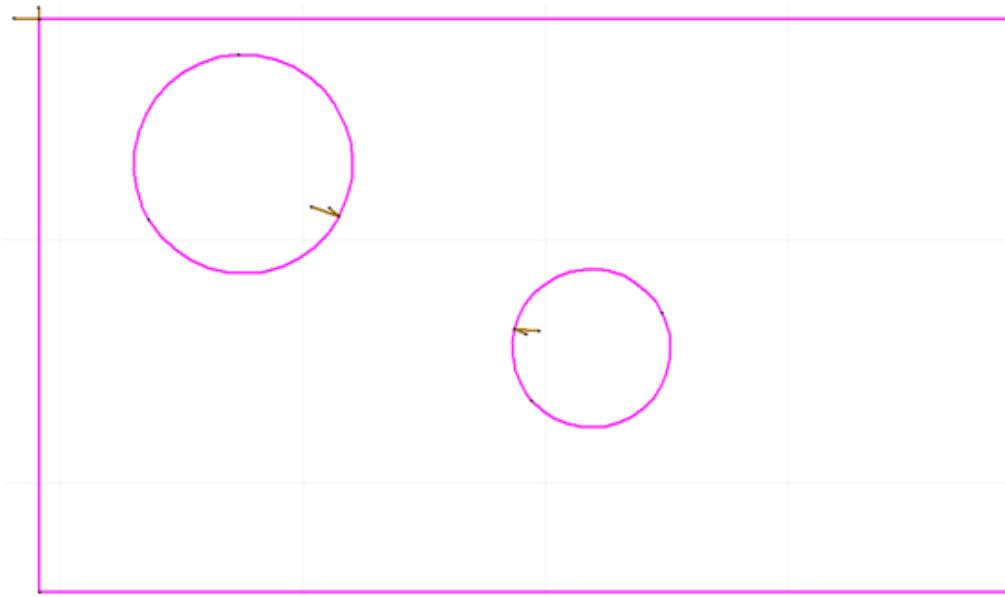
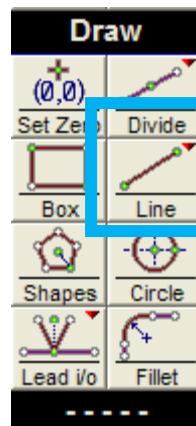
Step 4: Add the Nozzle Path to the Drawing

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Manual Lead i/o tools

Exercise

- *Draw traverse lines using the Line tool*

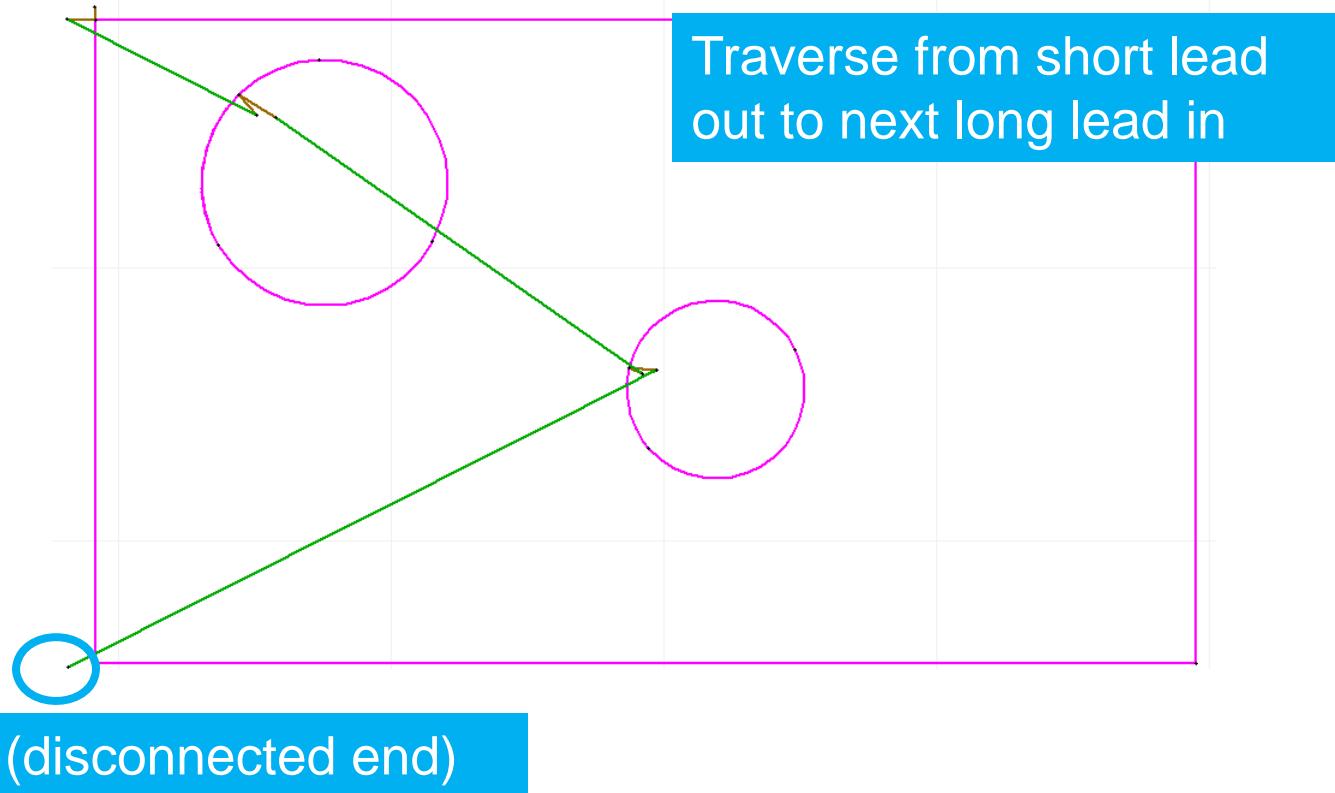


Keyword “traverse”

Step 4: Add the Nozzle Path to the Drawing

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Manual Lead i/o tools



Step 4: Add the Nozzle Path to the Drawing



Manual Lead i/o tools

Exercise

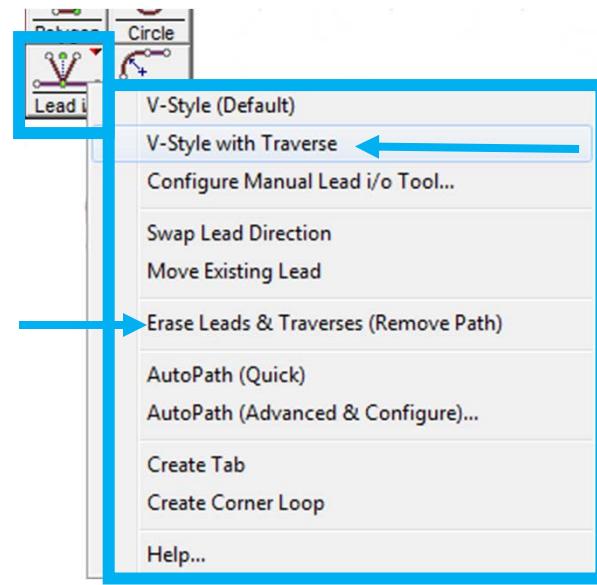
- *Erase leads and traverses in the previous drawing using the Erase Leads & Traverses command*
- *Add leads and traverses using the V-Style with Traverse command*



Keyword “lead i/o”

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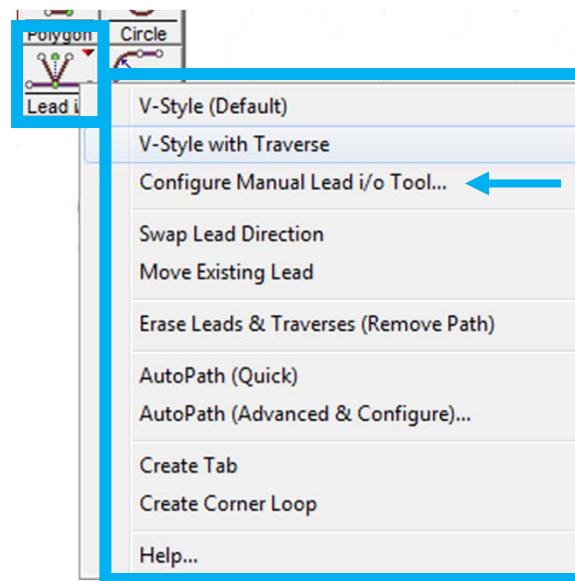
Step 4: Add the Nozzle Path to the Drawing



Manual Lead i/o tools

Exercise

- *Use the Configure Manual Lead i/o Tool command*



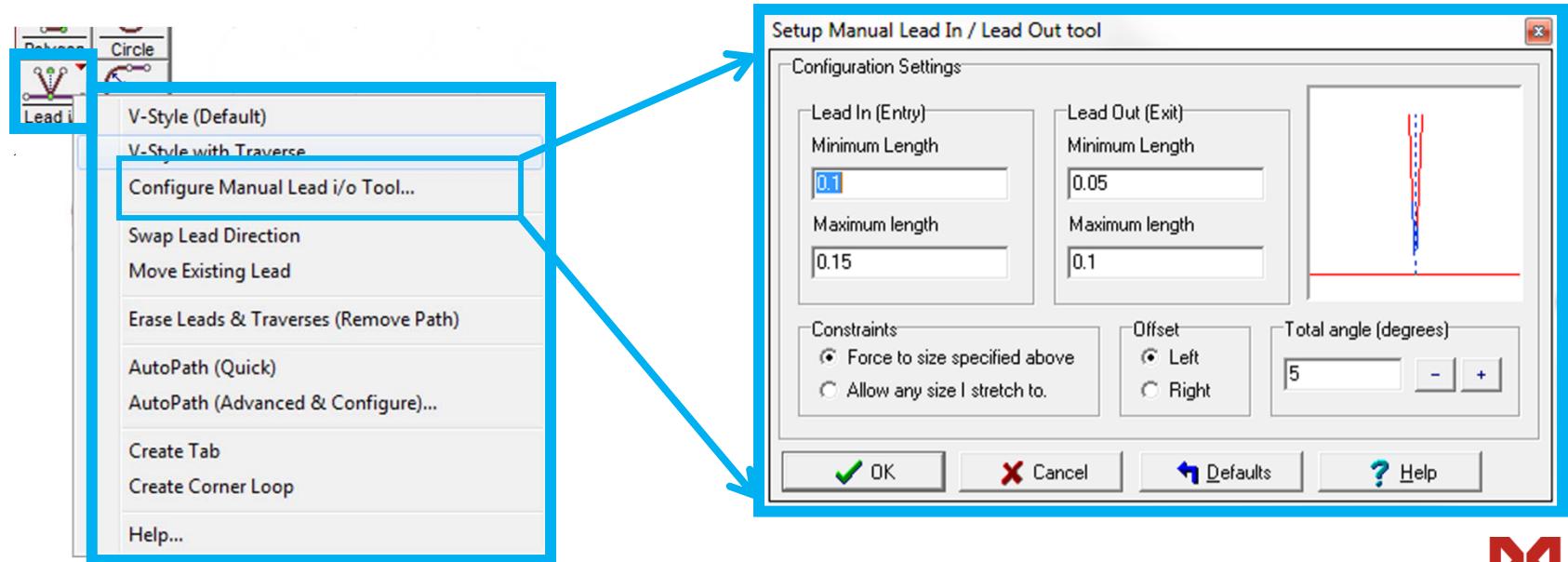
Step 4: Add the Nozzle Path to the Drawing



Manual Lead i/o tools

Exercise

- Click Configure Manual Lead i/o Tool

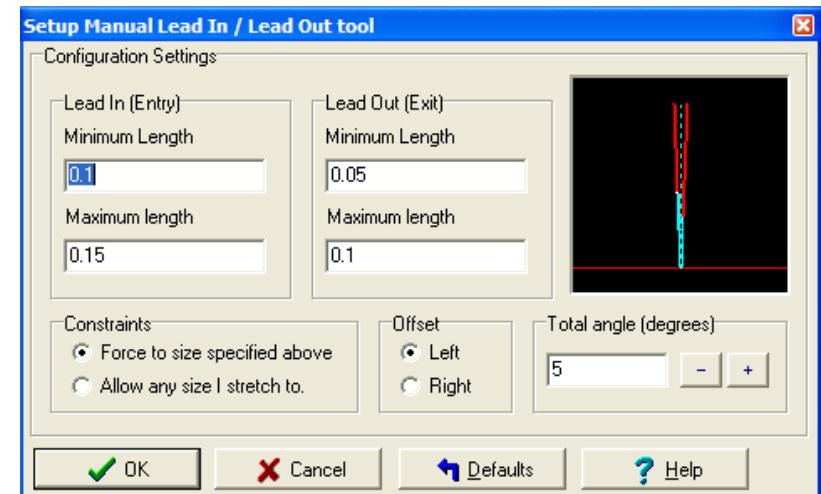


Step 4: Add the Nozzle Path to the Drawing



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



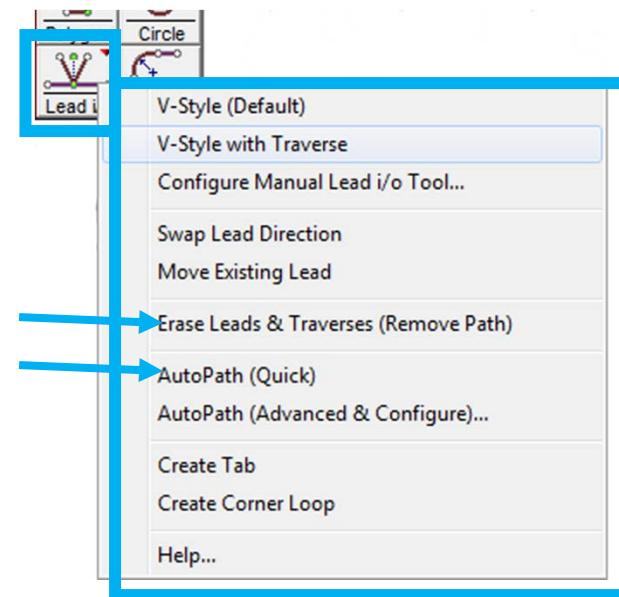
Step 4: Add the Nozzle Path to the Drawing



Automated Lead i/o tools

Exercise

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



Keyword “autopath”

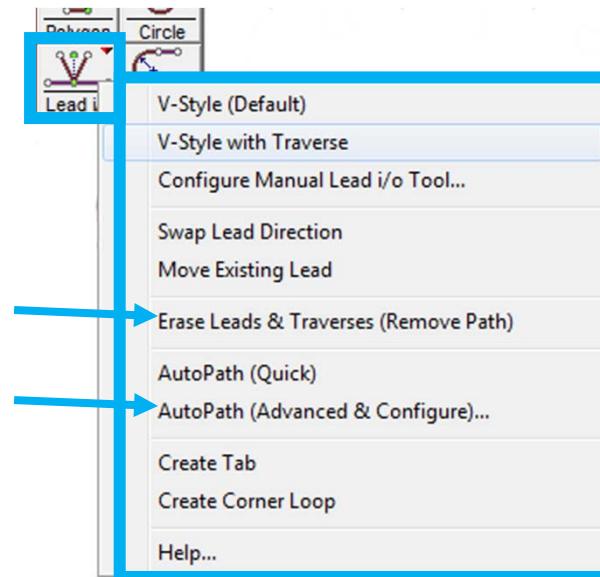
Step 4: Add the Nozzle Path to the Drawing



Automated Lead i/o tools

Exercise

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

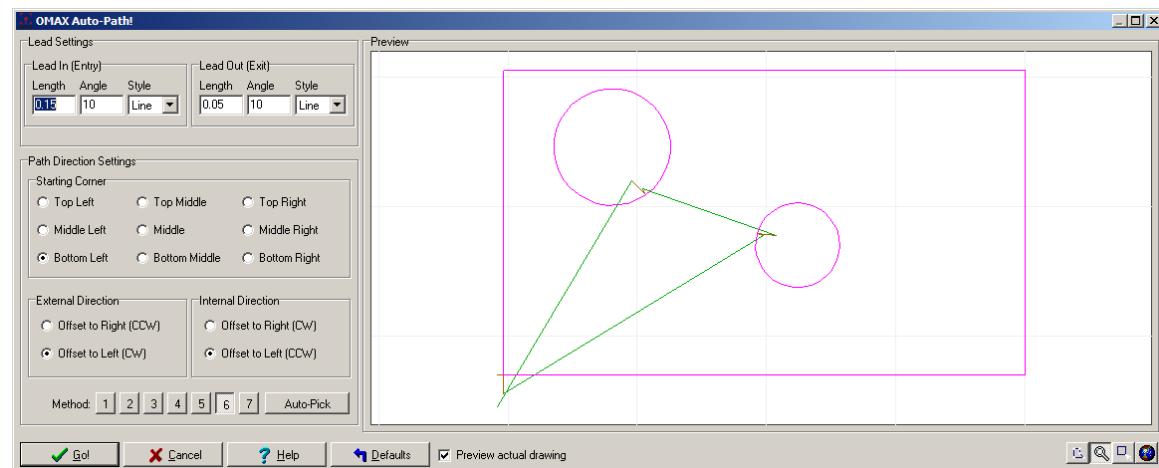


Step 4: Add the Nozzle Path to the Drawing

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Automated Lead i/o tools AutoPath Advanced & Configure command

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



Keyword “autopath”

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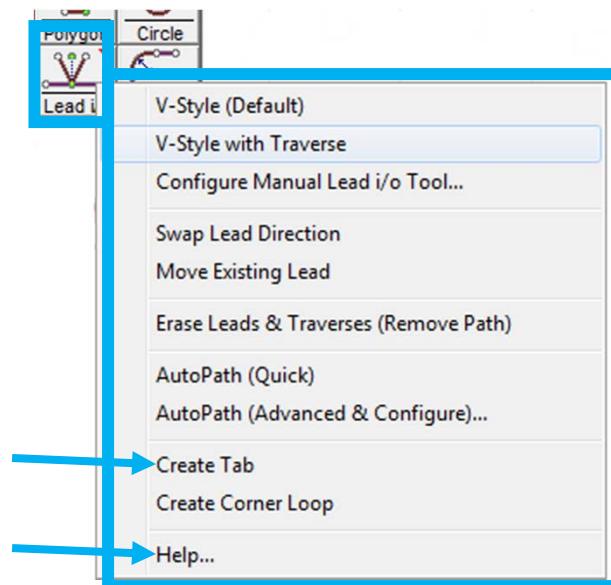
Step 4: Add the Nozzle Path to the Drawing



Create Tab

Exercise

- *Add a tab to the existing drawing using the Create Tab command*
- *Access Tab Help*



Keyword "tab"

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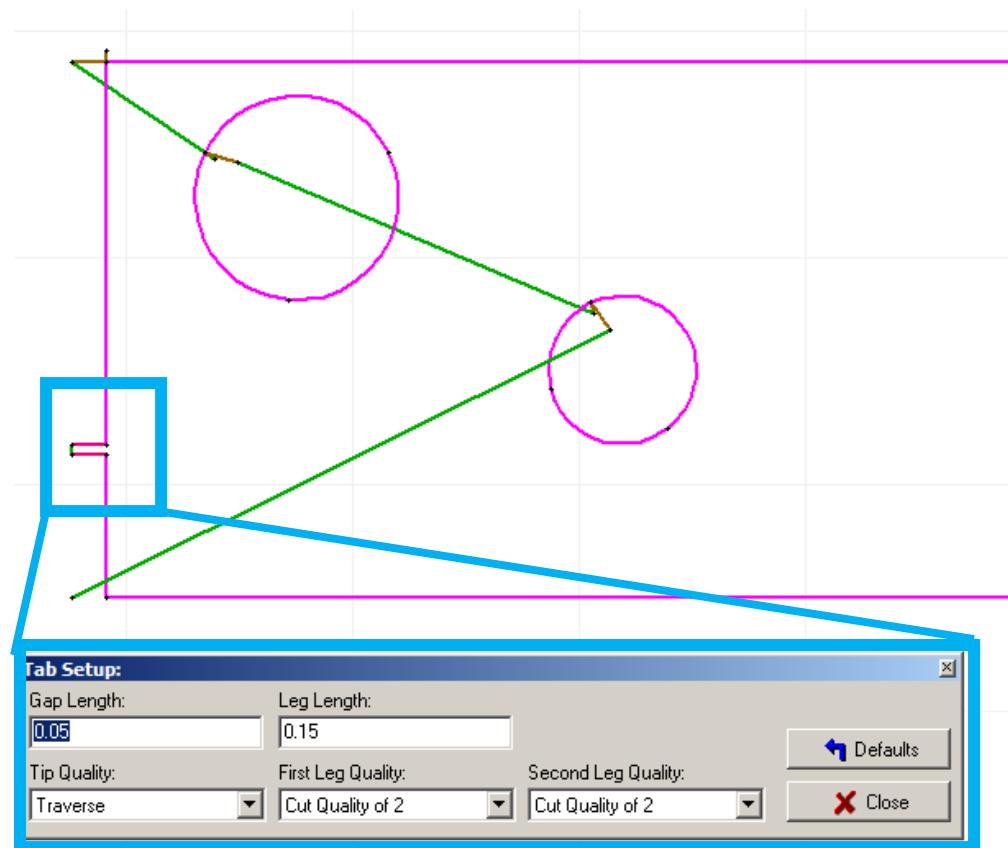
144

Step 4: Add the Nozzle Path to the Drawing

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Create Tab

- **Gap Length**
- **Leg Length**
- **Tip Quality**
- Leg quality



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Step 4: Add the Nozzle Path to the Drawing



Review Exercise

- *Step 1: Create a new drawing from scratch using Layout (create the DXF file)*
- *Step 2: Assign machining qualities to the entities in the drawing*
- *Step 3: Clean and Save the drawing*
- *Step 4: Add path elements using the automatic pathing tools*



Step 4: Add the Nozzle Path to the Drawing



Review

1. Which of the following items are considered part of the nozzle travel path?
 - a. Traverses
 - b. Lead ins and Lead outs
 - c. Part geometry
 - d. All of the above
2. Which Layout tool do we use to add our V-style lead ins and lead outs with?
 - a. Line
 - b. V
 - c. Tab
 - d. Lead i/o



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Step 4: Add the Nozzle Path to the Drawing



3. On internal geometry, we want to pierce and cut on which side of the geometry?
 - a. Inside
 - b. Outside
 - c. It depends on the part
4. What is one lead in/out tool that lets you easily fix a path that is traveling in the wrong direction?
 - a. V-Style or V-Style with Traverse
 - b. AutoPath Quick
 - c. AutoPath Advanced & Configure
 - d. Swap Lead Direction



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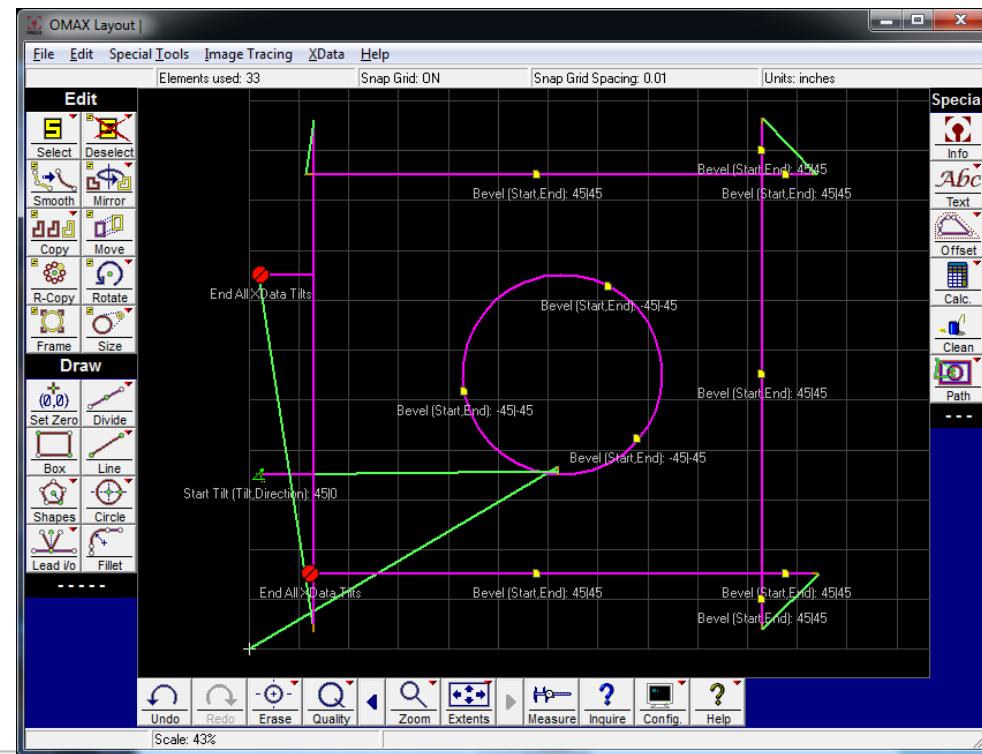


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Step 4: Add XData to the Path



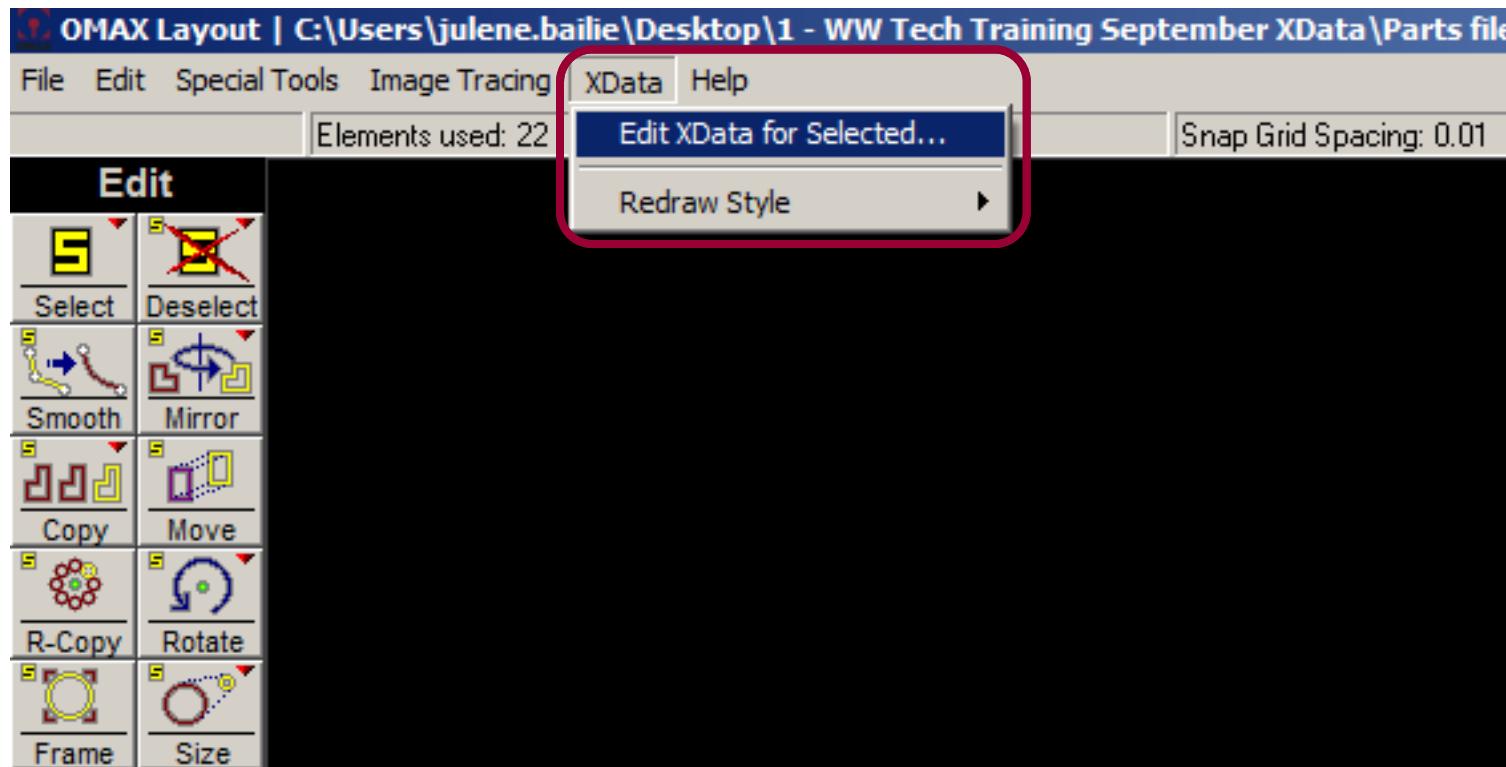
- XData is eXtra Data that can be assigned to entities in **Layout** to command specific actions in the tool path



Step 4: Add XData to the Path



- The **XData** menu is on the main menu



Step 4: Add XData to the Path

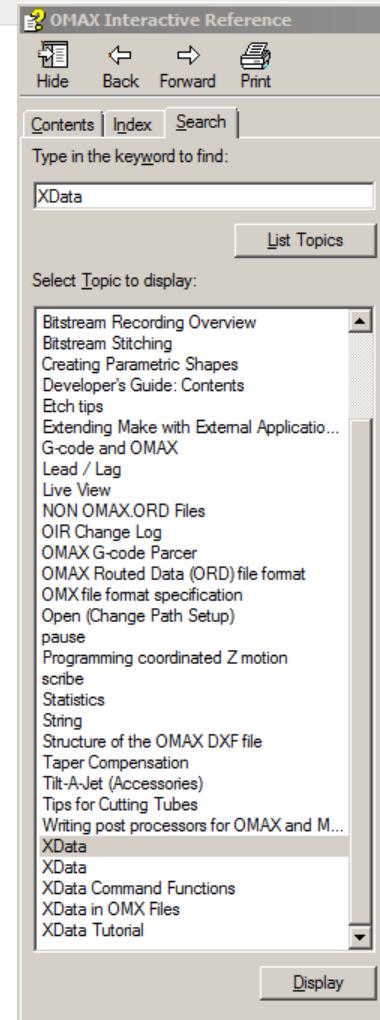
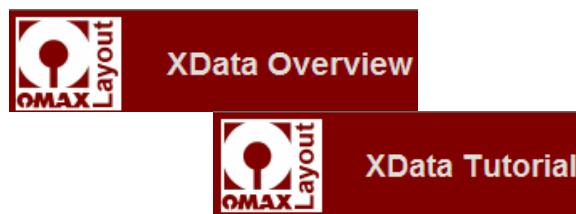


- Examples of how XData is used
 - Add pause points
 - Add a comment to an entity
 - Specify a different cut speed for an entity/entities
 - Command rotary axis movement
 - Specify nozzle tilt
 - and more...

Step 4: Add XData to the Path



- Prerequisites for using XData
 - Understand how the XData command is designed to work prior to using it
 - Consult the OMAX Interactive Reference (OIR)



Step 4: Common XData Commands



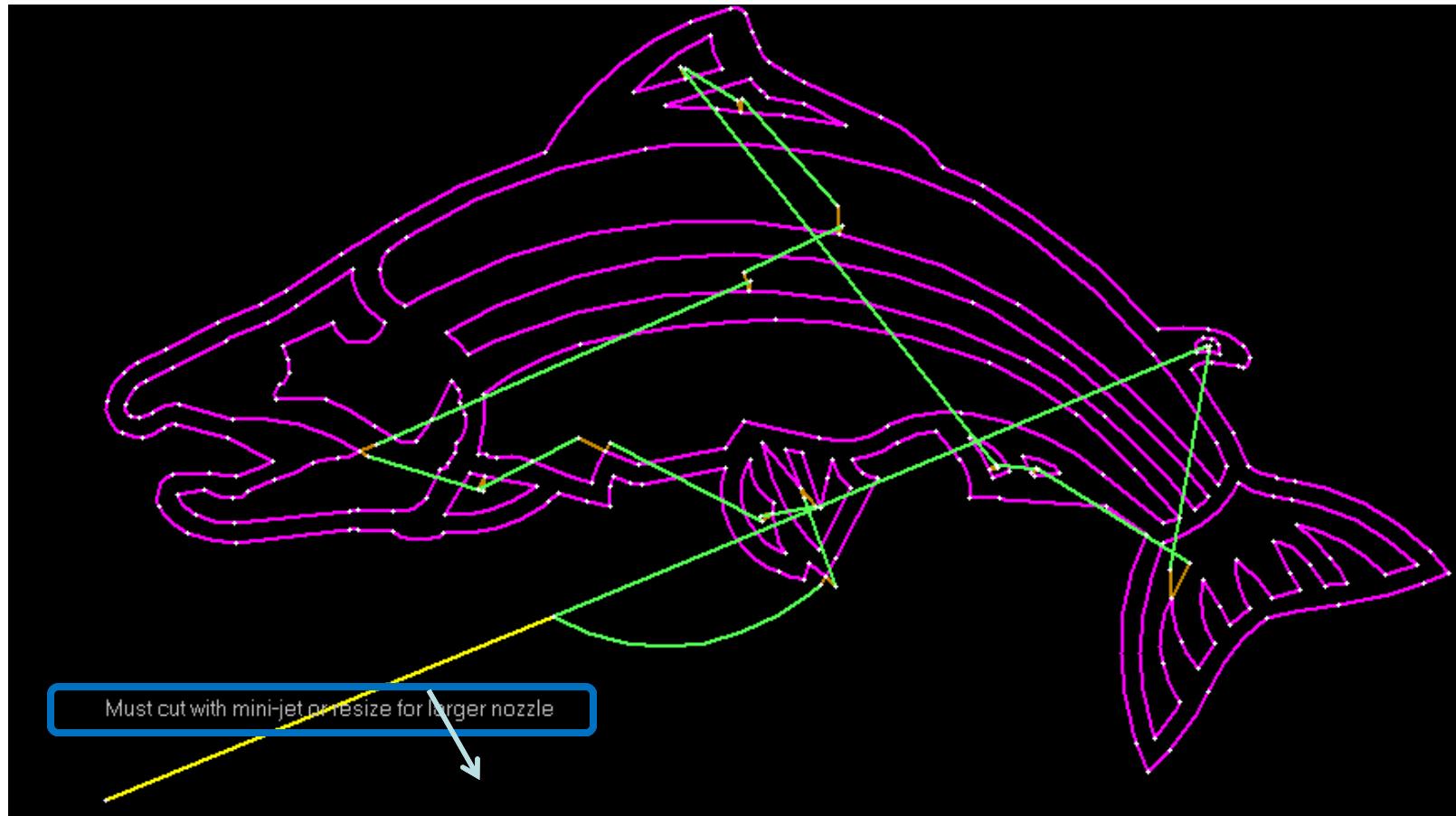
- [002] – Comment on Entity
 - Allows a comment to display on entities in the **Layout** drawing or tool path

Comments and Text Attributes

[002] –  Comment on Entity



Step 4: XData – Comment on Entity Example



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



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

Z-Axis Commands

[019] – Move Z



See the OIR for warnings related to using this command

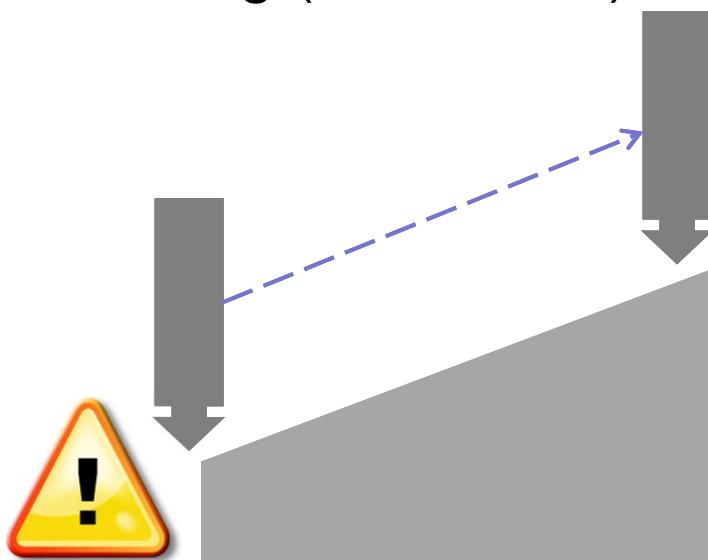


Step 4: Z-Axis movement comparison



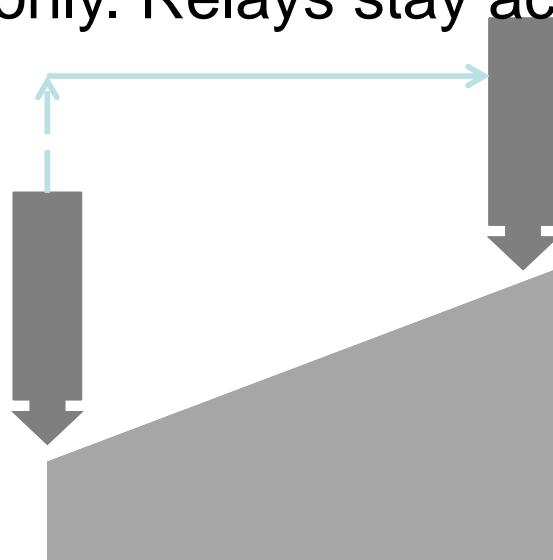
Z movement if programmed
with the 3D Path Editor

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

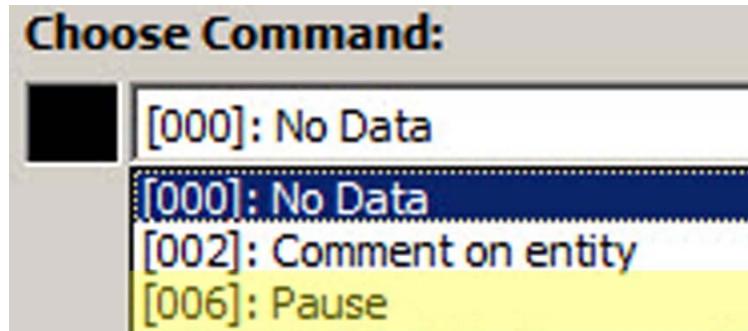


Step 4: XData Speed and Pause Commands



- [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 warnings related to using this command



XData Command



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



Steps in Making Parts



• Intelli-MAX Layout

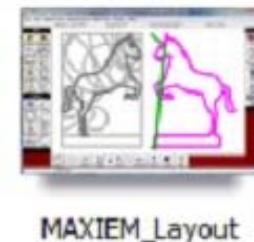
Step 1: Obtain/create a Drawing File (DXF file).

Step 2: Assign machining Qualities (edge finish).

Step 3: Clean and save the drawing.

Step 4: Add Path Elements to the drawing and save it.

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



MAXIEM_Layout

• 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.

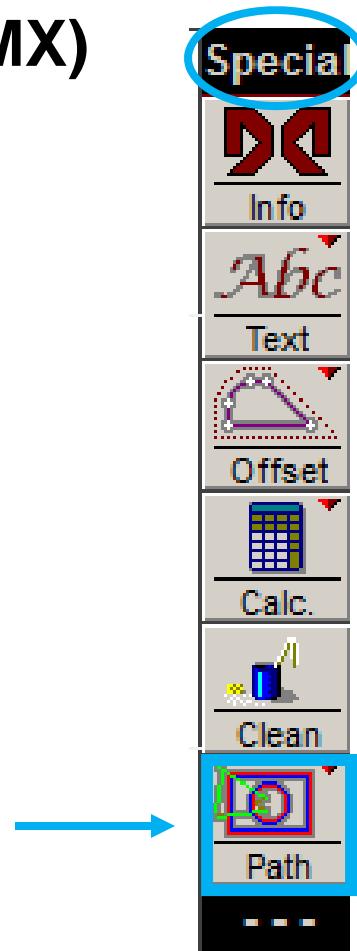


Step 5: Create the Machine Tool Path File



Steps to Create the Machine File (ORD/OMX)

- Open a saved DXF drawing file
- Run the **Path** tool
 - Perform quality checks
- **Save** as an ORD or an OMX file



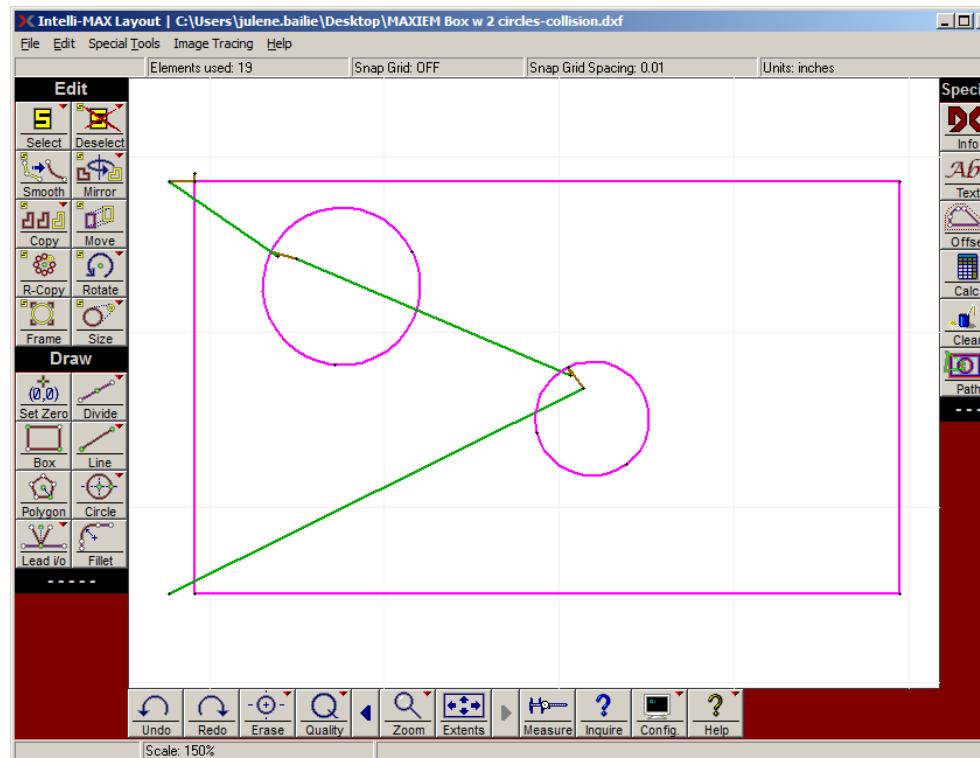
Keywords “clean, path”

Step 5: Create the Machine Tool Path File



Creating the Machine File (ORD/OMX)

- Task 1: Open a saved DXF drawing file



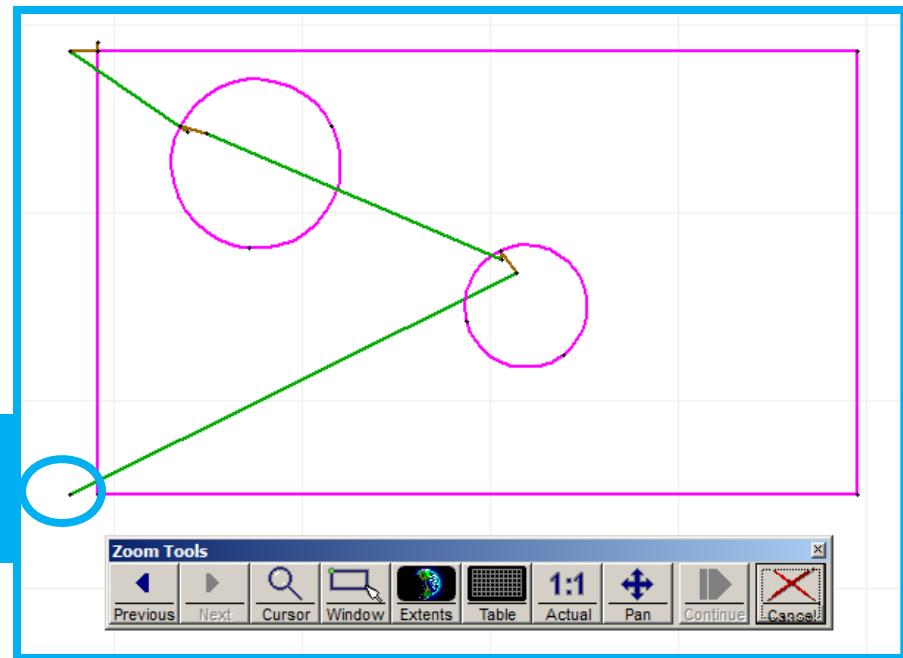
Step 5: Create the Machine Tool Path File



Creating the Machine File (ORD/OMX)

- Task 2: Click the **Path** tool
 - **Zoom Tools** opens
 - Select start point

start point
(disconnected end)



Step 5: Create the Machine Tool Path File



Creating the Machine File (ORD/OMX) Exercise

- *Click to open the **Path** tool in the test box.dxf drawing (click for default tool)*
- *Place the **Pick Start** pointer at a path end, and click to display the **Path** preview window*



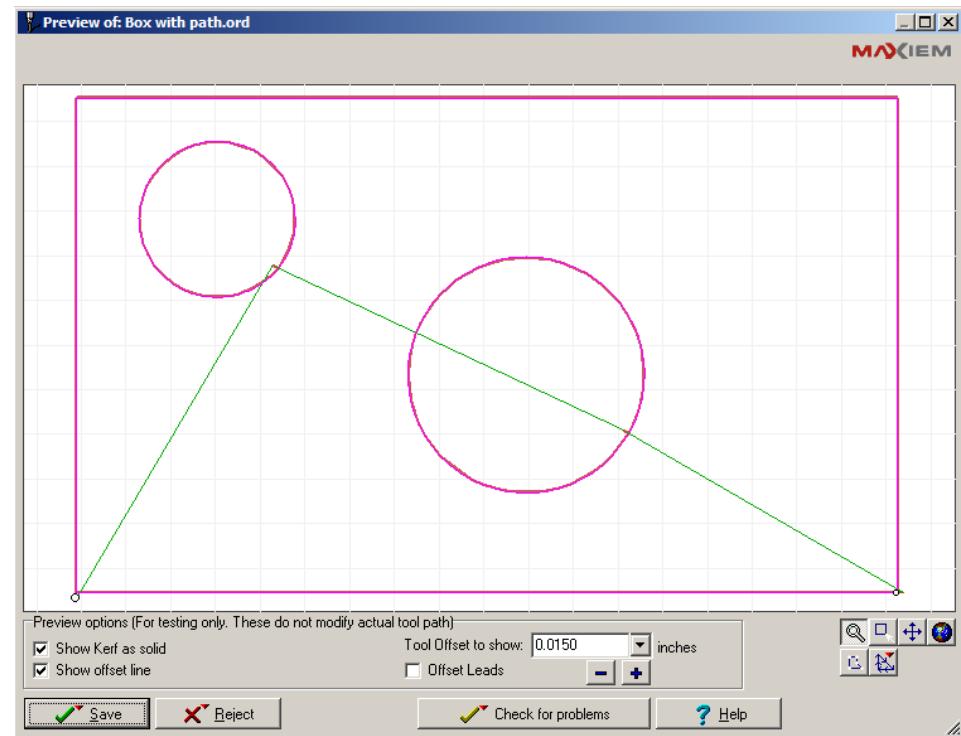
Step 5: Create the Machine Tool Path File

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Creating the Machine File (ORD/OMX)

Path preview window

Shows the converted DXF file in the Path preview window



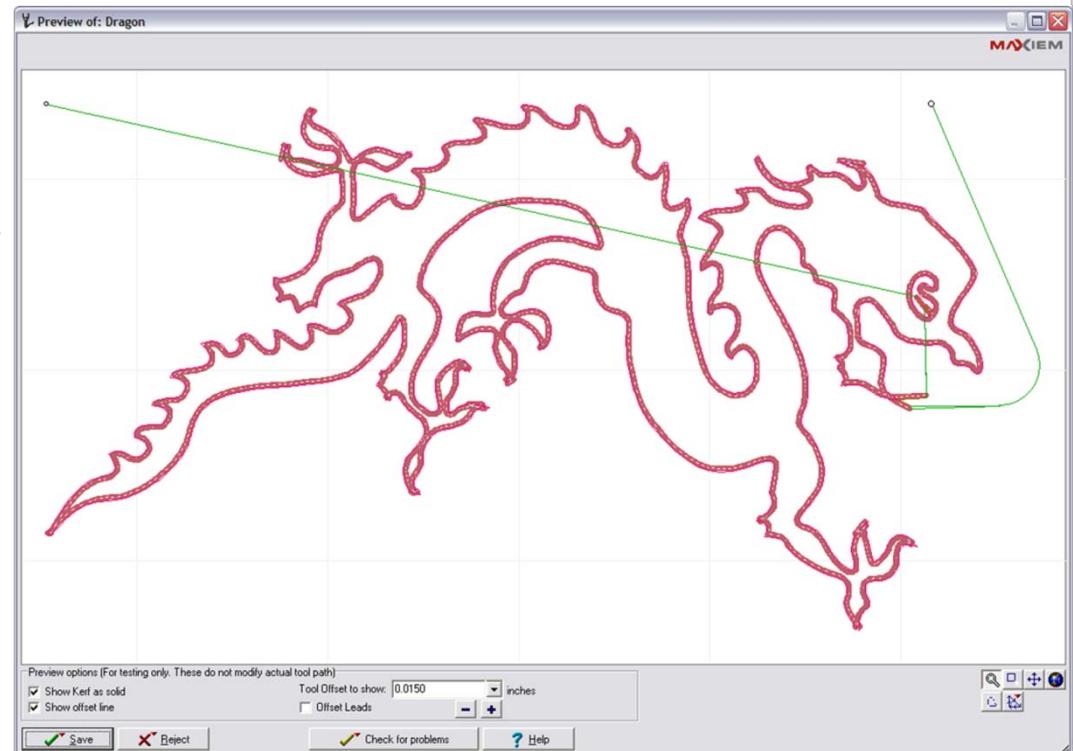
DC
MAXiem
WATERJETS

Step 5: Create the Machine Tool Path File

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ORD Preview Window Quality Checks

- Identify path errors
- Verify tool offset
- Check for collisions



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Step 5: Create the Machine Tool Path File



Creating the Machine File (ORD file)

Exercise

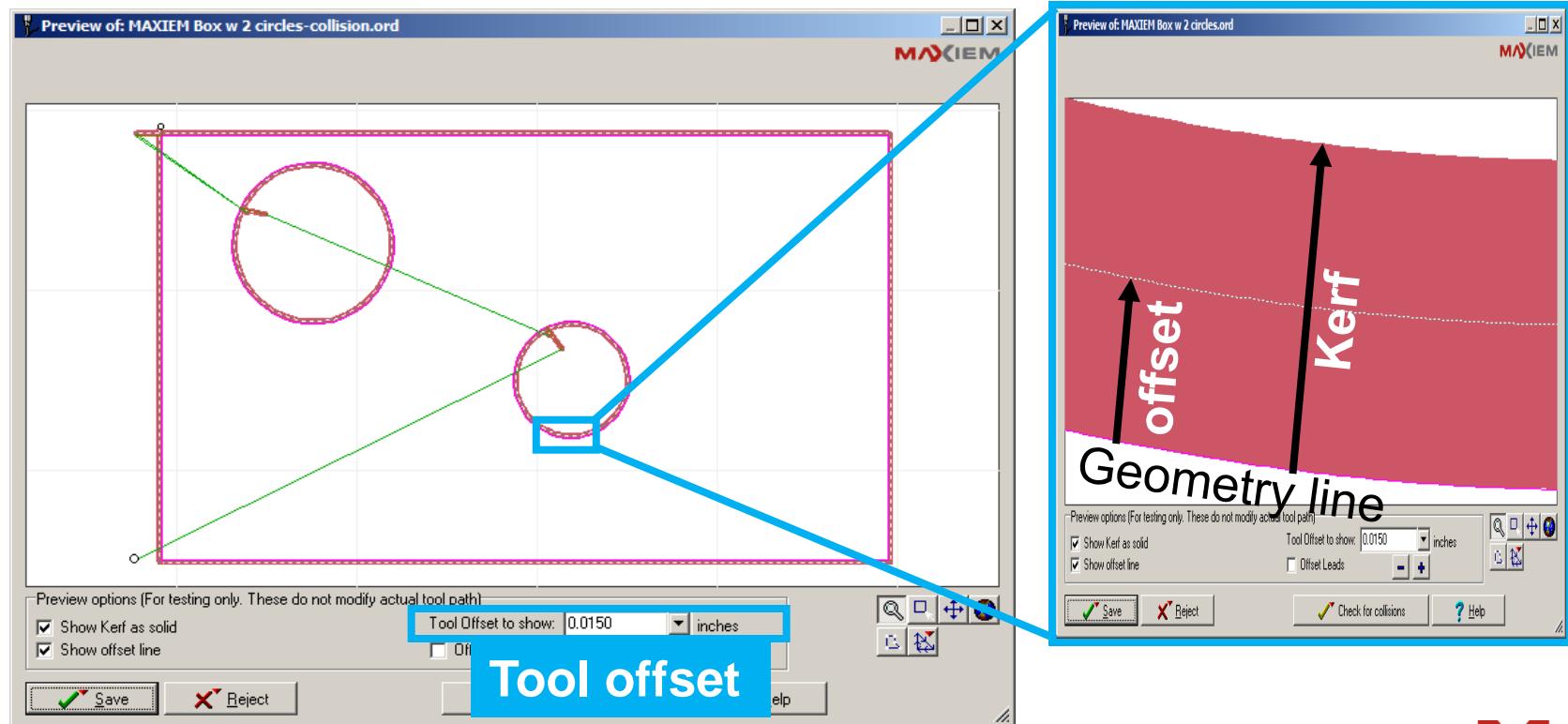
- *Run the **Path** tool*
- *In the Path preview window show and discuss each of the following quality checks:*
 - *Verify **tool offset** (using arrows, kerf, and tool offset settings)*
 - *Check for problems*



Step 5: Create the Machine Tool Path File



Perform Quality Checks in Path Preview



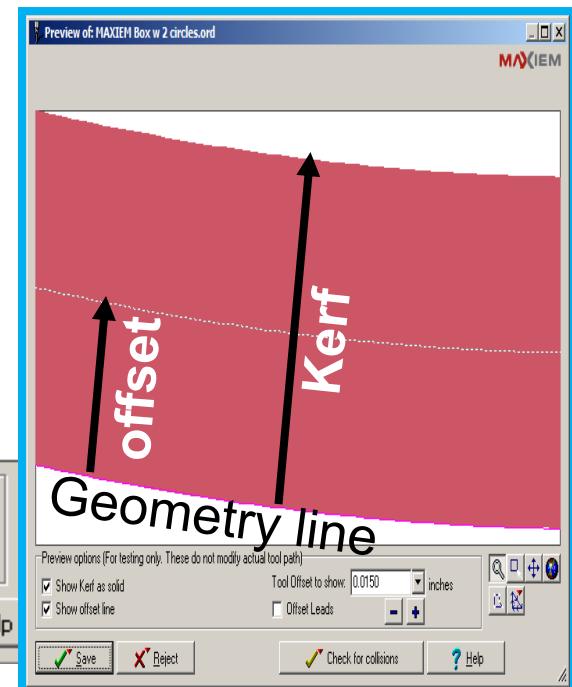
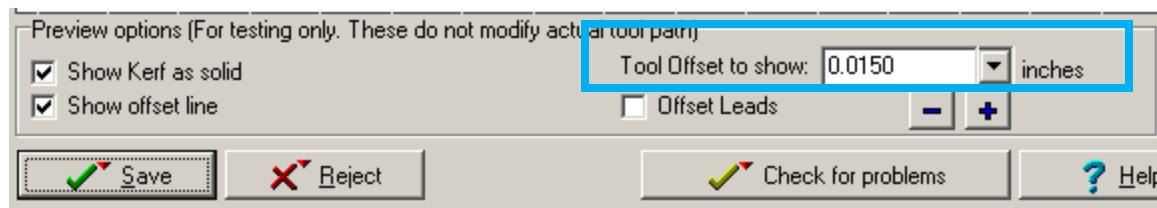
Step 5: Create the Machine Tool Path File



Perform Quality Checks in Path Preview

Exercise

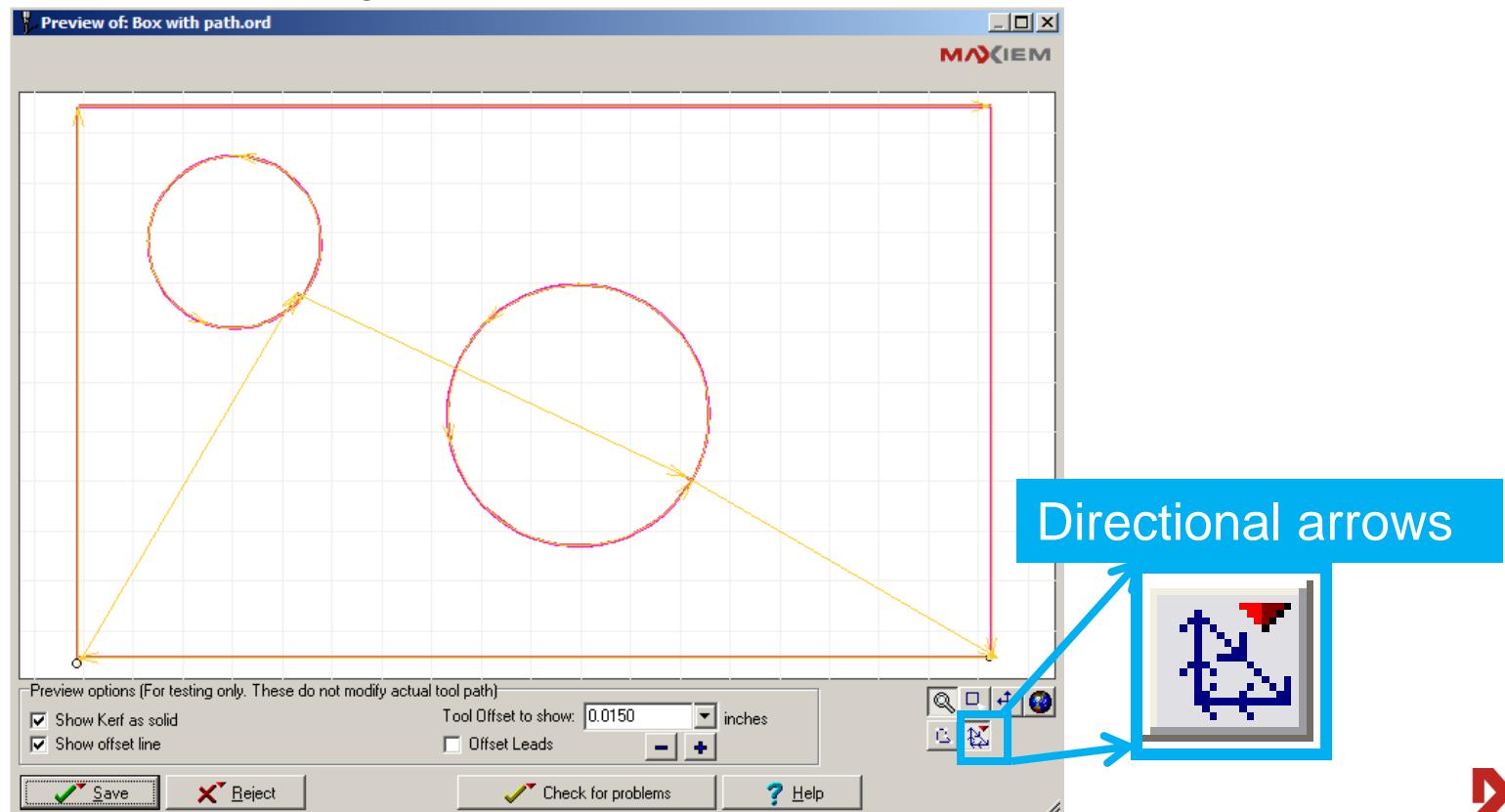
*Run the **Path** tool and check the
Tool Offset*



Step 5: Create the Machine Tool Path File

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Perform Quality Checks in Path Preview



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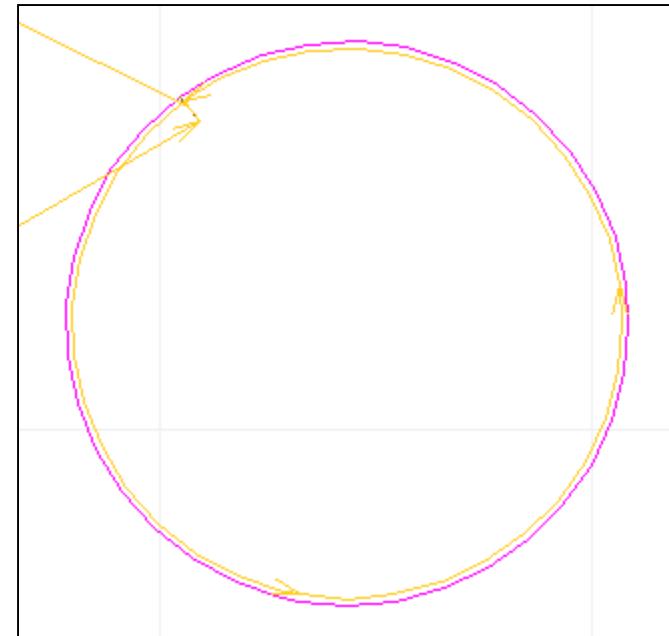
Step 5: Create the Machine Tool Path File



Perform Quality Checks in Path Preview

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

- a. Clockwise
- b. counterclockwise



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Step 5: Create the Machine Tool Path File

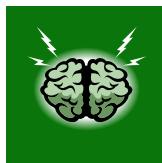
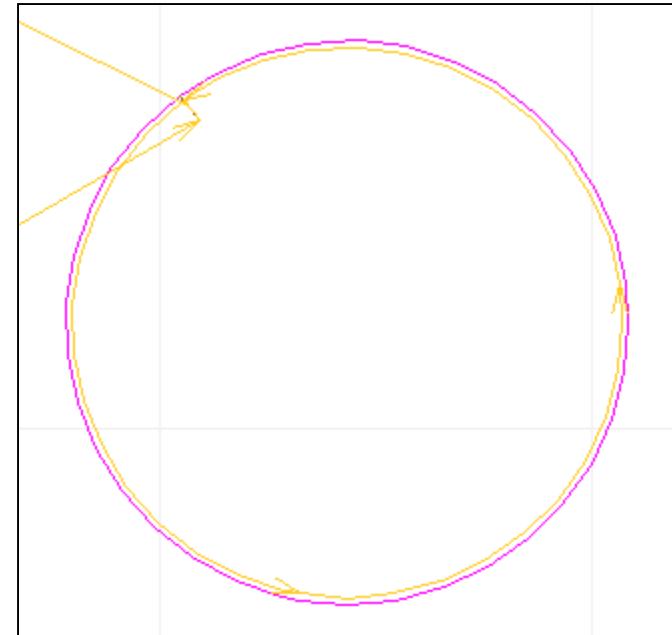


Perform Quality Checks in Path Preview

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

Exercise

- *Run the Path tool*
- *Run the Arrow tool*
- *Discuss the benefits of this tool*

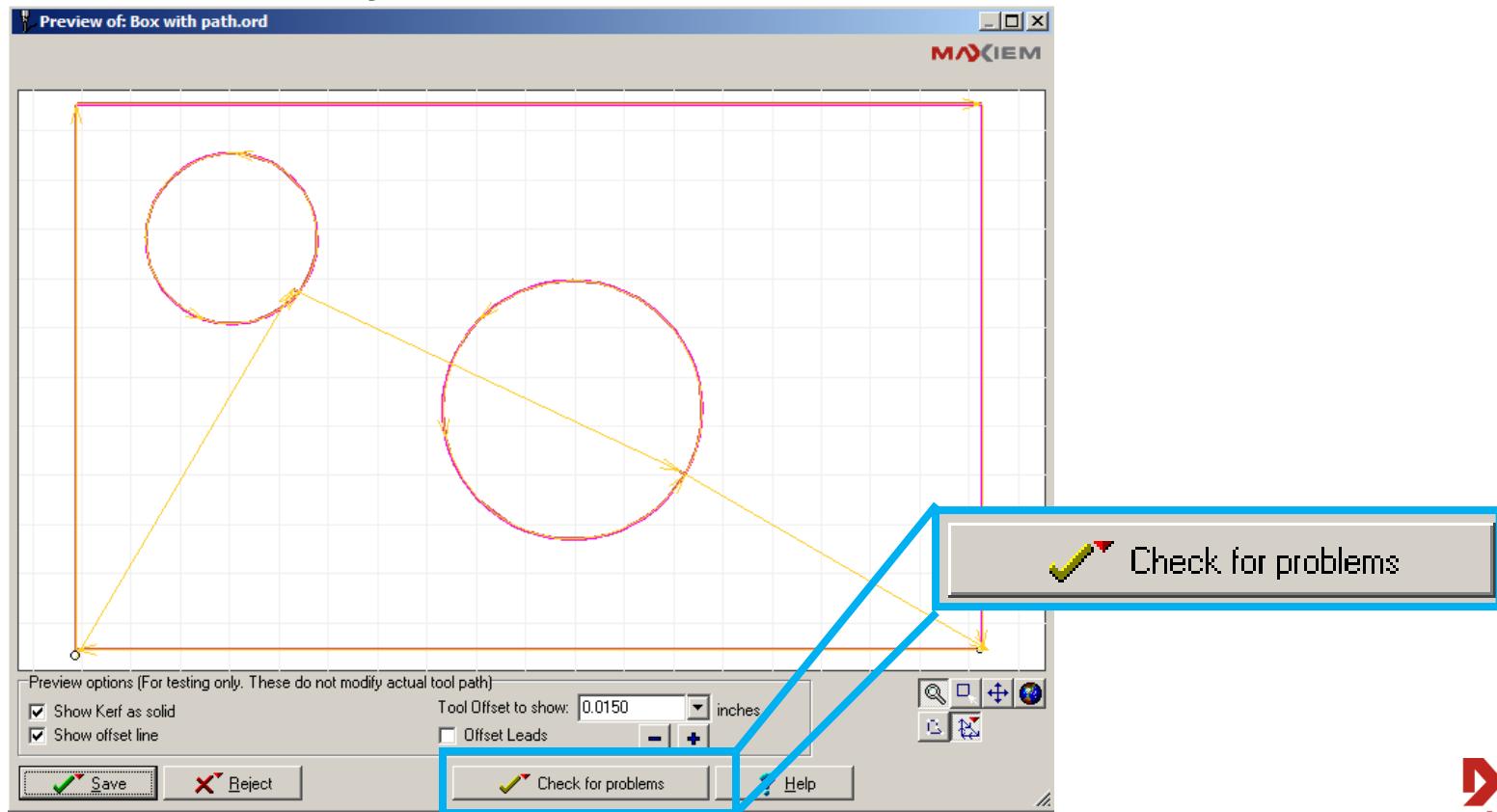


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Step 5: Create the Machine Tool Path File

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Perform Quality Checks in Path Preview



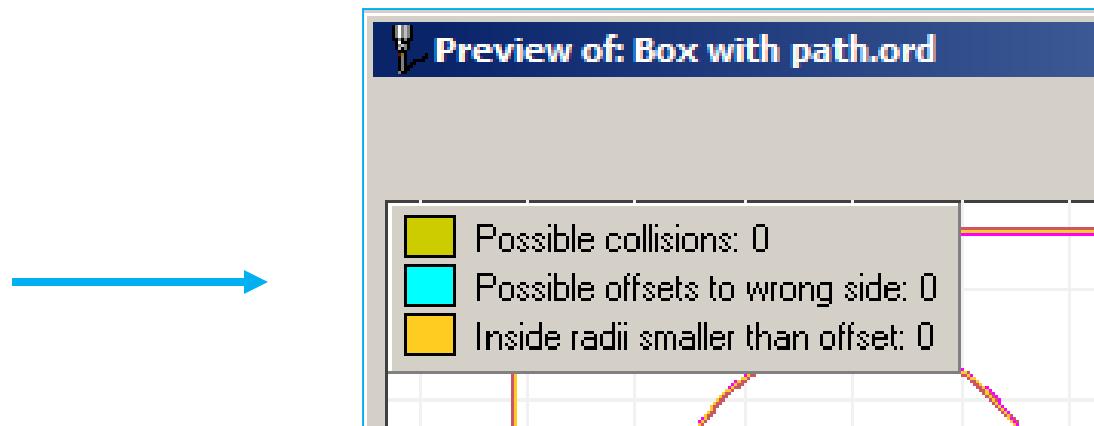
DC
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Step 5: Create the Machine Tool Path File



Demonstration

- Run the **Path** tool on a known good part (no problems)
- Click **Check for problems**



Keyword “collision”

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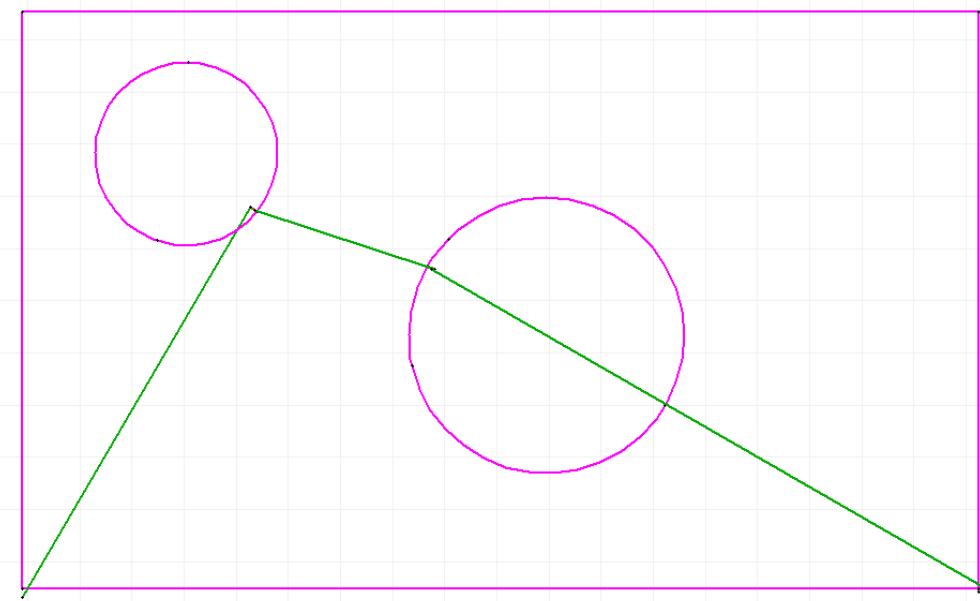
174

Step 5: Create the Machine Tool Path File



Demonstration

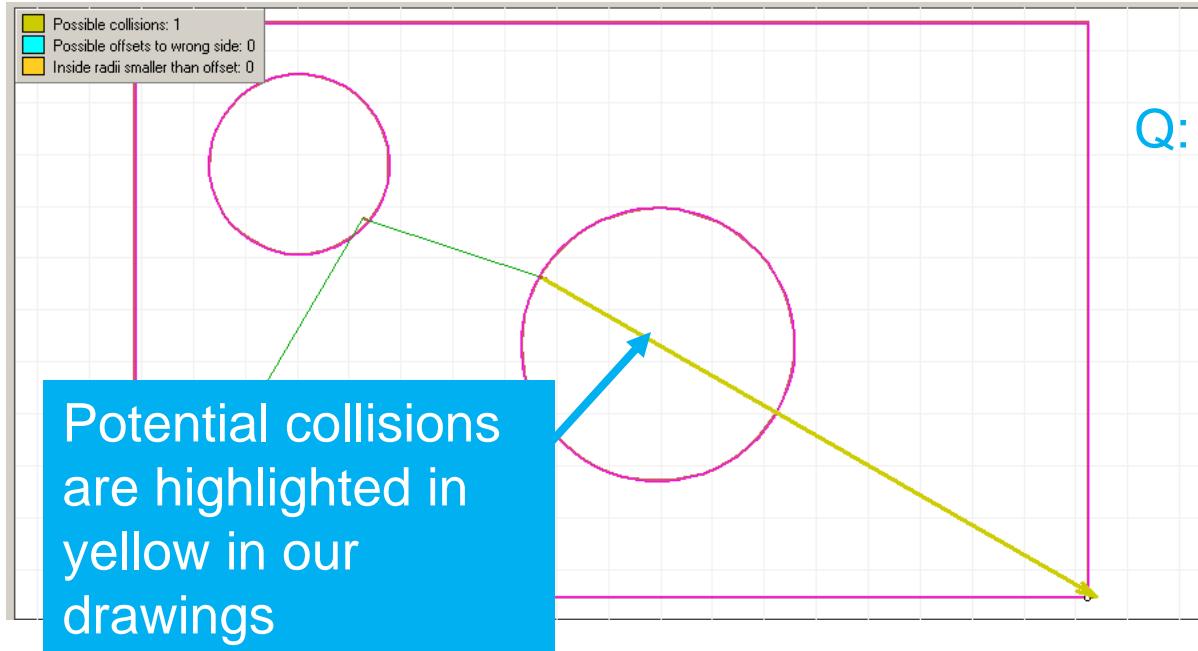
- *Run the **Path** tool on a DXF file that has a potential collision point*
- *Click **Check for problems***



Step 5: Create the Machine Tool Path File



Perform Quality Checks in Preview



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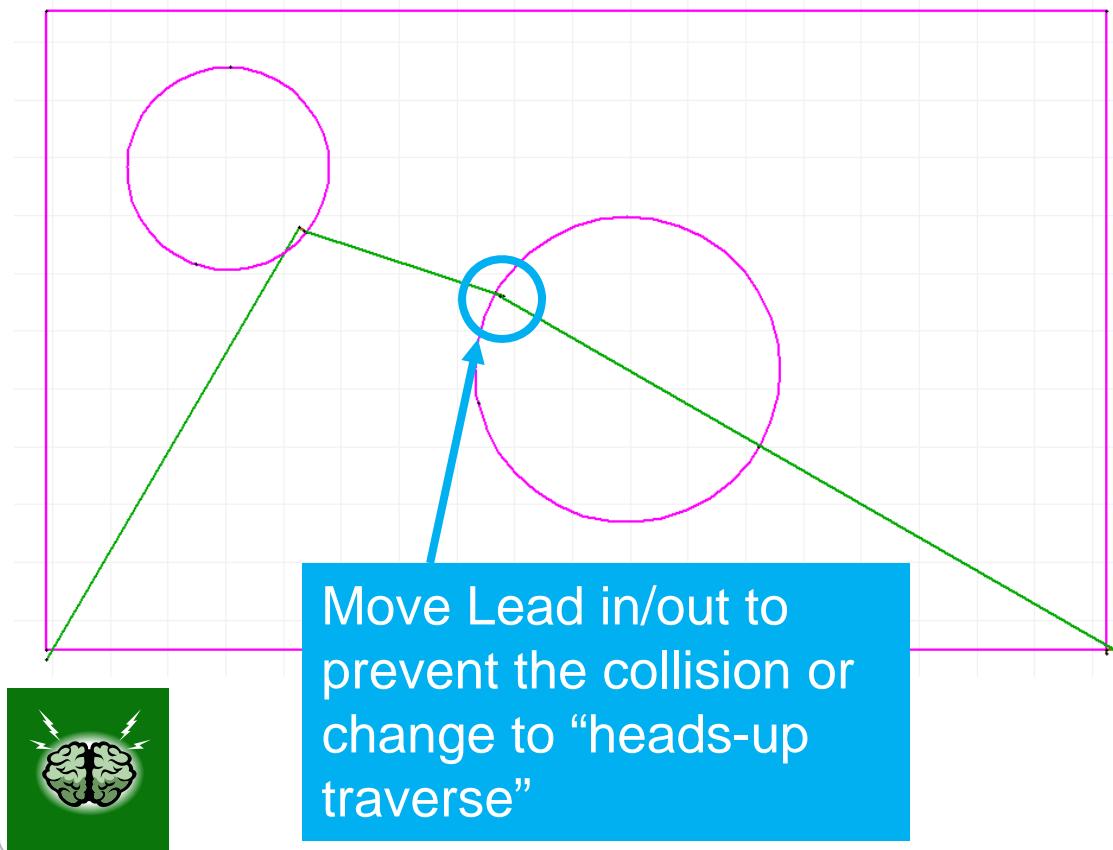


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Step 5: Create the Machine Tool Path File



Perform Quality Checks in Preview



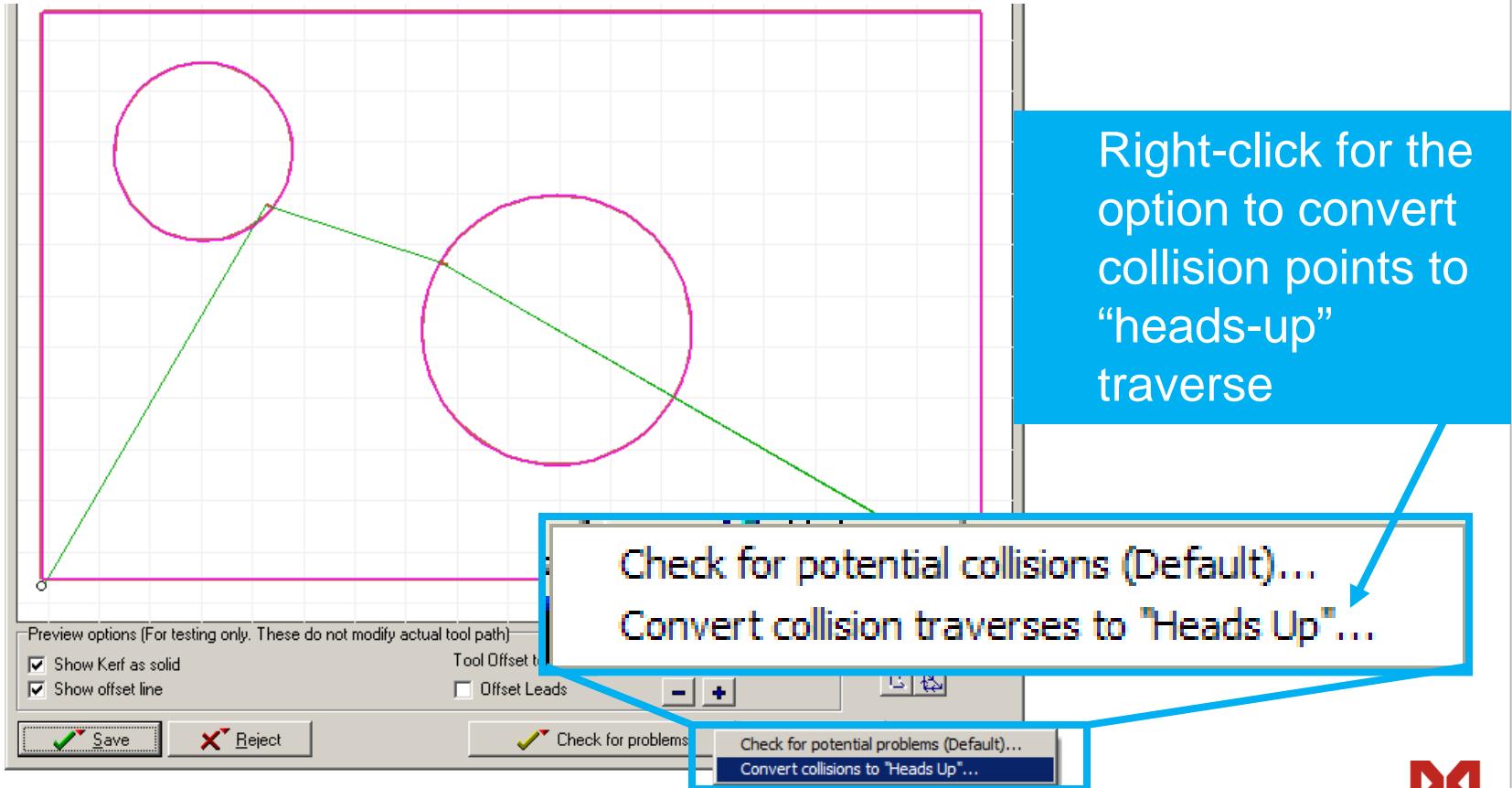
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- A: To avoid or fix potential collision points you can:
- Fix the DXF drawing by moving the lead in/out point
 - Change the entity to a “heads-up traverse” quality

Step 5: Create the Machine Tool Path File

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Perform Quality Checks in Preview



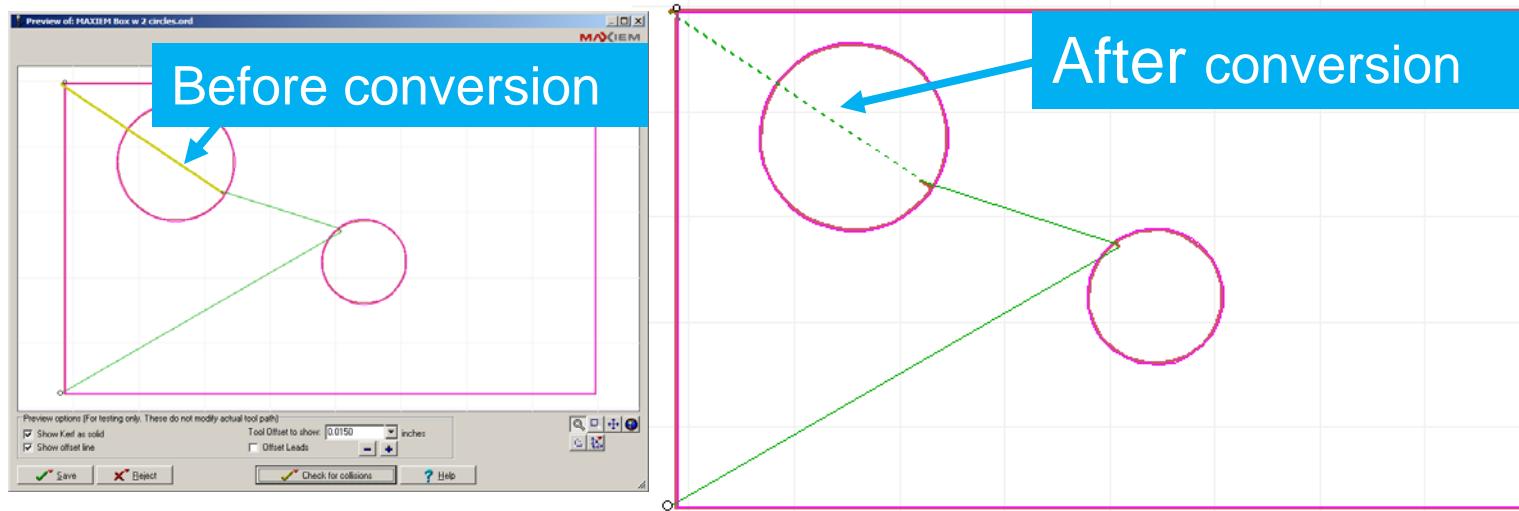
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Step 5: Create the Machine Tool Path File

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Exercise

- Run the **Path** tool on a **DXF** file that has a potential collision point
- Click **Check for problems**
- Convert the potential collision to a “**heads-up traverse**”

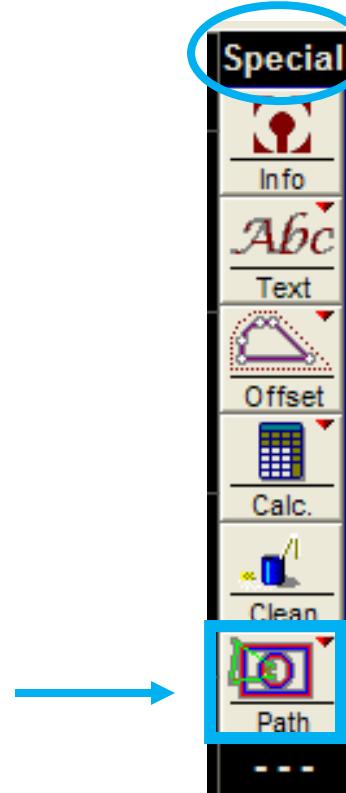


Step 5: Create the Machine Tool Path File



Create the Machine File (ORD/OMX)

- Open a saved DXF drawing file
- Run the **Path** tool
 - Perform quality checks
- **Save** the ORD file or save as an OMX file



Keyword “path”

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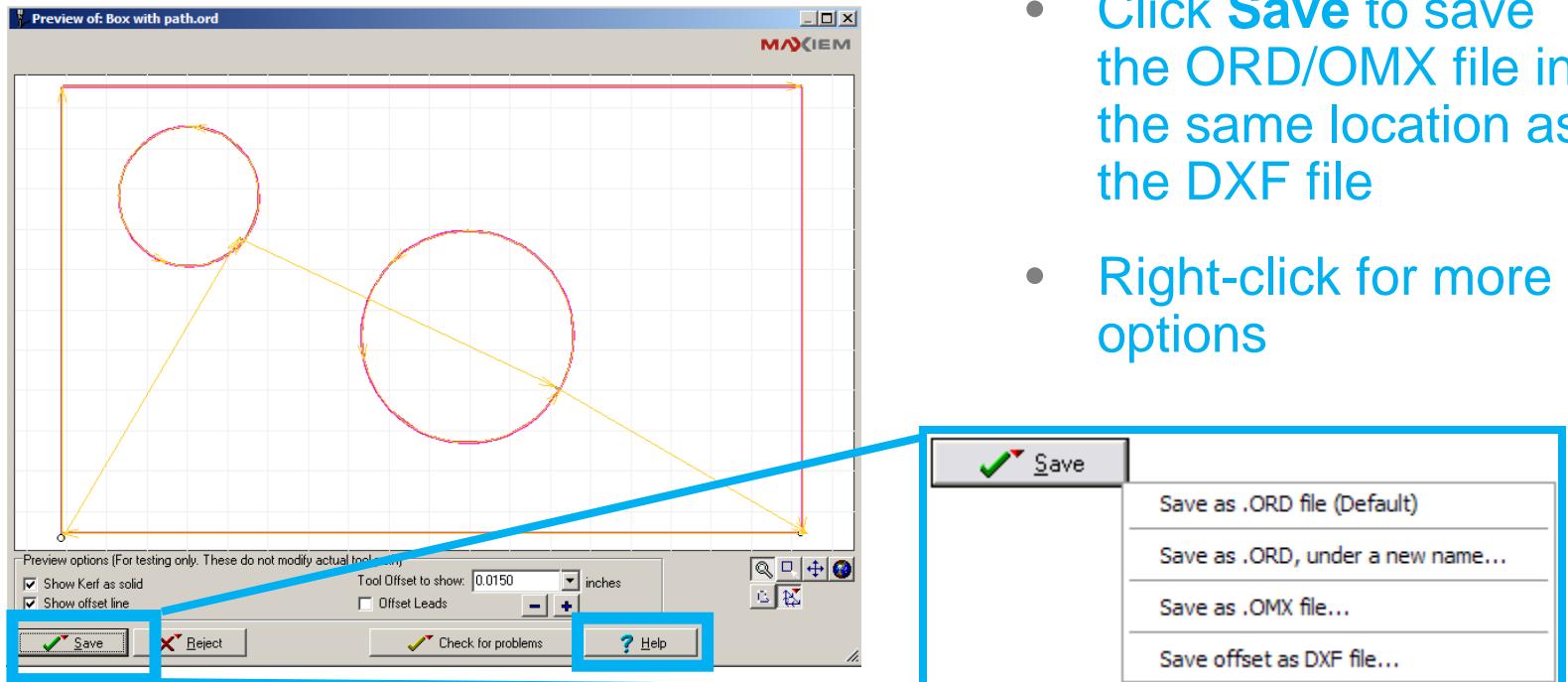
180

Step 5: Create the Machine Tool Path File



Create the Machine File (ORD/OMX)

- Save the file from the Path preview window



Keywords "Save, Path"

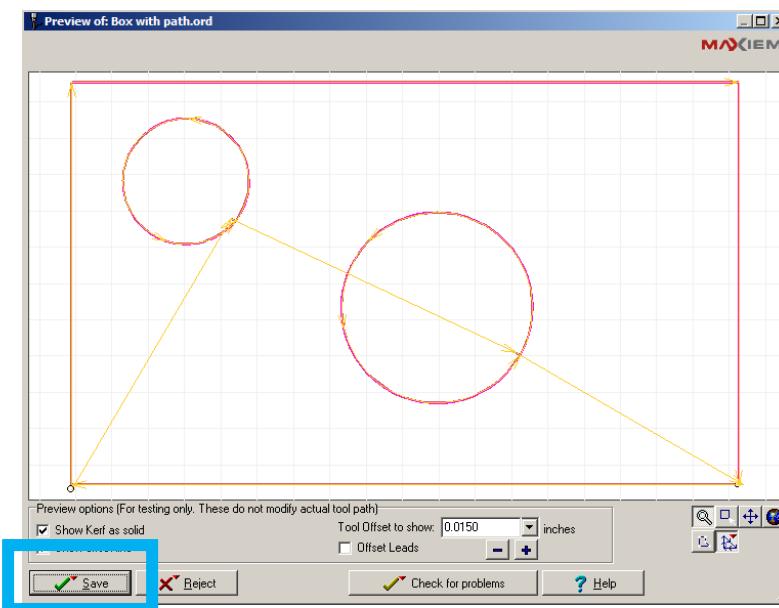
Step 5: Create the Machine Tool Path File



Create the Machine File (ORD/OMX)

Exercise

- *Run the Path tool*
- *Click Save to save the ORD or OMX file in same location as the DXF file*



Step 5: Create the Machine Tool Path File



Create the Machine File ORD or OMX file)

Exercise

- *Look at the DXF and ORD or OMX file icons you created in the previous steps*



MAXIEM_FileType_DXF



MAXIEM_FileType_ORD



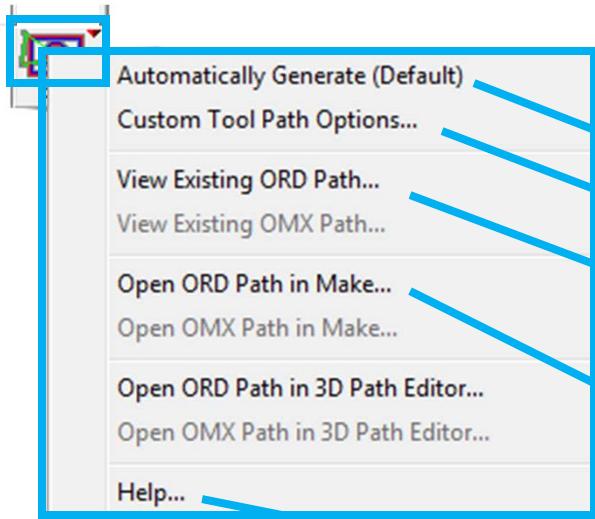
MAXIEM_FileType_OMX.ico



Step 5: Create the Machine Tool Path File



Create the Machine File (ORD or OMX file)



Path tool options

- Default path tool
- Use with caution
- Displays the machine path after it has been saved
- Opens the machine file in **Make**
- Help on using **Path tools**

Steps involved in making parts



Review Steps 1-5

Exercise

- *Step 1: Create a new drawing from scratch using Layout (create a DXF file)*
- *Step 2: Assign machining qualities to the entities in the drawing*
- *Step 3: Clean and Save the DXF file*
- *Step 4: Add a nozzle path using the automatic pathing tools*
- *Step 5: Run the Path tool, check for problems, and save the ORD or OMX file*



Step 5: Create the Machine Tool Path File



Machine Path Review

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



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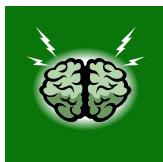
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Step 5: Create the Machine Tool Path File



Machine Path Review

3. Which of the following are quality checks you should perform when previewing your part in the path preview window?
 - a. Check the tool offset
 - b. Check for problems
 - c. All of the above
 - d. None of the above
4. What are the three main tasks to do in Step 5 of our process, creating the machine tool path
 1. _____
 2. _____
 3. _____



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Additional Features in Layout



Other Tools in Layout

- Image Tracing – capability to manually or automatically trace pixilated images
- Text Tools – capability to create text in drawings

Demonstration

- Show how to use the **Intelli-Trace** automatic tracing tool
- Show how to use the **Text** tool



Keywords “Tracing, Text”



Activities



Activities

1. Create a new DXF file, or use the one you created previously
2. Add Machining Qualities to the drawing using the **Layout Quality** tools
3. Add a nozzle path using one of the Lead i/o tools (you can use one of the automated tools)
4. Save the DXF drawing
5. Run the **Clean** tool on the DXF file. Fix any issues if needed
6. Run the **Path** tool to convert your file to an ORD or OMX preview file



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Activities



7. Perform the following quality checks on the file in Path preview
 - a. Check the tool offset
 - b. Check for problems
 - c. Use the directional arrows to verify your nozzle is cutting on the correct side of each of the geometries in your drawing
8. Save the ORD or OMX file



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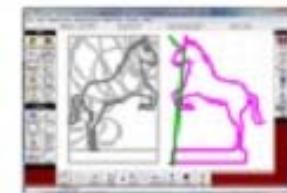


Steps in Making Parts



• Intelli-MAX Layout

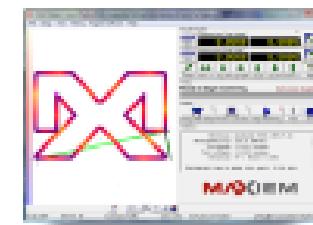
- Step 1:** Obtain/create a Drawing File (DXF file).
- Step 2:** Assign machining Qualities (edge finish).
- Step 3:** Clean and save the drawing.
- Step 4:** Add Path Elements to the drawing and save it.
- Step 5:** Create the Machine Tool Path file (ORD/OMX file).



MAXIEM_Layout

• 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.



MAXIEM_Make

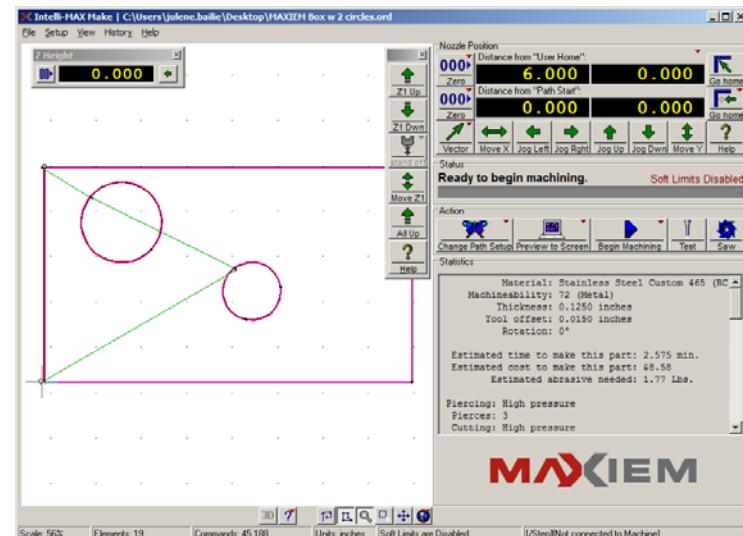


Introduction to Make Standard



Intelli-MAX Make Standard

- Controls the movement and actions of the MAXIEM abrasive waterjet
- The controller sends the motor control commands that move the nozzle and control the timing of abrasive and high-pressure water events



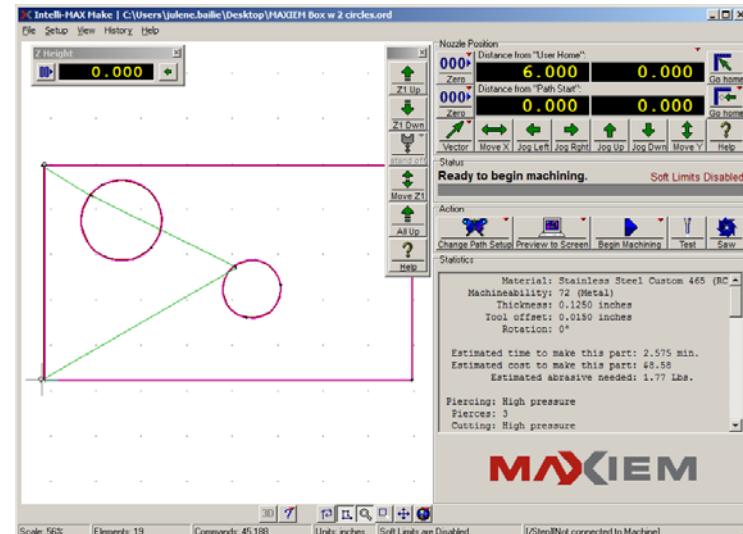
Keywords “**Make Help Contents**”

Introduction to Make Standard



Make also

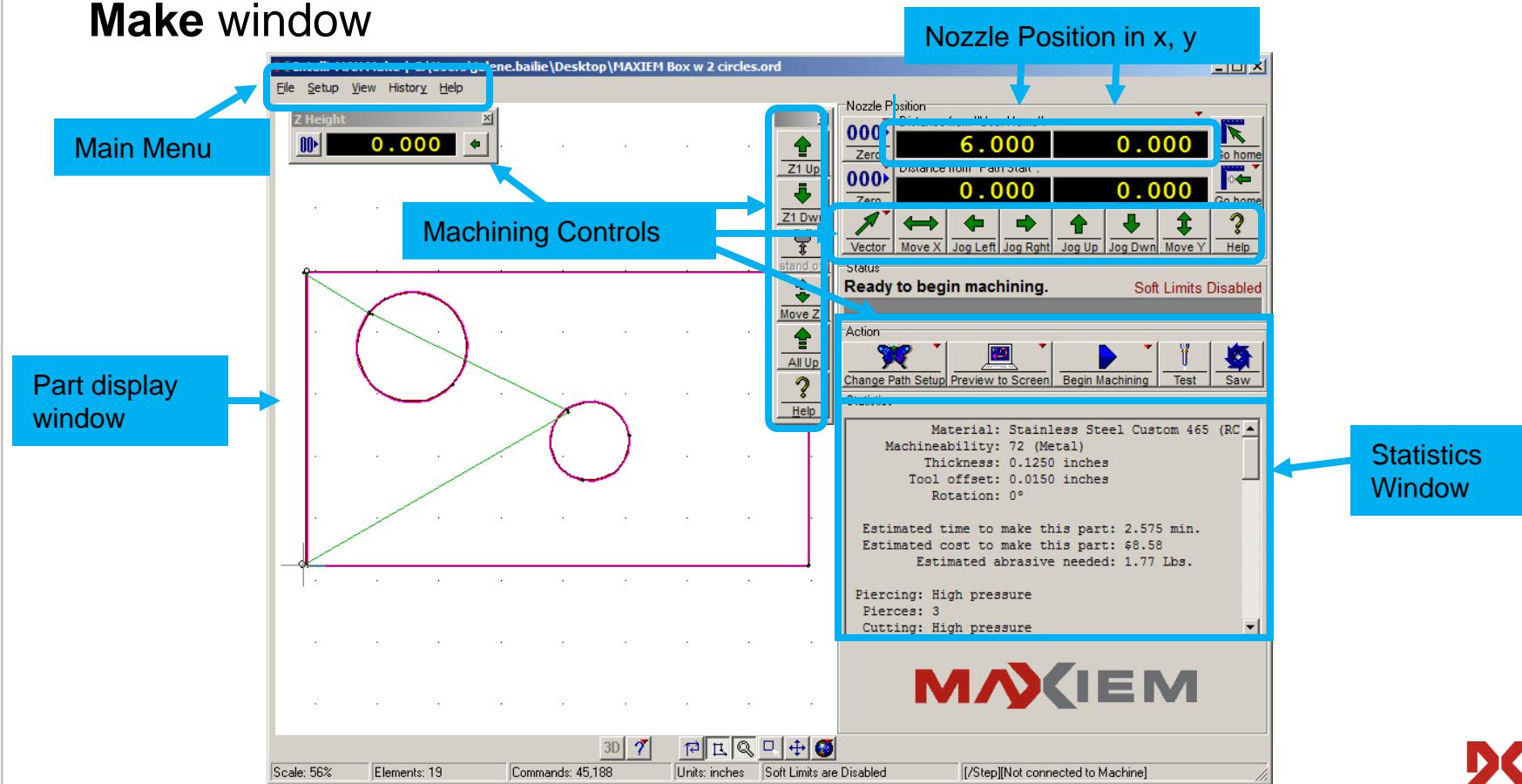
- Set specific controls on your machine to:
- Specify material set up for each part you cut
- Change variables in your machining process, such as abrasive mesh size, nozzle orifice size, abrasive flow rate and more
- Track part status and statistics, and create reports



Introduction to Make Standard

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Make window

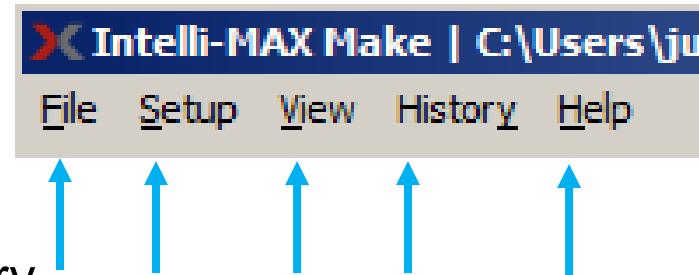


Introduction to Make Standard



Main menu

- Gives you access to the various functions available in **Make** such as
 - Open and configure files
 - Print statistics
 - Configure machine settings
 - View nozzle position data
 - Access part or machine history
 - Access the Help system

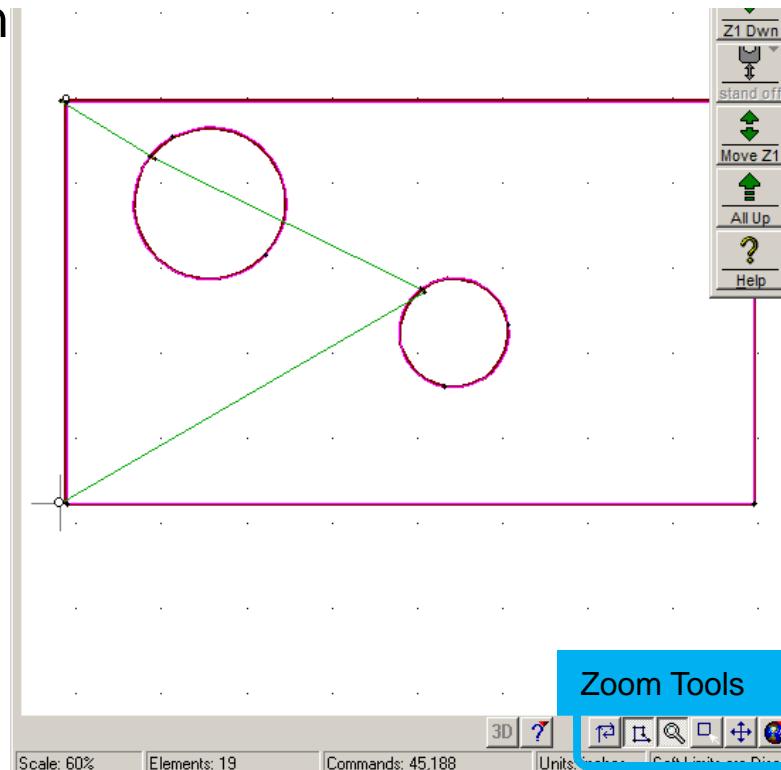


Introduction to Make Standard



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 cutting

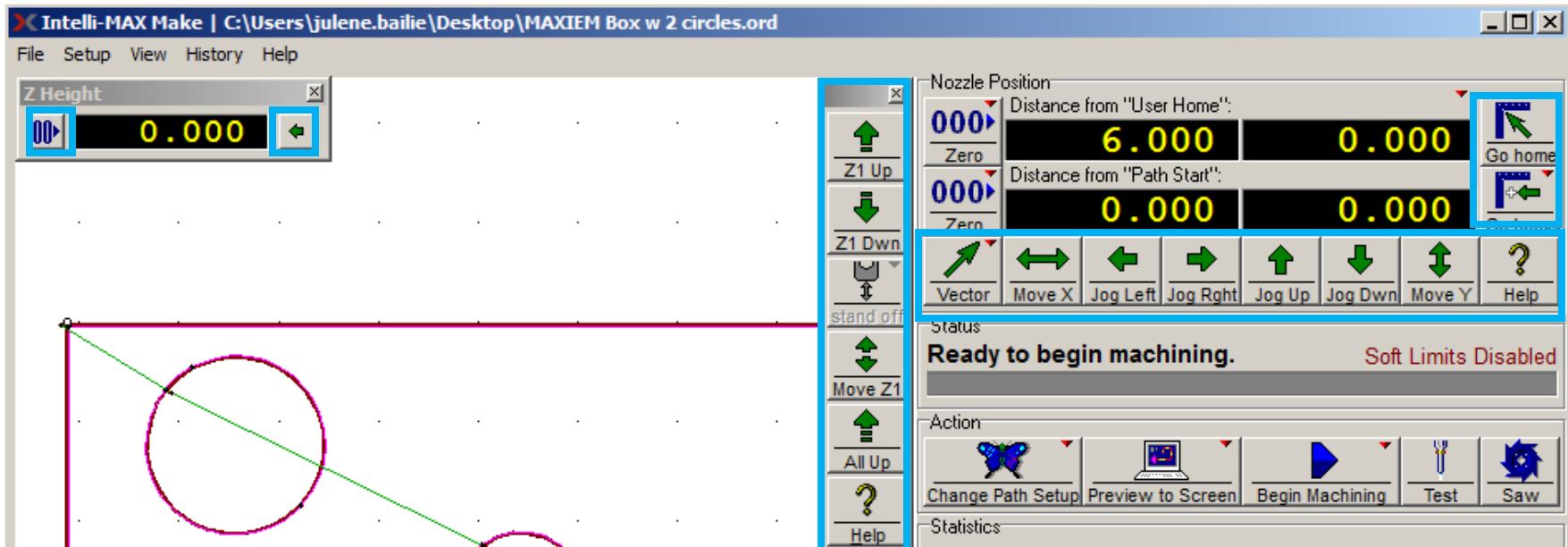
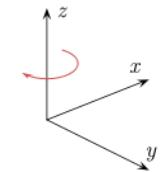


Introduction to Make Standard



Positioning Controls

- Move the cutting head in the X, Y, and Z directions



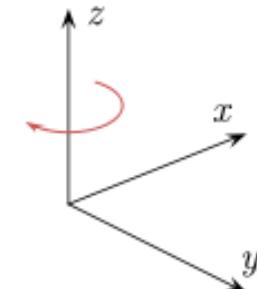
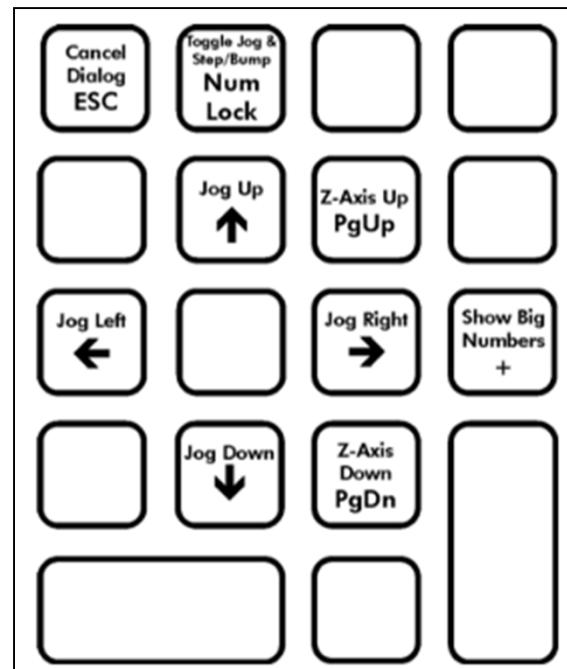
Keywords “Move, Jog, Homes”

Introduction to Make Standard

MAXIEM
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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



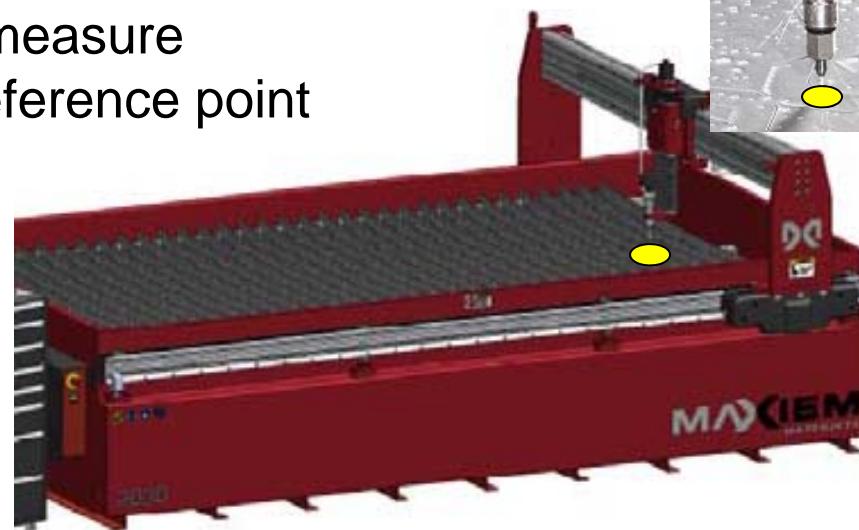
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Nozzle Position

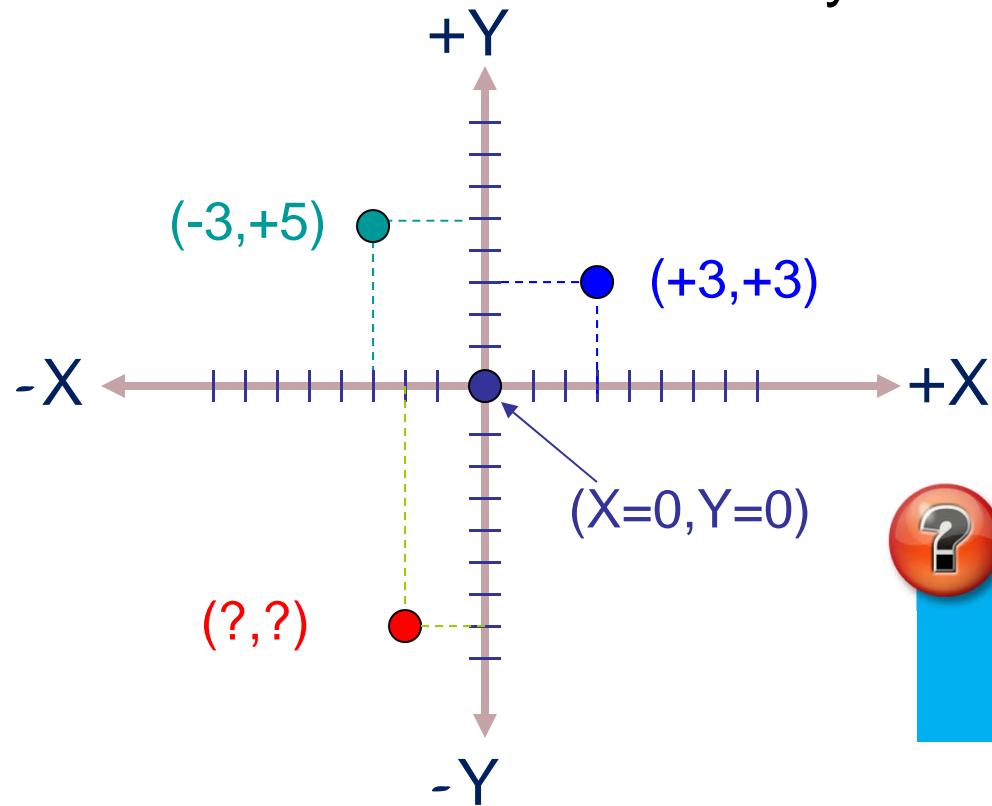
- Refers to a specific point where the nozzle is located on the machine
- The specific nozzle location point is referenced using X-Y coordinates
- The X-Y coordinates measure distance from some reference point (called a “Home”)



Introduction to Make Standard

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Two dimensional coordinate system



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

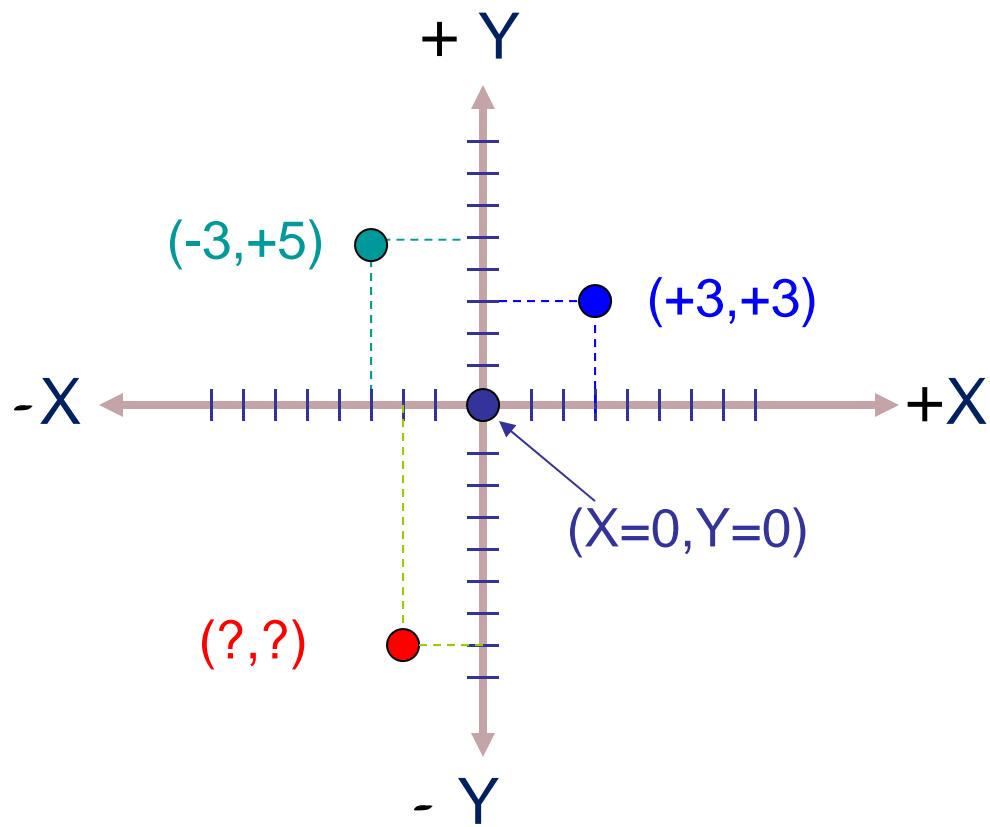


What are the X, Y coordinates of the red dot?

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A: The X, Y
coordinates of the red
dot are

X = -2 and Y = -7

(-2, -7)

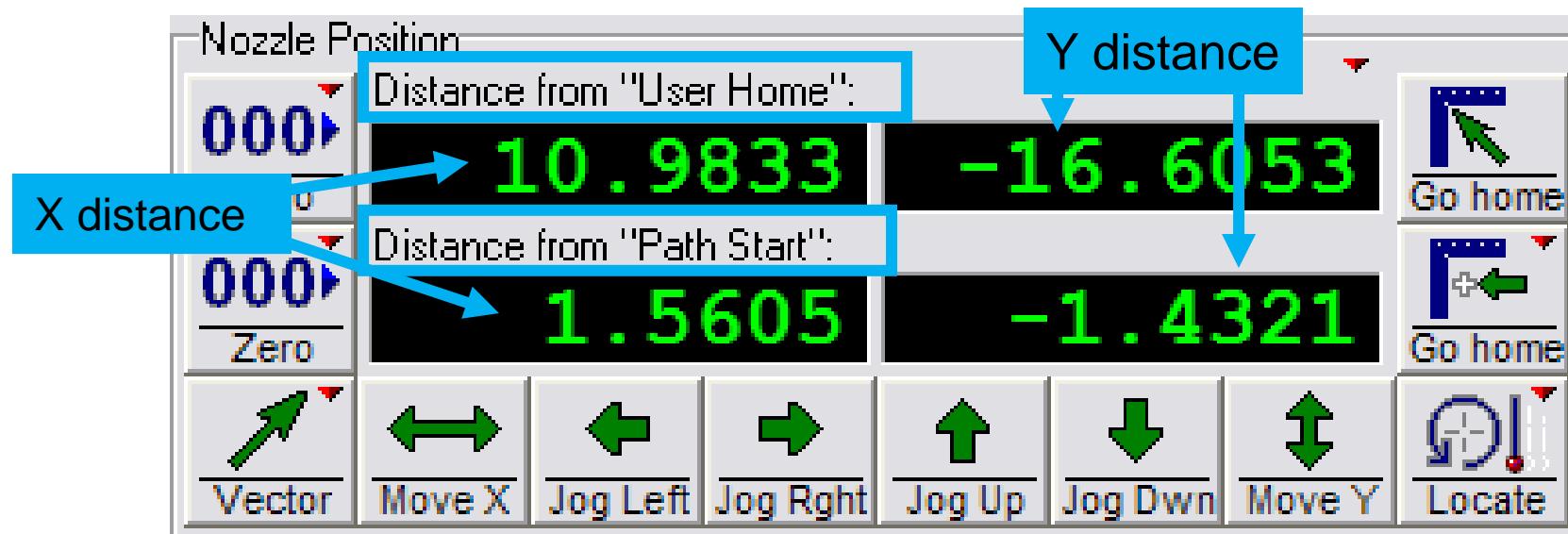


Introduction to Make Standard

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Nozzle Position Display

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

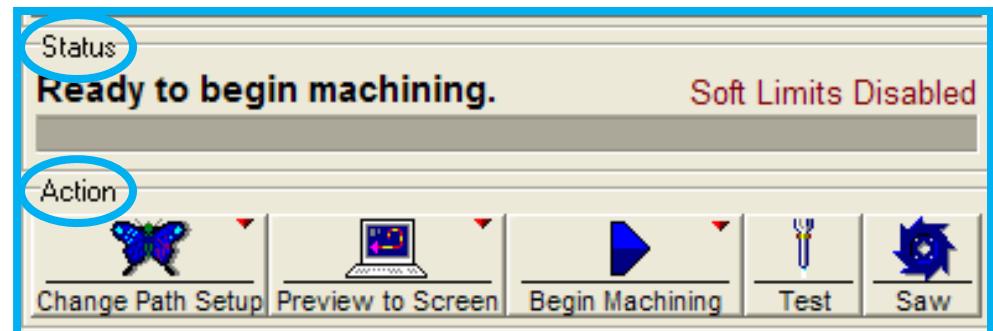


Introduction to Make Standard



Machining Controls

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



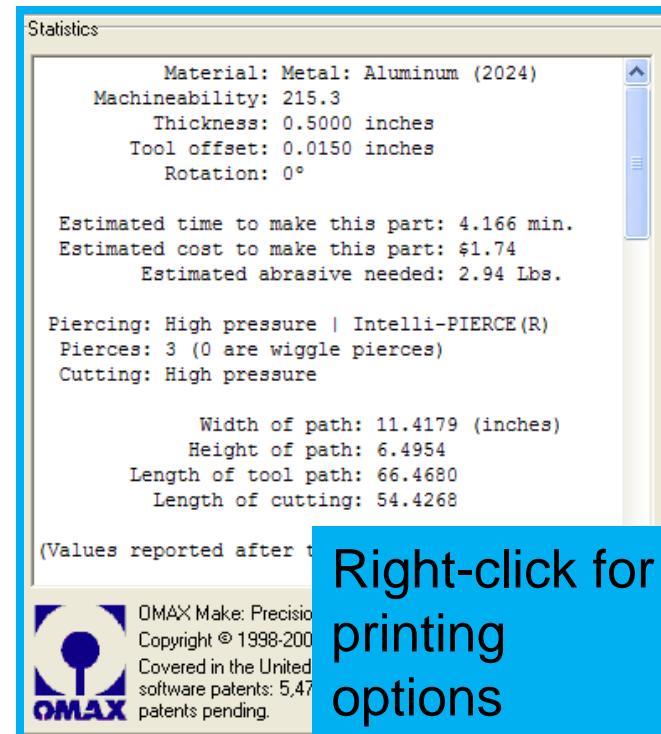
Keywords “machining controls”

Introduction to Make Standard



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



Keyword “statistics”

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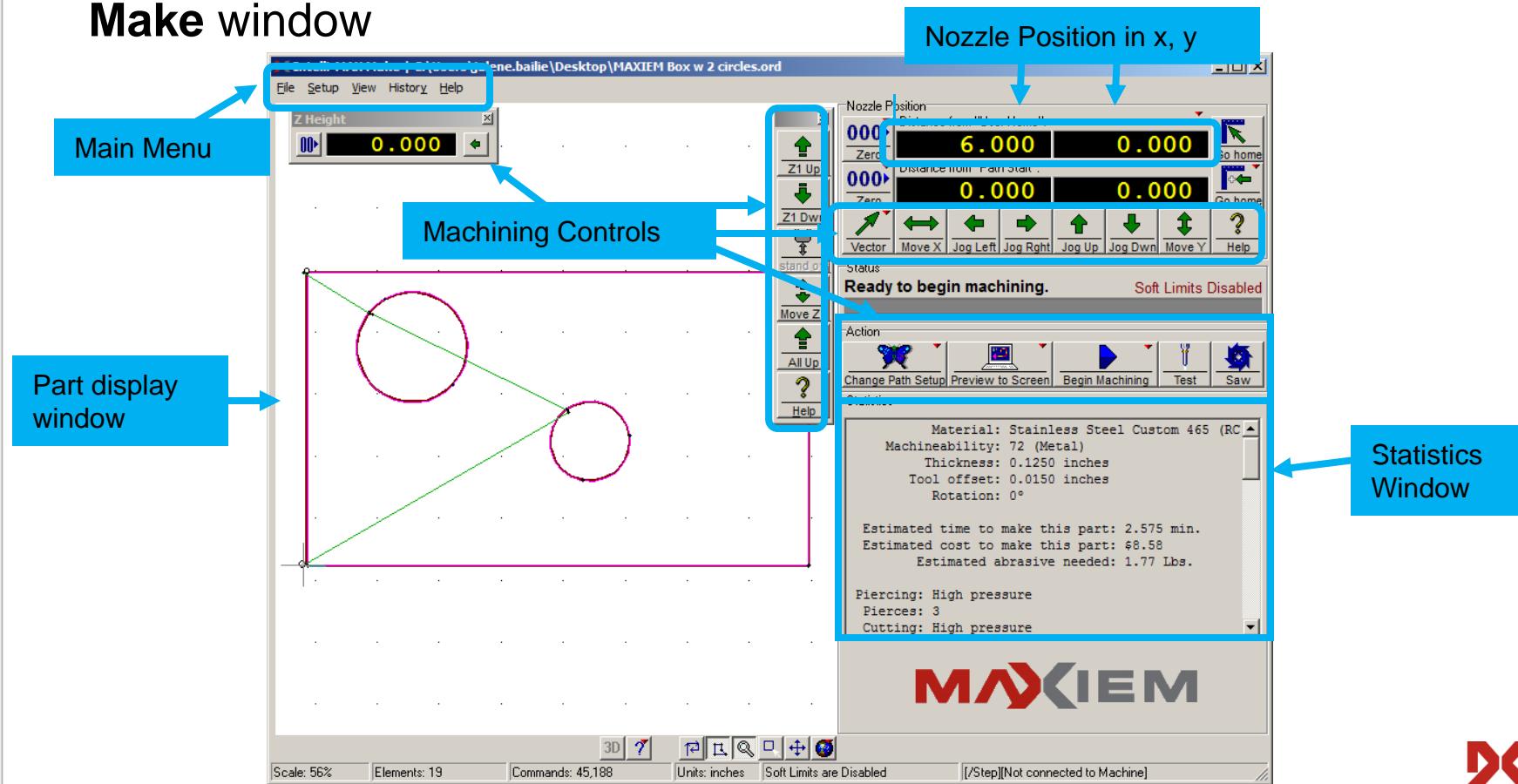


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Introduction to Make Standard

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Make window



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Make Review



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



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Make Review



Review

3. Which part of the **Make** screen 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 is not a machining control?
 - a. Saw
 - b. Test
 - c. Preview
 - d. Begin Machining
 - e. None of the above



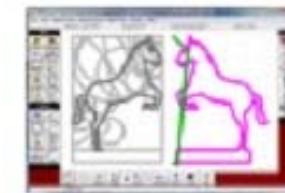
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Steps in Making Parts



• Intelli-MAX Layout

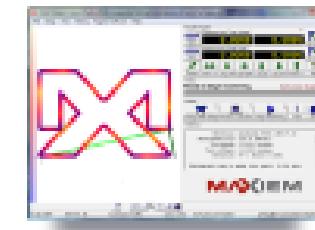
- Step 1:** Obtain/create a Drawing File (DXF file).
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- Step 3:** Clean and save the drawing.
- Step 4:** Add Path Elements to the drawing and save it.
- Step 5:** Create the Machine Tool Path file (ORD/OMX file).



MAXiem_Layout

• 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.



MAXiem_Make



Step 6: Start the Machine

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Machine Start-up

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

OMAX JetMachining® Center Safety Checklist Date _____

Safety Checklist Topics

Safety Labels and what they mean

Electrical Power

Water Flow

Air Flow

Air Protection

Water Protection

Oxygen and Nitrogen

Oxygen + Nit Cells

Safety Procedures (One)

Dress properly

Use personal protective equipment

Safety Procedures (Two X)

OMAX equipment comes with a safety manual

Read the safety manual before using the machine and understand how it operates

Wear personal protective equipment (PPE) at all times

Do not leave the machine unattended

Equipment Safety Features

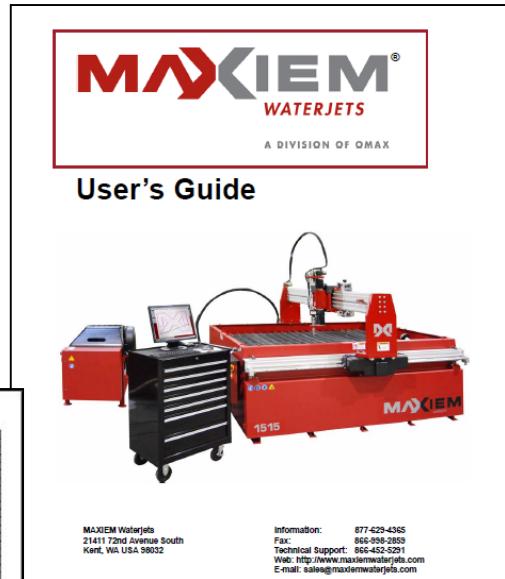
Emergency Stop (ES) button

Emergency Stop (ES) button

OMAX has a motion controller and circuit breaker which will automatically stop the machine if there is an emergency.

By signing this document I acknowledge receipt and review of the OMAX Safety Checklist and understand its contents. This document will be kept on file at OMAX as the Customer file.

Student Name _____ Signature _____



Step 6: Start the Machine



Machine Start-up Procedures

- Refer to the MAXIEM User's Guide for instructions on machine start-up

Startup Checkoff Sheet

Use the following checkoff sheet to ensure that all equipment startup tasks are completed and in the correct sequence. For more detailed startup instructions, refer to Cutting Parts, page 3-12.

WARNING! Safety First – Always wear safety glasses, ear protection, and hand protection when operating your OMAX JetMachining Center.

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

3 - 22 4004330-EN



Step 6: Start the Machine



Nozzle Position and Homes

- Three types of **Homes** used on the MAXIEM
 - 1. Absolute Home**
 - 2. User Home**
 - 3. Path Start Home**



Keyword “homes”

Step 6: Start 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 can not move any further than this in the X or Y direction
 - Every other **Home** position uses the Absolute Home as its reference point

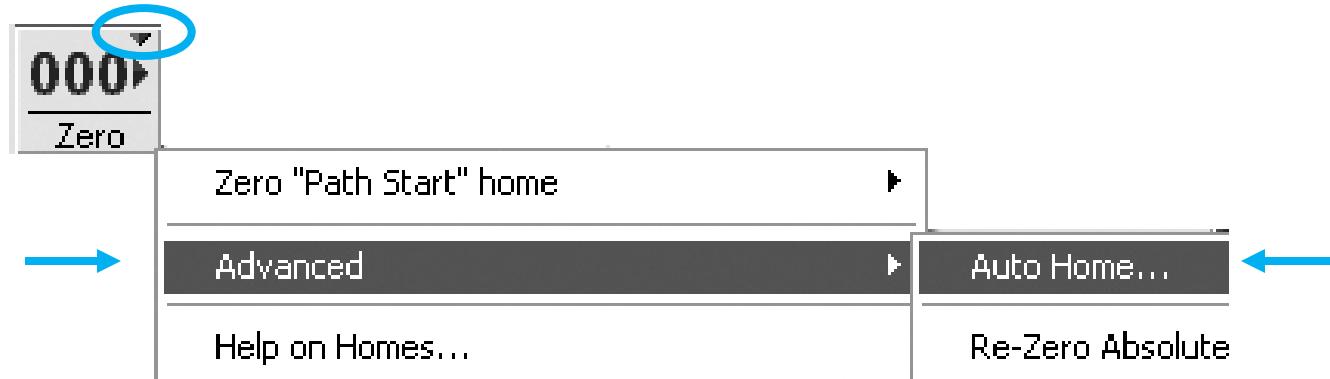


Step 6: Start the Machine

MAXIEM
WATERJETS

Nozzle Position

- Setting Absolute Home using Auto Home
 - Move the nozzle to within a 1 foot square of your machine's homing position
 - Raise the Z-axis to avoid obstacles
 - **Right-click Zero > Advanced > Auto Home**



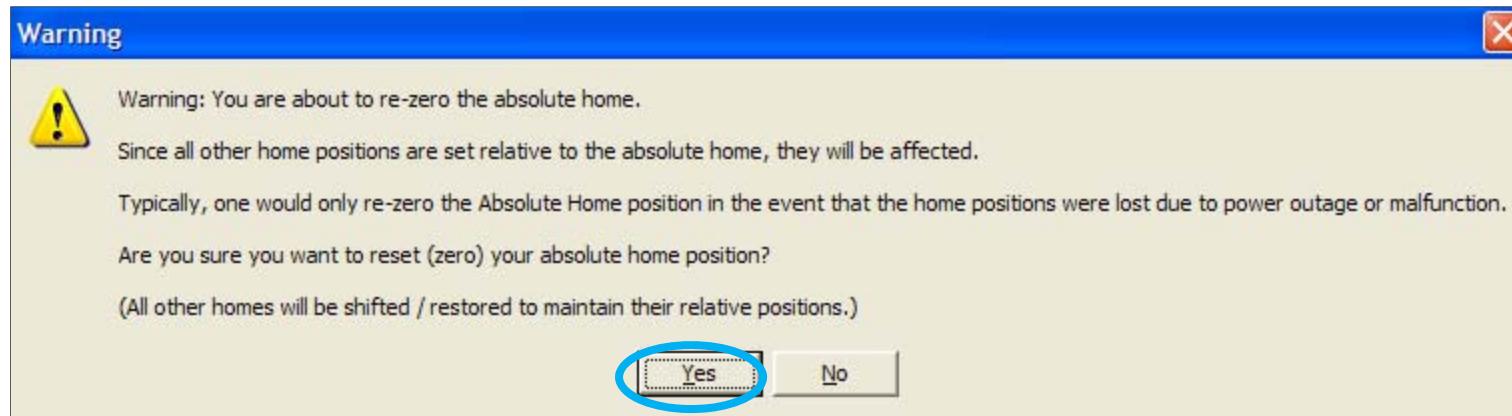
MAXIEM
WATERJETS

Step 6: Start the Machine



Nozzle Position

- Re-zero Absolute Home

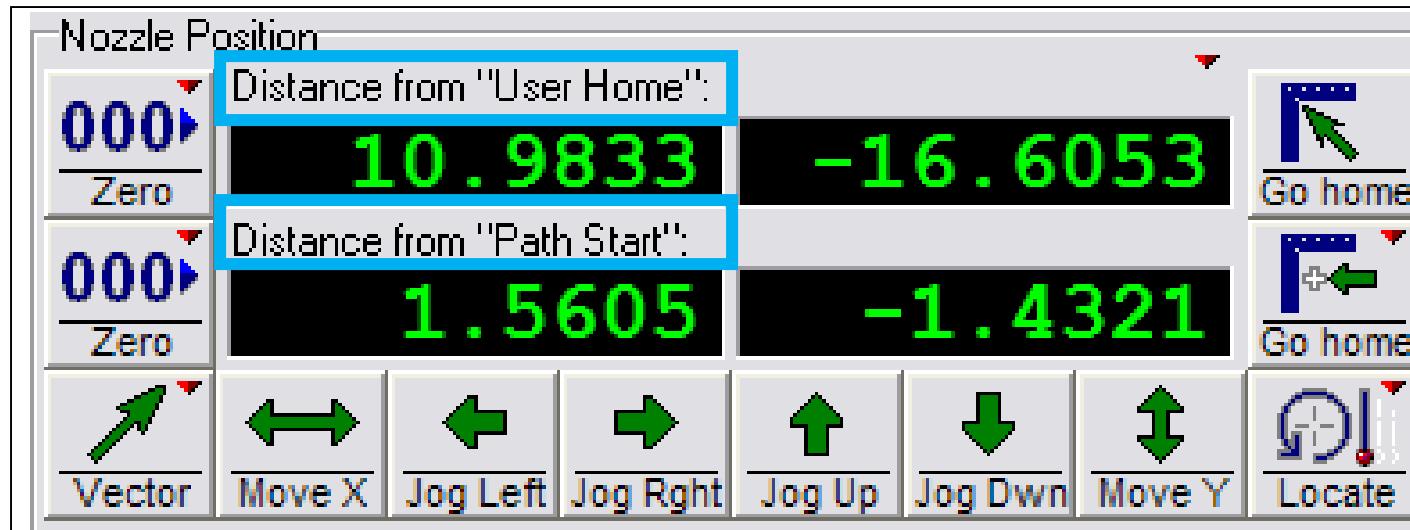


Step 6: Start the Machine

MAXiem
WATERJETS

Nozzle Position Displays

- The top row always displays the generic **User Home**
- The second row displays **Path Start Home**



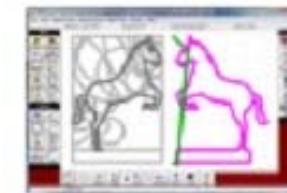
DC
MAXiem
WATERJETS

Steps in Making Parts



• Intelli-MAX Layout

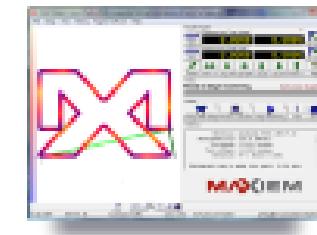
- Step 1:** Obtain/create a Drawing File (DXF file).
- Step 2:** Assign machining Qualities (edge finish).
- Step 3:** Clean and save the drawing.
- Step 4:** Add Path Elements to the drawing and save it.
- Step 5:** Create the Machine Tool Path file (ORD/OMX file).



MAXiem_Layout

• 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.



MAXiem_Make

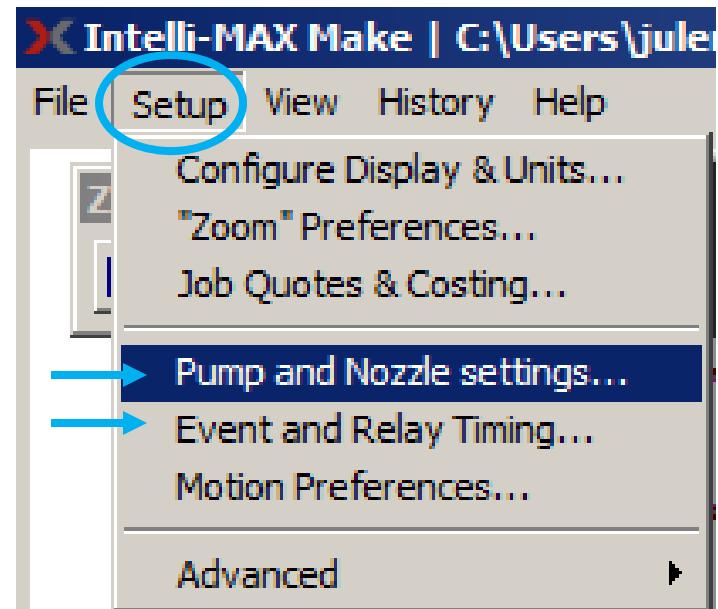


Step 7: Configure Machine Settings



Configure Machine Settings in Make

- Pump and Nozzle settings
- Event and Relay Timing



Keyword "Make Menu"

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Step 7: Configure Machine Settings



Pump and Nozzle Settings

The screenshot shows the MAXiem Machine Setup interface. The main window title is "MAXiem Machine Setup". The "Pump & Nozzle Configuration" tab is selected. The dialog contains fields for configuring the pump and nozzle:

Pressure at Pump in High Pressure Mode:	50000	PSI
Pressure at Pump in Low Pressure Mode:	20000	PSI
Jewel (orifice) Diameter:	0.014	inches
Mixing Tube Diameter:	0.03	inches
Abrasive Flow Rate:	0.75	Lb/min
Abrasive Size:	80	Mesh (US Standard)
Abrasive Index:	1	(Use 1.0 for garnet)

Note:
This is where you tell the Intelli-MAX 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.
(You are reporting to the software how your machine is configured.)

Help on Pump and Nozzle Settings

Setup View History Help

- Configure Display & Units...
- "Zoom" Preferences...
- Job Quotes & Costing...
- Pump and Nozzle settings...**
- Event and Relay Timing...
- Motion Preferences...
- Advanced

Keyword “Pump and Nozzle configuration”

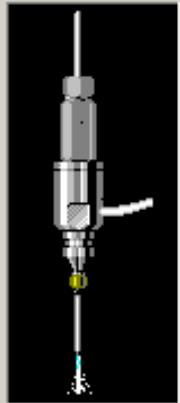
Step 7: Configure Machine Settings



Pump and Nozzle Settings

MAXIEM Machine Setup

Pump & Nozzle Configuration | Event & Relay Timing | Motion |

Pressure at Pump in High Pressure Mode: PSI

Pressure at Pump in Low Pressure Mode: PSI

Jewel (orifice) Diameter: inches

Mixing Tube Diameter: inches

Abrasive Flow Rate: Lb/min

Abrasive Size: Mesh (US Standard)

Abrasive Index: (Use 1.0 for garnet.)

Note:
This is where you tell the Intelli-MAX 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.
(You are reporting to the software how your machine is configured.)

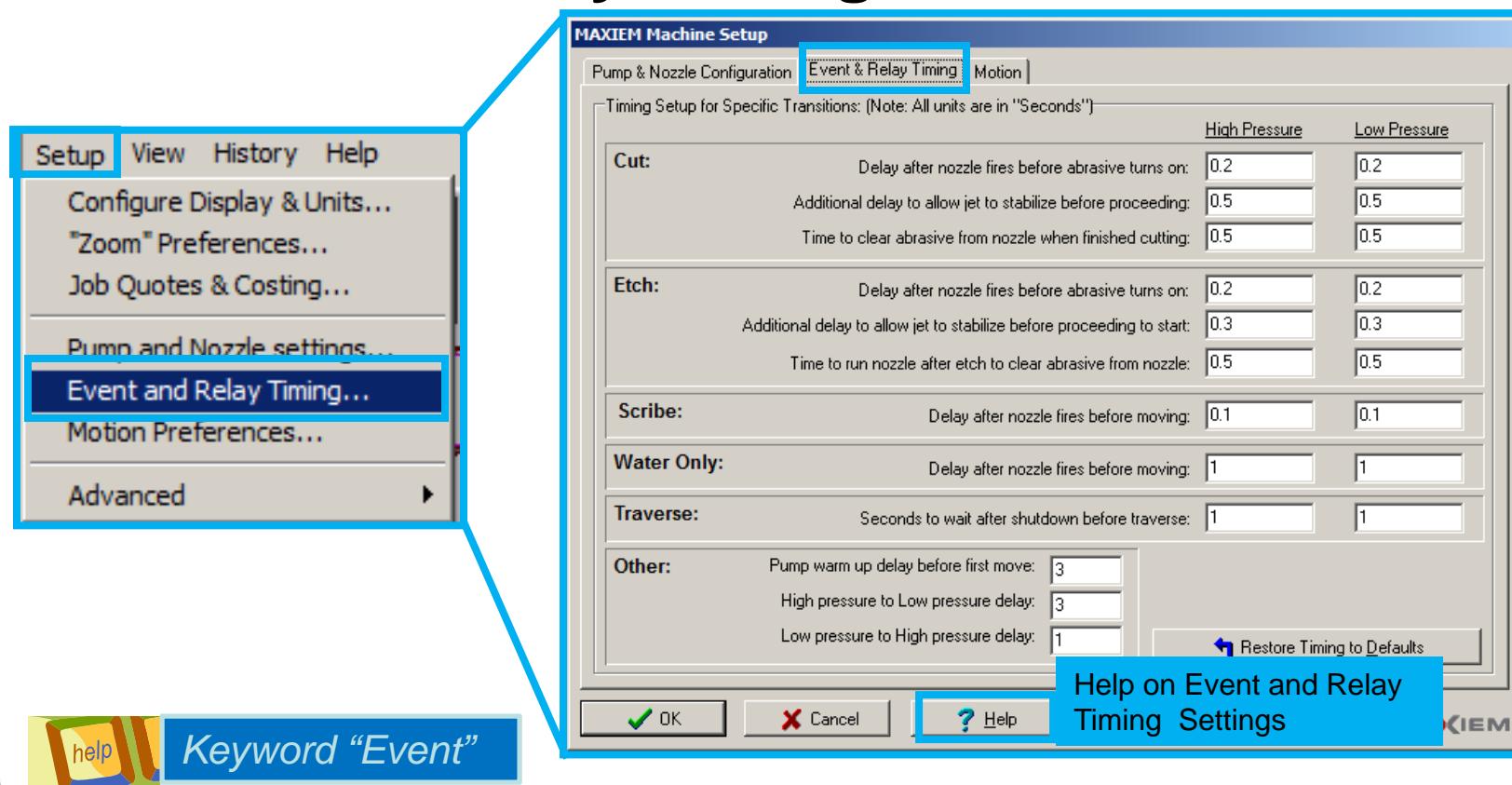
Important!
Settings here must match the actual performance and setup of the pump and nozzle



Step 7: Configure Machine Settings

MAXIEM
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Event and Relay Timing



Keyword "Event"

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Step 7: Configure Machine Settings



Machine Configuration Review

1. What are the two areas you need to configure or verify settings on each day during start-up?
 - a. Motion Controls
 - b. Pump and Nozzle Settings
 - c. 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 **Machine Setup** pages in **Make**?



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Steps in Making Parts



• Intelli-MAX Layout

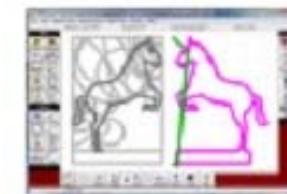
Step 1: Obtain/create a Drawing File (DXF file).

Step 2: Assign machining Qualities (edge finish).

Step 3: Clean and save the drawing.

Step 4: Add Path Elements to the drawing and save it.

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



MAXiem_Layout

• Intelli-MAX Make

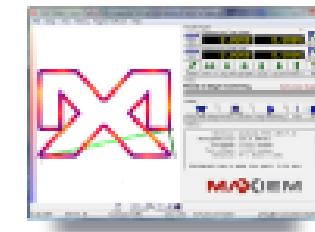
Step 6: Start up the machine.

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.



MAXiem_Make

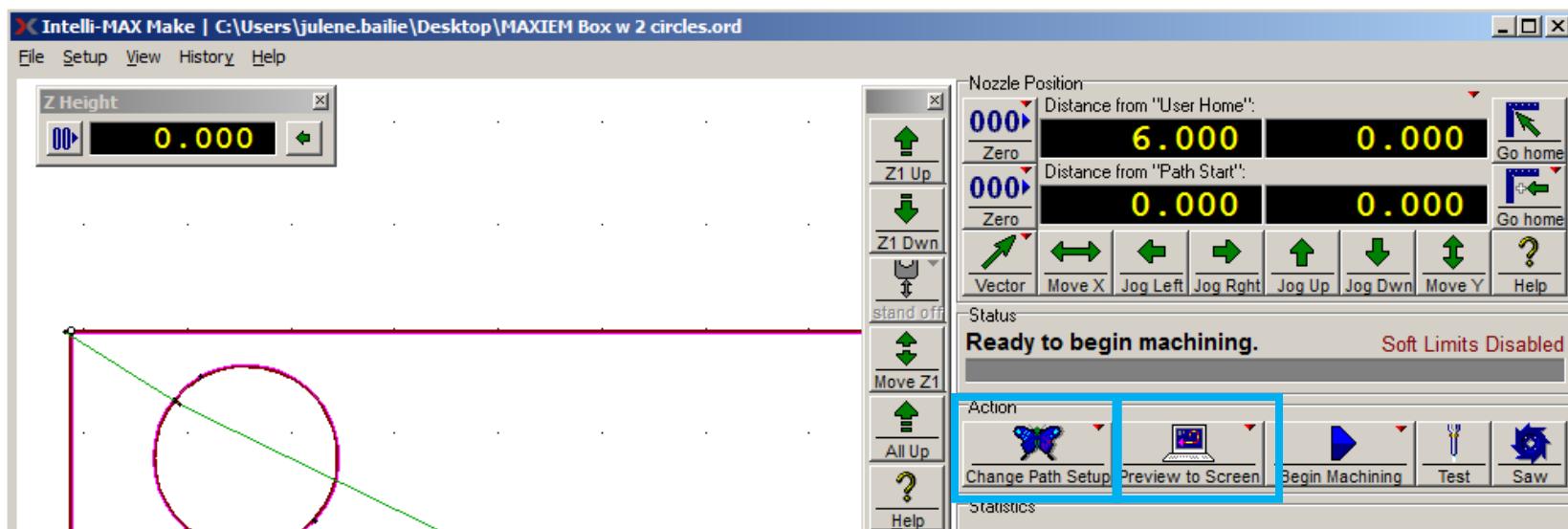


Step 8: Open the ORD/OMX File

MAXIEM
WATERJETS

Open and Configure the Machine File

- Change Path Setup
- Preview to Screen

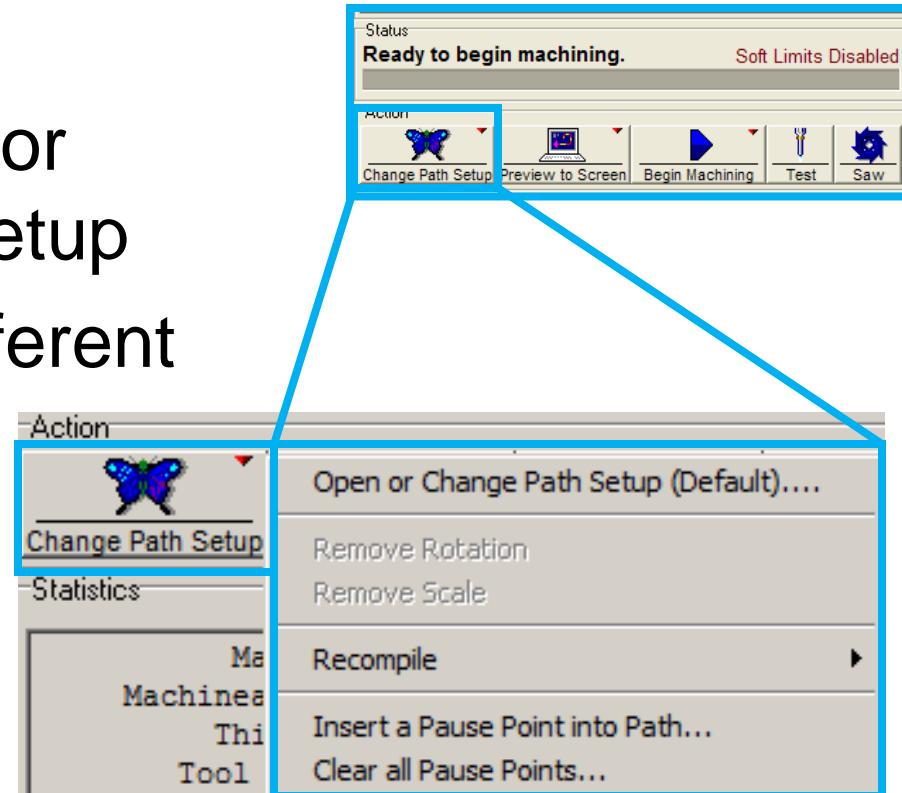


Step 8: Open the ORD/OMX File



Change Path Setup

- Open an ORD file or change the path setup
- Recompile in a different machining quality
- Insert pause point

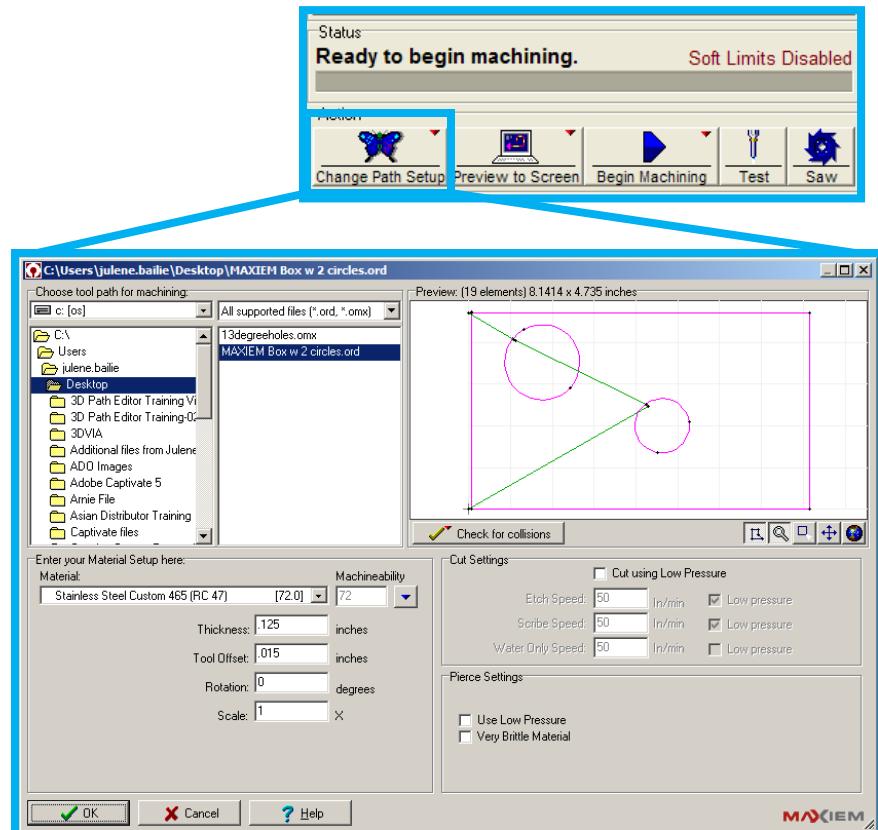


Step 8: Open the ORD/OMX File



Change Path Setup

- Open or change path setup
 - Open a new ORD file
 - Specify material setup
 - Preview the part file
 - Specify cut settings
 - Specify pierce settings
 - Activate accessories (such as the A-Jet or Terrain Follower)
 - Access Help

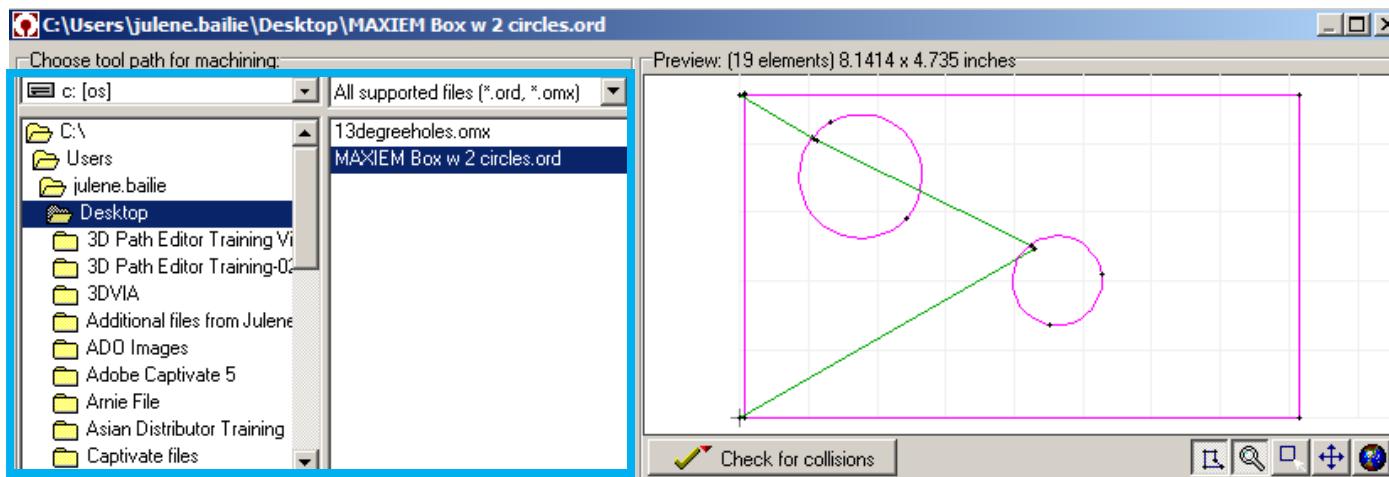


Step 8: Open the ORD/OMX File



Open a new ORD file

- You can select a new file for machining
- Note the files listed on the right below, are all ORD or OMX files

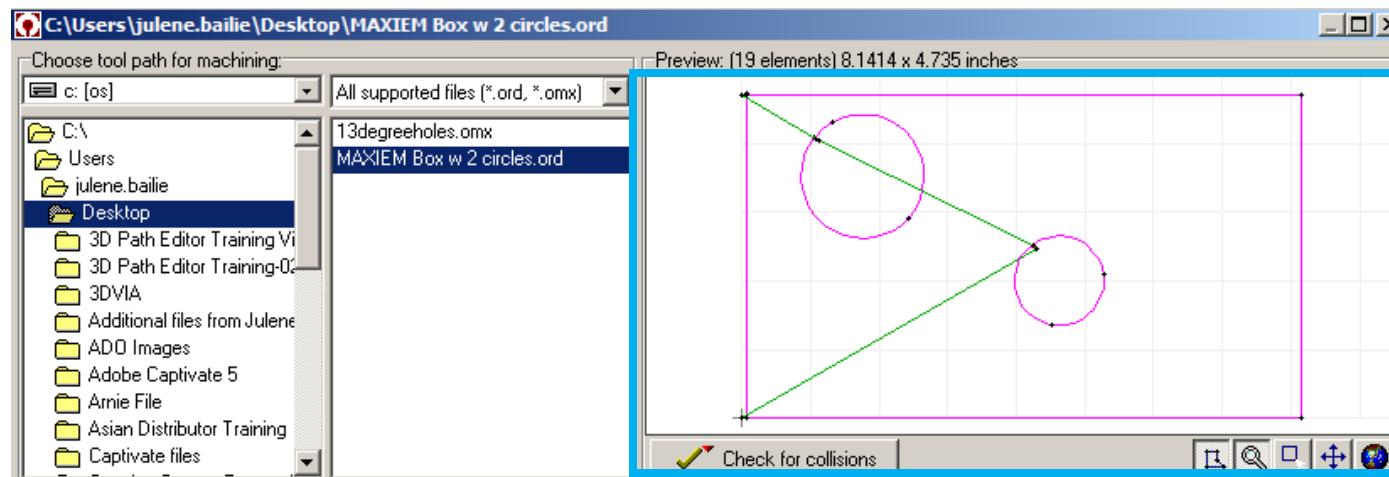


Step 8: Open the ORD/OMX File

MAXiem
WATERJETS

Part Preview Window

- Preview the part
- Check for collisions
- Use **Zoom tools**



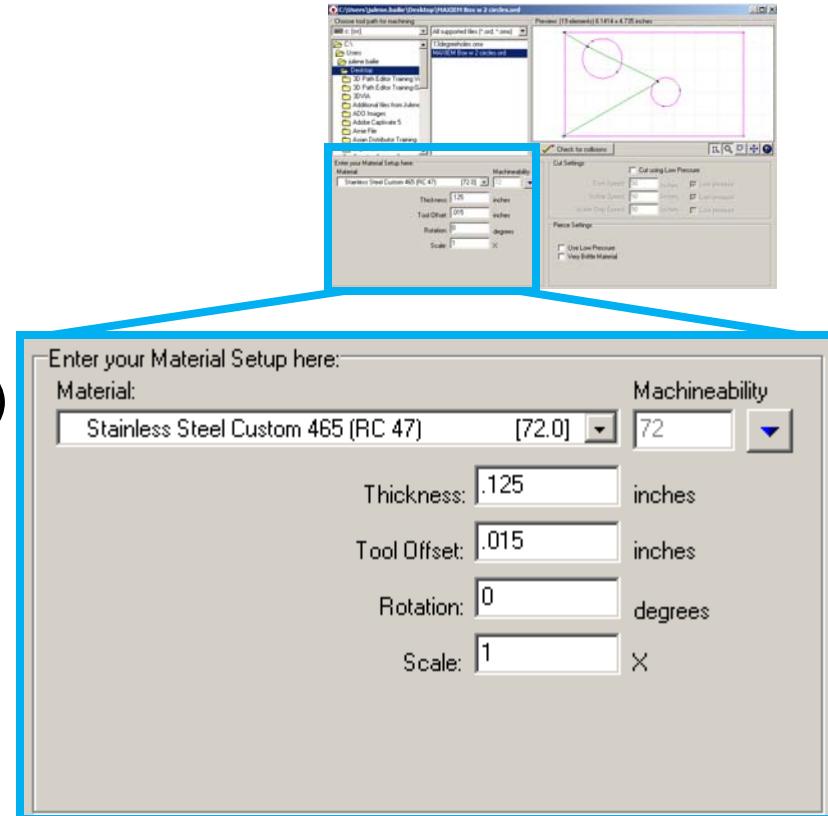
MAXiem
WATERJETS

Step 8: Configure the ORD/OMX File



Select Material Type

- Specify Material Thickness
- Specify Tool Offset
- Set Rotation
- Set Scale
- Enable the A-Jet (if applicable)

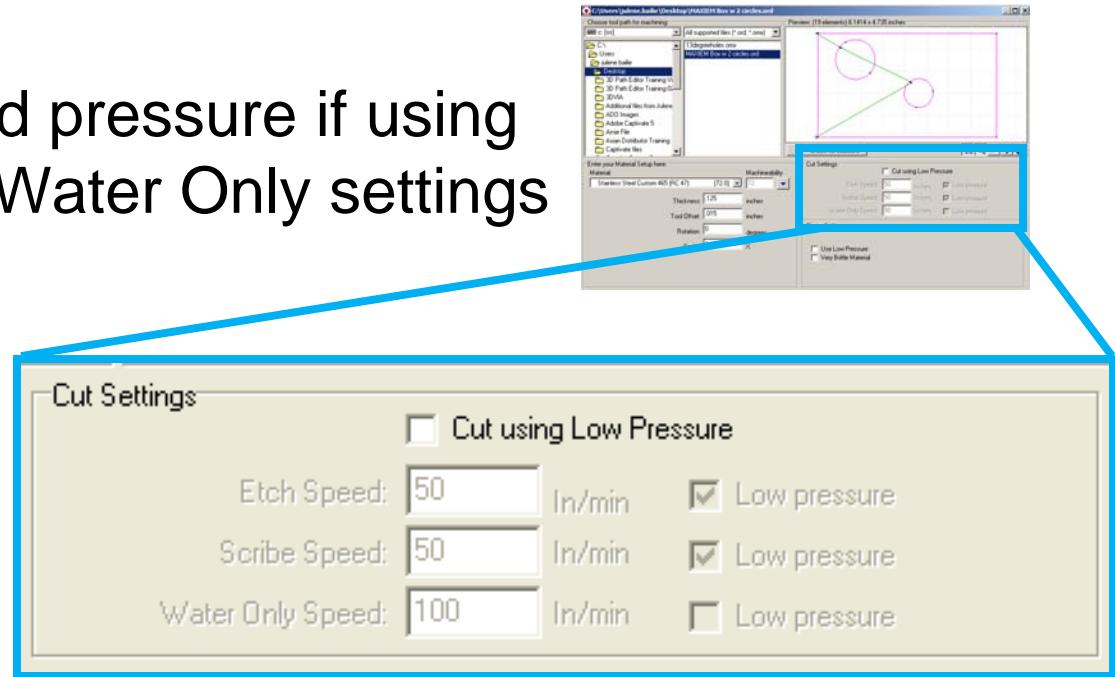


Step 8: Configure the ORD/OMX File



Cut Settings

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

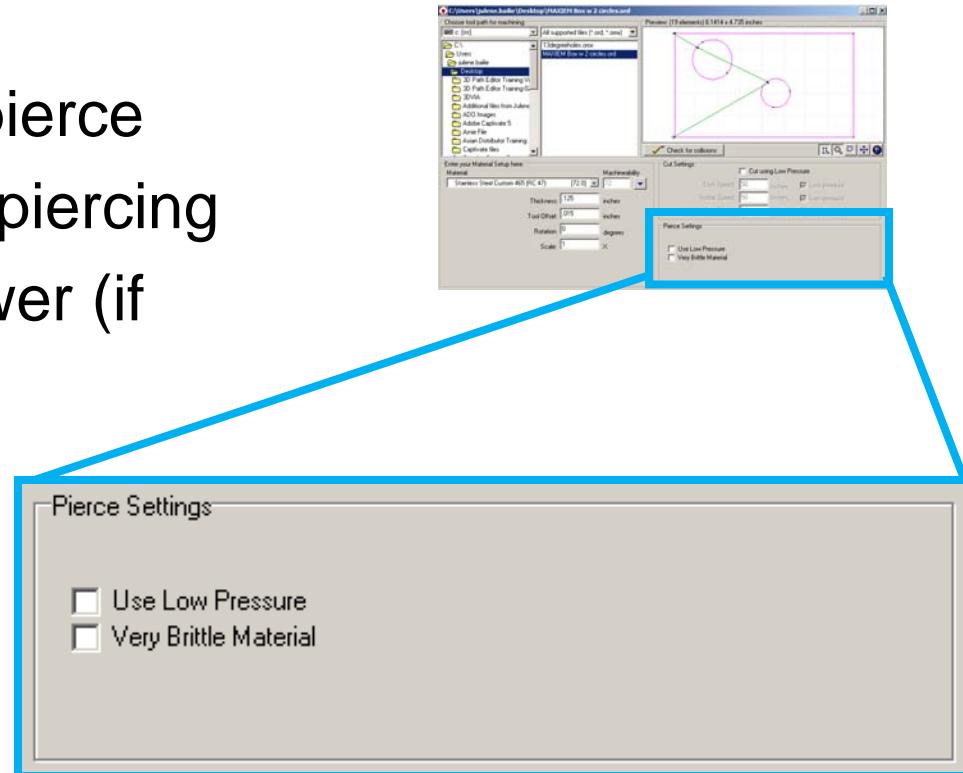


Step 8: Configure the ORD/OMX File



Pierce Settings

- Specify jet or drill to pierce
- Enable low-pressure piercing
- Enable Terrain Follower (if applicable)



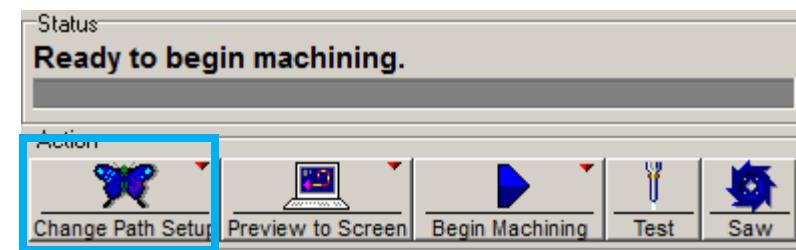
Step 8: Configure the ORD/OMX File



Activity



- Open **Make**
- Click **Change Path Setup**
- Review each area of **Change Path Setup**
 - Find and open a new file
 - Change **Material Setup**
 - Review **Cut** and **Pierce** settings
 - Open the part in **Make**

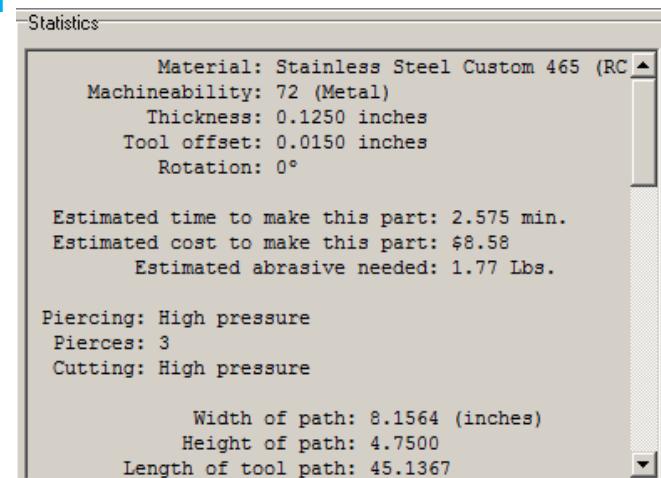


Step 8: Configure the ORD/OMX File



Activity

- Review the **Statistics** window for the new part
- Click **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

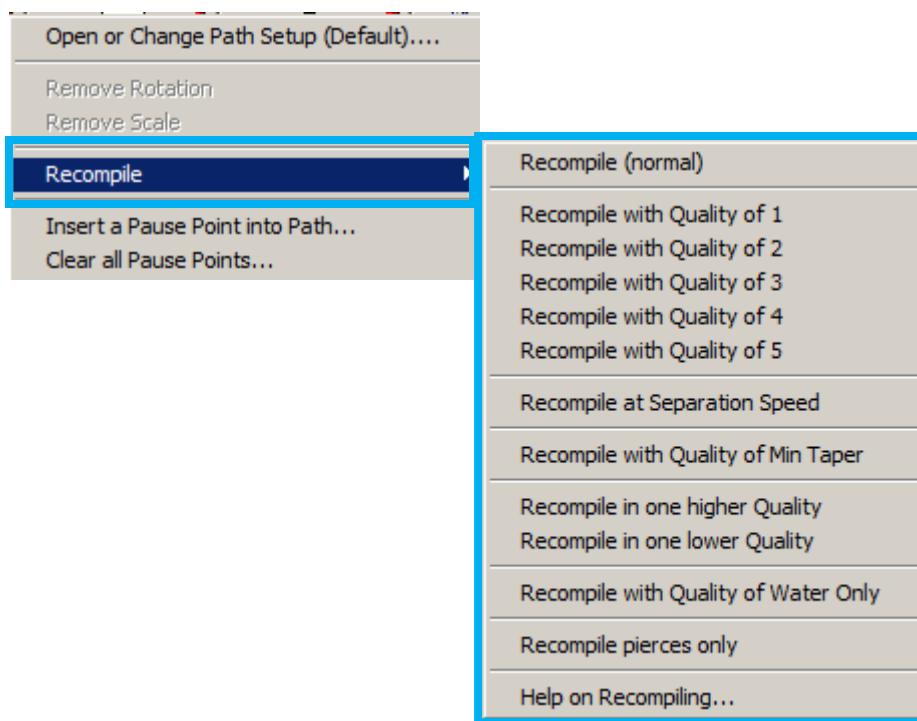


Step 8: Configure the ORD/OMX File



Recompile Options

- Change the machining quality of the part in **Make**



Step 8: Configure the ORD/OMX File



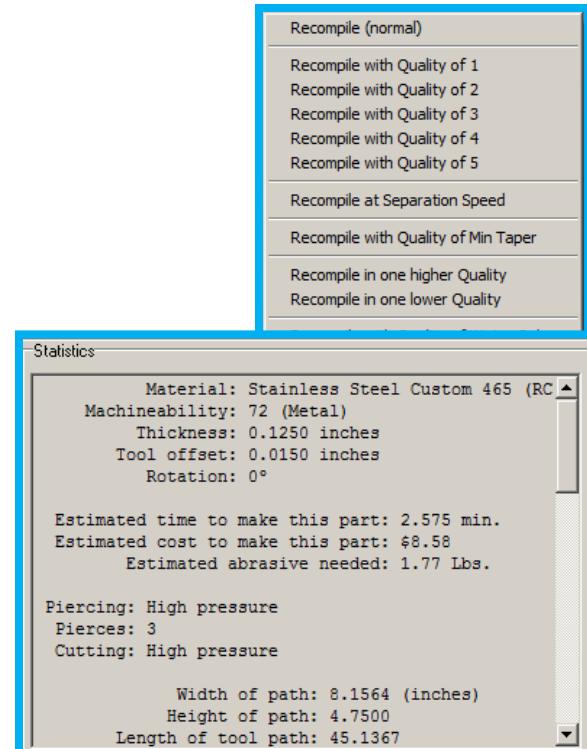
Activity

- Open an ORD 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?



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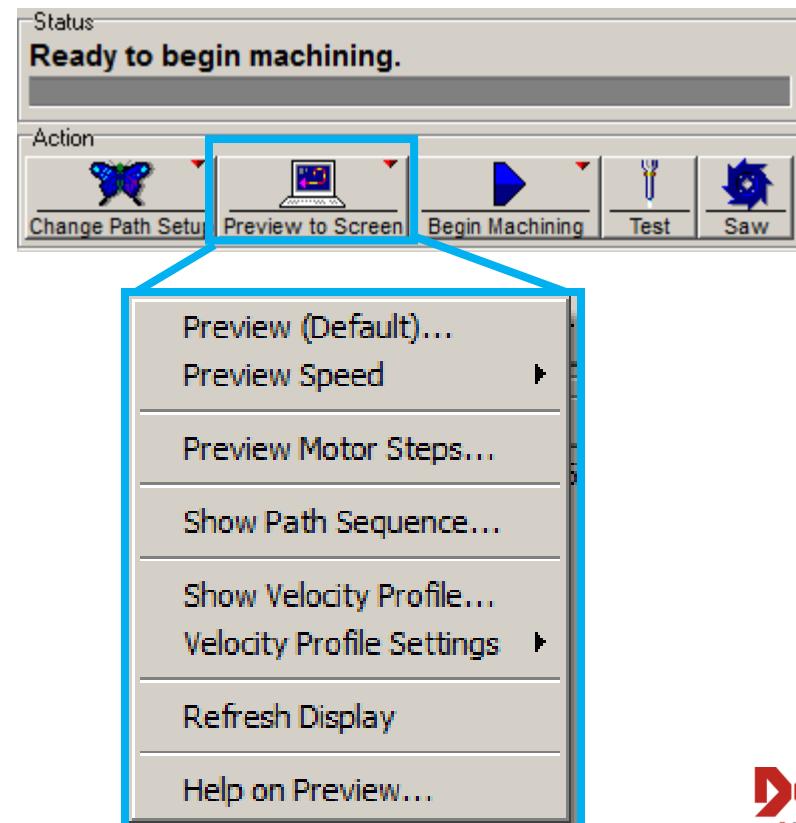
234

Step 8: Configure the ORD/OMX File



Preview to Screen

- **Preview (Default)**
- **Preview Speed**
- Motor Steps
- Path Sequence
- Velocity Profile
- Help



Step 8: Configure the ORD/OMX File



Preview Options

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



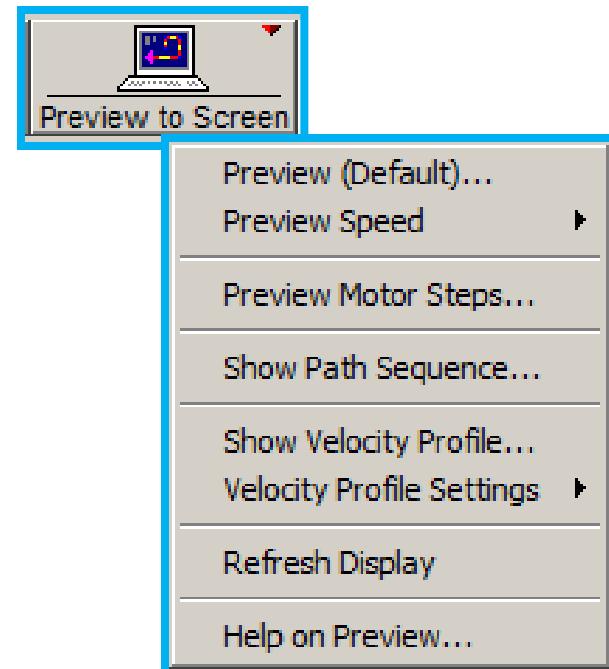
Keywords “preview to screen”

Step 8: Open and Configure the File



Activities

- Open an ORD file in **Make**
- Preview using the following
 - **Preview (Default)**
 - **Preview Motor Steps**
 - **Show Path Sequence**



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Step 8: Open and Configure the File



ORD File Configuration Review

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



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Step 8: Open and Configure the File



ORD File Configuration Review

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** window do you find information on about how much time it will take to make a part?



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Steps in Making Parts



• Intelli-MAX Layout

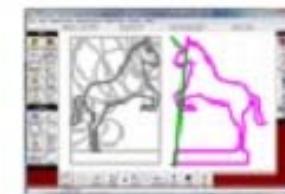
Step 1: Obtain/create a Drawing File (DXF file).

Step 2: Assign machining Qualities (edge finish).

Step 3: Clean and save the drawing.

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• Intelli-MAX Make

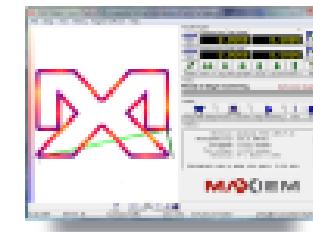
Step 6: Start up the machine.

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.



MAXiem_Make



Step 9: Load and Clamp Material

MAXiem
WATERJETS

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

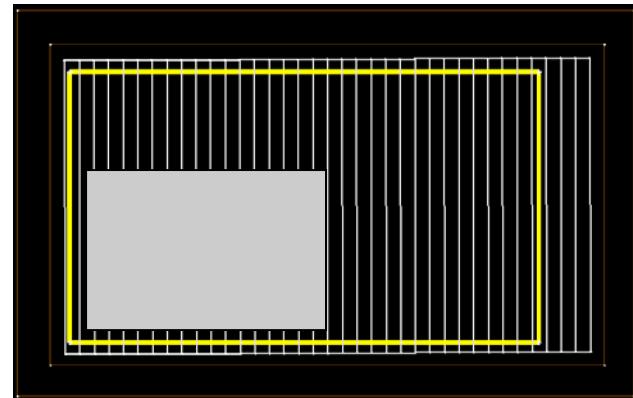


Step 9: Load and Clamp Material

MAXIEM
WATERJETS

Task 1: Place material in the tank

- Move the nozzle out of the way before loading material in the tank
- Place material “logically” on the slats in the tank for cutting



Warning! Slats
may be sharp

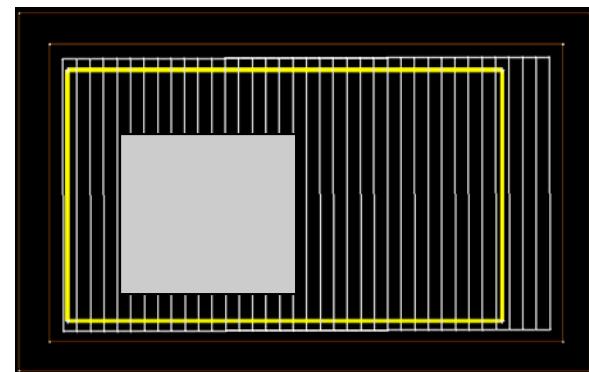
MAXIEM
WATERJETS

Step 9: Load and Clamp Material

MAXIEM
WATERJETS

What Is Logical Placement of the Material?

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



Keywords “*materials tips*”

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



Caution! Insufficient clamping may result in inaccuracies in finished parts



Keywords “fixturing”

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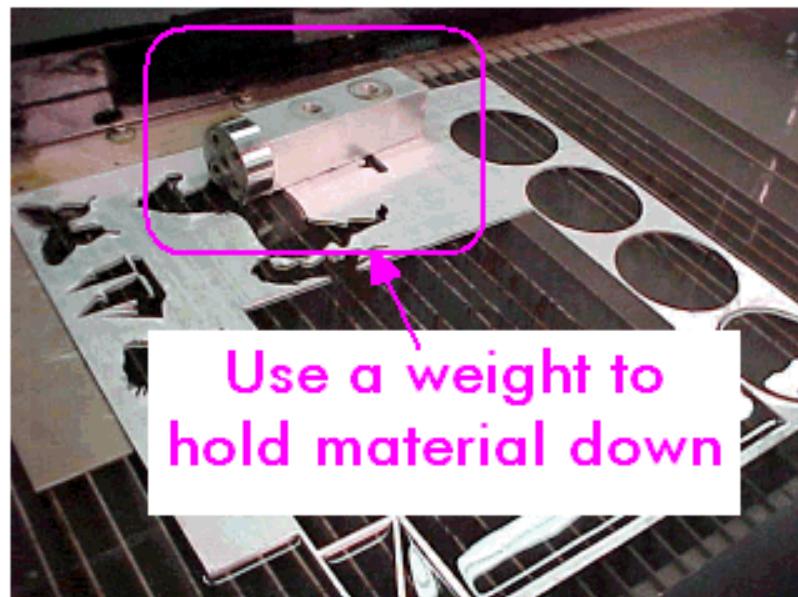
244

Step 9: Load and Clamp Material

MAXIEM
WATERJETS

Securely Fasten Materials in the Tank

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



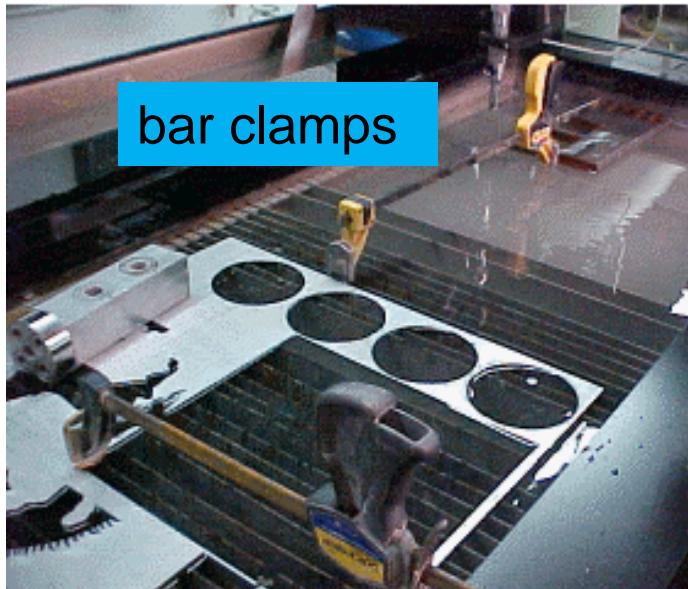
MAXIEM
WATERJETS

Step 9: Load and Clamp Material



Securely Fasten Materials in the Tank

- Secure the material against the side of the tank

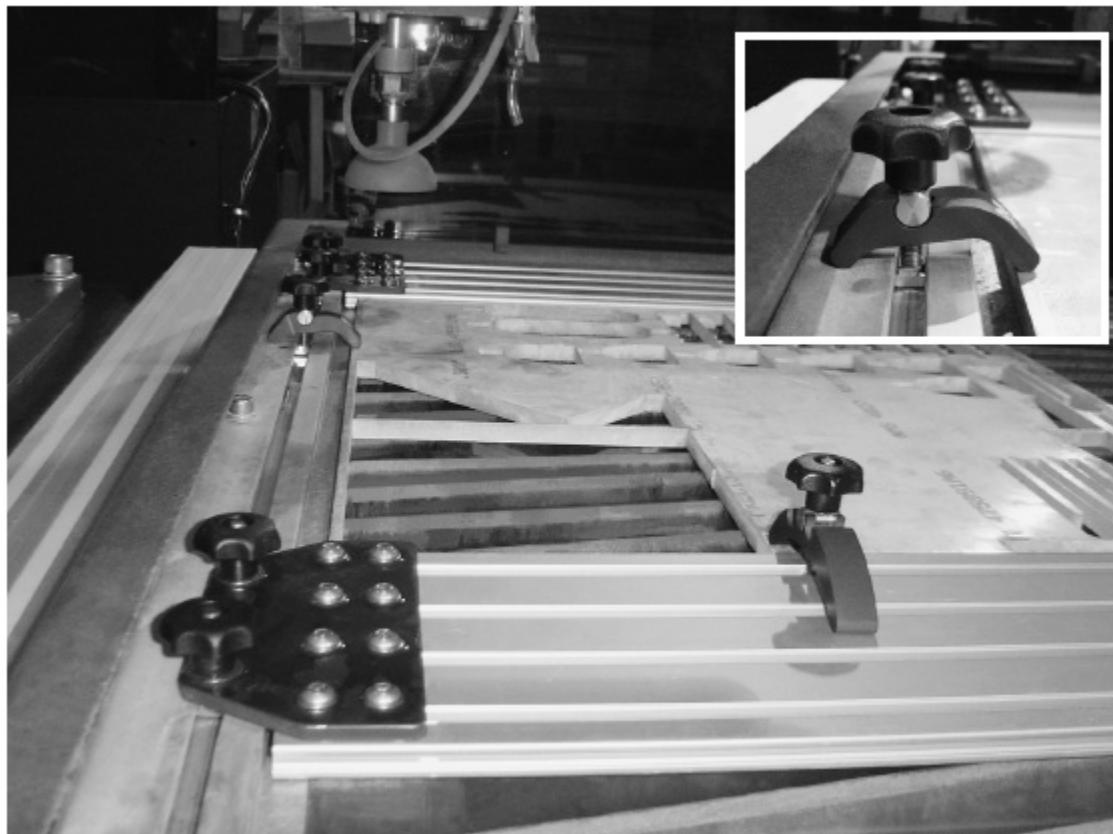


Caution! Do not secure materials against the slats

Step 9: Load and Clamp Material

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Material Holding Systems



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WATERJETS

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Step 9: Load and Clamp Material



Securely Fasten Materials in the Tank

- Flat plates
- Quick grips
- C-clamps
- Custom fixtures
- ?

What else might work for
securing materials in the tank?



See Dr. Olsen's article: *Fixturing for abrasive jet machining*

http://www.thefabricator.com/WaterjetCutting/WaterjetCutting_Article.cfm?ID=1238



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Step 9: Load and Clamp Material



Task 3: position the nozzle for cutting

- Move the nozzle to the nozzle travel path start location
- The machine will move along the path beginning from the start point (white cross) in your ORD/OMX file



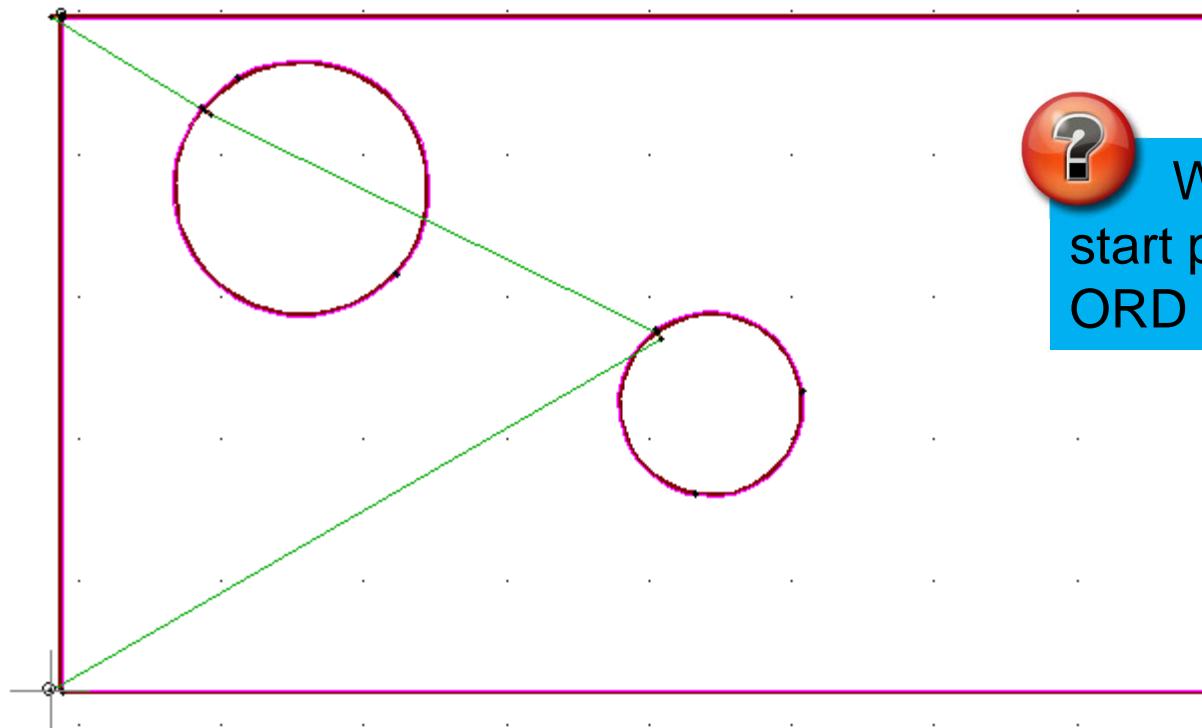
Step 9: Load and Clamp Material



Example ORD file and machine path



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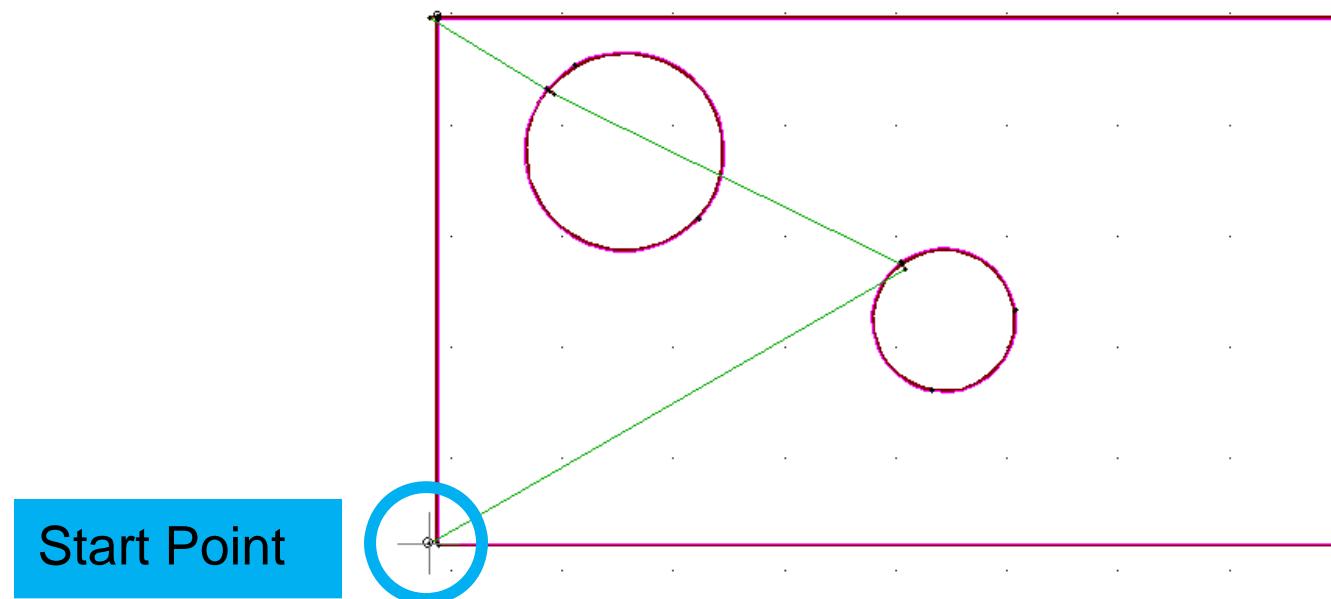


Where is the
start point in this
ORD file preview?

Step 9: Load and Clamp Material

MAXIEM
WATERJETS

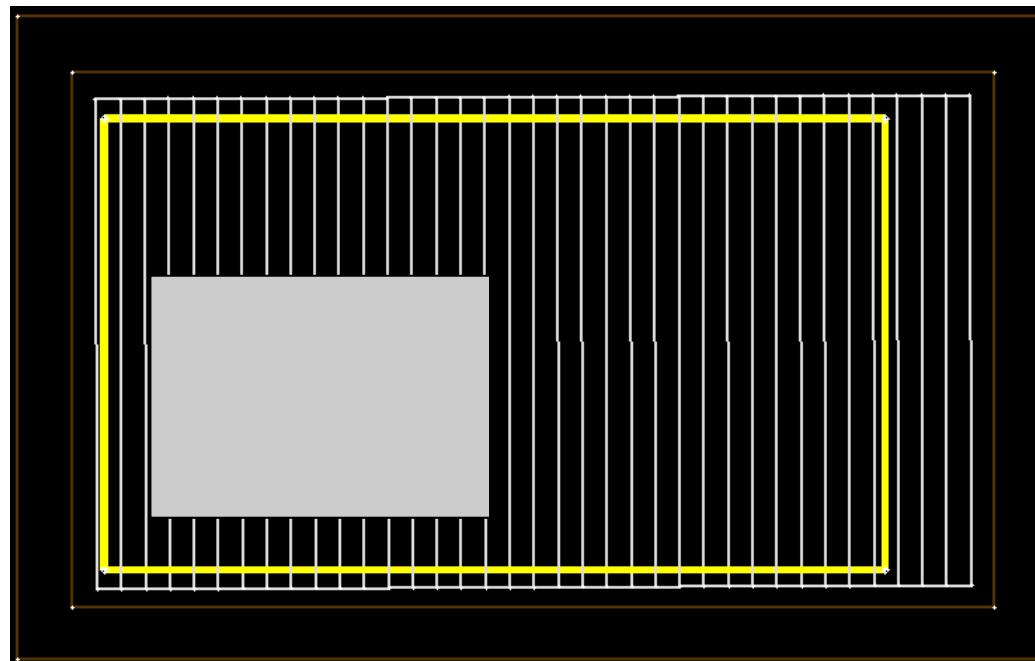
ORD file of the part we are going to cut



Step 9: Load and Clamp Material



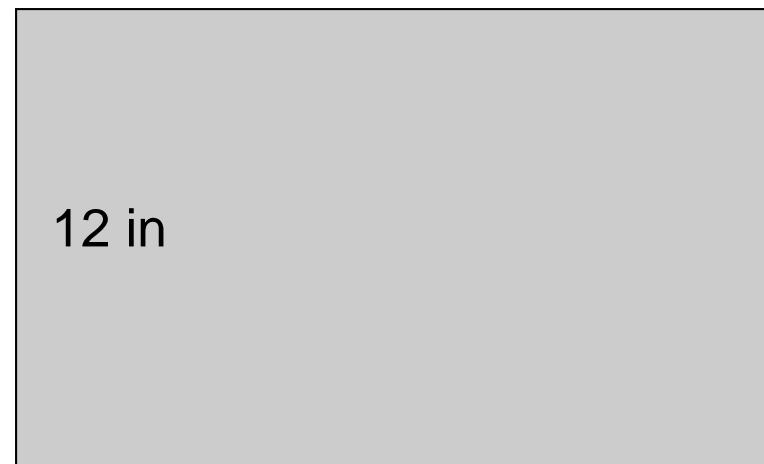
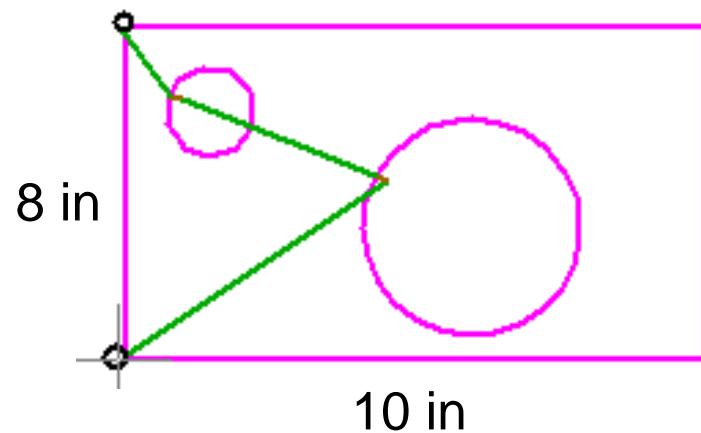
Material loaded and clamped in the tank



Step 9: Load and Clamp Material



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



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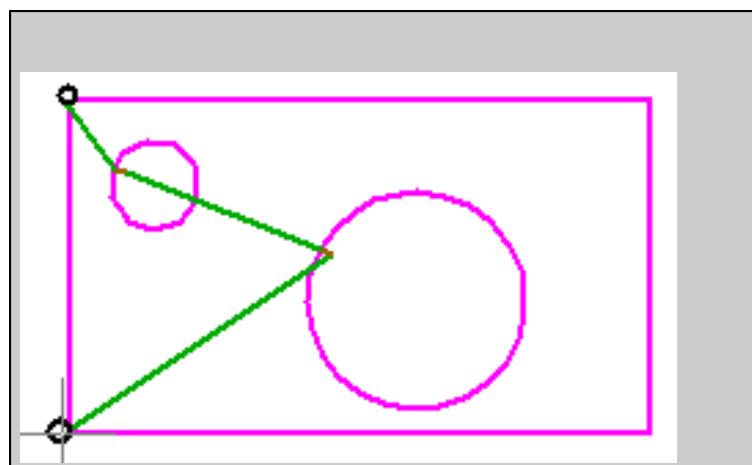
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Step 9: Load and Clamp Material

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Nozzle start position

You would place the nozzle so the whole part could be cut out of the material and so you would minimize your scrap



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WATERJETS

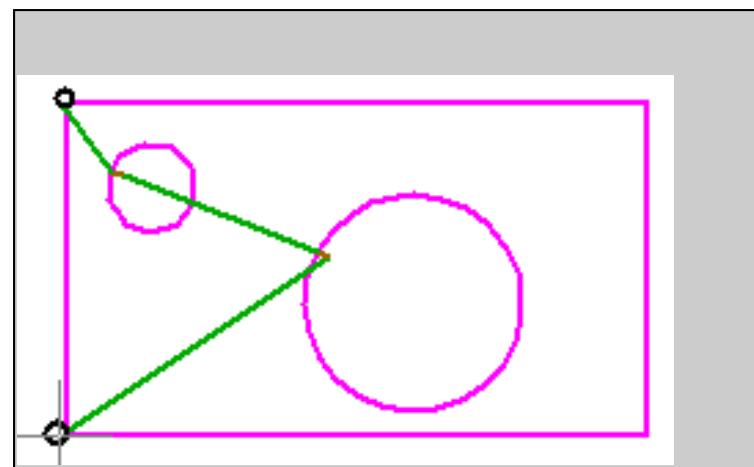
254

Step 9: Load and Clamp Material

MAXIEM
WATERJETS

Best Practices for Nozzle Positioning

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



MAXIEM
WATERJETS

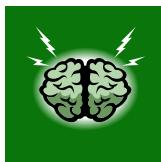
Step 9: Load and Clamp Material



Loading and Clamping Material Review

1. Give me one example of placing the material logically in the tank.
2. What are the three tasks involved in Step 9 of the Loading and Clamping Material process?

1. _____
2. _____
3. _____



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Step 9: Load and Clamp Material



Loading and Clamping Material Review

3. Why do we need to make sure our material is securely clamped in the machine before we cut it?
4. What is one consideration for positioning the nozzle for cutting a part?



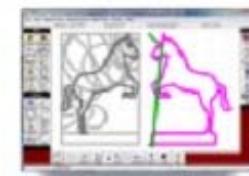
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Steps in Making Parts



• Intelli-MAX Layout

- Step 1:** Obtain/create a Drawing File (DXF file).
- Step 2:** Assign machining Qualities (edge finish).
- Step 3:** Clean and save the drawing.
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MAXIEM_Layout

• 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.



MAXIEM_Make



Step 10: Begin Machining & Cut the Part



Machining Tasks

- Task 1: Set the nozzle stand-off
- Task 2: Do a dry run of the tool path
- Task 3: Put the muff on the nozzle
- Task 4: Start the cutting process
- Task 5: Remove the cut part(s) from the machine

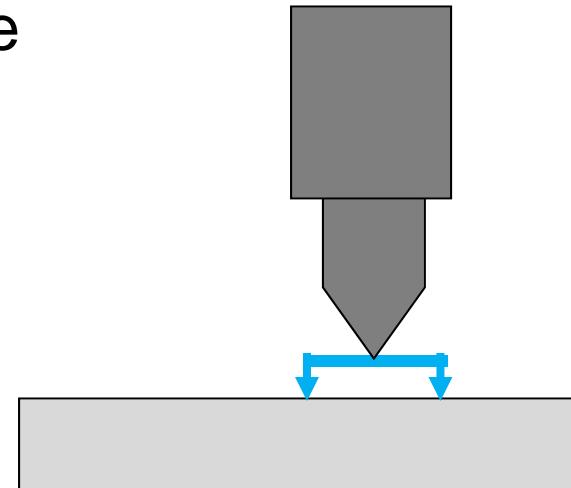


Step 10: Begin Machining & Cut the Part



Task 1: Set the nozzle stand-off

- Stand-off is the distance between the material surface and the tip of the mixing tube in the nozzle
- Set using a feeler gauge
 - .040 in. for standard Z-axis
 - .080 in. when using the A-Jet



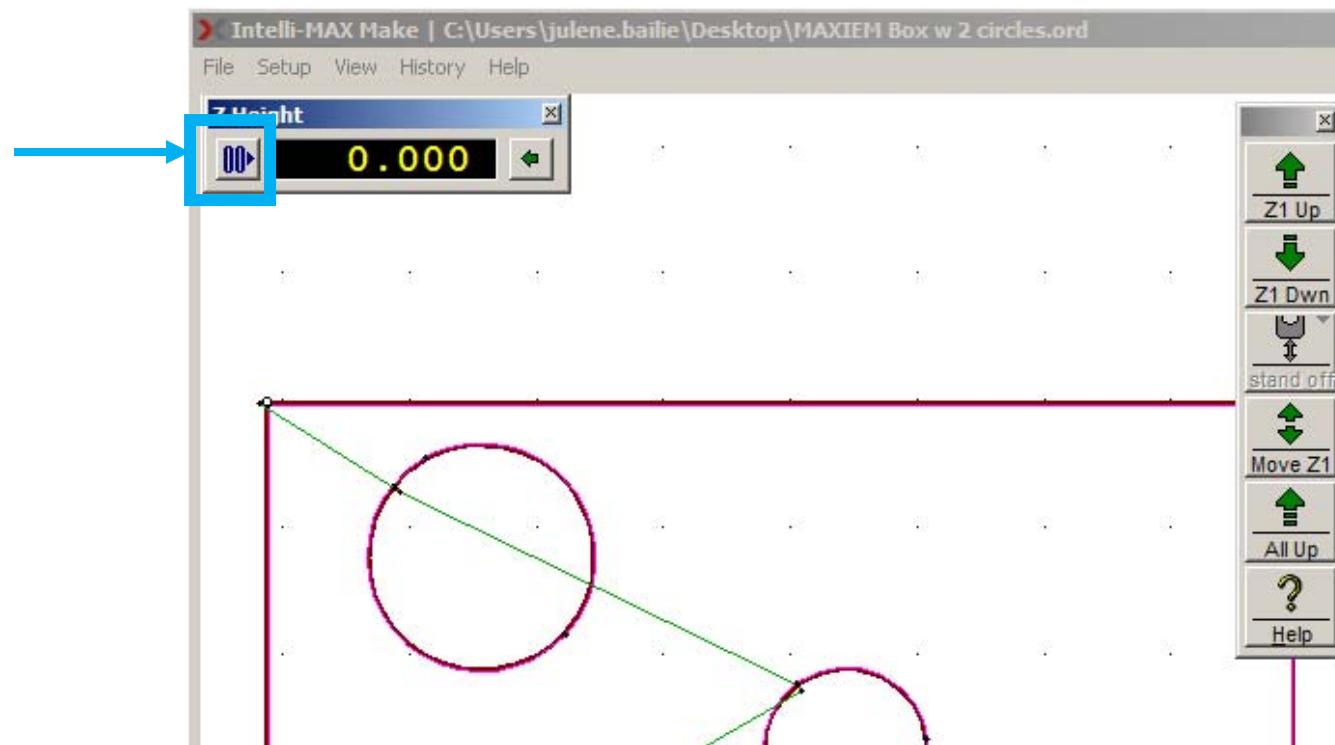
Keywords “stand-off”

Step 10: Begin Machining & Cut the Part

MAXIEM
WATERJETS

Task 1: Set the nozzle stand-off

- Click to zero the **Z Height** counter in **Make**

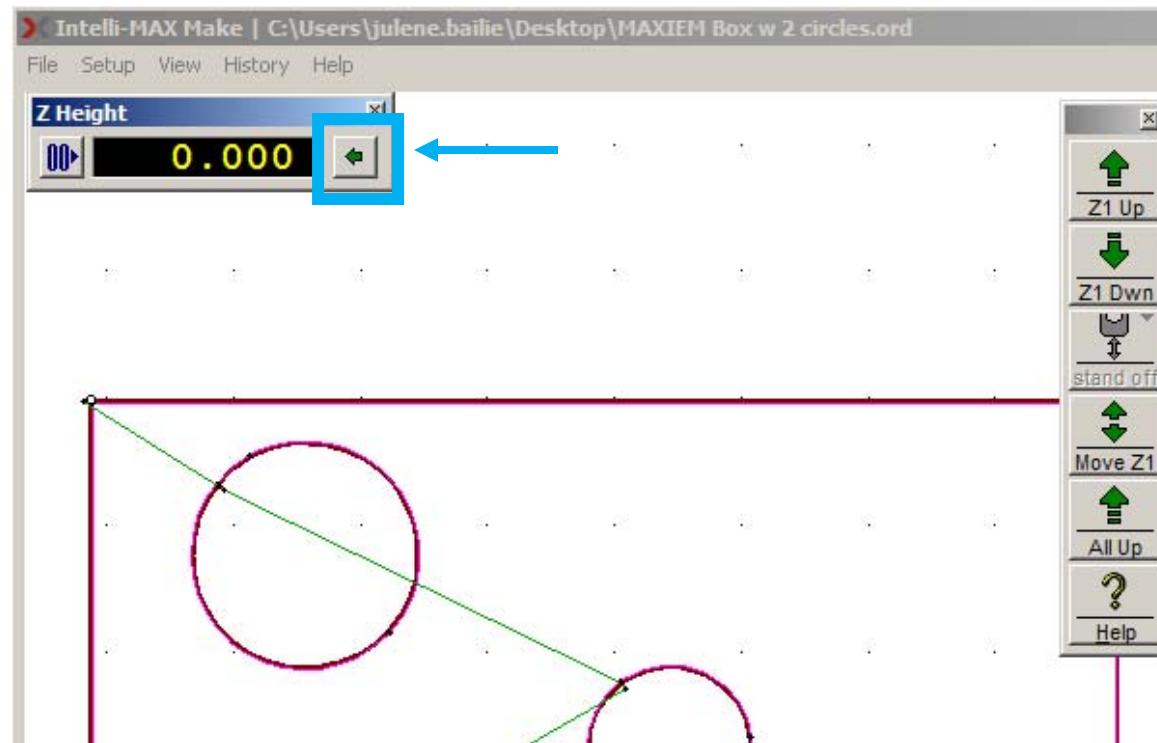


Step 10: Begin Machining & Cut the Part

MAXIEM
WATERJETS

Task 1: Set the nozzle stand-off

- Click to move the nozzle back to Z = zero in Make

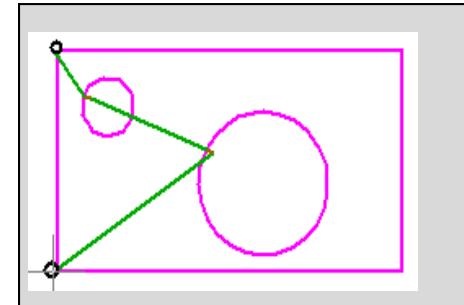


Step 10: Begin Machining & Cut the Part

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Task 2: 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
 - Verifies the part will fit on the material
 - Verifies the start point
 - Verifies the nozzle will not hit any fixturing
 - Verifies the nozzle stand-off is sufficient so the nozzle won't run into the material (if an uneven surface)



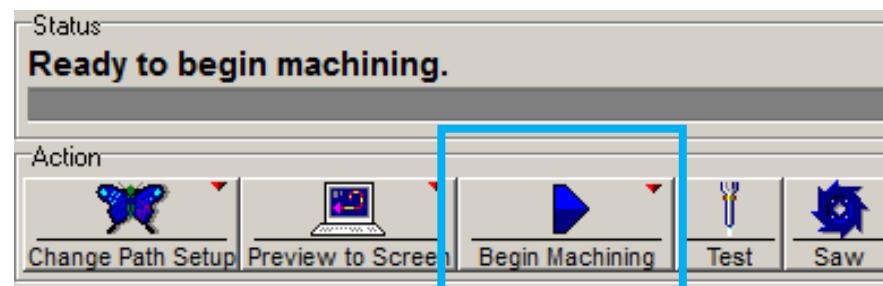
Keywords “dry run”

Step 10: Begin Machining & Cut the Part



Task 2: Do a dry run of the tool path

- To access the dry run option in **Make**, click **Begin Machining**
- This displays **OMAX Path Control**

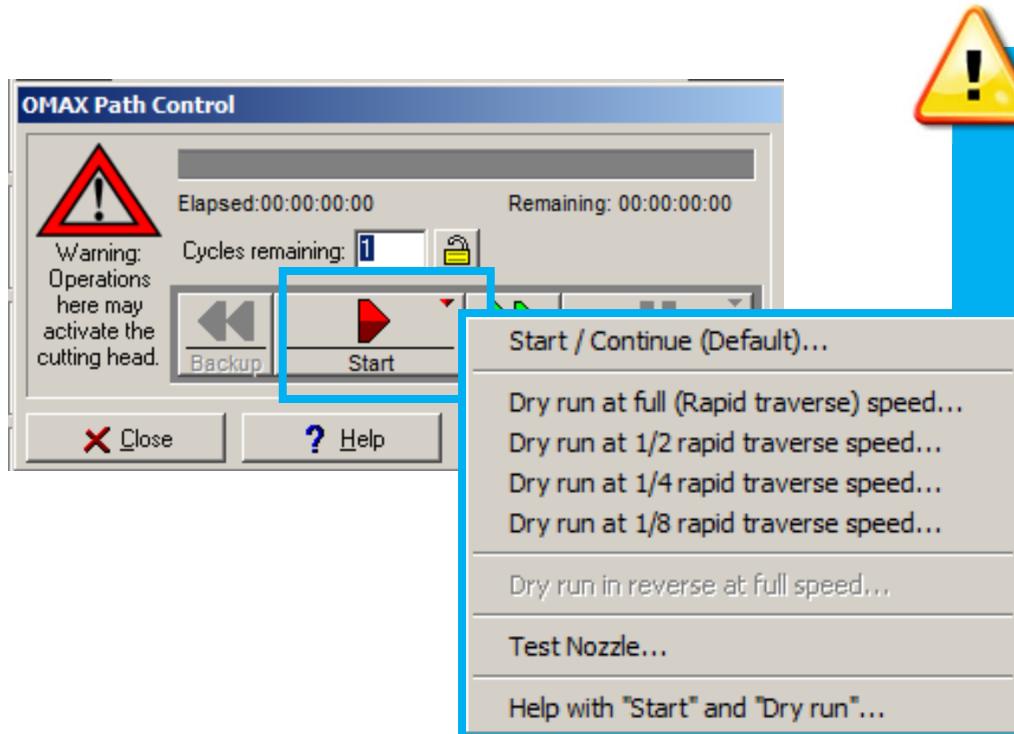


Step 10: Begin Machining & Cut the Part



Task 2: Do a dry run of the tool path

- In OMAX Path Control, right-click Start



Warning! Do not *left-click* the Start button as this will activate the cutting head

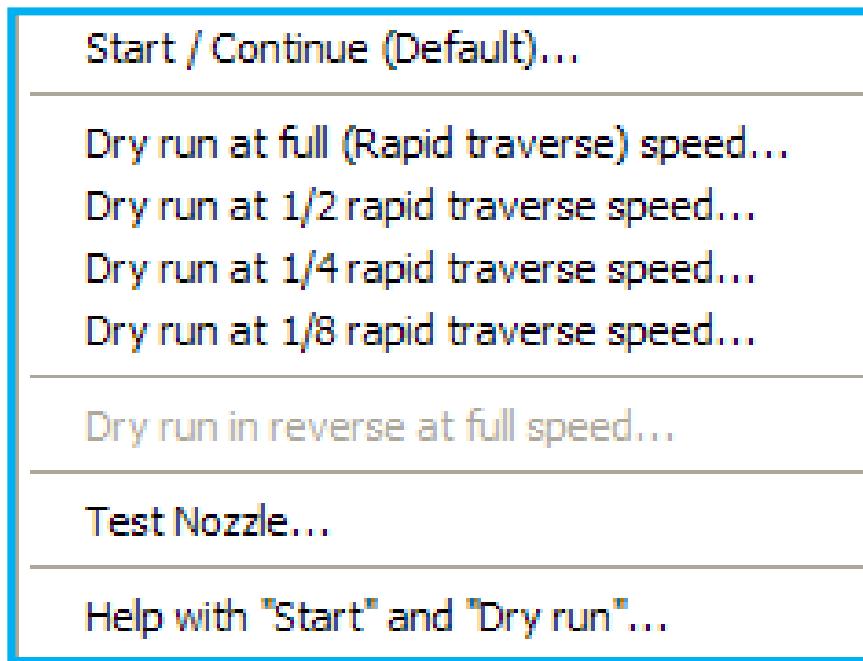


Step 10: Begin Machining & Cut the Part



Task 2: Do a dry run of the tool path

- Right-click **Start** to display the list of dry run options

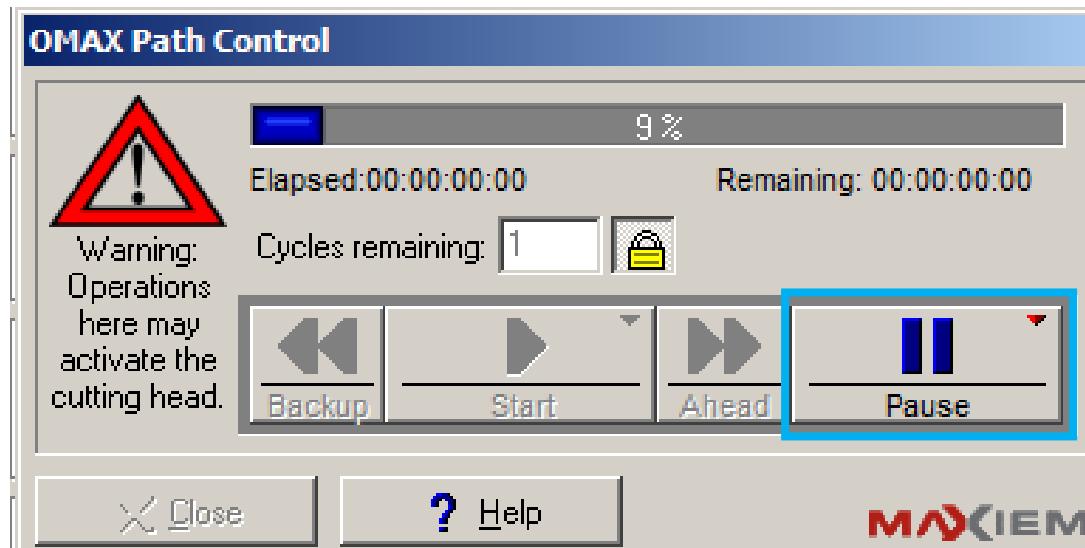


Step 10: Begin Machining & Cut the Part



Task 2: Do a dry run of the tool path

- Click **Pause** if you see potential problems during the dry run process – this will stop the nozzle



Step 10: Begin Machining & Cut the Part

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Task 2: Do a dry run of the tool path

- Click **Go home** to move the nozzle back to the **Path Start Home** position when you are finished with the dry run



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Step 10: Begin Machining & Cut the Part

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Task 3: Put the muff on the nozzle head

- Putting a muff on the nozzle prevents splash back that can damage the machine
- Always use a muff or splash guard



Keywords “muff”

Step 10: Begin Machining & Cut the Part

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Task 3: Put the muff on the nozzle head

- To put the muff on the nozzle
 - Close any machining functions in **Make**
 - Raise the nozzle Z-height about three inches
 - Slide the muff up onto the nozzle body so the bottom of the muff is about even with the tip of the mixing tube on the nozzle



Step 10: Begin Machining & Cut the Part



Task 4: 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?

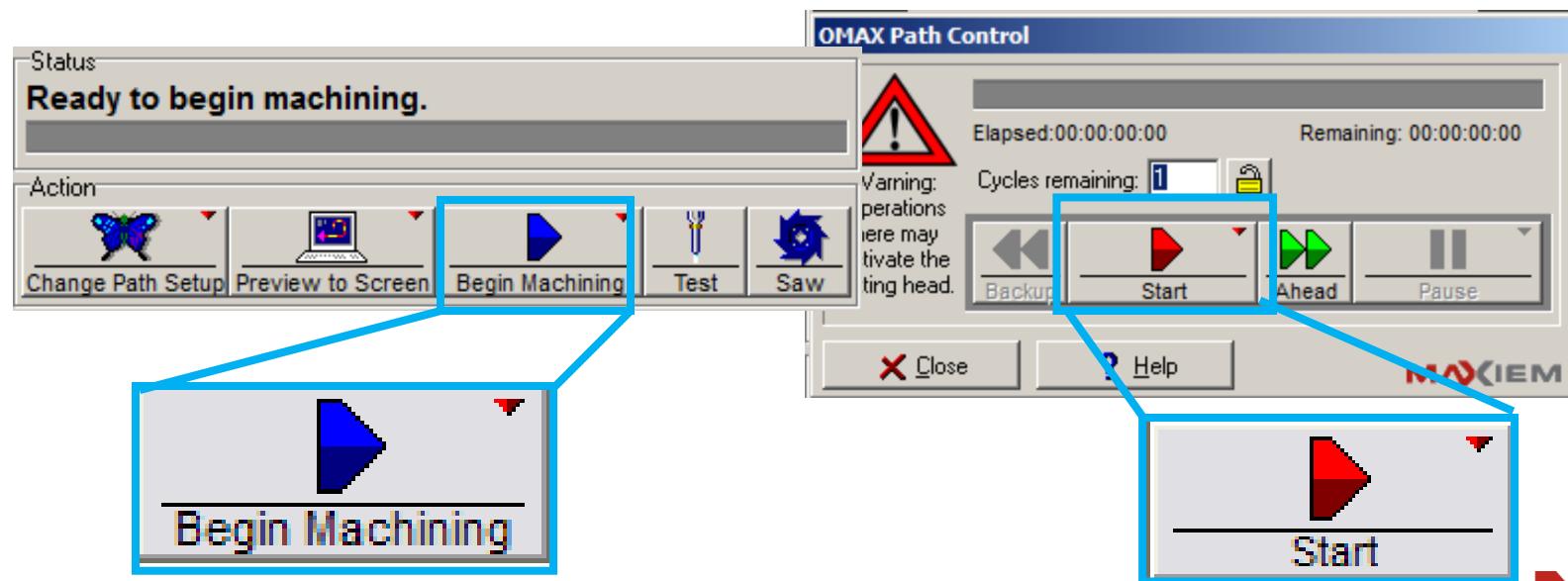


Step 10: Begin Machining & Cut the Part



Task 4: Begin machining the part

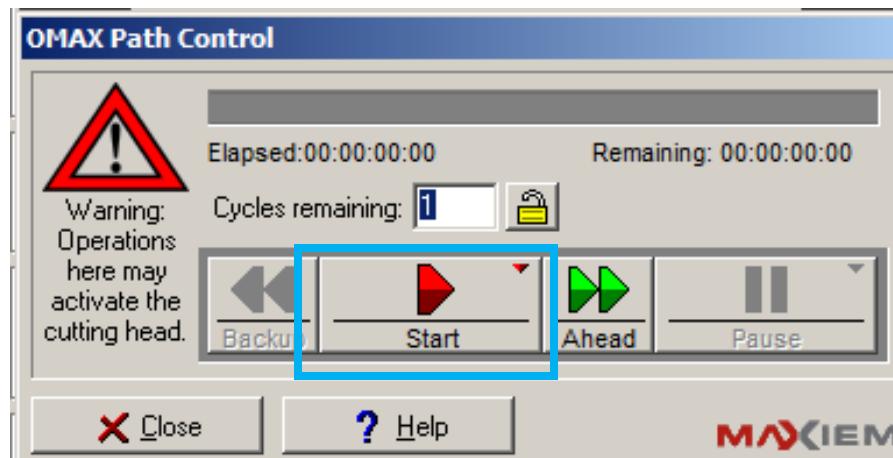
- To begin the machining process, click **Begin Machining**, and then click **Start**



Step 10: Begin Machining & Cut the Part



Task 4: Begin machining the part



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



Step 10: Begin Machining & Cut the Part

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Task 4: Begin machining the part



Both of these
Pause controls
will stop the
cutting head and
turn off the water
and abrasive



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Step 10: Begin Machining & Cut the Part



Task 4: Begin machining the part

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



Step 10: Begin Machining & Cut the Part

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Task 4: Begin machining the part

- Watch the part being machined
 - Adjust water level if necessary
 - Monitor the abrasive level. Add as needed.
 - Listen to the MAXIEM. It makes a distinct sound when cutting.
 - Check the part periodically



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Step 10: Begin Machining & Cut the Part



Task 5: Remove the cut part from the machine

- Close any machining function windows in **Make**
- Raise the nozzle Z-height
- Move the nozzle out of the way
- Rinse excess abrasive off the material
(if needed)
- Remove and inspect the 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 and save the drawing.

Step 4: Add Path Elements to the drawing and save it.

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



MAXIEM_Layout

• Intelli-MAX Make

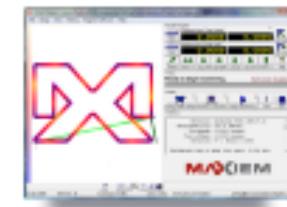
Step 6: Start up the machine.

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.



MAXIEM_Make



MAXIEM Customer Service



Customer Support

- Review the Service & Support section of the OMAX website for the following:
 - Hours of operation
 - Contact information
 - How to order/return parts
 - Warranty information

A screenshot of the OMAX website's Service & Support page. The page features a navigation bar at the top with links for OMAX PRODUCTS, MAXIEM PRODUCTS, PUMP TECHNOLOGY, SOFTWARE, BUY & FINANCE, SERVICE & SUPPORT, and PARTS ONLINE. Below the navigation is a search bar and links for News & Events, Company, Contact Us, Customer Login, and Create Account. The main content area has a red header "OMAX® ABRASIVE WATERJETS". It includes a "Service & Support" link in the breadcrumb trail. The "Service & Support" section contains a heading "Service & Support" and a paragraph about the company's commitment to education, training, and service. It also features a "OMAX & MAXIEM Technical Support" section with a table of hours, phone number, and email address.

www.omax.com/waterjets/service-support

