



Torchmate CAD Version 7.1 User's Guide

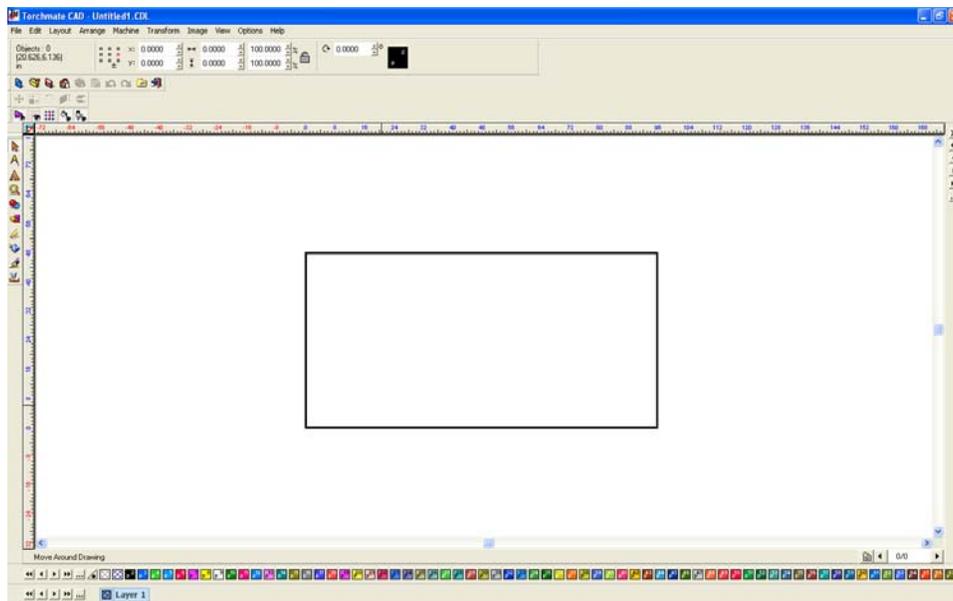
Revised: October 2008

Simple CAD Drawing:

This section describes basic drawing of a simple shape and how to prepare this shape to be cut. Please refer to later sections of this manual for further explanation on topics discussed.

Creating a Shape:

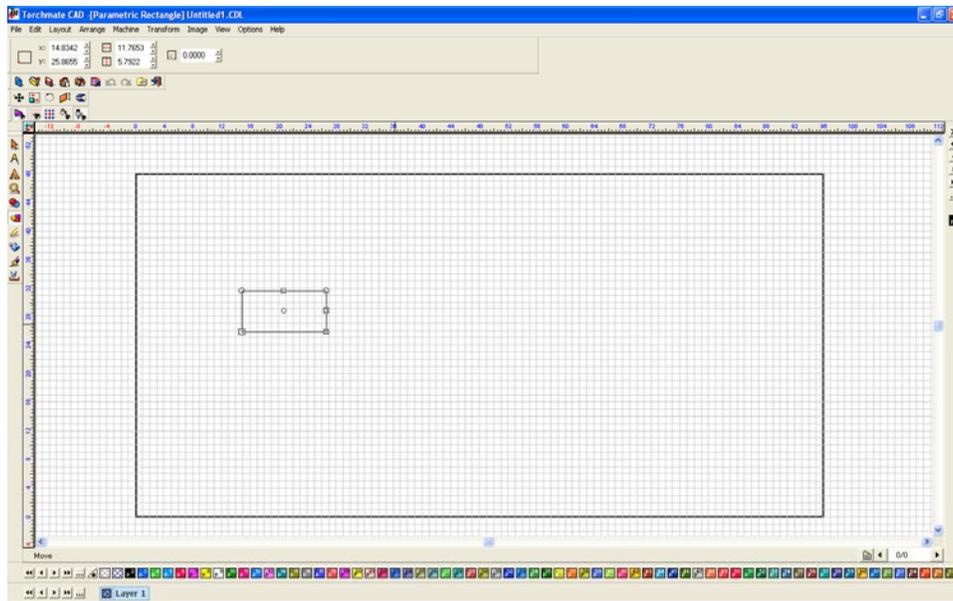
The Torchmate CAD's main screen has a tool bar along the left-hand side of the screen and an information bar along the top. All drawing is done in the main screen defined by the rulers along the margins. The top bar displays the size of the object, its position and scale. The left-hand tool bar contains tools used for drawing and manipulating objects.



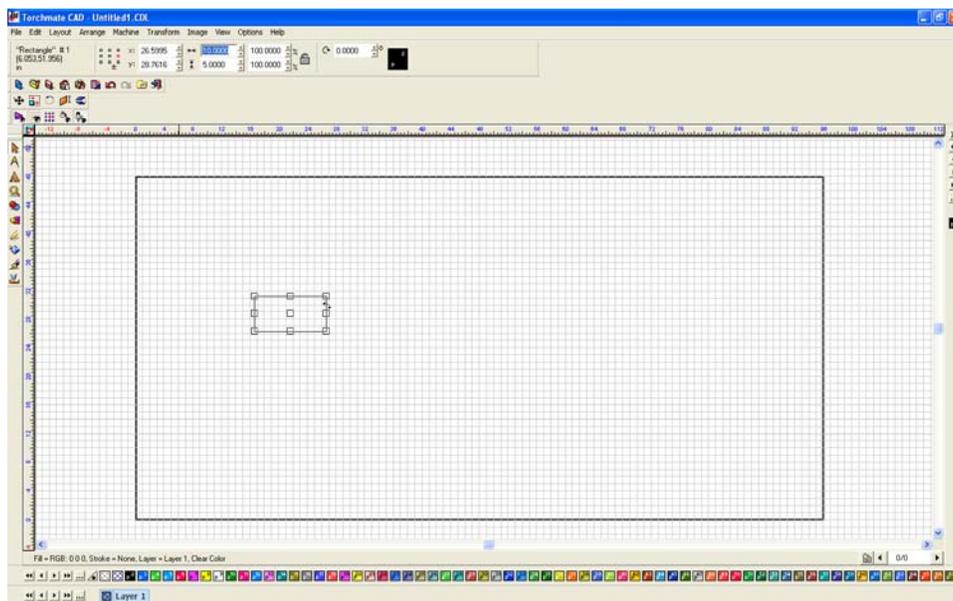
On the left-hand bar the shape tools can be accessed. The 'Shape Tools' menu has a few simple shapes to start most part drawings with (circle, oval, square, polygon, star, arrow and arch).



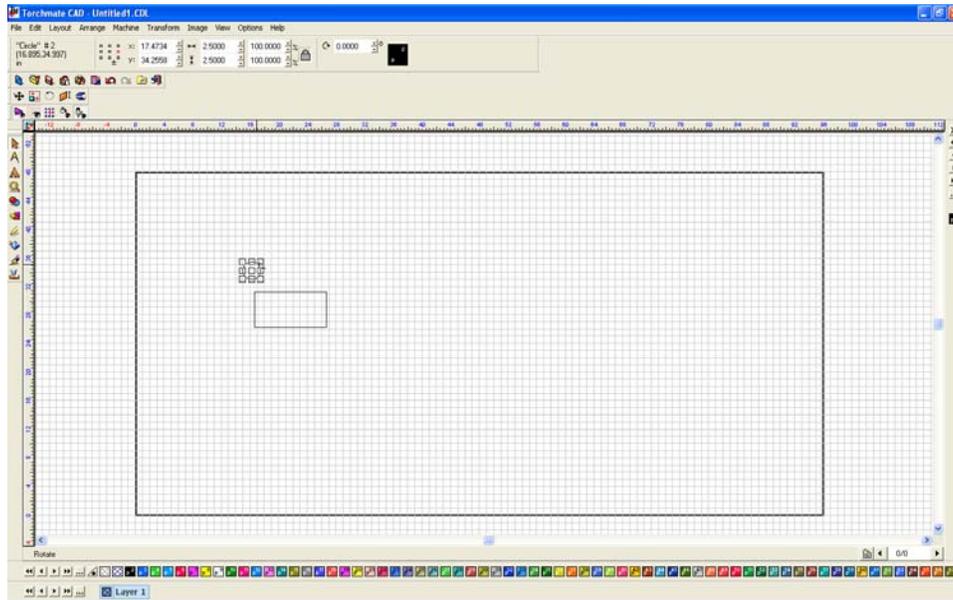
Begin by drawing a simple rectangle; the size is irrelevant as it can be adjusted later. To do this simply click on the rectangle icon from the 'Shape Tools' menu, then click and drag to draw out the rectangle in the work area.



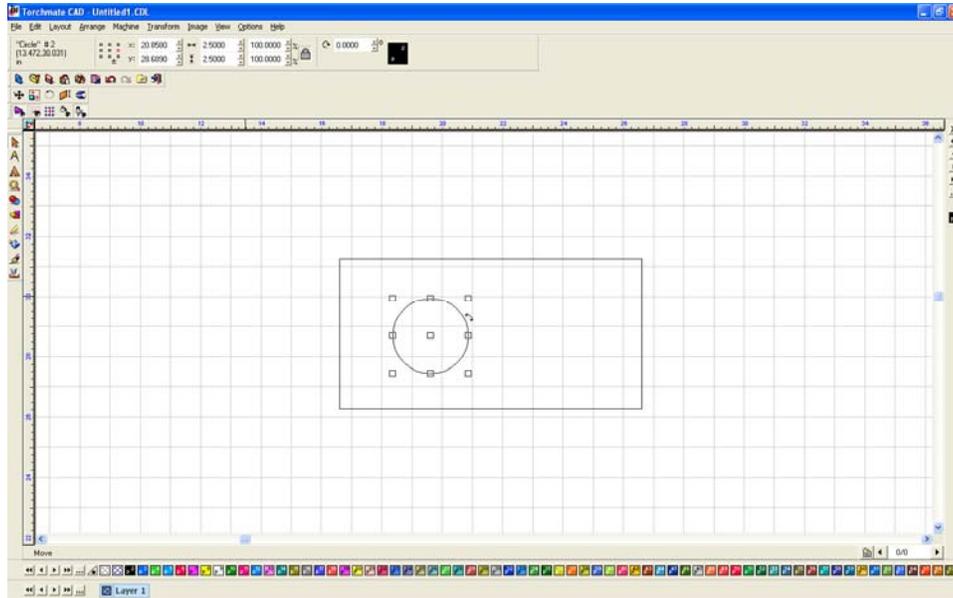
To change the rectangle's size select it by clicking on the edge of the part, then on the top tool bar type in the 'X' and 'Y' dimensions that are wanted and press enter.



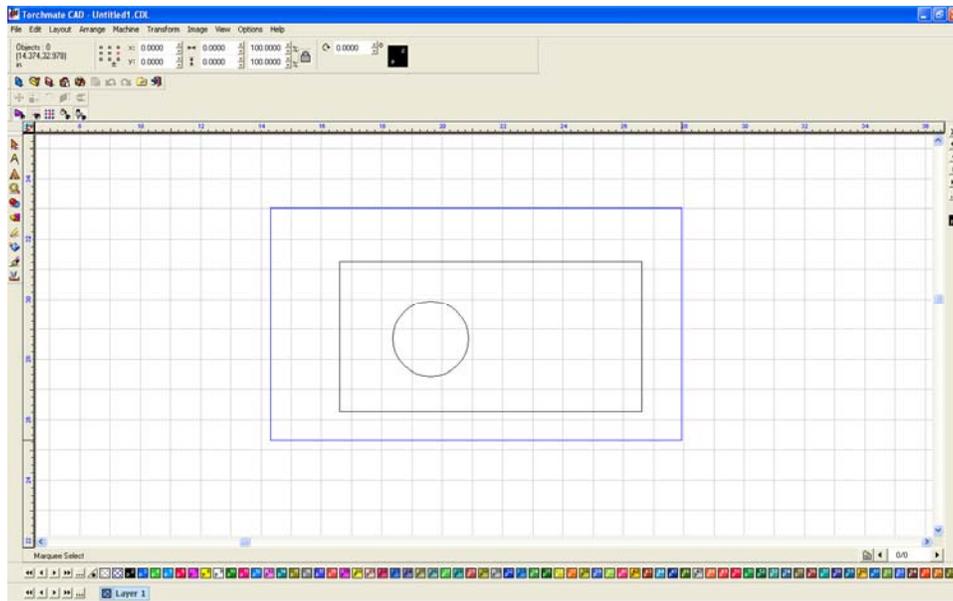
Draw a circle using the same method.



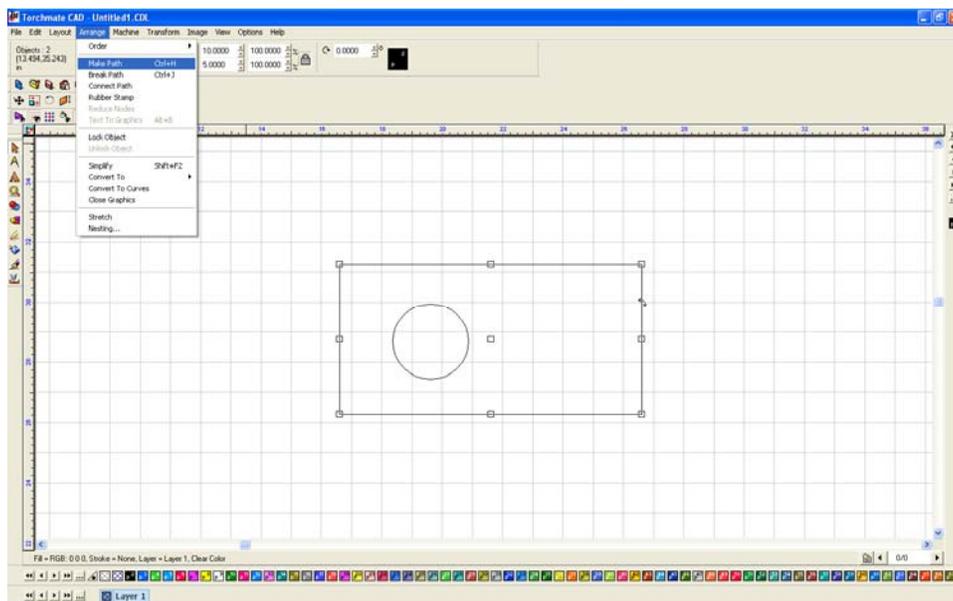
Zoom in on the shape by using the 'Zoom Tools' pull out along the left-hand tool bar. Next move the circle to position it inside of the rectangle.



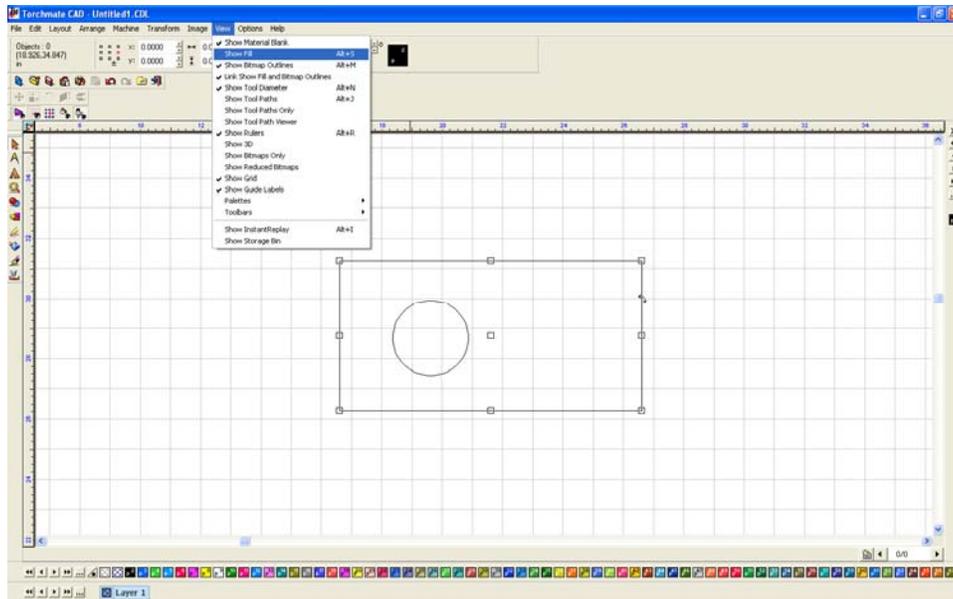
Once the circle is positioned in the rectangle select both objects, this can be done a few ways. Using the ‘Selection Tools’ from the left-hand toolbar click and drag a blue box around the two objects this will select both of them; another way is to go to ‘Edit’ → ‘Select All’.



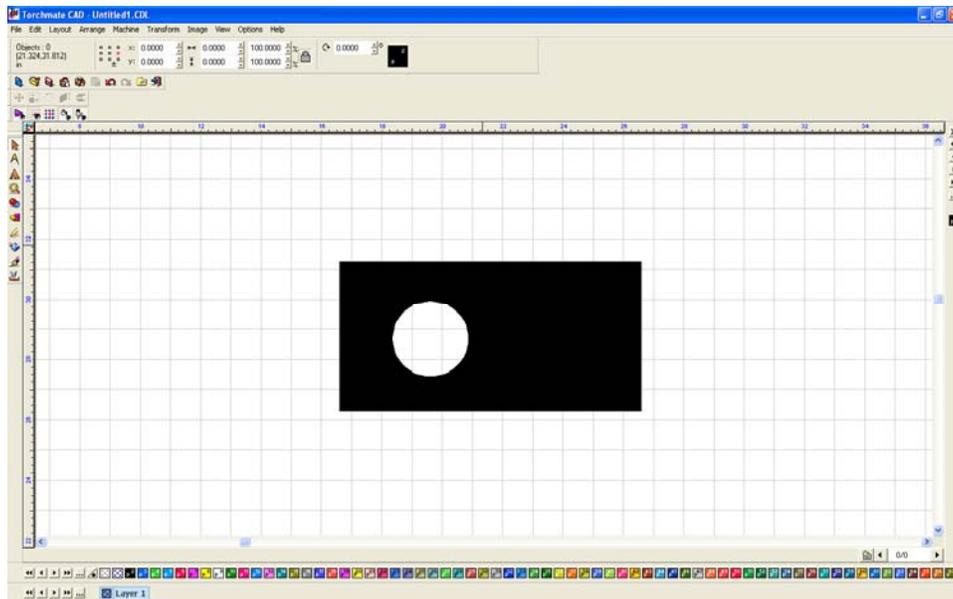
With both objects selected go to ‘Arrange’ → ‘Make Path’. This option tells the CAD that all objects selected are one part, allowing the software to determine if something is a hole or cutout.



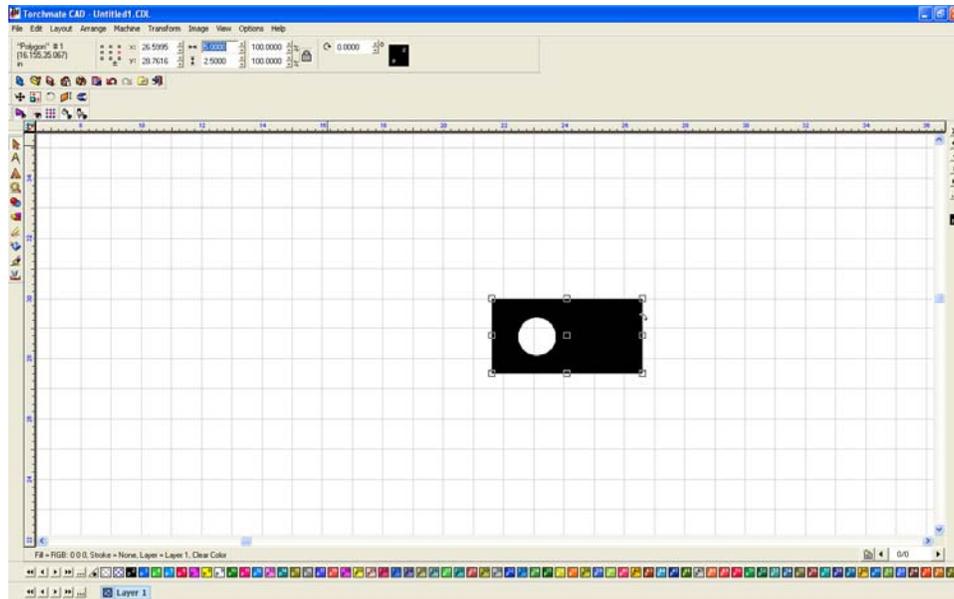
To verify that Torchmate CAD perceives the part as it is intended go to 'View' → 'Show Fill' this option displays the part as the computer sees it.



With 'Show Fill' on the part will fill in what is perceived as the part. Holes should be empty with the metal part filled in.



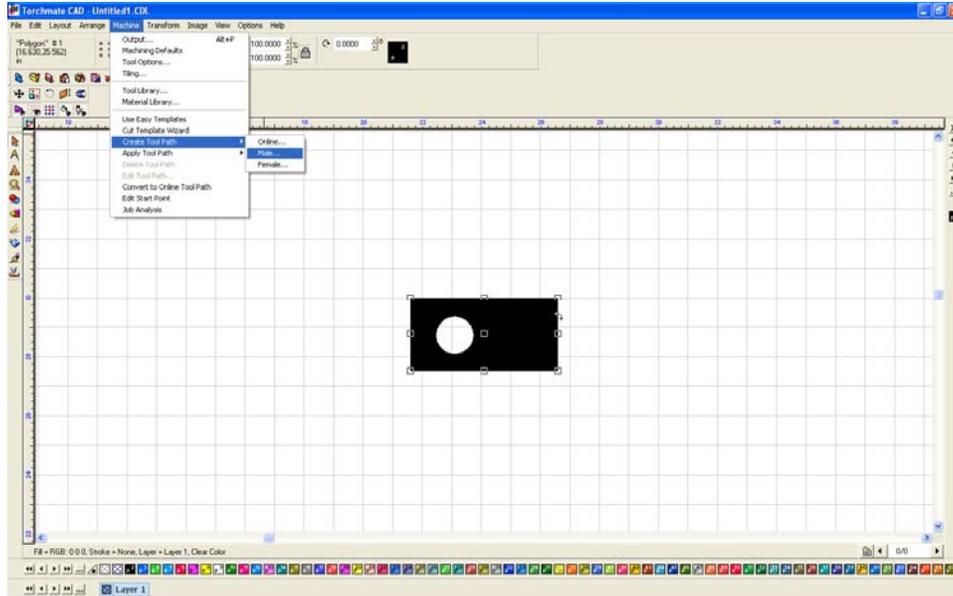
Once the part is finished it can be resized again if necessary, this resizing will adjust the hole's size along with the part's size.



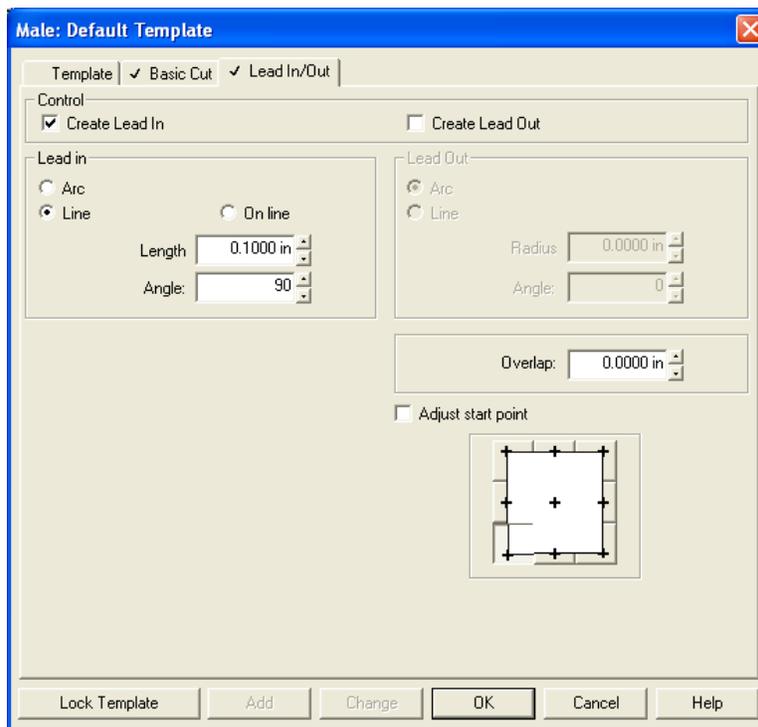
If the part is the correct size and 'Show Fill' appears correct the part is ready to have a tool path created.

Creating Tool Paths:

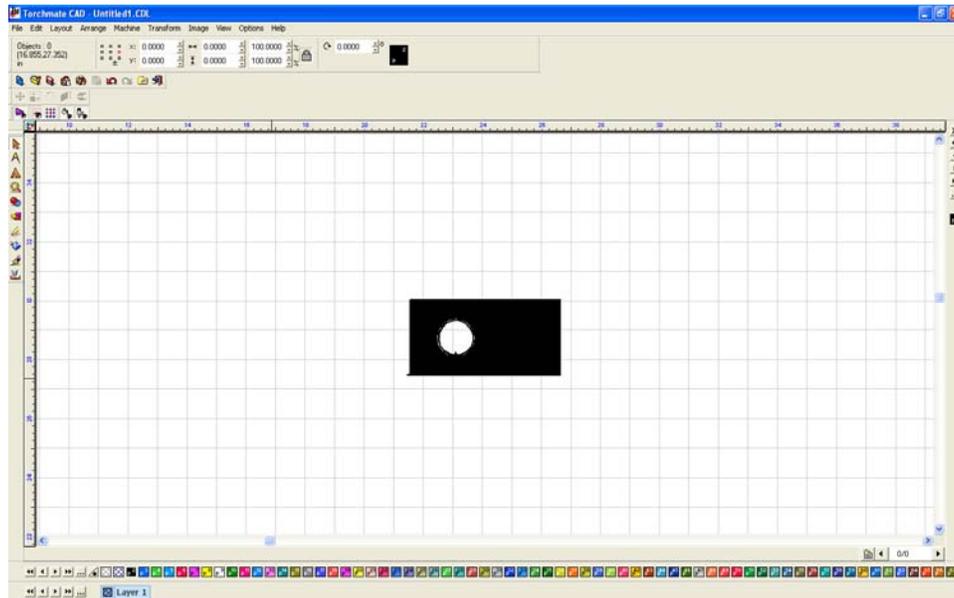
To create a tool path go to 'Machine' → 'Create Tool Path' → 'Male'.



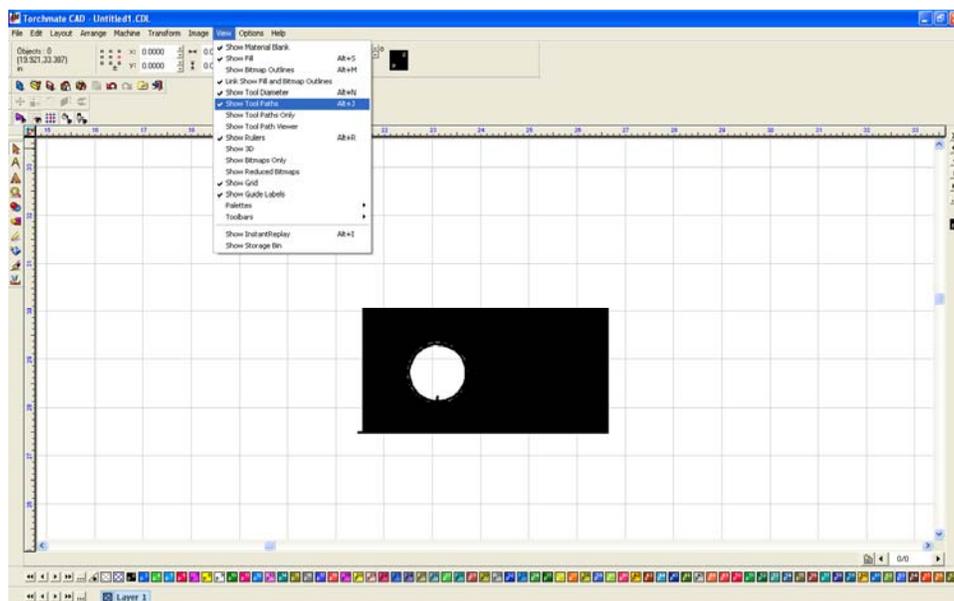
For this simple part the only changes to be made are under the 'Lead In/Out' tab. Create a lead in by specifying a length and angle. Then press 'OK' to create the tool path.



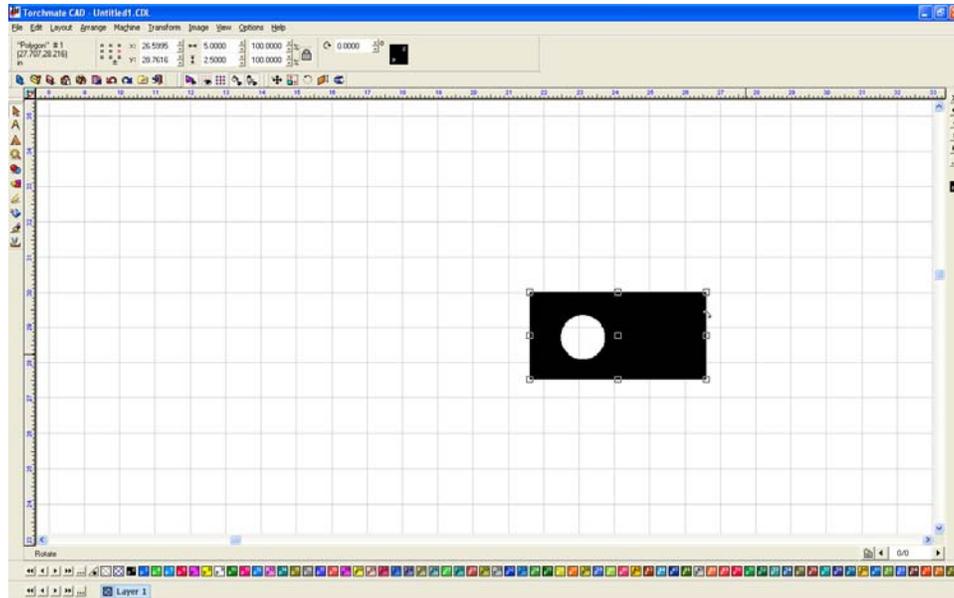
The screen now has two objects on it, the original part drawing and the tool path. The original drawing is no longer needed and needs to be removed.



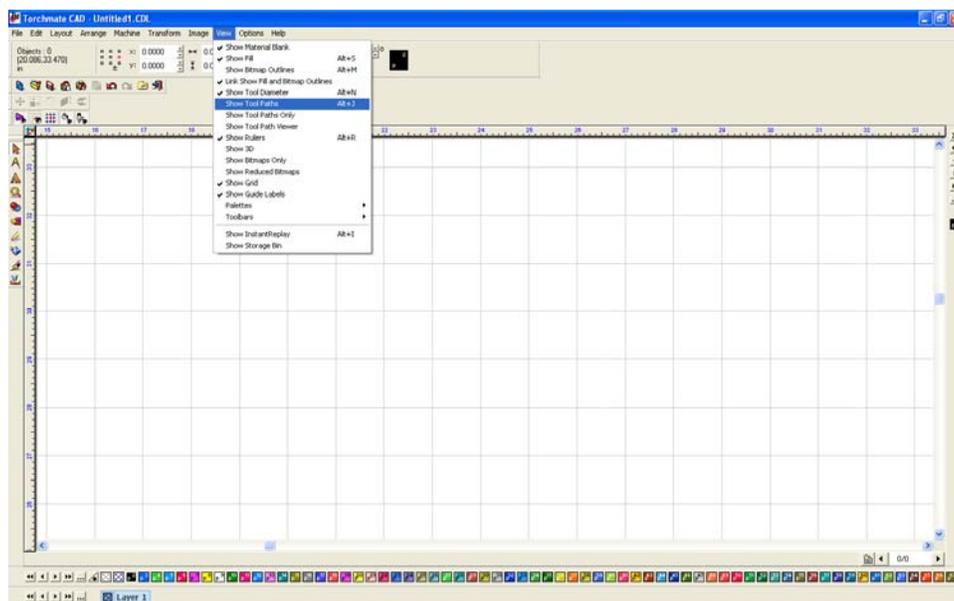
To eliminate the original drawing go to 'View' → 'Show Tool Paths' and ensure that it is unchecked.



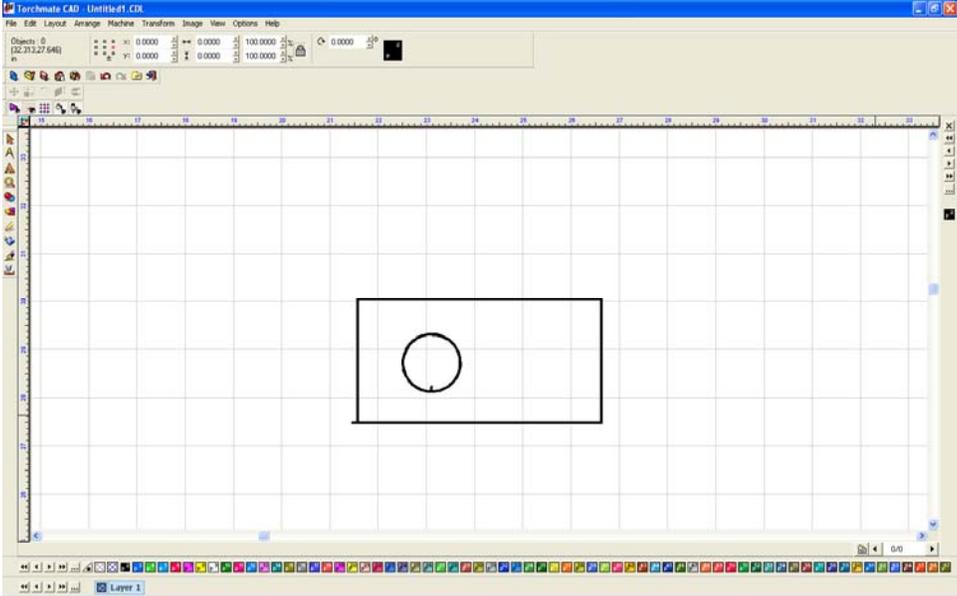
The only object visible now is the original object.



Select the object and press 'Delete' the screen will be blank now. Go back to 'View' → 'Show Tool Paths'.

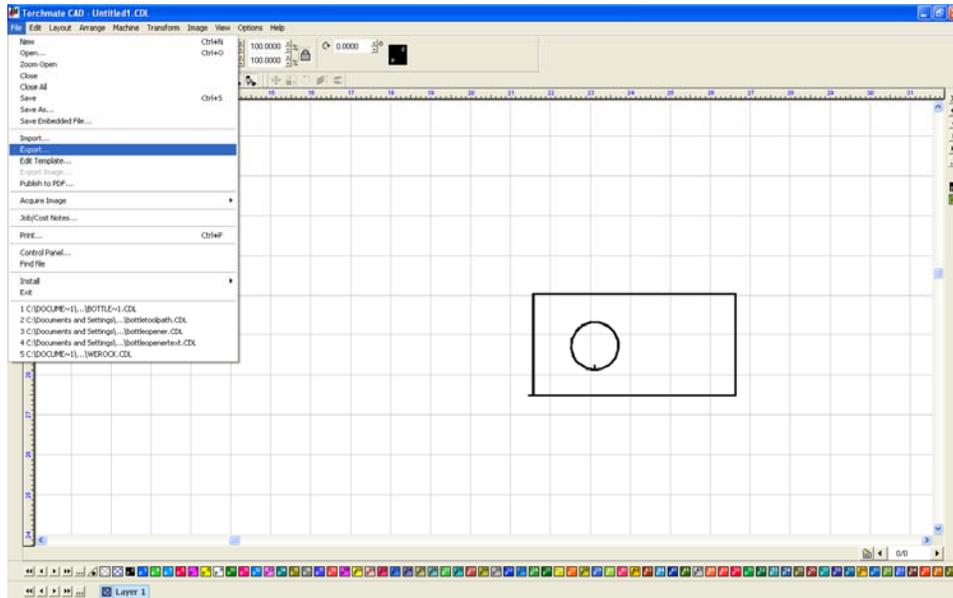


The only remaining object is the tool path, this part is now ready to export to be cut.

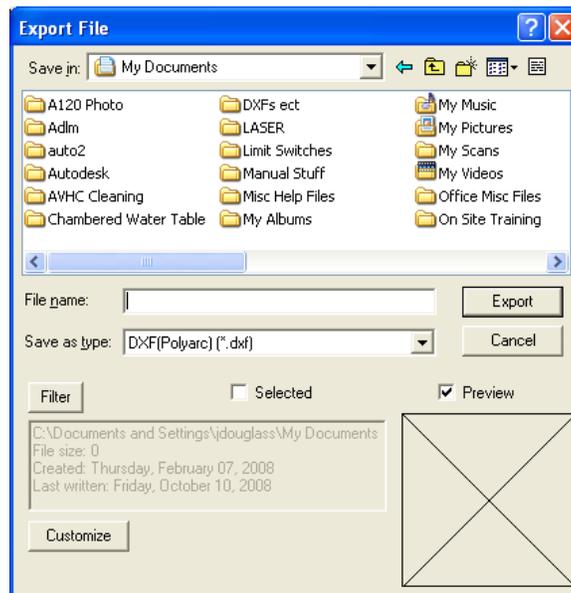


Exporting Files:

To be able to cut a part it needs to be exported as a 'DXF' format. To export go to 'File' → 'Export'.



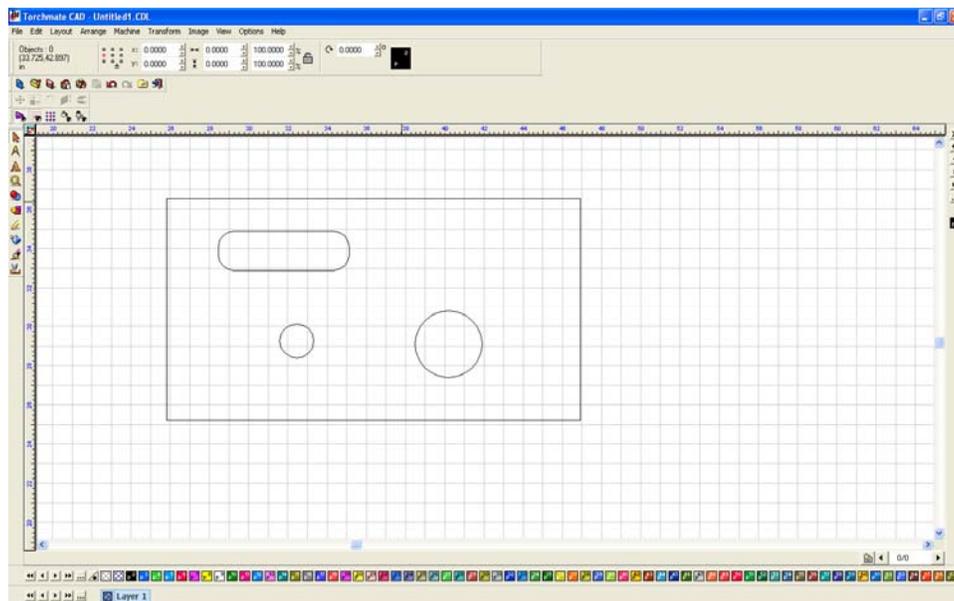
Ensure that the 'Save as type' is listed as 'DXF (Polyarc)'. Give the file a name and ensure that the location of where it is being saved is known. Select 'Export' and the file will now be able to be imported into the driver software to cut.



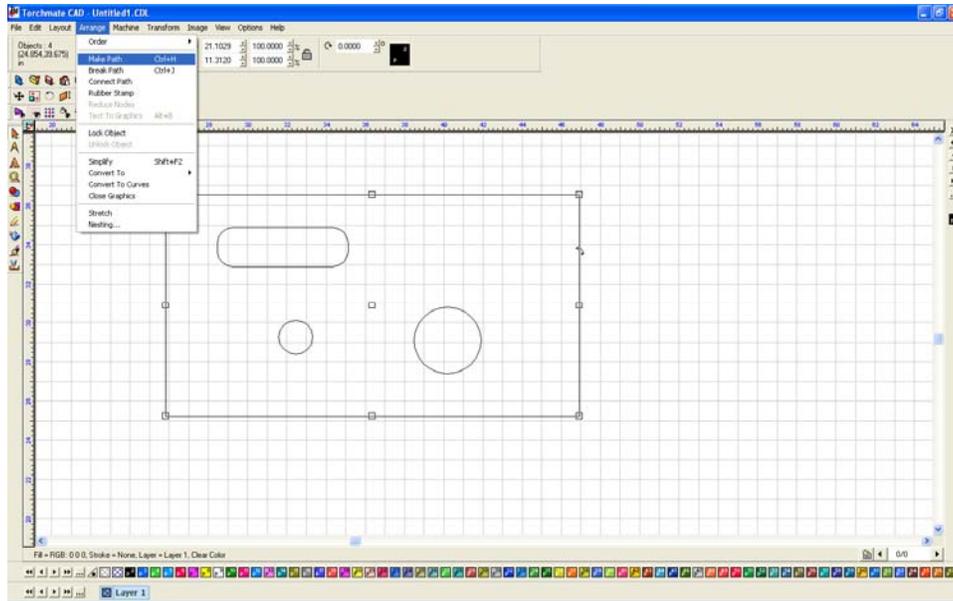
Understanding Paths:

In Torchmate CAD a path can mean a few things mostly it refers to either a tool path or an object. When a path refers to an object the path is essentially the whole part. For simple shapes the path is just one object. Once a part contains holes or cut outs then the path contains multiple shapes. In the Torchmate CAD the path of an object can be broken, connected, or made all path options are accessed from the 'Arrange' menu.

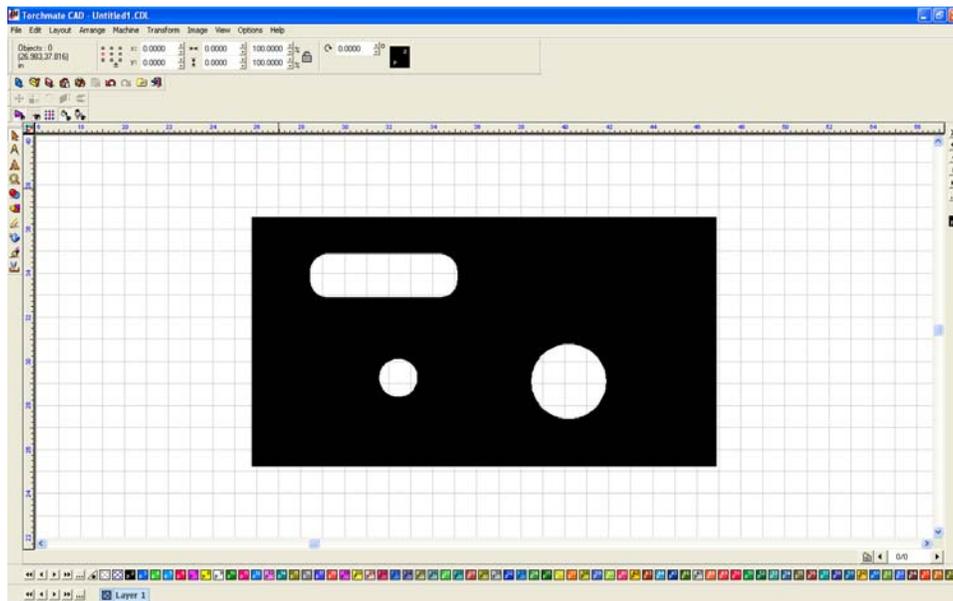
Make path takes multiple objects and tells the CAD to consider them as a single part. Make path is used primarily to create holes in objects. Start with an outline and a few holes.



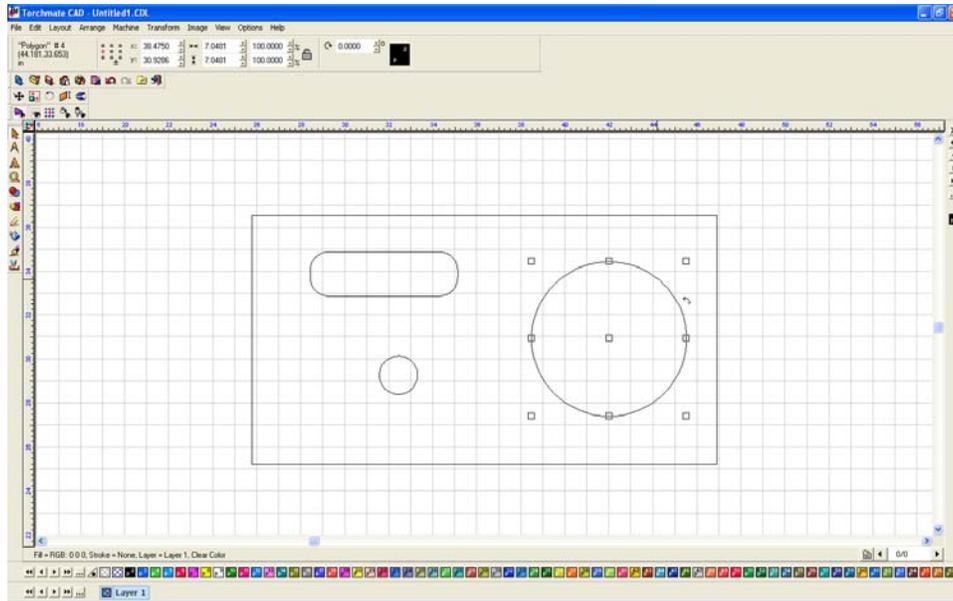
The part when it is just created is four separate objects the objects need to be merged together to one part. Select all objects that compose the part, then go to 'Arrange' and select 'Make Path'.



The objects are now one part and one path. The best way to ensure that this is the case is to go to 'View' and select 'Show Fill' this displays the object as the CAD interprets it; the filled in parts indicating the actual part.

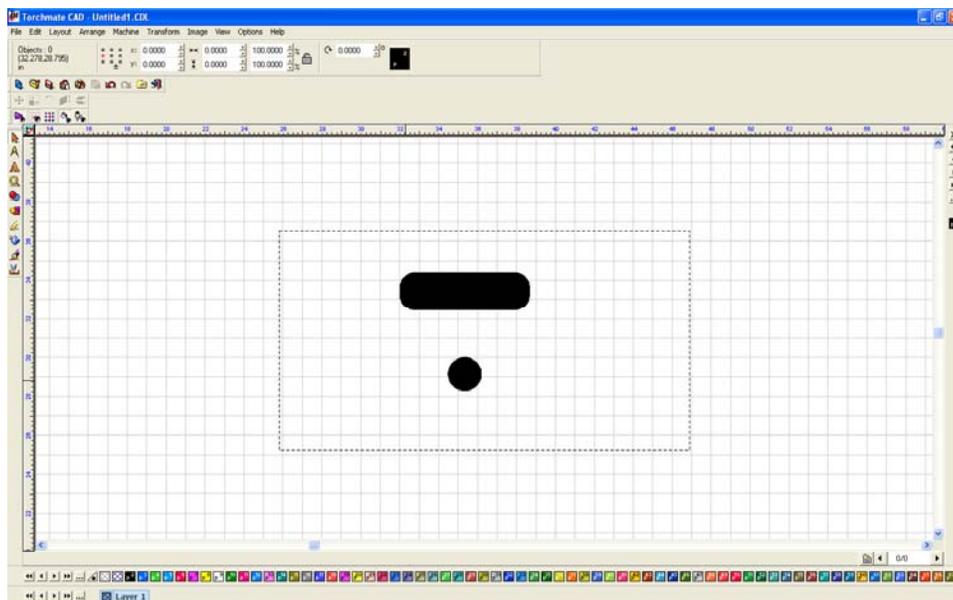


The object is now a single part that can be moved around, all of the nodes can be edited at once as well. To edit a single hole or the outline without changing any parts use break path to separate the objects back to individual elements. Any element can now be changed. Once changed select all parts and 'Make Path' again to revert the objects to a single part.

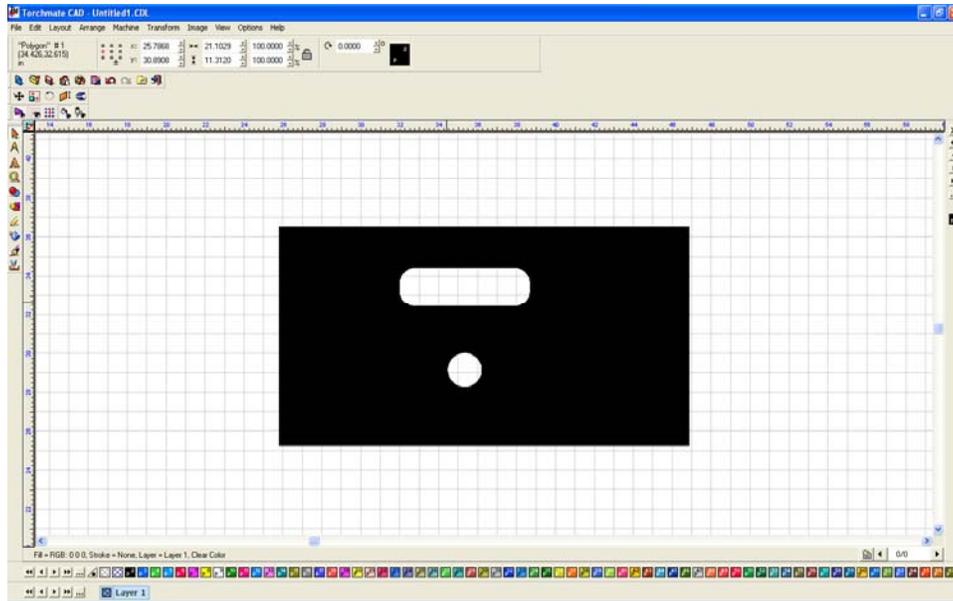


Using 'make' and 'break' path allows for the editing of single components of a part or the merging of elements to create a part. Show fill is an invaluable tool for keeping track as to what stage a part is in as it will show what the computer is considering a part.

'Connect Path' is used to join gaps in a object, these gaps can be very small and will generally occur in objects scanned or imported in to Torchmate CAD. The easiest indication that an object needs to have connect path applied to it is when 'Show Fill' is on; any object containing a gap will show up as a dotted line.



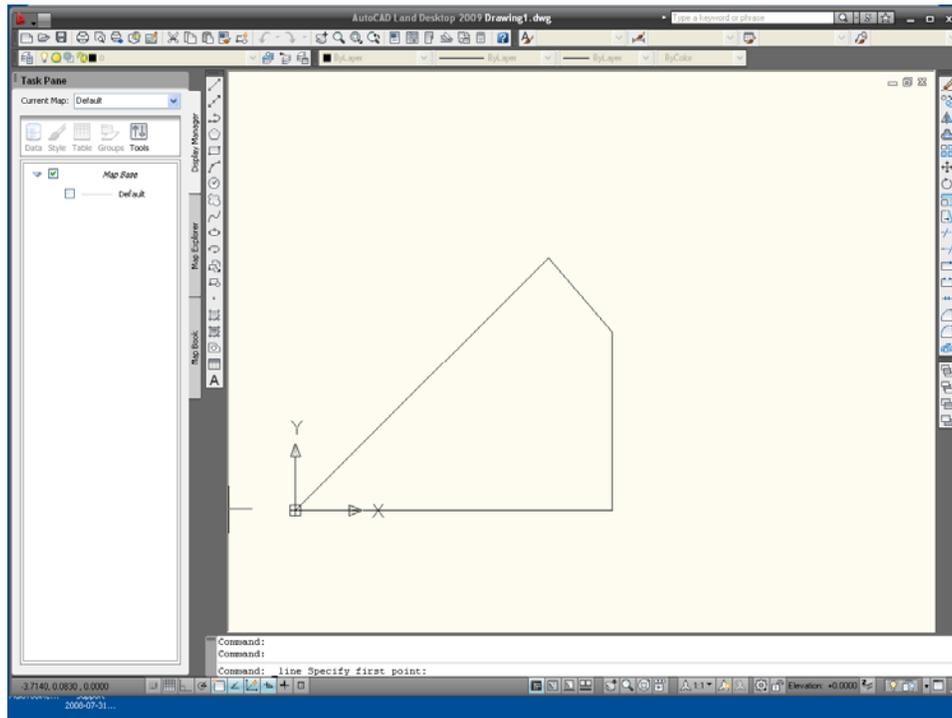
Select the object and choose 'Connect Path' from the 'Arrange' menu. The CAD will ask for an 'Allowable Error' this is the maximum distance it will attempt to join a gap.



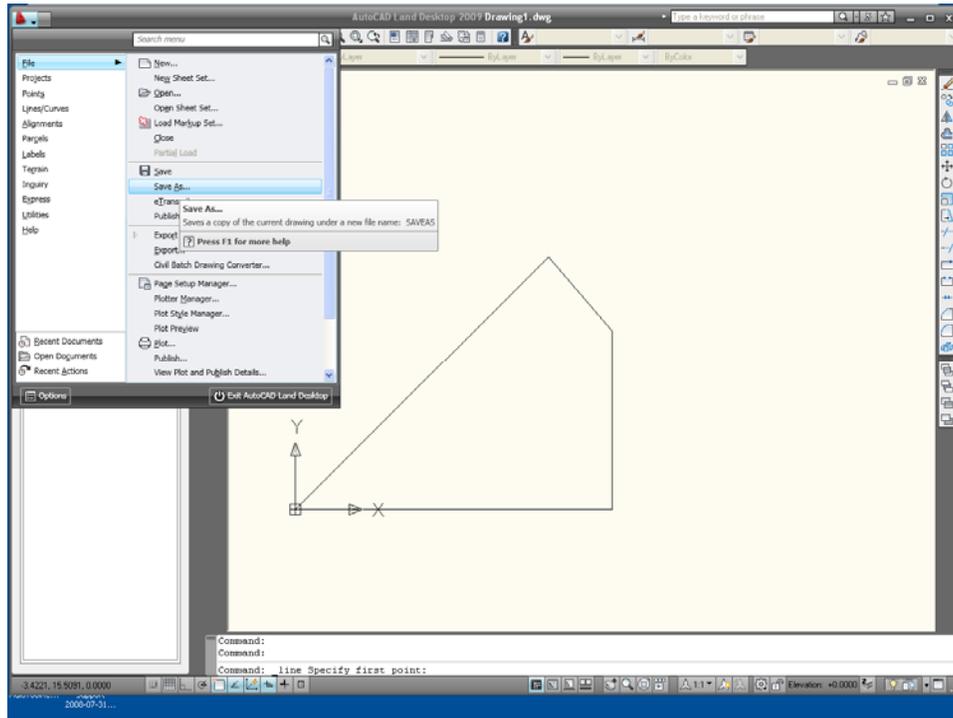
Importing DXF Format Drawings:

The DXF format is a universal exchange format for dimensioned drawings. Torchmate CAD can import DXF files and once in the CAD they can be manipulated and toolpaths can be created.

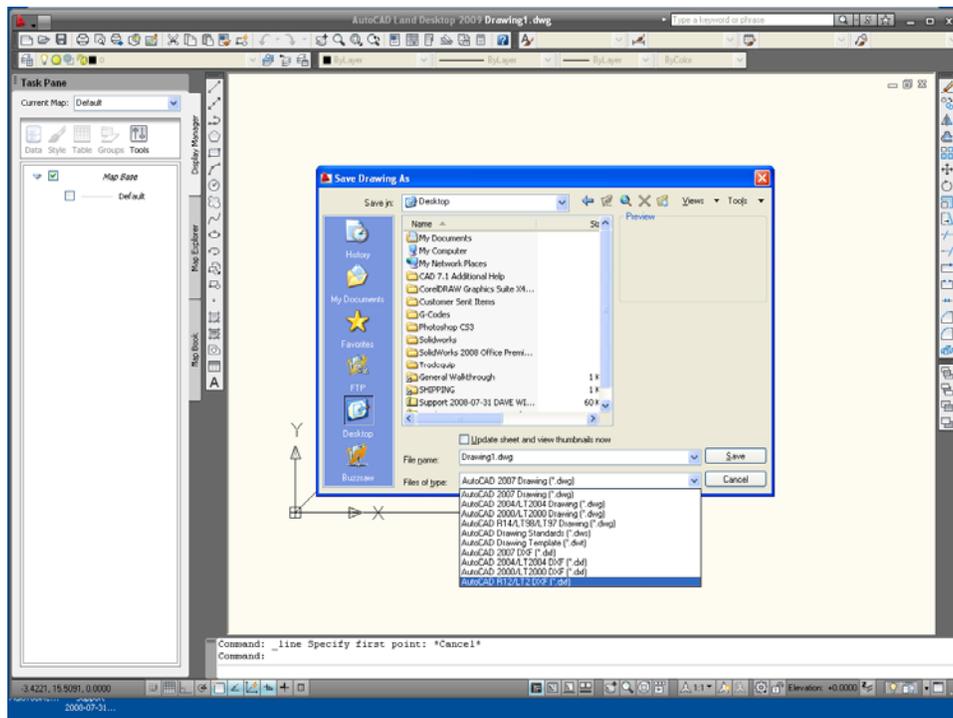
To bring in a DXF drawing the first step is to create one in another program, in this case AutoCAD.



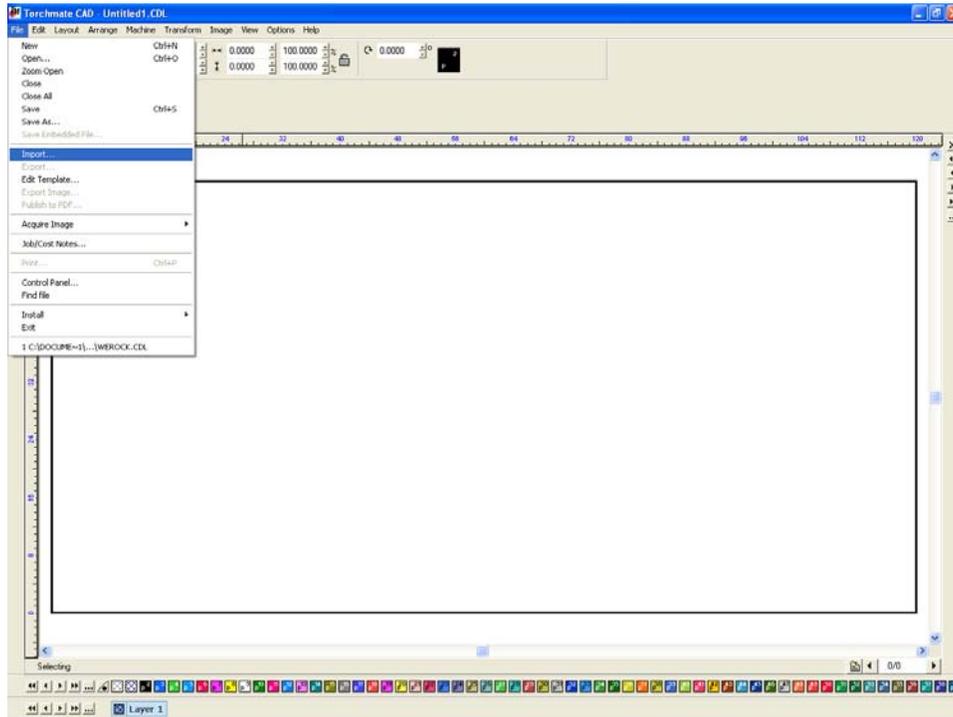
Depending on the program the option to create a DXF may be listed under ‘Save As’ or ‘Export’.



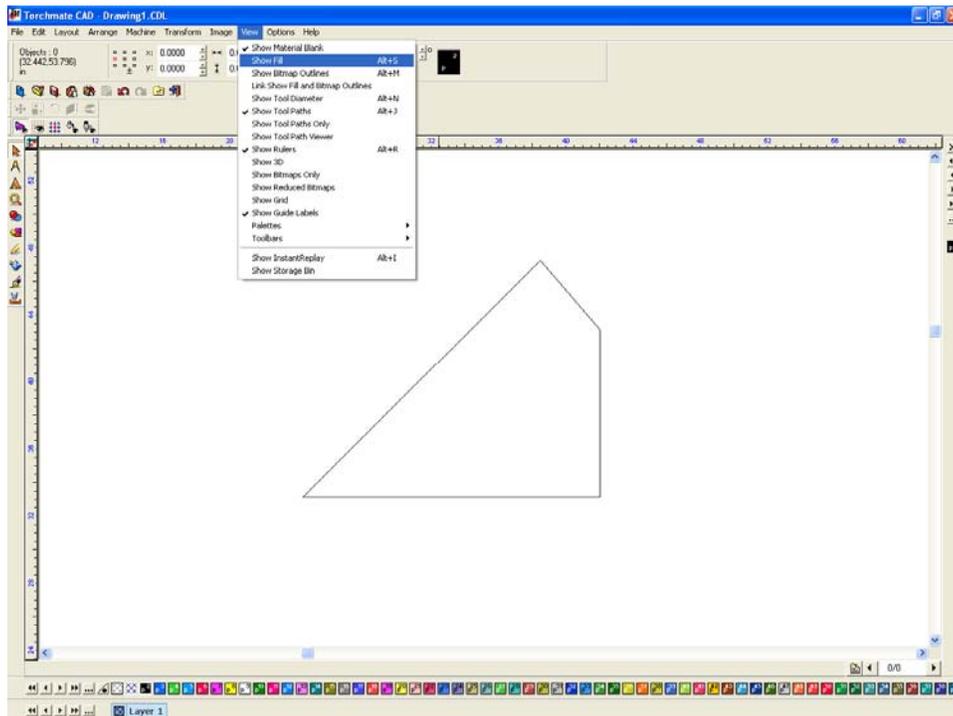
The program being used may have multiple options for which type of DXF to export as some will yield better results than others when brought in to Torchmate CAD.



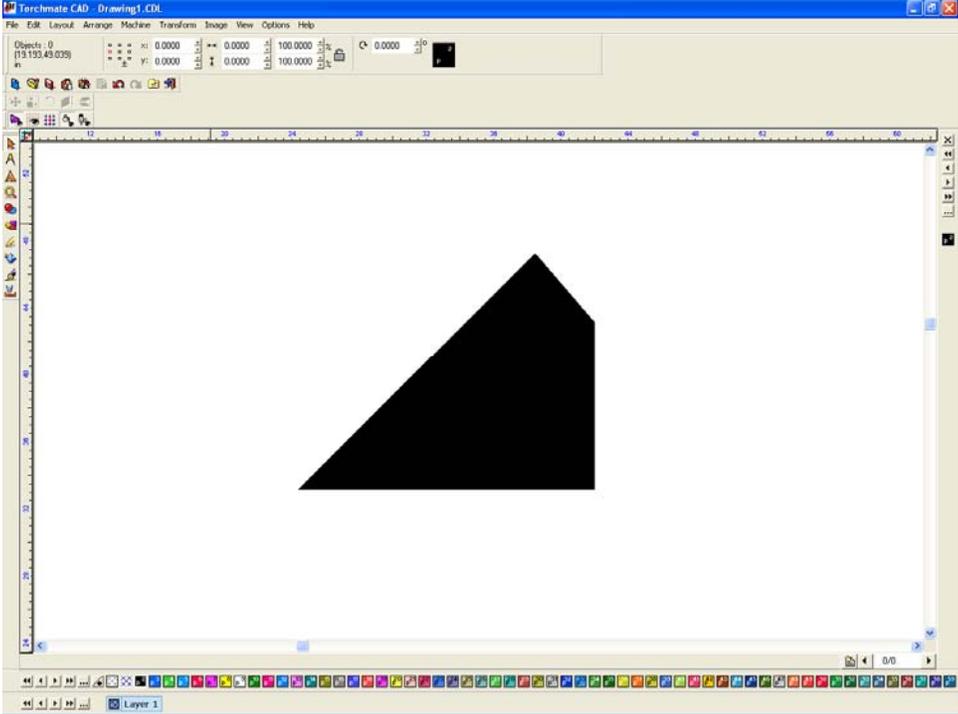
Now that the DXF is saved go into Torchmate CAD, go to 'File' and select 'Import'.



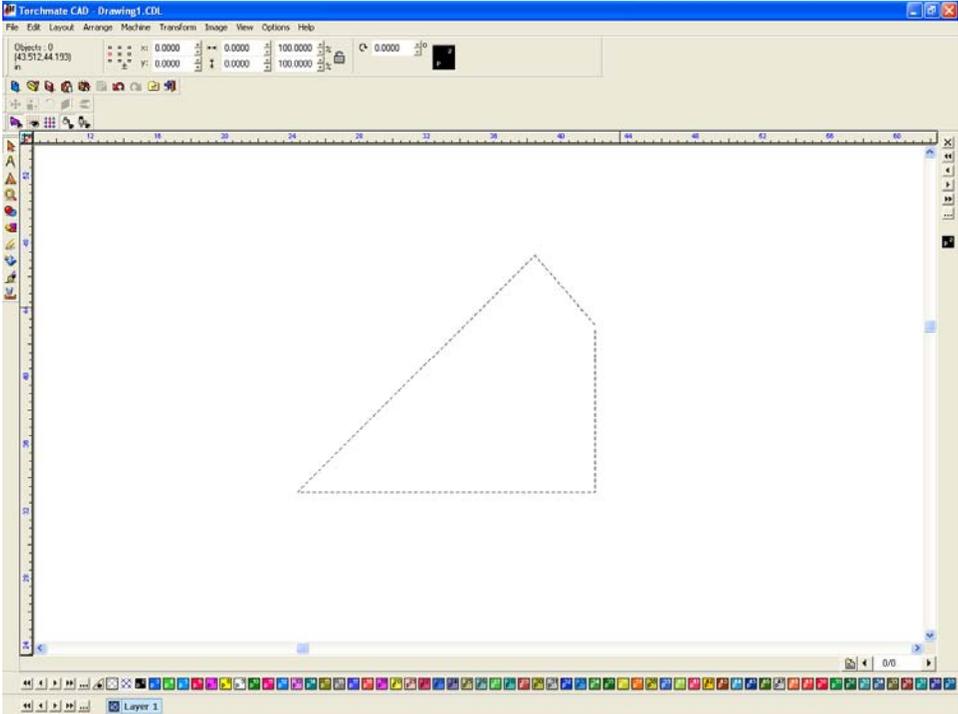
Once the drawing is placed the first step is to ensure that the part has been imported correctly. Go to the 'View' and select 'Show Fill'.



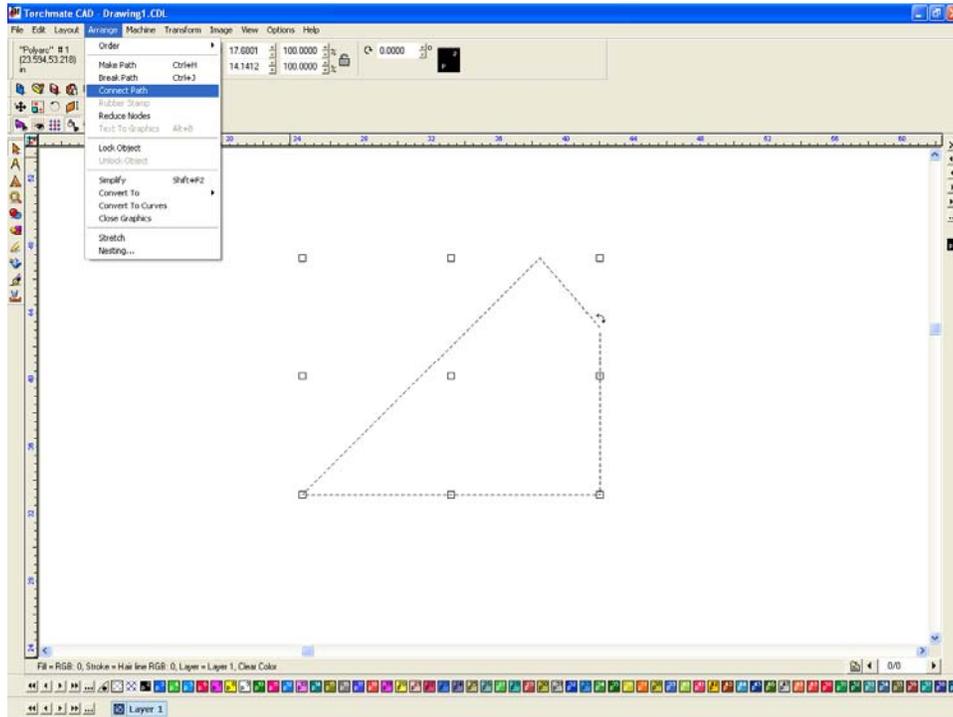
Show fill displays the object as the computer sees it. If the object is filled in solid then it is ready to have a toolpath created.



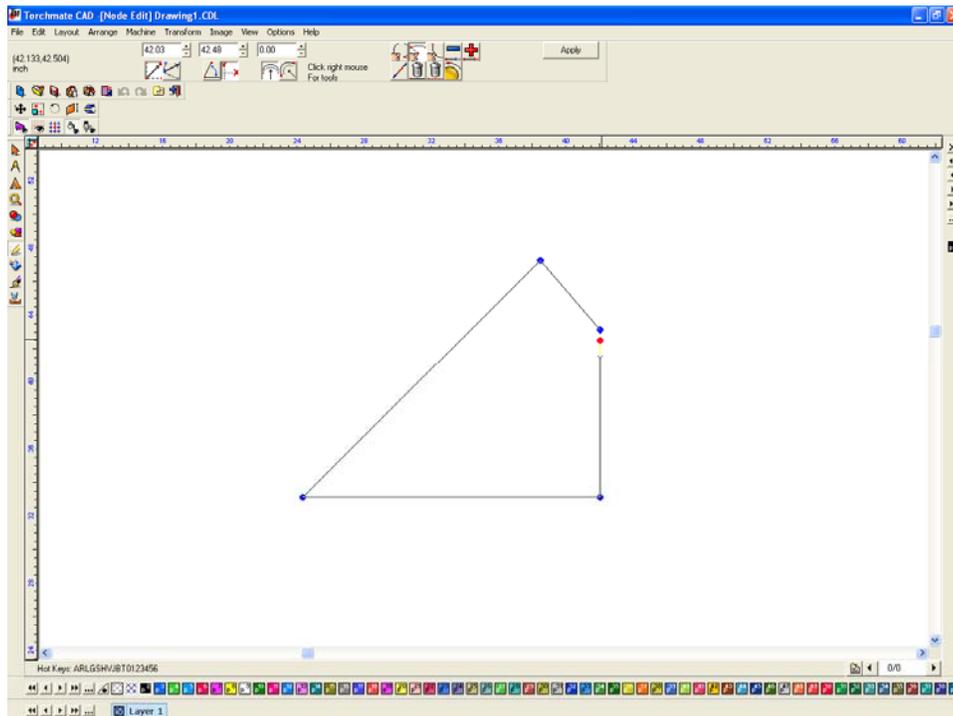
If the object appears with a dotted outline this indicates that there is a gap somewhere.



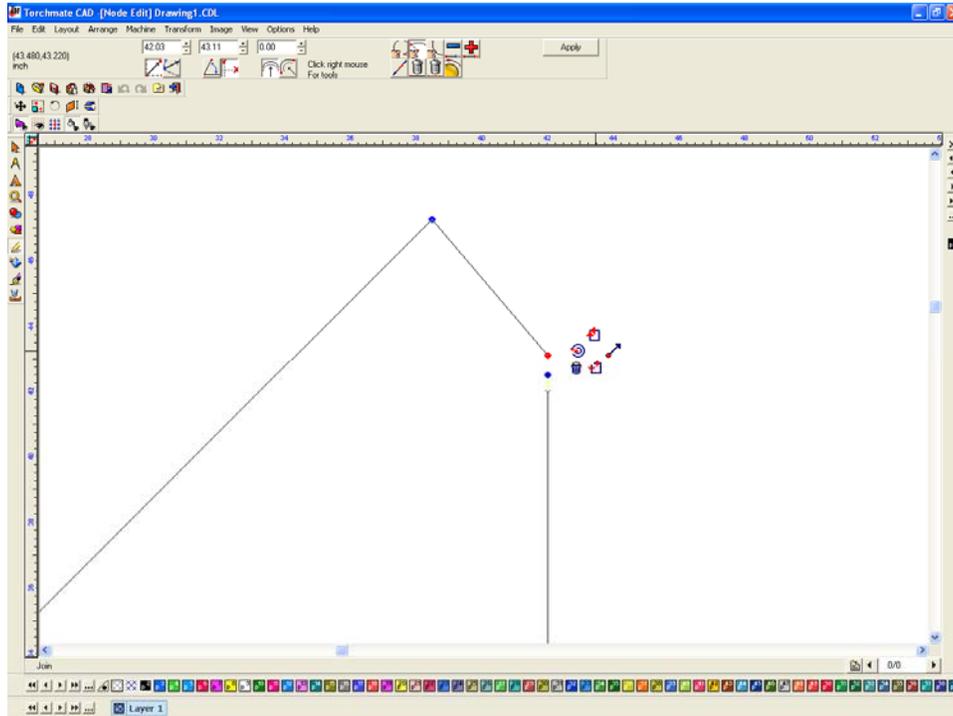
There are a few methods to try to correct this issue. The first method is to select the object go to ‘Arrange’ and select ‘Connect Path’. The CAD will join any gaps within the prescribed gap tolerance.



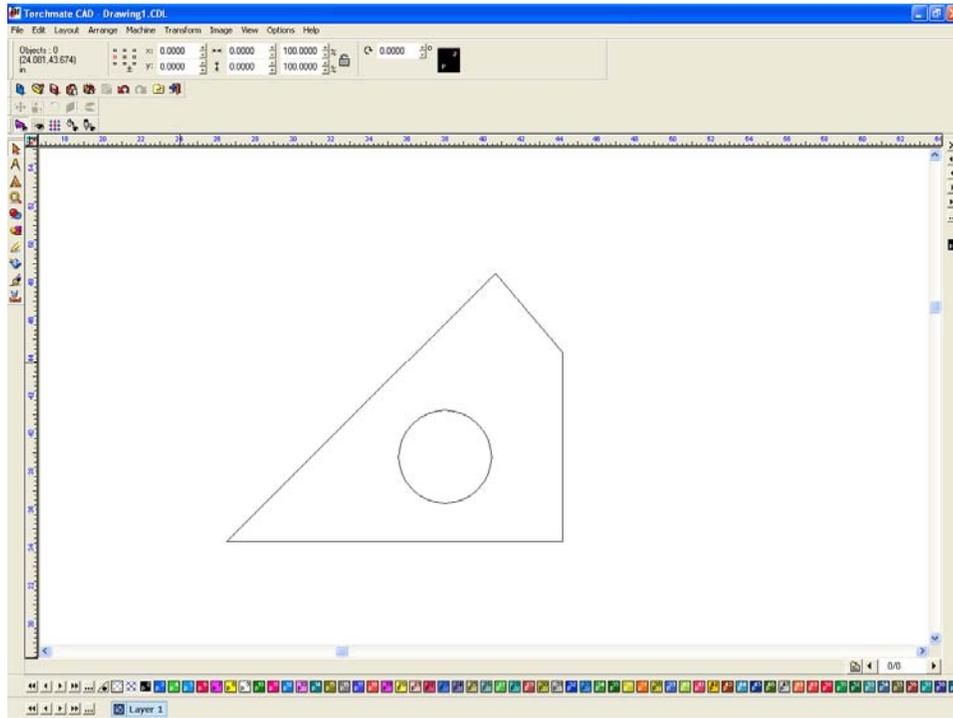
If connect path did not correct the gap the second method is to go into node editing. Double click on the object to enter node editing mode.



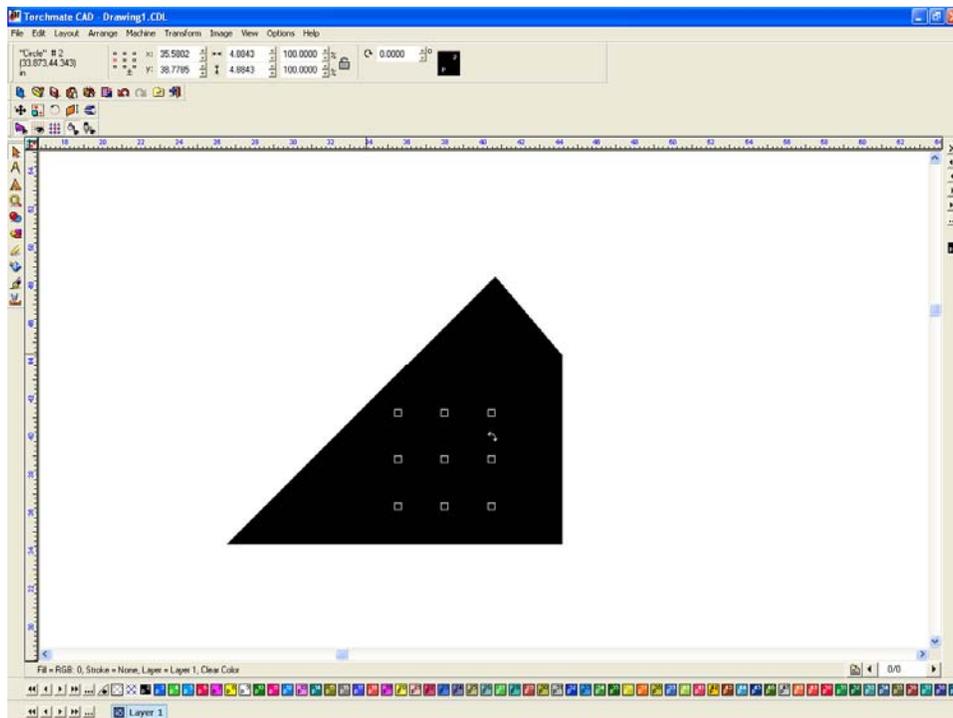
Select any node and it will turn red. If the 'Tab' key is held down the CAD will cycle through the nodes selecting each one in sequence. If there is a gap the cycle will stop and pressing 'Tab' will do nothing. At any place there is a gap select the node, hold down right-click, this brings up the node options. The top middle option is join this will join the node with a nearby un-joined node. Verify with 'Show Fill' that the part corrected.



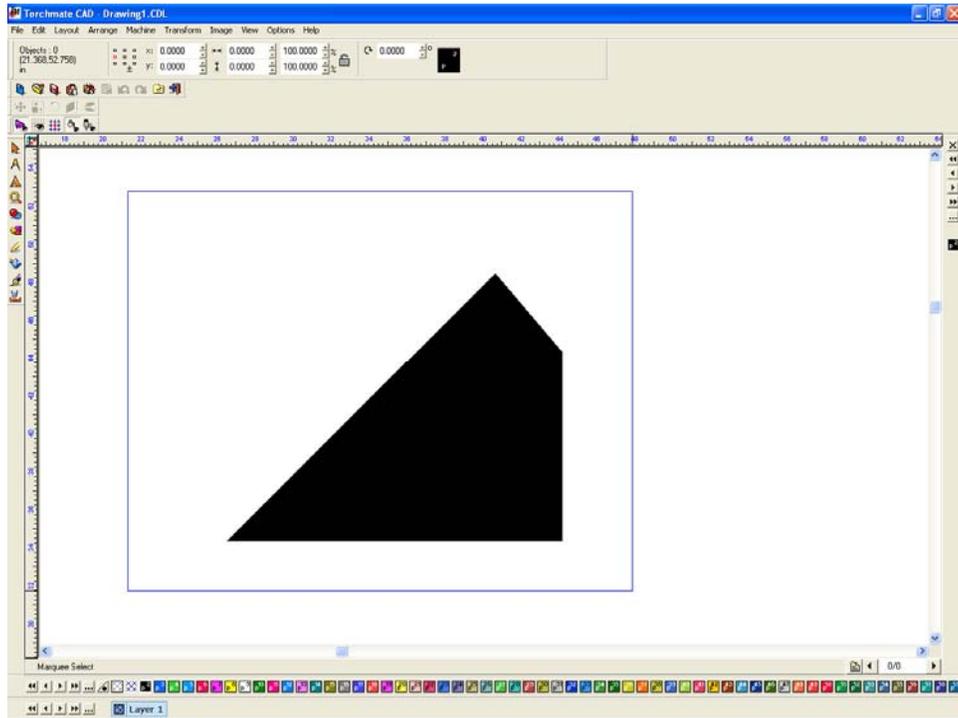
Another issue that can arise when importing a DXF occurs when the drawing has inside and outside parts.



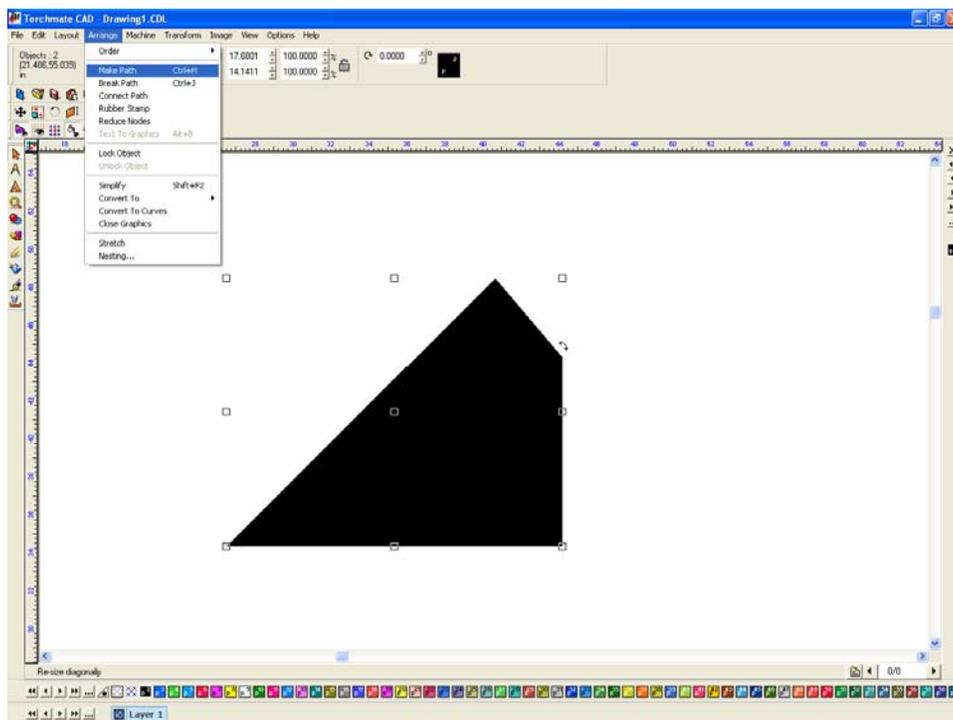
In this case the fill displays each object as solid, the CAD simply does not associate the hole with the rest of the part.



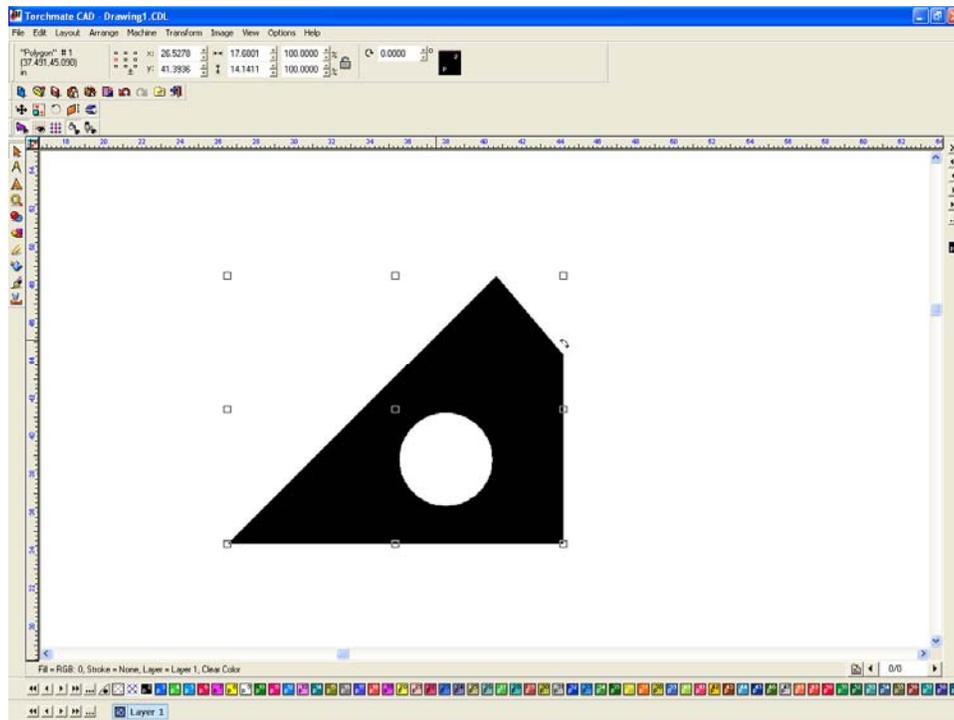
To correct this first select all of the components of a single part.



Go to 'Arrange' and choose 'Connect Path' this will tell the CAD to think of every object selected as one single part.



Once the part is corrected 'Show Fill' will display it correctly.

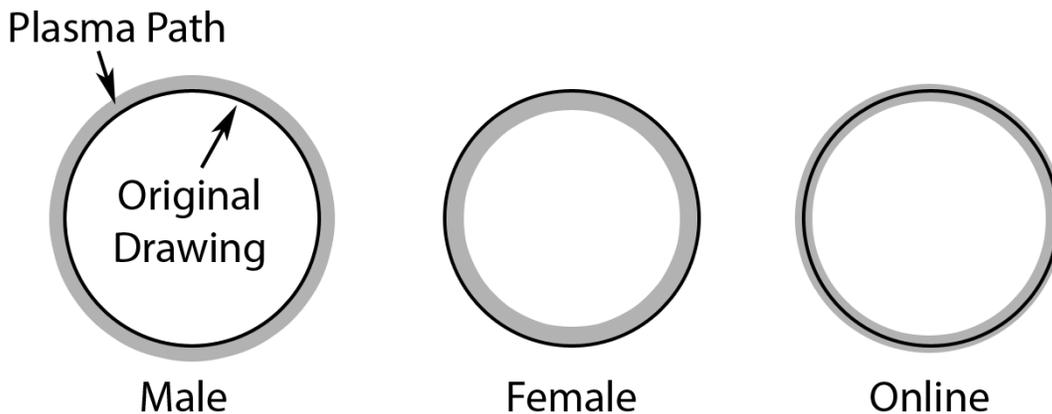


When importing DXF files keep in mind that some parts may have no issues while others can have several, it is always a good idea that before proceeding to cut or edit the part ensure that it is correctly imported.

Frequently asked questions about tool paths.

What is the difference between a Male, Female, and Online tool path?

Tool paths come in three varieties male, female, and online. The difference has to do with how the tool paths are offset from the original drawing. When cutting with plasma there is a certain amount of material eaten away this is called the kerf. In order to maintain the dimensions of a drawing the tool path needs to be offset from the drawing. An outside cut will use a male tool path and an inside cut will use a female tool path. An online tool path does not offset for any kerf and simply created a tool path along the center line of the drawing. Lead ins and lead outs are also created based on these offsets.



I have a part with a hole cut in it, what type of tool path do I use?

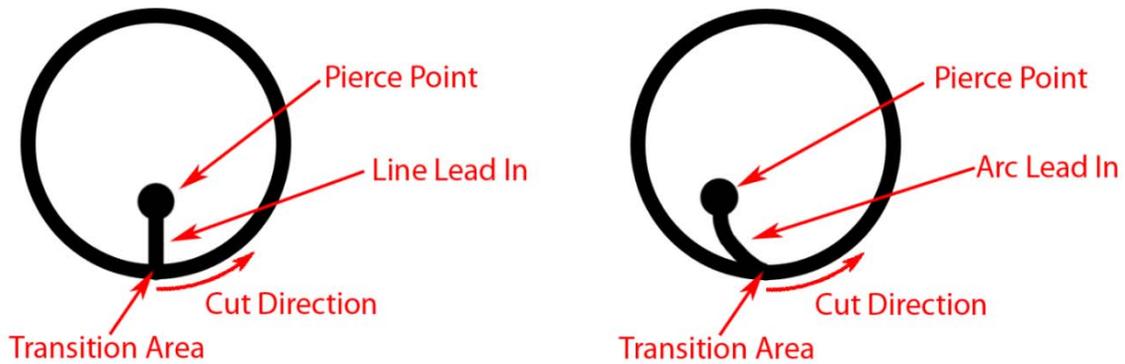
When a tool path is made in Torchmate CAD the type of tool path selected will determine how the outside cut is made, any inside cuts will be made opposite of the specified type. For instance if a plate with a hole in it has a tool path created select a male tool path, this will make the inside holes female automatically, all the critical dimensions will then be maintained.

Lead ins? Lead outs? Do I need both, some, or none?

For plasma cutting it is generally a good idea to create a lead in. What a lead in does is move the pierce point of a cut away from the finished edge and into an area of scrap. This prevents a dimple from being created on the part where the pierce occurred. In Torchmate CAD when a male or female tool path is made the lead in will be created to coincide with the offset direction. With plasma lead outs are generally not used especially if a height control is being used. If a lead out were used the part would finish cutting and then go to the lead out, the scrap piece may shift or fall out the arc will attempt to go somewhere this will result in the torch either diving down to follow the falling slug or the arc jumping to the part edge causing a divot. Oxy fuel torches can use a lead out to do common line cutting or in general to ensure a full sever.

Arc or line lead ins which are better? What is the difference?

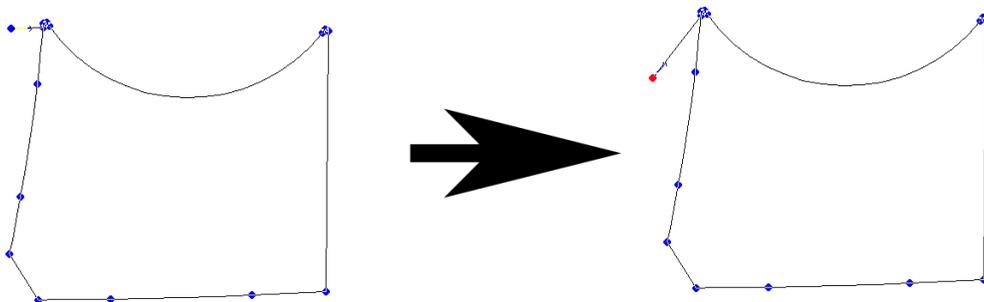
In most cases the difference between an arc lead in and a line lead in comes down to personal preference. The area where one would be preferred to another is when cutting inside holes.



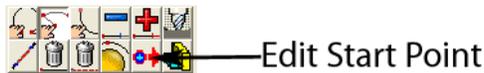
For a well calibrated table with minimal backlash a line lead in should be used, this will result in a cleaner transition area. The issue with an arc lead in occurs when the plasma's path comes around to finish the cut; it will encounter an area that has been partially cut on, and this can result in a divot or excess slag forming in the transition area. In outside cuts or non-circle inside cuts the lead in type generally will make no difference to the final quality.

Can I adjust my lead in points after I have created a tool path?

In Torchmate CAD the lead in length can be adjusted, this is similar to node editing a regular object. After a tool path is created double click on the tool path. The tool path will have blue points along it that indicate direction changes. The lead in will have a node at its end that can be selected and moved to a desired position.

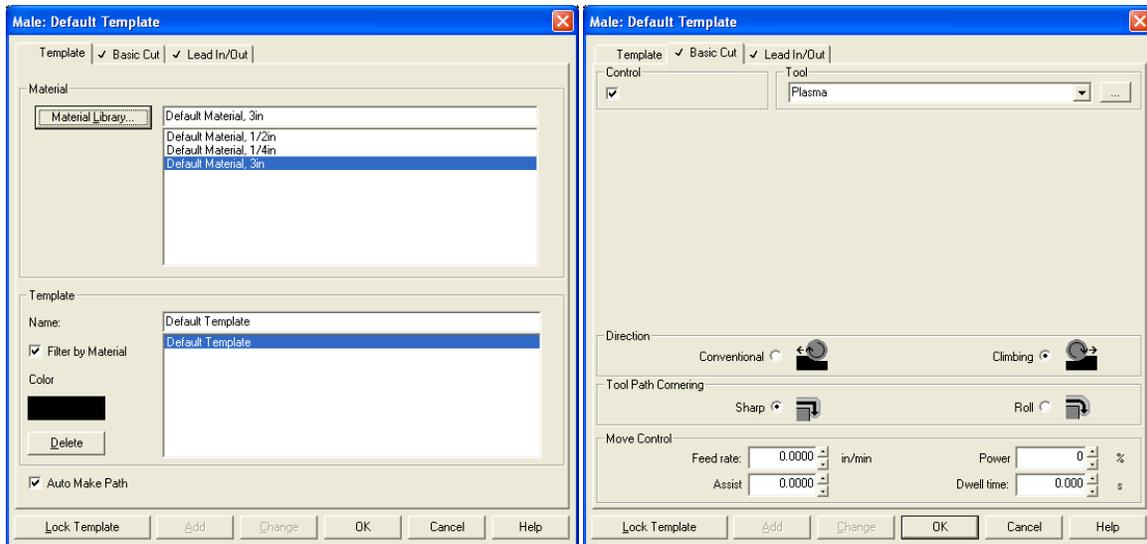


The point where the lead in connects to the part can also be adjusted after the tool path is made. When the tool path is selected and in node editing mode (by double clicking on the tool path) the top tool bar will have twelve small boxes, one of them adjusts the start point. Simply select the start point tool and click on the part where the new start point should be.



When I create a tool path what do all of the options do in the menu.

When creating a tool path there are three tabs that are accessible. The first tab is called 'Template' this tab can be used but will not affect the tool paths if it is never used.



If this tab is used what it stores is the information from the other two tabs as a material. For instance the settings can be set for one thickness, once the settings are made selecting change on the bottom row of buttons updates the selected material so that in the future the settings load with the specific material. Again if nothing is ever changed on this page the tool paths will never be affected.

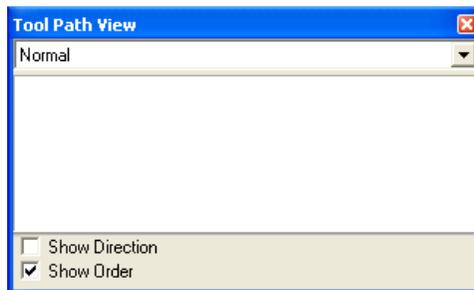
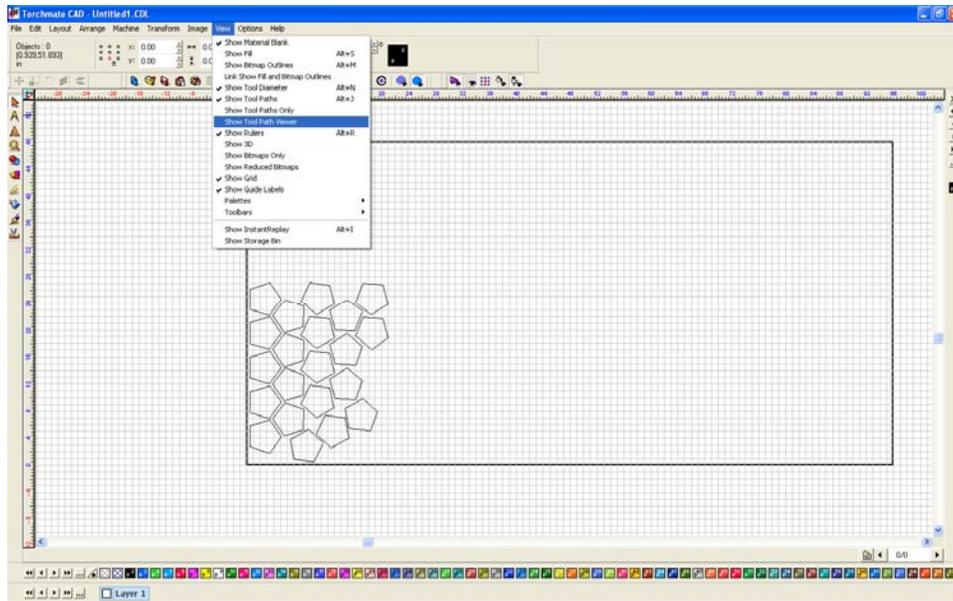
The second tab is called 'Basic Cut' this tab controls the tool being used as well as the shape of the cut. The tool pull down menu allows any tool from the tool library to be selected. The tool is what defines the offset to be used. 'Direction' specifies the motion of the tool around the tool path. 'Conventional' will create cuts so that an outside cut travels counter-clockwise and inside cuts will be clockwise, 'Climbing' will create the opposite direction tool paths. For plasma cutting a 'Climbing' cut should be used, for routing generally a 'Conventional' cut would be used but this can vary based on the bit used. The 'Tool Path Cornering' option allows for sharp or rounded corners to be created, in almost all instances a sharp corner is desirable. 'Move Control' is used if the g-code is being output from the Torchmate CAD in most cases this will be unused.

The third tab is 'Lead In/Out' and controls all aspects of lead ins and outs. The check boxes at the top enable a lead in, a lead out or both. For either type there is a choice between 'Arc' or 'Line'. When an 'Arc' is selected a radius can be specified this is the length of the lead away from the actual cut. For a line both a length and an angle need to be specified, this angle is in reference to the start point so a 90 degree angle will be perpendicular to the cut path. For lead ins an 'Online' lead can also be selected this is a lead in that will pierce on the part just a certain distance back from the start point; as the pierce is on the actual cut this type is generally not used. 'Overlap' is used to continue cutting past the start point before finishing a cut, this is used sometimes in oxy fuel cuts or with some plasma cutters that have a tendency to not finish a cut completely. Finally on this tab is 'Adjust Start Point' this allows for rough relocation of leads to the corner specified.

How do I reorder tool path cut order?

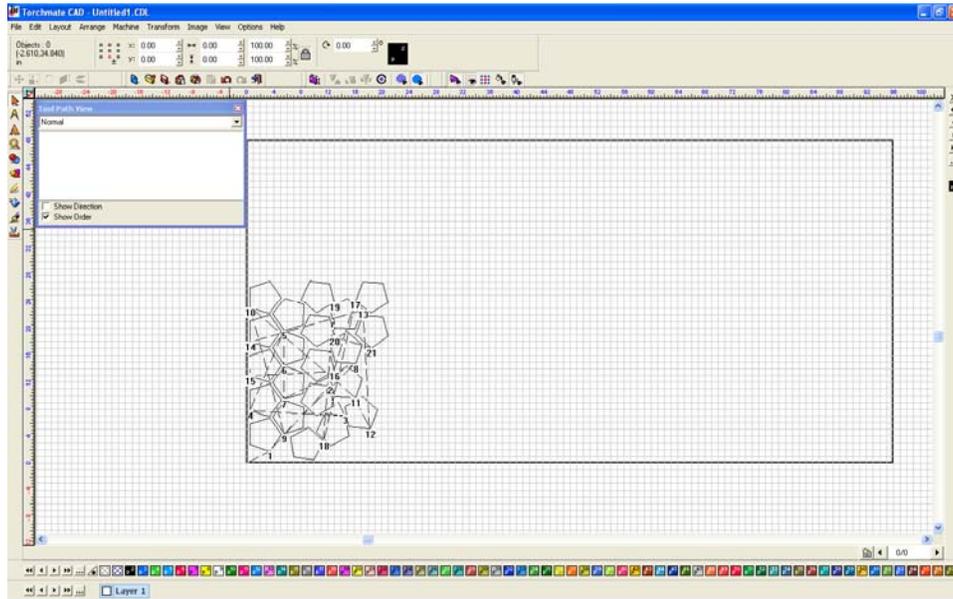
In Torchmate CAD there are multiple ways to reorder tool path cut order; each way is suited to certain circumstances. The cut order is generally edited after tool paths have been made, some of the methods however do allow for order to be specified prior to a tool path being created.

The simplest method of editing order is to use the 'Tool Path Viewer'. This method is simple to use but when doing a large amount of parts can become time consuming. To access this method go to 'View' → 'Show Tool Path Viewer'.

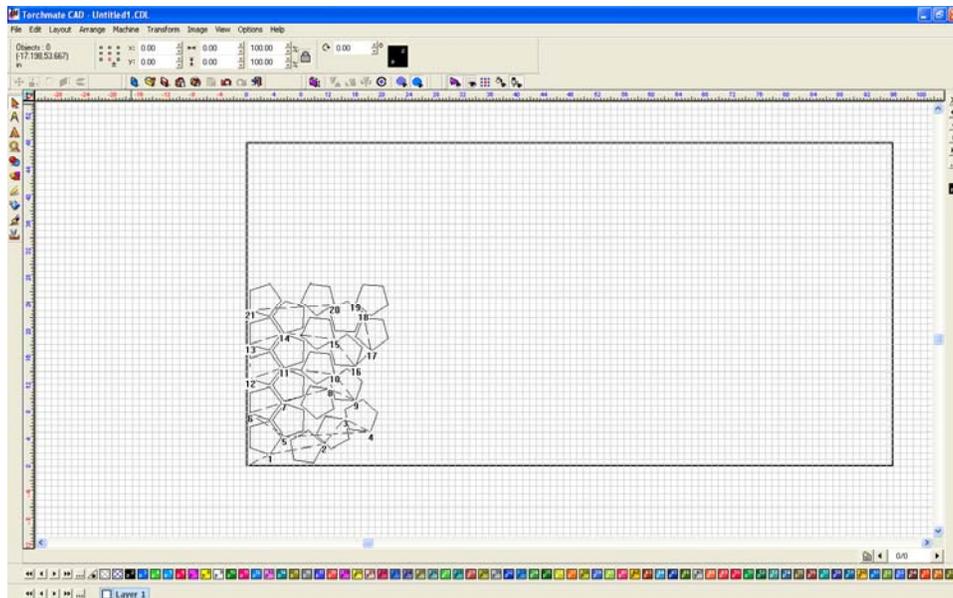
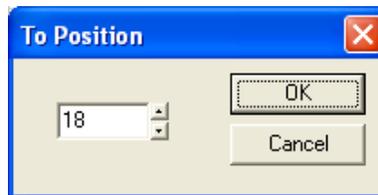


The 'Tool Path Viewer' opens a window, if 'Show Order' is checked it will display the cut order.

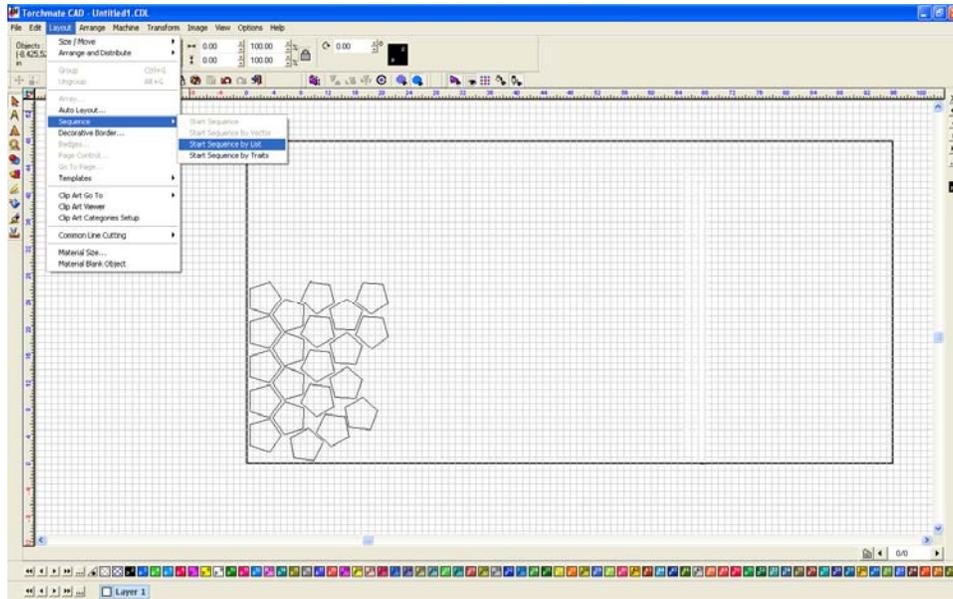
The cut order is displayed as numbers next to each part. When a part with multiple inside cuts is displayed it is still only displayed as a single number.



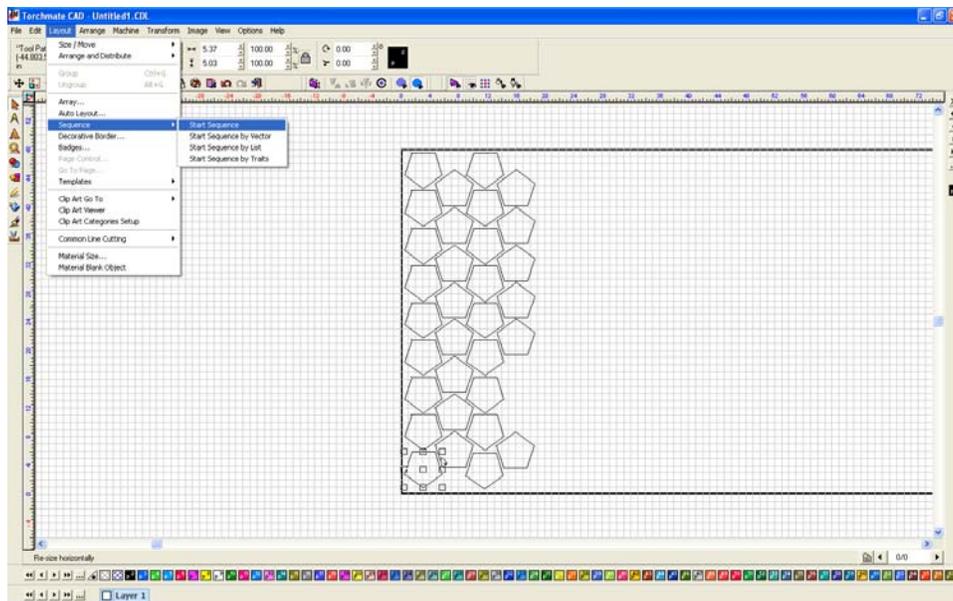
To change the order double click on any part, the 'To Position' window will appear. The number indicates the sequence position, simply type in the new position to change the order.



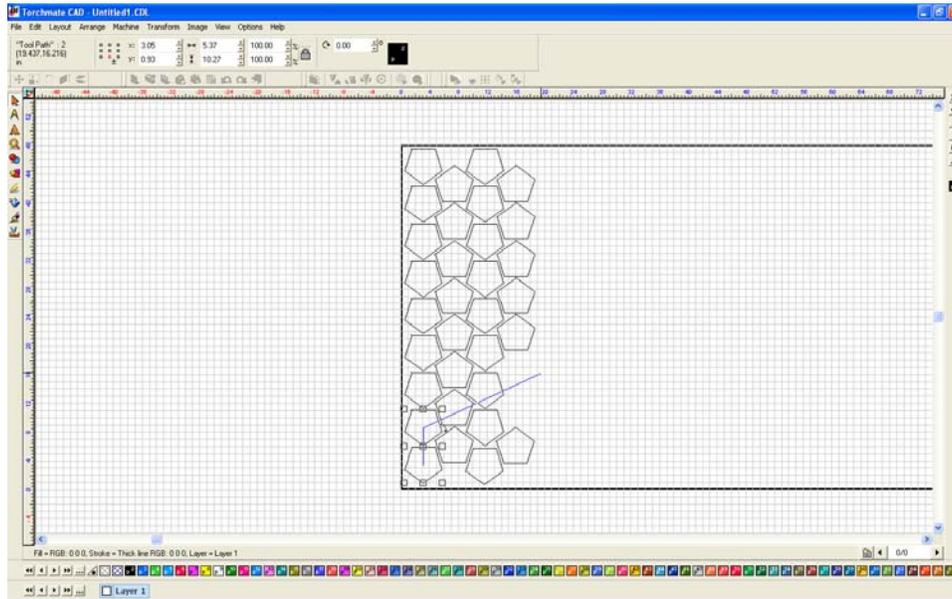
Another method to reorder cuts is called ‘Sequence’. There are four sequence options, three of which are quite useful in many cases; sequence by traits is only useful if each part is a different layer or color. To access the sequence options go to ‘Layout’ → ‘Sequence’ here the four choices are available.



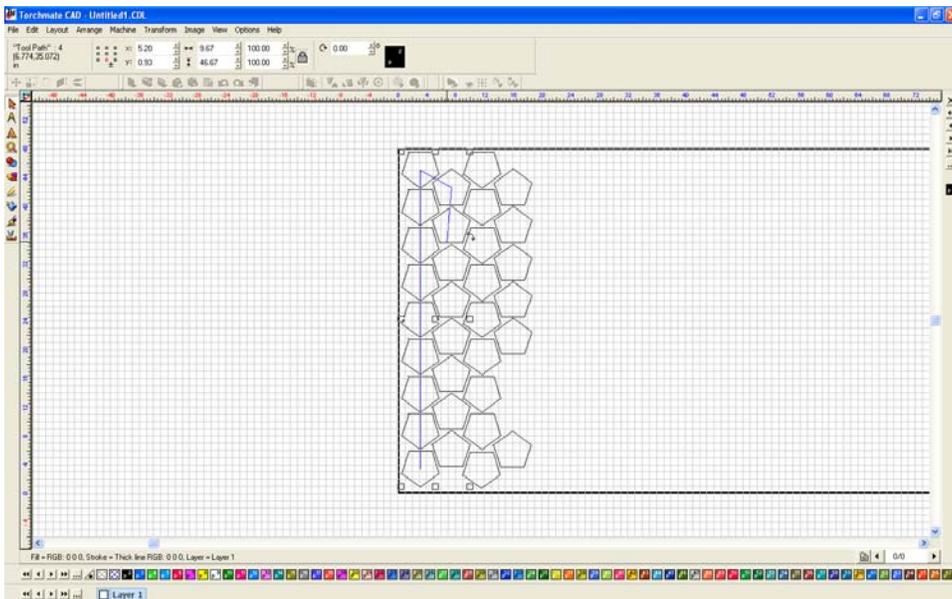
‘Start Sequence’ is the first choice in the menu. Begin by selecting the first object to be cut then select ‘Start Sequence’.



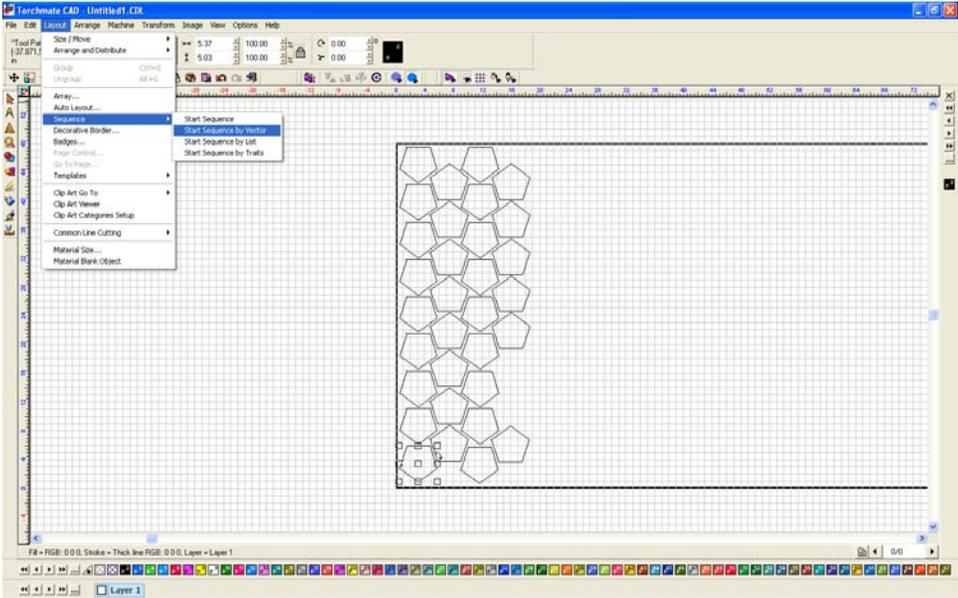
A blue line will emanate from the selected part. To make the cut out order click on each part in the order they need to be cut in.



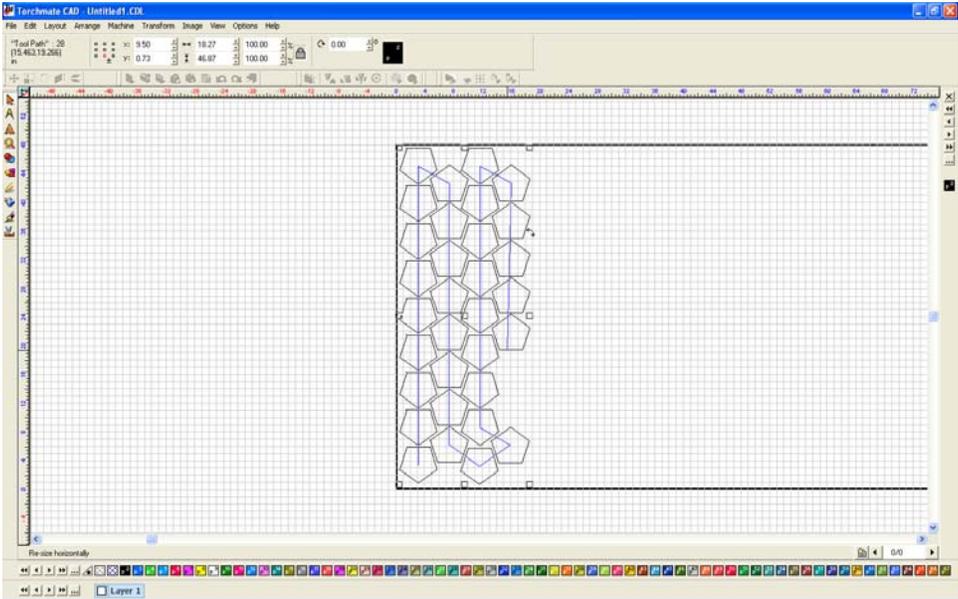
Continue doing so clicking on each part. For a large amount of parts this method can be a bit time consuming however for a few larger parts it is very quick and easy.



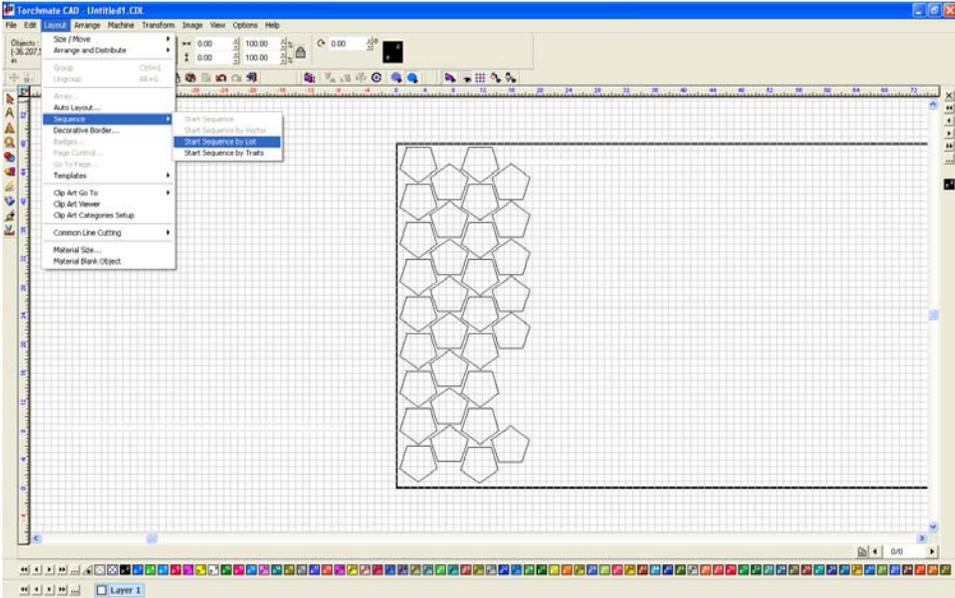
‘Start Sequence by Vector’ is similar to ‘Start Sequence’ but is more useful when rows of parts are used.



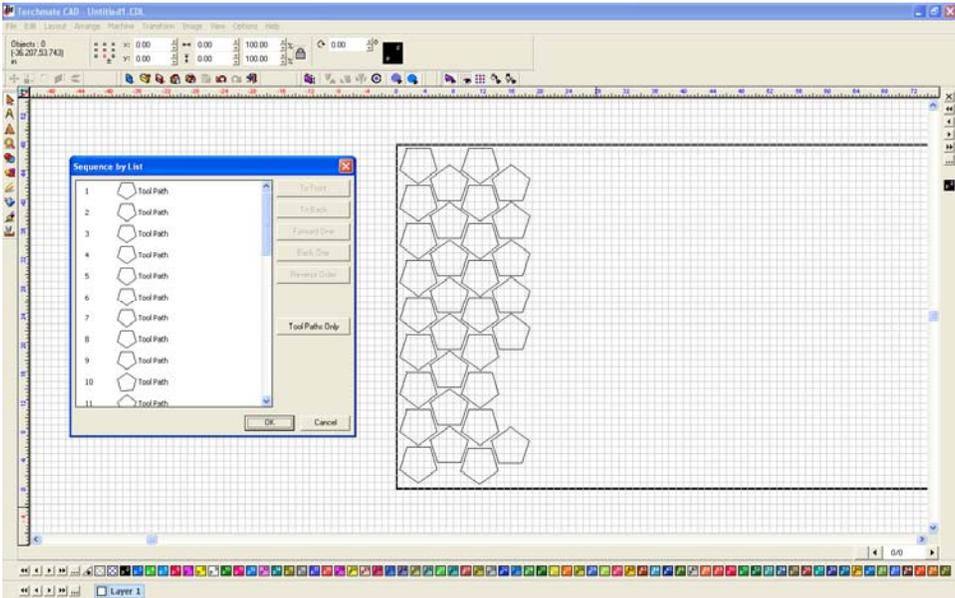
With ‘Start Sequence by Vector’ it is not necessary to click on each part to order them, simply by clicking on two parts will also order the parts in-between in series. This is useful for rowed parts since only the parts on the end of the rows need to be clicked to sequence the entire sheet.



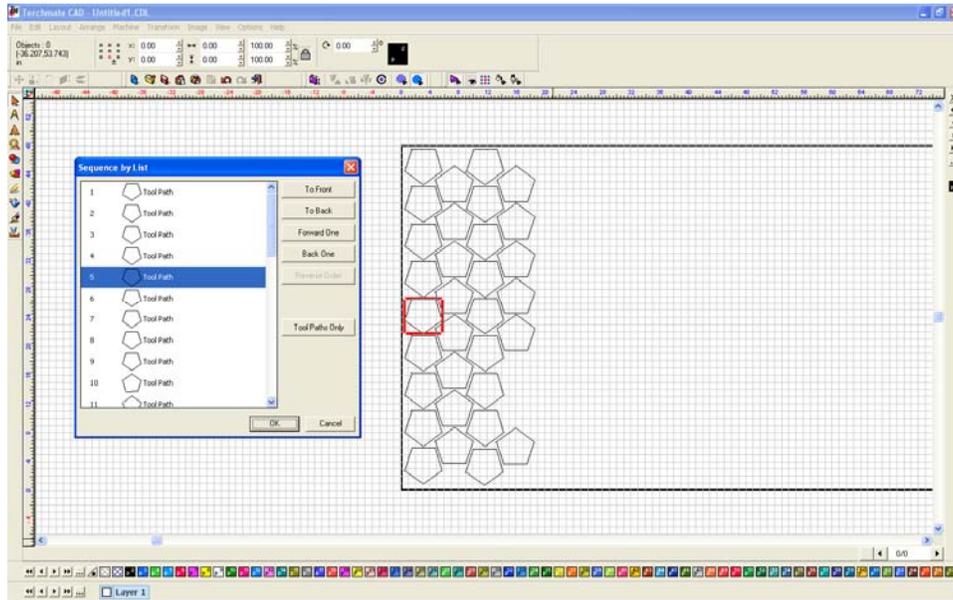
'Start Sequence by List' is another way to change cut order.



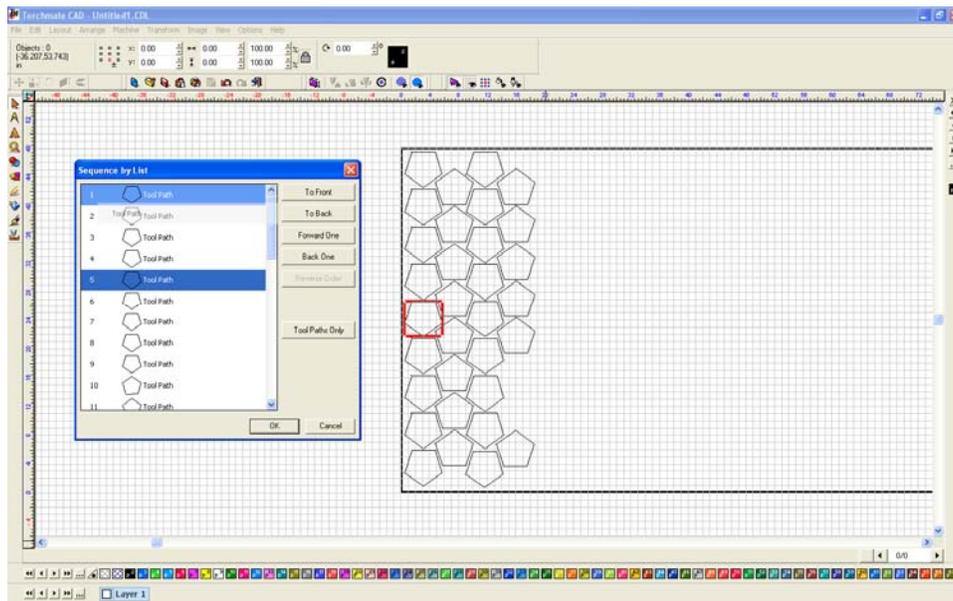
By list uses a moveable list to order cuts.



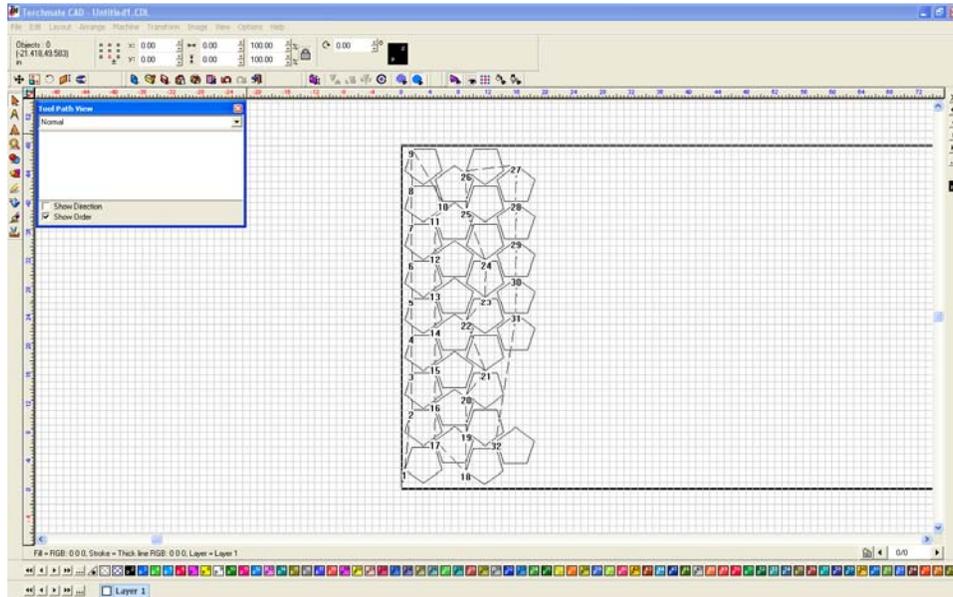
When a part is selected from the list it will also be highlighted with a red square on the work area.



The order is changed by dragging a part up or down the list, or by using the positioning buttons in the menu.



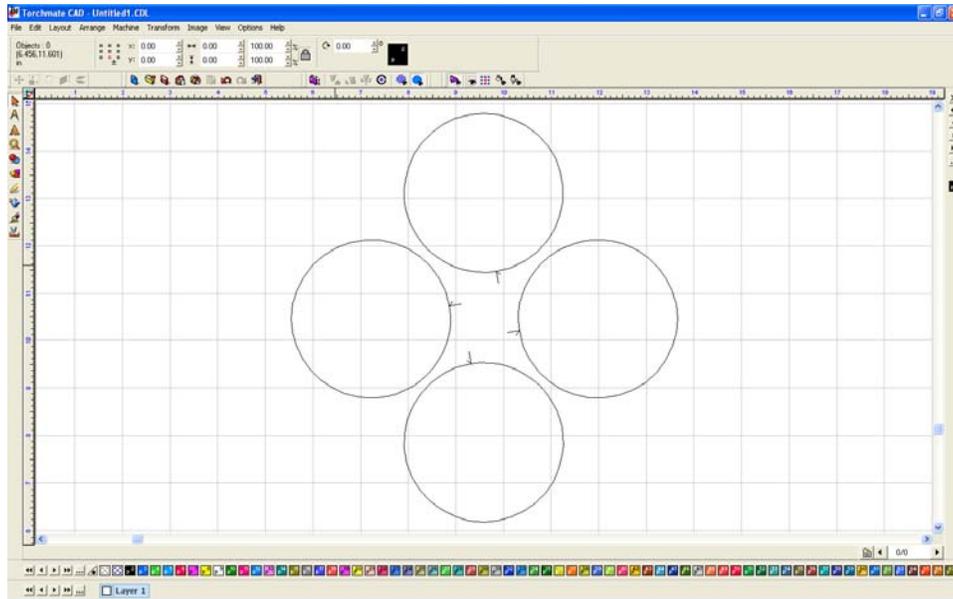
Any time the cut order is changed it can be viewed again by going to the 'Tool Path Viewer' in the 'View' menu. Keep in mind that the order displays a part with multiple cuts simply as a single number.



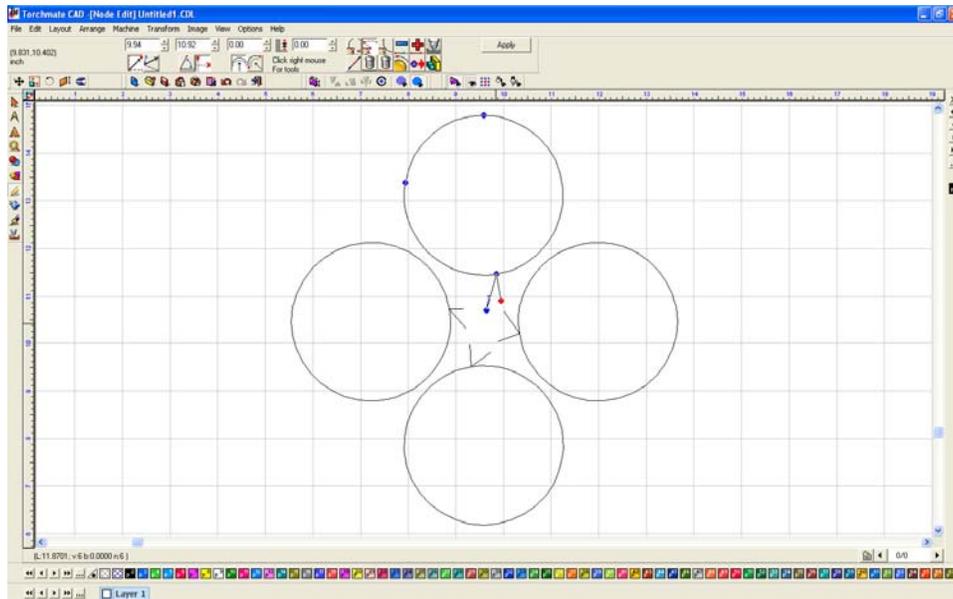
What is common line cutting and how is it accomplished in Torchmate CAD?

Common line cutting is a method of drawing that links some or all of the tool paths together as one single path. This is useful when working with thick plate using oxy fuel or when cutting with plasma and using an edge start method. In both these cases restarting a cut in the middle of the plate can take an upwards of 30 or more seconds or may be impossible. Common line cutting allows the tool to cut from one part to the next without turning off. Keep in mind that the path may cross over itself while doing this, with plasma this may cause the torch to go out and need to be restarted. Common line cutting uses a lead in and lead out for each part, with the lead out of one part connected to the lead in of the next. The most difficult part of common line cutting is positioning each part so that the travel distance between parts is minimized as cutting thick plate is generally at very slow speeds.

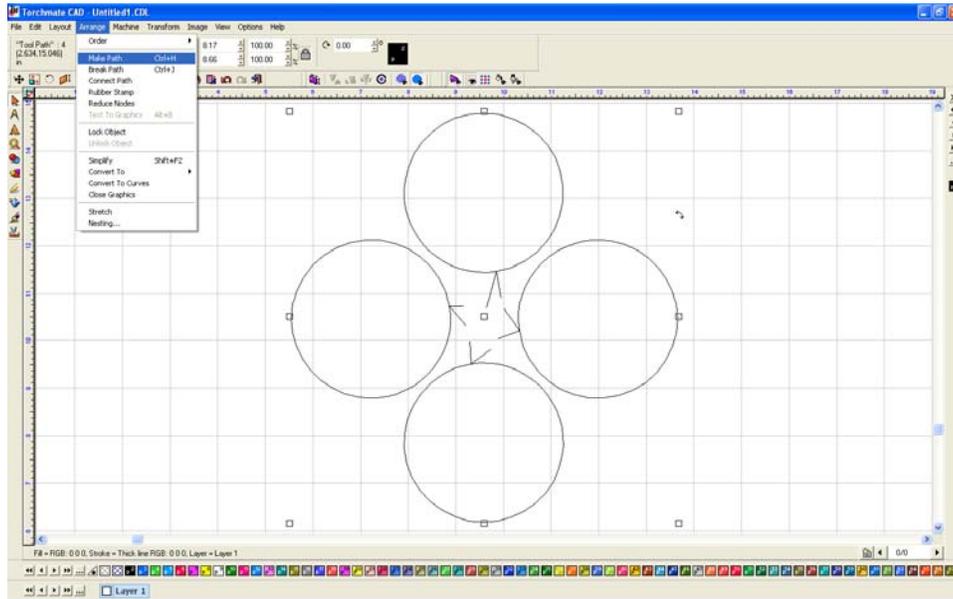
To common line cut begin by drawing the parts and laying them out on a sheet. Create a tool path with lead ins and lead outs, for the sake of clarity make them with different lengths or angles so they can be distinguished.



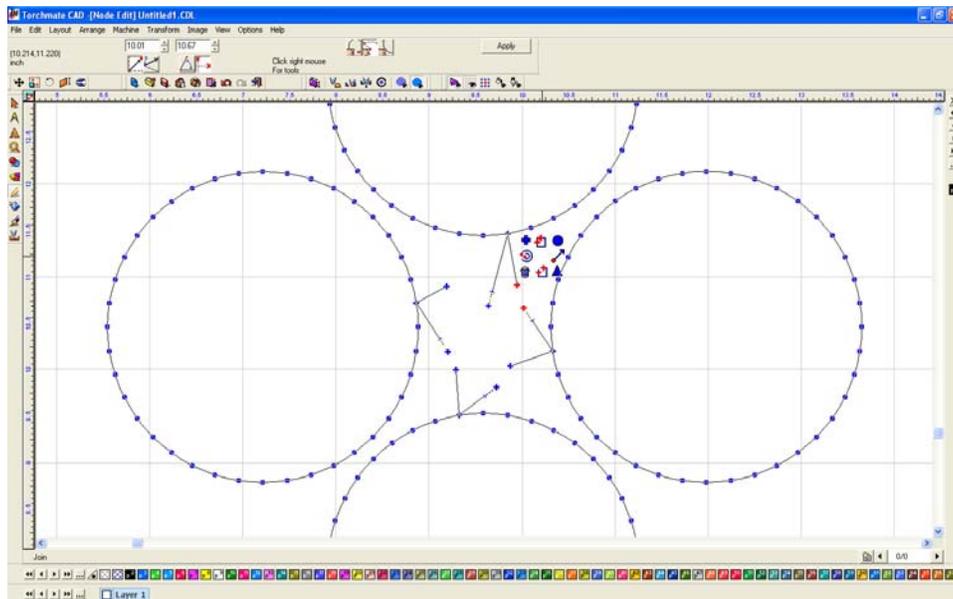
Edit each tool path so that the lead ins and outs are near each other.



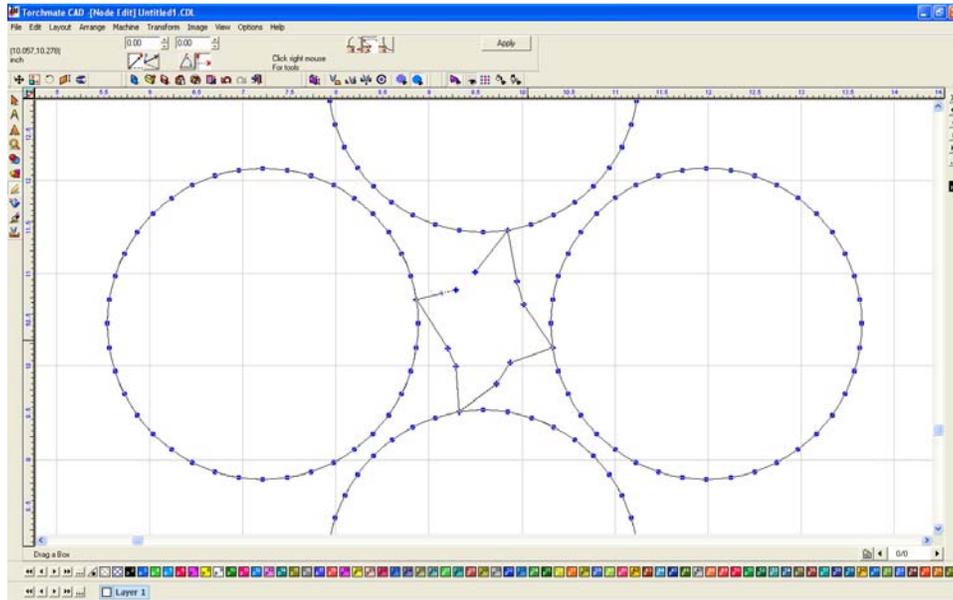
Select all of the tool paths, go to 'Arrange' → 'Make Path'. This converts the tool path back to a polygon but allows the parts to be joined together.



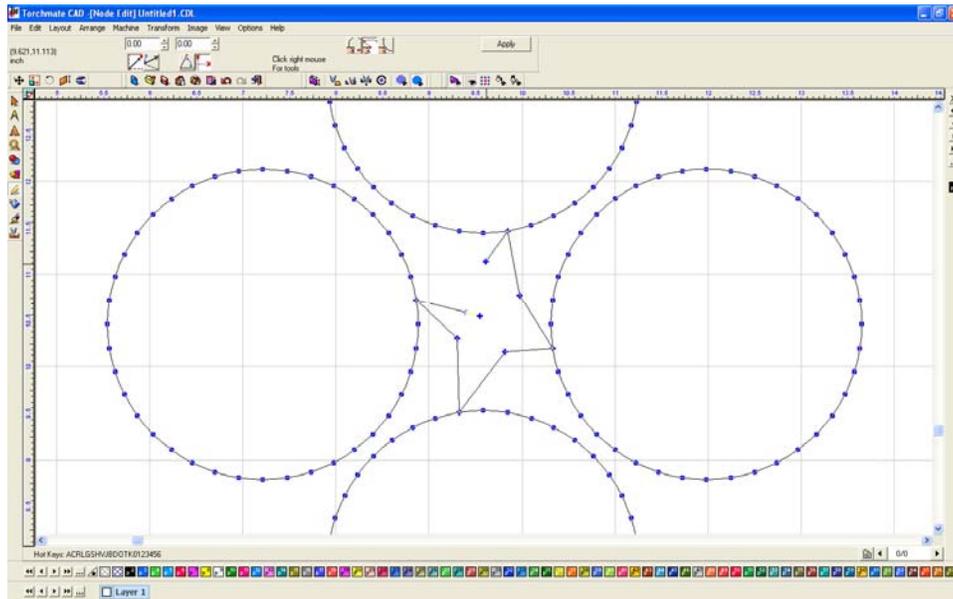
Double click on the parts to enter node editing. Join the lead in of one part to the lead out of another by selecting the two nodes, right-click, and select 'Join' (middle-top option).



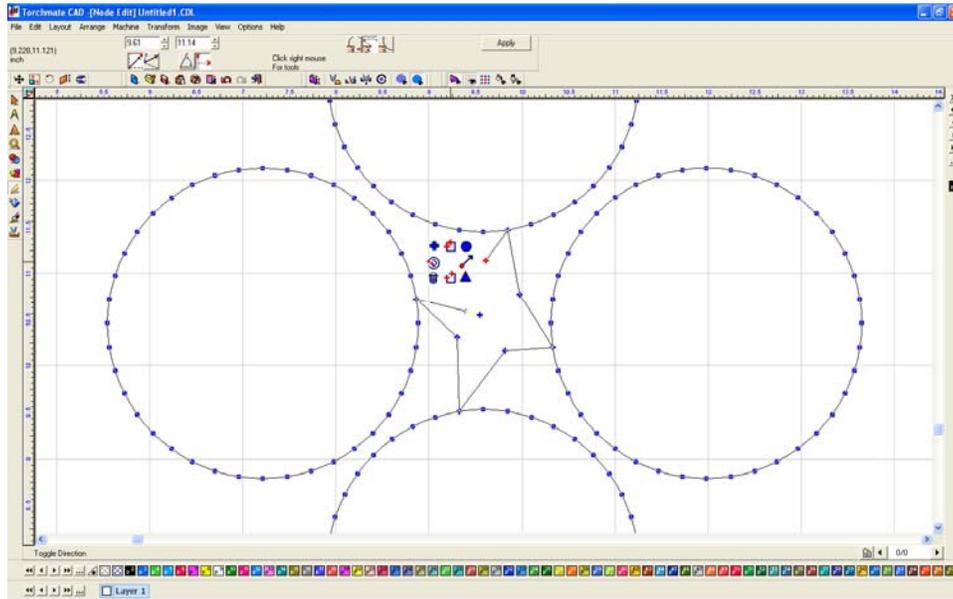
Repeat this with all of the parts leaving one lead in and one lead out not joined.



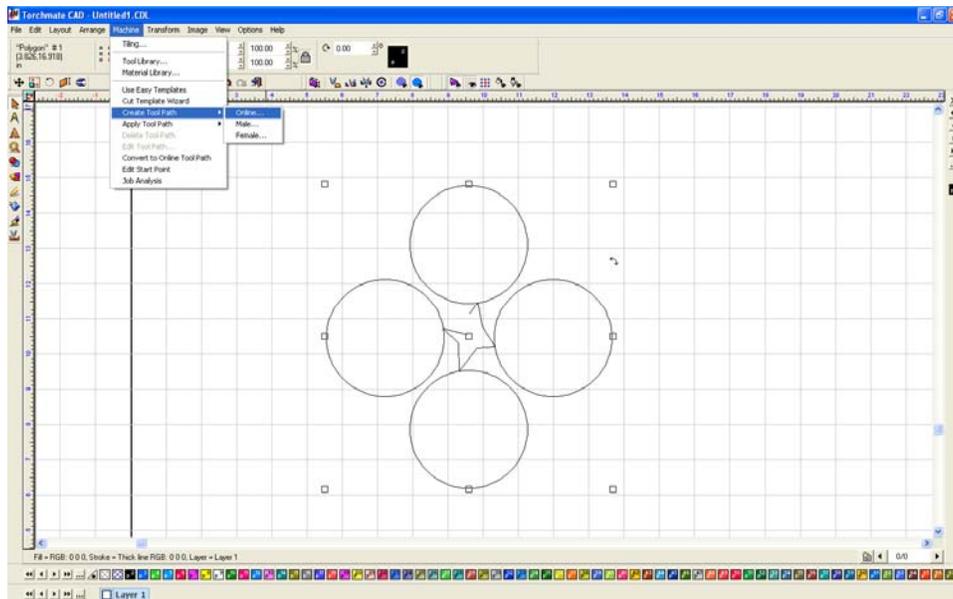
The nodes can be edited just as any drawing and the leads can be cleaned up by eliminating some of the nodes.



By joining the nodes occasionally the cut direction will change, to reverse it select the node that should be the starting point, right-click, and select 'Set Start Point' (the right-middle option).



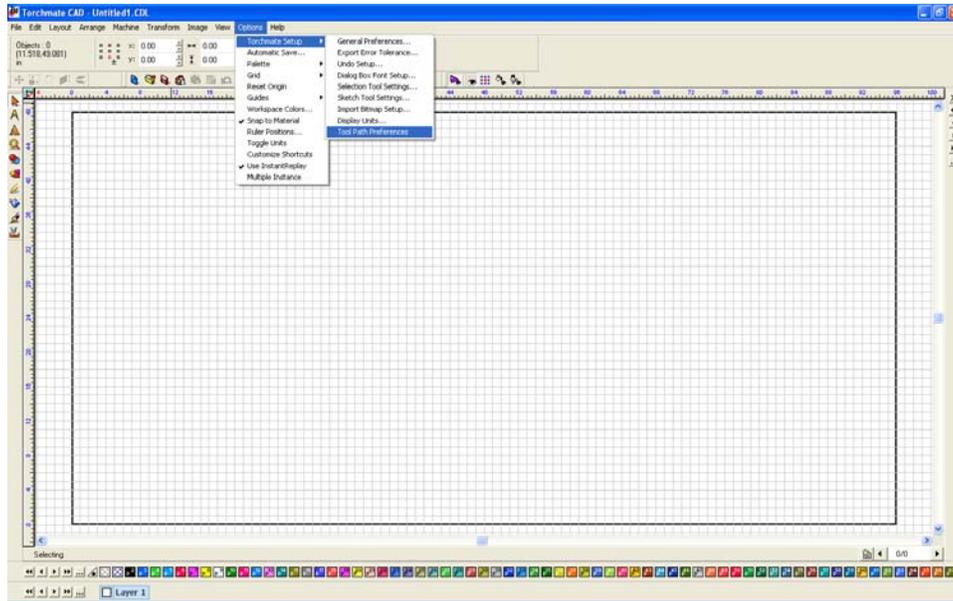
The parts are now joined; the last step is to create a tool path again. This time the tool path will be 'Online' since the offset was already done the first time the tool paths were created.



Again keep in mind when using common line cutting with plasma cutting the plasma can go out when traveling over an already cut area. When cutting parts with holes the holes will need to be created separately and cut order will have to be edited before cutting.

Why when I create a tool path the original drawing is grouped with the tool path and I cannot delete it?

In Torchmate CAD there is one default setting that must be changed to eliminate this problem. Go to 'Options' → 'Torchmate Setup' → 'Tool Path Preferences'.



Ensure that 'Group tool paths with originals' is unchecked. Press 'OK' and all future tool paths will be created just fine.

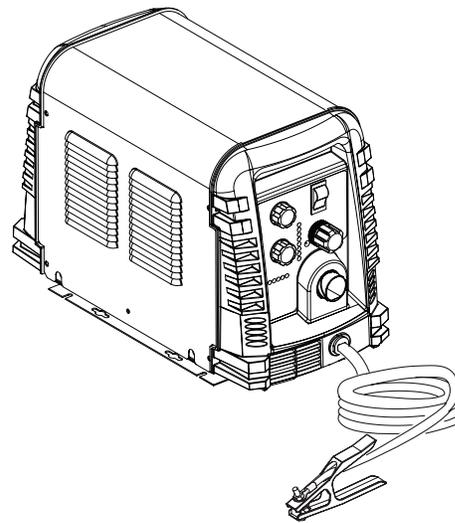




A60

CUTMASTER™

AUTOMATED PLASMA CUTTING SYSTEM



Art # A-08953_AB

Service Manual

Rev. AQ

Date: December 7, 2012

Manual # 0-4982

Operating Features:

60%
Duty
Cycle

60
AMP

DC

1
PHASE

3
PHASE

208-
230
V

400
V

460
V

600
V

SECTION 4 SYSTEM: OPERATION

4.01 Front Panel Controls / Features

See Illustration for numbering Identification

1. Output Current Control

Sets the desired output current. Output settings up to 60 Amps may be used for drag cutting (with the torch tip contacting the workpiece) or higher for standoff cutting.

2. Function Control

Function Control Knob, Used to select between the different operating modes.

SET  Used to purge the air through the unit and torch and leads and to adjust gas pressure.

RUN  Used for general cutting operations

RAPID AUTO RESTART  Allows for faster restarting of the Pilot Arc for uninterrupted cutting.

LATCH   Used for longer hand held cuts. Once a cutting arc is established, the torch switch can be released. The cutting arc will remain ON until the torch is lifted away from the work piece, the torch leaves the edge of the work piece the torch switch is activated again or if one of the system interlocks is activated.

3. ON OFF Power Switch

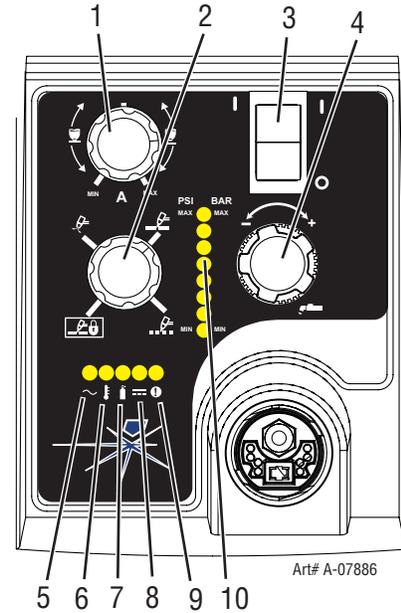
ON  / **OFF**  Switch controls input power to the power supply. Up is ON, down is OFF.

4. Air/Gas Pressure Control

The Pressure  Control is used in the "SET" mode to adjust the air/gas pressure. Pull the knob out to adjust and push in to lock.

5. AC Indicator

Steady light indicates power supply is ready for operation. Blinking light indicates unit is in protective interlock mode. Shut unit OFF, shut OFF or disconnect input power, correct the fault, and restart the unit. Refer to Section 5 for details.



6. Temp Indicator

Indicator is normally OFF. Indicator is ON when internal temperature exceeds normal limits. Let the unit cool before continuing operation.

7. Gas Indicator

Indicator is ON when minimum input gas pressure for power supply operation is present. Minimum pressure for power supply operation is not sufficient for torch operation.

8. DC Indicator

Indicator is ON when DC output circuit is active.

9. Fault Error Indicator

Indicator is ON when Fault circuit is active. See section 5 for explanations of fault lights.

10. Pressure Indicators

PSI	BAR
MAX	MAX
90	6.3
85	5.9
80	5.5
75	5.2
70	4.8
65	4.5
MIN	MIN

Art # A-08170

The Indicators will illuminate according to the pressure set by the Pressure Control Knob (number 4).

4.02 Preparations for Operation

At the start of each operating session:



WARNING

Disconnect primary power at the source before assembling or disassembling power supply, torch parts, or torch and leads assemblies.

Torch Parts Selection

Check the torch for proper assembly and appropriate torch parts. The torch parts must correspond with the type of operation, and with the amperage output of this Power Supply (80 amps maximum). Refer to Section 4T.07 and following for torch parts selection.

Torch Connection

Check that the torch is properly connected. Only Thermal Dynamics model SL60 / Manual, SL100 / Mechanical or SL100 / SV Automation Torches may be connected to this Power Supply. See Section 3T of this manual.

Check Primary Input Power Source

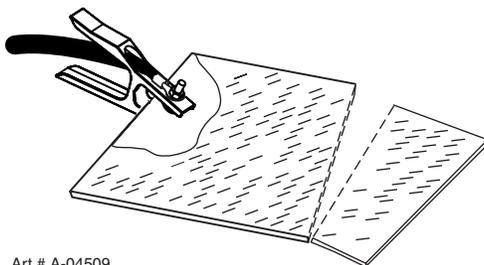
1. Check the power source for proper input voltage. Make sure the input power source meets the power requirements for the unit per Section 2, Specifications.
2. Connect the input power cable (or close the main disconnect switch) to supply power to the system.

Air Source

Ensure source meets requirements (refer to Section 2). Check connections and turn air supply ON.

Connect Work Cable

Clamp the work cable to the workpiece or cutting table. The area must be free from oil, paint and rust. Connect only to the main part of the workpiece; do not connect to the part to be cut off.



Art # A-04509

Power ON

Place the Power Supply ON / OFF switch to the ON (up) position. AC indicator turns ON.

Gas indicator turns ON if there is sufficient gas pressure for power supply operation and the cooling fans turn ON.

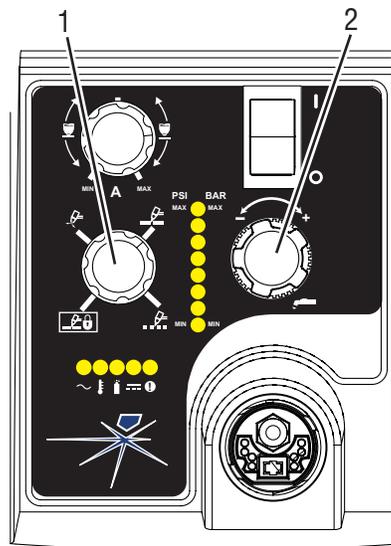
NOTE

Minimum pressure for power supply operation is lower than minimum for torch operation.

The cooling fans will turn ON as soon as the unit is turned ON. After the unit is idle for ten (10) minutes the fans will turn OFF. The fans will come back ON as soon as the torch switch (Start Signal) is activated or if the unit is turned OFF, then turned ON again. If an over temperature condition occurs, the fans will continue to run while the condition exists and for a ten (10) minute period once the condition is cleared.

Set Operating Pressure

1. Place the Power Supply Function Control knob to the SET position. Gas will flow.
2. For Standoff cutting, adjust gas pressure from 70 - 85 psi / 4.8 - 5.9 bar (LED's in center of control panel). Refer to the Standoff chart for pressure setting details.



Art# A-07946

STANDOFF		
CutMaster A60 Gas Pressure Settings		
Leads Length	SL60 (Hand Torch)	SL100 (Mechanized Torch) SL 100 SV (Automation Torch)
Up to 25' (7.6 m)	75 psi 5.2 bar	75 psi 5.2 bar
Each additional 25' (7.6 m)	Add 5 psi 0.4 bar	Add 5 psi 0.4 bar

- For Drag cutting, adjust gas pressure from 75 - 95 psi / 5.2 - 6.5 bar (LED's in center of control panel). Refer to the Drag Cutting chart for pressure setting details.

DRAG	
CutMaster A60 Gas Pressure Settings	
Leads Length	SL60 (Hand Torch)
Up to 25' (7.6 m)	80 psi 5.5 bar
Each additional 25' (7.6 m)	Add 5 psi 0.4 bar

Select Current Output Level

- Place the Function Control Knob in one of the three operating positions available:

RUN 

RAPID AUTO RESTART 

or LATCH  . Gas flow stops.

- Set the output current to desired amperage with the Output Current Control Knob.

Cutting Operation

When the torch leaves the workpiece during cutting operations with the Function Control Knob in the RUN position, there is a brief delay in restarting the pilot arc. With the knob in the **RAPID AUTO RESTART** position, when the torch leaves the workpiece the pilot arc restarts instantly, and the cutting arc restarts instantly when the pilot arc contacts the workpiece. (Use the 'Rapid Auto Restart' position when cutting expanded metal or gratings, or in gouging or trimming operations when an uninterrupted restart is desired). And with the knob in the LATCH position the main cutting arc will be maintained after the torch switch is released.

Typical Cutting Speeds

Cutting speeds vary according to torch output amperage, the type of material being cut, and operator skill. Refer to Section 4T.08 and following for greater details.

Output current setting or cutting speeds may be reduced to allow slower cutting when following a line, or using a template or cutting guide while still producing cuts of excellent quality.

Postflow

Release the trigger to stop the cutting arc. Gas continues to flow for approximately 20 seconds. During post - flow, if the user moves the trigger release to the rear and presses the trigger, the pilot arc starts. The main arc transfers to the workpiece if the torch tip is within transfer distance to the workpiece.

Shutdown

Turn the ON  / OFF  switch to OFF  (down). All Power Supply indicators shut OFF. Unplug the input power cord or disconnect input power. Power is removed from the system.

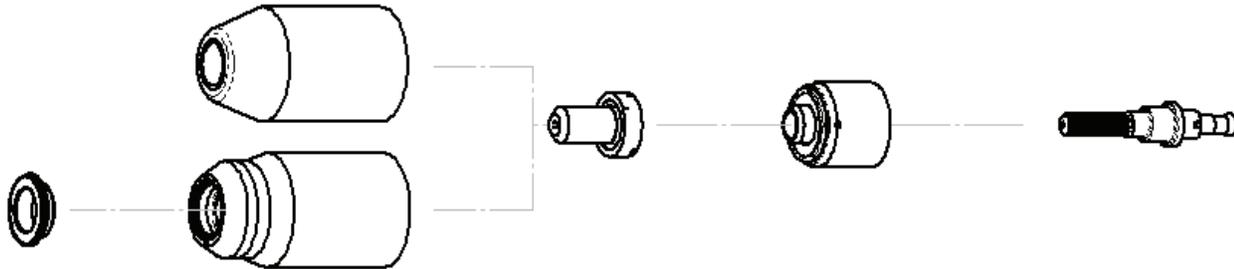
CUTMASTER A60

4T.08 Recommended Cutting Speeds for Machine and Automated Torches With Exposed Tip

Mild Steel

40A

Air Plasma / Air Shield

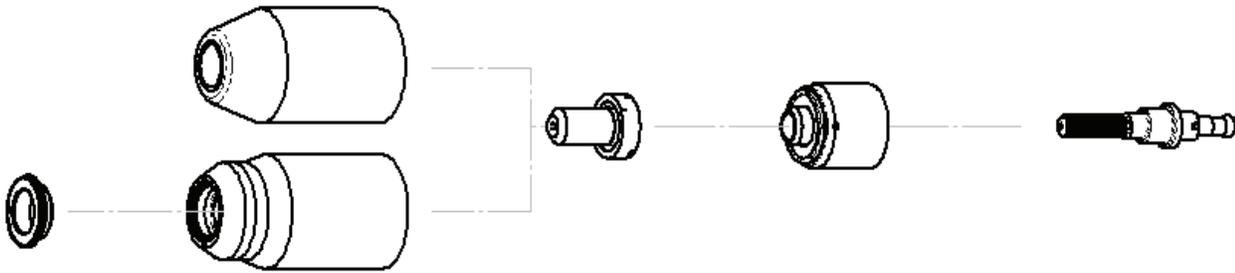


Deflector	Standard Shield Cup Maximum Life Shield Cup	Tip	Starter Cartridge Heavy Duty Starter Cartridge	Electrode
9-8243	9-8218 9-8237	9-8208	9-8213 9-8277	9-8232

Material Thickness			Gas Pressure (Air)	Arc Voltage	Torch Working Height	Travel Speed	Initial Piercing Height	Pierce Delay	Kerf Width @ Rec. Speed
(GA)	(in)	inch	PSI (torch lead length)	Volts	(in)	(ipm)	(in)	(sec)	(in)
20		0.036	70 (25') 75 (50')	101	0.14	160	0.18	0.0	0.05
16		0.060		103	0.14	140	0.18	0.0	0.05
14		0.075		105	0.14	120	0.18	0.1	0.06
12		0.105		108	0.14	80	0.18	0.2	0.06
10		0.135		110	0.14	60	0.18	0.3	0.06
	3/16	0.188		111	0.14	55	0.18	0.4	0.06
	1/4	0.250		117	0.14	40	0.18	0.5	0.07
	3/8	0.375		119	0.14	25	0.18	1.2	0.07
	1/2	0.500		120	0.14	15	0.2	2.0	0.07

CUTMASTER A60

Stainless Steel 40A Air Plasma / Air Shield



Deflector	Standard Shield Cup Maximum Life Shield Cup	Tip	Starter Cartridge Heavy Duty Starter Cartridge	Electrode
9-8243	9-8218 9-8237	9-8208	9-8213 9-8277	9-8232

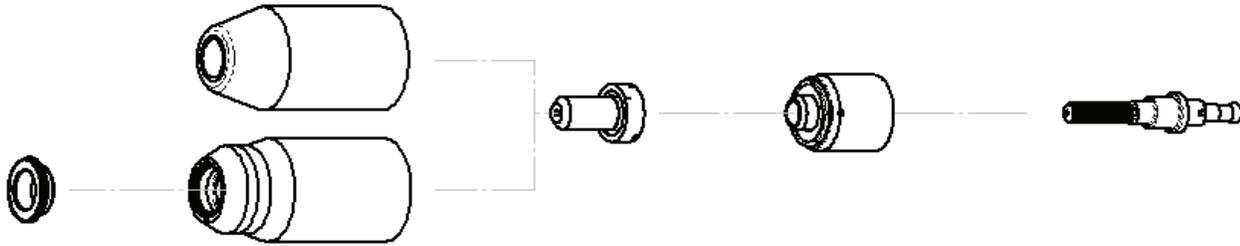
Material Thickness			Gas Pressure (Air)	Arc Voltage	Torch Working Height	Travel Speed	Initial Piercing Height	Pierce Delay	Kerf Width @ Rec. Speed
(GA)	(in)	inch	PSI (torch lead length)	Volts	(in)	(ipm)	(in)	(sec)	(in)
18		0.050	75 (25') 80 (50')	110	0.19	60	0.20	0.00	0.07
16		0.063		100	0.19	50	0.20	0.00	0.07
14		0.078		105	0.19	45	0.20	0.10	0.07
12		0.109		110	0.19	40	0.20	0.20	0.07
10		0.141		108	0.19	35	0.20	0.30	0.07
	3/16	0.188		110	0.19	30	0.20	0.40	0.07
	1/4	0.250		120	0.19	18	0.20	0.50	0.08
	3/8	0.375		126	0.19	10	0.20	2.00	0.08
	1/2	0.500		118	0.19	8	Edge start		0.09

CUTMASTER A60

Aluminum

40A

Air Plasma / Air Shield



Deflector	Standard Shield Cup Maximum Life Shield Cup	Tip	Starter Cartridge Heavy Duty Starter Cartridge	Electrode
9-8243	9-8218 9-8237	9-8208	9-8213 9-8277	9-8232

Material Thickness			Gas Pressure (Air)	Arc Voltage	Torch Working Height	Travel Speed	Initial Piercing Height	Pierce Delay	Kerf Width @ Rec. Speed
(GA)	(in)	inch	PSI (torch lead length)	Volts	(in)	(ipm)	(in)	(sec)	(in)
20		0.040	70 (25') 75 (50')	95	0.16	300	0.16	0.0	0.06
16		0.063		97	0.16	170	0.16	0.0	0.06
12		0.097		113	0.16	100	0.16	0.2	0.07
11		0.125		115	0.16	90	0.18	0.3	0.07
9		0.160		113	0.18	85	0.18	0.4	0.07
	3/16	0.188		116	0.18	75	0.18	0.5	0.07
	1/4	0.250		128	0.18	30	0.18	1.0	0.08
	3/8	0.375		150	0.18	10	Edge Start		0.09

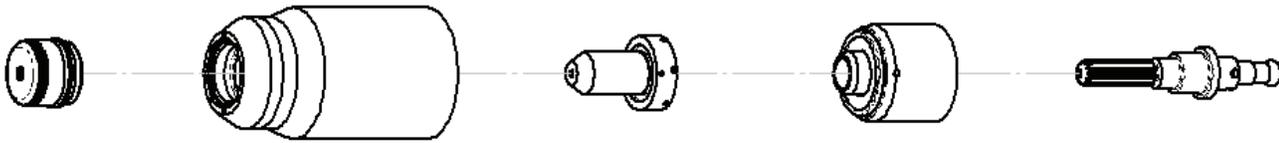
CUTMASTER A60

4T.09 Recommended Cutting Speeds for Machine and Automated Torches With Shielded Tip

Mild Steel

40A

Air Plasma / Air Shield



Shield Cap	Maximum Life Shield Cup	Tip	Starter Cartridge Heavy Duty Starter Cartridge	Electrode
9-8245	9-8237	9-8208	9-8213 9-8277	9-8232

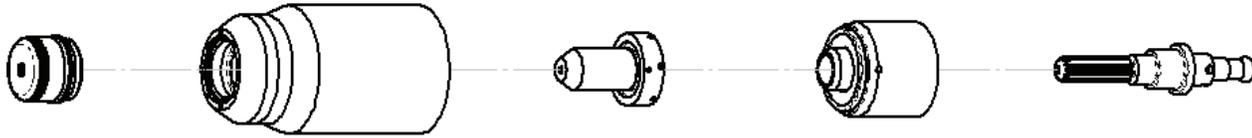
Material Thickness			Gas Pressure (Air)	Arc Voltage	Torch Working Height	Travel Speed	Initial Piercing Height	Pierce Delay	Kerf Width @ Rec. Speed
(GA)	(in)	inch	PSI (torch lead length)	Volts	(in)	(ipm)	(in)	(sec)	(in)
20		0.036	75 (25') 80 (50')	107	0.16	130	0.16	0.0	0.06
16		0.060		113	0.16	120	0.16	0.0	0.06
14		0.075		108	0.16	90	0.16	0.1	0.06
12		0.105		111	0.16	75	0.16	0.2	0.06
10		0.135		114	0.16	65	0.16	0.3	0.07
	3/16	0.188		115	0.16	65	0.16	0.4	0.07
	1/4	0.250		118	0.16	45	0.16	0.5	0.07
	3/8	0.375		123	0.16	23	0.16	1.2	0.08
	1/2	0.500		128	0.16	18	0.16	2.0	0.08

CUTMASTER A60

Stainless Steel

40A

Air Plasma / Air Shield



Shield Cap	Maximum Life Shield Cup	Tip	Starter Cartridge Heavy Duty Starter Cartridge	Electrode
9-8245	9-8237	9-8208	9-8213 9-8277	9-8232

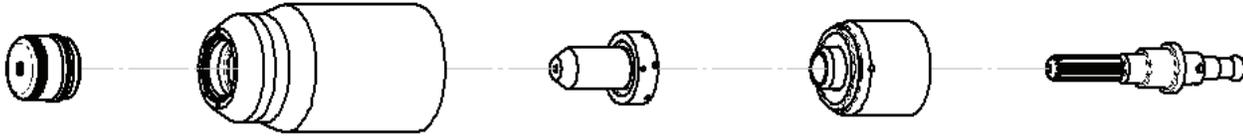
Material Thickness			Gas Pressure (Air)	Arc Voltage	Torch Working Height	Travel Speed	Initial Piercing Height	Pierce Delay	Kerf Width @ Rec. Speed
(GA)	(in)	inch	PSI (torch lead length)	Volts	(in)	(ipm)	(in)	(sec)	(in)
18		0.050	75 (25') 80 (50')	110	0.16	60	4.1	0.0	0.06
16		0.063		108	0.16	50	4.1	0.1	0.07
14		0.078		114	0.16	45	4.1	0.1	0.07
12		0.109		113	0.16	40	4.1	0.2	0.07
10		0.141		116	0.16	35	4.1	0.3	0.07
	3/16	0.188		115	0.16	30	4.1	0.4	0.07
	1/4	0.250		118	0.16	20	4.1	1.2	0.07
	3/8	0.375		125	0.16	15	4.1	1.8	0.08
	1/2	0.500		127	0.16	10	4.1	2.0	0.08

CUTMASTER A60

Aluminum

40A

Air Plasma / Air Shield



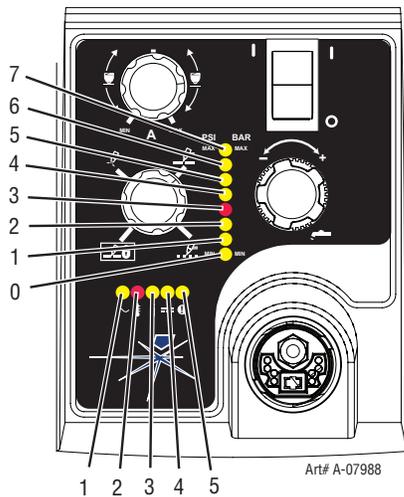
Shield Cap	Maximum Life Shield Cup	Tip	Starter Cartridge Heavy Duty Starter Cartridge	Electrode
9-8245	9-8237	9-8208	9-8213 9-8277	9-8232

Material Thickness			Gas Pressure (Air)	Arc Voltage	Torch Working Height	Travel Speed	Initial Piercing Height	Pierce Delay	Kerf Width @ Rec. Speed
(GA)	(in)	inch	PSI (torch lead length)	Volts	(in)	(ipm)	(in)	(sec)	(in)
20		0.040	75 (25') 80 (50')	110	0.19	300	0.20	0.0	0.06
16		0.063		113	0.19	170	0.20	0.1	0.07
12		0.097		120	0.19	100	0.20	0.2	0.07
11		0.125		125	0.19	90	0.20	0.3	0.07
9		0.160		126	0.19	85	0.20	0.4	0.07
	3/16	0.188		128	0.19	70	0.20	0.5	0.07
	1/4	0.250		137	0.19	30	0.20	1.0	0.08
	3/8	0.375		145	0.19	10	0.20	2.0	0.09

5.04 Fault Indicator

At initial power up, two lights will temporarily illuminate for 2-3 seconds to show the version of software used.

To determine the first digit, count the function indicators left to right, 1 through 5. To determine the second digit count the pressure indicators, reading from bottom to top, 0 through 7. In the example below the Temp indicator and 75 psi indicators are on indicating the version would be 2.3.



When the ① "Fault" indicator is ON or blinking it will be accompanied by one of the pressure indicator lights depending on what the Fault is. Only one of these faults will be displayed at one time. If more than one fault exists, when the first fault is corrected and cleared, the next fault will then be displayed. It is possible to have a fault indicated in the function indicators and another fault indicated in the pressure indicators. The following table shows each of the Faults possible.

Pressure Indicator	Fault
Max	Over Pressure
90	Internal Error
85	Shorted Torch
80	Consumables Missing
75	Start Error
70	Parts in Place
65	Input Power
Min	Under Pressure

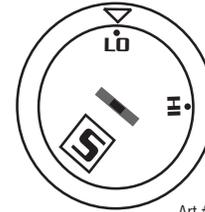
NOTE

Fault explanations are covered in the following tables.

Explanation of Faults

" UNDER PRESSURE: Indicates that operating pressure is set too low and power supply output power will be disabled.

INPUT POWER: Indicates primary line voltage is outside the operating limits of the power supply as selected by the setting of INPUT VOLTAGE SELECTION SWITCH at the rear of the unit. Low is 208/230 VAC and high is 460 VAC.



PART IN PLACE: Indicates that the shield cup is not properly installed or tightened.

START ERROR: Indicates that the START SIGNAL was active (ie. Torch Trigger depressed, hand held pendant switch on or CNC signal for torch on) during one of three conditions:

- 1) During initial power up when ON/OFF switch is turned to ON position
- 2) When fault which had been disabling the system is cleared.
- 3) When the FUNCTION CONTROL SWITCH Mode is moved from SET position to any of the other three (3) modes of operation.

CONSUMABLES MISSING: Indicates that the electrode, start cartridge or tip is missing or excessively worn.

SHORTED TORCH: Indicates the torch or lead has a shorted condition between positive and negative leads.

INTERNAL ERROR: Indicates a microprocessor error.

OVER PRESSURE: Indicates that operating pressure is set too high. The Error Indicator will not flash when the pressure is above 95 PSI. This LED will remain on and the system will operate but pilot starting and cut performance may be affected.

NOTE

The cooling fans will turn ON as soon as the unit is turned ON. After the unit is idle for ten (10) minutes the fans will turn OFF. The fans will come back on as soon as the torch switch (Start Signal) is activated or if the unit is turned OFF, then turned ON again. If an over temperature condition occurs, the fans will continue to run while the condition exists and for a ten (10) minute period once the condition is cleared.

5.05 Basic Troubleshooting Guide

WARNING

There are extremely dangerous voltage and power levels present inside this unit. Do not attempt to diagnose or repair unless you have had training in power electronics measurement and troubleshooting techniques.

Problem - Symptom	Possible Cause	Recommended Action
ON / OFF Switch is on but the A/C Indicator does not light	<ol style="list-style-type: none"> 1. Primary power disconnect is in OFF position. 2. Primary fuses / breakers are blown or tripped. 3. Faulty components in unit. 	<ol style="list-style-type: none"> 1. Turn primary power disconnect switch to ON position. 2. a) Have qualified person check primary fuses / breakers. b) Connect unit to known good primary power receptacle 3. Return to authorized service center for repair or replacement.
FAULT indicator flashing, 65 PSI indicator flashing	<ol style="list-style-type: none"> 1. INPUT VOLTAGE SELECTION SWITCH set for incorrect voltage. 2. Primary input voltage problem. 3. Faulty components in unit. 	<ol style="list-style-type: none"> 1. Turn OFF power to unit then set INPUT VOLTAGE SELECTION SWITCH to match primary input voltage. 2. Have qualified person check primary voltage to insure it meets unit requirements see section 2.04. 3. Return to authorized service center for repair or replacement.
TEMPERATURE indicator on. FAULT indicator flashing.	<ol style="list-style-type: none"> 1. Air flow through or around the unit is obstructed. 2. Duty cycle of the unit has been exceeded 3. Failed components in unit 	<ol style="list-style-type: none"> 1. Refer to clearance information – section 2.04 2. Allow unit to cool. 3. Return to authorized service center for repair or replacement.
GAS indicator OFF, FAULT and MIN pressure indicators flashing.	<ol style="list-style-type: none"> 1. Gas supply not connected to unit. 2. Gas supply not turned ON. 3. Gas supply pressure too low. 4. AIR PRESSURE CONTROL regulator set too low. 5. Failed components in unit. 	<ol style="list-style-type: none"> 1. Connect gas supply to unit. 2. Turn gas supply ON. 3. Set air supply inlet pressure to unit to 120 psi. 4. Adjust regulator to set air pressure - see section 4.02. 5. Return to authorized service center for repair or replacement.
FAULT and 70 PSI indicators flashing.	<ol style="list-style-type: none"> 1. Shield Cup loose. 2. Torch not properly connected to power supply. 3. Problem in torch and leads PIP circuit. 4. Failed components in unit. 	<ol style="list-style-type: none"> 1. Hand tighten the shield cup until it is snug. 2. Insure torch ATC is securely fastened to unit. 3. Replace torch and leads or return to authorized service center for repair or replacement. 4. Return to authorized service center for repair or replacement.
FAULT and 75 PSI indicators flashing.	<ol style="list-style-type: none"> 1. Start signal is active when ON/OFF SWITCH is turned to ON position. 2. Problem in the torch and leads switch circuit. 3. Failed components in unit. 	<ol style="list-style-type: none"> 1. Start can be active for one of the following: <ul style="list-style-type: none"> • Hand torch switch held closed • Hand pendant switch held closed • CNC START signal is active low Release the START signal source 2. Replace torch and leads or return to authorized service center for repair or replacement. 3. Return to authorized service center for repair or replacement.

Problem - Symptom	Possible Cause	Recommended Action
FAULT & 80 PSI indicators flashing. Gas flow is cycling on and OFF.	<ol style="list-style-type: none"> 1. Torch shield cup is loose. 2. Torch tip, electrode or starter cartridge missing. 3. Torch start cartridge is stuck. 4. Open conductor in torch leads. 5. Problem in the torch and leads switch circuit. 6. Failed components in unit. 	<ol style="list-style-type: none"> 1. Tighten shield cup by hand. Do not overtighten. 2. Turn OFF power supply. Remove shield cup. Install missing parts. 3. Turn OFF power supply. Bleed down system pressure. Remove shield cup, tip and start cartridge. Check start cartridge lower end fitting for free movement. Replace if fitting does not move freely. 4. Replace torch and leads or return to authorized service center for repair or replacement. 5. Replace torch and leads or return to authorized service center for repair or replacement. 6. Return to authorized service center for repair or replacement.
Nothing happens when torch switch or remote switch is closed (Or CNC START signal is active) No gas flow, DC LED OFF.	<ol style="list-style-type: none"> 1. Problem in the torch and leads switch circuit (Remote pendant switch circuit). 2. CNC Contoller device not providing Start signal. 3. Failed components in unit. 	<ol style="list-style-type: none"> 1. Take Torch and Leads (Remote Pendant) to Authorized Repair Facility. 2. Contact Controller manufacturer. 3. Return to authorized service center for repair or replacement.
FAULT and 85 PSI indicators flashing.	<ol style="list-style-type: none"> 1. Upper O-Ring on torch head is in wrong position. 2. Torch starter cartridge is stuck. 3. Worn or faulty torch parts. 4. Shorted Torch. 5. Temporary Short indicated by 5 blinks per second. 6. Power Supply Failure (Standard rate of blinking) 	<ol style="list-style-type: none"> 1. Remove shield cup from torch; check upper O-Ring position; correct if necessary. 2. Turn OFF power supply. Bleed down system pressure. Remove shield cup, tip and starter cartridge. Check starter cartridge lower end fitting for free movement. Replace if fitting does not move freely. 3. Inspect torch consumable parts. Replace if necessary. 4. Replace torch and leads or return to an authorized service center for repair. 5. Release torch switch and reactivate. 6. Return to authorized service center for repair or replacement.
No Fault lights on, no arc in torch.	<ol style="list-style-type: none"> 1. Failed components in unit. 	<ol style="list-style-type: none"> 1. Return to an authorized service center for repair.
FAULT and 85 PSI indicators flashing	<ol style="list-style-type: none"> 1. Internal Error 	<ol style="list-style-type: none"> 1. Turn the ON / OFF switch OFF then back ON again. If that does not clear the fault, return to an authorized service center for repair.
Pilot arc is on but cutting arc will not establish	<ol style="list-style-type: none"> 1. Work cable not connected to work piece. 2. Work cable/connector broken. 3. Failed components in unit. 	<ol style="list-style-type: none"> 1. Connect work cable. 2. Replace work cable. 3. Return to an authorized service center for repair.
Torch cutting is diminished	<ol style="list-style-type: none"> 1. Incorrect current setting. 2. Worn torch consumables. 3. Poor work cable connection to work piece. 4. Torch being moved too fast. 5. Excessive oil or water in torch. 6. Failed components in unit. 	<ol style="list-style-type: none"> 1. Check and adjust to proper setting. 2. Check torch consumables and replace as needed. 3. Check the connection of the Work Lead to the work piece. 4. Reduce cutting speed. 5. Refer to "Check air quality" in section 3 Torch. 6. Return to an authorized service center for repair.