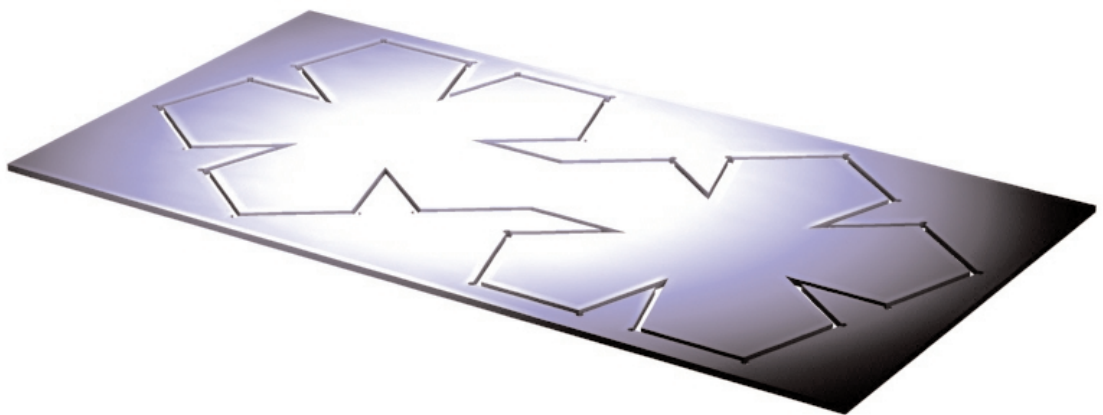


LICOM AlphaCAM

CAD/CAM system for Windows™

Laser / Flame / Water Jet

TUTORIAL



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Conventions When Using The Tutorial

Notes and comments are in *Italics* to separate them from the main text. If there are different ways of performing the same command or option, these are also in *Italics* and can be ignored the first time you work through the tutorial.

The symbol  indicates a new command for you to action.

The symbol  indicates a sub part of command for you to action

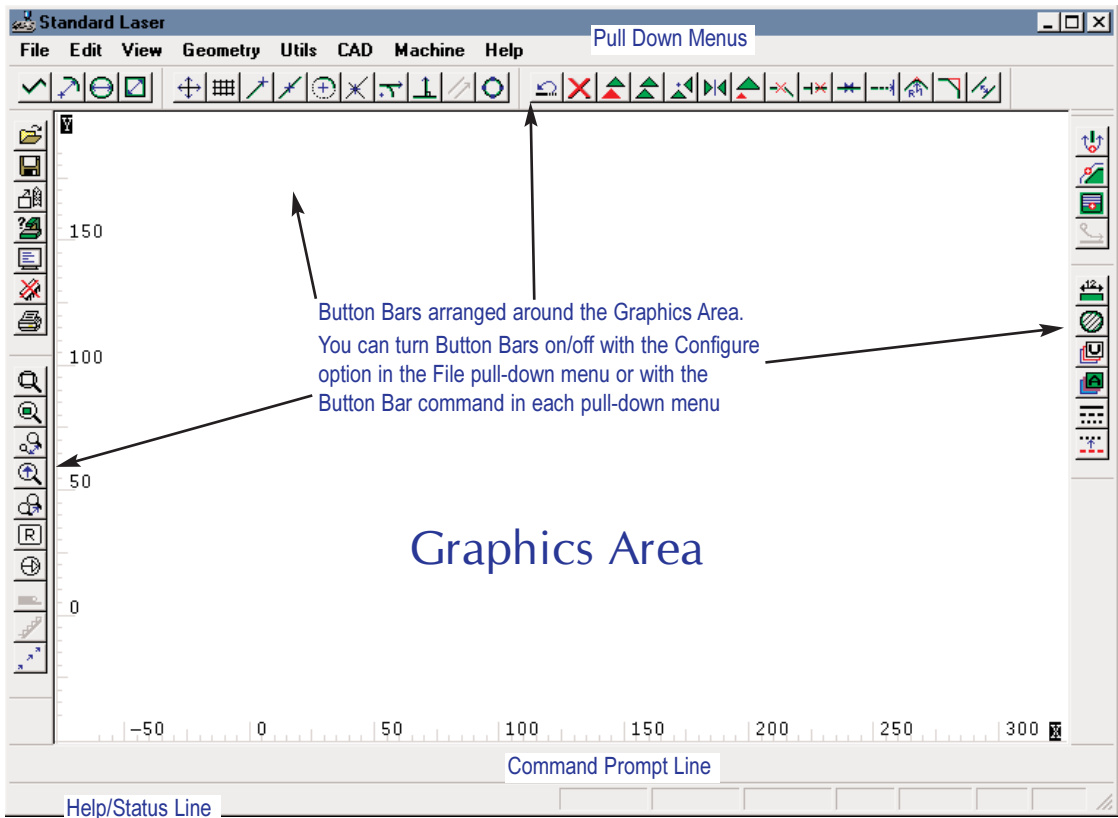
The HELP file is very comprehensive. When you have finished the tutorial, please take time to have a look at it. **Select HELP | Contents.**

Introduction

This **AlphaCAM** tutorial has been designed to give you a flavour of how **AlphaCAM** works, how interactive it is, how easy it is to learn and how easy it is to use. We assume that you are familiar with the concepts involved in CNC programming and have a reasonable understanding of your computer and the Windows operating system. **AlphaCAM** has been developed as a true 32-bit Windows 95 or NT application, so if you use other Windows programs you will be familiar with features such as floating button bars, tabbed dialog boxes, etc. If not, you should look at **HELP | Contents | Screen Layout.**

AlphaCAM systems are available for all machining disciplines. Each one is specifically designed for the machine type, but the look and feel of all the systems is standard. This tutorial can be used with both Standard and Advanced **AlphaCAM**, Laser / Flame or Water Jet, modules. The tutorial describes the construction and machining of the geometry for the following drawing.

If you have not already done so, start the **AlphaCAM** module. This will take you into the graphical portion of the system. Your screen will look similar to the one following.



During this tutorial, we tell you where to find commands on the pull-down menus. If there is a button for the command, this will also be shown.

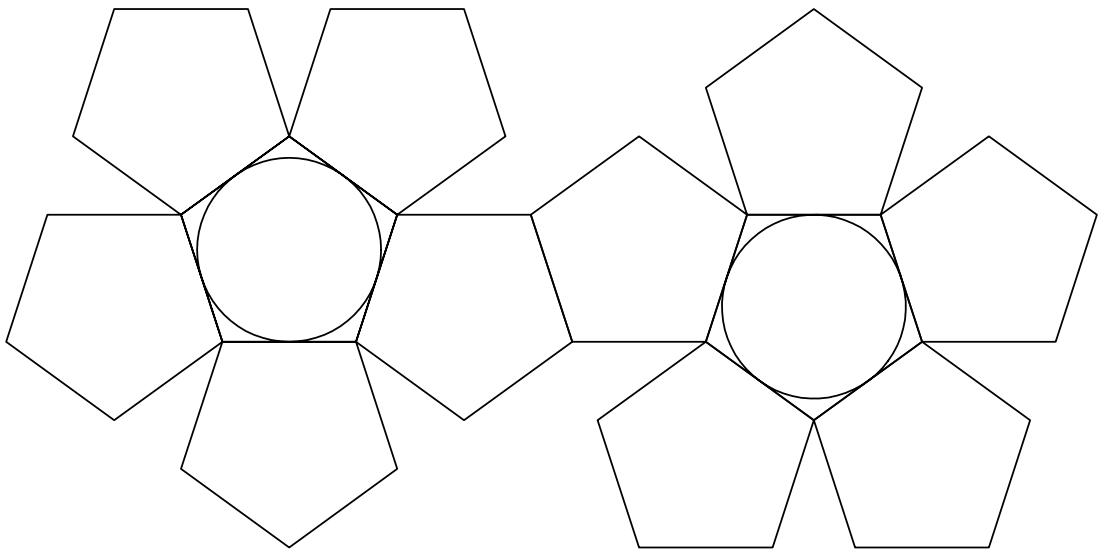
Take the trouble to locate the buttons on your screen. You can speed up your work by avoiding having to pull down menus and side menus to click on commands, when one click on a button will suffice.

To see what command a button performs, place the screen pointer over the button for a couple of seconds, and a prompt will appear beside the pointer.

The Part Geometry

This drawing is the part on which you will work in this tutorial. It was drawn, dimensioned and printed using **AlphaCAM**. By the end of the tutorial, you will have created the NC program for the drawing.

DODECAHEDRON BASED ON 100 INTERNAL PENTAGON



AlphaCAM provides various ways of creating part geometry.

Conventional CAD style geometry, creation, whereby individual geometric features are created and then trimmed in order to create geometric contours. Toolpaths are then applied to the geometric contours, from which the NC program is produced;


'**APS Fast Geometry**' is a unique way of creating 'bounded' geometry. This can turn some designs into geometric contours much faster than with any conventional CAD system.

With APS Fast Geometry, you do not specify individual lines and arcs. Instead, you say how the tool should move from one element to the next. Each change in direction is called a **Turn**. APS Fast Geometry builds a 'bounded' geometry profile by automatically trimming, blending and filleting as Turn details are entered. This method is very powerful, because it allows you to answer 'Unknown' to questions about poorly specified co-ordinates and once **AlphaCAM** has enough information it will 'back-calculate' to solve the unknowns.

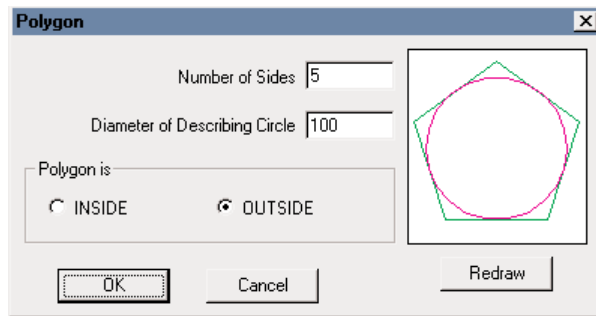
However, **CAD-style** geometry creation using Line, Arc and Circle commands is sometimes appropriate for simple shapes, and all the conventional CAD commands are included, plus Special Geometries, which automatically produce standard geometric shapes.

Creating The Geometry

Draw the Base Pentagon


- ☞ Select **GEOMETRY | Special Geometries | Polygon** . This command creates a multi-sided polygon, around or inside a base circle.

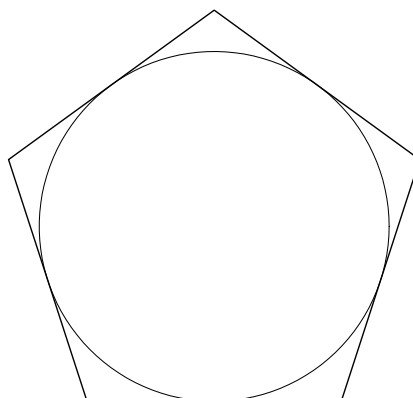
The Polygon dialog is displayed



- ☞ Enter the Number of Sides to the polygon. Type **5** followed by **Tab** to move to the next field
- ☞ Enter the Diameter of the Describing Circle of the polygon. Type **100**
- ☞ Select the **OUTSIDE** option then pick **OK**
- ☞ The command line now prompts you to enter the co-ordinates of the of the base circle centre. Type **0** **0**

The polygon is drawn on the screen.

- ☞ Select **VIEW | Zoom All**  **Ctrl+A** to make the geometry fit the screen
*Pressing **Esc** or **<RMB>** once aborts any repeating commands.*



Use Copy to duplicate the base polygon.


As the dodecahedron pattern is made up of similar pentagon's, it will be easier to manipulate them by a corner if the copy command is used rather than to create new pentagons using the polygon command.

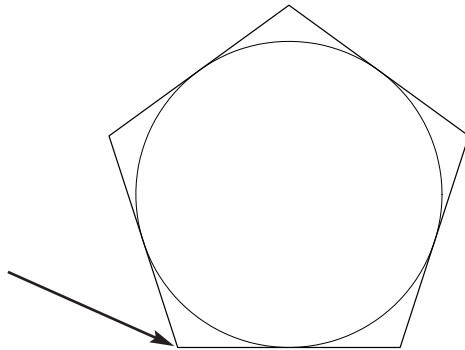
 Select **EDIT | Move Copy etc. | Copy.** 


 The command line prompts . Click on  the green pentagon. It will turn blue. Click on  Finish or press  indicate you have finished selecting the items to be copied.


 The command line prompts X Y .

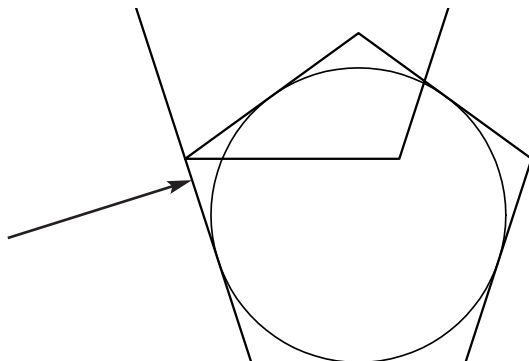
The base point is the point that the copy is to be controlled by.

Select End Point of , pick a position at the bottom left of the pentagon as shown below. The pentagon will be displayed on the cursor.



 The command line prompts X Y .

Select End Point of , pick a position at the top left of the pentagon as shown below.




 Pressing twice will abort the copy command.

Two pentagon's are now drawn on the screen.


Rotate the Pentagon into Position.

 Select **EDIT | Move Copy etc. | Rotate.** 


 The command line prompts . Click on  the top green pentagon. It will turn blue. Click on  Finish or press


 The command line prompts X Y .

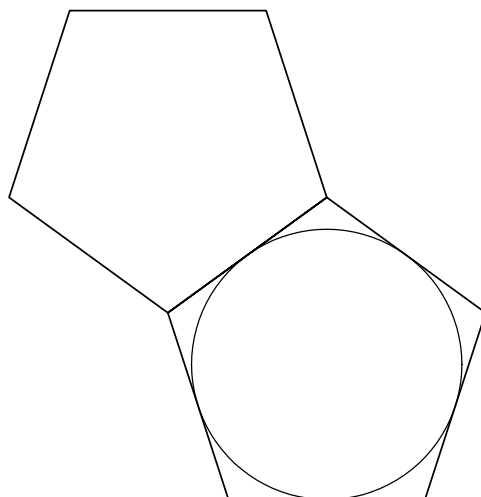
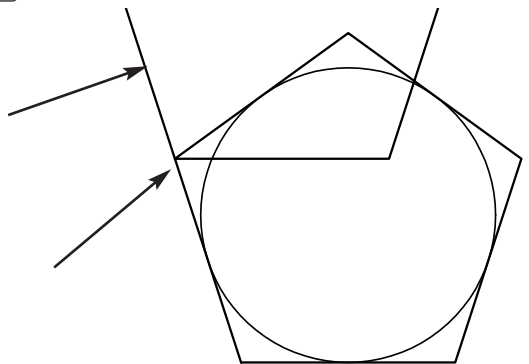
The base point is the point that the items are rotated about.

Select End Point of , pick a position at the bottom left of the selected pentagon as shown below.

The pentagon will be displayed on the cursor.



 The command line prompts Type **36** .

 The command line then prompts . Type **1** .



Rotate and Duplicate the Pentagon.

 Select **EDIT | Move Copy etc. | Rotate.** 

 The command line prompts . Click on  the top green pentagon. It will turn blue. Click on  Finish or press


 The command line prompts X Y .

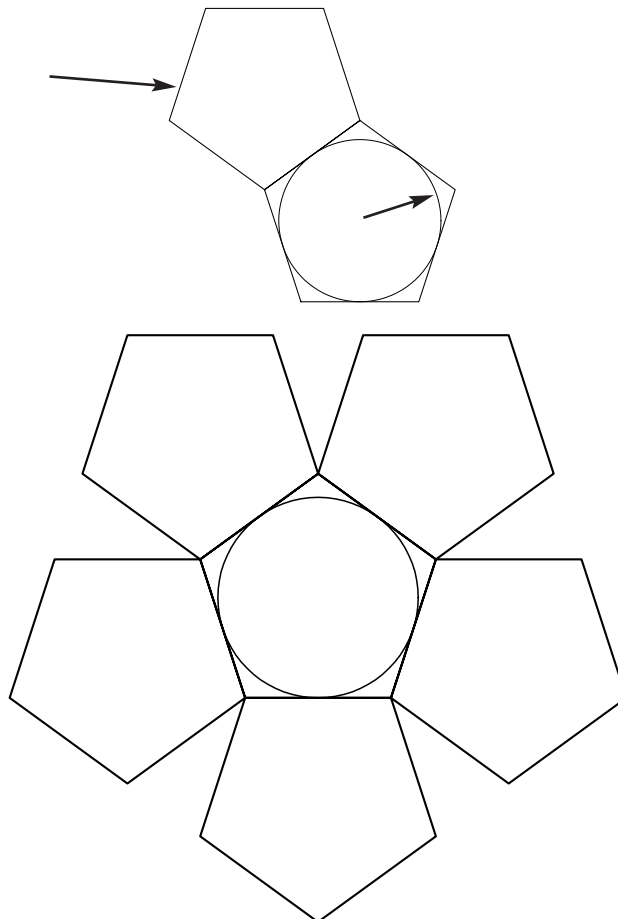
The base point is the point that the items are rotated about.

Select Centre of , pick the edge of the construction circle in the base pentagon as shown below.

The pentagon will be displayed on the cursor.


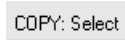
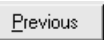





 The command line prompts Type **360/5** .

 The command line then prompts Type **5** .





Copy the Set of Pentagon's.

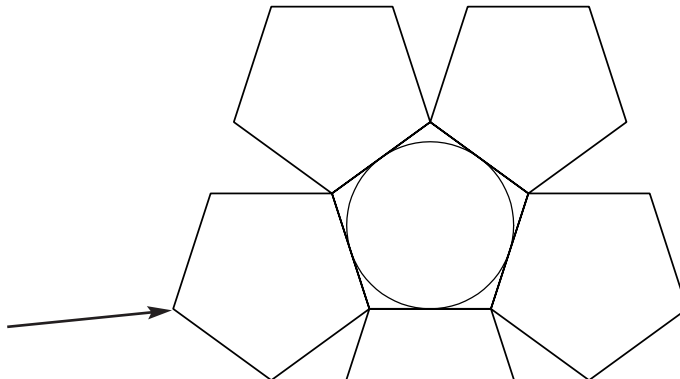
 Select **EDIT | Move Copy etc. | Copy.** 



 The command line prompts     . Click on  the **ALL** button. It will turn all the geometries blue.
Click on  Finish or press 



 The command line prompts 

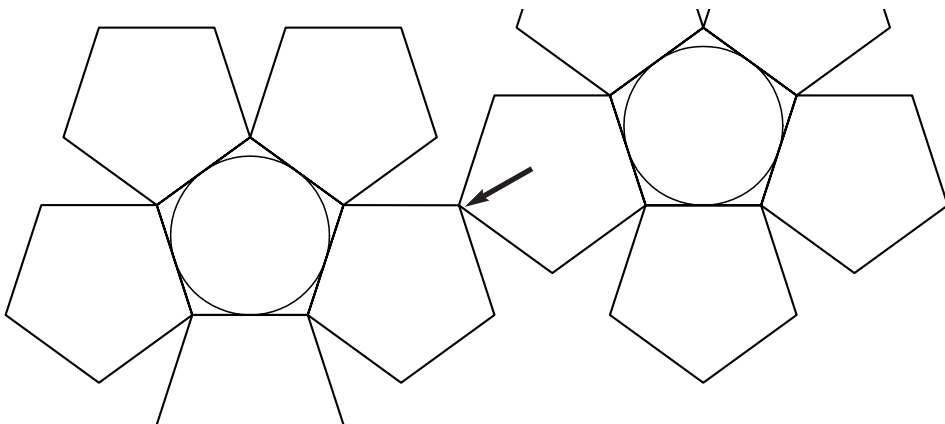
The base point is the point that the copy is to be controlled by.

Select End Point of  , pick the position at the extreme left of the set of pentagon's as shown below. The set will be displayed on the cursor.



 The command line prompts 




Select End Point of  , pick a position at the top right of the pentagon as shown below.



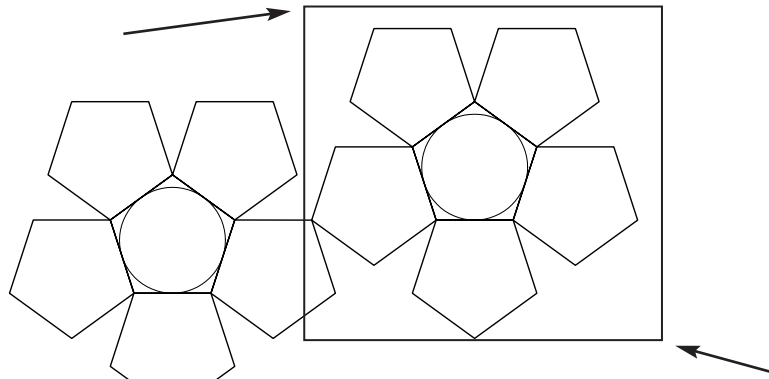
 Pressing  twice will abort the copy command.


Rotate the Pentagon Set into Position.

 Select **EDIT | Move Copy etc. | Rotate.** 


 The command line prompts . Click on  the set of pentagon's on the right. These can be selected individually by clicking on each one in turn, or, by a selection window click  at two diagonal corners of an enclosing rectangle that encompasses the pentagon's to be selected.


They will turn blue. Click on  Finish or press **[Esc]**



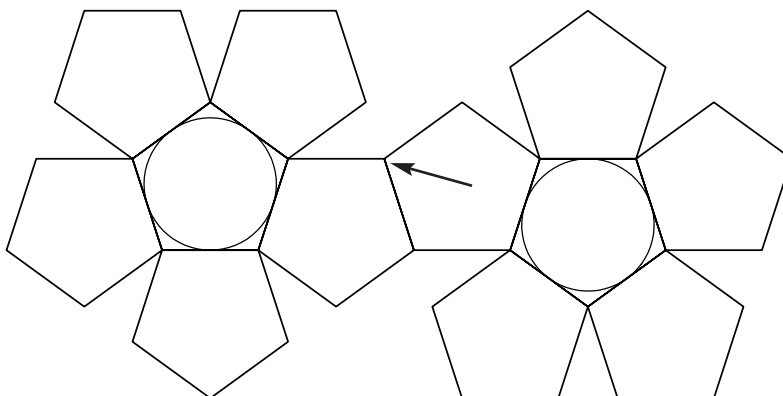
 The command line prompts

The base point is the point that the items are rotated about.

Select End Point of **[F6]** , pick the position where the two sets meet as shown below. The pentagon will be displayed on the cursor.

 The command line prompts Type **-36**

 The command line then prompts . Type **1** .



Create the Outer Boundary.

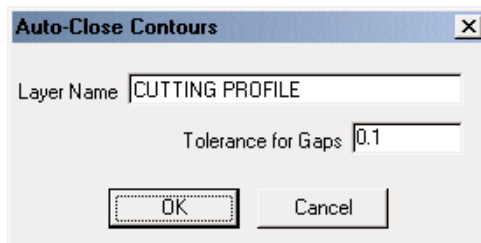
Creating the outer boundary can be done in two ways. If you use the advanced module you can use the Auto-Close Contour command, or you can use the Line or Point command and manually trace the outer boundary.

Using Auto Close Contour.

The Auto-Close function causes AlphaCAM to track along all arcs and lines that intersect (or are within the tolerance given) near to the selected point, always turning to the left at intersections, until a closed contour is formed.

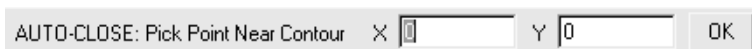
 Select **UTILS | Special Functions | Auto-Close Contours ...** 

A dialog box is displayed and prompts you to enter the layer name onto which the new profile will be created. If the layer does not exist then AlphaCAM will create it. You may also set the tolerance of the gap that AlphaCAM will ignore.



 Enter CUTTING PROFILE as the layer name and set the Tolerance to 0.1 then select

 The command line prompts

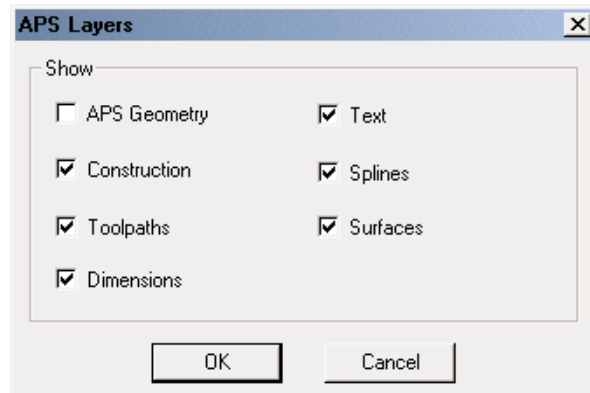



Select a position close to but outside one of the pentagon's

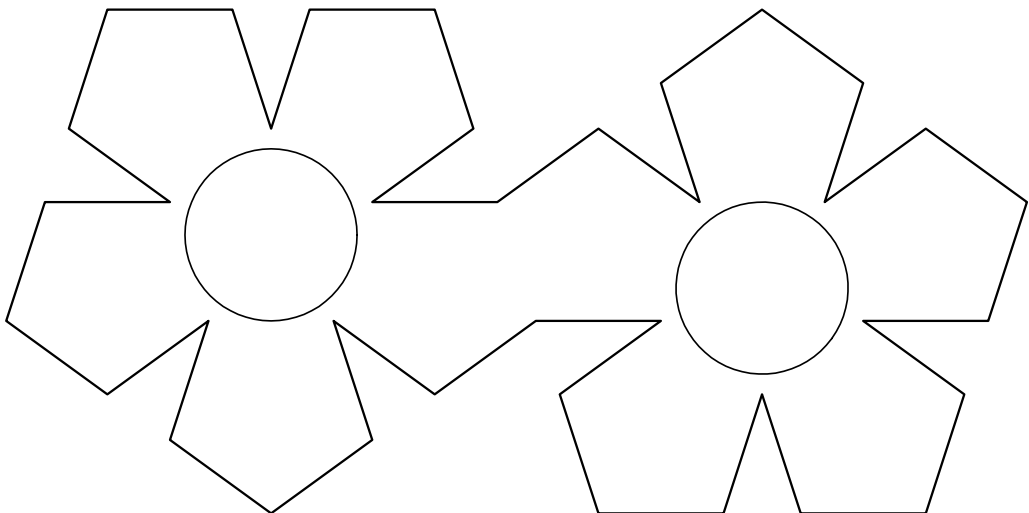
The Auto-Close function will track around the outside of the pentagon's and produce a closed profile on the new user layer CUTTING PROFILE.

To see the new profile turn off the APS Geometry layer.

 Select CAD | APS Layers 



 The APS layer dialog is displayed. Turn off the APS Geometry layer then select (Click on the to turn it on and off)



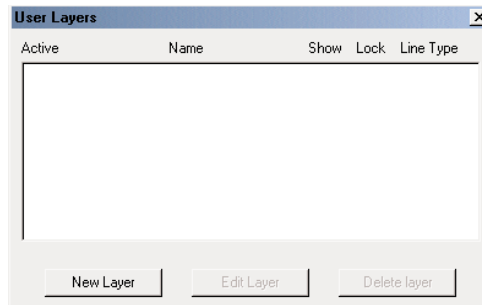
Manual Trace Outer Contour.

To manually trace the outer contour you can use either the Line or Point command. In this example we use the Point command because this will allow the use of the Delete Last option if you make a mistake.

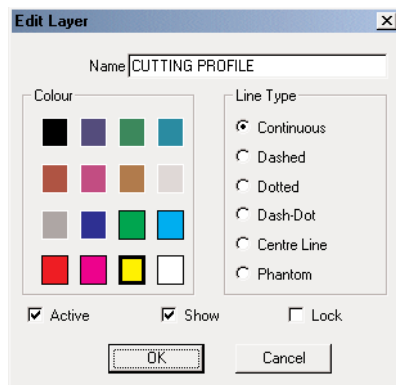
Before you create the new profile it is better if you create and active a User Layer on to which the new profile will be drawn.


 Select **CAD | User Layers.** 

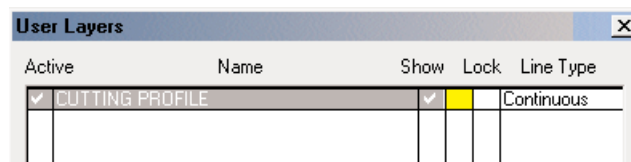
The user layer dialog box is displayed.



 Select New Layer and the second dialog box is displayed.




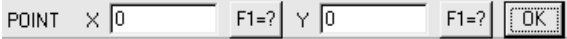
 Enter CUTTING PROFILE as the layer name, select a layer colour and select the Active option, then select




 The User Layers dialog will be displayed showing the current user layers. Select

The name CUTTING PROFILE should now appear in the title bar of AlphaCAM which indicates that this is the currently active User Layer.


 Select **GEOMETRY | APS Fast Geometry | Point.** 


 The command line prompts .

Using the End Point  **F6** snap function select each point in turn to create a closed boundary.

NOTE:

If the **F2** Auto Snap function is active then the system will automatically select the end points of elements.

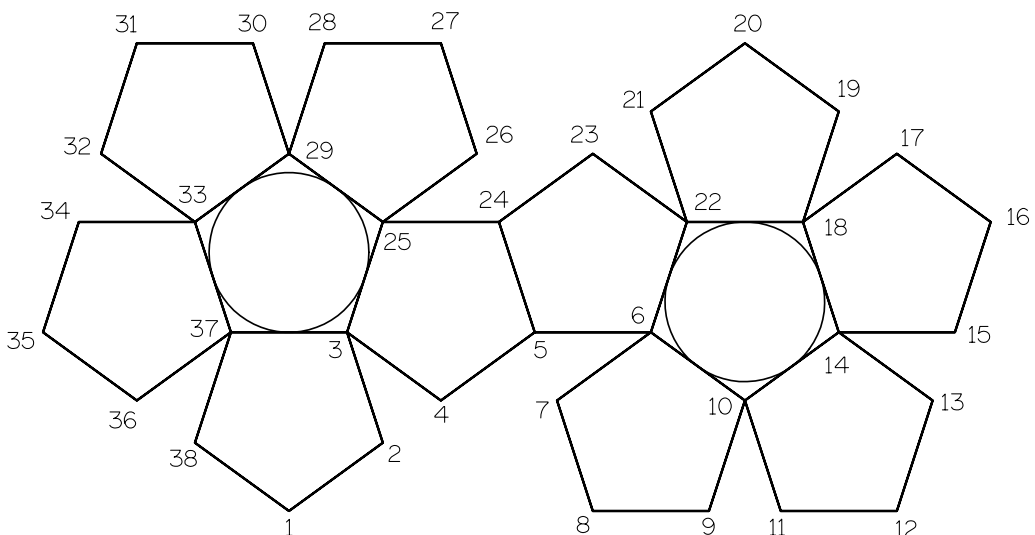
If **F2** Auto Snap is not active you will need to select the  **F6** Snap function before selecting each position.

or Selecting  **F6** End Point whilst holding down **Ctrl** makes end point modal and it will remain active until the Right mouse button is clicked.

If you select the wrong position use the

GEOMETRY | APS Fast Geometry | Delete Last. 

DO NOT USE UNDO as this will remove the complete profile.

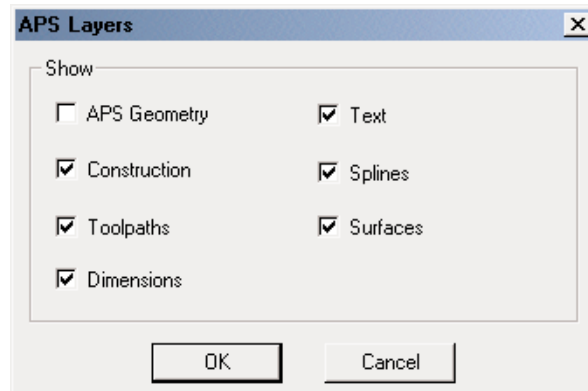




After you have selected position 38

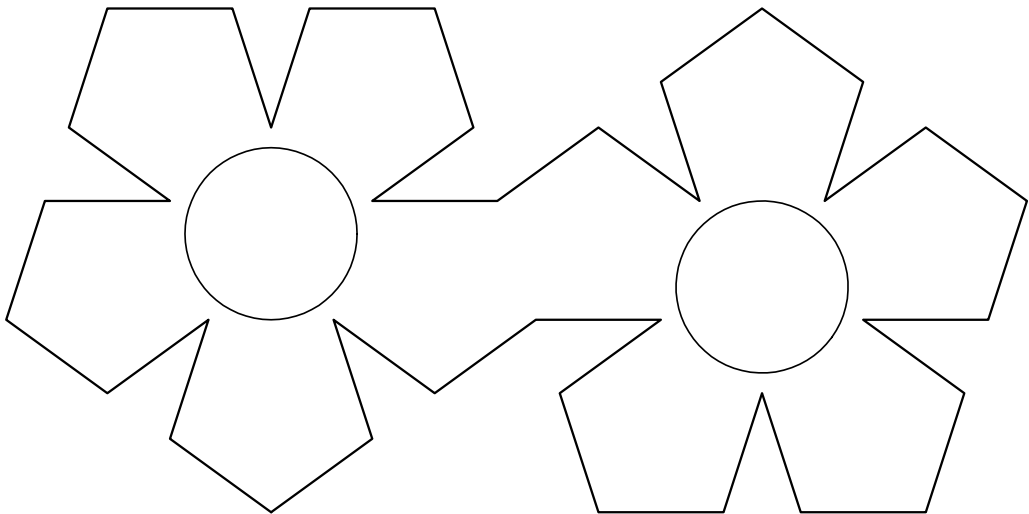
 Select **GEOMETRY | APS Fast Geometry | Close and Finish** **F4**. 

To see the new profile turn off the APS Geometry layer.

 Select **CAD** | **APS Layers** 



 The APS layer dialog is displayed. Turn off the APS Geometry layer, then select (Click  on the to turn it on and off)



Prepare For Machining

Firstly you need to check the cutting profile to ensure it is one profile.

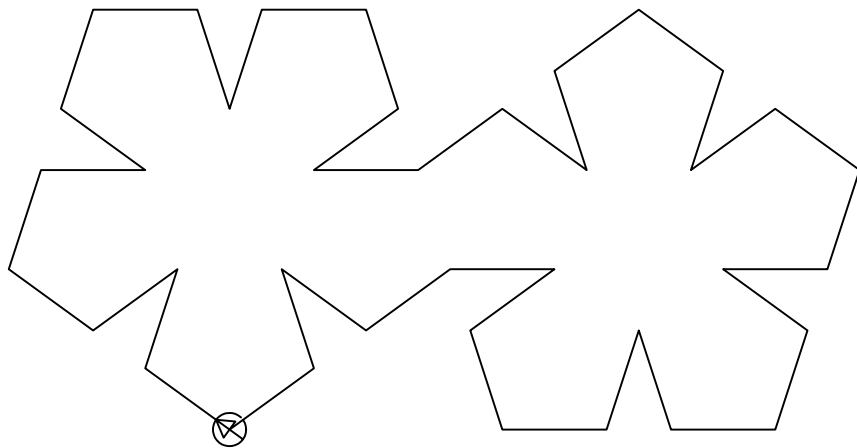
 Select **VIEW** | **Display Options** | **Ghost Tools** **Ctrl** + **G**. 

A Ghost Tool will be displayed at the start of each geometric profile. There should only be one ghost tool visible. If there is more than one Ghost Tool there is more than one profile, below is a list of possible causes.

You have not turned off the APS Geometry layer.

*You stopped and restarted the manual tracing. (Use **Join** to create one profile)*

*You created underlying geometrys. (Use **Delete** to delete unwanted geometry)*



It is necessary to set the right conditions before the machining commands are applied to the geometry profile.

Set The Machine Type

 Select **FILE** | **Select Post**  . The available post processors are displayed.

 Select a suitable post processor.

Set The Cutting Conditions

Setting the cutting conditions involves setting the way in which the beam will cut the component. The conditions only need to be set for geometries against which the tool is driven. The default tool directions are set as the direction of definition and on centre line.

In this case, you need to set the tool to cut on the outside of the geometry. The direction may be altered if required.

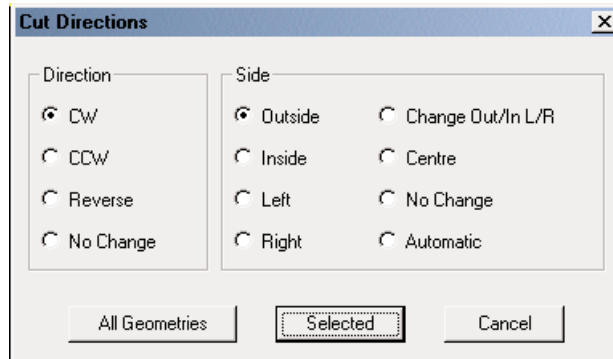
In addition to setting the tool directions and side of cutting, it may also be necessary to adjust the point at which the tool starts cutting the profile.



In this case, you can move the start point to the position indicated.


Tool Directions

 Select **MACHINE** | **Tool Directions** 

A dialog box with two sections is displayed. The left section controls the direction of cutting and the right section controls the side to which the tool is positioned when cutting. The side of cutting is defined whilst looking in the cutting direction.



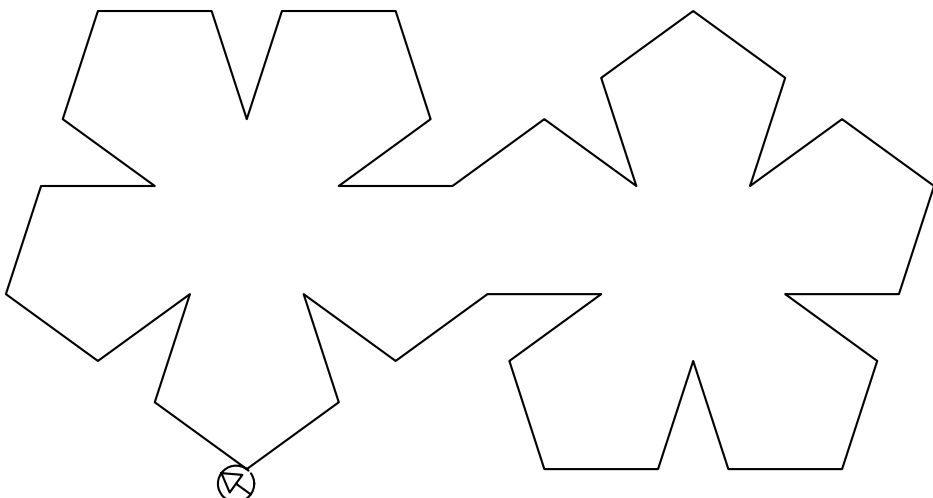
 Select the **CW** option to set the direction and select the **Outside** option. When the selection is correct, click  on the **Selected** button. The Selected button allows you to pick the geometries to which the tool directions are to be applied, (any holes would be set to inside).

 AlphaCAM prompts `TOOL DIRECTION: Select Geometries` Pick the geometry profile.

 Select **VIEW** | **Redraw**   +  to tidy up the display.

The ghost tool display should look like the following diagram.




*The ghost tool should be on the outside of the geometry.
Its position does not matter at this stage.*



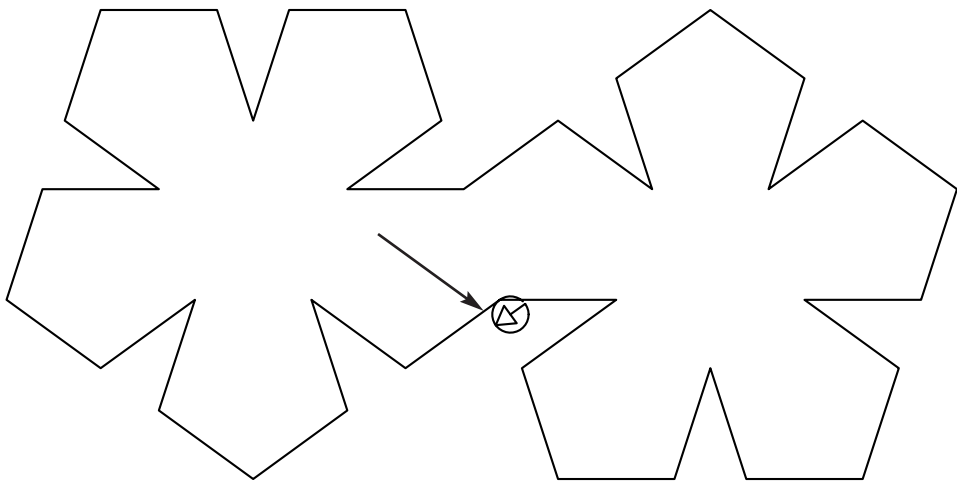
Start Point

You need to move the starting position to a suitable point, especially if the part is to be nested.

 Select **EDIT** | **Start, Order** | **Start Pt.**  **Ctrl** + **F**

 Select **UTILS** | **Snaps** | **End of**  **F6**. Click  on the edge of the pentagon shown.

 Select **VIEW** | **Redraw** **R** **Ctrl** + **R** to tidy up the display.
The ghost tool display should look like the following diagram.

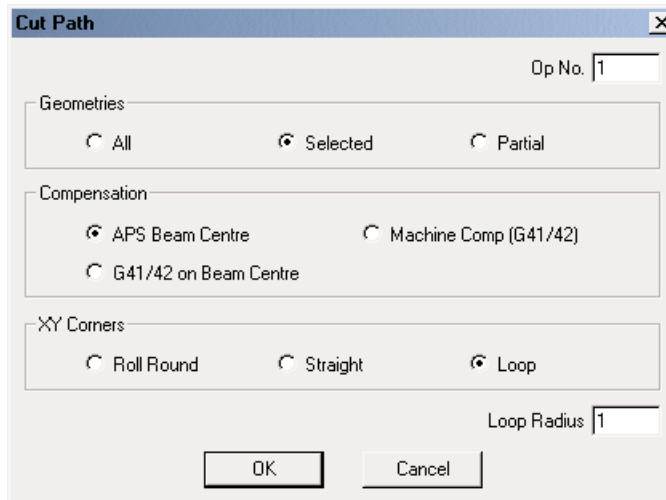


The following notes explain the tool path creation and modification for:-

- 1 Laser and Flame cutters.
- 2 Water Jet machines.

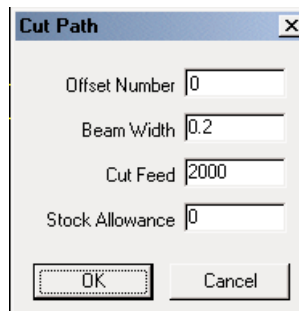
Create the Tool Path (Laser)

 Select **MACHINE** | **Cut Path** . A dialog box is displayed.



 Set the options as shown, then select and the next dialog box will be displayed.

The Loop option causes the tool path to create a loop at the external corners, thus moving the beam away from the part to prevent over burning the corners.



 Set the options as required by your machine, then select

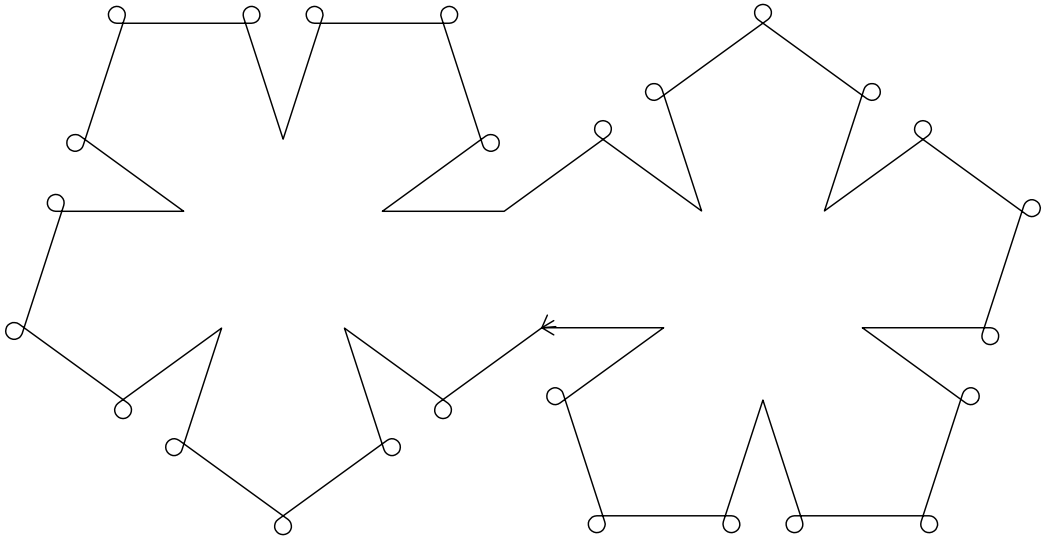
The important values are Beam Width, which is the cutting diameter of the beam or flame, and Cut Feed.

If the beam width is set too large the part will be cut oversize and if it is set too small the part will be cut undersize. This is because the program code is output using the centre of the beam.

The cut feed needs to be adjusted to suit what you are cutting.

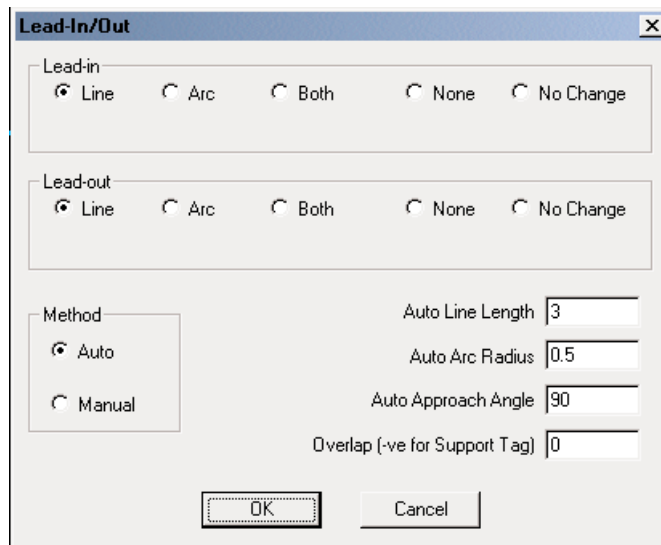
☞ AlphaCAM then prompts CUT PATH: Select Geometries Previous Finish (ESC) All

Select the geometry, then pick Finish or press **[Esc]** and the toolpaths will be displayed.



Add the Lead In-Out


☞ Select **MACHINE | Cut Path** . A dialog box is displayed.

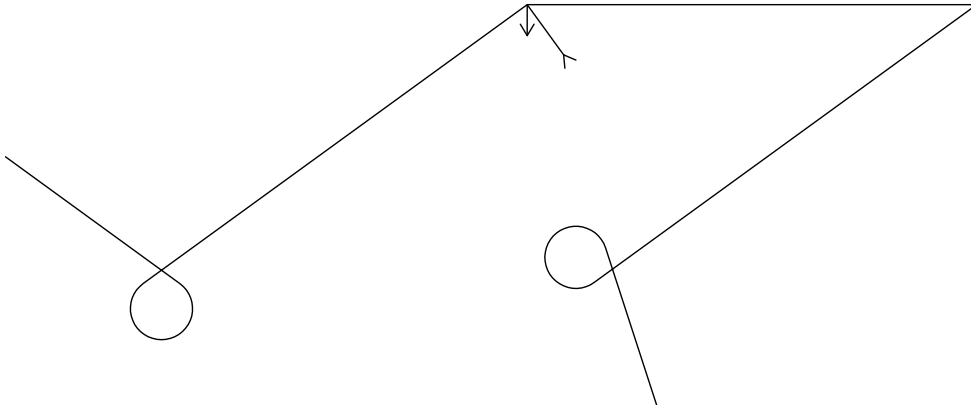


☞ Set the options as shown, then select OK

☞ AlphaCAM then prompts LEAD-IN/OUT: Select Tool Path Previous Finish (ESC) All

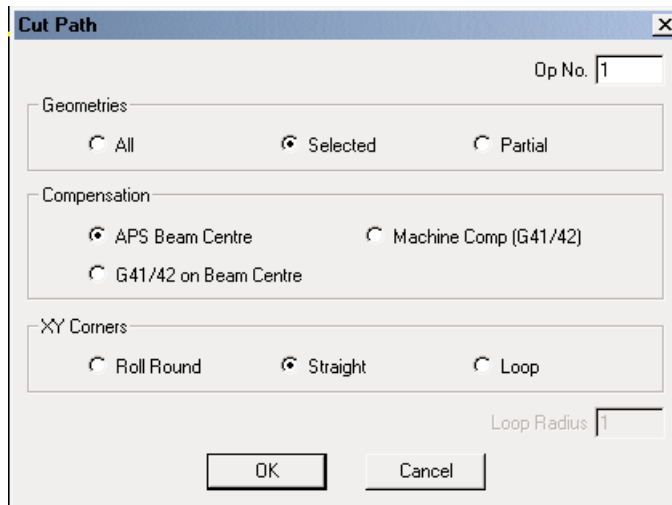
Select the toolpath, then pick Finish or press **[Esc]** and the lead in and out will be applied.

You can use the **VIEW | Zoom Window**  command to enlarge the view. If you have a wheel mouse, rolling the wheel will zoom in and out.

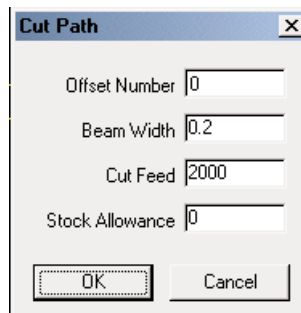



Create the Tool Path (Water Jet)

 Select **MACHINE** | **Cut Path** . A dialog box is displayed.



 Set the options as shown, then select and the next dialog box will be displayed.



 Set the options as required by your machine, then select

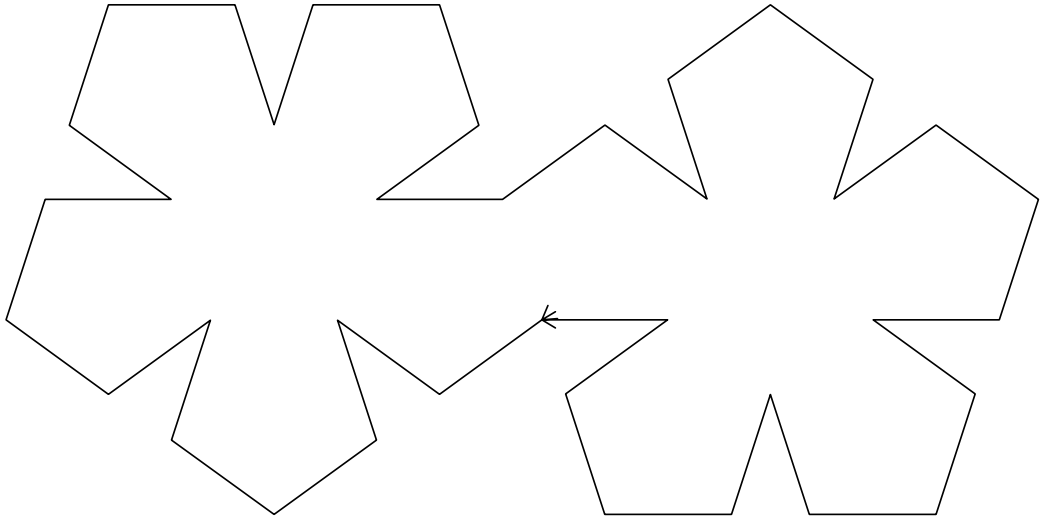
The important values are Beam Width, which is the cutting diameter of the beam or flame, and Cut Feed.

If the beam width is set too large the part will be cut oversize and if it is set too small the part will be cut undersize. This is because the program code is output using the centre of the beam.

The cut feed needs to be adjusted to suit what you are cutting.

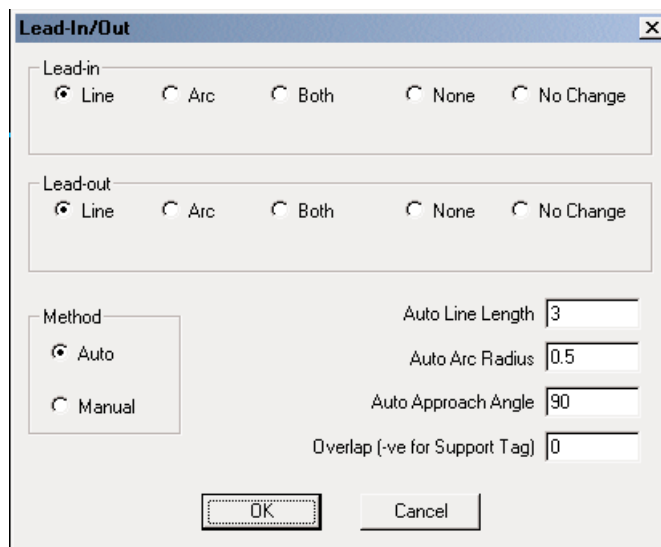
☞ AlphaCAM then prompts CUT PATH: Select Geometries Previous Finish (ESC) All

Select the geometry, then pick Finish or press **[Esc]** and the toolpaths will be displayed.



Add the Lead In-Out


☞ Select **MACHINE | Cut Path** . A dialog box is displayed.

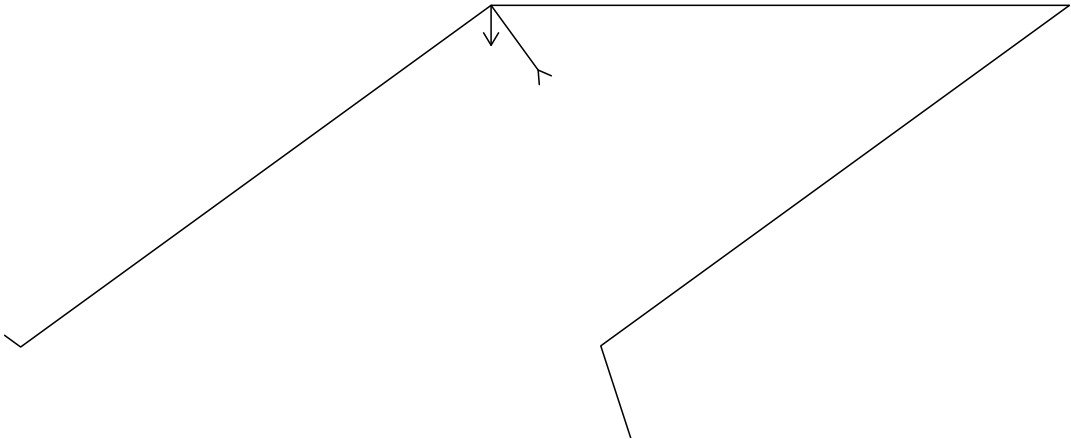


☞ Set the options as shown, then select OK

☞ AlphaCAM then prompts LEAD-IN/OUT: Select Tool Path Previous Finish (ESC) All

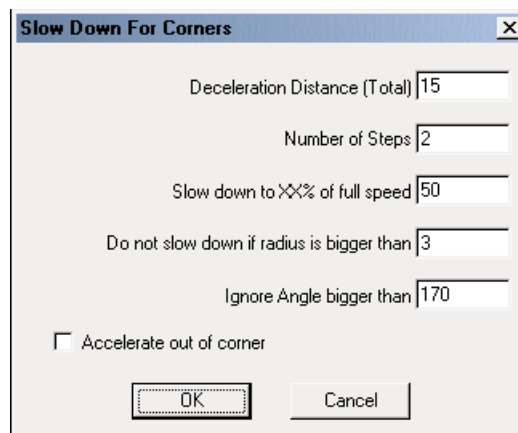
Select the toolpath, then pick Finish or press **[Esc]** and the lead in and out will be applied.

You can use the **VIEW | Zoom Window**  command to enlarge the view. If you have a wheel mouse, rolling the wheel will zoom in and out.



Apply Slow Down at Corners

 Select **MACHINE | [Edit Machining] | Slow Down for Corners...** .
A dialog box is displayed.



 Set the options as shown, then select

 AlphaCAM then prompts

Select the toolpath, then pick Finish or press and the deceleration breaks will be applied.

NOTE:

It is important you apply Slow Down for Corners after applying the Lead In/Out, as the Slow Down for Corners command breaks the tool path into separate paths with different feed rates.

