

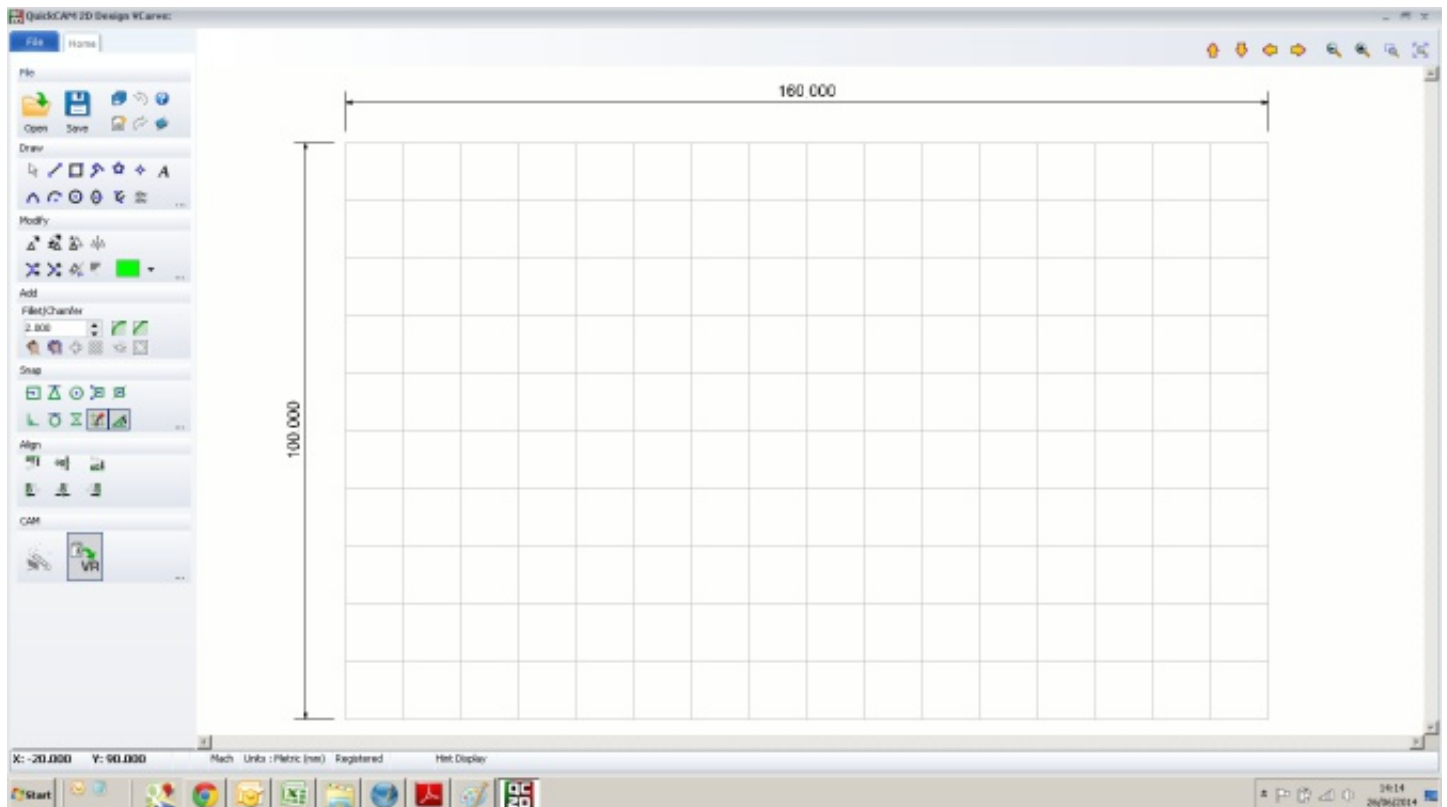
 **DENFORD**
CAD/CAM Solutions & Projects for Education

QuickCAM 2D

Design V2 QuickCAM 2D (V2.1)

2D Design & Manufacture Software

Training Guide





Denford Consumables

MATERIALS & CONSUMABLES



American Maple Wood Block

A creamy white hardwood with a close grain and fine, even texture.
Easy to work and finish, without the need for sanding.

Billet size: 160mm x 100mm x 20mm

Each	BID3509D
Pack of 50	BID3509G



Round Pine Billets

Ideal for use with the Rotary Fixture attachments.

Billet size: 65mm Dia. x 150mm Long

Pack of 10	BID3509J
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FOAM

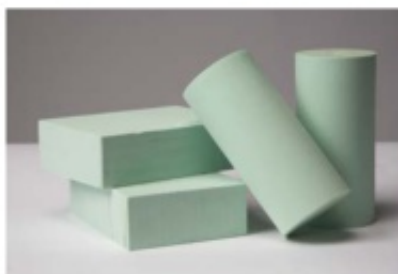
These rigid, closed cell foam blocks are ideal for the rapid machining of parts on the full range of Denford Milling Machines and Routers.

High Density Foam

Ideal for most 3D prototyping applications. Offering plenty of surface detail, it is commonly used in moulds for vacuum forming and is also suitable for painting.

Billet size: 150mm x 110mm x 45mm

Each	BID3508
Pack of 50	BID3508A



Billet size: 70mm Dia. x 150mm long

Each	BID3508DZ
Pack of 15	BID3508E

Ideal for use with the Denford 4th axis programmable rotary fixture.

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About QuickCAM 2D Design V2

QuickCAM 2D Design V2 is an improved version of QuickCAM 2D Design. It is an advanced, yet easy to use, wizard based 2D CAD / CAM package. You can create designs quickly and accurately, then run the CAM wizard to create CNC machine toolpaths. It features various import options to allow images, PCB's and designs from other CAD packages to be manufactured. The customisable post processor and advanced printing facilities provide outputs to most desktop CNC and laser machines.

Version 2 now features the ability to add tabs to parts and a new V carve function.

Introduction

The aim of this training guide is to teach you how to navigate your way around QuickCAM 2D V2 and instruct you how to use this software to create programs for your Router or Milling machine.

This guide will cover the creation of 2D vector graphics using the drawing tools and explain how to convert the drawings into CNC programs.

This guide makes use of screen shots where possible and will use the following conventions:

Instructions will be in this format

Text to be typed will be in this format

Any software buttons to be pressed, a picture of the button will follow the instruction

This guide assumes that your software has already been installed and your machine has been commissioned.

If any of the features described in this guide are not operating as described please check that the version number you are using is the same as that shown on the front cover.

Version is written on the title bar of the main software window.

Denford provide machine training and it is recommended that you undertake the training and use this guide as a revision guide after completion of the machine training.

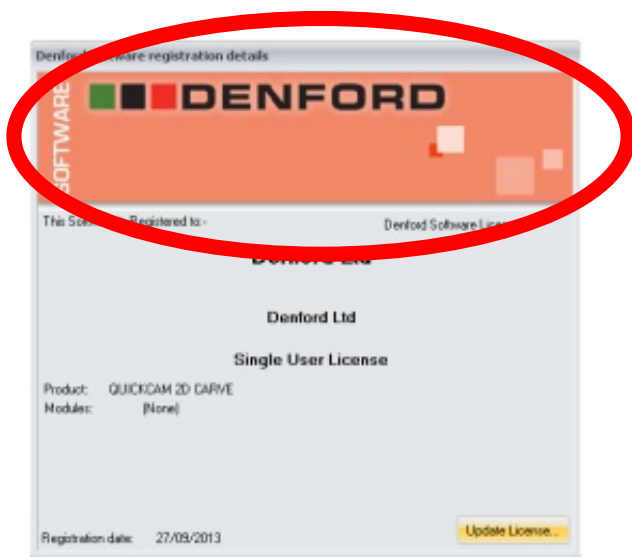
Launching QuickCAM 2D V2

Open the "Denford Applications" folder.
"Double click" on the QuickCAM 2D icon.

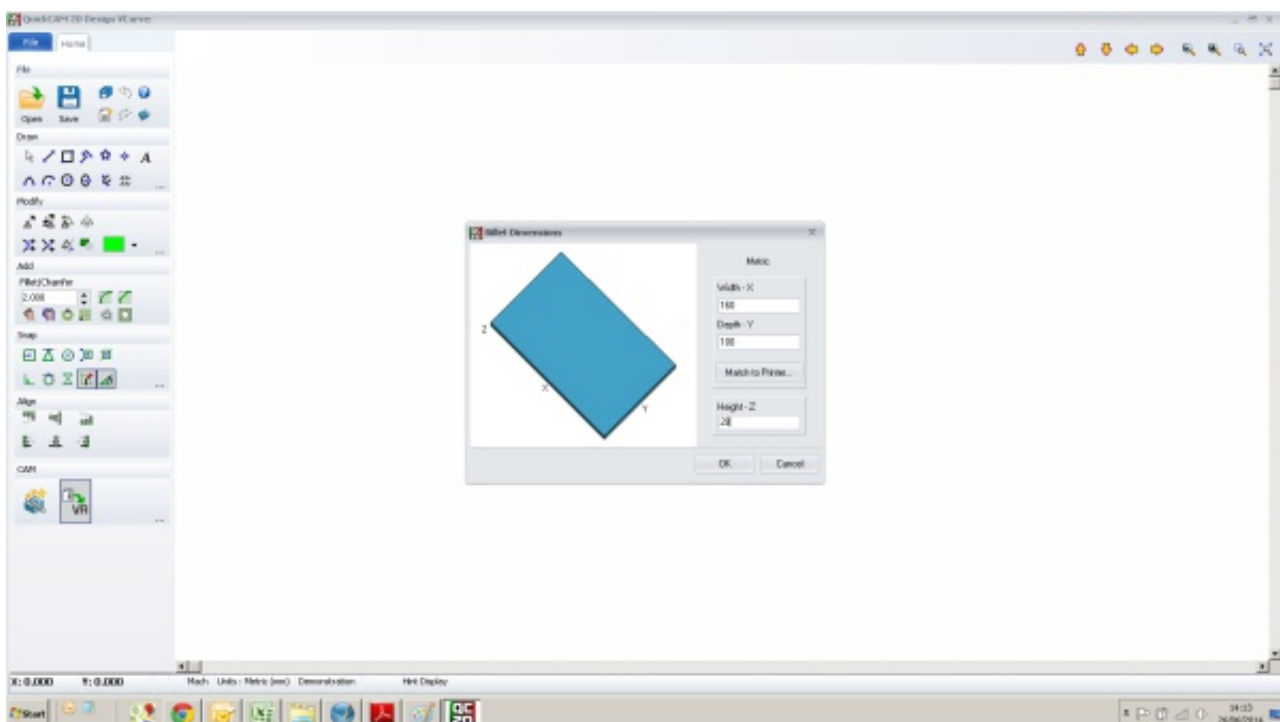


The screen shown on the right will be displayed and the software will take a minute or 2 to open.
You can force the software to open quicker by following the next instruction.

"Double click" on the area circled below.



The software will open and you will be greeted with the screen below.




Using the Graphical User Interface

The software opens in a window which should feel familiar to users who have used other Windows based vector drawing programs.

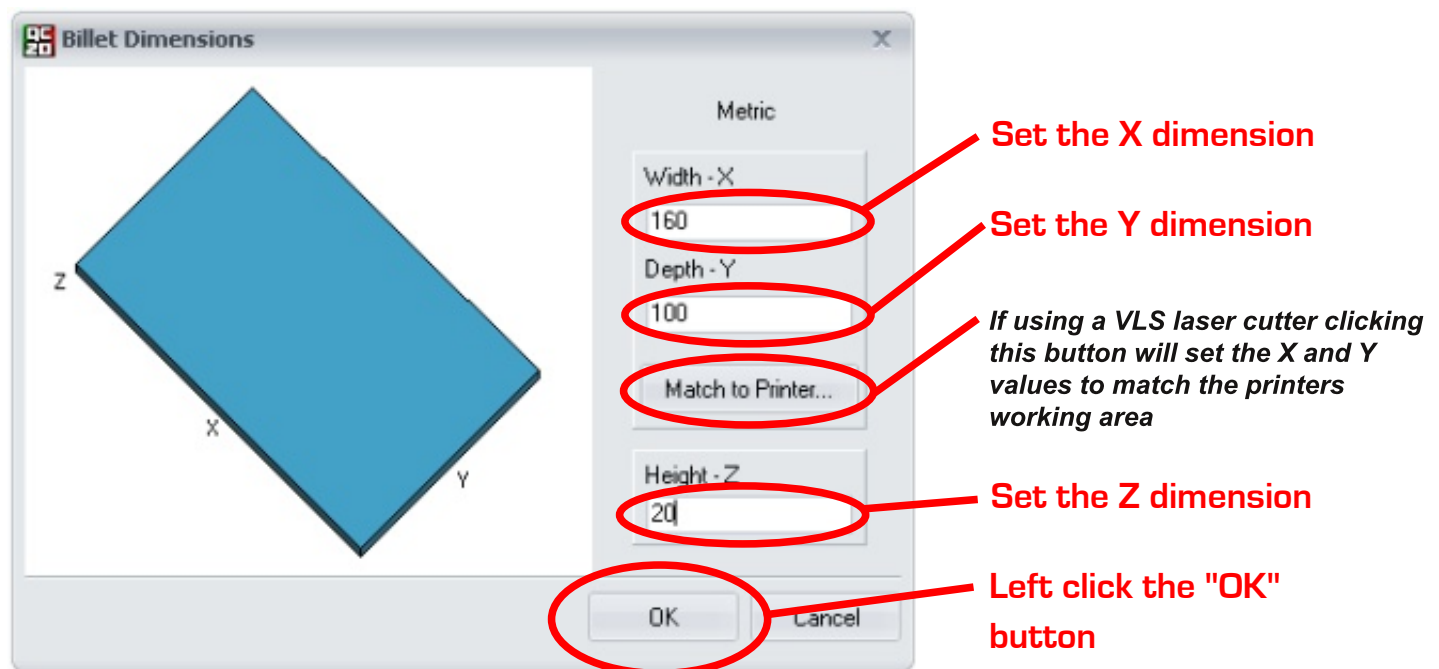
On the left of the screen is the toolbox which has 2 tabs, the rest of the screen is the design area, and on the top right of the screen are controls for navigating the design area.

All of the on screen buttons have tool tips and hovering over them with the mouse will bring up a description of that buttons function.

Creating a New Design

When the software is launched a new design is created automatically, if you wish to discard the current design and create a new one use the "Start New Design" button  in the toolbox

When creating a new design the first task is to set the billet dimensions, the window shown below will appear.

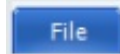


Toolbox

The Toolbox has 2 tabs, File and Home, by default the home tab will be selected.

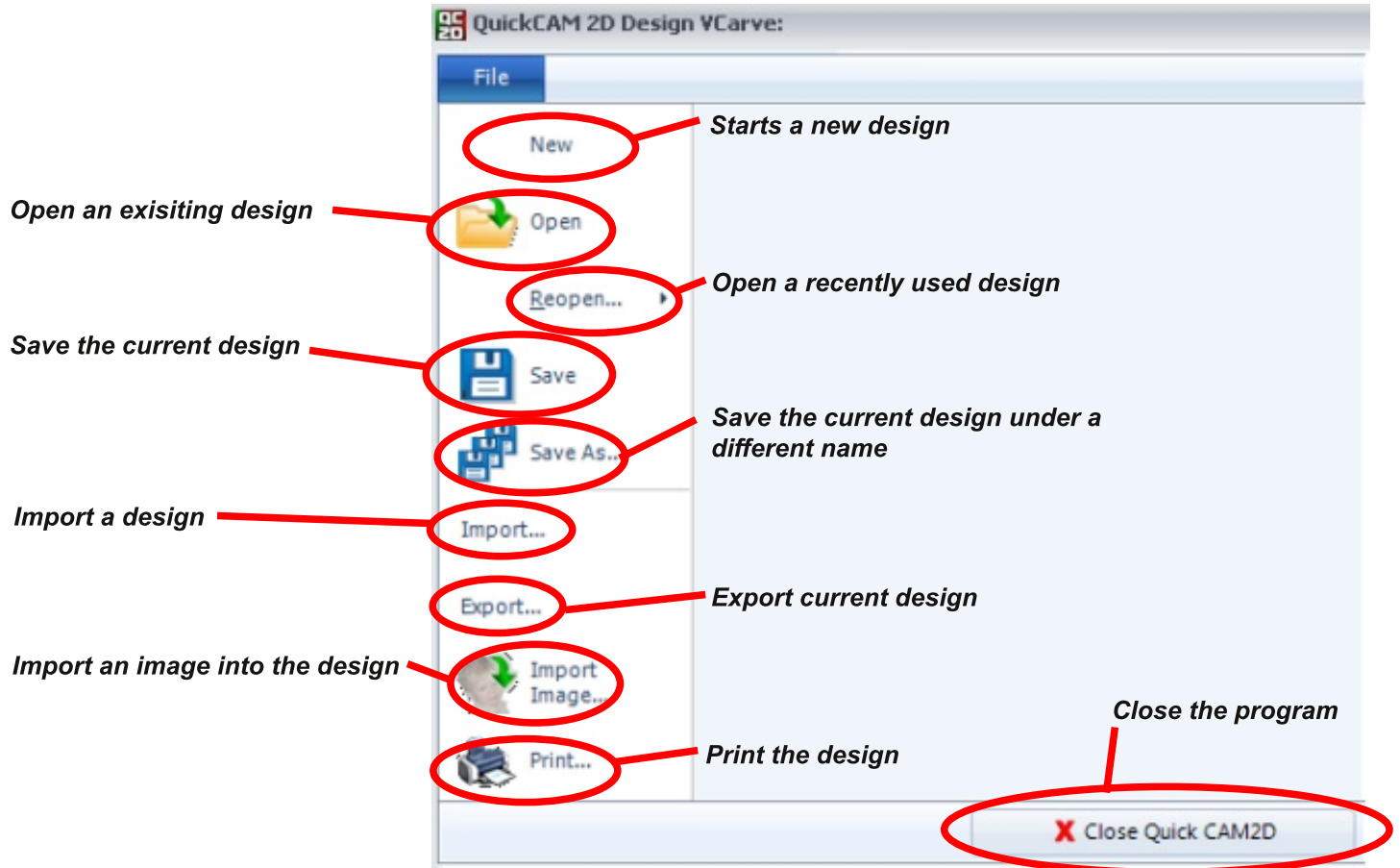
We will look at the File tab first.

Left click the "File" tab



File Tab

The toolbox should now look like the image below.



Import

Designs can be imported in the following formats:

Autocad files (dwg,dxf)

Gerber PCB (gb*)

Metafile (emf,wmf)

Postscript (eps,ps)

Export

Designs can be exported in the following formats:

Autocad Drawing eXchange Format (dxf)

Import Image

Images can be imported in the following formats:

.gif .png .jpg .jpeg

.bmp .tif .tiff .ico

.emf .wmf

Toolbox

Home Tab

The Toolbox should now look like the image below



The Toolbox is divided into 7 sections:

1. File
2. Draw
3. Modify
4. Add
5. Snap
6. Align
7. CAM

We will now examine each section and look at each button to understand its function.

File Section

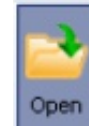
This section contains buttons with actions relating to the design file.

The image below is the file section.

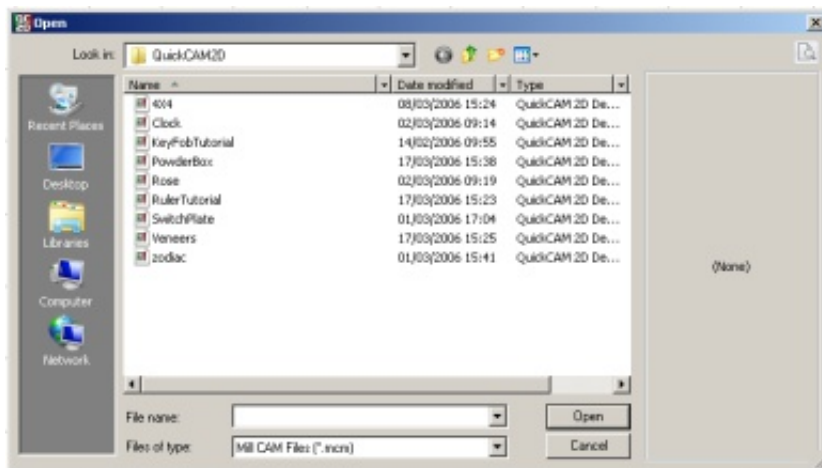


Open

When the "Open" button is clicked, the window below appears.



Select the file you wish to open (mcm) and left click the "Open" button

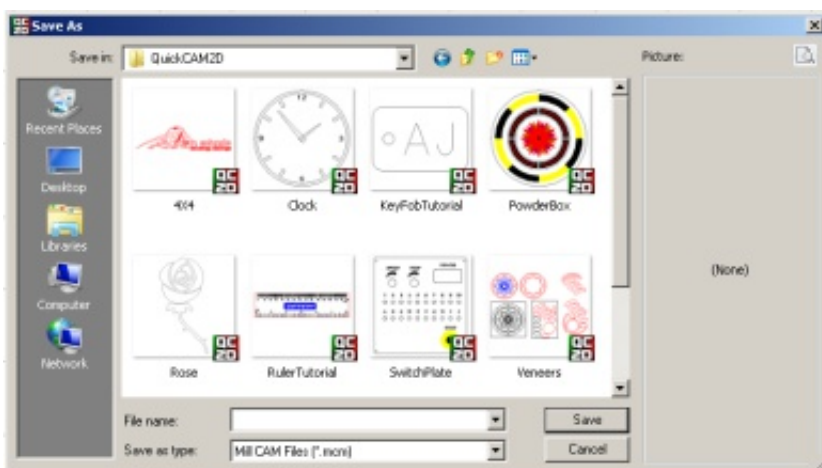
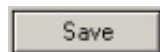


Save

When the "Save" button is clicked, the window below appears if it is a new design

Select a location and type a name for the file in the "File Name" text entry box

Click the "Save" button



If you have already saved the design then clicking the "Save" button will save any changes without opening the save window

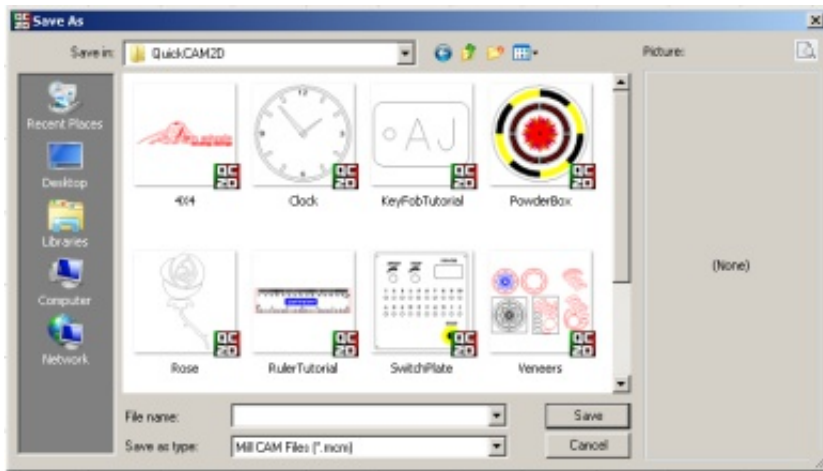
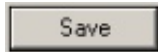
Save As

When the "Save As" button is clicked, the window below appears 

This is for saving the design with a new file name.

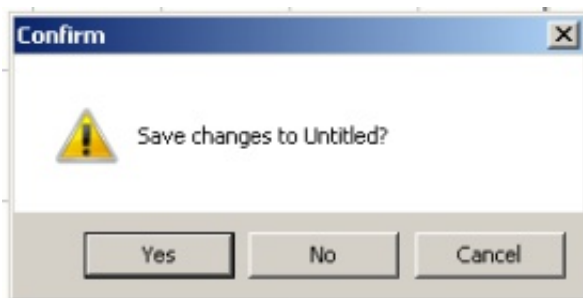
Select a location and type a name for the file in the "File Name" text entry box

Click the "Save" button



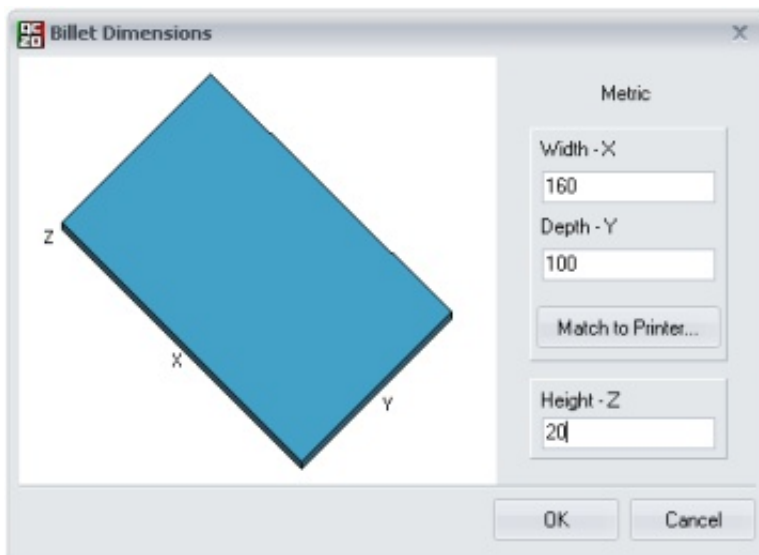
Start a New Design

When the "Start a New Design" button is clicked, you will be asked if you want to save changes




Make your choice

The window below will appear asking you to select billet dimensions, this window is described on page 6



Undo Last Action

Clicking this button will undo the last action 

Repeatedly clicking this button will keep undoing actions up to when the design was opened

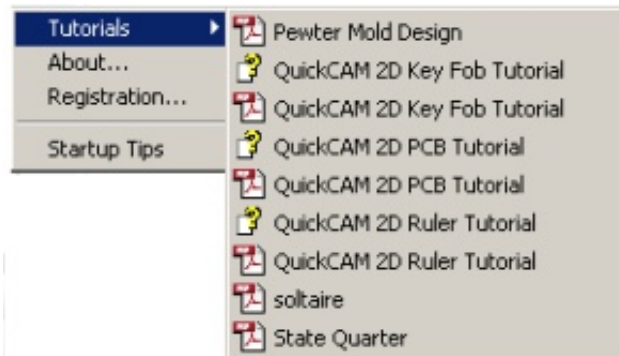
Restore the Previous Undo Action

Clicking this button will restore the action which was undone by the undo button 

Repeatedly clicking this button will keep restoring actions up to when the design was opened

About

Clicking this button will open the menu shown below 




Hovering over "Tutorials" will open another menu showing a series of step by step tutorials, clicking on any of the tutorials will open that file.

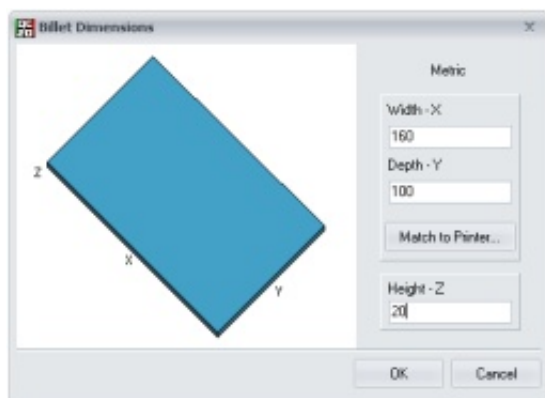
Clicking "About" will launch a window showing information about QuickCAM 2D Design V2

Clicking "Registration" will launch a window showing the software is license, this is also where you would go to install an upgrade if you have purchased V Carve

Clicking "Startup Tips" will tick this option and you will receive tips every time the software launches

Specify the Design Area Dimensions

Clicking this button will launch the "Billet Dimensions" window shown below, instructions for this window are on page 6 




Draw Section

This section contains buttons with actions relating to drawing vectors

The image below is the draw section.




Cancel

Clicking this button will cancel the current drawing / viewing mode 

Holding the left mouse button to click and drag can be used with this button to select objects

Double clicking on an object whilst this button is selected will open up the "Edit" window so that the properties of that object can be changed

Draw a Single Line


Clicking this button will enable you to draw a single line 

Left click where you want the line to start, left clicking a 2nd time will place the end point of the line.

Another way to place a line is to type the start point location in the coordinates box located at the top centre of the design area, then click the "OK" button, before typing the end point location into the same coordinates box shown below.



Draw a Rectangle


Clicking this button will enable you to draw a rectangle 

Left click where you want to place the 1st corner, left clicking a 2nd time will place the 2nd corner.

Another way to place draw a rectangle is to type the first corner location in the coordinates box located at the top centre of the design area, then click the "OK" button, before typing the 2nd corner location into the same coordinates box shown below.

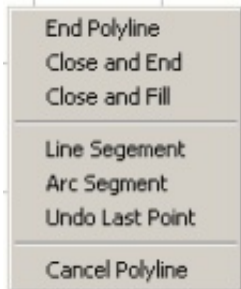


Draw Polyline

Clicking this button will enable you to draw a series of lines, these can then form a closed vector and be filled 

Left click where you want the line to start, left clicking a 2nd time will place the 2nd point of the line and so on.

To end the polyline, right click to bring up the polyline menu shown below




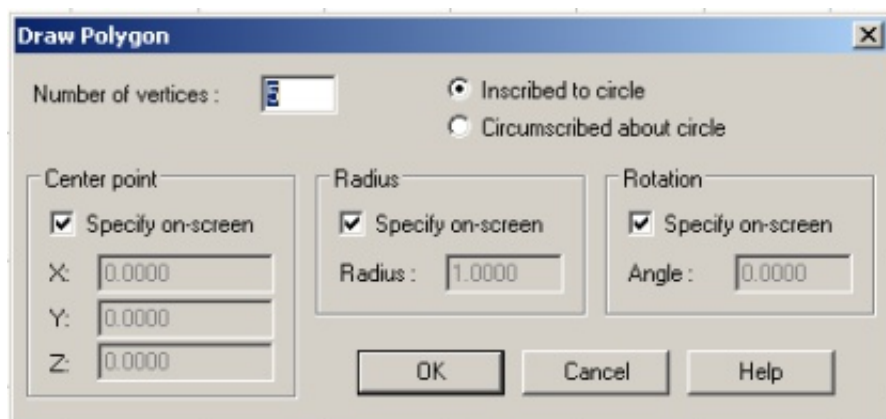
End Polyline - This will end the line
Close and End - This will form a closed vector by connecting the start point and the last point created
Close and Fill - This will close the vector as described above but also fill it, great if you want an area engraved on the laser
Line Segment - Reverts back to line segments if Arc Segment has been used
Arc Segment - Changes from straight lines to arcs
Undo Last Point - This will undo the last point
Cancel Polyline - Cancels the polyline, the "Esc" key on the keyboard can also be used

Another way to place a line is to type the start point location in the coordinates box located at the top centre of the design area, then click the "OK" button, before typing the 2nd point location into the same coordinates box shown below and so on.

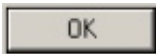


Draw a Regular Polygon

Clicking this button will enable you to draw a regular polygon, the "Draw Polygon" window will appear as shown below. 




Number of vertices - The number of sides wanted on your polygon
Inscribed to circle - The polygon will fit inside the circle
Circumscribed about circle - The circle will fit inside the polygon
Centre point - Untick this to enter coordinates of centre point
Radius - Untick this to specify the radius of the circle
Rotation - Untick this to specify the rotation of the polygon

After choosing the options for your polygon, left click the "OK" button 

If you specified the Centre Point, Radius, and Rotation in the "Draw Polygon" window then your polygon will appear. If the Centre Point, Radius, and Rotation check boxes were still ticked then left clicking will set the Centre Point for your polygon.

Moving the cursor will adjust the radius and rotation of the polygon, a 2nd left click will set the radius and rotation.

Draw a Single Point


Clicking this button will enable you to place a single point. 

A single point can then be used in conjunction with the "Snap to Node" button 

This will enable you to use points as guides when drawing or modifying objects.

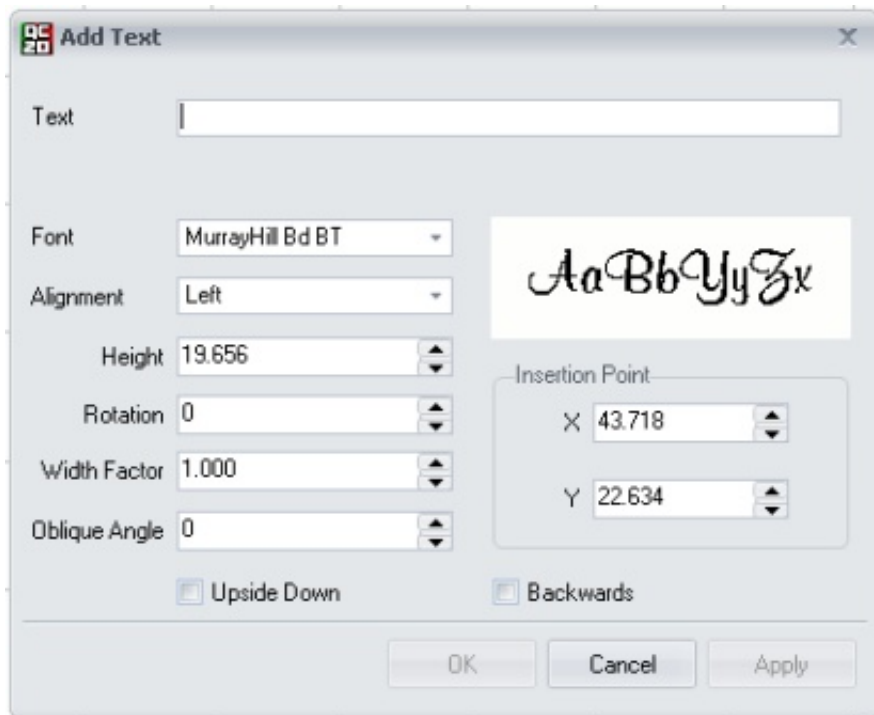
For example, you may want to mirror an object about a single point, placing the point first and snapping to it will make this process more accurate. Another example may be that you want to draw a polyline between a series of points, place the points first and then snap to the points when drawing the polyline.

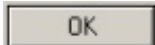
Draw a Single Line of Text

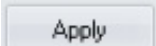
Clicking this button will enable you to draw a single line of text. 

After selecting this button you should draw a text box in the design area where you would like to place your text.

Left click where you want to place the bottom left corner, then drag the cursor up and right, a second left click will place the box and open the "Add Text" window shown below.




The "Add Text" window is where you type your text and format it, clicking the "OK" button will apply changes in the design area and close the window. 

Clicking the "Apply" button will apply changes in the design area and keep the window open to make further changes. 

Clicking the "Cancel" button will close the window without applying any changes. 

Draw a 3pt Arc

Clicking this button will enable you to draw a 3 point arc. 


After selecting this button move the cursor into the design area and left click to place the start point of the arc, a 2nd left click will place the 2nd point of the arc, and a 3rd left click will place the end point of the arc.

A right click at any point will cancel the arc.

Another way to place an arc is to type the start point location in the coordinates box located at the top centre of the design area, then click the "OK" button, before typing the 2nd point location into the same coordinates box shown below and so on.



Draw an Arc Using 2 Points and Centre

Clicking this button will enable you to draw an arc using a start point, end point, and specifying the arcs centre. 

After selecting this button move the cursor into the design area and left click to place the start point of the arc, a 2nd left click will place the centre point, and a 3rd left click will place the end point of the arc.

Another way to place an arc is to type the start point location in the coordinates box located at the top centre of the design area, then click the "OK" button, before typing the centre point location into the same coordinates box shown below and so on.



Draw a Circle


Clicking this button will enable you to draw a circle. 

After selecting this button move the cursor into the design area and left click to place the centre point of the circle, moving the cursor will now change the radius of the circle and a 2nd left click will set the radius.

Another way to place an arc is to type the centre point location in the coordinates box located at the top centre of the design area, then click the "OK" button, before typing the location of a point on the circumference of the circle into the same coordinates box shown below.

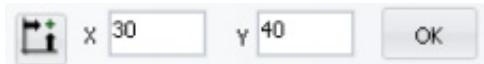


Draw an Ellipse


Clicking this button will enable you to draw an ellipse. 

After selecting this button move the cursor into the design area and click the left mouse button to place the centre point of the ellipse, a 2nd left click will set the rotational angle and the 1st radius, a 3rd left click will place the 2nd radius.

Another way to place an ellipse is to type the centre point location in the coordinates box located at the top centre of the design area, then click the "OK" button, before typing the location of a the point on the circumference of the ellipse for the rotational angle and the 1st radius, then click the "OK" button, before finally specifying the point for the 2nd radius into the same coordinates box shown below.

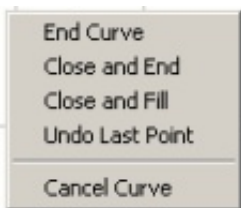


Draw a Spline / Curve

Clicking this button will enable you to draw a spline / curve. 

After selecting this button move the cursor into the design area and click the left mouse button to place the first point, a 2nd left click will place the 2nd point, and so on.

To end the spline / curve, right click to bring up the curve menu shown below



End Curve - This will end the curve.

Close and End - This will close the curve by joining the start and end points and end the curve.

Close and Fill - This will close and end the curve, it will also fill the area with the selected colour.

Undo Last Point - This will undo the last point

Cancel Curve - This will cancel the curve, pressing the "Esc" key on the keyboard will also achieve this.

Another way to place a spline / curve is to type the start point location in the coordinates box located at the top centre of the design area, then click the "OK" button, before typing the 2nd point location into the same coordinates box shown below and so on.



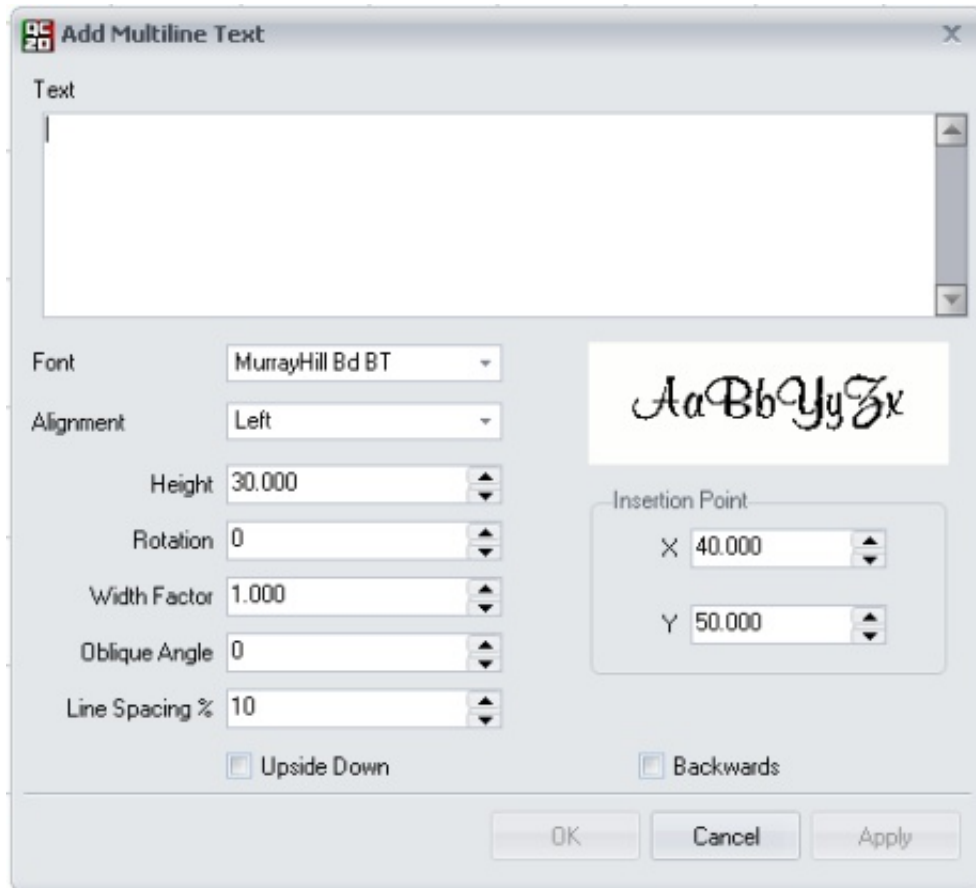
Draw Multiple Lines of Text

Clicking this button will enable you to draw multiple lines of text.

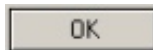


After selecting this button you should draw a text box in the design area where you would like to place your text.

Left click where you want to place the bottom left corner, then drag the cursor up and right, a second left click will place the box and open the "Add Multiline Text" window shown below.



The "Add Multiline Text" window is where you type your text and format it, clicking the "OK" button will apply changes in the design area and close the window.



Clicking the "Apply" button will apply changes in the design area and keep the window open to make further changes.



Clicking the "Cancel" button will close the window without applying any changes.



Show the Menu Options for Draw

Clicking this button will open up the menu shown below with options for draw.



Units - Select between Metric and Inch as the drawing unit.
Font Styles - Set the default font to be used when drawing text.

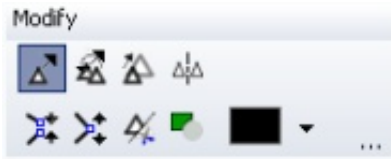
Modify Section

This section contains buttons with actions relating to modifying objects.


To modify an object it must be the currently selected object.

To select an object, use the "Draw Cancel" button as described on page 12

The image below is the modify section.




Move Current Object

Clicking this button will enable you to move the selected object. 

After selecting this button move the cursor into the design area, left clicking the mouse button will place a base point and a 2nd left click will set the distance and direction that the object will be moved from its current location.

If the "Shift" key on the keyboard is held down when the 2nd left click is performed then the object will stay in the original position and a copy will be placed in the new location.

Rotate Current Object

Clicking this button will enable you to rotate the selected object. 

After selecting this button move the cursor into the design area, left clicking the mouse button will place an axis around which the object will rotate, moving the mouse will adjust the angle of rotation, a 2nd left click will place the object.

Holding the "Shift" keyboard key will keep the original in position and a copy will be placed when the 2nd left click is performed.

At the top centre of the design area is an angle box, shown below, after placing the axis the angle of rotation can be typed here instead of the 2nd left click in the design area.



Scale Current Object

Clicking this button will enable you to scale the current object.

After selecting this button move the cursor into the design area, left clicking the mouse button will place a base point, moving the mouse will adjust the scale factor, a 2nd left click will set the scale factor.

Holding the "Shift" keyboard key will keep the original in position and a scaled copy will be placed when the 2nd left click is performed.

At the top centre of the design area is a scale box, shown below, after placing the base point the scale factor can be typed here instead of the 2nd left click in the design area.



Mirror Current Object

Clicking this button enables you to mirror the selected object.



After selecting this button move the cursor into the design area, left clicking the mouse button will place the 1st point of a mirror line, a 2nd left click will place the 2nd point of a mirror line and the object will be mirrored about it.

Holding the "Shift" keyboard key will keep the original in position and a mirrored copy will be placed when the 2nd left click is performed.

The 2nd point of the mirror line can be specified using the coordinates box in the top centre of the design area, shown below.



Join Nodes that are Close or Overlapping

Clicking this button enables you to join the selected objects.



Once the lines are selected, clicking this button will join them at their ends (nodes).

Explode Object into More Basic Lines

Clicking this button enables you to split objects into basic lines



Once the object is selected, clicking this button will split the object into individual lines.

Trim Lines

Clicking this button will enable you to trim objects.



Objects must be exploded to basic lines before the trim operation will work.

After selecting this button move the cursor into the design area and left click the mouse button to select the lines you wish to trim, when all lines you wish to trim are selected then click the right mouse button.

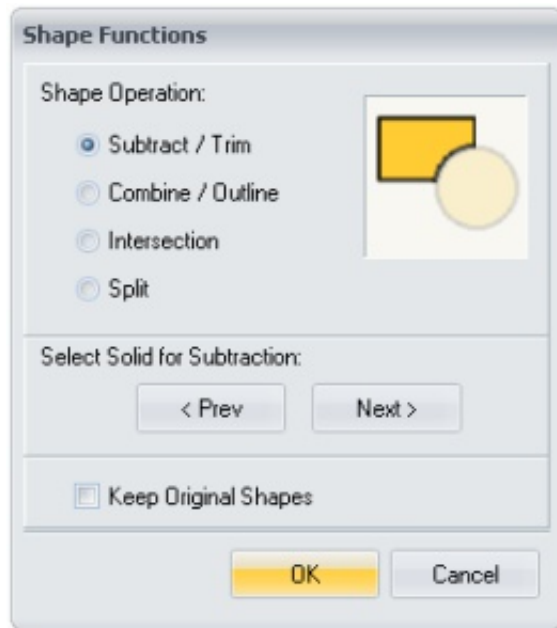
Further left clicks of the mouse button will now trim the line up to the point where it intersects another.

Perform Boolean Operation on Selected Shapes

Clicking this button will enable you to perform boolean operation on selected shapes. 

2 or more objects must already be selected before you can click this button.

After selecting this button the "Shape Functions" window will appear, shown below.



Subtract / Trim - Removes one overlapping shape from the other, use the Prev and Next buttons to change the order this happens in.

Combine / Outline - This option combines the outline of both shapes to make a new outline.

Intersection - Creates a new shape from the overlapping areas.

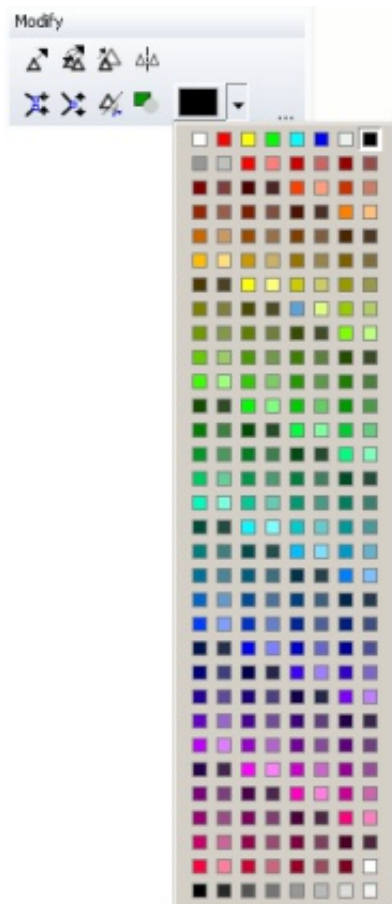
Split - Splits both shapes, removing the overlapping area.

Keep Original Shapes - The original will be kept and the function will be applied to a copy.


Default Colour

This button shows the current colour. 

Clicking the down arrow to the right of the colour swatch will open up a palette, this enables you to choose a new colour.



Show the Menu Options for Modify

Clicking this button will open up the menu shown below with options for modify. 



Colour Palette - Clicking this option allows you to select a new colour palette.

Confirm Delete - Selecting this option will turn on the confirm delete option (objects cannot be deleted without confirmation).

Add Section

This section contains buttons with actions relating to adding things to your design.
The image below is the add section.



Add Fillet / Chamfer

This button adds a fillet to the corner of the selected object.



This button adds a chamfer to the corner of the selected object.



Before clicking the button the fillet / chamfer amount should be set in the box shown below.

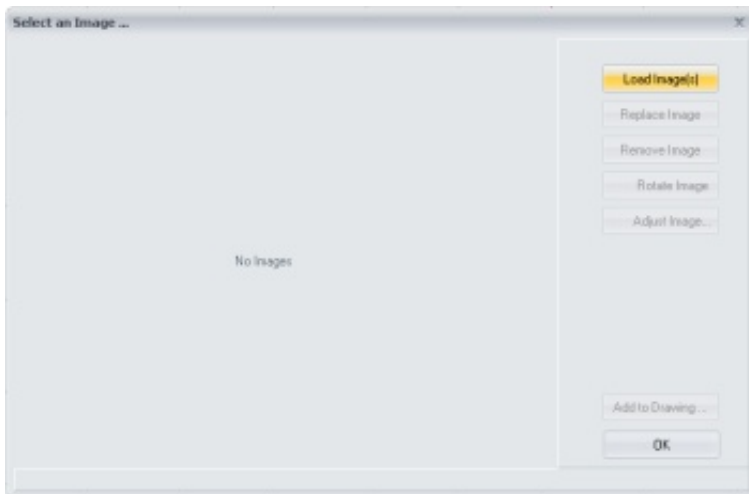


Add Image to the Design

This button allows you to add images to the design.



After selecting this button the "Select an Image" window appears, shown below.



Load Image - Click here to load an image

Replace Image - Click here to replace the currently selected image

Remove Image - Click here to remove the currently selected image

Rotate Image - Click here to rotate the currently selected image

Adjust Image - Click here to adjust the currently selected image

Add to Drawing - Click here to add the currently selected image to your design

OK - Click here to close the window

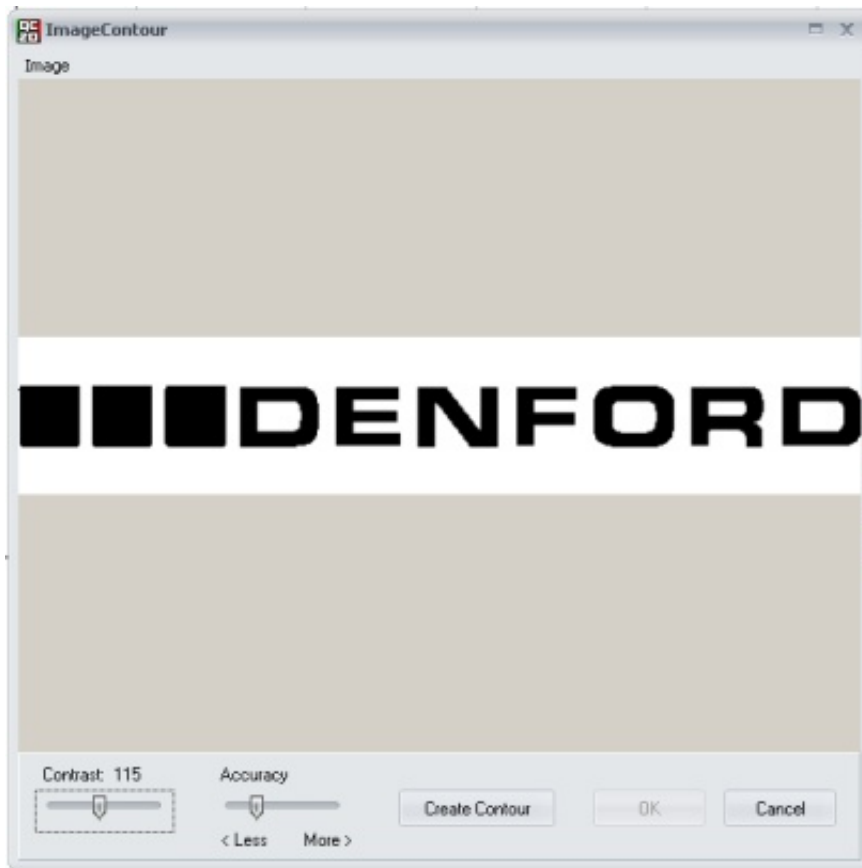


Create Polyline Contour Around Image

Click this button to create a polyline around the selected image.



After clicking this button the "Image Contour" window will appear, shown below.



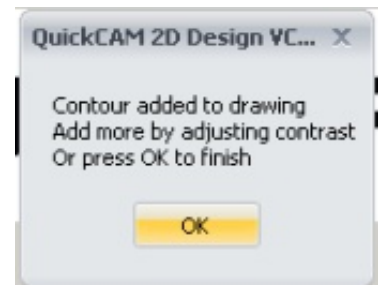
Contrast - Sliding this control will adjust the contrast of the image.

Accuracy - Sliding this control will adjust the accuracy of the edge detection.

Create Contour - Clicking this will create the contour around the image and the information window shown below will appear.

OK - Accept changes and close the window

Cancel - Close window without making changes



Circular Array

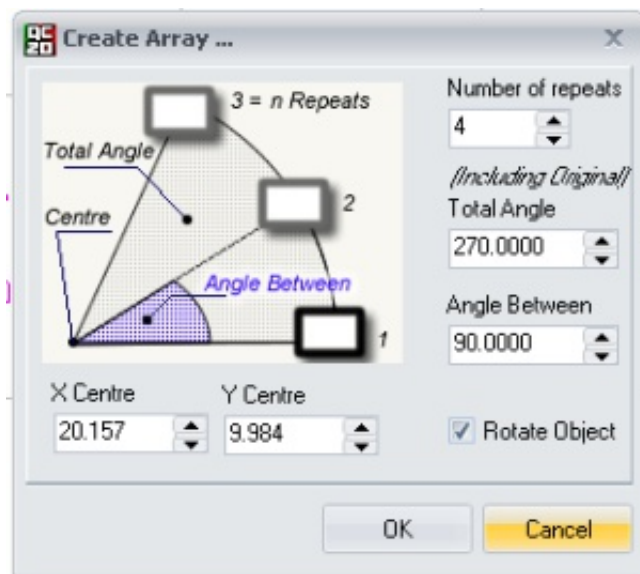
Click this button to duplicate items in a circular array.



An item must be selected before you can click this button.

After clicking this button move the mouse into the design area and click the left mouse button to place the axis around which the circular array will be generated.

The "Create Array" window will appear after the axis is placed, window is shown below.



Number of Repeats - Number of times to repeat the object, including original.

Total Angle - Total angle for the array, 360 for a full circle.

Angle Between - The angle between each repeat.

X Centre - X coordinate for the axis of rotation.


Y Centre - Y coordinate for the axis of rotation.

Rotate Object - Tick this box to rotate the object as well as repeat it.

OK - Click this to close the window and accept changes.

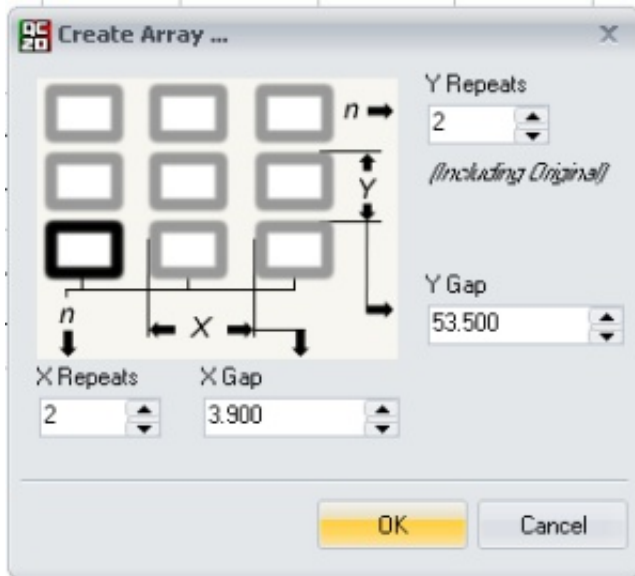
Cancel - Click this to close window and abandon changes.

Rectangular Array

Click this button to duplicate items in a rectangular array. 

An item must be selected before you can click this button.

After clicking this button the "Create Array" window will appear, shown below



X Repeats - How many times to repeat in the X direction (Like rows in Excel), including original.

X Gap - Distance between repeats, 0 gap would stack the repeats on top of each other.


Y Repeats - How many times to repeat in the Y direction (Like columns in Excel), including original.

Y Gap - Distance between repeats, 0 gap would stack the repeats on top of each other.

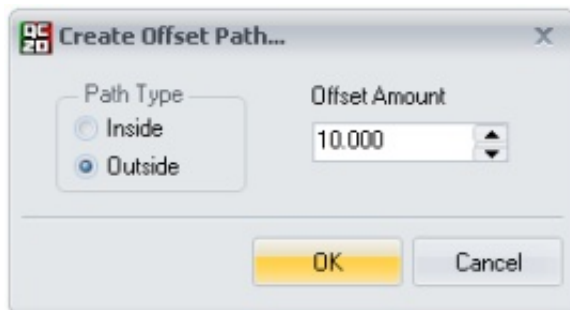
OK - Close the window and accept changes

Cancel - Close the window and abandon changes

Creat an Offset Path

Clicking this button will enable you to create an offset path around / within the currently selected object. 

After clicking the button, the "Create Offset Path" window will open, shown below.



Path Type - Select either inside or outside as the direction to create the offset.

Offset Amount - How much should the offset path be offset by.

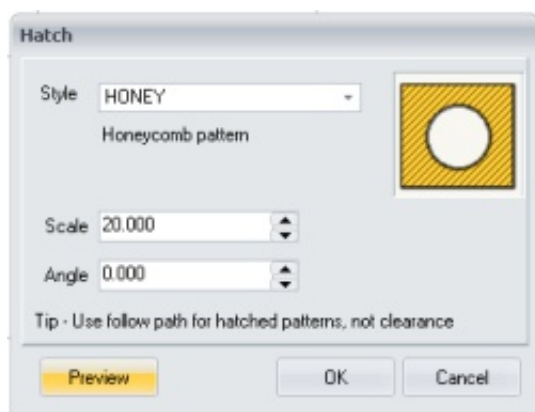
OK - Close the window and accept changes.

Cancel - Close the window and abandon changes.

Hatch

Click this button to hatch the selected object. 

After clicking this button the "Hatch" window will appear, shown below



Style - This drop down menu allows you to choose the style of hatching

Scale - Adjust the scale of the hatching

Angle - Adjust this to rotate the hatching

OK - Close window and accept changes

Cancel - Close window and abandon changes

Snap Section

This section contains buttons with actions relating to snapping to certain areas of the design when drawing or modifying objects.

Each of these buttons can be turned on or off, when selected they remain in that state until they are deselected.

The image below is the snap section.




Snap to End Point

Clicking this button turns on snap to end point 


When active new selections will automatically snap to the end of current nodes.

Snap to Mid Point

Clicking this button turns on snap to mid point 


When active new selections will automatically snap to the mid point of straight line vectors.

Snap to Centre Point

Clicking this button turns on snap to centre point 


When active new selections will automatically snap to the centre point of circles and ellipses.

Snap to Node

Clicking this button turns on snap to node 


When active new selections will automatically snap to existing nodes.

Snap to Intersection

Clicking this button turns on snap to intersection 


When active new selections will automatically snap to intersections between objects

Snap to Perpendicular

Clicking this button turns on snap to perpendicular 


When active new selections will automatically snap to a point which is perpendicular to an existing line when intersecting.

Snap to Tangent

Clicking this button turns on snap to tangent 

When active new selections will automatically snap to a point which is tangential to an existing curve when intersecting.

Snap to Nearest

Clicking this button turns on snap to nearest 

When active new selections will automatically snap to nearest existing point.

Snap to Grid

Clicking this button turns on snap to grid 

When active new selections will automatically snap to a point on the grid.

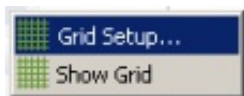
Snap to Angular Increments

Clicking this button turns on snap to angular increments 

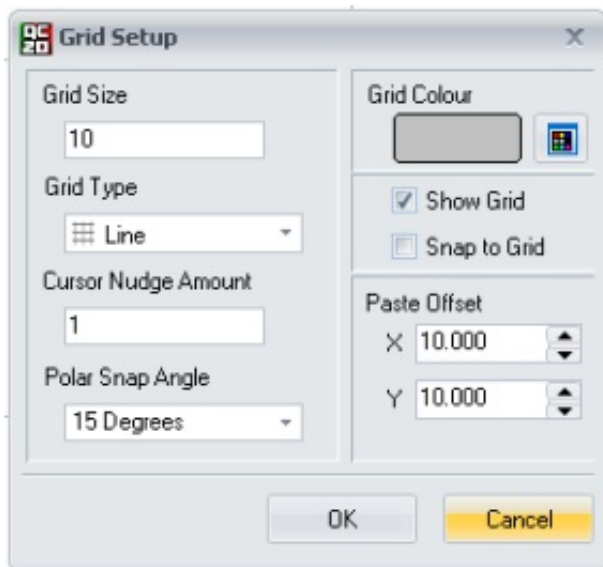
When active new selections will automatically snap to a pre-set polar angular increment.

Show the Menu Options for Snap

Clicking this button will display the snap menu options, shown below. 



Grid Setup - Clicking this button will open the "Grid Setup" window.
Show Grid - Clicking this button will toggle the grid display on and off.



Grid Size - Set the size of the grid squares.

Grid Type - Choose how the grid is displayed (Line, Dot, Cross, Square, Circle, X Mark)

Cursor Nudge Amount - Set the amount an object moves by when cursor keys are used.

Polar Snap Angle - Sets the angle to snap to when "Snap to Angular Increment" is turned on.

Grid Colour - Click on the palette to change the grid colour.

Show Grid - Toggles the grid on or off.

Snap to Grid - Toggles snap to grid on or off

Paste Offset - Set the X and Y offset from original when pasting.

OK - Close the window and accept changes.

Cancel - Close the window and abandon any changes

Align Section

This section contains buttons with actions relating to aligning objects to each other.

When selected these buttons align the selected objects in the specific direction for that button

The image below is the align section.



Align Top

Clicking this button will align the selected objects by the highest object.



Align Centrally in Vertical Plane

Clicking this button will align the selected objects by the centre of the both objects in the vertical plane.



Align Bottom

Clicking this button will align the selected objects by the lowest object.



Align Left

Clicking this button will align the selected objects by the furthest left object.



Align Centrally in the Horizontal Plane

Clicking this button will align the selected objects by the centre of the both objects in the horizontal plane.



Align Right

Clicking this button will align the selected objects by the furthest right object.



CAM Section

This section contains buttons with actions relating to Computer Aided Manufacture. Essentially this is the last section you will use after your design is complete, here we turn your design into a program that your CNC machine will understand. The image below is the CAM section



CAM Wizard

Click this button to create toolpaths and G Code from the current design. The CAM Wizard will be explained in detail in the next section.



VR Milling

Click this button to turn it on.

When turned on the G Code that is generated by the CAM Wizard will be sent directly to VR Milling V5 (machine control software)

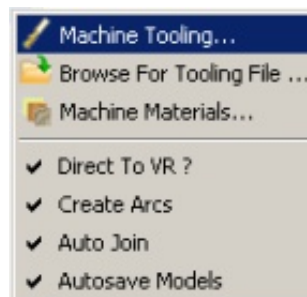


CAM Options Menu

Clicking this button will display the CAM options menu



The CAM options menu is shown below.



Machine Tooling - Opens the Tool and Offset editor
Browse For Tooling File - Load a tooling file, eg V Carve.MOF
Machine Materials - Add / edit material
Direct to VR - Tick to send toolpaths straight to VR Milling V5
Create Arcs - CAM output will generate arcs
Auto Join - Automatically join nodes
Autosave Models - Save design when launching CAM Wizard

CAM Wizard

Click the CAM Wizard button to launch.



This wizard will guide you through the process of turning your design into a CNC program that your CNC machine will understand.

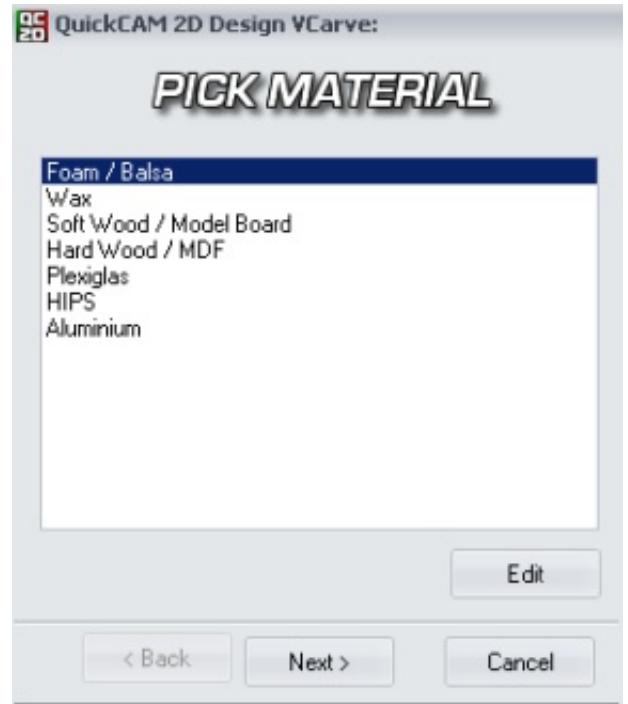
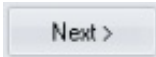
Pick Materials

The screen on the right will appear and you should select the billet material from the list.

This will set the feedrate, spindle speed, and step down to values appropriate for the selected material.

Use either the mouse or the keyboard cursor keys to highlight the material you wish to use.

Then use the left mouse button to click the "NEXT" button

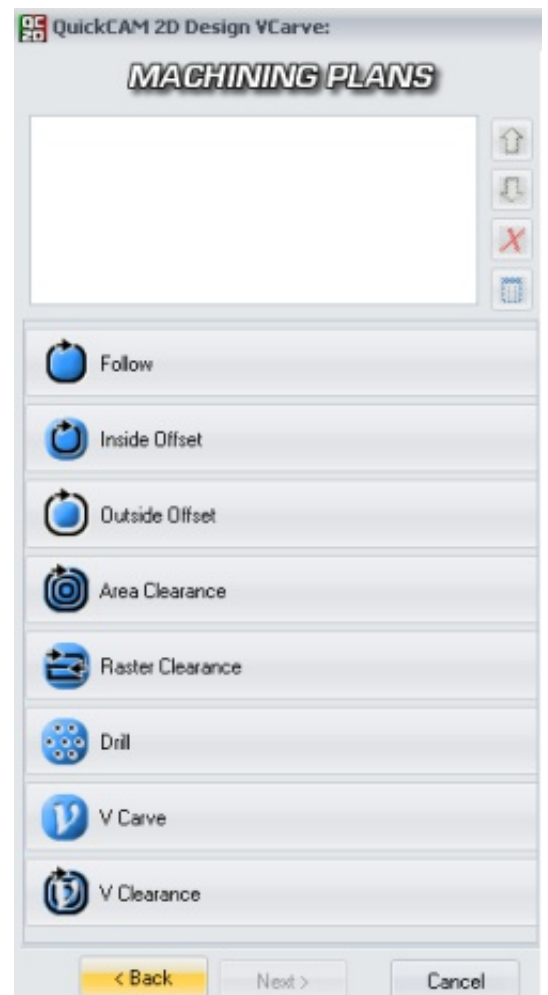


Machining Plans

This screen is where you set the machining plans for your design.

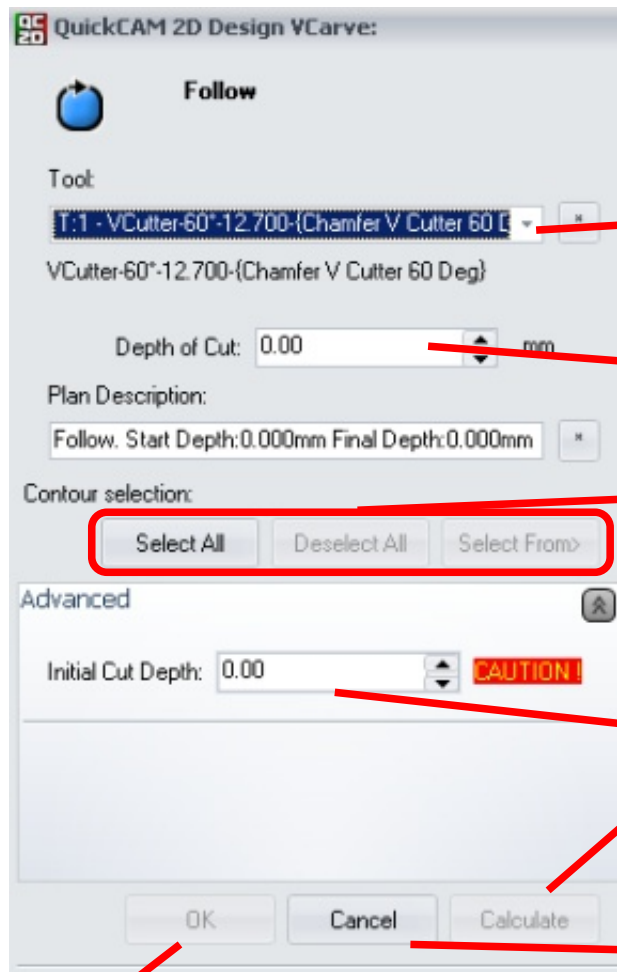
There are a choice of 8 different machining plans which we will describe individually.

There is no limit to the number of machining plans that you can add to the design, but bear in mind that the more complicated the design the longer it will take to machine.



Follow Cut

The follow cut will simply follow the vector line to a set depth with the selected tool



The image shows the 'Follow' dialog box in QuickCAM 2D Design VCarve. The dialog has several sections: 'Tool' with a dropdown menu, 'Depth of Cut' with a numeric input and unit, 'Plan Description' with a text field, 'Contour selection' with three buttons, 'Advanced' with an 'Initial Cut Depth' input and a 'CAUTION!' warning, and a bottom section with 'OK', 'Cancel', and 'Calculate' buttons. Red callout boxes with arrows point to specific elements, providing instructions on how to use them.

Follow

Tool: T:1 - VCutter-60°-12.700-(Chamfer V Cutter 60 D

VCutter-60°-12.700-(Chamfer V Cutter 60 Deg)

Depth of Cut: 0.00 mm

Plan Description: Follow. Start Depth:0.000mm Final Depth:0.000mm

Contour selection: Select All Deselect All Select From>

Advanced Initial Cut Depth: 0.00 CAUTION!

OK Cancel Calculate

Select a tool from the drop down

Set a cut depth

Use these buttons to select the vector lines, alternatively you can use the mouse and left click on the vectors to select / deselect. "Select From" lets you select the same vectors as an already created machining plan.

*Set this to specify a start depth (this assumes some material has already been removed)
ONLY USE THIS IF YOU UNDERSTAND THE FUNCTION*

Select this button to generate a preview of the toolpath

Click here to close the "Follow" window and abandon changes

Click here to accept changes and close the "Follow" window

Inside Offset

The inside offset can only be used on closed shapes and it will offset by the radius of the tool on the inside of the closed shape.

The image shows the 'Inside Offset' dialog box in QuickCAM 2D Design VCarve. The dialog has several sections: 'Tool' with a dropdown menu, 'Depth of Cut' with a numeric input, 'Plan Description' with a text field, 'Contour selection' with three buttons ('Select All', 'Deselect All', 'Select From'), 'Advanced' with 'Initial Cut Depth' and a 'CAUTION!' label, a checkbox for 'Auto arrange entities', and a preview area. At the bottom are 'OK', 'Cancel', and 'Calculate' buttons. Red callout boxes with arrows point to specific elements, providing instructions on how to use them.

Tool: T:1 - VCutter-60°-12.700-{Chamfer V Cutter 60 D} *

Depth of Cut: 0.00 mm

Plan Description: Inside Offset. Start Depth: 0.000mm Final Depth: 0.00 *

Contour selection: Select All Deselect All Select From>

Advanced: Initial Cut Depth: 0.00 CAUTION!

☒ Auto arrange entities

Buttons: OK Cancel Calculate

Callouts:

- Select a tool from the drop down
- Set a cut depth
- Use these buttons to select the vector lines, alternatively you can use the mouse and left click on the vectors to select / deselect. "Select From" lets you select the same vectors as an already created machining plan.
- Set this to specify a start depth (this assumes some material has already been removed)
ONLY USE THIS IF YOU UNDERSTAND THE FUNCTION
- Select this button to generate a preview of the toolpath
- Click here to close the "Inside Offset" window and abandon changes
- Click here to accept changes and close the "Inside Offset" window

Outside Offset

The inside offset can only be used on closed shapes and it will offset by the radius of the tool on the inside of the closed shape.

The image shows the 'Outside Offset' dialog box in QuickCAM 2D Design VCarve. The dialog has several sections: 'Tool', 'Depth of Cut', 'Plan Description', 'Contour selection', and 'Advanced'. Red callout boxes with arrows point to specific elements, providing instructions on how to use them.

Tool: T:1 - VCutter-60°-12.700-(Chamfer V Cutter 60 D. *
VCutter-60°-12.700-(Chamfer V Cutter 60 Deg)

Depth of Cut: 0.00 mm

Plan Description: Outside Offset. Start Depth:0.000mm Final Depth:0. *

Contour selection: Select All Deselect All Select From>

Advanced: Initial Cut Depth: 0.00 CAUTION! ☒ Auto arrange entities

Buttons: OK Cancel Calculate

Callouts:

- Select a tool from the drop down
- Set a cut depth
- Use these buttons to select the vector lines, alternatively you can use the mouse and left click on the vectors to select / deselect. "Select From" lets you select the same vectors as an already created machining plan.
- Set this to specify a start depth (this assumes some material has already been removed)
ONLY USE THIS IF YOU UNDERSTAND THE FUNCTION
- Select this button to generate a preview of the toolpath
- Click here to close the "Outside Offset" window and abandon changes
- Click here to accept changes and close the "Outside Offset" window

Area Clearance

Area Clearance can only be used on closed shapes, it is used to clear all the material from an area at the specified depth and stepover.

The image shows the 'Area Clearance' dialog box in QuickCAM 2D Design VCarve. The dialog has several sections: 'Tool' with a dropdown menu, 'Depth of Cut' with a numeric input, 'Plan Description' with a text field, 'Contour selection' with three buttons ('Select All', 'Deselect All', 'Select From'), 'Stepover' with a slider, 'Advanced' with 'Initial Cut Depth' and a 'CAUTION' label, and a 'Calculate' button. At the bottom are 'OK', 'Cancel', and 'Calculate' buttons. Red callout boxes with arrows point to specific elements, providing instructions on how to use them.

Tool: T:1 - VCutter-60°-12.700-(Chamfer V Cutter 60 D

Depth of Cut: 0.00 mm

Plan Description: Area Clearance. Start Depth:0.000mm Final Depth:0

Contour selection: Select All Deselect All Select From

Stepover: 5%

Advanced: Initial Cut Depth: 0.00 CAUTION

☒ Auto arrange entities

Buttons: OK Cancel Calculate

Callouts:

- Select a tool from the drop down
- Set a cut depth
- Use these buttons to select the vector lines, alternatively you can use the mouse and left click on the vectors to select / deselect. "Select From" lets you select the same vectors as an already created machining plan.
- Set the Stepover as a % of the tool diameter
- Set this to specify a start depth (this assumes some material has already been removed)
ONLY USE THIS IF YOU UNDERSTAND THE FUNCTION
- Select this button to generate a preview of the toolpath
- Click here to close the "Area Clearance" window and abandon changes
- Click here to accept changes and close the "Area Clearance" window

Raster Clearance

Raster Clearance can only be used on closed shapes, it is used to clear all the material from an area at the specified depth. It does this by doing an inside offset (and outside offset in the case of islands) and then rastering back and forth at the specified angle and stepover.

The screenshot shows the 'Raster Clearance' dialog box in QuickCAM 2D Design VCarve. The dialog is titled 'QuickCAM 2D Design VCarve: Raster Clearance'. It contains several sections: 'Tool' with a dropdown menu showing 'T:1 - Ball Nose-6.350-(1/4" Ball Nose (6.35mm))'; 'Depth of Cut' with a value of '0.00' and a unit of 'mm'; 'Raster Angle' with a value of '0'; 'Stepover' with a slider set to '5%'; 'Plan Description' with a text field containing 'Raster Clearance. Start Depth:0.000mm Final Depth'; 'Contour selection' with buttons 'Select All', 'Deselect All', and 'Select From'; 'Advanced' section with 'Initial Cut Depth' set to '0.00' and a 'CAUTION!' warning; a checkbox for 'Auto arrange entities'; and a preview area. At the bottom are 'OK', 'Cancel', and 'Calculate' buttons. Red callout boxes with arrows point to various elements, providing instructions on how to use them.

Tool: T:1 - Ball Nose-6.350-(1/4" Ball Nose (6.35mm))

Depth of Cut: 0.00 mm

Raster Angle: 0

Stepover: 5%

Plan Description: Raster Clearance. Start Depth:0.000mm Final Depth

Contour selection: Select All, Deselect All, Select From

Advanced: Initial Cut Depth: 0.00 CAUTION!

☒ Auto arrange entities

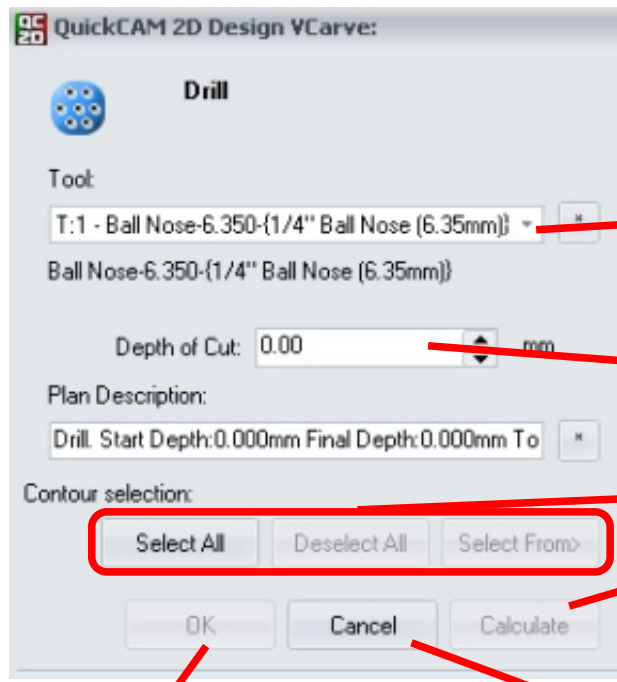
Buttons: OK, Cancel, Calculate

Annotations:

- Select a tool from the drop down
- Set a cut depth
- Set the Raster Angle
- Set the Stepover as a % of the tool diameter
- Use these buttons to select the vector lines, alternatively you can use the mouse and left click on the vectors to select / deselect. "Select From" lets you select the same vectors as an already created machining plan.
- Set this to specify a start depth (this assumes some material has already been removed) ONLY USE THIS IF YOU UNDERSTAND THE FUNCTION
- Select this button to generate a preview of the toolpath
- Click here to close the "Raster Clearance" window and abandon changes
- Click here to accept changes and close the "Raster Clearance" window

Drill

Drill can only be used on circles, it allows you to select the centre point of any circle and drill to the desired depth with the selected tool. It will peck drill, the size of each peck is based on the stepdown for the selected material.



The image shows the 'Drill' dialog box in QuickCAM 2D Design VCarve. The dialog has a title bar 'QuickCAM 2D Design VCarve:' and a sub-title 'Drill'. It contains several fields and buttons:

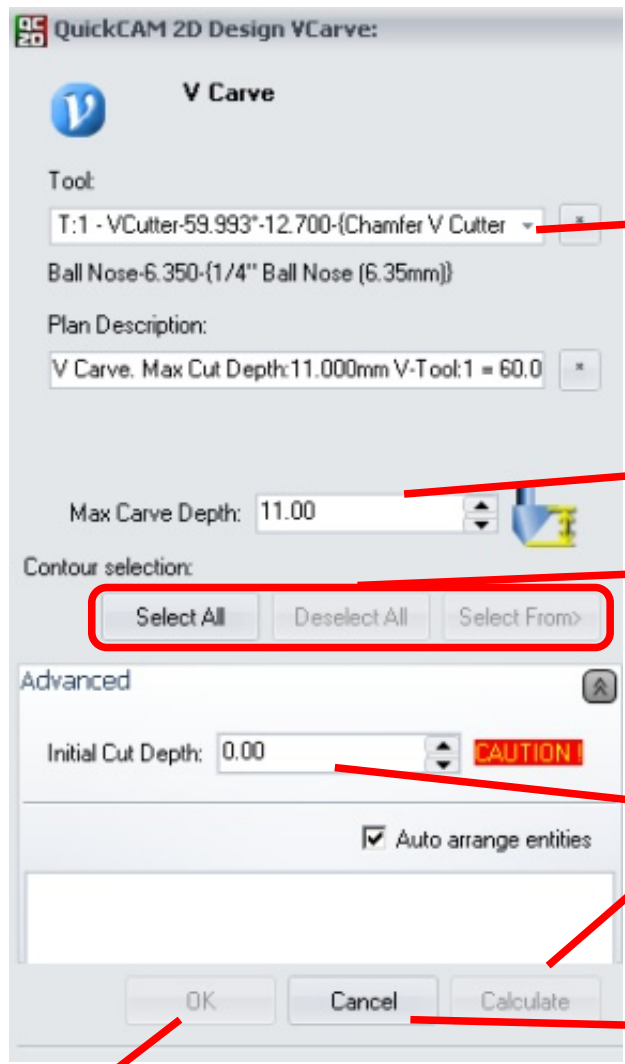
- Tool:** A dropdown menu showing 'T:1 - Ball Nose-6.350-(1/4" Ball Nose (6.35mm))' with a '*' button to its right.
- Depth of Cut:** A text field with '0.00' and a unit dropdown set to 'mm'.
- Plan Description:** A text field showing 'Drill. Start Depth:0.000mm Final Depth:0.000mm To' with a '*' button to its right.
- Contour selection:** Three buttons: 'Select All', 'Deselect All', and 'Select From>'. The 'Select From>' button is highlighted with a red box.
- Bottom buttons:** 'OK', 'Cancel', and 'Calculate'.

Annotations with red boxes and arrows point to specific elements:

- Select a tool from the drop down** points to the Tool dropdown menu.
- Set a cut depth** points to the Depth of Cut field.
- Use these buttons to select the vector lines, alternatively you can use the mouse and left click on the vectors to select / deselect. "Select From" lets you select the same vectors as an already created machining plan.** points to the 'Select All', 'Deselect All', and 'Select From>' buttons.
- Select this button to generate a preview of the toolpath** points to the 'Calculate' button.
- Click here to close the "Drill" window and abandon changes** points to the 'Cancel' button.
- Click here to accept changes and close the "Drill" window** points to the 'OK' button.

V Carve

V Carve can only be used on closed shapes, it is used to carve out all the material by raising and lowering the tool. If the area to be cleared is wider than the V Cutter then the "V Clearance" should be used.



The image shows the 'V Carve' dialog box in QuickCAM 2D Design. The dialog has several sections: 'Tool' with a dropdown menu, 'Ball Nose' with a text field, 'Plan Description' with a text field, 'Max Carve Depth' with a text field and a preview icon, 'Contour selection' with three buttons, 'Advanced' with an 'Initial Cut Depth' field and a 'CAUTION' label, and a 'Calculate' button. Red callout boxes with arrows point to specific elements, providing instructions on how to use them.

Tool: T:1 - VCutter-59.993"-12.700-{Chamfer V Cutter} *Select a tool from the drop down*

Ball Nose: 6.350-{1/4" Ball Nose (6.35mm)}

Plan Description: V Carve. Max Cut Depth:11.000mm V-Tool:1 = 60.0

Max Carve Depth: 11.00 *Set a maximum carve depth, this should be no more than the flute length of the tool as shown in the diagram to the right.*

Contour selection: Select All Deselect All Select From> *Use these buttons to select the vector lines, alternatively you can use the mouse and left click on the vectors to select / deselect. "Select From" lets you select the same vectors as an already created machining plan.*

Advanced: Initial Cut Depth: 0.00 **CAUTION!** *Set this to specify a start depth (this assumes some material has already been removed) ONLY USE THIS IF YOU UNDERSTAND THE FUNCTION*

☒ Auto arrange entities

Calculate *Select this button to generate a preview of the toolpath*

OK *Click here to accept changes and close the "V Carve" window*

Cancel *Click here to close the "V Carve" window and abandon changes*

V Clearance

V Clearance can only be used on closed shapes, it is used to carve out all the material like the area clearance. If the area to be cleared is narrower than the tool width, the tool will raise to use a smaller diameter tool in effect.



The screenshot shows the 'V Clearance' dialog box in QuickCAM 2D Design. The dialog has several sections: 'Tool' with a dropdown menu, 'Plan Description' with a text field, 'Max Curve Depth' and 'V Cutter Stepper' with numeric input fields and up/down arrows, 'Contour selection' with three buttons ('Select All', 'Deselect All', 'Select From'), 'Advanced' with an 'Initial Cut Depth' field and a 'CAUTION!' warning, and a 'Calculate' button. At the bottom are 'OK', 'Cancel', and 'Calculate' buttons. Red callout boxes with arrows point to specific elements, providing instructions on how to use them.

Tool: T:1 - VCutter-59.993°-12.700-(Chamfer V Cutter) *
VCutter-59.993°-12.700-(Chamfer V Cutter 60 Deg)

Plan Description:
V Clearance. Max Cut Depth: 7.000mm V-Tool:1 = 6 *

Max Curve Depth: 7.00

V Cutter Stepper: 5.00 mm

Contour selection:
Select All Deselect All Select From>

Advanced
Initial Cut Depth: 0.00 CAUTION!
☒ Auto arrange entities

Buttons: OK Cancel Calculate

Annotations:

- Select a tool from the drop down
- Set a maximum curve depth, this should be no more than the flute length of the tool as shown in the diagram to the right.
- Set the stepper in mm
- Use these buttons to select the vector lines, alternatively you can use the mouse and left click on the vectors to select / deselect. "Select From" lets you select the same vectors as an already created machining plan.
- Set this to specify a start depth (this assumes some material has already been removed)
ONLY USE THIS IF YOU UNDERSTAND THE FUNCTION
- Select this button to generate a preview of the toolpath
- Click here to close the "V Clearance" window and abandon changes
- Click here to accept changes and close the "V Clearance" window

Finished Machining Plans

When you have finished creating all the machining plans for your design the screen will look like the image below.

MACHINING PLANS

- ☒ Follow. Start Depth:0.000mm Final Depth:5.000mm Tool:1 = 12.700mm Diam
- ☒ Inside Offset. Start Depth:0.000mm Final Depth:5.000mm Tool:1 = 12.700mm Diam
- ☒ Outside Offset. Start Depth:0.000mm Final Depth:5.000mm Tool:1 = 12.700mm Diam
- ☒ Area Clearance. Start Depth:0.000mm Final Depth:5.000mm Tool:1 = 12.700mm Diam
- ☒ Raster Clearance. Start Depth:0.000mm Final Depth:2.000mm Tool:1 = 12.700mm Diam
- ☒ Drill. Start Depth:0.000mm Final Depth:20.000mm Tool:1 = 12.700mm Diam
- ☒ V Carve. Max Cut Depth:11.000mm

Toolbar buttons: Follow, Inside Offset, Outside Offset, Area Clearance, Raster Clearance, Drill, V Carve, V Clearance

Bottom buttons: < Back, Next >, Cancel

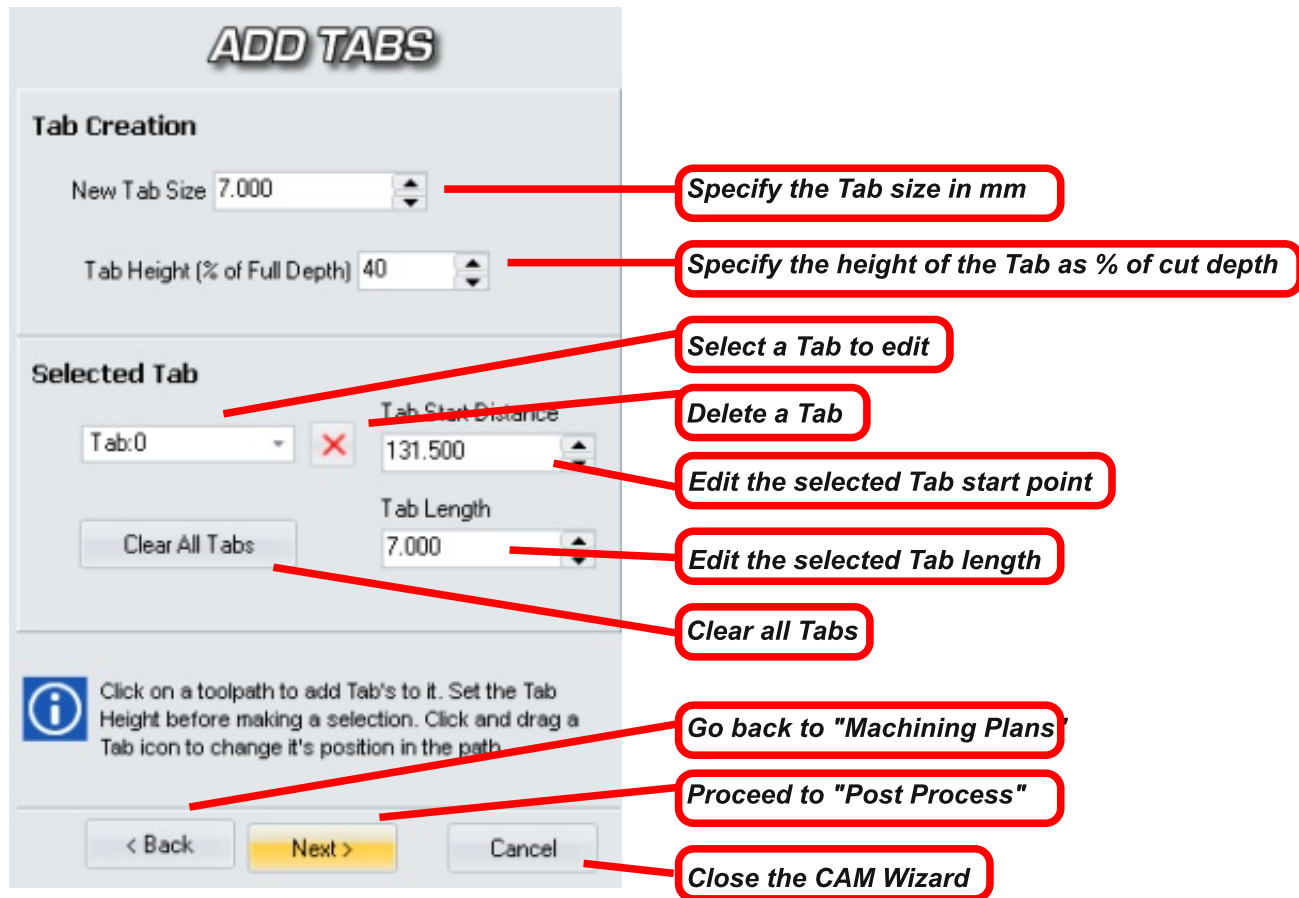
Callouts:

- Left click on a plan to select it
- Left click this button to move the selected plan up the list
- Left click this button to move the selected plan down the list
- Left click this button to delete the selected plan
- Left click this button to edit the selected plan
- Click here to go back to "Material Selection"
- Click here to proceed to "Add Tabs"
- Click here to close the CAM Wizard

Add Tabs

This option allows you to create tabs, adding tabs is useful when cutting to the full depth of the material with multiple profiles as the tabs will hold the parts together.

The image below represents the "Add Tabs" screen.



Add a Tab

To add a Tab, left click on the vector line you wish to add the Tab to.

The added Tab will look like the image this

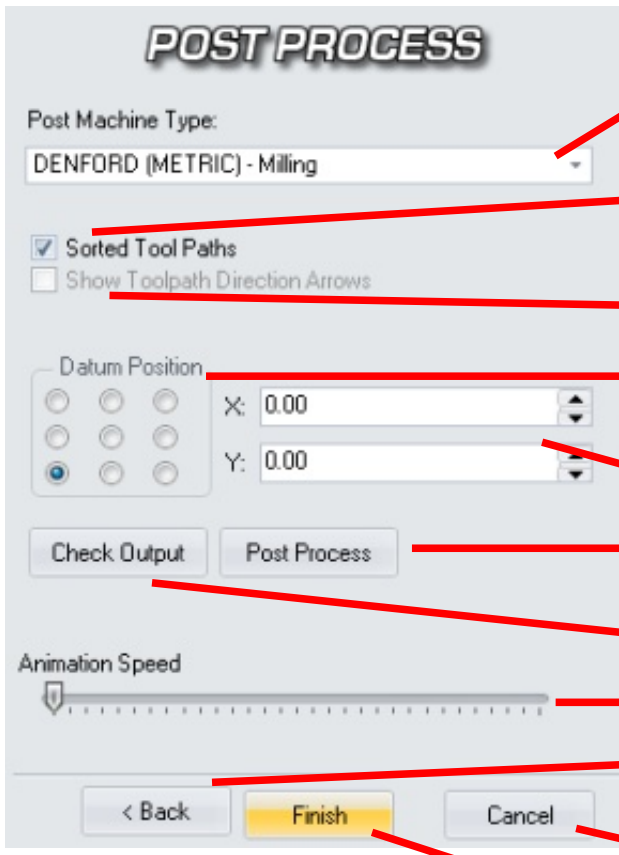


Clicking and holding the left mouse button whilst the cursor is over the added Tab enables you to move the Tab by dragging it.

Post Process

The final stage of the CAM Wizard is to choose the post processor for the program and set the datum position.

The screen will look like the image below.



The screenshot shows the 'POST PROCESS' dialog box. It has a title bar with 'POST PROCESS' in a stylized font. Below the title bar, there's a 'Post Machine Type:' label and a dropdown menu currently showing 'DENFORD (METRIC) - Milling'. To the right of this, a red callout box says: 'Click the drop down to select a post processor (Denford Metric - Milling should be used for current Denford machines)'. Below the dropdown, there are two checkboxes: 'Sorted Tool Paths' (checked) and 'Show Toolpath Direction Arrows' (unchecked). A red callout box points to the 'Sorted Tool Paths' checkbox: 'Click this to optimize the toolpaths, unselected will run toolpaths in the order they were created'. Another red callout box points to the 'Show Toolpath Direction Arrows' checkbox: 'Click here to show direction arrow on toolpath, clicking on toolpath will change the cut direction (only available after checking the output)'. Below these checkboxes is a 'Datum Position' section with a 3x3 grid of radio buttons. The bottom-left radio button is selected. To the right of the grid are two input fields: 'X: 0.00' and 'Y: 0.00'. A red callout box points to the 'X' input field: 'Set datum position'. Another red callout box points to the 'Y' input field: 'Specify datum position, X0 and Y0 is bottom left corner'. Below the datum position section are two buttons: 'Check Output' and 'Post Process'. A red callout box points to the 'Post Process' button: 'Creates the program, clicking this will launch a "Save As" window'. Below these buttons is an 'Animation Speed' section with a slider. A red callout box points to the slider: 'Simulates the program'. Another red callout box points to the slider: 'Slide this to change animation speed'. At the bottom of the dialog are three buttons: '< Back', 'Finish', and 'Cancel'. A red callout box points to the '< Back' button: 'Go back to "Add Tabs"'. Another red callout box points to the 'Finish' button: 'Close the CAM Wizard'. A final red callout box points to the 'Finish' button: 'Creates the program, clicking this will launch a "Save As" window and close the CAM Wizard'.

Click the drop down to select a post processor (Denford Metric - Milling should be used for current Denford machines)

Click this to optimize the toolpaths, unselected will run toolpaths in the order they were created

Click here to show direction arrow on toolpath, clicking on toolpath will change the cut direction (only available after checking the output)

Set datum position

Specify datum position, X0 and Y0 is bottom left corner

Creates the program, clicking this will launch a "Save As" window

Simulates the program

Slide this to change animation speed

Go back to "Add Tabs"

Close the CAM Wizard

Creates the program, clicking this will launch a "Save As" window and close the CAM Wizard

Having worked your way through the CAM Wizard and saved an FNC file you can now open it in VR Milling V5 and run the program. If you had selected the "Send to VR Milling" button



then VR Milling will be opened automatically and your program will be in the "Editor" window.

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On-Line Technical Forum

TECHNICAL SUPPORT AVAILABLE 24 HOURS A DAY, 7 DAYS A WEEK

Denford's Technical Forum is a free of charge on-line technical support service that is available to Denford customers 24 hours a day, 7 days a week.

"The technical forum has provided a wealth of information and support for our 20-year-old Denford CNC machine, in fact just as good as the support we receive for our brand new CNC Router!"



Denford's On-Line Technical Forum is a free of charge service that can be accessed 24 hours a day, 7 days a week.

The On-Line Technical Forum is available to Denford customers, old and new, and it couldn't be easier to use. Just visit <http://www.denforddata.com/bb/> and register on line.....it's that simple.

Denford's On-Line Technical Forum opens up the traditional communication channels that can restrict customer and technical support, due to availability of staff, teaching commitments or different time zones.

A multitude of topics relating to Denford machines and software (both new and old) are covered within the forum, which is simple to search, and easy to use.

Denford's Technical Team and Denford customers from around the world regularly log on to the forum to offer support and advice and, most importantly, post a solution for all to see.

As well as offering comprehensive technical support, Denford's On-Line Technical Forum enables customers to share ideas and projects with other users. Media such as teaching material, project work, PDFs, images, drawings and text documents are easily attached to messages for all users to view and comment on.

You can also read the latest Denford news before anyone else, and keep track of machine and software upgrades, some of which can be downloaded direct from the Technical Forum web site.

The On-Line Technical Forum has proved to be hugely popular with customers. One recent user posted a note to inform us that the Technical Forum has "provided a wealth of information and support for our 20-year-old Denford CNC machine, in fact just as good as the support we receive for our brand new CNC Router!"

Of course the traditional methods of phone and email are still available, but try out this new service by simply logging on to www.denforddata.com/bb/ and register.



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