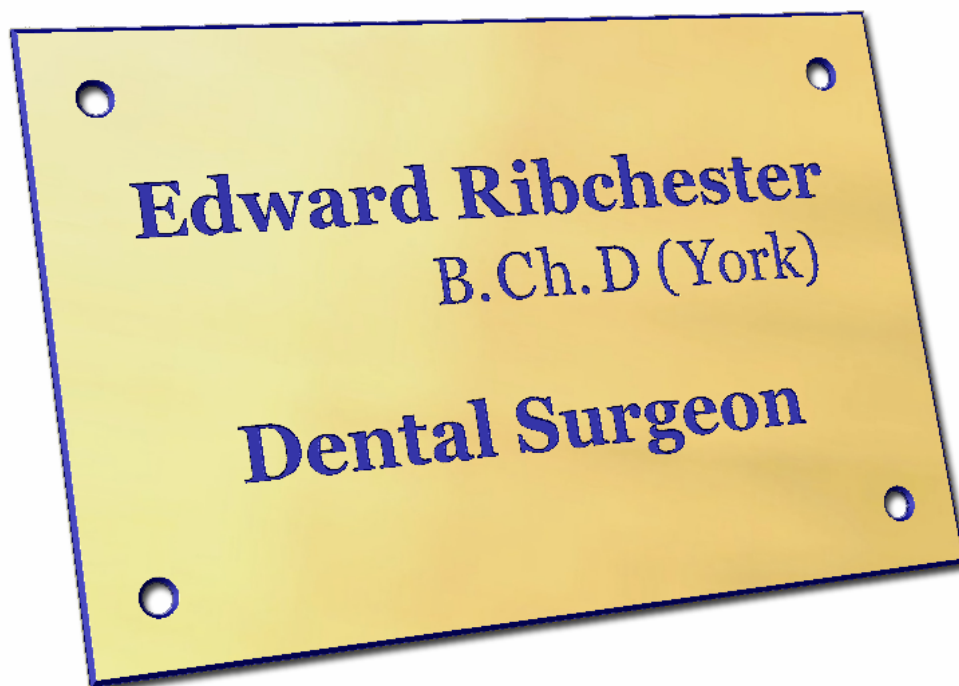


# Getting Started With *VCarvePRO*

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**Tutorial 1**  
**Engraved Brass Plate**

**Vectric**

# VCarve Pro

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## Disclaimer

All CNC machines (routing, engraving, and milling) are potentially dangerous and because Vectric Ltd has no control over how the software described in this manual might be used. Vectric Ltd or any associated Resellers cannot accept responsibility for any loss or damage to the work piece, machine or any individual, howsoever caused by misusing the software. Extreme care should always be taken and the output from the software thoroughly checked before sending it to a CNC machine.

The information in this manual may be subject to change without any prior notice. The software described in this manual is supplied under the terms and conditions of the software license agreement and may only be used in accordance with the terms of this agreement.

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# Introduction

Many businesses use their CNC machine for simply cutting out flat letters and shapes from plastic sheet, or engraving standard badges and nameplates, which are all based on simple 2D machining strategies. VCarve Pro can handle all these day to day tasks, however this tutorial will show you how to use your CNC machine to route and engrave jobs that include decorative 3D designs that will be more interesting and hopefully more profitable if you run a business.

The manual takes you step-by-step through an illustrated tutorials that shows and explains exactly how to use the VCarve Pro Software. Tips and tricks have also been included that will help you get the most from your CNC machine.

We hope you enjoy using the software.

## What is V-Carving?

V-Carving produces a constantly varying and flowing 3D carved effect on the job, which is similar to how a craftsman would carve by hand. Imagine a 'hand-carver' cutting letters into a piece of wood or stone, starting at a sharp corner, pushing the chisel deeper where the font stroke gets wider and pulling the tool out to form precise, sharp corners. V-Carving, also known as 3D Engrave or Intaglio engraving allows a V shaped or engraving tool to cut at varying Z depths that are directly linked to the width of the geometry in which the cutter is moving.

This effect is difficult to describe in words, but imagine using a flat-bottom end mill to cut 3mm (1/8<sup>th</sup>) deep inside the text shown below. The tool, being round will always leave a fillet radius in the corners and will not actually cut the complete letter where the diameter of the tool is too big to pass through the small gaps.



Sign including V-Carved Text

## What the software allows you to do

V-Carving is typically used in the following industries to add decoration to objects and products such as,

|               |  |
|---------------|--|
| Sign making   | House signs, Business, Restaurants, Pubs, Gold Leafed and Gilded |
| Woodworking   | Kitchen cabinet doors, Chairs, Doors, Table tops                 |
| Engraving     | Commemorative Brass plaques, Company logos,                      |
| Gifts         | Key rings, Personalised gifts                                    |
| Stone cutting | Memorials, Commemorative engravings                              |

## What file formats can be used?

VCarve Pro will open files that have been saved in the following formats.

|     |  |
|-----|--|
| DXF | Drawing Exchange Files from CAD systems                            |
| EPS | Encapsulated Postscript from Adobe Illustrator and Corel Draw etc. |
| AI  | Adobe Illustrator  |
| PDF | Portable Document Format for industry standard print data          |



If the designs are being prepared with software such as Corel Draw or Adobe Illustrator we recommend that you **convert the vector geometry and text to curves** and **switch off all patterns or colour fills** before exporting, **preferably as an EPS file**.

## Getting Help

If you need assistance when using the software there are 5 primary places to look.

1. **Program Help File** - From the Main menu select Help
2. **Video Tutorials** - These are supplied on the installation CD or can be downloaded from the Vectric website.
3. **User Forum** - The Vectric user forum at [www.vectric.com/forum](http://www.vectric.com/forum) is a very useful resource for information on VCarve Pro along with materials, cutters etc. and also to share knowledge and experiences.
4. **E-mail Support:** - The Vectric Support Team at [support@vectric.com](mailto:support@vectric.com)
5. **Frequently Asked Questions (FAQ)** - The support area on the Vectric web site at [www.vectric.com](http://www.vectric.com) maintains a list of the most frequently asked questions along with the answers.

## Watch the supporting tutorial videos



The video camera icon indicates there is a video file for that particular section of the manual.

Many of the tutorials and help files have associated video footage that will make learning to use this software more interesting and enjoyable. These are on the installation CD or Downloadable from the web site. Windows Media Player is required to view the video files.

If you experience problems running these files or need assistance please visit the technical support area on the web site and follow the links.

# Overview of the interface

The screen area is split into 6 main regions.

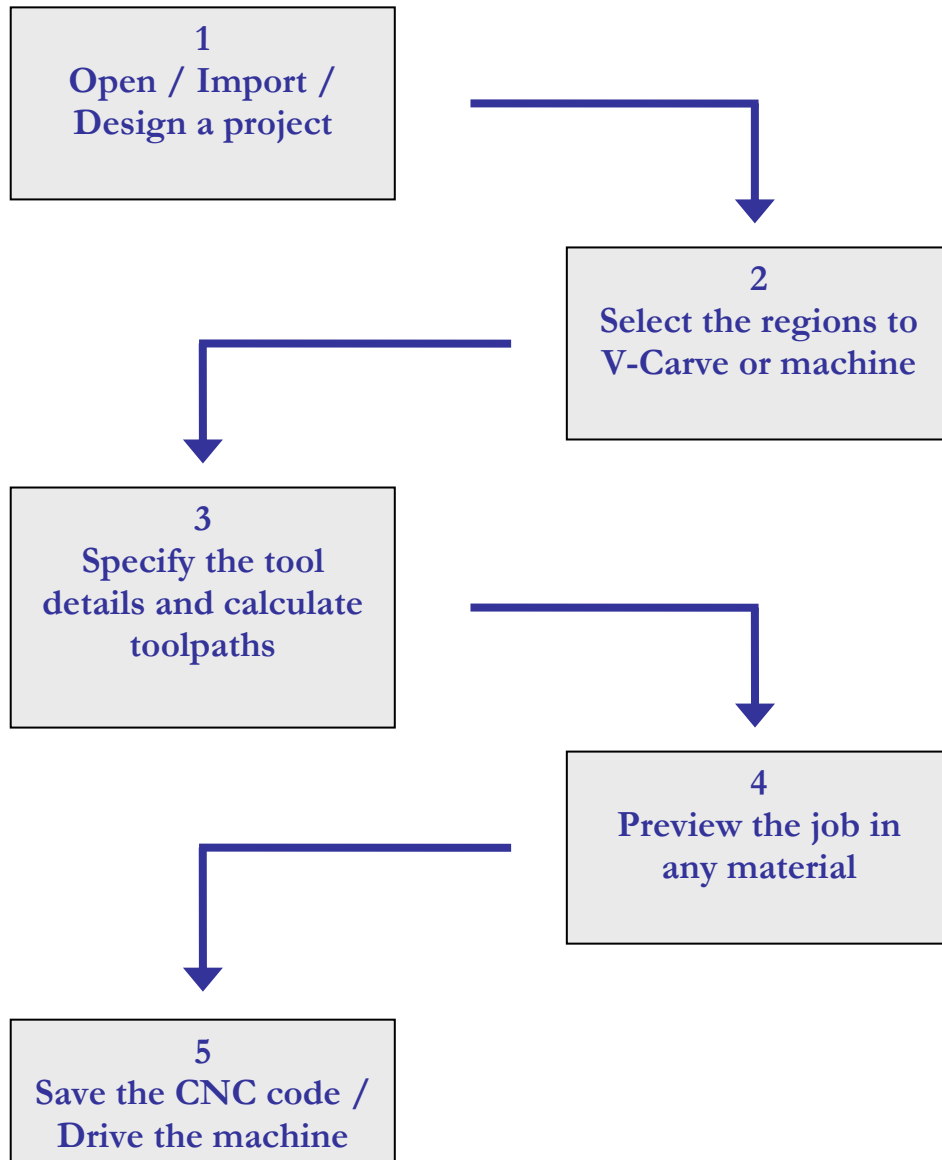
1. The **Main Menu bar** along the top of the screen provides access to additional, less commonly used commands available in the software. Simply click and each option will show a drop-down list of the functions.
2. The **Drawing Tab** on the left side of the screen provides general drawing tools for design modification, sizing, alignment etc. prior to machining.
3. The **Toolpath Tab** on the right side of the screen is where toolpaths are defined, calculated, edited and deleted. The Material set-up and Job Preview tools are also in this area.
4. The **Command forms** automatically appear in the Drawing window and the Toolpath tabs when tools are selected that require details to be entered such as dimensions for sizing or positioning etc.
5. The **2D Design window** is where the design is drawn, edited and selected ready for machining. Designs can be imported or created directly in VCarve Pro. This occupies the same area as the 3D Preview window and the display can be toggled between the two using F2 and F3 or the tabs at the top of the window.
6. The **3D Preview window** shows the calculated toolpaths and colour shaded carved job are displayed.



The User Interface

## The VCarve Pro Logic

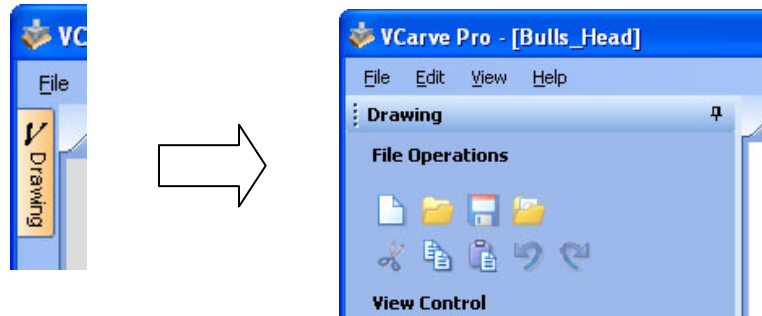
VCarve Pro has been developed specifically to design and calculate perfect 3D V-Carve / 3D Engrave and production machining toolpaths as quickly and easily as possible. The general work flow logic to apply to most jobs is explained in the diagram below.



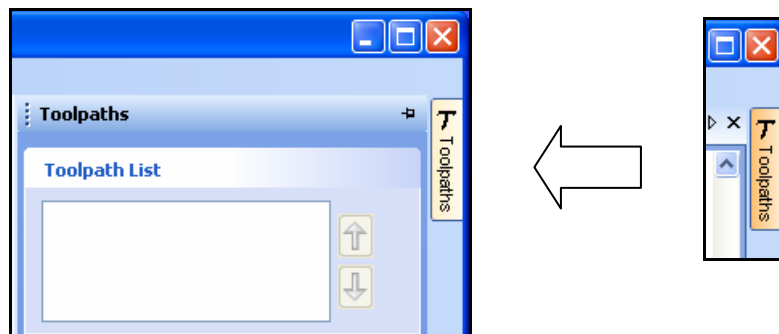
Although VCarve Pro's key strength is the toolpath engine it also includes drawing and editing tools that allow design modifications such as positioning, alignment changes and node editing to be made. Multiple design elements can also be imported, scaled, positioned and interactively edited to make a new design. Text can also be created using any TrueType font installed on your computer or the Single stroke engraving fonts supplied with the software.

## Managing windows - Auto Show / Hide

The two primary **Drawing** and **Toolpath Tabs** have Auto Hide / Show behaviour which allows them to automatically close when not being used, maximizing the working screen area. They can be opened and closed at any time by clicking the left mouse over the **Drawing** and **Toolpaths** tabs in the **top left** and **top right** corners of the interface.



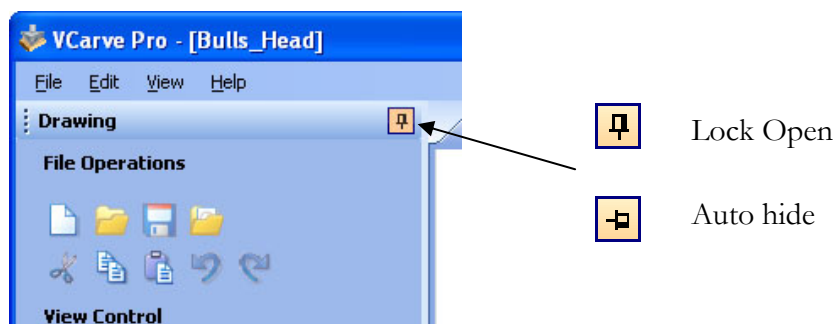
Click on the Drawing Tab to open the Drawing Window



Click on the Toolpaths Tab to open the Toolpaths Window

**i** Clicking on the Drawing or Toolpath tab will also close an open window.

Both windows have Auto Hide / Show behavior and can be locked open by clicking on the **Push-Pin button** in the top right corner of the window region as shown below.








Auto Hide / Show windows




## View Controls






The View Control options available when working in the 2D Design and 3D Preview windows are,

### 2D Design Window

|   |                         |  |
|---|-------------------------|--|
|  | <b>Zoom Interactive</b> | Mouse with Middle Wheel – Push / Pull  |
|  | <b>Zoom Box</b>         | Click top left corner<br>Click bottom right corner   |
|  | <b>Pan</b>              | Click and hold the Left mouse button – Esc to cancel<br><b>Shortcut:</b> Click and drag the <b>Middle</b> mouse button |
|  | <b>Zoom Extents</b>     | Zooms to show material limits in the 2D window   |
|  | <b>Zoom Selected</b>    | Click to select an object or objects<br>Zooms to the bounding box of the selections                                    |

 Mouse with Middle Wheel can be used to interactively zoom in / out.

### 3D Window

|   |                       |  |
|---|-----------------------|--|
|  | <b>3D Twiddle</b>     | Click and drag <b>Left</b> mouse button in the 3D window   |
|  | <b>Zoom</b>           | <b>Right</b> mouse button – Push / Pull<br>Mouse with Middle Wheel – Push / Pull                                   |
|  | <b>Pan</b>            | Click and drag <b>Right</b> mouse button + <b>Ctrl</b><br>Click and drag <b>Right</b> and <b>Left</b> mouse button |
|  | <b>Plan View</b>      | Looks directly down the Z axis onto the design in 3D window  |
|  | <b>Isometric View</b> | Shows the model in a 3D isometric view in the 3D window  |

 Pressing **F2 & F3** will toggle between displaying the **2D & 3D windows**

## Vectors

Decorative vector designs and shapes will often be imported from another drawing package such as Corel Draw, AutoCAD etc. rather than being completely drawn in VCarve Pro. The imported vector shape(s) can be modified, moved, scaled, rotated, mirrored or deleted.

### Vector selection methods

Multiple vectors can be selected in the following **4 ways**.

1. Manual multiple selection

Hold down the **Shift** key while clicking the **Left** mouse button on each vector required.

Objects can be deselected simply clicking on the object again with the **Shift** key pressed.

2. Moving the cursor from **Left** to **Right** selects only **FULLY enclosed** objects.

Click and drag the left mouse button moving from **Left to Right** selects all objects fully inside the selection rectangle.

3. Moving the cursor from **Right to Left** selects all objects **INSIDE** the selection rectangle and also any objects that the selection rectangle **TOUCHES**.

Click and drag the left mouse button moving from Right to Left selects all objects inside the selection rectangle + any that the selection touches.

4. Pressing the keyboard keys **Ctrl + A** will select all vector objects in the design

 Selected vectors are displayed as dotted purple lines.

### Vector deselect

Selections can be cancelled by simply,

1. Left clicking on an area outside the selection
2. Pressing the **Right mouse button** and selecting **Unselect All** (top option) from the list. You must click on the white drawing background to get this option in the menu.

## Vector editing

A design is created from vector lines, arcs and bezier spans, which all have different properties that can be selected, modified and moved at any time.



Vector Selection Tool

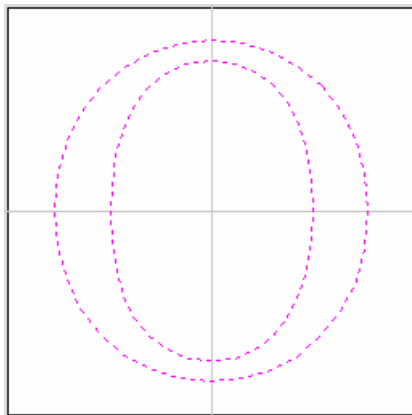
Selected from the Drawing tab on the left

Selected vectors are shown as dotted purple lines. Vectors need to be selected before any of the editing tools such as scaling and moving etc. can be used.

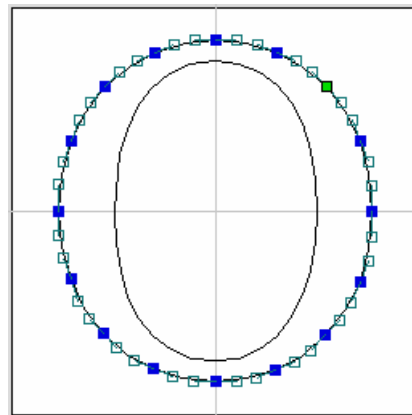


Node Editing Tool

Selected from the Drawing tab on the left



Vectors selected



Bezier node editing

When the Node Editing tool is active the cursor changes to a Black Arrow indicating that individual points (nodes) can be edited. Nodes can be interactively moved by clicking and dragging the left mouse button on a node to select and move the node to a new position.

The shape of lines, arcs and bezier spans can be edited by clicking and dragging on the nodes or control points to move them. Multiple nodes and control points can be selected and moved by using the multiple selection options such as the Shift key and dragging to make a selection.

If you right click on nodes or spans a context sensitive popup menu will be displayed which allows you to insert or delete points and nodes, cut the vector, move the start point etc.

## Drawing shapes

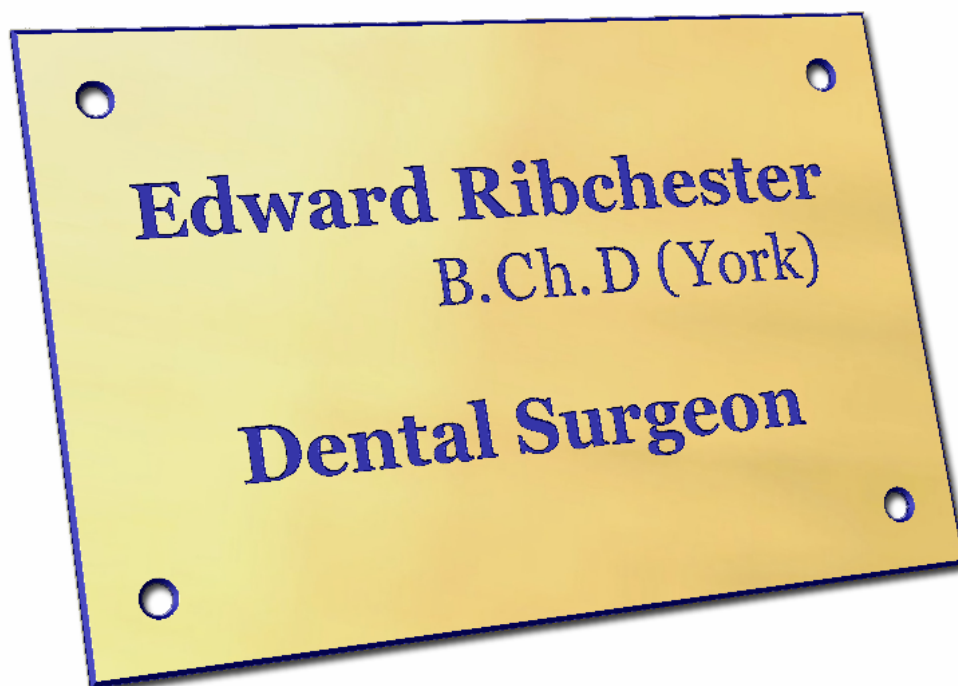
Simple shapes and designs can be drawn using the Circle, Oval, Rectangle and Polyline options. These shapes are commonly used to create new borders for signs or as a reference plate for a kitchen cabinet door etc. Shapes can be created by either entering exact dimensions in the Command Window or simply clicking the left mouse button in the 2D window to specify the parameters and coordinates interactively.

Drawing shapes is covered in more detail during the tutorials in this manual.

## Introduction

This tutorial will show you how to Engrave the Brass Plate shown below, which is approximately 200mm (8") wide x 130mm (5.5") high. The artwork for this sign will be designed using the software and then engraved using a standard Engraving cutter.

We estimate that this tutorial should take you approximately **15 minutes** to complete.



The finished Sign

There are 5 key stages in opening and preparing toolpaths for this sign.

1. Create a New Sign at the required size
2. Add the Text and Holes
3. Calculate the Engraving Toolpaths
4. Preview the completed job and Estimate the machining time
5. Save the Toolpaths ready for sending to the machine

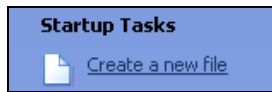
The file required for this tutorial are installed on your PC in the folder,

**C:\ Program Files\VCarve Pro 3.0\Sample Files\Engraved\_Plate.crv**

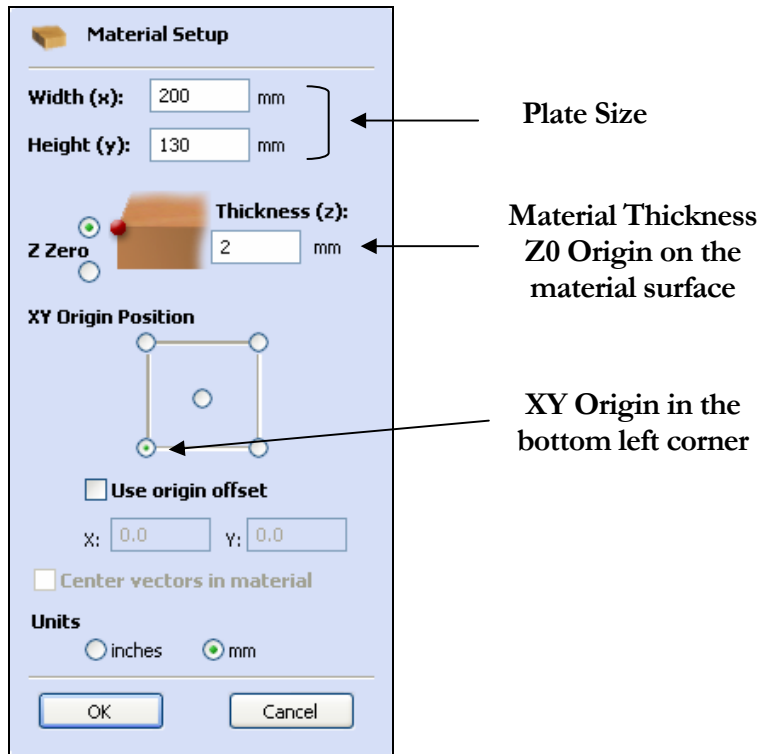
**Note:** If you are using the **Trial** version of VCarve Pro, you will need to load the file **Engraved.crv** if you want to be able to save and cut the toolpaths.

# 1. Creating a New Design

From the **Startup Tasks** tab toolbar click on the **Create a new file** icon.




Enter the required dimensions for the sign as shown below.

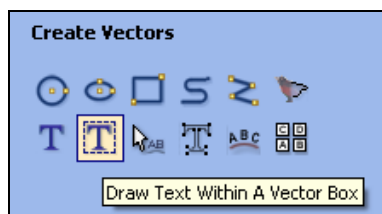


Click the **OK** button and the 2D window will show the new blank job.

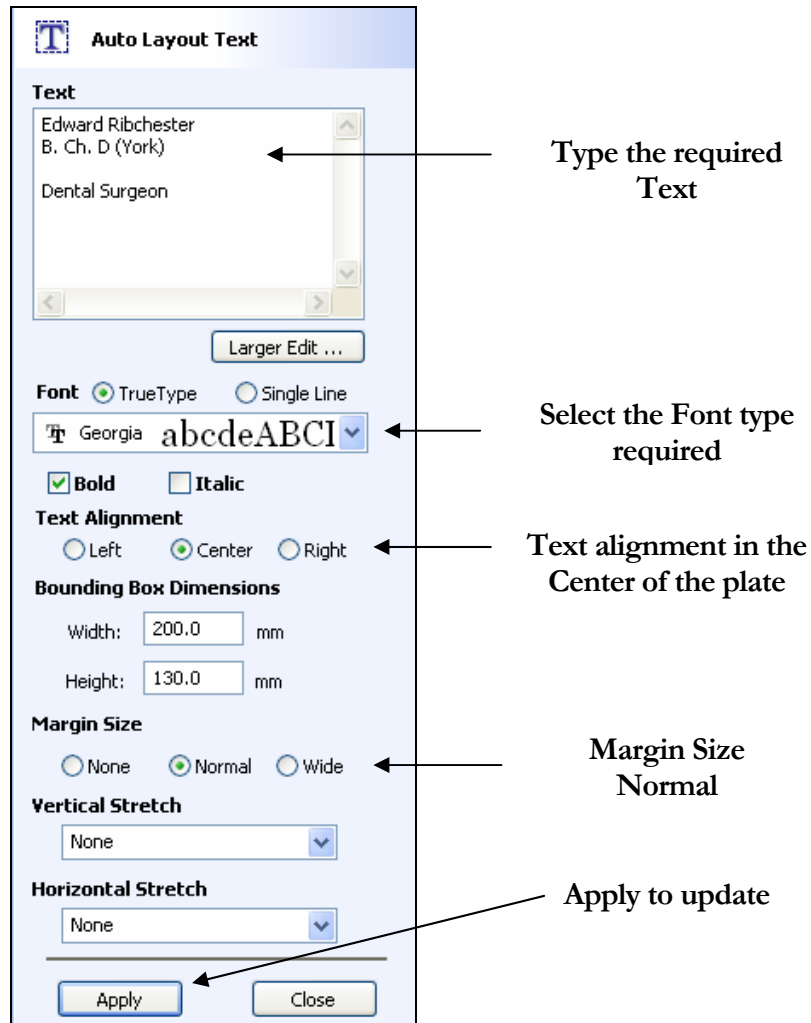
# 2. Adding Text and Holes

Using the Drawing Tools from the left side of the screen the Text and Holes will be added to the design.

Click the **Draw Text within a vector / boundary**  icon.

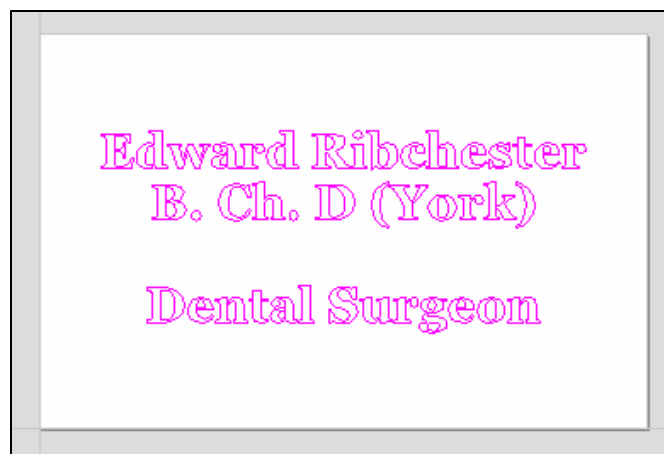


This text drawing option automatically sizes the text to the material size with options for defining the Margin size around the text block.



Enter the **Text** and select the required font to be used from the pull-down list.

Click the **Apply** button and the text will automatically be scaled to fit on the specified plate.



The text will be drawn in the **2D view** as shown above.

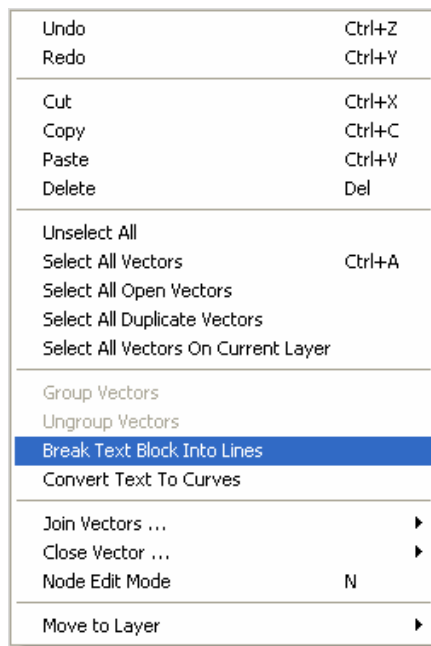
If the text needs editing simply click the **Left mouse button** on the text to select it and click the **Draw Text within a boundary** icon.

Click the **Close** button.

The middle line of text needs editing to align it to the right of the first line and to improve the letter kerning.

Left click to select the text and it will be drawn in purple.

Click the **Right Mouse button** and from the **Quick menu** select **Break Text Block into Lines**.



This creates 3 separate lines of text that can each be modified and moved etc.

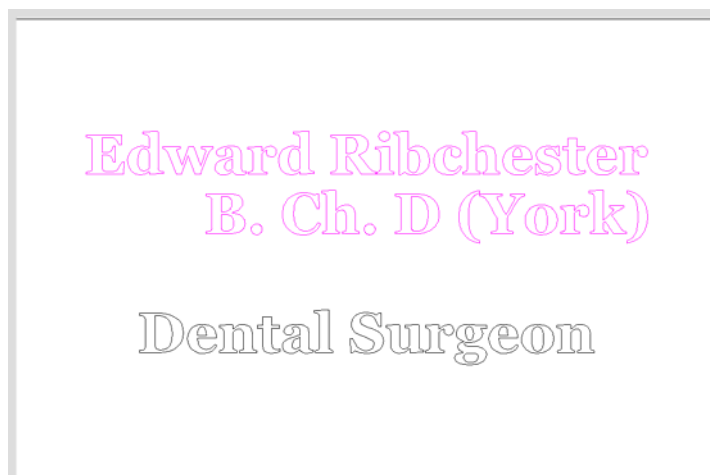
To align the middle line to the right-hand side of the first line of text.


Select the **Middle line of text**

Holding the **Shift key** select the **Top line** of text - 2 lines now selected.

Select the **Align Right**  icon

The middle line of text will move to the right and be aligned with the top line of text.



**Note** The letter kerning can easily be edited using the Edit Text Spacing and Curve tool .

Place the cursor between the letters to move and click the left mouse button.

Holding the **Shift key** moves the letters apart

Holding the **Ctrl key** doubles the distance the characters move on each mouse click.

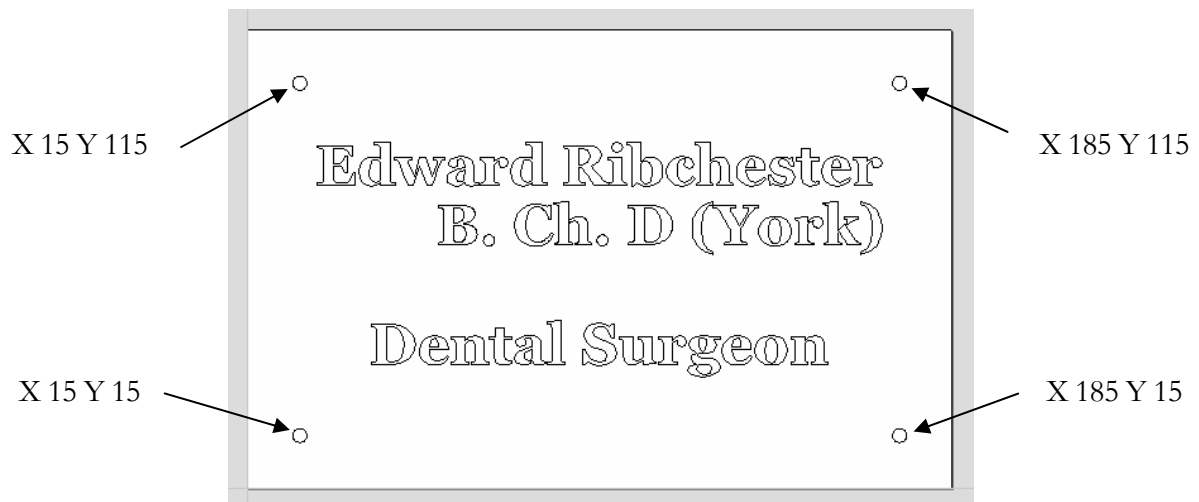
To add holes in the design simply draw circles in the 4 corners of the plate.



Click on the Draw Circles icon and enter the XY Position and Diameter for each circle.

A dialog box titled "Draw Circle" with a center point icon. It has fields for "Center Point" with X: 15.0 and Y: 15.0. Below are radio buttons for "Radius" and "Diameter", with "Diameter" selected. A field for "D:" shows 4.0 mm. There are "Apply" and "Close" buttons at the bottom.

Diameter = 4.0mm



|        |       |       |
|--------|-------|-------|
| Hole 1 | X 15  | Y15   |
| Hole 2 | X 15  | Y 115 |
| Hole 3 | X 185 | Y 115 |
| Hole 4 | X 185 | Y 15  |

After entering the dimensions for each circle click the **Apply button** to draw the circle.

**Note** To change / edit the size or position of a circle, select the circle and open the Draw Circle form. The position and size of the selected circle will be displayed and can be edited

The plate is now ready to calculate the required engraving toolpaths

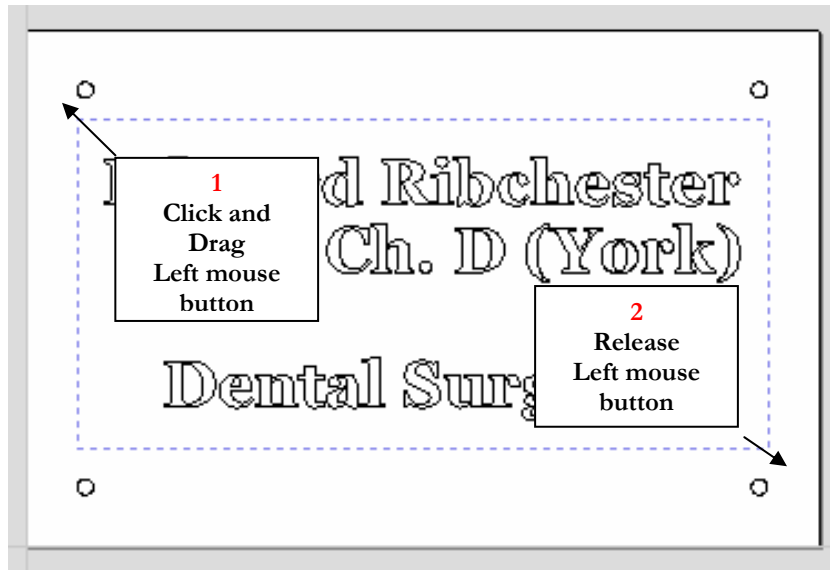


The horizontal and vertical **dotted pale grey lines** represent the **X0 and Y0** axes.

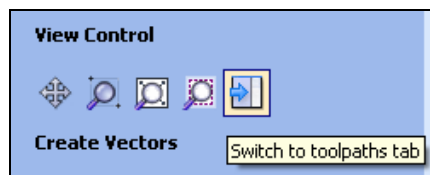


### 3. Calculate the Engraving Toolpaths

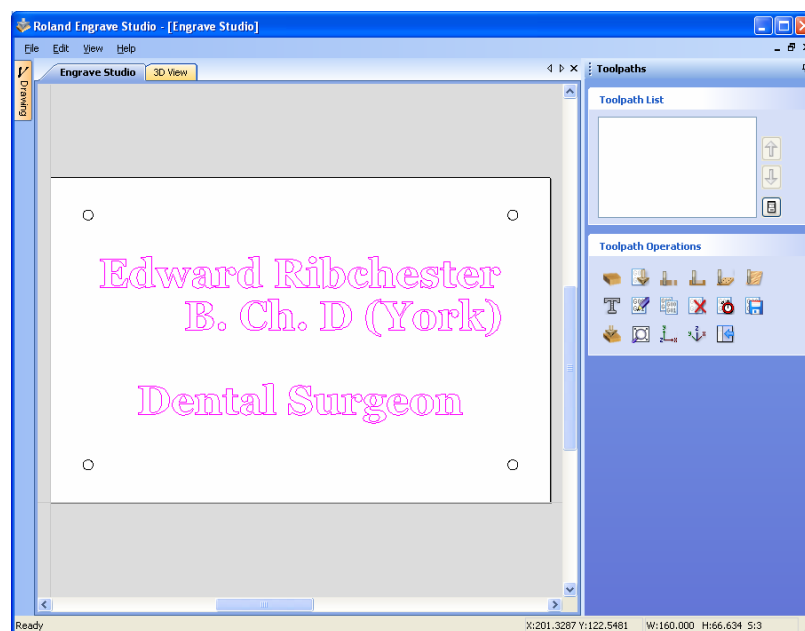
Select the text by either **clicking and dragging the left mouse** to enclose all the text or holding the **Shift key and clicking on each line of text**. The selected text is displayed in purple.



From the **View Control** section click on the icon to **Switch to the Toolpaths Tab** that closes the left hand interface and opens the toolpath options on the Right Side of the screen.



This automatically **closes the Drawing Tab** and **opens the Toolpath Tab** on the **Right** side of the screen as shown below in Figure 4.



Toolpath Tab

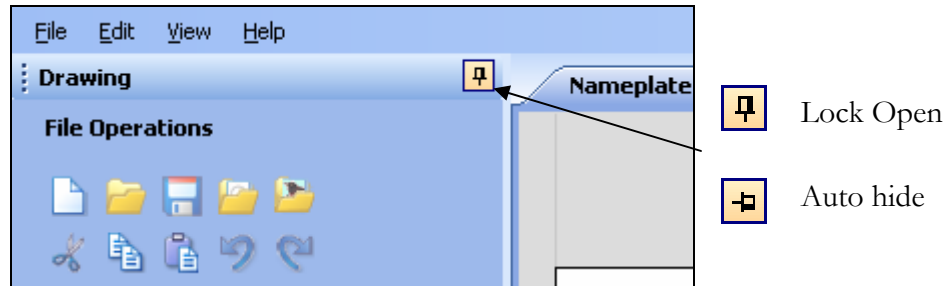


To re-open the **Drawing Tab** simply click the cursor on the **Drawing icon** in the **Top Left corner** of the screen and the drawing tools will automatically appear.



The **Drawing** and **Toolpath Tabs** have an Auto Hide and Show behavior, which allows them to automatically close when not being used, maximizing the working area.

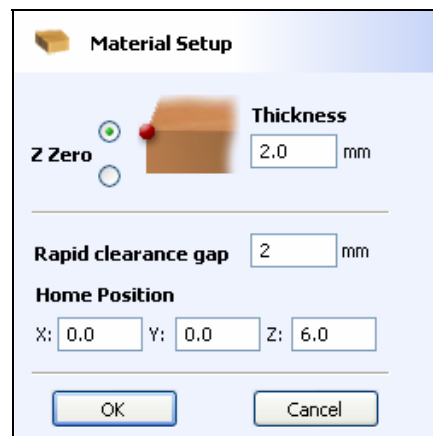
Click the **Push-Pin** to lock them in the Open position as shown below.



Auto Hide & Show windows



Select the **Material Setup** icon from the **Toolpath Operations** list on the Toolpaths tab and specify the Rapid Clearance Gap to be **2mm** and Home positions to be **X0, Y0, Z6mm** as shown below.



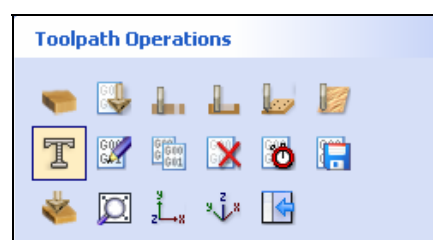
Material Setup

**Note** The **Z Zero position** is set to the **material surface**.

Click the **OK button** to accept the new settings.



Select the **Quick Engrave Toolpath** icon from the **Toolpath Operations** list and complete the form as shown below.



**Quick Engrave**

**Tool**  
 Engrave (50' 0.2 mm Tip Dia)  
 Select ... Edit ...

**Depth / Pressure** 2.0 mm

**Outline** **Fill**

**Stepover** 0.2 mm

**Offset** **Hatch**  
 Hatch Angle: 45.0 degrees  
 Cross Hatch

**Use Nose Cone**  
 Tool Depth: 0.2 mm  
 Number of Passes: 1

Safe Z: Static  
 Home Position: Static

Name: Quick Engrave 1  
 Calculate

**Post Processor**  
 Roland EGX-350  
 Driver: Roland EGX-350  
 Output Toolpath(s)  
 Close

Select the required cutter / diamond tool

Enter the Depth / Pressure to load the spring

Select the required Fill Pattern

Select this option when using a Nose Cone

Enter a suitable name and click Calculate

After Calculating a Toolpath click the Output button to send to the machine

Quick Engrave parameters

Click on the **Select** button to open the **Tool Database** and select the tool shown below.

In this example we are engraving brass with a standard 4.365mm diameter 50' included angle 0.2 Tip Diameter Engraving Cutter.

**Tool Database**

**Tool List**

- Metric Tools
- V-Bit (60 deg 6 mm)
- V-Bit (90 deg 12 mm)
- V-Bit (90 deg 32 mm)
- End Mill (3 mm)
- End Mill - 1.5
- End Mill (6 mm)
- Ogee - 6mm Rads 32mm Dia 12mm Deep
- Roundover - 9mm Rad 25mm Dia 12mm...
- End Mill (12 mm)
- Ball Nose (3 mm)
- Ball Nose (6 mm)
- Engrave (50' 0.2 mm Tip Dia)
- Drill (6 mm)
- Diamond Drag (90 deg 0.004 inches)
- Diamond Drag (90 deg 0.1 mm)

**Tool Info**

Name: Engrave (50' 0.2 mm Tip Dia)

Tool Type: Engraving

**Geometry**

Diameter (D): 4.0 mm

Side Angle (A): 25.0 degrees

Flat Diameter (F): 0.2 mm

**Cutting Parameters**

Pass Depth: 1.0 mm

Stepover: 0.08 mm 40.0 %

**Feeds and Speeds**

Spindle Speed: 12000 r.p.m

Feed Rate: 20.0 mm/sec

Plunge Rate: 10.0 mm/sec

Tool Number: 1

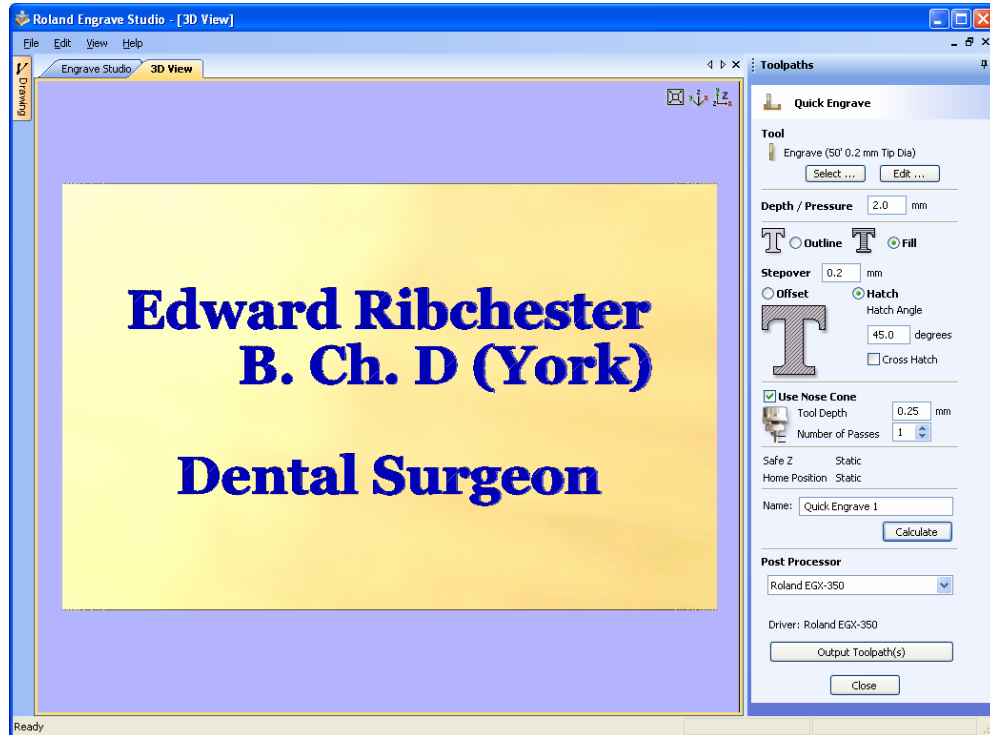
Apply

OK Cancel

**Important** The **Cutting Parameters** should be set for the material you are cutting

Click the **Edit button** to modify the cutting parameters to match the tooling you are using and the material being machined

Click the **Calculate** button and the toolpath will automatically be drawn in the **3D view** as shown below.





3D View showing Quick Engrave Toolpath & Material

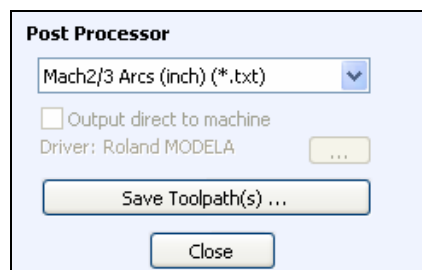
To **Rotate** the model **Click** and hold the **Left mouse button**.

To **Zoom**, use **Middle Wheel** on mouse or **Push / Pull** the **Right mouse button**

Pan using **Ctrl + Right** mouse button or the **Left + Right mouse buttons** together

For the standard views use the **ISO**  and **Plan**  view icons in the top right corner of the 3D view.

This Toolpath can be saved by selecting the appropriate postprocessor and clicking **Save Toolpaths**.

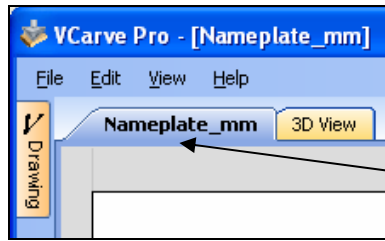


**Important** Ensure the engraving cutter has been loaded and set correctly on the machine before outputting a file to the machine.

## 4. Engraving the Fixing Holes

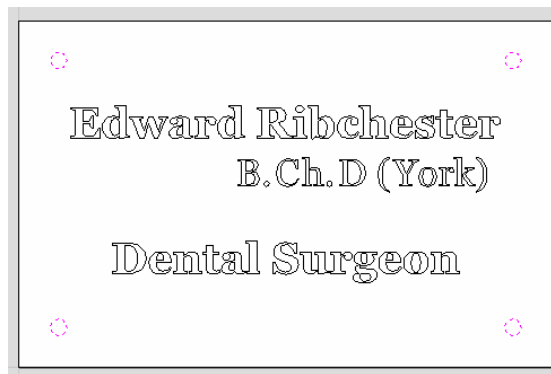
To engrave the holes in the late using the same engraving cutter used the Create Pocket Toolpath.

Open the 2D Window by clicking on the 2D View Tab




Click to Open the  
2D Window

Holding the Shift key click the Left mouse button to select each of the 4 circles.



The selection will be drawn  
as dotted purple circles.

From the Toolpath Operations menu select the **Pocket Toolpath**  icon and complete the form as shown below.

**Pocket Toolpath**

**Cutting Depths**

Start Depth (D) 0.0 mm

Cut Depth (C) 2.0 mm

**Tool**

Engrave (50' 0.2 mm Tip Dia)

Select ... Edit ...

**Clear Pocket ...**

Offset  Raster

Cut Direction

Climb  Conventional

Raster Angle 0.0 degrees

Profile Pass Last

Raster Allowance 0.0 mm

Ramp Plunge Moves

Distance 3.0 mm

Safe Z 2.0 mm

Home Position X:0.00 Y:0.00 Z:6.00

Name: Holes

Calculate Cancel

Enter the Cut Depth = Material Thickness

Select the Engraving cutter being used


Select Offset machining

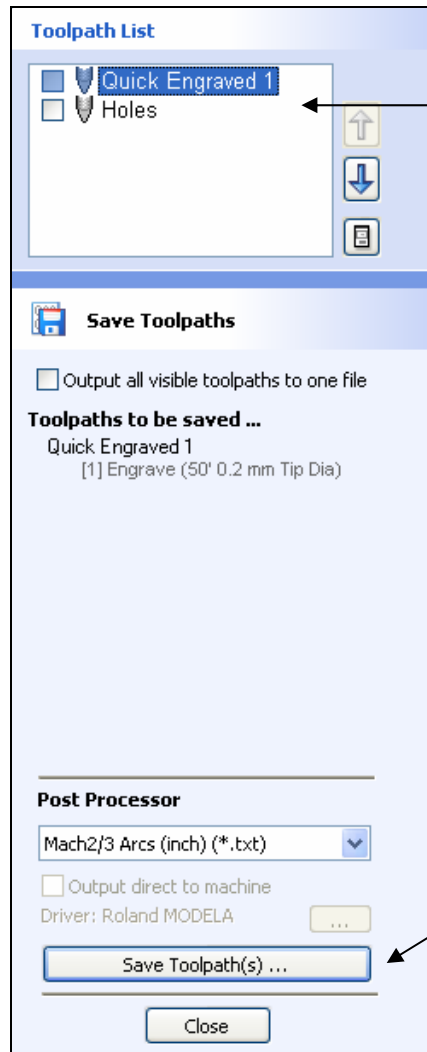
Switch on the Ramping option to ease the cutter into the material

Calculate the Toolpath

## 5. Saving Toolpaths

Before saving a toolpath, select postprocessor for your specific machine control system.

Save the Toolpaths by clicking the **Save Toolpath**  icon.



Select each Toolpath and Save the file ready for sending to the machine

### Output Toolpaths

Click the **SAve Toolpaths** button to save the selected Toolpath.


**Note** Calculated toolpaths can be edited by either,

Clicking the **Edit Toolpath** icon  or **Double clicking** on the name of the Toolpath name in the Toolpath List.

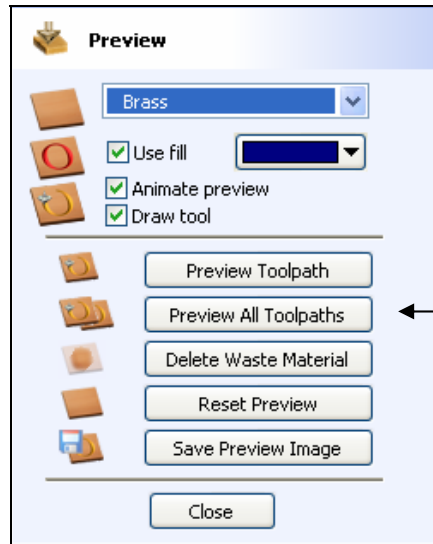
**i** Take extreme care to ensure the material and cutter are setup correctly before running the toolpaths on the engraving machine.

## 6. Preview the finished job and Estimate Times

After calculating a Quick Engrave toolpath the **Preview Toolpaths** form then needs to be opened.

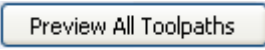
Close the Quick Engrave form and open the **Preview Toolpaths**  form.

This form is used to simulate the toolpath and show what the engraved job will look like. Different materials and colour fill settings can be changed to create realistic screen images.



Preview All of the Toolpaths

Job Preview form

Click the **Preview All Toolpath**  icon and an animated representation of the Tool cutting into the material will be shown in the 3D window.


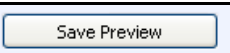


If running the software on low performance / old hardware, you might wish to switch off the **Animate Preview** and **Draw Tool** options, as this will increase the simulation speed.

The finished design can be shaded in different Material types and Fill Colors as shown below which shows the sign in Wood and Slate with a painted fill.

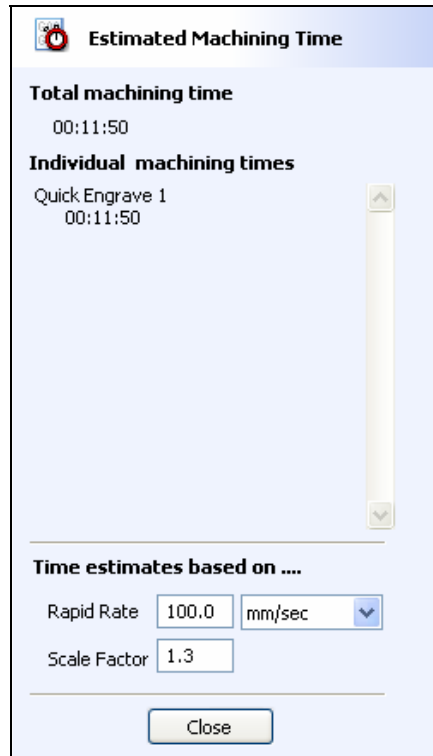



Finished Sign shown in Blue Plastic and Slate with Fill colours

Click the **Save Preview**   button to save the 3D window as an image file (bmp, jpg or gif) for use in customer quotations, marketing brochures or web site pictures etc.

Selecting the **Estimate Machining Times** icon  displays the estimated time required to machine the job in hours, minutes and seconds.







 The **Rapid Rate** is the maximum feed rate at which the machine travels.

The **Scaling Factor** can be set to obtain more realistic estimates for jobs that include lots of complex 3D carved moves, where the machine may not run at the programmed feed rates due to the need to accelerate and decelerate when the tool changes direction.

## 7. Saving the finished project

The finished project can be saved on the PC using the **Save File**  icon

This will save the complete project - Design + Toolpaths so it can be opened and edited at any time in the future.

 Take extreme care to ensure the material and cutter are setup correctly before using the toolpath.