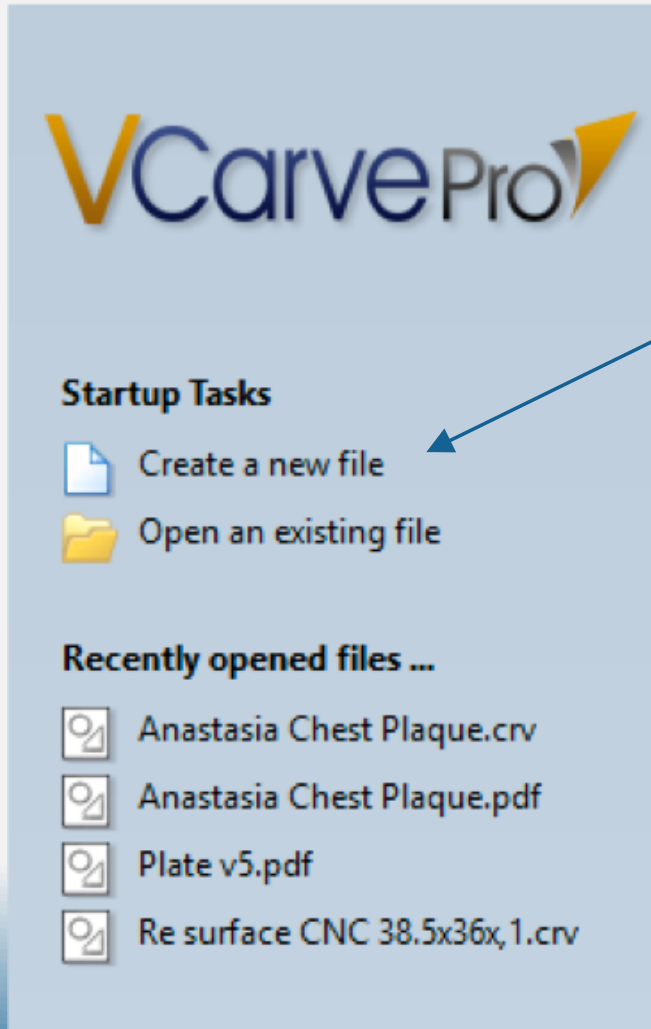


# CNC 101

**Handout for Woodcraft CNC101 Class  
developed by Bill Caldwell**

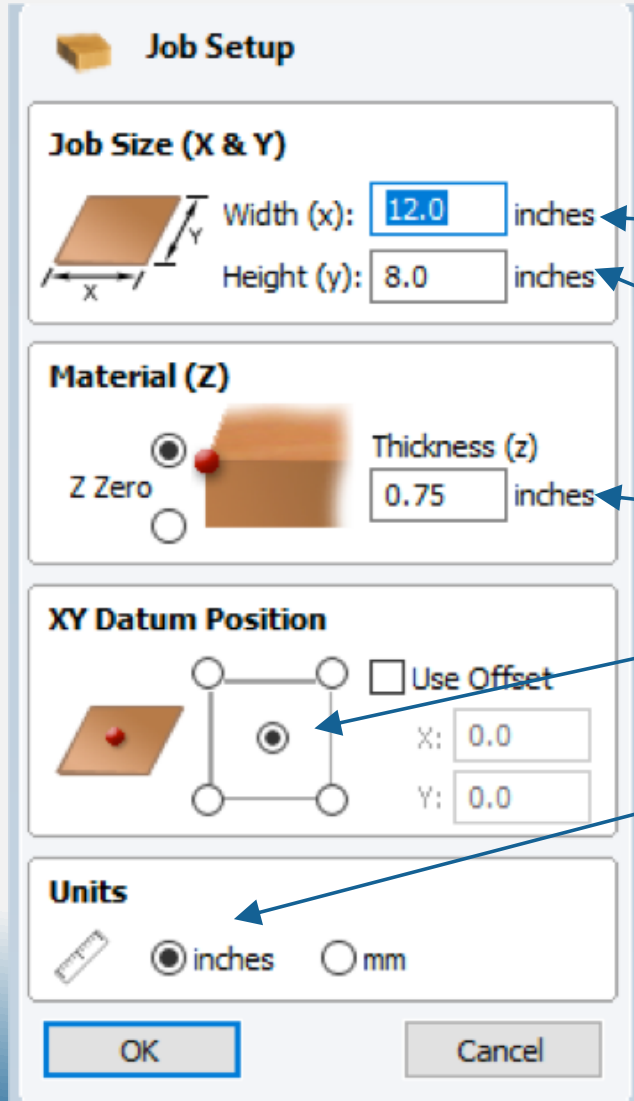
# USING V-CARVE TO DESIGN A PLAQUE

# CREATE A NEW FILE



Click on "Create A new file"

# SETTING THE WORK SPACE DIMENSIONS



The screenshot shows the 'Job Setup' dialog box with four sections: 'Job Size (X & Y)', 'Material (Z)', 'XY Datum Position', and 'Units'. Blue arrows point from text on the right to specific fields in the dialog.

- Job Size (X & Y):** Width (x): 12.0 inches; Height (y): 8.0 inches.
- Material (Z):** Thickness (z): 0.75 inches.
- XY Datum Position:** X: 0.0; Y: 0.0.
- Units:** inches (selected).

The Job Setup box (left) appears, allowing you to enter all the Variables needed for your project

The Width (**x dimension**) is the long side of the plaque, or the **horizontal axis**

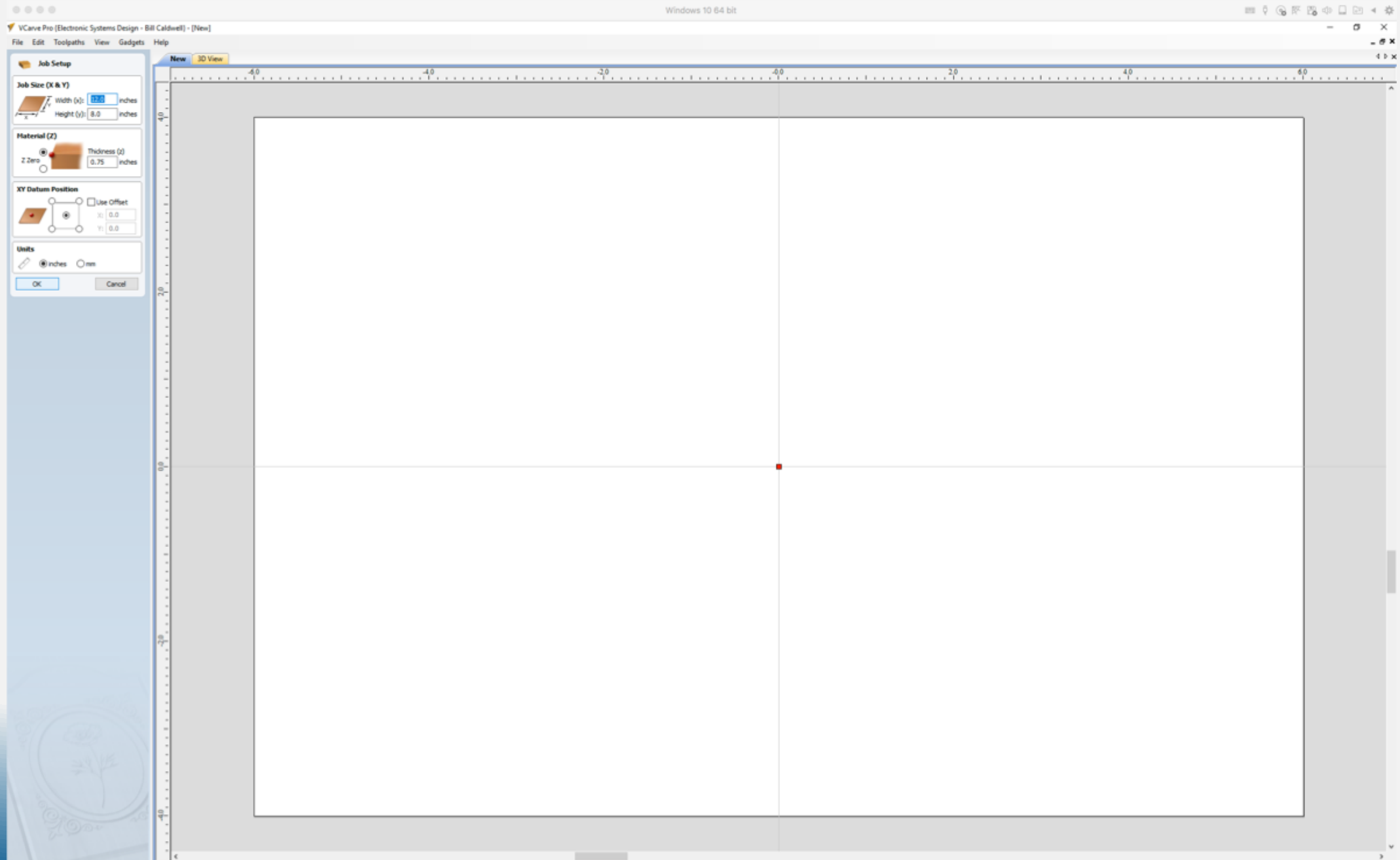
The Height (**y dimension**) is the long side of the plaque, or the **vertical axis**

The Material (**z dimension**) is the **thickness** of the material

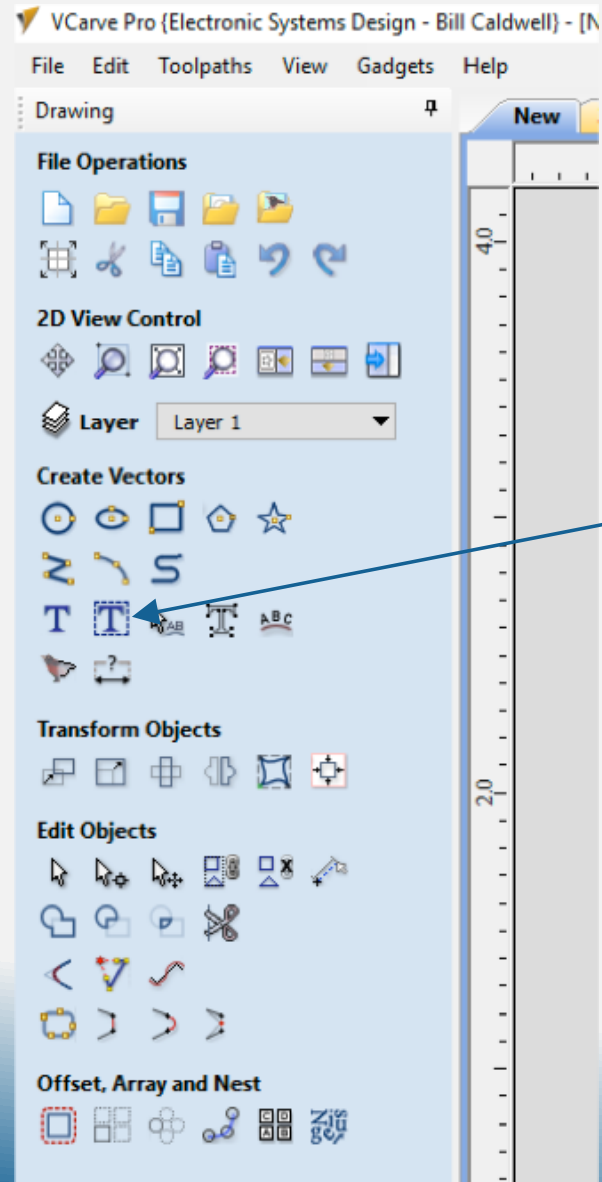
The **XY Datum Position (Index)** indicates where you want the **0,0** location to be.

For most projects, you will be working in **inches**--make sure this is set here

# WORK SCREEN WITH SCALED LAYOUT AND CENTERED INDEX



# SELECT “DRAW TEXT WITHIN A VECTOR BOX”



“Draw Text Within A Vector Box” allows you to scale the text within the frame (or sub frame) of your job space

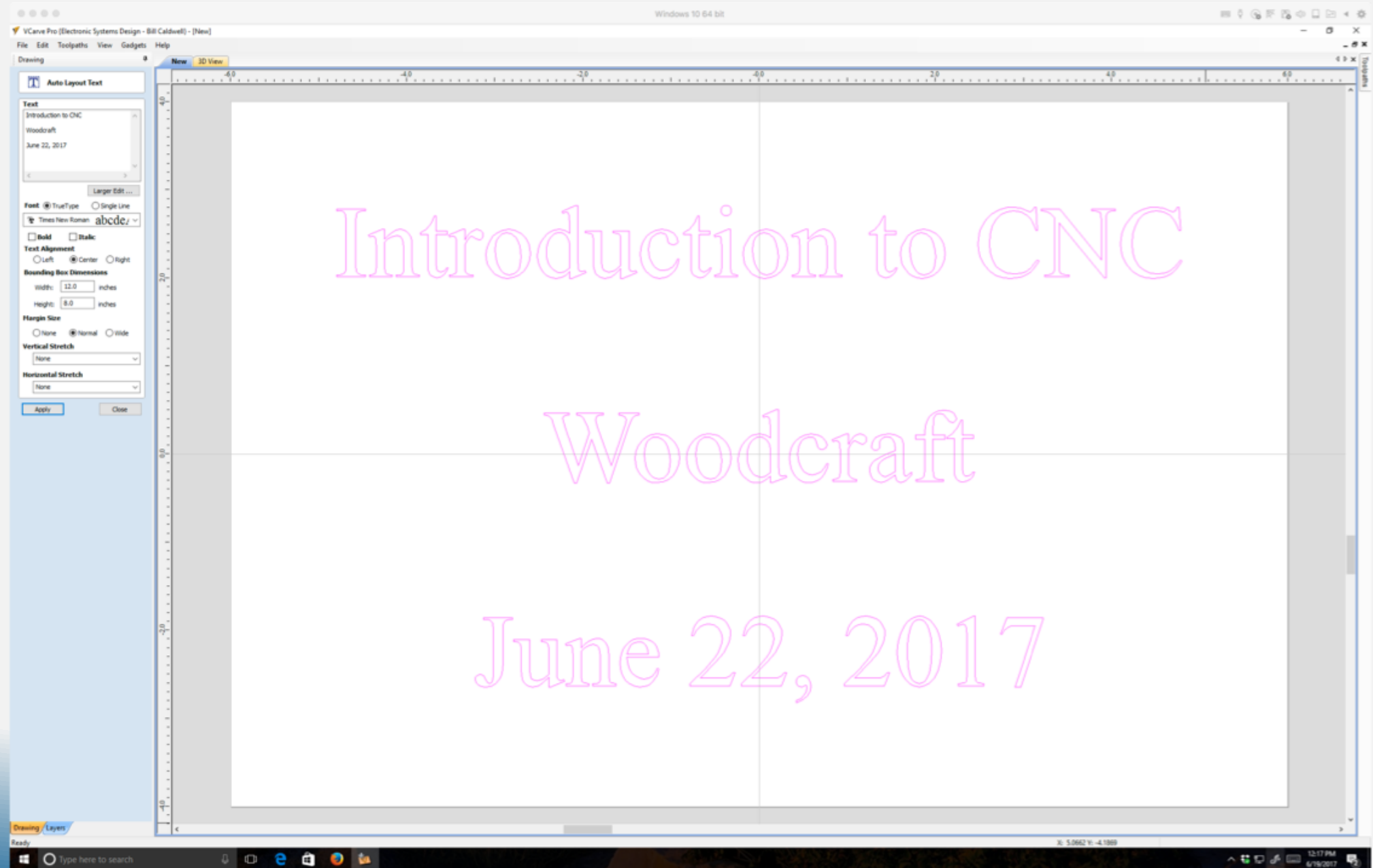
# TYPE YOUR TEXT FOR YOUR SIGN

Text →

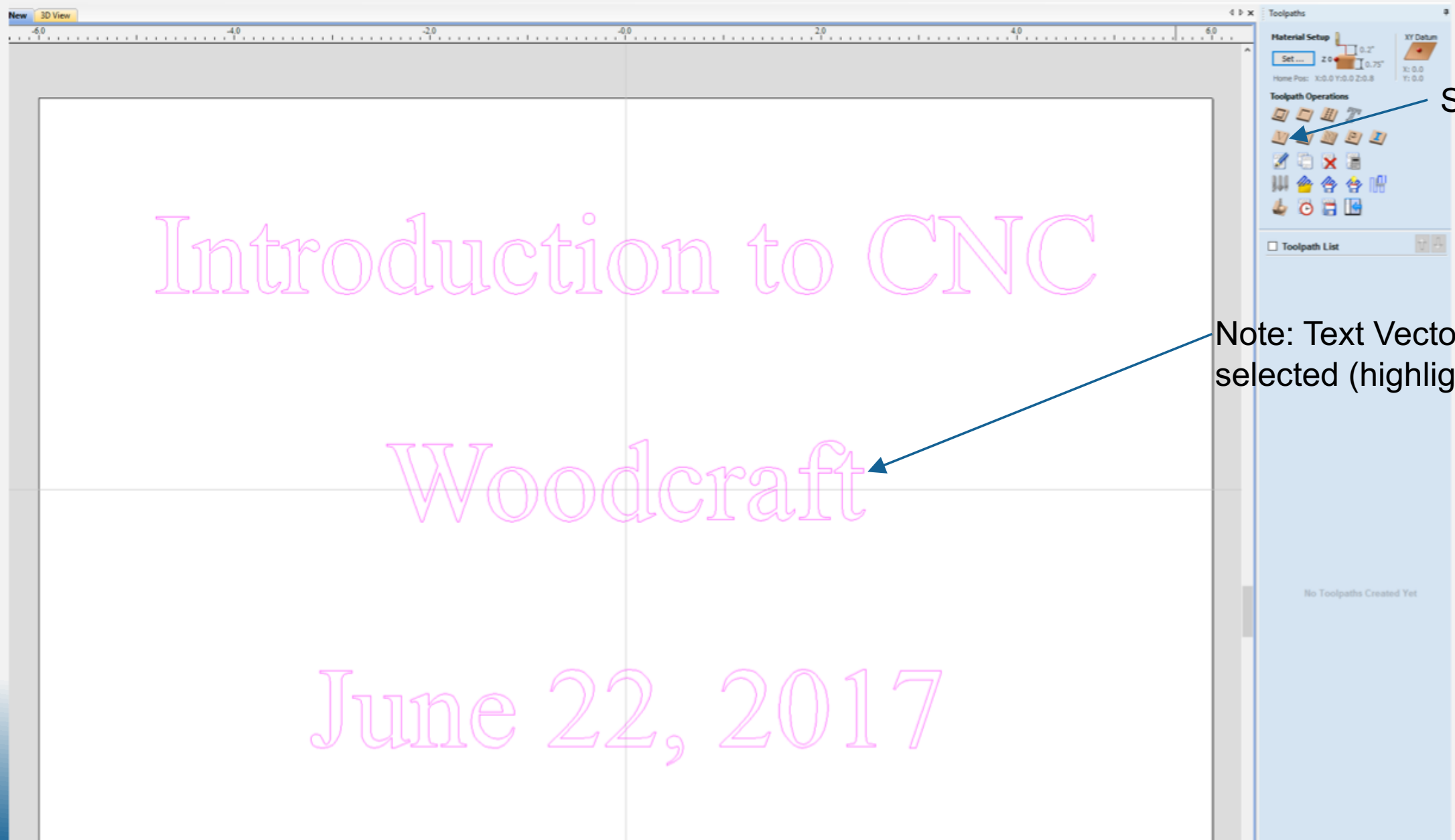
Font →

Alignment →

Bounding box →



# SELECT YOUR TOOL PATH



Select VCarve

Note: Text Vectors must be selected (highlighted)



# V-CARVE ENGRAVING TOOL PATH SETUP

Tool Database

**Tool List**

- Imperial Tools
  - End Mills
    - End Mill (1.75) inch surface
    - End Mill (.125) inches
    - End Mill (0.032 inches)
    - End Mill (.0625 inches)
    - End Mill (0.25 inches)
    - End Mill (0.5 inch)
  - Ball Nose
    - Ball Nose (0.25 inch)
    - Ball Nose (0.125 inch)
    - Ball Nose 0.0625 inches Di
  - V-Bits
    - V-Bit (60 deg 0.59375")
    - V-Bit (90 deg 0.5")
    - V-Bit (90 deg.5")
  - Form Tools
    - Ogee - 1/4" Rads 1 1/4" D
    - Bowl Bit - Tip 0.25, 1.25inc
    - Roundover - 3/8" Rad 1" C
  - Engraving
    - Engrave (20' 0.02" Tip Dia
  - Specialist
  - Drills

**Tool Info**

Name: V-Bit (90 deg.5")  
Tool Type: V-Bit

**Geometry**

Diameter (D): 0.5 inches  
Included Angle (A): 90.0 degrees

**Cutting Parameters**

Pass Depth: 0.125 inches  
Final Pass Stepover: 0.0065 inches (1.3%)  
Clearance Pass Stepover: 0.1 inches (20.0%)

**Feeds and Speeds**

Spindle Speed: 12000 r.p.m.  
Feed Rate: 100.0 inches/min  
Plunge Rate: 30.0

**Tool Number**: 1

Buttons: New..., Copy..., Delete, New Group, Import..., Export..., OK, Cancel, Apply

Set Depth

Select Tool

Toolpaths

**V-Carve / Engraving Toolpath**

**Cutting Depths**

Start Depth (D): 0.0 inches  
 Flat Depth (F): 0.25 inches

**Tool: V-Bit (90 deg.5")** [Select ...] [Edit ...]

**Use Flat Area Clearance Tool**  
Not using area clear tool [Select ...] [Edit ...]

**Flat Area Clearance ...**

Offset  Raster

Cut Direction:  Climb  Conventional

Raster Angle: 0.0 degrees

Ramp Plunge Moves  
Distance: 1.0 inches

**Use Vector Selection Order**

Safe Z: 0.2 inches  
Home Position: X:0.00 Y:0.00 Z:0.80

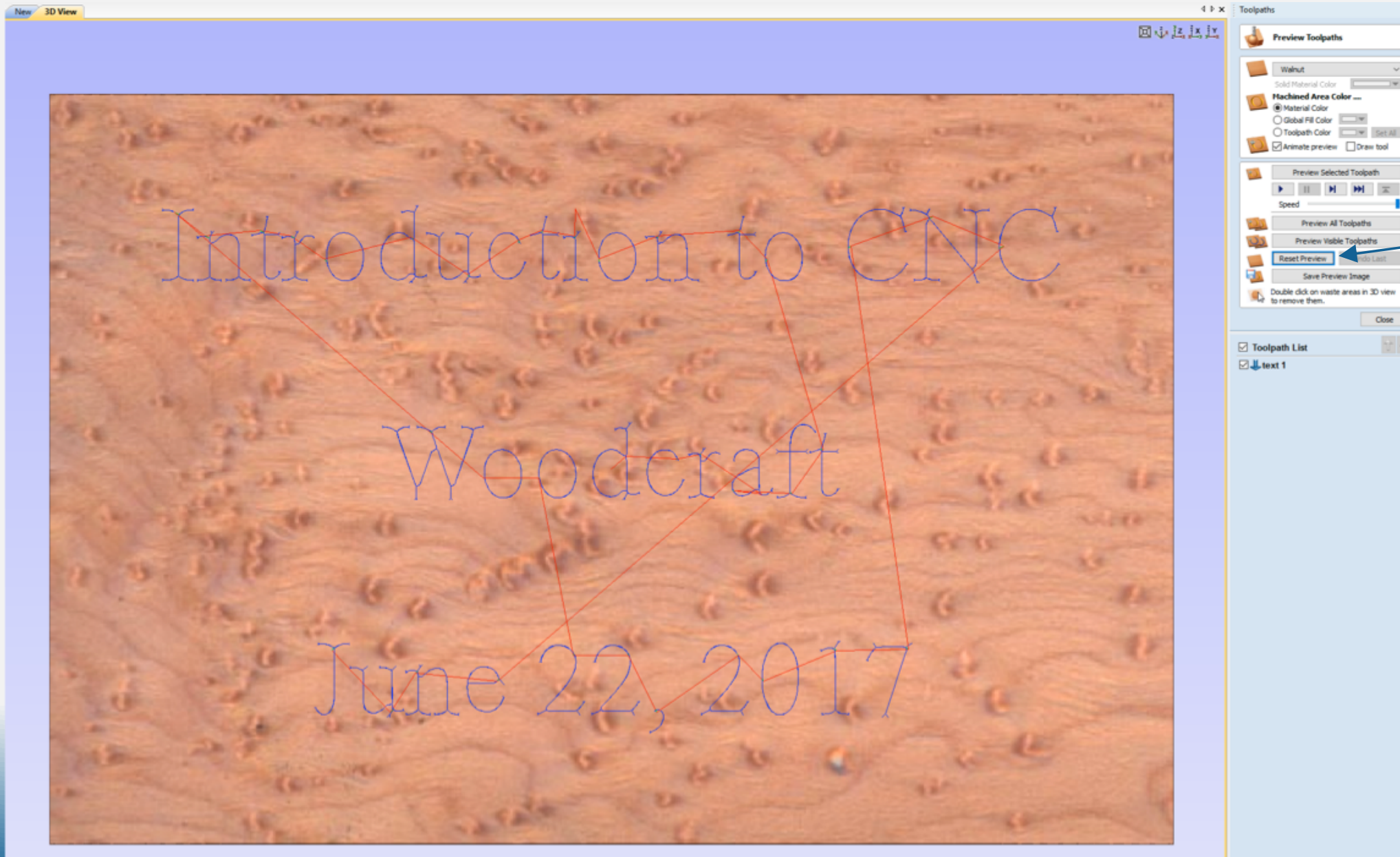
Vector Selection: Manual [Selector ...]

Name: text 1

[Calculate] [Close]

Name your tool path

# PREVIEW TOOL PATH SETUP



Select your simulated material

Preview your tool path

# SIMULATION RESULTS (PREVIEW TOOL PATH)



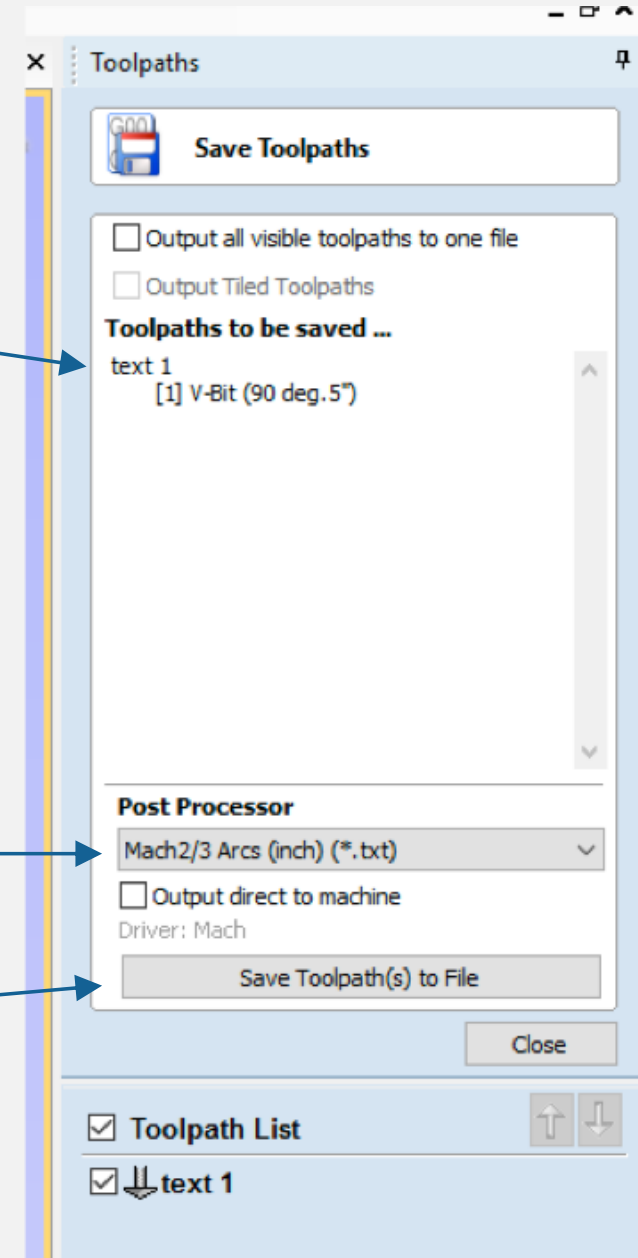
Create G-Code

# CREATE G-CODE AND SAVE TOOL PATH

Select tool path to be saved

Select post processor

Save the tool path



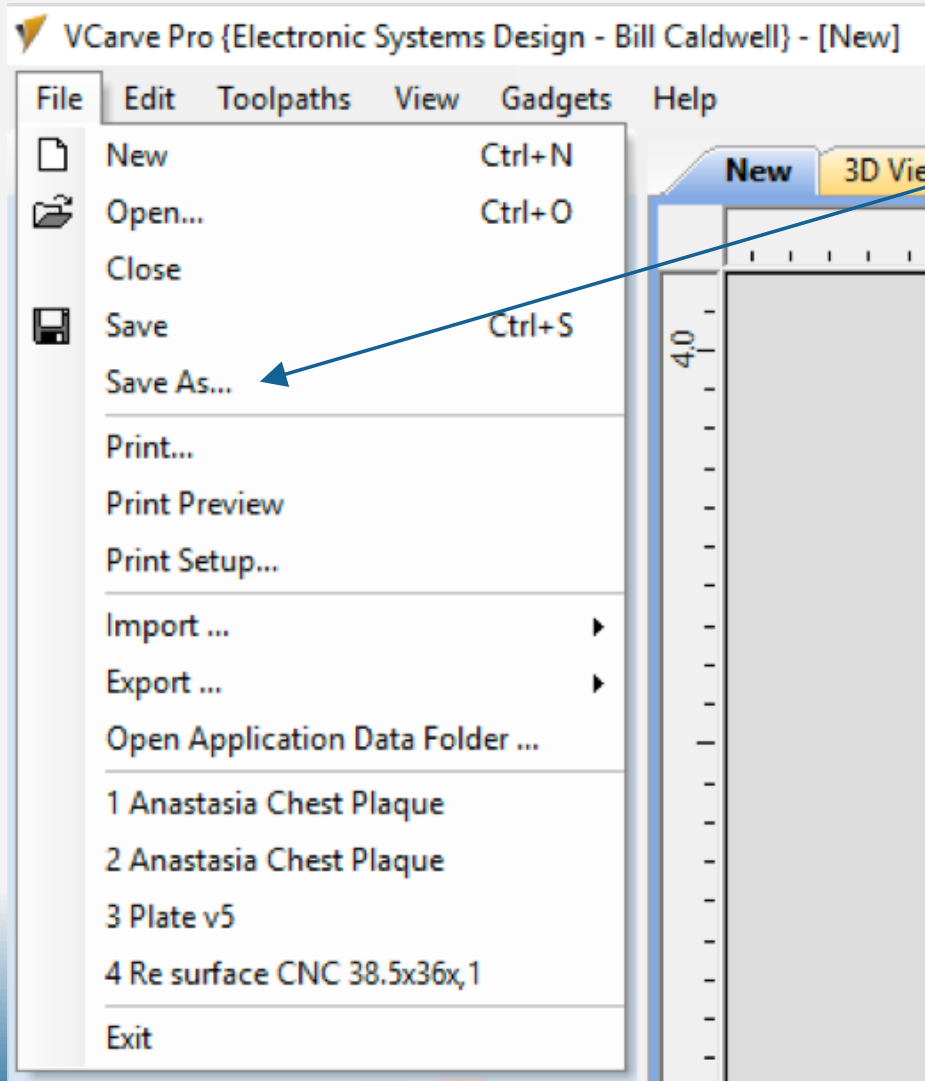
# TOOL PATH FILE (G-CODE)

```
Woodcraft Plaque 10x8.txt
( Woodcraft Plaque 10x8 )
( File created: Wednesday, June 21, 2017 - 03:21 PM )
( for Mach2/3 from Vectric )
( Material Size )
( X= 12.000, Y= 8.000, Z= 0.750 )
( )
(Toolpaths used in this file:)
(text 1)
(Tools used in this file: )
(1 = V-Bit {90 deg.5"})
N100G00G20G17G90G40G49G80
N110G70G91.1
N130 (V-Bit {90 deg.5"})
N140G00G43Z0.8000H1
N150S12000M03
N160(Toolpath:- text 1)
N170()
N180G94
N190X0.0000Y0.0000F100.0
N200G00X0.1607Y0.1426Z0.2000
N210G1Z-0.0572F30.0
N220G1X0.1411Y0.1481Z-0.0419F100.0
N230G1X0.1271Y0.1538Z-0.0326
N240G1X0.1173Y0.1597Z-0.0273
N250G1X0.1143Y0.1619Z-0.0262
N260G1X0.1075Y0.1678Z-0.0246
N270G1X0.0973Y0.1780Z-0.0237
N280G1X0.0848Y0.1878Z-0.0228
N290G1X0.0694Y0.1969Z-0.0217
N300G1X0.0509Y0.2048Z-0.0203
```

- N- Line Number
- M- Misc. Commands
- G- General Functions
- F- Feed Rate
- S- Spindle Speed

Example :  
Line number 150  
Spindle speed 12000 RPM  
Turn on the spindle motor

# SAVE YOUR WORK (DOES NOT INCLUDE TOOL PATH FILE)



Choose **Save As. . .**  
from the **File** menu

# RUNNING THE CNC MACHINE

- ▶ Hold down the work
  - ▶ Special track clamps
  - ▶ Double sided tape
  - ▶ Vacuum table
- ▶ Tool setting
  - ▶ Clean the collet
  - ▶ Insert the correct bit (make sure you set the shank depth correctly)
  - ▶ Tighten the collet

# MACH 3

Mach3 CNC Demo

File Config Function Cfg's View Wizards Operator Plugin Control Help

Program Run (Alt-1) MDI (Alt-2) Tool Path (Alt-4) Offsets (Alt-5) Settings (Alt-6) Diagnostics (Alt-7) Mill->G15 G0 G10 G17 G40 G20 G90 G94 G54 G49 G99 G64 G97

REF ALL HOME

Zero X	+0.0000	Scale +1.0000
Zero Y	+0.0000	Scale +1.0000
Zero Z	+1.0000	Scale +1.0000
Zero 4	+0.0000	Radius Correct

OFFLINE GOTO ZERO To Go Machine Coord's Soft Limits

Tool:0

File: \\Mac\Home\Desktop\Woodcraft Plaque 10x8.txt

Load Wizards Last Wizard NFS Wizards Normal Condition Regen. Toolpath Display Mode Jog Follow

Cycle Start <Alt-R> Feed Hold <Spc> Stop <Alt-S> Reset

Edit G-Code Recent File Close G-Code Load G-Code Set Next Line Line: 0 Run From Here

Rewind Ctrl-W Single BLK Alt-N Reverse Run Block Delete M1 Optional Stop Flood Ctrl-F Dwell CV Mode On/Off Z Inhibit +0.000

G-Codes M-Codes

Tool Information

Tool 0 Change Tool  
Dia. +0.0000  
H +0.0000  
Auto Tool Zero Remember Return  
Elapsed 00:01  
Jog ON/OFF Ctrl-Alt-J

Feed Rate

OverRidden FRO % 100  
Rapid FRO 100  
FRO 100.00  
Feedrate 100.00  
Units/Min 0.00  
Units/Rev 0.00

Spindle Speed

Spindle CW F5 SRO % 100  
RPM 0  
S-ov 8000  
Spindle Speed 8000

History Clear Status: Profile: Mach3Mill



# BIT SUPPLIERS

- ▶ Local:
- ▶ Ultratool in Huntington Beach.  
5451 McFadden Ave, Huntington Beach 92649  
1-800-854-2431

Online:

<http://drillcity.stores.yahoo.net/>