

Vision Series 4 Controller User Manual

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1 Introduction

About This Manual

This manual is designed to provide you with information about your Vision Series 4 Controller, Engraver or Router. Beginning with unpacking the machine and continuing through installation, operation and maintenance, this manual does not attempt to teach the user how to become an expert in engraving, computer usage, or engraving software usage. Some previous knowledge of engraving terms and the engraving process is certainly beneficial. **For information on the Vision Engraving Software, see the Vision Engraving Software manual.** For more information on your individual computer system, see your computer's user manual or contact your computer distributor.

To begin, locate the White/Blue Dongle or Orange Dongle or USB Stick included with your machine in the Accessories Box

Important Note:

The Vision software is available in two versions; one with a dongle, and one that is "dongle-less" and is loaded on to a USB Memory stick.

If your machine was delivered with, or you currently have the white/blue or orange software dongle, **DO NOT LOSE IT!**

The Vision software will **NOT** run without the dongle plugged into the computer.



1.1 Disclaimer and Warranty Information

Limits of Liability / Disclaimer of Warranty

The information contained within this manual has been carefully checked and is believed to be accurate, however, Vision makes no representations or warranties for this manual, and assumes no responsibility for inaccuracies, errors, or omissions that may be contained within this manual. In no event shall Vision be liable for any loss of profit including (but not limited to) direct, indirect, special, incidental, consequential, or other damages resulting from any defect or omission in this manual, even if previously advised of the possibility of such damages.

In the interest of continued product development, Vision reserves the right to make improvements to this manual and the products it describes at any time, without notice or obligation.

Limited Warranty:

Vision Computerized Engraving and Routing Systems (and Retrofit Tables)

Vision Computerized Engraving and Routing Systems (Vision) warrants that for a period of two (2) years from the date of shipment to the original purchaser of either a Series 4 Controller, Phoenix, Vision or Table Retrofit (the System), that the System will be free from defects in material and workmanship under normal use and service. Upon written notification, we will transfer the remaining warranty to a new customer. *This warranty shall cover all elements except for items covered by separate manufacturer's warranties and consumable items.* "Consumable" items include, but shall not be limited to, belts, brushes, lubricants, and cutters furnished with the System, for which no warranty is provided.

In the event a defect is discovered during the warranty period, within thirty days of discovery, but no later than the last day of the warranty period as described above, the user shall contact Vision for instructions regarding disposition of the problem. Vision shall, at its option, either (1) repair the affected product with new or refurbished parts, or (2) provide a replacement. Any incidental costs, including the cost of shipment from the user's location to the point of repair and return, and any installation performed by the user, shall be at the expense of the user.

This warranty covers normal use only and shall be void in the event that the System is altered or modified without authorization by Vision, or is subject to abuse, neglect, or other misuse by the user.

The warranties for Third-Party Hardware and Third-Party Software shall run directly from the manufacturers of such hardware and software to the user. Vision makes no warranties, expressed or implied, with regard to Third-Party Hardware or Third-Party Software.

Vision does not warrant any product, component, or part not manufactured by Vision that was not supplied by Vision. (Third-party items, including but not limited to software, are subject to their own manufacturer's warranties.) Vision does not warrant defects caused by a failure to provide a suitable environment for the system, by unauthorized attachments, by modifications or repairs other than by Vision, by use of the System for other than its original intention, or by other misuse or abuse of the System.

Extended Warranty

An Extended Warranty may be purchased which extends the terms of the original equipment Warranty in 1 year increments for a period of up to 30 days after the original equipment Warranty expires. An Extended Warranty may also be purchased for a period of up to 30 days after an existing Extended Warranty expires. Extended Warranties cannot be purchased on any equipment that is 7 or more years old, or if there is a Lapse of Warranty. Age of equipment is determined from the date of shipment to the original buyer.

Lapse of Warranty

If an Extended Warranty is not purchased within 30 days of the expiration of the original equipment Warranty, or within 30 days of the expiration of an existing Extended Warranty, the equipment will be in Lapse of Warranty. An Extended Warranty can never again be purchased for any equipment that is in Lapse of Warranty. It is the responsibility of the purchaser of the equipment to maintain accurate records and to know the expiration date of any Warranty.

The above and foregoing is the only warranty of any kind, either expressed or implied, by statute or otherwise, regarding the System, its fitness, quality, merchantability, or otherwise. Any warranties implied by law are hereby expressly disclaimed. No oral or written information or advice given by Vision, its Dealers, Distributors, Agents, or Employees shall create a warranty or in any way increase the scope of this warranty. Neither Vision, nor anyone else who has been involved in the creation, production, or delivery of the System shall be liable for any direct, indirect, consequential, or incidental damages (including damages for loss of business profits, business interruption, loss of business information, and the like) arising out of the use of, or inability to use, the product.

Any software supplied by Vision in conjunction with the purchase of the System for use therewith shall be governed by its own separate software license and warranty agreement.

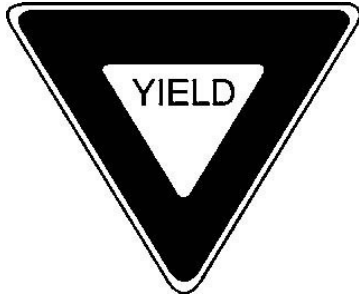
Terms and Conditions are subject to change

For Warranty Service Call: (602) 439-0700

Please have your machine serial number ready before calling.

Vision Engraving & Routing Systems is owned and operated by Western Engraver's Supply, Inc.
Phoenix, Arizona, USA

1.2 Safety Precautions



- Keep hands clear of the bottom of the spindle during operation.
- There are no user serviceable parts inside the controller. Please contact qualified service personnel for service issues.
- Openings are provided in the controller box for ventilation. Do not cover the openings or place the controller in an environment where the openings may become blocked.
- Never insert anything into the ventilation openings. Doing so may create a danger of electric shock.
- Do not expose the equipment to rain or use it near water. You can clean the controller with a damp cloth, but be sure to unplug the unit first.
- Always stop the machine before making any adjustments.
- Do not operate the equipment with the covers removed.
- Wear safety glasses when cutting any materials that emit chips.
- Use extreme caution when inserting or removing cutters.
- Before any servicing, disconnect the power cord.
- To avoid electric shock or equipment damage, ensure that the equipment is connected to the appropriate electrical source as noted in the installation procedures.
- Never operate the equipment with damaged or frayed power cords, loose connections, or exposed extension cords where the cord could create a tripping hazard.
- Be sure to hold the plug, not the cord, when disconnecting the equipment from an electrical socket or power source.
- Place the equipment in a location with low humidity and a minimum of dust. Avoid placing the equipment in direct sunlight or in locations with excessive heat. Follow the maintenance instructions for proper cleaning of the controller air filter.
- If your equipment does not operate properly; in particular, if there are any unusual sounds or smells coming from it, immediately unplug it and contact a service technician or your local distributor.
- Unplug the machine when it is going to be left unused for an extended period of time.

2 Series 4 Controller Installation

In the following sections, equipment and Vision software installation will be outlined. There are three connection configurations possible to the Series 4 Controller of your Vision Engraver or Router.

The first is a direct cable connection of the Series 4 Controller to your computer via the network port. There is a special "crossover" cable supplied with the Controller for this connection type. This configuration is for a stand alone computer that is NOT connected to a WIRED network or internet. The Controller can be connected to a computer that is connected to a wireless network in this manner.

The second configuration is for connection to the Series 4 Controller through a wired network using a standard network cable (DO NOT use the crossover cable when connecting to a network). In this configuration, the Controller will be recognized as a network device. Connection to the Controller in this manner is the easier of the two connection types. If there are no network connections available, a network hub can be added to allow connection of the Controller to your network.

The third configuration is for a connection from the computer to a hub (or router) and then to the controller. This is WITHOUT a computer network. Standard Ethernet cables are used in this configuration.

Please call your distributor or the service department at Vision for assistance if you are having problems making these connections.

IT IS HIGHLY RECOMMENDED THAT THE COMPUTER USED TO OPERATE THE VISION ENGRAVER OR ROUTER BE CONNECTED TO THE INTERNET. THIS ALLOWS THE USER TO ALLOW VISION'S TECHNICAL SUPPORT TO ACCESS THE MACHINE AND TROUBLESHOOT IF NECESSARY.

2.1 Computer Requirements

Minimum System Requirements

CPU:	Dual Core (2.0GHz or higher)
Hard Drive:	500 GB free space
RAM:	1GB + OS Requirements
Operating System:	Windows 10 - 32 Bit & 64 Bit Windows 8 & 8.1 - 32 Bit & 64 Bit Windows 7 - 32 Bit & 64 Bit Windows XP SP3 - 32 Bit (64 Bit not supported)
Ports:	USB port for security dongle Local or network Ethernet port to connect machine

Suggested System Requirements

CPU:	Core i3 (or faster)
Hard Drive:	1 TB (or more)
RAM:	4GB + OS Requirements
Operating System:	Windows 10 - 32 Bit & 64 Bit Windows 8 & 8.1 - 32 Bit & 64 Bit Windows 7 - 32 Bit & 64 Bit
Ports:	USB port for security dongle Local or network Ethernet port to connect machine

2.2 Controller Connections

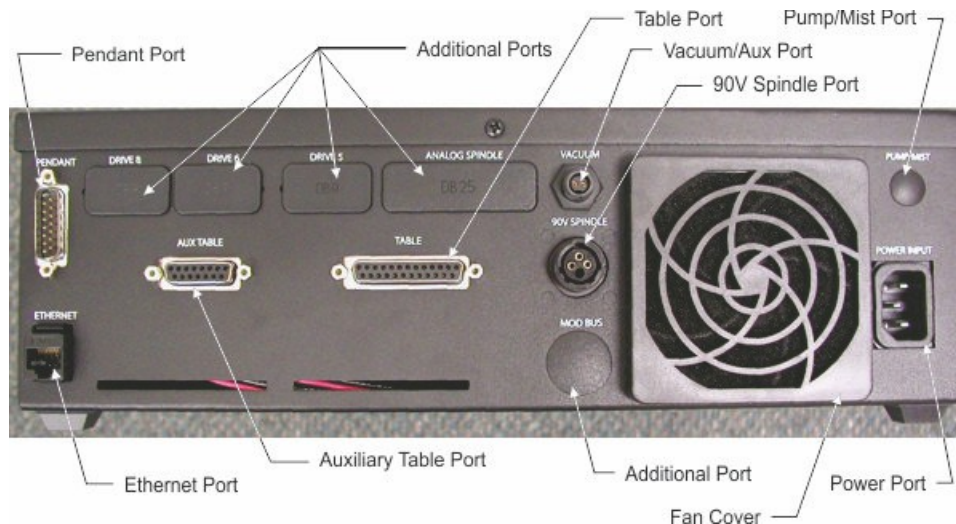
On the front of the Vision Series 4 Controller, the power switch is located on the left side of the controller.

Vision Series 4 Controller (front view)



On the rear of the Vision Series 4 Controller, there are four main connection ports and nine additional ports for use on certain machine models. All Controllers will use the Power Input port, the Ethernet port, The Table port and the Pendant port. Select machines, or machines with optional accessories, may use the Auxiliary table port, the Vacuum port, the 90V Spindle port, the Pump/Mist port, the Analog Spindle port, the Mod/Bus port, or 3 Drive ports reserved for special use.. A picture of the back of the Controller is shown below.

Vision Series 4 Controller (rear view)



Connect the power cord to a power source (110 - 240VAC, depending on model - Each Controller will have the proper required input voltage labeled), then plug the power cable into the port on the back of the Controller. Plug in the network cable (or the crossover cable) to the back of the Controller and either plug the network cable into your network (or hub), or using the crossover cable, plug into the network port on the back of your computer. Plug the Pendant cable into the Pendant port and plug the Table cable into the Table port.

NOTE - The crossover cable is colored gray.

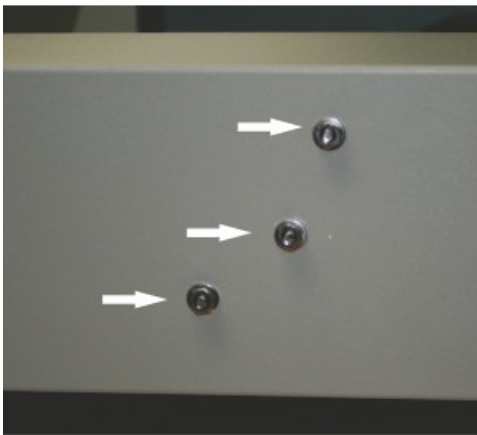
2.2.1 Pendant Holder Installation for Phoenix 1212, 16 Series and 25 Series machines

Your machine is shipped with an optional Pendant Holder to give the user a place to secure the Pendant.

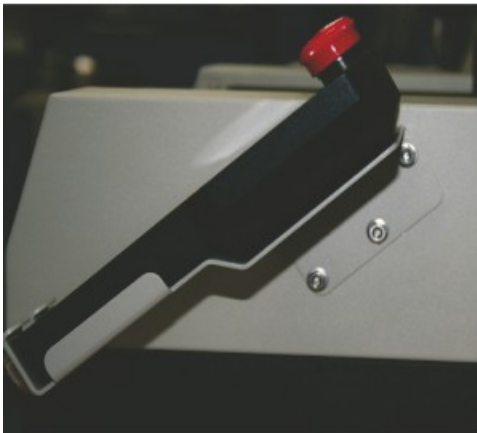
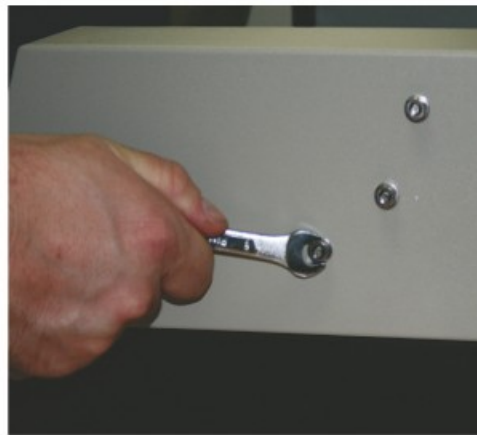
To install the Pendant Holder on the Phoenix 1212, follow the below procedure.

Phoenix 1212 Pendant Holder Installation

Step 1- Locate the 3 nuts



Step 2 - Remove nuts with wrench



Step 3 - Mount Pendant Holder and re-install nuts



Step 4 - Mount Pendant in Holder

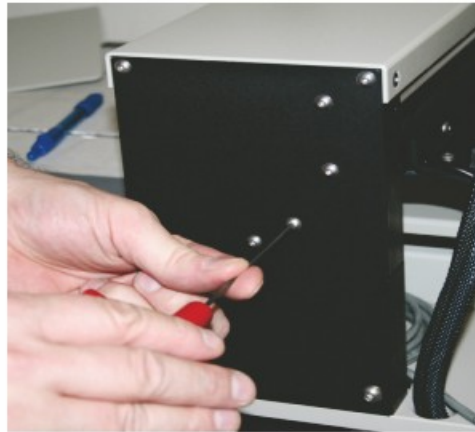
To install the Pendant Holder on the 16 Series machines, follow the below procedure.

16 Series Pendant Holder Installation

Step 1 - Locate the 3 screws



Step 2 - Remove screws with allen tool



Step 3 - Mount Pendant Holder
and re-install screws



Step 4 - Mount Pendant in Holder

To install the Pendant Holder on the 25 Series machines, follow the below procedure.

25 Series Pendant Holder Installation

Step 1- Locate the 3 nuts



Step 2 - Remove nuts with wrench



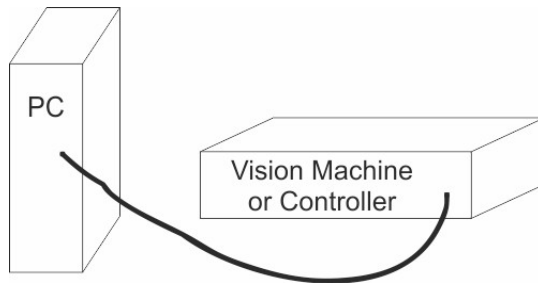
Step 3 - Mount Pendant Holder
and re-install nuts



Step 4 - Mount Pendant in Holder

2.2.2 Direct Connection to Computer

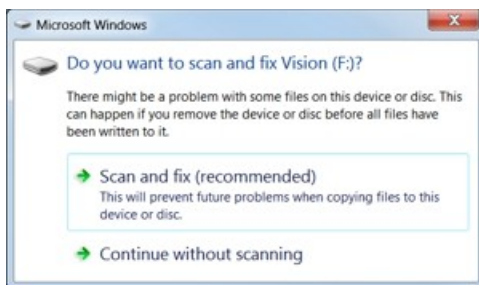
Direct Connection to Computer Using Crossover Cable



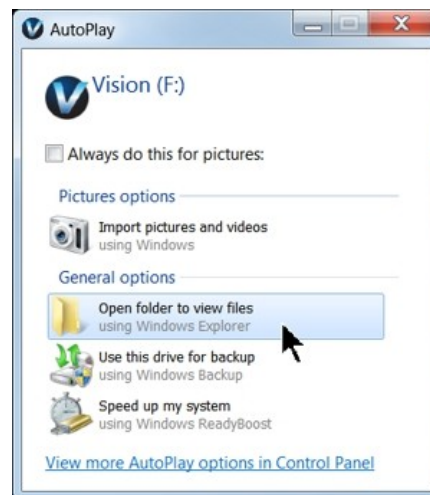
Once the controller is connected directly to your computer's network port with the crossover cable (the gray colored cable), turn the controller on. The power switch for the Vision Series 4 Controller is located on the front left of the Controller. Once the controller has initialized, plug the supplied Vision USB drive into an available USB port on your computer.

NOTE - This installation is performed on a Windows 7 PC. For Windows XP, Windows 8, Windows 8.1 or Windows 10, the screens are slightly different.

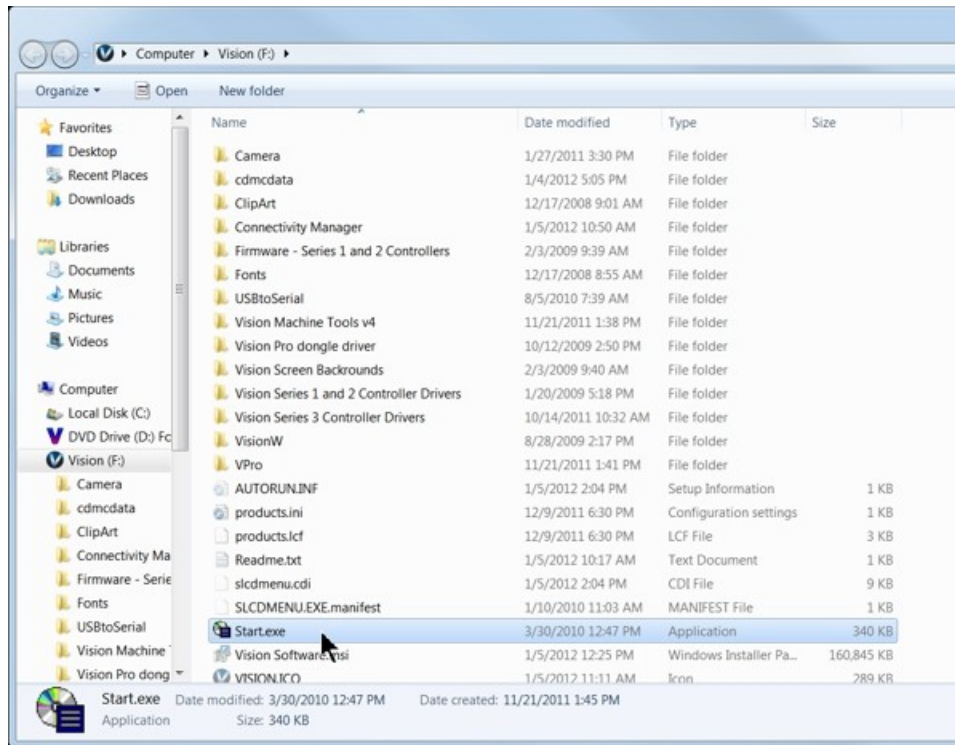
The computer will recognize the USB drive and the following screen will appear. Select Continue without scanning.



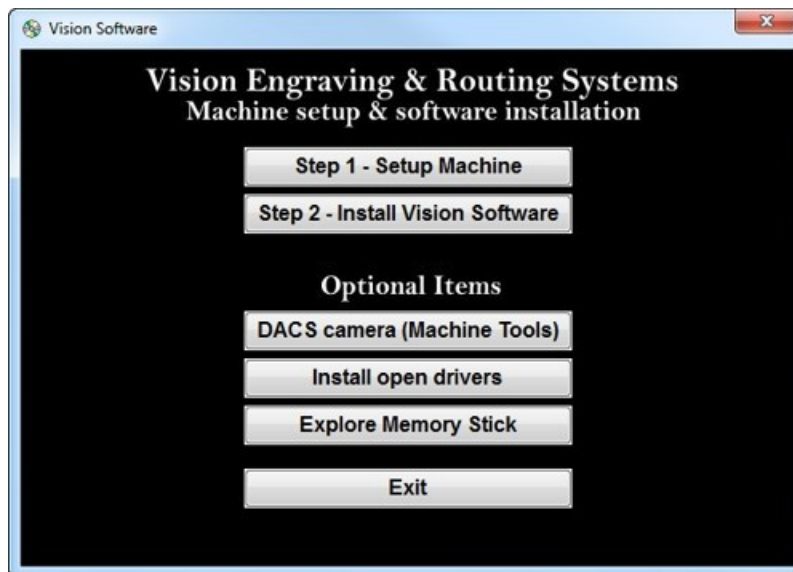
Select Open folder to view files.



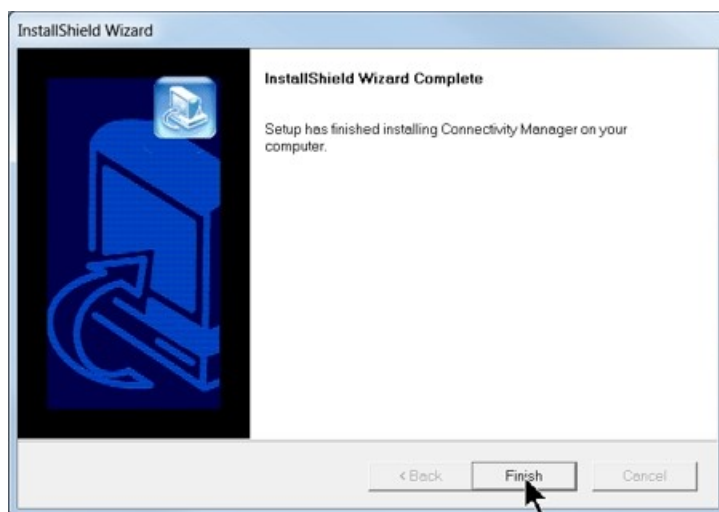
Locate the file named Start and double click on the file to start the installation. The screen below shows Start.exe, but your computer might not show the .exe portion.



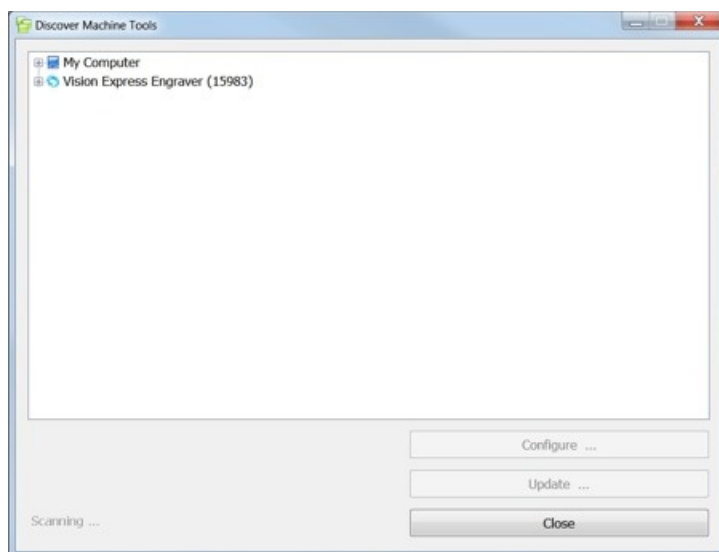
Select Step 1 - Setup Machine. This installs the Vision Connectivity Manager software.



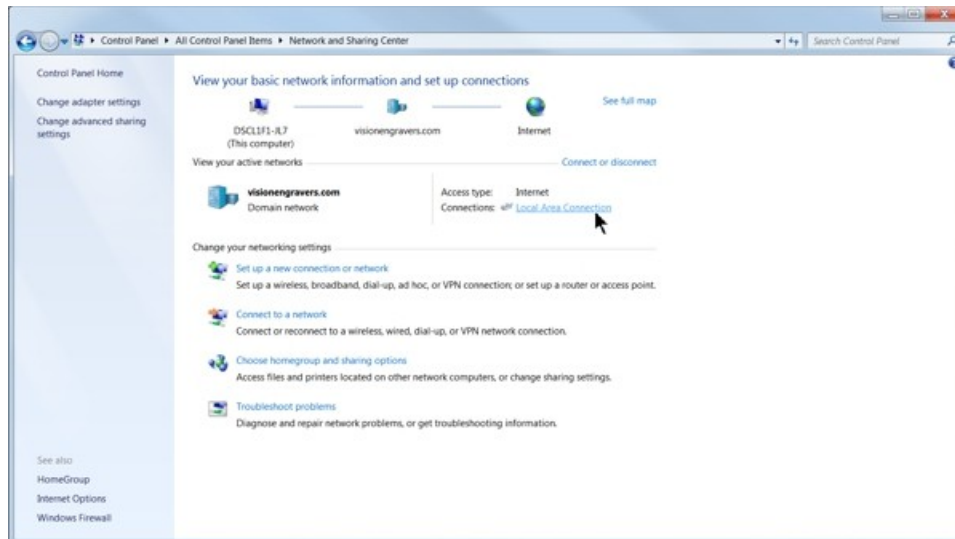
When the software is installed, select Finish.



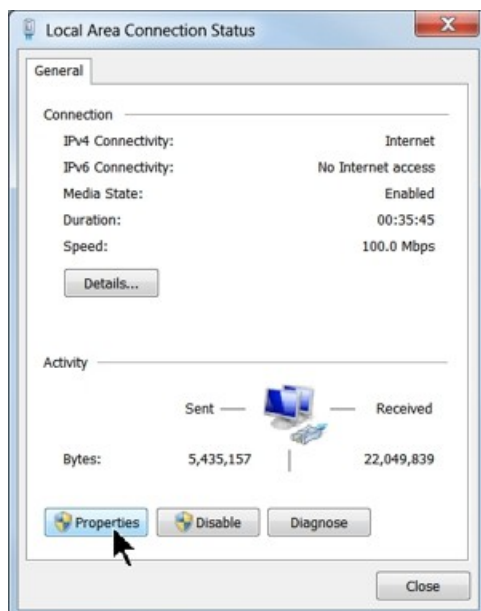
The Connectivity Manager will search for available Vision devices.



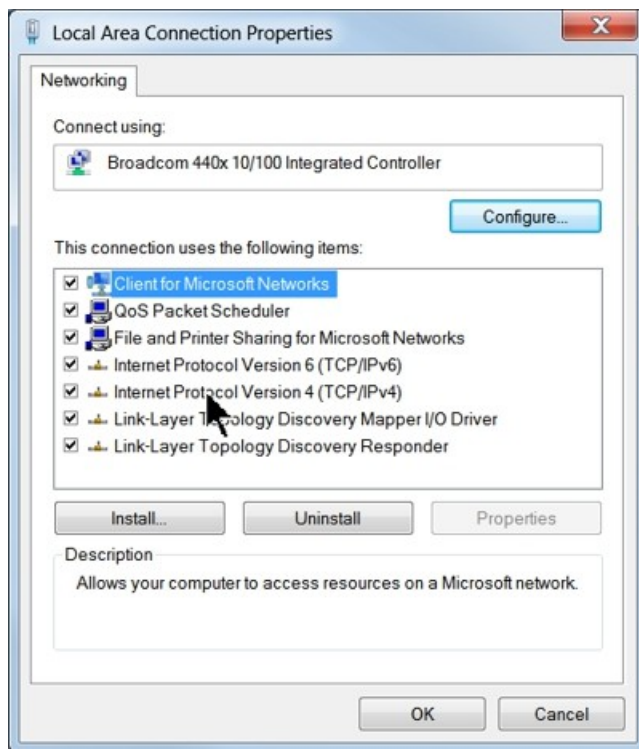
The computer's IP address will need to be set. NOTE - this should not cause any conflicts with your computer's wireless IP address, which is determined by the computer's wireless network card. To set the computer's IP address, open the Window's Control Panel. Depending on how you have this folder set, you will either see Network and Internet, or you will see the Network and Sharing Center immediately. If you see Network and Internet, select View Network Status and Tasks (which opens the Network and Sharing Center). If you see the Network and Sharing Center, open it. Then select Local Area Connection (as shown below).



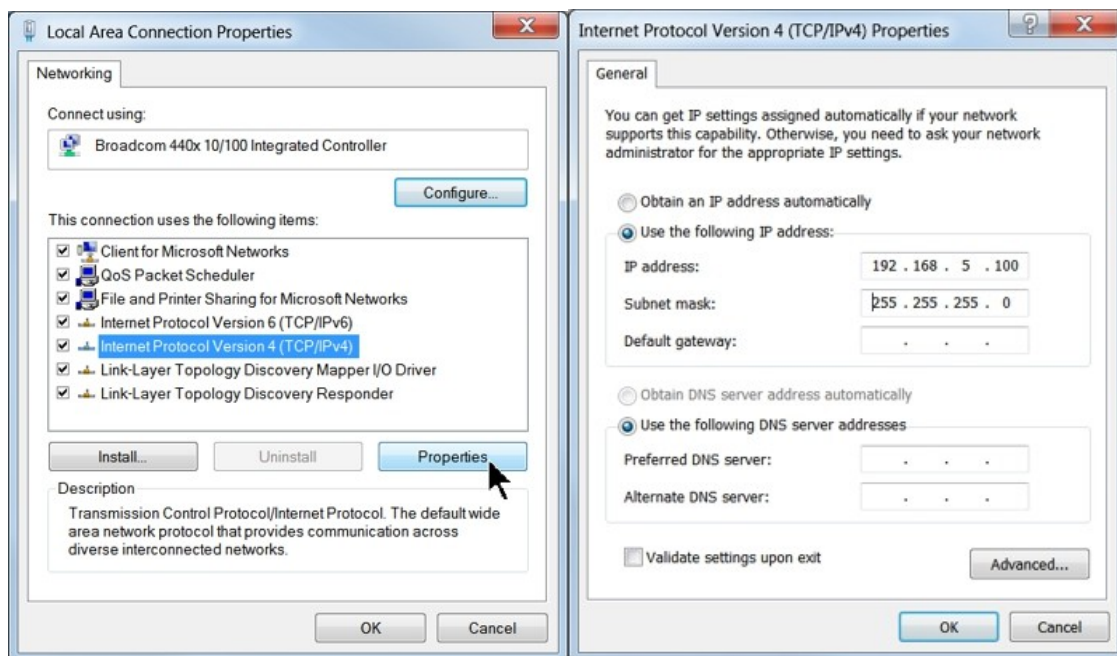
Select Properties.



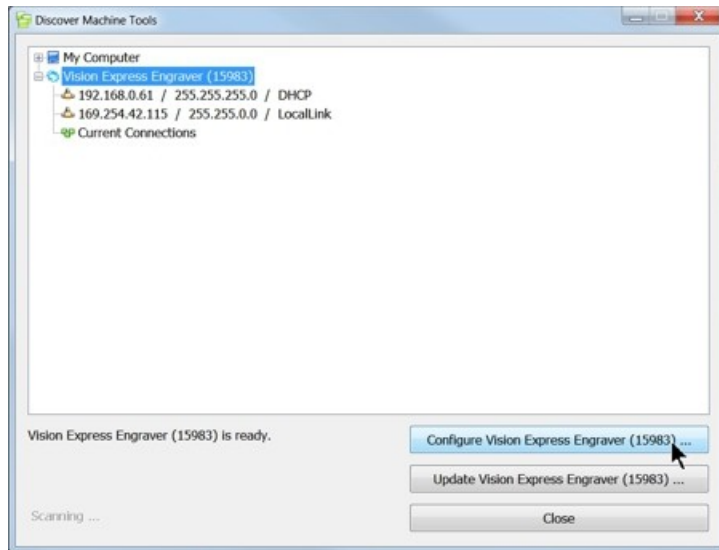
Then, select Internet Protocol Version 4 (TCP/IPv4).



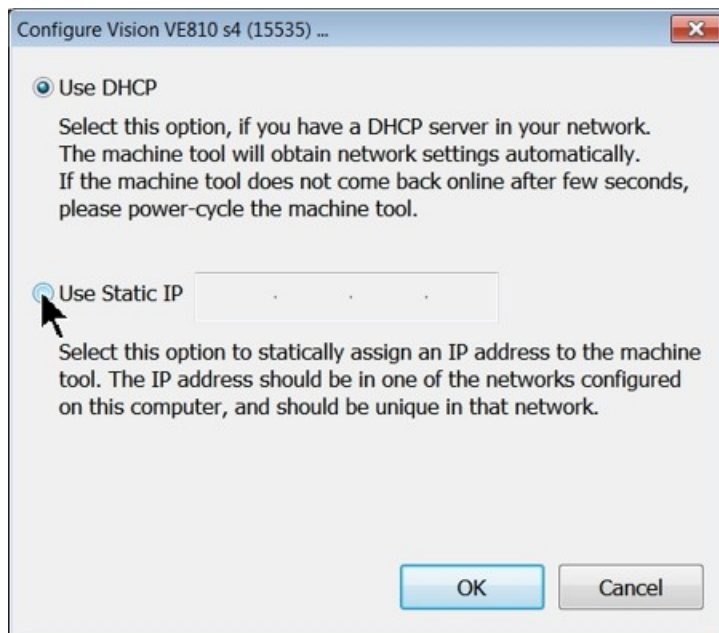
Then select Properties. Select Use the following IP address: and enter 192.168.5.100 and set the Subnet mask to 255.255.255.0 as shown. Then select OK and close any other network configuration windows.



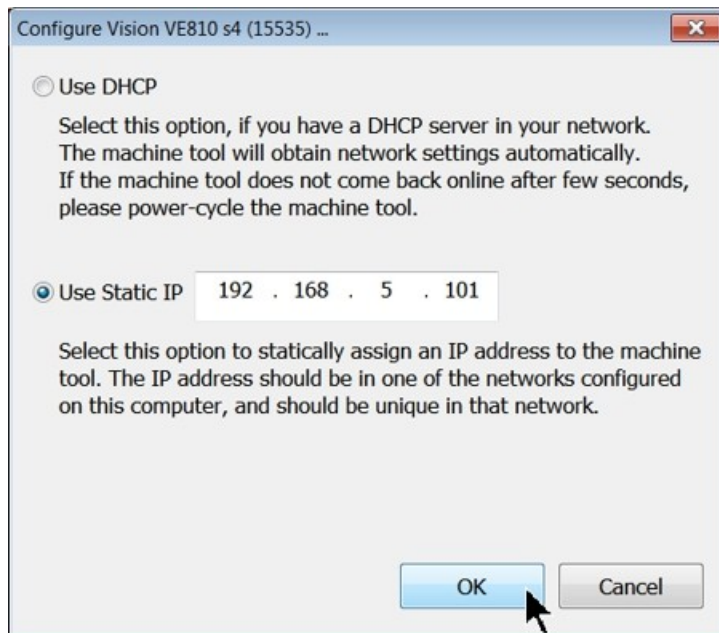
The IP address of the machine will need to be set to set up the connections properly. Select the + box next to the machine now listed in the Discover Machine Tools window to expand the information. Then select Configure (Your Machine) at the bottom of the screen.



Select Use Static IP.



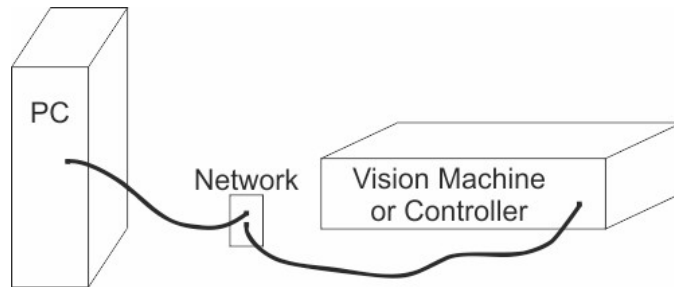
Set the IP address (as shown) to 192.168.5.101, then select OK. This sets the machine's IP address.



The configuration is complete at this point. Close the Discover Machine Tools window and return to the Main Installation Screen to proceed with the Vision software installation in the next section.

2.2.3 Network Connection

Connecting via Standard Network Cable to Network

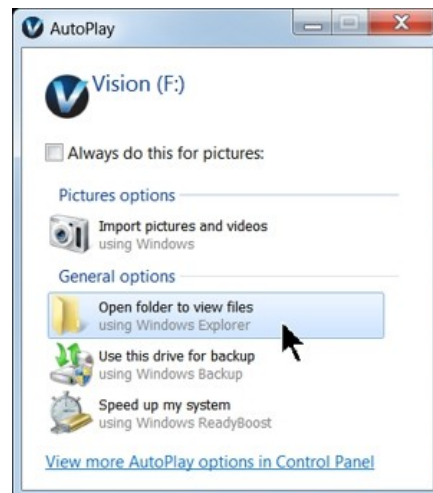
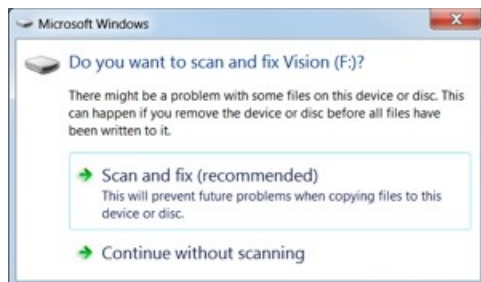


Once the controller is connected to your network, turn the controller on. The power switch for the Vision Series 4 Controller is located on the front left side of the controller. Once the controller has initialized, plug the supplied Vision USB drive into an available USB port on your computer.

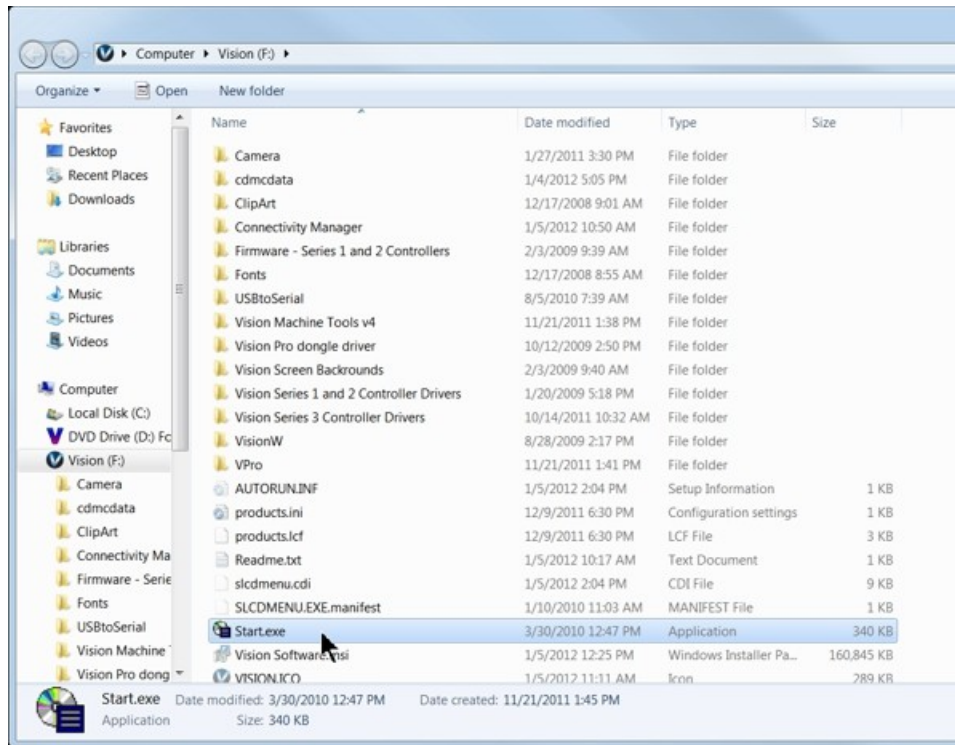
NOTE - This installation is performed on a Windows 7 PC. For Windows XP, Windows 8, Windows 8.1 or Windows 10, the screens are slightly different.

The computer will recognize the USB drive and the following screen will appear. Select Continue without scanning.

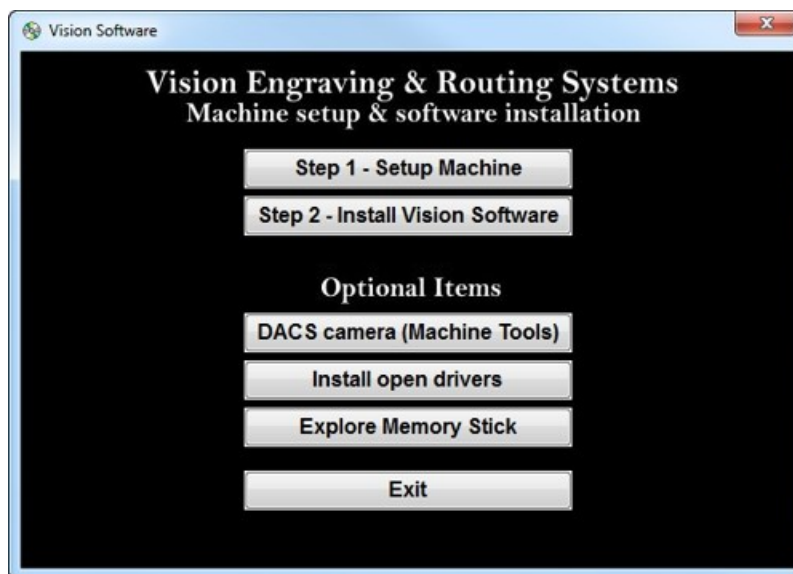
Select Open folder to view files.



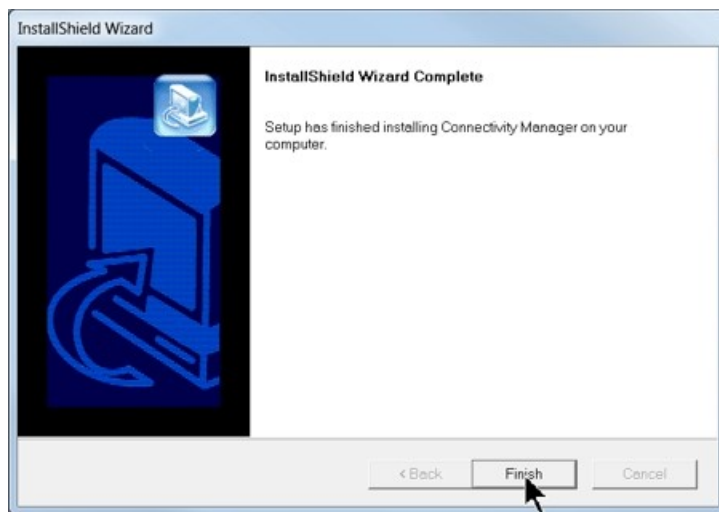
Locate the file named Start and double click on the file to start the installation. The screen below shows Start.exe, but your computer might not show the .exe portion.



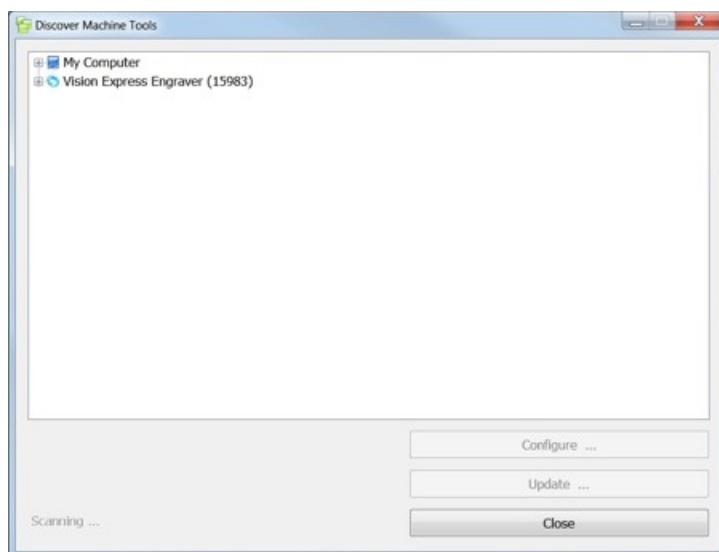
Select Step 1 - Setup Machine. This installs the Vision Connectivity Manager software.



When the software is installed, select Finish.



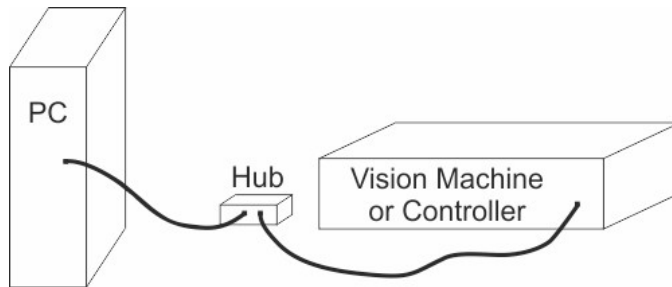
The Connectivity Manager will search for available Vision devices.



The configuration is complete at this point. Close the Machine Tools Discovery window and return to the Main Installation Screen to proceed with the Vision software installation in the next section.

2.2.4 Using a Network Hub - ONLY

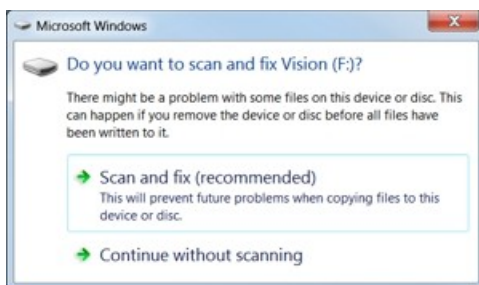
Connection from PC to Hub or Router to Machine or Controller



Once the controller is connected to a hub or router, and the hub or router is connected to your computer's network port, turn the controller on. The power switch for the Vision Series 4 Controller is located on the front left of the Controller. Once the controller has initialized, plug the supplied Vision USB drive into an available USB port on your computer.

NOTE - This installation is performed on a Windows 7 PC. For Windows XP, Windows 8, Windows 8.1 or Windows 10, the screens are slightly different.

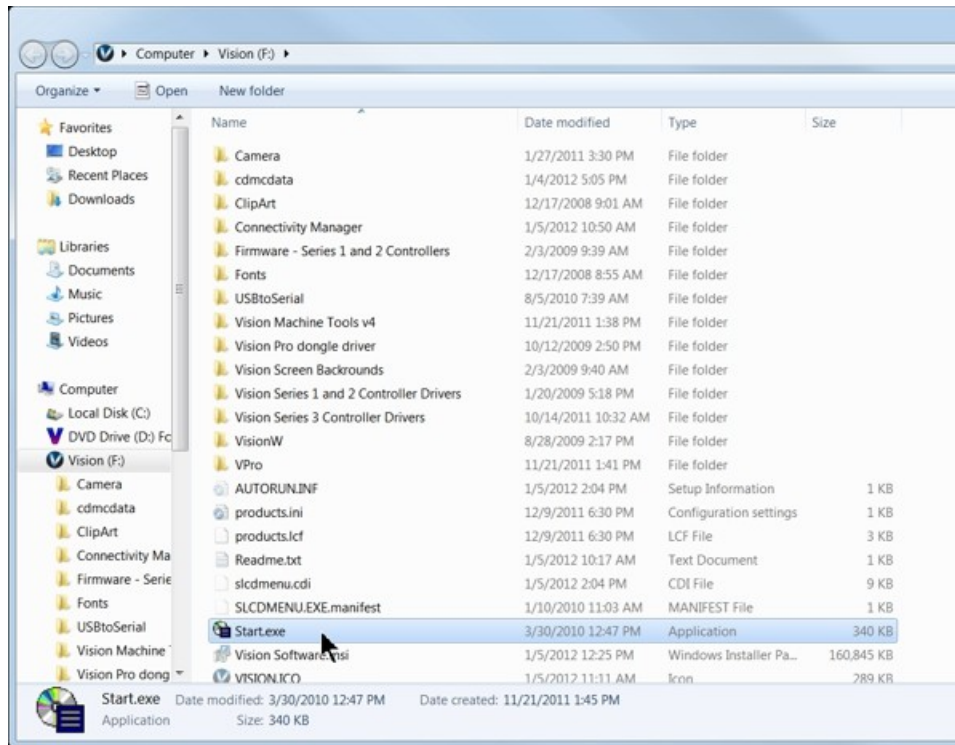
The computer will recognize the USB drive and the following screen will appear. Select Continue without scanning.



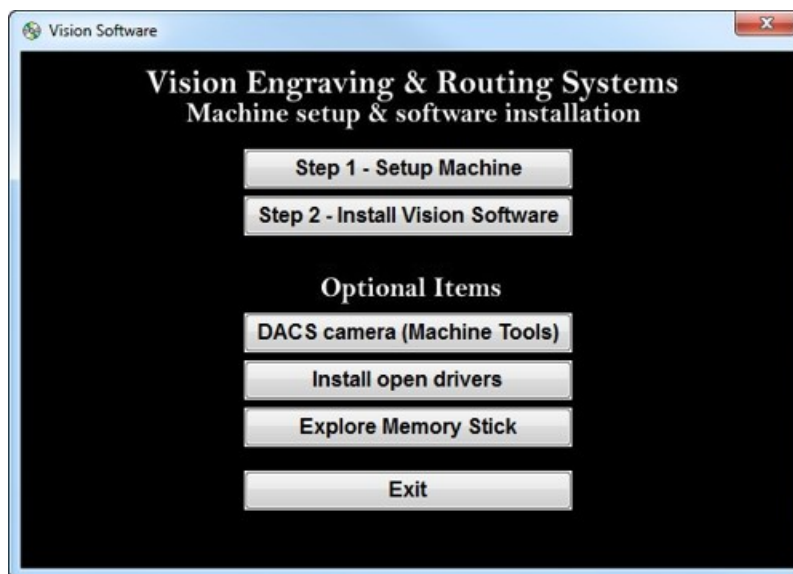
Select Open folder to view files.



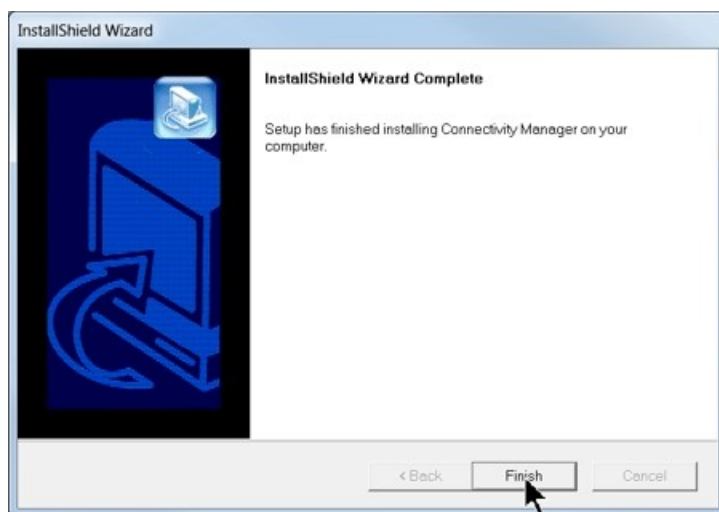
Locate the file named Start and double click on the file to start the installation. The screen below shows Start.exe, but your computer might not show the .exe portion.



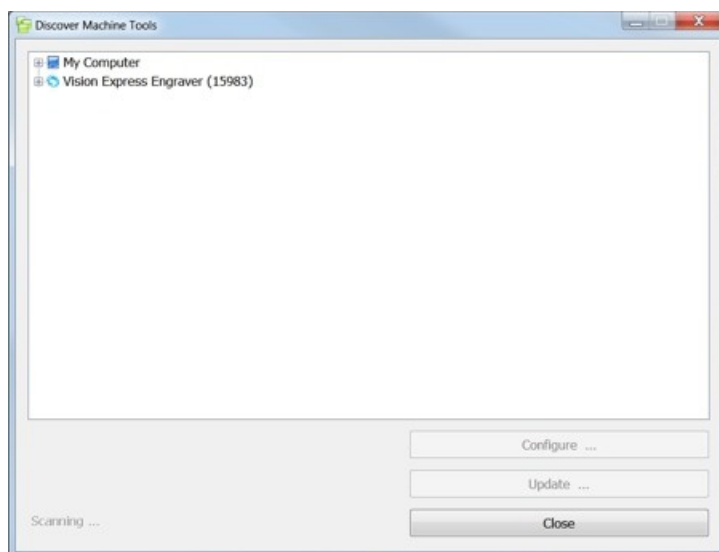
Select Step 1 - Setup Machine. This installs the Vision Connectivity Manager software.



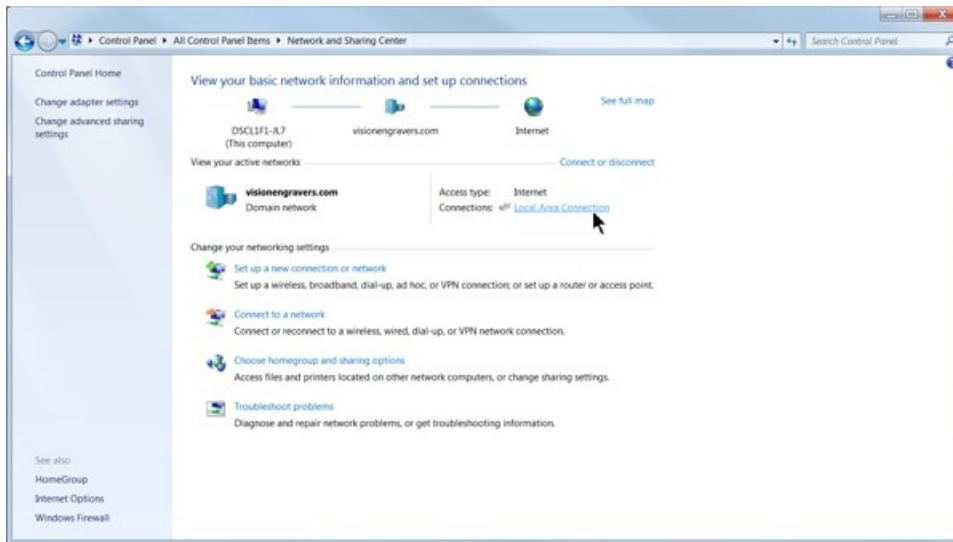
When the software is installed, select Finish.



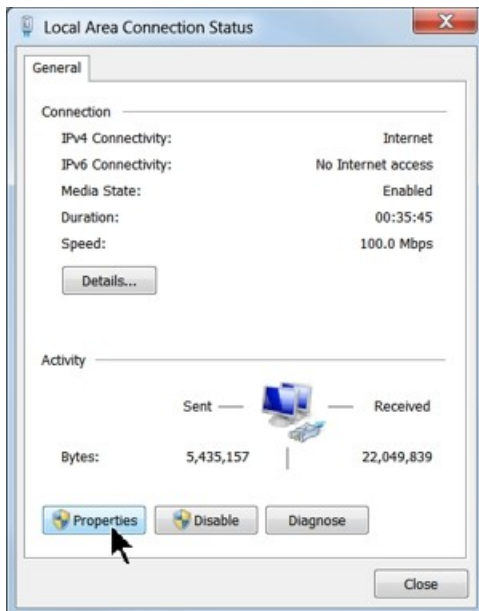
The Connectivity Manager will search for available Vision devices.



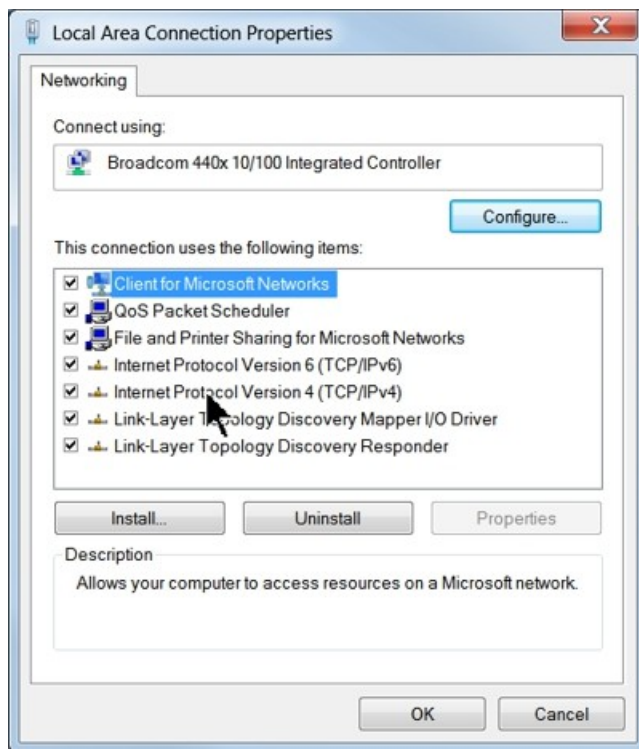
The computer's IP address will need to be set. To set the computer's IP address, open the Window's Control Panel. Depending on how you have this folder set, you will either see Network and Internet, or you will see the Network and Sharing Center immediately. If you see Network and Internet, select View Network Status and Tasks (which opens the Network and Sharing Center). If you see the Network and Sharing Center, open it. Then select Local Area Connection (as shown below).



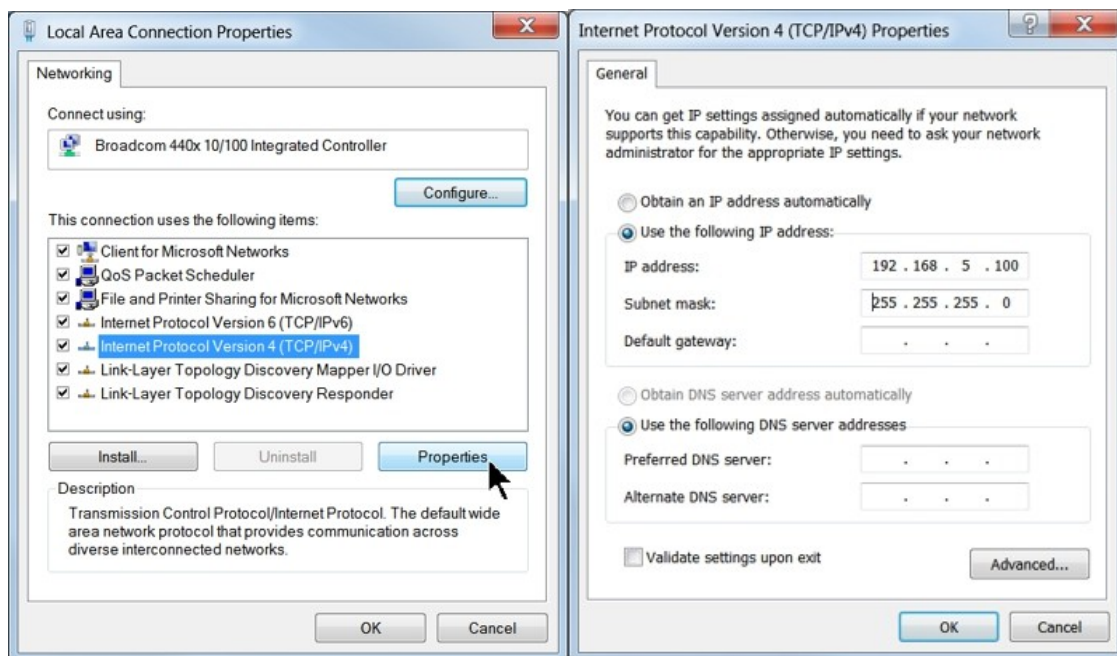
Select Properties.



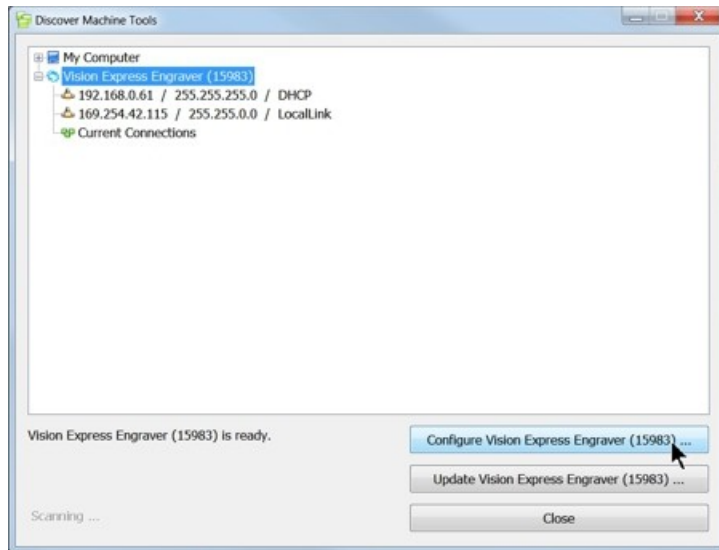
Then, select Internet Protocol Version 4 (TCP/IPv4).



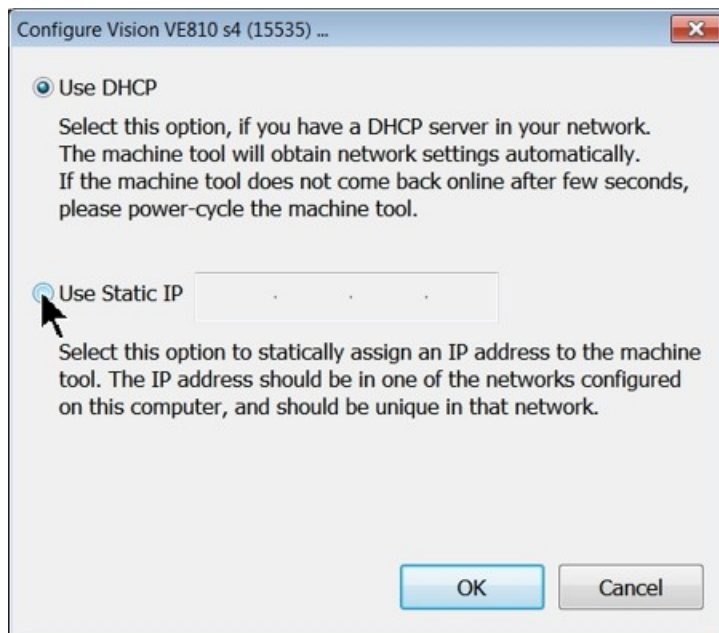
Then select Properties. Select Use the following IP address: and enter 192.168.5.100 and set the Subnet mask to 255.255.255.0 as shown. Then select OK and close any other network configuration windows.



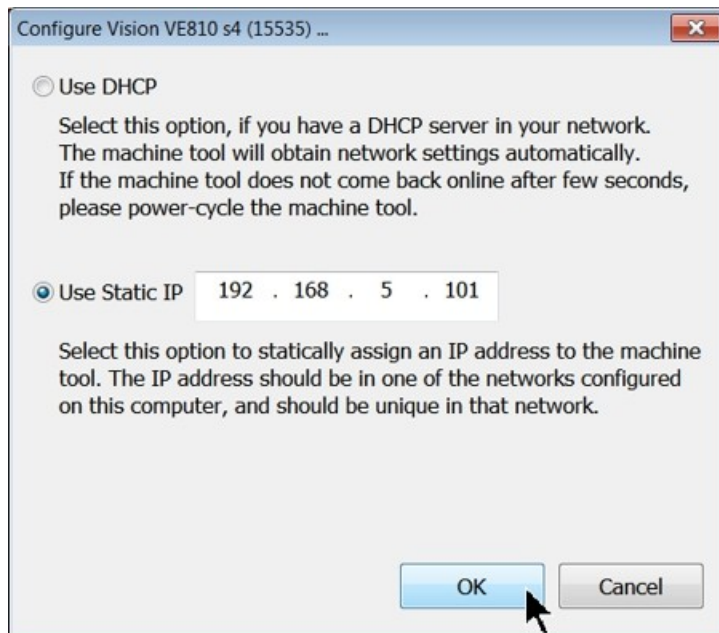
The IP address of the machine will need to be set to set up the connections properly. Select the + box next to the machine now listed in the Discover Machine Tools window to expand the information. Then select Configure (Your Machine) at the bottom of the screen.



Select Use Static IP.



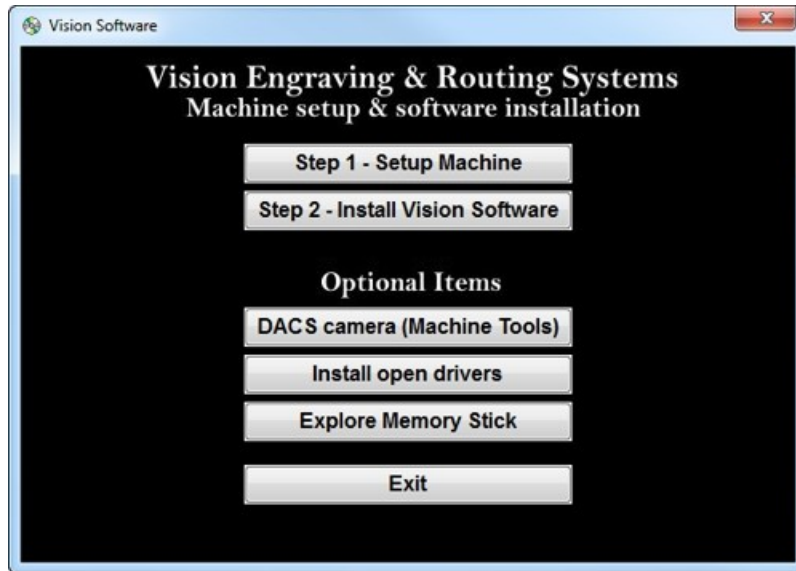
Set the IP address (as shown) to 192.168.5.101, then select OK. This sets the machine's IP address.



The configuration is complete at this point. The new IP address should appear in a few seconds in the Discover Machine Tools window. Close the Discover Machine Tools window and return to the Main Installation Screen to proceed with the Vision software installation in the next section.

2.3 Vision Software Installation

From the Main Installation Screen, Select Step 2 - Install Vision Software.



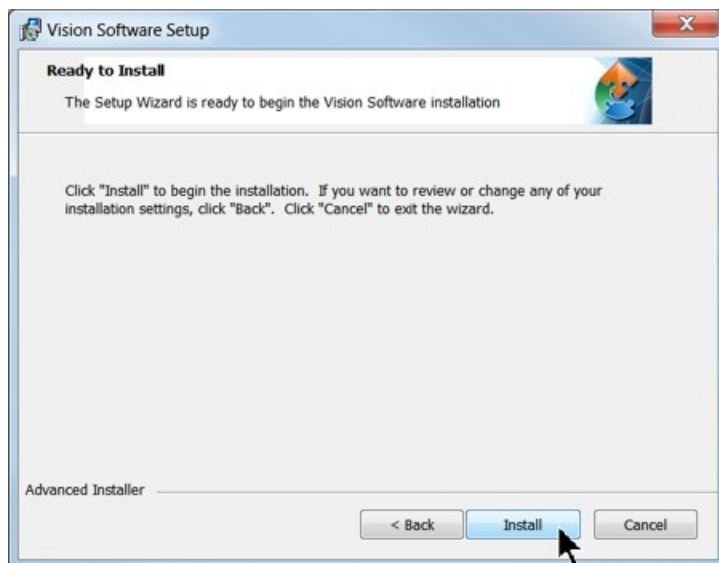
The Windows Installer will prepare the installation.



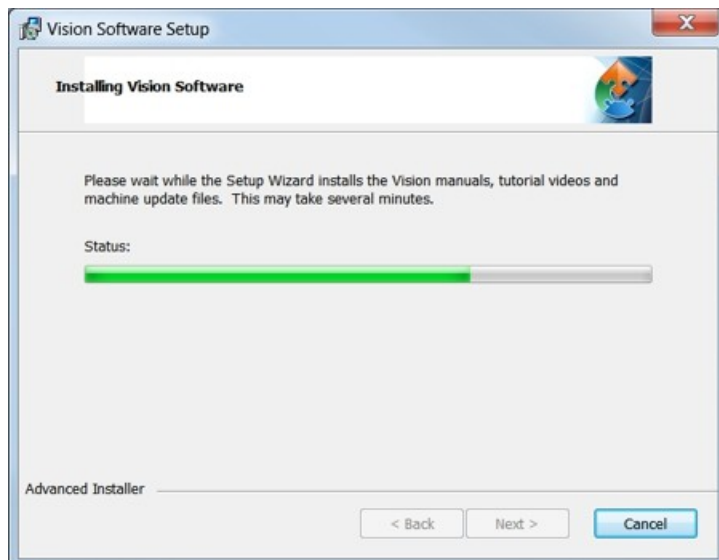
Select Next.



Select Install.



The installation will proceed.



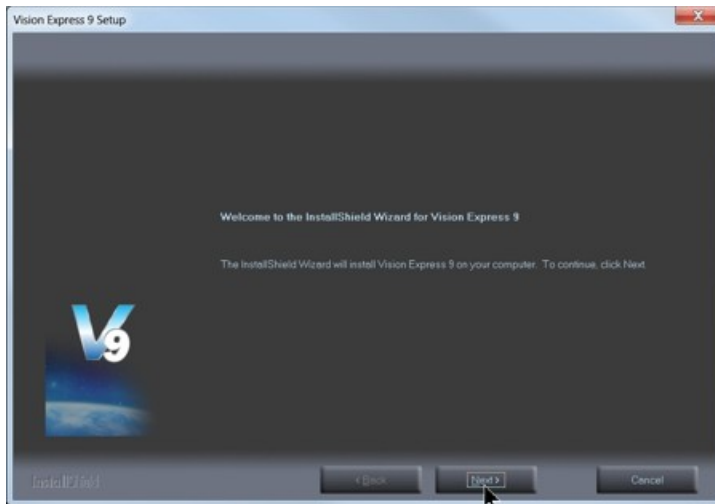
Select the appropriate language and select OK.



Installation will proceed.



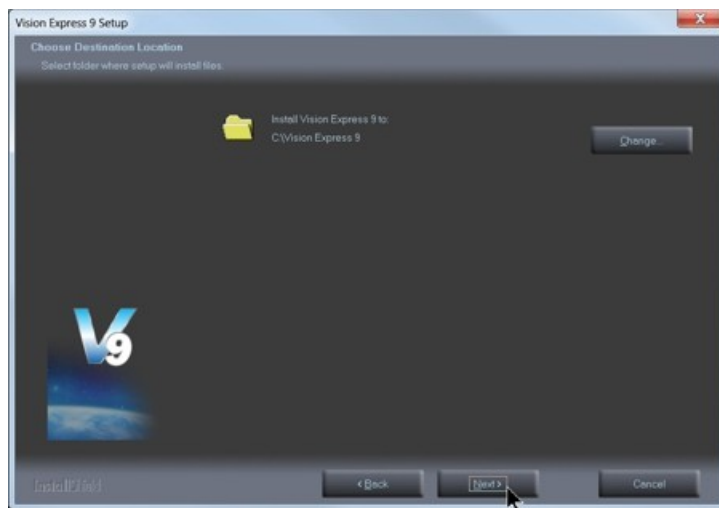
Select Next to begin the installer.



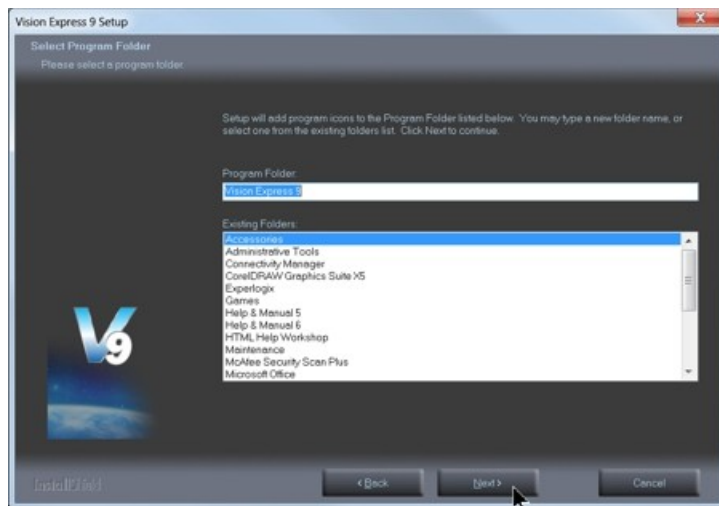
Select Accept the license agreement, then select Next.



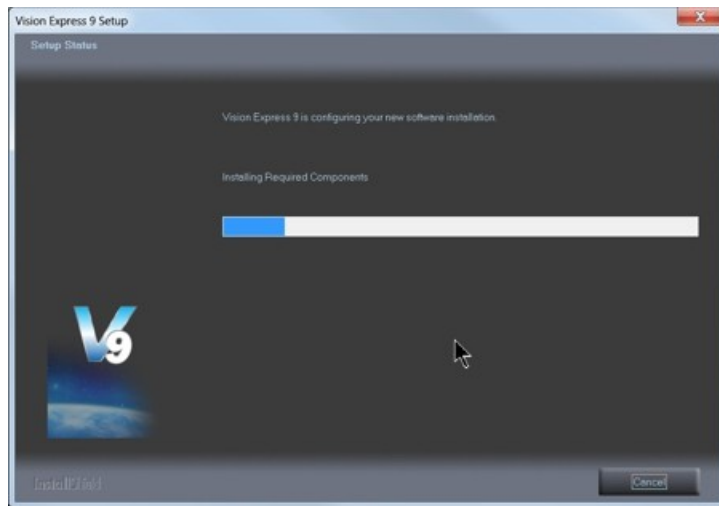
Select Next (or change the destination folder - not recommended).



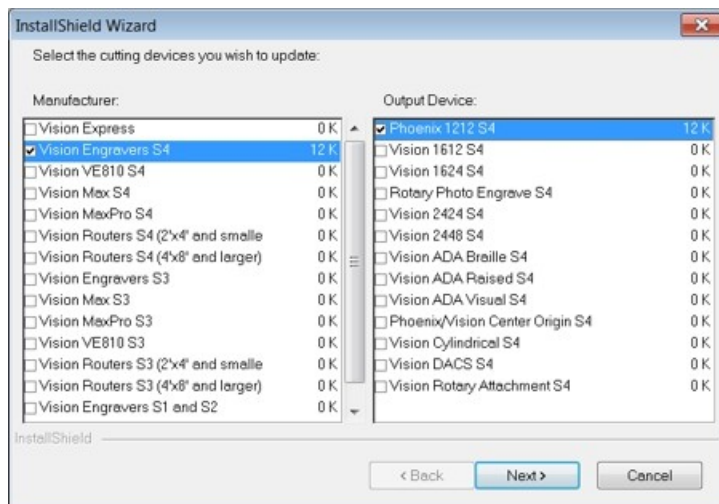
Select Next to create the folder.



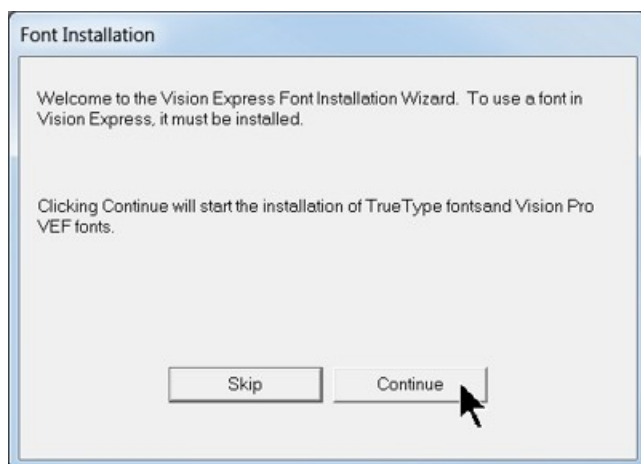
The installation will continue.



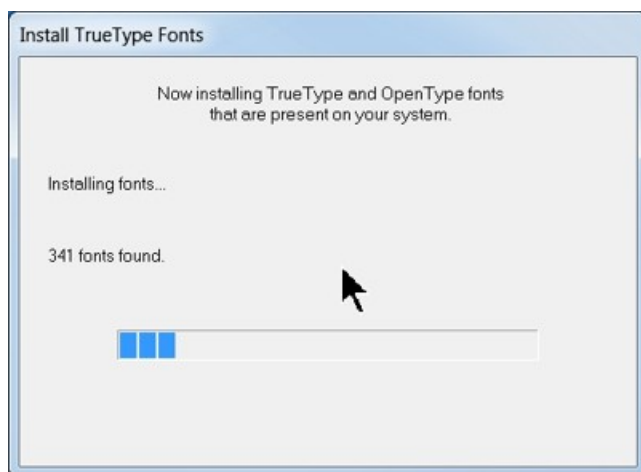
Select your machine from the Manufacturer list on the left side of this window by clicking in the box to the left of the machine (or machine series) you own. The right side of the window will list a selection of Output Devices. Only put a check mark in the box(es) to the left of the Output Device(s) you own. Then select Next. If you purchase another engraving system from Vision, it can be added to the machine list at a later date from within the Vision software.



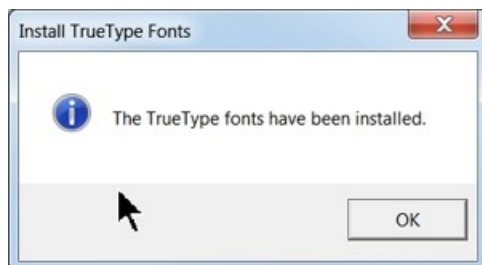
Select Continue to install True Type fonts and Vision Engraving Fonts on your computer.



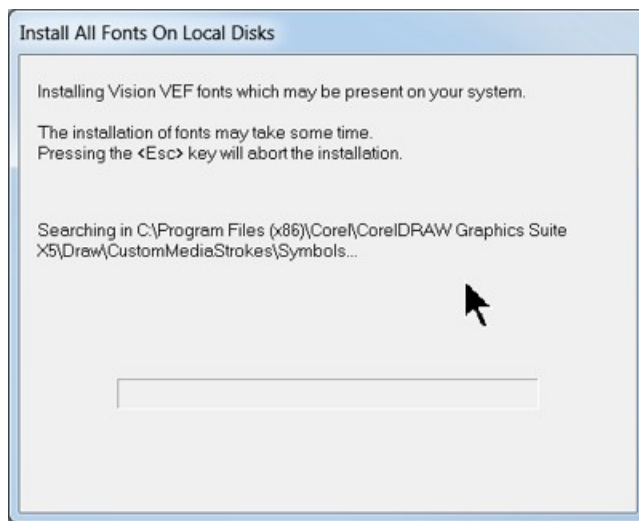
The software will look for True Type fonts on your computer and allow the Vision software to use them.



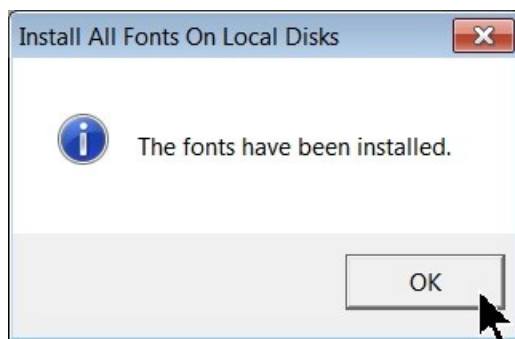
Once the True Type fonts are installed, select OK.



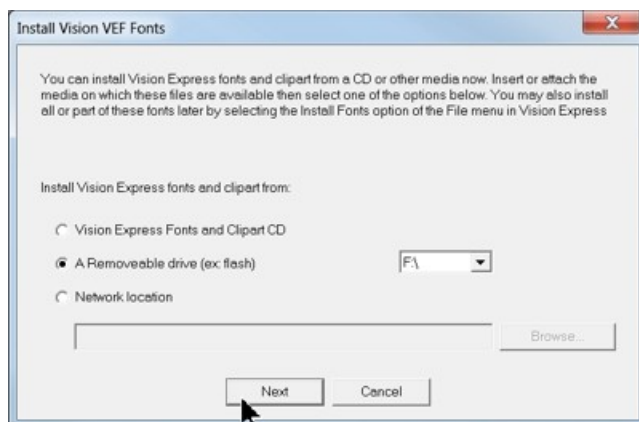
In this step, the software will install any Engraving fonts on your computer.



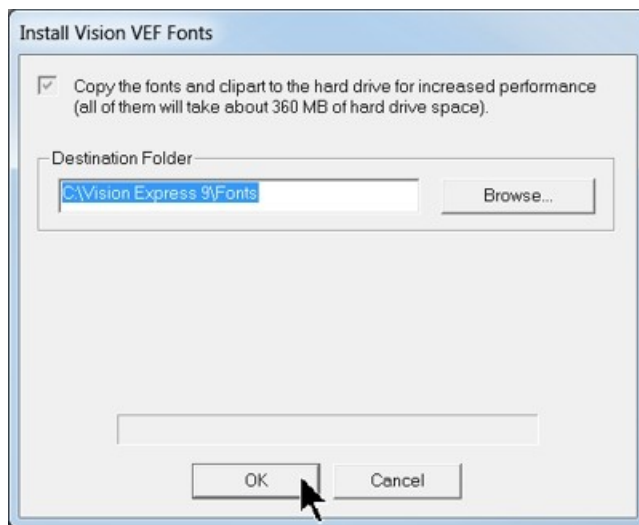
When complete, click on OK.



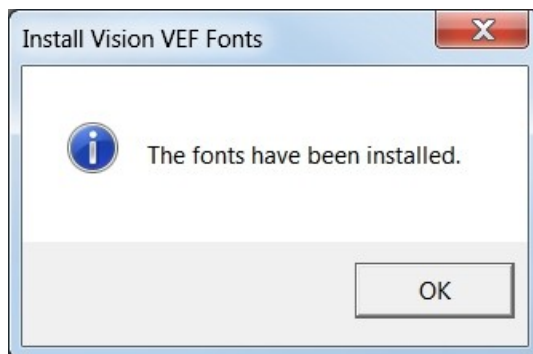
In order to install the fonts on the USB drive, select A Removable drive and from the drop down list, select the drive letter for the Vision USB drive plugged into your computer.



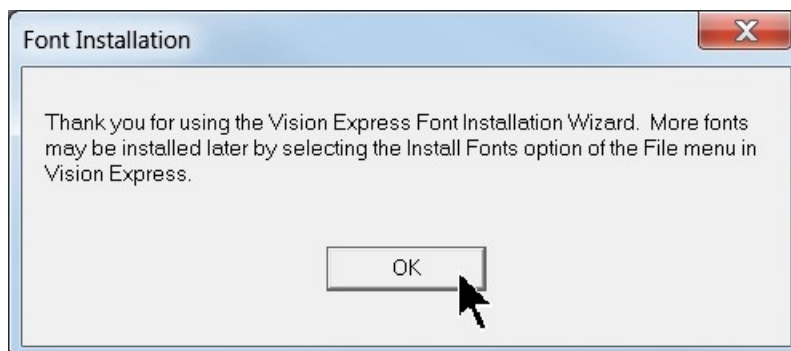
Select OK to install to the default folder.



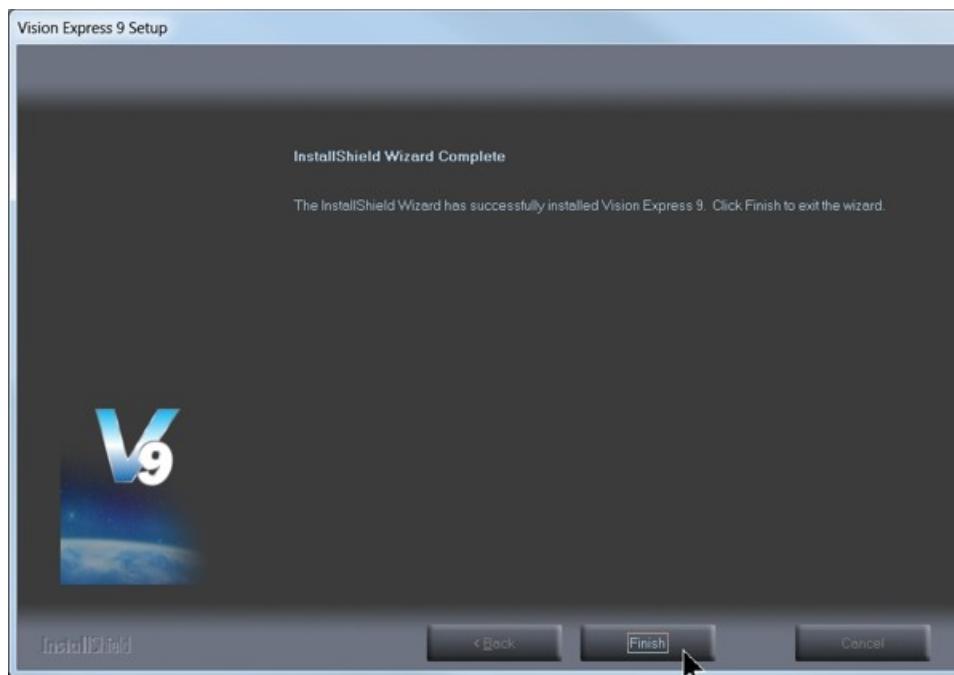
Select OK. All fonts and clipart have been installed from the USB drive at this time.



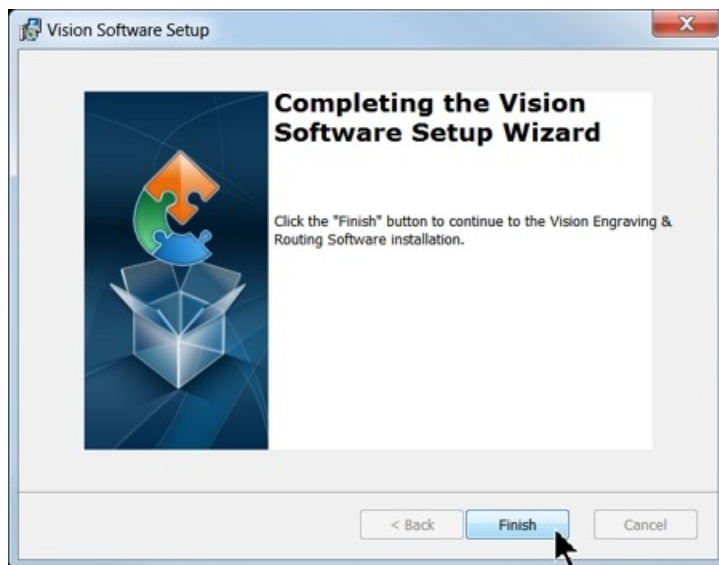
Select OK to return to the main installation screen.



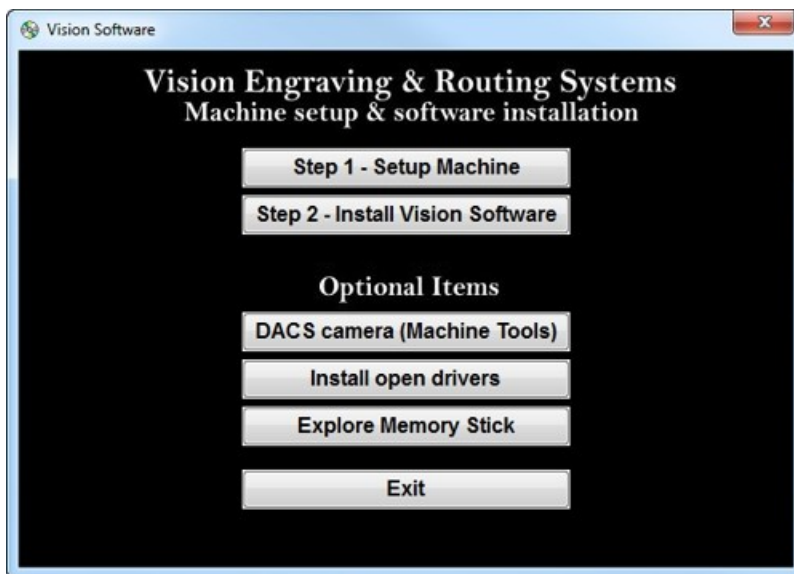
To complete the installation, select Finish.



To close the Software Setup window, select Finish.

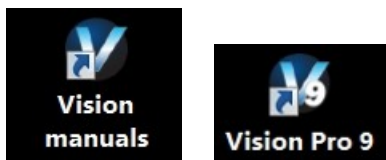


Select Exit to close the installer.



NOTE - If your machine was equipped with the DACS Camera System, click on the optional item "DACS camera (Machine Tools), then proceed to Section 5 in this manual.

The Vision manuals icon should now appear on your computer's desktop along with an icon for your version of Vision 9 software.



Clicking on the Vision manuals link will give the user access to User Manuals, Installation Guides, Accessories and Training Videos.

If you were supplied with an Orange Dongle (orange USB stick), keep it installed in your computer's USB port in order to use the Vision software. If you were supplied with another color USB stick with your machine, it can be removed at this time from your computer. Installation is now complete.

3 Operation

3.1 The Pendant Controls

The Pendant controls all of the movement and speeds of your Vision engraver or router. Below is a picture of the Pendant. The function of each button is explained below.

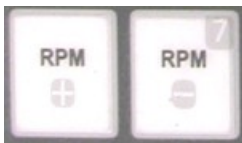




XY Speed + and - Buttons - These buttons control the engraving speed of the machine. You can change the engraving speed depending on the type of material you are engraving and the type of cutter you are using. If you are using a diamond drag cutter (non-rotating), you can generally run the machine at higher speeds. If you are using a rotary cutter, you will need to adjust the speed depending on what type of material you are cutting. Harder materials, such as acrylic and engraver's brass, will need to be engraved at slower speeds. Softer materials such as engraver's plastic can be engraved at higher speeds. A rule of thumb for setting the engraving speed is to start off engraving at a slow speed, then gradually increase the engraving speed while the machine is engraving. Increase the speed until you get to a speed where it sounds like the machine is working freely. If your speed is too fast, the machine will sound like it is working very hard, or putting a heavy load on the engraving spindle. If this happens, you can possibly dull the engraving cutter or the engraving quality will not be very good. Fortunately, engraving speeds presets for most materials are sent to the engraver with the job file. There is much less trial and error as a result.



Z Speed + and - Buttons - These buttons control how fast the spindle will move down into the material. Typically, you can leave the speed at it's maximum setting, unless you are engraving into hard materials such as acrylic or deep engraving into metals. In cases such as these, slow the speed down using the Z SPD - button. Again, this is part of the presets sent to the engraver after a material is selected in the Vision software.



RPM (Spindle Speed) + and - Buttons - These buttons control the rotational speed (RPM) of the engraving spindle. You would change the RPM of the engraving spindle depending on the type of material you are engraving or for different sizes of engraving cutters. The harder the material you are using, the higher the RPM you would use. Also, the larger the cutter you are using, the higher the RPM you would use. A rule of thumb for setting the spindle speed is to start out at a higher RPM. You can gradually lower the RPM while the machine is working. Keep lowering the spindle speed until the spindle sounds like there is a load (or drag) on the spindle. When you reach that point, you should turn the spindle speed knob up a little bit. The spindle speed also has presets based on the material selected in the Vision software.



Start Button- The Start button is used to start the engraving machine. When there is a job in the machine, the Pendant Screen will display the message "Press START to Go; EXIT to Abort. Z- up to Prox Restart, Shift/Start - Dryrun". Also, if you have pressed the Pause button to stop the engraving, pressing the Start button will resume the job.



If a job has been sent to the machine and has been run, the Start button has another feature. If you are using the Connectivity Manager (not Machine Tools), pressing the Start button after the job has been run, will recall the job. Pressing the Start button once more will run the same job.



, then



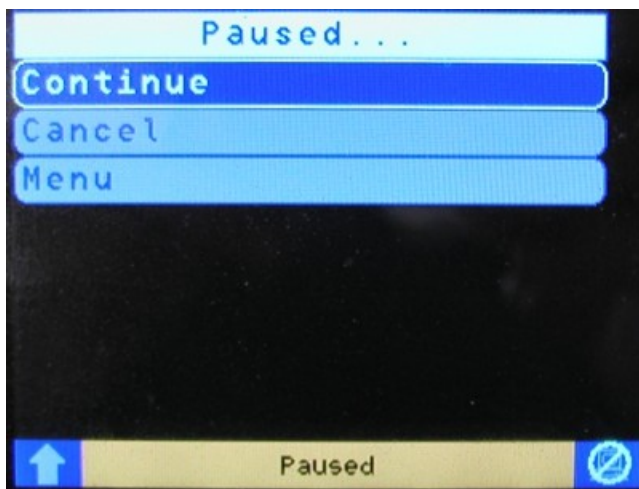
Shift, then Start Button

When connected via Connectivity Manager - Pressing Shift, then Start with a job in the machine will perform a dry run of the job with the red pointer on the machine. The red pointer will outline the job to be engraved. If there is no job in the machine, this function will attempt to connect to your computer and you will receive the messages "Connecting to host...", then, "Host not responding!" This is normal, as this button combination is not meant to be used with the connectivity manager.

When connected to Vision Machine Tools - If there is no job in the machine, pressing Shift, then Start will display a list of jobs that are stored on the computer's hard drive. Use the Y up and down jog buttons to move the cursor on the Pendant screen to the job to be engraved and then press Enter to select the job. Pressing Start will run the job. If a job is in the machine and ready to be engraved, pressing Shift, then Start will perform a dry run of the job with the red pointer on the machine. The red pointer will outline the job to be engraved.



Pause Button - The Pause button is used to momentarily stop the machine from engraving. If you press the Pause button while the machine is engraving, the machine will lift the cutter up from the material and stop engraving. The spindle motor and vacuum will power off while in Pause mode. Pressing the Start (or Enter) button will resume (Continue) the engraving where it left off. To Cancel the job, use the Y Up or Down buttons to select Cancel, then press the Enter button. When in Pause mode, the Pendant screen will display:



Emergency Stop Button - This button will stop engraving immediately, leaving the cutter in the down position and will power off the X, Y and Z stepper motors and also shut off the spindle motor and auxiliary. Once you have pushed the Emergency Stop Button, you must twist the knob clockwise to release it. Press the Goto Home button to power up the machine and move the spindle back to the home position. The job you were running will be canceled. To run a job, send it to the machine again.

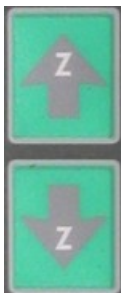
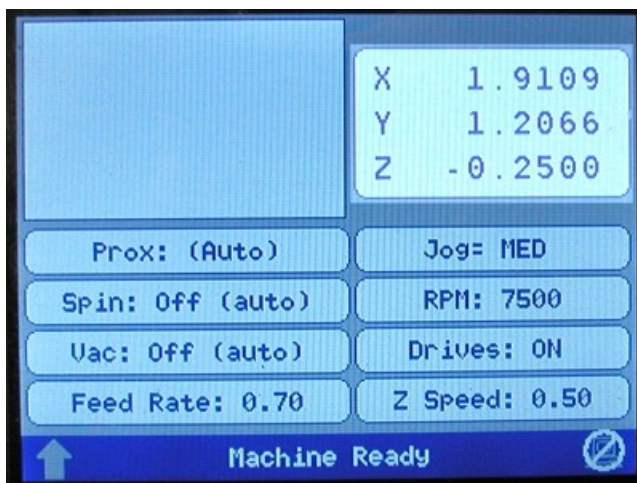


Jog Speed Button - The Jog Speed button will toggle the machine's jog speed between Fast, Medium and Slow. The current jog speed can be seen on the Pendant screen as highlighted below.





X & Y Jog Buttons - The X & Y jog buttons are used to move the position of the spindle on the T-Slot table work area. This is used to position graphics, or to locate an area for engraving. The X jog buttons will move the spindle left and right. The Y jog buttons will move the spindle front to back. As you use the X & Y jog buttons, the Jog speed will determine how fast the spindle will move and the spindle position will be displayed on the Pendant screen as highlighted below.



Z Jog Buttons - These will move the spindle up and down. These buttons are commonly used for setting the surface of your material when you are not using the proximity sensor. The spindle will jog up and down at the Jog speed displayed on the Pendant screen (medium, slow or fast). As you use the Z jog buttons, the spindle position will be displayed on the Pendant screen as shown above.



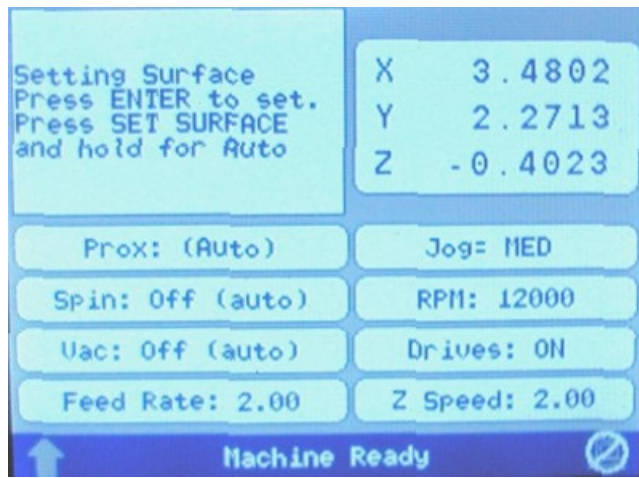
Shift button - The Shift button is used to access different functions. Pressing the Shift

button will highlight the up arrow in the bottom left corner of the Pendant screen.



Set Surface Button - The set surface button is used to set the surface point of the material you are engraving. The procedure for setting the surface is as follows:

- a) Use the X & Y jog buttons to move the spindle over the material to be engraved.
- b) Press the Set Surface button. The Pendant screen will display the message below



- c) Lower the spindle with the Z down jog button until you reach the desired position.
- d) Press the Enter button to set this as the surface position. The spindle will then move up to its lift position.

HINT: It is sometimes easier to set the surface right before engraving the job. To do this, send a job to the machine to be engraved. Press Pause. Press Start. The spindle will move to the first point to be engraved and pause. You can then jog the Z down until you reach the desired Z position, then press Set Surface, then press Enter to set the surface. Pressing Start will then begin the engraving process..



Shift, then Set Surface Button - When you first press the Shift button, then press the Set Surface button, the red dot laser pointer will power on. Repeating Shift, then Set Surface will turn the red dot laser point off.



Goto Home Button - When you press the Goto Home button, the engraver will return to its home position, which is either the default location in the upper left corner of the T-slot table, or a user defined home position. Pressing this while a job is running will lift the spindle up, move to the home position and cancel the job from the machine.

IMPORTANT: When the machine is first powered on, the Goto Home button must be pressed in order to set the home position of the machine before running any jobs.



Shift, then Goto Home Button - When you press the Shift button, then press the Goto Home button, the engraver will return to the top left corner of the T-Slot table and "re-home". This is used if the machine has lost position for some reason.



Set Home Button - The Set Home button is used to set a user defined home position. To define a home position, use the X & Y jog buttons to move the spindle to a point you want to set as the home position. Press the Set Home button. The message "Home Set." will briefly appear on the Pendant screen. This position is now set as the home (0,0) position. To reset this home back to the machine's home position at the upper left corner of the T-Slot table, press Shift, then press Goto Home, then press the Set Home button.

Setting a Home Using the Red Dot Laser Pointer - The red dot laser pointer can be used to set the machine's home position. Turn on the red dot laser pointer by pressing the Shift button, then pressing the Set Surface button. Jog the motion system to the desired location using the X & Y jog buttons and the red dot laser pointer for positioning. Press Set Home to save the home position in the machine. If you want to save a new home position, move the spindle to the desired position and press Set Home as described above.



Shift, then Set Home - If the machine is turned off, the user defined home position will be replaced with the factory home position. To reset the machine to the user defined home position, Press Shift, then Set Home. The machine will now use the user defined home position.

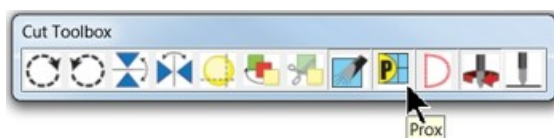
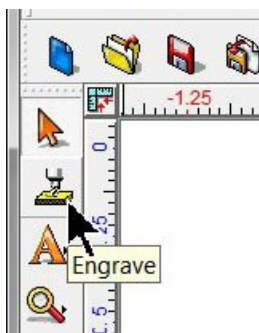


Goto Limits Button - The Goto Limits button is used to send the motion system to its upper left corner limits. This button is typically used for troubleshooting purposes only.



Prox On/Off Button - This button allows you to turn the Proximity Sensor on and off. The Prox sensor enables the machine to determine the Z position of the material. This feature works when engraving with a nose cone or diamond drag only; it is not designed for non-nose cone engraving or burnishing. The Pendant screen displays the status of the proximity sensor as (Auto) or Off.

Note: The proximity sensor can be turned on or off from within the Vision Pro software. When the Engrave icon is selected, the proximity icon can be selected or deselected to automatically turn the proximity sensor on or off when the job is running.



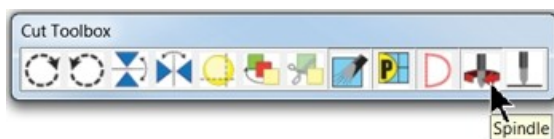
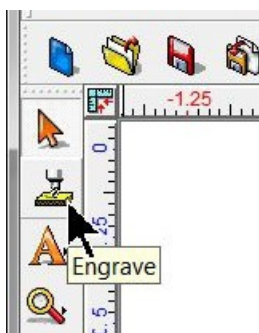
Proximity sensor on icon: 

Proximity sensor off icon: 



Spindle On/Off Button - The spindle motor can be either in automatic mode or off. You can toggle between these two modes by pressing the Spindle On/Off button. When set to (Auto), the spindle will automatically turn on and off at the beginning and end of the engraving job. If you press the PAUSE or STOP button, the spindle will turn off for safety reasons. Always make sure you have the spindle turned on when appropriate, otherwise you may run the risk of breaking your cutter. When pressing the Spindle On/Off button, the Pendant screen will display the status as (Auto), or Off.

Note: The spindle can be changed to on or off from within the Vision Pro software. When the Engrave icon is selected, the spindle icon can be selected or deselected to automatically turn the spindle on or off when the job is running.



Spindle on icon: 

Spindle off icon: 



, then

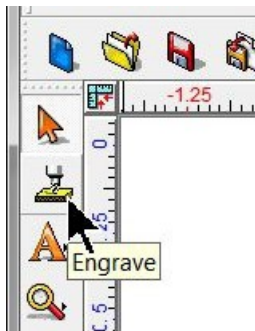


Shift, then Spindle On/Off Button - When you press the Shift button, then press the Spindle On/Off button, the spindle motor will start. Pressing Shift, then the Spindle On/Off button again will shut the spindle motor off. The Pendant screen will display On (Auto) when the spindle is turned on.



Aux On/Off Button - The auxiliary for an optional vacuum system motor can be either in automatic mode or off. You can toggle between these two modes by pressing the Aux On/Off button. The Pendant screen will display either Vac: Off (Auto), or Vac: Off. When set to Auto, it will automatically turn on and off at the beginning and end of the engraving job. If you press the PAUSE or STOP button, the vacuum will turn off for safety reasons. Always make sure you have the vacuum turned on when appropriate to remove chips that will be created during engraving.

Note: The auxiliary can be changed to on or off from within the Vision Pro software. When the Engrave icon is selected, the auxiliary icon can be selected or deselected to automatically turn the vacuum on or off when the job is running.



Auxiliary on icon:

Auxiliary off icon:



, then



Shift, then Aux On/Off Button - When you press the Shift button and then press the Aux On/Off button, the optional vacuum pump will start. Pressing the Aux On/Off button again will shut the vacuum pump off.



Numeric Buttons - The Numeric buttons are used when entering numbers. The Pendant will automatically switch to numeric mode when accessing menu items that require numerical input. The numbers 0 - 9, as well as the forward slash "/" and period "." are available.



Move XY Button - The Move XY button allows the user to move the spindle to an exact location. Press the Move XY button, then using the Numeric buttons, enter the X coordinate and press the Enter button. Enter the Y coordinate using the Numeric buttons, then press the Enter button. Press the Enter button one more time to jog the spindle to these coordinates, or press Exit to cancel this operation.



Access Jobs Button - When connected to Vision Machine Tools - If there is no job in the machine, pressing Access Jobs will display a list of jobs that are stored on the computer's hard drive. Use the Y up and down jog buttons to move the cursor on the Pendant screen to the job to be engraved and then press Enter to select the job. Pressing Start will run the job.



Enter Button - The Enter button is used to confirm an operation or to select a highlighted item in the menu system.



Exit Button - The Exit button is used to either cancel an operation, or to exit a menu.



Job Time Button - The Job Time button shows the time required to complete the last job.



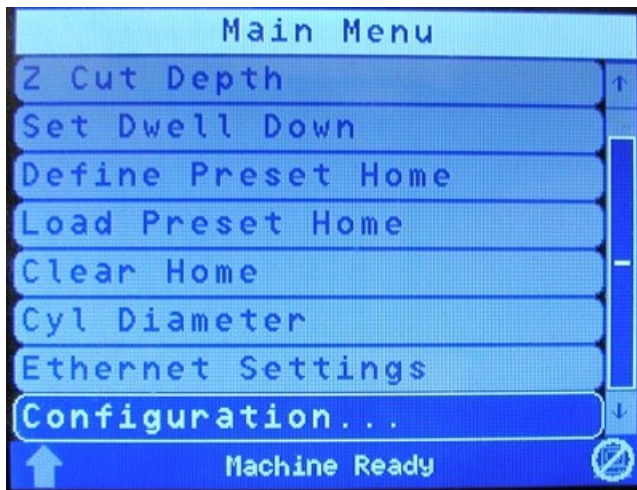
Rotary Axis Button - The Rotary Axis button allows for the rotary axis to be used. When this button is pressed, the Pendant screen will display a field to enter the diameter of your item to be engraved. Enter the diameter of the item using the Numeric buttons and press ENTER. Note: This button only works when a rotary axis is present on your machine.



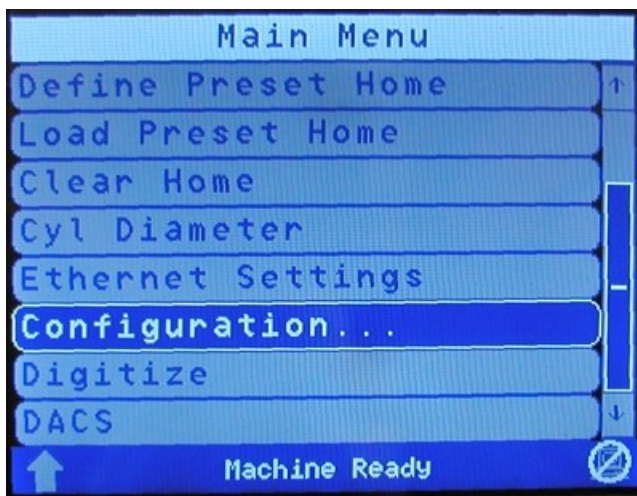
Menu Button - The Menu button allows access to various options within the Vision Controller. Pressing the Menu button will display the following Pendant screen. There are controls for Z Lift Height, Z Cut Depth, Defining a Preset Home Position, Loading a Preset Home Position, Clear Preset Home, Cylinder Diameter (when using a rotary axis), and Ethernet Connection Settings.



Pressing the Y down button will access the last menu item: Configuration.



On certain Vision machines, the second menu page adds options for Digitize and DACS. Those features are discussed in separate sections.

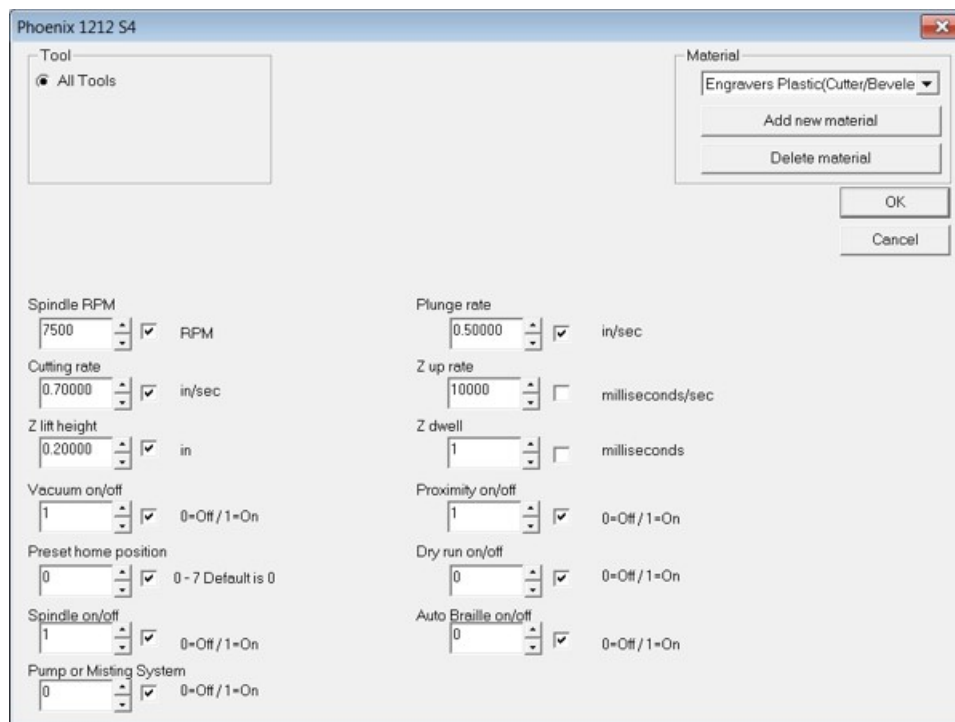
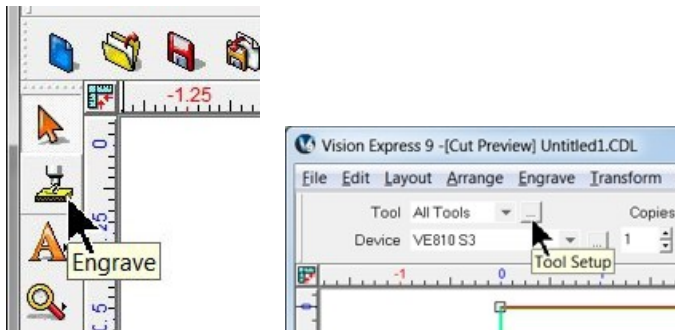


To access any of these menu items, use the Y up or down arrows to highlight the menu item, then press the Enter button. Each of these menu items are described later in this section.

Hint - To quickly scroll to the next menu page, use the Z up or down buttons.

Note: Many of the following features can be set from the Vision Pro software. When the Engrave icon is selected, select the icon with three dots to the right of All Tools as shown below. Settings can be changed for the following items:

Spindle RPM, Cutting Rate, Z-Lift Height, Vacuum (or Aux) On/Off, Preset Home Position number, Spindle On/Off, Pump (or Misting System) On/Off, Plunge Rate, Z Up Rate, Z Dwell, Proximity Sensor On/Off, Dry Run On/Off, and Auto Braille On/Off.



Z Lift Height - This will adjust the distance that the cutter lifts between characters while engraving. Move the cursor to the Z Lift Height using the Y up and down jog buttons and press Enter. Using the numeric buttons, enter the distance you would like the cutter to lift between characters. This number will be in inches or in millimeters, depending on how the controller is configured. It will show the units that are being used on the Pendant screen. After the lift distance is entered, press the Enter button to set this value. Press the Exit button to return to the main screen when finished.

Z Cut Depth - This will adjust the depth of engraving or routing. It is the distance from the position that you set as the surface, to the final depth you would like to cut. Move the cursor to the Z Cut Depth using the Y up and down jog buttons

and press Enter. Using the numeric buttons, enter the depth you would like to engrave or rout. This number will be in inches or millimeters, depending on how the controller is configured. It will show the units that are being used on the Pendant screen. After the Z Cut Depth is entered, press the Enter button on the controller to set this value. Press the Exit button to return to the main screen when finished. Note: The Z Cut Depth is only used if you are not setting the depth of cut in the Vision software.

Set Dwell Down - This controls how long the spindle will dwell, or wait after initially dropping the cutter down into the material before moving in an X/Y direction. This is typically used when engraving into harder materials, allowing the cutter to plunge to the correct depth before starting to engrave or rout. This number is in milliseconds, so entering a number of 1000 will allow for a 1 second delay. After the dwell time is entered using the numeric buttons, press the Enter button. Press the Exit button to return to the main screen when finished.

Define Preset Home - The user can store up to 9 preset home positions. Move the cursor to the Define Preset Home menu using the Y up and down jog buttons and press Enter. The Pendant screen will show the current number (#) as "Select Pre Home #". Numbers 1 through 9 can be user defined. Use the Z speed + and Z speed - buttons to select the home position you would like to save. Next, use the X and Y jog buttons to move the spindle to the position that you would like to use as the home position. Once the spindle is at the desired location, press the Enter button to store the home position. Press Exit to return to the main screen. *Note: Preset home positions are stored even after the controller has been powered off.*

Load Preset Home - To load a preset home, move the cursor to the Load Preset Home menu using the Y up and down jog buttons and press Enter. Use the Z speed + and Z speed - buttons to select the home position you would like to load. Once the desired position is shown on the Pendant screen, press the Enter button to load the home position. The machine will now use this position as the home position. Press the Exit button to return to the main screen when finished.

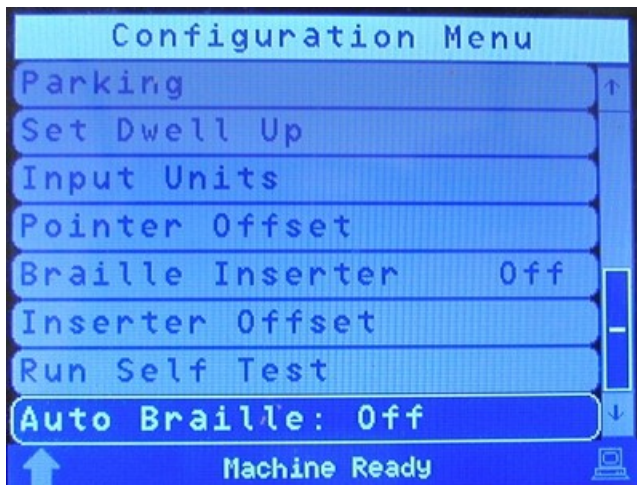
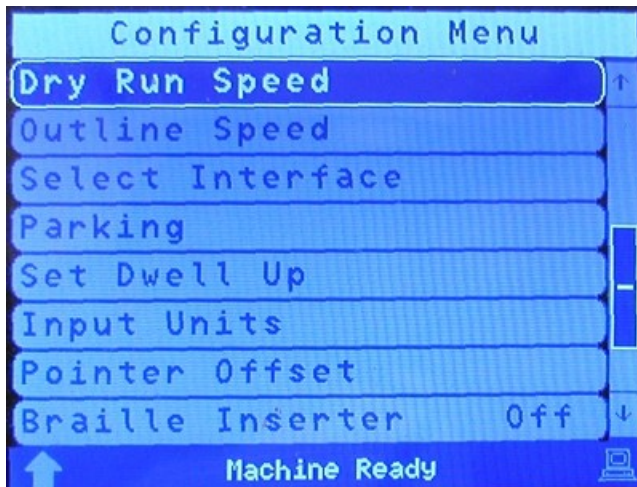
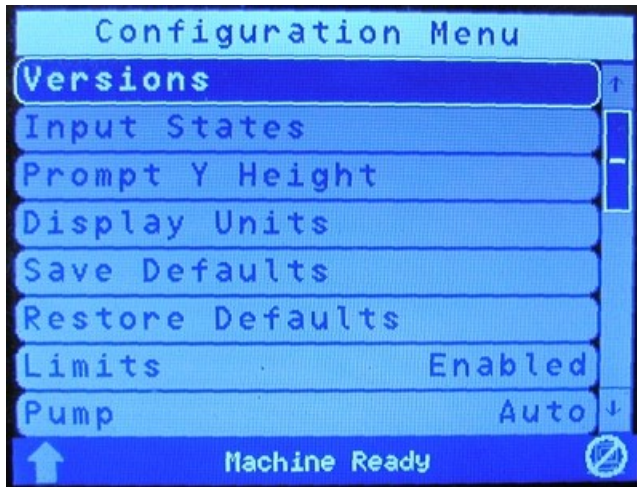
Clear Home - To clear the home position that has been loaded, move the cursor to the Clear Home menu using the Y up and down jog buttons and press Enter. The home position is now defaulted back to the upper left corner of the table. Press the Exit button to return to the main screen when finished. *Note: This does not apply to Preset Home Positions, only to the user defined home position set with the Set Home button.*

Cyl Diameter - This menu item is only used when engraving round objects on a machine that supports the rotary axis. Move the cursor to the Cyl Diameter using the Y up and down jog buttons and press Enter. Using the numeric buttons, enter the diameter of the item to be engraved. This number will be in inches or millimeters, depending on how the controller is configured. Once the diameter has been entered, press the Enter button on the controller to set this value. Press the Exit button to return to the main screen when finished.

Ethernet Settings - This menu is used to setup the network settings in the Vision controller. There are two options in the Ethernet Settings menu available after pressing Enter, which are:

1. Specify IP - Pressing the Enter button from this screen will set the Vision controller to DHCP, which automatically retrieves an IP address from the network server it is connected to. Pressing the Exit button from this screen will allow you to enter an IP address manually. Pressing Exit again allows the user to set the sub Net Mask. Please refer to the Machine Connections section for details on network configuration settings
2. Display IP - This menu is used to show the IP address that the Vision controller is set to. It also shows the IP address of the PC that is connected to the Vision controller.

The Configuration Menu - There are three screens to the configuration menu as shown below.



Configuration - This menu accesses various additional settings, as well as information about the machine in use. To change of view any of these settings, highlight the Configuration menu and press Enter. Each of these sub menus are described below:

Versions - Pressing Enter with this item highlighted will display hardware and software versions of the controller, as well as display the machine serial number.

Input States - Pressing Enter with this item highlighted will display information about the status of the motors and sensors on the machine.

Prompt Y Height - Pressing Enter with this item highlighted will allow the user to specify whether to ask the user for the Y height before running a job. When engraving jobs from programs such as CorelDraw®, jobs may engrave upside down on an engraving machine. This is because the program typically is referencing the home position from the lower left corner of the plate, and the engraver or router is referencing the home position from the upper left corner of the plate. To correct this, the Vision Job Server will flip the job automatically so that the engraving will be oriented properly. However, when doing this, the Vision controller needs to know the page size that is set up in programs such as CorelDraw®. To accomplish this, the Prompt Y Height configuration setting must be turned on. Move the cursor to the Prompt Y Height menu item using the Y up and down jog buttons and press Enter. Press the Y up or down jog buttons to select Yes or No. Press the Enter button on the controller. Press the Exit button two times to return to the main screen when finished.

Display Units - Pressing Enter with this item highlighted will allow the user to set the display units to either inches or millimeters. To change units, move the cursor to the Display Units menu item using the Y up and down jog buttons and press Enter. Press the Y up or down jog buttons to select imperial or metric units. Press the Enter button to save this setting. Press the Exit button two times to return to the main screen when finished.

Save Defaults - Pressing Enter with this item highlighted will allow the user to save various settings, even when the machine is turned off. The user can save settings such as the Spindle On/Off, Aux On/Off, Prox On/Off, Z lift, Z depth, RPM and surface location. To save the controller defaults, change the settings above to the way that you would like them. Move the cursor to the Save Defaults menu item using the Y up and down jog buttons and press Enter. The Pendant screen will show "Save as Defaults?". Highlight Yes or No using the X left or right jog buttons, then press Enter. The settings are now saved. Press the Exit button two times to return to the main screen when finished. The next time the Vision controller is turned on, the defaults will be as you set them.

Restore Defaults - Pressing Enter with this item highlighted will restore the defaults in the controller to the original factory set defaults. To restore the controller defaults, move the cursor to the Restore Defaults menu item using the Y up and down jog buttons and press Enter. The Pendant screen will show the main screen with "Restore to Factory Defaults?" shown in the upper left corner of the screen. Press Enter to restore the defaults. The Pendant screen will display "Loading Defaults...", then display "Reboot Now?". Press Enter to reboot the controller. The factory settings will then be restored.

Limits - Pressing Enter with this item highlighted will prevent the controller from reading the limit switches on the machine. This is typically used only in diagnosing problems that may occur with the machine's limit switches. To disable the limit switches, move the cursor to the Limits Enabled menu item using the Y up and down jog buttons and press Enter, which toggles the limit switches from Enabled to Disabled. Pressing Enter again will Enable the limit switches. Press the Exit button two times to return to the main screen when finished.

Pump - Pressing Enter with this item highlighted will activate the (optional) external misting system used for lubrication during specific material cutting. It is also used for the Max-Pro machines. This is a manual control and the Vision Pro software allows for automatic operation of the misting pump, so this feature is not often used. To turn this feature to Off or Auto, highlight the item in the menu and press Enter. To turn this feature to On or Auto, press the Shift button, then press Enter. Both Enter and Shift/

Enter are toggles. To return to the main Pendant screen, press the Exit button two times.

Dry Run Speed - Pressing Enter with this item highlighted will allow the user to set the dry run XY speed of the motion system. To set the speed, use the Y up or down buttons to highlight the menu item and press Enter. Use the numeric buttons to enter the desired speed, then press Enter to save this speed. To return to the main Pendant screen, press the Exit button two times.

Outline Speed - Pressing Enter with this item highlighted will allow the user to set the outline speed which used by the measure feature in the Vision Pro software. To set the speed, use the Y up or down buttons to highlight the menu item and press Enter. Use the numeric buttons to enter the desired speed, then press Enter to save this speed. To return to the main Pendant screen, press the Exit button two times.

Select Interface - Pressing Enter with this item highlighted will allow the user to select HPGL or GCode interface language. The Vision controller can run from both HPGL and GCode machine language. By default the controller uses the HPGL language which is what is used by Vision and Vision Pro software. If you would like to run GCode, move the cursor to the Select Interface menu item using the Y up and down jog buttons and press Enter. Use the Y up or down buttons to select the language you would like to use, then press Enter. Press the Exit button two times to return to the main screen when finished.

Parking - Pressing Enter with this item highlighted will allow the user to set the position the spindle will return to after a job has finished. To set this position, move the cursor to the Parking menu item using the Y up and down jog buttons and press Enter. There are four positions that you can set the spindle to move to at the end of the job. Datum: The spindle will move back to the limit switch position on the table. None: The spindle will remain at its last location when the job is finished. Z-Up: The spindle will remain at its last location at the end of the file and lift the spindle off the material. Home: The spindle will move to the current home position that is set in the controller. Use the Y up and down job buttons to select which parking position you would like to use, then press Enter to select it. Press the Exit button two times to return to the main screen when finished.

Set Dwell Up - *This is used only with tables that are using an air actuated Z axis. None of the current Vision systems use an air actuated Z axis.* This will allow the Z axis to release the air pressure so that the spindle moves up before moving to the next item to be engraved. Move the cursor to the Set Dwell Up menu item using the Y up and down jog buttons and press Enter. Enter the length of time required for the Z dwell up and then press Enter. This number is in milliseconds so entering a number of 1000 will allow for a 1 second delay. Press the Exit button two times to return to the main screen when finished.

Input Units - Pressing Enter with this item highlighted will allow the user to set the units used by the machine to either Imperial or Metric units. This differs from the Display Units menu item in that the input units are what the machine recognizes from the job sent to the machine, while the display units simply show the file on the Pendant screen as Imperial or Metric. The input units MUST match the units used to create the job, or improper scaling of the job will result. To select the input units, use the Y up or down buttons to highlight the menu item and press Enter. Use the Y up or down buttons to select either Imperial or Metric units, then press Enter to save this setting. To return to the main Pendant screen, press the Exit button two times.

Pointer Offset - Pressing Enter with this item highlighted will allow the user to modify the factory settings used in the machine to compensate for the offset between the spindle centerline and the red dot laser pointer location. Modification of this setting may be necessary if the location of the red dot laser pointer does not accurately represent the location of the spindle during engraving. To modify this setting, use the Y up or down buttons to highlight the menu item and press Enter. Use the numeric buttons to enter the X offset, then press Enter. Use the numeric buttons to enter the Y offset, then press Enter. The settings are now saved. To return to the main Pendant screen, press the Exit button two times.

Braille Inserter - Pressing Enter with this item highlighted will toggle the Braille Inserter function to On

or Off. The Vision Pro software automatically turns this function on or off with the job. This function is used only when the machine is being run from software other than Vision Pro.

Insertter Offset - Pressing Enter with this item highlighted will allow the user to modify the factory set offset used with the Braille Insertter tool. The offset is from the spindle centerline to the Braille Insertter centerline. The X and Y offsets are set for each machine if the Braille Insertter option was ordered from the factory. If the user restores factory defaults, the X and Y offsets will need to be reset. To modify the offsets, highlight the menu item and press Enter. Using the numeric buttons, enter the desired X offset, then press Enter. Enter the Y offset using the numeric buttons, then press Enter. Enter the Z-lift setting with the numeric buttons, then press Enter to save these settings. To return to the main Pendant screen, press the Exit button two times.

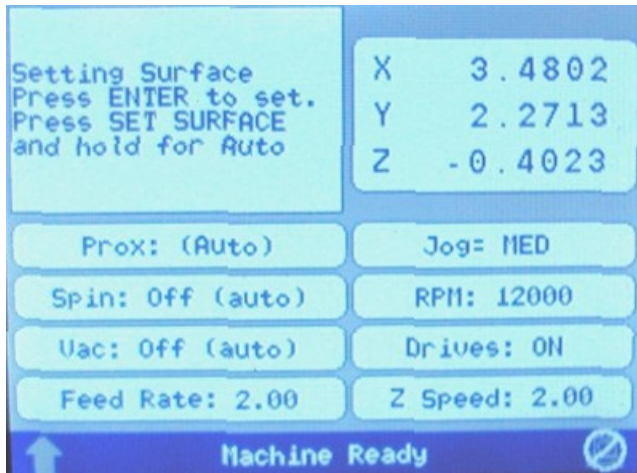
Run Self Test - Pressing Enter with this item highlighted will allow the user to engrave a self test job that is programmed into the controller. Move the cursor to the Run Self Test menu item using the Y up and down jog buttons and press Enter. The Pendant screen will display "Run Self-Test". Use the Y up or down buttons to select Yes or No, then press Enter. The Pendant screen will now show "Press Start to Go". Press the Start button to begin engraving the test job.

Auto Braille - Pressing Enter with this item highlighted will allow the controller to turn the automatic braille detection On or Off. A reboot will be required to retain this setting. This is set to on only if using a pneumatic auto Braille inserter. If not using the pneumatic auto Braille inserter, this setting should be set to off.

3.2 Set Surface Procedures

The procedure for setting the surface is as follows:

1. Use the X & Y jog buttons to move the spindle over the material to be engraved.
2. Press the Set Surface button. The Pendant screen will display the message below



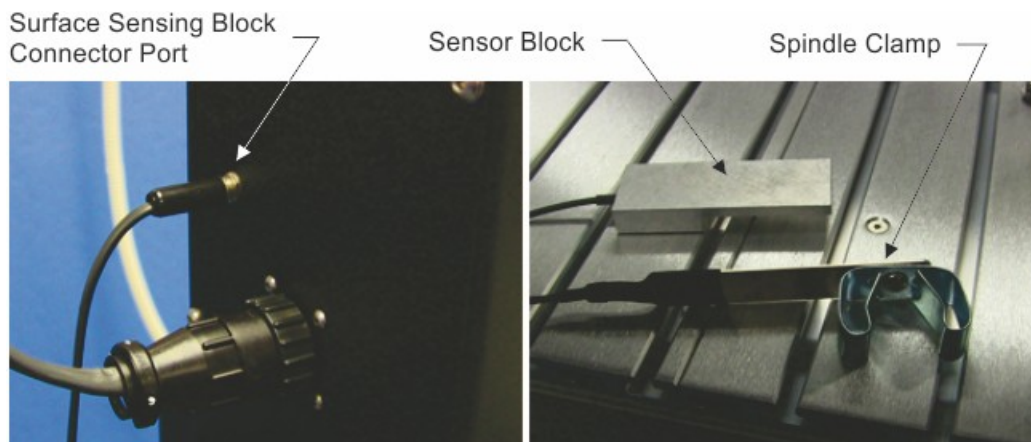
3. Lower the spindle with the Z down jog button until you reach the desired position.
4. Press the Enter button to set this as the surface position. The spindle will then move up to its lift position.

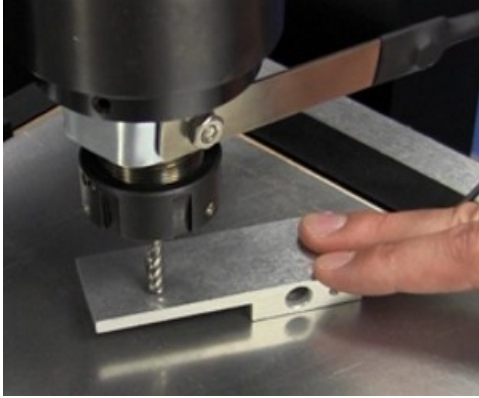
HINT: It is sometimes easier to set the surface right before engraving the job. To do this, send a job to the machine to be engraved. Press Pause. Press Start. The spindle will move to the first point to be engraved and pause. You can then jog the Z down until it touches the surface and press Set Surface, then Press Enter to set the surface. Pressing Start will then begin the engraving process.

NOTE: There are different procedures for different types of engraving - see below.

Using the Surface Sensing Block

Your machine may have been equipped to use with the Surface Sensing Block, which automatically sets the material surface. The Surface Sensing Block is connected to the back of the router head (on all router models) and to an auxiliary port on other machine models that had this option added from the factory.





CAUTION: Keep hands and fingers away from the spindle and cutter when performing this procedure! Serious injury may result. Do not place your hands or fingers below the cutter when setting the surface of your material!

To set the surface of your material:

1. Connect the sensor cable.
2. Install the Spindle Clamp on the bottom of the spindle.
3. Use the X and Y buttons on the Pendant to move the spindle over your material.
4. Place the Sensor Block on top of your material and hold as shown above.
5. Press the Set Surface button on the Pendant.
6. Press and Hold the Set Surface Button until the cutter tip touches the top of the Sensor Block. The spindle will move down and stop when the cutter tip just touches the top of the Sensor Block. The Controller will automatically calibrate and set the surface position of your material, then move the spindle up approximately 1/4 inch and stop.
7. Release the Set Surface button.
8. Press the Go to Home button on the Pendant.

NOTE: The design of the Sensor Block is such that if the sensor does not detect the cutter tip contacting the Sensor Block, the block will begin to tilt downward. If this occurs, release the Set Surface button immediately and check for proper installation of the Sensor Cable and Spindle Clamp.

Diamond drag engraving with a proximity sensor

Make sure that the proximity sensor is turned on. When you run the job, the spindle will go down until it touches the material and finds the surface automatically. If you want to change the lift amount of the cutter between characters, you will need to do the following steps:

1. Press the menu button on the controller. Note: If you are in the middle of engraving a job, press the pause button before pressing the menu button.
2. Use the Y jog up and down buttons to select Z Lift Height and press Enter.
3. Enter the lift height using the numeric buttons on the Vision controller and press Enter.
4. Press Exit to return to the main screen.
5. The Z lift height is now set. Press Start to run the job or resume engraving.

Diamond Drag and nose cone engraving without a proximity sensor

1. Send a job to the Vision controller.
2. With the prox off, press the Pause button and then press Start.
3. The machine will move to the start of the engraving and pause.

4. Use the Z jog down button to lower the spindle to material.
5. Press the Set Surface button.
6. Press the Enter button.
7. Press the Start button. The machine will start to engrave using the surface point that was just set.

Non-nose cone engraving (depth control)

1. Send a job to the Vision controller.
2. Make sure that the spindle is locked by tightening the spring adjustment knob all the way down.
3. Make sure that you have entered a depth of cut in the Vision or Vision Pro software. If you are using a different program than Vision or Vision Pro, use the Menu button on the controller to select and enter the Z Cut Depth.
4. With the prox off, press the Pause button and then press Start.
5. The machine will move to the start of the engraving and pause.
6. Use the Z jog down button to lower the spindle to material. Make sure that the cutter is just barely touching the surface.
7. Press the Set Surface button.
8. Press the Enter button.
9. Press the Start button. The machine will start to engrave using the depth that was entered in the software or the controller.

Burnishing

1. Send a job to the Vision controller.
2. Make sure you are using a burnishing adapter on the burnishing cutter.
3. With the prox off, press the Pause button and then press Start.
4. The machine will move to the start of the engraving and pause.
5. Use the Z jog down button to lower the spindle to material. Once the cutter reaches the material, press the Z jog down button a small amount more (typically about 0.03 - 0.05 inches).
6. Press the Set Surface button.
7. Press the Enter button.
8. Press the Start button. The machine will start to engrave using the depth that was entered in the software or the controller.

3.3 Set Home Procedure

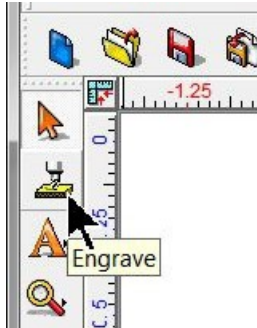
To set a user defined home position, use the X & Y jog buttons to move the spindle to a point you want to set as the home position. Press the Set Home button. The message "Home Set." will briefly appear on the Pendant screen. This position is now set as the temporary home (0,0) position. To reset the temporary origin back to the machine's home position at the upper left corner of the T-Slot table, press Shift, then press Goto Home, then press the Set Home button.

The red dot laser pointer can be used to set the machine's home position. Turn on the red dot laser pointer by pressing the Shift button, then pressing the Set Surface button. Jog the motion system to the desired location using the X & Y jog buttons and the red dot laser pointer for positioning. Press Set Home to save the home position in the machine. If you want to save a new home position, move the spindle to the desired position and press Set Home as described above.

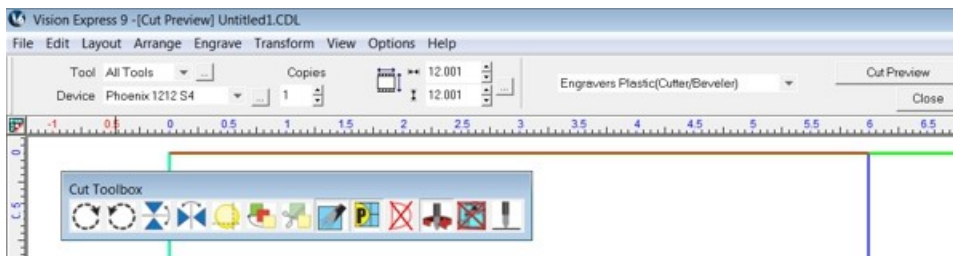
If the machine is turned off, the user defined home position will be replaced with the factory home position. To reset the machine to the user defined home position, Press Shift, then Set Home. The machine will now use the user defined home position.

4 Sending Jobs to Your Machine

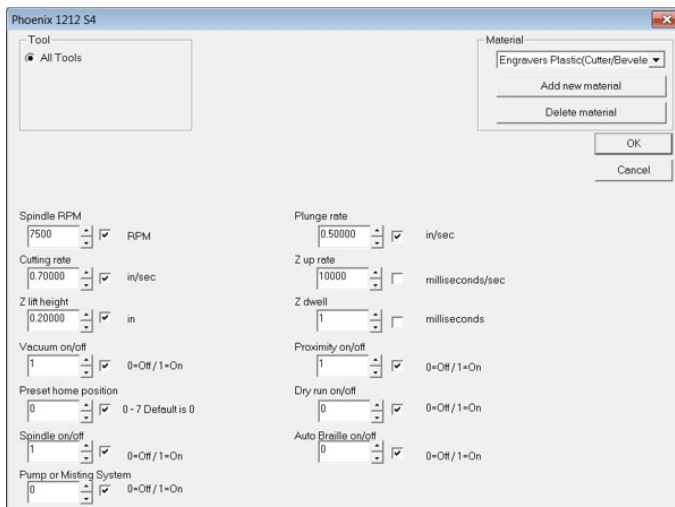
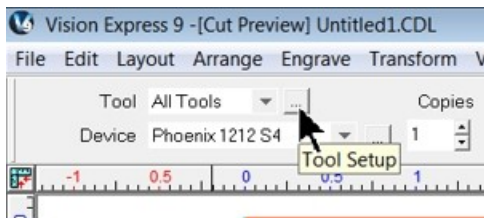
Once a job has been set up in the Vision 9 software, select the Engrave icon from the left toolbar.



The Cut Toolbox window will appear and the top toolbar will change to the Engrave toolbar.



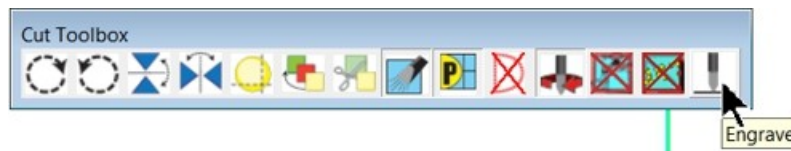
Make sure the Device is set to the machine you wish to send the files to, then select the Tool Setup icon to open the Tool Setup window.



Select the appropriate material from the Material Selection drop down list, then select OK.



Verify the Cut Toolbox settings (settings available will depend on device selected and version of Vision 9 software), and click on the Engrave icon.



The job will be sent to the machine.

5 Controller Maintenance

How to Remove and Clean the Air Filter

Weekly preventive maintenance should be performed to ensure reliable operation of your controller. It is recommended that the input fan filter be removed weekly and cleaned to ensure proper cooling of the electronics.

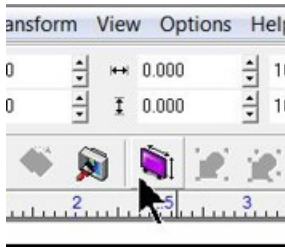
- i. Remove the filter guard; this is easiest if you pull from a corner of the guard.
- ii. Remove the filter and blow out the filter with low pressure compressed air, or rinse the filter with water and dry before replacing.
- iii. Replace the filter and replace the filter guard.



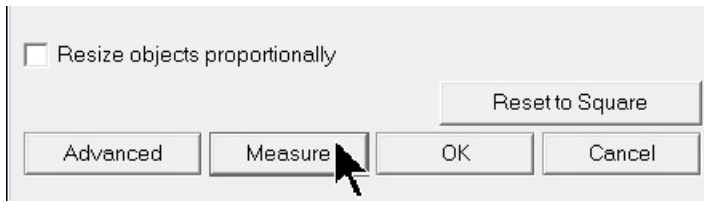
6 Using the Measure Feature

The Measure Feature is a very useful tool that can be used to set up both the machine's home position and the plate size in the Vision 9 software.

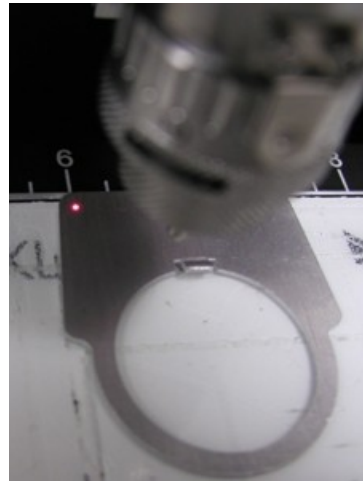
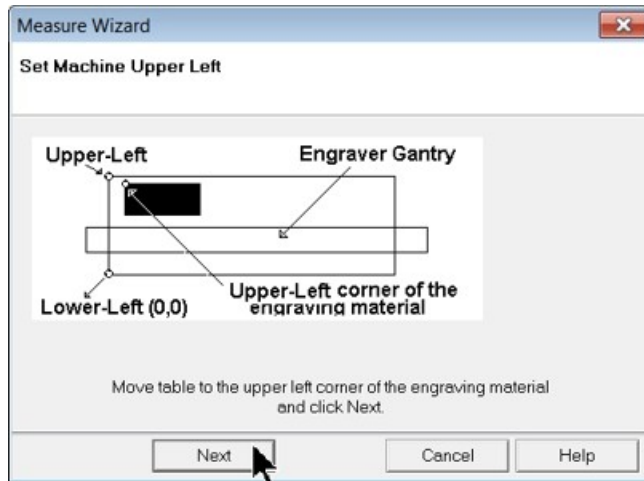
To use this feature, turn on the engraver and press the Go to Home button. Open the Vision 9 software with a new drawing and select the Plate Size icon on the top toolbar.



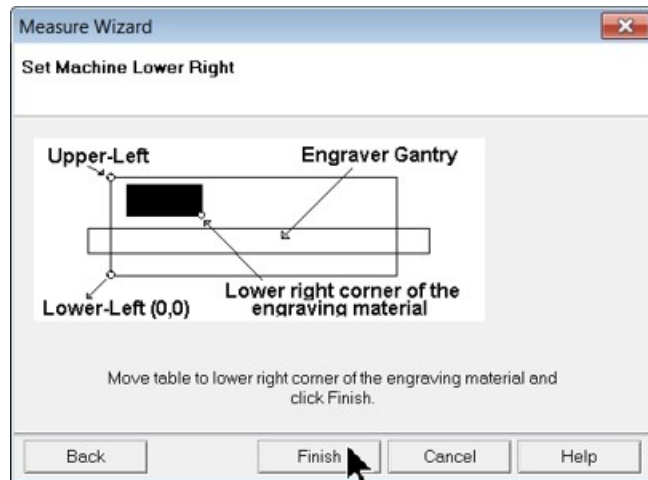
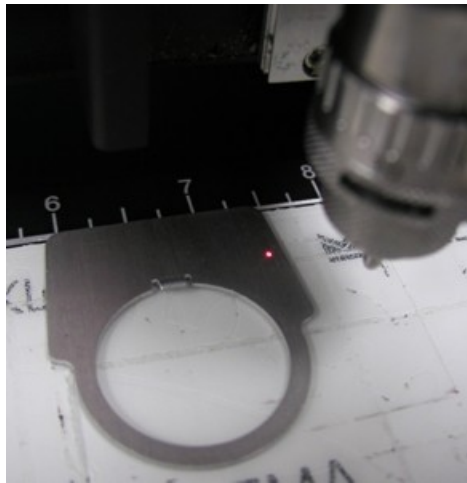
At the bottom of the plate size window, click on the Measure icon.



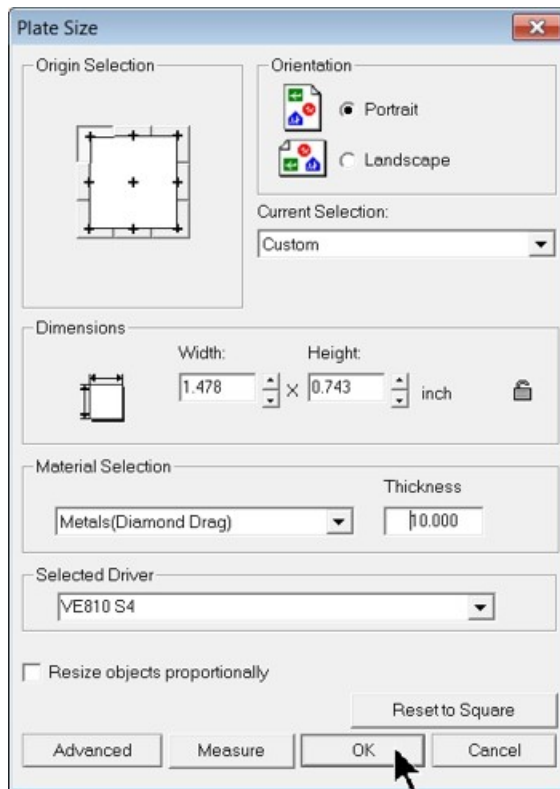
The Measure Wizard window will open. The engraver will turn on its red dot laser pointer. Move the spindle over the material and position the laser pointer so that it is in the upper left hand corner of the engraving area you wish to define. Then, click on Next in the Measure Wizard window.



Move the laser pointer to the lower right corner of the engraving area you wish to define, then click on Finish in the Measure Wizard window.



The dimensions of the plate size shown in the Plate Size window will now reflect the engraving area you have defined on the machine. The Home Position of the machine has also been set to the upper left corner of this area.



The machine will also allow you to outline the engraving area you just defined. Follow the instructions on your machine or controller to have the machine outline this engraving area with the red dot laser pointer. If the area appears to be correct, click on OK in the Plate Size window. The plate size in the Vision 9 software now shows the area defined with the measure feature. Design your job and send the job to the engraver.

Note that when using the measure feature, the machine will have its home position changed. You will need to reset the home position to the upper left hand corner of the engraving table in order to use the machine normally.

7 Example Jobs

In the following sections, there are 10 example jobs which can be used to learn the different ways to operate the Vision engraver or router. The jobs are separated into three levels; Level 1, Level 2 and Level 3. Level 1 contains files that provide instructions on the most common uses of the engraver or router, and utilizes Vision 9 Express software for job creation. Level 2 includes more advanced applications and may require features only available in Vision 9 Expert or Pro software. Level 3 uses Vision 9 Expert or Pro software and provides examples of advanced jobs.

The sections and example jobs are designed to incrementally teach the user how to operate their machine, as well as utilize some of the common functions within the Vision software. It is recommended that the first time user read through these sections and practice the techniques discussed in the order they are presented.

7.1 Holding Down Material

There are many ways to hold material down on the t-slot table. One of the major things to remember is that the material must be placed in the upper left corner of the t-slot table. This will ensure that the engraving is in the correct position on your material.

You can use double-sided tape, Multi Mat hold down material, the quick lock vise, or optional clamps and fixtures (see the Optional Accessories section of this manual for more details) to hold down material to the t-slot table. Double-sided tape or Multi Mat material are available from your Vision Distributor or directly from Vision.

Hold Down Techniques

Holding material in place is critical for engraving and cutting applications. The Multi Mat material is useful for both applications, but using double-sided tape or a spray adhesive can be a better choice for some applications. For most materials and engraving applications, the Multi Mat material is the easiest to use. Simply place it on the table and place the material to be engraved on top of it. When cutting completely through, or kiss-cutting materials, care must be taken to not cut too far through the material, or the Multi Mat will be slightly cut in the process. The most common approach to cutting when using the Multi Mat is to set the cut depth using the machine's micrometer or the "stacked material method" as described below and in the section on Profile Cutting. When using the micrometer, the material thickness should be measured with calipers. Keep in mind that some materials can vary in thickness and there may be areas that remain uncut. For a detailed explanation on the use of the micrometer for setting cutting depth, see Level 1 Example Job 4 in the Profile Cutting section.

Stacked Material Method

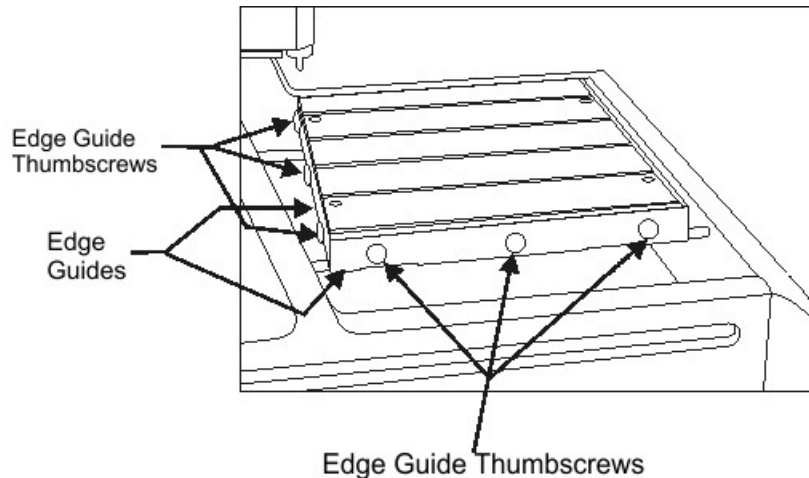
Many times, double sided tape can be a quick and very secure way to hold material down to the t-slot table. The downside to using tape is that it will remain on the table and can be a problem to remove. A better solution is to place Multi Mat material on the t-slot table, then place a piece of sacrificial material (of the same type as being cut) on top of the Multi Mat. Then apply double-sided tape to the sacrificial material and place the material to be cut on top of the sacrificial material. In this manner, while the machine is engraving or cutting other jobs, the sacrificial material/cut material can be removed and separated by the user, making better use of machine time and allowing for easier clean up. Note - if double-sided tape is used, be careful to cover a sufficient area to keep the material in place and also to hold smaller pieces in place so they do not move when the last section of the small piece is cut.

Spray Adhesives

Using a spray adhesive, in conjunction with "transfer tape" or "application tape" is yet another method often used. As with the other methods, place Multi Mat on the t-slot table. A piece of sacrificial material is then covered with transfer tape on its top surface and a spray adhesive is applied on top of the tape. Place the sacrificial material with the tape/adhesive side facing up on the Multi Mat material. Then, the material to be cut should have transfer tape applied to its back side and adhesive is sprayed on to the transfer tape. Place the material to be cut, tape/adhesive side down, on to the sacrificial material. This is a very secure way to cut through materials and once cutting is finished, the tape/adhesive can be easily removed from the back sides of cut pieces.

Edge Guides: The t-slot table edge guides need to be adjusted to the thickness of material that you are engraving. If they are higher than the material's surface, the nose cone may ride on top of the edge guides and the machine may not engrave characters completely.

Edge Guides (Side View)



To adjust the edge guides, loosen the edge guide thumbscrews and raise the edge guides above the surface of the T-slot table, then tighten the thumbscrews. Place the material on the table, then loosen the edge guide thumbscrews and lower the edge guides until they are even with (or just below) the material surface. Tighten the edge guide thumbscrews. This process should be repeated any time materials of different thicknesses are to be engraved.

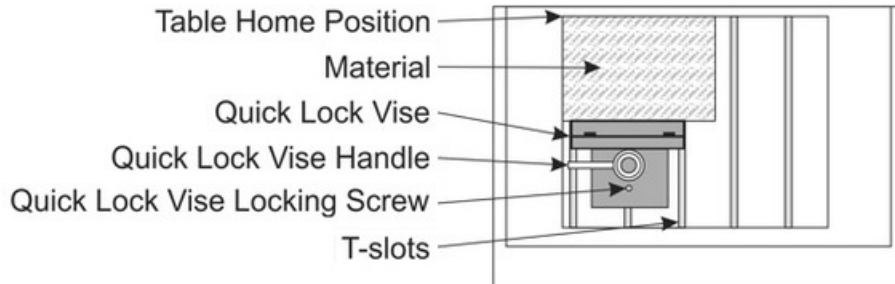
Quick Lock Vise

The Quick Lock Vise is used to clamp rigid materials against the top Edge Guide in order to prevent movement.

Put the material you would like to engrave on the t-slot table and push it to the home position corner. Next, loosen the quick lock vise locking screw and slide the quick lock vise so that there is about 1/16th inch gap between the edge of the vise and the material. Tighten the quick lock vise locking screw. Once this is done, the material can easily be secured by turning the quick lock vise handle. When changing the engraving material, simply loosen the quick lock vise handle, remove the engraved material, put the new material in and tighten up the quick lock handle.

Note: For larger pieces of material, you may need to put a small piece of double-sided tape on the t-slot table in the middle of the engraving material. This will keep the material from bowing in the center.

The quick lock vise will only work on square or rectangular materials. To hold down irregular shaped objects, you must use some other method. Ask your Vision Distributor or Vision if you need more information on this feature.



Vacuum Table

If your machine is equipped with a Vacuum table:

- a) Place a spoil board (sacrificial material) on top of the Vacuum table.
- b) Place your material on top of the spoil board.

NOTE: ALWAYS USE A SPOIL BOARD WITH THE VACUUM TABLE! CUTTING THRU MATERIAL MOUNTED DIRECTLY ON TO THE VACUUM TABLE CAN CAUSE PERMANENT DAMAGE TO THE TABLE.

Spoil board (Sacrificial material):

Fiberboard (MDF) is commonly used for spoil board because of its porosity and ability to allow air to flow thru it. The vacuum will pull air through the fiberboard and hold material in place. It is available in different thicknesses; such as 5/8", 1/2", 3/8", and 1/4".

Various densities of fiberboard provide different levels of vacuum.

- a) MDF (Medium Density Fiberboard) Most common, good air flow.
- b) LDF (Low Density Fiberboard) - Higher airflow than MDF.
- c) UL MDF (Ultra Lite MDF) - Higher airflow than LDF.

When working with a spoil board, it is best to fly-cut both sides. This removes the surface layer which can contain adhesives from manufacturing that may restrict air flow. It also will create a work surface that is flat in relation to the spindle. Thicker boards provide less hold down, but they can be fly-cut several times and be reused.

- a) Make sure you use the vacuum to hold the spoil board to the table.
- b) Purchase a fly cutting tool and fly-cut the entire area of both sides of the board.

NOTE: It is recommended to seal the edges of the spoil board with tape, or paint, to reduce the amount of vacuum lost along these edges.

Vacuum Table Operation

The vacuum table can be used to hold down most materials. If the material does not cover the entire table, place other flat, non-porous materials over the remaining area(s) to maximize vacuum. Areas left uncovered will reduce the amount of vacuum holding the material in place. Use caution when cutting out small parts. They may move when cutting is complete. Alternate holding methods or techniques may be required when cutting out small parts.

7.2 Level 1 Job Examples

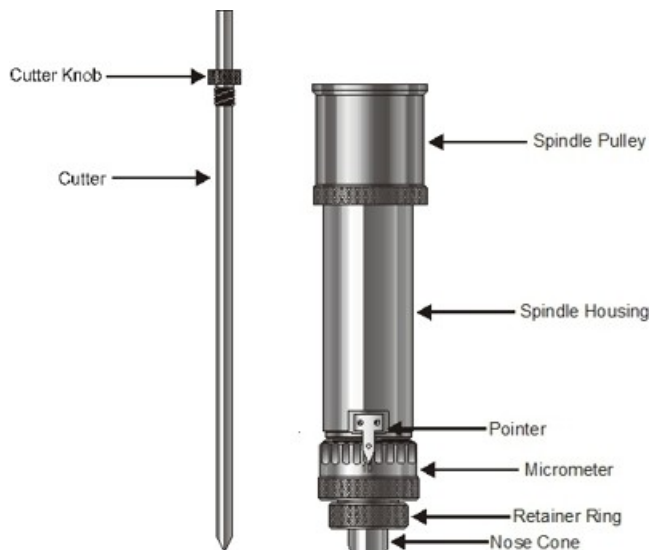
These first set of example jobs cover the basics of engraving and cutting. Starting with diamond drag engraving, the basic machine functions and software setup are discussed. By the last of these 4 examples, the user should be well acquainted with the machine and Vision software.

7.2.1 Diamond Drag Engraving

Engraving - Non Rotating

In this section, we will set up to engrave with a non-rotating cutter, such as a diamond drag cutter. The figure below shows a spindle with a diamond drag cutter.

Spindle with Diamond Drag Cutter



First, to install the diamond drag cutter, loosen the set screw on the cutter knob with the supplied cutter wrench and move the cutter knob to about the mid-point of the cutter tool, then lightly tighten the set screw. Note that the set screw on the cutter knob is NOT a standard Allen screw. It is a Spline Wrench. DO NOT attempt to turn the set screw with any tool other than the cutter wrench. Insert the cutter into the top of spindle and lower it until the cutter knob can be screwed into the spindle. The cutter knob is REVERSE threaded, so in order to tighten the cutter knob, turn the knob COUNTER-CLOCKWISE (when viewed from the top of the spindle) until it is hand tight.

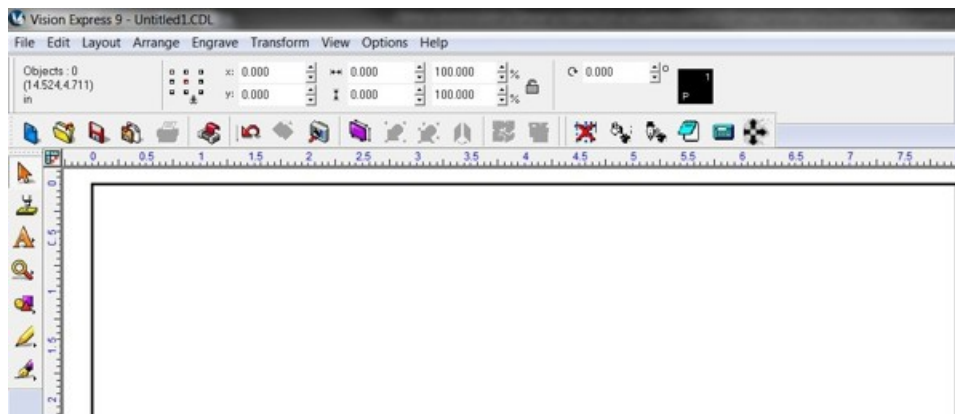
With your finger at the bottom of the nose cone, loosen the cutter knob set screw and lower the cutter so that the cutting tip extends below the bottom of the nose cone by approximately 1/4 inch (6 mm). Then tighten the cutter knob set screw.

Turn the Controller's power switch on. Set up the job you would like to engrave in the Vision Software (for an example job, please refer to the following section). Place the material on the t-slot table. In this type of engraving, the Proximity Sensor is used and will sense when the cutter tip contacts the material, then adjust the Z-Axis height and cutting pressure automatically. Also, the spindle does not need to rotate. The Vision software material selection (shown in the next section) will preset the engraver to turn the spindle rotation off and turn the proximity sensor on.

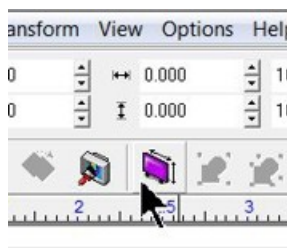
7.2.1.1 Example Job 1 - Diamond Drag

In this first example, Diamond Drag engraving will be performed on a 3" x 2" plate. The material used for this example application is black painted aluminum.

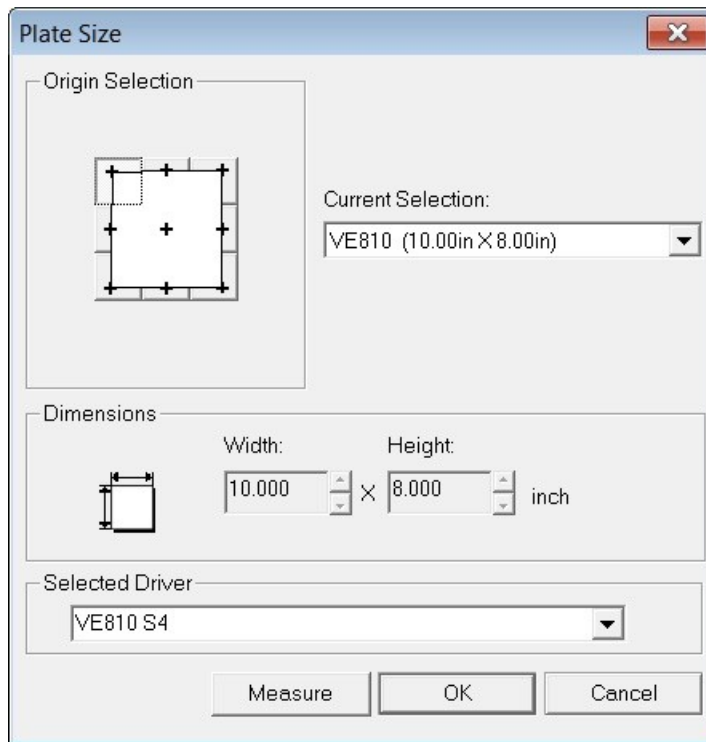
Starting with a new file in Vision Express 9 software, the first step is to adjust the plate size to match the plate to be engraved.



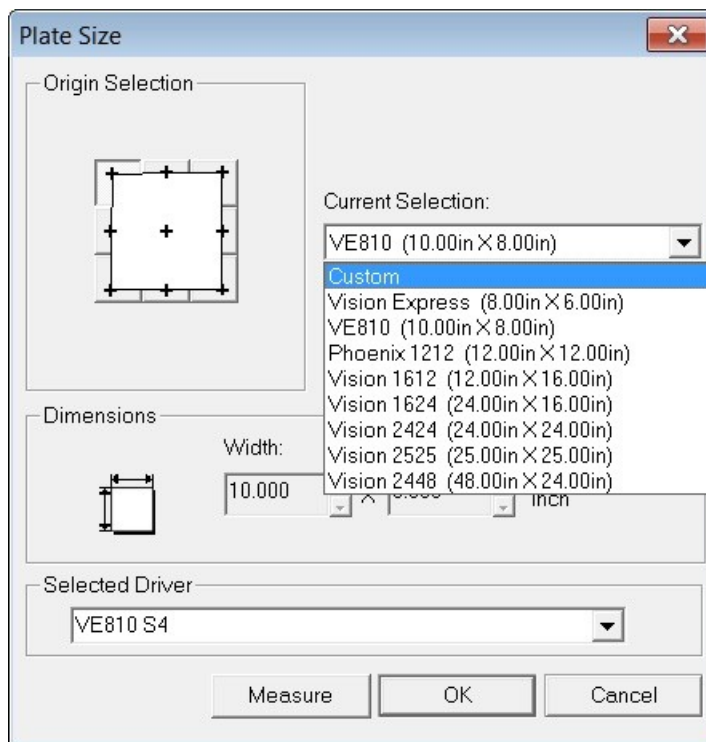
Click on the Plate Size icon.



The Plate Size window will appear.

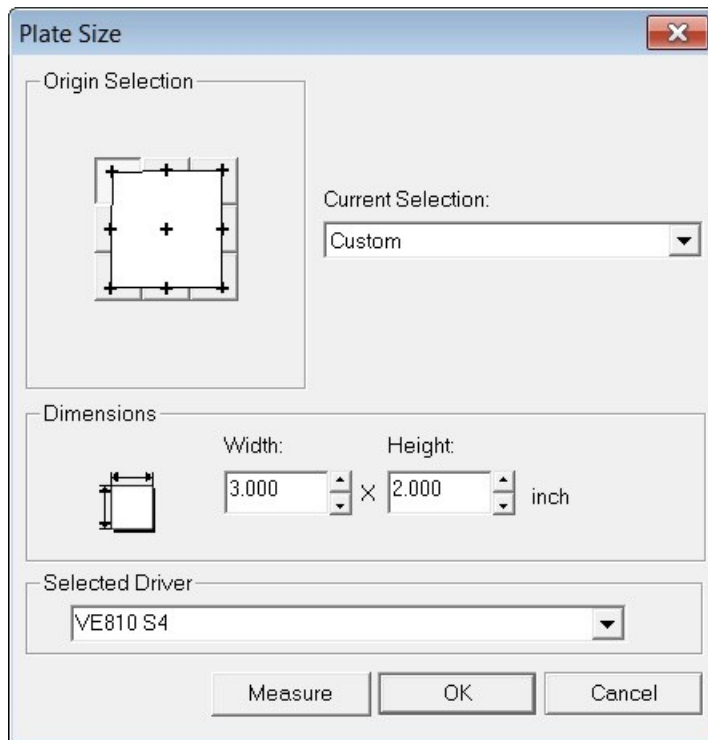


Click on the Current Selection drop down list and select Custom.

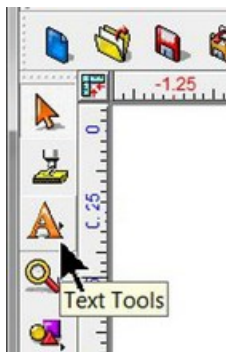


Enter the plate size to be engraved - for this example 3" x 2", and **select the appropriate driver for**

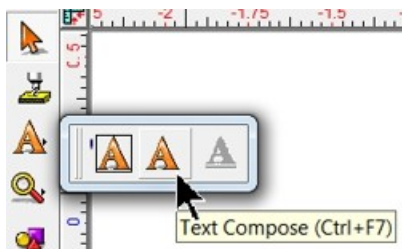
your machine in the **Selected Driver** drop down list. (VE810 S4 shown).



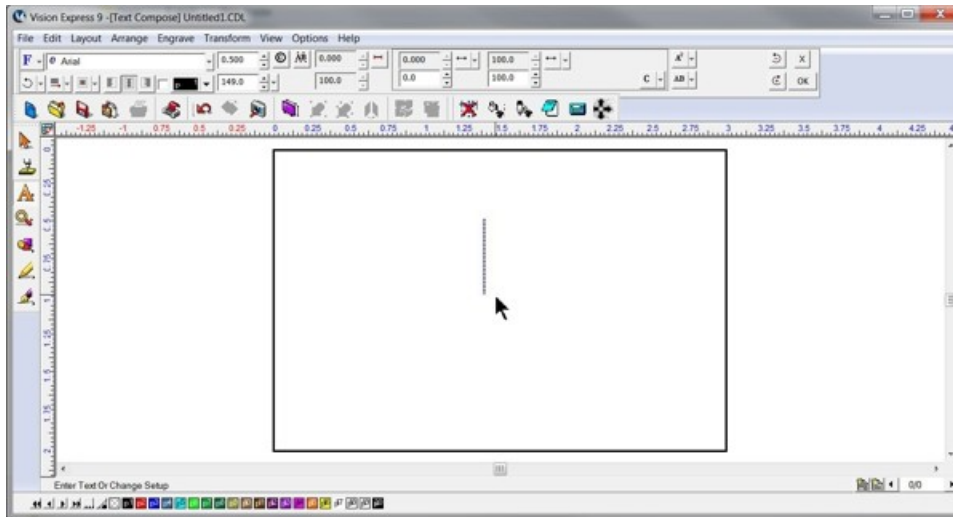
To add text, click on the Text Tools icon.



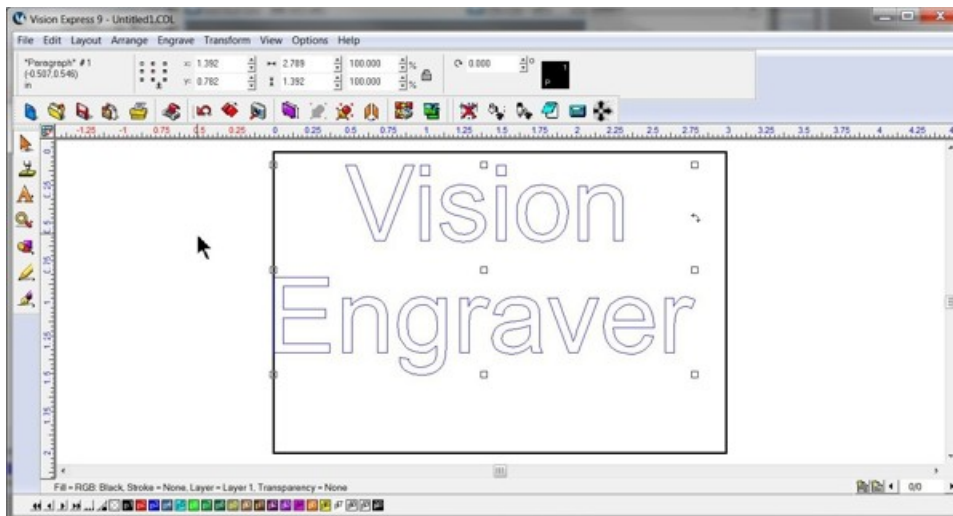
The flyout icons will appear, then select the Text Compose icon.



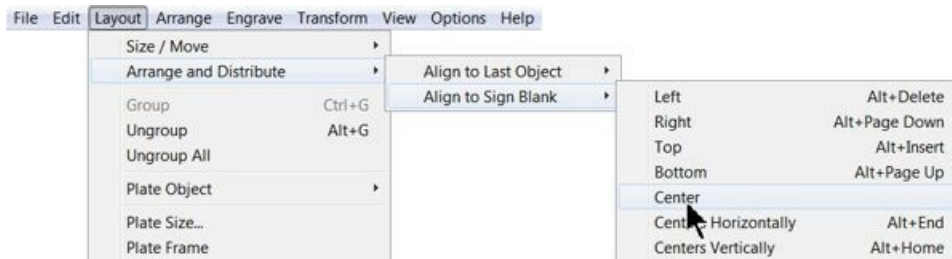
Click somewhere in the drawing to begin typing text. Note that on the top toolbar, the various font editing fields have appeared. The user should become familiar with the various ways fonts can be formatted with the toolbar options. For this example, the only change was for the font height, which was set to 0.500".



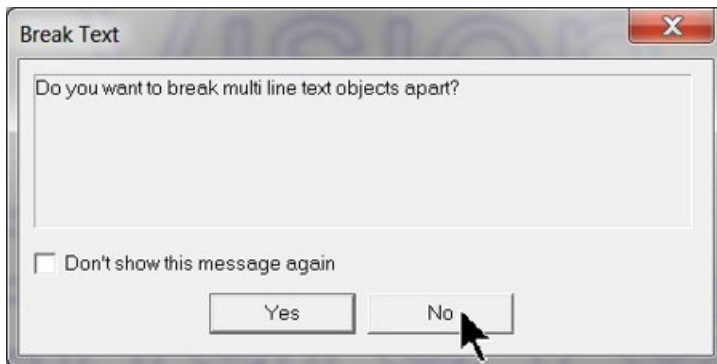
Begin typing text to be engraved.



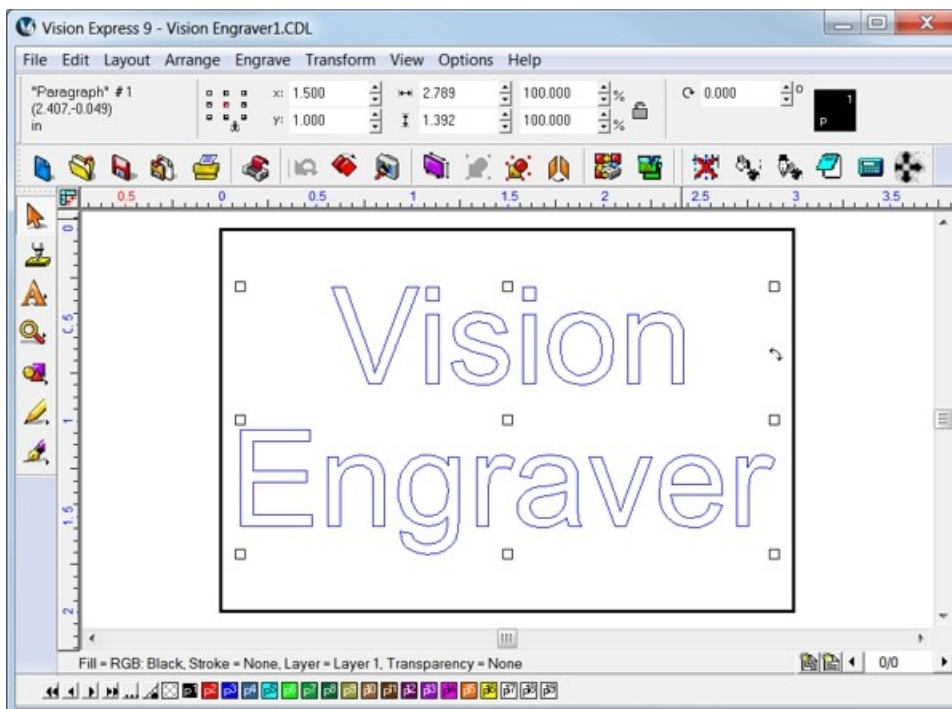
In order to align the text to the center of the plate, select Layout → Arrange and Distribute → Align to Sign Blank → Center (as shown below) from the top toolbar. Note that there are several ways to align objects within the Vision software.



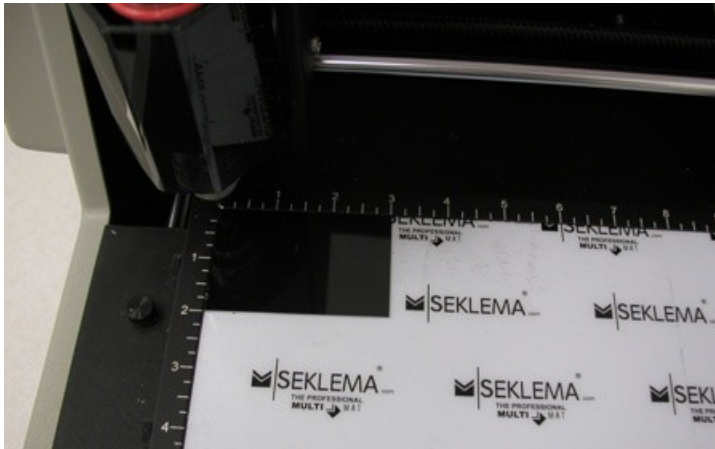
The Break Text warning may appear. If so, select No. If Yes is chosen, and more than one line of text has been entered, each line will align on top of one another in the center of the plate.



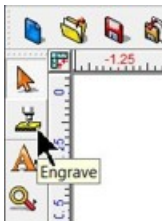
At this point, the screen should appear as below.



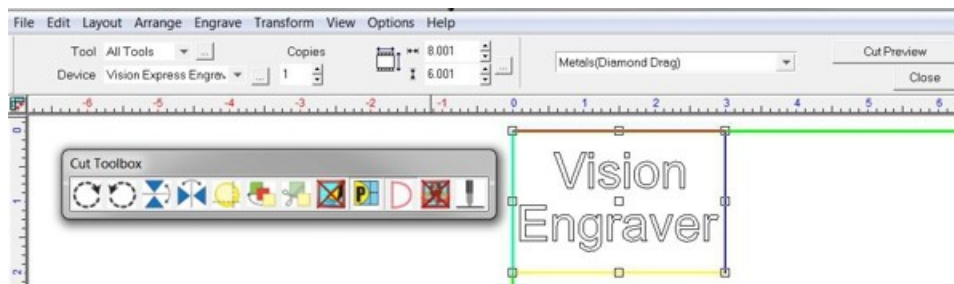
Next, the material should be placed on the engraving table, with the upper left corner of the material positioned in the home position (upper left corner of the engraving table). Note that the Multi Mat material has been placed on the t-slot table in order to hold the engraving material in place.



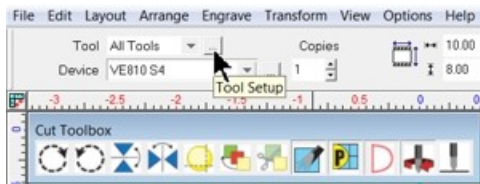
Select the Engrave icon from the left toolbar.



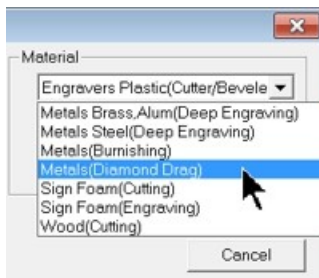
The Cut Toolbox will appear and the options for engraving will appear on the top toolbar.



Verify the Device chosen is for your machine, then open the Tool Setup window by clicking on the icon shown below (which is to the right of the Tools drop down list).



Select the appropriate material from the Material Selection drop down list. In this example, the material - Metals(Diamond Drag) is selected.



Since we are running a file for the first time, we will select the Dry Run option from the Cut Toolbox.



Make sure the "D" appears by selecting it. The default is "Off" for the Dry Run, which will engrave the plate. We want to make sure our file has been set up properly in this example and that the material is positioned correctly.

NOTE - Dry Run Operation - There is an offset between the spindle and the red laser pointer of approximately 0.40 inches (10.1 mm) in the X and 0.55 inches (14 mm) in the Y directions. If the characters to be engraved extend beyond the machine's table size, the file will not run because the motion system would have to move beyond its limits.

When ready to send the file to the engraver, make sure the power switch is turned on and the machine has initialized (the Goto Home message has appeared and you've pressed Goto Home), then select the Engrave icon from the Cut Toolbox.



Note - keeps hands and other loose objects away from the engraver during operation.

Press the Start Button on the controller to begin the Dry Run. The Dry Run feature will automatically activate the red dot laser pointer and show the user where the machine will engrave.

Note - If the spindle turns, or begins to drop toward the material, either press the Pause Button or the Stop Button on the machine. If either of these occur, make sure that Dry Run was selected in the Cut Toolbox (shown as the letter "D") and that the spindle has not been turned

on. The Spindle icon on the Cut Toolbox is show below for reference.

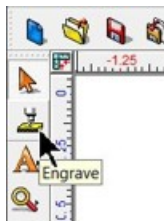
Spindle icon (shown as disabled)



Red Laser Pointer



If the file and material appear to be positioned properly and you are ready to engrave, select the Engrave icon from the left toolbar, turn off the Dry Run option and check to make sure the Proximity Sensor (see the Prox icon below) is enabled, then select the Engrave icon on the Cut Toolbox to send the file to the engraver.



Engrave icon (from toolbar)



Dry Run Off



Prox icon (shown as enabled)



Engrave icon

Make sure the material is positioned properly and secured on the engraving table, then press the Start Button on the controller to begin engraving.

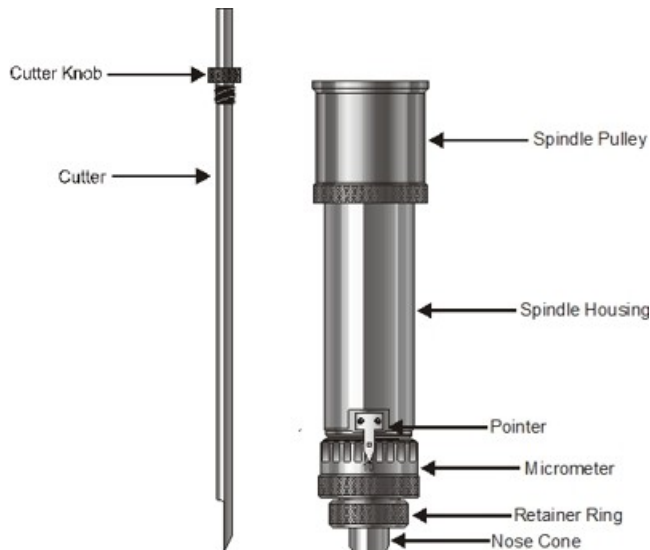
The finished piece should appear as shown below.



7.2.2 Rotary Engraving

In this section, we will set up to engrave with a rotating cutter. The figure below shows a spindle with a rotary cutter.

Spindle with Rotary Cutter



First, to install the rotating cutter, loosen the set screw on the cutter knob with the supplied cutter wrench and move the cutter knob to about the mid-point of the cutter tool, then lightly tighten the set screw. Note that the set screw on the cutter knob is NOT a standard Allen screw. It is a Spline Wrench. DO NOT attempt to turn the set screw with any tool other than the cutter wrench. Insert the cutter into the top of spindle and lower it until the cutter knob can be screwed into the spindle. The cutter knob is REVERSE threaded, so in order to tighten the cutter knob, turn the knob COUNTER-CLOCKWISE (when viewed from the top of the spindle) until it is hand tight. Then, you must zero the cutter. To do this, you must first turn the micrometer so that the pointer points to 0. Note - it is helpful to first turn the micrometer to the left (clockwise) until threads just start to appear on the spindle. This will be about 3 - 4 full turns of the micrometer from it's uppermost position. This allows for sufficient depth adjustment when turning the micrometer to the right.

With the machine powered off, take a scrap piece of material and push it up underneath the nose cone and hold it there. As an option to this method, jog the spindle over your material and lower the spindle until the nose cone come in contact with your material by using the Z jog button. Loosen the cutter knob set screw and push the cutter down until it just touches the material. Tighten the cutter knob set screw. The cutter is now zeroed.

To run a job, turn the machine on, then set up the job in the Vision Software. (For more information on this, see the example job file in the next section). Put the material on the t-slot table as described in the previous section.

Adjusting Depth of Cut

Cutting depth depends on the type of material being engraved. Generally, manufacturer's of engraving plastic provide recommendations for cut depth. If a recommended depth is unavailable, trial and error can be used to find the appropriate cut depth. Since the depth is set to zero at this time, in order to increase cut depth, the micrometer at the bottom of the spindle should be rotated to the right (counter-clockwise when viewing from the top of the spindle). To set a depth of 0.010 inches (0.25 mm) turn the micrometer to the right 10 clicks. Each "click" of the micrometer is 0.001 inches (0.025 mm). Run a job with an initial setting of 0.005 - 0.010 inches (0.12 - 0.25 mm). After the job has run for a short time, press the Pause Button on the front panel, then adjust the micrometer for more or less depth, depending on the whether the engraving is acceptable. Note - be careful not to set the depth of cut greater than the material thickness. This will cut completely through the material and potentially cut into the t-slot table. Press Start to resume engraving and to determine if the depth is appropriate.

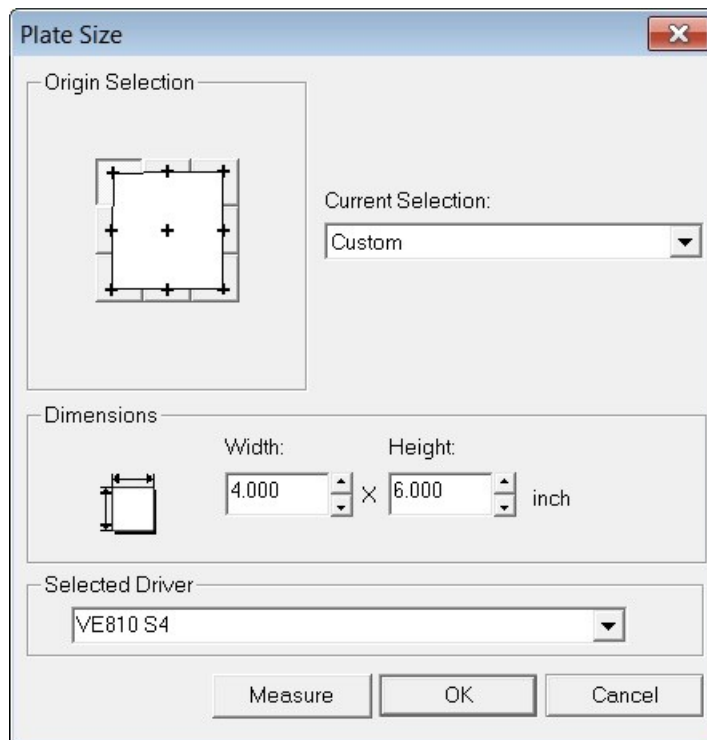
For a detailed example of running an rotary engraving job, please see the following section.

7.2.2.1 Example Job 2 - Rotary Engraving

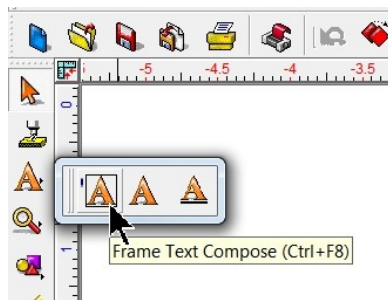
In this example, a sign will be made using engraver's plastic. The piece is pre-cut and measures 4 inches x 6 inches (100 x 150 mm).

Note - In this application, it is highly recommended to use the Vacuum Chip Removal System as described in the Optional Accessories section. The process of engraving or cutting plastics, acrylics, sign foam and wood, produces a significant amount of debris that can clog the nose cone and/or get trapped between the nose cone and the material, which will cause engraving/cutting depth inconsistencies as well as potentially scratch the surface of the material. The Vacuum Chip Removal System significantly reduces these problems and provides for a cleaner work area.

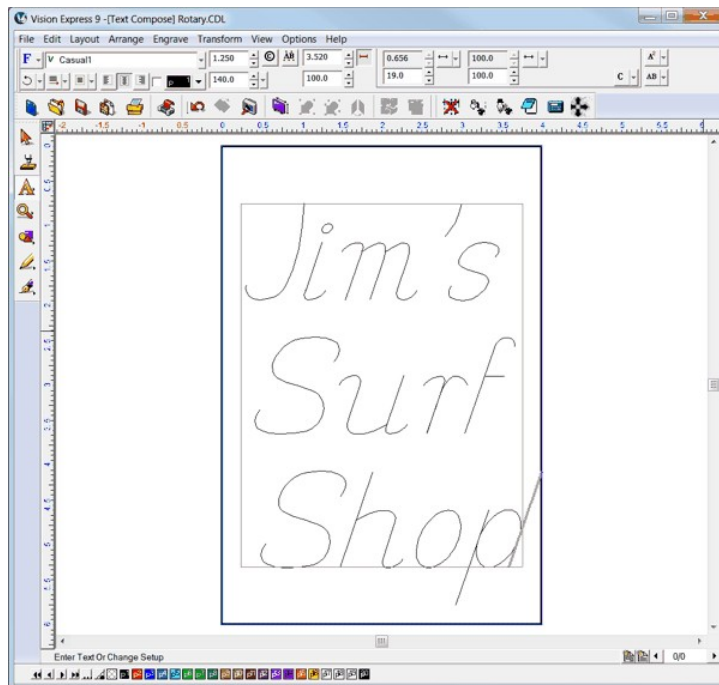
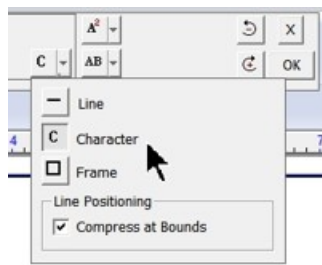
As with Example Job 1, the first step is to set the plate size in the Vision 9 Express software. Create a plate that is 4 inches wide x 6 inches high and make sure that the driver selected is for your machine.



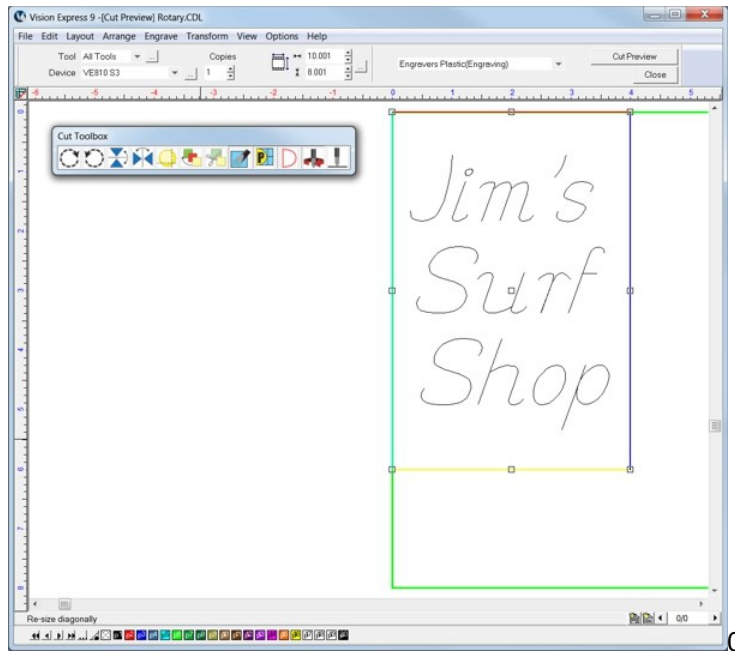
Enter text using the Frame Text Compose tool as shown below.



With this tool selected, text will automatically be centered and have automatic Kerning. In the below example, Character Mode was selected from the top toolbar and the font was changed to Casual1, with a height of 1.250 inches and a slant of 19 degrees. The top and center lines are left justified and the bottom is center justified in order to produce a sloping look to the sign.

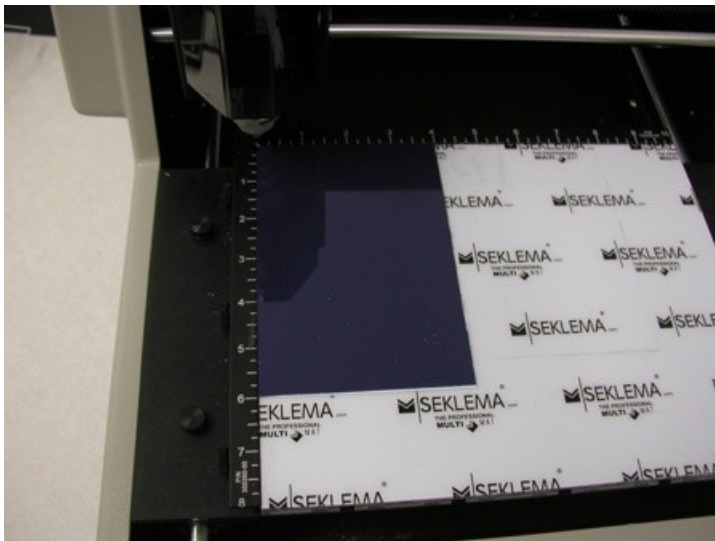


Once the file has been set up, select the Engrave Icon, open the Tool Options window and select Engravers Plastic(Engraving) from the Materials drop down menu. In the picture below, the Cut Toolbox shows that the Vacuum, Prox, Dry Run, and Spindle are all enabled. Since this is the second example job, sending a Dry Run job to the engraver is suggested. Select the Engrave Icon to send the file to the engraver.



If the Dry Run showed no set up errors, the job can be re-sent to the engraver with the Dry Run disabled.

Place the material on the table (shown with Multi Mat on the t-slot table to hold the engraving material in place), and press the start button on the machine to begin engraving.



NOTE - The design of the Vacuum Chip Removal System is to clear the debris away from the engraved material and prevent the chips from scratching the surface of the material during operation, and/or getting trapped between the nose cone and the material (when using the proximity sensor function) and causing the engraver to not engrave to the proper depth.

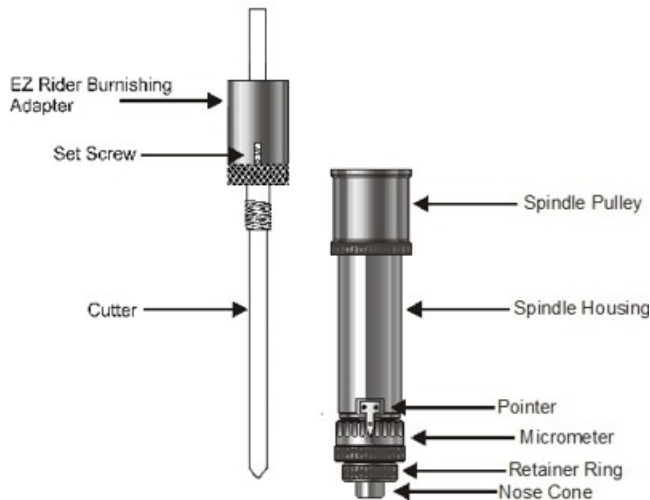
When the file is complete, remove the material from the table. HINT - Use a light bristle brush to clean out any debris that may remain in the engraved characters.



7.2.3 Burnishing

In this section, we will set up to engrave with a burnishing cutter. The figure below shows a spindle with a burnishing cutter and an optional EZ Rider burnishing adapter.

Spindle with Burnishing Cutter and EZ Rider Burnishing Adapter

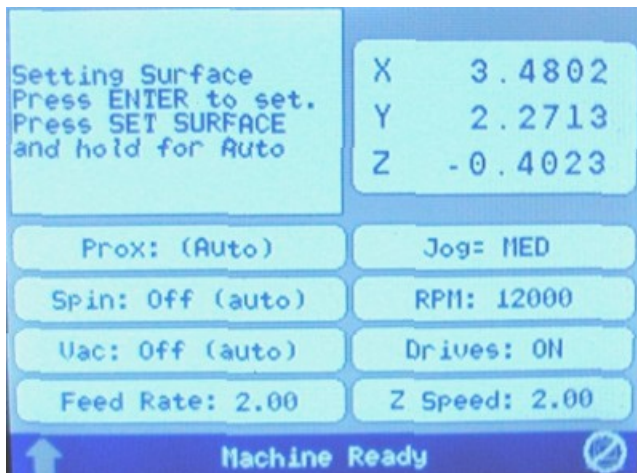


Burnishing is different than standard rotary engraving mainly because the nose cone is not used to set the depth of cut. Burnishing does not actually cut deep into metals, rather it cuts the painted surface off of metals. To effectively burnish, it is recommended to use an optional EZ Rider burnishing adapter. This helps to control the pressure of the cutter applied to the material. Burnishing requires less pressure than other types of engraving and the EZ Rider attachment applies the proper amount of pressure for burnishing.

Installing the EZ Rider is similar to using a cutter knob. First, screw the EZ Rider into the top of the spindle hand tight. Next, insert the cutter through the EZ Rider and spindle so that the cutter sticks out below the nose cone approximately 1/8 inch (3 mm). Tighten the set screw in the EZ Rider to hold the cutter in place.

In order to set the engraver up for burnishing, we will need to perform a "Set Surface" function. Turn the machine on and place the material on the table. Follow the steps below to perform the Set Surface procedure.

- a) Use the X & Y jog buttons to move the spindle over the material to be engraved.
- b) Press the Set Surface button. The Pendant screen will display the message below



c) Lower the spindle with the Z down jog button until the cutter tip touches the engraving material, then continue moving the spindle down for another 0.030 - 0.050 inches (0.75 - 1.25 mm). This is called "pre-loading" the adapter. Pre-loading the EZ Rider Burnishing Adapter sets the pressure applied by the cutter on to the material. More or less pre-load can be used, depending on the material to be engraved. The Z position shown on the Pendant screen can be used to view the Z position, and assist in the pre-loading procedure.

d) Press the Enter button to set this as the surface position. The spindle will then move up to its lift position.

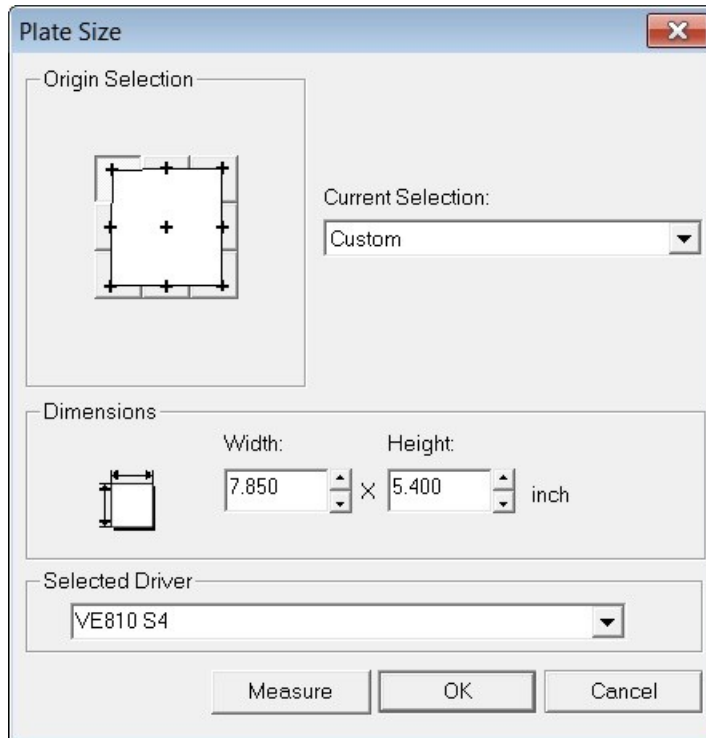
HINT: It is sometimes easier to set the surface right before engraving the job. To do this, send a job to the machine to be engraved. Press Pause. Press Start. The spindle will move to the first point to be engraved and pause. You can then jog the Z down until it touches the surface and press Enter to set the surface. Pressing Start will then begin the engraving process.

In the following example job, a burnishing file will be set up and run on coated brass material.

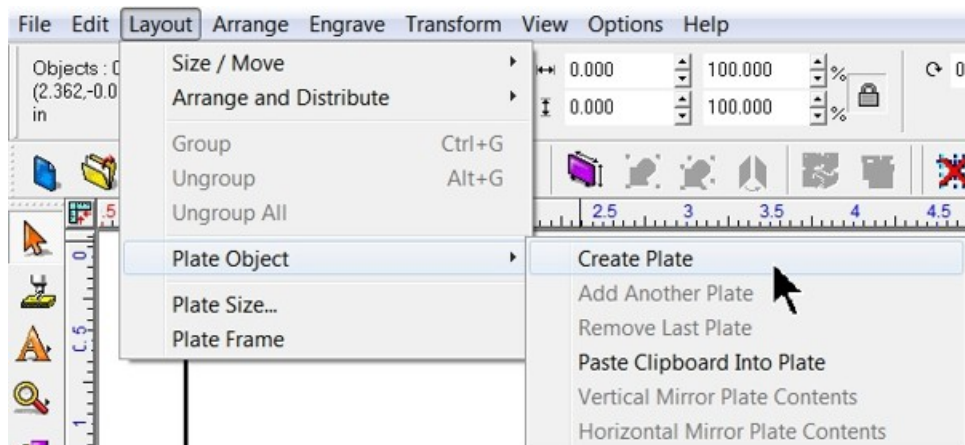
7.2.3.1 Example Job 3 - Burnishing

In this example, another feature in the Vision Software will be introduced. We will create a Plate Object in order to create multiple items with different text engraved on a single 7.85 x 5.4 inch (199.4 x 137.2 mm) piece of coated brass (also known as black brass or trophy brass). The plate will use a text import function from an external text file that will be copied into a plate template and the Vision software will automatically format the imported text.

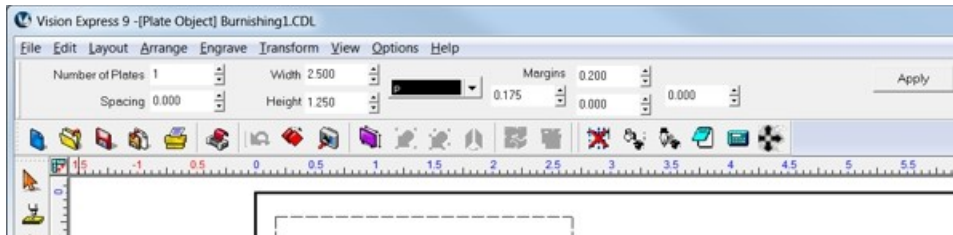
Begin by selecting the Plate Size Icon and setting the engraving area to a custom plate size with a 7.85 x 5.4 inch area.



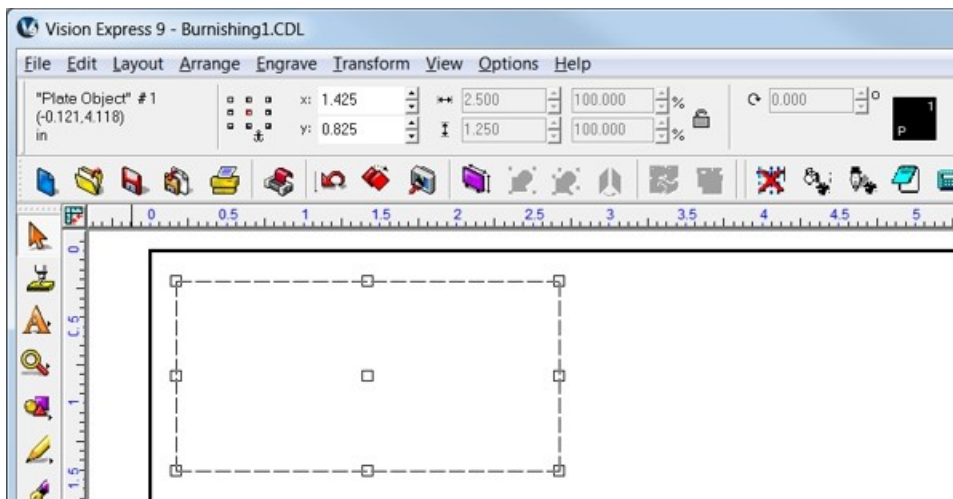
To create the Plate Object, select Layout → Plate Object → Create Plate from the top toolbar menu.



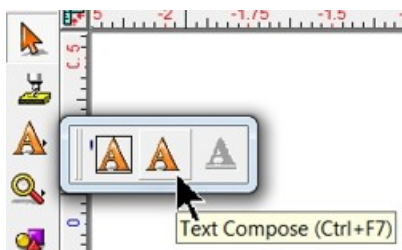
Adjust the number of plates to 1, leave spacing at 0.000 inches, width and height to 2.500 and 1.25 inches, set the left margin to 0.175 inches and the top margin to 0.200 inches as shown, then click on Apply. Note that the page margins on the toolbar are located such that the top field is for the top margin, the left field is the left margin, etc.



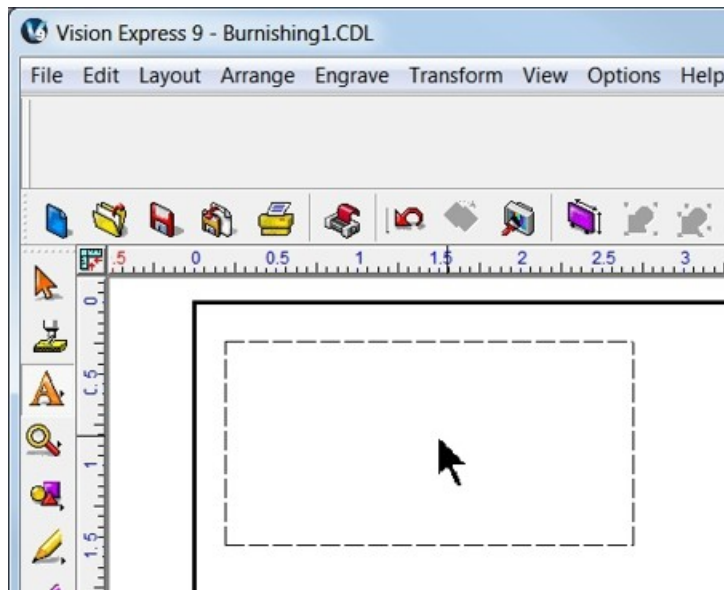
The screen should then appear as below.



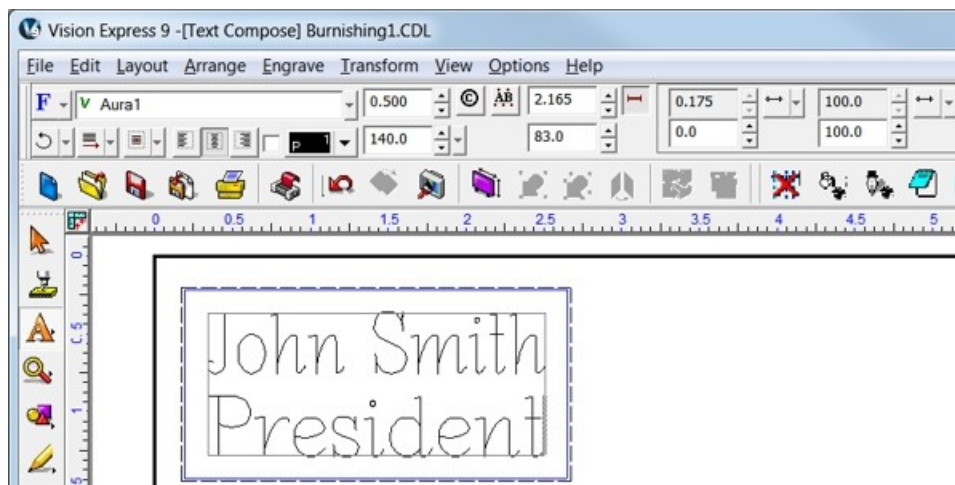
Select the Text Compose Icon.



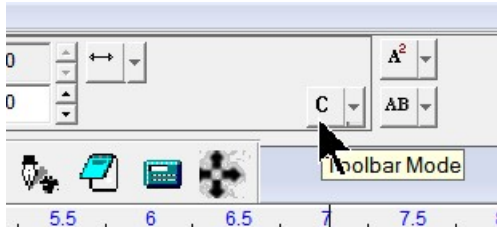
Click in the middle of the Plate Object.



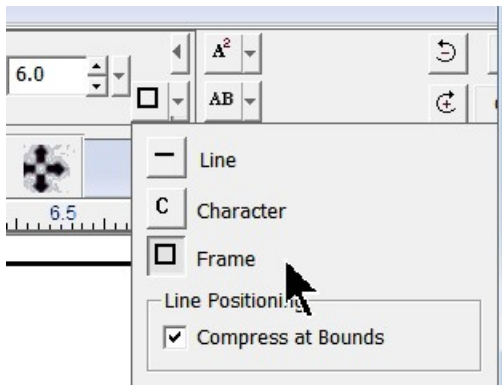
Enter any text in the format you wish to use. In this example, two lines of text are entered as variables (it does not matter what you type. The text entered is only for formatting and will be replaced with the text imported from the .txt file).



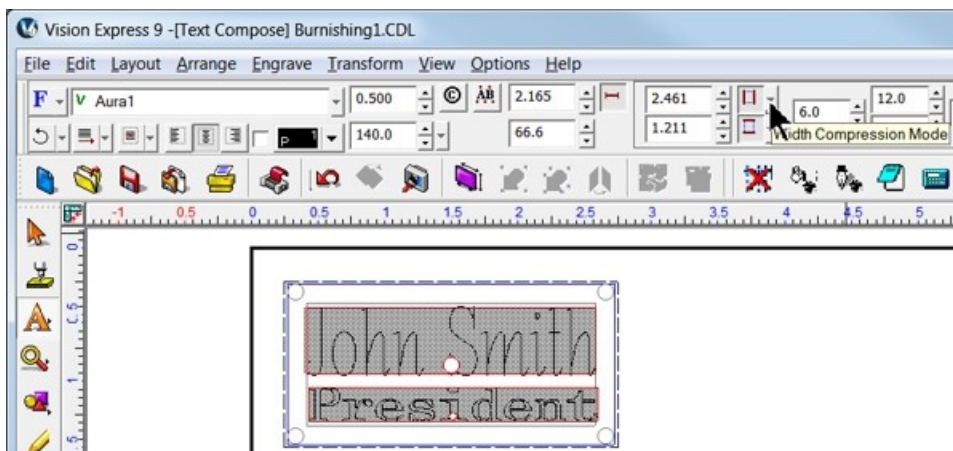
Each line of text can be independently set for font and size. Highlight the text to be changed, then from the font list on the top toolbar, choose the font to be used for the selected text and double click on the font name. If the size or other parameters need to be revised, use the toolbar fields to modify the font style. Please note that in this example, the Width Compression for the text was adjusted. In order to adjust the Width Compression, select the text, then click on the Toolbar Mode icon (shown below).



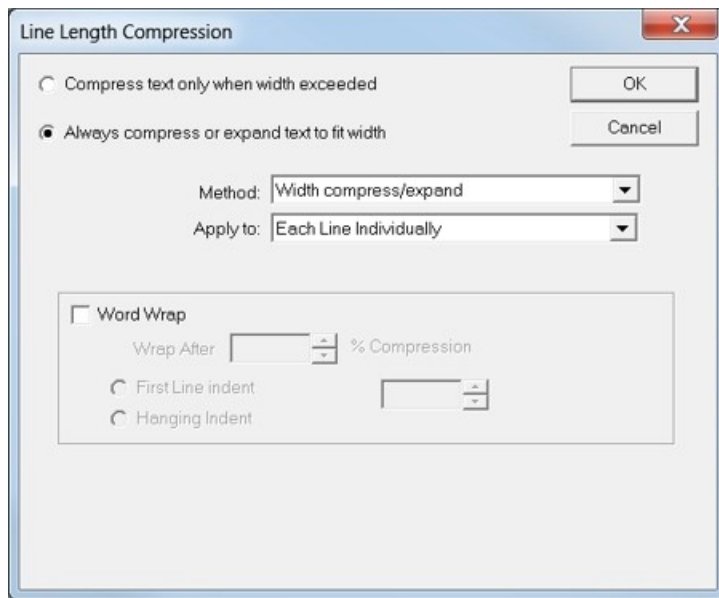
Select Frame mode.



Select all text and select the Width Compression Mode by clicking on the drop down list (as shown).

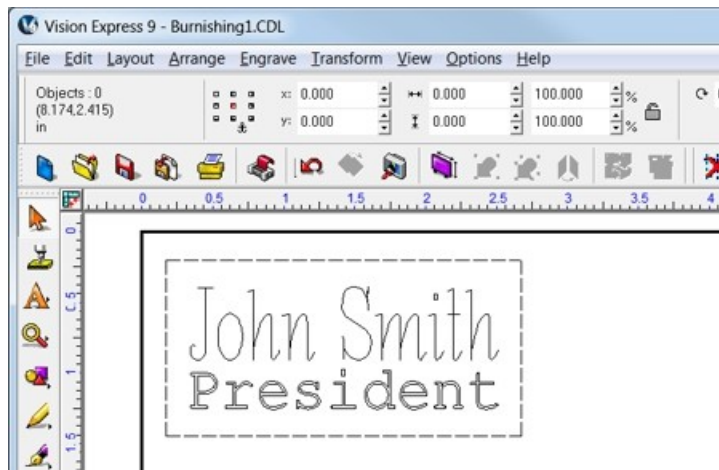


Change the settings to Always compress or expand text to fit width, Method: Width compress/expand, and Apply to: Each Line Individually. Deselect Word Wrap, then select OK.

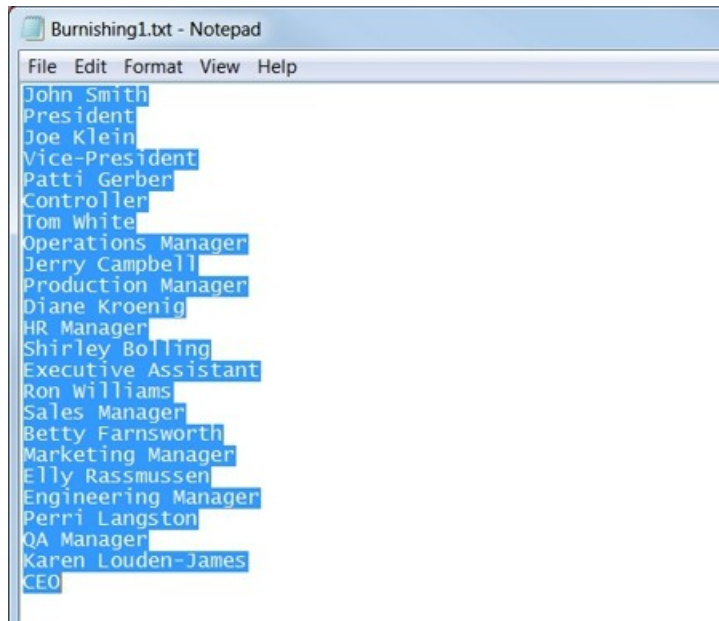


For a detailed description of all the font modifications possible, refer to the Vision software help or user manual.

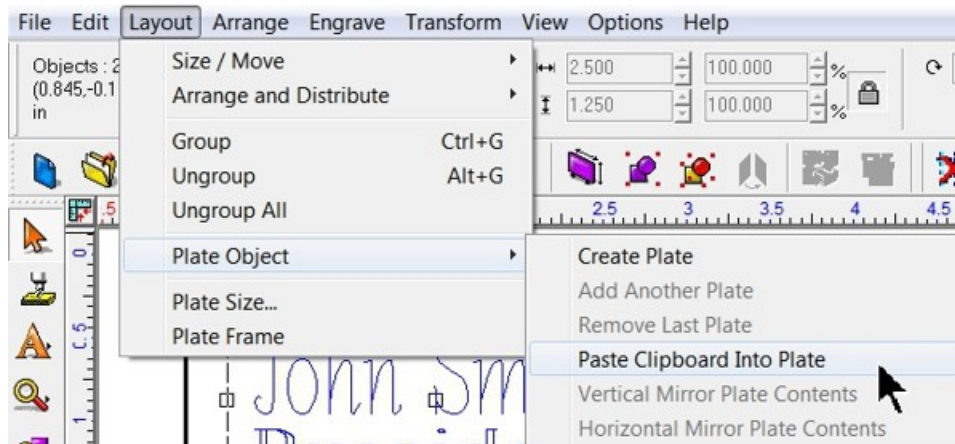
Once changes have been made, deselect text mode by clicking in any open area of the screen, away from the plate object.



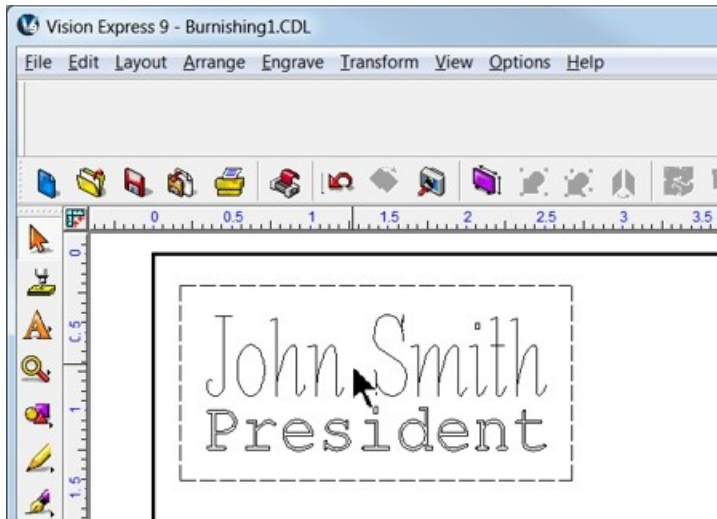
In this example, a text file was created in order to copy and paste the variables into the Vision software. Highlight the text and select copy from the edit menu (or right click and select copy). Note that in this example, the two variables are entered as subsequent lines in the text file and that there may be difficulties when importing from other file formats. A simple text file created in Windows Notepad is suggested.



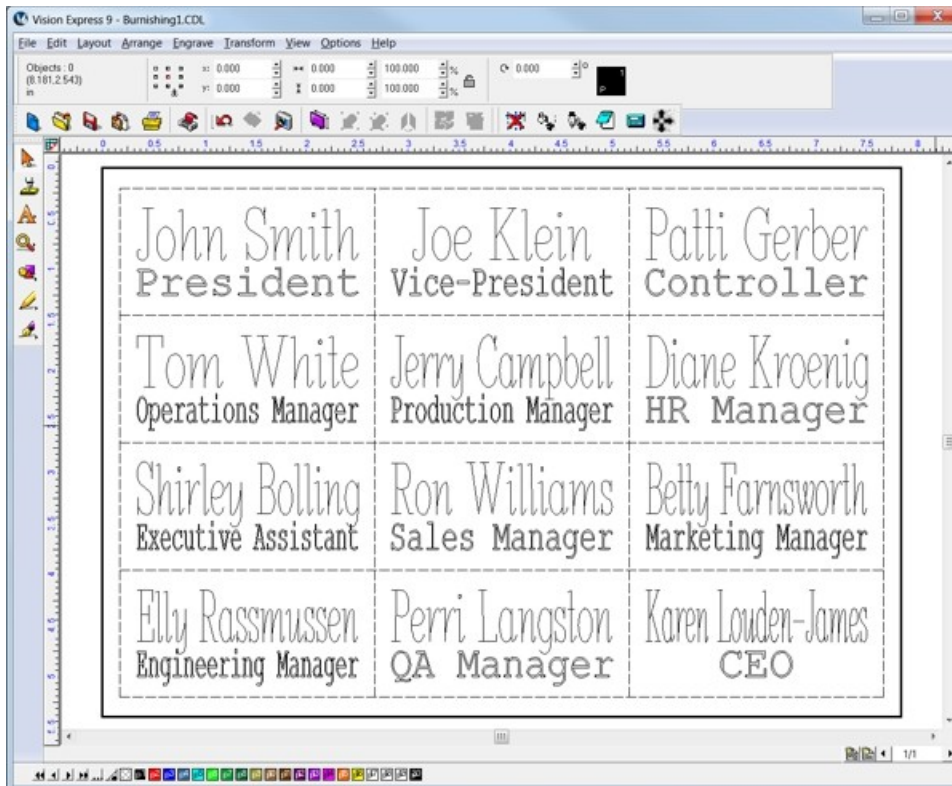
To insert the copied text, select Layout → Plate Object → Paste Clipboard Into Plate.



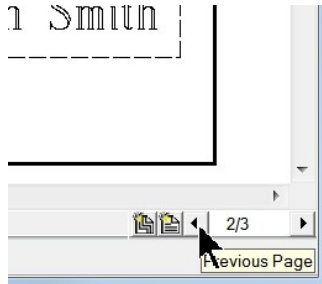
Click in the center of the plate.



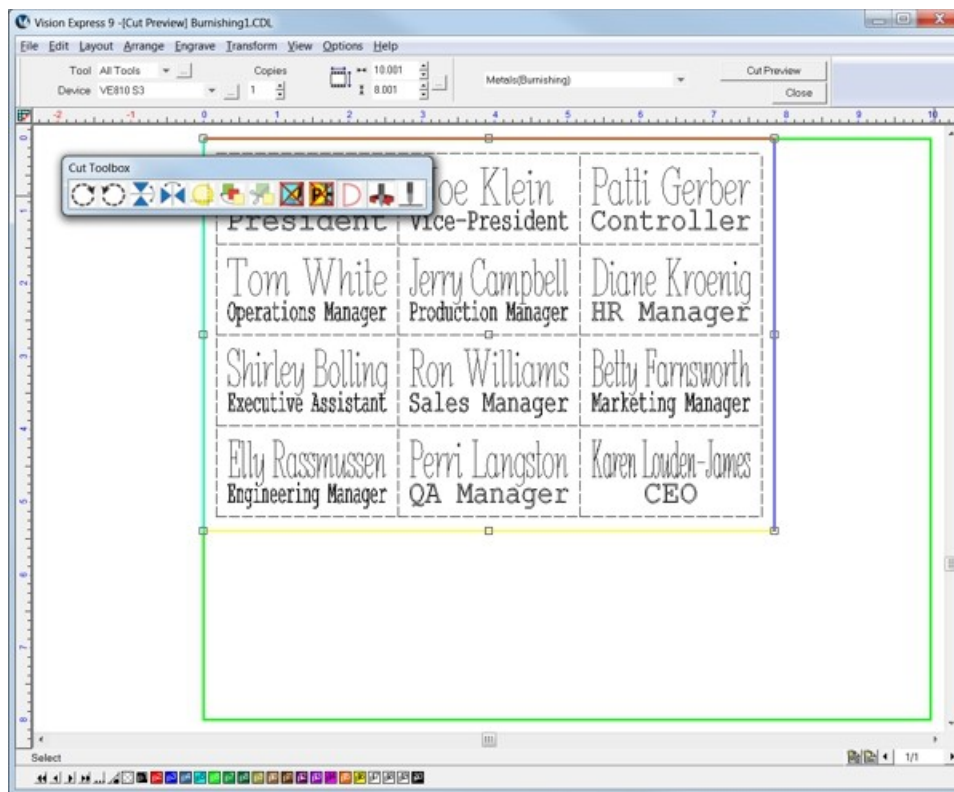
After clicking in the center of the plate, all fields are merged and multiple plate objects will be created based on the number of text variables selected.



Also, if there are more variables than can be fit into one plate in the Vision software, multiple plates (or pages) are automatically generated for individual output to the engraver. The lower right corner of the Vision software screen allows the user to view the individual pages. During the Engrave operation, the user will select the page to be sent to the engraver.

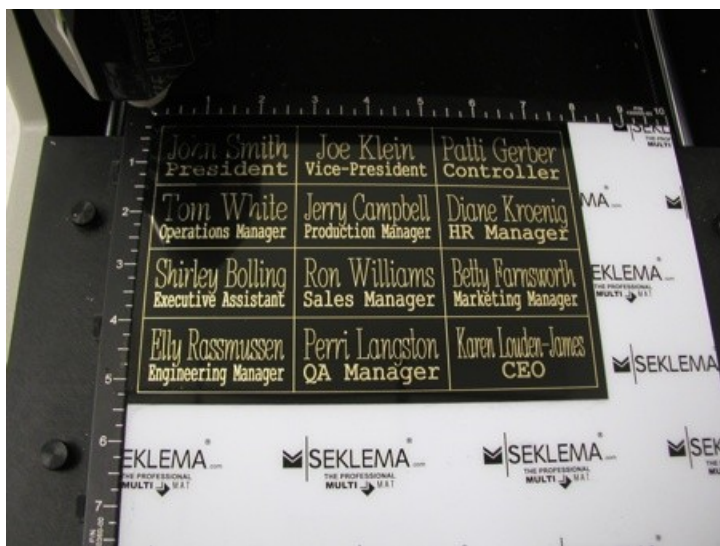


To finish this example job, set up the engraver for a metal burnishing application as described in the previous section and select the Engrave icon from the left toolbar. If you choose to run a Dry Run (as shown) to make sure the setup is correct, proceed as in prior sections to send the file to the engraver. Make sure you have performed the set surface procedure as well.



Note that if the plate objects are left as part of the file sent to the engraver, they will engrave as well. If this is not desirable, simply select the plate object within the Vision software and delete it prior to sending the file to the engraver. Alternatively, the plate object may be changed to a different color than the text to be engraved, or you can print selected objects by changing a setting in the Engrave → Engraving Default screen from the top menu bar. The Engrave by Color option is discussed in the next example job.

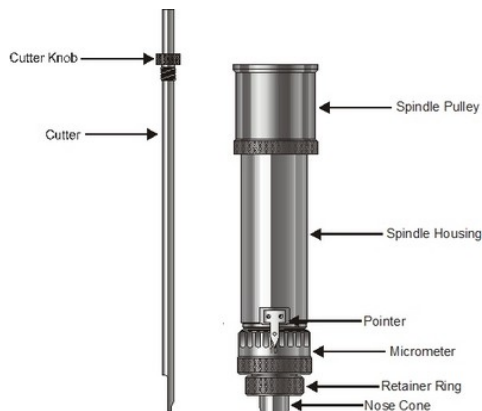
In this example, the plate object lines were engraved.



7.2.4 Profile Cutting

In this section, we will set up to engrave with a standard engraving cutter and cut completely through engraver's plastic with a cutter/beveler. The cutter/beveler is used to create a contrast on the edge of the cut material. The figure below shows the spindle with a rotary cutter/beveler.

Spindle with Rotary Cutter/Beveler



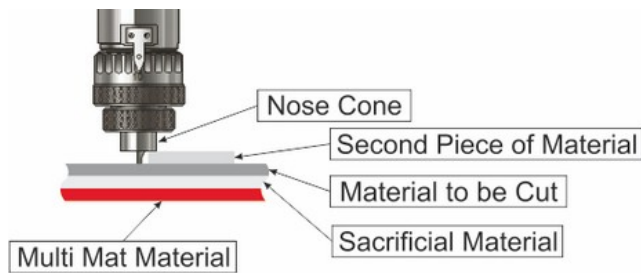
First, to install the rotating cutter, loosen the set screw on the cutter knob with the supplied cutter wrench and move the cutter knob to about the mid-point of the cutter tool, then lightly tighten the set screw. Insert the cutter into the top of spindle and lower it until the cutter knob can be screwed into the spindle. Tighten the knob COUNTER-CLOCKWISE (when viewed from the top of the spindle) until it is hand tight. Then, you must zero the cutter. To do this, you must first turn the micrometer so that the pointer points to 0. Note - it is helpful to first turn the micrometer to the left (clockwise) until threads just start to appear on the spindle. This allows for sufficient depth adjustment when turning the micrometer to the right. Zero the cutter, then set the engraving depth as described in the Rotary Engraving section. You will then need to set the cutting depth of the cutter/beveler tool.

Setting Cut Depth for Cutter/Beveler Tool - Standard Method

If you have measured the thickness of the material to be cut, you can adjust the micrometer in two ways - 1) adjust the cutter to cut through the material PLUS 0.001 - 0.003 inches (0.0250 - 0.075 mm). This method will produce a clean cut of the parts and lightly cut into the sacrificial material underneath, or 2) adjust the cutter depth to cut through the material MINUS 0.001 - 0.003 inches (0.0250 - 0.075 mm). This will create a "kiss cut" that will leave a very thin amount of material which holds all of the parts together, then the parts can be snapped apart after removal from the engraver. This second method is ideal in production environments where part handling is an issue.

Alternate Method For Setting Cut Depth for Cutter/Beveler Tool - "Stacked Material Method"

As an alternate to dialing the micrometer 50 or 60 clicks to set the cut depth on 1/16th inch plastics (or up to 130 clicks for 1/8th inch material), this second method utilizes a second piece of the same kind and thickness of material to be cut to set the cut depth. Refer to the below diagram - the material to be cut is placed on top of the sacrificial material/Multi Mat materials. The material to be cut is held in place either with double sided tape or by the spray adhesive/transfer tape method detailed in the Holding Down Materials section. Then a second piece of material is placed on top of the material to be cut. The nose cone is lowered on top of the second piece of material (near its edge) and the cutter is adjusted downward until it touches the top of the material to be cut. This, in effect, sets the cut depth to match the material thickness. The cutter knob set screw is tightened, then the micrometer is adjusted, either for a through cut (turning clockwise) or a kiss cut (turning counter-clockwise), 1 - 3 clicks.



Holding Down Material

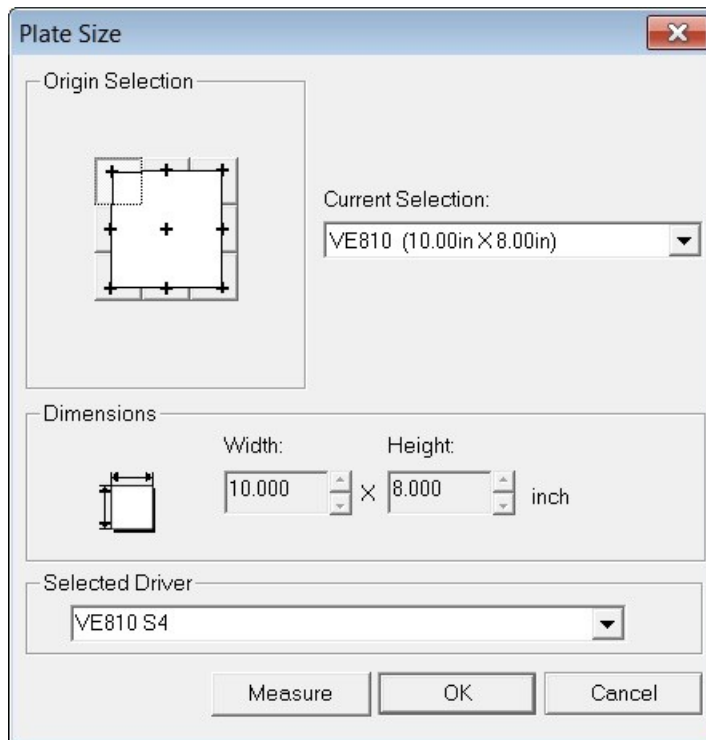
Secure the material on the t-slot table. It is best to use Multi Mat to hold the material in place, but keep in mind that since we are cutting completely through, there will likely be cut marks into the Multi Mat when the job is complete. A better procedure is to use a piece of sacrificial material on top of the Multi Mat. DO NOT place the material to be cut directly on the t-slot table. If you do, then the cutter will cut into the t-slot table and permanently damage the surface. Other methods for holding material down are in the section Holding Down Material.

7.2.4.1 Example Job 4 - Profile Cutting

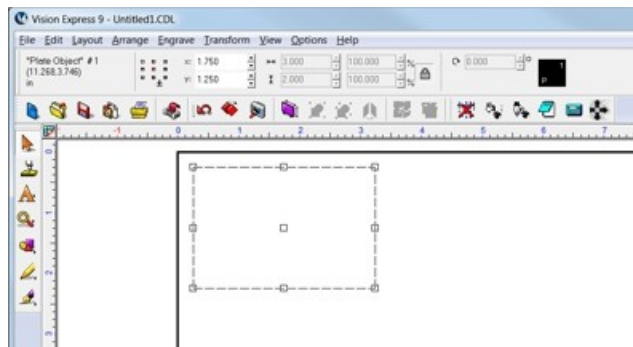
In this example job, engravers plastic will be set up to engrave several name badges, then the badges will be cut out. 1/16th inch standard engravers plastic is used. Two different tools will be used - one to engrave, and one to cut/bevel the edges.

As with Example Job 2, the Vacuum Chip Removal System is highly recommended for this application and is shown in this example.

First, the plate size will be adjusted to a 10 x 8 inch size (the standard Vision VE810 10 x 8 inch area can be used).

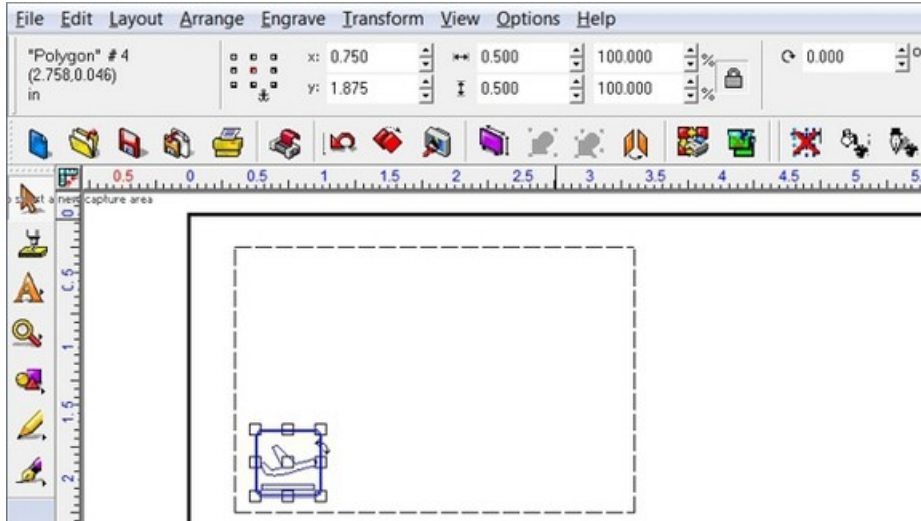


A single Plate Object will be created (from the top toolbar menu - Layout → Plate Object → Create Plate) with a size of 3 x 2 inches (75 x 50 mm) and margins on the top and left side will be set to 0.25 inches (6.4 mm). The margins are necessary so that during the cutting operation, the cutter will not cut right on the edge of the material, or on the edge guides.

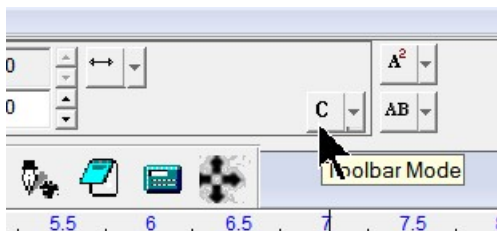


A Clip Art image will be added to the badge. The image is GENE0038.CDL from the Vision software clip art in the General folder (installed as C:\Vision Express 9\ClipArt\GENERAL. If you are using Vision Expert or Vision Pro, the folder name will reflect your particular version). To import the clip art, simply browse the folder in Windows Explorer and drag the file to the engraving area on the plate within the Vision software. the image will be quite large, so it must be re-sized to fit, either by changing the size manually on the toolbar, or by selecting the object and clicking on a corner node (holding down the left mouse button) and dragging the corner to make the image smaller.

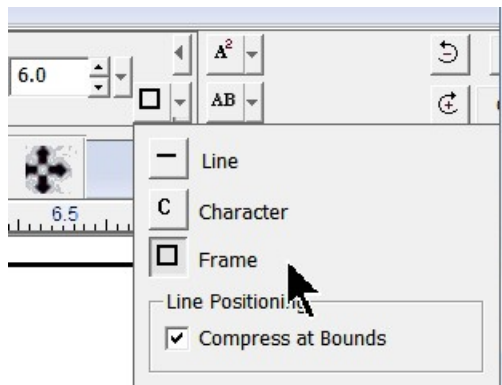
For this example, the image was re-sized to 0.5 x 0.5 inches (12.7 x 12.7 mm) and located at X 0.75, Y 1.875 as shown below.



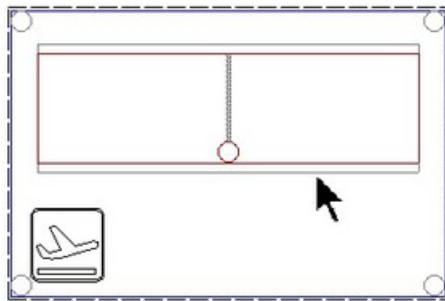
Next, three text fields are entered with the Text Compose tool. At first, when clicking in the middle of the Plate Object, the text field is set to centered within the plate and auto sized. We will adjust the text frame size and location using text Frame mode. To enable, select the Toolbar Mode Icon on the toolbar (only visible after selecting text, or after clicking on the Text Compose icon, then clicking within the plate object), then select the Frame mode. This will allow sizing and placement of the text field.



Select Frame mode.



Next, we will re-size the text area and type in some text (it does not matter what text is entered here. It is just entered to create the text object). To re-size the text frame, click and hold with the left mouse button on the black edge of the text frame and drag the frame to the appropriate size.



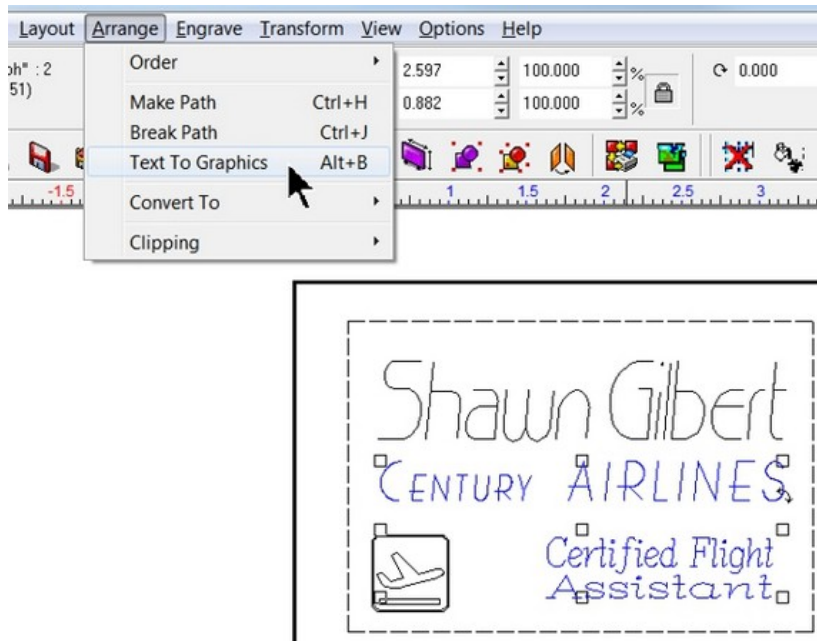
then,



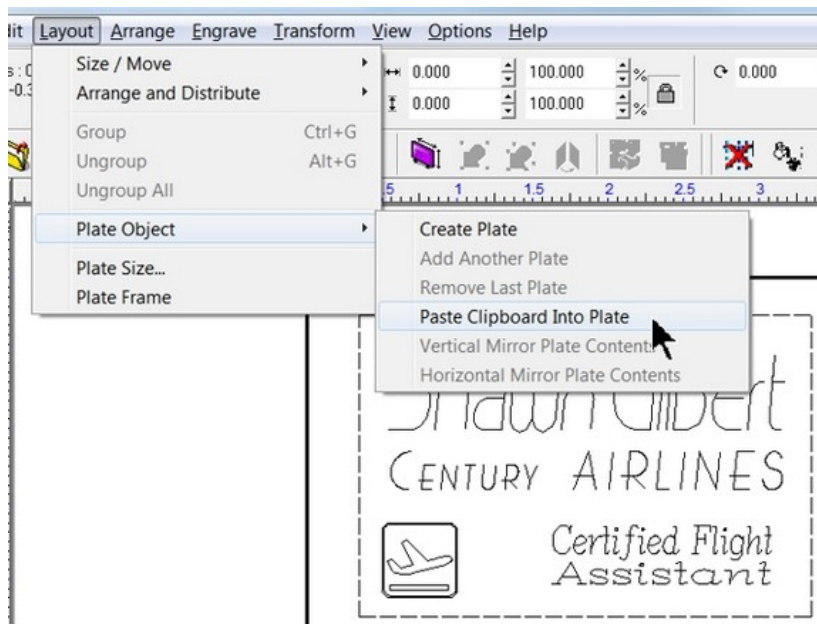
Two more text fields are entered in the same manner, re-sized, and fonts are changed.



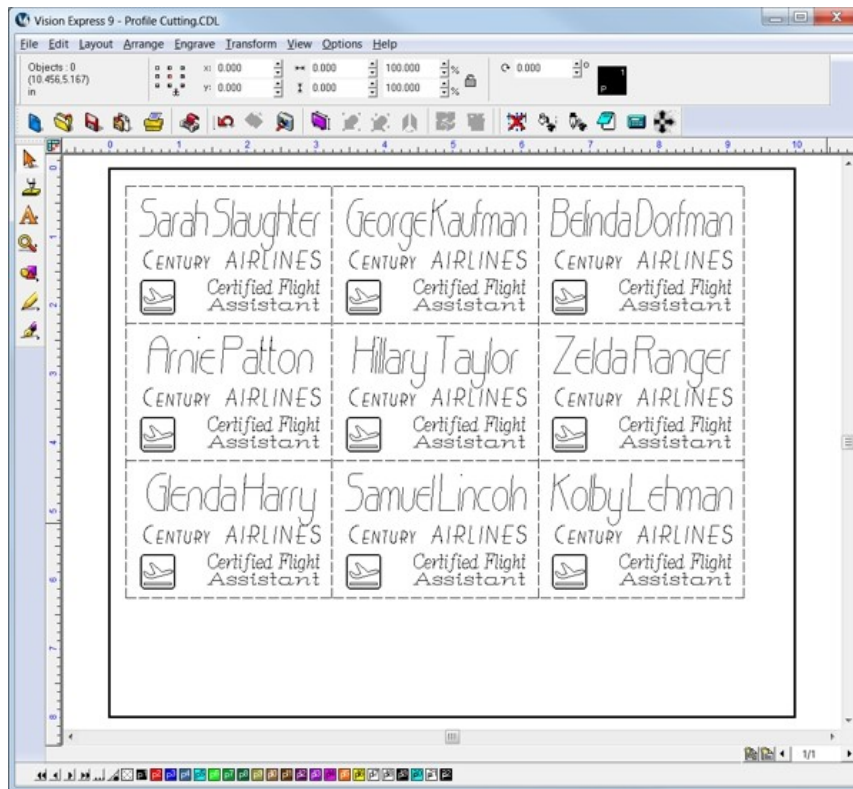
At this point, we need to change the two fixed text fields to graphics, so that when we import the text file for multiple badges, the correct text is replaced. Select the two text fields shown and from the toolbar, select Arrange → Text To Graphics. HINT - to select more than one object, click on the first object, hold down the Shift Key, then click on additional objects.



The two text fields are now non-editable graphics and will not be replaced when importing a text file with variable text. Next, copy the list of text variables from a Notepad text file and select Paste Clipboard Into Plate, then click in the middle of the Plate Object.

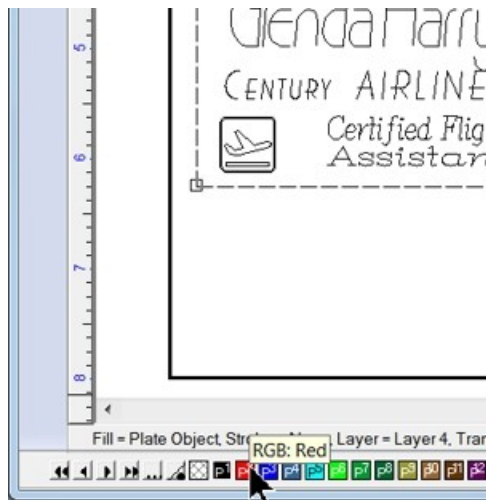


The screen should appear as below after pasting the names into the plate.



Lastly, before we send the file to the engraver, we will separate the graphics into two different colors, one for engraving and one for cutting. This is necessary so that two files can be sent to the engraver independently and a cutting tool change can be performed after engraving. To change the Plate Object frames to another color (red in this example), select the Plate Object frame, then click on the Red color icon on the bottom toolbar of the Vision software. It is also a good idea to verify the color of the other objects on the screen. If all other objects are to be Black, then select everything except for the Plate Object frame and click on the Black color icon at the bottom of the screen. Many times, when importing graphics, the color is unknown, so making sure the graphics are the correct color is good practice.

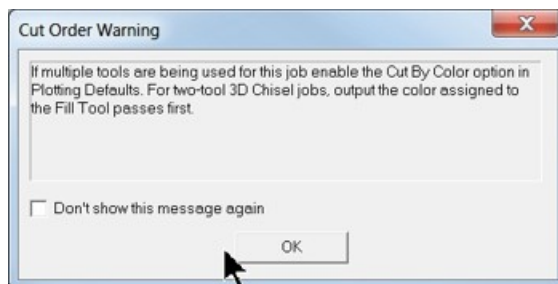
Note that if there is more than one page of names, each page of the file will need to have the plate frame color changed.



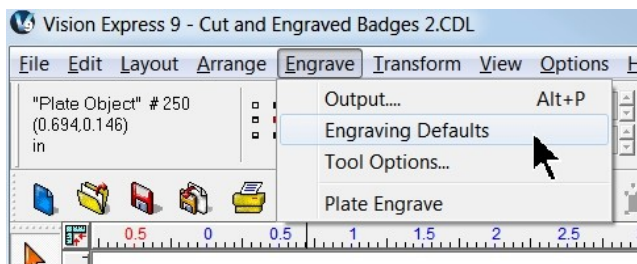
After changing the plate frame color.



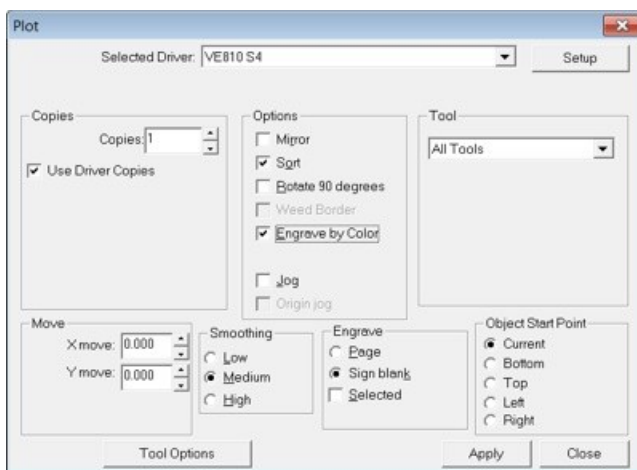
If you try to send this file to the engraver at this point (by clicking on the Engrave icon), a warning screen may appear as below.



In order to engrave by color, from the toolbar menu select Engrave → Engraving Defaults (Note that the Cut Order Warning screen refers to the "Plotting Defaults", but the menu item is "Engraving Defaults"),



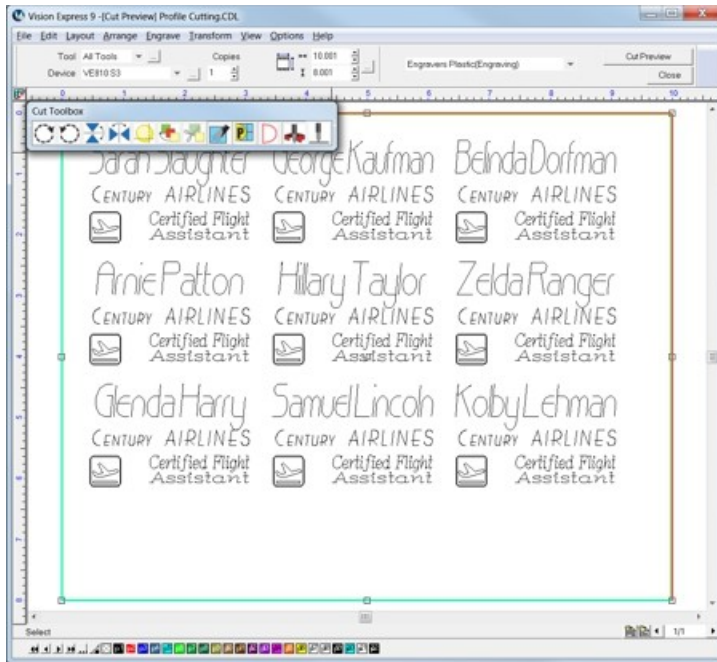
then make sure Engrave by Color checkbox is selected, then Apply and Close.



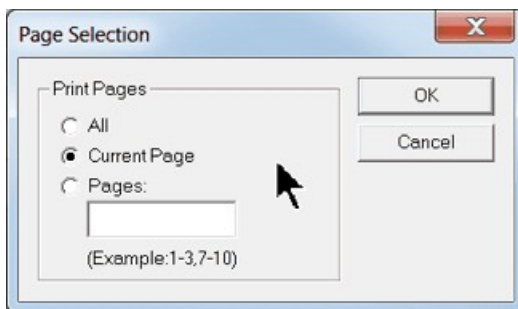
In order to send the engrave file to the engraver, select the Engrave icon from the left toolbar, at which time the Filter by Color window will appear. Select the color to send to the engraver in the Filter Layer drop down box. In this example, all text and graphics are Black, so the color Black (P1) was selected from the drop down menu in the Filter by Color window.



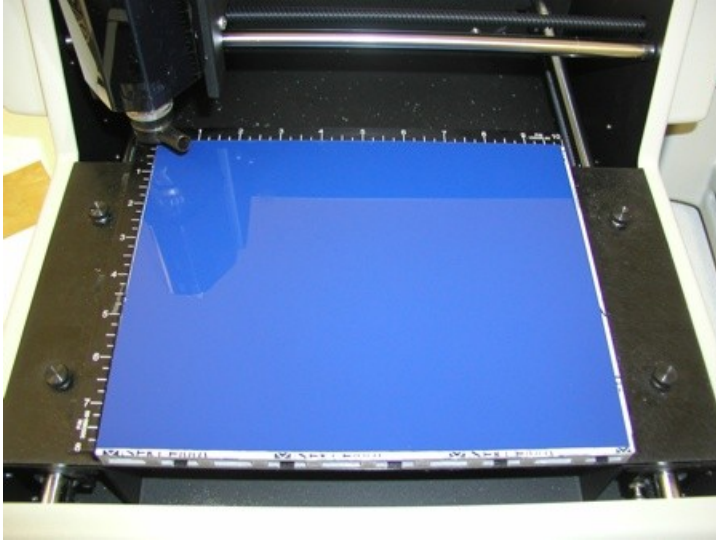
After clicking on Select, the Vision software window will show only the color being sent to the engraver, in this case, black. Make sure that Engravers Plastic(Engraving) is the material selected, and all options are turned on in the Cut Toolbox, including Dry Run for this example file. Select the Engrave icon from the Cut Toolbox to send the file to the engraver.



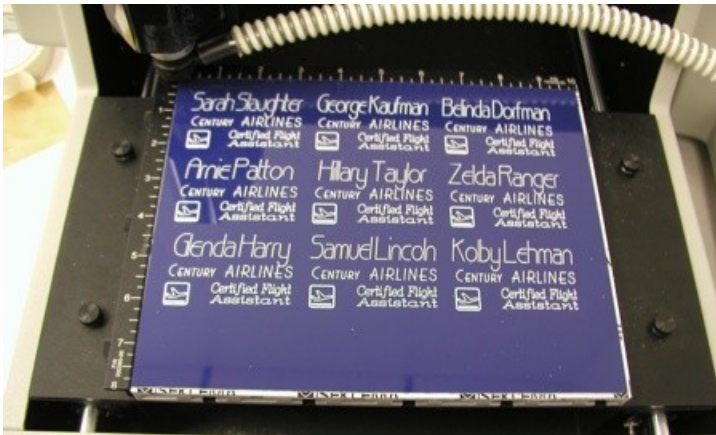
If there are multiple pages, the Page Selection screen will appear for you to choose which page(s) to send to the engraver. In this example, the Current page will be sent by itself so that the cut file can be sent afterward.



After selecting OK, the engraving file is sent to the machine. Place the material on the table and make sure the engraver is set up as in Rotary Engraving section before running the file. Use the proper cutting tool for the engraving application. Note that the nose cone for the vacuum chip removal system has been installed in this picture.

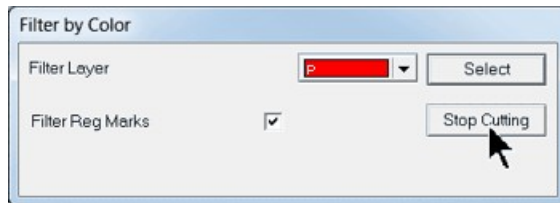


After pressing Start and finishing the job, the engraved portion of the file should appear as shown.

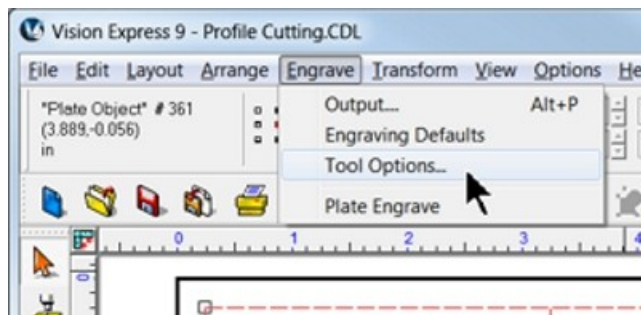


Cutting

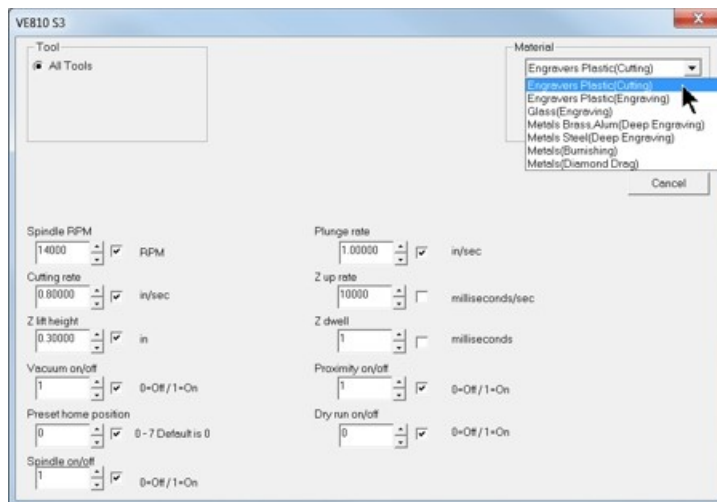
After sending the engrave file to the machine, the Filter by Color window will re-appear, signaling that the software is ready for you to send another file to the engraver. Since we need to change the material setting, select Stop Cutting.



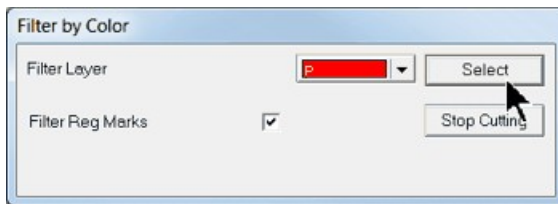
To change to the material setting for cutting, select Engrave from the top toolbar menu, then Tool Options.



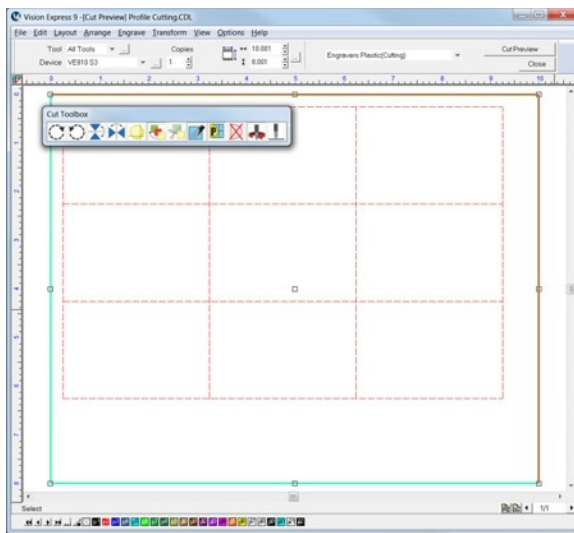
Select Engravers Plastic(Cutting) from the Material drop down list, then select OK.



Select the Engrave icon from the left side toolbar, then select the color for cutting in the Filter Layer drop down box in the Filter by Color window (select Red for this example),



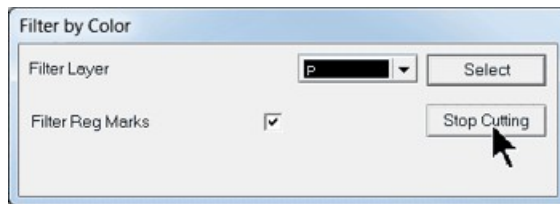
then select Engrave from the Cut Toolbox. The screen will show only objects in the color selected in the Filter by Color window.



The page selection screen will re-appear, for this example, choose Current Page and select OK. The file will be sent to the engraver. Make sure you have installed the cutter/beveler tool for this process and set up the cutting depth as described in the previous section. When the file is complete, it should appear as shown.



Note - The Filter by Color screen will once again appear. Since we have no further colors to send to the engraver, select Stop Cutting.



7.3 Level 2 Job Examples

These second set of examples involve more skill. From reverse engraving and color filling, to deep engraving and the creation of tool paths; these examples should build on the skills discussed in the Level 1 jobs and prepare the user for more advanced applications.

7.3.1 Reverse Engraving/Color Filling

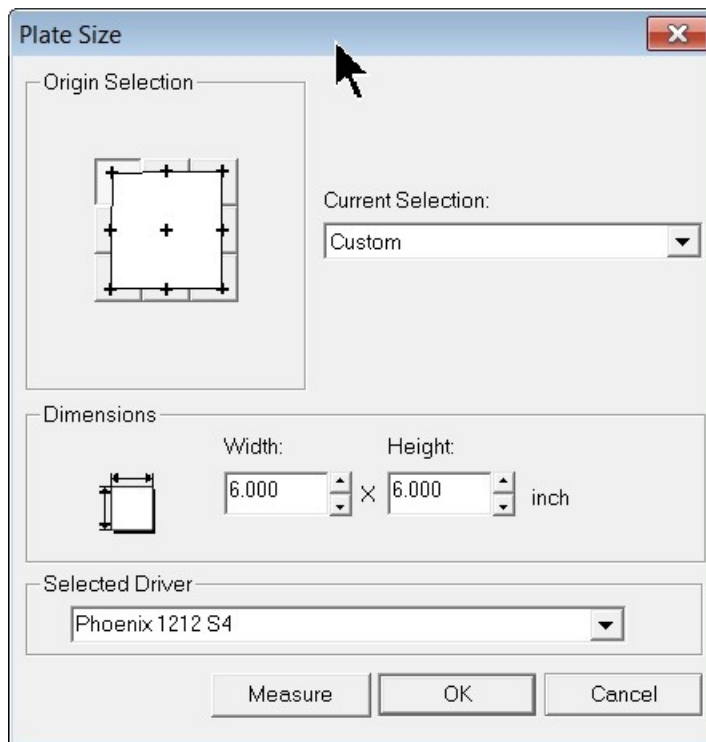
In this example, a reverse engraved sign will be created from reverse engraver's plastic. The techniques used with this application are: text layout and positioning, importing clipart, drawing simple graphics, adding fills, mirroring the graphics for reverse engraving and color filling. The basic setup is similar to that performed in the Rotary Engraving section in Level 1 Job Examples.

7.3.1.1 Example Job 5 - Reverse Engraving

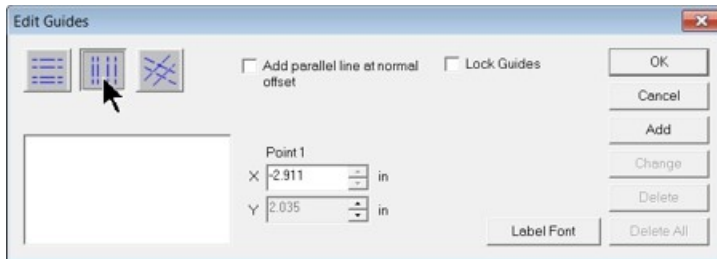
In this example, a sign will be made using reverse engraver's plastic. The piece is pre-cut and measures 6 inches x 6 inches (150 x 150 mm).

Note - In this application, it is highly recommended to use the Vacuum Chip Removal System as described in the Optional Accessories section. The process of engraving or cutting plastics, acrylics, sign foam and wood, produces a significant amount of debris that can clog the nose cone and/or get trapped between the nose cone and the material, which will cause engraving/cutting depth inconsistencies as well as potentially scratch the surface of the material. The Vacuum Chip Removal System significantly reduces these problems and provides for a cleaner work area.

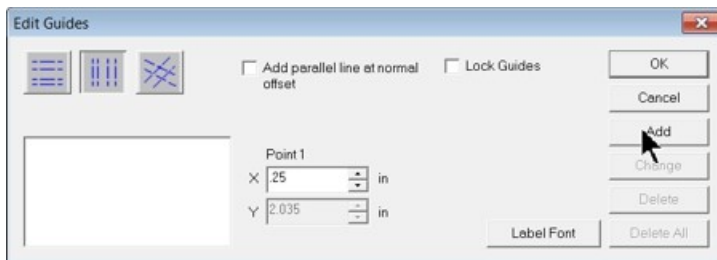
Set the plate size to 6 x 6 inches and select the driver for your machine. In this example, the Phoenix 1212 Series 4 engraver will be used.



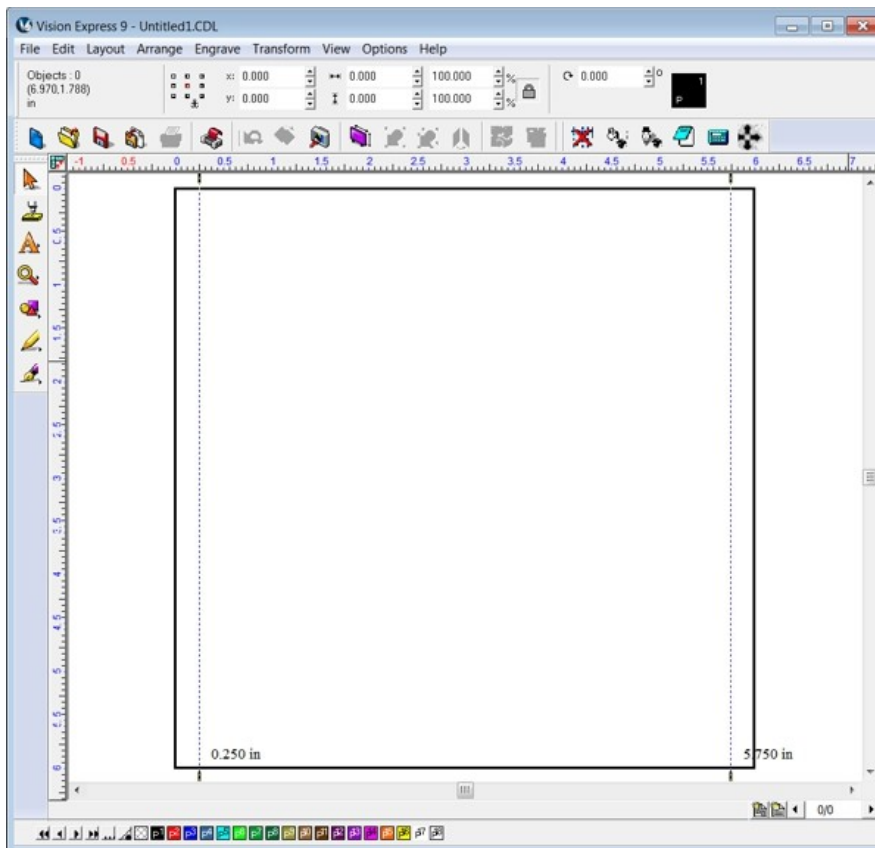
To make this job setup a little easier, we will add guidelines to the plate. Right click outside the plate area to show the Edit Guides window. Then select the vertical guides as shown.



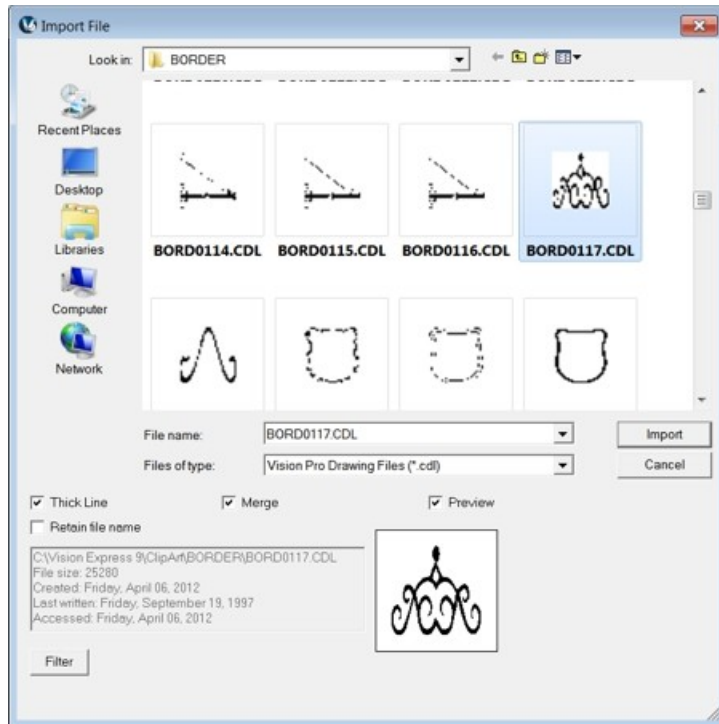
Enter 0.25 in the X entry field, then click on Add. Type in 5.75 in the X entry field, then click on Add, then click on OK.



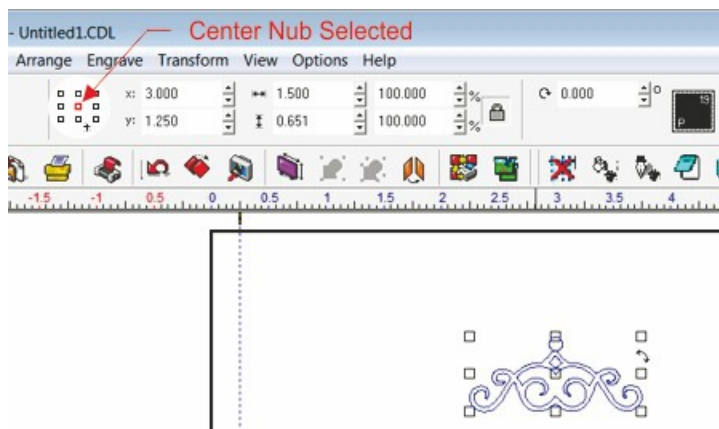
The plate area should now show the two guides you just added.



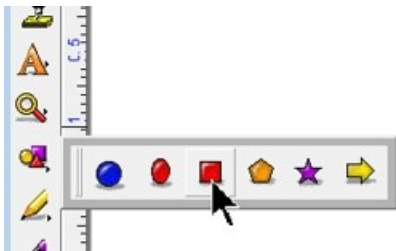
We now import clipart to add style to the sign. To import the file, select File → Import from the top menu bar. This will open the Import File window. The file we are importing is BORD0117 and is located in the C:\Vision Express 9\ClipArt\BORDER folder. Select the file, then click on Import. Click inside the plate area to finish importing the file.



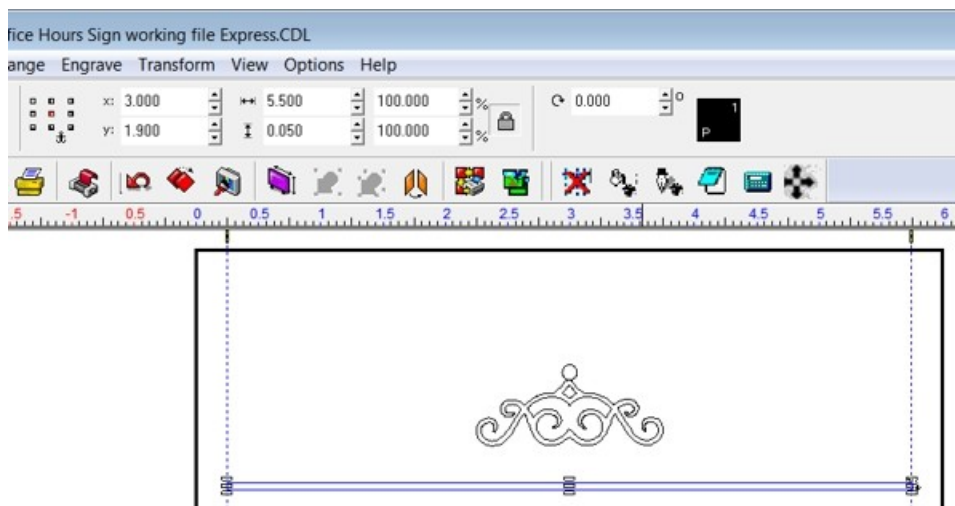
Change the size to 1.5 inches wide by 0.651 high and change the position to 3.00 inches X and 1.25 inches Y as shown, using the top toolbar fields. Make sure the center "Nub" is selected when positioning graphics using center coordinates.



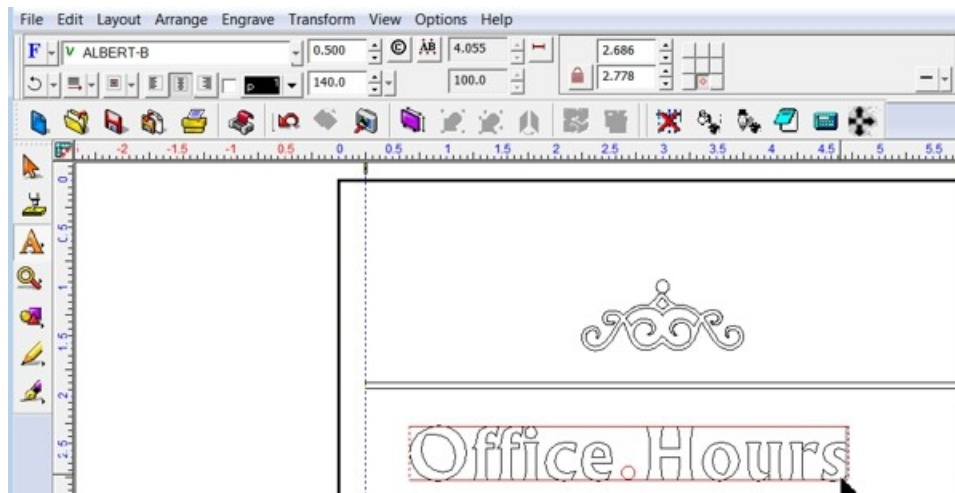
To add a rectangle that will separate the sign, select the Shape Tools icon from the left toolbar, then select the Rectangle tool.



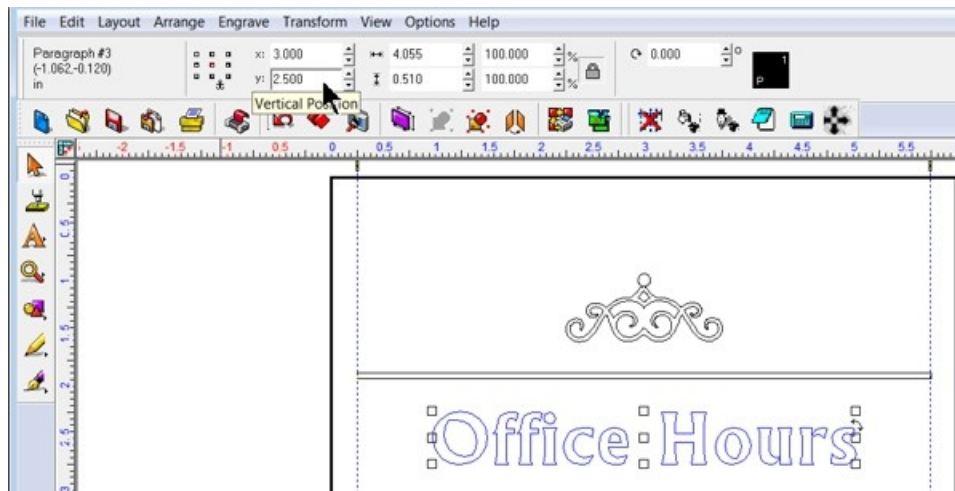
Draw a rectangle 5.5 inches wide x 0.05 inches high and position it to 3.00 inches X and 1.90 inches Y, as shown below.



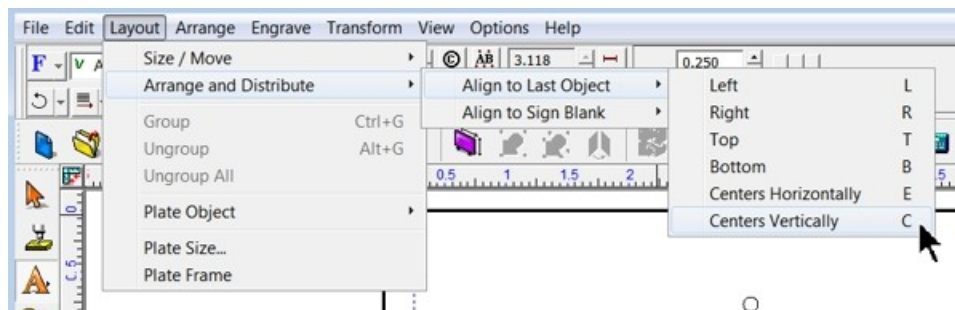
Enter the text shown with the Frame Text tool. The font is Albert-B, 0.500 inches high.



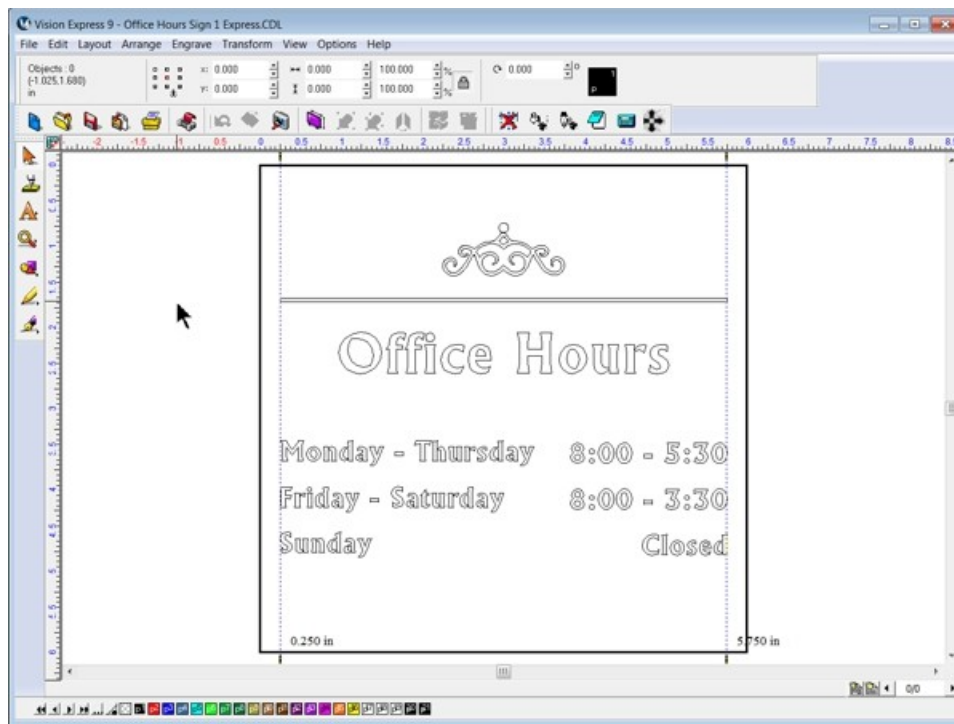
Using the position entry fields on the top toolbar, which will only show if you exit text mode after entering the text, then select the text as shown, change the position to 3.00 inches X and 2.5 inches Y. In a later step, the Y position will be changed slightly once all the text has been entered.



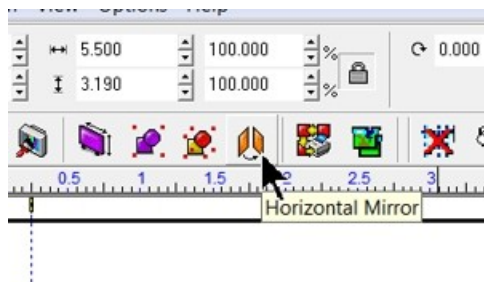
Add the additional text as shown. Each text is entered separately. (Monday - Thursday is one line, 8:00 - 5:30 is another line, etc.) The guides we added can be used to "snap" the text into position and align the left and right edges of these lines of text. To align each line of text, select the text along one line (such as Monday - Thursday and 8:00 - 5:30), then use the Align tool by selecting Layout → Arrange and Distribute → Align to Last Object → Centers Vertically.



Align each line of text. The spacing between text lines was equalized by moving each line of text with the up or down arrow keys on the computer's keyboard.



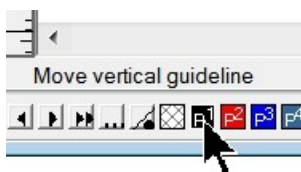
Since we are engraving the back side of the plastic, we need to mirror all objects about the center of the plate. Select all objects and click on the Horizontal Mirror icon on the top toolbar.



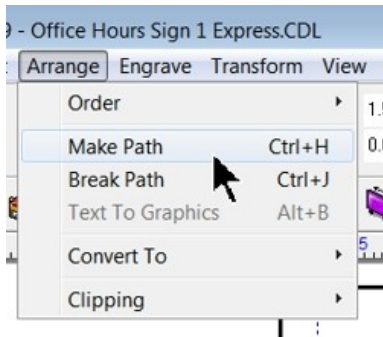
The plate should now appear as below.



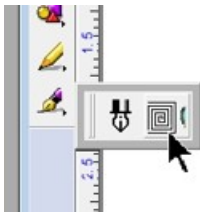
Next, since we are going to use a Hatch Fill to engrave the inside of all of the characters and clipart on screen, we first make sure all objects have the same outline color. Select all objects, then click on the Black color swatch on the bottom toolbar (shown below) with the left, then the right mouse buttons. This should be done any time clipart is imported. Many times, clipart is drawn in colors that may look similar to the color of other objects, but if they are different. The software will interpret them as different tools, and they may be engraved out of sequence or with different parameters.



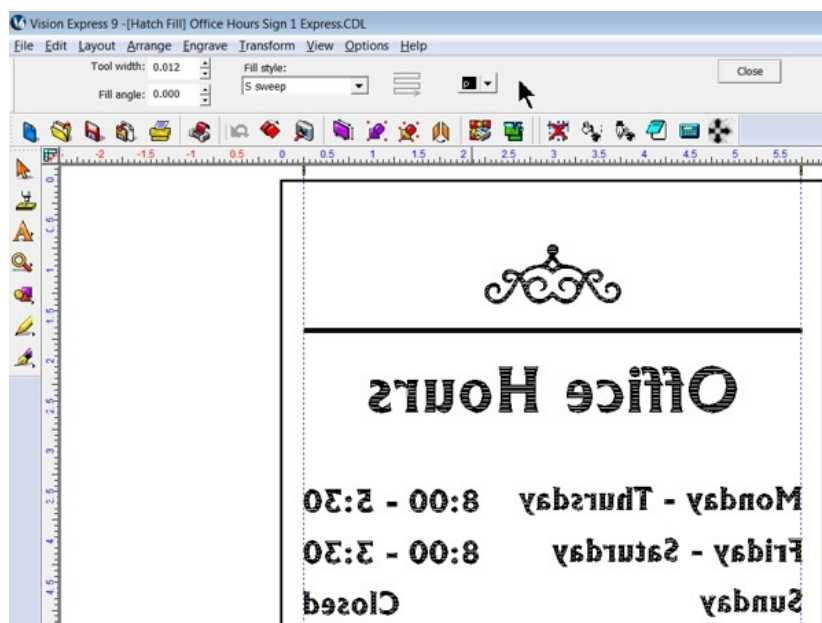
Once the color of all objects is the same, select only the clipart, then select Arrange → Break Path, then select Arrange → Make Path. This resets the fill path so that when we use the Hatch Fill tool, the correct parts of our clipart object will be filled.



Lastly, select the Stroke and Fill Tools (or the Tool Path Tools in Vision Expert or Pro) icon from the left toolbar, and click on the Hatch Fill tool.



The top menu bar will change to the Hatch Fill toolbar in Vision Express only. (For Vision Expert or Pro, see Fill Tool usage in Example Job 6). Since we are using a 0.015 Flex Cutter for this example, we need to change the Tool width setting to about 25% less than the cutter tip width. In this case, the Tool Width was set to 0.012 inches, the Fill angle was left as 0 degrees, the S sweep pattern was used (it is faster than the line sweep pattern) and the color was set to black. Once these settings have been changed, click on Close to exit the Hatch Fill toolbar.

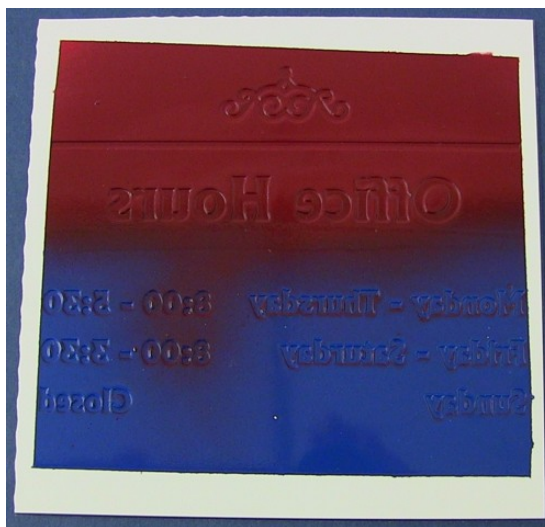


At this point, the file is ready to be sent to the engraver. Place the reverse engraver's plastic material on the t-slot table on top of Multi Mat. Set the engraving depth to slightly more than the cap layer for your material. In this case, the engraving depth was set to 0.020 inches (20 clicks). Send the job to the engraver using the Engravers Plastic material setting, hook up your vacuum chip removal system and start the job.



When the engraving is complete. Brush of any excess plastic chips from the engraved areas and color fill these areas with an acrylic based paint. It is recommended to mask the edges of the piece before painting. In this example, two colors were used to fill the engraved areas.

(Back of plate shown for reference)



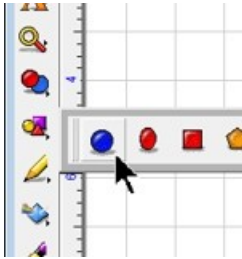
7.3.2 Deep Engraving Sign Foam

In this example, a sign will be deep engraved using Sign Foam material. The techniques used with this application are: creation of circles, fitting text to a path, logo creation, basic welding of objects, creating a star, object alignment and centering, and tool path fills.

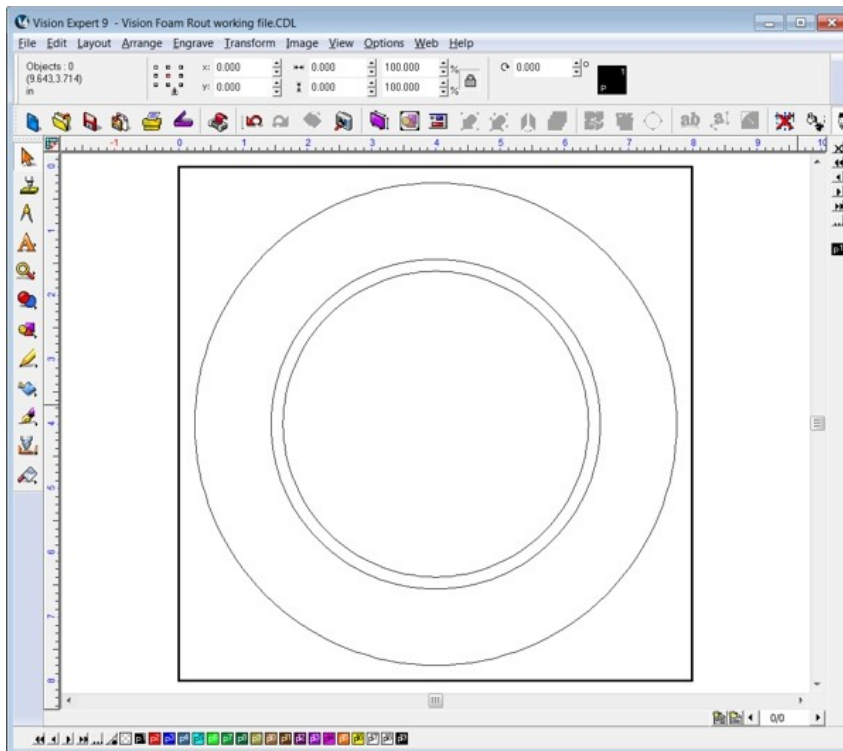
7.3.2.1 Example Job 6 - Deep Engraving

This example job will cover the creation of a sign made from Sign Foam. The background of the images will be engraved, which will allow the text and graphics to remain at the surface level.

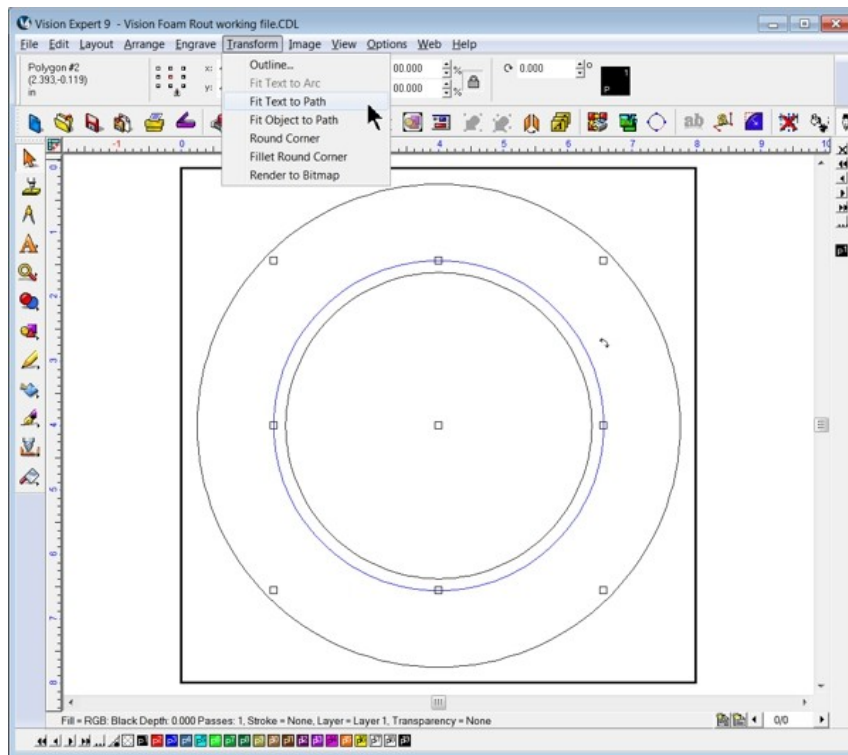
Beginning with a plate size of 8 inches x 8 inches in the Vision Expert 9 program, create three circles using the Circle Tool.



The circles should be sized to 7.5 inches, 5.125 inches and 4.75 inches diameter, then centered within the plate.



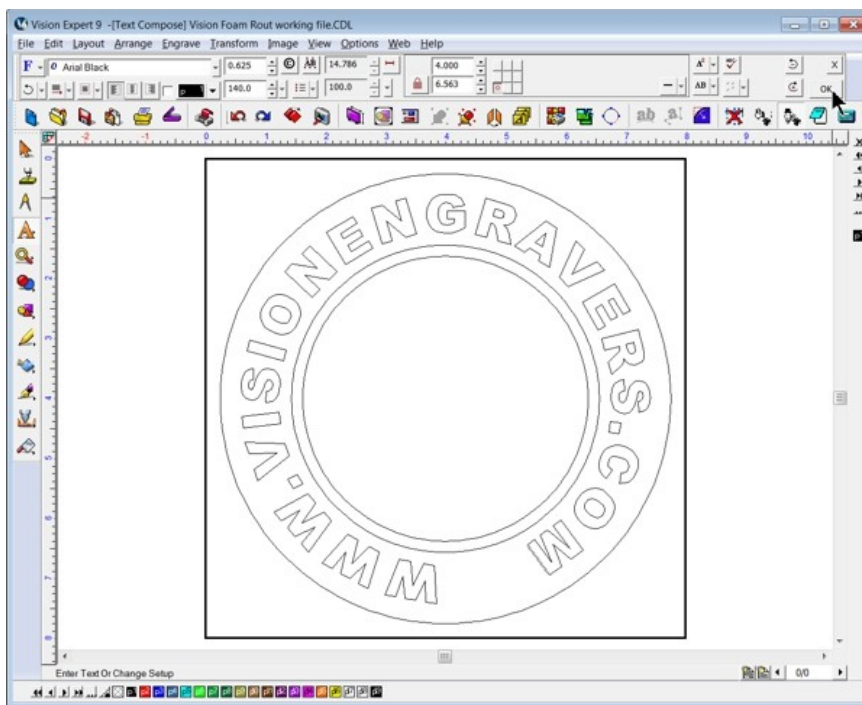
Select the middle circle, then select Transform → Fit Text to Path from the top menu bar.



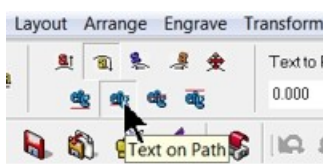
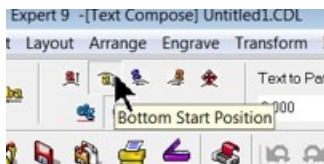
Select Add Text from the top toolbar.



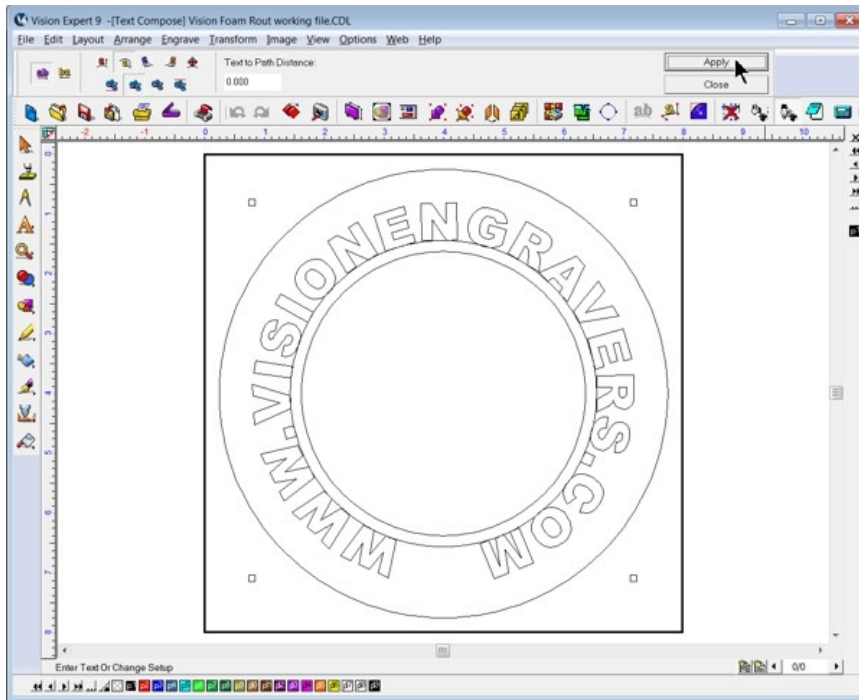
Select Arial Black from the font drop down list and set the size to 0.625 inches, type in the text as shown, then click on OK on the top toolbar.



Select the Bottom Start Position icon, then select the Text on Path icon.



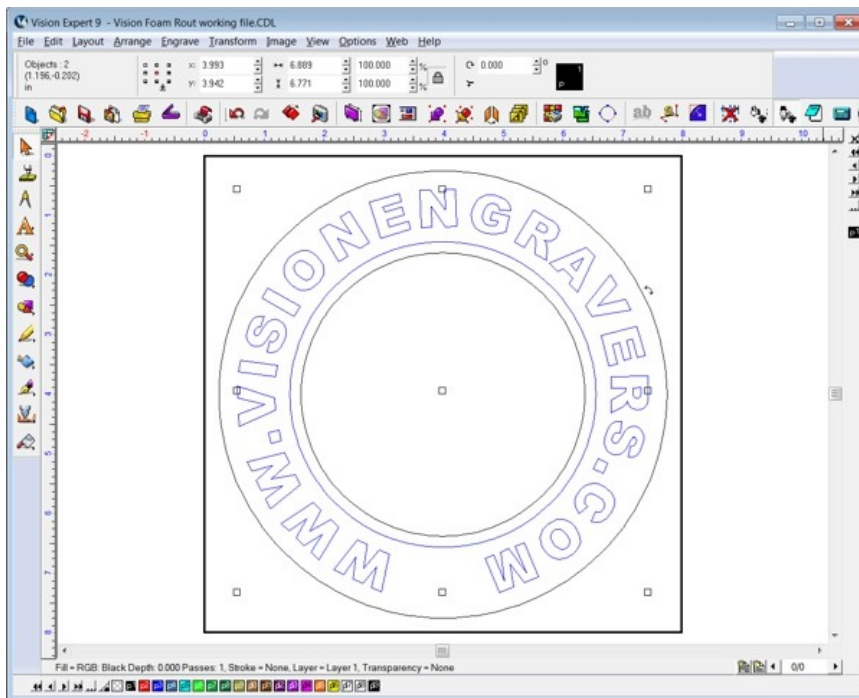
Select the Apply button. The text should now be located around the middle circle as shown below.



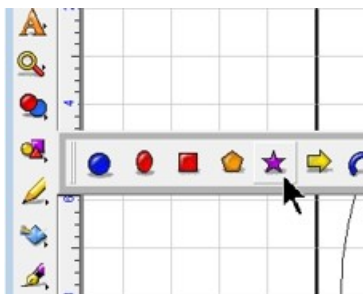
For this example, the text needs to be placed in between the outside and the middle circles. Enter 0.250 in the Text to Path Distance entry field, then select Apply, then select Close.



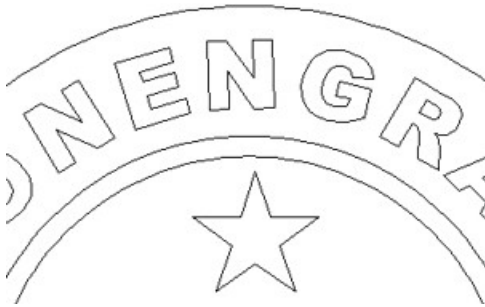
The text should now be centered between the outside and middle circles.



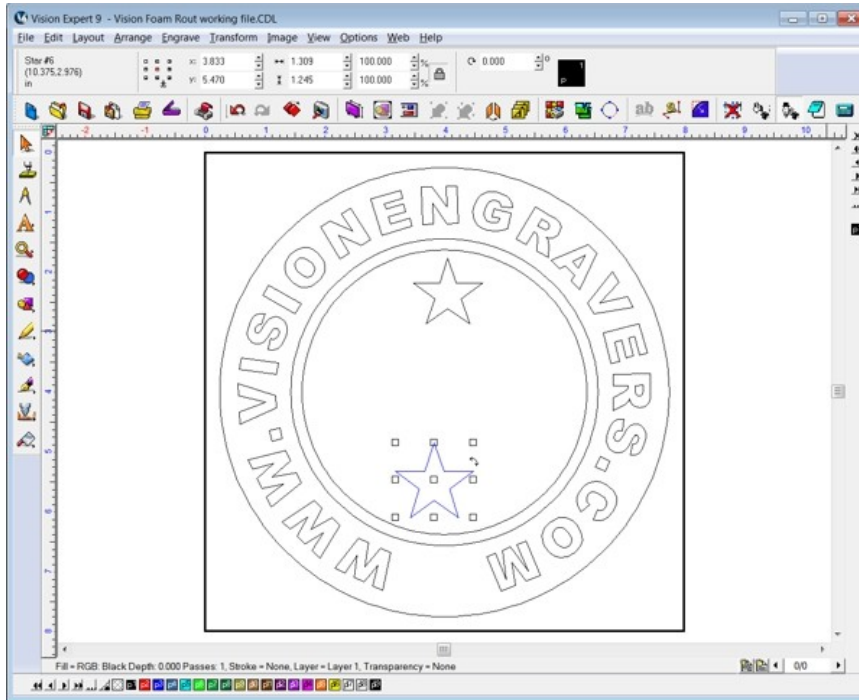
Two stars will be added using the Star tool.



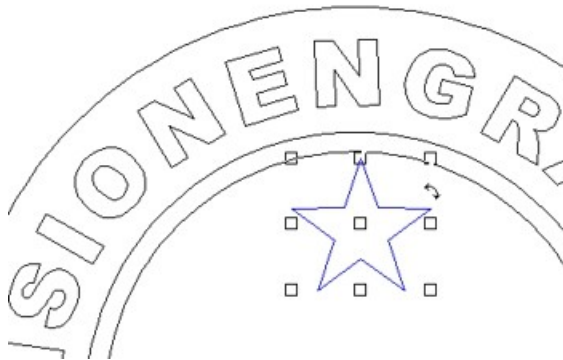
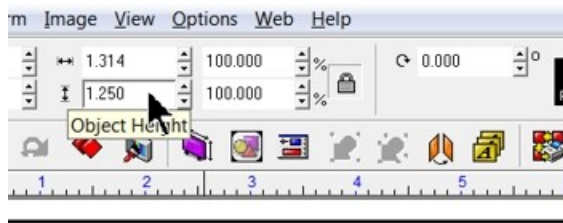
Select the Star tool, then click, hold and drag the first star as shown. To constrain the star and keep it level horizontally, hold down the CTRL key on the computer keyboard while drawing the star.



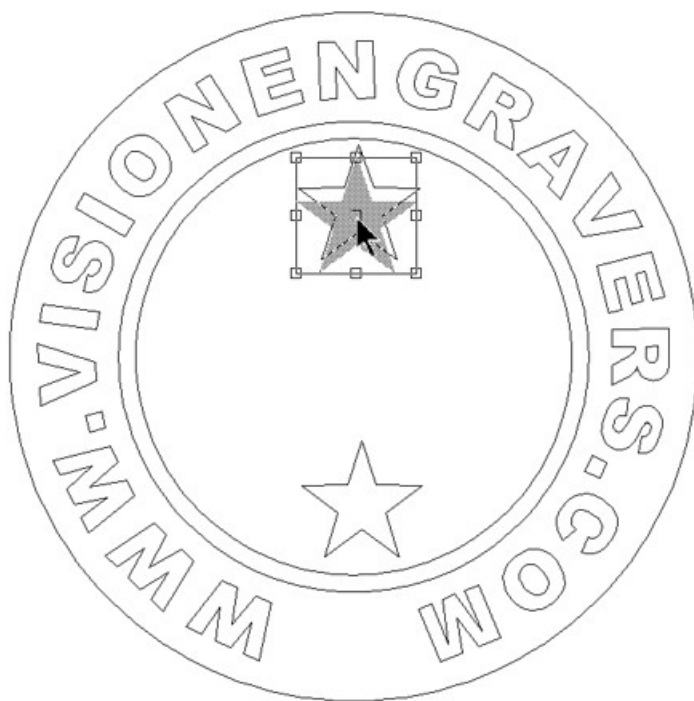
Draw a second star in the location shown. Do not be concerned with the size or exact placement of the stars at this time.



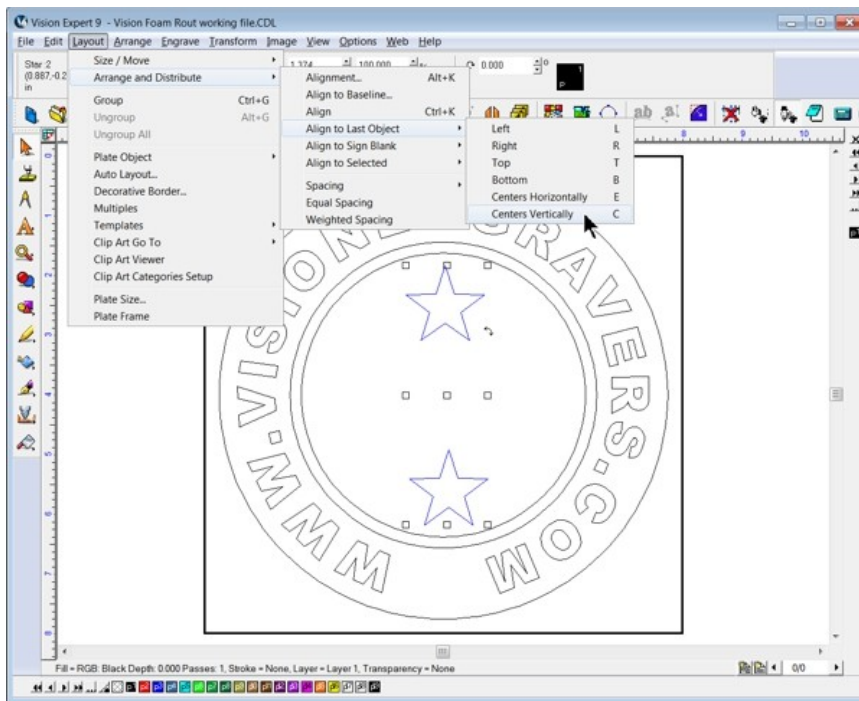
Select the first star, then change the size to 1.25 inches high in the Object Height entry field on the top toolbar. Repeat this for the second star.



Move each star to roughly 1/4 inch from the inner circle as shown.

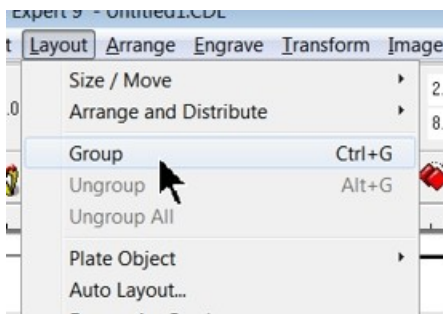


Select both stars, then select Layout → Align and Distribute → Align to Last Object and click on Center Vertically from the top menu bar.



To center these two stars within the circles, first, group the stars by selecting Layout, then clicking on Group from the top menu bar.

Hint: Hold the CTRL key on the computer keyboard and press the letter G at the same time as a shortcut to the Group command.

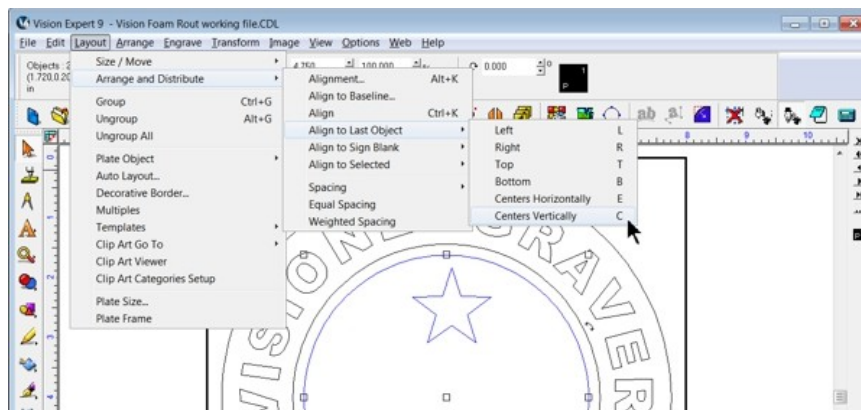


With the group of two stars selected, hold down the Shift key on the computer keyboard and select the inner circle.

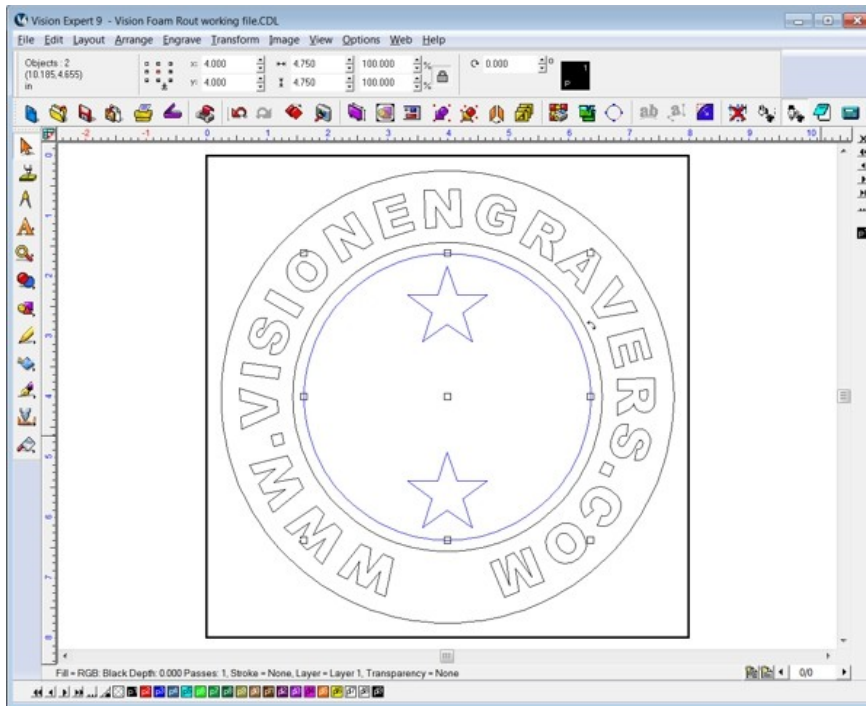


To align the group of stars to the circle, select Layout → Align and Distribute → Align to Last Object and click on Center Vertically from the top menu bar. Repeat this for Center Horizontally.

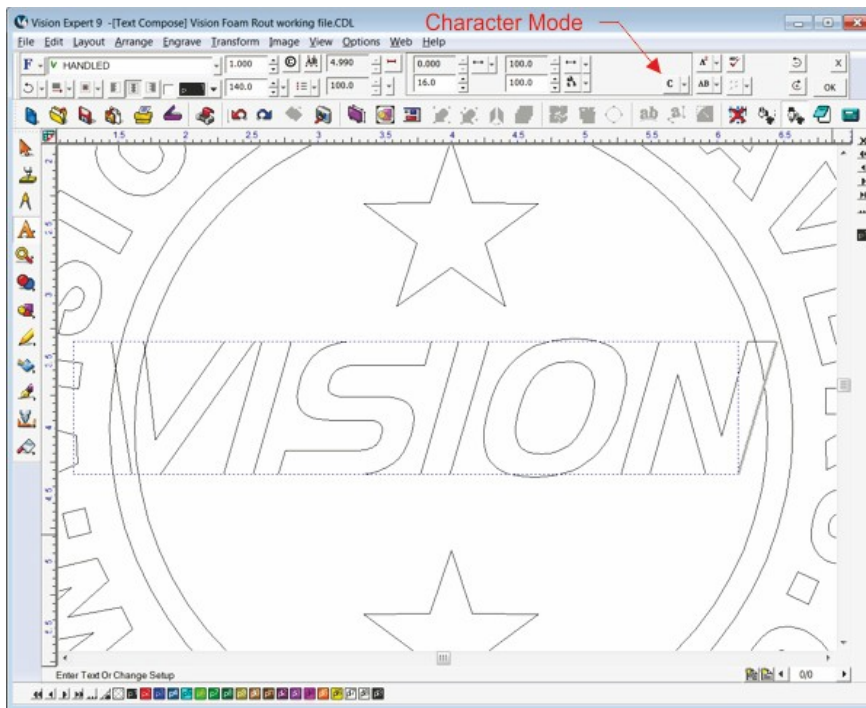
Hint: Shortcut keys are listed for many of the menu bar items. Simply press the letter C or the letter E on your keyboard to align vertically or horizontally to the last object selected.



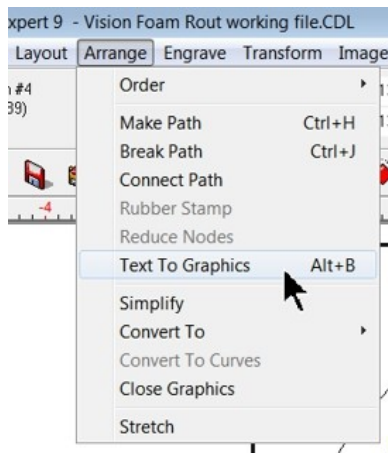
After aligning the group of stars to the circle, the screen should appear as shown below.



We will now create a logo by welding text together. Enter text using the Text Compose tool near the middle of the plate as shown. The font used is HANDLED and the size is 1.0 inch and the slant is 16 degrees. To access the Slant field, Character mode must be chosen.

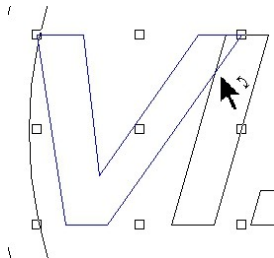


Before we can modify this text and weld it together, we must convert it to graphics. Select the text (or exit text mode by clicking in an empty area of the plate, if you are still in text mode), then select Arrange from the top menu bar and click on Text To Graphics.

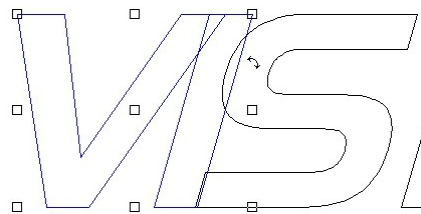


Each letter can now be selected individually. Select the first letter and move it to the right using the arrow keys on your computer's keyboard. Make sure there is an overlap with the next letter (as pointed to below). Add the second letter to the selected objects by holding the Shift Key on your computer's keyboard and clicking on the second letter (with the first letter still selected). Using the Shift/Click adds or subtracts objects as selected objects. With the first two letters selected, move them both to the right until the second and third letters overlap.

Overlap first and second letters.



Overlap first/second with third letter.



Continue adding letters and moving them until all letters overlap.



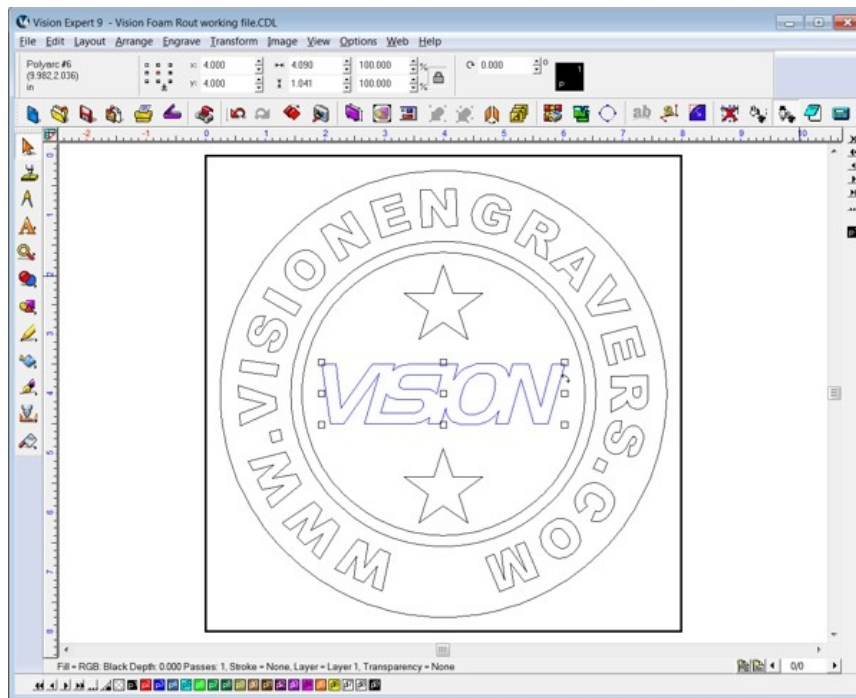
Select all of the overlapped letters, then select the Weld Tools icon from the left toolbar, then select Basic Weld.



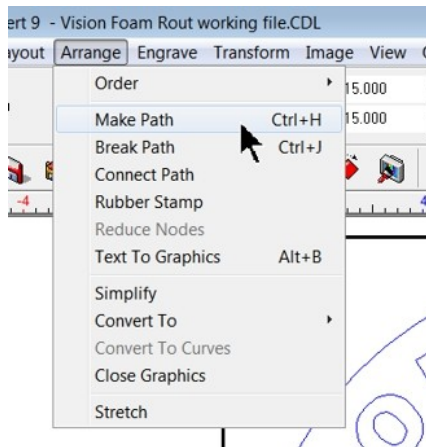
The finished logo should now appear as shown below.



Center this logo in the middle of the plate.



In order to engrave the background of this graphic, but not the text, or the area between the inner and middle circle and the stars, we need to use the Make Path tool after selecting all the objects. Before doing so, the text we added to the outside of the circle must be changed to graphics. Select this text, then select Arrange from the top menu bar, and click on Text To Graphics as we did for the logo text. To use the Make Path function, select all objects, (*Hint: Press the F3 Key on your computer's keyboard to select all objects*) then select Arrange from the top menu bar, and click on Make Path.



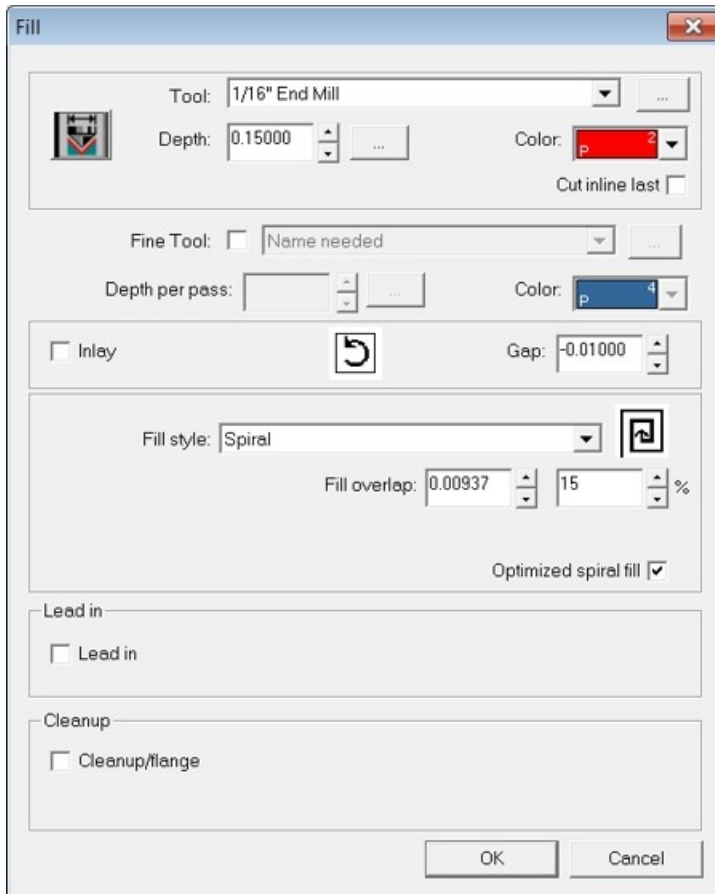
The Vision 9 software will automatically create a fill area based on the objects selected. To view the area now defined for filling, click and hold on the center node (with all objects selected). This will display the area which can now be filled.



We now need to create a tool path to fill in the highlighted area. Select Tool Path Tools from the left toolbar. Then select the Fill tool.



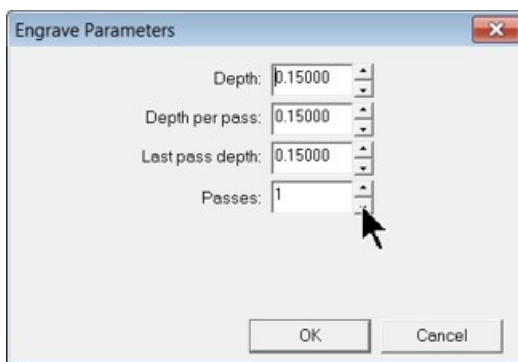
The Fill window will appear. Since we are going to use a 1/16th inch End Mill to engrave out the background, select the 1/16" End Mill as the Tool, set the Depth to 0.150 inches. Choose Red as the Color and set the Fill Style as Spiral and the Fill overlap to 15 percent. Lastly, set the gap to -0.010 inches. Using a negative Gap will allow the cutter to slightly reduce the size of the characters and increase detail in sections where there is not enough room for the tool to move through.



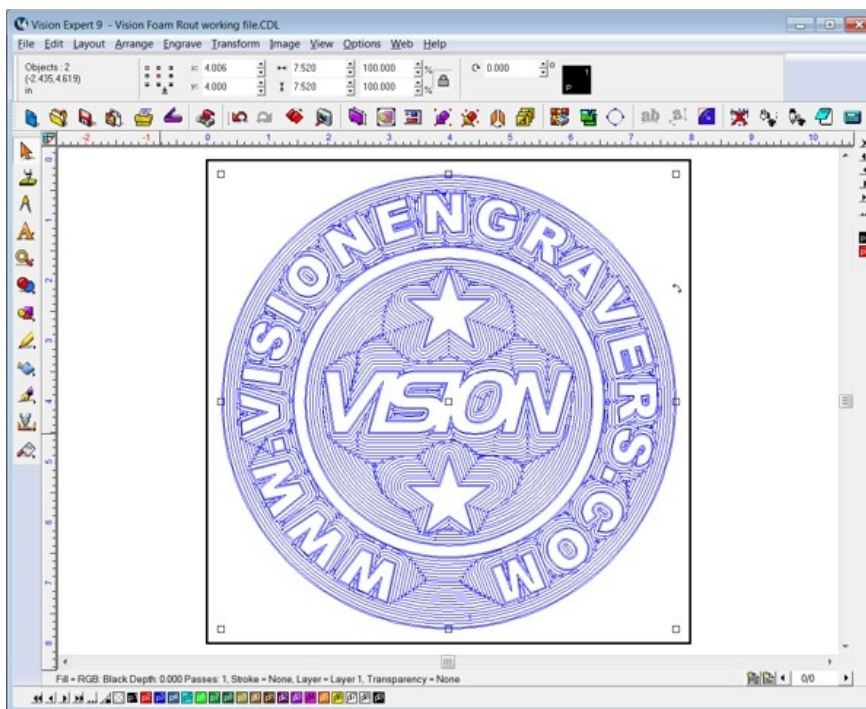
Click on the icon to the left of the Depth field as shown. This will allow the user to set the number of passes the engraver will make.



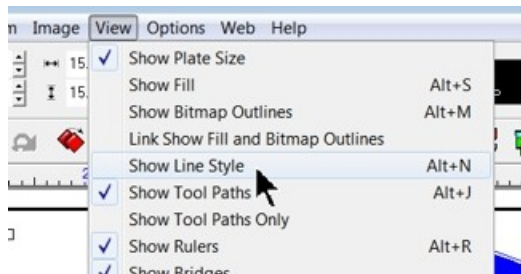
The Engrave Parameters window will appear. Set the number of passes to 1. Note that the other fields will automatically adjust. Click on OK to close this window.



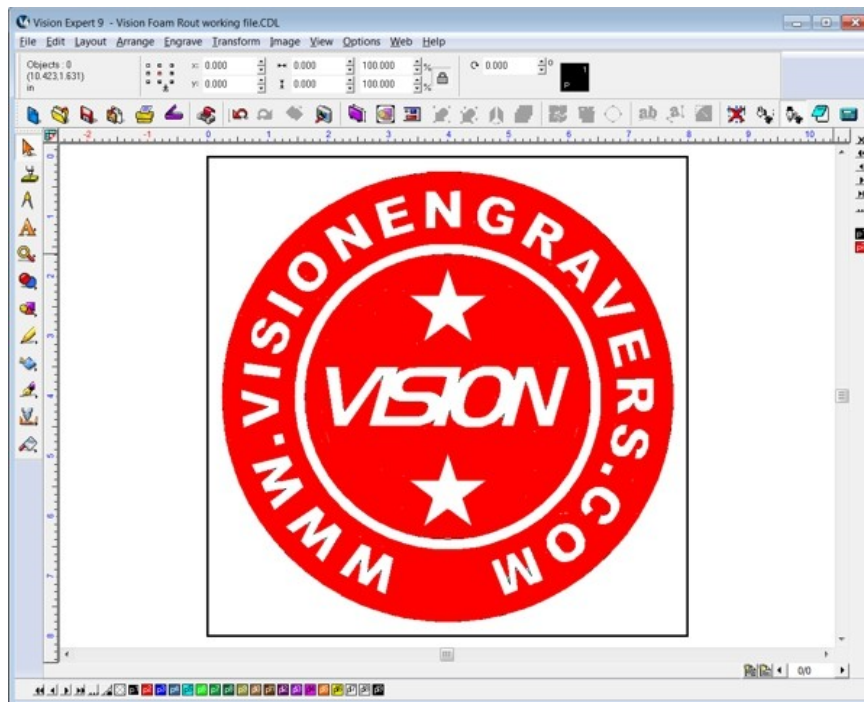
Click on OK to close the Fill window. the screen should appear as below.



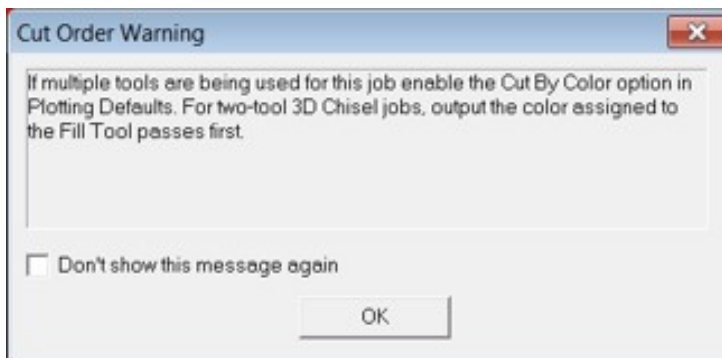
To view a representation of what the image will look like as engraved, select View from the top menu bar, then click on Show Line Style.



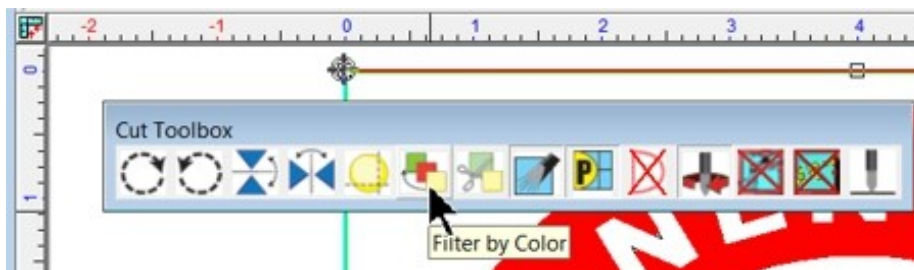
Click off to the side of the graphic in an open area. The image will then be displayed as shown below. It is a good idea to zoom into several sections of the image to make sure there are no un-engraved areas. If there are, either a smaller diameter tool should be used, or the gap should be reduced in order to increase detail.



To send only the tool path we just created to the machine, select the Engrave icon from the left toolbar. You will likely see this warning.



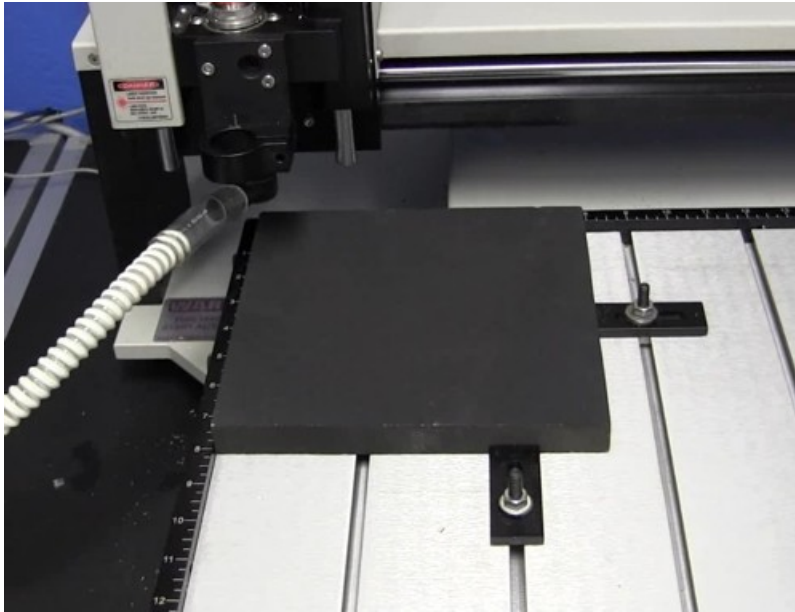
Click on OK. Then select the Filter by Color icon in the Cut toolbox.



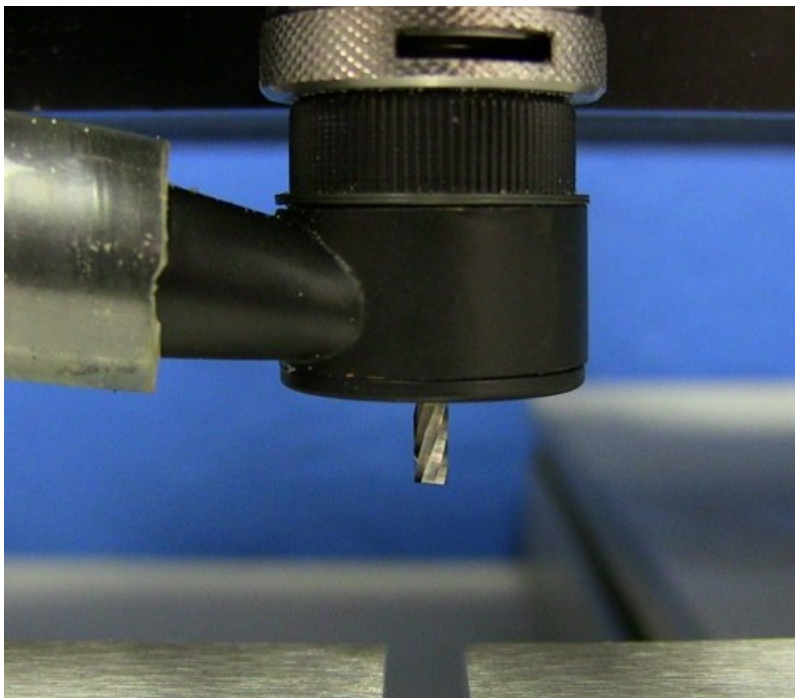
The Filter by Color window will appear. Click on the down arrow in the Filter Layer selection, then click on the Red color switch to select only the red tool path we created. Then click on Select.



Before sending the job to the machine, we need to place the material on the table, secure it with clamps (or other hold down methods) and set the surface of the material.



Since we are not using the proximity sensor in this application and are setting the cut depth based on the settings in the tool path we previously created, we need to use the Set Surface feature on the machine. Before doing so, install the cutter so that the cutter tip extends MORE than the cut depth set in the tool path. In this example, the cut depth was set to 0.150 inches. In the below picture, the cutter tip is shown extending approximately 0.250 inches below the vacuum nose cone. This is critical when not using the proximity sensor. If the tip does not extend more than the cut depth, the nose cone will stop the tool from cutting to its proper depth.



To set the surface, move the spindle over your material and lower it down using the Z Down button on the Pendant until the cutter tip just touches the surface of the material. Press the Set Surface button on the Pendant, then press Enter on the Pendant to set this position.

HINT: You can quickly determine when the cutter tip contacts the material surface by placing a piece of paper in between the cutter and the material and sliding it back and forth while slowly lowering the spindle. When you feel resistance, stop lowering the spindle and press the Set Surface button on the Pendant, then press Enter on the Pendant to set this as the surface position. Using this method also protects the material from being scratched by the cutter.

Once the surface has been set, select the Engrave icon from the left toolbar and make sure you have selected the correct device and tool options for Sign Foam Engraving, then select the Engrave icon from the cut toolbox to send the job to the machine.

WARNING: When not using the proximity sensor, the user MUST be prepared to use the Emergency Stop to stop the machine in case the job was not set up properly and the cutter continues to move down beyond the desired cut depth! If a set up error has been performed, it is possible for the machine to drive the cutter into the engraving table, causing significant damage to the cutter, spindle and table!

Use of the vacuum nose cone is highly recommended for this application.

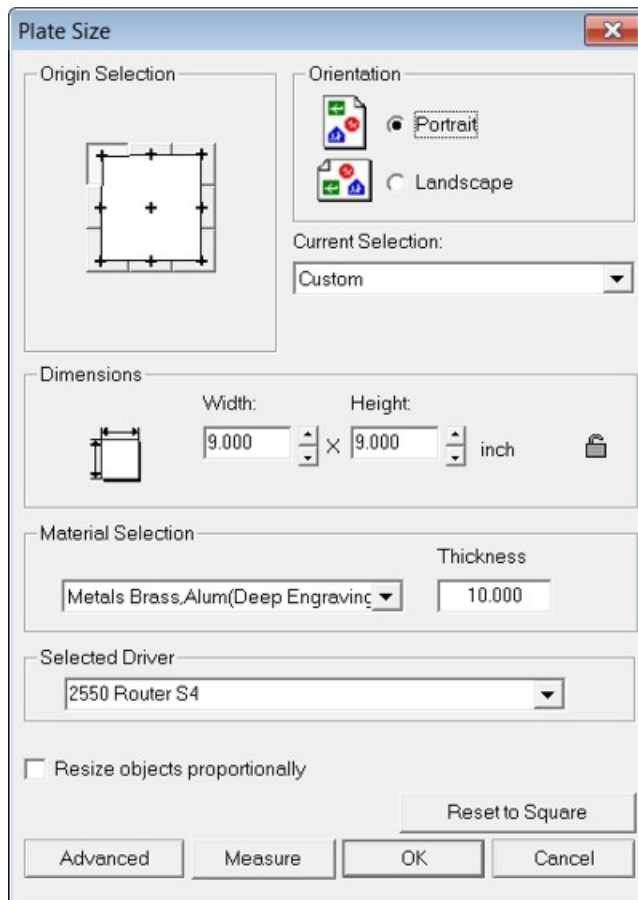


7.3.3 Profile Cutting Dimensional Letter - Metals

In this example, a dimensional letter will be cut out of 11 gauge aluminum plate with the Vision 2550 Router. The techniques used in this application are multi-pass metal cutting, holding down material, creating tool paths and using the Surface Sensing Block.

7.3.3.1 Example Job 7 - Dimensional Letter in Metals


Begin by setting the plate size to a 9.0 x 9.0 inch area.

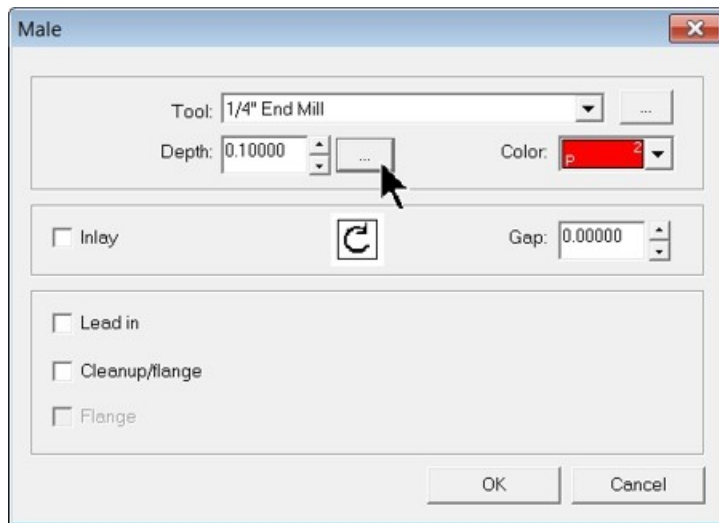


The image shows a software dialog box titled "Plate Size". It contains several sections for configuring the plate dimensions and material.

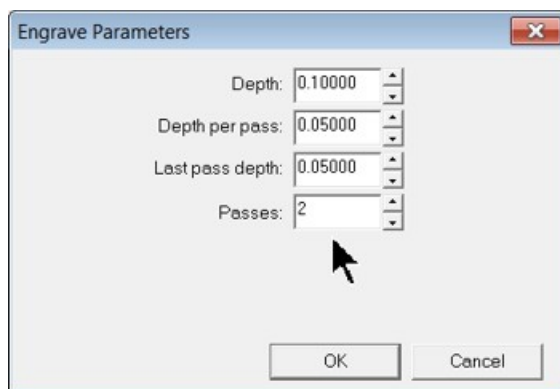
- Origin Selection:** A diagram of a square plate with a central crosshair and eight points on the perimeter, indicating where to place the origin.
- Orientation:** Two radio buttons, "Portrait" (selected) and "Landscape".
- Current Selection:** A dropdown menu showing "Custom".
- Dimensions:** Two input fields for "Width" and "Height", both set to "9.000". A unit selector shows "inch". A small diagram of a square with dimension lines is to the left.
- Material Selection:** A dropdown menu showing "Metals Brass,Alum(Deep Engraving)".
- Thickness:** An input field set to "10.000".
- Selected Driver:** A dropdown menu showing "2550 Router S4".
- Resize objects proportionally:** An unchecked checkbox.
- Buttons:** "Advanced", "Measure", "OK", "Cancel", and a "Reset to Square" button.

The Male path window will appear. In this example, since we are cutting completely through a piece of 11 Gauge aluminum, we will be using a 1/4" End Mill as the cutting tool. Set the Depth to slightly more than the material thickness. In this case, the material actually measures 0.091 inches thick. We will set the cutting depth to 0.100 inches and choose the proper tool for this application. Set the color to a different color than what was used to draw the original text, in this case, Red is chosen. Then click on

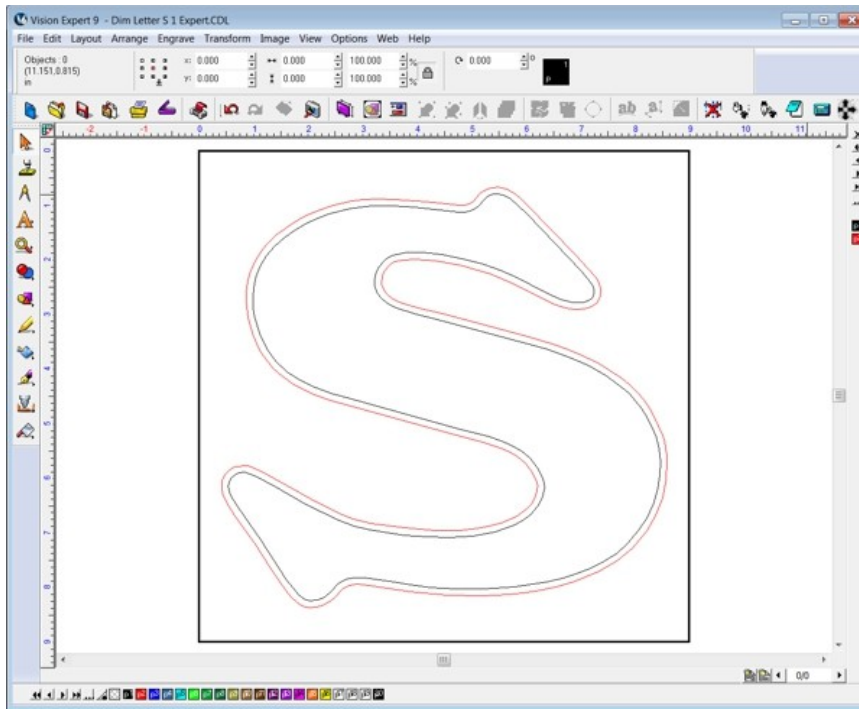
the  icon to the right of the Depth field in order to set the number of passes.



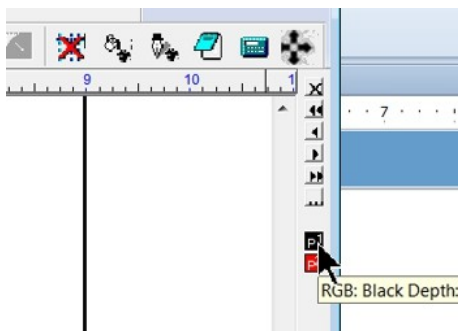
Set the number of passes to 2. The other fields, except the Depth field, will adjust to equal depths per pass. Click on OK when finished.



The tool path will be created. At this point, we are ready to send the job to the machine.

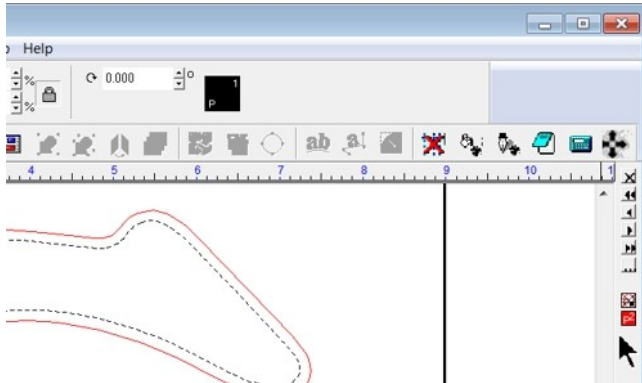


We only want to send the red tool path we created to the machine. There are several methods to sending specific objects to the machine. In this example we "turn off" all colors except for the one we want to cut. To do this, first, notice that on the right side of the Vision 9 window, there are two color swatches. These represent the colors we have used in our drawing (Black and Red).



To only send red objects to the machine, we can "turn off" the black by holding down the CTRL Key on the computer keyboard and clicking of the black color swatch with the LEFT Mouse button. Clicking on the swatch once will turn that color off and clicking it again (while holding the CTRL Key down) will turn the color back on.

For now, turn the black color off using the above method. Notice that the black object on screen is now shown with a dotted line. This indicates that we cannot select or print this color.



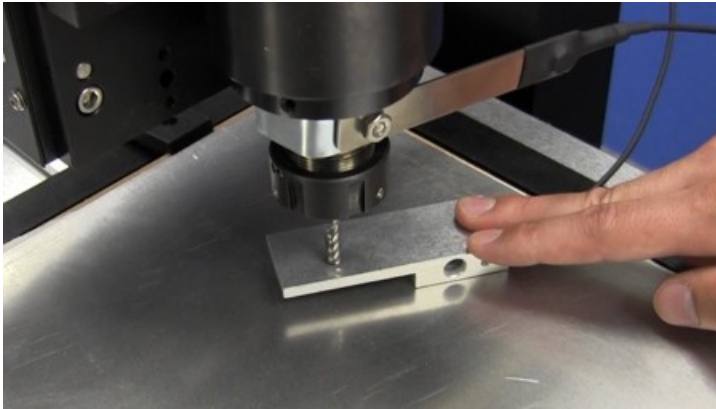
The color swatches now look like this.



This method of selecting which colors to send to the machine will be very useful when complex drawings with many objects, colors and tool paths are used.

Before sending the job to the machine, the material must be placed on the table and the surface must be set. The hold down technique used in this application is the Spray Adhesive technique discussed in the Holding Down Materials section. A piece of MDF was clamped to the machine's table for use as a spoil board and a large section of application tape was placed on the spoil board. Application tape was also applied to the back of the aluminum plate. Adhesive was sprayed on to the tape covering the spoil board and the tape on the back of the aluminum plate. The plate was then pressed on to the spoil board to secure it.

The set surface procedure used with the 2550 Router in this example utilizes the Surface Sensing Block (see below). Please refer to Set Surface Procedures in the Operation section of this manual.



Set the Home position to a point approximately 1/2 inch or more from the top left edge of the aluminum plate. This is to allow room for the cutter to trace a path inside the aluminum plate. When the machine is set up, select the Engrave icon from the left toolbar, make sure the Device is set for your machine and click on the Tool Setup icon to change the settings to profile cut the aluminum based on the recommendations of the cutting tool manufacturer*.

* Feeds and speeds for profile cutting materials heavily depend on the tool design, material and thickness. Due to the complexity of these factors, please refer to the suggested feeds and speed data available from the manufacturer of your particular cutting tool.

Metal applications are best performed using a lubricant. If your machine does not have the Vision Misting System, spray the surface of the metal prior to (and sometimes during) the cutting process. When cutting aluminum, the lubricant helps to reduce the chances of chips welding themselves back on to the base material and also to extend cutter life.



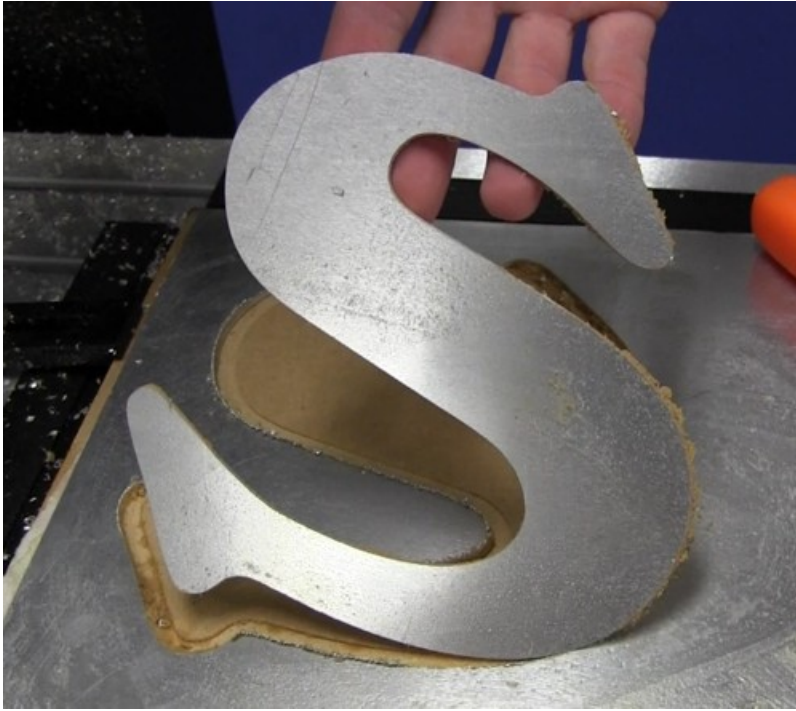
There will be a tremendous amount to debris created when cutting with a large diameter cutter. A shop-vac will be useful in keeping the work area and machine clean.



Remove the cut piece by prying it up with a sharp tool. The spoil board will have grooves cut into it, but it can be resurfaced using the router and reused until the board becomes too thin.



The finished part.

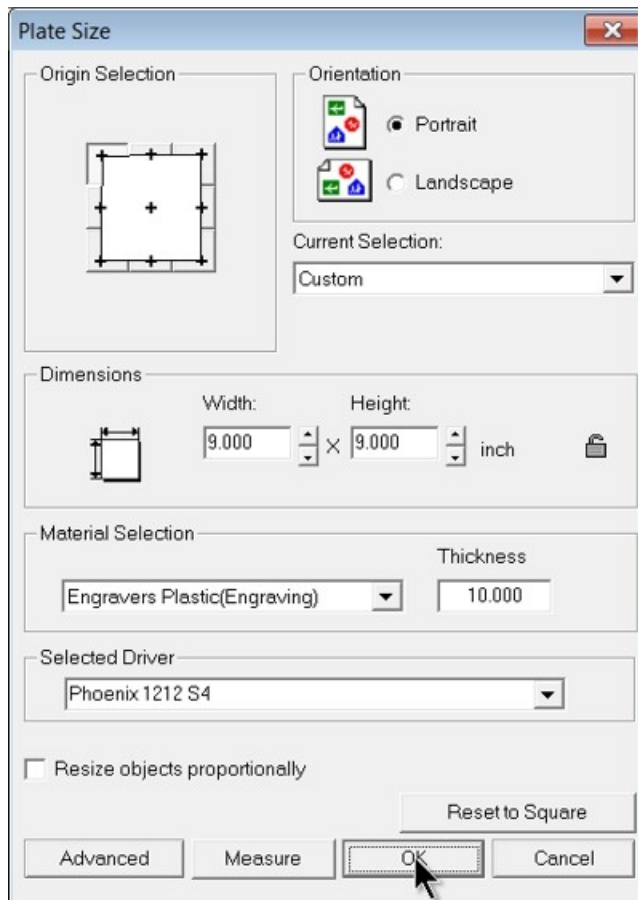


7.3.4 Profile Cutting Dimensional Letter - Non-metals

In this example, a dimensional letter will be cut out of Sign Foam material with the Vision 2550 Router. The techniques used in this application are cutting thick materials, holding down material and creating tool paths.

7.3.4.1 Example Job 8 - Dimensional Letters in Non-Metals

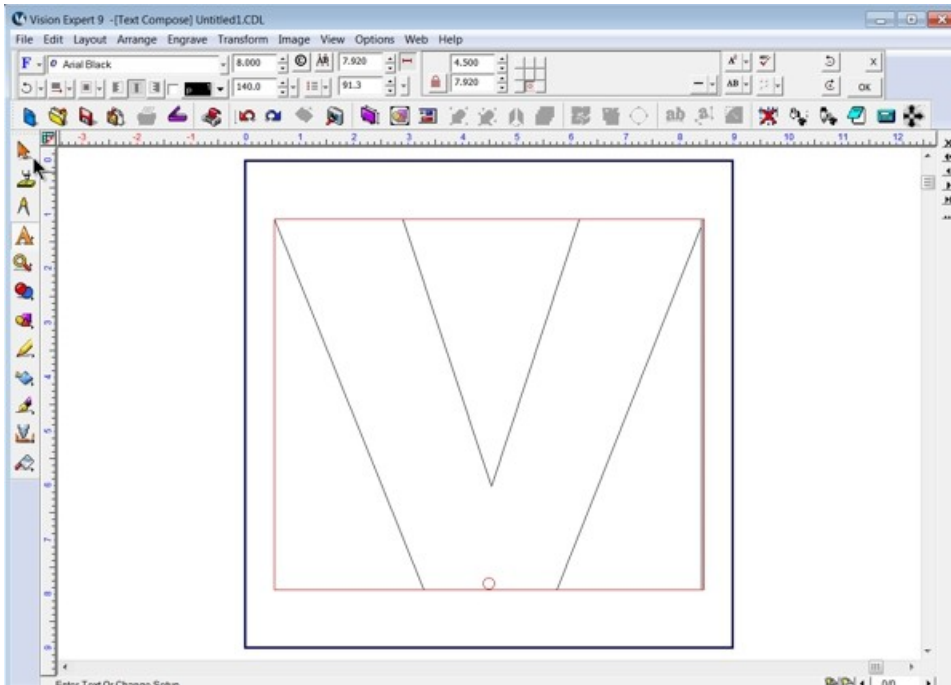
Begin by changing the plate size to 9.0 x 9.0 inches.



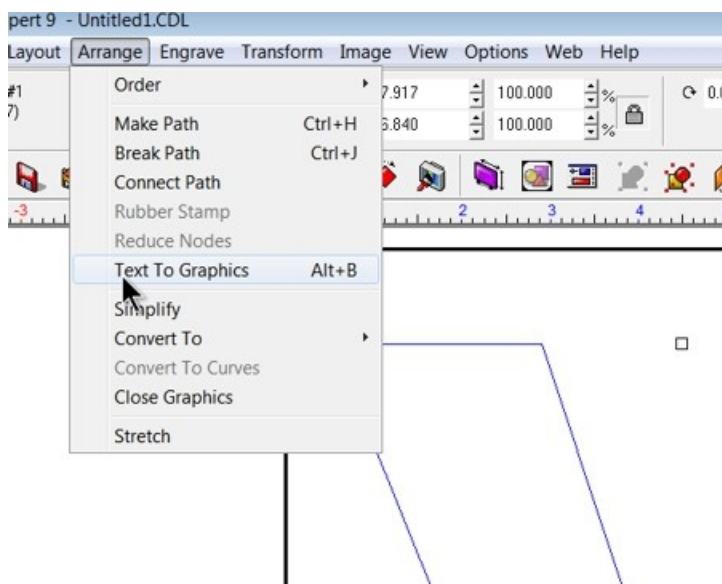
Select the Text Tools icon from the left toolbar and click on the Frame Text Compose tool.



Type in the letter shown below. The font used in this example is Arial Black and the front height is set to 8 inches.




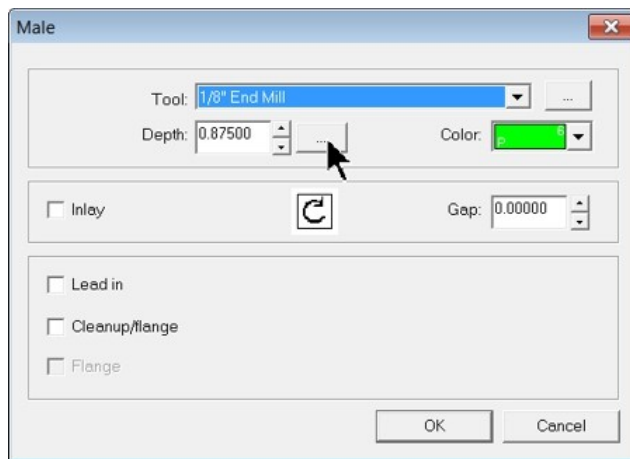
In order to create a tool path, we first need to change the letter from text to graphics. With the letter selected, select Arrange from the top menu bar and click on Text to Graphics.



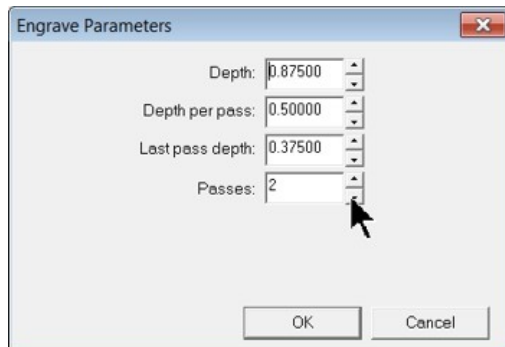
Select the Tool Path Tools icon from the left toolbar, then click on the Male tool path tool.



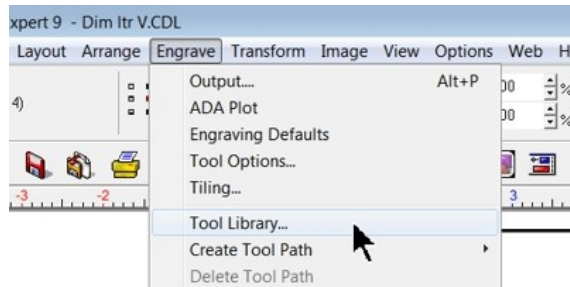
The Male tool path window will appear. The tool used for cutting in this example is a 1/8" End Mill and the material is 0.875 inches thick. Select the correct tool from the Tool drop down list, and set the Depth to slightly more than the material thickness. In this example, the Depth was set to 0.875 inches. Click on the  icon to the right of the Depth field to set the number of passes for this tool path.



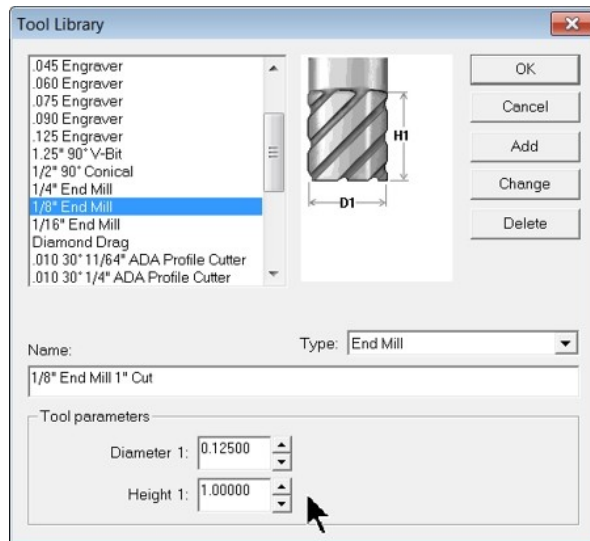
The first thing you should notice is that it's not possible to set the number of passes to 1. This is due to a limitation in the standard End Mill settings. In order to cut the material in one pass, an End Mill designed for this purpose is necessary. If you have the correct tool, select Cancel from this window and from the Male Tool Path window. We will then add a custom tool setting for a cutter designed for Sign Foam that has the ability to cut up to 1 inch thick material. If you are using a cutter with less depth capability, you will need to use more than one pass to cut through the material. Do NOT attempt to profile cut any material thicker than the maximum cutting height of the tool being used.




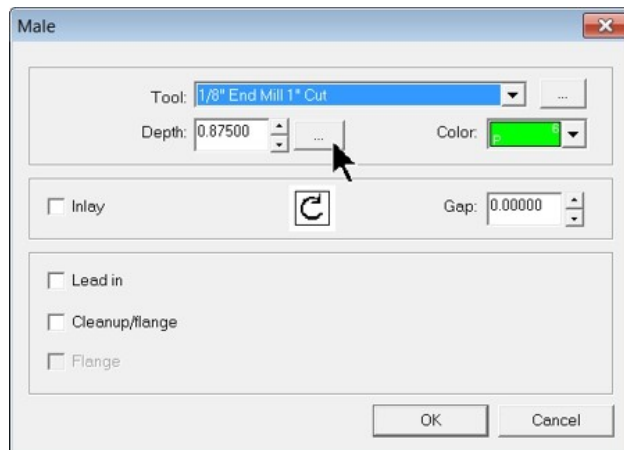
Select Engrave, then click on Tool Library to add a new tool for this application.



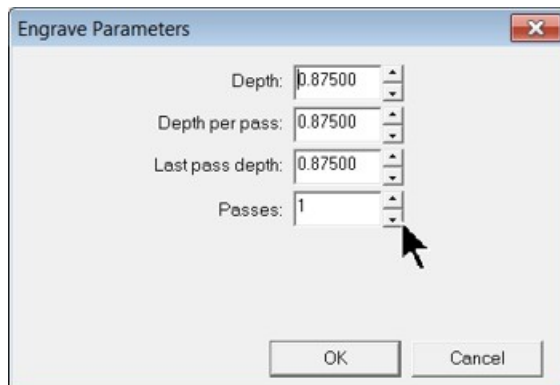
In the Tool Library, select a tool that is closest in description to the one you want to add. Give it a new name (1/8" End Mill 1" Cut was used in this example). Enter the cutting Height of the tool (1.00 inch in this example). Click on Add, which stores the new tool in the tool library, then click on OK.



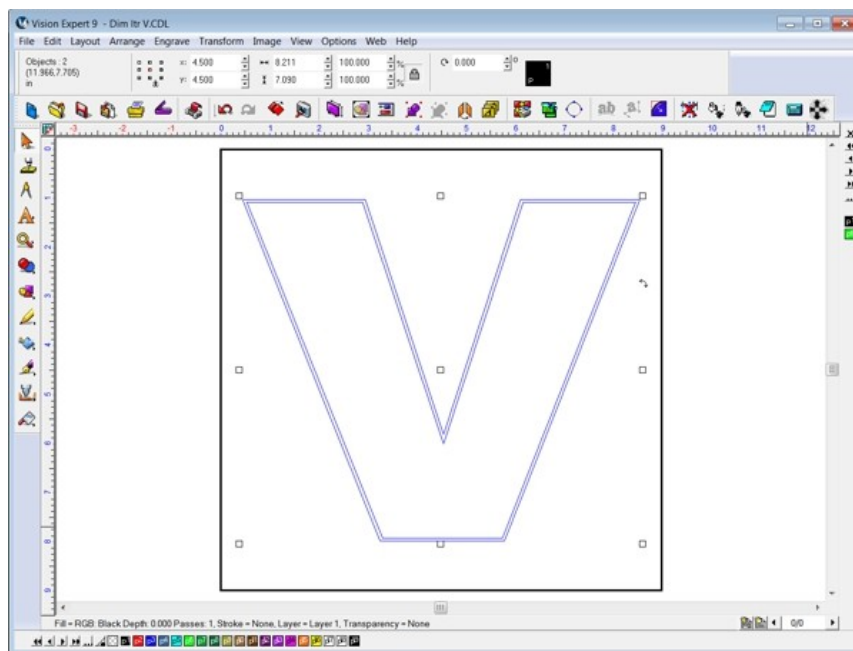
Select the Tool Path Tools icon from the left toolbar, then click on Male. Choose the new Tool you just created and adjust the Depth to 0.875 (which is slightly more than the actual material thickness - which measured 0.863 inches). Click on the  icon to set the number of passes.



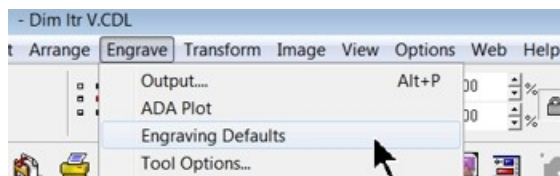
Set the number of passes to 1 and click on OK, then click on OK in the Male tool path window.



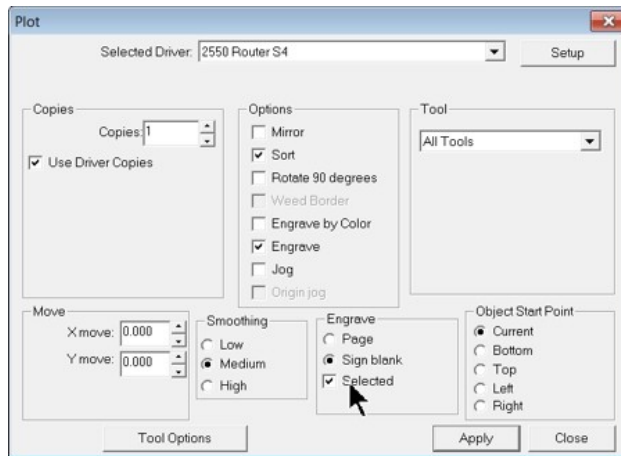
The tool path should now be created as shown below.



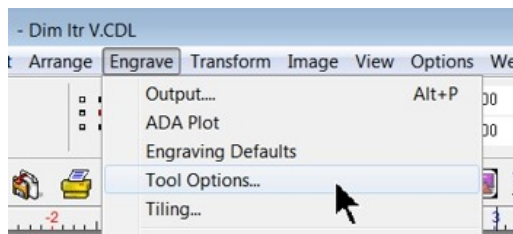
This example will show how to set the Device and the Tool before sending the job to the machine. Select Engrave from the top menu bar and click on Engraving Defaults.



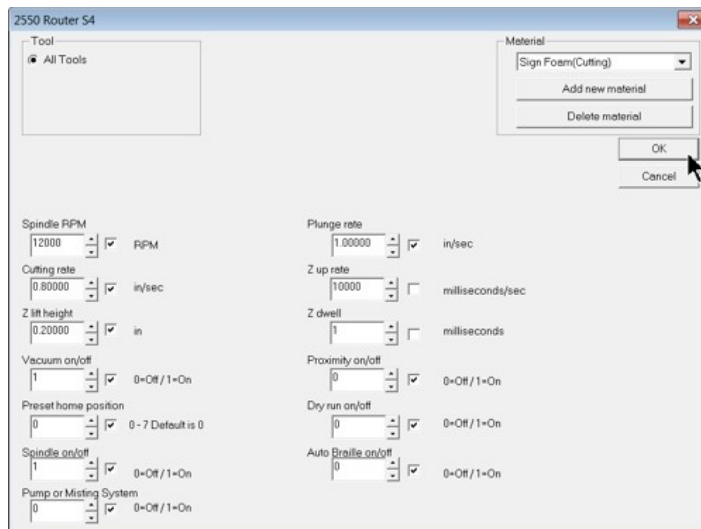
Select the Device as your machine. We will be sending only Selected items in our drawing to the machine, so put a check mark in the box to the left of Selected, then click on Apply and then Close.



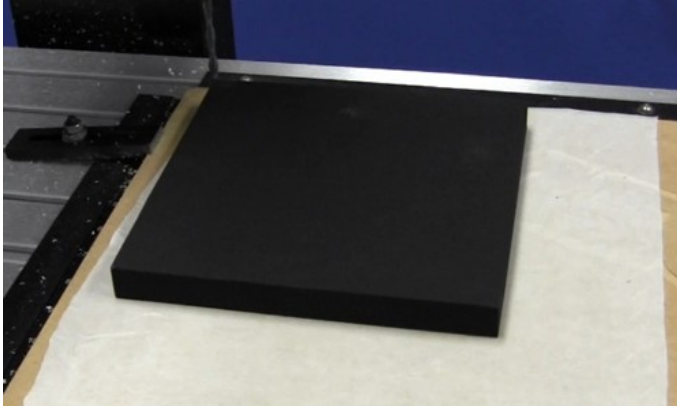
Select Engrave, then Tool Options from the top menu bar.



Select Sign Foam (Cutting) from the Material list. Set the Proximity on/off value to 0. We will be using the Set Surface function in this example, so the Proximity sensor will not be used. Click on OK when finished.

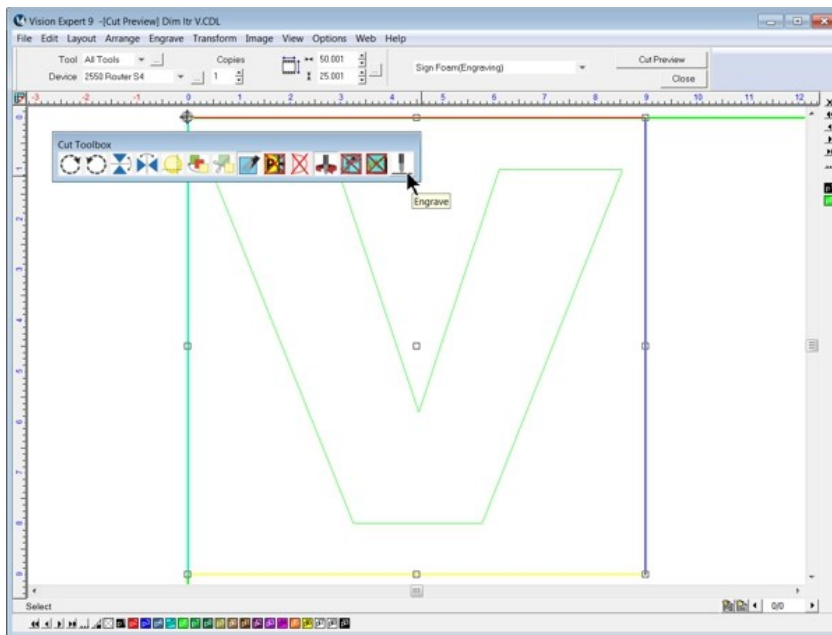


We now need to secure the material to the table. In this example, a piece of MDF was clamped to the table to use as a spoil board (sacrificial material) and a large piece of application tape was applied on top of the MDF. Spray adhesive was applied to both the top of the application tape and directly to the back side of the piece of sign foam. The sign foam was then pressed on to the application tape to secure it. This is a similar hold down technique as is discussed in the Holding Down Material section of this manual. Do not attempt to apply application tape to the back of the piece of sign foam. It will not stick well enough to hold the material in place.



Once the material is held in place and the End Mill is installed in the spindle, we then set the surface for the material (refer to the Set Surface Procedure in the Operations section of this manual, or Example Job 7). We also will set the Home Position to the top left corner of our material (refer to the Set Home Position procedure in the Operations section of this manual).

To send the job to the machine, select only the tool path in the Vision 9 software (remember, we are sending only selected objects to the machine). Select the Engrave icon from the left toolbar. Verify the Device and Tool setup, then send the job to the machine by clicking on the Engrave icon in the Cut Toolbox.



Since we have the Proximity sensor turned off, the machine will cut to a depth we set in our Tool Path setup. It uses the surface position set with the Set Surface function as the "zero" depth and will lower the cutter 0.875" below the material surface.

Caution: As with all applications, make sure you are ready to press the Emergency Stop or the Pause button on the Pendant, in the event that the job was not set up properly and the cutter moves too far down and starts cutting into the machine's table. Severe damage may occur if the cutter is allowed to cut into the machine's table.

Once the job has been run, remove the material from the table. Note: In this example, the vacuum nose cone was not used, but it is highly recommended to do so. As you can see by the waste remaining after this piece was cut, there is a large amount of debris produced when cutting sign foam materials.



7.4 Level 3 Job Examples

These last 2 example jobs are more complex, require combinations of cutting and engraving, as well as utilize features only available in the Vision 9 Expert or Pro software versions. A working knowledge of the software and machine setup are required to produce quality results.

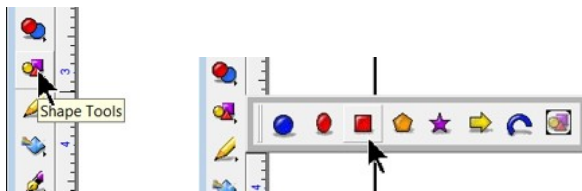
7.4.1 ADA Signs

In this example, an ADA sign will be created using 1/8th inch reverse engravable acrylic (clear with a white background), plastic applique material, and the braille insertion tool. The techniques used with this application are: importing decorative designs, using the braille inserter, creating braille text, reverse engraving, profile cutting acrylic and applique material, creating tool paths and color filling.

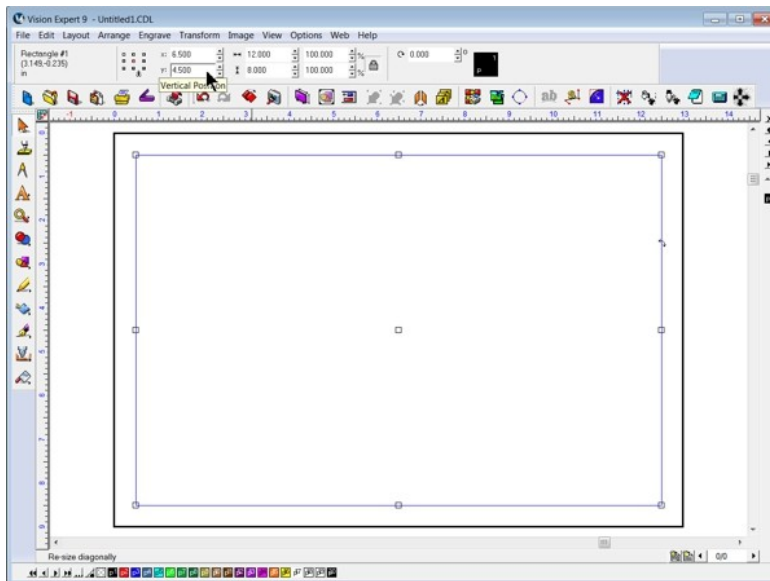
7.4.1.1 Example Job 9 - Acrylic ADA Signage

Note: 4 cutting tools are used in this particular application, although 3 tools can be used. The tools are: 1/8th inch End Mill for profile cutting the acrylic, 0.030 Flex Cutter for engraving filled areas, 0.015 Flex Cutter for profile cutting the applique material, and the Braille Drill Tool for drilling the holes for the braille beads..

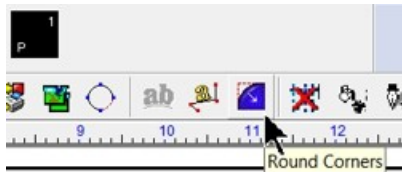
Begin by creating a 13 inch x 9 inch plate in Vision Expert 9. Vision Expert or Pro is required to create braille text as shown in this example job. Select the Shape Tools icon from the left toolbar, then select the Rectangle Tool..



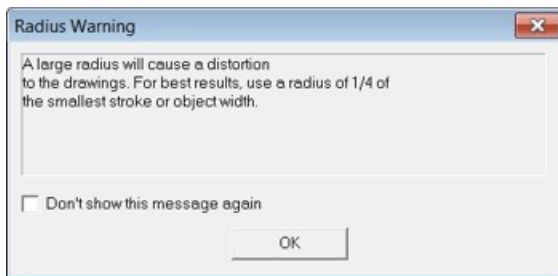
Create a 12 inch by 8 inch rectangle and center it in the middle of the plate. This will be used to cut the perimeter of the sign.



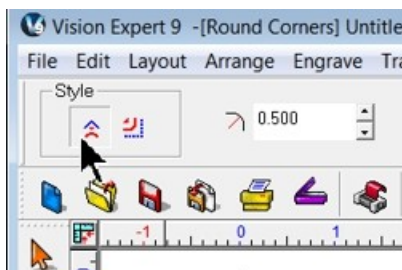
We now round the corners of this rectangle. With the rectangle selected, select the Round Corners icon from the top toolbar..



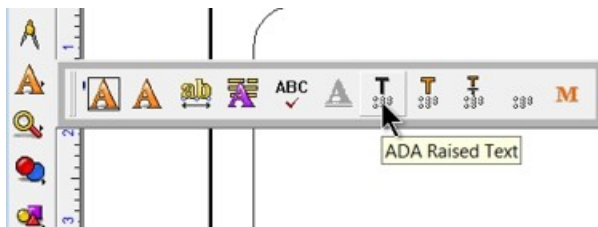
The following warning about large radius corners may appear, if so, click on OK. Our corner radius is small enough to not distort the rectangle.



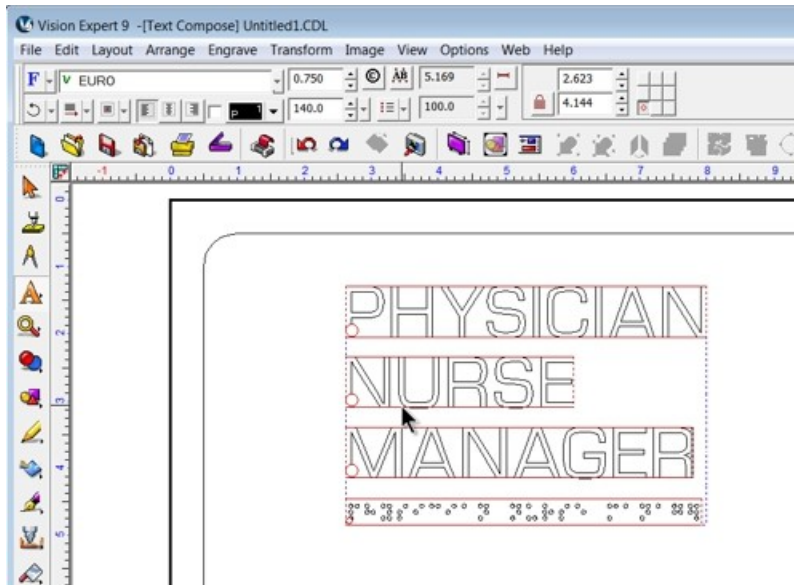
The rectangle options menu will appear above the top toolbar. Select the Round Outside Corners icon, then set the Corner Radius to 0.5 inches. Click on Apply and then Close to keep these changes.



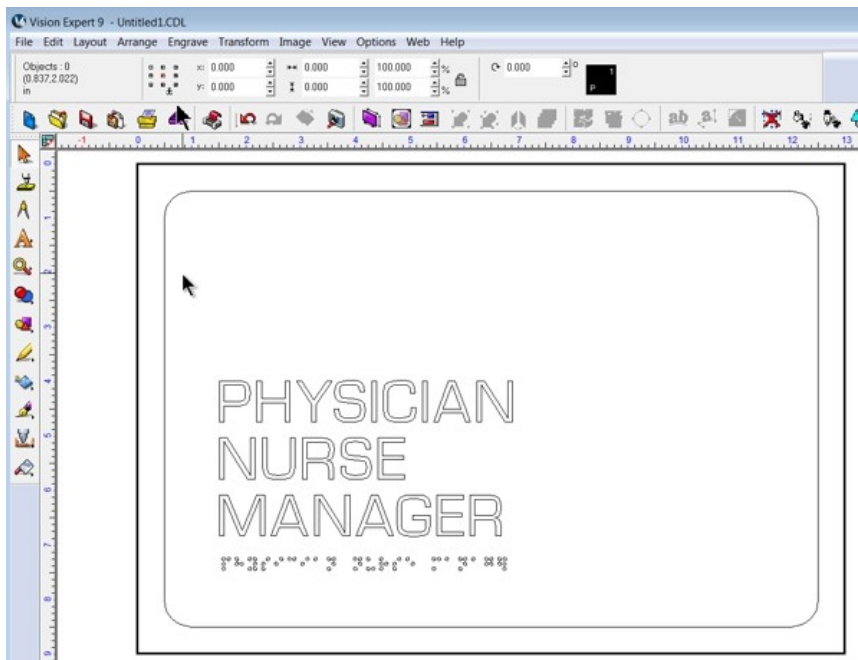
Select the ADA Raised Text tool after selecting the Text Tools icon from the left toolbar.



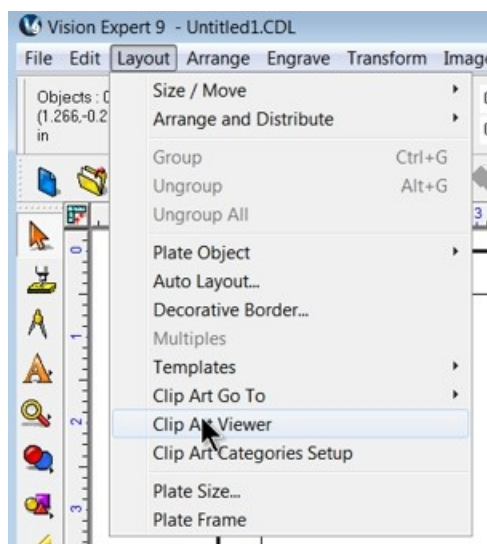
Enter the text as shown. The Font is 0.75 inch EURO. Do not enter three separate lines of text by clicking three times with the ADA Raised Text tool. Instead, enter the first line of text, press the Enter Key on you computer's keyboard, the type the second line. Repeat this for the third line.



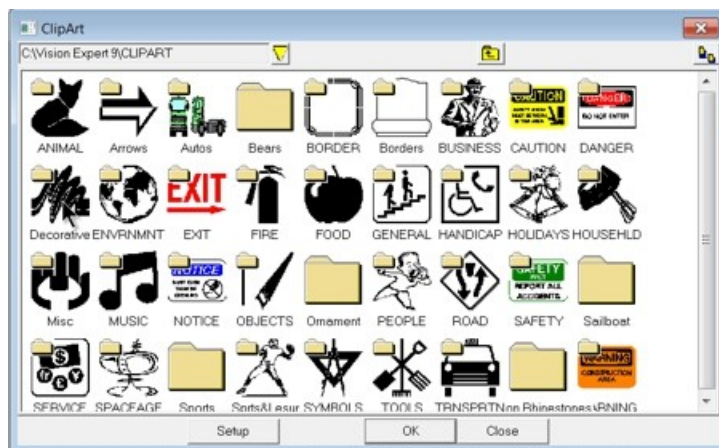
Move the text to the bottom left area on the plate.



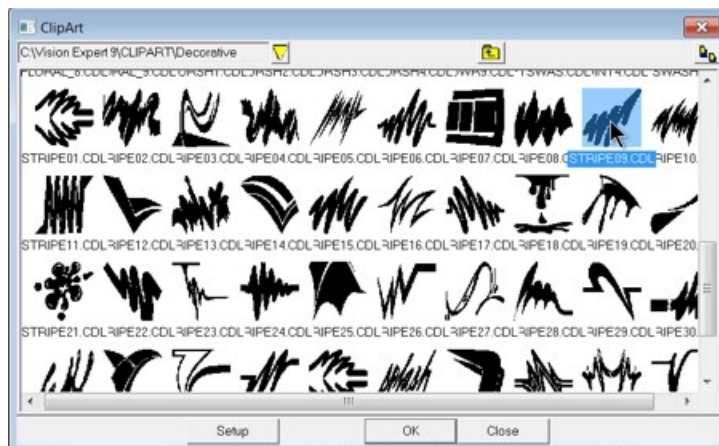
To insert some decorative clipart, select the Clip Art Viewer after selecting Layout from the top menu bar.

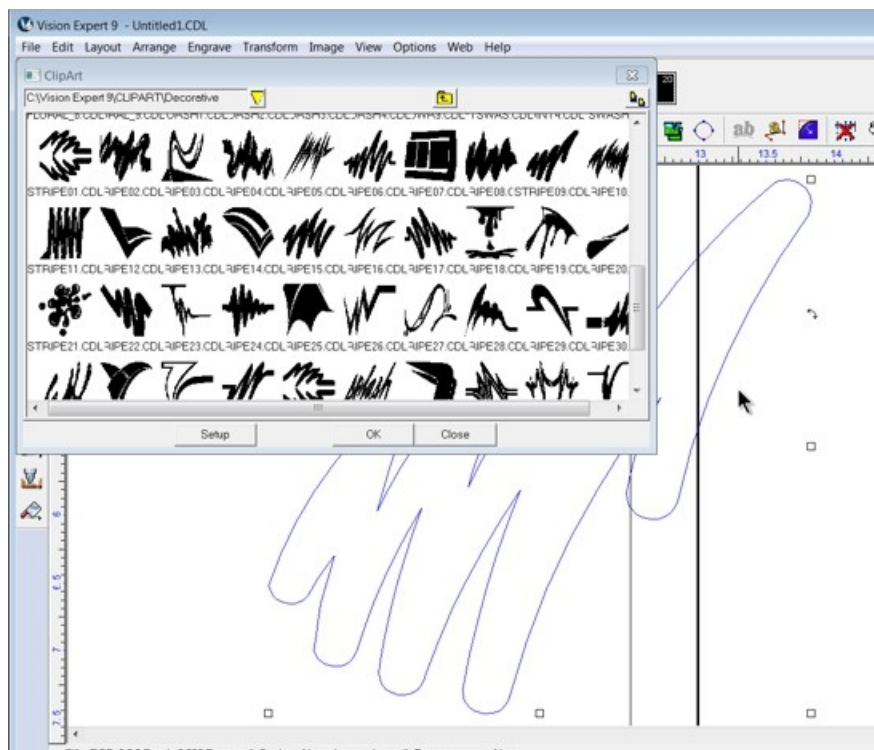


The Clipart window will appear. Double-click on the folder named Decorative to open it.

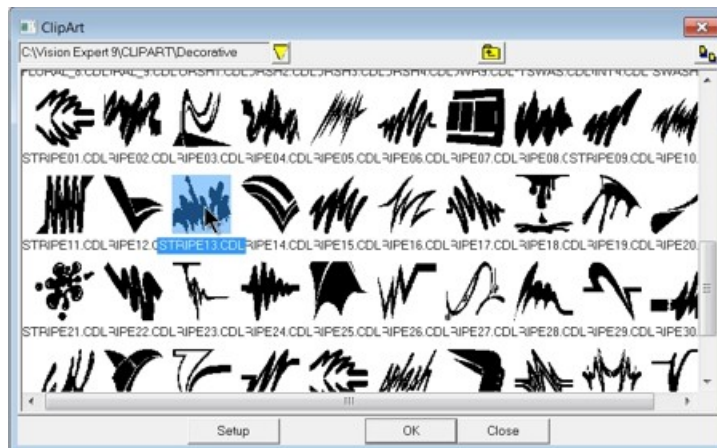


Select the file STRIPE09.CDL, then click, hold and drag it to the plate.

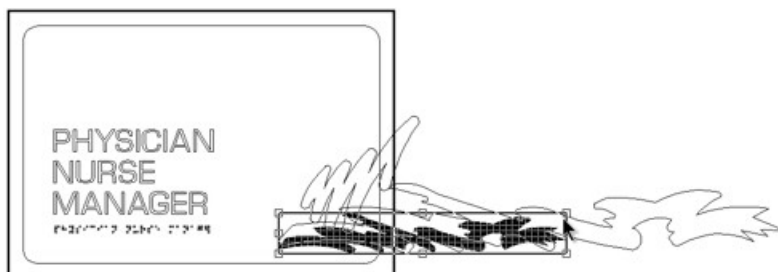




Select the STRIPE13.CDL file and click hold and drag it to the plate.

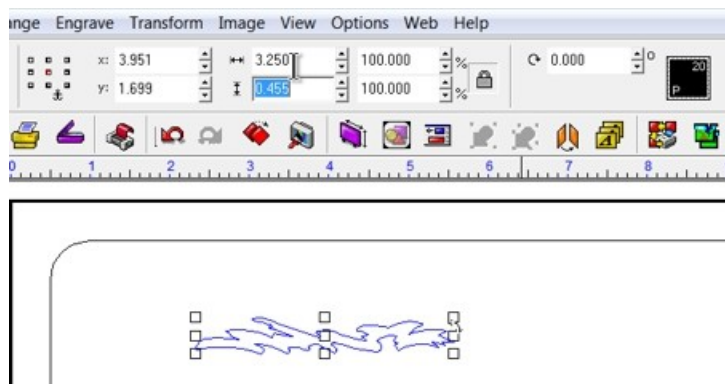


You will need to move these clipart images to their general locations within the plate area, and re-size them to fit.

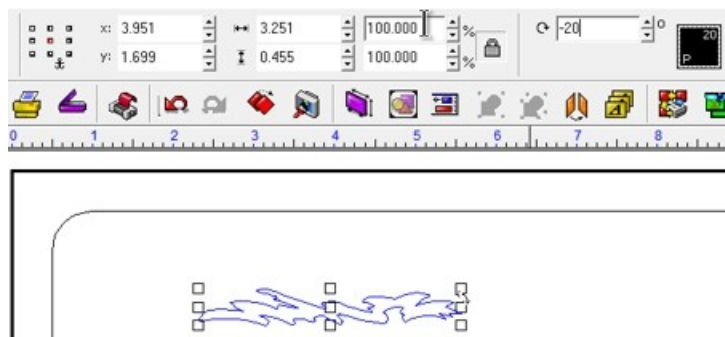


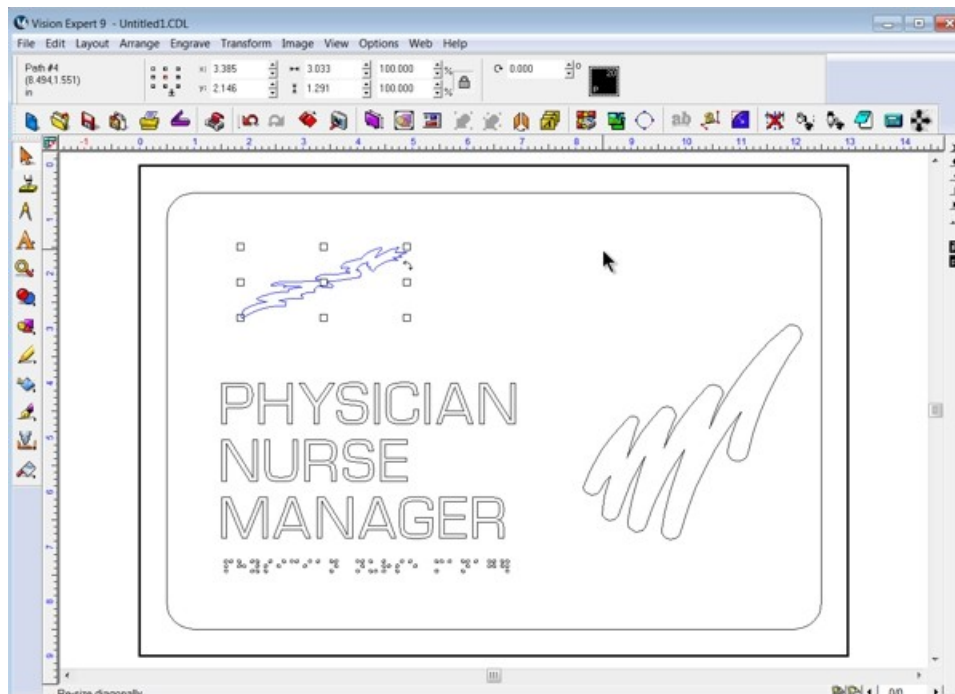


To be more specific on the size of the clipart images, select the image as shown, then change the Object Width to 3.25 inches in the entry field on the top toolbar.

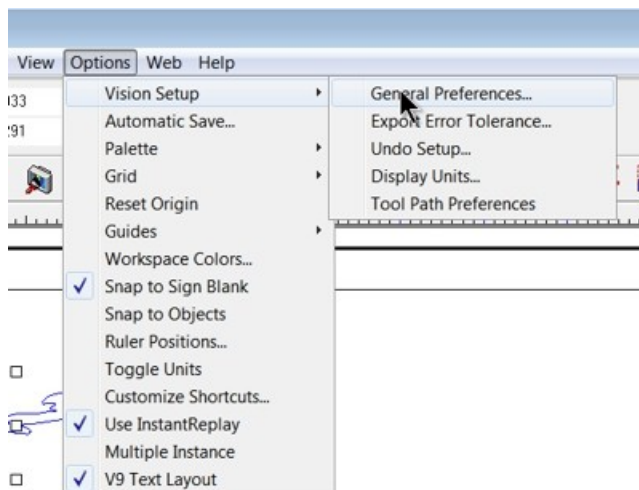


To rotate the image, enter -20 in the Rotation entry field on the top toolbar, then press Enter on the computer keyboard to make the change.

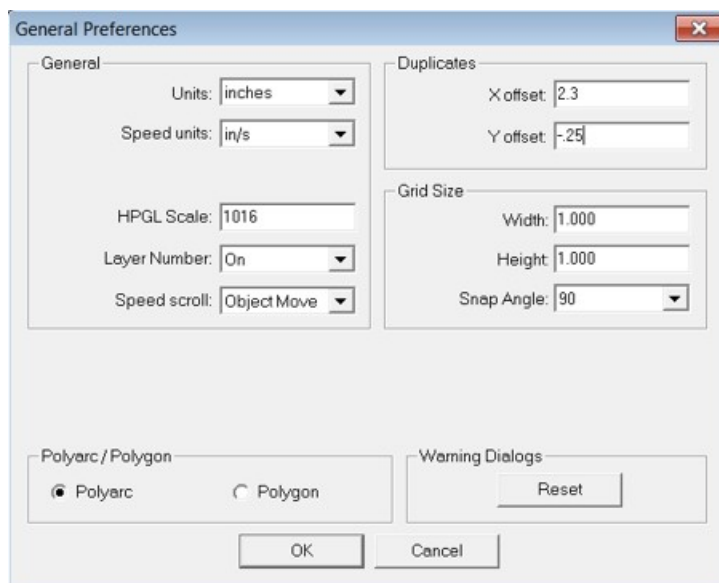




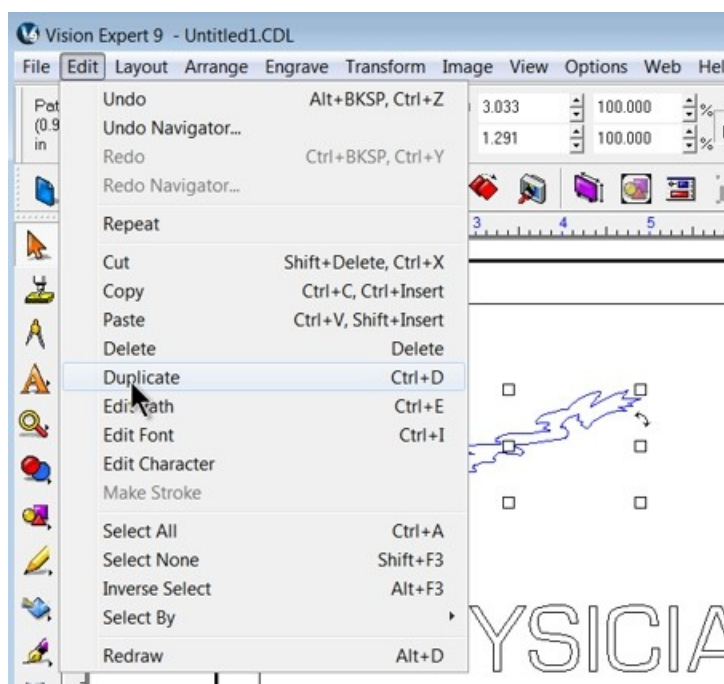
We will now duplicate this image a specific distance from the original and make a total of 4 images. To set the distance the duplicate image will be moved from the original image, Select Options from the top menu bar, then select Vision Setup and click on General Preferences.



The General Preferences window will appear. In the Duplicate section, type in an X offset of 2.3 inches and a Y offset of -0.25 inches. Click on OK to set these preferences.



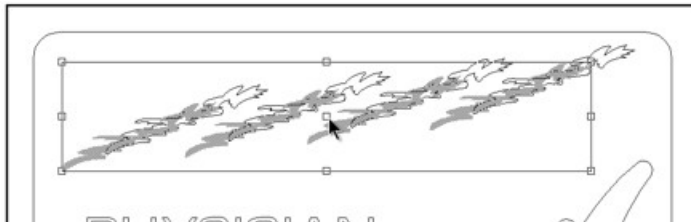
To duplicate the selected image, either select Edit from the top menu bar and click on Duplicate, or use the shortcut keys for this function CTRL D.



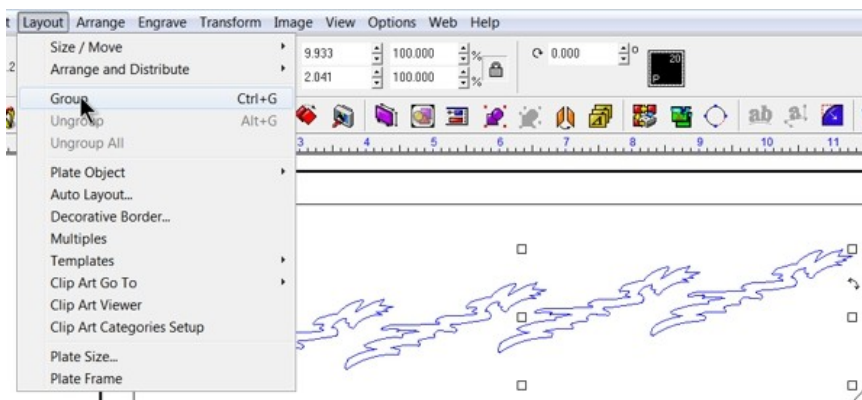
Create 3 duplicates, for a total of 4 clipart images.



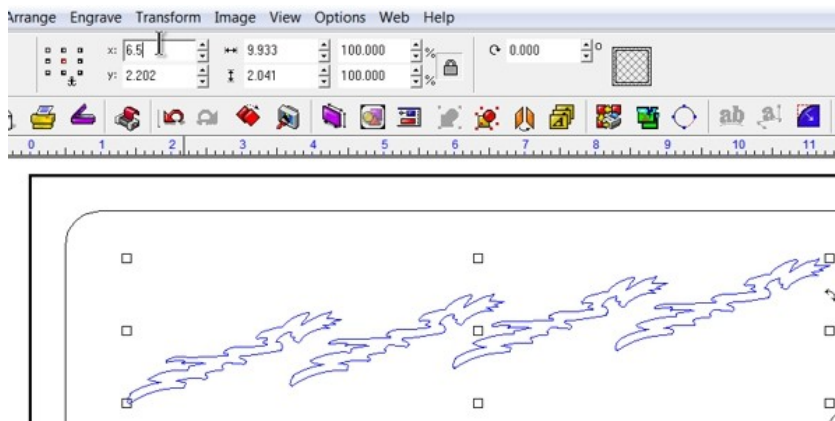
Select all 4 images and move them roughly to the top center of the plate.



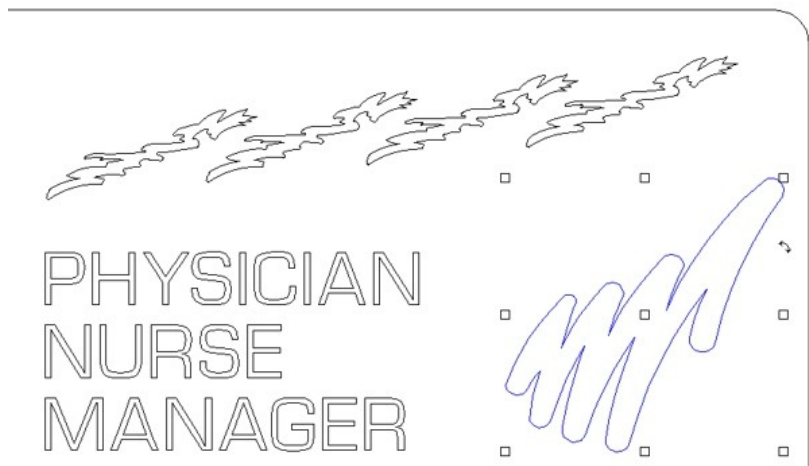
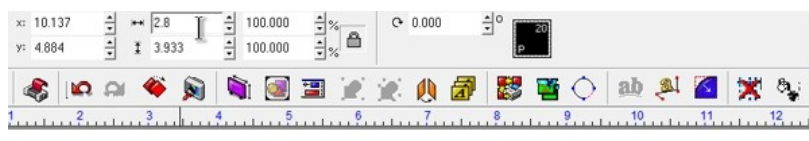
To accurately position these 4 images, we need to group them. Select Layout, then click on Group.



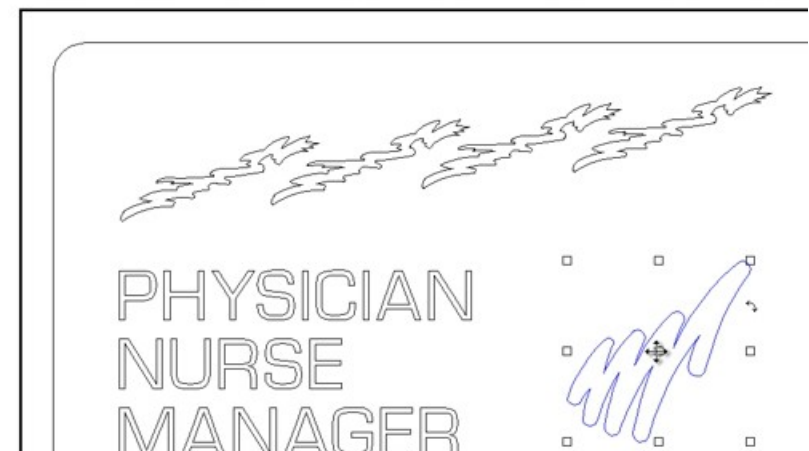
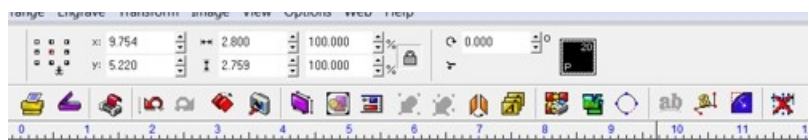
Once grouped, change the X position on the top toolbar to the middle of the page width, in this example, 6.5 inches.



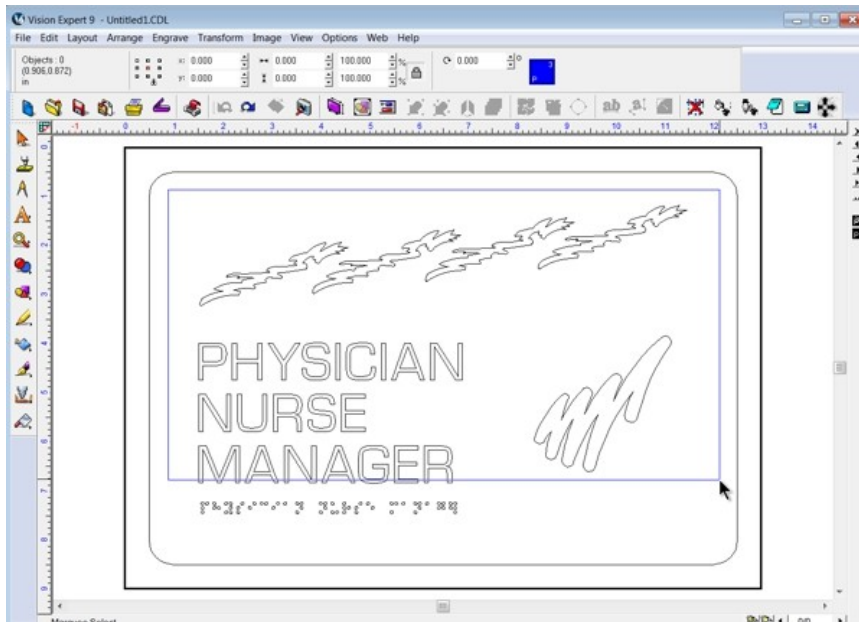
Change the width of the second clipart image to 2.8 inches using the Object Width entry field on the top toolbar.



Move the second clipart image to the right side of the page. In this example, the position was roughly chosen. Now is a good time to move any of the clipart images or the ADA text to space them equally within the plate.



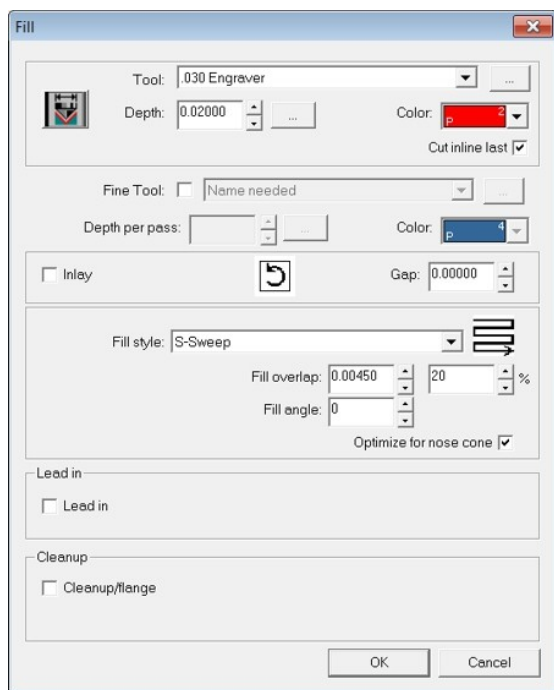
Select the group of images we created and the second clipart image.



To create a fill tool path for these images, select the Tool Path Tools icon from the left toolbar and then click on the Fill icon.



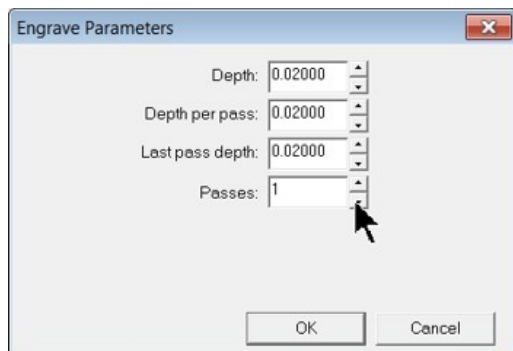
In the Fill window, for this example, choose the .030 Engraver as the Tool, set the Depth to 0.010 inches, set the Color to Red and set the Fill style as S-sweep with a 20% overlap.



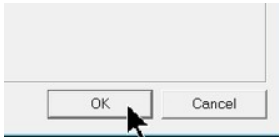
Click on the Depth options icon to set the number of passes.



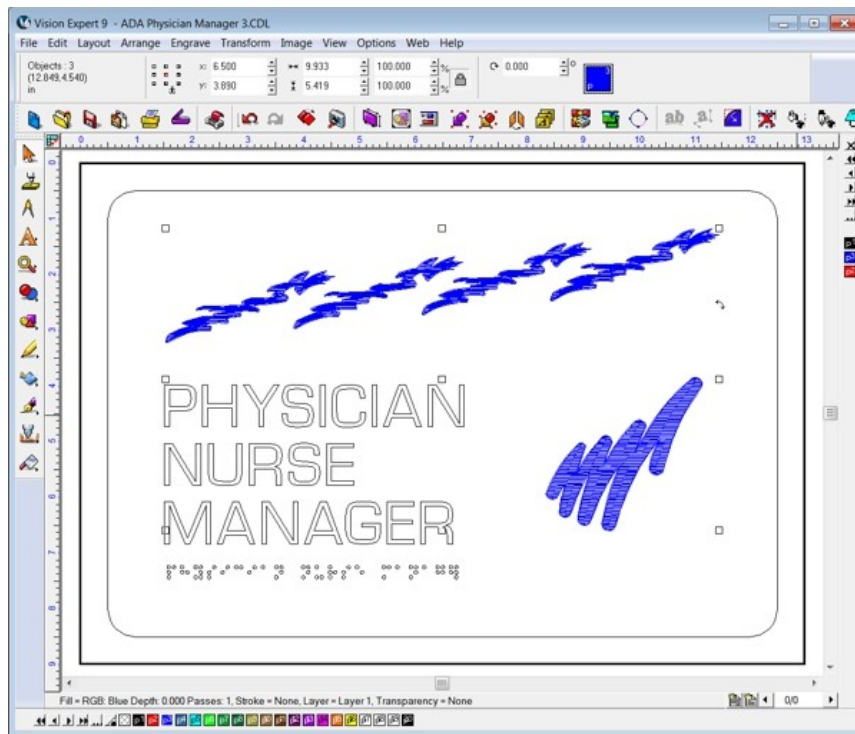
Set the Passes to 1, then click on OK to keep the change and close the window.



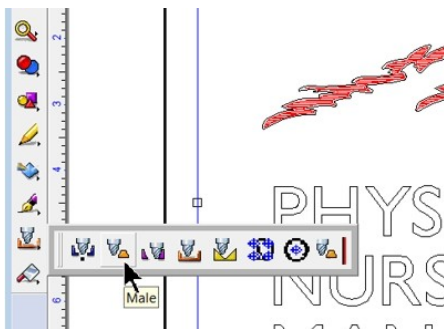
Click on OK to close the Fill window and create the tool paths.




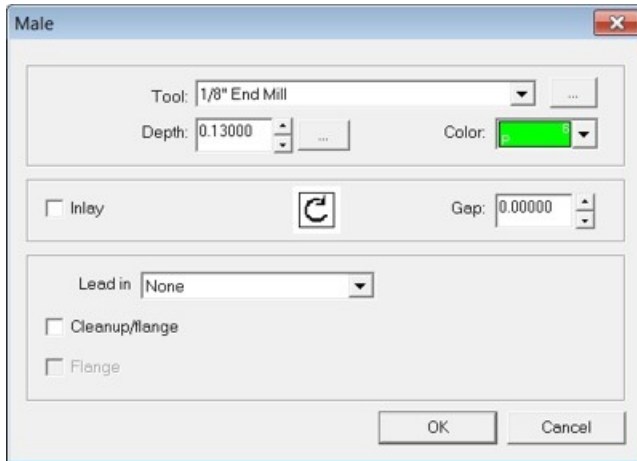
The clipart images now have tool paths, which will be used to engrave out the centers of these images.



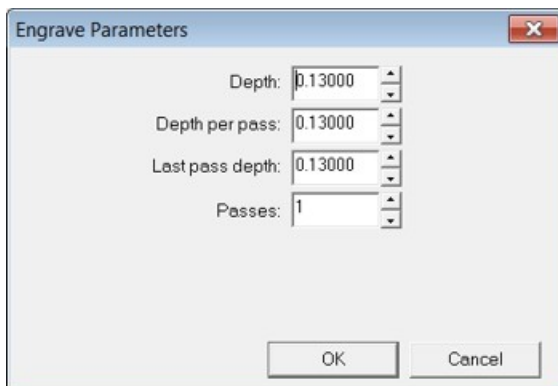
Two more tool paths need to be added. First, select the large rectangle and select the Male tool path tool from the left toolbar.



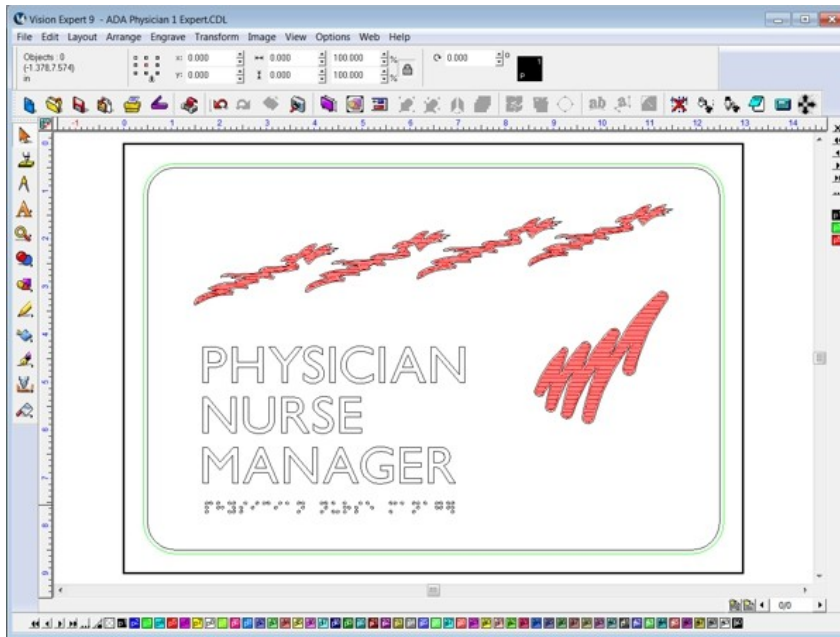
Choose the 1/8th inch End Mill as the Tool. Set the Depth to slightly more than the material thickness (in this case the material was 0.125", so the depth was set to 0.130"). Set the Color to Green (or another color you are not already using). Click on the  icon to set the number of passes.



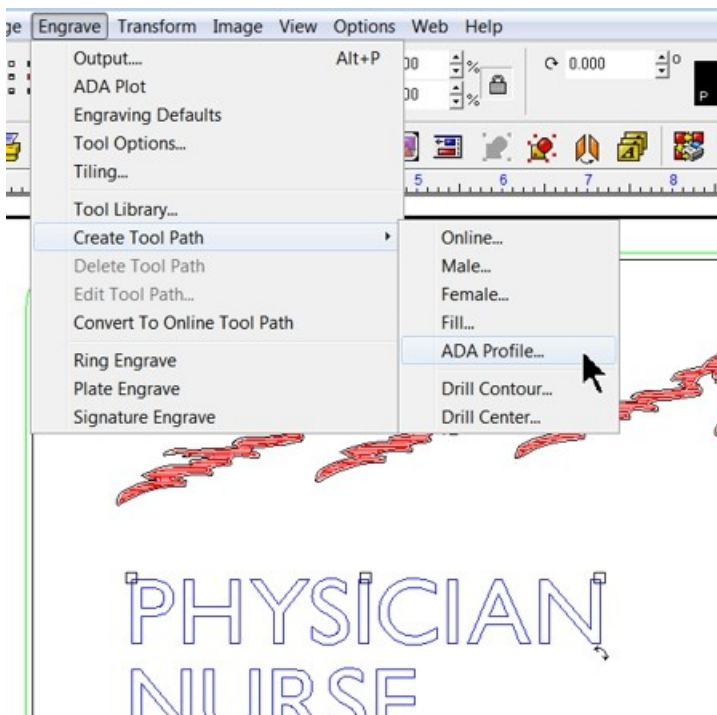
Set the number of passes to 1, then click on OK to close the Engraver Parameters window. Click on OK to close the Male tool path window.




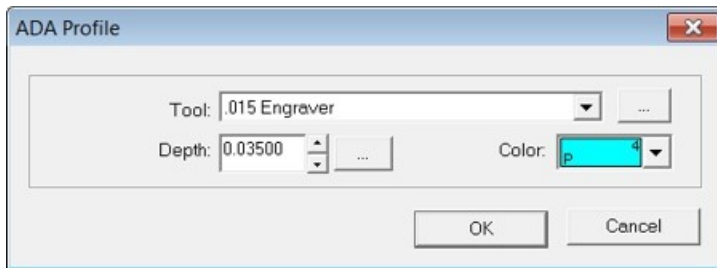
The tool path for the rectangle should be shown as below.



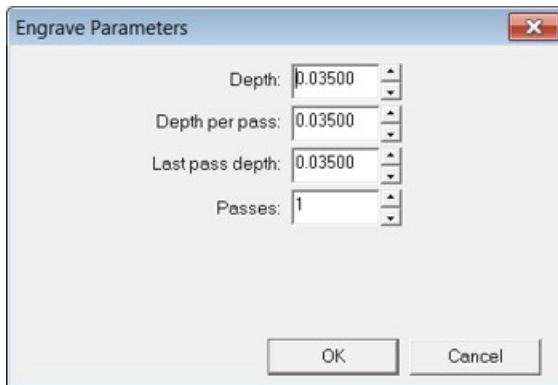
Select the ADA text, then select Engrave, then Create Tool Path and click on ADA Profile.



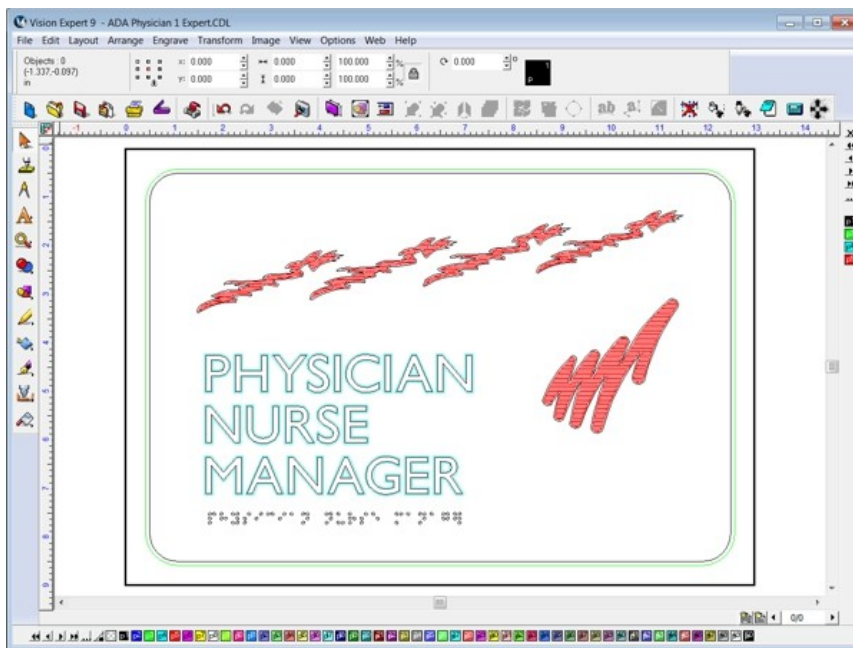
Set the Tool as the .015 Engraver, the Depth to 0.035 inches and the Color to cyan (or another unused color). Click on the  to set the number of passes.



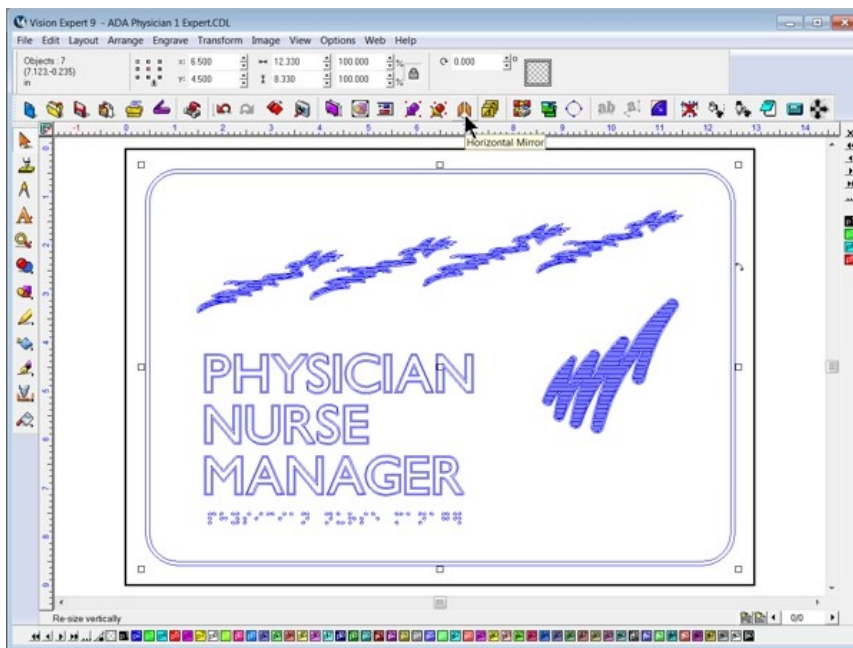
Set the number of passes to 1, then click on OK to close the Engrave Parameters window, then click on OK to close the ADA Profile window.



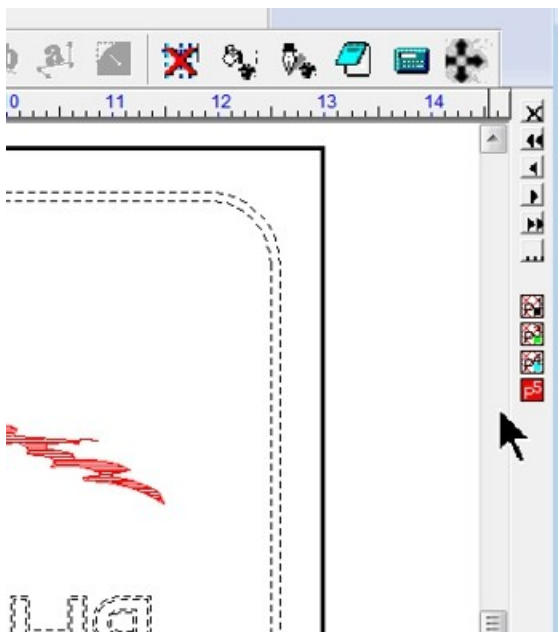
All tool paths have been created at this point and are all in different colors.



We first need to mirror the entire plate so that we can engrave the filled clipart. Select all objects (Keyboard shortcut - F3) and click on the Horizontal Mirror icon on the top toolbar.

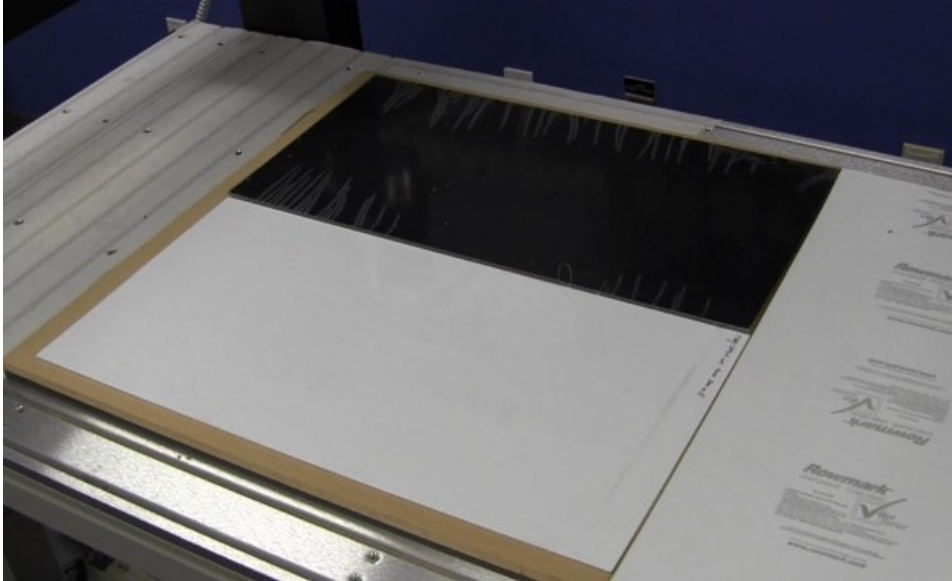


With the drawing now mirrored, we will turn off all colors except for red. Hold the CTRL Key down on your computer's keyboard and LEFT click on the black, cyan and green color swatches on the right side of the Vision 9 window. They should appear as shown below after doing so.



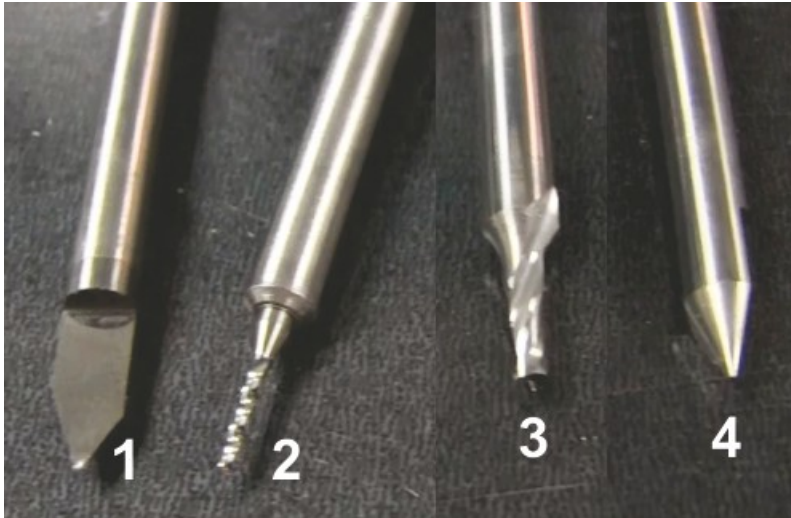
Before sending any jobs to the machine, place the material on the machine's table. The material shown here is in black in the upper left corner of the picture.

Note: When using the vacuum table, all open areas should be covered with a non-permeable material in order to maximize vacuum hold down force.



Tool Setup:

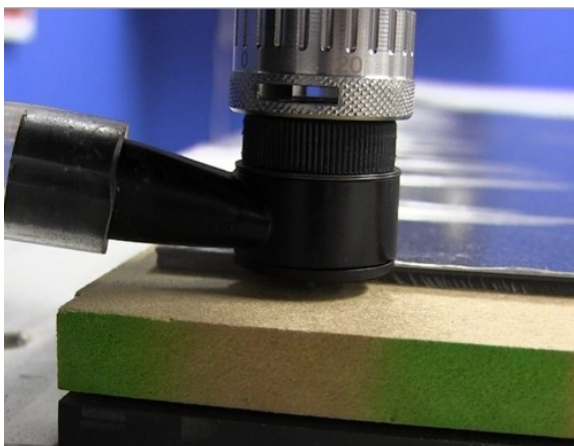
As described at the top of this section, 4 cutters are used in this example. Cutters 1, 2 and 4 need to be zeroed in the spindle with the micrometer set to 0. The cutting depth for cutter #3 will be set using the stacked material method as described in the Level 1 Job Example for Profile Cutting.



The following lists the depth settings and applications for the tools used.

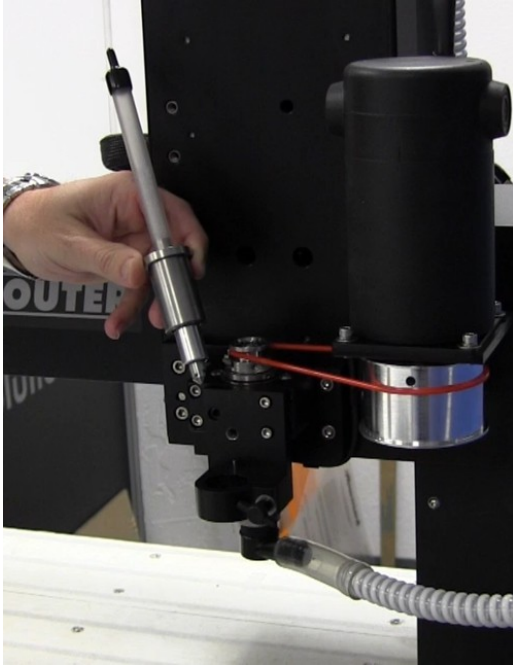
Cutter #	Depth Setting	Application
1 - 0.030" Flex Cutter	0.020" (20 clicks)	Reverse engraving
2 - Braille Drill	0.042" (42 clicks)	Drilling for braille beads
3 - 1/8" End Mill	*Stacked Material	Profile cutting 1/8"
4 - 0.015" Flex Cutter	0.035" (35 clicks)	Profile Cutting Applique

To set the depth of the 1/8" End Mill, position the nose cone so that the cutter can drop off the side of the 1/8" acrylic material and stop when hitting the vacuum table (or in this case, the MDF material used as a spoil board on top of the vacuum table) as shown below. Make sure the micrometer is set to the same 0 as when setting the other cutters.

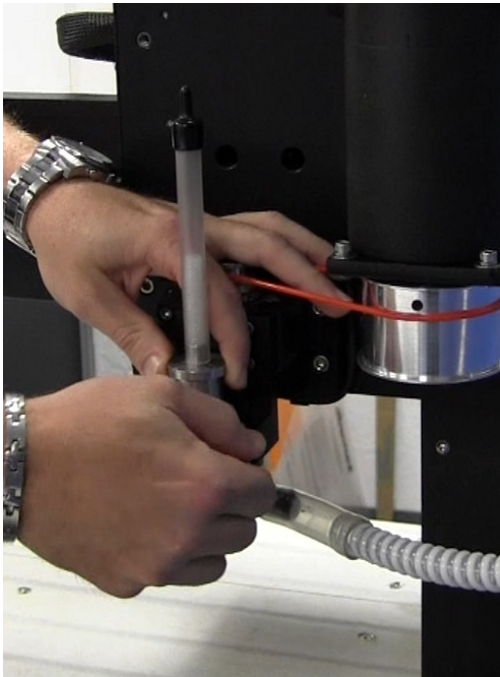


Braille Inserter Installation:

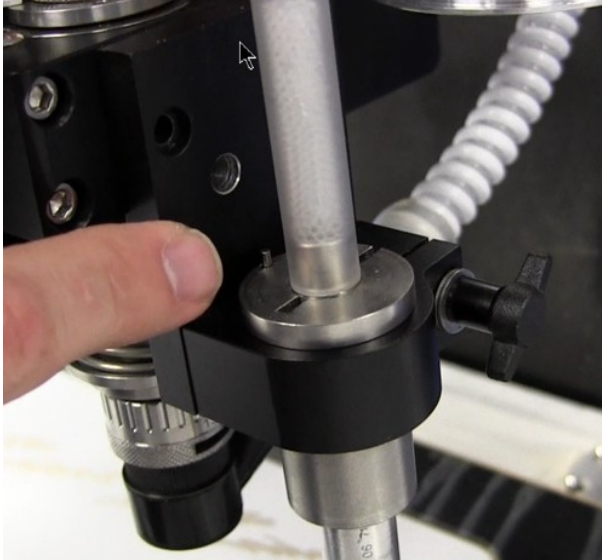
In order for the machine to insert the braille beads (rasters) into the drilled holes, the braille inserter must be installed. Install the inserter into its bracket.



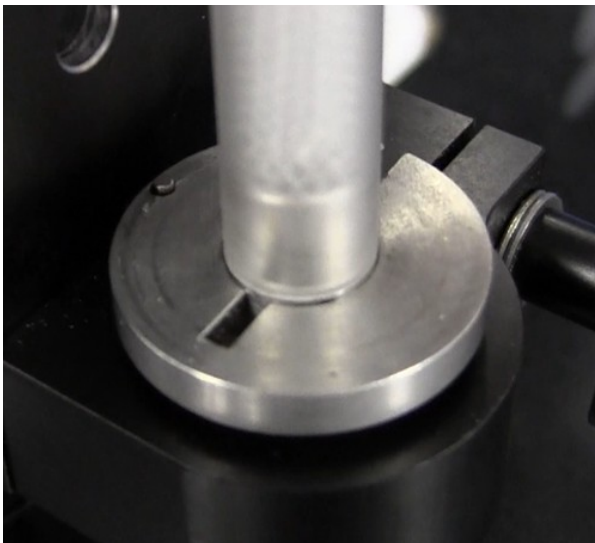
Lower the inserter into the bracket and tighten the clamp. At this point, the bottom of the inserter should be ABOVE the nose cone on the spindle.



Move the spindle over your material and loosen the clamp holding the inserter. Lower the inserter to its bottom position. this may require you to rotate the inserter so that the alignment holes are lined up. There is a pin that will extend above the inserter flange when the inserter is at it's bottom position (shown below). Tighten the clamp to secure the inserter.

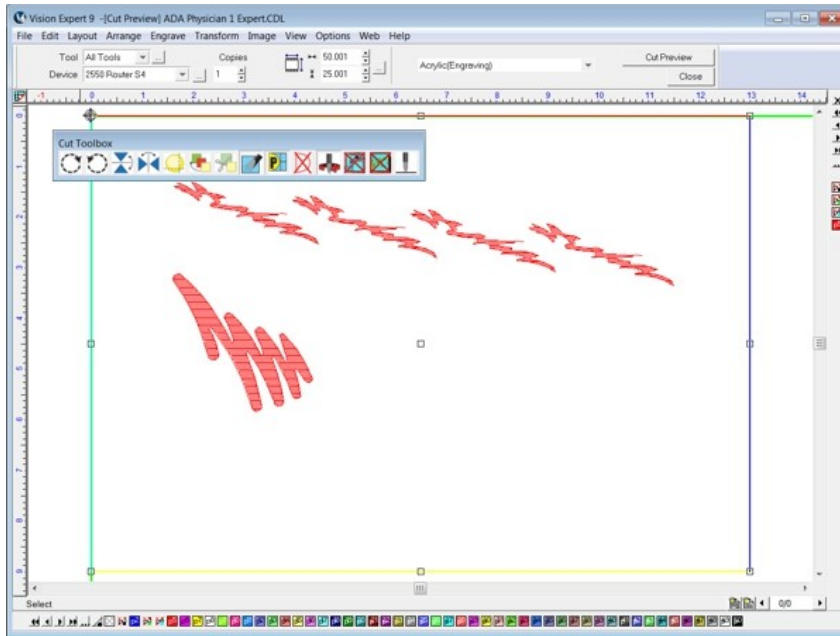


Lower the spindle until the tip of the inserter contacts your material and the depth pin is flush with the top of the inserter flange. Then press the Set Surface button on the Pendant and press Enter to set this surface position. This procedure sets the proper pressure applied to the raster beads to insert them into the holes we will drill. The top of the inserter flange is shown below with the pin flush with its top surface.

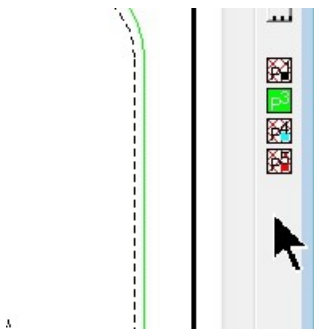


After setting the surface, press the Go to Home button on the Pendant.

With the machine now set up, install the 0.030" flex cutter and adjust for proper depth using the micrometer. In the Vision 9 software, send the job to the machine by clicking on the Engrave icon in the Cut Toolbox and run the job.



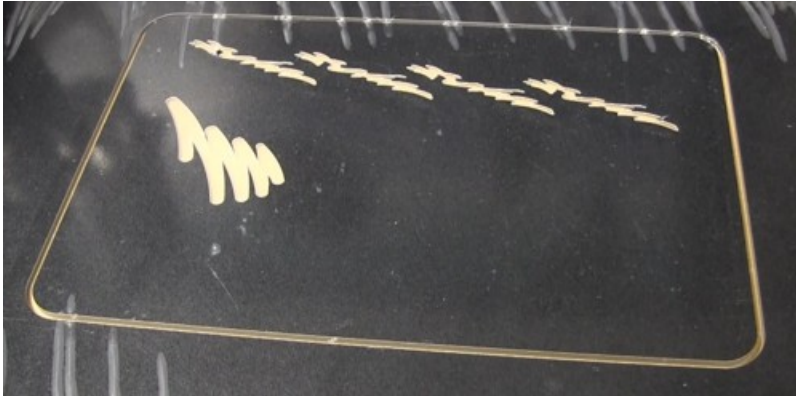
After the engraved areas are finished, remove the flex cutter and install the 1/8" End Mill. Set the micrometer back to its 0 point. Turn on the Green color and turn off all the other colors (using the CTRL + Left click method), so that we can only send the profile cut tool path to the machine.



When sending this job to the machine, be advised that cutting rates vary with each machine, material thickness and cutter being used. Please refer to the recommendations by the manufacturer of your cutting tool as well as Vision for proper settings.

To send this job to the machine, select the Engrave icon from the left toolbar, choose your device and select the proper tool settings, then click on the Engrave icon in the Cut Toolbox.

Once the profile cut is finished, we need to remove the cut out sign and flip it over to drill and install the braille raster beads. Use a small, sharp edged tool to carefully pry the cut out sign away from the vacuum table.



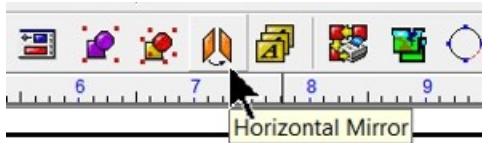
Flip it over and carefully align it back inside the cut out area.

NOTE: The material could have been profile cut first, then aligned using the table's rulers. The file setup would be different than in this example (i.e., the plate size would match the profile cut dimensions of the piece).



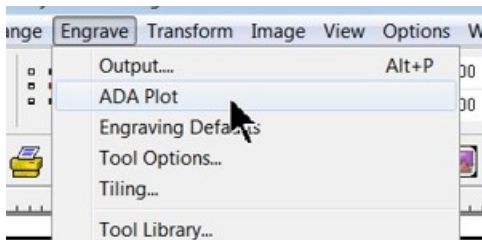
Remove the End Mill cutter and install the Braille Drill cutter. Set the cut depth to 0.042" (42 clicks).

To send a job which drills the holes for the braille rasters, we first turn on all colors in our Vision 9 plate (again, using the CTRL + Left click on the color swatches), and click on the Horizontal Mirror icon on the top toolbar to "un-mirror" the plate.

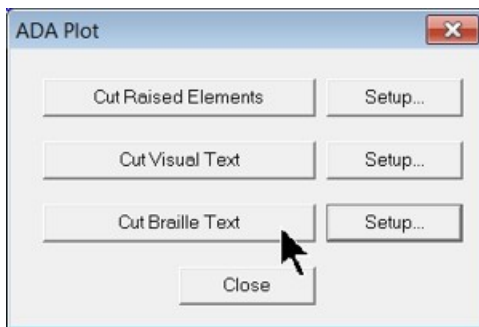


Select Engrave from the Top Menu, then click on ADA Plot.

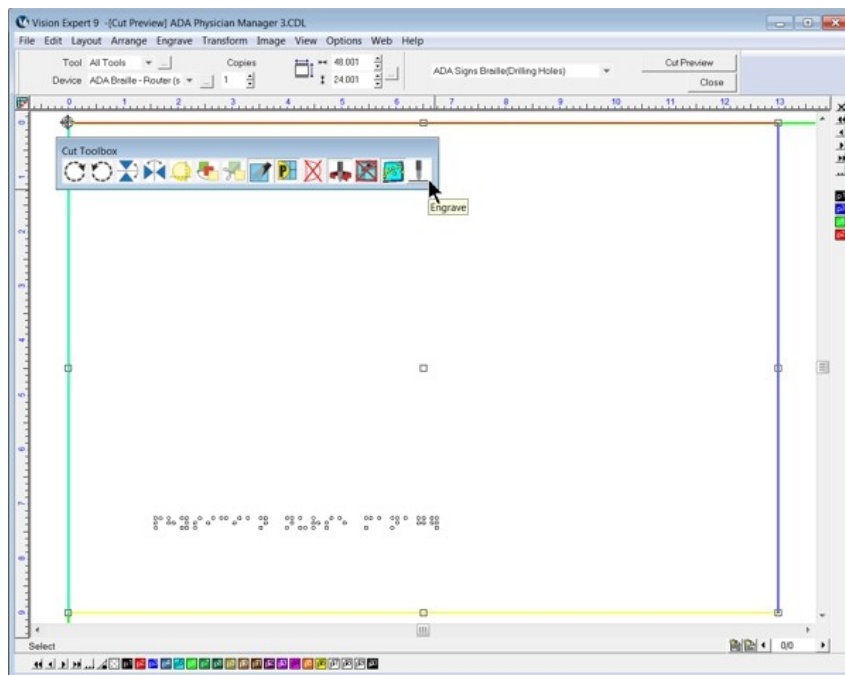
NOTE: When sending jobs to the machine using the ADA Plot function, TWO jobs will be sent to the machine. The first job drills the holes and the second places the rasters into the drilled holes.



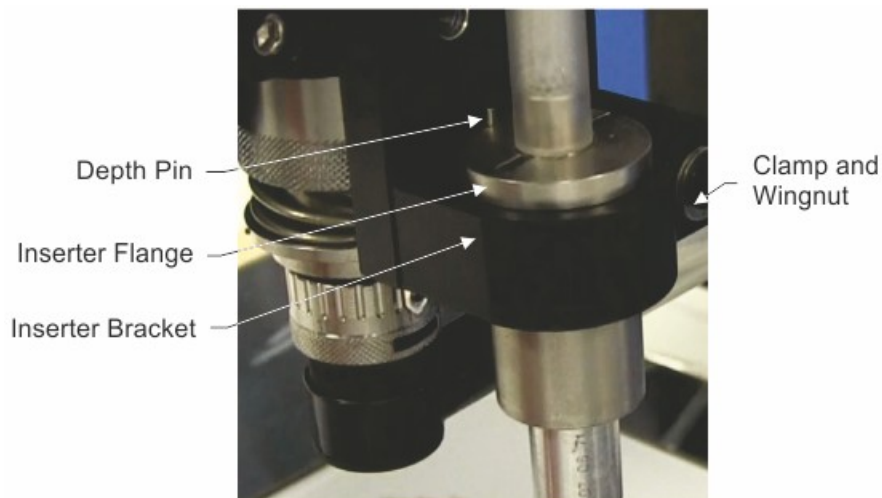
Select Cut Braille Text.



The Vision 9 software will automatically select only the braille dots on the screen and apply the correct parameters for drilling the holes. Click on Engrave to send these two jobs to the machine.



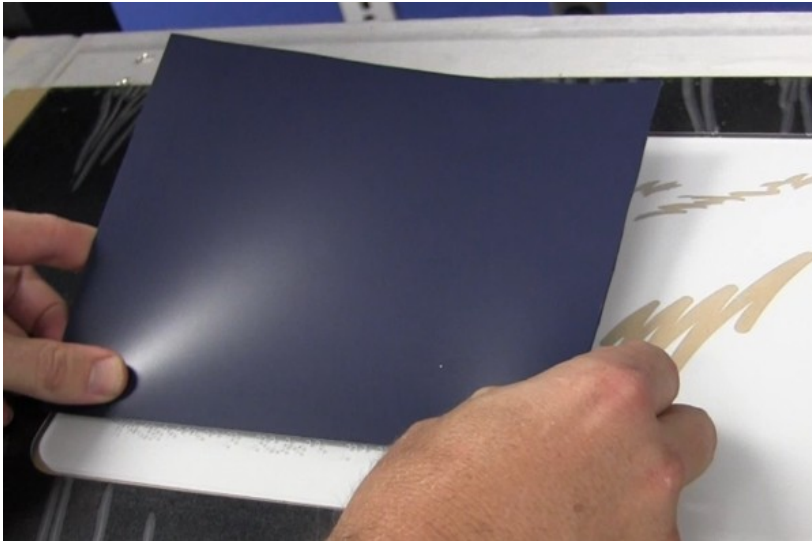
After drilling the holes, lower the braille inserter by loosening the inserter clamp and remove the braille drill tool from the spindle. Note that when lowered properly, the inserter flange will be flush with the mounting bracket surface and the depth pin will protrude above the flange top surface. Tighten the clamp after the inserter is lowered into place.



Run the second job to install the raster beads into the material. Note: In this example file, clear raster beads were used to blend in with the surface of the sign.

After running the job, raise the inserter so that the inserter tip is well above the bottom of the spindle nose cone.

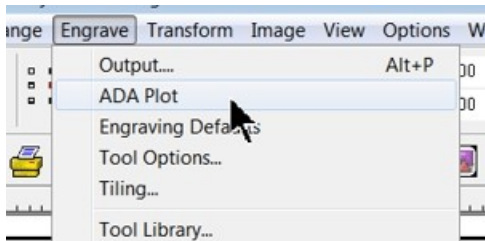
Install the 0.015 Flex cutter and set the depth to 0.035 inches (35 clicks). Apply a piece of applique above the braille rasters as shown. Press lightly to secure it with the adhesive. *Note that the applique has a pressure and time sensitive adhesive on the back side. Applying excessive pressure or letting the applique sit for more than an hour or so after applying it to the substrate material will make removing the excess applique material very difficult.*



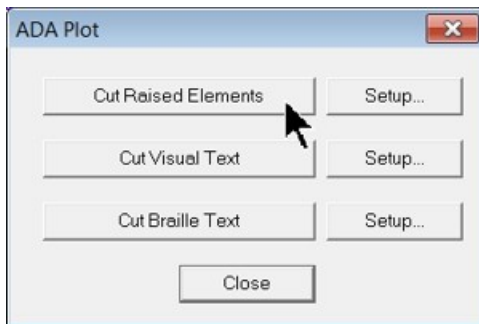
To send only the tool path of the raised text, turn off all colors except for cyan.



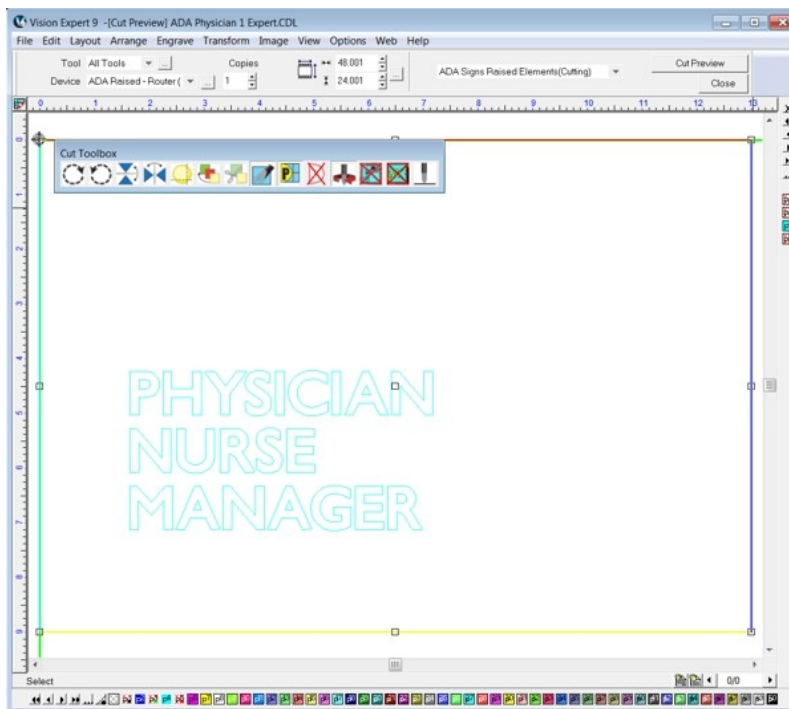
Select Engrave from the Top Menu, then click on ADA Plot.



Select Cut Raised Elements.



Click on the Engrave icon to send the job to the machine.



When the machine is finished cutting the applique, use a stiff bristled brush to remove any debris that remains in the cut areas, then remove the excess applique and weed any remaining pieces from the centers of characters.



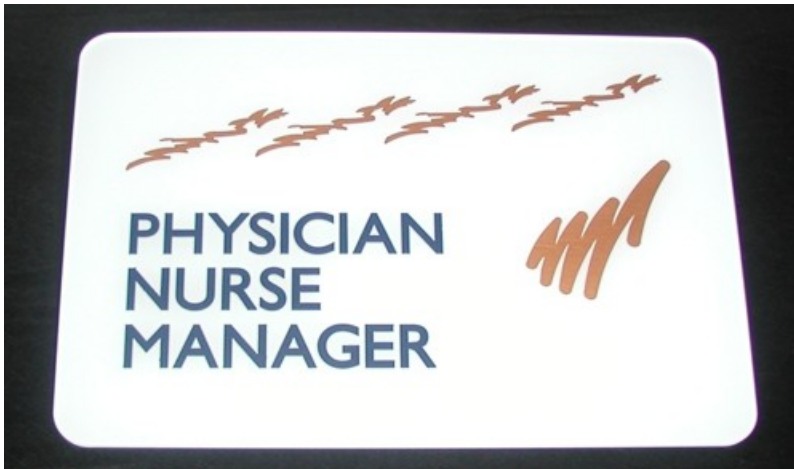
After weeding the interiors of some of the characters, we are ready to paint fill the reverse engraved areas.



Mask the edges of the back of the sign and fill with an acrylic based paint.



The finished sign.

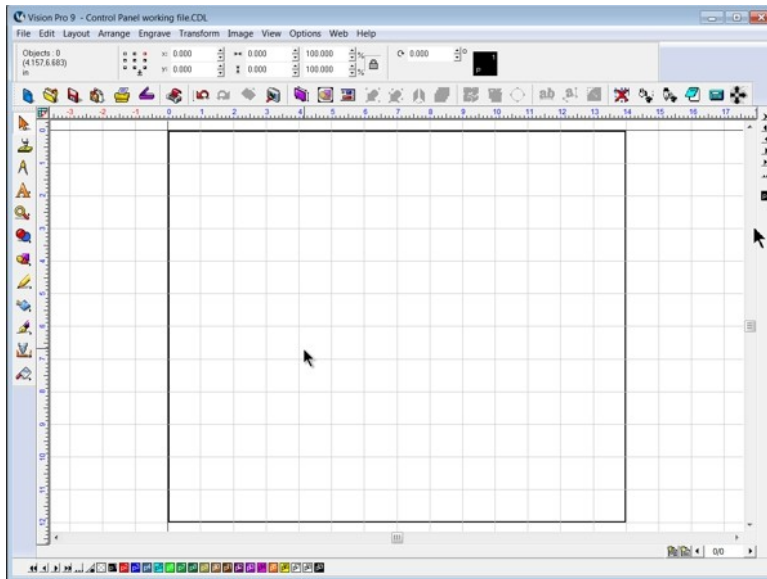


7.4.2 Control Panels

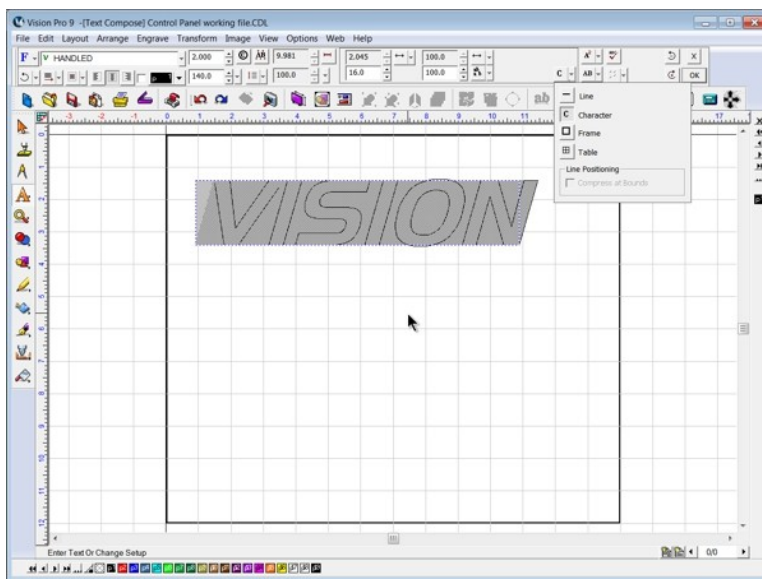
In this example, an industrial control panel will be created using 1/16th inch engraver's plastic. Vision Pro 9 software is required for this application in order to create a dial on the panel. The techniques covered in this application include: Logo creation, welding objects, object duplication, creating a basic array, dimensional placement of objects, and the creation of a dial.

7.4.2.1 Example Job 10 - Plastic Control Panel

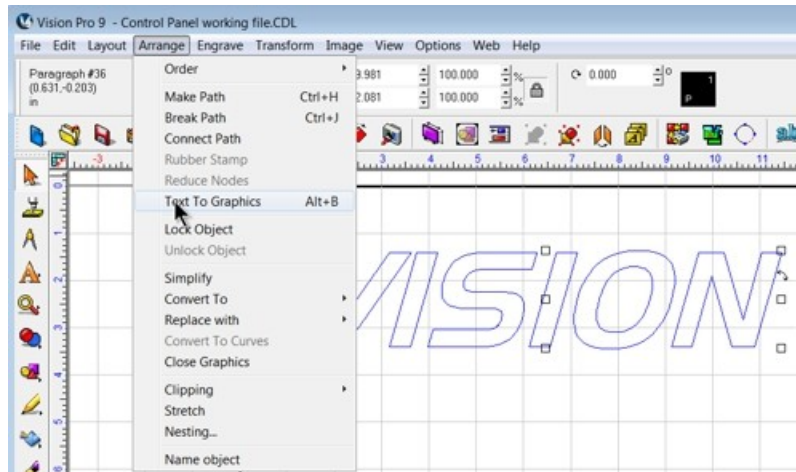
The control panel created in this example is constructed with a piece of engravers plastic which is slightly larger than our plate size. The final panel size will be 13.75 inches x 11.75 inches. Begin by setting the plate size to 14 x 12 inches.



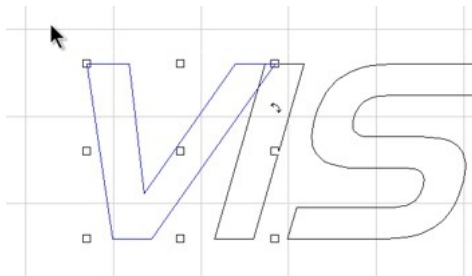
To create the logo, enter the text as shown, using HANDLED as the font. The font height is 2.0 inches and it has a slant of 16 degrees.



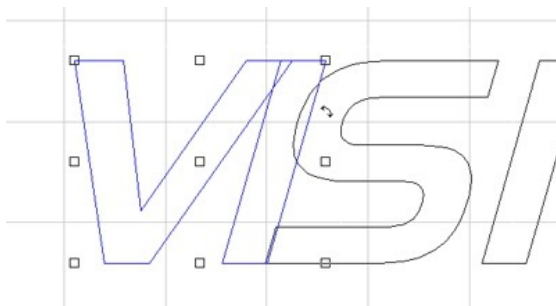
Once the text has been entered, before overlapping and welding the characters, the text must be changed to graphics. Select the text, then select Arrange from the top menu bar and click on Text to Graphics.



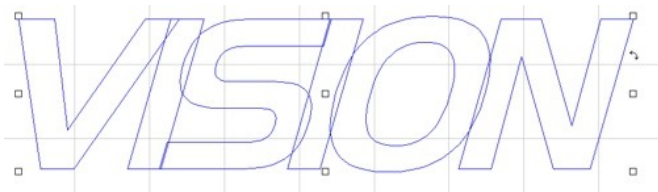
Select the first character, then using the arrow keys on the computer's keyboard, move the letter to the right until it overlaps the second letter as shown. This is done so that the letters can be welded together and form one single object.



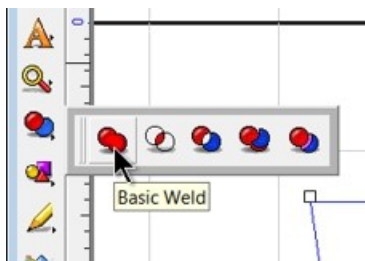
Select the first two letters, then move them together so that the second letter overlaps the third letter.



Repeat this for the rest of the letters, adding one at a time as selected objects and moving them until all of the letters overlap as shown. Note that when overlapping letter like the letter "S", make sure that the side of the letter completely overlaps the next character.



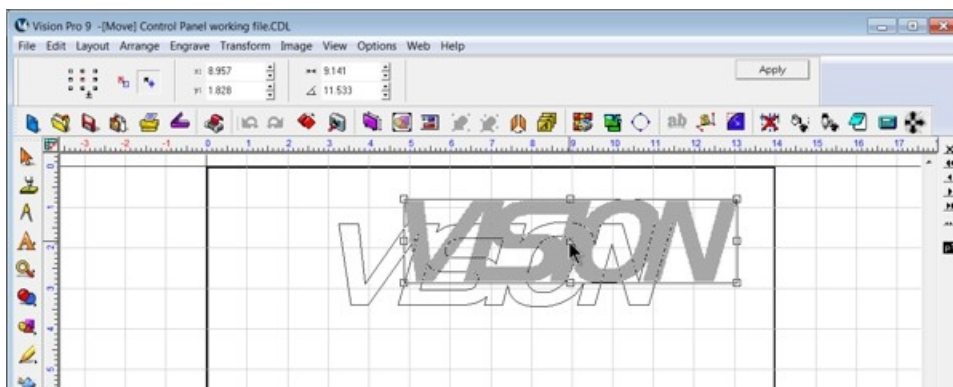
With all letters selected, select the Weld Tools icon from the left toolbar and click on Basic Weld.



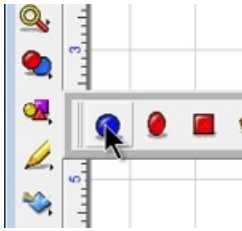
The letters will then be welded together to form a single object with a continuous outline. this is our "logo".



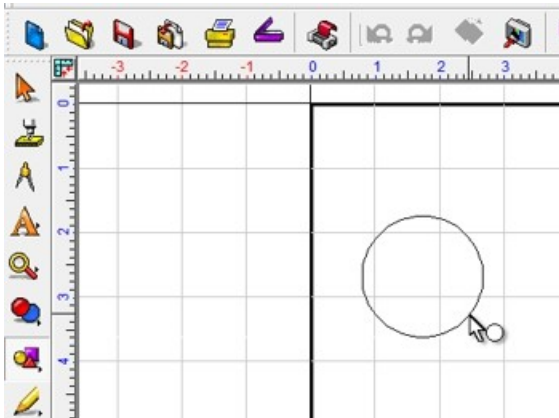
Move the logo to the upper right section of the plate.



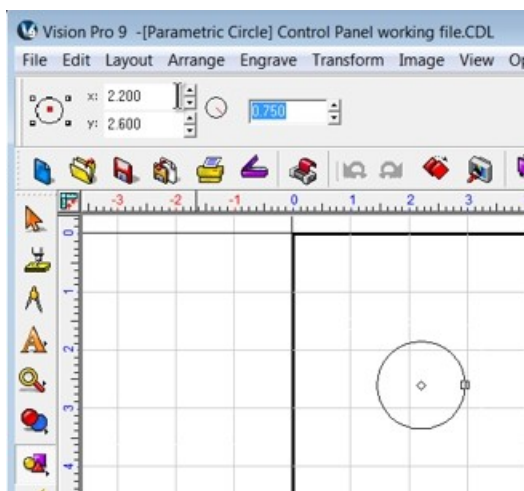
We now need to add a series of circles to the plate. Select the Shape tools icon from the left toolbar, then click on the Circle tool.



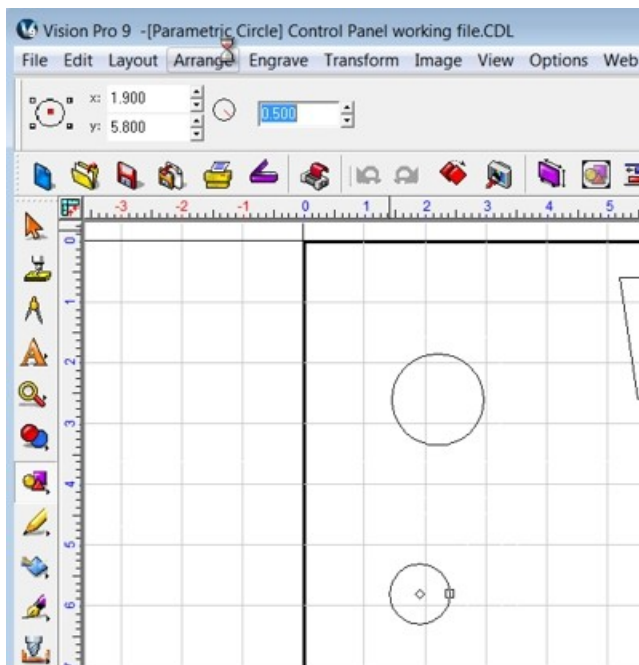
Click, hold and drag a small circle.



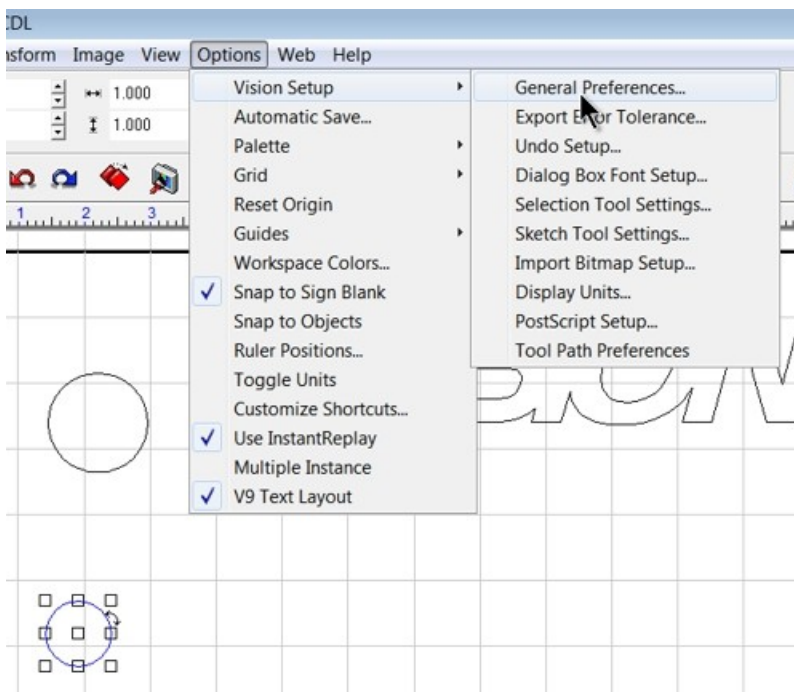
Enter the circle radius of 0.75 inches in the Radius entry field on the top toolbar. Also, change the X and Y coordinates for the center of the circle to 2.200 X and 2.600 Y. Press Enter on your keyboard or click in another field to set these changes.



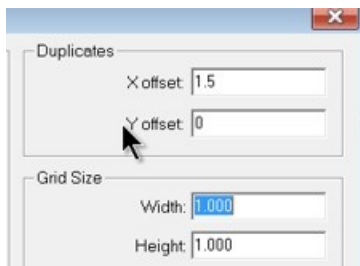
Create another circle with a radius of 0.500 inches and place it at the coordinates of 1.900 X and 5.800 Y.



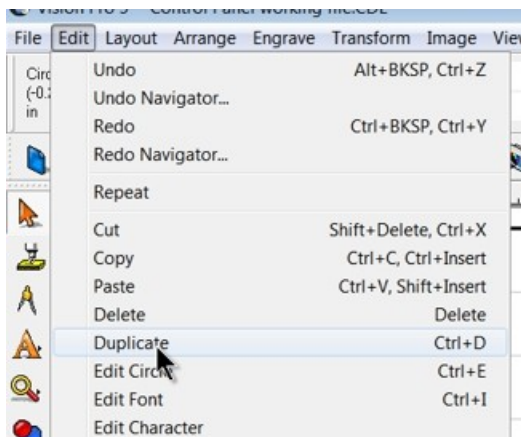
To create the array of circles, a simple row in this case, we first set the duplicate distance. Select Options → Vision Setup and click on General Preferences.



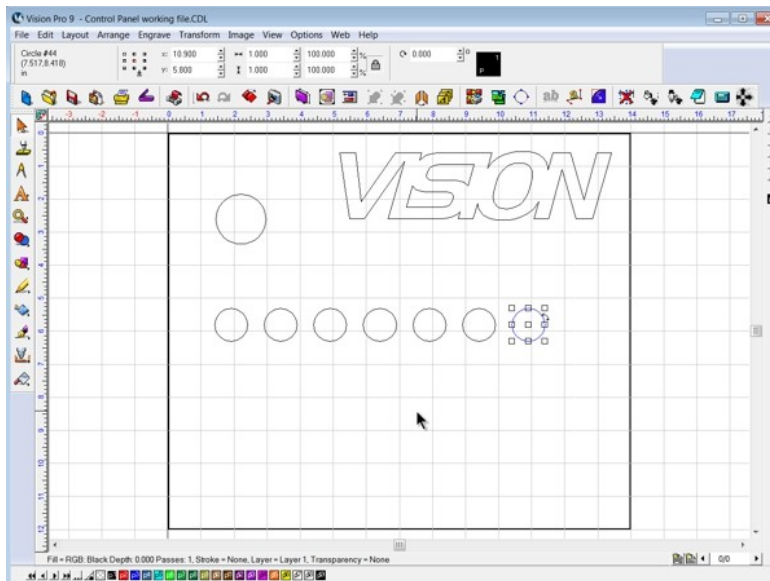
In the fields for Duplicate in the General Preferences window, enter an X offset of 1.5 inches and 0 for the Y offset. Click on OK to set this as the duplicate distance.



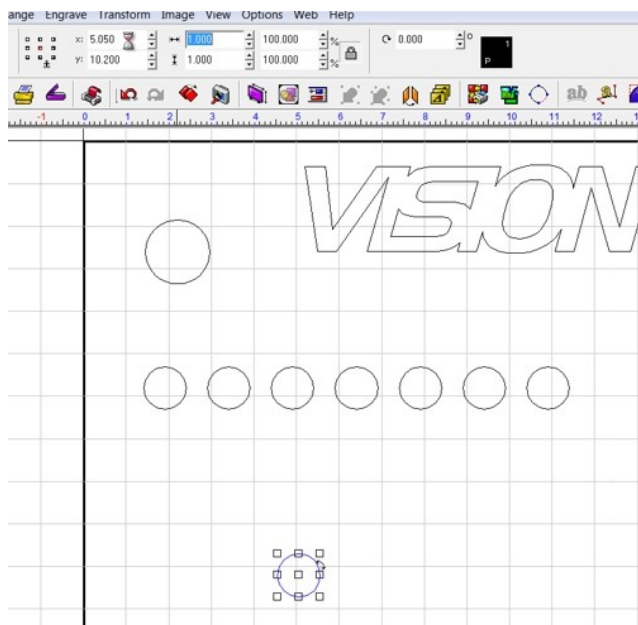
With the circle selected, either select Edit, then click on Duplicate from the top menu bar, or press CTRL D on your computer's keyboard to duplicate the circle.



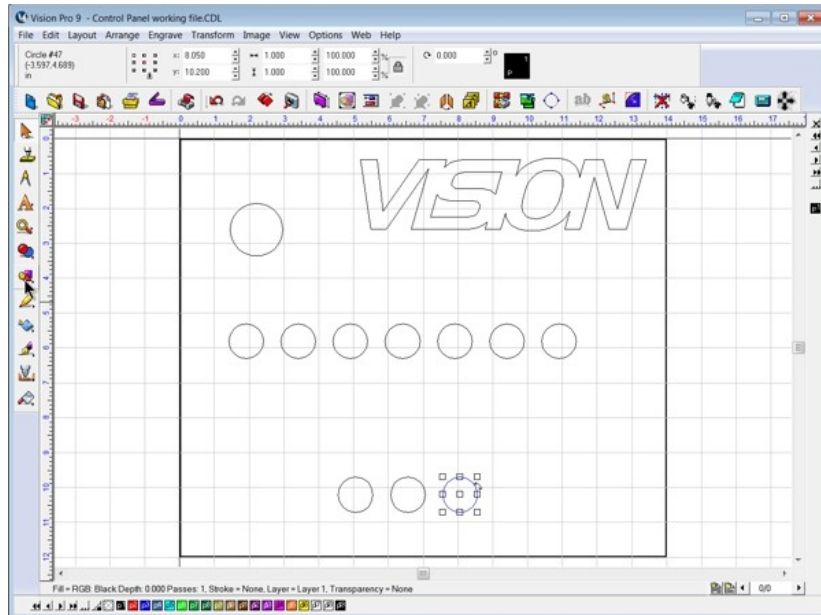
Continue duplicating each circle, until seven circles have been created. Using this method, each circle will be spaced exactly 1.5 inches apart.



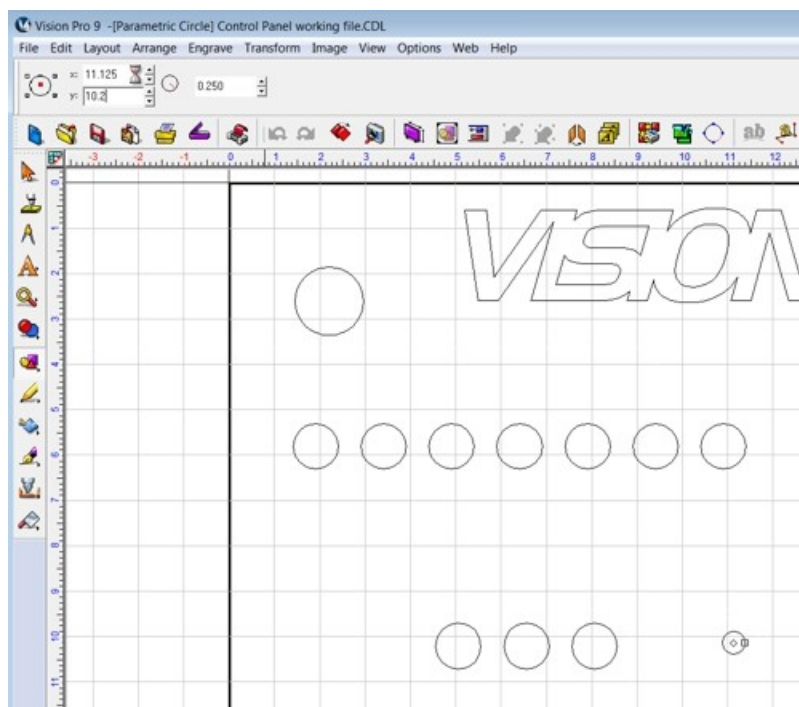
Create another circle with a diameter of 1.00 inches and position it at coordinates of 5.05 X and 10.20 Y.



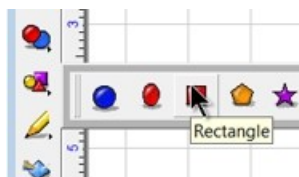
With this circle selected, duplicate it to create a total of three circles. Use the same duplicate distance as above (1.5 inches X and 0 inches Y).



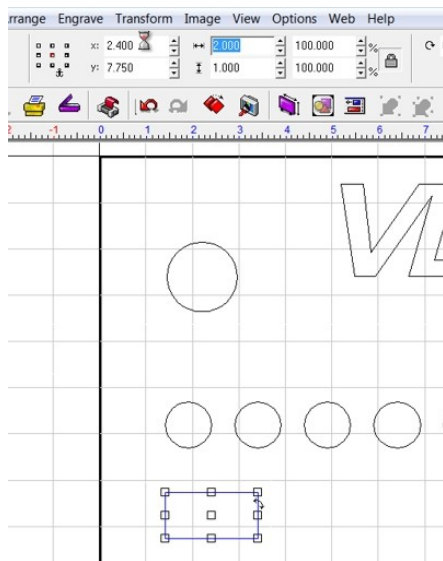
Create another circle with a radius of 0.25 inches and positioned at coordinates of 11.125 X and 10.20 Y.



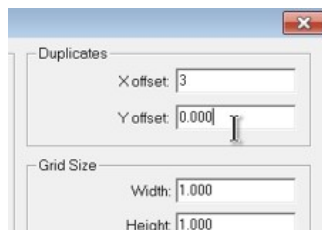
We now add some rectangles to the plate. Select the Shape Tools icon from the left toolbar and click on the Rectangle tool.



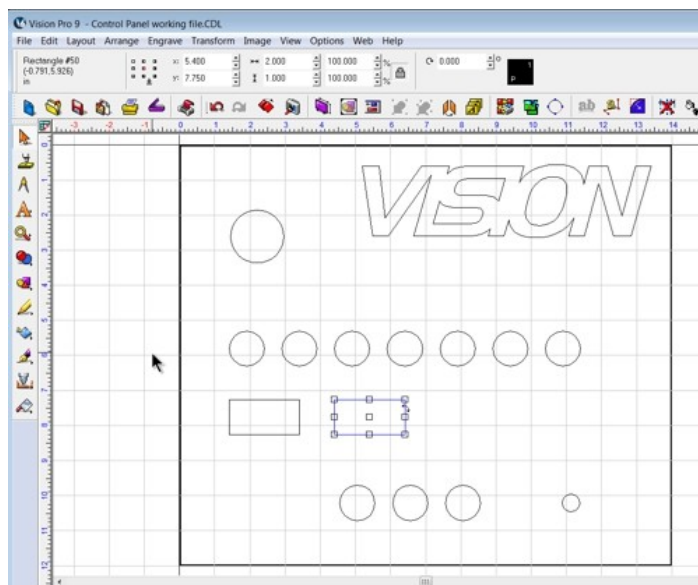
Click, hold and drag a rectangle below the first row of circles. Change the size and position of the rectangle to 2 inches wide x 1 inch high, positioned at 2.40 X and 7.75 Y.



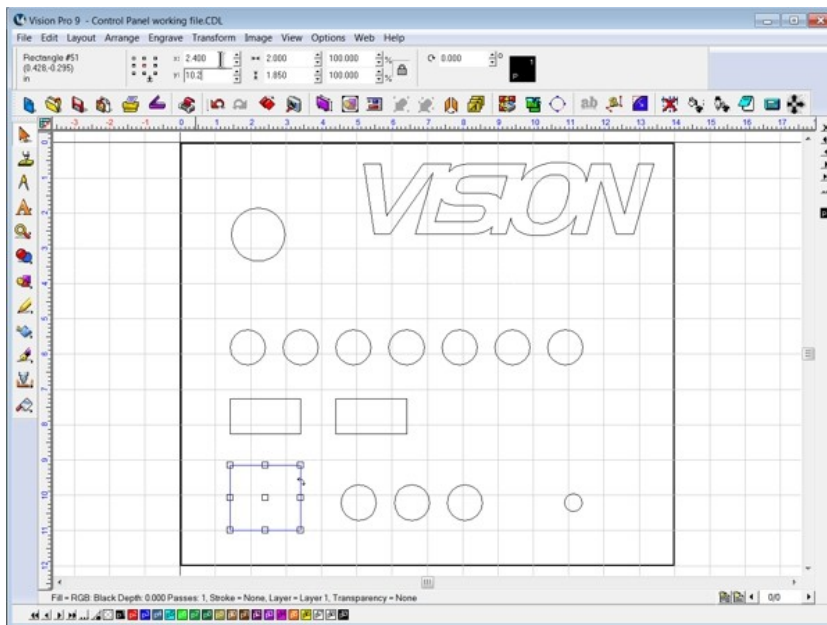
Change the Duplicate distance in the General Preferences window to 3.00 inches X and 0 inches Y.



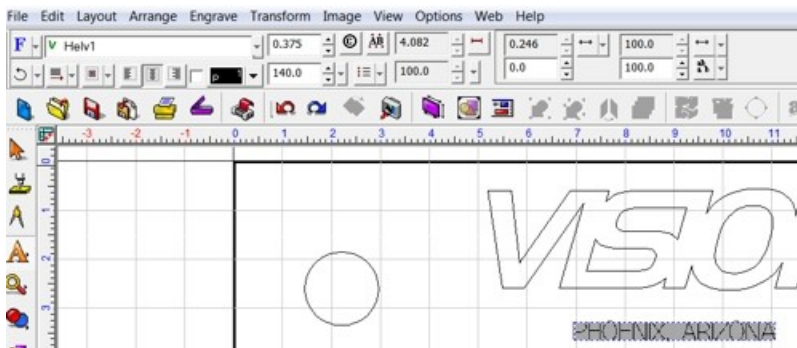
Duplicate the first rectangle to create a second rectangle 3 inches to the right of the first.

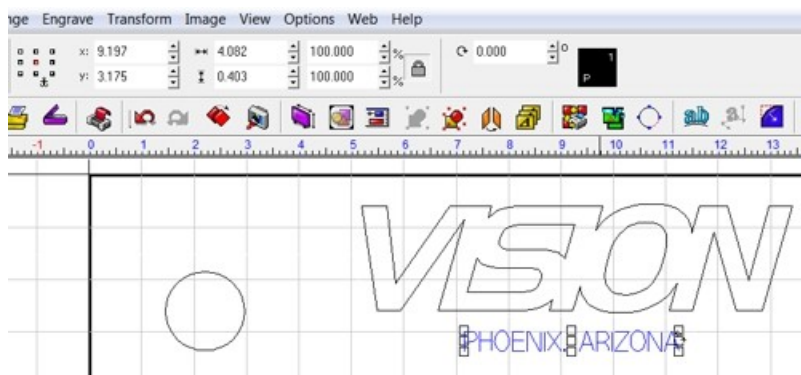


Using the Rectangle tool, draw another rectangle near the lower left corner of the plate. Change the size of the rectangle to 2.00 inches wide x 1.85 inches high, and position it at 2.40 X and 10.20 Y.

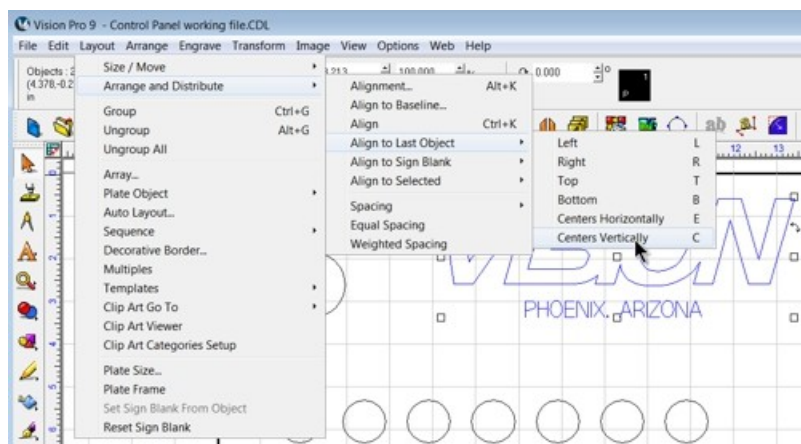


We now add text under the logo we created. Using the Text Compose tool, type in the text as shown. The font used is Helv1, height is 0.375 inches.

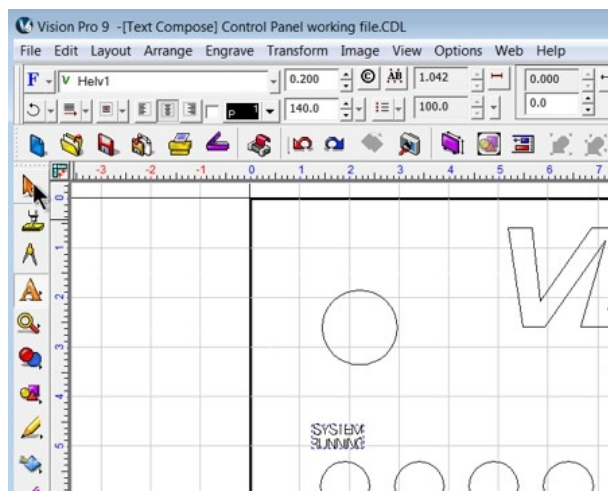




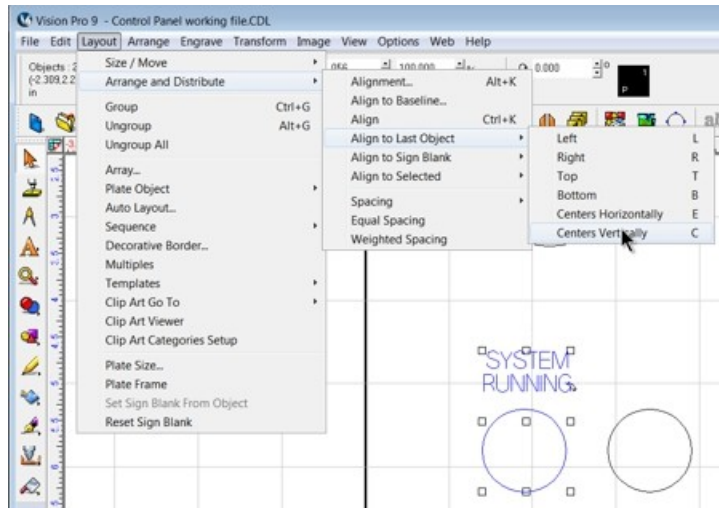
Center the text below the logo by first selecting the text, then while pressing the Shift key on your computer's keyboard, click on the logo to add it as a selected object. To center the text under the logo, either use the shortcut key by pressing the letter "C" on the computer's keyboard, or from the top menu bar, select, Layout → Arrange and Distribute → Align to Last Object → Center Vertically.



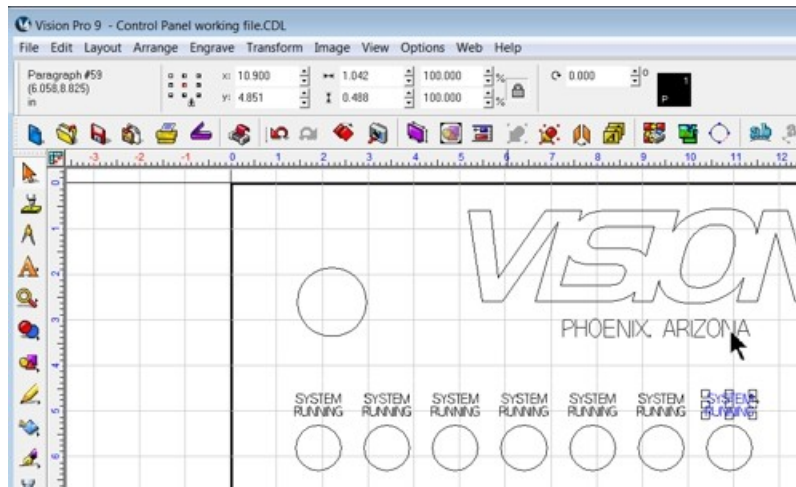
To add text above the circle we added, use the Text Compose tool and enter the text as shown. Make sure the text is center justified and the font is HELV1, with a font height of 0.20 inches.



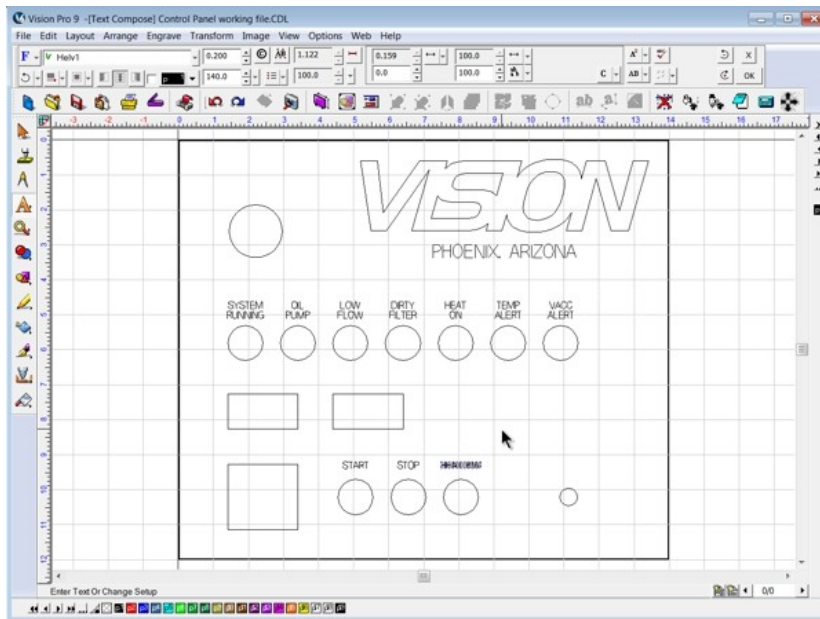
Center the text above the first circle by selecting the text, pressing down the SHIFT key on your keyboard, then selecting the circle below it and either use the shortcut "C" on the keyboard, or by using Center Vertically from the top menu bar.



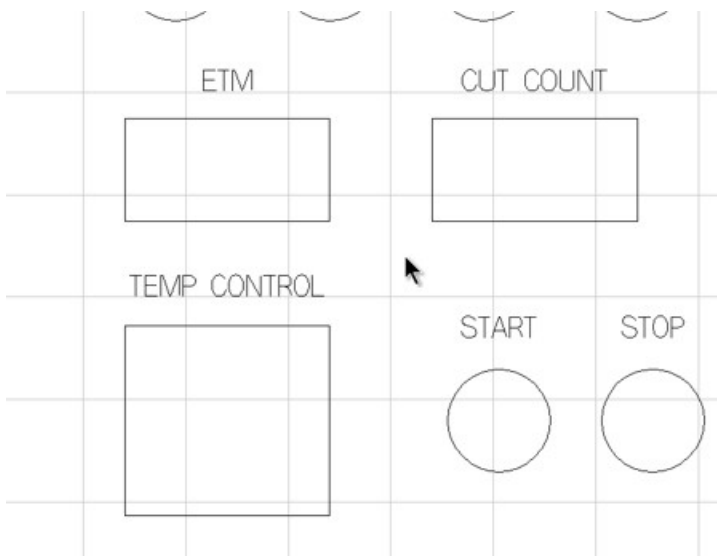
Adjust the Duplicate distance within the General Preferences window to 1.5 inches X and 0 inches Y, then duplicate the text until each circle on this first row has text above it.



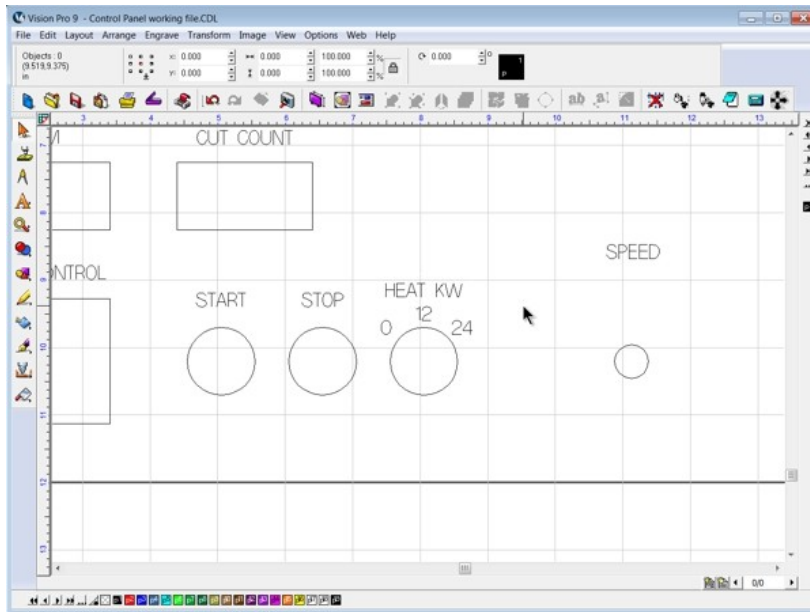
Repeat the procedure of creating text, aligning it over the first circle on the bottom row of circles, then duplicating the text until each circle has text above it. To change the actual text over each circle, double click on the text you wish to change, select all of the text, then type in the text as shown below. Do this for the text over each circle. Note - it is important to center justify the text when it is first created. This way, each time the text is modified, the text will remain centered over the circle below it.



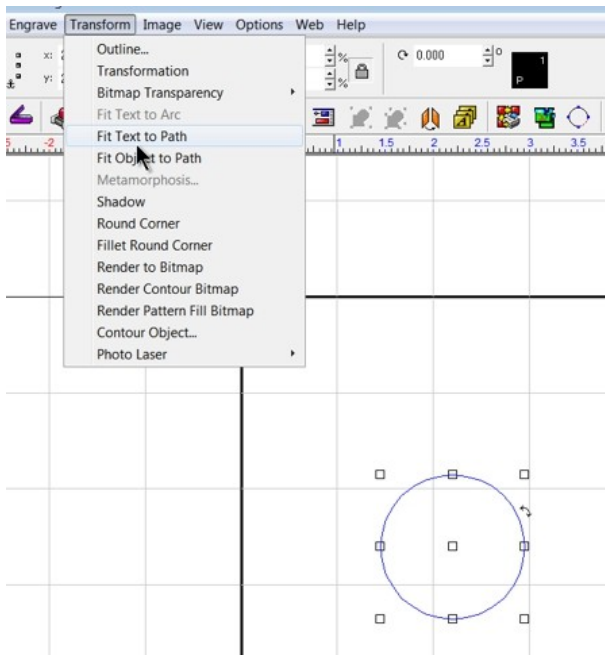
Add text in a similar fashion over the rectangles as shown.



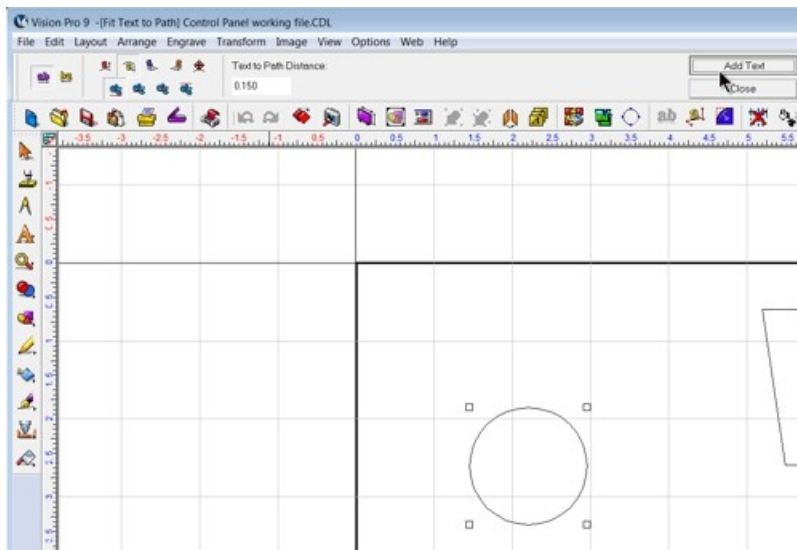
On the third circle on the bottom row, move the text towards the top of the plate and add the text (0, 12 and 24) as shown. Add the text centered above the small circle as shown. The positioning of these last two text entries was done visually.



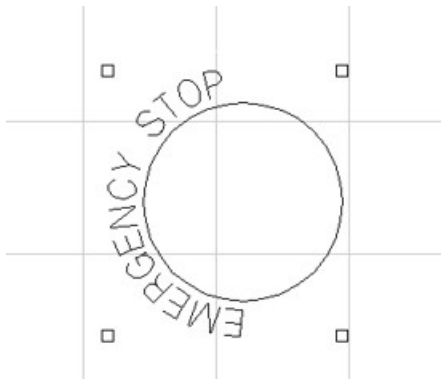
Now we add text around the large circle on the top left of the plate. First, select the circle, then select Transform from the top menu bar, then click on Fit Text to Path.



The top toolbar will change the the Fit Text to Path toolbar. Click on Add Text on the right side of this toolbar.



Enter the text as shown. The same font (Helv1, sized 0.20 inches high) was used.



To change the position of this text, click on the Top Start Position icon on the top toolbar, then click on Apply on the right side of this toolbar. Then enter the Text to Path Distance of 0.150 inches as show, and click on the Apply button again. Click on Close to exit this tool.





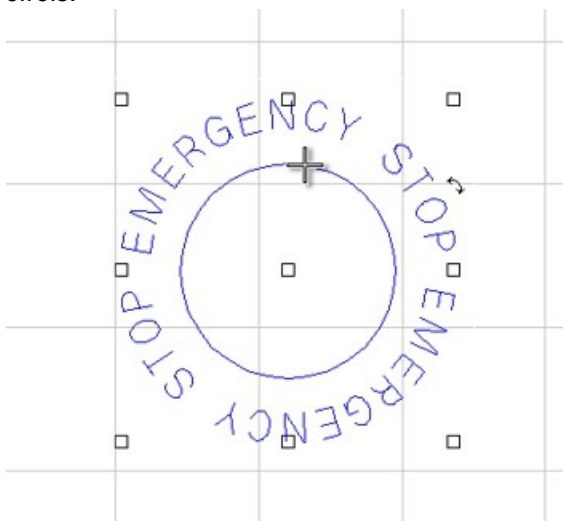
Duplicate this text.



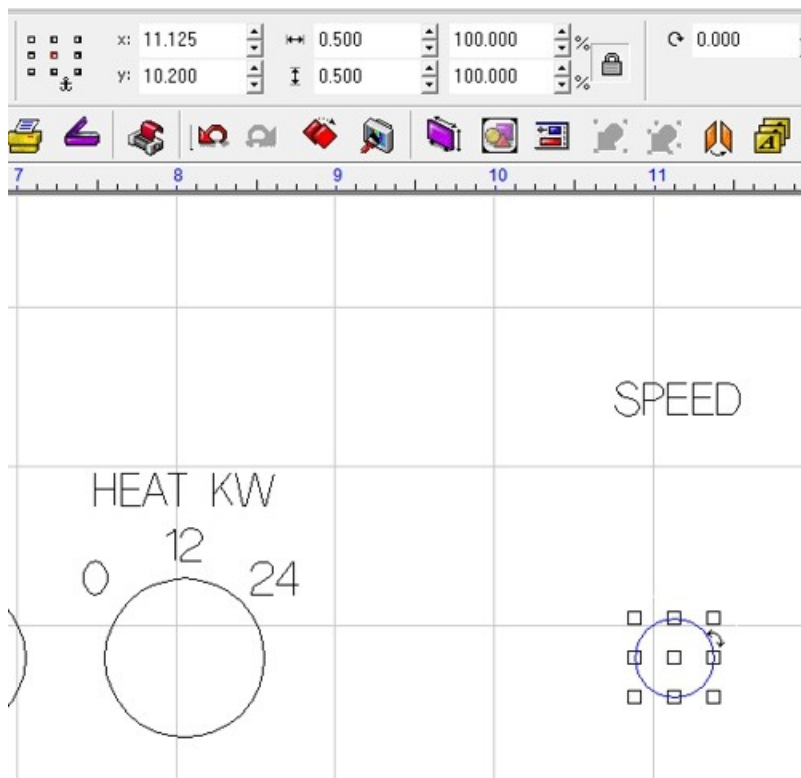
Rotate the duplicate text 180 degrees using the Rotation tool on the top toolbar. After entering 180 in the rotation entry field, press the Enter key on the computer's keyboard to accept this change.



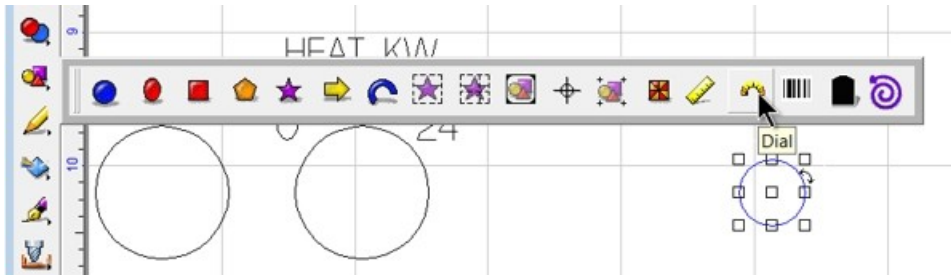
Move the text below the circle as shown. Align the text so that it is Centered Vertically to the text on the top of the circle, group the two lines of text, then center them both vertically and horizontally to the circle.



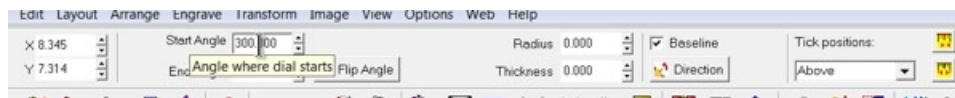
At this point, we will need to write down the center position of the small circle on the bottom right of the plate. Write down its coordinates; 11.125 X and 10.20 Y. We will need to reference this position when positioning a dial which we will now create.



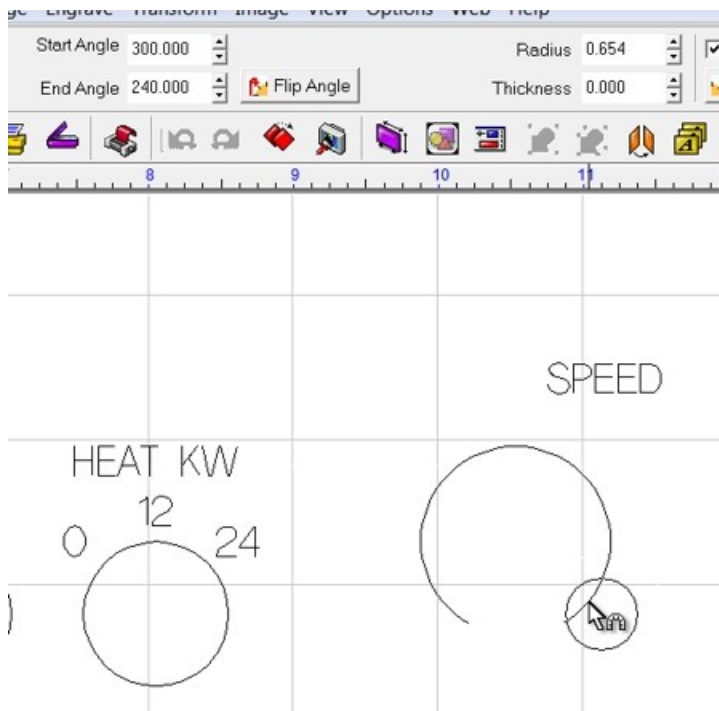
Select the Shape Tools icon from the left toolbar, then click on the Dial icon.



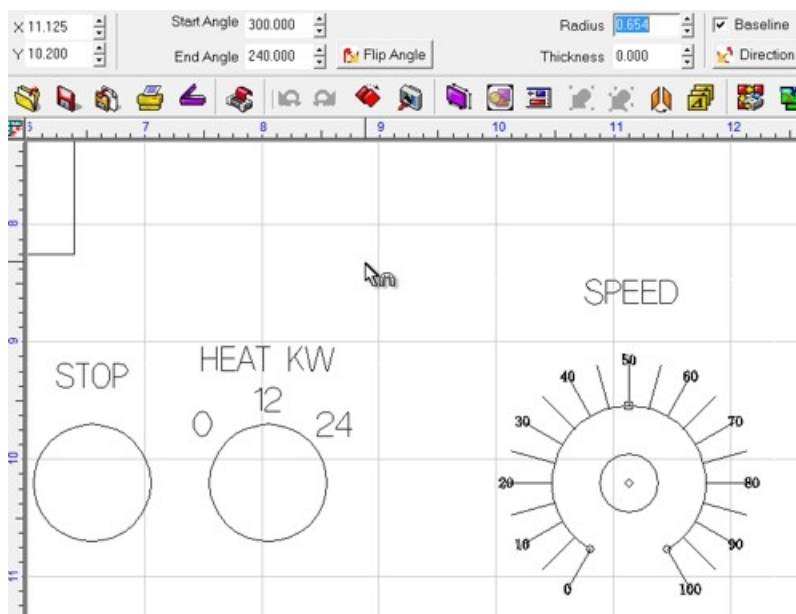
Before creating the dial, set the Angle where dial starts as 300 degrees and the Angle where dial stops to 240 degrees. Click in another entry field on the top toolbar (such as the Radius entry field) to set these angles.



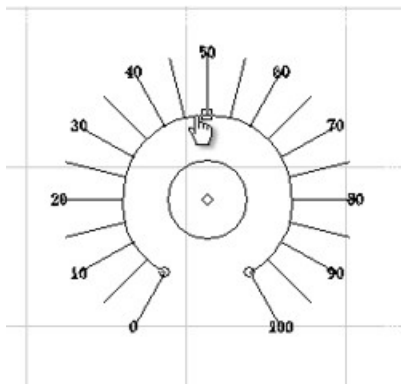
Click, hold and drag a dial roughly positioned over the small circle.



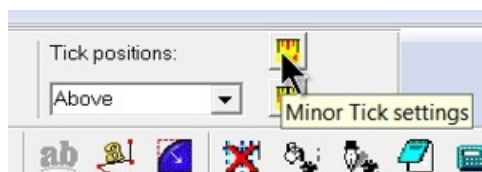
Set the Radius to 0.654 inches by entering this number in the Radius entry field. Press the Enter key on the computer keyboard to set this radius.



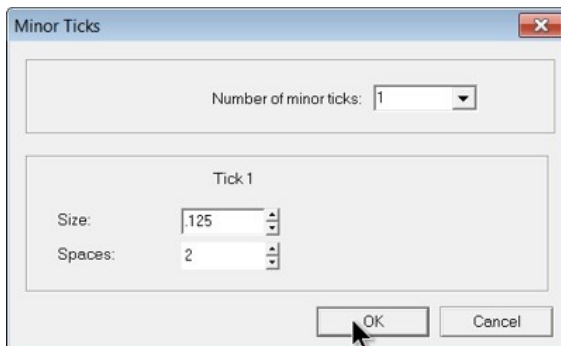
Alternatively, you can click, hold and drag from the node near the top of the dial to adjust its radius, although this is not an accurate way to size the dial.



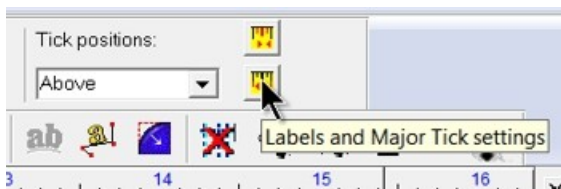
Note - the dial you created will likely not display as shown below yet. To adjust the tick marks on the dial, first, click on the Minor Tick settings icon on the top toolbar.



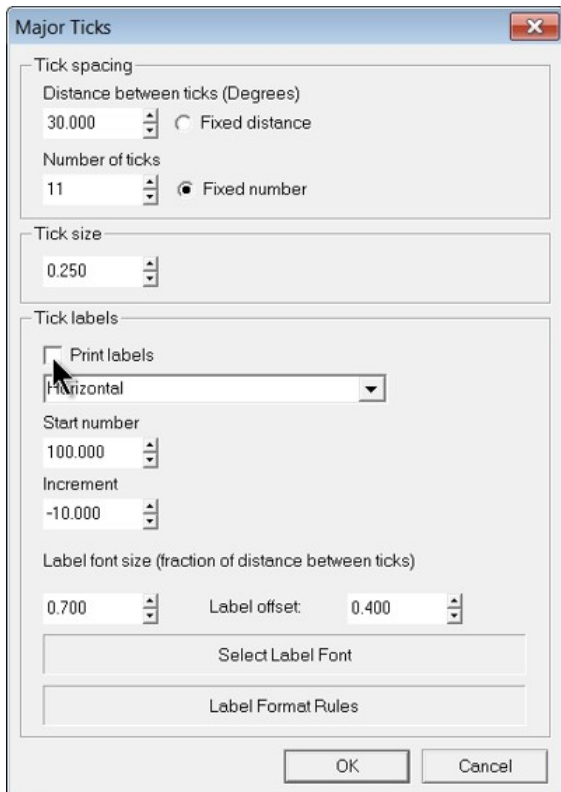
The Minor Ticks window will appear. Set the Number of minor ticks to 1, set the Size to 0.125 inches and the Spaces to 2. Press OK to close this window.



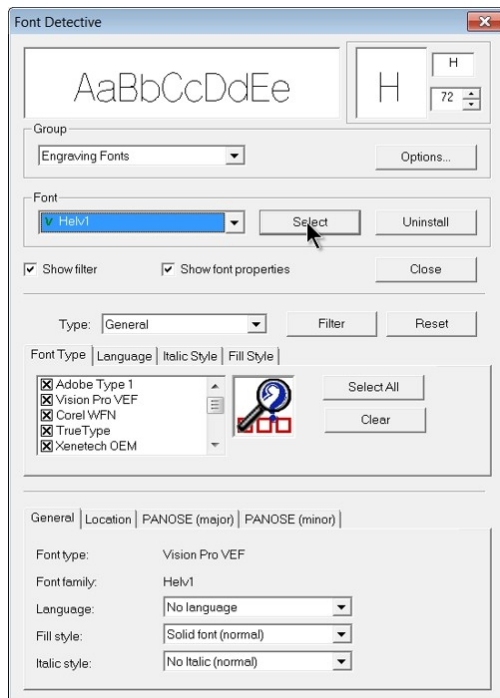
Select the Labels and Major Tick setting icon on the top toolbar.



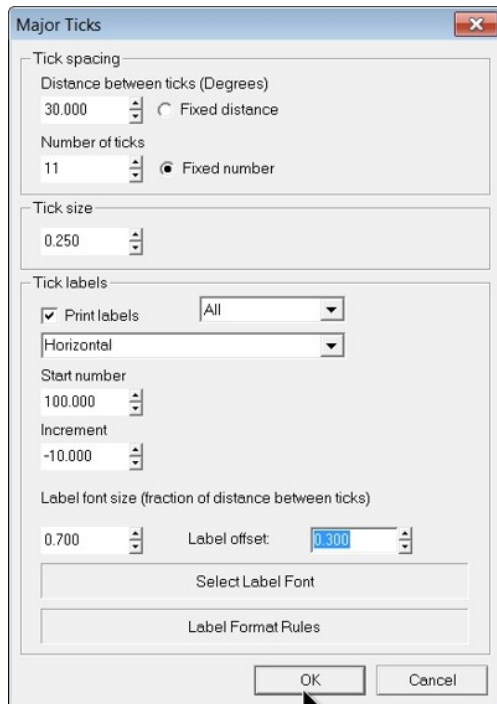
The Major Ticks window will appear. Change the settings to: Number of Ticks - 11, Tick size - 0.250, then add a check mark in the Print Labels box.



The Font Detective window will appear. Select Engraving Fonts as the Group, choose Helv1 font from the Font drop down list, then click on the Select button to the right of the Font drop down list.

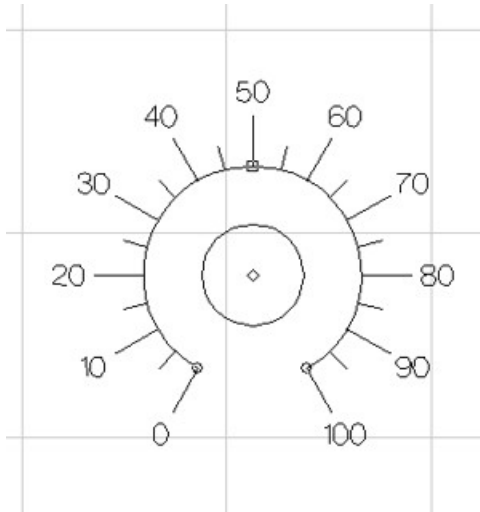


Now, set the Start number as 100, set the increment to negative 10 (- 10.000). Set the Label font size to 0.700 inches and the Label offset to 0.300 inches. Click on OK to set these parameters.

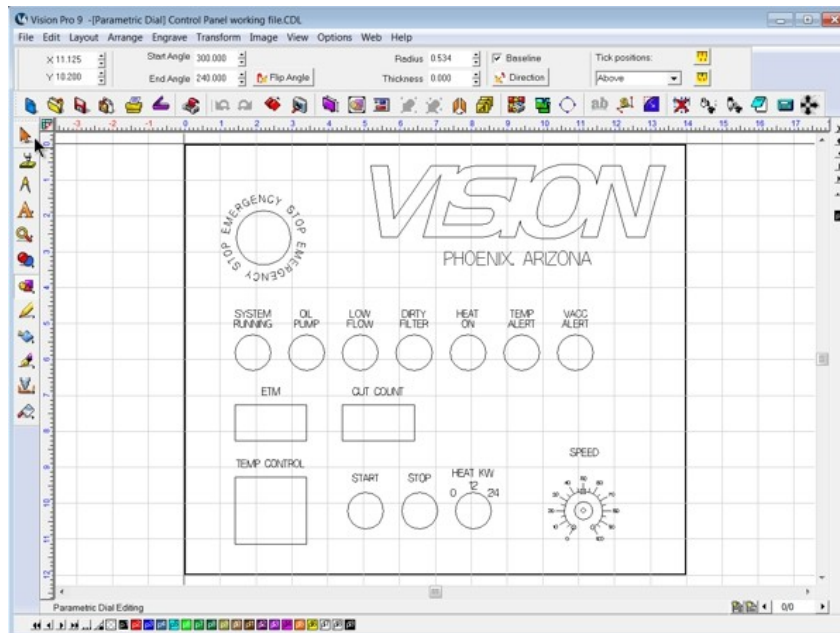


Change the position of the dial by referencing the center coordinates that we wrote down a few minutes ago. Select the dial and using the Horizontal and Vertical positions fields on the top toolbar, enter the coordinates of 11.125 X and 10.20 Y.

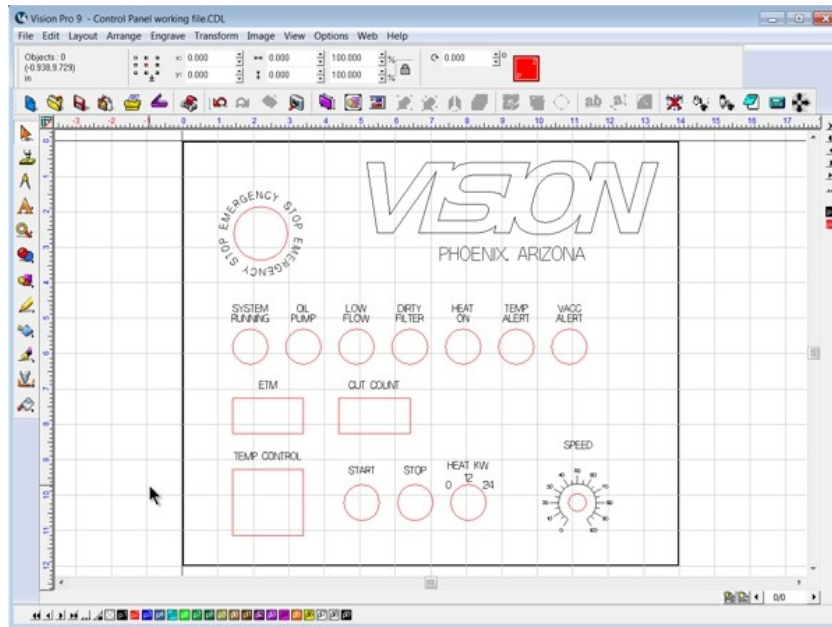
The dial should appear as shown below and be centered around the small circle.



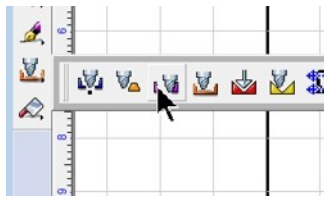
The basic layout is finished at this point.



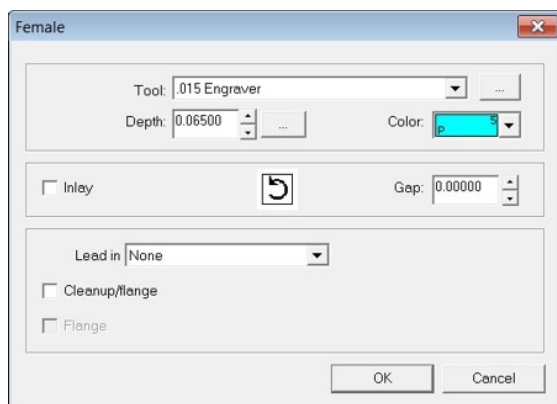
Since we have areas which will need to be cut out, we need to create tool paths in order to cut out the shapes to accurate dimensions. Before doing so and in order to make this procedure clear, all items to be cut out were changed to a different color (red was used here).




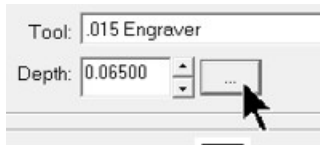
To create a tool path that compensates for the width of the cutter, first select all the objects to be cut (the objects shown in red above), then select the Tool Path Tools icon from the left toolbar and since we are cutting from the inside of the selected objects, click on the Female tool.



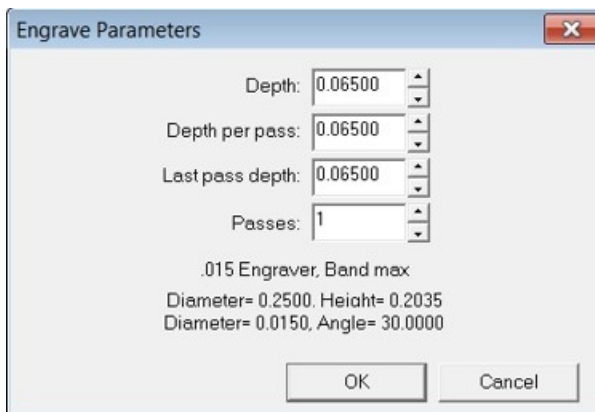
The Female tool path window will appear. Chose the cutter from the Tool drop down list. Set the Depth to slightly more than the material thickness (in this example, we are using 1/16th inch engraver's plastic, so the depth was set to 0.065 inches). Select a color other than one already used for the graphics on your drawing. In this example, the Cyan color was chosen.



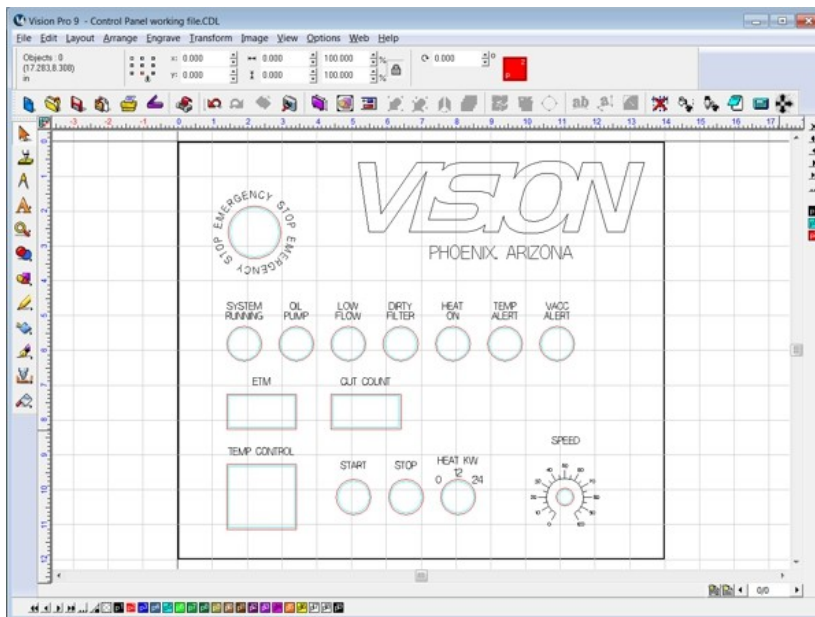
To set the number of passes used to cut through the material, select the  icon to the right of the Depth field.



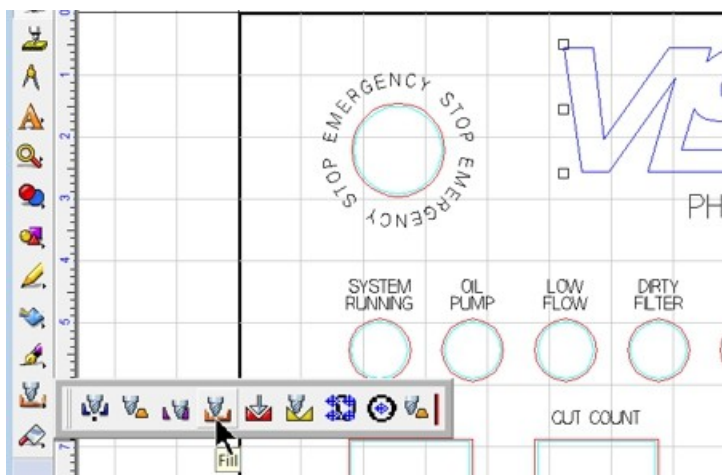
The Engrave Parameters window will appear. Click on the down arrow to the right of the Passes field to set the number of passes to 1. Note that if you increase or decrease the number of passes, the Depth per pass field and Last pass depth will automatically adjust to equal amounts. In most cases, when you first open this window, these depth numbers will be incorrect, therefore, even if the number of passes is correct, use the up and down arrows to change it, so that the other fields will auto correct themselves. Click on OK to accept these settings, then click on OK to close the Female tool path window.



The plate should now show three different object colors (note the right side of the Vision 9 software window - you can see which colors have been used in this job).

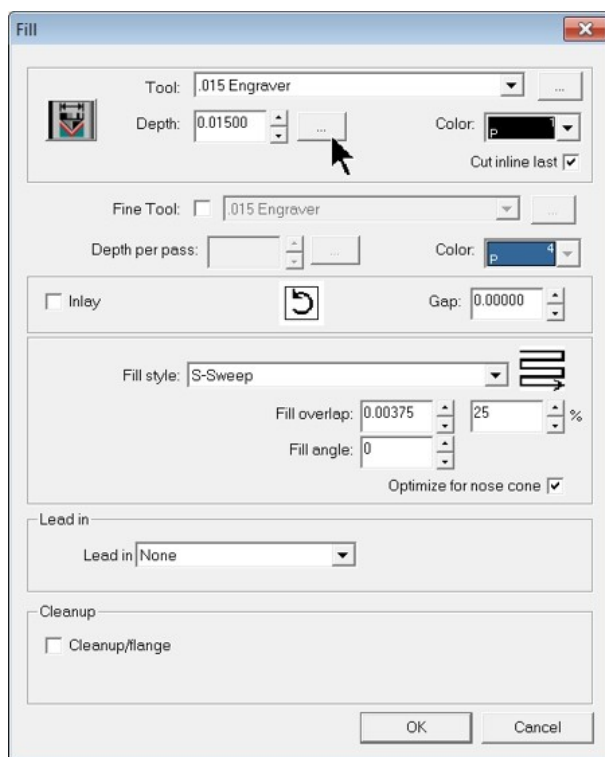


We now need to add a fill to the Vision logo. Select the Vision logo and select the Tool Path Tools icon from the left toolbar, then click on the Fill icon.

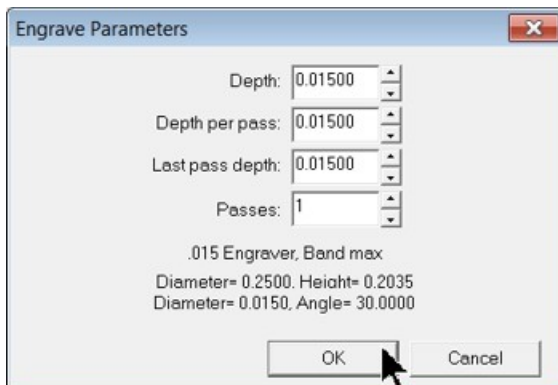


Set the tool as the .015 Engraver, the Depth to 0.015 inches, the Color to Black (we will engrave this area at the same time we engrave the other black objects), the Gap to 0, use S-Sweep for the pattern

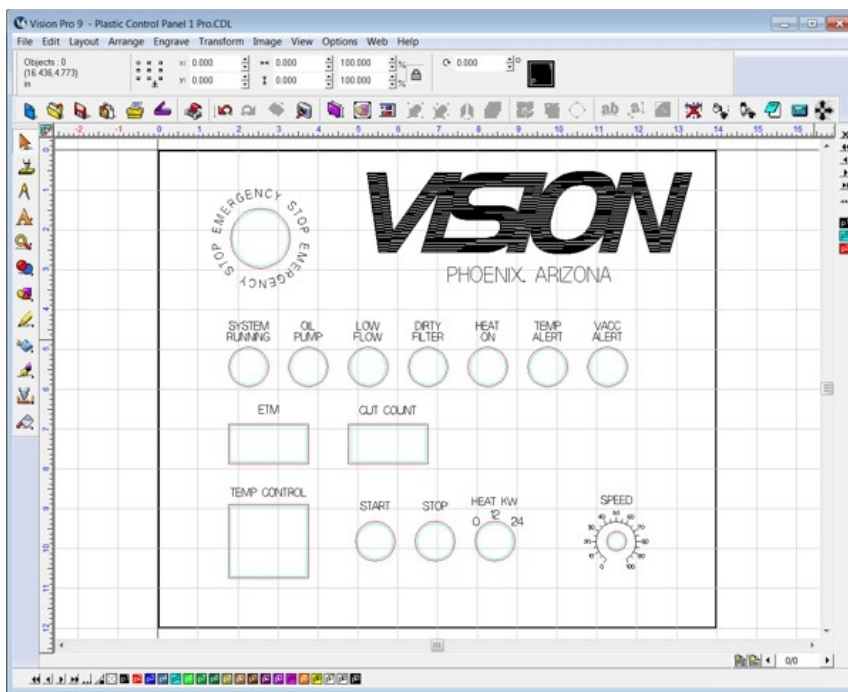
and set a 25% overlap, then click on the  icon to set the number of passes.



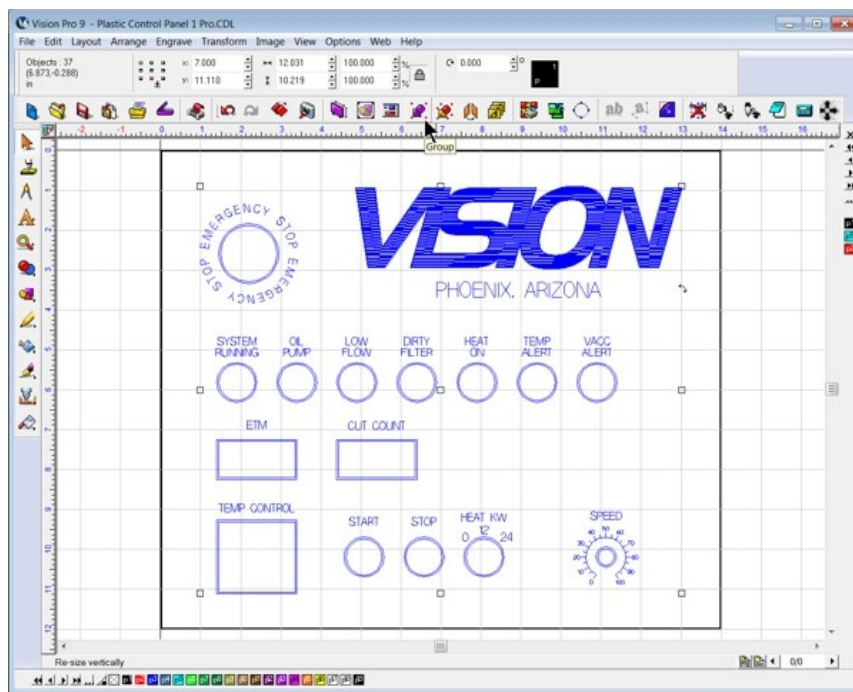
Set the number of passes to 1, then click on OK.



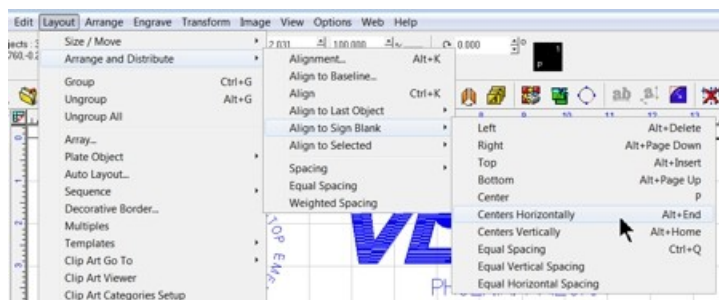
Click on OK to close the Fill tool window.



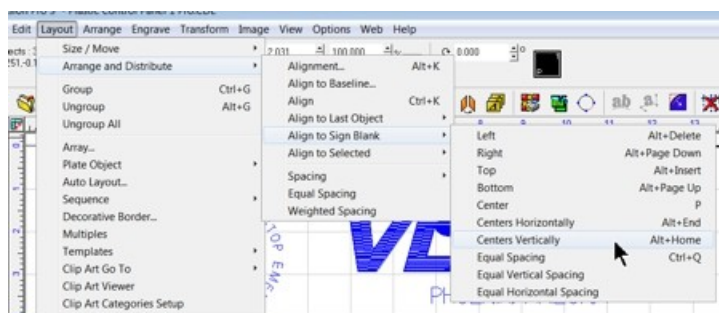
Before sending this job to the machine, all objects were selected (press the F3 on your computer's keyboard to select all objects) and grouped.



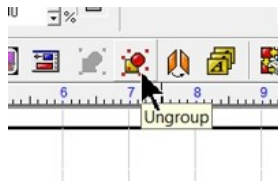
Then the objects were centered to the plate horizontally (shortcut keys ALT+End),



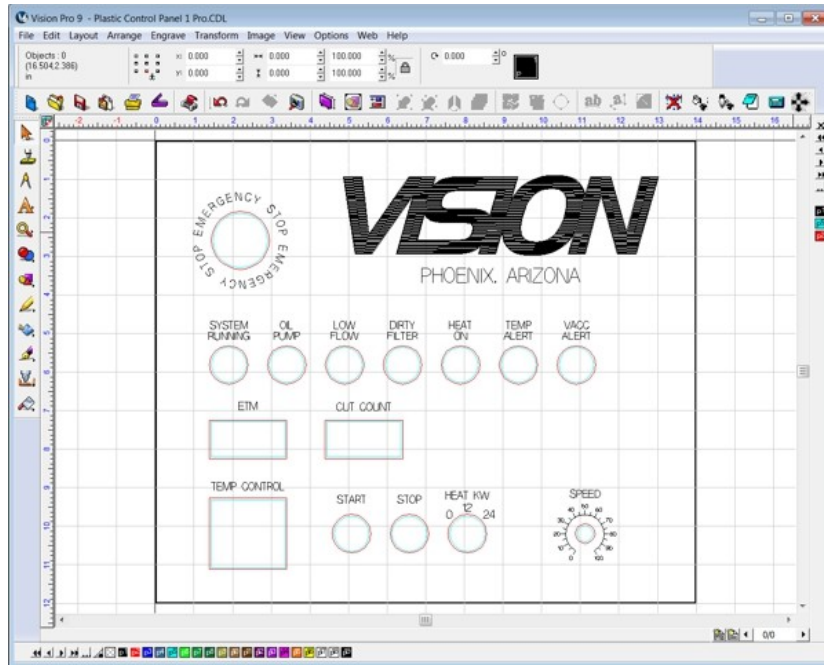
and centered to the plate vertically (shortcut keys ALT+Home).



The objects were then ungrouped.



The jobs are now ready to send to the machine.



In this example, the vacuum table on the Vision 2550 Router was used. The 0.015" Flex Cutter was installed and a depth of 0.015" (15 clicks) was set on the micrometer. The home position was set to the upper left corner of the material. To send only the engraving portion, disable the red and cyan colors by clicking on the color swatches on the right of the Vision 9 window while holding down the CTRL key on your computer's keyboard.



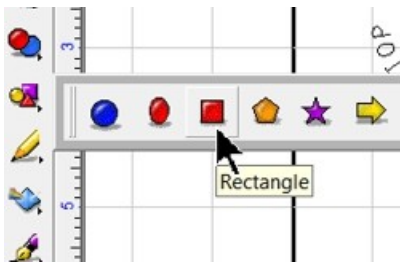
Select the Engrave icon from the left toolbar, set the Device to your machine, select Engraver's Plastic (Engraving) from the Tool Setup window, and click on the Engrave icon in the Cut Toolbox. Note that the material used here (yellow) is placed on top of MDF, which is used as both a spoil board and a vacuum surface. Any exposed areas of the MDF were covered to maximize vacuum.



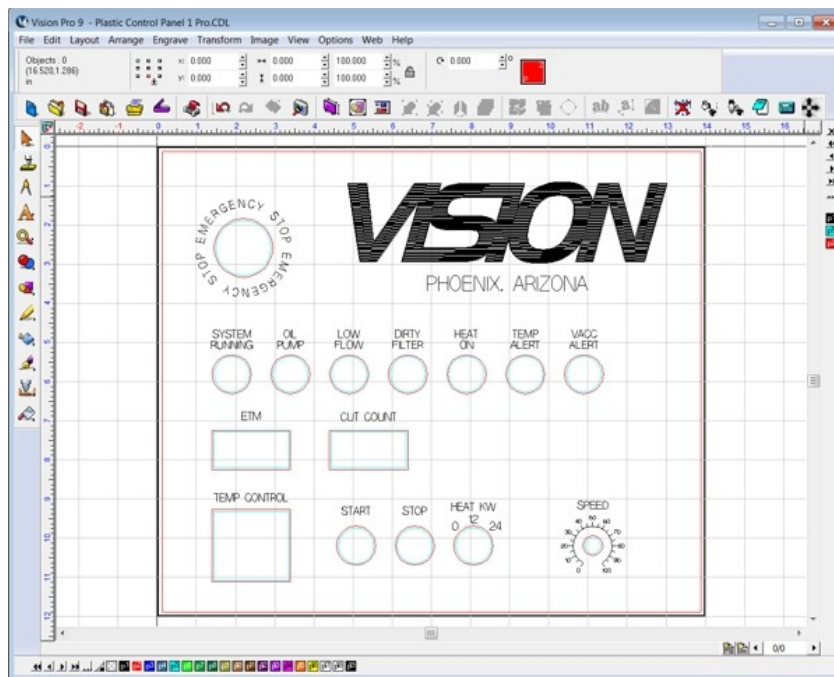
Only the black items should show in the Vision 9 software prior to sending the engraving portion to the machine. The below picture is after the engraving has finished.



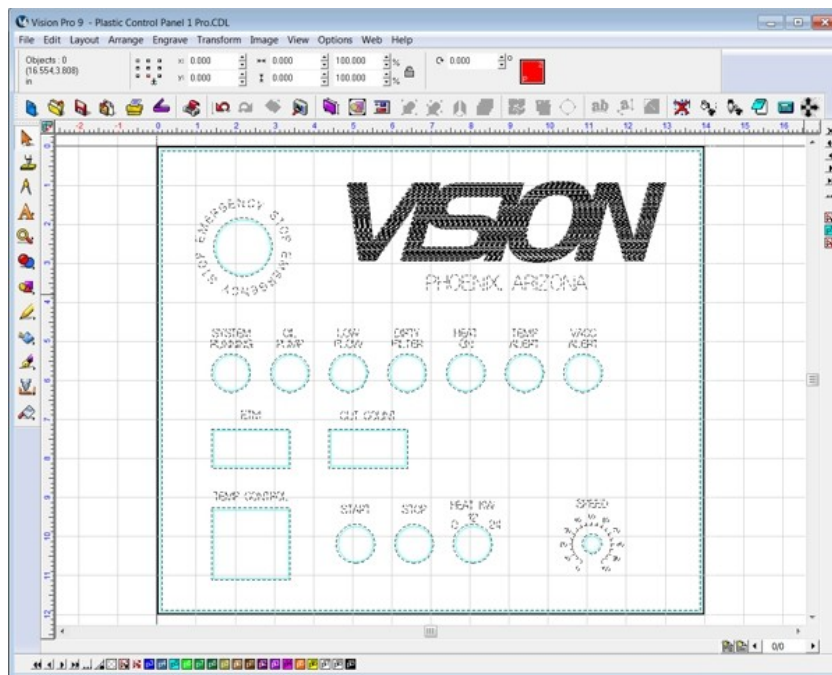
Since our material is slightly large than the final panel size, we need to add one last item to our drawing. Select the Shape Tools icon from the left toolbar and click on the Rectangle tool.



Draw a rectangle with a size of 13.75 inches wide x 11.75 inches high, center it on the plate and change the color to red.



Create a Male tool path for this rectangle the same way we created the tool paths for the other cut outs. Use the 0.015" Engraver as the tool and make the tool path color cyan (or any other unused color).



You can then turn off the black and red colors using the color swatches on the right side of the Vision 9 window and send all the objects in cyan to the machine. Use the settings for Engraver's Plastic (Cutting). All the cut outs will be processed. When the cutting is finished, the panel is then complete.



7.5 Feeds and Speeds

The best way to obtain cutting speeds and feeds is by contacting the tool or material manufacturer. Otherwise, determining the optimal cutting speed and feed rate for the project at hand requires some research and experience. Researching your cutter or material will ultimately yield a chip load or a SFPM (Surface Feet per Minute) value. These tool/material specific values can then be used in the following calculations to determine the speed and feed rates for your job.

$$Speed \left(\frac{rev}{min} \right) = \frac{SFPM \left(\frac{ft}{min} \right) * 3.82}{Diameter (in)}$$

$$Feed \left(\frac{in}{min} \right) = Speed \left(\frac{rev}{min} \right) * Chip Load * Number of Flutes$$

Speed equals the spindle speed in revolutions per minute (RPM).

SFPM equals the Surface Feet per Minute and is the speed at which the cutting edge of the tool moves past the material. This value is tool and material dependent.

Diameter is the tool diameter.

Feed equals the linear feed of the tool through the material.

Chip Load equals the amount of material each cutting edge of the tool removes per revolution. This value is tool dependent.

Speeds and feeds are often adjusted at the machine based on chip shape and size or the cutting sound. For routing applications one should start off using the recommended chip load and RPM for the material you are cutting. Increase the feed rate until the part finish starts to deteriorate or you risk moving the part. From this point, decrease the feed rate by 10%. Next decrease your RPM until your surface finish deteriorates, then increase your RPM until the finish is acceptable. These steps will yield the optimal speed and feed rates and the largest chip possible. Take note of these values for future reference.

Factors that will affect your feed and speed values include:

- Hardness of the material - Wood is the perfect example of this variable. A hard wood such as oak will require a slower feed rate than pine.
- Chip removal efficiency – A large nose cone and high volume vacuum will remove chips more efficiently thus allowing for faster feed rates.
- Size and Type of Cutter – A fine tipped cutter is more fragile and will require conservative feed and speed rates.
- Required Accuracy and Job Detail – products requiring fine detail or accuracy will require slower feed rates to account for tool deformation.
- Hold down method – The more securely a product is held down the more aggressive the feed and speed rates can be.
- Depth of cut - Shallow cuts can be made with faster feed rates.

- Strength/Speed of Motor – The strength and speed of the motor will limit the materials that can be cut and what feed rates you can cut at. The optional engraving and routing motors will cover most all engraving/routing needs.
 - The NSK High-Frequency 50,000 RPM Engraving Spindle is perfect for deep engraving into metals. The high RPM allows cutters to stay sharp much longer for increased production and allows for much faster speed in engraving.
 - The 3.25 HP 18,000 RPM Router Motor is perfect for routing applications in all materials.
 - The Standard Engraving Head can work at speeds up to 18,000 RPM, is driven by the Router Motor and can easily cut through plastics and woods.
 - The High Speed Engraving Head is capable of 30,000 RPM, is driven by the Router Motor and can increase feed rates when engraving many materials.

8 Vectorizing Bitmaps and Creating Fills in Vision Express

In this brief section, the commonly used techniques of importing a bitmap and vectorizing it for engraving/cutting, and the process of adding a vector fill to an outline will be demonstrated.

It is often required that a scanned image or a bitmap file is requested to be engraved. Since the Vision engraver is vector based and requires vector lines in order to follow a path for engraving, these bitmaps will need to be converted to vector images before being sent to the engraver. In many cases, the outline itself does not represent the graphic properly. The middle of the image will need to be engraved as well, and this requires a vector fill to be added to the vector image, so that the engraver can create larger/wider engraved areas.

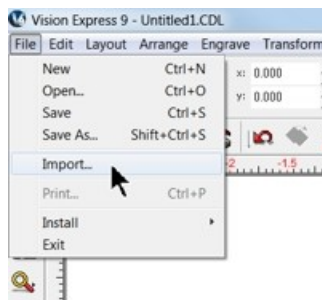
8.1 Vectorizing a Bitmap

The Vision Express 9 software has a new and vastly simplified method of creating a vector outline from a bitmap image. Vector outlines are automatically created when the bitmap is imported in the drawing. The following procedure can be used to import custom logos or images into the Vision Express 9 software for engraving purposes.

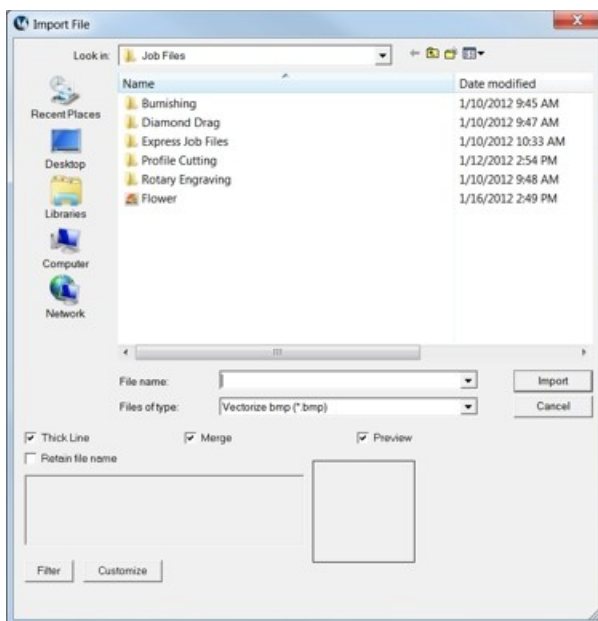
Compatible file types - Whether the user wishes to scan an image and import it, or will be using a file already created in another program, the image **MUST** be in a black and white .bmp format in order for the software to quickly create a vector outline. It is critical that the image be created at a high enough quality before creating the vector outline.

If the image has been printed and the user needs to scan it before importing it into the Vision Express 9 software, the image must be scanned at a recommended 300 dpi, then saved as a .bmp file format. Lower resolution images may not allow the software to create a good quality outline.

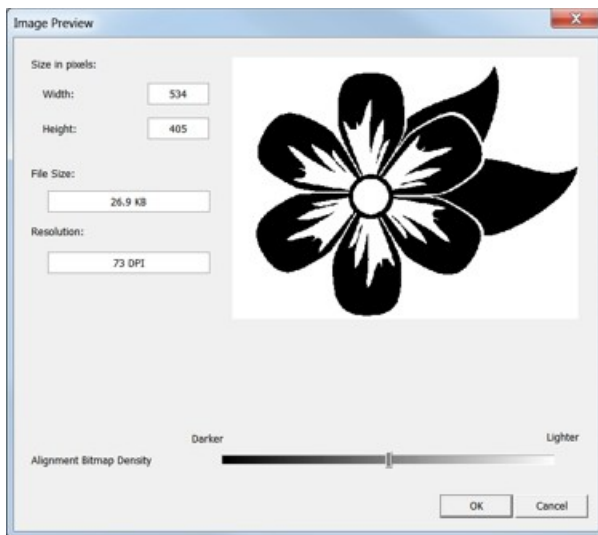
Open the Vision Express 9 software and create a new file in the desired plate size. Then simply select File → Import from the top toolbar menu.



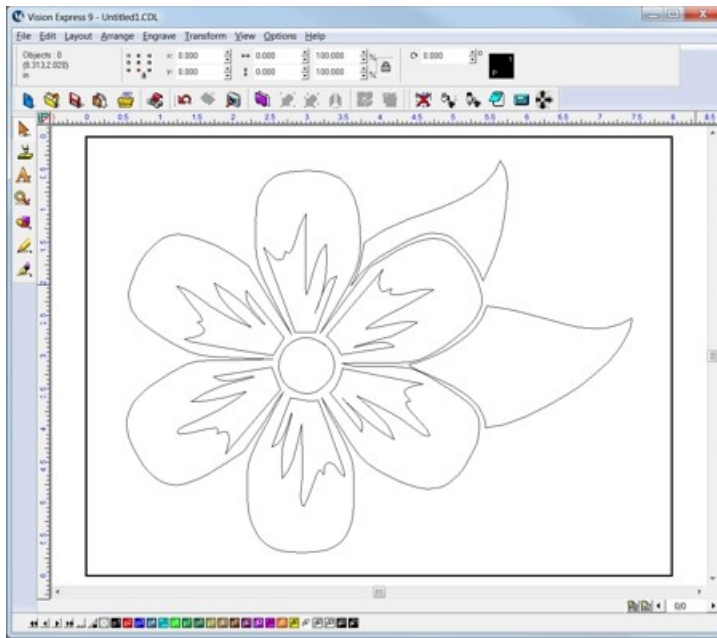
Using the drop down menu for Files of type, select Vectorize bmp (*.bmp), then choose the file and select Import.



The next screen has only one adjustment - Alignment Bitmap Density. There is a slider bar for darkening or lightening the image to show more or less detail. The default slider position is recommended. Select OK and the bitmap will be automatically converted to a vector outline for engraving.



The final image is shown below after it was imported and converted to a vector outline. It is ready to cut or engrave.

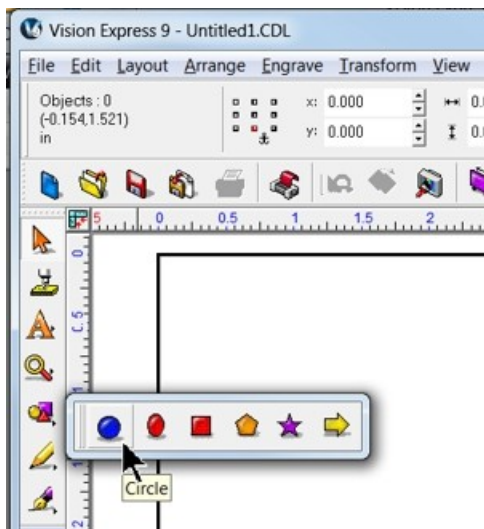


8.2 Creating Hatch Fills

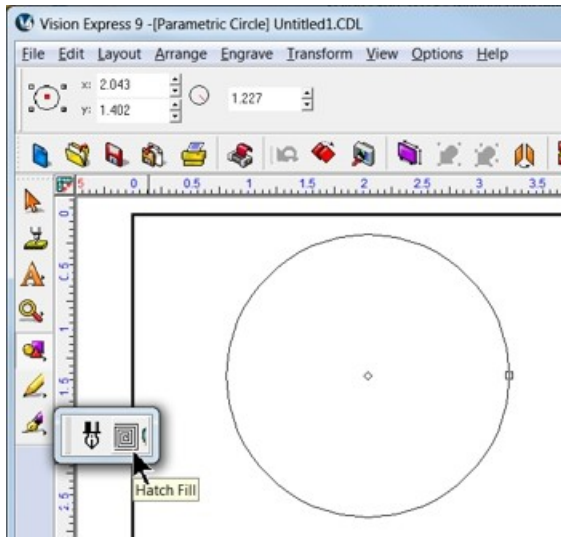
When an outline of an object needs to have the interior, or sections of the interior engraved, the Hatch Fill tool is used. As an example, if a simple circle is drawn in the Vision Express 9 software, but the user wants to engrave the entire circle, not just the outline, a hatch fill is used to create the vector fill path for the engraver to follow. In this section, three applications of a hatch fill will be shown.

Filling a simple object

After creating a new file in the Vision Express 9 software, draw a circle using the Circle icon from the Shape Tools flyout menu,



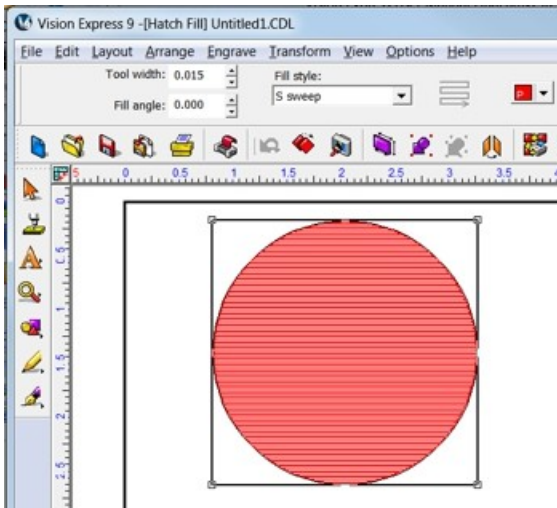
Click, hold and drag a circle, then select the Hatch Fill icon from the Stroke and Fill Tools flyout menu.



After selecting the Hatch Fill icon, the selected circle will be vector filled with the default settings. Note that on the top toolbar menu, tool options are now shown and the Tool width is set to 0.015 inches, Fill angle is at 0.000 degrees, the Fill style is S sweep and the color is Red. When selecting the Tool width, it is recommended to have a 20 - 25% overlap on each stroke. To determine Tool width, the cutter tip width will determine the Tool width. If a cutter with a cutter tip width of 0.020 is being used, then the recommended overlap for the Hatch Fill would be $0.020 \times 25\% = 0.005$ inches. To produce an overlap of 0.005 inches, subtract 0.005 from the cutter tip width ($0.020 - 0.005 = 0.015$ Tool width). If a cutter tip of 0.050 is used, then the overlap would be $0.050 \times 25\% = 0.0125$ inches, so the Tool width for the Hatch Fill would be $0.050 - 0.0125 = 0.038$ inches.

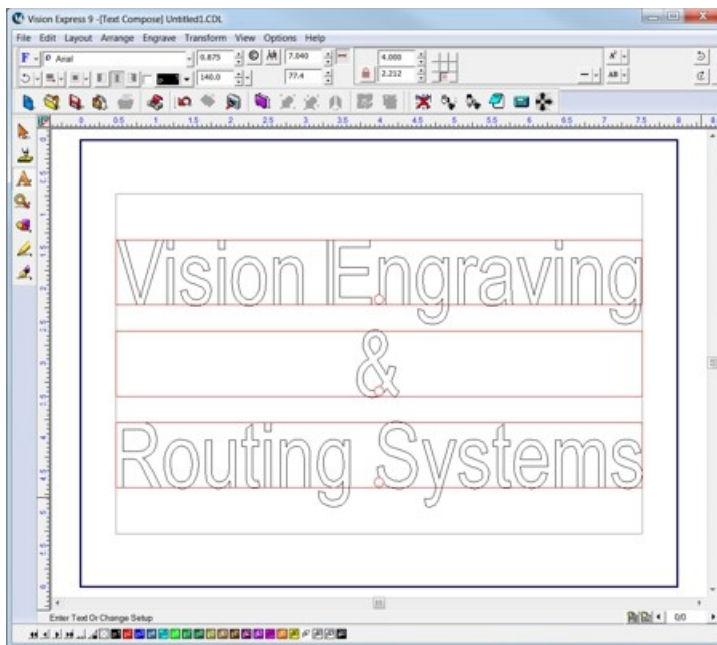
The user can experiment with different Fill angles and Fill styles to determine what looks best. Tool widths can be changed as well. More overlap creates a smoother background engraving, but requires more time. Less overlap will be faster, but the background can become rough. If the Tool width is greater than the cutter tip width, portions of the background will not be engraved. Doing so creates a visible hatch fill, which may be desirable for some applications.

Once the Hatch Fill has been adjusted, select Close from the toolbar menu. The image is ready to be sent to the engraver. You may want to change the hatch fill color to match the color of the outline, although it is not necessary.

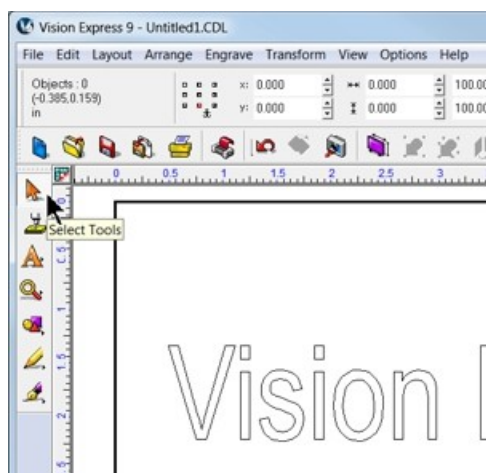


Filling Outline Text

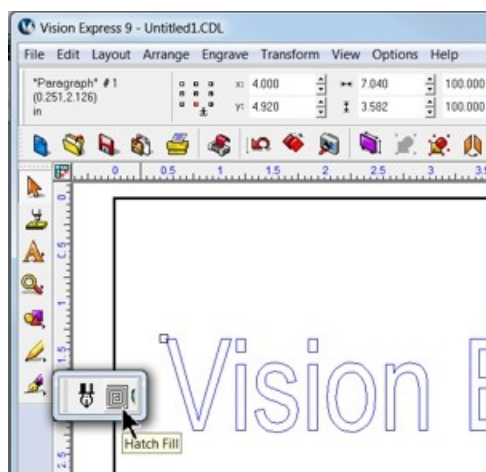
Hatch fills can be applied to outline text, but not single line text. In the below example, Arial text was used by selecting the Frame Text Compose icon and clicking in the middle of the plate to create the text as shown.



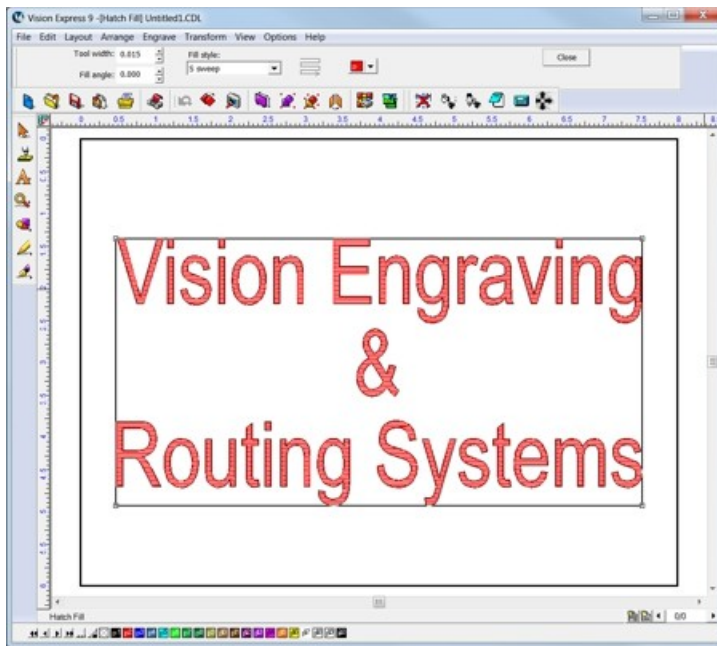
Before filling text, the user must first select the text with the Select Tools icon. Click on the Select Tools icon and select the text to apply the hatch fill to.



Select the Hatch Fill icon.

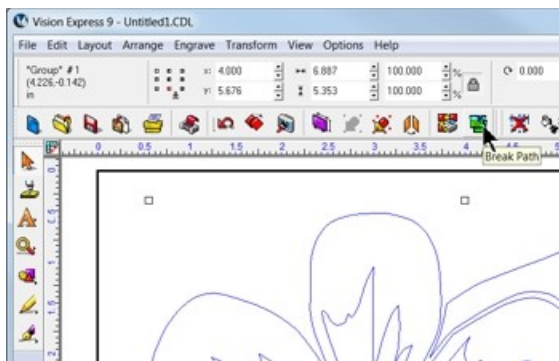


As with the previous example, the hatch fill is applied. Adjust the Tool width, Tool angle, Tool style and color as desired, then select Close. The file is ready to be sent to the engraver.

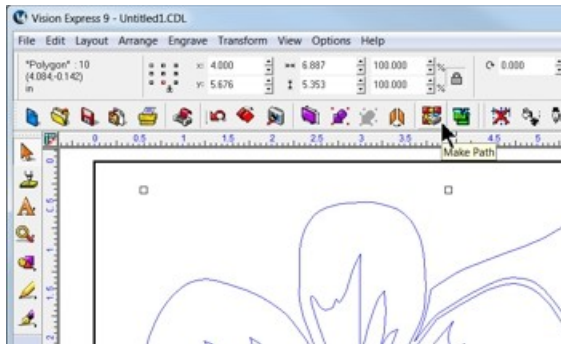


Complex Hatch Fills

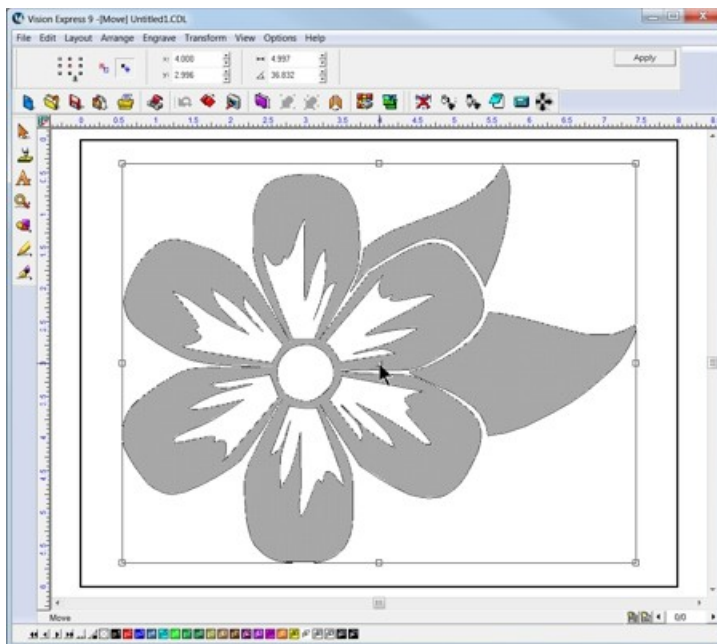
Some graphics have portions that do not need to be engraved and are within the boundaries of outside vector outlines. Using the Flower example file, import the file to vectorize the bitmap, then select the Break Path icon to separate the individual outlines.



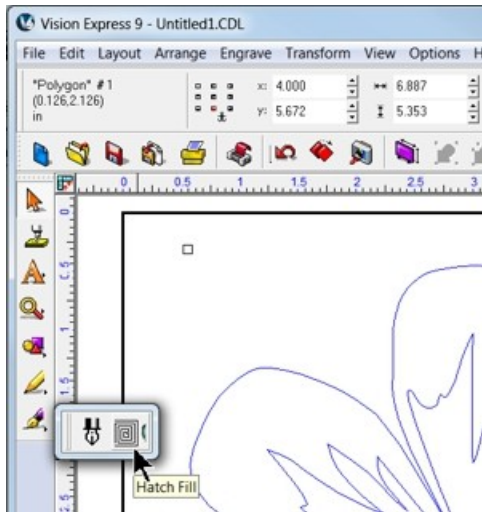
Next, we will need to create a path. The Vision Express 9 software has an intelligent path tool that will automatically detect portions of the graphic that are within outside vector lines and will create a hatch fill with the center portions left as unfilled. Press the F3 button on the computer keyboard to select all items, then select the Make Path icon.



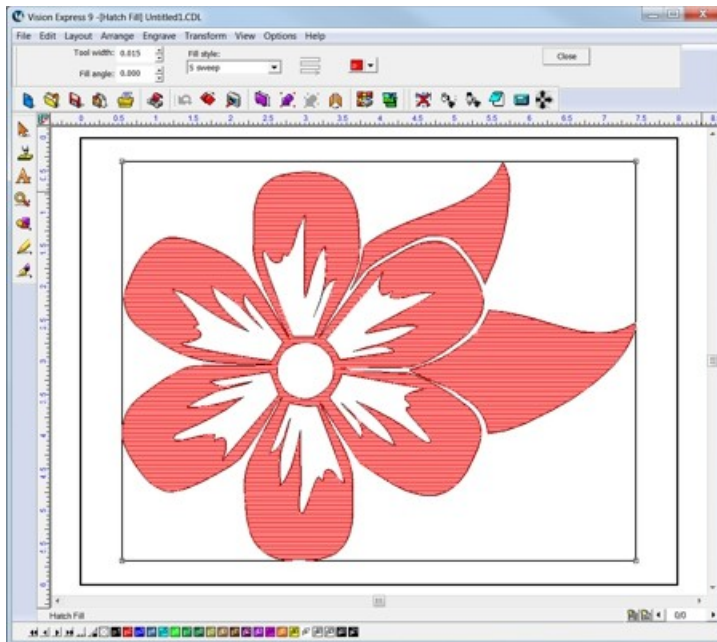
Then click and hold on the node in the center of the graphic. The automatic detection will display the areas that can be hatch filled.



If this looks correct, select the Hatch Fill icon.



The hatch fill will be applied. Adjust the tool options as desired and select Close from the toolbar menu. The file is ready to be sent to the engraver.



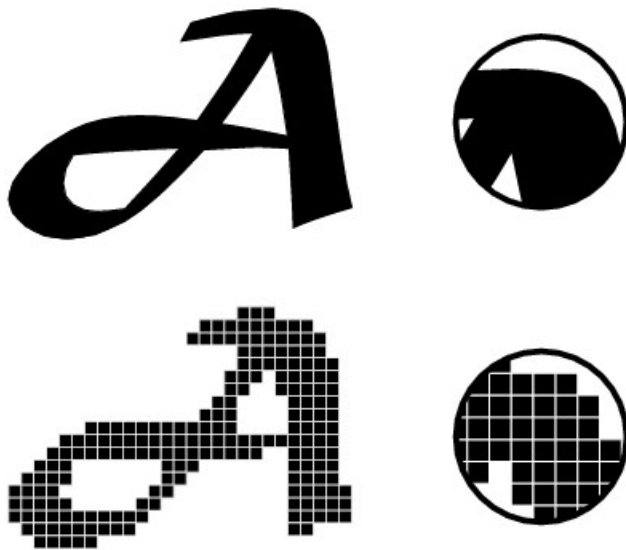
9 Vectorizing Images in Vision 9 Pro

The first step in creating a good quality vectorized image from a bitmap is to make sure the image quality of the bitmap is high enough that the vector image output clearly represents the original bitmap image. Before we begin this tutorial, a few definitions are needed.

Bitmap Image - Any form of digital image comprised of individual pixels of color. File formats are commonly; .bmp, .jpg, .jpeg, .tif, .gif, .png as well as some .pdf files and many others.

Vector image - A computer drawn image comprised of individual lines or curves. File formats for vector images can be .ai, .pdf, .cdr, .cdl, .svg as well as many others. Keep in mind that a vector file format can contain bitmap images as well as vector images, but a bitmap file format only contains bitmap images.

To create a vector image from a bitmap image, the bitmap must undergo vectorization. This is the process whereby the software analyzes the bitmap image and determines how to represent the image with vector lines and curves. Bitmaps are generally scanned into the computer with a scanner. They can also be drawn in graphic illustration programs. Most all images viewed on the internet are bitmaps. Photographs taken with a digital camera are also bitmaps. Bitmap quality will rely heavily on the process used to create the bitmap as well as the overall size of the image. Larger images, both in pixel dimensions and file size, produce higher quality images. The difference between bitmap images and vector images is shown below.



The top image is a vector image. The outlines are smooth and defined and the fills are a solid color. The bottom image is a bitmap image. The pixels of color are clearly defined and make up a grid of colored "boxes", then when combined together, create an image. Bitmaps have no "path", no continuous outline and no solid fill. Because of this, Vision engravers and routers cannot process a bitmap. A vector image is necessary for the machine to understand the path it should follow to create the image on a substrate.

Vectorizing an Image - Outline Tracing

The first image used will be the Vision business logo.



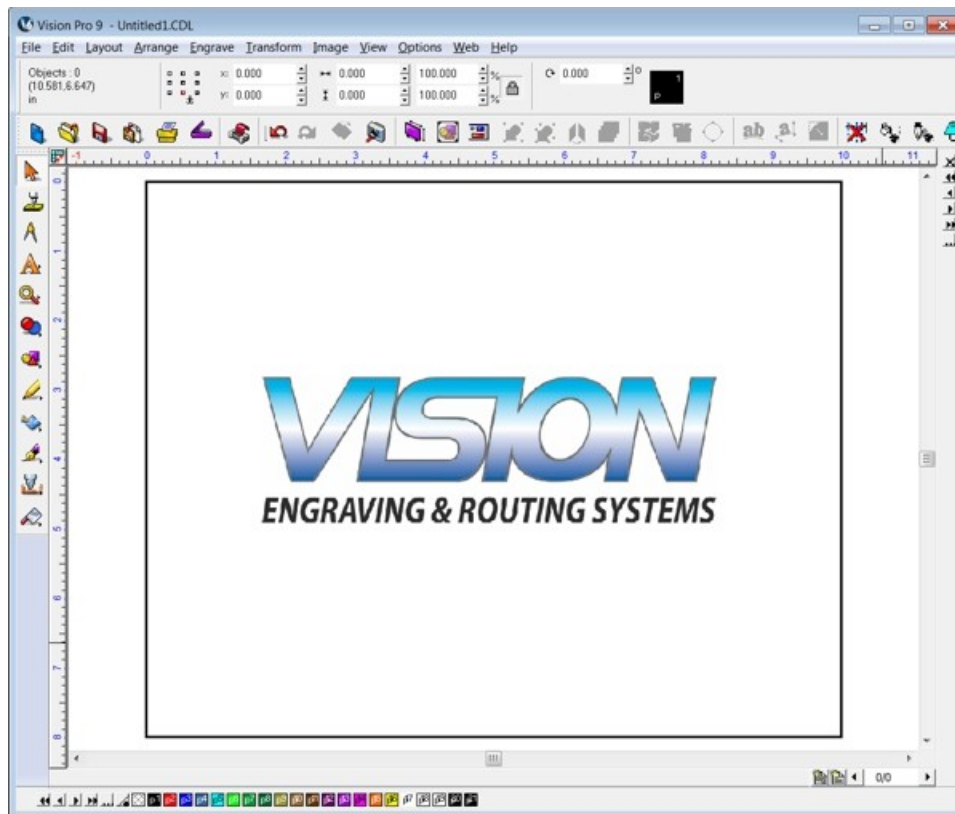
The below image is the same file, but zoomed in to see the individual pixels.



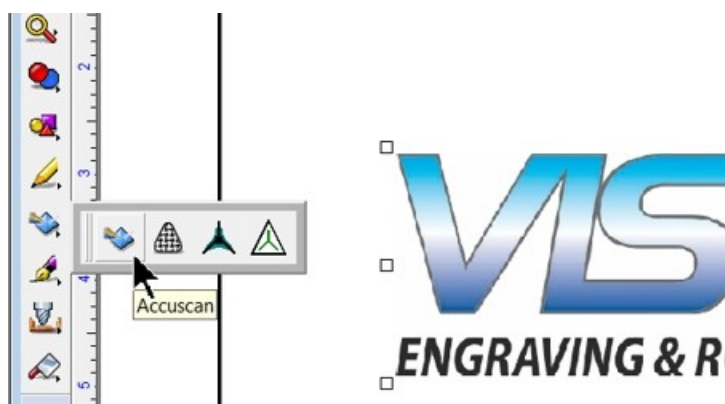
As you can see, each pixel is a specific color and the edges are not smooth. What we would like the image to look like is shown below. The outline was given a different color to highlight that there is a separate outline and fill on this image.



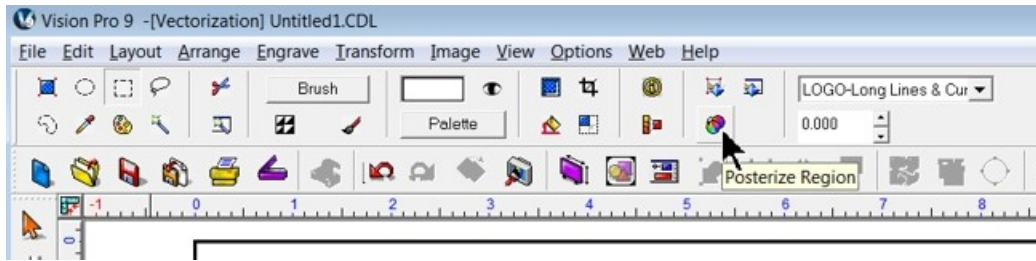
To begin the vectorization process, import a bitmap file into Vision Pro 9 using the File > Import command. (Vision Expert 9 can be used, but not all of the same vectorization features are available). For good quality vectorization, the bitmap should be as large as practical. In this example, the original bitmap size was 640 x 215 pixels.



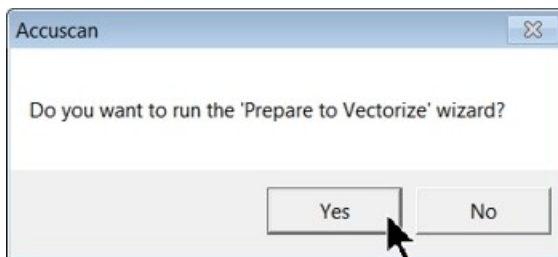
Select the bitmap by clicking on it, then select the Accuscan tool from the left toolbar.



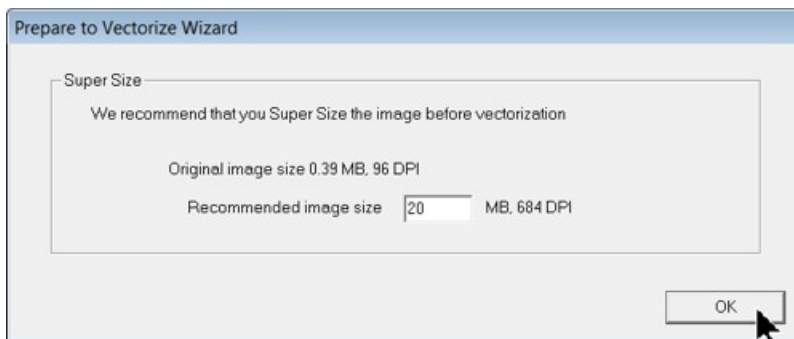
The image will need to be prepared to vectorize. Select the Posterize Region icon from the top toolbar.



The below window will appear asking if you want to run the Prepare to Vectorize wizard. Select Yes.



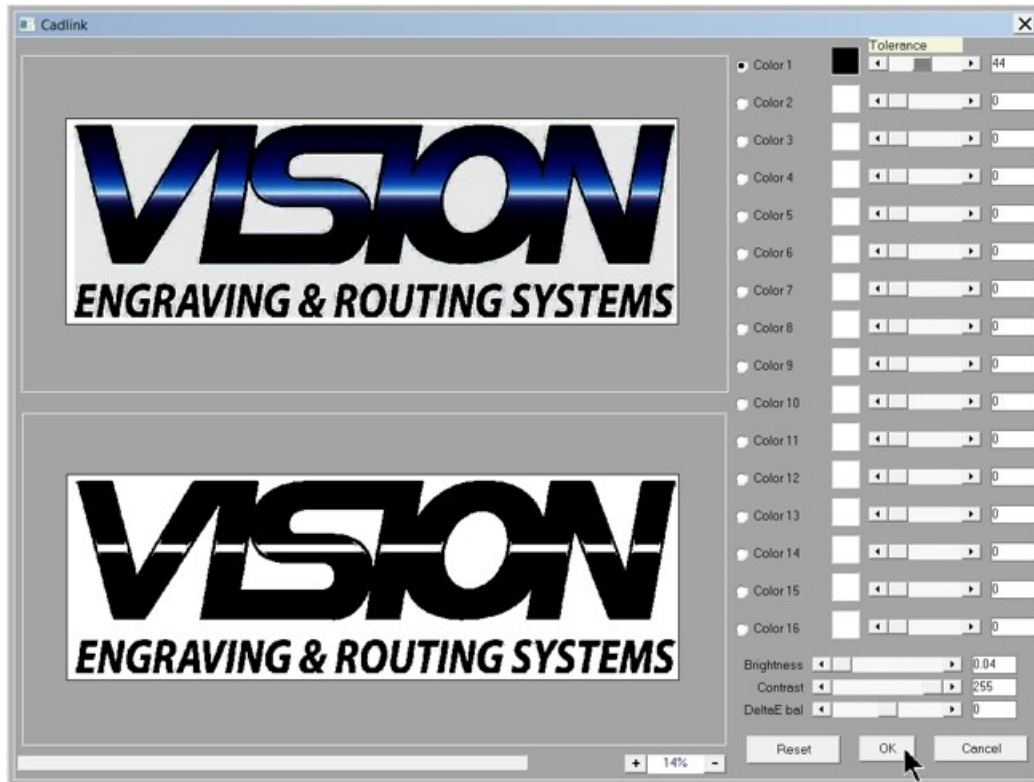
The wizard will open and recommend the image size be increased before vectorization should take place. Select OK and accept the standard recommended size.



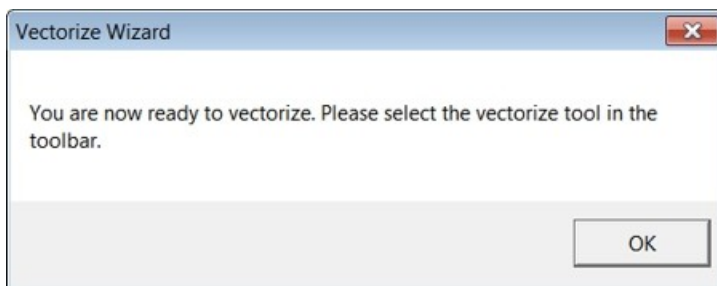
A window will appear where adjustments can be made to the supersized bitmap. The ideal settings will depend on the bitmap being used, but it is best to try to adjust the image to create sharp, crisp edges, a clear background and defined colors. Select OK when the image has been adjusted.



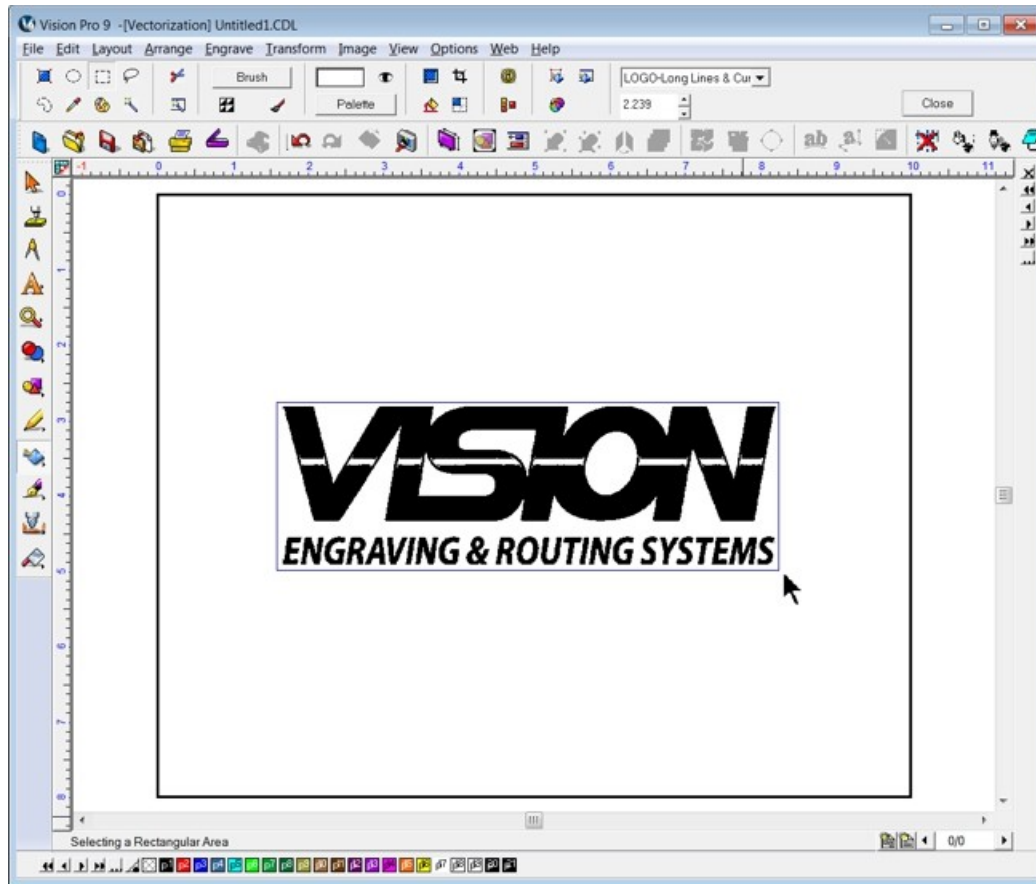
The next window allows for a selection of colors and whether or not to see more or less of the specific color via sliding the Tolerance level for that color. The Brightness adjustment at the bottom of the screen can also be adjusted to show more or less of the image. Since we are only interested in the outline of this image, the only color selected is the default Black color. The Brightness was reduced as much as possible, without turning the entire area black, then the Tolerance was increased until small speckles of black were seen around the image. Then the Tolerance was reduced so that those speckles were not visible. Since the interior of the image is what, it was not possible to completely fill in the interior of the image with black. This is not a problem as again, we're only interested in the outline of the image. Select OK to finish the vectorization process.



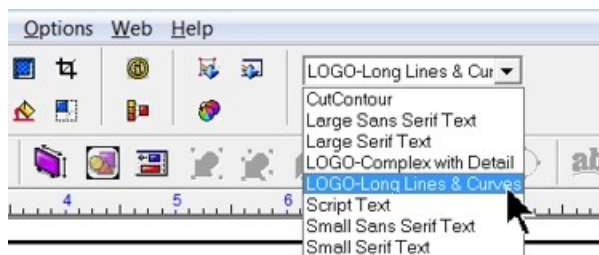
Once the image has been modified, the follow window will appear giving the notification that the image is ready to vectorize.. Select OK to close this window.



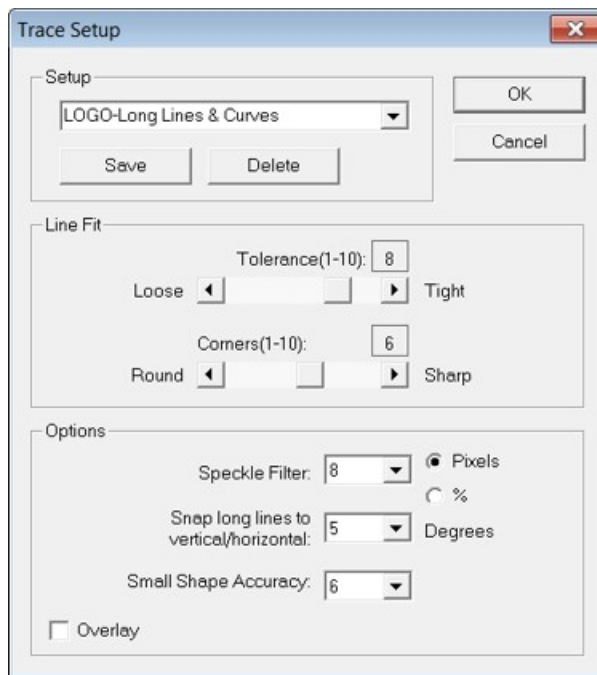
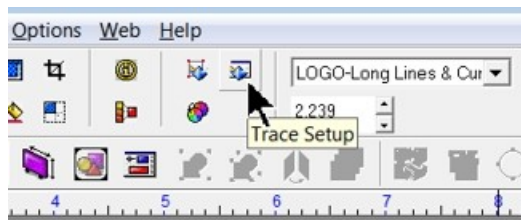
Using the cross hair pointer, click and drag a box around the area to be vectorized.



The top toolbar has many options for modifying the bitmap. To keep this tutorial simply, we will not cover all of the available tools and just select a preset for the type of image we wish to vectorize. In this case, LOGO-Long Lines & Curves was chosen. The user should experiment with the different presets to determine which works best for the image being vectorized.



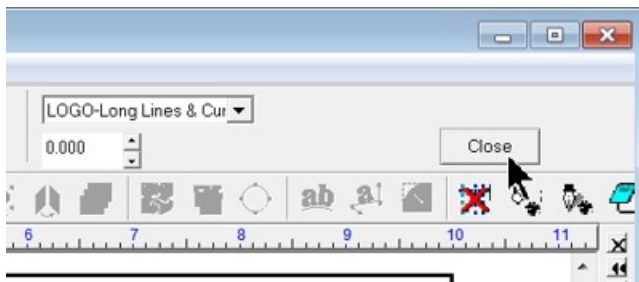
Alternatively, the preset can be adjusted by selecting the Trace Setup icon and making adjustments in the below window.



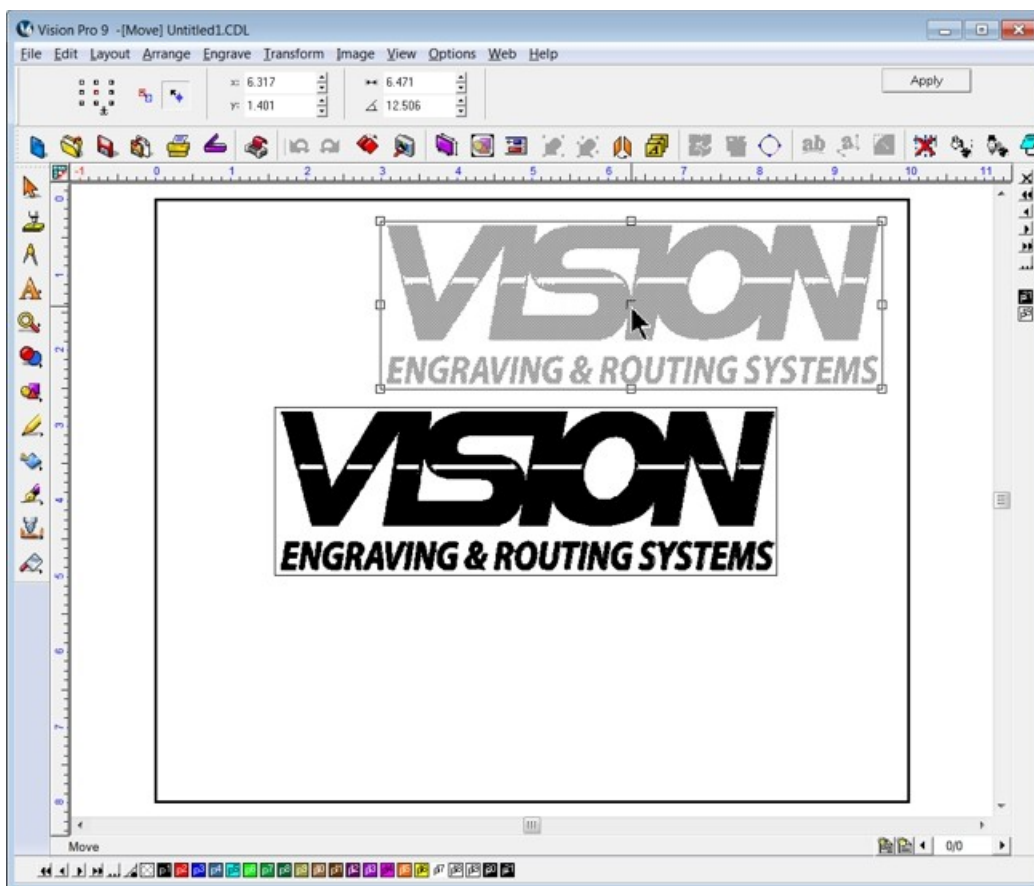
When a preset has been chosen, or modified in the Trace Setup window, select the Vectorization icon to begin vectorizing the image.



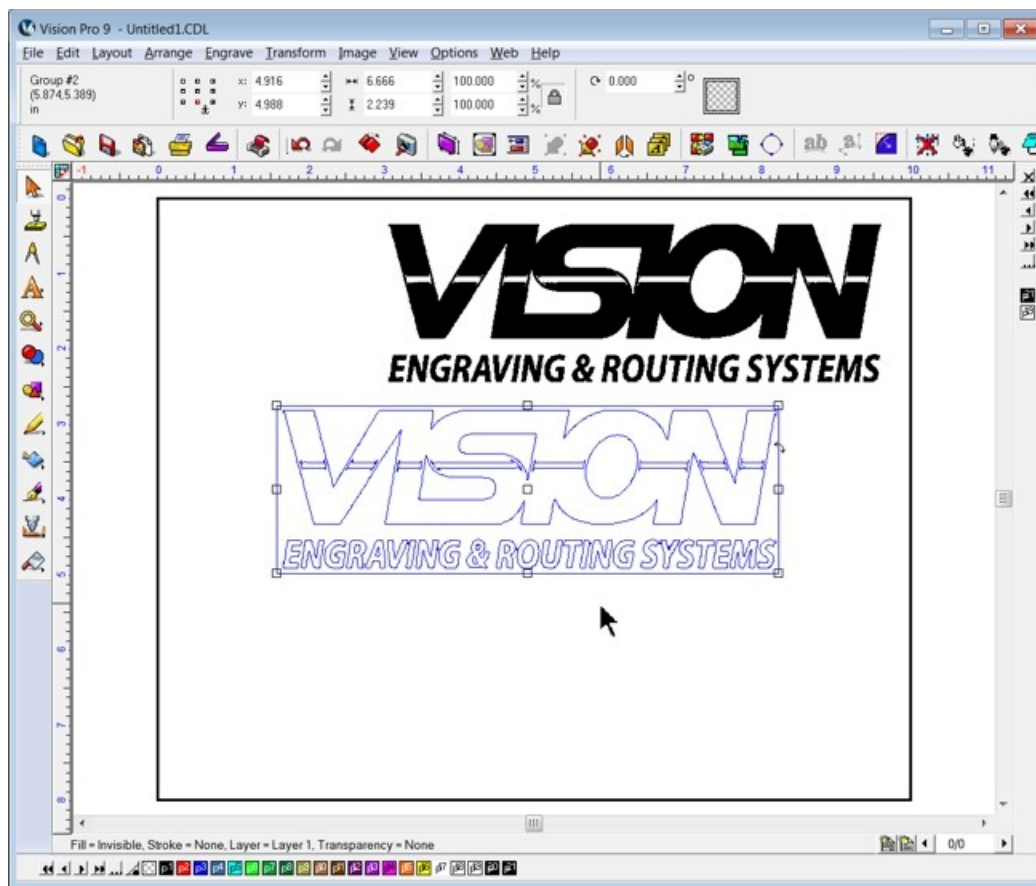
When the vectorization is complete, select Close on the top toolbar.



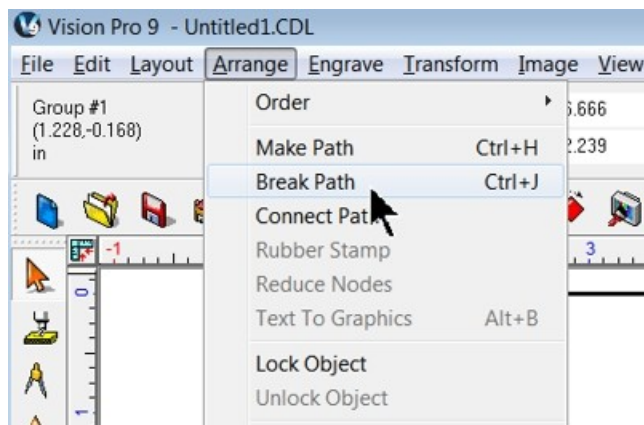
Two images will now be on the screen. Click, hold and drag the top image away to expose the vectorized image underneath.



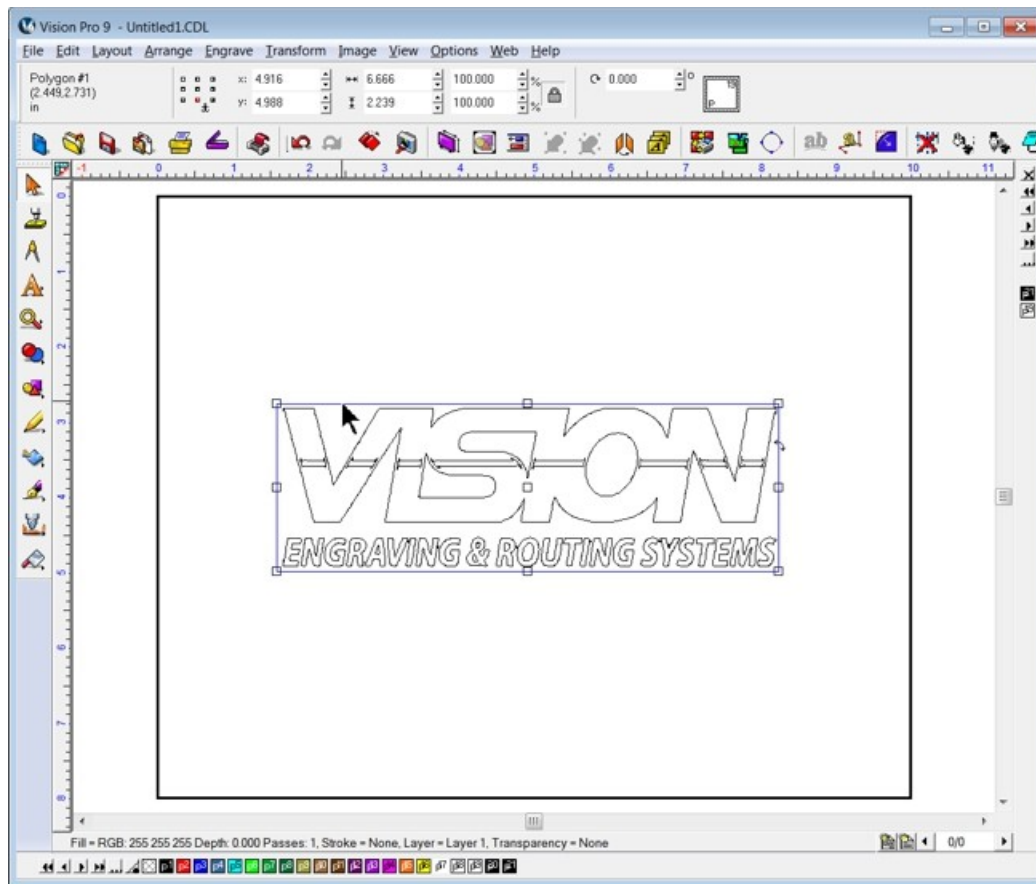
The vectorized image is shown selected (in blue). We can now modify the image to fix any errors, or delete areas we do not wish to use.



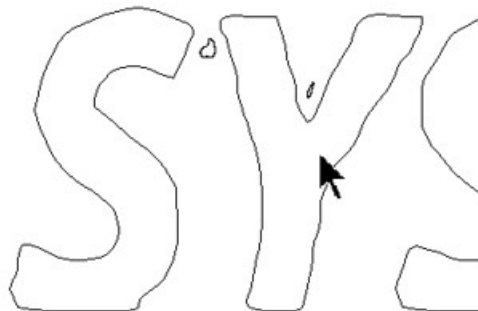
In order to modify the individual elements of this image, first, select **Arrange > Break Path** from the top toolbar.



This allows us to select individual elements to either modify the vector lines to more closely represent the original image, or as in this case, to delete sections of the image. The outline of the entire image is selected below and will be deleted.



Zooming in allows small areas we do not wish to engrave to be visible and deleted.

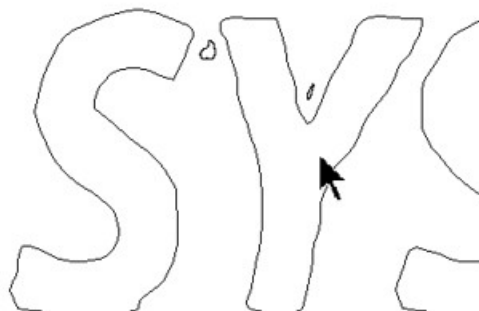


When finished modifying the image, select **Arrange > Make Path** to prepare the image for fills or tool paths. To verify that the image will be filled in the areas you want, select the image, then click on the center node of the image and hold down the mouse button. The areas that fills can be applied to will appear as shaded areas, as shown below.

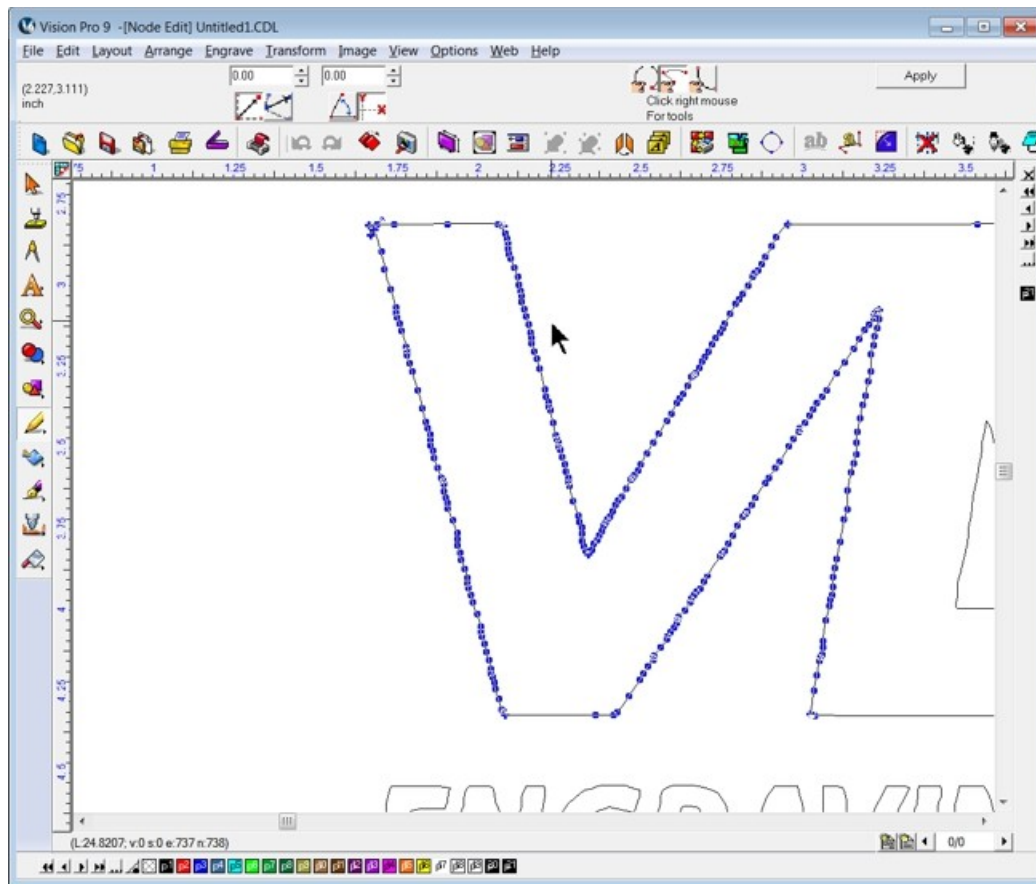


The image is now ready to be used.

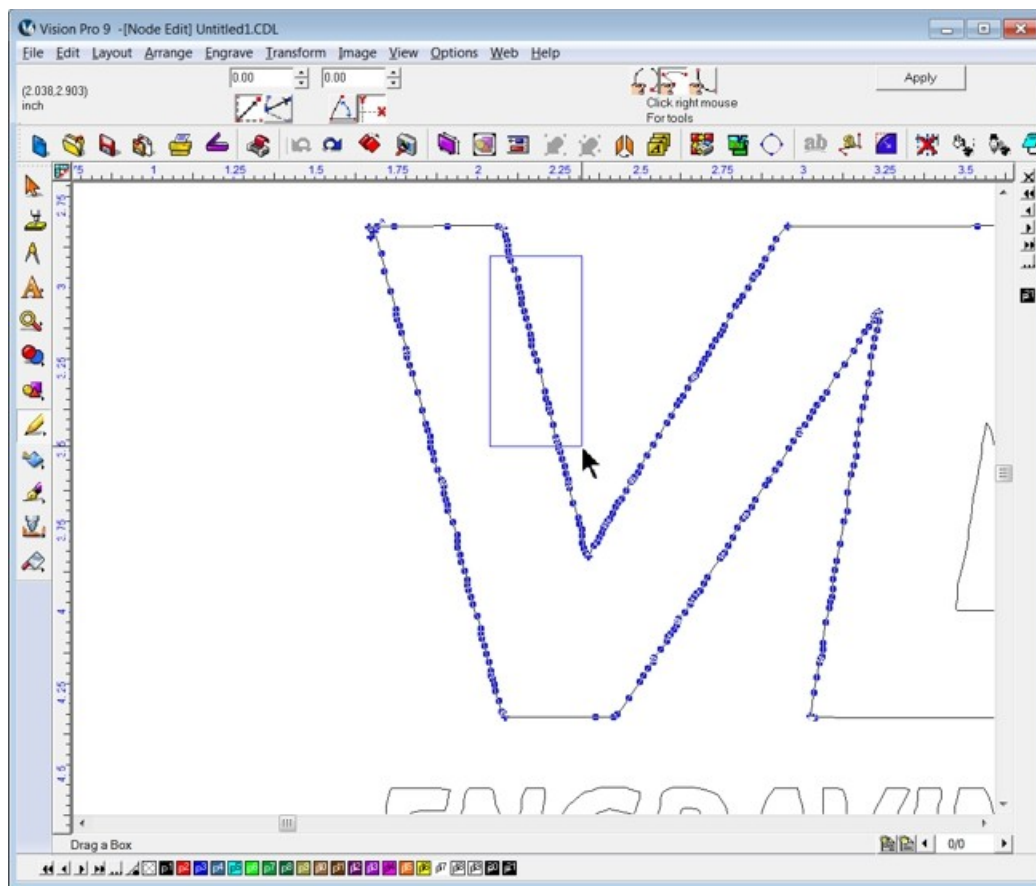
A note about accuracy - It may have become noticeable that the vectorization process does not often create smooth lines and curves - see image below. This is quite normal and consider that the image was greatly increased in size before the vector image was created. If the image is reduced in size to a typical size for engraving, these not so smooth lines will not be noticed. If it is important to make these lines smooth, the image can be modified using the Node Edit tool.



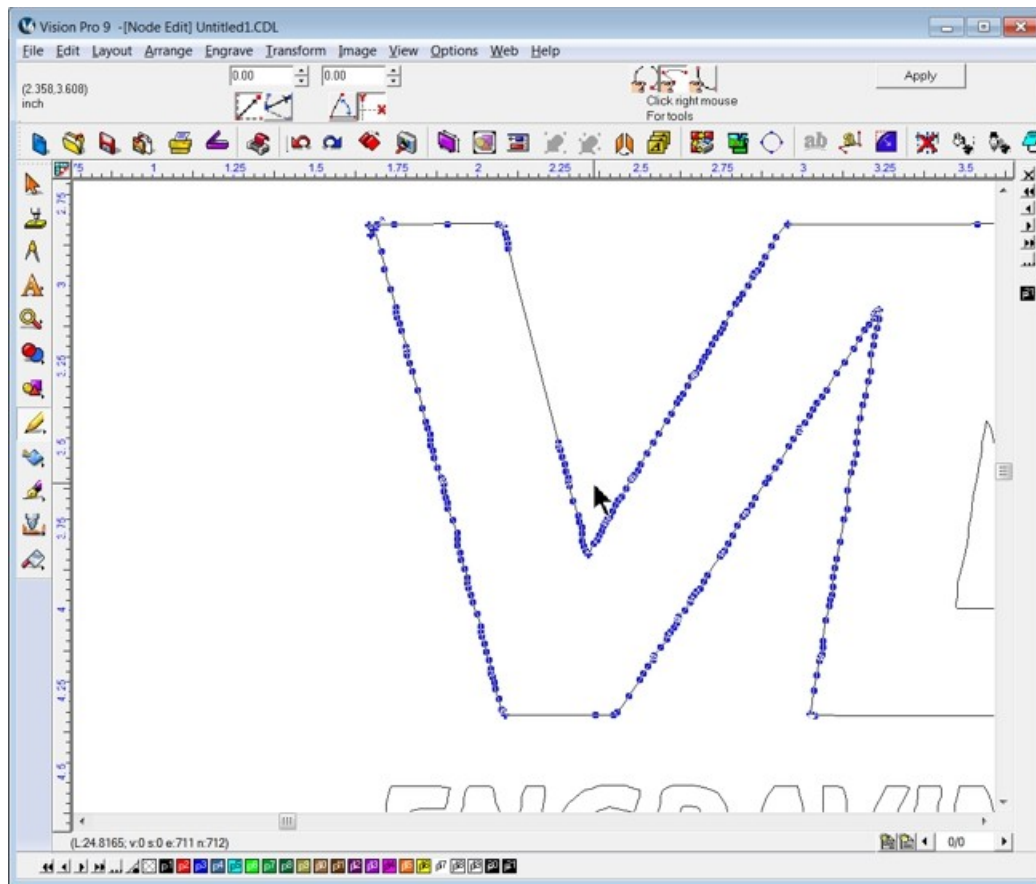
To use the Node Edit tool, select a line to modify and double click on it. Each node will appear as shown below.



To delete nodes and thereby straighten the line they are on, click, hold and drag a box around several nodes.



Then press the Delete key on the keyboard to erase them. You can also drag nodes and/or lines to create a more accurate image.



Vectorizing A Signature - Using the Centerline Trace Tool

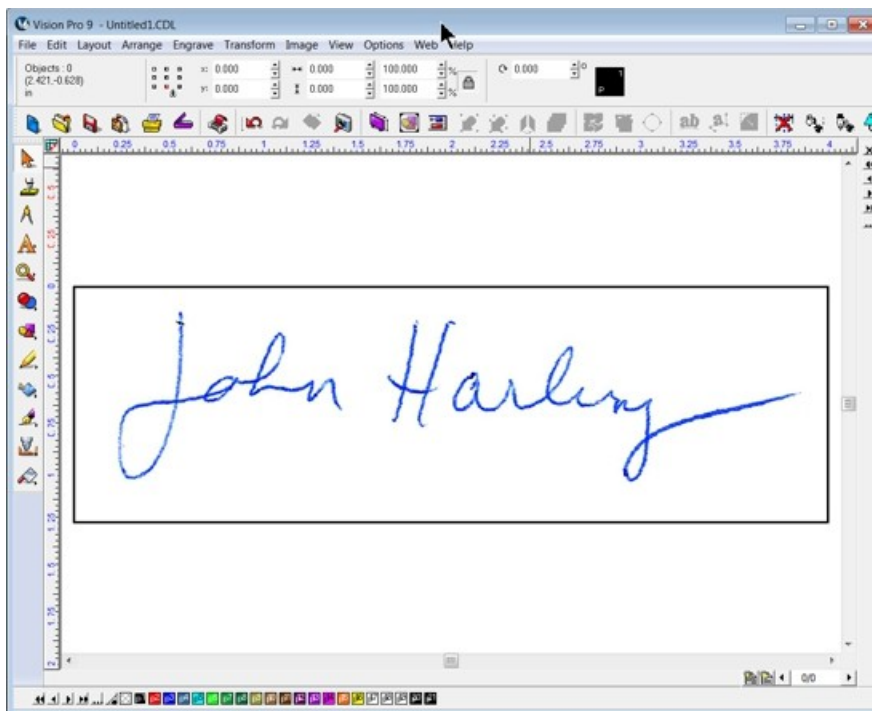
In this example, a signature will be scanned and saved as a color bitmap, then imported into the Vision 9 Pro software and a trace will be created using the centerline trace tool.

Preparation:

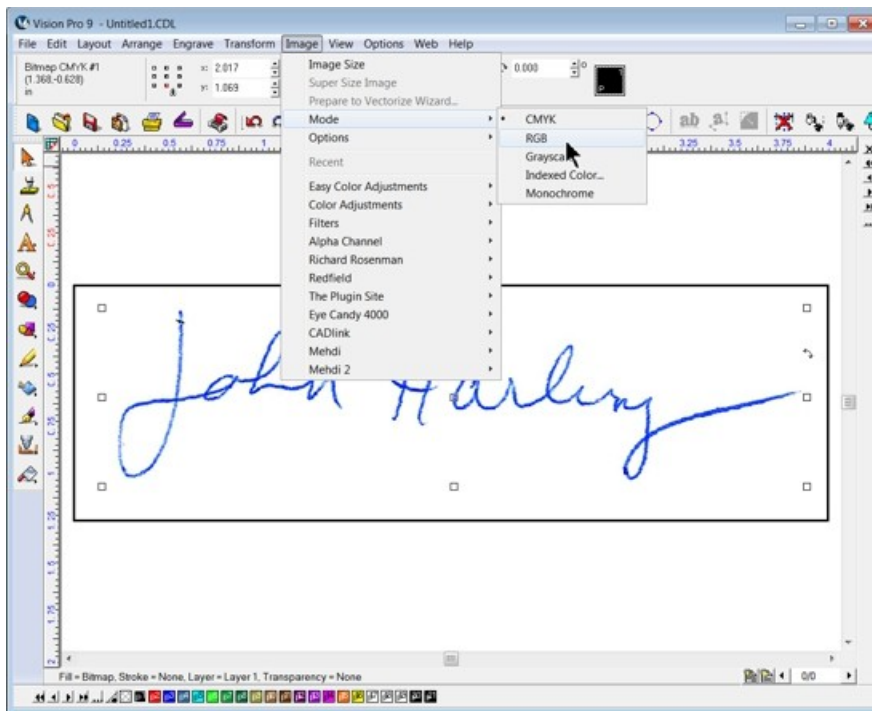
Image quality is very important when creating a centerline trace. If at all possible, create the signature using a felt tip black pen on white paper. Make the signature larger than normal so that when the image is reduced to a normal size, the quality is improved. If it is not possible to make the signature and an image must be used that has been previously scanned, there is more image preparation required in order to create an accurate vector trace. This example will use a color image scanned at 300 dpi and is 1121 x 284 pixels in size and is in .jpg format. The image is shown below.



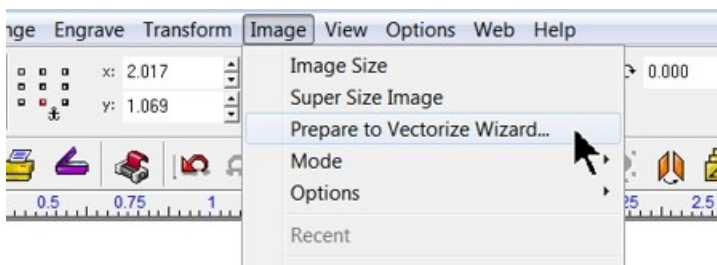
As can be seen, the image does not have a consistent color. There are gaps in the lines and even at 300 dpi, the individual pixels can be seen. Import the image into Vision 9 Pro using the File > Import command and place it anywhere inside the plate area. The plate size was reduced to just larger than the bitmap, although any plate size larger than the image can be used at this point.



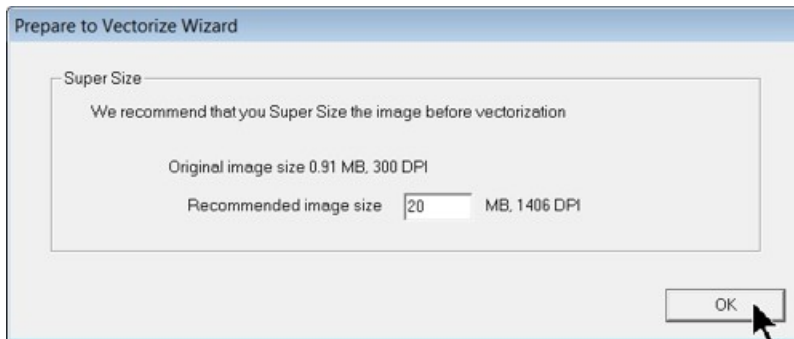
Select the image and make sure the image mode is set to RGB. Select Image > Mode > RGB to change the image mode.



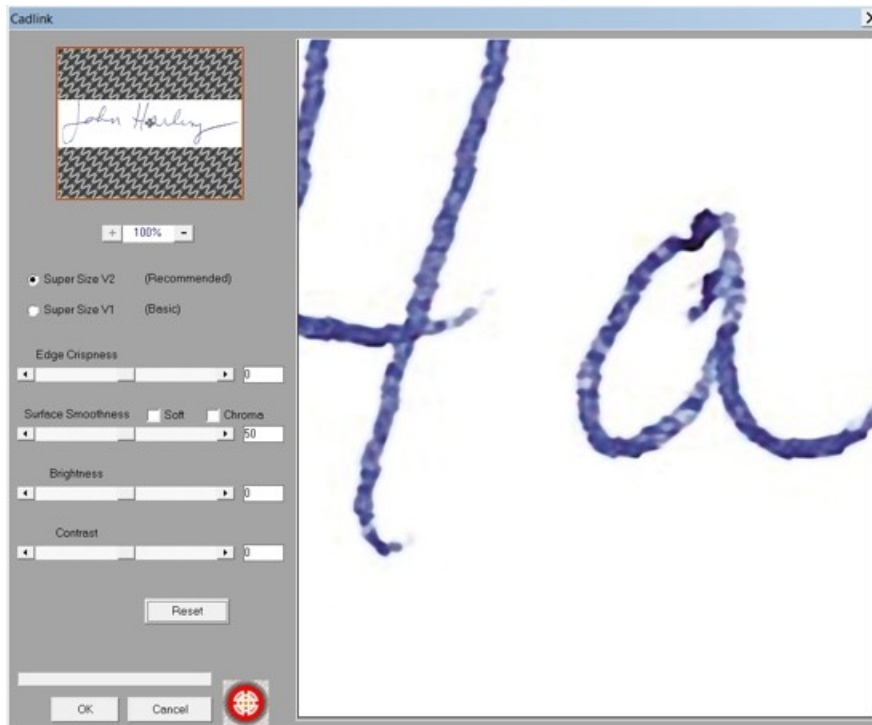
Open the Prepare to Vectorize Wizard by selecting Image > Prepare to Vectorize Wizard.



The Wizard will recommend that the image be increased in size. Select OK and use the suggested file size.

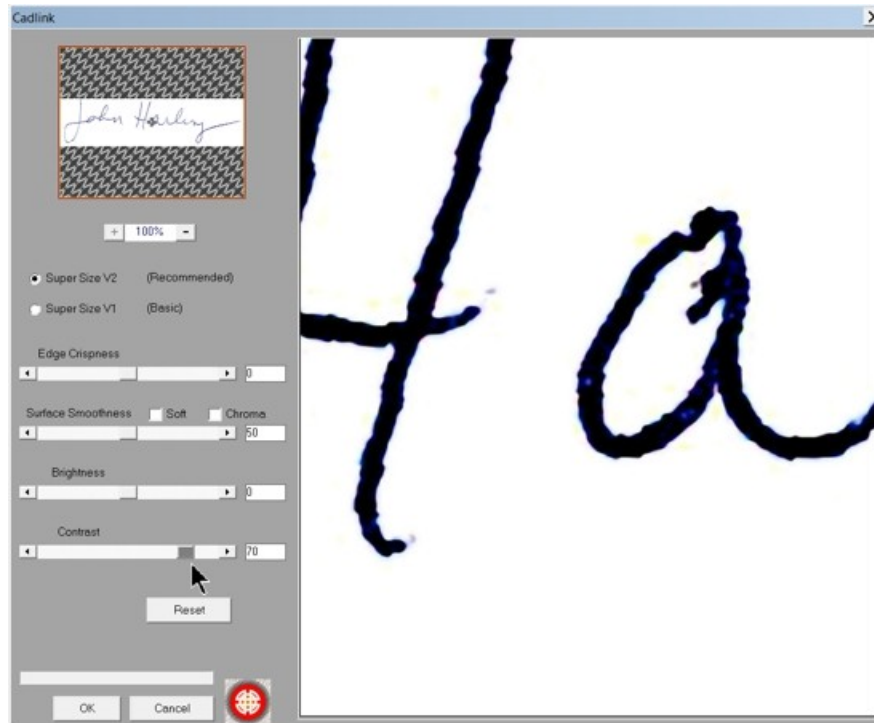


The image will be resampled and the pixels will be split up into smaller pixels in order to increase the image quality. Notice that with the default setting in the Wizard, the image doesn't look very good. This is acceptable, since the image has been increased in size and the default view zooms in to the image.

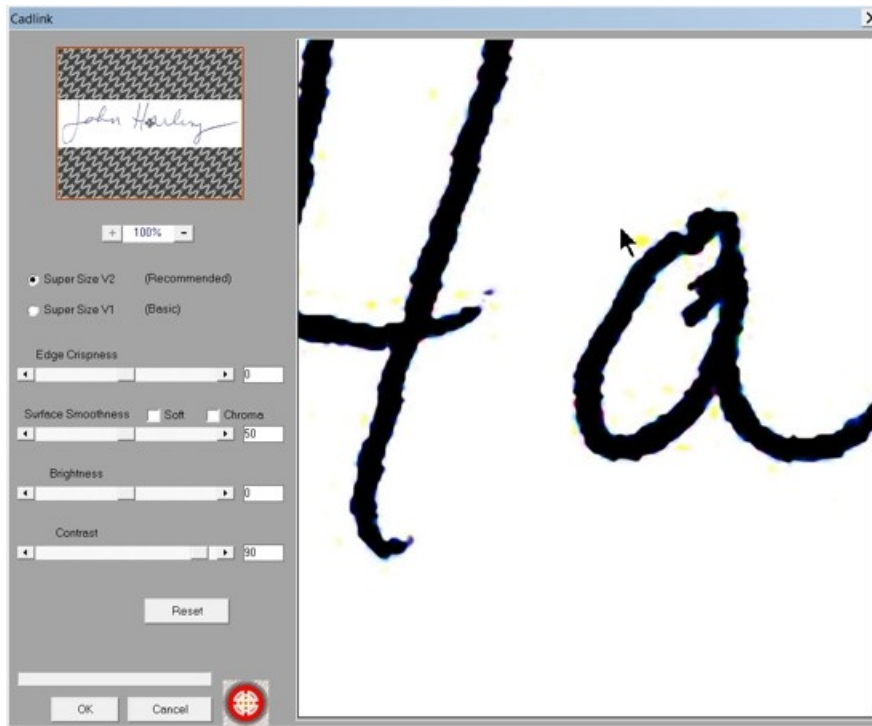


What needs to be accomplished with this Wizard is to change the pixels making up the signature more defined and darker. The background (white in this case) should not be affected, or areas of the background will be vectorized, which is not desirable. In this example, the only setting that was changed was the Contrast, which was changed from 0 to +70. Slide the contrast adjustment to the right to darken the signature pixels as much as possible. If the background starts becoming visible, reduce the contrast so that if there are areas of the background that show, they are very light in color.

NOTE - This entire procedure would be eliminated if the signature was written in black ink with a felt tip pen.



Below is an example of too much contrast. Contrast was set to +90 and the background is clearly visible as yellow spots. (See area below the mouse pointer). Although these spots are seen in the image above (adjusted to +70), they are fairly light and will be eliminated in the next step.

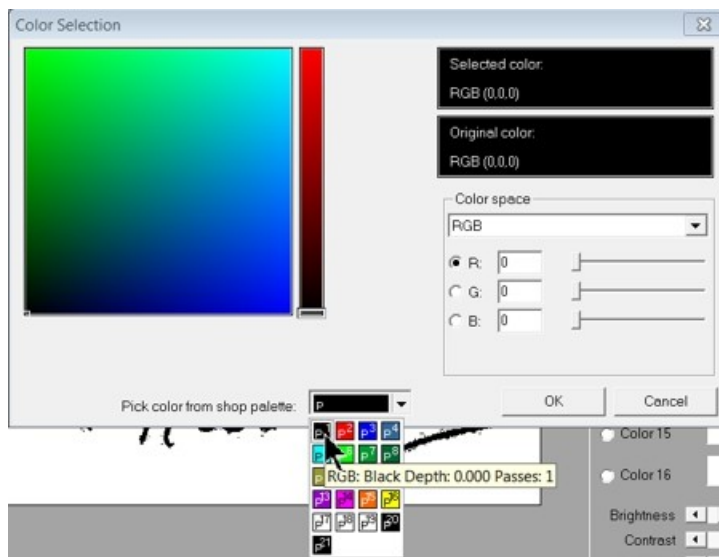


After adjusting the contrast to +70, select OK. The next Wizard window will appear. In this window, specific colors can be chosen to highlight. In this example, black is the only color we wish to use. At the top of this window, a black color swatch is displayed with an adjustment for Tolerance to the right.

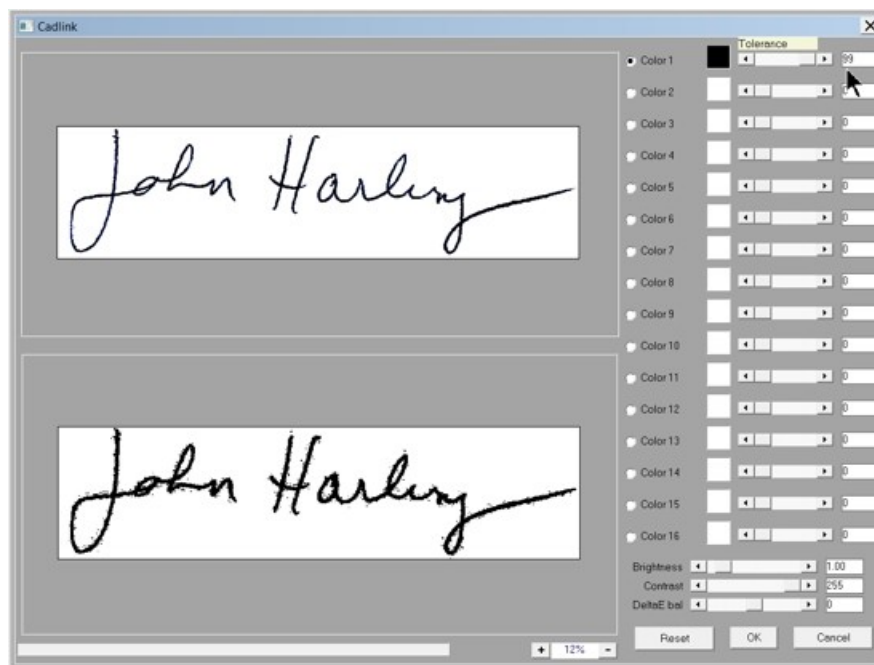
If the color swatch is not black, click on the color swatch.



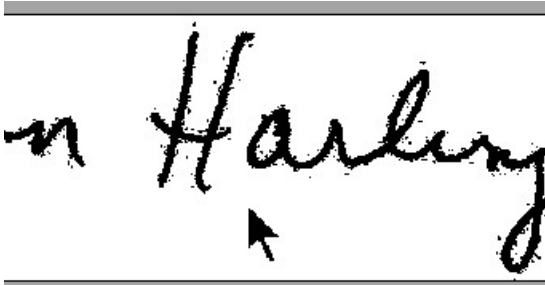
The Color Selection window will appear. Click on the Down Arrow next to Pick color from shop palette: and select the black color swatch (P1), then click on OK.



Adjust the Tolerance as high as possible without going to 100. In the below picture, Tolerance was increased to 99. Speckles will likely appear around the image at this point.



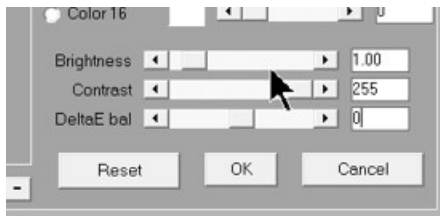
Example of speckles surrounding image.



Reduce the Tolerance until these speckles are not visible. In this example, the Tolerance was reduced to 83 in this example. The picture below shows that the speckles have been removed.



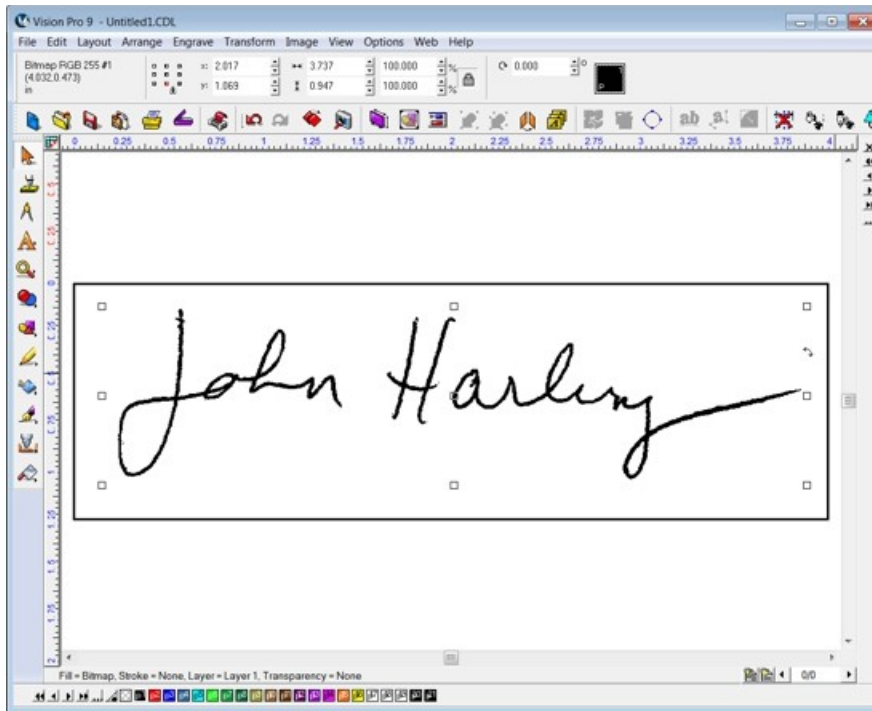
Note that the master brightness, contrast and DeltaE settings at the bottom right of the window have not been adjusted. Select OK to finish the Wizard.



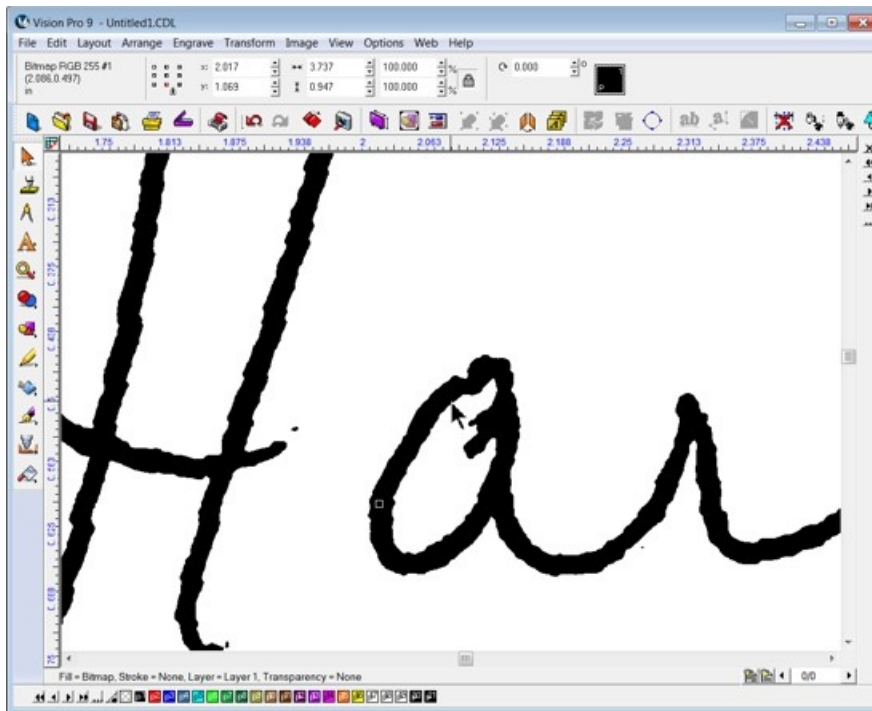
The Vectoize Wizard will inform you that you are now ready to vectorize the image. Select OK to proceed.



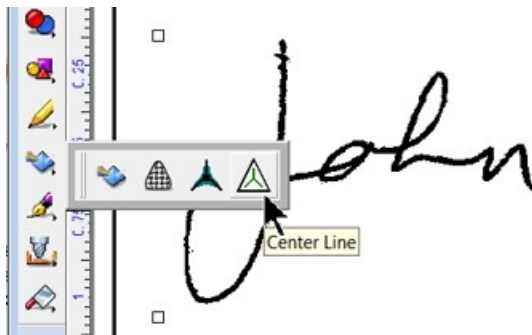
The transformed image will now appear in the Vision 9 Pro window.



Note that it is completely black at this point.



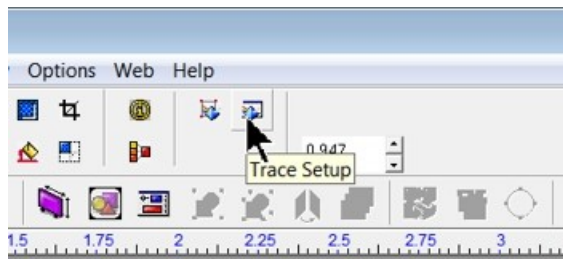
Select the Center Line tool from the Accuscan icon on the left toolbar.



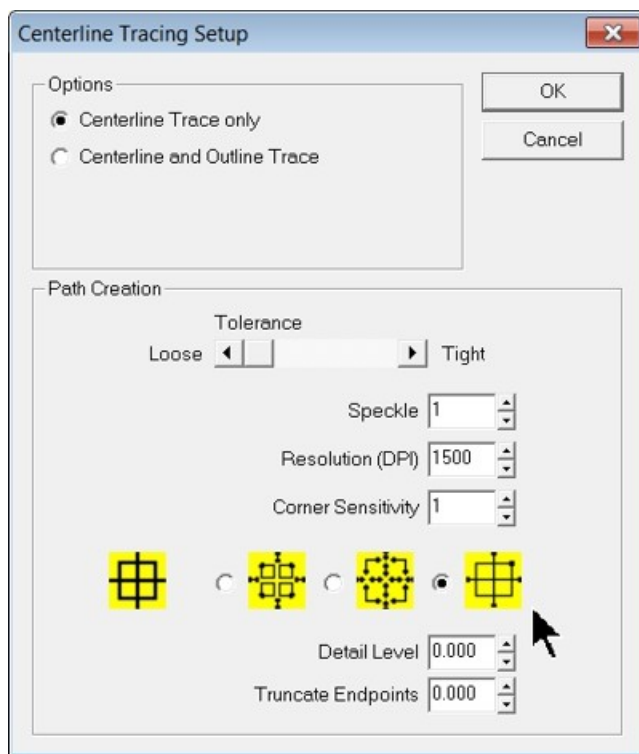
Marquee select the signature (click, hold and drag a box around the signature).



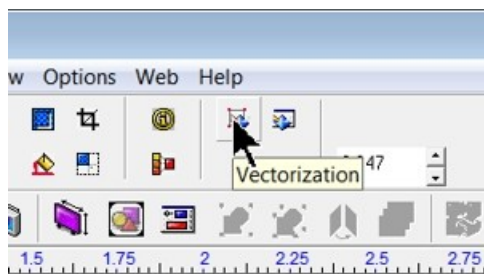
Open the Trace Setup window by selecting the Trace Setup icon on the top toolbar.



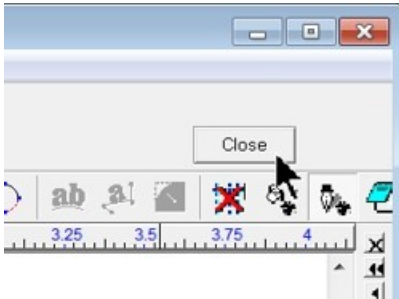
Duplicate the settings of this example; Select Centerline Trace only, set Tolerance to Loose, Speckle to 1, Resolution to 1500, Corner Sensitivity to 1. select the large pixel centering option (to the left of the mouse pointer in the picture below), Detail Level 0.000 and Truncate Endpoints 0.000, then select OK.



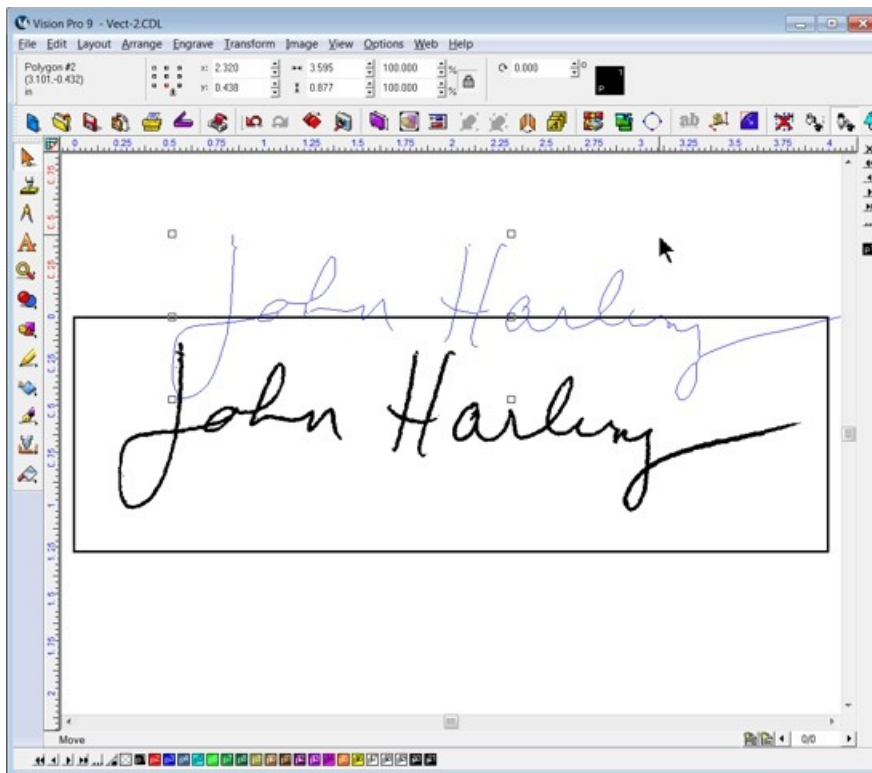
Select the Vectorization icon on the top toolbar.



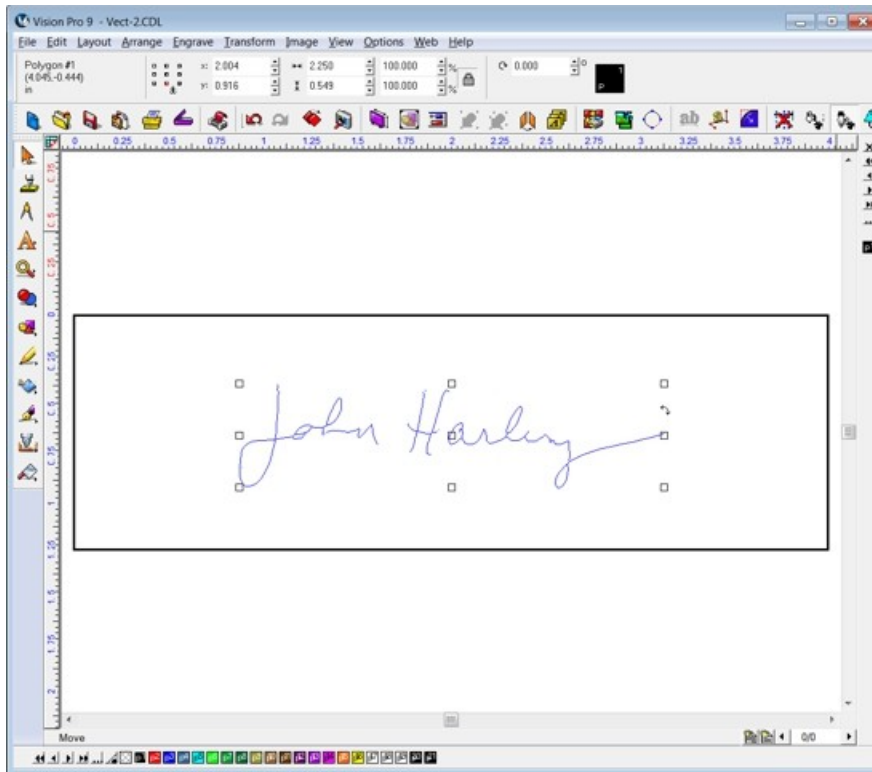
Then, select Close from the top toolbar.



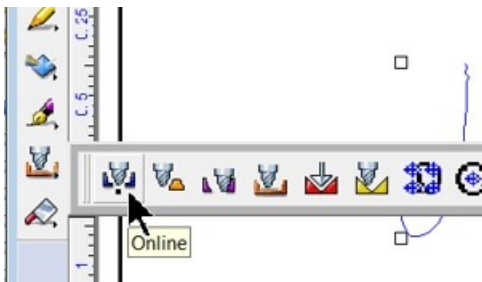
The centerline vector will be created and by default, the vector will be selected. Move the vectorized image away from the original image to view the results. It is common for the image to look slightly rough. This is acceptable and when the image is reduced to normal size and engraved, the image will smooth out considerably.



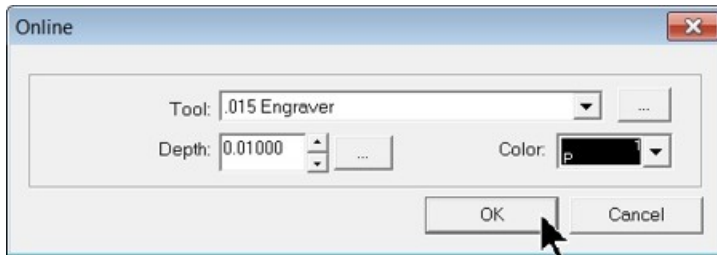
To better view a representation of the engraved product, delete the original image and center the vector image in the plate. Reduce the size of the image to represent an actual signature. In this case, the image was resized to 2.25 inches wide.



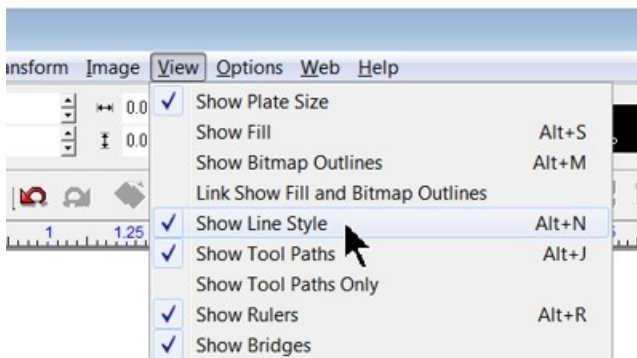
Apply an Online Tool Path. Select the Tool Path Tools, then the Online tool from the left toolbar.



Set the Tool and Depth setting to the cutter you are going to use and the depth you wish to engrave the item. Choose the color for the tool path. In this example, a .015 Engraver was selected as the tool and the depth was set to 0.010 inches. Then select OK.



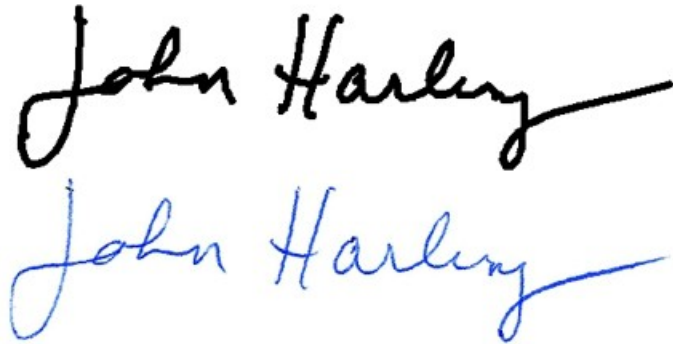
Make sure that Show Line Style is selected in the View command.



The image now represents what the engraved signature would look like on your material.

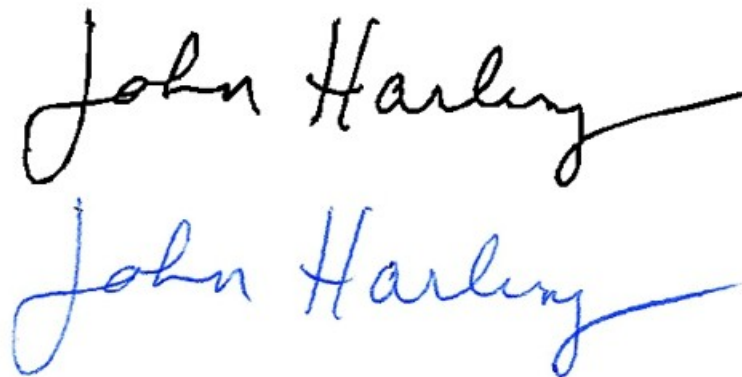


The picture below shows a comparison of the vectorized image (black) to the original scanned signature (blue). The line thickness of the vectorized image could be reduced by either using a smaller diameter cutter, or reducing the depth of engraving.



The image shows two versions of the signature "John Harley". The top version is a vectorized image in black, with thick, uniform lines. The bottom version is the original scanned signature in blue, showing natural line thickness variations and a more fluid, cursive style.

The below image is a comparison of the same vector image and the original, except that the tool path was recreated using a 0.010 Engraver as the tool and depth setting of 0.005 inches.

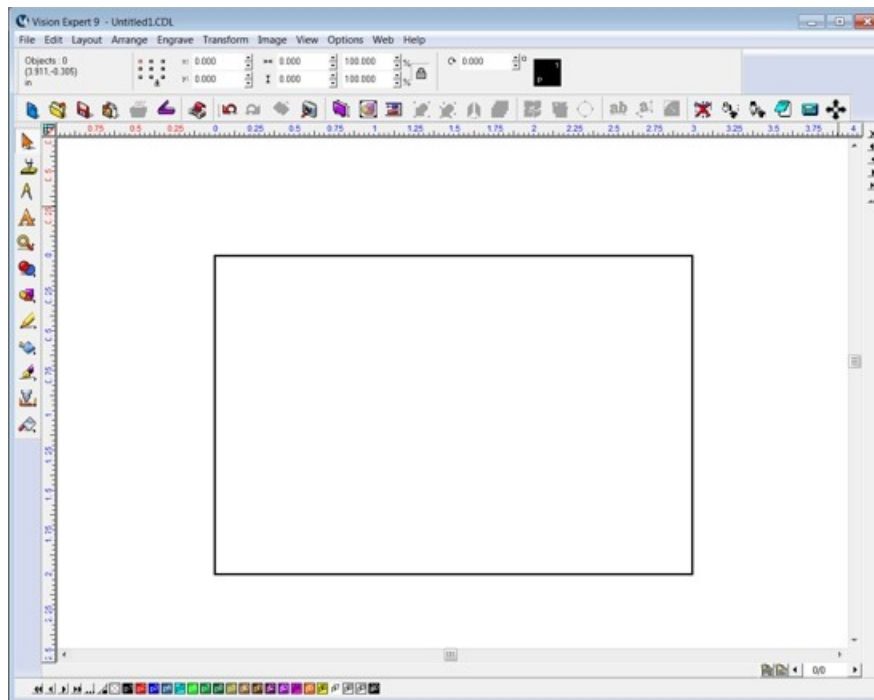


The image shows two versions of the signature "John Harley". The top version is a vectorized image in black, with thick, uniform lines. The bottom version is the original scanned signature in blue, showing natural line thickness variations and a more fluid, cursive style.

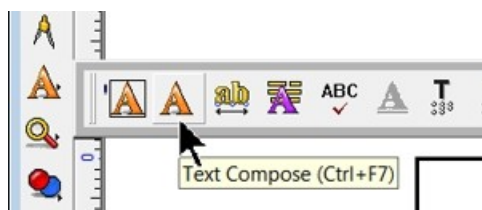
10 Creating Multiples and Serialization in Vision 9 Expert and Pro

Vision Expert and Vision Pro both have the same Multiples feature, which includes the ability to create serial numbers and lay them out in a specific array. This section will demonstrate how the user can set up the software to create multiple jobs with multiple items and include the creation of serial numbers.

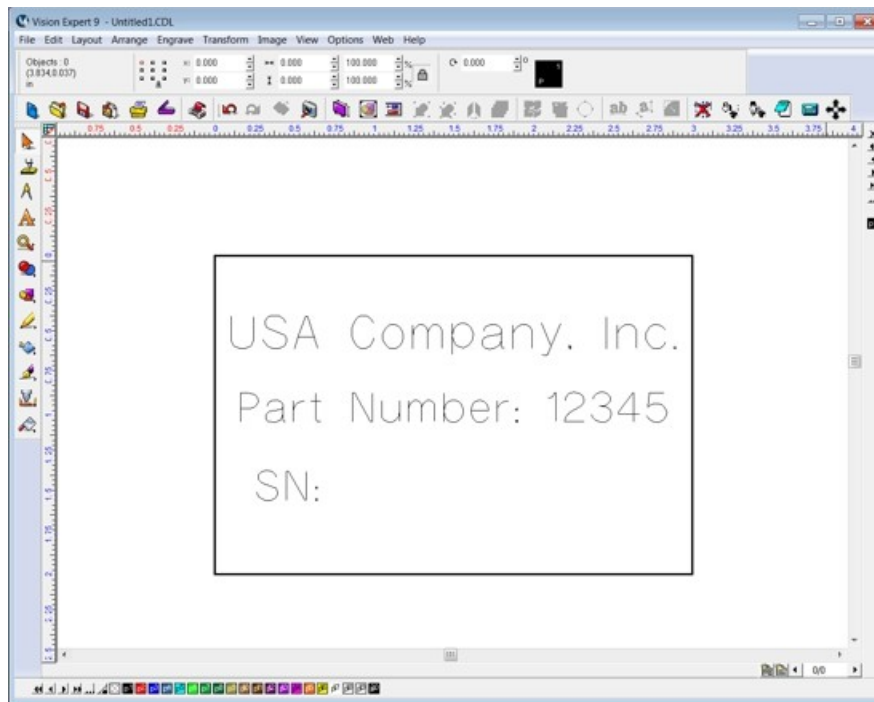
To begin, a new plate is created in Vision 9. In this example, the plate size used is 3 x 2 inches. Plate size should provide just enough space for the text of graphics to be engraved on ONE item.



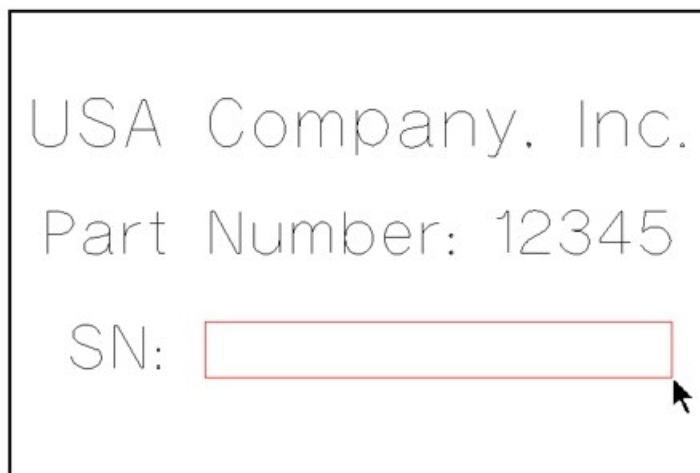
Three lines of text will be added individually using the Text Compose tool.



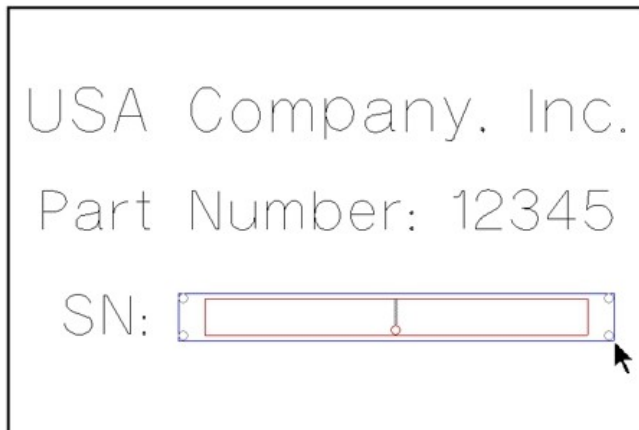
The text added below will be fixed text and remain the same for all items engraved.



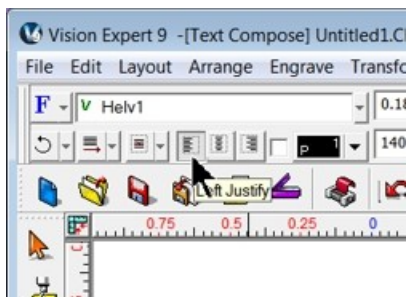
A 4th line of text is added using the same Text Compose tool, but instead of clicking inside the plate to start the text, a frame was drawn by clicking, holding and dragging in order to constrain the variable text to a specific area.



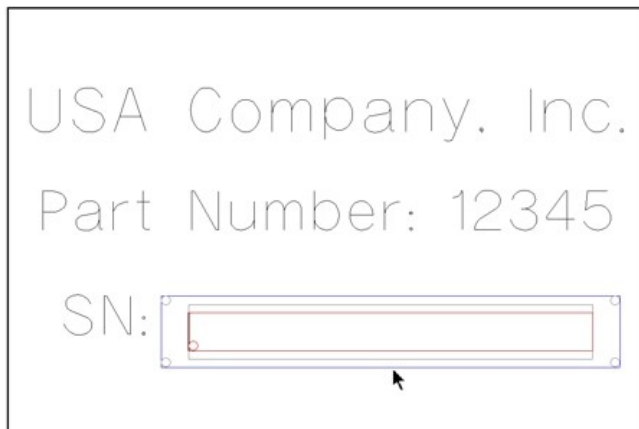
When the mouse button is released, a frame text area is created.



In order to make the text always start at the left side of the frame, the Left Justify option was selected on the top toolbar.



The frame is then modified to produce the same font and size as the text above (or any other size and font desired for the variable text). Set the font and height in the top toolbar, then drag the BLUE frame outline down until there are two visible RED frames inside the blue frame. These two red frames consist of an inner frame showing the area where the text will be constrained and an outer frame showing the allowable text height and width. Note that the outer red frame (and blue frame) do not allow text to exceed the plate frame. If the serial numbers are such that there are too many characters to fit within the inner red frame, the text will be automatically compressed by default. For more information regarding text compression options, search for Text Frame Properties in the Help section available on the top toolbar.



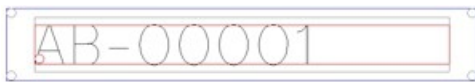
If the outer red frame is dragged up, as shown below, the inner red frame will match the height of the outer red frame. If this happens, the text will be reduced in size to fit.



When the outer red frame is larger than the inner red frame, the inner red frame will allow the full height of the text height specified on the top toolbar to be retained. This is important, because we want to allow the text to be created at the height specified and not reduced in size.



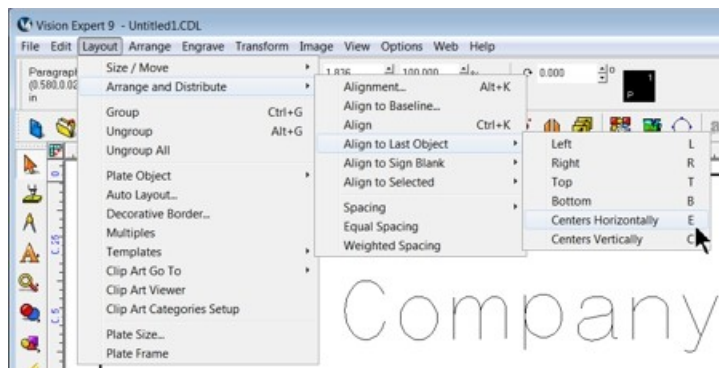
Text to be serialized is entered into this text frame. The number entered can be any number. If alpha characters are required, such as ABC123, there are two options; one is to make two text boxes and create the Alpha characters as fixed text, the other option is to enter them all on one text frame and when creating the serial numbers choose only the numbers to change. In this example, text was entered as AB-00001.



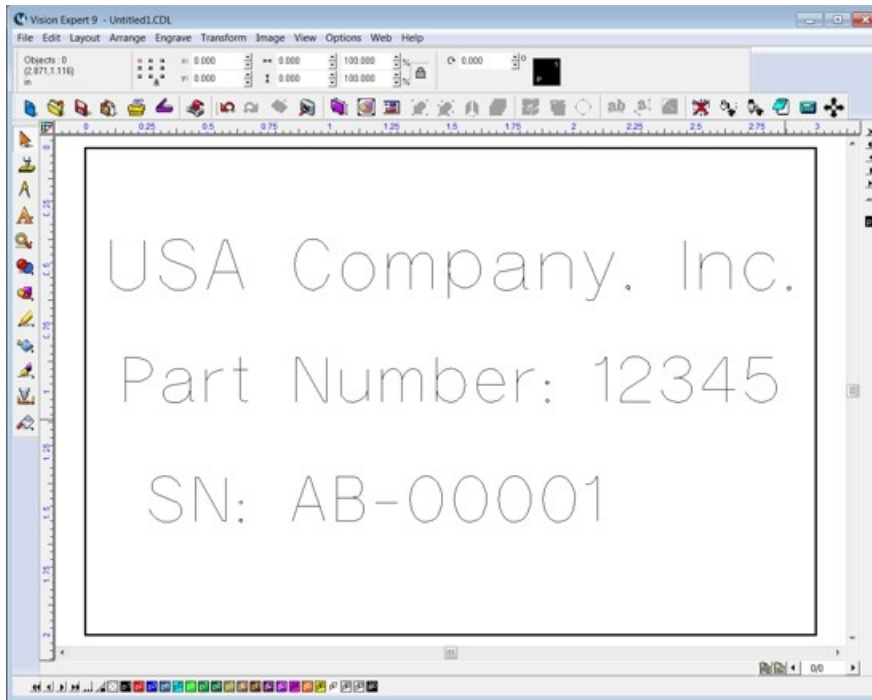
Text mode is then exited by clicking outside the text frame.



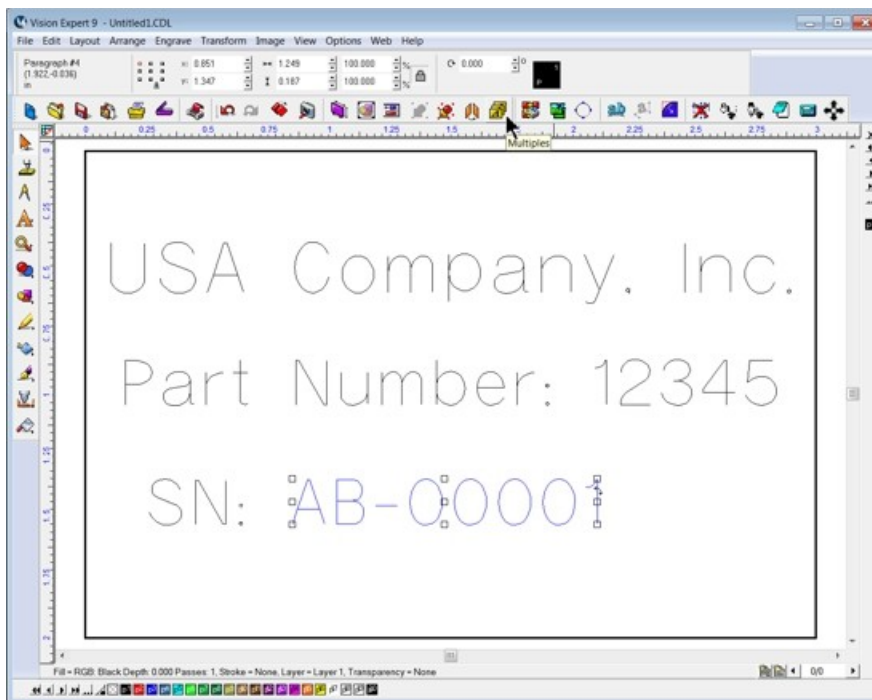
To align the serial number vertically to the text "SN:", select the serial number FIRST, then hold the Shift key on your keyboard down and click on the "SN:" text. This will set the align tool to align the first object selected to the last object selected. The shortcut to align objects on the same horizontal plane is simply pressing the letter E on your keyboard, or you can select Layout > Arrange and Distribute > Align to Last Object > Centers Horizontally from the top toolbar. Note that the shortcuts are listed to the right of each command in the top menu bar. (Hint - You can customize shortcuts to any command by selecting Options > Customize Shortcuts... from the top menu bar).

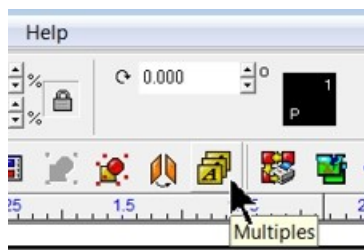


After aligning the text, the plate is as shown below.

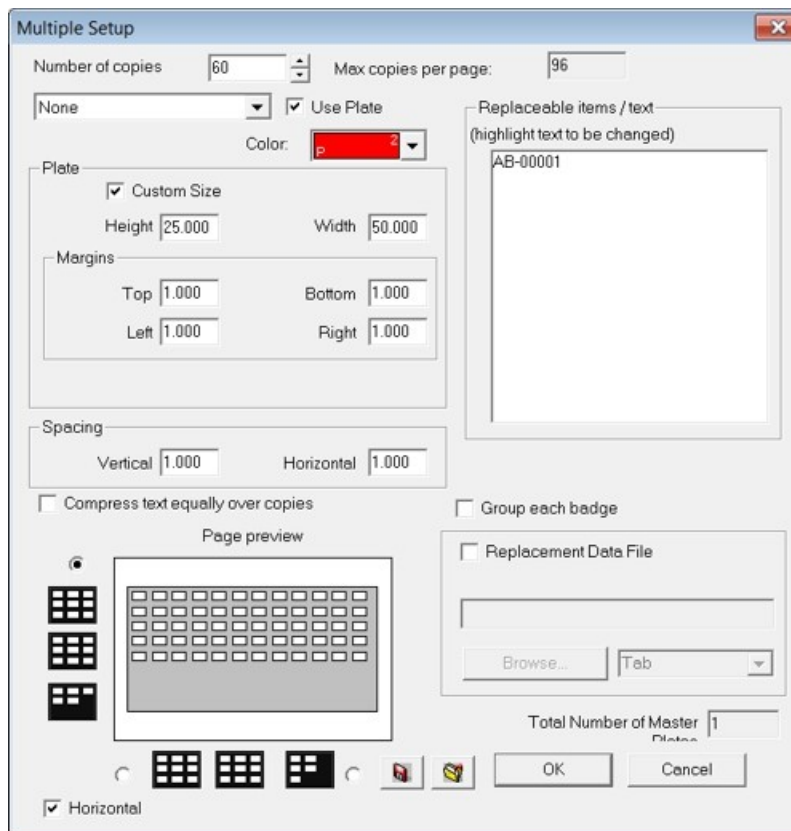


To begin creating multiple items, select the text to be serialized and click on the Multiple icon on the top toolbar.

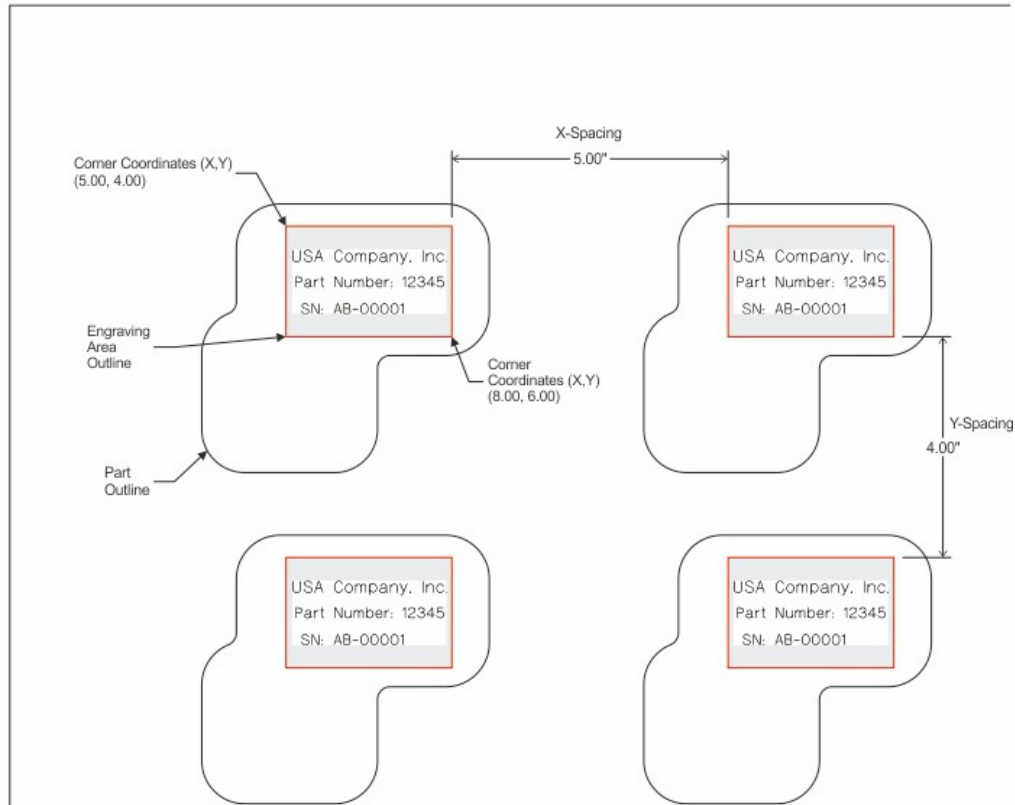




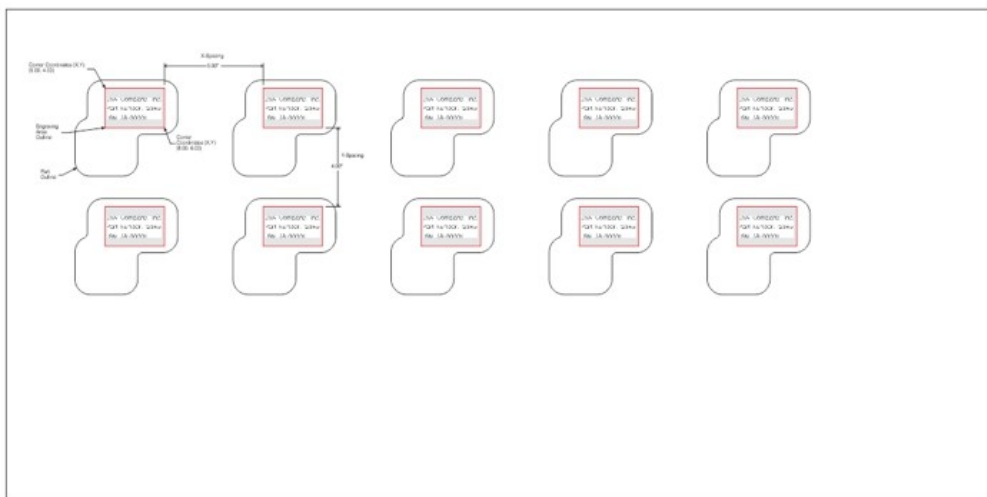
The Multiples window will appear. In this window, the user can select the number of copies of the image to process, as well as their location and spacing. This is also where the text designated for serialization is chosen. Note that the only text listed in the Replaceable items/text field is the variable text. This is because we only selected that line of text before clicking on the Multiples icon. If all text was selected, all would be shown as Replaceable items/text.



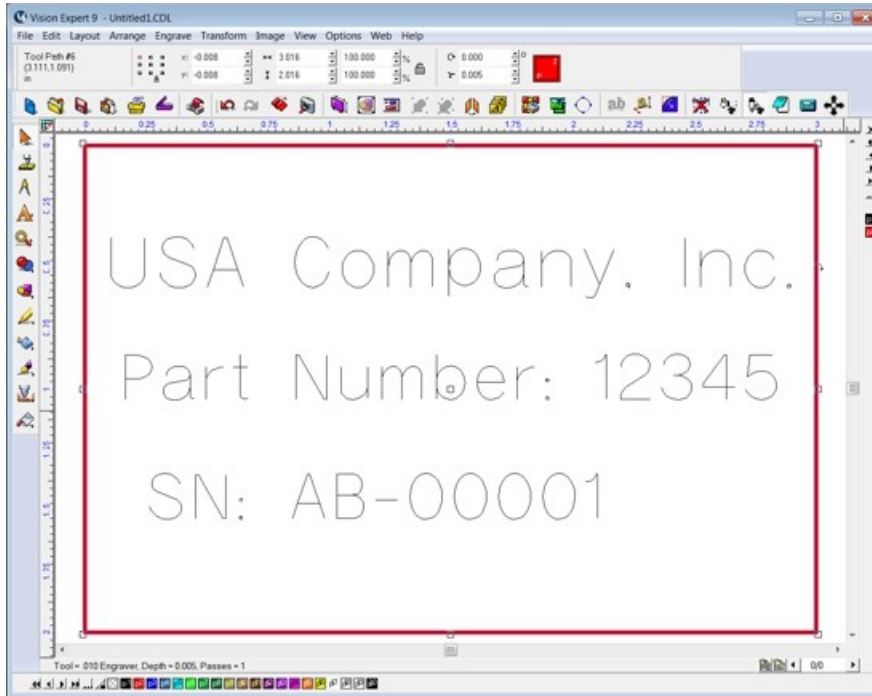
Before moving forward, we need to define where are parts will be located on the engraving table and the number of items we will be engraving. The following diagram shows an array of parts placed in a template/fixture and their locations/spacing. The X spacing of the parts is 5.00 inches and the Y spacing is 4.00 inches. Cancel and close the Multiples window at this time.



The array of parts is 5 columns and 2 rows for a total of 10 parts per job. The table is represented as the outside outline in the below picture.

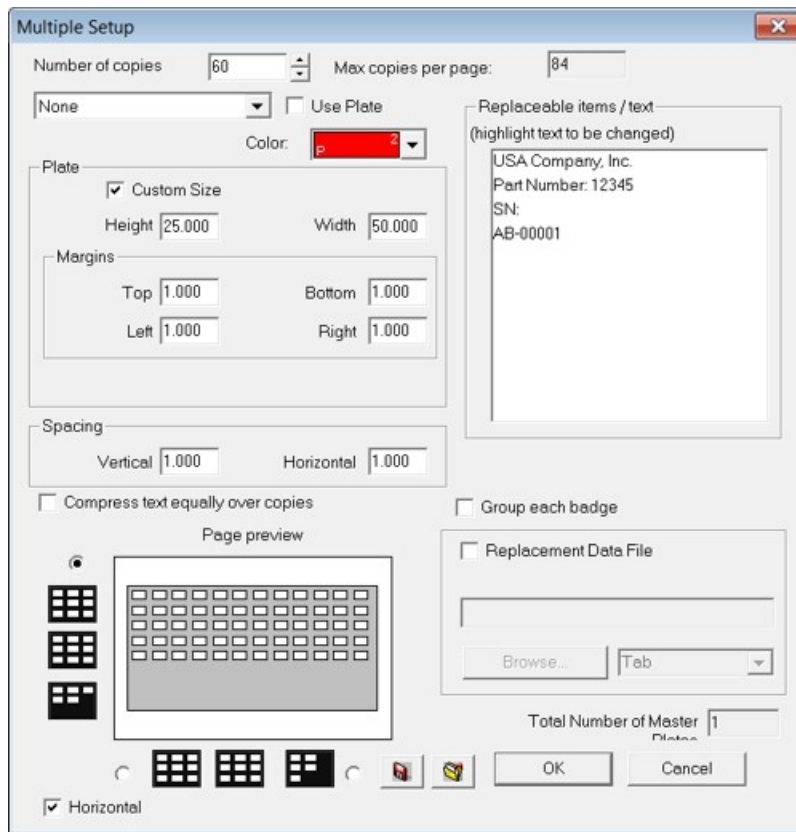


Before proceeding, it is important to note that in the Multiples window, **the spacing between items will be based NOT on the plate size, but on the size of the graphics.** To properly locate the text within the engraving area on our parts, we will add a rectangle that matches the plate size as shown below (which also represents the area on the part where we want to engrave. (To better illustrate the rectangle, the color was set to red and the line width was widened in the picture below. When drawing the rectangle, change the color to red (by left, then right clicking on the red color swatch on the bottom of the screen) so we can differentiate it from the black text that will be engraved, size it to 3" x 2" and center it to the plate using the Layout > Arrange and Distribute > Align to Sign Blank > Center)



NOTE: At this time, it is recommended to SAVE this file. Once multiples have been created, the file will be modified and if the file is saved after the multiples have been created, you won't be able to use the file to create additional jobs with different serial numbers. SAVE the file and use it as a template. (When opening the file to create the next batch of serial numbers, use File > Save As and re-save the file with a new name. Example - The file is saved at this point with the file name MULT1-Template.cdl. When you open this file to create a new set of serial numbers, first, save the file as MULT1-SN00015-00044.cdl. This will help keep track of the serial numbers already created.

To start creating multiples, select ALL graphics and click again on the Multiples icon. The Multiples window will again appear.



We will now set the spacing and number of items per job. Set the number of copies to 30, set the Margins to 0.00 and set the spacing to match our array - enter a vertical spacing of 4.00 and a horizontal spacing of 5.00. Now, reduce the Plate size in the Plate portion of this window to only allow 5 columns and two rows. In this example, the size was reduced to 12 inches height and 38 inches width. This size **MUST** be smaller than the engraving table size. This is critical in order for each job to only produce 10 copies, which matches our template/fixture. The Multiples window should appear as shown below. Note that in the Page preview, the parts are located starting in the upper left corner of the page and there are 2 rows, 5 columns.

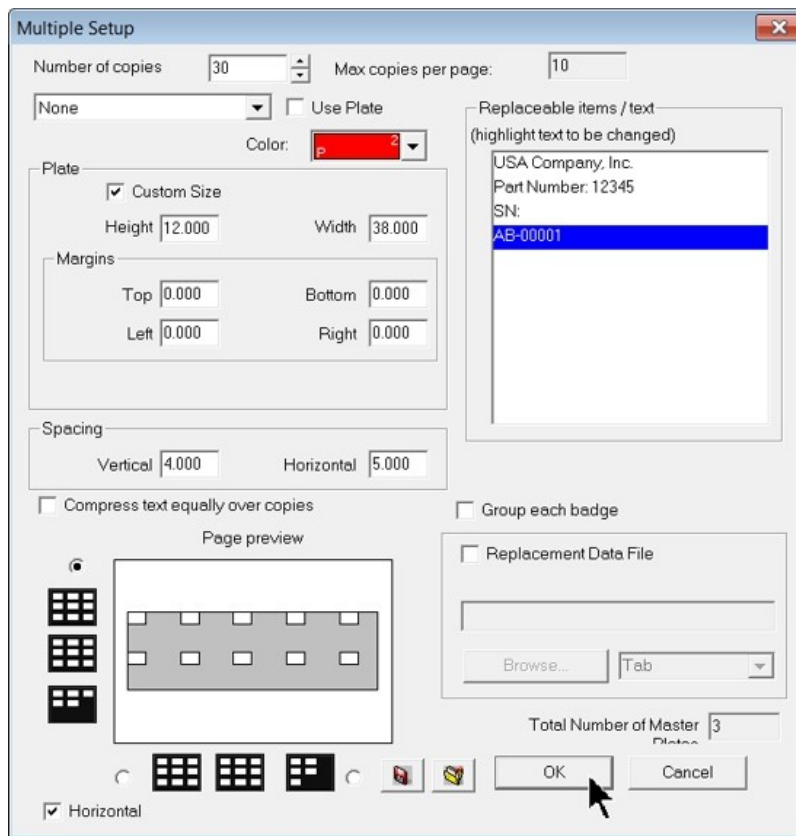
The screenshot shows the "Multiple Setup" dialog box with the following settings:

- Number of copies: 30
- Max copies per page: 10
- Plate: Custom Size, Height: 12.000, Width: 38.000
- Margins: Top: 0.000, Bottom: 0.000, Left: 0.000, Right: 0.000
- Spacing: Vertical: 4.000, Horizontal: 5.000
- Compress text equally over copies: ☐
- Group each badge: ☐
- Replacement Data File: ☐
- Page preview: Shows a 2x5 grid of parts.
- Horizontal: ☒
- OK and Cancel buttons are present.

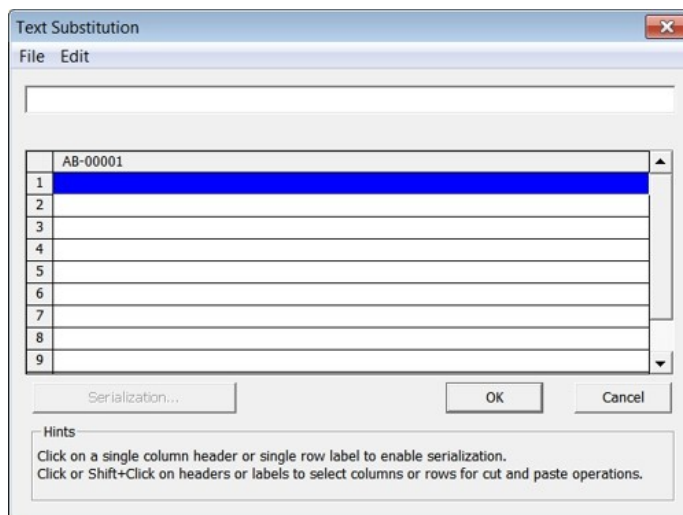
The "Replaceable items / text" section contains the following text:

```
USA Company, Inc.  
Part Number: 12345  
SN:  
AB-00001
```

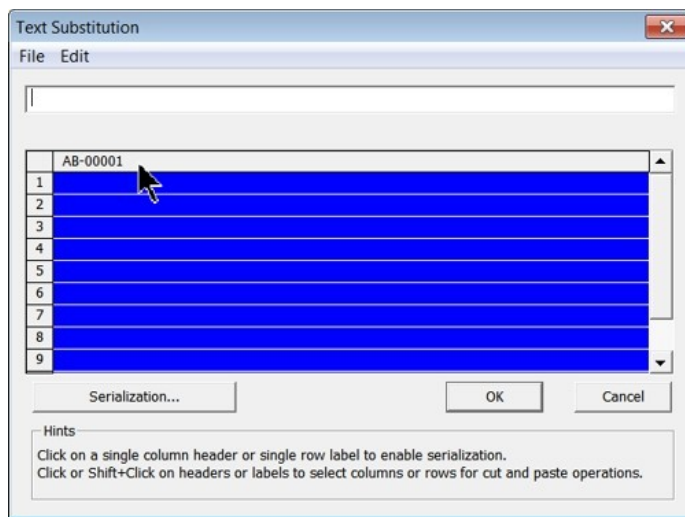
To assign serial numbers to the variable text, first select the variable text (it will highlight in blue) in the Replaceable items/text area, then click on OK at the bottom of the page.



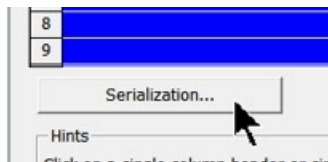
The Text Substitution window will appear. Note that there are no entries at this time and the only column is headed with the text of our variable text selection.



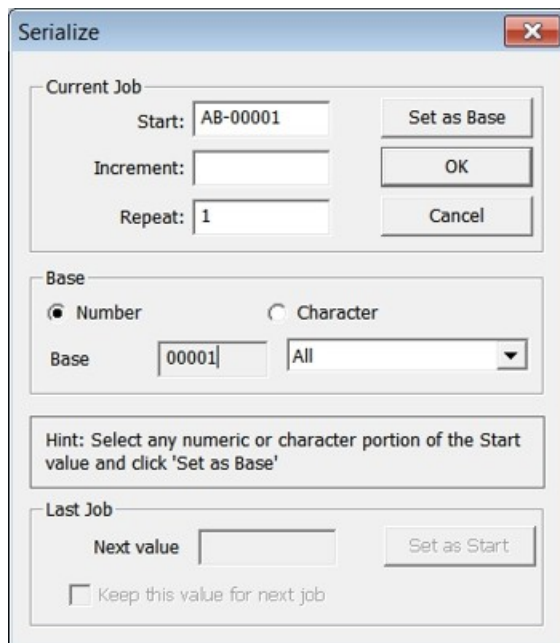
Click on the column header (where the variable text is displayed). All rows will now be highlighted in blue and the Serialization box will be activated.



Click on the Serialization box.



The Serialize window will appear.



We want to create serial numbers beginning with 00015 and ending with 00044. First, replace the serial number in the Start field with the first serial number we want to produce. In this example, type in 00015. Then, select only the number portion of the variable text in the in the Start field as shown and click on Set as Base.

Serialize

Current Job

Start: AB-00015

Increment:

Repeat: 1

Set as Base

OK

Cancel

Base

☒ Number ☐ Character

Base 00001 All

Hint: Select any numeric or character portion of the Start value and click 'Set as Base'

Last Job

Next value

Set as Start

☐ Keep this value for next job

Since we only want to produce 1 of each serial number, set the Repeat field to 1. (If we wanted to create more than one item with the same serial number, we could enter the number of items we want to produce of each serial number in the Repeat field. Entering 3, would produce 3 items of the same serial number). We also want the serial number to increment by 1 number. Enter 1 in the Increment field. Note that in the Base section, the Base is set to 00015, which is our first serial number. The Number (not character) selection is chosen and the All selection (default) is chosen. Once these changes have been made, select OK.

Serialize

Current Job

Start: AB-00015

Increment: 1

Repeat: 1

Set as Base

OK

Cancel

Base

☒ Number ☐ Character

Base 00015 All

Hint: Select any numeric or character portion of the Start value and click 'Set as Base'

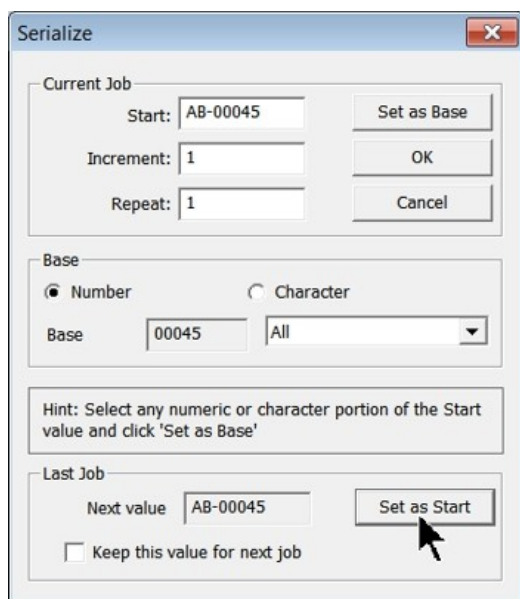
Last Job

Next value

Set as Start

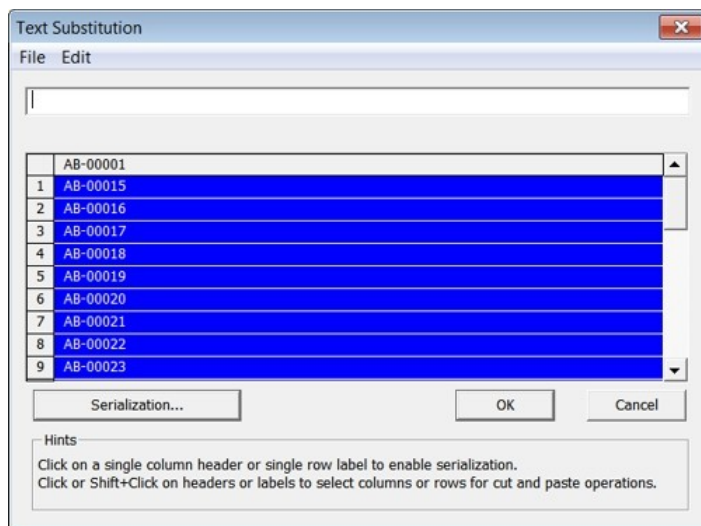
☐ Keep this value for next job

HINT - Vision 9 remembers the last set of serial numbers created and will allow you to begin the next set of serial numbers where you left off. Select Set as Start when producing the next set of serial numbers.



The 'Serialize' dialog box is shown. It has a title bar with a close button. The 'Current Job' section contains 'Start' (AB-00045), 'Increment' (1), and 'Repeat' (1). There are 'Set as Base', 'OK', and 'Cancel' buttons. The 'Base' section has radio buttons for 'Number' (selected) and 'Character', a 'Base' field (00045), and a dropdown menu (All). A hint box says: 'Hint: Select any numeric or character portion of the Start value and click 'Set as Base''. The 'Last Job' section has a 'Next value' field (AB-00045) and a 'Set as Start' button, which is being clicked by a mouse cursor. There is also a checkbox 'Keep this value for next job'.

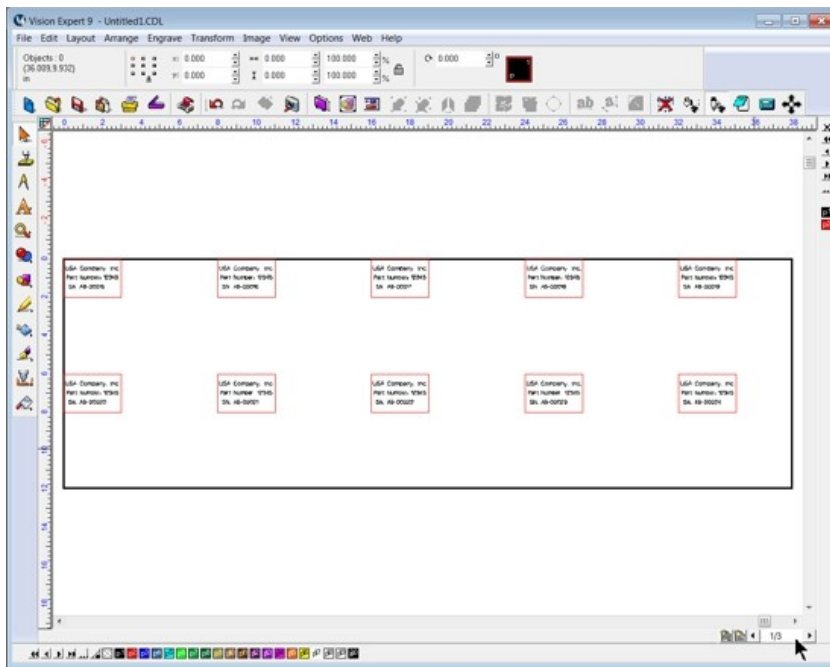
The Serialize window will now show the list of serial numbers we have created. The first number being 00015 and if you scroll down, you will see the last number created, 00044. Since this is what we want, select OK to create the job.



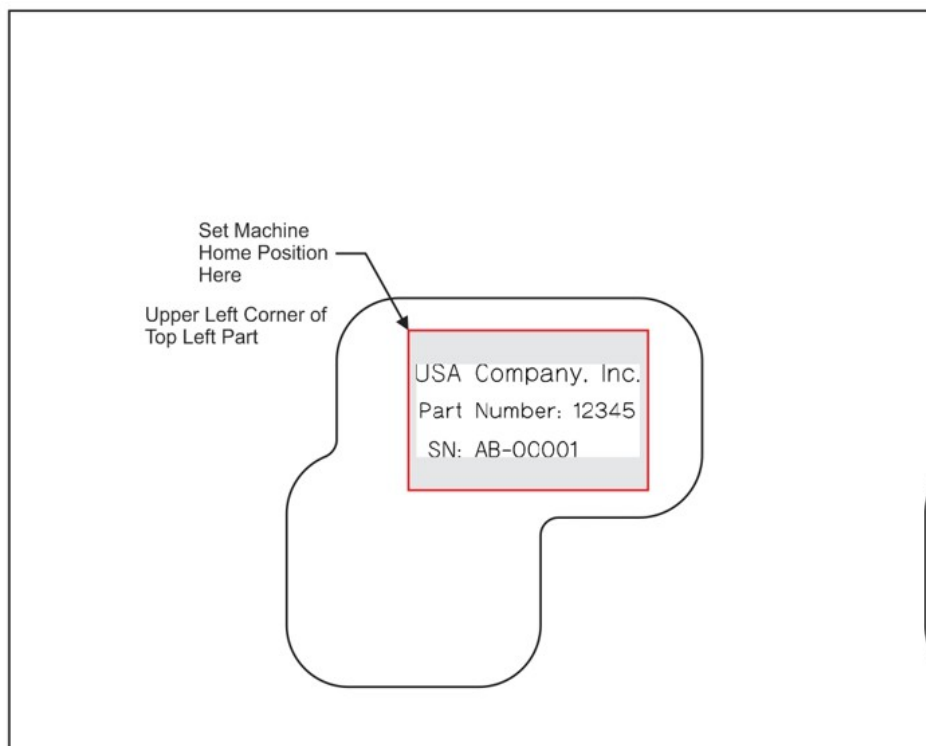
The 'Text Substitution' dialog box is shown. It has a title bar with a close button and a menu bar with 'File' and 'Edit'. There is a text input field at the top. Below it is a list box containing a table of serial numbers. The table has two columns: a row number and a serial number. The serial numbers range from AB-00001 to AB-00023. The rows are numbered 1 through 9. The 'Serialization...' button is highlighted. There are 'OK' and 'Cancel' buttons. A 'Hints' section at the bottom contains text: 'Click on a single column header or single row label to enable serialization. Click or Shift+Click on headers or labels to select columns or rows for cut and paste operations.'

	AB-00001
1	AB-00015
2	AB-00016
3	AB-00017
4	AB-00018
5	AB-00019
6	AB-00020
7	AB-00021
8	AB-00022
9	AB-00023

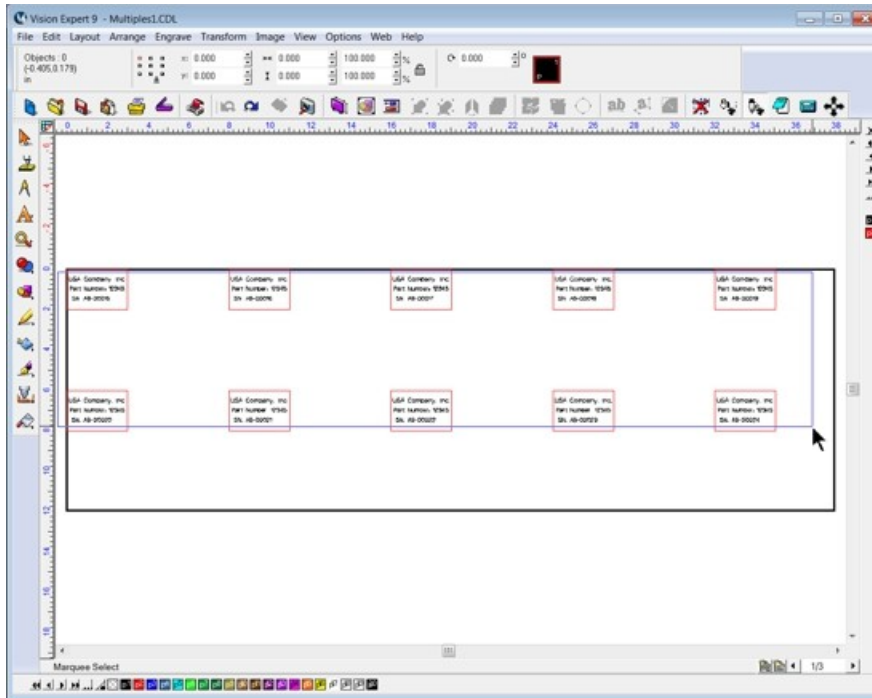
The job is then created. Note that since we are making 30 items, there are 3 pages to this job (see lower right corner of the below picture).



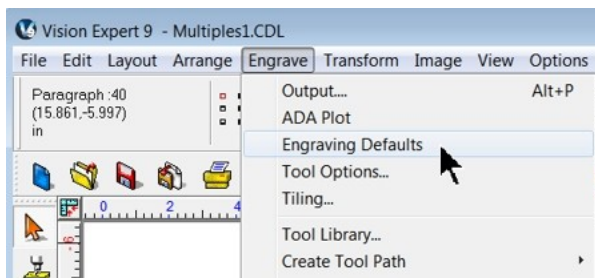
In order to properly locate this array of text, we now set the machine's home position to the upper left corner of the engraving area on the upper left part on our table.



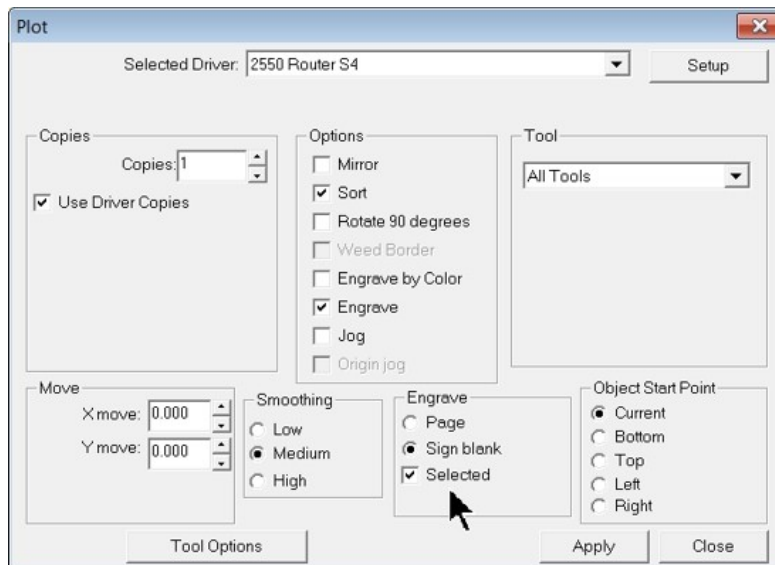
When sending this job to the machine, we only want to send the text. Select the text by dragging a box (marquee selecting) only the text as shown. Objects not completely inside the marquee selection box will not be selected. Hint - Since the only graphics we want to send are all in the color black, we could alternatively send the job to the machine using the Engrave by Color option. If this is done, keep in mind that if there are multiple pages of graphics (as in this example) 3 jobs will be sent to the engraver. The 2nd job is held in the printer queue until the first job is complete and is then sent to the machine. The 3rd job is also in the queue and will be sent to the machine after the 2nd job is complete.



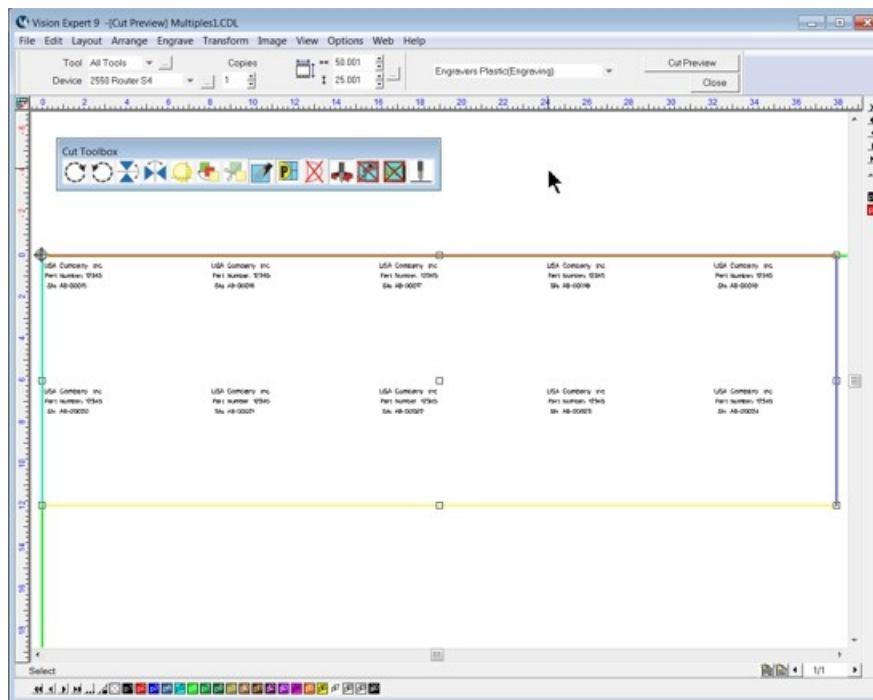
The selected objects will be then highlighted in blue. Make sure you have Vision 9 set to send only selected objects (if you are not sending the job using the Engrave by Color option), by first opening the Engraving Defaults (Engrave > Engraving Defaults from the top menu bar).



Then placing a check mark in the Selected option box near the bottom center of this window. Click on Apply, then Close to save this change.



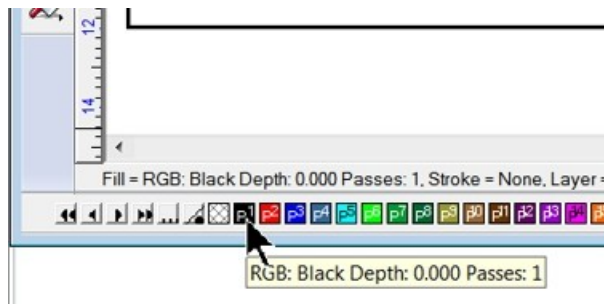
After selecting the Engrave icon from the left toolbar, the cut preview window is shown. Two important things to remember are: 1 - make sure only the text is showing in this window, and 2 - look at the bottom right corner of this screen to make sure that only one page is available (the page selection box should only show 1/1 if you are sending over only Selected objects). If your setup is correct, proceed with sending the job to the engraver.



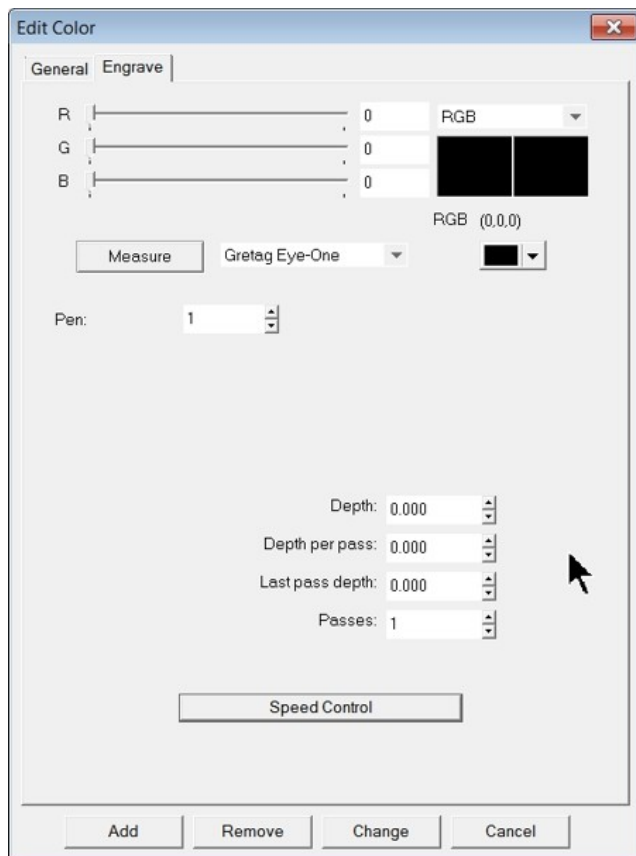
NOTE - The above procedure is appropriate for applications using the nose cone and proximity sensor. For applications where you have set the surface of the material and plan on setting the engraving depth via a tool path depth, follow the below procedure to set a specific engraving depth for a specific color.

Setting Engraving Depth for a Specific Color - For Online Engraving Only

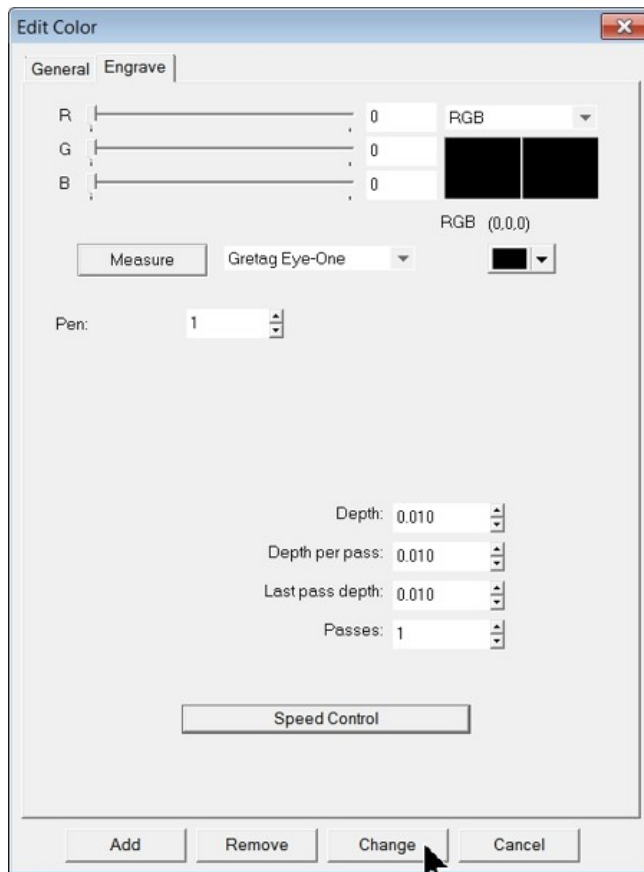
When sending graphics to the machine, it is possible to assign a depth to any color swatch, and therefore all graphics of that color on the screen. On the bottom color swatch bar, hover the mouse pointer over the black (P1) color swatch as shown. The Depth and Number of Passes assigned to this color are displayed.



To modify this setting, double click on the color swatch. This will open the Edit Color window.



Change the Depth (and if desired, the number of passes and depth per pass) to what is needed for your application, then select Change. In this example, a depth of 0.010 was entered and 1 pass will be used.



This will then set a temporary Depth and Number of Passes to all graphics of that particular color. Verify that the changes have been made by hovering over the color swatch again with the mouse pointer.



All jobs sent to the engraver will now utilize the temporary depth and number of passes for the black color. No tool paths need to be created. If the job is saved and re-opened later, the depth and number of passes are retained with the file.

Setting depth for specific colors will not affect jobs sent to the machine with the proximity sensor turned on and the default depth settings are not changed. The next new file created will use the standard depth setting of 0.000 for all colors.

