

FEBRUARY 16, 2023








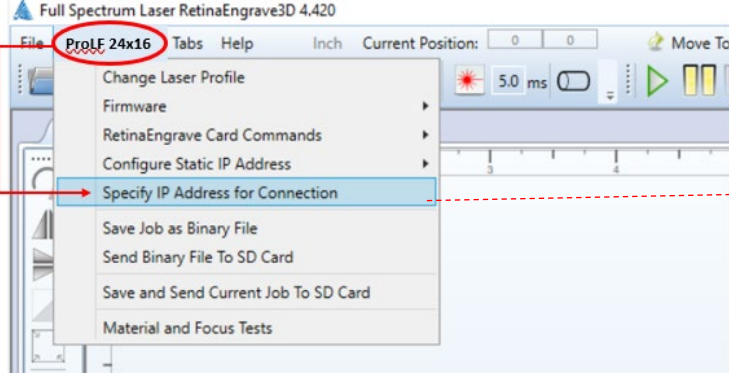

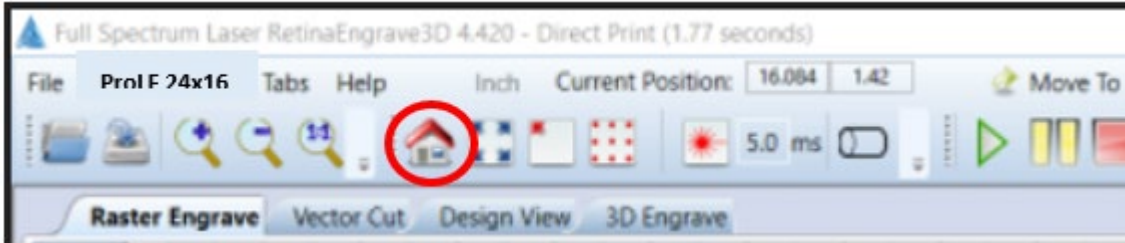
Full Spectrum

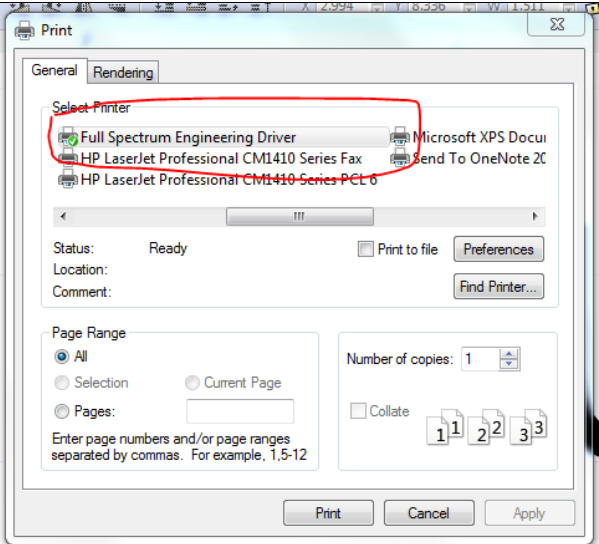

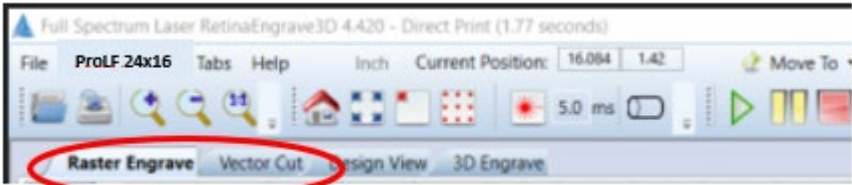
L A S E R

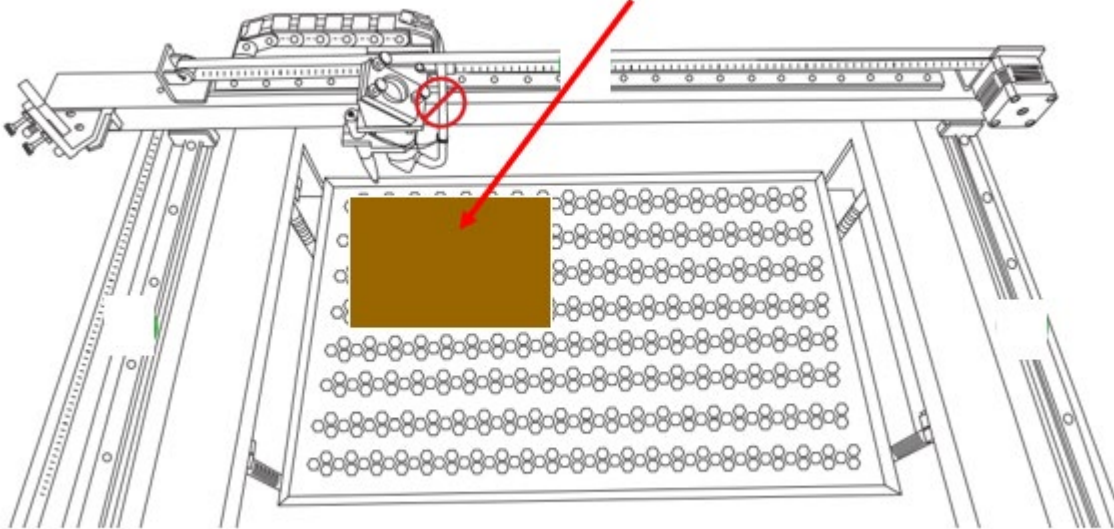
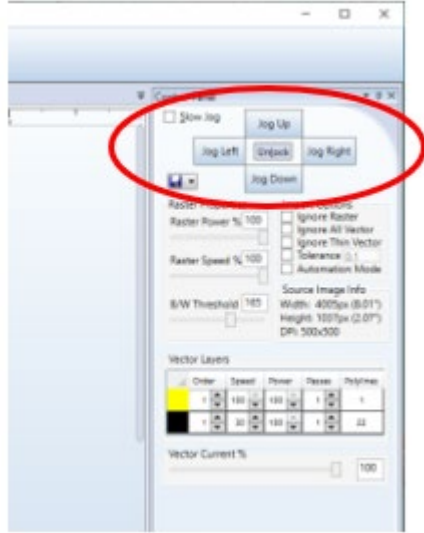
OPERATING FULL SPECTRUM LASER
STEP BY STEP: HOW TO ENGRAVE AND VECTOR CUT

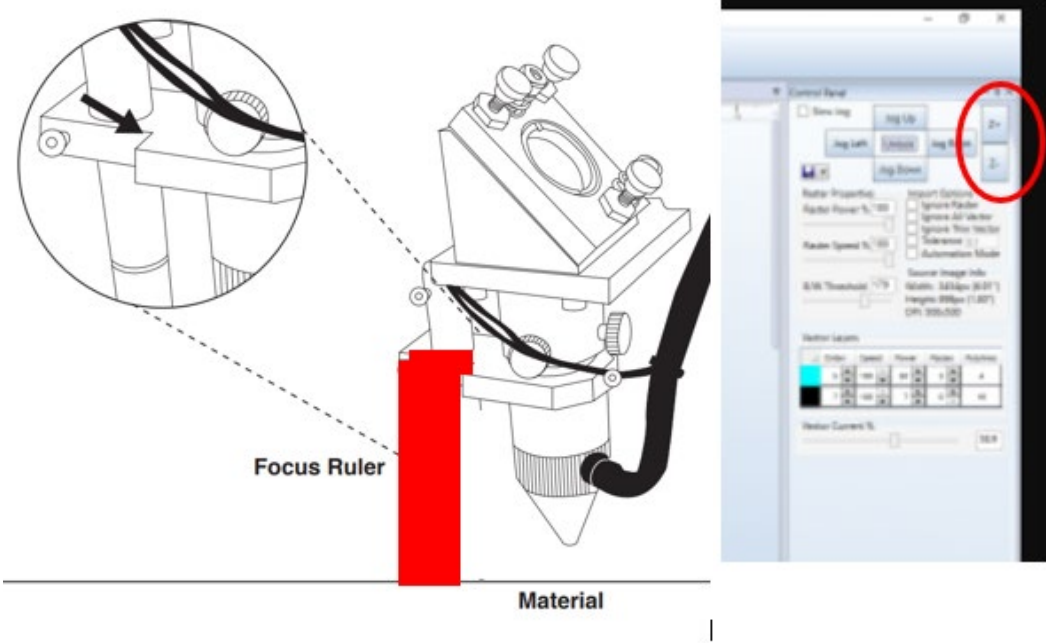
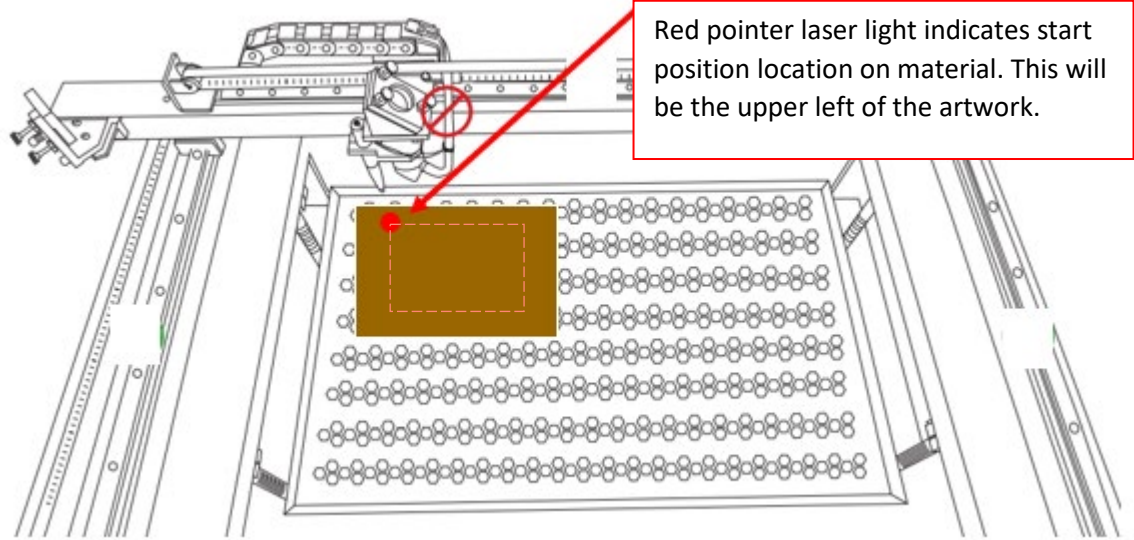
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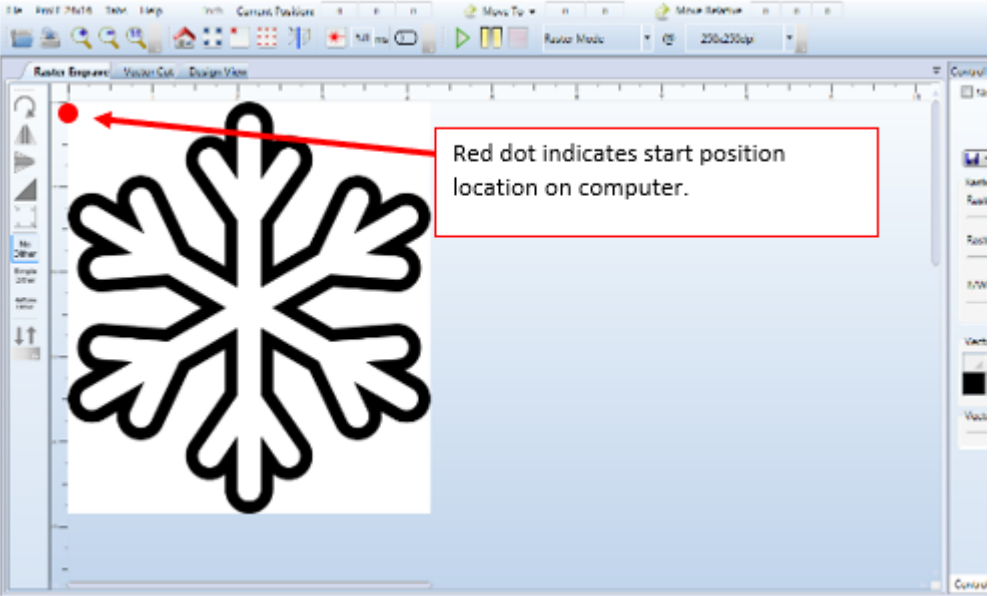
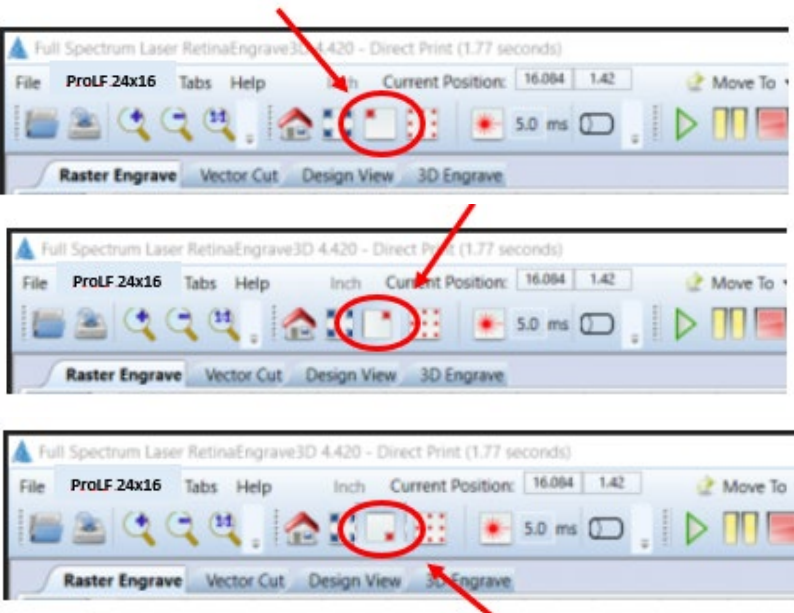
#	Step	Key Points	Why	Picture
1	Turn Laser Cutter on	<p>-There are three keys needed:</p> <ul style="list-style-type: none"> • Toolbox key • Main Power • Laser Key (in toolbox) 	<p>Use the main power key to turn on power.</p> <p>Use the laser key to turn on laser.</p>	
2	Turn on Air Filtration system	-Button is red when the system is off		
3	Check temperature on water chiller	If temperature is at 26 C or above, you will need to wait until it cools down.	Using the laser cutter when the temp is at or above 26 C can damage it.	
4	Open your design file on the computer	<p>-Double check file type</p> <p>-Make any changes as needed</p> <p>-Artwork should be sized to fit your material.</p>	You cannot effectively edit files once they are sent to the laser software.	

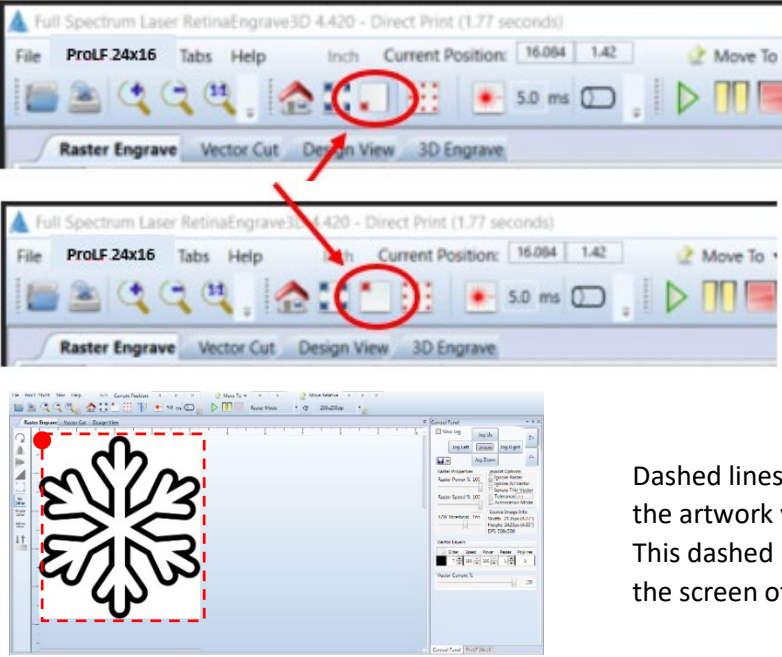
5	Open RetinaEngrave	-Should be located on the desktop	This program is what controls the laser cutter.	
6	Connect laser cutter to RetinaEngrave	<p>-ProLF 24x16 > Specify IP Address for Connection > Enter IP address shown on laser display panel</p> <p>-Once entered you should see 'Connected' in green in the bottom left corner of the program</p>	<p>Laser not booting up?</p> <p>Check to see if the emergency stop is engaged.</p>	 
7	Home the laser	Press the button that looks like a house on computer screen.	So the laser will know where the head is in relation to the home location.	

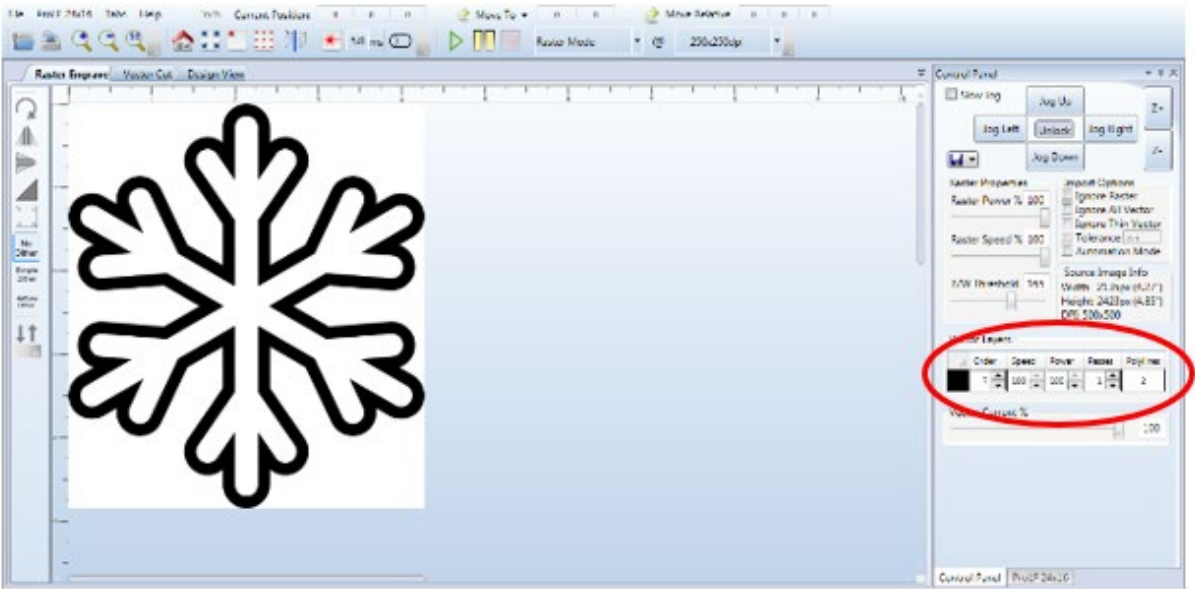
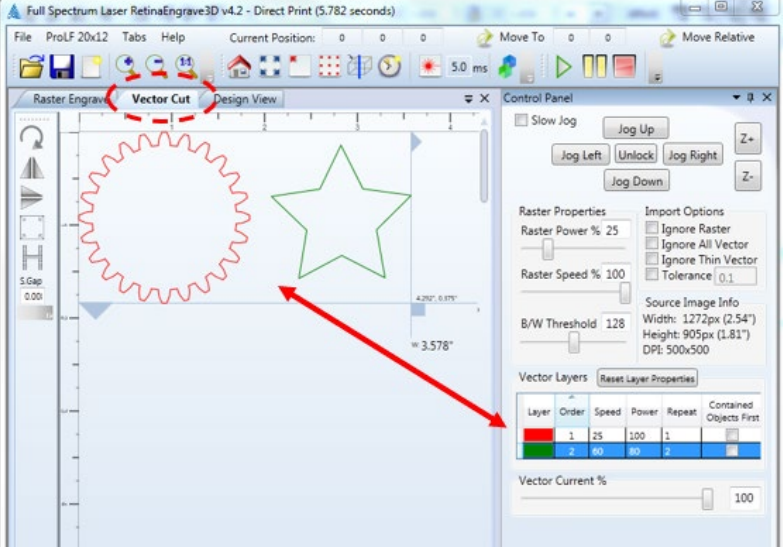
8	Send design to laser cutter	<p>-In your image viewing software select 'Print' and one of the printer options will be 'Full Spectrum Engineering Driver'</p> <p>-Your image will import to the RetinaEngrave software</p> <p>Select 'Actual Size' on print screen under Paper Size and Handling</p>	<p>This is how you put your artwork to be cut or engraved into the Retina Engrave software that controls the Full Spectrum laser cutter.</p>	
9	Make changes to design in RetinaEngrave	<p>-You can rotate, mirror image, and invert colors</p>	<p>You may find that the more transformations made to the artwork may cause issues.</p> <p>We recommend making edits in the design software.</p>	
10	Select tab at top for Raster Engrave or Vector Cut	<p>Engrave: applies artwork to the surface of material.</p> <p>Vector: used to cut material or</p>	<p>Rastering is a process where the laser sweeps back and forth over the material firing the laser</p>	

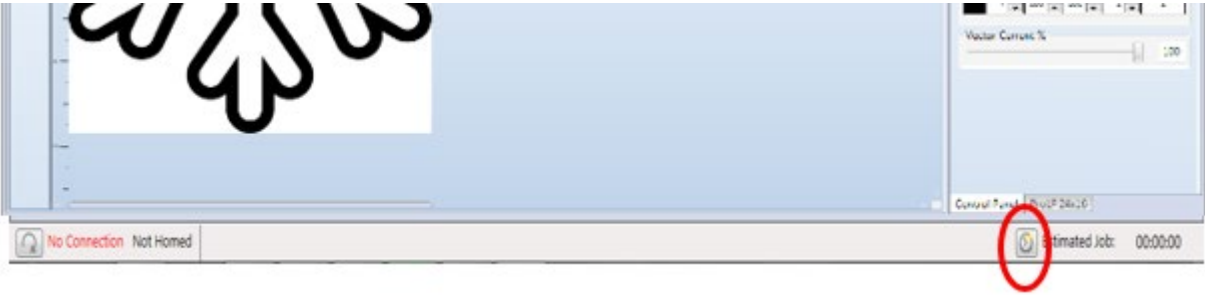

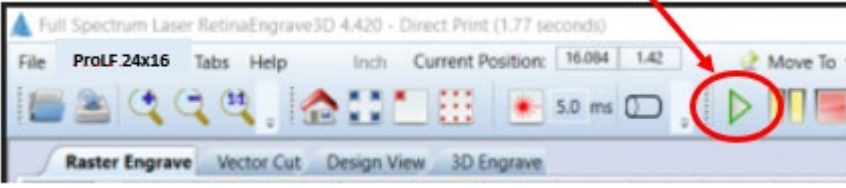
		score the surface.	for each pixel of the image.	
11	Place material in laser cutter	<p>Material is typically placed in top left of the bed for best results.</p> <p>Avoid contact with the laser head.</p>	<p>Take care to make the material square in the laser.</p> <p>The laser cannot recognize the position of the material and thus does not adapt to the position of the material.</p>	
12	Move laser head over material.	<p>-Use 'Jog' options on upper right part of RetinaEngrave software to move the laser head.</p> <p>Place a check in the "Slow Jog" box to make slower more exact moves.</p>	<p>Try clicking and holding the jog buttons and then releasing when ready for the laser head to stop.</p> <p>WARNING: Do not do several quick clicks close together to nudge the laser.</p>	

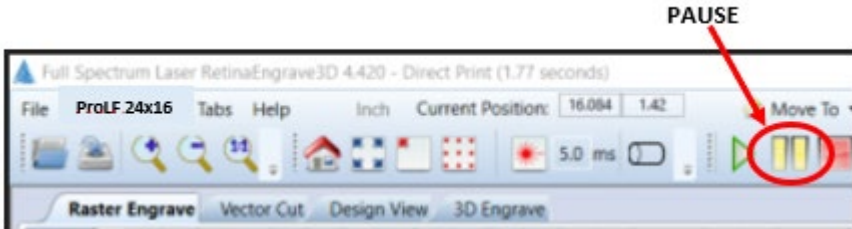
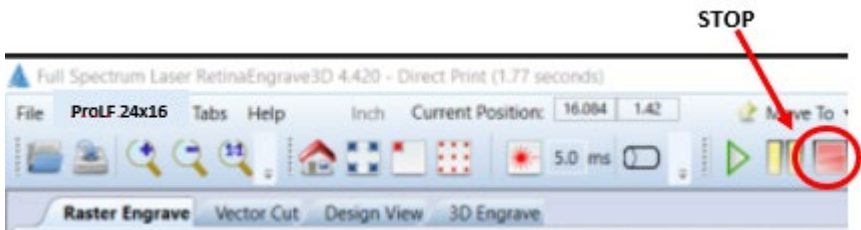
13	<p>Measure Focal Point (Z height)</p>	<p>On computer: Use the Z+ to raise the material higher. Use Z- to lower the material. When focus ruler touches top of material when hanging off the brass bracket on laser head, the laser will be in focus.</p>	<p>The laser must be in focus to engrave or cut. The laser will not be effective if it is out of focus.</p>	
14	<p>Jog laser head to start position.</p>	<p>Use the jog buttons to move the laser head to where you would like the laser to start applying the artwork on the material.</p>		 <p>Red pointer laser light indicates start position location on material. This will be the upper left of the artwork.</p>

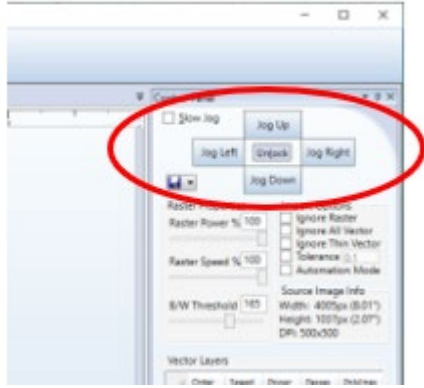



				
15	<p>Perform Perimeter Check</p>	<p>Click the perimeter step button.</p> <p>Each time you click the button the laser head will move along one of the four sides of your artwork's perimeter.</p> <p>You will want to step around all four sides and return the laser</p>	<p>This is to double check the placement of the artwork on your material.</p>	 <p>Start Position</p> <p>1st Click</p> <p>2nd Click</p>

		<p>head to the top left corner.</p> <p>Be sure to return to the upper left corner before making any adjustments to the position of the material or artwork.</p> <p>Make any adjustments if needed and then do a second full perimeter check.</p>		 <p>3rd Click</p> <p>4th Click: Back to start position</p> <p>Dashed lines indicate the perimeter of the artwork you have moved around. This dashed line does not appear on the screen of the computer.</p>	
16	Enter power and speed settings	<p>See manual for standard power/speed.</p> <p>Remember you can cut more than once but you can't uncut.</p> <p>You may need to experiment with settings on extra material to find the settings you prefer.</p>	Settings in manual are suggested and can vary significantly depending on the material.	<p>-These settings tell the laser how fast to move back and forth as well as how much power the laser uses.</p> <p>POWER: Higher percentage uses more power.</p> <p>SPEED: Higher percentages moves the laser head faster. Slowing the laser speed intensifies the power.</p> <p>PASSES: The number of times the laser will trace over the artwork. You may need two passes when vector cutting.</p>	

				
17	<p>Vector Cutting:</p> <p>Color Code Lines</p>	<p>If you need to ignore some lines or use different settings for particular lines, try color coding your lines.</p> <p>Right click on a line and assign it a new color.</p> <p>Color coding lines is not available when engraving.</p>	<p>How to ignore a line:</p> <ol style="list-style-type: none"> 1. assign a line a color 2. enter ZERO for the number of passes for that color. 	

18	Time Check	<p>Click clock icon to get a time estimate needed to complete the job.</p> <p>Can you complete the job AND clean up before the end of your reservation?</p> <p>You may need to book a new reservation.</p>	<p>It is not possible to complete a portion of the artwork, stop, and then resume the job in a later session.</p> <p>Give yourself 15 minutes to clean up.</p>	 <p>The screenshot shows a software window with a large black hand cursor icon. In the bottom right corner, there is a status bar with a clock icon circled in red, labeled "Estimated Job: 00:00:00".</p>
19	Close Lid before starting laser	<p>Be careful when closing the lid!</p> <p>The lid is heavy and will fall fast.</p> <p>Use handle on front to lower gently.</p>	<p>There are no bumpers to cushion the lid as it closes.</p> <p>Hard closes can result in damage.</p>	 <p>The photograph shows the top of a laser machine with a blue lid. A black handle on the lid is circled in red. To the right of the handle are a red emergency stop button and a key.</p>
20	Press Start	<p>Do not open the lid while the laser is running.</p> <p>Observe job and watch for issues:</p> <ul style="list-style-type: none"> Excessive smoke Fire 	<p>Pressing the green play button will start the engraving or vectoring cutting process.</p>	 <p>The screenshot shows the software interface for "Full Spectrum Laser RetinaEngrave3D 4.420 - Direct Print (1.77 seconds)". A green play button icon is circled in red with a red arrow pointing to it.</p>

		<ul style="list-style-type: none"> Unusual Performance 		
21	Wait for job to finish	<p>Pause Button: You can pause the job keeping the laser head in place. You can then resume progress.</p> <p>Stop: Cancels the job and send the laser head back to the start position.</p>	<p>Observing the process is essential.</p> <p>Look for issues such as fire, unexpected material movement, or performance issues.</p> <p>You must remain with the laser while the laser is powered on.</p>	 
22	Open Lid and Inspect	<p>If you do not move the material, it is possible to run the job again over the top.</p> <p>You can adjust your settings</p>		<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 10px; width: 45%;"> <p>Vector Cutting:</p> <p>Check to see if you have cut through material.</p> </div> <div style="border: 1px solid black; padding: 10px; width: 45%;"> <p>Engraving:</p> <p>Check to see if the engraving is as deep and dark as desired.</p> </div> </div>

		and rerun the job.		
23	Remove Material	<p>Jog laser head out of the way.</p> <p>IMPORTANT: Do not bump mirrors or laser head when removing materials.</p>		
24	Clean Up	<p>Vacuum up soot and debris from laser bed.</p> <p>Lift table grate and vacuum.</p> <p>Wipe table and work surfaces as needed.</p> <p>Return tools to toolbox.</p>	<p>Soot and debris in the laser are fire hazards.</p>	 
25	Check Out	<p>See staff.</p> <p>Return access key.</p>	<p>Staff will verify the area is clean and check all tools are present.</p>	 <p>Keys that are not checked in from your account can result in additional fees.</p>

TOOL INVENTORY

Drawer 1 – 7 items



- Focus Ruler (z-height guage)
- Caliper
- Level
- Scissors
- Knife
- Measuring tape
- Laser key

Drawer 2 – 3 items



- Instructions
- Rotary Instructions
- Suggested Power and Speed Settings

Drawer 3 – 1 item



- Cleaning Instructions

Drawer 4



- Staff Manuals

Drawer 5 – 1 item



- Rotary Tool
(Used for engraving cylinders.)

Open Area Below Drawers – 1 item



- Vacuum