

# ***LV-290***

## **User's Manual**



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Thank you very much for purchasing this product.

- To ensure correct and safe usage with a full understanding of this product's performance, please be sure to read through this manual completely and store it in a safe location.
  - Unauthorized copying or transferal, in whole or in part, of this manual is prohibited.
  - The specifications of this product and the contents of this operation manual are subject to change without notice.
  - This manual and the product have been prepared and tested as much as possible. If you find any misprints or errors, please inform Roland DG Corporation.
  - Roland DG Corporation assumes no responsibility for any direct or indirect loss or damage that may occur through use of this product, regardless of any failure to perform on the part of this product.
  - Roland DG Corporation assumes no responsibility for any direct or indirect loss or damage that may occur with respect to any article made using this product.
-

## For the USA

### FEDERAL COMMUNICATIONS COMMISSION RADIO FREQUENCY INTERFERENCE STATEMENT

Responsible Party: Roland DGA Corporation  
Address: 15363 Barranca Parkway Irvine, CA 92618 U.S.A.  
Telephone: 949-727-2100  
Type of Equipment: Laser Engraver  
Model Name: LV-290

#### NOTE:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.












This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

#### FCC CAUTION

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Use only I/O cables that have been designed and manufactured specifically for this device.

## For EU Countries

 This product must be disposed of separately at your local waste recycling center. Do not dispose of in household waste bin.	 Lever dit product in bij een lokaal afvalverzamelpunt. NIET met normaal huishoudelijk afval afvoeren.
 Bitte führen Sie dieses Produkt separat Ihrer örtlichen Entsorgungsstelle zu. Bitte nicht mit dem normalen Hausmüll entsorgen.	 Dette Produkt skal smides særskilt væk på den lokale affalds- og genbrugsstation. Må ikke smides ud sammen med almindeligt husholdningsaffald.
 Ne jetez pas le produit avec vos ordures ménagères. Portez-le dans un centre recyclage des déchets.	 Tätä tuotetta ei saa hävittää normaalien talousjätteiden mukana, vaan se on toimitettava ongelmajätteiden keräilypisteeseen hävitettäväksi.
 Questo prodotto deve essere smaltito negli appositi contenitori per la raccolta differenziata, non buttare nel cestino dei rifiuti casalinghi.	 Produkten måste kasseras separat på din lokala återvinningscentral. Släng inte produkten tillsammans med hushållssoporna.
 Este producto debe devolverse al centro de reciclaje más cercano a su domicilio para su correcta eliminación. No lo tire a la basura.	 Μην πετάξετε το αντικείμενο αυτό στο καλάθι των απορριμμάτων. Αφαιρέστε τις μπαταρίες και προσκομίστε το στο τοπικό κέντρο ανακύκλωσης.
 Deite fora separadamente este produto no seu centro de reciclagem local. Não o deite fora no seu caixote do lixo.	

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# 1

## **Chapter 1 Safety**

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**Principles of a CO2 Laser**

**Safety Ratings**

**The Safety Interlock System**

**Safety Labels**

**Safety Measures**

**Operating Environment**

## 1.1 Principles of a CO2 Laser

LASER is the acronym for Light Amplification by Stimulated Emission of Radiation. A CO2 laser works by electrically stimulating the molecules within a carbon dioxide gas mixture. When focused through a lens, this highly-intense and invisible beam will vaporize many materials. Depending on the speed and intensity of the projected beam, a CO2 laser may be used to engrave or cut through a wide variety of materials.

## 1.2 Safety Ratings

The LV-290 is equipped with a sealed carbon-dioxide laser that emits intense and invisible laser radiation with a wavelength of 10.6 microns in the infrared spectrum. The laser system is designated as a Class 1 laser device, meaning that the system is equipped with key safety features and an enclosed laser head to completely contain the laser under normal use. One of the key safety features found on the LV-290 is a Class 2 red beam safety guidance pointer (similar to a laser-pointer presentation pen) allowing the operator to see the exact location where the laser beam will fire.

Even though the LV-290 is equipped with the most powerful laser to date, through proper usage and taking necessary hardware safeguards, will make it an extremely safe machine.

When the front door and back door are open, machine becomes a Class 4 equipment and users must wear goggles to operate the machine.

## 1.3 The Safety Interlock System

The laser system is equipped with a safety interlock system utilizing magnetic sensors on the top and side access doors, laser-activation and door LED lights on the control panel. The magnetic sensors will deactivate the laser when either door is open. At this time, the "door" LED light found on the control panel will illuminate, indicating an open or improperly closed door. When the laser is in operation, the "laser" LED will illuminate to inform the operator that the laser is activated. If at any time, any of the access doors are open and the "laser" LED is illuminated, IMMEDIATELY unplug the laser system and contact your authorized Roland DG Corporation dealer.



### WARNING

- DO NOT operate the laser system if any component of the safety system is malfunctioning.
- DO NOT attempt to remove or modify any component of the safety interlock system.

## 1.4 Safety Labels


According to CDRH standards, all fixed or removable covers that allow access to a laser beam must have an appropriate laser warning labels attached to them. These warning labels must be clearly visible to the operator prior to removing the cover. Additional labels must be applied to the interior of the machine and be visible in the event when the covers are removed. A label clearly displaying the manufacturer's name, date of manufacture, description of product, model number, serial number, and compliance statement must be attached to the outer surface of the machine


In compliance with CDRH standards, the required warning labels are affixed at the time of manufacture to the LV-290, attached on appropriate locations. These labels are not to be modified in any way or removed for any reason. Please familiarize yourself with the specific labels and their locations on the machine. Below is a list of all the safety labels and their locations on the machine.


## Product Label


This label is located at the right-back side of machine. All the product information such as Serial Number, Model Numbers, Laser Power and Electric power can be found here. Before requiring any further tech support, always provide the service person with the information on this label.

### LV-290

		Serial Number <b>I50357</b>
Product	Laser Engraver	
Model	LV	
ModelNumber	LV-290	
Wavelength	10.57-10.63 $\mu\text{m}$	
Power	CO <sub>2</sub> 40W	
Input	100-240VAC, 50-60Hz, Max 15A	
Manufactured	May 2019	
Class I Laser Product Complies with EN60825-1:2014, EN ISO 13849-1:2015 Class II Laser Product Complies with CDRH Made in China Roland DG Corporation 1-6-4 Shinmiyakoda, Kita-ku, Hamamatsu-shi, Shizuoka-ken, 431-2103 Japan		



		Serial Number <b>I50357</b>
Product	Laser Engraver	
Model	LV	
ModelNumber	LV-290	
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Input	100-240VAC, 50-60Hz, Max 15A	
Manufactured	May 2019	
Class I Laser Product Complies with EN60825-1:2014, EN ISO 13849-1:2015 Class II Laser Product Complies with CDRH Made in Taiwan Roland DG Corporation 1-6-4 Shinmiyakoda, Kita-ku, Hamamatsu-shi, Shizuoka-ken, 431-2103 Japan		



### CDRH Label

This label indicates the class level of CDRH.



### CE Label

This label indicates the class level of CE



### Laser Path Warning Label

LV-290 is very safe under normal functioning conditions. However, in case of any accident, Laser Path Warning Label will be affixed on the possible laser path. When operators are nearby these paths, they should be careful of the possible injury while the machine is operating.



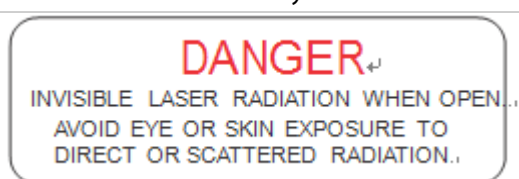
### Warning Label

Warning Label is written with all the necessary information to be aware of in every operation.



### Laser Path Danger label

This label indicates the laser path. Normally you can find this label inside of machine. Please take extra caution of this area when you conduct maintenance.



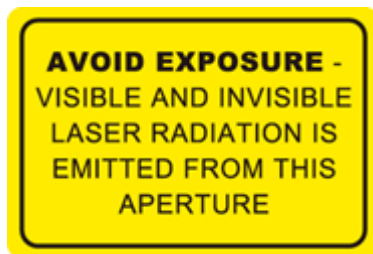
### Emergency Stop Label

This label indicates the emergency stop button. You can find this label on the right upper side of the machine.

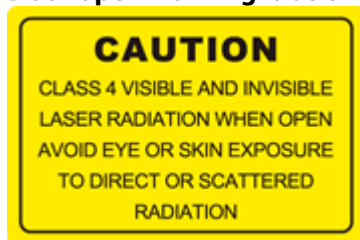


### Aperture warning stickers (mirror):

This label indicates the laser path. Normally you can find this label inside of machine or laser exit. Please take extra caution of this area when you conduct maintenance or operate machine.



### Door open warning labels



### Warning Label

This label is located on the laser outer case of 60W/80W/100W only



### Protection Window Label

This label indicates the protection wavelength. You can find this label in the lower right corner of window.



## 1.5 Safety Measures

### 1.5.1 General Safety

- **LASER RADIATION WARNING:** Exposure to laser radiation may result in physical burns and severe eye damage. Proper use and regular maintenance of this machine is important to the safety of all people in the immediate area.
- Prior to operation, carefully read and familiarize yourself with the warning labels located on both your laser system and in this manual.
- Never leave the machine unattended during the laser cutting and engraving process. The laser may ignite combustible materials. A well-maintained fire extinguisher and operational smoke or fire detector should be kept in the vicinity of the machine.
- **Caution—Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.**
- Resulting debris from laser cutting are very dangerous and may cause fire hazard.
- **DO NOT** leave debris and scraps inside laser machine after job finished. Always keep machine clean after job finished.

#### **WARNING**

- Resulting debris from laser processing are very dangerous and may cause fire hazard
- **DO NOT** leave debris and scraps inside laser machine after job finished. Must keep machine clean after job finished.
- Always remove the vector grid to clean any small pieces that have fallen through the grid.

#### **NOTE**

SmartGUARD™ is an optional fire detection alarm system. Contact your authorized Roland DG Corporation dealer for more details for having this safety option installed onto your system.

- Enable the SmartAIR™ nozzle when engraving or cutting materials that may easily ignite, such as acrylic, wood, or paper.
- Always wear safety goggles when the laser system is in operation. Reflective materials such as mirrors, enameled brass and anodized aluminum may partially-reflect some of the invisible laser radiation. Severe eye damage may occur if proper safety goggles are not worn.
- Connect to an electrical outlet that complies with this machine's ratings (for voltage, frequency and current). Incorrect voltage or insufficient current may cause fire or electrical shock.
- Connect the machine to a properly grounded power outlet. Ensure the voltage of the power source is identical to the voltage of the machine.
- When using an extension cord or power strip, use one that adequately satisfies the machine's ratings (for voltage, frequency, and current). Use of multiple electrical loads on a single electrical outlet or of a lengthy extension cord may cause fire.
- Do not open the laser access panel when the machine is plugged in.
- Do not attempt to modify or disassemble the laser module.
- Do not attempt to remove or modify any component of the machine's laser interlock safety system.
- Ensure the immediate work area of the machine is well-ventilated. Odors, vapors, and dust are by products generated during the laser engraving and cutting process. An exhaust system, vacuum cutting box, and honeycomb table are recommended. Please contact your authorized Roland DG Corporation dealer for more information.

- Do not laser heat-sensitive surfaces or materials that may generate toxic fumes, such as PVC and Teflon.
- Regularly clean and maintain your machine according to our cleaning and maintenance Instructions in Chapter 8. Doing so will ensure your machine will operate effectively and safely over a long period of time.

## 1.5.2 Safety Notice for Class 4 Machine

When the optional Pass-Through door module is installed, the laser system becomes a Class 4 machine with front and rear doors open, machine operators must wear goggles and follow the safety instructions to operate the machine.

Exposure to a Class 4 laser beam via direct radiation and indirect stray radiation may cause damage to both skin and eyes. Exposure to the Class 4 laser beam may cause ignition of combustible materials which can lead to a fire. A proper and well-maintained fire extinguisher should keep on hand next to the laser machine all the times. The machine operator is responsible to take all necessary protective measures to prevent the possible ignition or explosion of materials by the laser beam. A Class 4 laser system should be operated according to the following precautionary measures among others:

- The operator is obliged to appoint **a trained Laser Protection Officer** responsible for compliance with the relevant regulations.
- **Identify the danger zone** by installing **warning lights** and **warning signs** outside the area.
- **The danger zone must be secured against unauthorized access.**
- The operator of a Class 4 laser system should always **wear laser protection goggles** suitable for the laser wavelength in use and with optical density at least OD5+ within the danger zone.
- An additional warning light should also be installed in a visible location to warn the machine operator of any emerging laser radiation.

## 1.6 Operating Environment

Please follow the guidelines when considering a suitable location to set the LV-290. Improper work environments may lead to operational malfunction and/or unsafe working conditions. The LV-290 should be placed and operated in a standard office-type environment.

- Avoid environments where the machine is exposed to high levels of dust, temperature (temperature exceeding 30°C or 85°F) or humidity (humidity exceeding 70% or where the ambient temperature is near the dew point).
- Avoid small, enclosed areas with poor ventilation.
- Avoid areas with high levels of noise and electrical noise.
- Select a location that is large enough to accommodate the LV-290, an exhaust system, a computer and a work or storage table.
- Select a location in which the ambient temperature remains between 15°C and 30°C (60°F to 85°F).
- Select a location in which the relative humidity remains between 30% - 40%.
- Select a location in which there is a short, direct path to the fume exhaust system.
- Set the LV-290 on a floor surface that is completely even.
- Make sure your smoke or fire detection system in the immediate area is functioning.
- Setup the machine to be apart from the wall for at least 60 cm (2 feet).

## 1.7 Noise Test

Test Conditions: measured at a distance of 1 meter from the surface of the machinery and a height of 1.6 meters from the floor or access platform.

- LV-290 Sound Test Result: 49.8 dB

## 1.8 EC-Declaration of Conformity

### ***EC DECLARATION OF CONFORMITY***

Manufacturer : Roland DG Corporation.

Address of Manufacturer : 1-6-4 Shinmiyakoda, Kita-ku, Hamamatsu-shi, Shizuoka-ken, 431-2103, Japan

Product Name : Laser Engraver

Model No. : LV-290, LV-####@@-XXXXYY  
(#### = 1, 2 ... 8, 9, 0 or blank (Table Size), @@=none character, blank, II, III, IV ... X or A-Z; XXX & YYY = laser supplier tube model or blank)

Directive : 2006/42/EC Machinery Directive  
2014/35/EU Low Voltage Directive  
2014/30/EU Electromagnetic Compatibility Directive

For the most specific risks of this machine, safety and compliance with the essential requirements of the Directive has been based on elements of:

- EN ISO 12100:2010 / Safety of machinery - General principles for design - Risk assessment and risk reduction
- EN ISO 11553-1:2008 / Safety of machinery - Laser processing machines - Part 1: General safety requirements
- EN 60825-1:2014 / Safety of laser products - Part 1: Equipment classification and requirements
- EN ISO 13849-1:2015 / Safety of machine - Safety-related parts of control systems - Part 1: General principles for design
- EN 60204-1:2006+A1:2009+AC: 2010 / Safety of machinery - Electrical equipment of machines- Part 1: General requirements- Industrial electrical device
- EN 61000-6-2:2005 / Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
- EN 61000-6-4:2007/A1:2011 / Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environment



# 2

## **Chapter 2 Unpacking& Contents**

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**Unloading and Unpacking**

**How to pack properly**

**Contents and Accessories Checklist**

## 2.1 Unloading and Unpacking

The LV-290 is shipped in one crate that contains the machine, the software, and all of the necessary accessories. The following section shows detailed step-by-step instructions for unpacking and assembly of the machine.

### WARNING

More than one person may be needed when loading and unloading the shipping crate in order to avoid body injury or damage to the machine

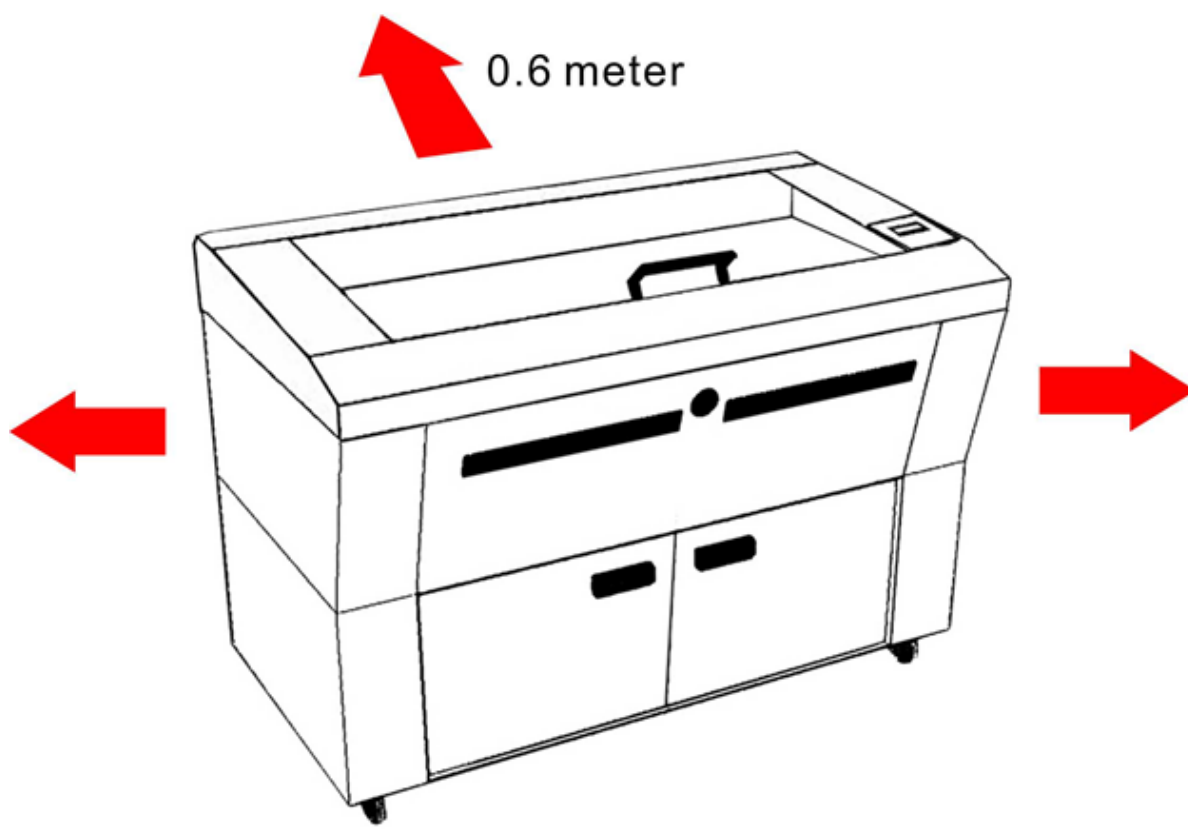
### NOTE

Please store the original shipping crate as it may be needed for transportation in the future.

To prevent damage to the machine or personal injury, please get assistance when loading and unloading the shipping crate. Please save the original shipping crate in case it is needed for future transport or product servicing.

## Installation location

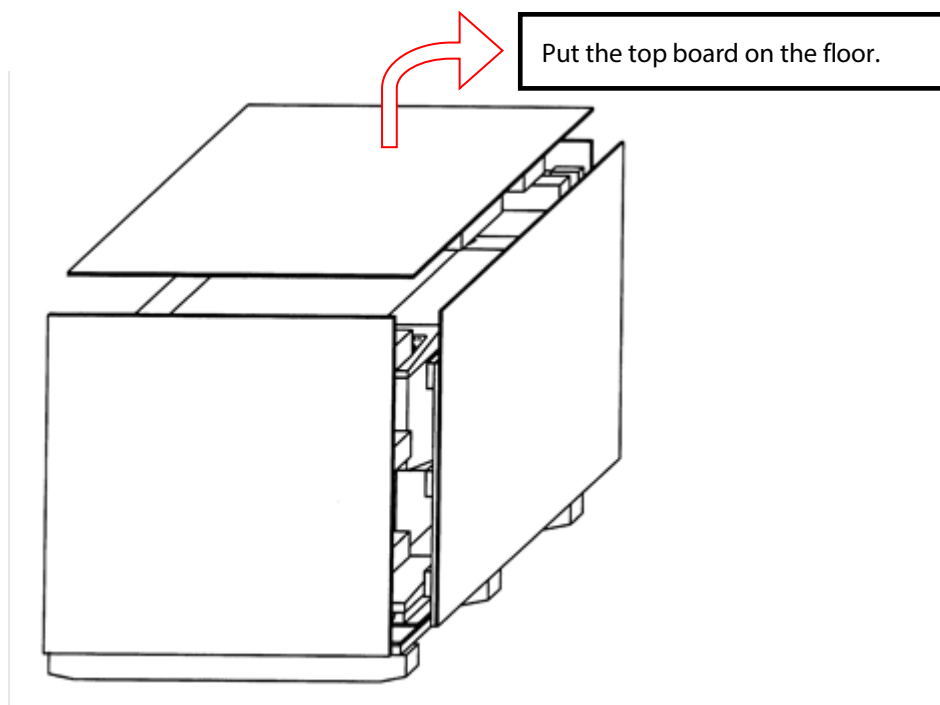
Before unpacking the laser system, make sure the location in which you intend to install the laser system will provide at least **2 feet (0.6meter)** of clearance on all sides of the machine.



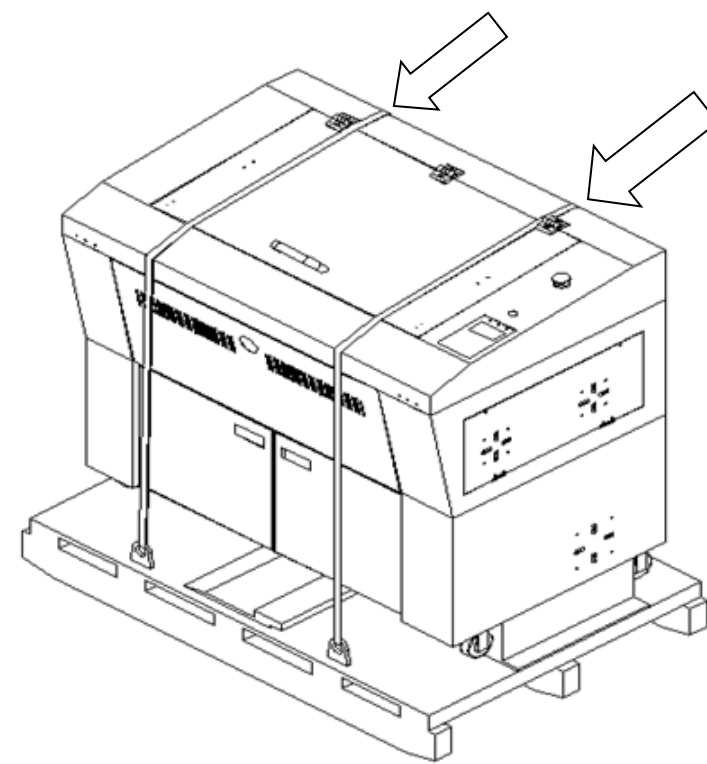
## Unpacking and Unloading

Move the shipping crate close to the desired working location of the machine. Unpack following the steps below.

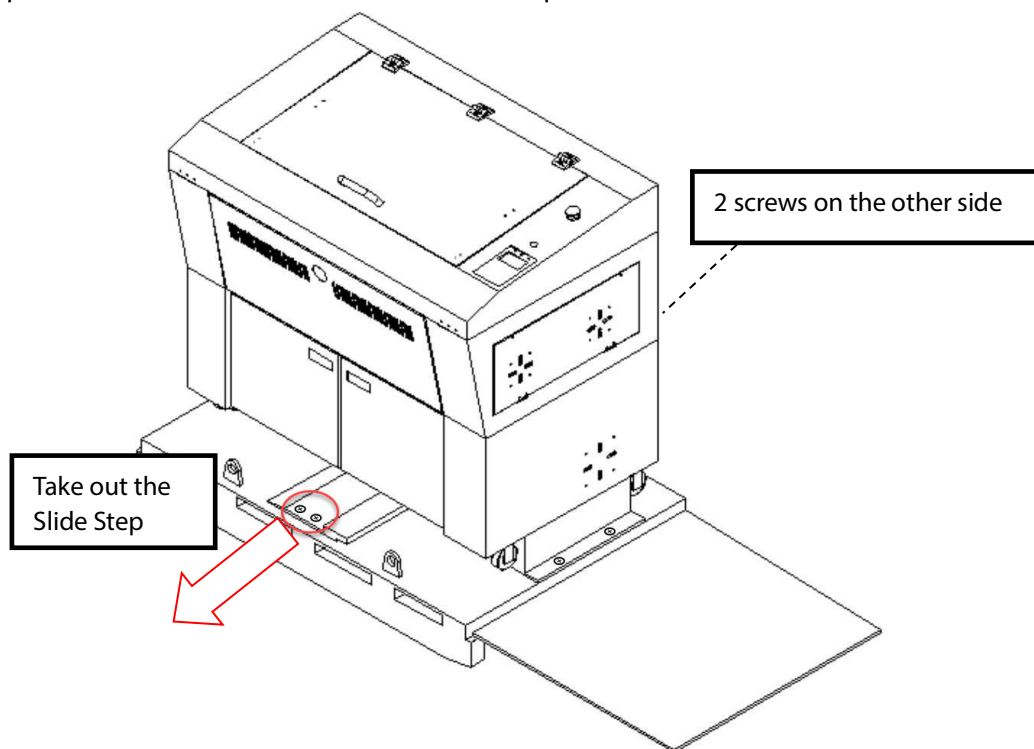
Step 1. Put the top board on the floor. Make sure the outer side faces up.



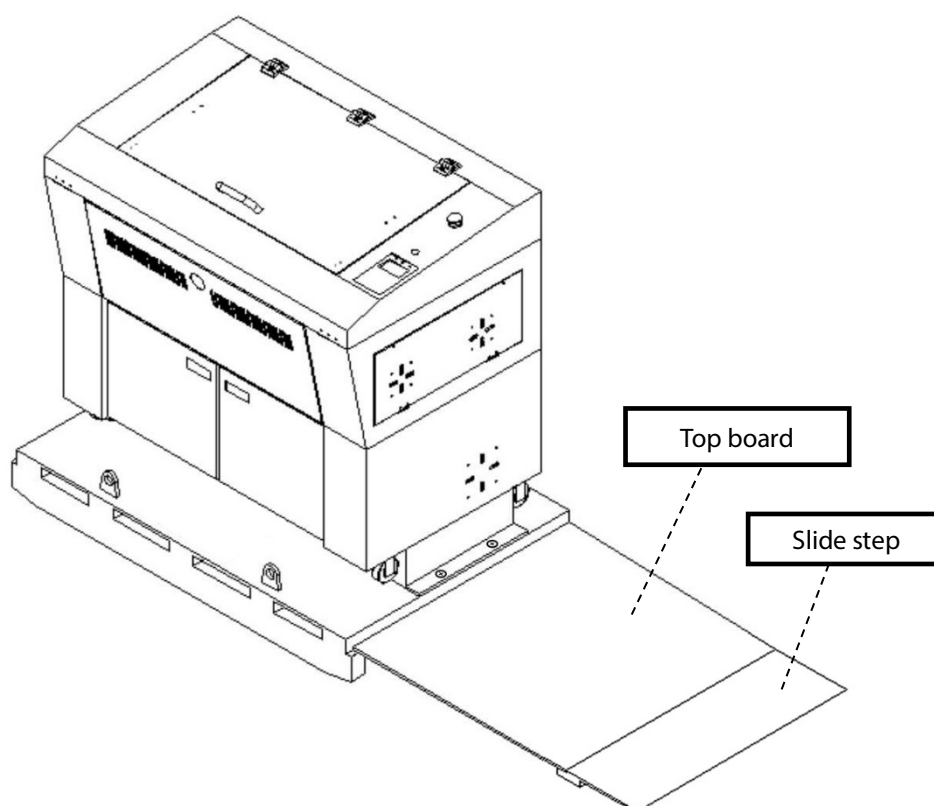
Step 2. Remove the two strings



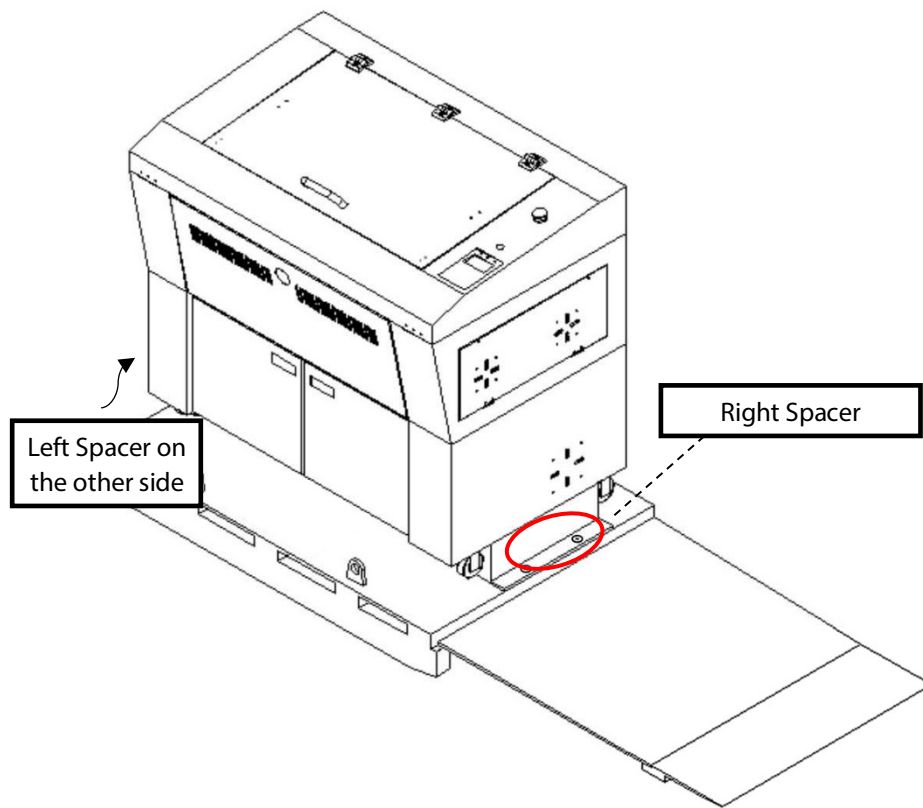
Step 3. Release 4 screws to take out the slide step



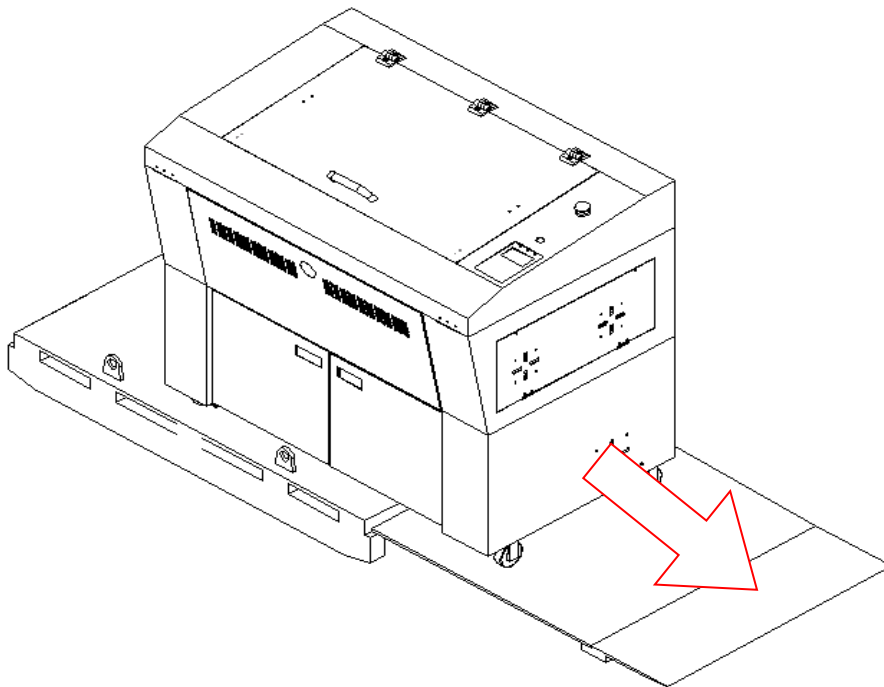
Step 4. Put the slide step next to the top board.



Step. 5 Loosen the 4 screws to take off the left and right spacer before rolling down this machine.



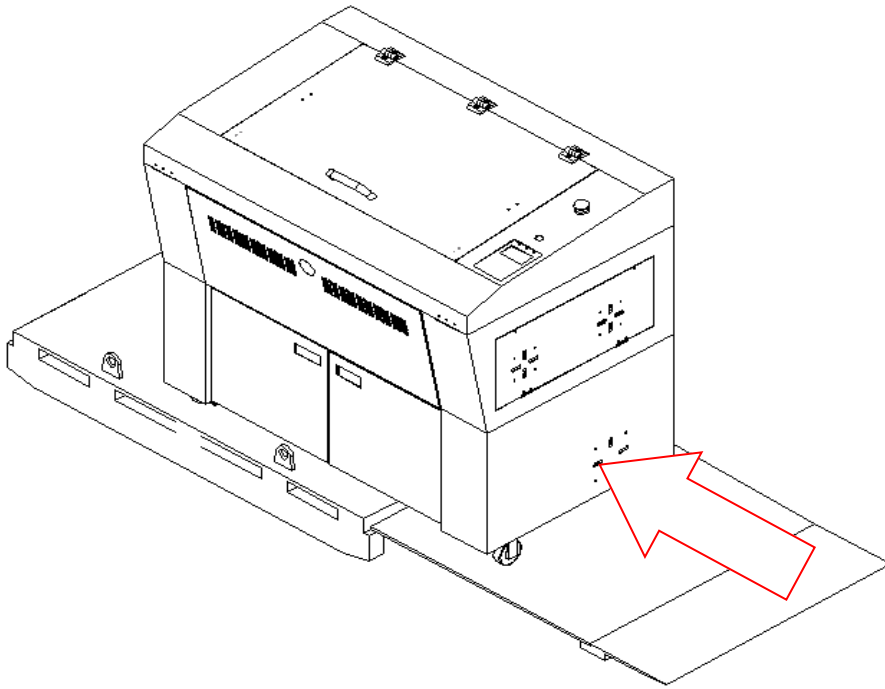
Step. 6. Carefully roll down the machine off the packing crate.



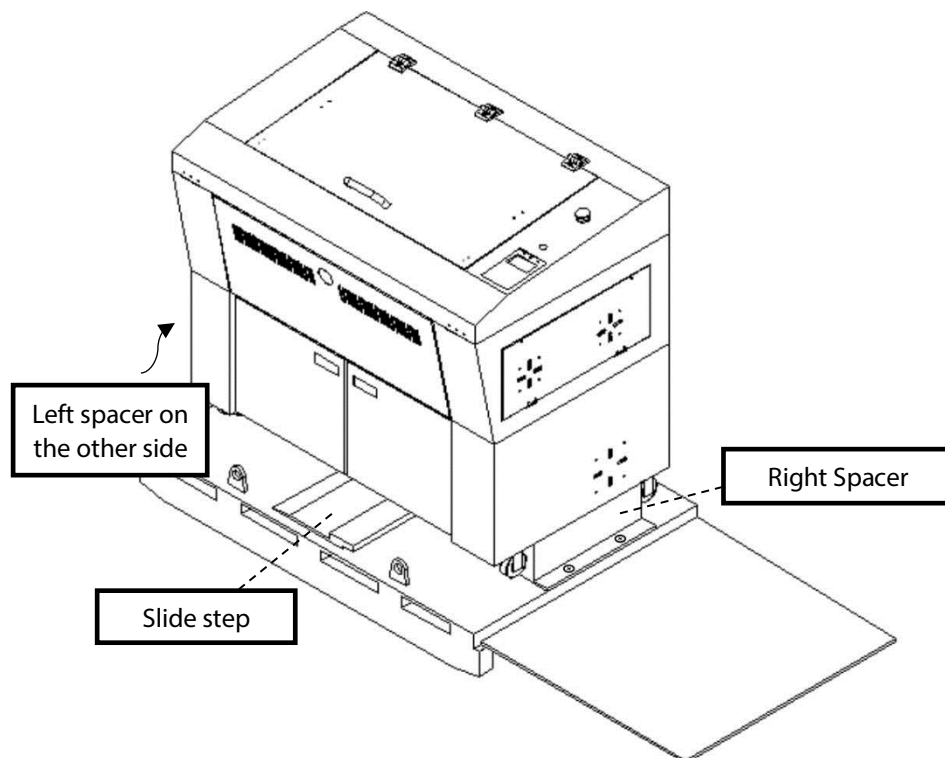
## 2.2 How to Re-pack the Machine

Step 1. Set up the ramp with the top board and slide step and carefully push the machine onto the wood pallet.

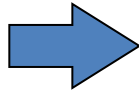
NOTE: More than one person may be needed when loading and unloading the shipping crate in order to avoid body injury or damage to the machine.



Step 2. Insert and lock the left and right spacer and slide step into the packing crate.

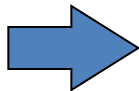


Step 3. Fasten the belts accordingly and make sure the machine is affixed on the wood plate.



\* Put the belt into the red circle part

Step 4. Moving the buckle to tighten the belt and buckle up as below pictures.



Step 5. Insert four side boards on the slot of bottom plate.

Step 6. Re-pack is completed.

## 2.3 Contents and Accessories Checklist

Please check to make sure that all of the following items are included within the shipping crate. If any of the following items are missing, immediately contact your authorized Roland DG Corporation dealer.

### **Roland** **Accessory Check List**

#### ***LV-290***

##### **Data Transmission Cable**

<input type="checkbox"/> Ethernet Cable	1 Piece	<input type="checkbox"/> USB Cable	1 Piece
---	---------	------------------------------------	---------

##### **Cleaning Tools**

<input type="checkbox"/> Cotton Swab	1 Pack	<input type="checkbox"/> PS2 Lubrication Grease	1 Piece
<input type="checkbox"/> Cleaning Tissue	1 Pack		

##### **Others**

<input type="checkbox"/> CO2 Goggle	1 Piece	<input type="checkbox"/> Spare Roller Set	3 Set
<input type="checkbox"/> Laser Firing Control Key	2 Piece	<input type="checkbox"/> User's Guide CD (Driver included)	1 Piece
<input type="checkbox"/> Magnet ( Lx2, Sx2 )	4 Piece	<input type="checkbox"/> 4" Hose Connector (Including M4 X 8 Screws)	1 Piece
<input type="checkbox"/> SmartPIN Auto Focus	1 Piece	<input type="checkbox"/> 2" Focus Tool	1 Piece
<input type="checkbox"/> Unilateral Wheel	6 Piece		

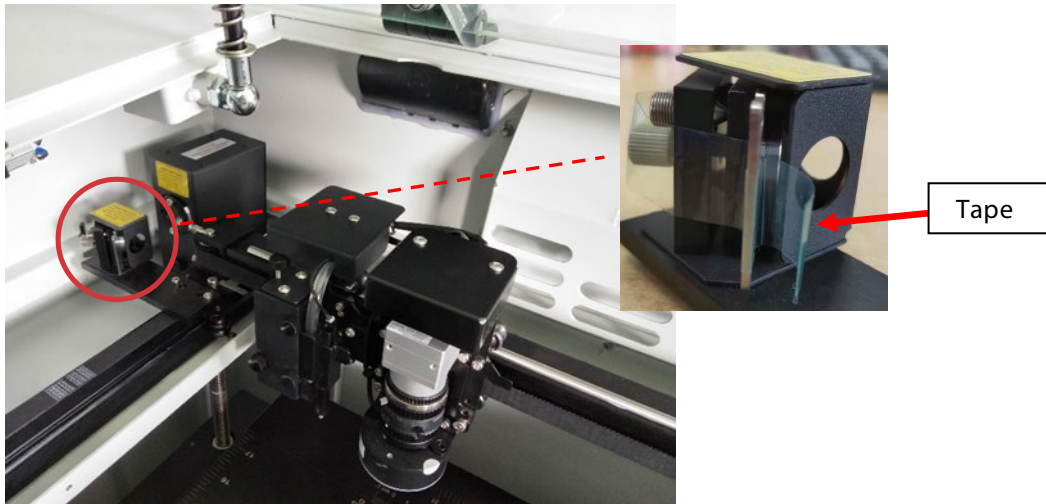
## 2.4 Before You Use This Machine

Before you use this machine, you must remove the tape protected mirror.

Step 1. Open the front cover.

Step 2. Remove a tape protected mirror.

DO NOT touch the mirror, when you remove the tape.



### **WARNING**

You must remove the tape protected mirror, before you use the machine. Using the machine with the protected tape may result in fire.

# 3

## Chapter 3 Mechanical Overview

---

**Front View**

**Top View**

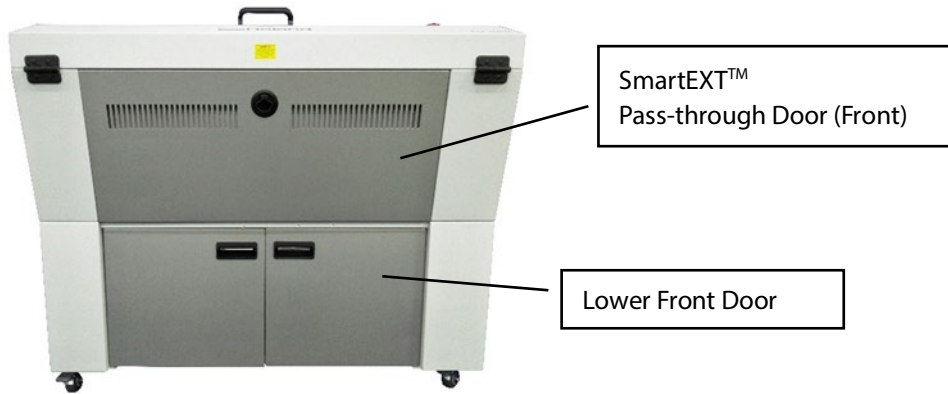
**Right View**

**Left View**

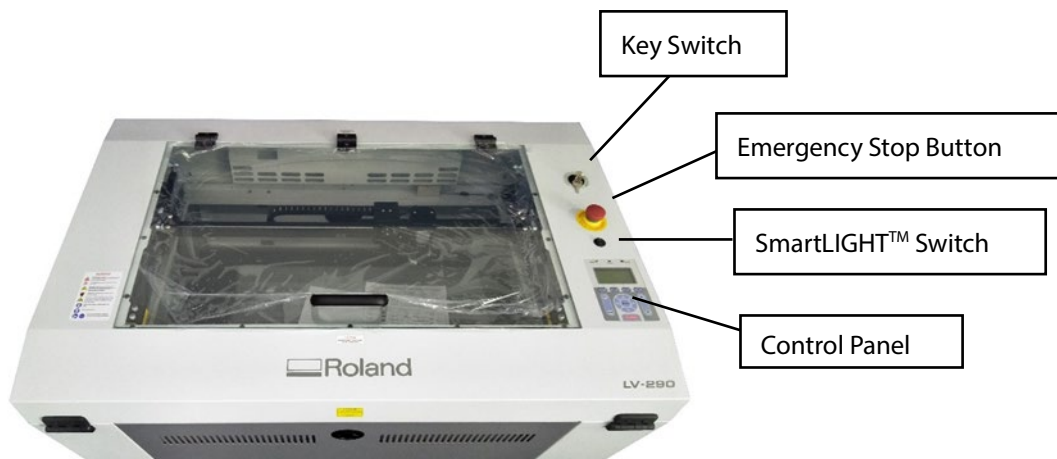
**Rear View**

Please take some time to familiarize yourself with this section regarding the mechanical overview of the LV-290. References will be made back to the different parts of the LV-290 in later sections.

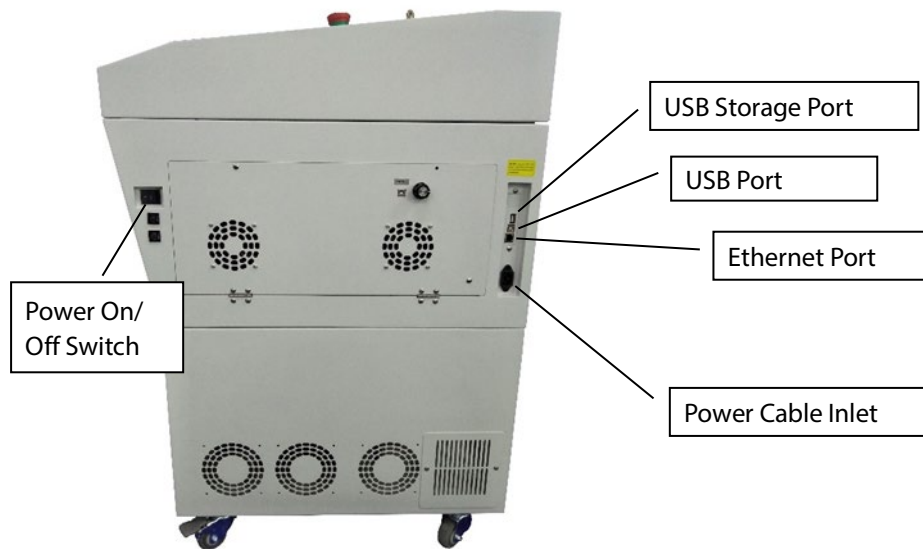
### 3.1 Front View



### 3.2 Top View



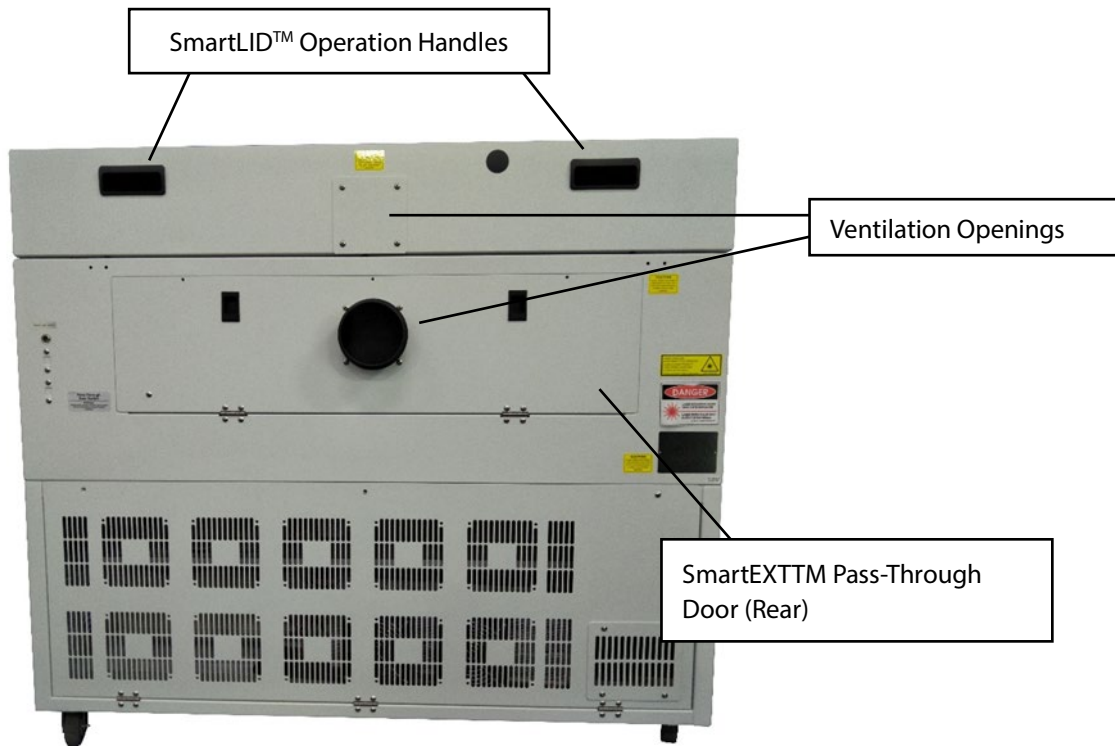
### 3.3 Right (Profile) View



### 3.4 Left (Profile) View



### 3.5 Rear View



# 4

## Chapter 4 Setup and Installation

---

### Machine Setup

- Powering Up the Machine
- Power Cable Connection
- Connecting the Computer

### Graphics Software Setup

- Recommended Computer Configuration
- Installation of the USB Driver
- Installation of the Print Driver
- Installation of the SmartCONTROL

## 4.1 Machine Setup

### 4.1.1 Powering Up the Machine

#### ⚠ CAUTION

Make sure both the LV-180 and computer are turned off before connecting either to a power source.

- 1) Connect the male end of the power cord to a quality surge protector and then connect the surge protector into a properly grounded outlet.
- 2) Do the same for the computer system.
- 3) Connect the air compressor and external air extraction system to the laser machine before powering up. The connection and setup of air compressor and air extraction system refer to Chapter 7 for details.
- 4) Connect the female end of the power cord to the machine's power cable inlet located on the right side of machine.

#### NOTE

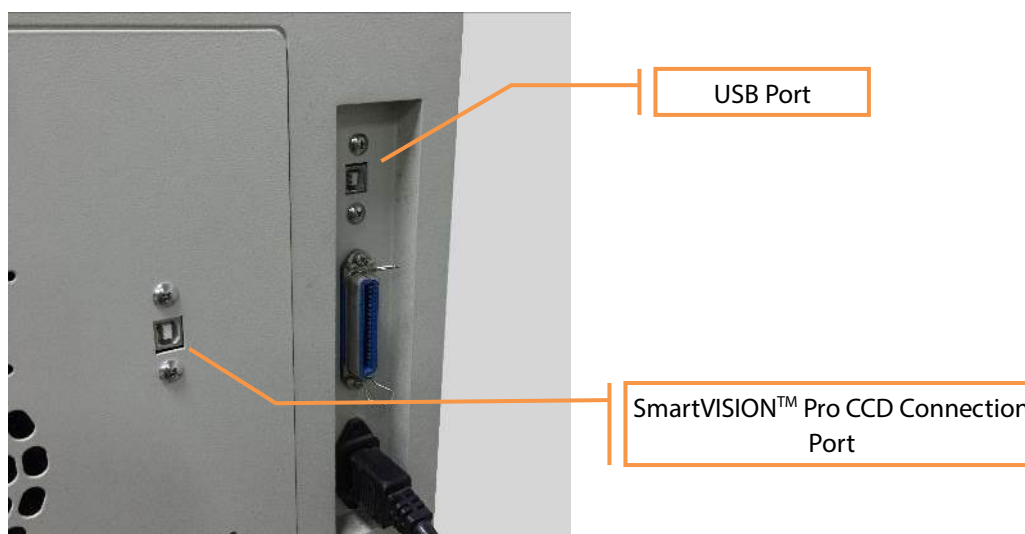
The LV-290 has been designed to automatically switch from 100-240 VAC.

### 4.1.2 Connecting the Computer

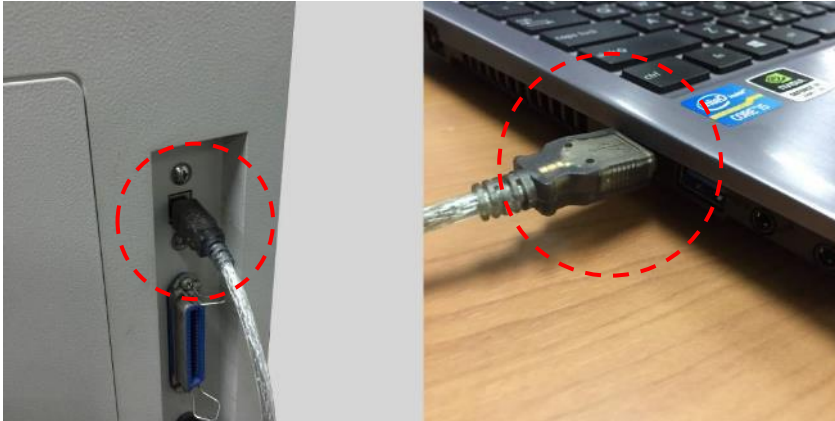
The LV-290 can communicate with a computer through a USB Port or LAN Port connection interface. Regardless of the connection method chosen, you will need to connect the respective connection cable from the LV-290 to your computer.

#### 4.1.2.1 USB Connectivity

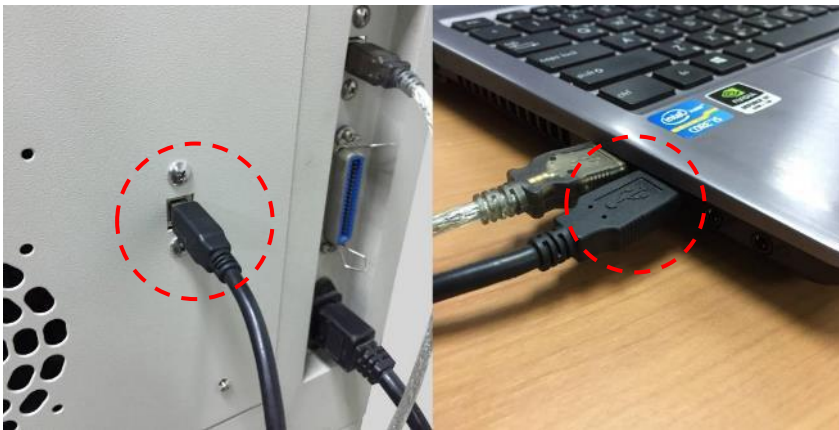
1. USB port and SmartVISION™ Pro CCD connection port are located on right side of laser machine.



2. After installation of the printer driver and SmartCONTROL Vision software, please connect the USB cable between computer and the laser machine



3. Connect the 2nd USB cable between computer and the SmartVISION™ Pro CCD connection port



#### 4.1.2.2 Ethernet Connectivity

Connect the Ethernet Cable in accessory to the Ethernet port on the right-hand side of the laser system. Follow below instruction for Ethernet connectivity setup.

##### **NOTE**

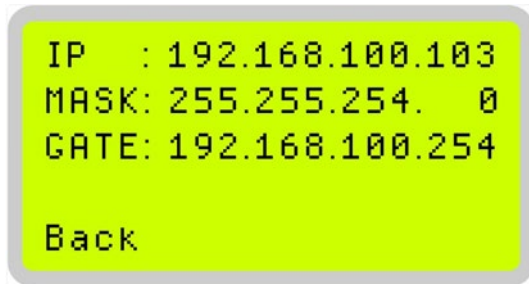
1. Never leave laser system unattended during laser cutting, engraving, and marking process, even with Ethernet or Wi-Fi connection setup, this requirement cannot be avoided. Exposure to the laser beam may cause ignition flame to combustible materials.
2. DO NOT connect USB cable when using Ethernet function for data transmission.
3. If you have purchased additional Optional Accessories for the LV-290, please refer to chapter 7 for instructions on how to properly setup your optional accessories. These should be setup prior to working with your LV-290.

## Networking Connectivity Setup

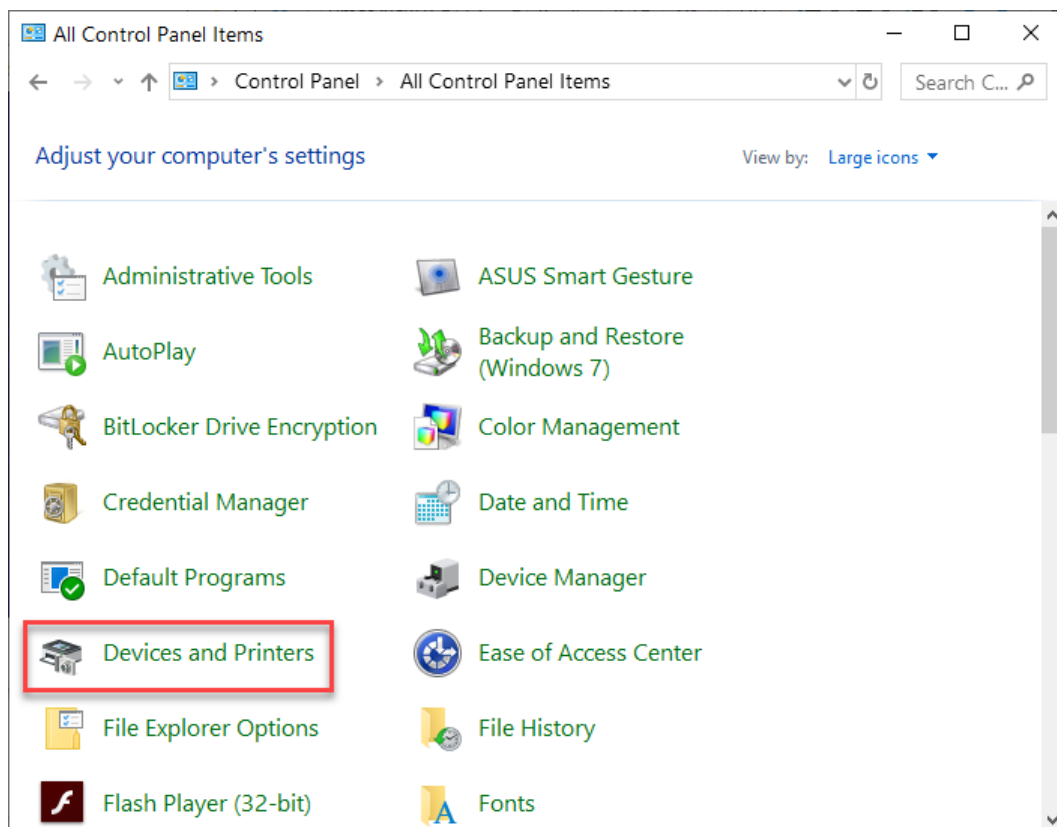
LV-290 is built-in with LAN port to enable multiple laser engravers to be operated by one PC and multiple PCs to share a single unit of laser engraver. Follow the setup instructions below.

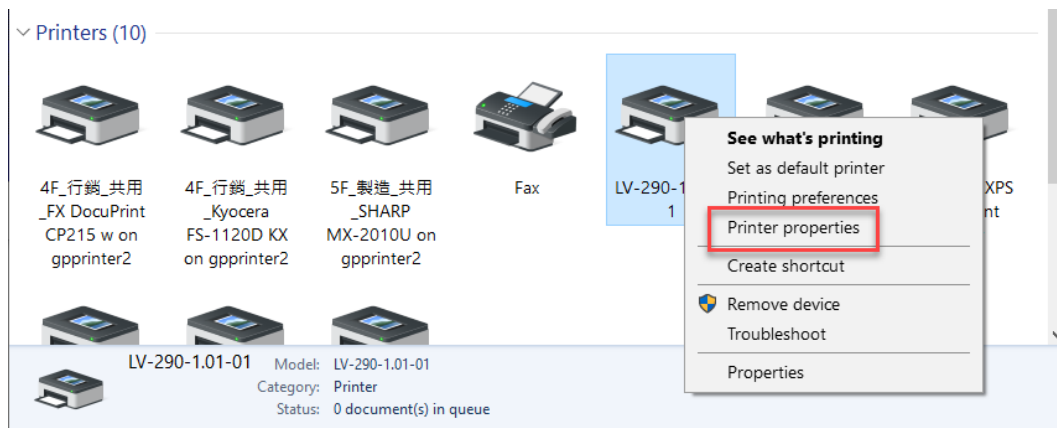
Step 1. Connect LAN cable to the LAN port of this machine and turn on machine

Step 2. Navigate the control panel through <F4> Function→ <Machine Setting>→ <LAN Setup Wizard>→ IP Address.

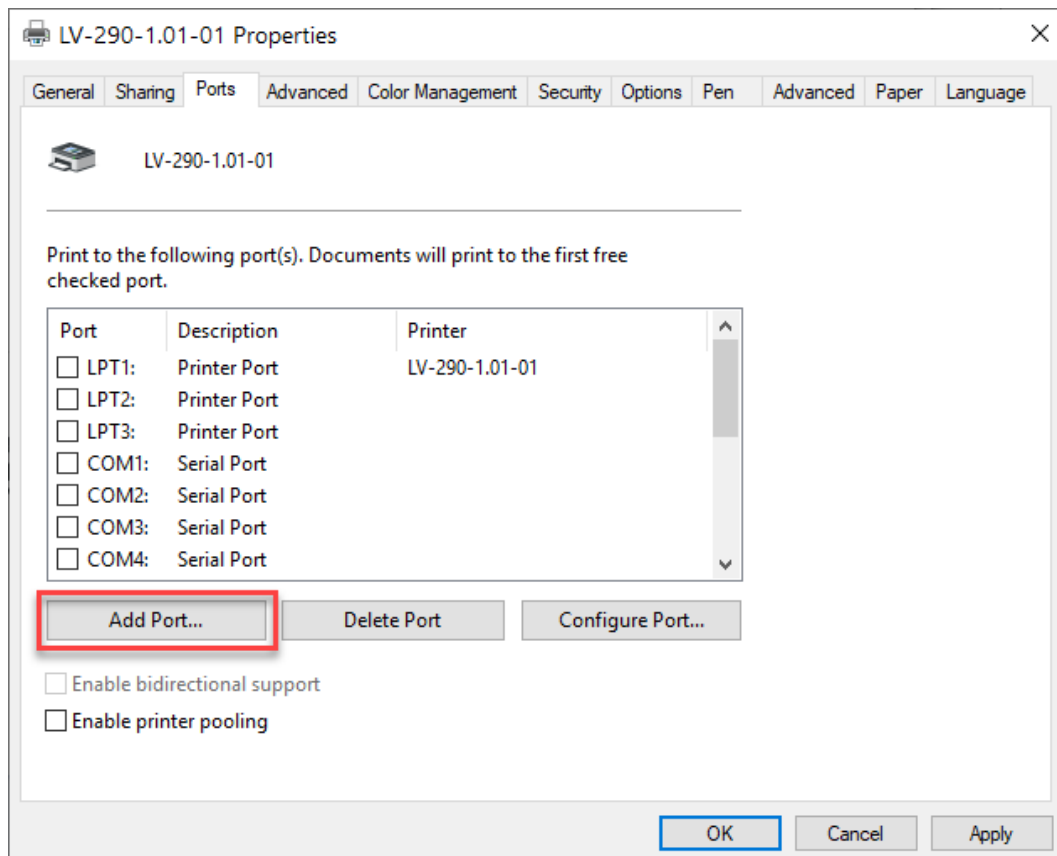


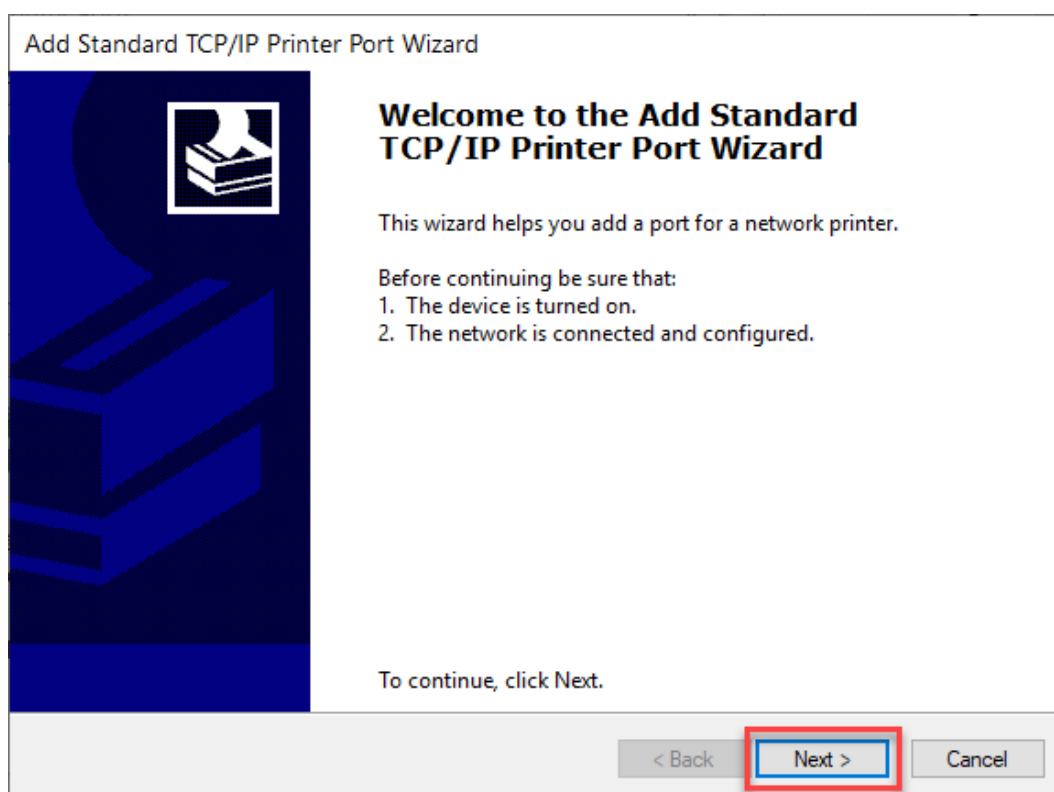
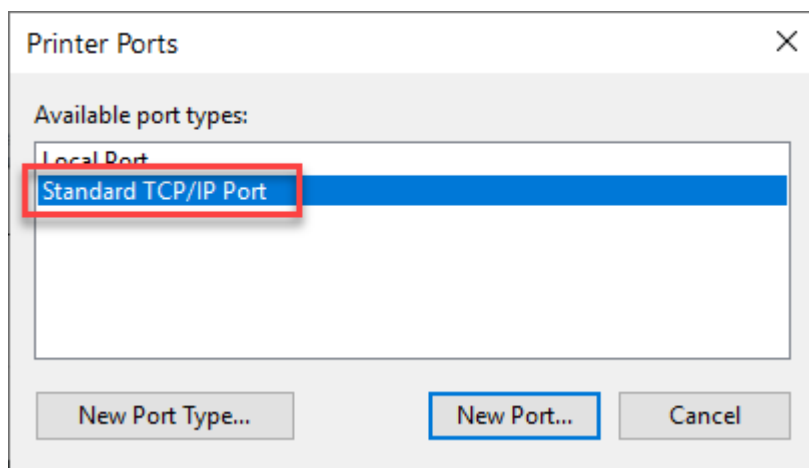
Step 3. Go to Windows <Control Panel>→ <Hardware and Sound>→ <Printer>, and right click on LV-290 printer to check printer properties.






Step 4. Go to <Ports> tab of LV-290 printer properties, and select <Add Port>, and follow the instruction to enter the TCP/IP information received from laser machine control panel in step 2.





Add Standard TCP/IP Printer Port Wizard

**Add port**  
For which device do you want to add a port?



Enter the Printer Name or IP address, and a port name for the desired device.


Printer Name or IP Address:

Port Name:

< Back   Next >   Cancel

Add Standard TCP/IP Printer Port Wizard

**Additional port information required**  
The device could not be identified.



The device is not found on the network. Be sure that:

1. The device is turned on.
2. The network is connected.
3. The device is properly configured.
4. The address on the previous page is correct.

If you think the address is not correct, click Back to return to the previous page. Then correct the address and perform another search on the network. If you are sure the address is correct, select the device type below.


Device Type

☒ Standard   ☐ Custom

Settings...

< Back   Next >   Cancel

### Add Standard TCP/IP Printer Port Wizard



## Completing the Add Standard TCP/IP Printer Port Wizard


You have selected a port with the following characteristics.

SNMP:	No
Protocol:	RAW, Port 9100
Device:	192.168.100.103
Port Name:	192.168.100.103
Adapter Type:	Generic Network Card

To complete this wizard, click Finish.

### LV-290-1.01-01 Properties

General Sharing Ports Advanced Color Management Security Options Pen Advanced Paper Language

 LV-290-1.01-01

Print to the following port(s). Documents will print to the first free checked port.

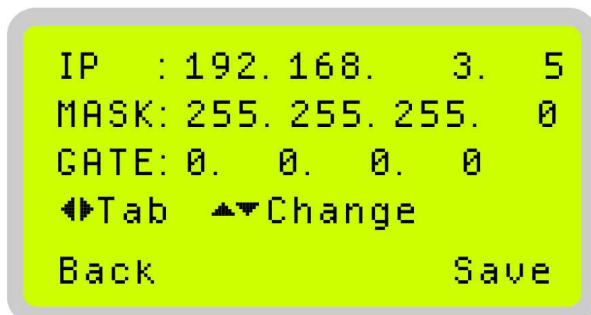
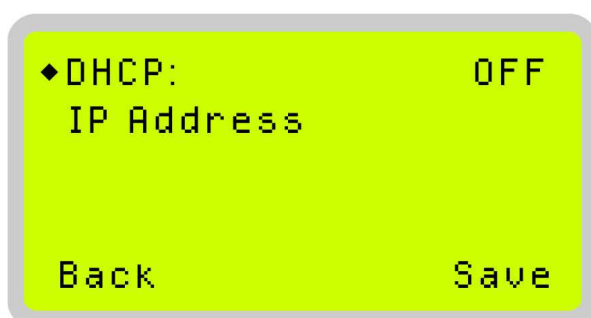
Port	Description	Printer
<input checked="" type="checkbox"/> 192.168.100.103	Standard TCP/IP Port	
<input type="checkbox"/> PORTPROMPT1:	Local Port	Microsoft XPS Document Writer
<input type="checkbox"/> C:\ProgramData\...	Local Port	Snagit 2018
<input type="checkbox"/> nul:	Local Port	
<input type="checkbox"/> IR	Local Port	
<input type="checkbox"/> Microsoft.Office....	App Monitor	OneNote

☐ Enable bidirectional support  
☐ Enable printer pooling

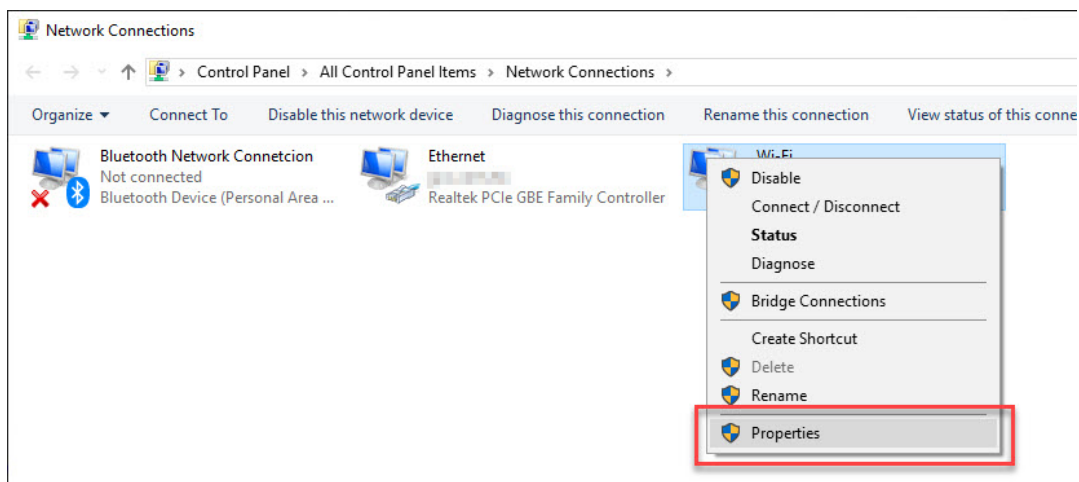
## Ethernet Connectivity Setup

ROLAND laser engraver is built-in with LAN port to transmit data from PC to laser engraver with ease and higher speed instead of USB port option.

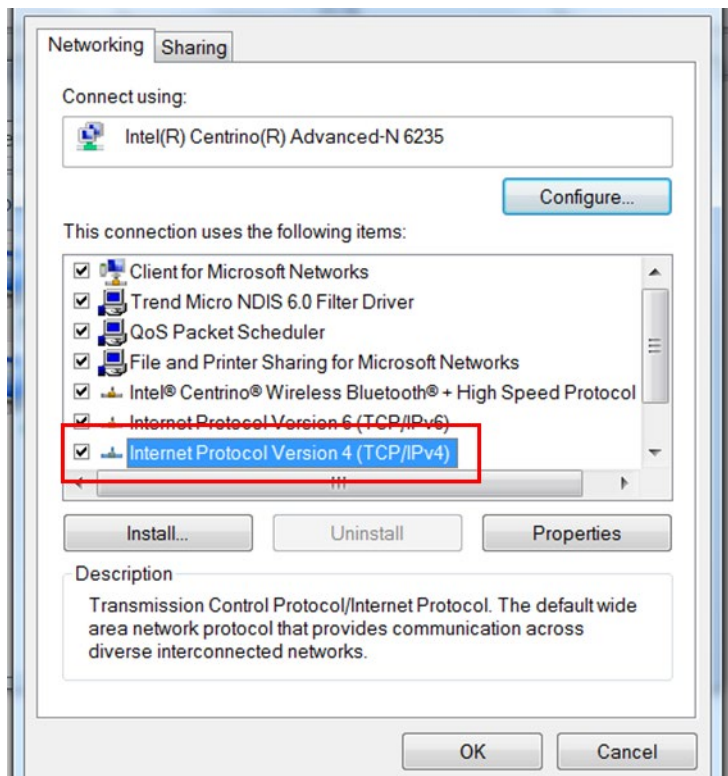
- Step 1. Connect LAN cable to the LAN port of this machine and turn on machine
- Step 2. Navigate the control panel through <F4> Function→ <Machine Setting>→ <LAN Setup Wizard>→ DHCP: OFF.
- Step 3. Navigate the control panel through <F4> Function→ <Machine Setting>→ <LAN Setup Wizard>→ IP Address.
- Step 4. Enter 192.168.3.X (X refers to 1~255 value which can't be the same value with IP address setting in PC or Notebook) for IP, and 255.255.255.0 for MASK with UP/ DOWN keys.



- Step 5. Go to <Control Panel→Network and Internet→Network Connections> of computer, right click mouse on the connected internet device, and choose <Properties>.

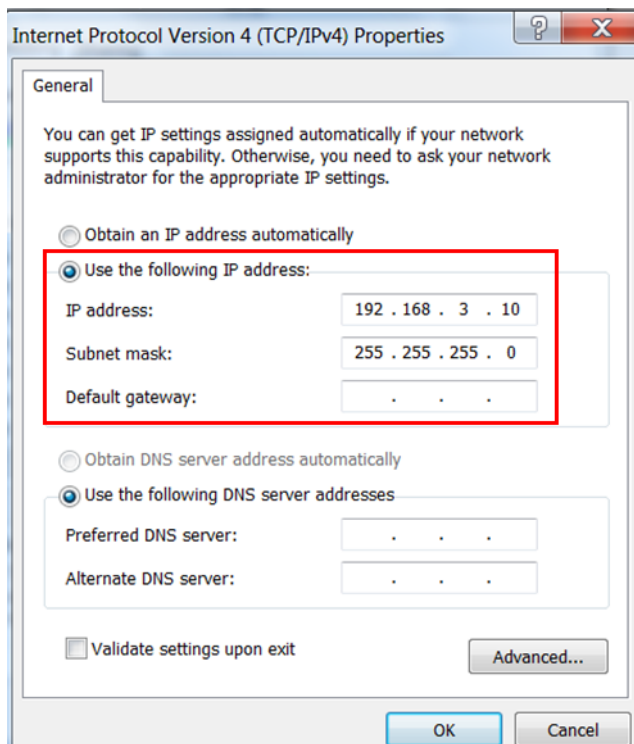


Step 6. Choose the <Internet Protocol Version 4(TCP/IPv4)> and click <Properties> to open up the setting window.

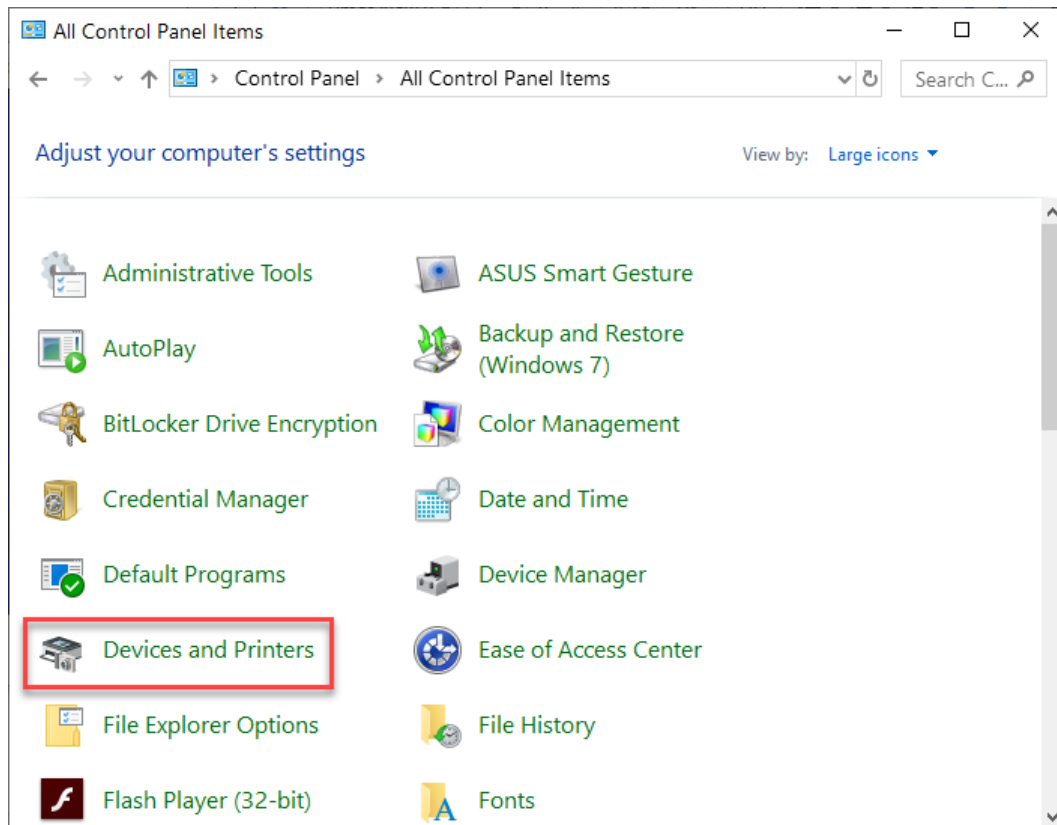


Step 7. Enter the IP address and Subnet mask setting values, and choose <OK>

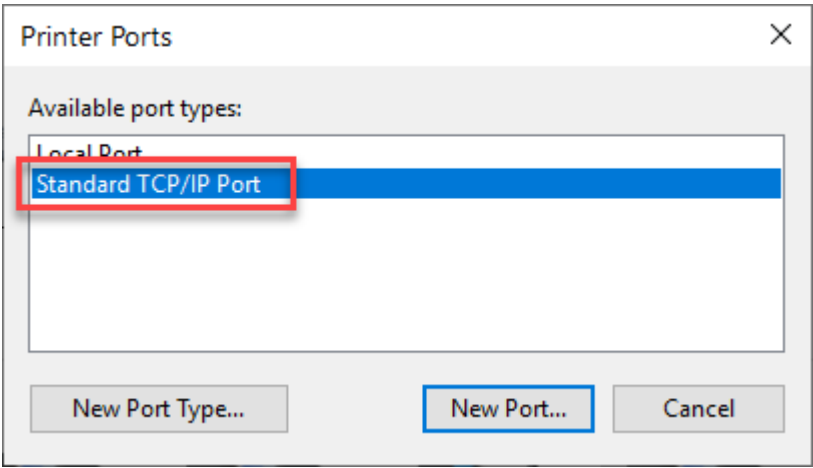
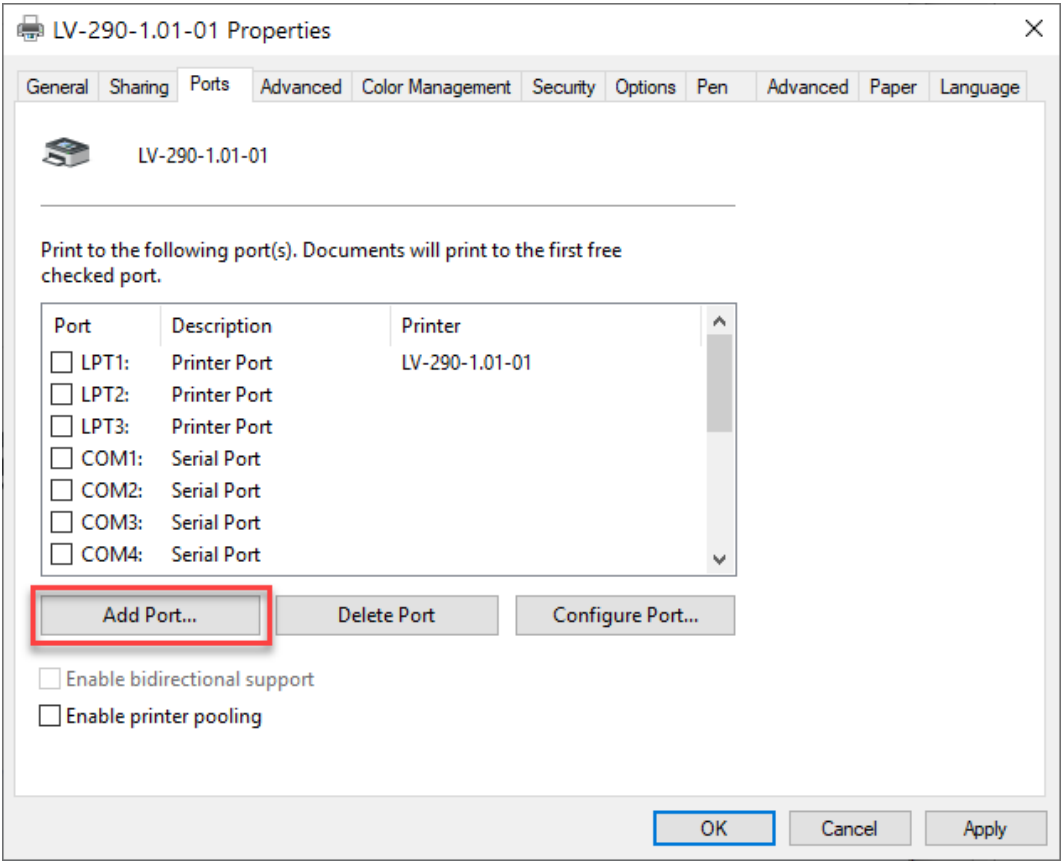
Note the IP address 192.168.3.X (X value can be 1~255, while can't be the same number as machine control panel setting in step 4)




Step 8. Go to <Control Panel> → <Device and Printers> of computer and right click on the laser machine printer, choose <Printer Properties>.



Step 9. Select <Add Pot> under Ports tab and follow the instruction to enter the TCP/IP information in laser machine’s control panel in step 4.



Add Standard TCP/IP Printer Port Wizard



## Welcome to the Add Standard TCP/IP Printer Port Wizard

This wizard helps you add a port for a network printer.

Before continuing be sure that:


1. The device is turned on.
2. The network is connected and configured.

To continue, click Next.

< Back   **Next >**   Cancel

Add Standard TCP/IP Printer Port Wizard

**Add port**  
For which device do you want to add a port?



Enter the Printer Name or IP address, and a port name for the desired device.


Printer Name or IP Address:

Port Name:

< Back   **Next >**   Cancel

Add Standard TCP/IP Printer Port Wizard

**Additional port information required**  
The device could not be identified.



The device is not found on the network. Be sure that:

1. The device is turned on.
2. The network is connected.
3. The device is properly configured.
4. The address on the previous page is correct.

If you think the address is not correct, click Back to return to the previous page. Then correct the address and perform another search on the network. If you are sure the address is correct, select the device type below.

Device Type


☒ Standard ☐ Custom

Generic Network Card

Settings...

< Back Next > Cancel

Add Standard TCP/IP Printer Port Wizard



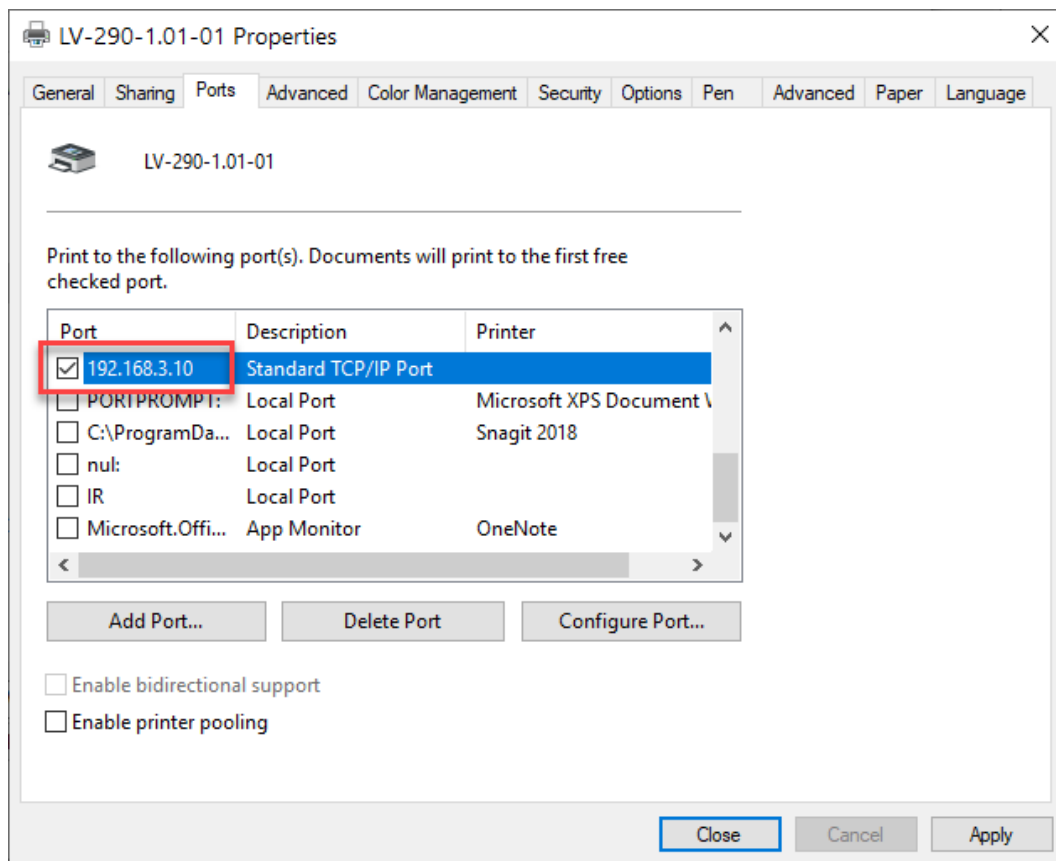
**Completing the Add Standard TCP/IP Printer Port Wizard**

You have selected a port with the following characteristics.

SNMP:	No
Protocol:	RAW, Port 9100
Device:	192.168.3.10
Port Name:	192.168.3.10
Adapter Type:	Generic Network Card

To complete this wizard, click Finish.

< Back Finish Cancel

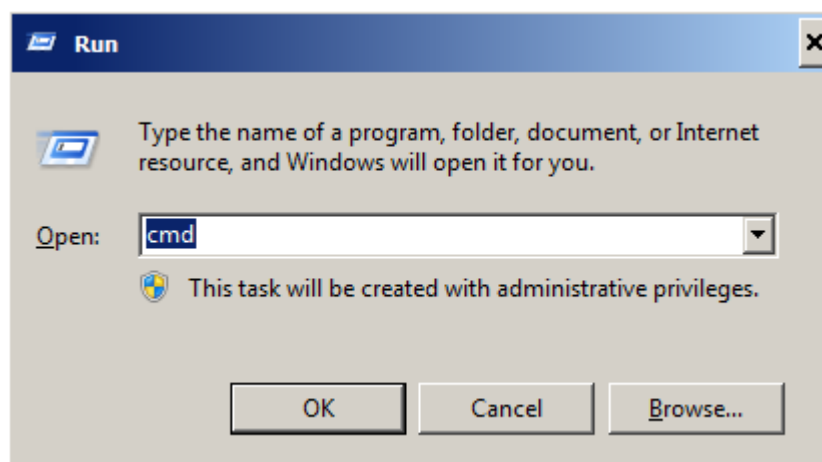


## Troubleshooting

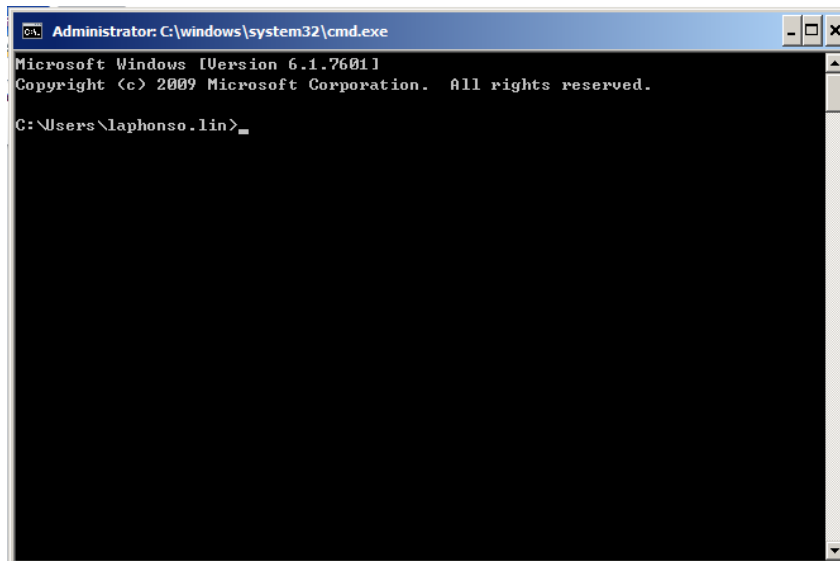
While users configure the Ethernet setting precisely with DHCP = OFF (assign the machine a static IP) referring to the manual, sometimes the communication might still not be able to work, at this time you can refer to below actions to have a basic troubleshooting with IT technician.

### 1. Verify the IP addresses you are using to see if they are valid.

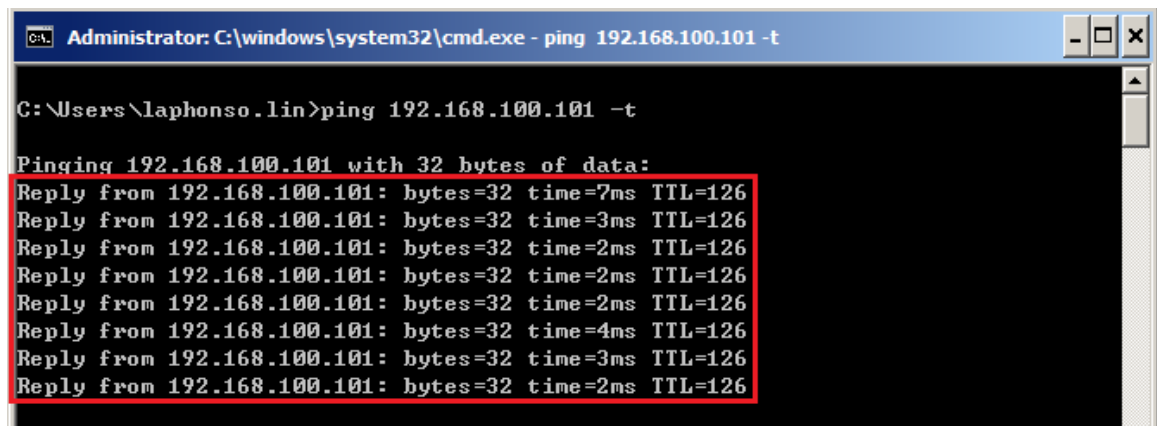
- i. Open command line mode in your windows system (Press Windows key + R, the "Run" window will appear, type "CMD" in the blank bar then press "OK" to open command line mode)



## Command line mode window

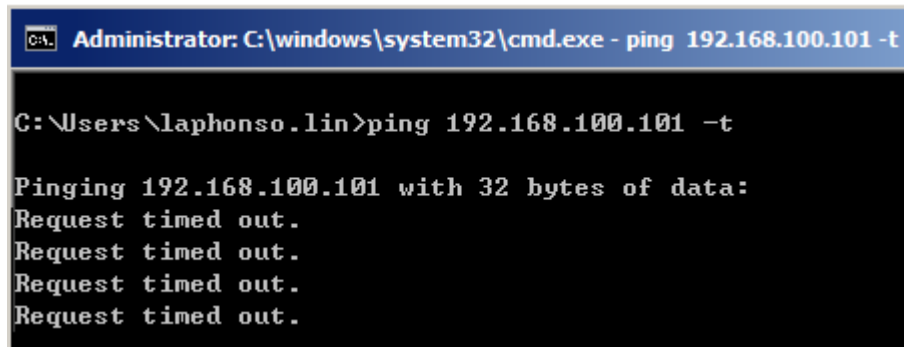


- ii. Type "ping x.x.x.x -t" after the prompt symbol, (x.x.x.x is the IP address you set on the laser machine, ie: 192.168.100.101), press "Enter" to run the "Ping" tool.



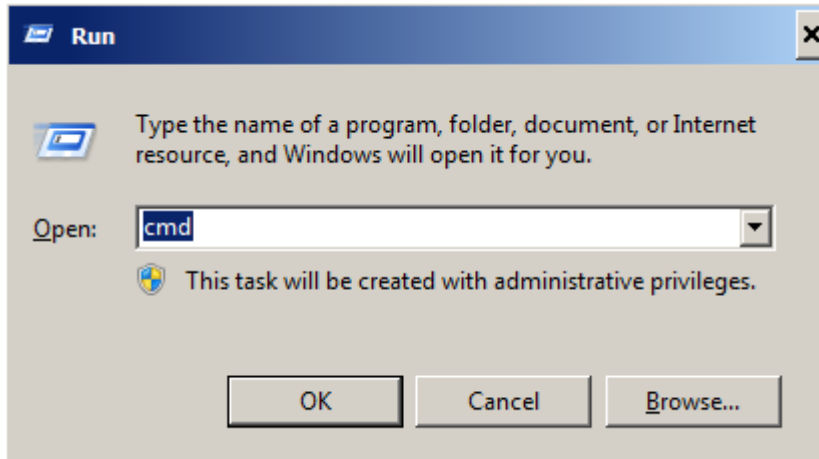
If the communication is OK between your PC and Laser machine, you will see reply from the destination IP.

If the communication is not ok, you will see "Request timed out" message from destination IP.



## 2. Diagnostics

- a. For cases the communication is not ok (can't get response, just have "Request timed out" from destination IP), you can look for two PC/Laptops which are original set in the LAN environment and work ok (they can get normal response from each other by the command "PING"), note down the TCP/IP configurations by running "ipconfig" on both PC/Laptops (press "Windows key + R" to call the "Run" windows, type "CMD" in the blank bar, press enter to start command line mode,



type "ipconfig" after the prompt symbol then press enter, the TCP/IP configurations of this PC/Laptop will show as below)

```
Administrator: C:\windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Users\laphonso.lin>ipconfig

Windows IP Configuration

Wireless LAN adapter Wireless Network Connection:

    Connection-specific DNS Suffix . . . : 
    Link-local IPv6 Address . . . . . : fe80::60bf:e478:9347:ef8e%12
    IPv4 Address. . . . . : 192.168.43.98
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.43.1
```

Set those two IP addresses to the laser machine and the PC/Laptop which you want to communicate with laser.

Test Ping again to see if you can get normal response from destination IP, if the communication is normal now (can get reply from destination IP), we can be sure the IP addresses we set originally are invalid, ask the LAN administrator to provide us a proper one.

- b. Directly connect the Laser machine and PC/Laptop using the RJ45 cable without any router/switch..etc. in between, test PING and send files, if the files can be sent and the result of PING is normal (can get response from destination IP), the Ethernet function of LV-290 is normal, it should be something wrong in the LAN environment , ask the administrator of the LAN to solve the problem.

### 4.1.3 USB Storage Setup

This machine is built-in with USB storage port allow you to transmit data from USB flash drive. You can format and use a USB flash drive as an USB storage of this machine.

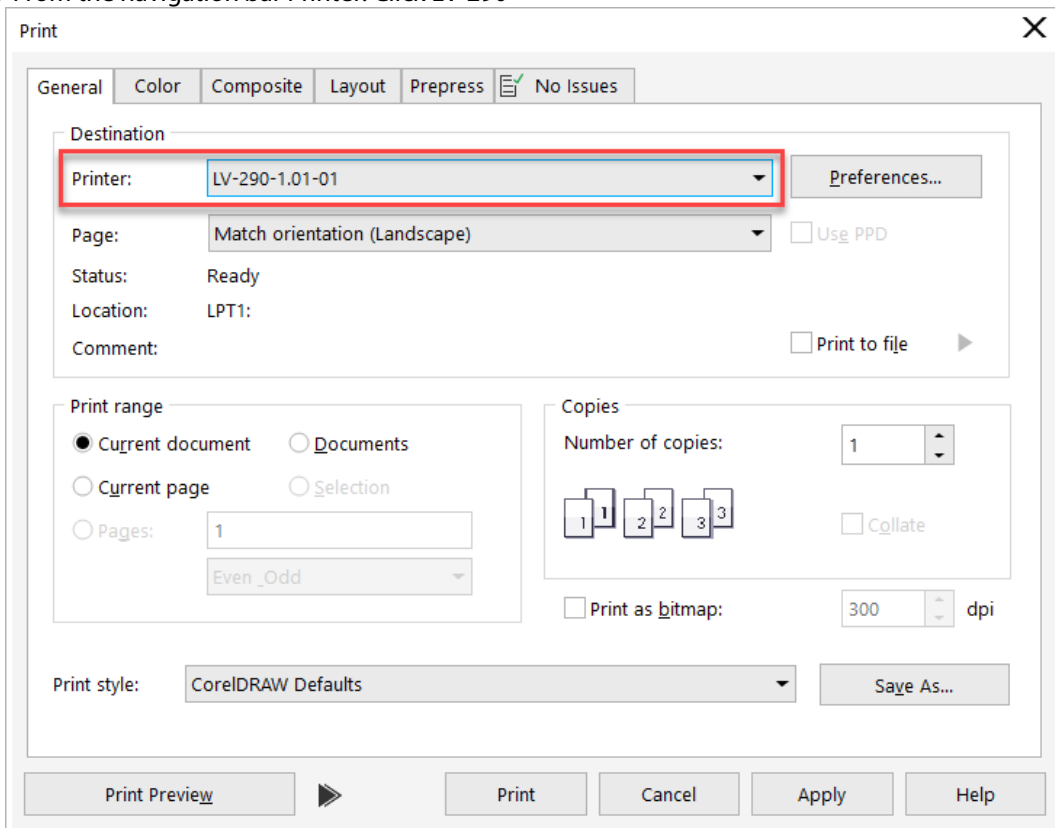
#### USB flash drive minimum requirements

- Windows FAT16/FAT32 file system format
- A maximum of 32G of storage capacity

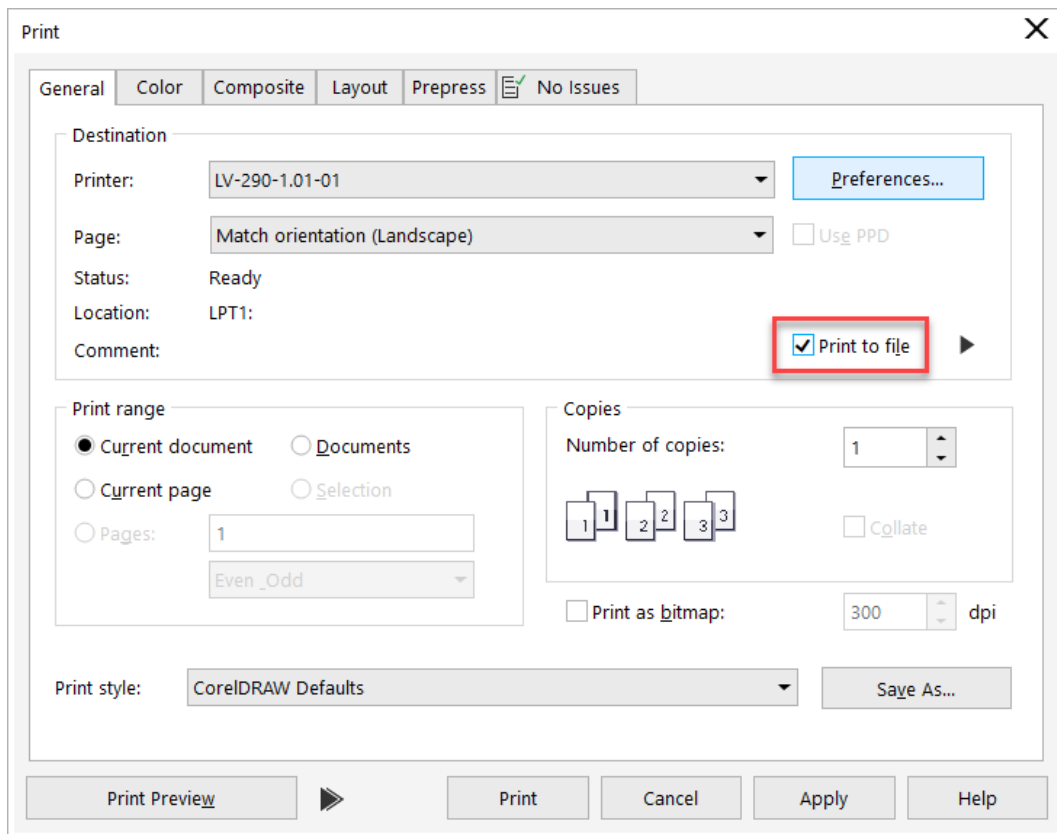
Step 1. Make sure the page setup and orientation is match LV-290. Please refer to Chapter 5.2.1 for page setup and orientation.

Step 2. Open the file in graphics software and click File → Print from menu bar, and the Print window will appear

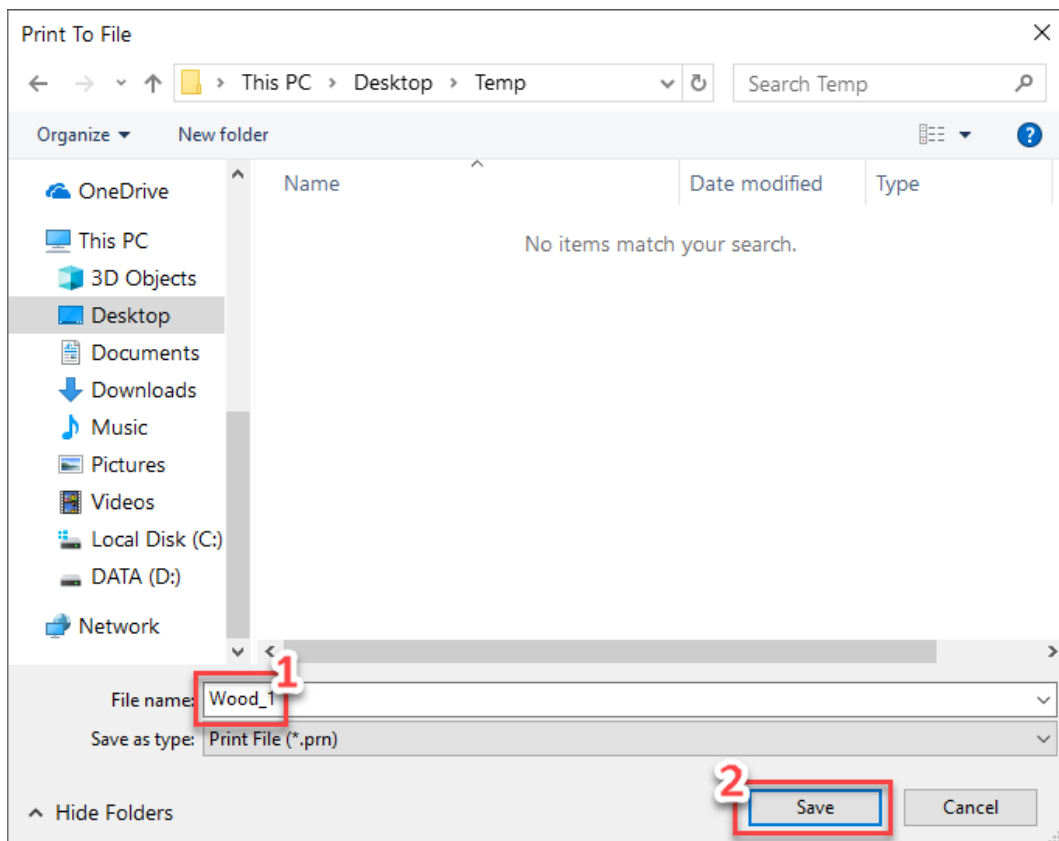
Step 3. From the navigation bar Printer. Click LV-290



Step 4. Checking the Print to file checkbox and click the Print button.



Step 5. Select the save folder and define file name, then click "Save" to convert



Step 6. Move the file to the USB flash drive

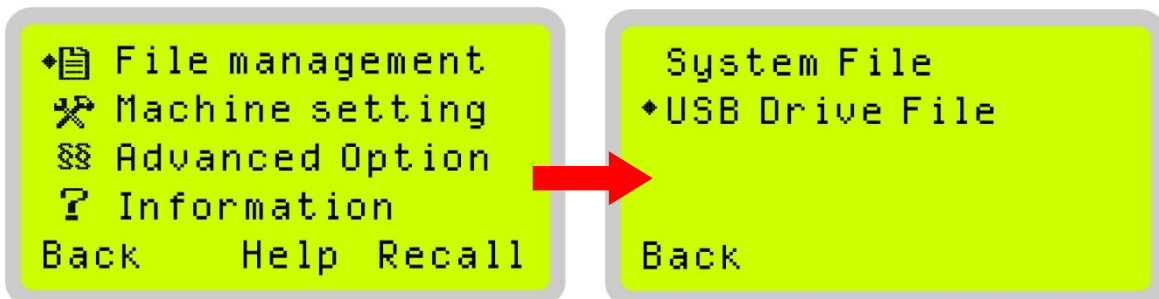
Step 7. Insert USB flash drive to the USB Storage port of this machine



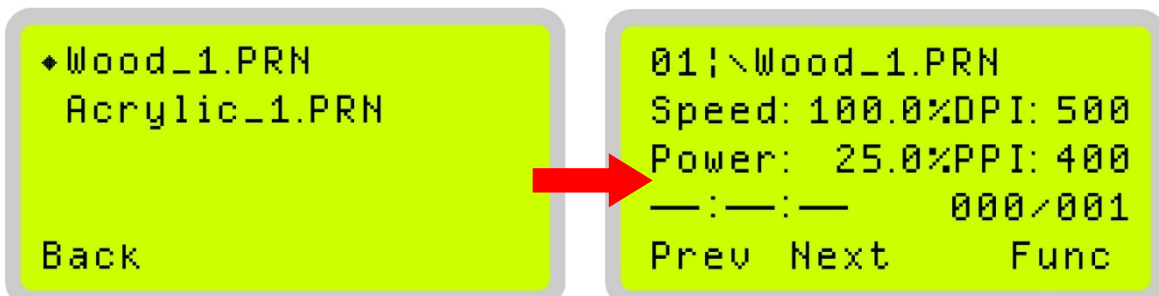
**NOTE**

USB storage function only supported for the PRN format, you can convert the file to PRN format from the printer driver.

Step 8. Navigate the control panel through <F4> Function→ <File Management>→ <USB Drive File>



Step 9. Choose the file and press Enter button from control panel to transmit the file to laser engraver.



Step 10. Press START button on control panel to begin laser jobs.

**NOTE**

File cannot be written to laser machine, please do not remove the USB flash drive if you want to keep process the job.

## 4.2 Graphics Software Setup

The LV-290 is compatible with graphics software that can output HPGL commands, such as CorelDRAW, Adobe Photoshop, AutoCAD, Illustrator etc.

### NOTE

Technical support will not be offered, if you experience output problems with non-supported graphics software.

### 4.2.1 Recommended Computer Configuration

The LV-290 operates under Windows operating systems and is designed to work on a computer that meets the following minimum requirements.

#### Computer Compatibility

- CPU – Pentium 90 (or equivalent) or greater
- RAM – 32 MB or higher
- HDD – 1.2 GB Hard Drive or greater
- SVGA – 15" Super VGA Monitor
- On Board Parallel Mode (Enabled from motherboard's BIOS)
- SPP – Preferred Mode
- ECP – Cable (Less than 1.8 meters)

#### Software Compatibility

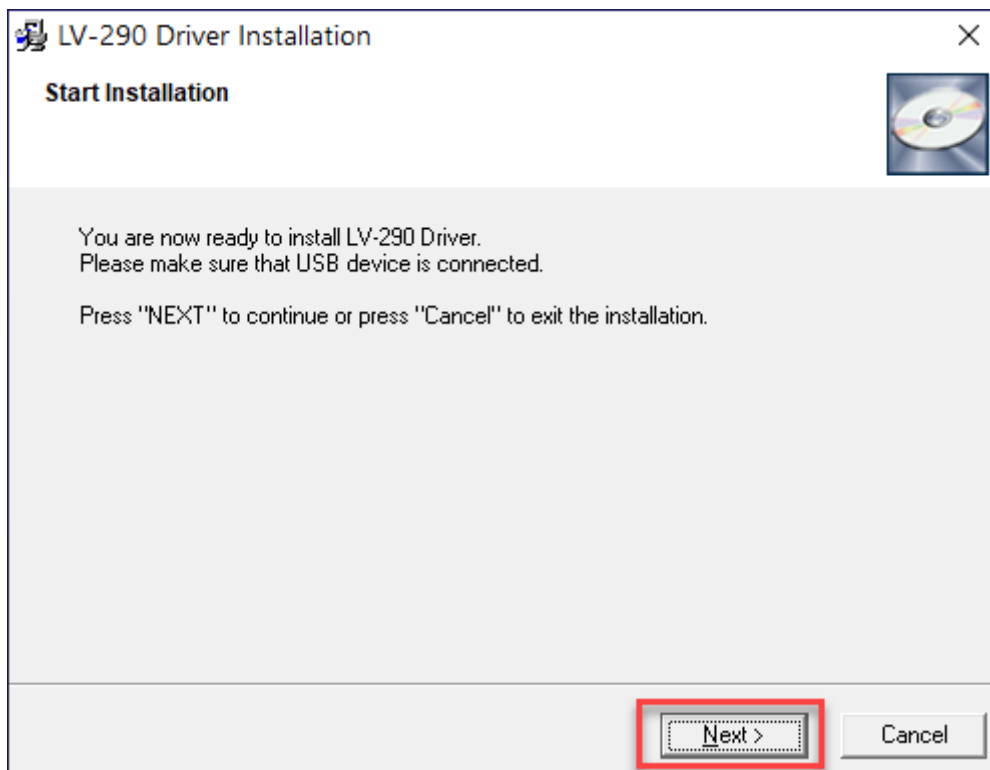
- The LV-290 printer driver is design for Windows 7, 8.1, 10 or other operating systems developed subsequently.

### 4.2.2 Installation of the Printer Driver

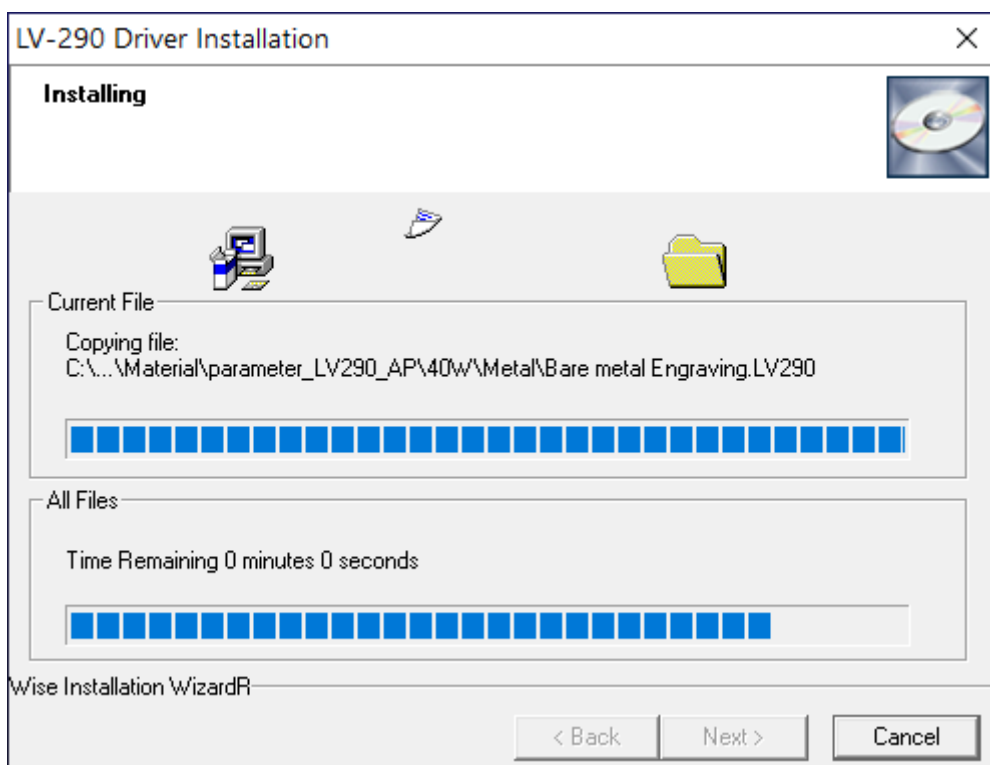
- 1) Take out the installation disk from the accessory box and insert to CD-ROM drive of computer. Wait few seconds for the CD Manager to begin the setup automatically.
- 2) Click on <LV-290> → <Printer Driver> from the menu of the installation CD.



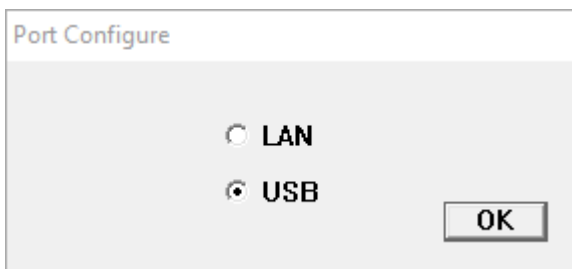
- 3) Click <Next>.



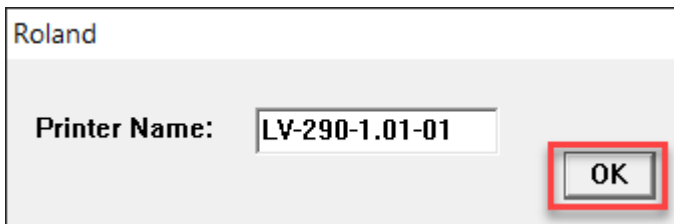
- 4) The installation would be finished in few seconds.



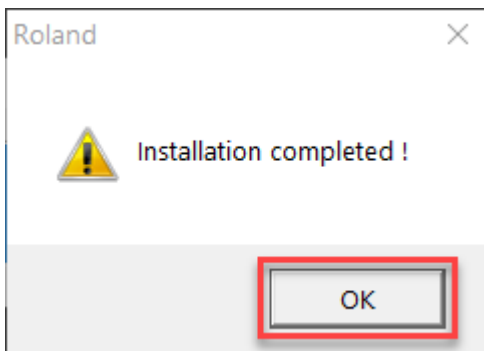
5) In the installation process, please choose the port configure, and press <OK>



6) After set the port configure, installation will show the window of printer name, please click <OK>



7) Click <OK> to complete the installation.



#### NOTE

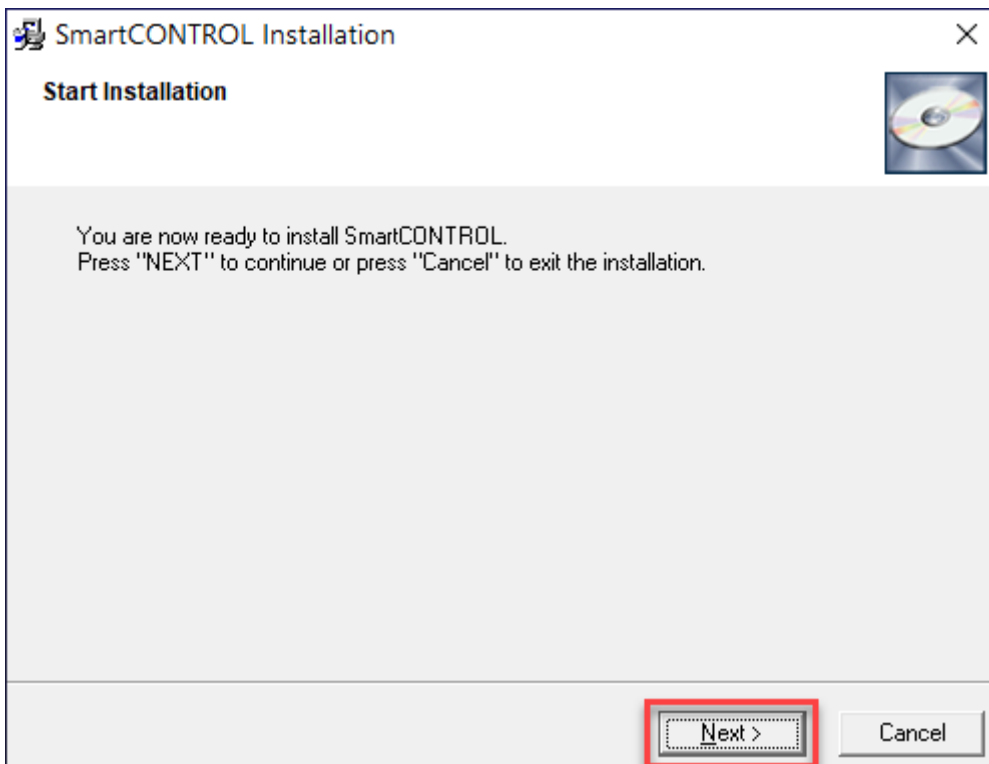
When working with the LV-290 Printer Driver within your graphics software, you will need to have the LV-290 set as the default printer to get proper output. If you select to not have the LV-290 to be the default printer, please remember to manually change this on your own from within the graphic software printer selection area or from the Windows Control Panel → Printers and Faxes section.

### 4.2.3 Installation of the SmartCONTROL Vision

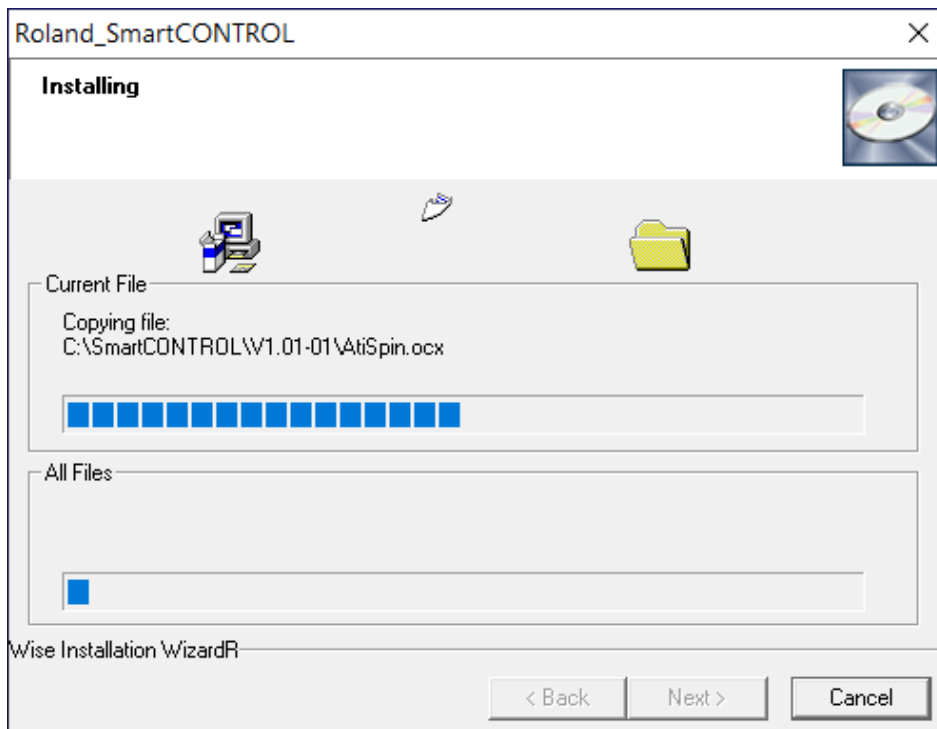
- 1) Turn the LV-290's power on.
- 2) Take out the SmartCONTROL™ installation disk and insert to CD-ROM drive of computer. Wait few seconds for the CD Manager to begin the Setup automatically.
- 3) Click on "Install SmartCONTROL" from the menu of the SmartCONTROL™ installation CD.



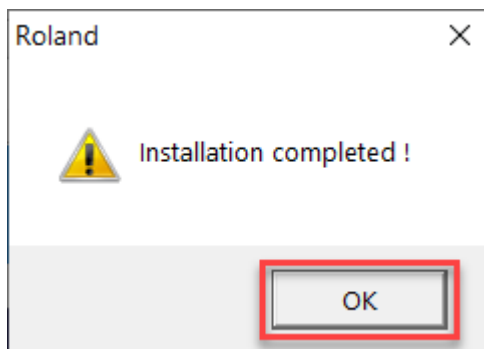
- 4) Click "Next"



5) The installation would be finished in few seconds.



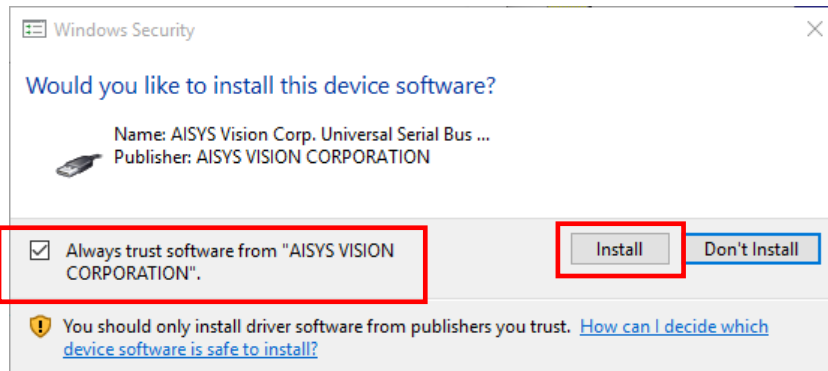
6) Installation is complete, please click "OK" button to continue the Device Driver installation.



7) The Device Driver Installation Wizard window will pop up, click "Next" to continue.



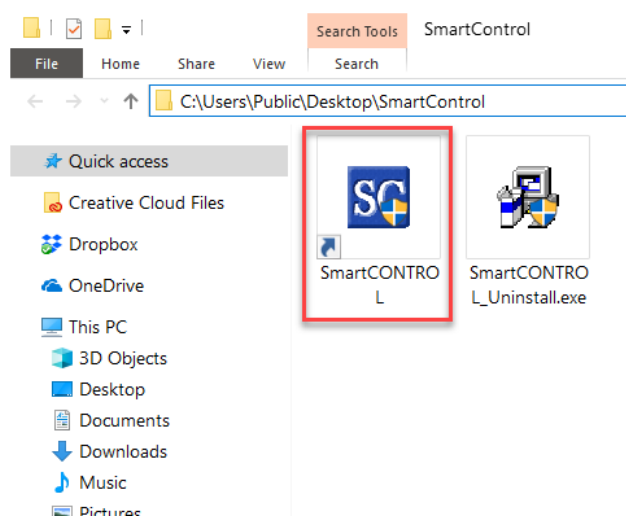
- 8) Windows security dialog box will appear and ask you "Would you like to install this device software?", choose "Always trust software from AISYS VISION CORPORATION" and click "Install" button to continue.



- 9) After installing the device driver, click "Finish" to close device driver installation wizard window.



- 10) When installation is complete, SmartCONTROL™ will create a "SmartCONTROL" folder on windows desktop, open the folder and double click SmartCONTRL.exe to run the program.

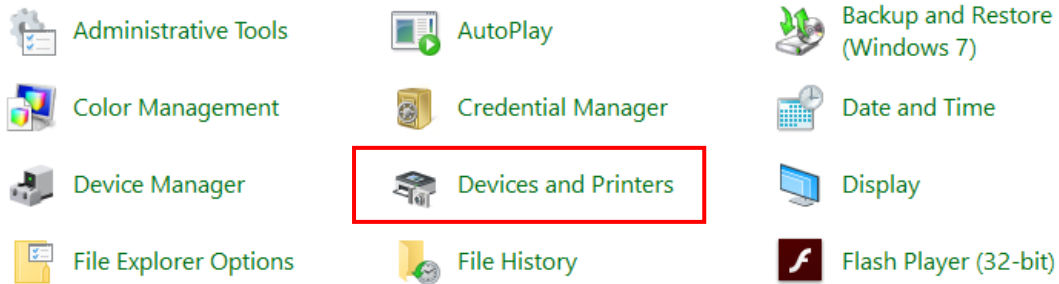


## 4.2.4 Using Adobe's AP with this machine

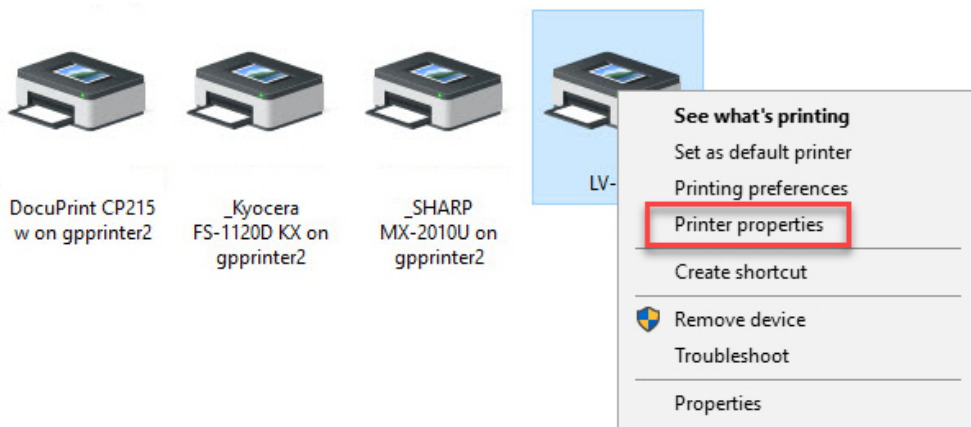
The Adobe's AP (e.g. Illustrator, Photoshop or Acrobat reader) processes files via its Advanced Printing Features; users should firstly deselect Enable Advance Printing Features; otherwise the machine is unable to recognize or read general files when uploaded.

### Deselect "Enable Advance Printing Features"

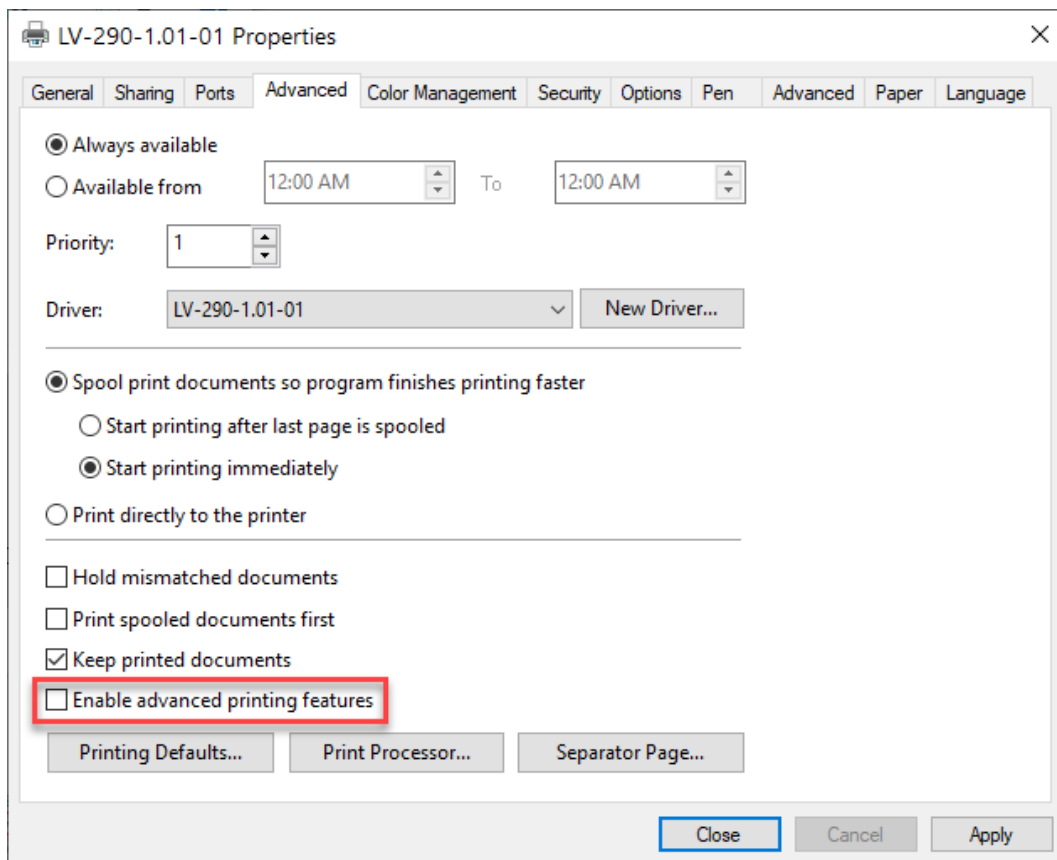
- 1) Click to select → Control Panel → Devices and Printers



- 2) Select your printer (for example, LV-290), right-click your mouse and choose Printer properties to enter LV-290 Properties setup

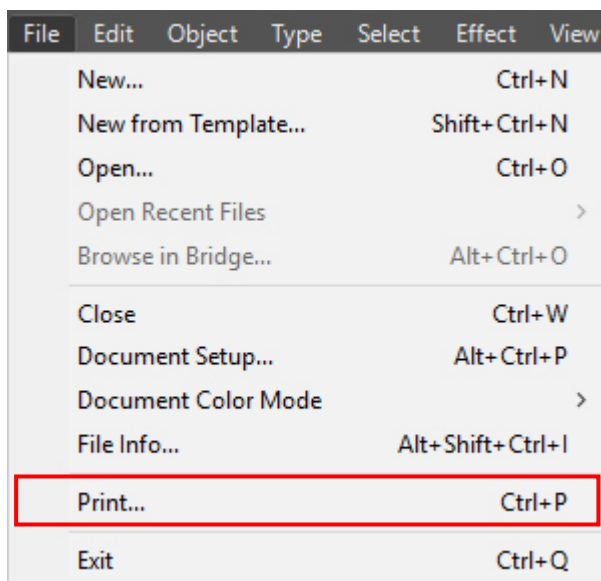


- 3) The click the Advanced tab, then deselect Enable Advanced Printing Features, now all files can be recognized and uploaded.

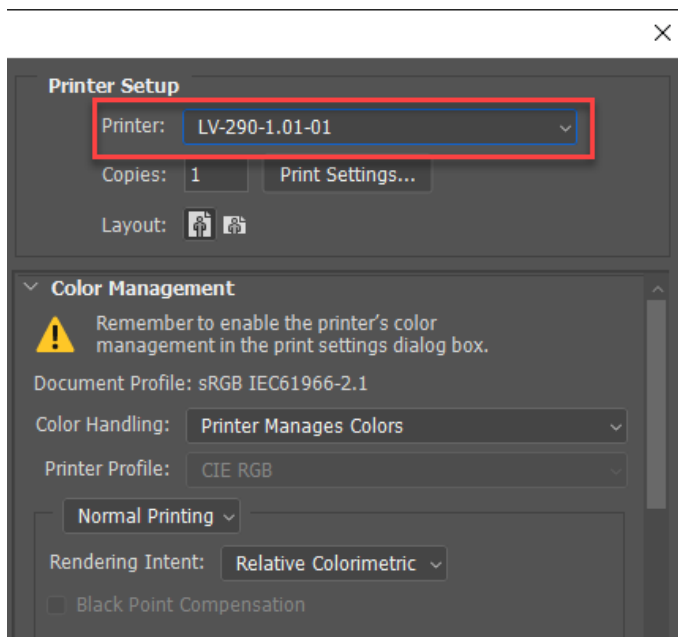


## File Transfer

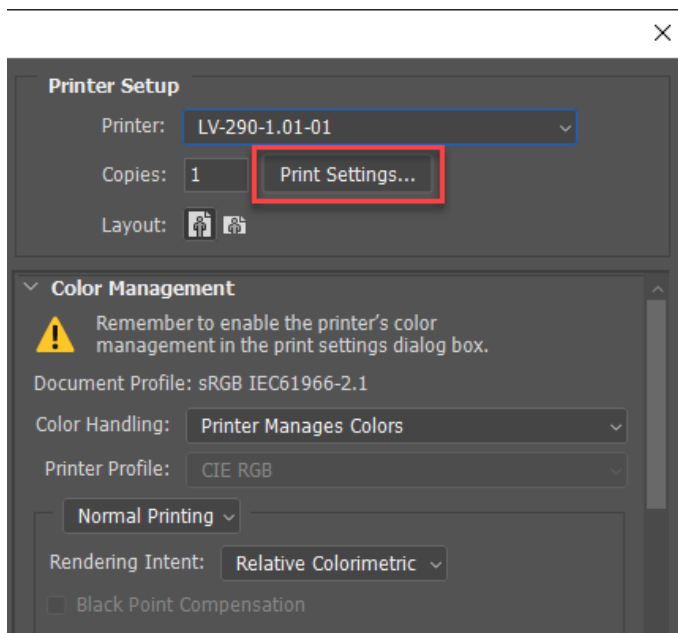
- 1) Select your working object, and then at the upper toolbar please choose File → Print.



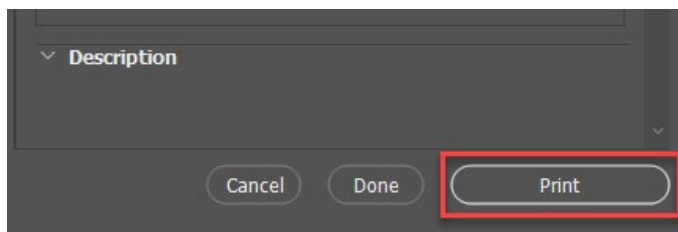
- 2) At the print setup screen, at Print Preset please select Custom, and choose LV-290 printer driver.



- 3) Then click on the "Print Settings..." button to enter Preferences settings.

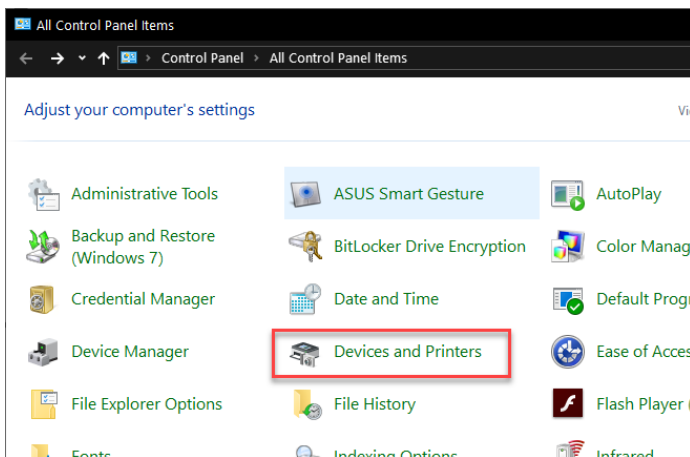


- 4) After all preferences are set, click Print to send file to the machine for print out.

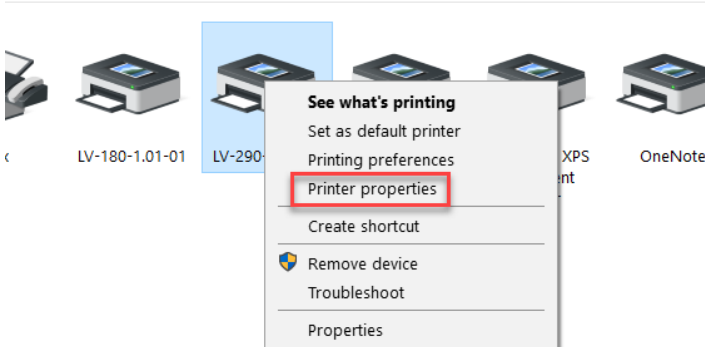


## Adobe Illustrator Output Instruction

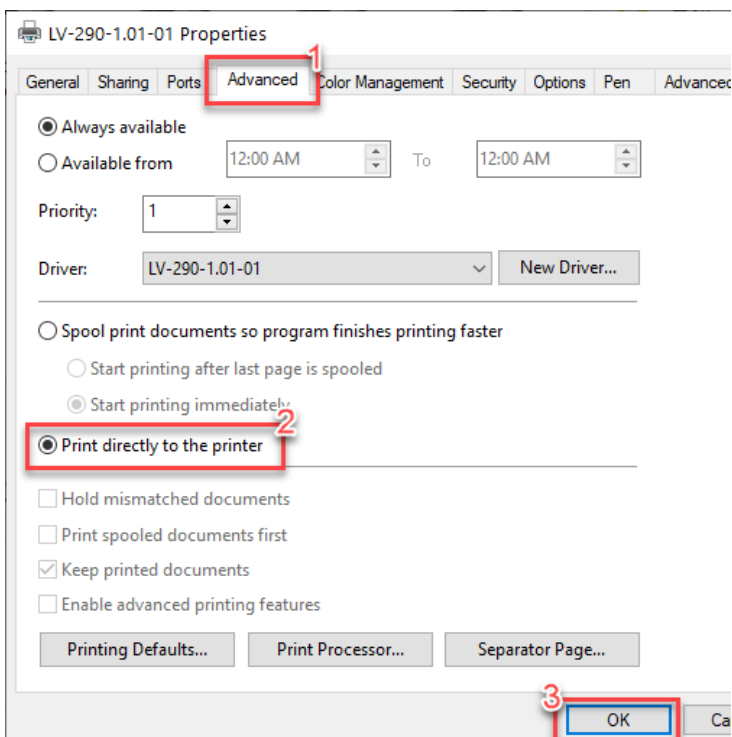
Step 1. Go to "Control Panel" → "Devices and Printers"



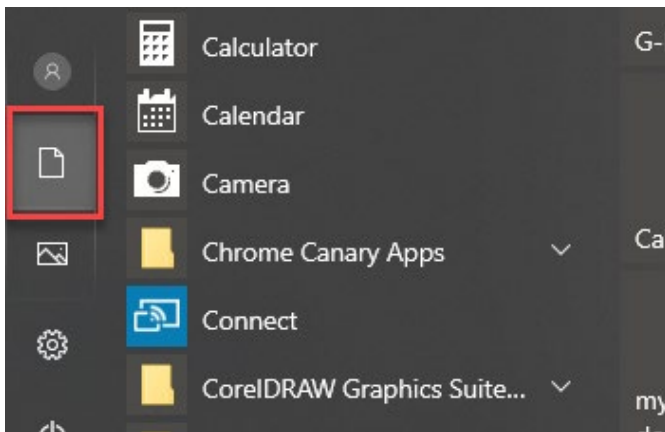
Step 2. Right click on the icon of the laser machine model and select "printer properties"



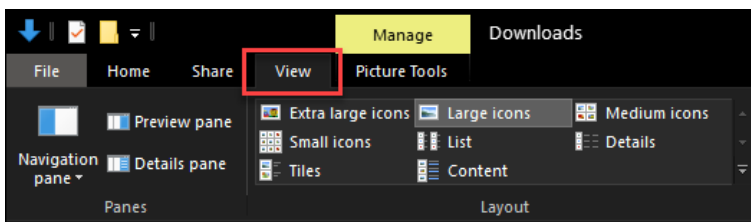
Step 3. Go to the "Advanced" tab and select "Print directly to the printer", then click "OK" button to complete the settings.



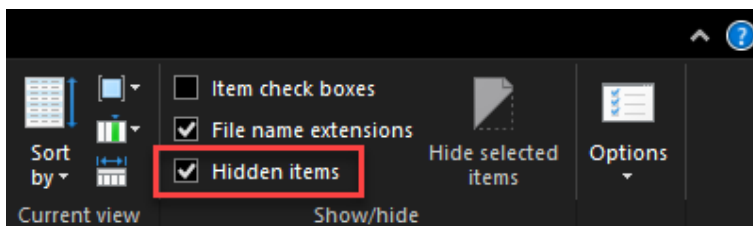
Step 4. Open "File Explorer" from the taskbar.



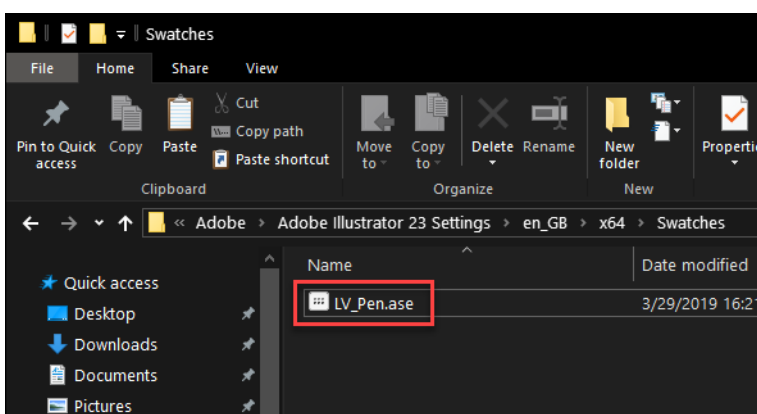
Step 5. Double click the "View" tab to expand the menu bar.



Step 6. Check the "Hidden items" checkbox to view hidden items.



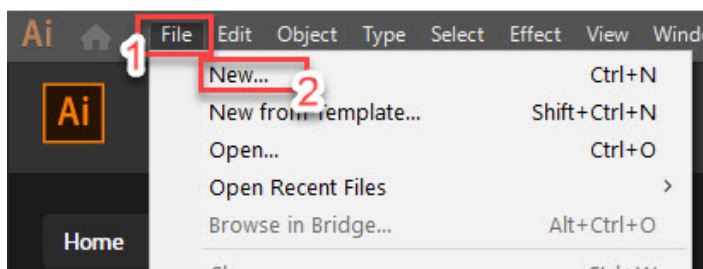
Step 7. Extract the file and copy the "Laser\_Pen.ase" to C:\Users\your user name\AppData\Roaming\Adobe\Adobe Illustrator 23 Settings\en\_US\x64\Swatches



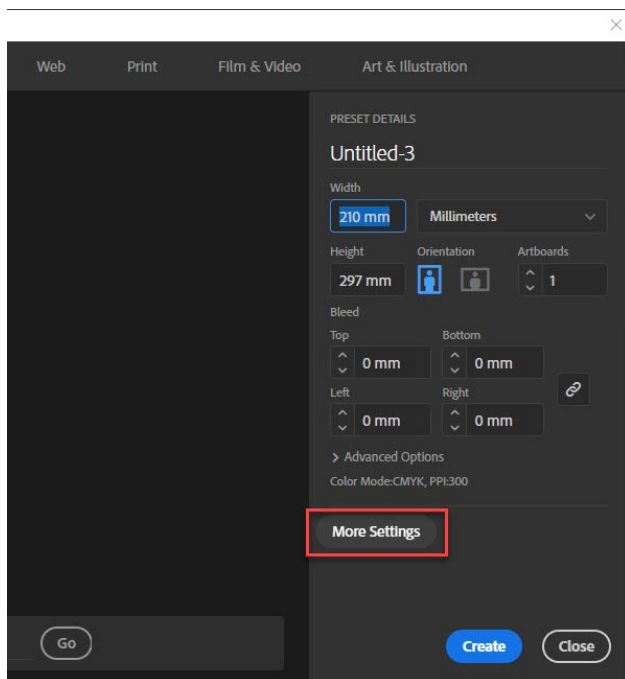
If you don't have the Laser\_pen.ase file, please browse the installation CD.  
Click on <Browse CD> from the menu of the Roland DG installation CD.

Step 8. Run the Adobe Illustrator.

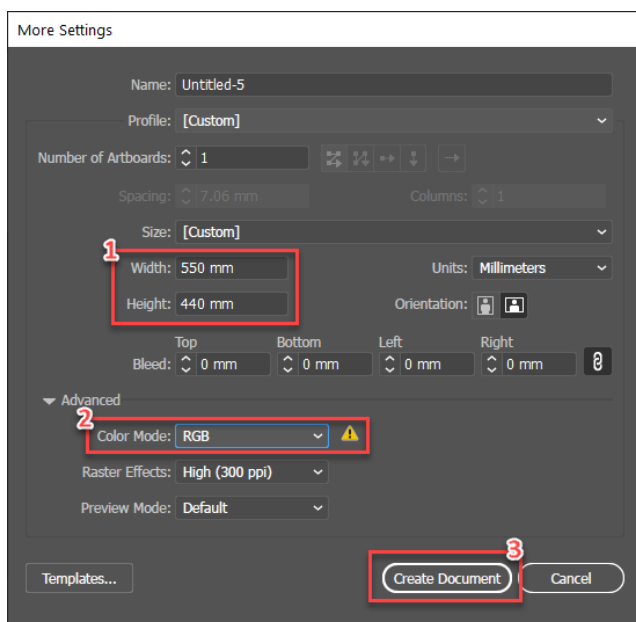
Step 9. Click “File” → “New...” from the menu bar.



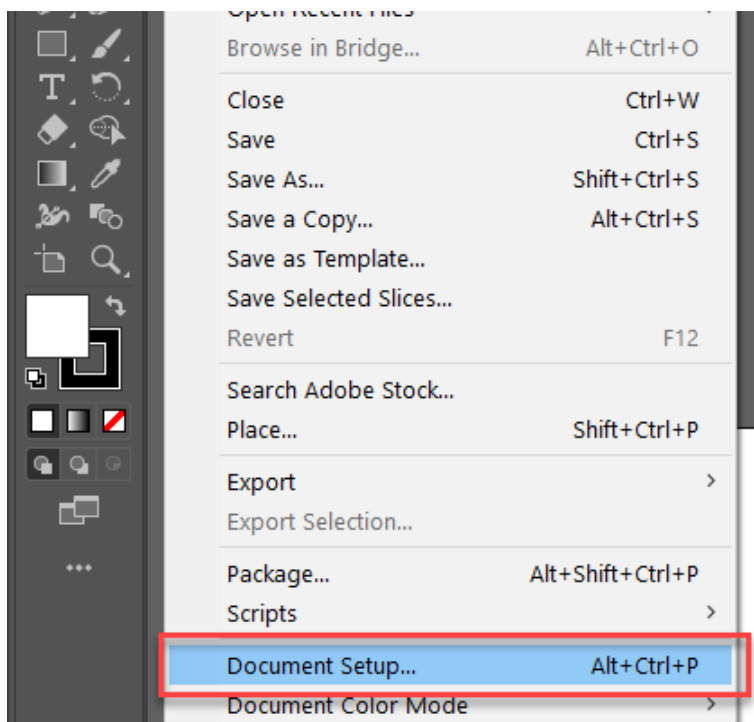
Step 10. Click “More Settings”



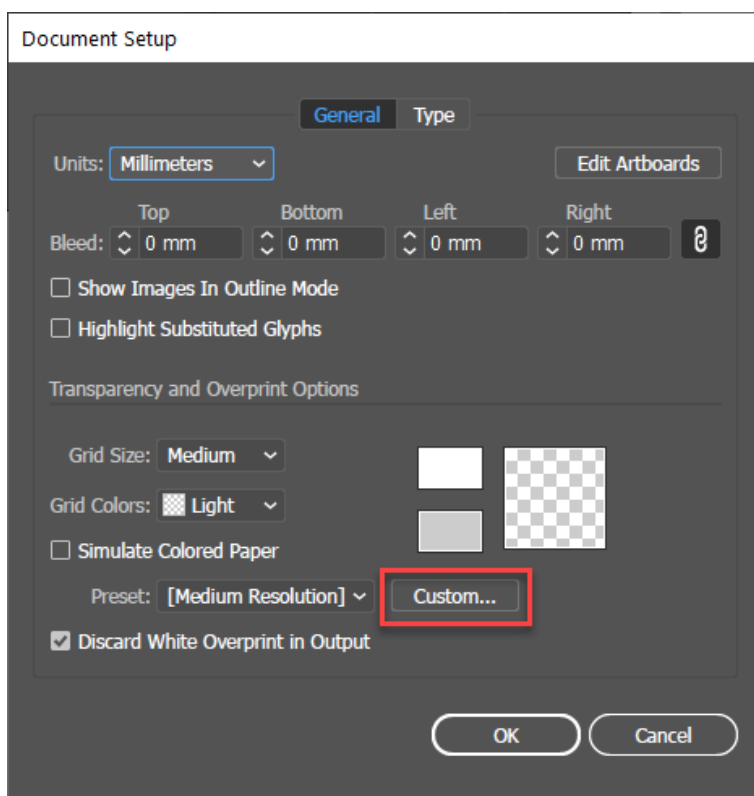
Step 11. Input the Width and Height of working area according to your machine model and set the Color Mode to “RGB”. Then click “Create Document” button to create the document.



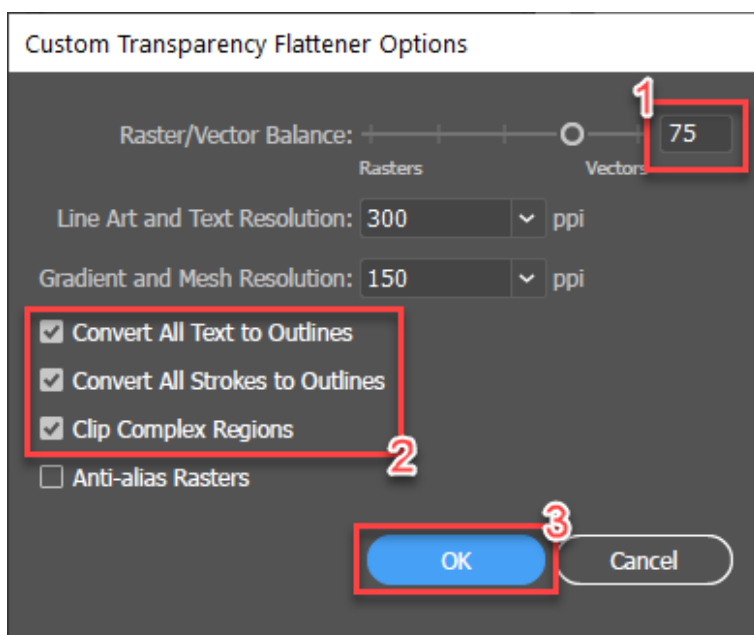
Step 12. Click “File” → “Document Setup...” from the menu bar to set the document.



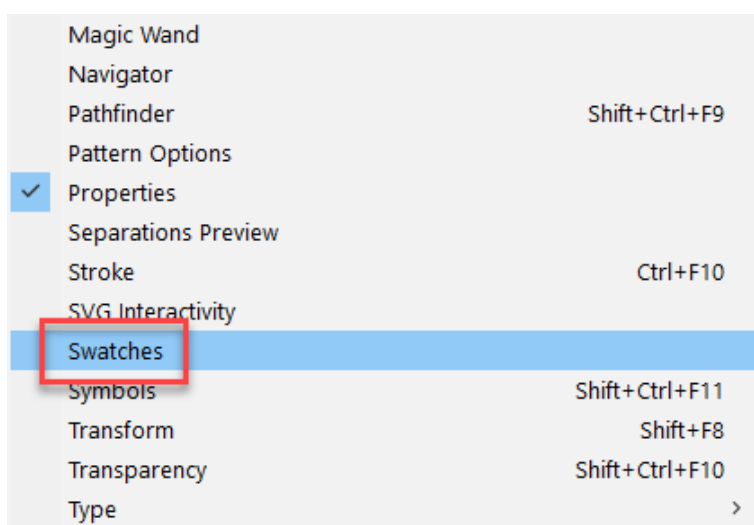
Step 13. Click “Custom...” button and the “Custom Transparency Flattener Options” window will pop up.



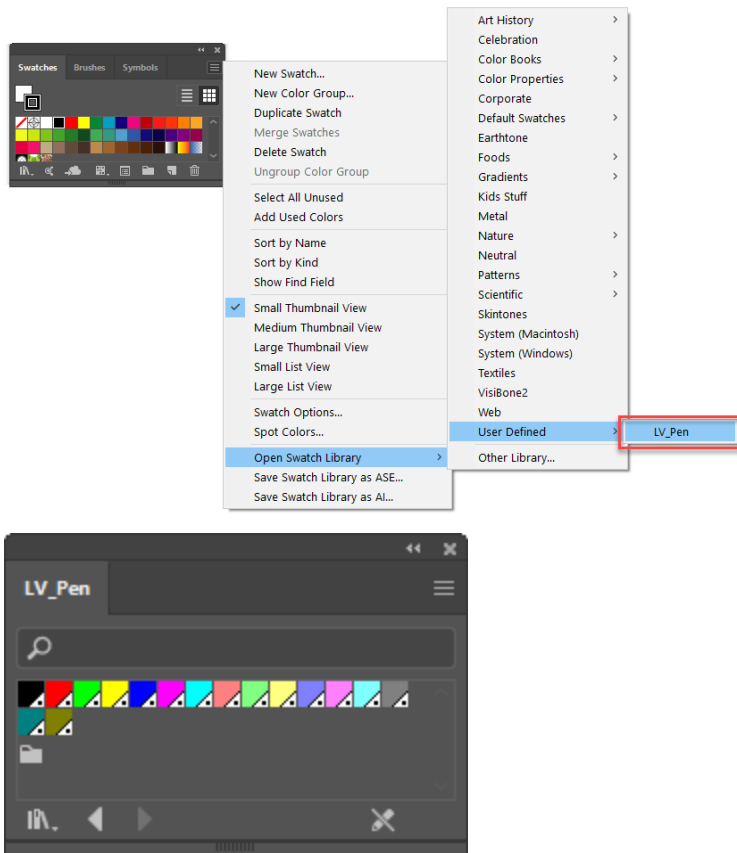
Step 14. Set “Raster/Vector Balance” to 75, and check “Convert All Text to Outlines”, “Convert All Strokes to Outlines”, and “Clip Complex Regions” checkboxes, then click “OK” to close the window.



Step 15. Click the “Window” from the menu bar and click the “Swatches”, and then the “Swatches” window will pop up

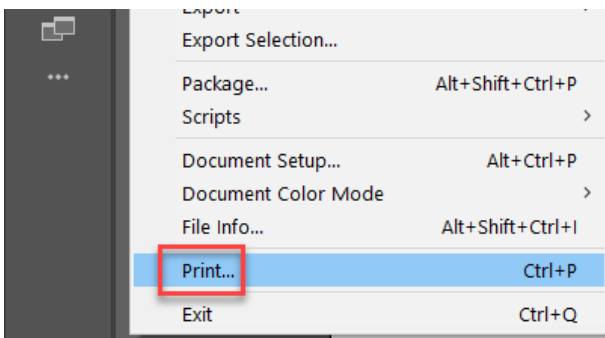


Step 16. Click the menu of the Swatches and select “Open Swatch Library” → “User Defined” → “Laser\_Pen” to open the swatch library.

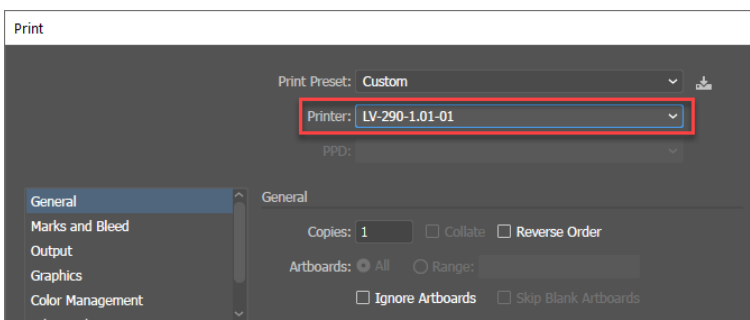


Step 17. Draw your artwork and assign the colors from the Laser\_Pen swatch library.

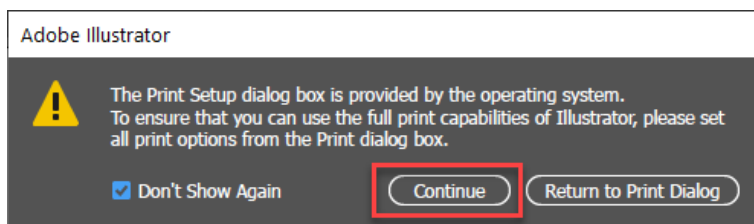
Step 18. After the drawing is complete, please click “File” → “Print” from the menu bar, then the “Print” window will pop up.



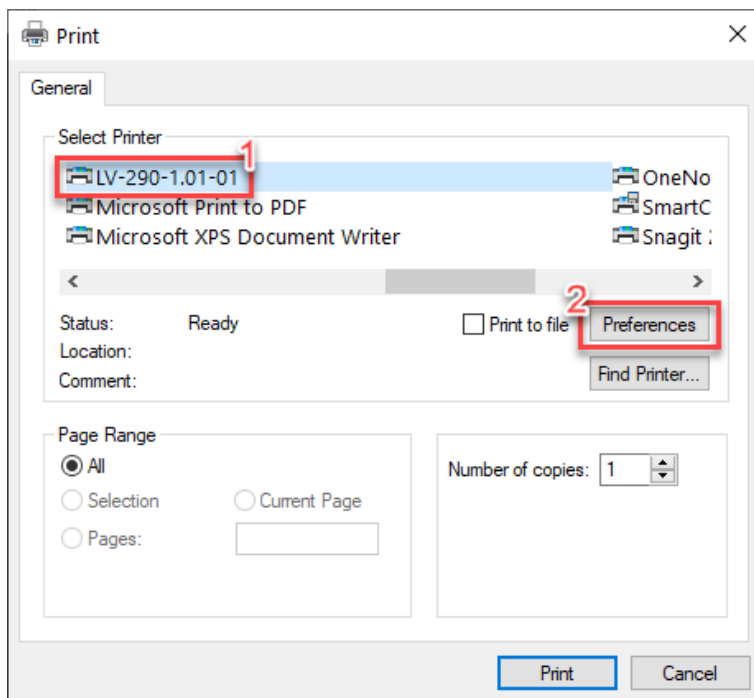
Step 19. Select your printer from the printer list.



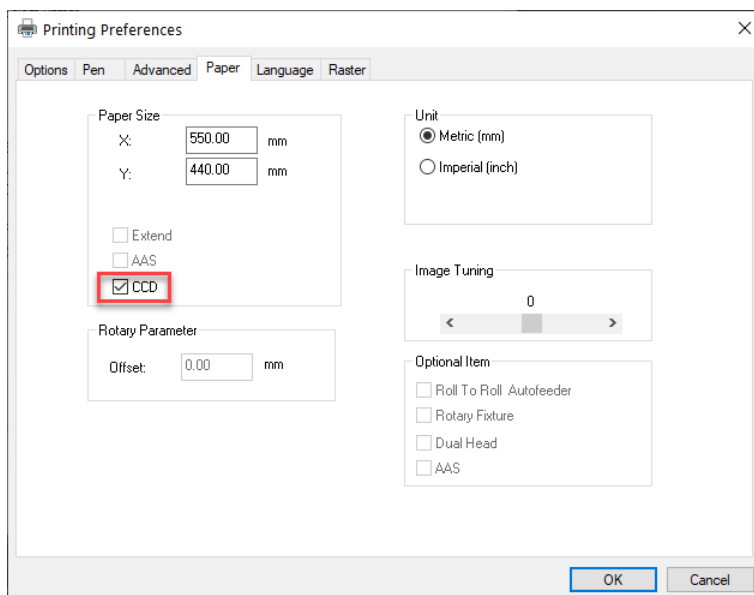
Step 20. Click the “Setup...” button to set your parameter. Adobe Illustrator will show a message of the printer. Please check the “Don’t Show Again” checkbox and click “Continue” button to set the printer parameter.



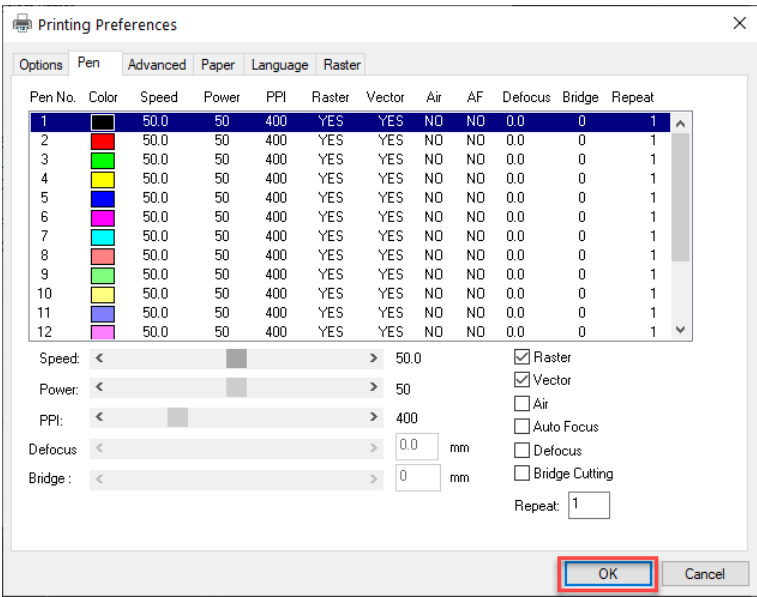
Step 21. Select your machine and click the “Preferences” button, then the “Printer Preferences” window will pop up.



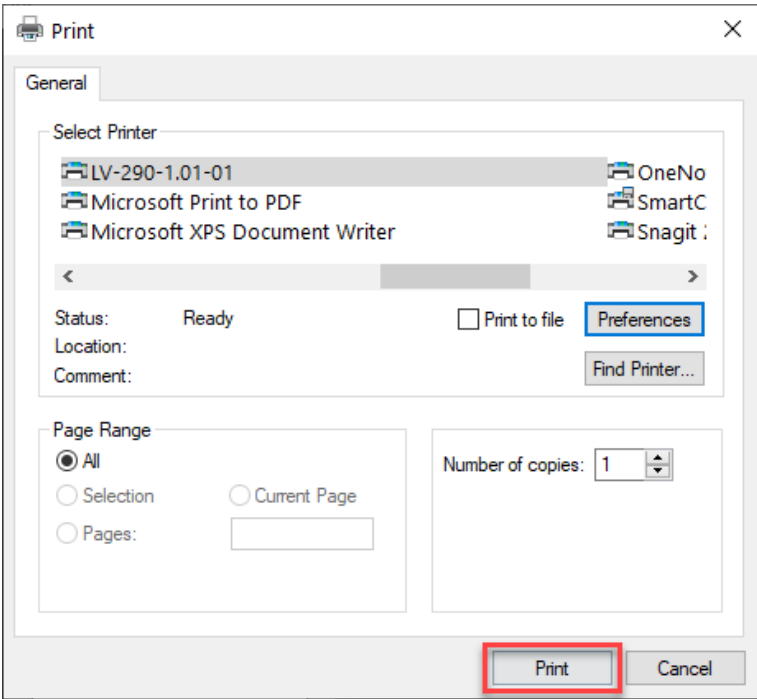
Step 22. Go to “Paper” tab and check the “CCD” checkbox if the machine has installed the SmartVISION Pro CCD.



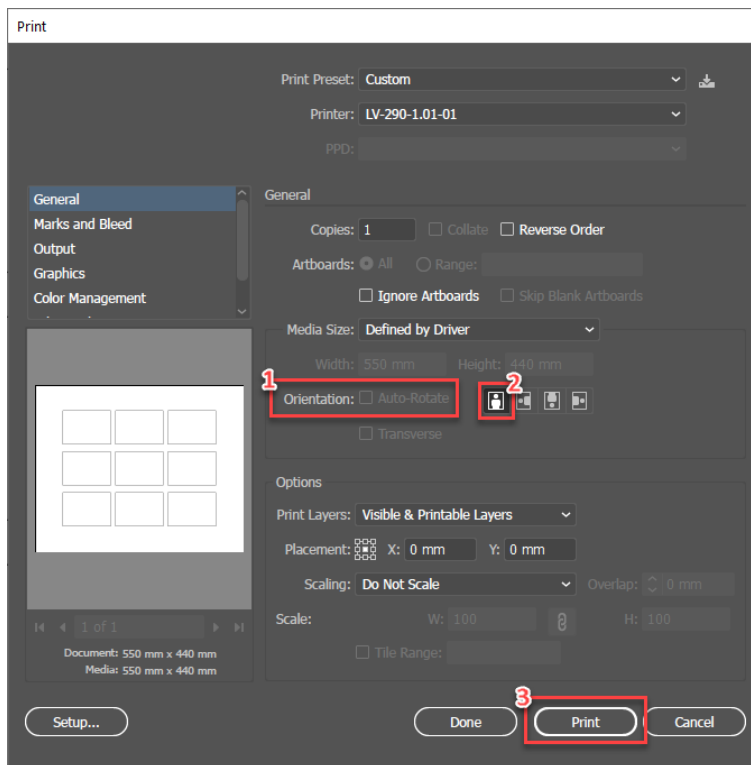
Step 23. After the parameter setting is completed, click “OK” button to close the “Printer Preferences” window.



Step 24. Click “Print” button to close the “Print” window.



Step 25. Uncheck the “Auto-Rotate” checkbox and click  icon, then click “Print” button to send the file to your machine.

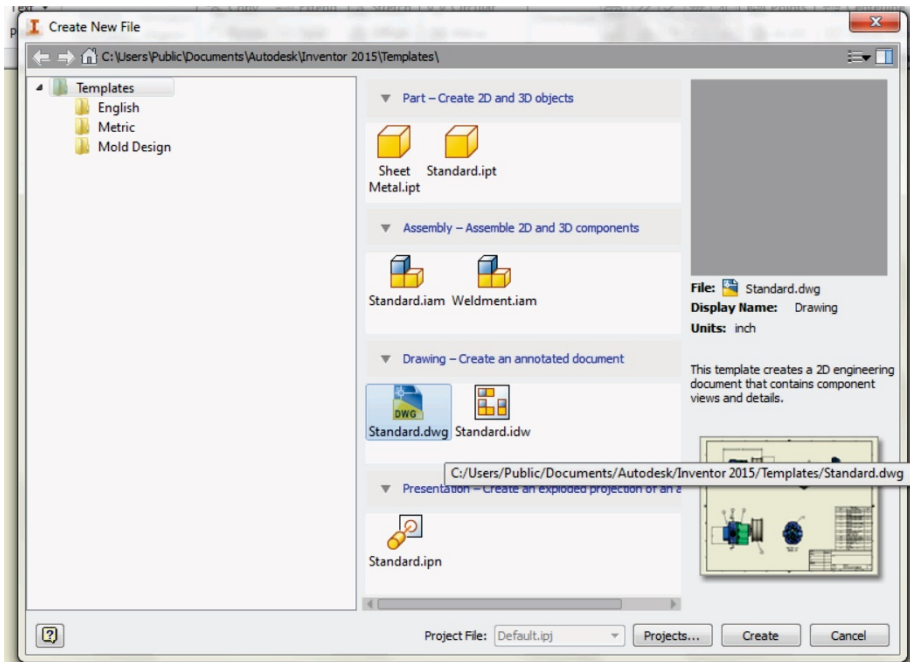


Step 26. Press the “Start/Stop” button on the control panel of the machine to start the job.

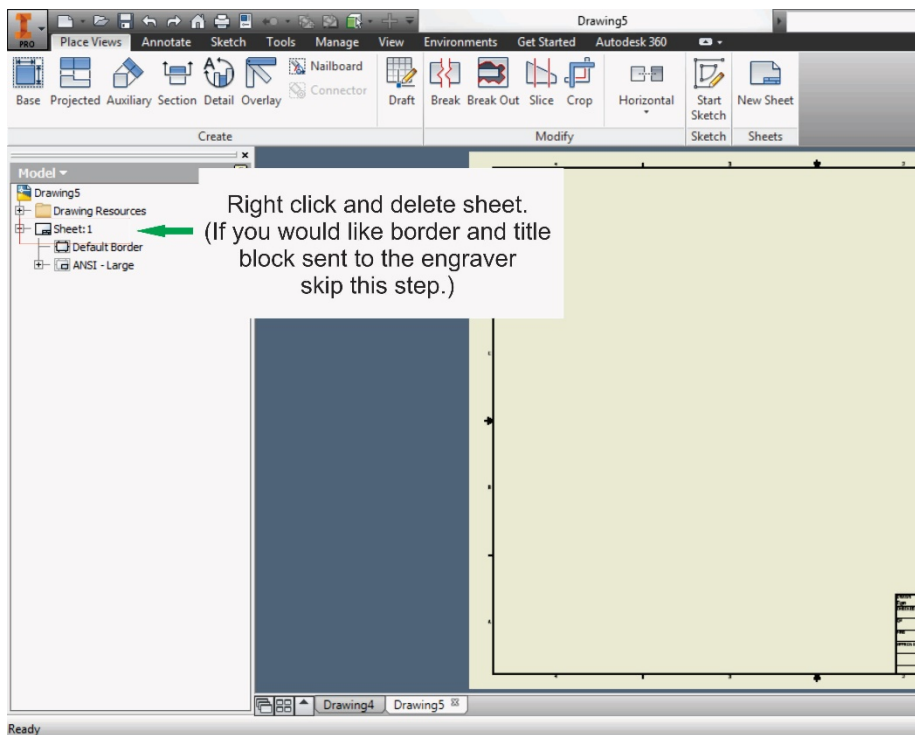


## 4.2.5 Using Autodesk Inventor with This Machine.

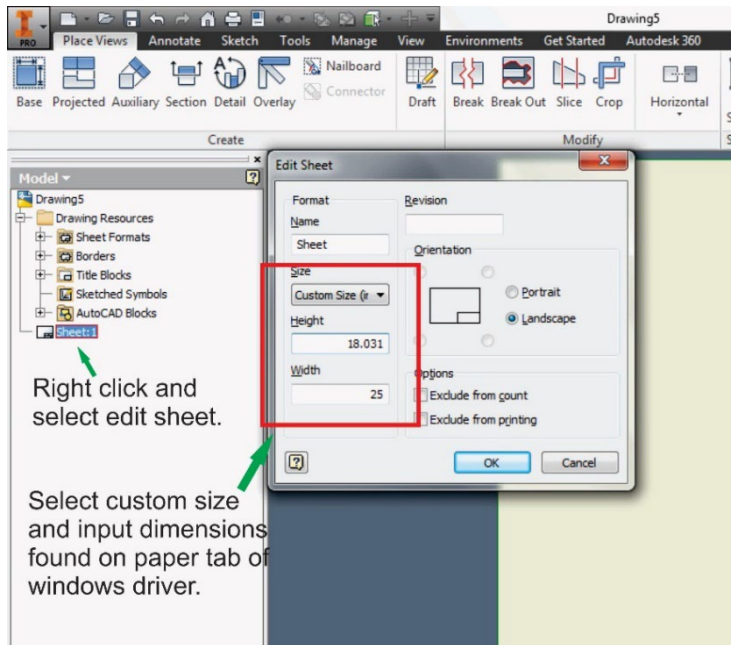
- 1) Start drawing.



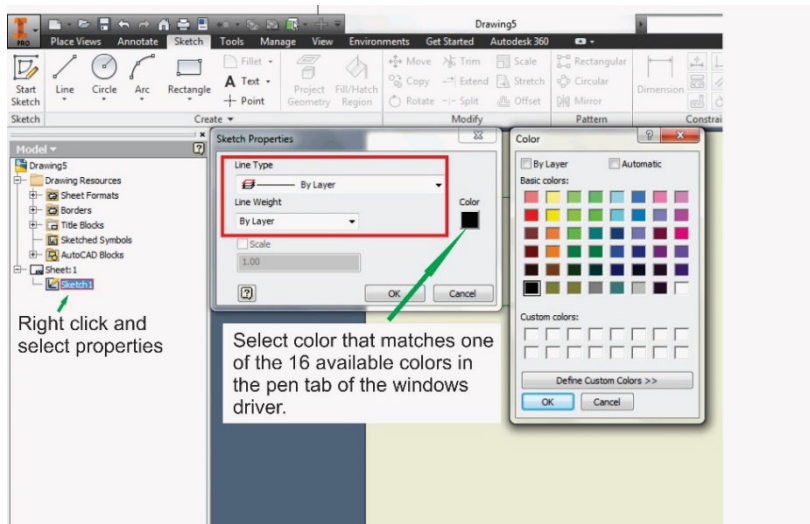
- 2) Delete border and title block by right clicking on sheet1 and selecting delete.



- 3) Set sheet size to match working area of engraver. Engraver working area can be found on the paper tab of the windows driver.

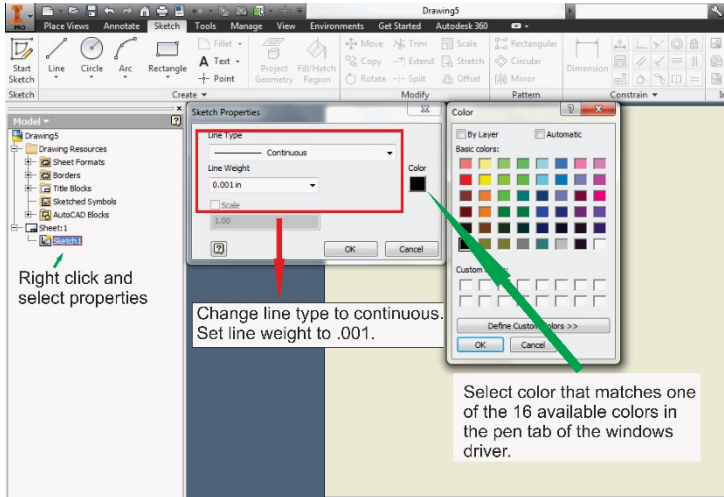


- 4) Start sketch.
- 5) Engraving
  - a. Finish sketch.
  - b. Right click on sketch and select properties.
  - c. Line Type: By Layer
  - d. Line Weight: By Layer
  - e. Set color to match one of the 16 colors available in the pen tab of the windows driver.



## 6) Cutting

- a. Finish sketch.
- b. Right click on sketch and select properties.
- c. Line Type: Continuous
- d. Line Weight: .001 in.
- e. Set color to match one of the 16 colors available in the pen tab of the windows driver.



### NOTE

All objects created in one particular sketch will have the same properties meaning all will engrave or all will cut. If you would like to engrave and cut in the same job you will need at least two sketches, one with all the engravings and another with all the cuts, to do so properly.

# 5

## Chapter 5 Operating LV-290

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### Using the Hardware

- Laser Key Switch
- Adjusting the LCD Display Screen's Contrast Setting
- Graphic Control Panel Overview (Description)
- Graphic Control Panel Navigation Chart
- Graphic Control Panel Function Pages

### The LV-290 Printer Driver

- Page Setup and Orientation
  - Color Management
  - Using the LV-290 Printer Driver
  - LV-290 Printer Driver >> Options Page
  - LV-290 Printer Driver >> Pen Page
  - LV-290 Printer Driver >> Advanced Page
  - LV-290 Printer Driver >> Paper Page
  - LV-290 Printer Driver >> Language Page
-

Once you have installed the USB Driver of this machine (for use with USB connection) and have connected the LV-290 to your computer, you will need to familiarize yourself with the LV-290 control panel and Printer Driver. The printer driver will be where specific laser parameters for your jobs are configured, while the control panel will allow you to set repeat times, manipulate file order, perform auto / manual focusing, and more.

## 5.1 Using the Hardware

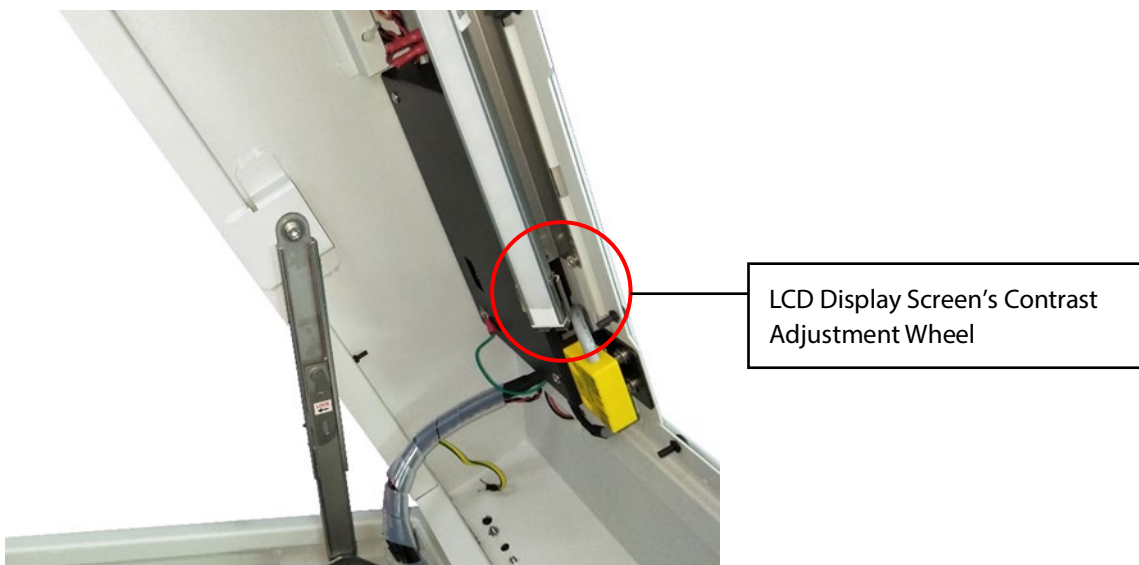
### 5.1.1 Laser Key Switch

Turn the key-switch to the "ON" position BEFORE powering on the machine. If the key-switch is turned to the "OFF" position, the laser will be disabled meaning that the laser will not fire although the XY motion system will still move. The laser firing will need 8-10 seconds to warm up if turning to off, and turn on later, therefore, please wait 10 seconds before pressing STRART button for laser work.



### 5.1.2 Adjusting the LCD Display Screen's Contrast Setting

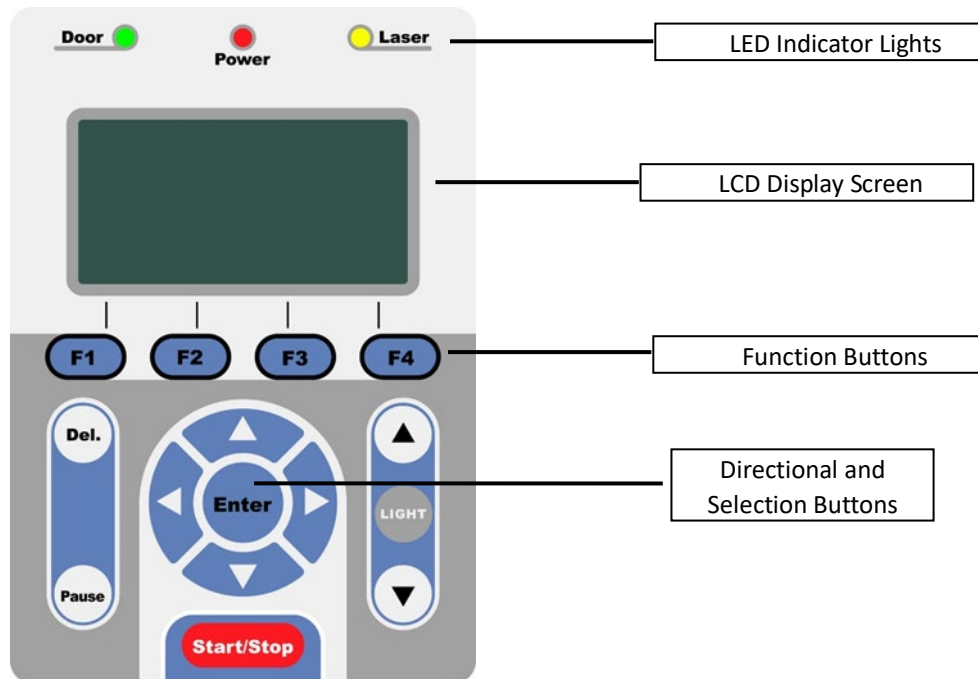
Depending on the lighting of your immediate work area, you may need to adjust the contrast of LCD display screen. You may increase or decrease the display screen's contrast via the contrast adjustment wheel found on the inside of the front cover on the bottom, right-hand side. You can access this area by opening the top window and looking inside to the rear, right side of the work area (as shown in the picture below).



## 5.1.3 Graphic Control Panel Overview

### The Control Panel

The control panel on the LV-290 provides an easy access to all the manual controls needed for cutting and engraving. The liquid crystal display (LCD), functional, directional and selection buttons make navigating through the machine's manual controls easy to do.



### LED Indicator Lights

The three indicator lights on the LV-290 control panel are part of the system's safety interlock system.

- Door – The door light will illuminate when either the top lid or external pass through doors on the LV-290 are open or improperly closed.
- Power – The power light will illuminate when the LV-290 is powered on.
- Laser – The laser light will illuminate when the laser is active and in operation.

### WARNING

- DO NOT attempt to remove or modify any component of the safety interlock system.
- If at any time, any of the access doors are open and the "laser" LED is illuminated, IMMEDIATELY unplugs the laser system and contact your authorized Roland DG Corporation dealer.
- DO NOT operate the laser system if any component of the safety system is malfunctioning.

### Directional and Selection Buttons

**Function (F1 / F2 / F3 / F4)** – Four function buttons allow you to select various functions which will change depending on what section of the menu you are in. Each function button's corresponding task will be displayed right above its respective button on the LCD display screen. Please note that in certain menus, not every function button will always be mapped to a corresponding action. In these situations, that particular button will not have a function.

**Directional** ( $\Delta$  /  $\nabla$  /  $\triangleleft$  /  $\triangleright$ ) – Four directional buttons allow you to navigate the selection cursor through the control panel menu and adjust the value of specific settings. In general, the  $\triangleleft$  /  $\triangleright$  directional buttons cycle through the various selections, while the  $\Delta$  /  $\nabla$  directional buttons adjust the value of that particular selection.

**Enter** – Confirms the current selection.

**Start / Stop** – Allows you to start or stop engraving jobs, once those jobs have been successfully loaded onto the system.

**Delete** – Provides quick access to delete the current job.

**Pause** – Pauses the current engraving process. Press again to resume the current process.

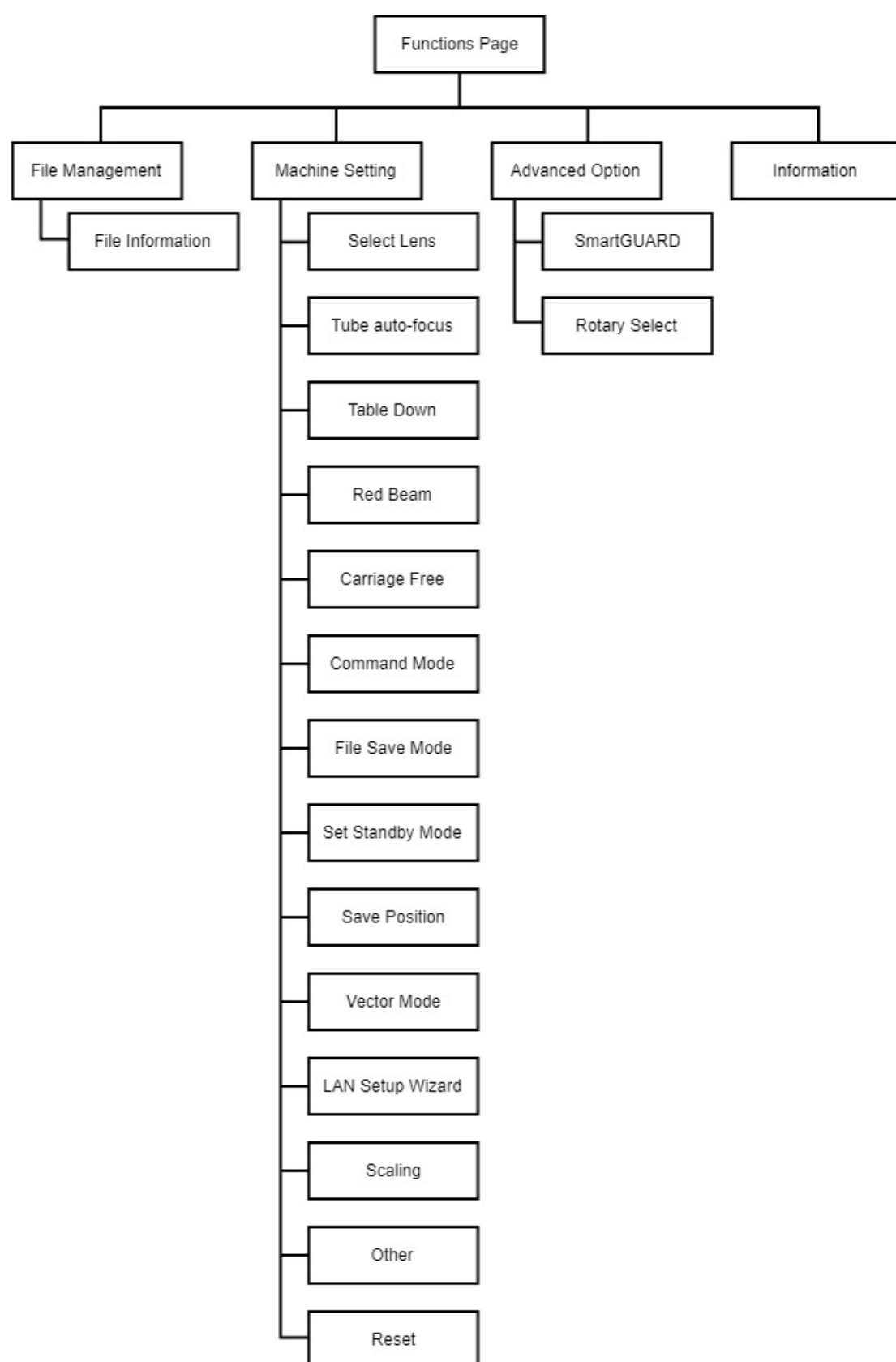
**Auto Focus** – After you have positioned your material and moved the lens carriage head to the area you want to engrave, press this button and the system will automatically adjust the optimal vertical focal distance for the laser.

**Manual Focus** ( $\blacktriangle$  /  $\blacktriangledown$ ) – To manually adjust the vertical focal distance between the laser head and the material, you can use the  $\blacktriangle$  /  $\blacktriangledown$  buttons to do so. Doing so will adjust the vertical height (z-axis) of the worktable.

#### **NOTE**

There is an 8-second warm up period after the door LED is triggered for systems equipped with Synrad laser tubes. i.e. opening the top lid or the external pass through doors of the machine. Operator must wait for 8 seconds before the laser tube can begin to work.

### 5.1.4 Graphic Control Panel Navigation Chart



## 5.1.5 Graphic Control Panel Function Pages

When the LV-290 is powered on, the machine will perform a series of safety checks and initialization routines. The LCD display screen will display the copyright, ROLAND logo, and machine initialization pages before going to the main work page.

### Main Work Page

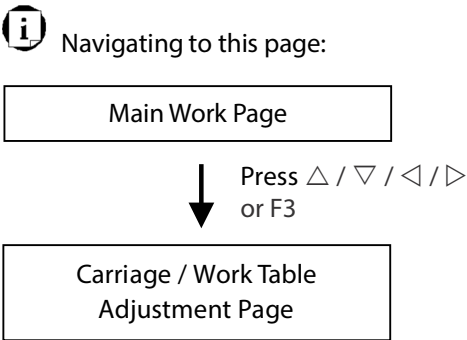
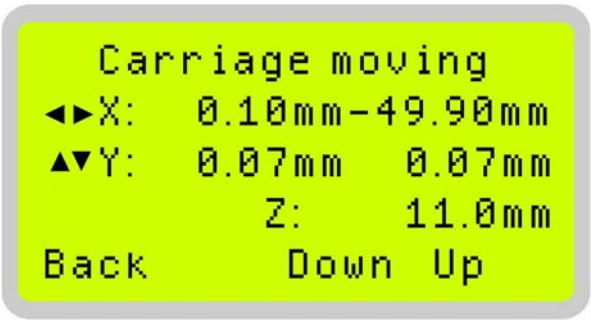
The image shows a simulated LCD screen with a yellow background and black text. The text is arranged in six lines: the first line says '—|Empty File'; the second line shows 'Speed:—.—%DPI:—'; the third line shows 'Power:—.—%PPI:—'; the fourth line shows '—:—:— —/—'; and the fifth and sixth lines show 'Prev Next SP Func' at the bottom.

```
—|Empty File
Speed:—.—%DPI:—
Power:—.—%PPI:—
—:—:— —/—
Prev Next SP Func
```

The main work page is the page that this machine will be the “home base” for when navigating through the various functions of the control panel. This will be the page that is displayed when you are processing your jobs. This page contains specific job information such as the current job’s name, Speed, Power, PPI, DPI, processing / remaining times, and jobs loaded.

Main Work Page	
Relevant Buttons	Function
F1 (Prev)	Scroll through previous jobs
F2 (Next)	Scroll through next jobs
F3 (SP)	Go to Store Position Page for SmartCENTER function
F4 (Func)	Go to Functions Page
△ / ▽ / ◀ / ▶ Directional	Go to Carriage / Work Table Adjustment Page
Start / Stop	Start / Stop the current job
Delete	Delete the current selected job
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

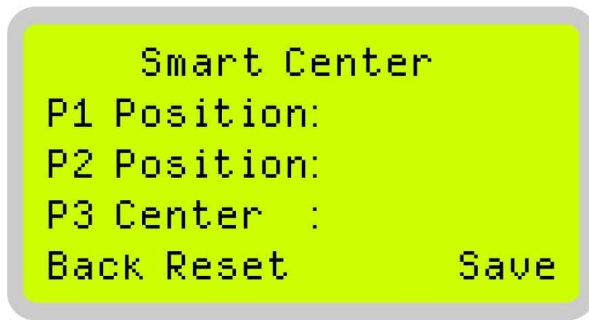
Carriage / Work Table Adjustment Page




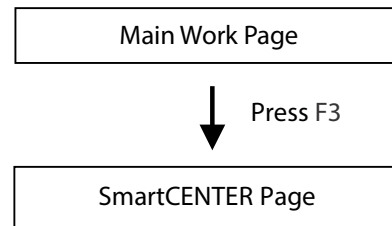
The Carriage / Work Table Adjustment Page allow you to manually increase and decrease the height of the work table (Z-axis). In addition, you can manually adjust the Y-axis and X-axis of the lens carriage.

Carriage / Work Table Adjustment Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
F3 (Down)	Manually decrease the height of the work table (Z-axis)
F4 (Up)	Manually increase the height of the work table (Z-axis)
$\triangle / \nabla / \triangleleft / \triangleright$ Directional	Manually adjust the Y-axis position of the lens carriage
$\triangleleft / \triangleright$ Directional	Manually adjust the X-axis position of the lens carriage
Start / Stop	Start / Stop the current job
Auto Focus	Initiate the auto focus function
$\blacktriangle / \blacktriangledown$ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

## SmartCENTER Page



 Navigating to this page:



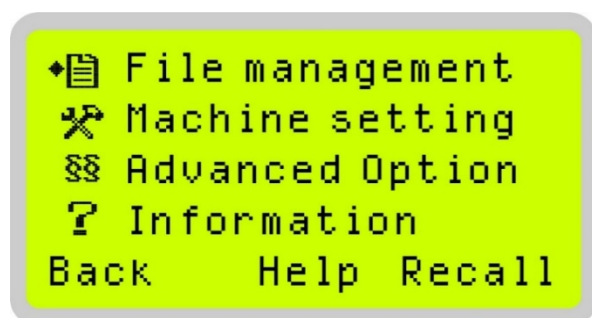
Under SmartCENTER mode the job will begin after the system positions the carriage to the center position between two points or four points indicated by the user. The SmartCENTER mode has to be enabled through the driver.

Enter SmartCENTER page by pressing the <F3> button. You will be prompted to indicate and store the position points. The positions can be indicated by moving the carriage by hand and pressing enter to save the positions indicated by the red pointer. After all points are set, the carriage will move to the center of the stored positions and the job will begin.

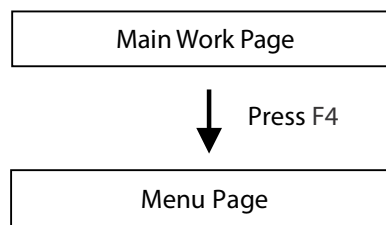
SmartCENTER Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
F2 (Reset)	Reset all saved positions
F4 (Save)	Save current lens carriage position
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

## Functions Page

The Functions Page allows you to edit file management and machine settings. From this page, you will be able to access the File Management, Machine Setting, and Machine Information pages.



Navigating to this page:

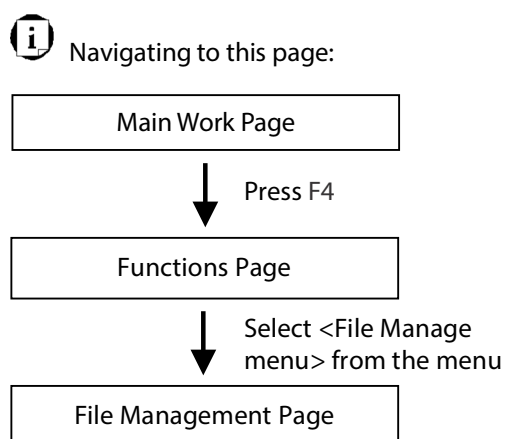
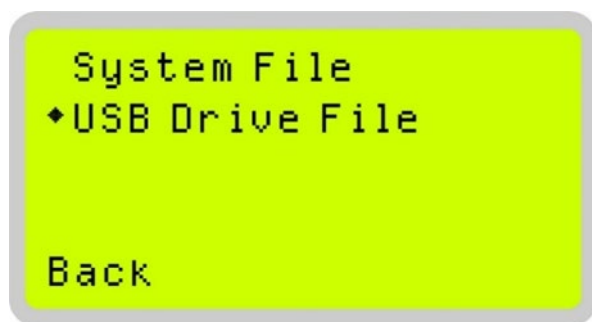


- File Management Page – this page allows you to manage the files that you have loaded onto the LV-290.
- Machine Setting Page – this page allows you to access and modify various machine settings, including: Set Lens, Tune Auto Focus, Set Table Down, Set Red Beam, Carriage Lock, Set Command Mode, Set File Save Mode, Set Vector Mode, LAN Setup, Other, Reset.
- Advanced Option Page- this page allows you to enable different optional peripherals for the laser machine, such as roll to roll auto-feeder, AAS calibration for contour cutting, SmartGUARD fire alarm etc.
- Machine Information Page – this page allows you to view information regarding the system such as the company logo, machine name, firmware version, and other information.

Functions Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
F3 (Help)	Display help
F4 (Recall)*	Recall the saved position as origin for subsequent jobs
△ / ▽ Directional	Scroll through the menu selections
Enter	Perform the selection
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

\* Refers to Machine Setting Page for save position and recall position functions.

## File Management Page



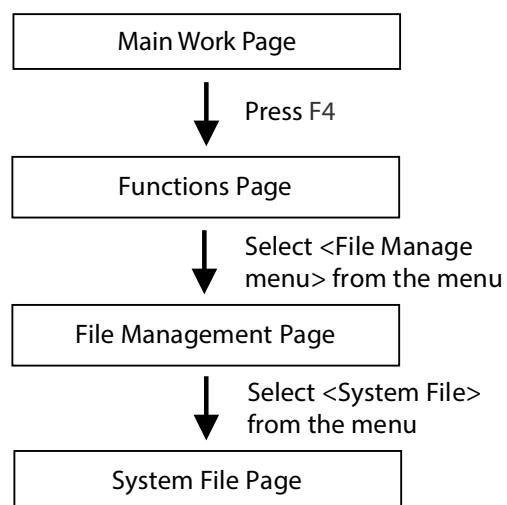
The File Management Page allows you to manage the files from system or USB drive.

File Management Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
△ / ▽ Directional	Scroll through the menu selections
Enter	Perform the selection
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

## System File Page



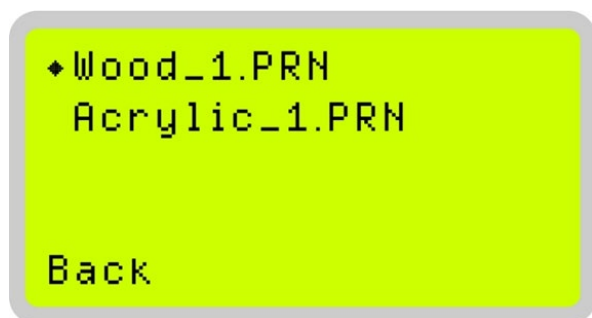
Navigating to this page:



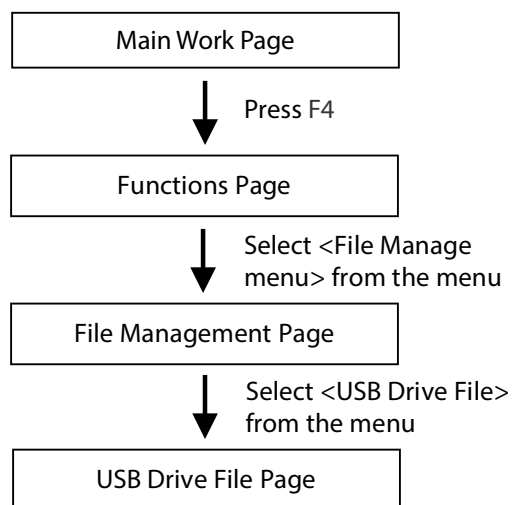
The System File Page allows you to manage the files that you have loaded onto this machine. You can scroll through your jobs, delete a selected job, delete all jobs, and go to the Link / DLink Page to set and arrange multiple loaded jobs into a single job queue for processing.

System File Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
F2 (Link)	Display help
F3 (D-All)	Back to previous page
F4 (Del)	Delete the selected job
△ / ▽ Directional	Scroll through the menu selections
Enter	Perform the selection
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

## USB Drive File Page



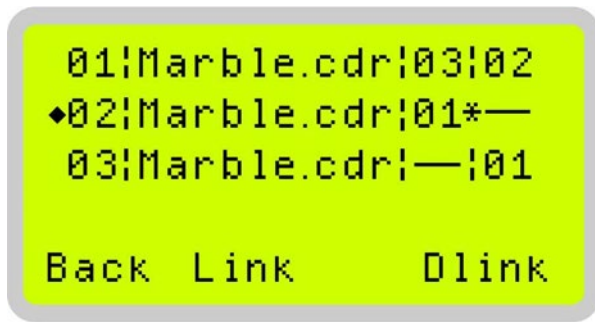
Navigating to this page:



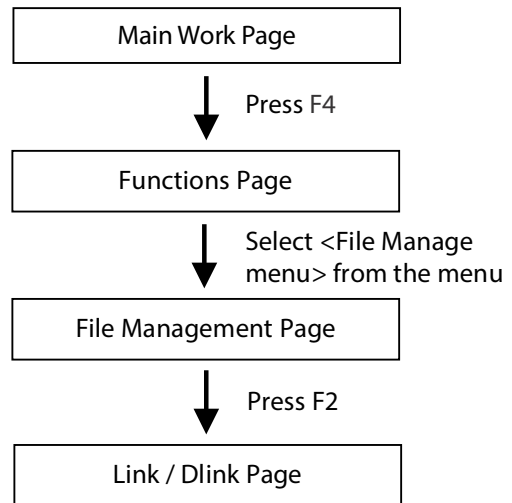
The USB Drive File Page allows you to load file from USB storage. You can scroll through your job to processing.

USB Drive File Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
△ / ▽ Directional	Scroll through the menu selections
Enter	Perform the selection
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

## Link / DLink Page



Navigating to this page:

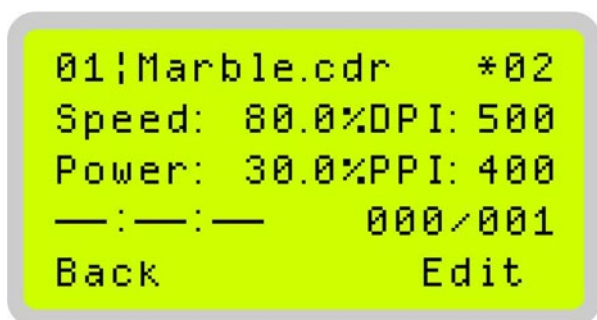


The Link / DLink Page allows you to set, arrange, and remove loaded jobs to and from a job queue for processing. Use the directional keys to cycle through your loaded jobs, then simply press the <F2 (Link)> key to add a file to the job queue. The job queue will be set in a sequential order based on the order you link the files. To remove a job from your job queue, press the <F4 (DLink)> key.

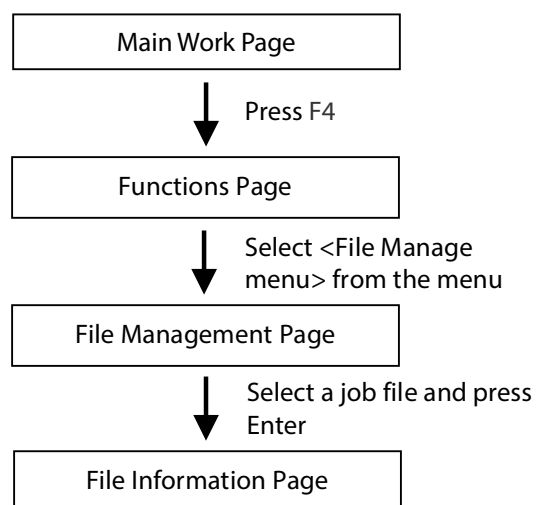
The first column field (before the file name) displays the job number. The sequence for your job queue is displayed in the two columns to the right of your file names. The first column to the right of your job file name displays the job number of the previous file in the job queue sequence. The second column after the file name displays that job's next file in the job queue sequence. First and last jobs in the job sequence you set will have a (--) in the first and second columns respectively. So according to the image above, the job queue sequence has been set to be processed in this order: 03:Marble.cdr → 01:Marble.cdr → 02:Marble.cdr.

Link / DLink Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
F2 (Link)	Add the currently-selected job to the job queue
F4 (DLink)	Remove the currently-selected job from the job queue
△ / ▽ Directional	Scroll through the menu selections
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

## File Information Page



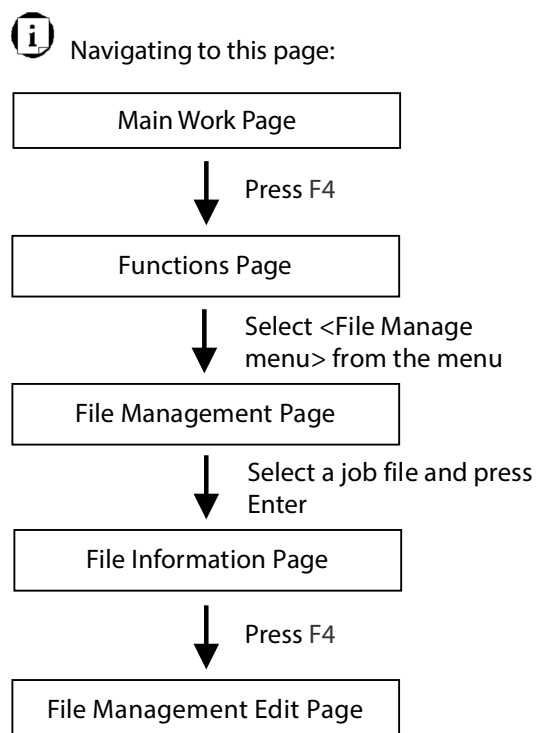
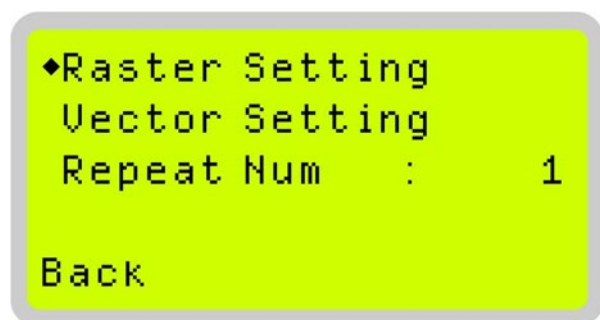
Navigating to this page:



The File Information Page allows you to view the speed, power, DPI, and PPI settings of the selected job. In addition, you will be able to go to the File Management Edit Page from this menu to change raster/ vector speed and power settings for the selected job.

File Information Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
F4 (Edit)	Go to the File Management Edit Page for the selected job
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

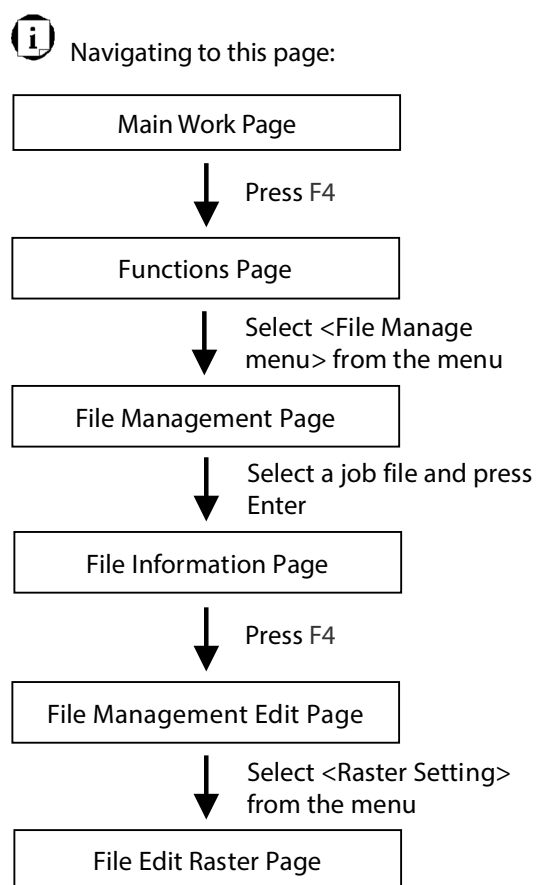
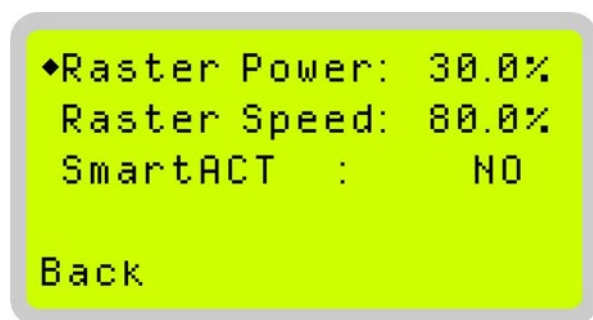
## File Management Edit Page



The File Management Edit Page allows you the choice to modify your raster or vector settings for the selected job, as well as setting the number of times to repeat the process of the selected job (Repeat Num).

File Management Edit Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
△ / ▽ Directional	Scroll through your loaded jobs
◁ / ▷ Directional	Cycle through the available selections
Enter	Perform the selection
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

## File Edit Raster Page

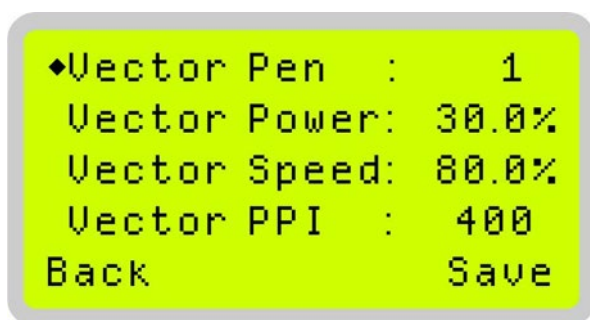


The File Edit Raster Page allows you to edit the raster power and speed settings, as well as enable or disable SmartACT for the selected job. These settings correspond to the same settings found on the printer driver. This page allows you to easily adjust these values to make immediate adjustments while processing your loaded jobs, even when you have disconnected your computer from this machine.

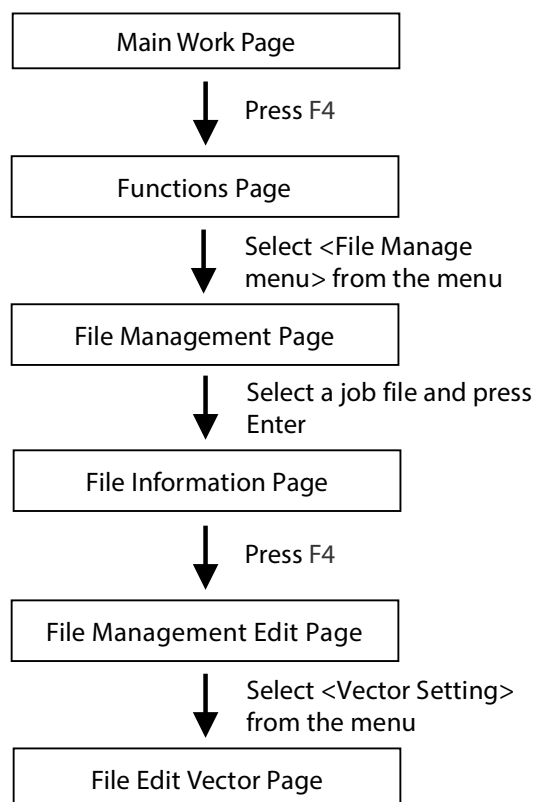
- Raster Power: 0.0% - 100%
- Raster Speed: 0.0% - 100%
- SmartACT: YES/ NO

File Edit Raster Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
△ / ▽ Directional	Scroll through your loaded jobs
◁ / ▷ Directional	Cycle through the available selections
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

## File Edit Vector Page



Navigating to this page:



The File Edit Vector Page allows you to edit the vector pen, vector power, vector speed, and vector PPI, and power ramp settings for the selected job. These settings correspond to the same settings found on the printer driver. This page allows you to easily adjust these values to make immediate adjustments while processing your loaded jobs, even when you have disconnected your computer from this machine.

- Vector Pen: 1 - 16
- Vector Power: 0.0% - 100%
- Vector Speed: 0.0% - 100%
- Vector PPI: 30 - 1524
- Power Ramp: YES/ NO

File CoreIDRAW Vector Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
F4 (Save)	Save your current settings
△ / ▽ Directional	Scroll through your loaded jobs
◁ / ▷ Directional	Adjust the value for that selection
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

## Machine Setting Page

◆Set Lens  
Tune auto-focus  
Set Table Down  
Set Red Beam  
Back      Next   Prev

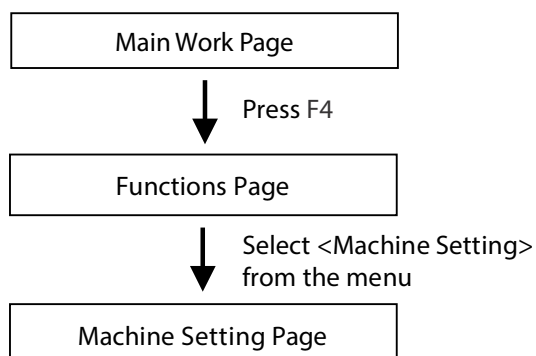
◆Carriage Free  
Command Mode  
File Save Mode  
Set Standby Mode  
Back      Next   Prev

◆Save Position  
Vector Mode  
Laser Options  
LAN Setup Wizard  
Back      Next   Prev

◆Scaling  
Others  
Reset  
  
Back      Next   Prev



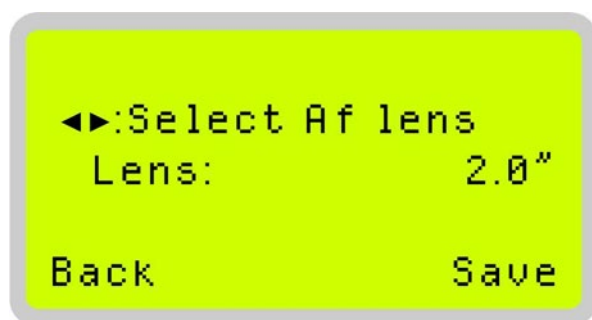
Navigating to this page:



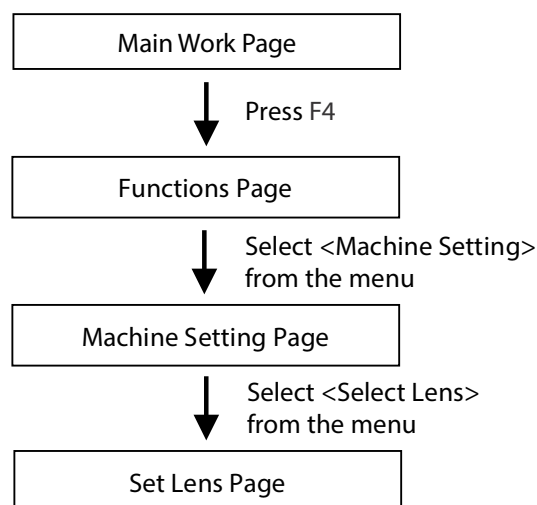
The Machine Setting Page allows you to access and modify various machine settings, including: Set Lens, Tune Auto Focus, Set Table Down, Red Beam on/ off, Carriage Free, select Command Mode, File Save, Select Vector Mode, LAN setup, Other, and Reset etc.

Machine Setting Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
F3 (Next)	Scroll to next page
F4 (Prev)	Scroll to previous page
△ / ▽ Directional	Scroll through your loaded jobs
Enter	Perform the selection
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

## Machine Setting- Select Lens Page





Navigating to this page:



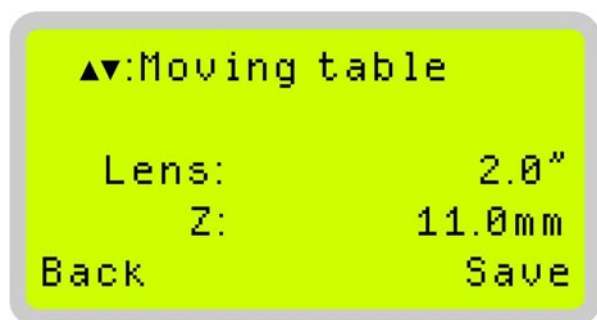
The Select Lens Page allows you to modify the lens settings after you have changed to a different focal lens. Remember to save your settings after you have made the proper changes. After that, pressing the Auto Focus button on control panel, the laser machine will conduct auto focus accordingly using the new lens setting. This machine includes different models which equipped different laser tubes, make sure the laser tubes installed with your machine before making adjustment.

- CO2 Laser Focal Lens: 1.5"/ 2.0"/ 2.5"/ 4.0" (Default 2.0")

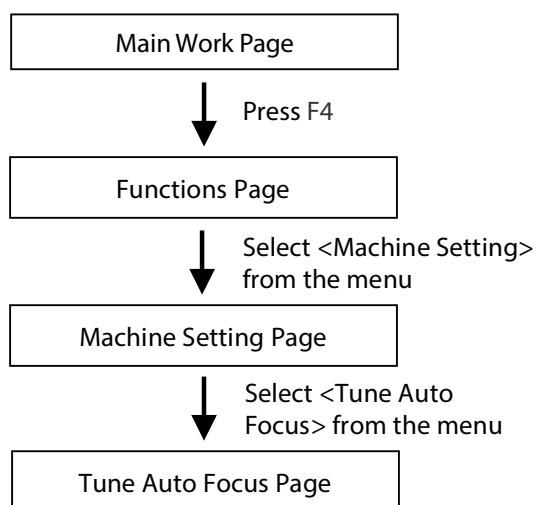
 Lens	1.5"	2.0"	2.5"	4.0"
 Spot Size	0.0029" (0.073mm)	0.0039" (0.099mm)	0.0048" (0.121mm)	0.0078" (0.198mm)

Select Lens Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
F4 (Save)	Save your current settings
△ / ▽ Directional	Cycle through selections
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

## Machine Setting- Tune Auto Focus Page



Navigating to this page:

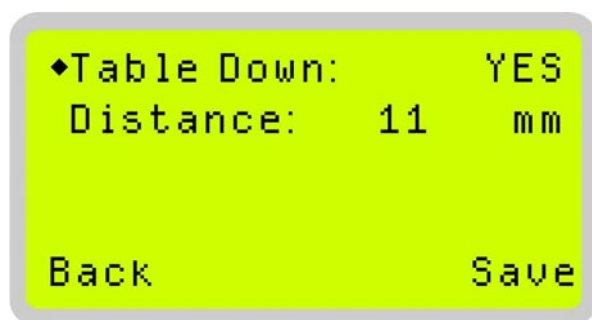


The Tune Auto Focus Page allows you to manually adjust the auto focus default value, or distance from lens carriage to the worktable (Z-axis) when the Auto Focus button is pressed.

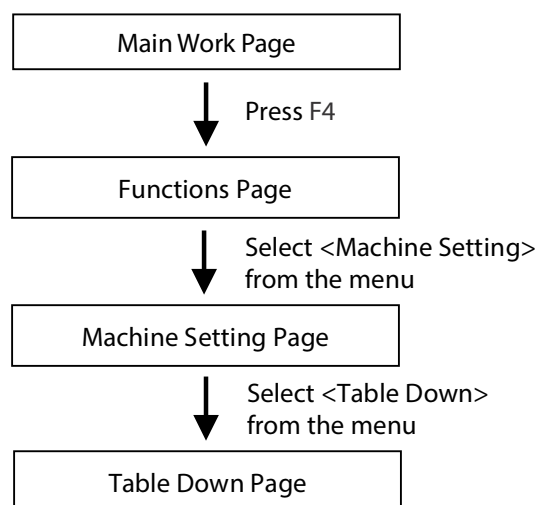
This machine includes different models which equipped different laser tubes, make sure the laser tubes installed with your machine before making adjustment.

Tune Auto Focus Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
F4 (Save)	Save your current settings
△ / ▽ Directional	Manually adjust the height of the work table (Z-axis)
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

## Machine Setting- Table Down Page



Navigating to this page:

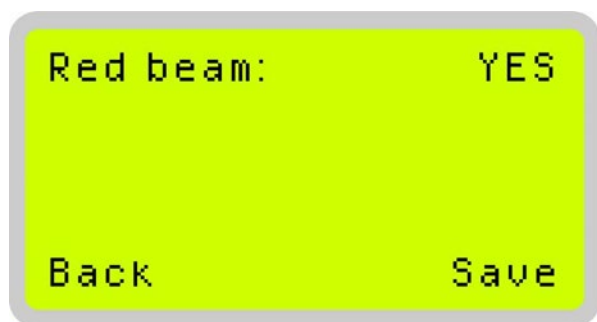


The Set Table Down Page allows you to select whether or not this machine, displays a table moving down warning message at startup. If the Table Down selection is set to <YES>, this machine will display a warning message at startup stating: "Table will move down and remove objects on table". Pressing the Enter key at this point will confirm the prompt to move the work table to its lowest position. If the Table Down is set to <NO>, this machine will not display the warning message at system startup.

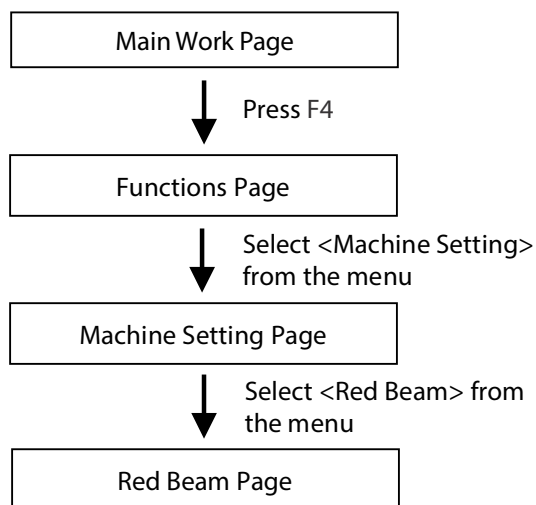
- Table Down: YES/ NO
- Distance: 0 - 165 mm

Table Down Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
F4 (Save)	Save your current settings
△ / ▽ Directional	Scroll through the menu selections
◁ / ▷ Directional	Adjust the value for that selection
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

## Machine Setting- Red Beam Page



Navigating to this page:

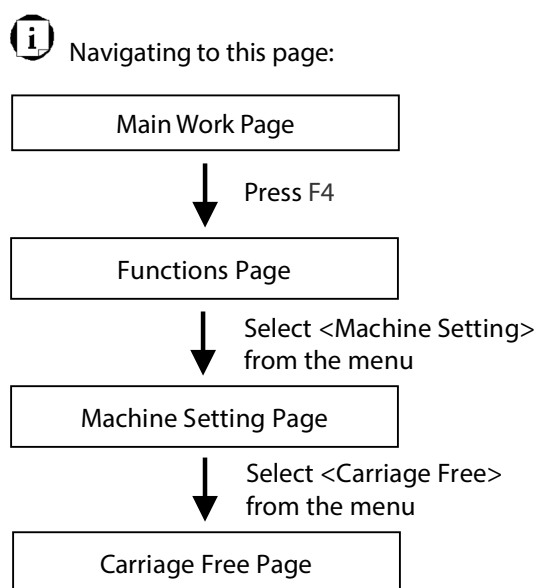
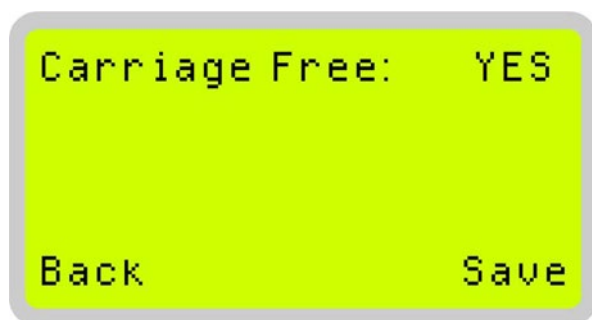


The Red Beam Page allows you to turn on or off the red dot laser pointer on the lens carriage. Enabling this function will indicate the exact area the engraving laser will fire upon.

- Red Beam YES / NO

Red Beam Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
F4 (Save)	Save your current settings
◁ / ▷ Directional	Cycle Red Beam between YES / NO
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

## Machine Setting- Carriage Free Page

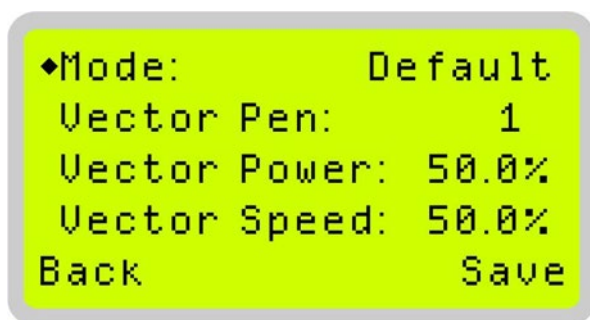


The Carriage Free Page allows you to decide whether the lens carriage to be locked or free for hand movement. If the Carriage Free setting is set to <YES>, then you will be able to manually move the lens carriage along the X and Y axis by hand with the top door open. Whereas setting the Carriage Free to <NO> will lock the lens carriage and movement or positioning can only be done by the control panel arrow keys.

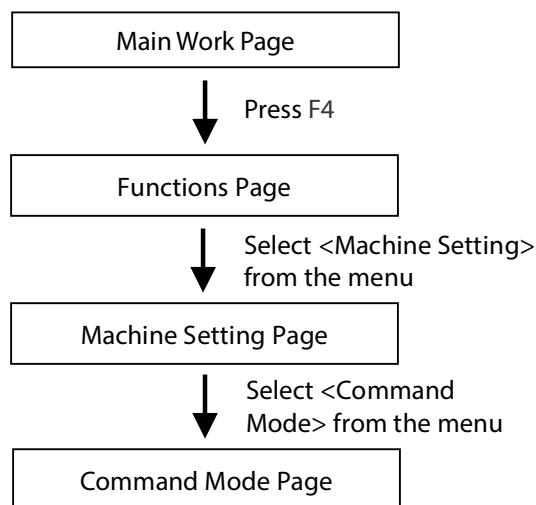
- Carriage Free YES / NO

Carriage Free Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
F4 (Save)	Save your current settings
◀ / ▶ Directional	Cycle Red Beam between Back / Save
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

## Machine Setting- Command Mode Page



Navigating to this page:

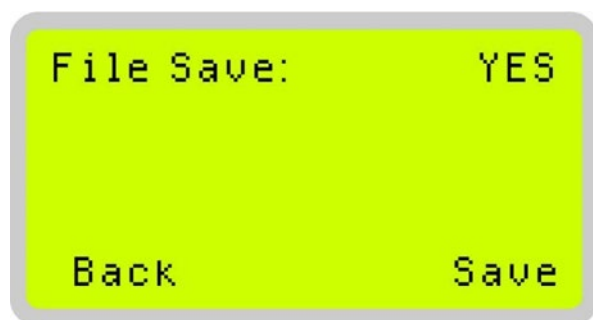


The Command Mode Page allows you to configure vector settings when outputting in Default or HPGL mode. Default mode refers to output the file through standard Windows print driver and also recognized by the most popular graphic software programs such as CorelDRAW, Photoshop, Illustrator, and more. Whereas, HPGL mode is a less common output format generated from some RIP applications (signage industry). Regardless of which format you will be working with, both output formats are supported.

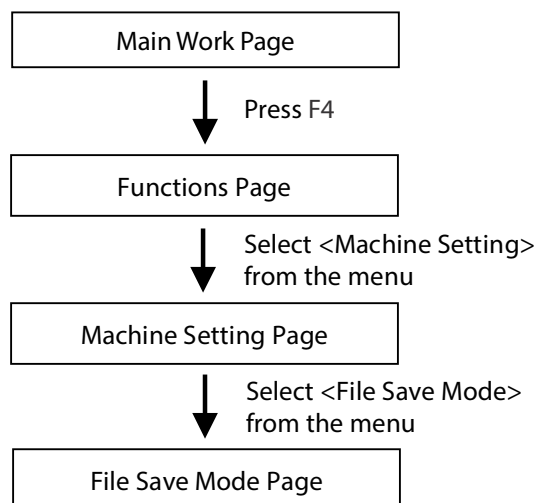
- Mode: Default / HPGL
- Vector Pen: 1 - 16
- Vector Speed: 0.0% - 100%
- Vector PPI: 0.0% - 100%
- Power Ramp: YES / NO

Command Mode Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
F4 (Save)	Save your current settings
△ / ▽ Directional	Scroll through the menu selections
◁ / ▷ Directional	Adjust the value for that selection
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

## Machine Setting- File Save Mode Page



Navigating to this page:

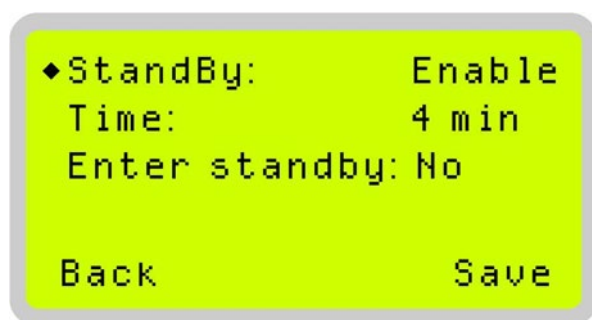


The File Save Mode Page allows you to set whether or not this machine, automatically deletes each job file after processing. Setting File Save to <NO> will automatically and immediately delete each job file from this machine, after the engraving or cutting process. Setting File Save to <YES> will retain the job files on this machine.

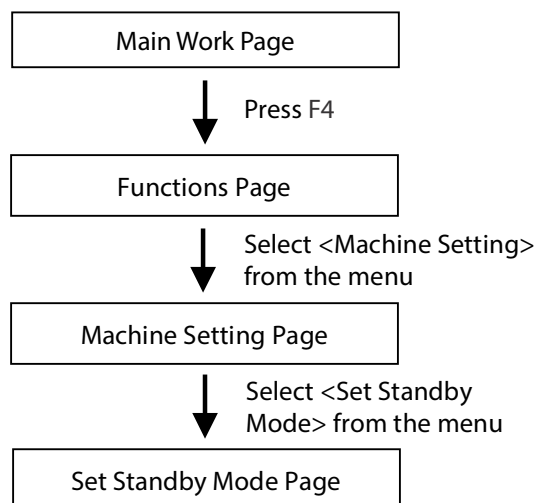
- File Save: YES / NO

File Save Mode Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
F4 (Save)	Save your current settings
◁ / ▷ Directional	Cycle File Save between YES / NO
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

## Machine Setting- Set Standby Mode Page



Navigating to this page:



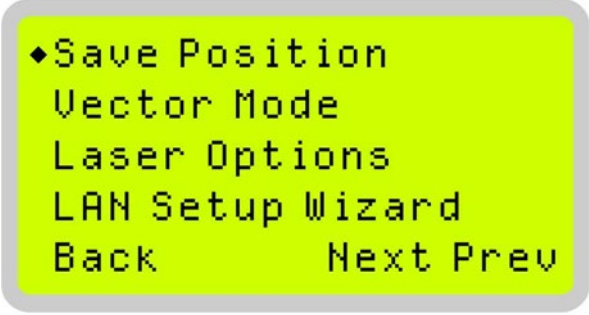
The Set Standby Mode page allows you to configure the laser machine automatically enter into power saving if machine is idle for a specified time.

When entering into the Set Standby Mode function, you can use Left or Right arrow keys to scroll between <Enable> or <Disable> the function. The Time function is to determine after how long the laser machine is idle, it will enter in power saving automatically. The default time is 4 minutes. The Enter Standby function will turn the machine into power saving immediately after selected.

- Standby: Enable/ Disable
- Time: 4-30 mins. (Default 4 mins.)
- Enter Standby: YES/ NO

Set Standby Mode Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
F4 (Save)	Save your current settings
◁ / ▷ Directional	Cycle standby mode between YES / NO
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
△ / ▽ Directional	Scroll between menu options
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

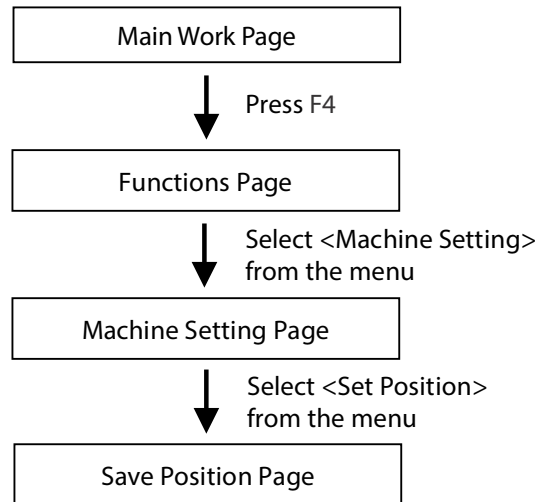
## Machine Setting- Save Position Page



◆ Save Position  
Vector Mode  
Laser Options  
LAN Setup Wizard  
Back            Next Prev



Navigating to this page:



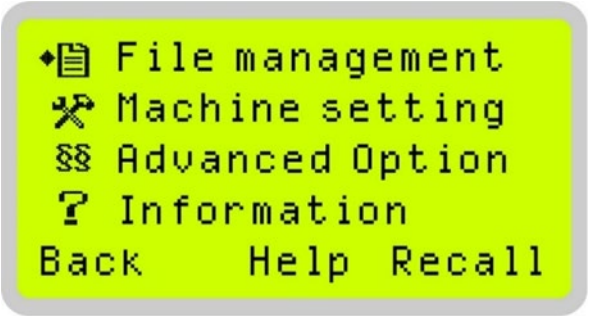
The Save Position Function allows you to save the current X-axis and Y-axis positions of the lens carriage to be the origin for subsequent jobs.



### Tip

This is an excellent function to use when you are processing identical items or engraving relatively smaller objects positioned away from the default start position (top left) of the work table.

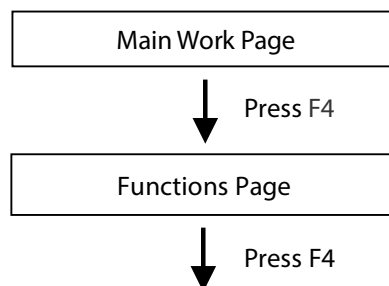
## Recall Position



◆ File management  
✂ Machine setting  
§§ Advanced Option  
? Information  
Back    Help Recall

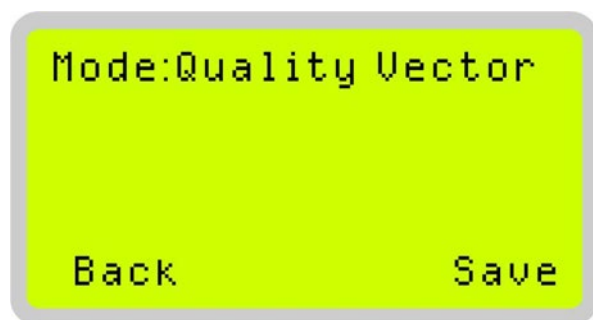


Navigating to this page:

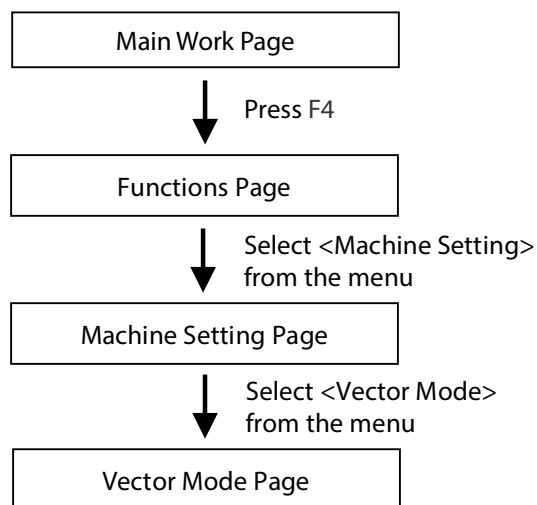


To recall the saved position, simply go to Functions page and press F4 again to recall the saved position. The lens carriage will be moved to the saved position and start subsequent jobs from this origin.

## Machine Setting- Vector Mode Page



Navigating to this page:



The Vector Mode Page allows you to adjust and balance vector mode's quality and speed settings based on your specific job. Speedy Vector Mode offers the highest output speed, sacrificing quality. Whereas Quality Vector Mode offers the highest quality, sacrificing output speed. Keep in mind that speed and quality are usually at a tradeoff. The system's default is Production Vector mode.

- Modes: Quality, Production, Speedy  
[Slower speeds / higher quality ----- Faster speeds / lower quality]

The machine will reboot automatically after clicking <Save> button for the change.

Vector Mode Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
F4 (Save)	Save your current settings
◁ / ▷ Directional	Cycle Set Vector Mode between QUALITY/ FINE/ COARSE/ SPEEDY VECTOR
△ / ▽ Directional	Scroll through menu options
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

## Machine Setting- LAN Setup Wizard Page

◆DHCP: OFF

IP Address

Back Save

◆DHCP: ON

IP Address

Back Save

IP : 0. 0. 0. 0

MASK: 0. 0. 0. 0

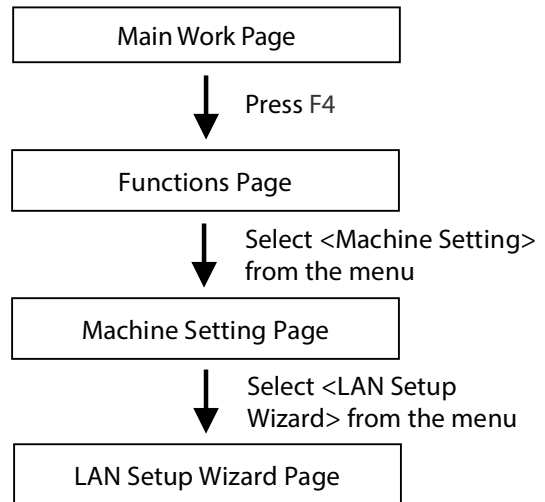
GATE: 0. 0. 0. 0

◀▶Tab ▲▼Change

Back Save



Navigating to this page:



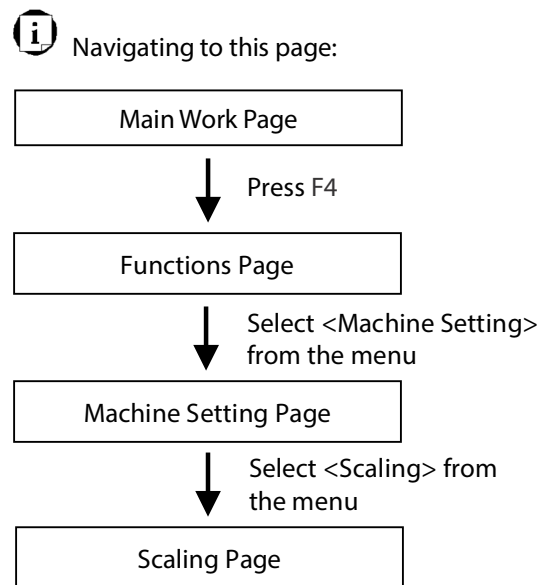
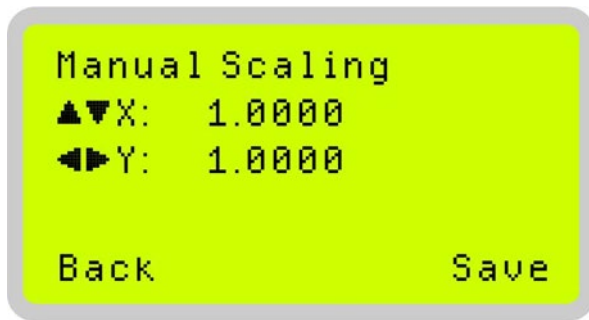
The LAN Setup Wizard Page allows you to connect the laser machine with ethernet to transmit files from computer to laser machine for processing jobs. When selecting the DHCP to <ON>, the network is set up to dynamic IP address, the IP address will automatically retrieve from network; while DHCP <OFF> is to apply static IP address, and you need to further enter the IP address, MASK, and GATE information. Using Left or Right directional keys under dynamic IP setting page to scroll between different columns to enter the address, and use Up or Down keys to change the numbers.

- DHCP: ON/ OFF

Please refer to Chapter 4.1.2 for ethernet connectivity setup in Windows driver.

LAN Setup Wizard Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
F4 (Save)	Save your current settings
◁ / ▷ Directional	Cycle DHCP between NO/ OFF, or move between tabs on IP address settings
△ / ▽ Directional	Scroll between menu options or change the numbers of IP address settings.
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

## Machine Setting- Scaling Page

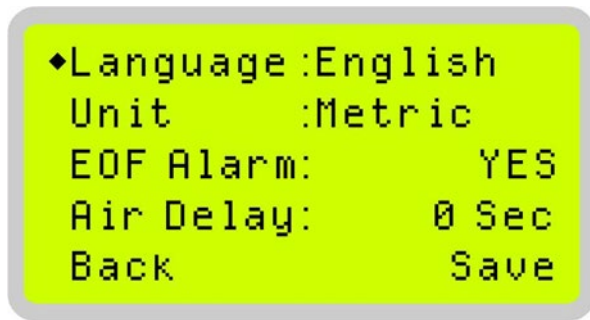


The Scaling Page allows you to fine tune the laser machine output scale to precisely fit the original graphic file design scale when precision output is required to your application.

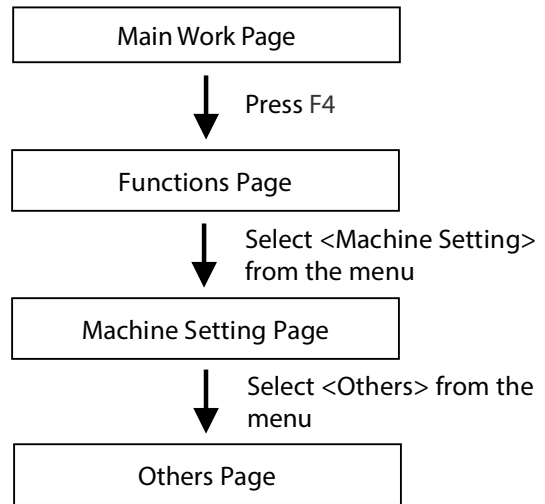
Please reboot the machine after clicking <Save> button for the change.

Scaling Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
F4 (Save)	Save your current settings
◁ / ▷ Directional	Adjust the X axis scaling numbers
△ / ▽ Directional	Adjust the Y axis scaling numbers
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

## Machine Setting- Others Page



Navigating to this page:



The Others Page allows you to change various settings that correspond to the control panel. The Language setting will allow users to change available languages displayed on the control panel. The Unit setting will allow you to change whether the units displayed by the control panel is in the metric or imperial system. The EOF (end of file) Alarm setting will enable or disable an audible notification when jobs are complete. The Air Delay setting allows you to specify the delay in seconds of the SmartAIR air-assist after the point of laser firing.

- Language: ENGLISH (others dependent on Firmware)
- Unit: METRIC/ INCH
- EOF Alarm: YES/ NO
- Air Delay: 1-100 seconds

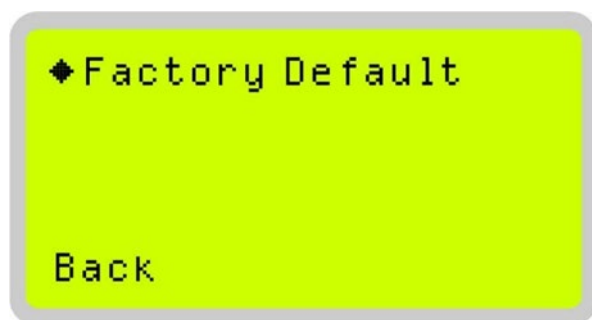


### Tip

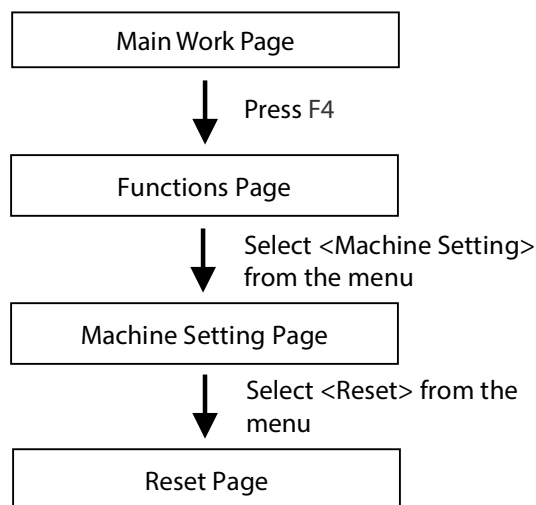
Depending on the material you are working with, your laser settings, and the desired results, please experiment with the air delay to achieve your desired results.

Others Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
F4 (Save)	Save your current settings
△ / ▽ Directional	Scroll through the menu selections
◁ / ▷ Directional	Adjust the value for that selection
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

## Machine Setting- Reset Page



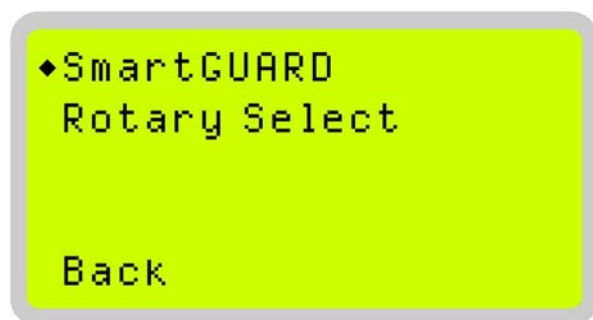
Navigating to this page:



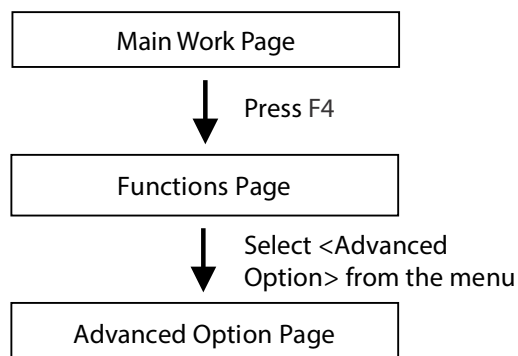
The Reset Page will restore machine settings back to factory default. Press ENTER to confirm the change and restart the machine.

Reset Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
△ / ▽ Directional	Scroll through the menu selections
Enter	Perform the selection
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

## Advanced Option Page



Navigating to this page:

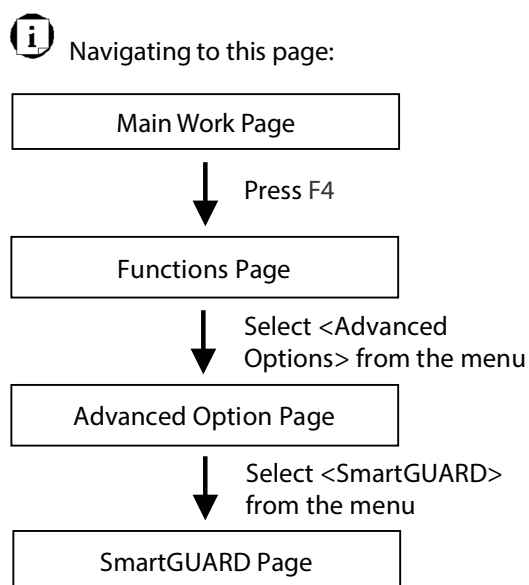
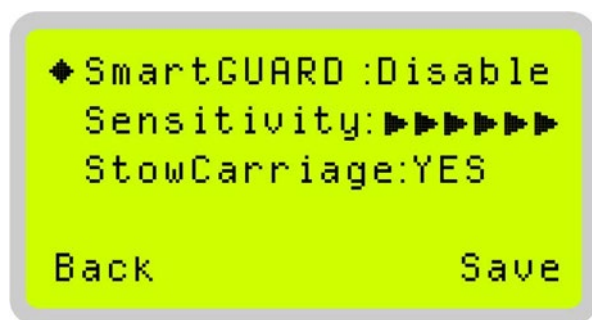


The Advanced Option Page allows you to access multiple setting for laser machine optional peripherals, including SmartGUARD, Auto-Feeder, and AAS Calibration.

Auto-Feeder and AAS Calibration options are only available for those LV-290 machines with CO2 laser tube configuration.

Advanced Option Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
F3 (Next)	Scroll to next page
F4 (Prev)	Scroll to previous page
△ / ▽ Directional	Scroll through menu options
Enter	Perform the selection
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

## Advanced Option- SmartGUARD Page



After optional SmartGUARD hardware installation, please enter the function menu on the control panel to enable the SmartGUARD fire alarm. Note SmartGUARD fire alarm system is not a fire extinguisher, but a fire detecting and alarm system.

### SmartGUARD Enable/ Disable:

Press directional key (Left or Right) to enable the SmartGUARD device or disable it.

### Sensitivity:

Press directional key (left or right) to set the sensitivity of SmartGUARD. There are seven sensitivity settings that can be selected. Sensitivity defines the delay time from when a fire is detected until the fire alarm alerts user, and automatically stop laser firing. For example, if the sensor delay switch is set to the 3-second position, the SmartGUARD will start an alarm and automatically stop laser firing after detecting a fire for 3 seconds.

### Stow Carriage:

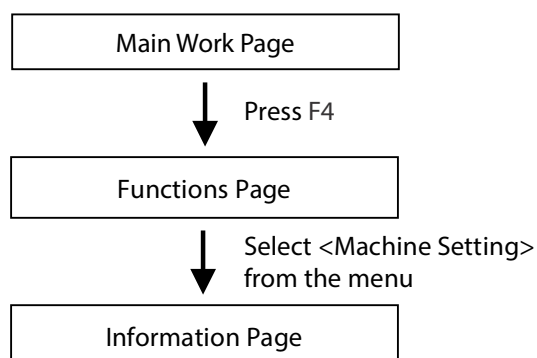
This function will decide if the lens carriage stay in the last position (set to <NO>) or move to the opposite direction (up or down) when fire alarm is initiated. The default is <YES>, the lens carriage will move to opposite direction when a fire detected.

SmartGUARD Setting Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
F4 (Save)	Save your current settings
△ / ▽ Directional	Scroll through the menu selections
◁ / ▷ Directional	Adjust the value for that selection
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

## Information Page



Navigating to this page:



The Information Page allows you to view information regarding the system such as copyright, laser machine name, firmware version, and other information.

Information Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
△ / ▽ Directional	Scroll through the menu selections
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

## 5.2 The LV-290 Printer Driver

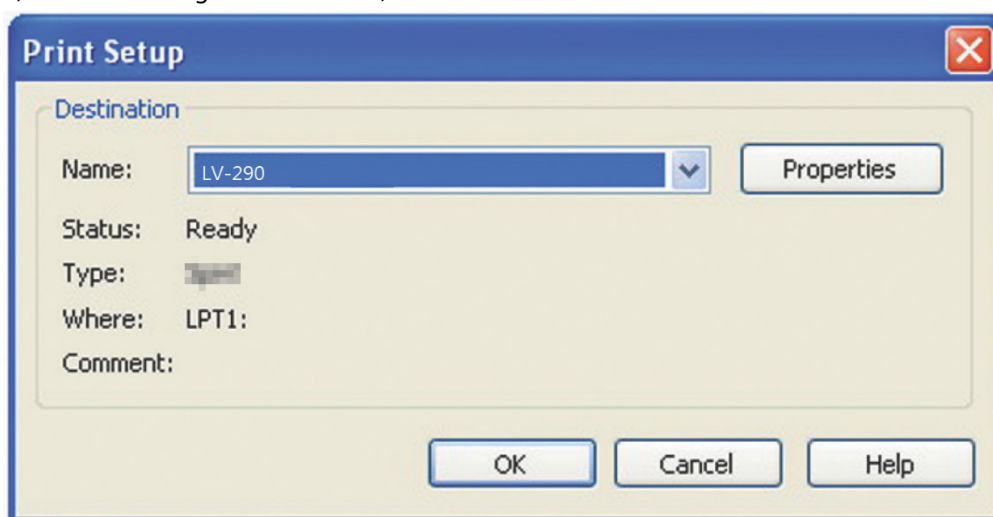
With the printer driver successfully installed, you will need to adjust the printer and page size default settings before you can begin editing and completing jobs. By doing so, you will be setting the work area in your graphics software to match the work table area.

### NOTE

Please make sure this machine is set to the default printer before proceeding to the page and layout setup.

Ensure that the LV-290 has been selected as the DEFAULT PRINTER. You can do so by going into your Windows Control Panel → Printers and Faxes. If the LV-290 is not selected as DEFAULT PRINTER, you may set it up through the graphics software as well. The following example takes CorelDRAW to demonstrate how to set up LV-290 as the Printer.

- 1) From the primary menu, click FILE → PRINT SETUP.
- 2) From the navigation bar Name, click LV-290 → OK



## 5.2.1 Page Setup and Orientation

The first thing you must do before working with the LV-290 Printer Driver will be to make sure the page and layout settings are properly configured within your graphics software. You will need to access and edit the Page Setup or Layout page of your graphics software to set your graphics software's page layout to match this machine's work table's dimensions and orientation.

From your graphic software's Page Setup page:

- Set the page orientation in the graphics software to Landscape mode.
- Set page size to match laser machine work area size.
  - LV-290: 640x460 mm (25.19"x18.11") or 740x460 mm (29.13"x18.11") with extended mode

### CorelDRAW Example (Page Setup and Orientation)

The following is an example of how to set the Page Setup and Orientation in the graphics software. CorelDRAW is the designated graphics software used for this example. For another graphics software, you will need to access the corresponding Page Setup page.

- 1) From the primary menu, click LAYOUT → PAGE SETUP.
- 2) From the navigation bar on the left, click DOCUMENT → PAGE → SIZE.
- 3) Ensure that NORMAL PAPER and LANDSCAPE are selected.
- 4) Ensure the Paper Width and Height dimensions match the LV-290 work area dimensions.
  - LV-290: 640x460 mm (25.19"x18.11") or 740x460 mm (29.13"x18.11") with extended mode
- 5) Click OK to end the paper size adjustment.



Instead of manually selecting the Landscape and setting the Paper Width and Height, you can simply click the Set from Printer function and CorelDRAW will automatically set the proper orientation and dimensions based on this machine's work table. (You MUST have the LV-290 set as the default printer prior to doing this.)

---

## 5.2.2 Color Management

The printer driver uses pen color settings to control laser engraver's engraving and cutting parameters. In addition to having your Page Setup and Orientation properly set in your graphics software, you will also need to make sure Color Management is DISABLED prior to working with the LV-290 Printer Driver.

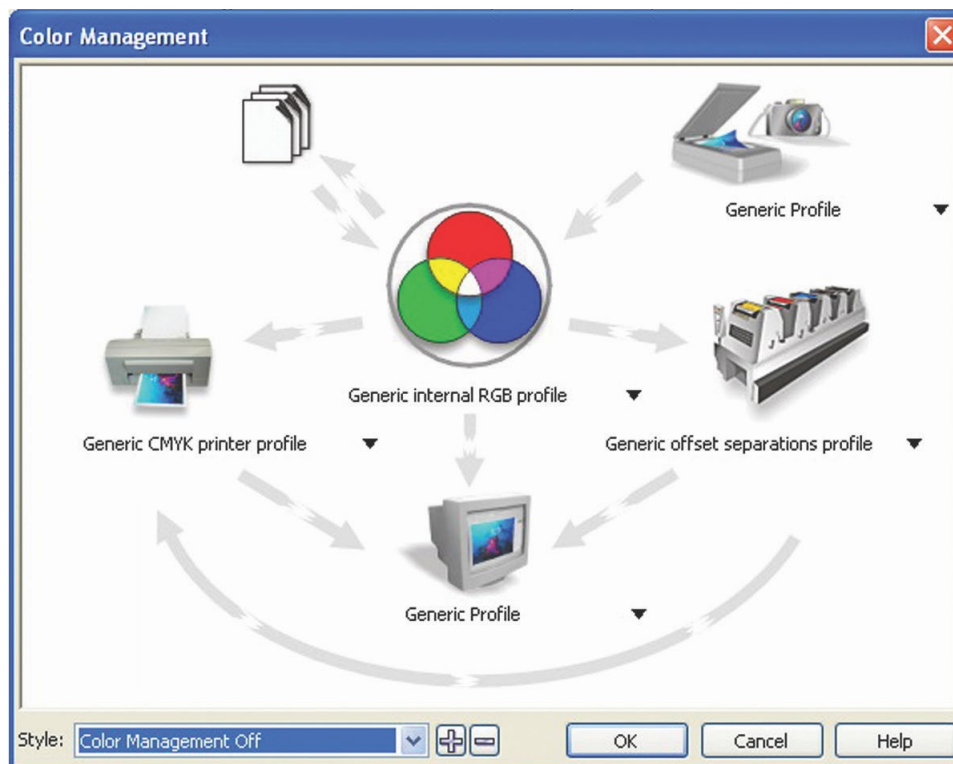
From your graphic software's Color Management page:

- Disable Color Management or set Color Management to Off.

### CorelDRAW Example (Color Management)

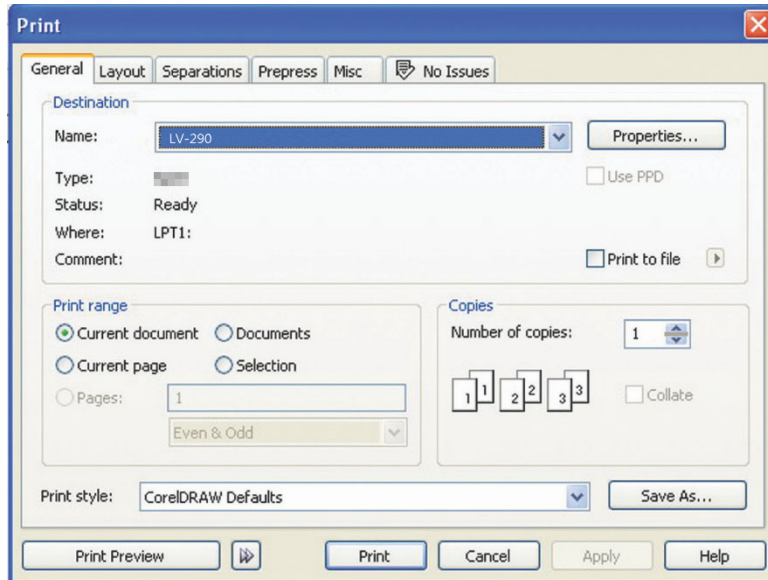
The following is an example of how to properly disable Color Management in the graphics software. CorelDRAW is the designated graphics software used for this example. For other graphics software, you will need to access the corresponding Color Management page.

- 1) From the primary menu, click TOOLS → COLOR MANAGEMENT and CorelDRAW's Color Management will appear.
- 2) Under the Style pull down menu, select COLOR MANAGEMENT OFF.
- 3) Click OK to complete the color management adjustments.



## 5.2.3 Using the Printer Driver

Now after you have properly set the Page and Layout and Color Management of your graphics software, you are ready to configure the details of your actual job through the LV-290 printer driver. The Printer Driver allows you to adjust your engraving / cutting options. After you have setup your image, design, or text to be engraved in your software application, you can access the Printer Driver by going to <FILE> → <PRINT> → <PROPERTIES>.



### NOTE

CorelDRAW was used as the software application for this screenshot example.

The LV-290 Printer Driver consists of seven primary sections (pages) in which you will be able to choose various engraving / cutting options and settings:

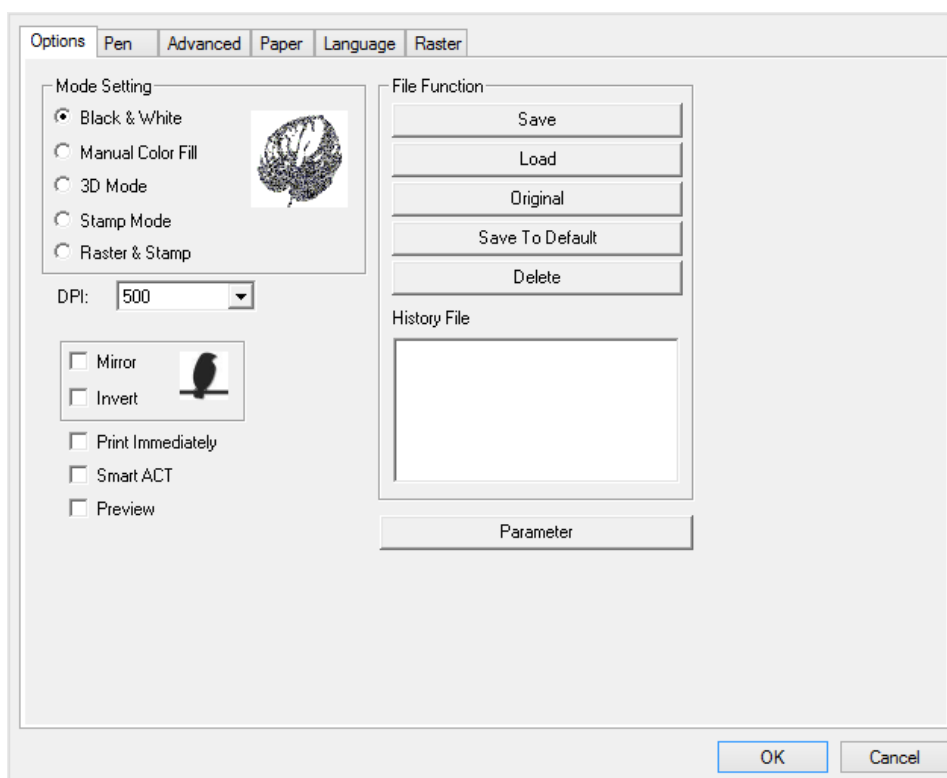
- Option Page
- Pen Page
- Advance Page
- Paper Page
- Language Page
- Raster Page (appears only in Black & White Mode)
- Stamp Page (appears only in Stamp Mode)



### Tip

The following sections describe the specific functions for each of the settings found in the LV-290 Printer Driver. If you are new to laser engraving, it is recommended that you first familiarize yourself with the general principles of the laser process in Section 6, especially the Vector Cutting and Raster Engraving concepts. This will make it easier to understand the various descriptions and terminologies used in this section.

### 5.2.3.1 LV-290 Printer Driver >> Options Page



#### Mode Setting (OPTIONS PAGE) [DEFAULT SETTING: Black & White]

You can select from four primary mode settings, depending on your application or results you would like to achieve.

#### Black & White:

Select this mode when using clipart images or drawings with several colors, shades of gray, or many outlines. This mode outputs in a method similar to that of a black and white laser printer.

The Printer driver will interpret colored and shaded areas as 256-level shades of gray by producing a halftone effect while engraving. Instead of engraving only solid lines, gray or halftone areas will be a collection of dots with varying density.

The entire selected image will be engraved using a single set of power and speed settings (the black pen from the PEN menu. Please refer to the next section of the details regarding the PEN functions). The resolution and depth of these halftone areas can be adjusted with the DPI setting found on the Options page. Please note that selecting the Black & White mode will add a new Raster page to the menu. The Black & White mode dithering settings can be changed from the Raster page. (Please refer to the Raster section below for details). Experiment with different dithering settings to attain the desired results.



#### Tip

The Black & White mode interprets the processed image by the varying colors and shades. For the best results, we suggest you convert the image to a grayscale image with your graphics software prior to engraving in the Black & White mode.

---

#### NOTE

Selecting the Black & White mode will enable the Raster page on the LV-290 Printer Driver, allowing you to adjust advanced stamp-related settings.

### Manual Color Fill:

Specify laser speed and power to different color pens. The VL-290 printer driver allows a maximum of 16 pen parameters to be set. It will help user to set different parameters easily in one file.

Pen No.	Color	Speed	Power	PPI	Raster	Vector	Air	AF	Defocus	Bridge	Repeat
1	Black	50.0	50	400	YES	YES	NO	NO	0.0	5	1
2	Red	50.0	50	400	YES	YES	NO	NO	0.0	0	1
3	Green	50.0	50	400	YES	YES	NO	NO	0.0	0	1
4	Yellow	50.0	50	400	YES	YES	NO	NO	0.0	0	1
5	Blue	50.0	50	400	YES	YES	NO	NO	0.0	0	1
6	Magenta	50.0	50	400	YES	YES	NO	NO	0.0	0	1
7	Cyan	50.0	50	400	YES	YES	NO	NO	0.0	0	1
8	Light Blue	50.0	50	400	YES	YES	NO	NO	0.0	0	1
1*	Light Green	50.0	50	400	YES	YES	NO	NO	0.0	1	1
10	Light Yellow	50.0	50	400	YES	YES	NO	NO	0.0	0	1
11	Light Purple	50.0	50	400	YES	YES	NO	NO	0.0	0	1
12	Light Cyan	50.0	50	400	YES	YES	NO	NO	0.0	0	1

Speed: <  >  
Power: <  >  
PPI: <  >  
Defocus: <  mm >  
Bridge: <  mm >

☒ Raster  
☒ Vector  
☐ Air  
☐ Auto Focus  
☐ Defocus  
☐ Bridge Cutting  
Repeat:

### 3D Mode:

3D Mode allows the naked eyes to visualize the curvatures of the 3D effect by applying 200 grayscale power level technology to create different depth of engraving.



### Stamp Mode:

The stamp mode is one of the more dynamic functions of the LV-290 laser engravers by applying 200 power levels to create different steps.



### NOTE

Selecting the Black & White mode will enable the Raster page on the LV-290 Printer Driver, allowing you to adjust advanced stamp-related settings.

### Raster & Stamp Mode:

Select this mode when you would like to engrave image on stamps. The Raster & Stamp mode combines the 256-level gray scale image processing technology and 200 power level stamp steps production requirement to create slopes.

Noted Raster & Stamp mode is only suitable for CO2 laser system

**DPI (Options Page) [DEFAULT SETTING: 500]**

DPI (dots-per-inch) represents the number of times the laser will fire over a one-inch path. This setting determines the image resolution and quality when performing raster engraving functions. Higher DPI settings result in cleaner and deeper engravings but require more time to complete. Lower DPI settings result in coarser and shallower engravings but require less time to complete. The LV-290 offers 8 DPI options: 125, 250, 300, 380, 500, 600, 760, 1000, and 1500 experiment with different settings to get your desired effect.

Below is a chart for your convenience detailing the Set DPI (your input setting) vs. Actual DPI (your output results).

Set DPI	125	250	300*	380	500	600*	760	1000	1500
Actual DPI	127	254	381	381	508	762	762	1016	1524

**NOTE**

Outputting a full-table (25.1" x 18.1") job using 300 or 600 DPI will result in a truncation error; this is due to the large differences in set DPI vs. actual DPI output for those two particular DPI settings. Therefore, when processing a 25.1" x 18.1" job using 300 DPI, we recommend you move to the next higher DPI setting of 380. Similarly, for a 25.1" x 18.1" job using 600 DPI, we recommend you use 760 DPI.

**Mirror (Options Page) [DEFAULT SETTING: Unselected]**

Checking this box will automatically engrave your image with a mirrored effect. This setting will flip the image along the Y-axis from left to right and vice-versa.

**Tip**

When engraving a stamp, via the stamp mode, the stamp image needs to be engraved in reverse (mirrored) for the final stamp to be correctly laid out.

---



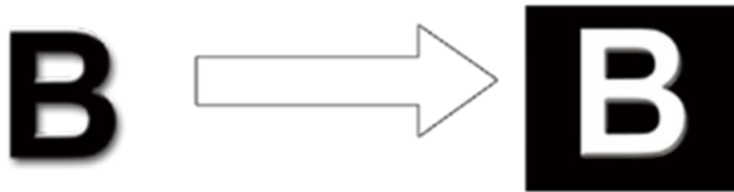
### **Invert (Options Page) [DEFAULT SETTING: Unselected]**

Checking this box automatically inverts / reverses the color of your image (the white areas become black and vice versa). The Invert option is not available if disabled while Manual Color File mode is selected.



Invert mode is useful when creating a stamp in Stamp Mode, as inverting your normal image will set the negative space to be engraved out, with the remaining positive space (your stamp design) protruding out.

---

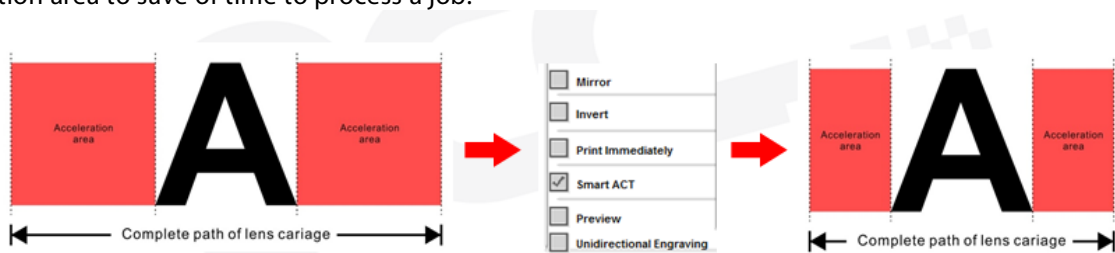


### **Print Immediately (Options Page) [DEFAULT SETTING: Unselected]**

Checking this will instruct the LV-290 to immediately begin the laser engraving process, when you select Print from your graphic software program. If Print Immediately is not checked, then selecting Print will transfer the job file to the LV-290 system and will need to be initialized from the LV-290 control panel.

### **SmartACT (Options Page) [DEFAULT SETTING: Unselected]**

By eliminating unnecessary travel of the lens carriage at the expense of some quality, SmartACT reduces the acceleration area to save of time to process a job!

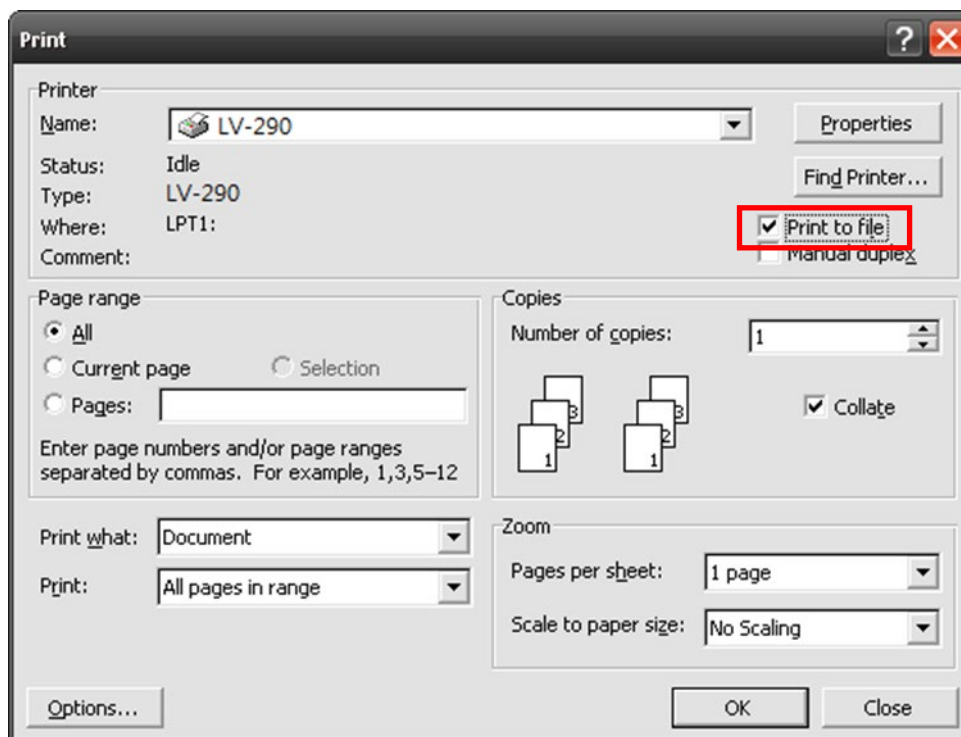


There is a greater performance gain when enabling SmartACT for designs that are vertically longer than they are horizontally wide, as the SmartACT optimization modifies the movement of the X-axis of the lens carriage.

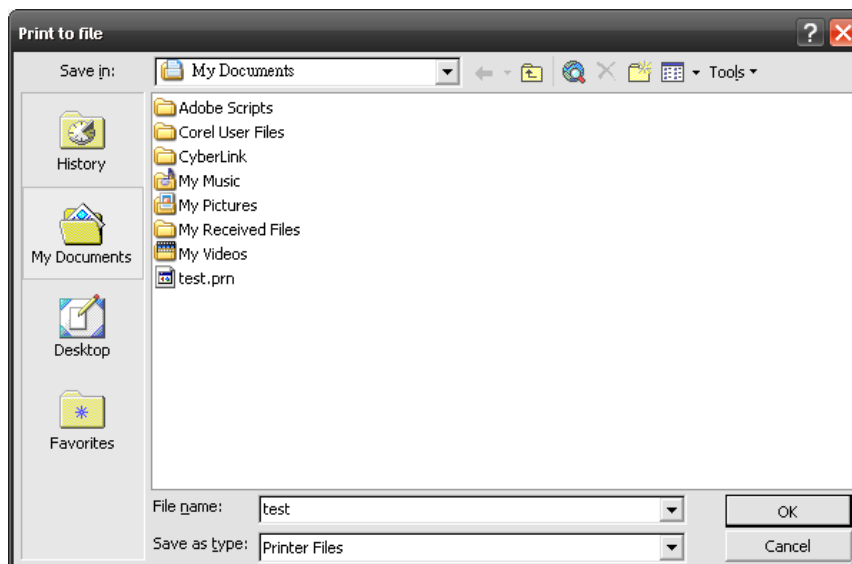
---

### Preview (Options Page) [DEFAULT SETTING: Unselected]

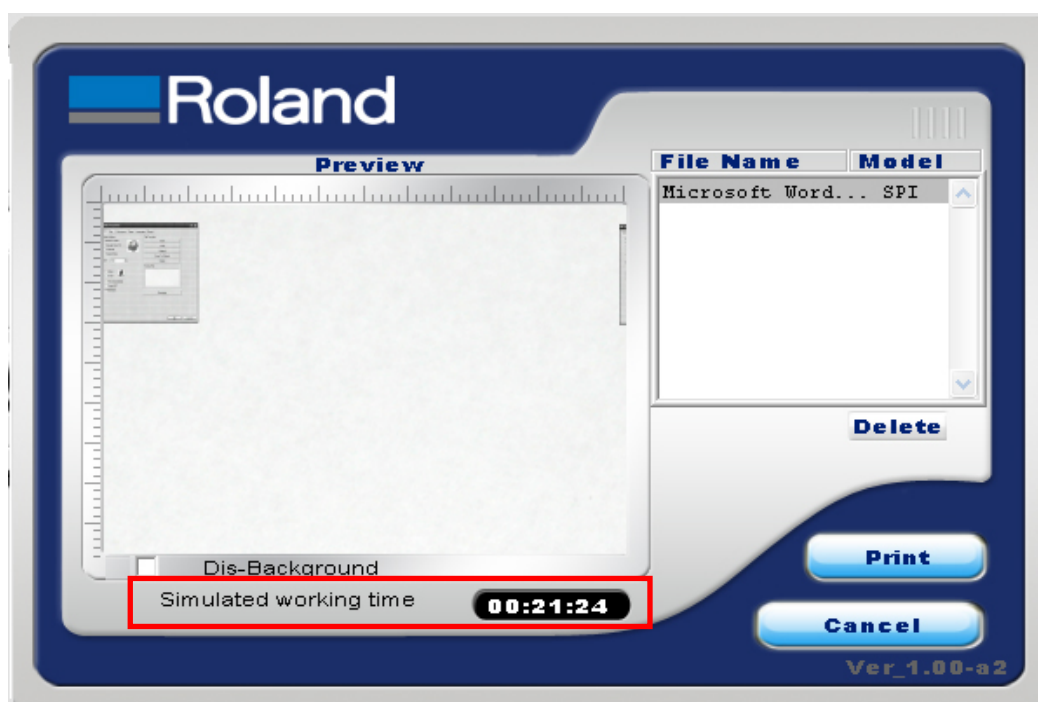
Users can use the Preview function to check a simulated output of the job. An estimated working time will also be shown. Please make sure to set the file printing option to “print to file” in order to activate the Preview function.



A filename will be prompted.



After entering the filename and pressing <ok>, the Preview screen will be shown.

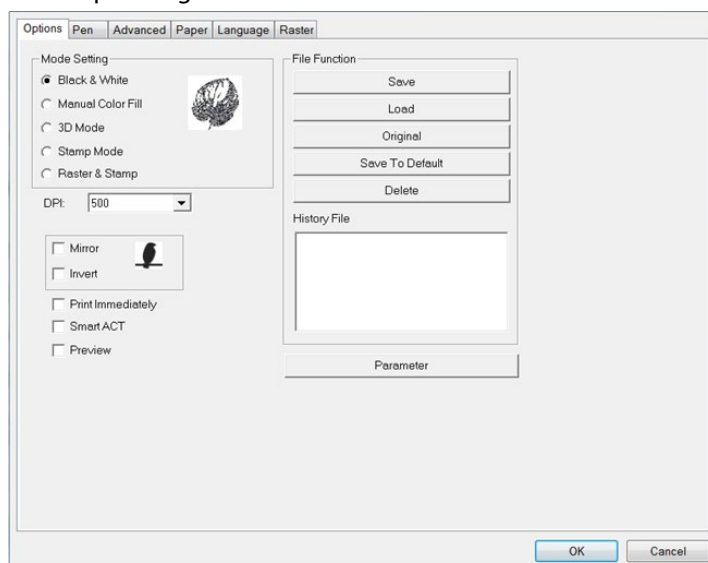


The output file can be previewed and an estimated working time of the job is also displayed.

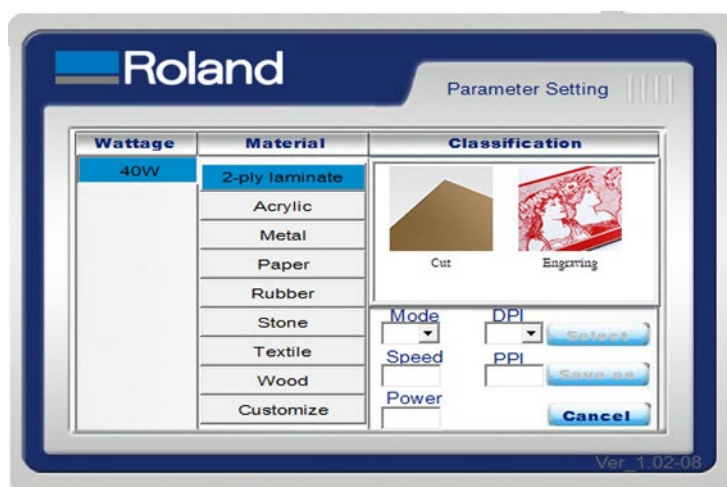
### File Function (Options Page):

The file function section allows you to manage various laser parameters. This section is useful when performing duplicate jobs on a variety of objects, allowing you to save your frequently used laser parameters and load them in the future.

- **History File:** This section contains a list of the recent files you have recently created and worked with.
- **SAVE:** This function will save the current print driver parameter settings to a file and location on your computer of your selection. (Saved parameter setting files will be tagged with the .Spi extension)
- **LOAD:** This function allows you to load those previously saved print driver parameters.
- **ORIGINAL:** This function will load the print driver's original factory parameter settings.
- **SAVE TO DEFAULT:** This function allows you to save your current print driver parameters as the default startup settings.



- **PARAMETER:** The material database consists of pre-built-in parameter settings to work with a wide variety of material including wood, acrylic, glass, 2py-laminated plastic, marble, tiles, rubber, coated metal, and more. With this convenient function, users can easily set up their tool by selecting the appropriate job type (engraving or cutting) and material categories for the corresponding parameters to be applied.



- **DELETE:** This function will delete the file you select from the History File section. Please note the Delete function only removes the file from the history file section, it does not remove the .Spi file from your hard drive, if you wish to completely remove the file from your hard disk, then you will have to manually delete the file from your operating system.)

#### NOTE

If you are using Windows as your operating system, make sure you log in with an administrator or administrator-rights account in order to properly save laser parameter settings.



#### Tip

LV-290 material database settings allow you easy to load the several parameters.  
If you are loading LV-290 parameter database as your operating parameter, please click <Parameter> under OPTIONS page, and direct load from several build-in parameter folders.

### 5.2.3.2 LV-290 Printer Driver >> Pen Page

The LV-290 incorporates the use of 16 different colors to represent 16 different laser power and speed settings when cutting and engraving. These colors are referred to as “Pens”. Think of each pen as a designated laser setting, rather than as a color. As an example, a black and white image will use only one power and speed laser setting (Black). An image that is made up of black, red and blue colors will be processed using the laser settings designated for each particular color. In order to utilize up to 16 different pens (laser parameter settings), make sure your graphics software can recognize and utilize the 16 pen colors designated by the LV-290 printer driver.

Pen No.	Color	Speed	Power	PPI	Raster	Vector	Air	AF	Defocus	Bridge	Repeat
1	Black	50.0	50	400	YES	YES	NO	NO	0.0	0	1
2	Red	50.0	50	400	YES	YES	NO	NO	0.0	0	1
3	Green	50.0	50	400	YES	YES	NO	NO	0.0	0	1
4	Yellow	50.0	50	400	YES	YES	NO	NO	0.0	0	1
5	Blue	50.0	50	400	YES	YES	NO	NO	0.0	0	1
6	Magenta	50.0	50	400	YES	YES	NO	NO	0.0	0	1
7	Cyan	50.0	50	400	YES	YES	NO	NO	0.0	0	1
8	Dark Red	50.0	50	400	YES	YES	NO	NO	0.0	0	1
9	Dark Green	50.0	50	400	YES	YES	NO	NO	0.0	0	1
10	Dark Yellow	50.0	50	400	YES	YES	NO	NO	0.0	0	1
11	Dark Blue	50.0	50	400	YES	YES	NO	NO	0.0	0	1
12	Dark Magenta	50.0	50	400	YES	YES	NO	NO	0.0	0	1

Speed: < [Slider] > 50.0  
Power: < [Slider] > 50  
PPI: < [Slider] > 400  
Defocus: < [Slider] > 0.0 mm  
Bridge: < [Slider] > 0 mm

☒ Raster  
☒ Vector  
☐ Air  
☐ Auto Focus  
☐ Defocus  
☐ Bridge Cutting  
Repeat: 1

OK Cancel

If you would like to specify your own colors to designate to a particular laser setting, then all you have to do is to double-click on that particular pen color from the pen menu and a color manager window will open where you can select “define custom colors” to define your own color (shown in the picture below). This is useful when your image is composed of colors that are not part of the pen menu’s default color selection, and instead of modifying your image, you simply assign the laser settings based on the existing colors depicted from your current image.

#### NOTE

The LV-290 printer driver cannot store more than 16 pen colors or different laser parameter settings per file.

### **Speed (Pen Page) [DEFAULT SETTING: 50]**

The speed slider controls the laser's speed during operation (engraving speed) with settings ranging from 0.1 – 100%. Keep in mind, the speed setting refers to the lens carriage moves at when cutting or engraving straight lines. The machine will automatically slow down when processing curves.



#### **Tip**

Cutting / engraving depth and quality are determined by a combination of power and speed. Slower speeds at higher power will produce deeper cuts and engravings, whereas higher speeds at lower power will produce more shallow cuts and engravings.

---

### **Power (Pen Page) [DEFAULT SETTING: 50]**

The power slider controls the laser's power during operation (engraving power) with a range setting from 0 – 100%. The percentage setting represents the power for each laser pulse fired.

### **PPI (Pen Page) [DEFAULT SETTING: 400]**

PPI (pulses-per-inch) represents the number of times the laser pulses (fires) per linear inch, exclusive for vector cutting. Higher PPI settings will generate deeper, overlapping laser pulses, resulting in cleaner cuts. Lower PPI settings (lower than 150) will result in the individual laser pulses being spread apart, resulting in a perforated effect (similar to the perforation in the paper between mailing stamps).

If you drag the PPI slider to the furthest right (maximum), the value will change to X. This completely disables the PPI control and continuously fires the laser non-stop, without pulsing.

Think of setting PPI to X as being equivalent to turning a water faucet on with the water continuously flowing out. This also disables the power ramp functionality, which automatically controls the PPI depending on the speed of the lens carriage (such as vector cutting around the corner of a square).



#### **Tip**

Cutting / engraving depth and quality are determined by a combination of power and speed. Slower speeds at higher power will produce deeper cuts and engravings, whereas higher speeds at lower power will produce shallower cuts and engravings.

---

### **Raster / Vector (Pen Page) [DEFAULT SETTING: Selected]**

Checking the Raster checkbox will process only the raster functions for the areas of your design that correspond to that particular "pen" color.

Checking the Vector checkbox will process the vector functions for the areas of your design that correspond to that particular "pen" color.

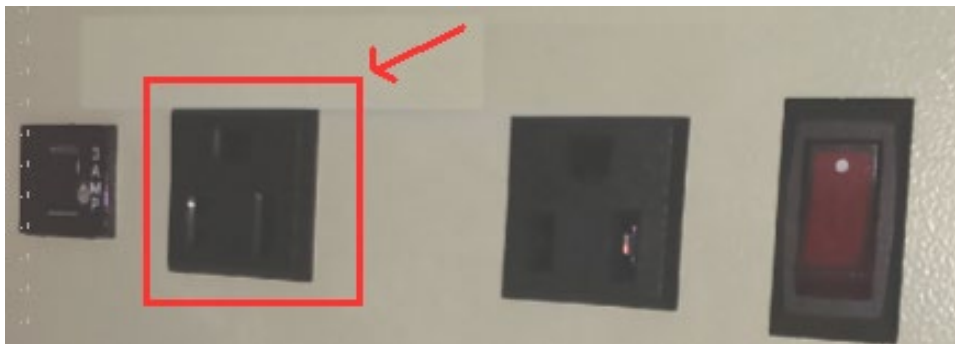
As an example: a particular "pen" color may be assigned to areas in your design containing color fills (raster engraving) and very thin lines (vector cutting). By checking / unchecking the Raster and Vector will force the driver to process / ignore the color fills / thin lines.

**Air (Pen Page) [DEFAULT SETTING: Unselected]**

This checkbox controls the SmartAIR air-assist function (if you have the optional air compressor installed). By selecting a pen color and checking this box will enable the SmartAIR air-assist function for that particular pen color. As an example, if you are performing a combination of both surface raster engraving job and deep vector cutting on a material such as acrylic, you may want to enable the SmartAIR air-assist for the vector cutting sections to get the cleanest cuts. To do this, you would simply need to select the pen color that you have assigned to the sections to be cut and select the Air checkbox for those particular pen colors.

**NOTE**

In order to use the Air Delay function under the firmware or the Air assist function in the driver, make sure that the optional air compressor is connected to the power outlet located in the lower machine cabinet. There are two power outlets located in the right-hand side of the lower machine cabinet, make sure that the air compressor is connected to the power outlet towards the left which is closer to the fuse.

**Auto Focus (Pen Page) [DEFAULT SETTING: Unselected]**

This checkbox sets the Auto Focus for that particular job. With the Auto Focus button checked, LV-290 will automatically initialize the auto focus procedure before starting the job. This will ensure the focal distance is properly set based on the particular material you are working with and the focal lens you have installed.

**Defocus (Pen Page) [DEFAULT SETTING: Unselected]**

This checkbox enables users to set the Defocus or out of focus distance for a particular job. With the Defocus button checked, the LV-290 will use the entered focus distance when performing the auto focus procedure before starting the job. This feature allows users to use out of focus engraving techniques when working with different types of materials. Note that the Defocus distance is set by the different pen colors.

Pen No.	Color	Speed	Power	Freq	Raster	Vector	Air	AF	PPI	Defocus	Repeat	waveform	Laser
1	Black	50.0	50	30	YES	YES	NO	NO	400	4.0	1	0	CO2
2	Red	50.0	50	30	YES	YES	NO	NO	400	0.0	1	0	CO2
3	Green	50.0	50	30	YES	YES	NO	NO	400	0.0	1	0	CO2
4	Blue	50.0	50	30	YES	YES	NO	NO	400	0.0	1	0	CO2
5	Yellow	50.0	50	30	YES	YES	NO	NO	400	0.0	1	0	CO2
6	Magenta	50.0	50	30	YES	YES	NO	NO	400	0.0	1	0	CO2
7	Cyan	50.0	50	30	YES	YES	NO	NO	400	0.0	1	0	CO2
8	Brown	50.0	50	30	YES	YES	NO	NO	400	0.0	1	0	CO2
9	Light Green	50.0	50	30	YES	YES	NO	NO	400	0.0	1	0	CO2
10	Orange	50.0	50	30	YES	YES	NO	NO	400	0.0	1	0	CO2
11	Purple	50.0	50	30	YES	YES	NO	NO	400	0.0	1	0	CO2
12	Pink	50.0	50	30	YES	YES	NO	NO	400	0.0	1	0	CO2

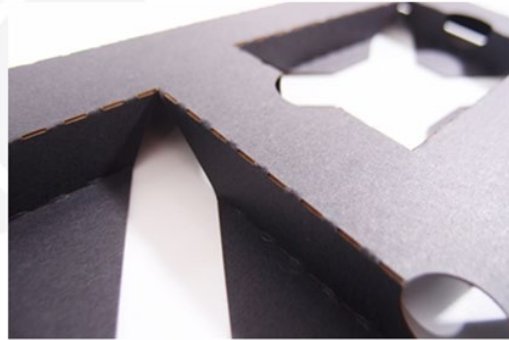
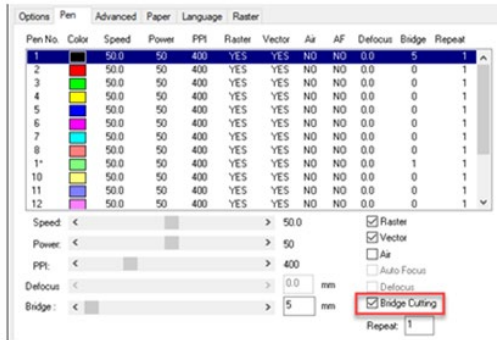
  

Speed: < [Slider] > 50.0  
Power: < [Slider] > 50  
Freq: < [Slider] > 30  
PPI: < [Slider] > 400  
Defocus: < [Slider] > 4.0 mm

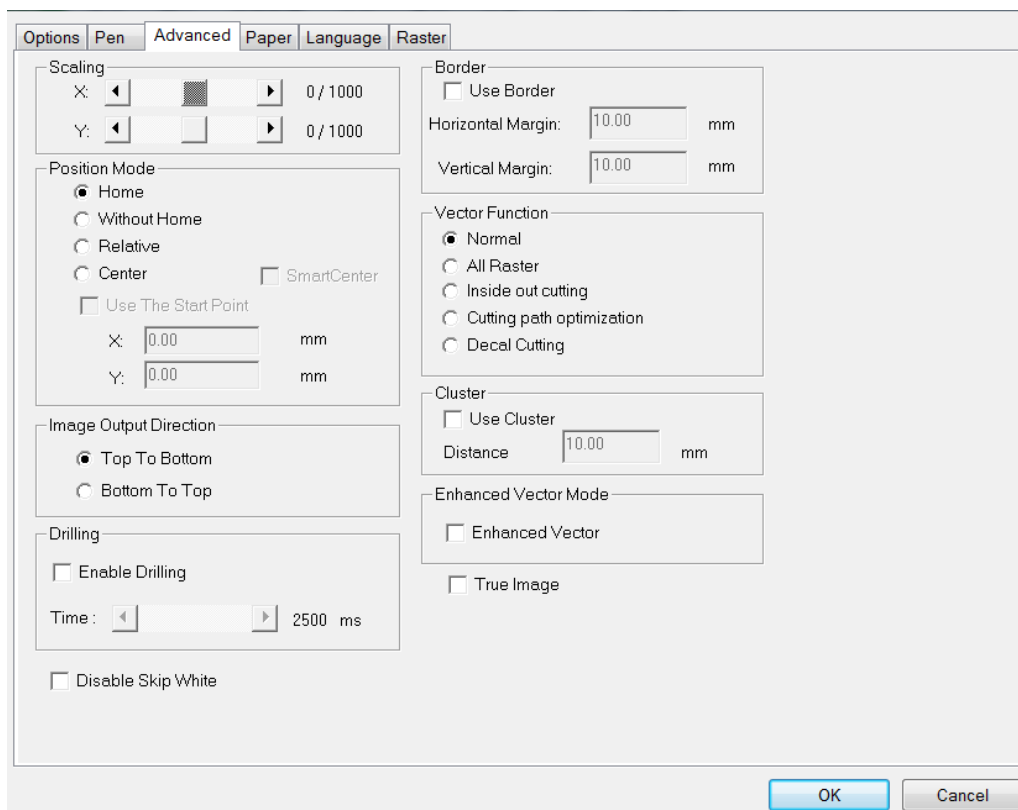
☒ Raster  
☒ Vector  
☐ Air  
☐ Auto Focus  
☒ Defocus  
☐ Waveform  
☐ Fiber Laser  
Repeat 1

### Bridge Cutting (Pen Page) [DEFAULT SETTING: Unselected / 0.0 mm]

Checking the Bridge Cutting checkbox will allow users to easily create perforation lines (dash-line). Once the line color along with another corresponding pen can be used in tandem to indicate the length of the gap and the uncut part of a perforation line. (If Pen 1 is selected for bridge cutting, Pen 9 will be reserved to the length of the connected lines of the perforation. If Pen 2 is selected, Pen 10 will be reserved and so on...)



### 5.2.3.3 LV-290 Printer Driver >> Advanced Page



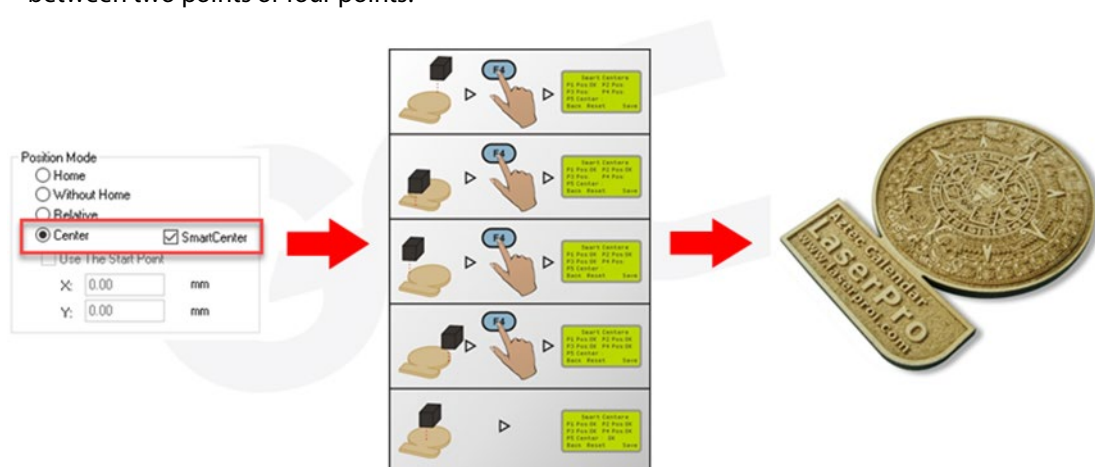
### Scaling (Advanced Page) [DEFAULT SETTING: 0]

In some cases you may find a slight output inaccuracy in the actual output compared to what you have set in the computer. This margin of error or offset is extremely small (approximately 1/300). What this means is that there may be a 1-unit offset for every 300 unit increments. As an example, if you engrave a 300mm straight line, it may end up measuring only 299 mm or 301 mm in the final output. In this case, you will want to set the scaling setting to +1/1000 or -1/1000 respectively to compensate. A general rule of thumb is for every 300 unit increment, you will want to adjust the slider by +1 if the final output is 1 unit increment shorter or -1 if the final output is 1 unit increment longer than your graphic design setting.

### Position Modes (Advanced Page) [DEFAULT SETTING: Home]

These selections allow you to control the positioning of the laser head after each job completion and before the next subsequent job.

- **Home:** Resets the positioning of the laser head to the 'home position' (upper-right) before and after each job.
- **Without Home:** The laser head will start the next job based on the position from its graphic application software setting, from the last position of the previous job. Upon completion of the current job, the laser head will remain at the last position of the previous job.
- **Relative:** This mode sets the current laser head position to correspond to the origin (top left) position of the graphic software. Therefore, the laser head will process the job from its current position relative to its setting in the graphics software.
- **Center:** Sets the current position of the laser head as the center point for your subsequent job. As an example, if the subsequent job is to vector cut a circle and you have the Position Mode set to Center, then the LV-290 will vector cut a circle around the initial position of the laser head.
- **SmartCENTER:** The SmartCENTER function is a quick and easy way to precisely locate the center point between two points or four points.



#### Tip

The SmartCENTER function is a quick and easy way to precisely locate the center point between two points or four points. It is a great tool for users whose jobs often require engraving on specific locations such as on award signs and plaques.



#### Tip

It is highly recommended you enable the red dot laser pointer when setting / adjusting the Position Modes, as this will ease your job positioning with enhanced accuracy.

---

### Image Output Direction (Advanced Page) [DEFAULT SETTING: Top to Bottom]

These selections allow you to control the direction in which the system processes an engraved image.



- **Top to Bottom:** Selecting this will force the system to process the current task by moving the lens carriage from the top to the bottom of the image (rear end to front end of the work table).
- **Bottom to Top:** Selecting this will force the system to process the current task by moving the lens carriage from the bottom to the top of the image (front end to rear end of the work table)

Normally, the LV-290 engraves from left to right, top to bottom. Selecting Bottom Up will alter the engraving sequence and the engraving will start from the bottom and work its way to the rear of the working table.



#### Tip

In situations where the material you will be working with may produce a lot of dust byproducts and you are utilizing the optional air extraction system, it is recommended that you select the Bottom To Top image output direction option. This will minimize the amount of dust byproducts lodged in the engraved sections as the air extraction system is vented from the rear of the machine, the same direction as the image is processed.

### Border (Advanced Page) [DEFAULT SETTING: Unselected]

In cases where you are working with a negative image (negative outline areas of your image are engraved, rather than the positive areas), you may wish to include a border around your image.

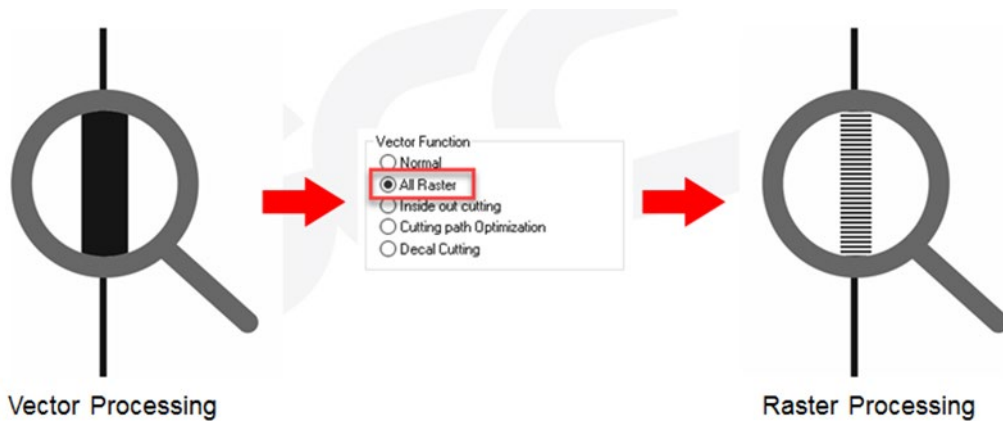
To properly add a border, you will first need to Invert your design from the Options Page, then check Use Border and specify a value for the thickness of the border you would like to add to your design. This mode is useful for engraving rubber stamps, as it allows you to create the outline around your stamp image.

#### NOTE

If you wish to use the Border and Cluster function simultaneously, the Border Thickness value must be less than the Distance value specified in the Cluster setting.

### Vector Function (Advanced Page) [DEFAULT SETTING: Normal]

- **Normal:** This selection will not apply any special advanced vector function to your job. This is the default Vector Function setting.
- **All Raster Output:** This selection will instruct the print driver to process your entire image as a raster engraving. Any vector lines within the image will be treated as raster data and outputted as a raster engraving, similar to a dot-matrix printer.



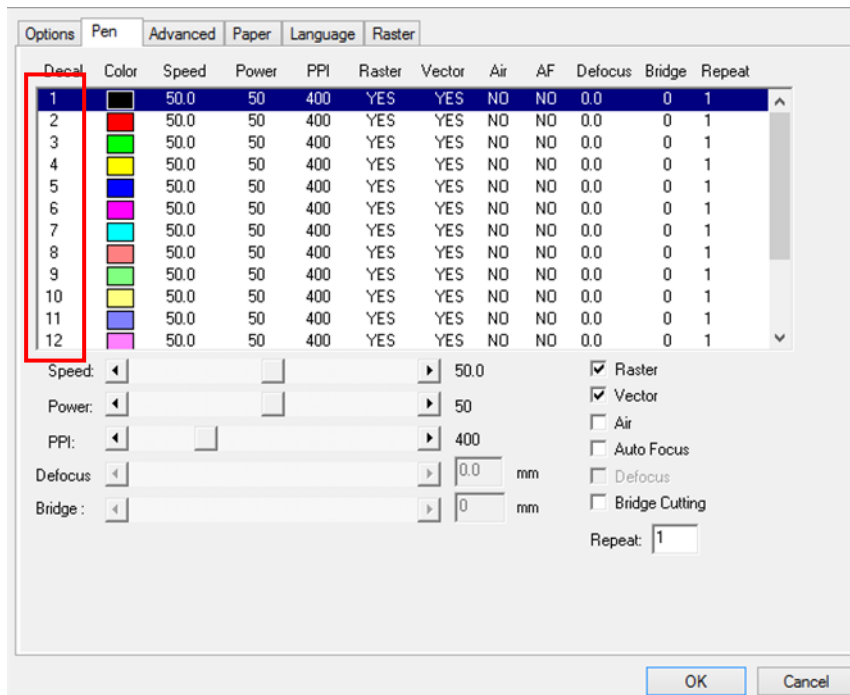
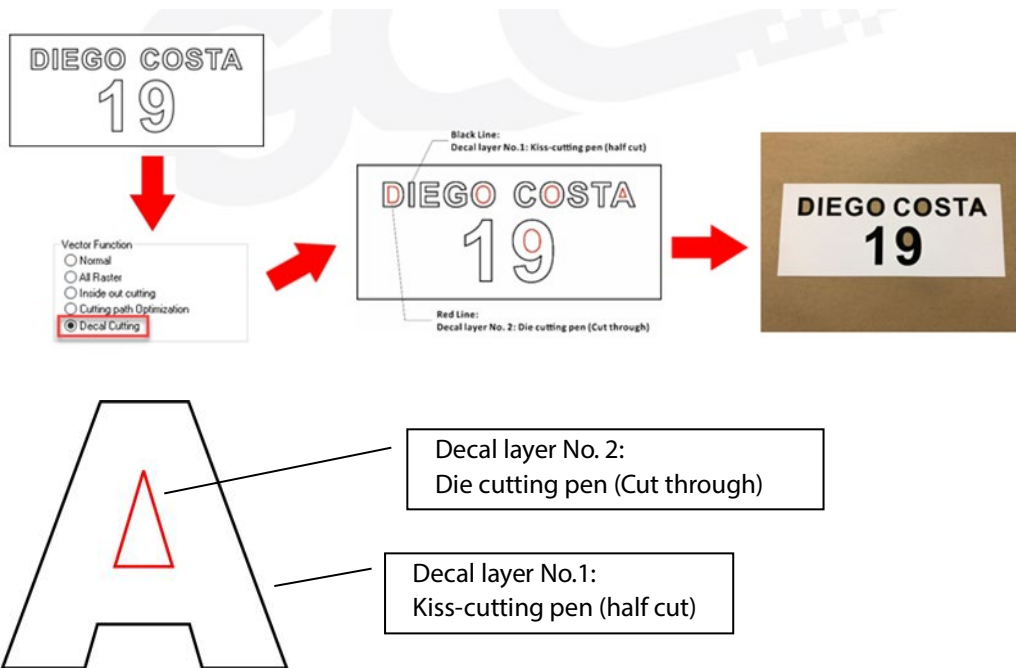
- **Vector Sorting:** When performing a vector cutting job in which your image has one vector cut area enclosed within another vector cut area, select the Vector Sorting mode. This mode will automatically instruct the print driver to process the inside vector image and move outwards. If you try to process a vector image that has multiple layers without using this mode, what may occur is the laser engraver may process the outer vector cutting first, and any inner vector cutting will not be possible as your centerpiece material may have dropped to the cutting table. This setting will always automatically direct the laser to cut from the inner most vector shape and move outwards.
- **Inside out Cutting:** This setting will always automatically direct the laser to cut from the inner most vector shape and move outwards.



- **Optimization Sorting:** This is a setting that will minimize your process time. When selected, the print driver will analyze your image and automatically determine the most efficient processing path to process your image.



- **Decal Cutting:** this function is developing to reduce material weeding job after laser cutting for multiple layers adhesive materials, such as lettering vinyl, heat transfer film, and twill film. This function allows allocating different parameters for corresponding decal layer numbers to do die cut (cut through media) for the unwanted parts, and kiss-cut (half cut) for the kept material parts, after the laser cutting, users can just peel off the materials to get rid of waste parts.




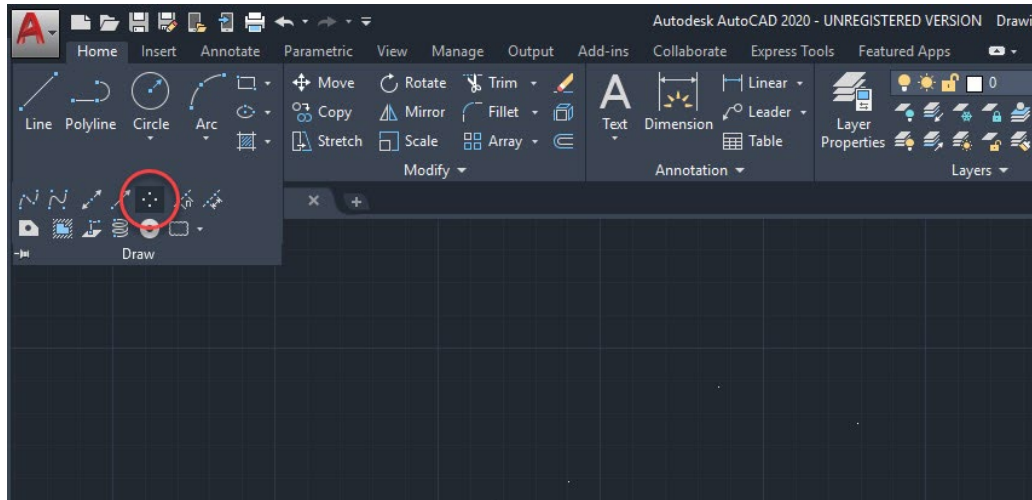
#### Enhanced Vector Mode (Advanced Page) [DEFAULT SETTING: Unselected]

This setting allows you to improve the cutting quality at the expense of speed. Your engraving speed will be dropped by 50%, to maximize the cutting power. We recommend that you enable this function when cutting thicker materials.

### Drilling (Advanced Page)

The drilling function is available only for use with AutoCad. Users can insert dots from AutoCad's tool bar and use the drilling function to set the drilling time required to create holes.

Use the default "point" tool (  ) from the tool bar to create dots which will be interpreted as drilling locations. Use the adjusting bar on under the "Drilling" function to set the drilling time (spot delay) required. The size of the drilled hole can be adjusted by deploying a longer or shorter drilling time.



### Use Cluster (Advanced Page) [DEFAULT SETTING: Unselected]

This setting allows you to change how the LV-290 interprets and processes individual / independent areas of an image in order to minimize job-processing times. The Cluster function is only applicable when multiple areas of an image are broken down and isolated from each other (areas not touching each other, blank space in-between). Another condition that must be met for the Cluster function is that these individual areas of your design must have some X-axis overlap, meaning that they should be to some extent side-by-side with empty spaces between them. The distance value can be set by the user and represents the limit or cutoff point in which side-by-side objects will be processed in Cluster mode or not. If the distance between side-by-side objects is greater than the set distance value, then the individual areas will be processed in Cluster mode. Conversely, if the distance between side-by-side objects is lesser than the set distance value, then the individual areas will be processed normally (not via Cluster mode).

An example of an image that would benefit from the Cluster function would be: 2 squares to be engraved, side-by-side on the X-axis with a 20 cm gap in between them. In this scenario, you would want to enable the Cluster setting and set the distance to a value less than 20. By doing so, the laser will completely process one square and "leap-frog" to the second square, rather than processing both squares simultaneously. The resulting processing time is minimized by eliminating the unnecessary travel distance the laser head needs to make across the X-axis in between squares, if they were to be processed simultaneously.

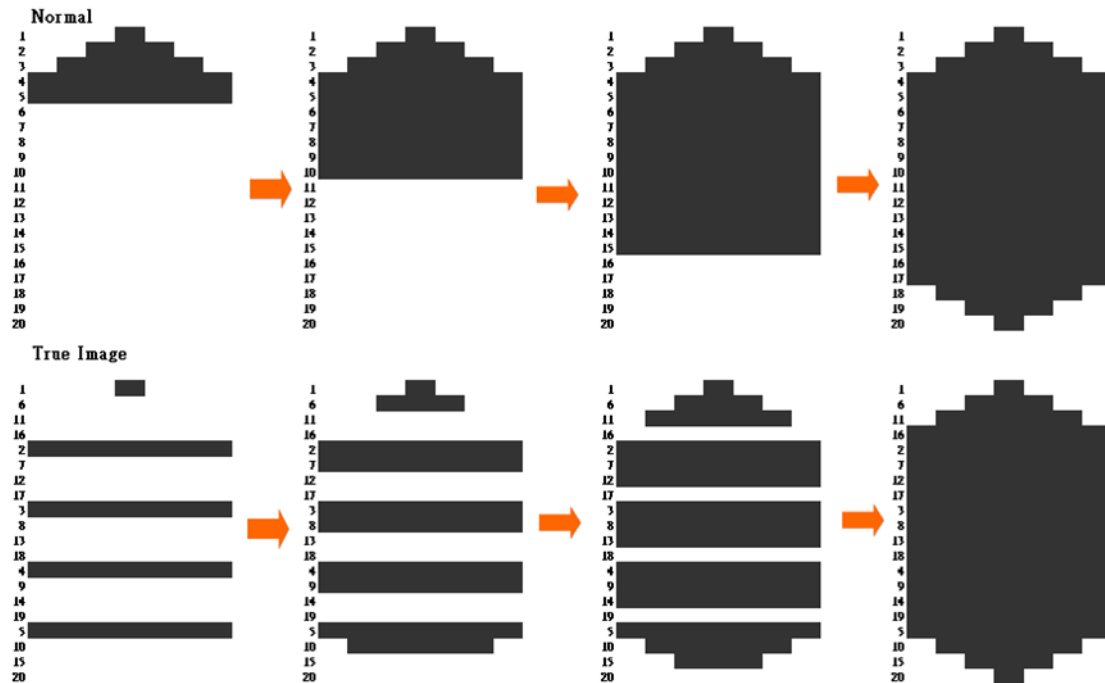
#### NOTE

If you wish to use the Border and Cluster function simultaneously, then the Border Thickness value must be less than the Distance value specified in the Cluster setting.

### True Image Mode (Advance Page) [DEFAULT SETTING: Unselected]

This setting allows you to improve the engraving quality by reordering the line by line output sequence and by doing so masking the banding problems. This feature is only suitable for engraving large sized graphics. Note: The overall working time will be increased.

True Image is a function that will shuffle the normal engraving sequence to produces a nicer engraving output by reducing possible banding occurrences.



### 5.2.3.4 LV-290 Printer Driver >> Paper Page

The screenshot shows the 'Paper' tab of the LV-290 Printer Driver. The 'Paper Size' section has input fields for X (640.00 mm) and Y (460.00 mm), with checkboxes for 'Extend', 'AAS', and 'CCD'. The 'Rotary Parameter' section has an 'Offset' field (0.00 mm). The 'Unit' section has radio buttons for 'Metric (mm)' (selected) and 'Imperial (inch)'. The 'Image Tuning' section has a slider set to 0. The 'Optional Item' section has checkboxes for 'Roll To Roll Autofeeder', 'Rotary Fixture', 'Dual Head', and 'AAS'.

#### Paper Size (Paper Page)

The paper size represents your total work area. Ensure that the paper size is never set greater than the working area. The X value represents the length and the Y value represents the width.

	LV-290
Working Area	25"x18" (640x460 mm)
Extended Working Area*	29"x18" (740 x 460 mm)

\* when Extend option is checked in Paper Page

#### NOTE

When using the optional rotary attachment system and with the Rotary Fixture option checked, the X value represents the length of your working piece. The Y value will be changed to Diameter, which represents the diameter of your working piece (at the position you wish to engrave).

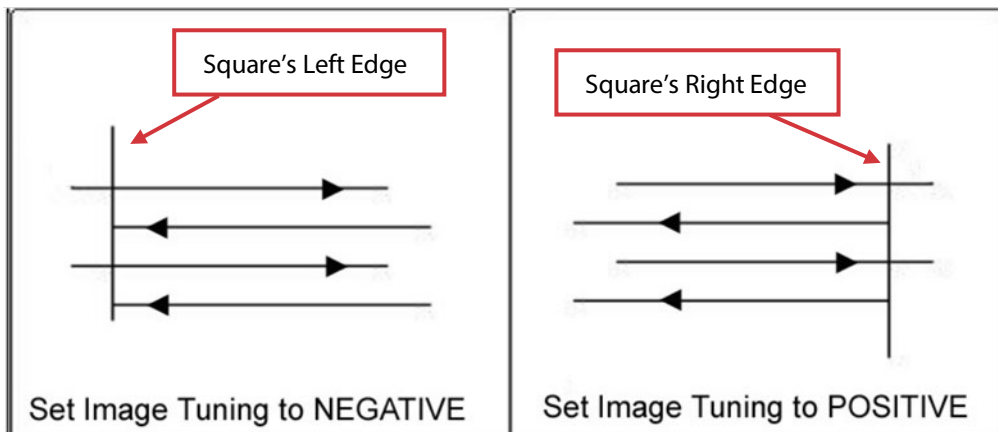
#### Unit (Paper Page) [DEFAULT SETTING: Metric (mm)]

Here you can set your preferred measurement standard in which you would like to use with the LV-290 printer driver. You can choose between metric or imperial standards.

### Image Tuning (Paper Page) [DEFAULT SETTING: 0]

In the event that you are processing extremely fine and detailed designs requiring near- microscopic edge-to-edge precision, you will need to adjust the image tuning setting. To adjust this setting, we recommend that you engrave a small black square design as a sample and use a magnifying glass to view the engraved results.

When you look at your engraved test square under a magnifying glass, you may notice the edges of your square may be slightly offset, with every consecutive engraved even or odd line protruding past the square's ideal edge. This occurrence may occur on the left or right side of the square and can be compensated for by the image tuning setting. In the diagram below, the arrows refer to the direction the laser head is moving to generate that engraved line. If the first and every other line protrude to the left of the square's ideal edge, you will want to set the image tuning to a negative value. If the first and every other consecutive line protrude to the right of the square's ideal edge, you will want to set the image tuning to a positive value. The further the protruding lines are from the square's ideal edge, the larger you will need to set the Image Tuning value to compensate.



The following is an example that has the proper image tuning, and demonstrates this significance when engraving fine, small, intricate text. The following two pictures show engraved text magnified with no image tuning (left picture) and image tuning enabled (right picture).



**Extend (Paper Page) [DEFAULT SETTING: Unselected]**

If you are processing a very large area requiring the maximum work table area, you will want to enable this mode. Enabling this mode will extend the LV-290 maximum work area to 29" x 18" (740 mm x 460 mm) from the default 25.197" x 18.110" (640 mm x 460 mm). This function is enabled at the expense of some quality loss, usually on the left and right edges of your full-size engraving. Usually the quality loss is minimal and may not be apparent, depending on your design.

**NOTE**

With the Extend function enabled, the following functions are disabled: 3D mode (Options Page), Stamp Mode (Options Page), SmartACT (Options Page), Disable Skip White (Advanced), Auto Focus (Pen Page), and Rotary Fixture (Paper Page).

**Rotary Fixture (Paper Page) [DEFAULT SETTING: Unselected]****NOTE**

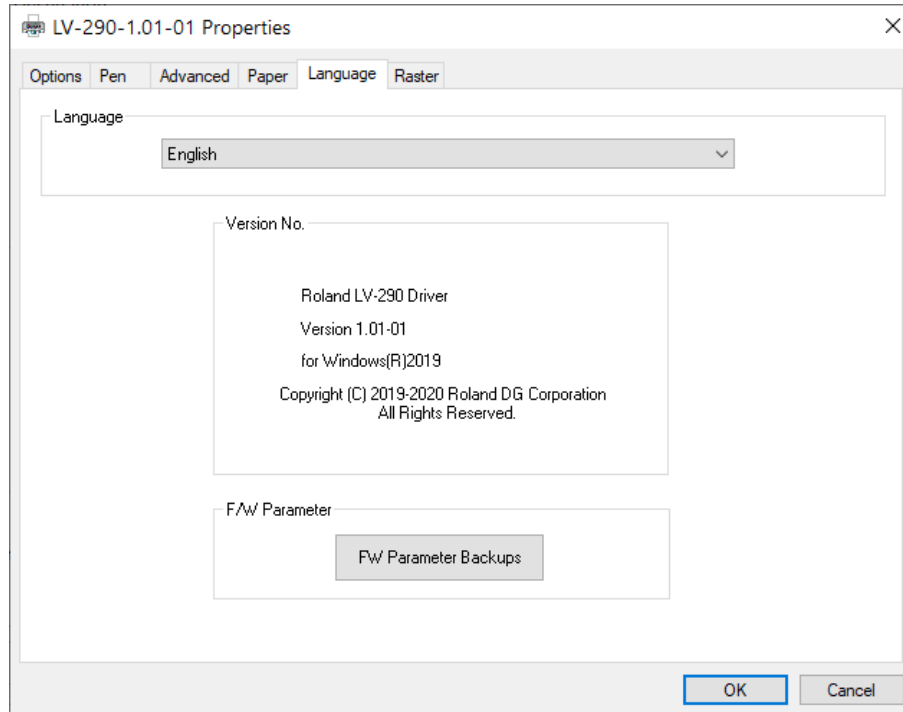
This option is only to be used with the Rotary Attachment optional accessory properly set up. For instructions on how to set up the Rotary Attachment, please refer to Chapter VII of this manual.

You will need to select this option when processing a job with the optional rotary attachment system to engrave on round or cylindrical objects. When you have your material and rotary attachment properly set up:

- 1) Check the Rotary Fixture function and notice the change in the Paper Size fields under Paper Size, the X value represents the length of your work piece. Enter the length of your work piece in this field.
- 2) Under Paper Size, the Diameter value represents the diameter of your working piece (at the position you wish to engrave). Enter the diameter of your work piece in this field. Again, remember the proper diameter value would be the diameter location, at the point of engraving on your work piece.
- 3) Under Rotary Parameter, the Offset value represents distance from the open end of your work piece to the base of the padded rubber wheel. This value will be displayed on the LCD panel. Enter the proper offset value in this field.

### 5.2.3.5 LV-290 Printer Driver >> Language Page

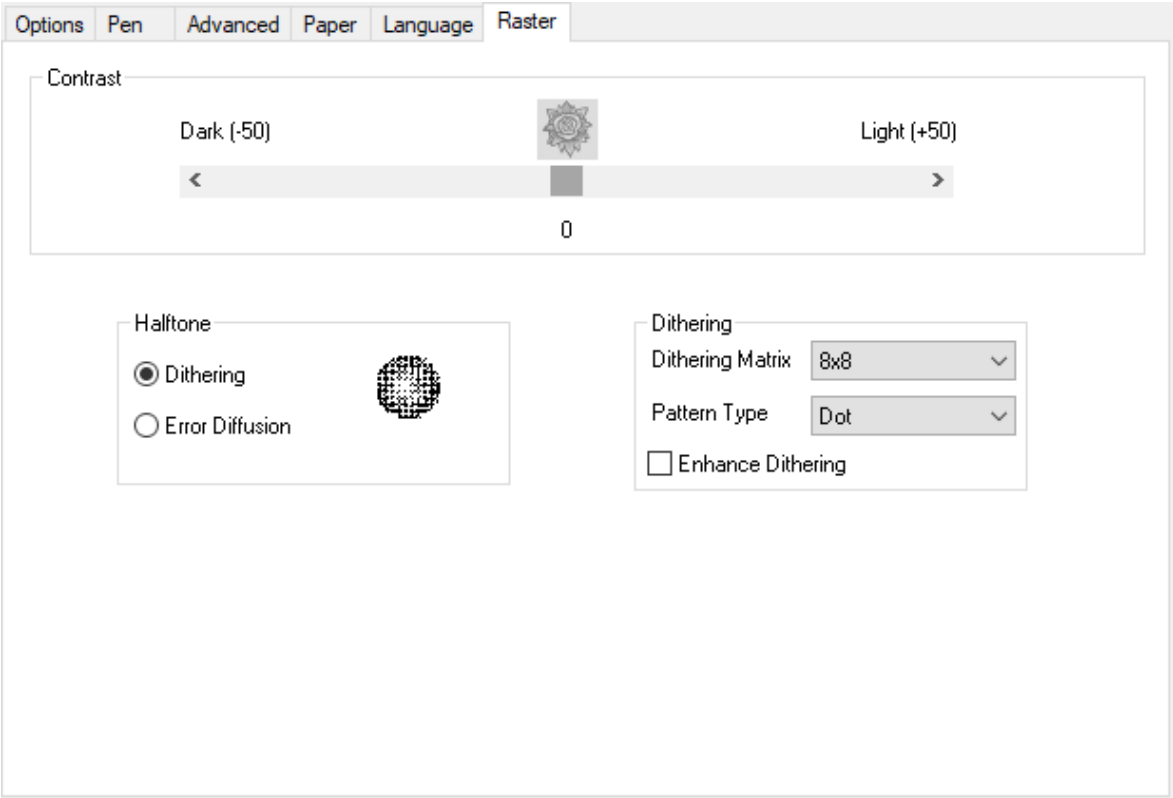
This page allows you to specify the language displayed by the LV-290 Printer Driver. Current language options allow for: English, Spanish, French, Chinese (Simplified, Traditional), Japanese, and German. Remember to select “Save to Default” on Options Page to save the specified language.



5.2.3.6 LV-290 Printer Driver >> Raster Page

NOTE

The Raster Page is only available when Black & White Mode Setting is selected from the Options Page, this page offers a number of advanced Raster Engraving output options.



Contrast (Raster Page) [DEFAULT SETTING: 0]

This provides a quick and easy way to immediately adjust the contrast of an engraved image. Moving the slider to the Dark setting will increase the contrast levels of the engraved output, whereas moving the slider to the Light setting will decrease the contrast levels of the engraved output.



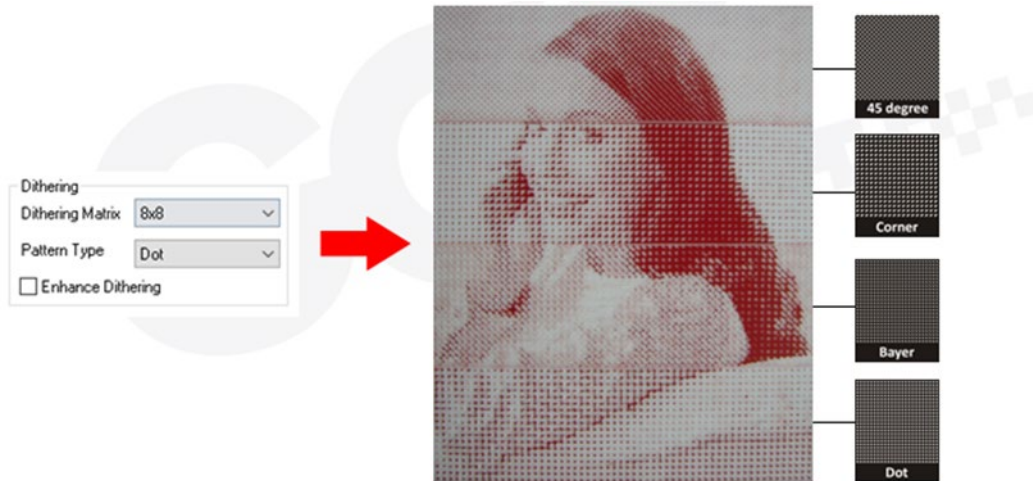
Tip

There are other ways to adjust an engraved image’s contrast such as: adjust the power / speed settings or simply adjust the contrast of the image in software with the graphic software application.

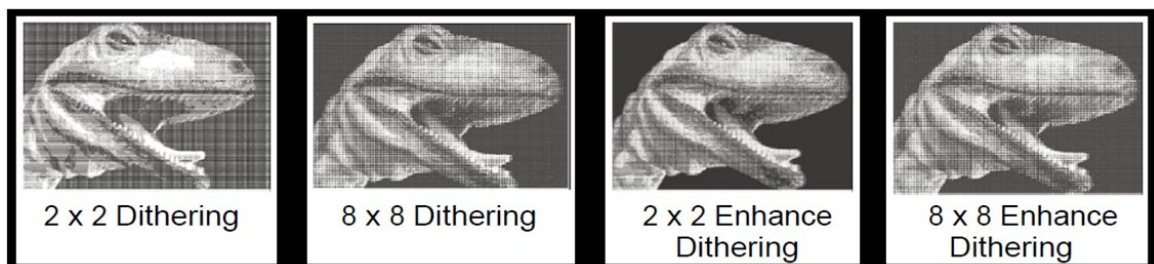
### Halftone (Raster Page) [DEFAULT SETTING: Dithering]

This option controls the way a raster-engraved image is processed. The “digital image to engraved output” process can be processed via two methods: Dithering or Error Diffusion. Each offer additional output options yielding different output effects, style, and quality.

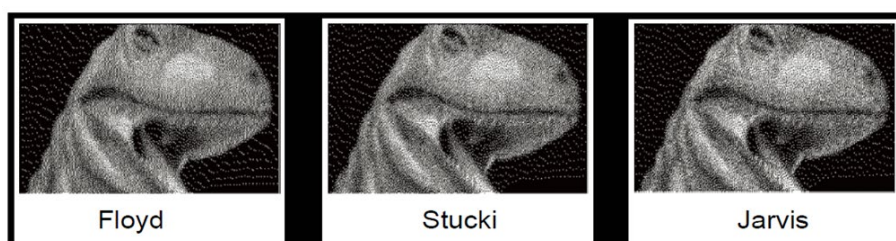
- **Dithering:** Interprets and outputs the raster engraving via the dithering method. This mode will allow you to select the Pattern Type and Dithering Matrix, and Enhanced Dithering.
  - **Pattern Type:** Dot, Bayer, Corner, 45 Degree [DEFAULT SETTING: Dot]  
Each pattern type uses a different shape and arrangement of dots to compose the shading effect of a raster image.  
The following diagram is an example of the raster effects when using the different pattern types.



- **Dithering Matrix:** Variable depending on the Pattern Type selected. [DEFAULT SETTING: 8x8]  
This controls the resolution (dot size) and the number of dots the image is broken down into for the dithering process. As an example, selecting 2 x 2 will shade with a 5-grade halftone, where as an 8 x 8 Dithering Matrix will dither with a 65-grade halftone.  
The following diagram is an example of the raster effects when using the different dithering matrices.



- **Enhance Dithering** [DEFAULT SETTING: Unselected]  
Selecting this will produce a finer dithering output.
- **Error Diffusion (Raster Page):** Interprets and outputs the raster engraving via the error diffusion method. This mode will allow you to select from three diffusion types: Floyd, Stucki, and Jarvis.
- **Diffusion Type:** Floyd, Stucki, Jarvis [DEFAULT SETTING: Floyd]  
Each diffusion type presents the shade of image as different spread halftones instead of dots to compose a raster image.  
The following diagram is an example of the raster effects when using the different diffusion types.



**Tip**

There is no “correct” or “best” setting when using the Raster options. The most appropriate settings will be based on a variety of factors: your design, the material you are engraving on, and the results you wish to achieve, etc. Please take some time to experiment with the multitude of raster options to get the one you feel is the best for your piece. This is where much of the fun in engraving is....experimentation!

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### 5.2.3.7 LV-290 Printer Driver >> Stamp Page

Producing stamps require different operational steps than your standard engraving or cutting jobs. The Stamp page offers dynamic options allowing you to customize your stamp production process.

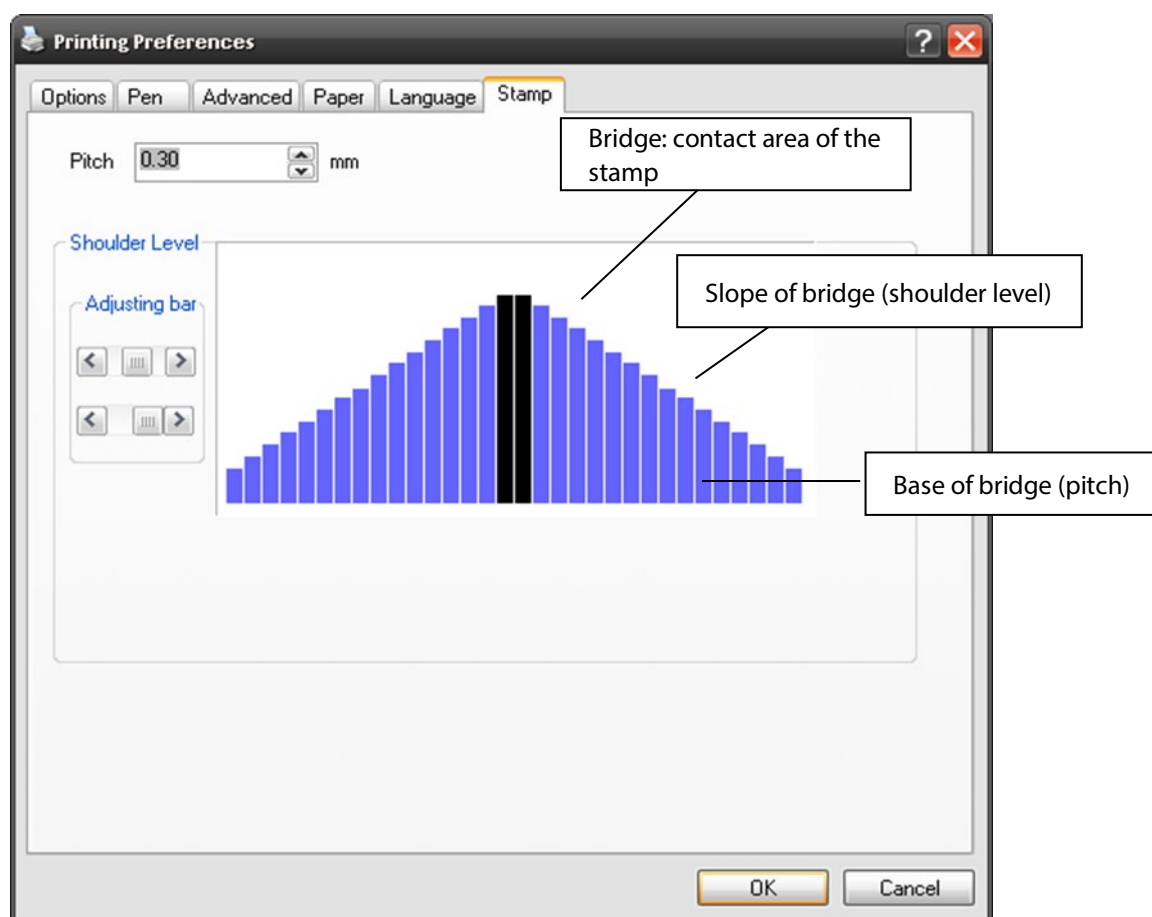
#### NOTE

The Stamp page will only appear and be accessible when you have selected the Stamp Mode from the Options Page.



#### Tip

Functions located on the other pages that are useful when making a stamp: Set Shoulder, Pitch, Border, Invert, and Mirror.



#### Pitch (Stamp Page)

Your stamp will be a reversed image composed of engraved depressions and ridges. Think of these ridges as the “contact sections” of the stamp. If the ridges of these contact sections are too thin, they may break. The Pitch setting allows you to increase the width of the ridge base, hence creating more stable “contact sections” and longer lasting stamp. The pitch value setting allows you to adjust the base width of the ridge. Broad pitch gives the maximum amount of support for each ridge. Experiment with different pitch value settings in order to produce the stamp that is best suited for your application.

**Adjustment Bar/ Power Level (Stamp Page)**

Another important aspect of creating a stamp is setting the slope level of the shoulder. The shoulder is the section from the “contact section” of the stamp to its base. This function allows you to adjust the slope for the shoulder sections of your stamp. By sliding the sliders or directly input of power levels, you will be able to change the slope of the shoulder.

**NOTE**

The visual representations of the Pitch and Shoulder Levels in the LV-290 driver are an exaggerated representation to allow for easy visual guidance and precise input. Remember we are working with distances less than 1 mm here.

## 5.3 SmartCONTROL Vision

### 5.3.1 SmartCONTROL Vision Introduction

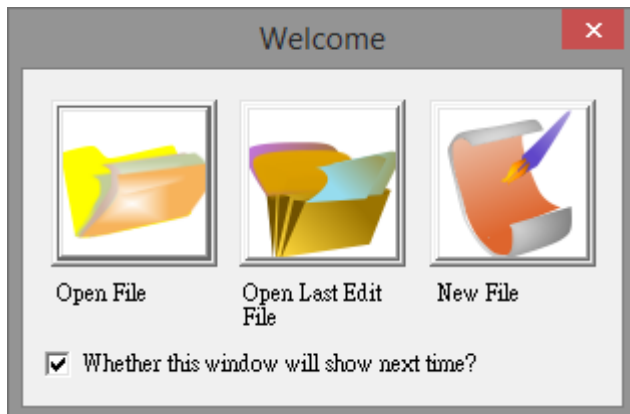
#### Reminder Window

In order to avoid transmission collisions, each time you launch the SmartCONTROL™ software, it will show a reminding message that shut down SmartCONTROL™ first if you want to print files through other graphic software to laser machine. Click “OK” to open SmartCONTROL™ software.

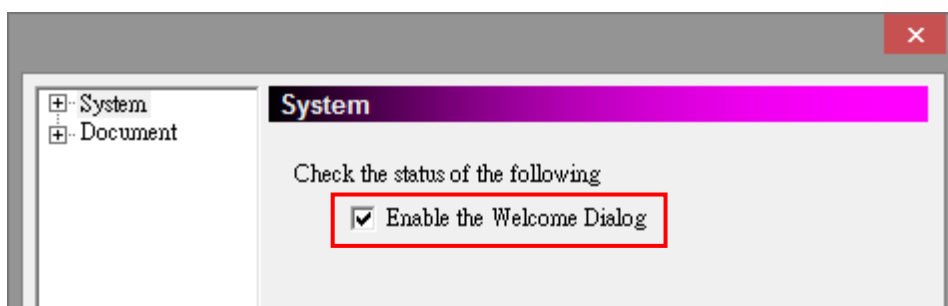


#### Welcome Window

This welcome window will allow you to quickly open historic files or begin a brand new job.



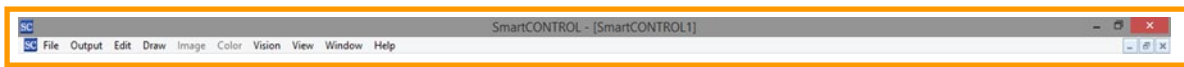
If you would like to disable this opening window next time you start SmartCONTROL™, please go to File→Option→System→Welcome and cancel the check on “Enable the Welcome Dialog”.



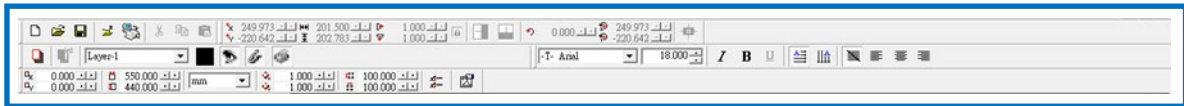
## Main Window

The Main Window of SmartCONTROL™ software is divided into several unique sections: The Menu Bar, the Tool Box, the Work Area, and the Property Table.

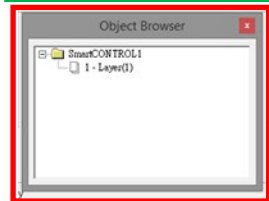
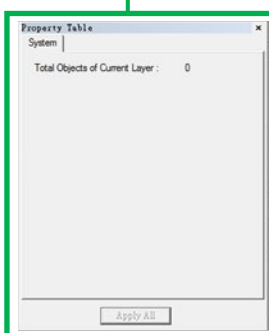
Menu Bar



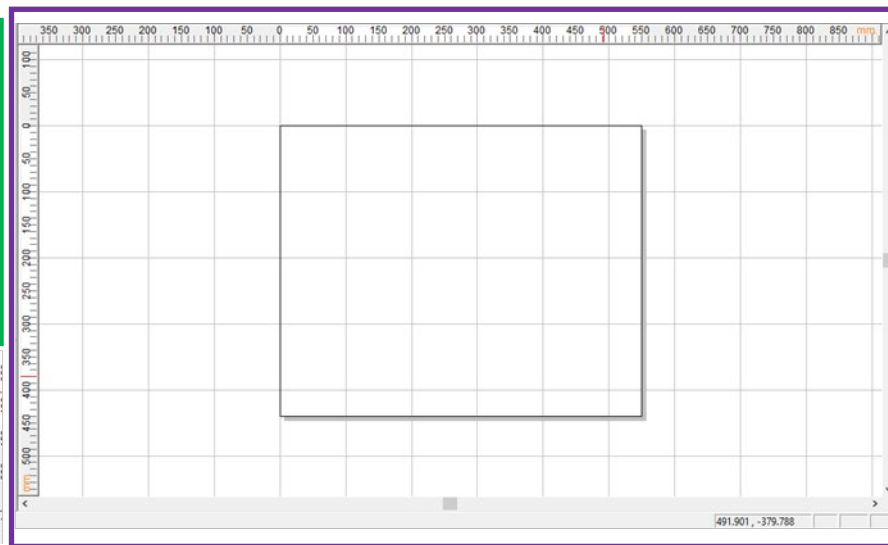
Tool Box



Property Table



Object Browser



Work Area

## Menu Bar

Similar to many Windows™ based program, the Menu Bar contains the locations of almost all the functions of the SmartCONTROL™ Software. They are sorted into the following categories:

- File Menu
- Output Menu
- Edit Menu
- Draw Menu
- Image Menu
- Color Menu
- Vision Menu
- View Menu
- Window Menu
- Help Menu

More information regarding the different Menus will be provided in the following sections.

## Tool Box

The default Tool Box is composed of the Standard Bar, the Properties Bar, the Draw Bar, the Font Bar, and the Edit Bar. These bars provide visual references for the most commonly used tools. More information regarding different tools would be present in the VIEW MENU section.

## Work Area

The Work Area is where graphics placed to create a file. The area can be enlarged or decreased to equal the size of the materials that are to be engraved or cutting.

## Property Table

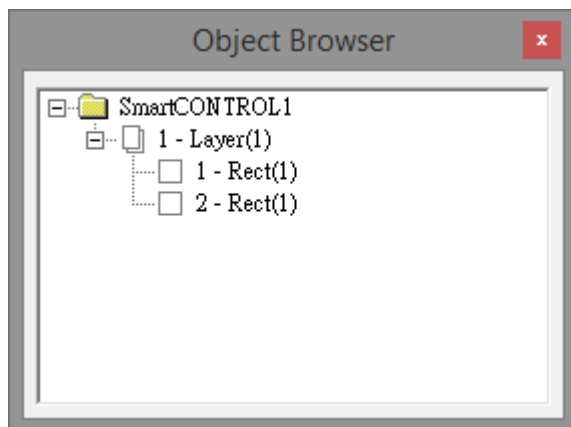
All objects created or imported on the Work Area have their own unique sets of properties. These properties define how each specific object or groups of objects are displayed on the Work Area or marked by SmartCONTROL™. To display the properties of an object or a group, simply highlight it and the specific property details should reveal themselves on the Property Table. If the Property Table is not currently active, choose the object and press the right mouse button to choose Property Table.

### NOTE

After you have edited one of the parameters in the Property Table, click on Apply or Apply to All in order to insert your changes.

## Object Browser

The Object Browser would show an OBJECT BROWSER Window in the left side, and list all the objects you create on the working area, you can identify the object format, create sequence, name the object and select objects by clicking it in the OBJECT BROWSER Window. The objects shown in the upper level means its output sequence.

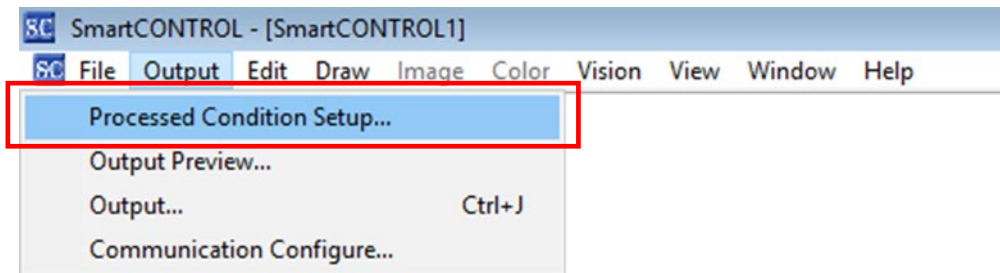


## Exit

Close SmartCONTROL™

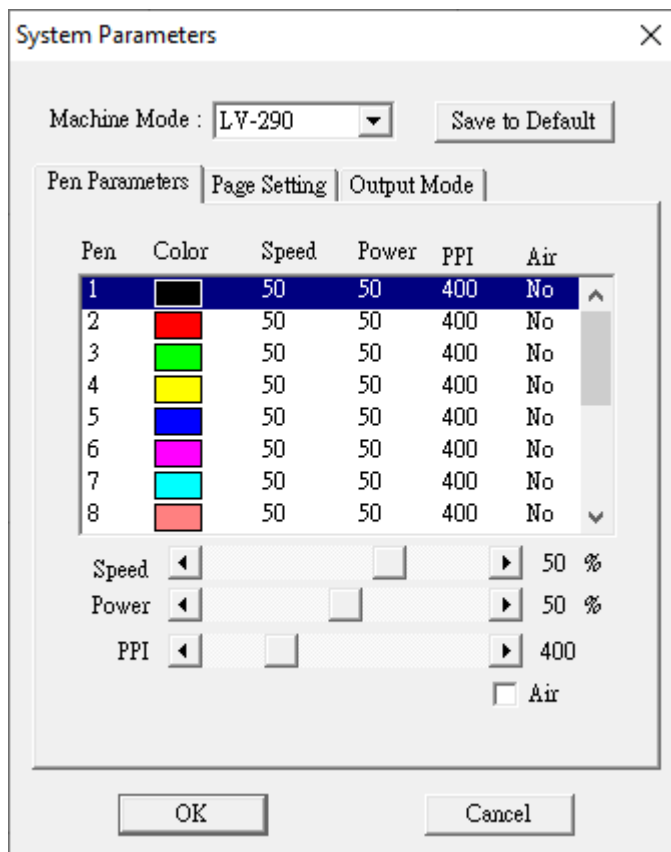
### 5.3.2 SmartCONTROL Vision Output Function

Output Function is to set up laser parameters and output graphic to laser machine. The function can be accessed through Menu Bar as indicated below.



#### Processed Condition Setup

Set the engraving output parameters such as pen parameters, page setting and output mode by selecting Processed Condition Setup under Output function.



## ➤ Pen parameters

Pen	Color	Speed	Power	PPI	Air
1	Black	1.0	90	762	No
2	Blue	24	80	762	No
3	Green	24	80	762	No
4	Cyan	24	80	762	No
5	Red	0.6	100	762	No
6	Magenta	24	80	762	No
7	Yellow	24	80	762	No
8	Purple	24	80	762	No

Speed: [Slider] 1.0 %  
 Power: [Slider] 90 %  
 PPI: [Slider] 762  
☐ Air

SmartCONTROL™ provides 16 color pens, and each pen presents laser parameter setting, once colors are set, the pen would refer to the specified parameters when you apply the colors to an output. Pen Parameters under Processed Condition Setup would enable you to adjust the power, speed of each color pen.

- (1) Choose a color pen
- (2) Adjust the bar next to speed, power and PPI for the chosen color pen

### Remark:

1. Speed  
The speed is calculated by percentage, which means some percentage of the max. Speed of the indicated laser engraver.
2. Power  
The power is calculated by percentage, which means some percentage of the max laser power that the indicated laser engraver has.
3. PPI  
PPI (pulses-per-inch) represents the number of times the laser pulses (fires) per linear inch, exclusive for vector cutting. Higher PPI settings will generate deeper, overlapping laser pulses, resulting in cleaner cuts. Lower PPI settings (lower than 150) will result in the individual laser pulses being spread apart, resulting in a perforated effect (similar to the perforation in the paper between mailing stamps).
4. Air  
This checkbox controls the SmartAIR air-assist function (if you have the optional air compressor installed). By selecting a pen color and checking this box will enable the SmartAIR air-assist function for that particular pen color. As an example, if you are performing a combination of both surface raster engraving job and deep vector cutting on a material such as acrylic, you may want to enable the SmartAIR air-assist for the vector cutting sections to get the cleanest cuts. To do this, you would simply need to select the pen color that you have assigned to the sections to be cut and select the Air checkbox for those particular pen colors.

## ➤ Page Setting

Pen Parameters | **Page Setting** | Output Mode

Machine Setting

X : 550.000 Y : 440.000 mm Default

Resolution 1000 DPI

☐ Rotary ☐ Extend

Rotary Parameter

Diameter : Offset : mm

Set the page parameters, including output page size, Resolution, Rotary Attachment.

### (1) Machine setting

Set the size of machine. It will be the working area.

## ➤ Output Mode

Pen Parameters | Page Setting | **Output Mode**

Mode

☒ Black & White mode  
☐ Manual color fill  
☐ Stamp mode  
☐ 3D Mode

Position

☐ Home (Abs. Coord.)  
☐ Without Home (Abs. Coord.)  
☒ Home (Rel. Coord.)

☐ Print Immediately ☐ Smart ACT

Repeat : 1 ☒ SmartCONTROL Vision

### (1) Mode

You can select from four primary mode settings, depending on your application or results you would like to achieve.

- **Black & White mode**

Select this mode when using clipart images or drawings with several colors, shades of gray, or many outlines. This mode outputs in a method similar to that of a black and white laser printer. This machine will interpret colored and shaded areas as 256-level shades of gray by producing a halftone effect while engraving. Instead of engraving only solid lines, gray or halftone areas will be a collection of dots with varying density.

The entire selected image will be engraved using a single set of power and speed settings (the black pen from the PEN menu. Please refer to the next section of the details regarding the PEN functions). The resolution and depth of these halftone areas can be adjusted with the DPI setting found on the Options page. Please note that selecting the Black & White mode will add a new Raster page to the menu. The Black & White mode dithering settings can be changed from the Raster page. (Please refer to the Raster section below for details). Experiment with different dithering settings to attain the desired results.



The Black & White mode interprets the processed image by the varying colors and shades. For the best results, we suggest you convert the image to a grayscale image with your graphics software prior to engraving in the Black & White mode.

---

- **Manual color fill**

Select this mode when you would like to designate specific power and speed settings and link them to certain colors of your image. The LV-290 printer driver allows a maximum of 16 pen parameters to be set.

### (2) Position

These selections allow you to control the positioning of the laser head after each job completion and before the next subsequent job.

- **Home**

Sets the position of laser machine carriage corresponding to the origin (top left) position of the graphic software before and after processing each job. Therefore, the laser carriage will start a job from this home position and return to the home position after completed jobs.

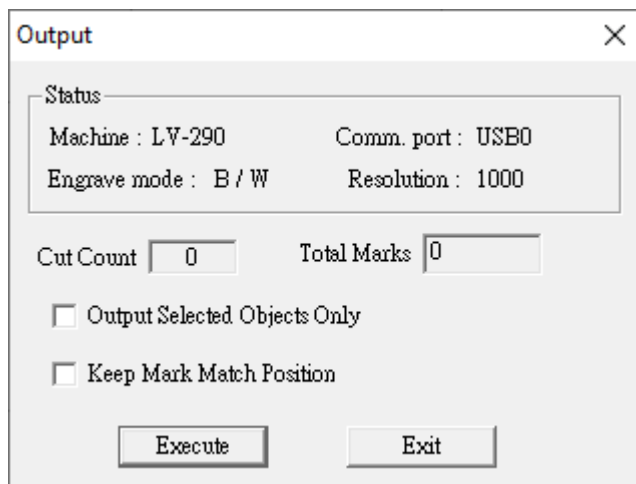
### (3) SmartCONTROL Vision

Check the SmartCONTROL Vision box to enable SmartCONTROL Vision function. More detailed setting of VISION function can be found in Chapter 5.3.3.

## Output Preview

Users can use the Preview function to check a simulated output of the job. An estimated working time will also be shown.

## Output



Output

Status

Machine : LV-290      Comm. port : USB0  
Engrave mode : B / W      Resolution : 1000

Cut Count       Total Marks

☐ Output Selected Objects Only

☐ Keep Mark Match Position

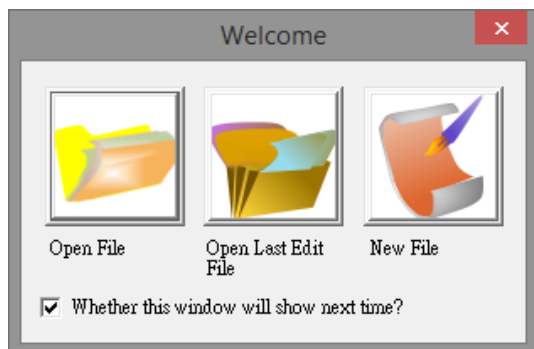
The output box would show all the output setting, and you can press “Execute” to start engraving or press Exit to close output and return to editing or output setting.

- (1) Output Select Objects Only  
Checking this will instruct the laser machine to prints the objects that you have selected.
- (2) Keep Mark Match Position  
Checking this will instruct the SmartCONTROL™ Vision used last time mark position to process job.

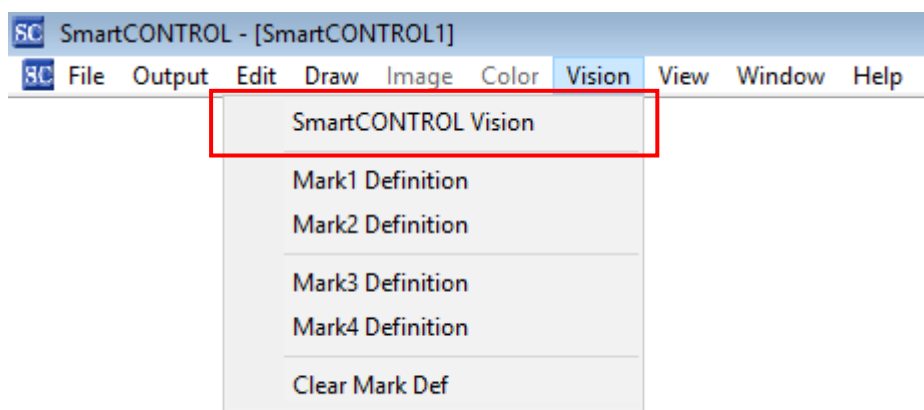
### 5.3.3 SmartCONTROL Vision Function

#### Running the SmartCONTROL™ Vision

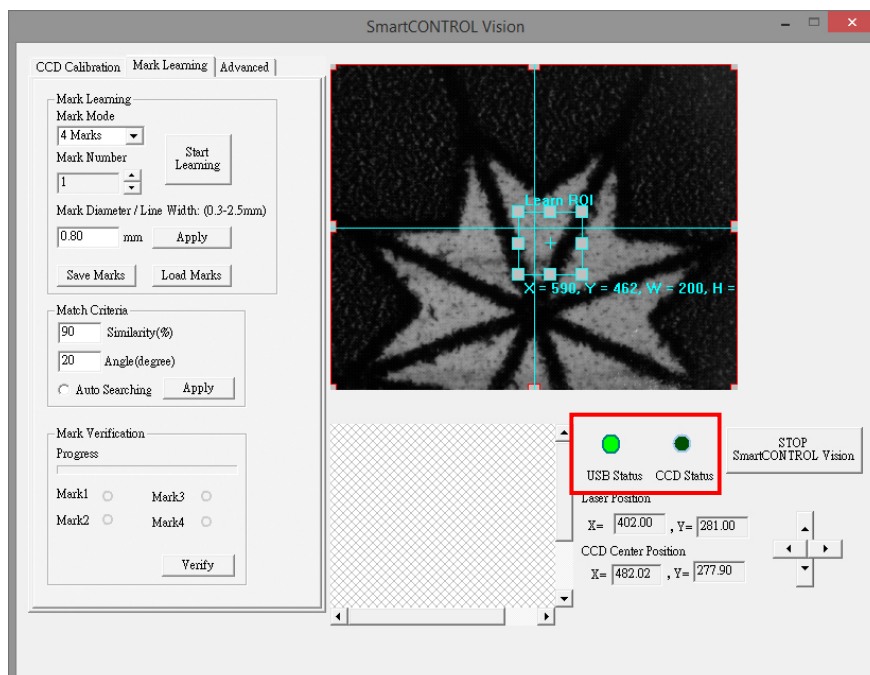
- 1) Launch SmartCONTROL™ software program and click “New File” or “Open File” to open history file.



- 2) Go to “Vision” in the Menu Bar and select “SmartCONTROL Vision”.



- 3) Make sure connection status indicator shows **green** for both “USB Status” and “CCD Status”



## NOTE

If the connection status indicator shows red, please reconnect the two USB cables and make sure "USB Status" green light is on, and the "CCD Status" green light is blinking.



▲ Successful Connection

▲ Incorrect Connection

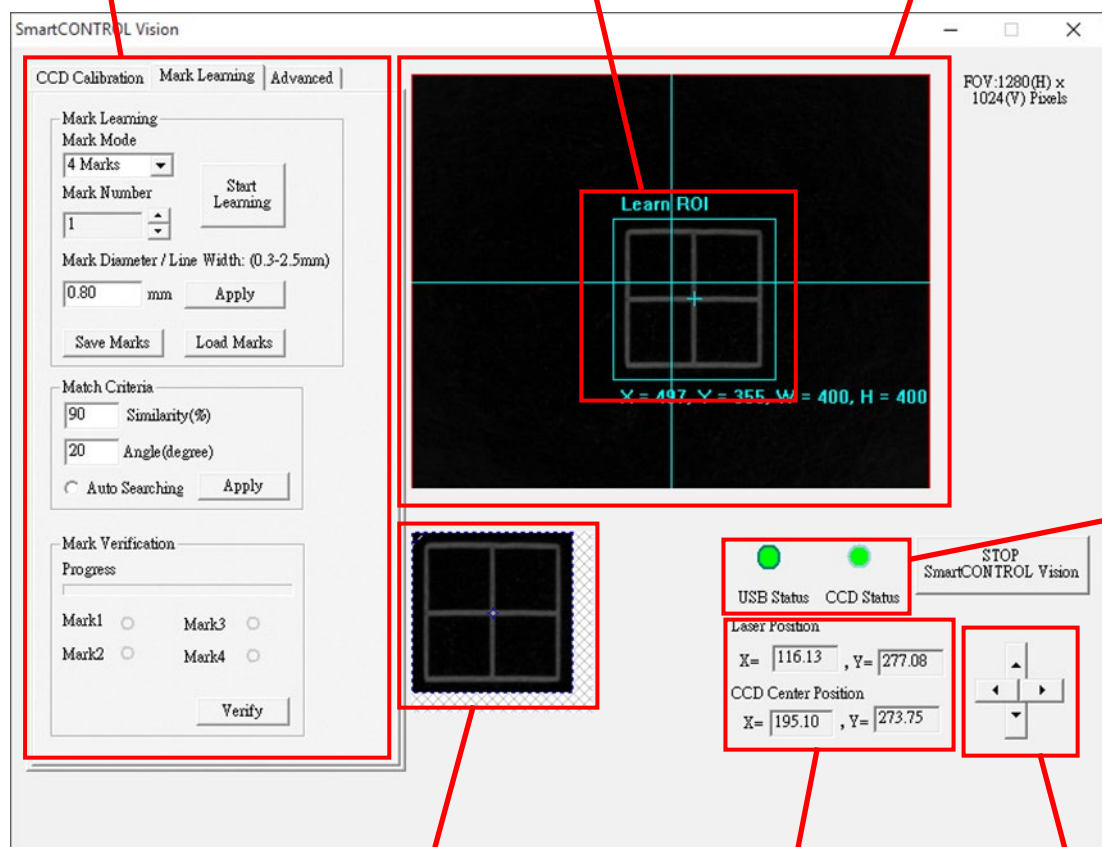
Incorrect connection may cause the SmartVISION™ PRO fail to work.

## SmartCONTROL™ Vision Main Window

SmartCONTROL™ Vision  
Function

Laser ROI Frame  
(Blue Frame)

Live View Window



Connection  
status  
indicator  
signs

Learned Mark Window

Laser and CCD  
Module Position

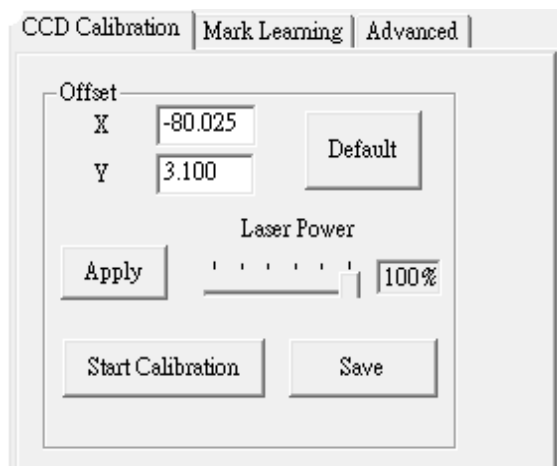
Arrows Key for  
CCD module

- **SmartCONTROL™ Vision Function**  
There are three functions of SmartCONTROL™ Vision, including CCD calibration, Mark Learning and Advance.
- **Live View Window**  
Displaying the object read by SmartCONTROL™ Vision in real time.
- **Laser ROI Frame**  
It allows user to choose the registration marks for learning, all the objects in the frame will be defined as mark.
- **Connection Status Indicator**  
Allow user to check connection status between the SmartCONTROL™ Vision software and SmartVISION™ Pro CCD.
- **Learned Mark Window**  
Shows the graphic which has been memorized
- **Laser and CCD Module Position**  
Shows the coordinate of the Laser and SmartVISION™ Pro CCD module.
- **Arrows Key for CCD module**  
To fine tune the position of the SmartVISION™ Pro CCD module
- **Stop SmartCONTROL Vision**  
Stop the operation of SmartCONTROL™ Vision

## SmartCONTROL™ Vision Function

The SmartCONTROL™ Vision function is divided into several unique sections: the CCD Calibration, the Mark Learning and Advanced

### ➤ CCD Calibration Tab



CCD Calibration Tab allows user to accurately calibrate the position of CCD module and laser beam.

➤ **Mark Learning Tab**

The screenshot shows the 'Mark Learning' tab selected. It contains three main sections:

- Mark Learning:** Includes a 'Mark Mode' dropdown set to '4 Marks', a 'Mark Number' spinner set to '1', a 'Start Learning' button, a 'Mark Diameter / Line Width: (0.3-2.5mm)' input set to '0.80 mm' with an 'Apply' button, and 'Save Marks' and 'Load Marks' buttons.
- Match Criteria:** Includes 'Similarity(%)' set to '90', 'Angle(degree)' set to '20', an 'Auto Searching' radio button, and an 'Apply' button.
- Mark Verification:** Includes a 'Progress' bar, four radio buttons for 'Mark1', 'Mark2', 'Mark3', and 'Mark4', and a 'Verify' button.

Mark Learning allows users to learn, save and load the marks.

● **Mark Learning**

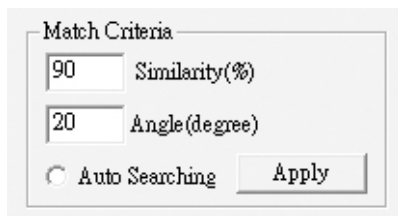
This close-up shows the 'Mark Learning' section with the following details:

- Mark Mode:** A dropdown menu currently showing '4 Marks'.
- Mark Number:** A spinner control currently showing '1'.
- Start Learning:** A button to initiate the learning process.
- Mark Diameter / Line Width: (0.3-2.5mm):** An input field showing '0.80' with a unit of 'mm' and an 'Apply' button.
- Save Marks / Load Marks:** Two buttons for saving or loading learned marks.

- **Mark Mode**  
Define using two, three or four-marks mode
- **Mark Number**  
Assign a number to the mark SmartCONTROL™ Vision is about to learn.

- Start Learning  
Start to learn the marks.
- Mark Diameter/Line width  
Set the registration mark diameter, dimension or line width, and the laser ROI frame will auto adjust to the suitable size for best result.
- Save Marks  
Save the marks which are learned.
- Load Marks  
Load the marks which are saved.

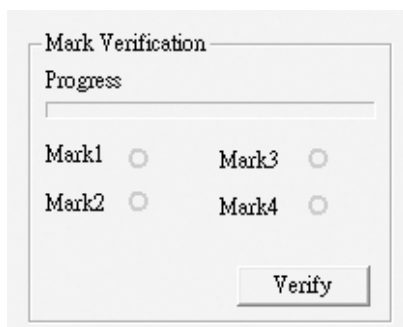
- Match Criteria



The Match Criteria dialog box contains two input fields: 'Similarity(%)' with the value '90' and 'Angle(degree)' with the value '20'. Below these fields is a radio button labeled 'Auto Searching' which is currently unselected, and an 'Apply' button.

- Similarity (%)  
Define the range of similarity comparing with the original learned marks when SmartCONTROL™ Vision is reading or searching marks.
- Angle (degree)  
Define the offset of angle variation comparing with the original learned mark when SmartCONTROL™ Vision is reading or searching marks.
- Auto Searching  
When check Auto Searching function, the CCD module will automatically search the marks in near areas if the first attempt of marks searching is failed.

- Mark Verification

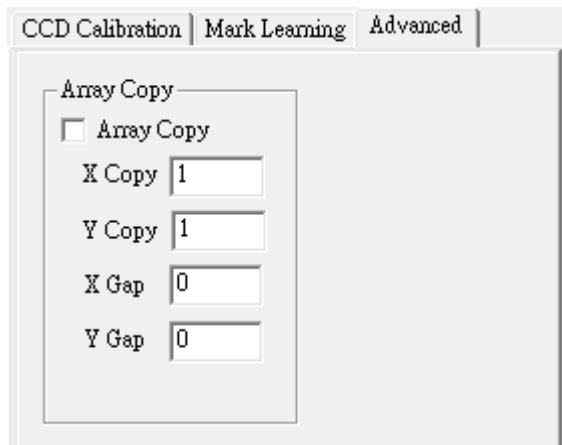


The Mark Verification dialog box features a 'Progress' bar at the top. Below it, there are four radio buttons arranged in a 2x2 grid, labeled 'Mark1', 'Mark2', 'Mark3', and 'Mark4'. At the bottom right of the dialog is a 'Verify' button.

Mark Verification helps to examine if the defined marks are easy to search for CCD module before starting the laser jobs.

- Similarity (%)  
It allows users to verify the percentage of similarity between the reading mark and the learned mark.
- Angle (degree)  
It allows users to verify the degree of angle between the reading mark and the learned mark.
- Mark Match  
It allows users to verify if SmartCONTROL™ Vision can successfully match with the learned mark or not.

➤ **Advanced Tab**

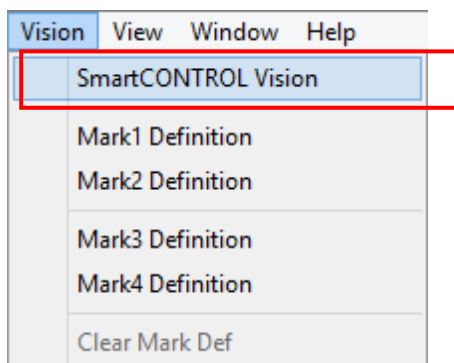


- **Array Copy**  
Check the box to enable the Array Copy function.
- **X Copy/Y Copy**  
Define the duplicated numbers of horizontal (X) and vertical (Y)
- **X Gap / Y Gap**  
Define the graphics gap of horizontal (X) and vertical (Y).

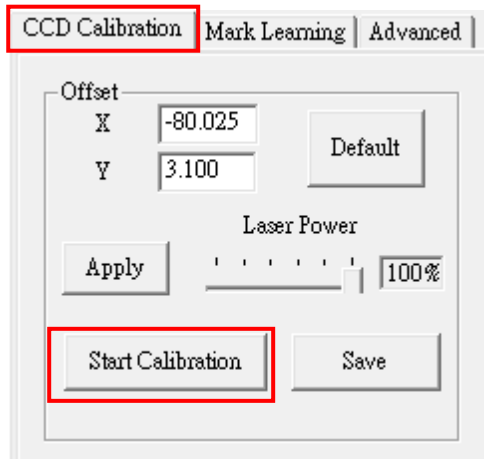
## SmartCONTROL™ Vision Calibration

Calibration function is aimed to fine-tune the position of the SmartVISION™ Pro CCD module and the laser beam. If high precision cutting is demanded, we recommend you to calibrate SmartVISION™ Pro first.

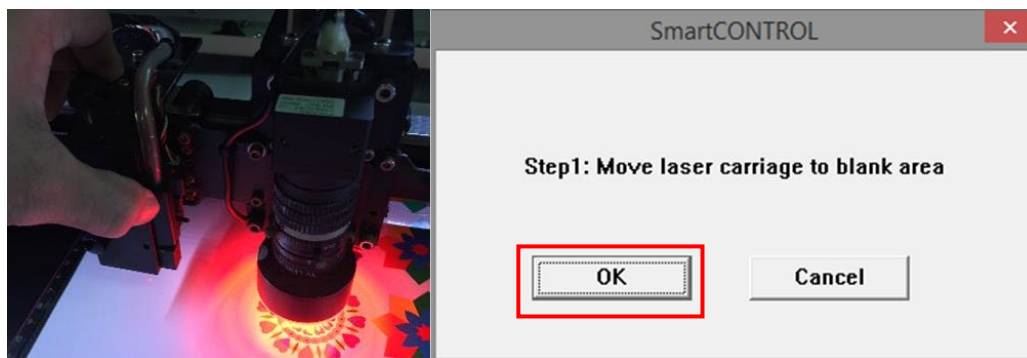
- 1) Place the black calibration cardboard in the accessory kit on the working table of laser system.
- 2) Press "AutoFocus" button of laser machine to automatically set the focal distance precisely.
- 3) Go to SmartCONTROL™ and Click "Vision" on the menu and select "SmartCONTROL Vision" from pull-down menu.



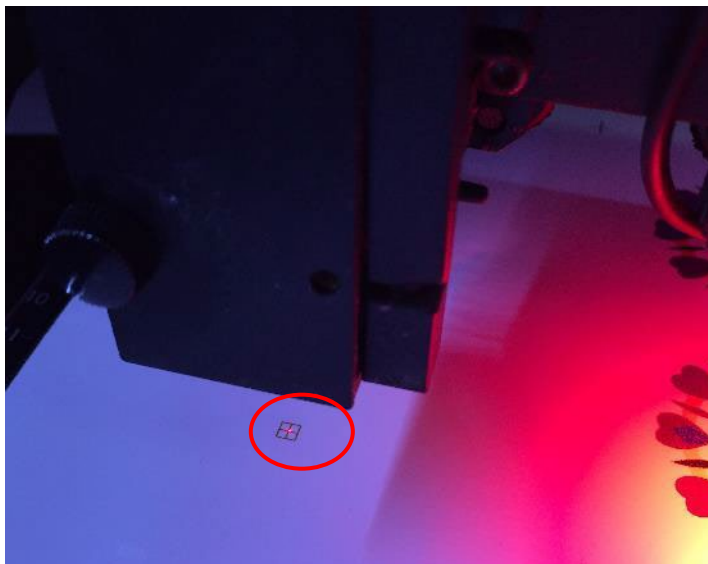
- 4) Click "CCD Calibration" tab and press the "Start Calibration" button.



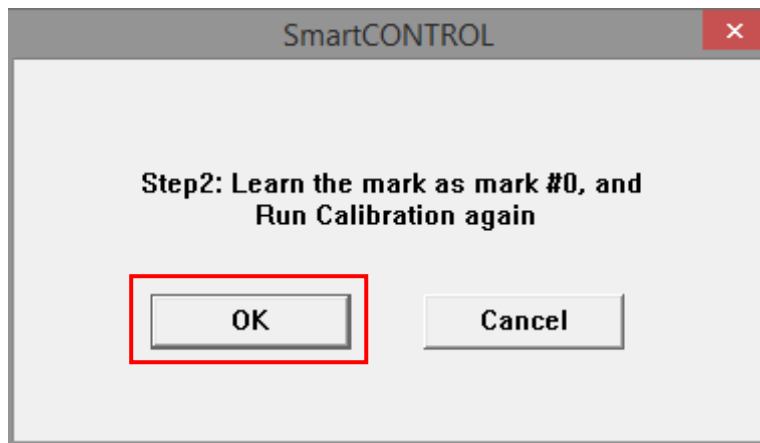
- 5) SmartCONTROL™ will show step by step instruction to guide you how to do the calibration.
- 6) Move the laser carriage to blank area and click OK.



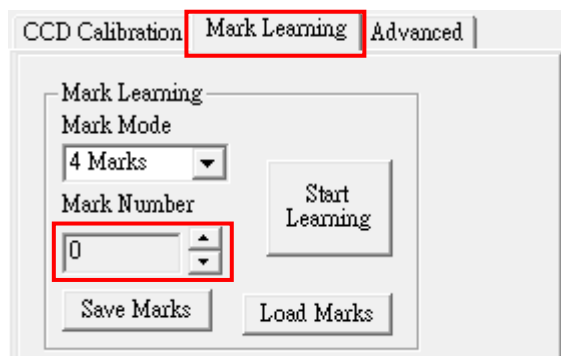
- 7) The laser machine will engrave a calibration mark.



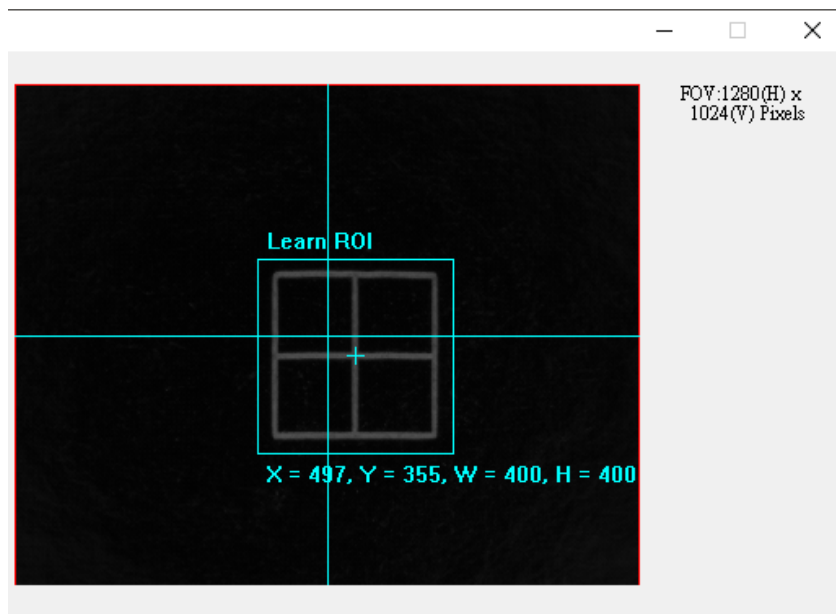
- 8) Click "OK" to continue.



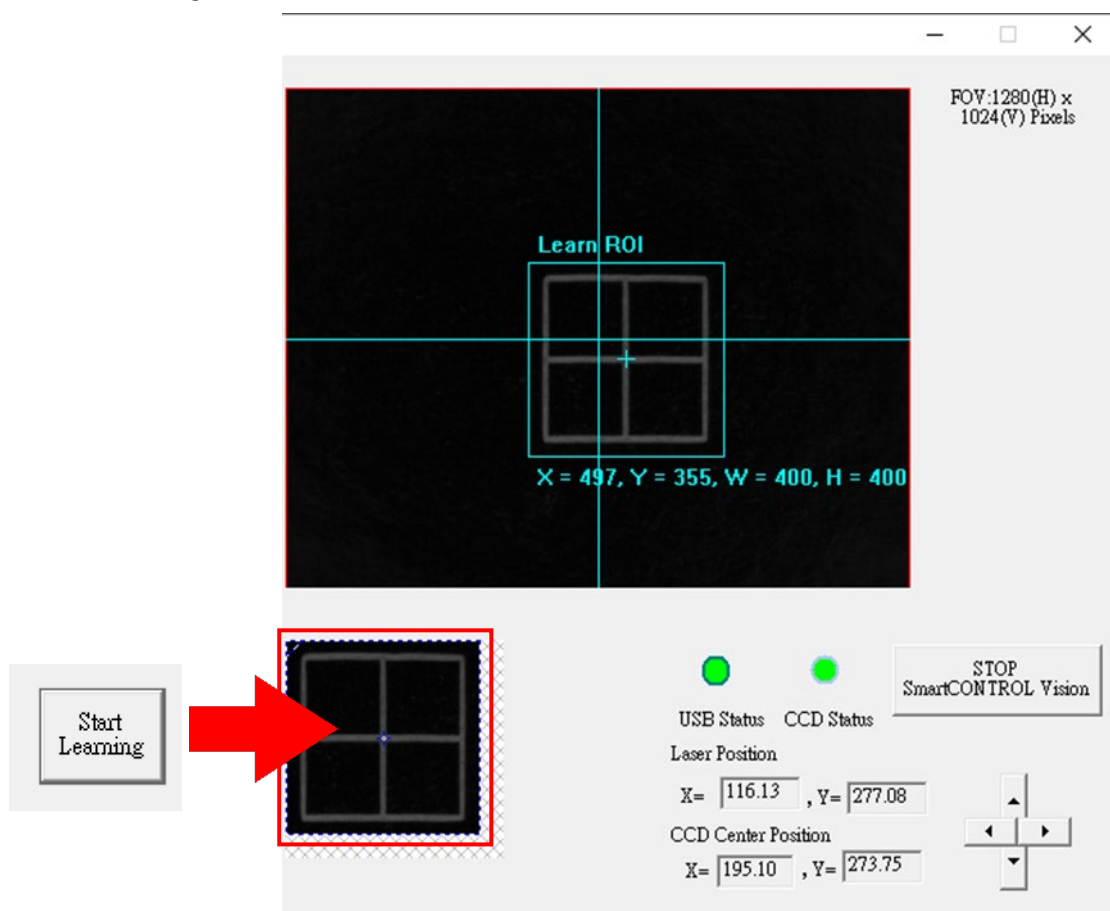
- 9) Click "Mark Learning" tab and set the Mark Number as 0. (Mark 0 is special for CCD calibration use.)



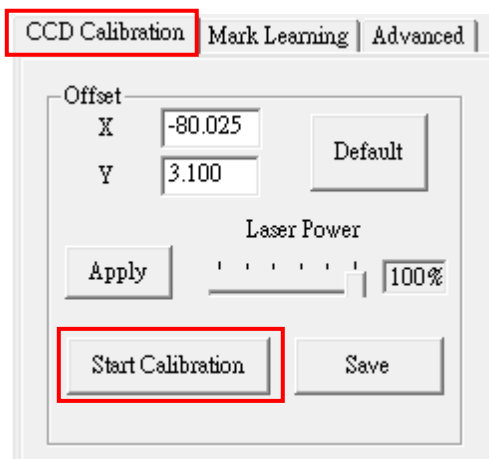
- 10) Use the mouse to move the laser ROI frame and make sure the frame crosshair is aimed at the center of the engraved calibration mark.



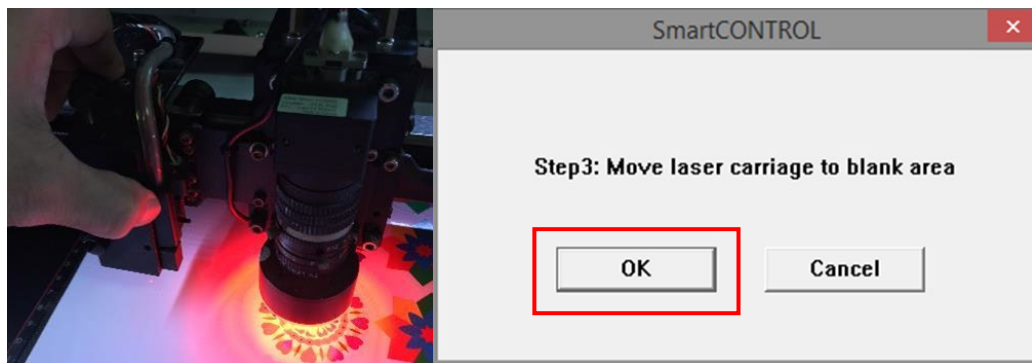
- 11) Press "Start Learning" button, then the Learned Mark Window will show the memorized mark.



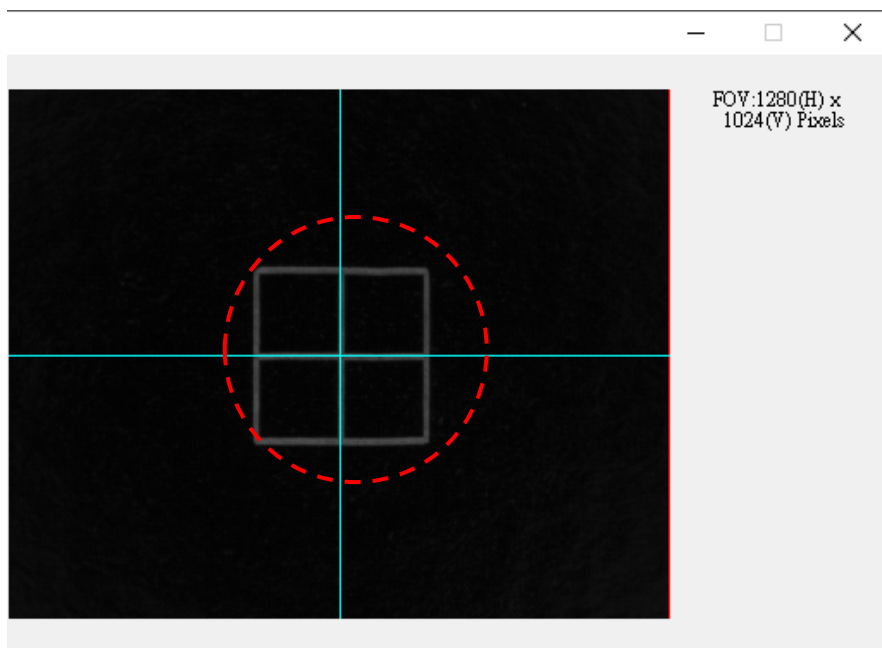
- 12) Click "CCD Calibration" tab and press the "Start Calibration" button again.



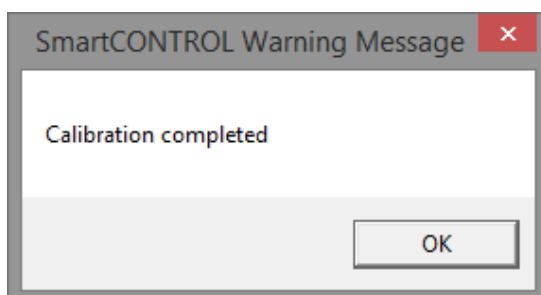
- 13) The message in step 3 will pop up, move the laser carriage to blank area and click OK.



- 14) Laser will engrave a new calibration mark and calibrate automatically. After calibration is done, the crosshair of laser ROI frame will aim at center of calibration mark.



- 15) The "Calibration completed" message will pop up indicating that calibration is completed.



## Convert and Import File

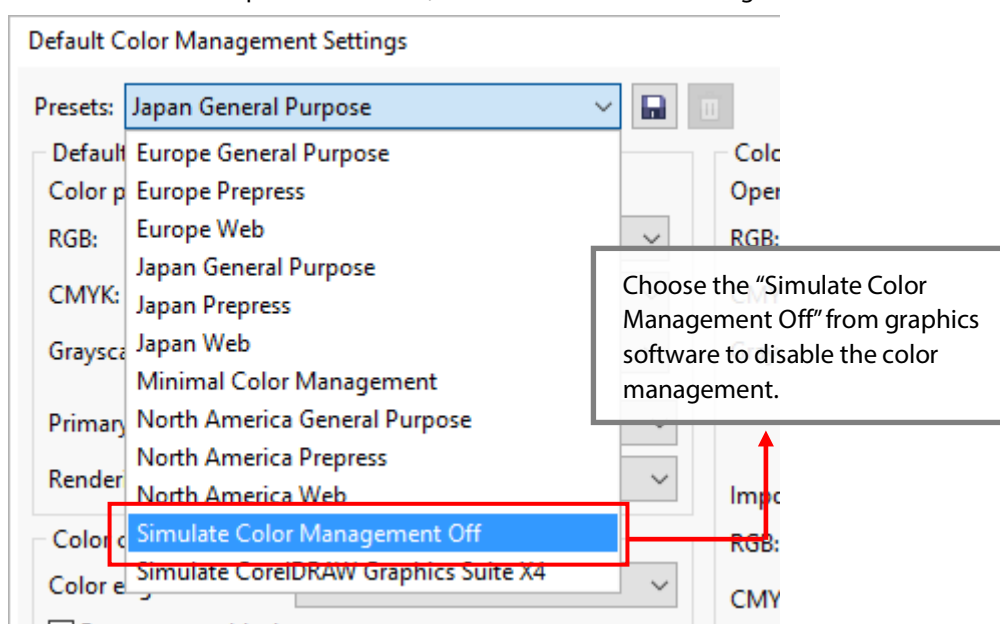
For the best output quality, we recommend you convert the graphic file to prn format via SmartCONTROL™ print driver from the graphics software (e.g. CorelDRAW or Illustrator). SmartCONTROL™ print driver will install to your computer automatically when you installed SmartCONTROL™ software.

Before converting the graphic file, please make sure Color Management is disabled and the Page Size fits to SmartVISION™ Pro CCD under graphic software.

### CorelDRAW Example (Color Management)

The following is an example of how to properly disable Color Management in the graphics software. CorelDRAW is the designated graphics software used for this example. For other graphics software, you will need to access the corresponding Color Management page.

- 1) From the primary menu, click Tools → Color Management → Default Settings... and CorelDRAW's Default Color Management Settings will appear.
- 2) Under the Present pull down menu, select Simulate Color Management Off.



- 3) Click OK to complete the color management adjustments.

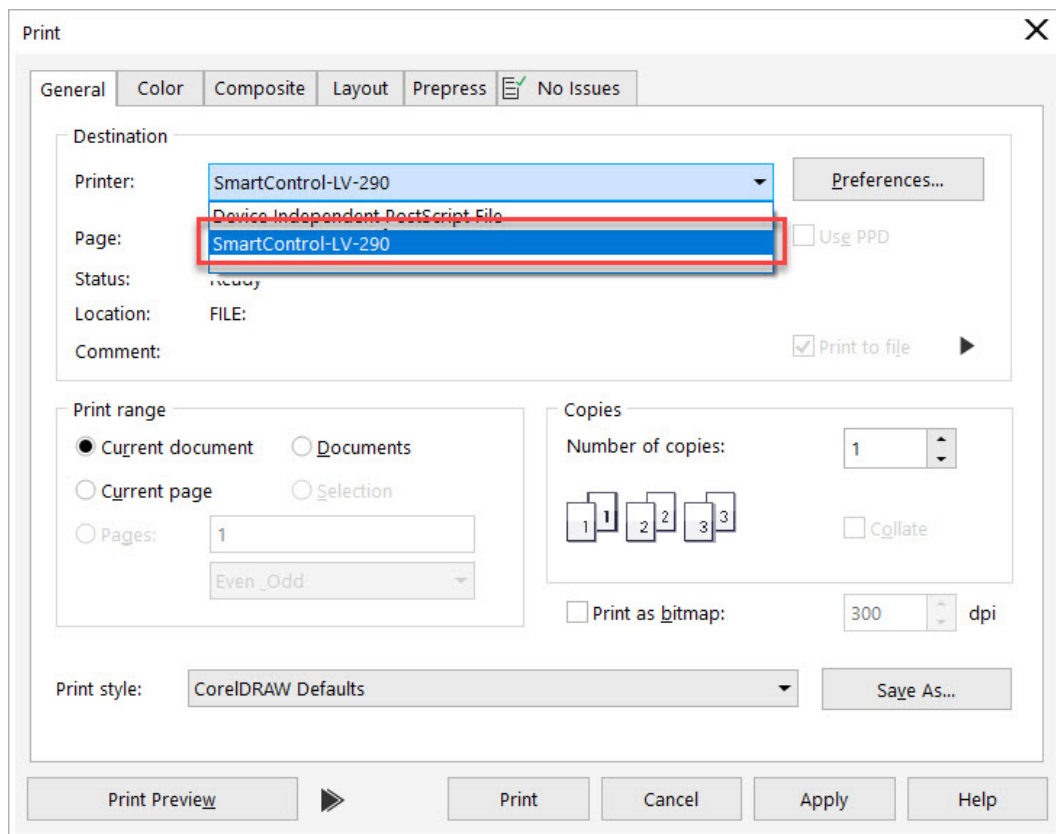
### From your graphic software's Page Setup page:

#### CorelDRAW Example (Page Setup and Orientation)

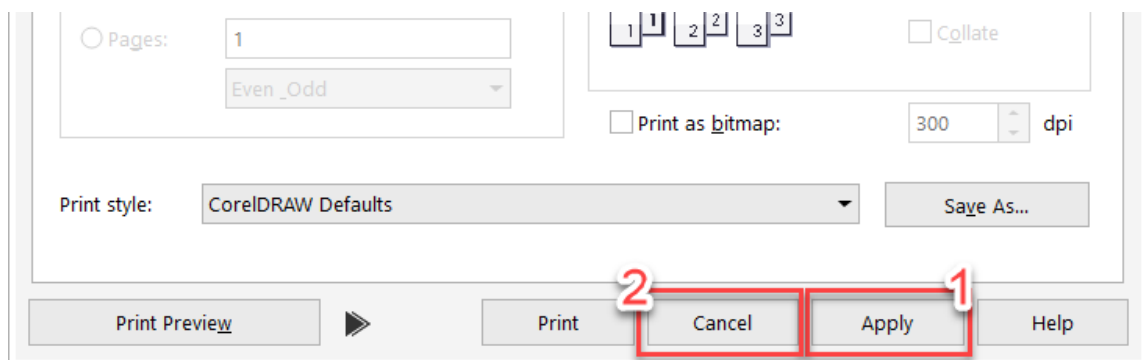
The following is an example of how to set the Page Setup and Orientation in the graphics software. CorelDRAW is the designated graphics software used for this example. For another graphics software, you will need to access the corresponding Page Setup page.

- 1) After the design is completed, click File → Print from the primary menu, then the print window will pop up.

- 2) Select your SmartCONTROL's driver <SmartCONTROL-LV-290> from the printer list

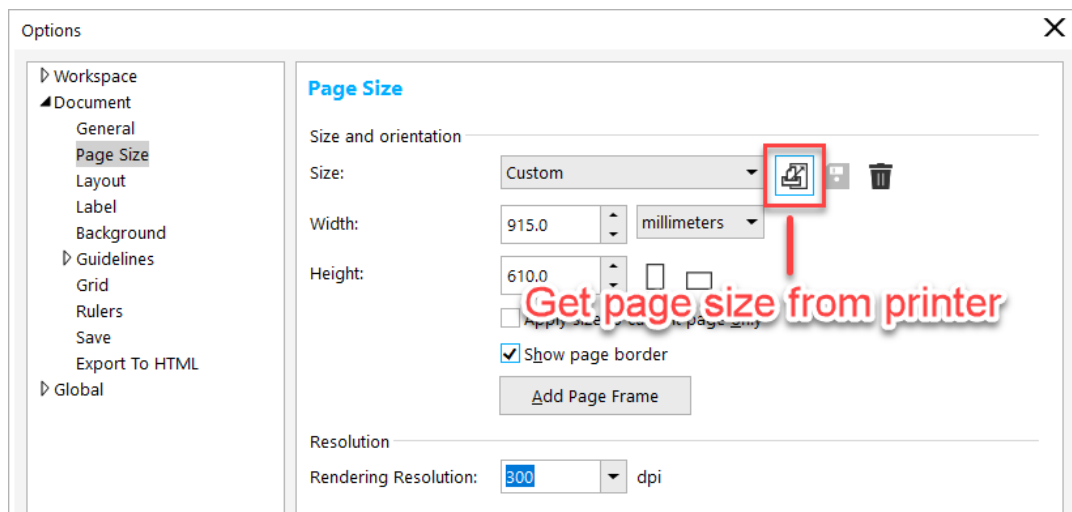


- 3) Click Apply and Cancel to close the print window.



- 4) From the primary menu, click Layout → Page Setup, then the Options window will pop up.

- Click the "Get page size from printer" button to fit SmartVISION™ Pro CCD working area.

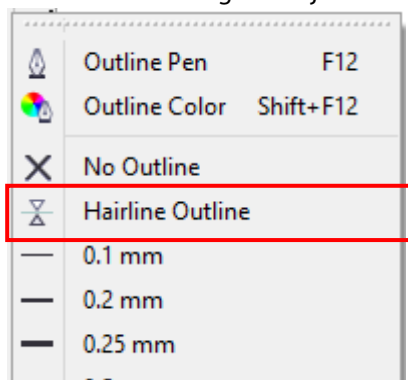


Model	Working area
LV-290 with SmartVISION™ Pro CCD	550mm x 440mm (21.6" x 17.3")

- Click OK to end the paper size adjustment.

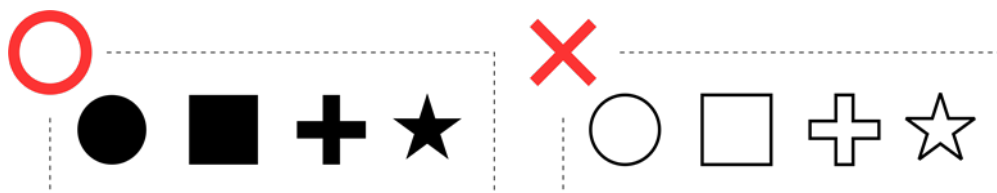
**Here we use CorelDraw as illustration of how to convert a file.**

- Select all the designed objects and set the outline to hairline from tool bar in the graphics software.



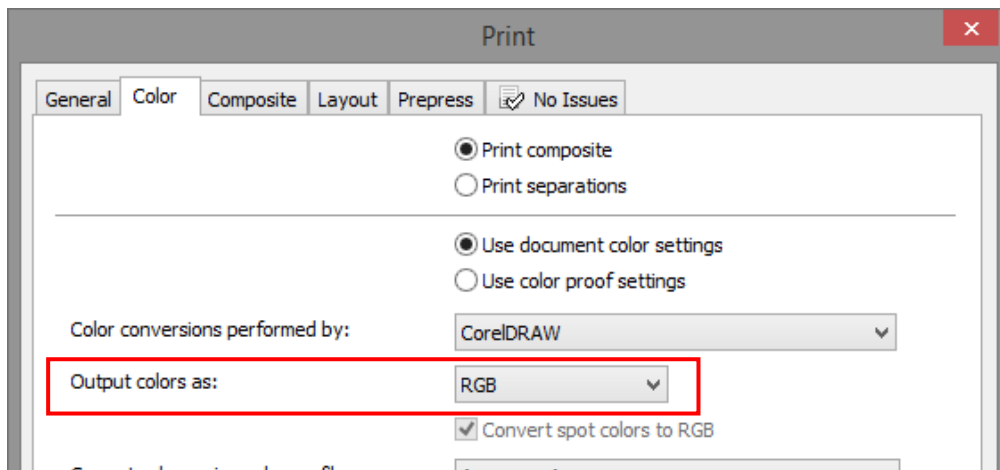
#### NOTE

After you have edited one of the parameters in the Property Table, click on Apply or Apply to All in order to insert your changes.

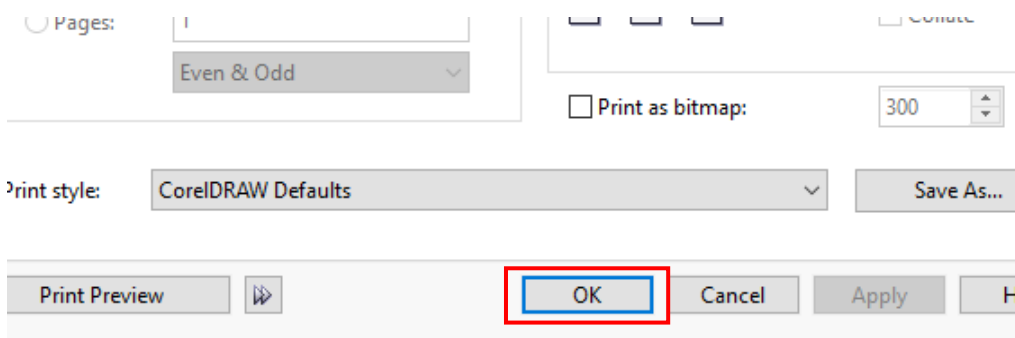


- From the primary menu in graphics software, click File → Print... and the Print window will appear.

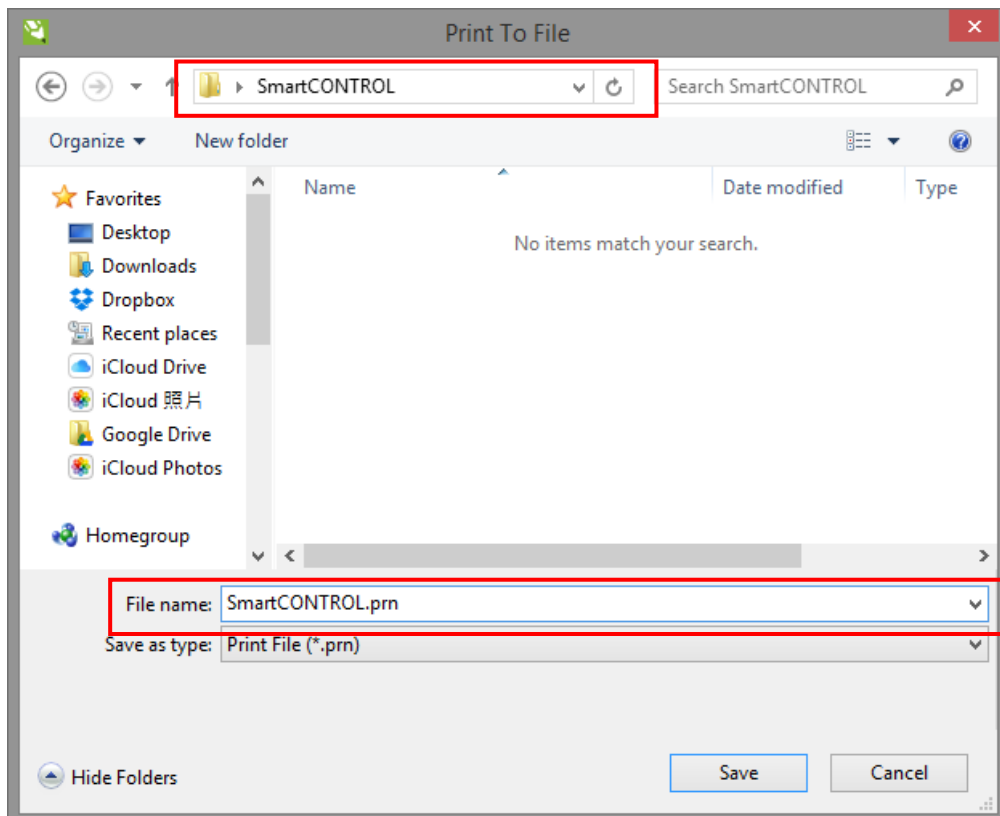
- 3) Click "Color" tab to make sure the "Output colors as:" set as RGB, and then click "OK" to continue.



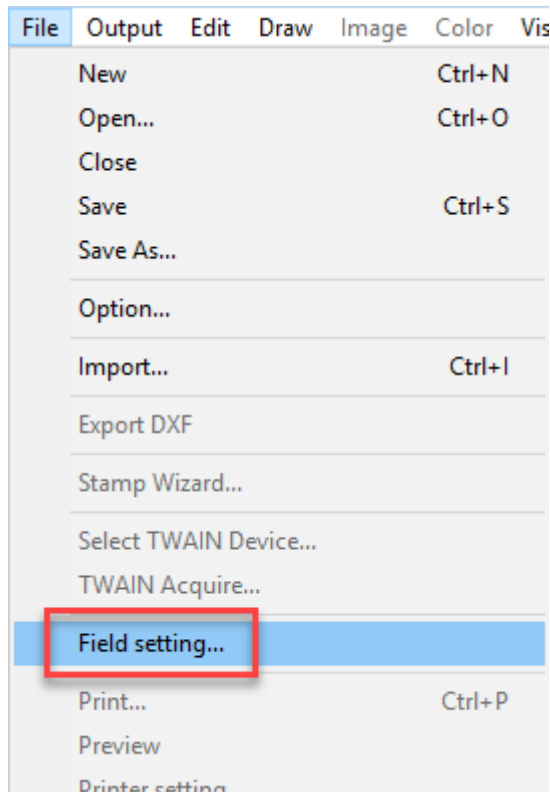
- 4) Click "OK" and Print To File window will appear



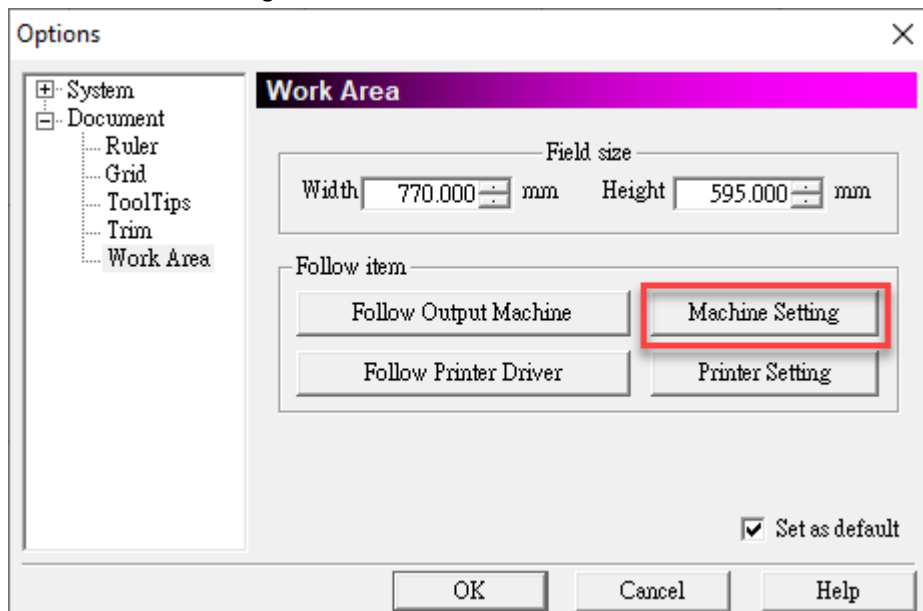
- 5) Select the save folder and define file name, then click "Save" to convert



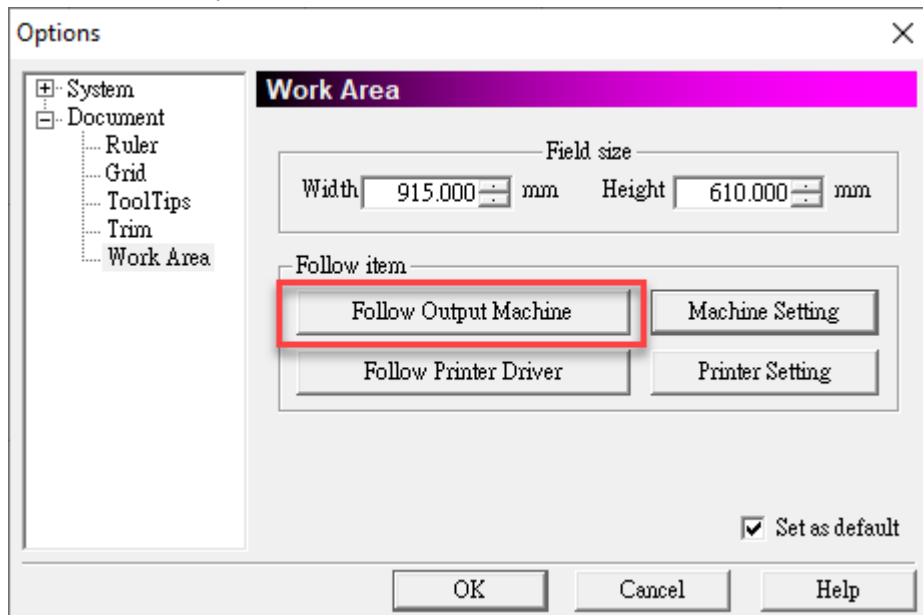
- 6) Close the graphics software (here is Corel Draw) and open the SmartCONTROL™ Software.
- 7) Click “File” → “Field Setting...”, then the field setting window will pop up



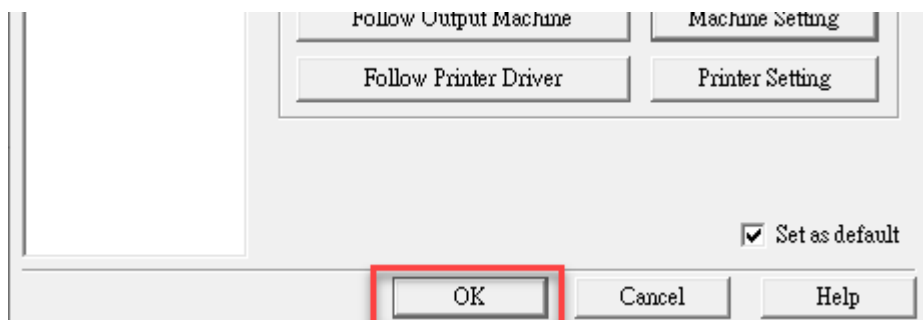
- 8) Click “Machine Setting”



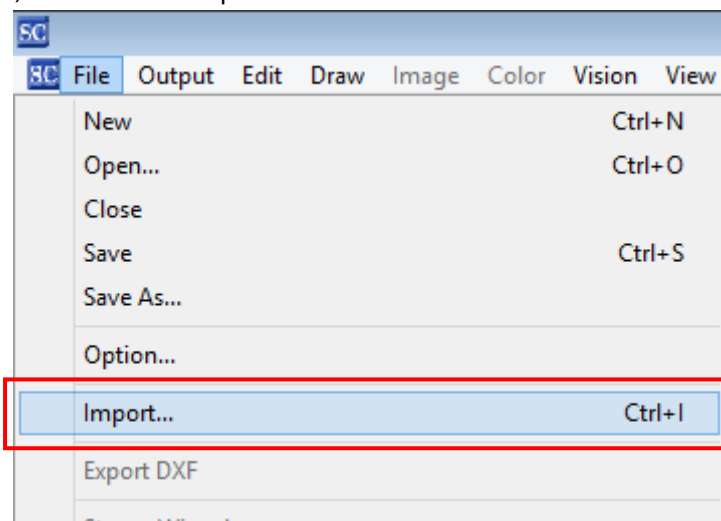
- 9) Click "Follow Output Machine" to set the correct work area.



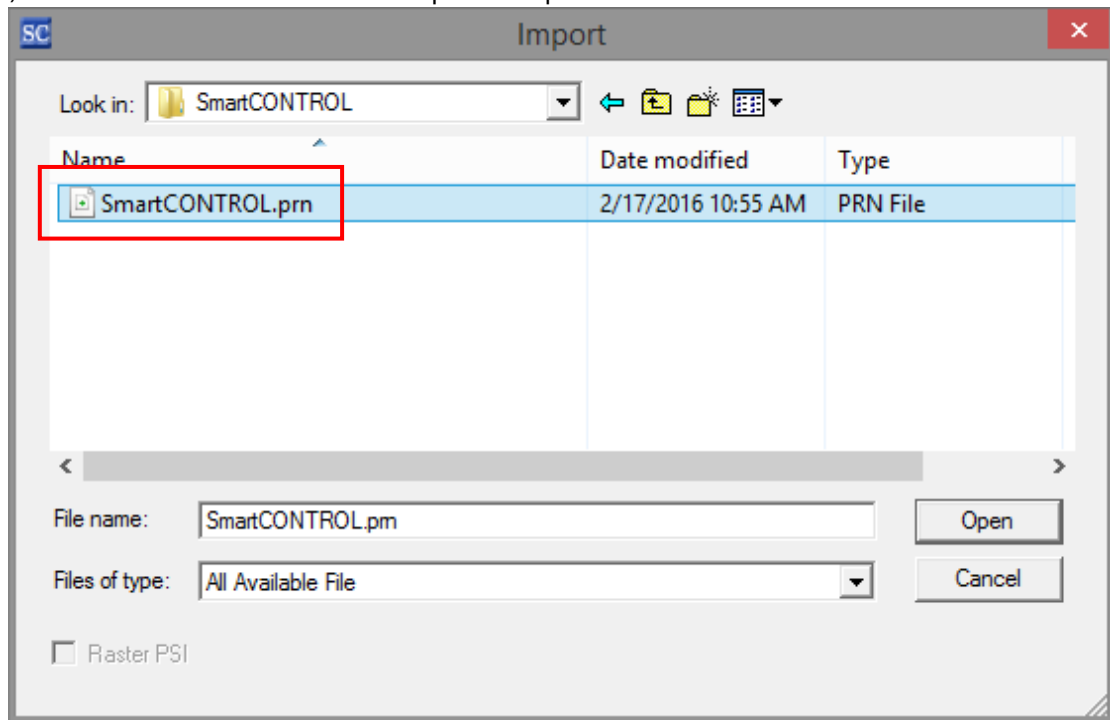
- 10) Click OK to end the work area setting.



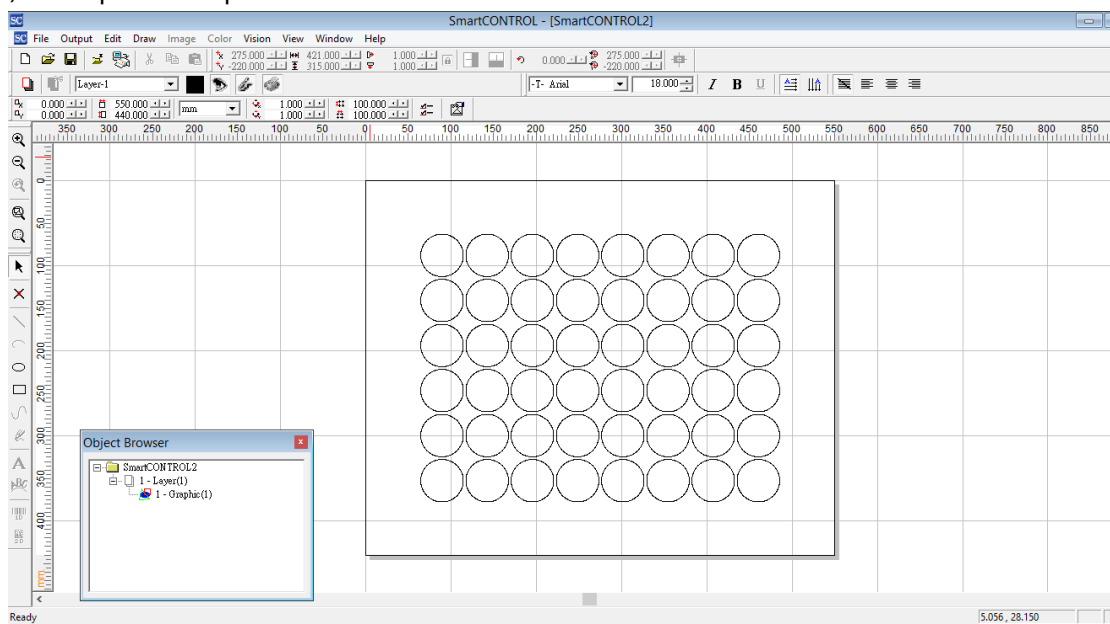
- 11) Click "File" → "Import"



12) Select the converted file and click “Open” to import the saved file to SmartCONTROL™



13) File import is completed.



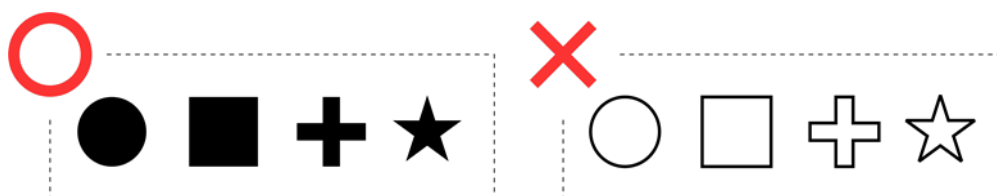
## Operating SmartCONTROL™ Vision

SmartCONTROL™ allows users to assign any graphic to be registration marks, at the meantime, if high precise cutting is required, we suggest you to use circle, square, crosshair or star as registration mark which we call it "Registration Mark Ready" scenario.



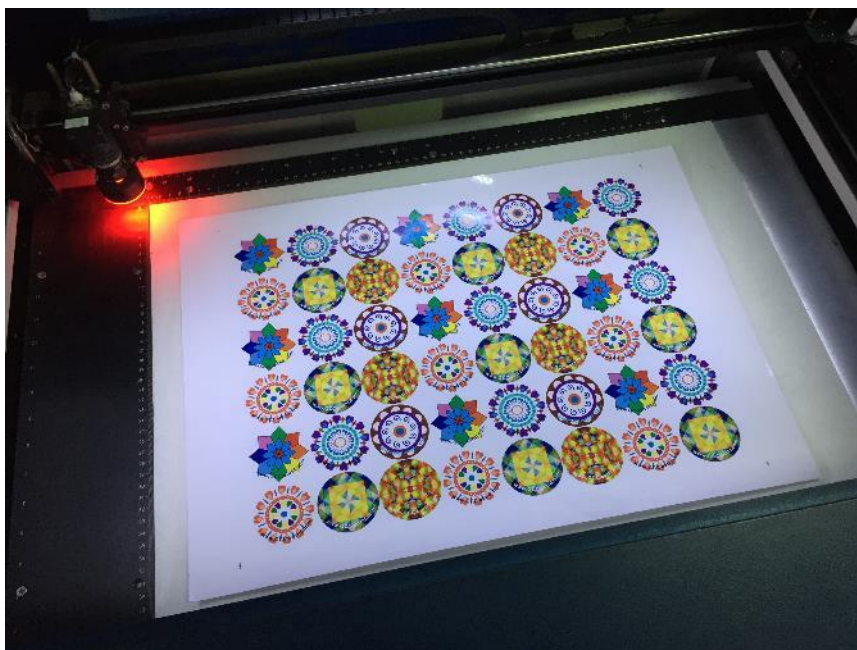
### NOTE

- The recommended value for registration mark size is between 1mm-2.5mm. Marks in extreme dimension may affect the precision of CCD reading.
- Under the Registration Mark Ready scenario, SmartCONTROL™ will automatically define the mark #2~#4. Make sure all the registration marks are the same type and filled before converting the graphic file to prn format.

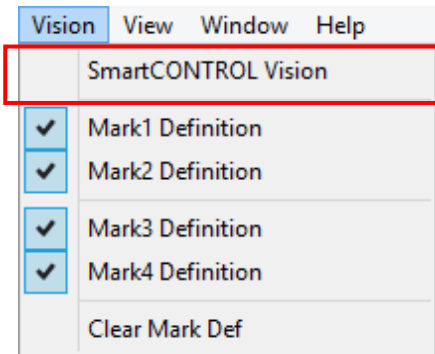


### SmartCONTROL™ Vision Operation – Registration Mark Ready Scenario

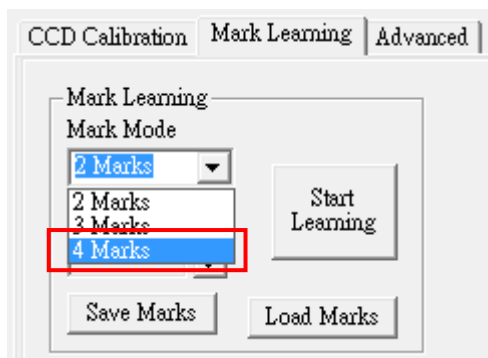
- 1) Place the printed object of the machine platform.



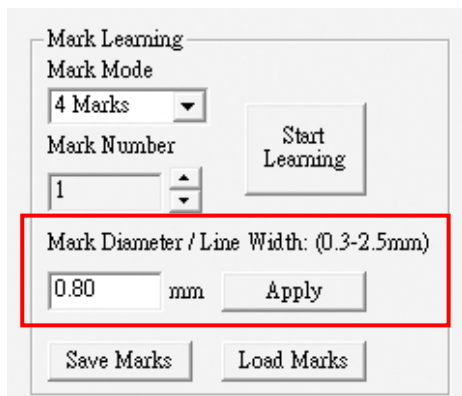
- 2) Click "AutoFocus" button of laser machine to automatically set the focal distance precisely.
- 3) Open the file or import prn file.
- 4) Click "Vision" on the menu bar and select "SmartCONTROL Vision" to launch the Vision operation window



- 5) Go to the "Mark Learning" tab and select mark mode. The illustration is 4 marks mode.



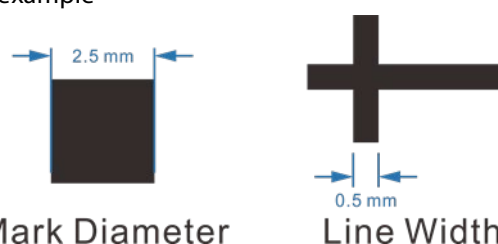
- 6) Input registration mark diameter/ dimension or line width value in the Mark Diameter / Line Width field.



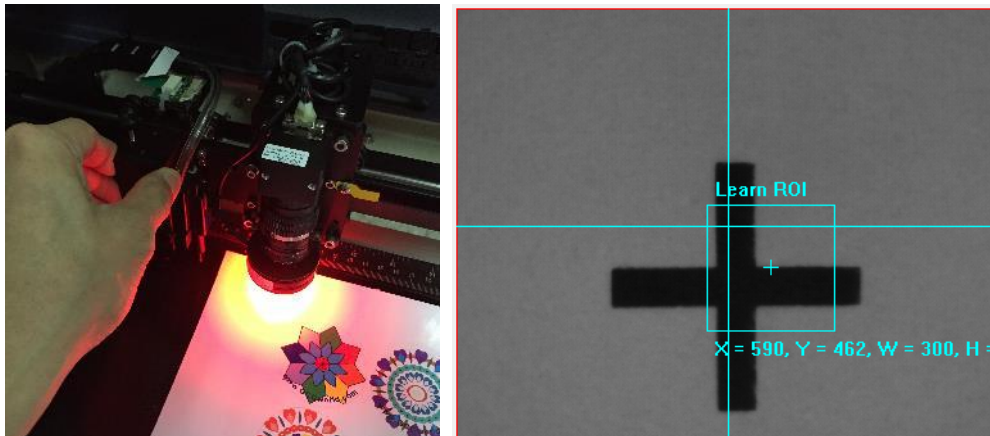
#### NOTE

Mark diameter/ line width value must be between 0.3mm~2.5mm.

For example

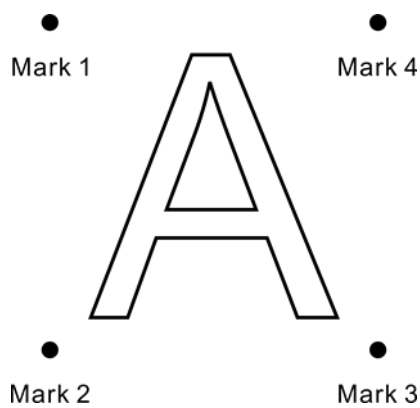


- 7) Move SmartVISION™ Pro CCD module to read the first mark, and make sure the mark shown on the software screen.

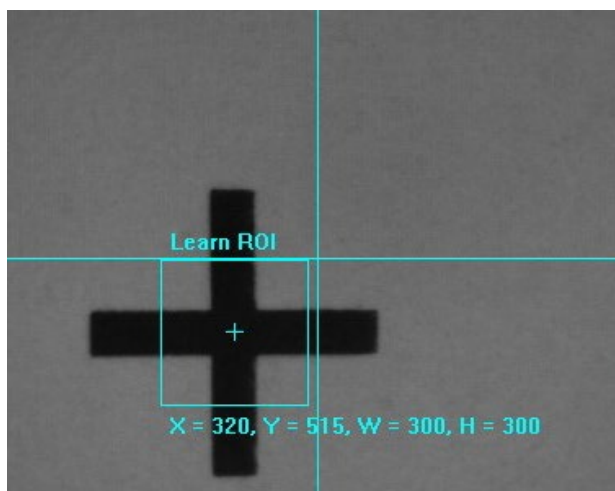


#### NOTE

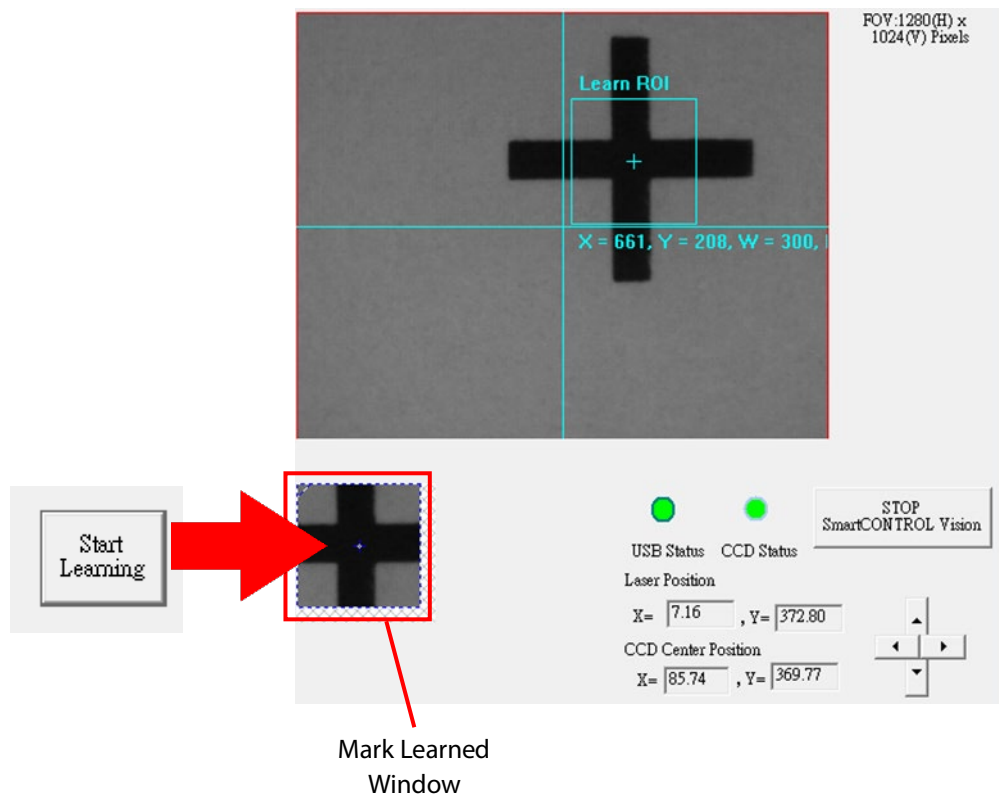
Following is the order of the mark #1 to mark #4.



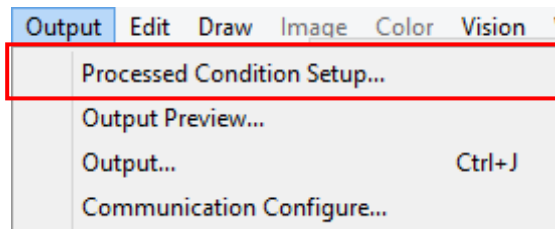
- 8) Use the mouse to move the laser ROI frame until the crosshair of the frame aims at the center of registration mark.



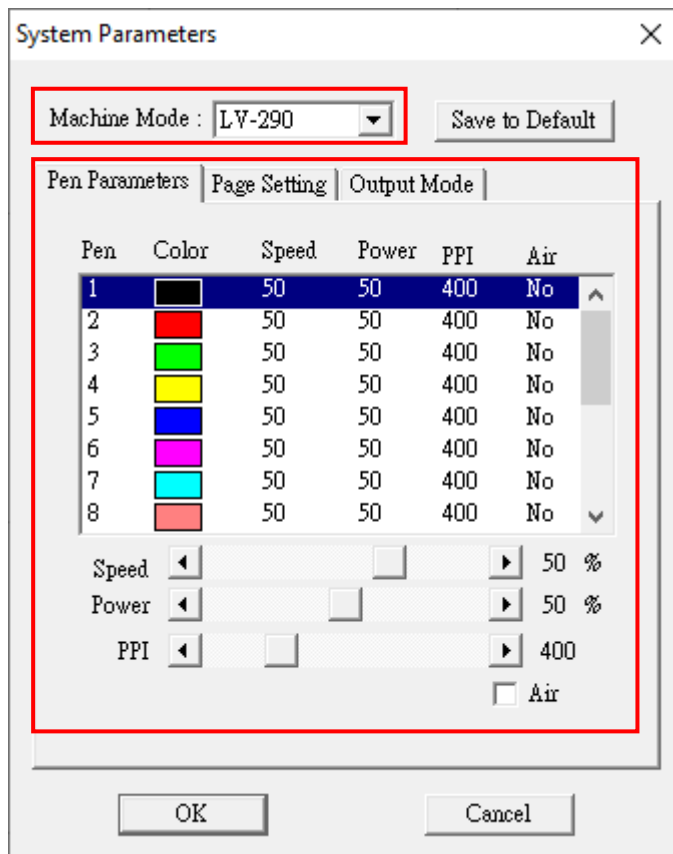
- 9) Click "Start Learning" button and the Learned Mark Window will show the learned pattern.



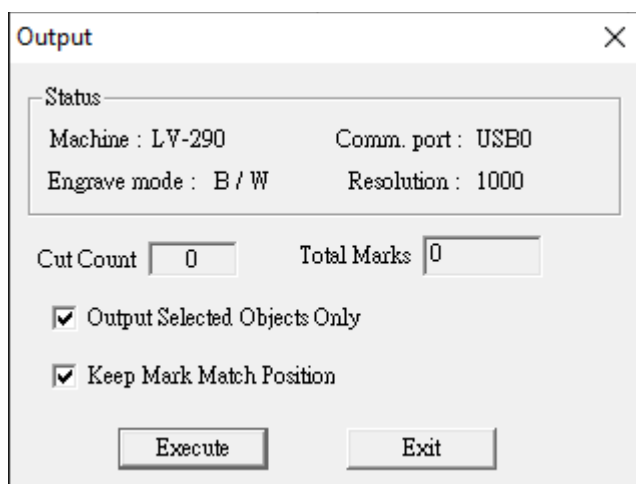
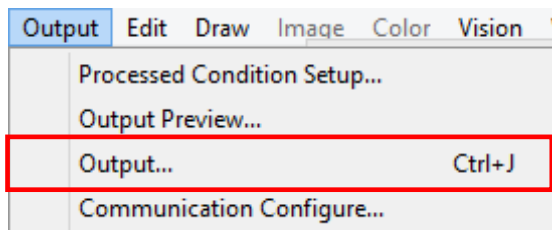
- 10) Click "Output" on menu bar and click "Processed Condition Setup"



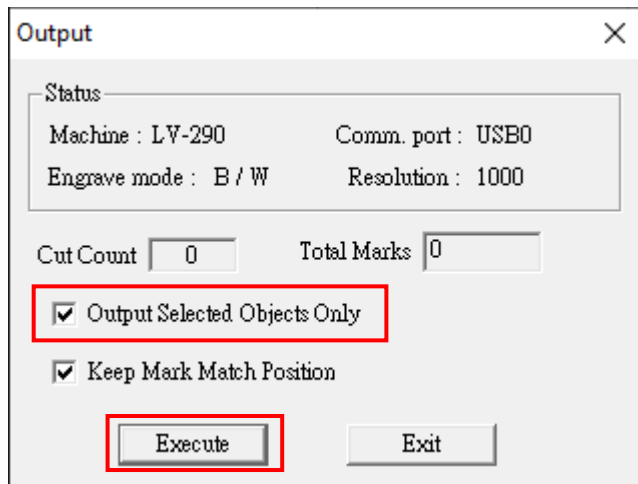
- 11) Select machine from "Machine Mode" and set the processing parameter in "Pen Parameter" tab



- 12) Click "Output" on menu bar and click "Output"



- 13) Check "Output Selected Objects Only" and the "Execute" button to start CCD reading and laser processing.

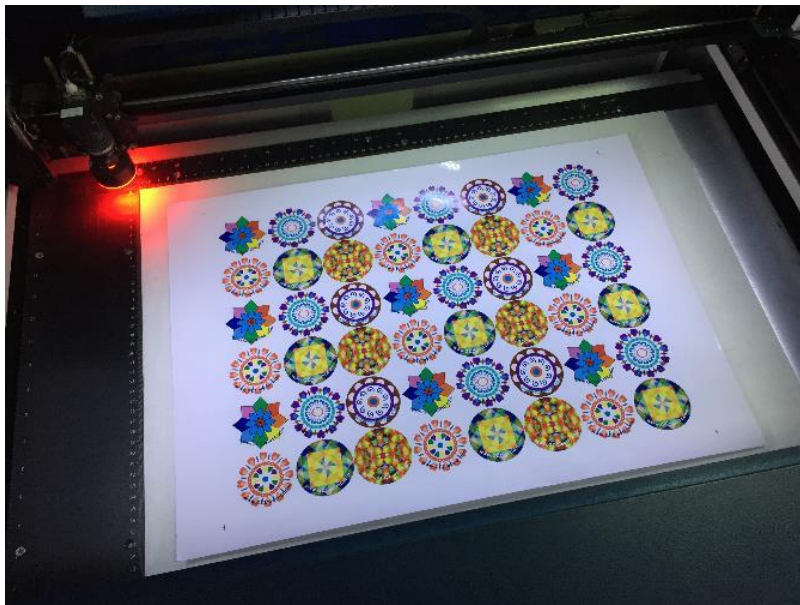


#### NOTE

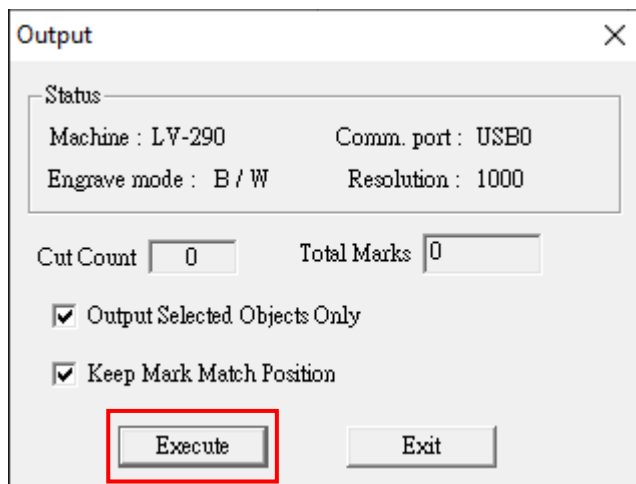
When SmartCONTROL™ Vision is under processing, any emergency, press "STOP SmartCONTROL Vision" button to stop the CCD action immediately.



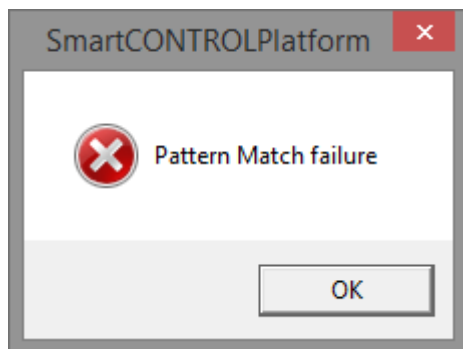
- 14) SmartVISION™ Pro CCD will automatically search for the registration marks and perform laser cutting jobs.
- 15) First job is completed, place the next object to the machine platform.



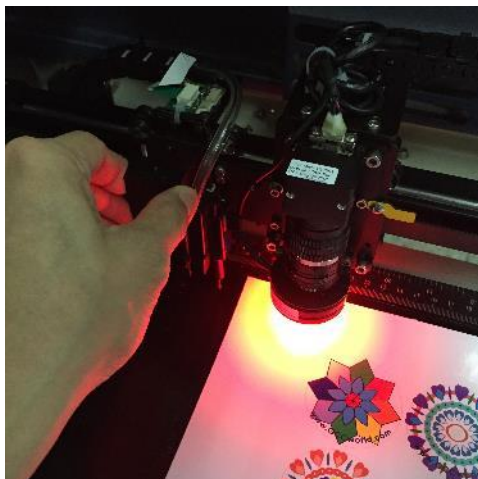
- 16) Click "Execute" of Output window to process job.



- 17) If there is an error with the placement, SmartCONTROL™ Vision may not find the marks correctly. "Pattern Match Failure" message will pop up, press "OK" button to continue.



- 18) Move the carriage with red beam to the failed mark.



- 19) Click "Execute" again, SmartCONTROL™ Vision will automatically calibrate the position and continue the job.

#### NOTE

If the object placement angle is too large, SmartCONTROL™ Vision may not source the marks. Repeat Step 17 ~ Step 19 operation.

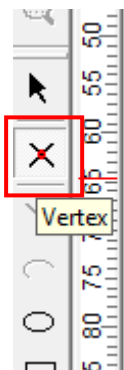
### SmartCONTROL™ Vision Operation – Define Marks from Graphic Scenario

Sometimes the printed objects may not include registration marks like circle, square, cross, or star for CCD reading, SmartVISION™ Pro CCD present a substitute solution for it.

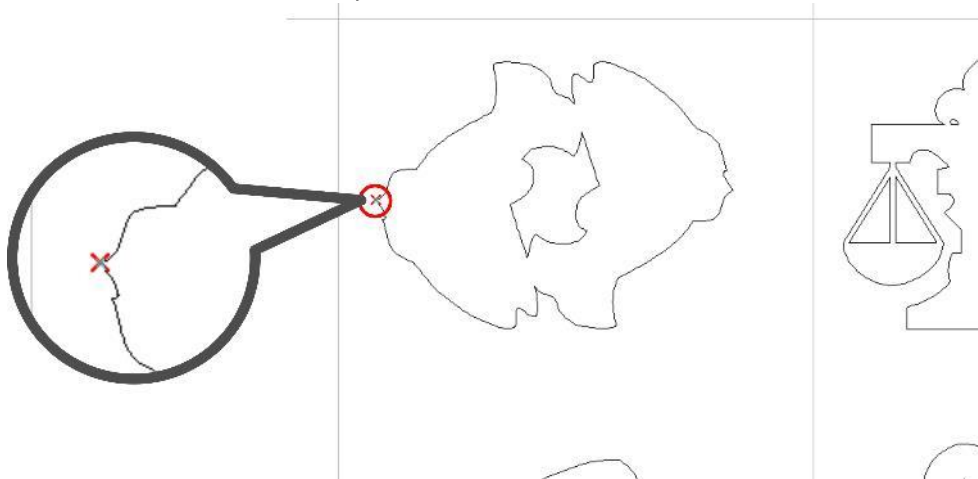
- 1) Place the printed object on the machine platform.



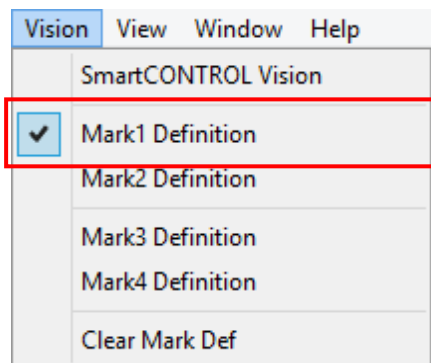
- 2) Click "AutoFocus" button of laser machine to automatically set the focal distance precisely.
- 3) Open the converted prn file or import prn file
- 4) Select the "Vertex" tool from tool bar



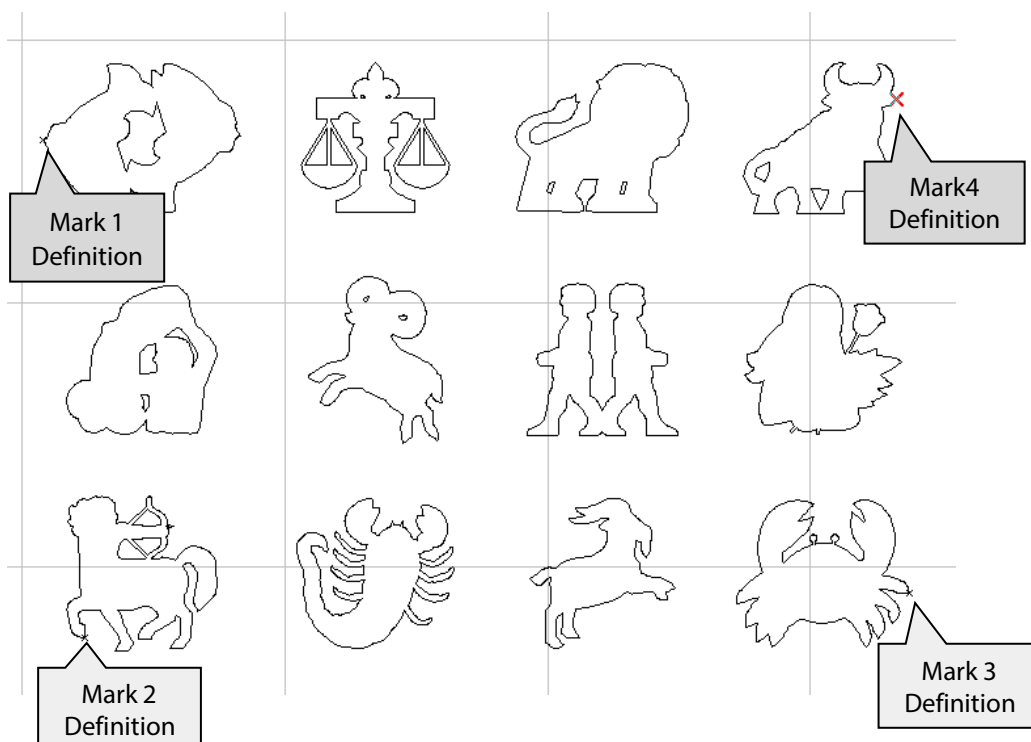
- 5) Move the mouse cursor to where you want to learn as registration mark and left click the mouse button, a vertex will be added on the object.



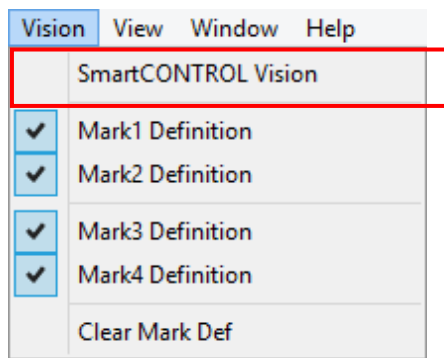
- 6) Click "Vision" on the menu bar and select "Mark 1 Definition," a check on the Mark 1 Definition will be shown.



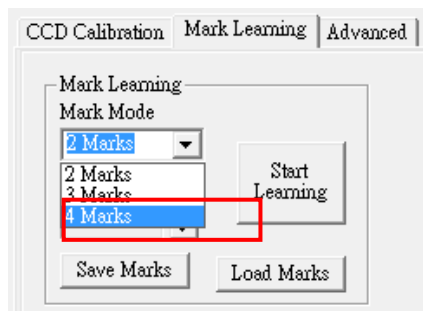
- 7) Repeat Step 5 to Step 6 to complete all mark definition settings.



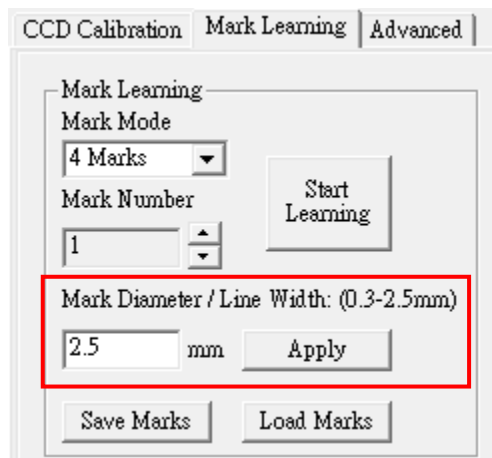
- 8) Click "Vision" on the menu bar and select "SmartCONTROL Vision."



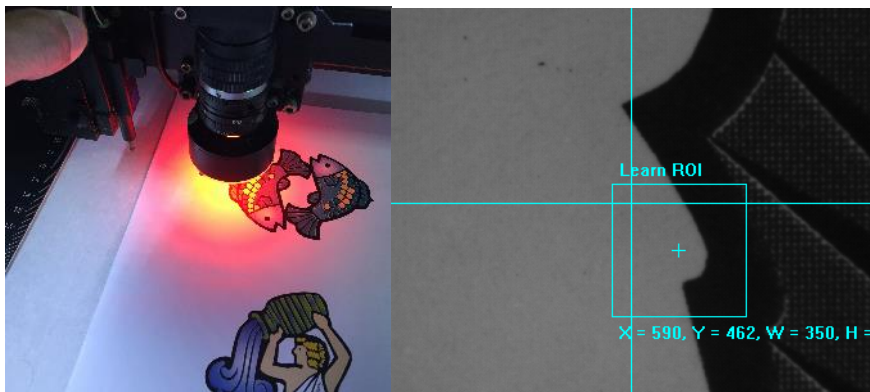
- 9) Go to the "Mark Learning" tab and select mark mode. The illustration here is 4 marks mode.



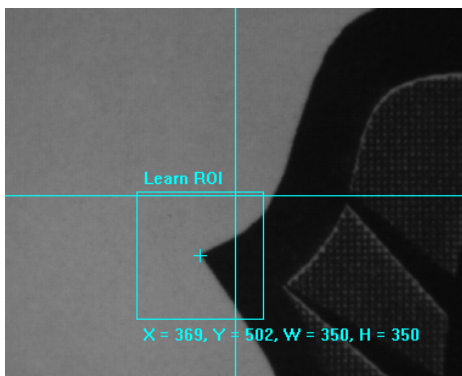
- 10) Input mark diameter or line width value in the Mark diameter / line width field. When the mark is defined as part of the graphic, it is recommended to set the mark diameter / line width as 2.5mm to get best reading results.



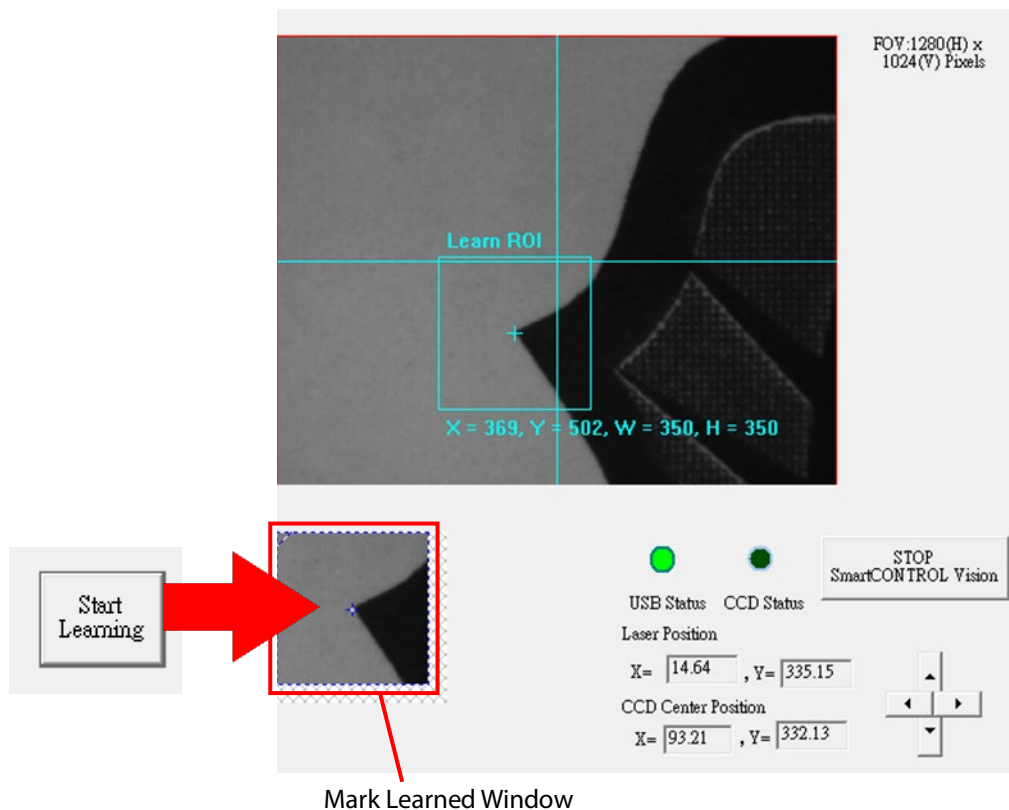
11) Move the SmartVISION™ Pro CCD module to the first marks till it's shown on the live window.



12) Use the mouse to move the laser ROI frame and ensure the crosshair of the frame aims at the defined mark.



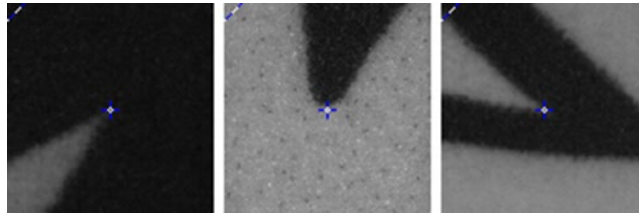
13) Click "Start Learning" button and the Learned Mark Window will show the learned pattern.



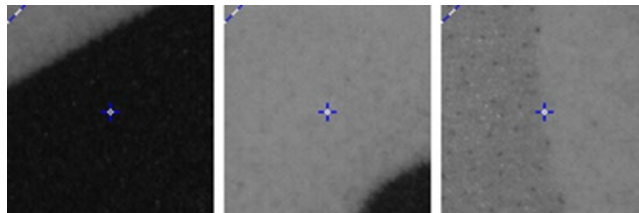
**NOTE**

When SmartCONTROL™ Vision is under processing, any emergency, press "STOP SmartCONTROL Vision" button to stop the CCD action immediately.

OK

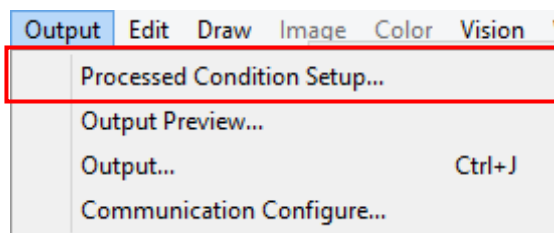


NG

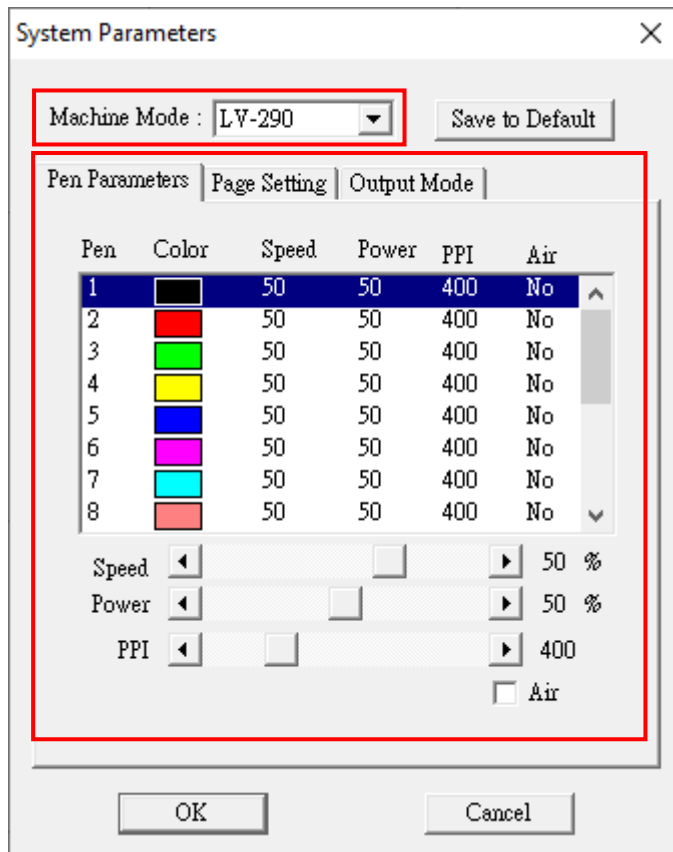


14) Repeat Step 11 to Step 13 to complete the 2 ~ 4 marks learning.

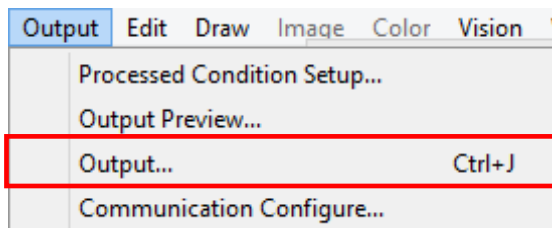
15) Click "Output" on menu bar and click "Processed Condition Setup"



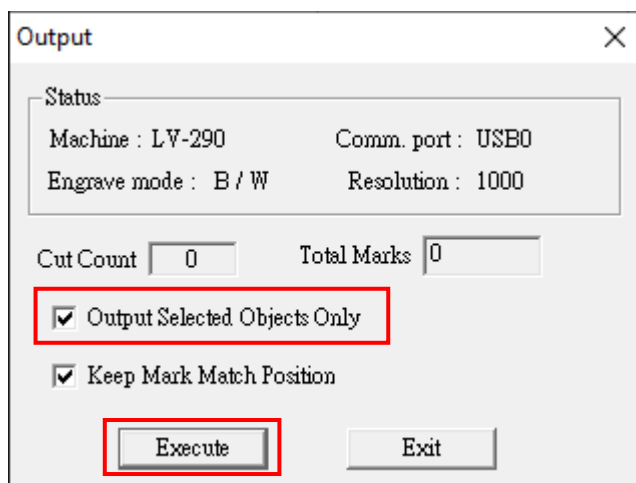
- 16) Select machine from "Machine Mode" and set the laser processing parameter in "Pen Parameter" tab



- 17) Click "Output" on menu bar and click "Output".



- 18) Check "Output Selected Objects Only" and the "Execute" button to start CCD reading and laser processing.



## NOTE

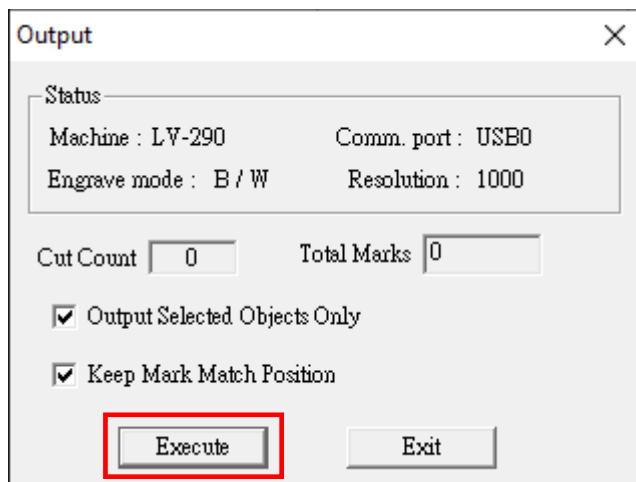
When SmartCONTROL™ Vision is under processing, any emergency, press "STOP SmartCONTROL Vision" button to stop the CCD action immediately.



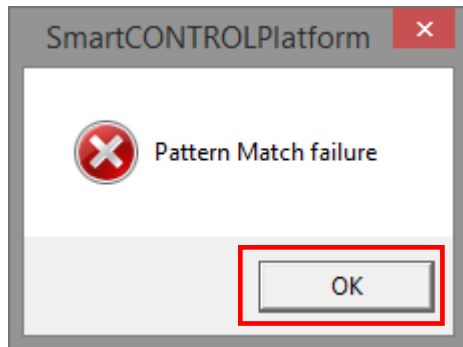
- 19) SmartVISION™ Pro CCD will automatically search for the registration marks and perform laser cutting job.
- 20) Processing completed, place the next object on the platform.



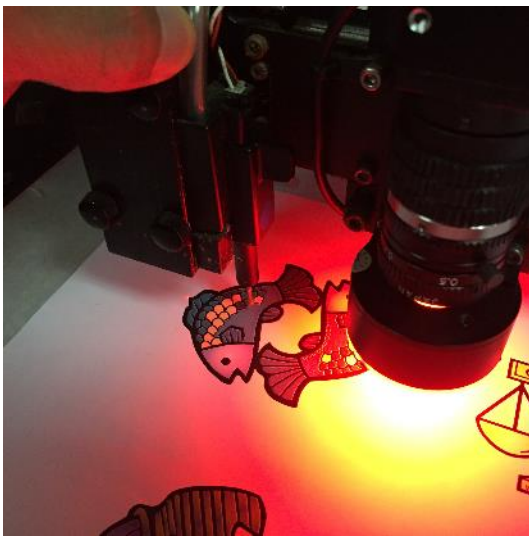
- 21) Click "Execute" to process second job.



- 22) If there is an error with the material placement, SmartCONTROL™ Vision may not be read correctly. "Pattern Match Failure" message will pop up, press the "OK" button to continue.



- 23) Move the carriage with red beam to the failed mark.



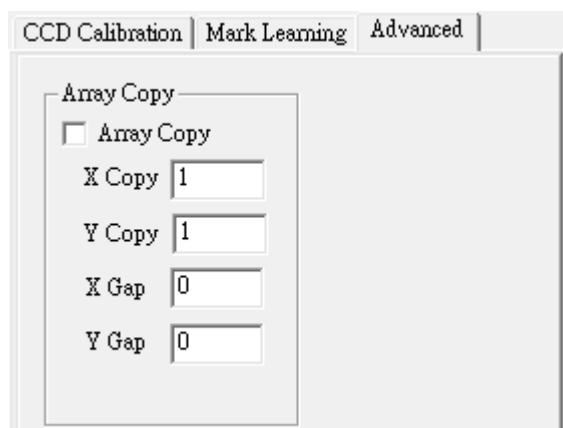
- 24) Click "Execute" again, SmartCONTROL™ Vision will automatically calibrate the position and continues the job.

#### NOTE

If the printed object placement angle is too large, SmartCONTROL™ Vision may fail to read the marks. Repeat Step 22 ~ Step 24.

#### Array Copy Function

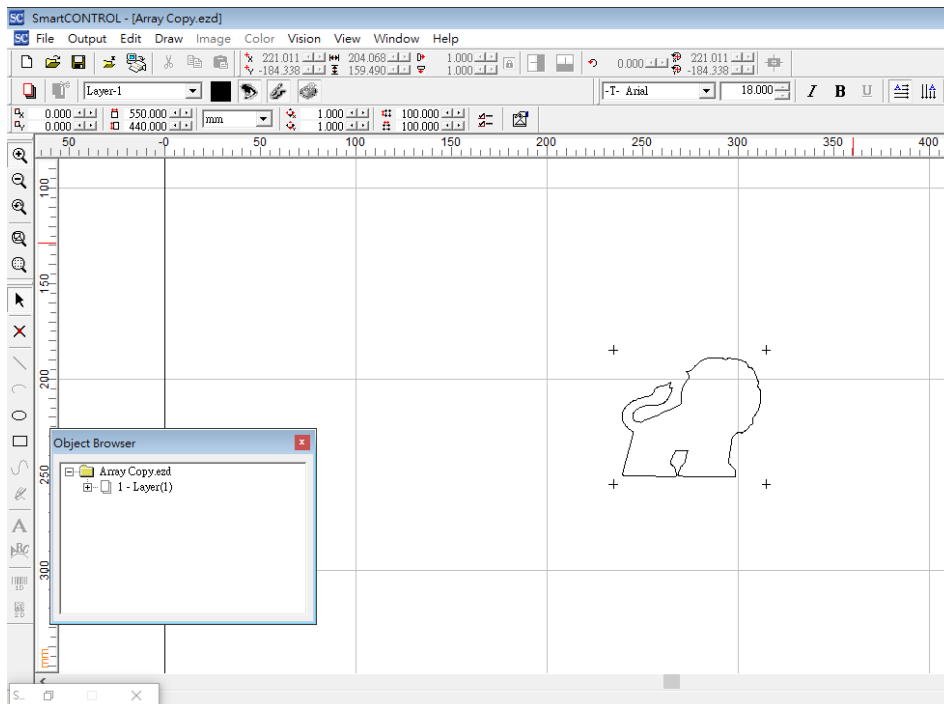
When the design graphic is repeatable and is arranged in matrix, you can only have CCD to learn one set of registration marks for all the graphics by using Array Copy function.



- 1) Place the printed object on the machine platform



- 2) Click "AutoFocus" button of laser machine to automatically set the focal distance precisely.
- 3) Open the file or import prn file.



- 4) Follow Chapter 4.6.1 step 4 ~ step 13 to define, learn, and read registration marks.

- 5) Click "Advanced" tab.

CCD Calibration | Mark Learning | **Advanced**

Array Copy

☐ Array Copy

X Copy

Y Copy

X Gap

Y Gap

- 6) Check Array Copy box and enter the matrix numbers of the X and Y copy.

CCD Calibration | Mark Learning | **Advanced**

Array Copy

☒ Array Copy

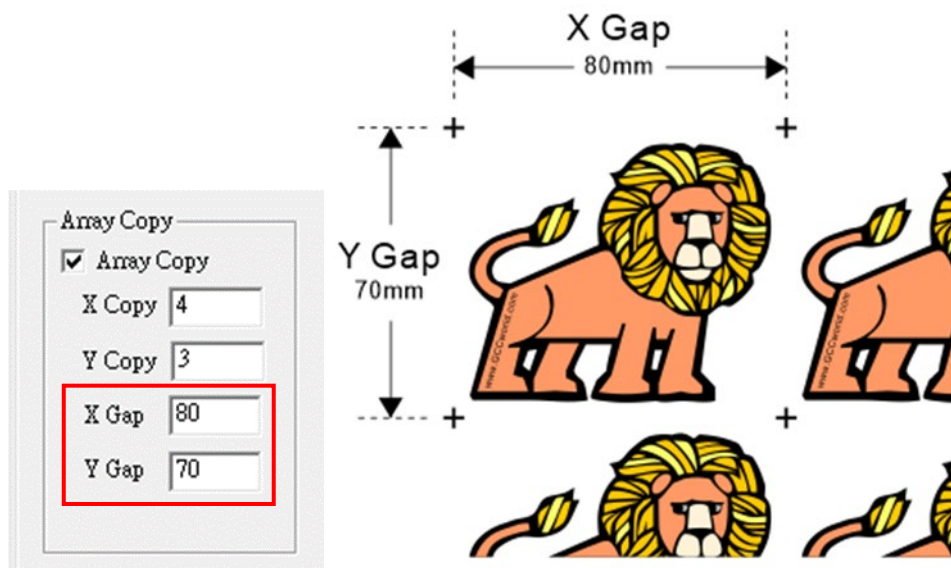
X Copy

Y Copy

X Gap

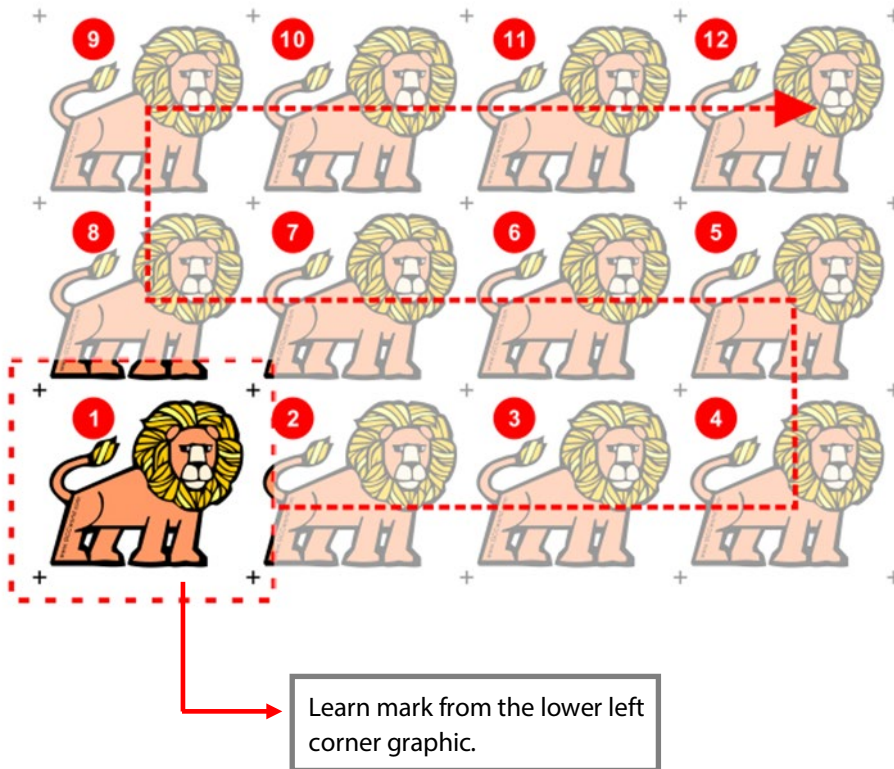
Y Gap

- 7) Enter the gap value of X and Y. Gap is defined as the distance from image to image shown in below.



## NOTE

The following picture shows the laser working path for graphics with Array Copy function. Please learn marks from lower left corner graphic.



- 8) Follow Chapter 4.6.1 step 14 ~ step 17 to execute the job, the SamrtVISION™ Pro CCD will automatically move, read marks and processing job.

# 6

## Chapter 6 Engraving and Cutting Techniques

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**Raster Engraving**

**Vector Cutting**

**Vector and Raster**

**3D Tips**

**Modify Image Setting of a Picture for Better Engraving Quality**

## 6.1 Raster Engraving

A CO2 laser engraver can process text, scanned image, digital picture, or design by “laser firing” grids /dots of individual pixels into a raster image. Think of this as simply “printing” your job onto any particular material. An example of a raster engraved piece would be a photo engraving on tile, as shown in the picture below.



## 6.2 Vector Cutting

A CO2 laser engraver can process text, design, and images composed of lines through continuous-firing of the laser to cut out various shapes. When performing vector cutting operations, imagine the laser head as a pair of scissors cutting out the lines specified in your design. An example of a vector cut piece would be a customized dining mat, as shown in the picture below.



The LV-290 Printer Driver determines which sections should be raster engraved or vector cut based on the outline width of that particular area or section of the design. In order to prep a particular section for vector cutting, you will need to set that object's fill color to white and set its outline thickness between 0.001" (0.025 mm) to 0.004" (0.1 mm) via the graphics software.

Below is an example of how to prep an area (in this case, we will use a section of text) for vector cutting. CorelDRAW will be used as the selected graphics software.

- 1) With the text function, create a string of characters and select those characters by clicking on the text.
- 2) Change the text fill color of the selected characters to white by left clicking on the white color from the CorelDRAW Color Palette (located on the right hand side of the screen)
- 3) Change the outline color of the selected characters outline by right clicking on the desired color from the CorelDRAW Color Palette.
- 4) Change the selected characters outline thickness to the thinnest width by right clicking on the selected text select <Properties> → Click on the <Outline> tab and change the Width to its thinnest dimension. Click on "OK" to apply the changes.
- 5) Now your string of characters has been properly designated as an area to be vector cut. Simply "print" your job (output the file to the LV-290) and watch as your string of characters is vector cut.

## 6.3 Vector and Raster

In some cases, you will want to process both raster engraving and vector cutting tasks within a single project. For example, if you wanted to engrave a design onto a particular material and then cut a particular shape around that engraving. The picture below is an example of engraving on a piece of leather which has then been cut out: The picture below is an example of an engraving on a piece of cork, which has then been cut out with a square shape:



In these situations when there are raster engraving and vector cutting operations on a single project, the printer driver will interpret between raster sections and vector sections by the types of lines and line widths of your design. Areas of your design with line widths set between 0.001" (0.025 mm), 0.004" (0.1 mm) will be designated for vector cutting, and the other areas will be designated for raster engraving.

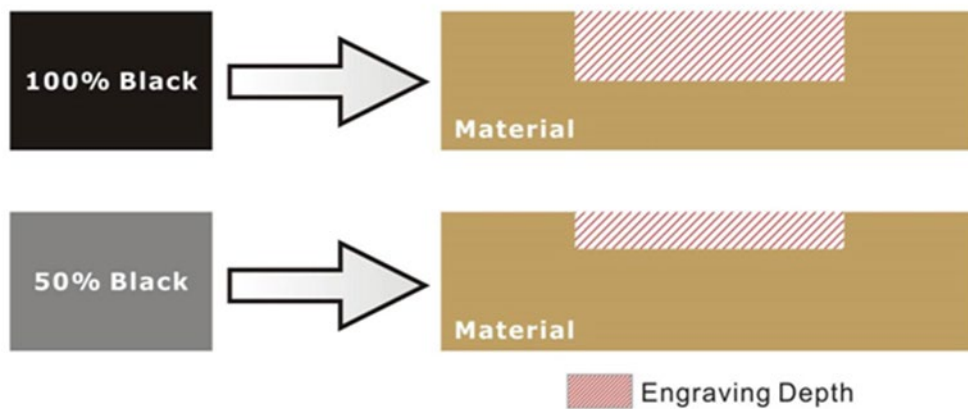
## 6.4 3D Tips

3D Mode is one of the functions of this laser engraver. Instead of traditional two dimensional graphic processing, 3D Mode allows the naked eyes to visualize the curvatures of the 3D effect by applying 200 power levels technology to create different depth of engraving. Although it is easy to produce 3D samples with this Engraver, production of the 3D graphic can be a hassle for our users.

### Principle for 3D production by laser

3D processing uses degrees of the gray level to adjust the output energy of the laser. Take the figures below as an example. When the color of a certain block is set as 100% black, the laser output energy for processing will be at 100%. The processing depth will be fairly deep. When the gray level is set as 50% black, the laser output energy will be adjusted to a smaller value accordingly so that the processing depth is not as deep.

By specifying the degrees of the gray level in this way, various energy output is achieved, and the 3D effects are produced.



By specifying different levels of black in design software, the corresponding laser power energy will generate different depths of engraving result.

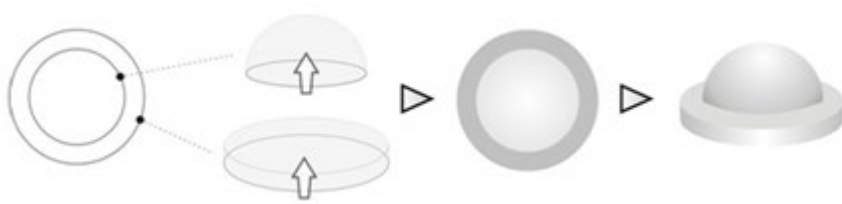
### Introduction to software for 3D graphic production

Many ways to produce 3D graphics are available. If you are familiar with or frequently use one of the 3D software in the market like Laser Type, EngraveLab, 3D Studio etc., you may use it for the production of 3D graphics. After completion, save the 3D images as one of the formats that is compatible with the Laser Engraver (such as JPG or BMP) and let the machine begin the engraving. If you are not familiar with any 3D software, some editing software specific for laser in the market also have 3D mode functionality, which could be a handy tool for you to produce 3D objects. Of course, you may also use Photoshop or CorelDRAW, which you might be using on daily basis, for the production of 3D objects. Ways to produce 3D graphics with these software are not the same. In the following section, we will give you simple illustrations with respect to how these software work.

## Laser Professional AP

Currently, quite few laser professional application softwares like Laser Type, 3D studio, EngraveLab are available in the market. You can not only create all kinds of vector images with these AP but also convert these vector images into 3D module, which is a great way to produce 3D graphics.

As illustrated in the figure below, all you need to do is to choose the direction of the vector and then set the length and shape of the convex or concave surface. The software will automatically generate the 3D graphic for you.

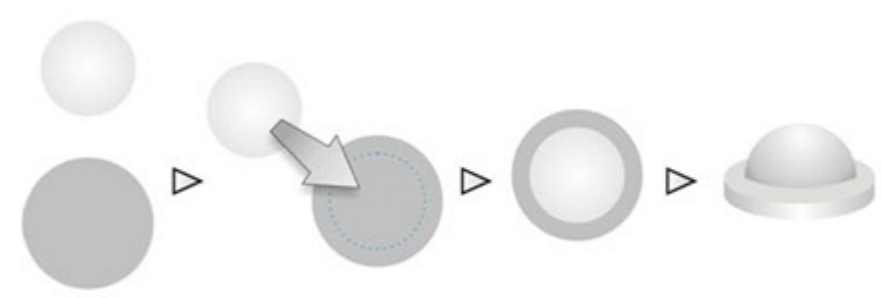


Concept illustration of 3D graphic production with Laser Professional AP

After the graphic is completed, you can output the 3D graphic directly to the laser machine through THIS MACHINE driver, which is very handy. Or you can also export the 3D graphics as JPG or BMP format and edit with frequently used CorelDRAW or Illustrator software, then output the graphic to THIS MACHINE laser system.

## Photoshop & CorelDRAW

The way to produce 3D graphics with Photoshop and CorelDRAW is very similar. Fill in the desired gray level colors to each of the drawn figures and proceed with further arrangement and combination. Then you may output the 3D graphic to the laser for the production of the 3D object. Take the figure below as an example. After producing two graphs in gray level, proceed with the arrangement and combination. Then you may let the laser proceed with 3D mode.



Both Photoshop and CorelDRAW may produce 3D graphics in the manner of combination.

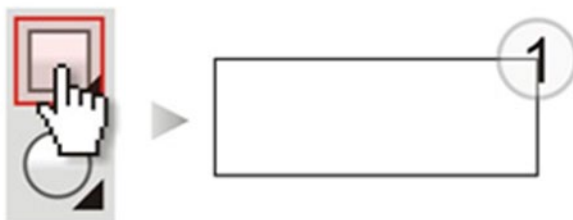
## A way to produce 3D graphics

For the production of 3D graphics, in addition to the requirement of having great familiarity with the software, a significant amount of time is required to design and arrange the layout. Thus, we use a relatively simple graphic for illustration so that you would understand how to produce 3D graphics better.

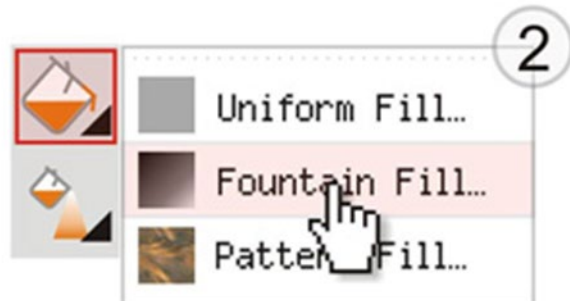


Take the graphic above as a production example. CorelDRAW is used for the production of the 3D graphic.

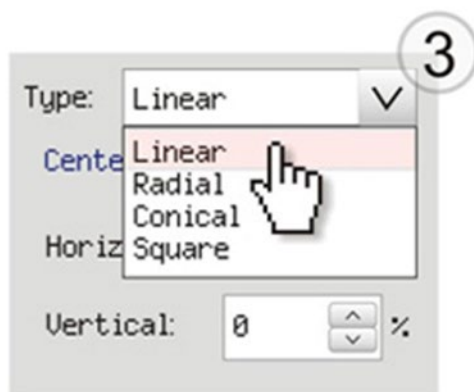
### Step 1. Produce the gray level background



▲ Draw a rectangular box with the drawing tool



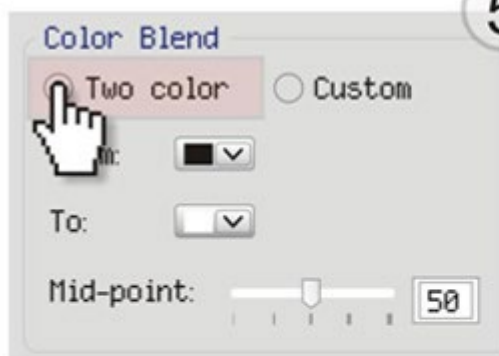
▲ Select Fountain Fill to fill in the gray level



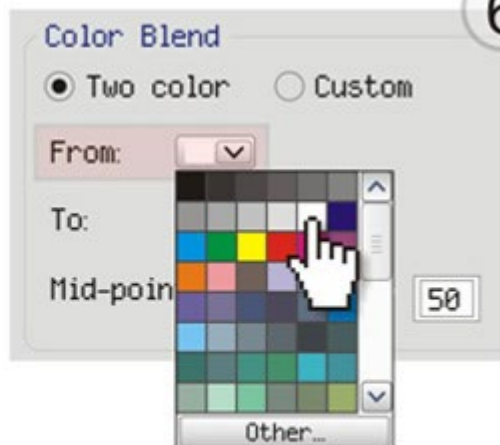
▲ Select Linear as the type of the gray level



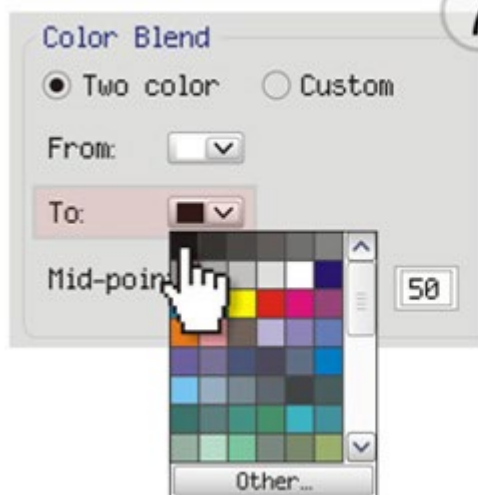
▲ Set the gray level angle as 90 degrees



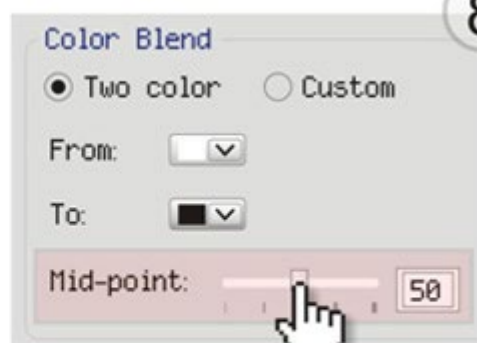
▲Select Two color as the type of the gray level



▲Set the From color as 0% Black



▲Set the To color as 100% Black



▲Set the Mid-point as 30



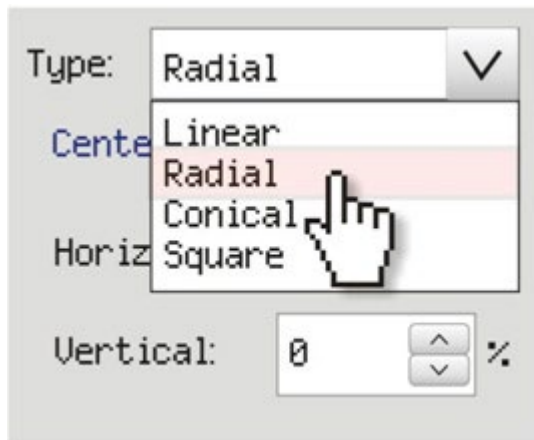
▲Click OK to complete the editing



▲A gray level graphic is finished

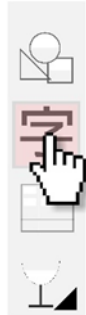
This machine requests your attention

If you need to produce circular 3D graphics, you only need to select Radial as the gray level type in the pull-down menu of Type. Then, a circular 3D graphic may be produced.



## Step 2. Produce three-dimensional characters


①



▶ Laser

▲Edit the word with the Text toolbox


②



Laser  
▼  
Laser

▲Use the Color toolbox on the right to fill the white color into the characters


③



Laser

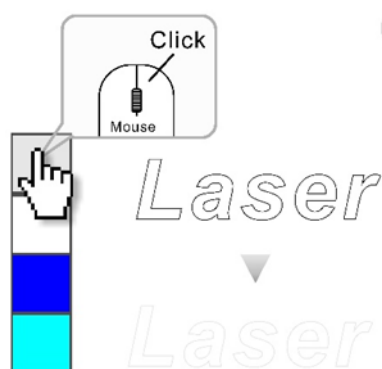
▲Select the desired font and size

④



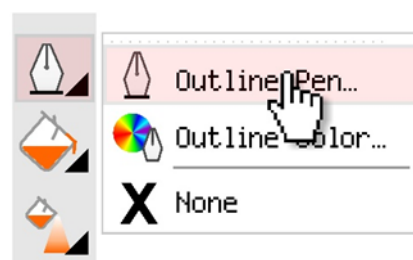
Laser

▲**Bold** and *italic* style may also be used



5

▲ On the palette, set the exterior frame as 10% gray level (Right click the mouse to set the color of the line for the exterior frame quickly)



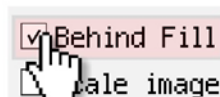
6

▲ Click on the Outline Pen tool



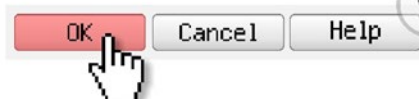
7

▲ Set the width of the line for the exterior frame



8

▲ Check the Behind Fill option



9

▲ Click OK to complete the text editing

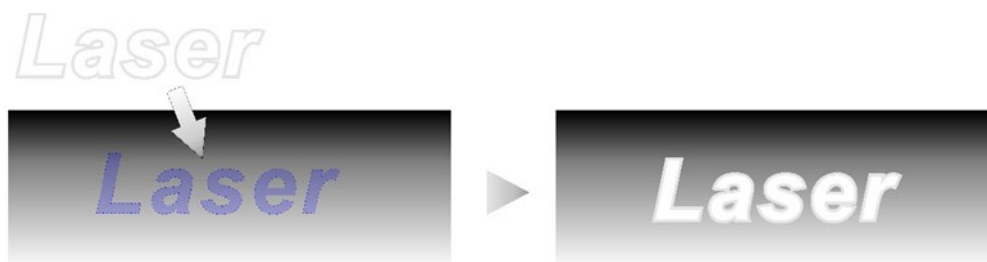
*Laser*

10

▲ Three-dimensional characters are completed

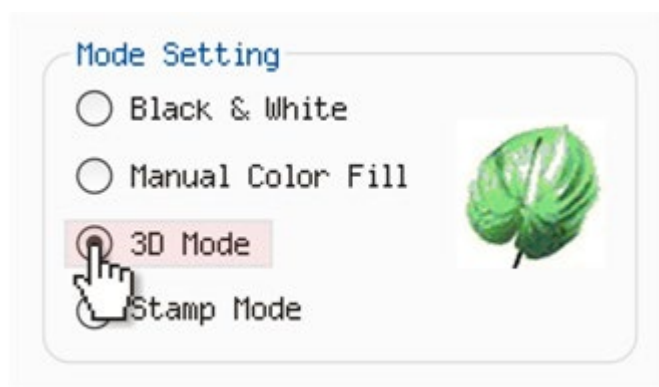
### Step 3. Combine the 3D images

After finishing the production for each of the objects, you may proceed with the combination of the objects. The combined graphic may be output with the laser engraver.



### Output the 3D graphic

After selecting the graphic to be output, set the Mode as 3D Mode in the driver. After setting the engraving parameters, output the 3D graphic.



### Tips for engraving 3D graphics

Application Lab provides a few reminders that may require your attention during the 3D engraving in order to improve the result of the engraving.

#### Turn on the Air Assist function

When the engraving is done along with Air Assist, the depth of the engraving would be deeper. Set Air assist inside the driver by checking the box.

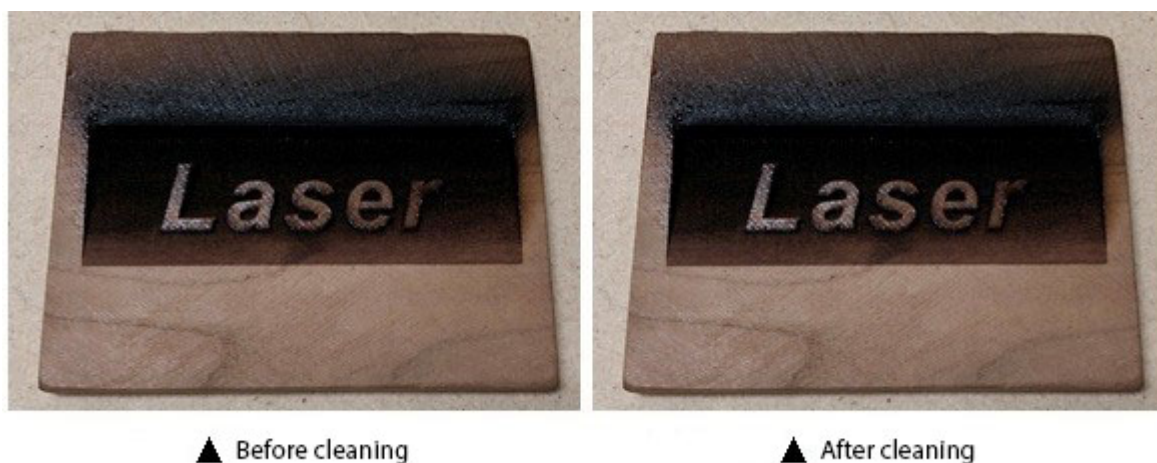


### Polish

Dust will accumulate during the engraving when acrylic is engraved. The acrylic may be polished with Polish after the engraving. After the processing, don't remove the engraved object. Use the Control Panel to lower the platform (for about 7~8 mm) and then engrave once again to achieve the better finish.

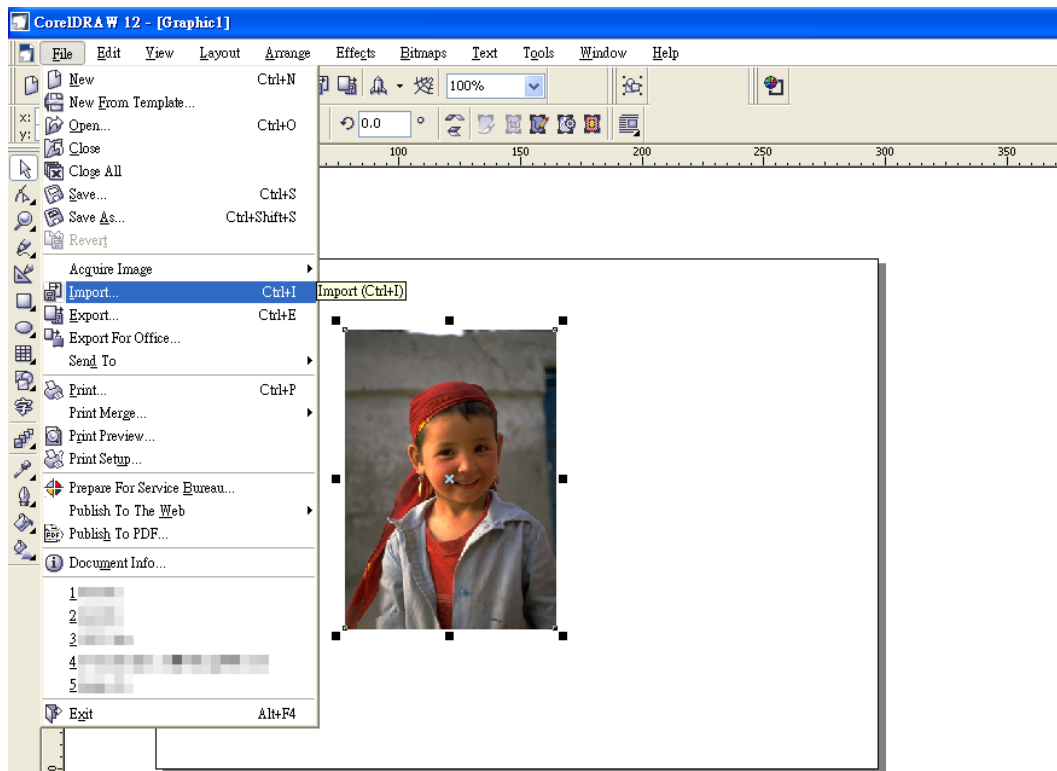


After engraving the wooden objects, please use a toothbrush with some clean water to remove the dust on top of the object.

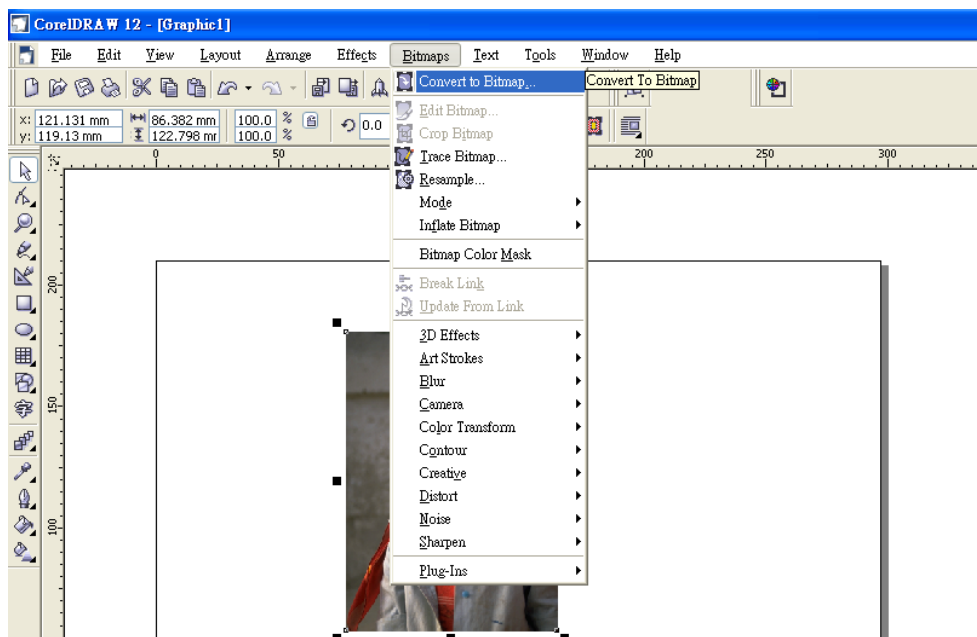


## 6.5 Modify Image Settings of Picture for Better Engraving Quality

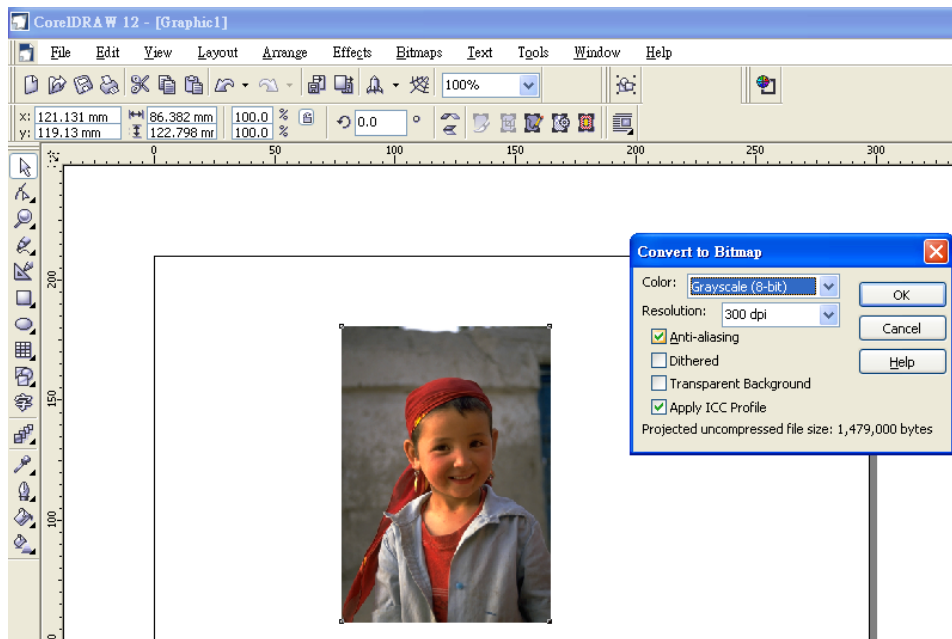
1. Connect your digital camera to the computer by USB cable.
2. Download the picture from the digital camera to the computer
3. Select the picture that you want to engrave.
4. Import the image from the folder where the picture is located by selecting File/Import



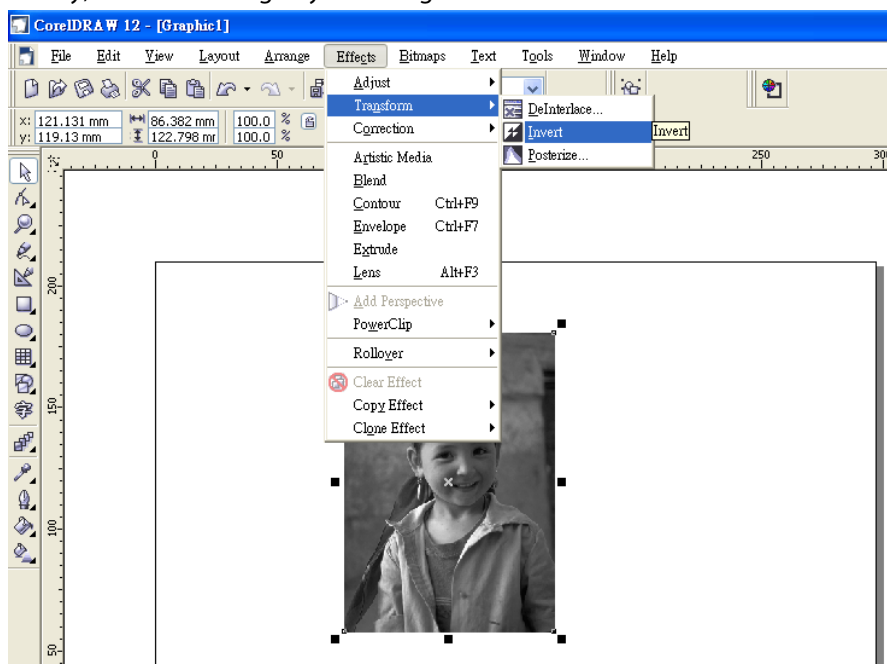
5. Convert the image to Bitmap by selecting the image and click on Bitmaps/Convert to Bitmap



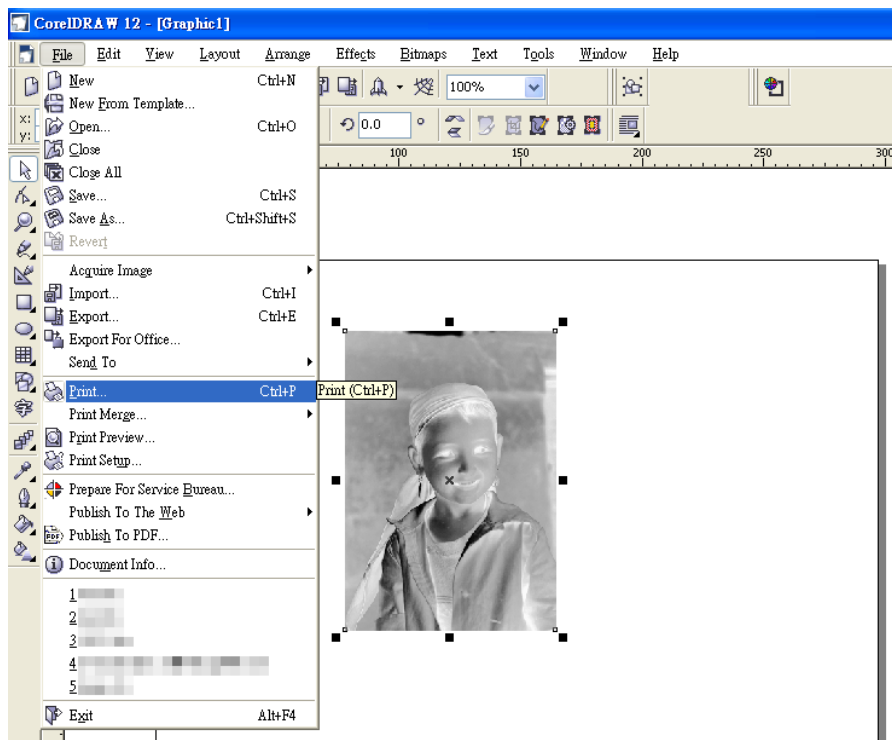
6. Change the Bitmap settings by setting "Color" to Grayscale (8-bit) and "Resolution" to 300 dpi and click OK.



7. Finally, Invert the image by selecting Effects/Transform/Invert



8. Now you are ready to output the modified image by clicking File/Print



#### NOTE

This instruction is a simple example for general use. There are many tips and tricks to achieve a good engraving quality. It takes a lot of practice and experience to achieve a good engraving quality. Different picture may need different modifications and different material may need different parameters.

# 7

## **Chapter 7 Optional Items**

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**Fume Extraction Unit Option**

**Air Compressor Option Items**

**Focus Lens Option**

Several optional items are available to enhance your experience with this machine. If anytime after the purchase of your machine, should you ever consider to purchase any optional item, please contact your authorized Roland DG Corporation dealer.

## 7.1 Fume Extraction Unit

To properly remove dust, vaporized materials and chemical smoke from the working area and machine, it is necessary to install a suitable air extraction system. The air extraction system and other components are readily available from your authorized Roland DG Corporation dealer, or you can elect to purchase and install one yourself with components found at your local industrial supply store.

LV-290's Fume Extraction Units are specifically designed to prevent personnel from inhaling hazardous fumes and dust generated by the laser process. Available for all LV-290 engravers, the Fume Extraction Unit represents the latest in exhaust extraction and odor reduction technology for all types of applications. Quiet operation, high vacuum capacity, compact design and long life expectancy are but a few outstanding features. Each LV-290 Fume Extraction Unit is powered by a maintenance-free, continuous-running turbine. In order to ensure personnel safety and legal compliance, the LV-290 Fume Extraction Unit is CE-compliant for Europe. To purchase a LV-290 Fume Extraction Unit, contact your authorized Roland DG Corporation dealer.

### INSTALLATION (Self-Assembled Unit):

- 1) If you purchase an exhaust system at your local industrial supply store, we suggest that you have a contractor install the exhaust system. We highly recommend you to install the exhaust system outside of the building for both noise considerations and if it does not possess filtering capabilities.
- 2) Mount the fume ventilation system in an obvious and accessible location, not too far from this machine, so it can be routinely switched on prior to laser engraving. The maximal distance you should mount the exhaust system away from this machine depends on the blower's vacuum capacity. We recommend that you consult with the vendor regarding the unit's vacuum force, maximal distances, based on the available models.
- 3) Connect rigid and smooth walled tubing such as PVC or sheet metal with a 4" diameter to the ventilation opening located on the rear side of this machine. (As shown in the picture below). Try to keep this tubing as straight as possible as bends reduce the exhaust efficiency. Use the appropriately sized tube clamps and sealants to ensure a tight and secure attachment.
- 4) There are two exhaust openings on the rear side of this machine, you can connect the top or bottom one, or both for application requirements. The top ductwork is suitable for dust, smoke generated on material surface when doing laser engraving, which will reduce residue left on material surface; while the bottom ductwork is recommended for laser cutting jobs. Optimum down vacuum is critical for clear cutting edge when laser cutting materials.



## 7.2 Air Compressor

Specifically designed for laser engravers, the air compressor utilizes an oil-free diaphragm. The air compressor helps to eliminate harmful and potentially damaging moisture from the laser optics, maximizing life of the laser optics. In addition, the air compressor provides an optimal air flow to the SmartAIR nozzles to minimize flaming, suppress working temperatures, and blow away dust and particle by products generated from the laser process. This machine provides an air control by pen color function in Windows driver to enable or disable air assist automatically per different pen jobs. Refer to Chapter 5.2.4.2 about driver operation in pen page.



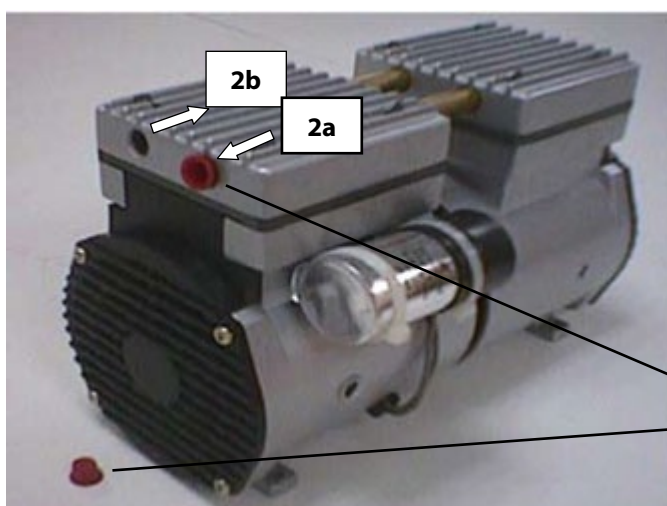
Power Cord B

1/4" Air Inlet Tubing

Power Cord A

### INSTALLATION:

- 1) Remove the plugs on the air compressor to expose the air inlets.
- 2) Fasten the included air tube fastener valve to the outgoing air inlet (indicated by 2a) and the air filter into the ingoing air inlet (indicated by 2b).



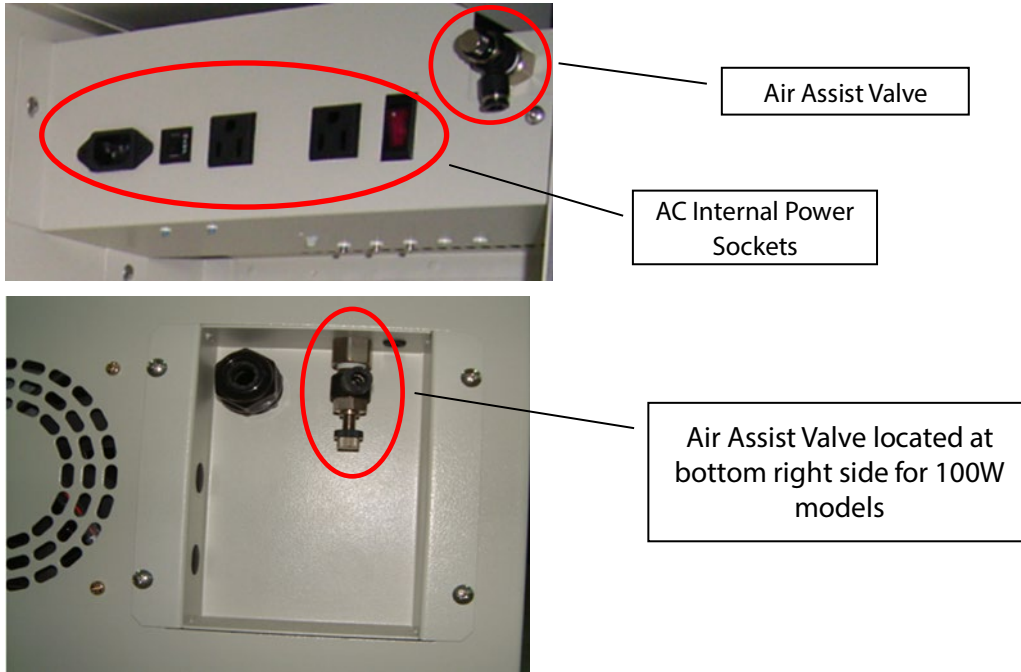
Plugs

- 3) Connect a 1/4" tubing to the air tube fastener valve on the air compressor.

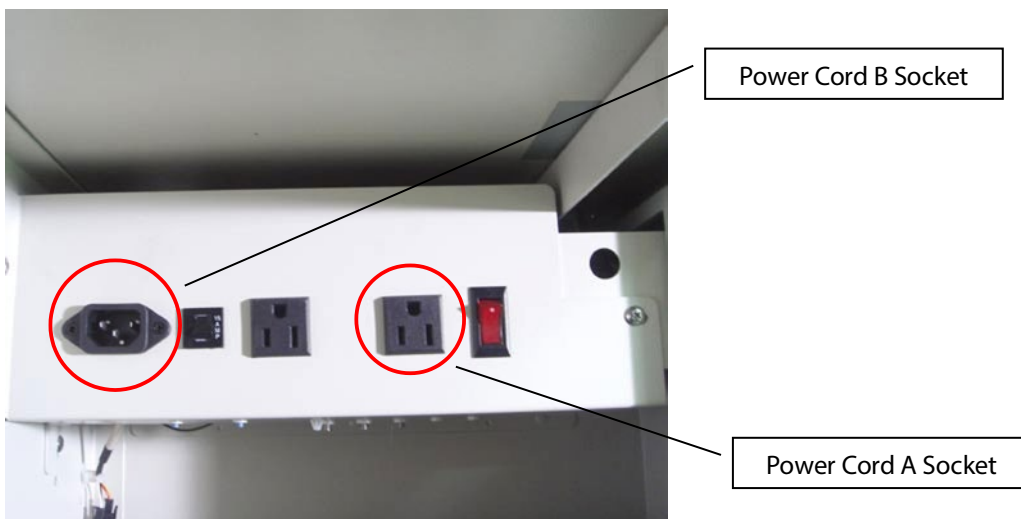
**NOTE**

It is important that the 1/4" air tubing has clean, straight cuts on each end. Jagged or slanted cuts will not produce adequate sealing capabilities.

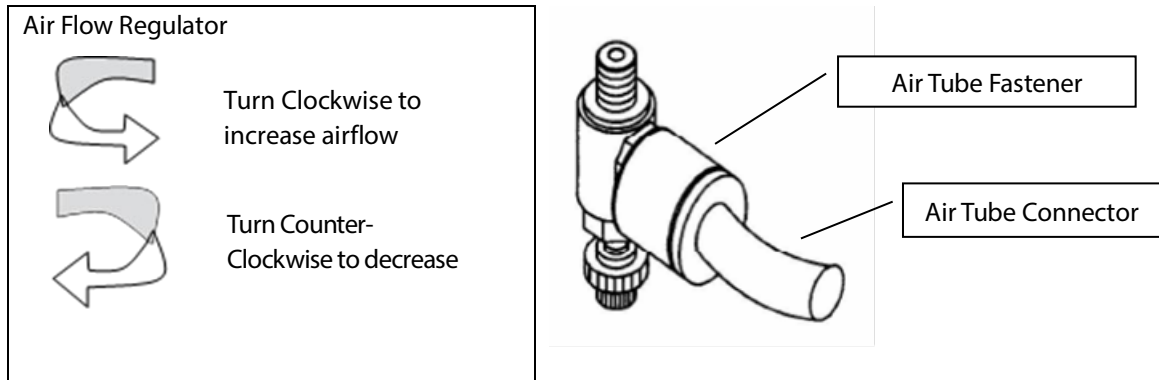
- 4) Open the bottom front doors of this machine to locate both the Air-Assist Valve and Internal Power Sockets. As indicated below:



- 5) Plug the air compressor's power cord A into the AC internal power socket.
- 6) Plug the female end of power cord B to the AC internal power socket and the male end to an external power outlet.



- 7) Take the unattached end of the ¼" air tubing (other end already connected to air compressor) and connect it to the air tube connector on the air assist valve. Make sure you press down on the air tube fastener when inserting the ¼" air tubing, to form a tight, secure attachment as indicated in the diagram below.



- 8) Congratulations, you have finished setting up the air compressor. Make sure you have the proper SmartAIR nozzle installed (depending on your application), before you turn on and utilize the air compressor.

#### **OPERATION:**

Switch on the air compressor unit and make sure that the airflow regulator on the air assist valve is opened (turn clockwise to increase the airflow, counter-clockwise to decrease the airflow). The air nozzle under the laser head should emit a steady flow of air.

With the SmartAIR nozzle and air compressor properly installed and operating, all configurations and settings relating to air-assist functions are controlled through the LV-290 printer driver and hardware control panel. Please refer to the LV-290 PEN page on print driver section of this manual for details on how to enable and configure air-assist functionality.

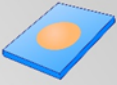
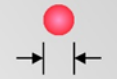
## 7.3 Focus Lens Options

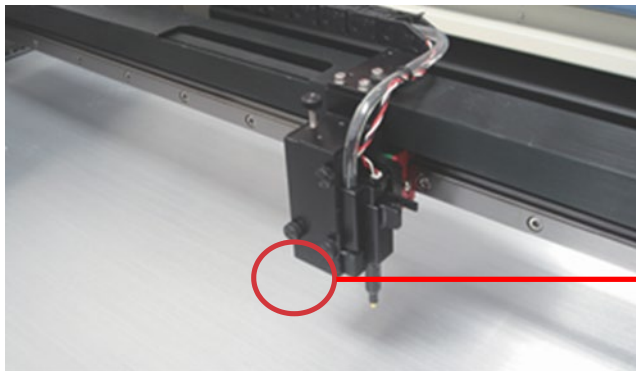
### 7.3.1 CO2 Laser Focus Lens

Roland DG Cop. offers four different focal lenses namely the 1.5", 2.0", 2.5", and 4.0" for different applications. The number description, 1.5", 2.0", 2.5", and 4.0" signifies the distance of where passed through beam will converge. For example, when a laser beam passes through a 2.0" focus lens, the beam will converge at a 2.0" distance resulting in a concentration of energy at that spot.

The resulting spot size from the different focus lens are also different and the following chart shows the different spot sizes achieved from the different lenses.

- 1.5" Lens: The 1.5" lens is best when used for engraving of very fine details
- 2.0" & 2.5" Lens: The 2.0" & 2.5" lenses are good for normal engraving and cutting of up to 10mm thick acrylic.
- 4.0" Lens: The 4.0" lens is good for 10mm and above acrylic cutting.

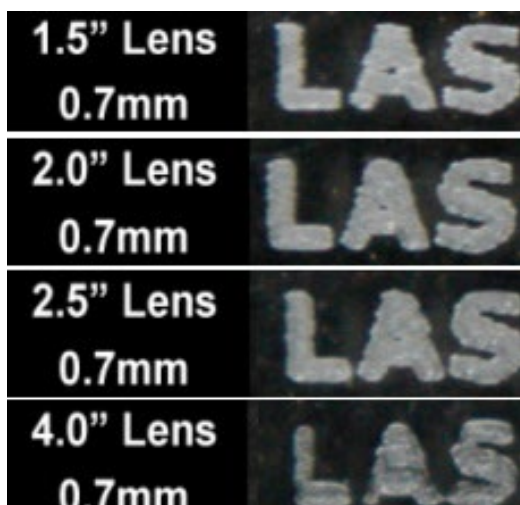
 Lens	1.5"	2.0"	2.5"	4.0"
 Spot Size	0.0029" (0.073mm)	0.0039" (0.099mm)	0.0048" (0.121mm)	0.0078" (0.198mm)



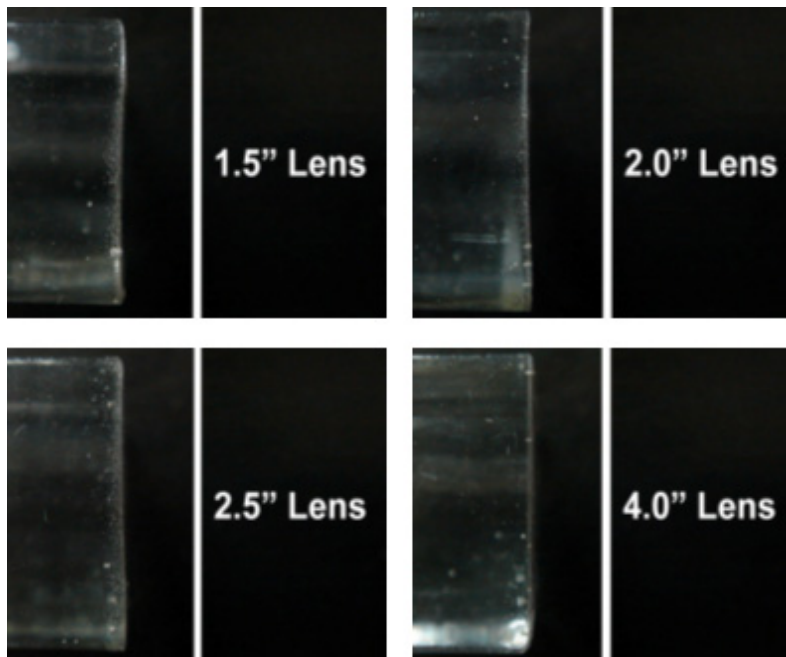
Unscrew the three thumb screws on lens carriage to remove the carriage panel. Take out the lens carriage and insert the optional one for different applications.

Thumbscrew

Engraving effects achieved with the different lenses



Cutting edges achieved with the different lenses



# 8

## Chapter 8 Basic Maintenance

---

### **Suggested Cleaning and Maintenance Supplies** **Maintaining the Work table and Motion System**

- Accessing the Work table and Motion System
- Cleaning the Work table and Motion System
- Lubrication of the Y Rails

### **Cleaning the Optics System**

- Removing the Mirrors
- Cleaning the Mirrors
- Removing and Cleaning the Focal Lens

Keeping your machine clean and well maintained will ensure quality output, consistent reliability, and extended product life. Smoke, dust or residue build-up inside the laser system or the mechanical components can cause a reduction in the laser power, irregularities in the motion system, reduced product life cycle, and a host of other avoidable problems. This section will cover how to perform regular maintenance on the work table, motion system, mirrors, and focal lens.

The frequency of the cleaning schedule will depend on number of variables such as the types of material you work with, the immediate work environment, the frequency of use, the quality of the exhaust system, etc.

### **WARNING**

- Electrical shock may occur if you do not turn off and unplug this machine before cleaning.
- Damage may occur to the system if you do not turn off and unplug this machine before cleaning.
- Always turn off and unplug this machine before cleaning!

## 8.1 Suggested Cleaning and Maintenance Supplies

Cleaning / Maintenance Tool	Special notes
Soap Solution or All-Purpose Cleaner	
Paper Towels	
Cotton Cloth	
Denatured Alcohol	DO NOT use alcohol on any painted surface, plastic, or the laser system.
Acetone	ONLY to be used on the work table
Vacuum Cleaner with a Flexible Nozzle	Only to be used in and around the work table and motion system
Lubrication syringe	Supplied
Cotton Swabs	Supplied
Lens Cleaner	Use a commercial methanol.
Lint Free Lens Tissue	Supplied
#2 Phillips Screwdriver	
Allen Wrench .050"	

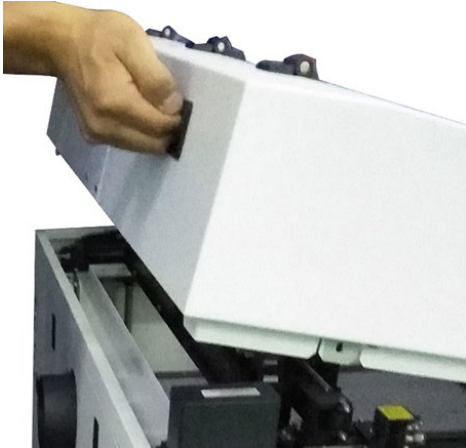
## 8.2 Maintaining the Work table and Motion System

### 8.2.1 Accessing the Work Table and Motion System

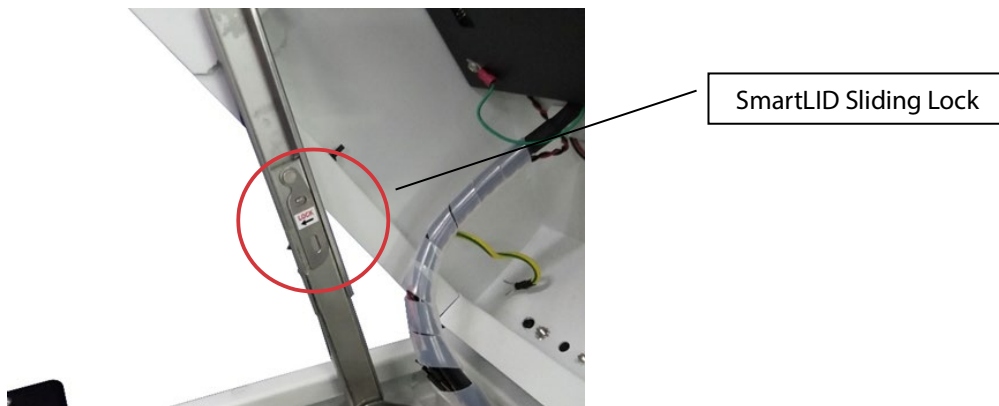
It will be important to gain full access to the work table and motion system to properly clean and maintain these areas. To do so, you will need to lift the SmartLID. You can do this via the following steps:

#### Opening the SmartLID:

- 1) The top lid of the machine can be lifted open by using the handles from the rear side. Lift the lid to the maximum (indicated by a small click) to engage the latch (as shown in the picture below).



- 2) Manually lock the SmartLID via the two sliding locks found on each side of the metal support rails by sliding them to the locked position (as shown in the picture below).



#### WARNING

Anytime you have the SmartLID open, always make sure you have properly engaged the SmartLID manual locks on both sides of the metal support rails. Failure to do so may pose a serious risk if the SmartLID slams down.

#### Closing the SmartLID:

To properly close the SmartLID after you have finished accessing the work table or motion system, please follow these steps:

- 1) Disengage both of the sliding locks found on each side of the metal support rails by sliding them away from you and into the unlock position.
- 2) Push the SmartLID away from you and move to the maximum position to disengage the latch (indicated by a small click) and gently close the SmartLID.

## 8.2.2 Cleaning the Work Table and Motion System

Clean the working table and the motion system on a frequent basis through the following steps:

- 1) Turn the power off and unplug this machine before cleaning.
- 2) Use a vacuum cleaner with a flexible nozzle to remove dust and debris from the work table and motion system.
- 3) Apply small amounts of all-purpose cleaner, alcohol, or acetone to a paper or cotton towel to clean the working table.
- 4) Apply a soap solution, all-purpose cleaner, or alcohol to a paper or cotton towel to wipe down the rails of the motion system.
- 5) Wait for all cleaning residue to dry completely before plugging in and operating this machine.

### CAUTION

- Never pour or spray alcohol or acetone directly to the working table.
- Oil, alcohol and acetone can cause fires or smoke build-up if improperly used.



### Tip

Please clean the AutoFocus pin each time after completing the engraved job to make sure the AutoFocus pin is free to move.

### 8.2.3 Lubrication of the X & Y Rails

In order to keep the motion system running smoothly, the X and Y rails of the motion system will need lubrication on weekly base. Apply 0.1ml of lubrication syringe in accessory box to the X liner rail of LV-290 on bi-week base, while apply a small amount of light grade machine oil or PS2 grease to a paper or cotton towel and apply to the X rail, and Y rails of LV-290 weekly. You can purchase PS2 grease from NSK dealers worldwide.

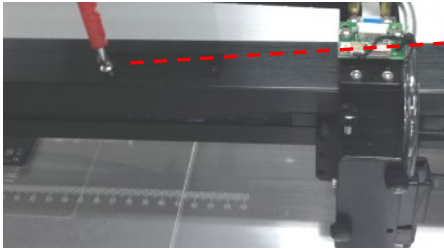
#### NOTE

- Clean and lubricate the X linear rail of LV-290 with 0.1ml grease from syringe every two weeks to properly maintain the motion system.
- The lubrication oil for the X linear rail on LV-290 must to be ordered you're your authorized Roland DG Corporation dealer. Other unknown grease may damage the rail's life time and performance.
- Always clean and lubricate the X and Y rails of LV-290 after working with materials that produce lots of debris (such as wood).
- Too much oil or PS2 grease applied to the Y rails will accelerate the debris building up.

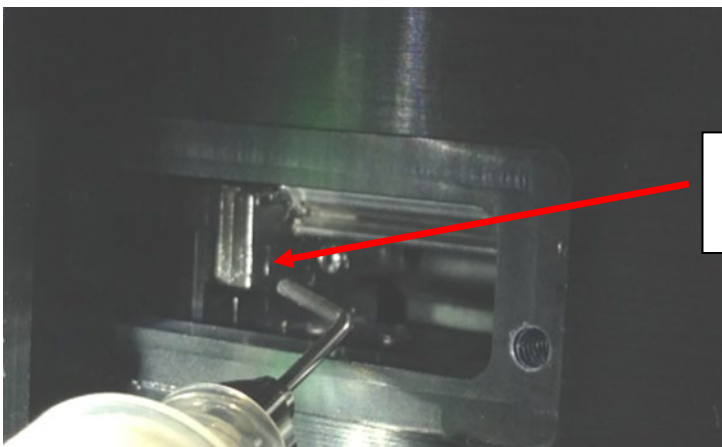
The X rail of LV-290 has linear bearing design which needs lubrication regularly depending on the job loading, recommend on bi-weekly base. Follow below procedures.

1. Take out the Grease Syringe from accessory box
2. Remove the lubrication slot plate on the X rails
3. Inject 0.1ml of grease to the injection opening inside the linear bearing, and move the lens carriage to smooth the grease and movement
4. Repeat the step 3 till the grease is full out of the linear bearing
5. Repeat the step 3 and 4 to the injection opening in opposite side of the linear bearing

6. Seal the lubrication slot plate back to the X rail



Remove the lubrication  
slot plate on X rail



Inject small amount of grease  
to this injection opening inside  
the linear bearing

7. Open the belt by hand and use cotton swab to clean the linear guide (make sure to clean top, bottom and surface of linear guide).



8. Use clean oil on cotton swab and then grease on linear guide (including top, bottom and surface of linear guide).



## 8.3 Cleaning the Optics System

### 8.3.1 Removing the Mirrors

We recommend that you check the mirrors once or twice a week to see if they require cleaning. If any debris or smoke residue is present, use the following steps to clean them.

#### NOTE

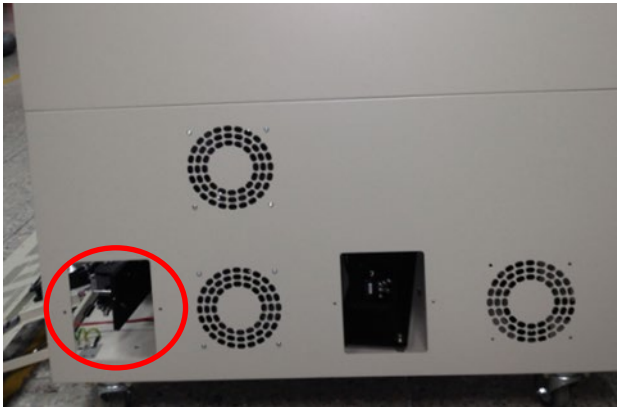
- Mirrors should be removed for cleaning one at a time to avoid beam misalignment after placing them back to the lens holders.
- Refer to section 8.3.2 on how to clean the mirrors.

The following section will illustrate the location of the four mirrors found on this machine for cleaning.

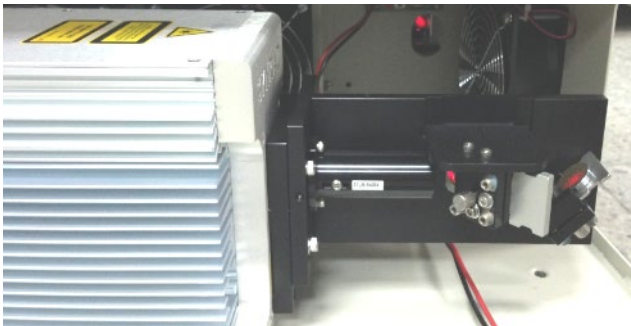
#### Mirror 1

Mirror #1 is located inside the bottom left access door panel of this machine.

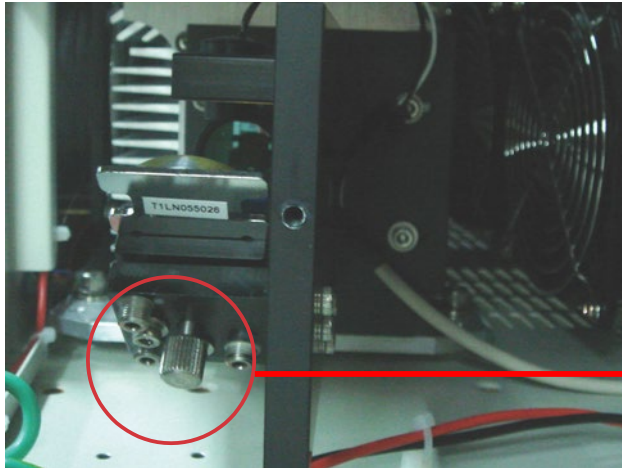
- 1) Use a #2 Phillips Screwdriver to open the access panel located on the bottom left side of this machine.
- 2) Open the slot cover on the bottom left side of this machine



- 3) Loosen the thumbscrew and remove the black dust cover in front of laser tube.



- 4) Loosen the thumbscrew securing mirror #1.

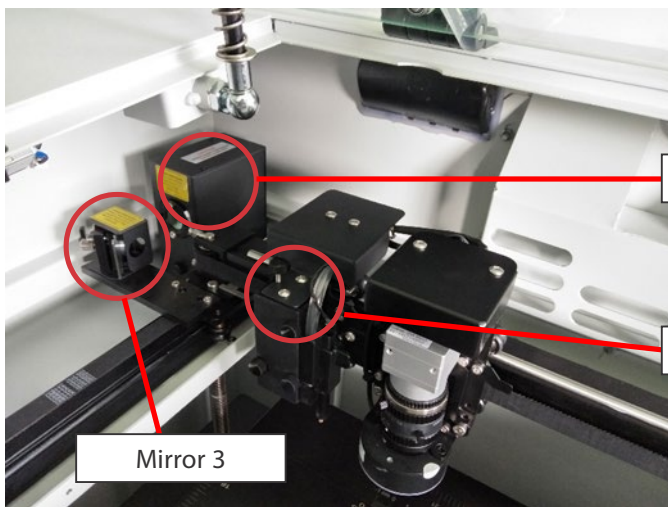


Thumbscrew

- 5) Clean the mirror in the proper manner.
- 6) Place the mirror back to the optics holder after cleaning.
- 7) Tighten the thumbscrew.
- 8) Close and secure all the covers.

### Mirror 2, 3, 4

These mirrors are located in the work table area of this machine.



Mirror 2

Mirror 4

Mirror 3

### Mirror 2

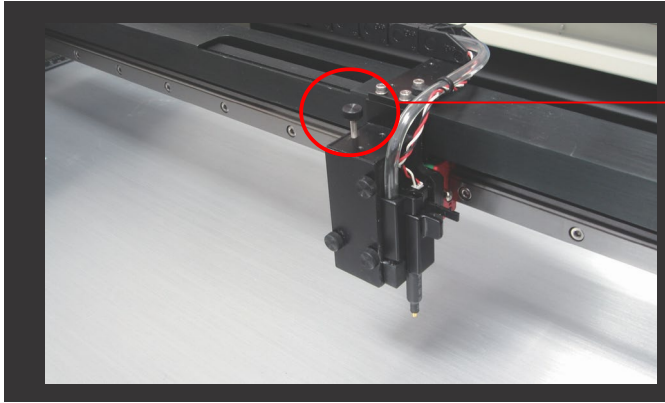
- 1) Unscrew and remove the black dust cover covering mirror 2.
- 2) Unscrew the thumbscrew holding mirror 2 in place.
- 3) Clean the lens in the proper manner.
- 4) Place the mirror back to the optics holder after cleaning.
- 5) Tighten the thumbscrew.
- 6) Close and secure the black dust cover.

### Mirror 3

- 1) Unscrew the thumbscrew holding mirror 3 in place.
- 2) Clean the lens in the proper manner.
- 3) Place the mirror back to the optics holder after cleaning.
- 4) Tighten the thumbscrew.

#### Mirror 4

- 1) Unscrew the three thumbscrews securing the lens carriage panel and remove the lens carriage panel to reveal mirror 4 and the focal lens.
- 2) Loosen the top thumbscrew to remove mirror 4 (as shown in the picture below).



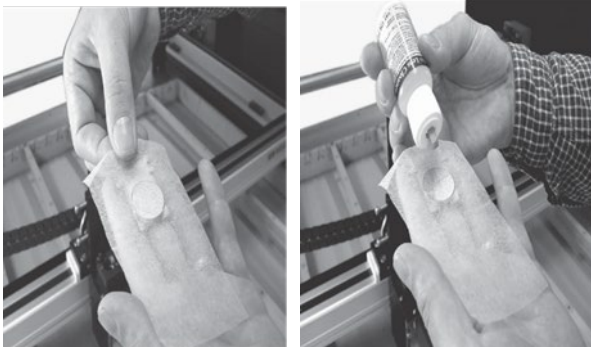
Top Thumbscrew

- 3) Clean the lens in the proper manner.
- 4) Place the mirror back to the optics holder after cleaning.
- 5) Tighten the top thumbscrew.
- 6) Reinstall the lens carriage panel and tighten the three thumbscrews.

#### 8.3.2 Cleaning the Mirrors

After you have removed each mirror, you will want to inspect each mirror for scratches, smoke residue, or debris. If any residue or debris is present, use the following steps to clean the mirrors.

- 1) Hold the mirror with the reflective side up, without touching the reflective side of the mirror (**DO NOT apply any finger pressure or any other cleaning solutions to the mirror surface**).
- 2) Drape a new sheet of lens tissue over the mirror.
- 3) Apply a few drops of methanol on the tissue covered mirror (apply enough so that the tissue absorbs just enough solution to cover the mirror surface).
- 4) Pull the tissue across the mirror in only one direction.
- 5) Repeat the cleaning processes if the mirror is not completely clean after the first attempt.
- 6) Make sure that the mirror is completely dry before reinstalling it.



### CAUTION

- If the center of the mirror is scratched, contact your machine representatives for replacement.
- **DO NOT apply any finger pressure or any other cleaning solutions to the mirror or focal lens surface.**
- The optics components are very fragile, handle carefully and follow the cleaning procedure well.

## 8.3.3 Removing and Cleaning the Focal Lens

- 1) Unscrew the three thumbscrews securing the lens carriage panel and remove the lens carriage panel to reveal the focal lens.
- 2) Carefully pull out the focal lens.
- 3) Clean the focal lens with a cotton swab and methanol solution. Be sure to clean both sides of the focal lens **(DO NOT apply any finger pressure or other cleaning solutions to the lens surface).**
- 4) After cleaning, use a cotton swab to gently dry the focal lens and lens cover.



Remove thumbscrew



Pull out the focal lens

## 8.4 Cleaning the Exhaust Duct

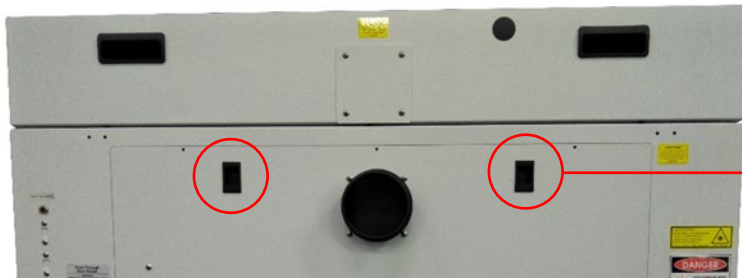
Efficient exhaust ventilation is crucial to laser cutting quality. We suggest you to clean the Exhaust Duct from accumulated dust regularly will help to maintain the ventilation efficiency of your laser engraving system.

Step 1. Remove screws fixing the rear door panel of laser machine

Step 2. Remove screws securing exhaust duct on rear door panel

Step 3. Open the rear door and take out the exhaust duct to clean with water

Step 4. Fix and secure the exhaust duct and rear door panel back to the laser machine



Remove screws  
securing rear door  
and exhaust duct



Take out the  
exhaust duct and  
clean with water

# 9

## **Chapter 9 Basic Troubleshooting**

---

## Quality Problems

- Check focal length setting under F4 function key > Machine Setting > Set Focus Lens to see if it matches the type of the lens installed.
- Check if the focal lens is installed correctly or if focal lens is not fixed properly.
- Check if it is caused by the debris or dust builds up in the bearing tracks of X rail.
- Check if it is caused from the damaged or dirty focal lens and mirror 4 in the lens carriage which cannot deliver the laser beam effectively.

## Non-operational Problems

- Laser does not fire
  1. If the red alignment beam is not visible, the laser beam may be misaligned. Adjust the reflection mirrors for exact focus.
  2. If the red alignment beam is visible, please check the driver power. The laser power may be set to too low for detection. Increase the percentage setting of the Laser Power from the software driver or the control panel.
  3. Check if the laser power connector is connected.
  4. For safety purposes, the laser will not fire when the top lid or the front door is open unless the door sensors are defeated by shorting them with magnets.
  5. Check water level or temperature of water cooler if the equipped laser requires water cooling. The laser tube will automatically shut down itself if the laser tube is over-heated.

### NOTE

- Unplug the machine before examining the mirrors, lens, motion system or any other part of the laser system.

## Other Problems

### • "Graphic Was Clipped..." Message

The size or location of graphic image may be bigger or beyond the legal working area. Do not place graphic object, especially vectors, right from (3,0) origin position, or 0 at either x or y rail of working area on application software. Take Corel Draw for instance, even when the vector line's width has been set to the thinnest, it may still go beyond the border and causes the error. If the message appears randomly but frequently even image object is smaller or within the legal border, check or change DRAM module, a bad contact or faulty DRAM could cause such error.

### • Auto Focus Pin is Not Functioning

The focus pin could be stocked by greasy residue that gradually forms a coating. Clean the probe with alcohol or acetone. Check the cable of focus pin, there might be a bad contact or breakage.

# 10

## Chapter 10 Appendix

---

**Glossary**

**Specification Sheet**

## 10.1 Glossary

**Color Fill** – Term within the awards and engraving industry used to describe the variety of techniques used to add color or contrast to engraving.

**DPI** – Dots Per Inch or Pixels Per Inch. The resolution of an image is defined by the amount of dots/pixels included in an inch. The DPI setting of 500, will tell the machine to include 500 laser firings within an inch.

**Driver** – A software program that allows the computer to communicate with its components and peripherals: printers, scanners, monitors, etc.

**Error Diffusion (Dithering Method)** - This effect uses a series of random black and white pixels to represent shading.

**Firmware** – Programming permanently set into a computer's ROM chips. This information is burned into the computer chips and can only be changed by replacing the chips, or in the case of EEROM, by special procedure.

**PPI** – Pulses Per Inch. PPI determines the gross amount of laser pulses there will be per linear inch. PPI is exclusively used for the vector setting. A PPI setting of 500 results in the laser firing every .002" (500 times per inch). If the standard lens is producing a vector laser focal point of .007", then higher PPI settings will result in deeper, overlapping laser pulses. PPI settings lower than 150 will result in the individual laser pulses being spread far apart, so they will not touch each other. Low PPI settings are a good example of perforate paper.

**Raster** – The process of rendering a cutting or engraving by multiple horizontal lines. For example: when cutting out or engraving a square, the raster setting will make the laser use numerous horizontal lines to fill in the outlined space.

**Raster Image** – An image that is defined as a collection of arranged pixels in a rectangular array of lines. A raster image is similar to a "Bitmap" graphics image.

**Raster Line** – A raster line is the individual horizontal line that makes up the raster image.

**Serial Port** – A connection that allows a computer to send data to a peripheral device one bit at a time. Usually it is a COM port that meets the RS232C specification.

**Vector** – The process of cutting or engraving an image by using single horizontal, vertical and curved lines. For example: when cutting out or engraving the outline of a square, the vector setting will make the laser use a thin single line to follow the outline of the shape.

## 10.2 Specification Sheet

\*\* Speed is not equal to throughput. Visit [www.rolanddg.com](http://www.rolanddg.com) for more details.

LV-290	
Work Area	When with SmartVISION Pro CCD: 550 mm x 440 mm (21.7 x 17.3 in.) When without SmartVISION Pro CCD: 640 mm x 460 mm (25.2 x 18.1 in.) Extendable to 740 x 460 mm (29.1 x 18.1 in.)
Max. Part Size (W x L x H)	762 x 482.6 x 165 mm (30 x 19 x 6.5 in.)
Table Size	790 x 530 mm (31.1 x 20.9 in.)
Dimensions (W x L x H)	1125 x 720 x 1005 mm (44.3 x 28.3 x 39.6 in.)
Laser Source	40W 10.6μm sealed CO2 Laser
Cooling	Air-cooled, Operating environment temperature 15°- 30°C (60° - 86°F)
Drive	Closed-loop DC Servo control
Maximum Motor Speed	60 IPS
Throughput**	1584 cm <sup>2</sup> / h (245.5 in <sup>2</sup> / h)
Throughput** with SmartACT	1828.8 cm <sup>2</sup> / h (283.5 in <sup>2</sup> / h)
Speed Control	Adjustable from 0.1-100% of 60IPS (Up to 16 color-linked speed settings per job)
Power Control	Available from 0~100% (UP to 16 colors linked power setting per job)
Distance Accuracy	0.254mm or 0.1% of move, whichever is greater
Z-Axis Movement	Automatic
Focus lens	Standard 2.0", optional 1.5", 2.5" & 4.0" available
Resolution (DPI)	Available 125, 250, 300, 380, 500, 600, 760, 1000, 1500
Computer Interface	Full speed 2.0 USB, 10 Base-T Ethernet
Memory Buffer	32MB standard
Compatible Operating Systems	Windows 7, 8.1, 10
Display Panel	4-line LCD panel showing current file name, total working time, laser power, engraving speed, file(s) loaded into memory buffer, setup and diagnostic menus
Safety	Class I Laser Product Compliant with EN60825 Class II Laser Product Compliant with CDRH 2006/42/EC Machinery Directive Compliance
Operation Voltage	100-240VAC, 50-60Hz Auto Switching, Max. 15A
Fume Extraction System	External exhaust system is required, one 4 in. connection on the back of the machine

