



FMC 280

User Manual



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1

Chapter 1

Safety

Principles of a DPSS & Fiber Laser

Safety Ratings

The Safety Interlock System

Safety Labels

Safety Measures

Operating Environment

1.1 Principles of a Laser

LASER is the acronym for Light Amplification by Stimulated Emission of Radiation. A fiber laser is a laser in which the active gain medium is an optical fiber doped with rare-earth elements such as erbium, ytterbium, neodymium, dysprosium, praseodymium, and thulium. They are related to doped fiber amplifiers, which provide light amplification without lasing. GCC fiber laser utilizes a MOPA technique used to achieve a pulsing laser, it can generate pulse width in the nanosecond range. A short pulse width generates an extremely high peak power. Such high peak power is very potent and effective in marking of metallic objects or other hard processed material. The advantages of fiber laser source is compact, high quality optical beam, energy efficient and no consumables. The laser beam delivery in terms of beam size and laser power are very consistent due to the good reflective nature and efficient cooling capacity of the fiber laser.

1.2 Safety Ratings

The LaserPro FMC280 is equipped with a DPSS 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 LaserPro FMC280 is a Class 3R red dot 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 LaserPro FMC280 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 opened. 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 GCC service team for technical support and maintenance instructions.



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 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 LaserPro FMC280, 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.



CDRH Label

This label indicates the class level of CDRH.



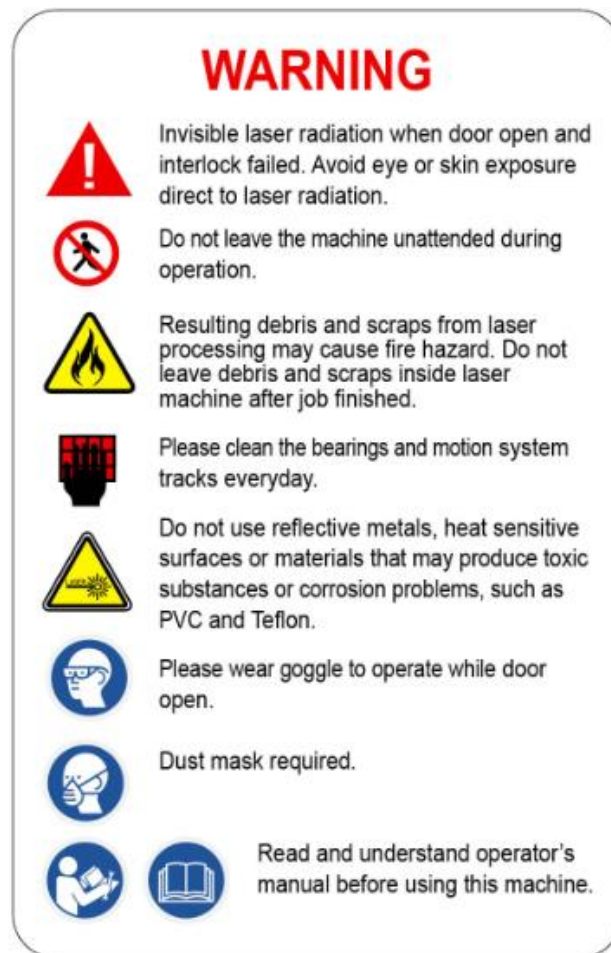
CE Label

This label indicates the class level of CE



Warning Label

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



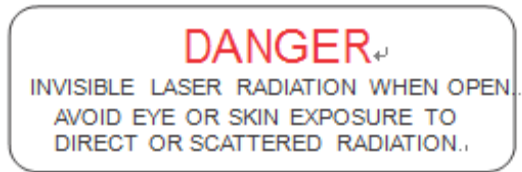
Laser Path Warning Label

LaserPro machines are very safe under normal functioning conditions. However, as a precaution, Laser Path Warning Label are affixed on possible laser paths and operators should be aware of the possibility of injury while machine is operating



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.



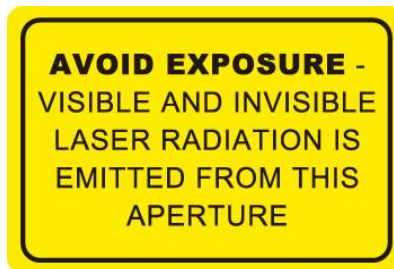
Emergency Stop Label

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



Protection Window Label

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

OD6+ @ 1064 nm Protection Window

Machine Operation Warning Labels

Machine Turn-On Procedures:

1. Power on FMC-280
2. Turn on the gas tank
3. Adjust the gas regulator valve to proper air pressure

Machine Turn-Off Procedures:

1. Turn off the gas tank
2. Click F4 then F2 on the control panel to enable AIR and release the remaining gas
3. Turn off the regulator valve and confirm the gas meter back to zero

Safety Regulation:

- Do NOT SMOKE near the laser machine even when it's powered off.
- When processing Aluminum, carbon steel, magnesium (Mg), or metallic materials with assisted Oxygen gas, you MUST connect an external explosion-proof air ventilation system to remove debris.
- Fasten the high-pressure gas valves tightly, otherwise hazards may occur.

NOTE

Please be aware that we request when processing cutting, must turn on the assisted gas system to prevent lens burst.

1.5 Safety Measures

- **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.
- When processing aluminum, carbon steel, magnesium (Mg), or metallic materials with assisted Oxygen gas, it's required to connect anti-explosion air ventilation system if the room working space is under 2.5m³ (88.28ft³).

Please be aware that the explosion-proof fume extraction system is a non-essential equipment for FMC280 machine. However, if the working space and working hours meet following two conditions simultaneously, you will have to set up an explosion-proof fume extraction system.

1. Room space $\leq 2.5 \text{ m}^3$ (88.28 ft³)
*2.5 m³ (88.28 ft³) = 1 m² (10.76 ft²) space with 2.5m (8.2 ft.) height
2. Use the machine for 24 hours continuously

Material	Air	Anti-Explosion dust removal equipment
Aluminum	O2	Yes, must work with anti-explosion dust removal equipment if the room working space is under 2.5m ³ (88.28ft ³)
Aluminum	N2	
Stainless Steel 304	N2	
Brass	N2	
Silver	N2	
Copper	O2	
Galvanized steel	O2	Yes, must work with anti-explosion dust removal equipment if the room working space is under 2.5m ³ (88.28ft ³)
Carbon Steel(ex. SPHC Hot pressed steel plate)	O2	Yes, must work with anti-explosion dust removal equipment if the room working space is under 2.5m ³ (88.28ft ³)
Carbon Steel	N2	

- Fasten the high-pressure gas valves tightly without falling, hazardous may occur.
- Caution—Use of controls, adjustments, or performance of procedures other than those specified herein may result in hazardous radiation exposure.
- Always wear safety goggles that will filter out 1064nm laser when the laser system 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

- Caution—Use of controls, adjustments, or performance of procedures other than those specified herein may result in hazardous radiation exposure.

NOTE

Each LaserPro FMC280 machine is shipped with a single pair of safety goggles. If additional safety goggles are required, please contact GCC directly or an authorized GCC distributor. If you wish to purchase one on your own, please make sure the safety goggles meet these requirements:

190 - 534nm OD5+
910-1070nm OD6+
Visible Light Transmission: 23.5%

- Connect the machine to a properly grounded power outlet. Ensure the voltage of the power source is identical to the voltage of the machine.
- 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 GCC or your local GCC distributor for more information.
- Do not laser heat-sensitive surfaces or materials that may generate toxic fumes, such as PVC and Teflon.
- Resulting debris from laser cutting are very dangerous and may cause fire hazard, clean the debris after machine usage.
- DO NOT leave any debris and scraps inside laser machine after job finished. Must keep machine clean after job finished.
- Regularly clean and maintain your machine according to our cleaning and maintenance instructions. Doing so will ensure your machine will operate effectively and safely over a long period of time.



WARNING

- **DO NOT SMOKE** next to laser machine even it's turned off already. The resulting metallic debris generated during laser processing may be dangerous and cause hazardous.

1.6 Operating Environment

Please follow the guidelines when considering a suitable location to set the LaserPro FMC280. Improper work environments may lead to operational malfunction and/or unsafe working conditions. The LaserPro FMC280 should be placed and operated in a standard office-type environment.

- Avoid environments where the machine is exposed to high levels of dust, temperature (temperatures exceeding 30°C or 86°F) or humidity (humidity exceeding 70% or where the ambient temperature is near the dew point).
- Avoid placing the machine in small enclosed areas with poor ventilation.
- Avoid areas with high levels of electrical noise.
- Select a location that is large enough to accommodate the LaserPro FMC280, 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 86°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 LaserPro FMC280 on a floor surface that is completely even.
- Make sure your smoke or fire detection system, and fire extinguish system in the immediate area are functioning.
- Setup the machine so that the back of the machine is at least 60 cm (2 feet) away from the wall in order to assure proper ventilation.

1.7 Assisted Air Safety and Setup Information

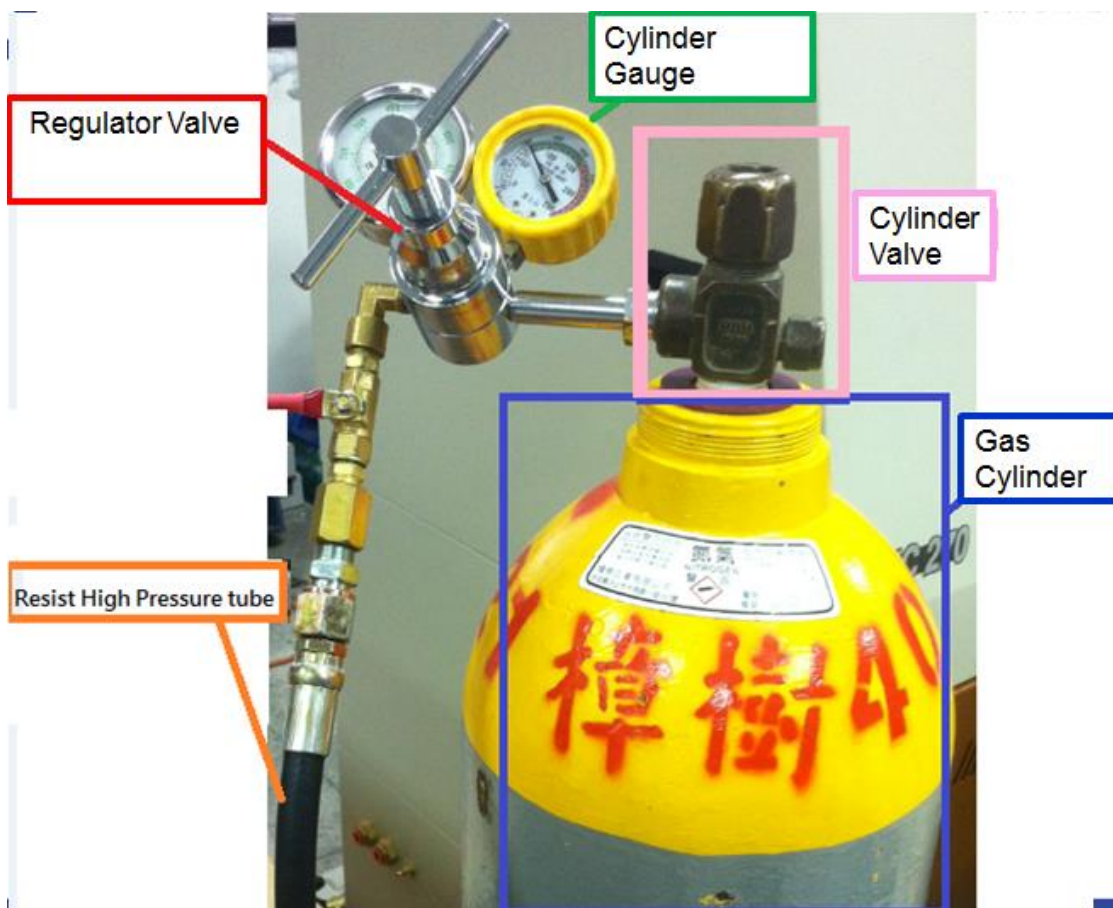
Assisted Air Setup:

Some assisted gas peripherals need to be prepared for assisted gas by your own before machine installation.

1. Gas Cylinder: Oxygen or 99.99% Nitrogen high pressure gas cylinder^{*(1)}.
2. Cylinder Valve: To seal or open the gas cylinder.
3. Cylinder Gauge: Showing how much gas left in the tank and its pressure level (PSI).
4. Regulator Valve: Control the gas pressure from gas tank to FMC280 laser machine.
5. Connector for High Pressure- Resist Tube and Regulator Valve: A high pressure air tube comes with the machine. Prepare connector^{*(2)} to connect it and Regulator Valve. High pressure-resist tube spec. is 3/8" (internal diameter) WP 180 BAR/2610 PSI NO.4SB.

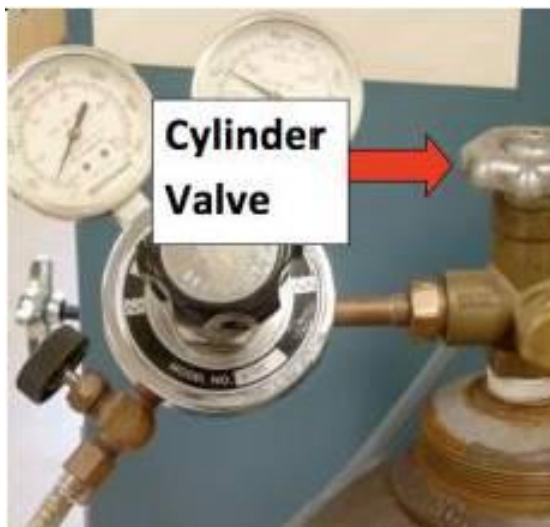
***(1) Clean and pure gas will help to deliver good cutting quality and maintain longer life of cutting head and optics with less maintenance. We recommend Air Products for gas cylinder working with FMC280 machine. <http://www.airproducts.com.tw/>**

***(2) The connector type is 3/8" Hose (9/16"-18 UNF) which is -6 hose size with inner diameter of 6/16 inch (3/8 inch).**

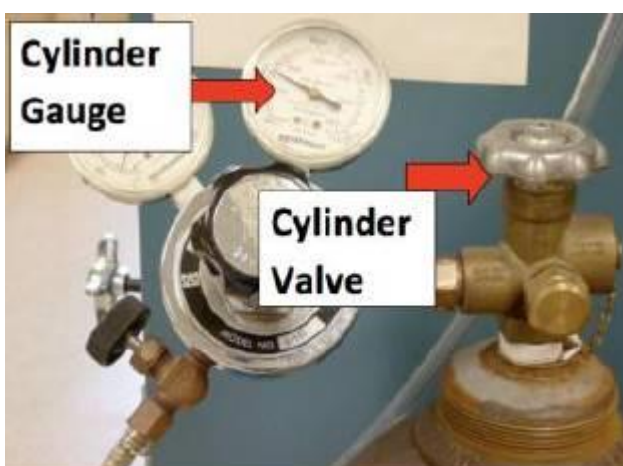


Assisted Air Safety Notice:

- Only use Oxygen and Nitrogen with FMC280 laser system. Other gas is NOT allowed.
- Only qualified personnel should be allowed to adjust pressure-regulating equipment.
- Valves, gauges and other regulating devices should be installed on compressor equipment in such a way that cannot be made inoperative.
- The Safety valves should be set to blow at pressures slightly above those necessary to pop the receiver safety valves.
- Blow off valves should be located on the equipment and shielded so sudden blow offs will not cause personnel injuries or equipment damage.
- Case iron seat or disk safety valves should be ASME approved and stamped for intended service application.
- Close cylinder valve when FMC280 is not in use.



Cylinder Valve - A mechanical device attached to a compressed gas cylinder that permits flow into or out of the cylinder, when the device is in the open position and prevents flow when in the closed position.



Cylinder Gauge - Show user the pressure of gas cylinder.



Regulator Valve – Adjust suitable gas pressure from gas cylinder for material processing.

Recommended Regulator Valve specification:

- inlet pressure : 0~3500 psi (0~250 kgf/cm²)
- Outlet pressure: 0~310 psi (0~22 kgf/cm²)
- Flow volume: 140m³/hr

NOTE

1. Make sure the high-pressure gas valves and connectors are tightly sealed without falling.
Hazardous may occur.
2. Life time of high-pressure air tubing is about 3 years. Exchange with required specification every 3 years.

1.8 Machine Turn-On/Off Procedures.

Follow below Procedures to operate FMC280.

Machine Turn-On Procedures:

1. Power on FMC-280 and make sure the machine initializing is complete before going to next step
2. Turn on the gas cylinder
3. Adjust the gas regulator valve to proper air pressure

Machine Turn-Off Procedures:

1. Turn off the gas cylinder
2. Click F4 then F2 on the control panel to enable AIR and release the remaining gas
3. Turn off the regulator valve and confirm the cylinder gauge back to zero

Machine Turn-On Procedures:

1. Power on the machine and make sure the machine initializing is complete.
2. Turn on the gas tank
3. Adjust the gas regulator valve to proper air pressure

Machine Turn-Off Procedures:

1. Turn off the gas tank
2. Click F4 then F2 on the control panel to enable AIR and release the remaining gas
3. Turn off the regulator valve and confirm the gas meter back to zero

Safety Regulation:

- Do NOT SMOKE near the laser machine even when it's powered off.
- When processing Aluminum, carbon steel, magnesium (Mg), or metallic materials with assisted Oxygen gas, you MUST connect an external explosion-proof air ventilation system to remove debris.
- Fasten the high-pressure gas valves tightly, otherwise hazards may occur.

NOTE

Please be aware that we request when processing cutting, must turn on the assisted gas system to prevent lens burst.

1.9 EC-Declaration of conformity

The manufacturer

GCC Great Computer

4F-1., No.236, Fude 2nd Rd., Xizhi Dist., New Taipei City 22151, Taiwan

hereby declares that the following product

GCC LaserPro FMC280

Model Number Z1

has demonstrated conformity to the following guidelines:

2006/42/EC Machinery Directive
2006/95/EC Low Voltage Directive
2004/108/EC EMC Directive

Applied during design and construction of this product:

- EN ISO12100 Safety of Machinery
- EN 60204-1 Safety of Machinery – Electrical equipment of machines
- EN ISO 11553-1 for checking the Safety distances to prevent hazard zones being reached by upper and lower limbs of the Laser Engraver
- EN 60825-1:2007 / Safety of laser products
- 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 environments
- EN 60529:1991 / Degrees of protection provided by enclosures (IP code) (IEC 60529:1989)
- EN ISO 13849-1:2008 / Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design.
- EN ISO 11204: 2009 / Acoustics - Noise emitted by machinery and equipment - Determination of emission sound pressure levels at the workstation and at other specified positions - Method requiring environmental corrections (ISO 11204:1995)



GCC Great Computer

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Chapter 2

Unpacking & Contents

Unloading and Unpacking

Contents and Accessories Checklist

2.1 Unloading and Unpacking

The LaserPro FMC280 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

Unpacking and Unloading

The LaserPro FMC280 is shipped in one crate that contains the machine, the software and other accessories. The following section has a detailed list of the steps required for unpacking of the machine.

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

Step 1: Move the shipping crate to the proximity of the designated work area.

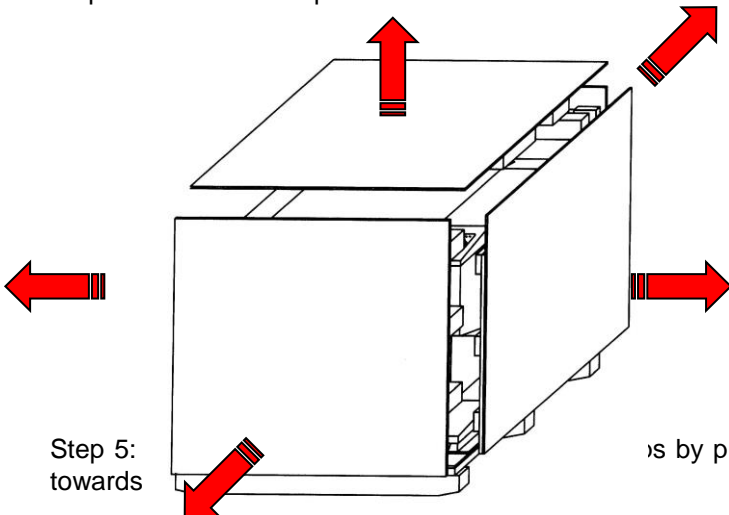
Step 2: Remove the bolt.



Step 3: Loosen the lock



Step 4: Remove the top board and each sideboard



Step 5: towards

is by pushing the lock on the strip down and then pull it out



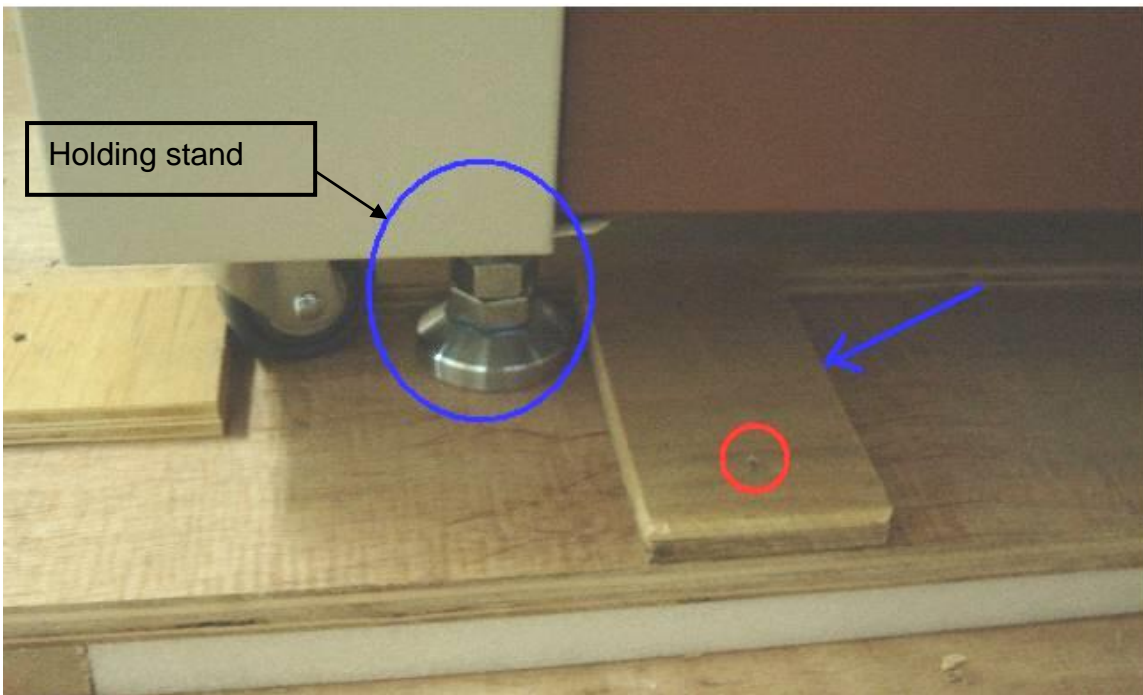
Step 6: Unscrew the screws fastening the slide boards on the pallet



Step 7: Unscrew the screws fastening the slide boards on the pallet then pull them off to form ramps and fix it by screws.



Step 8: Remove the wooden block from the crate base, and then unscrew the four holding stands so that they can be moved up.



Step 9: Position the ramps as shown below and the machine can now be pushed off the base board via the ramps.



2.2 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 local GCC distributor.

ITEM		QUANTITY
Cleaning Kit	Cotton Swab	1
	Lens Cleaner Solution	1
	Lens Tissue	1
	Lens Blower	1
Power Cord (US/EU/AU)		1
USB Cable		1
Ethernet Cable		1
Safety Goggles		1
4" Ventilation Pipe Connector		1
Installation CD (LaserPro FMC280 user manual, driver)		1
Lubrication Grease		1
Warranty Card		1
Grounded Supporting Pins (installed on machines already)		30pcs/ set
Supporting Bars (installed on machines already)		7
Magnetic Fixtures		6
3/8" High Pressure Air Tube		1
Cutting Sample		1
Allen Key		1
Lens Cleaning Blower		1
Grounding Cable		1

3

Chapter 3

Mechanical Overview

Front View

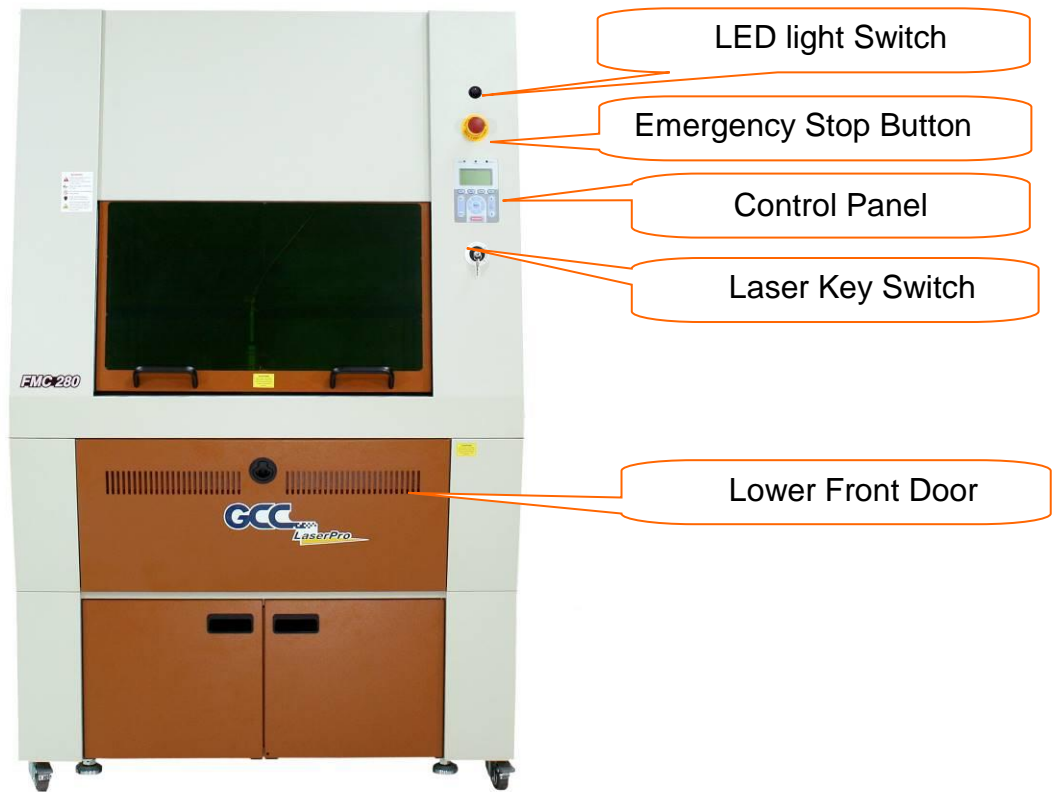
Right (Profile) View

Left (Profile) View

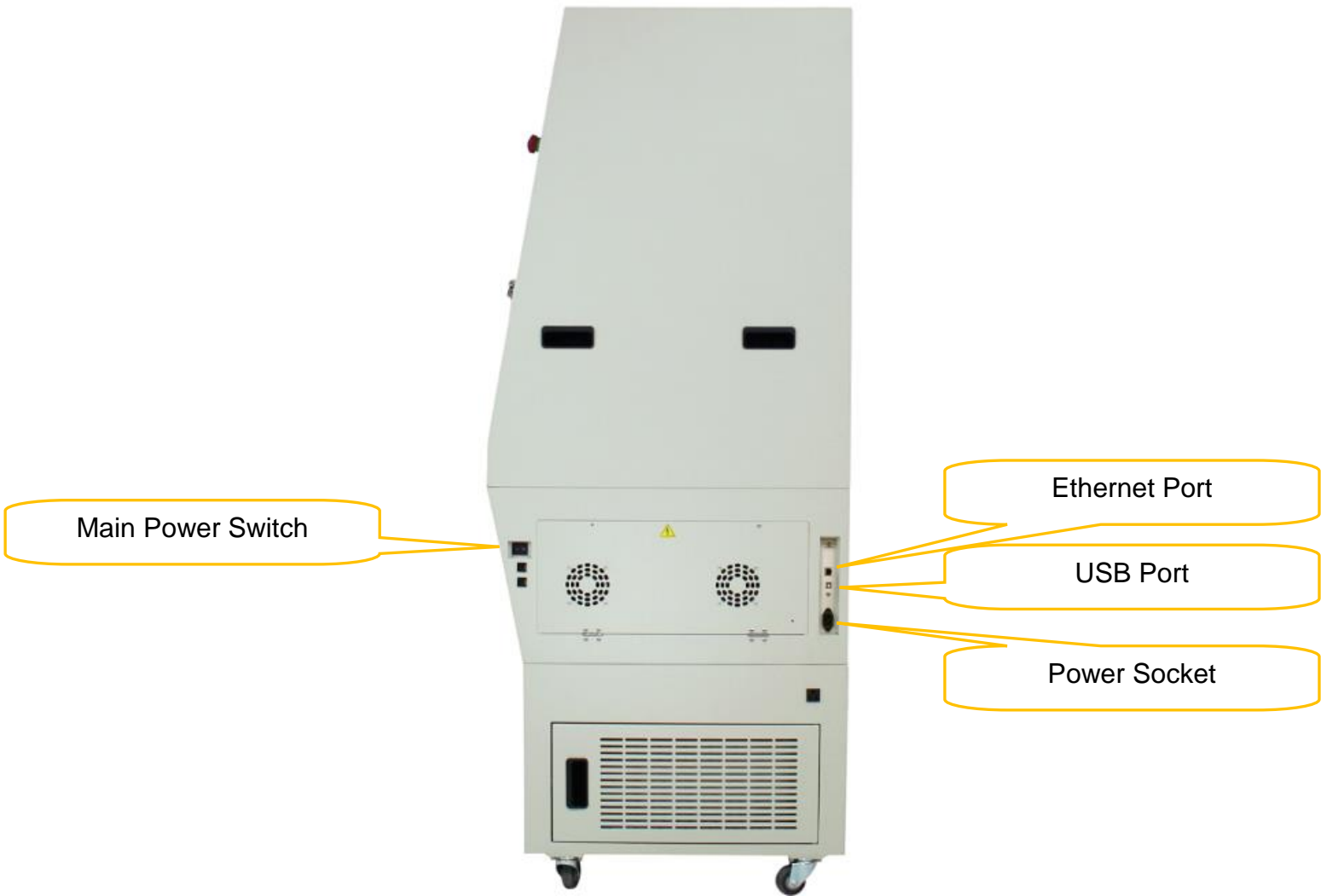
Rear View

Please take some time to familiarize yourself with this section regarding the mechanical overview of the LaserPro FMC280. References will be made back to the different parts of the LaserPro FMC280 in later sections.

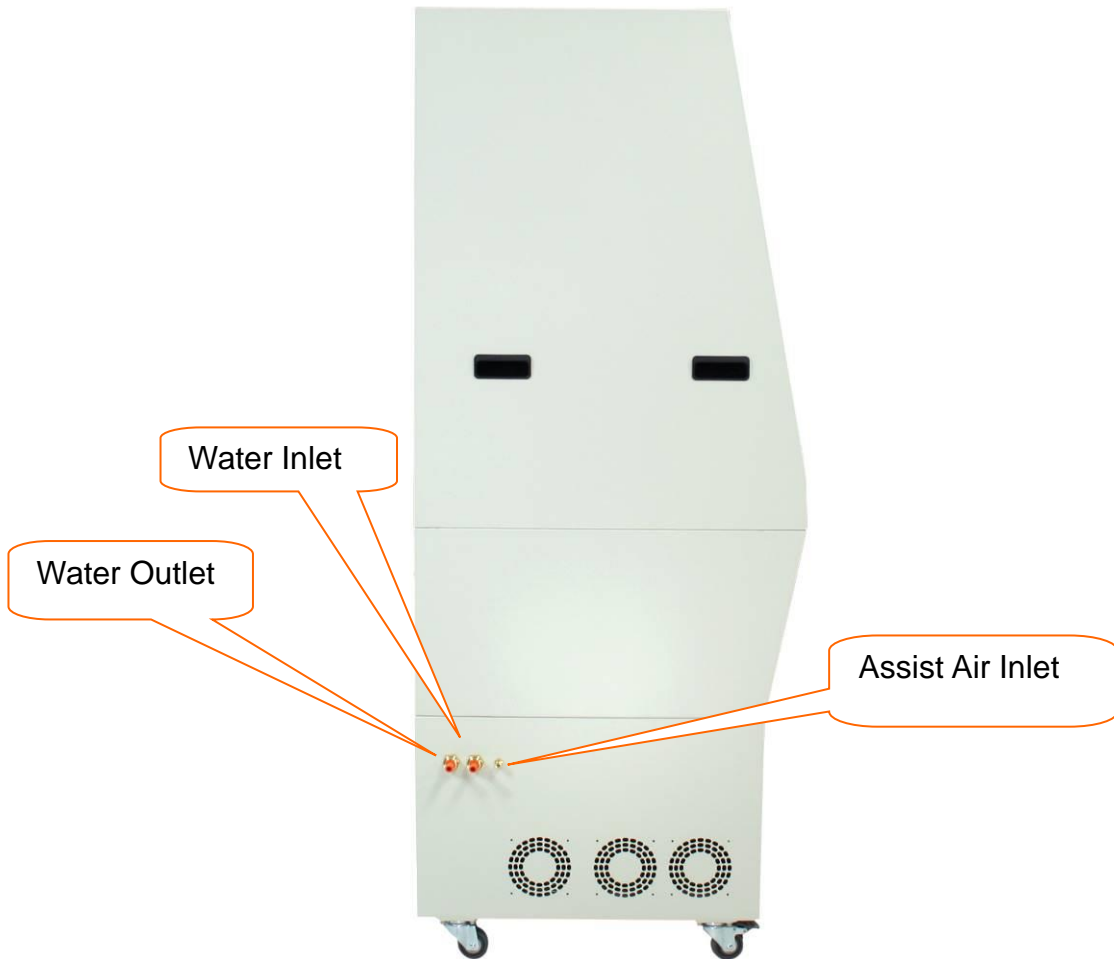
3.1 Front View



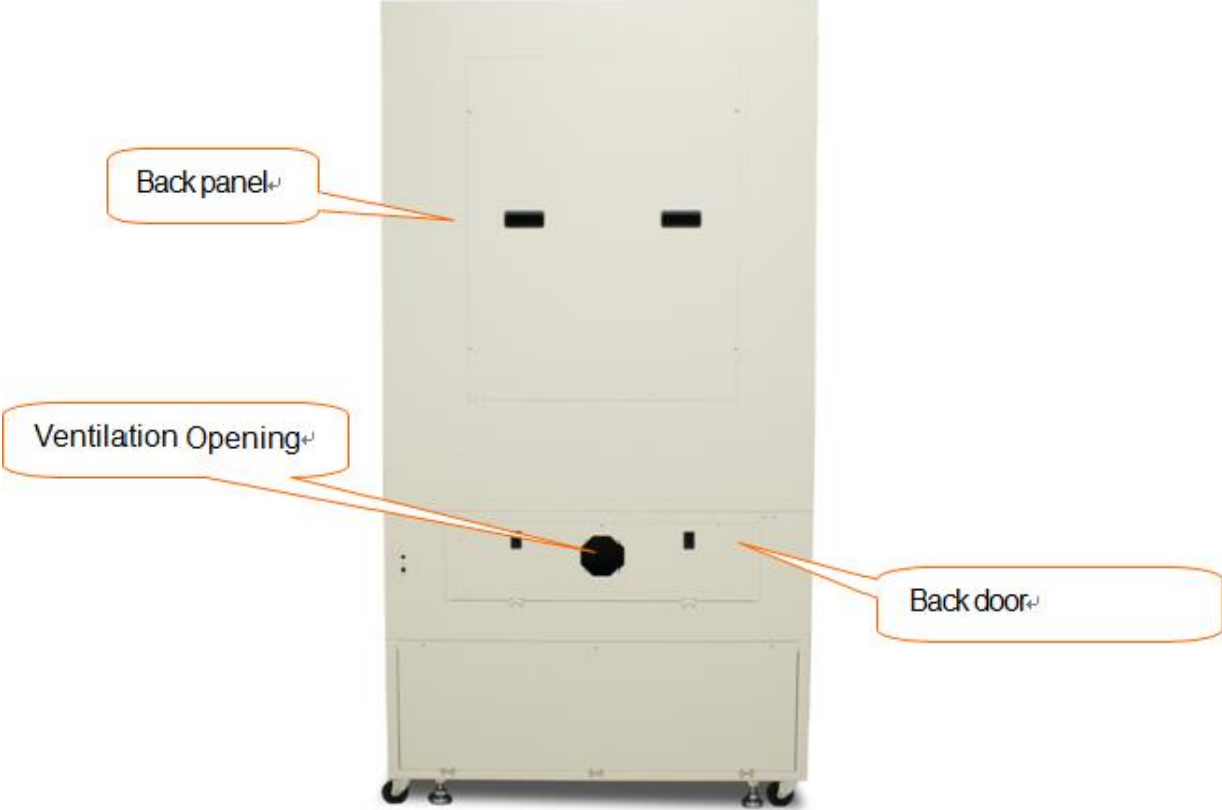
3.2 Right (Profile) View



3.3 Left (Profile) View



3.4 Rear View



4

Chapter 4

Setup and Installation

Machine Setup

- Powering Up the Machine
- Connecting the Computer

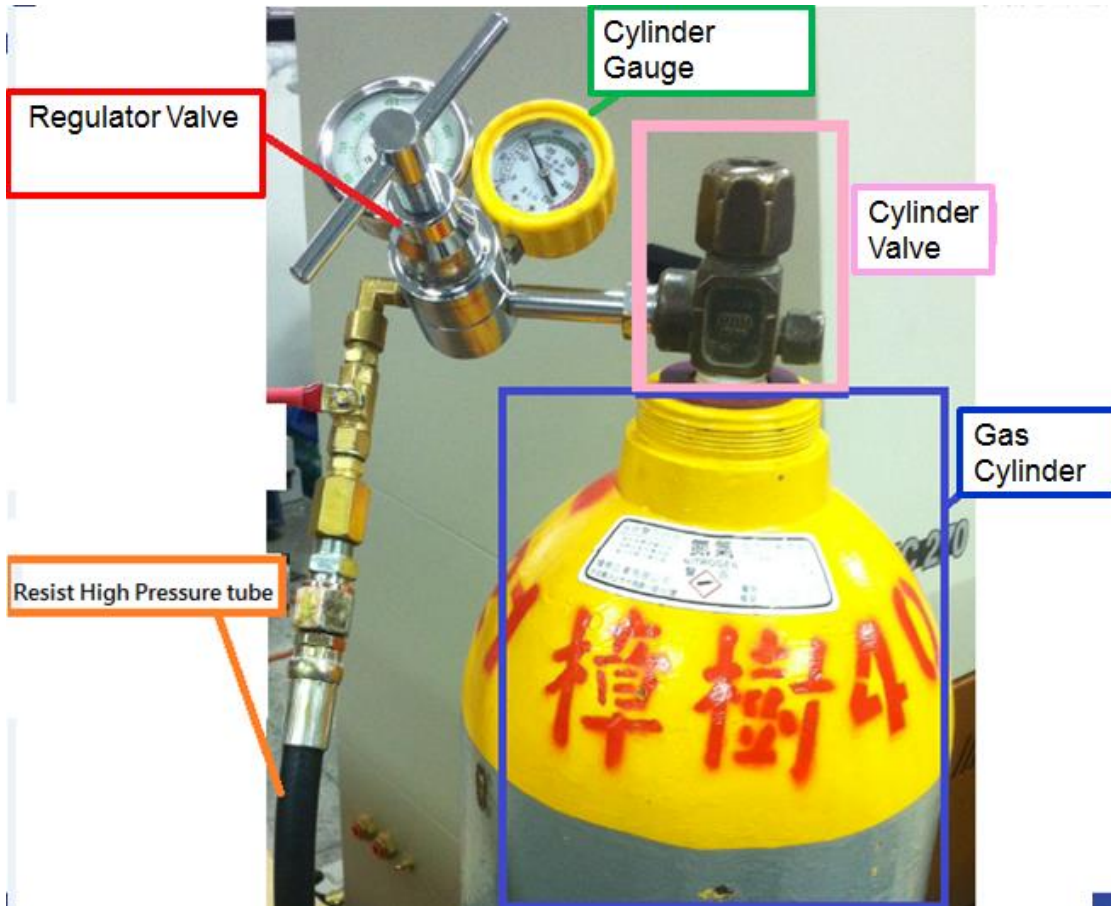
Graphics Software Setup

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

4.1 Machine Setup

4.1.1 Assisted Gas Setup

Some assisted gas peripherals need to be prepared for assisted gas by your own before machine installation. Please refer to Chapter 1.7 of this manual for assisted gas safety and installation.



4.1.2 Powering Up the Machine



CAUTION

Make sure both the LaserPro FMC280 and the 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 to a properly grounded outlet.
- 2) Do the same for the computer system.
- 3) Connect the female end of the power cord to the machine's power cable inlet located on the right side of machine.
- 4) For details, please refer 5.1.1 How to turn on FMC280



Tip

Please adjust the LCD Display Screen's Contrast before plugging in the electrical cord of your laser. LCD adjustment wheel is located underneath the control panel

4.1.3 Connecting the Computer

The LaserPro FMC Series 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 LaserPro FMC Series to your computer.

USB Connectivity: Connect the included USB Port Cable to the USB Port on the right-hand side of the LaserPro FMC280.

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

NOTE

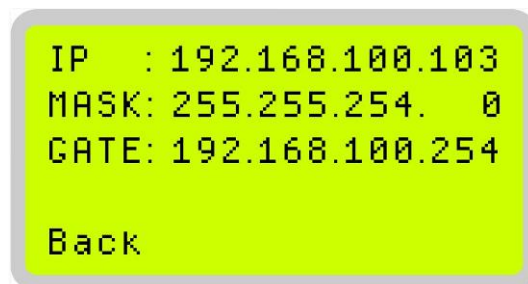
1. Never leave laser system unattended during laser cutting, engraving, and marking process, even with Ethernet or Wi-Fi connection setup, this requirement cannot be avoided. Exposure to the laser beam may cause ignition flame to combustible materials.
2. DO NOT connect USB cable to laser machine when going to use Ethernet cable as data transmission.
3. If you have purchased additional Optional Accessories for the LaserPro FMC280, please refer to chapter VII for instructions on how to properly setup your optional accessories. These should be setup prior to working with your LaserPro FMC280.

4.1.3.1 Networking Connectivity Setup

GCC laser engraver 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. Below setup instructions use GCC Spirit GLS laser system as illustration, the procedures are identical, only choose the right machine during setup if any.

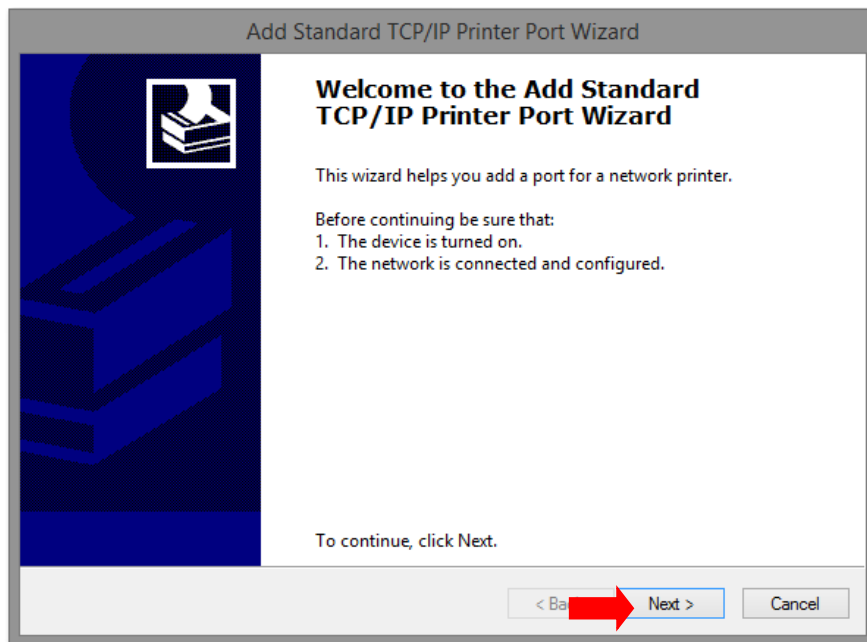
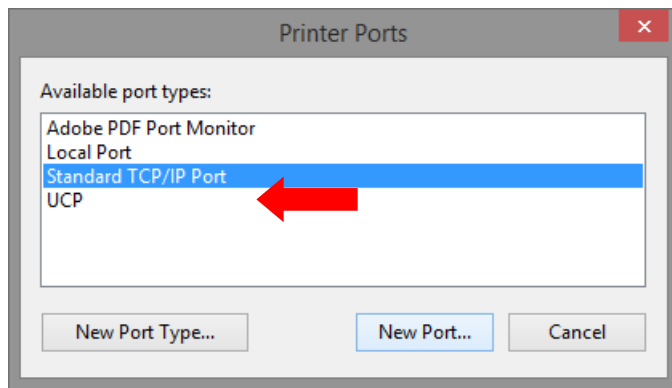
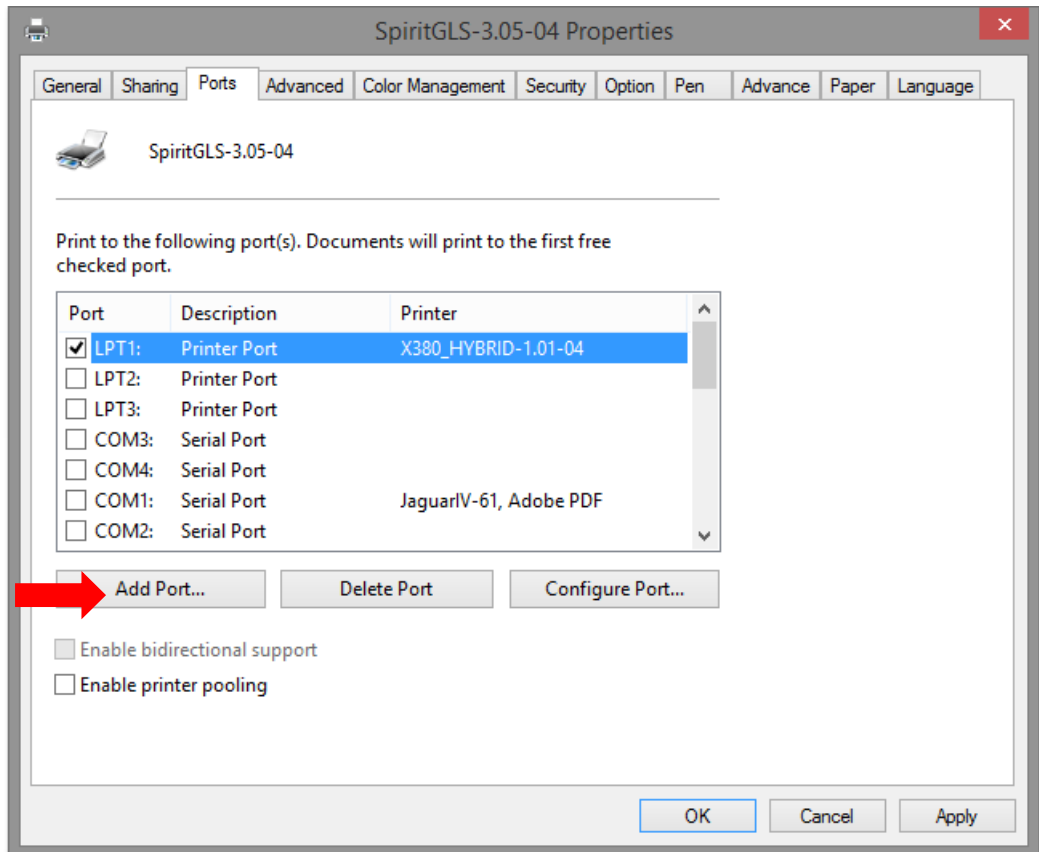
Step 1. Connect LAN cable to the LAN port of GCC laser engravers and turn on machine

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 Spirit series printer to check printer properties.

Step 4. Go to <Ports> tab of Spirit series 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

< Back Next > Cancel

Add Standard TCP/IP Printer Port Wizard

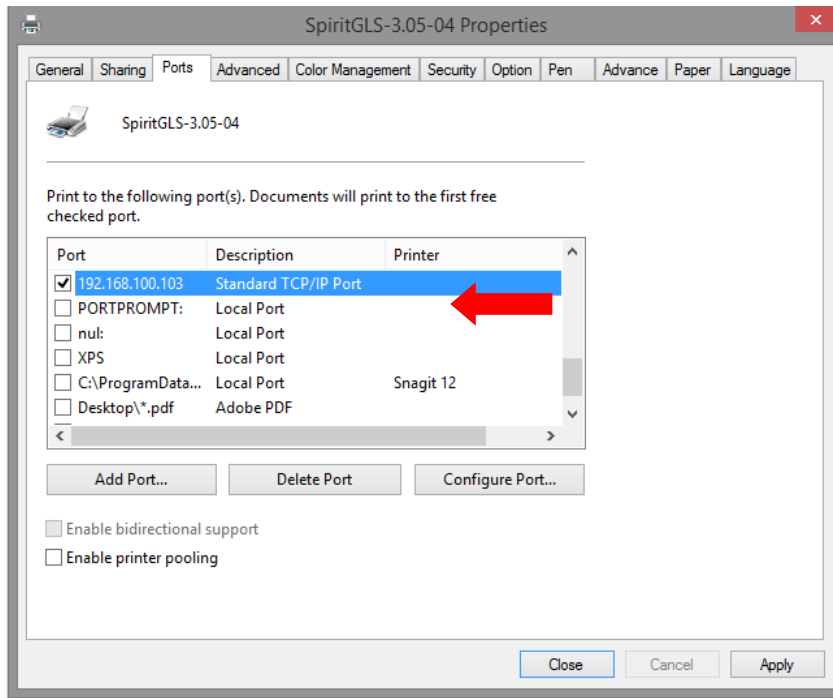
Completing the Add Standard TCP/IP Printer Port Wizard

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.

< Back **Finish** Cancel



4.1.3.2 Ethernet Connectivity Setup

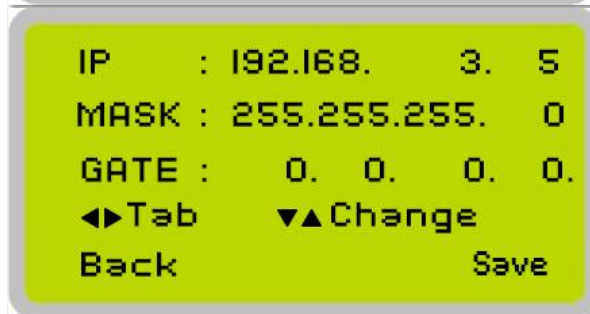
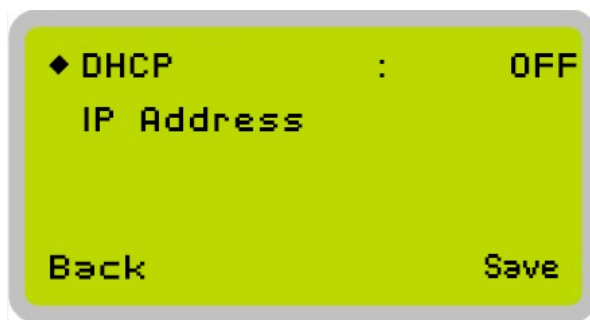
GCC laser engraver is built-in with LAN port to transmit data from PC to laser engraver with ease and higher speed instead of USB port option.

Step 1. Connect LAN cable to the LAN port of GCC laser engravers and turn on machine

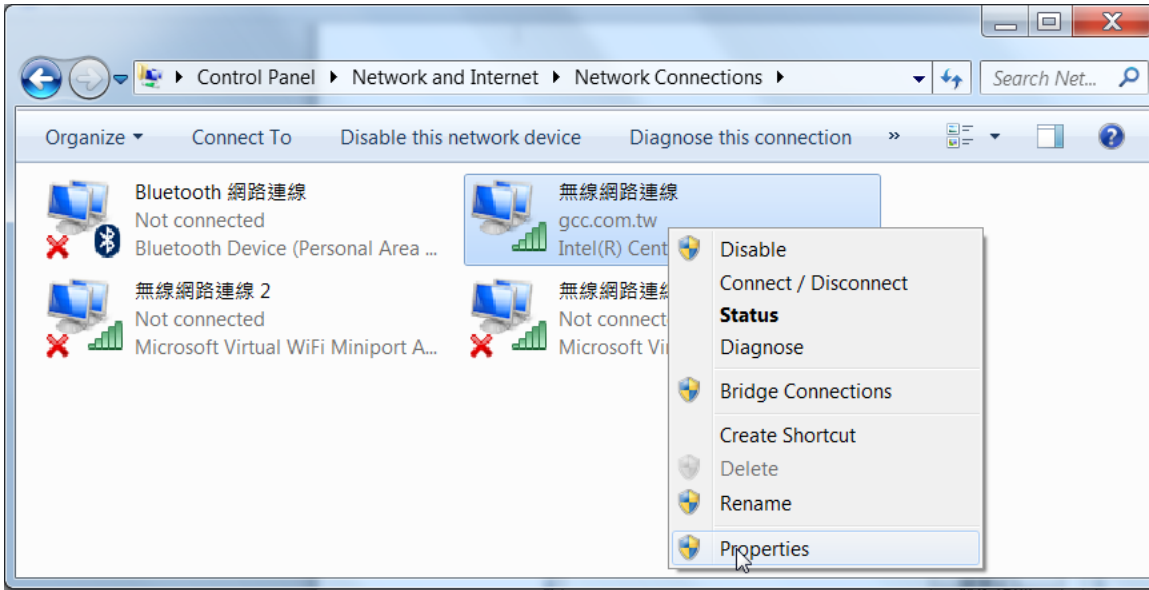
Step 2. Navigate the control panel through <F4> Function → <Machine Setting> → <LAN Setup Wizard> → DHCP: OFF.

Step 3. Navigate the control panel through <F4> Function → <Machine Setting> → <LAN Setup Wizard> → IP Address.

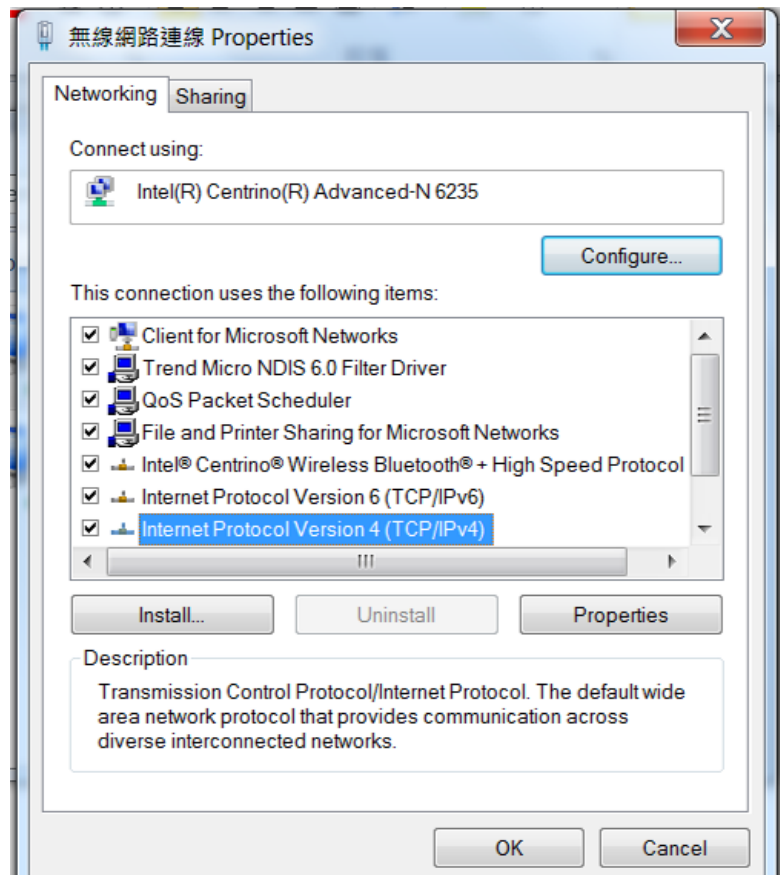
Step 4. Enter 192,168,3.X (X refers to 1~255 value which can't be the same value with IP address setting in PC or Notebook) for IP, and 255.255.255.0 for MASK with UP/ DOWN keys.



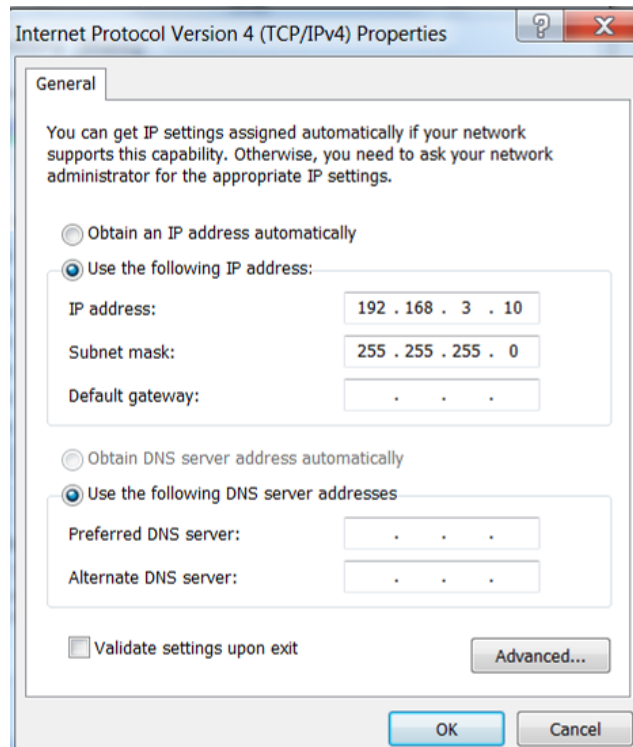
Step 5. Go to <Control Panel→Network and Internet→Network Connections> of computer, right click mouse on the connected internet device, and choose <Properties>



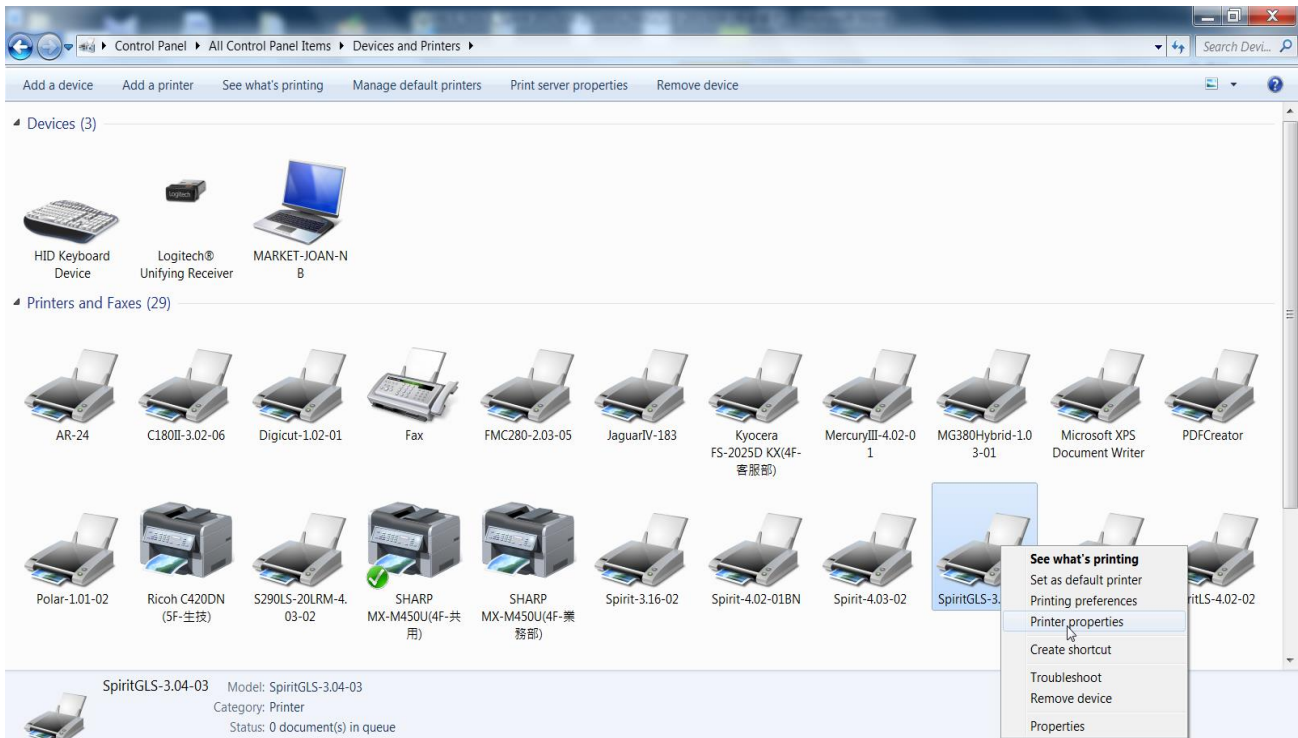
Step 6. Choose the <Internet Protocol Version 4(TCP/IPv4)> and click <Properties> to open up the setting window.



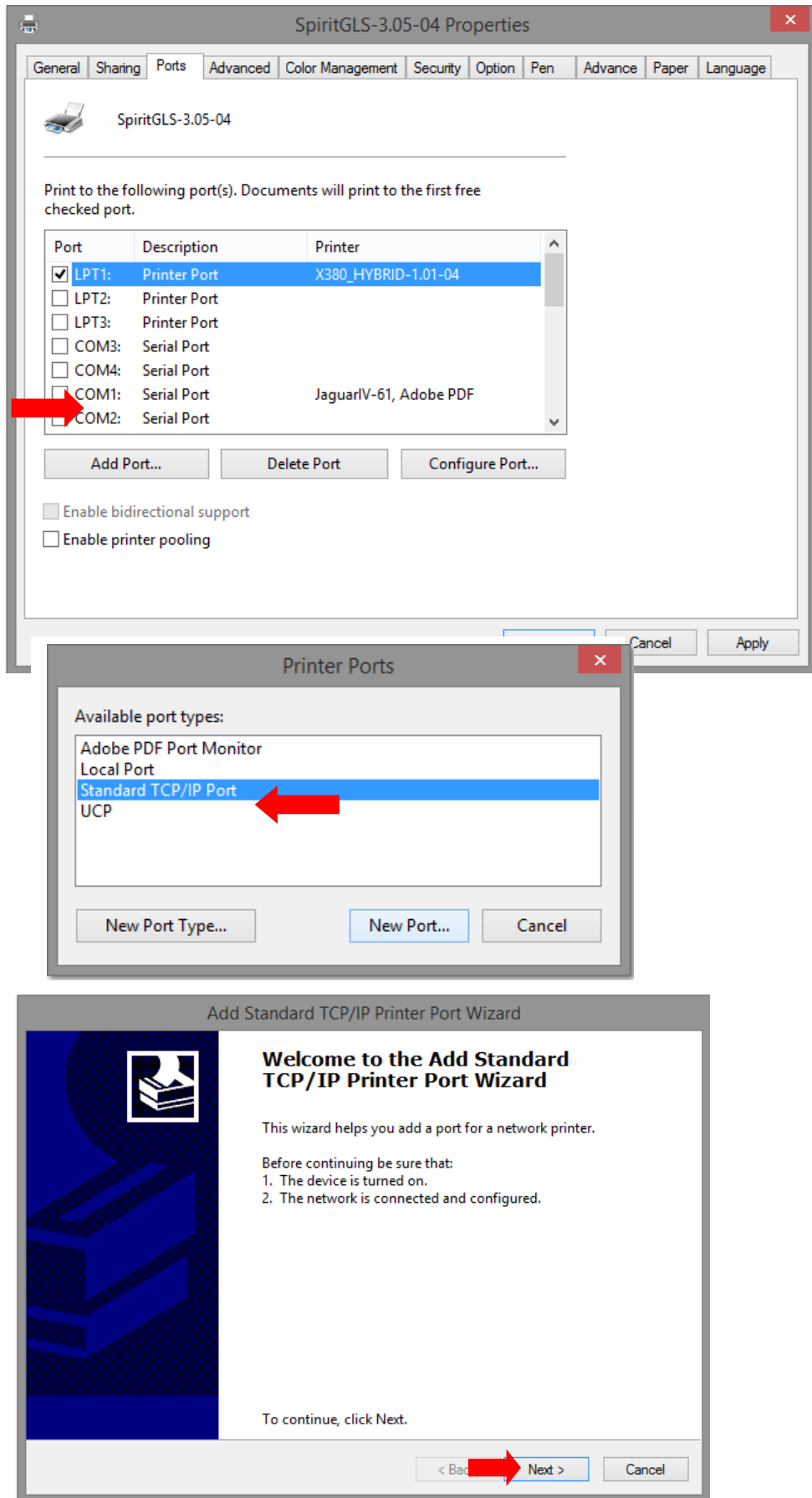
Step 7. Enter the IP address and Subnet mask setting values, and choose <OK>
 Note the IP address 192.168.3.X (X value can be 1~255, while can't be the same number as machine control panel setting in step 4)



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

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: 192.168.3.10

Port Name: 192.168.3.10

< 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.

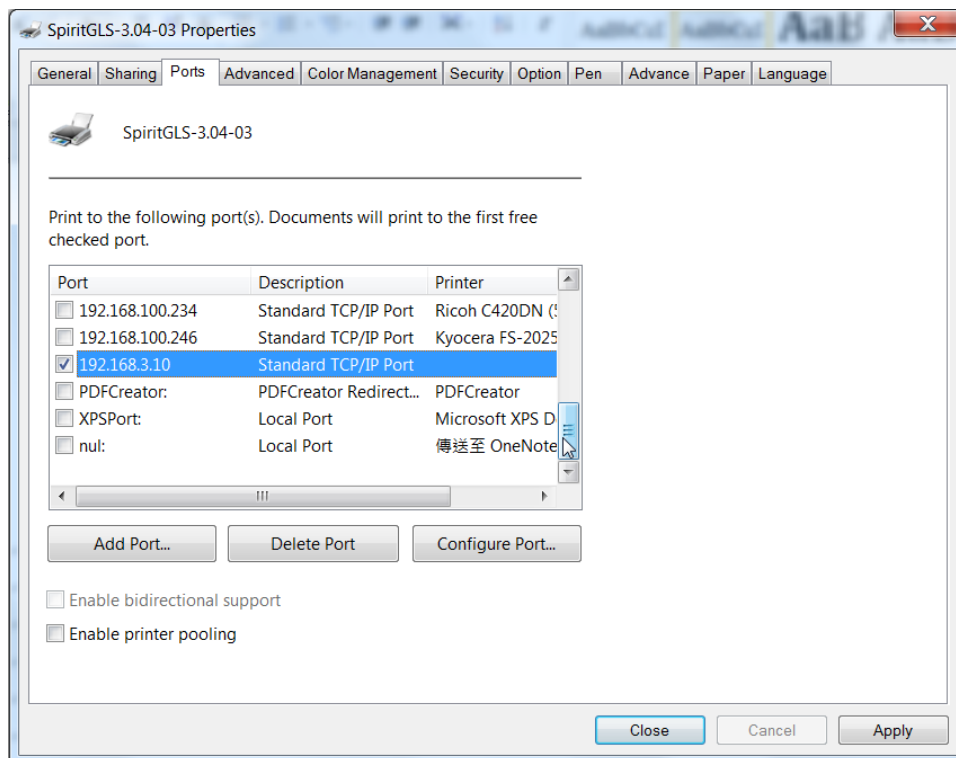
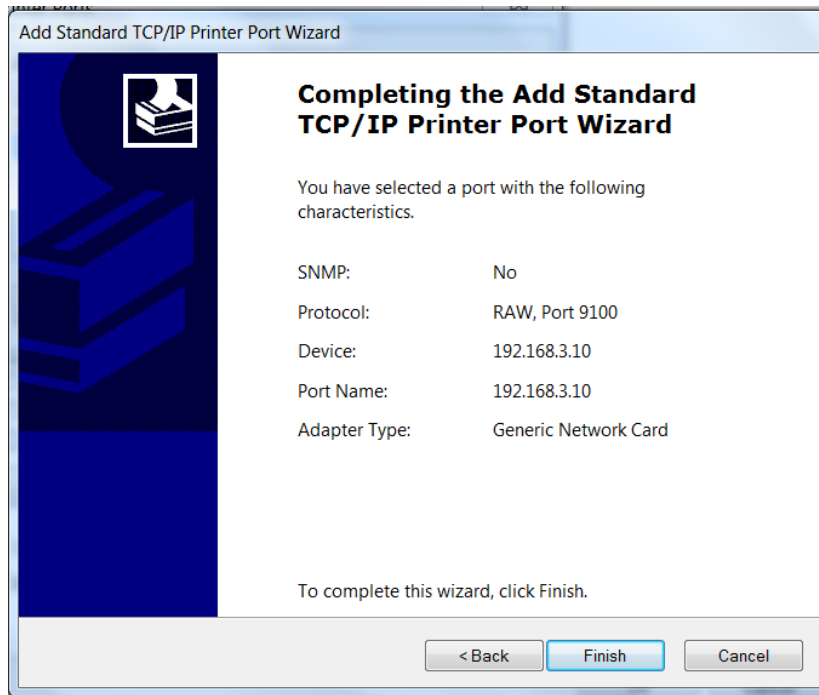
If you think the address is not correct, click Back to return to the previous page. Then correct the address and perform another search on the network. If you are sure the address is correct, select the device type below.

Device Type

Standard Generic Network Card

Custom Settings...

< Back Next > Cancel

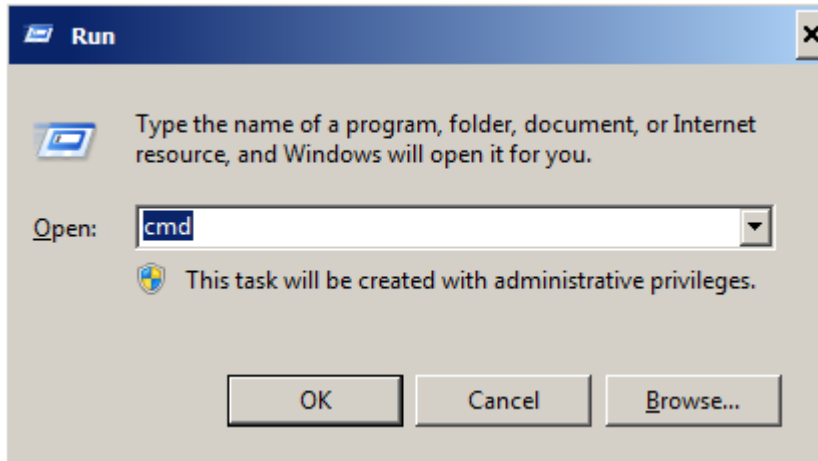


Troubleshooting

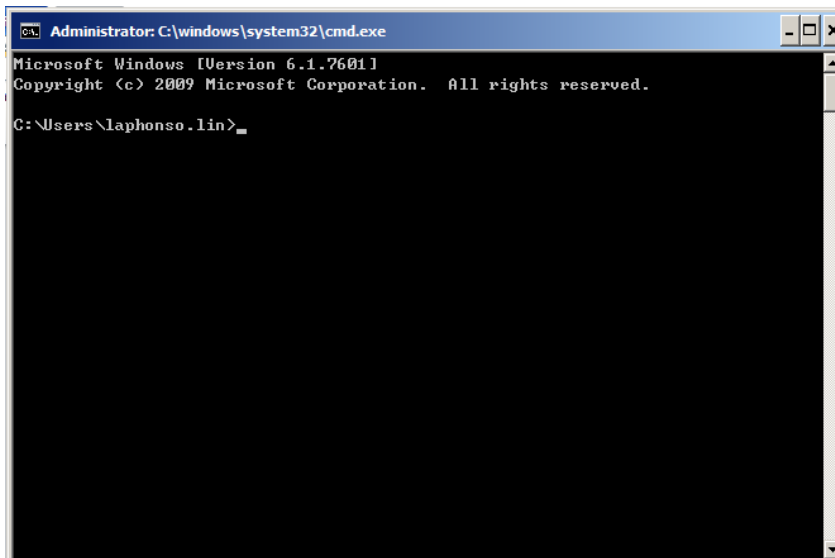
While users configure the Ethernet setting precisely with DHCP = OFF (assign the machine a static IP) referring to the manual, sometimes the communication might still not be able to work, at this time you can refer to below actions to have a basic troubleshooting with IT technician.

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

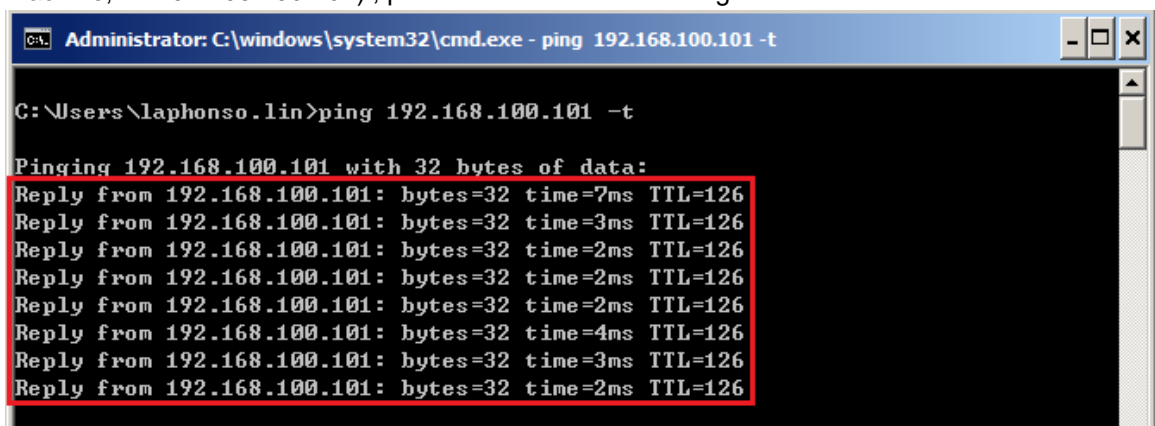
- i. Open command line mode in your windows system (Press Windows key + R, the "Run" window will appear, type "CMD" in the blank bar then press "OK" to open command line mode)



Command line mode window

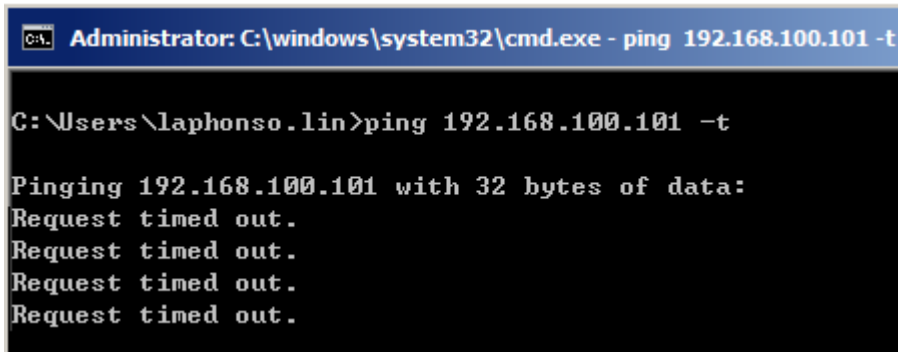


- ii. Type “ping x.x.x.x -t” after the prompt symbol, (x.x.x.x is the IP address you set on the laser machine, ie: 192.168.100.101)., press “Enter” to run the “Ping” tool.



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.



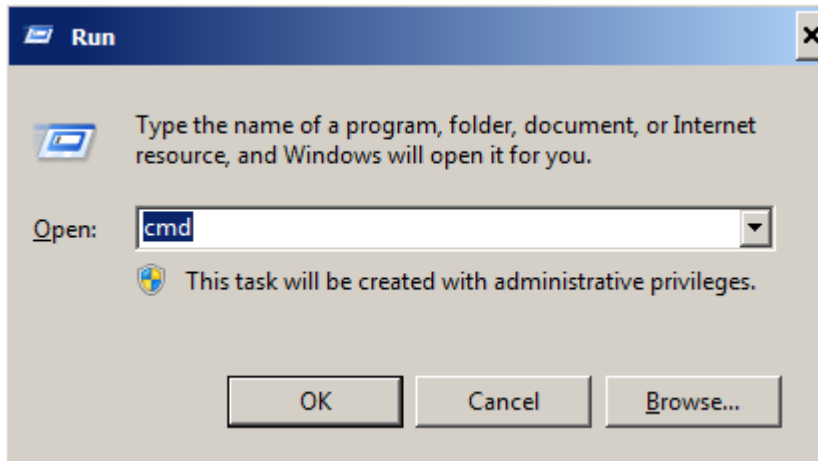
```
Administrator: C:\windows\system32\cmd.exe - ping 192.168.100.101 -t

C:\Users\laphonso.lin>ping 192.168.100.101 -t

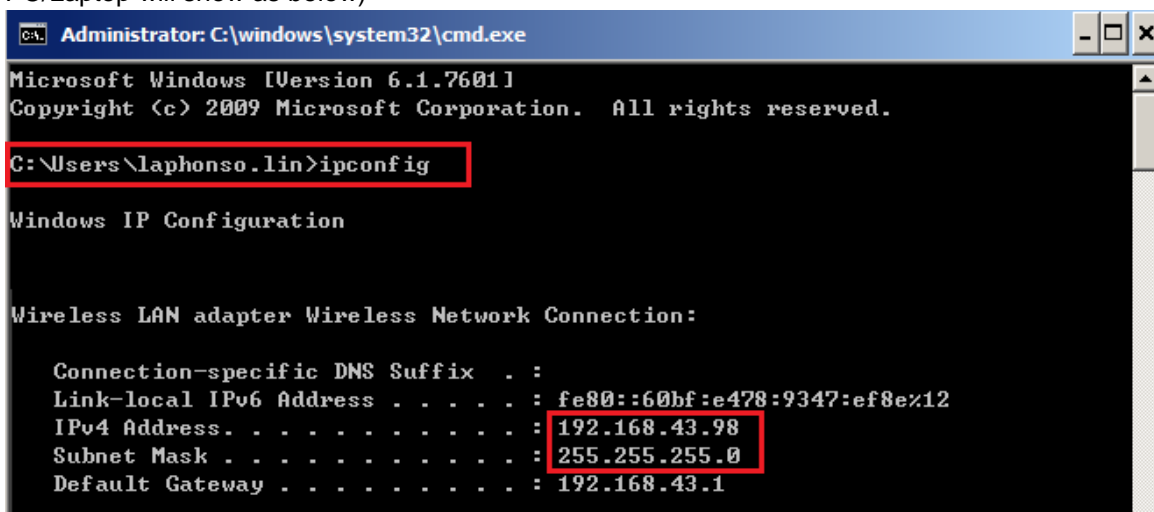
Pinging 192.168.100.101 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.
```

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 GCC laser is normal, it should be something wrong in the LAN environment , ask the administrator of the LAN to solve the problem.

4.2 Graphics Software Setup

The LaserPro FMC280 is compatible with graphics software that can output HPGL commands, such as CorelDRAW, Adobe Photoshop, AutoCAD, Illustrator etc.

Supported Graphic Software

- Photoshop
- CorelDRAW
- Illustrator
- AutoCAD

Other software such as EngraveLab and PhotoGrav may work with the LaserPro FMC280, but these are not officially supported. Any software that can output to the LaserPro Print Driver should work.

NOTE

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

4.2.1 Recommended Computer Configuration

The LaserPro FMC280 operates under Windows operating systems and is designed to work on a computer that meets the following minimum requirements.

Computer

- 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

- The LaserPro FMC280 drivers are designed for Windows 2000, XP, Window7 or other Windows operating systems developed subsequently.

4.2.2 Installation of the LaserPro Print Driver

- 1) Insert the LaserPro CD.
- 2) From the auto run menu, select **FMC280 → LaserPro Driver** to begin the LaserPro Print Driver installation.
- 3) When the Add Printer Wizard menu comes up, click **Next** to continue.
- 4) At the Local or Network Printer page, select **<Local printer attached to this computer>**, then click **Next** to continue.
- 5) At the Select a Printer Port page, select **<Use the following port>** and select the port that the LaserPro FMC280 will be attached to, then click **Next** to continue.
- 6) The next screen will prompt you with a list to select the manufacturer and model of your printer. From this menu, click **Have Disk**. Another menu will now pop up for you to indicate the location of the print driver. With the LaserPro CD still in your drive, click **Browse**, select the LaserPro FMC280 driver folder and locate the GLXXX.inf file. Click **OPEN** to have FMC280 displayed as a valid printer.
- 7) Now select FMC280 from the list of printers (FMC280 should be the only printer displayed on the list) and click **Next** to continue.
- 8) If a screen comes up informing you of the detection of a previous driver and asks to keep the existing driver or use the new one, select **<Replace Existing Driver>** and click **Next** to continue.
- 9) This screen will prompt you to provide a printer name. Simply type in **<FMC280>** and select **Yes** or **No** if you want to use this printer as the default printer and click **Next** to continue.

NOTE

When working with the LaserPro FMC280 Print Driver within your graphics software, you will need to have the FMC280 set as the default printer to get proper output. If you select to not have the FMC280 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.

- 10) At the Printer Sharing screen, select **<Do not share this printer>** and click **Next** to continue.
- 11) Select **<No>** when asked if you want to print a test page and click **Next** to continue.
- 12) Now simply click **Finish** to complete the Add Printer Wizard.
- 13) Now the installation will proceed, if you get a Hardware Warning about the software you are installing for this hardware has not passed Windows Logo testing, simply click **Continue Anyway** to ignore this warning.
- 14) Congratulations, your printer driver has been successfully installed!

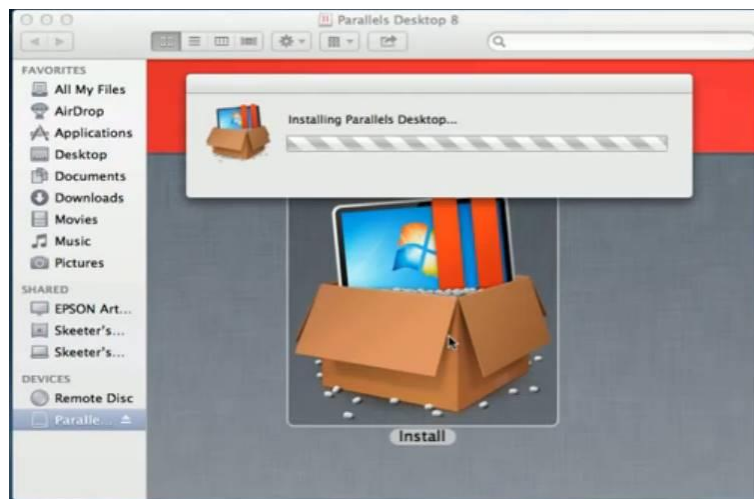
4.2.3 Parallels Desktops (MAC OS)

MAC users can use GCC LaserPro machines by purchasing the Parallels Desktop software which allows you to install Windows OS in MAC computers and run Windows based software under MAC computer and output with GCC print driver.

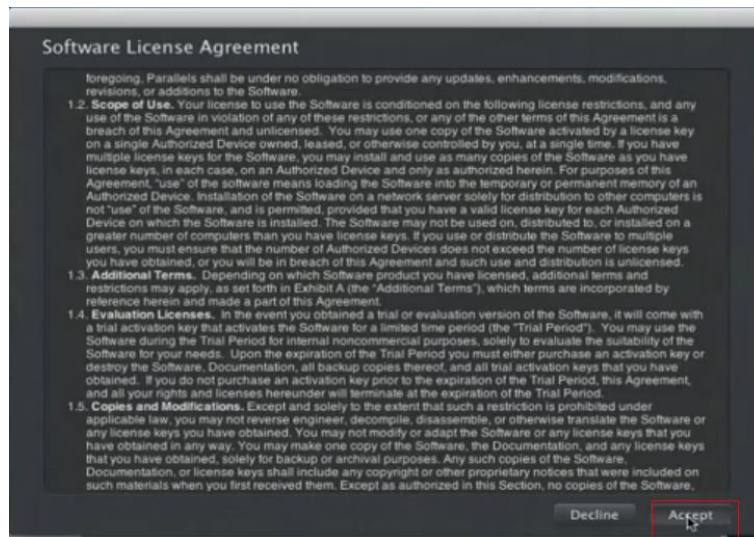
- 1) Purchase Parallels Desktops on its official website.



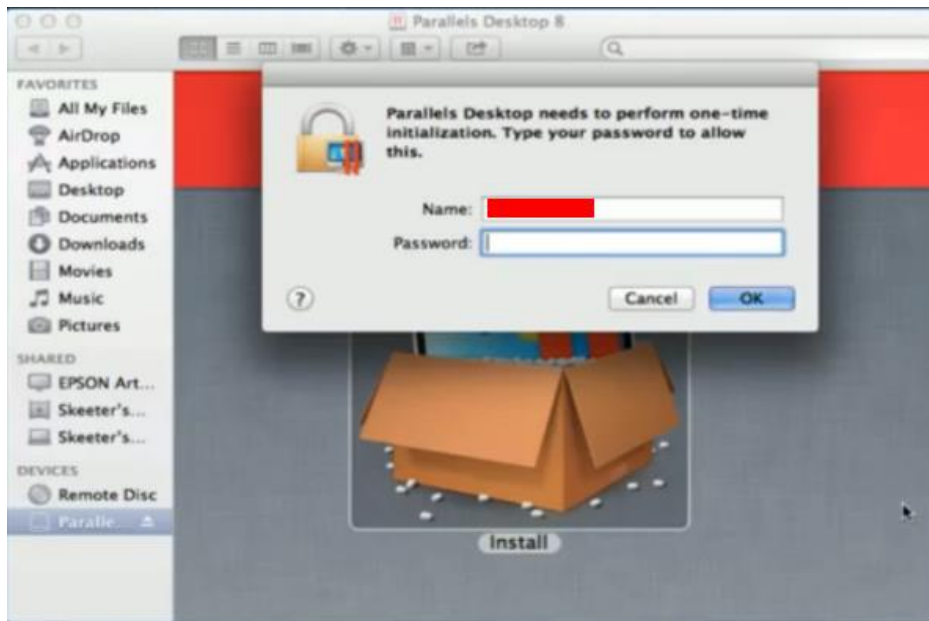
- 2) Install Parallels Desktops under Mac OS environment.



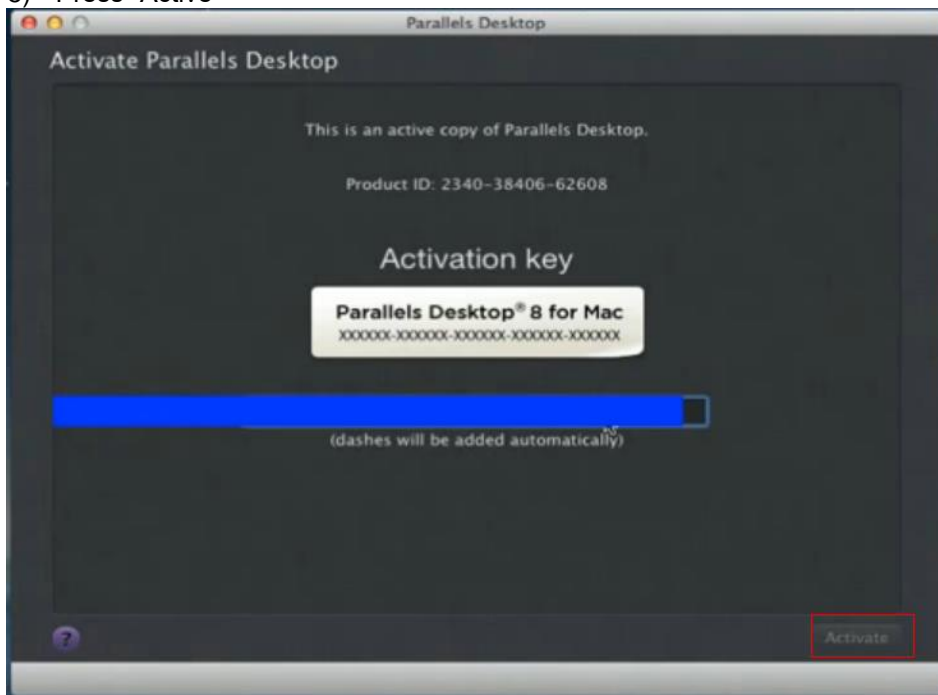
- 3) Read Software License Agreement and press "Accept" to continue installation



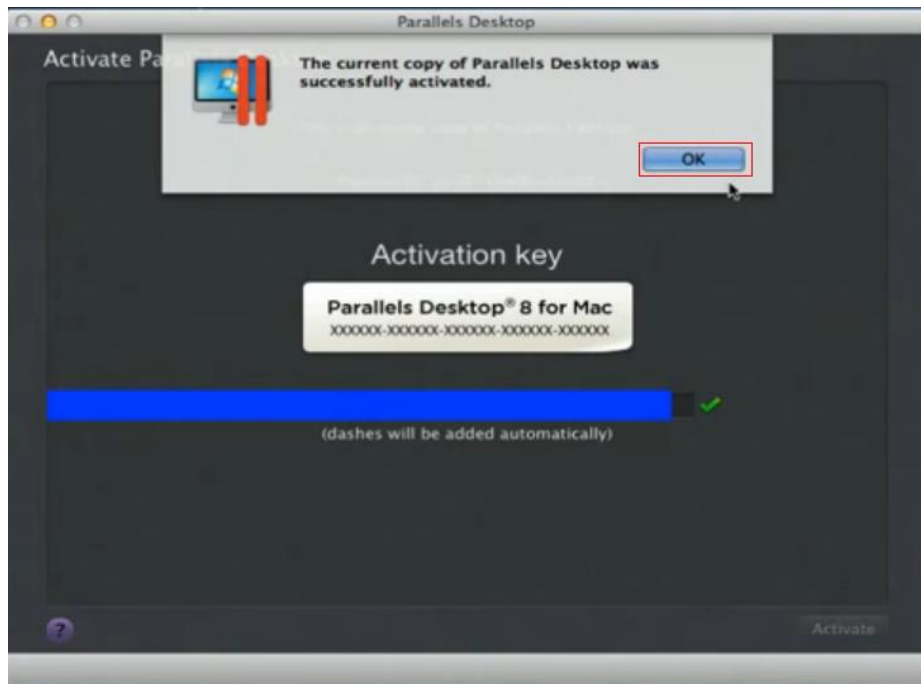
4) Enter your Mac OS X User Name and Password then press “OK”



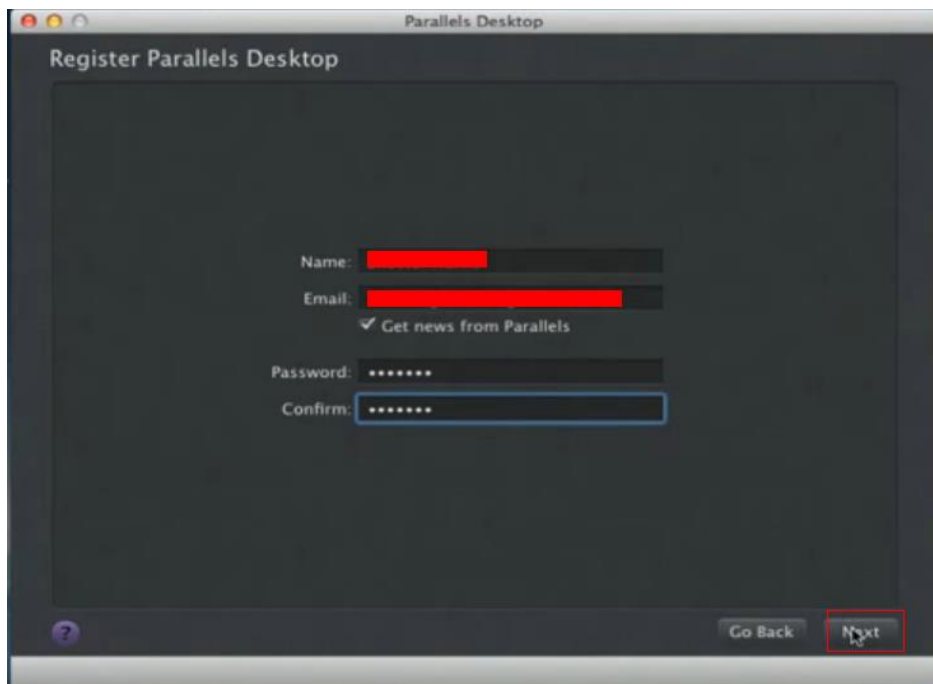
5) Press “Active”

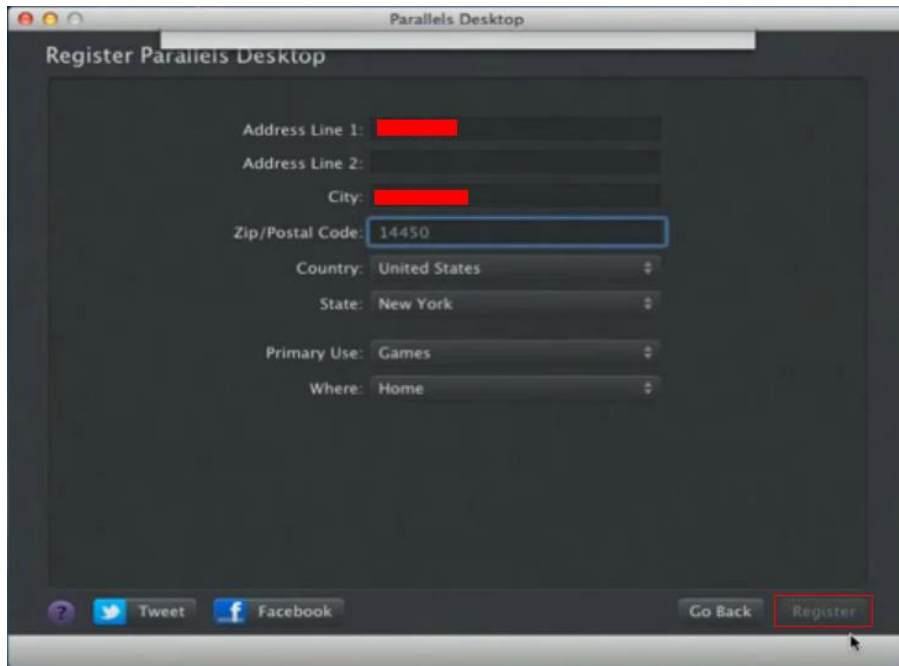


6) Press "OK" when activation is complete.

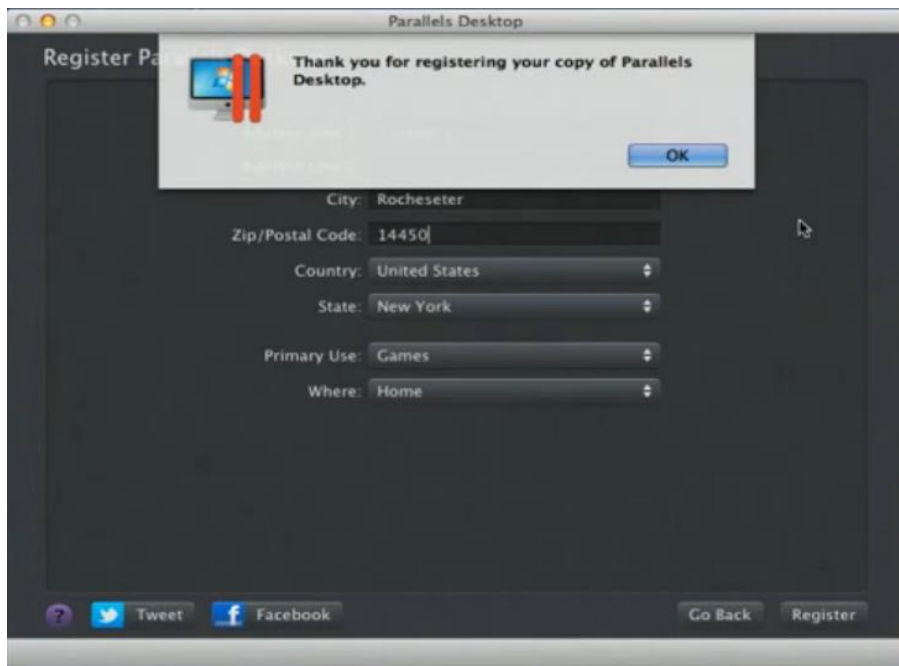


7) Register Parallels Desktop

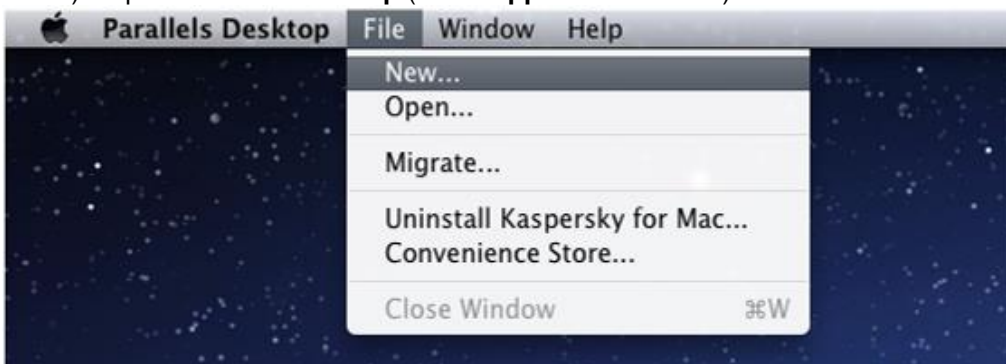




8) Press “Register” and “OK” to complete the installation of Parallels Desktop.



9) Open **Parallels Desktop** (in the **Applications** folder) then choose **File** → **New**



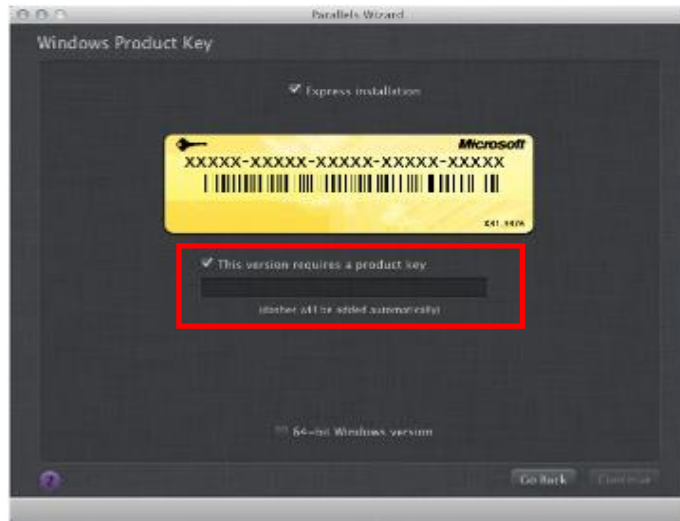
10) Press “Install Windows from DVD or image file” then press “continue” to install windows OS



11) Select CD-ROM drive with the Windows installation CD



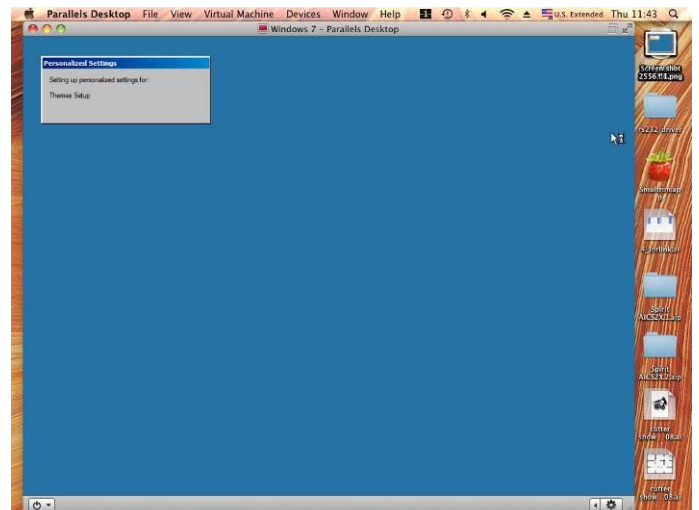
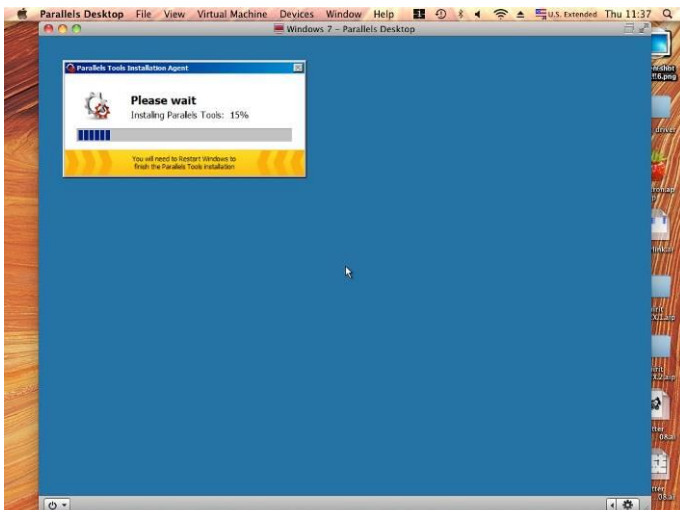
12) Enter the Windows OS product key



13) Select how you would like to run your Windows program.



14) After the prior setting is complete the windows OS installation procedure will start automatically.



- 15) Windows OS installation is complete then you can refer to “4.2.5 Installation of the LaserPro Print Driver” to install GCC LaserPro Print Driver.
- 16) Install the AP that you want to use after the above installation is complete.

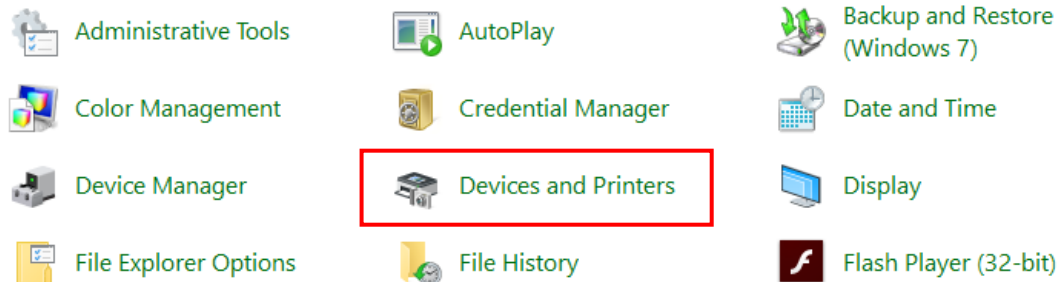


4.2.4 Using Adobe’s AP with GCC LaserPro machine

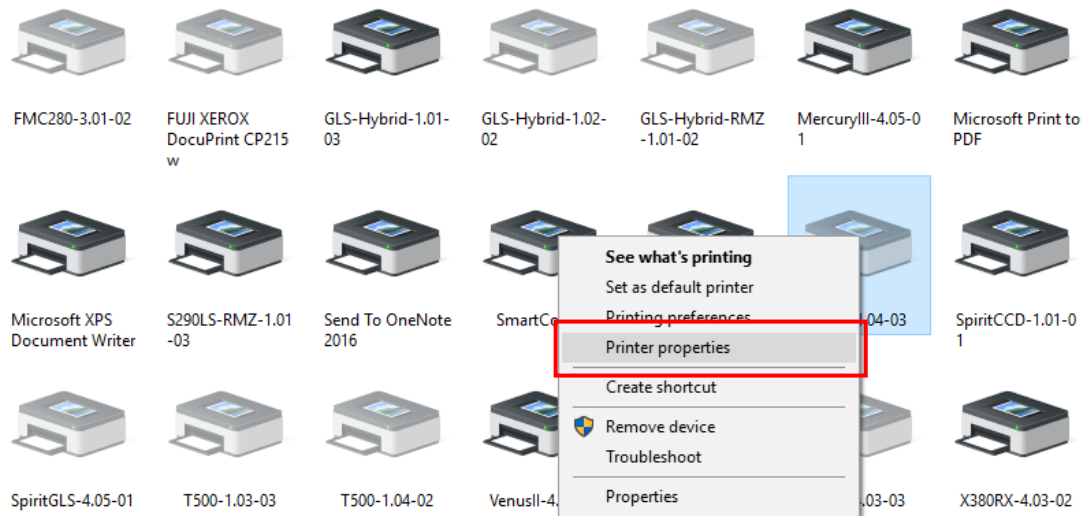
The Adobe’s AP (e.g. Illustrator, Photoshop or Acrobat reader) processes files via its Advanced Printing Features; users should firstly deselect Enable Advance Printing Features; otherwise the machine is unable to recognize or read general files when uploaded.

- Deselect “Enable Advance Printing Features”

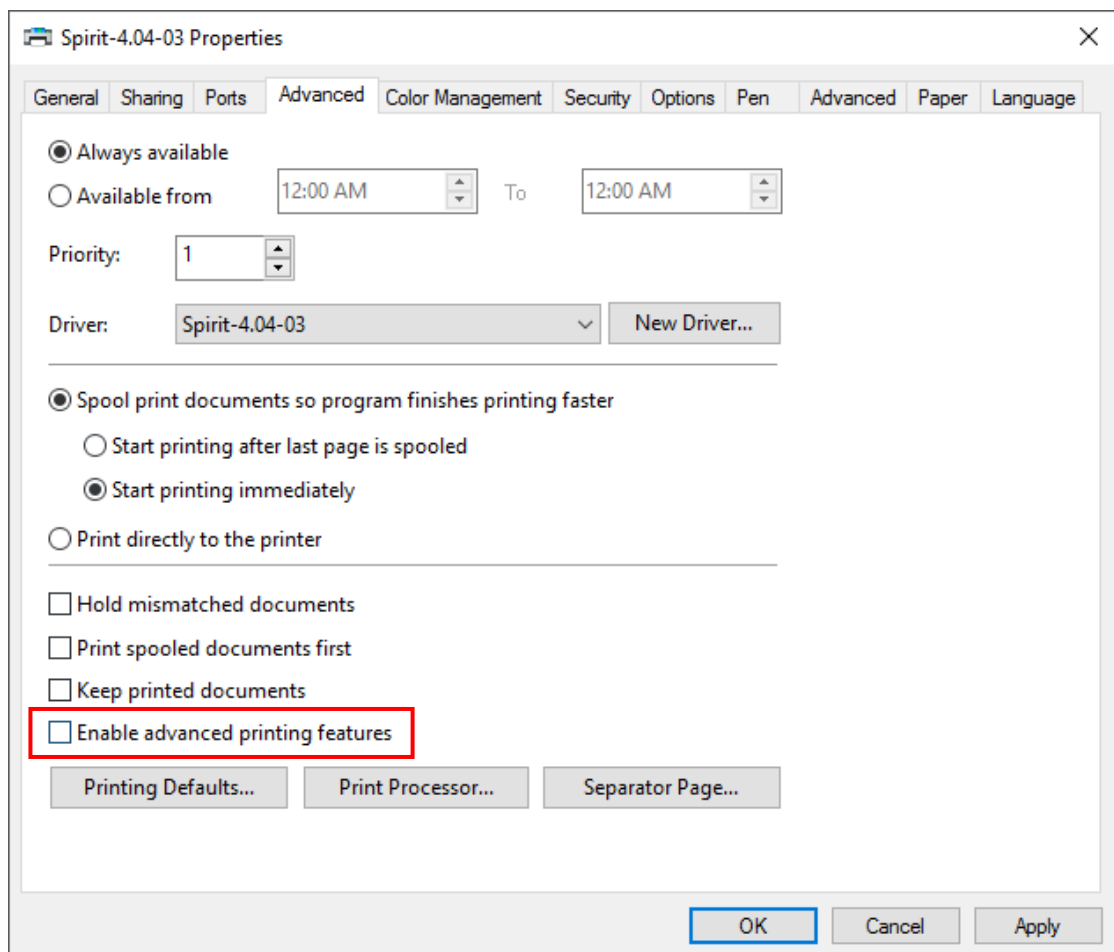
1) Click to select → Control Panel → Devices and Printers



- 2) Select your printer (for example, Spirit), right-click your mouse and choose Properties to enter Spirit Properties setup

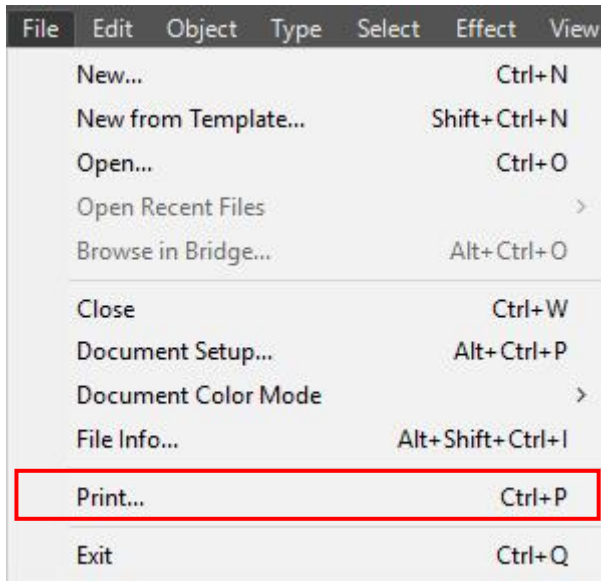


- 3) The click the Advanced tab, then deselect Enable Advanced Printing Features, now all files can be recognized and uploaded.

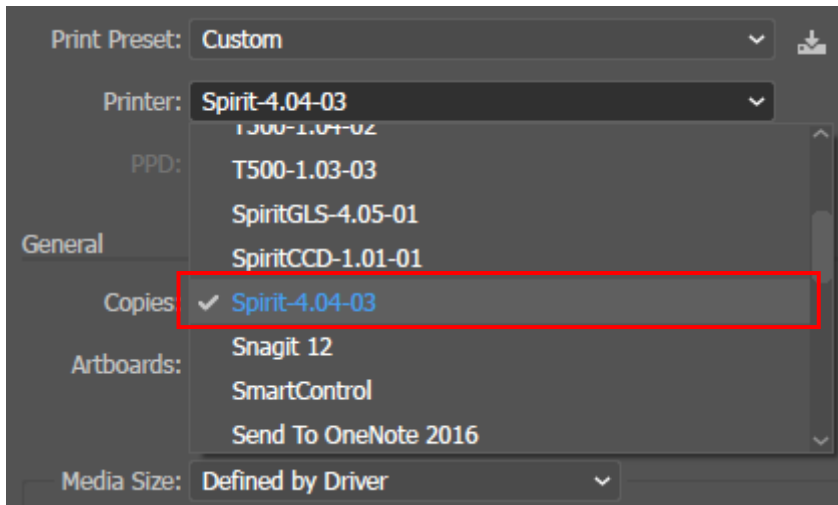


- **File Transfer**

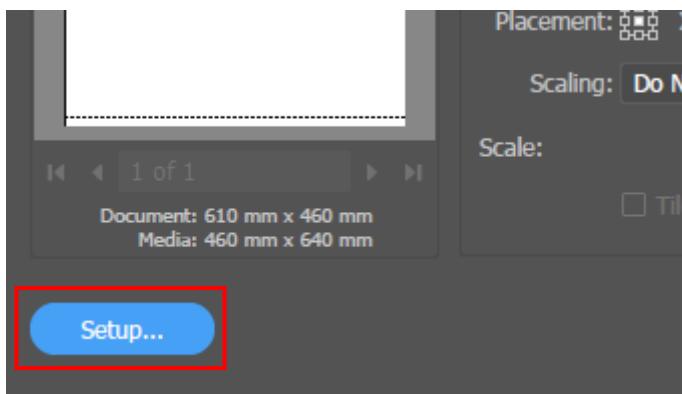
1) Select your working object, and then at the upper toolbar please choose File → Print.

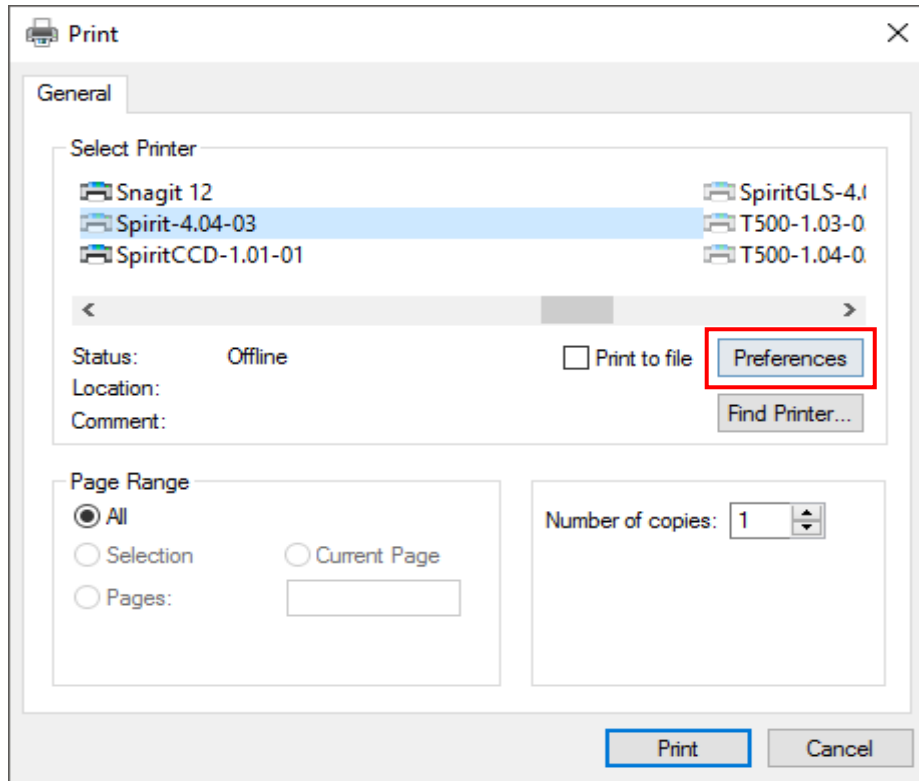


2) At the print setup screen, at Print Preset please select Custom, and choose your printer (e.g. Spirit)

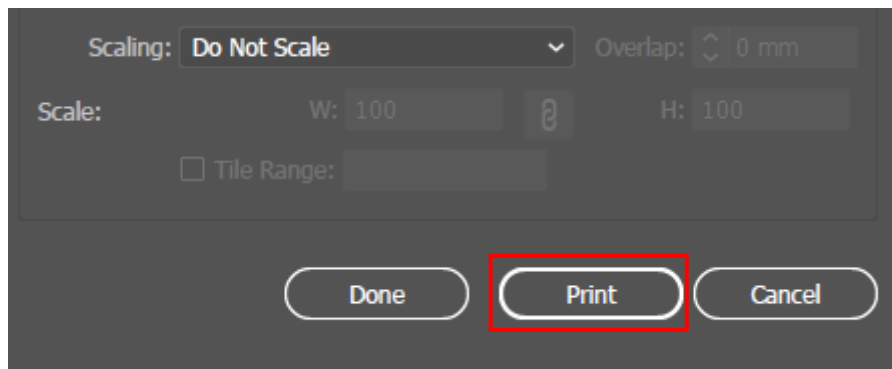


3) Then click on the lower left tab of Setup to enter Preferences settings.



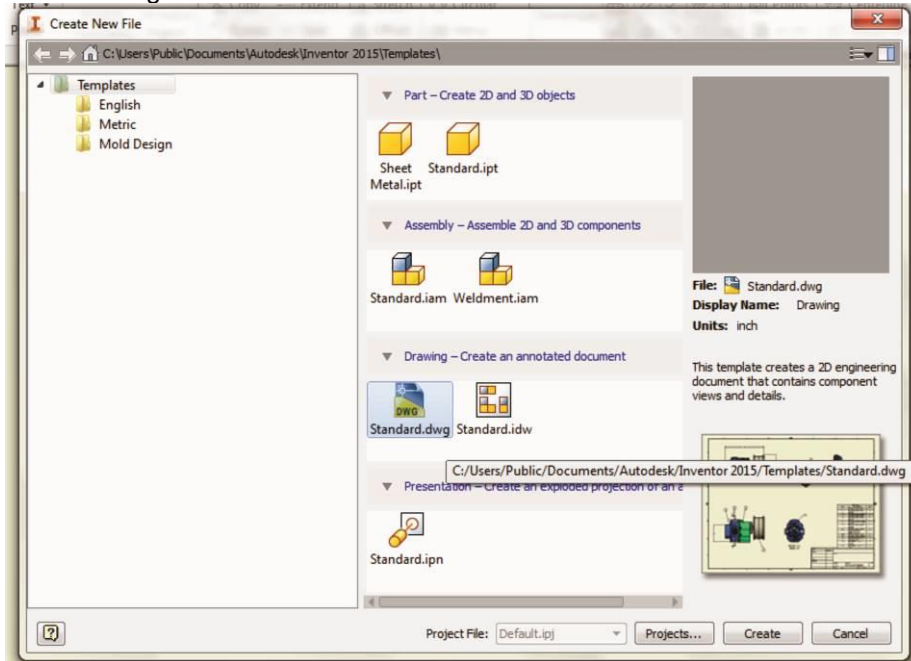


4) After all preferences are set, click Print to send file to the machine for print out.

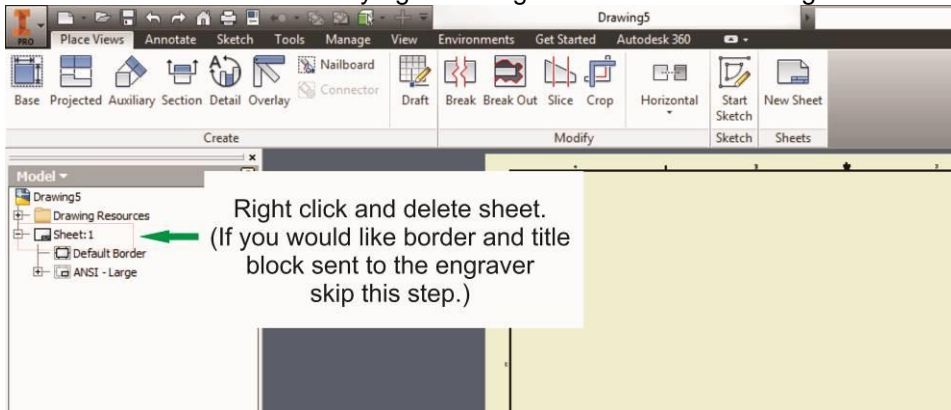


4.2.5 Using Autodesk Inventor with GCC LaserPro machine

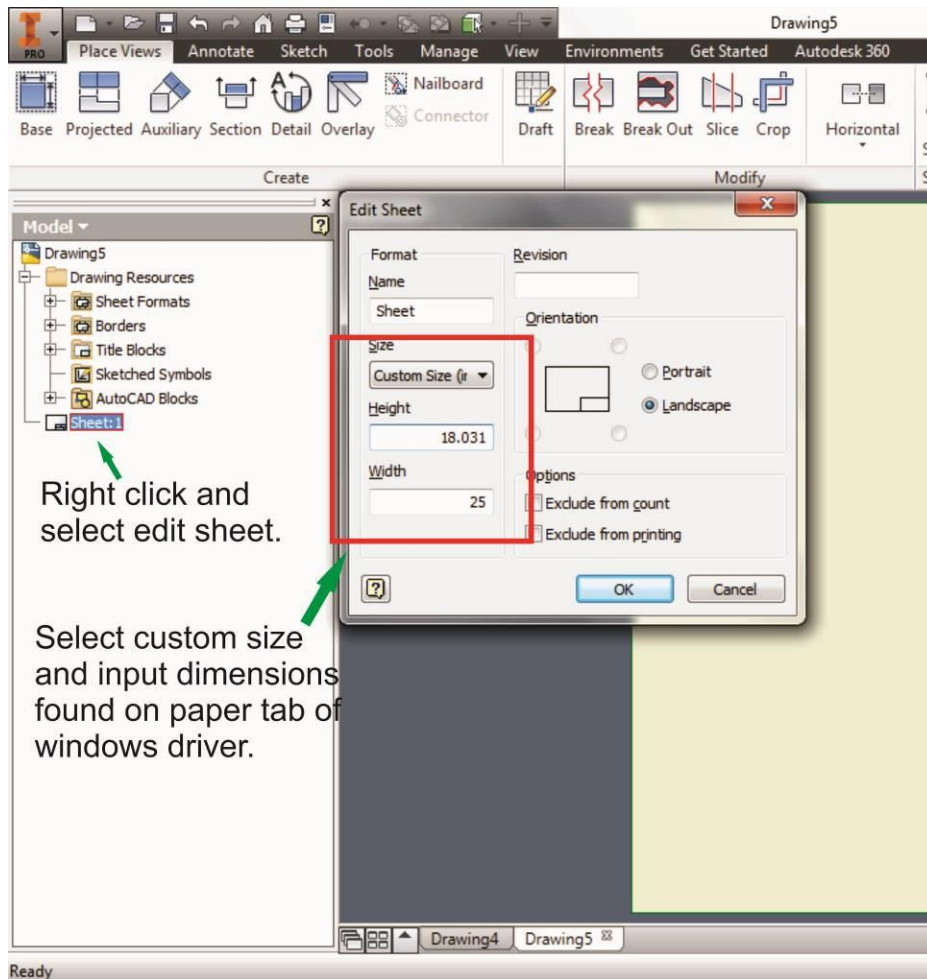
1. Start drawing.



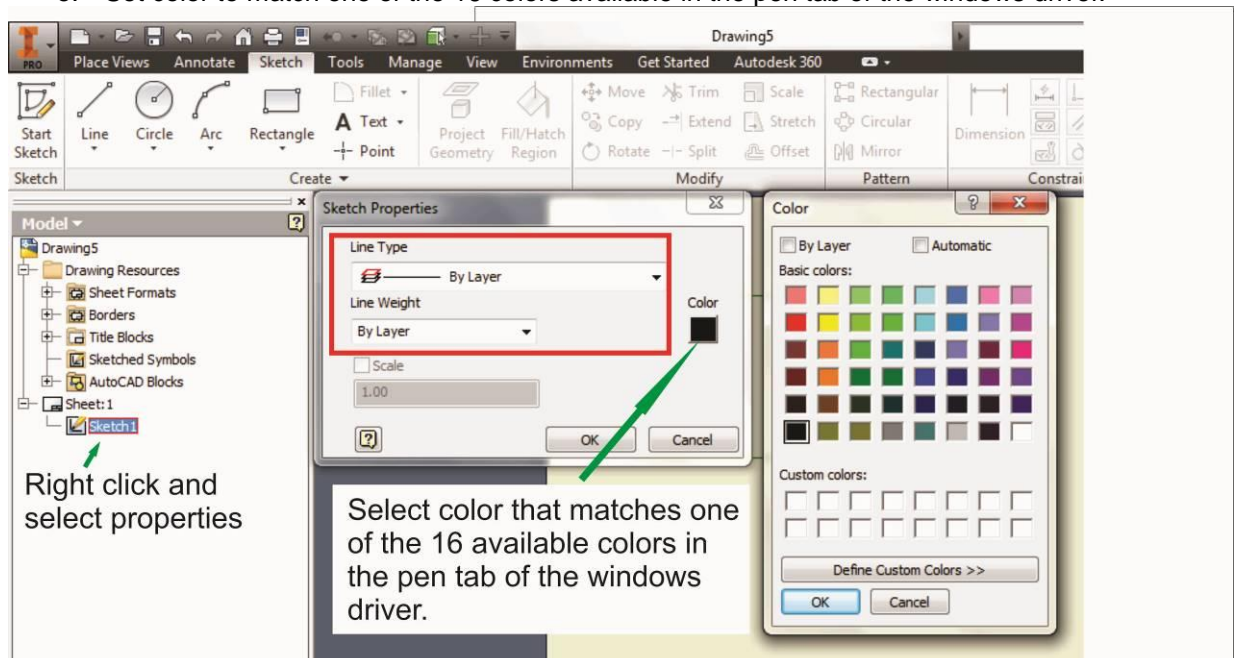
2. Delete border and title block by right clicking on sheet1 and selecting delete.



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

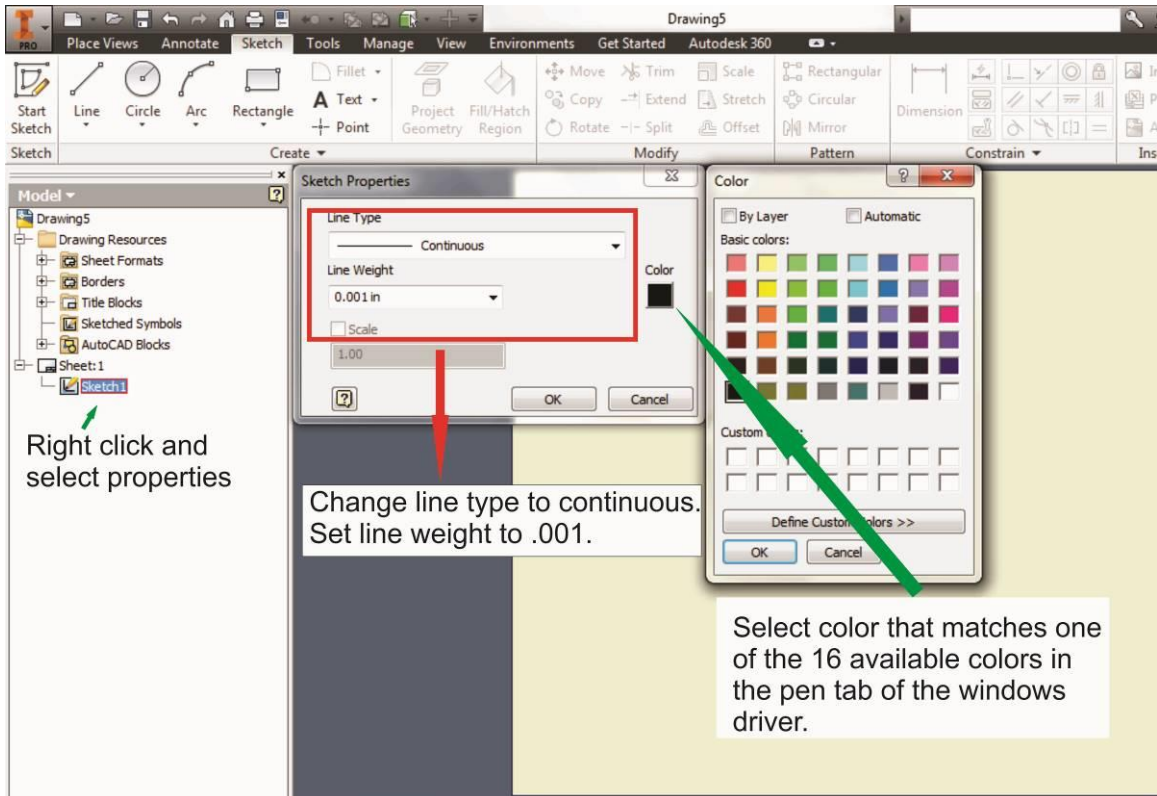


4. Start sketch.
5. Engraving
 - a. Finish sketch.
 - b. Right click on sketch and select properties.
 - c. Line Type: By Layer
 - d. Line Weight: By Layer
 - e. Set color to match one of the 16 colors available in the pen tab of the windows driver.



6. Cutting

- Finish sketch.
- Right click on sketch and select properties.
- Line Type: Continuous
- Line Weight: .001 in.
- 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 the LaserPro FMC280

Using the Hardware

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

The LaserPro FMC280 Print Driver

- Page Setup and Orientation
- Color Management
- Using the LaserPro FMC280 Print Driver
 - LaserPro FMC280 Print Driver >> Options Page
 - LaserPro FMC280 Print Driver >> Pen Page
 - LaserPro FMC280 Print Driver >> Advanced Page
 - LaserPro FMC280 Print Driver >> Paper Page
 - LaserPro FMC280 Print Driver >> Language Page

Once you have installed the LaserPro Print Driver, and have connected the LaserPro FMC280 to your computer, you will need to familiarize yourself with the LaserPro FMC280 control panel and LaserPro Print Driver. The print 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 How to turn on FMC280

Follow the machine turn-on and off procedure label attached on machine.

Machine Turn-On Procedures:

1. Power on the machine and make sure the machine initializing is complete.
2. Turn on the gas tank
3. Adjust the gas regulator valve to proper air pressure

Machine Turn-Off Procedures:

1. Turn off the gas tank
2. Click F4 then F2 on the control panel to enable AIR and release the remaining gas
3. Turn off the regulator valve and confirm the gas meter back to zero

- (1) Power on the machine and wait the machine finish initialization before going for step 2
- (2) Turn on the gas tank
- (3) Adjust the gas regulator valve to proper pressure level
- (4) Turn on the key switch in the front of machine. Now the machine is ready for operation.



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 the 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 window and looking inside to the rear, right side of the work area (as shown in the picture below).



LCD Display Screen
Contrast Adjustment

* This picture was taken with back door opened to clearly show the location of the contrast adjustment wheel.

5.1.3 Move Lens Carriage Correctly

- (1) Do **NOT** move the lens carriage by holding the laser carriage and optical fiber to prevent the damage of machine.

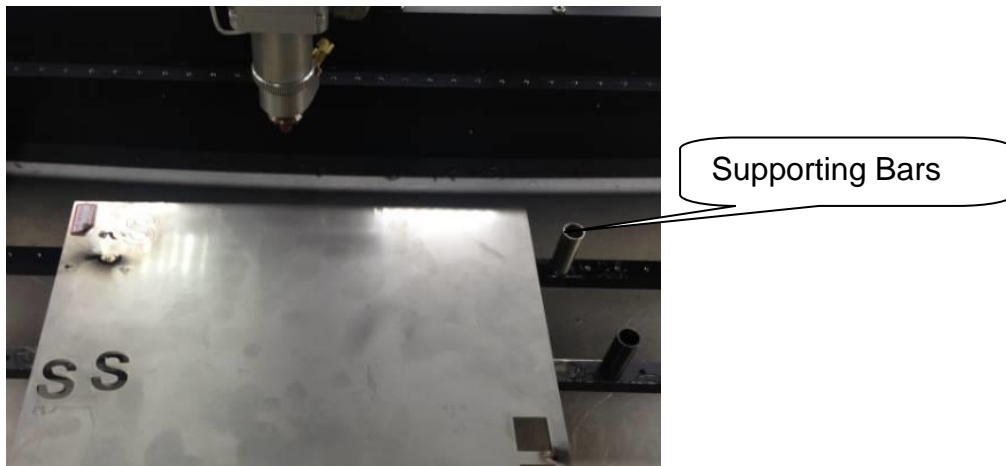


- (3) Correct way to move the carriage is to hold the rail or gently hold black box behind carriage.



5.1.4 Work Piece Setup

(1) Place the sheet metal piece to the work table on supporting bars.



(2) Arrange the magnetic fixtures to keep the sheet metal flat

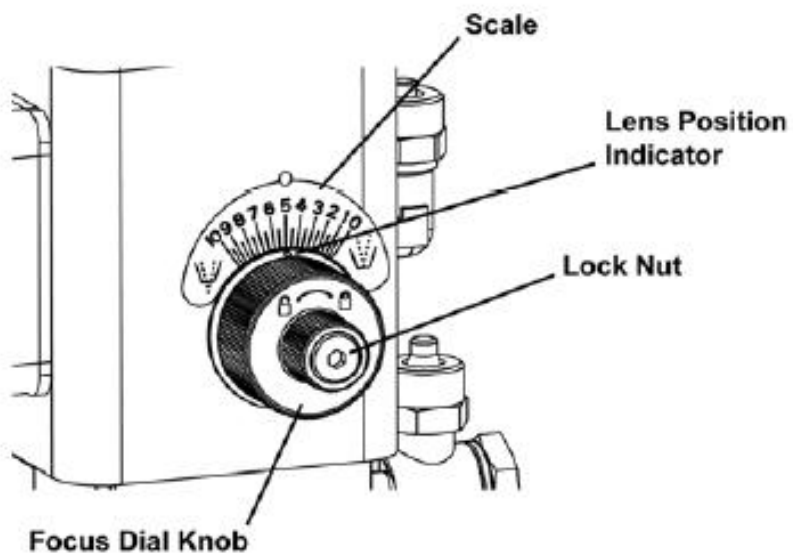


NOTE

1. Proper grounding is critical for LaserPro FMC280 laser system proper operation.
2. Change the supporting bars if it's rusted after time usage. Rusted supporting bars may affect the grounding of FMC280 and cause fault operation.

5.1.5 Setting Focus Position

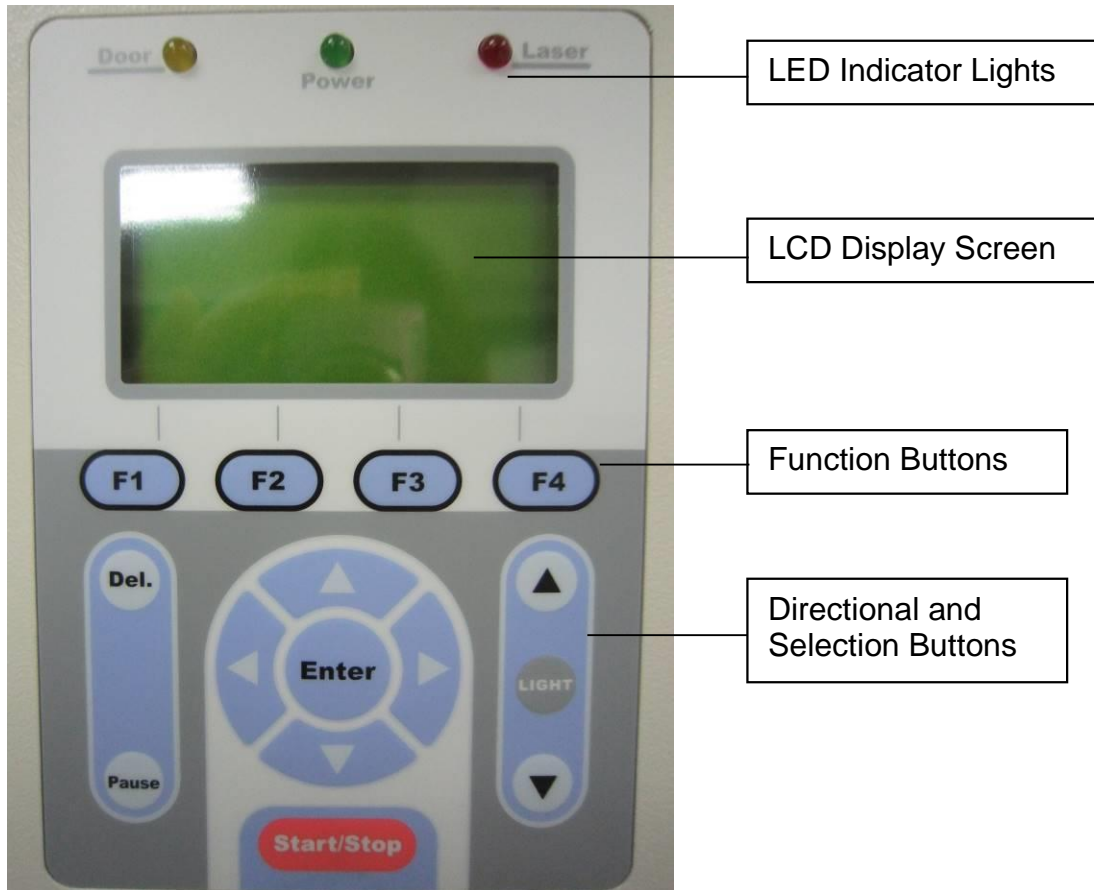
- (1) Loosen the lock nut by rotating it counterclockwise
- (2) Turn the focus Dial Knob (the larger the number on the dial further outside the tip the focus position moves)
- (3) Once the focus position is properly set, tighten the Lock Nut by rotating it clockwise.



5.1.6 Graphic Control Panel Overview

The Control Panel

The control panel on the LaserPro FMC280 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

Three indicator lights on the LaserPro FMC280 control panel are part of the system's safety interlock system.

- **Door** - The door light will illuminate when the window on the LaserPro FMC280 is open or improperly closed.
- **Power** - The power light will illuminate when the LaserPro FMC280 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, unplug the laser system IMMEDIATELY and contact GCC technical support for service instructions.
- 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 (⤴ ⤵ ⤶ ⤷) – 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 ⤴ ⤵ directional buttons cycle through the various selections, while the ⤶ ⤷ directional buttons adjust the value of that particular selection.

Enter – Confirms the current selection.

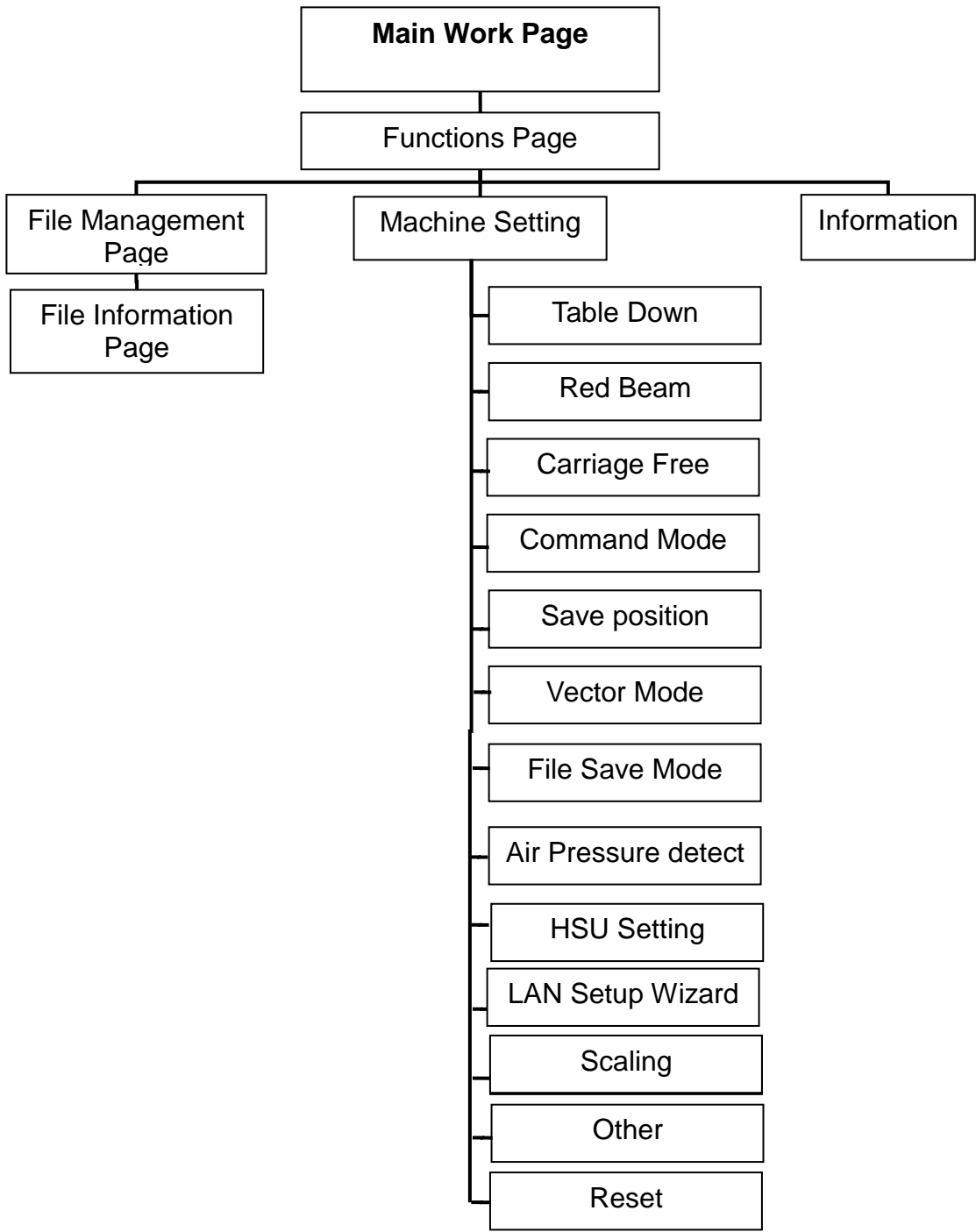
Start / Stop – Allows you to start or stop engraving jobs, once those jobs have been successfully loaded onto the system.

Delete – Provides quick access to delete the current job.

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

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

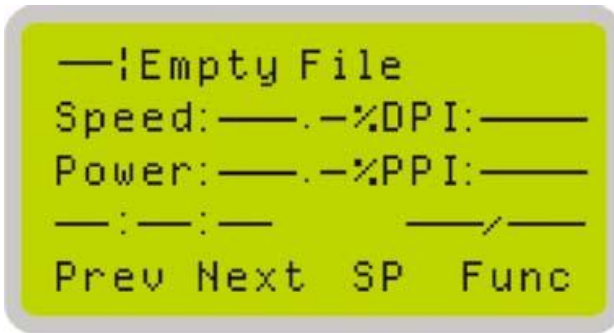
5.1.7 Graphic Control Panel Navigation Chart below



5.1.8 Graphic Control Panel Function Pages

When the LaserPro FMC280 is powered on, the machine will perform a series of safety checks and initialization routines. The LCD display screen will display the GCC copyright, LaserPro logo, and machine initialization pages before going to the main work page.

Main Work Page



The main work page is the page that the LaserPro FMC280 will default to upon startup and 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, Freq., DPI, processing / remaining times, and jobs loaded.

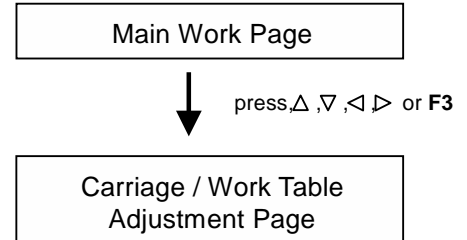
Note: When you select SmartCENTER from the driver “SP” option will be available on the main work page as shown in the above picture. On the contrary, if the SmartCENTER option was not selected on the driver, the “SP” option will not be available on the screen

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
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



i Navigating to this page:




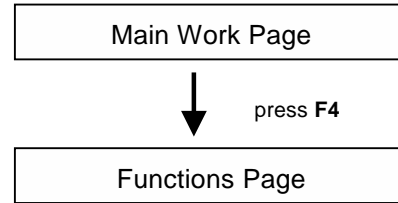
The Carriage / Work Table Adjustment Page allow you to manually increase and decrease the height of the work table (Z-axis). In addition, you can manually adjust the Y-axis and X-axis of the laser carriage.

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)
△/▽ Directional	Manually adjust the Y-axis position of the laser carriage
◀/▶ Directional	Manually adjust the X-axis position of the laser carriage
Start / Stop	Back to Main Work Page
▲/▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

Functions Page



 Navigating to this 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.

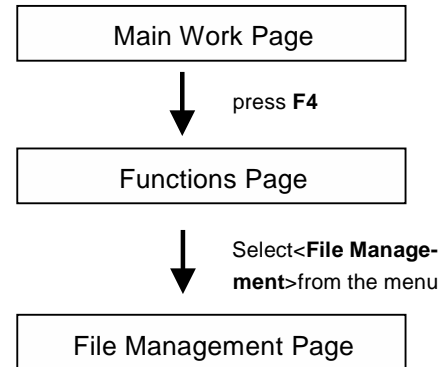
- **File Management Page** – this page allows you to manage the files that you have loaded onto the laser engraver.
- **Machine Setting Page** – this page allows you to access and modify various machine settings, including: Set Lens, Set Table Down, Set Red Beam, Carriage Lock, Set Command Mode, Save Position, Flash Memory, Set File Save Mode, Set Vector Mode, Other, Reset.
- **Machine Information Page** – this page allows you to view information regarding the system such as the GCC logo, machine name, firmware version, and other information.

Functions Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
F2 (Air)	Release the remaining air tubing before machine turning off
F3 (Help)	Display help
F4 (Recall)	Back to previous page
△/▽ Directional	Scroll through the menu selections
Enter	Perform the selection
Start / Stop	Back to Main Work Page
▲/▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)
Auto Focus	Initiate the auto focus function

File Management Page



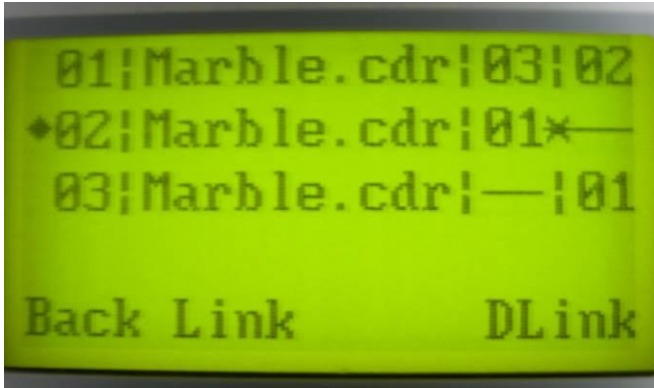
i Navigating to this page:



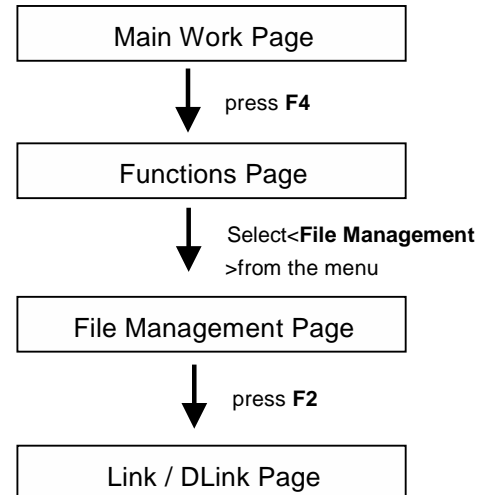
The File Management Page allows you to manage the files that you have loaded onto the LaserPro FMC280. You can scroll through your jobs, delete a selected job, delete all jobs, and go to the Link / DLink Page to set and arrange multiple loaded jobs into a single job queue for processing.

File Management Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
F2 (Link)	Go to the Link/DLink Page
F3 (D-All)	Delete all loaded jobs
F4 (Del)	Delete the selected job
△ / ▽ Directional	Scroll through the menu selections
Enter	Go to the File Information Page for the selected job
Start / Stop	Go to the Main Work Page for the selected job
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

Link / DLink Page



i 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.

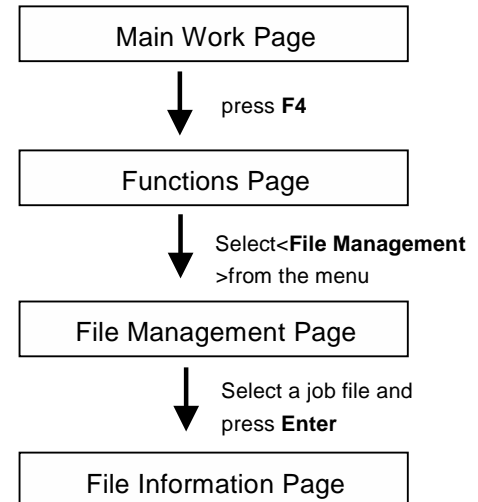
The first column field (before the file name) displays the job number. The sequence for your job queue is displayed in the two columns to the right of your file names. The first column to the right of your job file name displays the job number of the previous file in the job queue sequence. The second 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
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

File Information Page



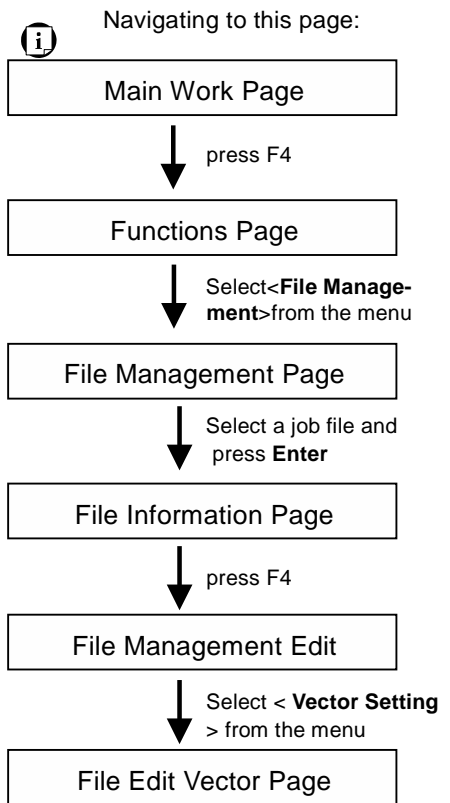
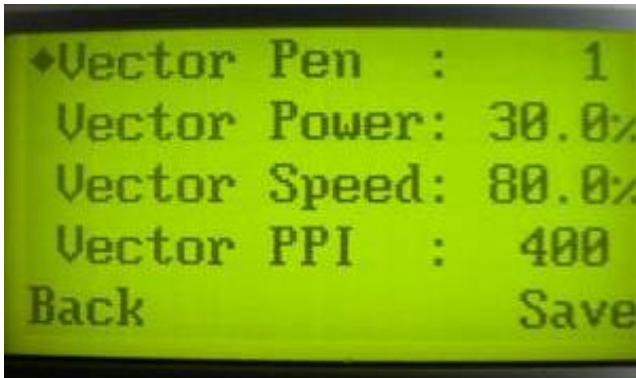
i Navigating to this page:



The File Information Page allows you to view the speed, power, DPI, and Freq. settings of the selected job. In addition, you will be able to go to the File Management Edit Page from this menu to change 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
▲/ ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

File Edit Vector Page

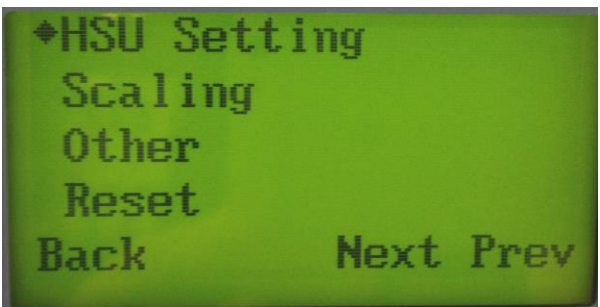
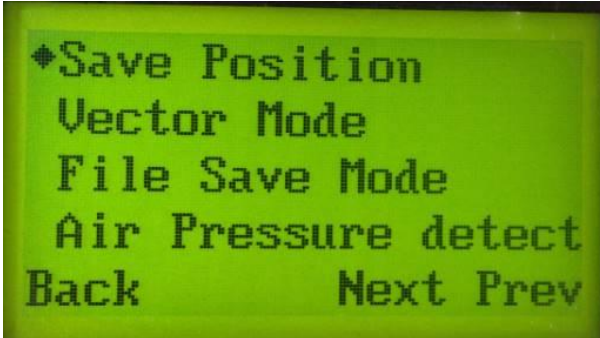



The File Edit Vector Page allows you to edit the vector pen, vector power, vector speed for the selected job. These settings correspond to the same settings found on the LaserPro FMC280 print driver. This page allows you to easily adjust these values to make immediate adjustments while processing your loaded jobs, even when you have disconnected your computer from the LaserPro FMC280.

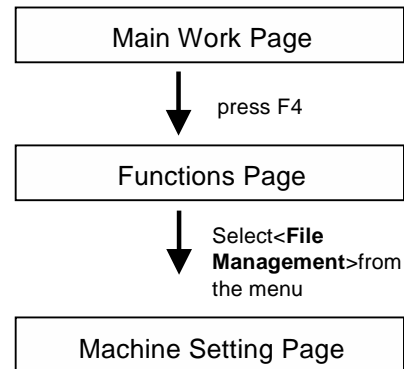
- Vector Pen: 1 - 16
- Vector Power: 0.0% - 100%
- Vector Speed: 0.0% - 100%

File Edit Vector Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
F4 (Save)	Save your current settings
◀ / ▶ Directional	Adjust the value for that selection
△ / ▽ Directional	Scroll through the menu selections
Start / Stop	Back to Main Work Page
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

Machine Setting Page



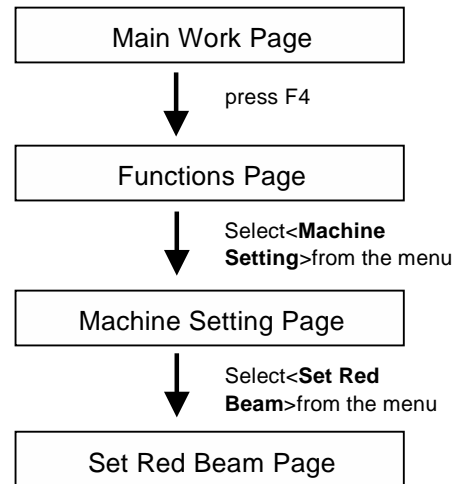
 Navigating to this page:



The Machine Setting Page allows you to access and modify various machine settings, including: Set Table Down, Set Red Beam, Carriage Free, Set Command Mode, Save Position, File Save Mode, Set Vector Mode, Other, and Reset.

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)

Table Down Page>> Machine Setting Page

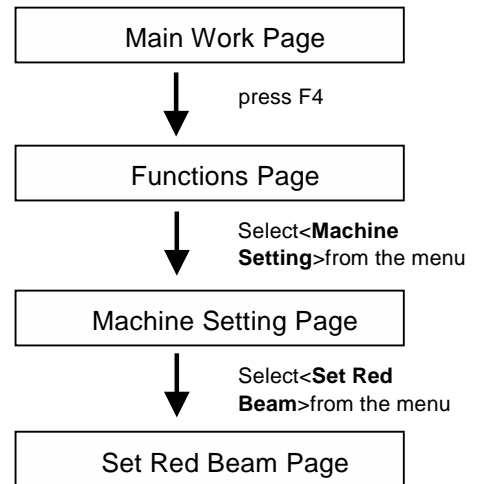
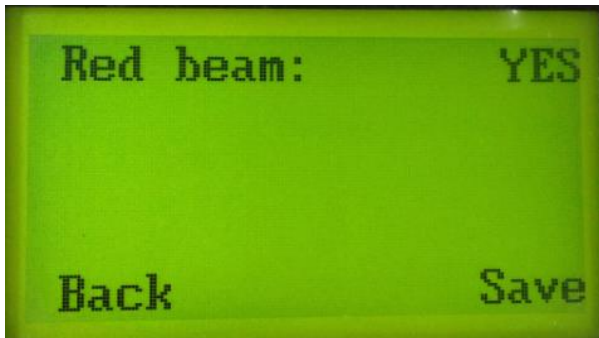


The Set Red Beam Page allows you to turn on or off the red dot laser pointer on the laser carriage. Enabling this function will indicate the exact area the engraving laser will fire upon.

- Red Beam: YES/ NO

Set 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
Light	Turns Internal Lights ON or OFF
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

Red Beam Page>> Machine Setting Page

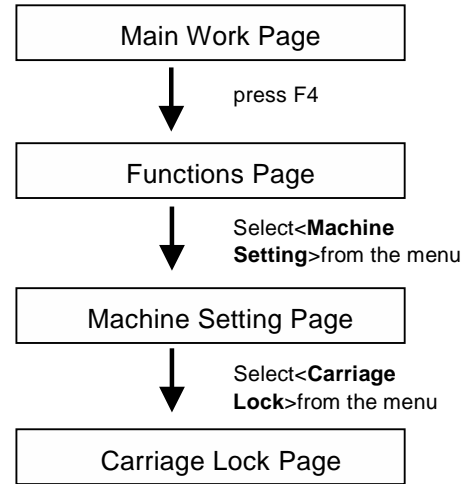
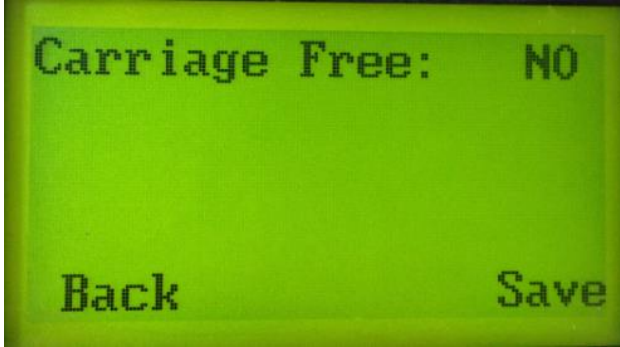


The Red Beam Page allows you to turn on or off the red dot laser pointer on the laser carriage. Enabling this function will indicate the position where the laser will fire upon.

- Red Beam: YES/ NO

Set 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)

Carriage Free Page>> Machine Setting Page

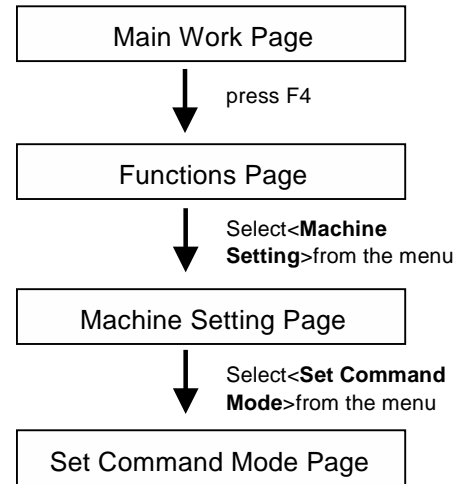
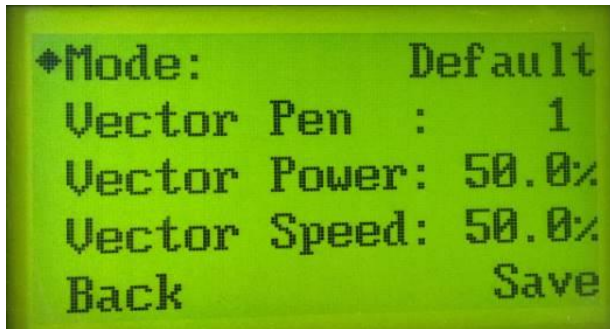


The Carriage Free Page allows you to set whether the laser carriage is to be locked or free. If the Carriage Free setting is set to <YES>, then you will be able to manually move the laser carriage along the X and Y axis by hand with the top door open. Whereas setting the Carriage Free to <NO> will lock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

- 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)

Command Mode Page>> Machine Setting Page



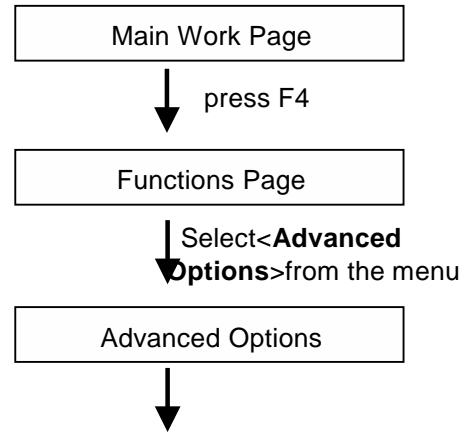
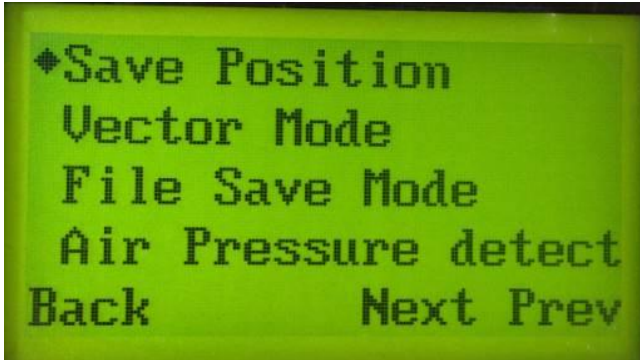
The Command Mode Page allows you to configure vector settings when outputting in Default or HPGL mode. Default mode is the standard Windows print driver and also recognized by the most popular graphic software programs such as CorelDRAW, Photoshop, Illustrator, and more. Whereas, HPGL mode is a less 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

Set 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)

Save Position Page >> Machine Setting Page

Navigating to this page:



Select <Save Position> from the menu

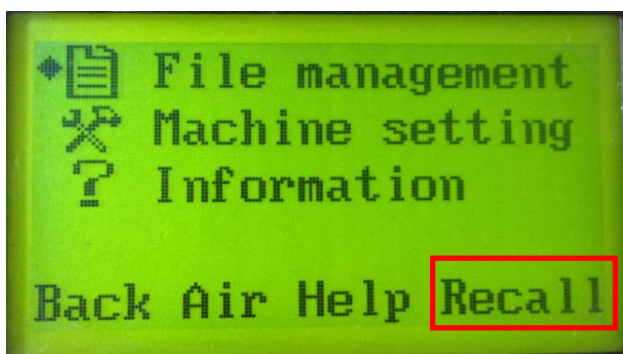
The Save Position Function allows you to save the current X-axis and Y-axis positions of the laser carriage and sets this position to be the origin for subsequent jobs.



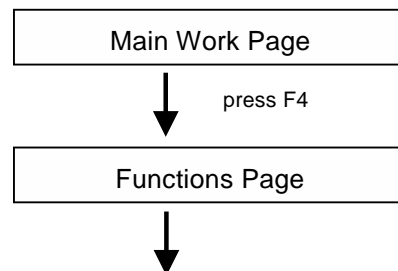
Tip

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

Recall Position



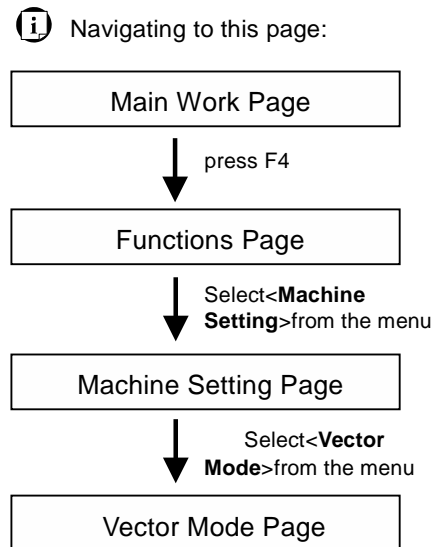
i Navigating to this page:



Select <Recall> by pressing F4

To recall the saved position, simply go to Functions page and press F4 again to recall the saved position. The laser carriage will be moved to the saved position.

Vector Mode Page>> Machine Setting Page



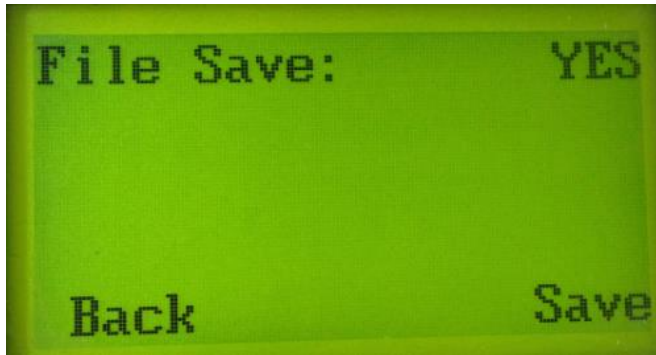
The Set Vector Mode Page allows you to adjust and balance vector mode's quality and speed settings based on your specific job. Speedy Vector Mode offers the highest output speed, sacrificing quality. Whereas Quality Vector Mode offers the highest quality, sacrificing output speed. Keep in mind that speed 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)

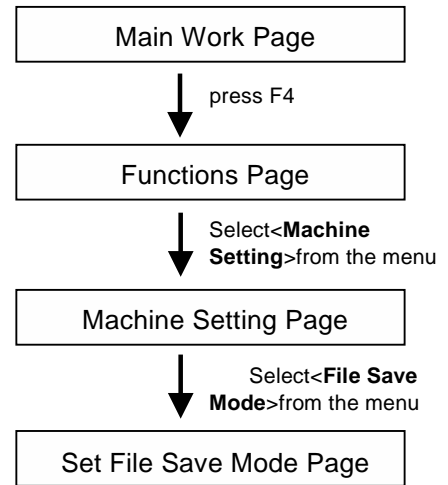
The machine will reboot automatically once clicking <Save> button for the change.

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)

File Save Mode Page>> Machine Setting Page



i Navigating to this page:

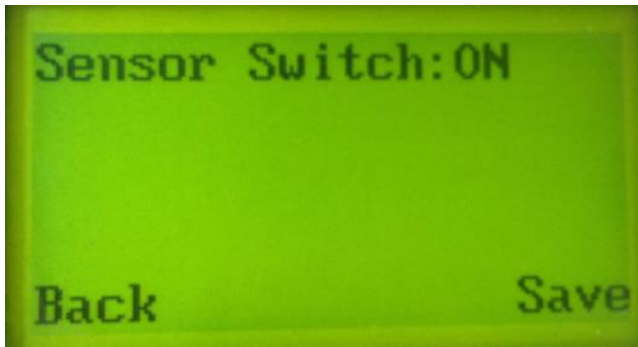


The Set File Save Mode Page allows you to set whether or not the LaserPro FMC280 automatically deletes each job file after processing. Setting File Save to <NO> will automatically and immediately delete each job file from the LaserPro FMC280 after the engraving or cutting process. Setting File Save to <YES> will retain all job files on the LaserPro FMC280.

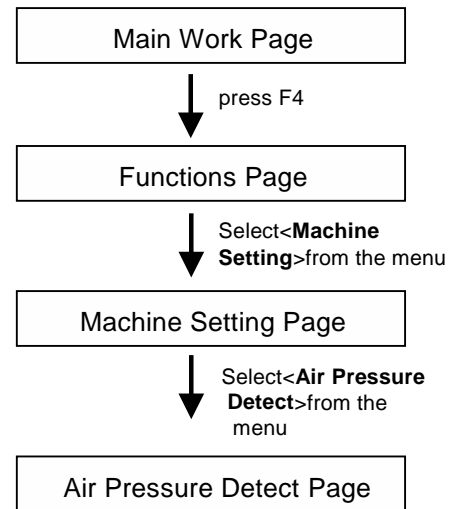
- File Save: YES / NO

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)

Air Pressure Detect Page >> Machine Setting Page



i Navigating to this page:

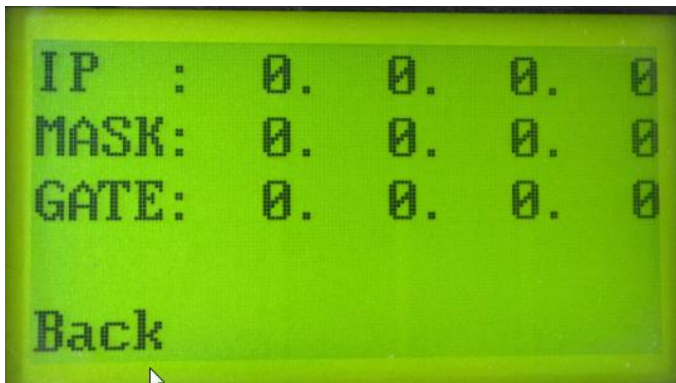
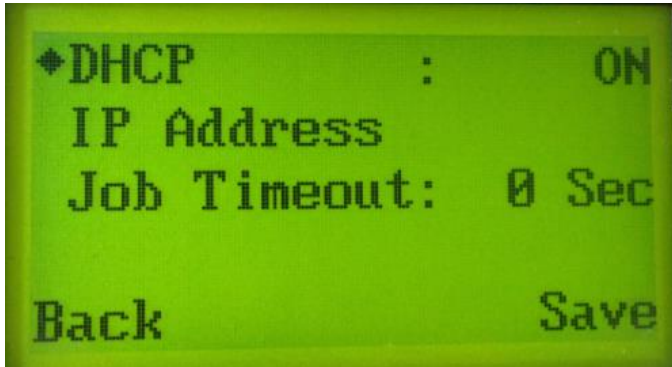


Enable the Air Pressure Detect allows the laser machine to detect if the assisted gas is supplied or it's run out of gas, the laser machine will show error message to remind when the assisted gas is not detected to ensure optimal cutting result.

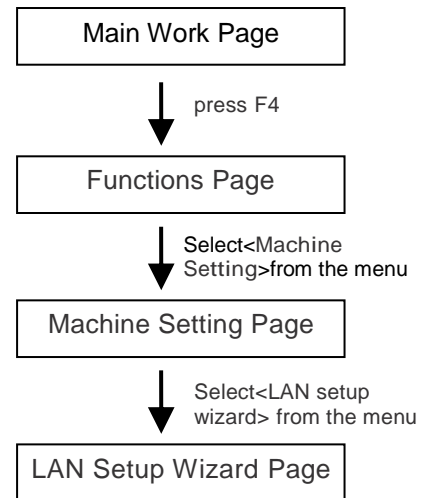
- Sensor Switch: ON/ OFF

Air Pressure Detect Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
F4 (Save)	Save your current settings
◀ / ▶ Directional	Cycle Air Pressure Detect between ON/ OFF
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)

LAN Setup Wizard Page>> Machine Setting Page



(i) Navigating to this page:



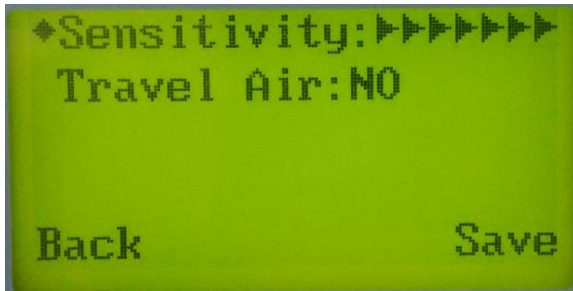
The LAN Setup Wizard Page allows you to connect the laser machine with ethernet to transmit files from computer to laser machine for processing jobs. When selecting the DHCP to <ON>, the network is set up to dynamic IP address, the IP address will automatically retrieve from network; while DHCP <OFF> 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

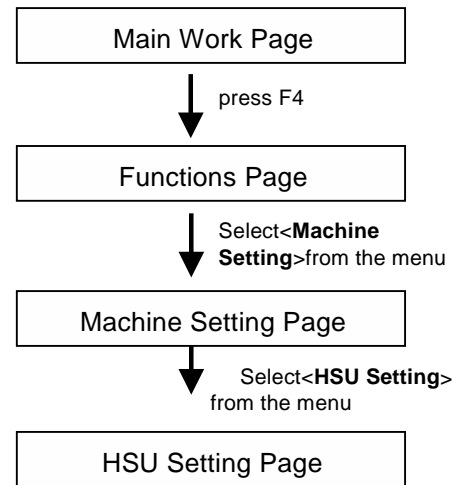
Please refer to Chapter 4.1.3 for ethernet connectivity setup in computer

LAN Setup Wizard Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
F4 (Save)	Save your current settings
◁ / ▷ Directional	Cycle DHCP between ON/ 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)

HSU Setting Page>> Machine Setting Page



i Navigating to this page:



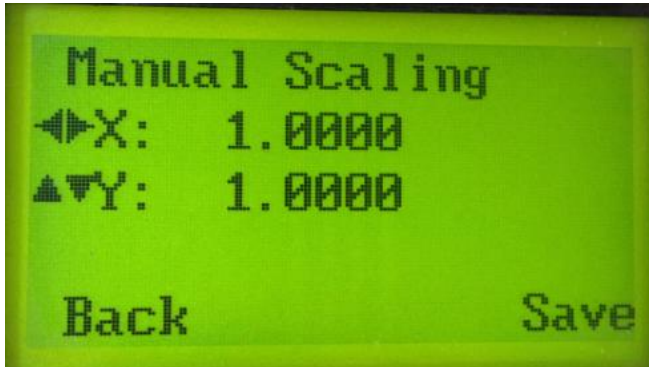
There are two functions under HSU Setting page, one is HSU sensitivity, and the other is Travel Air.

HSU Sensitivity function allows you to adjust the sensitive level of HSU laser cutting head to automatically detect the gap between working object and HSU laser cutting head to keep fixed focal distance for optimum processing result. Setting to higher HSU sensitivity level, the HSU laser cutting head will be more sensitive to metal materials including work piece, dust, and dross. Set the sensitivity level per your application and graphics.

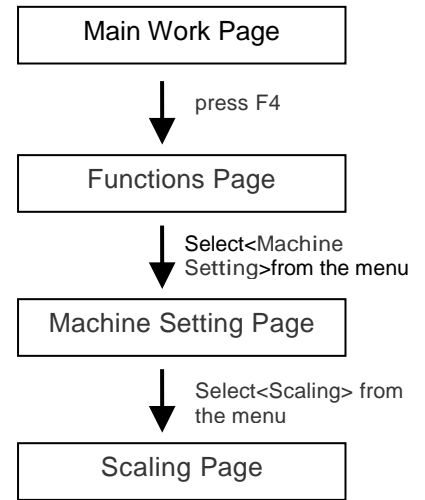
Travel Air function allows you to decide if the assisted gas keeps blowing when HSU laser cutting head moves between end point to next starting point to save assisted gas consumption.

HSU Setting Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
F4 (Save)	Save your current settings
◀ / ▶ Directional	Adjust HSU Sensitivity Level from low to high; Cycle between YES and NO for Travel Air .
△ / ▽ Directional	Select between different functions
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)

Scaling Page>> Machine Setting Page



i Navigating to this page:

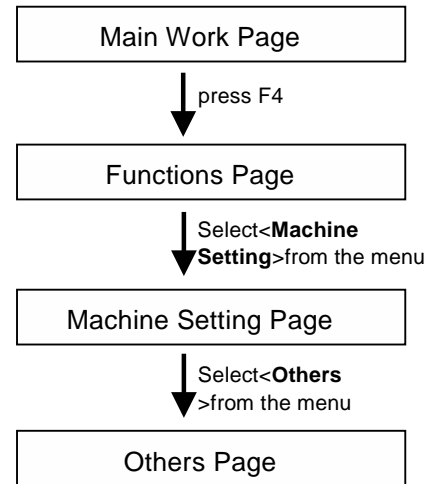
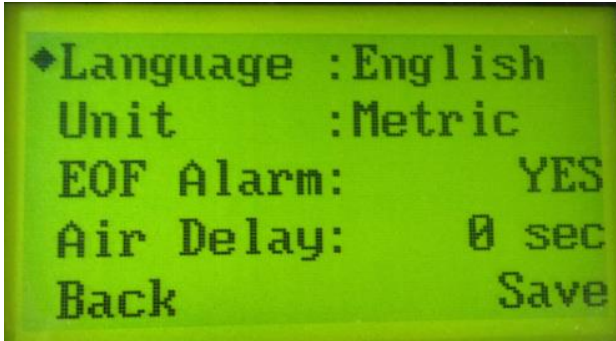


The Scaling Page allows you to fine tune the laser machine output scale to precisely fit the original graphic file design scale when precision output is required to your application.

Remember to reboot the machine once selecting <Save> button to enable 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)

Others Page>> Machine Setting Page

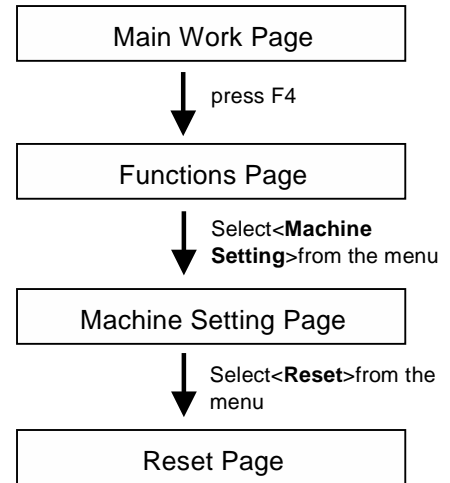


The Others Page allows you to change various settings that correspond to the control panel. The Language setting will allow users to change available languages displayed on the control panel. The Unit setting will allow you to change whether the units displayed by the control panel is in the metric or 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 air-assist after the point of laser firing.

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

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)

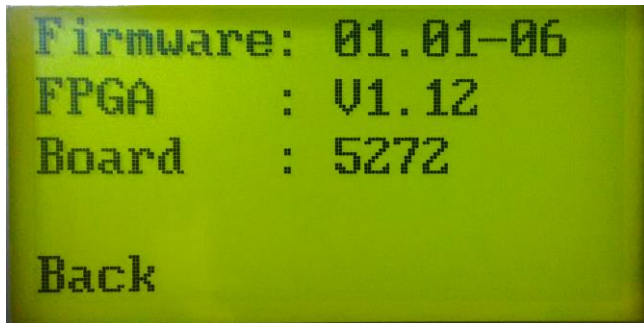
Reset Page>> Machine Setting Page




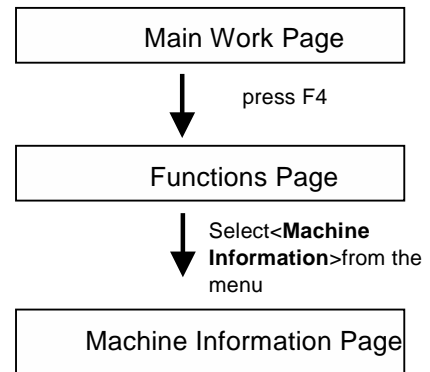
The Reset Page will restore machine settings back to factory default. Press ENTER to confirm the change, and restart the machine.

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

Machine Information Page



 Navigating to this page:



The Machine Information Page provides you the information regarding the system such as the GCC logo, machine name, firmware version, and other information.

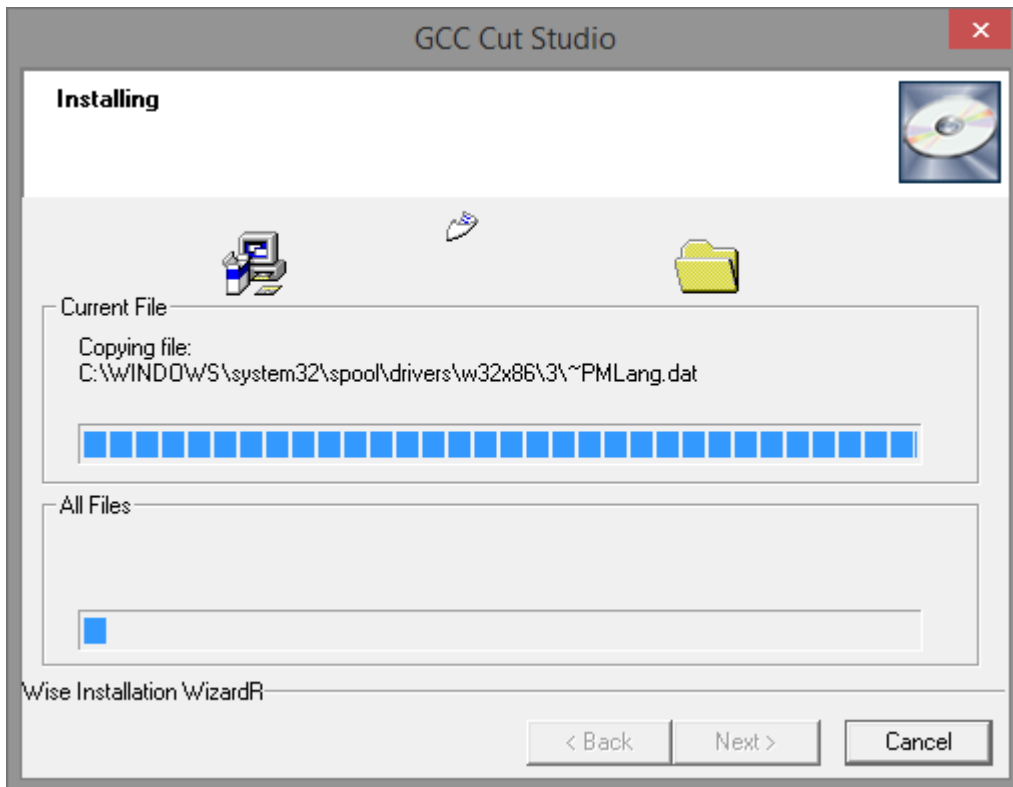
Information Page	
Relevant Buttons	Function
F1 (Back)	Back to previous page
△ / ▽ Directional	Scroll through the menu selections
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

5.2 Add Bridge to Cutting

GCC LaserPro FMC280 fiber laser system comes with a node-bridge cutting function to help thin metal generate good cutting edge by assigning small bridges on the cutting path to prevent the cutout falling apart, and remove it manually after laser cutting.

5.2.1 Node Bridge Installation

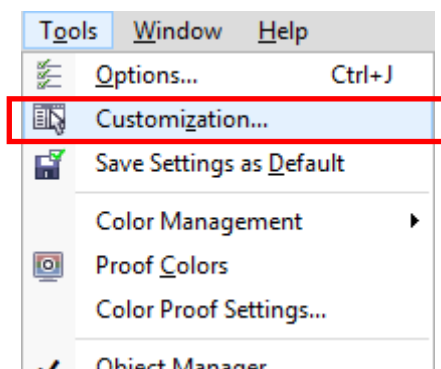
Step 1. When you install FMC280 print driver, the node bridge function will be automatically added to your CorelDRAW X7.



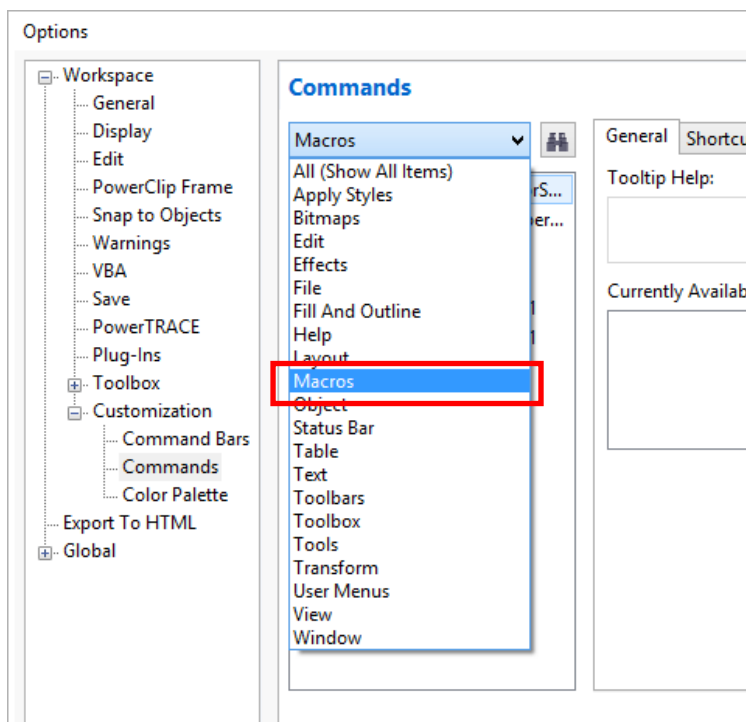
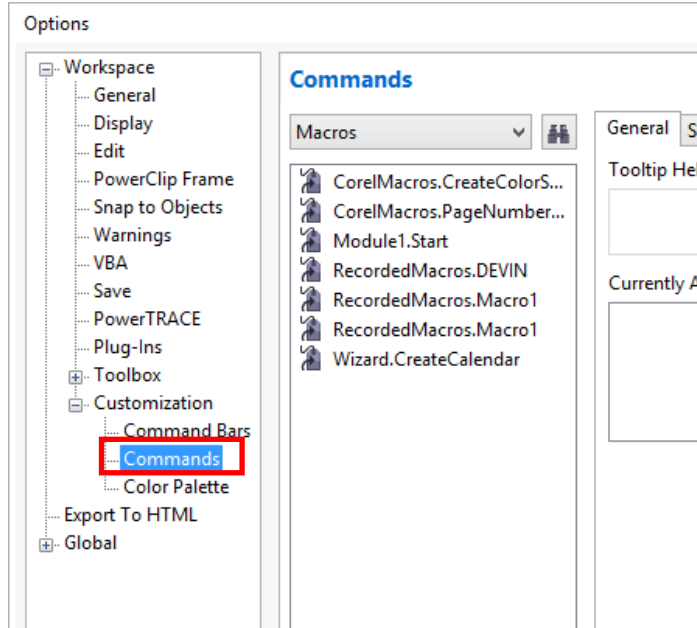
NOTE

Node bridge function is available for FMC280 print driver version 3.02 or after.

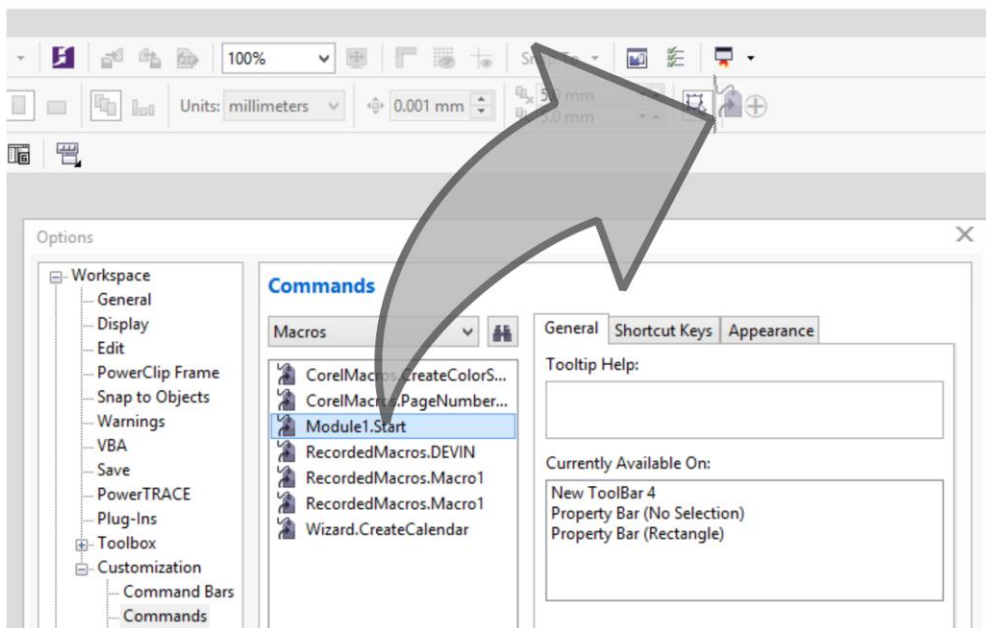
Step 2. Launch the CorelDRAW X7, go to “Tools” → “Customized” from the menu bar, and the “Options” window will be popped up.



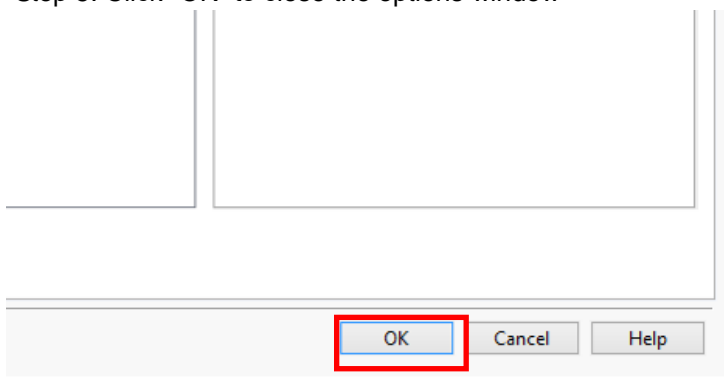
Step 3. Click “Commands” and then “Macros” from the menu



Step 4. Click and drag “Module1.Start” to the toolbar of CoreIDRAW.



Step 5. Click “OK” to close the options window

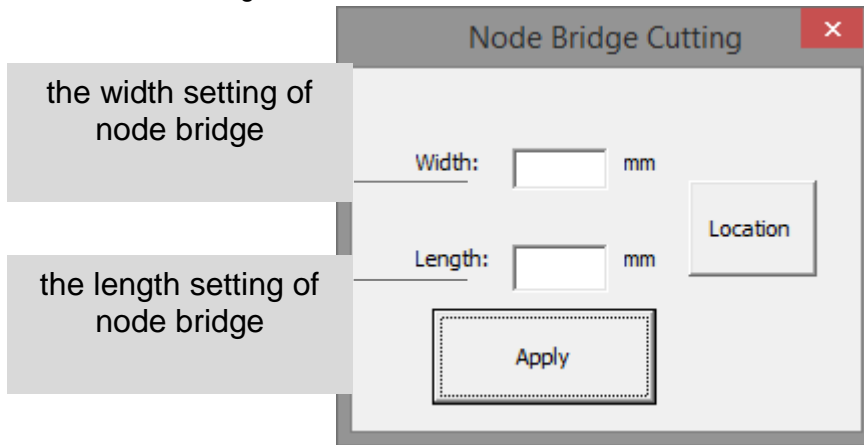


Step 6. The installation is completed, the node bridge icon will show on the toolbar of CorelDRAW.

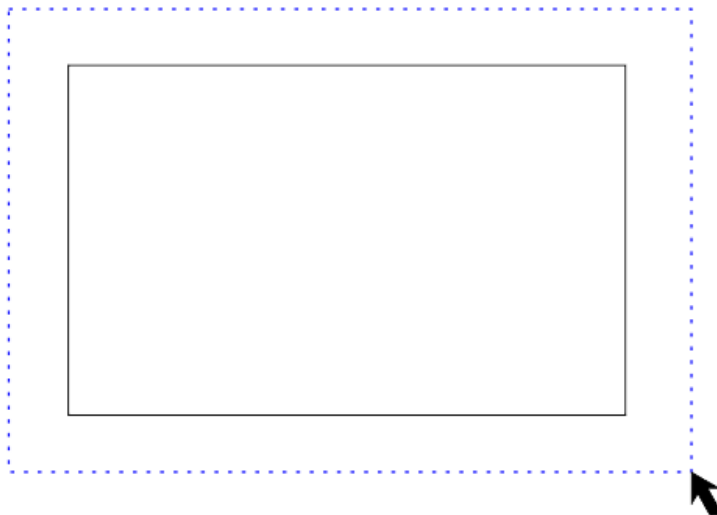


5.2.2 Node Bridge Operation

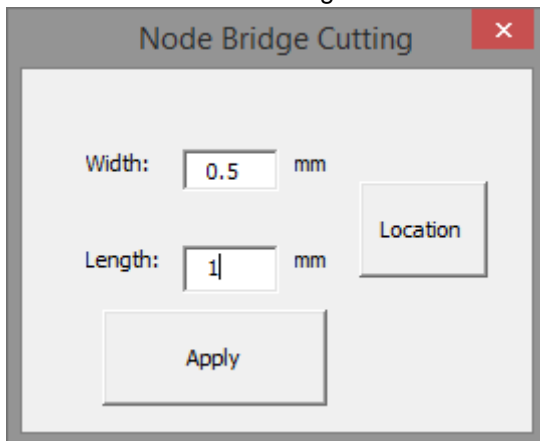
Step 1. Click the “Node Bridge” icon from CorelDRAW toolbar to launch the “Node Bridge Cutting” window



Step 2. Using the “PICK TOOL” to select object.



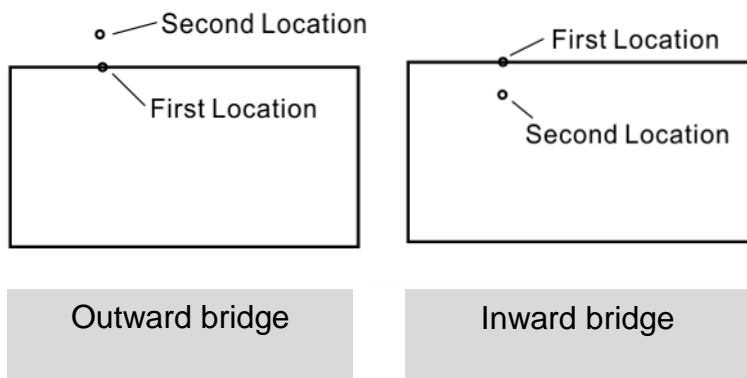
Step 3. Enter the width and length value of the required bridge and press “Location” button.



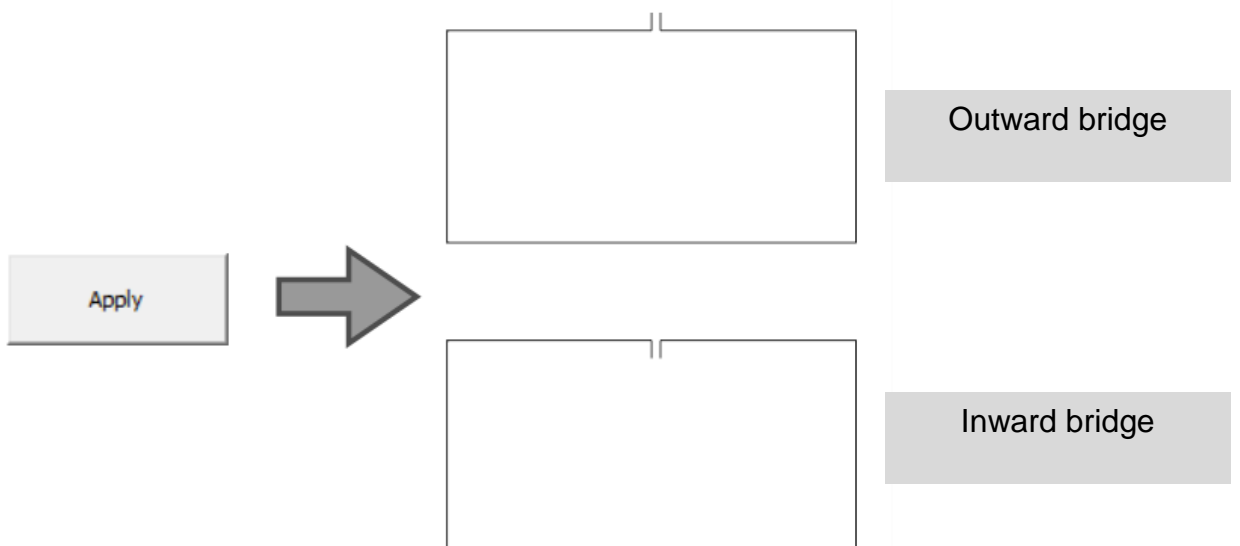
NOTE

The maximum width value for node bridge is 0.5mm, and 5mm for the length value.

Step 4. Click the object to define node bridge location and its direction. The first click will assign its location to the node bridge, and the second click will define the inward or outward direction of the bridge.



Step 5. Click "Apply" button to confirm the setting.



Step 6. Repeat Step 4 ~ Step 5 to continue generate other node bridges on the cutting path.

Step 7. After setting up node bridges, click "FILE" then select "PRINT" under menu bar to print the graphic file to the FMC280 print driver for laser parameter settings and cutting.

5.3 The LaserPro FMC280 Print Driver

With the LaserPro FMC280 print 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 LaserPro FMC280 work table area.

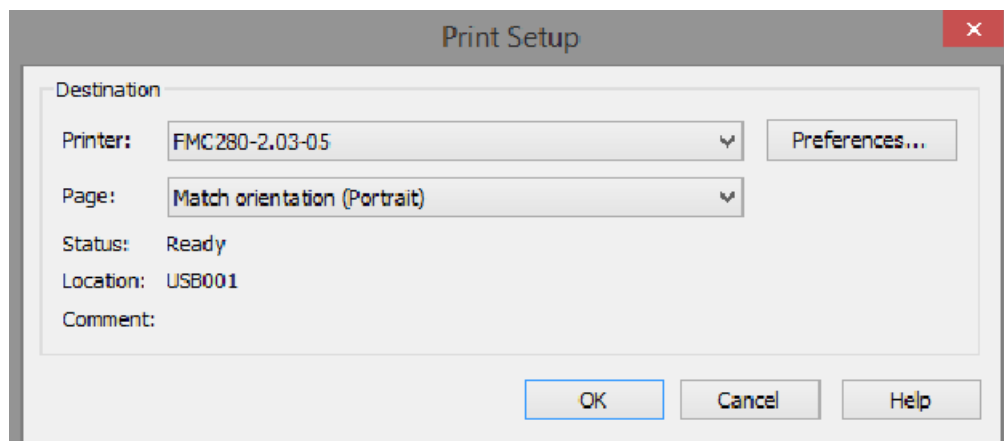
NOTE

Please make sure the LaserPro FMC280 is set to the default printer before proceeding to the page and layout setup.

Ensure that the LaserPro FMC280 has been selected as the DEFAULT PRINTER. You can do so by going into your Windows Control Panel → Printers and Faxes.

If the LaserPro FMC280 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 LaserPro FMC280 as the Printer.

- 1) From the primary menu, click FILE → PRINT SETUP.
- 2) From the navigation bar Name, click FMC280 → OK



5.3.1 Page Setup and Orientation

The first thing you must do before working with the LaserPro FMC280 Print 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 the 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 horizontal length to 712 mm (28 inches) and vertical height to 370mm (14.5 inches).

CorelDRAW Example (Page Setup and Orientation)

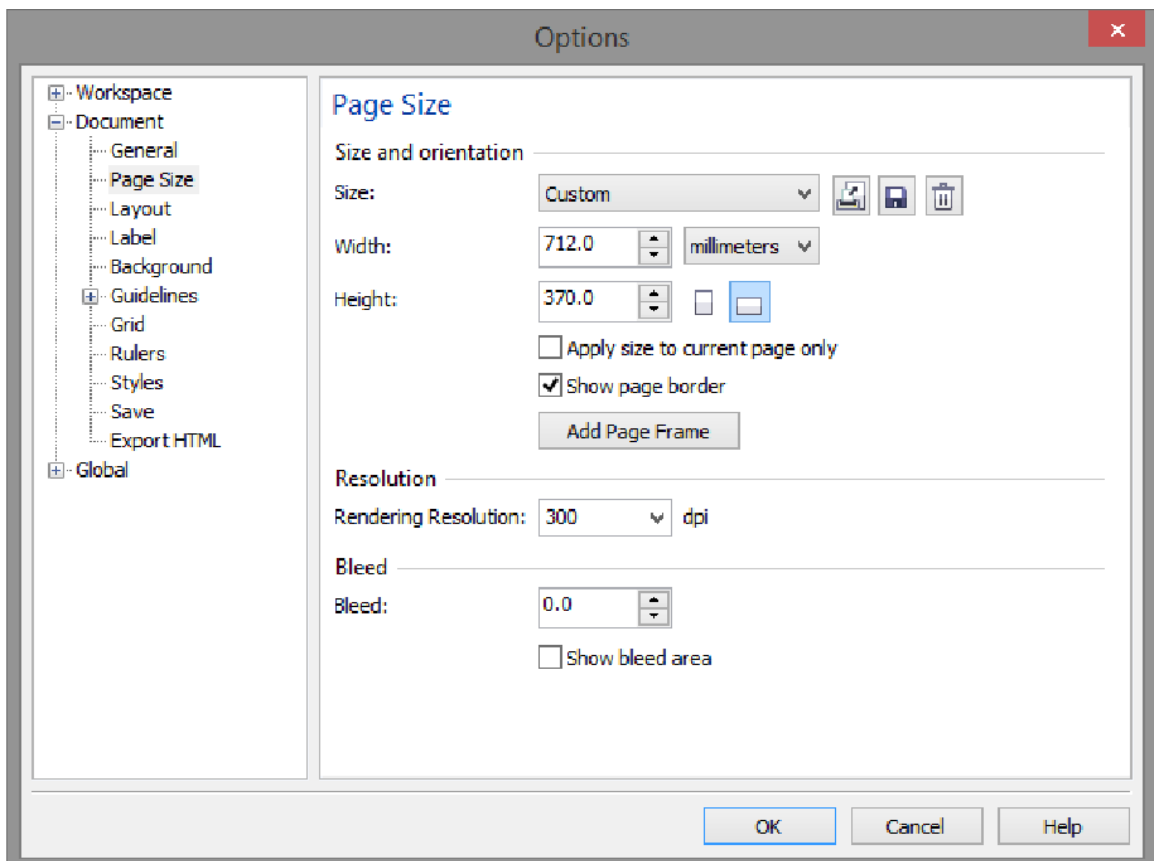
The following is an example of how to set the Page Setup and Orientation in the graphics software. CorelDRAW is the designated graphics software used for this example. For other graphics software, you will need to access the corresponding Page Setup page.

- 3) From the primary menu, click LAYOUT → PAGE SETUP.
- 4) From the navigation bar on the left, click DOCUMENT → PAGE → SIZE.
- 5) Ensure that NORMAL PAPER and LANDSCAPE are selected.
- 6) Ensure the Paper Width and Height dimensions match the work table dimensions of 712 mm (28inches) and 370 mm (14.5 inches)
- 7) Click OK to end the paper size adjustment.



Tip

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 the work table. (You MUST have the LaserPro FMC280 set as the default printer prior to doing this.)



5.3.2 Color Management

The LaserPro 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 LaserPro FMC280 Print Driver.

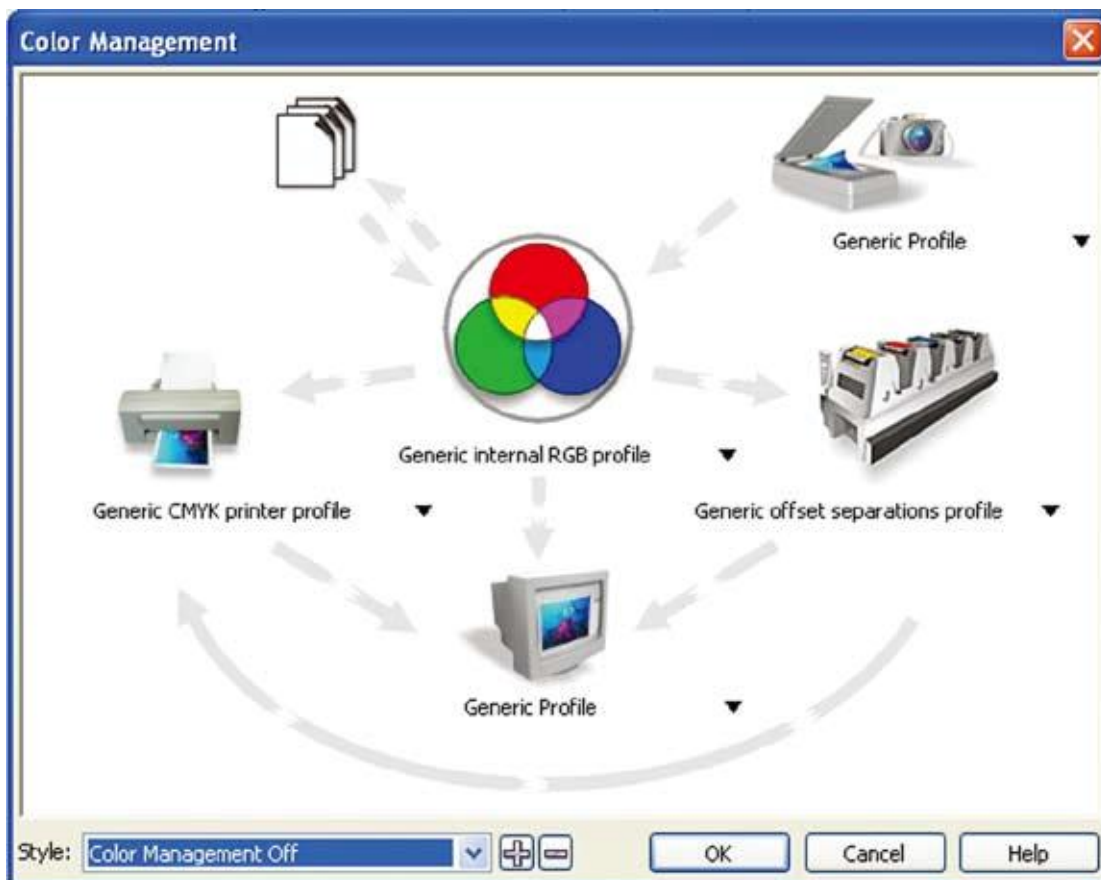
From your graphic software's Color Management page:

- 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.

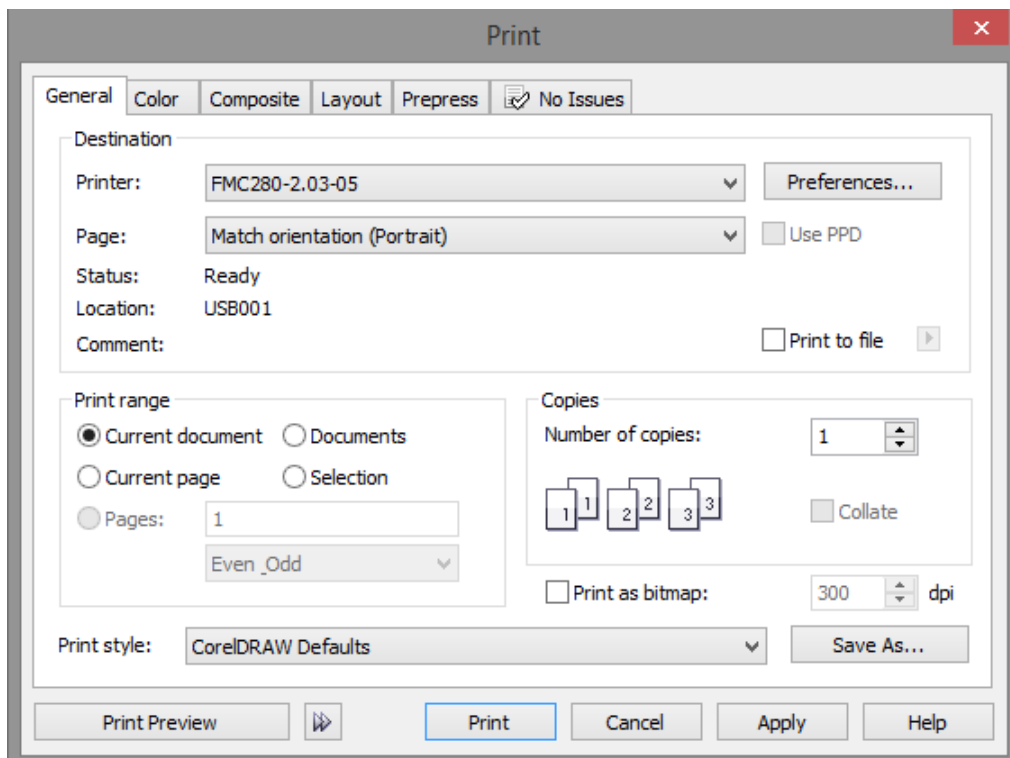
- 1) From the primary menu, click TOOLS → COLOR MANAGEMENT and CorelDRAW's Color Management will appear.
- 2) Under the Style pull down menu, select COLOR MANAGEMENT OFF.
- 3) Click OK to complete the color management adjustments.



5.3.3 Using the LaserPro FMC280 Print 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 LaserPro FMC280 Print Driver. The print 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 LaserPro FMC280 print driver by going to FILE → PRINT → PROPERTIES.



NOTE

For this screenshot example, CorelDRAW was used as the software application.

The LaserPro FMC280 Print Driver consists of five primary sections (pages) in which you will be able to choose cutting options and various settings:

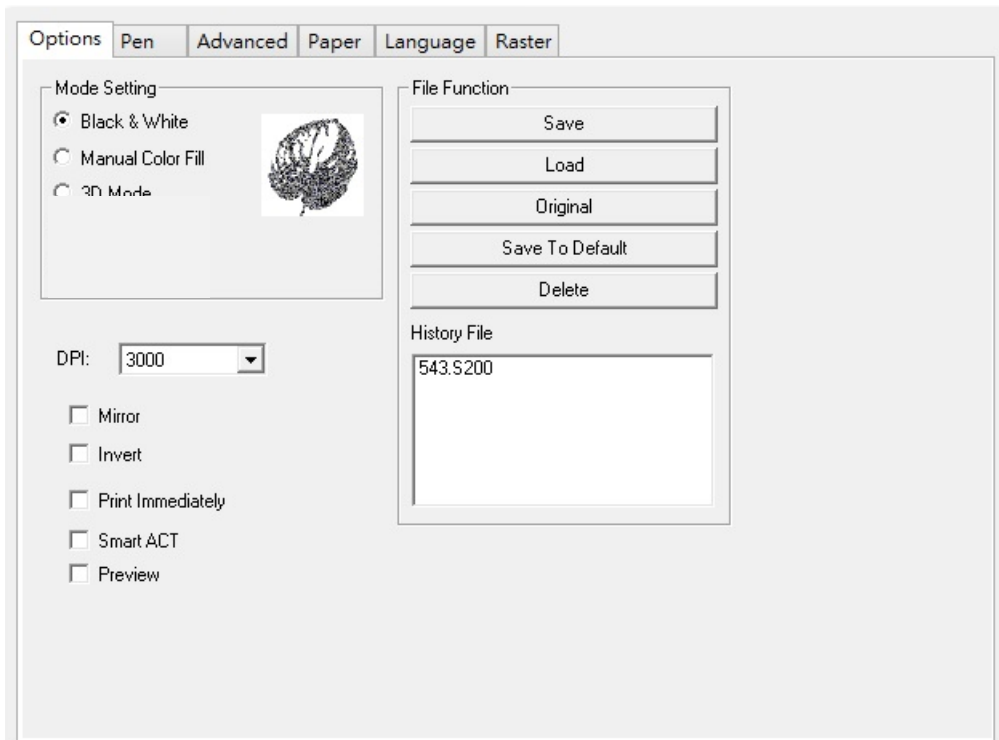
- Options Page
- Pen Page
- Advanced Page
- Paper Page
- Language Page



Tip

The following sections describe the specific functions for each of the settings found in the LaserPro FMC280 Print Driver. If you are new to laser cutting, it is recommended that you first familiarize yourself with the general principles of the laser process in Chapter 6. This will make it easier to understand the various descriptions and terminologies used in this section.

5.3.3.1 LaserPro FMC280 Print Driver >> Options Page



Mode Setting (Options Page)

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 GCC LaserPro print 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 GCC LaserPro Print Driver, allowing you to adjust advanced stamp-related settings.

Manual Color Fill

Specify laser type to different color pens. The GCC LaserPro print 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 Blue	50.0	50	400	YES	YES	NO	NO	0.0	0	1
12	Light 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:

DPI (Options Page)

DPI (dots-per-inch) represents the number of times the laser will fire over a one-inch path. Higher DPI settings result in more laser dot/ density over the path, result in powerful, cleaner, or deeper cuttings, but require more time to complete. Recommend to set the value to 3000 to obtain good cutting through edge.

The DPI setting also 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. 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	3000
Actual DPI	127	254	381	381	508	762	762	1016	1524	3048

NOTE

Outputting a full-table 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 full-table job using 300 DPI, recommend to move to the next higher DPI setting of 380. Similarly, for a full-table job using 600 DPI, we recommend to use 760 DPI.

Please note that when using Illustrator for output, the vector function supports a DPI range of 380 - 1500.

Print Immediately (Options Page)

Checking this will instruct the LaserPro FMC280 to immediately begin the laser cutting 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 machine and will need to be initialized from the LaserPro FMC280 control panel.

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 .FMC280_200 extension)
- **LOAD:** This function allows you load previously saved print driver parameters or LaserPro parameter database.
- **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.
- **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 .FMC280_200 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 2000 and above as your operating system, make sure you log in with an administrator or administrator-rights account in order to properly save laser parameter settings.

SmartACT (Options Page)

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

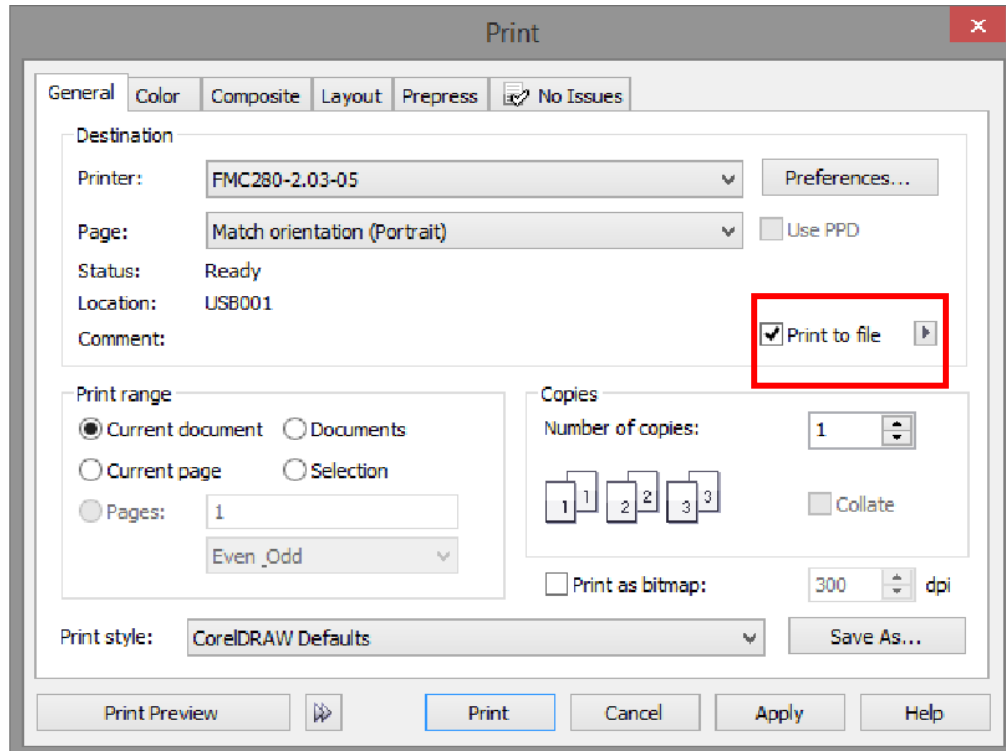


Tip

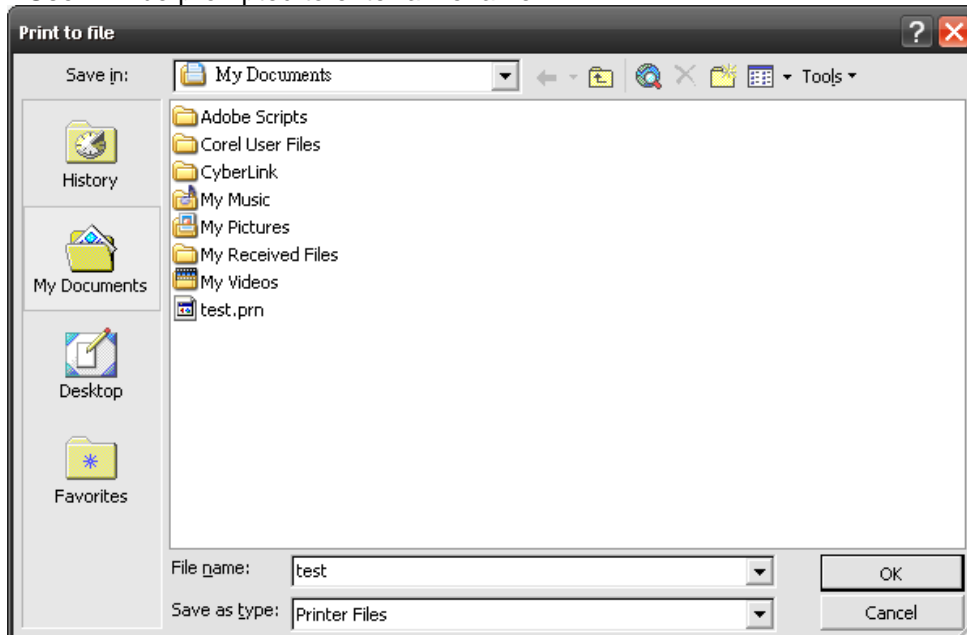
There is a greater performance gain when enabling SmartACT for designs that are vertically longer than they are horizontally wide, as the SmartACT optimization modifies the movement of the X-axis of the lens carriage.

Preview (Options Page)

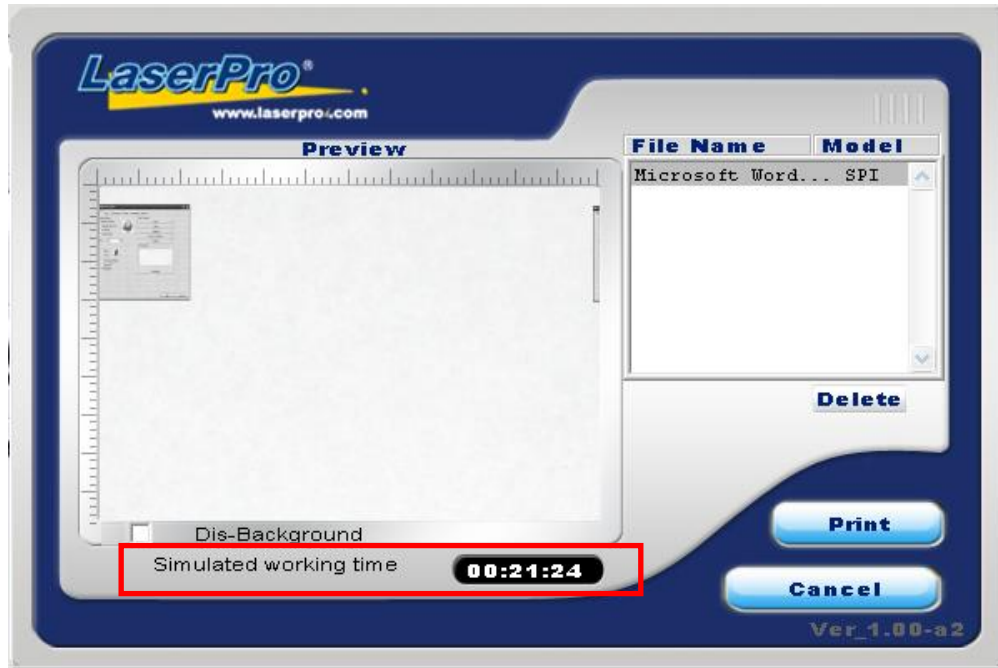
Users can use the Preview function to check a simulated output of the job. An estimated working time will also be shown. Please make sure to set the file printing option to “print to file” in order to activate the Preview function.



User will be prompted to enter a filename



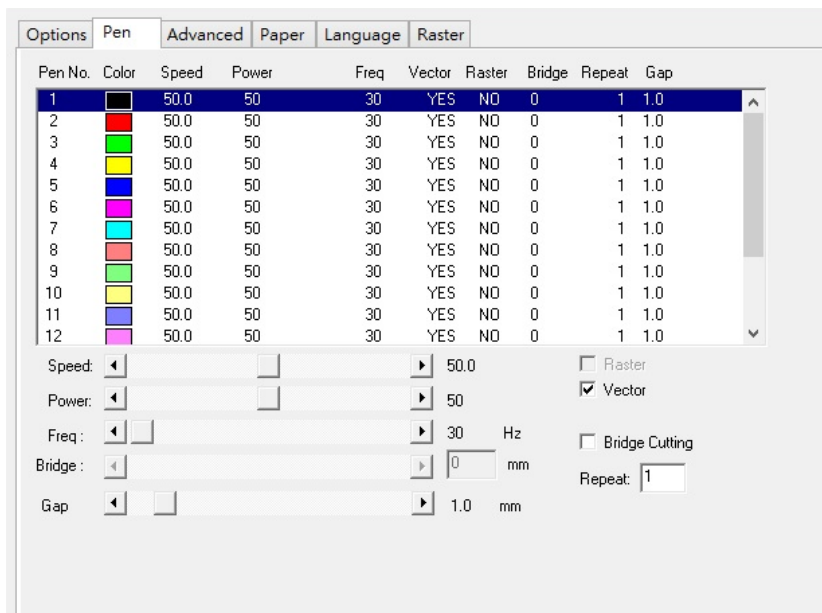
After entering the filename and pressing “ok”, the Preview screen will be shown.



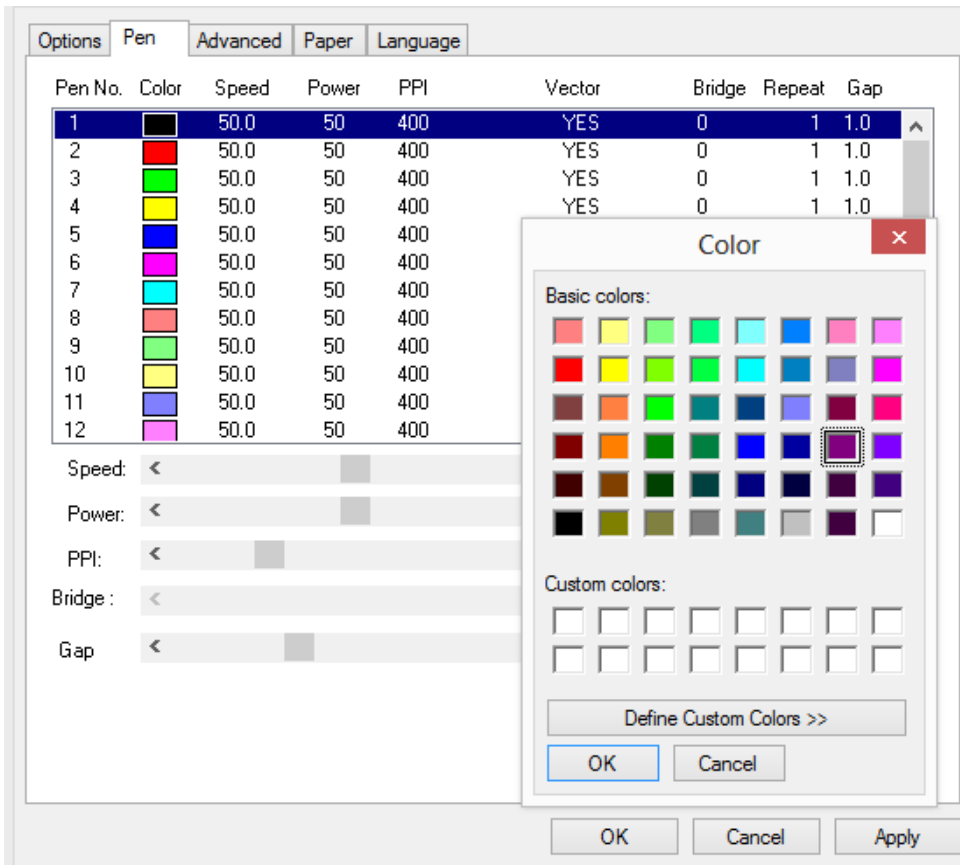
The output file can be previewed and a simulated working time of the job is also displayed. The working time is only estimation which might be slightly different from the actual working time

5.3.4.2 FMC280 Print Driver >> Pen Page

The LaserPro FMC280 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 LaserPro FMC280 print driver.



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 LaserPro FMC280 print driver cannot store more than 16 pen colors or different laser parameter

Speed (Pen Page)

The speed slider controls the laser’s speed during operation with settings ranging from 0.1 – 100%. Keep in mind, this is the speed the laser moves at when cutting or engraving straight lines. The machine will automatically slow down when processing curves.

Power (Pen Page)

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.

Tip



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

.....

PPI (Pen Page)

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).

Freq. (Pen Page)

Frequency (unit: Hz) stands for the Pulse Repetition Rate (PRR), it defines how many laser firing pulses within one second time period. The higher the Frequency is, the more laser pulses and smaller width (pulse duration) and less power energy per pulse. The frequency range for FMC280 is 10-2000Hz. For thermal sensitive materials, use smaller power setting while higher frequency to pierce the materials will get optimal cutting result.

Raster/ Vector (Pen Page)

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

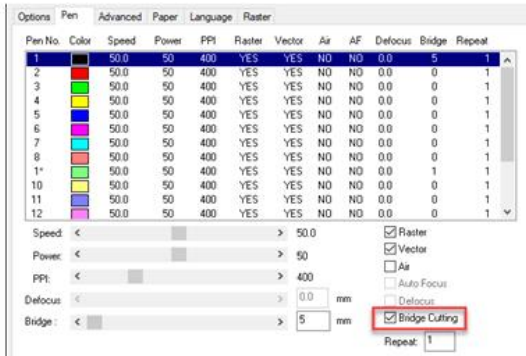
Checking the Vector checkbox will process the vector functions for the areas of your design that correspond to that particular “pen” color.

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.

	Vector Checked	Vector Unchecked
Raster Checked	Processes both Vector and Raster functions for that particular color	Processes only the Raster functions for that particular color (Vector functions ignored)
Raster Unchecked	Processes only the Vector functions for that particular color (Raster functions ignored)	Does not process Vector or Raster functions for that particular color

Bridge Cutting (Pen Page)

Checking the Bridge Cutting checkbox will allow users to easily create perforation lines (dash-line cutting). Once set 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 be the length of the connected lines of the perforation. If Pen 2 is selected, Pen 10 will be reserved and so on...)



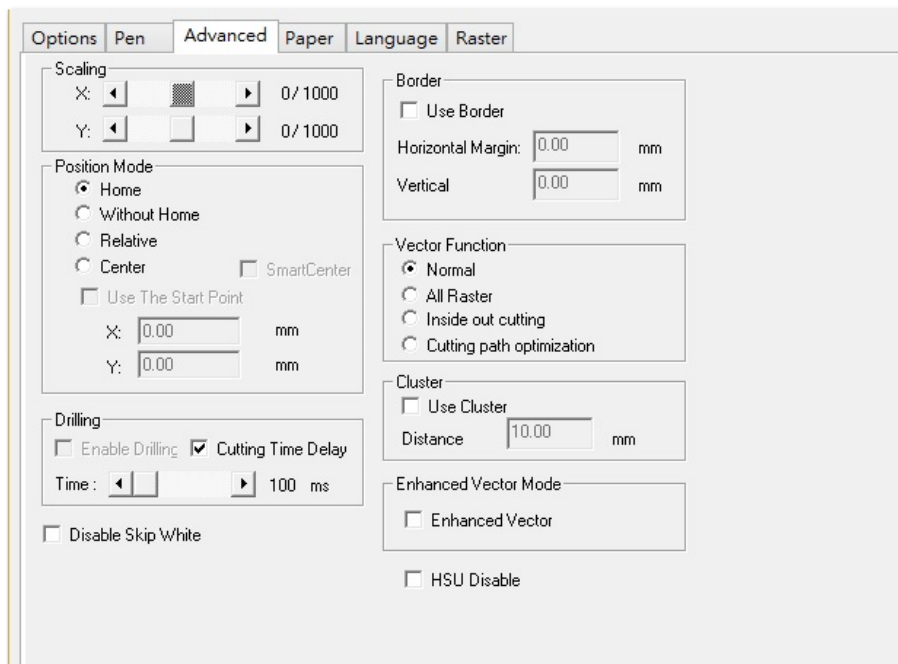
Gap (Pen Page)

Gap refers to the distance between material surface and nozzle of the lens carriage. Smaller gap can help to deliver stronger assisted gas through the cutting kerf, thus better cutting edge or more powerful cutting capability.

Repeat (Pen Page)

Enter the repeat numbers to the function box, the laser will re-do the job for specified times. Some cutting may require multiple cut passes to cut through the materials with optimum quality.

5.3.4.3 LaserPro FMC280 Print Driver >> Advanced Page



Scaling (Advanced Page)

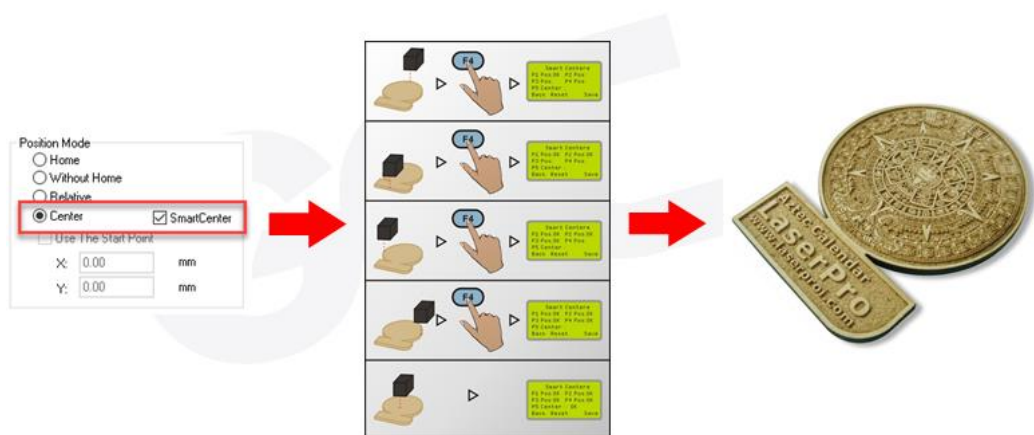
In some cases you may find a slight output inaccuracy in the actual output compared to what you have set in the computer. This margin of error or offset is extremely small (approximately 1/300). What this means is that there may be a 1-unit offset for every 300 unit increments. As an example, if you 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)

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 LaserPro FMC280 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. The SmartCENTER function is a great tool for users whose jobs often require engraving on specific locations.

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

- **Normal:** This selection will not apply any special advanced vector function to your job.
- **Inside out Cutting:** This setting will always automatically direct the laser to cut from the inner most vector shape and move outwards.



- **Cutting Path Optimization:** 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.



Enhanced Vector Mode (Advanced Page)

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.

Cluster (Advanced Page)

This setting allows you to change how the Spirit 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.

Cutting Time Delay (Advanced Page)


The cutting time delay will extend the laser firing time on the first pulse to successfully penetrate the materials. Drag the time bar to adjust the delay time.

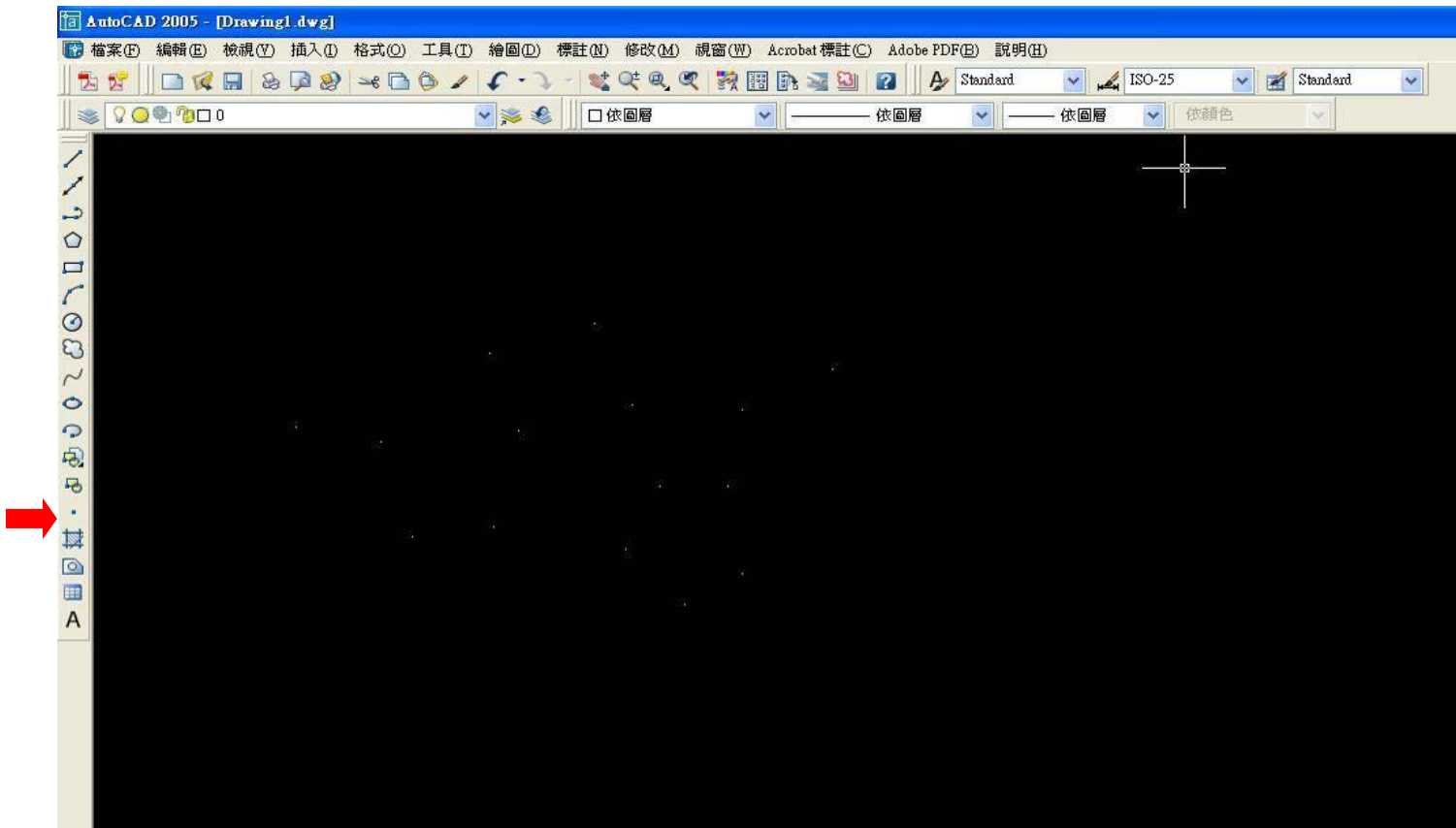
HSU Disable (Advanced Page)

When Black & White mode (Raster function) is selected, the HSU Disable function will automatically checked to turn off laser cutting head to automatically detect gap between working object and the laser cutting head. If the processed work area is not even, laser cutting head may collide to working piece, suggest to turn on HSU auto detection by unchecking HSU Disable function.

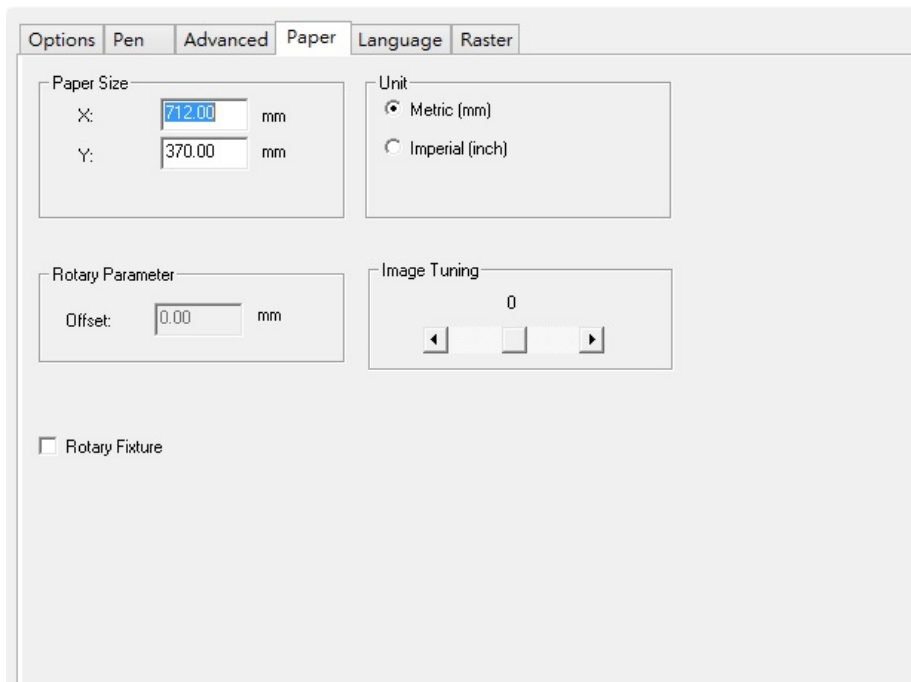
Drilling (Advanced Page)

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 "dot" 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.



5.3.4.4 LaserPro FMC280 Print Driver >> Paper Page



Paper Size (Paper Page)

The paper size represents your total work area. Ensure that the paper size is never set greater than the FMC280 work table area of 28" x 14.5" (732 mm x 356 mm). The X value represents the length and the Y value represents the width.

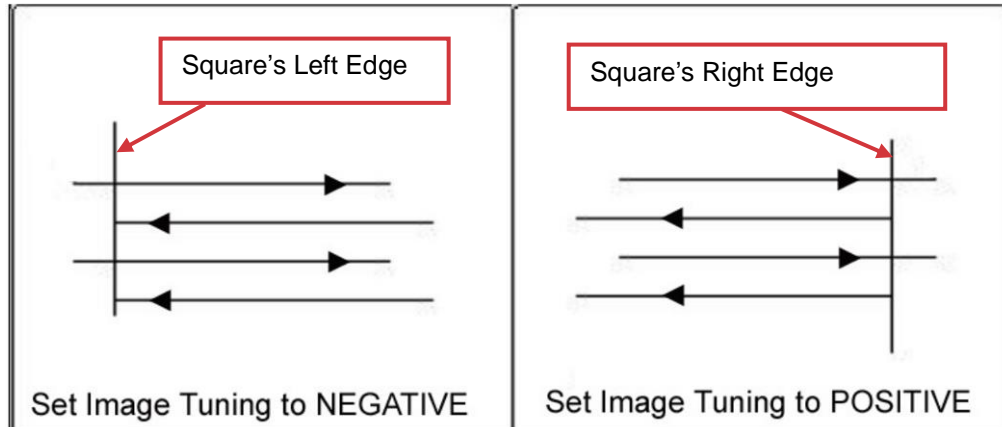
Unit (Paper Page)

Here you can set your preferred measurement standard in which you would like to use with the LaserPro FMC280 print driver. You can choose between metric or imperial standards.

Image Tuning (Paper Page)

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).



Rotary Fixture (Paper Page)

NOTE

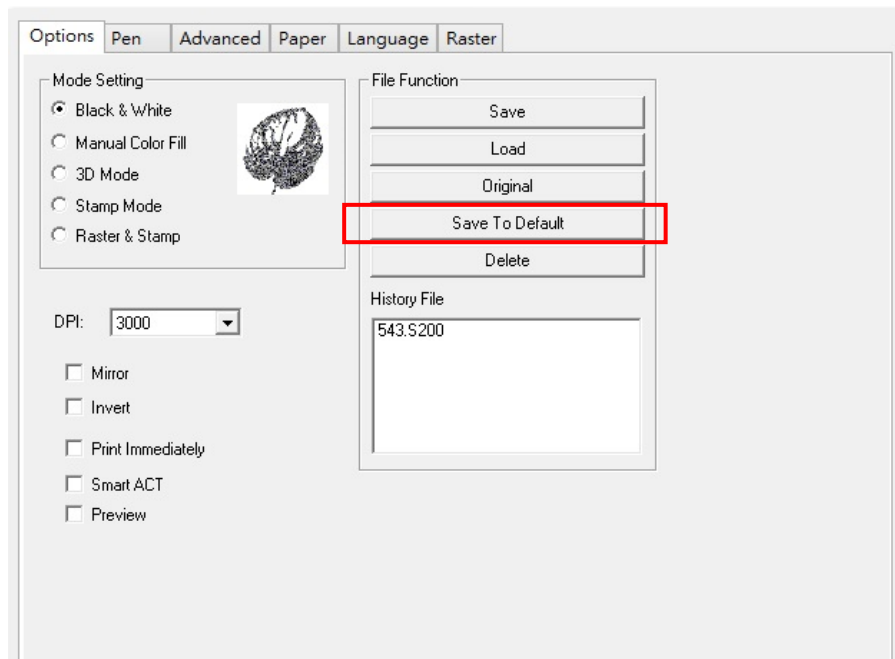
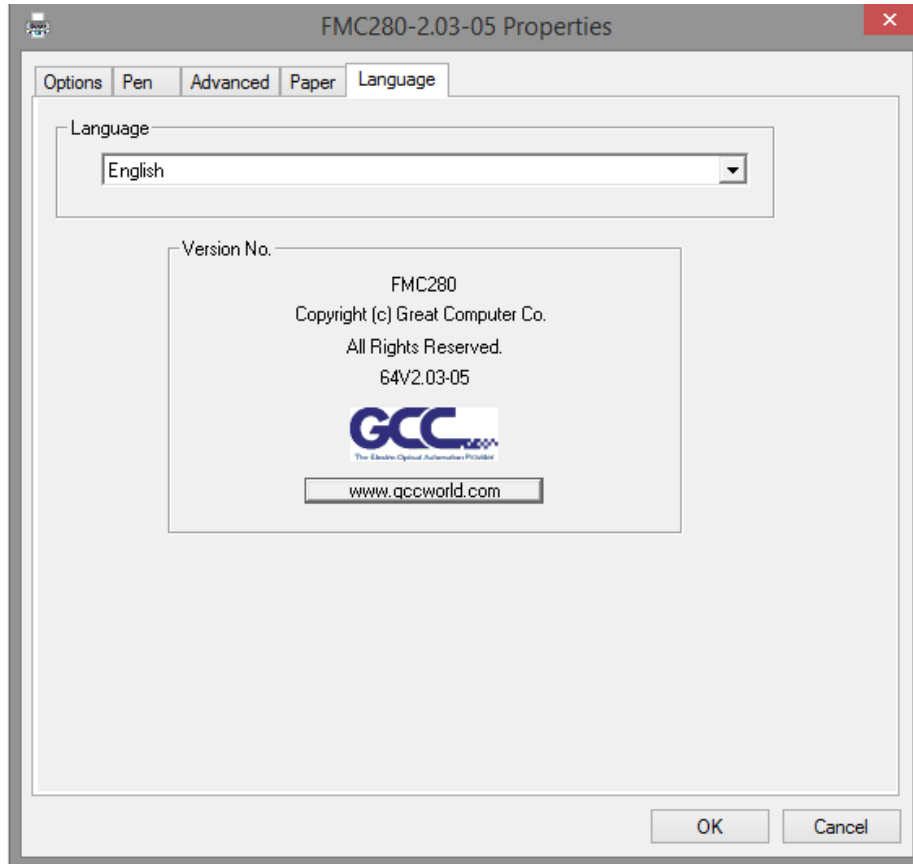
This option is only to be used with the Rotary Chuck optional accessory properly set up. For instructions on how to set up the Rotary Chuck, please refer to Chapter VII of this manual.

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 machine default origin to where you would like to start laser job. The default value is zero.

5.3.4.5 LaserPro FMC280 Print Driver >> Language Page

This page allows you to specify the language displayed by the LaserPro FMC280 Print Driver. Current language options available is English. Remember to click <Save To Default> button on Options page to active the language change.



5.2.3.6 LaserPro FMC280 Print 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.

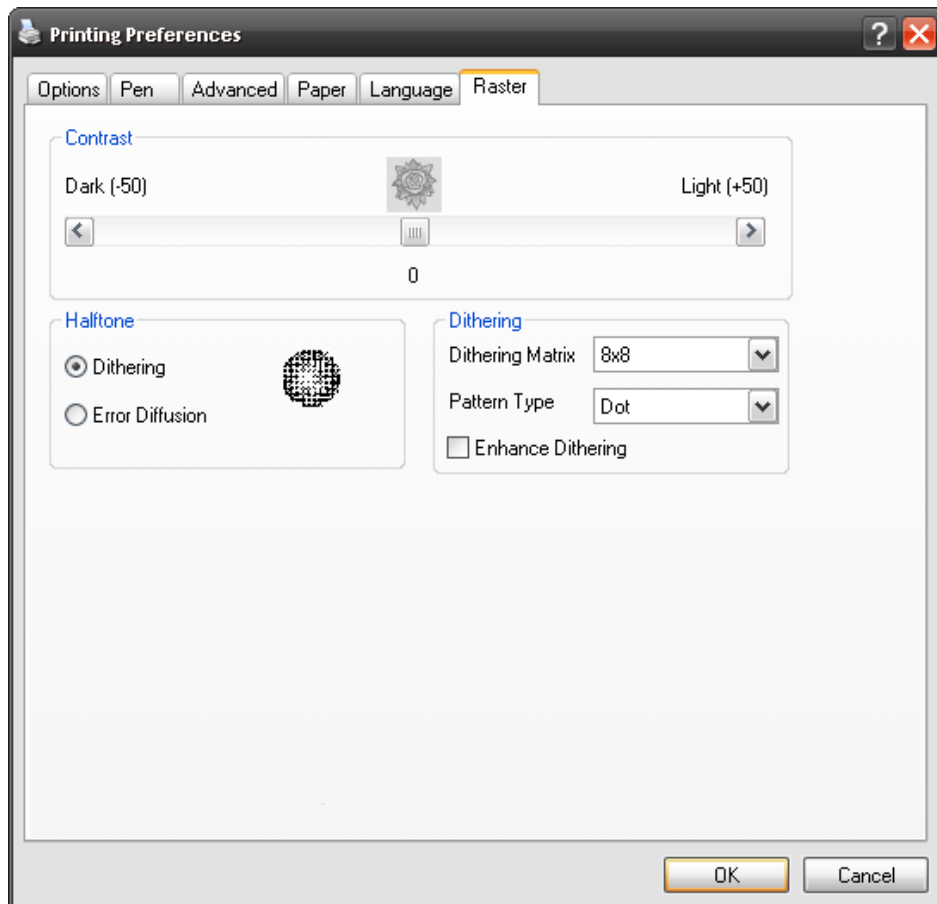
Contrast (Raster Page)

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)

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.

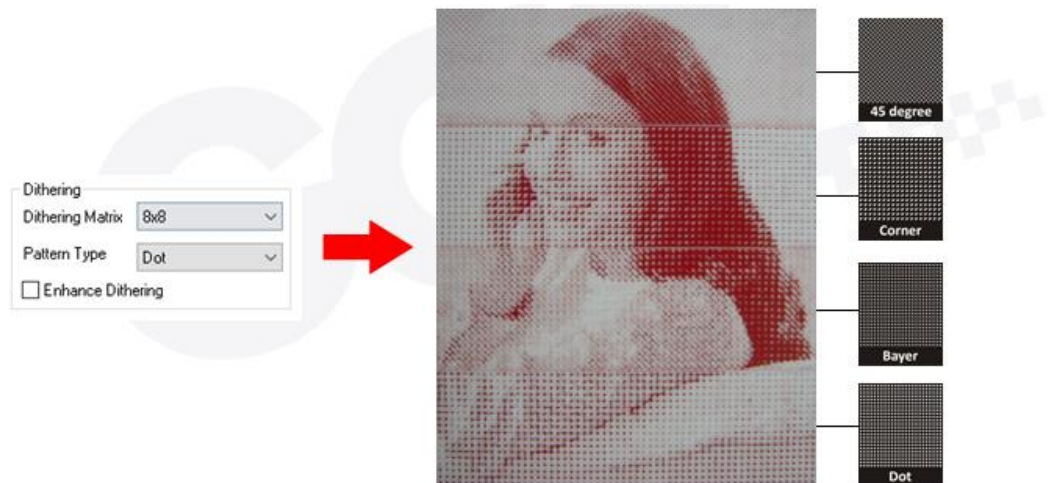
- Dithering: Interprets and outputs the raster engraving via the dithering method.

This mode will allow you to select the Pattern Type and Dithering Matrix, and Enhanced Dithering.

- Pattern Type: Dot, Bayer, Corner, 45 Degree

Each pattern type uses a different shape and arrangement of dots to compose the shading effect of a raster image.

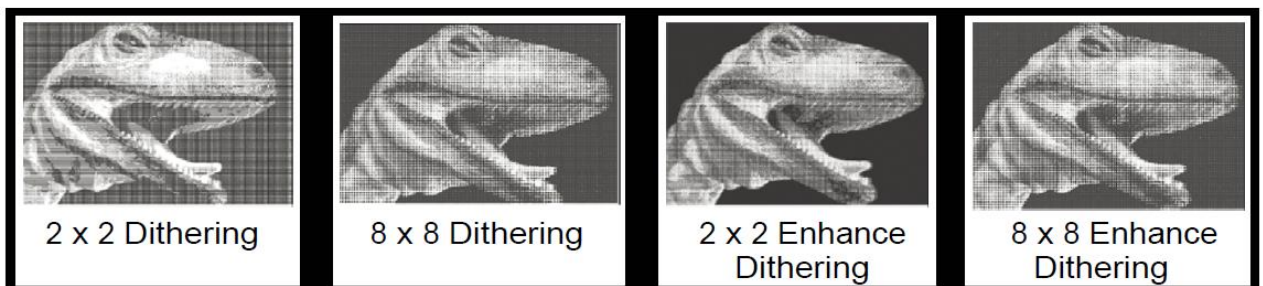
The following diagram is an example of the raster effects when using the different pattern types.



- 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]

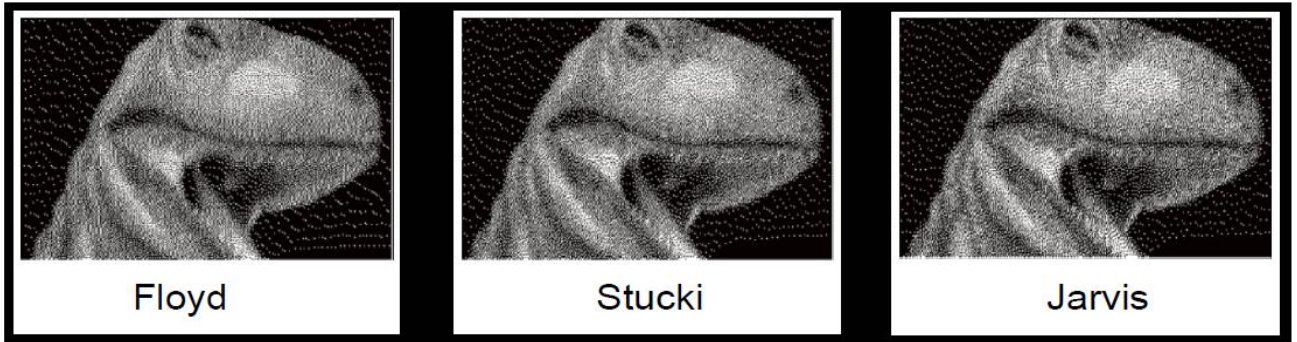
Selecting this will produce a finer dithering output.

- 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!

6

Chapter 6

Cutting Techniques

Vector Cutting

Cutting Large Work Piece

3D Tips

Modify Image Settings of Picture for
Better Engraving Quality

6.1 Vector Cutting

A 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 is cutting as shown below.



The LaserPro FMC280 Print Driver determines which sections should be 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)

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. Set up the laser driver parameters and "print" your job (output the file to the LaserPro FMC280) and watch as your string of characters is vector cut.

Parameter Settings Reference:

Material	Thickness	Air Nozzle	Gas	Gas Pressure	Focus Setting	DPI	Freq.	Gap	PPI	Time delay	Enhanced Vector	Power	Speed
SUS304	3.0 mm	Ultra	Nitrogen	260 psi	4.75	3000	100Hz	0.4mm	X	100ms	Yes	100%	1.4%
Copper	0.5 mm	Fine	Oxygen	100 psi	2.25	3000	100Hz	0.5mm	X	100ms	Yes	100%	1%
Copper	2.0 mm	Fine	Oxygen	160 psi	2.00	3000	100Hz	0.5mm	X	100ms	Yes	100%	3%
Aluminum	3.0 mm	Fine	Oxygen	140 psi	4.50	3000	100Hz	0.5mm	X	200ms	Yes	100%	1.5%
Silver **	0.5mm	Fine	Nitrogen	200 psi	1.0	1500	100Hz	0.3mm	X	300ms	No	100%	0.2%
Silver **	1.0mm	Fine	Oxygen	120 psi	1.0	1500	100Hz	0.4mm	X	200ms	No	100%	0.2%

*above parameters are only for reference, adjust it to gain optimal result.

** Two passes applied for silver cutting

6.2 Cutting Large Work Piece

When processing large piece materials than sheet metal like molded engineering parts, follow below procedures for setup. Youtube video is also available for quick reference

https://www.youtube.com/watch?v=dEHyzKPzU_Q



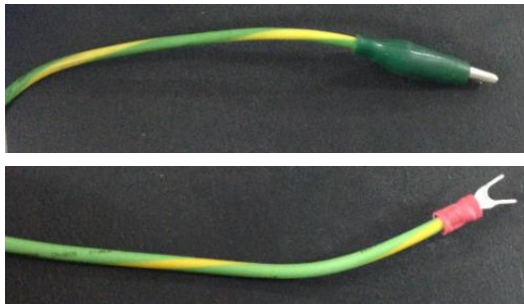
Step 1. Remove all the supporting bars on working platform with screw driver



Step 2. Lower down the work table by pressing DOWN arrow key on control panel then place the working piece to the table.

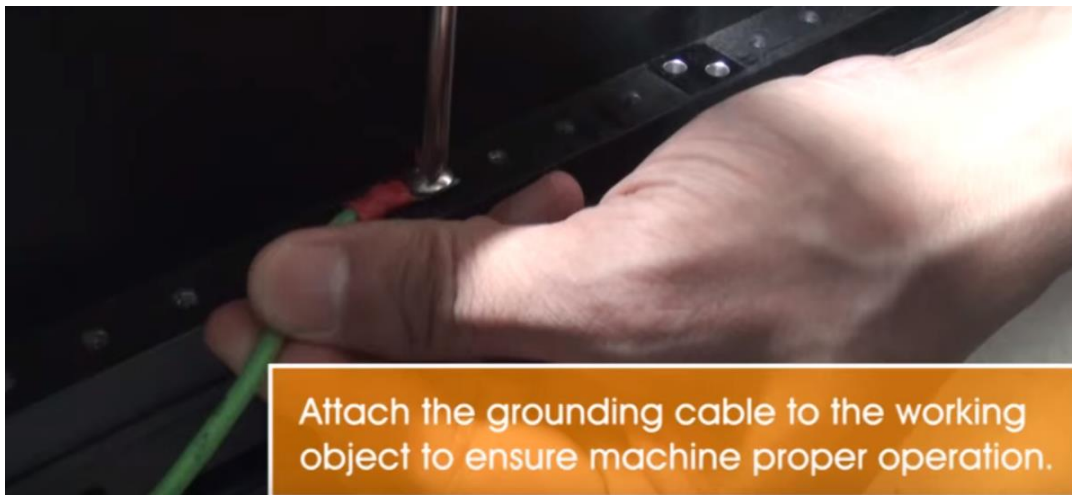


Step 3. Take out the grounding cable from accessory box. Attach one end of the cable to the metal frame of work table with screws and the other end to work piece to ensure proper grounding for machine protection.



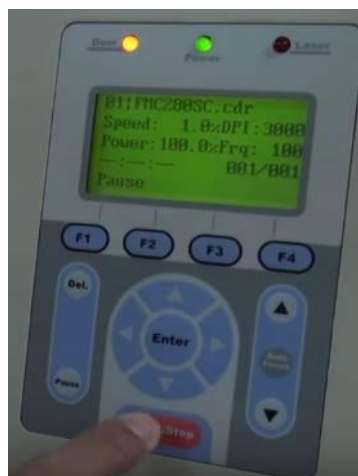
Attach the clip end of grounding cable to work piece. Remove the painting of work piece where clip the cable.

Connect the Y shape end of grounding cable to the frame of work table with screw.



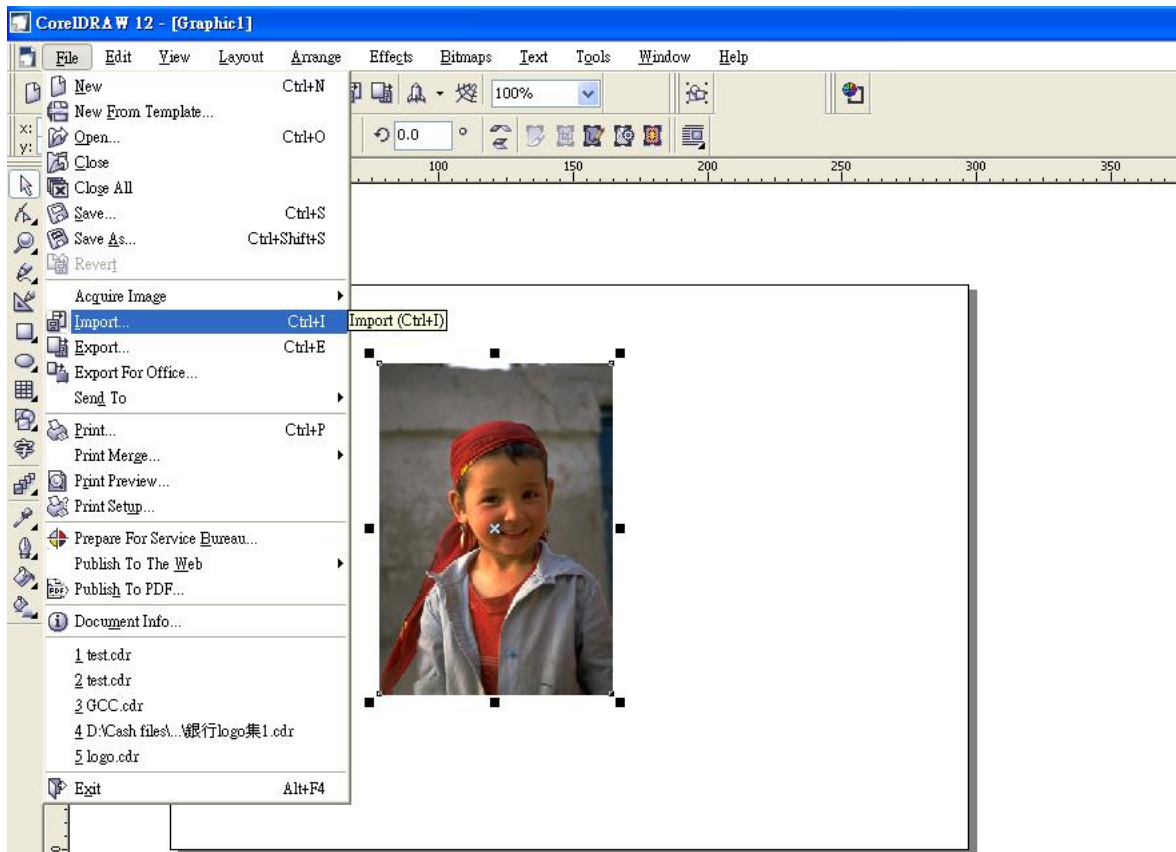
Step 4. Press AutoFocus button on control panel, FMC280 laser system will automatically find the optimum focal distance for best laser cutting quality.

Step 5. Set up the laser parameters on LaserPro print driver and press START button on control panel to start laser jobs.

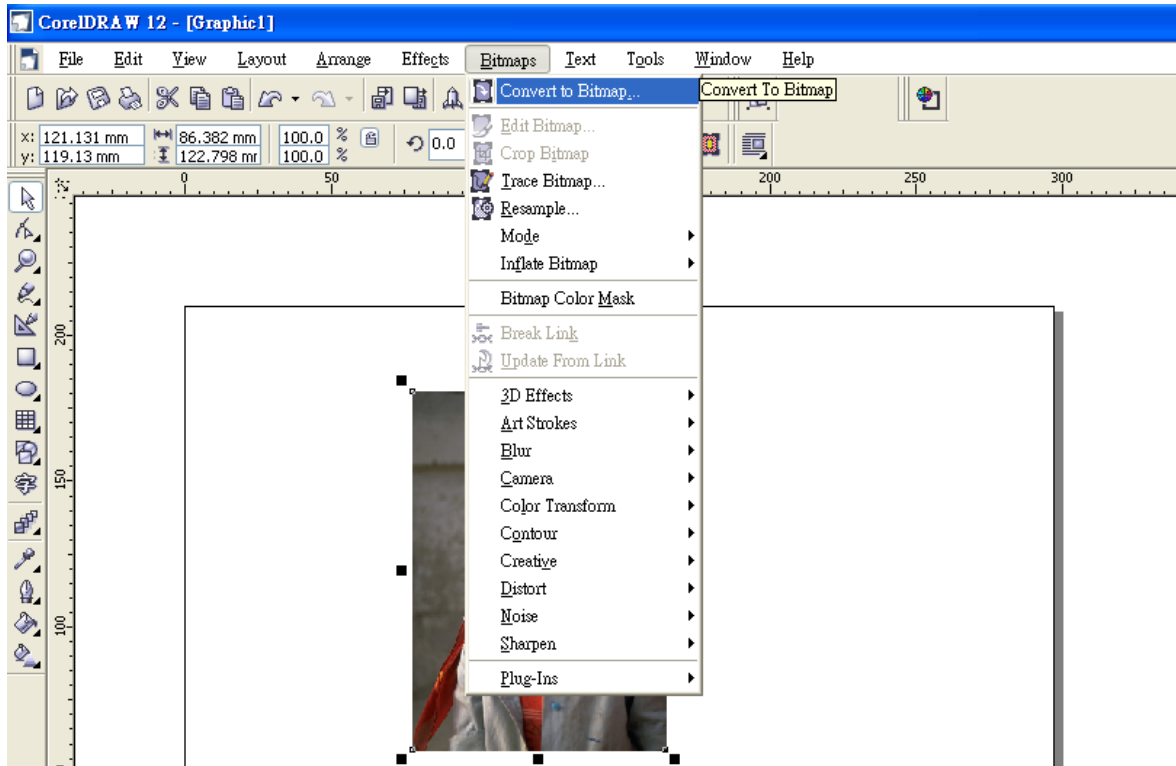


6.3 Modify Image Settings of Picture for Better Engraving Quality

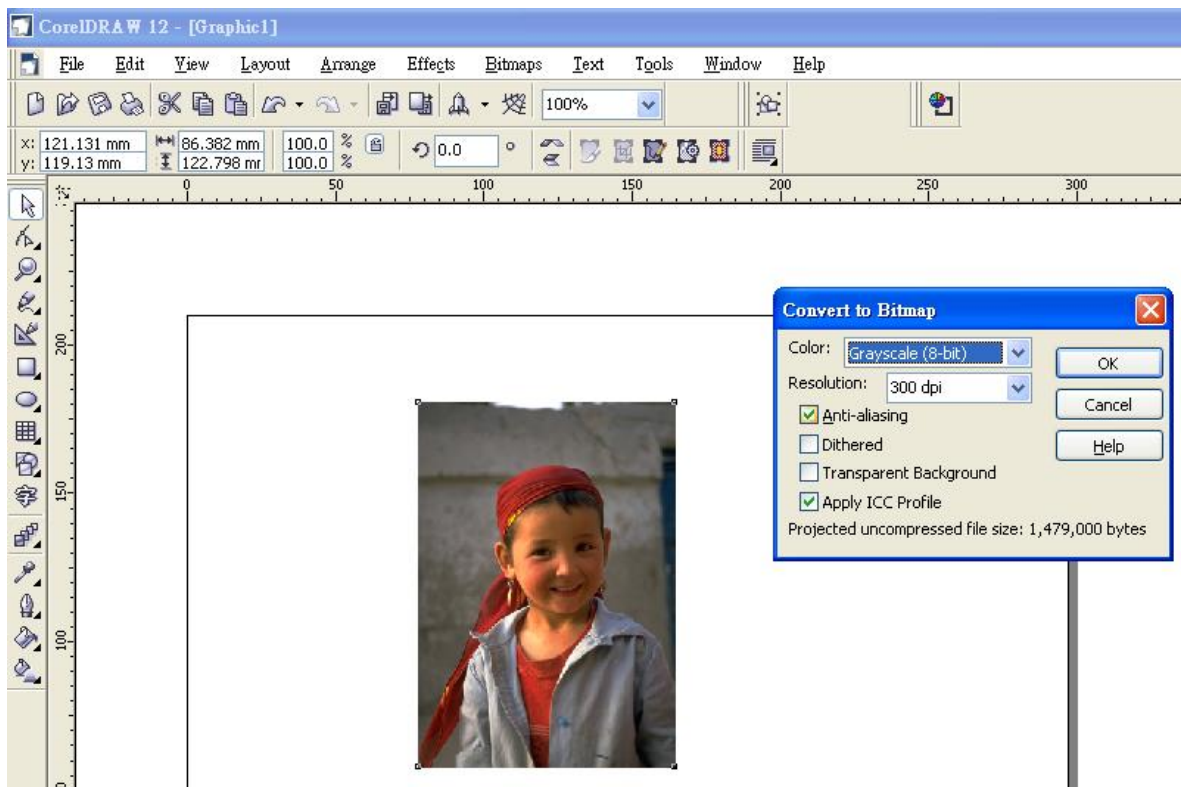
1. Connect your digital camera to the computer by USB cable.
2. Download the picture from the digital camera to the computer
3. Select the picture that you want to engrave.
4. Import the image from the folder where the picture is located by selecting File/Import



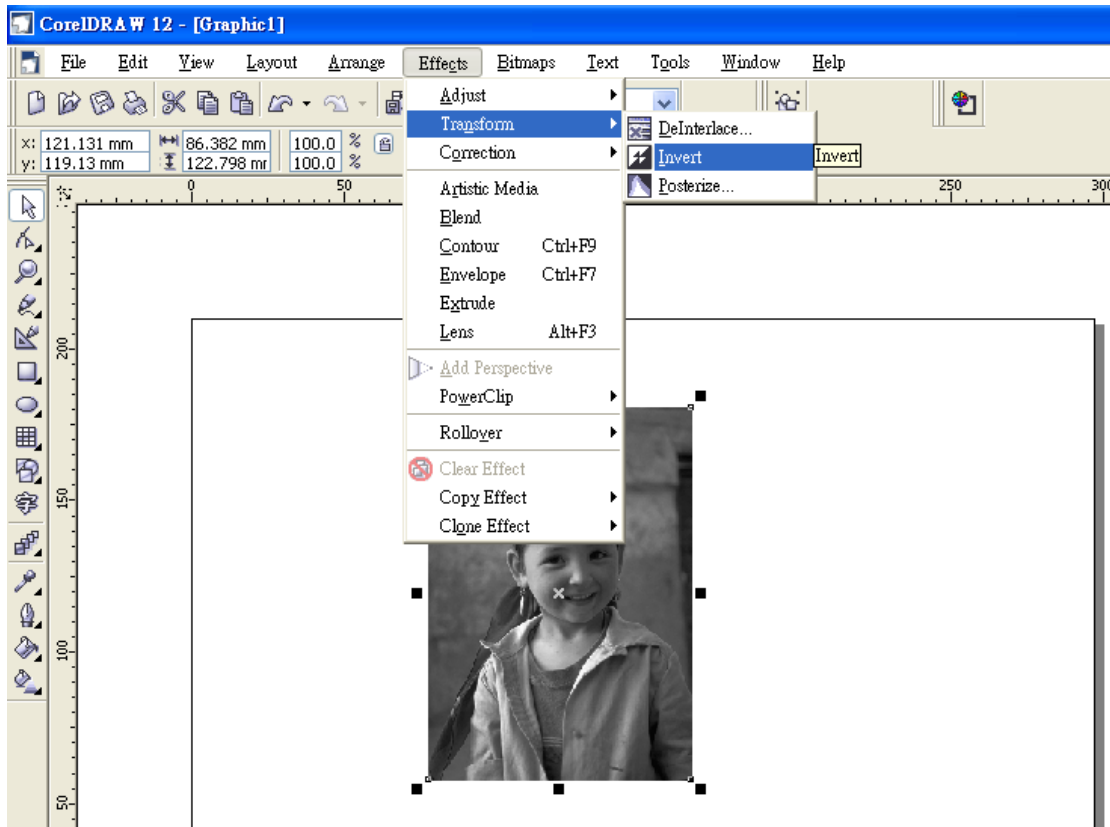
5. Convert the image to Bitmap by selecting the image and click on Bitmaps/Convert to Bitmap



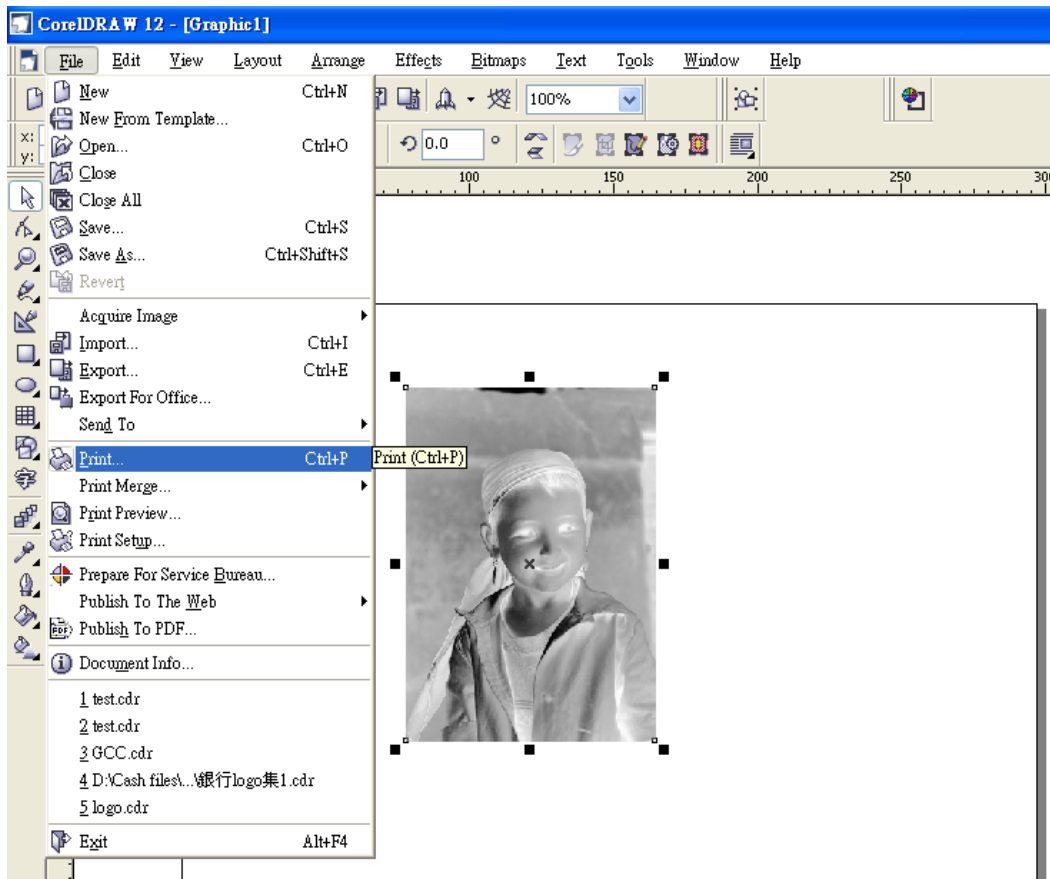
6. Change the Bitmap settings by setting “Color” to Grayscale (8-bit) and “Resolution” to 300 dpi and click OK.



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 Air

Extraction System Option

Rotary Chuck Option

When purchasing the LaserPro FMC280 from your local authorized GCC distributor, you will be provided with a chance to purchase optional items to enhance your experience with the acquired system. If anytime after the purchase of your LaserPro FMC280, should you ever consider to purchase any optional item, please contact your local authorized GCC distributor.

7.1 Fume Extraction System

To properly remove potentially combustible dust, vaporized materials and chemical smoke from the working area and machine, it is REQUIRED to connect an explosion-proof fume extraction system to work with GCC LaserPro FMC280 laser machine if the room working space is under 2.5m³ (88.28ft³).

Example of potentially combustible metal dust including Aluminum, magnesium (Mg), Aluminum alloy, Mg alloy, Al-Mg alloy, and any other Oxygen assisted metallic cutting process. If there is a sufficient concentration of these substances, mixed with air, an ignition source can cause an explosion.

The fume extraction system can help to take away metallic debris and powder generated during laser processing to prevent high concentration of combustible dust accumulated within the work table. You can source fume extraction system locally meeting below specification with CE and ATEX Zone 22 compliance for Europe, and American Explosion regulation of Class 2 Division 2. Depureco from Italy is one of the vacuum extraction systems we would recommend, you may contact Depureco local dealer for more product selection information and installation guiding.



<http://www.depureco.com/ATEX-3D-Z22-Industrial-Vacuums/TBz22-ATEX-II-3D>

Model No.	TBz22 ATEX II3D
Power	2,2 KW (3.0 HP)
Air Flow	280 mc/hr
Max. Vacuum	230 mBar / 23kPa
Hazardous Approval	ATEX Zone 22; America Explosion regulation of Class2 Division2

INSTALLATION (Self-Assembled Unit):

- 1) Purchase an explosion-proof exhaust ventilation system at your local representatives, we suggest that you have a contractor install the exhaust system.
- 2) Connect the fume exhaust system in an obvious and accessible location, not too far from the FMC280 laser system, so it can be routinely switched on prior to laser processing. The maximal distance you should mount the air exhaust system away from the LaserPro FMC280 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 the LaserPro FMC280. (As shown in the picture below). Try to keep this tubing as straight as possible due to bended air tubing will reduce the exhaust efficiency. Use the appropriate sized tube clamps and sealants to ensure a tight and secure attachment.



7.2 Rotary Chuck

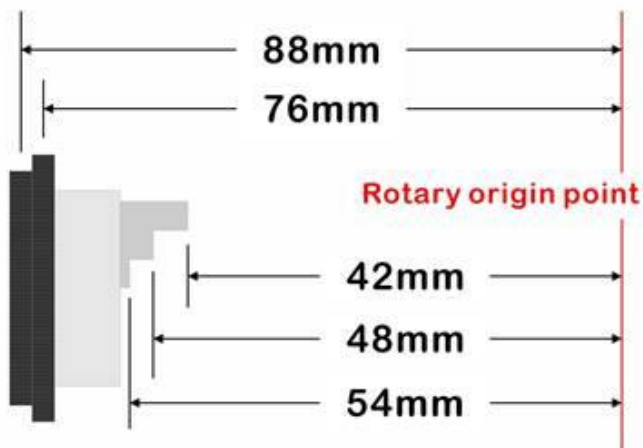
The Rotary Chuck option provides the FMC280 laser system with the ability to engrave on cylindrical or spherical objects. In addition to the standard X, Y, Z axis, the rotary chuck allows for a fourth axis which rotates the working object up to 360° to allow for engraving & cutting on cylindrical or circular objects.



Work Piece Limitations	
Maximum Length	375 mm (14.76 inches)
Maximum Loading Weight	4 kg (8.8 lbs.)
Minimum Diameter	20 mm (0.79 inches)
Maximum Diameter	65 mm (2.56 inches)

The position of FMC280 rotary origin point

Once install rotary on FMC280, the origin point will be adjusted in order to prevent capacitive cutting head from hitting to the object automatically. Please refer to below picture to understand the position of FMC280 rotary origin point.

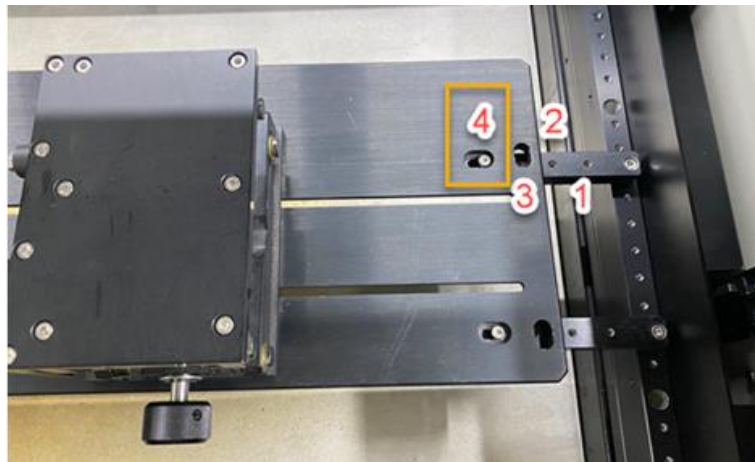


INSTALLATION:

- 1) Power off the FMC 280 laser system.
- 2) Install two Supporting Bars to the middle of working table, align them to the marked screw holes on the table frame as shown below.

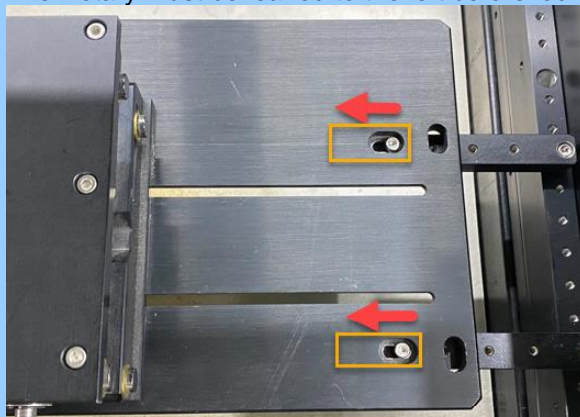


- 3) Put the Rotary Chuck on top of the two Supporting Bars in step.2. Align and fix the Rotary Chuck to the No. 4 screw opening on the Supporting Bars.

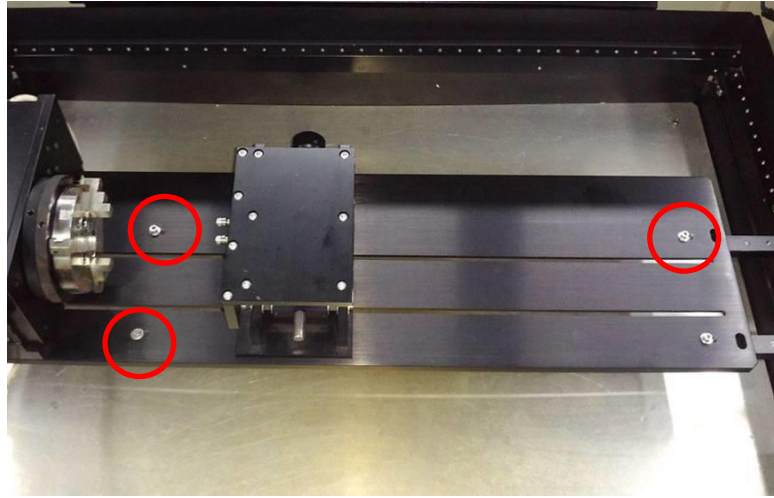


NOTE

The Rotary must be leaned to the left before locking the screw.



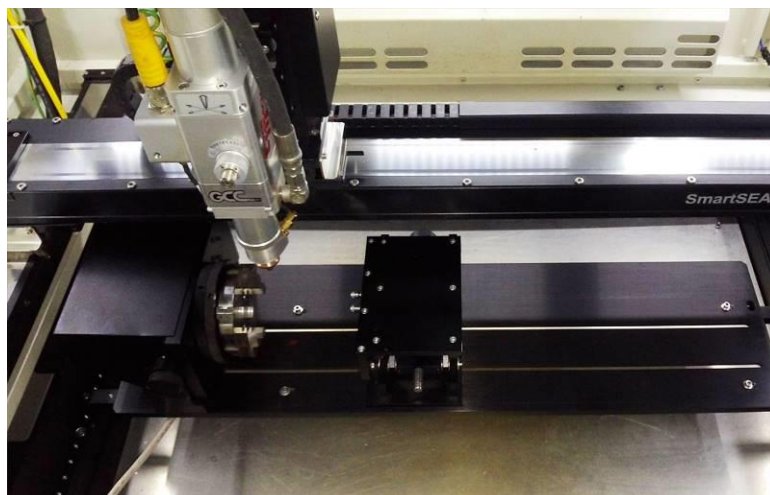
- 4) Fix the other three screws accordingly.



- 5) Open the front door of the FMC280 laser machine and connect the Rotary Chuck cable to the connection port located on the machine chassis, and close the front door.



- 6) The Rotary Chuck now is properly installed. Power on the FMC280 laser system, the Rotary Chuck will be automatically detected, the working table will move to its proper position.





CAUTION

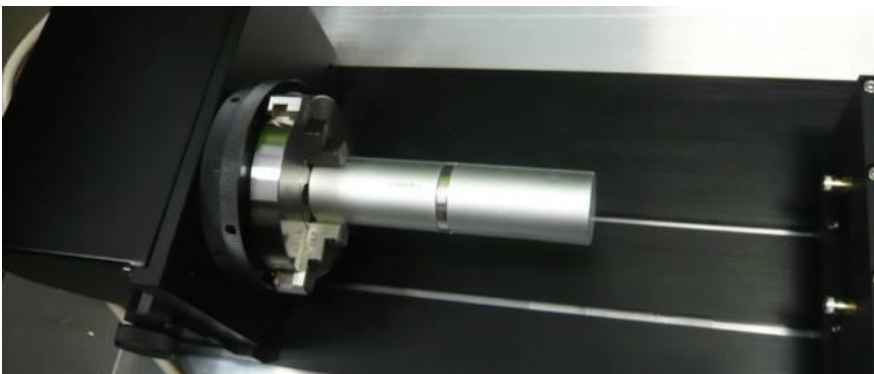
Please make sure that the laser cutting head will not collide with the Rotary Chuck prior to start work by lowering the work table down first.

LOADING OBJECTS:

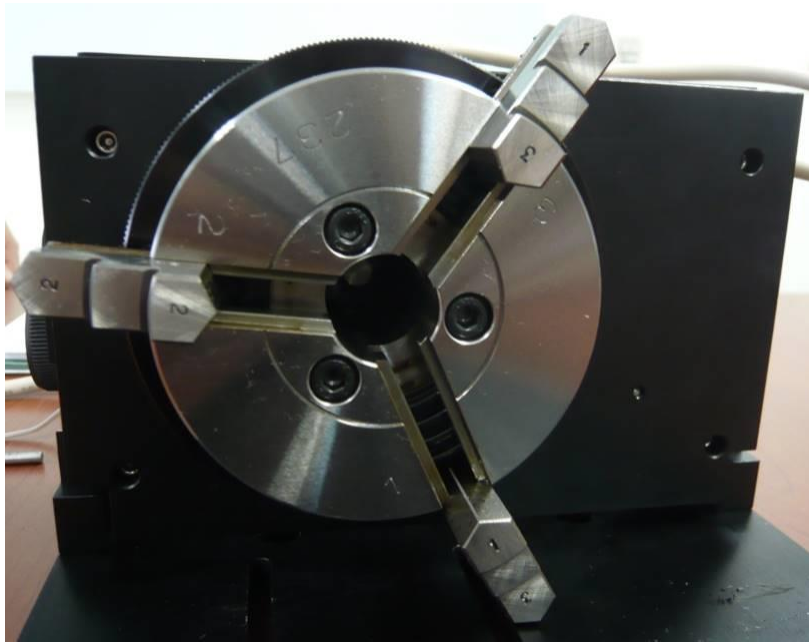
To load the working object to Rotary Chuck, you can use the enclosed tools to widen or tighten the metallic claws. Simply insert the two metal pins into the holes on the turn-dial and turn it to widen or tighten the claws to hold the working object.



There are two different ways that the Rotary Chuck can hold an object, by sliding the clamps inwards or outwards to hold the object as shown below.



The clamps on the Rotary Chuck can be detached and reverted for better fitting objects with different sizes. Note that the clamps should be assembled by lining up the correct numbers.



Please remember to lubricate the detachable clamps along the groove with machine oil regularly after each use.



The rear end of the Rotary Chuck also can be locked or unlocked to slide its position by using an Allen key as shown below.

Dial the lever indicated with red arrow below to move up or down the rear end which will adjust its leveling to match clamping end. The red circle marked leveling screws can be removed and reassembled to different height level of openings with Allen key.



OPERATION:

- 1) Use a ruler to measure the diameter (at the point on the work piece where it will process laser engraving or cutting) and length of the work piece. Make a record of this.
- 2) Unlock the adjustable rear end of the Rotary Chuck, load the work piece onto the Rotary Chuck by centering the object to the clamping end and adjustable rear end. Adjust the leveling screws on the rear end of Rotary Chuck to make sure the work object is centering to the clamping end, thus work piece is horizontally leveling to the HSU laser cutting head in X axis. Slide the adjustable rear end to accommodate the length of the work piece firmly.
- 3) Manually move the HSU laser cutting head to the proper X/ Y location on the object where you will do laser engraving or cutting. Hit the Auto Focus button on control panel and the FMC280 laser machine will now properly focus at the location to be laser engraved or cut.
- 4) Prepare the graphic you would like to work with the Rotary Chuck, print it to GCC laser Print Driver, and go to "Paper" page of the Print Driver.

The screenshot shows the 'Paper' tab of the GCC Laser Print Driver. It contains several input fields and options:

- Paper Size:** X: 712.00 mm, Y: 370.00 mm
- Unit:** Metric (mm) (selected), Imperial (inch)
- Rotary Parameter:** Offset: 0.00 mm
- Image Tuning:** 0
- Rotary Fixture:**

- 5) From the Paper Page, the first thing you must do is to check the Rotary Fixture. The Paper Size options and Rotary Parameter will change to allow for proper input based on your Rotary Chuck.
 - a) Under Paper Size, the X value represents the length of your working piece. Enter the length of your work piece in this field.
 - b) Under Paper Size, the Diameter value represents the diameter of your working piece where the laser works. Enter the diameter of your work piece in this field. Again remember the proper diameter value would be the diameter location on your work piece you will do laser engraving or cutting.
 - c) Under Rotary Parameter, the Offset value represents distance from machine default origin to where you would like to start laser job. The default value is zero.
- 6) Go back to other pages of GCC Laser Print Driver to set up laser parameters like speed, power, dpi and frequency etc. (refer to Chapter V of user manual of laser machine for details) and click "OK" to print your design to FMC 280 laser machine for starting job.

NOTE

The maximum diameter and length of the work object is 120 mm and 410 mm respectively. Its maximum weight should not exceed 4 kg.

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 LaserPro FMC280 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 worktable, 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. Clean the machine work table, drawer, lens on weekly base for normal usage case.

WARNING

- Electrical shock may occur if you do not turn off and unplug the LaserPro FMC280 before cleaning.
- Damage may occur to the system if you do not turn off and unplug the LaserPro FMC280 and turn off laser power supply by key before cleaning.
- Always turn off and unplug the LaserPro FMC280 and turn off the laser power supply by key 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
Light Grade Machine Oil	
Cotton Swabs	Supplied
Lens Cleaner	1pc supplied, suggest source local supply*
Lint Free Lens Tissue	Supplied
#2 Phillips Screw driver	
Allen Wrench .050"	

*The recommended lens cleaner is Eclipse Cleaning System Solution from Photographic Solutions or HPLC grade Methanol. Search "Eclipse Cleaning System Solution" on Amazon or eBay to get the solution locally.

<http://www.amazon.com/Photographic-Solutions-ECDCS-Cleaning-Solution/dp/B0000AUR11>



Eclipse Cleaning System Solution

8.2 Maintaining the Work table



WARNING

Anytime you have the window open, always make sure you have properly engaged the window on correct position of the metal support rails. Failure to do so may pose a crush risk if any part of your body is within the vicinity of the work area.

8.2.1 Cleaning the Work Table System

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

- 1) Turn the power off, release the gas, and unplug the LaserPro FMC280 before cleaning.
- 2) Use a vacuum cleaner with a flexible nozzle to remove dust and debris from the work table.
- 3) Use a vacuum cleaner to clean the drawer as well.



CAUTION

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

8.3 Cleaning the Optics System

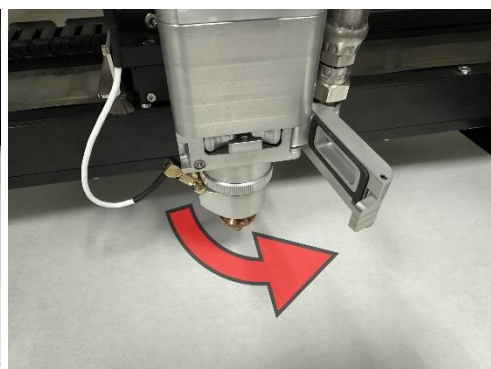
8.3.1 Removing the Protection Window

We recommend that you check the Protection window and Focal lens once or twice per day to see if they require cleaning. If any debris or smoke residue is present, use the following steps to clean them. The following section will illustrate the location of the lenses found in the machine for cleaning. Below steps will teach you how to clean and all operation procedures need to be very careful.

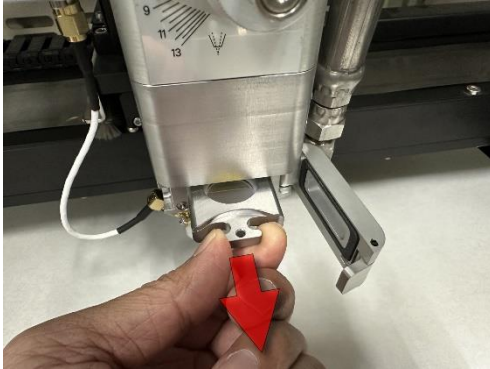
Protection Window

The protection window is located inside the carriage of the LaserPro FMC280.

- (1) Wash your hand before you are doing any cleaning operation and all procedures need to process under clean environment with the air conditioner.
- (2) Press the latch of the protection window to open the cover.



- (3) Pull out the protection window.



- (4) Use Lens Cleaning Blower in the accessory box to blow away dust or residue from the window surface.
- (5) Place a lens cleaning paper on the protection window then remove the cover slide from the drawer by applying pressure with your fingers to the surface with the cleaning paper of the cover slide, opposite the seal ring. The seal ring and cover slide will pop out.
(SAVE THE SEAL RING if it is without any damage.)
- (6) Drape a new sheet of lens tissue over the mirror.
- (7) Apply a few drops of lens cleaner on the tissue-covered mirror (apply enough so that the tissue absorbs just enough solution to cover the mirror surface).
- (8) Pull the tissue across the mirror in only one direction.
- (9) Repeat cleaning if the mirror is not completely clean after the first attempt.
- (10) Ensure the mirror is completely dry before reinstalling it. The air blower in the machine accessory box can help to dry the lens after cleaning.
- (11) After proper cleaning, install the cover slide by placing it into the Cover slide. Replace with a new seal ring if it appears to be damaged.
- (12) Insert the protection window into the head and close the cover. Please make sure the latch of the cover is locked on the head completely.

9

Chapter 9

Appendix

LaserPro FMC280 Specification Sheet

9.1 LaserPro FMC280 Specification Sheet

Model	FMC280 Z1
Laser Source	1070nm fiber laser source, 1.5kW peak power
Work Area	28 x 14.5 in. (712 x 370mm)
Max. Part Size (W x L x H)	30.9 x 21.3 x 4.7 in. (786 x 542 x 120 mm)
Dimensions	44.3 x 28.3 x 70.8 in. (1125 x 720 x 1800 mm)
Cooling	Air Cool
Drive	Closed-loop DC Servo Control
Speed Control	Adjustable from 0.1~100% (Up to 16 color-linked speed settings per job)
Power Control	Adjustable from 0~100% (Up to 16 color-linked power settings per job)
Distance Accuracy	0.254 mm or 0.1% of move, whichever is greater
Engraving Capability	256-level grayscale image processing capability
Z-Axis Movement	Automatic
Resolution (DPI)	125, 250, 300, 380, 500, 600, 760, 1000, 1500, 3000
Maximum Motor Speed	20IPS
Computer Interface	10 Base-T Ethernet, Full Speed 2.0 USB port
Display Panel	4-line LCD panel showing current file name, total working time, laser power, cutting 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
Facility Requirements	
Operating Voltage	200-240VAC, 50/60Hz Auto Switching, Max. 12A
Fume Extraction System	External exhaust system required, one 4" connection on the back of the machine

- Speed is not equal to throughput. See dealer or visit www.gccworld.com for more details.
- Caution—Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
- All specifications are subject to change without prior notice.