Laser Tools & Technics Corp.

User Manual

Version 1.1 e

SLC-M+ Series

Introduction

Technical Support

Thank you for purchasing the SLC-M+ series. This product is warranted to be free of manufacturing defects for one year from the date of purchase. Our technical support group is glad to work with you in answering your questions. If you cannot find the solution to your particular application, or, if for any reason you need additional technical assistance, please use the ways as following:

Tel: 886-3-5727772 (Mon.-Fri., 8:30 - 18:00, Taiwan)
Fax: 886-3-5728898
Email: service@lttcorp.com
Web: www.lttcorp.com
Address: No. 121, Lane 99, Pu-Ding Road, Hsin Chu City, Taiwan, R.O.C.

Disclaimer

Special Symbols

Failure to follow instructions may lead to product damage, or error.

Failure to follow instructions may lead to injury by electric shock.

Failure to follow instructions may lead to injury by invisible radiation.

Contents

Chapter 1 Safety

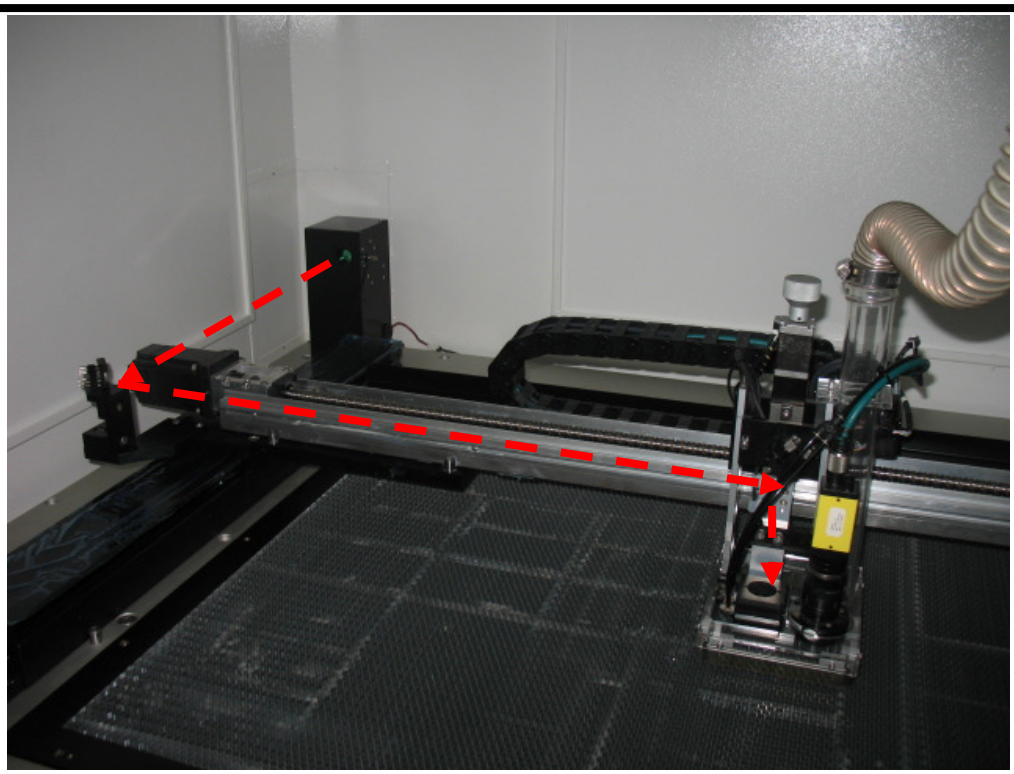
1.1 Safety Regulation

The SLC-M+ series uses a CO_2 Laser as a light source. It is classified as a class-IIIR product by **CDRH (the Center for Devices and Radiological Health)**.

Wavelength : 9.3~10.6μm
Maximum output power : 17 ~ 100W
Visibility : Invisible

When operating the SLC-M+ series, be sure to always comply with the safety regulations as following:

- Do not attempt to modify or disassemble any component of the machine without LTT technical support.
- Do not open the doors of chassis and access the laser tube or electronic components, especially while the machine power is on.
- Connect the machine to a grounded outlet. Verify that the voltage of the outlet is correct for the machine.
- Do not disable the interlocks which are on top and front doors.
- Be careful about the path of the invisible laser beam shown in figure. Otherwise, eye or skin injury may result.



- Do not watch the laser beam directly during operation. Bright light caused by the lasing process can damage the eye.
- The side and rear doors are fixed by screws for safety. If you open these doors, the SLC-M+ will become a Class 4 laser device. For your safe, please wear protective goggles.
- The laser beam may cause fire. Never leave machine along without other operator watching during the laser cutting process. Keep a fire extinguisher near the machine at any time.
- Blowing materials with air flow from nozzle while cutting or engraving can avoid fire occurring and also obtain good quality.
- Verify that materials used in the cutting are proper for lasing. Never cut substrates that contain **PVC** or **Teflon**.
- Good efficiency of exhaust system makes you avoid breathing dust, debris or poison gas.
- Please comply with maintenance schedule as chapter 4 to keep SLC-M+ working well.
- Before you execute auto focusing function, please make sure that there will be no crashing between motion system and other objects. For safety, it is **NOT** recommended to use auto focusing function on inequality materials.

1.2 Name Plate and Warning Labels

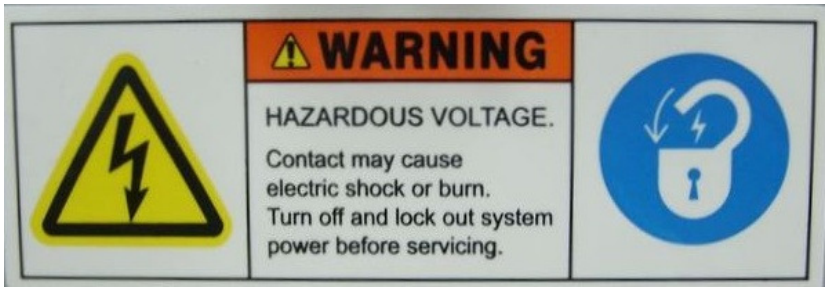
The labels as following are affixed to the SLC-M+. These labels must never be removed. If they are damaged or tampered for any reason, please request for LTT immediately to replace them.

1

2

3

4



5


AVOID EXPOSURE
INVISIBLE LASER RADIATION
EMITTED FROM THIS APERTURE

1.3 Safety Protection Device

■ Interlock

The laser beam will not be emitted if you open the **front** door. The LED indicator of "**DOOR**" on control panel will be off.

Front door close

Front door opens

■ Laser Switch

Laser switch on control panel can shut down the power of laser system immediately, and it has no effect on motion system. Compared with interlock, Turning off laser switch can save power. When you turn on laser switch, the LED indicator of "**LASER**" on control panel will be on (it needs to take more than 5 seconds to warm up laser tube while you turn it on).

■ **ON**

■ **OFF**

■ Emergency Stop Switch

Pressing the red pushbutton can shut down the main power of system immediately when emergency condition occurs. And turning right the red pushbutton can recover the power (Before recovering power, please clear the trouble in the machine first).

■ **ON**

■ **OFF**

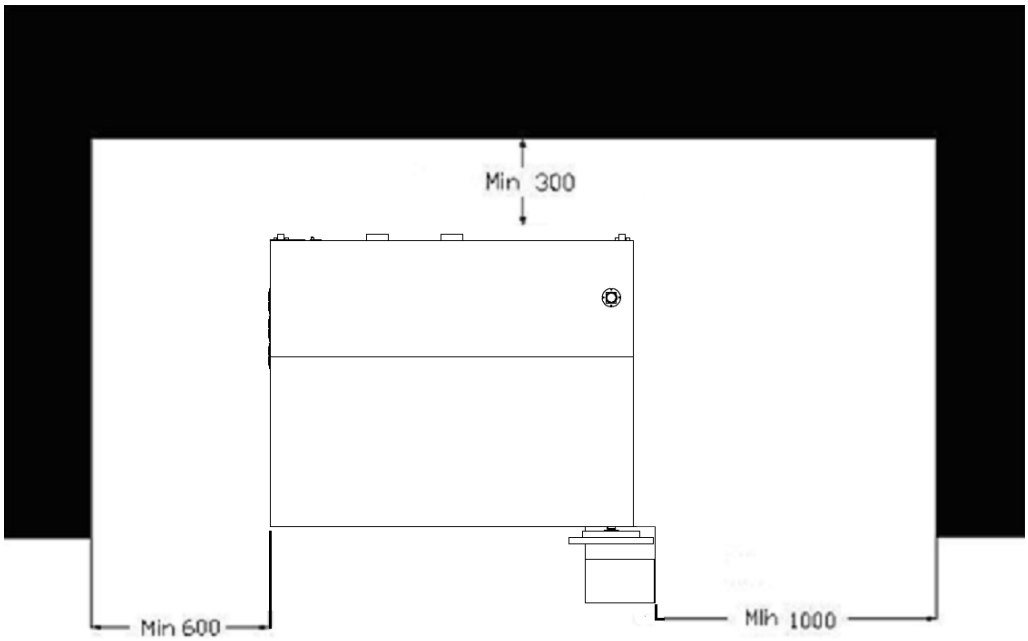
Chapter 2 Installation

2.1 Unpack and Locate Machine

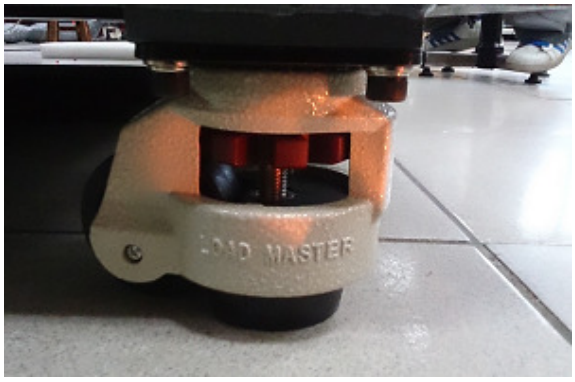
This section explains how to unpack and locate machine.

1. Locate the machine and keep the recommended space for maintenance.

Unit: mm



2. Lock the wheels to locate the machine.



2.2 Package Contents List

This section explains the package contents of the SLC. The package includes the following components. Before using the unit, check that all components have been included in the package.

1 Box

2 Cotton Swab

3 Alcohol Dropper

4 Allen Wrench

5 LaserCAM Driver CD-Rom

6 USB Cable Driver CD-Rom

7 Power Cable

2.3 Part Names and Functions

This section explains the main part names and functions of the SLC-M+.

1. Front Door

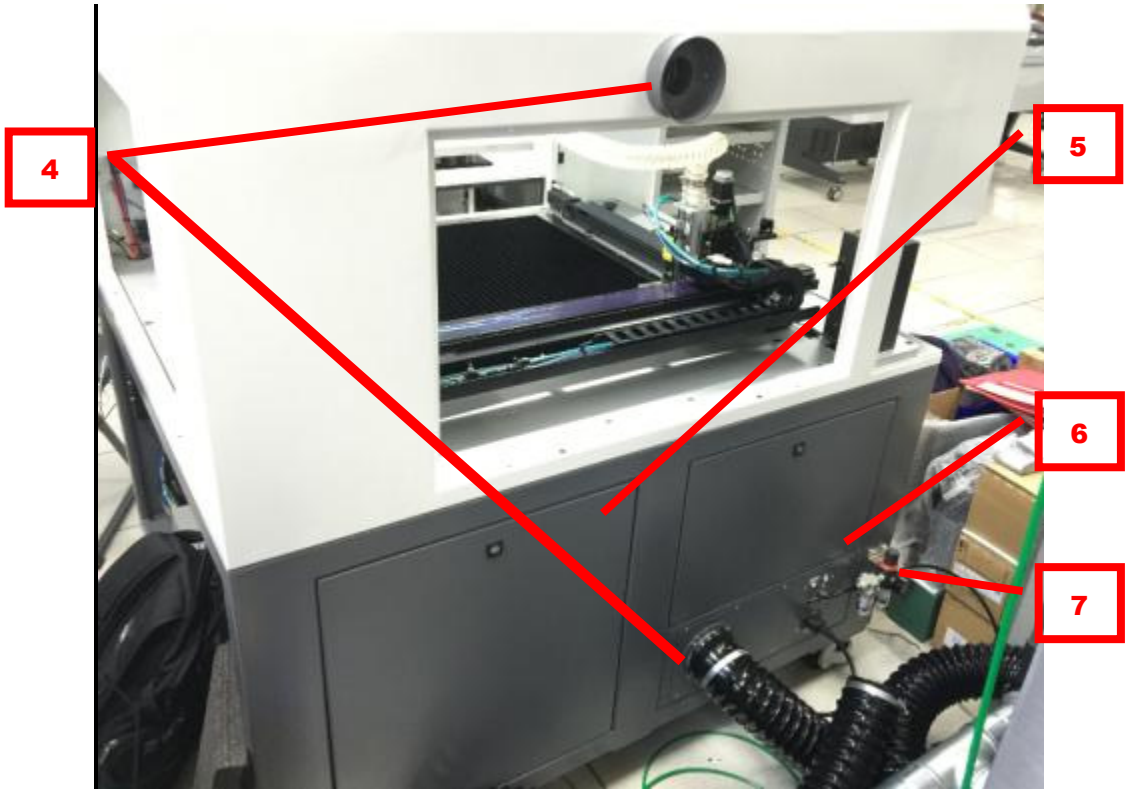
This door has interlock sensors for safety. If you open this door, the laser will be not emitted.

2. Front Door of chassis

Mostly opening this door is for maintaining. Do **NOT** open this door if it's not necessary, especially the machine power is on.

3. Side Door (Left/Right) of chassis

Mostly opening this door is for maintaining. Do **NOT** open this door if it's not necessary, especially the machine power is on.



4. Exhaust Port

These two ports can exhaust the smoke which is caused by cutting. These ports have to be connected to blower through pipes.

5. Rear Door (Left) of chassis

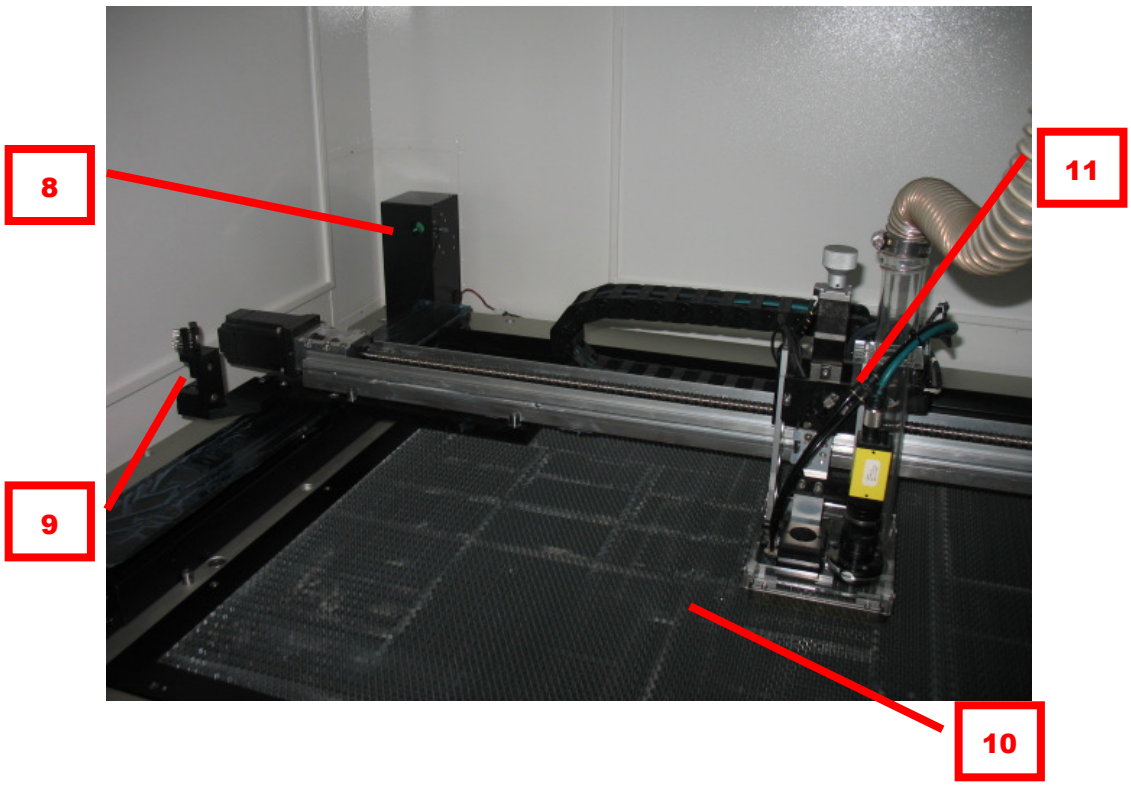
Mostly opening this door is for maintaining. Do **NOT** open this door if it's not necessary, especially the machine power is on.

6. Rear Door (Right) of chassis

Mostly opening this door is for maintaining. Do **NOT** open this door if it's not necessary, especially the machine power is on .

7. Air Filter

These parts can dissipate the heat in the chassis which is caused by laser generator.



8. Window Lens

This part can protect 1st ~3rd mirror against dusts or debris. It should be cleaned this lens daily. (See chapter 4)

9. 4th Mirror

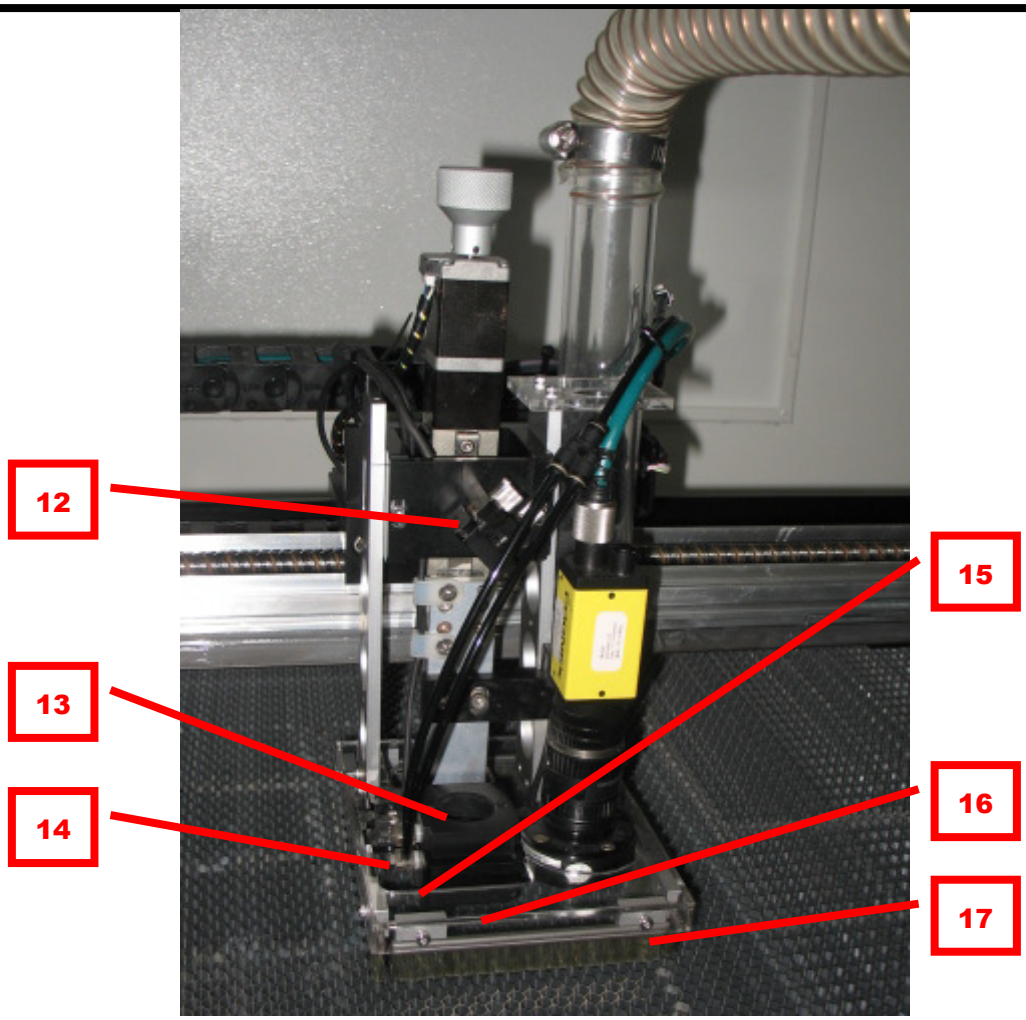
This part reflects laser beam to carriage. Also, it should be cleaned this lens daily. (See chapter 4)

10. Table

This part can carry materials for cutting.

11. Carriage

This part includes 5th mirror, focal lens, nozzle, and auto focusing set. You can move it left, right, forth and back by the keys on control panel. (See section 3.3.1)



12. Final Mirror

This part reflect laser beam to focal lens. Also, it should be cleaned daily. (See chapter 4)

13. Focal Lens

This part can focus the laser beam on materials for cutiing. Also, it should be cleaned this lens daily. (See chapter 4)

14. Auto Focal System

This part can adjust focal height automatically by touching material.

15. Air Assist Adjustment

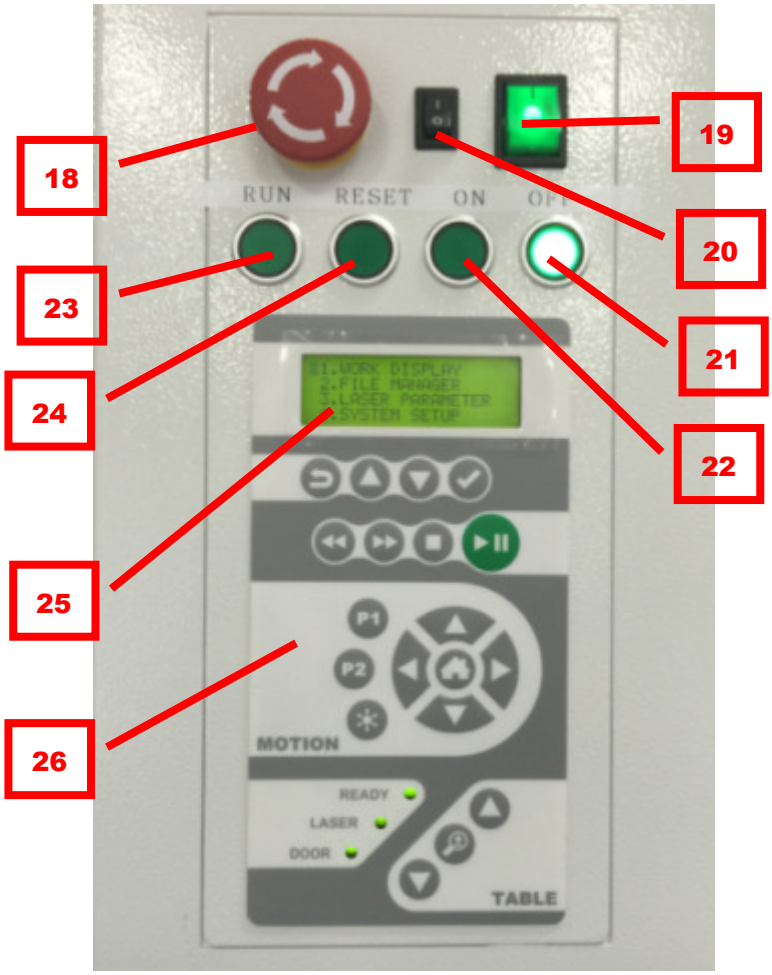
This part can adjust air flow which is out of the nozzle.

16. Nozzle

This part can provide a air assist to protect focal lens against dust or debris.

17. Real-time Exhaust

This part can remove dust immediately



18. Emergency Stop

Please see section 1.3

19. Power Switch

This switch can turn on/off the main power of this machine.

20. Laser Power Switch

Please see section 1.3This switch can turn on/off the main power of this machine.

21. Table Suction On

Press this switch then the air of work table can be sucked.

22. Table Suction Off

Press this switch can turn off the air suck.

23. Run

Press this switch can start to run the work.

24. Reset

Press this switch can reset work.

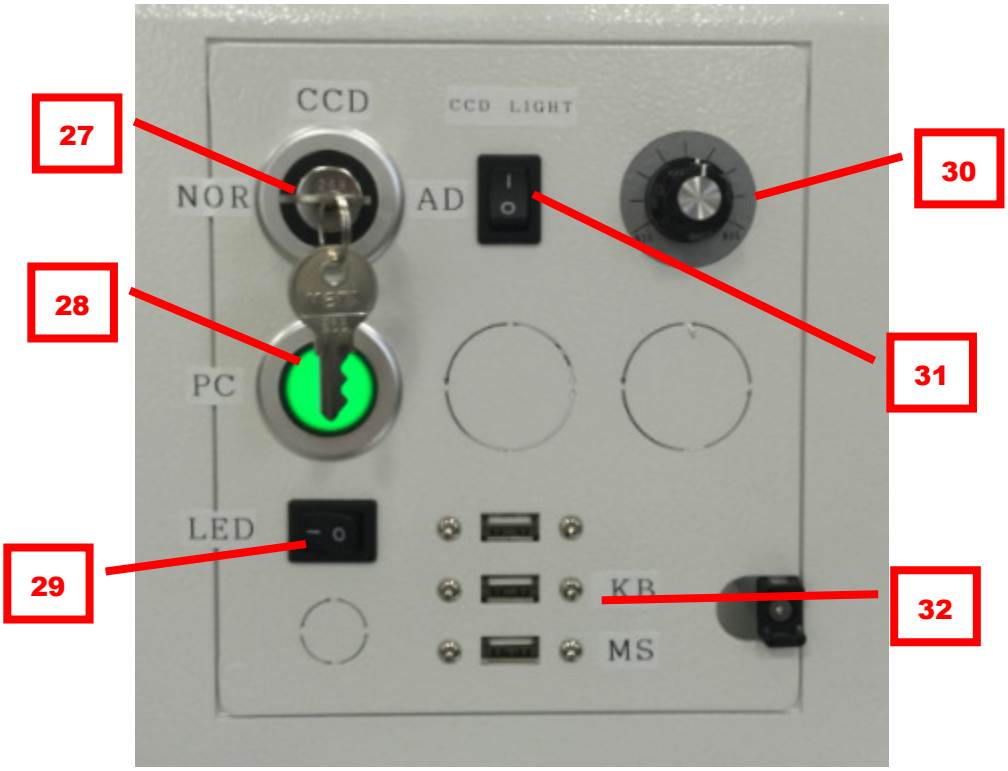
25. Lcd Display

LCD display shows the operating menu and information from system. If you want to obtain more detail about operating menu, please see section 3.3.1.

26. Control Panel

Control panel can operate machine. If you want to obtain more detail about operating

menu, please see section 3.3.1.



27. Function Switch

This part provides user to switch the premissions by key switch.

Normal : Cutting without CCD function.

CCD : Cutting with CCD function.

Admin : Administration user with all function and close the interlock function.

*under the [Admin] permission, the machine will become a Class 4 laser device. For your safe, please wear protective goggles. (see section 1.1).

28. PC Power Switch

This switch controls the power of the built-in computer, turn on the computer before use the machine.

29. LED Light Switch

This switch controls the light inside the machine.

30. CCD Light regulator

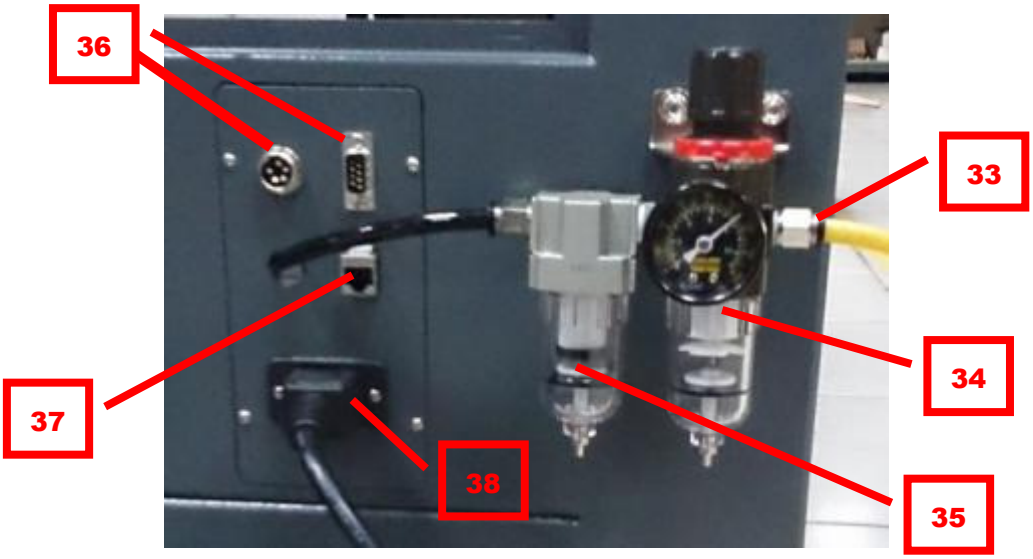
This part control the CCD light, adjust it depending on using demand .

31. CCD Light Switch

This switch controls the CCD Light, turn it on before use the CCD function.

32. USB Port

This part can provide the USB ports to the built-in computer.



33. Air Inlet Port

This part is the total air inlet for this machine.

34. Air Filter

This part filtered water vapor in the air is the total air inlet for this machine.

35. Oil mist separator

This part provide extra filtered for water vapor in the air. This part is the total air inlet for this machine.

36. Serials Port

This part is used for the expansion of I/O module.

37. RJ-45 Ethernet Port

SLD-M+ provides built-in computer instead of external computer, it provides computer Internet or LAN through this port.

38. Power Inlet

This part can provide main power through cable from wall power supply.

2.4 Hardware Installation

This section explains the installation steps with other hardware.

1. Check environment

■ **Power supply**

Power supply : 220 VAC, Single Phase

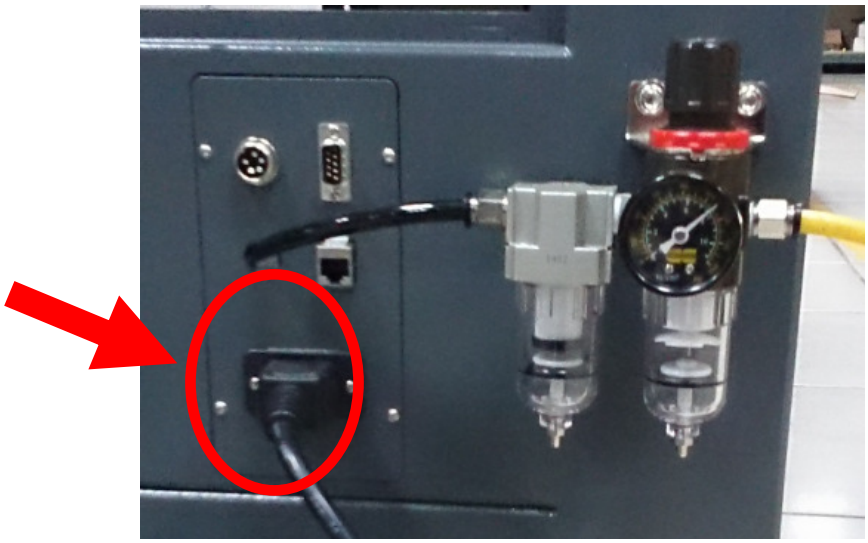
■ **Environment**

Temperature: 15 ~ 30 ℃,

Relative humidity : 35 ~ 85 %

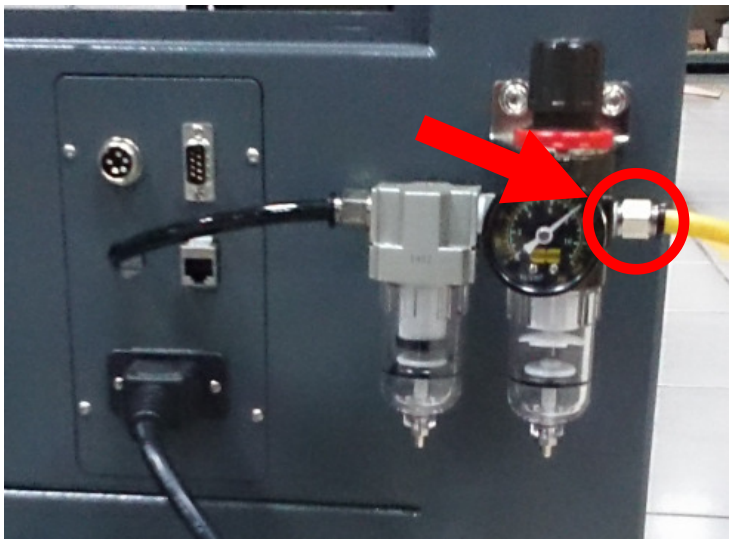
Other : Avoid to dust, dirt, oil, mist, strong vibration, or sudden temperature changes

2. Connect AC power cable

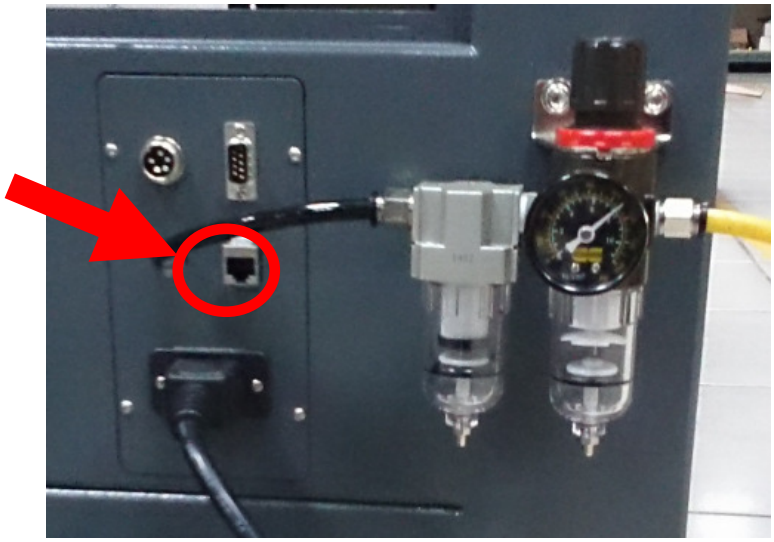


3. Connected the pipes from blower to machine.

4. Connect air tube from filter port to Air Compressor.



5. Connect RJ-45 Ethernet cable to machine.
It provides the built-in computer Internet or LAN.



2.5 Driver Installation

2.5.1 Install Driver

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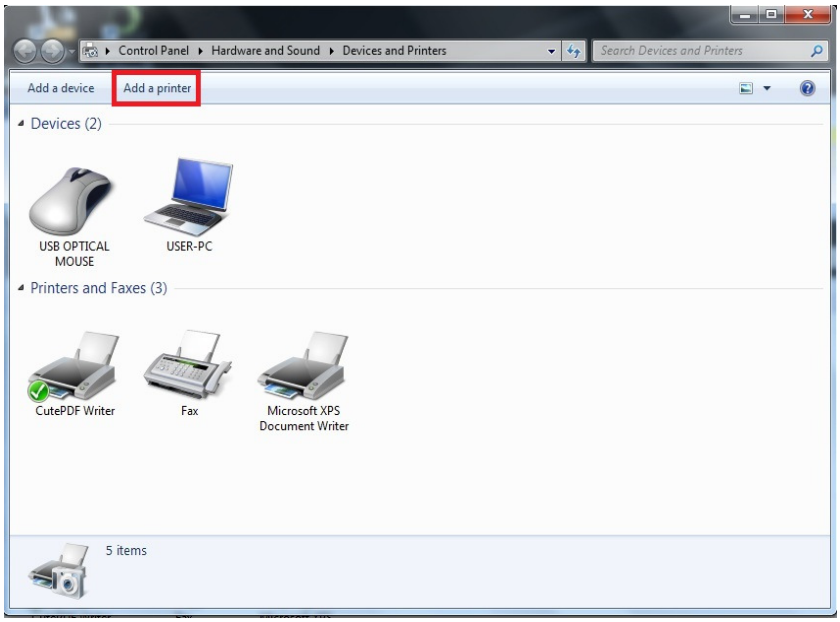
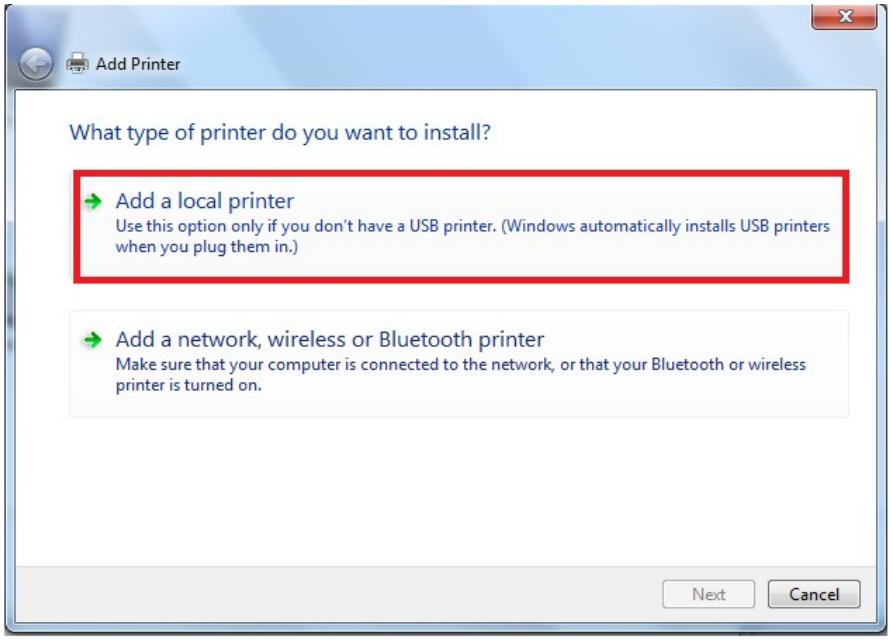
This section explains the installation steps for driver on computer.

1. Put the CD-ROM of installation into CD/DVD drive

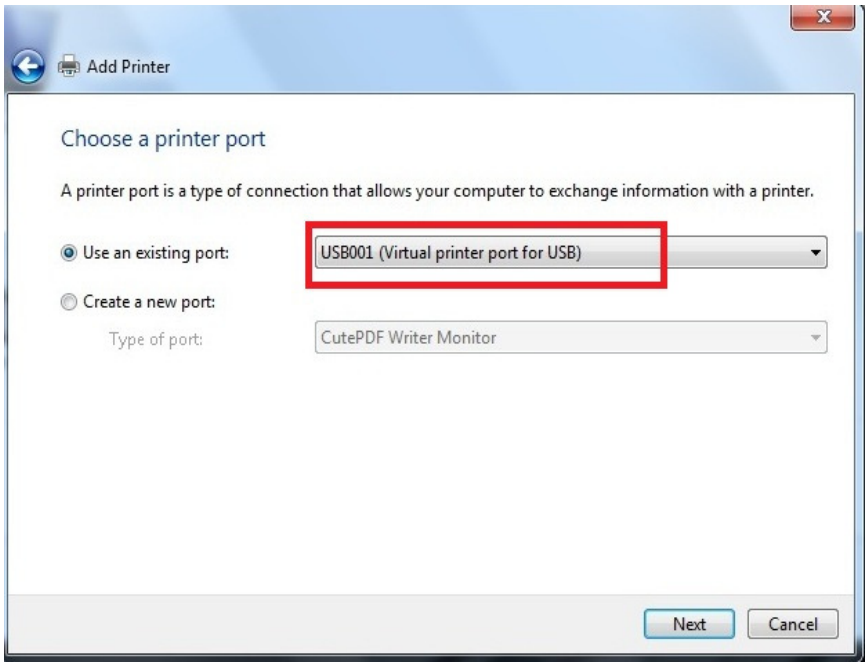
2. Go to the [Printers and Devices] window and select the [Add a printer] option



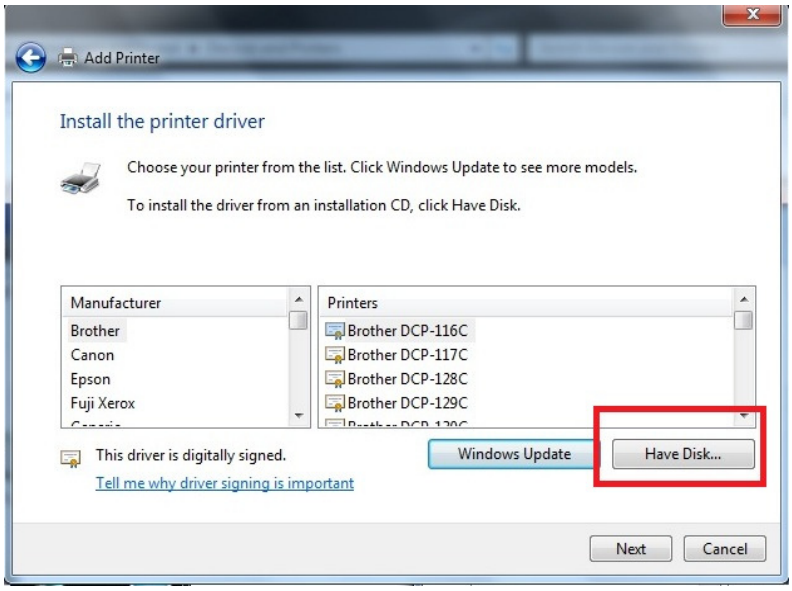
3. Select [Add a local printer], then click the [Next] button



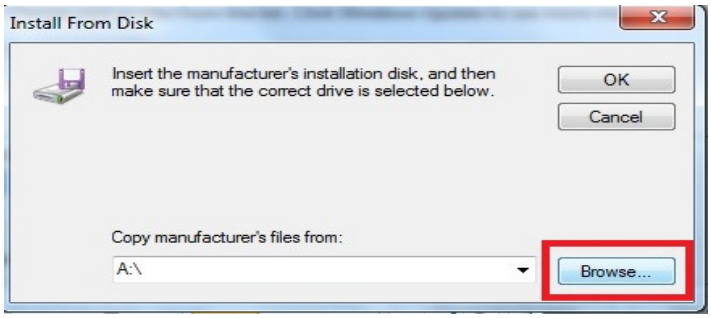
4. Select [Use an existing port], then select [USB00*(USB printer support)], then click the [Next] button. (* means the port number of the USB printer support port number).



5. Select [Have Disk...].

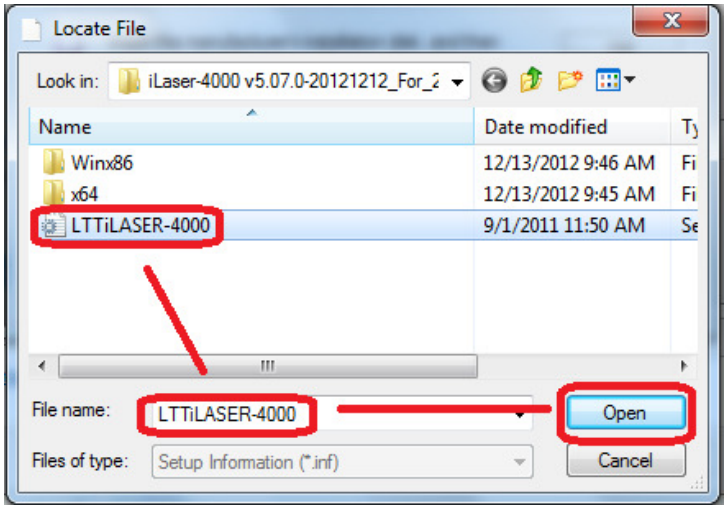


6. Select [Browse...]

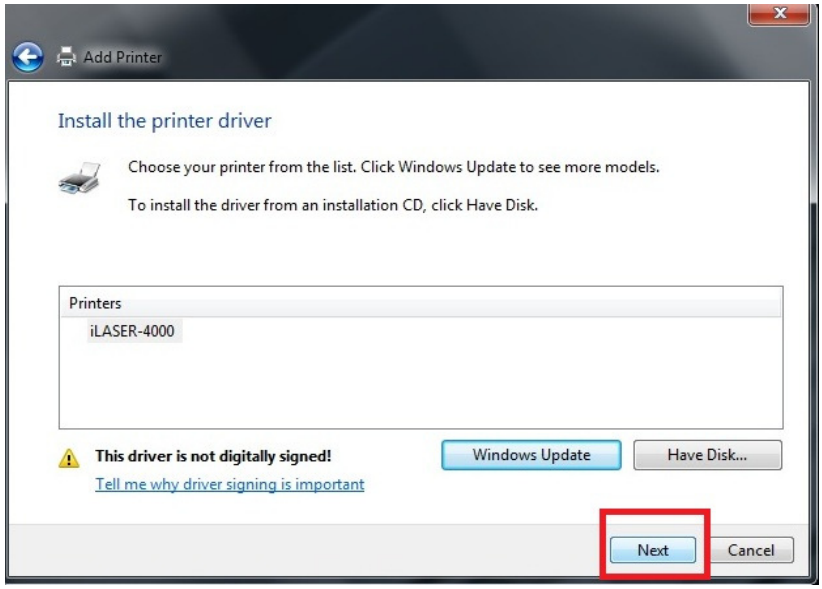


7. Please select the .inf install file.

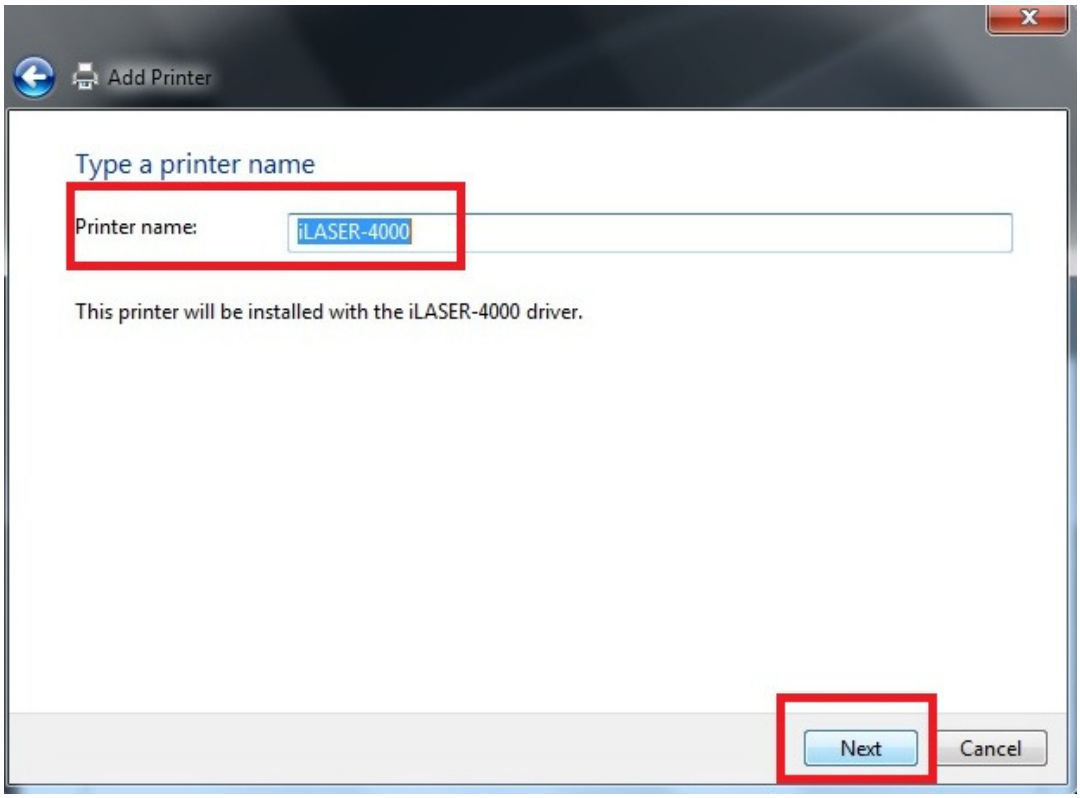
Please select the file which named match the machine name to install.



8. Select [Next].

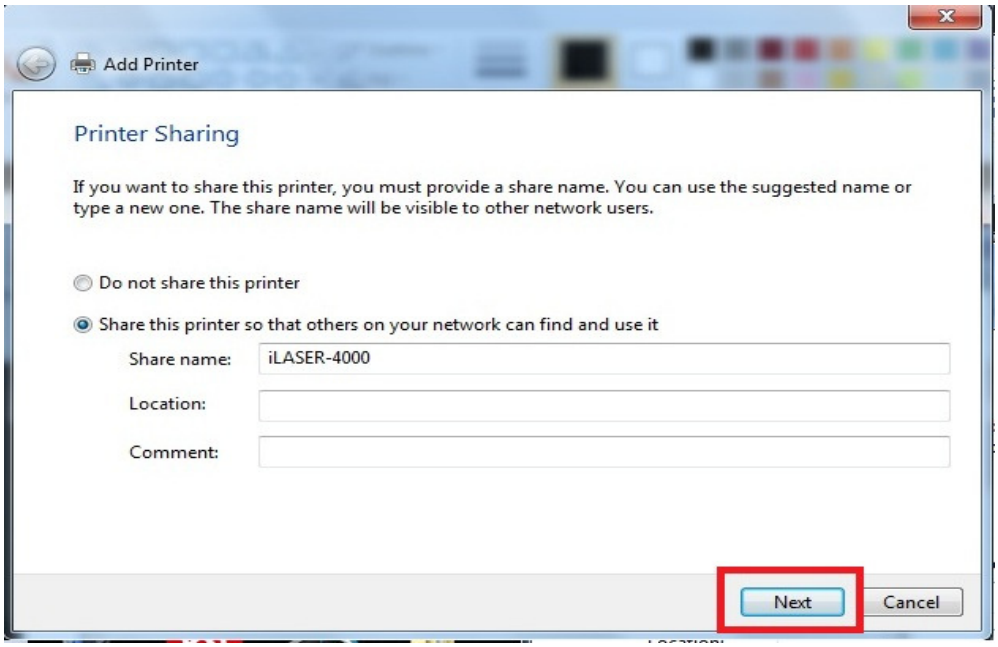


9. You can define the name of machine, after the setting, click [OK].



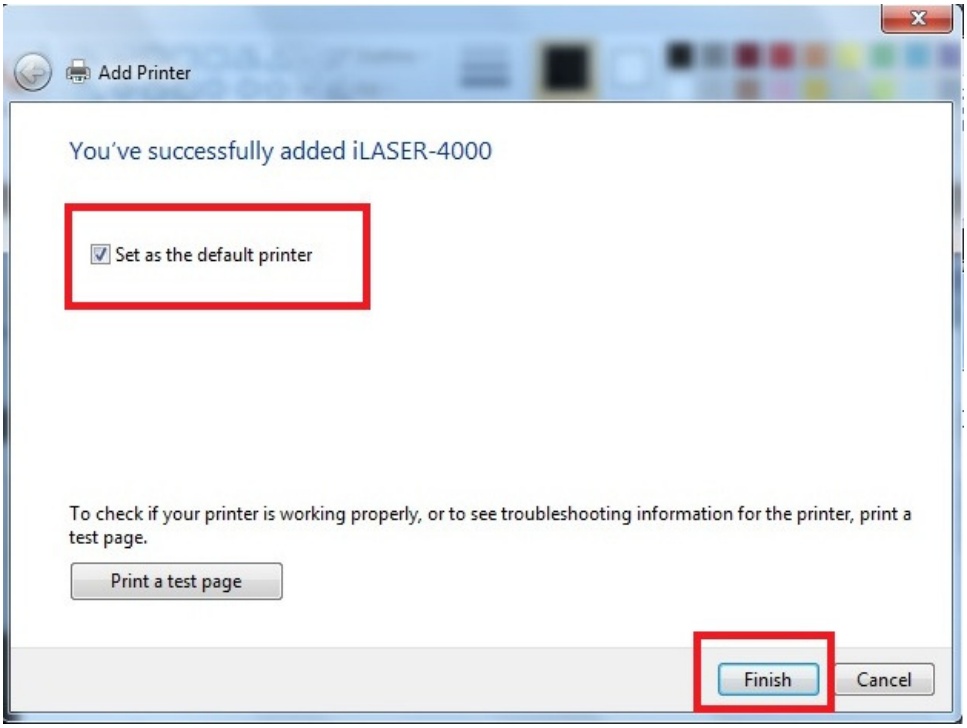
10. Select [Install this driver software antway].

11. Please select [Do not share this printer].

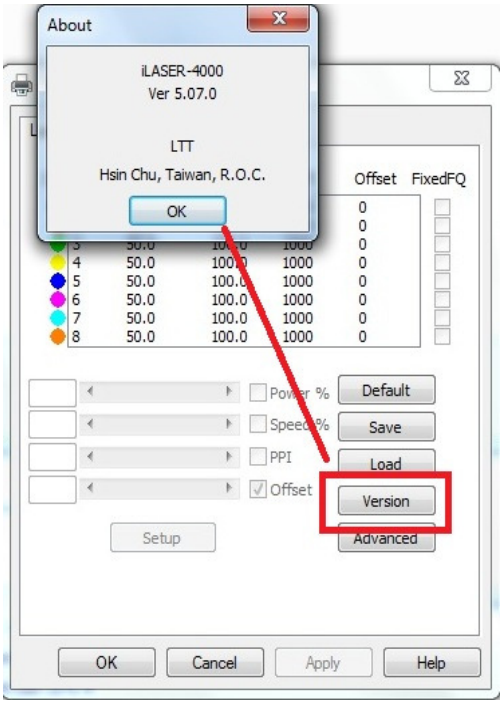


12. Click [Next].

If you want this machine to be the default printer, then please select **[Yes]**, or please select **[No]**. If there are no other drivers installed on your computer, the SLC-M+ will automatically be set as your default printer.



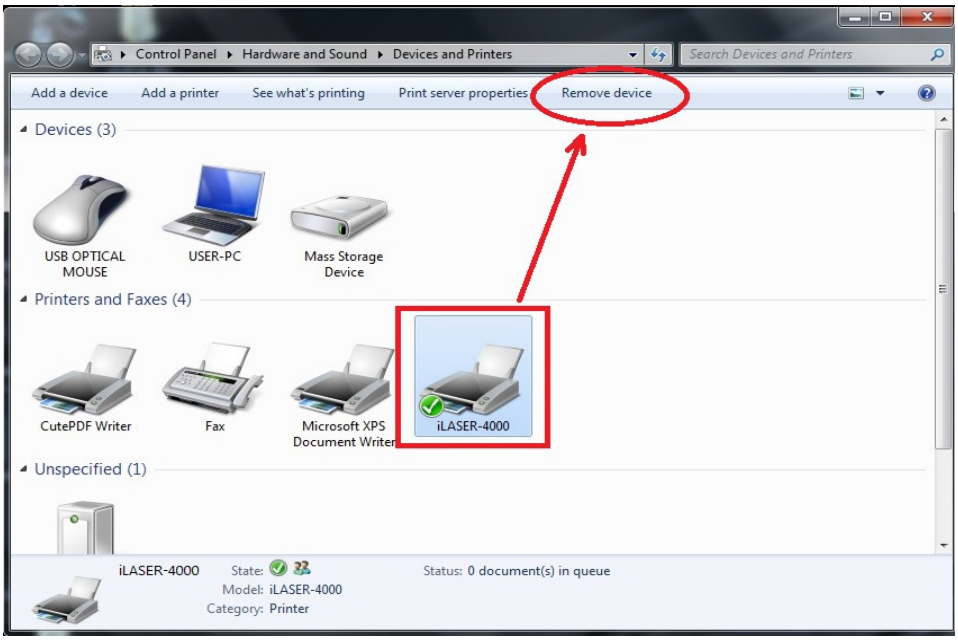
13. Go to [Printer and Devices] page and right click [SLC-M+] then select [Properties]. Then click [Version] to confirm the version of the driver.



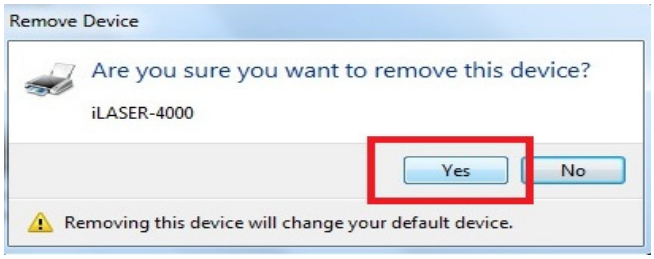
2.5.2 Uninstall Driver

1 Go to [Devices and Printers] window

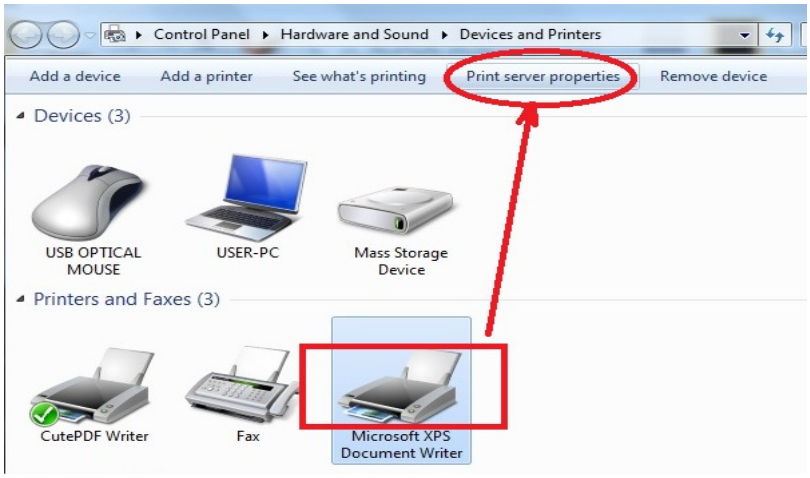
2 Select the Printer you want to delete and then press the [Delete this Printer] button.



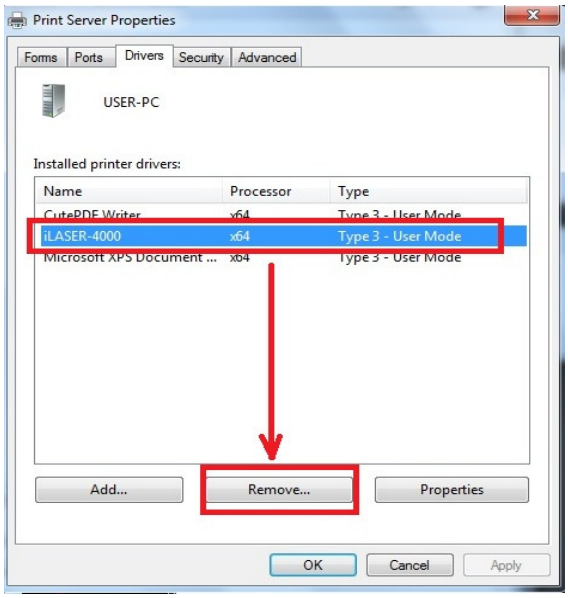
3 Press the [Yes] button.



4 After the uninstall process, please select random printer then select [Print server properties].

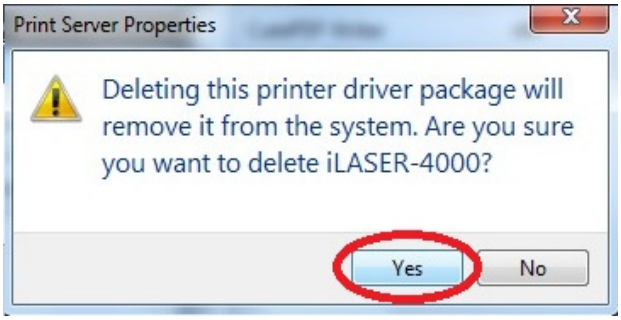


5 Switch to [Drivers] tab and choose the Printer you have just deleted. Press [Remove] button.

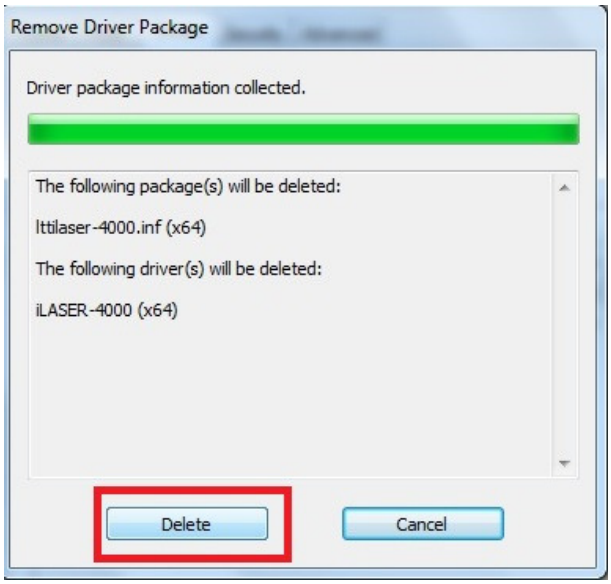


6 Select [Remove driver and driver package], then click [OK].

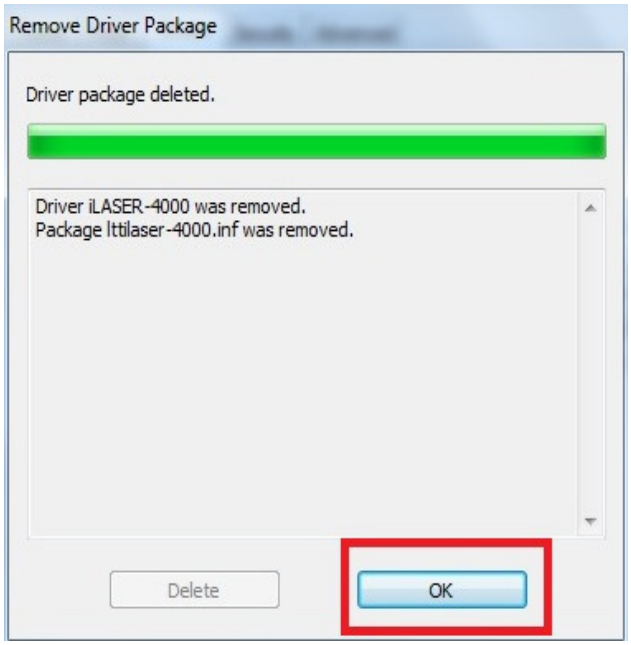
7 Click [Yes] to confirm the uninstall process.



8 click [Delete].

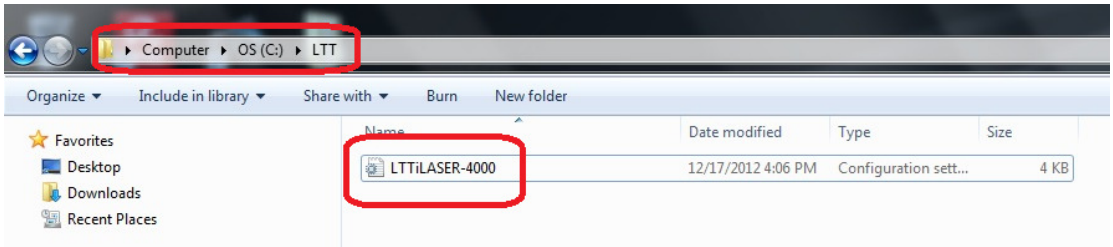


9 Click [OK] to close the window after remove the driver.



10 Close the [Devices and Printers] window.

11 Go to [Computer] > [C:] > [LTT], then remove all files under the folder.

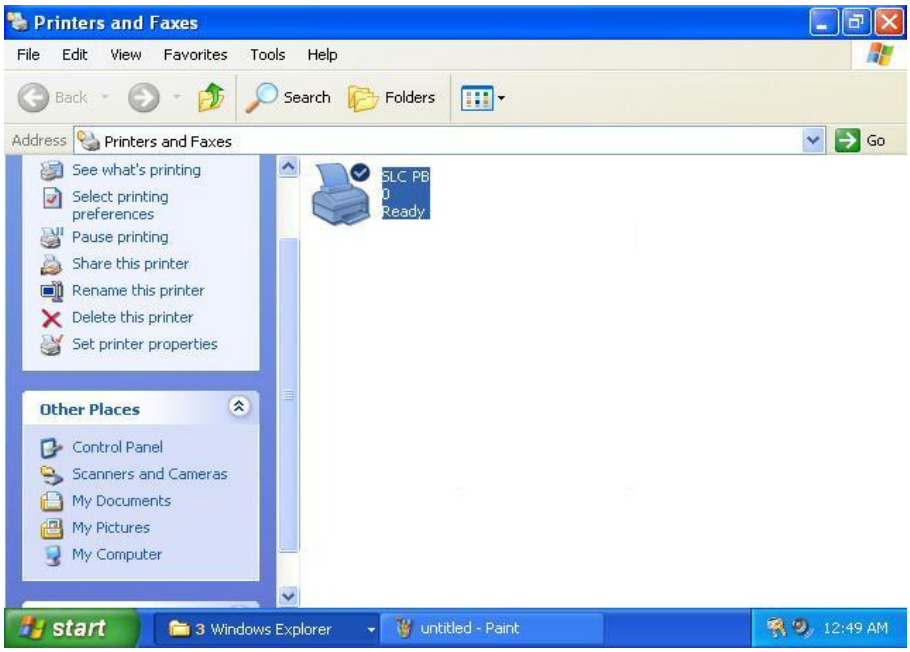


2.5.3 Change USB Cable to Another Port

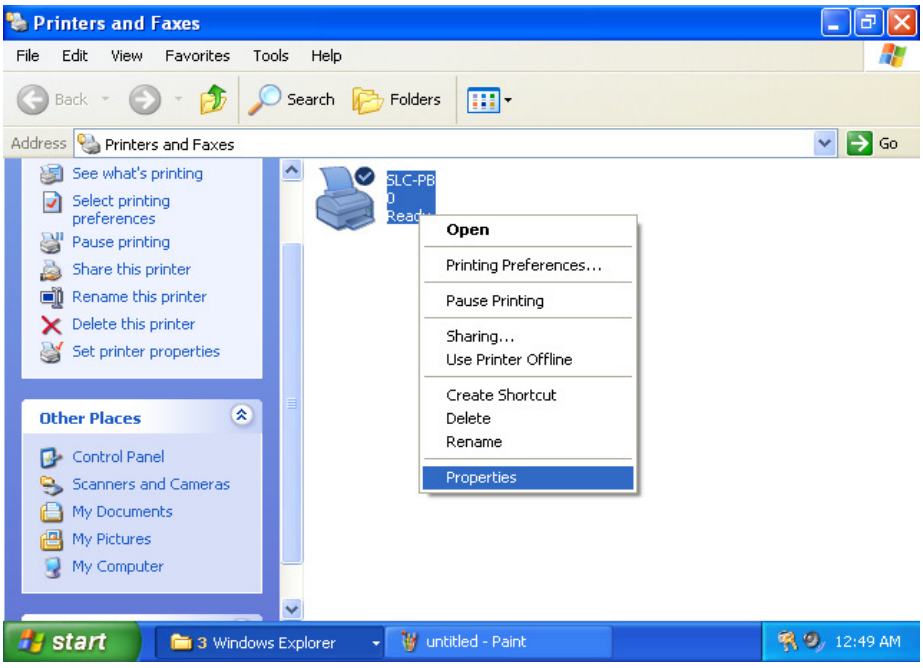
This section explains that the steps when change USB port.

Once you contact the USB Cable to computer, we strongly suggest that do not change it to another USB port. If you must change USB cable to another port, you have to also change the printer settings of SLC-M+. If this happens, please follow next steps.

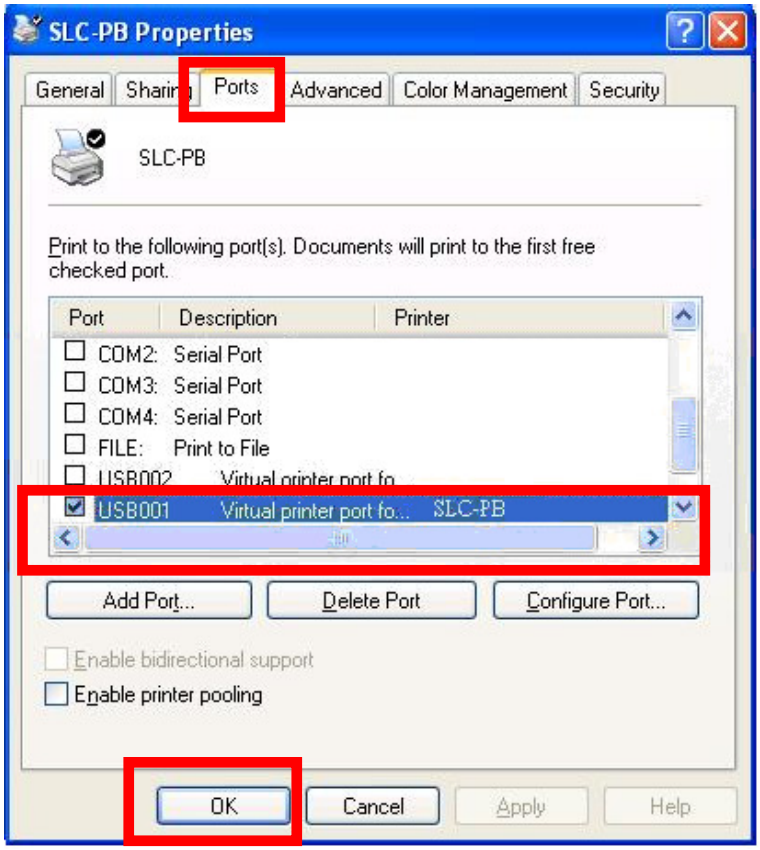
1. Connect the USB cable to another port well with SLC-M+.
2. Open **[Devices and Printers]** window



3. Right click SLC-M+ and select **[Properties]**



4. Switch to **[Ports]** label. Switch the **[USB00*]** which is belong to the new port and click **[OK]**.

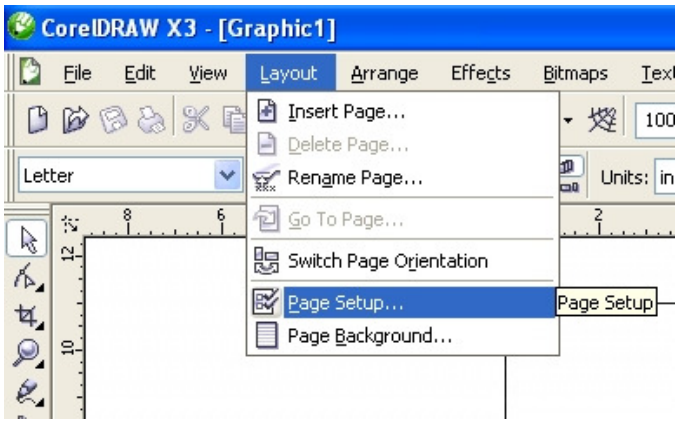


5. Done.

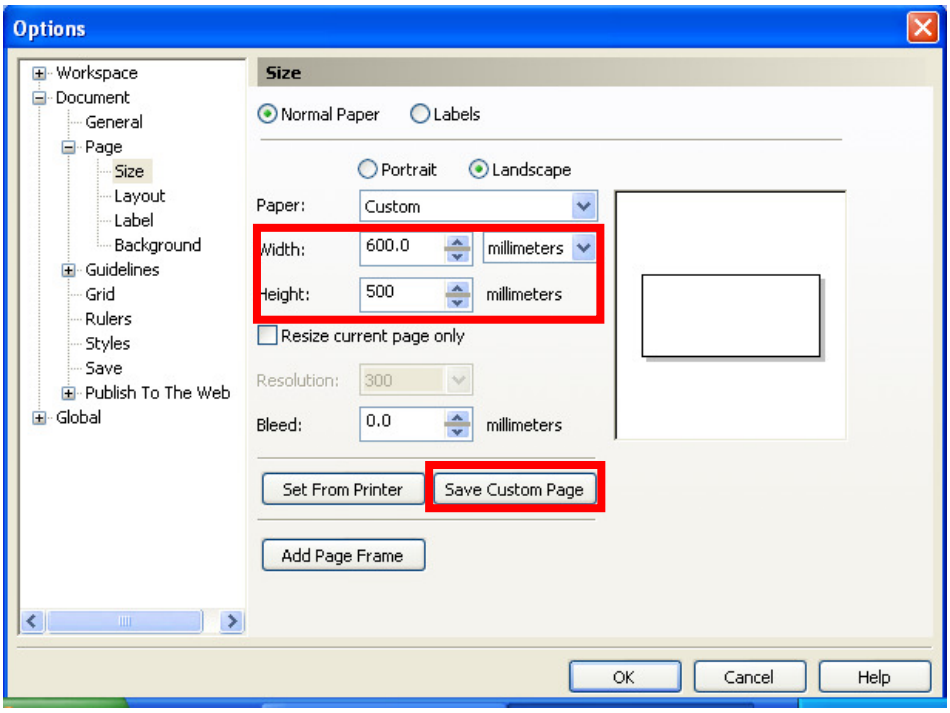
2.6 CorelDRAW Setup

It is strongly recommended to keep the graphic software's page size the same with driver's page size before you begin editing files. Here you will learn how to setup your page and learn how to keep those settings that you don't have to setup again next time. If you are a autocad user, please see section 2.7.

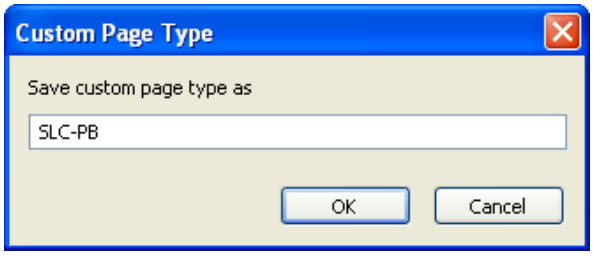
Go to **[Layout]** → **[Page Setup]**



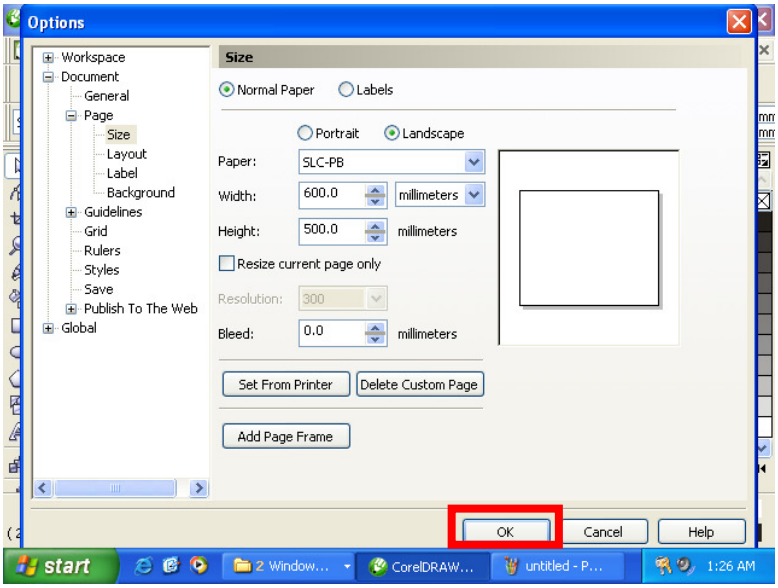
Modify **[Width]** and **[Height]** according to work area (See Appendix 1). Click **[Save Custom Page]** button.



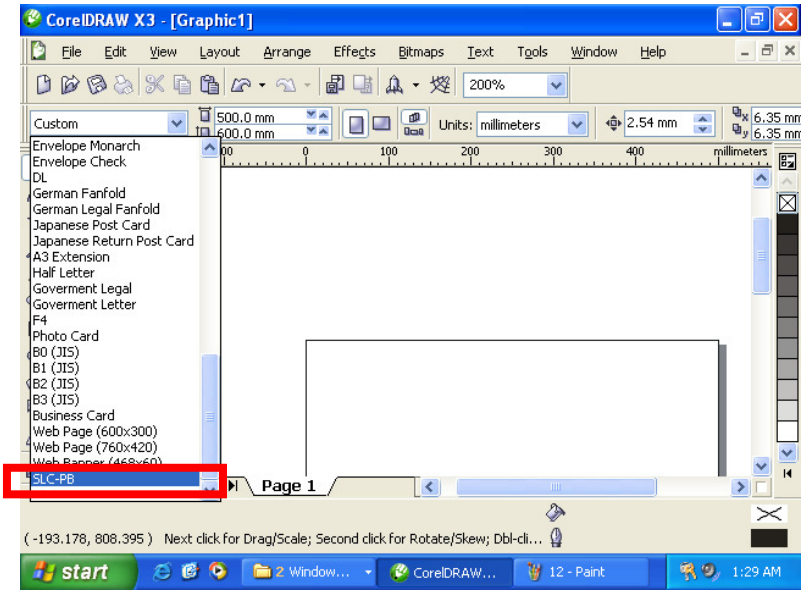
Name this paper type. It is recommended to name with the machine type. Then click **[OK]** to save.



Click **[OK]** to complete the paper size adjustment.



Next time you can select template style while you create new file.



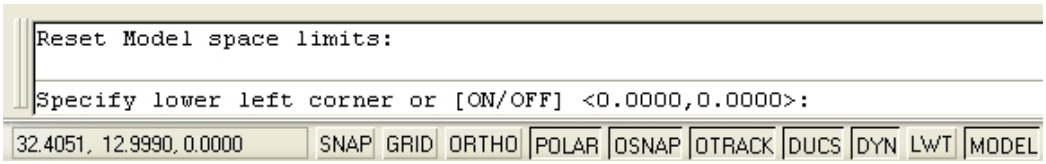
2.7 AutoCad Setup

Here you will learn how to setup the page and print setting on AutoCAD.

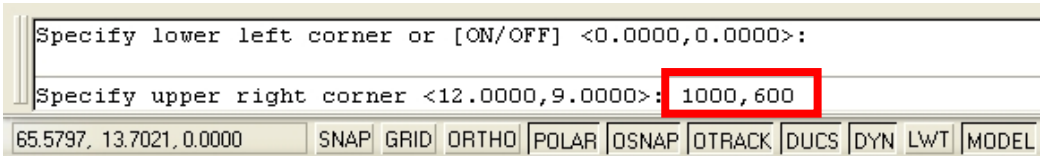
1. Page And Layout Setup

Open the AutoCAD. Type **[limits]** on the command line then press **[Enter]** key.

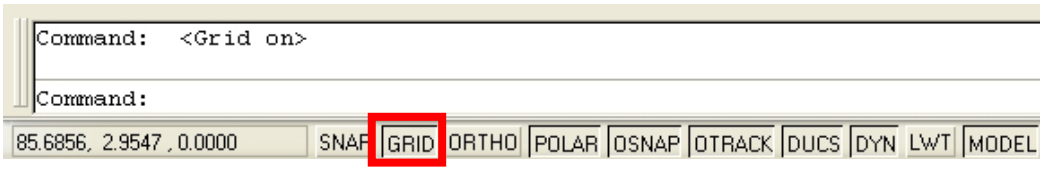
Then press **[Enter]** key to set the bottom left corner to **[0,0]**.



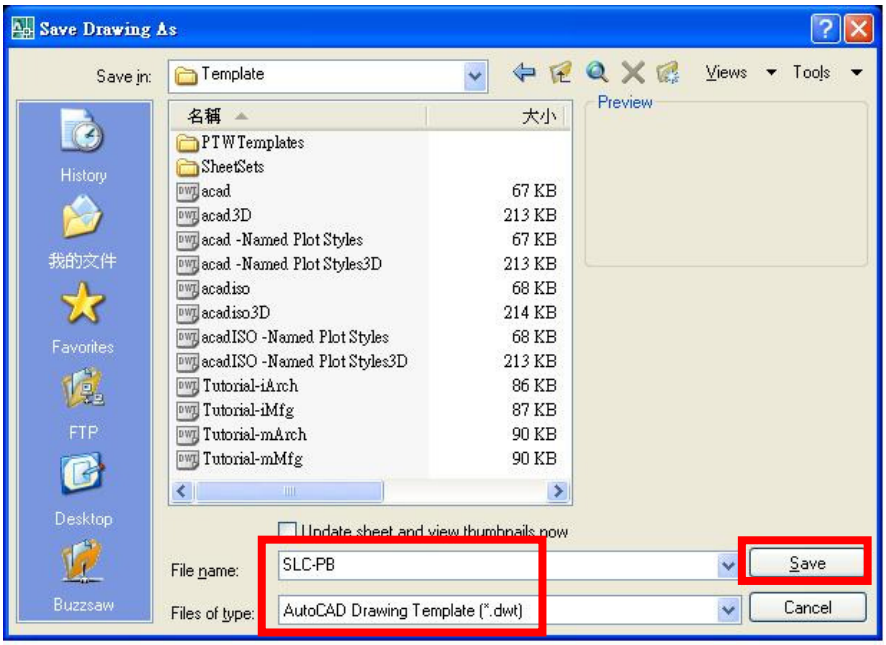
Setting the top right corner according to work area (See Appendix 1). Then press **[Enter]** key.



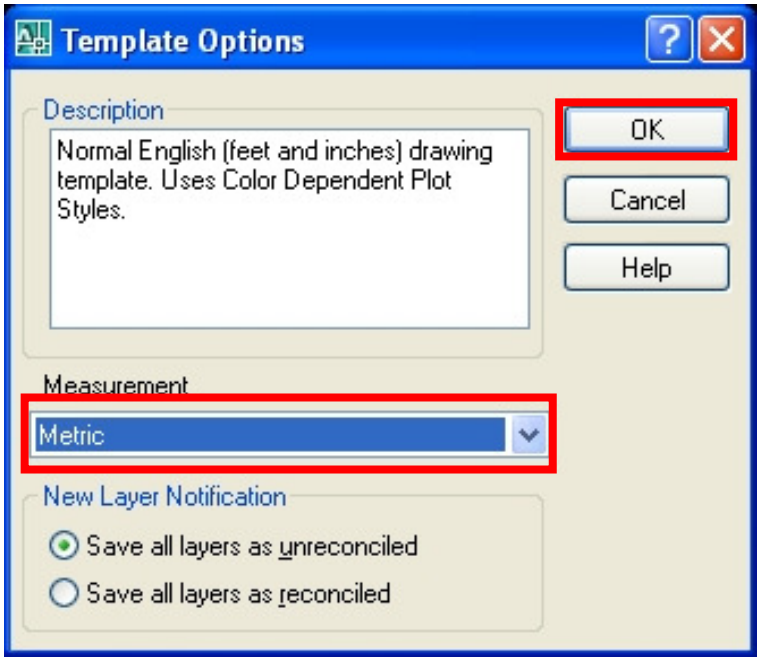
Turn on the grid by typing **[grid]** on the command line or turn on directly by pressing the **[GRID]** button which located under the command line. The grid shows the page area so that can help user to see boundary.



Choose **[File]** → **[Save as]**. Then select **[Files of type]** as **[*.dwt]**. Set file name as machine type and then press **[Save]** button to save the Template style.



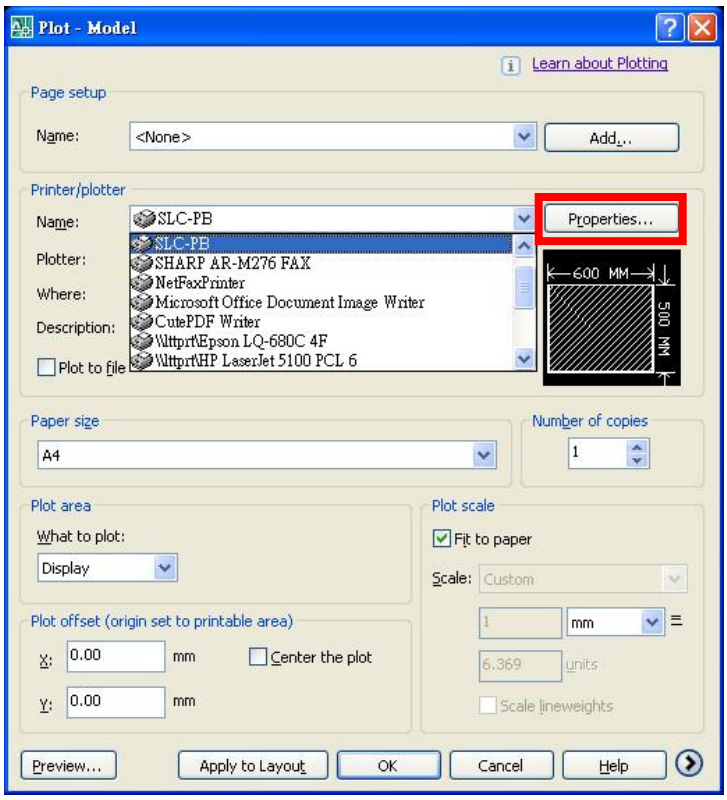
Write down some description for the template and set the measurement unit system you want.



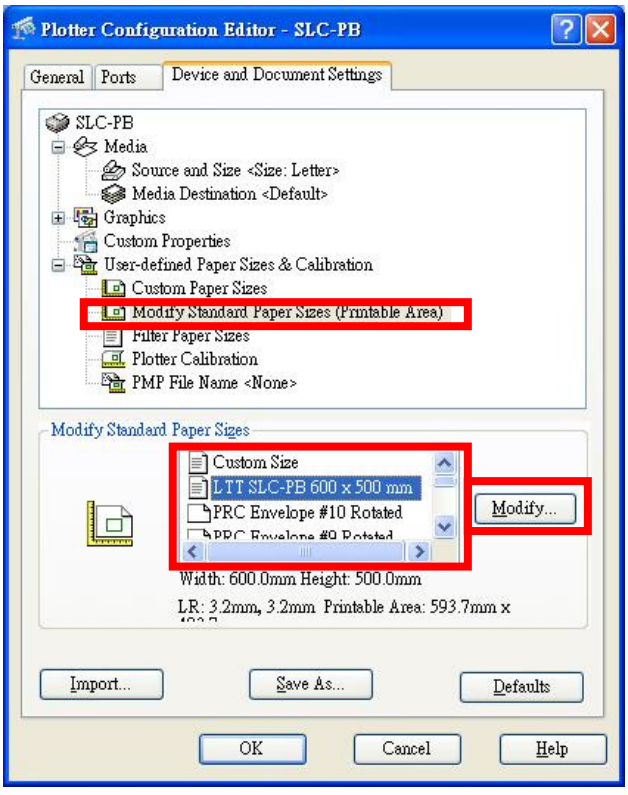
You can select the template file you created whenever open AutoCAD. Next time when you use the same page size, you can use the template file directly so that you don't have to setup the page anymore.

2. Print Setting

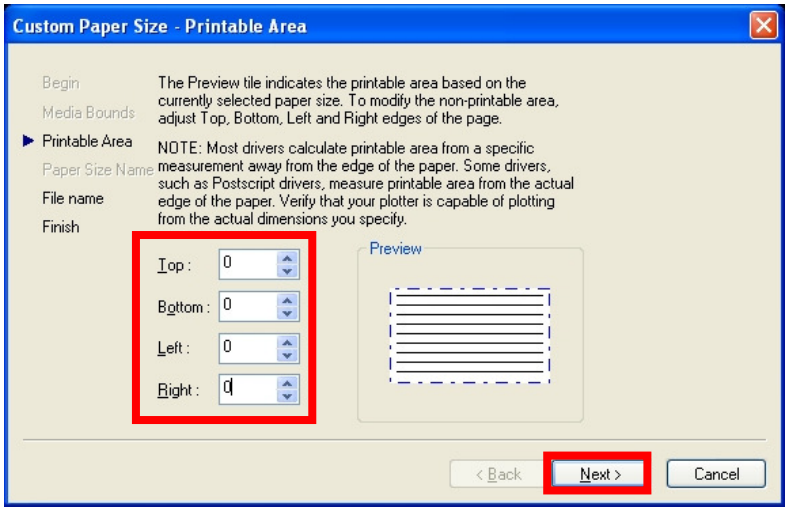
Go to **[File]** → **[Plot]**. When the **[Plot]** window shows, select printer driver and click **[Properties]** button.



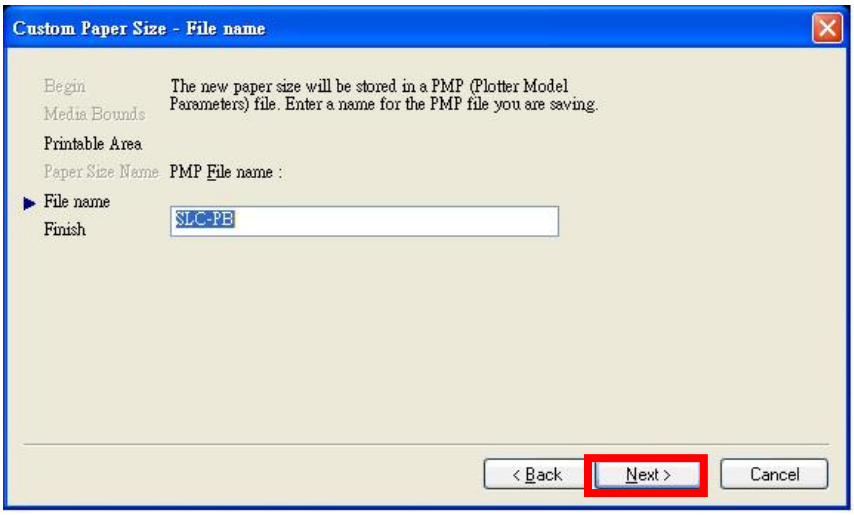
Select **[Modify Standard Paper Sizes]** on the tree-list box. Select the option which starts with **[LTT...]**. Press **[Modify]** button.



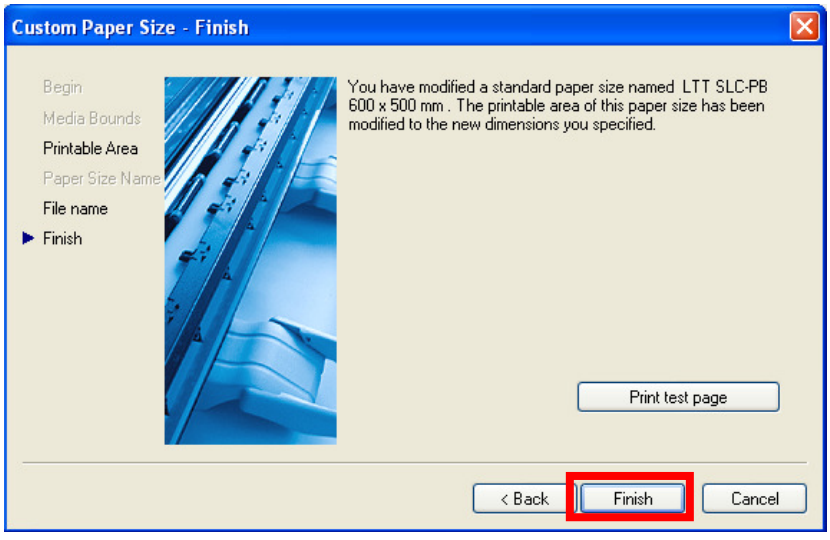
Modify **[Top]**, **[Down]**, **[Left]** and **[Right]** to zero, press **[Next]** button to continue.



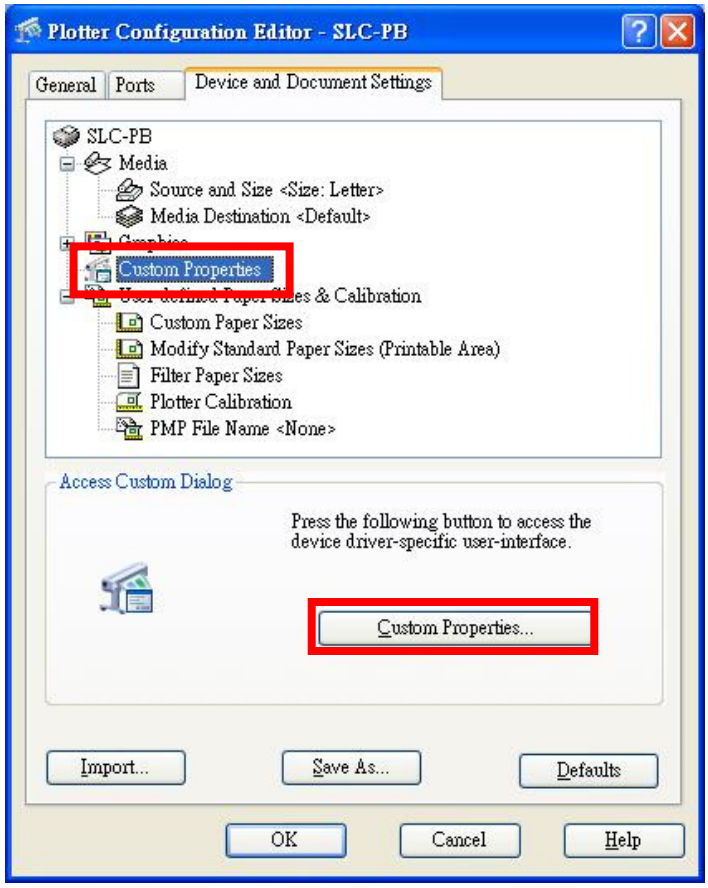
Press [**Next**] button to continue.



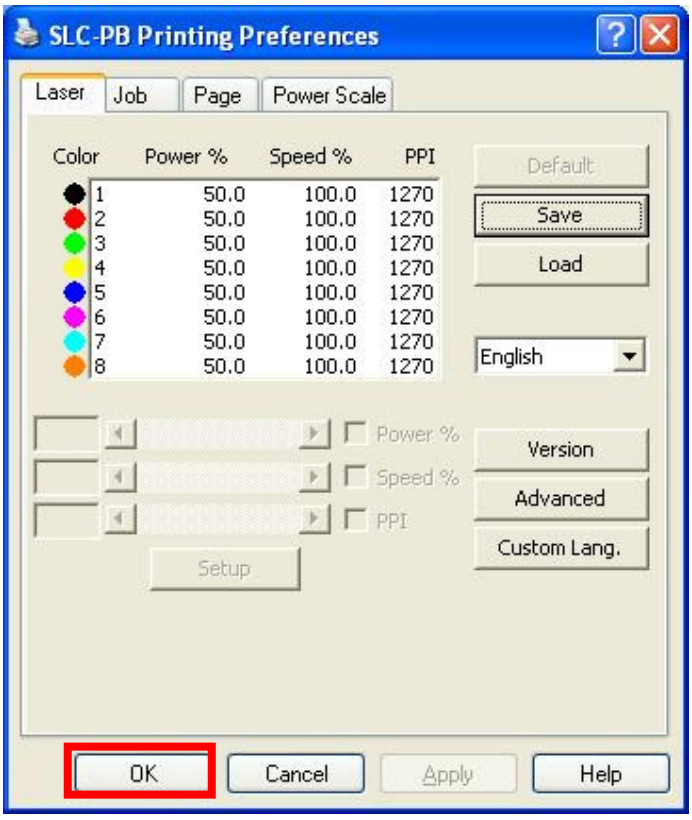
Press **[Finish]** button to continue.



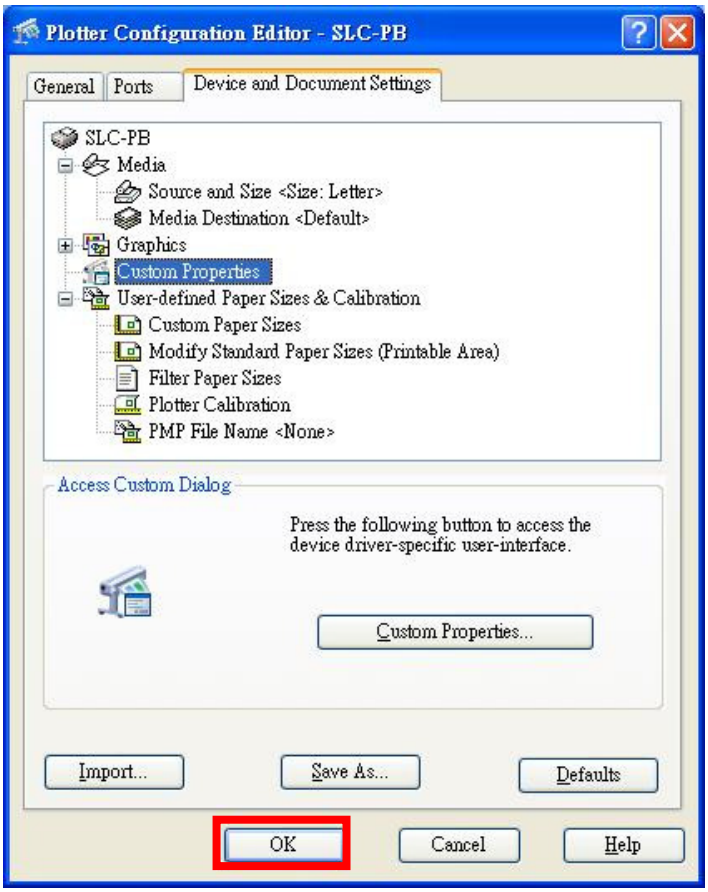
Select **[Custom Properties]** and click **[Custom Properties]** button at middle.



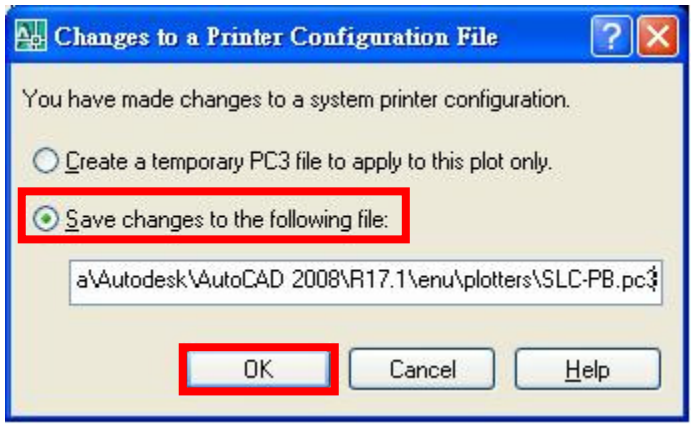
Modify Laser settings if need. Press **[OK]** to finish driver setting.



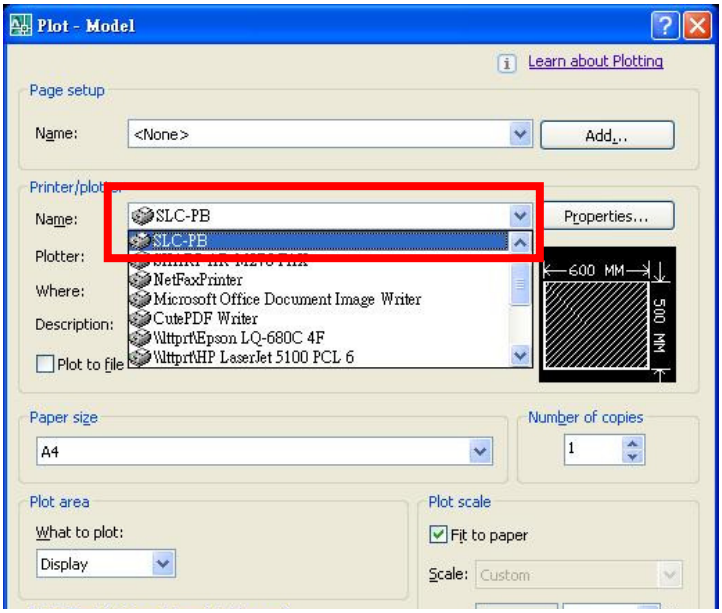
Press **[OK]** to back to print setting.



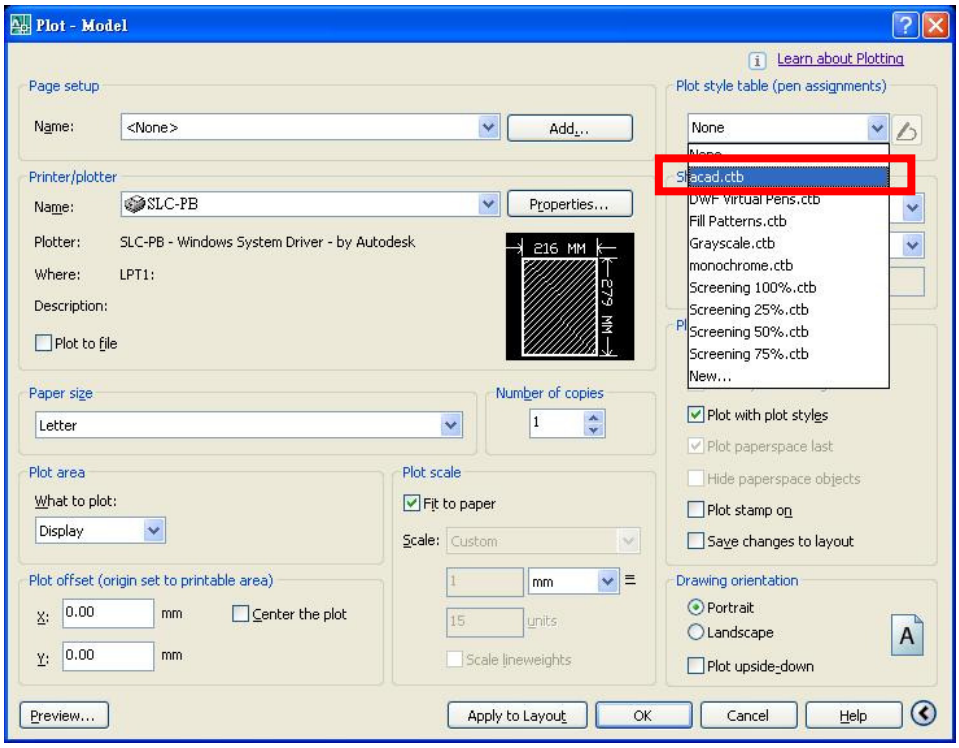
Select **[Save changes to the following file]** and press **[OK]** to continue.



You will find the printer option that you just created (***.pc3**) on **[Name]** box. Please select the new printer instead of original in the future.

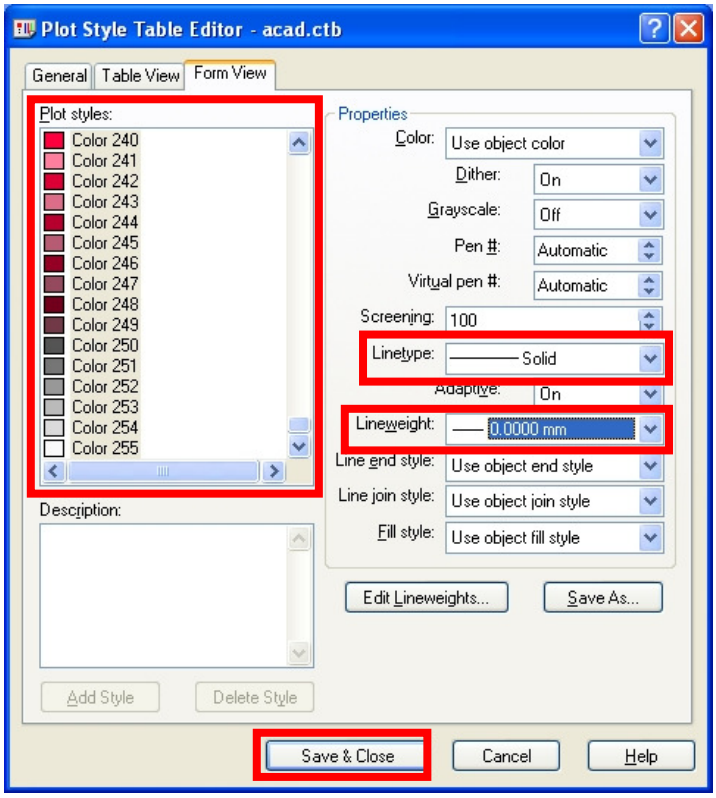


Select **[Plot style table]** to **acad.ctb**. Press **[Edit]** button.

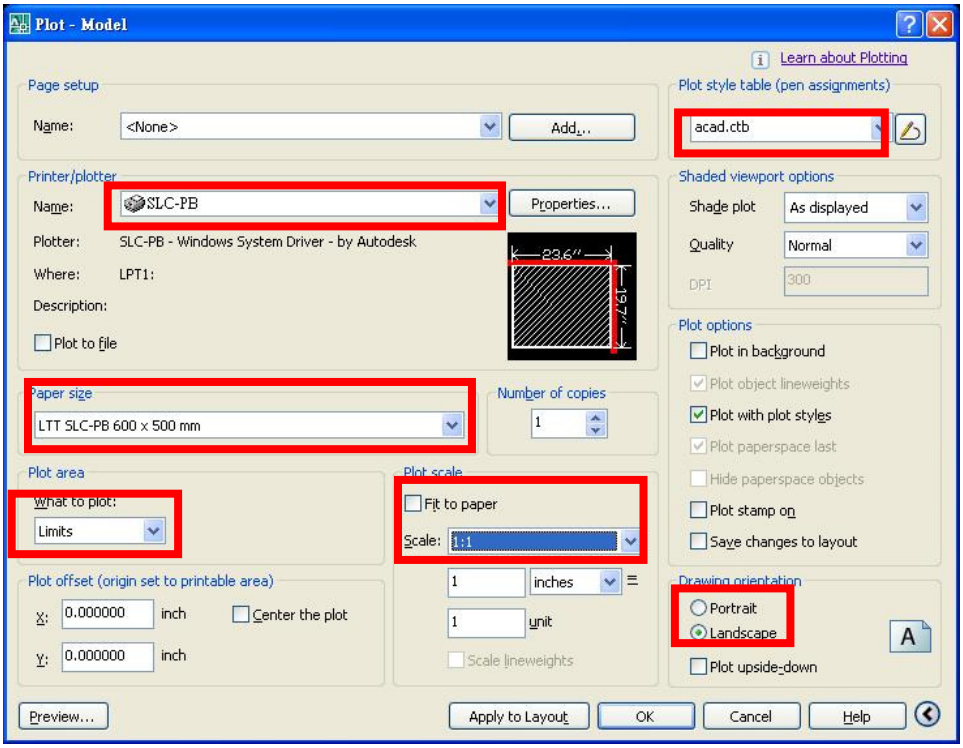


Press **[Yes]** button to continue.

Use **[Shift]** key to help selecting all colors in **[Plot styles]** list. Set the **[Linetype]** to **[solid]** and the **[Lineweight]** to **[0.0000 mm]** Press **[Save & close]** button to continue.



Please follow the settings below. Switch to **[Plot Settings]** tab. Select the **[Plot scale]** to **[1:1]**. Select the **[Plot area]** to **[Limits]**. The **[Drawing orientation]** should be set to **[Landscape]**. Then Press **[OK]** to send file to machine.

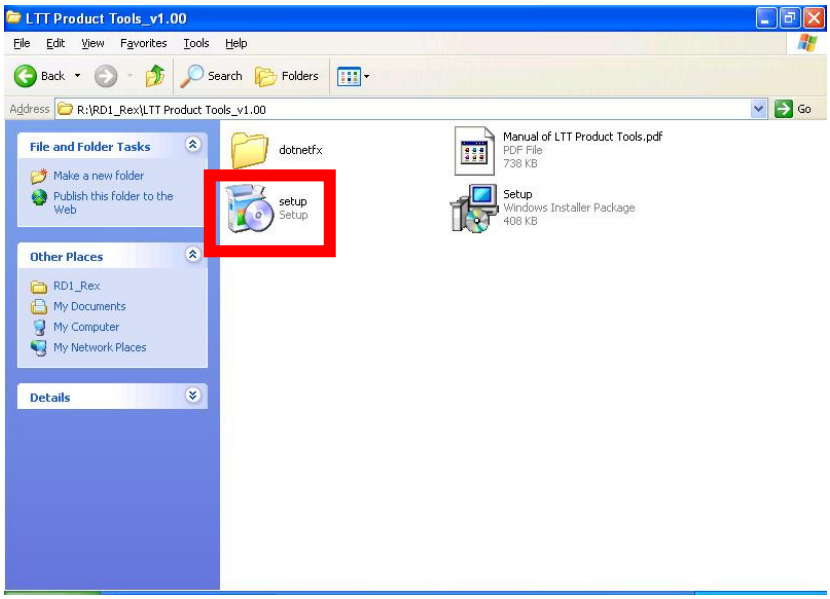


2.8 LTT Product Tools

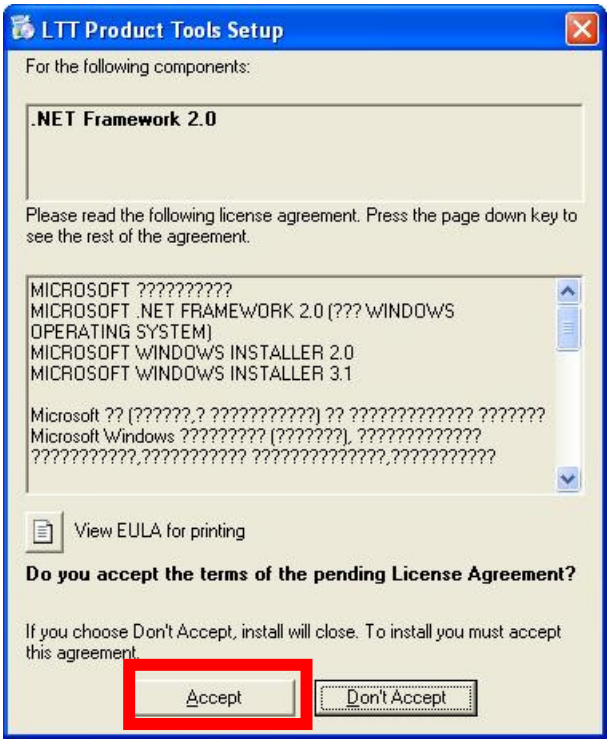
2.8.1 Install Procedure

LTT Product Tools is the software which can send prn or plt file, update firmware, and change the Ethernet settings. This section explains the installation steps on your computer.

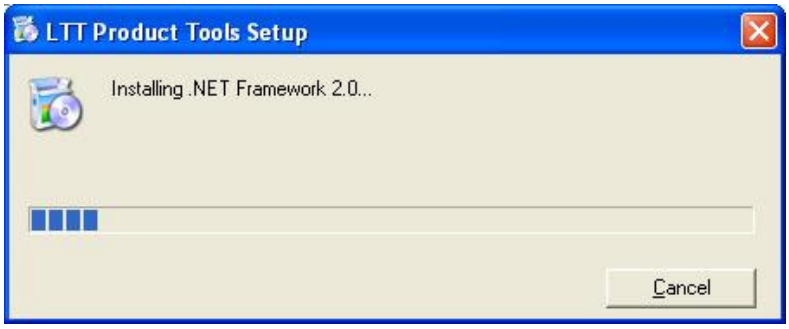
1. Double click **[setup.exe], (the file is included in the installation CD)**



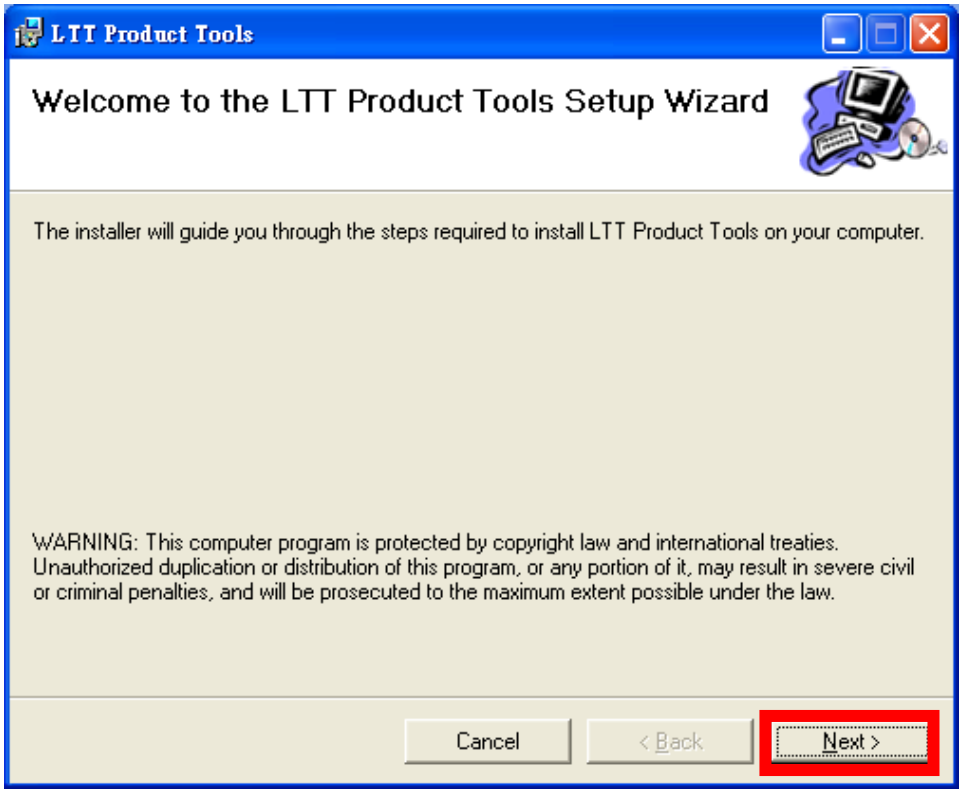
2. When you see the diagram below, please press the **[Accept]** key to go on. If not, please go to Step 4.



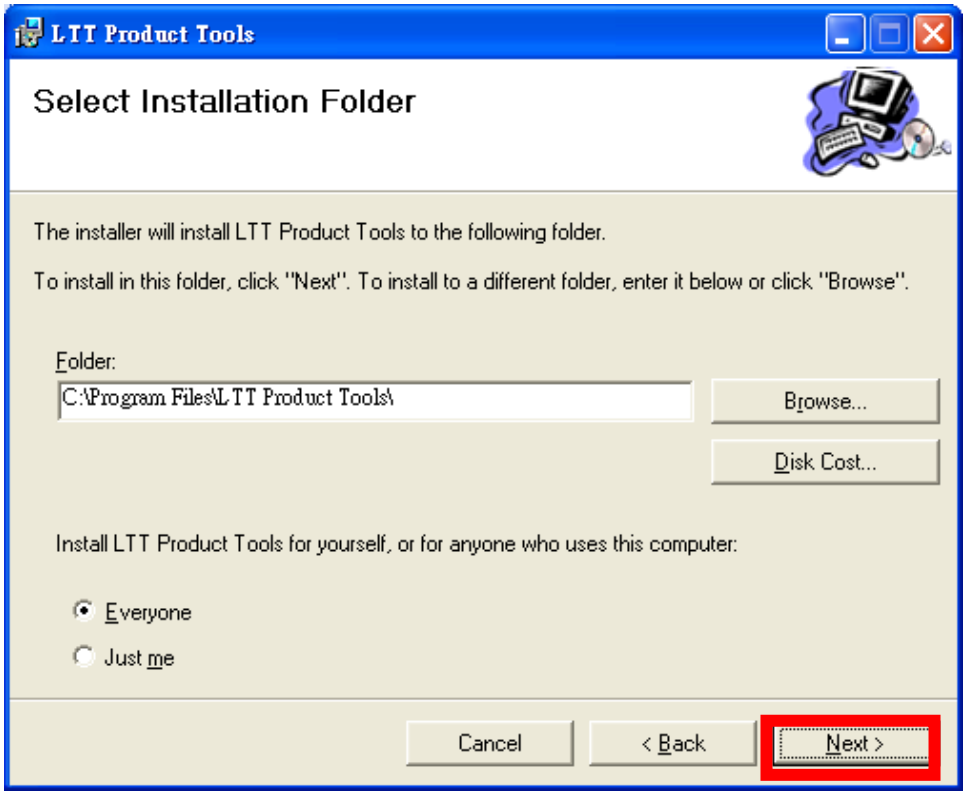
3. When you see the diagram below, please wait for some minutes.



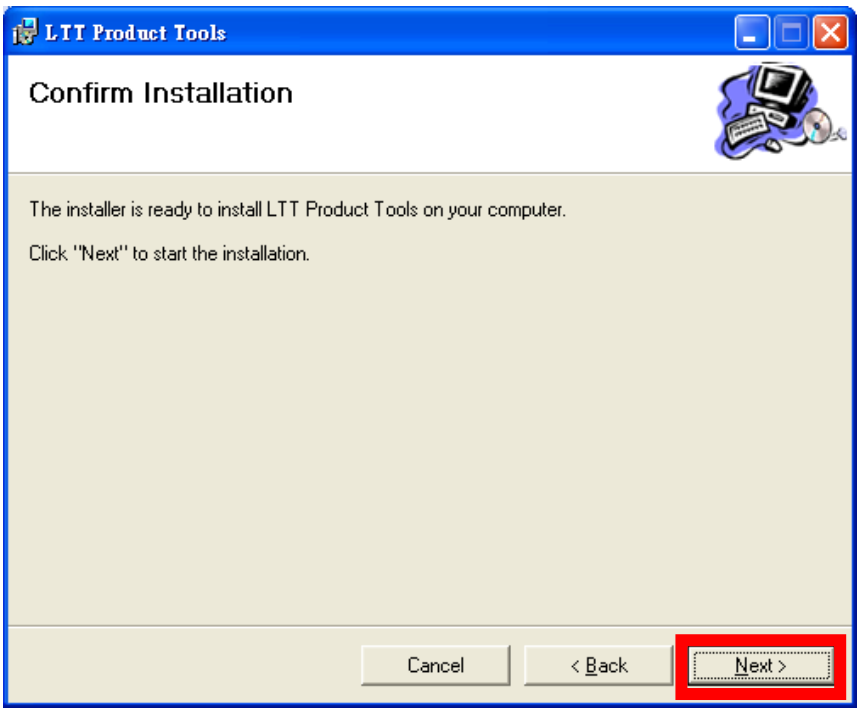
4. When you see the diagram below, please press the **[Next]** key to go on.



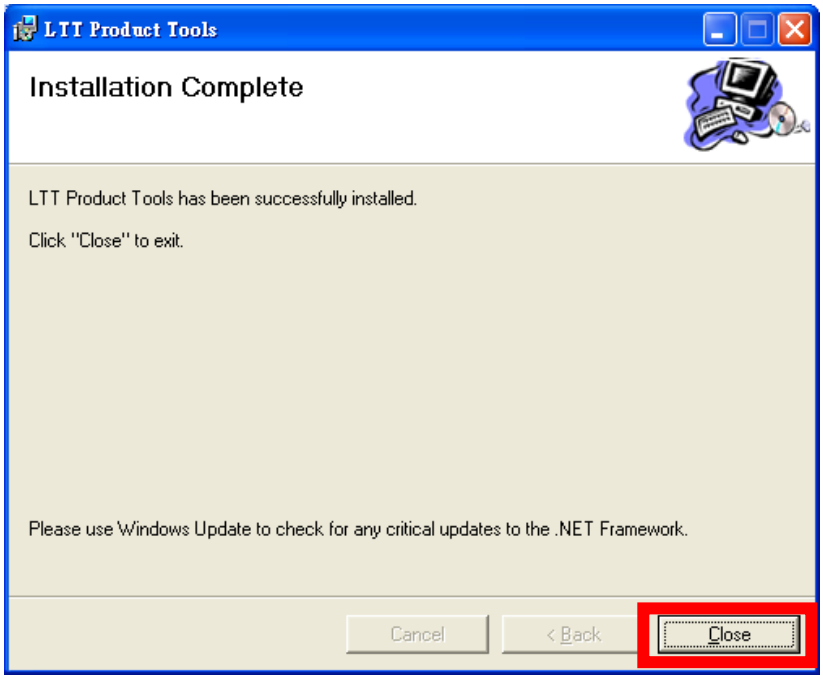
5. When you see the diagram below, please choose a position to install the software, or use the default value. And press **[Next]** key to go on.



6. Press **[Next]** key to go on.



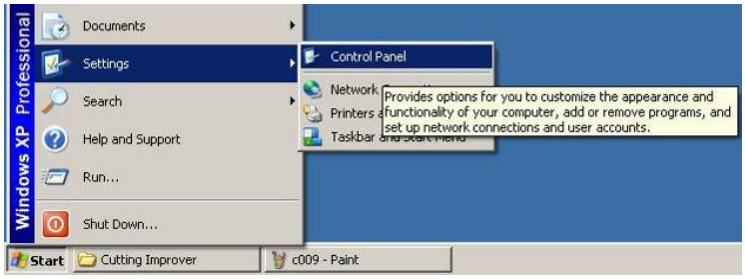
7. Press **[Close]** key to finish the setup procedure.



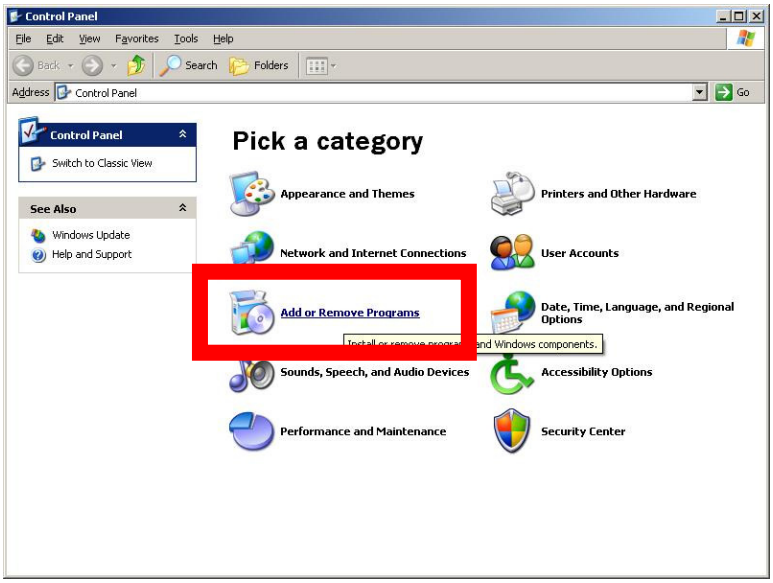
8. After the setup procedure, you can open the software from two shortcuts. The first one locates on the **[Desktop]**, and the second one is placed in the **[Start Manu]**.

2.8.2 Uninstall Procedure

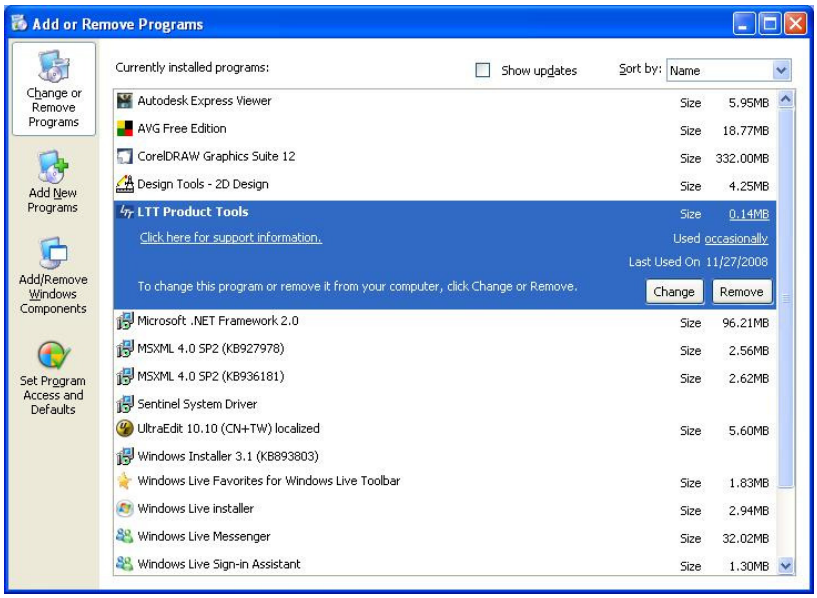
1. Click **[Start]** →**[Settings]** → **[Control Panel]**



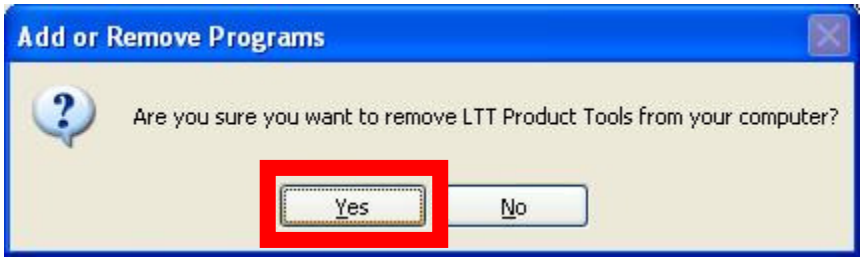
2. Double click **[Add or Remove Programs]**



3. Click **[LTT Product Tools]** → Press **[Remove]** key



4. Please choose **[Yes]**



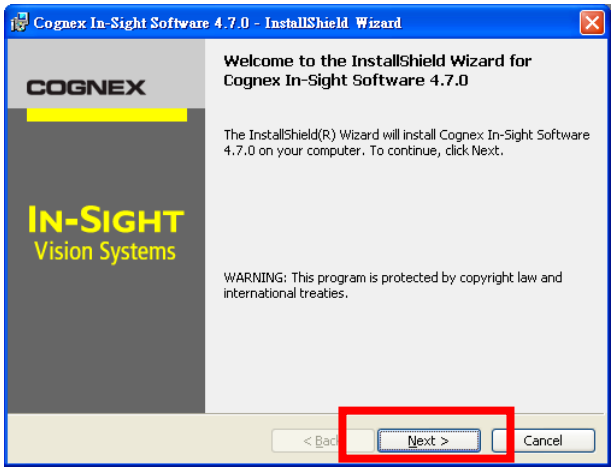
5. Done

2.9 In-Sight Explorer Installation

2.9.1 Install Procedure

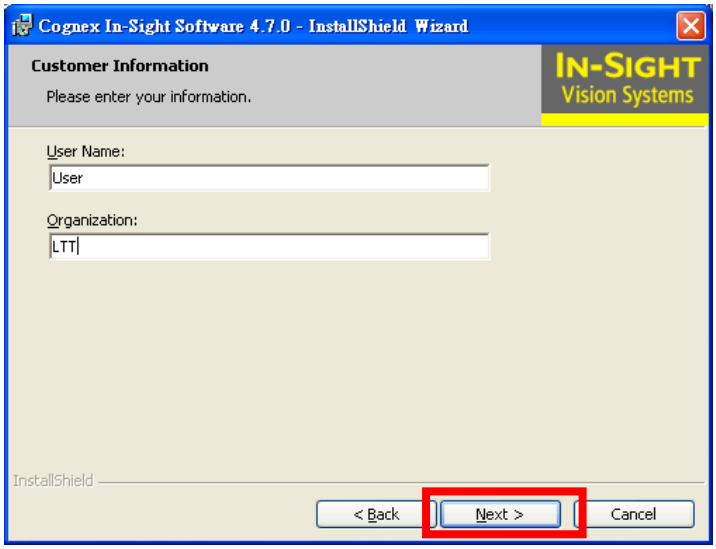
1. Please copy the file **[Cognex In-Sight Software 4.7.0.exe]** to your PC, and double click it. **(the file is included in install CD)**

2. Click [Next]

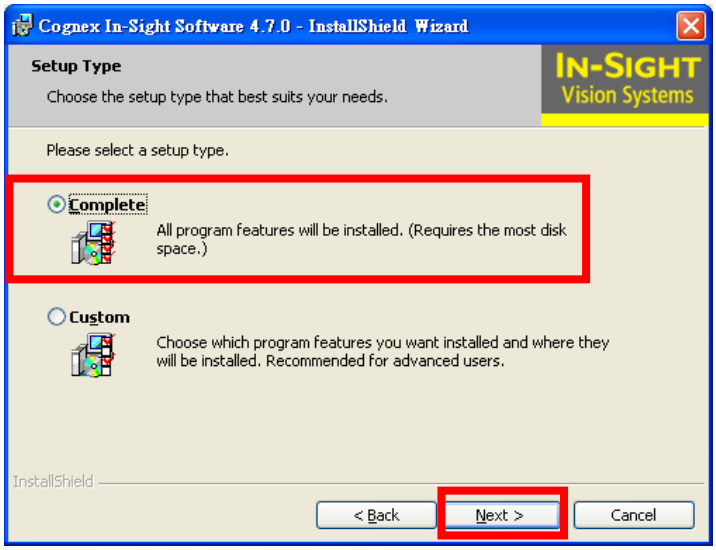


3. Choose **[I accept the terms in the license agreement]** and then click **[Next]**

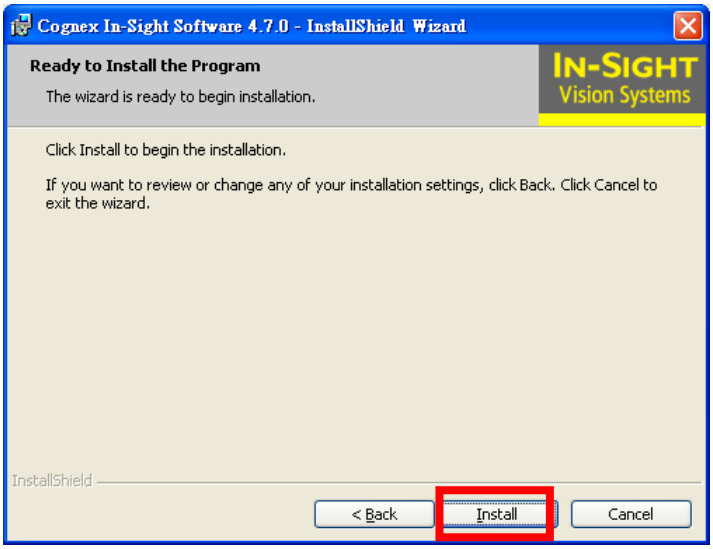
4. Key in the **user name** and **organization**. Then click **[Next]**



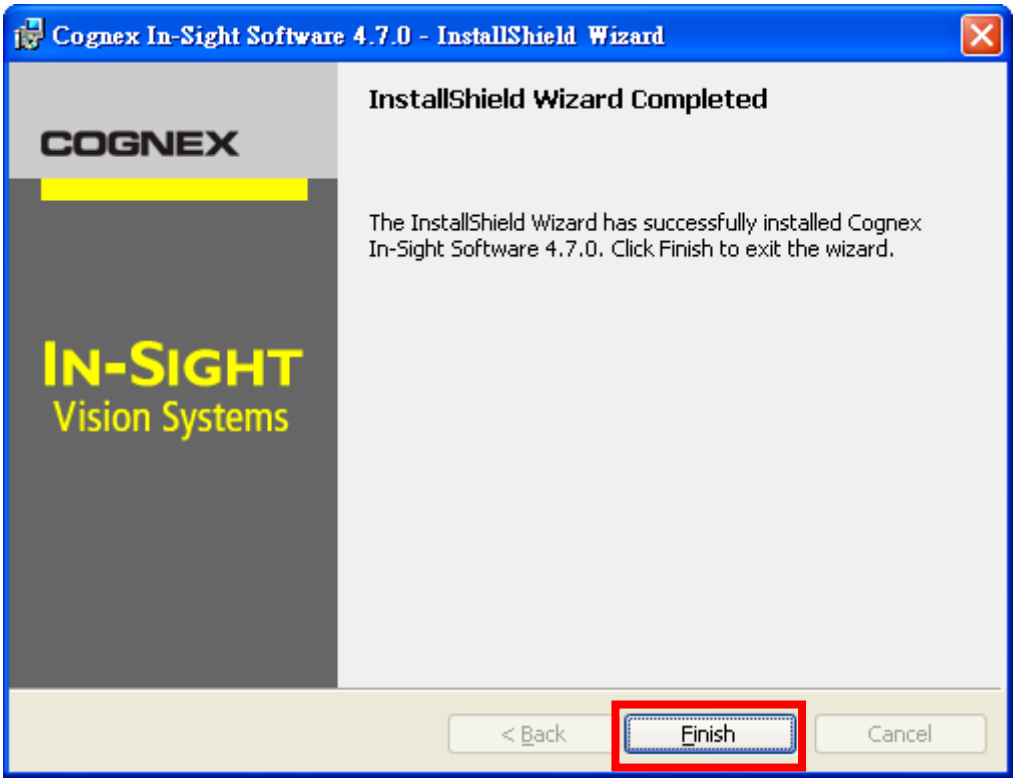
5. Choose **Complete** and press **[Next]**



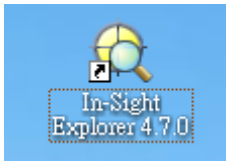
6. Click **[Install]** button to go on.



7. Waiting for install procedure. When seeing blow window. Click **[Finish]** to finish install procedure for **In-Sight Explorer**.

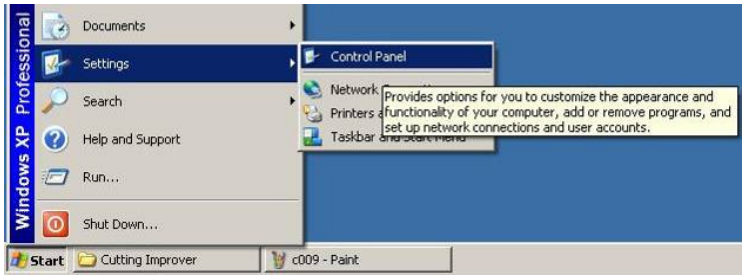


8. After the setup procedure, you can open the software from two shortcuts. The first one locates on the **[Desktop]**, and the second one is placed in the **[Start Manu]**.

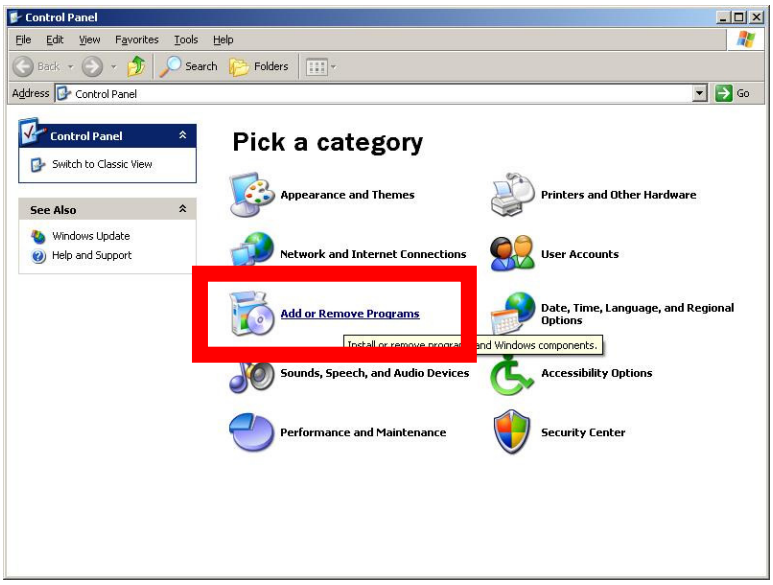


2.9.2 Uninstall Procedure

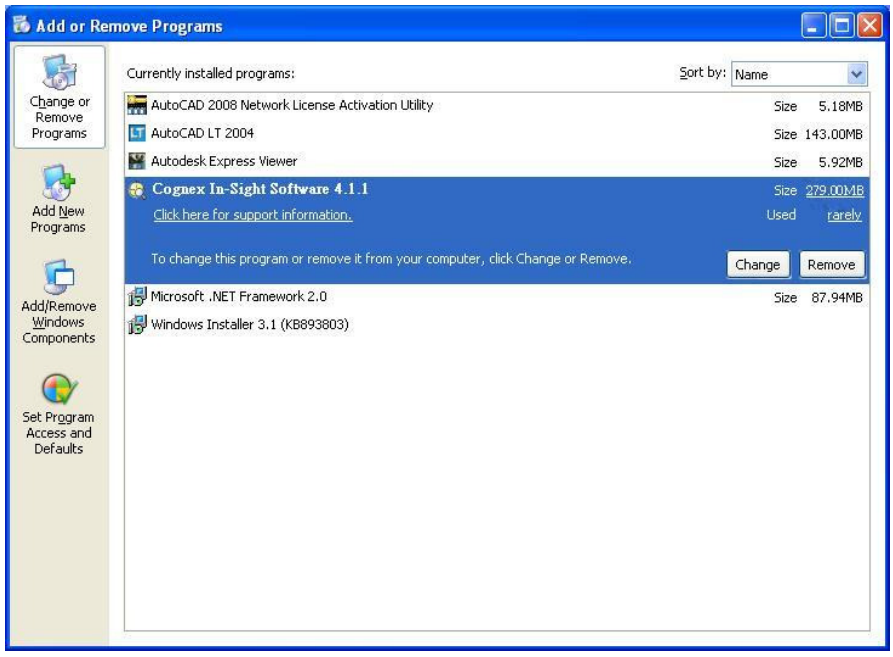
1. Click **[Start]** →**[Settings]** → **[Control Panel]**



2. Double click **[Add or Remove Programs]**



3. Click **[Cognex In-Sight Software 4.7.0]** → Press **[Remove]** key



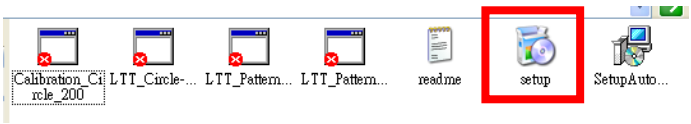
4. Please choose **[Yes]**

2.10 AutoCCD Installation

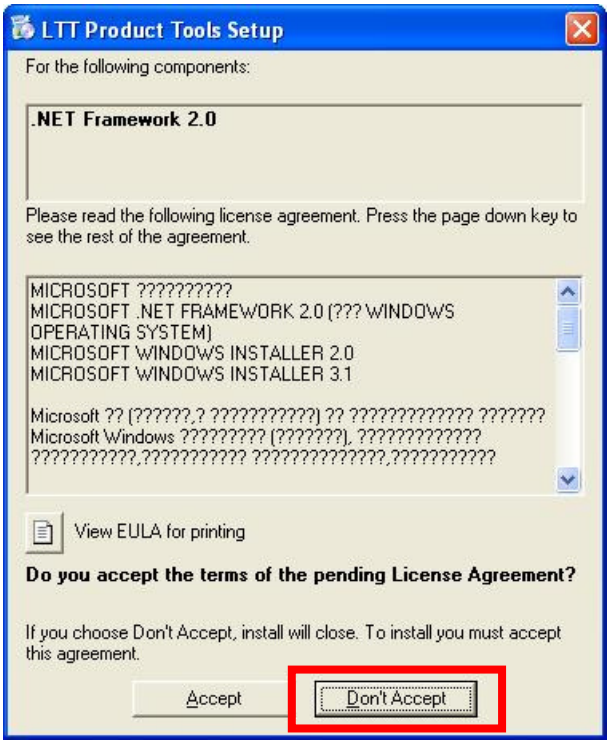
2.10.1 Install Procedure

AutoCCD is the main control program for cutting with CCD camera. This section explains the installation steps to your PC.

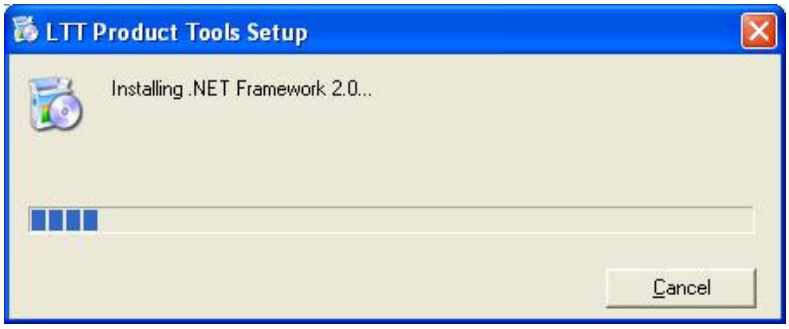
1. Please find the AutoCCD folder from installation CD. Double click **[setup.exe]**



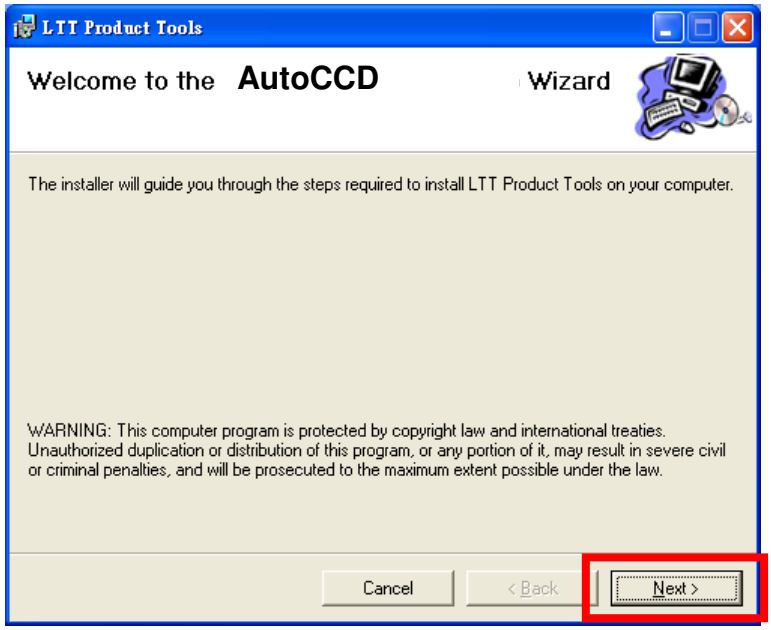
2. When you see the diagram below, please press the **[Accept]** key to go on. If not, please go to Step 4.



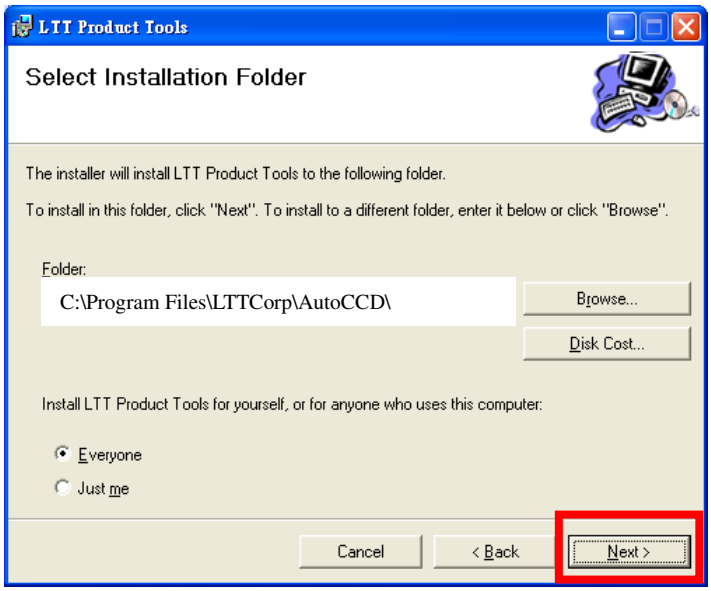
3. When you see the diagram below, please wait for few minutes.



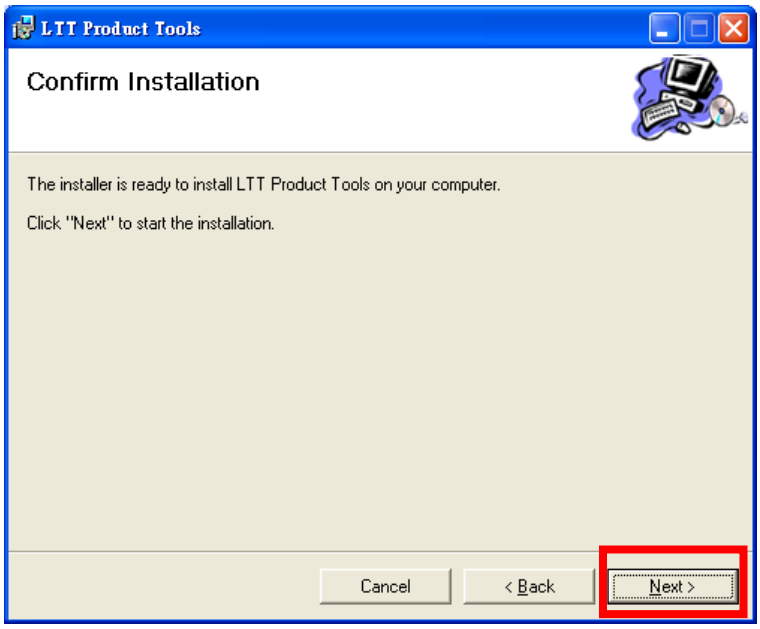
4. When you see the diagram below, please press the **[Next]** key to go on.



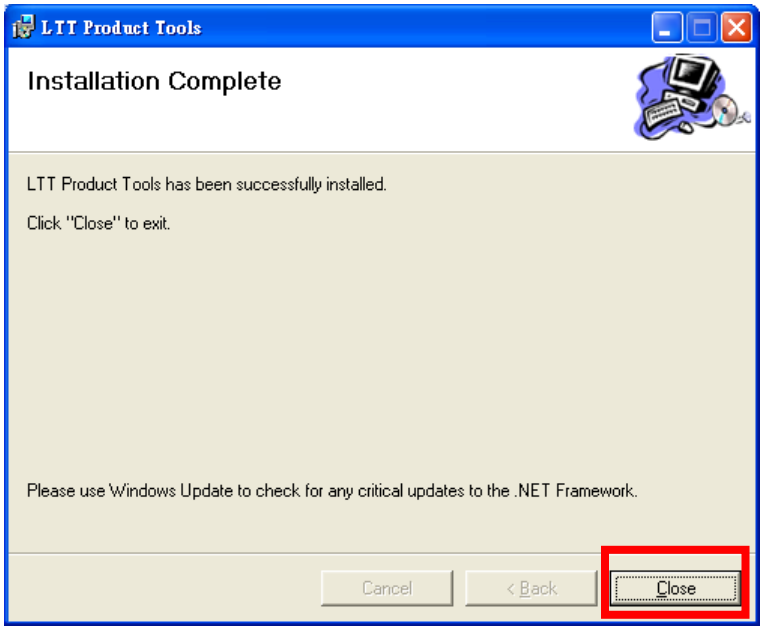
5. When you see the diagram below, please choose a position to install the software, or use the default value. And press **[Next]** key to go on.



6. Press **[Next]** key to go on.



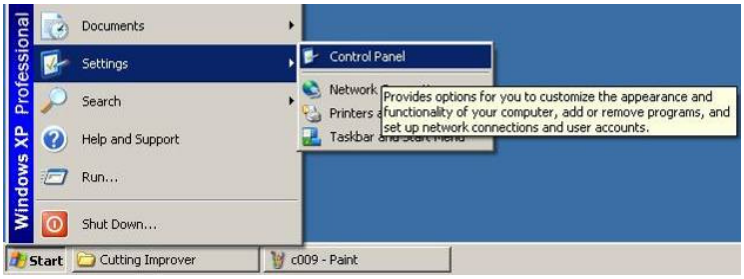
7. Press **[Close]** key to finish the setup procedure.



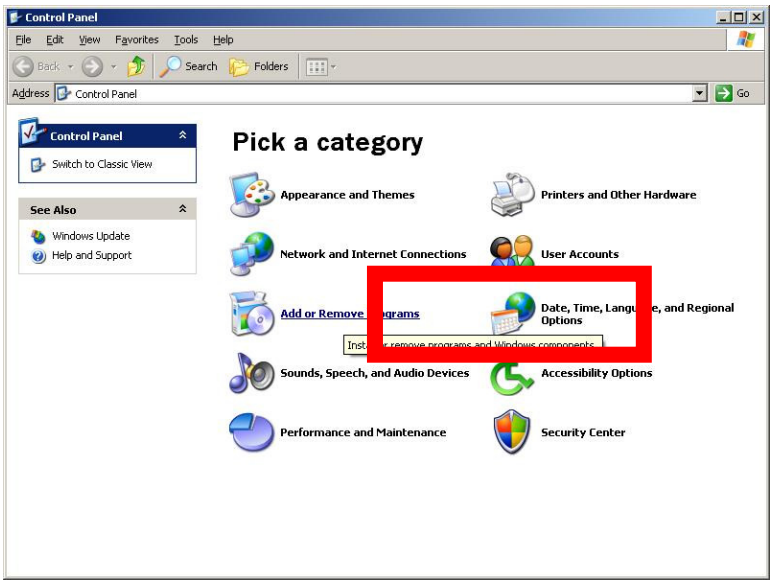
8. After the setup procedure, you can open the software from two shortcuts. The first one locates on the **[Desktop]**, and the second one is placed in the **[Start Manu]**.

2.10.2 Uninstall Procedure

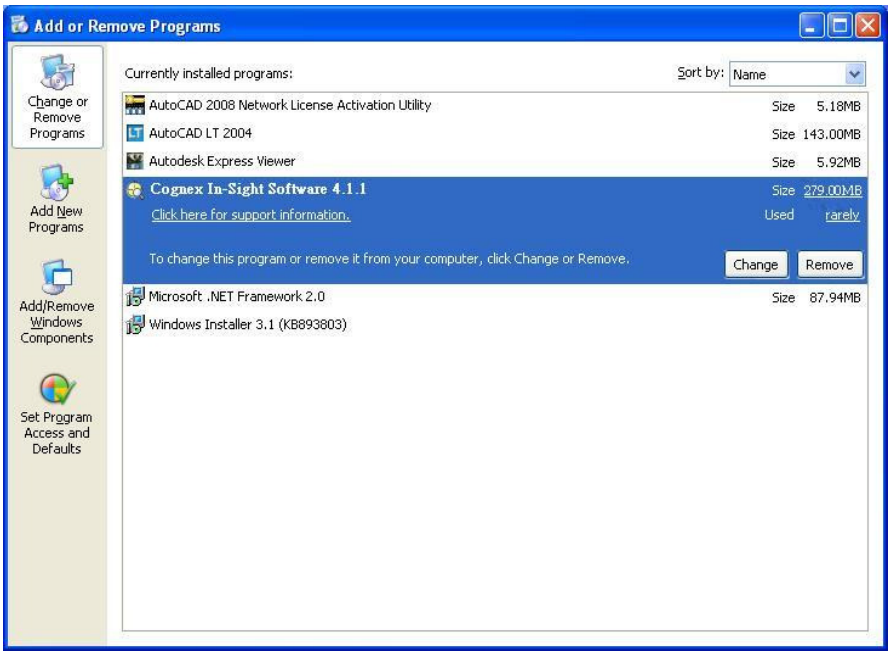
1. Click **[Start]** →**[Settings]** → **[Control Panel]**



2. Double click **[Add or Remove Programs]**



Click **[AutoCCD]** → Press **[Remove]** key

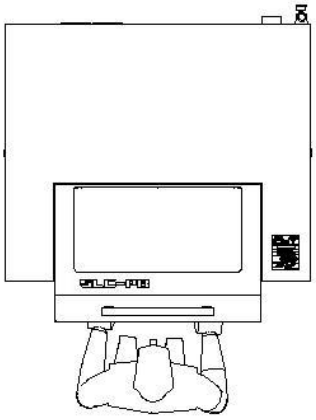


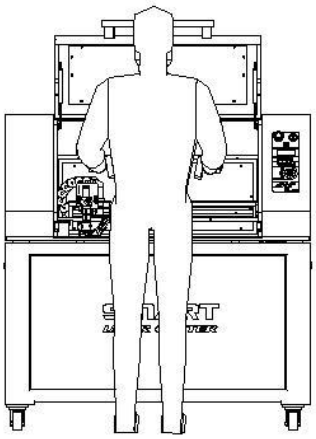
4. Please choose **[Yes]**

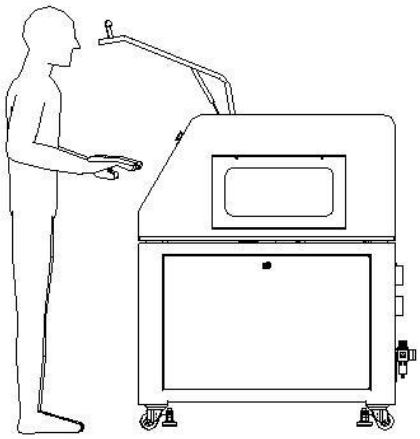
Chapter 3 Operation

3.1 Operator Position

This section shows the position when you operate machine.







3.2 Basic Operation Flow without CCD

This section explains the basic and common steps to operate SLC-M+. If you want to obtain more detail about operation, please see section 3.3 and 3.4.

Before process the steps in this section, please make sure that you have already finished all steps in chapter 2.

1. Get machine ready.

Turn on the power.

Wait for system start and homing process finishing.

2. Send file to machine.

Open a drawing file or draw a new one on CorelDraw or AutoCAD.

Execute the **[Print]** or **[Plot]** function.

Modify the settings of driver. (See section 3.4)

Click **[OK]** to send file.

3. Adjust focal height (if necessary).

Put the material on the table.

Move the carriage above the material.

Press  and select **[Yes]**.

4. Execute file.

Select the file on control panel.

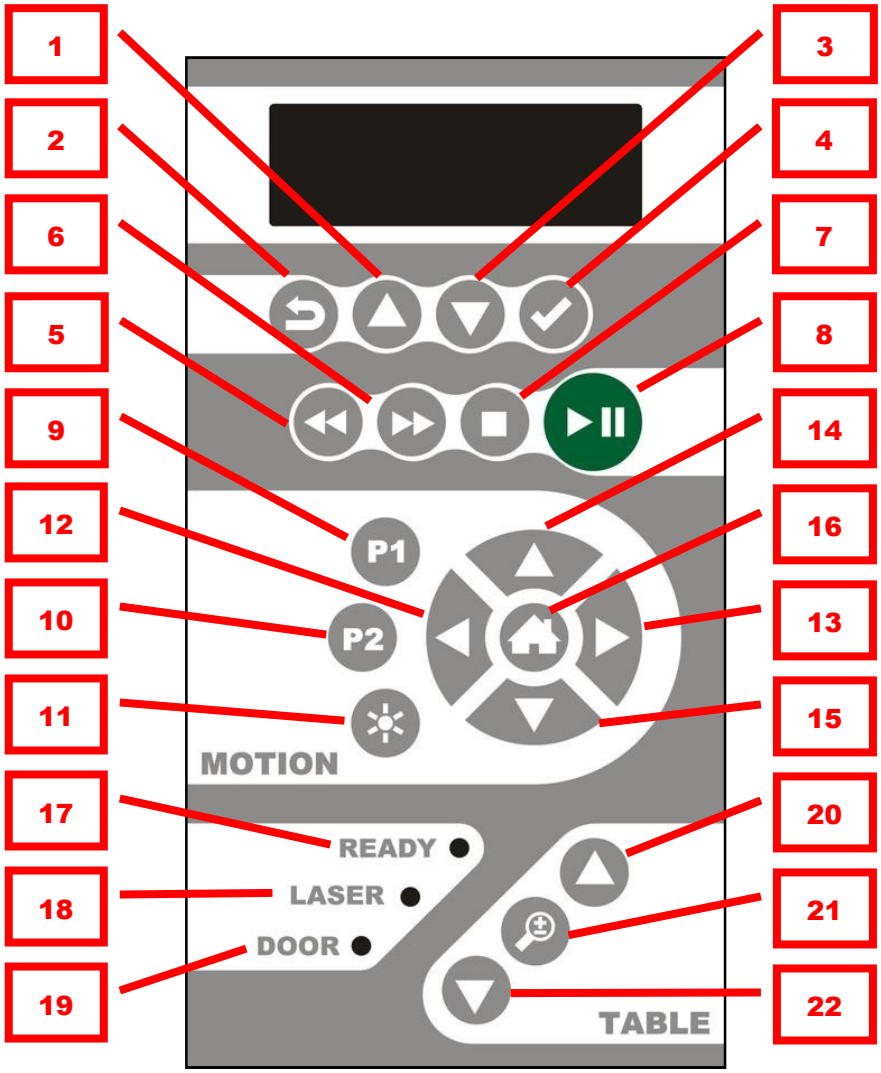
Make sure all LED indicators on control panel are on. (If not, see chapter 5)

Press  to start file.

3.3 Machine Operation without CCD

This section explains the detail about how to operate SLC-M+.

3.3.1 Control Panel



Cursor Up / Increase Values
Escape
Cursor Down / Decrease Values
Enter
Previous File
Next File
Stop
Run / Pause
Move to P1
Move to P2
Red Beam Switch/ Laser
Move Carriage Left (X-)
Move Carriage Right (X+)
Move Carriage Forward (Y-)
Move Carriage Back (Y+)
Homing
Ready Indicator
Laser Indicator
Door Indicator
Focal Lens Up
Auto Focusing
Focal Lens Down

1. Cursor Up / Increase Values

Move the cursor up or increase values.

2. Escape

Escape from sub-menu or sub-selection

3. Cursor Down / Decrease Values

Move the cursor down or decrease values.

4. Enter

Enter into sub-menu or confirm the selection.

5. Previous

Select previous file in file list.

6. Next

Select next file in file list.

7. Stop

Give up the file that is in pause mode. You can't stop file directly which is not in pause mode.

8. Run / Pause

Run the file when system is ready or in pause mode. Pause the file when it is running.

9. Move Carriage to P1

Move the carriage to the location of P1. The way to set location of P1, please see section 3.3.2

10. Move Carriage to P2

Move carriage to the location of P2. The way to set location of P2, please see section 3.3.2

11. Red Beam Switch / Laser

Turn on/off the red beam normally.

But if in the sub-menu of **[Alignment mode]** (See section 3.3.2), this key will turn to emit the laser beam for alignment.

12. Move Carriage Left (X-)

Move the carriage left slowly when press this key shortly. If you want to move the carriage left faster, please press and hold this key.

13. Move Carriage Right (X+)

Move the carriage right slowly when press this key shortly. If you want to move the carriage right faster, please press and hold this key.

14. Move Carriage Forward (Y-)

Move the carriage forward slowly when press this key shortly. If you want to move the carriage forward faster, please press and hold this key.

15. Move Carriage Back (Y+)

Move the carriage back slowly when press this key shortly. If you want to move the carriage back faster, please press and hold this key.

16. Homing

Move the carriage to home and reset the position of home if the carriage loses its position.

After the homing process, you have to press  so that you can leave the homing page.

17. Ready Indicator

This indicator will be on when system is ready to run file and no file is in pause mode.

18. Laser Indicator

This indicator will be on when laser tube is ready for emission.

19. Door Indicator

This indicator will be on when all doors with interlocks are closed.

20. Focal Lens Up

Move the focal lens up slowly when press this key shortly. If you want to move the focal lens up faster, please press and hold this key.

21. Auto Focusing

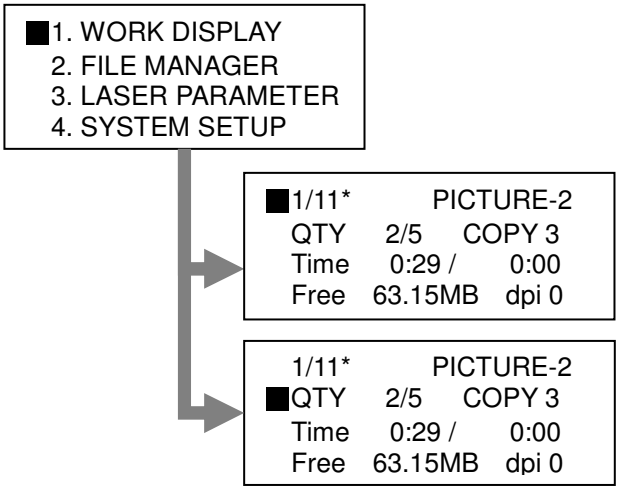
Automatically adjust the distance of lens and material to focus length.

22. Focal lens Down

Move the focal lens down slowly when press this key shortly. If you want to move the table down faster, please press and hold this key.

3.3.2 Operating Menu

1. Work Display



1 /11*

Indicates that there are totally 11 files in memory, and the first file is selected at present. You can press and to select files.

PICTURE-2 :

Indicates that the present file is named "PICTURE-2". You can name file on the tab "Page" of driver. (See section 3.4.3)

QTY 2/5 :

Indicates that the file is limited to be executed 5 times at most, and system has finished 2 times. It will be invalid to press if system has finished 5 times. The way to modify this setting is described in section 3.4.3.

COPY 3 :

Indicates that the file will repeat 3 times automatically if you press one time. The way to modify this setting is described in section 3.4.3.

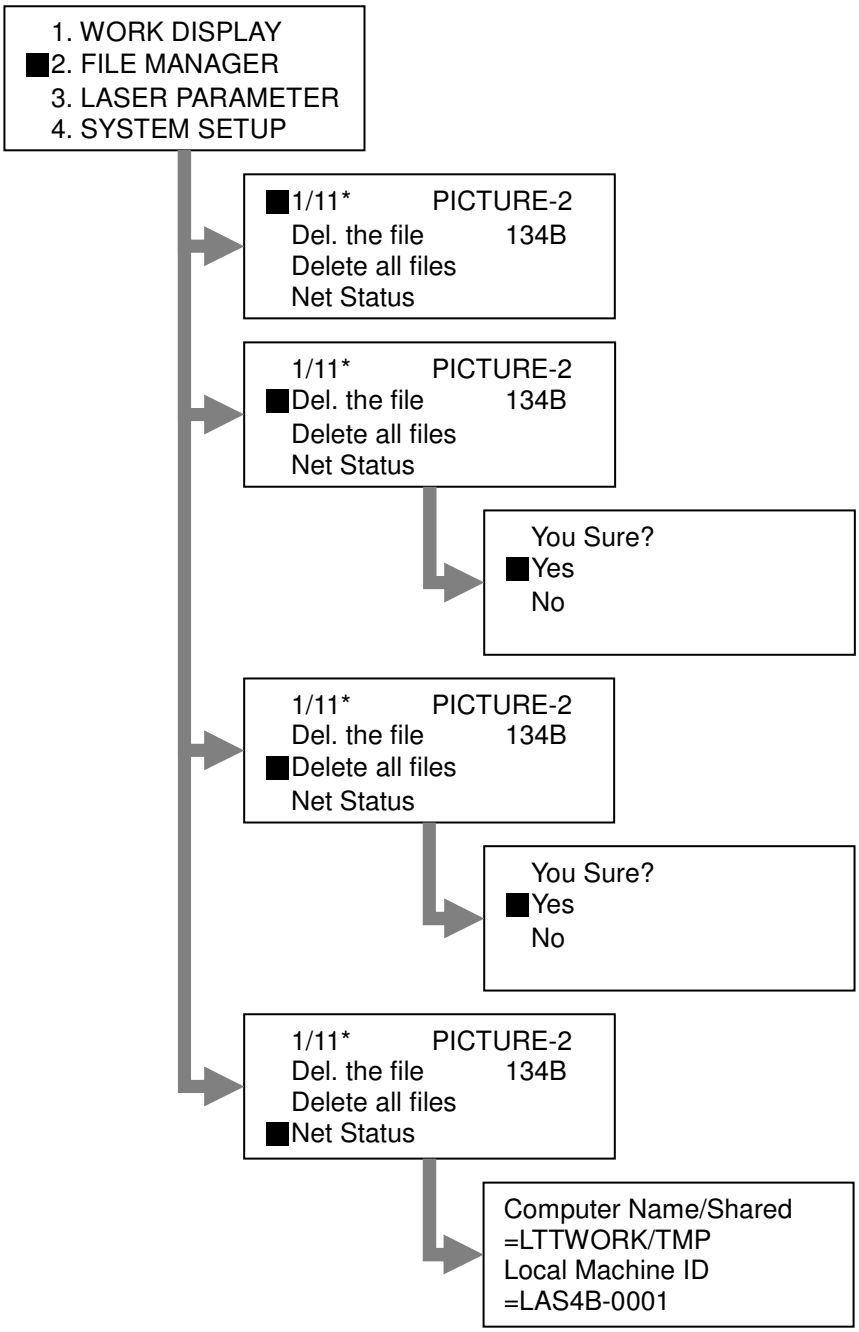
Time 0:29 / 0:00

The first timer records the pass time at present when a file is executed. The second timer will record the total time if the file has ever finished at one time

Free 63.15 MB dpi 0

If no file is executed, this line will display available memory. If a file is being executed, it will display the current power and speed settings.

2. FILE MANAGER



1 /11* PICTURE-2

Like the definition in Work display, it indicates the number and name of files. You can press and to select files.

Del. the file :

This selection can delete single file which is selected at present.

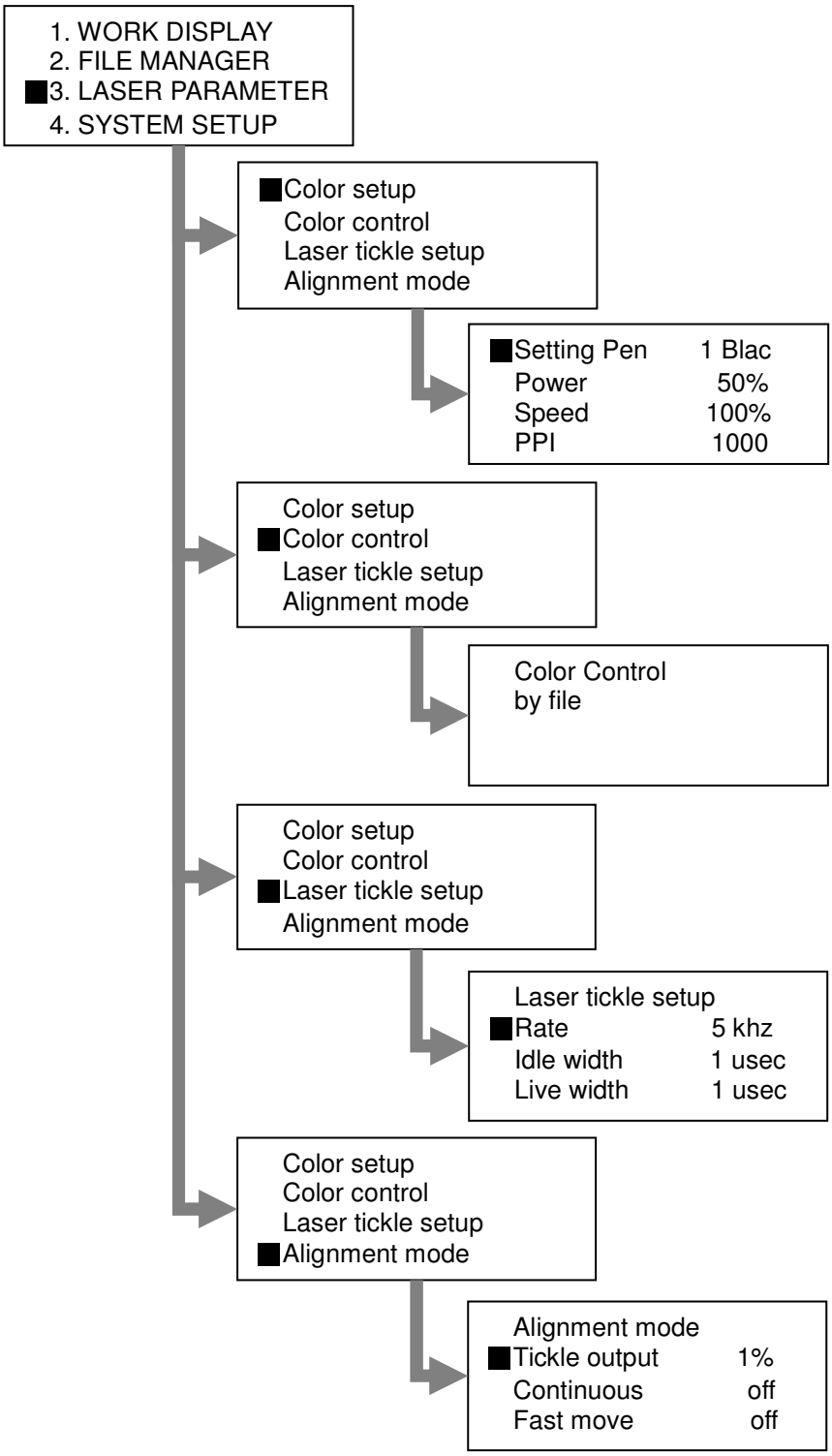
Delete all files :

This selection can delete all files in memory.

Net Status

This selection can show the settings of Ethernet.

3. Laser Parameter



Color Setup

The settings of each color can be adjusted under this selection after the file has been sent. It is not necessary to use because mostly all settings are defined in print driver before sending the file.

Setting Pen

Indicates the color you want to modify.

Power

Indicates the present power for setting pen. Its range is between 0~100%.

Speed

Indicates the present speed for setting pen. Its range is between 0~100%.

PPI

Indicates the number of pulses per inch for setting pen. It has six options, and they are 166, 200, 250, 333, 500, and 1000.

Color Control

There are two options: **[by file]** and **[by panel]**. **[by file]** means that the color settings are defined based on print driver for single file. **[by panel]** means that the color settings are defined based on **[Color Setup]** for all files.

Laser Tickle Setup

The laser tickle pre-ionizes the gas into a plasma state so that it is just below the laser threshold. Increasing tickle width beyond 1 μs will add enough energy to the plasma to cause laser emission. By applying a laser tickle, the laser will respond predictably to laser signal even when there is considerable "off" time between applied pulses. It is recommended **NOT** to change the settings unless instructed to by a LTT technician.

Alignment Mode

This function is used for alignment of laser. It is recommended **NOT** to use this function unless instructed to by a LTT technician.

Tickle output

Indicates the power for laser tickle. Its range is between 0~100%.

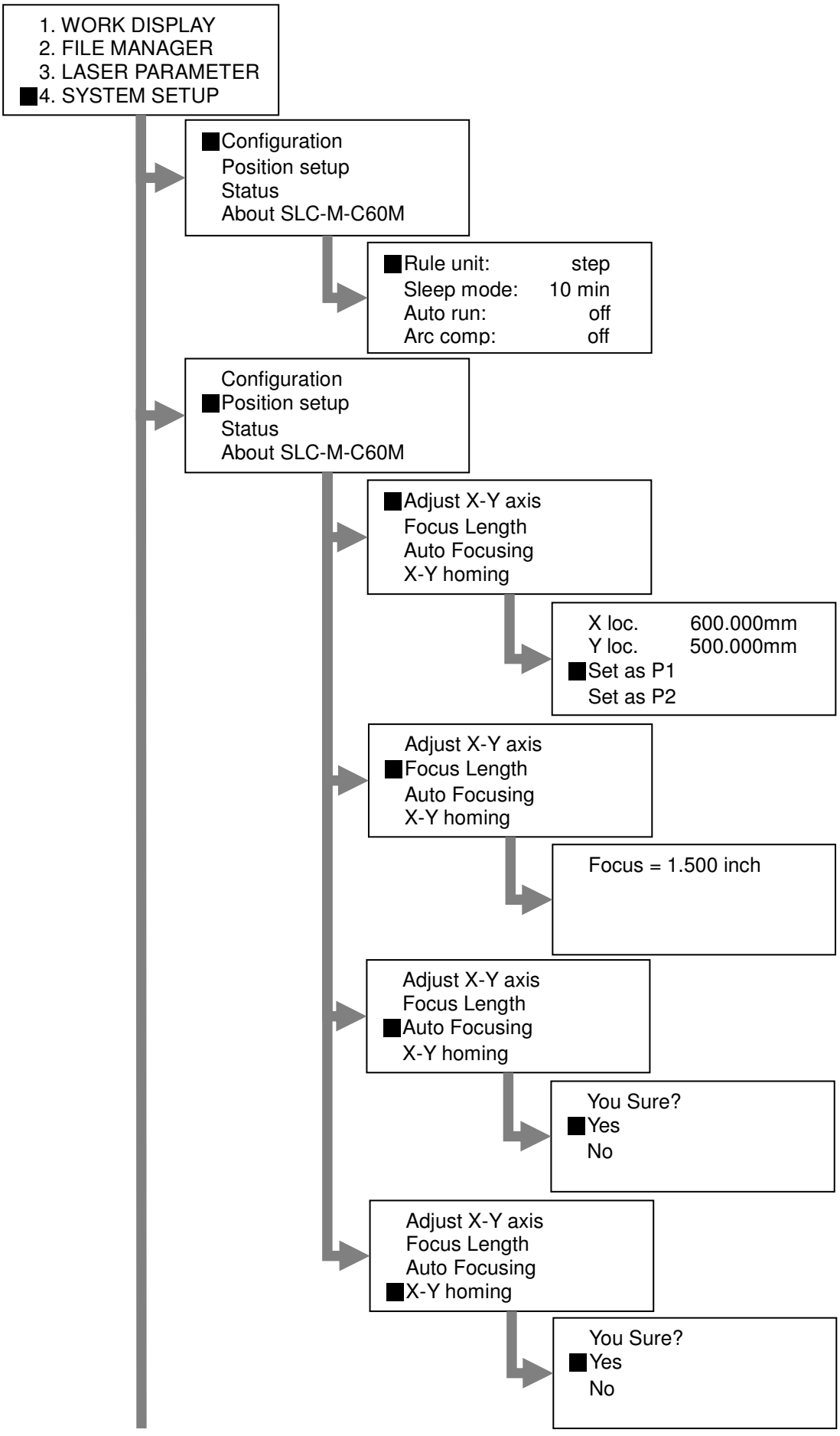
Continuous

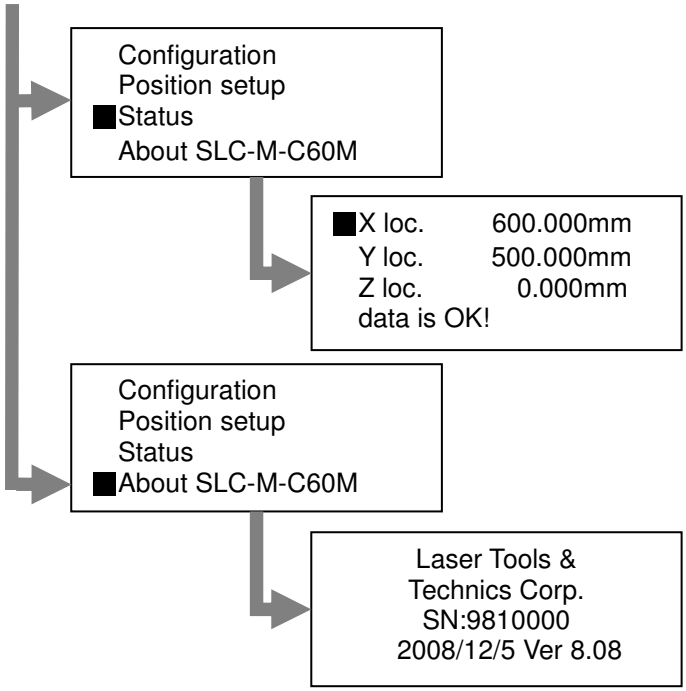
If this function is on and press  , the laser tickle will emit continuously until pressing  again. If this function is off, the laser tickle emits only when you keep pressing 

Fast move

If this function is on, you can move the carriage faster to nine position of working table by using motion control keys.

4. System Setup





Configuration

Rule unit

This function can allow user to select the unit of length for system. There are three options: **step**, **millimeter**, and **inch**.

Sleep mode

After the setting time, system will turn off the power of laser tube if there is still no file being executed.

Auto run

This item has been deactivated.

Arc comp

Compensates laser output power while cutting an arc.

Position setup

Adjust X-Y axis

This function can allow user to set the position of **[P1]** and **[P2]**. Please move the carriage to the position that you want set for **[P1]** or **[P2]**. Then press **[Enter]** when the cursor is on the right side of **[Set as P1]** or **[Set as P2]**.

Focus Length

This function can change focal length for auto focusing if you change the size of focus lens.

Auto Focusing

Focusing the laser automatically. This function is the same w .

X-Y homing

Move the carriage to home, and reset the position of home if the carriage loses position. This function is the same with .

Status

This function can show the position of carriage and table.

About SLC-M+ ####

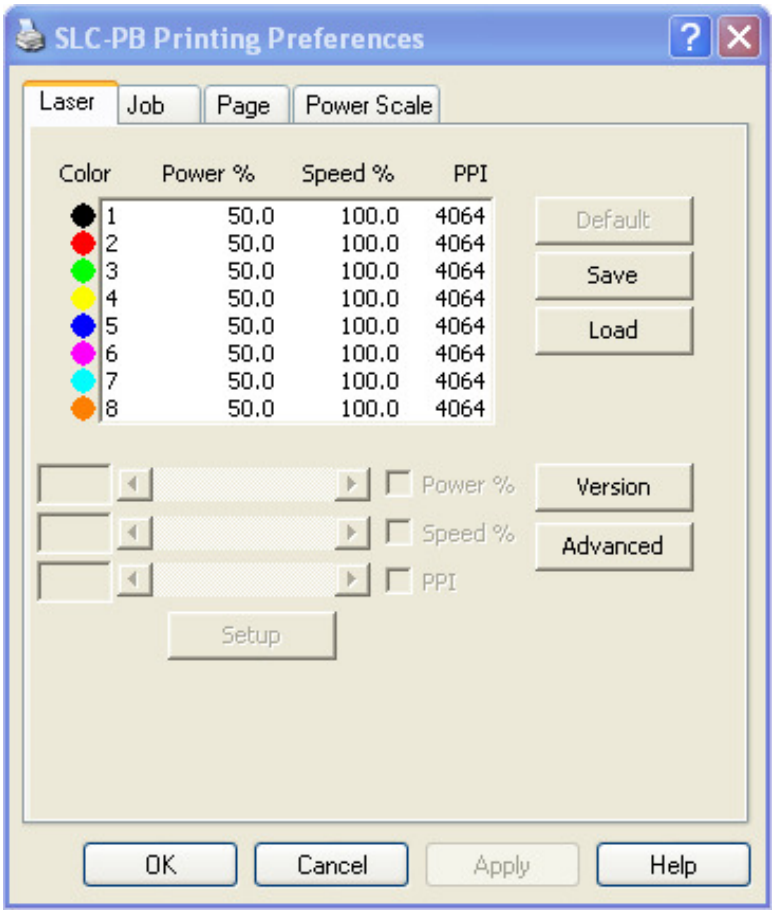
This function can show the firmware version and the machine serial number.

3.4 Print Driver Operation

Because SLC-M+ is controlled by a standard Windows printer driver, you can create the drawing on your favorite graphics software based on Windows system. When you want to send files to SLC-M+, you can easy modify the driver settings just like using a desktop printer. There are four tabs in SLC-M+ driver programming: **Laser**, **Job**, **Page**, and **Power scale**.

3.4.1 Laser Tab

The **[Laser]** tab contains Power, Speed, and PPI for eight colors. Other functions enable user to save and load configuration files of driver settings, check driver information, tune machine, and customize the language of driver.



Color

SLC-M+ system can cut with eight groups of power, speed and PPI according to the color in drawing. If the color in drawing does not belong any one of these eight colors, then driver will choose a similar one according to its RGB values.

Power

This item can control the output power by setting the percentage of maximum power. For example, if the maximum power of Laser generator is 30 Watts, then setting 50% power will generate about 15 Watts of output power.

Speed

This item can control the output speed by setting the percentage of maximum speed. For example, if the maximum speed of cutting is 60 ips, then setting 50% speed will produce about 30 ips of cutting speed.

PPI

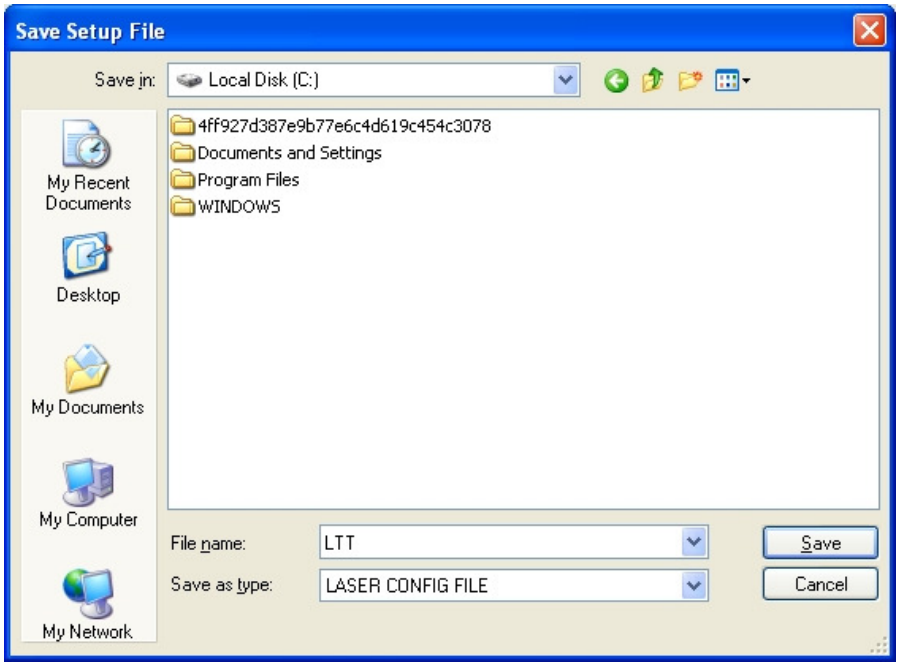
PPI means "Pulses Per Inch". This item controls the numbers of laser pulses in one inch. This item only affects vector cutting. It is recommended to decrease PPI for dull materials like wood and increased for polished materials like acrylic.

Setup

The settings of power, speed, and PPI can be modified by editing the text boxes and dragging the sliders. Then please click the setup button to save the new values for each setting.

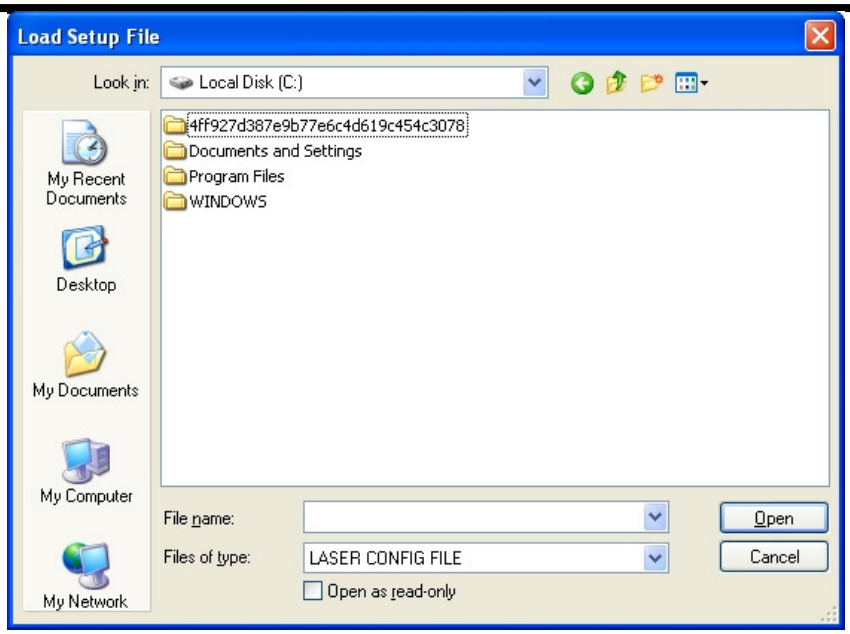
Save

Clicking this button will pop up a **[Save Setup File]** window. User can save all settings into a configuration file (*.lcf).



Load

Clicking this button will pop up a **[Load Setup File]** window. User can load all settings from a configuration file (*.lcf).

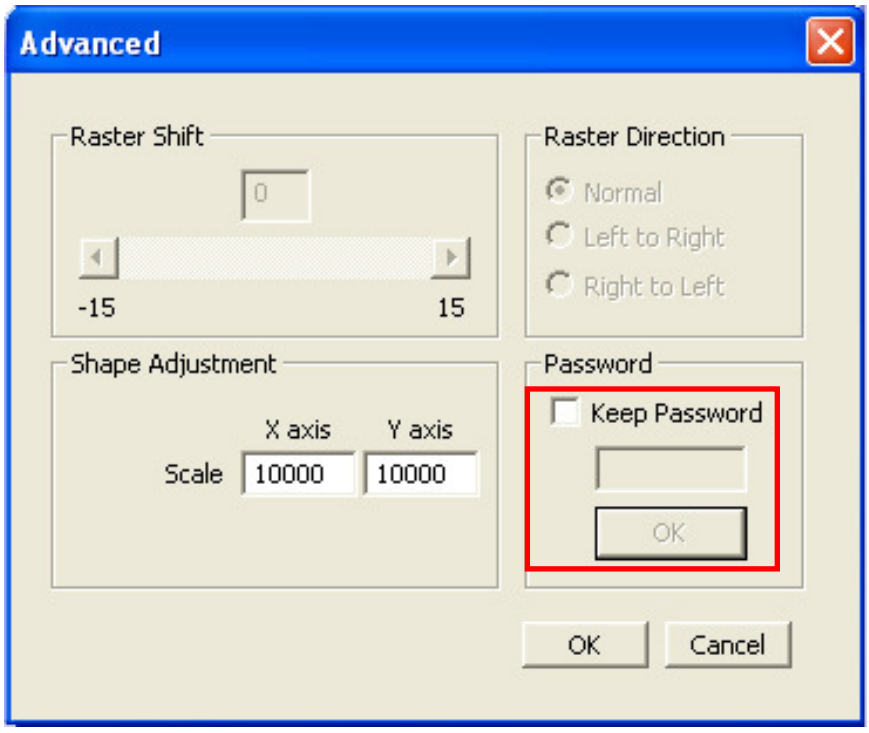


8. Version

Clicking this button will show the version of driver.

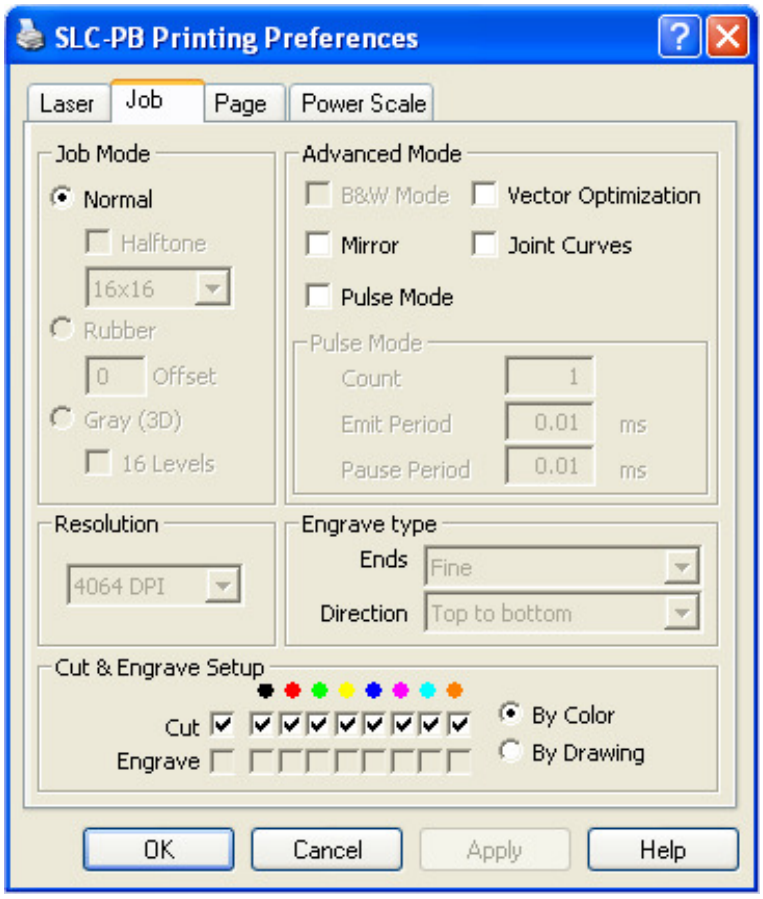
9. Advanced.

Clicking this button will pop up a **[Advanced]** window. Enter the Password [ltt] and press OK, and user can set the Shape Adjustment from 9500 to 10500. This parameter allows the file to be enlarged or reduced the size between 95% and 105%. (Left bottom is the reference point, and the graphic's position and size will both be changed)



3.4.2 Job Tab

The Job tab is divided into four sections: **Job Mode** and **Cut & Engrave Setup**.



1. Job Mode

Normal

This mode uses the eight color settings to vector cut graphics drawn in the graphic software. (other mode is not applicable for SLC-M+ at this time)

Advanced Mode

Mirror

This mode will mirror the drawing horizontally. However, we suggest mirroring your drawing in the graphics program which will allow you to accurately preview the drawing before the job is sent to the machine.

Pulse Mode

This mode can be enabled for drilling holes. For details on holes drilling, contact technical support.

Vector Optimization

This mode can modify the working path base on positions of vector in the drawing, it can decrease working time.

Joint Curves

This mode can make cutting circle or arc faster and smoother.

Resolution

(This function is for Engrave, not applicable for SLC-M+)

Engrave type

(This function is for Engrave, not applicable for SLC-M+)

Cut & Engrave Setup

The Cut & Engrave Setup section allows the user to enable and disable certain functions of the machine. If the box next to Cut is unchecked the machine will disregard any potions of the graphics that instruct the laser to vector cut. Engraving mode is not supply at this time. For more precise control the boxes below each color allow the user to disable the cut options independently for each color.

By Color

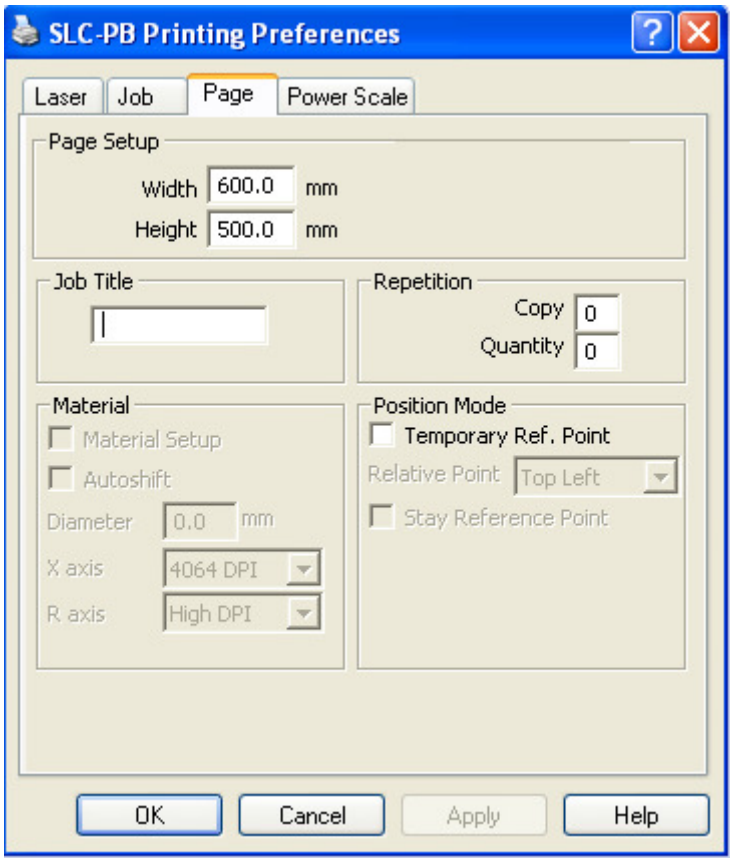
When **[By Color]** is selected vector are cut according to the predefined color order. And vectors of the same color are cut in the sequence they have been drawn.

By Drawing

When **[By Drawing]** is selected all vectors are cut in the sequence in which they have been drawn, regardless of color.

3.4.3 Page Tab

The Page Tab is divided into four sections: **Page Setup**, **Job Title**, **Repetition**, and **Position Mode.**



1. Page Setup

The Page Setup section includes the Width and Height information of machine.

2. Job Title

The Job Title input box allows the user to input a title for the job being sent to the machine. The title entered will be the top line of the job file on the display of the machine.

3. Repetition

The Repetition section allows the user to modify the setting of **[Copy]** and **[Quantity]** which will be shown on panel. (See section 3.2.2)

4. Material

(This function is not support for SLC-M+)

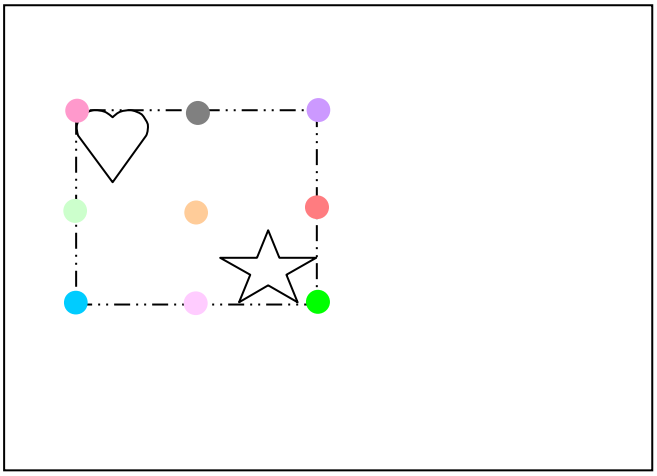
5. Position Mode

Temp Ref. Point

If this box is checked, the file will not execute in the position as application software. Otherwise, it will execute in the position where user determine on machine.

Relative Point

There are nine relative points. They are **Top Left**, **Top Middle, Top Right, Middle Left**, **Center**, **Middle Right, Bottom Left, Bottom Middle** and **Bottom Right**. Those points mean different positions on the boundary of drawing in application software.



Relative Point

There are nine relative points. They are **Top Left**, **Top Middle, Top Right, Middle Left**, **Center**, **Middle Right, Bottom Left, Bottom Middle** and **Bottom Right**. Those points mean different positions on the boundary of drawing in application software.

Stay Reference Point

If you want to stay on reference point after job finished, you can choose this option. This option can save your time when you want to use.

- **Top Left**
- **Top Middle**
- **Top Right**
- **Middle Left**
- **Center**
- **Middle Right**
- **Bottom Left**
- **Bottom Middle**
- **Bottom Right**
- **Pattern**
- **Boundary Box**

3.4.4 Power Scale

The Power Scale tab is divided into two sections, **Power Scale** and **Custom Power Scale**.

(This function is for Engrave, not support for SLC-M+)

3.5 LTT Product Tools Operation

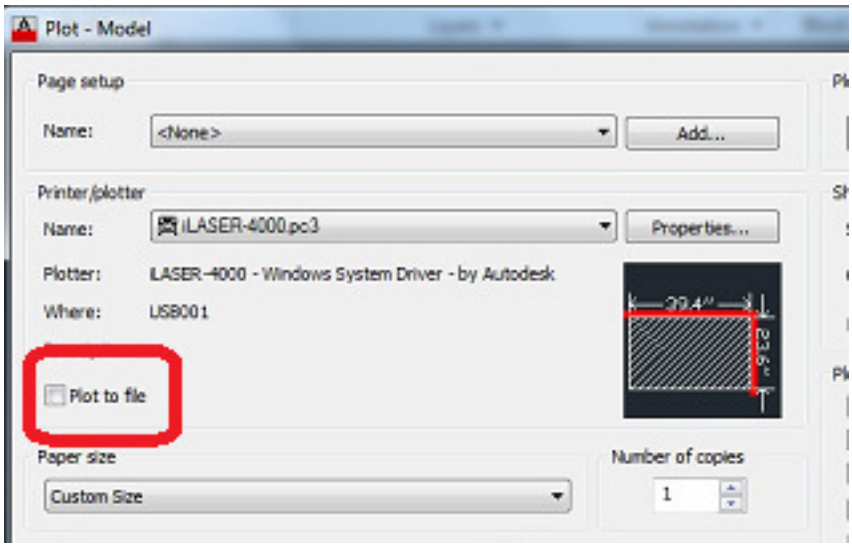
3.5.1 File Transfer

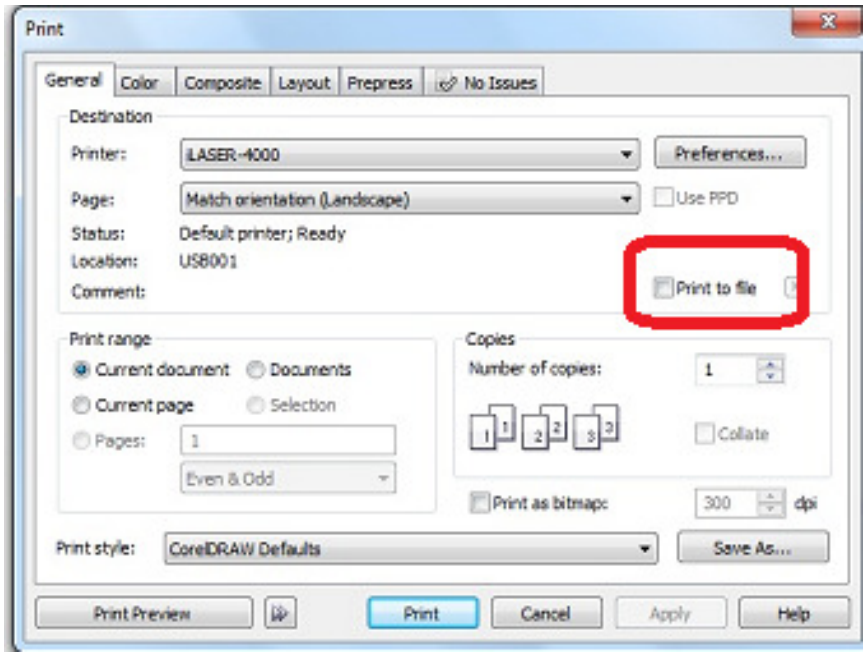
You can send a output file (*.plt file or *.prn file) from drawing software (CAD or Corel Draw) to the machine through this software. And don't need to open any the drawing software. It is suitable for stable mass production.

*Note : LTT Product Tools provides only file transfer, it can't change any parameter of the drawing (speed, power, ect…).

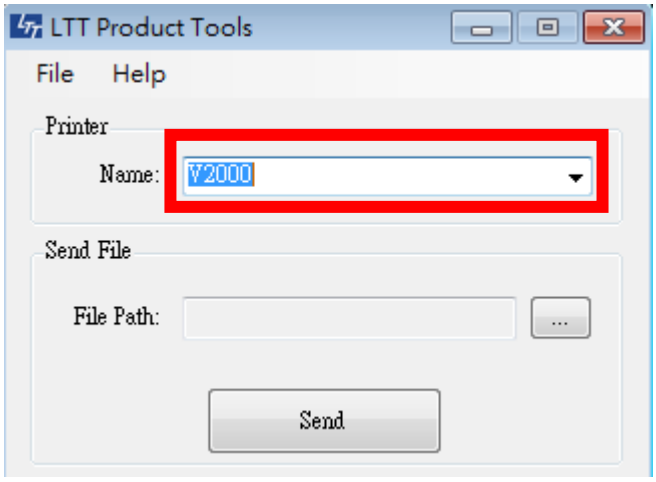
Make a [*.plt] or [*.prn] file

Select [Print/ Plot to file] function after all parameters setting, select [Print] then you will get a [*.plt] or [*.prn] file

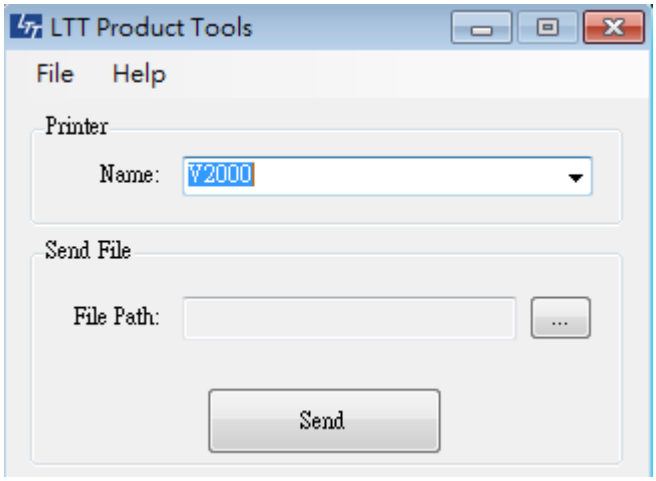




Open the [LTT Product Tools] and select your machine.



Click […] and find your file then click [Send]



You will hear one long beep two short beeps showing that the file transfer has completed successfully.

3.5.2 System Upgrade

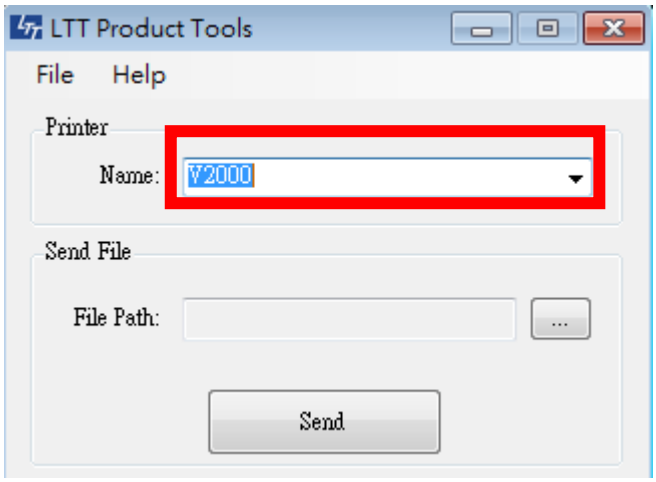
Generally, the file for upgrade will be provided from LTT. The file type is **[*.ice]**. While upgrade is processing and the power is turned off or the cable is disconnected, the SLC-M+ may not be upgraded for the moment. If this situation happens, please contact LTT.

1. Turn off the SLC-M+, and check that the SLC-M is connected with PC through USB cable.

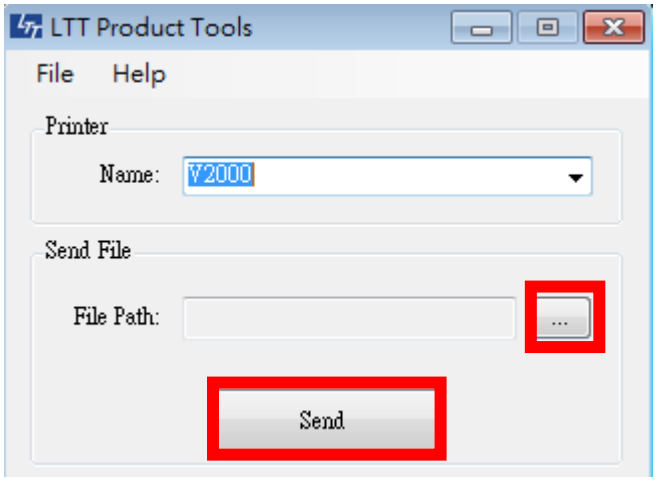
2. Turn on the SLC-M+ and computer. Press and hold on the control panel right after turning on SLC-M+ until the following screen appears.

ILS-IIIa firmware upgrade V 3.01 READY !!!

3. Run **[LTT Product Tools]**, and select the printer.



4. Then select the **[*.ice]** file with **[...]** key, then press **[Send]** key to upgrade the firmware of SLC-M+.



5. You will hear two short beeps along with the following display, showing that the upgrade has completed successfully.

6. Press on the Control Panel and you will hear a beep after which SLC-M returns to main menu.

7. Check the firmware version in the 4th line of the **[ABOUT]** submenu (See section 3.3.2).

3.6 Basic Operation Flow with CCD

3.6.1 Calibration flow

This section explains the calibration steps before operate SLC-M+ with CCD. If you want to obtain more detail about operation, please see section 3.7 and 3.8.

Before executing the steps in this section, please make sure that you have already finished all steps in chapter 2.

1. Get machine ready.

Turn on the power.

Wait for system start and homing process finishing.

2. Link computers, connectivity and language settings

Check the connection between PC and machine

Turn on the PC

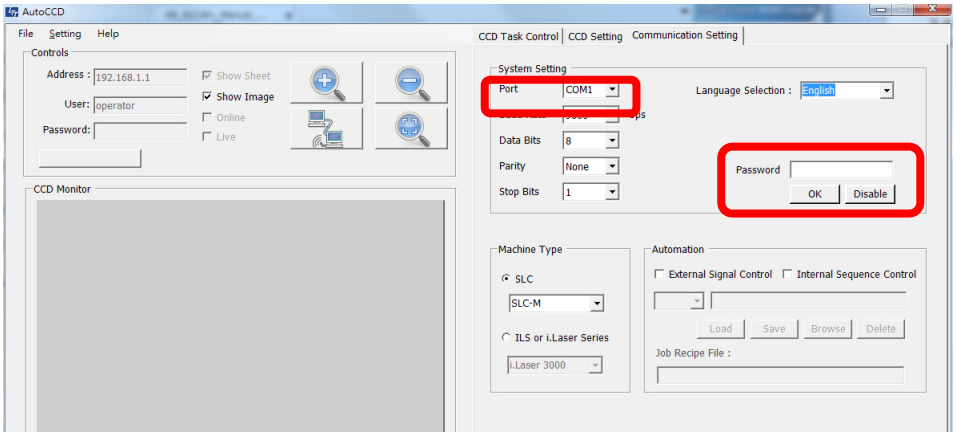
Execute AutoCCD.exe

Go to [communication setting] and type the password [ltt].

Select the language : English, Traditional Chinese, Simplified Chinese, Korean.

Select RS232 connect port.

Select the laser machine type.



3. Adjust focal height of laser focus lens (if necessary)

Put the material on the table.

Move the carriage above the material.

Press and select **[Yes]**.

4. Adjust the right focus of the CCD(if necessary)

Move the CCD to see any pattern

Adjust the working distance until image in CCD monitor is clear.

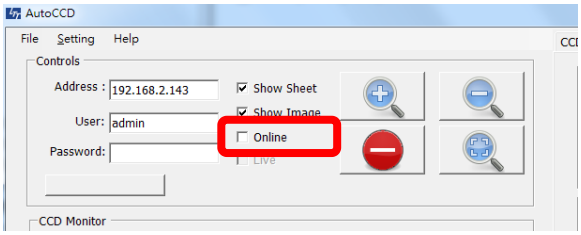
5. Preparation steps for CCD calibration.

Put a A4 paper at the center of the working area. Make sure the paper will not be moved during the whole calibration.

Turn on the laser power key.

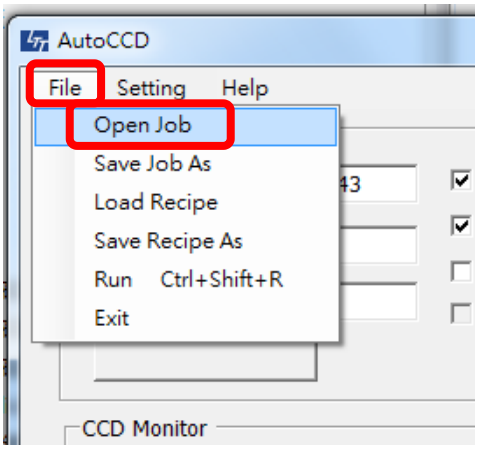
Press the **Connect** button and let the AutoCCD connects with CCD.

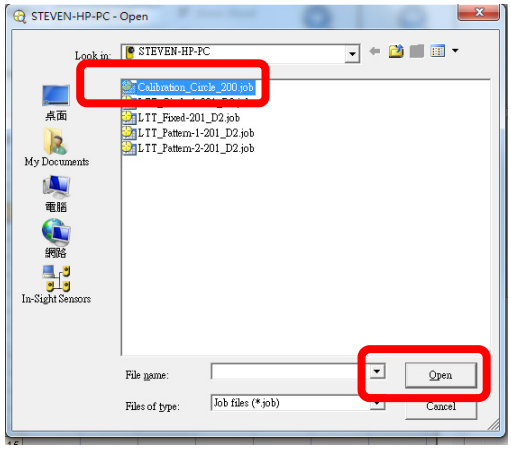
Please DO NOT select the [online] function to avoid the error while calibration.



Go to **AutoCCD / File / Open Job**. Open **[Calibration_Circle_200.job]**

Go to **AutoCCD / CCD Setting** tab. Key in the Password with [**LTT**]





6. Do the [Pixel to MM] calibration.

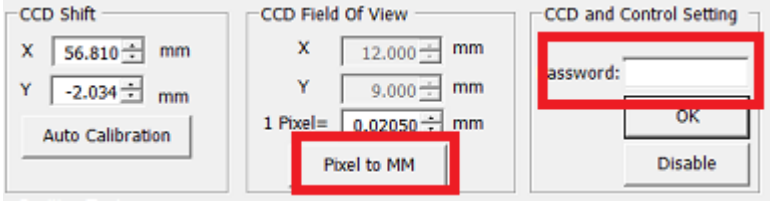
Press **[Pixel to MM]** button.

The AutoCCD will automatically send a **P2MM.prn** file to the machine and then marks two circle on the A4 paper.

AutoCCD will automatically move the CCD to get the image, then calculate the pixel to millimeter transform constant.

Finally you will see the number of **[1 Pixel= mm]** will be updated by AutoCCD.

You can do it again. Please don't move the marked paper, and turn the laser power key off. Then press **[Pixel to MM]** button again. It will do the above processes all over again.



7. Do the [Auto Calibration] calibration.

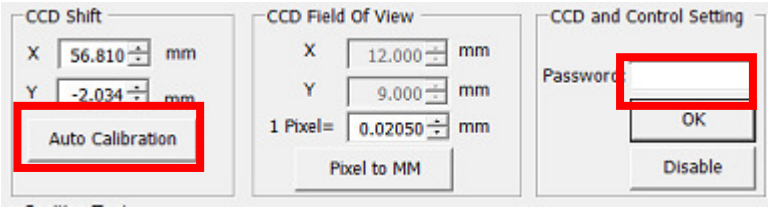
Press **[Auto calibration]** button.

The SLC-M+ will automatically send a **Shift.prn** file to the machine and then marks a circle on the A4 paper.

AutoCCD will automatically move the CCD and get the image, then calculate the shift parameters constant.

Finally you will see the number of **[CCD Shift]** will be updated by AutoCCD.

You can do it again. Please don't move the marked paper, and turn the laser power key off. Then press **[Auto calibration]** button again. It will do the above processes all over again.



3.6.2 Operation Flow with CCD

This section explains the basic and common steps to operate SLC-M+ with CCD. If you want to obtain more detail about operation, please see section 3.7 and 3.8.

Before executing the steps in this section, please make sure that you have already finished all steps in chapter 2.

1. Get machine ready.

Turn on the power.

Wait for system start and homing process finishing.

2. Get PC ready

Check the connection between PC and machine

Turn on the PC

Execute AutoCCD.exe

3. Adjust focal height (if necessary)

Put the material on the table.

Move the carriage above the material.

Press and select **[Yes]**.

4. Adjust the right focus of the CCD(if necessary)

Move the CCD to see any pattern

Adjust the working distance until image in CCD monitor is clear.

5. Setting drawing parameter in AutoCCD

Go to AutoCCD / CCD Setting tab

Select the [Calibration] mode.

Go to AutoCCD / CCD Task Control tab

Load drawing file

Setup Mark distance

Setup two point setting

Setup start point

Setup Matrix (if necessary)

6. Start AutoCCD procedure

Select printer

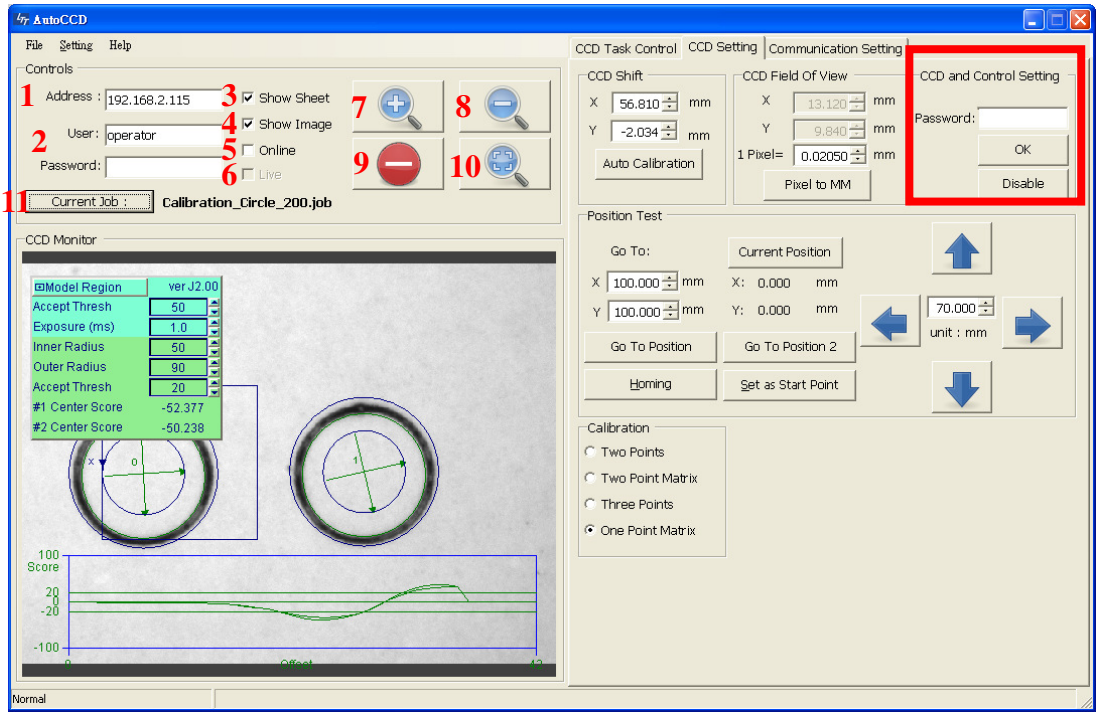
Click  to start CCD task

3.7 AutoCCD Operation

AutoCCD is the main control program for cutting with CCD. It is to find reference marks of work piece, then re-calculate offset and rotation of the drawing to fit the new location of work piece.

This section explains functions of AutoCCD and how to use them.

3.7.1 Controls



1. Address: The CCD IP address. You need to enter the password in **[CCD Setting]** → **[CCD and Control Setting]** to change it.(See section 3.7.1.1 for more detail)

2.User & Password: User name and password for CCD control account. You need to enter the password in **[CCD Setting] → [CCD and Control Setting]** to change it.

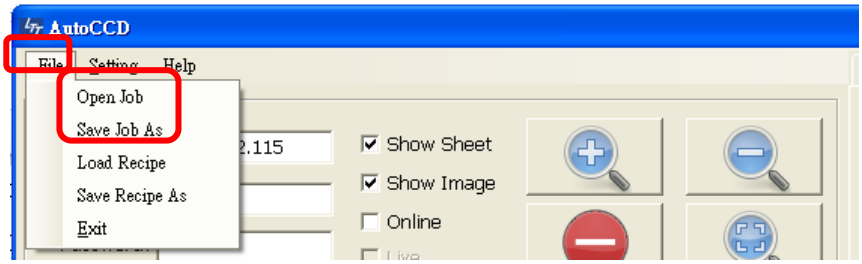
User name can use <admin> or <operator>.

The default password is empty. If you need to use password to control, you have to use In-sight Explorer, go to Sensor/User List to modify the settings.

Generally use <operator> can get a easy view of job.

For <admin> user, you can use <open job> and <save job as> in the File tab.

For <operator> user, you can only use <open job>.



3. Show Sheet: For <admin> user, it will turn on or off the sheet in CCD monitor. For <operator> user, it will turn on or off the customer view in CCD monitor.

4. Show Image: Show the CCD Image in CCD monitor.

5. Online: Make the CCD function working. You can see the real time result of pattern position and image in CCD.

6. Live: See the real time image from CCD.

7. Zoom in: Zoom in the CCD image in CCD monitor.

8. Zoom out: Zoom out the CCD image in CCD monitor.

9. Connect: Connect to the CCD device. Before connection, please check the setting of CCD IP address and user account.

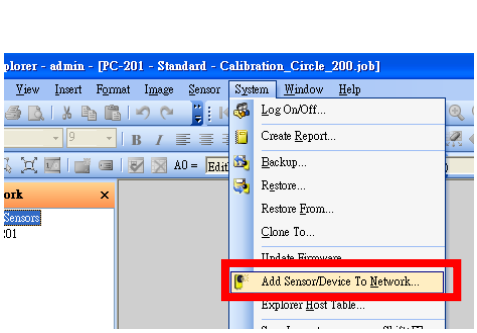
10. Zoom to fit: Zoom in/out the image to fit the vision zone of the CCD Monitor.

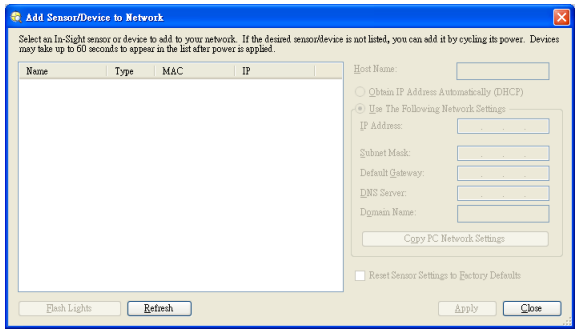
11.Current Job: Press this button to show what current job is loaded in the CCD.

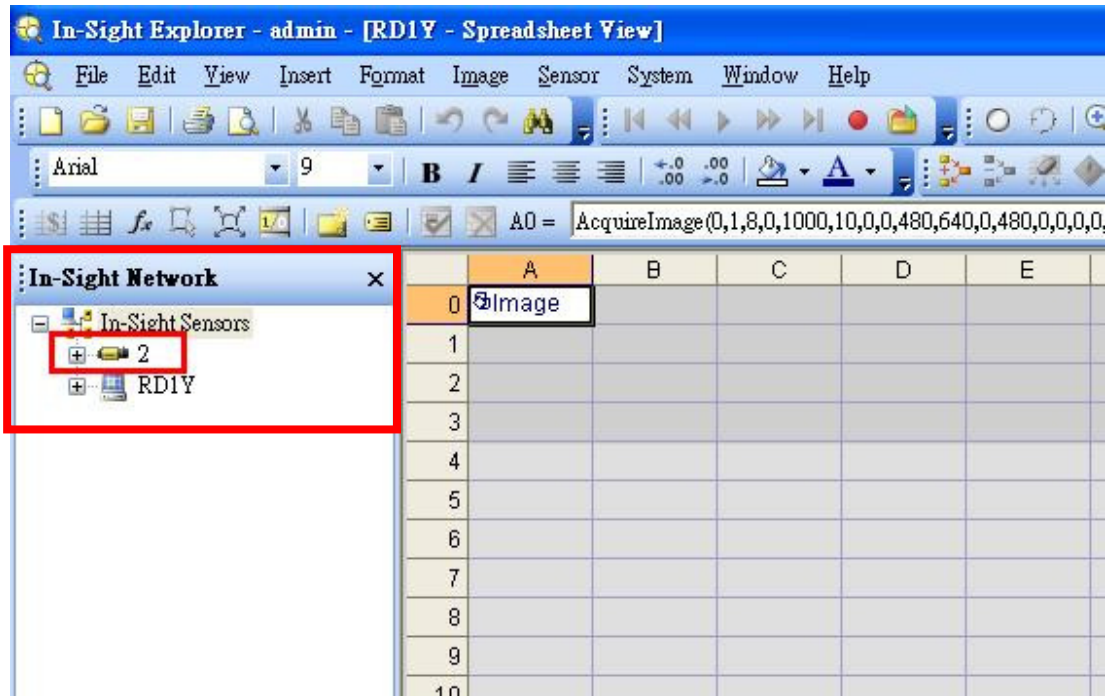
3.7.1.1 Find the CCD IP address

When connecting to CCD, CCD device will use DHCP to get an IP address. When CCD connection is all right, In-sight Explorer will show the device in **[In-Sight Network].** You can press **[Ctrl]+[Shift]+[1]** to show **[In-Sight Network]** window.

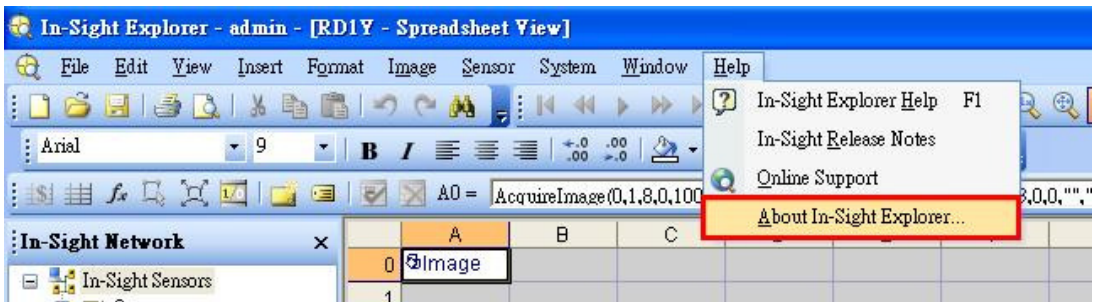
If you still can not find a CCD device, then you can go to **[System / Add Sensor/Device To Network]**, press the **[Refresh]** to search the CCD.

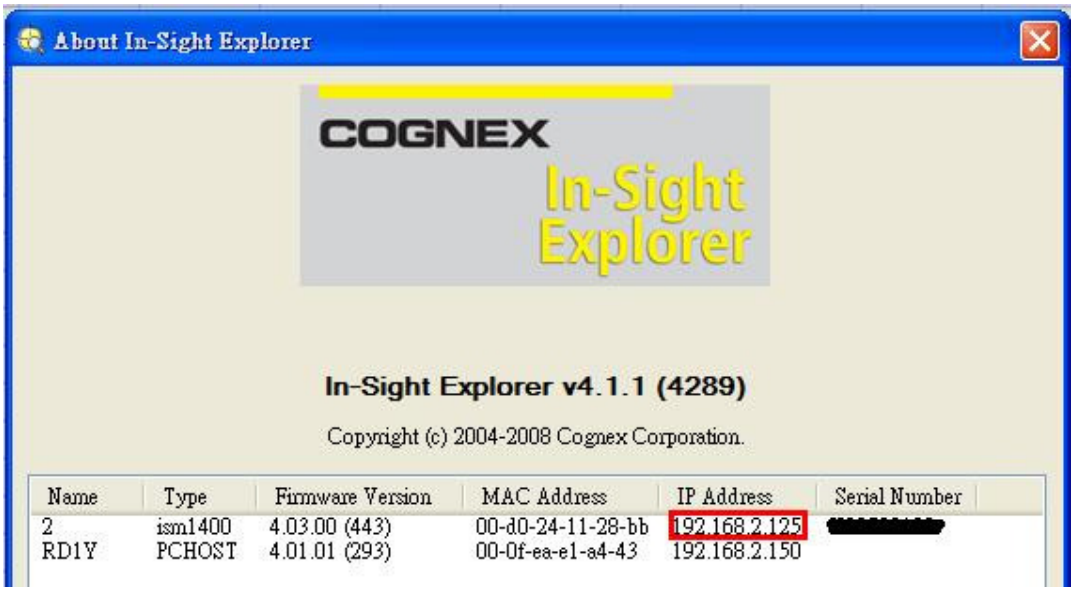






2. When CCD device is connected. Chick **[Help]**->**[About In-Sight Explorer]** to see the IP address of CCD device.

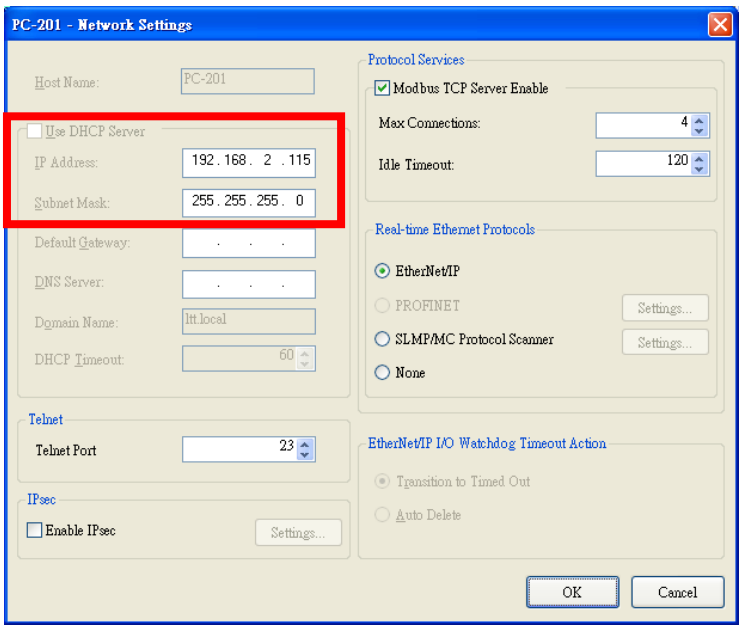




3.7.1.2 Setup CCD IP address

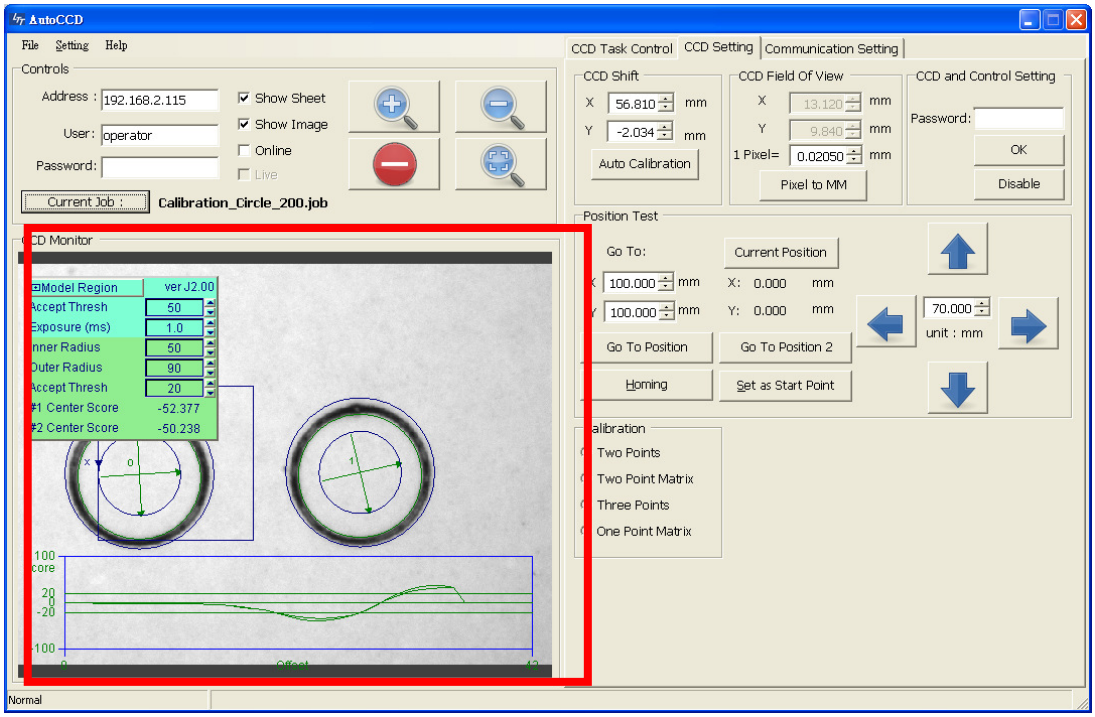
Open In-Sight Explorer, go to **Sensor / Network settings**. It will open a Network Settings window.

You can change the IP address of the CCD device.



3.7.2 CCD Monitor

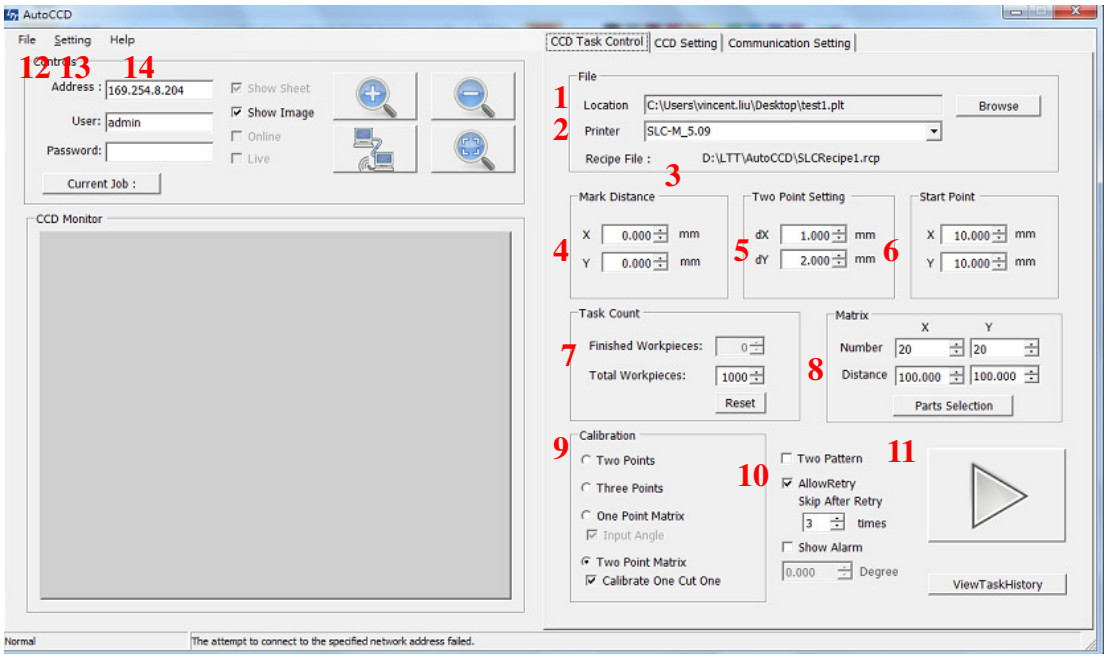
This area can show the image from CCD on time or last time. You can fine tune the job loaded in the CCD. For example, you can train a pattern here. (See 3.8 for more detail)



3.7.3 CCD Task Control

3.7.3.1 Function description

This area is the main settings to control CCD movement to fit the working piece marks in the working table.



1.File location: load the drawing file. (See 3.7.3.2 for more detail)

2.Printer: Select the working machine printer driver like SLC-M+.

3.Recipe File : The recipe which loaded by the prmissions [admin] of all setting include the parameters and drawing selection.

4.Mark Distance: The distance between reference mark and working picture. (See 3.7.3.2 for more detail)

5.Two Point Setting: The distance between two reference marks.(See 3.7.3.2 for more detail)

6.Start Point: The position to search the first reference mark. You can use functions of **[Position Test]** to find it.

7.Task Count: Count the work-piece and limit the total work-pieces. (The counter only count a successful job)

8.Matrix: For a matrix marks calibration, here are parameters for matrix marks settings.

9.Calibration: Select calibration functions: Two Points, Three Points, One Point Matrix, Two Point Matrix.

10.Other Settings:

Two Pattern : Select this potion if your work piece has two deferent mark patterns.

Allow Retry : This function is only applicable under the matrix calibrations. Select this function, if AUTOCCD calibration is fail in anywhere, then the soft will let the machine do the calibration by times you set under the function, then upon the times, the machine will let the piece bypass and continual the work.

Degree : This function is only applicable under One Point Matrix calibration. The calibration will fit the rotation angle.

11.Start: Start the procedure of CCD function and working.

12.View Task History: It can show the task history in txt or excel format. Different format can be selected at [Setting].

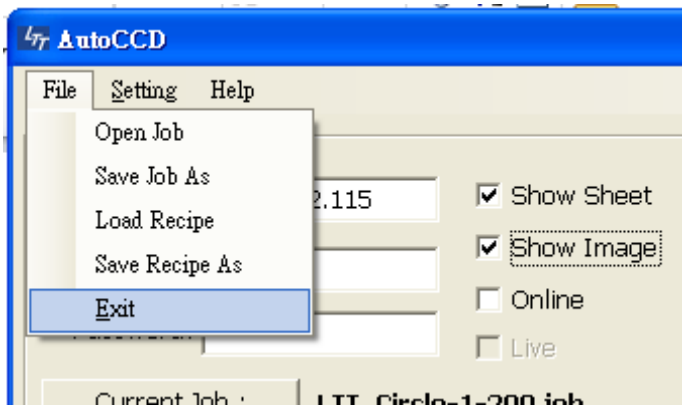
13.File

Open Job: After connect with CCD, you can open a job saved in the CCD.

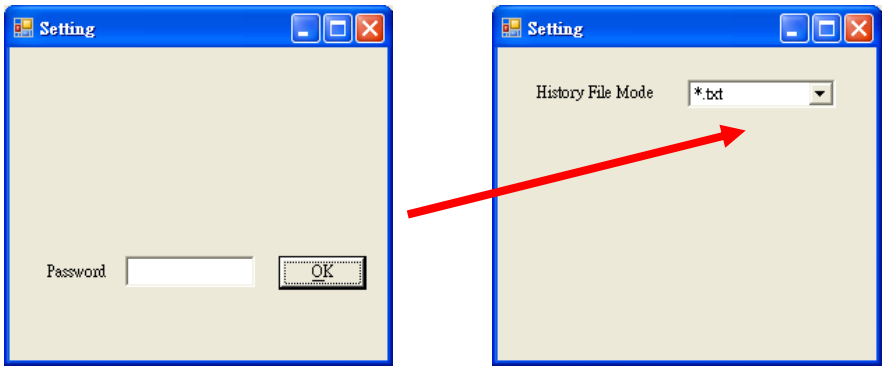
Save Job As: For <admin> user, you can save job in the CCD.

Load Recipe: Load work recipe for different application.

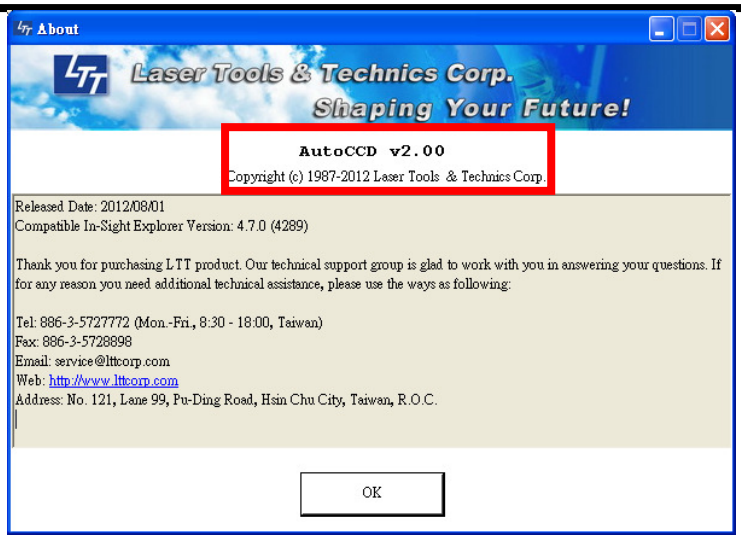
Save Recipe As: Save work recipe as a *.rcp file.



14.Setting: You can key in the password [ltt] to change the task history stored format.



15.Help: It is the version tab.



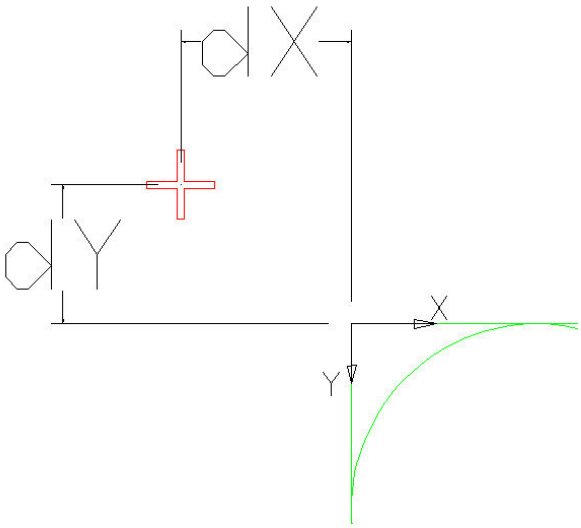
3.7.3.2 Setting Definition

File:

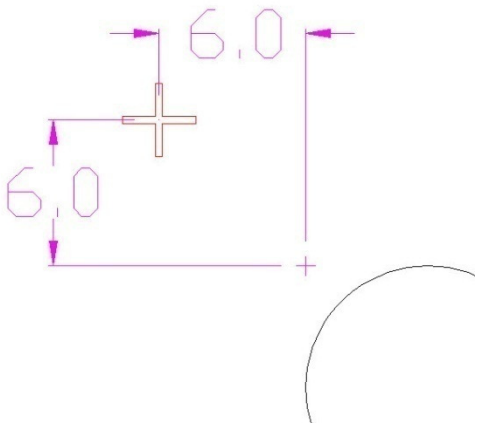
Drawing file is only contained drawing for cutting. Any other reference drawing will make wrong cutting position. Drawing file should be the format in plt or prn. When print, please select **[Print to file]** to save the prn or plt file in your computer. Please pay attention before printing, in the driver [Page] tab, the [Position Mode] must leave empty checks in [Temporary ref. Point] and [Stay Reference Point]

Mark Distance:

Mark Distance means the distance between reference mark and the top left of the drawing. If the top left of the drawing is a curve, the distance is showed below. The values of dX and dY are minus in below drawing.

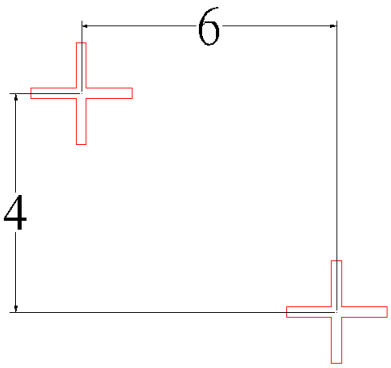


For example, the values of dX and dY in below drawing are -6 and -6



Tow Point Setting:

Two Point Setting is the distance between two reference marks. If the top left one is the origin of the coordinates, the coordinate of the bottom right one is the setting.



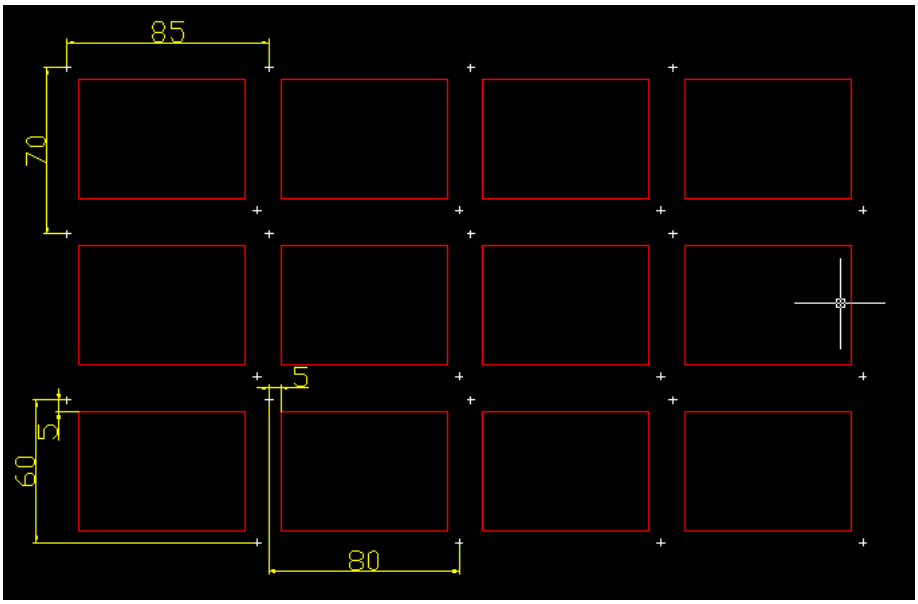
For example, two point setting of above picture is dX= 6 , dY= 4

Matrix:

In the following example, each cell has two cross at top-left and down-right.

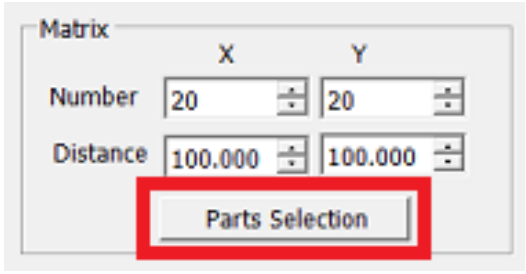
Number for x, y are 4, 3.

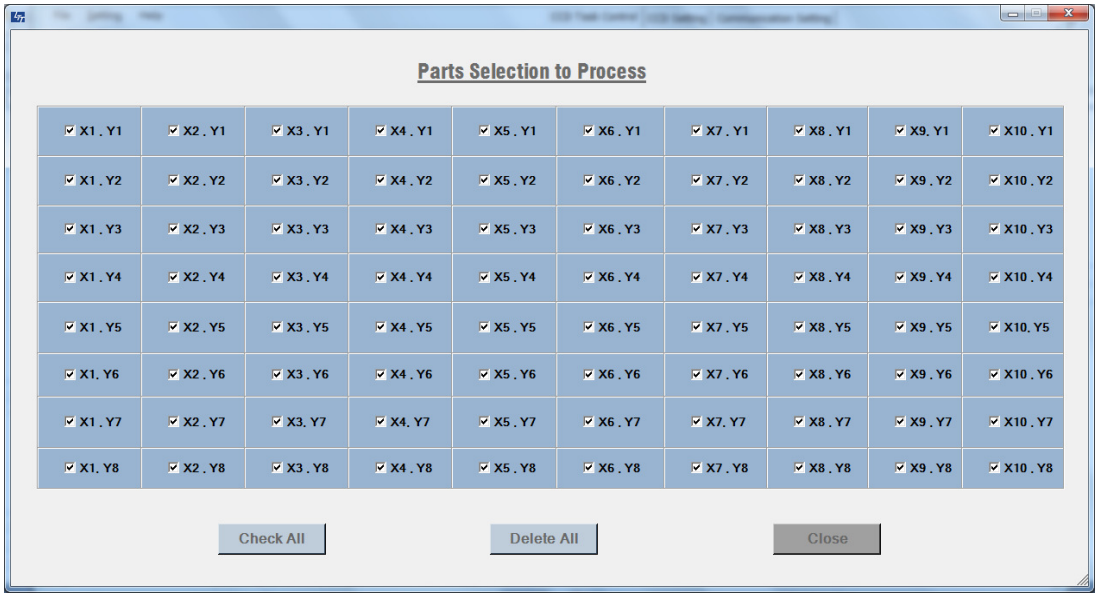
Distance for x, y are 85, 70.



Parts Selection:

Under this function, you can choose the pieces you want to do or by pass.





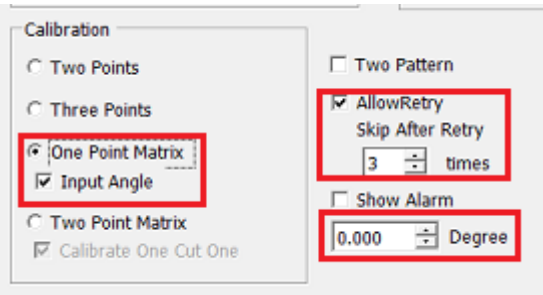
One Point Matrix:

Under this function, AUTOCCD will take only one point for calibration for every piece.

With its sub-function [Input Angel], then enter the angel in [Degree] to specifies the default rotation angle.

With its sub-function [Allow Retry] to retry calibration or bypass the fail piece.

Under the calibrate function, you will get the shorter working time.



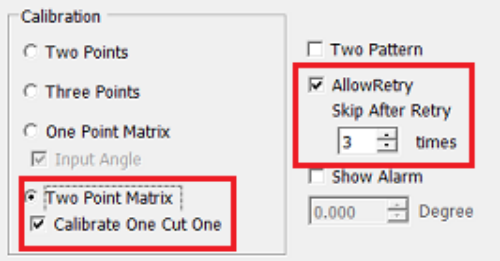
Two Points Matrix:

Under this function, AUTOCCD will take two points for calibration for every piece.

With its sub-function [Calibrate One Cut One], will let machine cut one piece after done one calibrate, till all pieces are done.

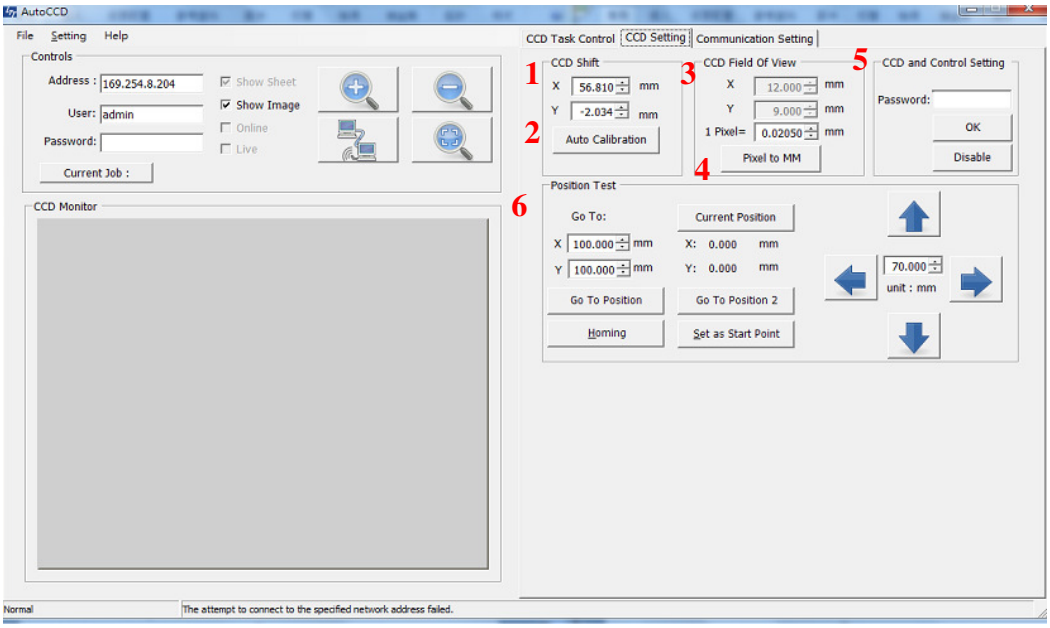
With its sub-function [Allow Retry] to retry calibration or bypass the failed piece.

Under this calibrate function, you will get a better calibrate/cutting quality.



3.7.4 CCD Setting

Here are the functions for user to calibration, setup for CCD job, setup Start point.



CCD shift: The CCD shift is the distance between laser focus and the center of CCD camera. (See 3.7.4.1 for more detail)

Auto Calibration: Do auto calibration to update CCD shift values.

3. CCD Field Of View: It shows the field size of CCD View in mm. (See 3.7.4.1 for more detail)

4. Pixel to MM: Do auto calibration to update 1 Pixel to mm transform constant.

5. CCD and Control Setting: Before change the CCD IP address, user, CCD shift and CCD Field of View, you need to enter the password. When enter the password, you need to click **[OK]** to make it work. After change those settings, you can click **[Disable]** to prevent any other one from changing settings.

6. Position Test: You can move the carriage by using this function. You can find the start position by using this function too. (See 3.7.4.2 for more detail)

3.7.4.1 CCD shift and CCD Field Of View

This section will show you how to do the auto calibration of CCD Shift and CCD Field Of View. It is very important for SLC-M+ cutting with CCD. It is a very basic setting for CCD. If the number of CCD Shift and CCD Field Of View are not right, you can not get a accuracy cutting with CCD.

Please do the **[Pixel to MM]** first and then **[Auto Calibration]**

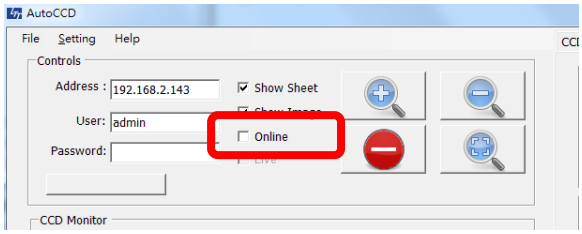
1. Preparation steps for CCD calibration.

Put a A4 paper at the center of the working area. Make sure the paper will not be moved during the whole calibration.

Turn on the laser power key.

Press the Connection button and let the AutoCCD connects with CCD.

Please DO NOT select the [online] function to avoid the error while calibration.



Go to AutoCCD / File / Open Job. Open [Calibration_Circle_200.job]

Go to AutoCCD / CCD Setting tab. Key in the Password with [LTT].

2. Do the [Pixel to MM] calibration.

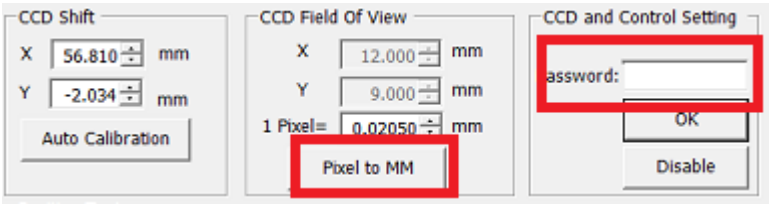
Press [Pixel to MM] button.

The AutoCCD will automatically send a P2MM.prn file to the machine and then marks two circle on the A4 paper.

AutoCCD will automatically move the CCD to get the image, then calculate the pixel to millimeter transform constant.

Finally you will see the number of [1 Pixel= mm] will be updated by AutoCCD.

You can do it again. Please don't move the marked paper, and turn the laser power key off. Then press [Pixel to MM] button again. It will do the above processes all over again.



3. Do the [Auto Calibration] calibration.

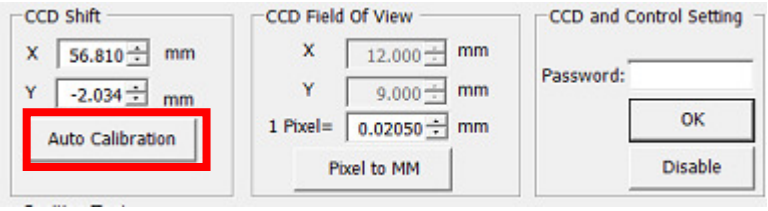
Press [Auto calibration] button.

The SLC-M+ will automatically send a Shift.prn file to the machine and then marks a circle on the A4 paper.

AutoCCD will automatically move the CCD and get the image, then calculate the shift parameters constant.

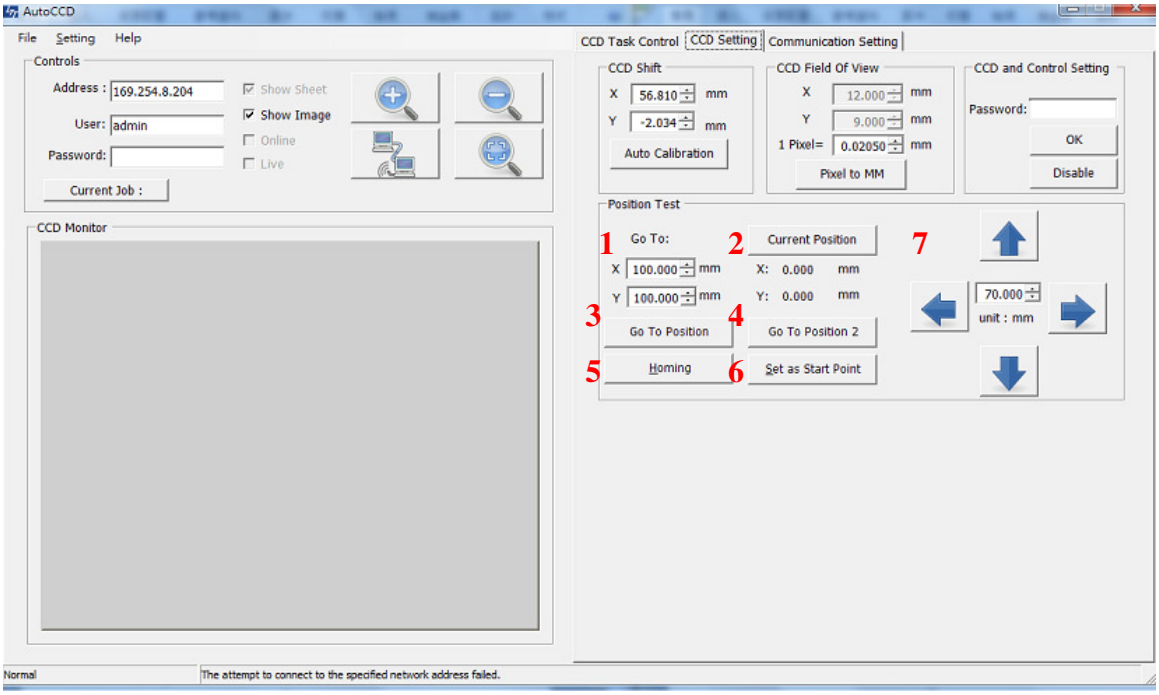
Finally you will see the number of [CCD Shift] will be updated by AutoCCD.

You can do it again. Please don't move the marked paper, and turn the laser power key off. Then press [Auto calibration] button again. It will do the above processes all over again.



3.7.4.2 Position Test

This function is to use for finding star position and moving carriage.



1.Go To: Set up the position to move

2. Current Position: Show the present coordinate of the carriage.

3. Go To Position: Move the carriage to the position which is setting in #1

4. Go To Position 2: Move the carriage to the position 2 which calculates from #1 and two point setting.

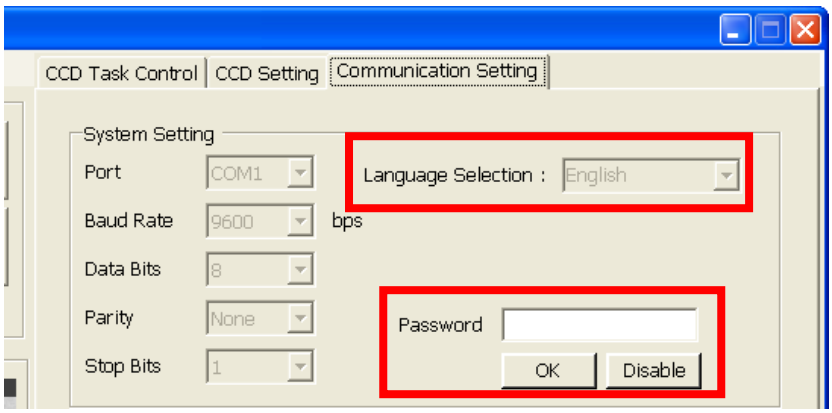
5. Homing: Move the carriage to home and reset the position of home if the carriage loses its position.

6. Set as Start Point: After finding the start position, you can set the coordinate in #1 to be the start point by click this button.

7.Moving: You can moving the carriage toward four directions by the distance in the middle blank.

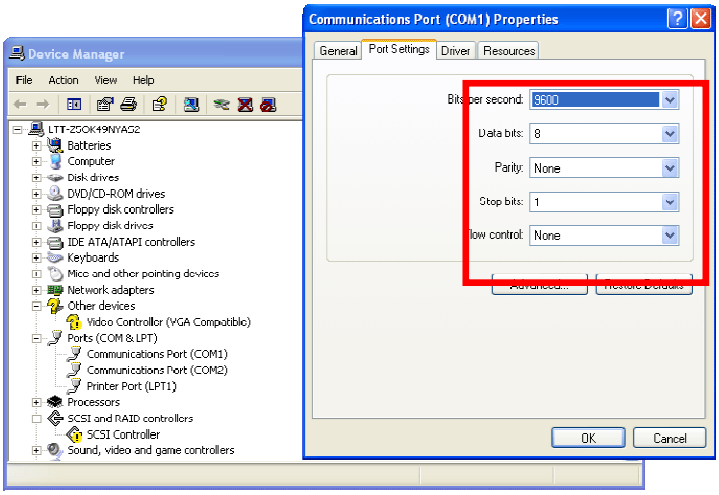
3.7.5 Communication Setting

Communication Setting is setup the communication port of RS232. Before change this setting, you need enter the password and click **[OK]** to allow changing. Please only change the port. If change other settings, the connection between PC and machine may not be made. The [Disable] button can disable other one without permission to change the setting.



Language Selection: User can change the language. Before change this setting, you need enter the password and click **[OK]** to allow changing.

Choose the COM port that connected PC and machine (the COM port should be identified correctly). Make sure that the parameters in computer's COM Port are the same as in AutoCCD.



3.7.6 Tips of AutoCCD

The AutoCCD has a hot key function. When all parameters are setting. When the tap is on **[CCD Task Control]**, you can press **[Enter]** to start the CCD task. When quantity production. You can connect a mini number keyboard. Setup parameters first. Then, you can just load/unload work-pieces and press **[Enter]**.

Other Hot Keys

Controls:

Connect = Alt + C

CCD Task Control:

Browse = Alt + B

Run = Enter

CCD Setting:

Go To Position = Alt + G

Go To Position 2 = Alt + 2

Homing = Alt + H

Set as Start Point = Alt + S

Up = Alt + U

Down = Alt + D

Left = Alt + L

Right = Alt + R

Ok = Alt + O

Communication Setting:

Ok = Alt + O

3.8 CCD Jobs Description

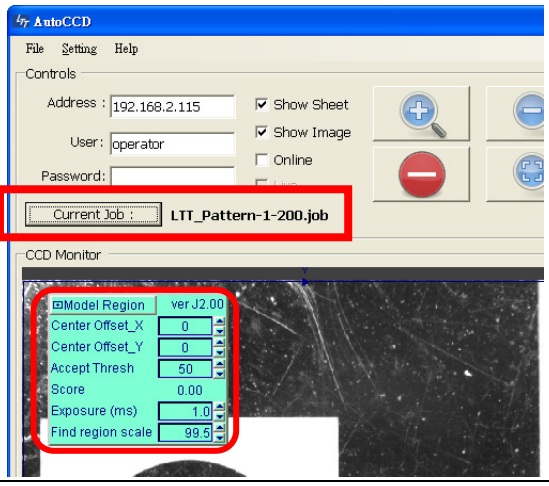
There are four types of jobs for user to use for SLC-M+ cutting with CCD. These jobs are special design for AutoCCD. Please note the version compatibility between jobs and AutoCCD.

Job	Function
LTT_Pattern-1-200.job	It works for single pattern. CCD will find the matched pattern in the field of view. It will output the defined position if the matched pattern is over the accept thresh.
LTT_Pattern-2-200.job	It works for both single pattern and two different patterns.
LTT_Circle-1-200.job	It works only for single circle pattern.
Calibration_Circle_200.job	It works for CCD calibration about FOV and CCD Shift.

3.8.1 Single Pattern Job

AutoCCD use CCD to find reference marks in the material and calculate the position difference and rotate angle. If these reference marks are the same, then you can use this job. It works for single pattern. CCD will find the matched pattern in the field of view. It will output the defined position if the matched pattern is over the accept thresh.

Job Name : LTT_Pattern-1-200.job



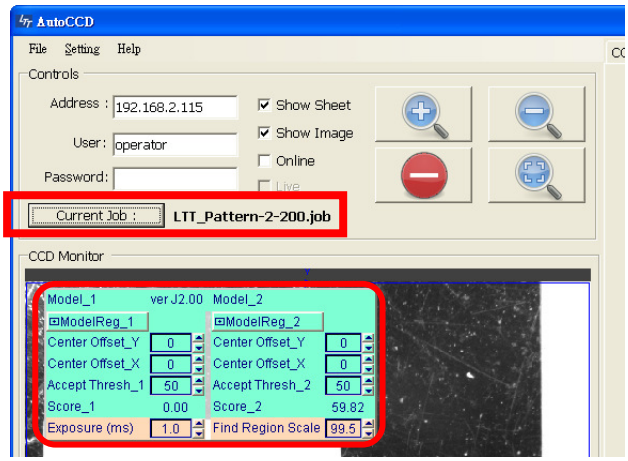
Name	Descriptions
Model Region	Press this button; you can train the pattern that you want. You can save the job setting as a <admin> user. For <operator> user, the job setting can not be saved.
Ver. J2.00	This is the version of the job file.

Center Offset_Y	You can fine tune the position of the trained pattern that you want CCD output. You can adjust it up and down. Tips:The green arrow aims the positive direction.
Center Offset_X	You can fine tune the position of the trained pattern that you want CCD output. You can adjust it left and right.
Accept Thresh	The minimum limit for the CCD find the matched pattern in the field of view.
Score	The score for the CCD find matched pattern.
Exposure (ms)	You can control the image acquire exposure time. The setting value is from 0.016 to 1000. When you use a lower exposure time, you have to input a higher LED light.
Find region scale	You can setup the find region area, the setting value from 10 to 99.5.

3.8.2 Two Pattern Job

AutoCCD use CCD to find two marks in the material and calculate the position difference and rotate angle. If these two marks are not the same, then you can use this job. It works for two different patterns. This job can also work for the single pattern.

Job Name : LTT_Pattern-2-200.job



Name		Descriptions
ModelReg_1	ModelReg_2	Press this button, you can train the pattern that you want. You can save the job setting as a <admin> user. For <operator> user, the job setting can not be saved.

Center Offset_Y	Center Offset_Y	You can fine tune the position of the trained pattern that you want CCD output. You can adjust it up and down.
Center Offset_X	Center Offset_X	You can fine tune the position of the trained pattern that you want CCD output. You can adjust it left and right.
Accept Thresh_1	Accept Thresh_2	The minimum limit for the CCD find the matched pattern in the field of view.
Score_1	Score_2	The score for the CCD find matched pattern.
Exposure (ms)		You can control the image acquire exposure time. The setting value is from 0.016 to 1000. When you use a lower exposure time, you have to input a higher LED light.
Find region scale		You can setup the find region area, the setting value from 10 to 99.5.

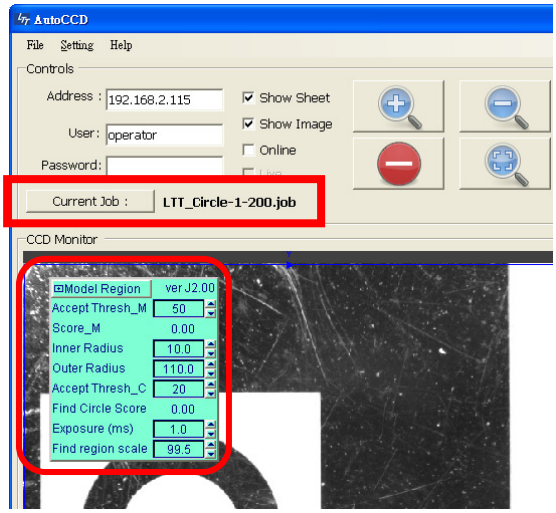
3.8.3 Circle Pattern Job

It works for single circle pattern. This job has two steps to find the circle center.

1st step, it finds the pattern that matched.

2nd step, it will find the circle in the matched pattern and output the center position. It will find the circle between inner radius and outer radius.

Job Name : LTT_Circle-1-200.job

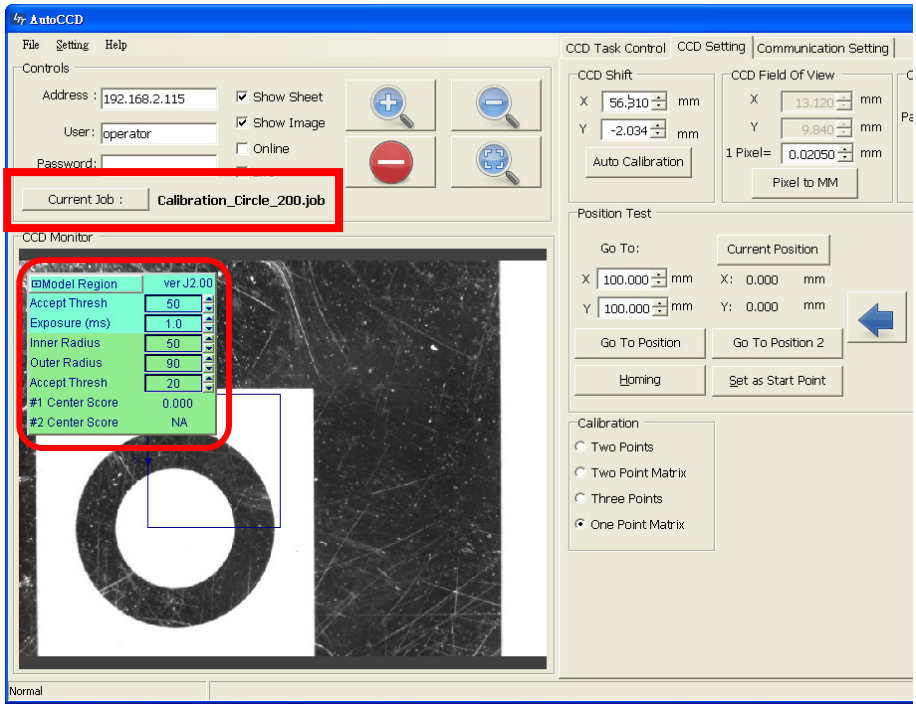


Name	Descriptions
Model Region	Press this button, you can train the circle pattern. You can save the job setting as a <admin> user. For <operator> user, the job setting can not be saved.
Accept Thresh_M	The minimum limit for the CCD find the matched pattern in the field of view.
Score_M	The score for the CCD find matched pattern.
Inner Radius	Inner radius setting.
Outer Radius	Outer radius setting.
Accept Thresh_C	The minimum limit for the CCD find the matched circle between inner radius and outer radius. You can adjust the level for different image.
Find Circle Score	The score for the CCD find matched circle between inner radius and outer radius.
Exposure (ms)	You can control the image acquire exposure time. The setting value is from 0.016 to 1000. When you use a lower exposure time, you have to input a higher LED light.
Find region scale	You can setup the find region area, the setting value from 10 to 99.5.

3.8.4 Calibration Job

It only works for CCD calibration about FOV and Shift.
When you want to calibrate the <Pixel to MM> and <Auto Calibration>, you have to load this job.
Run <Pixel to MM>, the AutoCCD will send a P2MM.prn file to machine. It will mark two circles at the center of the working area. AutoCCD will move the CCD to the position and find these two circle center and calculate the pixel to mm transform constant.
Run <Auto Calibration>, the AutoCCD will send a shift.prn file to machine. It will mark one circle at the center of the working area. AutoCCD will move the CCD to the position and find the circle center and calculate the CCD shift constants.

Job Name : Calibration_Circle_200.job



Name	Descriptions
Model Region	Press this button, you can train the pattern that you want. For the first time use this function, you have to train it and save.
Accept Thresh	The minimum limit for the CCD find the matched pattern in the field of view.
Exposure (ms)	You can control the image acquire exposure time. The setting value is from 0.016 to 1000. When you use a lower exposure time, you have to input a higher LED light.
Inner Radius	Inner radius setting.

Outer Radius	Outer radius setting.
Accept Thresh	The minimum limit for the CCD find the matched circle between inner radius and outer radius. You can adjust the level for different image.
#1 Center Score	The score for the CCD find matched circle between inner radius and outer radius.
#2 Center Score	The score for the CCD find matched circle between inner radius and outer radius.

3.8.5 Set the Default Job

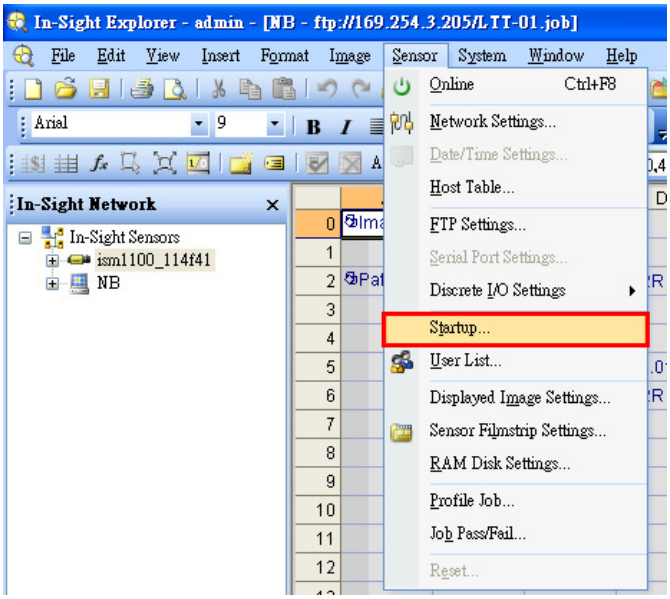
When AutoCCD connects to the CCD, it will use the present job in In-sight explorer. If In-Sight Explorer does not be executed, AutoCCD will load the default job.

This section will explain how to setup a job to be the default job.

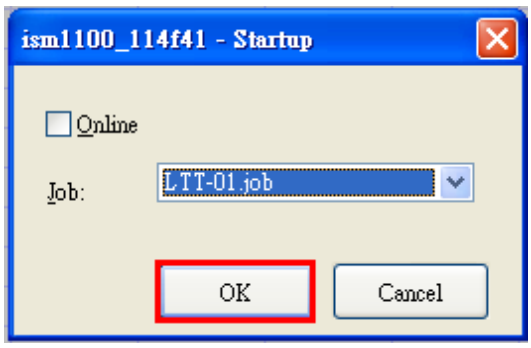
1. Connect to the CCD.

Please make sure the job you want to set as a default job is in the CCD device. You can check it from the **[In-Sight Files]**. You can see display or hide it by pressing **Shift** + **Ctrl** + **2**.

3. Click **[Sensor]** -> **[Startup…]**



4. Select the job you want to be set as the default job. Then, press **[OK]**. The setting will take effect after CCD restarted.



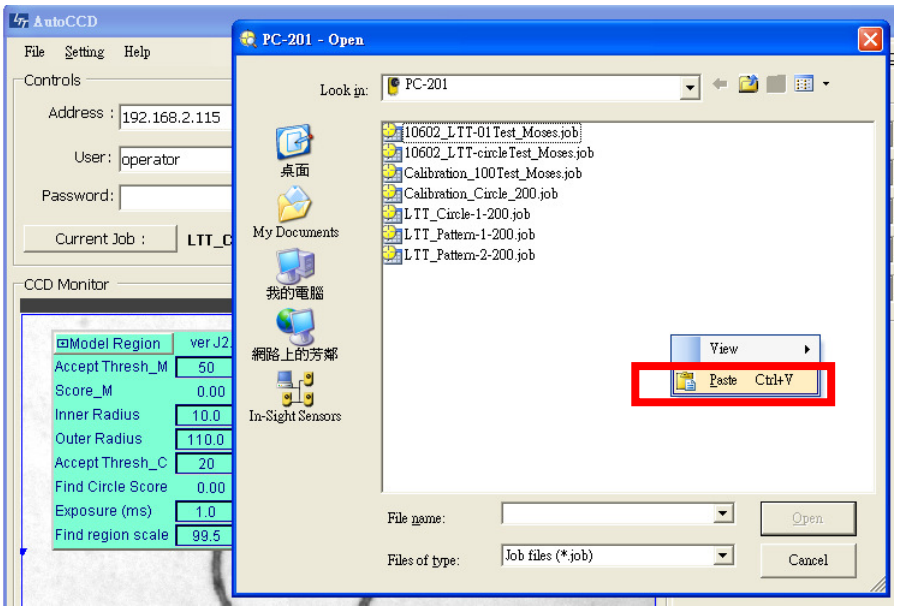
3.8.6 Job Copy, Save and Delete

If you need to do job copy, save and delete, you must use <admin> connect with CCD. For a <operator> user, it can not be done about save and delete actions.

Copy Job from PC to CCD

1.Copy the job at PC.

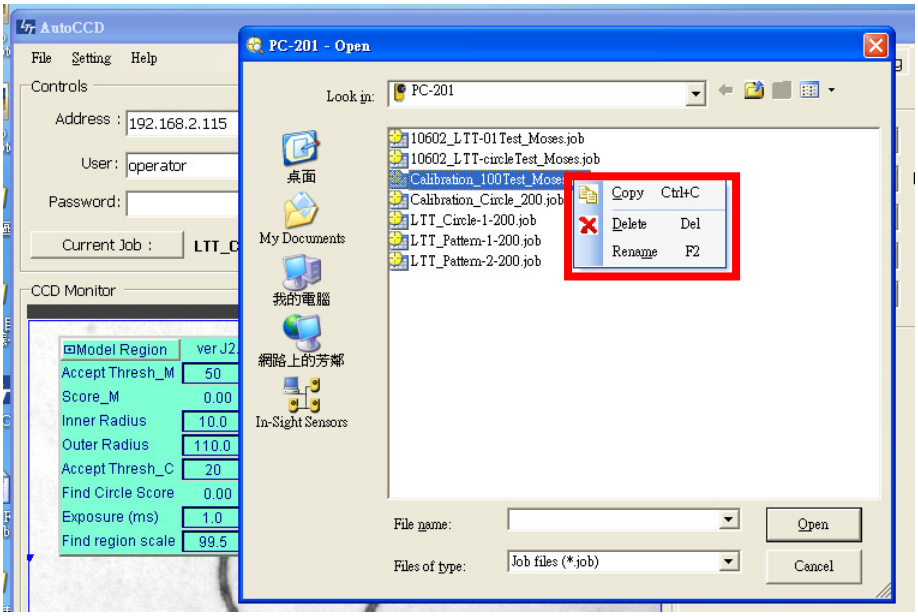
2.Go to File / Open Job. Right click the mouse, choose Paste.



Copy, Delete, Rename a Job from CCD

1. Go to File / Open Job. Select a job and right click the mouse, choose Copy, Delete or Rename.

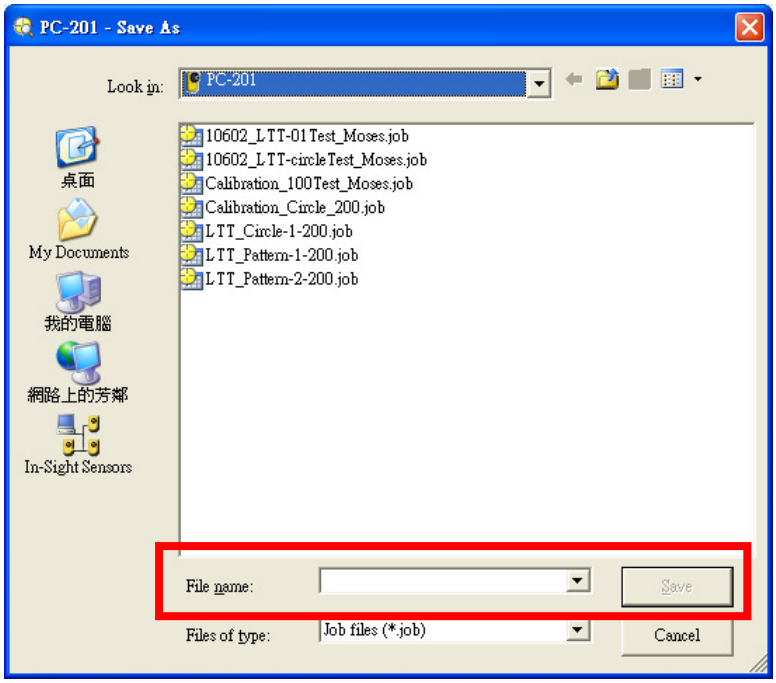
Right click mouse at PC's folder, and choose Paste then you can copy the job to PC.



Save Job

Go to File / Save Job As, it will open a Save As Window.

You can choose a job to overwite or give a new file name to save.



Chapter 4 Maintenance

4.1 Daily Cleaning

1. Preparation

Ensure that the system is turned off and the AC power cable is unplugged.

Prepare for cotton swab, cotton cloth, and alcohol.

2. Clean machine

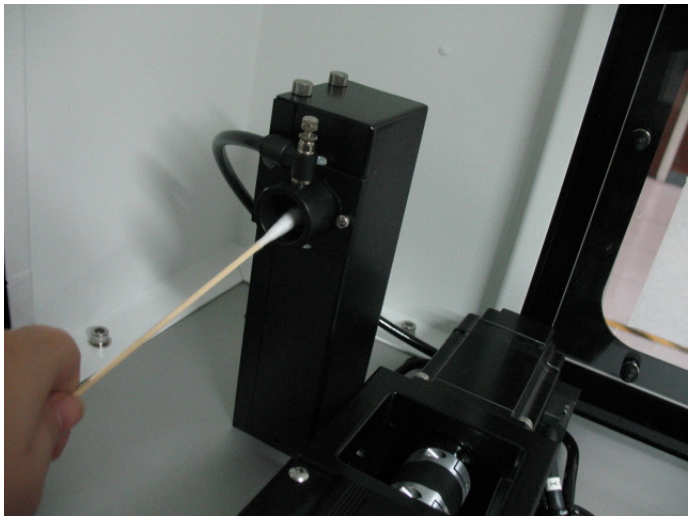
Remove all loose dirt and debris from inside of the machine.

Clean the top window with cotton cloth and alcohol.

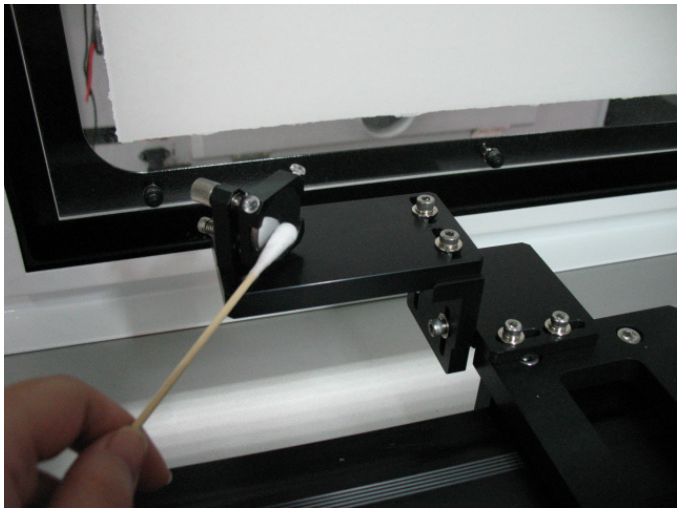
Clean all of the rails of the motion system with cotton cloth and alcohol.

3. Clean lens and mirror

Clean the window lens with cotton swab and alcohol.

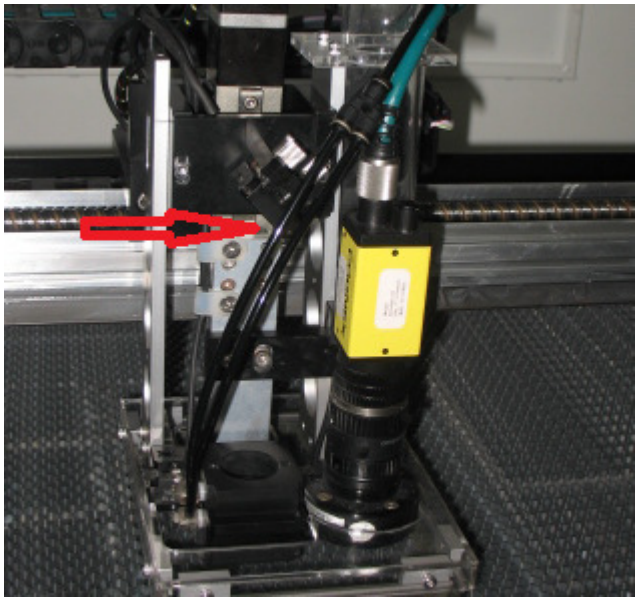


Clean 3rd mirror with cotton swab and alcohol.

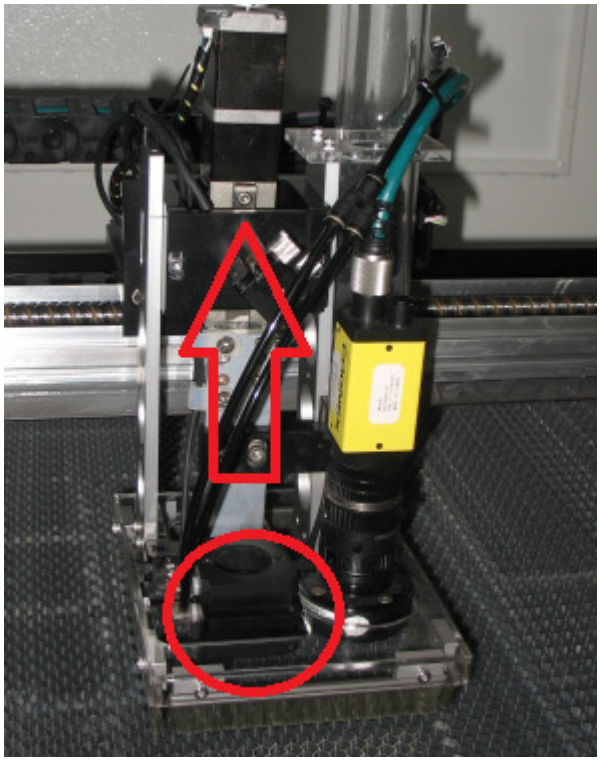


Clean 4th mirror and focal lens with cotton swab and alcohol.

Clean **4th** mirror with cotton swab and alcohol



Lift the Z-axis to take out the lens, assembly it back after clean the lens.



4.2 Weekly Cleaning

1. Preparation

Ensure that the system is turned off and the AC power cable is unplugged.

Prepare for compressive air which is waterless and oil free, dry brush, cotton swab and alcohol.

2. Clean machine

Clean all electric components with compressive air and dry brush.

Clean exhaust port with brush.

Clean all cooling fans with compressive air.

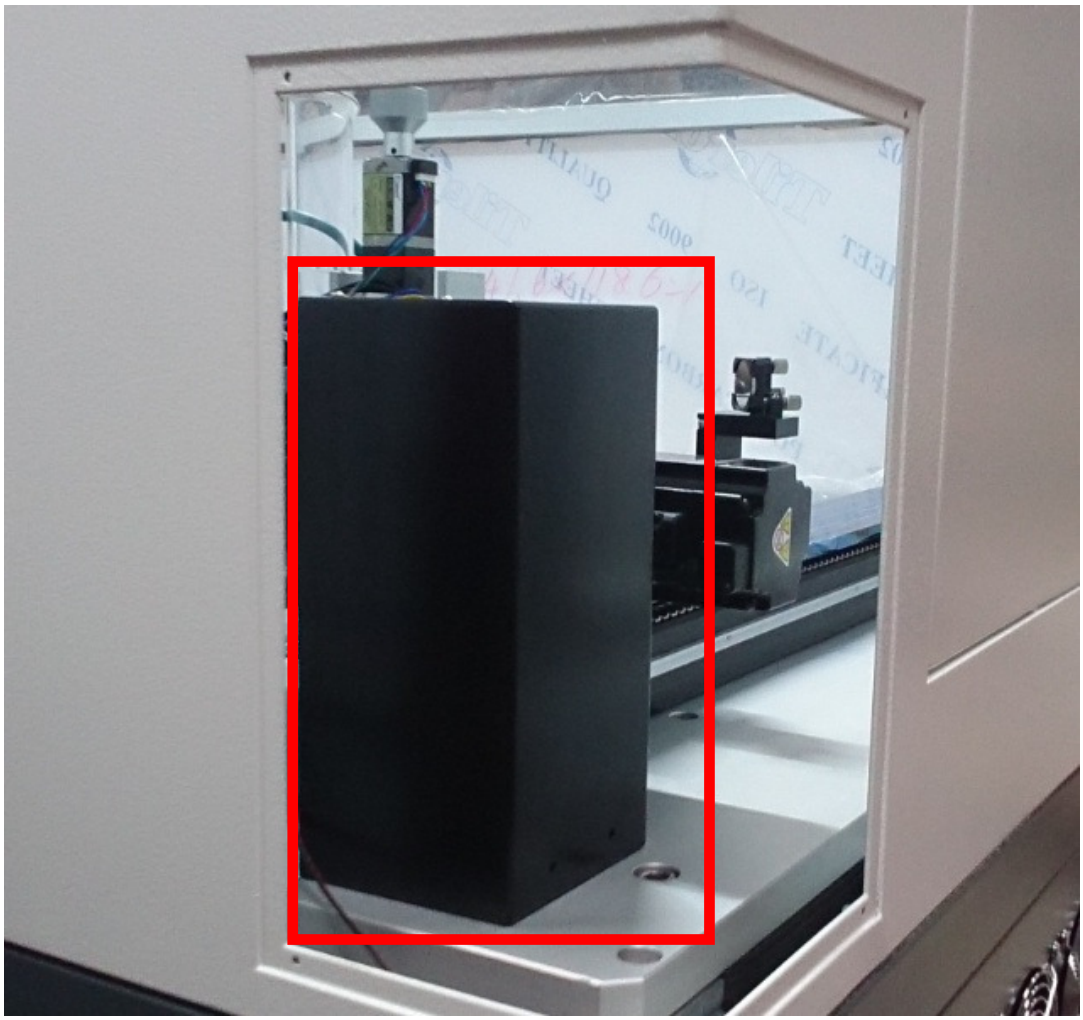
Clean all filter cottons.

3. Clean lens and mirror

Clean 2nd mirror with cotton swab and alcohol.

Remove the left alignment cover.

Remove the reflection mirror protection cover.



Clean the mirrors, assembly back after clean.

Chapter 5 Trouble Shooting

This chapter provides suggestions to check and solve some common problem. If you can't find any answer in this chapter, please see introduction to call technical support!!

Problem	Cause	Remedy and reference
Power is not turned on.	AC power cable is not connected properly.	Check Hardware Installation. (See section 2.4.)
	Emergency stop is pressed down.	Turn right the pushbutton. (See section 2.3.)
Laser beam is not emitted.	Laser on/off switch may be turned off.	Turn on the switch. (See section 2.3.)
	Doors with interlocks are not closed. (If "Door" indicator is dark.)	Close all doors with interlocks. (See section 2.3.)
	The temperature of laser generator is too high.	Stop job for a certain time to cool laser generator. Check the fans of laser and clean them.
	Laser beam is misalignment.	Realign by adjusting mirrors.
	The setting of laser power is too low.	Increase the setting. (See section 3.4.2.)
	Laser generator has breakdown.	Please contact LTT. (See Introduction)
Cutting or engraving quality is bad.	Focal length is not suitable.	Adjust focal length. (See section 3.3.1)
	Lens and mirrors are dirty.	Clean the lens and mirrors. (See section 4.1 and 4.2)
	Setting of focal length on panel does not match with lens.	Modify the setting. (See section 3.3.2)
	Lens and mirrors are broken.	Please contact LTT. (See Introduction)
	The settings of laser power are not suitable.	Modify the setting. (See section 3.4)

Appendices

Appendix 1 Specifications

This section describes the specification of the SLC-M+ series.

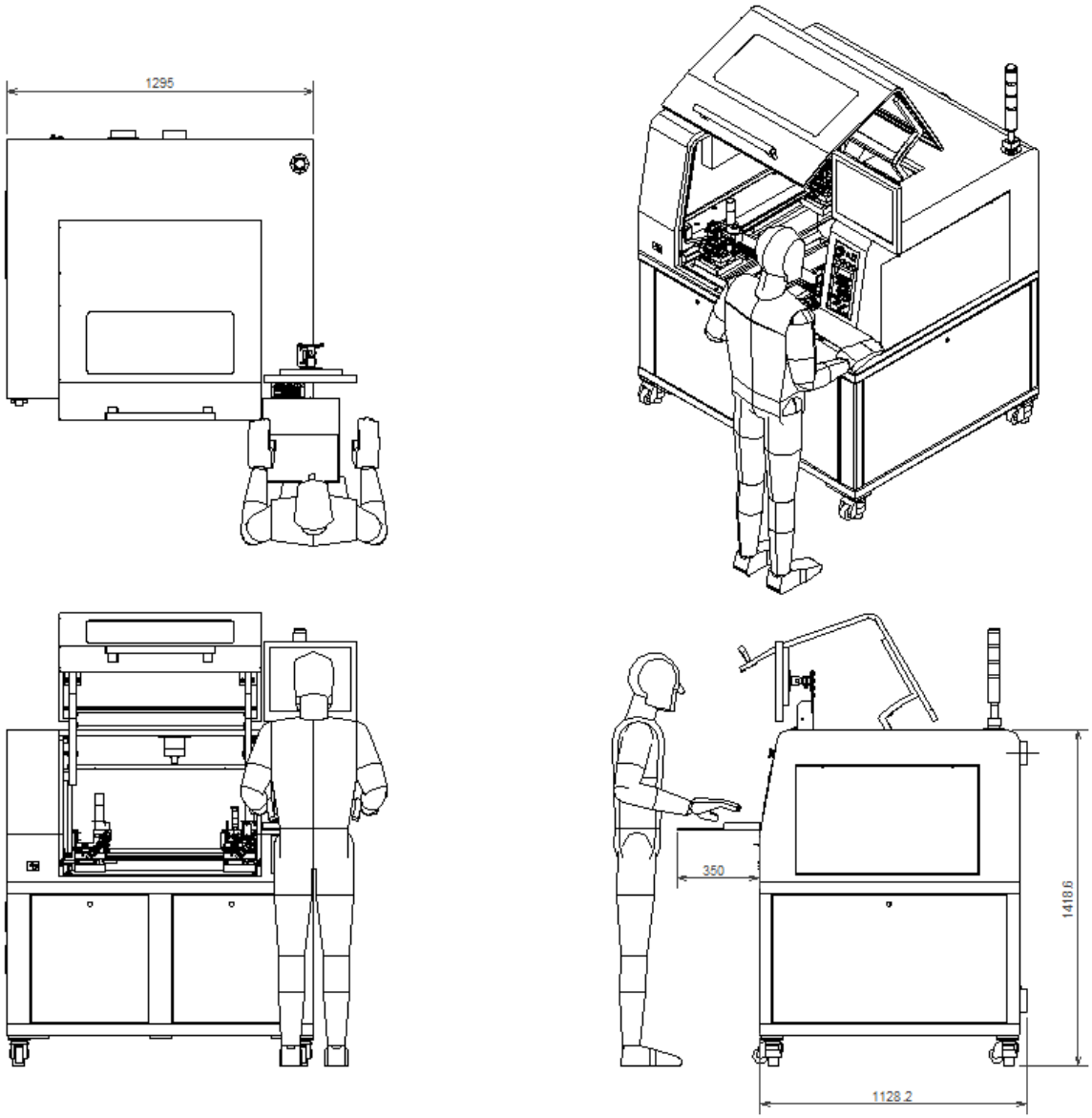
Model	SLC-M+
Work area	630 (L) ×630 (W) mm
Focal lens Movement	50 (H) mm
Max. speed	400 mm/sec (15.7"/sec)
Resolution(DPI)	4064, 2032, 1354, 1016, 812, 677
Memory Buffer	64MB
Interface	USB port
Laser generator	30W /60W /100W (air-cooled CO2 laser)
Power supply	220~240V AC, 30 Amp, 50/60 Hz
Exhaust	requiring at least 16.0 m³/min air flow for two 4" connection
Regulatory Compliance	RoHS directive
Standard	Auto Focusing Red-beam Pointer Beam Expender Honeycomb cutting table
Options	Blower Air compressor

Appendix 2 Dimensions

This section describes the dimensions of SLC-M+ series.

SLC-M+ series

Unit:mm



Appendix 3 Suggested Power and Speed Settings

The below settings are only intended to be starting points. Many variables can affect actual settings. Different manufacturers have different formulations, laser tubes differ in actual power output, natural materials vary greatly, and the user desired results will drastically affect actual settings.

Laser Source : 30 Watt						
Material	**Type**	**Thickness**	**Speed**	**Power**	**PPI**	**DPI**
Acrylic	Engraving		100%	20%		500/1000
	Cutting	3 mm	3%	100%	1000	
		5 mm	2%	100%	1000	
		10 mm	0.5%	100%	1000	
Anodized Aluminum	Engraving		100%	40%		500/1000
Card Stock	Cutting		40%	100%	250	
Cermark	Engraving		25%	100%		500
Ceramic Tile	Engraving		60%	100%		500
Coated Brass	Engraving		100%	50%		1000
Crystal	Engraving		100%	30%		500
Denim	Engraving		100%	30%		500
	Cutting		20%	100%	500	
Glass	Engraving		100%	50%		500
Granite	Engraving		60%	40%		333
Laser Foil	Cutting		50%	100%		1000
Laserable Plastic	Engraving		100%	20%		1000
	Cutting	1.5 mm	8%	100%	500	
Leather	Engraving		100%	70%		500
	Cutting		2%	100%		
Marble	Engraving		60%	23%		333
Rubber Stamp	Engraving		15%	100%		1000
	Cutting		4%	100%	500	
Wood	Engraving		100%	100%		500/1000
	Cutting	3 mm	7%	100%	500	
		6 mm	2.5%	100%	500	