VisionCut Laser Cutting System Operation Manual

CONTENTS

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Safety

当心激光
Warning laser

　　Live Focus System (LFS) is applied in laser processing machine. Laser protection is CLASS3 and CLASS4.

　　Please reference to GB7247.1-2001 and take some safety protection measures.

　　　The following should be executed：

- Operation persons should wear protection glasses.
- Connected to the ground. A valid connection to ground should be done and the resistance should be less than 1 ohm. CNC machine tools, LFS, sensor shell and support plate should be stable grounding.
- Please do not try to disassemble the parts of LFS. Otherwise, the LFS will be fault.
- Laser beam nozzle and the LFS sensor are integrated design. When the LFS is working, please do not touch the sensor. Otherwise will cause damage to your body.
- When cutting glossy surface metal, please notice the reflect laser beams from the metal surface. Some protection measure should be taken to avoid the body to be damaged. Preventive measures should be taken and operate carefully, to prevent burn out parts by laser beam off center axis.
- Keep the sensor and nozzle clean. Avoid the cooling water, condensed water or other foreign matter flowing into sensor; otherwise the sensor will be fault. The laser power and other controllers should meet the EMC standard and should be connect to the ground reliably.
- Sensors and electrical cabinet parts must be grounding as requirements. Processed metal artifacts should be reliable grounding.

Chapter 1 Electrical Manual

1.1 Overview—VisionCut Introduction

VisionCut laser cutting control system is designed exactly for processing the material with Mark points. This system is based on the RDS3040G motion controller and DSP+FPGA framework and has high performance in motion control and laser control. This system uses PCI interface, and has strong operational capability, VisionCut can meet the requirements of laser cutting industry.

This laser cutting system can interfaces with CO2 laser, high power YAG laser and Fiber laser, and also has limit switch input, home switch, servo alarm and laser protect function, can control servo motor and step motor.

The following diagram is the composition diagram of the VisionCut laser cutting system. Please refer to Picture 1-1. The electrical connection details as Picture 1-2 showed.
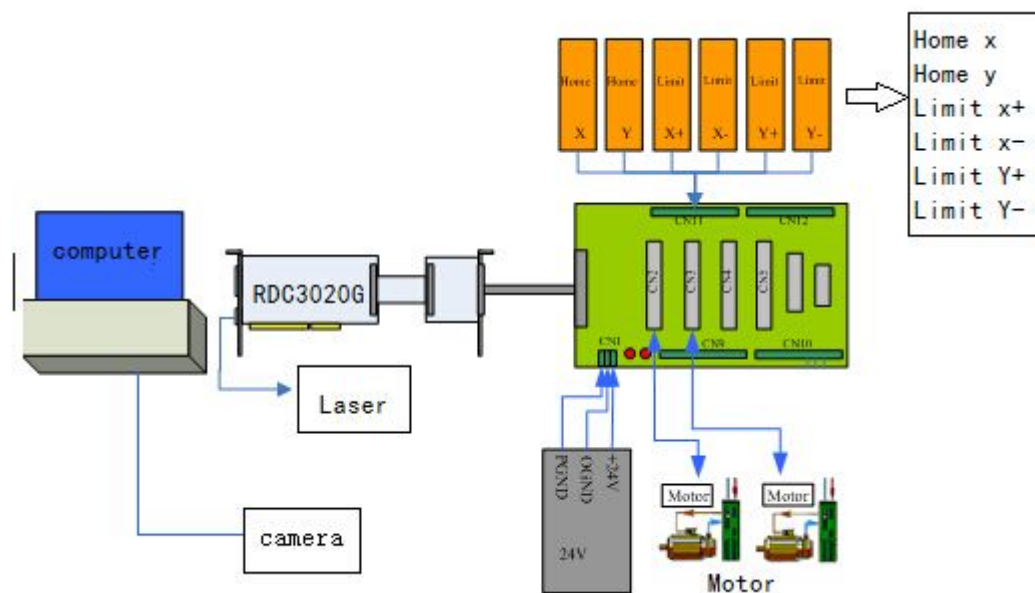
Picture 1-1 VisionCut laser cutting system
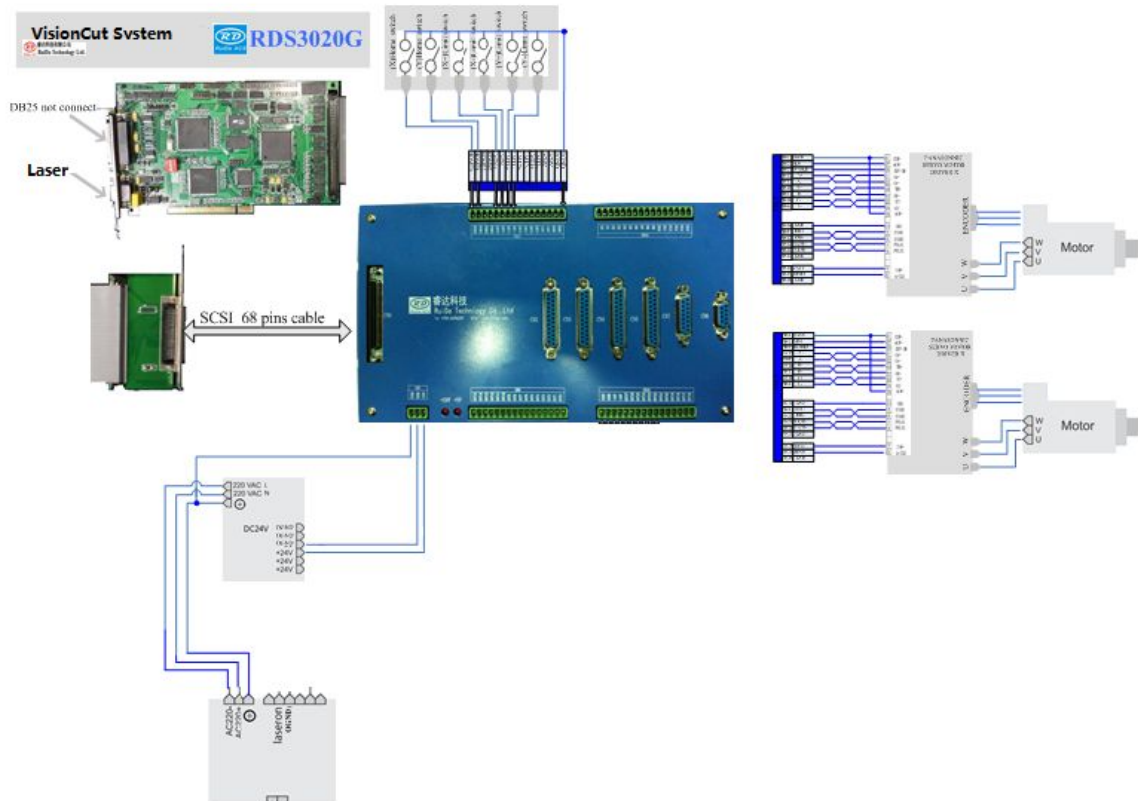
Picture 1-2 Electrical Connection of VisionCut laser cutting system

Chapter 2 Installation & Operation

2.1 List of product

When you received our product, please check the type and accessories and make sure these are what you ordered. If wrong, please contact RuiDa technology.

In the case of industrial applications, we expect our products to be protected from hazardous or conductive materials and/or environments that could cause harm to the controller by damaging components or causing electrical shorts. When our products are used in an industrial environment, install them into an industrial electrical cabinet or industrial PC to protect them from excessive or corrosive moisture, abnormal ambient temperatures, and conductive materials. If RuiDa control systems, products are exposed to hazardous or conductive materials and/or environments, we cannot guarantee their operation.

List of product:
RDS3040G-PCI Motion controller (1pcs);
Extended terminal board (1pcs);
68-PIN SCSI cable (1pcs);
Instruction and CD (1pcs)
Lens (1pcs)
Camera (with connecting line) (1 set)
Antistatic glove (1pcs)
Brightness regulator (with connecting line)
Driver board (1pcs)

> ⚠   ***Dangerous !***
>
> *Avoid the controller form ESD, please release the static charge before touching the motion controller.*

2.2 RDS3040G-PCI Motion Controller Configuration Diagram
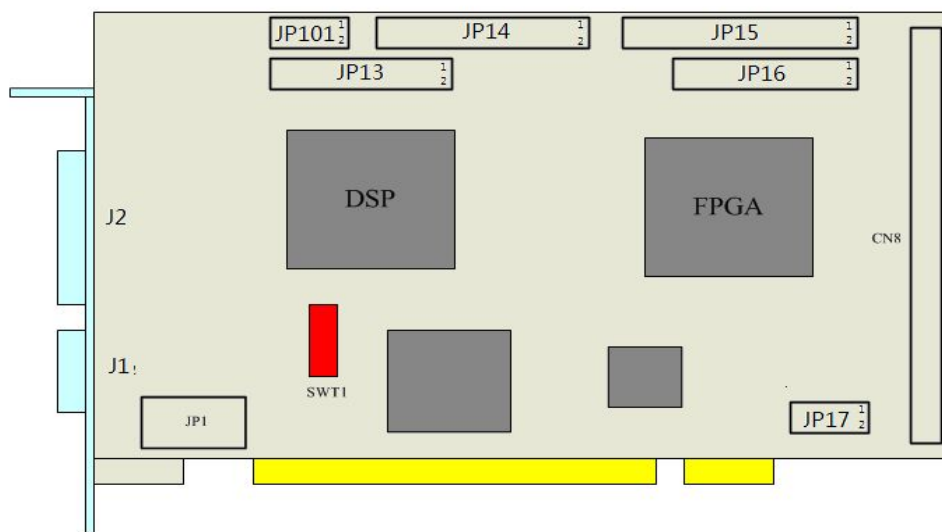
Picture 2-1: Diagram of RDS3040G-PCI

Sheet 2-1 Encoder Switch SWT1 default state

Pin	State
1	OFF
2	OFF
3	OFF
4	OFF
5	OFF
6	OFF

J2: extend interface

J1: extend interface

    JP101: extend interface

JP13: extend interface

JP14: extend interface

JP15: extend interface

JJP16: extend interface

JP17: Quadrature encoder interface

JP11, JP12, JP20: reserved

The diagram of the matched terminal board with RDS3040G-PCI is shown in Picture 2-2.
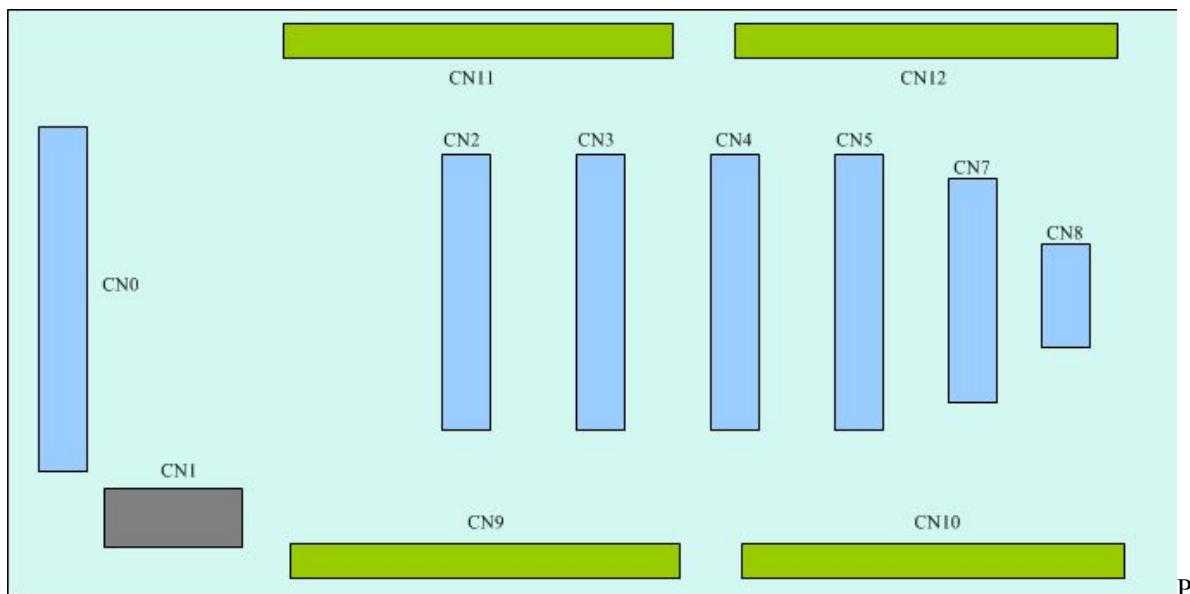
icture2-2: Extended Terminal Board Structure Diagrams of RDS3040G-PCI

The function of connectors is described in Sheet 2-2.

Sheet 2-2 Connector Definition

Connector	Description
CN0	Connect with RDS3040G-PCI
CN2	X axis motor interface
CN3	Y axis motor interface
CN4	Z axis motor interface
CN5	A axis motor interface
CN7	Reserved
CN8	Reserved
CN9	General purpose IO output(low 16 channels)
CN10	General purpose IO input(high 12 channels)
CN11	Dedicated purpose IO input
CN12	General purpose IO input
CN1	Power(24V)

2.3 System Installation & Application Procedures

Please follow the steps to set up your laser cutting system:

Step1:   **Insert the RDS3040G motion controller into PCI slot**

↓

Switch off the AC power

↓

Wear the ESD gloves

↓

Open the computer box and install the RDS3040G controller into the PCI slot

↓

Tighten the screw

↓

Switch on PC power, if the top left indicator flashing on the RDS3040G,

which shows the RDS3040G work well.

↓

Shut off computer, and Switch off the PC power.

↓

Connect other devices to RDS3040G terminal board, such as laser device, motors etc.

↓

Restart the PC power, then the system can work normally.

Step 2: Connect the RDS3040G controller with the terminal board

Connect the RDS3040G controller to terminal board with the 68 pin SCSI wire.

The power supply of the terminal board is 24V/3A, if 24V power on, the led indicator in the terminal board will turn on, it can work normally, but if there is one or both off, which indicated there is fault in the terminal board, and please contact technical support staff of RuiDa technology.

Step 3: Install the PCI driver in windows XP

The PCI driver is just for window XP, if others, please contact RuiDa technology.

When windows started, system will check the PCI device automatically and remind user to install PCI driver.

Select "install from a list or the specific location", click "NEXT".

In this page, select "search the best driver in the location", and select "search include the location", click "browse".

Insert the CD in the cd-rom. Click "Browse" and select the directory "CDROM: \driver\win xp" "Add Hardware Wizard", click "NEXT". In the device manager, there is a new device named "RDDriver ", click "+", " RuiDaTech RD400SCAN Ver1.0" is displayed.

Step 4: RDS3040G-PCI Running Test

Open the VisionCut software, if opened successfully, the PCI driver is installed correctly. If there are faults during opening the VisionCut software, the PCI driver is installed unsuccessfully.

Step 5: Connect X, Y axis motor

There are 4 channels DB15 interface for motor control, the signals including pulse+dir, alarm, servo on and encoder signals. Figure 3 is the definition of the signals in details.

The controller provides signal output in differential method. The electrical diagram as showed in Picture 2-3. Servo alarm input and enable output are in photoelectric isolation mode, the electrical diagram as showed in Picture 2-4 and Picture 2-5. The connection between RDS3040G and motors is described in detail in appendix 1.
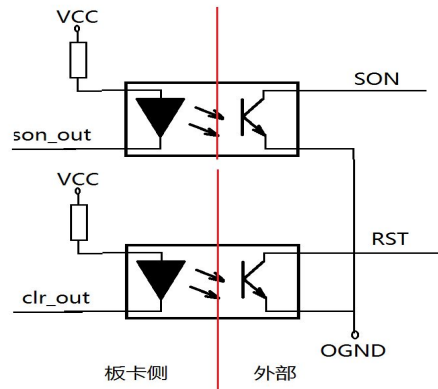
● **Motor control signals output**
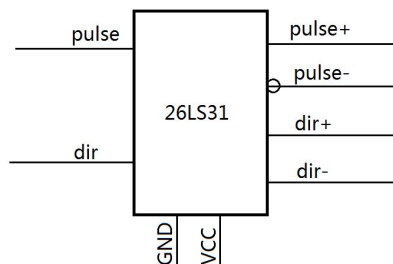
Picture 2-3 pulse +dir differential output
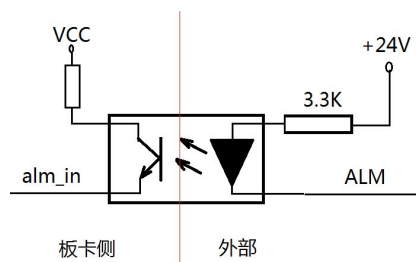
Picture 2-4 Servo alarm signal input

Picture 2-5 Servo enable and reset signal output

Sheet 2-3 CN2~CN5 Signal Definition

Pin	Signal	Description	Pin	Signal	Description
PIN1	OGND	24V referenced ground	PIN14	OVCC	24Voutput
PIN2	ALM	Servo alarm input	PIN15	CLR	Servo reset output
PIN3	SON	Servo enable output	PIN16	NC	NC
PIN4	A0-	ENCODER A-	PIN17	A0+	ENCODER A+
PIN5	B0-	ENCODER B-	PIN18	B0+	ENCODER B+
PIN6	C0-	ENCODER C -	PIN19	C0+	ENCODER C+
PIN7	+5V	+5V output	PIN20	GND	Digital ground
PIN8	Vout	Speed referenced command	PIN21	GND	Digital ground
PIN9	DIR+	DIR+	PIN22	DIR-	Dir-
PIN10	AGND	Analog referenced ground	PIN23	PULSE+	Pulse+
PIN11	PULSE-	Pulse-	PIN24	GND	Digital ground
PIN12	NC	NC	PIN25	NC	NC
PIN13	GND	Digital ground			

Step 6: Connecting to the dedicated IO for X, Y axis motors

The signal for the motor control includes: LIMIT input, HOME input. If connects to servo motors, there are still include SERVO ON and ALARM input.

HOME and LIMIT, SERVO ON, ALARM signals are all photoelectric isolated. Just is shown as picture 2-6.
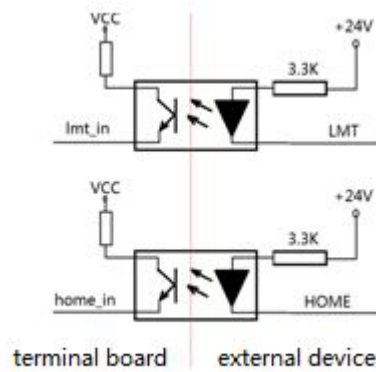
Picture2-6 Dedicated input and dedicated output signal

The definition of dedicated IO is described in Sheet 2-4 in detail.

Sheet 2-4   Definition of the dedicated IO in CN11

| Pin	Signal	Description	Pin	Signal	Description
PIN1	HOME0	HOME input for axis X	PIN9	LMT2+	LIMIT+ input for axis Z+
PIN2	HOME1	HOME input for axis Y	PIN10	LMT2-	LIMIT- input for axis Z-
PIN3	HOME2	HOME input for axis Z	PIN11	LMT3+	LIMIT+ input for axis A+
PIN4	HOME3	HOME input for axis A	PIN12	LMT3-	LIMIT- input for axis A-
PIN5	LMT0+	LIMIT+ input for axis X+	PIN13	OVCC	24V power output
PIN6	LMT0-	LIMIT- input for axis X-	PIN14	OVCC	24V power output
PIN7	LMT1+	LIMIT+ input for axis Y+	PIN15	OGND	24V referenced ground
PIN8	LMT1-	LIMIT- input for axis Y-	PIN16	OGND	24V referenced ground

Step: Connecting to laser

Sheet 2-5 J1 Signal Description

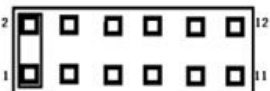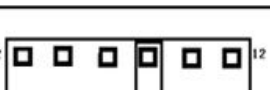| PIN	Signal	Description
PIN1	VCC	+5V power output
PIN2	PWM1	The first channel PWM output
PIN3	DA2	The second channel analog quantity signal output
PIN4	START	external startup signal input
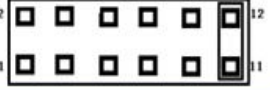
PIN5	GND	GND
PIN6	LASERON	laser switching signal
PIN7	PWM2	The second channel PWM output
PIN8	DA1	The first channel analog signal output
PIN9	STOP	external stop signal input
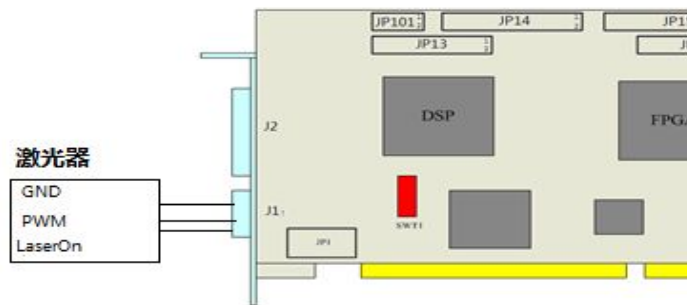
Picture 2-7 The laser connection
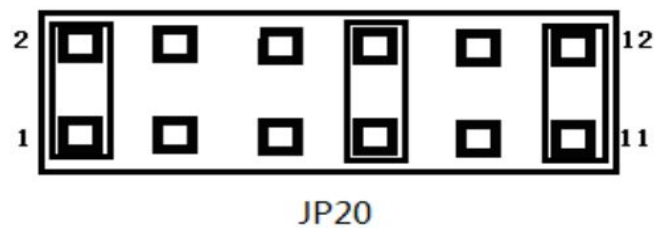
Picture 2-8 The Laser jumper connection

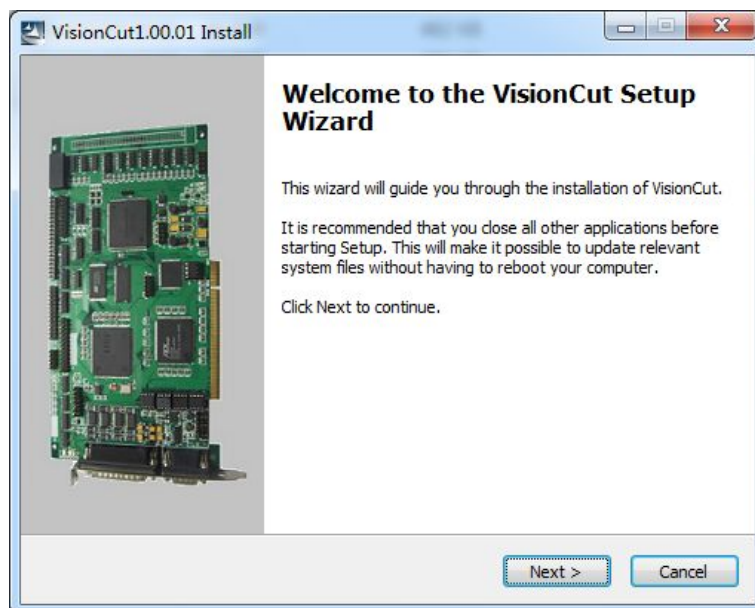| Pin	Signal definition	instructions
JP20		PWM1-
		PWM1+
JP20		LASERON-
		LASERON+
JP20		PWM2-
		PWM2+

Picture 2-10 Polarity choices of output signal

Chapter 3 Software Operation Manual
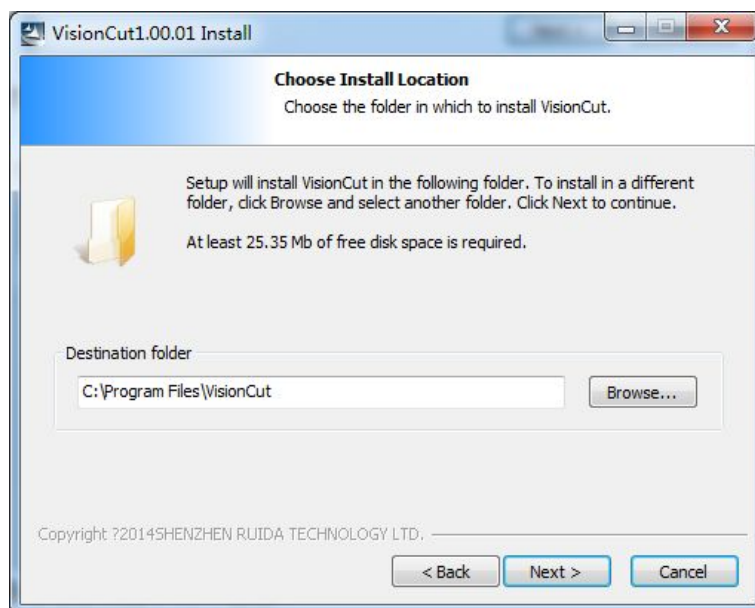
3.1 Software Installation

Double click the VisionCutSetup.exe，the software will be installed in the computer. Please follow

the step to install the software correctly. Press "next".

Pop-up "choose install location", user can modify the installation path, and also can choose the default installation path the display showed.

Click "next", pop-up dialog box "select shortcuts".

Click "next", pop-up whether to create a Desktop icon
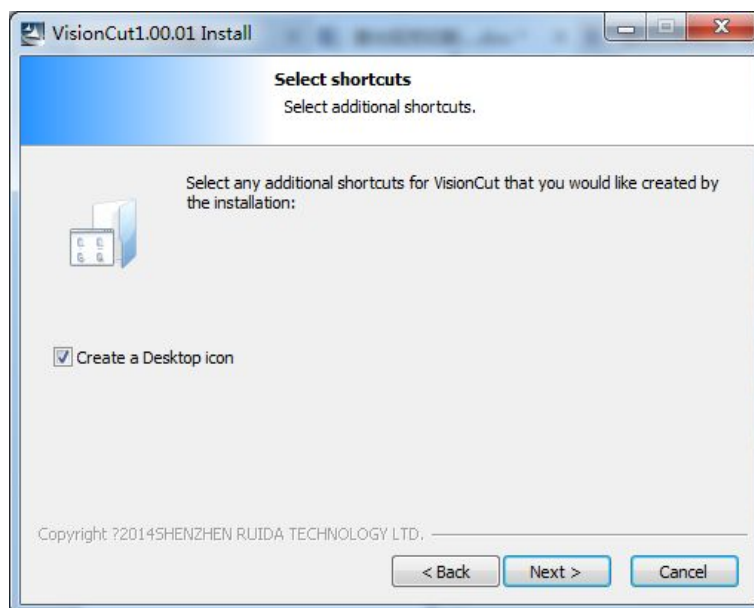
Click "next", pop-up "ready to install", after confirmed, click "install" to install.

A dialog will be popped-up to prompt "update camera driver…".

If "yes", will update the camera driver, if "no", will not update.

Click "finish" camera driver installation finished, VisionCut installed at the same time.

3.2 VisionCut Introduction

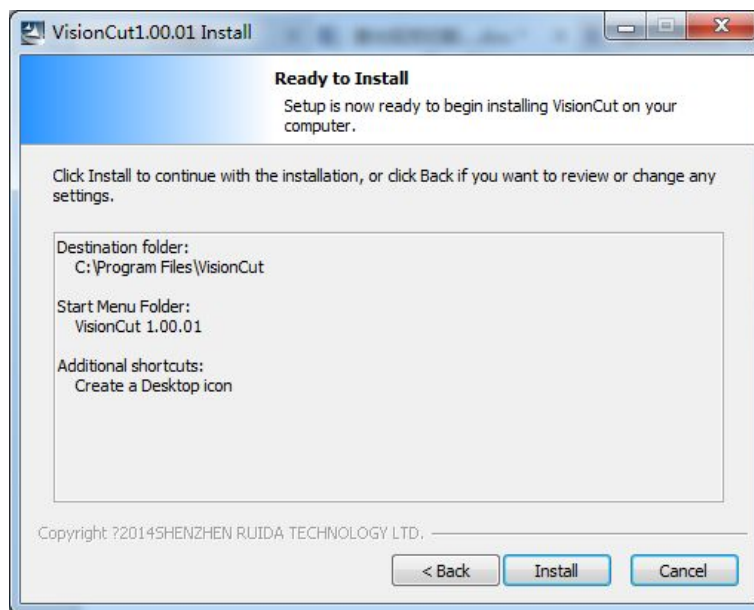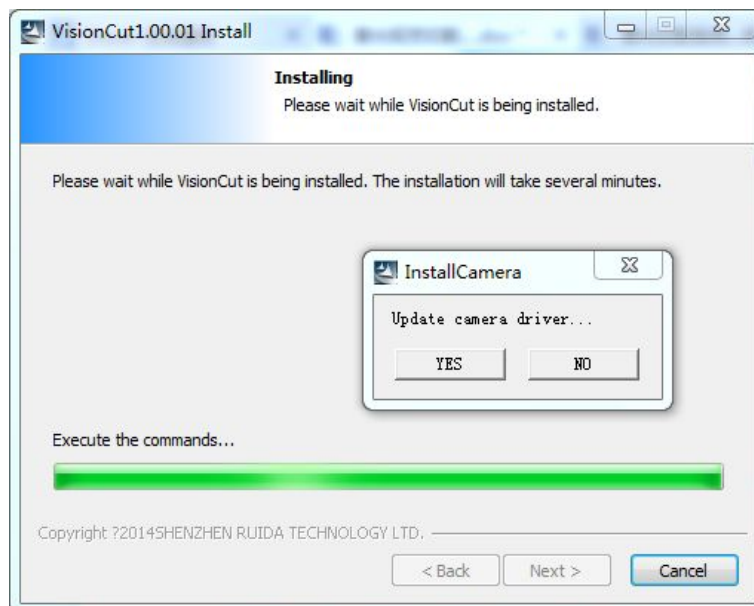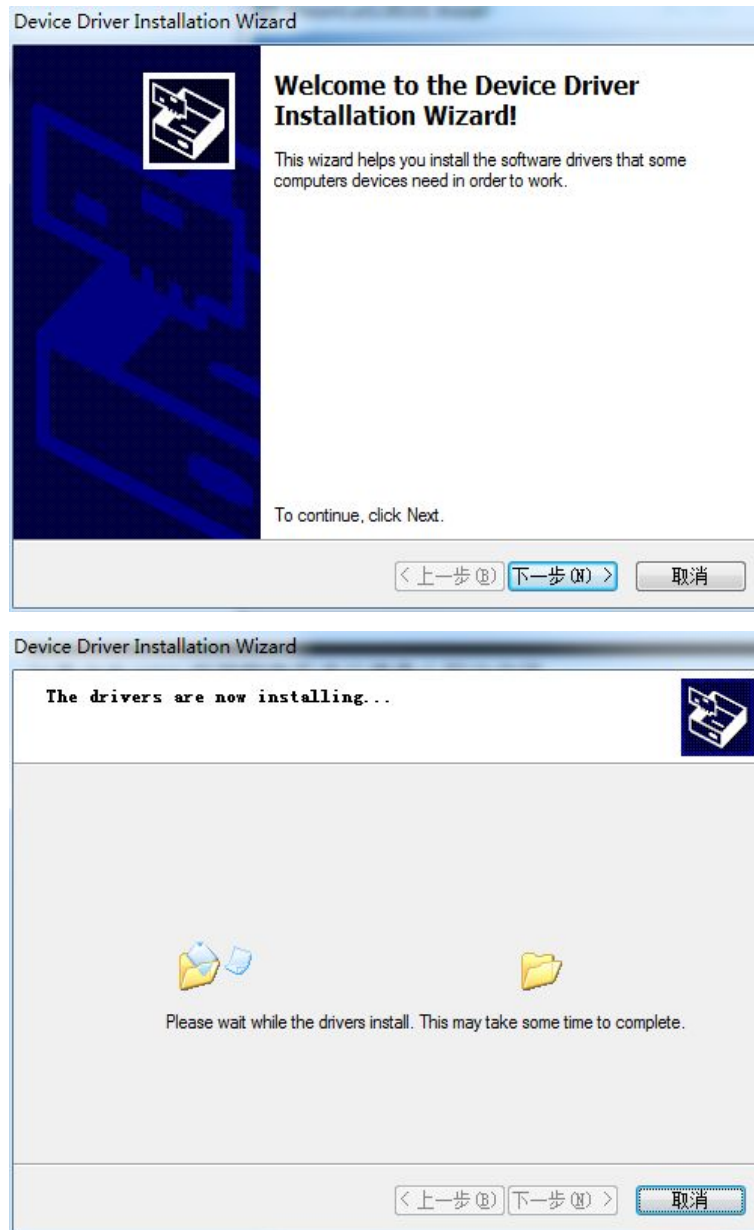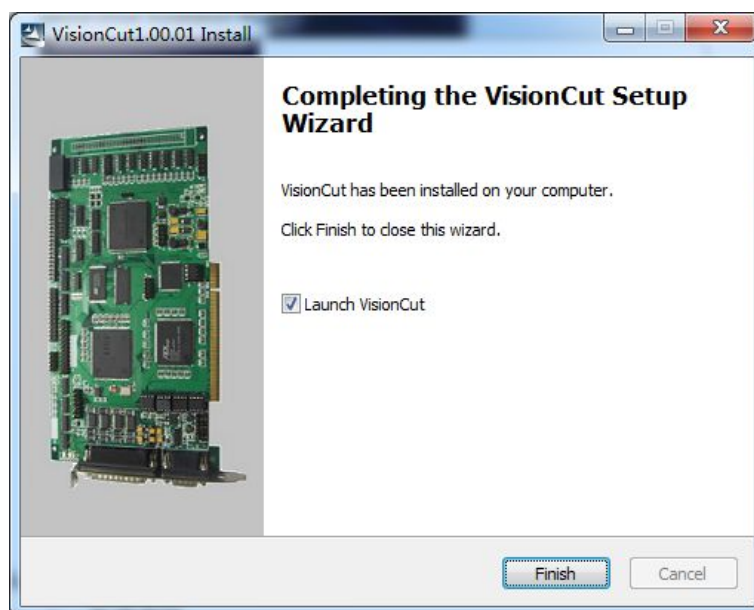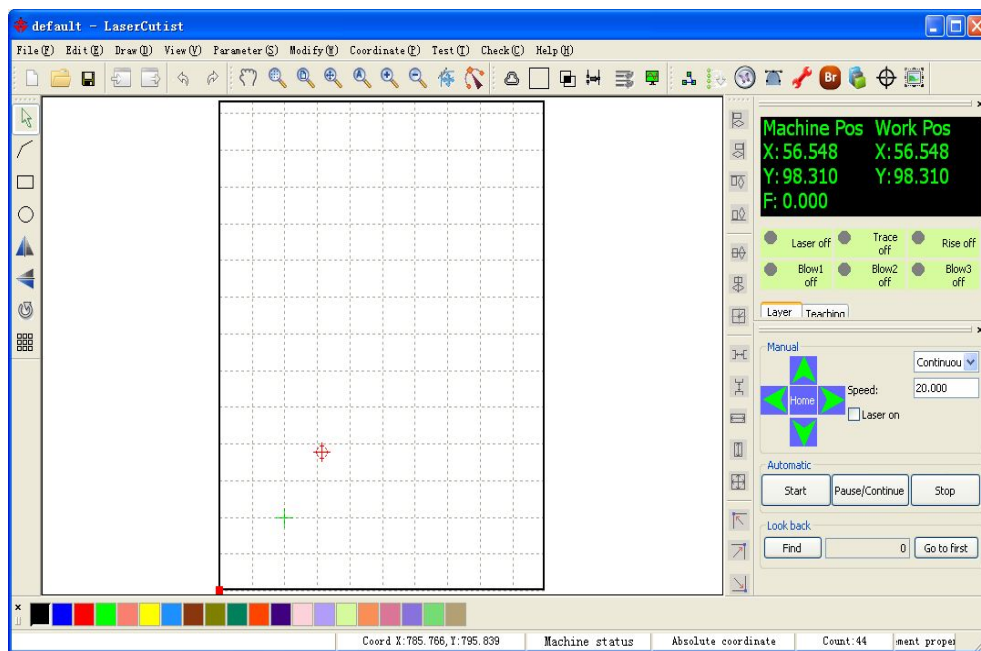## 3.2.1 Main Interface of VisionCut

The main interface of the VisionCut is shown as Picture 3-1.

Picture3-1 Main interface of the software

The main interface includes 10 functional areas, such as Menu, Tools, Status, View, Edit, Modify, Draw, Align, Work area, Control Panel.

a. System Menu: Include of File, Edit, Draw, Check, Para, Modify, Coordinate, Test, View, Help.

b. System Tools: Mainly including: New, Open, Save, Import, Export, Undo, Redo.

c. System status: Just is shown as picture3-2.To display the X, Y coordinate position, system alarm status, process quality and the attribute display of internal and external mold.

Picture 3-2 System status

d. View Tools: Including: Move, Frame selection, Page range, Data scale, display all, zoom in/out, Path display, Polygon display.

e. Edit Tools: Including: close lines, delete Overlapping lines, Merge joined lines.

f. Modify Tools: Path optimization, sequencing manually, setting start point.

g. Draw Tools: Including: move, draw polygon line, draw rectangle, draw ellipse, horizontal mirror,

vertical mirror, rotate, array.

h. Align Tools: Top align, bottom align, left align, right align, horizontal and vertical middle align, horizontal and vertical array with uniformly-spaced, uniformly-width, uniformly-height, displayed in the center of page, moving to bottom left, moving to bottom right, moving to top left, moving to top right.

i. Image capture Area: To display the image captured for matching test.

j. Control panel: Mainly to achieve the related processing functions, which including manual and automatic processing.

3.2.2 Module Function

1)   **Menu--File**

File operation includes new, open, save, save as, import, and export. File menu is shown as picture 3-3.
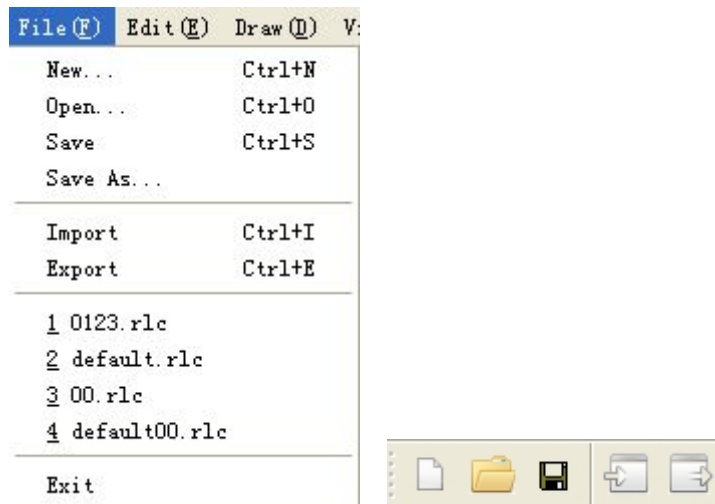
Picture3-3 File menu

    a.   **New**

     Click "new", If there are graphics in the display area, VisionCut tell you the displayed file to be saved or not. If you select saving none, then the display area will be cleared. If you select to save, the file in the display area will be saved.

    b.   **Open**

     Click "open", then the file with extension *.rlc can be only opened. The *.rlc file is generated by VisionCut itself.

    c.   **Save and Save as**

     File can be saved as *.rlc with save or save as operation. The *.rlc file is not only included position of the segment but also the work parameters and other information.

    d.   **Import**

     Click "Import", then the file dialog will be appeared. VisionCut supports the Ai, plt, dxf format file.

The software has file parameter setting, you can set the precision of plt file, the data unit of dxf files and whether import the dxf information or not.

Picture3-4 File parameter

e. Export

All the file that displayed on the VisionCut can be exported as *.ai or *.plt format.

2) Menu--Edit

Edit operation includes Undo, Redo, Generating Parallel lines, Force close lines, Delete Overlapping lines, Merge joined lines, Outline compensation, horizontal and vertical mirror, Rotate, Array, delete the graphics selected. The edit menu is shown as picture 3-5.
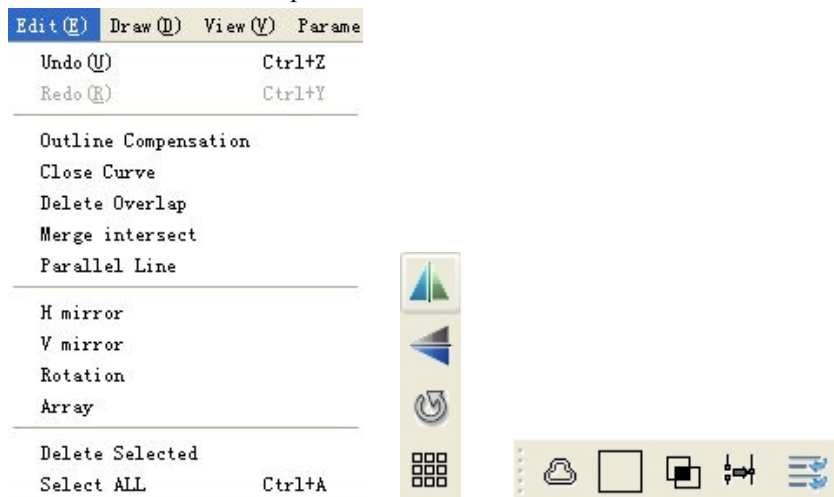
Picture 3-5 Edit Menu

a. Undo and redo

Cancel and restore the operation steps.

b. Mirror

Mirror operation includes horizontal and vertical mirror.

c. **Rotate**

When you rotate the graphics, the rotate angle can be set. But the X, Y position could not be set. The position of X, Y that is displayed in the picture3-6 the graphics center position that you have selected. They cannot be set.

Picture 3-6 Rotation function

d. **Array**

VisionCut supports graphic elements array. You can set the elements space align with X direction or Y direction. The rows and columns quantity 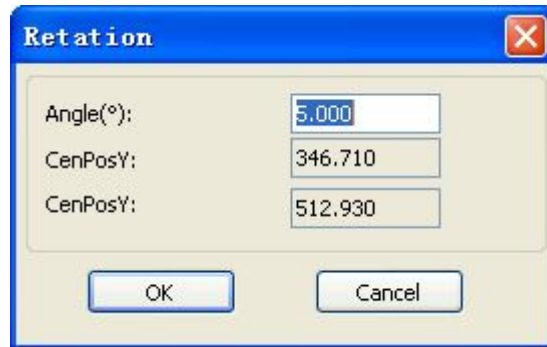of arrays in the X or Y direction can be set too. When using auto-full function, which will calculate the rows and columns quantity of array according to the width and height of the material.   Click "Array" to array the graphics. Shown as picture 3-7
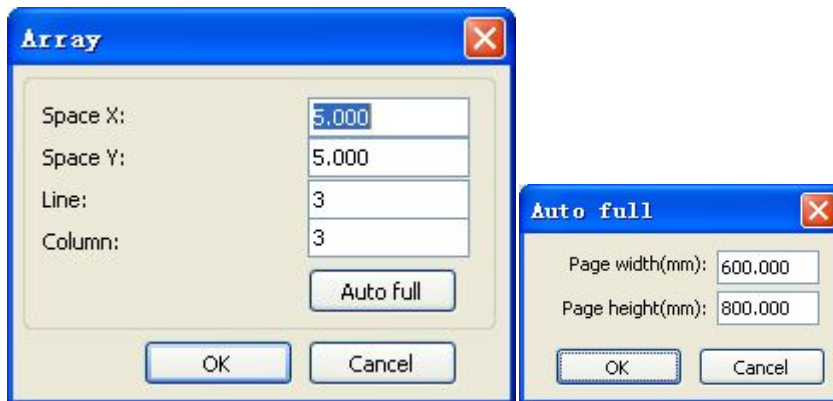
Picture 3-7 Array function

e. **Closed curves.**

Click "closed graphics", will pop up a dialog box "close the lines", to make a judgment of the graphics whether need close operation, if "Force close", whatever the length between the start point and the end point is, VisionCut will force to close the polygon lines
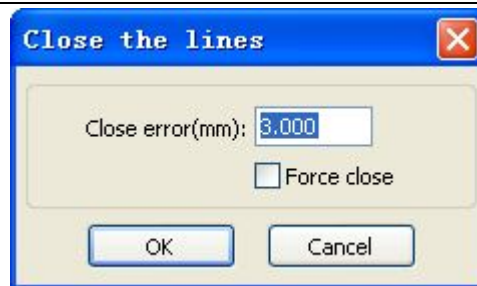
Picture3-8 Close lines dialog

f.   Delete overlapping lines

If there are two or more lines are too closed with each other, one of them is not useful. It can be deleted. The interval length limit of two lines should be set. When VisionCut check that the interval length of two lines is less that the interval length limit, VisionCut will delete the un-useful lines. Function is shown as picture 3-9.

Picture3-9 Delete the overlapping lines

g.   Merge Intersect

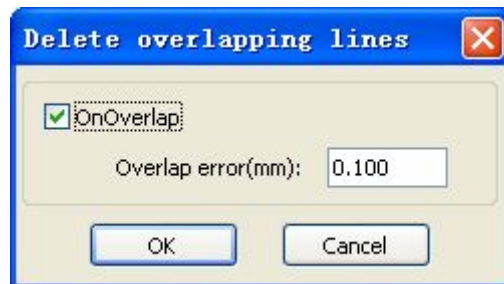When some polygon lines of a closed graphics are not connect with each other, the merge polygon lines function can made the lines connect with each other. Before that, the merge error limit should be set. When the length of two polygon lines is less that the merge error limits, the polygon line will connect with each other. When the length of two polygon lines is more than the merge error limit, the merge polygon function will be ignored.
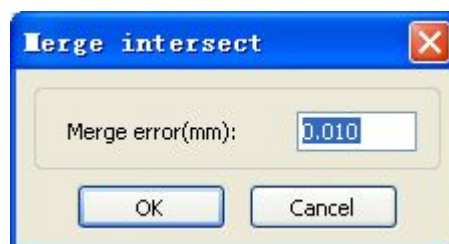
Picture3-10 Merge the polygon lines

h.   Delete selected

Delete the graphics selected （you can use the "Delete "key on the keyboard）.

i.   Select all

Select all graphics on the display window （you can use the "Ctrl+A" on the keyboard）.

3)   Menu--Draw

Draw graphics include graphics drawing, graphics transformation, and align tools. Graphics drawing includes drawing polygon line, rectangle, and ellipse. Graphics transformation can change the position and proportion quantitatively. Align the selected graphics with various operations.

1. Draw tools

The draw tools are shown as picture 3-11.
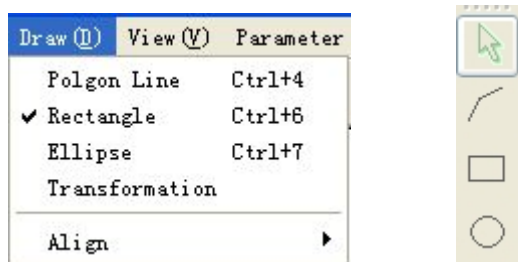
Picture 3-11 Draw tools

a. Move selected：

Click " " and then select the graphics in the display window, the graphics selected can be moved when the cursor is placed on the center of the selected graphics with the left key of the mouse is being pressed down.

b. Polygon lines：

Click the polygon lines, Move the cursor and press down the left key of the mouse, the polygon lines will be drew. To end the draw, press the right key of the mouse.

c. Rectangle：

Click the rectangle, press down the left key of the mouse and move the cursor. Then release the left key of the mouse, a rectangle is drew on the display window.

d. Ellipse：

Click ellipse, press down the left key of the mouse and move the cursor. Then release the left key of

the mouse, an ellipse is drew on the display window.

2. Transformation
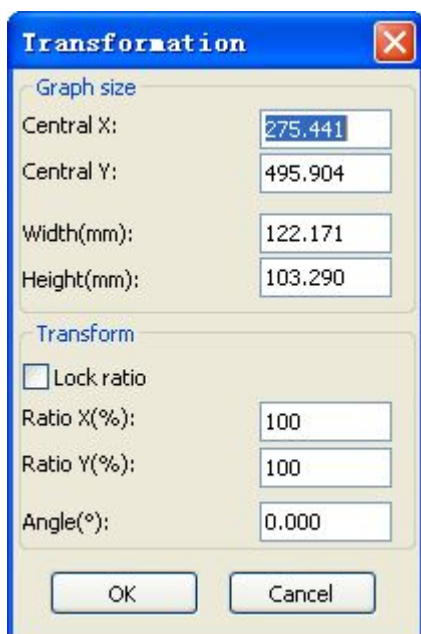
Picture3-12 Transformation parameters

To change the position of the graphics can through change graphics center position, and the change of width and height of the graphics and scaling to change the size.

Rotation can be set to rotate the graphics based on the center point of the graphics.

3. Align

The align function is shown as picture3-13.

```
Align Left
Align Right
Align Top
Align Bottom
Center Horizontal
Center Vertical
Page Center
Space across
Space Down
Make same width
Make same height
Make same size

Page left top
Page right top
Page right bottom
Page left bottom
```
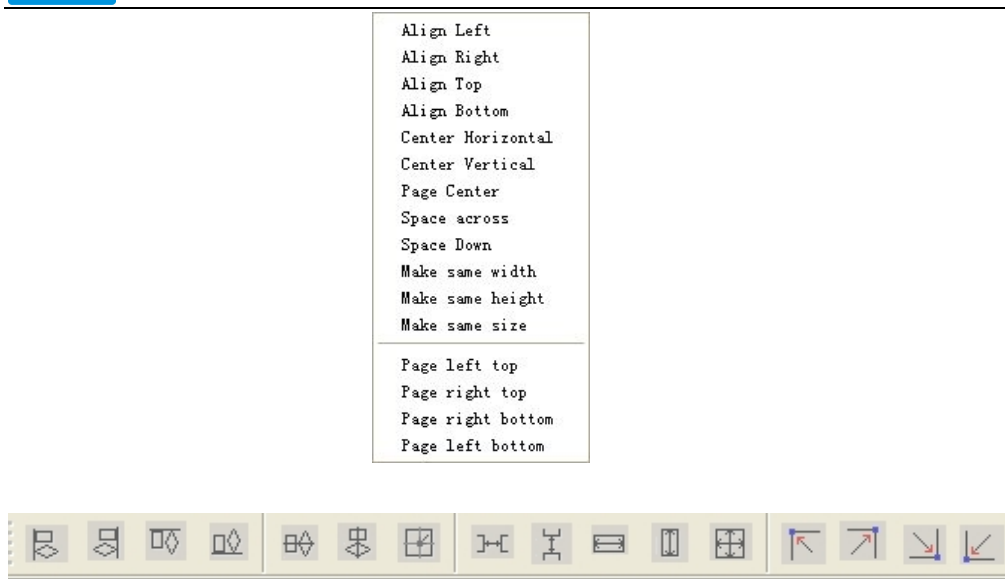
Picture 3-13 align tools

4)   **Menu--View**

View function can help users to check the graphics more clearly. View tools include of move selected, offset, zoom in, zoom out, display all, view selected, view all the page, display path, display polygon point. As showed in Picture 3-14.

```
View (V)   Parameter (S)
   Polygon Node
   Curve Path

   View select
   View full page
   View full scale
   View all
   Zoom out
   Zoom in
   Move selected
   Move Page
```
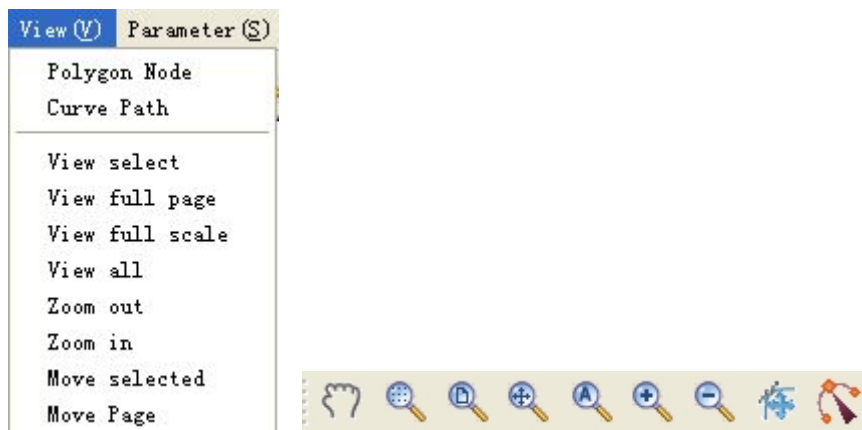
Picture 3-14 view tools

1. **Move selected**

  Use the left key of the mouse to select the graphics and move the graphics.

2. **Move page**

  You can move the entire display window when pressing down the left key of the mouse.

3. **View selected**

Pressing down the left key of the mouse and select a rectangle area, then release the left key of the mouse. The rectangle area will be zoomed in to display in all window.

4. View full page

Restore the display page to the original display page.

5. View full scale

View the selected graphics in all the scale of the display window.

6. View all

Display all the graphics in the display window.

7. Zoom in and Zoom out

Click "zoom in" or "zoom out", when the left key of the mouse is clicked, the display windows will zoom in or zoom out based on the cursor point.

8. Graphics path

This function will display the cutting path, the jump path and the graphics sequence.

9. Polygon node

The function will display all the polygon points of the graphics in the display window.

5) Menu--Parameters

The parameters include machine parameter, system parameter, cut parameter, file parameter.

1. Machine parameter

The machine parameter is just only opened to the machine manufacture. So the parameter is not allowed to be modified without the manufacture's authorization.

There is a password protect to prohibit to modify the parameters. When the password you entered has been authorized; the dialog will be opened as picture 3-15.

Picture 3-15 Machine parameters

a.　**Direction Polarity**

You can change the direction of the axis motion when you send positive pulse. For example, you have defined the positive direction of an axis. If you find that the axis run to negative direction when you send a positive movement, you should change the direction polar.

b.　**HOME Polarity**

Choose which electrical level to trigger HOME switch, select "High", which means rising edge is triggered; select "Low", the falling edge is triggered.

c.　**Limit Polarity**

Limit switch triggered by electrical level. Select "High", triggered by high level; select "Low", means triggered by lower level.

d.　**Control Signal**

Pulse+dir signal is valid to motor control.

e.　**Pulse Equivalency**

That means the quality of the pulse when axis moved 1m.

f.　**Cut Range**

Set the cut range according to the machine work area. The cut range is usually smaller than the machine work area.

g.　**Maximum velocity**

The maximum working velocity.

h. Start velocity

The first moving velocity at start point.

i. Maximum acceleration

The maximum acceleration is to limit the cut velocity and the jump velocity.

j. Jog acceleration

Emergency Stop acceleration

The acceleration is for the emergency stop, such as limit trigger, alarm trigger.

k. Write para

Save the parameters to the card.

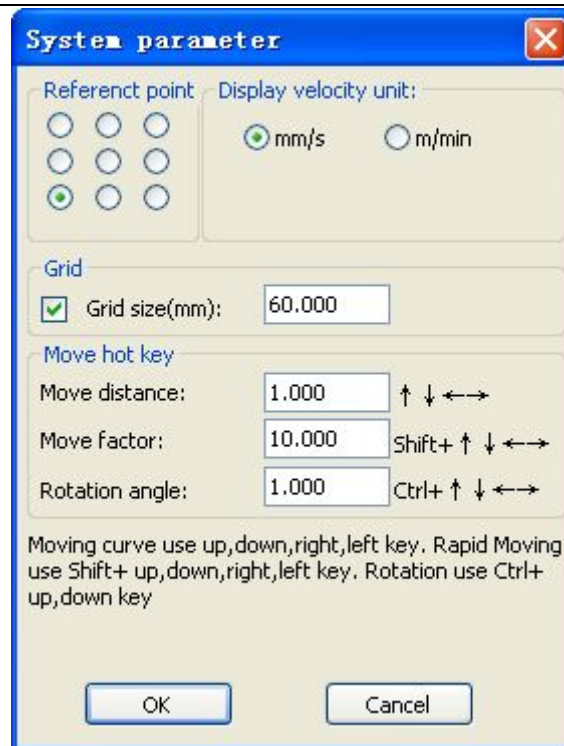### l. Read para

Read the parameters from the card.

m. Open

Open the file of .RDSet format, to set the parameters.

2. System parameter

System parameter is related to the VisionCut configuration.

Picture3-16 System parameter

a. Graphics Reference point

The point is set on the external rectangle of graphics outline. There are 9 points for that. If you select one, VisionCut will consider that the point is the graphics start point. The cutting process will happen from the point. If you changed the reference point, the green brick will display on the reference point.

b. Grid size

The distance of the grid in the display window can be set.

c. Move distance

User can use the up key, down key to move the select graphics to move up and down. The unit is set in the adjust distance column. User can use the left key, right key to move the select the graphics to move left and right.

d. Move factor:

If you want to move the graphics faster with the up, down, left, right key, you can set the adjust ratio. For example, if you set the adjust ratio to be 10, the unit of movement is adjust ratio*adjust distance.

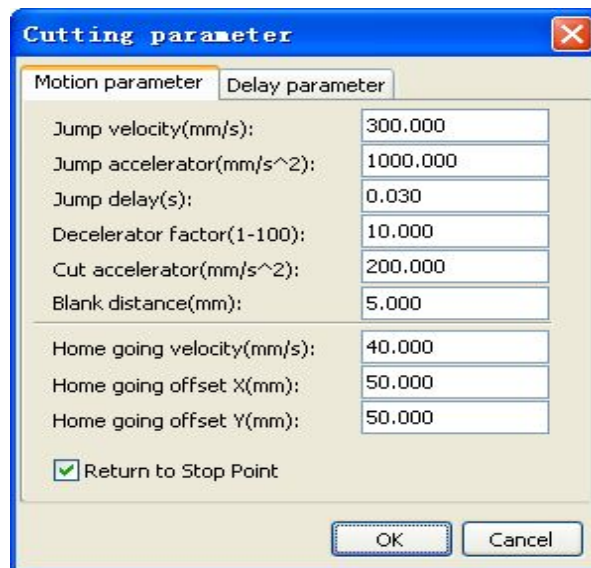You can press shift + up, shift + down, shift + left, shift + right to have a faster movement.

e. Rotation angle

When the adjust rotation angle is set correctly, you can use Ctrl+up, Ctrl+down to rotate the graphics.

3. Cutting parameter

The cut parameter includes motion parameter and delay parameter.

Motion parameter: the parameters related to movements, which can be set by user.

Picture 3-17 Cutting parameter

Jump velocity: moving velocity without laser emits.

Jump acceleration: moving acceleration without laser emits.

Jump delay: Delay for a period of time to wait for the machine stopped.

Decelerator factor: Bigger coefficient can cause, the faster end point velocity, but the lower process precision.

Cutting Acceleration: moving acceleration with laser emits.

Home going velocity: the velocity to back.

Home going offset: The offset to the home switch position.

Return to stop point: this option is to judge the laser head whether back to stop point after finished process.

4. **File Parameter**

When import a file, some parameters should be set. As shown in picture 3-18.

Picture3-18 File import parameter

PLT import dpi: When a PLT file is imported, the parameter should be set. The default is 1016 DPI.

DXF data unit: one data unit corresponding to the length unit when DXF file import,

Import text info. : Whether to import text information or not when import the DXF file.

6)   Menu--modify

Modify menu includes path optimization, sequence manually, data check, as showed in Picture 3-19.
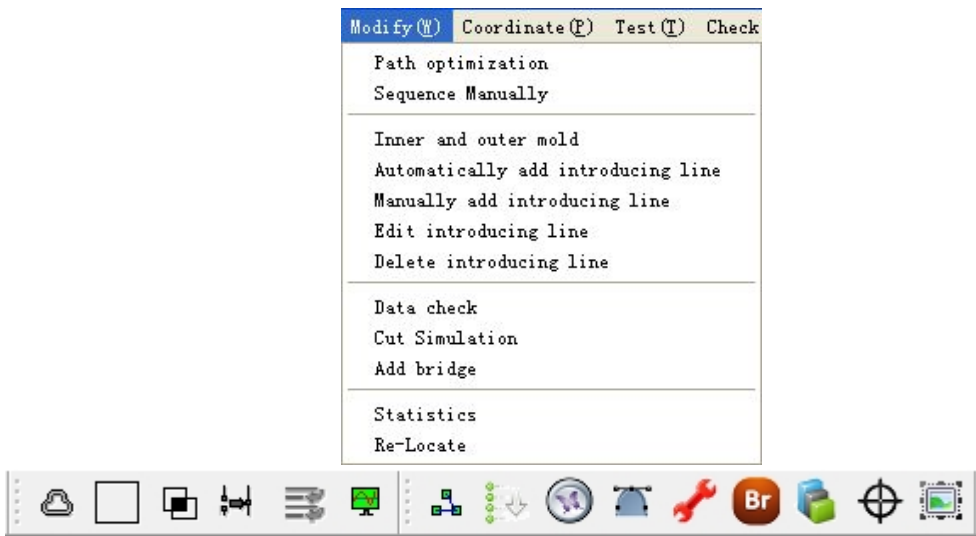
Picture3-19 Handle Menus

1.   Path optimization

According to the optimization conditions, the sequence of the graphics elements can be controlled as your wish. As showed in Picture 3-20.

Picture 3-20 Path optimizations

2. Sequence Manually

User can make the order of the graphics elements manually.

As shown in Picture 3-21.
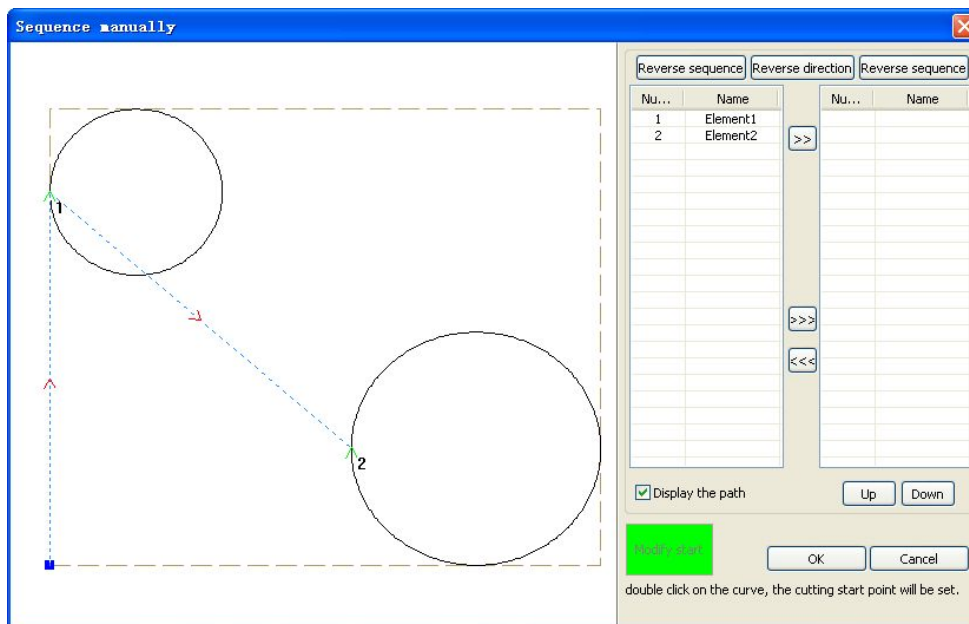
Picture 3-21 Making cut order manually

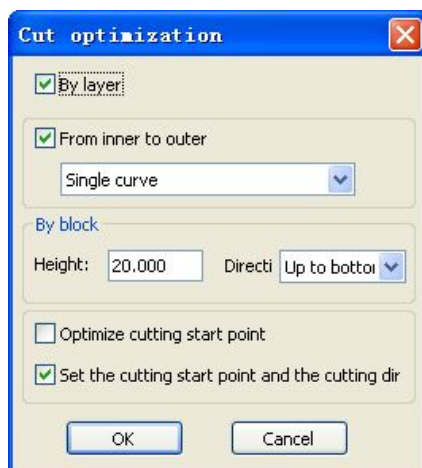When you opened the dialog, the graphics elements will display in the display window. The jump and cut path will be displayed in the window. The sequence of the graphics element described in Arabic numerals is displayed in the window too.

You can use the cursor to click on the graphics element. The element's name will be displayed in the right bar.

: to add the selected left graphics element to the right bar.

: to can add all the graphics elements to the right.

: to restore the entire graphics element in the right to the left.

Reverse sequence: to make a reverse sequence of all the graphics elements.

Reverse direction: to make a reverse cutting direction in one graphics element.

Using Up and Down can modify the element's sequence in the right bar.

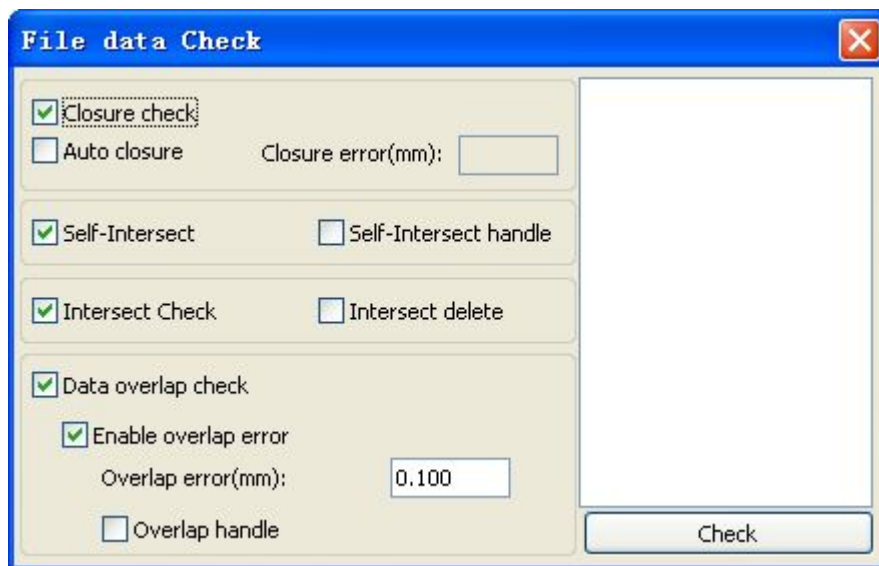Click `Modify start` , and move the cursor to the graphics polygon point, then double click the mouse; a new cut start point is generated. User can use the function to change the cut start point.

3. Data check

Data check includes close, intersect, self-intersect, overlapping. VisionCut can handle these incorrectly data automatically.

Picture 3-22 Data check

Closure check:

To check the graphics is closed or not. If the distance is less than the close error limit, VisionCut will close the graphics automatically.

Self-intersect check:

If a closed graphics is self-intersect, VisionCut will separate the graphics.

Intersect check：

To check the graphics is intersect or not. If there are intersections, VisionCut will automatically merge the intersection line.

Data overlap check：

To check the graphics is overlap or not. If overlapping, VisionCut will delete the overlapping lines.

Notice: this operation will make a closed graphics to be un-closed graphics.

7)   Menu--Test

Test function includes signal test, motion test, and Run frame.

As shown in Picture 3-23.
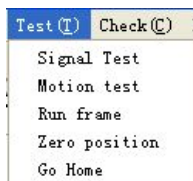
Picture 3-23 System test

1.   Signal test

The signal test can test the level status of the current limit switch and general input & output IO and set the output level. Test dialog is shown as picture 3-24.
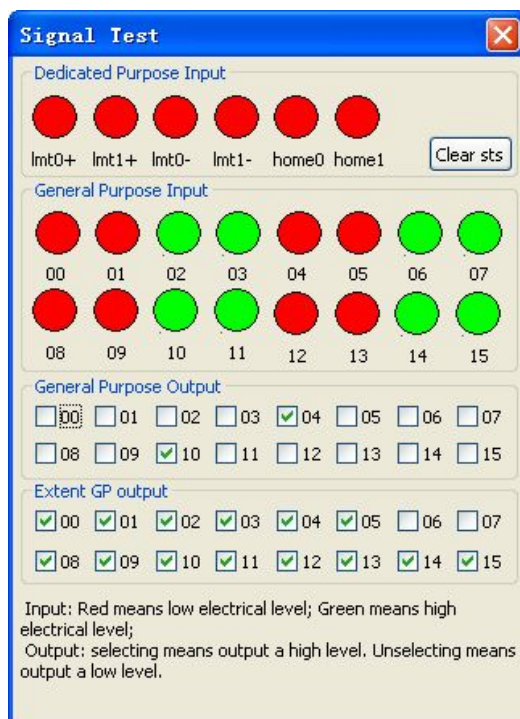
Picture 3-24 Signal test

2.   Motion test
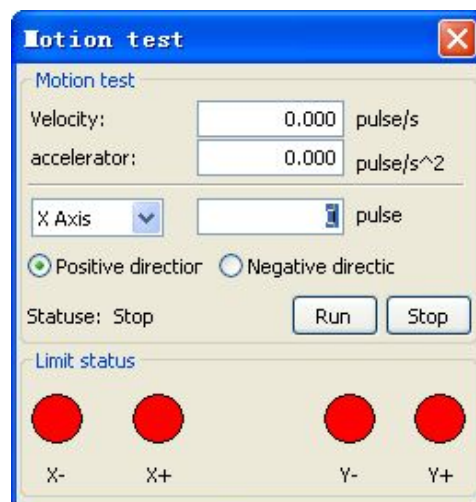
Picture3-25 Machine Test

User can test the machine motion at the first step. With this function, the negative and positive direction of the X, Y axis can be identified. The limit switch is triggered or not can be displayed in the dialog.

3.   Zero position

Set the current position to the origin position.

4.   Reset

The machine goes back to home switch.
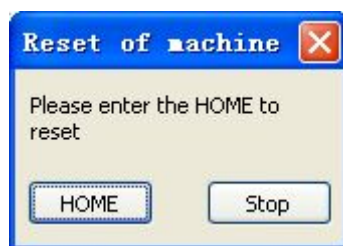
8)   Menu--Check

As shown in Picture 3-26.

Picture 3-26 Check option

9)   Menu--Help

As shown in Picture 3-27.
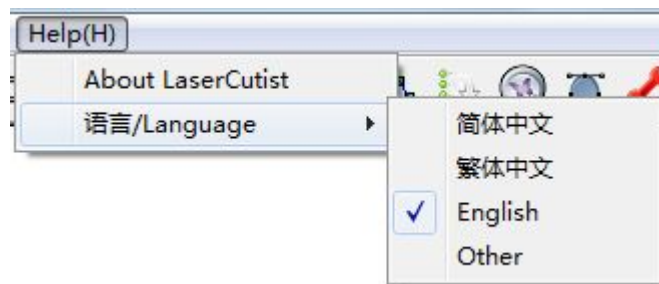
Picture 3-27 Help option

10)   Menu--position

This function just used for ordinary cutting for ensuring the locating point.
Absolute coordinate: take left bottom as original point, move the view area data into this area for cutting.
Current position: move the view area data into laser head current position for cutting.
Locating point: move the view area data into locating point for cutting.

3.3 Graphics Capture Area Introduction

Showed as below:
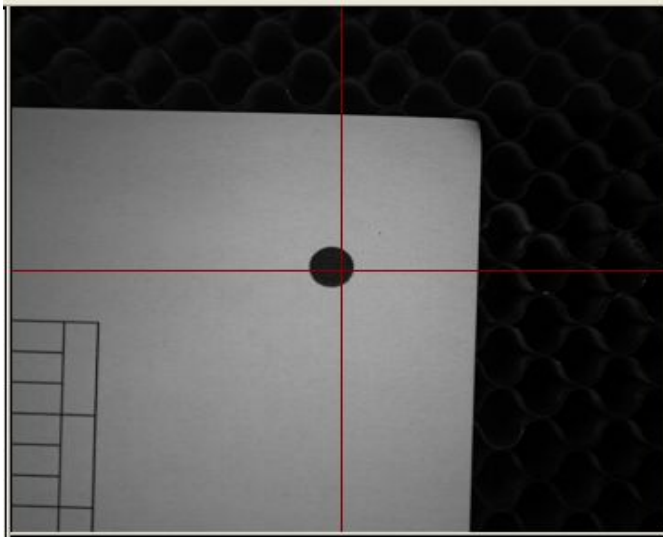
Picture 3-28 Graphics Capture Area

Mainly for real-time displaying the graphics captured. You can adjust size of the effective area when using it, rolling the mouse wheel can adjust the captured graphics.

3.4 Process Control Area Introduction

Process control area shown as 3-29, includes manual process and automatic process.
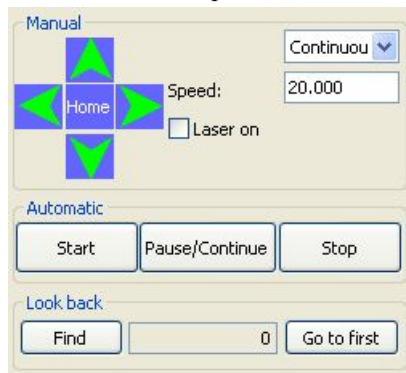
Picture3-29 Process control area

3.4.1 Manual Process

In this function, you can do machine test, inching, continuous moving and frame work.

a. Inching

The length of the inching is 0.01mm, 0.1mm, 1mm, 10mm, and 100mm. Also you can customize the distance.

b. Continuous moving

Pressing down the "up" "down" "left" "right" button can move the X, Y axis. Release the button

will stop the motion.

c. Speed

The motion speed when set manually.

d. Pulse power

The power when setting pulse.

e. Pulse

Press "pulse" to emit laser for dotting.

f. Speed ratio

Generally, the speed ratio adjustable range is 0% ~200%, if user wants to adjust it to make the feed speed more than the max. speed when system initialized, the controller take the max. speed as feed speed.

3.4.2 Automatic Process

a. Work control

Work control includes start, pause/continue, and stop.

b. Process the selected graphics

Select the selected process graphics.

c. Move the Z-axis to focus, and also can move Z-axis to fixed position.

d. U-axis control, to control the feed axis movement, also can feed automatically after processing.

e. Ordinary Cutting, cutting directory omitting vision

f. Whether blowing, blowing automatically when processing after checked it. And stop blowing process stopped.

g. Foot pedal

Press "foot pedal", the same as press "start" bottom.

3.4.3 Enable Effective Area

Green frame will be appeared when selected; only the green frame internal is effective.

3.4.4 Positioning

Take the current position point as processing start point.

3.4.5 Back to position point

The laser head backs to processing start point.

3.4.6 Process parameters

Double click the related layer to set the layer parameters.

图层	速度	输出	吹气	
	100.000	YES	吹气1	
	80.000	YES	吹气1	
	50.000	YES	吹气1	
	30.000	YES	吹气1	

Picture3-30 layer

Layer: Software distinguishes the graphics processing technology parameters from different layers. For scanning processing methods, multiple bitmaps in the same layer will as a whole picture output, if each bitmap output individually, it can be placed in different layer.

Is Output: 2 options: "yes" and "no". Choose "yes", the corresponding layer will output processing; choose "no", no output processing.

Speed: The processing speed corresponding to processing method.
For cutting processing, the slower speed, the better processing, the smoother track; the faster, the processing effects, the worse the track;
For scan processing, the slower speed, the more depth scanning at the same energy, the thicker scanning trace, and the scanning resolution also reduced.
The faster speed, the thinner depth scanning at the same energy, details distortion increased.
For dot processing, the main change is idle speed.

If Blowing: if the machine connected external fan, and fan has enabled, then if choose "yes", then this layer in data processing, will open the fan, otherwise, will not open the fan. If disable the fan, no matter choose "yes" or "no", that is meaningless.

The minimum / maximum power: the power values range is 0 to 100, which means the laser strong or weak in processing; big value, the laser is strong; small value, the laser is weak. Minimum power is less or equal to the maximum power.

Seal: The seal unclosed when cutting closed graphics, you can use seal compensation to close. But it will
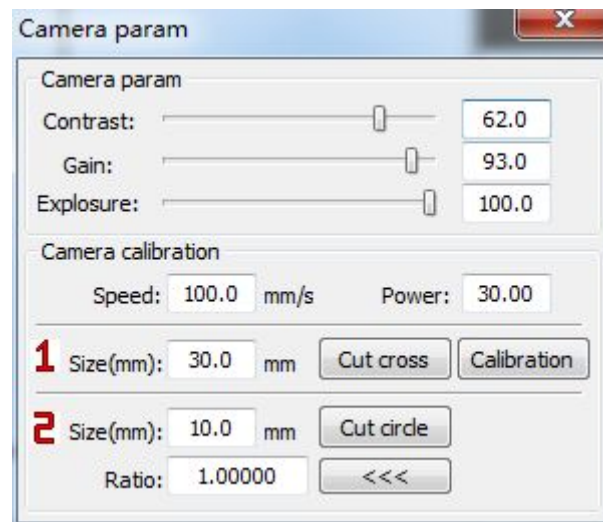
be failed if the seal is misplaced.

Laser turn-on delay: turn on punching time/ turn-on delay

Laser turn-off delay: turn off punching time/ turn-off delay

3.4.7 Camera parameters

    Click 【camera para】on the operation panel button, can appear the following camera parameters Settings dialog:

Picture3-31 camera parameter
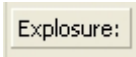
a. Camera parameter

The camera adjustment on the hardware mainly through adjusting the aperture and focal length to adjust the quality of the image, but which can't adjust freely after the camera is installed. Usually it is to adjust the ambient light.

The camera parameters adjustment in the software:

Contrast: Mainly through adjust the background color and contrast material color difference to fine image quality.

Gain: the brightness of the image magnification.

Exposure: the longer the exposure, the higher of the image brightness. Click Explosure: can perform automatic expose operation.

"Contrast", "gain" are both to deal with image data. So when image is in dim, firstly adjust the light source (lamp on the camera) and 【**Exposure**】, if still cannot get the desired effect, to adjust brightness,

contrast, gain.

b. Camera Calibration:

【Speed 】: In the process of camera calibration, laser head moving speed or when cutting cross or dotting.

【Power 】: The processing power when camera calibration.

【Cut Cross】: Click the "cross cutting", the laser will quickly cut a cross.
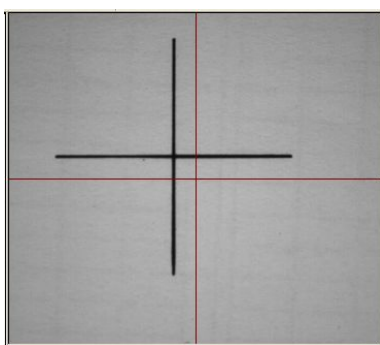
Picture 3-32 Cut Cross

【Camera Distance Calibration】: Cut a cross, then move the camera view cross center to coincide with the cross center, click "camera calibration". System will calculate the offset from camera view center to the center of the laser head.
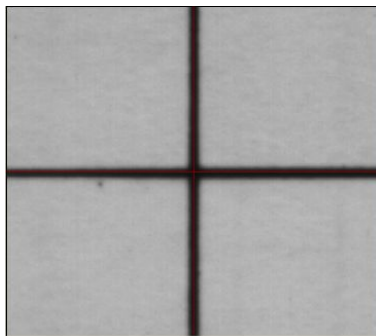
Picture 3-33 Camera Distance Calibration

After calibration, execute the second step to calibrate precision, cutting a circle as appointed, press "cut circle", the system will cut a circle on the platform and then matching test the circle size in the model parameters as below showed:
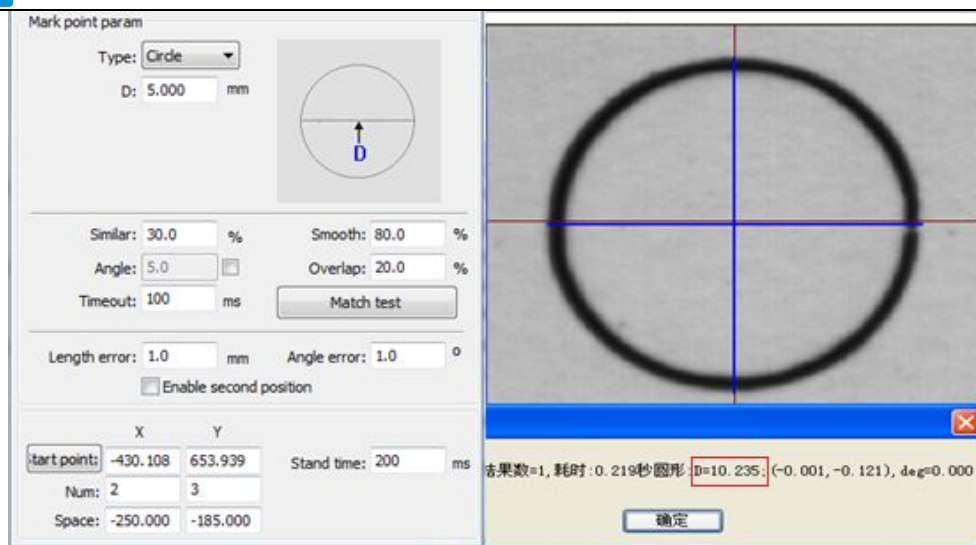
Picture 3-34 matching test to measure diameter

Click "<<<" to correct the pixel precision, fill the matching test result into Measuring Length Bar, then click "confirm", the system will confirm the proportionality coefficient automatically.
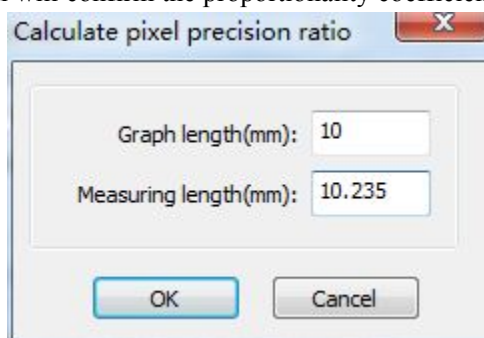
Picture 3-35 pixel precision ratio

3.4.8 Model Parameters

a. Mark Point Parameters

To choose the needed mark point types to make model, respectively supporting circle, cross, rhombus, circular ring, rectangle, square, and triangle. When making models please make corresponding parameters (diameters, width, and height) as pictures showed.

b. Model matching parameters

【Smooth coefficient】：The higher smoothing coefficient, the less scattered points of feature region be extracted.（Detailed Description please refer to chapter 5.2.3）.

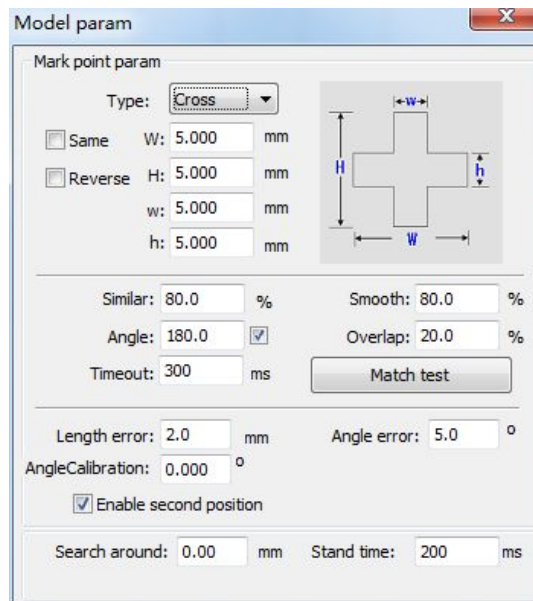【Similarity】：The matching score of model and actual graphic, the higher scores, the more similar. The similarity setting directly affects the matching quality.

【Overlap】：The overlap percentage of two target object envelope rectangular. This parameter controls whether targets can be identified when overlapping.

【Match Angle】：The model rotation and searching angle range. For example, the value set to 180°. In the matching process, the searching angle range is -180°~180°. To set the search angle according to actual needs. The larger searching angle, the longer matching time required. If the user does not need to set this parameter, and you should remove the option directly.

【Timeout】：When you set the parameter of 'Match num', you need to set this parameter to control

matching time. In process of matching, in order to avoid waiting for a long time or lacking of time to cause the failure of target image matching. This parameter is mainly affected by the model characteristics of complexity.

【Match test】: Match the current model and the target image of camera field view, test results will be returned as results-interface. When the matching results are not satisfied, adjust the similarity until the matching results satisfied.

c. Enable Secondary Positioning

After searching the target, not set this location coordinates as criterion, but moved to the target automatically, take photos again, and repositioned target location coordinates.

Distance offset / Angle offset: When two-point positioning, such as you might find more features when searching feature 2, according to the distance between feature 1 to feature 2, if found multiple features in the circle arc of feature 1 as origin, then as angle to distinguish them.

Note: But when the offset is set too small, missing cut will be happened. Generally distance offset can be set within 2mm, angle offset within 5°, such as the workpiece requires more accurately, you can set smaller.

d. Mark point identification settings
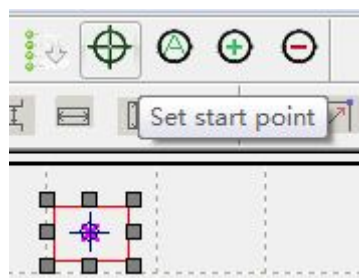
Support any point identification, which is fit for mark point cutting with different quantity. To choose the mark point in the view area, click ⊕ to set the starting point, and choose other mark point, click

to set. You can also click ⊘ to search all the mark points automatically.

e. Mark point searching path

Click the starting point to confirm the starting point coordinate, also can choose the mark point in the view area to click ⊕ to set the starting point.

The system will search the marking points starting from the closest other marking points.

Appendix 1

1. RDS3040G connecting to Panasonic Servo Driver

       control terminal blocks（CN2，CN3）   servo drivers terminal
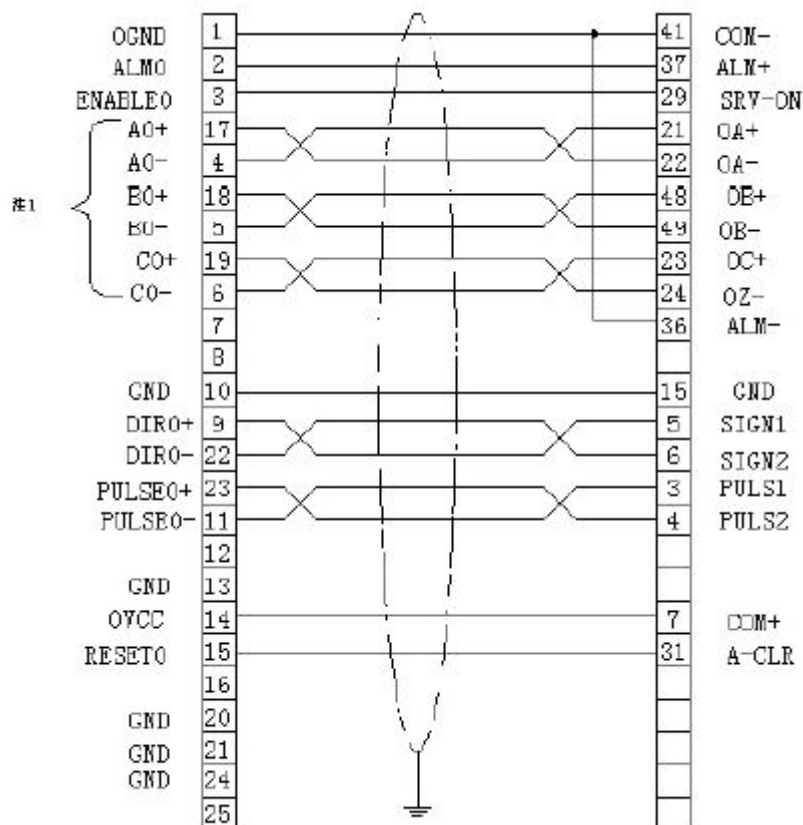
2. RDS3040G controller &YASKAWA SERVOPACK Connection Diagram

control terminal blocks（CN2，CN3）　　　　　servo drivers terminal
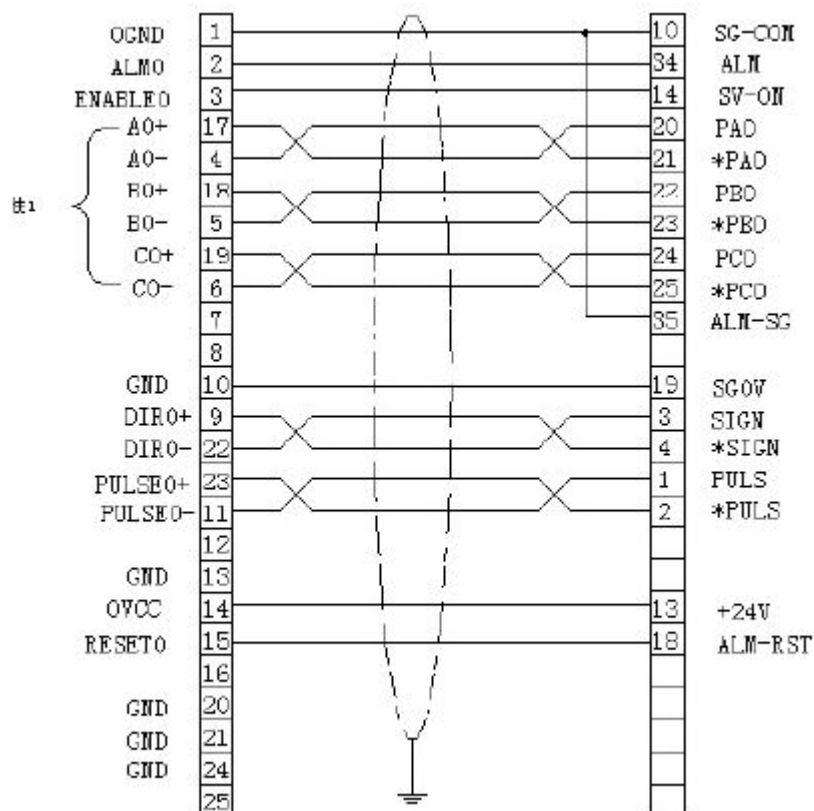
3. RDS3040G controller &YASKAWA SGDE Connection Diagram

control terminal blocks（CN2，CN3）   servo drivers terminal

OGND	1	10	SG-COM
ALM0	2	34	ALM
HNABLH0	3	14	SV-ON
	17		
	4		
	18		
	5		
	19		
	6		
	7	35	ALM-SG
	8		
GND	10	36	SG0V
DIR0+	9	3	SIGN
DIR0-	22	4	*SIGN
PULSE0+	23	1	PULS
PULSE0-	11	2	*PULS
	12		
GND	13		
OVCC	14	13	+24V
RESET0	15	18	ALM-RST
	16		
GND	20		
GND	21		
GND	24		
	25		
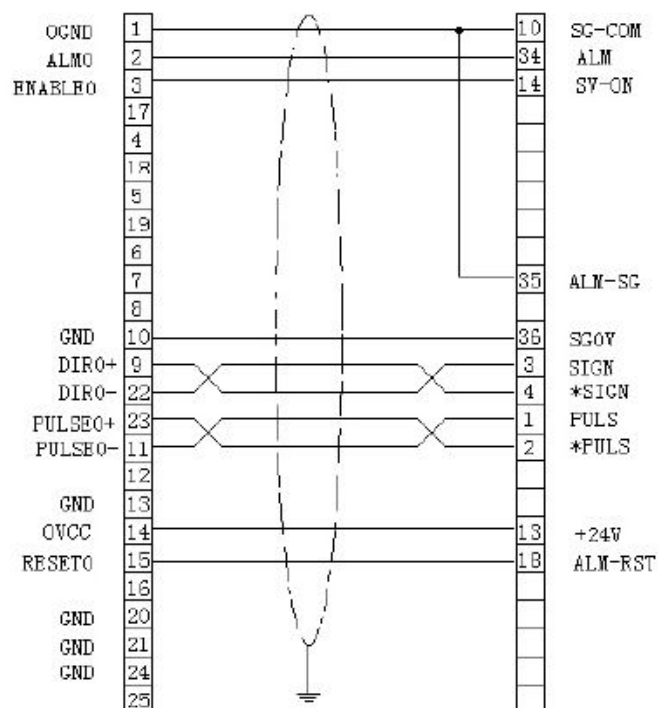
4. RDS3040G controller &YASKAWA SGDM Connection Diagram

control terminal blocks（CN2，CN3） servo drivers terminal

control terminal	pin		pin	servo terminal
OGND	1		32	ALM-
ALM	2		31	ALM+
ENABLE	3		40	/S-ON
	17			
	4			
	18			
	5			
	19			
	6			
	7			
	8			
GND	10		6	SG
DIR+	9		11	SIGN
DIR-	22		12	/SIGN
PULSE+	23		7	PULS
PULSE-	11		8	/PULS
	12			
GND	13			
OVCC	14		47	+24V
RESET	15		44	/ALM-RST
	16			
GND	20			
GND	21			
GND	24			
	25			
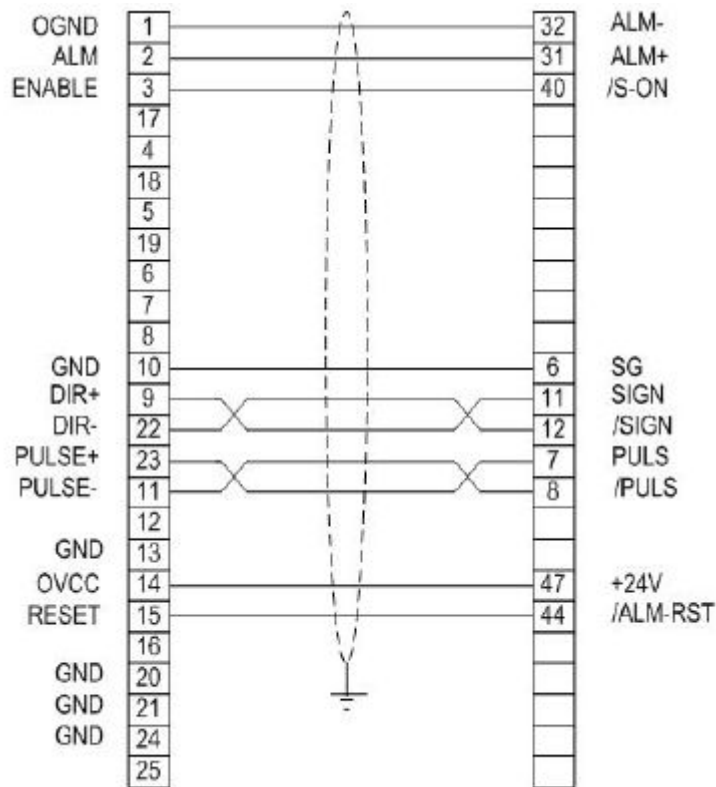
5. Controller & Mitsubishi MELSERVO-J2-Super series driver position control mode connection

control terminal blocks（CN2，CN3）   servo drivers terminal
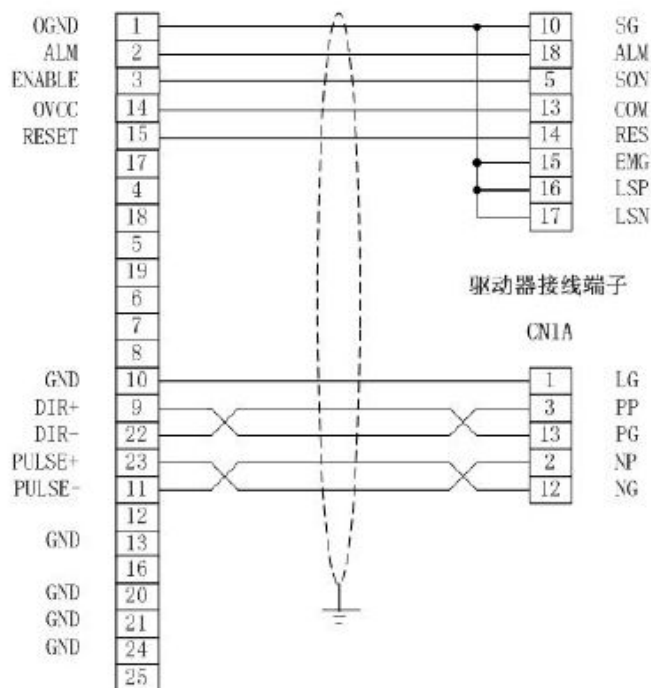
6. **Controller & Mitsubishi MR-E series Driver Position Control Mode Connection**

control terminal blocks（CN2，CN3）　　　　servo drivers terminal
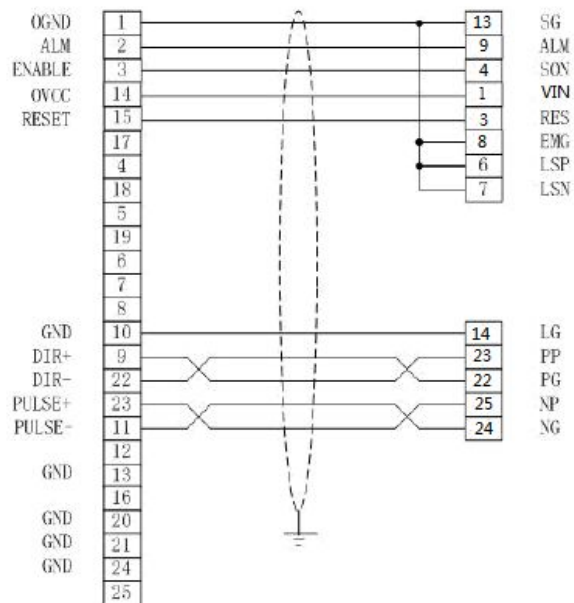
7.   Controller & SIMENS SINAMICS V80 Driver Position Control Mode Connection

control terminal blocks（CN2，CN3）   servo drivers terminal

OGND	1	7	MG
ALM	2	12	ALARM
ENABLE	3	6	ON/OFF
OVCC	14	5	+24V
RESET	15		
	17		
	4		
	18		
	5		
	19		
	6		
	7		
	8		
GND	10		
DIR+	9	4	PP
DIR-	22	3	PG
PULSE+	23	2	NP
PULSE-	11	1	NG
	12		
GND	13		
	16		
GND	20		
GND	21		
GND	24		
	25		
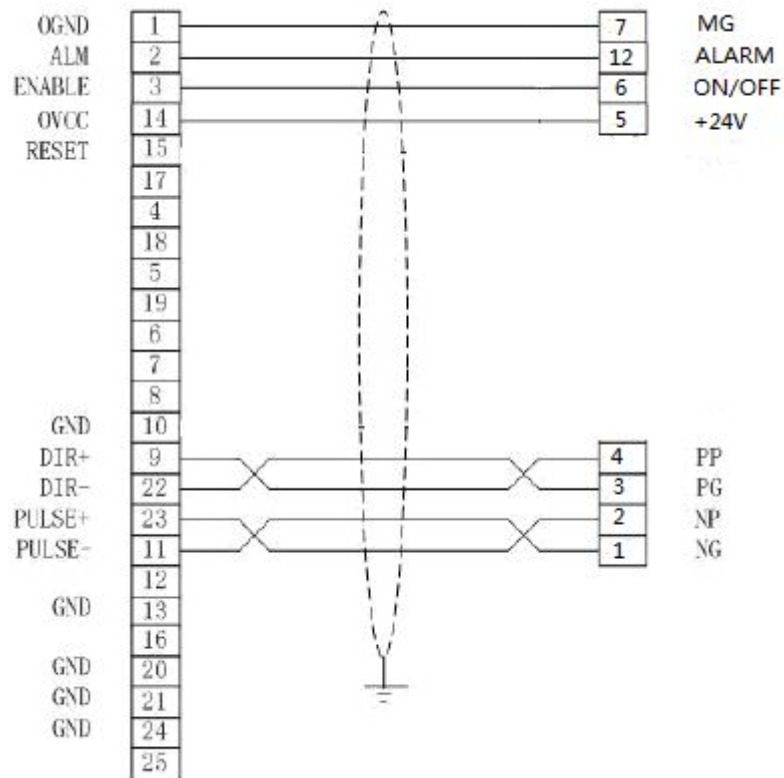
Appendix 2 Expansion Interface

OUT15 is blowing, IN3 is stop signal join-up, and IN11 is start signal join-up.

Appendix 3 CCD System Specification of Visioncut System

1. Electrical Connection

User must connect the lighting system according to this specification correctly. Lighting system consists of the following parts:

 LED ring lighting group
 drive plate
 light controller (with wire)
 folding cable for switching over
 mechanical mounting bracket (2 pcs)

Electrical connections are shown in Figure-1 below. Please correctly connect them according to the following strictly.
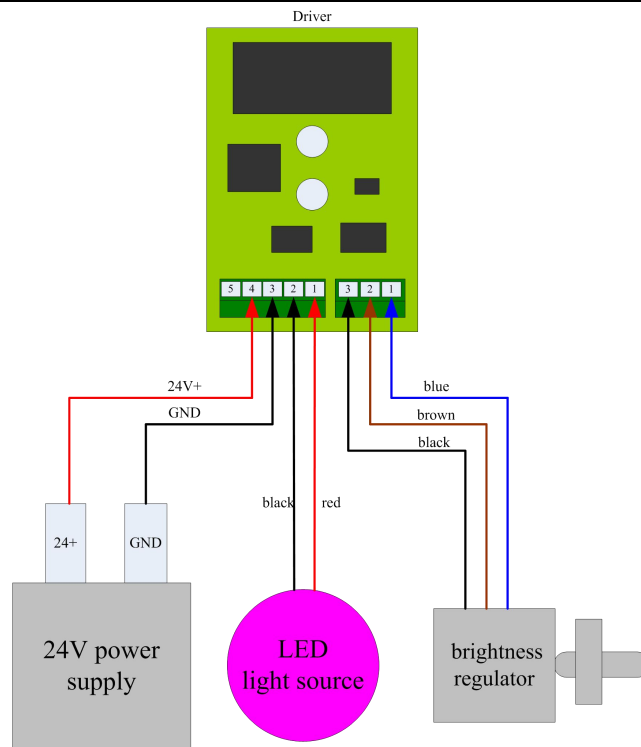
Driver

Figure-1 CCD lighting system electrical connection diagram

2. Brightness Control

Rotating light controller can adjust the brightness of the LED lighting, rotating the light controller counterclockwise until the voice of "pa" to close the LED lighting system; clockwise rotation, brightness will increase gradually

3. Camera and lighting system installation size

After installed the camera and lighting components, the component must be fixed to the machine, the size of the fixed plate as shown in the figure below.
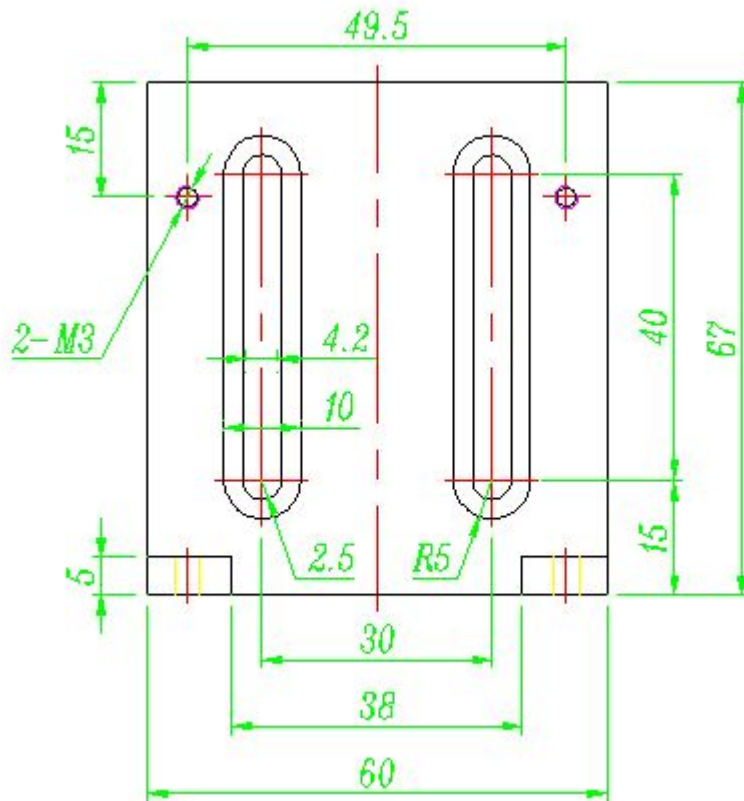
Figure-2 The fixed plate size

The two slotted holes in the middle of plate, suggested use six-head stud to fix them to the machine. You can adjust the height of the camera up and down through a rectangle slotted holes. The depth of sink groove is 2 mm.

4. Installation steps

The whole mechanical components includes the following components:

      camera

      camera fixed bracket

      light source

      light source fixed bracket

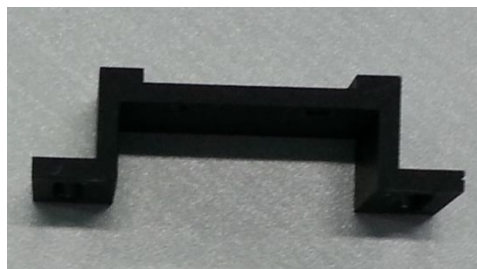Components as shown in the Figure-3/4 below:

      Figure-3 Camera   Figure-4 Camera Bracket

    First of all, fixed camera and camera bracket, fixed the mounting bracket on the back of the camera (labeled on the back).The camera just nested to the concave part of the mounting bracket. And keep the camera and mounting bracket perpendicularity, fixed with the matching M3 interior hexagon screws. After the installed, the picture as showed in Figure-5.

Figure-5 Camera components

Note: be careful during the installation process by all means, screw down the screws should be moderate, otherwise easy to damage the camera.

Second, light source and light source bracket, the light source and light source mounting bracket as shown in Figure-6 and Figure-7. In the process of installation, try to make bracket closing to the center of the light source circle part. So that ensure the camera is located in the center of the whole light source hole.
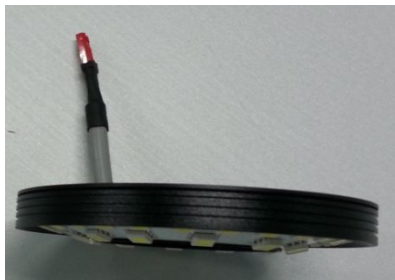

Figure-6 light source   Figure-7 light bracket

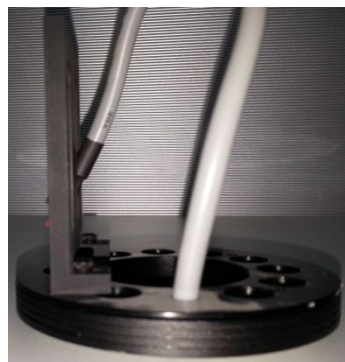After installed components, as showed in Figure-8.

Figure-8 Light source components

Light source components installation is completed, light source components installed in the proper place to X beam of cutting machine, keep the bottom edge of light source away from the cutting plane distance is about 125 mm. The height would be adjusted by sliding groove of light bracket.

Fixed light sources and bracket, you can install the component. There is a rectangular bar hole in camera mounting bracket for connecting to light bracket and installation, and light bracket has two mounting holes of the M3, connecting rectangular mounting holes of camera components and light bracket screw holes through screw. When installation, make the top of the strip-type holes of camera and mounting holes of light source aligned. As shown in Figure-9.If the user wants to adjust the distance between camera and cutting plane, the camera components installation has 10 mm allowance. You can adjust the up and down, but ensure the light does not affect the camera taking pictures.
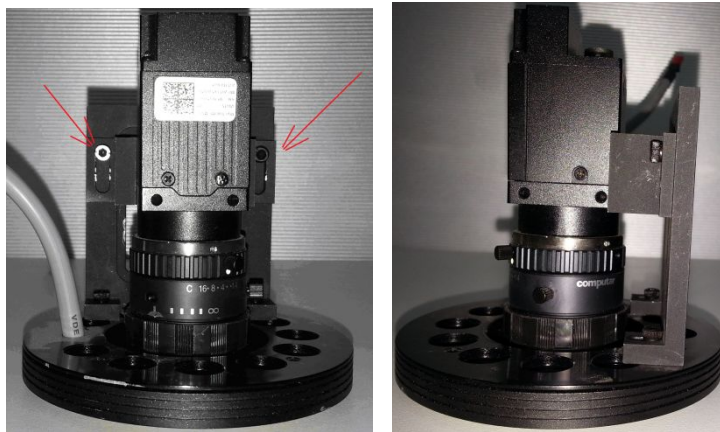

Figure-9 installation drawing of camera components and light components

Installed correctly or not, please refer to the conditions:

1. the camera is perpendicular to the cutting plane, that is, the camera on front and behind and left and right and direction is perpendicular to the cutting plane. If tilted, the user need to fine tune.

2. Camera lens is located in the center of the light source; make the lens is located in the center of the light hole. As shown in Figure-10.

If checked and meet the above conditions, then fasten the screw.

Figure-10 camera and light source bottom view

5. Camera parameter

When camera configured to 8 mm, the camera's field of view parameters shown as below for your reference:

Equipped lens with 8 mm

The field width (mm)	The camera height (mm)
80 x64	90
100 x80	109
120 x96	141
140 x112	163
160 x128	193
180 x144	218

Sheet 1 The height relation of field of view and camera

Remarks: camera height refers to the camera after lens installation, the distance between the bottom border edge of lens and cutting plane.

Thank you very much for using the product from Shenzhen RuiDa Technology!

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