Chapter 1 Introduction

Chapter 2 Installation and connection of the system

2.1 CNC-Router Configuration requirements

2.2 CNC-Router System installation

If you have installed an old version of cnc-router on your computer, you can also install new software directly, which will overwrite old files with new files. Note that performing such operations will overwrite all previous data, please note the backup of the data.

The cnc-router system includes two parts: computer software and motion control card, so the installation of the system is divided into two parts: the installation of computer software and the installation of motion control card.

2.2.1 Computer software installation

The installation process of the computer software is as follows:

(1)   First, get the latest version of cnc-router computer software from the manufacturer or agent, copy the installation files to the computer to be installed;

(2)Find the computer software installation package for the cnc-router system in the copy destination folder. The following number is version code, if you have more than one version of the installation package, please install the latest version;

(3)Double-click the icon to start installing computer software, which will pop up a verification window, password provided by the manufacturer or dealer. As shown in figure 2.2-1:
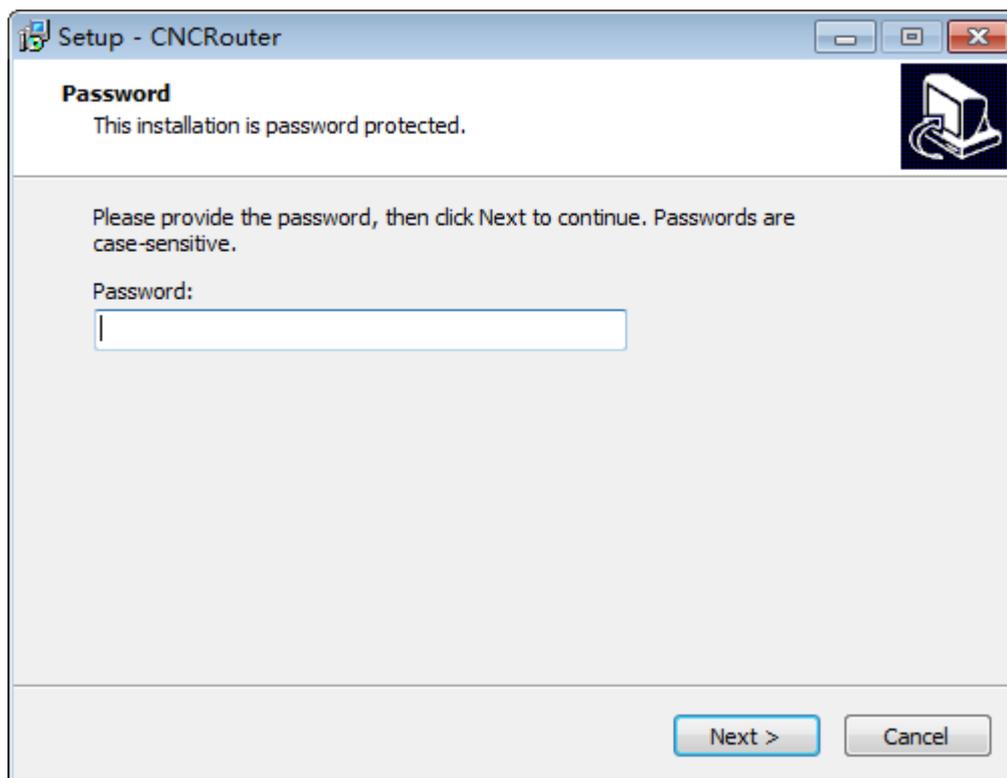

Figure 2.2-1

(4)After entering the password, click next. The installer will pop up the installation destination prompt dialog box, as shown in figure 2.2-2
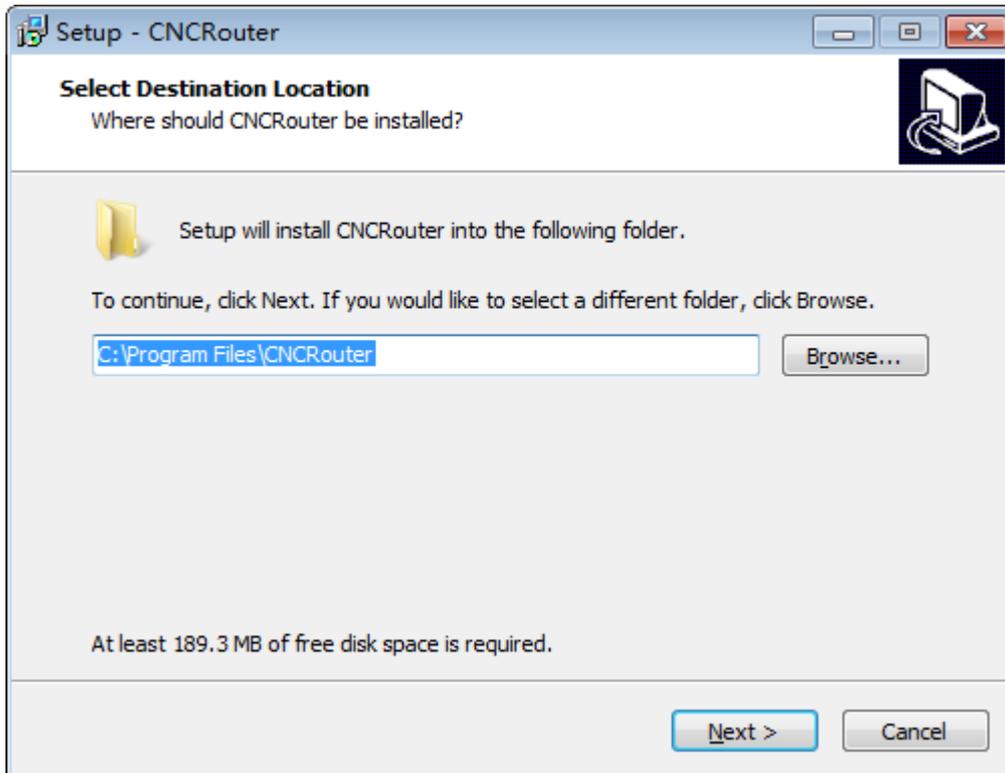

Figure 2.2-2

⑸ Click next, setup prompts to select additional taskbar, in this dialog box you can choose whether to create desktop shortcuts, the program is created by default, you can click uncheck not to create shortcuts as shown in figure 2.2-3:
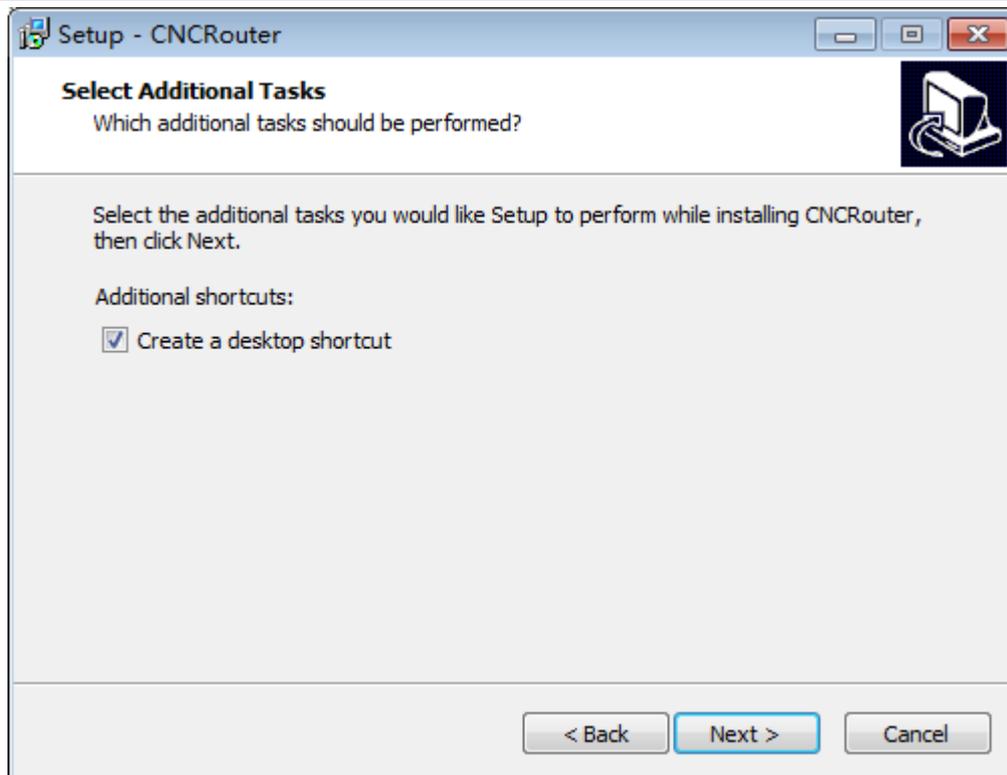
Figure 2.2-3

(6)Click next, the program is ready to install, and the dialog box pops up, as shown in figure 2.2-4:
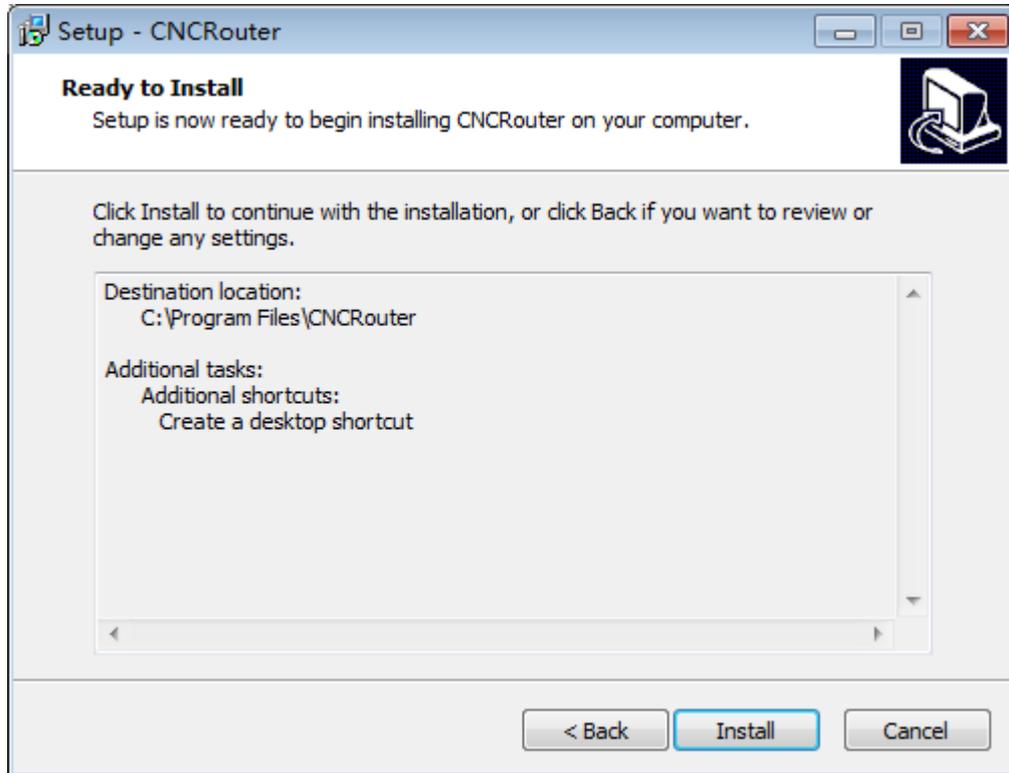
Figure 2.2-4

(7)Click the install button, cnc-router computer software starts installation, will show the installation progress, if you need to cancel the installation, can click the cancel button. As shown in figure 2.2-5:
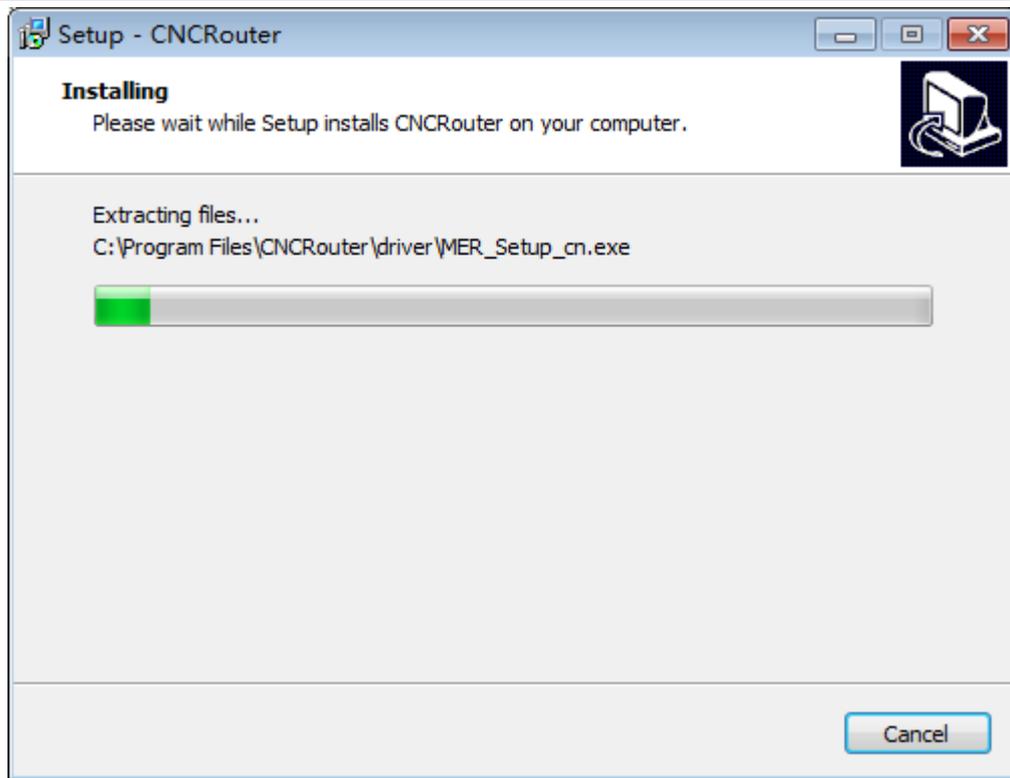
Figure 2.2-5

(8)After waiting for the installation to complete, a dialog box appears that prompts the installation runtime, using the environment necessary to install the software, as shown in figure 2.2-6:
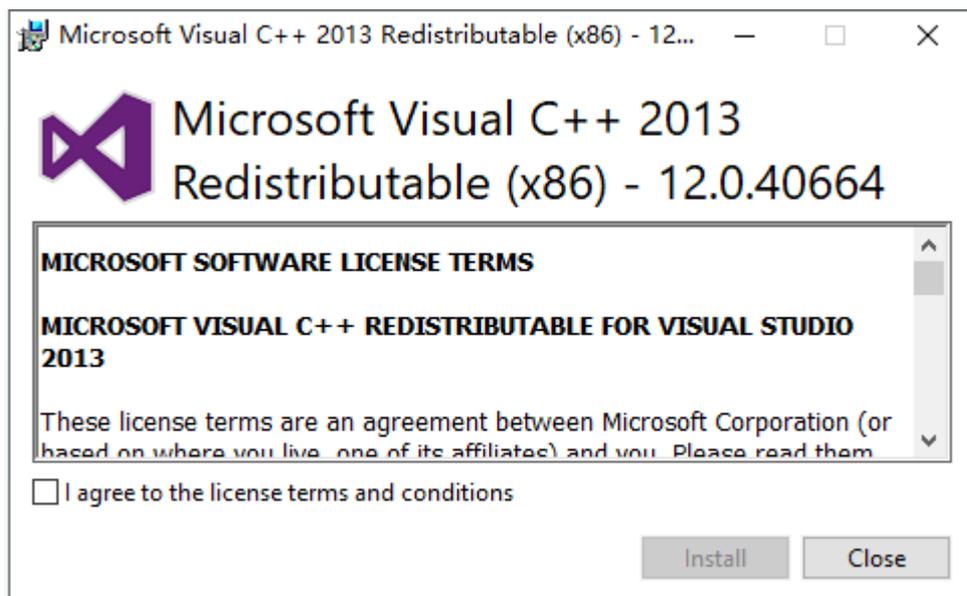

Figure 2.2-6

(9)Click next to install. A dialog box to select the installation component pops up.

(10)Click next to start installation.The progress bar shows the progress of the installation. As figure 2.2-7 below.
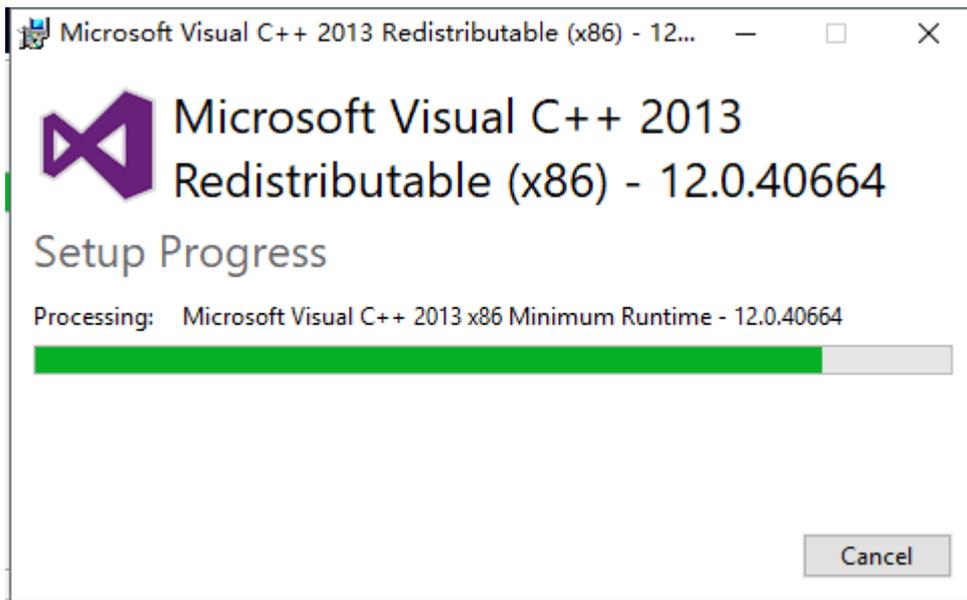

Figure 2.2-7

(11)When firmware library installation is complete, the complete installation dialog box will pop up, click finish, the firmware

library installation is complete. As shown in figures 2.2-8:
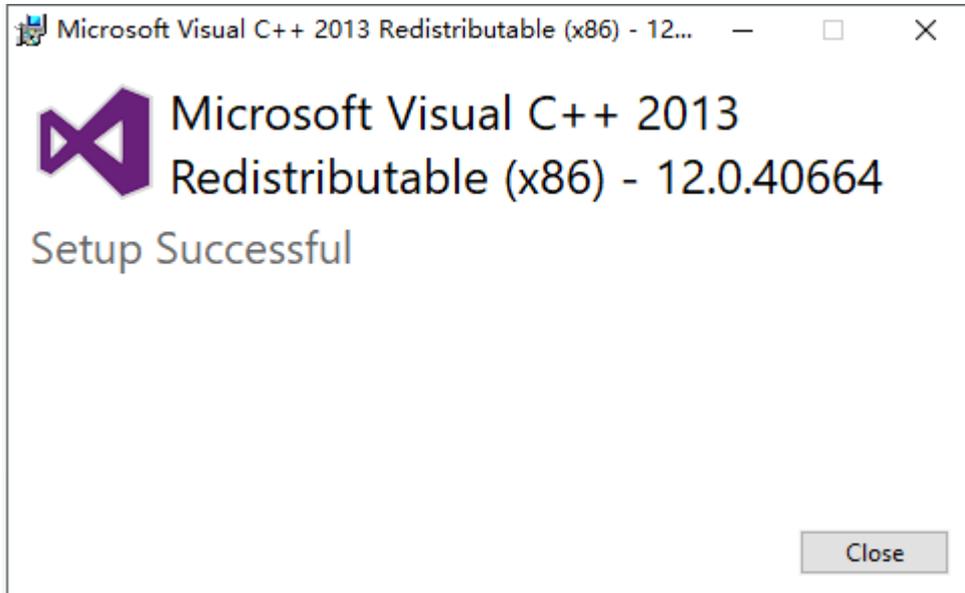
(12)Click complete, finish the installation of the runtime, because the system supports CCD processing, need to install the camera driver, the next program will automatically start the camera driver installation, pop-up camera driver installation wizard. As shown in figures 2.2-9:
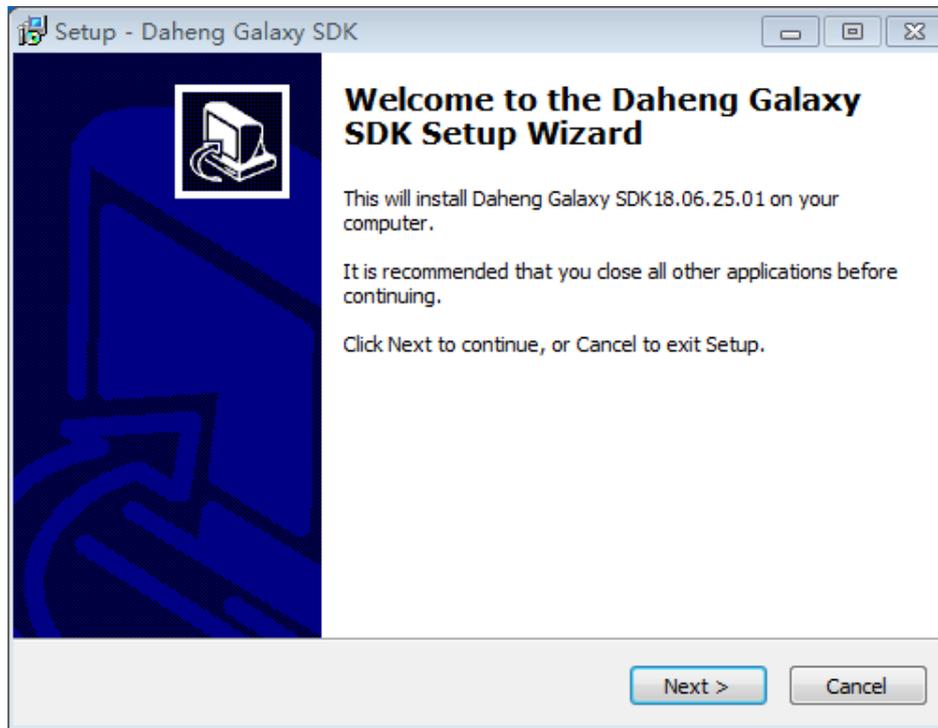
Figure 2.2-9

(13)Click next, continue installation, start camera-driven installation. As shown in figure 2.2-10:

Figure 2.2-10

9
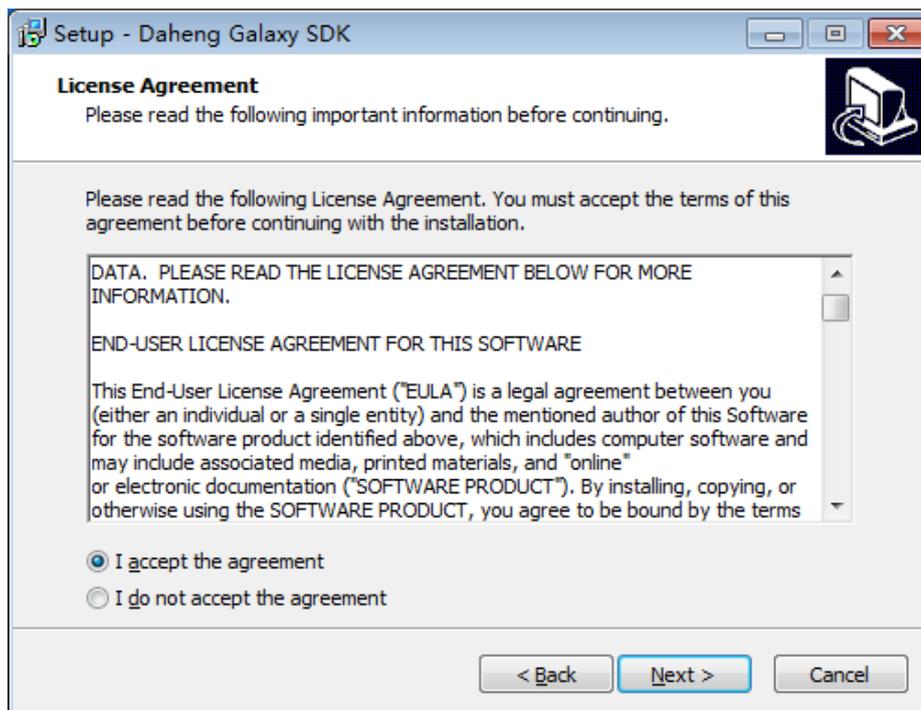
(14)Click next, continue installation, select camera-driven installation directory, recommend using the default directory. As shown in figure 2.2-11:
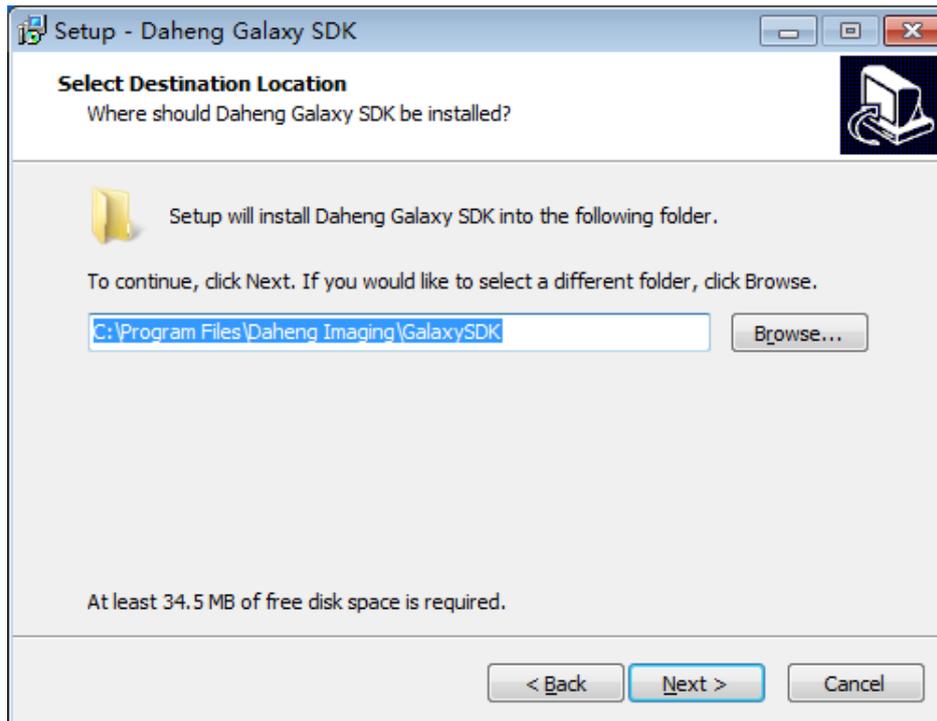
Figure 2.2-11

(15)Click next to continue the installation and select the components you want to install. As shown in figures 2.2-12:
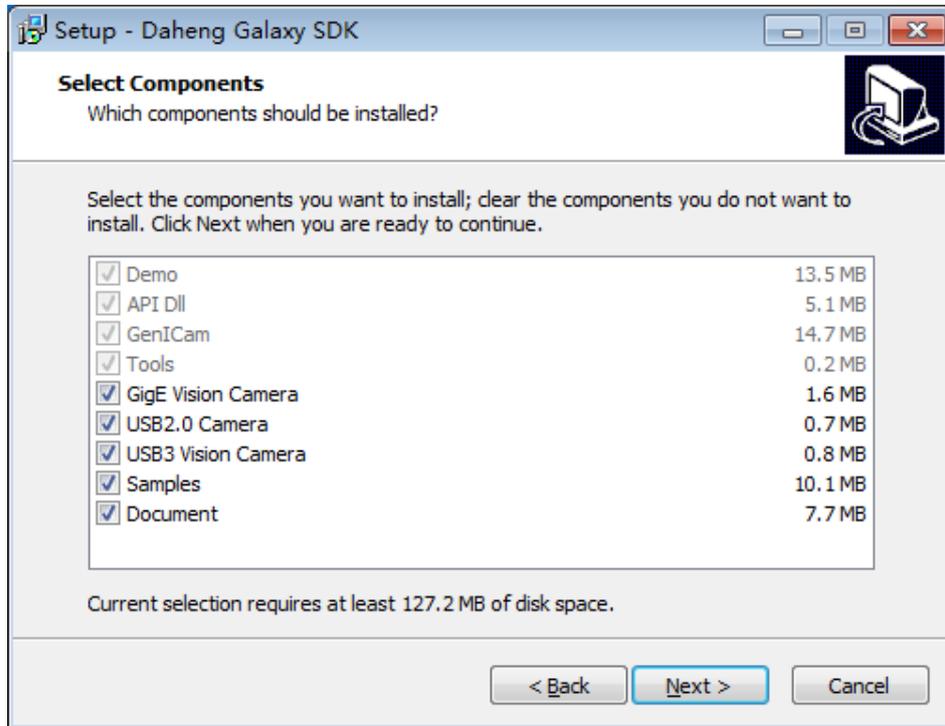
Figure 2.2-12

(16)Click next，Select the installation directory for the program shortcut. As shown in figures 2.2-13:
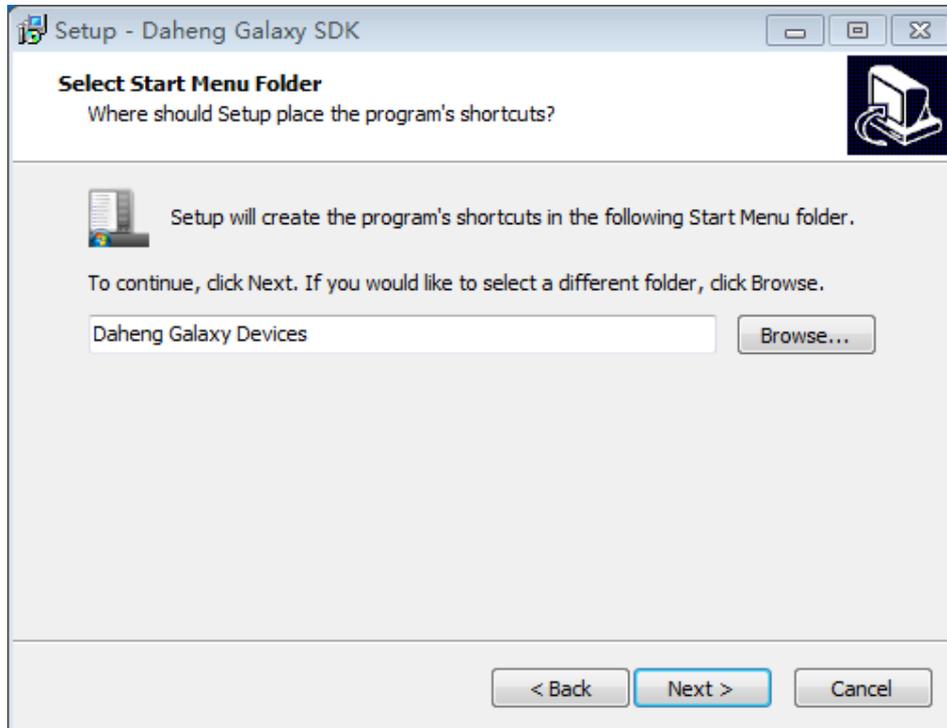
Figure 2.2-13

(17)Click next to select whether to create a left-hand shortcut to the driver, as shown in figure 2.2-14
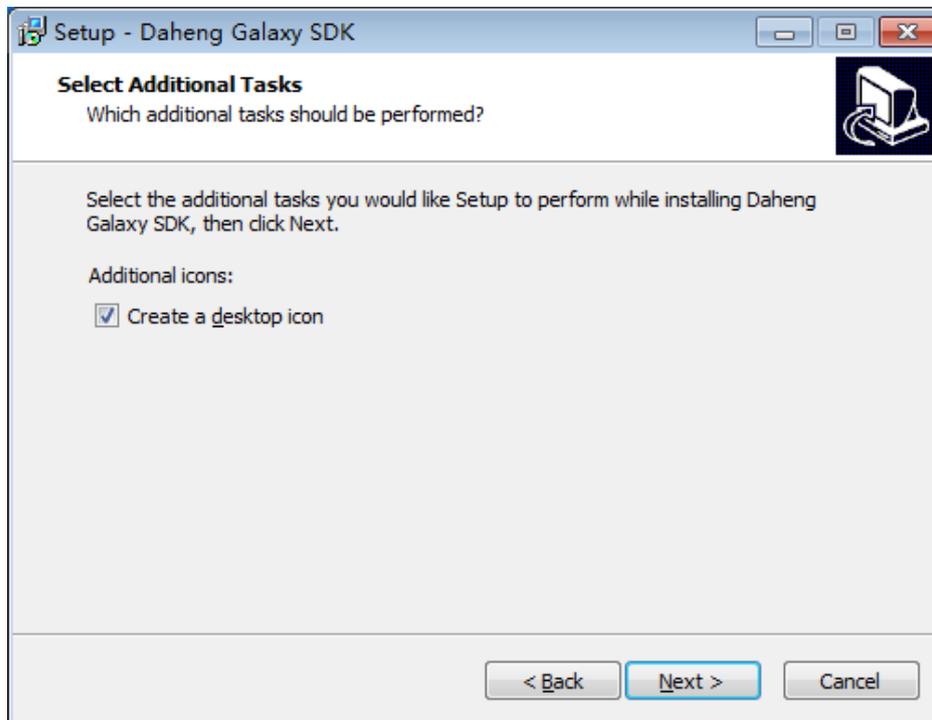
Figure 2.2-14

(18)Click next and prompt for installation. As shown in figures 2.2-15:
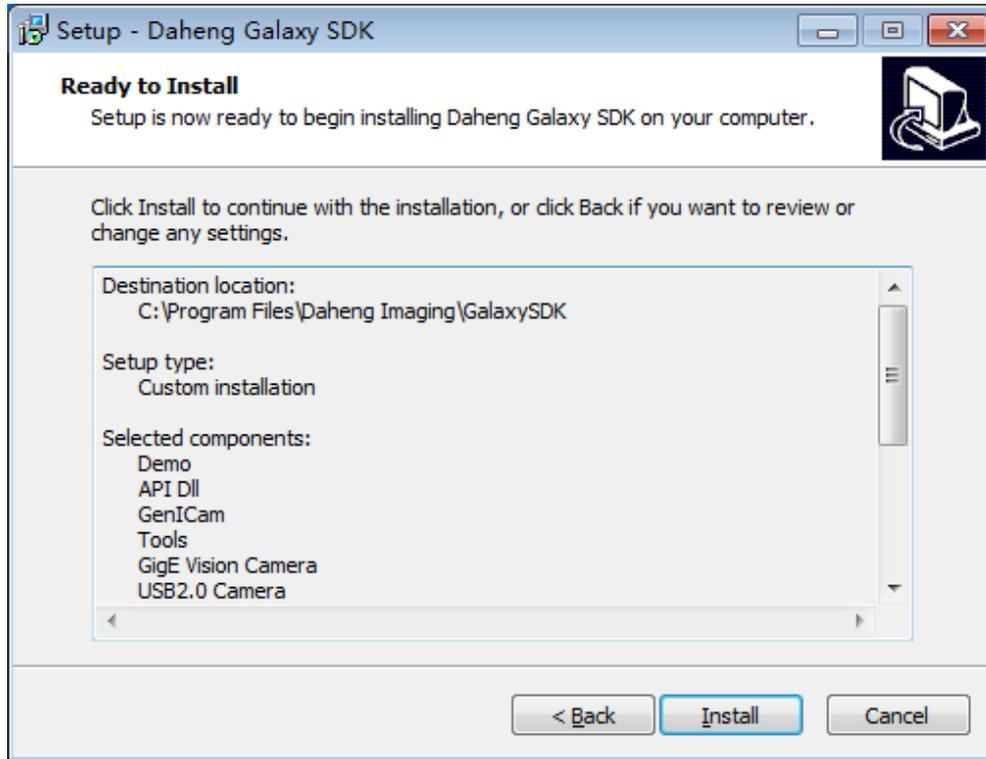
Figure 2.2-15

(19)Click on installation, you can learn progress according to the installation progress bar. As shown in figure 2.2-16 ：
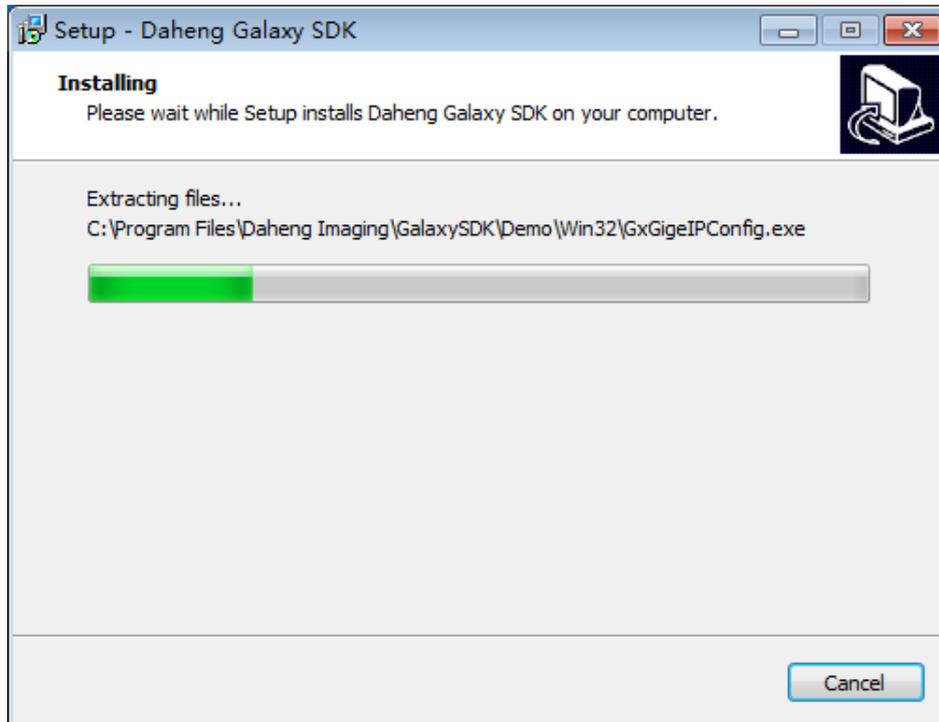
Figure 2.2-16

(20)Wait for the installation to complete, after the installation will pop up dialog box, click finish, complete the camera-driven installation. As shown in figures 2.2-17:
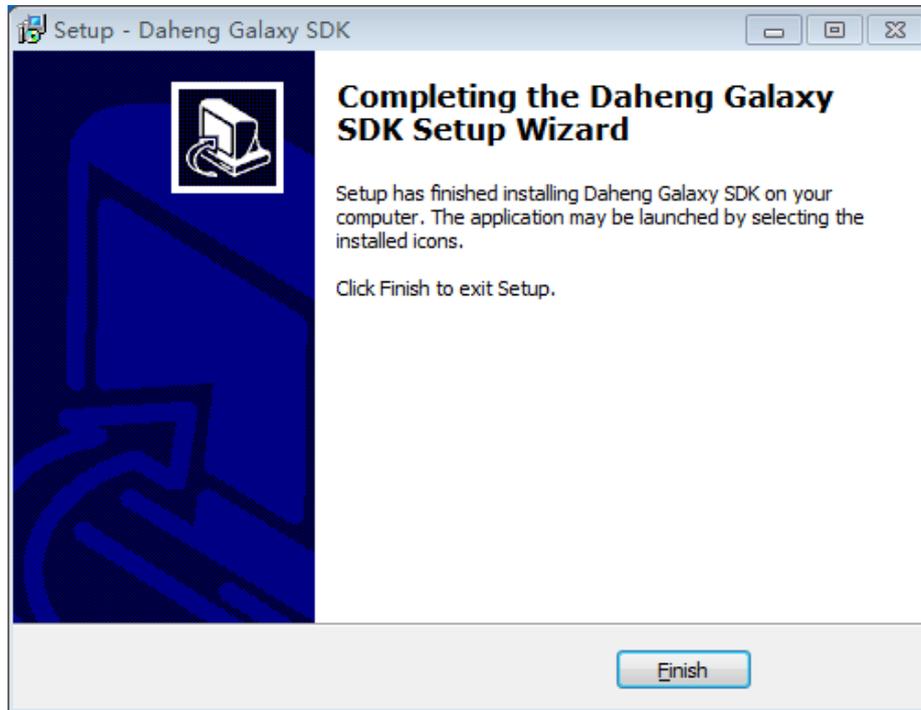
Figure 2.2-17

(21)After the driver installation is complete, you will be prompted for reboot. You need to restart your computer before you can use your camera properly. Click complete and restart the computer.

2.2.2 Motion control board installation

After the installation of computer software of cnc-router control system, it is necessary to install the motion control board card. The motion control board card of cnc-router system is connected with the computer through the network cable, thus realizing the communication and achieving the purpose of controlling the movement of the machine.

Connect each signal line of board card to the corresponding position of motor and machine, pay attention to connection quality and prevent the phenomenon of poor contact. The wiring diagram is as follows.

2.2.3 Upgrade of motion control card program

2.2.4 CNC-Router Unloading of control system

Chapter 3 Interface introduction

3.1 software interface

CNC-Router software consists of title bar, menu bar, status bar, function selection bar, drawing toolbar, display area, file information area, display area, machine tool control bar. As shown in figure 3.1-1:
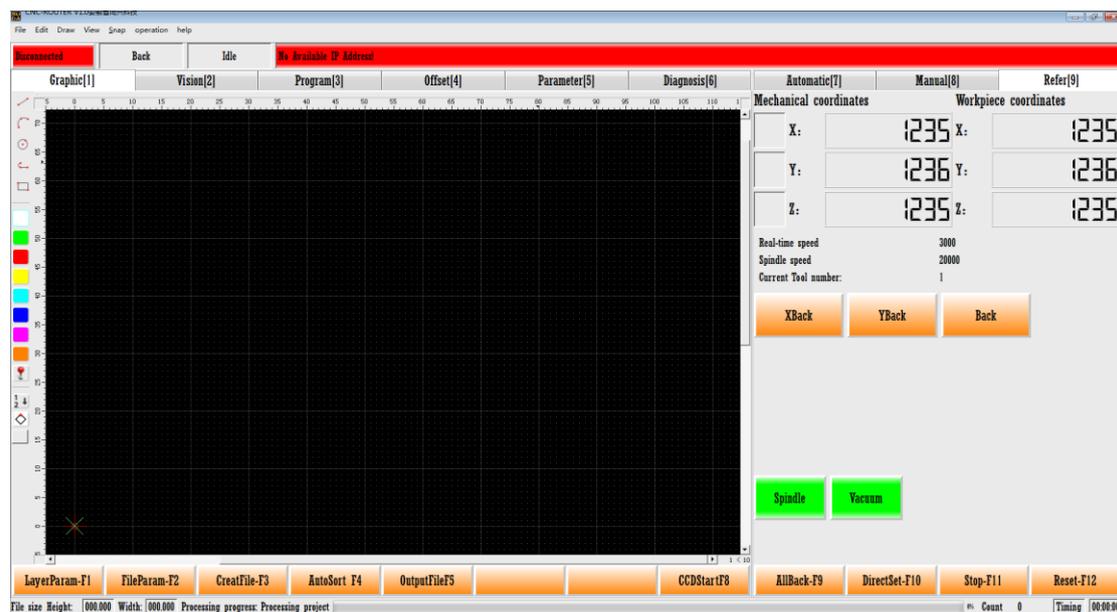
Figure 3.1-1

Menu bar: includes file, edit, draw, view, capture, action, help options to accomplish different tasks

Status bar: used to display the current status of machine tools, including network connection status, processing status.

Window selection: includes graphical display, visual, program, offset, parameter, diagnosis, automatic, manual, reference point function interface selection. Select different windows according to different operations.

Drawing tools: after loading the graphics file .JPG; .DXF, you can use the bar tool to make simple picture modifications. Includes straight line, arc, circle, multi-terminal line and rectangle drawing.

Layer selection: a file can be divided into multiple layers, the entire layer of the file for a unified modification, this area also contains the selection of mark points.

Processing options: including sorting, starting point, compensation options function selection area: select different serial port will have different function button, click button to operate.

File information: display the basic information of the file, in loading and other operations, according to the progress bar to understand the progress of work.

Machine tool control bar: including automatic, manual, reference point

three functional windows. Choose according to your needs. Each

window displays information about the location of the shaft signal.

3.2 Menu list

Edit

↺	Undo	Ctrl+Z
↻	Redo	Ctrl+Y
✏	Delete	Del
✂	Cut	Ctrl+X
⧉	Copy	Ctrl+C
⧉	Paste	Ctrl+V
	Escape	Esc
	Select Layer	▶
⟋	Mirror	M, I
⟋	Offset (with Distance)	O, F
⚘	Divide	D, I
◣	Explode	X, P
	Bridge	B, G
⌐	Round	R, N
	Delete Duplicates	D, D
⟲	Rotate	
	Array	
	Expansion	

File

☐	New	Ctrl+N
	GCodeLoad	
	GCodeUnload	
	JPGOpen	
📂	Open DXF/AI/PLT	Ctrl+O
➡	ImportFile	Ctrl+Shift+I
💾	Save	
💾	Save As...	
	Exit	Ctrl+Q

Draw

	Line	▶
	Arc	▶
⊙	Center, Point	C, I
	Polyline	▶
	Shape	▶
A	Text	T, E

View

🔍	Zoom In	+
🔍	Zoom Out	-
🔍	Auto Zoom	Z, A
⊕	Pan Zoom	Z, P
⌕	Reset	Q, Q
▦	Grid	G, R
☰	Property Editor	
✔	RapidRoad	
✔	WorkNumber	
✔	Direction	
✔	StartPoint	
⟍	Distance Point to Point	I, P

Snap

+	Snap Free	S, F
Auto	Snap Auto	S, A
+	Restrictions Off	E, N
⟷	Restrict Horizontally	E, H
↕	Restrict Vertically	E, V
✛	Restrict Orthogonally	E, O

operation

X Back to Reference Point	
Y Back to Reference Point	
Z Back to Reference Point	
All Back to Reference Point	
Start	F9
Breakpoint Resume	F10
Stop	F11
Select Processeing Block	
Reset	

help

about

Chapter 4 Basic operating process

```
┌─────────────┐     ┌─────────────┐     ┌─────────────┐
│  Back to    │ →   │ Inpout File │ →   │Check and edit│
│mechanical zero│   │             │     │    files    │
└─────────────┘     └─────────────┘     └─────────────┘
┌─────────────┐     ┌─────────────┐     ┌─────────────┐
│Process setting│ → │ Turn on the │ →   │  Machining  │
│             │     │camera and set│    │   control   │
└─────────────┘     └─────────────┘     └─────────────┘
```
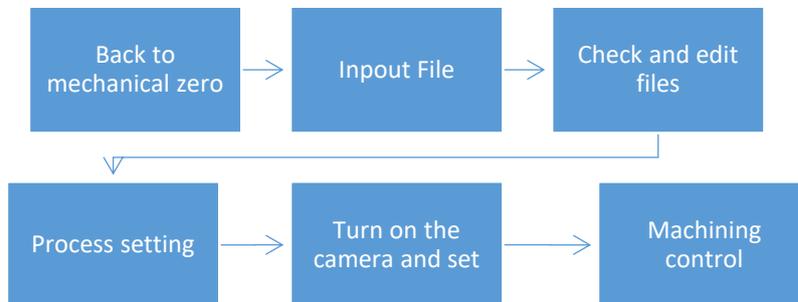
4.1 Return mechanical zero

To return the mechanical zero, we need to set the axis direction, pulse equivalent and rough orientation direction first, and refer to the software in detail. Click the reference point button in the upper right corner of the control bar of the machine tool interface to return to the mechanical zero   Refer[9]   Then click all the back to zero buttons in the lower left corner of the machine tool control bar   AllBack-F9   , Machine tools begin to return to mechanical zero, waiting for zero back to finish. When the mechanical origin is confirmed to be successful, the mechanical origin sign will appear in front of the corresponding shaft ⊕。
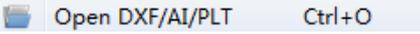
When the user ensures that the mechanical coordinate of the current position is consistent with the actual mechanical coordinate of the machine tool, for example, the machine tool has not been shut down and has not happened the abnormal situation such as tight stop, the

user can click the **DirectSet-F10** button and directly set the current mechanical coordinate as the exact machine coordinate. When this is done, the front of the shaft on the machine tool control bar will also appear as a marker that will complete the mechanical origin。

4.2 Import file

Cnc_router system supports image editing, can directly import. Jpg and. Dxf files. After importing the file, the software will automatically extract the contour of the graphics and display it in the display interface. Click the File button in the menu bar File, Click the JPGOpen button in the pop-up dialog. After that, the file selection interface will pop up, the folder location of the file will be opened, the file will be double-clicked, and the software will automatically recognize the contour of the graph, that is, the machining path, and project and display it in the window.

In addition to importing JPG files, you can also open previously edited files to improve productivity. click Open DXF/AI/PLT   Ctrl+O pop up dialog box,Select folder. Select the previously edited and saved file, the contents of which can also be displayed in the window.

4.3 Review and edit documents

This part is mainly related to drawing tools, layer selection interface, machining selection of three toolbars. Drawing tools can be used to draw straight lines , arcs , circles , multi-terminal lines and rectangles ; the layer selection interface can select the parameters of each layer to meet the requirements of machining multiple different parameter products at a time. CNC-Router provides 7 layers to choose from. The mark points can be determined at the layer selection interface, and the mark points are needed to be processed normally in CCD processing. You can select the image profile in the window, and then click the graphics selection window on the left to determine which layer the product belongs to.

4.4 Process setting

When processing multiple products, the software automatically sorts. If the user needs to change the order of processing, you can click the button. Next to the mouse, there will be an additional number with a circle, starting at 0, and then using the mouse to click on the first workpiece. At this point, the workpiece becomes the first workpiece to be processed, and the workpiece with a number next to the mouse becomes 1. 5%. Click on the next piece you want to process, and the

order is second. And so on can complete all the job processing order of

the order. In the process of reordering, the software will automatically

plan the processing path.

Click on the start button ◇ in the processing selection bar to

customize the workpiece from that point to meet the needs of some

situations. Select the workpiece and click the compensation button in

the processing selection bar to set the compensation parameters. The

box body is shown in figure 4.3-1:

Figere 4.3-1
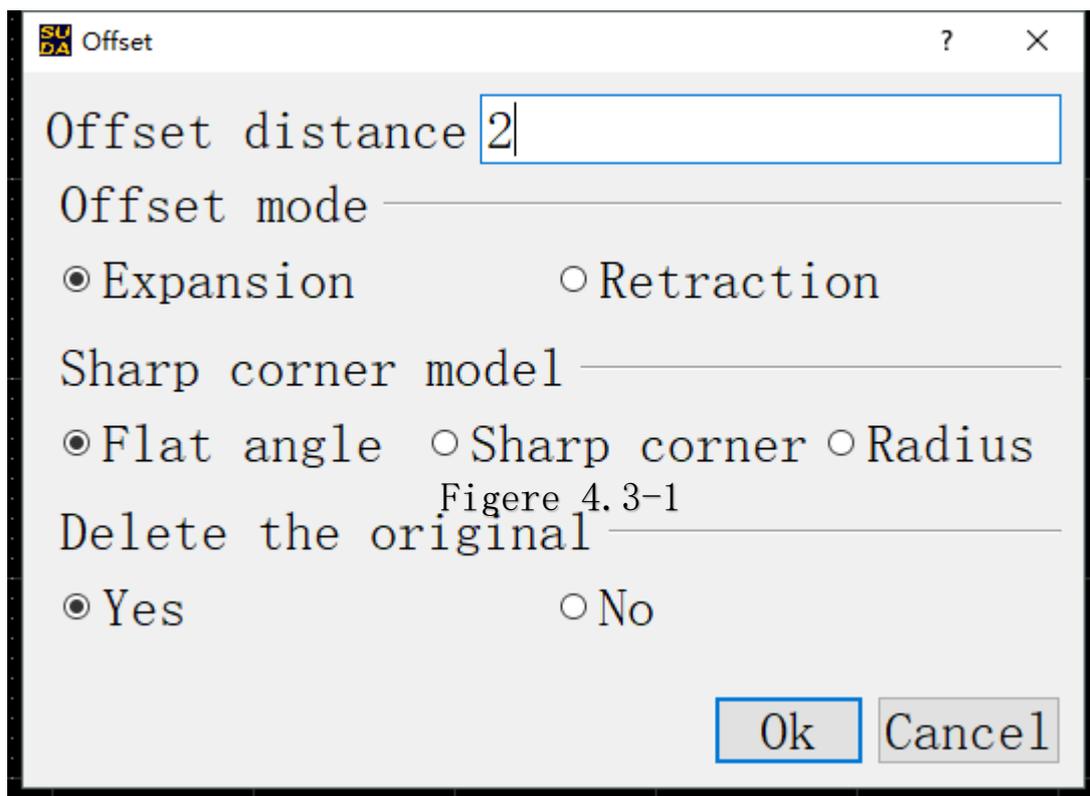
In this window can set offset distance, offset mode, angle mode and whether to delete the original image.

4.5 Open the camera and setting

Camera setting is also needed in CCD processing mode. Click the visual column in the Serial selection bar. The location is shown in figure
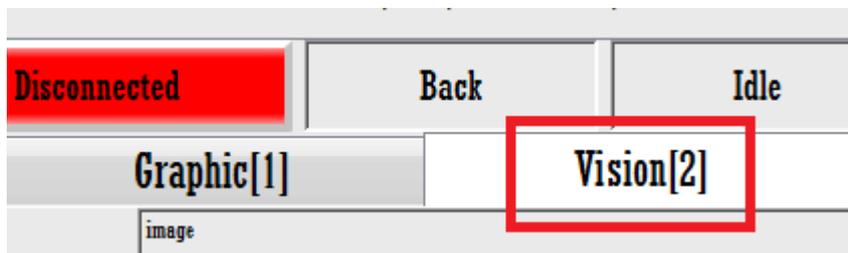
4.5-1:

Click **OpenCameraF2** The camera will start and the image will be displayed to the display window. Use the manual movement window of the machine console, as shown in Figure 4.5-2:
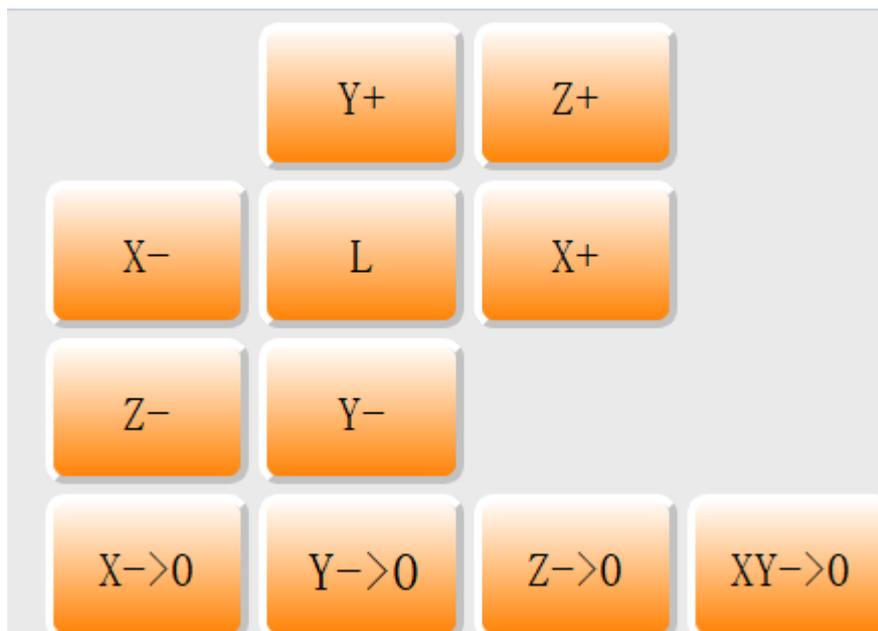

Figure 4.5-2

Move the XY axis and align the camera at the mark point in the lower left corner of the machining file (the system defaults to the lower left corner, which can be adjusted) and click on the template to add; as shown in figure 4.5-3:
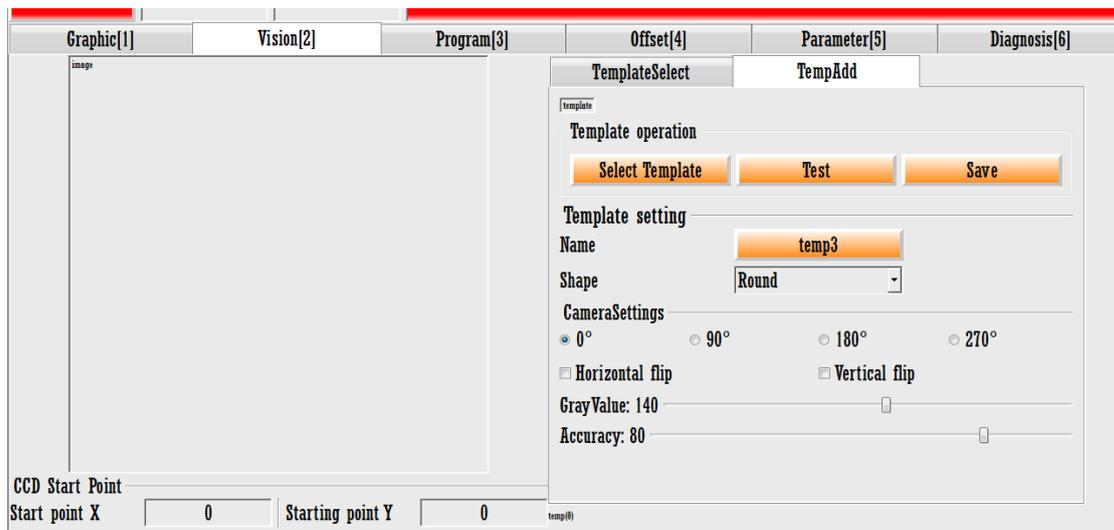

Figure 4.5-3

The template added operation window appears, and then click Select Template to select the template box. You can then box the template. The template sets the interface to wake up the figure shape choice and the name setting, may set the gray scale value and the precision value according to the need. Then to test, click on the button Test for template testing. See if the camera can find the mark point based on the template we selected. If you can find the mark point that the template is available, click on the button Save to save the template for the next processing of direct use. When the template is set,

fine-tune the value of the XY axis so that the mark point shows the center of the area again. Click **Load current coordinates**, then the system saves the position of the current point as the first mark point. Go back to the graphical display interface, click **CCDStartF8**, the system began to automatically patrol positioning. After that, processing began.

4.6 Processing control

The CNC-Router control system can view the location information of each axis and perform simple control while machining. The control

interface is shown in figure. 4.6-1:

Automatic[7]	Manual[8]	Refer[9]

Mechanical coordinates   **Workpiece coordinates**

X:	1235	X:	1235
Y:	1236	Y:	1236
Z:	1235	Z:	1235

Real-time speed   3000
Spindle speed   20000
Current Tool number: 1

Feedrate   5000

G00 Rate   15000

SpindleRate   24000

Processing progress   24%

Spindle	Vacuum

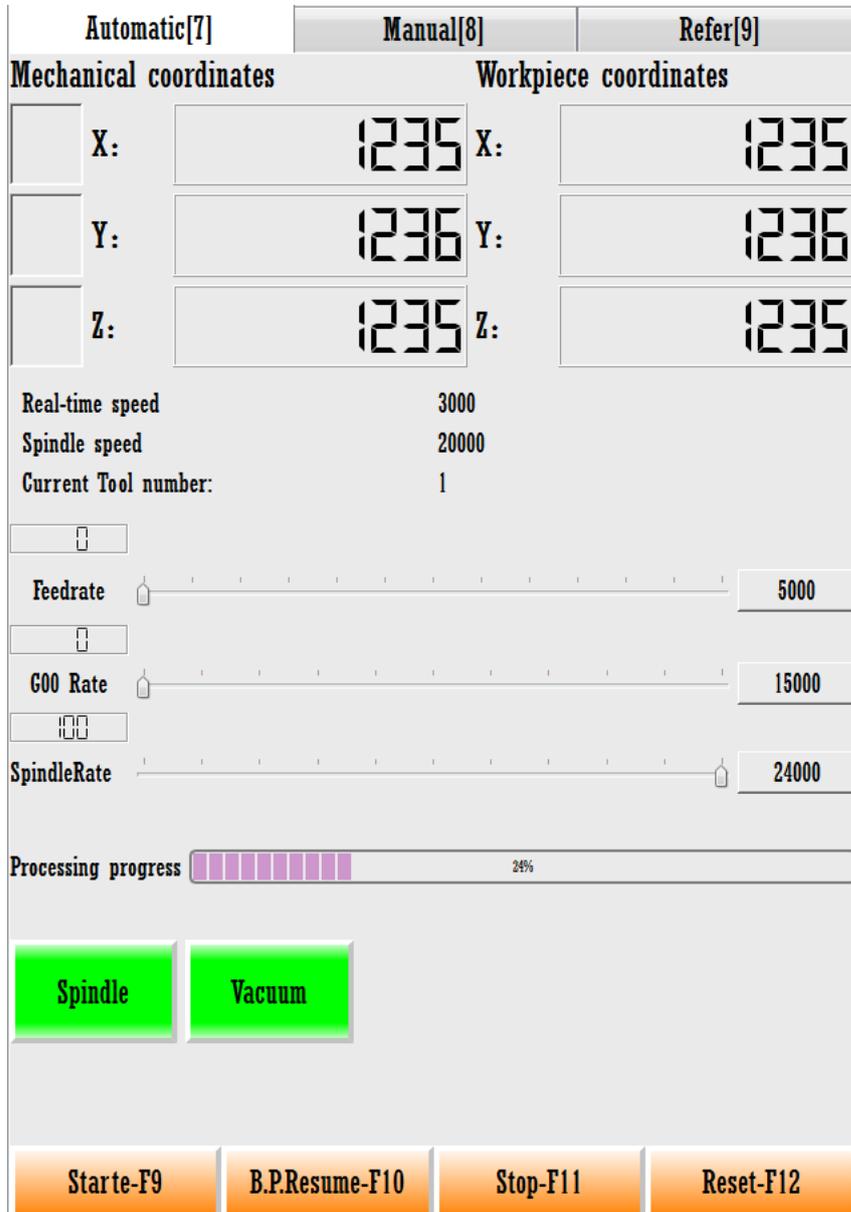| Starte-F9	B.P.Resume-F10	Stop-F11	Reset-F12

Figure 4.6-1

You can view the current toxin, spindle speed, and knife number in this interface. Moving sliders can adjust economic, G 00 and spindle rates. You can view the progress of processing in the progress bar. Click

on the file **Starte-F9** will be processed from scratch; click **B.P.Resume-F10** on the last processing stop place start processing; click **Stop-F11** on the software immediately stop the current processing; when the alarm, solve the problem, click on the **Reset-F12** clear alarm sign.

Chapter 5 Software detail explanation

5.1 Menu

5.1.1File

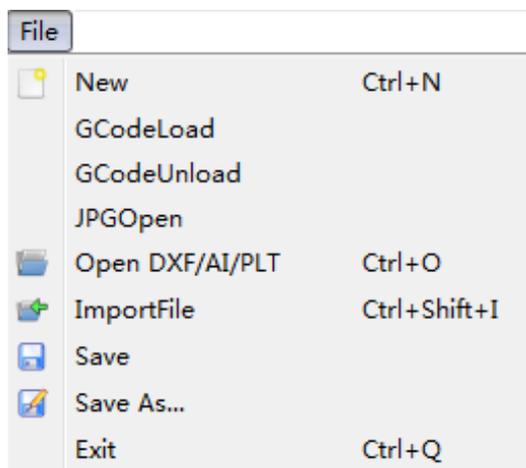Click the File button in the menu bar and then   File Action tab appears, as shown in title 5.1-1:

Figure 5.1-1

Here you can do operations on the file.

5.1.1.1 G-code file loading and unloading

GCodeLoad   Option to load nc code, click to load the nc file. Then

pop up the file selection interface, find the folder where the file, double-

click the file for file loading. You can view and edit files in the program
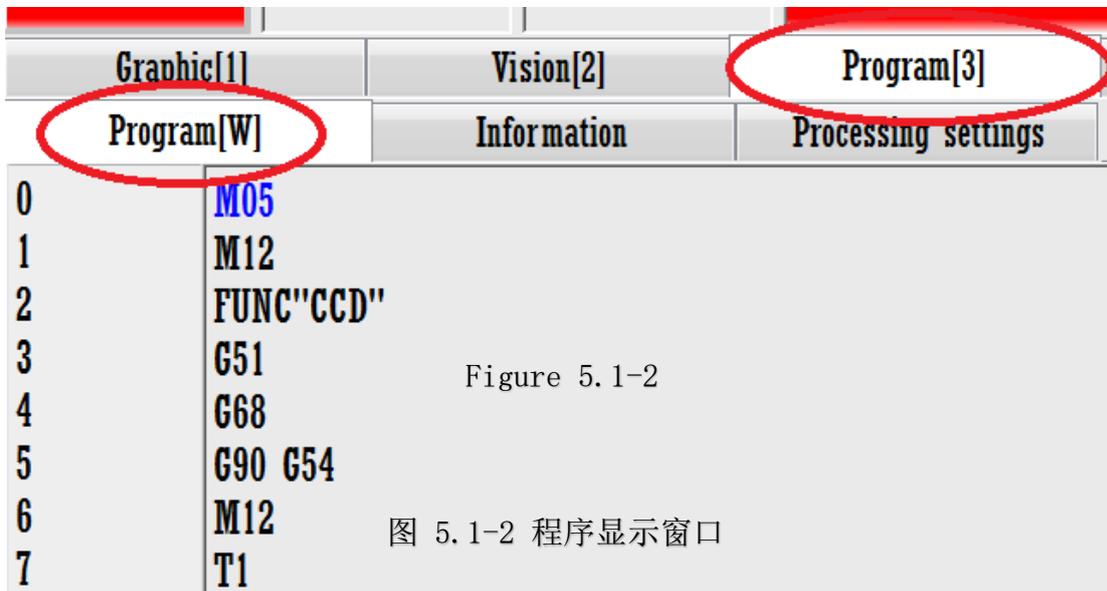
window as shown in figure 5.1-2:

Figure 5.1-2

图 5.1-2 程序显示窗口

When you need to replace the nc file you need to load, you can

click GCodeLoad   again to load the new nc file, click on the program

window below Load-F1 , can also achieve the secondary effect. When

you need to edit the g code simply, you can click the button Edit-F3 , pop

up the editing software, and edit in this window. Please be careful to

save after editing.
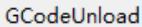
GCodeUnload   can uninstall the currently loaded nc files, click can

uninstall, can also click on the program window below UnLoad-F2 , can

also achieve the effect of the system.

5.1.1.2 JPG file open

JPGOpen   this option can open JPG image file

Click JPGOpen   button，the file selection dialog box will pop up, find

the JPG file we need to open, double-click open. In the open project soft

drop will automatically extract the contour of the graphics, the progress

bar below can see the file loading process. After loading, the extracted

contour will be displayed in the display area, allowing the user to edit

and so on.

5.1.1.3 new-built

New   Ctrl+N   option can recreate a blank file for

user editing. Click to create a new file. There is a shortcut key Ctrl + N

can   achieve this function.

### 5.1.1.4 Open
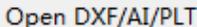
Open DXF/AI/PLT   Ctrl+O Option can open .DXF file and can click

Ctrl+0 to achieve this function.

Clicking on the button will pop up the file selection box, find the file you want to open, click, wait for a moment to see the file in the preview area on the right.

After making sure the file is correct, click the button Open to load the file and edit it. In this option, you can open previously saved files, reduce the amount of work you need to process the same files again, and improve work efficiency.

5.1.1.5 Import
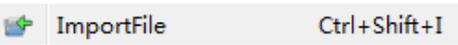
ImportFile   Ctrl+Shift+I Option can load product information from other files into the current file to add two files and for the purpose of one file. The ability to use the shortcut key Ctrl shift i to quickly use this feature.

When the button is clicked, the file selection dialog box pops up. The window style is similar to the window style when the file is opened. Select the file you want to import, click, wait, preview the file in the preview box on the right, after confirm that the file is correct, and then click the button below Open . After a little wait, the file was imported successfully.

Next, the position that needs to be placed is selected by moving the mouse, and the position of the graph can be seen in real time during the moving process, which is convenient to choose the position. After the location has been selected, click the left mouse button to place in the specified location. At this time, the image is still attached to the mouse of the file, if the image needs to continue to be imported, then select a new location to place the second group of images; if the image does not need to continue to be placed. Right-click to exit file import mode.

5.1.1.6 File saving

🔲 Save   and 🔲 Save As...   buttons are used for saving the Edited file, saving format is DXF format.

When the file that needs to be saved is first edited, clicking the button 🔲 Save , the file selection dialog box will pop up, and the selected folder is the destination folder that the file wants to save. If you need to open the file later, look for it in the subdirectory. At the bottom of the window there is a filename window, which can customize the name of the file to be saved. The file name can be named after the name of the product or code, which is convenient for future file management.

If the open file is not first edited, click the button 🔲 Save and the file will be saved. And the filename and save path will not change.
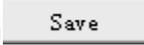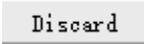
Button ![Save As...] is different from saving，this function is to save files that are now being processed to a different folder. Without changing the file you are working on. If a line is now added to the A file, click the button ![Save As...] , save it in another folder, and name it B. then close the software. There is this line in the B file and no line in the A file.

When you click Save as, the File selection dialog box will also pop up to select the save path, and you can also name the file name in the filename window below. If you need to use this file in the future, look for it under the secondary file path.

5.1.1.7 Exit

![Exit Ctrl+Q] button can exit software，Click to exit.Can use shortcut key Ctrl +Q to achieve this function. If the edited file is not saved, a prompt dialog box will pop up asking if it is saved.

If you need to save, please click the button ![Save] to save. The steps are consistent with saving. The software will exit automatically after it is saved again. Click the button ![Discard] if you don't need to save the file. The software will exit. If you miss the button, you can click

the button Cancel and cancel the exit operation. The software will

return and continue the operation.

5.1.2 Edit

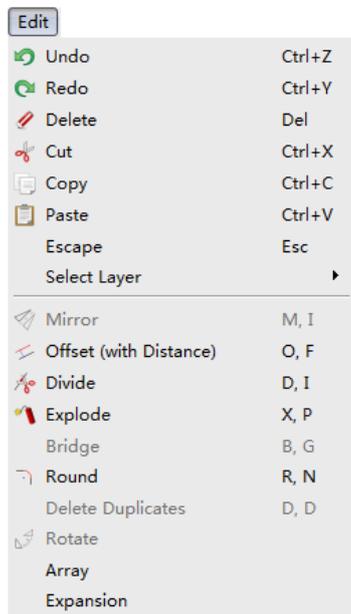Click the button Edit on the menu，will pop up editing menu, as

shown figure 5.1-5

Figure 5.1-5

5.1.2.1 Undo and redo

Undo Ctrl+Z button can cancel the last operation, File

restore, you can use the shortcut key Ctrl+Z to achieve the function;

Redo Ctrl+Y button is redo, redo is to do the undone step again,

allowing the file to return to the edited state more quickly after the

wrong undo. You can also use the shortcut key Ctrl+Y to achieve the secondary function.

5.1.2.2 Delete

Delete Del Button can remove unwanted parts.

When you want to get out of certain parts, you can use the mouse click to select or box select the unwanted parts, and then click on the button Delete Del in the edit menu to remove them. It is also possible to select the section that needs to be deleted and then use the shortcut key del button to produce the section. If deleted by mistake, it can be revoked.

5.1.2.3 Cut

Cut Ctrl+X buttoncut the selected image and move it to the target position. You can also use the shortcut key Ctrl+X to use this feature.

To use this feature, select the image firstly, click the cut button in the edit menu, and you can cut the image. So on the drawing of the cut image. At this point, click the button Paste Ctrl+V in the edit, or use the shortcut key Ctrl+V to paste the image. Can be found around the mouse attached to the newly cut image, the location for real-time updates. Select the location you want to place and click the left mouse

button to place the image. After cutting, you can place any number of target files. After the number of placement is satisfied, right-click or ESC can exit the cutting operation, for the next work.

5.1.2.4 Copy

Copy Ctrl+C button can copy the selected image and place it in a different location as required. You can use the shortcut key Ctrl+C to use this feature. If you want to use this function the same as cutting, select the file you want to copy firstly, then click copy in the edit menu, the image copy is complete. Click the button Paste Ctrl+V in the edit menu or paste the image using Ctrl+V. The image you want to copy appears in display area and is attached to the mouse. Display position update in real time, move to where you need to be placed, click the left mouse button, and place the image. When we put the image and cut it, we can put the array. When we know it is no longer necessary, right-click the mouse button or press the keyboard ESC to quit the copy operation and continue to work. Copy and cut, can operate between two files.

5.1.2.5 paste
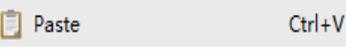
Paste   Ctrl+V button is used to transfer the copied, cut image to the current working interface. The ability to use the shortcut key Ctrl+V for quick operation.

5.1.2.6 Cancel
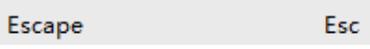
Escape   Esc button is used when the function button is clicked again, and the function needs to be exited. The shortcut button is ESC. Click to exit the current function, mouse recovery selection of the initial function.

5.1.2.7 Layer line selection
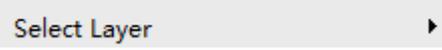
Select Layer   ▸ Button is used to select all lines of the target layer. The layer selection window will pop up after clicking, as shown in figure 5.1-6:
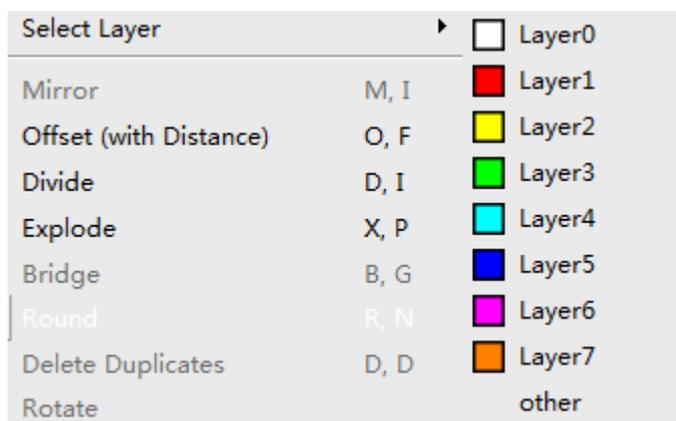

Figure 5.1-6

Select the layer according to the requirement, click, all the lines of the layer are selected to continue the operation.

5.1.2.8 mirror image

✍ Mirror M, I button can mirror the selected image.

Select the graphics that you want to mirror, then click the edit menu button to change the mouse to cross selection mode. Used to select a ground. Because the images are all two-bit graphics, the images are located according to a straight line. A straight line can be determined at two points. Now click on the left mouse button to set the first point, followed by a line segment connected to the mouse from the first point, and a new image that is more mirrored. Image processing is based on the line segment, moving the mouse, can change the angle and length of the line segment, and then move the image after the image will move. Once you get the desired graph, click on the left mouse button again, and the dialog box shown in figure 5.1-7
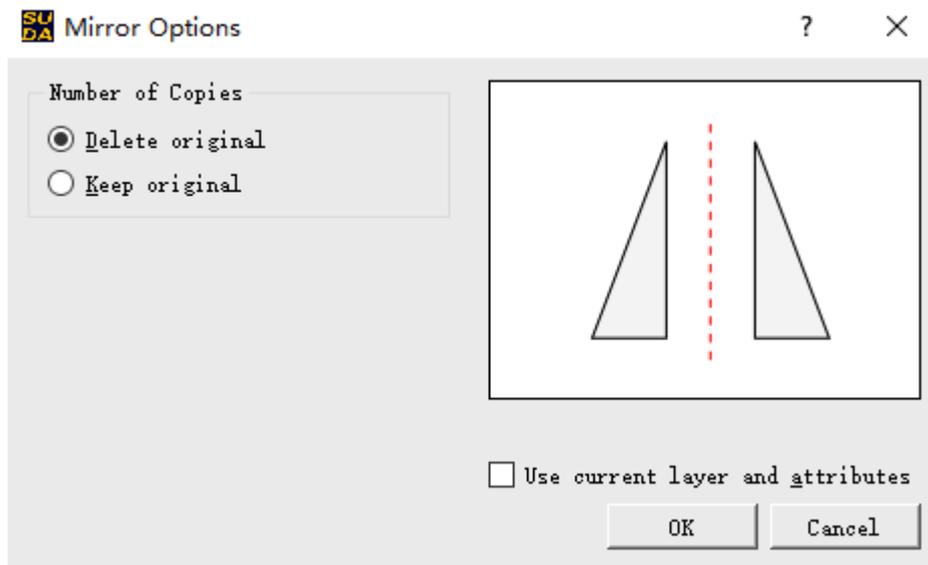
Figure 5.1-7

In the selection button on the left, you can choose whether to delete the original image. Delete original means to delete the original image, that is, to delete the original image, that is to say, only the image after the mirror image. Keep original means to retain the original image, then both images remain. Below there is a checkable option: use current layer and attributes, if checked, the mirrored file properties will use the file properties of the layer where the original image is located.Check the settings, click the button, then complete the mirror operation, back to the edit interface. If you are not satisfied with the image results, click the button, cancel the mirror operation, and return to the edit interface.

5.1.2.9 Offset replication

Offset (with Distance) O, F button can turn on offset copy

function. Line and arc lines can be offset copy. Click on the button to

enter the equidistant replication function, where two data boxes are

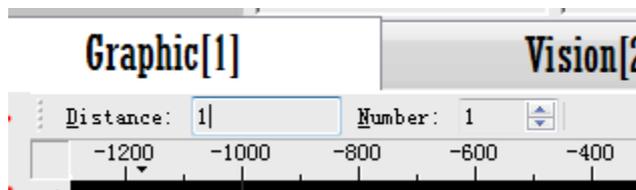added to the upper part of the display area, as shown in figure 5.1-8:

Figure 5.1-8

The first data box distance represents the distance between the

generated target and the secondary target, and the second data box

number represents the number of copies needed at a time. After

adjusting these two parameters, we can start the equal-distance

replication, place the mouse on the target that needs to be copied, and

the software will display the copied target. Click the left mouse button

to determine the assistance. Equidistant auxiliary completion. Click ESC

to return the mouse initial state.

5.1.2.10 break
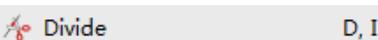
Divide D, I Can be used to break straight and curve

segments.

Click on the button, the mouse become into a cross-shaped. Use the mouse to select lines that need to be interrupted. If the line is clicked, there will be a dashed line perpendicular to the line segment, and the position of the dotted line can be controlled by the mouse. The intersection point between the dotted line and the line segment is the breaking point. If a curve segment needs to be interrupted, the dashed line is the perpendicular to the tangent of the point. The break point is also the point at which the dashed line intersects with the line segment.

5.1.2.11 Scatter
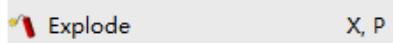
 Click on the button to scatter the target graphics. When there is a large overall figure, and the user only needs a part of the graph, you can use the break-up function. First use the mouse to select the file, then click the break button in the edit menu, and the graph is scattered. Once broken, you can edit parts of the line.

5.1.2.12 bridge location

Click on the button to select the straight line and curve segment bridge function settings. Click on the button and the bridge setting dialog box will pop up.

Users can set the bridge by modifying the parameters of the dialog box.

The bridge width represents the gap width after breaking. After setting the bridge width, you can choose break mode. The bridge setting has three modes for customers to choose from: distance mode, quantity mode, and manual mode. After this, the user can preview the effect in the left view box.

Distance mode: click on the circular button on the left side of the distance mode to select distance mode. In this mode, you can choose whether to cross the endpoint. After selection, if you have a breakpoint setting on the endpoint according to the distance, it will automatically skip, Does not work with the endpoint. Users need to set the distance between two points in the distance data read box.

Quantity mode: click on the circular button on the left side of the number mode to select the quantity mode. This mode means setting a specified number of breakpoints on the selected straight curve, each breakpoint distance isometric, the number of users can be set in the box below.

Manual mode: click the circular button on the left side of the manual mode to select manual mode. After selecting the bridge width,

you can edit it in the left view box. Once the mouse is moved over the line, a circular box icon appears, and the circle contains the indication that this is the path that will be eliminated. Using the mouse click to eliminate, the user can use the mouse wheel in the view to scale the view. The interface can also be moved up and down by the shortcut ctrl mouse wheel; the shortcut key shift mouse roller moves the interface left and right.

After setting up, click the button OK below, the finished graphics will be applied to the drawing; if you need to cancel the bridge operation, click the button Cancel.
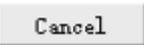
5.1.2.13 倒角
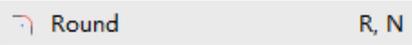
Click Round R, N button，can enter chamfer function. Click, mouse will become cross-type.

Click on an edge that requires a chamfer, then move the mouse to the other side of the corner, where you can preview the graphics behind the corner in the view box. The top of the review box can set the arc radius of the chamfer, as shown in figure 5.1-10:
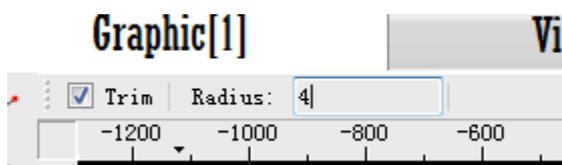

Figure 5.1-10

Check the trim option to remove the original corner, and uncheck it without deletion. The radius option box can set the radius of chamfer and fill in the radius of circle. After chamfering setup, right-click can exit the chamfer function, other operations.

5.1.2.14 Delete duplicate lines

Click Delete Duplicates D, D button to enter delete duplicate line function. Users need to box the area where they want to delete duplicate lines. Click Edit-Delete the repeating line, at this time the duplicate line is deleted.

5.1.2.15 Rotate

Click Rotate button to enter rotate function. The user needs to select the graphics that need to be rotated and then click the rotate button of the edit menu. The mouse becomes cross-shaped and can select a point that is the base point of rotation. Click on the mouse to determine the location of the point, and the rotation settings window will pop up after the mouse click, as shown in figure 5.1-11:
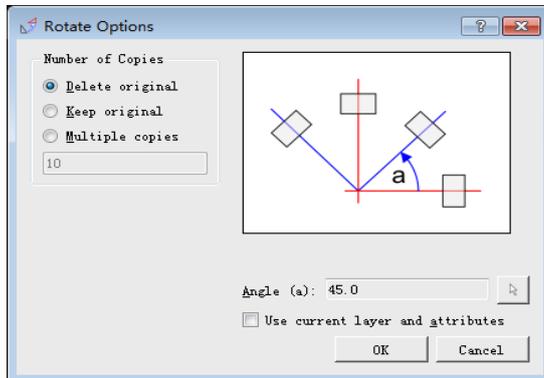
Figure 5.1-10

The user can select the copy mode according to the quantity

selection box on the left: check and delete the source file to indicate

that the graph before the rotation is deleted only the graphics after the

rotation, check the reserved source file to indicate that the two graphics

before and after the rotation are retained; Multiple copy represents

copying a graph of user settings and all files, including source files,

remain.

The user can set the rotation angle in the angle setting box. The

rotation direction defaults to counterclockwise. Check "use the current

layer's properties" to make the graphics properties after rotation the

same as before rotation. The user can choose the rotation angle and use

the layer attribute according to the demand.

5.1.2.16 array

Clicking the button Array on the edit menu allows the user to

array the graphics. Select the graphics that require array processing and

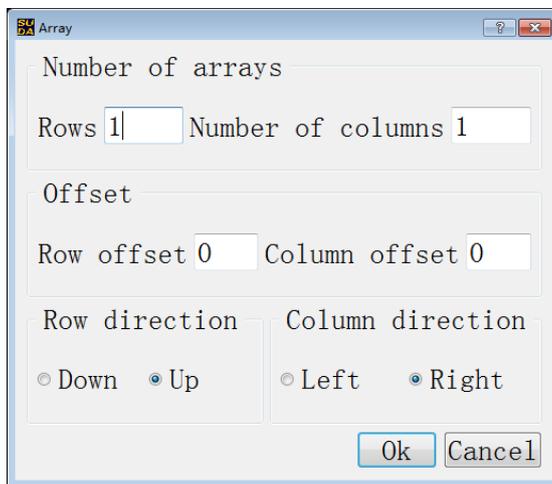click the button to pop up the array settings window, as shown in figure

5.1-11:

Figure 5.1-11

The number of rows and columns represents the total number of rows

and columns after the array processing; the row offset represents the

distance between the two rows after the array processing, and the

column offset represents the distance between the two columns after

the array processing. When the value is 0, the graph is connected to the

end and the head; the row direction and the column direction are set to

indicate that the array processed and copied graphics are placed in the

relative position of the original graph.

5.1.2.17 External expansion and contraction

Click Expansion on the edit menu to expand or shrink the graphics.

Tool interpolation can be implemented using this function. Select the

graph that you want to manipulate, click the indentation button in the

edit menu, and the settings window will pop up, as shown in figure 5.1-
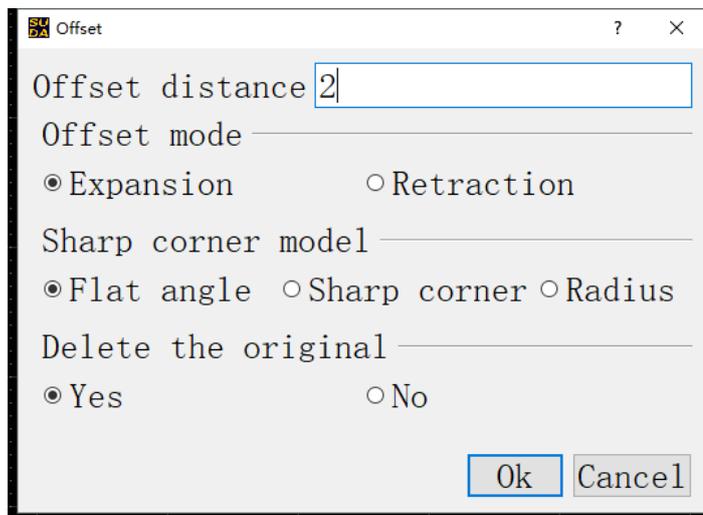
12:

Figure 5.1-12

The offset distance represents the distance between the image and the original

image after the expansion; the extraneous expansion in the offset mode indicates

that the original image is expanded outwards, and the internal contraction means

that the original figure is narrowed to the inside; when the graphics are scaled, if the

graphics have a focus, The graphic angle is the same as the original figure. If there is

no focus, the corner mode of the processed graphics can be specified according to

the selection of the user's sharp mode, and the user can choose whether to delete the original image according to the demand by deleting the original file tab.

5.1.3 Drawing

Click the button Draw on the menu,the drawing menu will pop up, as shown in 5.1-13
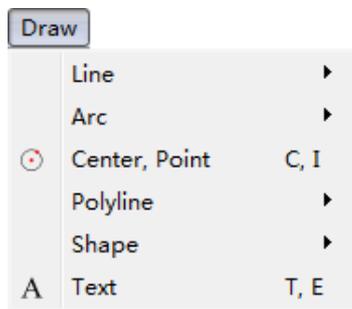

Figure 5.1-13

5.1.3.1 Straight line

Click Line button will pop up line drawing mode selection bar, including [two lines], [angle lines], [horizontal lines], [vertical lines]. Click Line from 2 Points L, I button，the mouse will become cross-shaped. Move the mouse to the target point and click the left mouse button

5.1.4 View

The view button is clicked on the menu bar and the view tab appears, as shown in figure 5.2-1:
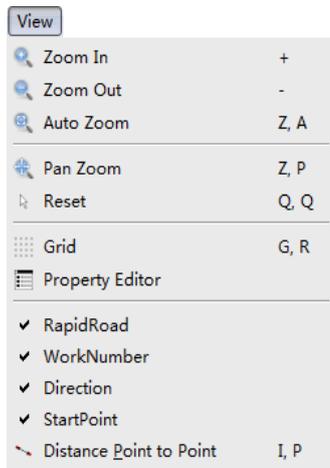
5.1.4.1 View scaling

5.1.5 Capture

5.1.6 Operation

Chapter 6 Testing of equipment

Appendix