

BEIJING RichAuto S&T Co., Ltd

Engraving Machine Motion Control System

5 Inches Color Screen A57 Automatic Tool Changing Mechanical Carving

User's Manual

Thank you for choosing RichAuto products!

This manual helps you be familiar with the company's products, and get information about system components、 configuration, etc.

The manual introduces the detailed knowledge of the system characteristics、operational processes、 installation & commissioning, and safety precautions. Please read this manual carefully before using the system and machine, which will help you make use it better.

Precautions:

1. Use of this product is strictly prohibited in the strong interference、 strong magnetic field environment. Operating ambient temperature 0-70 ℃, working environment humidity 0-90% (non-condensing).
2. Insert U disk in the correct direction. Do not pull out 19 pins tenon type socket cable when system run.
3. Perform processing U disk file process, do not pull out the U disk to prevent the interruption of data transmission.
4. Strictly prohibited metal, dust, and other conductive substances enter the controller.
5. The machine shell should connect the ground wire to ensure the safety of working and to prevent interference.
6. Prohibited unauthorized disassembly, no internal user repairable parts.
7. For long periods of time not using, please cut off the power, and properly kept.
8. Pay attention to water, dust and fire when using it.
9. Do not use the corrosive chemical solvents to clean the device.
10. Spindle motor bearing life and its rotate speed is inversely proportional.
11. Graver is very sharp. Do not touch when it is running, in order to avoid injury; Do not use handkerchiefs, scarves contact it to prevent embroiled damage.

Important Notice:

The Company shall not be responsible for any loss caused by improper using or breaking the correct operating procedures.

Beijing RichAuto S&T Co., Ltd owns this manual final interpretation, the company reserves the right to modify all information in this manual, including data, technical details, etc..

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Foreword

System introduction:

RichAuto is CNC motion control system independently developed by Beijing RichAuto and it can be widely applied to machinery, advertisement, woodworking, mold engraving machine, laser, flame, plasma cutting machine, wood lathe, dispenser and so on in the machine control field.

RichAuto makes DSP as the core control system, High-speed processing operation is the microcontroller, PLC systems can't match; Use embedded structure, High degree of integration, Strong stability, easy to installation and operation; Support U disk and removable storage card reader. Adopt USB Interface for communication, High transmission speed, fully implement plug and play and all work offline.

Performance features:

1. 5 inches color screen display, high cost performance handheld controller.
2. Continuation of the original product operation mode, easy operating and simply training
3. Faster, stable, effectively reducing the mechanical resonance.
4. Support various processing format, such as G code, PLT, bitmap and DXF etc.
5. Can preview the process path before machining process, dynamically display G code and the tool position during processing.
6. Professional custom designed housing, with the ability of shockproof, dustproof, waterproof and electromagnetic interference proof.
7. Support more I/O port definition.
8. Support multiple languages, such as Spanish, French, Arabic, etc
9. Using a customize user interface, which provide customers with a unique operate interface.
10. Can be achieved by "CNCSys" installed on PC to control multiple motion control system, and enables real-time view of the processing site, saving labor costs.

Technical Parameters:

Item No.	RichAuto-A57		
CPU	DSP	Power off protection	Support
Built-in memory	1GB	Breakpoint processing function	Unlimited
Display screen	5 inches color screen	External power supply voltage	24V DC
Communication port	UDisk、 Network	Maual mode	Continuous、 Step、 Distance
Linkage No. of axes	3 axes	Interpolation mode	line、 Arc、 Spline
Control signal	Differential	Soft/Hard limit	Support
Drive system	Step/Servo motor	Max. pulse frequency	10MHz
Min. input unit	0.001mm	Password protection	Support
Languages	English、 Simple Chinese、 Traditional Chinese and other languages can be made to order		
Standard Configuration	Handheld controller; HDMI high definition data transmission cable; 16 I/O wiring board		

1. RichAuto System Construction

RichAuto control system contains the following parts: Handheld motion controller、Circuit switching wiring board、HDMI digital high-definition transmission cable.

RichAuto accessories schematic diagram



Handheld motion controller



Wiring board

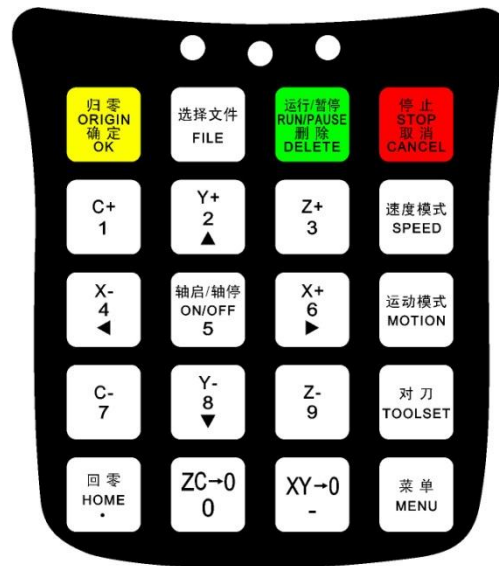


19-pin HDMI data transmission cable

HDMI cable connect handheld motion controller and wiring board, each I/O port connect to external electrical components, realize the connection of system and machine tool.

2. Buttons Introduction

RichAuto handheld motion controller according to the system requirement defines 20 operate buttons. Each button provides one or more function in different work conditions.



Usage methods

RichAuto motion control system operation is divided into one-button and buttons combination two ways operation.



One-button operate: Separate press one button on handheld motion controller is One-button operation.

Combination buttons operate: Press two buttons at the same time implement some operation is the combination buttons operation;

The method is: Firstly, push the first main function button do not release; Secondly, push another auxiliary function button, loosen both of the two buttons to realize combination buttons operation.




Buttons function details:

Button name	Function
	Back to work origin, confirm motions /inputting/operating
	Load the files from U disk or inner memory
	Run or pause processing、 delete inputting data、 different property selecting in menu
	Stop during processing ; Cancel of selections, inputting and operating; Start“The display function list”
	Positive movement of C axis、 figure 1 inputting
	Positive movement of Y axis; Raise speed during processing; Figure 2 inputting; Move up in menu
	Positive movement of Z axis; Figure 3 inputting; Increase spindle speed during processing
	Negative movement of X axis; figure 4 inputting ; Left move in menu

轴启/轴停 ON/OFF 5	Spindle start/stop; Figure 5 inputting
X+ 6 	Positive movement of X axis; Figure 6 inputting; Right move in menu
C- 7	Negative movement of C axis; Figure 7 inputting
Y- 8 	Negative movement of Y axis; Reduce speed ratio during processing; Figure 8 inputting; Move down in menu
Z- 9	Negative movement of Z axis; Figure 9 inputting; Reduce spindle speed during processing
回零 HOME .	Return HOME in manual mode; Decimal point inputting
ZC→0 0	Set work piece origin of Z and C axis; Figure 0 inputting
XY→0 -	Set work piece origin of X and Y axis; Negative sign inputting

速度模式 SPEED	High or low speed exchanging under manual mode
运动模式 MOTION	Manual mode-continue/step/distance to select
对刀 TOOLSET	Start Z axis automatic tool setting
菜单 MENU	Enter into menu setting; Change information of "Machine status area" during processing

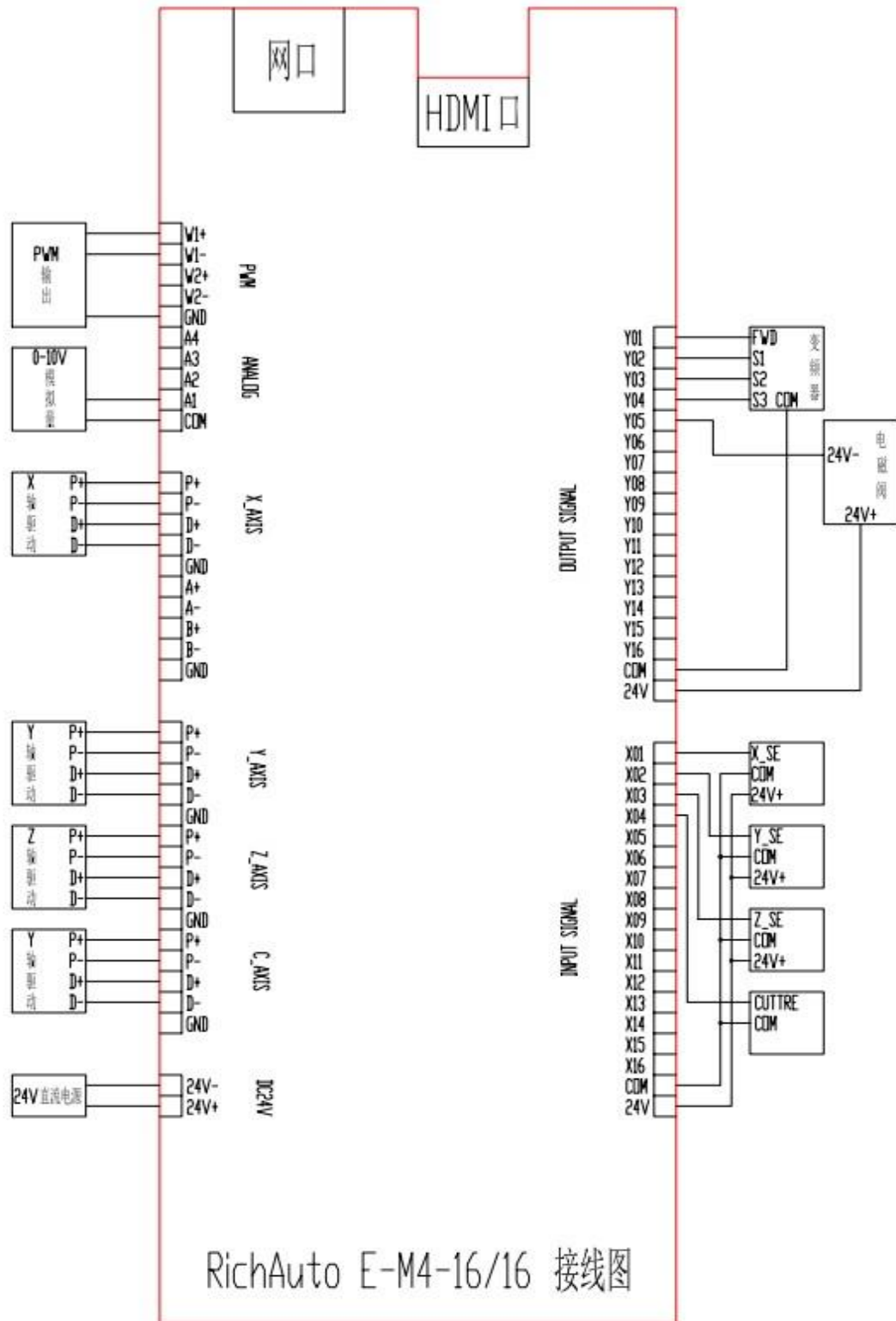
List of combination buttons:

Combination buttons	Function
菜单 MENU + 	System upgrade
菜单 MENU + "0-9" figure key	Switch the coordinate system (0 for the mechanical coordinate system , 1 - 9 for the work coordinate system)
 + 	View previous processing information

 +“1-8” figure key	Start the breakpoints processing (support number 1 - 8)
 ZC→0 0	Start advanced process mode
 	Exit buttons testing interface
轴启/轴停 ON/OFF 5 +Z+/Z-	Adjust spindle speed
运动模式 轴启/轴停 MOTION ON/OFF 5 +	Manually tool changing
菜单 对刀 MENU TOOLSET +	Calculate Z axis offset value of each cutting tool

3. Wiring instructions

RichAuto Stepping Wiring Diagram



A57 Linear array tool changing system port definitions

Input signal terminals

No.	PORT DEFINIE	REMARK
X1	X HOME	Logic low
X2	Y HOME	Logic low
X3	Z HOME	Logic low
X4	Tool setting	Logic low
X5	Converter alarm	unused
X6	X axis servo alarm	unused
X7	Y axis servo alarm	unused
X8	Z axis servo alarm	unused
X9	Air compressor pressure sensor	Logic low
X10	Manually loosen or broach the tool	Logic low
X11		unused
X12		unused
X13	Lossen tool finished	PNP normal closed
X14	Broach finished	PNP normal closed
X15	Dust hood put in place	PNP normal closed
X16	Whether spindle has tool signal or not	PNP normal closed
COM		
24V		

Output signal terminal

No.	PORT DEFINIE	REMARK
Y1		unused
Y2		unused
Y3		unused
Y4		unused
Y5		unused
Y6		unused
Y7		unused
Y8		unused
Y9		unused
Y10		unused
Y11		unused
Y12		unused
Y13		unused
Y14	Loosen or broach the tool output signal	Logic low
Y15	Dust hood up and down output signal	Logic low
Y16		unused
COM		unused
24V		unused

Installation Requirements: Power supply (24V, 3A), it is better to add a filter to prevent the electric field interference. If origin detecting switch are different power supply type, the special testing switching power is needed. (24V origin detecting switch is the best choice)

RichAuto control system realizes its control through the connection between the wiring board and CNC machine. Wiring board terminals can be divided into input terminals and output terminals:

Input terminals:

INPUT SIGNAL (Input signal terminals)

DC24V (Main power supply terminal)

Output terminal:

X_AXIS (X pulse output terminal & encoder output terminal)

Y_AXIS (Y pulse output terminal)

Z_AXIS (Z pulse output terminal)

C_AXIS (C pulse output terminal)

OUTPUT SIGNAL (Output signal terminal)

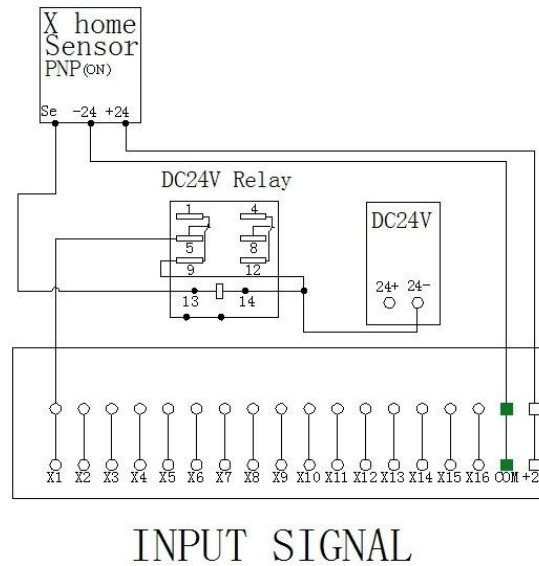
ANALOG (Analog signal output terminal)

PWM (PWM digital signal output terminal)

Pulse and direction signal suggest using twisted-pair.

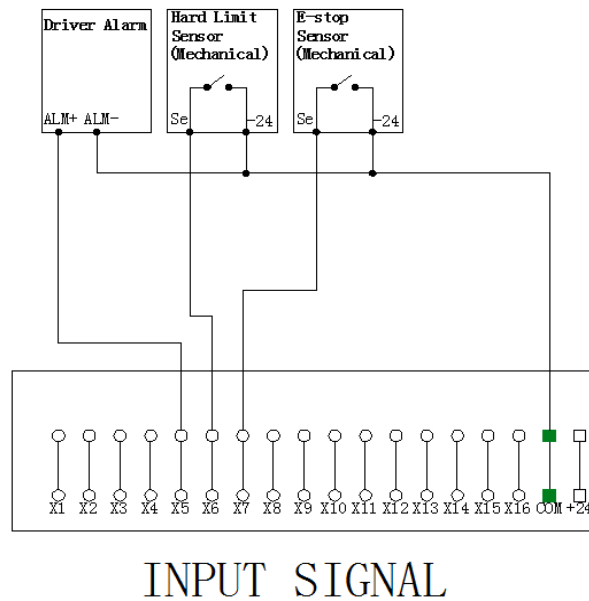
Special connection illustrates:

PNP(ON)Normally closed type proximity switch connection illustrate (Y、Z axis the same as X axis)

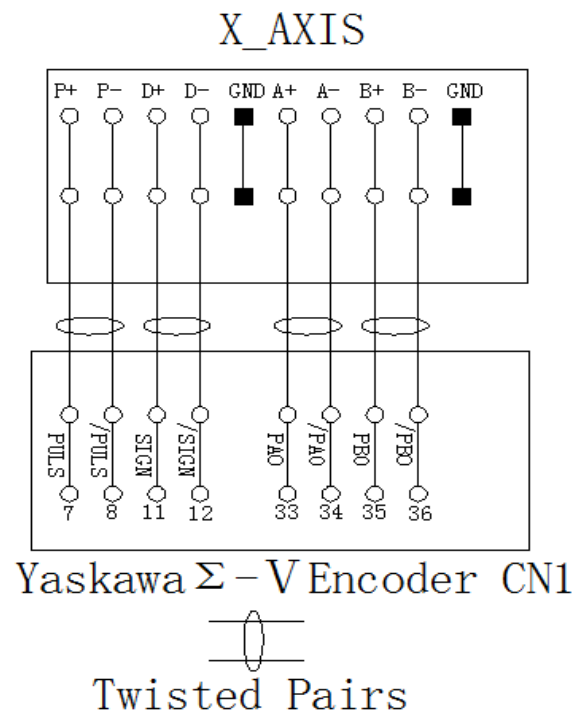


Unused input terminal connection:

Eg: X5-Driver Alarm signal, X6-Hard Limit signal, X7-E-stop switch signal



Servo drive:



Tool change signal port:

X13 Lossen tool finished signal

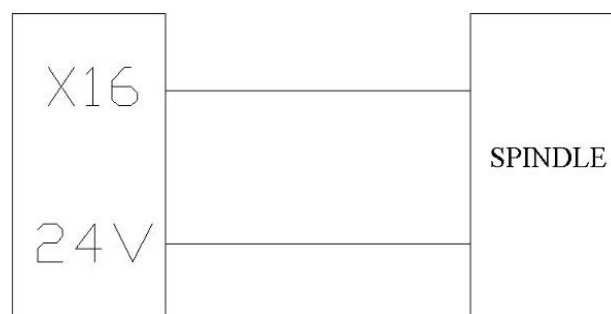
X14 Broach finished signal

X15 Dust cover in place signal

X16 Whether spindle has cutter or not signal

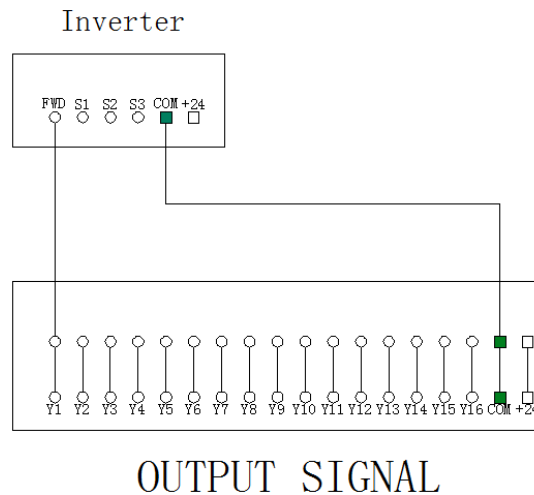
Tool change signal port X13 to X16 logic high voltage effective(that is to short connect with 24V+)

For instance: X16 signal connection is as below



Spindle output connection:

(1) **2-state** : spindle start-ON / spindle stop-OFF



Spindle State:

Setting: Enter "**Spindle State**", screen shows:



SpdlCnt=Spindle Count

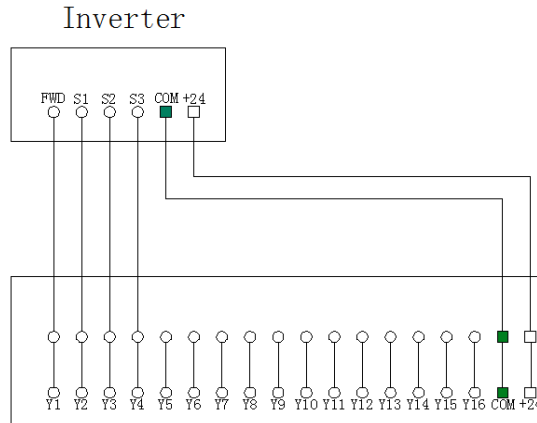
Press "**RUN/PAUSE DELETE**", input figure 1, change Spindle Count to 1, and then press "**ORIGIN OK**", screen shows:



Press "**Y+ 2**", "**Y- 8**" to move cursor up and down; Press "**RUN/PAUSE DELETE**", you can change the indicator light color, like above picture.

(2) **3-line and 8-state** : spindle on---S1—speed 1 , S2—speed 2...Sn—speed n ;

spindle off--- screen shows “Fn + the speed number”.





OUTPUT SIGNAL

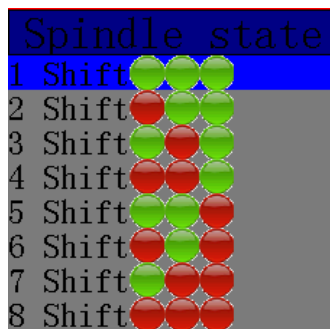
Spindle State:




Setting: Press  enter "**Spindle State**", screen shows:



SpdlCnt=Spindle Count

Press "", input figure 3, change Spindle Count to 3, and then press "", screen shows:

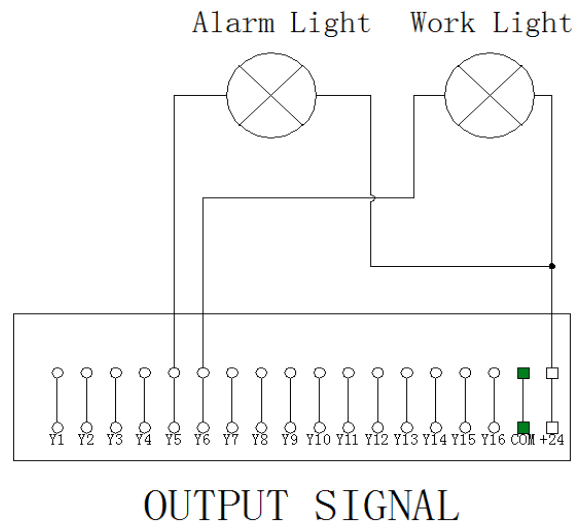


Press "", " to move cursor up and down, press "", you can change the indicator light color(or status), as shown above.

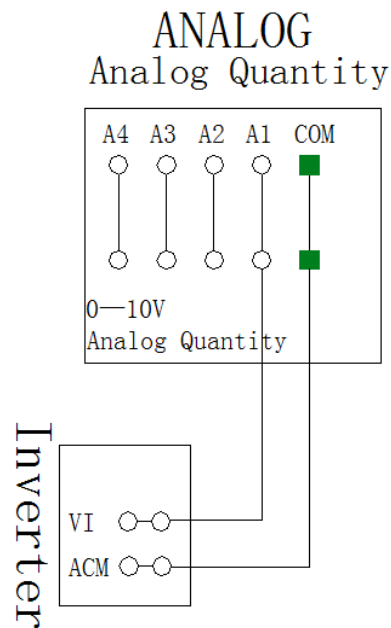
NOTE: Some of the frequency converter internal FWD and DCM (COM) is connected in parallel, no need to connect Y1 (S0) in such situations, only connect DCM with GND which is on the wiring board, and also no need to reset spindle state.

Unused input terminal connection:

Eg: Y5-Alarm Light signal, Y6-Work Light signal



Analog output signal connection:



Setting procedure: enter "MENU" - "Menu function user interface" - "MACHINE SETUP" - "Spindle Setup" -

"Spindle MAX Spd"(Spd=speed)

It connects the machine with control system while complete the above settings.

4. Machine tools and controller debugging

(1) Start up the dsp system, press “CANCEL” enter into the main user interface, ignore the “return HOME” options; Enter into MENU to input correct “pulse equivalent”; Manually move each axis to confirm the direction. If the movement direction and definition direction is opposite, users should change the motor phase sequence to make alterations.

(2) According to the original location of the machine coordinates, users can enter **menu-menu function user interface-machine setup-homing setting - home direction** to reset it.

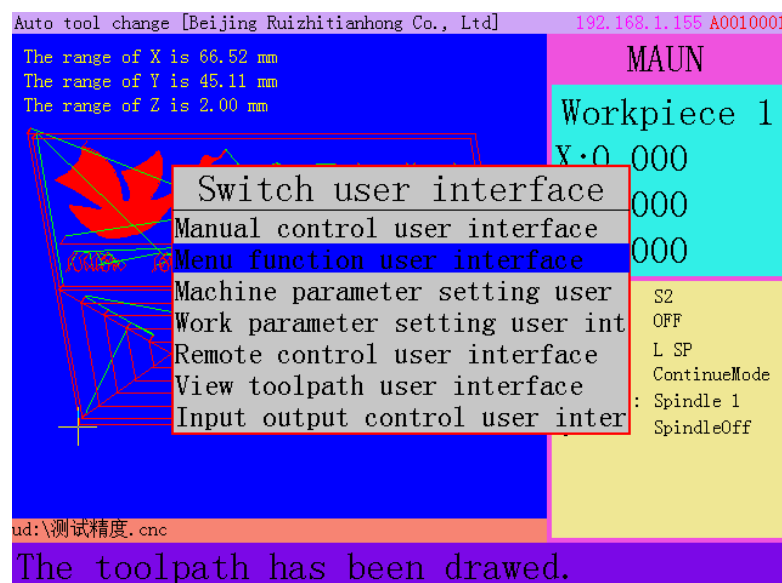
(3) Enter **menu-menu function user interface-machine setup-voltage setup**, to check whether the home switch is working (Manual trigger , signal lamp lights up({green to red}))

(4) Enter **menu- machine setup**, modify “ATC spindle count” and “ATC position”. Use combination buttons “MODE”+ON/OFF” for testing the tool changing.

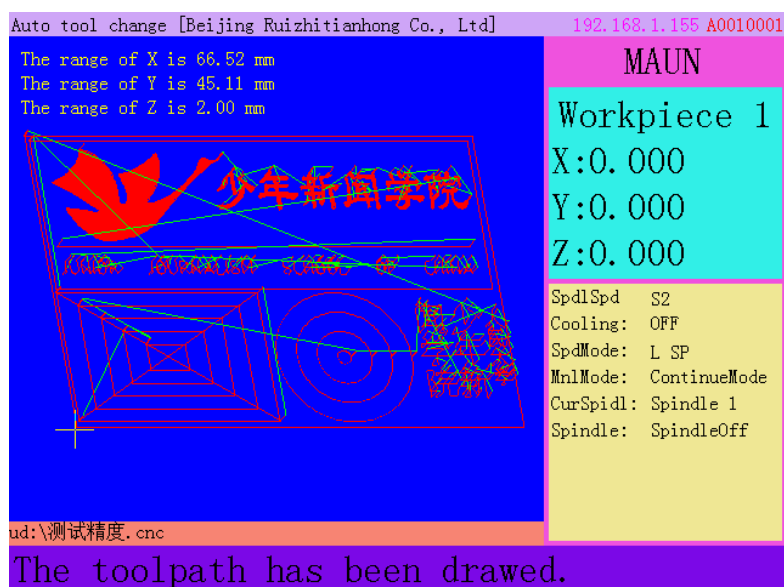
The machine should in good connection if all of above setting is proper.

5. User’s interface switching

Press MENU popup “switch user interface”, contains 7 user interfaces: **Manual control user interface**、**Menu function user interface**、**Machine parameter setting user interface**、**Work parameter setting user interface**、**Remote control user interface**、**View tool path user interface**、**Input output control user interface**.



Manual control user interface:



See above figure, start up dsp system and return machine origin coordinate(all axes home)to enter into the main user interface.

It clearly shows 9 contents, from top to bottom are respectively:

1. System software type (Auto tool change) & company name(the name of company can be customized).
2. System IP & hardware type number
3. File processing range(size)
4. Processing file emulational image & tool path(red indicate process path, green indicate dry running path)
5. Work mode: "MANUAL" or "AUTOMATIC" mode
6. Workpiece coordinate: display current coordinate serial number, including machine coordinate system and work coordinate system; And the value of X, Y and Z axis.
7. Machine status area: Display spindle state、speed mode、motion mode、cooling unit state, etc.
8. File information area: Display file name (including filename extension) and record location.
9. Message area(Lable messages): Display file loading process information.

Menu function user interface:

```
Auto tool change [Beijing Ruizhitianhong Co., Ltd] 192.168.1.155 A0010001
Machine configuration
Work Param config Machine size
Sytem Configuration Spindle delay time
File operations Homing seting
Version show Input polar
Output polar
Function configurati
C.A.D thickness
Max speed limit
Spindel line count
Spindel state
Input list
Output list
Accept the connected from the 192.168.1.
```

System menu details including 5 main menus: **MACHINE** configuration、**Work** parameter configuration、**SYSTEM** configuration、**File operations**、**Version show**. Detailed instructions are described in the following pages.

Remote control user interface:

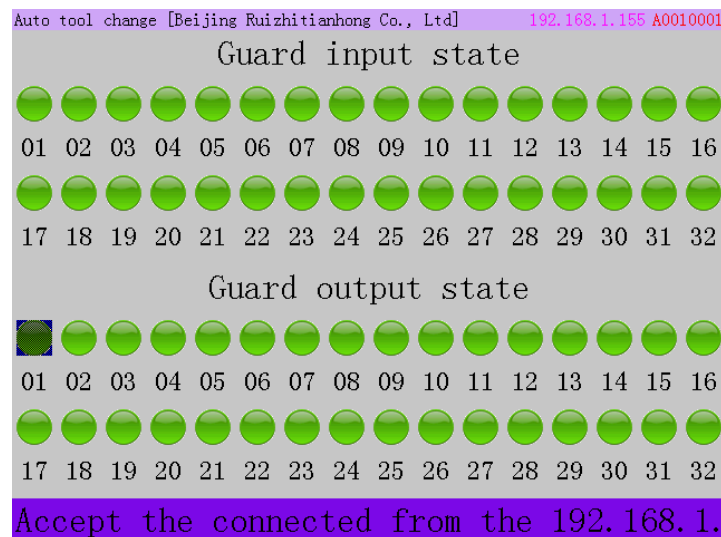
```
Auto tool change [Beijing Ruizhitianhong Co., Ltd] 192.168.1.173 A0010001

Network remote control

This function suspends development.
If you have special needs, please
contact us.

Accept the connected from the 192.168.1.
```

Input output control user interface:

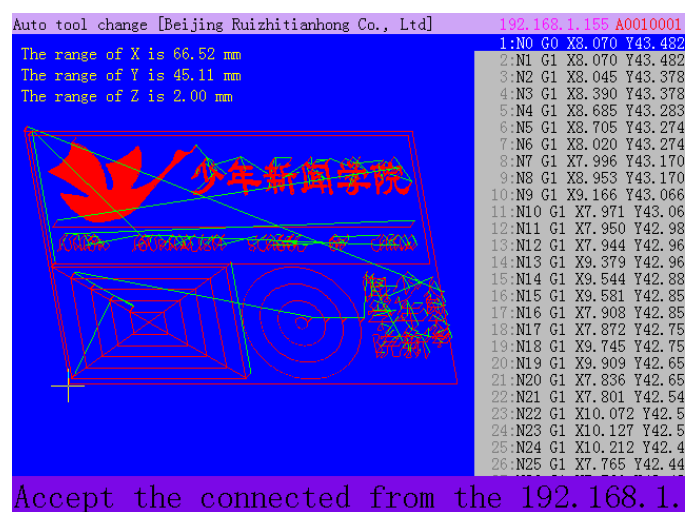


Input and output ports have 32 status indicators. They are correspond to the input and output ports on wiring board. Because of the standard wiring board is a 16 I / O board, only need the first 16 ports which is 01 - 16.

Input terminal debugging: Normally the lights show in green. They will turn red when the input signal triggered. However, if corresponding position indicator light stays in green while the input signal is triggered. User should check the problem of corresponding signal sensor, circuit and the wiring board.

Output terminal debugging: User modifies the indicator status (change from green to red), corresponding output signal status of the wiring board will change as well.

View tool path user interface:



In this interface, user can preview processing path and the G code file.

Press number buttons“2”or“8” to move up or down line by line.

Press number buttons“3”or“9”to move page by page.

Press number buttons“4”or“6”directly shows file head or file end line.

Press combination buttons “MODE”+ number buttons“2”or“8”to view top and bottom of the work path.

Press combination buttons, “MODE”+ number buttons“4”or“6” to view left and right side of the work path.

Press combination buttons, “MODE”+ number buttons“3”or“9”zoom in or out.

6. Menu description

6.1 Machine configuration

Users can set the parameters about machine hardware under "Machine configuration". It is set by machine producer according to equipment type. If machine hardware parameter is not changed, this parameter also should not change. If machine users need to change, please consult machine producer and modify under the guidance of their technical engineers.

6.1.1 Pulse Equiv (Pulse Equivalent)

The number of pulses of the system needs to send when machine moves every 1mm.

Unit: Pulse/mm.

1) stepper motor driver

Formula = pulses per revolution / distance per revolution

Pulses per revolution formula: $(360^\circ / \text{stepper angle}) * \text{Driver subdivision}$

Some stepper drivers mark pulse number directly.

Distance/r formula:

Screw drive machine = screw pitch * mechanical transmission ratio

Rack drive machine = rack module * gear teeth number* π * mechanical transmission ratio

Stepper motor system formula:

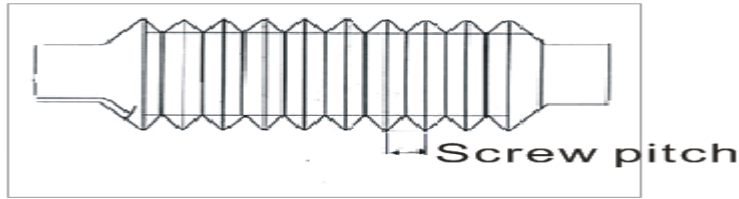
✓ **Screw drive:**



$$\text{pulse} = \frac{\frac{360^\circ}{\text{Stepper angle}} * \text{Driver subdivision}}{\text{Screw pitch} * \text{transmission ratio}}$$

Formula Description: step angle is the angle of the motor parameters, motor rotation step walk.

Driver subdivision is the parameter set by the driver.



Screw pitch (above picture): The distance that the nut moves when the ball screw makes one rotation.

Transmission ratio: The speed ratio or angular velocity ratio of the capstan and the driven wheel.

✓ **Rack drive:**



$$\text{pulse} = \frac{\frac{360^\circ}{\text{stepper angle}} * \text{Driver subdivision}}{\text{rack module} * \text{gear teeth number} * \pi * \text{transmission ratio}}$$

Formula Description: step angle is the angle of the motor parameters, motor rotation step walk.

Driver subdivision is the parameter set by the driver.

Rack module and gear teeth number are gear parameters. Rack module * gear teeth number * π equals the perimeter of the reference circle.

Transmission ratio: The speed ratio or angular velocity ratio of the capstan and the driven wheel.

2) **Servo motor driver**

The pulse equivalent leave factory value in dsp system X, Y and Z are both 400 pulse/mm, it act as a constant to set electronic gear ratio on the servo motor drive.

The numerator of electronic gear ratio is the pulse count of encoder, can be searched in servo driver manual.

Denominator of electronic gear ratio:

Screw drive: dsp controller pulse equivalent (400) * Screw pitch * mechanical transmission ratio

Rack drive: dsp controller pulse equivalent (400) * rack modulus * rack teeth number * π * mechanical transmission ratio

6.1.2 Machine size

RichAuto system make the table size as the soft limit values, in order to prevent machine move over travel, machine size value must be less than or equal to the actual value of machine travel.

6.1.3 Spindle delay time

Spindle delay time(Unit ms): Including spindle on delay and spindle off delay.

Spindle state: The system uses multiple state of rotate speed to control the spindle or spindle start/stop signal.

Spindle Max. speed: This option only set when using 10V analog output control, The value should be the inverter maximum speed(Unit: rpm/ minute).

If user chooses multi-step speed output signal to control spindle rotate speed will no need setting this option.

6.1.4 Homing setting

Home speed: Each axis movement speed when execute return home.

Home order: Each axis movement order when execute return home.

Home direction: Each axis motion direction when return home. This setting is depend on the installation position of home sensor. If the home sensor is installed at the positive side of machine tool, then it should set "pos"; if it is at the negative side of machine tool, should be set as "Neg".

6.1.5 Input/output polar

Input/output polar are used to set the normally open or normally closed state of each port. DSP system defined the green indicator light as normally open state, red indicator light as normally closed state.

Including input and output terminals, the specified of each port please refer to "input/output list".

6.1.6 Function Confi (Function Configuration):

Set whether the system reserves a function or not.

Note: Press "OK" button to exit. The system will prompt a dialog box to ask for restating the system after the operation.

6.1.7 C.A.D thickness

It must input the actual thickness of feeler block. If it is greater than the actual thickness Z axis cutter may damaged; If it less than actual thickness Z axis cutter can't reach the surface of the work piece.

C.A.D thickness is the value of automatic tool setting parameter, it not acts as the parameter of manually tool setting.

6.1.8 Max speed limit(Unit: mm/minute)

Set the maximum speed of each axis both positive and negative side. Maximum speed only takes effect during processing, manual speed of machine movement not use this parameter.

6.1.9 Input list

To open or prohibit input signal, if the wiring board ports does not connect any signal, users can prohibit those signals, in order to avoid the wiring error.

Note: Press “OK” to confirm the modification, and then exit.

6.1.10 Clear system cache

Users need to do this after functional upgrade, such as change four-axis program to three-axis program, users must do this operation. After this operation, users need to restart the system.

6.1.11 Distance mode timeout(Unit: second)

When users are in manual motion mode, selecting distance mode, but if the machine does not move in a certain period of time (system default is 30 seconds), system will intelligently switch to continuous mode to prevent Z-axis collision risk, in order to avoid the customer forgot to switch back to continuous mode and set a large distance value.

6.1.12 ATC spindle count

Input correct quantity of tool changing machine cutters.

6.1.13 ATC position

Input tool changing position of each cutter. There are two ways for setting: manually move machine to corresponding point or input the value of coordinates. For Z offset value should be calculated by automatic tool changing. (Use combination buttons: “MENU”+“TOOL SET”)

6.2 Work parameter configuration

6.2.1 Acceleration (Unit: mm/s²)

The maximum acceleration value during acceleration and deceleration movement, improve (including straight and curved motion) processing capabilities. If acceleration is too large, it may cause the motor losing steps, jitter and even whistle, if too small, it will lead to accelerated slowly and reduce the operating speed of the entire graph.

6.2.2 Work speed

Set automatic work speed, including work speed and traverse speed.

6.2.3 Safe height

The height of Z axis lift during processing. System default value is 250.000 mm.

6.2.4 Low manual Spd (Unit: mm/minute)

Under “**Low Manual Spd**” mode, the speed of manually to move each axis.

Setting: Enter “**Low Manual Spd**”, screen shows:

Unit MMPerSec	
XSpeedOfSlow	1200.000
YSpeedOfSlow	1200.000
ZSpeedOfSlow	1200.000

6.2.5 High Manual Spd(Unit: mm/minute)

Under “**High Manual Spd**” mode, it is the speed of manually moving each axis.

Setting: Same operation as “**Low Manual Spd**”

6.2.6 Speed ratio

Actual processing speed=work speed*speed ratio, it does not affect the speed of Z lift up during processing.

6.2.7 Fall down ratio

Including fall down ratio and fall down height. During automatic processing, Z axis fall down to the “fall down height”(the distance between cutter peak and the workpiece origin point),and then execute fall down ratio, to reduce Z axis fall down speed in order to avoid unnecessary loss.

NOTE: In working path, Z axis working depth must be a negative value. Otherwise the fall down speed ratio doesn't work. And also, the fall down height must lower than both system safe height and G code file safe height, if not, system will choose the lowest value for the execution.

6.2.8 Parking state

Set the machine stop position when system finished the processing. Users can choose a certain option, or input special coordinate value.

6.2.9 G code attribution

Set special G code attribute, according to the actual need to make changes.

6.2.10 Pro Attribute

Set special Process attribute, according to the actual need to make changes

6.2.11 Unit Circle speed limit(Unit: mm/minute)

System default circle limit is 1000.000

6.2.12 Array process

Set array parameter, including column count、Row count、Column space、Row space、Interval
(unit: ms)

Column space: File spacing of X direction

Row space: File spacing of Y direction

Total Processing times= column count* Row count

Interval: System default 0, it means no wait.

During processing, if users need to change processing materials after completion of each processing, you need set time interval a negative number. When the first time processing is completed, the screen prompt: waiting for the next array processing, press any key to start the next array processing at this time, if not press, system keep waiting.

6.2.13 Start speed (Unit: mm/minute)

The speed of axis started directly from standstill. Not starting from zero speed, but starting directly from a certain speed, so it can shorten the overall processing time, but do not set this speed too high. If set too high, it will cause the motor losing steps, jitter and even whistle; Set too small, it will reduce the operating speed of the entire graph. If the inertia of motion axes (axis heavier), users can set a smaller start speed, if the inertia of motion axes smaller (lighter shaft), users can set it bigger.

6.3 System Setup

6.3.1 Languages

Change system language, users can choose Chinese or English

6.3.2 Initialization

After data initial system parameters will restore to factory setting.

6.3.3 Formating

Wipe the internal files, it will not damage the system parameters

6.3.4 Screen lock

The system screen will lock when there is no operation within the limit time.

6.4.5 Trial password

Supply 20-digit initial passwords and the limit time (processing time, Unit: hour) .

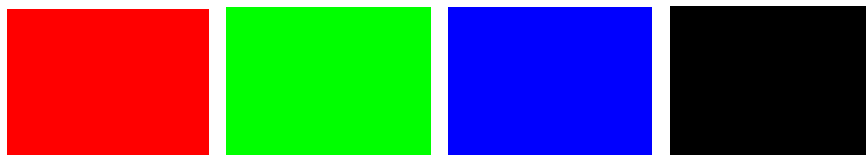
6.3.5 Buttons Check

Users can check buttons are valid or not under this menu. Enter "Buttons Check", press every button,

if it is valid, the screen will highlight. Exit "Buttons Check", press ""+ ".

6.3.6 Test Screen

Check whether the screen can work normally or not. Enter the interface, press each button, if it is saturated color, indicate it is OK; if the color has deficiency, user should send the DSP system to our company for repairing.



6.3.7 Backup

Backup the system parameters into U disk or system inner memory space. File format: **data.bak**.

6.3.8 Recovery

Restore backup data from U disk or inner system.

6.3.9 System update

Upgrade the system through the U disk, the firmware format is *****.PKG**

6.3.10 Internet Parameter Setup

```

NetworkConfig
LocalIPAddress:192.168.1.10
LocalIPMask: 255.255.255.0
GateWayAddress: 0.0.0.0
DNS Address: 0.0.0.0

```

6.3.11 Internet connect set

```

Network control
Allow:
Allow:
Allow:
Allow:
Reject:
Reject:
Reject:
Reject:

```

6.4 File Operations

6.4.1 Copy file

Copy files from U disk to Inner.

6.4.2 Delete file

Delete inner files.

6.4.3 View file

View the files or G codes from U disk or internal, user also can view recent file.

6.4.4 File working information

After system power on, it will statistic the times of completed processing according to the files' name.

While the system is power off, those data will disappear.

6.4.5 Check Pro Time (Check Processing Time)

Calculate processing time by system work speed, after reading G code, the screen will display the processing time, different work speed corresponding to different processing time.

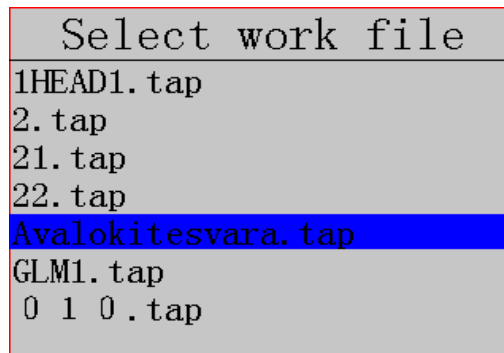
Operating mode: Press "ORIGIN OK" to enter "Check Pro Time", screen shows:

```

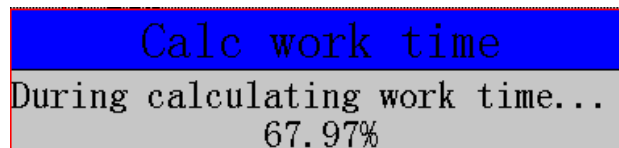
Select work file
UDisk File
Internal File
Recent File

```

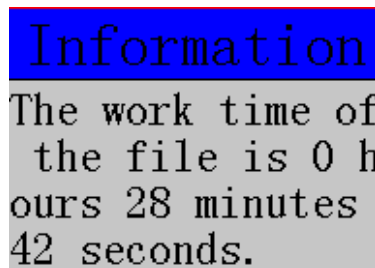
Press "Y+ 2 ▲", "Y- 8 ▼" to choose "U Disk"/"Internal/Recent File":



Press “”to enter, choose processing file, and then press “”, after calculation:

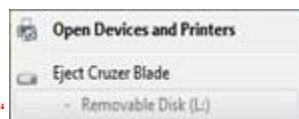


Screen will show processing time :



NOTE: Please pull out the U disk correctly after copying files from computer, otherwise, the controller may not recognizes the U disk.

1. Win7(32 bit) system: After copying files, please press “”,and then the display will show



“,choose the device to be shut down. When it shows



“, the U disk pulls out from computer

successfully.

2. Win XP system : after copying files,please press “”,and then it will show

“ Safely remove USB Mass Storage Device - Drive(H:) ”,choose the device to be shut down. When it shows

“ Safely Remove Hardware ”, the U disk pull out from computer successfully.

6.4 Version Show

Users can view information about the system hardware and software, including:

- ✧ Update Version: eg: P1.409/rz-xxxx/q10-82
- ✧ Product ID eg: A0020112
- ✧ Soft Version eg: A1.1936
- ✧ Emergency Version eg: A1.1920
- ✧ Soft type: 4-axis carving
- ✧ Hardware type: 4-axis carving Support 3-inch screen Flash Disk Mode

7. Handheld controller operate

When dsp controller connected to machine tool, enter into main interface according to the prompt dialog. Suggest selecting “all axes home”. In “manual control user interface”, user could press “MODE” switching manual motion mode (continuous, step and distance), press “HIGH/LOW” to switch manual speed of each axis.

When process work piece, choose the target file first, and then move each axis to a proper position, and set work piece origin (XY-0 and Z-0). The origin of Z axis, user can also use automatic tool set “TOOLSET” to confirm (Every time tool change only need to calculate Z axis offset value for one time, and only set one of the tools when execute toolset). At last, press “RUN” to start processing. A57 system reads G code and T command for automatically switch tools, T1 is number 1 tool, T2 is number 2 tool)



During processing, press “PAUSE” and then adjust position, work speed and spindle speed.

RichAuto control system support break point and power off protect. During processing, press “CANCEL” to save 1—8 break point. Use combination buttons “RUN”+ “number 1--8” to execute the corresponding break point; Power failure during processing, user can restart system and then all axes return HOME, the system will prompt a dialog to continue previous processing(Remember, if user do not return home after restarting the system, the system will lose the previous memory.)

Note: All of above operation, for detailed key usage please refer to “Button description”.

8. Advanced processing

Advanced processing is to meet the special requirements of operation. It contains: **Array work, resume work, manual tool change, Part work, Calculate bound, Mill plane, Calculate work time, Find**

break number, Auto resize, Scale work. Press combination buttons “”+ “” start advanced processing.


8.1 Array work

Refer to “**Work param configuration**”.

8.2 Resume work

Select saved break point to continue the processing. When selecting, user can move the cursor up



or down, also can press  to enter a new line number to start at the new line. Use combination buttons “RUN” + “number1-8” can start break point processing either.

8.3 Tool changing(Manually)

It means manually loose or pull out the cutting tool in a certain position of machine tool, the position also can be set.

8.4 Part work

Part work means user can select a start line and stop line from G code, so that realize the part working.

8.5 Calculate bound

Calculate bound means user can check the size of processing file, so as to avoid unnecessary waste of materials and processing errors

8.6 Mill plane

Include scanning type and Surround type mill plane. When decided the start position, enter into mill plane to set each parameter, including scan width、scan height、tool diameter、scan depth、Z step and T ratio。

8.7 Calculate work time

Calculate the processing time according to the system processing speed.

8.8 Find break line number

The function is used in the occasion when the system haven't save break point. Move the machine to the nearest point which needs to continue working. (The system will automatically recognize latest working position), in order to reach better processing, we recommend user move the machine to the previous line. Press “RUN”+“0” button to enter into Advanced processing, choose “**Find break line number**”, and then choose the previous process file, carried out in accordance with the prompted dialog box.

Note: User must ensure the work piece origin consistent with previous when using this function.

8.9 Auto resize

Enter into “**Auto resize**”, it will prompt a window as below,

Input	Target	Size
X start		0.000
Y start		0.000
X size		30.000
Y size		30.000
X- Space		10.000
X+ Space		10.000
Y- Space		10.000
Y+ Space		10.000

For example: A 20*20mm square(in red outline), modified all the values as shown in above screenshot. It will output a new square in green outline. The yellow parts are the overlapping lines of blue and red lines. The blue lines are the outlines which have negative and positive spaces.

Shown as below:



Scale the size of process graphic, each axis can be scaling independently.

Scale the size of process graphic, each axis can be scaling independently.

● PS1. System upgrade

Copy upgrade file to U disk, and insert U disk into handle, file format: extension *******.PKG** & shown as **rz-xxxx**. Operate as follow:

During using dsp controller, sometimes it needs update the software version. Customer should update with U flash disk. Copy update file to U disk, and then insert it to the usb communication port on dsp handheld controller. Generally, the update file format is ****.PKG**, the screen shows as **rz-****** or **q**-******.

Method 1: Menu—system configuration—system upgrade, select the update file in U disk, system automatically update, after the upgrade it ask to restart system.

Method 2: Through the keyboard shortcuts “MENU”+ “OK” button, it will skip to system upgrade interface.

Method 3: Emergency recover upgrading. In the case of system can't start normally, using emergency start for upgrading. Generally, do not recommend using this function. Details are holding down any key, then start the system, waiting for over 3 seconds, and then release the key. After that, please operate in accordance with the system prompt.

● PS2. Common troubleshooting

Solutions of the faults information on the screen

1. After power on, the screen flicker or automatically restart.

Analysis and solutions:

- 1). Power supply is insufficient. Check power supply if there are problems, and change high-quality power supply to solve the problems.
- 2). The local power grid unstable. Check local grid voltage instability, or increase the the regulator filter device.
- 3). There are something wrong with the power chip of the handle. This phenomenon also appears when the handle is powered through the USB cable to the computer, please return back the handle to our company.

2. Cannot set working origin during normal operation

Analysis and solutions:

- 1). User may get into the mechanical coordinate system. Press the button "menu" + "1" to switch to the first work coordinate system.
- 2). The buttons are broken. Menu-system setup- buttons check, to check the buttons are normal or not.

Faults in practical operation

1. The file size does not match the size of the actual set

Analysis and solutions:

- 1). Pulse equivalent is wrong. Contact the cnc router manufacture to get the correct values and modify it.
- 2). The engraving cutter selection doesn't in accordance with the knives in processing file. Replace correct cutting tool.

2. Screen prompt exceeding hard limit during processing

Analysis and solutions:

- 1). Machine is not carried back to zero, the system is not able to confirm the actual position. Make the machine back zero.
- 2). After setting the working origin, the reserved range is less than the actual file size . Determine the actual file size and set correct working origin.
- 3). User set the wrong working origin in the processing file. Check the path of the file, and re-export the correct file.

3. Z axis (spindle) fall down abnormally (too fast and damaged the cutter) during processing

Analysis and solutions:

- 1). Working speed beyond the fastest speed of Z axis. " Machine setup " - " Max speed limit " , set the speed to the safe speed.
- 2). Coupling is loosing or transmission slippages. Re-adjustment the connecting parts.
- 3). The lines connect the interface board with the motor drivers has disruption. Re-adjust the lines.
- 4). Processing file error. Check processing file, try to download the correct processing file to U disk or handle internal.
- 5). There is something wrong with the lines connecting Z axis motor and motor driver. Replace the lines.

4. Each time repeating the same processing file after backing to the machine origin , Z axis depth is not the same

Analyses and solutions:

- 1). Machining countertop is uneven or processing object not firmly fixed, re-milling countertop adjust the flatness.

- 2). Z-axis origin detection switch repeat positioning accuracy error, causing each Z axis homing error. Replace a high-quality detection switch.
- 3). Too much interference in the Z-axis homing process to form a false origin. Re-adjust the line.

5. Back to the origin , the machine cannot stop

Analysis and solutions:

Double press on the "menu" button, input signal (origin detection switch signal) self-testing, whether the detection signal is triggered or connect normally.

- 1). The the origin detection switch is damaged. Replace a new one.
- 2). The distance of the origin detection switch detection sheet beyond the detection range of the switch, adjust the position of the test piece.
- 3). The origin detection switch to the interface board wiring aging or loosening. Again check the connections.
- 4). The interface board is broken. Depot Repair.
- 5). 50-pin data cable is broken. Replace it with a new data line.

6. Back to the machine origin , machine move to the reverse direction

Analyses and solutions:

- 1). The origin detection switch types do not match with the definition of the corresponding level. Modify the level. (Normally open type corresponds to a level defined the direction of the arrow down, normally closed type corresponds to the level defined arrow up).
- 2). The origin detection switch is damaged. replace a new one.
- 3). The origin detection switch connects interface board not well. Refresh the line to determine the wiring is correct.
- 4). Too much interference, resulting in the illusion of the detection switch has been triggered. Recalibrated the whole circuit.
- 5). The interface board is broken. Depot Repair.
- 6). 50-pin data cable is broken. Replace the data line.

7. Abnormally working when processing file or the actual file is different from

theoretical file

Analyses and solutions:

- 1). The program disorder.
- 2). External interference is too large.Refresh connection. (separate strong electric from weak current, "GND" of inverter separated from the other components.

8. Start automatic tool setting, the tool does not stop after touching feeler block

Analyses and solutions:

- 1) "cutter" signal line connects "cutter" terminal not well.
- 2) The "GND" terminal of interface board does not connect with spindle shell or connect not well.

9. Handle LCD digital changes, the machine does not move

Analyses and solutions:

If one axis is not moving, it may be a connection problem. Change another normal terminal to this terminal, if it is ok, the motor driver is ok. Maybe there is something wrong with interface board、50-pin cable. If it is still not moving, it is necessary to detect the corresponding drive and motor.

If all axes are not moving , firstly check if there are problems in the 50-pin cable and interface, secondly check the power supply of the motor drivers. Lastly, you have to check the mechanical part.

10. It is normal to the move from one location to another location, but when return from that position to the original position is not normal

Analyses and solutions:

Mechanical problems, screw may install not well.

Electrical components and wiring problem

1. An axis or multi-axis only one-way movement after handle power-on

Analyses and solutions:

- 1). There is something wrong with the lines connect the interface board with the motor driver, check the connection.
- 2). Interface board is damaged. Replace the interface board.
- 3). The motor driver is damaged. Replace the driver.

2. The certain axis motor does not move after handle power-on

Analyses and solutions:

- 1). Operator makes pulse line and direction line oppositely, rewiring it.
- 2). 5V common anode end of the motor driver disconnected, check the connection.
- 3). The motor driver is damaged, operator can promote motor after handle power-on.
- 4). The chip of the interface board damages, no pulse signal output.

3. Screen is not bright after handle power-on, and connected handle to computer with a USB cable the screen displays normal

Analyses and solutions:

- 1). The handle does not connect to power supply. Check DC24V power supply output normal or not, if normal please check the cable from the power supply to the interface board.
- 2). The 50-pin cable is damaged or the interface is broken.

4. Screen is not bright after handle power-on, and connect the handle to computer by USB cable, the screen is also not bright

Analyses and solutions:

- 1). This phenomenon may due to the handle shocked by external force or fall on the ground, causing the crystal processor damaged. Depot Repair.
- 2). Users connect high voltage power supply, Depot Repair.

5. The screen display“spindle on”, actually the spindle off, the screen display“spindle off”, actually the spindle on

Analyses and solutions:

- 1). There is something wrong with wires. organize your wires.
- 2). The output level definition is wrong. Modification correct output level definition.

6. Screen is not bright after handle power-on

Analyses and solutions:

- 1). The power supply voltage is too big or the chip is broken because operator makes positive and negative of the power oppositely. Depot Repair.
- 2). The power supply is damaged. Replace the power supply.
- 3). 50-pin data cable damaged. Replace the data line.

4). Handle 50-pin interface damage. Return back to Repair.