

# CNCUSB Controller

## User Manual

### **Introduction**

#### 1.1

CNC motion controller is a device connect computer with motor driver. It can work with your laptop or desktop which have USB port connection.

This is a complete (hardware / software) project, no need any additional softwares. The control card is compatible with most motor drives, it is the replacement of the drive board of the parallel port.

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## 1.2 Computer System Requirements

Bottommost (lowest) configuration:

1 GHz or faster CPU processor

512MB of memory

500 MB of free disk space

DirectX 9 graphics device with WDDM 1.0 or higher driver

USB 2.0 port

.NET Framework 3.5 SP1

Recommend configuration:

2 GHz or faster CPU

2GB RAM

500 MB free disk space

DirectX 9 graphics device with WDDM 1.0 or higher driver

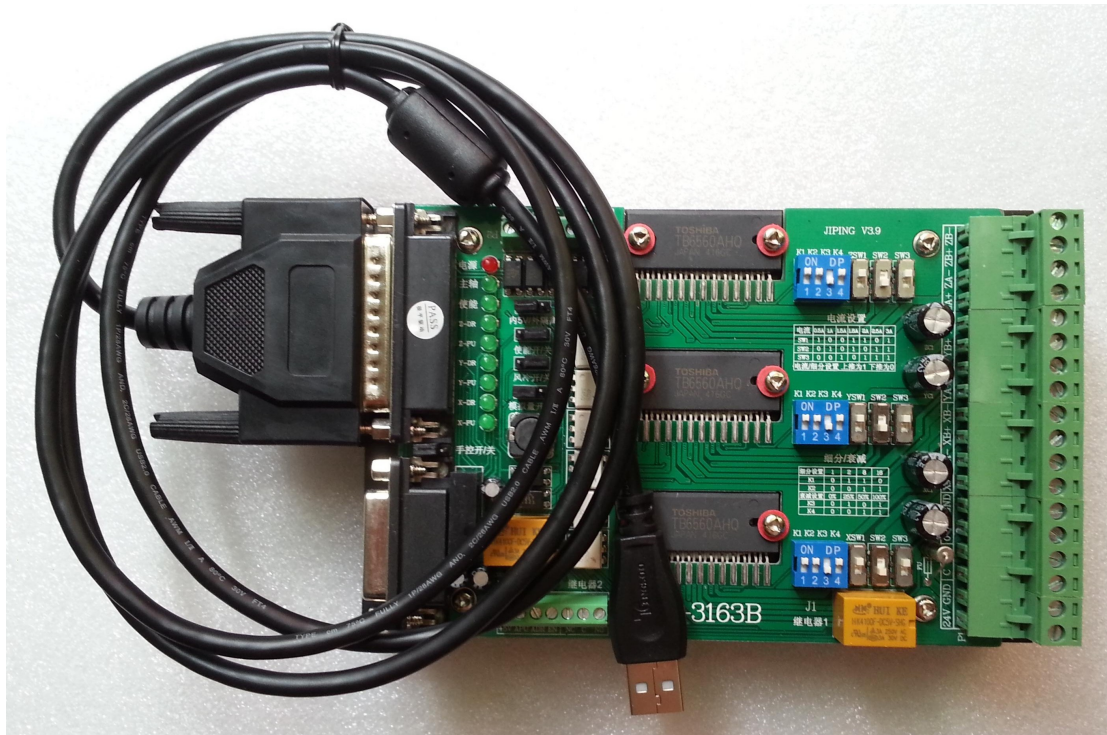
USB 2.0 port

.NET Framework 3.5 SP1

Hardware:



How to connect:



### USB 25 pins functions:

Function	DB25pins	Remark
X axis (step pin)	2	
Xaxis (dir pin)	3	
Y axis (step pin)	4	
Y axis (dir pin)	5	
Z axis(step pin)	6	
Zaxis (dir pin)	7	
A axis (step pin)	8	
A axis(dir pin)	9	
External input interface (optoelectronic isolation)		
IN10	10	External emergency button
IN11	11	X axis limit switch
IN12	12	Y axis limit switch
IN13	13	Z axis limit switch
X、Y、Z、A axis Enabled	14	Enable
IN15	15	Tool setting*
No usage of other pins		

\* this function is choosable, if there was, drive board will available

### Spec&functions

#### 2.1

Run Windows XP, Vista or Windows 7 (32 bit or 64bit) with USB2.0

Andvanced Interpolation algorithm

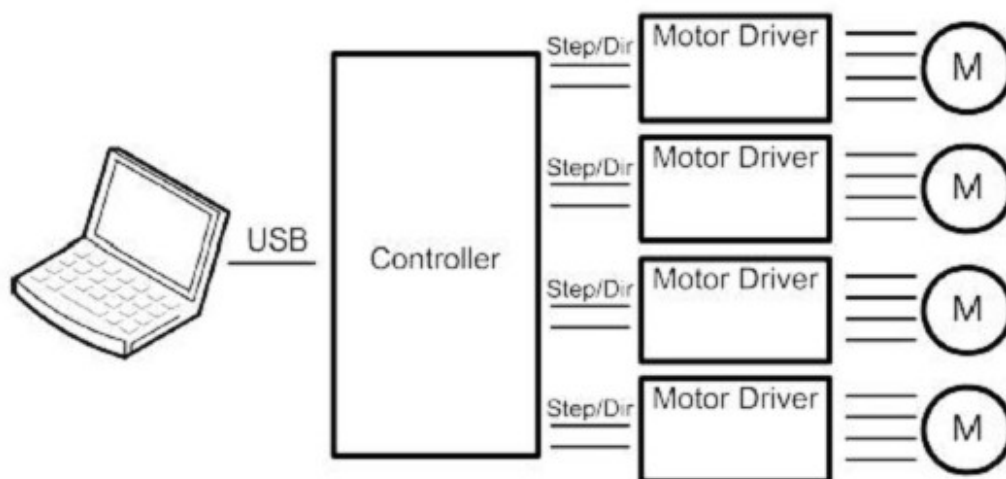
High-performance IO buffer

Provide, Start, Stop, Pause, Continue

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- Support standard RS274/NGC G-code (EMC2 compatible)
- Support advanced G-codes - G40, G41, G42 (tool radius compensation)
- Support advanced G-codes - G43, G49 (Tool length encoding)
- Support advanced G-codes - G54, G59.3 (coordinate system)
- support SolidCAM, MasterCAM, ArtCAM, Vectric, ... creat G code
- support 3-axis, 4-axis.
- Load DXF file
- Load directly PLT/HPGL file
- Load directly picture file
- Load directly drill file
- Load directly GERBER file
- Advanced tool change function
- export G-code
- export DXF
- export CSV
- export NC

安装



## 2.2

One point of USB card connect controller box by parallel port;  
Another point connect computer USB port.

Four-axis controller card instrudtion:

## 2.3

Support 4<sup>th</sup> axis machine

Can switch 3 modes: Normal XYZ, thermal cutting XYUV, rotating XYZA,

Provided for each axis 25 kHz pulse signal

12 us minimum pulse width

All axis limit

Can be accessed by external port, such as hand remote controller;

3 digital outputs (spindle / cutting liquid / mist)

### 3. Software

#### 3.1 Installation

System need to install:

- DirectX 9c for .NET
- Microsoft .NET 3.5 SP1 Framework
- Control software

##### 3.1.1 Install driver

First install --- NET35



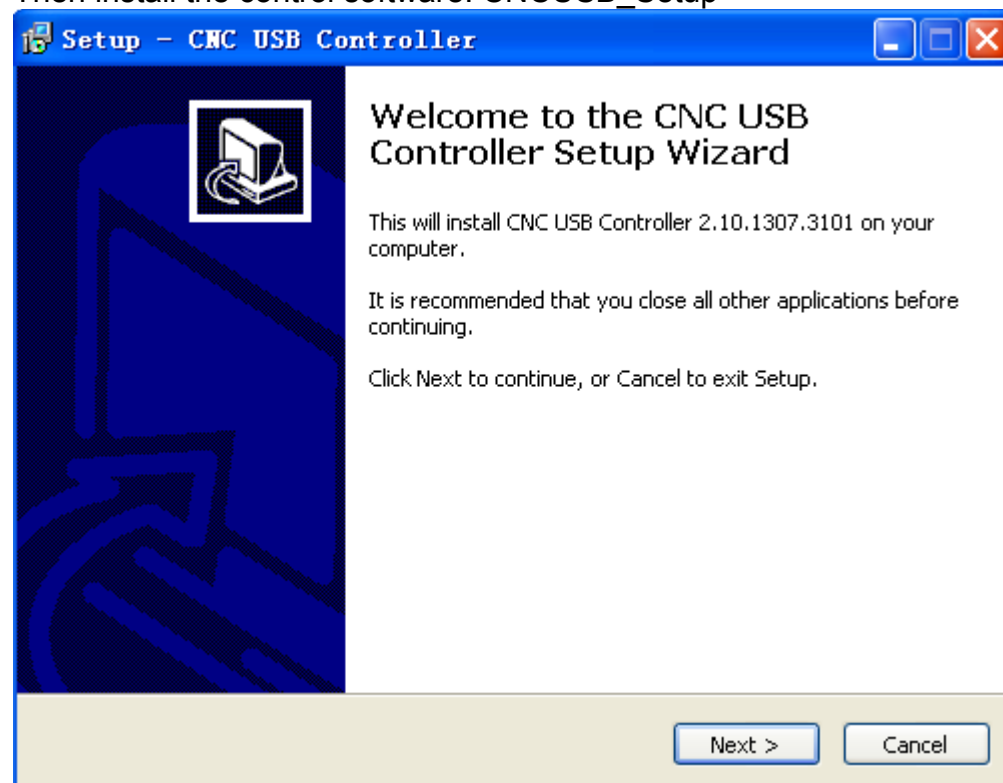
Please wait a second until software installation complete...

Then install DX9:

## 再安装 DX9



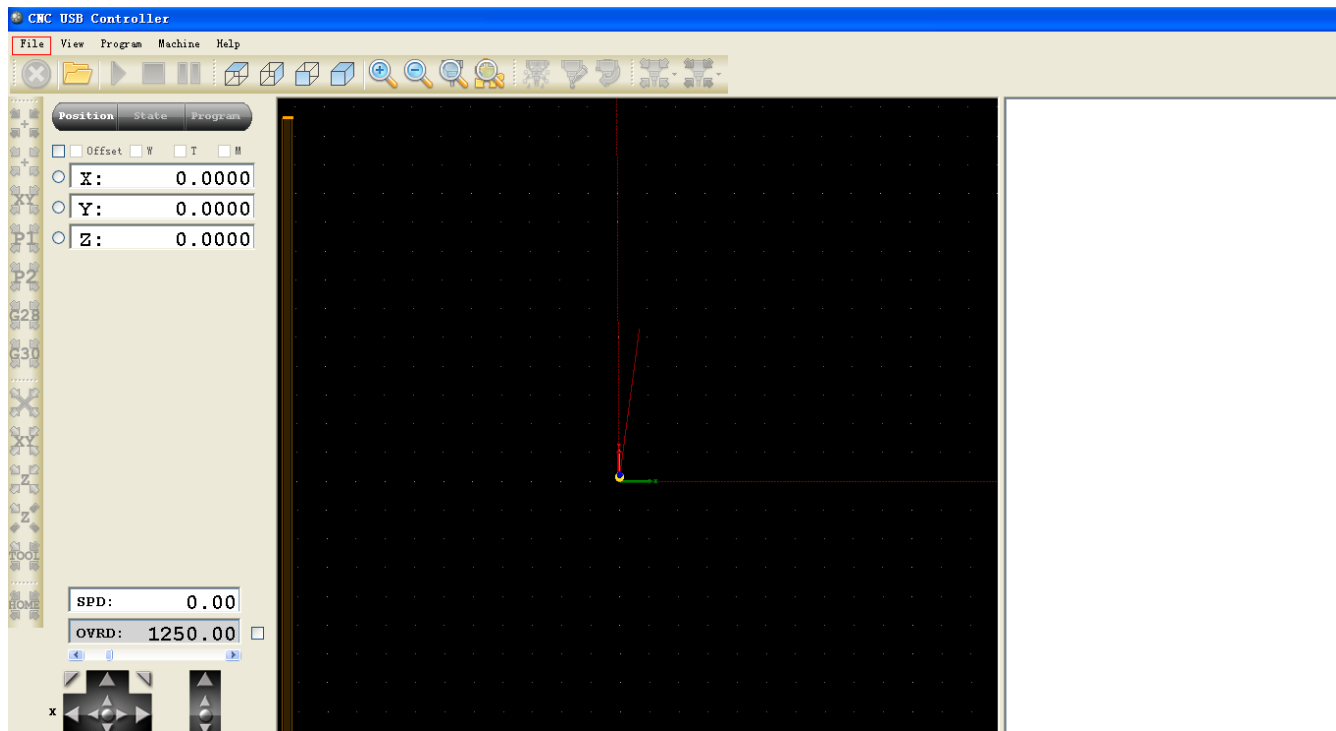
Then install the control software: CNCUSB\_Setup



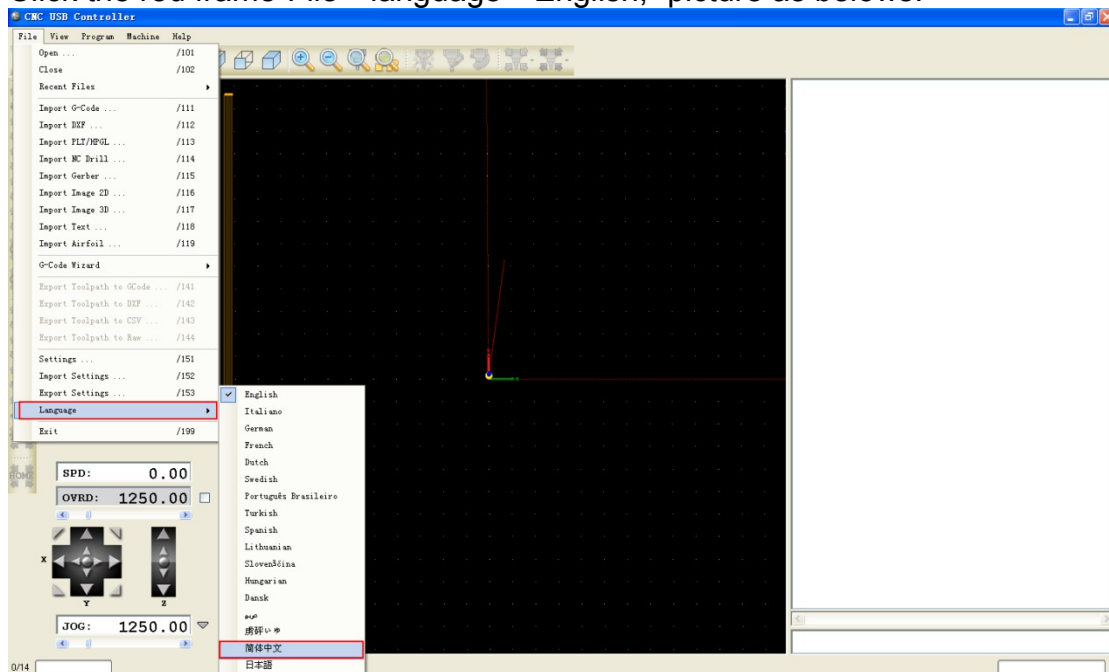
After installation, it needs Registration, otherwise can only run 25 rows Code. This software must work with controller card together.

1, Open CNC USB Controller, choose your language.

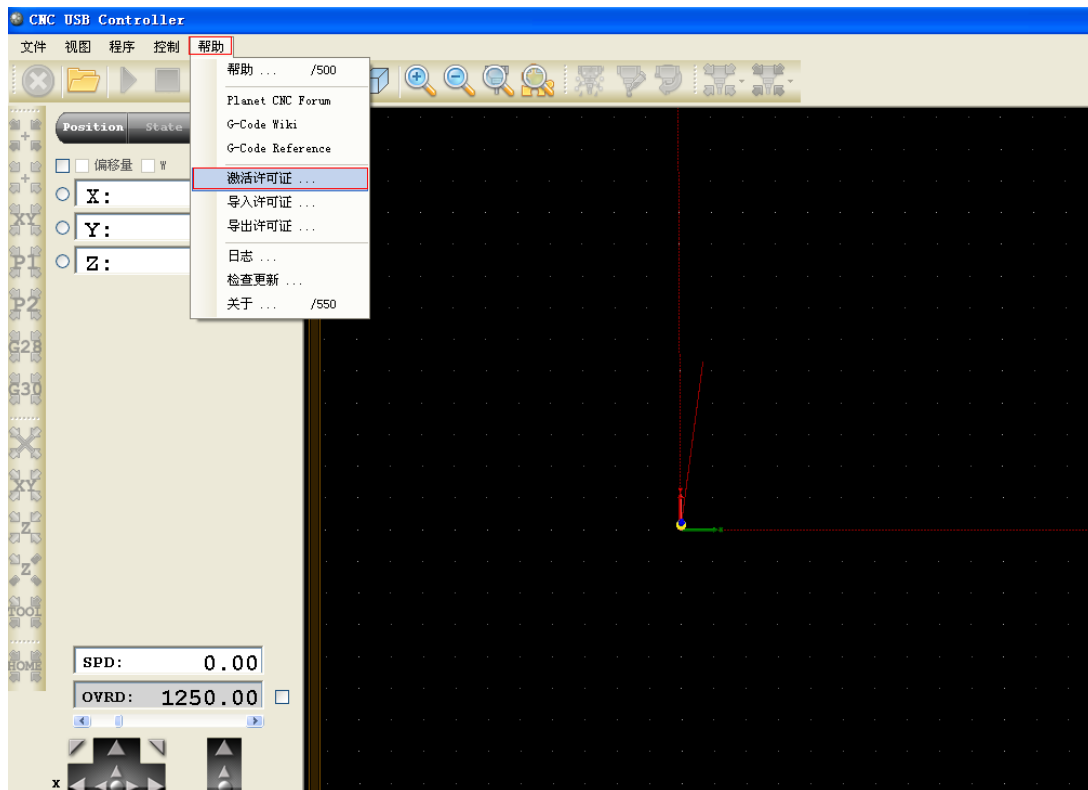




Click the red frame "File---language---English," picture as belows:

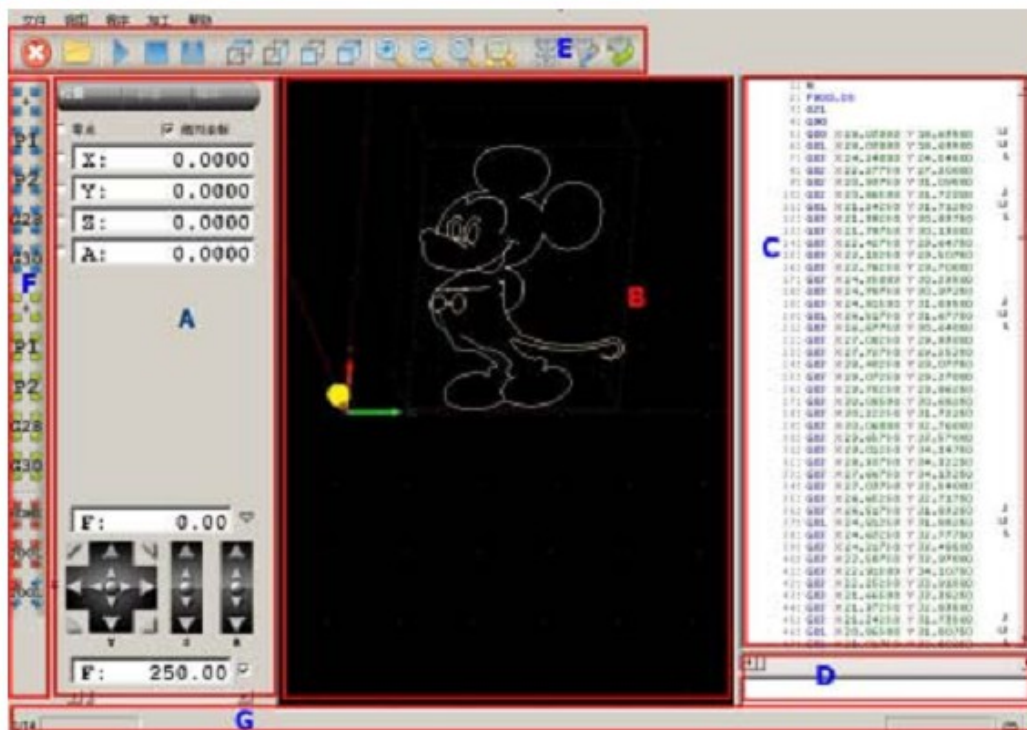


Insert the USB card, click "help"---"activate", enter the register code, picture as belows:



For more convenient, you can save the setting steps, just need to click "File"—Load file (file name usually: XXXX.Setting. )

### 3.3 Main window:



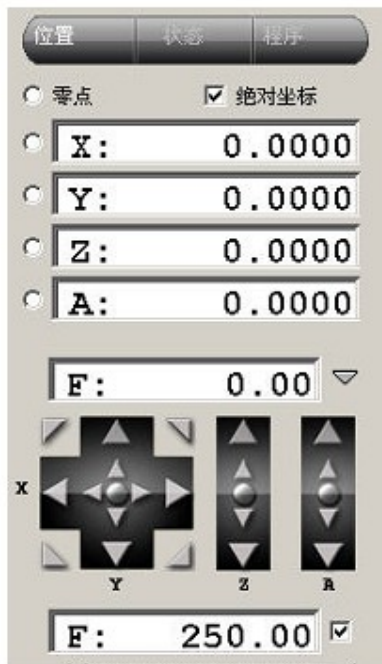
A – Position, status, code information board

B – process code



C – G-code  
 D – manually G-code  
 E – Tool  
 F – common positioning tool  
 G– status  
 Position operate”

### 3.3.1 Main functions:



#### Position

Clear button  
 Current speed  
 Move  
 Speed adjust



Purple background: + Direction limit trigger  
 Red background: - Direction Limit Trigger

Above the window position coordinate system shows the current position information.

Absolute coordinates marked "absolute coordinates" option. You can also enter the figure directly then press Enter,

Of course, that means the position is the new figure. If you enter 0, the current axis position is cleared.

"Zero" button will clear all axis positions.

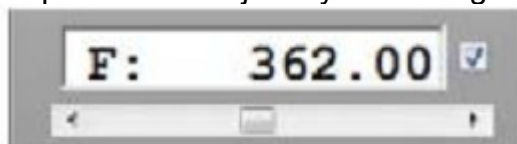
Speed F shows the 'unit / per minute.' Unit setting in the system parameters.

Jog key is moving the equipment to the desired position, the speed limited by the following slider as belows.

F value on the right drop-down button, when clicked, pop Stepping Options box, specify the stepping movement distance.



F speed value adjust by the sliding block:



Specify or entered manually.

Right hook - specified speed, ignoring F order of G code (generally on hook),

After hook, the processing speed can be changed.

Do not hook – use accelerated speed of "General Settings" in speed of G code or system parameters.

The Select Default from the "General Settings" and "specified speed" item definition.

Speed Settings: System parameters "basic settings" default rate, "Axis Set 1"

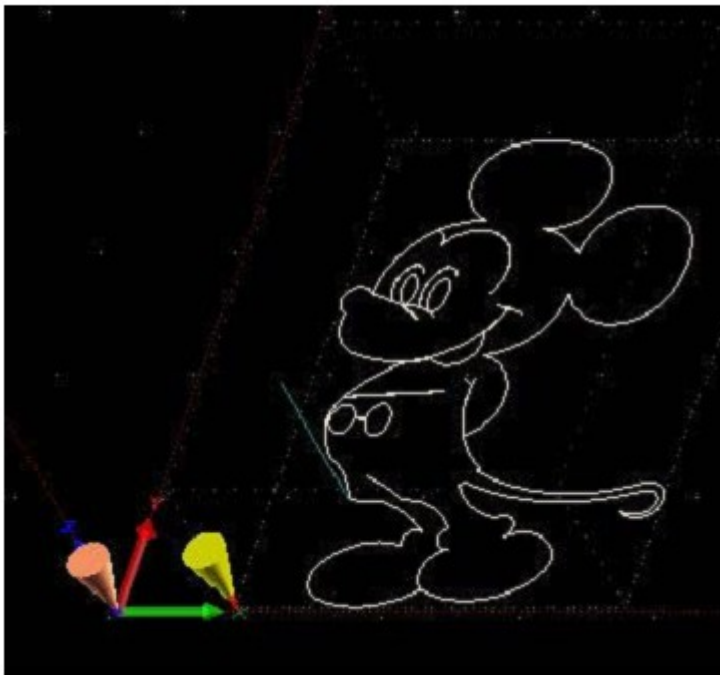
The maximum speed of each axis.

3.3.2 Status of board

位置		状态	程序
▲			
单位	毫米		
平面	XY		
模式	绝对坐标		
进给速度	800.00 !		
快速速度	250.00 !		
进给速度 (0)	250.00		
快速速度 (0)	250.00		
冷却液	未知		
冷却雾	未知		
主轴	Stopped (150.		
轴			
X	0.000		
Y	0.000		
Z	0.000		
A	4.260		
偏移量			
当前	1		
X偏移量	0.000		
Y偏移量	0.000		
Z偏移量	0.000		
A偏移量	0.000		
刀具			
刀具	0 (0)		
名称			
刀具类型	未知		
直径	0.000		
Z刀具偏置	0.000		
▼			
行数	172		
G代码	%		

Show:        Current device status

3.3.4    Processing code window



This window displays the device, tools, machining path 3D map.

Orange Box - device processing capacity range

Gray grid - machine worktable

Axis arrow - display coordinate system origin

Red axis - the origin of the coordinate system selected

White Lines - machining feed path

Green Line – blank path

Red lines - selected path (on the right Select G-code line number)

Yellow Cone - the current tool position

Orange cones - analog display position •

Dark green / gray cone - G28 and G30 Location •

Dark green / gray - project scope and procedures for cutting range

Shortcuts:

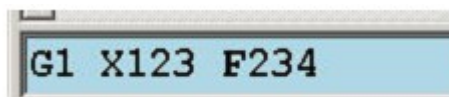
Zoom / shrink: mouse wheel

Shift: Press the left mouse button and move

3D perspective changes: Press the right mouse button and move

### 3.3.6 Manually G code input window

G code text can be entered:



Devices such as input "G1 X123 F234" F-way speed of X axis will be moving forward 123 units.

Toolbar



### 3.3.7

Toolbar functions from left to right:

Emergency Stop  
Open the code file  
Begin  
Stop  
Pause  
Top View  
Lateral view  
Front View  
3D perspective  
Zoom  
Shrink  
Centered at the origin  
Show all

If software shows status below, it says the controller card communication failed, or you pressed the emergency button.



Usual positioning tool as belows:

- 将当前位置设置为零点
- 将当前位置设为 PACK 1
- 将当前位置设为 PACK 2
- 将当前位置设为 G28
- 将当前位置设为 G30
- 设备移动至 零点
- 设备移动至 PACK 1
- 设备移动至 PACK 2
- 设备移动至 G28
- 设备移动至 G30
- 回原点
- 回对刀位 自动对刀
- 在当前位置 对刀






## Status bar

### 3.3.9

Left side display control card cache information

Right side picture shows in controlling status  
When processing, it will shows the working condition

13/14 

11% 00:02:56  

### 3.3.10 File menu



### 3.3.11 display menu





Code menu

### 3.3.12



Device menu

### 3.3.13

紧急停止	Escape
启动	Enter
开始循环...	
停止	
暂停	暂停
断点	▶
冷却雾	Ctrl+M
冷却液	Ctrl+F
主轴	▶
移动到指定位置	▶
当前位置设置	▶
原点	Ctrl+Shift+H
这里刀具长度	Ctrl+Shift+T
刀具长度	
转换	▶
系统固件	▶

## Firmware

upgrade – control card upgrade

Control card must first enter the upgrade mode, after power on shorted external interface pin 7 and 10 . Release, the red status light flash.

Authentication - Compare card firmware and software version are the same

### 3.3.14 MenuHelp

帮助...
Google
G代码标准
参考 NIST RS274NGC G代码
参考 EMC2 G代码
激活授权...
导入许可文件...
导出许可文件...
日志...
检查更新...
关于...

## 4. system parameter setting



#### 4.1 Basic settings

Size unit: Metric or inch

Axis: check your machine 3 or 4 axis ( this card the max 4 axis)

Axis definition: X, Y, Z, A axis(rotary axis); but for cutting usually use: X Y U V.

Axis name:

X, Y, Z – common axes

A, B, C – rotary axis

U, V, W – parallel axis (hot cutting machine)

The default rate

The default setting when the code runs (G-CODE F is not specified when) the feed and air speed, the unit is size

Units / per minute.

Feed - under the knife processing speed (G-CODE in general as G01)

Fast speed ----- Non under the knife movement speed (G00).

Speed limit: hook on the right side of the main interface F value is also selected (meaning software default)

After processing by hook on the main interface to set the F processing, ignoring F G code commands.

Limited to only feed rate: the hook under the knife only after the specified speed

Hook is not empty full speed under the knife away and the main interface F value at.

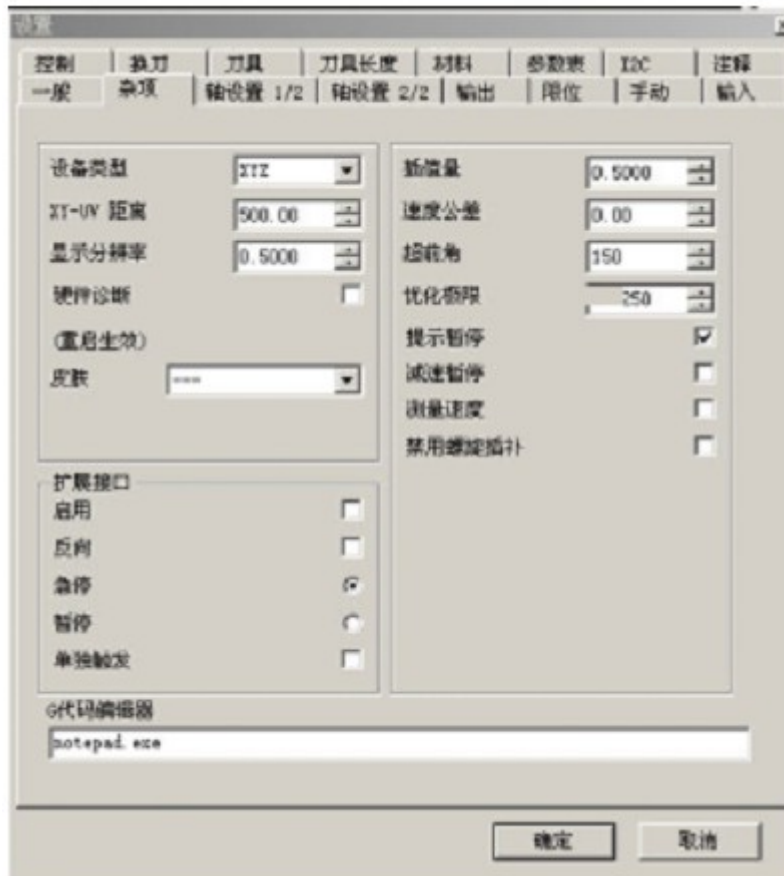
color          Definition icon widget color

shortcut      Define keyboard shortcuts

adjust          Calibration platform, designated units are consistent with the actual movement distance



## 4.2 Miscellaneous



Select the device type:

XYZ - ordinary 3-axis engraving machine

Hot wire - 4-axis thermal cutting

Rotary - device has the rotation A axis

•

XY-UV distance: distance of both ends of thermal cutting

Display Resolution: setting in the middle of the main interface window, processing code icon window, plus small figure will increase the value of the computer Computation.

Hardware graphics acceleration: after on the hook, use graphics graphics acceleration. .

Skin: Select the software interface skin (restart to take effect)

Expansion ports:

Start: Not take effect until the hook is enabled

Opposite: need to take the hook

For the emergency stop button

For Pause

Jog: without self-locking switch must hook

Other:

Advance angle

Advance angle used to calculate the speed, if the angle between the two movements is bigger than this value will not reduce speed. If the angle between the two movements is less than this value will reduce the walking speed. In G-code, use "L" and "J" to display.

### Optimization thresholds

Optimize the degree of optimization of the threshold setting. Program will attempt to delete the lines shorter than the specified length. Set this too low will cause the machine to shake, if set too big, the detail will be lost too.

Pause dialog      Pause pop-up dialog

Pause deceleration      Pause is enabled when decelerating, the proposed hook, avoid high-speed movement will be suspended inertial motion.

### 4.3 Axis setting 1

	X	Y	Z	A
<b>轴</b>				
步数/mm	100.000	100.000	100.000	100.000
反向	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
倒置脉冲	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>加速度</b>				
初始速度	100.00	100.00	100.00	100.00
最大运行速度	0.00	0.00	0.00	0.00
加速度	15.000	15.000	15.000	15.000
<b>反向间隙</b>				
反向间隙	0.0000	0.0000	0.0000	0.0000
<b>刀具位置</b>				
1#刀具	0.00	0.00	0.00	0.00
2#刀具	0.00	0.00	0.00	0.00

确定 取消

### Pulses / step

Set the number of pulses per unit, this value is very important, please use the basic settings after setting the calibration function tests.

Trapezoidal screw pitch is generally 4MM, axis number of steps to be set to 400.

Ball screw pitch is generally 5MM, axes should be set to 320 the number of steps

Reverse

Set against the direction of movement



#### Level inverter

Some motor drives with a total of yin yang connection of different correlation.

#### Acceleration

Movement started from the initial velocity (units / min) and speed (units / second squared) to the maximum speed.

Acceleration value is smaller, the maximum speed from the initial speed to the longer time-consuming, the more stable the motor.

#### Maximum Speed

Please set up the machine movement is not lost step value.

Be careful to set these parameters, serious adjustment.

#### Backlash

Can be set for each axis hysteresis

#### Stops

Set PACK1, PACK2 information.

In manual homing useful tool.

### 4.4 Axis setting 2

Limit

Limits for each axis hardware limit switch, hook hired

Limit -

Usually set to 0

Limit +

Effective working distance, the settings icon in the main interface window will work area

Homing

This function is implemented with hardware limit switch. After execution, the one axial direction, that come into contact with the contact limit switch is a certain position, and then move a distance.

Y axis is homed when the - direction moves at a speed of 200, met - limit switch, the point defined as -10

Point, Y and then moved to 0:00.

That is the Y axis 0:00 from a real hard limit has 10 safe distance.

Note that with the relationship between different coordinate systems.

Lower left corner of the main interface hired origin is in effect.

#### 4.5 Output

设置

控制	换刀	刀具	刀具长度	材料	参数表	I2C	注释
一般	杂项	轴设置 1/2	轴设置 2/2	输出	限位	手动	输入

M3, M4, M5 (主轴)

使用输出引脚 开/关

使用输出引脚 刀具路径

使用输出引脚 速度

最小  最大

暂停 ☐

延迟

正转 开  关

反转 开  关

输出

1# 引脚输出反向 ☐

2# 引脚输出反向 ☐

3# 引脚输出反向 ☐

4# 引脚输出反向 ☐

5# 引脚输出反向 ☐

6# 引脚反向输出 ☐

7# 引脚反向输出 ☐

启用电机反向 ☐

M7, M8, M9 (冷却液)

使用输出引脚 冷却液 (M8)

使用输出引脚 冷却液 (M7)

使电机 (E-停止)

使用输出引脚

退出时 ☐

M62, M63 Pout Qval

使用输出引脚 ☐

M64, M65 Pout Qval

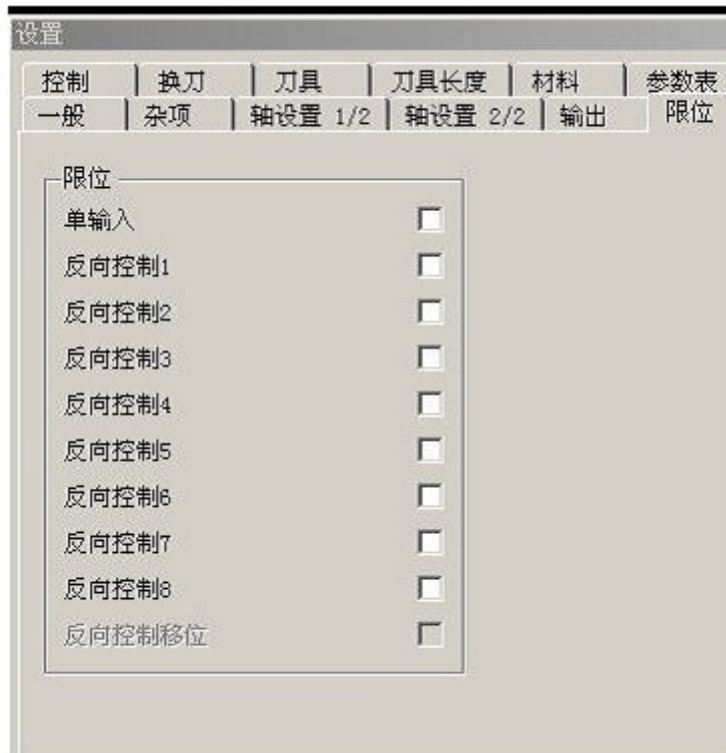
使用输出引脚 ☐

确定 取消

M3,M4,M5 Spindle control command (control spindle function temporarily use)

Switch port  
Direction for the port  
Speed port

#### 4.6 Limit



Single Limit: hook after: each axis - + direction limit sharing a port that is restricted to the axis 2 position switch in parallel. Limit one point to the X with, limit 2 to Y, limit 3 to Z, limit 4 to A.

Not hook: Limit 1 to X-, limit 2 to X +

Anti level: normally closed limit switch hook.

#### 4.7 Jog key



External point switch

Enable

Hook This feature takes effect after

Inverting

No hook

Acceleration and deceleration

After the acceleration and deceleration function hook effect

Stepping

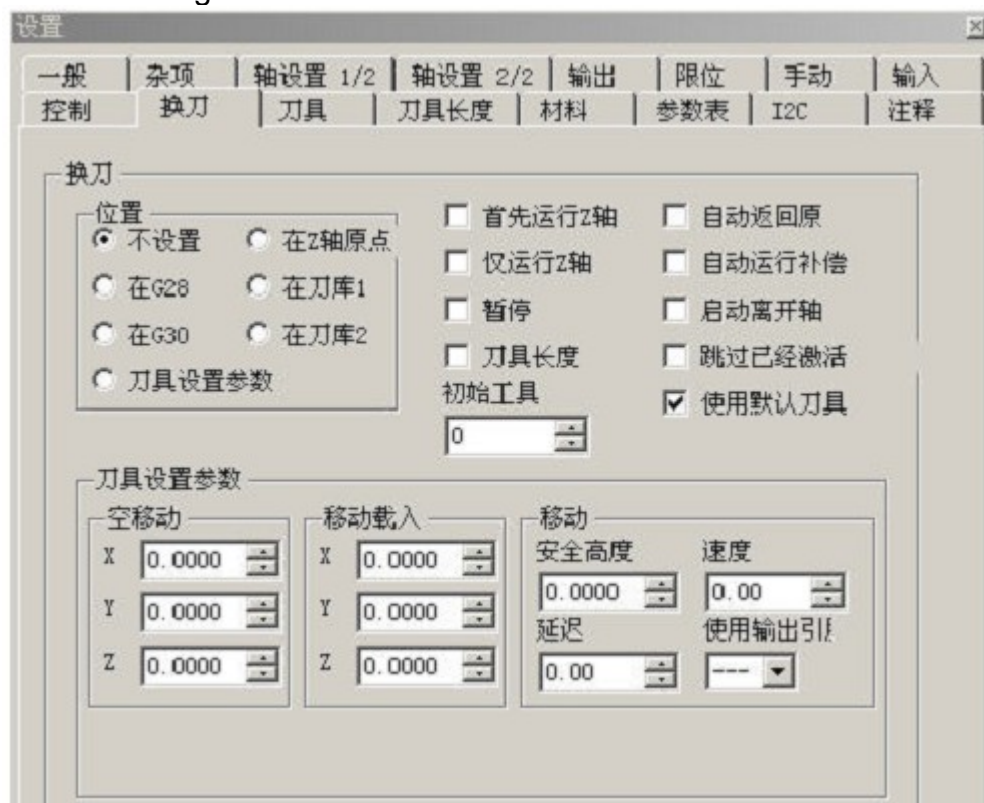
Minimum step size, how many units to move once more

Max speed

Move the fastest speed

Movement speed by the control card external speed potentiometer control, if not then press the top speed.

#### 4.8 tool change



Tool change command (M6) execution triggered.

Location

ATC prior to move the location of the first definition, pay attention to the adequacy of the Z-axis height tool.

Z-axis first move

Just move the Z axis

Pause

Length of the knife

After execution of the knife tool change operation, see below see "the knife"

Back before the tool change position

Automatic compensation

Maintaining spindle status

Status with the hook on the back spindle M3, M5 command and control, do not hook tool will automatically close when the spindle, but only after manual opening tool.

Initial knife

The default knife.

## Tool library settings

### 4.9 Tool bit

The screenshot shows a software window titled '设置' (Settings) with a tabbed interface. The '工具' (Tool) tab is selected. The window contains the following fields and controls:

- 序号** (Serial Number): A numeric input field with the value '0'.
- 名称** (Name): A text input field.
- 刀具类型** (Tool Type): A dropdown menu.
- 备注** (Remarks): A text input field.
- 直径** (Diameter): A numeric input field with the value '0.0000'.
- Z偏移量** (Z Offset): A numeric input field with the value '0.0000'.
- X偏移量** (X Offset): A numeric input field with the value '0.0000'.
- 换刀** (Tool Change) section:
  - X**: A numeric input field with the value '0.0000'.
  - Y**: A numeric input field with the value '0.0000'.
  - Z**: A numeric input field with the value '0.0000'.

Need to cooperate with tool library

### 4.10 Tool setting

The screenshot shows a software window titled '设置' (Settings) with a tabbed interface. The '刀具长度' (Tool Length) tab is selected. The window contains the following fields and controls:

- 刀具长度** (Tool Length) section:
  - 启用** (Enable): A checked checkbox.
  - 位置** (Position) section:
    - X**: A numeric input field with the value '0.0000'.
    - Y**: A numeric input field with the value '0.0000'.
    - 速度** (Speed): A numeric input field with the value '0.00'.
  - 当前位置设置** (Current position setting) section:
    - Z**: A numeric input field with the value '0.0000'.
  - 刀具路径** (Tool path) section:
    - Buttons: '-', '+', and a circular arrow icon.
  - 使用原料** (Use raw material): An unchecked checkbox.
  - 返回** (Return): A checked checkbox.
  - 暂停** (Pause): An unchecked checkbox.
- 刀具传感器** (Tool sensor) section:
  - 启用** (Enable): An unchecked checkbox.
  - 记录位置** (Record position): An unchecked checkbox.

Enable

Enable the feature on the hook

Position the knife speed

Equipment before moving to the XY position, then the Z-axis direction at a speed of a movement in that direction until the limit switch is hit.

Let position is usually the thickness of the knife block, increase the number of



actual use to avoid carving does not penetrate.  
Tool sensor  
Tool usage.

4.11 Material

设置

一般 杂项 轴设置 1/2 轴设置 2/2 输出 限位 手动 输入  
控制 换刀 刀具 刀具长度 材料 参数表 I2C 注释

序号  
0

名称

备注

类型

x尺寸  
0.0000

x位置  
0.0000

y尺寸  
0.0000

y位置  
0.0000

z尺寸  
0.0000

z位置  
0.0000

更新

增加

删除

4.12 parameter

设置

一般 杂项 轴设置 1/2 轴设置 2/2 输出 限位 手动 输入  
控制 换刀 刀具 刀具长度 材料 参数表 I2C 注释

坐标系 1  
坐标系 2  
坐标系 3  
坐标系 4  
坐标系 5  
坐标系 6  
坐标系 7  
坐标系 8  
坐标系 9  
位置 - G28  
位置 - G30  
偏移量 G92

坐标系1 (G54)  
X Y Z  
0.0000 0.0000 0.0000  
A B C  
0.0000 0.0000 0.0000  
U V W  
0.0000 0.0000 0.0000

更新

复位

Set coordinates with several common position.

Modified point update.

Reset to the default values.

#### 4.13 I2C extention



I2C control card provides external communication function, the external hardware support can achieve:

External coordinate display

Spindle control

Other controls.

Ask and answer

#### 5.1 Firmware Upgrade

Each software update, you must also upgrade the firmware. The software will automatically detect.

You can also manually upgrade method for the control card, short external interface 7 feet and 10 feet, and then click the menu upgrade.

Upgrade mode with the usual mode of operation

Status lights flashing at different frequencies.

#### 5.2 Axis zero and cleared

Zero refers to the axis to the current coordinate system 0. Can click the main window on the left toolbar icon.

Clear refers to the current position as 0, according to the location information at the top of the main window button clears all the axes, an axis can also be cleared individually.



### 5.3 Home position



The main window right side  icon, perform automatic back hardware origin, to be used in conjunction with limit switches.

### 5.4 Tool setting operation



Click  (tool setting) or  (Current position tool setting) to operate.

Note:

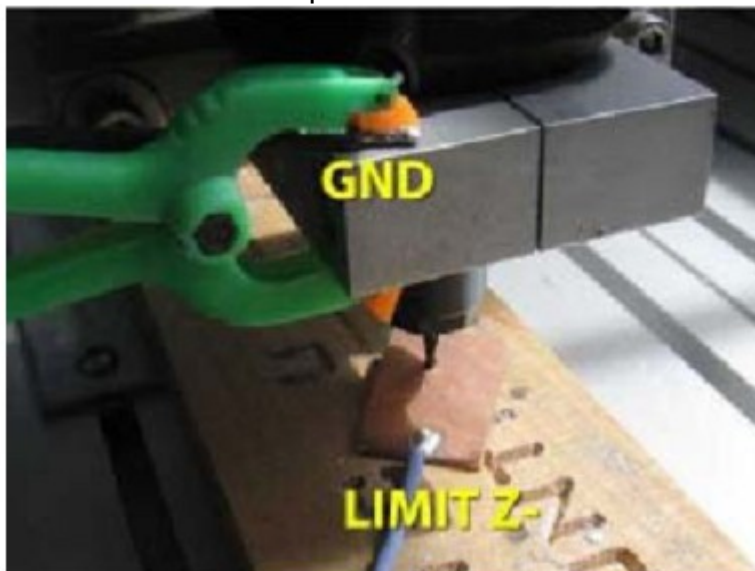
Insulated with a bottom of the PCB board or other flat conductor as a knife block, connected to the Z-axis - or + limit;

Spindle tool is connected to the ground terminal of the control card (GND).

Z axis slowly move down when touched when both, Z axis sensing trigger limit, then the location is right

Knife block thickness.

Z axis will move up four units of exhumation to a safe altitude.



### 5.5 Speed-related options and Precautions

Speed-related Key Points:

Maximum velocity for each axis

In the "axis setting 1";

G code specified velocity;

---

Basic settings in the "default rate" (G code does not specify movement speed);

Specifies the F value (the main window bottom left);

Empty process and feed rate;

The maximum pulse frequency control card 25kHz.

Working speed:

Specified speed (the right side of the main window hook on the bottom left of the F value)

"Feed" or "Feed + empty away" by their own set of F-value work, processing time can be changed.

When not specified, "Feed + empty away" by G-code file F-value work; G F value is not set by the system based on the "default rate" work.

**END.**

**Software updating...**