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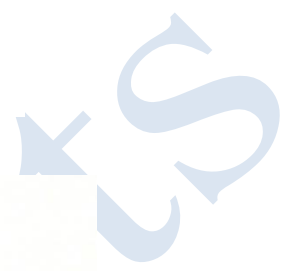
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MACH3 LPT Port USB Card

NVUM LPT

(English Version)





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1. Chapter One Introduction

1.1 Products Introduction

RATTMMOTOR CNC has engaged in the Numerical control industry for 7 years, specialized in the research, development and production of various CNC controller systems with high quality and high reliability. We produce the stepper motor, spindle motor, ATC spindle, Brushless DC motor, Stepper motor driver, and also 1 to 6 axis CNC motion controllers etc

RTM200 is the 4 axis motion controller we spend 4 years to design.

RTM200 support Mach3 software and serial port MPG, through USB to communicate with computer.

RTM200 motion controller adopts the ARM design framework. The ARM design includes communication, code analytic, underlying algorithm and pulse generation. Rational design, reliable control, convenient operation.

This manual introduces operation, connection and usage schedule of our professional motion controller for engraving machine. Through a lot of the drawing the users can learn quickly how to use this motion controller.

1.2 Products specification

- ✓ Support USB;
- ✓ 5 ports input interface for ordinary digital data;
- ✓ 3 ports output interface for ordinary digital data;
- ✓ 1 port 0-10V spindle speed analog output interface (can change to PWM output);
- ✓ can support 6 axis stepper systems, 200KHz pulse output for every axis;
- ✓ ARM motion control chip;
- ✓ Compatible with MPG input, support the digital display MPG from our company.

1.3 Products Appearance and size

RTM200 motion controller is with the plastic shell structure. The controller appearance as the Figure 1-1 show:

The products overall size is 56mm*54mm*22mm;



Figure1-1. NVUM_LPTV1.1 front appearance and size

1.4 Substantival explanation

When operate the NVUM_LPT,where will be a lot of English abbreviation,now we list all of them for your kindly references:

FRO:Feedingadjust:During the operating process,the F value already set,and need to adjust the current feeding speed, then we can adjust FRO value to realize it.

SRO: Spindle speed adjust: During the operating process, the S value already set, and need to adjust the current spindle speed, then we can adjust SRO value to realize it :

Current Speed $S\# = \text{setting } S * SRO$.

SRJ:speed adjust manually

During the operating process,as the manual speed already set,and we need to adjust the current speed,and impossible to fix the value during it is working,then we can revise the SRJ value to realize it.

Current manual speed $FS\# = \text{Setting manual speed} * SRJ$.

F:Feedingspeed,the unit is mm/min.For example $F=200$,means every minute feeding 2000mm.

S: Spindle Speed. Unit is rad/min. For example S=20000, means 20000 revolution/Minute.

X axis Coordinate

Y axis Coordinate

Z axis Coordinate

A axis Coordinate

1.5 Noting and Waring



Free from exposure to the electronics without waterproof function. Please environment as dry as possible. This is the icon.



Wiring warning, the IO input terminal of this equipment support the equipment with source switch (such as Inductive proximity switch.) When using such kind of switch, attention please: avoid the +terminal and -terminal of power supply to connect with GND. This equipment's analogy quantity output terminal of spindle control also have a certain load capacity. Please avoid this terminal connect with GND. In case that the interior components and parts be broken down.



Operation warning, Please do the security measures well when connecting with the machine tools. The ESTOP, limit and other things must be perfected. When comes across the emergency, please press the ESTOP key at once or cut off the power directly, thus avoiding the equipment damage and casualty.



High voltage danger, the primary device is 18-32VDC power supply. Voltage equipment. Pls pay attention to the electricity, safety when conducting the operation

2. Chapter Two Connection

2.1 Product connection define and method

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Figure2-1. Product wiring section and interface summary

As the Figure 2-1 showed,the connection of the controller includes USB connection interface, MPG interface and LPT controller port. Now we descript them in details as below.

2.2.1) LPT Controller interface

As Figure 2-1 showed,No.1 is LPT Controller interface. In the first row, from right to left, it's PIN1 to PIN13; in the second row, from right to left, it's PIN14-PIN25. PIN1-PIN9,PIN14,PIN16,PIN17 are output PINs, which can be set as PWM, usual output and stepper motor control port. and PIN10-PIN13,PIN15 are input PINs, which can be set as probe, limit, estop and home. See as table 2-1.



Figure2-2. sequence of LPT port

No.	INPUT & OUTPUT	Note
1	OUTPUT PORT	Can be set as usual output\stepper motor controller port and spindle PWM output
2	OUTPUT PORT	
3	OUTPUT PORT	
4	OUTPUT PORT	
5	OUTPUT PORT	
6	OUTPUT PORT	

7	OUTPUT PORT	
8	OUTPUT PORT	
9	OUTPUT PORT	
10	INPUT PORT	Can be set as limit/estop/probe/home
11	INPUT PORT	
12	INPUT PORT	
13	INPUT PORT	
14	OUTPUT PORT	Can be set as usual output\stepper motor controller port and spindle PWM output
15	INPUT PORT	Can be set as limit\estop\probe\home
16	OUTPUT PORT	Can be set as usual output\stepper motor controller port and spindle PWM output
17	OUTPUT PORT	
18-25	GND	Ground

Table 3-1 Stepper driver control interface define

NVUM_LPT can replace computer's LPT port, and performs better than computer's LPT port. This port connect to stepper driver board see as figure 2-3.

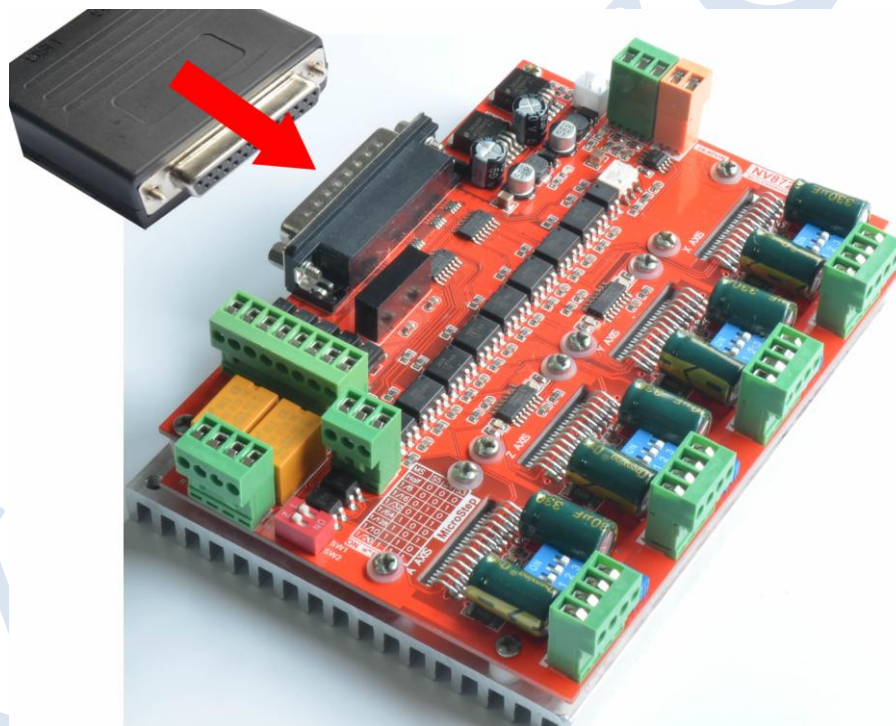


Figure2-3. Connect with Stepper driver board

2.2.2) MPG connection

As shown in Figure 2-2 marked 2 of the location of the serial port MPG, the port type is RJ45, that is, the common standard network interface. Serial pulse generator pulse generator is the standard pulse generator, the axis of choice, such as the choice of power through the serial port and host interaction. Serial port hand pin, pin label reference figure 2-4, from left to right in order PIN1-PIN8. Serial port hand pulse pin definition reference table 2-2. serial port manual pulse using method reference serial port manual pulse user manual.



Figure2-4. Pins Number of MPG

No.	Mark	Definition
1	GND	GND of MPG
2	RXD	Serial input communication port
3	TXD	Serial output communication port
4	+5V	5V power port
5	FHA+	A+ of MPG
6	FHA-	A- of MPG
7	FHB+	B+ of MPG
8	FHB-	B- of MPG

2.2.3) USB Port

As the Figure 2-1 show, The marked No. 3 port is USB communication port, NVUM_LPT communicate with mach 3 through it.

3. Chapter Three Software Installation

3.1 MACH3 Install

When you purchase our product, we will supply a CD-ROM, which contains the MACH3 installation, registration, and USB plug-ins. See as Figure 3-1

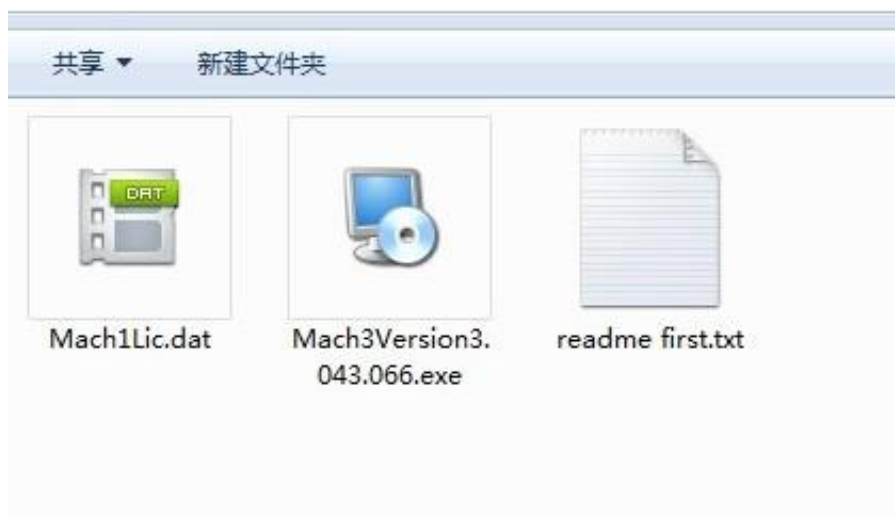


Figure3-1. MACH3 soft installation

First run the installation Mach3Version3.043.066 .Into the first page. See as Figure 3-2.



Figure3-2. MACH3 installation process 1

Click Next and then enter the page shown in Figure 3-3

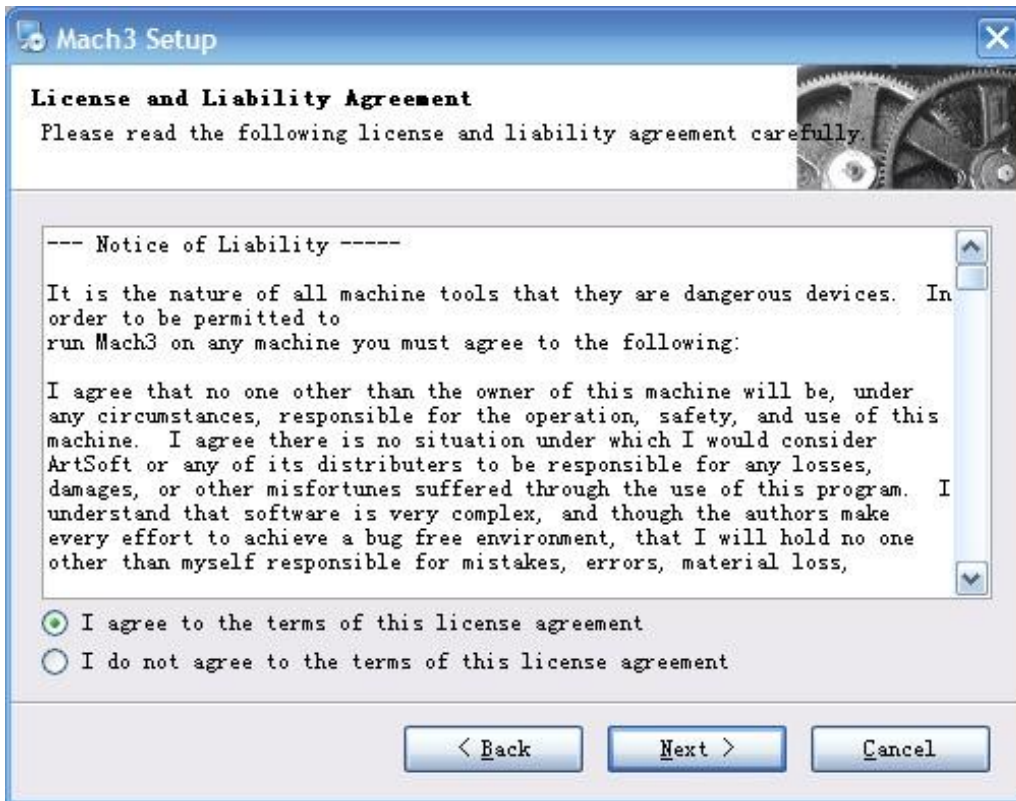


Figure3-3. installation process 2

Select I agree and click Next, See as Figure 3-4.



Figure3-4. MACH3 installation process 3

Select the installation path, click Next (it can be installed on any disk, and recommended to install the C drive or the D drive) See as Figure 3-5

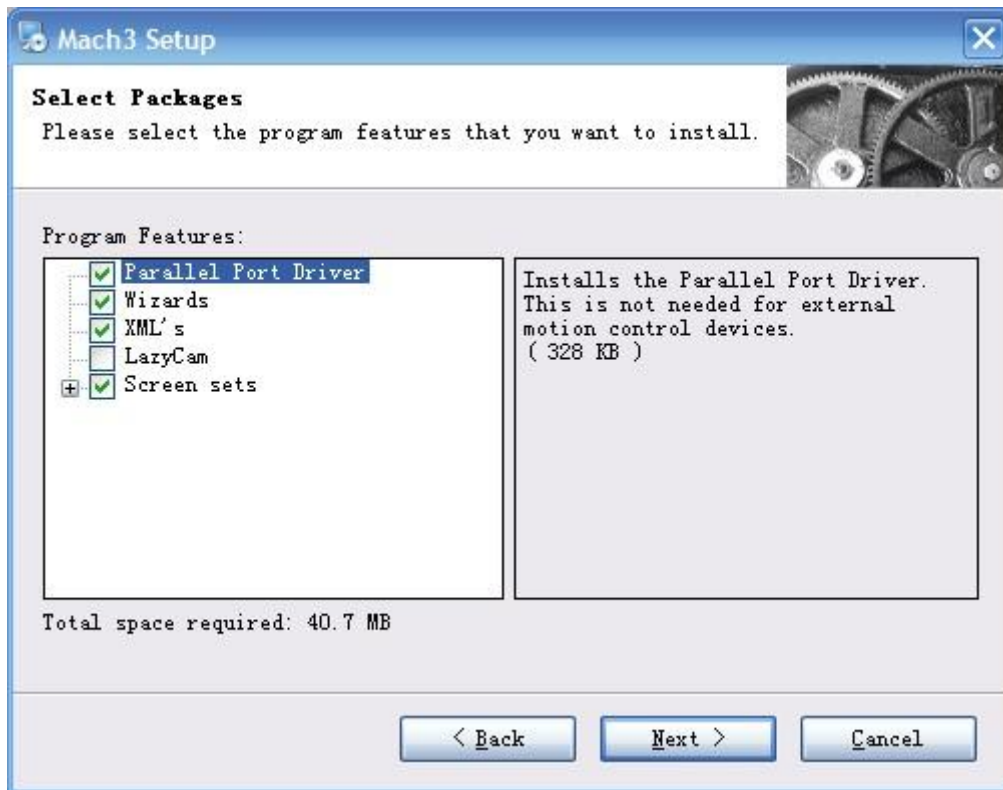


Figure3-5. MACH3 installation process 4

Click Next until completion. Then restart the computer.

3.2 NVUM_LPT Plug-in installation



Copy the file NVUM_LPT.dll to X:\Mach3\PlugIns, X is the disk where the soft is installed.

4. Chapter Four

Setting of software

4.1 Open software



Double-click the mach3mill

Enter mach3 software. Pop-up the plug-in dialog box. See as Figure 4-1.

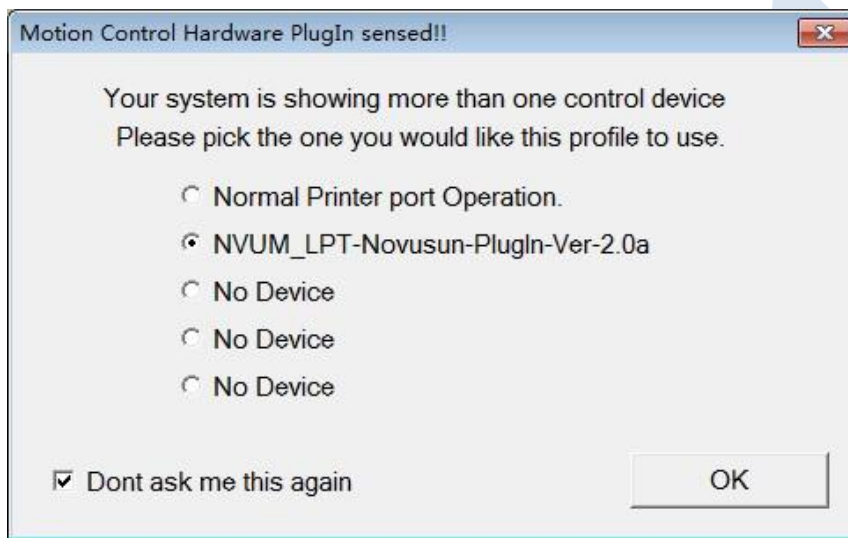


Figure4-1. Plugin selection dialog

Choose our plugin NVUM_LPT_Novusun-PlugIn---Ver-2.0a. Then press OK. If you do not want the dialog box appear again next time, you can select Don't ask me this again. If connect successfully, Status bar will show "NVUM_LPT device is connected to your computer". See as Figure4-2.

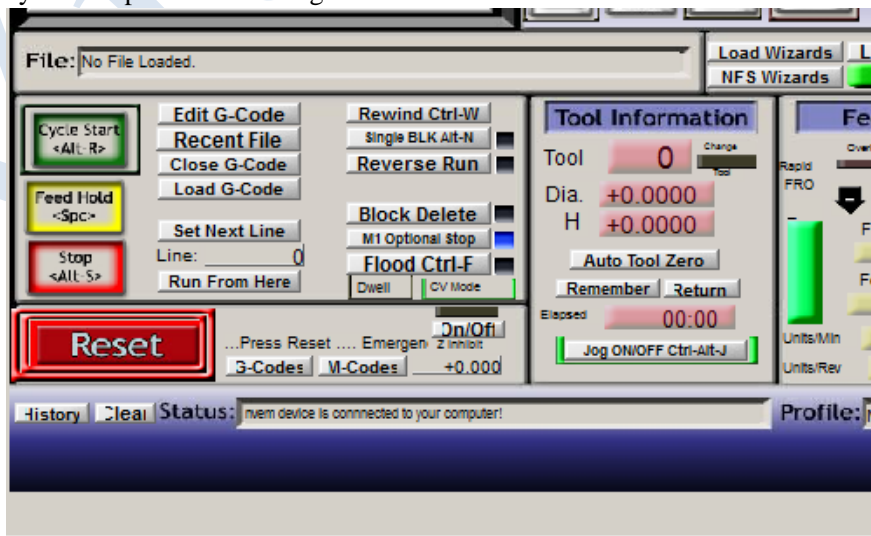


Figure4-2. connect successfully

4.2 Software Common settings

4.2.1 Check NVUM_LPT plugin

Click config plugins to input PluginConfig, you can see NVUM_LPT. See as Figure4-4.

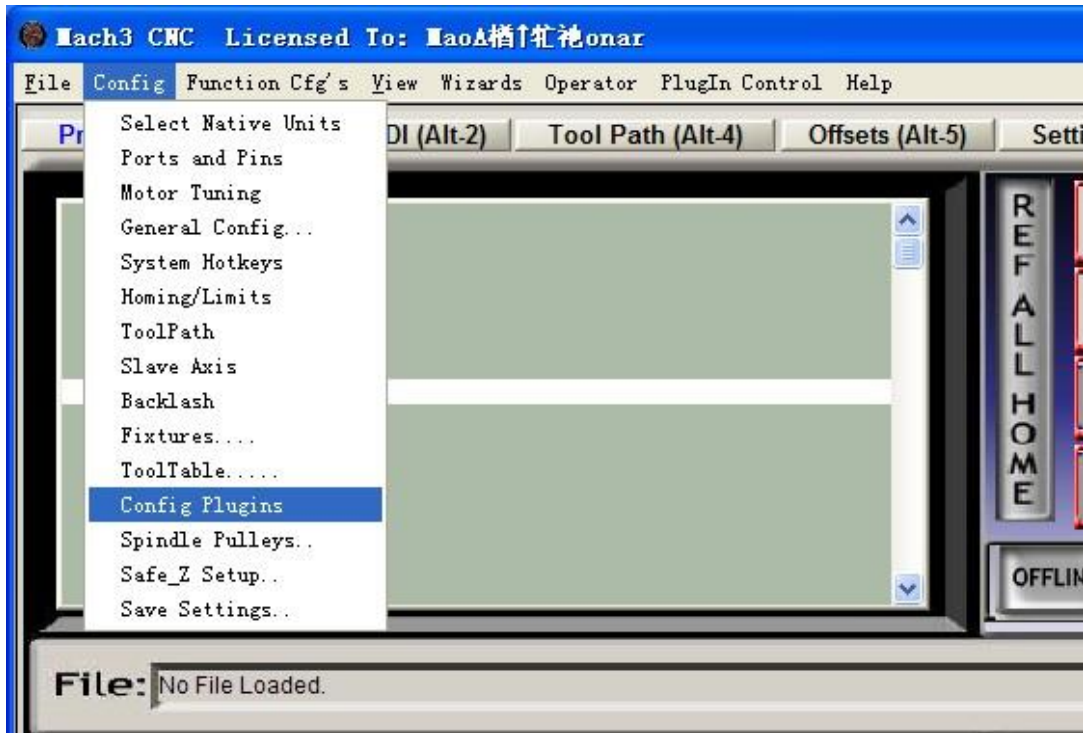


Figure4-3. Input Config plugins

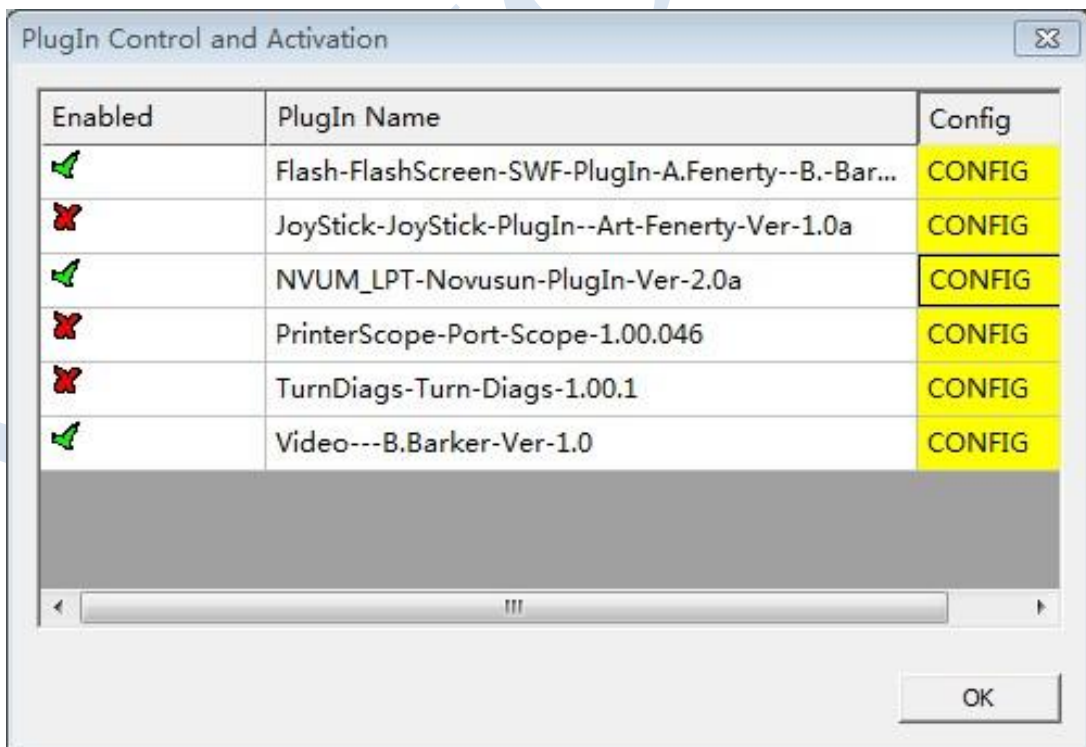


Figure4-4. MVUM Plugin

4.2.2 Motor operating parameters setting

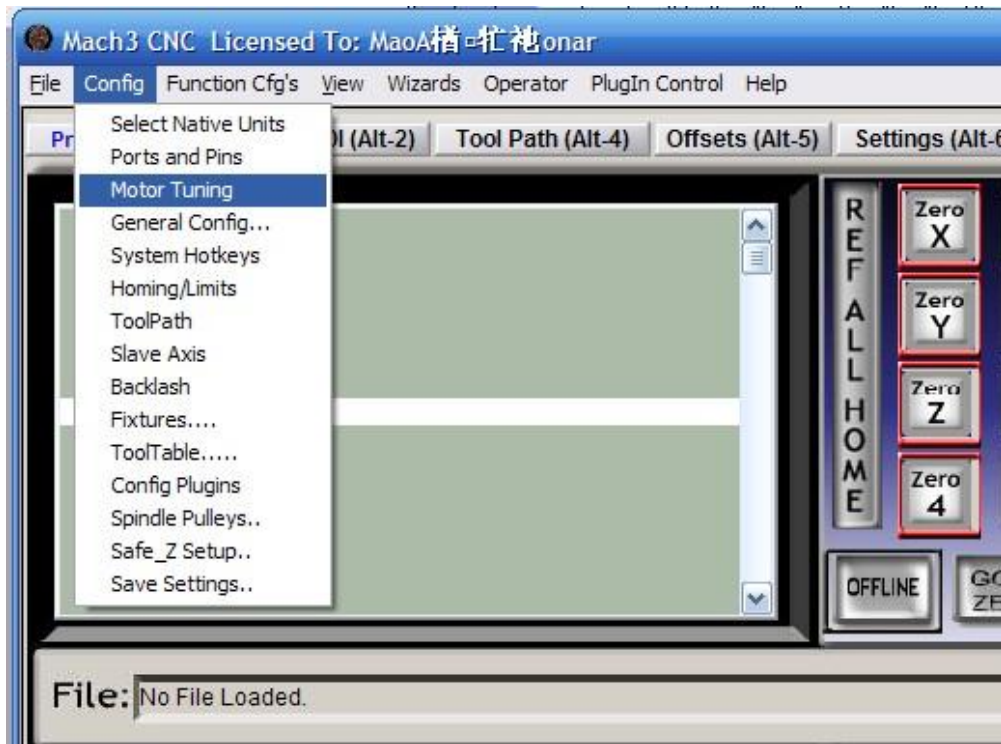


Figure4-5. Motor operating parameter setting menu entry

See as Figure 4-5. From submenu “motor tuning” of the menu “config” into the motor parameter settings dialog. See as Figure 4-6

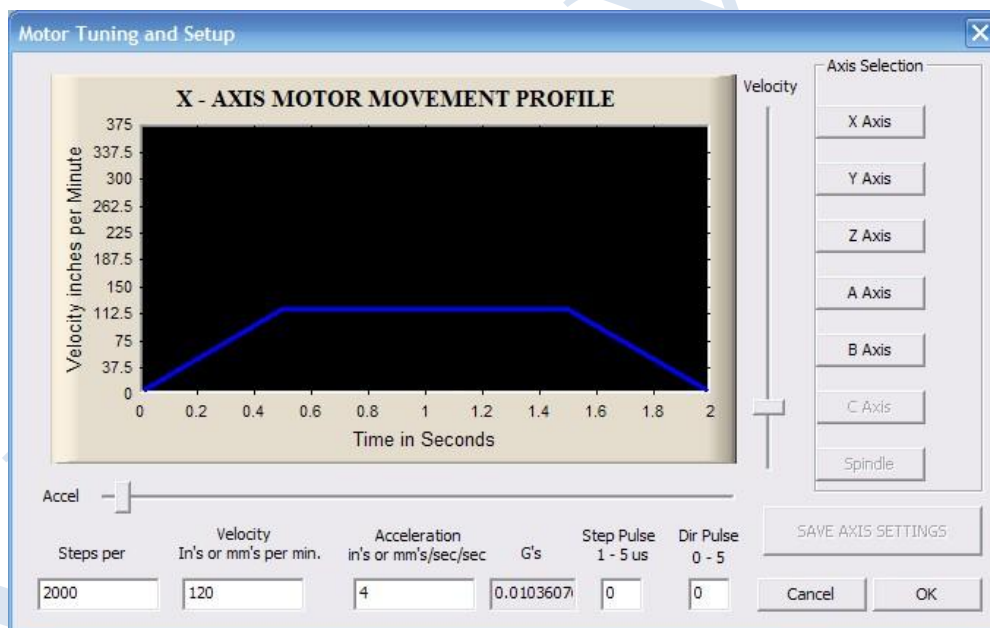


Figure4-6. Motor operating parameter settings dialog

The parameters are defined as follows:

Steps per: Pulse equivalent, it is number of pulses required with axial movement 1mm, This can be calculated by lead screw pitch and motor drive segment. Such as pitch 2.5mm, 2-phase motor 8 segments, Calculation method is $8 * 200 / 2.5 = 640$.

Velocity: The speed is the axial velocity, Units is mm/s, Recommended settings 1500.

Acceleration: Units is mm/s², Recommended settings 200.

Step Pulse: Step Pulse Cannot be set, it's 2.5us in default.

Dir Pulse: Dir Pulse Cannot be set, it's 2.5us in default.

Attention: The parameters for each axis is not necessarily the same, To select the axis, and then set

parameters. You should click “SAVE AXIS SETTINGS” After setting.

4.2.3 Port Settings



Figure4-7. Port setting entry

See as Figure 4-7, Click the sub-menu “ports and pins” of menu “Config” into Port Settings dialog box.

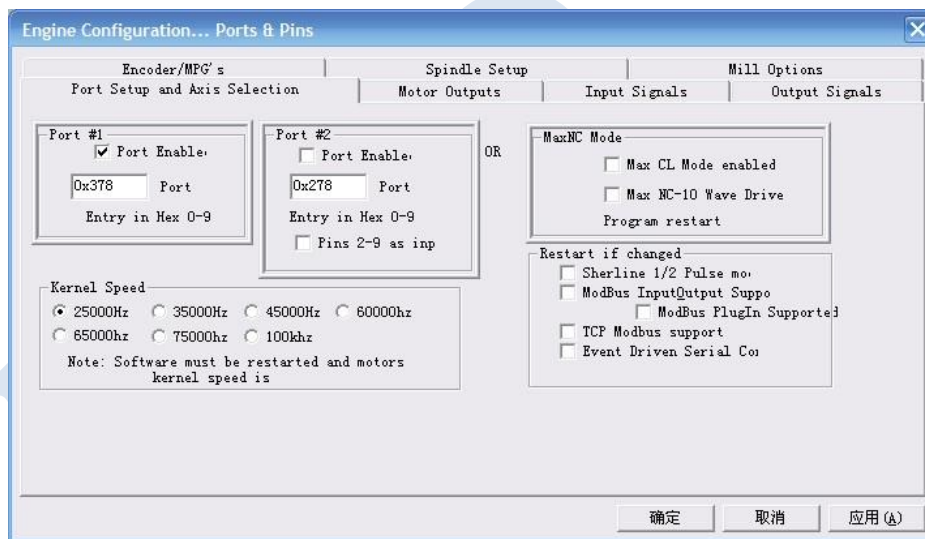


Figure4-8. Pin&Port Dialog

The sub-pages you need to set include “Motor Outputs”, “Input Signals”, “Output Signals” and “Spindle Setup”. First Click to enter “Motor Outputs”. This page is to select the stepper motor control pin. See as Figure4-9. Here based on the actual customer application board to set the pin definition, here we take NV872T4 as an example, the XYZA 4 axis pulse and direction signals in turn PIN2, PIN3, PIN4, PIN5, PIN6, PIN7, PIN8, PIN9.

To make the Z axis to the same direction, Z axis’s “Dir low” should be set to “√”. Other axes’s should be set as system need.

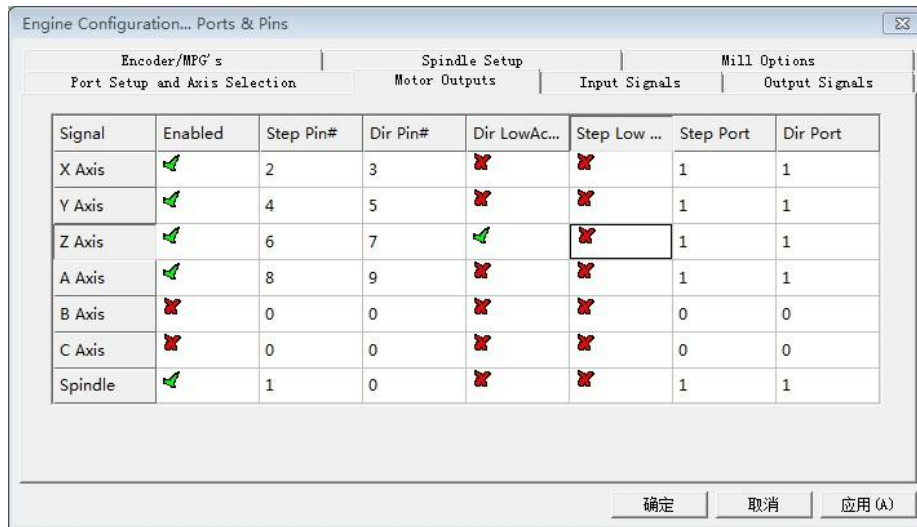


Figure4-9. Stepper motor port settings dialog

Click “Input Signals” Into the input signal settings page. See as Figure4-10. Here LPT prot 10-13 were configured as X++,HOMEX,Y++,HOMEY.

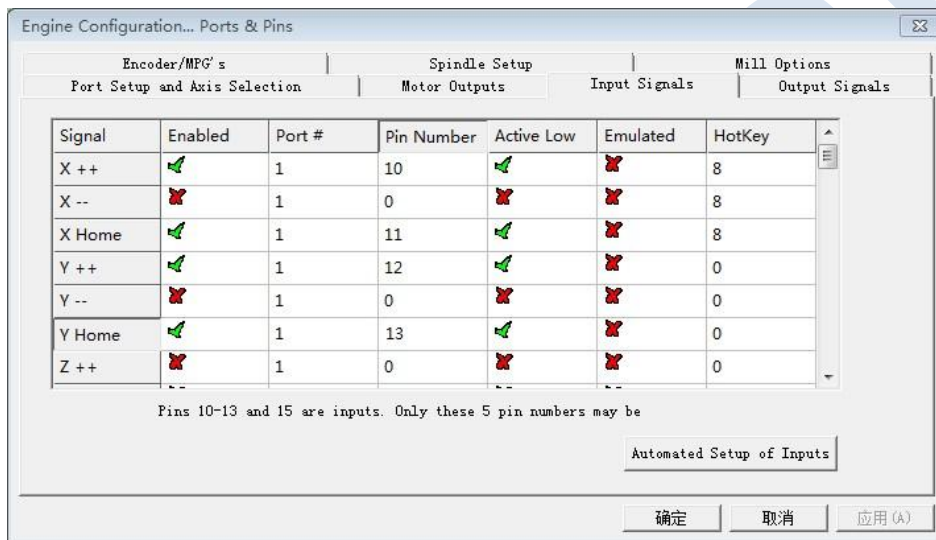


Figure4-10. limited Input Settings dialog

Here you can configure according to your actual needs the corresponding function.

Optional Function include XYZABC6axis’s Upper and lower limit, XYZABC6axis’s HOME point.

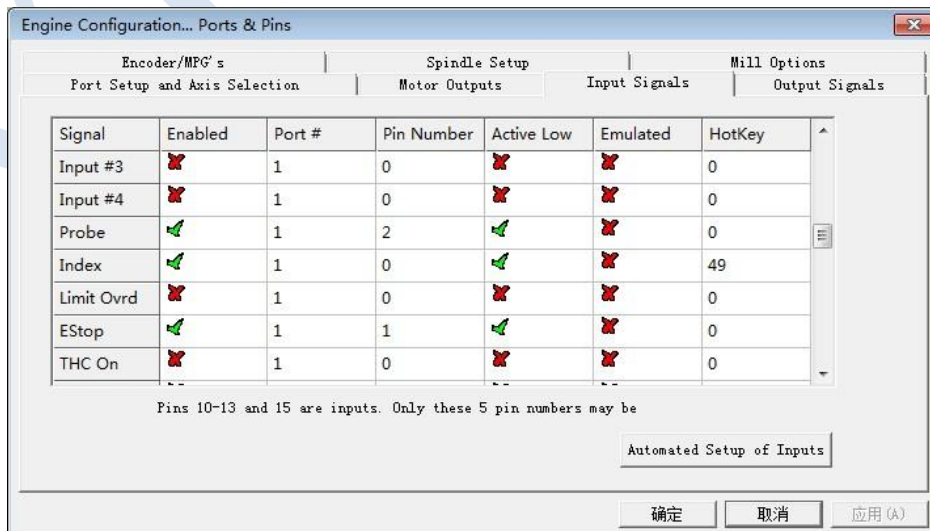


Figure4-11. Estop Probe and index Setting dialog

PROBE, ESTOP and Spindle speed back index Setting see as Figure 4-11,

Click “Spindle Setup” switch to the spindle settings page. See as Figure4-12.

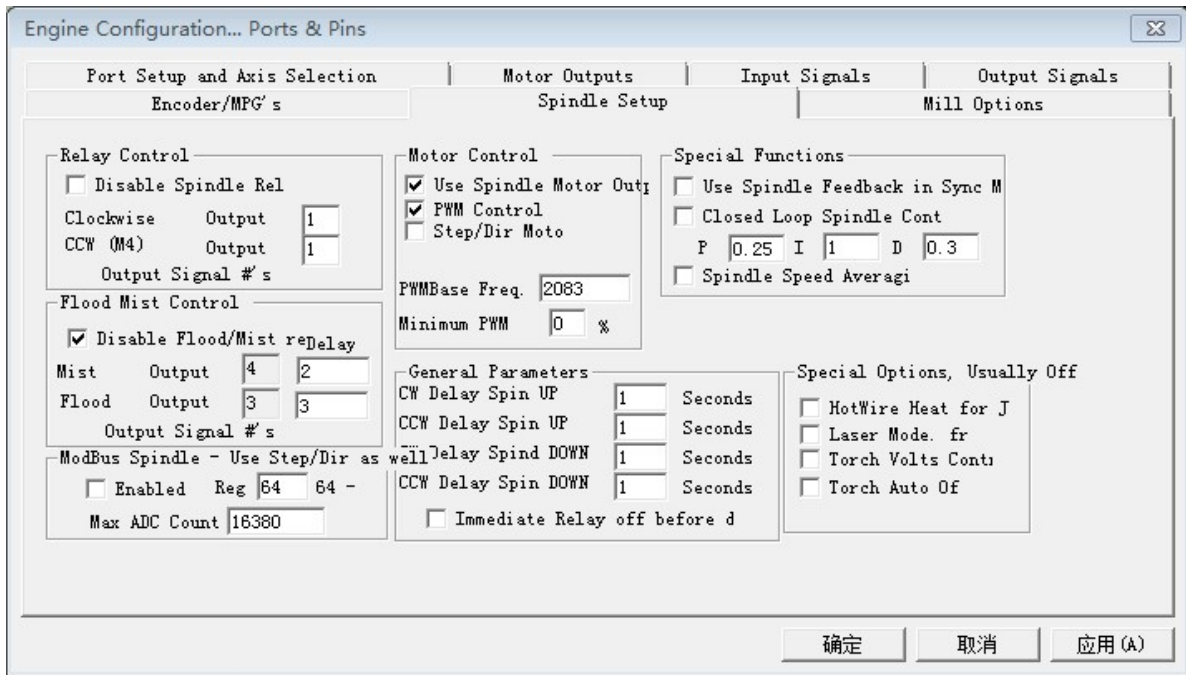
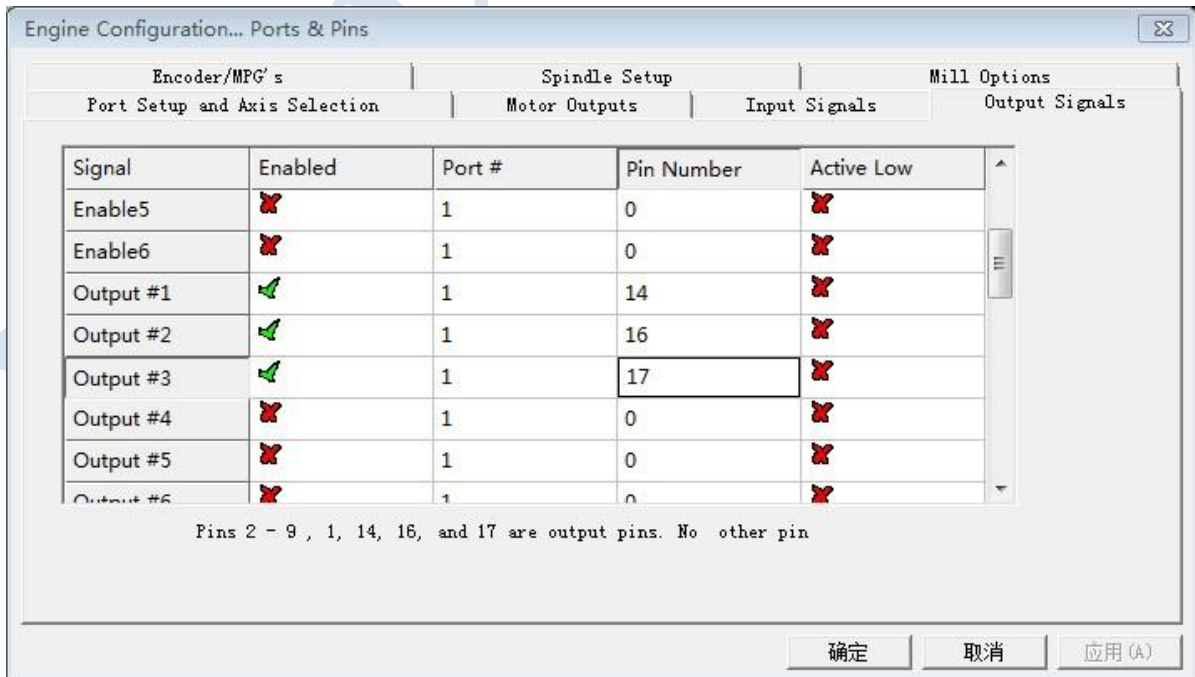


Figure4-12. Spindle Settings dialog

Here we can configure the spindle rotates CW、Reverse CCW、Mist、Flood pin, See as Figure4-13,They have been configured as 1、2、3、4. Corresponding to output#1~output#4 in Figure4-14.output#1~output#6 in Output Signal Setup dialog can be Configured into these 4 signals. Here we only configure CW \MIST\FLOOD. They are M3\M7 and M8 in G-code file. CW is controlled by OUT1 and MIST is controlled by OUT2 and Flood is controlled by OUT3. Here we note correspondence between 2 page. Please select “use spindle motor output” if required PWM speed spindle. And select “PWM Control”. Our PWM pin fixedly on stepper motor config page see as figure 4-9, we set PWM to PIN1.



Spindle setting corresponds to the

5. Chapter Five Using of software

5.1 Set Machine Coordinate system

Firstly Open the software,as the drawing 5-1 shows,at this time,the software can operate the machine movements,but before the setting machine coordinate system,there is no connection between the software and machine.So first step is to set the machine coordinate system.

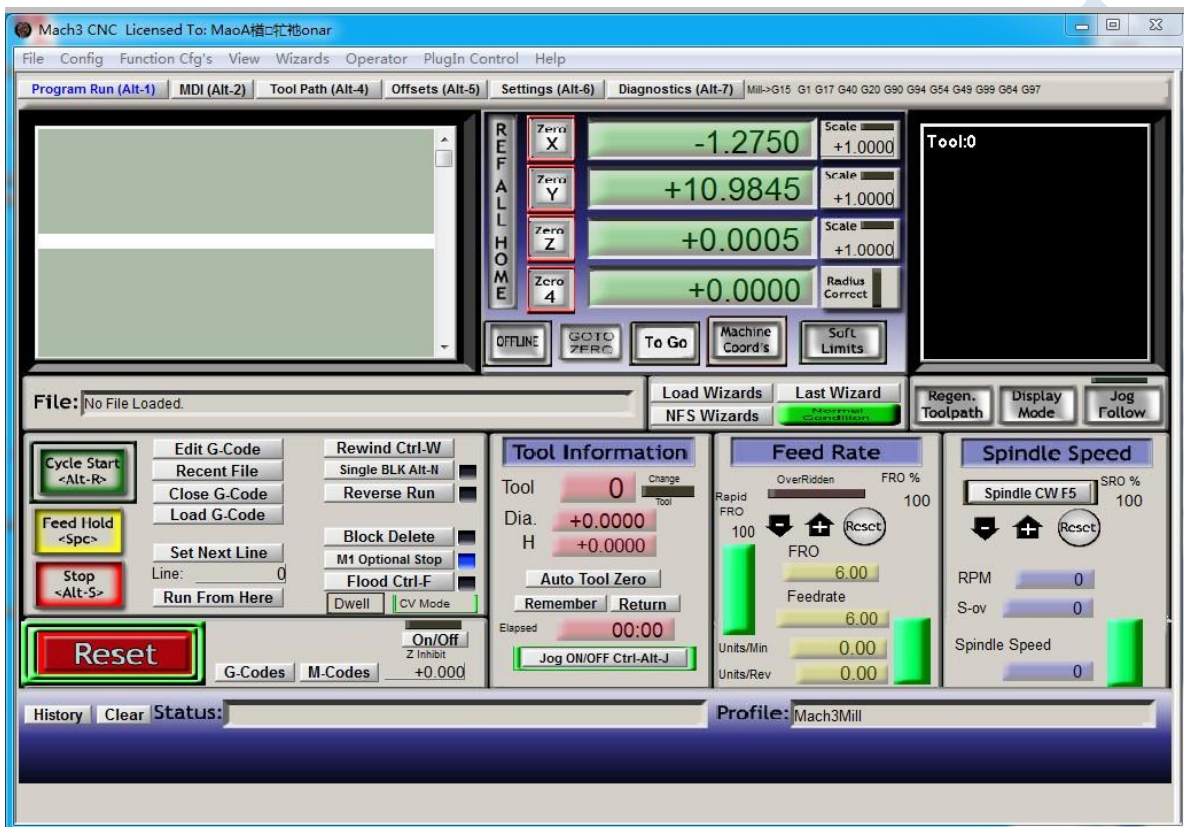


Figure5-1. Main Screen of mach3

1.Set the machine original position switch

As our request,some machine set the original point at the coordinate positive direction,some machines set the original point at the coordinate negative direction.Mach 3 can search out the machine original point direction by the software setting.As the pic 5-2 shows,open Homing on the config menu.Then as pic 5-3 shows.On this page,Home Neg is for searching for the machine original point direction, × means searching original point at negative direction; √ means searching original points at the positive direction.As the picture 5-3 shows,X axis's original position is at the negative direction,Y and Z's original points are at the positive direction.

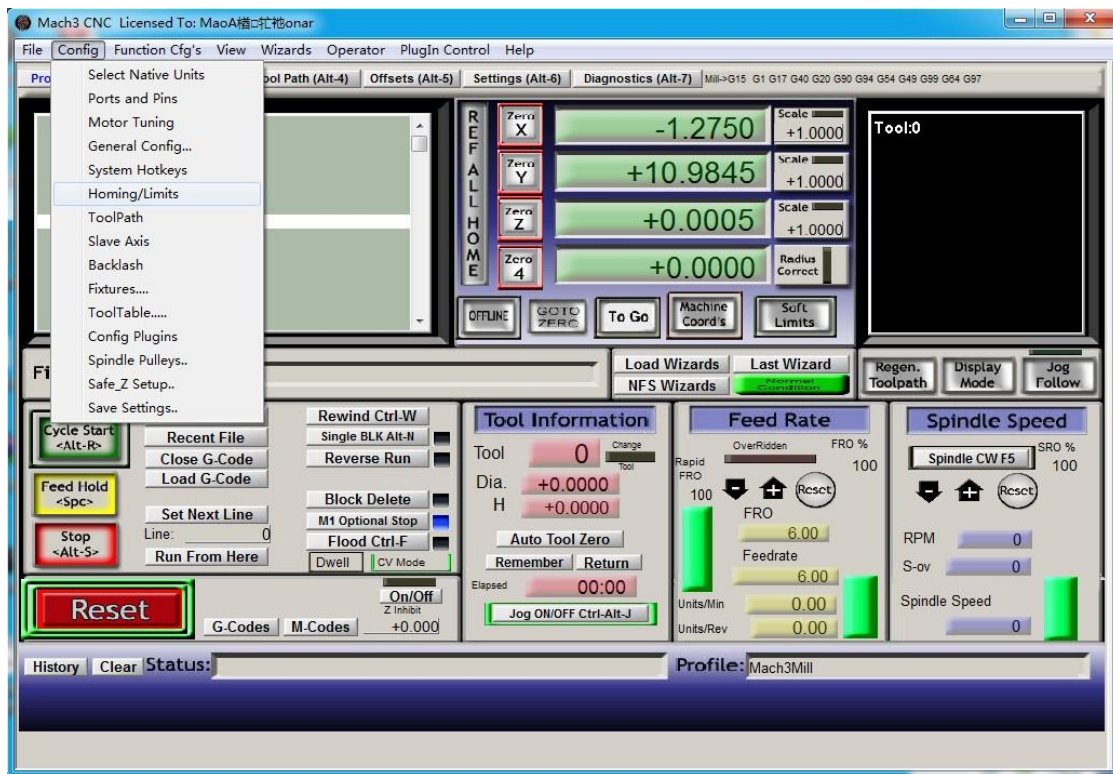


Figure5-2. Click homing of Config

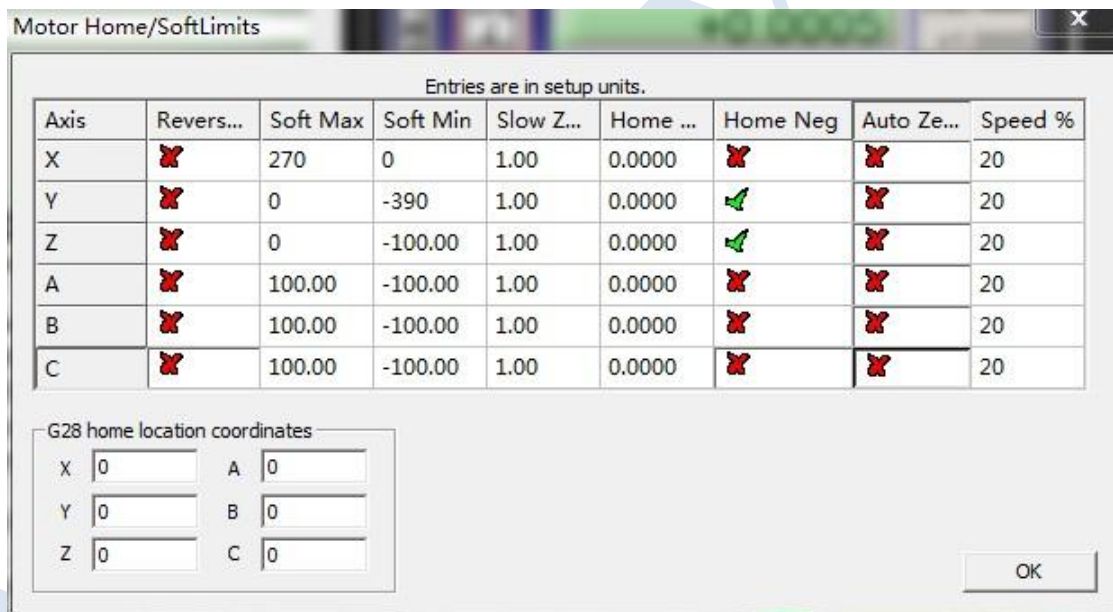


Figure5-3. Motor Home and Softlimits dialog

2.Set soft limits

As Figure 5-3 shows, this page also can set machine soft limit points. Soft Max is positive direction soft limited points, soft Min is negative direction soft limited points. The soft limited points values are according to the references to the machine coordinate system, so as this example shows, Y and Z axis's max value is 0, all the effective coordinate data is less than 0. As the Figure shows, according to our current request, we set our XYZ axis soft limited points area as [0,270] [-390,0] [-100,0].

3.Searching for machine original points

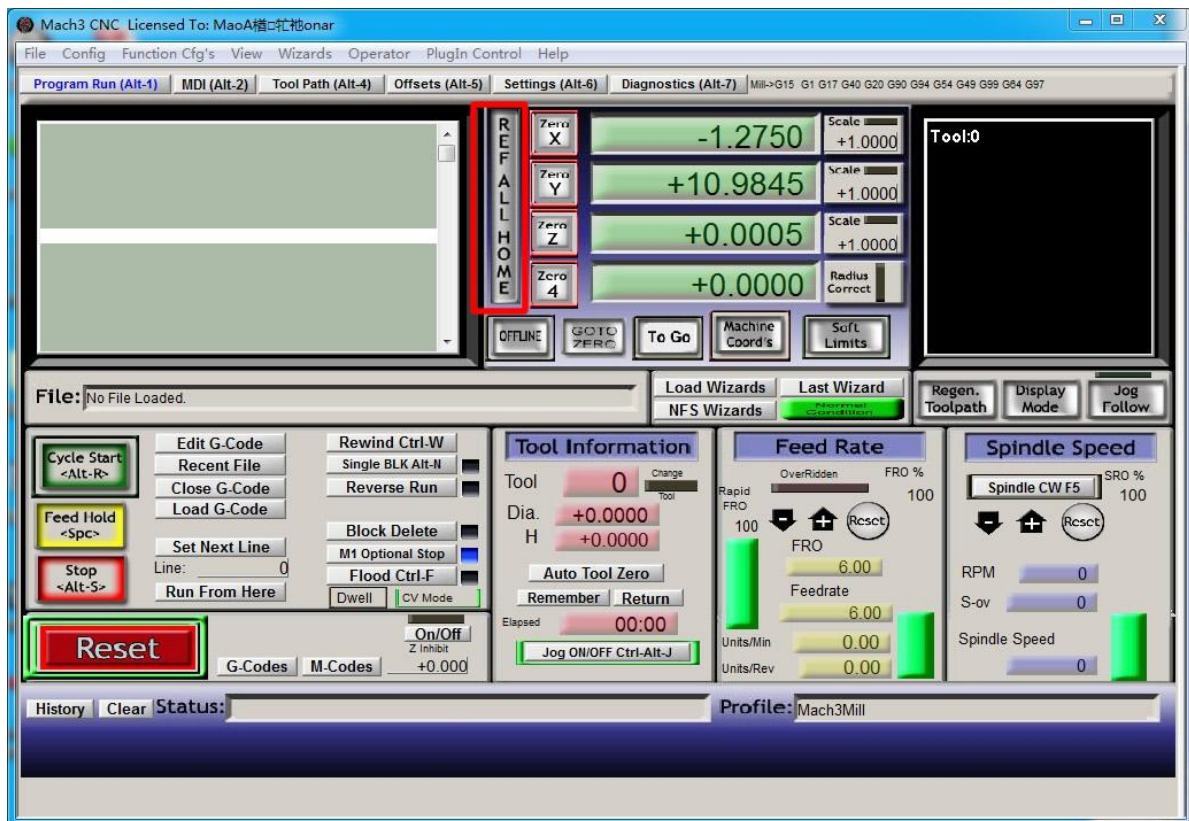


Figure5-4. Click REF ALL HOME to HOME all axis

As Figure 5-4 shows,press REF ALL HOME at main display page,then XYZ A4 start to search for the original points,if you need more axis's operation,edit macro command,or press Alt+7 into Diagnostics display page,you can search original point for every axis. Diagnostics

5.2 Set workpiece coordinate system

Because every working material is hold in different position on the machine,we need to set one or more workpiece coordinate system.

1. Move to current working piece 0 point

Firstly hold down the material,use keyboard or pendant to move tool tip at the 0 point,so this 0 point is the working piece 0 point,it related with the working G code file,so the user must be very familiar to his own working G code.As our example shows,the 0 point is on the center of the working piece surface,so we just move the tool tip to this position.

2. Clear Coordinate

As 5-5 shows,press Zero button on each axis, then clear to 0 for each axis.After operation,the result shows as Figure 5-6.

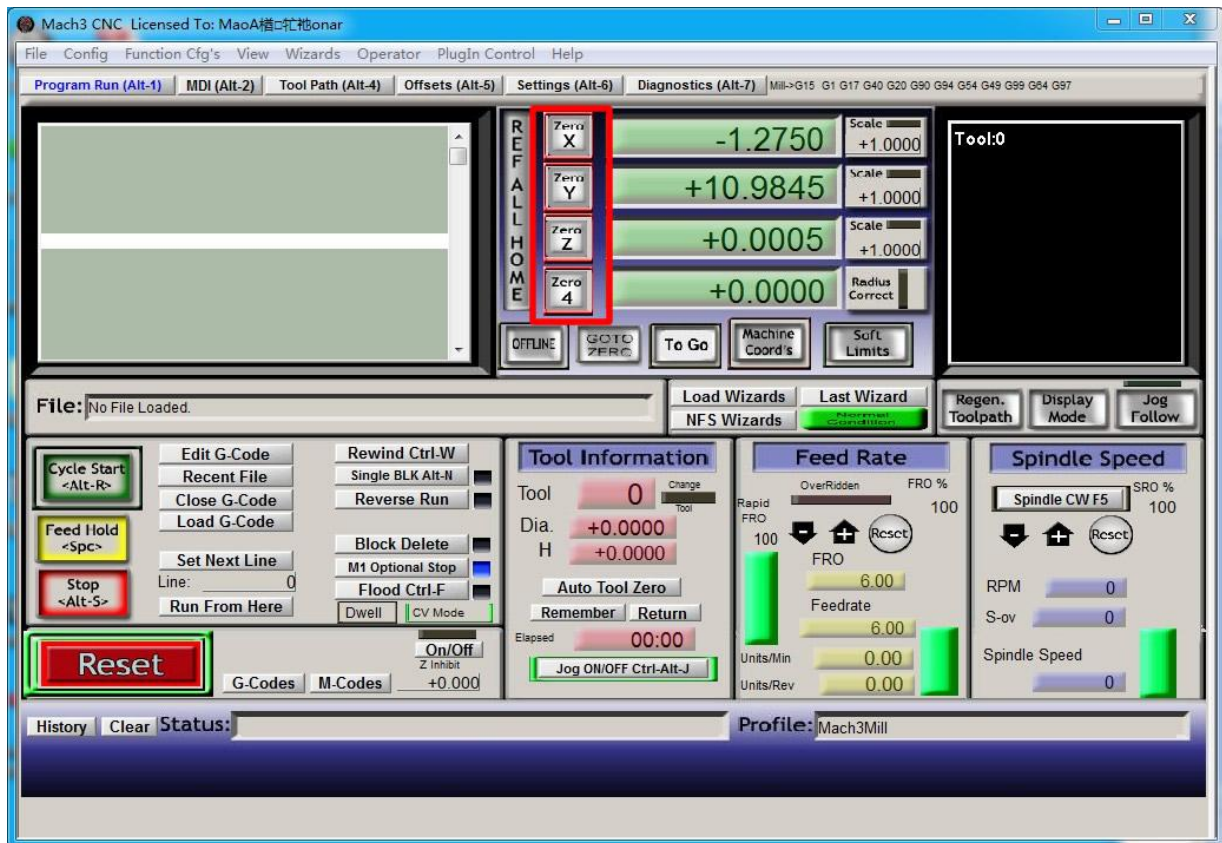


Figure5-5. Press Zero on each axis,all clear to 0

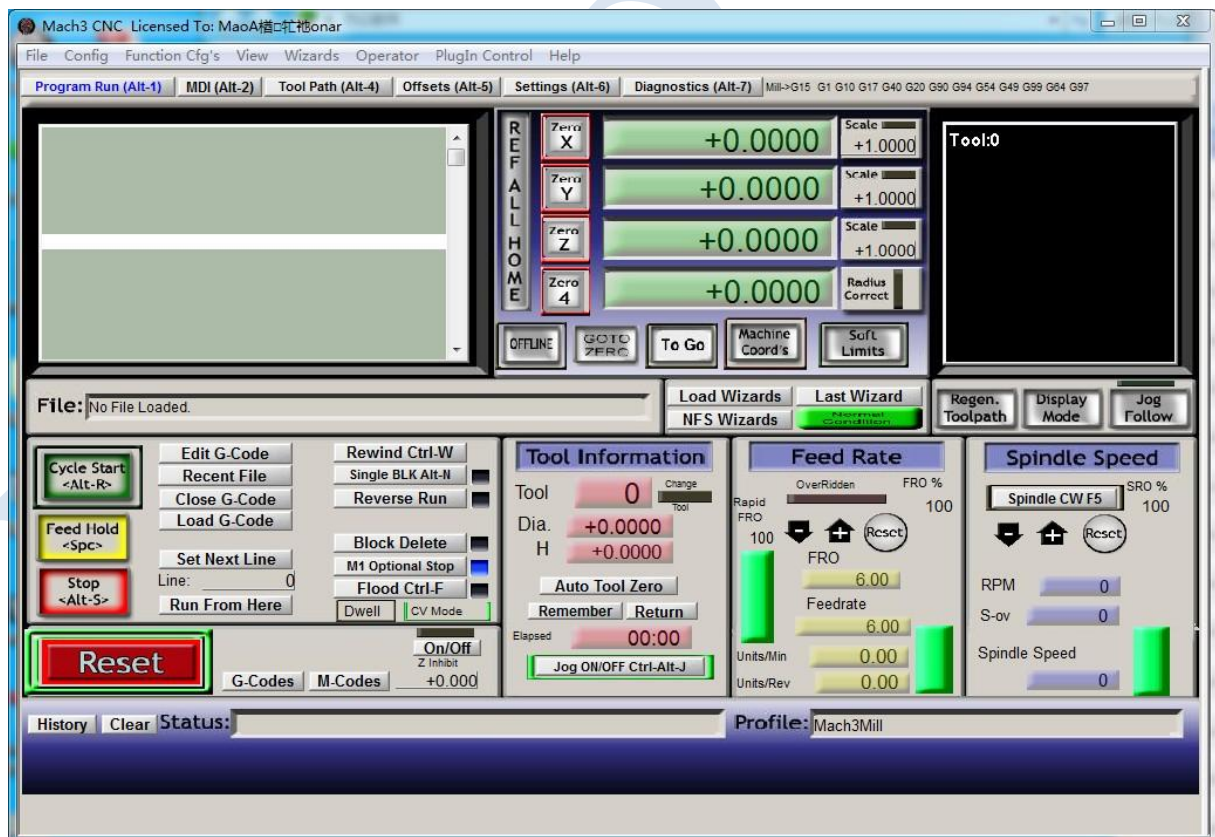


Figure5-6. Main Screen after ZERO all axis

5.3 Open G code file and run

As Figure 5-7 shows,press “load G code” button at the main page or open “Load G code” at main menu “File”,open your G code.It displayed as Figure 5-8 showing,then press button “cycle start” then machine start to work.

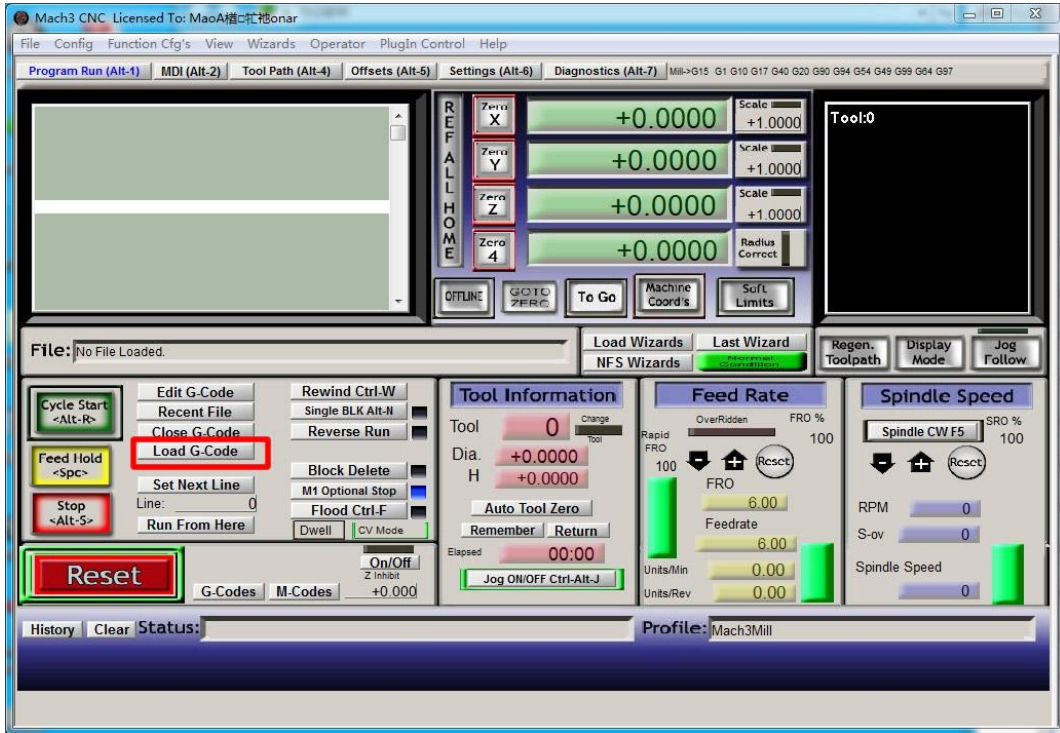


Figure5-7. Press Load G-Code and open your G code

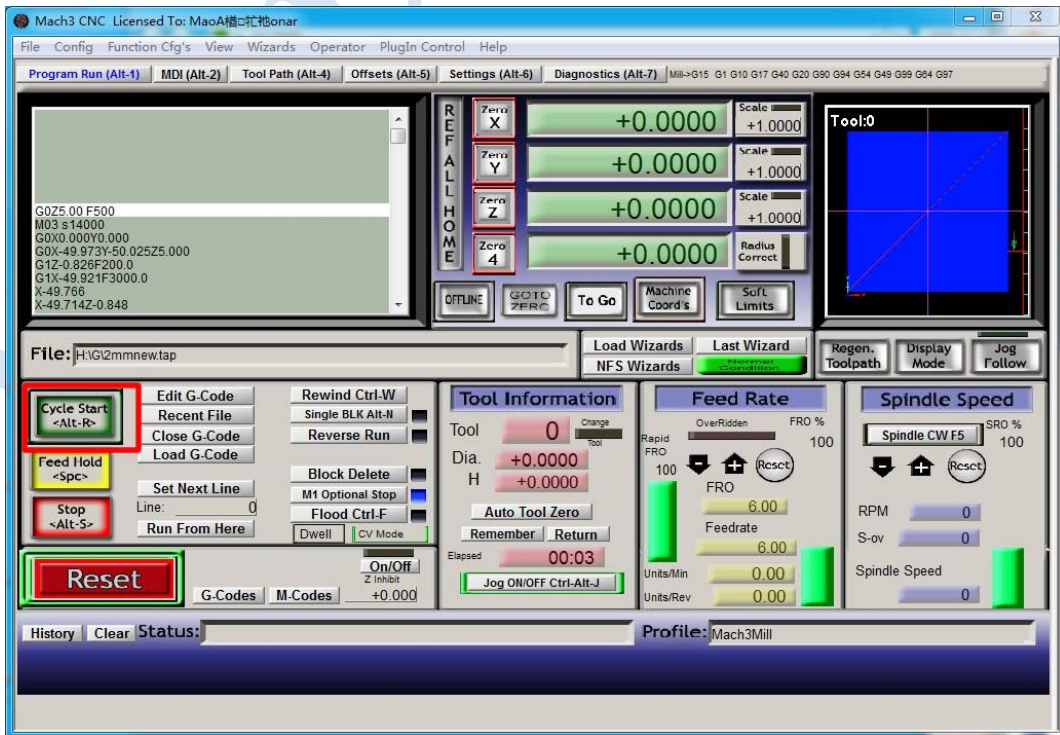


Figure5-8. After opening G code,press “Cycle Start” and start to work