

Operation Manual of Glass Engraving machine

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I .Profile Introduction

1. Introduction Of Machine

BAINENG CNC Glass Engraving machine is an intelligent high-end Glass Deep-Processing Equipment. The machine can make various designs and patterns through CAD software, then transfer the CAD drawings to BAINENG software(CAM) and converting it to the code. Finally the machine can work according to TAIWAN SYNTEC CNC system's instructions.

Operation process:

drawing→transfer the drawing to software→lead the code into the system→the machine working

2. Introduction of software

Baineng software is easy to learn and operate. You just need to transfer CAD2000.dxf to Baineng software ,then it can automatically generate the codes.

Operation process:

File import→select the lines→set the parameters→update the parameters→generate the codes

II .Installation

1. Requirements to prepare install the machine:

- 1) Prepare 4pcs steel plates in size300*300*5mm. Put the plates to the bearing feet of machine.
- 2) Compressed air to 0.7-0.8MPA or Prepare Air Compressor.
- 3) Air Pipe in 10mm Diameter(Length will according to installation space).
- 4) Power Circuit:3*6² & 2*4²(Length will according to installation space)
- 5) Independent power control circuit breaker(3P45A)
- 6) A 10-20tons Jack Lifting(Adjust the level of machine).
- 7) Windows7 with 32bits computer

2. Installation of Machine(See attachment)

1) Balance of Machine

Put the linear on the straight lines for X,Y axis with precision level. Adjust X,Y axis in a horizontal level with adjustable cushion。

2)Installation of Lines

This Machine adopts AC380V/N/PE supply power.

Select 3*6+2*4 in 5 core cable connect main power supply and ground. Ground resistance

not exceed 4

Please check the system interface definition to see how to connect data cable to system.

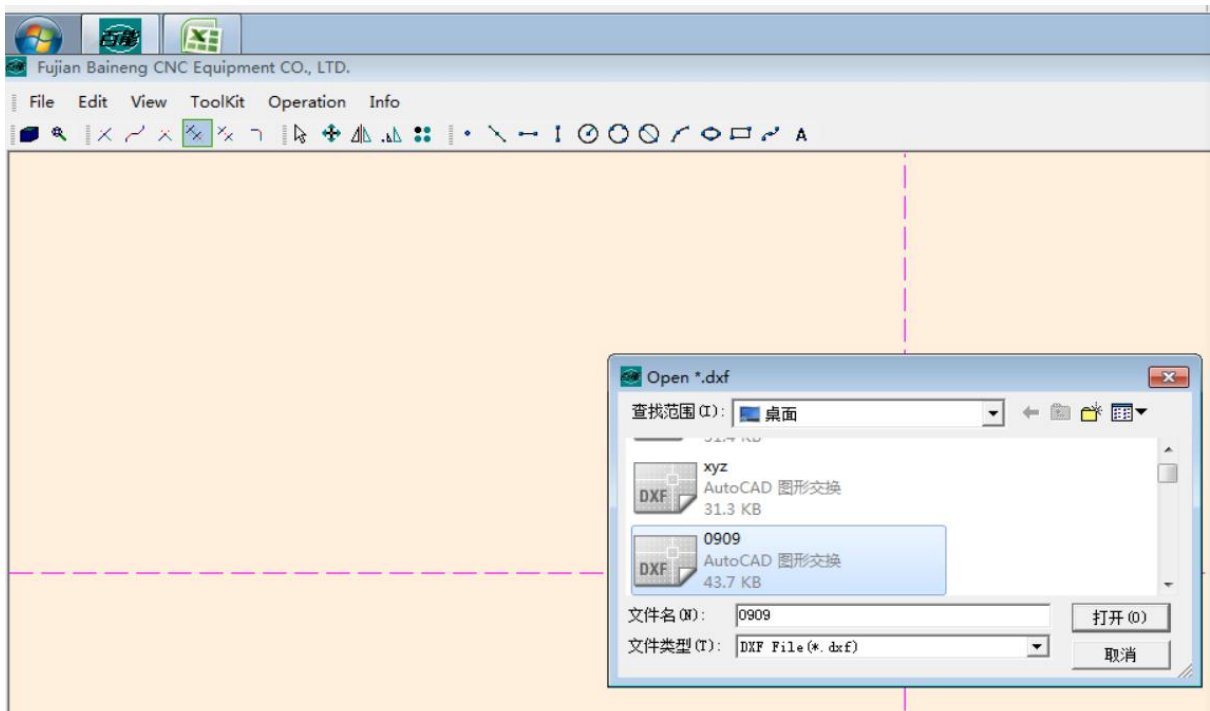
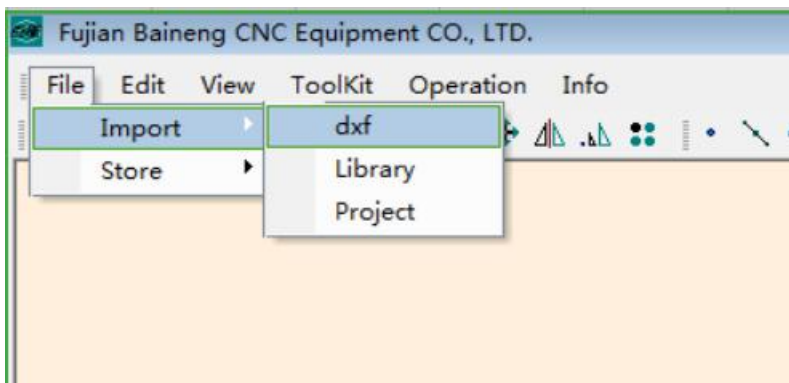
Attention:It is best to be installed and operated by professional technician or Electrical Engineer ,otherwise will cause the machine damage and Casualties

3. Installation of Software

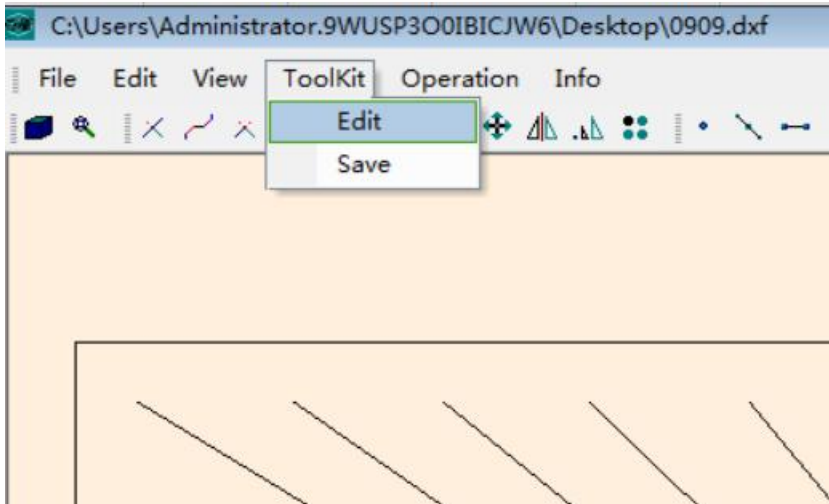
Software will be installed through remote by our technician.

Operation Step:

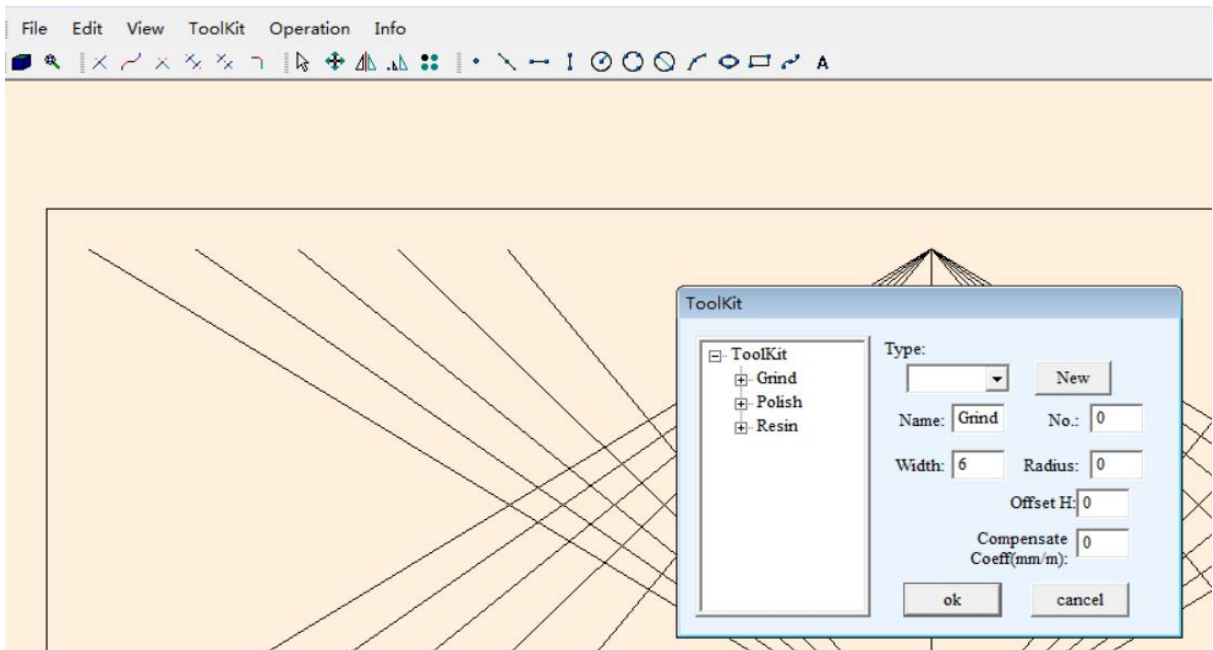
1)Open Baineng Software,download the Processing Graph(in DXF file)



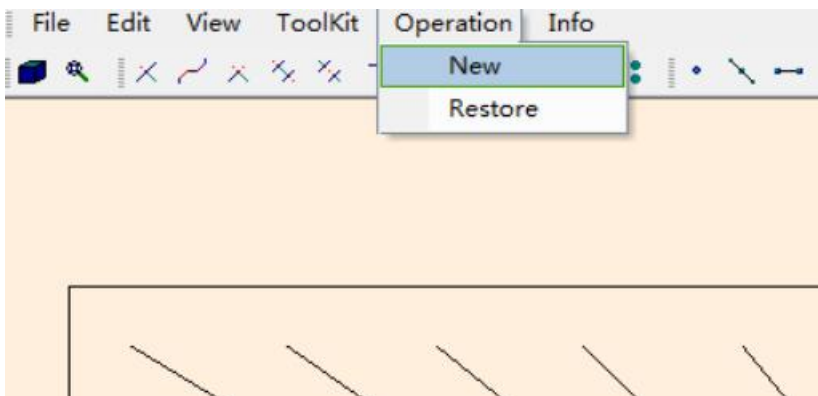
2)Set the data on tool magazine,then click “Acquire tool Library”.

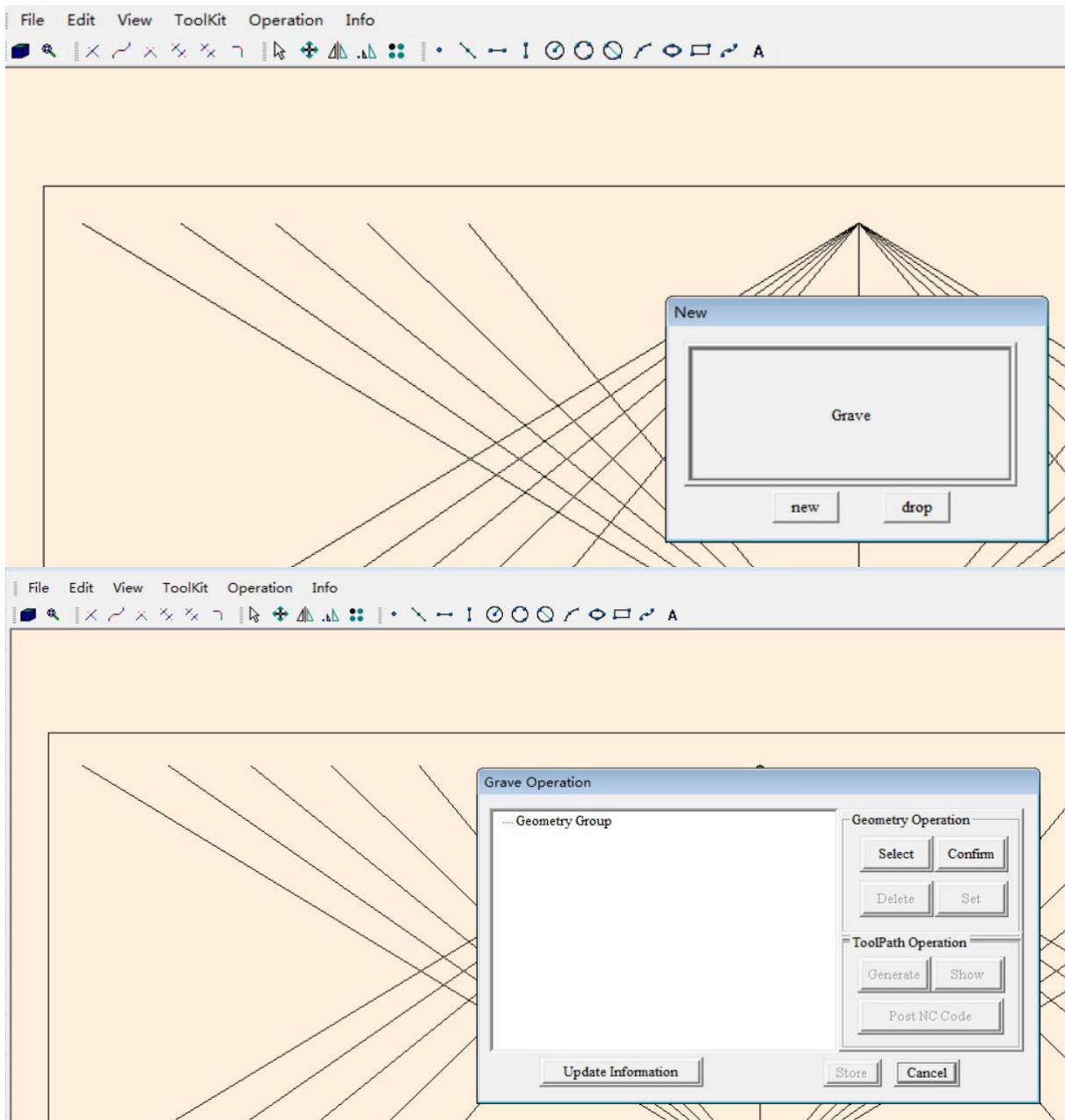


Set parameter for tool: Tool Number, Width, Radius, Decentration (Need set the wear coefficient for Polishing Wheel)

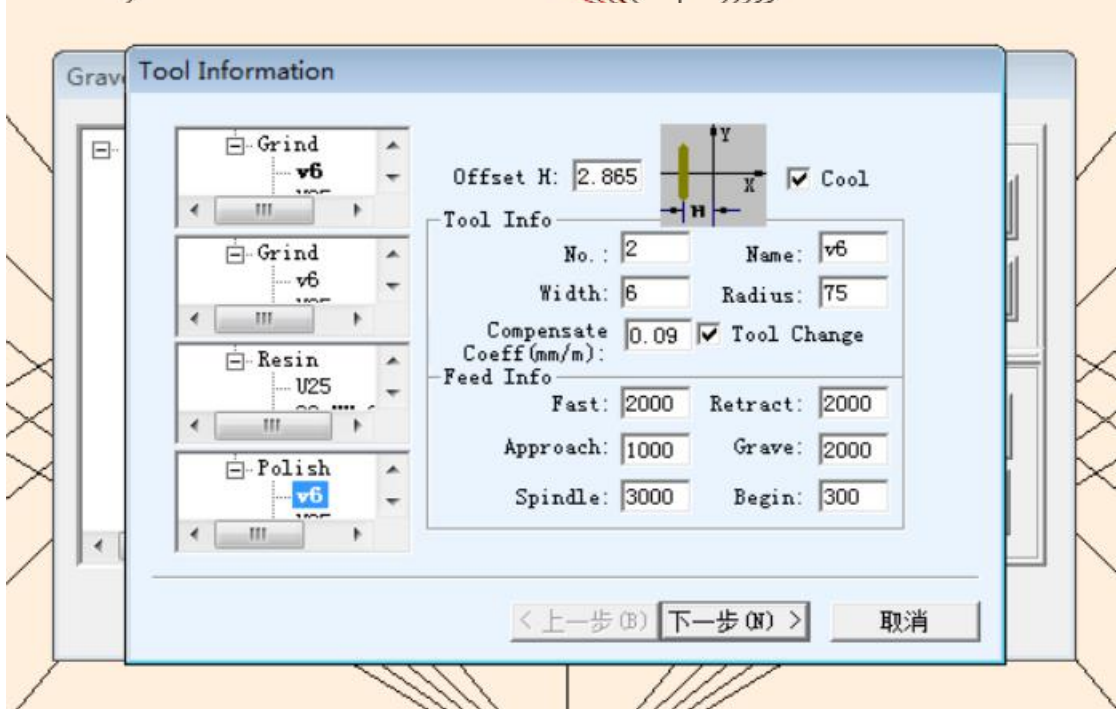
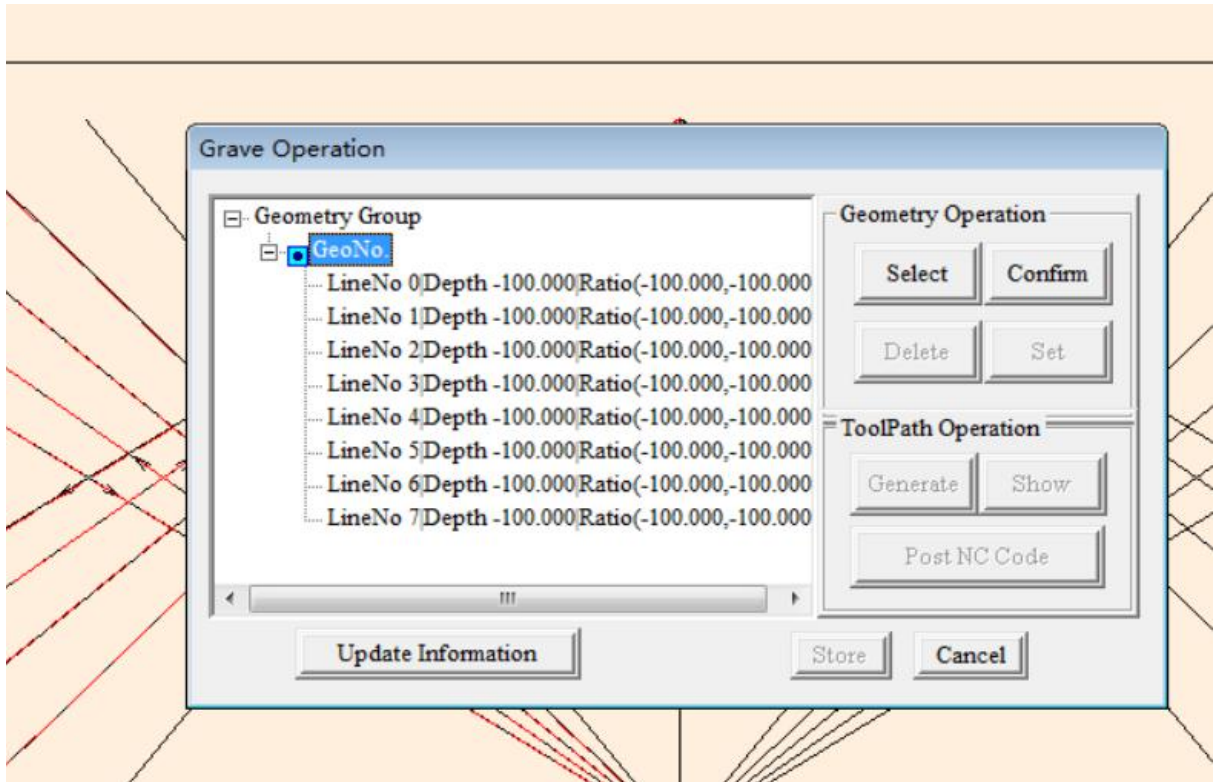


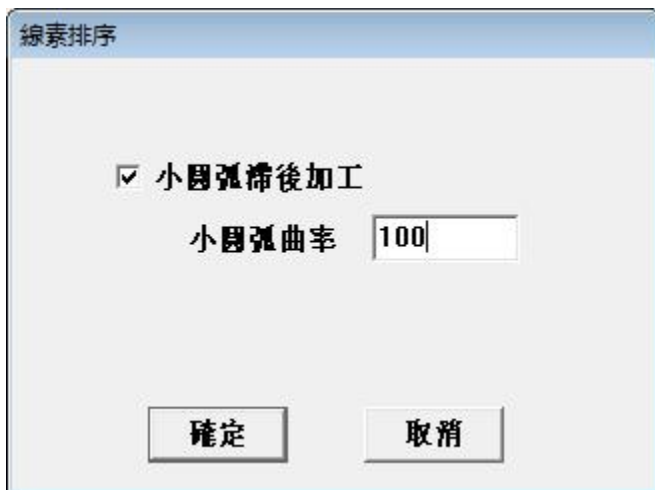
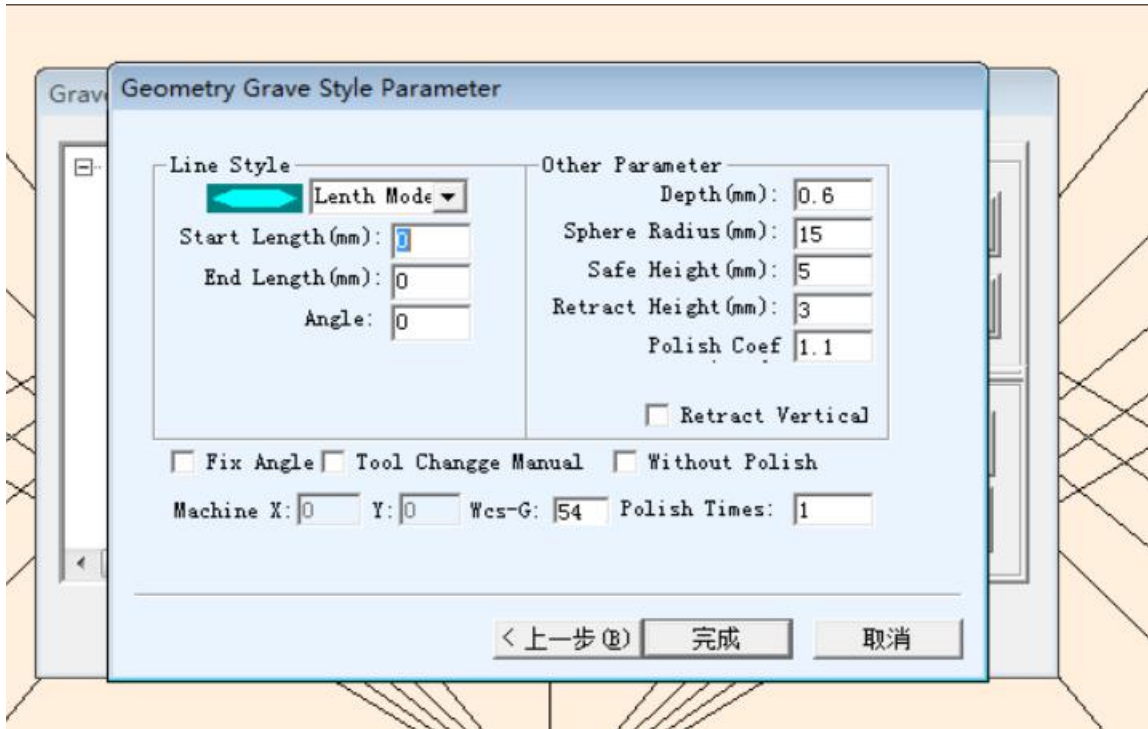
3) Select Linear Processing.



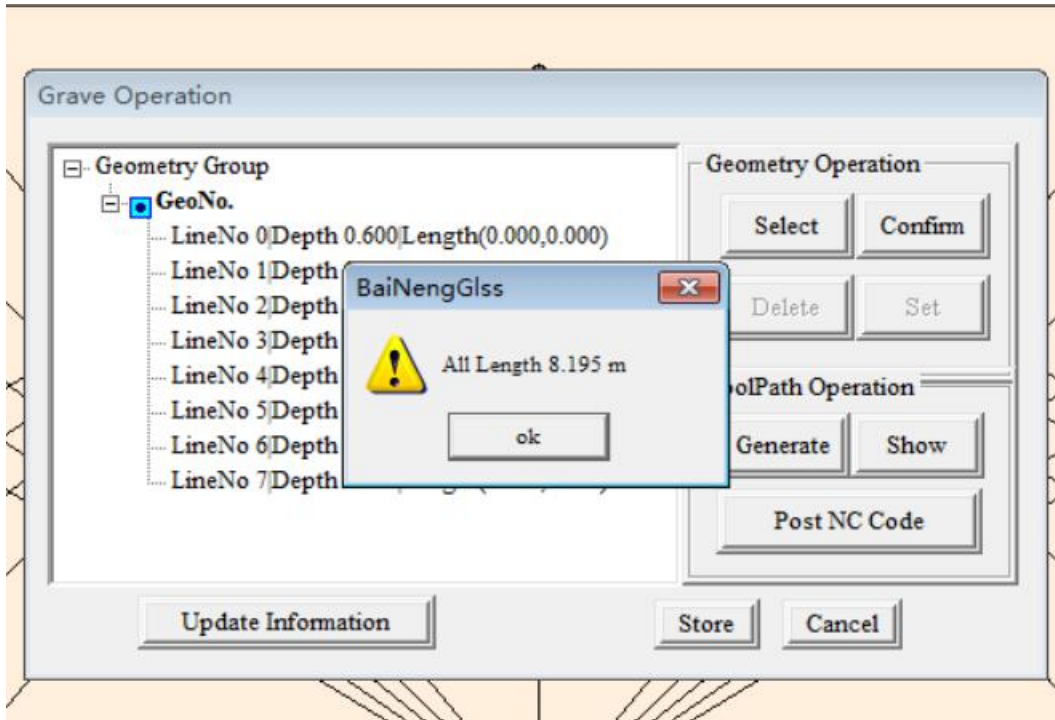


4)Right-click and select linetype,then set parameter:Select the size of tool,speed of spindle,feedspeed,etc.





5)Update Processing information--Come into being route--show route--Postposition Processor,finish programming.





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0 - 记事本
文件(F) 编辑(E) 格式(O) 查看(V) 帮助(H)

%MACRO
;O1001;
G54 G49;
#26 := @602/100.0;
G90 G00 Z(110.0+(#26));
@612 := 679;
@617 := 679;
@622 := 1;
@672 := 2;
@682 := @712;
@632 := 0;
@652 := 0;
@623 := 0;
@673 := 0;
@683 := 0;
@633 := 0;
@653 := 0;
@624 := 0;
@674 := 0;
@684 := 0;
@634 := 0;
@654 := 0;
@625 := 0;
@675 := 0;
@685 := 0;
@635 := 0;
@655 := 0;
@626 := 0;
@676 := 0;
@686 := 0;
@636 := 0;
@656 := 0;
IF@621=1 THEN
  GOTO 100;
ELSE
  GOTO 200;

```

III. System Control

1. Starting Up

Turn on all the power switches, until all appliances are fully displayed.

2. Zero-Return

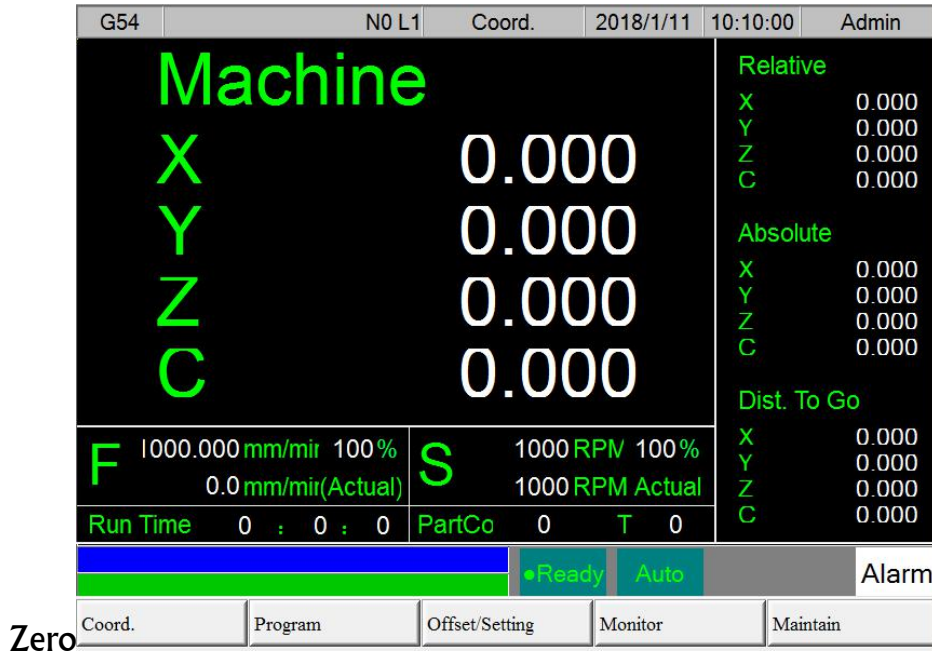
1) Select the Zero return mode.

2) 『X+, X-, Y+, Y-, Z+, Z-, C+, C-』

Press 『X+, X-, Y+, Y-, Z+, Z-, C+, C-』 according to direction of machine motion.

3) Machine starts return to Zero

Note: The direction for all axis coordinates must on “-”, then machine can back to



3. Set the Working Coordinates

1) Open "set the offset" as below:



2) Fill the X.Y.Z.axis coordinates in corresponding parts(It needs to add radius of the diamond wheel to Z axis coordinate)

4. Set Tools Library Coordinates

1) Manually measure the corresponding X.Y.Z axis coordinates for tools 1-10 and make a record

2) Open "set the parameters"(see below picture), search the axis parameters for

tools(3426-3456).Fill the coordinates in the parameters(Input Method:need to fill “-”and 0,no need to fill decimal point)

Index	Item	Value
2510	5th axis neg. coordinate of stroke limit 2(BLU)	0
2511	6th axis pos. coordinate of stroke limit 2(BLU)	0
2512	6th axis neg. coordinate of stroke limit 2(BLU)	0
2542	Protect range of stroke limit 2(1:Outside; 2:Inside)	2
2801	X axis 2nd reference point(BLU)	0
2802	Y axis 2nd reference point(BLU)	0
2803	Z axis 2nd reference point(BLU)	0
2804	4th axis 2nd reference point(BLU)	0
2805	5th axis 2nd reference point(BLU)	0
2806	6th axis 2nd reference point(BLU)	0
2821	X axis 3rd reference point(BLU)	0
2822	Y axis 3rd reference point(BLU)	0
2823	Z axis 3rd reference point(BLU)	0
2824	4th axis 3rd reference point(BLU)	0
2825	5th axis 3rd reference point(BLU)	0
2826	6th axis 3rd reference point(BLU)	0

●Ready Auto Alarm

All Param.	Service Param. Setting	Maker Param. Setting	Compensation Param.	Goto Param.
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5. Measurement of tool decentration

- 1)Put the tools on the machine by hand,start spindle(speed in 300-500)
- 2)Move the C-axis mechanical coordinates to 90 degrees
- 3)Move the tool to the reference point by hand remote(Y axis) and clear the data to 0 on the hand remote
- 4)Move the Y axis in the opposite direction until to safe distance(C axis gearbox will not touch the reference block after rotating 180 degree)
- 5)Move the C-axis mechanical coordinates to 270 degrees.
- 6)Then slowly move the tool to reference block ,and make the value 1/2.(Mean:Input the eccentricity value to the parameter for tool library on Baineng software.)

6. Processing parameters

- 1)Open the interface of processing parameters(as below)



1) Thickness of Glass

The thickness of the processing glass(For example:if the thickness is 5.0mm,then input 5.0 to "Glass Thickness")PS:Glass length and width mean the max size of the glass,no need to input.

2) Rough machining/Finishing/Polishing

The three dialog box can only input 0 or 1(0 means close and 1 means open)

3) Depth ratio1/Depth ratio 2

When the groove depth exceed the pressure that the glass and diamond wheel can bear,we can process the groove twice by "Depth ratio 1 and Depth ratio 2"(For example:If the depth of groove is 2mm,we can set 0.8 on "Depth ratio1" and 2 on "Depth ratio 2",it means the groove depth for first processing is 80%,equal to $2*0.8=1.6$,and the second processing is 100%,it is 2mm).

4) Velocity ratio/Speed ratio

Input range 0.1-1.2

0.1 means 10%,1.2means120%.Velocity ratio:It means feeding rate

Speed ratio:It means spindle speed

7. Placement of glass workpieces.

Washing the worktable and vacuum holes,then place the glass workpiece to the point which has been set the coordinates.

If process smaller glass,because the size is too small to be sucked,we can put the same thickness waste glass in other vacuum holes.This can

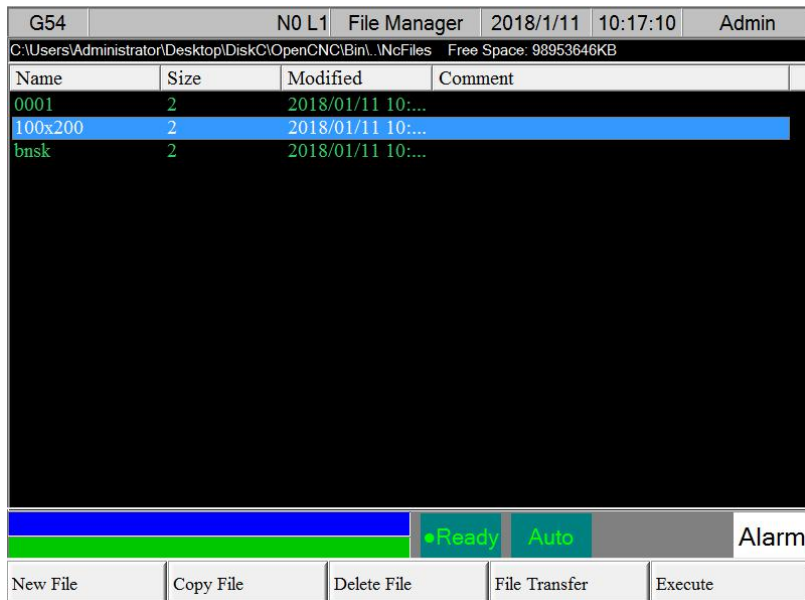
increase the suction of the processing glass

8. Operation for vacuum suction

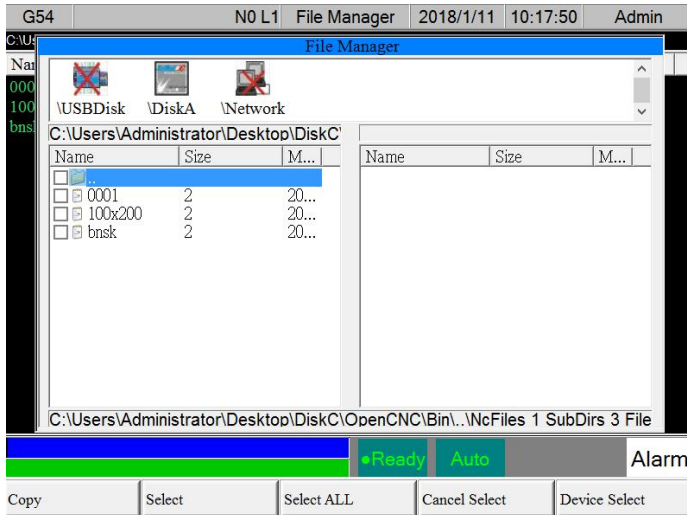
- 1) Open the blowing button on the control panel
- 2) Turn on the corresponding suction switch on the machine worktable and check if the processing glass has already been sucked well.

9. Copy the program

- 1) Copy the processing code(NC file)to U disk and insert to the USB joint in the control system
- 2) Open "Program Editor" F2(See below picture 1), open F4 archives administration-F4 File Transfer-F1 File input(See below picture 2)
- 3) Choose the file which need to process, press F1 to select-F2 to copy



Picture 1



Picture 2

10. Program loading

Back to "Program Editor" as Picture 1, Move the cursor to the copied file and click F5 to load it start processing.

IV. Polishing Compensation

1. Parameter setting for new polishing wheel

Measure the radius of polishing wheel: Input the radius size of the polishing wheel to Length Geometry

As below picture

Remark: While input the radius size of new polishing wheel, must increased 0.5-1 upon actual radius size (For example: if the actual radius size is 82.5, should be input the data is 83)

2. Set compensation value (Wear Coefficient) for polishing wheel

1) Press F5 Processing Parameters--F2 Tool Parameters (Password: 520). As below picture:

G54		N0 L1		Offset/Setting		2013/8/22		17:42:01		
Input Mode(Absolute (I)Increment (Z)Measure)					Machine					
Absolute					X 0.000					
Diameter(D)					Y 0.000					
Length(H)					Z 0.000					
Geometry		Wear		Geometry		Wear		A 4.158		
1	0.000	0.000	0.000	0.000	0.000	Dist. To Go				
2	0.000	0.000	0.000	0.000	0.000	X 0.000				
3	0.000	0.000	0.000	0.000	0.000	Y 0.000				
4	0.000	0.000	0.000	0.000	0.000	Z 0.000				
5	0.000	0.000	0.000	0.000	0.000	A 0.000				
6	0.000	0.000	0.000	0.000	0.000	Relative				
7	0.000	0.000	0.000	0.000	0.000	X 0.000				
8	0.000	0.000	0.000	0.000	0.000	Y 0.000				
					Z 0.000					
					A 4.158					
					●Ready		Auto		Alarm	

The Tool	Wear coefficient	Tool life
No. 1	[Redacted]	55
No. 2	0.020	55
No. 3		
No. 4		
No. 5	0.070	55
No. 6		
No. 7	0.020	55
No. 8		
No. 9	0.070	55
No. 10		
No. 11		
No. 12		

2018/1/11 10:30

2) Input wear coefficient value of polishing wheel on the corresponding tool number. The value of wear coefficient between 0.03-0.09. (The value should be small for harder polishing wheel relatively, and large for softer polishing wheel. Details must subject to Practice.)

2. Set compensation value for bubble polishing wheel

While processing bubbles, the compensation value of polishing wheel should be larger relatively. Because wheel wear out faster when polishing bubble, if the compensation coefficient can't follow actual wear value, it will be not good on polishing effect.

V. Common System Alarm

System Alarm	Alarm reason	Solve way
Home Alarm	While turn on the machine, all axes not return to home.	Move X.Y.Z.C axis and make machinery coordinates to negative. Then click "HOME"--"START"
Tool Library Alarm	Due to some errors cause push out tool library not successful.	A, Check if the air pressure too low. B, Check if tool library device is fully lubricated. C, Check if all switches and lines are damage or not. D, After solve all above problems, Press "restart" or "power off and restart" to clear alarm.
Tool Change Alarm	Tool change not finish while automatically change tools.	According to system remind, press "home" till alarm clear.
Actuator Alarm	The alarm happen due to operation fault cause all	

	axes crash or actuator and servo motor occurred.	<p>A,Check the alarm code and failure reason,solve the problem accordingly.</p> <p>B,The machine totally power off,move the problem axes to safety position by “JOG”.</p>
1. Spindle frequency converter alarm	<p>A,Alarm happen while input voltage fault or output lines and machine failure.</p> <p>B,Human reason(The tool crash to the worktable due to the error of coordinate for Z axis)</p>	<p>A,Check the alarm code of frequency converter and read the manual to check failure reason,solve it accordingly.</p> <p>B,Cut off the control power of frequency converter to solve the problem.</p> <p>C,After confirm the problem solved,totally power off the machine,restart after 10mins,move up Z axis to safety position by“JOG”.</p>
Over-trip Alarm	<p>。 Each axis moves over stroke limited.</p>	<p>Move the alarm axes to the opposite direction by”JOG”until the alarm clear.If still not solve,should be check if trip switches and lines damage.</p>
Following Error Alarm	<p>A,Due to wrong operation cause each axis move slightly,the alarm is issued.</p> <p>B,If following error value double over MAX error value,the alarm is issued.</p>	<p>A,Check if all control lines and actuators of axes are alarm.</p> <p>B,If alarm issued by actuators,solve the problem according to above step(Actuator Alarm)</p> <p>C,Check if electrical components and lines both burn-in,and if there have too much dust in</p>

		actuator make temperature too high cause following speed slowly.
Miss Command Alarm	<p>A, Due to long time without lubrication for each axis cause resistance to move.</p> <p>B, Momently Check if the tolerance of feedback and output command value is within the predetermined error range after the controller stop output the commands to an axis ,if not within the error range, the alarm is issued.</p>	<p>A, Check if the automatically lubrication device can add oil normally.</p> <p>B, Enter into “Parameter setting”, find the missing place, adjust the error value range greater than the actual value. (Remark: Increase this parameter value, the error value should be increase also)</p>

VI. Problem happen while processing

1. Lines not polished well

1) Not polished well at the beginning point.

Adjust the radius of polishing wheel smaller in BAINENG CAM software. (For example: If the actual radius is 70, should be change to 60)

2) Not polished well on finished point.

Adjust the radius of polishing wheel larger in Baineng CAM software. The diamond wheel is not sharp enough, engraving glass too deep.

3) Not shinning on straight line edge

The eccentric value for diamond wheel and polishing wheel is different.

2. Not polished well on cross point.

This is because tool is not tight enough. It needs to wash the tool holder and change the plate.

3. Tools break glass

1) Diamond wheel not cooling enough while processing, it's reduce the ability of diamond wheel cause break glass.

2) There have space between tool holder and hollow shaft, cause diamond wheel not stable while processing and break glass.

3) Due to long-term lack of lubrication, wearing too much will generate space for the

two bearings in the hollow shaft.It breaks the glass.

4)The actual radius of the polishing wheel is larger than the data in the system.(For example,the actual radius is 75,but it sets 65 in the system)

VII.Maintenance

Purpose:Keep machine clean and new,reduce failure rate,improve productivity,extended service life.

1. Gear box of C axis

1)Periodical cleaning the dust in the surface so that it can be heat dissipation while processing

2) The gearbox is a high density area.Lubrication is the most important.It should be pay more attention to whether the oil level in the oil box is in normal position(Reamark:eft and right oil Windows and oil holes are independent)

3) Develop a good habit for oil change.Changing the oil in the gearbox regularly can improve the service life of the gearbox.

(It should be change gear oil after 200hours or one month for new machine,then 3 month is ok.Normally keep the oil running in the horizontal center line of the oil window)

4) Do not knock the gear box.

Suggestion:Use medium load industrial closed gear oil(L-CKC150)

2. Ball screw and Linear

1) The ball screw and linear of each axis is transmission part,it's lubrication automatically by system.It should set the control time of the lubrication system according to the workload and keep lubrication oil in lubrication pump.

2) While add lubricating oil,do not add used lubricants and oils.

3) Clean the dirt and moisture on ball screw and linear in time,especially for Z axis.

4) 。 Do not use corrosive liquid or sandpaper (cloth) to wipe the ball screw and linear.

Remark: Check ball screw and linear of X-axis if with oil regularly,if without oil,must add it,linear can smear the oil,screw must use oil gun to add oil.

3. Electric box

1) There are many main electronic component in the electric box.It should be dust-proof and wet-proof

2) Don't move the control box after installation to avoid any damage on lines.

3) Regularly clean the dust in the control box and electric box.Please use dry and

clean brush or high-pressure air cooler to clean. Prohibited to use compressed air with water and other compressed gases.

- 4) After running 1 month, check electrical parts thoroughly and tight the screw.
- 5) All above inspection and operation must by professional electrical person.

4. Worktable

- 1) Cleaning the powder and dust in the worktable, like glass and polishing wheel dust. It should use high pressure water gun to wash the worktable.
- 2) The suction hole on the worktable should be unblocked at all times. Turn off the vacuum switch and turn on vent switch so that the dust can be out.

5. Vacuum pump and water pum

- 1) Before turn on the vacuum pump, please pour the water from the inlet into the vacuum pump that has been opened. If there is no water to run for a long time, it will cause no gas or can not absorb the workpiece, and make vacuum pump burn out.
- 2) The water tank should be cleaned in time for the water supply and the maintenance of the water pump. Due to long-tern processing and recycled water, there is much glass dust and powder which makes water block and water pump broken.

Suggestion: Clean water tank everyday.

6. Oil in oil-water separation cup is supply lubrication of Electromagnetic valve and air cylinder (Oil cup must keep oil)

VIII. Notes

1. Safety Procedures

Safety Procedures issued to ensure operator and machine can avoid accidents by improper operation, so all reference person must read this chapter carefully and take preventive accordingly.

2. Safety checking

A. While Maintenance must cutoff power.

B. Please wear safety protection measures at work, like safety shoes, safety helmet, safety goggles, etc

C. Pls don't wear wet gloves while operate the machine

D. Do not remove mechanical safety device or metal sheet cover.

E. The environment around the machine needs to be clean and bright. Don't stack other stuff. Do not clean around side of the machine with air gun. (Avoid dust rise)

F. While there are people working in the worktable, it is strictly forbidden to operate

machine.

G. Any electronic control problem should be handled by the professional people.

H. Check that all parts which need the oil should be lubricated.

I. Check that the door and panel of the electrical cabinet are closed and locked.

J. Make sure all the buttons are in good condition

K. Make sure that all wires are not broken

L. Please check whether the three-phase voltage is normal before power supply.

M. Please fully understand the operation instructions before use

N. The machine must be grounded. Connect the copper to 1 meter underground. (Grounding resistance shall not be greater than 4 ohms)

A. Operating process to grind table of machine

1, Starting up---Return to home---Change Parameters---determine the position of grinding table to change Program coordinates---repair grinding wheel---Adjust Z axis coordinate---Running.

2, Press F3---Set the offset G54P2(G55)workpiece coordinates(If use this coordinate, please recover this coordinate after grinding the table, and change Z axis coordinate according to actual condition)Clear all datas to zero.

3, Determine the starting point of the grinding table mechanical coordinates(For example: If Grinding the table from left bottom means: Start point X+direction, Y-Direction, first end point is X-Direction, C axis is 270degree, From X+Direction back to X-Direction and move to Y+Direction), and set this coordinates value of start point and end point to program coordinates, means change the program coordinates.

4. Repair Grinding Wheel: Install diamond pen, load the grinding wheel to hollow shaft, start spindle speed and control the speed within 500-800, adjust C axis to 270degree, move machine head which load grinding wheel to the diamond pen, Move Z axis down to grinding wheel where near diamond pen, set the hand remote speed to 10 times gear then slow down, and down 0.1-0.2mm again after touch the diamond pen, Move Y axis back and forth to smooth grinding wheel.

5. Starting grinding the table with the z-axis coordinates: Use hand remote move the smooth grinding wheel to the bottom of table, just touch the table is ok, don't move the coordinates of Z axis (Note: The Grinding wheel can not remove after load it, if take down the grinding wheel, must repair it again) Running BNSK program (Determine the coordinates of Program and table are same)

6. Remark: When stop, return and restart the Z axis coordinates, the Program Z axis coordinates value will go down (Means Grinding the table down), use machine original carried BNSK grinding procedures, not need to change the coordinates. If use new program, please collate the route of program Y axis with the number of round trip L (If possible, L value can be increased when confirmed Y+ route limit is effective)

Modify data of Underline

%@MACRO

G55

M8;

M3S2600;

G91G0Z50. ;

G90G0X418. Y-960. C270. ;----- (Coordinates of starting point need change)

G91G0Z-49. ;

G1Z-1.2;----- (The depth of grinding table is 0.2mm need to change Z axis coordinates)

M98H0100L33;---- (The number of back and forth need to change)

M09;

M05;

M30;

N100

G90G1X-2201. F5000. ;—— (Ending point coordinates of X axis need to change)

G91Y30. ;

G90G1X418. ;—— (Starting point coordinates of X axis)

G91Y30. ;

M99;

