

Suzhou SIP Automation Tech. Co., Ltd 苏州工业园区麦特自动化技术有限公司

Add 15-1 Putian Private Industrial Zone Weiting, SIP Suzhou Jiangsu P.R.China 215122

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MK-03 Kammprofile Machine Operation Manual

Suzhou SIP Mate Automation Tech Co., Ltd

www.suzhoumate.com

Thanks for choosing Mate product. Please read through the manual carefully before operating the machine. Keep this manual in a safe place for future reference. Due to continuous technology upgrade, there may be some differences between manual and machine itself, please feel free to ask for latest information from us.

Agenda

1 Company Brief

2 Machine Introduction

3 Operation Guide

4 Machine Specification

Company Brief

Suzhou SIP Mate Automation Technology Co., Ltd. is located in Well-known Suzhou Industrial Park, east of Suzhou, within the 2 hours car driving far from the Shanghai Pudong International Airport, and Shanghai harbor, one of the biggest harbor in China, as well a major one in the world. With a strong R&D team, Mate can always provide customers tailor-made automation solution; therefore, help customers improve productivity meanwhile, saving cost dramatically.

Our specialties include energy industry; automobile industry; electronic industry and so on. We have been successfully sold our machines and equipment domestically as well as to many countries in North-America, Europe, and Asian Pacific.

“Create value for customer” has been always our key concept and company motto. Sincerely hope that Mate can become customers’ assistant to help them grow their business to great success.

Machin

This machine is mainly designed for making wide varieties of kammprofile gaskets from 500 mm to 3500 mm in diameter; and up to 60 mm width in flange. It can also makes grooving and chamfering if change to proper blade.

This machine use the Numerical Control System (NCS) and servo motor to control the blade travelling, so can make very high quality of kammprofile gasket, the whole process can be programmed by NCS. The operator only need to do is initial position of cutting manually, the rest work will be done by

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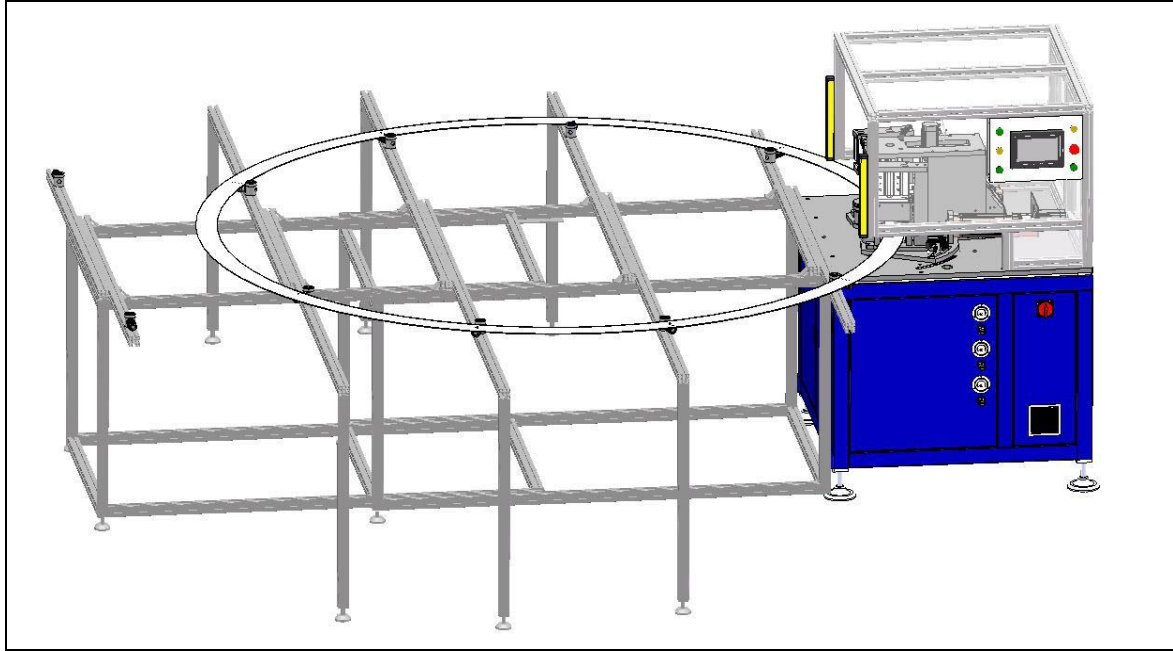
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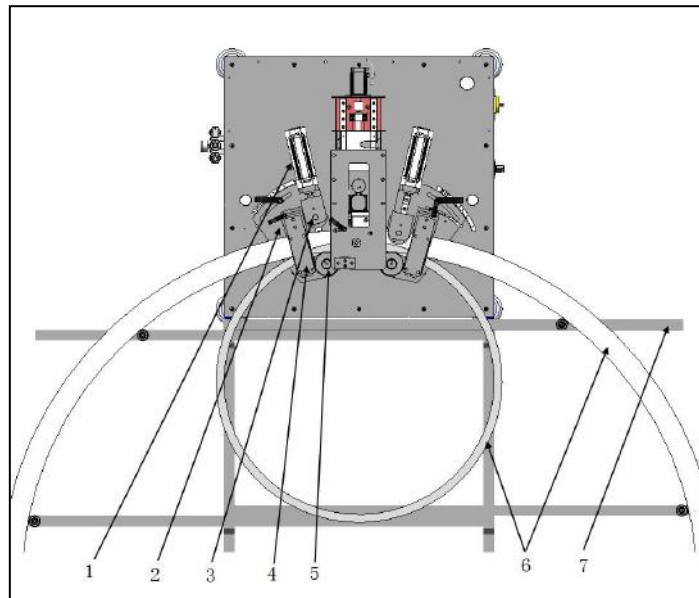
machine automatically after select the right product program. All process parameters can be type in NCS through an interface, the operator can choose save those settings in case use again in the future, the NCS can save up to 200 types of gasket settings. The operator simply needs to pick up the right product type from the memory, then all the setting you saved in will be pull out and ready for production.

Machine overview



Machine details

Detailed drawing 1 (top view)



1 Cylinder --- horizontal clamp

2 Clamp system --- provide the both horizontal and vertical clamp for the ring, it can also turn around against the drive wheel axis, so to adopt the different size of ring.

3 Press wheel --- drove by the cylinder to provide the horizontal clamp to the ring

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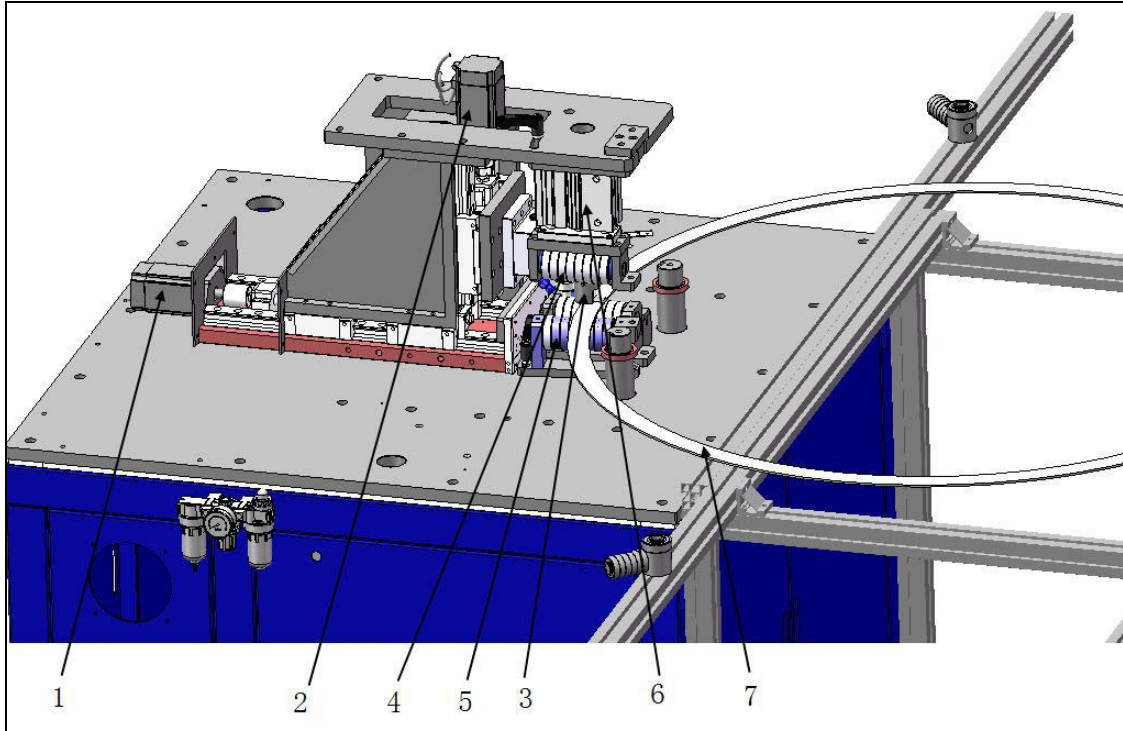
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4 Vertical press --- provide vertical clamp to the ring

5 Drive wheel --- two drive wheels drive the ring turn around in setting speed

6 Rings (show positions of different size of rings)

7 Frame work



Detailed drawing 2 (side view)

1 Server motor --- drive the blade back and forward (X axis control)

2 Server motor --- drive the blade up and down (Z axis control)

3 Blade --- tip replaceable

4 Vertical press --- provide vertical clamp to the ring

5 Support wheel --- provide support to ring when the blade come down to it

6 Vertical press cylinder --- Vertical press down the working part

7 Ring --- the working part for processing

Control Panel



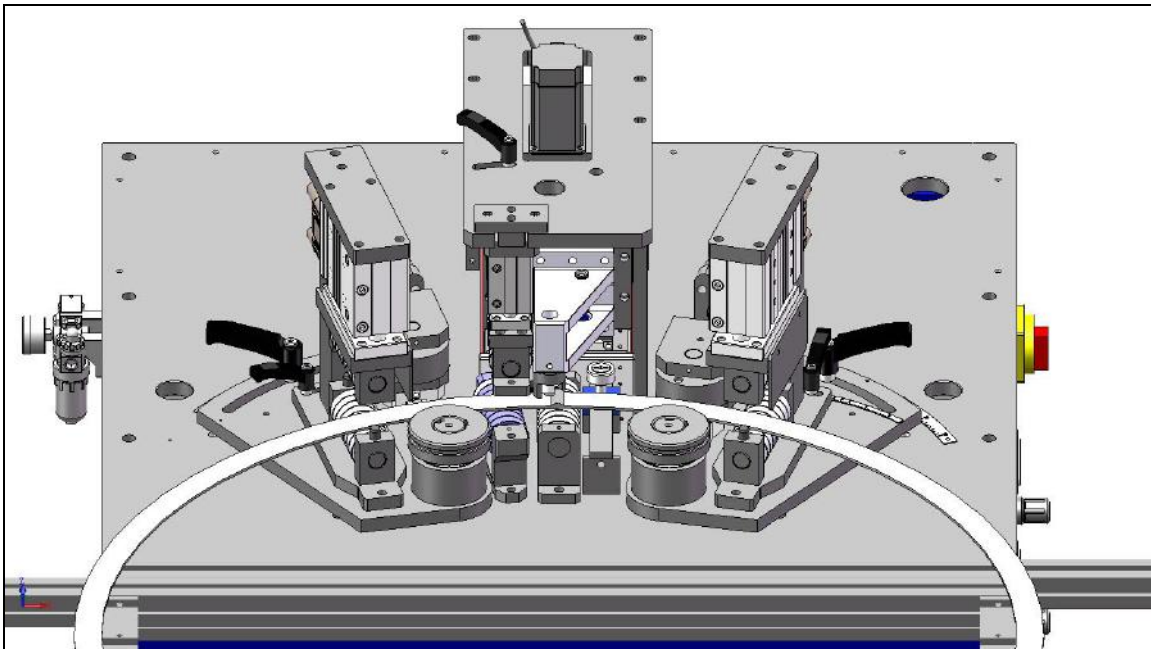
For detailed information of the “Control Panel”, please refer to the Page106-Page 112 of the DF 100Ti Control System.

Operation Guide

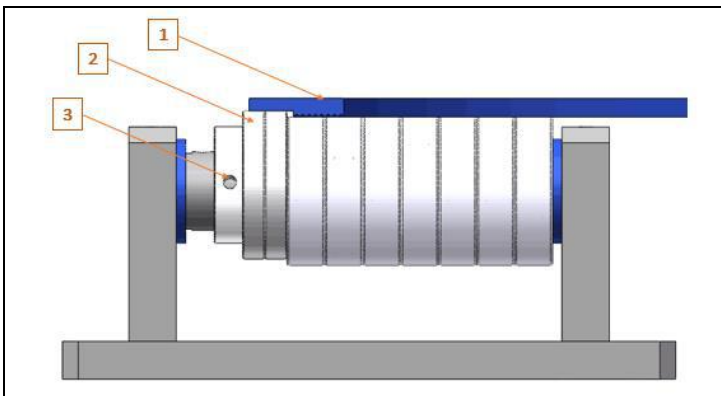
Step1 Power on and check the compressed air supply to make sure air supply is ready.

Step2 Load the working part e.g. ring, then press “Clamp & Release” button, the ring will be clamped both vertically and horizontally(see below drawing1), meanwhile the rest part of ring must be put on the support wheels on the frame work (see below drawing3), and make sure the red arrow roughly point to central point of the ring. To better adopt the different sizes of ring, the clamp system is designed to be able to turn around against the drive wheel axis.

Drawing1.



Drawing2



1---Guide ring type of kammprofile gasket

2---eccentric bears

3---Screw for eccentric bearing set tightening

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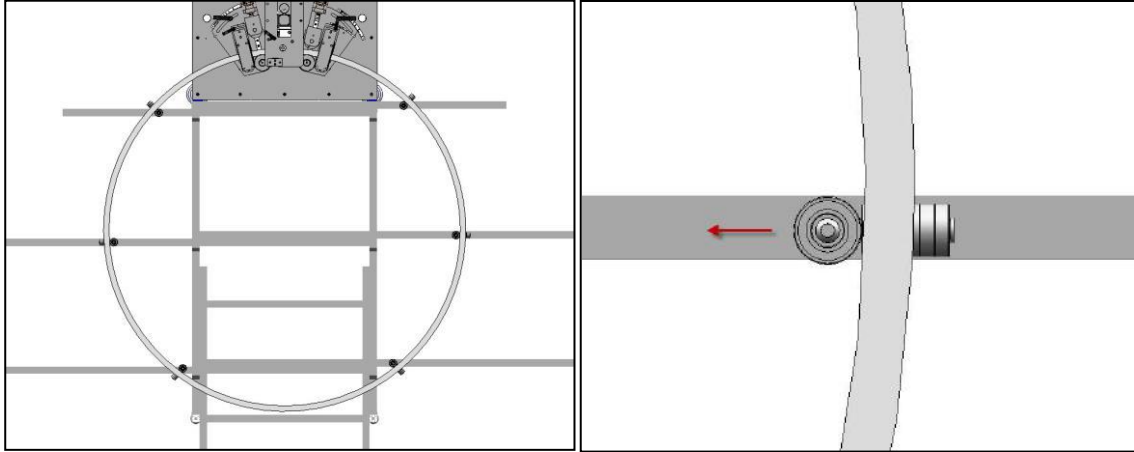
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The above drawing is the eccentric support bearing set, there are two bears designed to adjust height as shown, when the guide ring gasket being made one side, turn to the another side, these two bearings can be adjustable to give the guide ring part firm support when the top surface is under processing.

Drawing 3 (Framework & Support wheels)



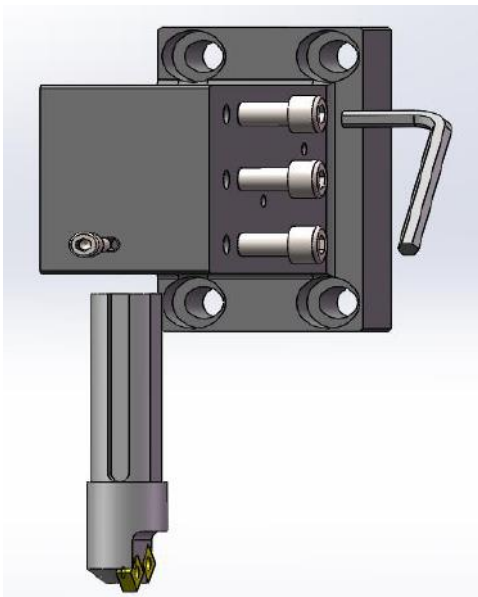
Additional Tips



1st Tip, the operator must ware glass for eye protection.

MK-03 Kammprofile machine use complex cutter, which can do both grooving and chamfering by changing the cutter holder, see the below two pics,

Pic1 Demo how to change the cutter holder, unscrew and tight the screw at the top, and make sure the slot of the holder to the screw, this screw to stop the holder turning.



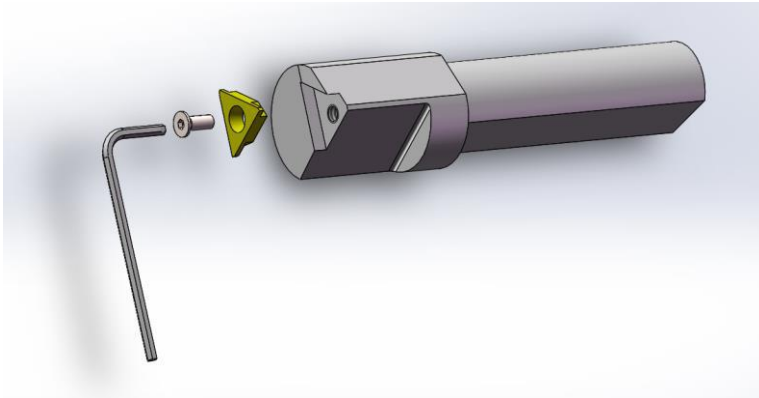
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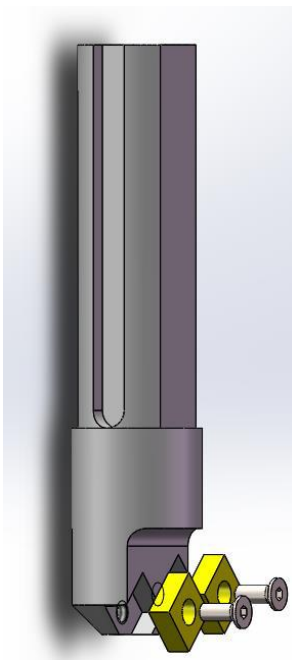
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Pic2 This is for ex-circle grooving, which is for making LG type of gasket,



Pic3 This demo the tips change over.



For more information for Numerical Control System operation and programming, please refer to the 100Di Numerical Control System User Manual.

Pre- installed Program

%000 (Full serration program)

N0000 M10 (Clamp)

N0010 G04 D1 (Time delay 1 second)

N0020 M08 (Air blow on)

N0030 M03 S1200 (Main shaft rotate, speed 1200r/s)

N0040 G04 D1 (Time delay 1 second)

N0050 G0 X471.06 Z812.26 (Cut move to standby position, X value should be 0.6 mm smaller than the value of initial position; Z value should be 1 mm smaller than the value of initial position)

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N0060 G75 X472.06 Z792 I0.003 K0.003 E1 F0.5 (Surface circular processing, X value =initial position +depth of groove; Z value = initial position + flange width; I value is cut feed speed 0.03 mm/minute; K value define Z axis return speed 0.03 mm/minute; E value define X axis travel 1 mm each time if the interval of groove is 1 mm; F cut feed speed)

N0070 G0 X441.66 (X axis move back to home position, X value should be 30mm smaller than initial position)

N0080 M09 (Air blow off)

N0090 G0 Z813.26 (Z axis move back to home position, Z value= initial position)

N0100 M05 (Main shaft stop)

N0120 M11 (Release)

N0130 M30 (Program over)

%001 (Out ring + serration program)

N0000 M10 (Clamp)

N0010 G04 D1 (Time delay 1 second)

N0020 M08 (Air blow on)

N0030 M03 S1200 (Main shaft rotate, speed 1200r/s)

N0040 G04 D1 (Time delay 1 second)

N0050 G0 X470.56 Z812.26 (Cut move to standby position, X value should be 0.6 mm smaller than the value of initial position; Z value should be 1 mm smaller than the value of initial position)

N0060 G01 X471.16 F100 (X axis move to out ring start position, F value is cut feeding speed 100 mm min)

N0070 G01 Z802 F0.5 (Z axis move to out ring start position, F value is the cut feeding speed 0.5mm/min)

N0080 G0 X470.56 Z801 (X axis move to serration start position, X value should be 0.6 mm smaller than the value of initial position; ; Z value = initial position + flange width -1mm)

N0090 G75 X471.56 Z792 I0.003 K0.003 E1 F0.5 (Surface circular processing, X value =initial position +depth of groove; Z value = initial position + flange width; I value is cut feed speed 0.03 mm/minute; K value define Z axis return speed 0.03 mm/minute; E value define X axis travel 1 mm each time if the interval of groove is 1 mm; F cut feed speed)

N0100 G0 X441.16 (X axis move back to home position, X value should be 30mm smaller than initial position)

N0110 M09 (Air blow)

N0120 G0 Z812.26 (Z axis move back to home position, Z value= initial position)

N0100 M05 (Main shaft stop)

N0120 M11 (Release)

N0130 M30 (Program over)

%002 (Serration + inner ring program)

N0000 M10 (Clamp)

N0010 G04 D1 (Time delay 1 second)

N0020 M08 (Air blow on)

N0030 M03 S1200 (Main shaft rotate, speed 1200r/s)

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N0040 G04 D1 (Time delay 1 second)

N0050 G0 X470.06 Z812.26 (Cut move to standby position, X value should be 0.6 mm smaller than the value of initial position; Z value should be 1 mm smaller than the value of initial position)

N0060 G75 X471.06 Z800.26 I0.003 K0.003 E1 F0.5 (Surface circular processing, X value =initial position +depth of groove; Z value = initial position + flange width; I value is cut feed speed 0.03 mm/minute; K value define Z axis return speed 0.03 mm/minute; E value define X axis travel 1 mm each time if the interval of groove is 1 mm; F cut feed speed)

N0070 G0 Z799.26 (Z axis move to inner ring start position, Z Value =initial position-flange width -1mm)

N0080 G01 X471.06 F6 (X axis move to inner ring start position, F cut feeding speed 6mm/min)

N0090 G01 Z792.26 F0.5 (Z Value = initial position + flange width, F cut feeding speed 0.5mm/min) ????

N0100 G0 X441.06 (X axis move back to home position, X value should be 30mm smaller than initial position)

N0110 M09 (Air blow off)

N0120 G0 Z812.26 (Z axis move back to home position, Z value= initial position)

N0100 M05 (Main shaft stop)

N0120 M11 (Release)

N0130 M30 (Program over)

%003 (Corrugation program)

N0000 M10 (Clamp)

N0010 G04 D1 (Time delay 1 second)

N0020 M08 (Air blow on)

N0030 M03 S1200 (Main shaft rotate, speed 1200r/s)

N0040 G04 D1 (Time delay 1 second)

N0050 G0 X495.039 Z783.485 (Cut move to standby position, X value should be 0.6 mm smaller than the value of initial position; Z value should be 1 mm smaller than the value of initial position)

N0060 G01 X495.639 F10 (X axis move to start position, F cut feeding speed 10 mm/min)

N0070 G03 X496.6 Z779.485 R4.5 F0.005 (1st Arc circular processing, X value =initial position +depth of groove; Z value = initial position + arc width; R means arc radius, F cut feed speed)

N0080 G03 X496.6 Z775.485 R4.5 F0.005 (2nd Arc circular processing, X value =initial position +depth of groove; Z value = end position of first arc + arc width; R means arc radius, F cut feed speed)

N0090 G03 X496.6 Z771.485 R4.5 F0.005 (3rd Arc circular processing, X value =initial position +depth of groove; Z value = end position of 2nd arc + arc width; R means arc radius, F cut feed speed)

N0100 G03 X496.6 Z767.485 R4.5 F0.005 (4th Arc circular processing, X value =initial position +depth of groove; Z value = end position of 3rd arc + arc width; R means arc radius, F cut feed speed)

Repeat process the arc until finish them all.

N0110 G0 X465.639 (X axis move back to home position, X value should be 30mm smaller than initial position)

N0120 M09 (Air blow off)

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N0130 G0 Z783.485 (Z axis move back to home position, Z value= initial position)

N0100 M05 (Main shaft stop)

N0120 M11 (Release)

N0130 M30 (Program over)

%004 (Guide ring grooving program)

N0000 M10 (Clamp)

N0010 G04 D1 (Time delay 1 second)

N0020 M08 (Air blow on)

N0030 M03 S1200 (Main shaft rotate, speed 1200r/s)

N0040 G04 D1 (Time delay 1 second)

N0050 G0 X507.392 Z720.881 (Cut move to standby position, X = value of initial position; Z value should be 6 mm greater than the value of initial position)

N0060 G01 Z726.881 F20 (Z axis move to start position, Z value=the value of initial position, F cut feeding speed 20 mm/min)

N0070 G74 Z727.881 I0.005 K0.005 F0.5 (Process groove, Z value = initial position + groove depth I value is cut feed speed 0.05 mm/ minute; K value define Z axis return speed 0.05 mm/minute; F is cut feeding speed)

N0080 G0 Z720.881 (Z axis move back to initial position)

N0090 M09 (Air blow off)

N0100 G0 X477.392 (X axis move back to home position, X value should be 30mm smaller than initial position)

N0100 M05 (Main shaft stop)

N0120 M11 (Release)

N0130 M30 (Program over)

%005 (Out groove program)

N0000 M10 (Clamp)

N0010 G04 D1 (Time delay 1 second)

N0020 M08 (Air blow on)

N0030 M03 S1200 (Main shaft rotate, speed 1200r/s)

N0040 G04 D1 (Time delay 1 second)

N0050 G0 X502.392 Z742.886 (Cut move to standby position, X = value of initial position; Z value should be 6 mm smaller than the value of initial position)

N0060 G01 Z748.886 F20 (Z axis move to start position, Z value=the value of initial position, F cut feeding speed 20 mm/min)

N0070 G74 Z750.386 I0.005 K0.005 F0.5 (Process out grooving, Z value = initial position + groove depth I value is cut feed speed 0.05 mm/ minute; K value define Z axis return speed 0.05 mm/minute; F is cut feeding speed)

N0080 G0 Z742.886 (Z axis move back to initial position)

N0090 M09 (Air blow off)

N0100 G0 X472.392 (X axis move back to home position, X value should be 30mm smaller than initial position)

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N0100 M05 (Main shaft stop)

N0120 M11 (Release)

N0130 M30 (Program over)

%006 (Chamfer program)

N0000 M10 (Clamp)

N0010 G04 D1 (Time delay 1 second)

N0020 M08 (Air blow on)

N0030 M03 S1200 (Main shaft rotate, speed 1200r/s)

N0040 G04 D1 (Time delay 1 second)

N0050 G0 X492.981 Z754.551 (Cut move to standby position, X = value of initial position; Z value = the value of initial position)

N0060 G75 X493.481 I0.003 K0.005 F0.5 (Process out grooving, Z value = initial position + groove depth I value is cut feed speed 0.05 mm/ minute; K value define Z axis return speed 0.05 mm/minute; F is cut feeding speed)

N0070 G0 X462.981 (X axis move back to home position, X value should be 30mm smaller than initial position)

N0080 M09 (Air blow off)

N0100 M05 (Main shaft stop)

N0120 M11 (Release)


N0130 M30 (Program over)



MK-03 COMMON CODE DEFINATION		
S/N	Code	Defination
1	M30	Over
2	M03	Main shaft stop
3	M05	Main shaft turning
4	M08	Air blow off
5	M09	Air blow on
6	M10	Jaw expand
7	M11	Jaw withdraw
8	G0	Cutter back to initial position
9	G01	Cutter back to home position
10	G03	OD to ID
11	G04	Delay time
12	G74	Flange serration process re-circle



Machine Setup

**Connect to power supply and compressed air supply, power supply 3 phase 380 V Hz 50-60 Hz;
 Compressed air supply no less than 0.8 Mpa.**

Set up blade initial position

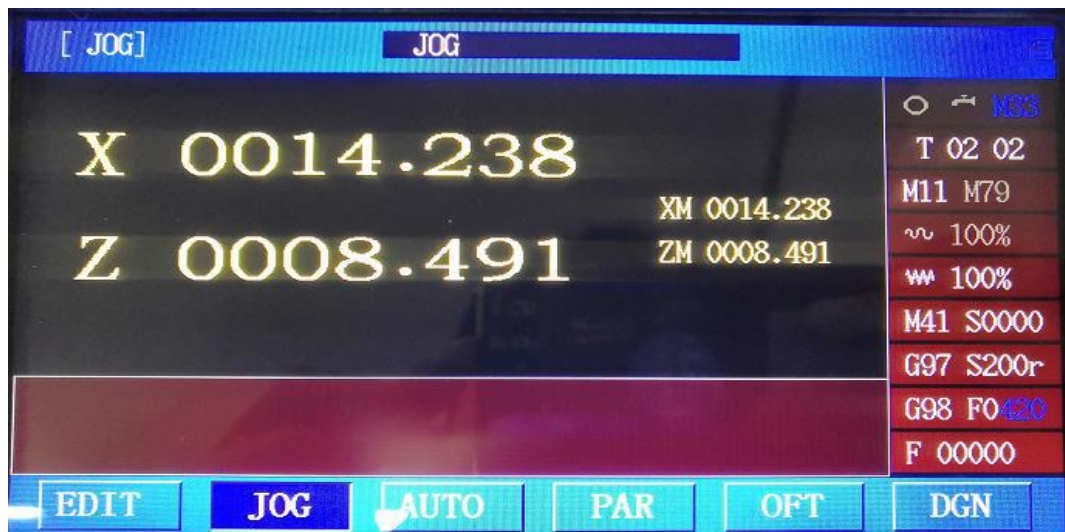
Turn on power, the numeric control system will show below page (Pic 1), then press  come to the manual page (Pic2), then type in M10(Cylinder shrink) or M11(cylinder expand), then press

 clamp the part; type in M03 (manual) and press , then type in S400 and press

 define the motor turning speed, press  make motor turn around.



(Pic 1)



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
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(Pic 2)

Set up initial position

Press , , ,  manually control cut blade move to the initial position

quick, when the blade move to close enough to the part then press  reduce speed, then press the above 4 keys again to move slowly the blade toward the part until blade touch the parts, press



come to the next page (Pic 3) record position under “X” and “Z”.






[OFT]						
OFT.NO	Z	X	R	T	S	Y
01	0000.000	0000.000	0000.000	0	00	0000.000
02	0000.000	0000.000	0000.000	0	00	0000.000
03	0000.000	0000.000	0000.000	0	00	0000.000
04	0000.000	0000.000	0000.000	0	00	0000.000
05	0000.000	0000.000	0000.000	0	00	0000.000
06	0000.000	0000.000	0000.000	0	00	0000.000
07	0000.000	0000.000	0000.000	0	00	0000.000


(Pic 3)

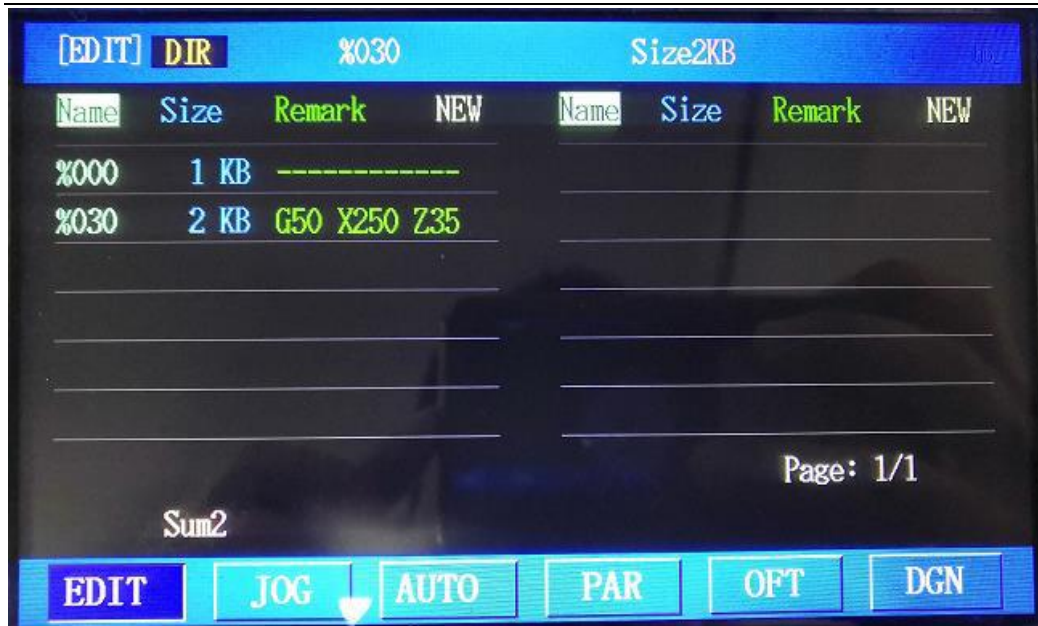
Under chamfering process, repeat above steps to move the blade until its inside touch the part, then record the position under “X” and “Z” as above.

How to pick up program

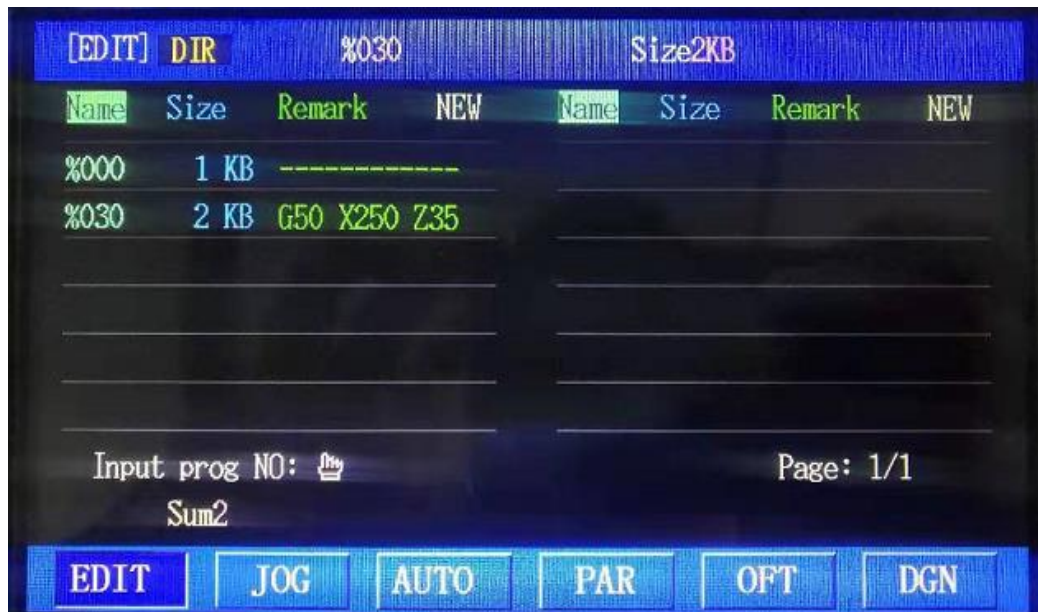
Press  come to the page as (Pic 4) shown, see the left side program numbers such as

001,002,030 etc. Press  come to the page Pic 5, press 001 press  finish program set up.

After program set up press  come to auto page (Pic 7) program is ready for processing.


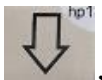




(Pic 4)



(Pic 5)

How to modify the program,

Come to the program page shown as (Pic 6), then press , , ,  move

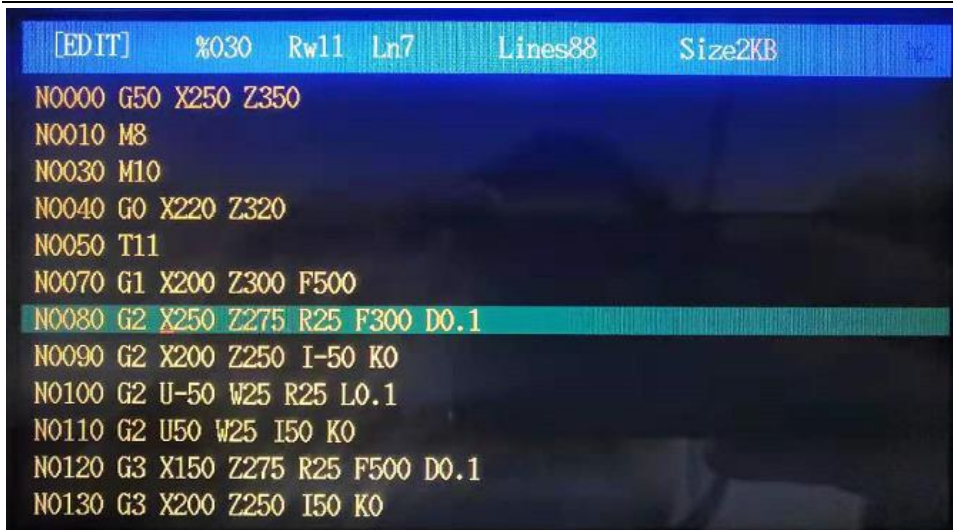
the cursor to position where need to modify, press  delete the value and type in revised value, modification accomplished.

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(Pic 6)



After program modification, press  come to auto page (Pic 7) program is ready for processing.

To move the cutter, you can also use handwheel to control



by press  button if machine deployed it.

Off---Switch off the handwheel controlling

X, Z---Control X axis and Z axis moving respectively

X1,X10,X100---Jog rate, eg. Handwheel per graduation

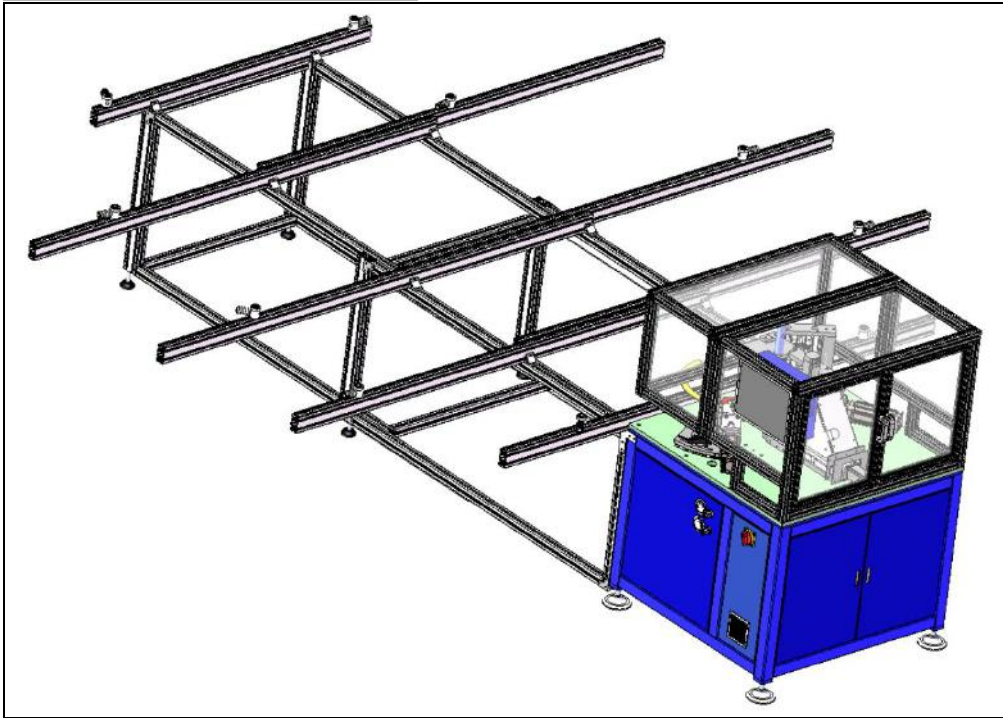
X1=0.001mm

X10=0.01mm

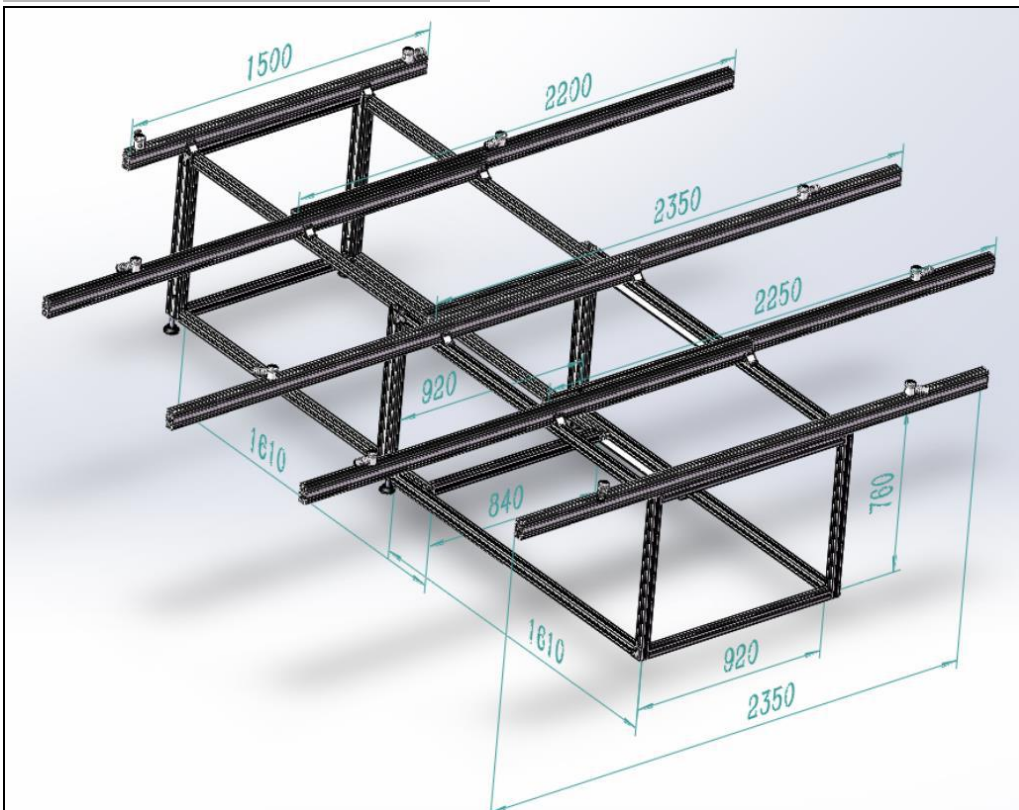
X100=0.1mm



Machine Overview



Machine Framework



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Machine Specification

Type	MK-03
Machine Profile	4.5m(L)*3.6m(W)*1.3m(H)
Weight	660 KG
Power supply	4.2 KW
Voltage	380V,variable
Process control	Numerical control system like CNC
Servo motor	Servo motor control cutting
Size range	450mm - 3500mm
Material allowed	Stainless steel, Carbon steel, Alloy
Thickness	2mm-6mm
Flange width maximum	60mm
Profile	Wide variety of profiles
Cycle time	5 minutes for size 24'
Setup or size change time	5-10 minutes
Ring load & Unload	Manually
Grooving process	One by one, start from the OD to ID
Groove and Chamfering	Yes
Turning speed	80-120 m/minute, adjustable
Driving mode	Two driving wheels
Cooling mode	Vortex Cooler
Air Consumption	0.8 L/minute

The end.