



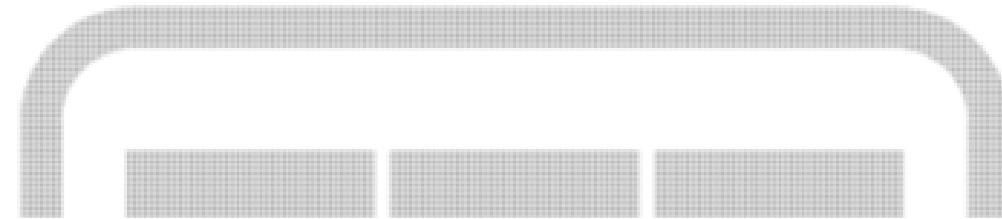
# Introduction to fully automatic honing machine

i|4.0

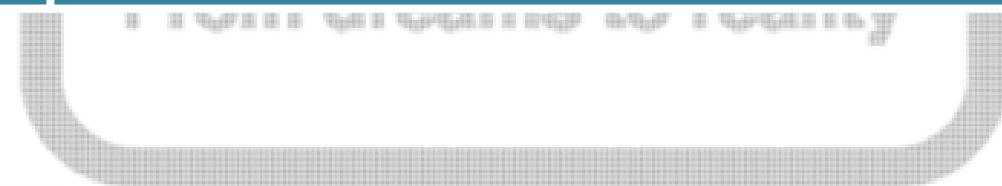
FULLY AUTOMATIC HONING  
MACHINE



**SIRUBA®**  
Sew Reach



NO	<b>Introduction</b>
1	<b>Specification</b>
2	<b>Excellent Mechanical Design and Manufacturing</b>
3	<b>Precision and Effectiveness</b>
4	<b>Exquisite Appearance Design</b>



## (1) Specification

### i4.0 Advantages:



SIRUBA fully automatic honing machine was the most advanced equipment. It had the following advantages:

- ※ The frame was made by cast iron material (FC250 & FCD400 )with excellent shock absorption to ensure stability.
- ※ The spindle motion adopts nitrogen balance system to connect the universal joint to make spindle motion more stable.
- ※ Adopting THK high strength guide rail and precision screw mechanism components, adopting automatic forced centralized lubrication system, the machine tool is not easy to wear and tear, durable to ensure the service life of the machine.
- ※ Advanced screw anti loosening design makes machine tool more stable.
- ※ Adopting FANUC servo control system and Japanese SANKYO high precision rotary table to meet flexible manufacturing.
- ※ Powerful spindle motor provides powerful power for large aperture machining. :
- ※ The automatic size detection system (gas electric conversion measurement) has the functions of automatic checking, calculating and correcting.

## (1) Specifiaction

### Machine Specification

Item	unit	Specification
Honing Diameter Range	mm	$\phi 3 \sim \phi 50$
Z-axis travel	mm	100
Tool storage capacity	pcs	6
Max Spindle working distance	mm	300
Speed range of spindle	rpm	0 ~ 2000
Rapid traverse rate	m/min	35
Distance from spindle to worktable	mm	400 ~ 800
Size of revolving disk	mm	$\phi 690$
Type of revolving disk	0.75kw	Electric
Number of workplaces	step	8
Working time of single workplace	s	2
Power of spindle driver motor	kw	5.5
Speed range of spindle driver motor	rpm	300 ~ 1100
Power of elevating motor	kw	1.6
Speed range of elevating motor	rpm	0 ~ 3000
Power of cooled motor	kw	1.5
Required precision :		
①dimensional accuracy±	mm	0.001
②Circularity ○	mm	0.001
③Cylindricity /○/	mm	0.002
④Roughness √	μm	Ra0.2
Machine size	mm	L3000×W2240×H2650

## (1) Specification

### FANUC Specifications

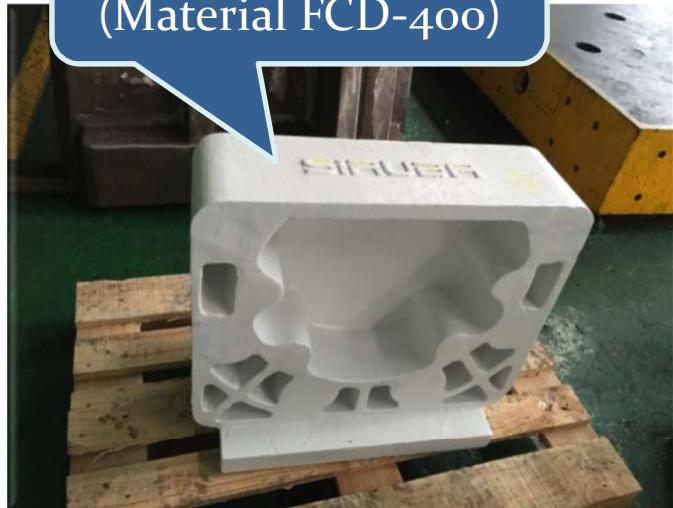


	Brand	FANUC
	Model	ROBOT LA Mate 200iD
	Controlled axes	6 axes
	Reach	717mm
Motion range (Maximum speed)	J1 axis	340°/s · 5.93rad/s
	J2 axis	245°/s · 4.28rad/s
	J3 axis	420°/s · 7.33rad/s
	J4 axis	380°/s · 6.63rad/s
	J5 axis	250°/s · 4.36rad/s
	J6 axis	720°/s · 12.57rad/s
	Max load capacity at wrist	7kg
Allowable load moment at wrist	J4 axis	16.6 N·m
	J5 axis	16.6 N·m
	J6 axis	9.4 N·m
Allowable load inertia at wrist	J4 axis	0.47 kg·m <sup>2</sup>
	J5 axis	0.47 kg·m <sup>2</sup>
	J6 axis	0.15 kg·m <sup>2</sup>
	Mass	25kg

## (2) Excellent Mechanical Design and Manufacturing



② Upright column  
(Material FC-250)



③ Multi Spindle  
(Material FCD-400)



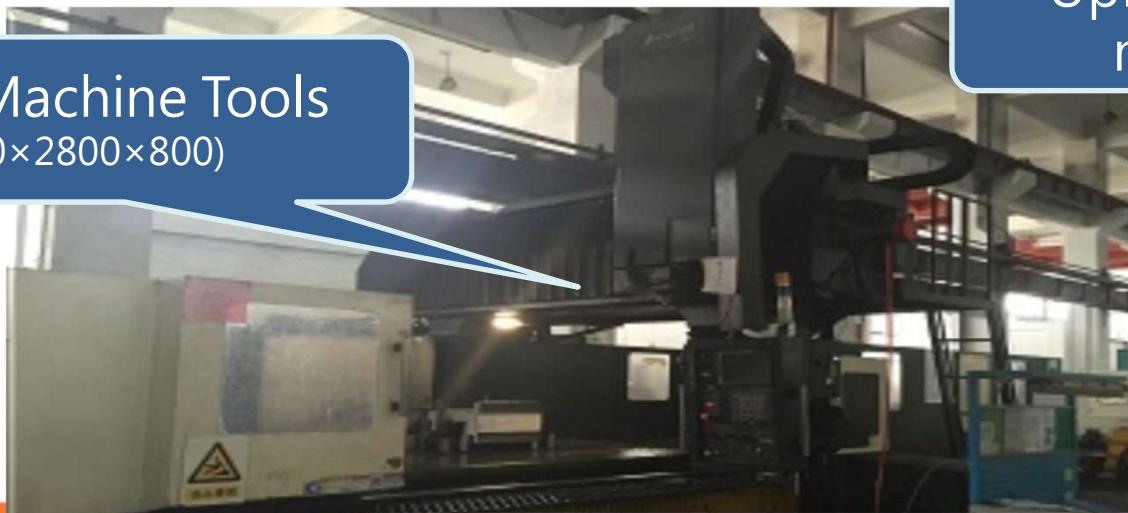
① Machine tool base  
(Material FC-250)

## (2) Excellent Mechanical Design and Manufacturing

Multi Spindle  
machining



5-Axis Machine Tools  
(6000×2800×800)



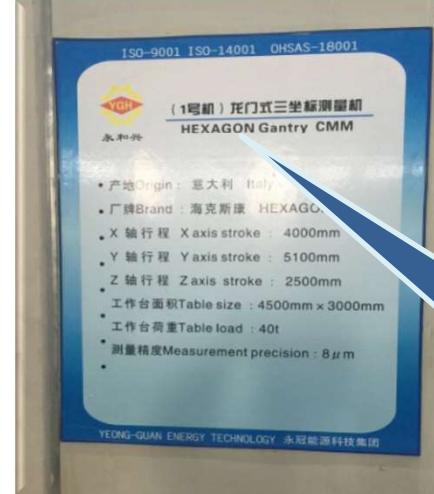
5-Axis Machine Tools

## (2) Excellent Mechanical Design and Manufacturing

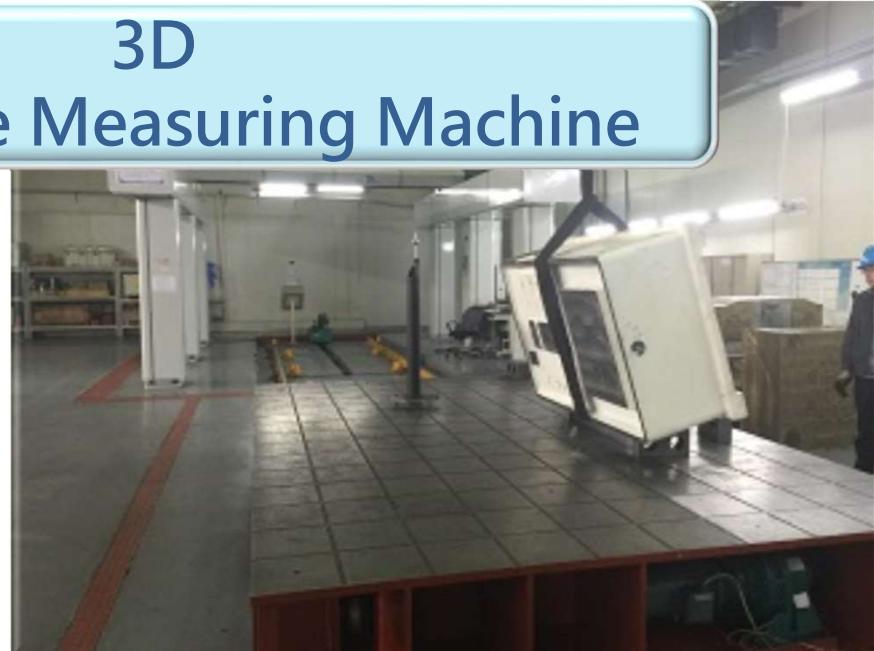


Checked by  
3D CMM

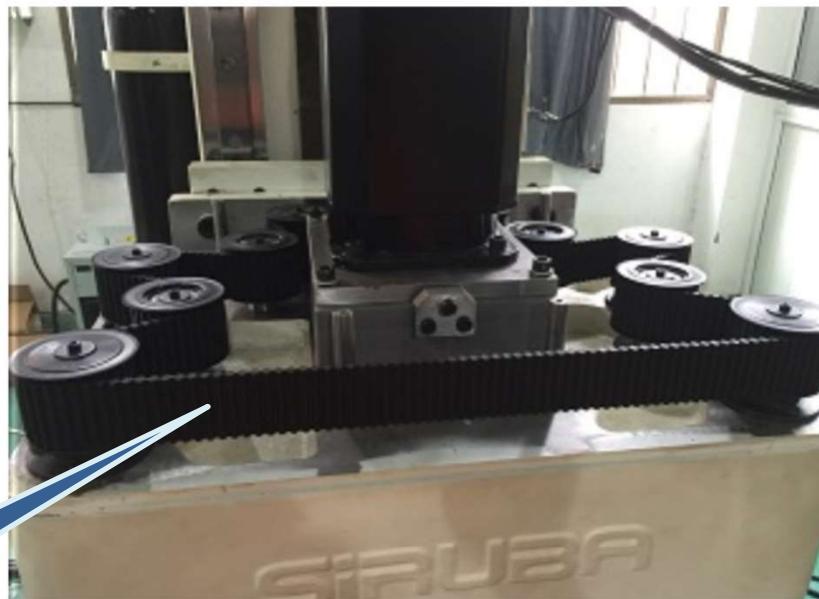
3D  
Coordinate Measuring Machine



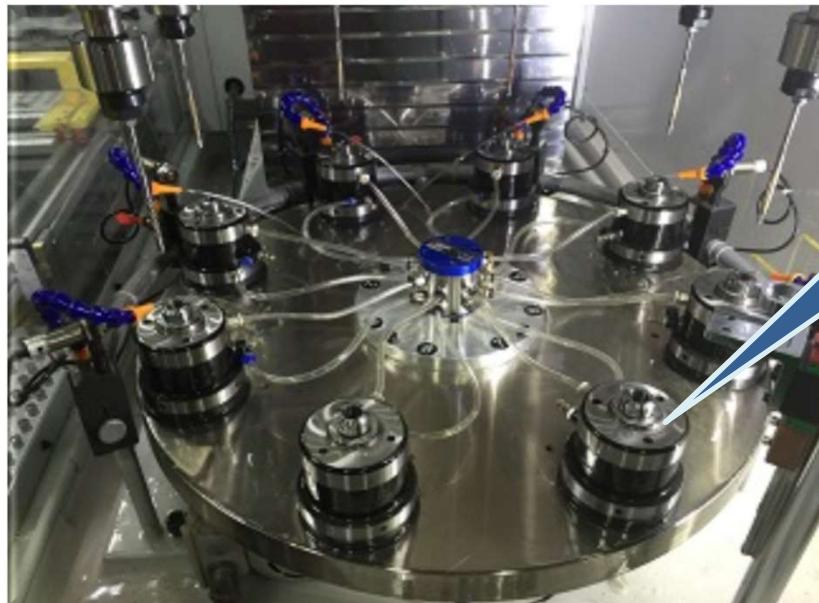
Italy  
HEXAGON  
3D CMM



## (2) Excellent Mechanical Design and Manufacturing



Timing belt  
drivers



6-axis and  
8-stations

## (2) Excellent Mechanical Design and Manufacturing

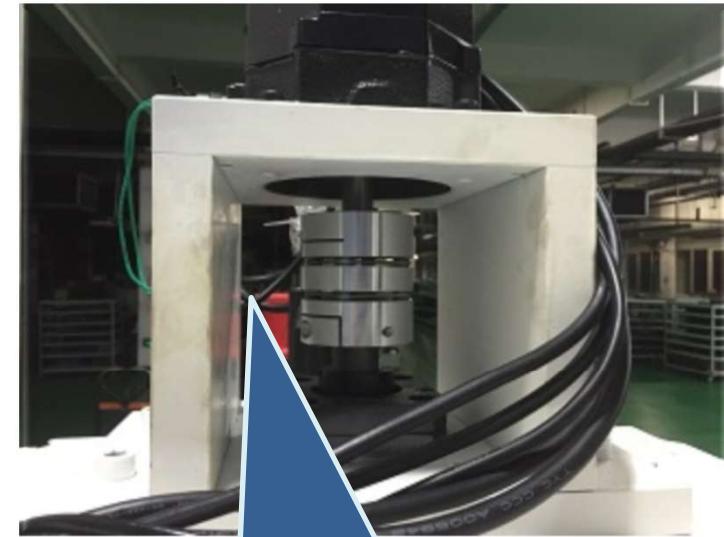


Double diaphragm  
coupling



Servo motor

Ball Screw



Double diaphragm  
coupling

## (2) Excellent Mechanical Design and Manufacturing

Air universal joint



Spindle motion balancing system  
(nitrogen type)



Balance cylinder



## (2) Excellent Mechanical Design and Manufacturing

SUS-304不鏽鋼線 & 鉸線鉗



## (2) Excellent Mechanical Design and Manufacturing



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Machine operation  
surface view

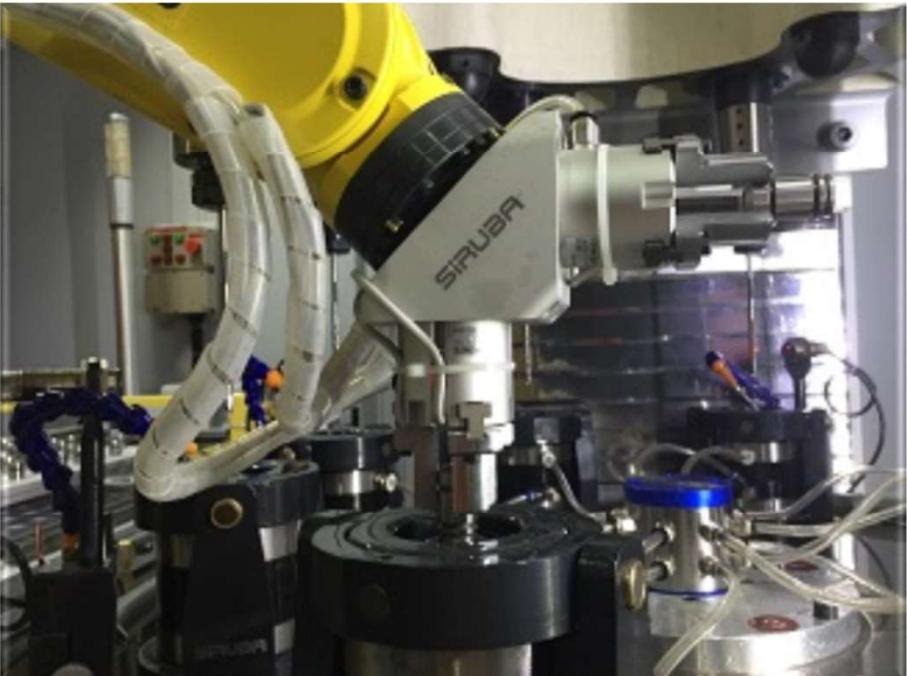
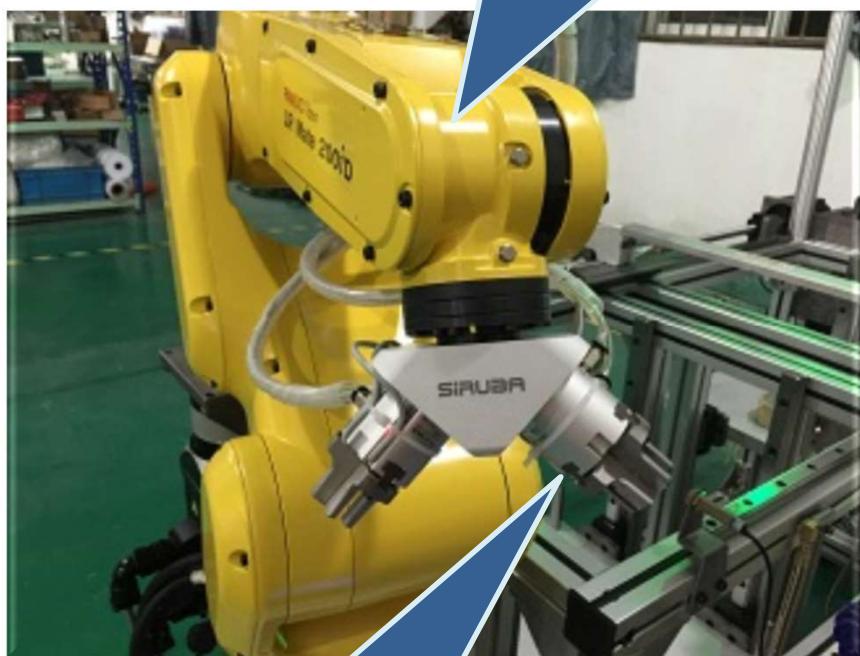
Industry 4.0 logo



Single -Pass  
Single Stroke Honing

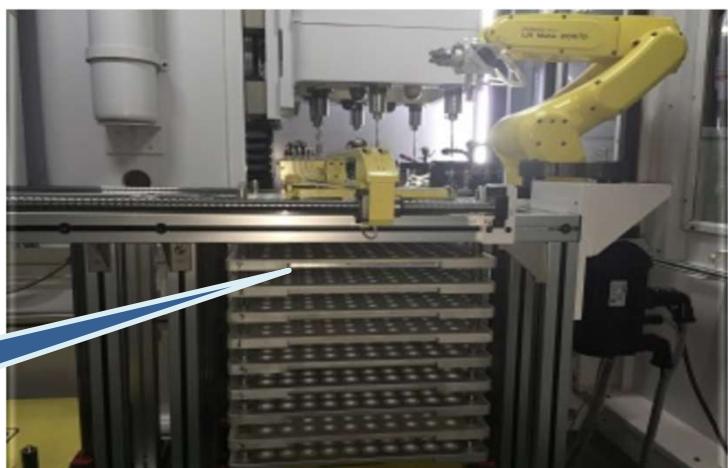
## (2) Excellent Mechanical Design and Manufacturing

FANUC 6-axis robot



SMC 3 Finger  
Gripper Pneumatic

Automatic  
loading/unloading



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Sew Reach

## (2) Excellent Mechanical Design and Manufacturing



① Automatic size measurement  
《 gas measuring instrument 》

④ Defective collection area

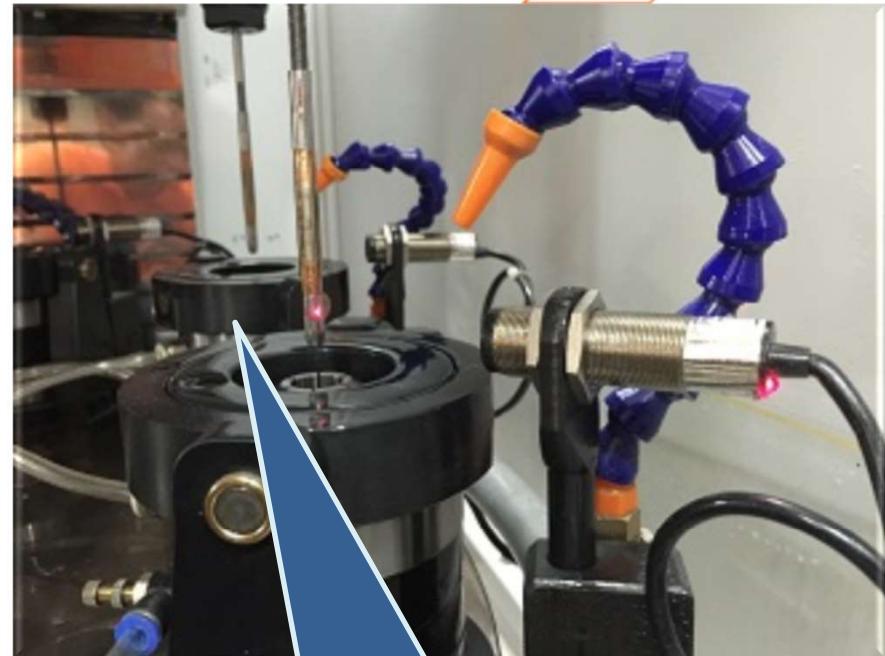
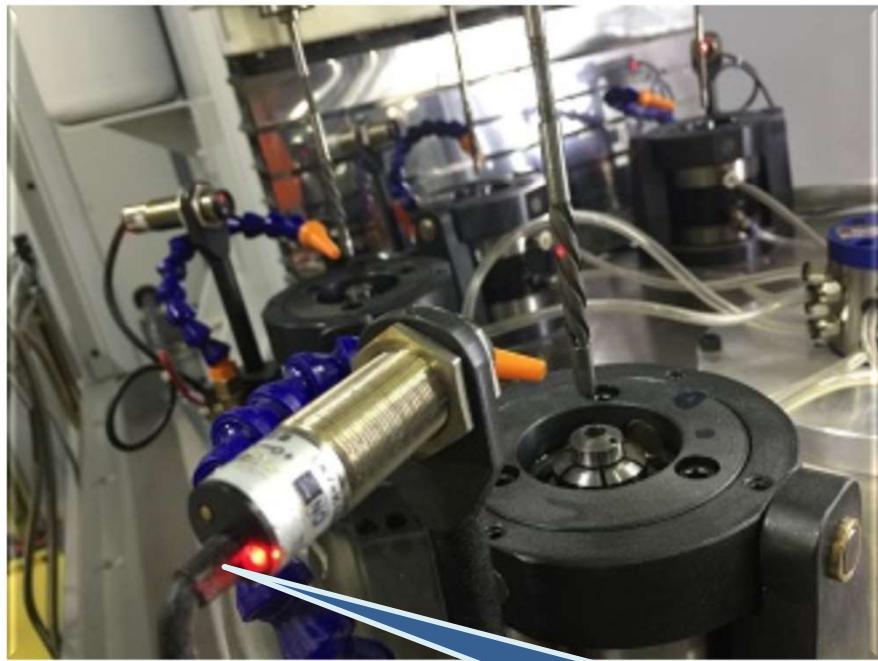


② Intelligent control instrument with automatic checking, calculating and correcting functions



③ Display the number of defective products

## (2) Excellent Mechanical Design and Manufacturing



Infrared tool detection  
system(6-AXIS)

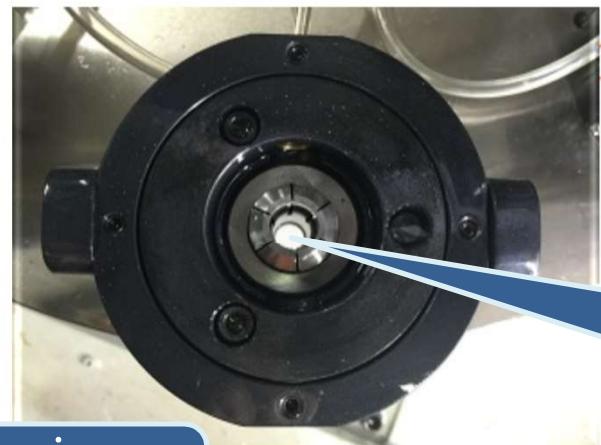
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Infrared tool detection  
system(6-AXIS)

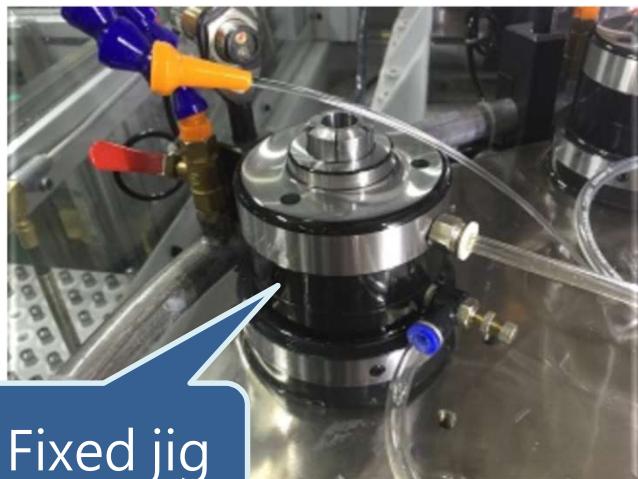
## (2) Excellent Mechanical Design and Manufacturing



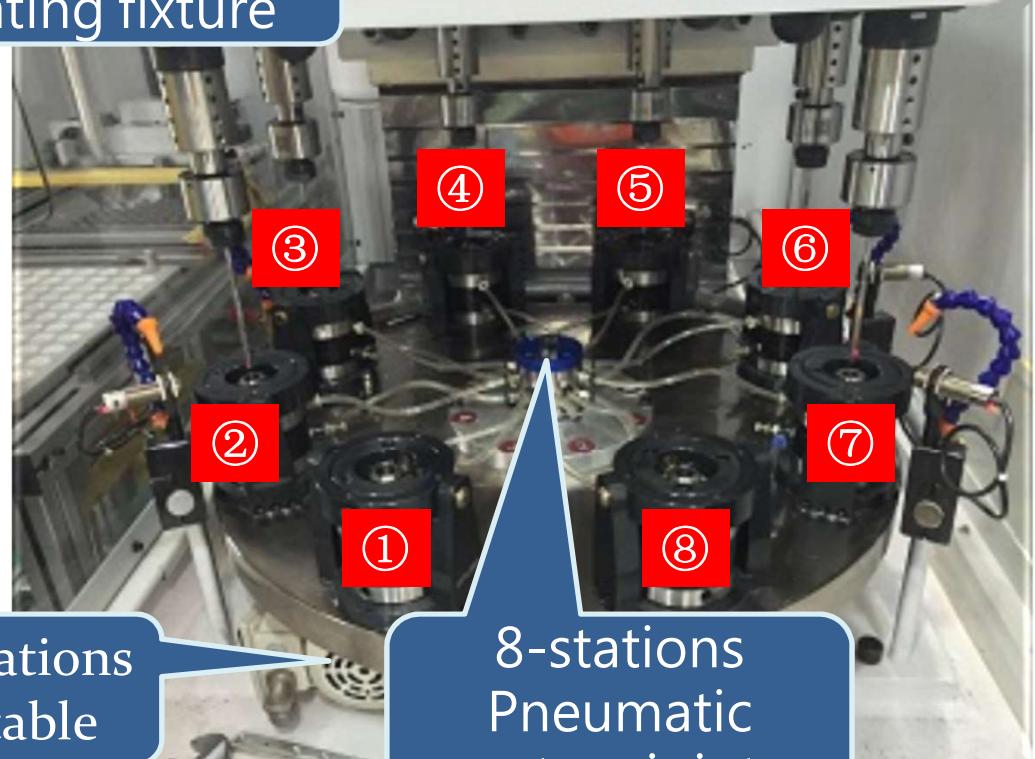
① X/Y axis  
floating fixture



Pneumatic  
flexible  
collet



② Fixed jig



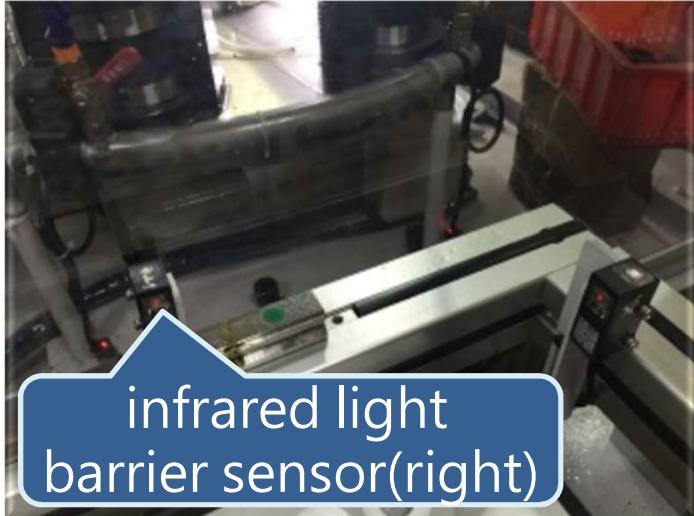
SANKYO 8-stations  
electric turntable

8-stations  
Pneumatic  
rotary joint

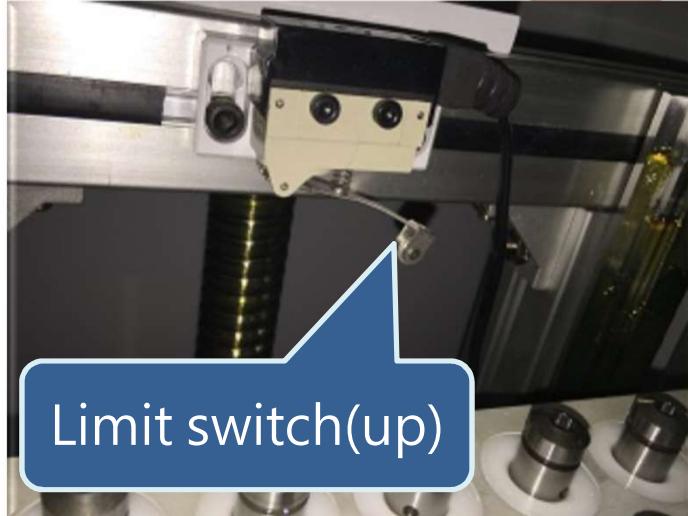
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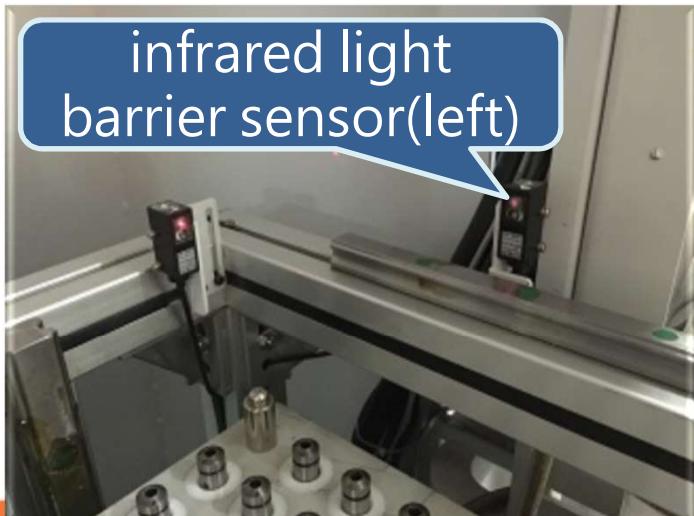
## (二) 優異的機械設計&製造



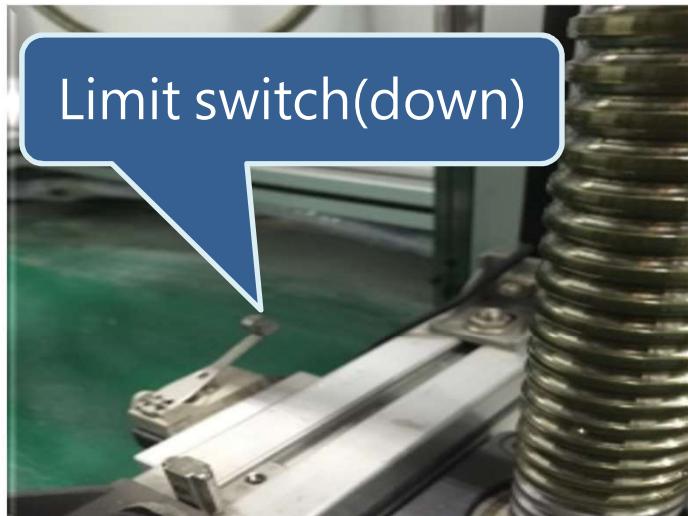
infrared light  
barrier sensor(right)



Limit switch(up)

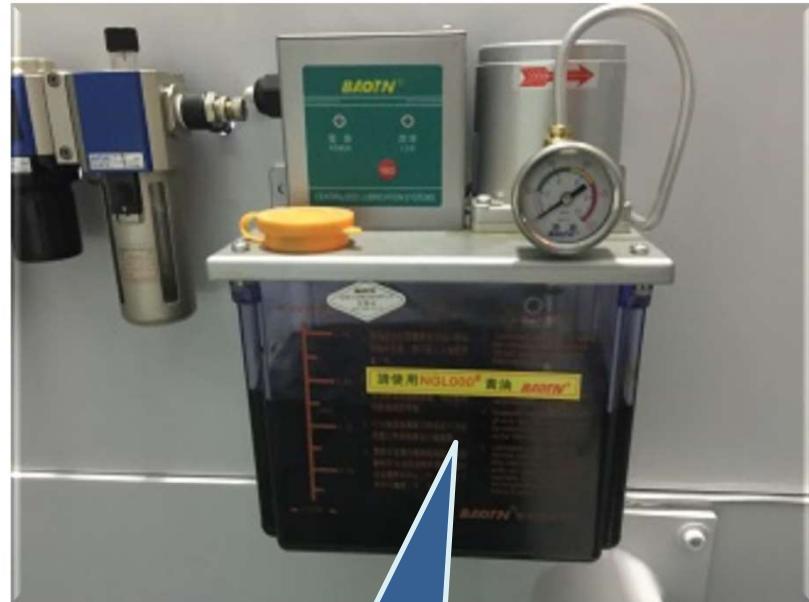


infrared light  
barrier sensor(left)

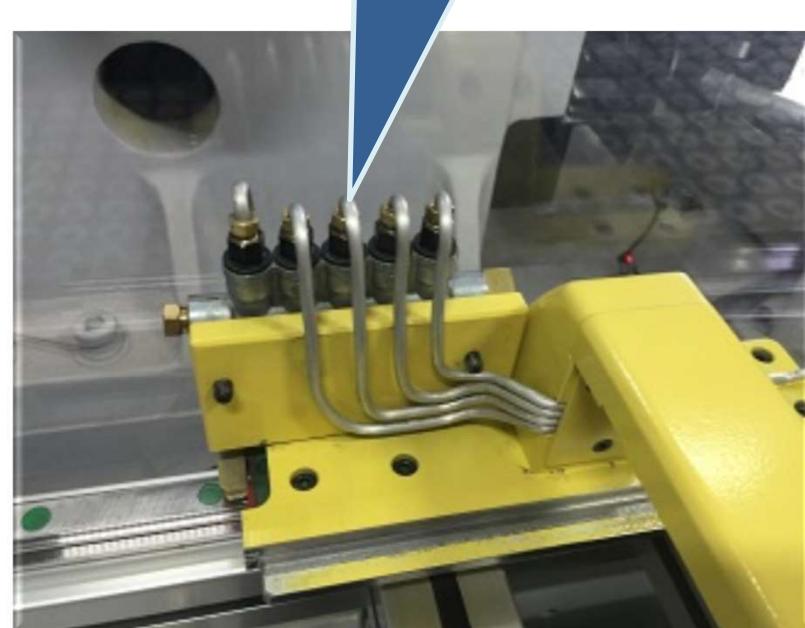


Limit switch(down)

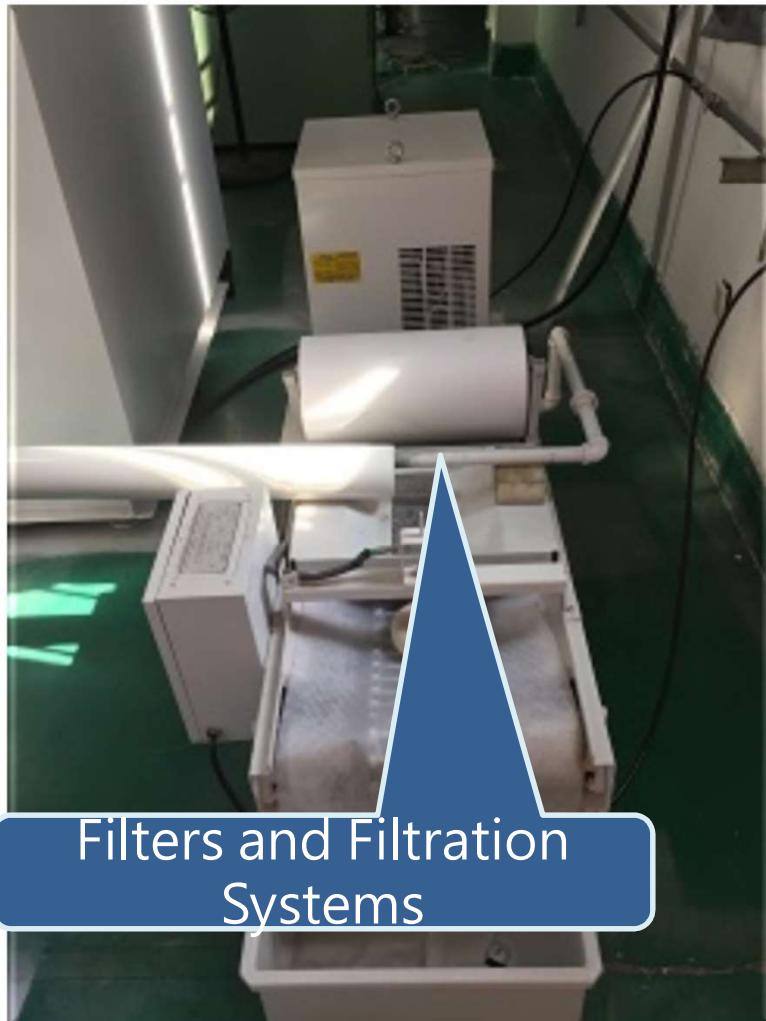
## (2) Excellent Mechanical Design and Manufacturing



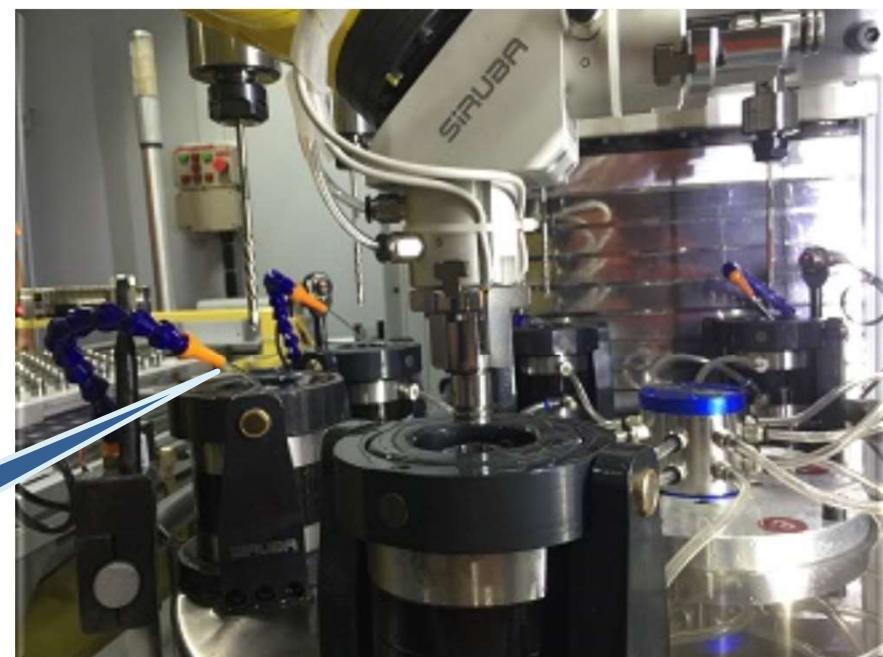
Lubricating oil pipeline



## (2) Excellent Mechanical Design and Manufacturing



Design of Honing Coolant  
Temperature Control System  
 $\pm 1^\circ\text{C}$



## (2) Excellent Mechanical Design and Manufacturing



electric closet power distribution cabinet



Air conditioning



### (3) Precision and Effectiveness



### (3) Precision and Effectiv

## I Detection data

KF-214 ( $\phi 6.5 +0.009$ $+0.003$ )		NO.	①dimensional accuracy $\pm 0.001\text{mm}$	②Circularity $\bigcirc$ $1\mu$	③Cylindricity $/\bigcirc/$ $2\mu$	④Roughness $\checkmark$ $Ra0.2$
		#1	$\phi 6.506$	0.22	1.22	0.053
		#2	$\phi 6.505$	0.14	0.86	0.042
		#3	$\phi 6.507$	0.22	1.33	0.062
		#4	$\phi 6.506$	0.19	1.38	0.076
		#5	$\phi 6.506$	0.17	1.11	0.041
		#6	$\phi 6.505$	0.19	0.97	0.123
		#7	$\phi 6.506$	0.21	1.25	0.048
		#8	$\phi 6.506$	0.14	1.27	0.047
		#9	$\phi 6.505$	0.25	1.73	0.035
		#10	$\phi 6.506$	0.12	1.02	0.036

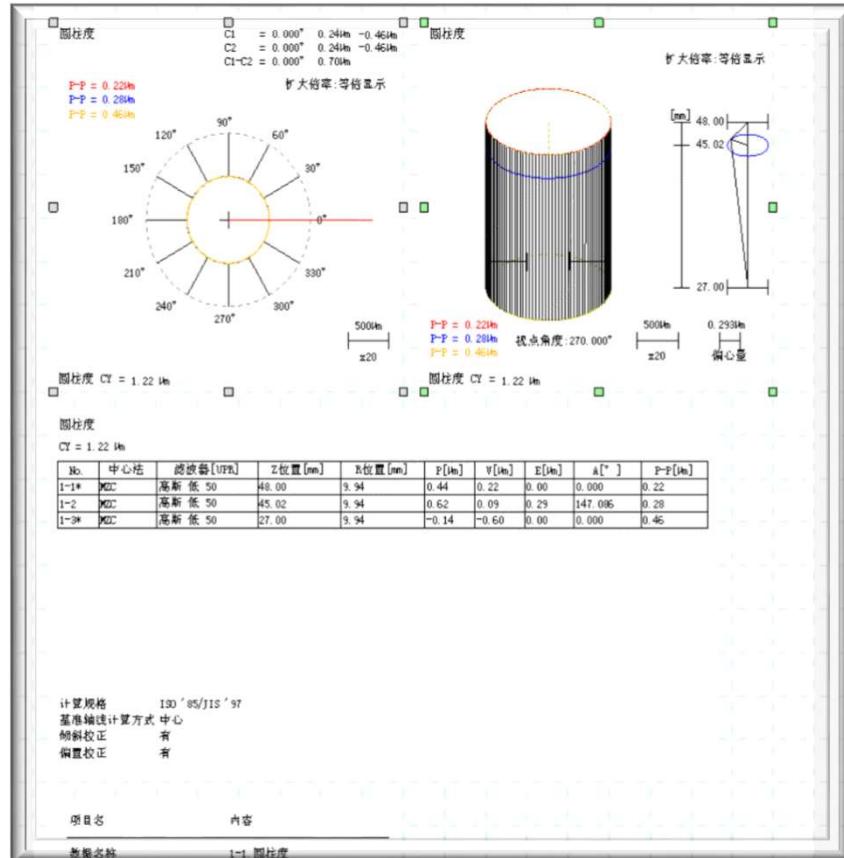
MD-41 ( $\phi 15 +0.003$ $-0.002$ )		NO.	① dimensional accuracy $\pm 0.001\text{mm}$	② Circularit $\bigcirc$ $1\mu$	③ Cylindricity $/\bigcirc/$ $2\mu$	④ Roughness $\checkmark$ $Ra0.2$
		#1	$\phi 15.001$	1.9	2.93	1.962
		#2	$\phi 15.002$	1.45	2.16	1.863
		#3	$\phi 15.001$	1.07	2.06	1.968
		#4	$\phi 15.000$	0.93	2.53	1.875
		#5	$\phi 15.003$	1.88	2.92	1.628
		#6	$\phi 15.001$	1.30	2.27	1.988
		#7	$\phi 15.001$	1.50	2.64	1.991
		#8	$\phi 15.002$	1.96	2.47	1.852
		#9	$\phi 15.000$	1.72	2.33	1.793
		#10	$\phi 15.001$	1.43	2.58	1.872

KL-208 ( $\phi 10 +0.005$ $+0.010$ )		NO.	① dimensional accuracy $\pm 0.001\text{mm}$	② Circularity $\bigcirc$ $1\mu$	③ Cylindricity $/\bigcirc/$ $2\mu$	④ Roughness $\checkmark$ $Ra0.2$
		#1	$\phi 10.005$	1.5	2.5	0.243
		#2	$\phi 10.007$	2.0	3.5	0.155
		#3	$\phi 10.005$	1.5	3.0	0.204
		#4	$\phi 10.005$	1.5	3.5	0.189
		#5	$\phi 10.008$	2.5	2.0	0.165
		#6	$\phi 10.007$	1.5	4.0	0.211
		#7	$\phi 10.008$	2.0	3.5	0.232
		#8	$\phi 10.006$	1.5	2.0	0.265
		#9	$\phi 10.006$	1.5	2.0	0.144
		#10	$\phi 10.008$	2.0	2.5	0.200

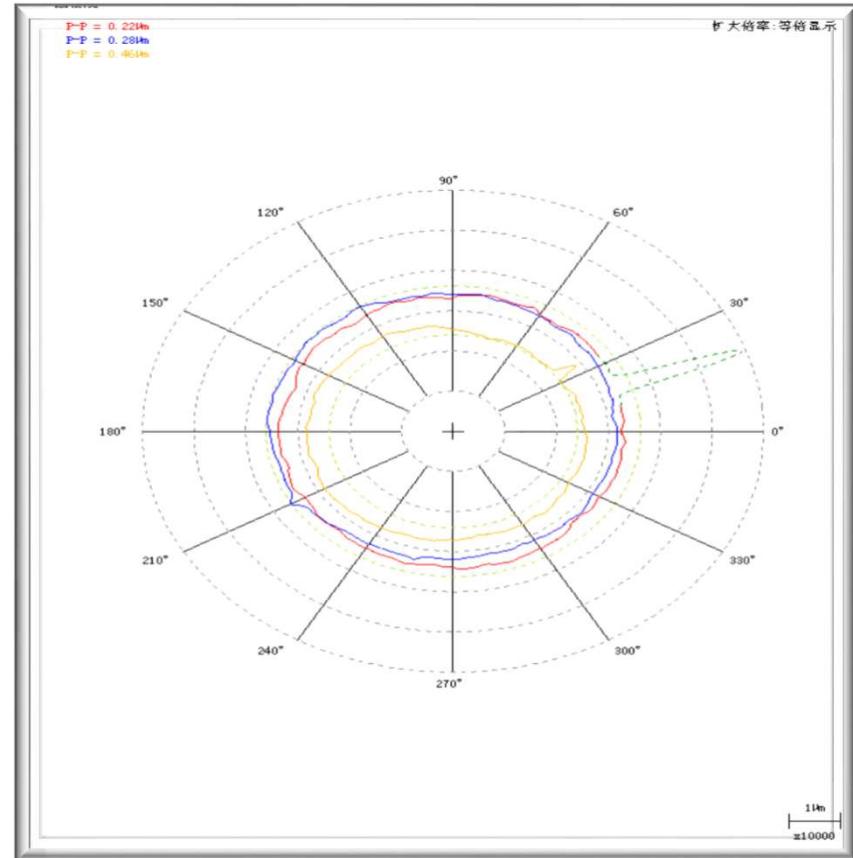
### (三)精度及效益分析

## • Cylindricity analysis diagram

Cylindricity 3D  
analysis diagram

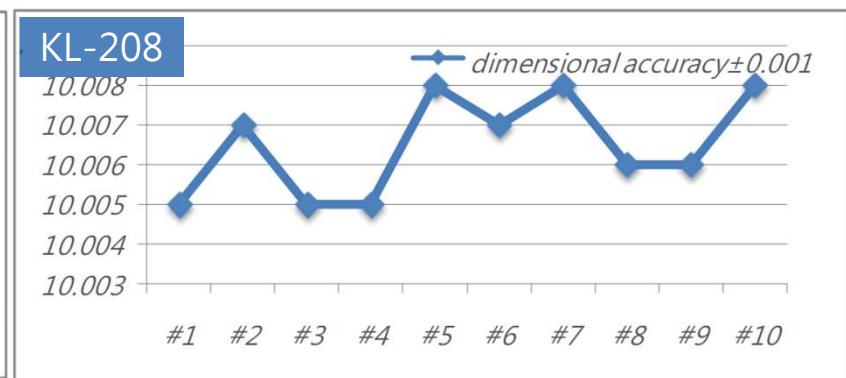
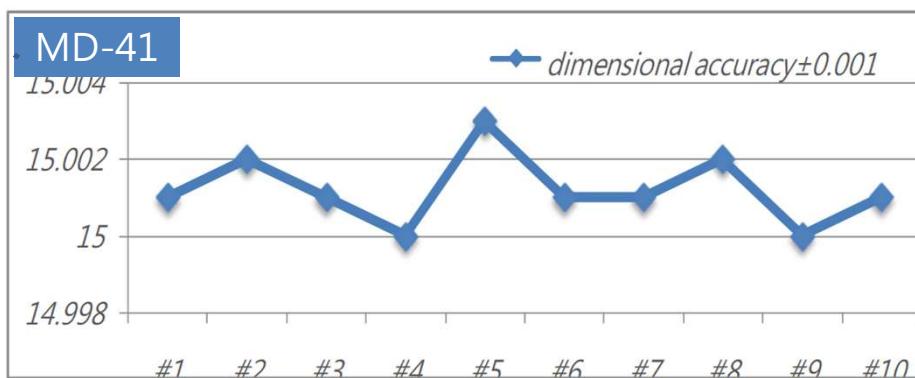
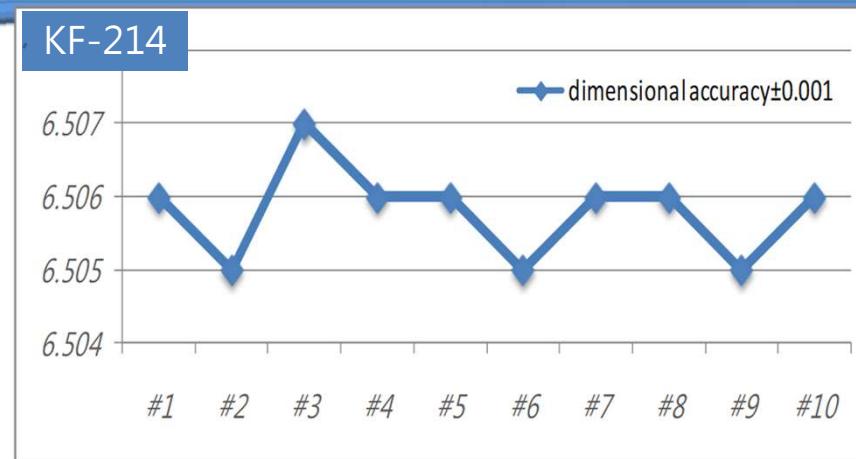


Cylindricity 2D  
analysis diagram



### (3) Precision and Effectiveness

#### ① 《dimensional accuracy±》



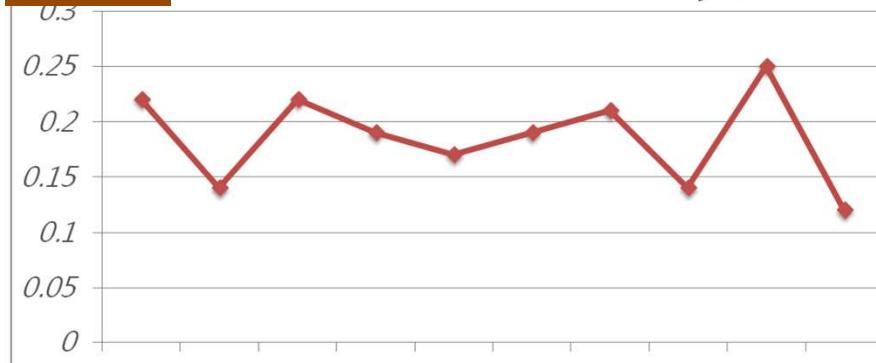
### (3) Precision and Effectiveness



#### ② 《Circularity ○》

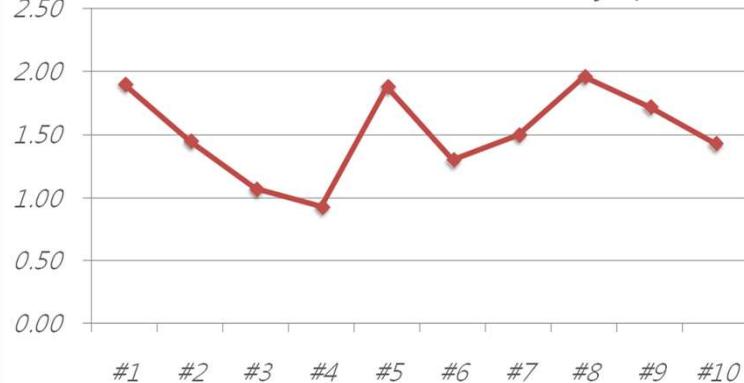
KF-214

— Circularity 1 $\mu$



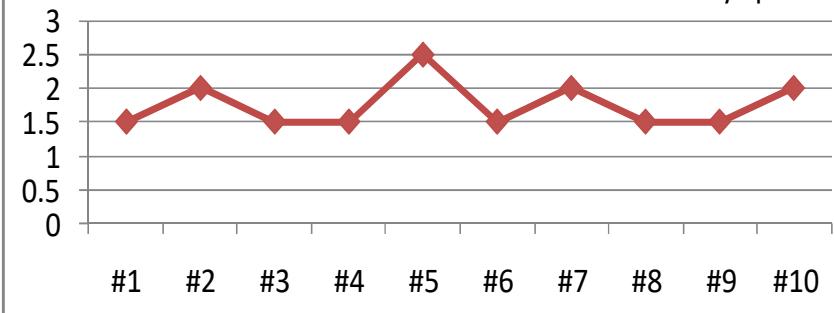
MD-41

— Circularity 1 $\mu$



KL-208

— Circularity 1 $\mu$

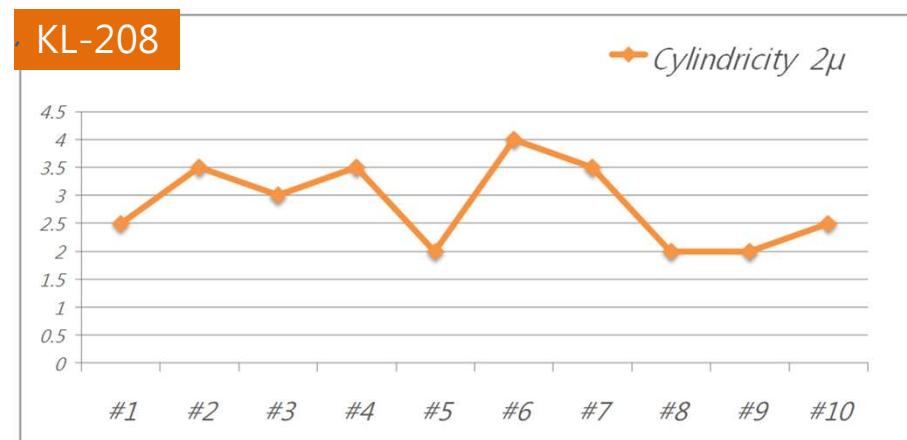
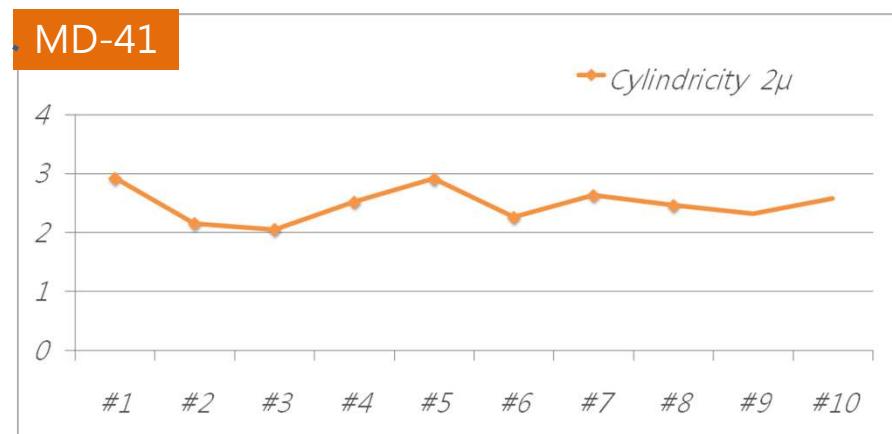
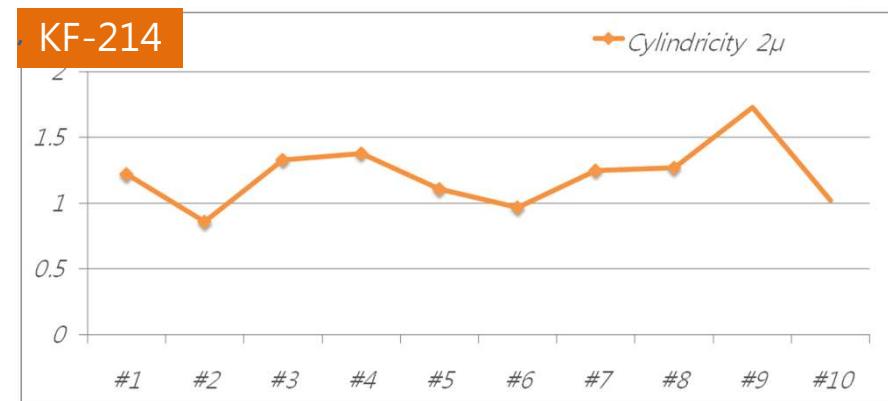


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### (3) Precision and Effectiveness

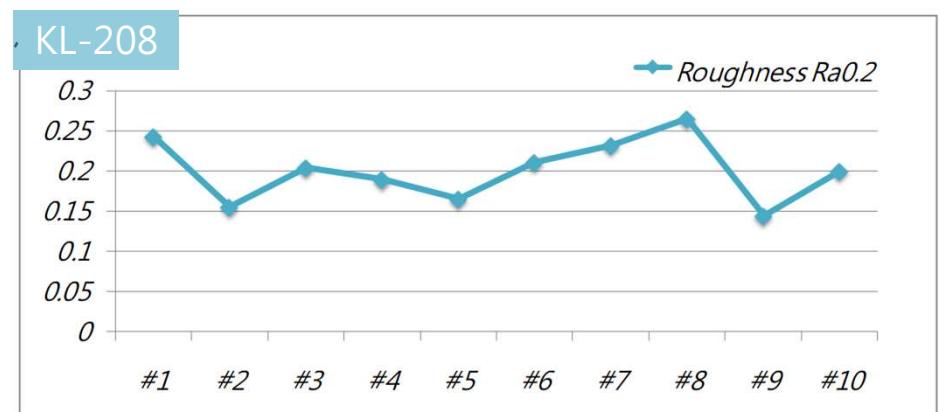
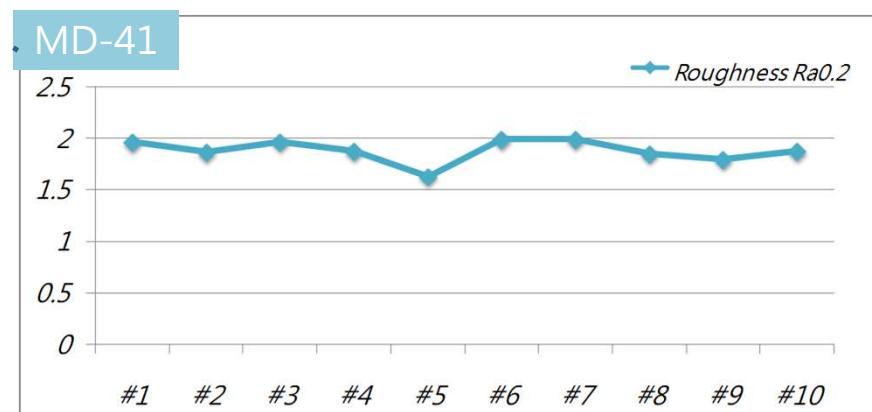
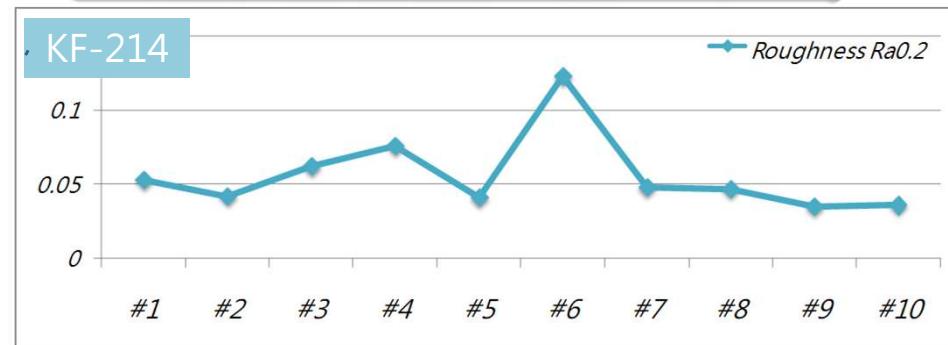
#### ③ 《 Cylindricity /○/》



### (3) Precision and Effectiveness



#### ④ 《Roughness √》

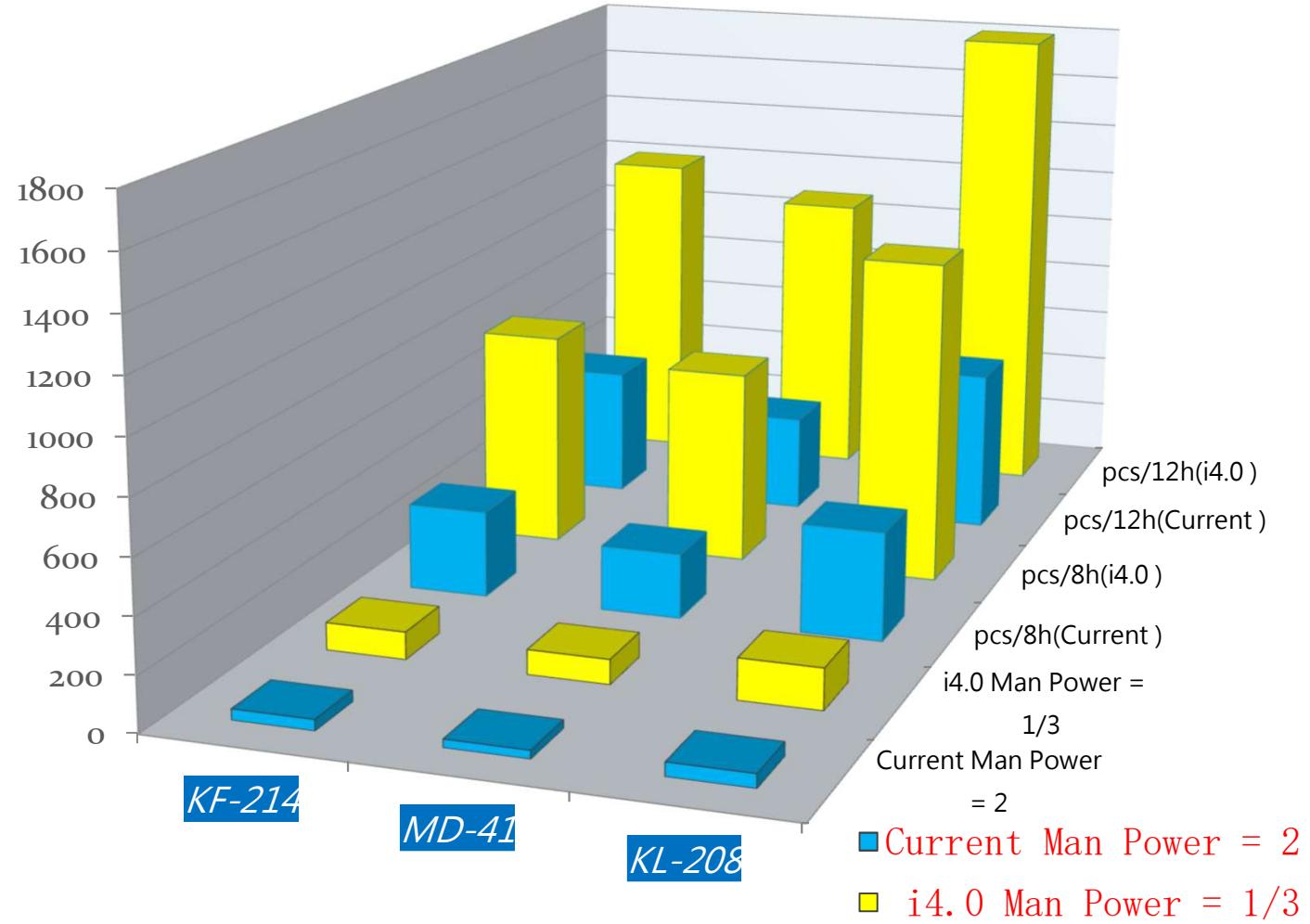


### (3) Precision and Effectiveness



Comparison	Machining	Tool	Process				Man Power	unit	production pcs/8h	production pcs/11h				
Vertical - honing machine	honing	Honing strip	(1) harsh honing	(2) finish honing	(3) harsh reaming	(4) finish reaming	2	2pcs	250	350				
			40s/pcs	40s/pcs	14s/pcs	14s/pcs								
			Total cycle time : 108s											
i 4.0	Reaming and honing	Electroplating-diamond reamer	i 4.0				1/3	1pcs	900	1260				
Fully automatic honing machine			Fully automatic honing machine											
			30s/Cycle time											

### (3) Precision and Effectiveness



## (4) Exquisite Appearance Design



Left side of  
encloser



Right side of  
encloser



**Siruba®**  
Sew Reach

#### (4) Exquisite Appearance Design





*The intelligent  
factory solution is  
your best choice*

