

Accessories

Standard : ● Optional: : ★

Description	Module	5BC-X29	5BC-X34	5BC-X38
1.Air blast through spindle_M53		●	●	●
2.Air conditioning for electrical cabinet habor HA-750AF		●	●	●
3.ARM Type ATC 32P		●	●	●
4.Automatic Power off		●	●	●
5.Built-in Spindle 15000RPM/HSK-A63		●	●	●
6.Calibration spheres (KKH 250)		●	●	●
7.Coolant system_Coolant Pump Motor,Stand		●	●	●
8.Centralized Automatic Lubrication System		●	●	●
9.X, Y, Z-axis linear scale system_HEIDENHAIN		●	●	●
10.Dynamic Collision Monitoring(#40)		●	●	●
11.Full-enclosed splash guard_multi-piece door		●	●	●
12.Fluorescent lamp x 1		●	●	●
13.Foundation bolt		●	●	●
14.Hydraulic Hose Coolant gun		●	●	●
15.Individual machine manual x 1		●	●	●
16.kinematicOpt(#48 CYCLE 451)		●	●	●
17.Link Type Chip Conveyor and Portable chip bucket		●	●	●
18.Maintenance safety guard(Including maintenance ladder)		●	●	●
19.WORKPIECE MEASURE PROBE(HEIDENHAIN TS-460)		●	●	●
20.Pedal Ladder_L1500*W800*H490mm [L59.06" *W31.50" *H19.29"]		★	★	★
21.RS232 Interface		●	●	●
22.Remote manual pulse generator/HR510		●	●	●
23.Spindle Water Cooler		●	●	●
24.Spray around spindle		●	●	●
25.Spindle Air Curtain		●	●	●
26.Screw Type Chip Conveyer		●	●	●
27.Tool package		●	●	●
28.Y-axis ball screw support device		●	●	●
29.Z Axis Nitrogen Counter Balance		●	●	●
30.Air gun		★	★	★
31.ARM Type ATC 40P		★	★	★
32.Built-in Spindle12000RPM/HSK-A100(CYTEC)		★	★	★
33.Built-in Spindle 24000RPM/HSK-A63		★	★	★
34.Coolant Through Spindle_20BAR [290.07PSI] With Water Cart		★	★	★
35.Coolant Through Spindle_25BAR [362.58PSI] With Water Cart		★	★	★
36.CTS full splash guard with top cover		★	★	★
37.Hoist Seat		★	★	★
38.TOUCH PROBE		★	★	★
39.X-axis ball screw support device		★	★	★
40. Software Option 1_Cylinder surface interpolation,Tilting plane,Circle in 3 axes (#8)		●	●	●
41.Software Option 2 Spline interpolation /TCPM (#9)		●	●	●
42.Kinematic coordinate conversion		●	●	●
43.TNCRemot Software		★	★	★



Intelligent Machining Center

5BC Series
Smartcenter

- 5-Year warranty on guideways
 - 5-axis head made by Hartford
 - 4 linear guideways on Z-axis
 - One-piece wider column design
 - Slant beam design on cross beam



She Hong INDUSTRIAL CO. LTD.

No.3 Jingke N. Road, Taichung City, 408 Taiwan
www.hartford.com.tw Tel: 886-4-23501980 Fax: 886-4-23581793
CAT No : 20230927-F19

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Hartford

Hartrol · Smartcenter · Robocell

We manufacture intelligent machines only

A.I. Applications inside, Hartrol Plus is the control which provides machining status with advanced features.

AiSmartControl

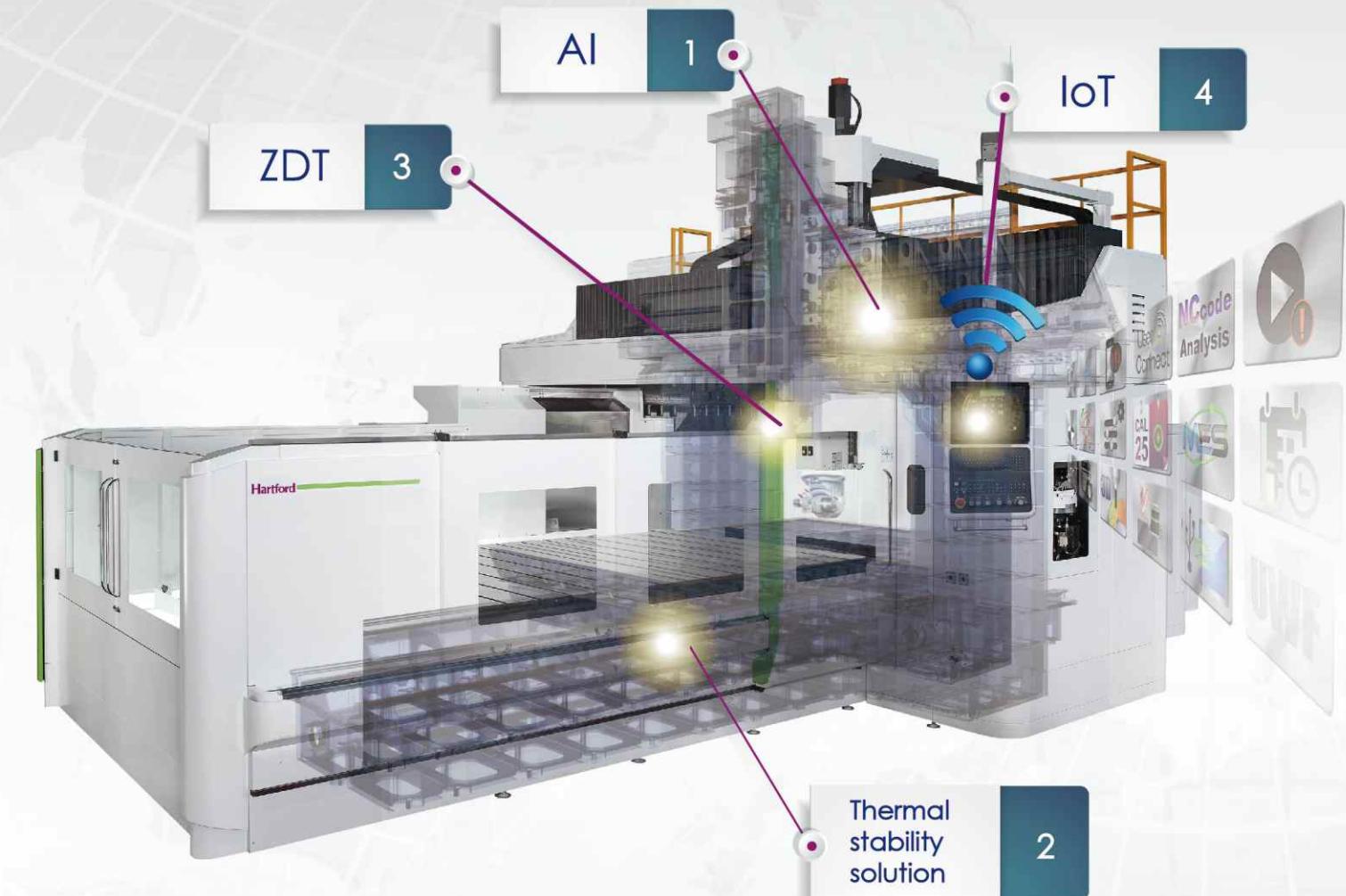


Major functions
of Hartford AI
controller



Imagine what future machines
ought to be outlined.

Hartford
redefine the future



IoT
+ Remote Warm-up & Turn-on
+ Hartrol Plus Sync & Update
+ User Connect



Thermal stability solution
+ Spindle Thermal Compensation
+ Casting Thermal Compensation
+ Thermal Symmetry / Thermal Balancing



ZDT
+ Diagnosis Report on Spindle Operation
+ Alarm Report System



AI
+ Facial Recognition System
+ AI Efficient Lubrication Management
+ Smart Efficient Chip Collection



How to quickly implement automation?

Hartford Robot Production Cell

Easy to get started

Hartford Robocell provides you a professional robot training and rich automation experience, to let you quickly learn and easily operate your automation systems

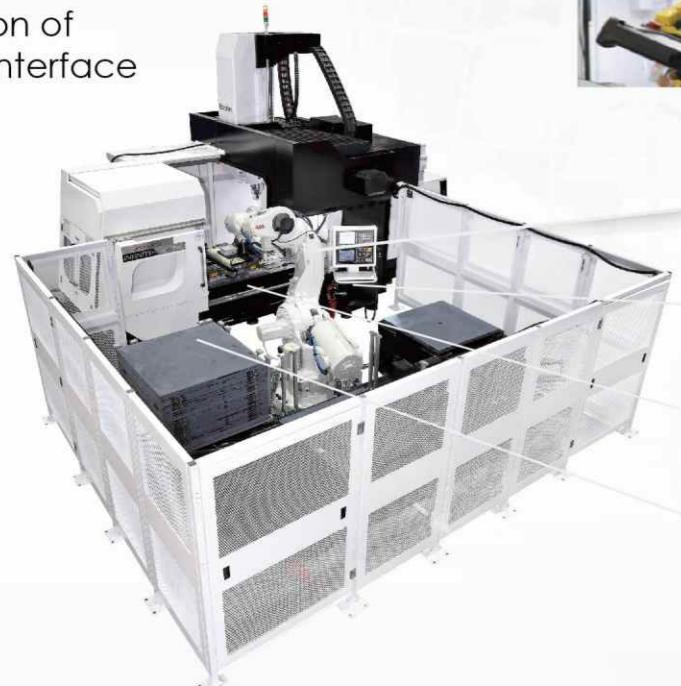
Quality control monitoring

Automation systems have to pass all the strict Quality Control tests at every stage like design, assembly, testing, final inspection and shipment, complete quality control processes for all the products.

Professional analysis

Robocell Machining optimization service, to let you be on the top by using professional machining methods

What definition of Automation interface only :



- 1.Automatic Door
 - 2.Automatic Interface
 - 3.Pneumatic/ Hydraulic Interface
 - 4.Other options
- | | | |
|--|---|--|
| 1.Automatic Door | 2.Automatic Interface | 3.Pneumatic/ Hydraulic Interface |
| <ul style="list-style-type: none"> ■ Pneumatic/Automatic Door System_Operating Door ■ Pneumatic/ Servo Automatic Door System_Right Side Door | <ul style="list-style-type: none"> ■ I/O Preparation ■ Profibus Link Preparation ■ CC-Link Preparation ■ EtherNet/IP Link Preparation | <ul style="list-style-type: none"> ■ 1/2/3 Cell Automatic Pneumatic/ Hydraulic Interface in the machine |
| 4.Other options | | |
| <ul style="list-style-type: none"> ■ High Pressure Spray Nozzle with Automatic Preparation | <ul style="list-style-type: none"> ■ HStainless Base | <ul style="list-style-type: none"> ■ High-volume chip-removal system comprising dual side augers |

High Efficiency Solutions for Aerospace Components

A perfect demonstration for machining accuracy and ability.

Hartford 5-axis double column machining center suits for complex multi axis components whilst maintaining high precision and excellent material removal efficiency



1.Aerospace component



2.Hood

NCG-2005 5-axis Accuracy Testing

■ Workpiece name	NCG2005	■ Workpiece material	Necuron 1007	■ Workpiece size	75x105x50 mm
■ Workpiece fixed angle	0 ° & 30 °	■ Cycle time	12 min	■ Tool	Ø 6 mm end mill

Dimensional accuracy



Marginal lines(1 mm) in X, Y-axis are consistent.

N/C Thermal elongation check



Connection wall thickness down to 10 µm is not broken.

Angle accuracy deviation of rotating axes



High angle accuracy of B/C axes is easily recognized by surface finish and spacing symmetry.

Tool center point check



Tool center point in 5-axis (X,Y,Z,B,C) positions accurately.

Workpiece surface check



Accurate right angle between X & Y plane.

Axis accuracy check



In hole cutting, tool feeds in right and left direction are symmetrical.

Contour accuracy check



By the high accuracy of contour.

The Optimized Structure Design on 5BC

Hartford 5BC machining center delivers the power and versatility cutting capability. Providing the best resolution for aerospace industry.



Full range of linear guideway five-year warranty:

Warranty coverage will not apply under following conditions

- 1.Improper operation (collision)
- 2.Lack of regular cleaning of accumulated debris causing damage to the linear rails & carriages.



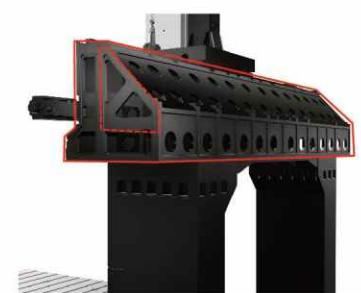
Four linear guideways on Z-axis

- Supported by high rigidity roller type linear guideways.
- Bilateral supported delivers higher rigidity.
- Provides higher stability and accuracy.
- Patent (I264343 : Four linear guideways on Z-axis.)



Slant beam design on cross beam

- 45 ° Force flow design reducing vibration through efficient force flow transfer.
- Increased machine stability.
- Increased machine cutting accuracy.
- Patent (M435318: Slant beam design on double column cross beam)



One-piece wider column design

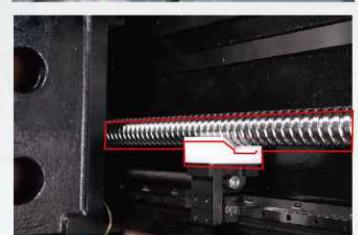
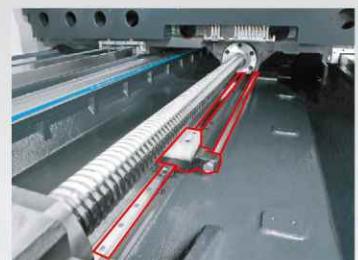
- Increased contact area between the column and the machine base to 1250mm.
- This provides a more efficient delivery of cutting force to the machine base.
- Multi-layer box-in-box ribs structure design.
- Reduce vibration to improve your accuracy.
- Patent (M437316: The section of box type structure features excellent torsion-resistance.)



Hartford-Made High Rigidity Head & Structure

X,Y-axis ballscrew supported

- Ball screws downcast problem can be improved.
- Enhance machining accuracy.
- Y-axis: x29/x34/x38 are standard.
- X-axis : Machines above 5 meter are standard, machines under 5 meter are optional.



Hartford-made high rigidity 5-axis head

- The 5-axis head is made in Taiwan.
- High rigidity **FORK** structure design.
- High accuracy & high rigidity 5-axis head



High rigidity & strength machine head stock

- The size of machine head section is 540x521mm
- Chamfer design inside the stock
- Machine head rigidity and strength can be boosted.

Measurement Equipment

The advanced measurement technique

- Dynamic collision monitoring (DCM) function increases machine running safety.
- CYCLE 451 measurement can be operated easily so that machine accuracy is always maintained.
- Heidenhain TS460+KKH250 are standard.



Dynamic collision monitoring(DCM)

- Automatically monitors the working space of machine.
- Prevents collision with components.
- Increases the level of safety for both the operator and machine.

Kinematic Comp(opt.)

- This technology takes volumetric compensation to a new level.
- Enhances precision machining of large workpiece.

Kinematic Opt 48

- It's a 3-D touch probe cycle that automatically measures all rotary axes.
- This makes recalibration a fast and efficient process.
- Machine accuracy can be controlled even over long period.

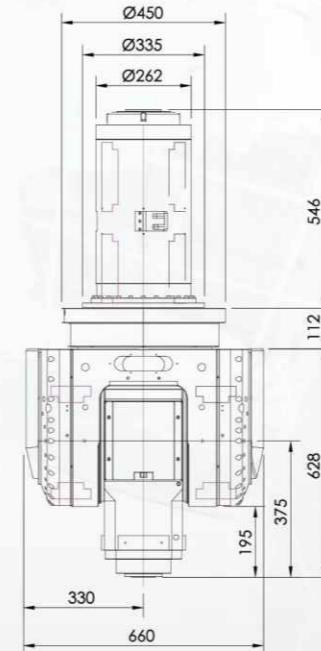
Powerful spindle torque

Powerful spindle torque

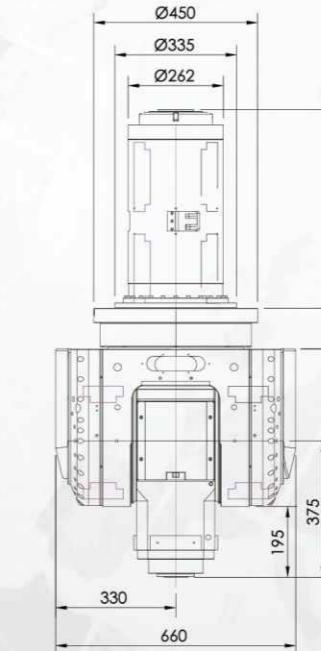
	Model	ITRI-5A63				CYTEC_M21		
		HSK-A63(Spindle)	B	C	HSK-A100(Spindle)	B	C	
Rotation range	degree	-	-	$\pm 105^\circ$	$\pm 240^\circ$	-	$\pm 110^\circ$	$\pm 360^\circ$
Positioning accuracy	sec	-	-	$\pm 5''$	$\pm 5''$	-	$\pm 5''$	$\pm 2''$
Rotation speed	rpm	15000	24000	60	60	12000	60	60
Rotation torque(Con.)	Nm	70.4	72	648	638	170	700	700
	ft-lbs	51.92	53.1	477.94	470.56	125.39	516.29	516.29
Rotation torque(Max.)	Nm	88.3	88	1200	1000	220	1000	1000
	ft-lbs	65.13	64.91	885.07	737.56	162.26	737.56	737.56
Holding torque	Nm	-	-	4000	4000	-	4000	4000
	ft-lbs	-	-	2950.25	2950.25	-	2950.25	2950.25

Spindle diagram

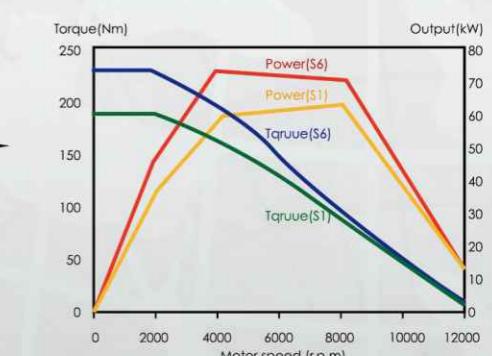
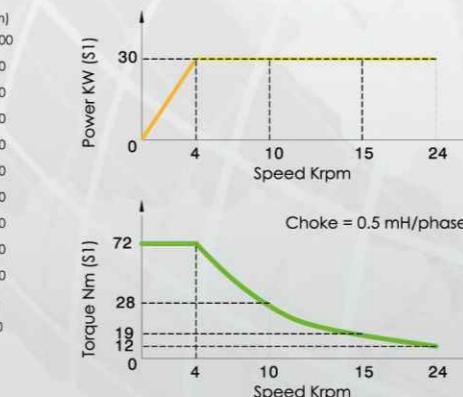
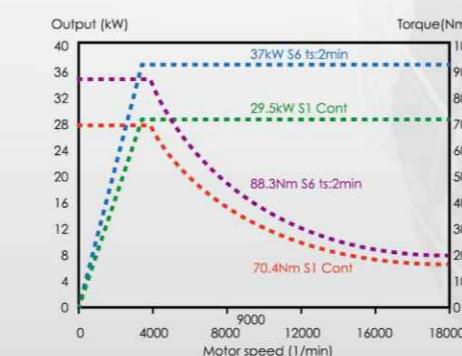
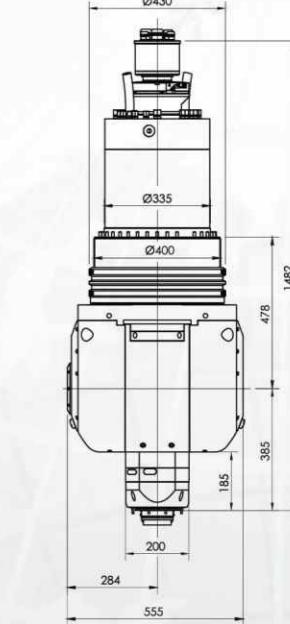
HSK-A63(ITRI-5A63)
15,000 rpm



HSK-A63(ITRI-5A63)
24,000 rpm

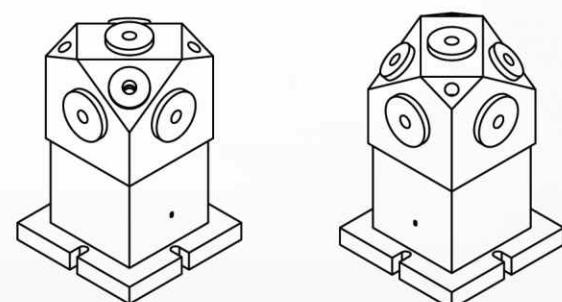
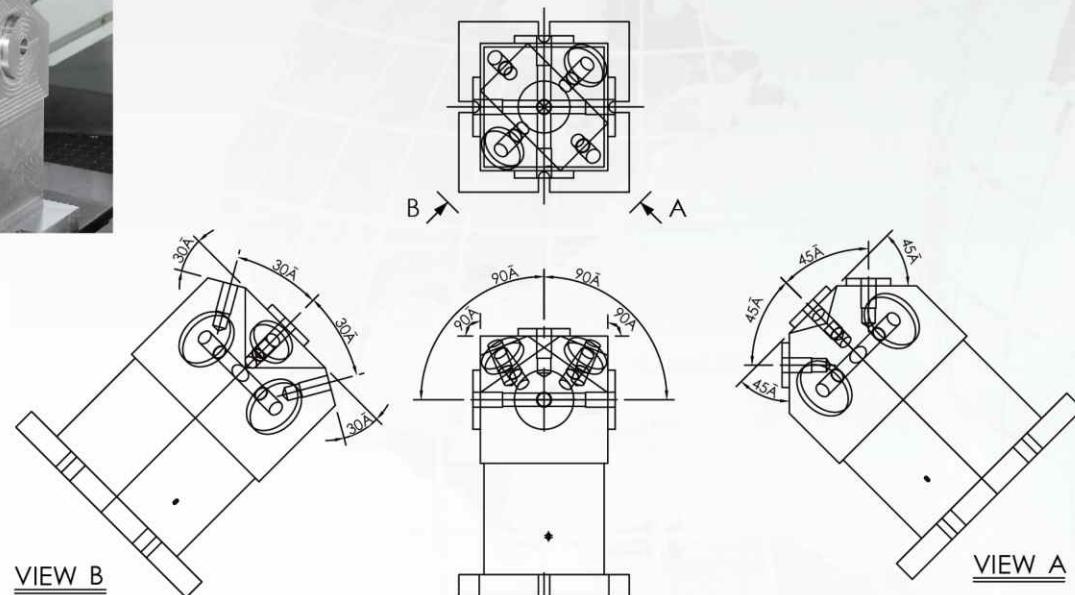


HSK-A100(ITRI-5A63)
12,000 rpm



Precision measuring

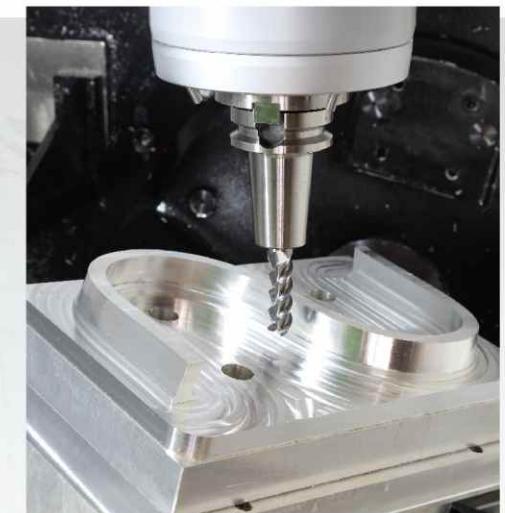
Five axis accuracy inspection : 9 faces measurement.



Item	Test Item	Tolerance	Test Results
1	Reference surface P relative face A, B, C, D (90 degree) of angle error.		0.0036
2	Reference surface P relative face E, F (45 degree) of angle error.		0.0036
3	Reference surface P relative face G, H (30 degree) of angle error.	±0.1mm	0.0044
4	Reference hole P relative axial hole A, B, C, D (90 degree) of angle error.		0.007
5	Reference hole P relative E, F axial hole (45 degree) of angle error.		0.0055
6	Reference axial hole P relative G, H axial hole (30 degree) of angle error.		0.001

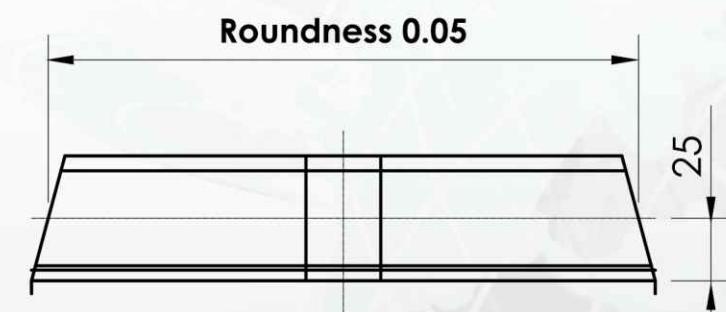
unit : degree

5-axis accuracy test : S-CUT



Item	Test Item	Tolerance	Test Results
1	Multi-faces simultaneous (Finish/smooth)	RA3.2 Rmax12.5	RA2.0 Rmax12.5
2	Profile accuracy	0.12mm	0.085mm
3	Thickness accuracy of 5-axis simultaneous	±0.1mm	0.063mm
4	commutation grain	No cutting stepping grain	No cutting stepping grain

NAS-979 Inspection Cutting report

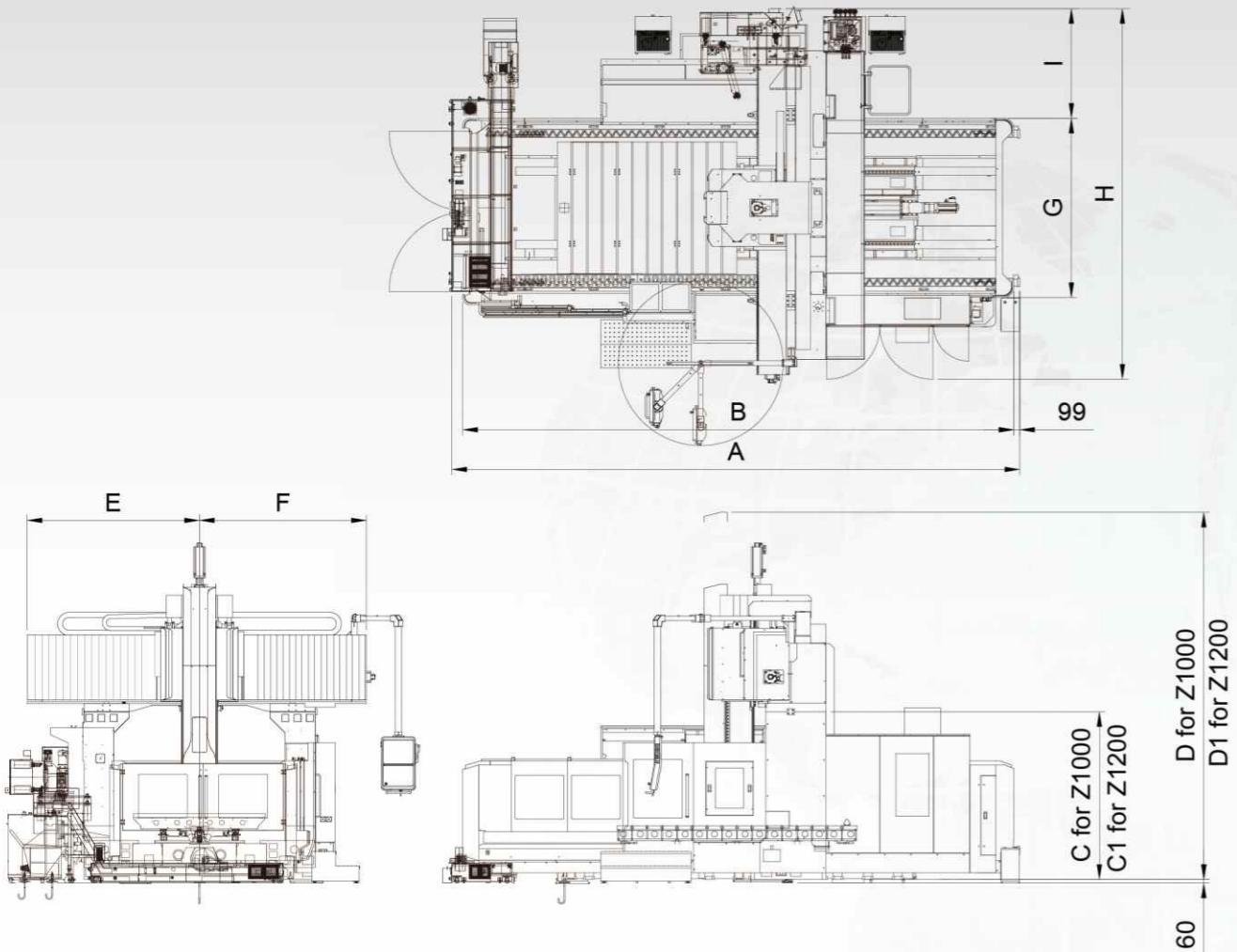


	Tolerance	Test results
Inclination angle	∠15°(±1°/20")	15.0007°
Roundness	0.05	0.0148

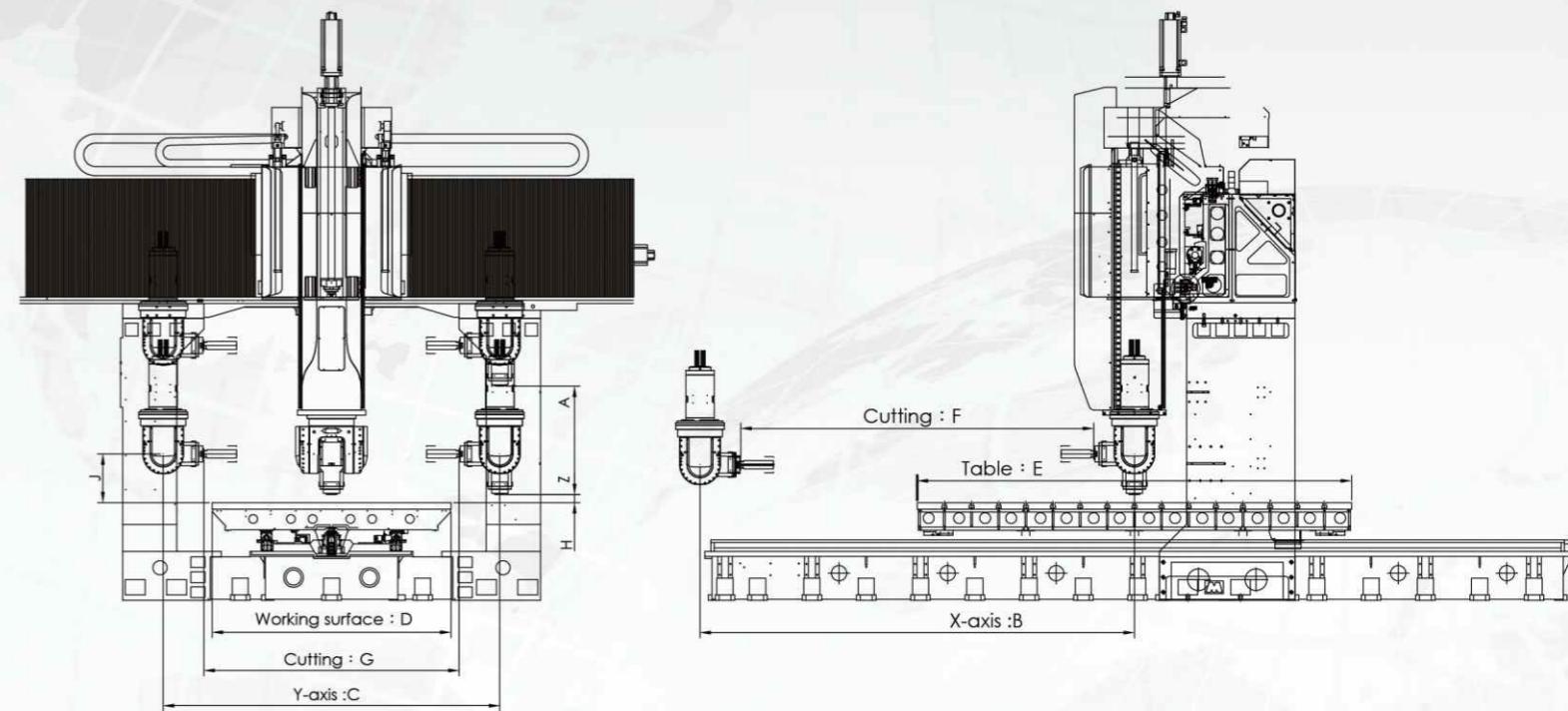


All the test results featured in this catalogue were produced under strict testing condition in a specialized testing environment. Under different testing conditions and less than ideal testing environments. That the test results may vary from those shown in this catalogue.

Machine Dimension



Cutting Range



Model	A	B	C	C1	D	D1	E	F	G	H	I	Notes
5BC-329	9676	9396	2600	2800	5730	6130	2624	2533	2494	5687	1830	HSK-A63
			2800	3000	5930	6330				5787	1930	HSK-A100(CYTEC)
5BC-429	11076	10796	2600	2800	5730	6130	2873	2784	2994	5687	1830	HSK-A63
			2800	3000	5930	6330				5787	1930	HSK-A100(CYTEC)
5BC-434	11076	10796	2600	2800	5730	6130	3073	2984	3394	6178	1830	HSK-A63
			2800	3000	5930	6330				6287	1930	HSK-A100(CYTEC)
5BC-534	13076	12796	2600	2800	5730	6130	3073	2984	3394	6178	1830	HSK-A63
			2800	3000	5930	6330				6287	1930	HSK-A100(CYTEC)
5BC-438	11076	10796	2600	2800	5730	6130	3073	2984	3394	6587	1830	HSK-A63
			2800	3000	5930	6330				6687	1930	HSK-A100(CYTEC)
5BC-538	13076	12796	2600	2800	5730	6130	3073	2984	3394	6587	1830	HSK-A63
			2800	3000	5930	6330				6687	1930	HSK-A100(CYTEC)
5BC-738	17276	16996	2600	2800	5730	6130				6587	1830	HSK-A63
			2800	3000	5930	6330				6687	1930	HSK-A100(CYTEC)

UNIT : mm

Model	A	B	C	D	E	F	G	H	J	F	G	H	J
										2230	2130		
5BC-329	3000	2900	2200	3000	2250	2150	2150	2150	2150	2230	2130		
										3230			
5BC-429	4000	3400	2200	4000	3250	2650	2650	75	450	3230	2630	190	575
										4230			
5BC-434	4000	3400	2200	4000	3250	2650	2650	75	450	3230	2630	190	575
										4230			
5BC-534	5000	3800	2500	5000	4250	3050	3050	35	410	3230	3030	150	535
										4230			
5BC-438	4000	3800	2500	4000	3250	3050	3050	35	410	3230	3030	150	535
										4230			
5BC-538	5000	3800	2500	5000	4250	3050	3050	35	410	3230	3030	150	535
										4230			
5BC-738	7000	3800	2500	7000	6250	7000	7000	6250	6250	6230			
										6230			

UNIT : mm

Machine Specifications

item	model unit	5BC - 329 / 429	5BC - 434 / 534	5BC - 438 / 538 / 738
Table	Working surface	mm	3000 / 4000 x 2200	4000 / 5000 x 2200
	T-slot Width X pitch(number)	mm	28 x 250 (11 / 15)	28 x 250 (15 / 19)
	Max. load (Average)	kg	10000 / 12000	12000 / 15000
Travel	X -axis travel	mm	3000 / 4000	4000 / 5000
	Y -axis travel	mm	2900	3400
	Z -axis travel	mm	1000 opt. 1200	1000 opt. 1200
	Distance from spindle end to table(HSK-A63)	mm	Z:1000 _ Column 2600 : 75~1075 Z:1200 _ Column 2800 : 75~1275	Z:1000 _ Column 2600 : 75~1075 Z:1200 _ Column 2800 : 75~1275
	Distance from spindle end to table(HSK-A100)	mm	Z:1000 _ Column190 ~ 1190 Z:1200 _ Column190 ~ 1390	Z:1000 _ Column190 ~ 1190 Z:1200 _ Column190 ~ 1390
	Distance from spindle center to column	mm	480	480
	Distance between two columns	mm	2300	2800
Spindle	Spindle nose taper		HSK-A63 / HSK-A100	HSK-A63 / HSK-A100
	Spindle speed(Built-in)	rpm	HSK-A63 :15000 / 24000 HSK-A100 : 12000	HSK-A63 :15000 / 24000 HSK-A100 : 12000
	RPM of B axis	rpm	60	60
	Roted Torque	Nm	HSK-A63 : 1200 HSK-A100 :1000	HSK-A63 : 1200 HSK-A100 :1000
	Braking Torque	Nm	HSK-A63 : 4000 HSK-A100 : 4000	HSK-A63 : 4000 HSK-A100 : 4000
	Tilting travel (B axis)	drgree	HSK-A63 : ±105° ; HSK-A100 : ±110°	HSK-A63 : ±105° ; HSK-A100 : ±110°
	Precision of Positioning		15"	15"
Feed	C axis speed	rpm	60	60
	Roted Torque	Nm	HSK-A63 : 1000 ; HSK-A100 : 1000	HSK-A63 : 1000 ; HSK-A100 : 1000
	Braking Torque	Nm	HSK-A63 : 4000 ; HSK-A100 : 4000	HSK-A63 : 4000 ; HSK-A100 : 4000
ATC	C axis Travel	drgree	HSK-A63 : ±240° ; HSK-A100 : ±360°	HSK-A63 : ±240° ; HSK-A100 : ±360°
	Precision of Positioning		15"	15"
	Cutting feedrate(X/Y/Z)	m/min	12/12/12 (329) 10/12/12(429)	10/12/12(434) 8/12/12(534)
Positioning Accuracy	Rapid traverse rate(X/Y/Z)	m/min	20/18/16	20/18/16(434) 14/18/16(534)
	Capacity	pcs	A: 32(40/60)	A: 32(40/60)
	Max. tool weight	kg	HSK-A63: 7 ; HSK-A100: 20	HSK-A63: 7 ; HSK-A100: 20
Other	Max. tool size(dia.X length)	mm	HSK-A63: Ø60(75)x300L ; HSK-A100: Ø125x400L	HSK-A63: Ø60(75)x300L ; HSK-A100: Ø125x400L
	3-axis laser positioning accuracy/full travel, without linear scale(JIS B6330)		±0.010 / ±0.012	±0.012 / ±0.012
	Positioning accuracy	mm	±0.003	±0.003
Positioning Accuracy	Repeatability	mm	±0.003	±0.003
	3-axis repetitive positioning accuracy, with linear scale (JIS B6330)		±0.010 / ±0.012	±0.012
	Positioning accuracy	mm	±0.003	±0.003
Other	Repeatability	mm	0.016 / 0.018	0.018 / 0.026
	3-axis laser positioning accuracy(VD13441)repeat 5 time		0.014 / 0.015	0.015 / 0.021
	Positioning accuracy	mm	6.5	6.5
Other	Repeatability	mm	HSK-A63: 100~110 ; HSK-A100: 90~100	HSK-A63: 100~110 ; HSK-A100: 90~100
	Required air pressure	kg/cm ²	HSK-A63: 100~110 ; HSK-A100: 90~100	HSK-A63: 100~110 ; HSK-A100: 93~103
	Electric power requirement	kVA	35000 / 39000	45000 / 50000
Other	Machine weight	kg	11775 / 13175 x 7240	13425 / 15425 x 7740
	Floor space	mm	HSK-A63 : 9676 / 11076 x 5687 x 5730	HSK-A63 : 11076 / 13076 x 6187 x 5730
	Machine dimension(L x W x H)	mm	HSK-A100 : 9676 / 11076 x 5787 x 6130	HSK-A100 : 11076 / 13076 x 6287 x 6130