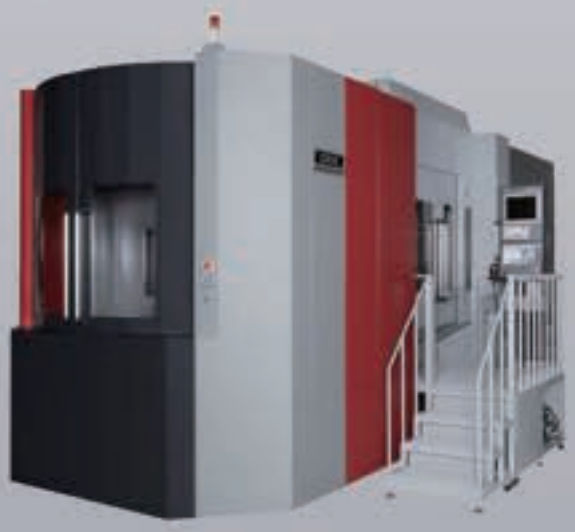
OKK 100 Years of Reliability & Precision
OKK CORPORATION

5-axis Horizontal Machining Center

HM-X SERIES

HM-X6000
HM-X8000



Highly-efficient machining of extremely complex parts!

As with all OKKs we paid special attention to the rigidity of the cast body, built solid and features our massive liner roller guides and large-diameter ball screws for the feed system, allowing the HM-X Series to easily cut exotic materials.
All OKK horizontals feature Core chilled pre-tensioned and double-anchored ball screws in order to maintain the high accuracy needed throughout long hours of machining.

HM-X SERIES

5-axis Horizontal Machining Center

HM-X SERIES

HM-X6000

Reliability has further increased with our innovative Trunnion table

Rapid traverse rate (X, Y, Z)	54m/min(2126ipm) (OP:75m/min(2953ipm))	Maximum loading capacity	650kg (1433lbs)	Spindle torque (25% ED/Continuous rating)	420/238N·m (310/176ft·lbs)
Rapid traverse rate (A, B)	A:10 B:33.3min^{-1}	Spindle nose (Nominal number)	7/24 taper, No.50	Spindle output (30-min/Continuous rating)	30/25kW (40/34HP)
Maximum workpiece size	ϕ750×H700mm(dia.29.53"×H27.56")			Spindle rotating speed	35～12000min^{-1}

5-axis machining center is built on the battlefield proven HM-series platform.
Excellent in both speed and rigidity.

HM-X8000

Tilting spindle head structure allows superior 5 axis machining without inclining a heavy workpiece

Up to 2000 kg can be loaded on the table supported with on large crossed roller bearings

Rapid traverse rate (X, Y, Z)	48m/min(1890ipm)	Maximum loading capacity	2000kg (4409lbs)	Spindle torque (25% ED/Continuous rating)	623/305N・m (460/225ft・lbs)
Rapid traverse rate (A, B)	A:8.3 B:16.7min^{-1}	Spindle nose (Nominal number)	7/24 taper, No.50	Spindle output (30-min/Continuous rating)	45/26kW (60/35HP)
Maximum workpiece size	φ1200×H1250mm(dia.47.24"×H49.21")			Spindle rotating speed	35～12000min^{-1}

OKK has integrated our new 5-axis control technologies recently only available on our vertical machining centers.

HM-X6000

Exceptional rigidity and accuracy

OKK's liner roller guides and large-diameter ball screws provide a highly rigid feed system.
This combined with our high-power head allow for heavy-duty machining.
Rapid traverse rates of 54m/min(2126ipm) (75m/min(2953ipm) optionally) for the X, Y and Z axes, 10 min^{-1} for the A axis and 33.3 min^{-1} for the B axis enable high-speed machining.
As a part of the standard specification, core chilled and pre-tensioned, double-anchored ball screws matched with thermal displacement correction function (OKK's original function) result in minimal thermal displacement errors for 24-hour high-accuracy machining.

High-power, High-torque spindle head paired with our tremendously rigid main body allows you to put the power in the cut.

高トルクビルトインモータ主軸搭載により、
ハイパワーな加工を実現。

Spindle taper	No.50
Spindle motor	30/25kW(40/34HP)
Maximum torque	420N·m(310ft·lbs) OP:623N·m(460ft·lbs)
Spindle diameter	φ100mm(dia.3.94")

New innovative Trunnion table

The solid dual-disc clamping method of the Trunnion table ensures the brake retains force of 10000N·m(7376ft·lbs) for the A axis and 6800N·m(5015ft·lbs) for the B axis.
The double (hydraulic and mechanical) clamping method is being used for our pallet clamping which ensures the clamping force of 96000N. The pallet clamping continues to hold even in the event of power failure, keeping your employees safe and downtime to a minimal.
Trunnion table drive system has been changed to the new roller type from the conventional slide. This allows for improved indexing accuracy, rotary encoders are used for the A and B axes as a part of the standard specification.
The tilting axis is outfitted with a no-backlash mechanism. (what mechanism).

Direct-turn APC (automatic pallet changer) is standard

The APC unit allows for the operator to setup work for the next operation while machining on the other pallet. Just push the pallet ready button once part is ready to be machined. When pallet change m-code is called, the pallet changes even if operator is not present so that long hours of unmanned operations are possible.
Use of the direct-turn APC reduces cycle time and floor space.

Side view from inside machine

Setup side

Wide adaptability
Machine medium and large-sized workpieces regardless of their materials

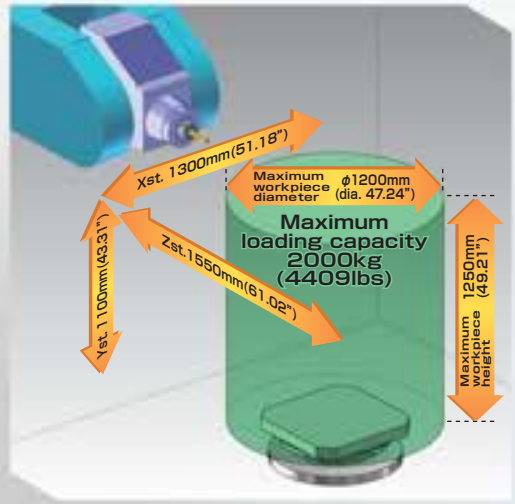
HM-X8000

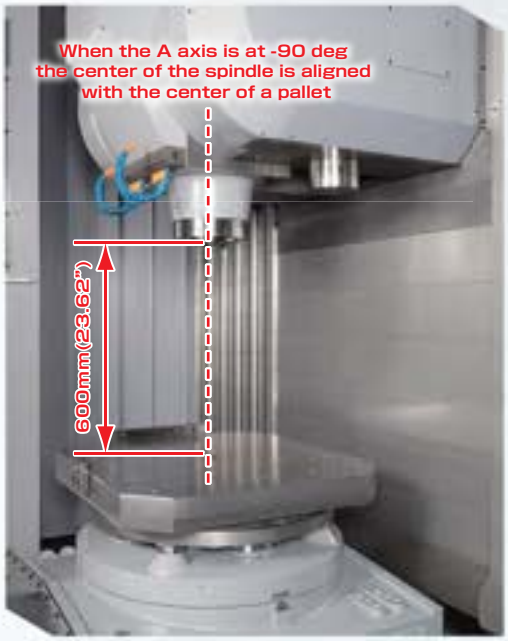
Highest-in-class spindle torque

45kW(60HP)(25%ED)/623N·m (460ft·lbs)(15%ED) high-power and high-torque built-in motor

Maximum 2000kg(4409lbs) can be loaded on the table

Use of the large-diameter crossed roller bearing improves rigidity of the table and enables loading up to 2000kg(4409lbs). The brake torque has also been improved with the use of spike type brake disc. Medium and large-sized workpieces are easily loadable up to a maximum φ1200×H1250mm (dia.47.24" ×H49.21")-high.

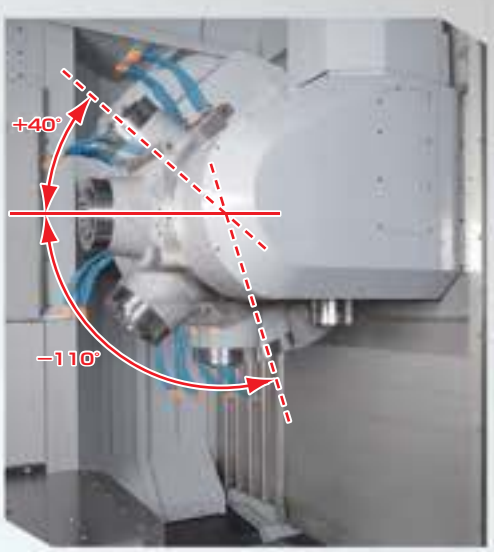




A-axis at -90 degrees

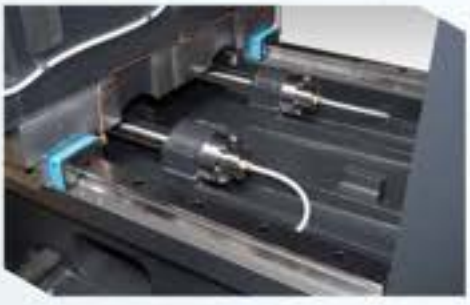
Tilting axis (A axis) is in the spindle head

The head tilting structure improves ergonomics for the operator allowing them to easily access and visually check workpieces inside the machine.
Machining is possible with the spindle positioned in the vertical and horizontal position.
When the angle of the A-axis is -90 degrees, access to the position where the center of the spindle is aligned with the center of the pallet.



Incomparable rigidity and accuracy

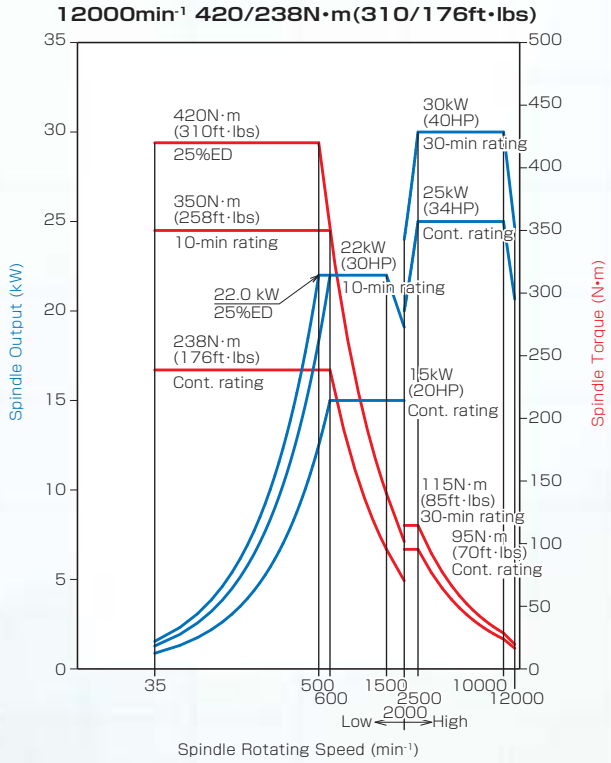
Rigid liner roller guides and large-diameter twin ball screws used for the X and Y axes improve machining quality.
As standard on all OKK horizontals the HM-X8000 is equipped with core chilled and pre-tensioned, double-anchored ball screws and our thermal displacement correction function (OKK's original function) resulting in minimal thermal displacement errors for 24-hour high-accuracy machining.

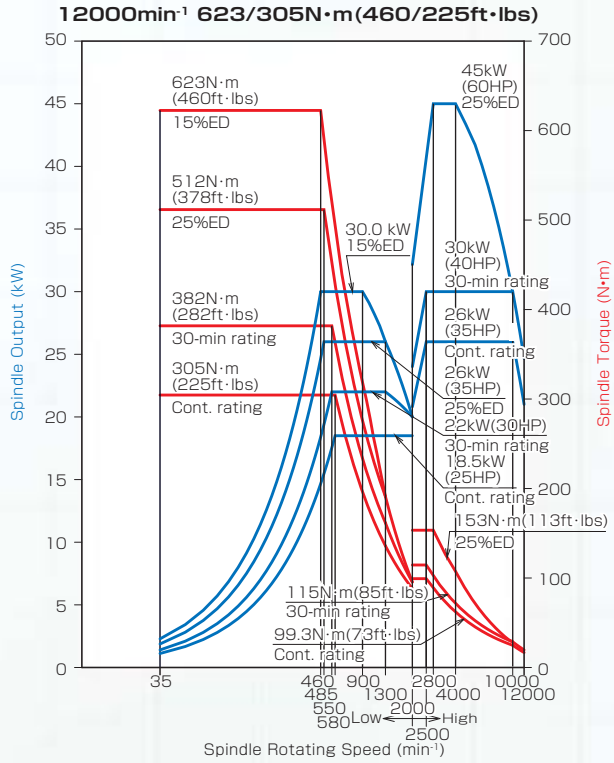


Accessibility

Improved accessibility ensures higher operability.
Easily set work offsets and inspect workpieces inside the machine.

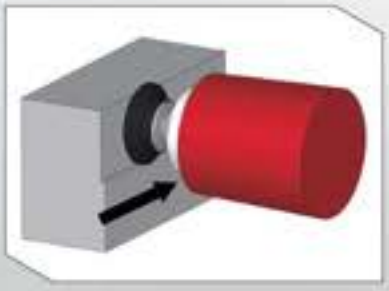
Torque Diagram



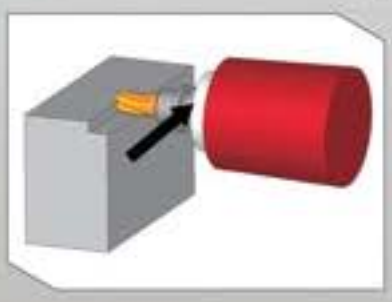


	12000min-1 420/238N·m (310/176ft·lbs)	12000min-1 623/305N·m (460/225ft·lbs)
HM-X6000	Std.	Opt.
HM-X8000	—	Std.

Machining Capabilities

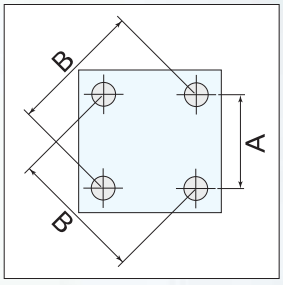


		HM-X6000	HM-X8000	
			Angle of A axis: 0°	Angle of A axis: 90°
Machining conditions	Unit	Face milling ϕ125(4.92")×T6		
Spindle rotating speed	min-1	300	400	400
Cut width	mm	100(3.94")	100(3.94")	100(3.94")
Cut depth	mm	6(0.24")	6(0.24")	6(0.24")
Feed rate	mm/min	780(31ipm)	700(28ipm)	800(31ipm)
Cutting amount	cm3/min	468(28.5in3/min)	420(25.6in3/min)	480(29.3in3/min)
Spindle motor load	%	102%	100%	100%
Workpiece material		S45C	S45C	S45C



		HM-X6000	HM-X8000	
			Angle of A axis: 0°	Angle of A axis: 90°
Machining conditions	Unit	Side milling ϕ40(1.57") × 6T	Side milling ϕ50(1.97") × 6T	
Spindle rotating speed	min-1	200	200	200
Cut width	mm	20(0.79")	15(0.59")	15(0.59")
Cut depth	mm	50(1.97")	50(1.97")	50(1.97")
Feed rate	mm/min	240(9ipm)	200(8ipm)	240(9ipm)
Cutting amount	cm3/min	240(14.6in3/min)	150(9.2in3/min)	180(11in3/min)
Spindle motor load	%	80%	68%	78%
Workpiece material		S45C	S45C	S45C

Accuracy



A	200.000(7.87")
B	282.843(11.13555")

Cutting Accuracy

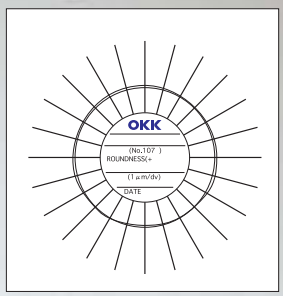
(mm)

	HM-X6000		HM-X8000	
	OKK tolerance	Result	OKK tolerance	Result
Axial direction	0.015 (0.00059")	0.003 (0.00012")	0.015 (0.00059")	0.004 (0.00016")
Diagonal direction	0.015 (0.00059")	0.005 (0.00020")	0.015 (0.00059")	0.002 (0.00008")
Deviation of hole dia	0.010 (0.00039")	0.005 (0.00020")	0.015 (0.00059")	0.004 (0.00016")

Circular Cutting Accuracy

(mm)

	HM-X6000		HM-X8000	
	OKK tolerance	Result	OKK tolerance	Result
Circularity	0.015 (0.00059")	0.004 (0.00016")	0.015 (0.00059")	0.004 (0.00016")

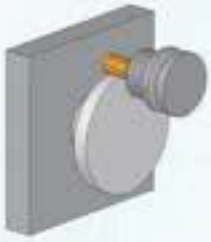


Positioning Accuracy

(mm)

		HM-X6000	HM-X8000
Positioning accuracy (X, Y, Z)	Without linear scale	±0.0025(0.00010")/ full length	X:±0.0025(0.00010")/full length Y:±0.0025(0.00010")/full length Z:±0.0030(0.00012")/full length
	With linear scale	±0.0020(0.00008")/ full length	X:±0.0020(0.00008")/full length Y:±0.0020(0.00008")/full length Z:±0.0025(0.00010")/full length
Positioning repeatability (X, Y, Z)	Without linear scale	±0.0015(0.00006")/ full length	±0.0015(0.00006")/full length
	With linear scale	±0.0010(0.00004")/ full length	±0.0010(0.00004")/full length
Positioning accuracy	With encoder	A axis: ±5 sec; B axis: ±2.5 sec	A axis: ±5 sec; B axis: ±2.5 sec

(OKK tolerance)



Simultaneous 5-axis taper cone machining

(mm)

	HM-X6000		HM-X8000	
	OKK tolerance	Result	OKK tolerance	Result
Circularity	0.050 (0.00197")	0.012 (0.00047")	0.050 (0.00197")	0.015 (0.00059")

Remarks
*1: The above sample data shows short-time machining examples and the results of continuous machining may differ.
*2: The above sample data show the accuracy under the OKK's in-house cutting test conditions. The results may vary with the conditions of the cutting tools and fixtures.
*3: The accuracies shown above are the values obtained based on the OKK's inspection standards under the conditions that the machine is installed according to the OKK's foundation drawing while keeping the ambient temperature constant.

Unmanned Operation

Matrix Magazine and Multi Pallet are available as an option.
These systems can be expanded easily in the field after its delivery.

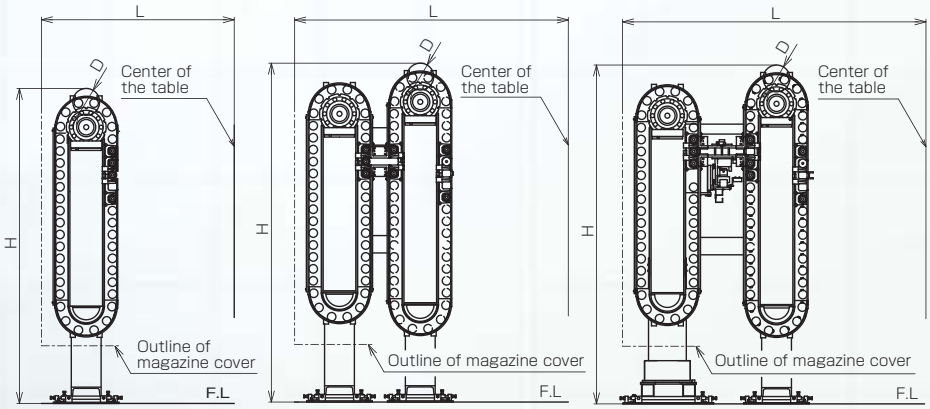
Matrix Magazine

Multi Pallet

Tool Magazine

Chain-type 40-tool magazine (HM-X6000) and 60-tool magazine (HM-X8000) are included in the standard specification. there is also a Matrix Magazine option, which will increase the capacity up to 161 / 233 / 311 or 389 tools (Capacity of Matrix Magazine).

40/60-tool magazine | **80/116-tool magazine** | **120/160/176/236-tool magazine**



Number of storable tools*1	HM-X6000 L mm	HM-X6000 H mm	HM-X6000 D*2 mm	HM-X8000 L mm	HM-X8000 H mm	HM-X8000 D*2 mm
40 tools [Std]	2005 (78.94")	3170 (124.80")	ϕ270 (dia.10.63")	2130 (83.86")	3305 (130.12")	ϕ270 (dia.10.63")
60 tools [Opt]		4370 (172.05")			4265 (167.91")	
80 tools [Opt]	2820 (111.02")	3410 (134.25")		2945 (115.94")	3545 (139.57")	
116 tools [Opt]		4370 (172.05")			4265 (167.91")	
120 tools [Opt]	3120 (122.83")	3410 (134.25")		3245 (127.76")	3545 (139.57")	
160 tools [Opt]		3410 (134.25")			3545 (139.57")	
176 tools [Opt]		4370 (172.05")			4265 (167.91")	
236 tools [Opt]		4370 (172.05")			4265 (167.91")	

*1: Number of storable tools of the 40/60-tool magazine refers to a total number of tools including the tool in the spindle i.e. subtract one from the above for the actual number of tools storable in the magazine.

*2: The dimension D means the maximum tool diamer applied to the tool with no tools placed in the pots in the tool magazine that adjoin the pot designated to the tool. It is ϕ115 mm in any of the above cases unless both pots have no tools.

ATC [Automatic Tool Changer]

The ATC unit offers stable tool changes and amazing durability. The speed variable ATC function included in the standard specification enables smooth tool change in the use of heavy or large-diameter tool as the ATC turning speed is reduced automatically according to the setting made at the time of registration of the relevant tool.

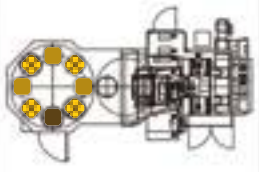
HM-X6000	HM-X8000
Maximum tool diameter ø270mm (dia.10.63")	Maximum tool diameter ø270mm (dia.10.63")
*ϕ115mm(dia.4.53") unless adjoining pots have no tools	*ϕ115mm(dia.4.53") unless adjoining pots have no tools
Maximum tool length 500mm (19.69")	Maximum tool length 400mm (15.75")
Maximum tool mass 25kg (55lbs) (in the case of slow turning)	Maximum tool mass 25kg (55lbs) (in the case of slow turning)
*20kg(44lbs) when turning at normal speed	*15kg(33lbs) when turning at normal speed

APC [Automatic Pallet Changer]

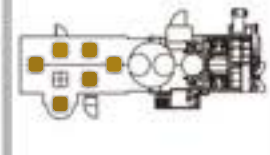
The direct-turn 2APC unit is included in the standard specification. The automatic multi pallet changer and the FMS are available optionally. The units are compatible with the through-pallet jig interface and the rotary joint type jig interface.

HM-X6000	8APC	5520×8760mm(217.32"×344.88")
HM-X8000	6APC laid in line	6000×13400mm(236.22"×527.56")
	6APC laid crosswise	6130×12100mm(241.34"×476.38")
	8APC laid in line	6000×15000mm(236.22"×590.55")
	8APC laid crosswise	7730×12100mm(304.33"×476.38")

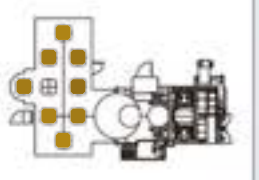
HM-X6000
8APC



HM-X8000
6APC with setup station
laid in line



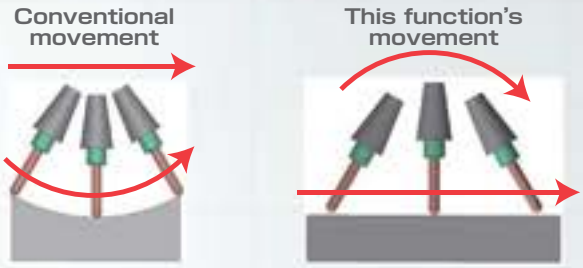
HM-X8000
8APC with setup station
laid crosswise



5-axis Support Technologies

5-axis Control Function

Tool Center Point Control



Produces errors due to movement of rotation axis

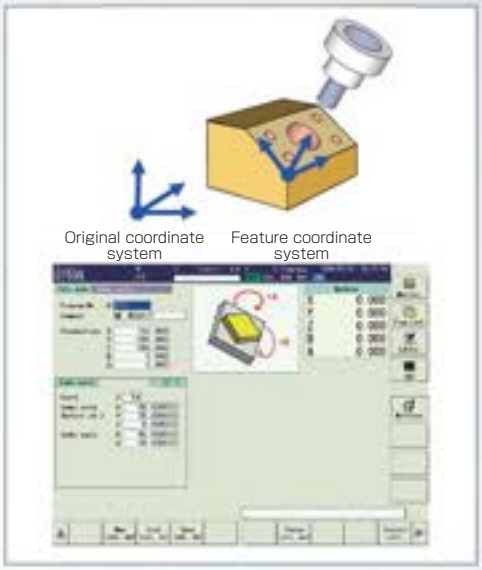
Loci of the tool tip as instructed

Linear interpolation while changing the angle of the tool normally requires complicated machining data using minute segments as shifts in the direction of the axis of the tool need to be instructed according to the change in the tool's angle.
By using the Tool Center Point Control, location of the tool tip are as instructed regardless of the instructions for the rotation axis. As speed of the tool tip is constant (designated speed), further high-quality surfacing can be achieved.

5-axis Indexing Function

Inclined Surface Indexing (Machining) Command
HM-X6000 Opt. HM-X8000 Std.

The inclined surface indexing (machining) commands allow setting as desired the surface to be machined by using the newly defined coordinate system (feature coordinate system).
It enables efficient creation of the machining programs similar to the programming for the normal 3-axis machining centers.



MULTI-FACER II

When indexing the planes to be machined on the 5-axis machining centers, it may take time for setting the workpiece origins. Those workpiece origins can be set easily by using the MULTI-FACER II that enables creating the programs for indexing easily without requiring calculations.

5-axis Measurement Function

A5 system Opt.

When 5-axis machining, One key component to high accuracy 5 axis machining is ensuring that the center position of the rotation axis has been set correctly.
If wrong this significant effects the machining accuracy.
OKK has reduced the error that can be generated by the operator with our A5 System, (OKK's Original software) that allows the operator to easily measure and set the center of rotation axes automatically with use of this software.
A5 System improves upon the already high-accuracy 5-axis indexing capability and simultaneous 5-axis machining.

Specifications

Item		Unit	HM-X6000	HM-X8000
Travel on X axis (Column: right / left)		mm	1050(41.34")	1300(51.18")
Travel on Y axis (Spindle head: up / down)		mm	900(35.43")	1100(43.31")
Travel on Z axis (Pallet: back / forth)		mm	820(32.28")	1550(61.02")
Travel on A axis (Pallet tilting / head tilting)		deg	−110 to 20	−110 to 40
Travel on B axis (Pallet turning)		deg	360	
Distance from table top surface to spindle center		mm	−170 to 730(-6.69" to 28.74")	60 to 1160(2.36" to 45.67")
Distance from table center to spindle nose		mm	150 to 970(5.91" to 38.19")	−500 to 1050(−19.69" to 41.34")
table (pallet) work surface area		mm	□600(□23.62")	□800(□31.50")
Max. workpiece weight loadable on table (Pallet)		kg	650(1433lbs) (Uniformly distributed load)	2000(4409lbs) (Uniformly distributed load)
Pallet top surface configuration			24×M16 tap	
Minimum index angle of table (pallet)		deg	0.001	
Minimum index angle of A axis		deg	0.001	0.001
Table (Pallet) index time for 90 degrees		sec	0.6	1.2
A axis index time for 90 degrees		sec	1.7	2
Spindle speed		min^{-1}	35 to 12000	
Number of spindle speed change steps			Electrical two-speed control (MS)	
Spindle nose (Nominal number)			7/24 taper, No. 50	
Spindle bearing bore diameter		mm	φ100(φ3.94")	
Rapid traverse rate	XYZ:	mm/min	54000(2126ipm) (Opt.75000(2953ipm))	48000 (1890ipm)
	AB:	min^{-1}	A:10 B:33.3	A:8.3 B:16.7
Cutting feed rate	XYZ:	mm/min	1 to 40000 (0.04 to 1575ipm)*1	1 to 20000 (0.04 to 787ipm)*1
	AB:	min^{-1}	A:0.1～5 B:0.1～5	A:0.1～8.3 B:0.1～5.6
Type of tool shank (Nominal number)			JIS B 6339 BT50	
Type of pull stud (Nominal number)			OKK only 90°	
Tool storage capacity		tools	40*2	60*2
Maximum tool diameter		mm	φ115(φ4.53")(With no tools in adjacent pots φ270(φ10.63"))	
Maximum tool length (from the gauge line)		mm	500(19.69")	400(15.75")
Maximum tool weight		kg	Normal turning:20(44lbs)/ Slow turning:25(55lbs)	Normal turning:15(33lbs)/ Slow turning:25(55lbs)
Maximum tool moment		N·m	29.4(21.7ft.lbs)	
Tool selection method			Address fixed random method	
Tool exchange time (cut-to-cut)		sec	4.2	5.7
Pallet change method			Direct-turn method	
Pallet exchange time (New JIS evaluation time)		sec	18.0	22.0
Spindle motor		kW	30(40HP) (30-min rating)/ 25(34HP) (continuous rating)	45(60HP) (25%ED) / 30(40HP) (30-min rating) / 26(35HP) (continuous rating)
Motor for tool clamp/unclamp unit		kW	0.75(1.0HP)	
Feed motor	XYZ:	kW	5.5(7.4HP)	X:5.0(6.7HP)×2 Y:14.0(18.8HP)×2 Z:6.0(8HP)
	AC:	kW	A:5.5(7.4HP) B:4.5(6.0HP)	A:7.0(9.4HP) C:4.5(6.0HP)
Hydraulic pump motor		kW	1.5(2.0HP)	
Motor of oil cooler for spindle and feed system (compression/discharge)		kW	1.7(2.3 HP)/0.75(1.0HP)	1.1(1.5HP)/0.4×2(0.54HP)
Coolant pump motor		kW	60Hz:1.2(1.6HP) 50Hz:0.7(1.0HP)	
Power supply AC200V±10% 50/60±1Hz AC220V±10% 60±1Hz *4 *3		kVA	67	82
Compressed air supply		Mpa,ℓ/min[ANR]	0.4 to 0.6(58 to 87psi)*4, 500(132gpm)*5	
Hydraulic unit tank capacity		ℓ	20(5gal)	
Spindle and feed system cooling oil tank capacity		ℓ	70(18.5gal)	20(5.3gal)×2
Magazine lubricating oil tank capacity		ℓ	1(0.3gal)	4.2(1.1gal)
Coolant tank capacity		ℓ	400(106gal)	800(211.3gal)
Machine height		mm	3430(135.0")	4290 (168.90")
Required floor space		mm	3905(153.74")×5450(214.57")	5433(213.9")×7755(305.3")
Machine weight		kg	20000(44100lbs)	30000(66138lbs)
Operating environment temperature		℃	5 to 40	

*1: Available under the HQ or hyper HQ control.
*2: The number of stored tools refers a total number of tools including the one installed on the spindle i.e. subtract one from the above for actual number of tools stored in the tool magazine.
*3: When the supply voltage is 220VAC, the supply frequency of 60Hz only is applicable.
*4: Purity of compressed air should be class 3.5.4 or higher class of ISO 8573-1/JIS B8392-1 standard.
*5: Specified is the compressed air supply flow rate for standard specification machines. When optional specifications such as an air blow nozzle are added, add the corresponding air supplyrequirement.

Standard and optional Accessories

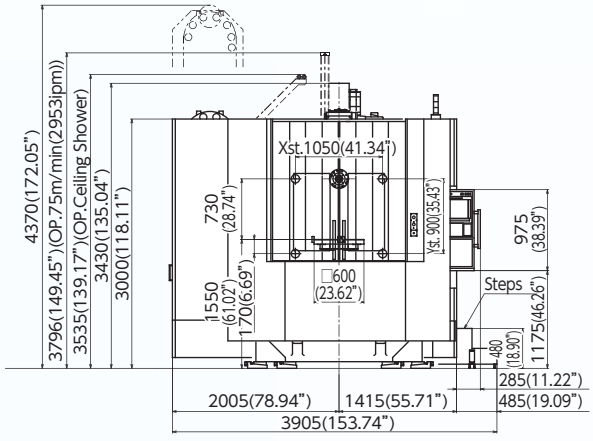
Standard: Option: Not available:

Item				HM-X6000	HM-X8000
Spindle taper and pull stud	Taper		BT50		
	Tow faces contact holder		HSK-A100		
			BT type		
	Pull stud		OKK90°		
			MAS I		
			MAS II		
Maximum spindle speed	BT50	Gear	8000min-1	22/18.5kW	
		MS	8000min-1	22/18.5kW	
			12000min-1	30/25kW	
				45/30/26kW	
Table/ Axis	Table		BRT(Built-in rotary table)	Least Index 0.001°	
	Rapid feed rate 75m/min				
Magazine	BT50 HSK-A100		40MG	40MG×1	
			60MG	60MG×1	*1 *1
			80MG	44MG+40MG	
			116MG	60MG×2	*1 *1
			120MG	44MG+40MG×2	
			160MG	44MG+40MG×3	
			176MG	60MG×3	*1 *1
			236MG	60MG×4	*1 *1
			161MG/233MG/311MG/389MG	Matrix magazine	
	Magazine Interruption function				
	Magazine operation panel				
	Tool holder remove by foot pedal			Standard for BT50/HSK two face contact holder	
For Automatic pallet hanger and pallet	APC		2APC		
			Multiple APC	6-pallet APC	
				8-pallet APC	
	Pallet		Tapped type Pallet	24-M16 screw	
			T-Slot type Pallet		
			Additional Pallet		
For Coolant and Chip conveyor	Coolant tank		Standard Coolant tank		
			Lift up chip conveyor	Hinge/Scraper/Scraper with magnet/Drum	
	Chip ejection		Coil conveyor	Bed left and right	
			Chip flow coolant	Bed left and right	
	Coolant		Spindrecoolant nozle		
			Ceiling Shower		
			Coolant shower gun		
			Air blow		
			Oil mist air blow		
			Coolant through spindle	2MPa/7MPa	
			Air through spindle		
			Oil hole		
			Oil skimmer		
			Mist collector		
For accuracy	Dubble anchor pretension ball screw			With core cooling ball screw	
	Lubrication oil cooler unit				
	Linear scale feed back			XY-axis or XYZ-axis	
	Rotary encoder			AB-axis	
	Coolant cooler unit				
Other accessories	Signal tower lamp			Tow lamp without buzzer	
	Working light			LED light	
	Workpiece automatic measurement Tool length measurement and break detection Tool break detection		Touch sensor T0	Manual measurement	
			Touch sensor T1-A	Workpiece automatic measurement	
			Touch sensor T1-B	Workpiece automatic measurement/Tool length automatic measurement/Tool break detection	
			Touch sensor T1-C	Tool length automatic measurement/Tool break detection	
			Tool break detection in magazine	Contact type or laser type	
	Automatic grease lubrication unit			XYZ-axis/ball screw	
	Automatic oil lubrication unit for MG and ATC part				
	Foundation parts for machine anchoring			Bond anchoring method	
	Rotary window			At operation door	

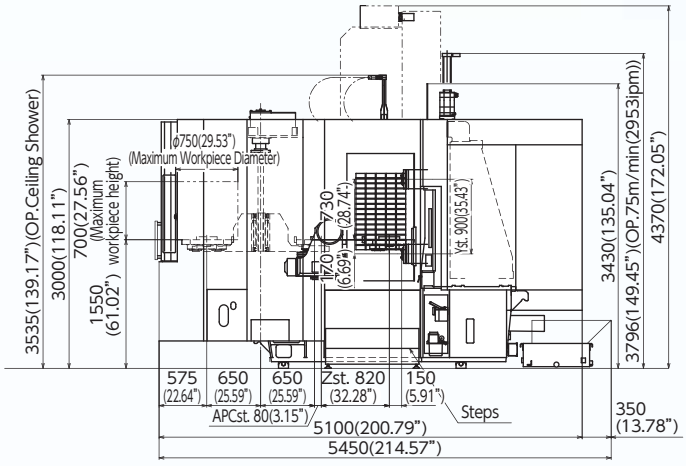
MG: Tool magazine unit *1: It is not available for the HSK-A100.

HM-X6000 Machine Dimensions

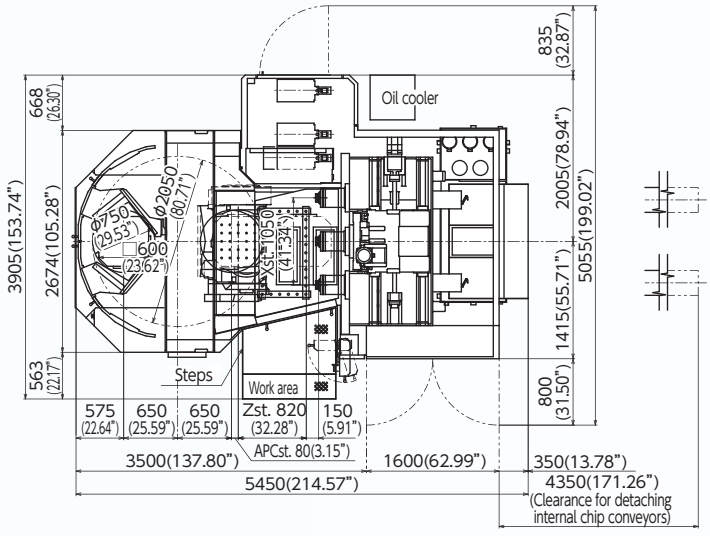
Front View



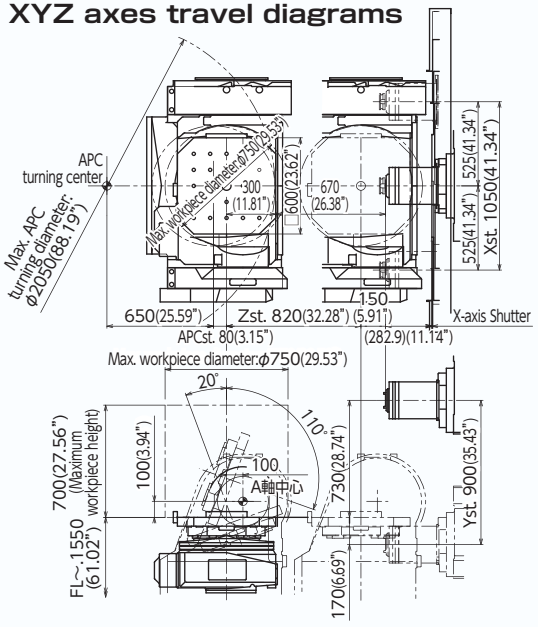
Side View



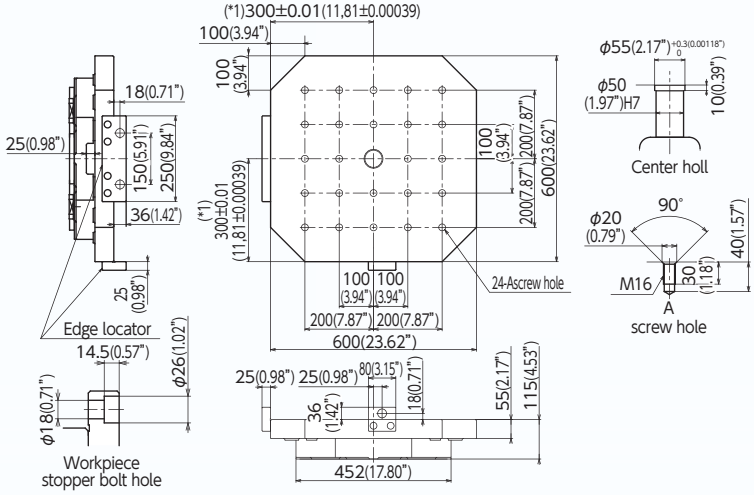
Floor Space Diagram



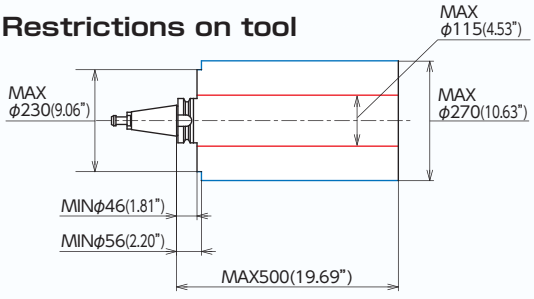
XYZ axes travel diagrams



Pallet Dimensions



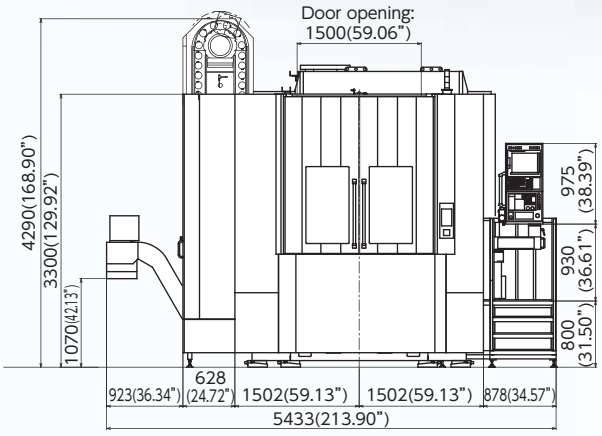
Restrictions on tool



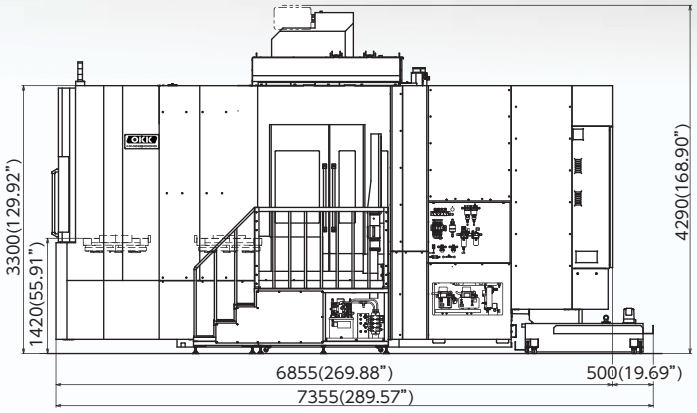
Note: The dimension marked with (*1) is the dimension between the center of rotation and the edge locator.

HM-X 8000 Machine Dimensions

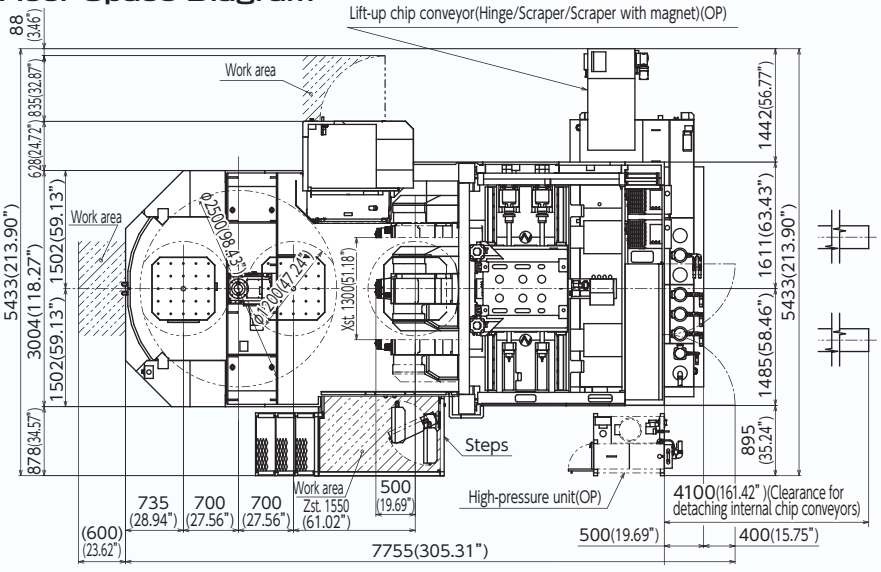
Front View



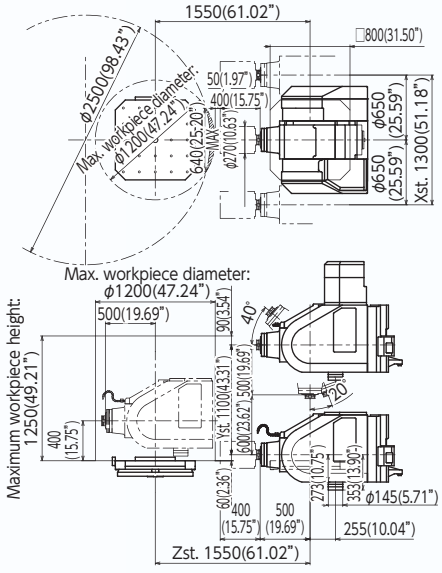
Side View



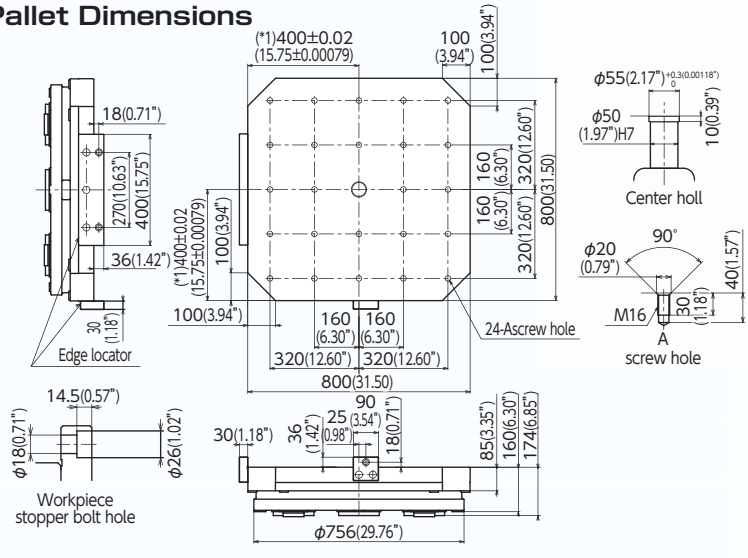
Floor Space Diagram



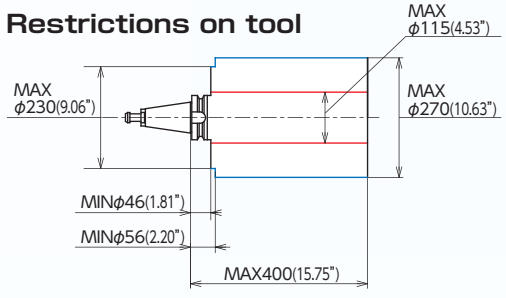
XYZ axes travel diagrams



Pallet Dimensions



Restrictions on tool



Note: The dimension marked with (*1) is the dimension between the center of rotation and the edge locator.

F31i-B5(WindowsCE Open CNC)

Standard Specification	HM-X6000	HM-X8000
Controlled axes: 5 (X, Y, Z, A, B)	○	○
Simultaneously controlled axes: 5 axes	○	○
Least input increment: 0.001mm / 0.0001"	○	○
Max.programmable dimension: ±999999.999mm / ±39370.0787"	○	○
Absolute / Incremental programming: G90 / G91	○	○
Decimal point input / Pocket calculator type decimal point input	○	○
Inch / Metric conversion: G20 / G21	○	○
Program code: ISO / EIA automatic discriminaton	○	○
Program format: FANUC standard format	○	○
Nano interpolation(internal)	○	○
Positioning: G00	○	○
Linear interpolation: G01	○	○
Circular interpolation: G02 / G03(CW / CCW) (including Radius designation)	○	○
Cutting feed rate: 6.3-digit F-code, direct command	○	○
Dwell: G04	○	○
Manual handle feed: manual pulse generator 1 set (0.001, 0.01, 0.1mm)	○	○
Rapid traverse override: 0 / 1 / 10 / 25 / 50 / 100%	○	○
Cutting feed rate override: 0 to 200%(every 10%)	○	○
Feed rate override cancel: M49 / M48	○	○
Rigid tapping: G84, G74(Mode designation: M29)	○	○
Part program storage capacity: 160m[64KB]	○	○
No. of registered programs: 120	○	○
Part program editing	○	○
Background editing	○	○
Extended part program editing	○	○
15" color LCD／QWERTY key MDI	○	○
Clock function	○	○
MDI (Manual Data Input)operation	○	○
Memory card／USB interface	○	○
Spindle function: 5-digit S-code direct command	○	○
Spindle speed override: 50 to 150%(every 5%)	○	○
Tool function: 4-digit T-code direct command	○	○
ATC tool registration	○	○
Auxiliary function: 3-digit M-code programming	○	○
Multiple M-codes in 1 block: 3 codes(Max. 20 settings)	○	○
Tool length offset: G43, G44/G49	○	○
Tool diameter and cutting edge R compensation: G41, G42/G40	○	○
Tool offset sets: 99 sets	○	○
Tool offset memory C	○	○
Manual reference position return	○	○
Automatic reference position return: G28/G29	○	○
2nd reference position return: G30	○	○
Reference position return check: G27	○	○
Automatic coordinate system setting	○	○
Coordinate system setting: G92	○	○
Machine coordinate system: G53	○	○
Workpiece coordinate system: G54 to G59	○	○
Local coordinate system: G52	○	○
Program stop: M00	○	○
Optional stop: M01	○	○
Optional block skip: /	○	○
Dry run	○	○
Machine lock	○	○
Z-axis feed cancel	○	○
Auxiliary function lock	○	○
Program number search	○	○
Sequence number search	○	○
Program restart	○	○
Cycle start	○	○
Auto restart	○	○
Single block	○	○
Feed hold	○	○
Manual absolute on/off: parameter	○	○
Sub program control	○	○
Canned cycle: G73, G74, G76, G80 to G89	○	○
Mirror image function: parameter	○	○
Automatic corner override	○	○
Exact stop check/mode	○	○
Programmable data input: G10	○	○
Custom macro	○	○
Graphic display	○	○
Backlash compensation for each rapid traverse and cutting feed	○	○
Smooth backlash compensation	○	○
Memory pitch error compensation(interpolation type)	○	○
Skip function	○	○
Tool length manual measurement	○	○
Emergency stop	○	○
Data protection key	○	○
NC alarm display / alarm history display	○	○
Machine alarm display	○	○
Stored stroke check 1	○	○
Load monitor	○	○
Self-diagnosis	○	○
Absolute position detection	○	○
Manual Guide i (Basic)	○	○
Stored stroke check 2, 3 (for OKK use)	○	○
3rd & 4th reference position return (for OKK use)	○	OP

Standard Specification		HM-X6000	HM-X8000
Tool center point control for 5 axis machining	PK2,3	○	○
Inverse time feed	PK2,3	○	○
Unidirectional positioning: G60	PK2,3	○	○
Data server: ATA card(1GB)	PK2,3	○	○
Coordinate system rotation: G68, G69		○	○
Instruction of inclined plane indexing	PK3	OP	○
Manual feed for 5 axis machining	PK3	–	○
Tool length compensation along tool vector	PK3	–	○
Straightness compensation	PK3	–	○

Optional Specification			
Least input increment: 0.0001mm / 0.00001"		□	□
FS15 tape format		□	□
Helical interpolation	PK1	□	□
Cylindrical interpolation		□	□
Hypothetical axis interpolation		□	□
Spiral/Conical interpolation		□	□
Smooth interpolation		□	□
NURBS interpolation		□	□
Involute interpolation		□	□
One-digit F code feed		□	□
Handle feed 3 axes(Standard pulse handle is removed)		□	□
Part program storage capacity: 320m[128KB](250 in total)		□	□
Part program storage capacity: 640m[256KB](500 in total)		□	□
Part program storage capacity: 1280m[512KB](1000 in total)	PK1	□	□
Part program storage capacity: 2560m[1MB](1000 in total)		□	□
Part program storage capacity: 5120m[2MB](1000 in total)		□	□
Part program storage capacity: 10240m[4MB](1000 in total)		□	□
Part program storage capacity: 20480m[8MB](1000 in total)		□	□
RS232C interface: RS232C-1CH		□	□
Data server: ATA card(4GB)		□	□
Spindle contour control(Cs contour control)		□	□
Tool position offset		□	□
3-dimensional cutter compensation		□	□
Tool offset sets: 200 sets in total	PK1	□	□
Tool offset sets: 400 sets in total		□	□
Tool offset sets: 499 sets in total		□	□
Tool offset sets: 999 sets in total		□	□
Addition of workpiece coordinate system(48 sets in total): G54.1 P1 to P48	PK1	□	□
Addition of workpiece coordinate system(300 sets in total): G54.1 P1 to P300		□	□
Machining time stamp		□	□
Optional block skip: Total 9		□	□
Tool retract and return		□	□
Sequence number comparison and stop		□	□
Manual handle interruption		□	□
Programmable mirror image	PK1	□	□
Optional chamfering / corner R		□	□
3-dimensional coordinate system conversion		□	□
Interruption type custom macro		□	□
Addition of custom macro common variables: 600		□	□
Figure copy		□	□
Scaling: G50, G51		□	□
Chopping		□	□
Playback		□	□
Automatic tool length measurement: G37 / G37.1		□	□
Tool life management: 256 sets in total	PK1	□	□
Addition of tool life management sets: 1024 sets in total		□	□
High-speed skip		□	□
Run hour and parts count display	PK1	□	□
Manual Guide i (Milling cycle)		□	□

Original OKK Software			
Machining support integrated software (incl. Help guidance, etc.)		STD	STD
Tool support		STD	STD
Program Editor		STD	STD
EasyPRO		STD	STD
A^5 System(A)　Measure rotation center		OP	OP
A^5 System(B)　Measure rotation center and location error		–	–
Work Manager		OP	OP
HQ control		STD	STD
Hyper HQ control mode B	PK2,3	STD	STD
5 Axis NC Option Package A (including the items with "PK2")		STD	–
5 Axis NC Option Package B (including the items with "PK3")		–	STD
NC option package (including the items with "PK1")		OP	OP
Multi-FacerII		STD	STD
Special canned cycle (including circular cutting)		OP	OP
Cycle Mate F		OP	OP
Soft ScaleIIm		STD	STD
Touch sensor T0 software		OP	OP
Tool failure detection system (Soft CCM)		OP	OP
Adaptive control (Soft AC)		OP	OP
Automatic restart at tool damage		OP	OP

Functions for Operability and Environmental Measures

ECO Measures

ECO Sleep Function

In order to reduce wasted power, air, etc., the power saving mode is activated when the machine has been in the standby state for a specified period of time. During the power saving mode, servos, chip convers, etc. are turned off. The mode is cancelled automatically when the setup operation is finished (door is closed).

LED Lamp HM-X6000 Opt. HM-X8000 Std.

LED lamps are used for reduction in heat generated by the lighting system and for saving power.

Inverter Oil Cooler HM-X8000 Std.

Inverter oil cooler provides limited temperature variation and realizes energy consumption.

Improved Operability

15-inch Operation Panel

- 15-inch color liquid crystal display improves visibility of the information displayed on the screen as well as operability.
- Not only operability but simplicity has been taken into account for the operation panel. The operation panel has a QWERTY keyboard similar to the PCs'keyboards.
- The OKK's original screens for the setup operations and operational support are contained.

F31i-B

lift-up type chip conveyors Opt.

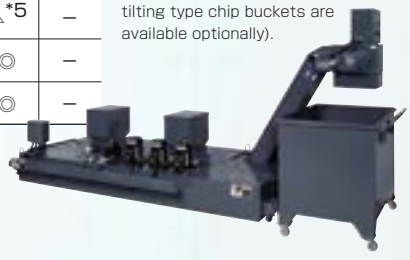
Compatibility of lift-up type chip conveyors with chip types

◎: Most suitable ○: Usable △: Conditionally usable ×: Not usable –: Not applicable

Type of chip conveyor				Hinged		Scraper		Magnet scraper		Scraper with drum filter		Magnet scraper with drum filter	
Use of coolant oil				Used	Not used	Used	Not used	Used	Not used	Used	Not used	Used	Not used
Type of chips	Magnetizable chips	Steel	Short curl	◎	◎	○	○	◎	◎	○	–	◎	–
			Spiral	◎	◎	△*2	△*2	△*2	△*2	×	–	×	–
			Long	◎	◎	×	×	×	×	×	–	×	–
			Needle shape	×	△*1	×	○	○*3	○	○	–	◎	–
			Powder and small lump	×	△*1	×	○	○*3	○	○	–	◎	–
		Cast iron	Needle shape	×	△*1	×	○	○*3	○	○	–	◎	–
			Powder and small lump	×	△*1	×	○	○*3	○	△*3	–	◎	–
	Non-magnetizable chips	Aluminum	Short curl	×	◎	△*4	○	–	–	◎	–	◎	–
			Spiral	○	◎	○	○	–	–	△*5	–	△*5	–
			Long	○	◎	○	○	–	–	△*5	–	△*5	–
			Needle shape	×	△*1	×	○	–	–	◎	–	◎	–
			Powder and small lump	×	△*1	×	○	–	–	◎	–	◎	–

*1: Minute chips can enter the conveyor through a gap on the hinged plate. Therefore, inside the conveyor needs to be cleaned frequently.
*2: Scraper can easily catch long chips. Therefore, shortening the chips (for example by using the step feed) or removing the chips is required if left un maintained the drum filter may get damaged.
*3: When flow rate of the coolant is large, filters can be clogged with chips out of the conveyor case. Therefore, combined use of a magnet plate and frequent cleaning of filters is recommended.

This photo shows the hinged pan type chip conveyor (fixed type and tilting type chip buckets are available optionally).



Methods

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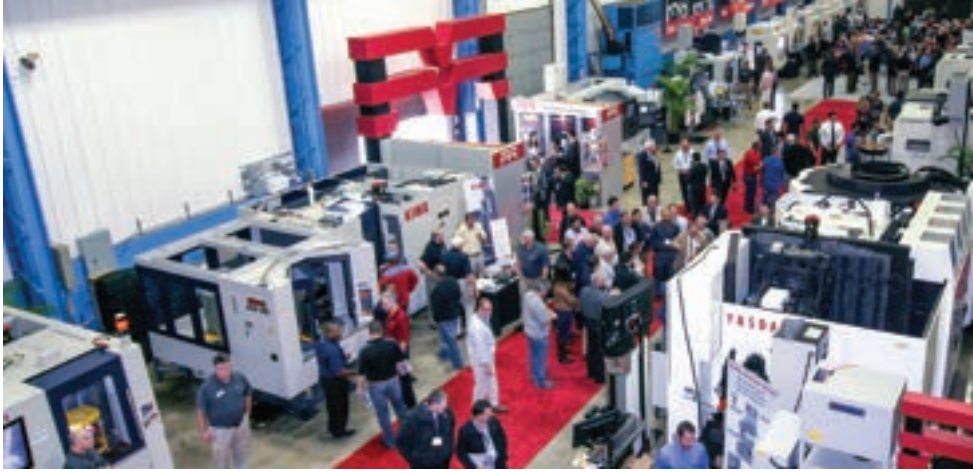

Founded in 1958, with three employees and a few refurbished machines, Methods Machine Tools, Inc. has grown into one of the largest, most innovative precision machine tools importers in North America. With over 300 employees, eight sales and technology centers, and over 40,000 machines installed throughout the United States, Canada and Mexico, Methods supplies leading-edge precision machine tools and solutions. The founder Mr. Clement McIver, Sr., established principles from the company's beginning that continue to set Methods apart from conventional importers or distributors. "Anyone can sell a machine," said the company's late founder, "but not everyone provides the extra effort that makes a difference in the company's bottom line."

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*Limited Availability