

### OPEN POSSIBILITIES

**Horizontal Machining Centers** 

# SPACE CENTER MA-HII Series

**MA-500HI/MA-600HI** 



# Horizontal Machining Centers SPACE CENTER MA-HII Series

### MA-500HI/MA-600HI











# Master craftsmanship manufacturing for a wide range of applications

From highly accurate, steady machining of mass production, to long, continuous, die/mold applications, the MA-HII takes the wide realm of machining to a higher dimension.

From heavy-duty cutting to fine precision work,

Okuma's flagship product offers performance that will

exceed your expectations.

— Always making a great product even better —



MA-600HII

### Ideal performance levels from a variety of spindles for a wide range of applications

### Highly efficient production with high machining capacity



### Machining capacity

### 901 cm³/min (MA-500HII actual data\*1)

Standard spindle: 6 000 min-1 ø100 face mill. Material: \$450.

Standard Spindle: 6,000 min 9	100 face mili Ma	terial: 545C				
Tool	Spindle speed min <sup>-1</sup>	Cutting m/min	Feed rate mm/min	Cut width mm	Cut depth mm	Chips cm³/min
ø100 face mill 10 blades (carbide)	955	300	3,220	70	4	901
ø50 porcupine cutter (carbide)	1,146	180	500	25	50	625
ø63 insert drill (carbide)	606	120	121	_	_	_
M42 P4.5 tap	91	12	409.5	_	_	81%*

\* Spindle load

### 802 cm<sup>3</sup>/min (MA-600HII actual data\*1)

Wide-range spindle: 12,000 min<sup>-1</sup> ø100 face mill Material: S45C

Tool	Spindle speed min <sup>-1</sup>	Cutting m/min	Feed rate mm/min	Cut width mm	Cut depth mm	Chips cm³/min
ø100 face mill 10 blades (carbide)		300	2,865	70	4	802
ø50 porcupine cutter (carbide)	1,146	180	400	25	50	500
ø63 insert drill (carbide)	606	120	91	_	_	_
M42 P4.5 tap	91	12	409.5	_	_	_

### **1,081 cm³/min** (MA-600HII actual data\*1)

Super-heavy spindle: 6,000 min<sup>-1</sup> (Optional) ø200 face mill Material: S45C

Tool	Spindle speed min <sup>-1</sup>	Cutting m/min	Feed rate mm/min	Cut width mm	Cut depth mm	Chips cm³/min
ø200 face mill 10 blades (cermet)	330	207	1,404	140	5.5	1,081

<sup>\*1.</sup> The "actual data" referred to above for this brochure represent examples, and may not be obtained due to differences in specifications, tooling, cutting, and other conditions.

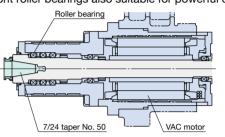
### Spindle lineup for machining a wide range of materials, from steel to titanium/Inconel



Long service life oil-air lubrication (all spindles)

### ■ Standard spindle: 6,000 min<sup>-1</sup>

Front roller bearings also suitable for powerful cutting

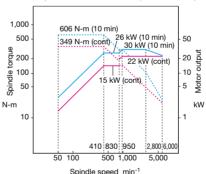


### ■ Mainly for steel workpieces

#### Standard spindle No. 50

• Spindle speed: 6,000 min-1

Max output: 30/22 kW (10 min/cont) Max torque: 606/349 N-m (10 min/cont)

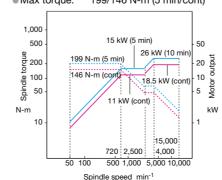


#### Steel machining

### Wide-range spindle No. 40 (Optional)

Spindle speed: 15,000 min<sup>-1</sup>

 Max output: 26/18.5 kW (10 min/cont) 199/146 N-m (5 min/cont) Max torque:



### Wide-range spindle No. 50 (Optional) 419 N-m (1.7 times more than previous model)

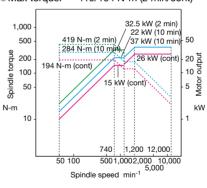
■ Machines materials from

Spindle speed: 12,000 min<sup>-1</sup>

aluminum to steel

Max output: 37/26 kW (10 min/cont)

Max torque: 419/194 N-m (2 min/cont)

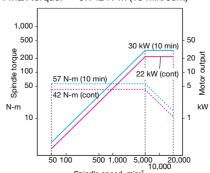


### ■ Die/mold and aluminum machining

#### High-speed spindle HSK-A63 only (Optional)

• Spindle speed: 20,000 min<sup>-1</sup>

Max output: 30/22 kW (10 min/cont) Max torque: 57/42 N-m (10 min/cont)



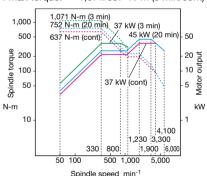
### ■ Machines Inconel, titanium and other difficult-to-cut materials Super-heavy spindle No. 50 (Optional)

### **1,071 N-m** (heavy-duty cutting)

Spindle speed: 6,000 min<sup>-1</sup>

Max output: 45/37 kW (20 min/cont)

Max torque: 1.071/637 N-m (3 min/cont)



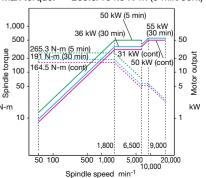
#### For a wide range of applications, from aluminum to steel

#### Wide-range, high-speed spindle HSK-A100 only (Optional)

• Spindle speed: 20,000 min<sup>-1</sup>

Max output: 55/50 kW (30 min/cont)

Max torque: 265.3/164.5 N-m (5 min/cont)



### **Outstanding dimensional stability** with long-run machining of large workpieces

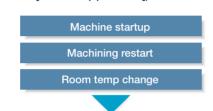


### Dimensional changes of less than 8 µm over time in a wide machining range (actual data with room temperature change of 8°C [TAS-C applicable])

### ■ Eliminate waste with the Thermo-Friendly Concept

In addition to maintaining high dimensional To stabilize thermal deformation. accuracy when room temperature changes, Okuma's Thermo-Friendly Concept provides high dimensional accuracy during machine startup and machining restart.

warming-up time is shortened and the burden of dimensional correction during machining restart is reduced.

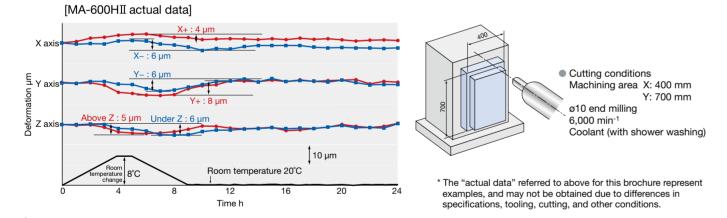


High dimensional stability

### ■ Evolved TAS-C environmental thermal deformation control: Stable dimensional accuracy in large machining area

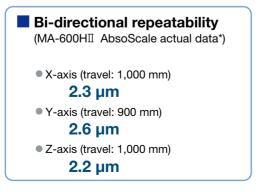
A function for controlling deformation caused by table or workpiece thermal expansion during room temperature or coolant temperature changes has been added to TAS-C environmental thermal deformation control, enabling stable dimensional accuracy to be obtained in a large machining area.

The benefits: better dimensional accuracy from large workpieces requiring long cycle times, and reduced dimensional variation from repetitive workpiece mount positioning.



### Positioning accuracy, based on ISO 230-2 machine tool test conditions

■ The exactness of bi-directional positioning (MA-600HII AbsoScale actual data\*) X-axis (travel: 1,000 mm) 2.3 µm Y-axis (travel: 900 mm) 2.8 µm Z-axis (travel: 1,000 mm) 2.9 um



<sup>\*</sup> Note: The "actual data" referred to above represent examples of data obtained by using ISO 230-2 test methods done at Okuma factories, and they are not guaranteed values.

Next-Generation Energy-Saving System

### **ECO suite**

A suite of energy saving applications for machine tools

### ECO Idling Stop

Accuracy ensured, cooler off

Intelligent energy-saving function with the Thermo-Friendly

The machine itself determines whether or not cooling is needed and cooler idling is stopped with no loss to accuracy. (Standard application on machines with Thermo-Active Stabilizer—Spindle)

### ECO Power Monitor

On-the-spot check of energy savings

Power is shown individually for spindle, feed axes, and auxiliaries on the OSP operation screen. The energy-saving benefits from auxiliary equipment stopped with ECO Idling Stop can be confirmed on the spot.

**■ ECO Operation** (Optional) Intermittent/continuous operation of chip conveyor, or mist collector during machining

■ ECO Hydraulics (Optional) Energy-saving hydraulic unit using servo control technology

### Optimized Servo Control **SERVONAVI**

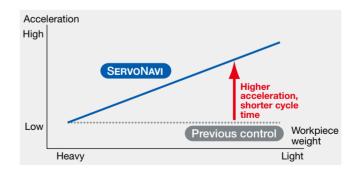
Achieves long term accuracy and surface quality

### ■ SERVONAVI AI (Automatic Identification)

 Cycle time shortened with faster acceleration Work Weight Auto Setting

On table travel type machining centers, the table feed acceleration with the previous system was the same regardless of weight, such as workpieces and fixtures loaded on the table.

Work Weight Auto Setting estimates the weight of the workpiece and fixture on the table and automatically sets servo parameters, including acceleration, to the optimum values. Cycle times are shortened with no changes to machining accuracy.

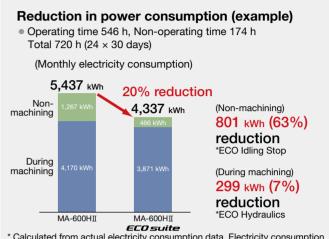


 Maintaining high accuracy and stable operations Inertia Auto Setting

When workpieces or fixtures are changed, inertia mass also changes, sometimes resulting in greater positioning error of the rotary axis. IAS estimates workpiece/fixture inertia mass from acceleration torque and automatically changes servo parameter settings to the optimum values so that high accuracy and stable movement can be maintained.

#### ECO suite benefits

Electricity consumption during non-machining time greatly reduced with "ECO Idling Stop." which shuts down each piece of auxiliary equipment not in use.



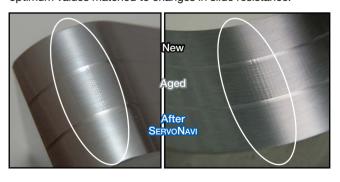
\* Calculated from actual electricity consumption data. Electricity consumption will differ depending on machine specifications and usage status.

### SERVONAVI SF (Surface Fine-tuning)

### Maintains machining accuracy and surface quality Reversal Spike Auto Adjustment

Slide resistance changes with length of time machine tools are utilized, and discrepancies occur with the servo parameters that were the best when the machine was first installed. This may produce crease marks at motion reversals and affect machining accuracy (part surface quality).

SERVONAVI's Reversal Spike Auto Adjustment maintains machining accuracy by switching servo parameters to the optimum values matched to changes in slide resistance.



#### Contributes to longer machine life **Vibration Auto Adjustment**

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When aging changes machine performance, noise, vibration, crease marks, or fish scales may appear. Vibration Auto Adjustment can quickly eliminate noise and vibration even from machines with years of operation.

### Machine structure for high speed feed and high rigidity

### ■ High speed operation

Rapid traverse: 60 m/min (X-Y-Z axes)
Rapid acceleration: 0.7G (maximum)
Tool change: 2.0 sec (T-T)

4.4 sec (C-C)

Table indexing: 2.0 sec (MA-600HII 1 degree indexing 90 degrees)

2.5 sec (MA-600HII 0.001 degree indexing 90 degrees)

APC time: 12 sec (MA-600HII)

### ■ Machine structure

 Highly rigid 3-point supported bed
 Easy installation thanks to bed that does not twist. Supporting stable, high accuracy over a long period.

#### Ball screw bracket

The ball screw brackets at both ends of the X-Y-Z axes are reinforced and combined for highly accurate drive and positioning.

#### Ball screw cooling

X-Z axis ball screw cooling and Y-axis motor bracket cooling are standard. Assuring stable accuracy during high rates of operation.

#### Indexing table, pallet

Indexing table uses curvic coupling for high-accuracy indexing.

- · Std: 1 degree
- · Opt: NC 0.001 degree

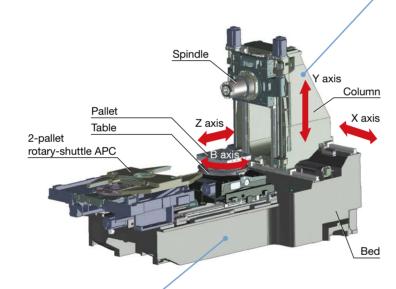
Pallet seating surface uses a taper cone system for high accuracy positioning and high durability.

#### Environmental measures

Roller guides with retainers for each axis. Lubricating oil pump with optimal control for 40% reduction in lubricating oil.  Highly rigid column strongly withstands bending and torsion



Diagonal rib configuration of columns



# ■ Bed supports fast travel of heavy parts



Ribs placed directly below guideways

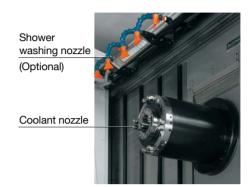
### Easy to operate . . . the key to improving productivity

Less burden on the operator, much shorter job preparation times

### Large capacity coolant tank gives peace of mind even when operating continuously for a long time

Tank capacity 20% larger than previous model

Tank capacity: Tank 1,070 L (effective: 520 L)
Pump motor capacity: 390 W
Discharge: 42 L/min (water soluble)
Coolant nozzles (Standard): 8, with check valves
Shower coolant system (Optional): 10 nozzles





### Open-ceiling door

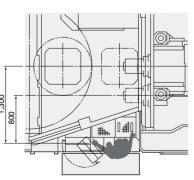
- Easy workpiece mounting/dismounting with a crane
- Good lighting and no coolant dripping

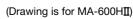


### ■ Left-mounted operation panel Improved visibility with rotating movable monitor

- XYZ direction of the workpiece and operation screen are the same
- Operator and screen proximity for less fatigue during operation
- Excellent spindle and workpiece accessibility

 800 mm from operation panel to spindle at the column traverse







Good access to machine interior with wide, 2-step platform

# Required tool storage for productive, high-mix workpiece applications

Respond flexibly with magazine matched to needed tool storage capacity

### **Auto tool changer**

Flexible, high-volume tool storage systems available for adding more types of workpieces. Matrix magazines store larger numbers in compact, quick tool-change arrangements.

			ATC tool	ATC tool			
ATC type	Magazine type	Max di	ameter	Maximum length, mass,			
		w/adjacent	w/o adjacent *1	moment			
40 tools (standard), 60 tools	Chain magazine	ø140 mm	ø240 mm				
81 tools, 111 tools,	Matrix magazine			May langth 450 [000 *2]			
141 tools, 171 tools	(171 tool cabinet)	ø105 mm (standard)	ø240 mm (large size)	Max length 450 [600 *2] mn			
195 tools, 225 tools,	Matrix magazine	ø130 mm (mid-size)	0240 mm (large size)	Max mass 25 kg			
255 tools, 285 tools	(285 tool cabinet)			Mass moment 36.75 N-m			
320 tools, 400 tools	Multiple magazine	ø135 mm	ø240 mm				

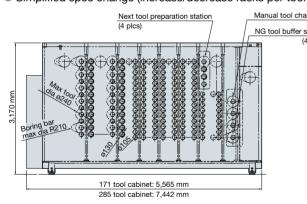
<sup>\*1.</sup> With MA-600HII 20,000 min<sup>-1</sup>, the maximum tool diameter is limited depending on the spindle speed used. \*2. Only MA-600HII supported with option

# ■ Supports ATC matrix magazines with 81 tools or more

Tool prep time reduced

Minimum: 12 seconds (multiple magazines: 19 seconds)

- Narrower machine width
- Simplified spec change (increase/decrease racks per tool vol.)





Magazine type	ine type 171 tool cabinet 285 tool cabinet					
Tool storage capacity	Total 171 tools	Standard tools only: up to ø105 Mid-size tool: tool up to ø130 (Large tool: ø130 to ø240*1	123 tools 48 tools 12 tools)	Total 285 tools	Standard tools only: up to ø105 Mid-size tool: tool up to ø130 (Large tool: ø130 to ø240*1	213 tools 72 tools 18 tools)

<sup>\*1.</sup> With MA-600HII 20,000 min<sup>-1</sup>, the maximum tool diameter is limited depending on the spindle speed used.

Note: Chain magazine 60 tools; matrix magazine and multiple magazine are optional.

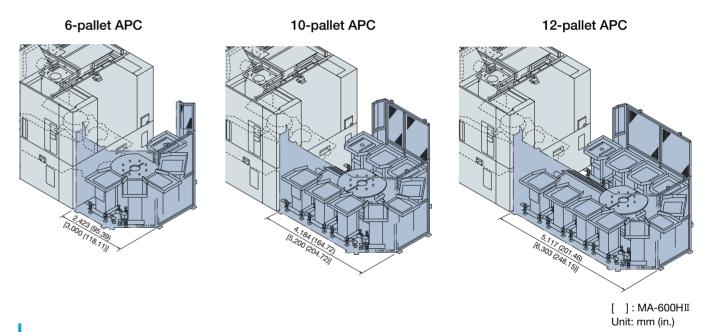
### Flexible production of large-variety workpiece applications

Compatible with production plans matched to high-mix workpiece demand

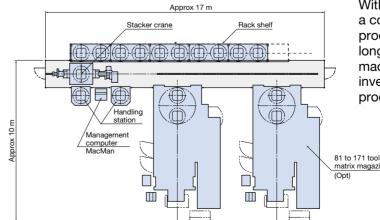
### Flexible APC units

Multi-pallet APCs allow the operator to single setup a large number of workpieces, and use the extra time available for other jobs. Setups at the end of the day for untended operations are also a benefit.

- Multi-pallet APC connects to standard 2-pallet rotary-shuttle APC
- APC change time remains same.
- Can be adapted flexibly to match plant layout and type of production



### **Ready for FMS applications**



With several machines, stacker/transport system, and a control system, this FMS makes possible flexible production of large-variety, large-volume jobs. With long, untended operations, efficient (waste-less) machine utilization, reduced work-in-progress inventory, and space-saving arrangement raises shop productivity to high levels.

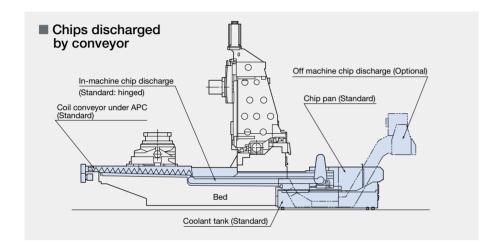
### [System layout example]

- MA-600HII: 2 • Pallets: 30
- Rack levels: 3
  - (system height approximately 6 m)
- Handling stations: 2

# Large-volume chip discharge systems effectively handle automated, long run applications

### Chip discharge

- Chips discharged directly with center trough just under spindle
- No accumulation of chips in the machining chamber, neat and simple covering
- In-machine washer, APC fork washer, under-pallet wash



### ■ In-machine chip discharge



### ■ Off-machine chip discharge



### ■ Recommended chip conveyors

○ : Recommended △ : Available

Material		Steel FC		AL/Nonferrous metal	Mixed (general use)
Chip shape		000			
In-machine chip discharge	Hinge (Standard)*1, *2	0	0	0	0
	Hinge type	0	_	_	△ (*4)
Off-machine chip discharge (Optional)	Scraper type	_	○ (dry)	_	_
	Scraper (with drum filter)	_	(wet) with magnet	△ (*3)	_
( )	Hinge + Scraper (with drum filter)*3	△ (*1)	△ (wet) (*2)	0	0

- \*1. Scraper type (Optional) can be selected. \*2. With MA-600HII at 20,000 min<sup>-1</sup>, hinged system (Optional faster transport) required.
- \*3. With MA-600HII at 20,000 min-1, hinged system + scraper and drum filter (Optional faster transport + dimensions) required.
- \*1) When there are many fine chips \*2) When chips are longer than 100 mm \*3) When chips are not longer than 100 mm \*4) When there are few fine chips Note: When chips are dry, clean out chips that have accumulated under the pallet or elsewhere in the machine as needed.

### Off-machine lift-up chip conveyors

Туре	Hinge	Scraper	Scraper (with drum filter)	Hinge + Scraper (with drum filter)
Shape				

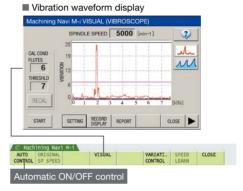
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### High accuracy machining with advanced technology



### Automatically changes to optimum spindle speed (M-i)

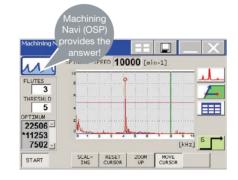
Built-in sensors measure chatter vibration and the machine automatically changes to the best spindle speed.



# Adjust cutting conditions while monitoring the data (M-g II+)

Navigates effective measures by detecting and analyzing machining chatter with a microphone attached to the machine.





### **Hi-Cut Pro**

shape commands (corner angle, arc).

Faster! ... using max cutting feedrates

By accelerating and decelerating cutting feedrates per upp

By accelerating and decelerating cutting feedrates per upper limits, cycle times are reduced.

More accurate! ... using machine tolerances

The OSP automatically controls speeds and acceleration per

Without Hi-Cut Pro
With Hi-Cut Pro

# Collision prevention Collision Avoidance System (Optional)

### World's first "Collision-Free Machine"

CAS prevents collisions in automatic or manual mode, providing risk-free protection for the machine and great confidence for the operator.



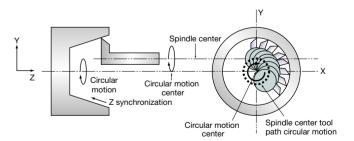
### Turn-Cut (Optional)

### Turning on a machining center

Turning is done with synchronized control with X-Y coordinate arc and tool edge position of rotating spindle tool.

Machining of tapered holes

- Machining of various diameters with a single tool
- Machining of ID/OD greater than largest tool diameter





### ■ Machine Specifications

			MA-	500HI	MA-	600HI		
	Item	Unit	No. 50	No. 40*1	No. 50	No.40*1		
Travels	X-axis travel (column left/right)	mm (in.)	700 (2	27.56)	1,000	(39.37)		
	Y-axis travel (spindle up/down)	mm (in.)	900 (35.43)					
	Z-axis travel (table front/back)	mm (in.)	780 (30.71) 1,000 (39.37)					
	Spindle center to pallet top	mm (in.)		50 to 950 (1.	.97 to 37.40)			
	Spindle nose to pallet center	mm (in.)	70 to 850 (2	.76 to 33.46)	70 to 1,070 (2	2.76 to 42.13)		
Pallet	Work area	mm (in.)	500 × 500 (1	9.69 × 19.69)	630 × 630 (24.80 × 24.80)			
	Max load	kg	<sup>-</sup> ] 008	1,000]	1,200	[1,400]		
	[50 to 6,000 (Super-heavy spindle), 50 to 15,000, 50 to 20,000 [50 to 6,000, (Super-heavy spindle), 50 to 12,000]  Tapered bore [50 to 6,000, (Super-heavy spindle), 50 to 12,000, 20,000]  7/24 taper No. 50 7/24 taper No. 40, 7/24 taper No. 50							
	Max workpiece dimensions	mm (in.)	ø800 × 1,000 (ø	ø31.50 × 39.37)	ø1,000 × 1,000	(ø39.37 × 39.37)		
Spindle	Spindle speed	min-1	50 to 6,000		50 to 6,000			
			[50 to 6,000		[50 to 6,000,			
			(Super-heavy			50 to 15,000,		
			spindle), 50 to	50 to 20,000	spindle), 50 to	50 to 20,000		
	Tapered bore		7/24 taper No. 50	7/24 taper No. 40,	7/24 taper No. 50	7/24 taper No. 40,		
	·		[HSK-A100]	HSK-A63* <sup>2</sup>	[HSK-A100]* <sup>3</sup>	HSK-A63*2		
	Bearing dia	mm (in.)	ø100 (ø3.94)	ø70 (ø2.76)	ø100 (ø3.94)	ø70 (ø2.76)		
Feed rate	Rapid traverse	m/min (ipm)	, ,	X-Y-Z: 6	0 (2,362)	,		
	Cutting feed rate	mm/min (ipm)		X-Y-Z: 1 to 60,00	00 (0.04 to 2,362)			
Motors	Spindle (10 min/cont) *4	kW (hp)	30/22 [45/37*4, 37/26] (40/30 [60/50, 50/35])	26/18.5, 30/22 (35/25, 40/30)	30/22 [45/37*4, 37/26, 55/50*5] (40/30 [60/50, 50/35, 75/66])	26/18.5, 30/22 (35/25, 40/30)		
	Feed axis	kW (hp)		: 4.6 (6.13) × 2, (6.13)		: 4.6 (6.13) × 2, (6.93)		
	Table indexing	kW (hp)		3.5 (	4.67)			
ATC	Tool shank		MAS403 BT50 [HSK-A100]	MAS 403 BT40, HSK-A63*2	MAS403 BT50 [HSK-A100]*3	MAS 403 BT40, HSK-A63*2		
	Pull stud		[1.0.171.00]	MAS	-	1.0.17.00		
	Magazine capacity	tools	40 [60. 8	31, 111, 141, 171, 1		320. 4001		
	Max tool dia (w/ adjacent) *6	mm (in.)	ø140 (5.51)	ø100 (3.94)	ø140 (5.51)	ø100 (3.94)		
	Max tool dia (w/o adjacent) *6	mm (in.)	ø240 (9.45)	ø150 (5.91)	ø240 (9.45)* <sup>7</sup>	ø150 (5.91)		
	Max tool length	mm (in.) 450 450		450 [600]	450			
			(17.72)	(17.72)	(17.72 [23.62])	(17.72)		
	Max tool weight	kg (lb)	25 (55)	10 (22)	25 (55)	10 (22)		
	Tool selection	3 ()	, ,	mory random (Fixed	` '	. ,		
Machine	Height	mm (in.)	1415	3,174 (		/		
size	Floor space; width x depth	mm (in.)	3.110 × 5.971 (1	122.44 × 235.08)		134.25 × 255.71)		
	Weight	kg (lb)		(47,300)		(53,900)		

[ ]: Optional

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- \*1. No. 40 spindle is optional.
- \*2. 20,000 min-1 with HSK-A63 only
- \*3. 20,000 min<sup>-1</sup> with HSK-A100 only
- \*4. Super-heavy spindle motor rating is 20 min/cont (for heavy-duty cutting)
- \*5. 20,000 min<sup>-1</sup> spindle motor rating is 30 min/cont
- \*6. Values differ with a matrix magazine. Please inquire.
- \*7. With MA-600HII 20,000 min-1, the maximum tool diameter is limited depending on the spindle speed used.

### ■ Standard Specifications

Spindle speed	6,000 min <sup>-1</sup> (30/22 kW [10 min/cont])	Hydraulic unit	
ATC magazine capacity	40 tools	Automatic 1° indexing table	
Spindlehead cooling system		2-pallet rotary-shuttle APC	Pallet top surface M16 tap
Simple ball screw cooler	X-Z axes	Full enclosure shielding	2-pallet pivoted type for APC
Centralized lubrication	Oil level alarm and pressure alarm	Operation panel	
Coolant supply system	Tank 1,070 L (Effective: 520 L),	ATC operation panel	For manual operation
	pump 390 W (50 Hz), 620 W (60 Hz)	NC (OSP) control cabinet	Heavy current systems
In-machine chip discharge	Hinge	ventilation fan	
Chip pan for above		Status indicator	3 phase C type
ATC air blower (blast)		Foundation washers, jack bolts	
Chip air blower (blast)	Nozzle type	Slip stoppers and chemical	
Coil conveyor under APC		anchors	
In-machine chip washer		Tool release lever	
APC fork washer		Tapered bore cleaning bar	
Air filter and oiler		Hand tools	
Telescopic cover		Tool box	

### Optional Specifications

Optional Speci	iications		
Spindle speeds	50 to 12,000 min <sup>-1</sup> , 37/26 kW, No. 50	Chip air blower (blast)	Adapter
	50 to 15,000 min <sup>-1</sup> , 26/18.5 kW, No. 40	Off-machine chip discharge	Refer to Recommended chip
	50 to 20,000 min <sup>-1</sup> , 30/22 kW, HSK-A63 only	(Lift-up chip conveyor types)	conveyors on page 11.
	(MA-600HII) 20,000 min <sup>-1</sup> , 55/50 kW, HSK-A100 only	Chip bucket for above	Height 700 mm (27.56 in.), 1,000 mm (39.37 in.)
Super-heavy spindle*1	6,000 min <sup>-1</sup> , 45/37 kW, 1,071 N-m, No.50	Hydraulic oil cooler	
Dual contact spindle	HSK-A63, HSK-A100, BIG-PLUS®	Coolant heater / cooler	
ATC magazine capacity	60 tool (chain magazine type)	Auto tool length comp/	Touch sensor
(tools)	81, 111, 141, 171, 195, 225, 255, 285 tool	breakage detection	
	(matrix magazine type)	Auto zero offset/	Touch probe
	320, 400 tool (multiple magazine system)	auto gauging	
AbsoScale detection	X-Y-Z axes, X-Y axes	Tool life management	By hour meter
Auto 0.001° indexing table	Built-in NC table	Turn-Cut	
APC	Multi-pallet APC 6, 10, 12	Pull stud bolt shape	MAS-1, CAT, DIN, JIS
FMS 2-pallet APC	Wing block type, Under-pallet fork type	Pull stud bolt	MAS-1, MAS-2, CAT, DIN, JIS
Pallet top surface	T-slot	Standard T-column fixture	Height: 850/825 mm, Pitch: 100/125 mm
configuration			(MA-500HII/MA-600HII)
Spare pallets		Standard square-column	Height: 850/825 mm, Pitch: 100/125mm
Edge locator		fixture	(MA-500HII/MA-600HII)
Oil hole coolant system	1.5 MPa	Ball-screw cooler	X-Y-Z axes
Thru-spindle coolant*2	1.5 MPa, 7.0 MPa, large flow 1.5 MPa,	Recommended	AbsoScale detection (X-Y-Z axes)
	large flow 7.0 MPa	for die machining	Super-NURBS
Shower coolant	10 nozzles		DNC-DT, 0.1 µm control
Work wash gun		TAS-S	Thermo Active Stabilizer—Spindle
Oil mist lubricator		TAS-C	Thermo Active Stabilizer—Construction

<sup>\*1.</sup> For heavy-duty cutting \*2. Okuma pull studs required.

### ■ Major options

Auto tool length compensation/breakage detection



Probe type sensor Detection increment: 1 µm Auto-measure aligning air blower quipped



Non-measurement time

Auto zero offset / Auto gauging



Optical signal messaging type touch probe
Detection increment: 1 µm

### With revamped operation and responsiveness ease of use for machine shops first!

Smart factories implement advanced digitization and networking (IoT) in manufacturing to achieve enhanced productivity and added value. The OSP has evolved tremendously as a CNC suited to advanced intelligent technology. Okuma's new control uses the latest CPUs for a tremendous boost in operability, rendering performance, and processing speed. The OSP suite also features a full range of useful apps that could only come from a machine-tool manufacturer, making smart manufacturing a reality.

### Smooth, comfortable operation with the feeling of using a smart phone

Improved rendering performance and use of a multi-touch panel achieve intuitive graphical operation. Moving, enlarging, reducing, and rotating 3D models, as well as list views of tool data, programs, and other information can be accomplished through smooth, speedy operations with the same feel as using a smart phone. The screen display layout on the operation screen can also be changed to suit operator preferences and customized for the novice and/or veteran machinists.



Note: 15-in. operation panel screen shots.

Collision Avoidance System (Optional) shown above.

### "Just what we wanted."— Refreshed OSP suite apps

This became possible through the addition of Okuma's machining expertise based on requests we heard from real, machine-shop customers. The brain power packed into the CNC, built by a machine tool manufacturer, will "empower shop floor" management.



Routine inspection support **Maintenance Monitor** 

The Maintenance Monitor displays items for inspections before starting daily operation and regular inspections and the rough estimate of inspection timing. Touching the [INFO] button displays the PDF instruction manual file of relevant maintenance items.







Increased productivity through visualization of motor

### **Spindle Output Monitor**



Making new machining technology simpler and easier to use Turn-Cut Guide (Optional)



Monitoring operating status even when away from the

E-mail Notification



15

Automatic saving of recorded alarms

## Screen Capture



### Standard Specifications

Basic Specs	Control	X, Y, Z, simultaneous 3 axis, spindle control (1 axis)
	Position feedback	OSP full range absolute position feedback (zero point return not required)
	Coordinate functions	Machine coordinate system (1 set), work coordinate system (20 sets)
	Min / Max inputs	8-digit decimal, ±99999.999 to 0.001 mm (3937.0078 to 0.0001 in.), 0.001°
		Decimals as: 1 µm, 10 µm, 1 mm (0.0001,1 in.) (1°, 0.01°, 0.001°)
	Feed	Cutting feed override 0 to 200%, rapid traverse override 0 to 100%
	Spindle control	Direct spindle speed commands, override 30 to 300%, multi-point indexing
	Tool compensation	No. of registered tools: Max 999 sets, tool length/radius compensation: 3 sets per tool
	Display	15-inch color LCD + multi-touch panel operations
	Self-diagnostics	Automatic diagnostics and display of program, operation, machine, and NC system faults
Programming	Program capacity	Program storage capacity: 4 GB; operation backup capacity: 2 MB
	Program operations	Program management, editing, multitasking, scheduled program, fixed cycle, G-/M-code macros, arithmetic, logic statements,
		math functions, variables, branch commands, coordinate calculate, area calculate, coordinate convert, programming help
Operations	"suite apps"	Applications to graphically visualize and digitize information needed on the shop floor
	"suite operation"	Highly reliable touch panel suited to shop floors. One-touch access to suite apps.
	Easy Operation	"Single-mode operation" to complete a series of operations, advanced operation panel/graphics facilitate smooth machine control
	Machine operations	MDI, manual (rapid traverse, manual cutting feed, pulse handle), load meter, operation help, alarm help, sequence return,
		manual interrupt/auto return, pulse handle overlap, parameter I/O, PLC monitor, alignment compensation
	MacMan	Machining management: machining results, machine utilization, fault data compile & report, external output
Communications /	Networking	USB (2 ports), Ethernet
High speed/accura	acy specs	Hi-G Control, Hi-Cut Pro, pitch error compensation, SERVONAVI, Machining Time Shortening Function
Energy-saving	ECO suite	ECO Idling Stop*1, ECO Power Monitor*2

- \*1. Spindle cooler Idling Stop is used on TAS-S machines.
- 2. The power display shows estimated values. When precise electrical values are needed, select the on-machine wattmeter option

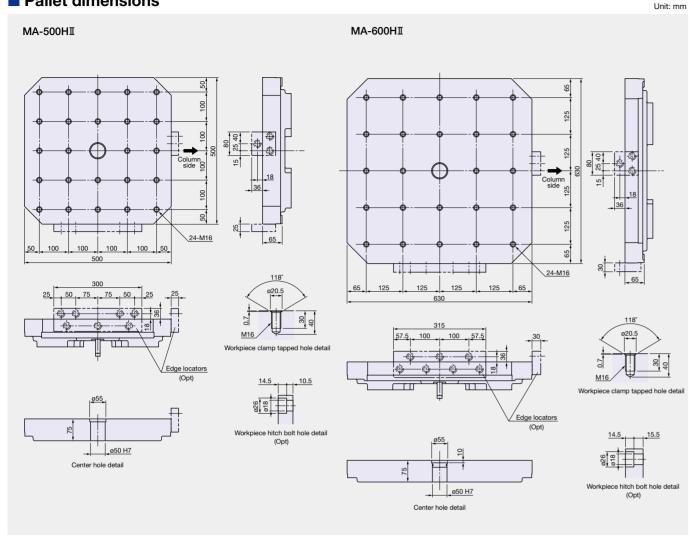
### Optional Specifications

em	Kit Specs*1	E	ML	E	D	A(	Ť
		E	υ	E	ט	E	L
	25.14/2 102 1 11 1 1 1 1				1		T
	dvanced One-Touch IGF-M (Real 3D simulation included atteractive MAP (I-MAP) gramming uto scheduled program update //M-code macros ommon variables   1,000 pcs   2,000 pcs   2			-	_	•	ł
Std: 200 pcs)  2,000 pcs  Program branch; 2 sets  Program notes (MSG)  Coordinate system election  Std: 20 sets  400 sets  Std: 20 sets)  400 sets  Interpolation  Synchronized Tapping II  Synchronized Tapping II  Sylindrical side facing  Stole machining  Stole grooving (flat-tool free-shaped grooving)  Strin-Cut  Stole max rotational speed setting*1)  1-digit feed				•	•		l
							Ţ
	ım update	•	•	•	•	•	1
							1
							1
(Std: 200 pcs)							1
	S						1
Program notes (MSG)			•		•		1
Coordinate system	100 sets	•		•		•	
selection	200 sets		•		•		I
(Std: 20 sets)	400 sets						T
Helical cutting (within 3	360°)	•	•	•	•	•	T
	,						T
		•	•	•	•	•	t
		•	•	•	•	•	t
	<u> </u>						t
							t
	free-shaped grooving)						t
	nce snaped grooving,						t
	ool grooving (flat-tool free-shaped grooving)  urn-Cut  ool max rotational speed setting*1)  1-digit feed  4 sets, 8 sets, parameter					$\vdash$	t
	ol grooving (flat-tool free-shaped grooving) rn-Cut ol max rotational speed setting*1) -digit feed						t
	rn-Cut ol max rotational speed setting*1) -digit feed		•	•	•	•	+
	rol max rotational speed setting*1) 1-digit feed 4 sets, 8 sets, parameter rogrammable travel limits (G22, G23) kip (G31) kis naming (G14)		_	_	-	_	$^{+}$
						-	+
						_	+
			-		_	_	+
			•		•		1
Drawing conversion			•		•	_	1
			•		•		1
	I/O variables (16 each)						1
Tape conversion★							
1onitoring							Į
Real 3D simulation				•	•	•	1
Simple load monitor	-	•	•	•	•	•	1
NC operation monitor	·	•	•	•	•	•	1
Hour meters	Power, spindle, NC, cutting						
Operation end buzzer	With M02, M30, and END commands						
Work counter	With M02 and M30 commands						ľ
MOP-TOOL	Adaptive control, overload monitor						J
Tool life management	Hour meter, No. of workpieces	•	•	•	•	•	T
auging							į
	Touch probe (G31)	Incl	uded	l in m	nachi	ne sr	)(
Auto gauging Touch probe (G31)					nachi		
Tool breakage	(touch sensor) (G31)						
detection	Includes auto tool offset	Incl	uded	l in m	nachi	ne sp	)(
Gauging data printout							Τ
Manual gauging (w/o s		•	•	•	•	•	+
							1

	Kit Specs*1	NML		3D		AOT	
Item		Ε	D	Е	D	Е	С
External I/O communication	on						
RS-232-C connector							
DNC-T3							
DNC-B (RS-232C-Ether	net transducer used on OSP side)						
DNC-DT							
DNC-/Ethernet							
Additional USB (Additional USB)	onal 2 ports, Std: 2 ports)						
Automation / untended or	peration						
Auto power shut-off	M02 and END alarms,						
	work preps done	•	_	_	_	_	_
Warm-up (calendar timer)							
External program	Button, rotary switch, digital						
selection	switch, BCD (2-digit, 4-digit)						
Cycle time reduction (Ignores certain commands)		•	•	•	•	•	•
Pallet pool control (PPC) (Required for multi-pallet APC)							
Robot, loader I/F	, , , , , , , , , , , , , , , , , , , ,						T
High-speed, high-precision	on	_					
AbsoScale detection	X-, Y-, Z-axes						
Inductosyn detection	Additional axes						Г
Super-NURBS							Т
0.1 µm control (linear axis commands)							Т
TAS-S (Thermo Active :							T
	Stabilizer—Construction)						Т
ECO suite (energy saving	,						
ECO Operation	<u> </u>						Г
ECO Power Monitor	Wattmeter						H
Energy-saving	Inverter						Н
hydraulic unit	ECO Hydraulics						H
Other	200 i iya aanoo						
CNC cabinet lamp							
Circuit breaker							
Sequence operation	Sequence stop	•	•	•	•	•	
Upgraded sequence restart		_	•	-	•	-	
Pulse handles	2 pcs, 3 pcs (Std: 1 pc)		-		-		-
External M signals	4, 8 signals						$\vdash$
Collision Avoidance Sys	, 0						$\vdash$
	gII+ (cutting condition search)						$\vdash$
One-Touch Spreadshee	U , U						$\vdash$
Block skip; 3 sets							$\vdash$
Additional axes	A B C avec [prope aposs]						-
Fixture offset	A, B, C axes [preps, specs]						-
	tion Custom)						$\vdash$
OSP-VPS (Virus Protection System)  19-indisplay operation panel w/ adjustable-tilt key board			_				$\vdash$

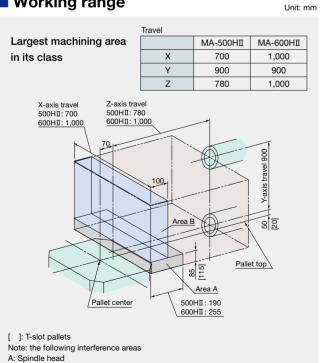
- 1) Required with MA-600HII 20,000 min-1

■ Pallet dimensions



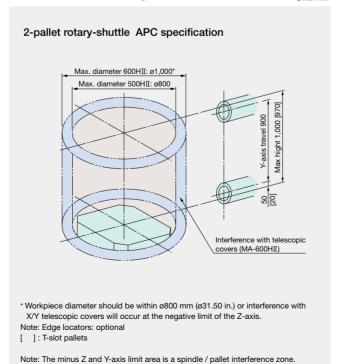
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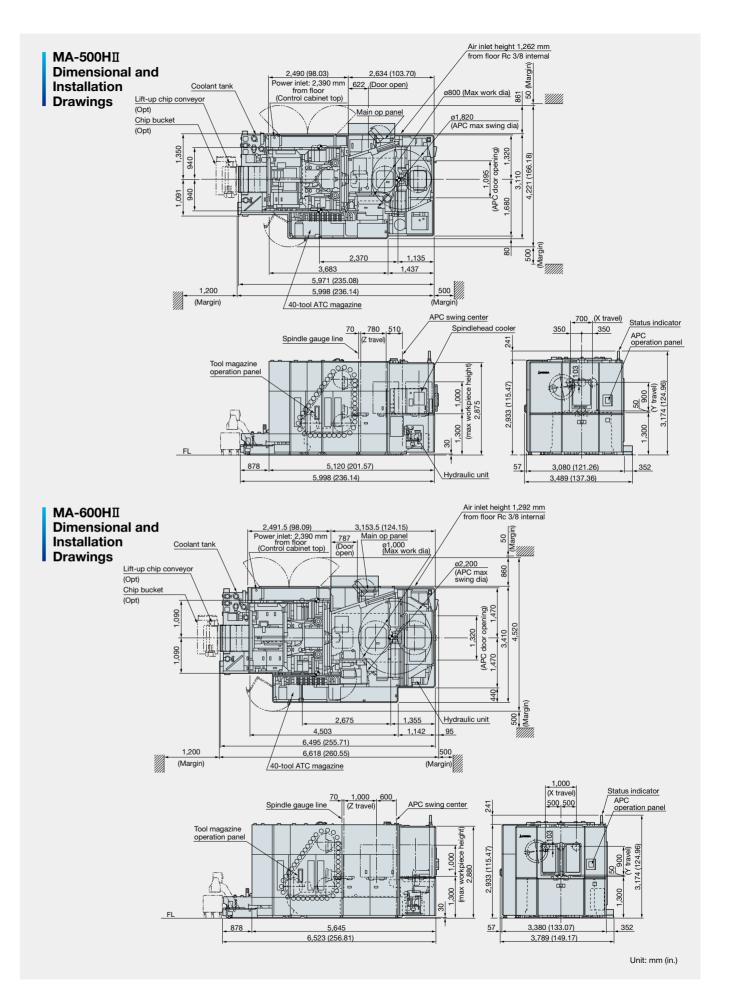
### ■ Working range



B: When max workpiece dia is ø800 to ø1,000 mm (ø31.50 to ø39.37 in.) (MA-600H  $\rm II$ )

### ■ Maximum workpiece dimensions







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