OKUMA

MB-5000HII

Horizontal Machining Center

MB-5000HII

Horizontal Machining Center

Intelligent Technology

- Thermo-Friendly Concept
- Collision Avoidance System
- Machining Navi
- SERVONAVI

A World's Fastest Class Machine

MB-5000HII achieves optimal machining at the fastest speed possible in various production forms, from mass production to variable-mix, variable-volume production. All of the units have been updated to realize revolutionary productivity. With high durability and reliability, the machine can demonstrate its best performance even on the shop floor in a tough environment.

- ■ **High speed** — Fast machining of aluminum parts in mass production
- ■ **High rigidity** — Also handles powerful cutting of steel
- ■ **High productivity** — Chip handling that achieves maximum operating times
- ■ **Space saving** — Highest floor space productivity in its class
- ■ **High accuracy** — Outstanding accuracy stability with use of Thermo-Friendly Concept
- ■ **Environmentally friendly** — Autonomously achieves stable dimensional accuracies and reduced energy consumption

MB-5000HII
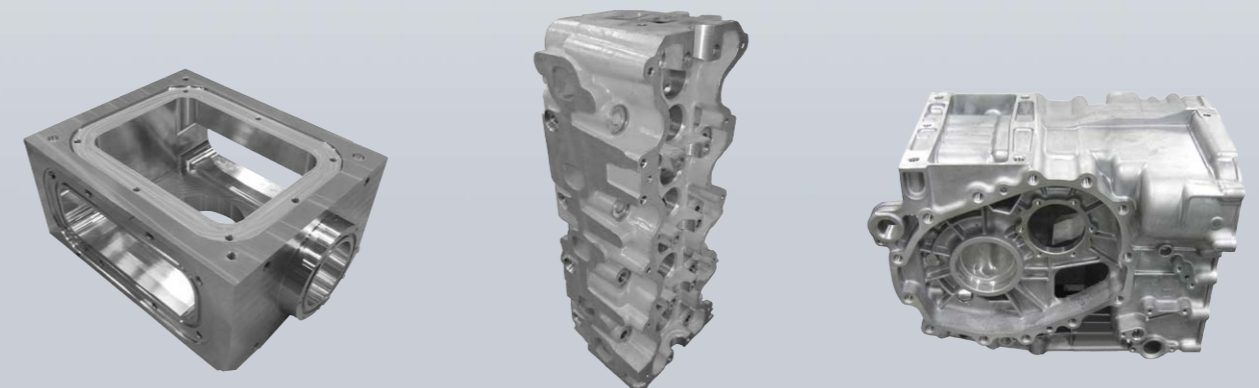
Photographs and images used in this brochure may include optional equipment.

Achieving high-speed performance in the world's fastest class

Quick machine movements

Fast acceleration/deceleration in the axis feed for shorter positioning times, high-speed table rotation, and shorter tool change times — all are effective toward achieving cycle times of the world's fastest class.

■ Reduced positioning times

With fast accel/decel axis feeds designed to reduce positioning times:

● Rapid traverse acceleration (max)   X-axis: **1.0 G**   Y-axis: **1.1 G**   Z-axis: **1.0 G**
● Rapid traverse   X-Y-Z axes: **60 m/min**

■ Machining Time Shortening Function

MTSF shortens machining time in operations with repeated rapid traverse (G00) and cutting feed (G01) movements for parts with many drilled holes. (See "Cycle time reduction" on page 12 for details.)

Note: The amount by which machining time is reduced will differ depending on machine setup, machined part shape, and part program.

■ Reduced table indexing times

A roller gear cam mechanism is used for the 0.001-degree indexing table (option), and that has minimized indexing time. Fast indexing has been achieved.

● 90° indexing: **1.0 sec***
● 180° indexing: **1.2 sec***

* With 0.001° indexing table (option)

■ Reduced ATC times

The ATC disk magazine provides faster operations.
The farthest tool magazine indexing time possible is 5.1 seconds.

● ATC tools: 48 (No. 40 spindle)
● ATC time: T-T*1:   **0.9 sec** (tool mass: 4 kg or less)
                                1.3 sec (tool mass: 4 kg or higher)
            CTC min*2:   **2.1 sec** (tool mass: 4 kg or less)
                                2.5 sec (tool mass: 4 kg or higher)
● Farthest pot indexing: **5.1 sec** (With 48-tool magazine)

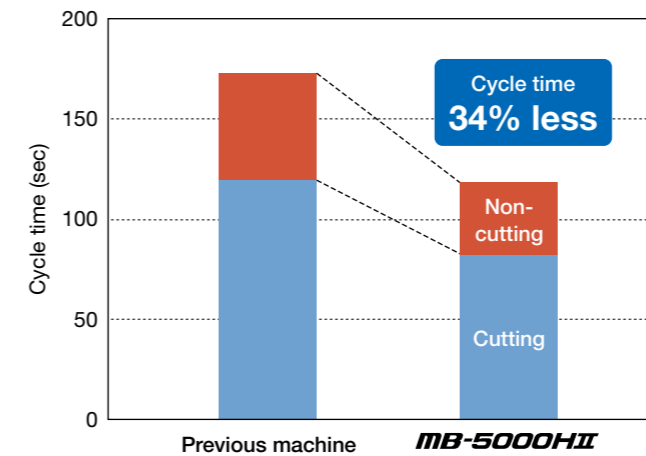*1. MAS standard measurements (formerly JIS B 6013)
*2. ISO 10791-9 (2001) (JIS B 6336-9) measurements
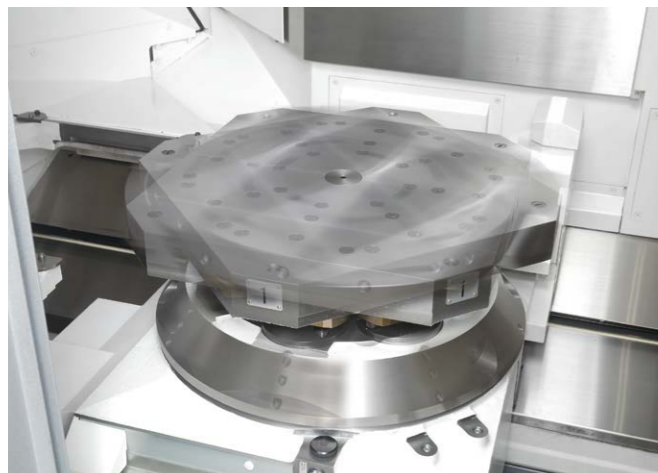
Fast machining of aluminum parts in mass production

■ High-speed machining example of aluminum mass production

The cycle time became 34% less compared to the previous machine.

Cycle time **34% less**

[High-speed drilling]

In addition, with the high-speed machining spindle* (20,000 min^{-1}, 30/22 kW) (option) for aluminum, tapping and other applications can be faster.

* Spindle ramp up for 0 → 15,000 min^{-1}: 1.3 sec (38% shorter compared to standard specs)

Also handles powerful cutting of steel

The lineup of spindles with roller bearings, compared to ball bearings, has higher rigidity. (option)
In addition to No. 40 spindles, No. 50 spindles are also available. With large-diameter side cutters and long boring bars etc, deep hole and protruding cut applications can be handled.
[Max tool length: 510 mm, max tool weight: 12 kg (No. 40 spdl), 15 kg (No. 50 spdl)]

■ Power spindles (options)

● Spindle taper: 7/24 taper No. 40 (BIG-PLUS®), HSK-A63
                7/24 taper No. 50 (BIG-PLUS®), HSK-A100
● Bearing dia: ø90 mm (roller bearings)
                Oil-air lubrication

End milling capacity 704 cm^3/min (S45C)

● Spindle speed: 12,000 min^{-1}
● Max output: 33/26 kW (10 min/cont)
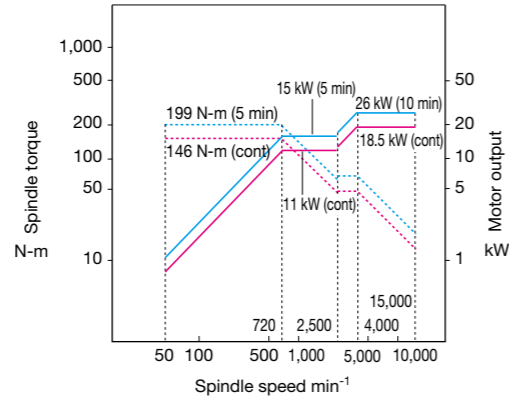● Max torque: 302 N-m (10%ED)

The lineup of highly rigid and highly torqued spindles

The spindle lineup

■ Standard spindle (No. 40)
For highly efficient machining of general machine parts

- Spindle speed: 15,000 min⁻¹
- Max output: 26/18.5 kW (10 min/cont)
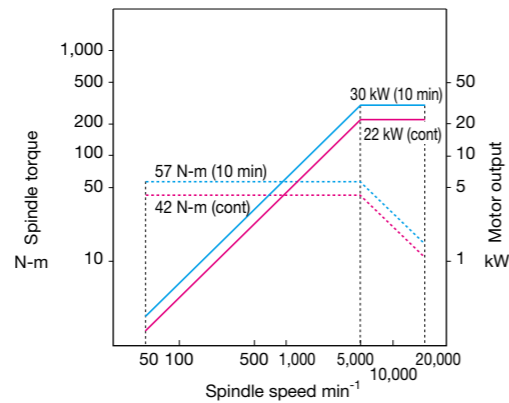- Max torque: 199/146 N-m (5 min/cont)

Graph labels: Spindle torque (N-m), Motor output (kW), Spindle speed min⁻¹
15 kW (5 min), 199 N-m (5 min), 146 N-m (cont), 26 kW (10 min), 18.5 kW (cont), 11 kW (cont)
720, 2,500, 4,000, 15,000
50 100 500 1,000 5,000 10,000

Face milling capacity
483 cm³/min (S45C)
- Tool: ø80 face mill 8 blades (cermet)
- Spindle speed: 1,194 min⁻¹
- Cutting: 300 m/min
- Feed rate: 3,750 mm/min
- Cut width: 56 mm
- Cut depth: 2.3 mm

■ High-speed spindle (No. 40) for aluminum applications
(option)
For fast machining of aluminum

- Spindle speed: 20,000 min⁻¹
- Max output: 30/22 kW (10 min/cont)
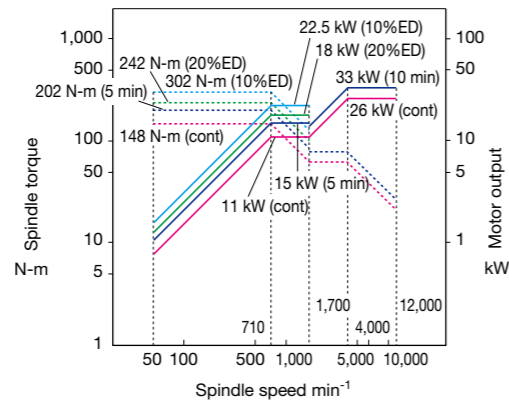- Max torque: 57/42 N-m (10 min/cont)

Graph labels: Spindle torque (N-m), Motor output (kW), Spindle speed min⁻¹
30 kW (10 min), 22 kW (cont), 57 N-m (10 min), 42 N-m (cont)
50 100 500 1,000 5,000 10,000 20,000

Face milling capacity
2,700 cm³/min (A5052)
- Tool: ø63 face mill 5 blades (carbide)
- Spindle speed: 15,000 min⁻¹
- Cutting: 2,968 m/min
- Feed rate: 20,455 mm/min
- Cut width: 44 mm
- Cut depth: 3 mm

■ Power spindles (Nos. 40/50)
(options)
For powerful cutting of castings and cast steel parts

- Spindle speed: 12,000 min⁻¹
- Max output: 33/26 kW (10 min/cont)
- Max torque: 302 N-m (10%ED)

Graph labels: Spindle torque (N-m), Motor output (kW), Spindle speed min⁻¹
22.5 kW (10%ED), 18 kW (20%ED), 242 N-m (20%ED), 202 N-m (5 min), 302 N-m (10%ED), 33 kW (10 min), 26 kW (cont), 148 N-m (cont), 15 kW (5 min), 11 kW (cont)
710, 1,700, 4,000, 12,000
50 100 500 1,000 5,000 10,000

End milling capacity
704 cm³/min (S45C)
- Tool: ø20 roughing end mill 7 flutes
- Spindle speed: 4,029 min⁻¹
- Cutting: 253 m/min
- Feed rate: 8,800 mm/min
- Cut width: 4 mm
- Cut depth: 20 mm

Face milling capacity
628 cm³/min (S45C)
- Tool: ø100 face mill 5 blades (cermet)
- Spindle speed: 955 min⁻¹
- Cutting: 300 m/min
- Feed rate: 1,910 mm/min
- Cut width: 70 mm
- Cut depth: 4.7 mm

Note: The "actual data" referred to above for this brochure represent examples, and may not be obtained due to differences in specifications, tooling, cutting condition, and others.

Chip discharge designed to achieve maximum operating times

Machining chamber with accumulated chips and biting into covers — thoroughly removed

In-machine covers renewed. Flat covers are used to drastically improve chip discharge. Moreover, with simpler designs, chip accumulation and biting-in troubles have been prevented. The machine has the high durability fully capable of withstanding the long continuous runs required for mass production at maximum rapid-traverse rates and machining capacity.

■ In-machine covers with improved reliability

- X-/Y-axis with armored bellows, and the Z-axis with a single steel sheet cover minimize chip biting-in damage.

Single stainless steel cover (Z-axis)

X-/Y-axis armored bellow covers

■ With smooth chip discharge, long continuous machining

- Below pallet wash, table both-side chip flush are standard. Long continuous runs are strongly supported by in-machine covers preventing chip accumulation in any.
- Large-volume shower coolant washes machining chamber corners and table periphery, to prevent chip accumulation.

Below pallet washing

Chip flush on both sides of the table
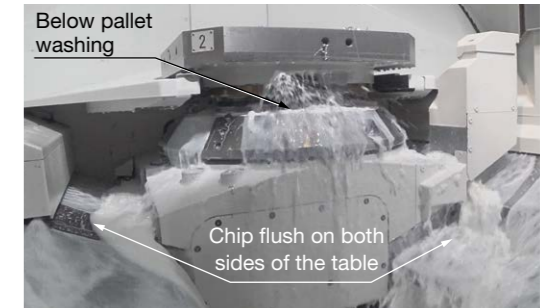
■ *Full center trough* achieves chip discharge from any type of machining application

- All areas of the machining chamber converge with the in-machine chip conveyor.
- Larger directly-below-spindle discharge port. Smoother out-machine chip discharge possible.

Troublesome coolant tank cleaning work is reduced dramatically to increase productivity.
In addition, the environmental impact caused by the disposal of coolant is reduced.
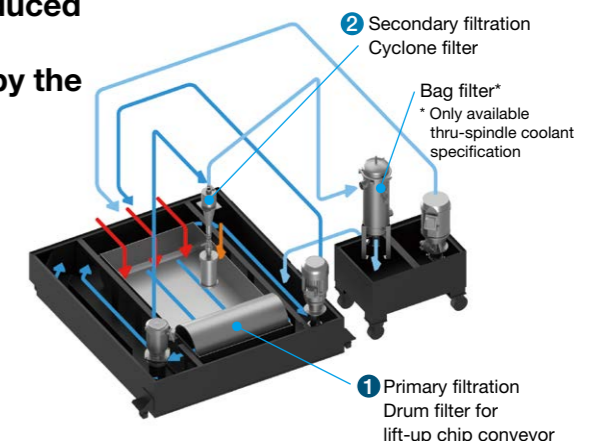
■ Sludgeless Tank (option)

Sludge removal rate **99%** (when the material is casting and aluminum)
Note: After secondary filtration (cyclone filter) permeation. Okuma evaluated removal rate.

No tank cleaning for 3 years (okuma equipment actual data)

No coolant replacement for 3 years (okuma equipment actual data)

Note: If the Sludgeless Tank option is selected, a chip conveyor with drum filter must also be selected.

❷ Secondary filtration Cyclone filter

Bag filter*
* Only available thru-spindle coolant specification

❶ Primary filtration Drum filter for lift-up chip conveyor

Proud of space-saving designing for class best floor space productivity

With a small footprint, providing a large machining area

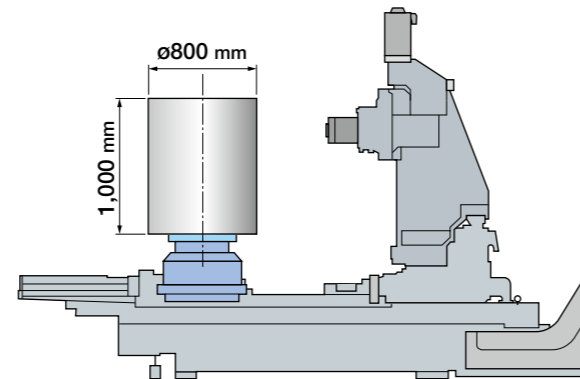### ■ Class smallest installation space

Foot print
14.3 m²

5,620mm

2,540mm

(RDF lift-up chip conveyor with drum filter)

■ User-friendly operation

● Independent left-side operation panel (swivel type)
The panel can be operated while watching workpieces to improve operability
● Column traverse system provides an easy access to the spindle and workpiece
● The overhead door can be opened to let light in and eliminate coolant drops

Multi-Pallet Tower APC

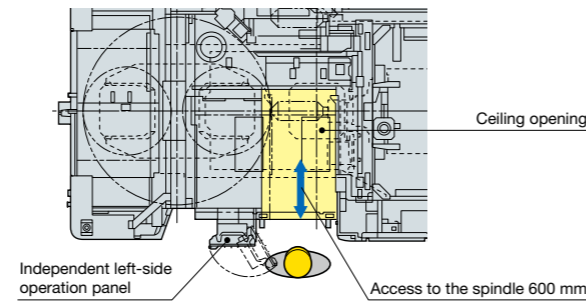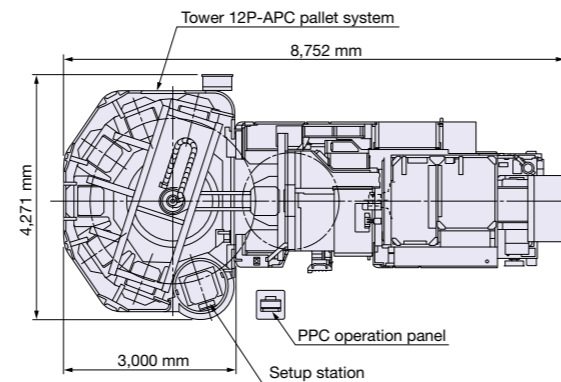Tower 12P-APC pallet system   Setup station

■ Class largest, wide machining area

Max machining dia: **ø800 mm**

Max machining height: **1,000 mm**

● Machining area   X-axis travel: 760 mm
Y-axis travel: 760 mm
Z-axis travel: 810 mm

ø800 mm

1,000 mm

Ceiling opening

Independent left-side operation panel

Access to the spindle 600 mm

Tower 12P-APC pallet system

8,752 mm

4,271 mm

3,000 mm

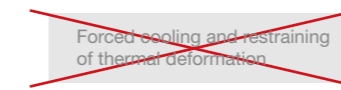PPC operation panel

Setup station

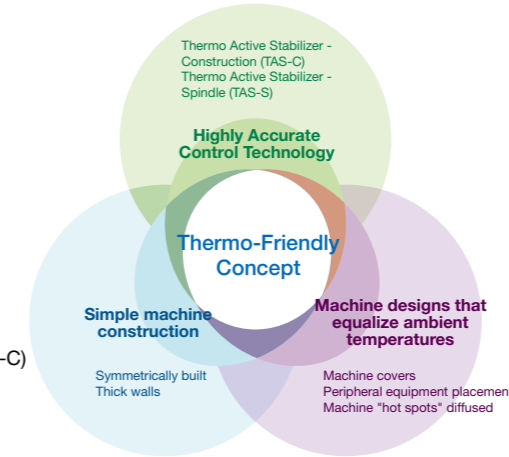# Reliable machining with high accuracy and outstanding thermal stability

Thermo-Friendly Concept
The unique approach of "accepting temperature changes"

■ Thermo-friendly structure gives outstanding thermal stability

Forced cooling and restraining of thermal deformation

1. Minimal temperature deviation

2. Manageable thermal deformation

3. Accurate compensation

Thermo Active Stabilizer—Construction (TAS-C)
Thermo Active Stabilizer—Spindle (TAS-S)

Thermo Active Stabilizer - Construction (TAS-C)
Thermo Active Stabilizer - Spindle (TAS-S)

Highly Accurate Control Technology

Thermo-Friendly Concept

Simple machine construction

Machine designs that equalize ambient temperatures

Symmetrically built
Thick walls

Machine covers
Peripheral equipment placement
Machine "hot spots" diffused

Machining dimensional change over time minimized with outstanding dimensional stability
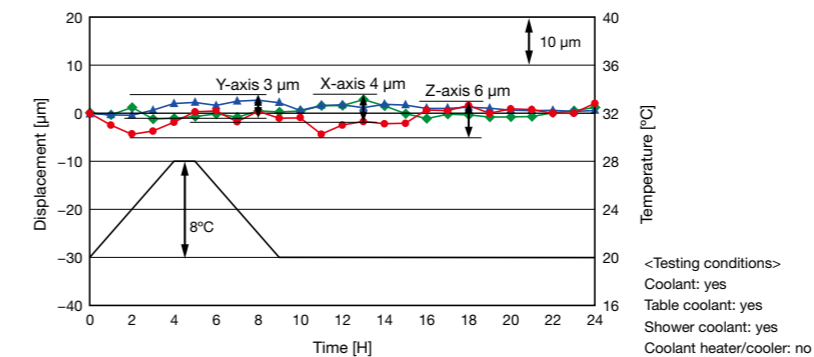
■ Eliminate waste with the Thermo-Friendly Concept

Okuma's Thermo-Friendly Concept achieves high dimensional stability not only when the room temperature changes, but also at machine startups or when machining is resumed.
The warm-up operation time to stabilize thermal deformation is shortened, and the burden of dimensional correction when resuming machining is reduced.

Machine startup

Machining restart

Room temp change

High dimensional stability

■ Machining dimensional change with ambient temperature range of 8°C

6 µm (MB-5000HII Actual data)

Y-axis 3 µm   X-axis 4 µm   Z-axis 6 µm

10 µm

8°C

<Testing conditions>
Coolant: yes
Table coolant: yes
Shower coolant: yes
Coolant heater/cooler: no

■ TAS-C (Thermo Active Stabilizer—Construction)

TAS-C estimates and accurately controls the volumetric thermal deformation of the machine's construction due to ambient temperature changes; based on data from properly placed sensors, feed axis positions, and actual machine thermal deformation characteristics.

■ TAS-S (Thermo Active Stabilizer—Spindle)

The TAS-S spindle thermal deformation control takes into account various conditional changes such as the spindle's temperature data, modification of the spindle rotation and speed, as well as spindle stoppage. The spindle's thermal deformation will be accurately controlled, even when the rotating speed changes frequently.

High-accuracy machining

High accuracy	High-precision index table	Highly rigid bed
● Even higher accuracy with Y-axis motor base cooling (standard) and ball screw cooling (option)	● NC 0.001° indexing (option) Indexing time (90°/180°) 1.0/1.2 sec ● A roller gear cam is used for the drive ● The pallet seating on a tapered cone achieves highly accurate positioning and excellent durability	● A highly rigid 3-point support bed is used to enable easy installation and stabilize accuracy for a long time

Contribution to the realization of a carbon-free society

## Highly productive, accurate and eco-friendly

Green-Smart Machine

Okuma has worked to reduce energy consumption in order to achieve carbon neutrality at the three factories in Japan which are our main production bases.

We have realized high productivity through automation and process-intensive machining, in addition to high-accuracy machining, and we then introduced the use of green energy to transform the three domestic factories into carbon-neutral factories.

"Green-Smart Machines" is our definition of Okuma's intelligent machine tools, which autonomously achieve stable dimensional accuracy and reduced energy consumption, to support environmentally friendly production. Our policy is to deploy "Green-Smart Machines" fully, to help achieve a carbon-free society.

Starting with products manufactured at those carbon-neutral factories and supplying them all over the world, we will work together with our customers to help solve the social issues faced by the manufacturing industry.

Green-Smart Machines are **environmentally friendly** products that autonomously achieve stable dimensional accuracies and reduced energy consumption.
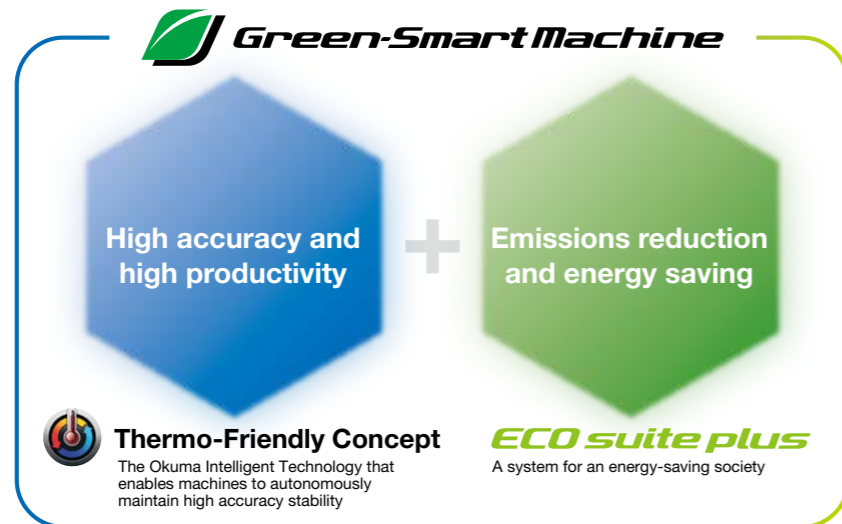
Green-Smart Machine

High accuracy and high productivity

+

Emissions reduction and energy saving

Thermo-Friendly Concept
The Okuma Intelligent Technology that enables machines to autonomously maintain high accuracy stability

ECO suite plus
A system for an energy-saving society

Thermo-Friendly Concept

The Okuma Intelligent Technology that enables machines to autonomously maintain high accuracy stability

The unique concept of accepting temperature changes achieves consistent high accuracy without special coolers or excessive air conditioning.

■ Reduction of warm-ups and dimensional compensation

Reduce the time needed for daily warm-ups and dimensional compensation to adjust to ambient temperature changes

■ Reduction of power used for air conditioning

Maintain high stability of dimensional accuracy even if the air conditioning temperature range is expanded.

■ Reduction of machine body coolers

Achieve outstanding dimensional accuracy without any special machine body cooling being required to maintain accuracy

■ The Okuma way to cool

Spindle   Spindle cooler

Cooling

Constant temperature
(always)
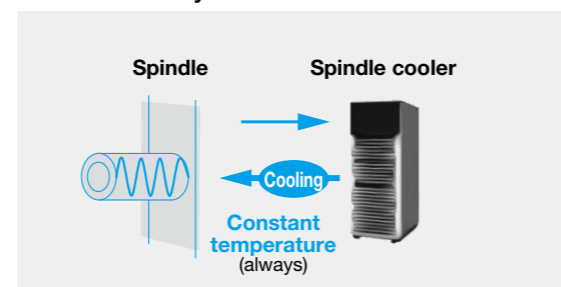
By always setting a constant coolant supply temperature, the cooler power consumption is reduced.
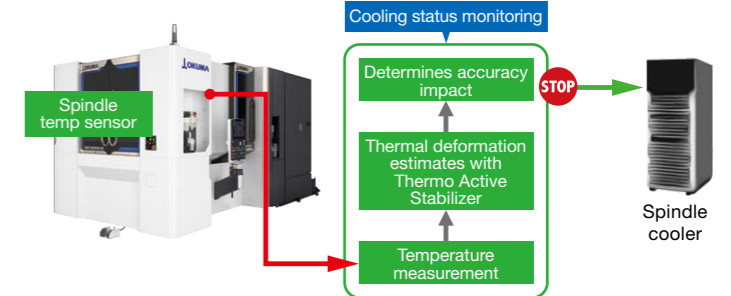

ECO suite plus
A system for an energy-saving society

■ ECO Idling Stop

Auxiliary equipment consume a substantial portion of the power used in a factory. This function enables each of them to be turned off when not needed to reduce power consumption.

In addition to when automatic operation is suspended, it is now possible to stop idling during manual operation. Power consumption and carbon dioxide emissions are reduced without conscious effort by the operator.

■ The machine monitors the cooling level when not machining, and proactively turns off the cooler while maintaining high accuracy conditions.

Cooling status monitoring

Spindle temp sensor

Determines accuracy impact

STOP

Thermal deformation estimates with Thermo Active Stabilizer

Temperature measurement

Spindle cooler

■ ECO Operation

By using only the required peripherals (chip conveyor, mist collector), energy-saving operations are possible.

■ ECO Power Monitor

Power is shown individually for spindle, feed axes, and auxiliaries on the OSP operation screen.

In addition to regenerative power, the energy-saving benefits from auxiliary equipment stopped with ECO Idling Stop can be confirmed on the spot.
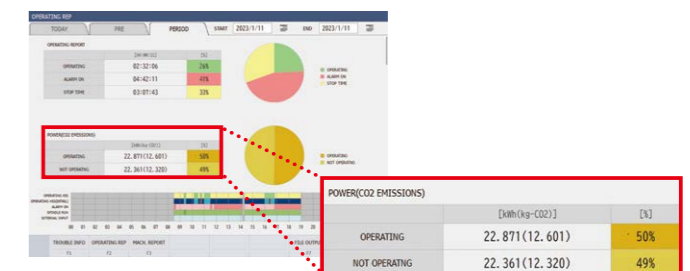
1 **Check carbon dioxide emissions on the spot**

With ECO suite plus, you can also check the power consumption of each device.
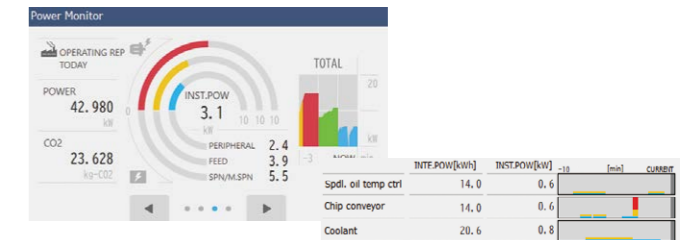
2 **Simultaneously records operating status and carbon dioxide emissions**

With ECO suite plus, recording carbon dioxide emissions for each device, and data output is possible.

3 **Analyze carbon dioxide emissions and improve machine tool operation**

With ECO suite plus, not only the display on the machine but data analysis for each device is also possible on a PC, to see a more detailed carbon dioxide emission analysis.
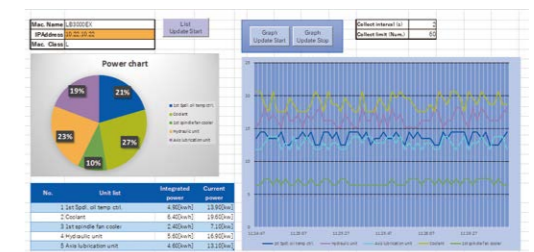
Example of utilizing One-Touch Spreadsheet (option) to create visual feedback of machine's power consumption and carbon dioxide emissions.

A wide variety of advanced technologies to increase productivity

AI Machine Diagnosis Function (option)
Machine tool diagnostics technology with artificial intelligence (AI)

### ■ With predictive maintenance, prevent machine stoppages just in time

Okuma's AI-equipped control diagnoses the presence or absence of abnormalities in the machine spindle and feed axes and identifies any irregularities found.

Downtime from machine stoppage is minimized, so the benefits are highly accurate, productive, and stable operations over the long term. The operators themselves can easily diagnose the machine by following simple screen guidelines on the Okuma control.

Notes:
AI diagnostic models are already installed, and diagnoses can be performed by the machine itself. AI diagnostic models can be updated through Okuma's Connect Plan.
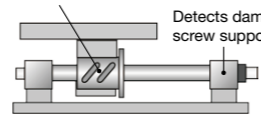With AbsoScale detection specs, ball screw wear detection is possible.

AI Spindle Diagnosis Function
Detects damage to spindle bearings
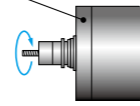
AI Feed Axis Diagnosis Function
Detects ball screw wear condition
Detects damage to ball screw support bearings

Self-diagnosis of spindle and feed axis status with AI

Turn-Cut (option)
Turning operations on machining centers

■ Shorter lead times with process-intensive machining

Simultaneously controlling X-Y circular motion with the tool edge position rotated by the spindle tool enables lathe-like turning.
● Tapers also possible
● Hole making with different diameters — with one tool
● Machine IDs/ODs with ATC-oversized large tool diameters

Spindle center
Circular motion
Circular motion center
Z sync
Circular motion center
Spindle center tool path circular motion
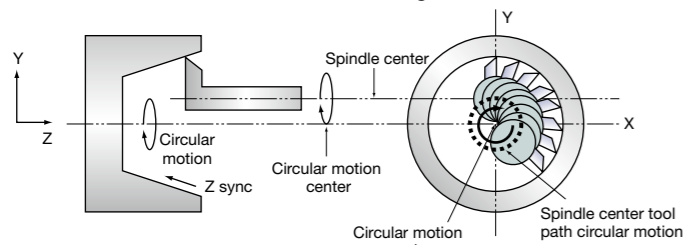
Note: AbsoScale detection and ball-screw cooling required.

[Turning valve parts]
With Turn-Cut, it's possible to turn the seating surfaces required by gas pipe sealing conditions.

Flat-Tool Grooving (option)
Airtight seal grooving

■ Gooving with high sealability

The spindle phase is precisely synchronized with cutting edge motion, to perform highly accurate grooving.
● Getting high sealability without hand finishing.
● Complex seal groove curves also cut with flat tools.

Okuma Intelligent Technology exhibits powerful effect on machine shop floors
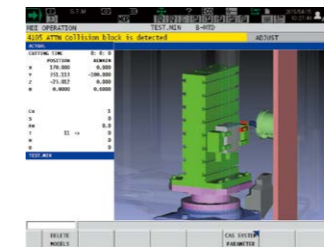
Collision Avoidance System (option)
Collision prevention

Allowing operators to focus on making parts

■ 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.

SERVONAVI
Optimized Servo Control

Achieves long term accuracy and surface quality

■ SERVONAVI AI (Automatic Identification)

Work Weight Auto Setting
● Cycle time shortened with faster acceleration
Work Weight Auto Setting estimates the weight of the workpiece and fixture on the table and automatically sets the liner axis servo parameters, including acceleration, to the optimum values. Cycle times are shortened with no changes to machining accuracy.
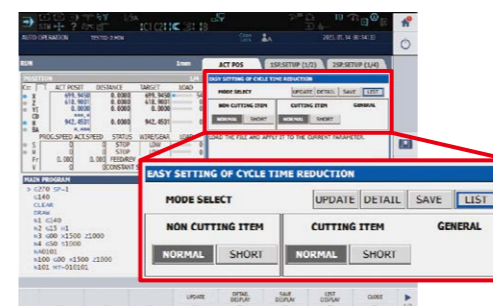
Rotary Axis Inertia Auto setting
● Maintains high accuracy and stable movements
The "ServoNavi Rotary Axis Inertia Auto Setting" estimates the inertia of the workpiece and jig from the acceleration torque, and automatically sets the optimum servo parameters for the table rotation axis, including acceleration, thereby maintaining the high-precision operation of the table rotary axis.
Moreover, the table indexing time for light weight workpieces is reduced.

Machining Navi M-*i*, M-*g*Ⅱ+ (option)
Cutting condition search for milling

Longer tool life and shorter machining times by optimizing cutting conditions

■ Searches for the best cutting conditions
● Machining Navi M-*i* changes automatically to optimum spindle speed
● Machining Navi M-*g*Ⅱ+ displays several spindle speed possibilities

Machining Navi (OSP) provides the answer!

■ SERVONAVI SF (Surface Fine-tuning)

Reversal Spike Auto Adjustment
● Maintains machining accuracy and 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.

Vibration Auto Adjustment
● Contributes to longer machine life
Vibration Auto Adjustment can quickly eliminate noise and vibration even from machines with years of operation.

Cycle time reduction
Significantly shortens cycle times and reduces power consumption

● Operation time reduction: The non-cutting time is shortened by simultaneously performing multiple operations, such as main-axis rotation and axis movements, and allowing the rotational axis to take the shortest path when rotating
● Machining time shortening: The cycle time is reduced for parts machining with frequent switches between cutting feed and rapid traverse by using high-speed feeder-mode switching and optimal acceleration/deceleration
● Easy parameter setting: Collects parameters related to cycle time reduction in a single screen for enabling changes and reuse in a single operation

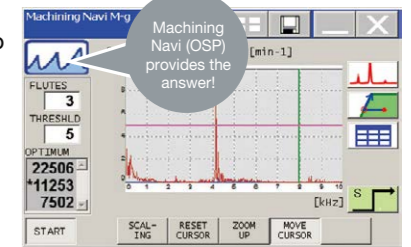Parameter easy setting
Setting screen

Cycle time **34%** Less

[Measuring conditions]
Sample part program used to drill and tap dozens of holes on three sides of an aluminum die casting.

Previous machine   MB-5000HⅢ

■ Machine Specifications

	Item	Unit	MB-5000H No. 40	[No. 50]*1
Travels	X-axis (Left/right column)	mm (in)	760 (29.92)	
	Y-axis (spindle up/down)	mm (in)	760 (29.92)	
	Z-axis (table front/back)	mm (in)	810 (31.89)	
	Spindle center to pallet top	mm (in)	50 to 810 (1.97 to 31.89)	
	Spindle nose to pallet center	mm (in)	100 to 910 (3.94 to 35.83)	
Pallet	Pallet size	mm (in)	500 × 500 (19.69 × 19.69)	
	Max load	kg (lb)	500 (1,100)	
	Indexing angle	deg	1 [0.001]	
	Max workpiece dimensions	mm (in)	ø800 × 1,000 (31.5 × 39.37)	
Spindle	Spindle speed	min⁻¹	15,000 [12,000, 20,000]	12,000
	Tapered bore		7/24 taper No. 40 [HSK-A63]	7/24 taper No. 50 [HSK-A100]
	Bearing dia	mm (in)	ø70 (2.76) [12,000 min⁻¹: ø90 (3.54)] [20,000 min⁻¹: ø70 (2.76)]	ø90 (3.54)
Feedrate	Rapid traverse	m/min (fpm)	X, Y, Z: 60 (196.86)	
	Cutting feedrate	mm/min (ipm)	X, Y, Z: 1 to 60,000 (0.04 to 2,362)	
Motors	Spindle (10 min/cont)	kW (hp)	26/18.5 (35/25) [12,000 min⁻¹: 33/26 (44/35)] [20,000 min⁻¹: 30/22 (40/30)]	33/26 (44/35)
	Feed axes	kW (hp)	X, Y, Z: 5.2 (6.9)	
	Table indexing	kW (hp)	3.0 (4.0) [3.5 (4.7)]	
ATC	Tool shank		MAS403 BT40 [CAT40, DIN40, HSK-A63]	MAS403 BT50 [CAT50, DIN50, HSK-A100]
	Pull stud		MAS2 [MAS1, CAT, DIN, JIS]	
	Magazine capacity	tools	48*2 [64]*2 [100]*3 [140, 180, 220, 260, 300, 340]*4	40*2 [60]*2 [80]*3 [90, 120, 150, 180, 210, 240]*4
	Max tool dia (w/ adjacent)	mm (in)	ø90 (ø3.54)	ø100 (ø3.94)
	Max tool dia (w/o adjacent)	mm (in)	ø170 (ø6.69)	
	Max tool length	mm (in)	510 (20.08)	
	Max tool weight	kg (lb)	12 (26.4)	15 (33)
	Tool selection		Memory random [fixed address]*5	
Machine Size	Height	mm (in)	2,885 (113.58)	
	Floor space; width × depth (RDF specs)*6	mm (in)	2,540 × 5,620 (100 × 221.26)	2,900 × 5,620 (114.17 × 221.26)
	Weight	kg (lb)	13,700 (30,140)	14,000 (30,800)
Controller			OSP-P500M	

*1. No. 50 spindle is optional *2. Disk magazine *3. Chain magazine *4. Matrix magazine *5. Chain and matrix magazine types use the fixed address
*6. With RDF drum filter lift-up chip conveyor [ ]: option

■ Standard Specifications

Spindle speed	15,000 min⁻¹, 26/18.5 kW (10 min/cont)	X-/Y-axis armored bellows	
ATC magazine capacity	48 tools	Hydraulic unit	
Spindlehead cooling system	Oil controller	Automatic 1° indexing table	
Centralized lubrication auto grease supply unit	Grease cartridge 700 ml, and with grease level and pressure warnings	2-pallet rotary-shuttle APC	Pallet top surface M16 tap
		Full enclosure shielding	Two-pallet pivoted type for APC
Coolant supply system	Tank 1,000 L (Effective: 710 L), pump 3.3/3.8 kW (50/60 Hz)	ATC operation panel	
		Work lamp	LED lamp
In-machine chip discharge	Hinge type chip conveyor	Status indicator	3 phase C type
Chip pan for above			Red (alarm), Yellow (end), Green (running)
ATC air blower (blast)		Foundation washers, jack bolts	
Chip air blower (blast)	Nozzle type	Tool release lever	
In-machine chip washer		Tapered bore cleaning bar	
Shower coolant 10 nozzles		Hand tools	
Below pallet washing		TAS-S	Thermo Active Stabilizer—Spindle
Air filter and oiler		TAS-C	Thermo Active Stabilizer—Construction

■ Optional Specifications
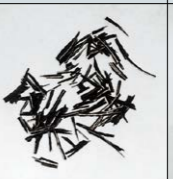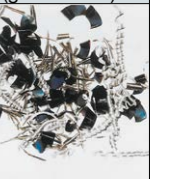
Spindle speeds	12,000 min⁻¹, 33/26 kW (10 min/cont)	Chip air blower (blast)	Adapter
* See P5 for details	20,000 min⁻¹, 30/22 kW (10 min/cont)	Sludgeless Tank	
Dual contact spindle*1	HSK, BIG-PLUS®	Off-machine chip discharge (lift-up chip conveyor types)	· Hinge
ATC magazine capacity (No. 40)	64 (disk magazine), 100 (chain)		· Scraper + drum filter
	140, 180, 220, 260, 300, 340	* See the table below for details	· Hinge + scraper + drum filter
	(matrix magazine)		Conveyor discharge heights; 800, 1,200 mm
ATC magazine capacity (No. 50)	60 (disk magazine), 80 (chain)	Chip buckets for above	Heights: 700 mm, 1,000 mm
	90, 120, 150, 180, 210, 240	Hydraulic oil cooler	
	(matrix magazine)	Coolant heater/cooler	
AbsoScale detection	X-Y-Z axes	Tool breakage detection	Auto tool length compensation included
Auto 0.001° indexing table	Built-in NC table		(touch sensor)
Auto pallet changer (APC)	6-P parallel shuttle, 12-P tower, FMS	In-magazine tool breakage detection	
Pallet top	T-slots, inch holes		
Spare pallets		Auto zero offset	Auto gauging (touch probe)
Edge locator		Tool life management	By cumulative operation timer, etc
Oil-hole coolant system	1.5 MPa	Pull stud bolt shape	MAS1, CAT, DIN, JIS
Thru-spindle coolant*2	1.5, 7.0 MPa; Large flow 1.5, 7.0 MPa	Standard T-column fixture	Height: 850 mm, Pitch:100 mm
Work wash gun		Standard square-column fixture	Height: 850 mm, Pitch:100 mm
Oil mist lubricator		Ball-screw cooler	X-Y-Z axis

*1. Be sure to select this specification when BIG-PLUS® holder is used.
*2. Okuma pull stud required with thru-spindle coolant.

■ Recommended chip conveyors
(Please contact an Okuma sales representative for details.)
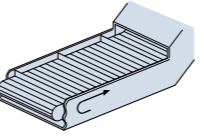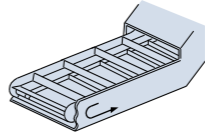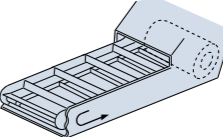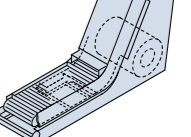
○ : Recommended   △ : Conditionally recommended

Workpiece material		Steel	FC	Aluminum / Non-ferrous metal	Mixed (general use)
Chip shape					
In-machine	Hinge type (Standard) *1	○	○	○	○
Off-machine chip discharge (option)	Hinge type	○	—	—	△ *2
	Scraper type	—	○ (Dry)	—	—
	Scraper type (with drum filter)	—	○ (Wet) with magnet	△ *3	—
	Hinge + scraper (with drum filter)	△ *4	△ (Wet) *5	○	○

*1. Scraper type (option) can be selected.
*2. When there are few fine chips   *3. When chips are shorter than 100 mm   *4. When there are many fine chips   *5. When chips are longer than 100 mm
* 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

Type	Hinge	Scraper	Scraper (with drum filter)	Hinge + scraper (with drum filter)*
Shape				

* This type will be selected when the Sludgeless Tank has been selected.

A next-generation CNC that makes manufacturing DX (digital transformation) a reality

OSP-P500

Improved productivity and stable production

As Your Single Source for M-E-I-K (Mechanics - Electronics - IT - Knowledge) merging technologies, Okuma offers this CNC to build an advanced "digital twin" that faithfully reproduces machine control and machining operations and creates new value. In addition, Okuma offers productivity improvement and stable production with ease of use that allows customers to use their machining know-how, an energy-saving solutions that achieve both high accuracy/productivity and eco-friendly products, with robust security protection against increasing threats of cyber attacks.

Faithful reproduction of machines and processing — Digital support for shop floor work
Digital Twin (option)

"Okuma's **two** digital twins" made possible by an office PC and a next-generation CNC reduce machine downtime and improve machine utilization

The same simulation can be run on the CNC of a real machine as well as on an office PC. When a problem occurs on the shop floor, it can be solved quickly on site without going back to the office.
The CNC control, data, and 3D models, the same as those on the real machine, are used to faithfully simulate a virtual machine and improve simulation accuracy.
Pre-verification can be conducted in a short time through super high-speed simulation.

15-inch operation panel

1 Digital Twin On PC [*1]
Simulate shop machines in the office

Front loading is performed with the actual status matched with the data on the office PC to further improve productivity.
Highly accurate pre-verification minimizes trial and error in first part machining, and reduces machine downtime to the minimum.

*1. The PC software is to be used with one package for one machine.

2 Digital Twin On Machine
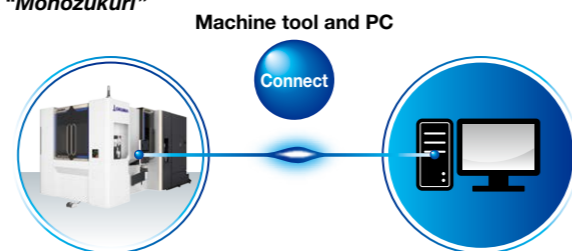#### Simulating the CNC of a real machine

Super-fast and super-accurate machining simulations are performed with the CNC of a real machine on-site to minimize machining preparation work. Actual machining can be started immediately, greatly improving the operating rate of the machine.

Front loading
Reducing work on the physical machine to increase the operating rate

Verification of setup
Verifying the setup status in a virtual space on the machine

Using the results confirmed by the office simulator on the actual machine

Virtual space

IIoT gets the latest machine data

Virtual space

Real space

Information check, actual machining by simulator

Actual machining

Using the latest machine data in the office simulators

Note: The screens above are examples of the Collision Avoidance System (option).

Connect Plan

Get Connected, **G**et Started, and **G**et Innovative with Okuma "*Monozukuri*"

Connect, Visualize, Improve

Okuma's Connect Plan is a system that provides analytics for improved utilization by connecting machine tools and visual control of factory operation results and machining records. Simply connect the OSP and a PC and install Connect Plan on the PC to see the machine operation status from the shop floor, from an office, from anywhere. The Connect Plan is an ideal solution for customers trying to raise their machine utilization.

Machine tool and PC

Connect

■ A next-generation CNC OSP-P500M 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 command	±99999.999 mm, ±9999.9999° 8-digit decimal, command units: 0.001 mm, 0.01 mm, 1 mm, 0.0001°, 0.001°, 1°
	Feed	Cutting feed override: 0 to 200%
	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
	Security	Operator authentication, Lock screen, OSP-VPSII-STD
Programming	Program capacity	Program storage capacity: 4 GB; operation buffer: 2 MB
	Program operations	Scheduled program, fixed cycle, G-/M-code macros, arithmetic, logic statements, math functions, variables, branch commands, coordinate calculate, area machining, coordinate convert, programming help, user task, keyway cycle
Operations	OSP suite	"suite apps" to graphically visualize and digitize information needed on the shop floor, "suite operation" enable 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
	MacMan plus	Machining management: aggregation and display of machining records, operating records and problem information, visualization of power consumption, file output
	Machine operations	Operation help, load meter, alarm help, sequence return, manual interrupt/auto return, pulse handle overlap, parameter I/O, PLC monitor
Communications / Networking		USB (2 ports), Ethernet, DNC-T1, Smart I/F
High speed/accuracy specs		Thermo Active Stabilizer—Spindle (TAS-S), Thermo Active Stabilizer—Construction (TAS-C), Hi-Cut Pro, pitch error compensation, Hi-G control, SERVONAVI, Cycle time reduction (operation/machining time reduction, easy parameter setting)
Energy-saving	ECO suite plus	ECO Idling Stop, ECO Operation, oil temperature controller auto control, ECO Power Monitor
	Power Regeneration System	Regenerative power is used when the spindle and feed axes decelerate to reduce energy waste.

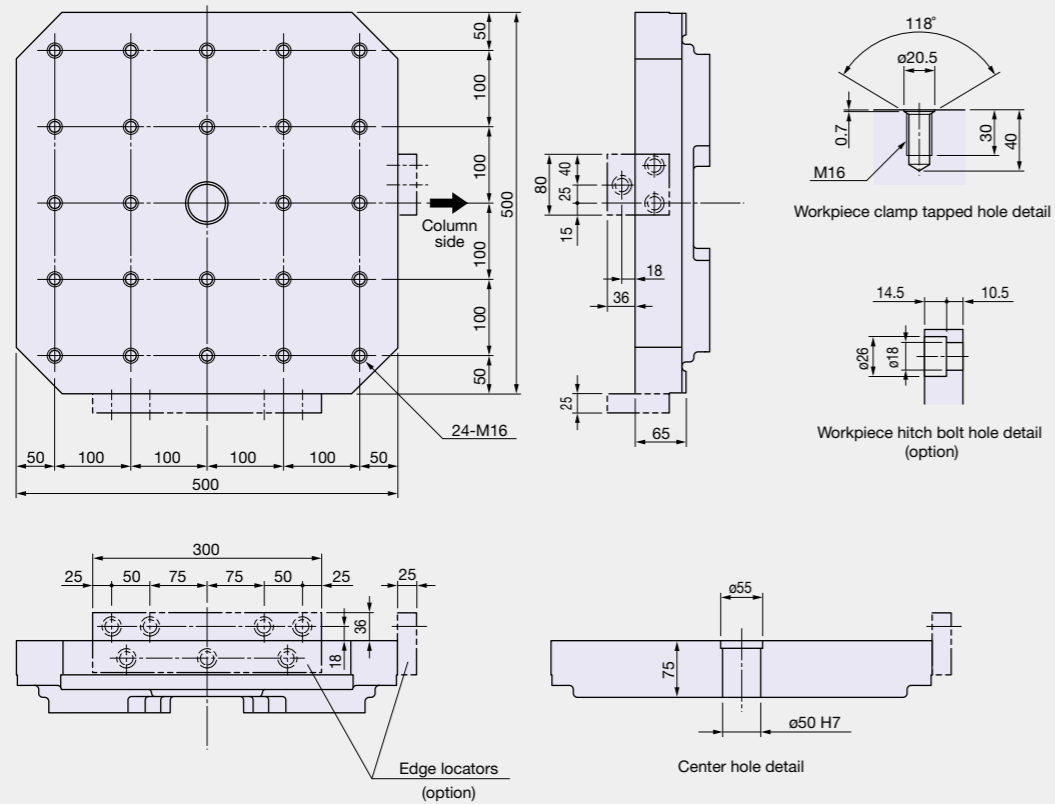## ■ A next-generation OSP-P500M optional specifications

Item / Kit Specs	NML E	NML D	AOT E	AOT D	DT E	DT D	DT AOT E	DT AOT D
Digital Twin								
Virtual Machining					● (VE)	● (VD)	● (VE)	● (VD)
Quick Modeling					● (VE)	● (VD)	● (VE)	● (VD)
OPC UA for Machine Tools					●	●	●	●
OSP API KIT					●	●	●	●
Interactive functions								
Advanced One-Touch IGF-M (w/ Real 3-D simulation)			●	●			●	●
Interactive MAP (I-MAP)			●	●			●	
Smart OSP Operation			●	●	●	●	●	●
Programming								
Operation buffer 10MB	●	●	●	●	●	●	●	●
Program notes (MSG)	●	●	●	●	●	●	●	●
Auto scheduled program update	●	●	●	●	●	●	●	●
Block skip; 9 sets								
Program branch; 9 sets								
Coordinate system select (Std: 20 sets) — 100 sets	●		●		●		●	
— 200 sets		●		●		●		●
— 400 sets								
Helical cutting	●	●	●	●	●	●	●	●
3-D circular interpolation								
Skip								
Synchronized Tapping II	●	●	●	●	●	●	●	●
Arbitrary angle chamfering	●	●	●	●	●	●	●	●
Cylindrical side facing								
Tool max rotational speed setting								
F1-digit feed — External switch type, parameter type								
Programmable travel limits (G22, G23)	●	●	●	●	●	●	●	●
Slope machining — Type I, Type II								
Axis name designation								
Fixture offset II								
Dynamic fixture offset								
Tool grooving								
Turn-Cut								
Dynamic Tool Load Control								
3-D tool compensation								
Drawing conversion — Programmable mirror image (G62)	●		●		●		●	
— Enlarge/reduce (G50, G51)	●		●		●		●	
User task — Common variables 1,000, 2,000 pcs								
— G-code macros: 80 sets added								
— I/O variables (16 each)								
Sequence stop	●	●	●	●	●	●	●	●
Sequence return — Mid-block sequence return		●		●		●		●
Tool wear compensation — Includes input restriction	●	●	●	●	●	●	●	●
Tool life management — Includes warning	●	●	●	●	●	●	●	●
External I/O communication								
RS-232C connector								
DNC connection — DNC-T3, DNC-B, DNC-DT								
— DNC-C/Ethernet								

Item / Kit Specs	NML E	NML D	AOT E	AOT D	DT E	DT D	DT AOT E	DT AOT D
Gauging								
Auto tool length offset/breakage detection								
In-magazine tool breakage detection								
Auto Workpiece Gauging/Auto zero offset								
Manual gauging (w/o sensor)	●	●	●	●	●	●	●	●
Interactive gauging (touch sensor, touch probe required)	●	●	●	●	●	●	●	●
Monitoring								
21.5-inch color LCD operation panel with adjustable-tilt keyboard								
One-Touch Spreadsheet								
Collision Avoidance System								
Real 3-D Simulation					●	●	●	●
Simple load monitor — Spindle overload monitor	●	●	●	●	●	●	●	●
NC operation monitor — Hour meter, workpiece counter	●	●	●	●	●	●	●	●
Status indicator								
Operation end buzzer								
Workpiece counters on machine								
Tool breakage no-load detection		●		●		●		●
MOP-TOOL — Adaptive control, overload monitor								
AI machine diagnostics * — Spindle/feed axes, or feed axes only								
Machine Status Logger								
Cutting Status Monitor								
Machining Navi M-*i*, M-*g*II+(cutting condition search)								
Feed axis retraction								
Tool retract cycle								
Automation / unattended operation								
Auto power shut-off — M02 and END alarms, work preps done → OFF	●	●	●	●	●	●	●	●
Warm-up (calendar timer)								
External program — Button, rotary switch								
— Digital switch, BCD (2-digit, 4-digit)								
Pallet pool control (PPC) (Required for multi-pallet APC)								
Connection with automated devices — Robot, loader I/F								
— Stacker crane I/F								
— FMS link I/F								
High-speed, high-precision								
AbsoScale detection — X-Y-Z axes								
Dynamic displacement compensation	●	●	●	●	●	●	●	●
0.1 µm control (linear axis commands)								
Hyper-SurfaceII — 3 linear axes, 3 linear axes + 2 rotary axes								
ECO suite plus								
ECO Power Monitor — On-machine wattmeter								
Spindle Power Peak Limiter								
Energy-saving hydraulic unit — ECO Hydraulics								
External output interface of consumed electricity								
Other								
Circuit breaker								
OSP-VPSII (Virus Protection System)								
Pulse handles — 2 pcs, 3 pcs								
External M codes [4 sets, 8 sets]								

Note: NML: Normal kit, AOT: Advanced One-Touch IGF-M kit, DT: Digital Twin kit,
DT AOT: Digital Twin Advanced One-Touch IGF-M kit, E: Economy, D: Deluxe
VE and VD kits are also equipped with the Digital Twin on PC function, allowing running from a PC.
* With AbsoScale detection specs, ball screw wear detection is possible.
Specifications, etc. are subject to change without notice.

■ Pallet dimensions

Metric tap pallet

118°
ø20.5
M16
0.7
30
40

Workpiece clamp tapped hole detail

14.5 10.5
ø26 ø18

Workpiece hitch bolt hole detail (option)

50 100 100 100 100 50
500
24-M16

Column side
80 40 25 15
18 36
25 65

ø55
75
ø50 H7

Center hole detail

300
25 50 75 75 50 25 25
36 18

Edge locators (option)

50

■ Working range

Unit: mm

X-axis travel: 760 mm
Y-axis travel: 760 mm
Z-axis travel: 810 mm

Z-axis travel 810
100
X-axis travel 760
Y-axis travel 760
810 [780]
50 [20]
Pallet top
Area A
160
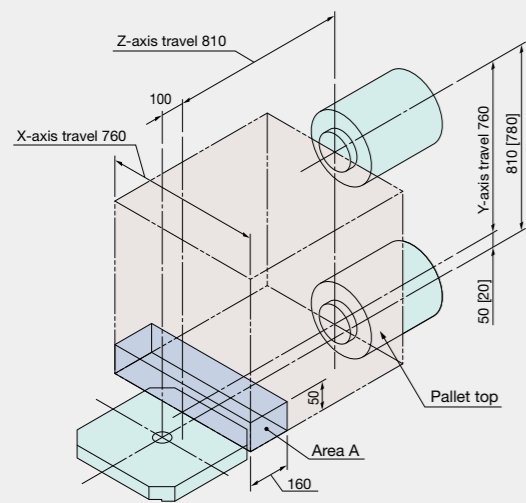
[ ]: T-slot pallets
Note: The machine should be operated with caution and with reference to the following interference areas described below.
Area A: Spindlehead interference
● 160 × 50 mm when the B-axis is 0, 90, 270, or 360 degrees.
● 160 × 50 mm or larger when the B-axis is other than 0, 90, 270, or 360 degrees.
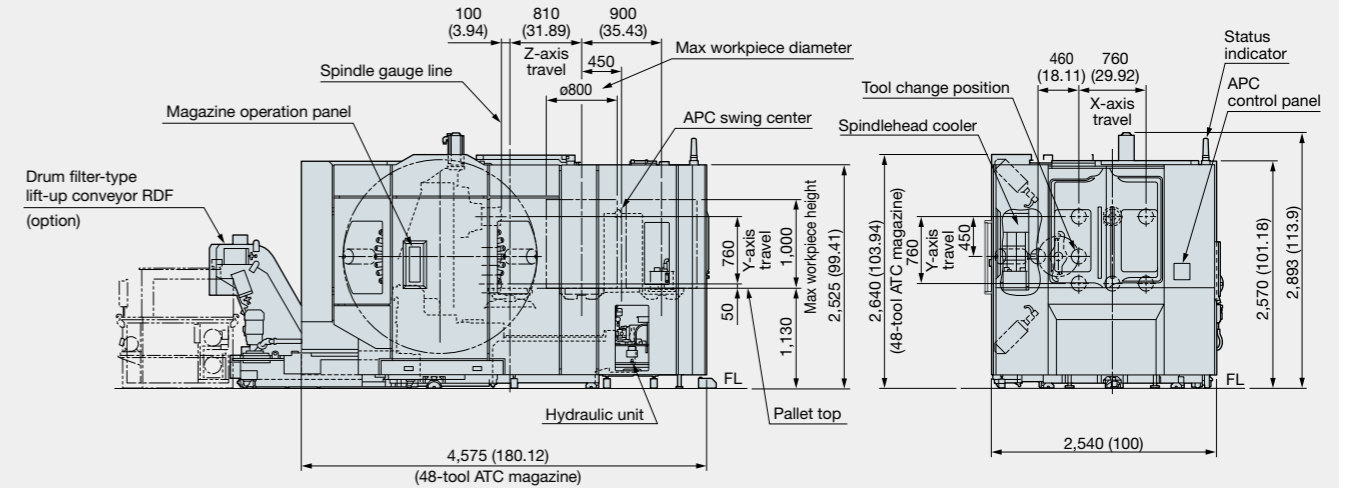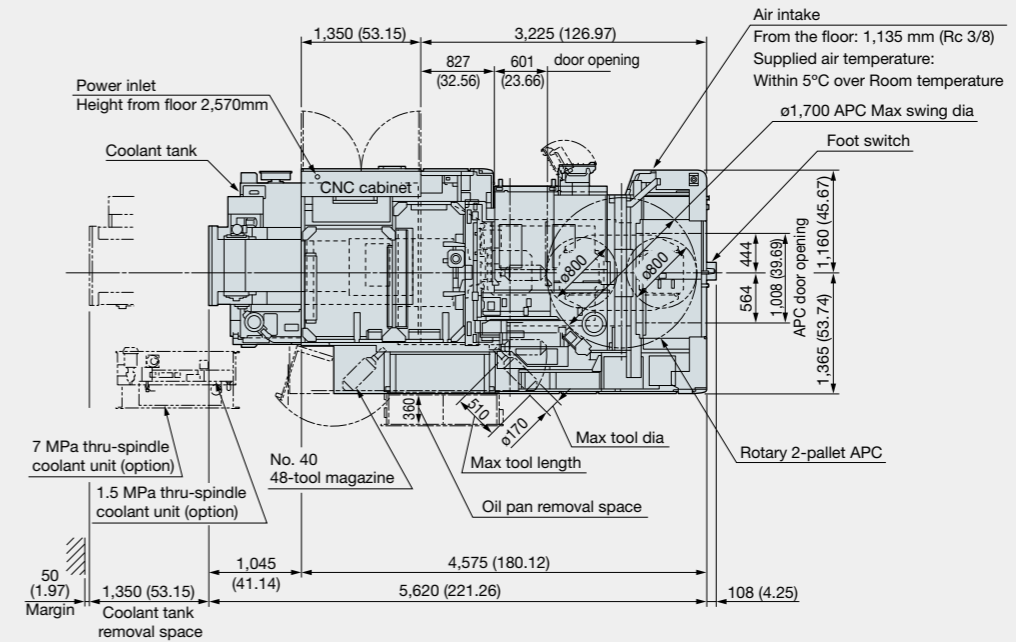
■ Maximum workpiece dimensions

Unit: mm

2-pallet rotary-shuttle APC specification

Max. diameter ø800
Z-axis travel 810
X-axis travel 760
100
Max hight 1,000
Y-axis travel 760
810 [780]
50 [20]
Spindle center
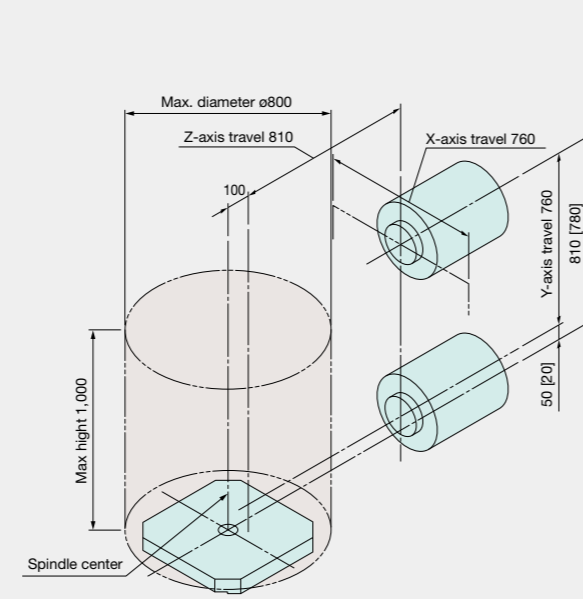
[ ]: T-slot pallets

Note: The minus Z and Y-axis limit area is a spindle / pallet interference zone.

MB-5000HII
Dimensional and Installation Drawings (No. 40 Spindle)

1,350 (53.15) 3,225 (126.97)
827 (32.56) 601 (23.66) door opening
Air intake
From the floor: 1,135 mm (Rc 3/8)
Supplied air temperature:
Within 5°C over Room temperature
ø1,700 APC Max swing dia
Power inlet
Height from floor 2,570mm
Foot switch
Coolant tank
CNC cabinet
ø800 ø800
564 444 1,008 (39.69) 1,160 (45.67)
1,365 (53.74) APC door opening
7 MPa thru-spindle coolant unit (option)
1.5 MPa thru-spindle coolant unit (option)
No. 40 48-tool magazine
360 510 ø170
Max tool dia
Max tool length
Oil pan removal space
Rotary 2-pallet APC
50 (1.97)
Margin
1,350 (53.15)
1,045 (41.14)
4,575 (180.12)
5,620 (221.26)
108 (4.25)
Coolant tank removal space

100 (3.94) 810 (31.89) 900 (35.43)
Z-axis travel 450
Max workpiece diameter
Spindle gauge line
ø800
460 (18.11) 760 (29.92)
X-axis travel
Status indicator
APC control panel
Magazine operation panel
APC swing center
Tool change position
Spindlehead cooler
Drum filter-type lift-up conveyor RDF (option)
760 Y-axis travel 1,000
Max workpiece height
50 1,130 2,525 (99.41)
2,640 (103.94) (48-tool ATC magazine)
760 Y-axis travel 450
2,570 (101.18) 2,893 (113.9)
Hydraulic unit
Pallet top
FL FL
4,575 (180.12) (48-tool ATC magazine)
2,540 (100)

Unit: mm (in)

When using Okuma products, always read the safety precautions
mentioned in the instruction manual and attached to the product.

OKUMA

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