OKUMA

MA-8000H
Horizontal Machining Center

MA-8000H
Horizontal Machining Center

Intelligent Technology

Thermo-Friendly Concept

Collision Avoidance System

Machining Navi

SᴇʀᴠᴏNᴀᴠɪ

For greater productivity of large parts with outstanding machining capacity and incredible reliability

Increased machining capacity with a powerful 10,000 min⁻¹ spindle (option)

- 10,000 min⁻¹ No. 50 spindle machining capacity: 1,157 cm³/min (S45C)
  1,389 cm³/min (FCD450)

Higher floor space productivity* with larger work envelope

- X-axis travel: 1,400 mm (longer than previous machine)
- Y-axis travel: 1,200 mm (longer than previous machine)
- Z-axis travel: 1,350 mm (longer than previous machine)

* Area productivity: Ratio of required machine floor area to processing area

Outstanding dimensional stability even for long-run machining of large workpieces

- The Thermo-Friendly Concept minimizes dimensional changes due to ambient temperature changes and machining heat.
  Achieves outstanding dimensional stability even during long-run machining.

Contributing to the realization of a decarbonized society by achieving high productivity and high precision, together with environmental friendliness

- Thermo-Friendly Concept and ECO suite plus, an energy-system that meets the needs of a decarbonized society, autonomously achieve both stability of dimensional accuracy and energy consumption reduction.

An operator-friendly machine design

- Daily inspection equipment is placed behind the machine for shortest front accessibility and operator workflow to improved operator efficiency.

Chip discharge that maximizes uptime

- Effective workspace area washing suppresses chip accumulation and reduces frequent chip cleaning inside the machine.

"Sludgeless Tank" enhances stable operations (recommended option)

- The Sludgeless Tank removes coolant impurities (sludge) that affect machining effectiveness—drastically reducing troublesome tank cleaning.

Automation support to further improve productivity

- Flexible support for automation; multi-pallet APC systems effective hydraulic/pneumatic fixture port arrangements
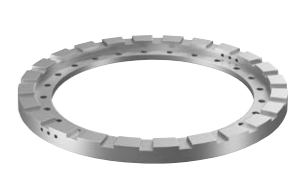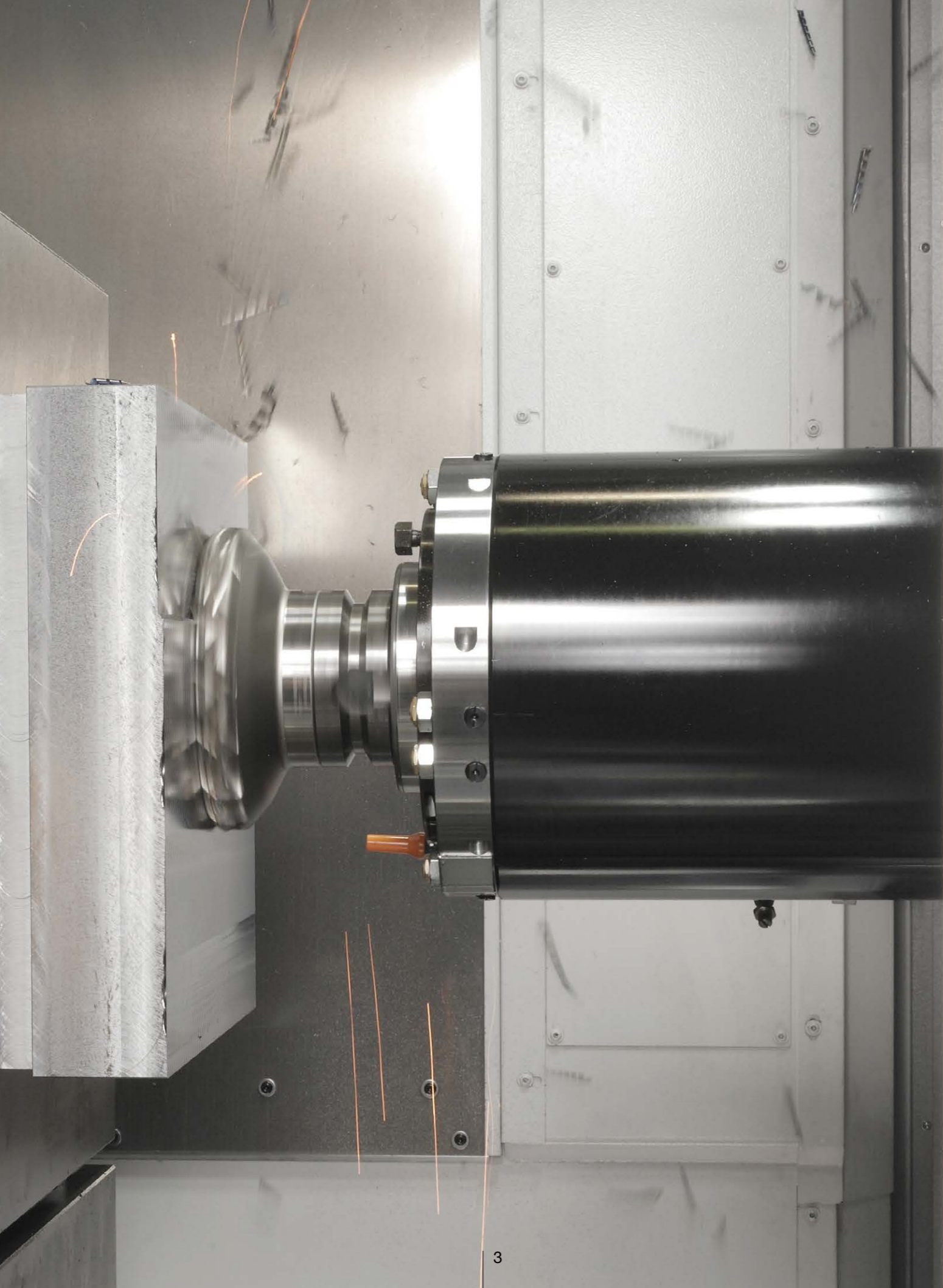
Increased machining capacity with a powerful 10,000 min⁻¹ spindle (option)

| Lineup with powerful spindle: 10,000 min⁻¹ (option)

Delivering high machining capacity across a wide range of low to high speeds. Effectively handles a wide range of workpieces from heavy-duty cutting of steel to aluminum machining.

■ Handling a wide range of applications from heavy-duty to high-feed machining
Powerful spindle 10,000 min⁻¹ No. 50 (option)

- Max output: **45/30 kW** (20 min, 60% ED/cont)
- Max torque: **652/349 N-m** (15% ED/cont)
- Machining capacity:
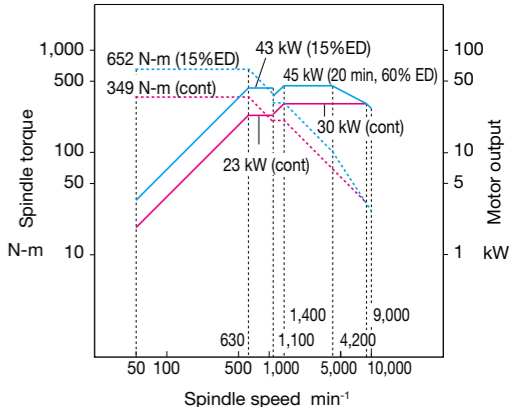
Material: S45C   Actual data

● Milling capacity

1,157 cm³/min (S45C)

Tool:	ø160 mm face mill
	16 blades (carbide)
Spindle speed:	597 min⁻¹
Cutting Speed:	300 m/min
Feed rates:	3,826 mm/min
Cut width × depth:	112 mm × 2.7 mm
(Cut position: 741 mm from pallet top)	

● End milling capacity

632 cm³/min (S45C)

Tool:	ø50 mm end mill
	4 blades (carbide)
Spindle speed:	1,318 min⁻¹
Cutting Speed:	207 m/min
Feed rates:	1,581 mm/min
Cut width × depth:	10 mm × 40 mm
(Cut position: 776 mm from pallet top)	

Material: FCD450   Actual data

● Milling capacity

1,389 cm³/min (FCD450)

Tool:	ø160 mm face mill
	16 blades (carbide)
Spindle speed:	497 min⁻¹
Cutting Speed:	250 m/min
Feed rates:	3,180 mm/min
Cut width × depth:	112 mm × 3.9 mm
(Cut position: 742 mm from pallet top)	

● End milling capacity

1,000 cm³/min (FCD450)

|	
Tool:	ø80 mm end mill
	4 blades (carbide)
Spindle speed:	980 min⁻¹
Cutting Speed:	246 m/min
Feed rates:	980 mm/min
Cut width × depth:	17 mm × 60 mm
(Cut position: 794 mm from pallet top)	

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.

■ Spindle variations

■ Mainly for steel workpieces

Standard spindle No. 50

- Spindle speed: 6,000 min⁻¹
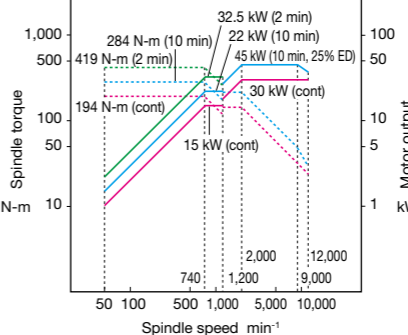- Max output: 30/22 kW (10 min/cont)
- Max torque: 606/349 N-m (10 min/cont)
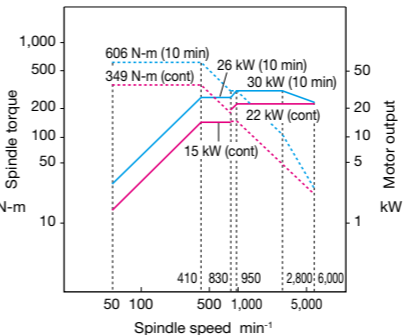
■ Machines materials from aluminum to steel

Wide-range spindle No. 50 (option)
Max output: 45 kW
(1.2 times more than previous model)

- Spindle speed: 12,000 min⁻¹
- Max output: 45/30 kW (10 min, 25% ED/cont)
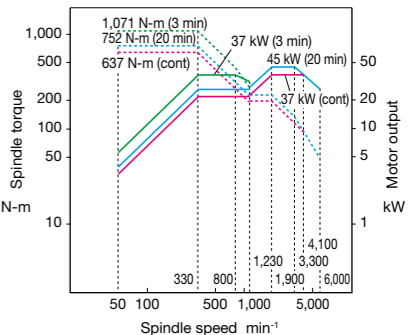- Max torque: 419/194 N-m (2 min/cont)

■ Machines inconel, titanium and other difficult-to-cut materials

High-torque spindle No. 50 (option)
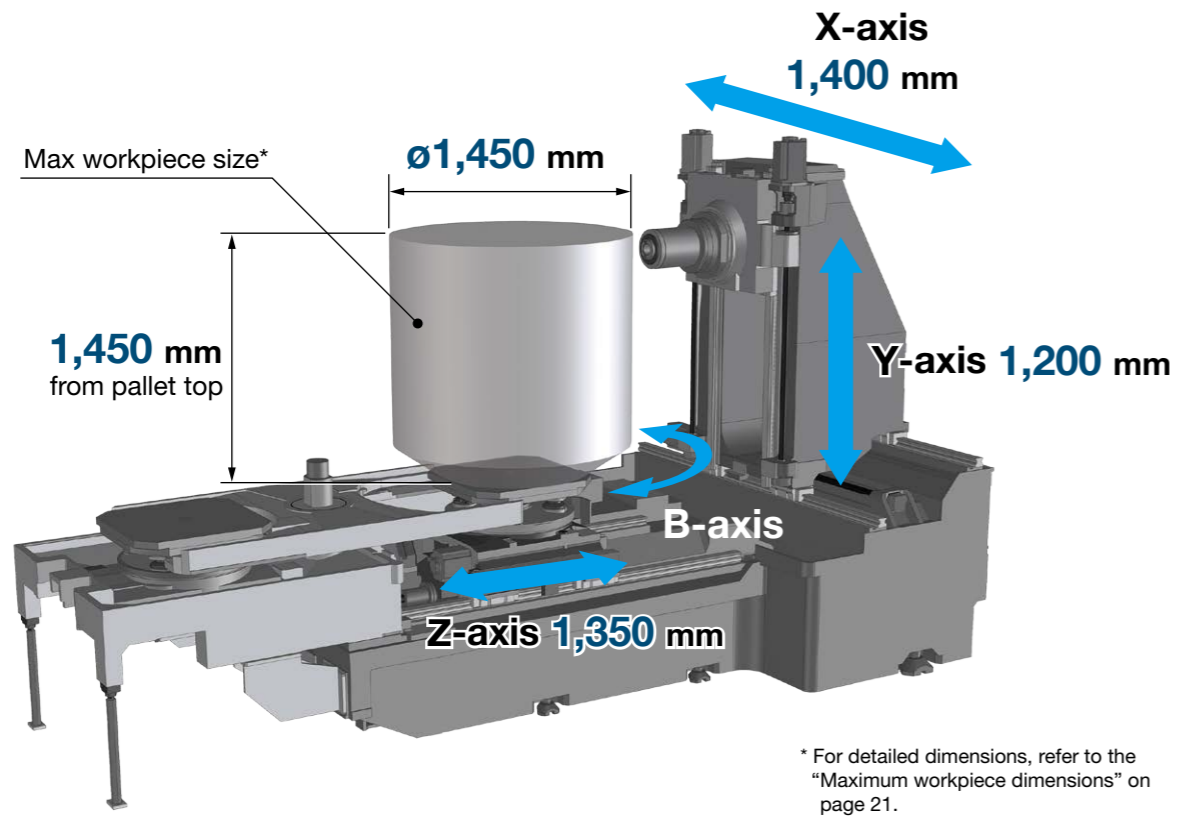**Max torque: 1,071 N-m**
(heavy-duty cutting)

- Spindle speed: 6,000 min⁻¹
- Max output: 45/37 kW (20 min/cont)
- Max torque: 1,071/637 N-m (3 min/cont)

Higher floor space productivity with larger work envelope

Optimal travels for the large parts applications

With longer X-, Y-, and Z-axis travels, a wider range of applications can be handled.

X-axis
1,400 mm

Max workpiece size*

ø**1,450** mm

1,450 mm
from pallet top

Y-axis **1,200** mm

B-axis

Z-axis **1,350** mm

* For detailed dimensions, refer to the "Maximum workpiece dimensions" on page 21.

■ Larger work envelope

- X-axis travel: **1,400** mm (longer than previous machine)
- Y-axis travel: **1,200** mm (longer than previous machine)
- Z-axis travel: **1,350** mm (longer than previous machine)

■ Load capacity

3,000 kg (option) (more than previous machine)

■ Max workpiece size

ø**1,450 × 1,450** mm

■ Max tool length

800 mm (option)

■ High speed operations

- Rapid traverse: 50 m/min (X-, Y-, Z-axis)
- Tool change: 2.0 sec (T-T)*1
        4.3 sec (CTC min)*2
- Pallet change time: 17.5 sec*1
        18.3 sec*2
- Table indexing time: 1.9 sec*3/90°   1 degree indexing

*1. MAS standard measurements (formerly JIS B 6013)
*2. ISO 10791-9 (2001) (JIS B 6336-9) measurements
*3. At low inertia

# Outstanding dimensional stability even for long-run machining of large workpieces

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

■ 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
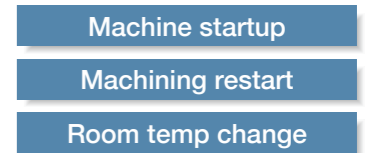
High dimensional stability

■ 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.

Machine is structurally designed to achieve outstanding accuracy

● Highly rigid 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-Y-Z axes ball-screw cooling and motor bracket cooling are standard. Assuring stable accuracy during high rates of operation.

● Indexing table and pallet
Highly accurate indexing table
  • Standard: Curvic coupling (1 degree indexing)
  • Optional: NC (0.001 degree indexing)
The pallet seating on a tapered cone achieves highly accurate positioning and excellent durability.

■ The exactness of bi-directional positioning
(MA-8000H AbsoScale actual data)
- X-axis (travel: 1,400 mm)   **3.0 µm**
- Y-axis (travel: 1,200 mm)   **3.4 µm**
- Z-axis (travel: 1,350 mm)   **2.3 µm**

■ Bi-directional repeatability
(MA-8000H AbsoScale actual data)
- X-axis (travel: 1,400 mm)   **2.4 µm**
- Y-axis (travel: 1,200 mm)   **2.8 µm**
- Z-axis (travel: 1,350 mm)   **1.6 µm**

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.

Contributing to the realization of a decarbonized society by achieving high productivity and high precision, together with environmental friendliness

## 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.
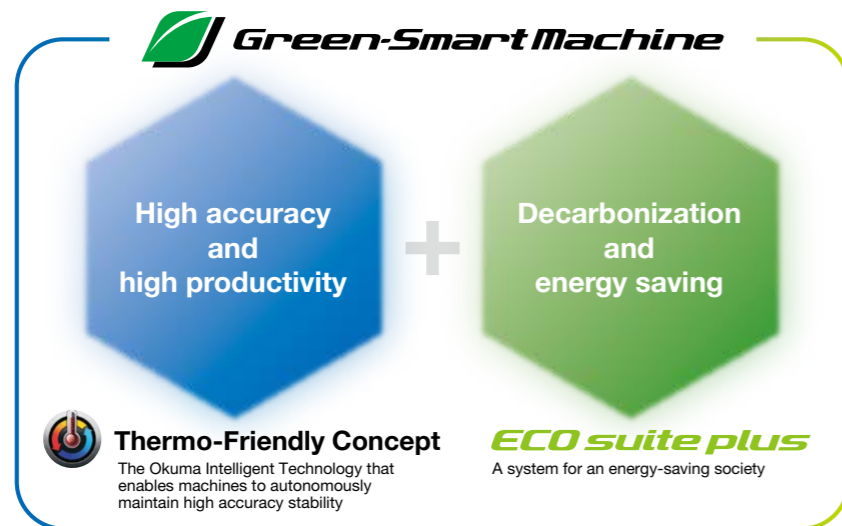
Green-Smart Machine

High accuracy and high productivity

+

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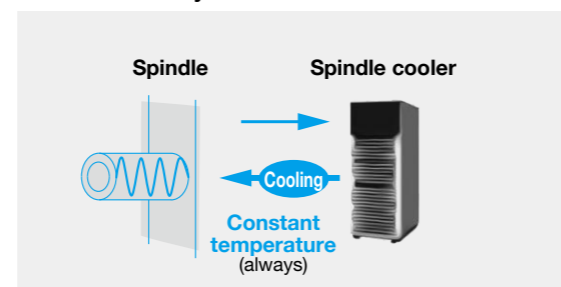
By always setting a constant coolant supply temperature, the cooler power consumption is reduced.

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.

■ 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.

■ 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

1 Check carbon dioxide emissions on the spot

With ECO suite plus, you can also check the power consumption of each device.
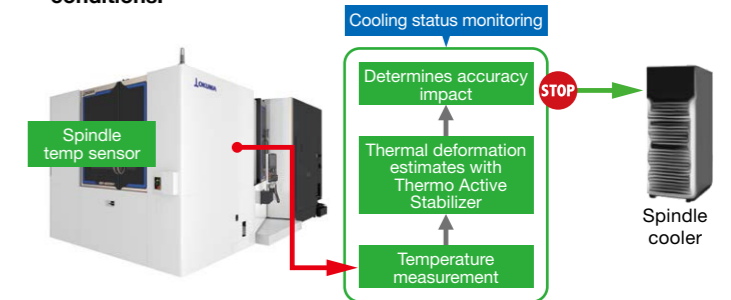

2 Simultaneously records operating status and carbon dioxide emissions

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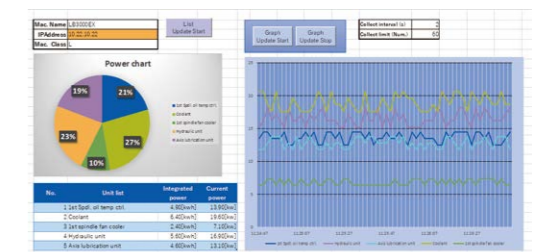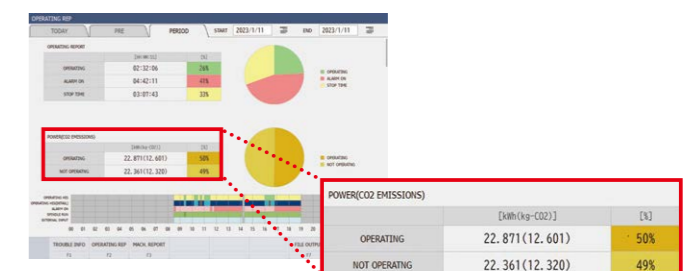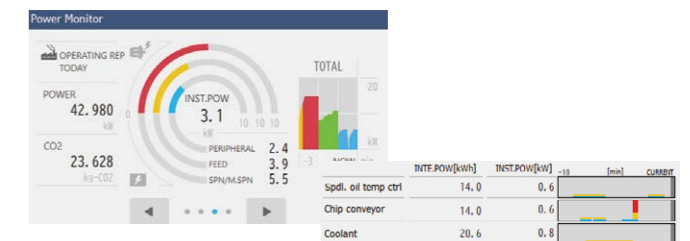

3 Analyze carbon dioxide emissions and improve machine tool operation

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.

An operator-friendly machine design

Good machine access and better work efficiency

■ Improved setup station operator efficiency
■ Wider APC door opening width
● More efficient setups for maximum-size parts

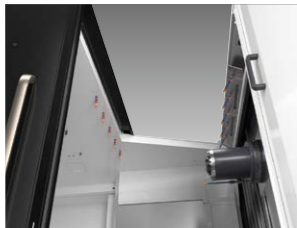Max workpiece dia ø1,450 mm

Open 1,700 mm
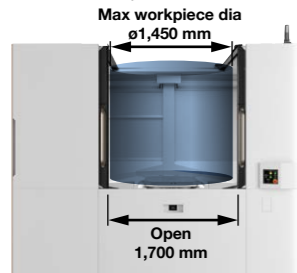
■ Open ceiling for both setup station and workspace area (with door open)
● Easy part load/unload by crane
● Lighting is good, and coolant doesn't drop in the workspace area
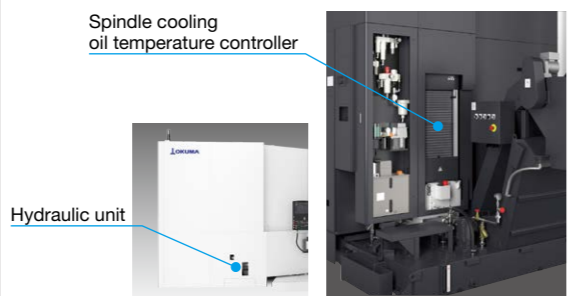

Setup station

Workspace area

■ Maintenance improved by grouping daily inspection equipment behind the machine
■ Hydraulic unit is located on the operation side and daily check points are located at the rear of machine.
● Operator efficiency also improved with shortest workflow

Spindle cooling oil temperature controller

Hydraulic unit

■ Good accessibility to the spindle and workpiece
● 520 mm from tool load/unload button to spindle

Tool L/U btn

■ Space around the machine— operator preference steps available
● Easy to move around the machine, and a wide 700 mm steps (option) is available
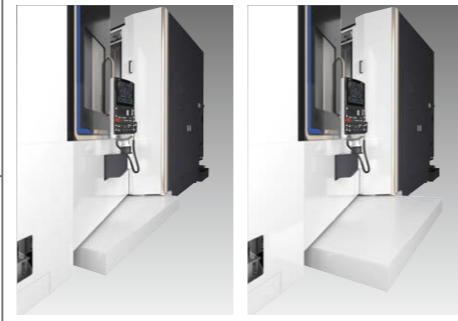
220 mm (standard)   700 mm (option)

■ Operation panel mounted on the left   Swivel movement improves visibility and workability
● Workpiece and operation screen XYZ directions are the same
● Operator can be close to the screen, for less fatigue
● Operation panel moves horizontally toward spindle

The angle can be adjusted
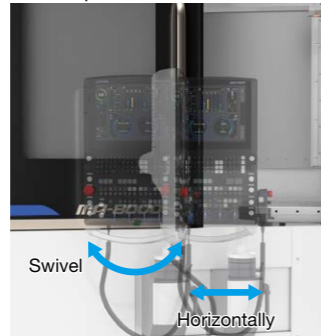
Swivel

Horizontally

■ In-machine steps (standard) improve in-machine operator efficiency
● Steps move with table and stationary step at workspace area entrance
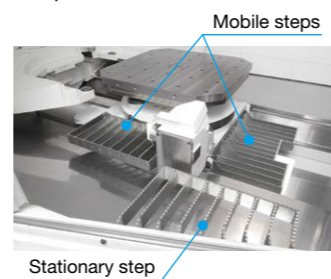
Mobile steps

Stationary step

Chip discharge that maximizes uptime

With simple workspace covering and reinforced coolant applications, efficient chip discharge and long-run machining possible

Just Z-axis travel single cover and a smooth X-, Y-axis telescopic covers suppress chip accumulation.
Moreover, in dry machining without coolant, washing only the lower workspace area with coolant is possible.
In-machine washing prevents likely areas of chip accumulation, by cleaning away chips to maintain long-run production runs.

■ Chip discharge and workspace area designed to prevent chip accumulation

Stronger workspace lower area with large-volume coolant wash and hinge conveyor smoothly removes accumulated chips out of the machine.

From the upper area of the workspace, a shower coolant system (option) and coolant from the X-, Y-axis telescopic covers suppress chip accumulation.

Preventing chip accumulation with smooth X-, Y-axis telescopic covers and Z-axis stainless steel single cover.

Flat covers in the workspace prevent chip accumulation.

Center trough design enhances large amount of chip discharge out of the machine.

Z-axis stainless steel single cover   X-, Y-axis telescopic covers

■ Out-of-machine chip discharge
Optional a lift-up chip conveyor that discharges chips to the outside of the machine, and a Sludgeless Tank (recommended option) that efficiently removes sludge are available.
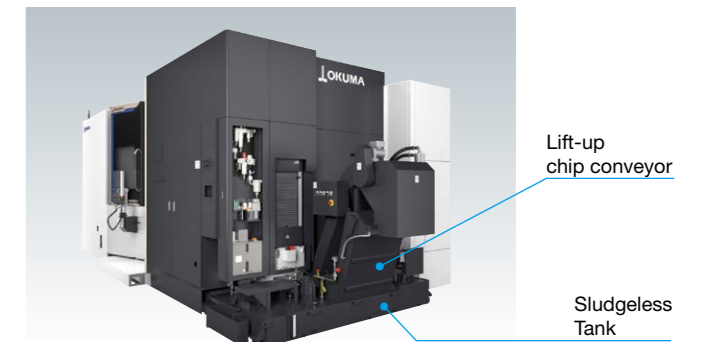
Lift-up chip conveyor

Sludgeless Tank

"Sludgeless Tank" enhances stable operations
(recommended option)

> **The number of troublesome coolant tank cleaning operations is significantly reduced, improving productivity.**
> **Furthermore, environmental impact due to coolant disposal is also reduced.**

It is important to remove impurities (sludge) contained in the coolant for the stable operation of the machine, and coolant tank cleaning is indispensable.

The Sludgeless Tank (recommended option) efficiently collects sludge and reduces defects caused by coolant containing sludge, such as scratches on machined surfaces and trouble with cutting tools. Sludge accumulation in the tank is suppressed, which also drastically reduces the frequency of troublesome tank cleaning and enables stable operation over long hours. In addition, the frequency of coolant replacement can be greatly reduced, which also reduces the environmental impact of coolant disposal. Coolant supplied with thru-spindle coolant specifications uses a bag filter to collect even finer sludge and improve machined surface quality.

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: It is necessary to select a chip conveyor with hinges + scraper (with drum filter) if the Sludgeless Tank option is chosen.

② Secondary filtration Cyclone filter

Bag filter

① Primary filtration Drum filter for lift-up chip conveyor

Clean coolant flows to the spindle

Bag filter

Sludgeless Tank

Sludge removal rate **99%**

② Secondary filtration Cyclone filter

① Primary filtration Drum filter for lift-up chip conveyor

Coolant flow

■ Keeping spindle tapers clean

The three filtration devices in the Sludgeless Tank and coolant suction inside the spindle reduce dirt on the spindle taper and lessen defective machining.

Note: Suction of coolant from the spindle also limits the outflow of coolant to the spindle taper when changing tools.

■ Compact—integrated with the thru-spindle coolant tank

The thru-spindle coolant tank is integrated for space-saving installation.

Lift-up chip conveyor (option)

Integrated with thru-spindle coolant tank
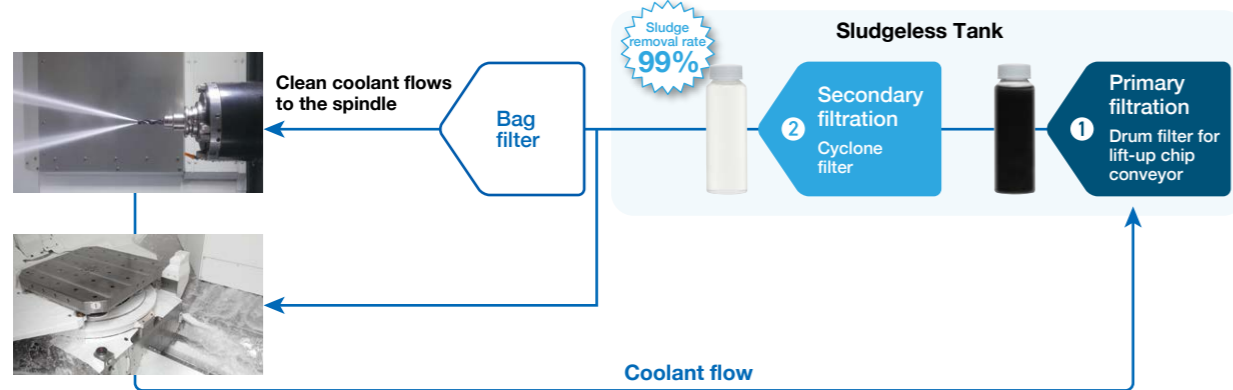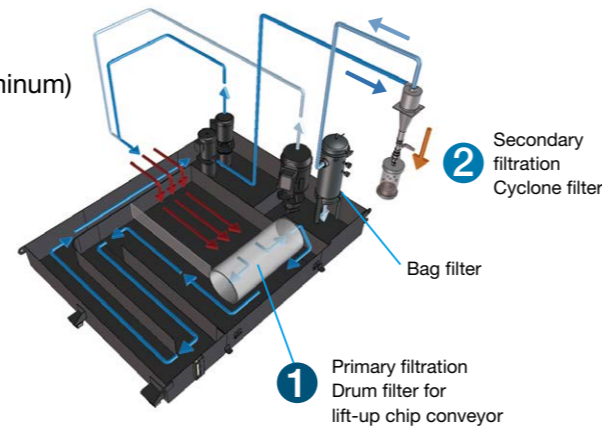
Automation support to further improve productivity

> **Flexible automation support**

■ Equipped with a large number of thru-pallet fixture ports (option)

The setup station pallet base can be equipped with up to 16 fixture ports for hydraulic and pneumatic pressure, and the workspace area table base can have up to 8 ports for flexible automation applications. Simplifying complex hydraulic circuits is possible, making it easier to design auto-clamp fixtures. Customers benefit from more agile system building to handle diverse automation requirements.

Setup station

Max **16** ports (hyd/pneu)[1, 2]
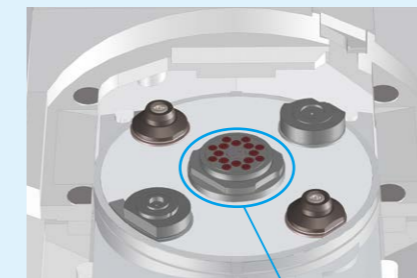
16 ports

For the setup station 16 ports preps

With 16 ports, arrangements for robotic and automation applications will be expanded, and more flexible fixture support will be possible. With 16 ports, a large number of parts can be mounted, and a different workpiece can be clamped on each side of a 4-sided tooling block fixture.

[1]. 8 or 16 ports available. (for 16 ports, max 12 hydraulic ports)
[2]. Hydraulic pressure: 7 MPa.

Workspace area (in machine)

Part load/unload[1]: Max **7** ports[3]
Workholding clamps[2]: Max **8** ports[3]

7 or 8 ports
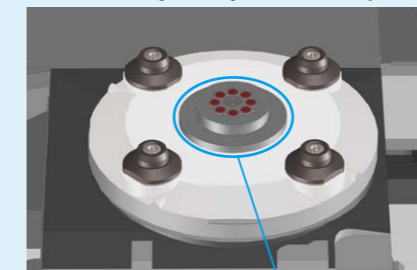
Part load/unload in workspace area (table) also possible

"Part load/unload" fixture ports also allow part load/unload in the workspace area in the machine. Adjustment times for trial cuts can be shortened and fixture readjustments in the workspace improve work efficiency. With more ports, hydraulic applications have increased, eliminating complicated hydraulic circuits arrangements.

[1]. For part load/unload in the workspace area, **select part load/unload.**
[2]. If the above is not required, **select workholding clamps.**
[3]. Hydraulic pressure: 7 MPa.

Example of robotic automation

■ Auto Setup Station Pallet Rotate (option)

This feature automatically rotates the setup station pallet in 90° increments by stepping on the foot switch. Operator efficiency has been improved, and robotic part load/unload can be done from multiple fixtures.

Flexible production of large-variety workpiece applications

An impressive lineup of automation systems

■ Flexible APC systems

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
- Pallet change time is the same as in the standard APC
- Can be adapted to match plant layout and type of production

6-pallet APC

10-pallet APC

4,128 mm

7,228 mm
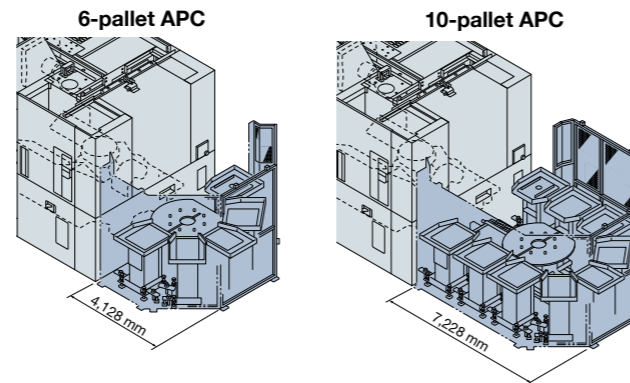
■ Auto tool changer

The standard number of tools that can be stored is 60. 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 magazine capacity	Magazine type	ATC tool		
		Max diameter		Maximum length, mass, moment
		w/adjacent	w/o adjacent	
40 tools, 60 tools (standard)	Chain magazine	ø140 mm	ø240 mm	Max length 600 [800] mm
81 tools, 111 tools, 141 tools, 171 tools	Matrix magazine (171-tool cabinet)	ø105 mm (standard)	ø240 mm (large size)	Max mass 25 kg
195 tools, 225 tools, 255 tools, 285 tools	Matrix magazine (285-tool cabinet)	ø130 mm (mid-size)		Mass moment 36.75 N-m
320 tools, 400 tools	Multiple magazine	ø135 mm	ø240 mm	

[   ]: Option

Matrix system ATC magazine (option)

■ Ready for FMS applications

- An FMS with a smart, expandable stacker crane system

Approx 30 m

Stacker crane   Rack shelf

Approx 15 m

Handling station

MA-8000H   MA-8000H   MA-8000H   MA-8000H

[System layout example]
- MA-8000H   4
- Pallets   32
- Rack levels   2
  (system height approximately 5.5 m)
- Handling station   1

285-tool matrix magazine

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 technology, Okuma offers this CNC to build an advanced "digital twin" that faithfully reproduces machine c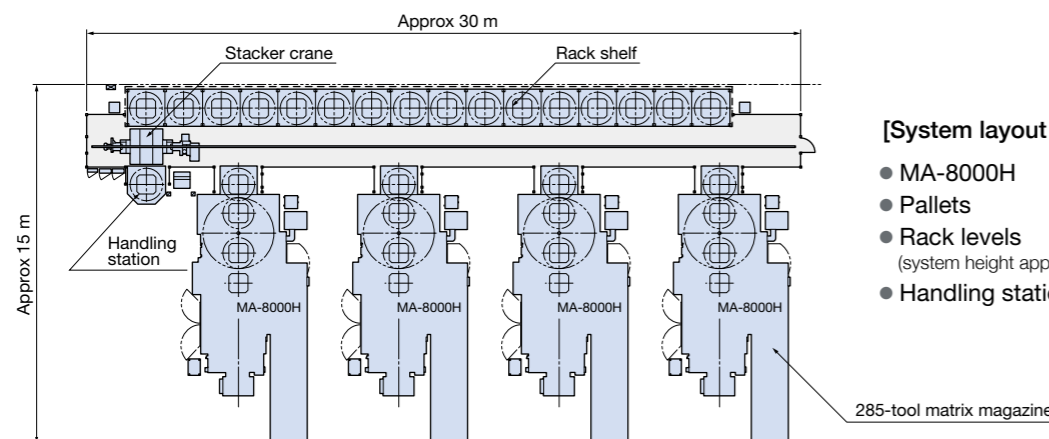ontrol and machining operations and create new value. In addition, Okuma offers productivity improvement and stable production with ease of use that allows customers to use their machining know-how, an energy-saving solutions that achieve both high accuracy/productivity and eco-friendly products, with 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

Simulation using the latest machine information can be achieved with an office PC and OSP-P500 installed on the physical machine. This enables preparation for machining in advance in the office environment (front loading). Preparing machining for the next part while continuing machining can reduce the preparation time for the physical machine. When a problem occurs on the shop floor, it can be solved quickly on site without going back to the office.

15-inch operation panel

1 Digital Twin On PC*
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.

* 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

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

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

Virtual space

IIoT gets the latest machine data

Virtual space

Real space

Information check, actual machining by simulator

Using the latest machine data in the office simulators

Actual machining

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
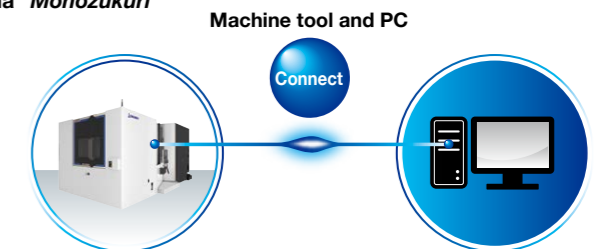
Advanced technology—effective for machine shops

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
- IDs and ODs can be machined when they exceed the maximum tool diameter that ATC can handle

Note: AbsoScale detection and ball-screw cooling required

Example of use: 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

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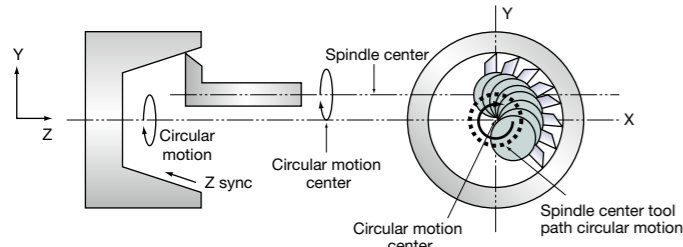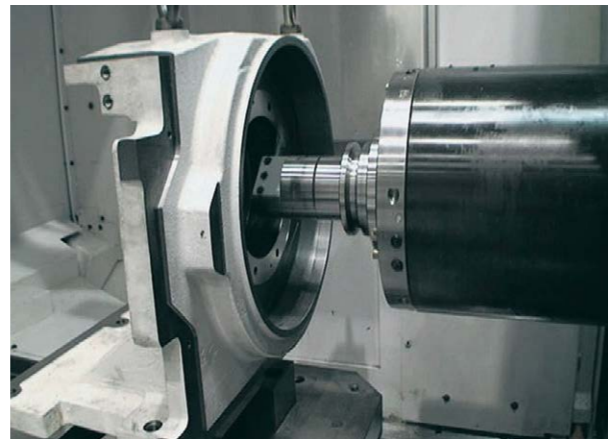
The spindle phase is precisely synchronized with cutting edge motion, to perform highly accurate grooving.
- Getting high sealability without hand finishing.
- Complex seal groove curves also cut with flat tools.

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.
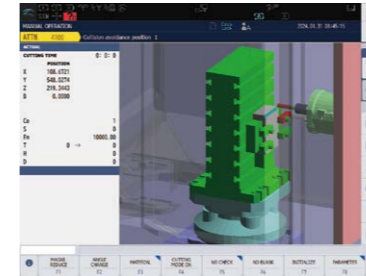
SERVONAVI
Optimized Servo Control

Achieves long term accuracy and surface quality

■ SERVONAVI AP (Automatic Parameter setting)

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.

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 spindle rotation and axis feed, and allowing the rotary axis to take the shortest path
- Machining time shortening: The cycle time is reduced for parts machining with frequent switches between cutting feed and rapid traverse by using feeder-mode high-speed 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

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

Changing to optimum spindle speed

Changing spindle speed

Lower cutting load required

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.

■ Machine Specifications

	Item	Unit	MA-8000H
Travels	X-axis (column left/right)	mm (in)	1,400 (55.12)
	Y-axis (spindle up/down)	mm (in)	1,200 (47.24)
	Z-axis (table front/back)	mm (in)	1,350 (53.15)
	Spindle center to pallet top	mm (in)	100 to 1,300 (3.94 to 51.18)
	Spindle nose to pallet center	mm (in)	100 to 1,450 (3.94 to 57.09)
Pallet	Work area	mm (in)	800 × 800 (31.50 × 31.50)
	Max load capacity	kg (lb)	2,000 [3,000]*1 (4,400 [6,600]*1)
	Indexing angle	deg	1 [0.001]
	Max workpiece dimensions	mm (in)	ø1,450 × 1,450 (57.09 × 57.09)
Spindle	Speed	min-1	50 to 6,000 [50 to 10,000, 50 to 12,000, 50 to 6,000 (high-torque spindle)]
	Tapered bore		7/24 taper No. 50 [HSK-A100]
	Bearing dia	mm (in)	ø100 (ø3.94)
Feed rate	Rapid traverse	m/min (ipm)	X, Y, Z: 50 (1,969)
	Cutting feed rate	mm/min (ipm)	X, Y, Z: 1 to 50,000 (0.04 to 1,969)
Motors	Spindle	kW (hp)	30/22 (40/30) (10 min/cont) [10,000 min-1: 45/30 (60/40) (20 min, 60 %ED/cont), 12,000 min-1: 45/30 (60/40) (10 min, 25 %ED/cont), High-torque spindle: 45/37 (60/50) (20 min/cont)]
	Feed axes	kW (hp)	X: 5.1 (6.8), Y: 3.5 (4.67) × 2, Z: 5.1 (6.8)
	Table indexing	kW (hp)	4.6 (6.13)
ATC	Tool shank		MAS403 BT50 [CAT50, DIN50, HSK-A100]
	Pull stud		MAS2 [MAS1, CAT, DIN, JIS]
	Magazine capacity	tools	60 [40 (chain magazine type)] [81, 111, 141, 171, 195, 225, 255, 285 (matrix magazine type)] [320, 400 (multiple magazine system)]
	Max tool dia (w/ adjacent)*2	mm (in)	ø140 (5.51)
	Max tool dia (w/o adjacent)*2	mm (in)	ø240 [ø315]*3 (9.45 [12.40]*3)
	Max tool length	mm (in)	600 [800]*3 *4 (23.62 [31.50]*3 *4)
	Max tool mass	kg (lb)	25 [30]*3 (55 [66]*3)
	Tool selection		Memory random [Matrix magazines use fixed addresses]
Machine size	Height	mm (in)	3,442 (135.51)
	Floor space; width × depth	mm (in)	3,960 × 8,178 (155.91 × 321.97)*5
	Mass	kg (lb)	33,000 (72,600)*6
Controller			OSP-P500M

[ ]: Option
*1. Machine component movements become slower with this optional specification.
*2. Values differ with a matrix magazine. Please inquire.
*3. Shutter open/close times become longer with the optional specification.
*4. Max workpiece diameters may be limited by required tool lengths.
*5. Off-machine chip discharge; hinge + scraper with drum filter (Recommended).
*6. Workpieces and tools not included.

■ MA-8000H Standard Specifications

Spindle speed	No. 50	6,000 min-1 (30/22 kW [10 min/cont])	APC fork washer	
ATC magazine capacity		60 tools	Air filter and oiler	
Spindlehead cooling system			Telescopic cover	
Ball-screw cooler		X-Y-Z axes	Hydraulic unit	
Centralized lubrication		Tank: 20 L	Automatic 1° indexing table	
		Oil level alarm and pressure alarm	2-pallet rotary-shuttle APC	Pallet top surface M16 tap
Coolant supply system		Tank: 1,293 L	Full enclosure shielding	2-pallet pivoted type for APC
		(Dirty tank: 1,168 L (effective: 800 L)) (Clean tank: 125 L)	Operation panel	15 in; movable (swivel, horizontal)
		Pump: 3.0 kW, 1.5 kW,	ATC operation panel	For manual operation
		0.55 kW (50 Hz)/0.75 kW (60 Hz)	NC (OSP) control cabinet ventilation fan	
			Work lamp	LED (2 locations)
In-machine chip discharge		Hinge	Status indicator	3 phase C type
Chip pan for above			Foundation blocks, jack bolts	
Coolant nozzle		Insert nozzle type	Slip stoppers and chemical anchors	
Thru-spindle coolant*		1.5 MPa	Tool release lever	
Suction of excess coolant in spindle			Tapered bore cleaning bar	
ATC air blower (blast)			Hand tools	
Chip air blower (blast)		Nozzle type	Tool box	
Coil conveyor under APC			TAS-S	Thermo Active Stabilizer – Spindle
In-machine chip washer			TAS-C	Thermo Active Stabilizer – Construction

* Okuma pull stud required with thru-spindle coolant.

■ MA-8000H Optional Specifications

Spindle speeds	No. 50	50 to 10,000 min-1, 45/30 kW	In-machine chip discharge	Scraper type chip conveyor
		50 to 12,000 min-1, 45/30 kW	Off-machine chip discharge (lift-up chip conveyor types)	Refer to Recommended chip conveyors.
High-torque spindle	No. 50	6,000 min-1, 45/37 kW, 1,071 N-m		
Dual contact spindle*1		HSK, BIG-PLUS®	Chip bucket for above	Height 700 mm, 1,000 mm
ATC magazine capacity		40 tools (chain magazine type)	Hydraulic oil cooler	
(tools)		81, 111, 141, 171, 195, 225, 255, 285 tools	Coolant heater / cooler	
		(matrix magazine type)	Auto tool length comp /	Touch sensor
		320, 400 tools (multiple magazine system)	breakage detection	
AbsoScale detection		X-Y-Z axes	Auto zero offset/auto gauging	Touch probe
Auto 0.001° indexing table		Built-in NC table	Tool life management	By hour meter
APC Auto pallet changer		Parallel shuttle: 6P, 10P	Turn-Cut	AbsoScale detection required
FMS 2-pallet APC		Wing block type, Under-pallet fork type	Pull stud bolt shape	MAS1, CAT, DIN, JIS
Pallet top surface configuration		T-slot	Pull stud bolt	MAS1, MAS2, CAT, DIN, JIS
Spare pallets			2-sided tooling block	
Edge locator			4-sided tooling block	
Oil-hole coolant system		1.5 MPa	Angle plate	
Thru-spindle coolant*2		7.0 MPa, large flow 1.5 MPa, large flow 7.0 MPa	Additional work lamp	
Semi-dry machining		Thru-spindle type, nozzle type,	Machining Navi	M-i, M-gⅡ+
		thru-spindle/nozzle switch type	Hydraulic fixture systems	Linked, pallet-thru types
Shower coolant		10 nozzles	Recommended	AbsoScale detection (X-Y-Z axes)
Workpiece wash gun			for die machining	Hyper-SurfaceⅡ
Oil mist lubricator				DNC-DT, 0.1 µm control
Mist collector				
Chip air blower (blast)		Adapter		
Coolant system		Sludgeless Tank (recommended option)		

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

■ Chip conveyors (Please contact an Okuma sales representative for details.)

○: Recommended
△: Conditionally recommended

Workpiece Material		Steel	Cast iron	Aluminum/non-ferrous metal	Mixed (general use)
Chip shape					
In-machine chip discharge	Hinge type (standard)*1	○	○	○	○
Off-machine chip discharge (option)*2	Hinge + scraper with drum filter (recommended)	○	○	○	○
	Hinge type	○	—	—	—
	Scraper type*3	—	○ (dry)	—	—
	Scraper type with drum filter*3	—	○ (wet) with magnet	△	—

*1. Scraper type (option) also available.   *2. With limitations per conveyor discharge direction.   *3. When chips are shorter than 100 mm

■ Off-machine lift-up chip conveyors

Type	Hinge + scraper with drum filter	Hinge	Scraper	Scraper with drum filter
Shape				

Note: Becomes hinge + scraper (with drum filter) if Sludgeless Tank (option) is selected.

■ A next-generation CNC OSP-P500M standard specifications

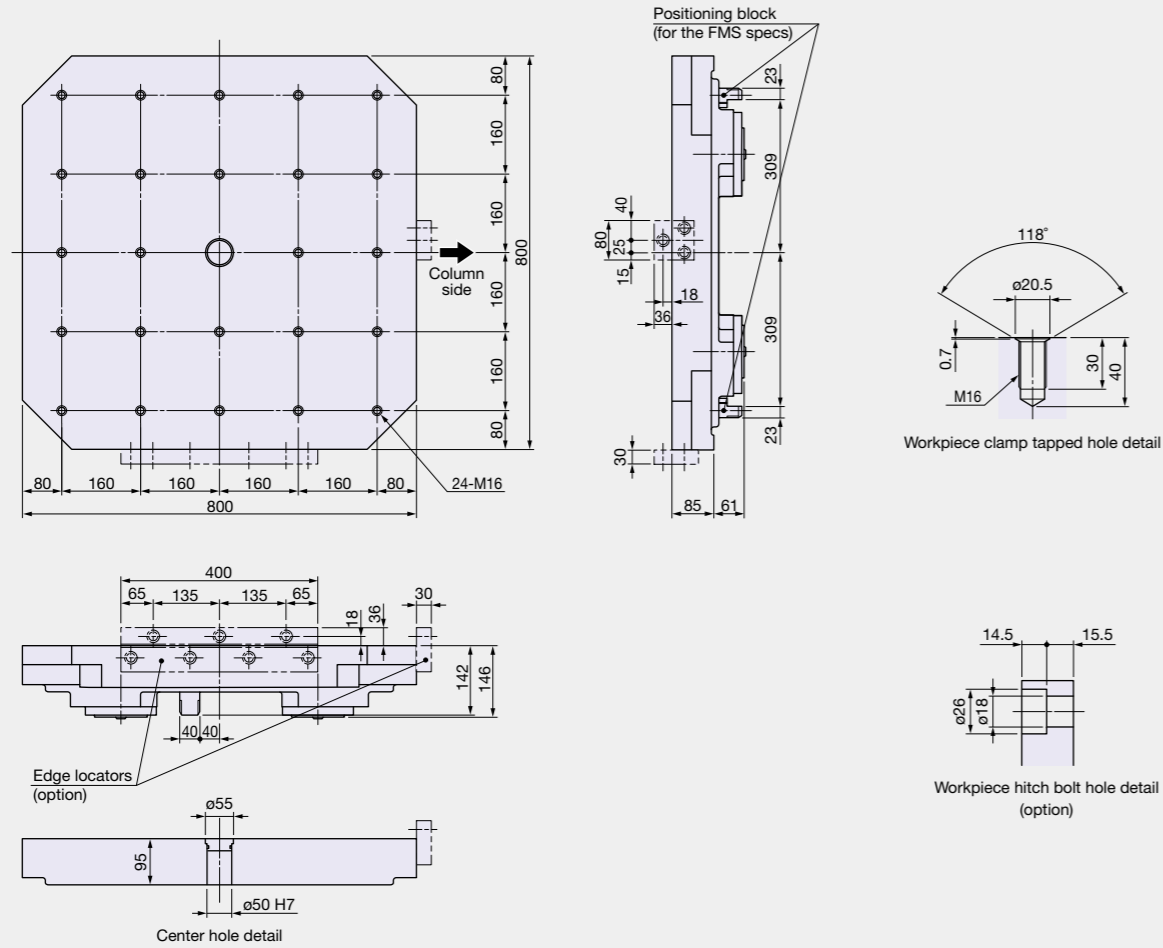| Basic Specs	Control	X, Y, Z, simultaneous 3 axis, spindle control (1 axis)
	Position feedback	OSP full range absolute position feedback (zero point return not required)
	Coordinate functions	Machine coordinate system (1 set), work coordinate system (20 sets)
	Min / Max command	±99999.999 mm, ±9999.9999° 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, auto power shut-off
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, SᴇʀᴠoNᴀᴠɪ, Cycle time reduction (operation time reduction, machining time shortening, 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 CNC OSP-P500M kit specifications/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									
Coordinate change and 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 tilt adjustment									
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-loaddetection				●		●		●	
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-gII+(cutting condition search)									
Feed axis retraction									
Tool retract cycle									
Automation / unattended operation									
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 1. NML: Normal kit, AOT: Advanced One-Touch IGF-M kit, DT: Digital Twin kit,
　　　DT AOT: Digital Twin Advanced One-Touch IGF-M, E: Economy, D: Deluxe
　　　VE and VD kits are also equipped with the Digital Twin on PC function, allowing running from a PC.
Note 2. Specifications, etc. are subject to change without notice.
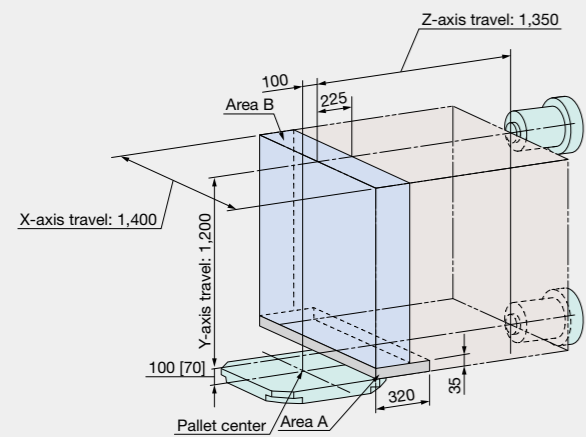* With AbsoScale detection specs, ball-screw wear detection is possible.

■ Pallet dimensions

Positioning block
(for the FMS specs)

23

309

40

80

15 25

18

36

309

30

23

85 61

80

160

160

160

160

80

800

Column side

80

160

160

160

160

80

800

24-M16

118°

ø20.5

0.7

M16

30

40

Workpiece clamp tapped hole detail

400

65 135 135 65

18

36

30

142 146

40 40

Edge locators
(option)

ø55

95

ø50 H7

Center hole detail

14.5 15.5

ø26
ø18

Workpiece hitch bolt hole detail
(option)

■ Working range

Unit: mm

Z-axis travel: 1,350

100

225

Area B

X-axis travel: 1,400

Y-axis travel: 1,200

100 [70]

Pallet center / Area A

320
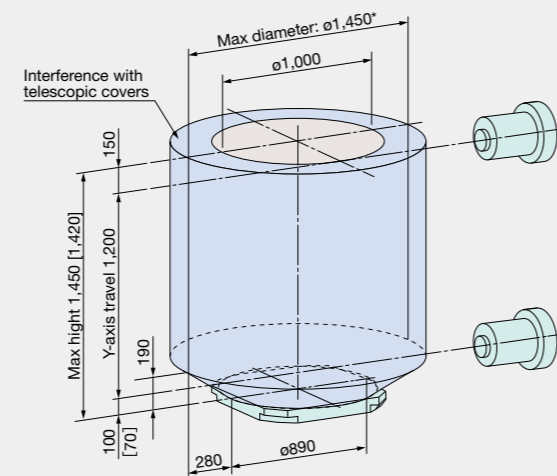
35

Travel

	MA-8000H
X	1,400
Y	1,200
Z	1,350

[ ]: T-slot pallets
Note: the following interference areas
A: Interference between spindle and table
B: Interference between X-, Y-axis telescopic covers and workpiece
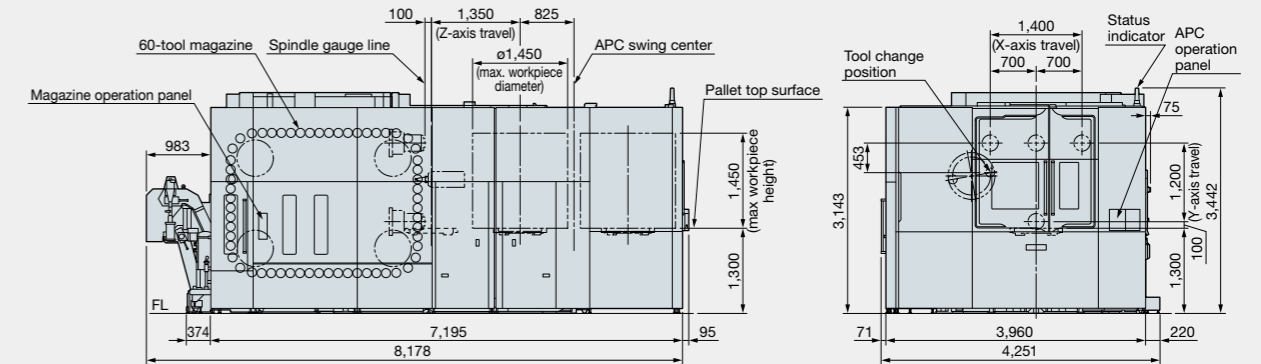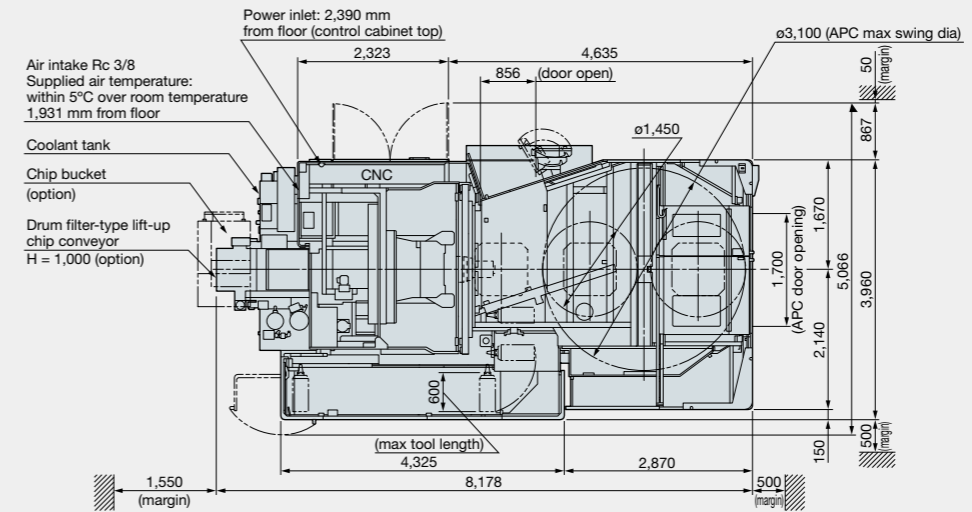
■ Maximum workpiece dimensions

Unit: mm

Max diameter: ø1,450*

ø1,000

Interference with
telescopic covers

150

Max hight 1,450 [1,420]

Y-axis travel 1,200

190

100 [70]

280 ø890

[ ] : T-slot pallets
* At Z-axis minus end, X-, Y-axis telescopic covers and workpiece interfere occurs;
  requiring max workpiece diameter set at ø1,000 mm.
  Also note that interference may occur at workpiece bottom as shown in this drawing.
Note: The minus Z and Y-axis limit area is a spindle/pallet interference zone.

21

MA-8000H
Dimensional/Installation Drawings

Power inlet: 2,390 mm
from floor (control cabinet top)

2,323

4,635

856 (door open)

ø3,100 (APC max swing dia)

50 (margin)

867

Air intake Rc 3/8
Supplied air temperature:
within 5°C over room temperature
1,931 mm from floor

ø1,450

Coolant tank

Chip bucket
(option)

CNC

Drum filter-type lift-up
chip conveyor
H = 1,000 (option)

1,670
1,700
(APC door opening)
2,140

5,066

3,960

600

(max tool length)
4,325

2,870

150

500 (margin)

1,550
(margin)

8,178

500 (margin)

100

1,350
(Z-axis travel)

825

60-tool magazine

Spindle gauge line

ø1,450
(max. workpiece
diameter)

APC swing center

Pallet top surface

Magazine operation panel

983

1,450
(max. workpiece
height)

1,300

3,143

FL

374

7,195

95

8,178

1,400
(X-axis travel)
700 700

Status
indicator

APC
operation
panel

Tool change
position

75

453

1,200
(Y-axis travel)
3,442

100

1,300

71

3,960

220

4,251

22

This product is subject to the Japanese government Foreign Exchange and Foreign Trade Control Act with regard to security controlled items; whereby Okuma Corporation should be notified prior to its shipment to another country.

OKUMA

OKUMA Corporation

Oguchi-cho, Niwa-gun,
Aichi 480-0193, Japan
TEL: +81-587-95-7825 FAX: +81-587-95-6074