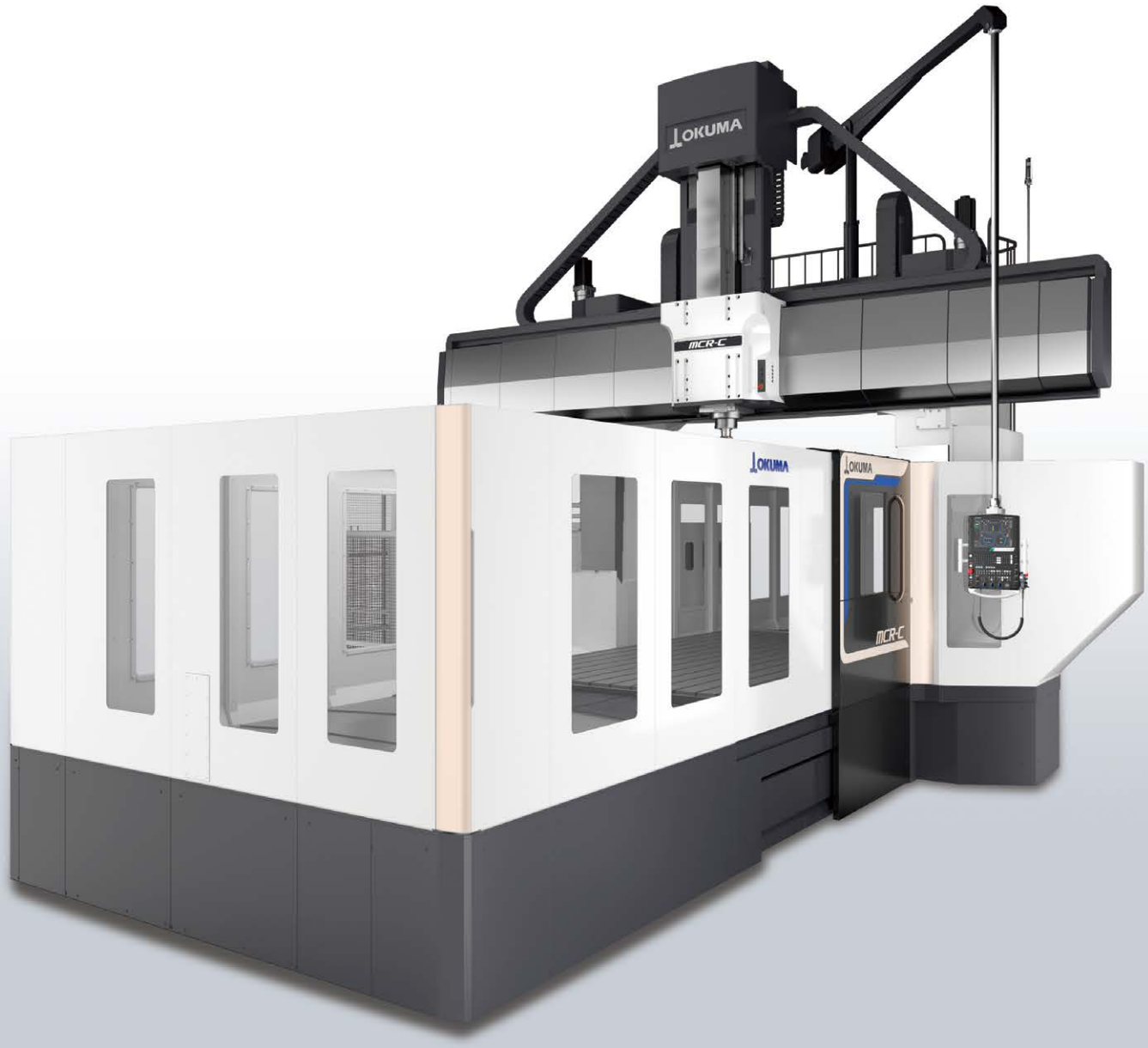
OKUMA

OPEN POSSIBILITIES

MCR-C

Double-Column Machining Center
[5-Face Machining]



MCR-C

Double-Column Machining Center
[5-Face Machining]

Intelligent Technology | Thermo-Friendly Concept | Collision Avoidance System | Machining Navi | ServoNavi

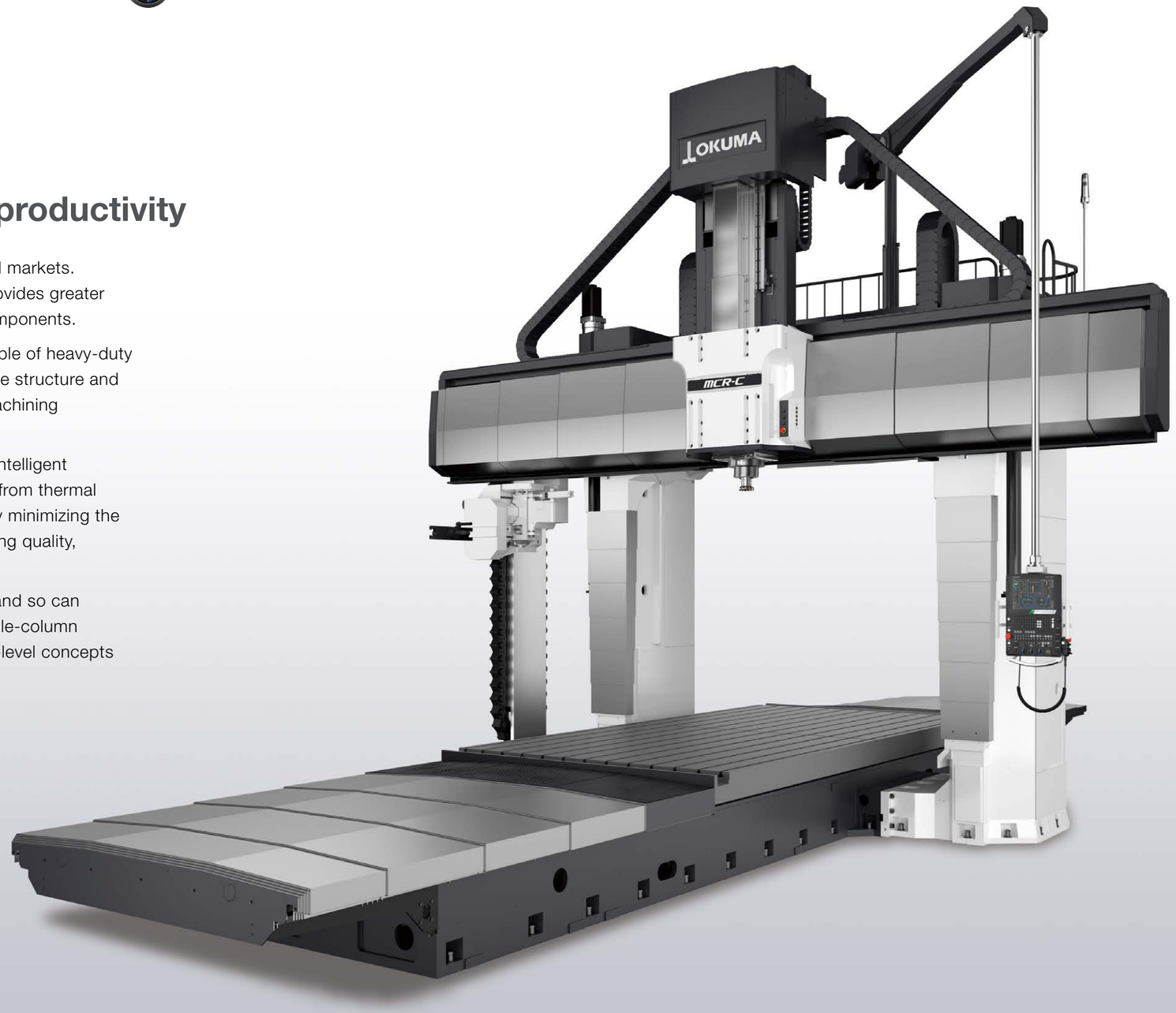
High power, high torque, high productivity

Heavy industries continue to experience growth in global markets. Okuma's MCR-C is a high performance machine that provides greater productivity in the machining of large, high-accuracy components.

The MCR-C is equipped with a high power spindle capable of heavy-duty cutting. That power is fully displayed with a solid machine structure and fast axis feeds, achieving significant improvements in machining performance including reduced non-cutting times.

The Thermo-Friendly Concept, one of Okuma's original Intelligent Technologies, helps to eliminate the accuracy problems from thermal deformation that are characteristic of large machines. By minimizing the amount of thermal deformation to ensure stable machining quality, production costs are greatly reduced.

Okuma is a manufacturer of both machine and control, and so can deliver impressive value to customers. The MCR-C double-column machining center for 5-face machining fulfills these high-level concepts to achieve the highest productivity.



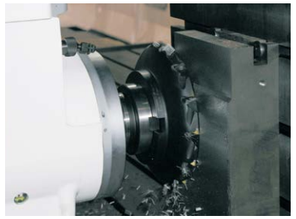
Photographs and images used in this brochure may include optional equipment.
Not showing full-enclosure shielding and other items.

High machining capacity and machining accuracy necessary for highly efficient production, and a large work envelope that enables machining of super-large parts

Machining capacity (S50C steel)

High output extension head
(Spindle bearing diameter: ø130, L250)
1,210 cm³/min

ø250 face mill	10-blade
● Cutting Speed	188 m/min
● Cut Width × depth	8 × 175 mm
● Feedrate	864 mm/min (0.36 mm/blade)



High output 90° angular head
(Spindle bearing diameter: ø130, L270)
1,075 cm³/min

ø250 face mill	10-blade
● Cutting Speed	188 m/min
● Cut Width × depth	8 × 175 mm
● Feedrate	768 mm/min (0.32 mm/blade)

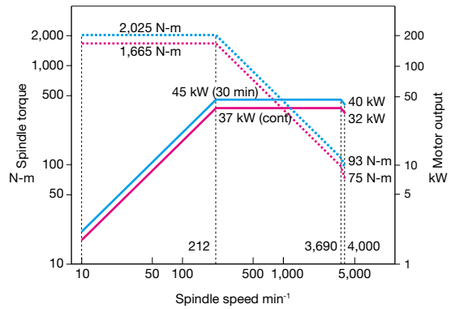
Notes: High output specifications are optional.
The “actual data” referred to above for this brochure represent examples, and may not be obtained due to differences in specifications, tooling, cutting condition, and others.

■ Highly rigid ram (420 × 425 mm) enables heavy-duty cutting

The spindlehead has a ram-type structure with the largest cross section, 420 × 425 mm, of any of Okuma’s double-column series machines. It thus possesses the rigidity to deal with powerful cutting, even with the 90° angular head.

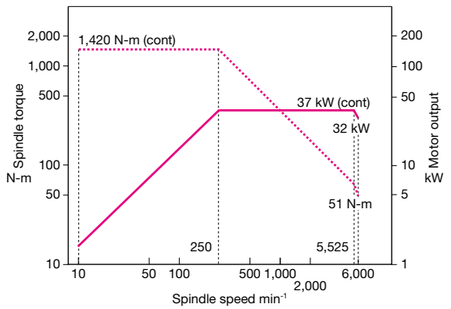
■ Standard spindle

Spindle speed: **4,000 min⁻¹ (gear)**
Max output: 45/37 kW (30 min/cont)
Max torque: **2,025/1,665 N-m**



■ 6,000 min⁻¹ spindle (option)

Spindle speed: 6,000 min⁻¹ (gear)
Max output: 37 kW (cont)
Max torque: 1,420 N-m



Large work envelope

- Z-axis travel: 1,050 mm (option: 1,250 mm)
- Max width between columns: 4,650 mm (45 model)
- Long travel: 12,200 mm (X-axis)
- Max table top to spindle nose: 4,000 mm (when including optional 35 type and high column + 2,200 mm)

Okuma double-column machining centers– highly rigid and accurate construction

Highly efficient, expansive multitasking operations

- Various types of attachment heads
- Highly efficient machining with attachment head auto changer
- High output and torque provides highly efficient roughing operations
- Rapid traverse...X-axis: 24 m/min
  Y-axis: 24 m/min
  Z-axis: 15 m/min
  W-axis: 3 m/min

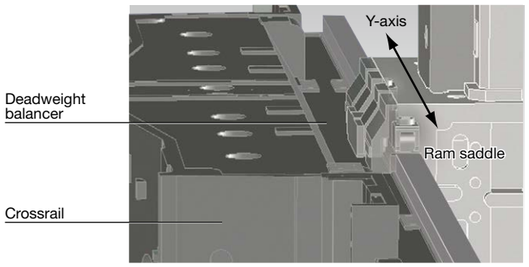
Note: Speeds may vary depending on the machine size.

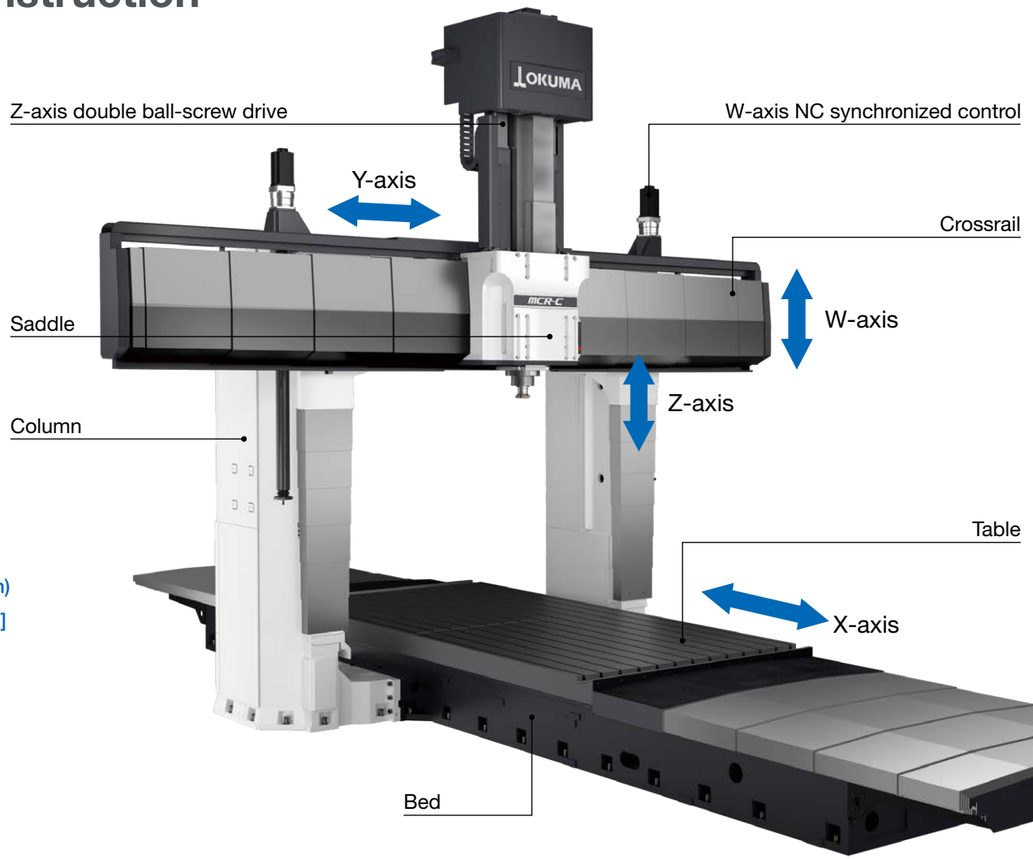
Highly rigid ram-type spindlehead
(Spindle ram vertical movement: Z-axis)

- Rigid ram spindlehead...Ram: **420 × 425** mm (16.54 × 16.73 in)
- Z-axis travel...**1,050** mm (41.34 in) [option: 1,250 mm (49.21 in)]

Spindlehead (ram saddle) guideway
(Spindle saddle left/right movement: Y-axis)

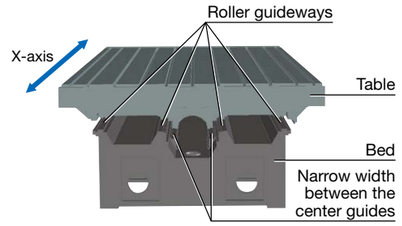
The spindlehead guideway has a highly rigid rectangular cross-sectional geometry. It is also supported by a self-weight balancing device via a roller on the crossrail. High quality machined surfaces and fast, accurate movements are obtained with these structures.





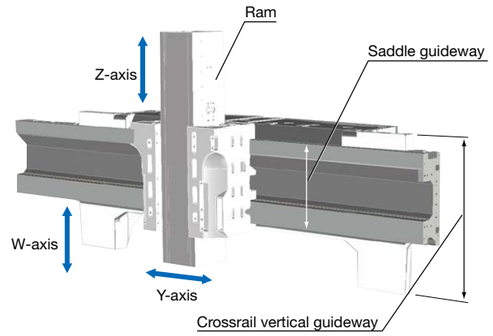
Roller guide system for table guide
(Table front/back movement: X-axis)

The table moves with a roller guideway and the heavy weight of the table and workpiece is supported with four roller bearings on hardened and ground surfaces. This allows for agile, smooth movements and accurate positioning unaffected by weight changes from heavy workpiece loads.
The layout puts the drive system (ball screw) in the center of the table and narrow, horizontal roller guideways. This can maintain stable, outstanding linear motion straightness over the long term.



Crossrail vertical guideway
(Crossrail vertical movement: W-axis)

The extra long upper and lower vertical guideways on the crossrail present a stable structure that ensures longer service life and rigidity.

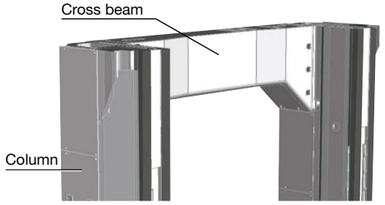


Square double-column construction

The double-column structure with square columns has sufficient rigidity for vertical, horizontal, and twisting loads, withstanding heavy-duty cutting and maintaining high accuracy.

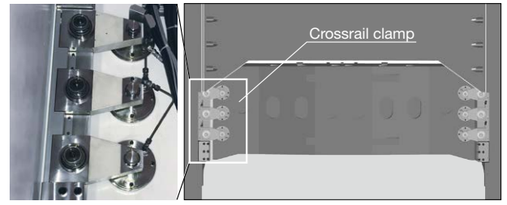
Cross beam optimization

A simple structure is achieved with integration of the top beam and cross beam based on structural analysis for the best design. Stable quality is maintained over long times.



Crossrail clamp
(Crossrail vertical movement: W-axis)

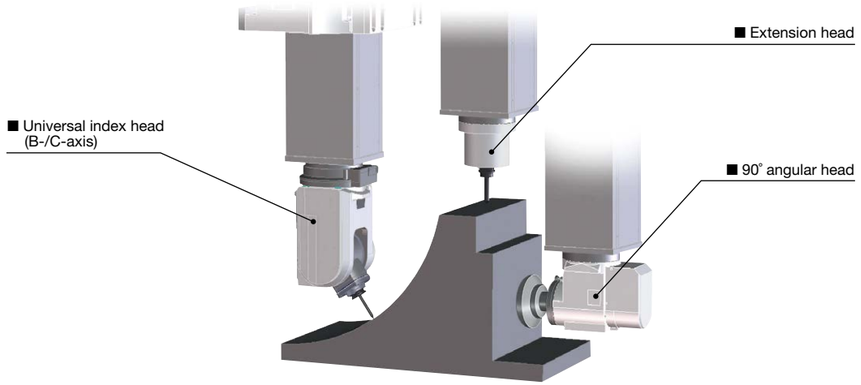
Powerful clamping devices that apply the principle of levers are used on crossrail clamps for powerful machining.



For a wide range of efficient, multitasking applications—to satisfy your need for the right tool

Full array of attachment heads

Machining of all types and all shapes can be done by changing the rich variety of attachment heads. Auto operation with many continuous processes can be done using an auto tool changer (ATC) and auto attachment changer (AAC), greatly improving productivity.



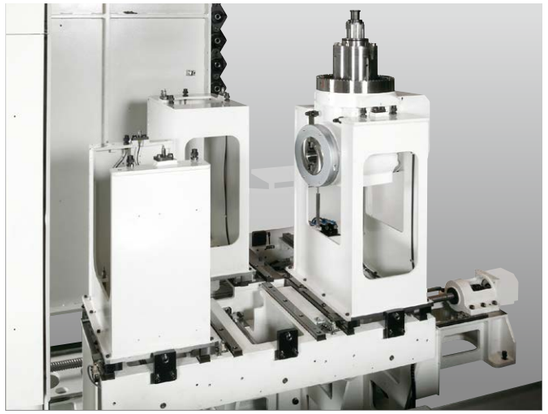
■ Attachment head variations

Extension head		
	L150	4,000 min^{-1} (45 kW), 6,000 min^{-1} (30 kW), High output spec: 6,000 min^{-1} (37 kW)
	L250	4,000 min^{-1} (37 kW), 6,000 min^{-1} (26 kW), High output spec: 4,000 min^{-1} (45 kW), 6,000 min^{-1} (30 kW)
	Others, L350, L450, L500, L620, thru-spindle coolant spec, etc.	
90° angular head		
	L150	3,000 min^{-1} (30 kW), 6,000 min^{-1} (22 kW)
	L250	3,000 min^{-1} (30 kW), 6,000 min^{-1} (22 kW)
	Others, L355, C-axis: 1 indexing, thru-spindle coolant spec, High output spec: L270, 3,000 min^{-1} (45 kW) etc.	
Special angular head		
	30°	2,000 min^{-1} (22 kW), 6,000 min^{-1} (7.5 kW)
	45°	2,000 min^{-1} (22 kW)
	Others, thru-spindle coolant spec etc.	
Universal index head (B-/C-axis)		
	B-/C-axis: 5 indexing	2,000 min^{-1} (15 kW), 4,000 min^{-1} (15 kW), 6,000 min^{-1} (15 kW)
	B-axis: 1 indexing, C-axis: 5 indexing	2,000 min^{-1} (15 kW), 4,000 min^{-1} (15 kW), 6,000 min^{-1} (15 kW)
	B-/C-axis: 1 indexing	2,000 min^{-1} (15 kW), 4,000 min^{-1} (15 kW)*, 6,000 min^{-1} (15 kW)*
	* Thru-spindle coolant spec available	
NC-BC universal head		
	L830	4,000 min^{-1} (26 kW), 6,000 min^{-1} (26 kW)
	L940	Thru-spindle coolant spec: 4,000 min^{-1} (20 kW), 6,000 min^{-1} (20 kW)

Notes: Please consult for applications which may have restrictions.
Maximum output is shown in parenthesis.

Smaller and faster AAC
(Automatic Attachment head Changer)

Completely automate machining of multiple sides with a variety of spindle heads (attachments) that mount automatically and accept ATC.



Fast ATC
(Automatic Tool Changer)

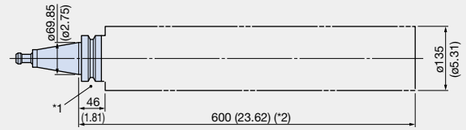
A single tool change arm automatically changes magazine tools for both the vertical and horizontal spindles. The next tool to be used is brought to the standby position during cutting, so that tools can be changed in the shortest possible time.

ATC is available for all types of angular head (30°, 45°) and universal index head (B-/C-axis) in addition to extension head and 90° angular heads.

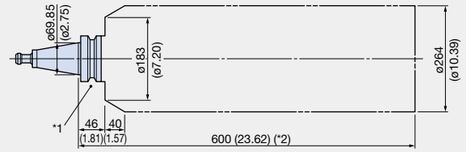
■ ATC tool dimensions

Unit: mm (in)

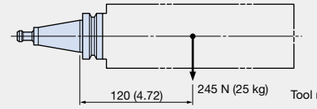
● **Maximum adjacent tool size**
The maximum tool size is determined by the neighboring tool size



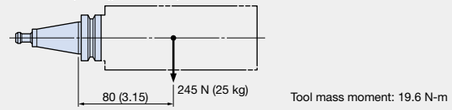
● **Maximum non-adjacent tool size**
This is the maximum tool size when there are no tools on either side of a tool.



● **Maximum ATC tool mass moment**
29.4 N-m (25 kg×120 mm)

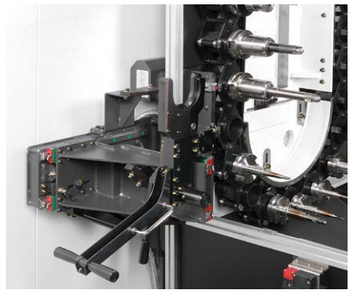


● **Maximum ATC tool mass moment with high-speed movement**
19.6 N-m (25 kg×80 mm)



Note: Tools with tool weight moments over 29.4 N-m can not be used.
ATC with high speed movement can be done with tools of 19.6 N-m
*1. Commercially available milling chucks may interfere with ATC arm and other tools. Prior to use, confirm size dimensions with the tool manufacturer (brochure, etc).
*2. When raised column specs are not selected, an interlock is set so that the ATC cannot function within 50 mm from the lower limit of the W axis to prevent interference with the AAC unit.

■ Magazine tool load/unload device



Magazine tool loading and unloading can be done safely and easily.

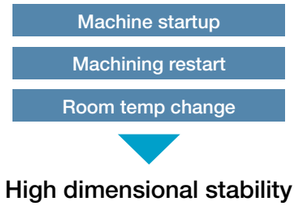
High accuracy is enabled in normal factory environments

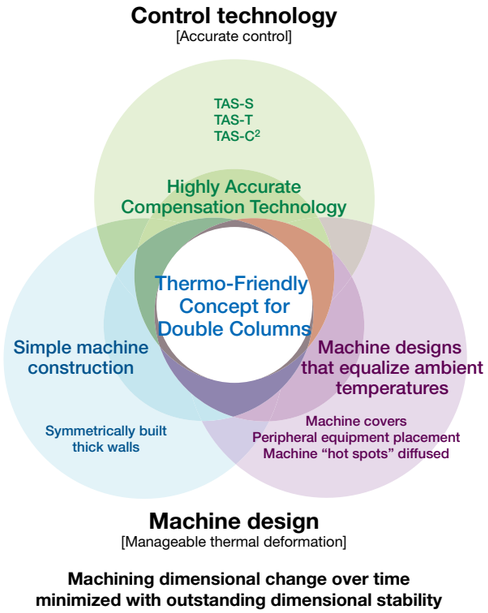
Thermo-Friendly Concept
Manageble Deformation — Accurately Controlled

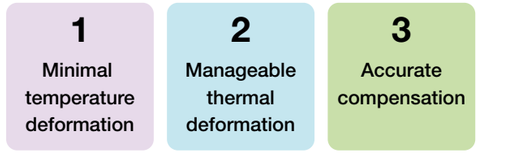
Eliminate waste with the Thermo-Friendly Concept

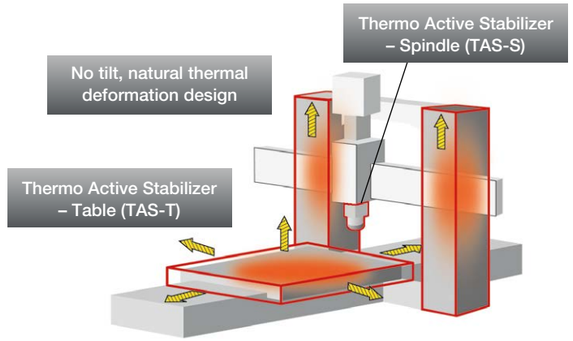
Okuma's Thermo-Friendly Concept achieves high dimensional stability not only when the room temperature changes, but also at machine startups or when machining is resumed.

The warm-up operation time to stabilize thermal deformation is shortened, and the burden of dimensional correction when resuming machining is reduced.









[Manageable Deformation] [Accurately Controlled]

Integrated machine design and control technology

The Thermo-Friendly Concept plays a principal role in our machine design. With simple machine designs and construction that equalize ambient temperatures, deformation is predictable, and complex torsion or tilting is controlled.
Highly accurate compensation technology with the OSP controller developed by Okuma accurately controls thermal deformation from room temperature changes, spindle thermal deformation from frequently changing spindle speeds, and inconsistent thermal deformation from coolant temperature.
With the Thermo-Friendly Concept (Manageable Deformation – Accurately Controlled), Okuma products provide unrivaled dimensional stability.

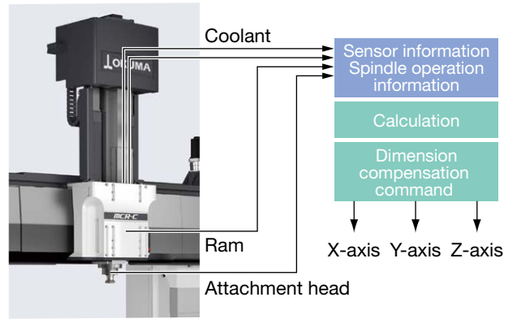
Sophisticated thermal displacement control technology

	Thermo-Friendly Specifications	Thermo-Friendly Premium Specifications (option)*
Spindle thermal deformation control technology	**Thermo Active Stabilizer – Spindle (TAS-S)** Thermal deformation from spindle rotation controlled with high accuracy.	
Environmental thermal deformation control technology	**Thermo Active Stabilizer – Table (TAS-T)** Deformation from thermal expansion of table is accurately controlled.	**Thermo Active Stabilizer – Construction for large machines (TAS-C²)** TAS-C²: Thermo Active Stabilizer – Table Thermo Active Stabilizer – Construction In addition to TAS-T at the left, the machine is optimally controlled to maintain machining accuracy even when ambient temperatures change.

* X-Y-Z axes AbsoScale specs required.

Thermo Active Stabilizer – Spindle (TAS-S)

Thermal deformation of the spindle from high spindle speeds is accurately controlled (X-Y-Z axes). Accurate control is also performed in cases of frequent spindle speed changes, and thermal deformation of attachment heads are also controlled.



Thermo Active Stabilizer – Table (TAS-T)

In machining large workpieces, things like hole pitch deviation may become larger due to thermal expansion. Thermo Active Stabilizer – Table controls dimensional changes from thermal expansion of the table to obtain stable dimensional accuracies of even large components.

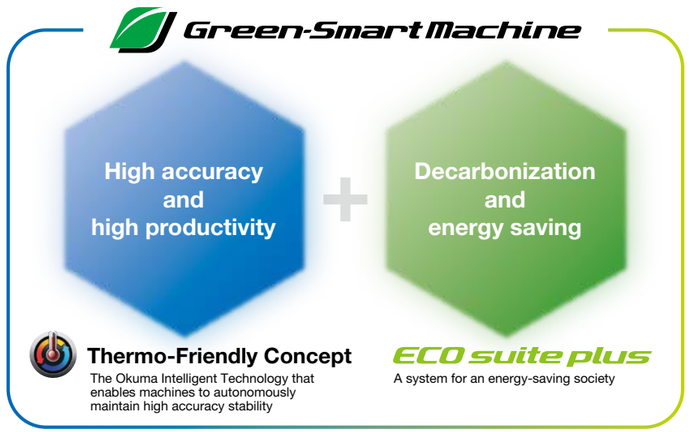
Thermo Active Stabilizer – Construction for large machines (TAS-C²) (option)

In addition to Thermo Active Stabilizer – Table (TAS-T), the machine is optimally controlled to maintain machining accuracy even when ambient temperatures change.

Highly accurate, productive and eco-friendly

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.



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.

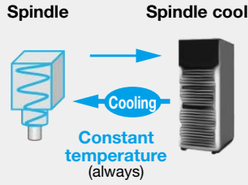
■ Reduction of power used for air conditioning

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



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

ECO suite plus A system for an energy-saving society

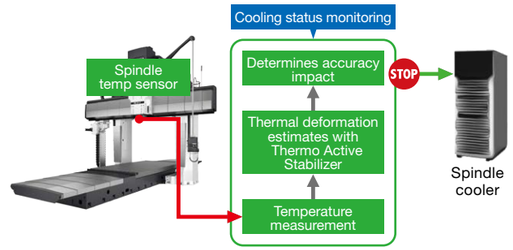
ECO Idling Stop

Accuracy ensured, cooler off

All auxiliary equipment when not needed (most of factory power consumption), can be turned off. The cooling system necessary for maintaining accuracy uses Thermo-Friendly Concept technology, and the machine itself decides when to cool and stop idling while maintaining high accuracy.

With ECO suite plus, the machine automatically detects the operating status, eliminating the need to push buttons while reducing carbon dioxide emission as much as possible without operator awareness.

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



ECO Operation

Peripheral equipment runs only when needed

By using only the required peripherals (chip conveyor, mist collector), energy-saving operations that also maintain high productivity are possible. ECO suite plus enables more detailed tuning of “operation patterns” to thoroughly reduce carbon dioxide emission.

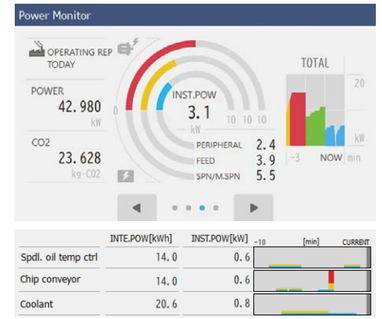
ECO Power Monitor

Confirming energy savings and analyzing reductions

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.

[On-the-spot checks of operating status, power consumption, and carbon dioxide emissions]

Three phases of visualization (view, record, and analyze) and energy-saving functions, which make it possible to analyze even the operating status of each device, support the decarbonization cycle.



[Analyze carbon dioxide emissions and improve machine tool operation]

With ECO suite plus, detailed data analysis of carbon dioxide emissions for each device is possible on a PC.

[Example of auxiliary power display using One-Touch Spreadsheet (option)**]**

Note: The spreadsheet file for data analysis needs to be prepared by the customer.

Technology for high-speed, high-accuracy machining

3D Smart Calibration System (option)

Calibrating the volumetric accuracy of the machine

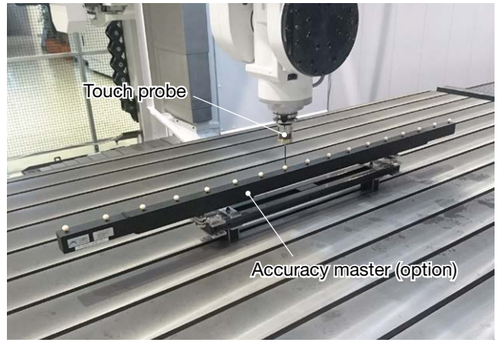
Any operator can easily calibrate machine accuracy

Factory floor surface deformation over the long term affects machine accuracy.

The 3D Smart Calibration System checks and calibrates the machine accuracy (positioning, straightness, perpendicularity) by automatically measuring the accuracy master (the absolute accuracy reference) using an easy-to-operate touch probe.

By calibrating accuracy at the right time, high accuracy is maintained throughout the machining space over the long term.

Notes: The machine accuracy that can be calibrated differs depending on the machine specifications and type of accuracy master (option) used.
The floor deformation of the customer's machine shop foundation may be large and require machine level adjustments.



Automatic measurement of ball beam by touch probe

Accuracy Stability Diagnosis Function (option)

Self-diagnosis of changes in machine accuracy

To diagnose mechanical thermal deformation due to non-uniform factory temperatures

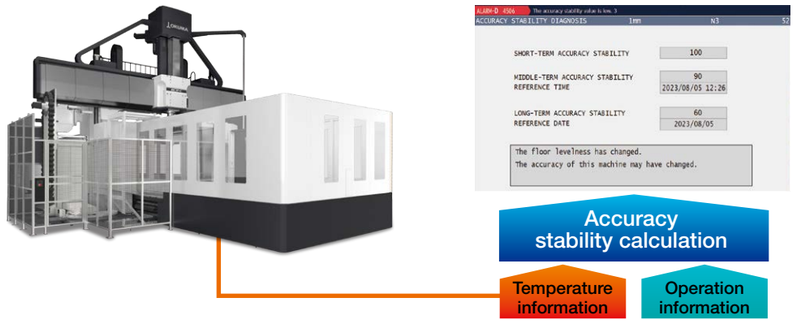
On production floors where the machine is exposed to wind or sunlight, the temperature around the machine becomes uneven, creating an environment in which the thermal deformation of the machine tends to increase.

The Accuracy Stability Diagnosis Function estimates the change in machine accuracy due to non-uniform factory temperatures, quantifies it as "accuracy stability" and displays that information on the screen.

If the accuracy is unstable, the operator will be notified by a message or alarm. More stable machining accuracy can be achieved by performing accuracy checks and adjustments when notified.

Diagnosing changes in machine accuracy from factory floor thermal deformation

The change in machine accuracy due to thermal deformation of the production floor is also estimated and quantified as a factor of "accuracy stability". Notifications of the best timing for machine accuracy adjustments with 3D Calibration etc, will be provided.



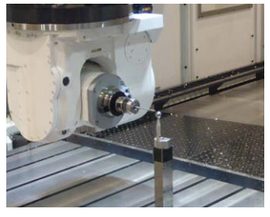
Auto Attachment Head Compensation (option)

Anyone can perform rotation compensation of attachment heads easily

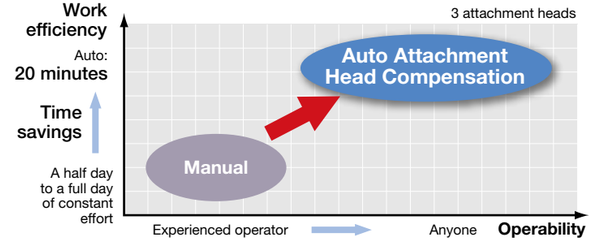
Rotation compenstion that used to take half day to a full day now done automatically in twenty minutes*

Auto Attachment Head Compensation is a function that is automatically sets attachment head rotation compensation values. It is quick, easy and can be used by anyone. By setting the compensation values, the program commands can be made for tool tip position even with different attachment head type and rotation tilt. Creation of NC programs and machine operation becomes much easier.
Auto Attachment Head Compensation performs this rotation compensation work automatically, enabling automatic setting in 20 minutes* for a task that used to take an experienced operator a half to full day with three attachment heads. High machining accuracy can also be maintained with regular measurements.

* The time needed for automatic settings differs with the attachment head.



The datum sphere is fixed to the table and measurement preparations are completed by simply positioning the attachment head with attached touch probe near the top of the datum sphere.



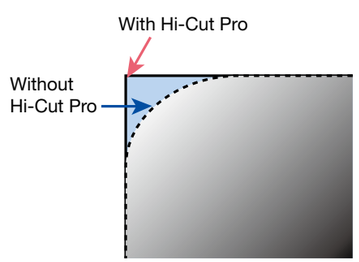
Note: AAHC requires Okuma's auto gauging and auto zero offset functions (with touch probe).

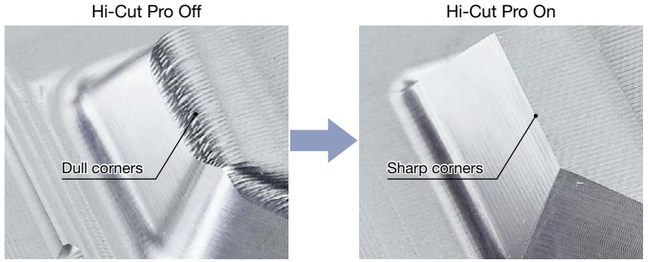
Hi-Cut Pro (standard)

Shorter cutting times and highly accurate machining

A speed and acceleration controller to make sharper corners and smoother arcs—ideal for the extra accurate and quicker cycle time jobs.

● **With Hi-Cut Pro**





Okuma Intelligent Technology exhibits powerful effect on machine shop floors

Collision Avoidance System (option)

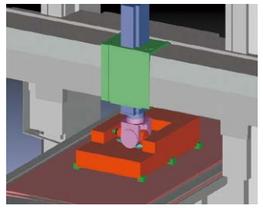
Collision prevention

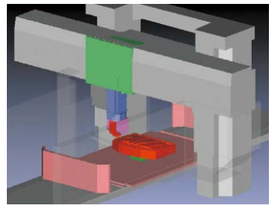
Significantly reducing setup and trial times

"Concentrate on machining" without collision worries

NC controller (OSP) with 3D model data of machine components—workpiece, tool, fixture, attachment head— performs real time simulation just ahead of actual machine movements. In both automatic operation and manual movements, advance checks are made for interference or collisions and the machine movement is stopped.

Machinists (novice or pro) will benefit from reduced setup and trial cycle times, and the confidence to focus on making parts.





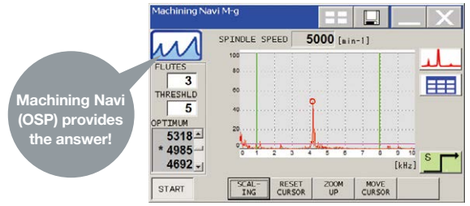
Machining Navi M-*g*Ⅱ (option)

Cutting condition search for milling/machining

Longer tool life and shorter machining times by optimizing cutting conditions

Maximizing machine tool performance

Navigates effective measures by detecting and analyzing machining chatter with a microphone attached to the machine. Effects are seen mainly on high rotation chatter with M-*g*Ⅱ.



SERVONAVI

Optimized Servo Control

Achieves long term accuracy and surface quality

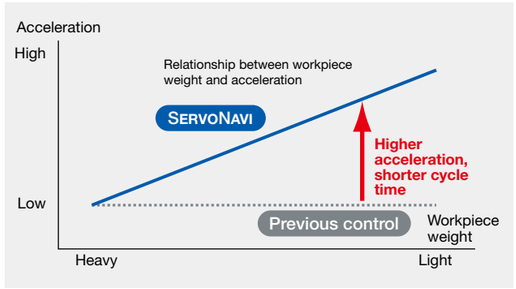
SERVONAVI AP (Automatic Parameter setting)

- **Work Weight Auto Setting**

Cycle time shortened with faster acceleration

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

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



SERVONAVI SF (Surface Fine-tuning)

- **Reversal Spike Auto Adjustment**

Maintains machining accuracy and surface quality

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

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

When aging changes machine performance, noise, vibration, crease marks, or fish scales may appear.

Vibration Auto Adjustment can quickly eliminate noise and vibration even from machines with years of operation.

- **Deflection Auto Adjustment***

Maintaining high quality machined surfaces on dies/molds

With fast accleration/deceleration in the machining of dies and molds, etc, positioning error due to bending (ball screw expansion/contraction) can affect the machined surface quality.

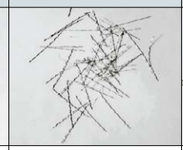
Deflection Auto Adjustment maintains the surface quality of die/mold machined surfaces by automatically adjusting the servo parameters to match the amount of bending, even when the amount of bending of the ball screw has changed and positioning error has occurred as a result of changes over time.

* X-Y axes AbsoScale detection specs are needed.

Smooth discharge of large amounts of chips

Recommended chip conveyors (Please contact an Okuma sales representative for details.)

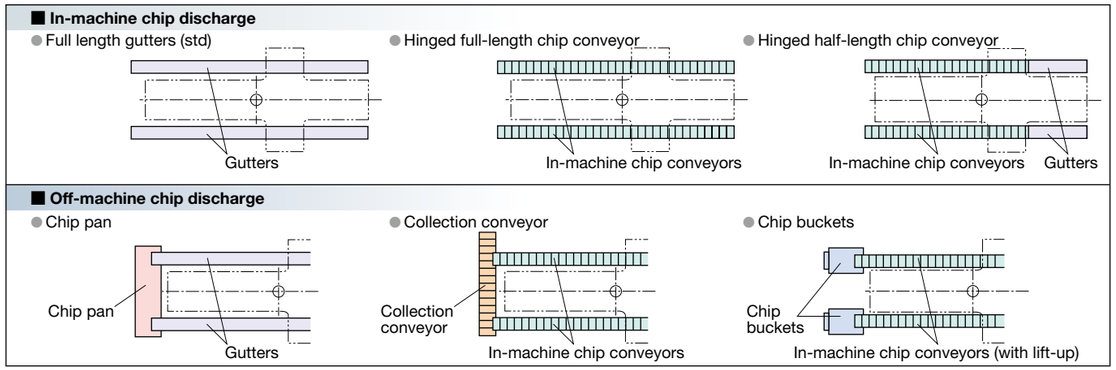
○: Recommended

Workpiece material		Steel, stainless steel	Cast iron	Aluminum/ non-ferrous metal	Mixed (general)	Special blank materials
Chip shape						Ceramic, carbon, glass, etc.
In-machine chip discharge	Full length gutters (std)	○	○	—	○	○
	Hinge type	○	○	○ (Alminum)	○	—
Off-machine chip discharge	Hinge + scraper with drum filter (recommended)	○	○*	○	○	—
	Hinge type	○	—	—	○	—

* Attachment of a magnet separator is recommended

Note: The specs recommended above are based on wet machining (including washer specifications). For dry machining, please contact our sales staff.

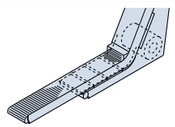
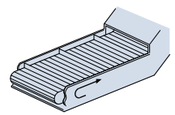
Example of chip conveyor placement



Note: Conveyor chip discharge direction (rear), off-machine chip conveyor discharge direction (operation side, magazine side), chip coolant tank position, etc. can be combined to match space. Please consult with your Okuma sales representative to confirm final arrangements.

Full length gutter

Collection conveyor chip discharge (lift-up conveyors)

Type	Hinge + scraper with drum filter	Hinge
Shape		

Machine Specifications

Model		MCR-C 25			MCR-C 30				MCR-C 35					MCR-C 45			
Item		25 × 40	25 × 50	25 × 65	30 × 50	30 × 65	30 × 80	30 × 100	35×50	35 × 65	35 × 80	35 × 100	35 × 120	45 × 65	45 × 80	45 × 100	45 × 120
Travel																	
X-axis (table front / back)	mm (in)	4,200 (165.35)	5,200 (204.72)	6,700 (263.78)	5,200 (204.72)	6,700 (263.78)	8,200 (322.83)	10,200 (401.57)	5,200 (204.72)	6,700 (263.78)	8,200 (322.83)	10,200 (401.57)	12,200 (480.31)	6,700 (263.78)	8,200 (322.83)	10,200 (401.57)	12,200 (480.31)
Y-axis (spindlehead left/right)	mm (in)	3,200 (125.98)			3,700 (145.67)				4,200 (165.35)					5,200 (204.72)			
Z-axis (ram up/down)	mm (in)	1,050 [1,250] (41.34 [49.21])															
W-axis (crossrail up/down)	mm (in)	1,000 (39.37)			1,200 (47.24)												
Effective width between columns	mm (in)	2,650 (104.33)			3,150 (124.02)				3,650 (143.70)					4,650 (183.07)			
Table to spindle nose	mm (in)	0 to 1,650 [0 to 1,550][*1] (0 to 64.96 [0 to 61.02][*1])			0 to 1,850 [0 to 1,750][*1] (0 to 72.83 [0 to 68.90][*1])				0 to 1,800 [0 to 1,700][*1] (0 to 70.87 [0 to 66.93][*1])					0 to 2,000 [0 to 1,900][*1] (0 to 78.74 [0 to 74.80][*1])			
Table																	
Working surface	mm (in)	2,000 × 4,000 (78.74 × 157.48)	2,000 × 5,000 (78.74 × 196.85)	2,000 × 6,500 (78.74 × 255.91)	2,500 × 5,000 (98.43 × 196.85)	2,500 × 6,500 (98.43 × 255.91)	2,500 × 8,000 (98.43 × 314.96)	2,500 × 10,000 (98.43 × 393.7)	3,000×5,000 (118.11 × 196.85)	3,000 × 6,500 (118.11 × 255.91)	3,000 × 8,000 (118.11 × 314.96)	3,000 × 10,000 (118.11 × 393.7)	3,000 × 12,000 (118.11 × 472.44)	3,700 × 6,500 (145.67 × 255.91)	3,700 × 8,000 (145.67 × 314.96)	3,700 × 10,000 (145.67 × 393.7)	3,700 × 12,000 (145.67 × 472.44)
Maximum load	kg (lb)	22,000 (48,400)	27,000 (59,400)	34,000 (74,800)	33,000 (72,600)	43,000 (94,600)	52,000 (114,400)	66,000 (145,200)	29,500 (64,900)	37,000 (81,400)	47,000 (103,400)	61,000 (134,200)	65,000 (143,000)	40,000 (88,000)	50,000 (110,000)	60,000 (132,000)	75,000 (165,000)
T-slots Width x No. <center pitch>	mm	24H7 × 11 (center 200, both ends 130)			24H7 × 13 (center 200, both ends 180)				24H7 × 15 (center 200)					24H7 × 19 (center 200, both ends 150)			
Height from machine bottom	mm (in)	850 (33.46)			900 (35.43)				950 (37.40)					1,050 (41.34)			
[Pallet][*2]																	
Working surface	mm (in)	2,000 × 3,700 (78.74 × 145.67)	2,000 × 4,700 (78.74 × 185.04)	2,000 × 6,200 (78.74 × 244.09)	2,500 × 4,700 (98.43 × 185.04)	2,500 × 6,200 (98.43 × 244.09)	2,500 × 7,700 (98.43 × 303.15)	2,500 × 9,700 (98.43 × 381.89)	3,000×4,700 (118.11 × 185.04)	3,000 × 6,200 (118.11 × 244.09)	3,000 × 7,700 (118.11 × 303.15)	3,000 × 9,700 (118.11 × 381.89)	—	—			
Maximum load	kg (lb)	8,000 (17,600)	10,000 (22,000)	13,000 (28,600)	12,000 (26,400)	15,000 (33,000)	20,000 (44,000)	24,000 (52,800)	14,000 (30,800)	18,000 (39,600)	21,000 (46,200)	25,000 (55,000)	—	—			
T-slots Width x No. <center pitch>	mm	24H7 × 11 (center 200, both ends 130)			24H7 × 13 (center 200, both ends 180)				24H7 × 15 (center 200)				—	—			
Height from machine bottom	mm (in)	1,200 (47.24)			1,250 (49.21)				1,350 (53.15)				—	—			
Spindle (Extension head)																	
Speed range	min^{-1}	10 to 4,000 [10 to 6,000][*3]															
Taper bore		7/24 taper No. 50															
Bearing diameter	mm (in)	ø100 (3.94) [ø85 (3.35)][*3] [High output specifications: ø130 (5.12)[*4], ø100 (3.94)[*5]]															
Feed rate																	
Rapid traverse	m/min (ipm)	X-Y: 24, Z: 15 (X-Y: 945, Z: 591)			X-Y: 24[*6], Z: 15 (X-Y: 945[*6], Z: 591)		X: 20, Y: 24[*6], Z: 15 (X: 787, Y: 945[*6], Z: 591)		X-Y: 24[*6], Z: 15 (X-Y: 945[*6], Z: 591)		X: 20, Y: 24[*6], Z: 15 (X: 787, Y: 945[*6], Z: 591)			X: 24, Y: 20[*6], Z: 15 (X: 945, Y: 787[*6], Z: 591)	X-Y: 20[*6] Z: 15 (X-Y: 787[*6], Z: 591)		
Cutting feed rate	mm/min (ipm)	1 to 10,000 (0.04 to 394)															
W-axis travel rate	m/min (ipm)	3 (118)															
Automatic Tool Changer																	
Tool shank		MAS BT50															
Pull stud		MAS2															
Tool magazine capacity	tools	50 [80, 100, 120, 180]															
Max tool diameter	mm (in)	w/ adjacent tools: ø135 (5.31); w/o adjacent tools: ø264 (10.39)															
Max tool length	mm (in)	600 (23.62)															
Max tool mass	kg (lb)	25 (55)															
Tool selection		Fixed adress															
Motors																	
Spindle drive	kW (hp)	45/37 (60/50) (30 min/cont) [37 (50) cont][*3]															
Axis feed drives	kW (hp)	X: 14.0 <9.4[*7]>, Y: 9.4, Z: 5.2 × 2 (X: 18.6 <12.5[*7]>, Y: 12.5, Z: 6.9 × 2)															
Crossrail elevating	kW (hp)	W: 5.2 × 2 (6.9 × 2)							W: 5.6 × 2 (7.5 × 2)								
Power Sources																	
Electrical power supply	kVA	90[*8]															
Compressed air supply	L/min (ANR)	1,000 (0.5 MPa or more)[*8]															
Machine Size																	
Height	mm (in)	6,620 (260.63)			6,900 (271.65)									7,200 (283.46)			
Floor space (machine only)	mm (in)	7,810 × 10,730 (307.48 × 422.44)	7,810 × 12,830 (307.48 × 505.12)	7,810 × 16,430 (307.48 × 646.85)	8,310 × 12,830 (327.17 × 505.12)	8,310 × 16,430 (327.17 × 646.85)	8,310 × 19,430 (327.17 × 764.96)	8,310 × 23,930 (327.17 × 942.13)	8,835 × 12,830 (347.83 × 505.12)	8,835 × 16,430 (347.83 × 646.85)	8,835 × 19,430 (347.83 × 764.96)	8,835 × 23,930 (347.83 × 942.13)	8,835 × 27,930 (347.83 × 1,099.61)	9,895 × 16,430 (389.57 × 646.85)	9,895 × 19,430 (389.57 × 764.96)	9,895 × 23,930 (389.57 × 942.13)	9,895 × 27,930 (389.57 × 1,099.61)
Mass (machine only)[*9]	kg (lb)	49,000 (107,800)	55,000 (121,000)	63,000 (138,600)	61,000 (134,200)	70,000 (154,000)	83,000 (182,600)	91,000 (200,200)	68,000 (149,600)	78,000 (171,600)	92,000 (202,400)	102,000 (224,400)	116,000 (255,200)	107,000 (235,400)	124,000 (272,800)	139,000 (305,800)	158,000 (347,600)
CNC		OSP-P500M															

[ ]: Option

*1. With 250 mm long extension head

*2. In the case of APC specs (option), please also consider the high column because the distance from the end of the spindle to the top of the pallet will be shorter.

*3. 6,000 min^{-1} specs

*4. 4,000 min^{-1} specs

*5. 6,000 min^{-1} specs

*6. Deceleration near both ends of Y-axis travel

*7. 25 × 40

*8. Standard specs

*9. With 50-tool magazine, 2-station AAC

MCR-C Standard Accessories

Main motor and standard electricals		Magazine tool loader	
Main spindle and gear box cooler	Oil temperature controller	ATC magazine safety fence	
Thermo-Friendly specifications	TAS-S, TAS-T	Column slideway covers	
Extension head	4,000 min^{-1} L150 45 kW	Crossrail clamp system	
Synchronized NC W-axis		Seesaw pendant operation panel	Elevation: 600 mm
Hydraulic unit		Work lamp	LED
Automatic Tool Changer (ATC)	50 tools	Status indicator	3-color LED
Z-axis double ball screw		Door interlock	
Full length gutter	Both machine sides	Tool kit	
ATC air blower (blast)		Tapered bore cleaning bar	
Spindle air curtain		Tool box	

MCR-C Kit Specifications

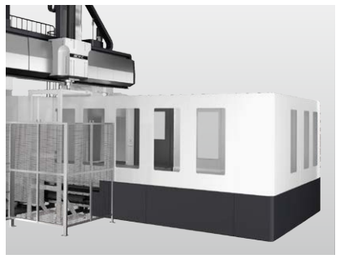
Machine kit specs Kit	S	A	P	AP
Attachment head ATC	●	●	●	●
Attachment head auto attaching/indexing unit (AAC)		●		●
Attachment head manual tool changing	●	●	●	●
Attachment head coolant lines	●	●	●	●
Auto pallet changer (APC) preparations			●	●
X-axis 2.0 m travel extension (side shuttle APC)			●	●

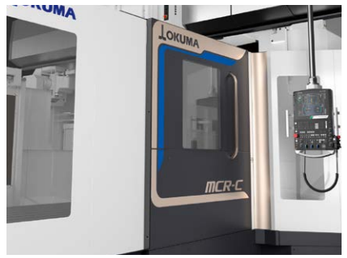
MCR-C Optional Specifications

Automatic pallet changer (APC)	2-pallet side shuttle (2.0 m extension in X-axis travel)	Thermo-Friendly specifications	Premium (includes TAS-S)
		Dust-proofing	
Average continuous cutting with limited upper feedrate	X, Y, Z: 6 m/min, X, Y: 10 m/min, Z: 6 m/min	NC rotary tables	NC rotary table, inclined rotary table
		Mist collector	
Optional Z-axis travel	1,250 mm	Dust collector	
Coolant system		Full-enclosure shielding	w/o ceiling
Coolant tank	500 L, 1,000 L, 1,500 L, 2,000 L		w/ ceiling
Coolant heater/cooler			Column front/back covers
Oil skimmer		Auto Attachment Head Compensation	
Filtration system			
Semi-dry machining	Thru-spindle, nozzle	AbsoScale detection*3	X-Y-Z axes, X-Y axes
Thru-spindle coolant*1	High/low pressure switch (2 MPa, 7 MPa)	3D Smart Calibration System	Includes linear axis error measurement, spatial compensation, and accuracy stability diagnosis
Centralized coolant application			
Coolant pump	0.75 kW, 1.1 kW		
Oil mist coolant	Insert nozzle	Auto tool length compensation & breakage detection	Touch sensor system, Laser sensor system
Oil-hole coolant system	Simple system, High/low pressure switch (2 MPa)	Auto gauging & auto zero offset	Touch probe
Chip air blower (blast)		In-machine chip conveyors	Full length, lift-up type Half length, lift-up type
ATC tool magazine capacity	80, 100, 120, 180 tools		
ATC tools	Heavy tool (35 kg × 120 mm)	Chip flushers	Crossrail shower (L/R column front), front/back gutters with telescopic covers, workpiece wash gun
Tool shank	CAT 50, DIN 50		
Spindle speeds (No. 50)	10 to 6,000 min^{-1}		
Pull stud	MAS1, special CAT	Collection chip conveyors	Hinged, hinge + scraper (w/ drum filter) Hinged + magnetic separator
Table T-slot width	20H7, 22H7, 28H7		
Table cross slot width	Please consult for width depth, pitch	Chip buckets	L type, H type
Optional table width	+300 mm	Pendant arms	Parallel linked, manual, electric, floor mounted, front/back travel types
High column specs	200 mm increments (please inquire for +400 mm or higher)		
Optional W-axis travel*2	Standard travel +200 mm (please inquire for +400 mm or higher)	Foundation methods	Foundation bolts, chemical anchors, no foundation bolts (foundation pad only)
Fire regulations compliance		Machine foundation pit work	50 to 1,400 mm
Ram oil pan slush collector		Optional control cabinet positions	
Attachment head accelerator preps			
Angle head preps			
Auto attachment changer (AAC)	2 stations to 7 stations		
Attachment head	Please consult		

*1. Dedicated Okuma pull studs required for thru-spindle coolant
*2. Depending on the spec conditions, certain applications may not be possible.
*3. X-axis linear scale required for n × 65 and larger machines (X-axis travel larger than 6,700 mm)

Main options





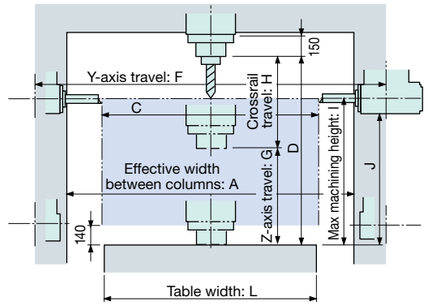
Full enclosure shielding without ceiling

ATC 100 tools

Working ranges

Machinable area (extension head (L150), 90° angular head (L150) used, tool length = 300 mm)

Unit : mm



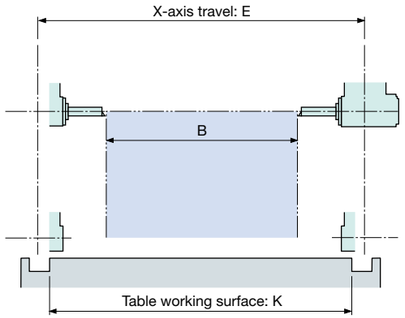
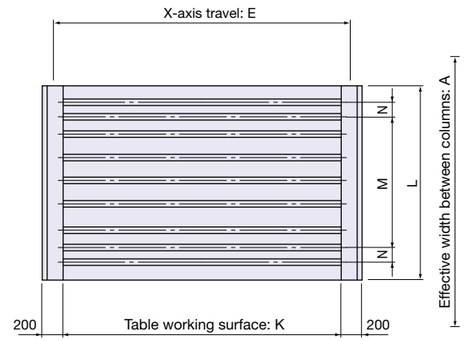
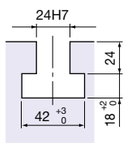


Table dimensions



T-slot details



Unit: mm

Size	A	B	C	D	E	F	G	H	I	J	K	L	M	N
25×40	2,650	3,240	2,240	0 to 1,650	4,200	3,200	1,050	1,000	1,350	1,538	4,000	2,000	8×200 =1,600	130
25×50		4,240			5,200						5,000			
25×65		5,740			6,700						6,500			
30×50	3,150	4,240	2,740	0 to 1,850	5,200	3,700		1,200	1,550	1,738	5,000	2,500	10×200 =2,000	180
30×65		5,740			6,700						6,500			
30×80		7,240			8,200						8,000			
30×100		9,240			10,200						10,000			
35×50	3,650	4,240	3,240	0 to 1,800	5,200	4,200			1,500	1,688	5,000	3,000	12×200 =2,400	200
35×65		5,740			6,700						6,500			
35×80		7,240			8,200						8,000			
35×100		9,240			10,200						10,000			
35×120		11,240			12,200						12,000			
45×65	4,650	5,740	4,240	0 to 2,000	6,700	5,200			1,700	1,888	6,500	3,700	16×200 =3,200	150
45×80		7,240			8,200						8,000			
45×100		9,240			10,200						10,000			
45×120		11,240			12,200						12,000			

• Dimensions may change depending on the type of attachment head.
• Dimensions may change depending on options, such as APC specs, high column specs or optional travel.

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 control 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.

15-inch operation panel

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.

1 Digital Twin On PC*

Simulate shop machines in the office

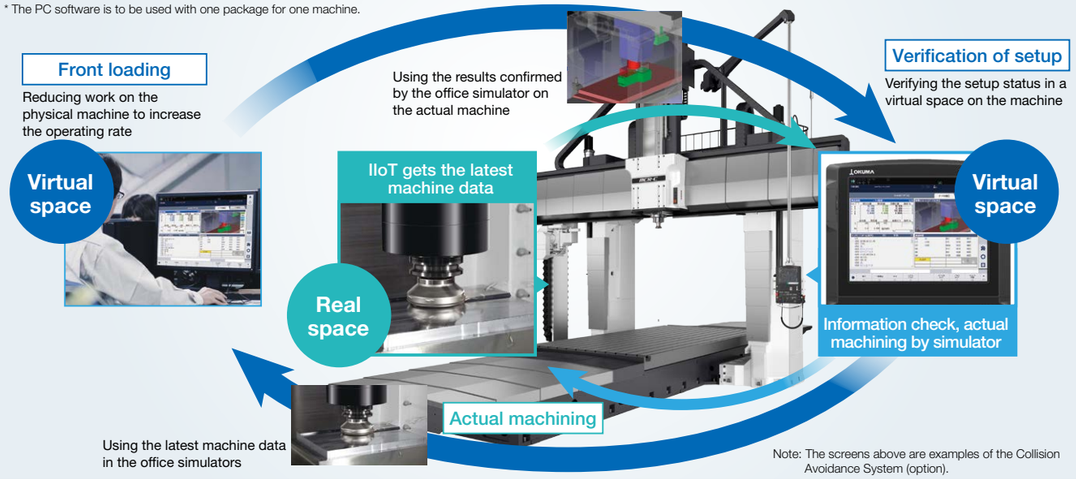
Front loading is performed with the actual status matched with the data on the office PC to further improve productivity.
Highly accurate pre-verification minimizes trial and error in first part machining, and reduces machine downtime to the minimum.

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.

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



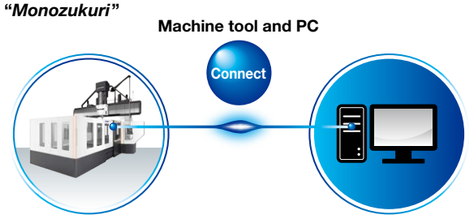
Note: The screens above are examples of the Collision Avoidance System (option).

Connect Plan

Get Connected, Get Started, and Get 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.



OSP-P500M standard specifications

Basic Specs	Control	X, Y, Z, W, simultaneous 4 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%, rapid traverse override 0 to 100%
	Spindle control	Direct spindle speed commands, override 30 to 300%, multi-point indexing
	Tool compensation	No. of registered tools: Max 999 sets, tool length/radius compensation: 3 sets per tool
	Display	15-inch color LCD + multi-touch panel operations
	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-Friendly (TAS-S: Thermo Active Stabilizer – Spindle, TAS-T: Thermo Active Stabilizer – Table), Hi-Cut Pro, Pitch error compensation, Hi-G control, SERVONAVI*1, Cycle time reduction (operation time reduction, machining time shortening, easy parameter setting)
Energy-saving functions	ECO suite plus	ECO Idling Stop, ECO Operation, oil temperature controller auto control, ECO Power Monitor*2
	Power Regeneration System	Regenerative power is used when the spindle and feed axes decelerate to reduce energy waste.

*1. For Deflection Auto Adjustment included in the specs, X-Y axes AbsoScale detection specs are needed.
*2. The power display shows estimated values. When precise electrical values are needed, select the wattmeter option.

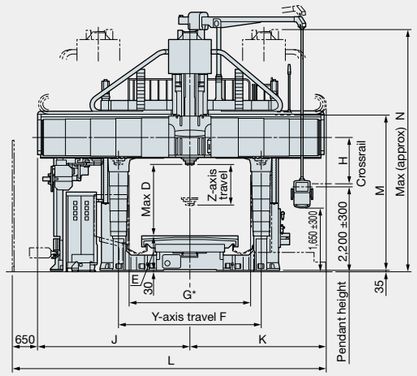
OSP-P500M kit specifications/optional specifications

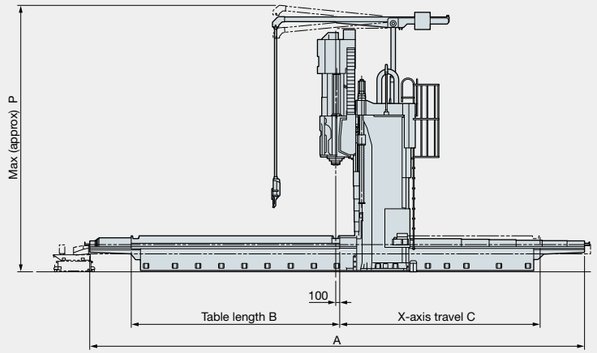
Item \ Kit Specs	NML E	NML D	AOT E	AOT D	DT E	DT D	DT AOT E	DT AOT D
Digital Twin								
Virtual Machining					● (VE)	● (VD)	● (VE)	● (VD)
Quick Modeling					● (VE)	● (VD)	● (VE)	● (VD)
OPC UA for Machine Tools					●	●	●	●
OSP API KIT					●	●	●	●
Interactive functions								
Advanced One-Touch IGF-M (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	●		●		●		●	
Coordinate system select (Std: 20 sets) — 200 sets		●		●		●		●
Coordinate system select (Std: 20 sets) — 400 sets								
Helical cutting (within 360 degrees)	●	●	●	●	●	●	●	●
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								
3-D tool compensation								
Coordinate change and drawing conversion — Programmable mirror image (G62)		●		●		●		●
Coordinate change and drawing conversion — Enlarge/reduce (G50, G51)		●		●		●		●
User task — Common variables 1,000, 2,000 pcs								
User task — G code macros: 80 sets added								
User task — I/O variables (16 each)								
Sequence stop	●	●	●	●	●	●	●	●
Sequence return — Mid-block sequence return		●		●		●		●
Tool wear compensation — Includes input restriction	●	●	●	●	●	●	●	●
Tool life management — Includes warning	●	●	●	●	●	●	●	●
Leading edge offset								
Inverse time feed								
Alignment compensation								
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								
Auto Workpiece Gauging/Auto zero offset								
Manual gauging (w/o sensor)	●	●	●	●	●	●	●	●
Interactive gauging (touch sensor, touch probe required)								
Monitoring								
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* — Feed axes								
Machine Status Logger								
Cutting Status Monitor								
Machining Navi M-gII (cutting condition search)								
Feed axis retraction								
Tool retract cycle								
Automation / unattended operation								
Warm-up (calendar timer)								
External program — Button, rotary switch / BCD (2-digit, 4-digit)								
High-speed, high-precision								
Auto Attachment Head Compensation								
Thermo-Friendly Premium								
AbsoScale detection — X-Y-Z axes								
Straightness compensation								
Dynamic displacement compensation	●	●	●	●	●	●	●	●
0.1 µm control (linear axis commands)								
Hyper-SurfaceII — 3 linear axes + 2 rotary axes								
3D Smart Calibration System								
Accuracy Stability Diagnosis								
Simultaneous 5-axis kit								
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]								

Notes: 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.
Specifications, etc. are subject to change without notice.
* With AbsoScale detection specs, ball-screw wear detection is possible.

Dimensional Drawin





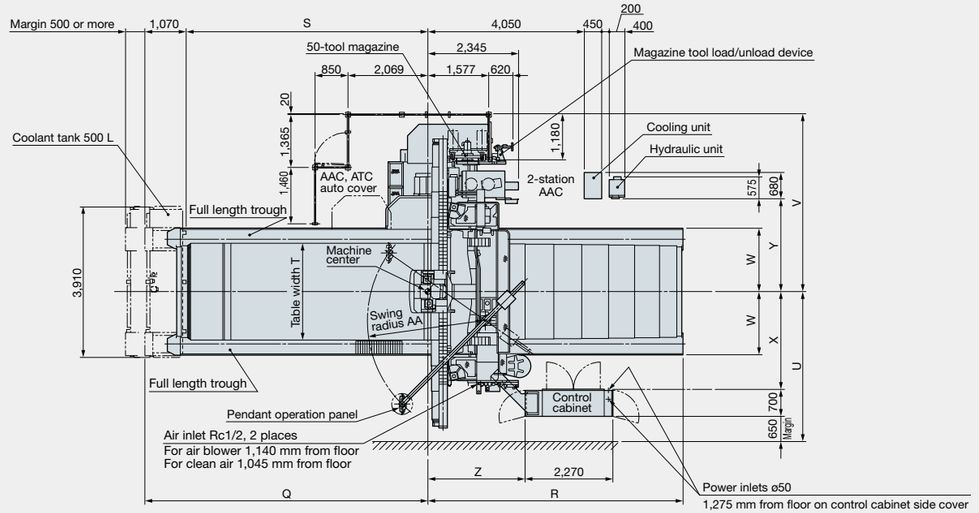
* Effective width between columns

Unit: mm

	Size	A	B	C	D	E	F	G	H	J	K	L	M	N	P
MCR-C 25	25×40	10,730	4,400	4,200	1,650 (1,550)	850	3,200	2,650	1,000	3,700	3,275 [3,365]	7,625 [7,715]	3,650	6,030 [6,230]	6,620 [6,820]
	25×50	12,830	5,400	5,200											
	25×65	16,430	6,900	6,700											
MCR-C 30	30×50	12,830	5,400	5,200	1,850 (1,750)	900	3,700	3,150	1,200	3,950	3,535 [3,625]	8,135 [8,225]	4,025	6,280 [6,480]	6,900 [7,100]
	30×65	16,430	6,900	6,700											
	30×80	19,430	8,400	8,200											
	30×100	23,930	10,400	10,200											
MCR-C 35	35×50	12,830	5,400	5,200	1,800 (1,700)	950	4,200	3,650	1,200	4,200	3,795 [3,885]	8,645 [8,735]	4,025	6,280 [6,480]	6,900 [7,100]
	35×65	16,430	6,900	6,700											
	35×80	19,430	8,400	8,200											
	35×100	23,930	10,400	10,200											
	35×120	27,930	12,400	12,200											
MCR-C 45	45×65	16,430	6,900	6,700	2,000 (1,900)	1,050	5,200	4,650	1,200	5,025	4,365 [4,365]	9,915 [9,915]	4,425	6,580 [6,780]	7,200 [7,400]
	45×80	19,430	8,400	8,200											
	45×100	23,930	10,400	10,200											
	45×120	27,930	12,400	12,200											

Notes: Dimensions may change depending on specifications.
( ) dimensions for machines with 250 mm long extension head
[ ] dimensions for machines with 1,250 mm Z-axis travel.

Installation Drawing



This drawing show outline of standard machine. These dimensions will change if optional specifications are selected.
And depending on the destination country or region, full enclosure or safety fences are required.

Unit: mm

	Size	Q	R	S	T	U	V	W	X	Y	Z	AA
MCR-C 25	25×40	6,275	5,555	5,205	2,000	3,630	4,350	1,386	2,280	2,150	2,465	3,050
	25×50	7,325	6,605	6,255								
	25×65	9,125	8,405	8,055								
MCR-C 30	30×50	7,325	6,605	6,255	2,500	3,880	4,600	1,636	2,530	2,400	2,515	3,050
	30×65	9,125	8,405	8,055								
	30×80	10,625	9,905	9,555								
	30×100	12,875	12,155	11,805								
MCR-C 35	35×50	7,325	6,605	6,255	3,000	4,130	4,850	1,886	2,780	2,650	2,515	3,050
	35×65	9,125	8,405	8,055								
	35×80	10,625	9,905	9,555								
	35×100	12,875	12,155	11,805								
	35×120	14,875	14,155	13,805								
MCR-C 45	45×65	9,125	8,405	8,055	3,700	4,750	5,550	2,386	3,400	3,050	2,635	3,250
	45×80	10,625	9,905	9,555								
	45×100	12,875	12,155	11,805								
	45×120	14,875	14,155	13,805								

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MCR-C

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

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