

5-Axis Horizontal Machining Center

**UNIVERSAL CENTER *MU-10000H***



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**MU-10000H**



Large horizontal machining center for beautiful finishing of large, complex parts with 5-axis multi-sided machining



Photographs used in this brochure may show optional equipment.

# Experience the power of process-intensive machining with 5-axis multitasking

Simultaneous 5-axis machining (linear and rotary), for single chucking applications with less fixturing. Resulting in shorter lead-times with improved productivity.

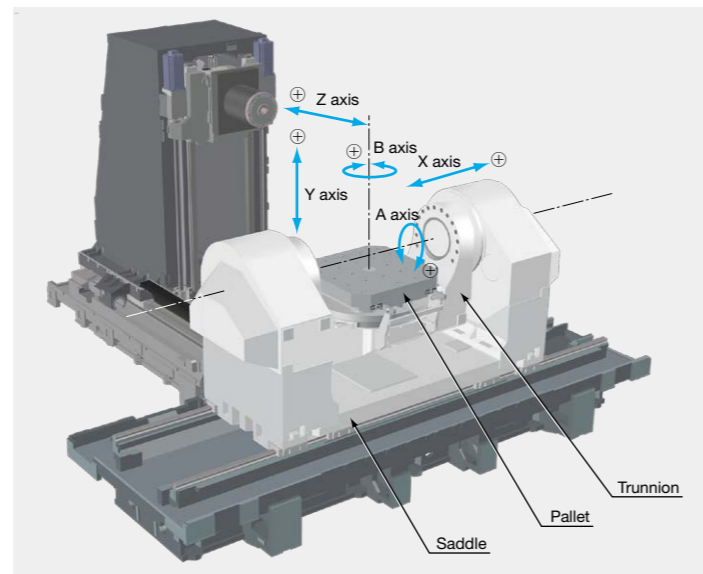


## Beefy torque makes easy work even of difficult-to-machine material

- Integral motor/spindle: **1,071 N-m**
- Gear spindle: **1,920 N-m** (Optional)

## Large working range to handle large parts

- Maximum working range **ø1,500 × h1,175 mm**
- Pallet size **1,000 × 1,000 mm**
- Axis travel  
**X: 1,550 mm**  
**Y: 1,600 mm**  
**Z: 1,650 mm**



## Highly rigid machine structure

### Bed and column to achieve heavy-duty cutting

- Ideal rib layout to resist bending and torsion

### Smooth, powerful, and highly accurate axis drive system

- High accuracy double ball screws are used on X, Y, and Z axes
- Double motor drive system on A, B axes

### Thermal deformation controlled for high-accuracy machining

- Ball screw and motor base cooling on X, Y, Z axes
- A, B axes drive unit cooling

# Highly efficient machining with outstanding machining capacity

## Machining capacity (material S45C)

Gear spindle: 4,500 min<sup>-1</sup>, 40/30 kW (15 min/cont) (Optional)

### ø250 face mill, 10 blade (cermet)

- Stock removal: **1,000 cm<sup>3</sup>/min**
- Spindle speed: 293 min<sup>-1</sup>
- Cutting speed: 230 m/min
- Width × depth: 175 × 6 mm
- Feedrate: 953 mm/min

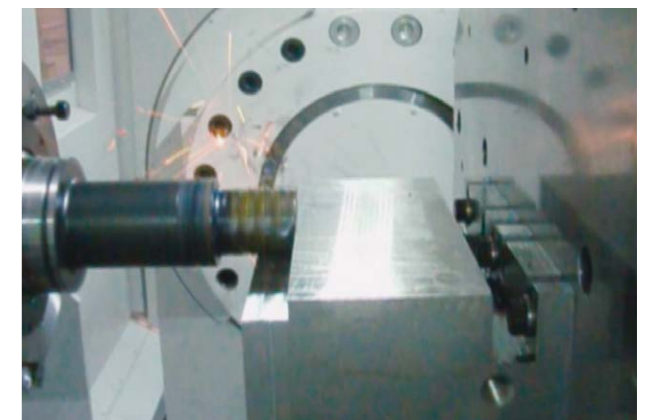
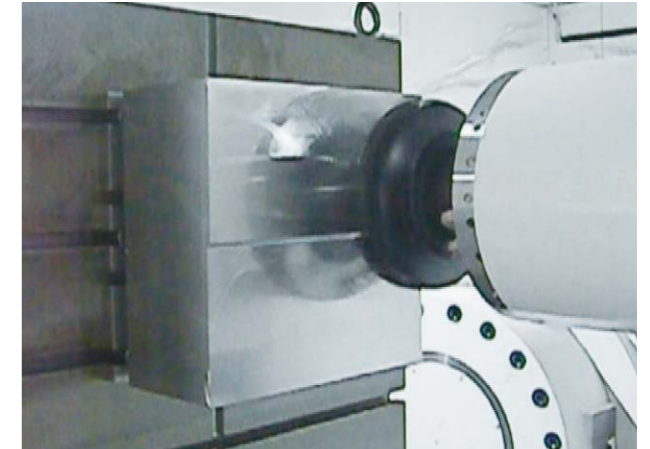
### ø63 end mill radial facing, 4 blade (carbide)

- Stock removal: **602 cm<sup>3</sup>/min**
- Spindle speed: 1,415 min<sup>-1</sup>
- Cutting speed: 280 m/min
- Width × depth: 10 × 35 mm
- Feedrate: 1,720 mm/min

### ø50 end mill radial facing, 3 blade (carbide)

- Stock removal: **700 cm<sup>3</sup>/min**
- Spindle speed: 1,780 min<sup>-1</sup>
- Cutting speed: 280 m/min
- Width × depth: 50 × 10 mm
- Feedrate: 1,400 mm/min

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



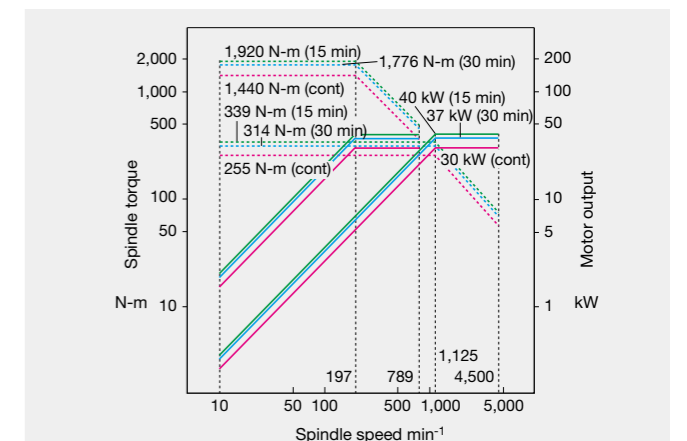
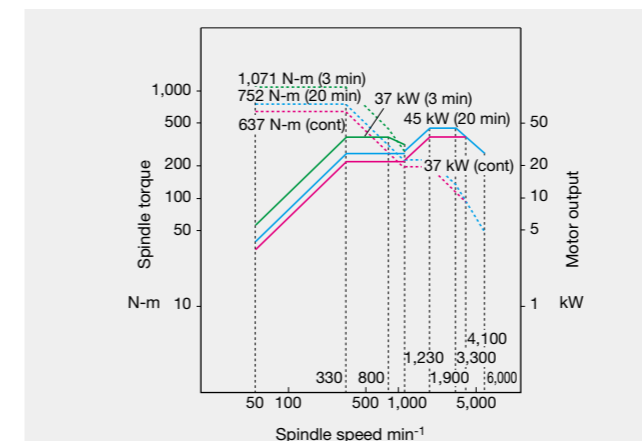
## High-torque spindle: 1,071 N-m (integral motor/spindle), 1,920 N-m (gear spindle)

### Integral motor/spindle (Standard)

- Speed 6,000 min<sup>-1</sup>
- Max output 45/37 kW (20 min/cont)
- Max torque 1,071/637 N-m (3 min/cont)

### Gear spindle (Optional)

- Speed 4,500 min<sup>-1</sup>
- Max output 40/30 kW (15 min/cont)
- Max torque 1,920/1,440 N-m (15 min/cont)



# Trunnion table that supports high speed, high accuracy machining of large parts



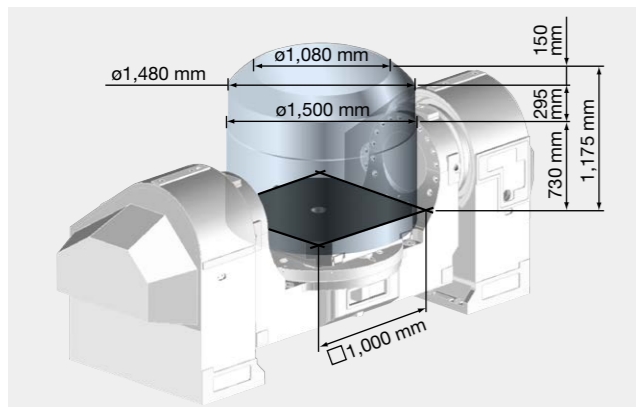
## Working range suited to large part machining

### Swing ranges

- A axis (table swing) +35 to -115°
- B axis (pallet swing) 360°

### Max workpiece

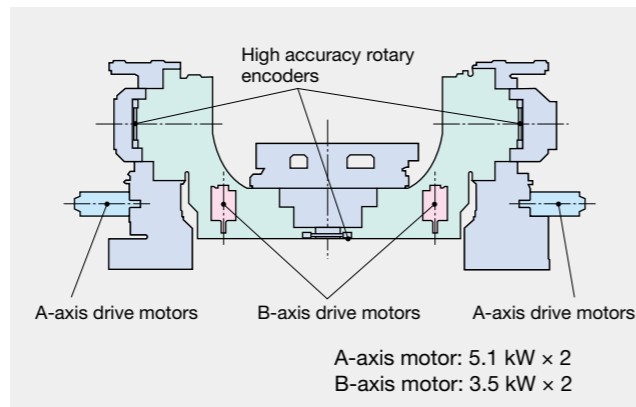
- Max workpiece swing diameter  $\phi 1,500$  mm
- Max workpiece height 1,175 mm
- Max workpiece weight 2,500 kg



## High speed trunnion table

- A and B axes have double motor drive for good responsiveness and rapid movements
- High accuracy indexing with highly accurate Okuma rotary encoder directly linked to table and trunnion
- A- / B-axis swing: 12 / 20 min<sup>-1</sup>
- A- / B-axis indexing (90°): 1.52 / 1.14\* sec
- A-axis indexing / return accuracy:  $\pm 0.4$  /  $\pm 0.1$  sec
- B-axis indexing / return accuracy:  $\pm 1.0$  /  $\pm 0.1$  sec

\* Without clamping time



# Ease of operation improves productivity



Smooth approach from operation panel to machining chamber



Outstanding access to tools, workpieces  
· Emphasis on operator visibility and easy confirmation of tool edge and machining portions



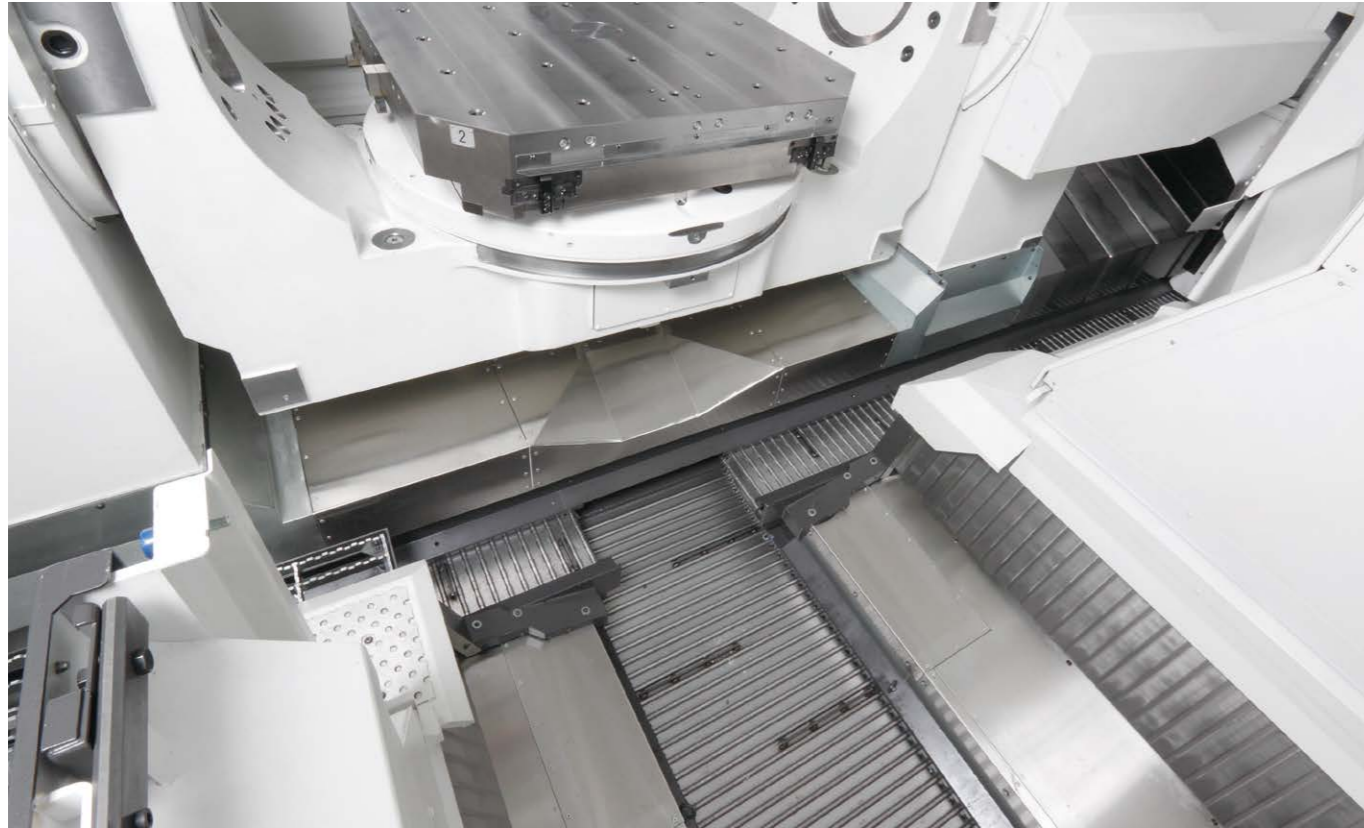
Cleaner and simpler spindle shape for less interference with workpiece in 5-axis machining.



Thorough consideration of fixture workability in APC  
· Basically flat chamber floor for easy fixture work and cleaning  
· Working space provided on workpiece periphery  
· Crane loading is easy with large double-door opening

# Smooth discharge of large volumes of chips from long-run machining

## Chip discharge

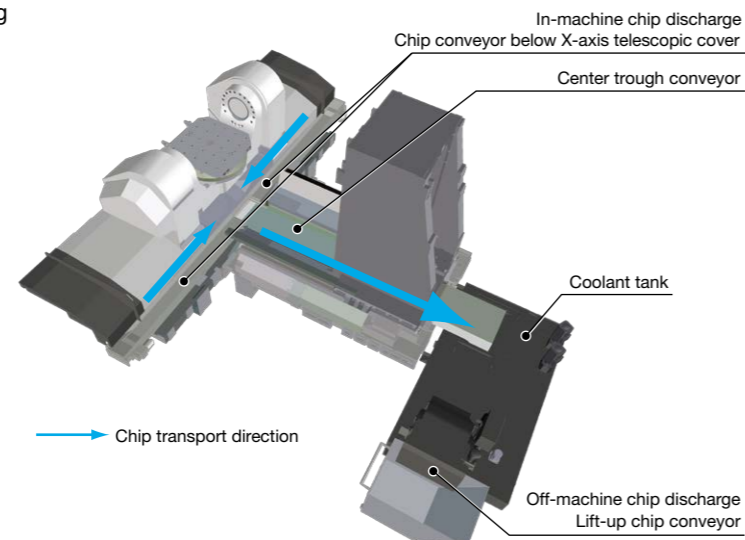


- A hinged conveyor beneath the center trough and X-axis telescopic cover facilitate smooth transfer of chips.
- Clean, simple covering prevents chips from accumulating in the machining chamber.

In-machine chip conveyor (hinged)



Off-machine chip conveyor (hinged scraper with drum filter)

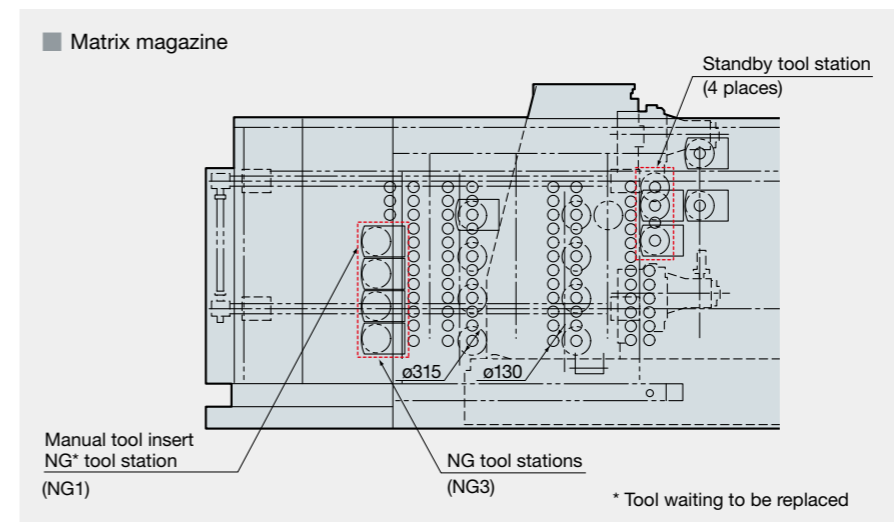


\*See p. 14 for recommended conveyor specifications

# Flexible production of large-variety workpiece applications

## Tool changer (ATC), matrix magazine type

- Fast, space-saving matrix magazine system with low energy use drive is standard
- Open-ceiling magazine door for storage of heavy tools with crane
- Shorter tool preparation times: minimum 18 seconds
- Reduced machine width



Open ceiling magazine door

ATC tools	ATC Tool Specs				Max tool length Max tool mass Max tool moment
	Max diameter/storage				
	w/ adjacent	Storage	w/o adjacent	Storage	
81 tools	$\phi 130$ mm	81 tools (59 tools* <sup>1</sup> )	$\phi 315$ mm	8 tools	● Max tool length 600 mm
129 tools		129 tools (107 tools* <sup>1</sup> )			● Max tool mass 30 kg
177 tools		177 tools (155 tools* <sup>1</sup> )			● Max tool moment 37 N-m

\*1. Magazine capacity for  $\phi 130$  mm or less tools when all 8  $\phi 315$  mm tools are attached

## Flexible pallet change

- 2-pallet parallel shuttle APC (Standard)
- 6-pallet APC (Optional)

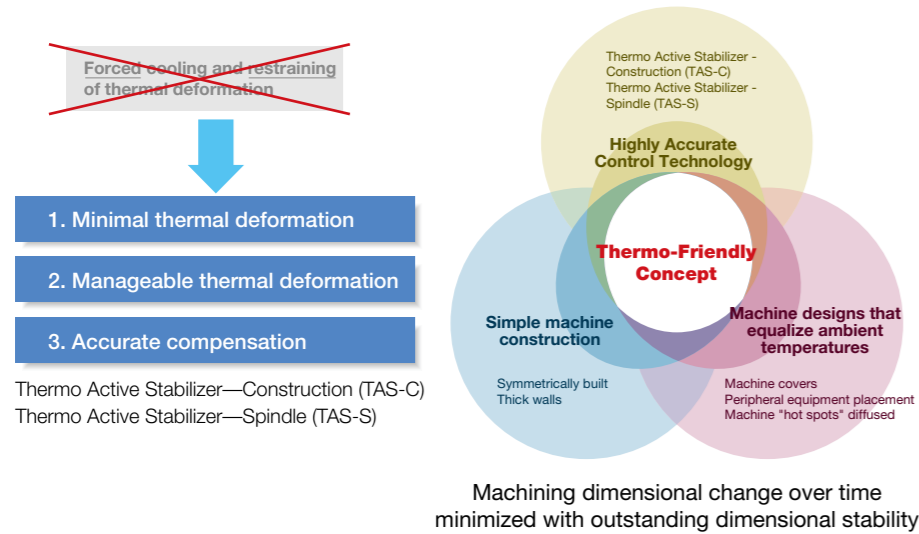


# High-precision machining on a large machine



The unique approach of “accepting temperature changes”  
**Thermo-Friendly Concept**

## Thermo-friendly structure gives outstanding thermal stability



## TAS-C (Thermo Active Stabilizer—Construction) [Optional]

The TAS-C environmental thermal deformation control accurately controls the machine’s structural thermal deformation; by taking into consideration the machine’s thermal deformation characteristics, temperature data from properly placed sensors, and feed axis positioning information.



Gauging and compensation of geometric error  
**5-Axis Auto Tuning System** (Optional)

## Higher accuracies in 5-axis machining

5-axis machining accuracy is greatly affected by misalignment and other “geometric errors” on the rotary axis. The 5-Axis Auto Tuning System measures geometric error using a touch probe and datum sphere, and performs compensation using measurement results to tune the movement accuracy on 5-axis machines. In this way 5-axis machining accuracy on a higher level is achieved.

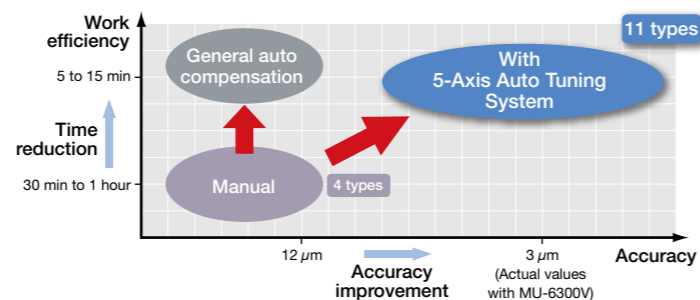


## TAS-S (Thermo Active Stabilizer—Spindle) [Optional]

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.

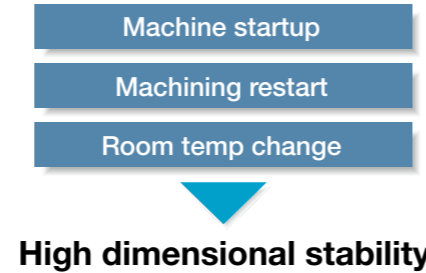
## Quick and easy tuning by anyone

Previously, manual measurements of the indexing center were bothersome and time-consuming, but with the 5-Axis Auto Tuning System the measurements are made automatically by the machine. Measurements can therefore be done with stable accuracy in a short time by anyone. (Up to 11 geometric errors tuned automatically.) In addition, the results of tuning are applied regardless of whether the operation in auto, manual, or MDI and whether Tool Center Point Control is on or off. Setup and machining can therefore be done with the same operations as before.



## Eliminate waste with the Thermo-Friendly Concept

In addition to maintaining high dimensional accuracy when room temperature changes, Okuma’s Thermo-Friendly Concept provides high dimensional accuracy during machine startup and machining restart. To stabilize thermal deformation, warming-up time is shortened and the burden of dimensional correction during machining restart is reduced.



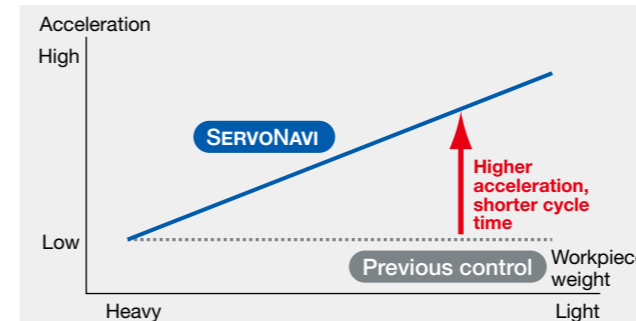
Optimized Servo Control  
**SERVO NAVI**

Achieves long term accuracy and surface quality

## SERVO NAVI AI (Automatic Identification)

### 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 servo parameters, including acceleration, to the optimum values. Cycle times are shortened with no changes to machining accuracy.



### Inertia Auto Setting

Maintaining high accuracy and stable operations

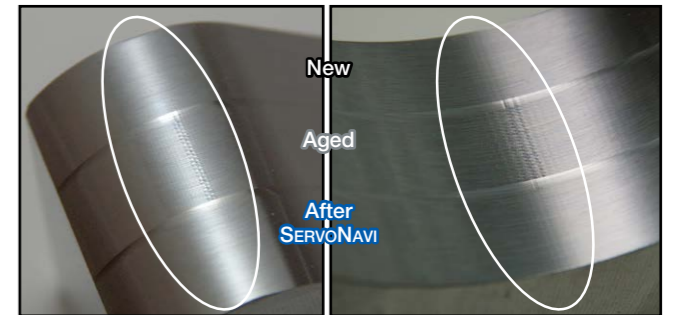
When workpieces or fixtures are changed, inertia mass also changes, sometimes resulting in greater positioning error of the rotary axis.

Inertia Auto Setting estimates workpiece/fixture inertia mass from acceleration torque and automatically changes servo parameter settings to the optimum values so that high accuracy and stable movement can be maintained.

## SERVO NAVI 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). 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

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.

Next-Generation Energy-Saving System  
**ECO suite**

A suite of energy saving applications for machine tools

## ECO Idling Stop Accuracy ensured, cooler off

Intelligent energy-saving function with the Thermo-Friendly Concept. The machine itself determines whether or not cooling is needed and cooler idling is stopped with no loss to accuracy. Electricity consumption during non-machining time greatly reduced with “ECO Idling Stop”, which shuts down each piece of auxiliary equipment not in use. (Standard application on machines with Thermo-Active Stabilizer—Spindle)

## ECO Power Monitor On-the-spot check of energy savings

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

## ECO Operation (Optional) Intermittent/continuous operation of chip conveyor and mist collector during operation

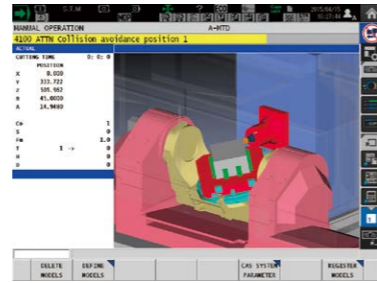
## ECO Hydraulics (Optional) Energy-saving hydraulic unit using servo control technology

# High accuracy machining with advanced technology

## Collision prevention Collision Avoidance System

### 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.



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

\* Harmonic Spindle Speed Control available only with M-i or M-g II+. (N/A with M-g II.)

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

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

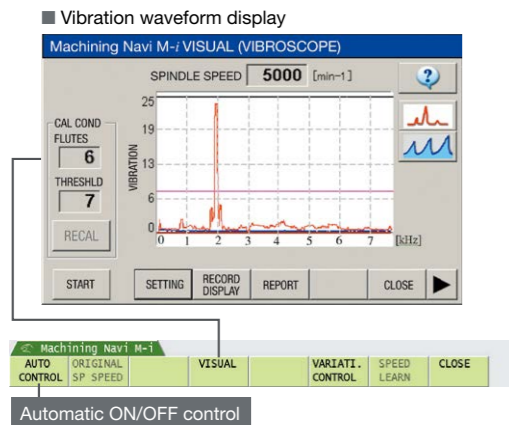
● Available only with Okuma integral motor/spindles. (N/A with gear spindles.)

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

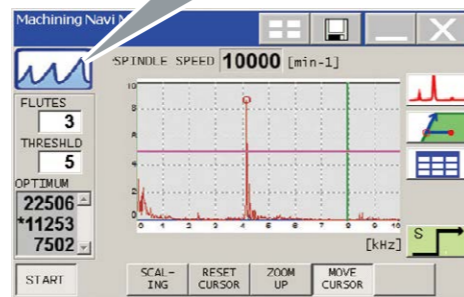
Navigates effective measures by detecting and analyzing machining chatter with a microphone attached to the machine.

- M-gII+: compatible with integral spindles
- M-gII : compatible with gear spindles

Machining Navi (OSP) provides the answer!



- This sign indicates a change to the optimum spindle speed.
- This sign indicates that spindle speed is being changed.
- This sign indicates that the cutting load needs to be reduced.



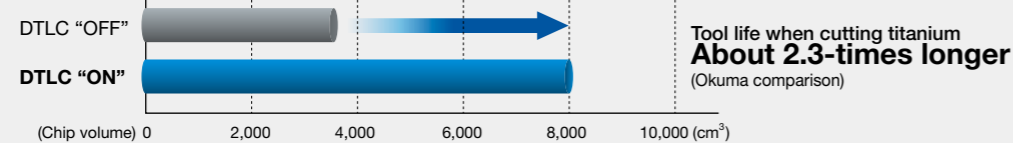
## Dynamic Tool Load Control (Optional)

### Prevents chipping, extends tool life

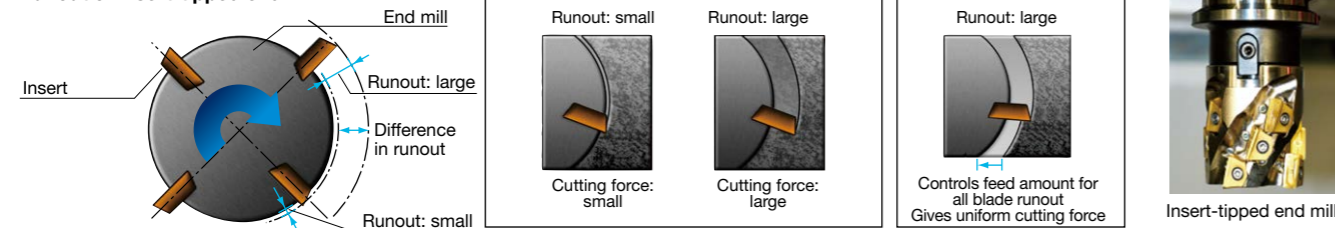
When machining of difficult-to-cut material, chipping from blade runout often occurs with insert-tipped end mills. To stabilize such machining, solid end mills with high tool costs have generally been used.

Dynamic Tool Load Control gives uniform cutting force with advanced synchronization of spindle phase and feed rate to control end mill chipping. This improves tool life and stabilizes machining. Switching from expensive solid tools also leads to reduced tool costs.

[Actual data] Chip volume per tool under the same cutting conditions (tool life)



### Runout of insert-tipped end mill



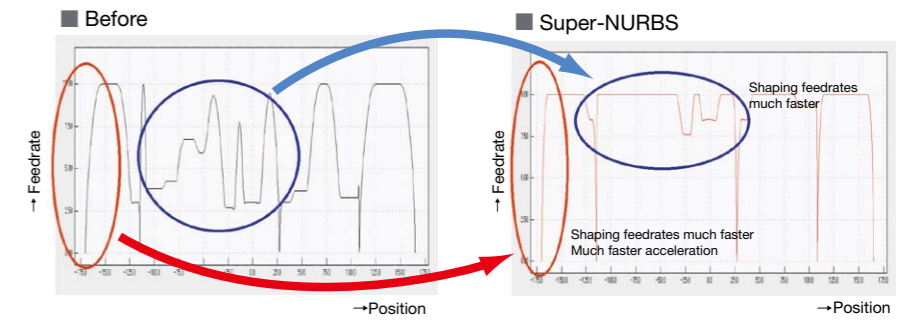
Note: The above are actual examples. Your results may vary due to differences in specifications, tooling and cutting conditions.

# With simultaneous 5-axis control that produces excellent machined surface quality

## Simultaneous 5-axis kit makes it even easier Because "Machine & Control" OSP provides advanced features

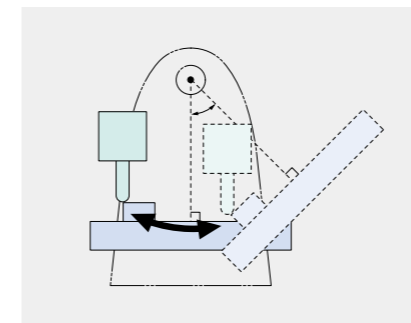
### High Speed Contouring Super-NURBS (5-axis specs) (Optional)

High speed NC function for high accuracy, high quality, and high speed machining of curved surfaces of any shape with newly-developed "sculptured-surface adaptive acceleration control."



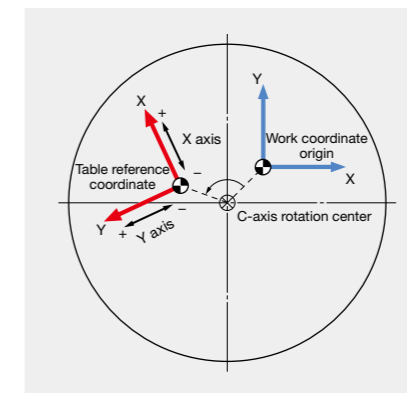
### Tool Center Point Control Manual Feed (Optional)

This feature will provide rotary operation with a tool point as the center when operating the rotary axes manually. When the table is swiveled, axis movement will occur with no change in the tool position on the workpiece.



### Table Origin Coordinate Manual Feed (Optional)

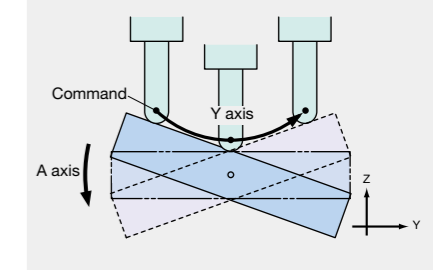
A feature to perform X-Y-Z-axis manual feed (rapid traverse, cutting feed, pulse handle) when origin coordinate systems shift on a swiveling table.



### Tool Center Point Control II (Optional)

Function controls the path of the tool tip with respect to the workpiece on each axis so that the tool tip trajectory is linear with the axis travel command including the A, B, and C axes.

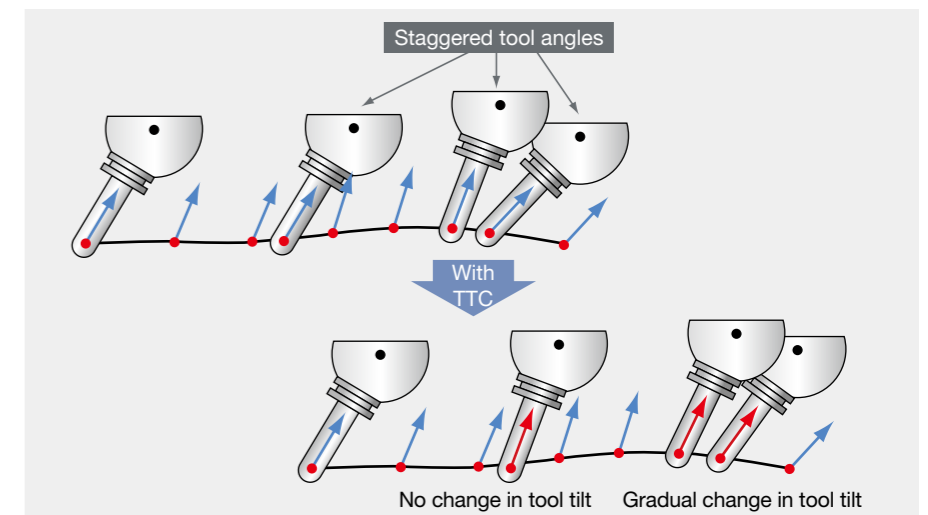
● In the case of simultaneous Y-axis and A-axis commands with the linear command (G01), the tool path is a straight line when viewed from the workpiece.



### Tool Tilt Compensation

(Included in Tool Center Point Control II)

The tool angle on a workpiece (tool tilt) in 5-axis machining will change on a waving surface. CAM processing errors will cause the tool to stagger with unnecessary accel/decel and reverse angles during axis feed. Simul 5-Axis TTC will keep feedrates steady with a smooth sequence of commands to automatically correct tool tilt angles—resulting in shorter cycle times and smoother surface finishes.



## Machine Specifications

Item		Unit	MU-10000H
Travel	X axis travel (table L/R)	mm (in.)	1,550 (61.02)
	Y axis travel (spindlehead vertical)	mm (in.)	1,600 (62.99)
	Z axis travel distance (column front/back)	mm (in.)	1,650 (64.96)
	A axis (trunnion swivel)	deg	+35 to -115
	B axis (pallet swivel)	deg	±360
	Pallet top (centerline) to spindle centerline	mm (in.)	Tap specifications: A axis = 0°: -475 to +1,125 (-18.70 to +44.29) [T-slot specifications: A axis = 0°: -505 to +1,095 (-19.88 to +43.11) A axis = -90°: -610 to +990 (-24.02 to +38.98)
	Pallet centerline (top) to spindle nose	mm (in.)	A axis = 0°: 40 to 1,690 (1.57 to 66.54), Tap specifications: A axis = -90°: 175 to 1,825 (6.89 to 71.85) [T-slot specifications: A axis = -90°: 145 to 1,795 (5.71 to 70.67)]
Pallet	Pallet dimensions	mm (in.)	□1,000 (39.37)
	Max load capacity	kg (lb)	Tap specifications: 2,500 (5,500) [T-slot specifications: 2,300 (5,060)]
	Max workpiece dimensions	mm (in.)	Tap specifications: ø1,500 × h1,175 (ø59.06 × h46.26) [T-slot specifications: ø1,500 × h1,145 (ø59.06 × h45.08)]
Spindle	Spindle speed	min <sup>-1</sup>	50 to 6,000 [10 to 4,500 (gear spindle), 50 to 12,000 (Integral spindle)]
	Tapered bore		7/24 taper No. 50
	Bearing dia (front bearing)	mm (in.)	ø100 (3.94) [ø110 (4.33) (gear spindle)]
Feed	Rapid traverse	m/min (fpm)	X - Y - Z : 42 (137.80)
		deg/min	A: 4,320, B: 7,200
	Cutting feedrate	mm/min	X - Y - Z : 1 to 42,000
		deg/min	A: 4,320, B: 7,200
Motors	Spindle drive	kW (hp)	45/37 (60/50) (20 min/cont) [40/37/30 (55/50/40) (15/30 min/cont) (gear spindle), 37/26 (50/35) (10 min/cont) (Integral spindle)]
	Feed axes	kW (hp)	X - Z: 5.2 (7) × 2, Y: 5.1 (7) × 2, A: 5.1 (7) × 2, B: 3.5 (5) × 2
ATC	Tool capacity	tools	[81, 129, 177]
	Tool shank		MAS BT50 [CAT No.50, DIN No.50, HSK-A100, HSK-A125*] Note: HSK-A125 is not available with 6,000 min <sup>-1</sup> , 12,000 min <sup>-1</sup> spindle.
	Pull stud		MAS 2 [MAS 1, CAT, CAT Special, DIN, JIS]
	Max tool dia (w/ adjacent tool)	mm (in.)	ø130 (5.12)
	Max tool dia (w/o adjacent tool)	mm (in.)	ø315 (12.40)
	Max tool length	mm (in.)	600 (23.62)
	Max tool weight	kg (lb)	30 (66)
	Max tool moment	N-m (ft-lbf)	37 (27)
	Tool selection		Fixed address
	APC	No. of pallets	
Machine size	Pallet change system		2-pallet parallel shuttle
	Height	mm (in.)	3,694 (145.43)
	Floor space W x D	mm (in.)	6,880 × 10,930 (270.87 × 430.31) (81-tool ATC magazine), × 11,632 (457.95) (129-tool ATC magazine), × 12,555 (494.29) (177-tool ATC magazine)
Weight	kg (lb)	62,100 (136,620) (81-tool ATC magazine), 62,700 (137,940) (129-tool ATC magazine), 63,000 (138,600) (177-tool ATC magazine)	

[ ] Optional

## Standard Specifications

Spindle speed	6,000 min <sup>-1</sup> (45/37 kW [20 min/cont])	Trunnion table	A, B axes
Spindle/spindlehead cooler	Oil temperature controller	2-pallet parallel shuttle APC	Pallet top: M20 tap
Ball screw cooler	X, Y, Z axes	Full enclosure shielding	
A, B axis cooler	Oil temperature controller	Operation panel	
Centralized lube auto unit	With oil level and pressure alarms	Operator platform	
Coolant equipment	Tank: 1,400 L (effective: 1,000 L) Pump: 555 W/885 W (50/60 Hz)	ATC manual operation panel	
In-machine chip discharge	Chip conveyor below X-axis telescopic cover Center trough chip conveyor	Work lamp	LED
In-machine chip washer	1.1 kW	Status indicator	3-color C type
ATC air blower (blast)		Air filter and oiler	
Chip air blower (blast)	Nozzle	Hydraulic unit	
Table washer		Foundation blocks, jack bolts	
Telescopic cover / in-machine washer		Tapered bore cleaning bar	
		Hand tools	
		Tool box	

## Optional Specifications

Spindle speed	4,500 min <sup>-1</sup> , 40/37/30 kW, No.50 (Gear spindle) 12,000 min <sup>-1</sup> , 37/26 kW, No.50 (Integral spindle)
Dual contact spindle	HSK, BIG-PLUS®
ATC tool magazine capacity	81, 129, 177 (matrix magazine system)
AbsoScale detection	X, Y, Z axes
Automatic pallet changer	Multi-pallet APC: 6 pallets
Pallet upper surface shape	T groove specs
Spare pallet	
Edge locator	
Oil-hole coolant system	1.5 MPa
Thru-spindle coolant*1	1.5, 7.0 MPa, large flow 1.5, 7.0 MPa
Shower coolant system	
Workpiece washing gun	
Chip air blower	Adapter type
Off machine chip discharge	Drum filter-type lift-up conveyor Mosnic RDF
Chip bucket for above	Height 700 mm, 1,000 mm
Hydraulic unit cooler	
Coolant heater/cooler	
ATL comp/breakage detect*2	Laser sensor
Auto zero offset/gauging	Touch probe system
Operation panel	Link arm type
Pull stud shape	MAS1, CAT, DIN, JIS
Pull stud	MAS2, MAS1, CAT, DIN, JIS
Chemical anchoring systems	Chemical anchors, foundation bolts

\*1. Okuma pull stud required

\*2. Auto tool length compensation/breakage detection

## Main special specifications



Shower coolant, coolant nozzle



Auto zero offset and auto gauging (wireless touch probe)



Receiver (sends and receives touch probe signals)

## Recommended Chip Conveyors

Workpiece material	Steel	FC	Aluminum / Nonferrous	Mixed (general use)	Recommended specifications	
					○	△
Chip shape					○	△
In-machine	Hinge type	[Std] *	○	○	○	○
Off-machine	Scraper type (with drum filter)	[Opt]	—	○(Wet) with magnet	△(*3)	—
	Hinge + scraper (with drum filter)	[Opt]	△(*1)	△(Wet)(*2)	○	○

\* Scraper type is available as an option.

\*1. When there are many fine chips \*2. When chips are longer than 100 mm \*3. When chips are shorter than 100 mm

Note: In the case of dry chips, clean out chips that have accumulated under the pallet or elsewhere in the machine as needed.

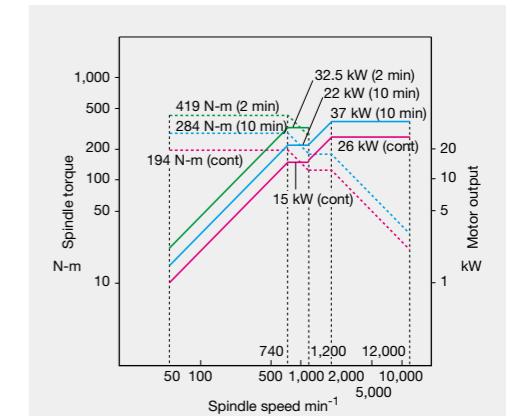
## Off-machine lift-up chip conveyors

Name	Scraper type (with drum filter)	Hinge + scraper (with drum filter)
Shape		

\*Regular cleaning of coolant tank is necessary even for conveyors with drum filters.

## Integral motor/spindle (Optional)

- Speed 12,000 min<sup>-1</sup>
- Max output 37/26 kW (10 min/cont)
- Max torque 419/194 N-m (2 min/cont)



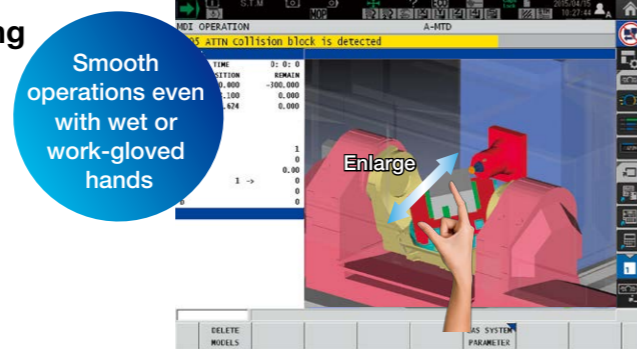


## With revamped operation and responsiveness— ease of use for machine shops first!

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

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

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



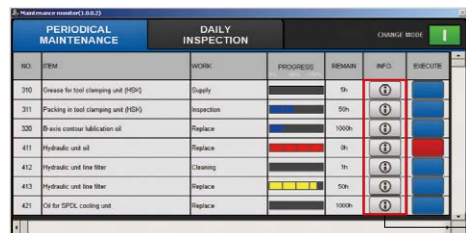
Note: 15-in. operation panel screen shots. Collision Avoidance System (Optional) shown above.

## “Just what we wanted.”— Refreshed OSP suite apps

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

### Routine inspection support Maintenance Monitor

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



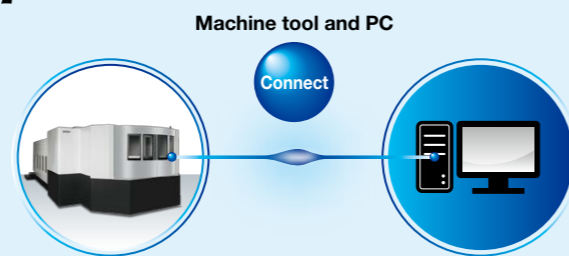
[INFO] button

- Increased productivity through visualization of motor power reserve  
**Spindle Output Monitor**
- Monitoring operating status even when away from the machine  
**E-mail Notification**
- Comment display for greater ease of use and faster work  
**Common Variable Monitor**
- Automatic saving of recorded alarms  
**Screen Capture**
- Easy programming without keying in code  
**Scheduled Program Editor**

## Get Connected, Get Started, and Get Innovative with Okuma “Monozukuri” Connect Plan

### 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.



## Standard Specifications

Basic Specs	Control	X, Y, Z, A, B simultaneous 5-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 unit: 0.001 mm, 0.01 mm, 1mm, 0.0001", 0.001", 1"
	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
	Self-diagnostics	Automatic diagnostics and display of program, operation, machine, and NC system faults
	Programming	Program capacity
Program operations		Program management, editing, scheduled program, fixed cycle, G-/M-code macros, arithmetic, logic statements, math functions, variables, branch commands, coordinate calculate, area machining, coordinate convert, programming help, fixture offset II
Operations	"suite apps"	Applications to graphically visualize and digitize information needed on the shop floor
	"suite operation"	Highly reliable touch panel suited to shop floors. One-touch access to suite apps.
	Easy Operation	"Single-mode operation" to complete a series of operations Advanced operation panel/graphics facilitate smooth machine control
	Collision Avoidance System*1	Prevents interference during manual operation and automatic operation, it's possible to model shape data easily. (per certain component/movement may exist)
	Machine operations	MDI, manual (rapid traverse, manual cutting feed, pulse handle), load meter, operation help, alarm help, sequence return, manual interrupt/auto return, pulse handle overlap, parameter I/O, Self-diagnostics, PLC monitor, alignment compensation, Easy Setting of Cycle Time Reduction
	MacMan	Machining management: machining results, machine utilization, fault data compile & report, external output
Communications / Networking	USB (2 ports), Ethernet	
High speed/accuracy specs	Hi-Cut Pro, pitch error compensation, Hi-G Control, SERVONAVI, Machining Time Shortening Function	
Energy-saving	ECO suite	ECO Idling Stop*2, ECO Power Monitor*3

\*1: Required specification  
\*2: There are limitations when Collision Avoidance System and Super-NURBS are used simultaneously.  
\*3: Spindle cooler Idling Stop is used on TAS-S machines.  
\*3. The power display shows estimated values. When precise electrical values are needed, select the wattmeter option.

## Optional Specifications

Item	Kit Specs*1	NML		3D		AOT-M	
		E	D	E	D	E	D
<b>Interactive functions</b>							
Advanced One-Touch IGF-M (w/Real 3-D simulation)							
Interactive MAP (I-MAP)							
<b>Programming</b>							
Auto scheduled program update							
Common variables (Std: 200 pts)	1,000 pcs						
	2,000 pcs						
Program branch; 2 sets							
Program notes (MSG)							
Coordinate system	100 sets						
select	200 sets						
(Std: 20 sets)	400 sets						
Helical cutting (within 360°)							
3-D circular interpolation							
Synchronized Tapping II							
Arbitrary angle chamfering							
Cylindrical side facing							
Slope machining							
Inverse time feed							
Tool grooving (flat-tool free-shaped grooving)							
Tool center point control II (TCP- II) (w/ tool tilt comp)							
Tool tilt command							
Tool max rotational speed setting							
F1-digit feed	4 sets, 8 sets, parameter						
Programmable travel limits (G22, G23)							
Skip (G31)							
Axis naming (G14)							
Additional G-/M-code macros							
3-D tool compensation							
Tool wear compensation							
Drawing conversion	Programmable mirror image (G62)						
	Enlarge/reduce (G50, G51)						
User task 2	I/O variables (16 each)						
Tape conversion*1							
<b>Monitoring</b>							
Real 3-D simulation							
Simple load monitor	Spindle overload monitor						
NC operation monitor	Hour meter, work counter						
Hour meters	Power, spindle, NC, cutting						
Operation end buzzer	M02, M30, and END commands						
Work counter	With M02 and M30 commands						
MOP-TOOL	Adaptive control, overload monitor						
Machine Status Logger							
Cutting Status Monitor							
AI Machine Diagnosis Function							
Tool life management	Hour meter, No. of workpieces						
<b>Gauging</b>							
Auto gauging	Touch probe (G31)						
Auto zero offset	Includes auto gauging						
Tool breakage (touch sensor) (G31)							
detection	Includes auto tool offset						
Gauging data printout	File output						
Manual gauging (w/o sensor)							
Interactive gauging (touch sensor, touch probe required)							
<b>External I/O communication</b>							
RS-232C connector							
DNC-T3							
DNC-B (RS-232C-Ethernet transducer used on OSP side)							
DNC-DT							
DNC-C/Ethernet							
Additional USB (Additional 2 ports, Std: 2 ports)							
<b>Automation / untended operation</b>							
Auto power shut-off	M02 and END, alarms, work preps done						
Warm-up (calendar timer)							
External program select	Button, rotary, digital switches, BCD (2-digit, 4-digit)						
Cycle time reduction (Ignores certain commands)							
Pallet pool control (PPC) (Required for multi-pallet APC)							
<b>High-speed, high-precision</b>							
AbsoScale Detection	X-, Y-, Z-axis						
5-Axis Auto Tuning System	Standard, high spec						
<b>Straightness compensation</b>							
Super-NURBS*2	5-axis specifications						
Simultaneous 5-axis kit	Tool center point control II Tool center point control manual feed Table origin coord manual feed Super-NURBS (5-axis spec) Slope machining Inverse time feed Tool tilt command DNC-DT						
TAS-S (Thermo Active Stabilizer—Spindle)							
TAS-C (Thermo Active Stabilizer—Construction)							
<b>ECO suite</b>							
ECO Operation							
ECO Power Monitor	On-machine wattmeter						
Energy-saving	Inverter system						
hydraulic unit	ECO Hydraulic						
<b>Other</b>							
Control cabinet lamp (inside)							
Circuit breaker							
Sequence operation	Sequence stop						
Upgraded sequence restart	Mid-block return						
Tool point center manual feed							
Table reference coord manual feed							
Pulse handle	2 pcs, 3 pcs (Std: 1 pc)						
External M signals	4, 8 signals						
Machining Navi*3 M-i*4, M-gII*4, M-gII*5 (cutting condition search)							
One-Touch Spreadsheets							
Block skip; 3 sets							
Leading edge offset							
OSP-VPS (Virus Protection System)							
19-inch display operation panel w/adjustable-tilt keyboard							

\*1. Technical consultation needed for specifications  
\*2. There are limitations when Super-NURBS and Collision Avoidance System are used simultaneously.  
\*3. Harmonic Spindle Speed Control available only with Machining Navi M-i or M-gII+ specifications.  
\*4. Machining Navi M-i or M-gII+ are available with integral motor/spindles.  
\*5. Machining Navi M-gII is available with gear spindles.



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

● The specifications, illustrations, and descriptions in this brochure vary in different markets and are subject to change without notice.  
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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.



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