OKUMA

Double Column Machining Center

MCR-AF

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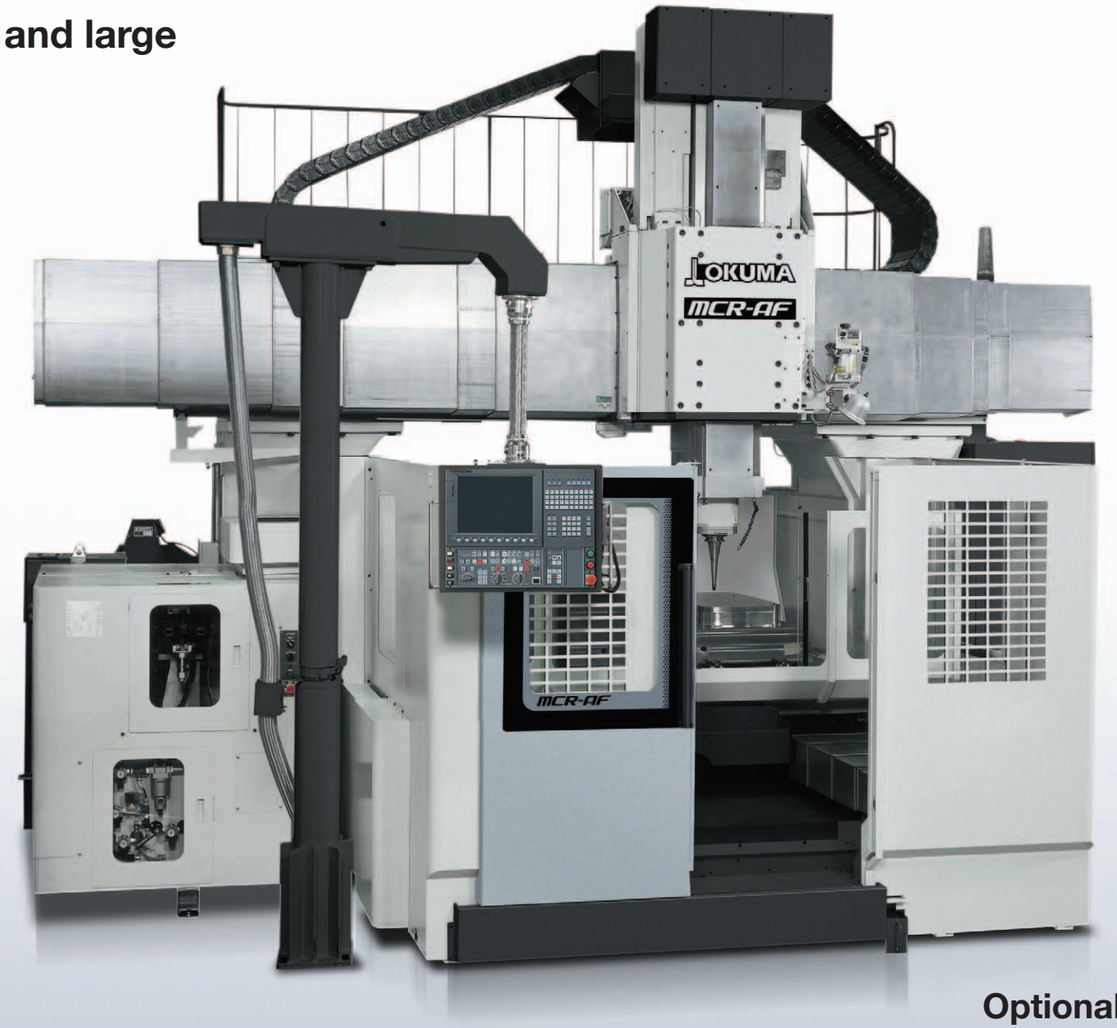
Collision Avoidance System

Machining Navi

The best machine for medium-sized and large dies/molds and IT products



Powerful and highly rigid machining

- Multitasking slide/roller guideways
- Fixed crossrail

Z-axis travel 800 mm (31.50 in.)

- Twin ball-screw drive system
- AbsoScale (standard)

OSP-P300M on board

- Okuma control / Windows® collaboration
- High performance NC computer in a flat panel

Table variations

- Sizes 2,000 x 1,500 mm (MCR-AF 25 x 15)
  2,000 x 2,000 mm (MCR-AF 25 x 20)

Compact design

- Floor space **23.5 m²**
  (MCR-AF 25 x 15)

20%
less than previous machine

Types of workpieces

- Medium to large die/molds
  Inner panels for small cars, household appliances
- IT production units
- General machine parts

Optional packages

- **Aluminum application kit:** high-speed, highly accurate machining
- **Die/mold application kit:** high-quality machining
- **Highly efficient and accurate machining of standard parts**

Photos in this brochure may include optional equipment.

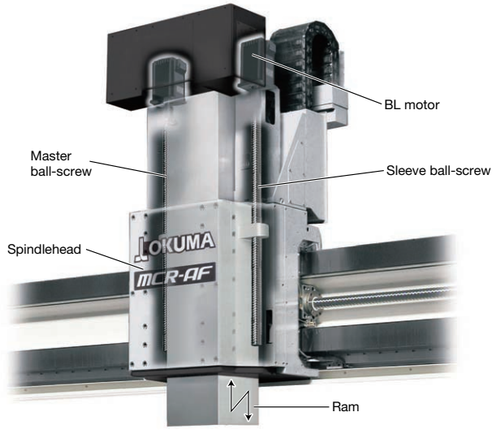
Super rugged, high-precision construction

Ram-type spindlehead for super rigidity

With a cross section of 350 x 350 mm (13.78 x 13.78 in.) there's enough rigidity in the square ram-type spindlehead to handle any heavy-duty machining.

Z-axis twin ball screws + AbsoScale (Std)

The Z axis is controlled with double ball screws that drive both sides of the ram.
A high level of straightness is achieved on the Z axis.
0.003 mm / 800 mm (0.00012 in. / 31.50 in.)

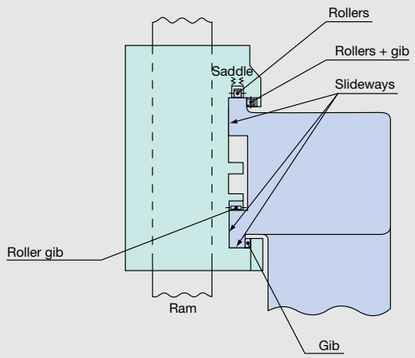


Powerful and highly accurate machining

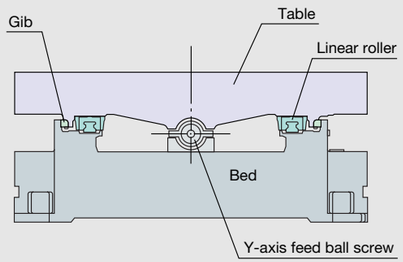
Multitasking slide/roller guideways

Rationally designed combination slide/roller X-Y ways absorb cutting vibration. With rollers taking on the weight, movements are smooth, providing superb accuracies, positioning, and stable operations over long periods.

■ X-axis guide structure



■ Y-axis guide structure



High-speeds improve productivity

High-speed feedrate

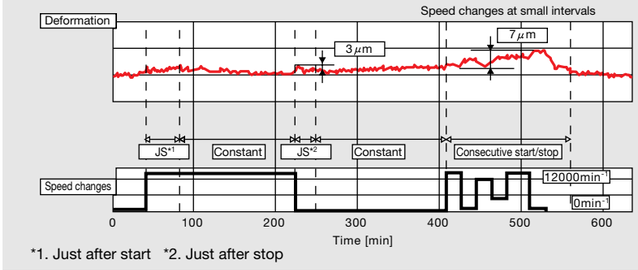
- Rapid traverse 20 m/min (X, Y axes) (787 ipm)
- Cutting feedrate 10 m/min (394 ipm)

Multitasking slide/roller guideways provide better

TAS-S: Thermo Active Stabilizer–Spindle (Opt)

The thermal deformation generated as the spindle rotates are minimized to ensure the highest accuracies at high-speeds.

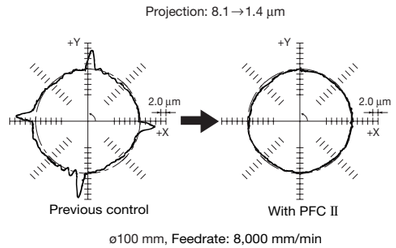
■ Sample



*1. Just after start *2. Just after stop

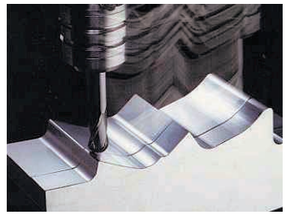
PFC Ⅱ (Projection Flat Control Ⅱ) (Opt)

Lost motion and backlash from axis reverse movements occur at various speed levels. PCF II dynamically flattens out spikes when circular quadrants switch.

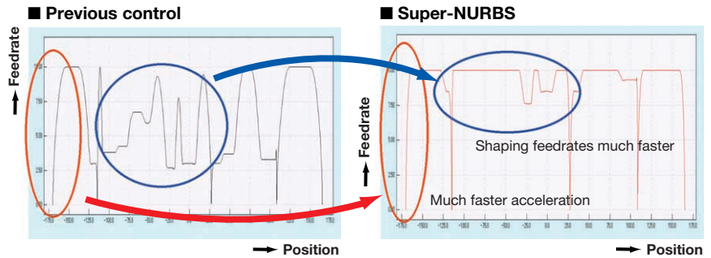


3-dimensional machining is changed with Super-NURBS (Opt)

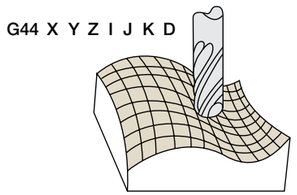
For fast/accurate high-quality machining (fast contouring function)
"Super-NURBS — the world's first "Sculptured Surface-Adaptive Acceleration Control." From routine parts to complex free forms, this high-speed CNC function lets you machine fast, and get superb accuracies and quality.



■ Previous control ■ Super-NURBS

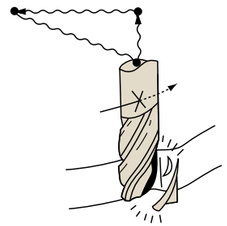


3-D tool compensation (Opt)



See 3-dimensional tool offsets by commanding the I, J, and K offset directions with the coordinates.

Mid-block restart (Opt)



Resume cutting either from the beginning or midway into a desired block.

Parameter F1 digit (Opt)

When it is difficult to program feedrates for die-making and you need different feedrates for specific cutting patterns, you can simply program using feedrate numbers. Choose either the rotary switch or the display and keyboard type F1 parameters.

Machine specification

	Item	Unit	MCR-AF	
			25 x 15	25 x 20
Travels	X-axis (spindlehead horizontal)	mm (in.)	2,600 (102.36)	
	Y-axis (table front/back)	mm (in.)	1,500 (59.06)	2,000 (78.74)
	Z-axis (ram vertical)	mm (in.)	800 (31.50)	
	Effective width between columns	mm (in.)	2,600 (102.36)	
	Table to spindle nose	mm (in.)	300 to 1,100 (11.81 to 43.31) [200 to 1,000 (7.87 to 39.37)]*1	
Table	Working surface	mm (in.)	2,000 x 1,500 (78.74 x 59.06)	2,000 x 2,000 (78.74 x 78.74)
	Maximum load	kg (lb)	10,000 (22000)	
	T-slot width	mm (in.)	20H7 (0.79H7)	
	Height from floor to table	mm (in.)	850 (33.46)	
Spindle	Speed range	min^{-1}	8,000 (12,000*1, 15,000*2, 20,000*3, 25,000*4)	
	Taper bore		7/24 taper No. 50 [7/24 taper No. 50*1, 7/24 taper No. 40*2, HSK-A63*3,*4]	
Feedrates	Rapid traverse	m/min (ipm)	X-Y:20, Z:10 (787/394)	
	Cutting feedrate	mm/min (ipm)	1 to 10,000 (0.04 to 394)	
Motors	Spindle drive	kW (hp)	VAC 26/22 (35/30) (30 min/cont) [37/26 (50/35)*1, 22/18.5 (30/25)*2, 30/22 (40/30)*3, 15/11 (20/15)*4 (10 min/cont)]	
Automatic Tool Changer	Tool shank		MAS BT50 [MAS BT50*1, MAS BT40*2, HSK-A63*3,*4]	
	Pull stud*		MAS 2 type	
	Tool magazine	tools	24 [32*2, *3, *4, 48*2, *3, *4, 50*5, 72*5, 100*5]	
	Max tool diameter	mm (in.)	W/adjacent tools: ø125 (ø4.92)*5 [ø135 (ø5.31)*6, ø90 (ø3.54)*2, *3, *4] W/o adjacent tools: ø230 (ø9.06)*5 [ø125 (ø4.92)*2, *3, *4]	
	Max tool length/weight	mm/kg	400/25*5 [8*2, *3, *4]	
Machine Size	Height	mm (in.)	4,670 (183.86) [4,450 (175.20)*1]	
	Floor space	mm (in.)	5,560 x 4,200 (218.90 x 165.35)	5,560 x 5,230 (218.90 x 205.91)
	Weight	kg (lb)	24,500 (54,000)	26,000 (57,300)
CNC			OSP-P300M	

[ ]: Optional

*1. 12,000 min^{-1} spindle *2. 15,000 min^{-1} spindle *3. 20,000 min^{-1} spindle *4. 25,000 min^{-1} specs
*5. 8,000 min^{-1}, 12,000 min^{-1} specs *6. 50-tool magazine with 8,000 min^{-1} and 12,000 min^{-1} specifications
* Pull studs not available with HSK specs.

Standard specifications/accessories; Kit specifications

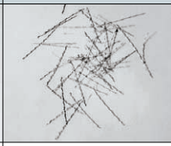
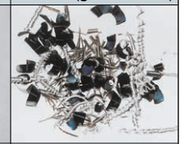
	Standard	Die/mold applications	Aluminum applications
Spindle speed	30 to 8,000 min^{-1}	30 to 8,000 min^{-1} (50 to 12,000 min^{-1})	50 to 15,000 min^{-1} (50 to 20,000 min^{-1}, 50 to 25,000 min^{-1})
Rapid traverse	X-Y 20 m/min, Z 10 m/min		
Cutting feedrate	X-Y-Z 10 m/min		
Spindle cooling system	Oil controller		
Hydraulic unit	○	○	○
ATC air blower (blast)	○	○	○
Hand tool	○	○	○
ATC magazine shutter	○	○	○
Tool release lever	○	○	○
Tool box	○	○	○
Ladder/crossrail safety fence	○	○	○
Thru-spindle coolant	—	—	Medium pressure
ATC tool capacity	24-tool		
Tool shank	MAS BT50		MAS BT40 (HSK-A63)
Spindle motor (10 min/cont)	VAC 26/22 kW (30 min/cont)	VAC 26/22 kW (30 min/cont) (VAC 37/26 kW)	VAC 22/18.5 kW (VAC 30/22 kW, VAC 15/11 kW)
Pull stud	MAS 2 type		JIS (—)
Work lamp	LED		
3-color status indicator	LED		
Coolant tank	—		1,400 L
Shower coolant	—		○
Short column height specs	—		Standard or 200 mm shorter
Full enclosure shielding	Open ceiling		With ceiling
Operation panel	Separately mounted rotary pendant arm		
Spindle tool load/unload operation panel	Pendant operation panel mount		
AbsoScale	Z axis	X-Y-Z axis	X-Y-Z axis
Chip discharge	—	Hinge chip conveyor	Chip collection conveyor with drum filter Chips flushed on both sides
OSP-P300M 3D-D kit	—	○	○
Super-NURBS	—	○	○

Optional specifications

Spindle speed (special)	12,000 min^{-1} No. 50 main motor VAC 37/26 kW (10 min/cont)
	15,000 min^{-1} No. 40 main motor VAC 22/18.5 kW (10 min/cont)
	20,000 min^{-1} HSK-A63 main motor VAC 30/22 kW (10 min/cont)
	25,000 min^{-1} HSK-A63 main motor VAC 15/11 kW (10 min/cont)
ATC magazine capacity (special)	BT50 50, 72, 100-tool
	BT40 32, 48-tool
	HSK-A63 32, 48-tool
Thru-spindle coolant	Medium pressure type (included in aluminum machining kit), high/low pressure switch system
Semi-dry machining	Nozzle type, thru-spindle air type
Spindle nose contact	Spindle BIG-PLUS® specifications
Work lamp	LED spotlight
Full enclosure shielding	Open ceiling; with ceiling (included in die/mold machining kit, aluminum machining kit)
Chip discharge	3 hinge-type conveyors (included in die/mold machining kit)
	Chip flushing on both sides of table, chip collection conveyor with drum filter (included in aluminum machining kit)
Coolant supply system	Coolant tank (300 L, 500 L, 1400 L), coolant nozzle, 750 W coolant pump (1400 L coolant tank included with aluminum machining kit)
AbsoScale	X and Y axes (Z axis standard) (included in die/mold machining kit and aluminum machining kit)
TAS-S	Required specification with die/mold machining kit and aluminum machining kit
Short column specs	200 mm, 300 mm, 400 mm (200 mm shorter column is available with aluminum machining kit)
Chip air blower (blast)	
DNC link DNC-DT	Required specification with die/mold machining kit
T-slot (special)	
T-slot	
Attachment head specs	Commercially available accelerator heads, angle heads (inquire for details)
Auto tool length compensation/ Tool breakage detection	Touch sensor, laser sensor
Auto gauging/Auto zero offset	Touch probe (radio wave)
NC rotary table	
Mist collector	
Foundation bolts and foundation washers	L800, L500

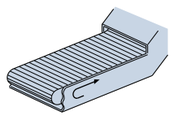
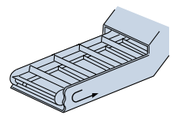
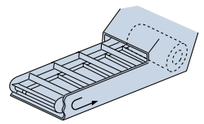
Recommended chip conveyors (please contact an Okuma sales representative for details).

○ : Recommended △ : Recommended with certain conditions

Material		Steel	FC	Al Nonferrous metal	Mixed (general use)
Chip shape					
In-machine	Chip flusher	—	—	○	—
	Hinge type	○	○	○	○
Off-machine (Collection conveyor)	Hinge type	○	○ (dry)	—	△ (*1)
	Scraper	—		—	—
	Scraper (with drum filter)	—	○ (wet)	○	○

*1) When there are few fine chips. Please contact an Okuma sales representative for details.

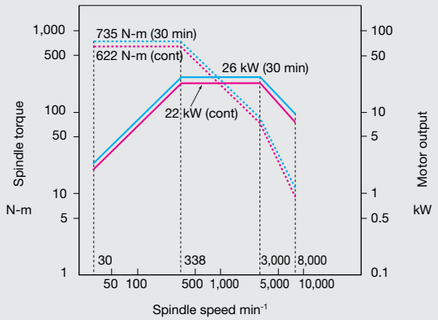
Common off-machine lift-up chip conveyors

Type	Hinge	Scraper	Scraper (with drum filter)
Shape			

Spindle

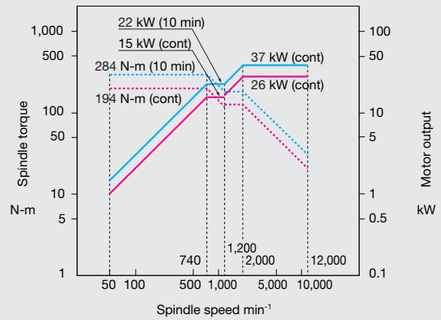
Standard spindle

- Spindle speed ... 8,000 min^{-1} (No. 50)
- Max output ..... VAC 26/22 kW (35/30 hp) (30 min/cont)
- Max torque..... 735/622 N-m (30 min/cont)



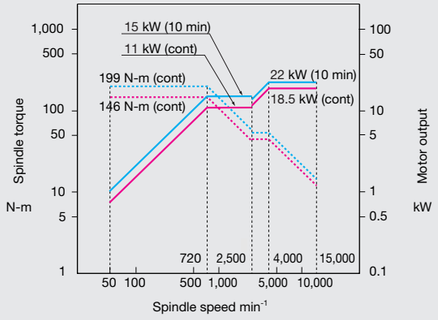
Wide-range spindle (optional)

- Spindle speed ... 12,000 min^{-1} (No. 50)
- Max output ..... VAC 37/26 kW (49/35 hp) (10 min/cont)
- Max torque..... 284/194 (10 min/cont)



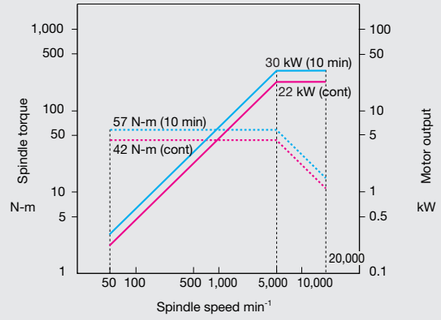
Wide-range spindle (optional)

- Spindle speed ... 15,000 min^{-1} (No. 40)
- Max output ..... VAC 22/18.5 kW (29/25 hp) (10 min/cont)
- Max torque..... 199/146 N-m (10 min/cont)



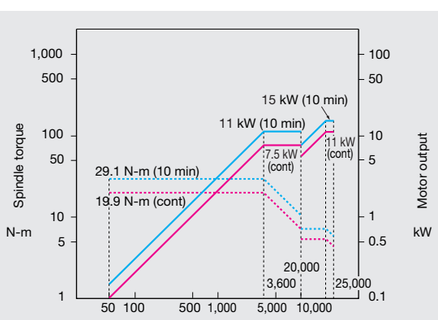
High-speed spindle (optional)

- Spindle speed ... 20,000 min^{-1} (HSK-A63)
- Max output ..... VAC 30/22 kW (40/30 hp) (10 min/cont)
- Max torque..... 57/42 (10 min/cont)



High-speed spindle (optional)

- Spindle speed ... 25,000 min^{-1} (HSK-A63)
- Max output ..... VAC 15/11 kW (20/15 hp) (10 min/cont)
- Max torque..... 29.1/19.9 N-m (10 min/cont)



Powerful cutting examples

Workpiece material S45C

Tool		Spindle speed min^{-1}	Cutting speed m/min (ipm)	Cutting width mm (in.)	Cutting depth mm (in.)	Feedrate mm/min (ipm)	Chip volume cm^3/min (in^3./min)	Ram protrusion mm (in.)
ø160 (ø6.30) face mill 8 flute (cermet)		400	200 (7874)	112 (4.41)	6 (0.24)	970 (38.19)	650 (39.65)	520 (20.47)
		300	150 (5906)	112 (4.41)	5 (0.20)	640 (25.20)	360 (21.96)	800 (31.50)
ø63 (ø2.48) end mill (carbide)	Groove	900	180 (7087)	63 (2.48)	25 (0.98)	150 (5.91)	240 (14.64)	650 (25.59)
	Side face	900	180 (7087)	31.5 (1.24)	50 (1.97)	190 (7.48)	300 (18.3)	650 (25.59)

Working range diagram

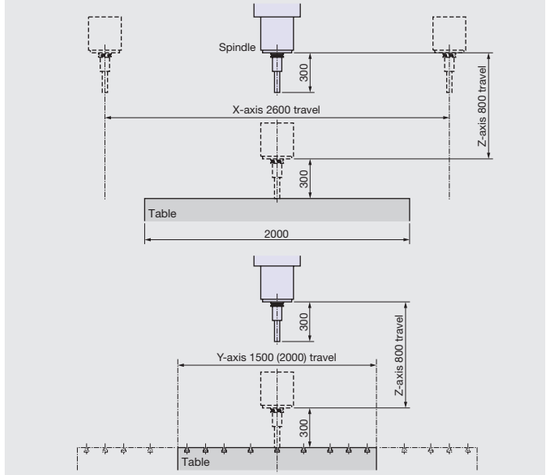
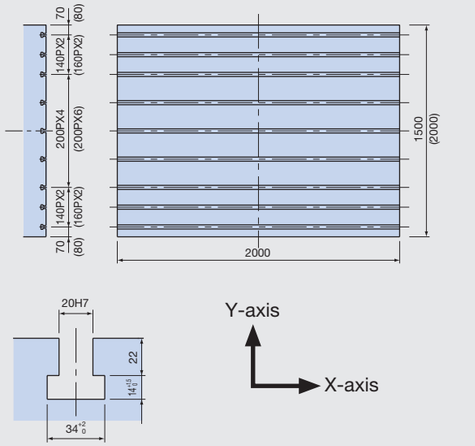
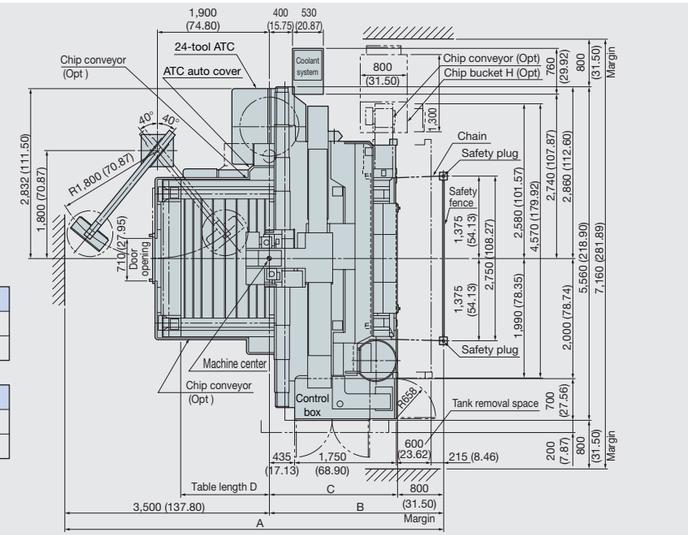


Table dimensions 25 x 15 (25 x 20)

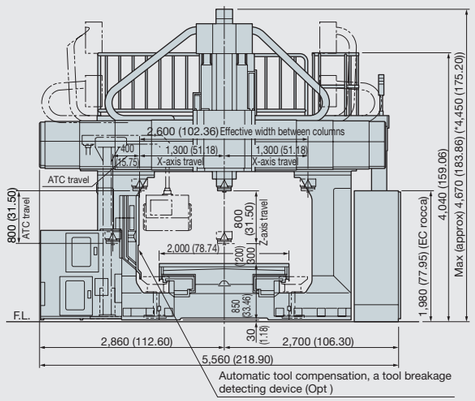


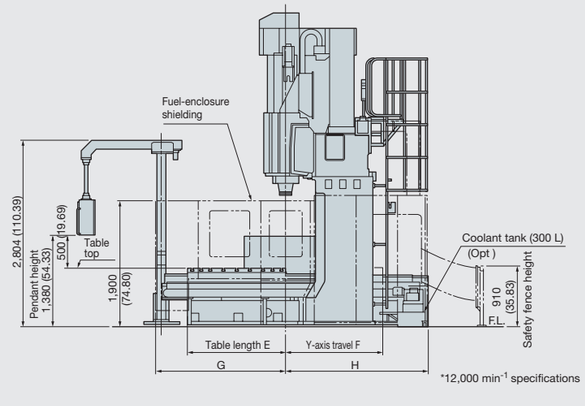
Dimensional / Installation drawing



Size	A	B	C	D
25X15	6,500	3,000	2,200	1,500
25X20	7,000	3,500	2,700	2,000

Size	E	F	G	H
25X15	1,500	1,500	2,000	2,200
25X20	2,000	2,000	2,530	2,700

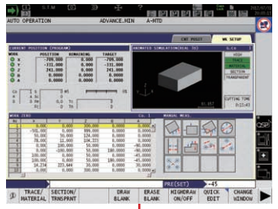




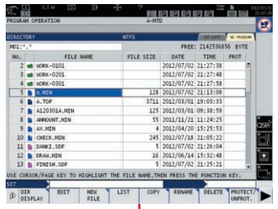
Satisfaction from complete control of a machine tool

As a “machine & control” builder, Okuma makes further strides in machine tool manufacturing with this superb Control featuring “Easy Operation.” Okuma took a close look at the way machinists actually operate machine tools, to help them create smoother and more effective ways of producing parts. Novice operators as well as professional machinists get complete control—and satisfaction. Moreover, what you want to see and do conveniently come together in a “single-mode operation.” First, select one of three operation screens. Then simply touch the screen or press a function key to see and do your job.

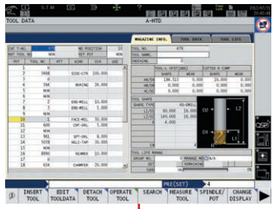
■ Setup operations
■ Trial/continuous cuts



■ Programming

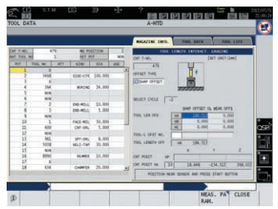


■ Tool preparations



Easy tool registration

With spreadsheet simplicity —tool offsets, tilt, shape, life, etc—all the tool data required to cut a part can be registered here.
Since the registered tool data is also used by Okuma auto programming (Advanced One-Touch IGF) and a collision check function (Collision Avoidance System), this screen will complete the entire registering process.



The touch sensor screen pops up from the tool registration screen. Tool compensation values are set while looking at a guidance message.

Standard Specifications

Basic Specs	Control	X, Y, Z, simultaneous 3 axis, spindle control (1 axis)
	Position feedback	OSP full range absolute position feedback (zero point return not required)
	Coordinate functions	Machine coordinate system (1 set), work coordinate system (100 sets)
	Min / Max inputs	8-digit decimal, ±99999.999 to 0.001 mm (3937.0078 to 0.0001 in.), 0.001˚ Decimals as: 1 µm, 10 µm, 1 mm (0.0001,1 in.) (1˚, 0.01˚, 0.001˚)
	Feed	Cutting feed override 0 to 200%, rapid traverse override 0 to 100%
	Spindle control	Direct spindle speed commands, override 30 to 300%, multi-point indexing
	Tool compensation	No. of registered tools: Max 999 sets, tool length/radius compensation: 3 sets per tool
	Display	15-inch color LCD + touch panel operations
	Self-diagnostics	Automatic diagnostics and display of program, operation, machine, and NC system faults
Programming	Program capacity	Program storage capacity: 4 GB; operation backup capacity: 2 MB
	Program operations	Program management, editing, multitasking, scheduled program, fixed cycle, G-/M-code macros, arithmetic, logic statements, math functions, variables, branch commands, coordinate calculate, area calculate, coordinate convert, programming help
Operations	Easy Operation	“Single-mode operation” to complete a series of operations Comprehensive management of tool shape and tool compensation information for each tool number Tool data shared between machining, Advanced One-Touch IGF (optional), and Collision Avoidance System (optional) Advanced operation panel/graphics facilitate smooth machine control
	Machine operations	MDI, manual (rapid traverse, manual cutting feed, pulse handle), load meter, operation help, alarm help, sequence return, manual interrupt/auto return, pulse handle overlap, parameter I/O, self-diagnostics, PLC monitor, alignment compensation
	MacMan	Machining management: machining results, machine utilization, fault data compile & report, external output
Communications / Networking		USB (2 ports), Ethernet, RS-232-C interface (1 channel)
High speed/accuracy specs		Hi-Cut Pro, pitch error compensation, Hi-G Control

Optional Specifications

Item		Kit Specs*1 NML E	NML D	3D E	3D D	AOT E	AOT D
Interactive functions							
Advanced One-Touch IGF-M (Real 3-D simulation included)						●	●
Interactive MAP (I-MAP)				●	●		
Programming							
Auto scheduled program update (Scheduled program [non-auto] is std)		●	●	●	●	●	●
G/M-code macros							
Common variables (Std: 200 sets)	1,000 sets						
	2,000 sets						
Program branch; 2 sets							
Program notes (MSG)			●		●		●
Coordinate system selection (Std: 20 sets)	100 sets	●		●		●	
	200 sets		●		●		●
	400 sets						
Helical cutting (within 360˚)		●	●	●	●	●	●
3-D circular interpolation							
Synchronized Tapping Ⅱ							
Arbitrary angle chamfering		●	●	●	●	●	●
Cylindrical side facing							
Slope machining							
Tool max rotational speed setting							
F1-digit feed	4 sets, 8 sets, parameter						
Programmable travel limits (G22, G23)		●	●	●	●	●	●
Skip (G31)							
Axis naming (G14)							
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*2							
Monitoring							
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	With M02, M30, and END commands						
Work counter	With M02 and M30 commands						
MOP-TOOL	Adaptive control, overload monitor						
Tool life management	Hour meter, No. of workpieces	●	●	●	●	●	●

Item		Kit Specs*1 NML E	NML D	3D E	3D D	AOT E	AOT D
Gauging							
Auto gauging	Touch probe (G31)	Included in machine specs					
Auto zero offset	Includes auto gauging	Included in machine specs					
Tool breakage detection	(touch sensor) (G31) Includes auto tool offset	Included in machine specs					
Gauging data printout	File output						
Manual gauging (w/o sensor)		●	●	●	●	●	●
Interactive gauging (touch sensor, touch probe required)							
External I/O communication							
Additional RS-232-C channel							
DNC-T3							
DNC-B (232C-Ethernet transducer used on OSP side)							
DNC-DT							
DNC-/Ethernet							
Additional USB							
Automation / untended operation							
Auto power shut-off	M02 and END alarms, work preps done	●	●	●	●	●	●
Warm-up (calendar timer)							
External program selection	Button, rotary switch, digital switch, BCD (2-digit, 4-digit)						
Cycle time reduction (Ignores certain commands)							
High-speed, high-precision							
Spindle thermal deformal deformation control TAS-S							
AbsoScale detection	X-, Y-axis						
Super-NURBS	Type A, Type B						
Other							
Control cabinet lamp (inside)							
Circuit breaker							
Sequence operation	Sequence stop	●	●	●	●	●	●
Upgraded sequence restart	Mid-block return		●		●		●
Pulse handles	2 pcs, 3 pcs (Std: 1 pc)						
External M signals	4, 8 signals						
Collision Avoidance System							
Machining Navi M-g (cutting condition search)							
One-Touch Spreadsheet							
Block skip	3 sets						
Feed axis retract							
OSP-VPS (Virus Protection System)							

*1. NML: Normal, 3D: Real 3D simulation, E: Economy, D: Deluxe, AOT: Advanced One-Touch IGF-M
*2. Requires technical consultation.

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

⚠ Fire Safety Precautions

To protect your factory and equipment from fire and assure continued safe operation, observe the following fire safety precautions whenever you operate machinery.
Whenever possible, avoid the use of oil-based coolants for cutting operations.
Sparks caused by hot chips, tool friction, and grinding can cause fires.
Always observe the following safety measures to ensure safe operation when machining flammable materials or when performing dry machining.

1. Oil-based coolant
   (1) Use nonflammable cutting fluid coolant.
   (2) When the use of an oil-based coolant is unavoidable:
   - **Before** you begin machining, check cutting tools to make sure of their service life and the condition of the tool edge, and choose cutting conditions that will not cause a fire.
   - Periodically clean the coolant filter to maintain sufficient coolant discharge, and frequently verify that coolant is discharging normally.
   - Take measures to control the outbreak of fire: Place a fire extinguisher near the machine, have an operator constantly monitor operation, and install an automatic fire extinguishing system.
   - Do not place flammable materials near the machine.
   - Do not allow chips to over accumulate.
   - Periodically clean the inside of the machine and the area surrounding it.
   - Check that the machine is operating normally.
   - Never run the machine unattended.
   - Since an automatic fire extinguishing system and other peripherals are needed for grinding operations, please let us know as soon as possible if you plan to perform such operations.
2. Precautions regarding machining of potentially flammable materials
   Before machining any material designated by law as a flammable substance, e.g., plastic, rubber, wood, acquaint yourself with the special characteristics of the material in terms of fire prevention, and observe the precautions given in (2) above to ensure safe operation.
   Example: When machining magnesium, there is a danger that magnesium chips and water-soluble coolants will react to produce hydrogen gas, resulting in an explosive fire if any chip should ignite.
3. Dry machining
   Dry machining is a fire hazard because workpieces, tools, and chips are not cooled. To ensure safe operation, do not place any flammable objects near the machine and do not allow chips to over accumulate.
   In addition, be sure to check cutting tools to make sure of their service life and the condition of the tool edge, and observe the precautions regarding oil-based coolants given in (2) above.

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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.

OKUMA Corporation, OGUCHI-CHO, NIWA-GUN, AICHI 480-0193, JAPAN • TEL (0587) 95-7825 • FAX (0587) 95-6074

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