OKUMA

OPEN POSSIBILITIES

OSP-P500

Next-generation CNC

OSP-P500

Next-generation CNC

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

— Innovation with a digital twin created by a machine tool manufacturer that produces CNC in-house —

Improved productivity and stable production

As Your Single Source for M-E-I-K (Mechanics - Electronics - IT - Knowledge), Okuma offers this CNC to build an advanced “digital twin” that faithfully reproduces machine control and machining operations and creates new value. In addition, the product helps improve productivity and realize stable production, featuring ease of use that allows customers to use their machining know-how. Additional features are: control technology that achieves high-speed and high-accuracy machining, energy-saving solutions that achieve both high productivity/accuracy and eco-friendliness, and robust security functions to protect against the increasing threat of cyber attacks.

Faithful digital reproduction of machines and processes
Innovative concept of a digital twin

Novice friendly Smart operation
Innovative operability

Realizing high-speed and high-accuracy machining
Innovative machining

Reducing environmental impact
Energy-saving solutions

Increasing cyber resilience
Robust security

Faithful digital reproduction of machines and processing

Innovative concept of a digital twin

Okuma’s digital twin faithfully simulates a virtual machine, offering control equivalent to that in a real environment, by using the latest machine operation data and 3D models. Through super high-speed and high-accuracy simulation based on the features of Okuma, which is a machine tool manufacturer that produces NC control in-house, the digital twin calculates cycle time, machining shape, and electricity consumption. It supports accurate estimates of cycle time, development of the machining schedule, and quick and accurate estimates of delivery time and costs when an order is received.

Made possible by an office PC and OSP-P500

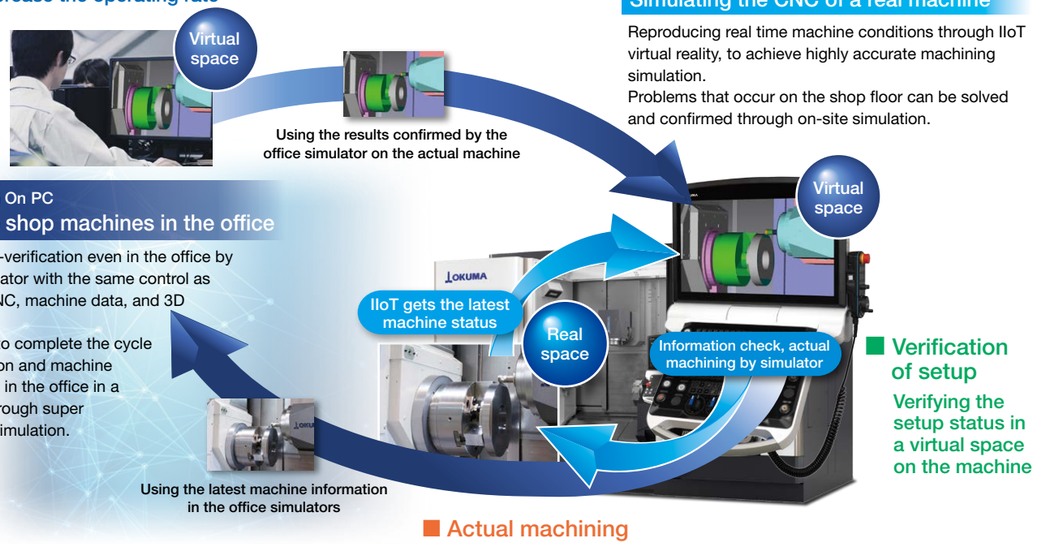
Two digital twin systems

Simulation using the latest machine operation data 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). Physical machine preparation time can be reduced by using digital twin preparation results to prepare for machining the next parts while machining continues. When a problem occurs on the shop floor, it can be solved quickly on site without going back to the office.

“Okuma’s two digital twin systems”

■ Front loading

Reducing work on the physical machine to increase the operating rate



■ Verification of setup

Verifying the setup status in a virtual space on the machine

■ Actual machining

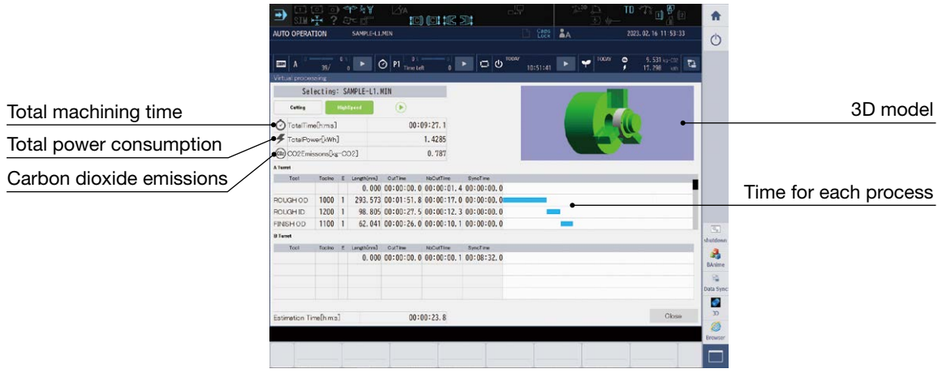
* The simulator is an OSP-P500 option.

Highly accurate simulation

Time is estimated accurately to support customer production plans and also solve machining problems quickly in the digital sphere.

Using the latest machine information to provide instant and accurate time estimates

Time is estimated precisely by considering not only axis movements but also peripheral units such as auto tool changers, and collecting real drive data on physical machine movements to give feedback to the virtual machine. In addition, power consumption and carbon dioxide emissions are displayed.

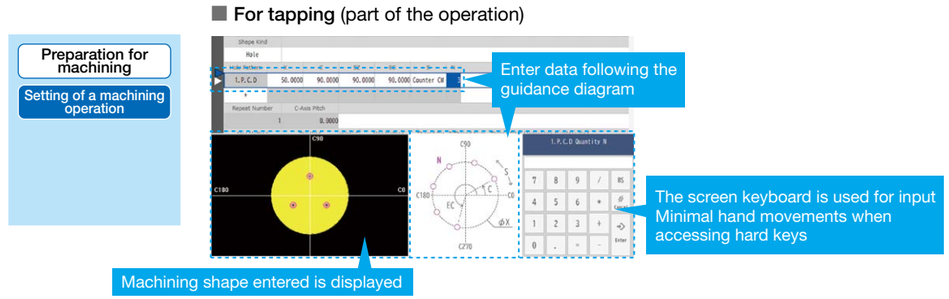


Novice friendly Smart operation

Innovative operability

It's possible to speed up preparation for machining, even without knowledge of NC programs

While preparation for machining is conventionally conducted by writing GM code programs for machining settings and processes based on the drawing, this product enables the machining processes to be determined automatically, simply by following the guidance and entering drawing information.



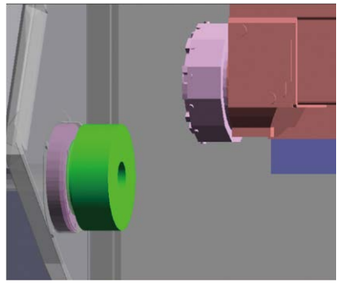
3D models can also be set during preparation for machining

3D models are essential for simulation. During preparation for machining on the machine, OSP-P500 can also easily set 3D models on the virtual machine in the simulator.

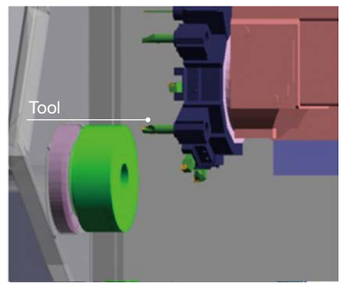
When preparation for machining is conducted according to the process schedule, models of tools and workpieces are set on the virtual machine.

【Work procedures】

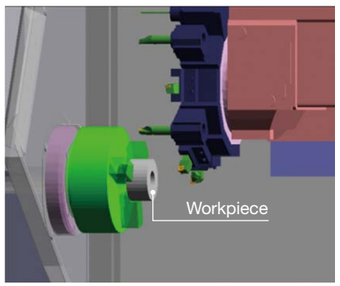
① **Start of preparation for machining**
No model of workpieces or tools



② **Preparation of tools**
Setting a model of the tool



③ **Preparation of workpieces**
Setting a model of the workpiece



User-friendly operation panel that pursues visibility and ease of use

Two types of operation panel are available, designed to take ease of use and machine installation space into consideration.
The panels are equipped with a tilting mechanism. The 21.5-inch panel has a partial-tilt mechanism for the machine operation panel, while the whole panel can be tilted in the 15-inch version.

- The 21.5-inch panel offers improved operability, with the operation screen displaying information on actual position and programs running, concurrently with data from the digital twin and decarbonization applications.
- The 15-inch panel is space-saving without compromising performance and functions.

Realizing high-speed and high-accuracy machining

Innovative machining

Machining performance is improved with high-performance hardware and optimized software control

Improved processing capacity and response speed between control modules shorten processing time.

CNC performance is calculated at twice that of the conventional product*

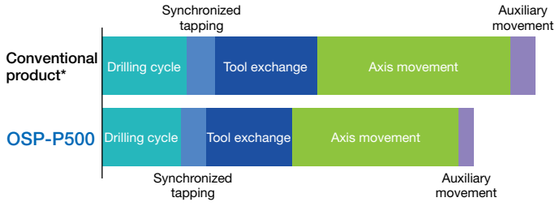
AI diagnosis is faster and more accurate

AI diagnosis takes one-third the time, compared with the conventional product*

Tool breakage during processing can be detected in advance and abnormalities of main spindles and feed axes can be determined instantly.

* OSP-P300A

The time for machining general parts is shortened by up to 15%
(same part program, same cutting conditions)



Improving the performance of machining dies and free-form surfaces

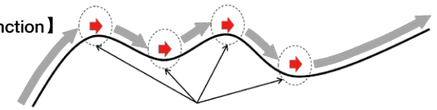
The performance of machining dies and free-form surfaces is improved with axis control that is optimal for the machining shape based on advanced digital technology. In addition, irregular width of tool marks in shuttle machining is avoided to improve machining surface quality and also reduce machining time.

Finishing of die machining

[Axis control optimal for the machining shape]

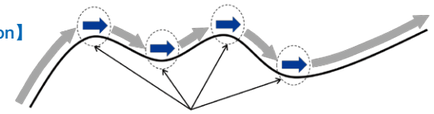
- Controlling vibration without slowing down for corners
- Shortening machining time while also improving surface quality

【Without the function】



Sudden acceleration/deceleration vibrations adversely impact surface quality

【With the function】



The speed at the corners can be higher under the same cutting conditions

Reducing environmental impact

Energy-saving solutions

ECO suite plus

Energy-saving system that corresponds to a decarbonized society

ECO suite plus, which is autonomous energy-saving and decarbonization technology, is installed as standard. It supports the decarbonization improvement cycle with an energy-saving system that is eco-friendly while offering high accuracy and high productivity.

The system is equipped with ECO Idling Stop, which uses autonomous machine decision-making to stop operation of unnecessary units, ECO Power Monitor, which visualizes and records power consumption and carbon dioxide emissions for analysis, and ECO Operation, which optimizes the actions of the units that move during machining. In addition, carbon dioxide emissions can be verified in advance through super-fast and super-accurate simulation.

ECO Idling Stop

Actively stopping idling while maintaining machining accuracy, based on autonomous machine decision-making

ECO Operation

Expanding control to optimize each device and thereby reduce energy consumption during machining

ECO Power Monitor

Real-time visualizing of power consumption of spindles and feed axes, as well as each auxiliary equipment group

ECO Power Monitor

Analyzing power consumption to start an improvement cycle

Increasing cyber resilience

Robust security

Protecting the operation of machines and precious assets such as part programs from cyber attacks

As digital networks develop and servers are increasingly connected to factory machines, the threat of cyber attacks increases, making it ever more important to protect against them. OSP-P500 is equipped with robust security functions for defense against and protection from cyber attacks, along with data restoration, to protect the operation of machines and precious assets such as part programs in the event of a cyber attack.

Defense	Prevent unauthorized access and connection	Identification of operators and communications, authentication function, etc.
Protection	Control damage	Anti-virus measures based on the allowlist, functions to prevent falsification and detect abnormalities, etc.
Data restoration	Preparation for emergencies	Control software and data backup function, etc.

OSP-P500

OSP-P500L CNC for Lathes
OSP-P500S CNC for Multitasking Machines

●: Standard ○: Optional —: Not available
* Ethernet is a registered trademark of Xerox Corporation USA
MTConnect is a registered trademark of Association For Manufacturing Technology

Specifications

Name	Description	P500L	P500S
■ Controlled axes, control systems, command units			
No. of machine axes	Turning X-Z simultaneous: 2 axes x 1 turret, 2 axes x 2 turrets, 2 axes x 3 turrets,	Depending on the models/mechanisms	Depending on the models/mechanisms
	Milling X-Z-C (or Y) simultaneous: 3 axes x 1 turret, 3 axes x 2 turrets, 3 axes x 3 turrets		
	Milling X-Y-Z-B-C simultaneous: 5 axes		
Spindle axis	1 axis, 2 axes		
Milling spindle [M spindle] axes (M specs)	1 axis, 2 axes, 3 axes		
PLC axes	8 axes		
Loader axes	2 axes, 3 axes, 6 axes (3 axes + 3 axes)		
Max no. of axes	32 axes		
Position feedback	OSP full range absolute position detection		
No. of control systems	1 system (1 turret), simultaneous 2 systems (2 turrets), simultaneous 3 systems (3 turrets)		
2-spindle independent control	Each spindle executes an independent part program		
Y-axis control	Straight line Y-axis, slant Y-axis		
Synchronized axis control	Two motors are synchronized to drive one axis		
Command/operation programmable units	0.001 mm, 0.01 mm, 1 mm, 0.001°, 0.01°, 1°	●	●
Min input	0.001 mm, 0.001°	●	●
Max input	Decimal 8 digits, ±99999.999 mm	●	●
■ Display/Operating functions			
Operation panel	15-inch operation panel, XGA touch screen	Depending on the models/mechanisms	Depending on the models/mechanisms
	21.5-inch operation panel, Full HD touch screen		
	Operation panel tilt adjustment		
	Standard portable pulse handle (type A)		
	Portable pulse handle with function buttons (type B1)		
	Robot-adaptable portable pulse handle with function buttons (type B2)		
	Keyboard QWERTY layout	●	●
	Keyboard ABC layout	○	○
	Multi-touch panel operations	●	●
Languages	19 languages available (Jpn, Eng, Ger, Fr, etc.)	●	●
	Language switchable	○	○
Smart OSP Operation		○	○
[Machining process chart]	Machining defined and operated according to the machining process chart		
[Process preparation and editing]	Process preparation and editing guided by process chart		
[Process control and operation]	Guided control and operation guided by process chart		
[Process preparation and editing]	Automatic decision of the turning process in the machining process chart	○	○
Easy Operation	Single-mode operation	●	●
	Setup data	●	●
	Forming soft jaws	●	●
OSP suite	Various "suite" apps support the series of machining operations, and "suite operation" enables one-touch access to those apps	●	●
Program editing	Simultaneous edit 2 files in 1 screen	●	●
	One-touch editing (editing of the selected part program, no need to specify file name, auto cursor movement to the block being executed)	●	●
	Arranges sequence numbers	●	●
	Editing programs beyond the edit buffer	●	●
	UNDO/REDO of program editing	●	●
	Multi-level directory	●	●
File name index display	2 file name indexes displayed in 1 screen	●	●
	Display of refined indices	●	●
	Preview of the program content	●	●
Manual cutting feed	Manual cutting feed on the operation panel	○	○
Sequence return	To specified sequence, auto restart from returned point	●	●
	Mid-block sequence return	○	○
	In the C-axis cycle for drilling equidistant holes, the sequence returns to the midway hole position and resumes automatic operation.	●	●
Tool restart	The list of tool commands on the part program is displayed with a sequence return to the designated tool command	●	●
Sequence number search	Machine from the specified sequence no.	●	●
Manual interrupt, auto return	After a manual operation, auto operation restarts, with auto return to the point of interruption	●	●
Library programs	Registers sub-programs as library (No need to select sub-program)	●	●
Parameter I/O	Parameter file input/output, verify	●	●
Relative actual position display	The reference position of the position currently displayed can be changed at any time.	●	●
One-Touch Spreadsheet	Excel® files assist machining setups	○	○
Post-process workpiece gauging	Measures workpiece outside machine, and compensates for tool offset based on measurement results Quantitative compensation method (five level, seven level)/BCD method/RS-232C method	○	○
Measured data output to file	Measured data output to file	○	○
NC Gage	Workpiece dimensions and geometrical tolerance can be measured	○	○
PLC monitor	Maintenance work after machine shutdown is supported with ladder display, data trace, etc.	●	●
■ Programming and machining (including milling)			
Imperial/metric switch	Program commands and data setting operations are switchable between metric and imperial.	○	○
Combined use of mm/min	Combined mm/rev & mm/min feed rates	●	●
Work coordinate system	Number of selected sets: 10, 100	○	○
Zero shift	Zero offset calculation, and shift according to G code	●	●

Name	Description	P500L	P500S
■ Programming and machining (including milling)			
Threading	Lead thread ridge designate, variable lead thread, chamfering while threading	●	●
	Multiple threads by specifying phase difference		
	Fixed threading cycle (single cycle, multiple cycles)		
	Circular threading (Along an arc)	○	○
Threading slide hold	Pause for threading during fixed cycle	●	●
	Pause for threading during non-fixed cycle	○	○
Threading matching	Possible to re-cut threads for threaded parts once removed	○	○
Threading override	Adjusts spindle overdrive while threading	○	○
Auto chamfering	Easy chamfering at a corner angle of 90° (C, R)	●	●
Arbitrary angle chamfering	Easy chamfering at an arbitrary corner angle (C, R)	●	●
Auto programming for turning (LAP 4)	Auto machining of cutting paths from roughing to finishing	●	●
	Cutting path generated to match blank shapes		
Fixed cycle for tapers	4 patterns: ID, OD/longitudinal, axial face	●	●
Groove cutting/spindle drilling cycle	OD, ID and axial face groove cutting cycle and cutting-off cycle	●	●
	Drilling cycle while rotating the workpiece		
Spindle tapping cycle	Floating tapping cycle with main spindle and Z-axis	●	●
	Synchronized tapping cycle with main spindle and Z-axis	●	●
Hole drilling fixed cycles (M specs)	Drilling, boring and tapping	●	●
Keyway cycle (M specs)	Cycle for keyway milling on workpiece sides and face	●	●
Profile generation (M specs)	Straight-line machining and circular arc machining on workpiece sides and face	○	○
Coordinate calculation (M specs)	Sequential coordinate values on straight line and circumference designated with single command	○	○
NCYL command (M specs)	Skip of cycle axis movement in fixed drilling cycles in the commanded block	○	○
Coordinate change (M specs)	Shift, rotation and copying of the workpiece coordinate system	○	○
	Enlarges and reduces drawings	○	○
	X-C coordinate change: X-C axes movement is commanded on the X-Y coordinate	○	○
User Task	IF/THEN, DO/WHILE, GOTO (variables) statement, etc.	●	●
	Arithmetic operations, functional operations, logical operations, inverse trigonometric functions	●	●
	Common variables (Standard: 200 sets)	●	●
	Common variables: 1,000 sets	○	○
	Local variables, system variables, sub-programs	●	●
	GM code macros (G-codes: 20 sets, M-codes: 20 sets)	●	●
	READ/WRITE/GET/PUT	●	●
	Input/output variables (24 points each)	○	○
Block skip	Use soft on/off keys on screen to skip execution of a part program (number of sets: 1)	●	●
	Block skip 9 sets	○	○
Program messages	To show notes in part program screens	○	○
Home position	Home position for positioning at set parameters Users: 64 sets, System: 192 sets	○	○
Helical cutting (M specs)	Circular interpolation + helical axis interpolation (including multiple command macros)	○	○
	Generated helical cutting with XC + Z axes (including multiple command macros)	○	○
B-axis slope machining	Easy programming of slope machining with the B-axis tilted	—	○
Slope machining	Type Ⅰ: Parallel and rotational movements of the X-Y-Z coordinate system are used to define the coordinate system along the slope of the workpiece and the part program is executed	○	○
	Type Ⅱ: Various definition methods are used to define the coordinate system along the slope of the workpiece and the part program is executed The spindle is automatically indexed so the slope coordinate system Z-axis and the tool axis match direction	○	○
Fixture offset	The program coordinate is offset according to the C-axis angle	—	○
Oriented spindle stop	Program command for the stop position	●	●
Harmonic Spindle Speed Control	The spindle speed is periodically changed to avoid chatter during the cutting of large-diameter thin workpieces or small-diameter long workpieces	○	○
	The M spindle speed is periodically changed to avoid chatter during cutting	—	○
Tool grooving (M specs)	Helical operation with synchronization of two axes consisting of a plane (XY, ZX, YZ) and the M spindle	—	○
Turn-Cut (M specs)	Turning with the synchronization of X-Y axes circular movement and M spindle rotation (also possible on a slope)	—	○
Flat Turning (M specs)	Flat turning with synchronized rotation of the spindle and the M spindle	○	○
Dynamic tilt turning	Turning with simultaneous control of 3 axes including the B-axis	—	○
Y-axis turning	Cut-off processing with feed in the Y-axis direction (a specialized tool is required)	—	○
Gear Machining Package (M specs)	Gear programming (interactive programming)	—	○
	Gear cutting function		
Hob machining (M specs)	Hob machining with synchronized rotation of the spindle and the M spindle	○	○
Cutting step feed	Dwelling during cutting to cut chips	○	○
Inverse time feed	Feed rate command with cutting time	○	○
Synchronized C-axis control (M specs)	C-axis control for machining with the workpiece chucked with both main and sub spindles	○	○
A/B synchronized turret feed	Simultaneous machining with A/B saddle	○	○
Z-W overlap function	Of workpiece on L/R spindles with single turret	○	○
Auto C-axis clamping/ unclamping (M specs)	Auto C-axis clamping/un-clamping according to presence or absence of C-axis command	—	○
X-axis radius command for turning	Radius commands can be used for the X-axis during turning	○	○
Spindle phase synchronizing	During spindle rotation, highly accurate workpiece transfer between spindles	○	○
Spindle dead-slow cut	Extremely slow spindle speed cutting	○	○
Spindle S command 0.1 min^{-1}	Spindle speed command S unit 0.1 min^{-1}	○	○
■ Interactive programming			
Advanced One-Touch IGF-L	With the entry of a unicursal turning shape, the machining method is automatically decided	○	○
	Realistic 3D simulated test cuts		
	Slope machining (available only for slope machining specs)		

Name	Description	P500L	P500S
■ Tool management			
Tool information management			
[Tool information management]	Compensation, life management, shape data, etc. are collectively managed for each tool (1,000 tools can be registered)	●	●
[Tool command (TD command)]	Tool indexing and tool compensation commands based on tool information management are available	—	●
Tool compensation	Number of comp sets: 20 sets for each of the registered tools (up to 1,000 tools)	—	●
	Number of comp sets: 2 sets for each of the registered tools (up to 1,000 tools) However, the maximum number of total sets (standard) is 32	●	—
	Maximum number of total sets (additional): 96/999	○	—
Y-axis center height offset	Misalignment in the Y-axis direction is set in Y-axis tool offset for machining with compensation	○	○
Tool life management	The number of workpieces or cutting time is accumulated and when the set value is reached, a spare tool is automatically indexed; Life data of each tool are displayed as graphs	○	○
	Prior notice of tool life		
Tool compensation for multi control system	Controls reference for spindles 1 and 2 and orthogonal position compensation	—	○
Multi insert tool	Management of tools with multi-edge inserts in a single holder	—	○
	(4, 8, 12 edge multi insert tools)		
Multiple simultaneous tool management	Up to 8 cutting edges can be attached to each station of the turret, and tools for each cutting edge can be separately managed.	○	—
Turret intermediate indexing	The turret is indexed midway between adjacent stations to allow expansion of the number of attached tools	○	—
Double tooling	2-tool load management for each turret station	○	○
■ Program capacity, program operation			
Program storage capacity	4 GB (includes setup data)	●	●
Operation buffer	Standard: 2 Mbyte	●	●
	Expanded: 10 Mbyte	—	○
Scheduled programs	Scheduled operation in a specified execution order of multiple programs	●	●
■ High-speed/high-accuracy functions			
Hi-G control	Positioning acceleration/deceleration conforming to motor's speed/torque characteristics	●	●
Hi Cut Pro	High-speed, high-accuracy machining with speed control and acceleration control suitable for parts machining	○	○
Hyper-Surface Ⅱ (3 linear axes) (3 linear axes + 2 rotary axes)	High-speed, high-accuracy and high-quality machining with a shape smoothing function and shape adaptive acceleration control suitable for curved surface machining	—	○
	Selecting the intended use (workpiece type) and the process (roughing, semi-finishing, finishing), means the optimal machining parameters are automatically selected		
	At the time of roughing, acceleration/deceleration at a corner is optimized to achieve both tolerance and machining time reduction		
	SMART finishing During finishing, both machining time reduction and high-quality machining are achieved with the control of deceleration at corners and of acceleration/deceleration vibration		
	Surface quality-oriented correction of program command points		
5-axis machining	NC B-axis	—	○
	Hyper-Surface Ⅱ (3 linear axes + 2 rotary axes)	—	○
	Tool Center Point Control Ⅱ (includes tool tilt compensation)	—	○
	Tool posture command	—	○
	Cutting point command	—	○
Cycle time reduction	Operation time reduction	○	○
	Machining time reduction, easy parameter setting	●	●
	Chuck open/close and auto tailstock advance/retraction during spindle rotation	○	○
0.1 µm control	0.1 µm command increments	○	○
AbsoScale detection	X-, Z-, Y-axis	○	○
Pitch error compensation	X-Y-Z and C-axis pitch error compensation	○	○
Straightness compensation	Compensation of orthogonal axis straightness	○	○
Thermo-Friendly Concept			
[TAS-S (spindle)]	Corrects thermal deformation error generated during spindle rotation	○	○
[TAS-C (construction)]	Corrects thermal deformation error generated during shop temperature changes affecting machine construction	○	○
5-Axis Auto Tuning System	Gauging and compensation of geometric error in 5-sided machining applications	—	○
Dynamic displacement compensation	Dynamic displacement during acceleration/deceleration is compensated for, to improve machining accuracy	—	○
■ Monitoring, adaptive control			
Collision Avoidance System (Units and actions to prevent interference are limited)	Interference during automatic, MDI and manual operations is prevented	○	○
	Easy modeling of shape data		
	Simultaneous movement with Hyper-Surface Ⅱ and Tool Center Point Control Ⅱ	—	○
Quick modeling	Easy preparation of 3D models of tools, jigs and workpieces	○	○
	Supply of affluent 3D model data	○	○
	Easy creation of a machine digital twin environment	○	○
Real 3D simulation	Real time simulation of all machining modes (auto, MDI, manual operation)	○	○
	With 2D simulation		
Virtual Processing	Pre-machining preparation is more efficient with a digital twin	○	○
	Machining trajectory, scraping		
	High-speed, high-precision machining time estimation		
	Power consumption (carbon dioxide emissions) estimation		
Load monitor	CNC monitors and displays load conditions of feed axis and spindle in a graph (machining stops when overloaded)	○	○
	No-load detection, part number expansion, workpiece ejection detection		
Cutting Status Monitor	To reduce machining failure, spindle and feed axis loads are monitored to trigger an alarm, pause operations, and/or trigger evacuation operations.	—	○
Machine Status Logger	Commands, operations and spindle and feed axis loads are recorded to increase, analyze and improve machining traceability	○	○

Name	Description	P500L	P500S
■ Monitoring, adaptive control			
Maintenance suite			
[Maintenance Monitor]	The plans, implementation schedules and history of regular maintenance items and daily inspection items are managed	●	●
[Collection of log data for maintenance]	Operation history (MMPBU), detection of spindle collisions (CLDT), data on change over time (S-LOG, A-LOG), machine diagnosis data (D-LOG)	●	●
[AI Machine Diagnosis]	AI-based spindle, M spindle and feed axis diagnostics	○	○
[Servo diagnosis]	Abnormalities of the servo system (drive unit, encoder, motor) are diagnosed to support cause analysis	●	●
Machining Navi M-*i*	Based on chatter vibration during milling, the M spindle speed is automatically optimized to stabilize machining	—	○
Machining Navi M-*g*Ⅱ, M-*g*Ⅱ+	Chatter sound during milling is visualized to help automatically select the optimal M spindle speed for stable machining	—	○
Machining Navi L-*g*Ⅱ	Search function for selecting the cutting conditions that best prevent chatter during turning	○	○
Machining Navi T-*g*	Search function for selecting the cutting conditions that best prevent chatter during threading	○	○
SERVONAVI AI	Workpiece weight auto setting, spindle inertia auto setting	●	●
SERVONAVI SF	Reversal Spike Auto Adjustment, Vibration Auto Adjustment	—	●
NC operation monitor	NC hour meters for NC start, spindle rotation, cutting, etc. and 4 NC workpiece counters	○	○
Workpiece counters	[Count only], [Cycle stop when the full count is reached], [Start is disabled when the full count is reached]	○	○
Hour meter on machine	The power ON time, spindle rotation time and NC running time are counted	○	○
Operation end buzzer	A buzzer goes off at M02/M30 and M00/M01 and also when an alarm is generated	○	○
Status indicator	NC running lamp, alarm lamp, machining end lamp	○	○
Cycle time over check	An alarm goes off and the operation stops when the prescribed cycle time is exceeded	○	○
Feed axis retraction	Pull back in axial direction during power failures	○	○
■ Measuring			
Cutting edge gauging	Touch Setter M, Touch Setter A	○	○
Tool breakage detection	Tool breakage is automatically detected with Touch Setter gauging	○	○
Tool breakage detection	The sensor attached to the top of the spindle detects milling tool breakage	○	○
In-process workpiece gauging	Auto zero offset using a standard ring	○	○
	Workpieces are automatically gauged to compensate tool offset, Z-axis zero offset and C-axis zero offset		
In-process workpiece gauging Y-axis gauging	Workpieces are automatically gauged to compensate Y-axis zero offset, tool offset and tool diameter	○	○
Y-axis slope gauging	Workpieces are automatically gauged in the slope coordinate system to compensate tool offset and tool diameter and set measurements as variables	○	○
In-process workpiece gauging 3-point gauging	The cylinder outer diameter and hole inner diameter are gauged at three points to calculate diameters and central positions and set them as variables	○	○
■ Energy-saving functions			
ECO suite plus	ECO Idling Stop, ECO Operation	●	●
	ECO Power Monitor (on machine watt meter is optional)	●	●
	External output interface of consumed electricity	○	○
	Oil temperature controller auto control	—	●
	Spindle Power Peak Limiter	○	○
■ Machining management			
MacMan plus	Aggregation and display of machining records, operating records, operating history and trouble information	●	●
	Records, trouble info file output	●	●
■ Automation/unattended operation functions			
Auto power shutoff	Power is automatically turned off when machining is completed or an alarm is generated	○	○
External program	Push button, rotary switch, digital switch, BCD	○	○
Connection with automated devices	Robot loader I/F, bar feeder I/F, FMS link I/F	○	○
■ Networking			
External I/O communication	Ethernet (1,000 Mbps), USB 3.0 interface 2 ch	●	●
	RS-232C interface (for OSP only) 1CH to 4CH	○	○
	Connected to host and other machines using FL-net and Ethernet/IP	○	○
DNC-T1	Ethernet part program transfers	●	●
DNC-DT	Remote operation using Ethernet: part programs are downloaded from PCs for the machining operation	○	○
Smart I/F	I/F for Connect Plan Connect Plan: production control system produced by Okuma	●	●
DNC-T3	I/F for MacMan-net MacMan-net: production control system produced by Okuma	○	○
DNC-C/Ethernet	Host and FMS link via Ethernet	○	○
OSP API KIT	API for Windows®-based application development	○	○
OSP-MTConnect	MTConnect I/F for production management systems produced by other companies	○	○
OPC UA for Machine Tools	Communication specification for machine tools compatible with OPC UA communication Compatible with Ver. 1.00 specifications and essential functions	○	○
■ Pocket manual functions			
Online help	Programming help, operation help, alarm help	●	●
■ Other functions			
Earth leakage circuit breaker	Power shutoff with the detection of earth leakage	○	○
External M signals	[2 sets, 4 sets, 8 sets, 16 sets]	○	○
■ Security			
Operator authentication	User management and restrictions on machine operation based on ID and password	●	●
Lock screen	Restrictions on machine operation after the machine has been out of use for a long time	●	●
OSP-VPS Ⅱ	Allowlist-based virus protection system (STD)	●	●
	Allowlist-based virus protection system (EX)	○	○

OSP-P500

OSP-P500M CNC for Machining Centers
OSP-P500S CNC for Machining Centers with Multitasking

●: Standard ○: Optional —: Not available
* Ethernet is a registered trademark of Xerox Corporation USA
MTConnect is a registered trademark of Association For Manufacturing Technology

Specifications

Name	Description	P500M	P500S
■ Controlled axes, control systems, command units			
No. of machine axes	X-Y-Z simultaneous 3 axes, max simultaneous 5 axes, max simultaneous 6 axes	Depending on the models/mechanisms	Depending on the models/mechanisms
Spindle axis	1 axis		
Turning spindle axes (L specs)	1 axis (using C axis)		
PLC axes	16 axes		
Max no. of axes	32 axes		
Position feedback	OSP full range absolute position detection		
No. of control systems	1 system		
Synchronized axis control	Two motors are synchronized to drive one axis		
Command/operation programmable units	0.001 mm, 0.01 mm, 1 mm, 0.0001°, 0.001°, 0.01°, 1°	●	●
Min input	0.001 mm, 0.0001°	●	●
Max input	Decimal 8 digits, ±99999.999 mm	●	●
■ Display/Operating functions			
Operation panel	15-inch operation panel, XGA touch screen	Depending on the models/mechanisms	Depending on the models/mechanisms
	21.5-inch operation panel, Full HD touch screen		
	Operation panel tilt adjustment		
	Standard portable pulse handle (type A)		
	Portable pulse handle with function buttons (type B1)		
	Robot-adaptable portable pulse handle with function buttons (type B2)		
	Keyboard QWERTY layout	●	●
	Keyboard ABC layout	○	○
	Multi-touch panel operations	●	●
Languages	20 languages available (Jpn, Eng, Ger, Fr, etc.)	●	●
	Language switchable	○	○
Smart OSP Operation		○	○
[Machining process chart]	Machining defined and operated according to the machining process chart		
[Process preparation and editing]	Process preparation and editing guided by process chart		
[Process control and operation]	Guided control and operation guided by process chart		
Easy Operation	Single-mode operation	●	●
	Setup data	●	●
OSP suite	Various “suite” apps support the series of machining operations, and “suite operation” enables one-touch access to those apps	●	●
Program editing	Simultaneous edit 2 files in 1 screen	●	●
	One-touch editing (editing of the selected part program, no need to specify file name, auto cursor movement to the block being executed)	●	●
	Arranges sequence numbers	●	●
	Editing programs beyond the edit buffer	●	●
	UNDO/REDO of program editing	●	●
	Multi-level directory operation, directory tree display	●	●
File name index display	2 file name indexes displayed in 1 screen	●	●
	Display of refined indices	●	●
	Preview of the program content	●	●
Manual cutting feed	Manual cutting feed on the operation panel	●	●
Sequence return	To specified sequence, auto restart from returned point	●	●
	Mid-block sequence return	○	○
Sequence number search	Machine from the specified sequence no.	●	●
Manual interrupt, auto return	After a manual operation, auto operation restarts, with auto return to the point of interruption	●	●
Sequence stop	Stops machining at prescribed sequence number	●	●
Library programs	Registers sub-programs as library (No need to select sub-program)	●	●
Parameter I/O	Parameter file input/output, verify	●	●
	Input/output by way of CSV file	●	●
Relative actual position display	The reference position of the position currently displayed can be changed at any time.	●	●
One-Touch Spreadsheet	Excel® files assist machining setups	○	○
Pulse handle overlapping	Overlaps tool travel due to part program with tool travel due to pulse handle	●	●
Pulse handle angle/arc feed	Angle and arc feed with simultaneous 2-axis control by pulse handle	○	○
PLC monitor	Supports maintenance work after machine shutdown Ladder display, data trace, etc.	●	●
Pulse handle addition	Total: 3 pieces	○	○
Pulse handle with touch panel	Pulse handle with touch panel that displays the feed axis position, etc.	○	○
■ Programming and machining (including turning)			
Imperial/metric switch	Program commands and data setting operations are switchable between metric and imperial.	○	○
Combined use of mm/min	Combined mm/rev & mm/min feed rates	●	●
Work coordinate system	Number of selected sets: standard 20	●	●
	Number of selected sets: 100, 200, 400	○	○
	Change of the work coordinate system: Designate the tool edge position to automatically set the coordinate system	●	●
Programmable travel limits	Per G22, G23	○	○
Axis name designation	Can change axis name by G-code	○	○
Threading (L specs)	Lead thread ridge designation, variable lead thread, chamfering while threading, fixed threading cycle (single cycle, multiple cycles), multiple thread by designating phase difference	●	●
	Circular threading (Along an arc)	○	○
Threading slide hold (L specs)	Pause for threading during fixed cycle	●	●
	Pause for threading during non-fixed cycle	●	●
Arbitrary angle chamfering	Easy chamfering at an arbitrary corner angle (C, R)	○	○
Auto programming for turning (L specs)	Auto machining of cutting paths from roughing to finishing Generates cutting paths according to blank shape	—	●

Name	Description	P500M	P500S
■ Programming and machining (including turning)			
Groove cutting/turning spindle drilling cycle (L specs)	OD, ID and axial face groove cutting cycle and cutting-off cycle Drilling cycle while rotating the workpiece	●	●
Hole drilling fixed cycles	Drilling and boring	●	●
	Synchronized Tapping	○	○
Keyway cycle	Cycle for keyway milling on the XY, ZX or YZ plane	●	●
Area machining	Machining of a defined rectangle area Face milling (surface), pocket milling (inner surface), round milling (periphery, inner periphery)	●	●
Cylindrical side machining	Can easily carry out machining of cylindrical side	○	○
Coordinate calculation	Sequential coordinate values on straight line and circumference designated with single command	●	●
NCYL command	Skip of cycle axis movement in fixed drilling cycles in the commanded block	●	●
Coordinate change	Shift, rotation and copying of the workpiece coordinate system	●	●
	Enlarges and reduces drawings	○	○
	Programmable mirror image	○	○
User Task	IF/THEN, DO/WHILE, GOTO (variables) statement, etc.	●	●
	Arithmetic operations, functional operations, logical operations, inverse trigonometric functions	●	●
	Common variables (Standard: 200 sets)	●	●
	Common variables: 1,000 or 2,000 sets	○	○
	Local variables, system variables, sub-programs	●	●
	G-/M-code macros (G-code: 20 sets, M-code: 20 sets)	●	●
	G-code macros: 100 sets (80 sets added)	○	○
	READ/WRITE/GET/PUT	●	●
	Input/output variables (16 points each)	○	○
Block skip	The execution of the part program is skipped by turning on/off soft keys on the screen (number of sets: 1)	●	●
	Block skip 9 sets	○	○
Programmable branch	The branch of the part program can be turned ON/OFF with soft keys on the screen (number of sets: 9)	○	○
Program messages	To show notes in part program screens	●	●
Home position	Home position for positioning at set parameters Users: 64 sets, System: 192 sets	●	●
F1 shift	Feed speed command by designating the number - external switch type/parameter type	○	○
Helical cutting	Circular interpolation + helical axis interpolation	○	○
3D circular interpolation	Three dimensional interpolation	○	○
Skip	Axis travel by G-code, movement skip by sensor input	○	○
Slope machining	Type Ⅰ: Parallel and rotational movements of the X-Y-Z coordinate system are used to define the coordinate system along the slope of the workpiece and the part program is executed	○	○
	Type Ⅱ: Various definition methods are used to define the coordinate system along the slope of the workpiece and the part program is executed The spindle is automatically indexed so the slope coordinate system Z-axis and the tool axis match direction	○	○
Fixture offset	The workpiece coordinate of the rotary/tilting axis is offset	○	○
Dynamic fixture offset	The work coordinate is automatically offset according to the movement of the rotary axis	○	○
Oriented spindle stop	Program command for the stop position	●	●
Harmonic Spindle Speed Control	The spindle speed is periodically changed to avoid chatter during cutting	○	○
Tool grooving	Helical (simultaneous XY + spindle)	○	○
Turn-Cut	Simultaneous XY arc+ spindle	○	○
Dynamic tilt turning (turning specs)	Turning with simultaneous 3-axis control including the A-axis (B-axis)	—	○
Gear Machining Package	Gear Programming (interactive programming)	—	○
	Gear cutting function		
Hobbing and skiving	Hobbing and skiving with synchronized rotation of the C-axis and the spindle	—	○
Cutting step feed	Dwelling during cutting to cut chips	○	○
Inverse time feed	Feed rate command with cutting time	○	○
Spindle path control	Contouring per simultaneous control of spindle C and X-Y-Z axes	○	○
Dynamic Tool Load Control	Control of chipping due to tool runout during the machining of difficult-to-cut materials	○	○
Punch tap cycle	High-speed threading cycle using tools dedicated to punch tap	○	○
■ Interactive programming			
Advanced One-Touch IGF-M	Auto operation decision (drilling, milling)	○	○
	A wide range of machining including contouring, grooving, pocket machining, milling, boring and linear chamfering		
	Realistic 3D simulated test cuts		
	Direct from machining order tables (no G/M codes)		
	Slope machining, 5-face machining		
I-MAP	Part programs can be edited according to guide maps (with figure calculation function)	○	○
I-MAP-B	Solid shape machining function added to I-MAP pattern cycle	○	○
I-MAP-C	Functions to determine cutting conditions and automatically determine drilling cycle added to I-MAP	○	○
■ Tool management			
Tool information management	Compensation, life management, shape data, etc. are collectively managed for each tool (999 tools can be registered)	●	●
Tool compensation	Tool length compensation (for turning, compensation in two directions), tool diameter compensation (for turning, nose R compensation), tool wear compensation	●	●
	3 sets for each of the registered tools (up to 999 tools), maximum number of total sets: 999	●	●
3D tool compensation	Designates offset direction at I, J, K	○	○
Tool life management	The number of workpieces or cutting time is accumulated and when the set value is reached, a spare tool is automatically indexed; Life data of each tool are displayed as graphs	●	●
	Tool life prior notice, tool life warning, tool life special prior notice/warning		
■ Program capacity, program operation			
Program storage capacity	4 GB (includes setup data)	●	●
Operation buffer	Standard: 2 Mbyte	●	●
	Expanded: 10 Mbyte	○	○

Name	Description	P500M	P500S
■ Program capacity, program operation			
Program operation type	A-Operation: All programs are loaded into the operation buffer and operated	●	●
	B-Operation: Programs exceeding the operation buffer are loaded sequentially (sub-programs/branch instructions can be used) and operated	●	●
	S-Operation: Programs exceeding the operation buffer are loaded sequentially (sub-programs/branch instructions cannot be used) and operated	●	●
Sub-program large capacity operation	When a sub-program is called and executed, the relevant sub-program is searched for and executed	○	○
Scheduled programs	Scheduled operation in a specified execution order of multiple programs	●	●
Scheduled program auto update	Updates part programs during a scheduled run	○	○
■ Measuring			
Auto tool length offset/ auto tool breakage detection	Automatically performs tool length compensation and tool breakage detection Continuous tool gauging: Multiple tools are continuously gauged automatically	○	○
In-magazine tool breakage detection	Tool breakage is automatically detected in the magazine	○	○
Auto gauging	Checks workpiece dimension, and auto zero offset Measured data output to file	○	○
Manual measurement	Easy manual tool length compensation, workpiece gauging and zero setting according to guidance on the display	○	○
Interactive gauging	Easy semi-automatic tool length compensation, workpiece gauging and zero setting according to guidance on the display	○	○
NC Gage	Workpiece dimensions and geometrical tolerance can be measured	○	○
■ High-speed/high-accuracy functions			
Hi-G control	Positioning acceleration/deceleration conforming to motor's speed/torque characteristics	●	●
Hi-Cut Pro	High-speed, high-accuracy machining with speed control and acceleration control suitable for parts machining	●	●
Hyper-Surface Ⅱ (3 linear axes) (3 linear axes + 2 rotary axes)	High-speed, high-accuracy and high-quality machining with a shape smoothing function and shape adaptive acceleration control suitable for curved surface machining	○	○
	With the selection of the intended use (workpiece type) and process (roughing, semi-finishing, finishing), the optimal machining parameters are automatically selected		
	At the time of roughing, acceleration/deceleration at a corner is optimized to achieve both tolerance and machining time reduction		
	SMART finishing During finishing, both machining time reduction and high-quality machining are achieved with the control of deceleration at corners and of acceleration/deceleration vibration		
	Surface quality-oriented correction of program command points		
	NURBS (high-dimensional curves) commands are available		
5-axis machining	Hyper-Surface Ⅱ (3 linear axes + 2 rotary axes)	○	○
	Tool Center Point Control Ⅱ (includes tool tilt compensation)	○	○
	Tool posture command	○	○
	Cutting point command	○	○
	Tool side machining	○	○
	Leading edge offset	○	○
	Tool side offset	○	○
	Tool-axial tool length comp	○	○
	Manual feed functions: manual tool feed (tool-axial), manual tool feed (right angle), table standard coordinate system manual feed, tool center point manual feed	○	○
Cycle time reduction	Operation time reduction	●	●
	Machining time shortening	●	●
	Easy parameter setting	●	●
In-position check	Suppression of the machine's follow-up delay within a specified value range before and after the rapid traverse command block	●	●
Exact stop check	Suppression of the machine's follow-up delay within a specified value range in the designated axis travel block	●	●
0.1 μm control	0.1 μm command increments	○	○
AbsoScale detection	X-axis, Y-axis, Z-axis, W-axis	○	○
Inductsyn detection, DD encoder detection	A-axis, B-axis, C-axis	○	○
Pitch error compensation	Compensation for ball screw pitch error	●	●
Straightness compensation	Compensation for linear axis motion	○	○
Misalignment compensation	Compensation for misalignment of the rotary axis rotation center	○	○
Thermo-Friendly Concept			
[TAS-S (spindle)]	Corrects thermal deformation error generated during spindle rotation	○	○
[TAS-C (construction)]	Corrects thermal deformation error generated during shop temperature changes affecting machine construction	○	○
5-Axis Auto Tuning System	Gauging and compensation of geometric error in 5-sided machining applications	○	○
Auto Attachment Head Compensation	Rotation compensation values of the attachment head are automatically set	○	○
3D Calibration	Error measurement and compensation: Straight axis errors are measured and compensated as volumetric errors/geometric errors to calibrate machine accuracy Accuracy Stability Diagnosis	○	○
Accuracy Stability Diagnosis	Changes and stability of accuracy are visualized based on the temperature and operation status of the machine, the environment in the plant, etc. to give a notification with a message when an accuracy check is needed	○	○
Attachment rotation compensation	Compensation for misalignment due to the rotational direction of the attachment	○	○
Spindle head rotation compensation	Compensation for misalignment due to the rotational direction of the spindle head	○	○
Dynamic displacement compensation	Dynamic displacement during acceleration/deceleration is compensated for, to improve machining accuracy	○	○
■ Pocket manual functions			
Online help	Programming help, operation help, alarm help	●	●
■ Monitoring, adaptive control			
Collision Avoidance System (Units and actions to prevent interference are limited)	Interference during automatic, MDI and manual operations is prevented	○	○
	Easy modeling of shape data		
	Simultaneous movement with Hyper-Surface Ⅱ and Tool Center Point Control Ⅱ	○	○

Name	Description	P500M	P500S
■ Monitoring, adaptive control			
Quick modeling	Easy preparation of 3D models of tools, jigs and workpieces	○	○
	Supply of affluent 3D model data	○	○
	Easy creation of a machine digital twin environment	○	○
Real 3D simulation	Real time simulation of all machining modes (auto, MDI, manual operation)	○	○
	Solid/cross section/transmission display of workpieces, track line display, tool shape display		
	With cycle time calculator		
Virtual Processing	Pre-machining preparation is more efficient with a digital twin	○	○
	Machining trajectory, scraping		
	High-speed, high-precision machining time estimation		
	Power consumption (carbon dioxide emissions) estimation		
Simple load monitor	Monitors spindle overload (machining stops when overloaded)	○	○
Tool breakage no-load detection	In drilling, detects the no-load cutting status of the spindle caused by tool breakage, triggers an alarm and stops operation	○	○
Synchronized tapping torque monitoring	During synchronized tapping, monitors for spindle overload (Overload causes machining stop and evacuation)	○	○
MOP-T00L	Overload monitoring and adaptive control	○	○
Cutting Status Monitor	To reduce machining failure, spindle and feed axis loads are monitored to trigger an alarm, pause operations, and/or trigger evacuation operations.	○	○
Machine Status Logger	Commands, operations and spindle and feed axis loads are recorded to increase, analyze and improve machining traceability	○	○
Maintenance suite			
[Maintenance Monitor]	The plans, implementation schedules and history of regular maintenance items and daily inspection items are managed	●	●
[Collection of log data for maintenance]	Operation history (MMPBU), detection of spindle collisions (CLDT), data on change over time (S-LOG, A-LOG), machine diagnosis data (D-LOG)	●	●
[AI Machine Diagnosis]	AI-based spindle and feed axis diagnostics	○	○
[Servo diagnosis]	Abnormalities of the servo system (drive unit, encoder, motor) are diagnosed to support cause analysis	●	●
Machining Navi M-*i*	Based on chatter vibration during machining, the spindle speed is automatically optimized to stabilize machining	○	○
Machining Navi M-gⅡ, M-gⅡ+	Chatter vibration during machining is visualized to help automatically select the optimal spindle speed for stable machining	○	○
SERVONAVI AI	Work Weight Auto Setting, Rotary Axis Inertia Auto Setting	●	●
SERVONAVI SF	Reversal Spike Auto Adjustment, Vibration Auto Adjustment, Deflection Auto Adjustment	●	●
NC operation monitor	NC hour meters for NC start, spindle rotation, cutting, etc. and 4 NC work counters	○	○
Workpiece counters	Count only	○	○
Hour meters	The power ON time, spindle rotation time, NC running time and cutting time are counted	○	○
Operation end buzzer	A buzzer goes off at M02/M30 and M00/M01 and also when an alarm is generated	○	○
Status indicator	NC running lamp, alarm lamp, machining end lamp	○	○
Feed axis retraction	Pull back in axial direction during power failures	○	○
■ Energy-saving functions			
ECO suite plus	ECO Idling Stop, ECO Operation	●	●
	ECO Power Monitor (on machine watt meter is optional)	●	●
	External output interface of consumed electricity	○	○
	Oil temperature controller auto control	●	●
	Spindle Power Peak Limiter	○	○
	ECO Hydraulics	○	○
■ Machining management			
MacMan plus	Aggregation and display of machining records, operating records, operating history and problem information	●	●
■ Automation/unattended operation functions			
Auto power shutoff	Power is automatically turned off when machining is completed or an alarm is generated	○	○
External program	Push button, rotary switch, digital switch, BCD	○	○
Connection with automated devices	Robot loader I/F, stacker crane I/F, FMS link I/F	○	○
■ Networking			
External I/O communication	Ethernet (1,000 Mbps), USB 3.0 interface 2 ch	●	●
	RS-232C interface (for OSP only) 1CH to 4CH	○	○
	Connected to host and other machines using FL-net and Ethernet/IP	○	○
DNC-T1	Ethernet part program transfers	●	●
DNC-DT	Remote operation using Ethernet: part programs are downloaded from PCs for the machining operation	○	○
DNC-B	Ethernet RS-232C for OSP, connects to host RS-232C; remote buffer operations	○	○
Smart I/F	I/F for Connect Plan Connect Plan: production control system produced by Okuma	●	●
DNC-T3	I/F for MacMan-net MacMan-net: production control system produced by Okuma	○	○
DNC-C/Ethernet	Connected to host using Ethernet	○	○
OSP API KIT	API for Windows®-based application development	○	○
OSP-MTConnect	MTConnect I/F for production management systems produced by other companies	○	○
OPC UA for Machine Tools	Communication specification for machine tools compatible with OPC UA communication Compatible with Ver. 1.00 specifications and essential functions for s	○	○
■ Other functions			
Earth leakage circuit breaker	Power shutoff with the detection of earth leakage	○	○
External M signals	[4 sets, 8 sets] Signals for controlling external devices such as rotary indexing tables	○	○
■ Security			
Operator authentication	User management and restrictions on machine operation based on ID and password	●	●
Lock screen	Restrictions on machine operation after the machine has been out of use for a long time	●	●
OSP-VPS Ⅱ	Allowlist-based virus protection system (STD)	●	●
	Allowlist-based virus protection system (EX)	○	○

OSP-P500

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.
Pub No. OSP-P500LMS-E-(1a)-Non (Mar 2023)

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