Vertical Machining Centers

**GENOS M series**

**GENOS M460-VE-e**  **GENOS M560-Ve**
GENOS technology carries Okuma’s genetic heritage and takes you to the leading edge of global competition.

Machining accuracy and productivity that exceed expectations; ease of use with a thorough understanding of the user’s perspective. Machine shops around the world long for machines like this. Okuma has faced this challenge head on, resulting in the high quality GENOS global machine. Okuma’s technical genes are found in cutting edge manufacturing that seeks to balance high quality and low cost.

Photos used in this brochure include optional equipment.
Highly rigid construction for productivity that exceeds expectations

- Same double column structure as on the best-selling MB-V series
  Maximum performance is achieved by limiting the options with the same high-rigidity structure.

- Fast, powerful, long-life spindle
  (bearing lubrication: oil-air)

- Table size / machining area
  GENOS M460-V6-e
  GENOS M560-V6-e
  762 mm (X-axis travel)
  1,000 mm (table)
  460 mm (Z-axis travel)
  460 mm (Y-axis travel)

- Highly rigid double-column construction

- Tough vertical ribs directly below linear ball guides

- Zero alignment drive / center drive

- Ball screw bracket integrated in machine

- "X" diagonal rib casting

- Highly rigid structure supports powerful cutting
  In addition to the highly rigid double-column structure and the diagonal rib casting base section, Okuma’s original design makes this a robust machine capable of stable, powerful cutting even with high-speed movement.

- Small overhang for more efficient machining
  The overhang from the machining point to slideway is small, enabling efficient machining. For table movement, the Y-axis overhang also remains small regardless of the machining position.

- Highly accurate drive system
  The ball screw is set at the center of the table. By aligning the positions of the center of the ball screw and the guideway, highly accurate drive and positioning are achieved with no collisions.

- Hi-G Control (standard)
  Acceleration/deceleration during positioning is controlled by math functions linked to motor speed/torque characteristics, to provide both machine accel/decel and vibration control.
High dimensional stability

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.

- **TAS-C: Thermo Active Stabilizer—Construction**
  *“Proactively” keeps the machine in optimum, stable condition during shop environment temperature change resulting in superb (stable) machining accuracies.*

- **TAS-S: Thermo Active Stabilizer—Spindle**
  *Accurate compensation during spindle start/stops, and speed changes.*

Simplified structure for thermal deformation / Design technology for uniform dissemination of heat

The machine expands and contracts in predictable directions, and manageable deformation is achieved with a machine structure that evenly transmits the temperature.

- **Thermally symmetric structure**
  *Equal left-right construction permits straightforward thermal distortion*

- **“Box-build” structure**
  *Column structure built up of simple blocks is used to permit straightforward thermal distortion*

- **Thermally balanced structure**
  *A cover is set on the front of the column and the control cabinet on the back for even conduction of temperature.*

Insulation measures from coolant, chips

Chips with heat produced by machining are quickly removed before heat is transferred to machine.

- **Spindles with heat produced by machining are quickly removed before heat is transferred to machine.**

Shorter cutting times and highly accurate machining

**Hi-Cut Pro (standard)**

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

- **Hi-Cut Pro Off**
  *Round corners*

- **Hi-Cut Pro On**
  *Sharp corners*

Improved productivity with powerful machining

- **Wide-range spindle specifications**
  *15,000 min⁻¹*

<table>
<thead>
<tr>
<th>Spindle speed: 8,000 min⁻¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spindle motor output: 22/18.5 kW (10 min/cont)</td>
</tr>
<tr>
<td>Torque: 199 N·m</td>
</tr>
<tr>
<td>Tapered bore: 7/24 taper No. 40</td>
</tr>
</tbody>
</table>

- **15,000 min⁻¹ wide-range spindle**

  | Tool Spindle speed min⁻¹ Cutting Speed m/min Feedrate mm/min Width mm Depth mm Amount cm³/min |
  |---------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
  | Ø80 face mill 8 blades (cermet) | 895 | 225 | 3,000 | 56 | 3 | 504 |
  | Ø20 roughing end mill 7 flutes (carbide) | 4,000 | 251 | 4,800 | 7 | 20 | 672 |
  | Ø63 insert drill (carbide) | 720 | 142 | 108 | - | - | - |
  | M30 x 3.5 tap | 318 | 30 | 1,113 | - | - | - |

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

(-10 0 10 20 30 40 Temperature (°C) 24 20 8 C 0 2 4 6 8 10 12 14 16 18 20 22 24 Elapsed time (Hr) OD dimensional change (µm) X-axis 5 µm Y-axis 6 µm 2-axis 6 µm | TAS-C: Thermo Active Stabilizer—Construction |
*“Proactively” keeps the machine in optimum, stable condition during shop environment temperature change resulting in superb (stable) machining accuracies.*
Truly machinist oriented, superb ease-of-use machine operation

For smooth machining preparations

- Loading/unloading tools to/from the magazine can be performed from the front of the machine
- Tool load/unload button on spindlehead
- Simple and accurate zero setting with auto gauging (Optional)
- Simple and accurate tool information input with auto tool length compensation (Optional)

With wide door opening for easy workpiece access and setup changes

- Outstanding ease of use
- Wide door opening : 850 mm (1,323 mm)
- Approach to table : 210 mm (215 mm)
- Table height : 800 mm

Photo shows a M560-V-e

Actual required footprint 8.0 m² (10 m²)

- Power line, chip disposal maintenance location
- Air supply maintenance location

Chip discharge

In-machine chip conveyor (coil)

Lift-up chip conveyor (illustrated image; also see p.12)

Coolant tank
Hi-tech Okuma mechatronics for advanced machining applications

Push cutting conditions higher to increase profit

Machining Navi instantly determines the optimal cutting conditions for highly efficient machining.

Cutting conditions can be changed while looking at analysis results

Based on the chatter noise captured by the microphone, Machining Navi displays a number of optimal spindle speed possibilities on the screen. The operator can change to the indicated spindle speed with a single touch and immediately confirm the result.

With a variety of eco-friendly features

Machine tool idling stop

ECO Idling Stop

Only the necessary units run

ECO suite benefits

Electricity consumption during non-machining time greatly reduced with "ECO Idling Stop," which shuts down each piece of auxiliary equipment not in use.

ECO suite provides a suite of energy-saving functions that can be used on machines

- "ECO Idling Stop" for operation of necessary units only
- "ECO Power Monitor" for visual graphics of power
- Intermittent/continuous operation of chip conveyor and mist collector during operation—"ECO Operation" (Optional)

Energy-saving technology

- Energy-saving NC unit
  - Computer in a flat panel with a high-performance CPU
  - Power-saving design
  - LCD (Liquid Crystal Display) used

- Energy-saving drive unit
  - Low-loss power transistor used
  - Power regeneration system used

Power consumption

<table>
<thead>
<tr>
<th>Machine Type</th>
<th>Servo Unit Power Consumption (%)</th>
<th>NC Unit Power Consumption (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990s OSP</td>
<td>100%</td>
<td>136%</td>
</tr>
<tr>
<td>2000s OSP</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>OSP-P300</td>
<td></td>
<td>40%</td>
</tr>
</tbody>
</table>

Previous Okuma machine

- 100%

GENOS M460-VE-e

- 85%
### Machine Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>GENOS M460-VE-e</th>
<th>GENOS M560-V-e</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Travels</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X axis (ram saddle horizontal) mm</td>
<td>762</td>
<td>1,050</td>
</tr>
<tr>
<td>Y axis (table front/back) mm</td>
<td>460</td>
<td>560</td>
</tr>
<tr>
<td>Z axis (spindle vertical) mm</td>
<td>780</td>
<td></td>
</tr>
<tr>
<td>Table top to spindle nose mm</td>
<td>1,500</td>
<td>1,510</td>
</tr>
<tr>
<td><strong>Table</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max work dimension mm</td>
<td>1,000 x 460</td>
<td>900</td>
</tr>
<tr>
<td>Floor to table top mm</td>
<td>1,300 x 560</td>
<td></td>
</tr>
<tr>
<td><strong>Spindle</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max spindle speed mm/s</td>
<td>15,000</td>
<td></td>
</tr>
<tr>
<td>Speed ranges</td>
<td>Stepless</td>
<td></td>
</tr>
<tr>
<td>Tapered bore</td>
<td>7/24 taper No. 40</td>
<td></td>
</tr>
<tr>
<td>Bearing dia (mm)</td>
<td>ø70</td>
<td></td>
</tr>
<tr>
<td><strong>Feedrate</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rapid traverse mm/m</td>
<td>X-Y: 40, Z: 32</td>
<td></td>
</tr>
<tr>
<td>Cutting feedrate mm/m</td>
<td>X-Y: 32</td>
<td></td>
</tr>
<tr>
<td><strong>Motors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spindle</td>
<td>kW</td>
<td>22/18.5 kW</td>
</tr>
<tr>
<td>Feed axes (mm)</td>
<td>X-Y-Z: 3.5</td>
<td></td>
</tr>
<tr>
<td><strong>ATC</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tool shank (tool magazine)</td>
<td>MAX BT40</td>
<td></td>
</tr>
<tr>
<td>Tool magazine (tool)</td>
<td>32-tool</td>
<td></td>
</tr>
<tr>
<td><strong>Tool magazine</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max tool dia (mm)</td>
<td>ø63</td>
<td></td>
</tr>
<tr>
<td>Max tool dia (mm)</td>
<td>ø76</td>
<td></td>
</tr>
<tr>
<td>Max tool length (mm)</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>Max tool weight (kg)</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Max tool moment (N-m)</td>
<td>7.8 (6 kg x 1.3 m)</td>
<td></td>
</tr>
<tr>
<td>Tool selection</td>
<td>Memory random</td>
<td></td>
</tr>
<tr>
<td><strong>Machine Size</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Height (mm)</td>
<td>2,225 x 2,810</td>
<td></td>
</tr>
<tr>
<td>Floor space (mm)</td>
<td>2,564 x 3,154</td>
<td></td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>7,000</td>
<td>9,300</td>
</tr>
<tr>
<td><strong>Control</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard Specifications and Accessories</td>
<td>OSP-P300MA-e</td>
<td></td>
</tr>
</tbody>
</table>

### Standard Specifications and Accessories

- **Spindle speed**: 50 to 15,000 min⁻¹
- **Rapid traverse**: X-Y: 40 mm/min, Z: 32 mm/min
- **Spindle cooling system**: Oil controller
- **Air cleaner (filter)**: Including regulator
- **Spindle oil-air lubrication system**
- **Spindle thermal deformation control (TAS-S)**
- **Thermo active stabilizer construction (TAS-C)**
- **Automatic tool changer**
- **ATC magazine shutter**
- **Tool unclamp package**
- **Coolant supply systems tank capacities**
- **Thru-spindle coolant**
- **Flexible nozzles**
- **In-machine chip conveyor (coil)**
- **ATC air blower (blast)**
- **Foundation washers (with jack bolts)**
- **2-lamp status indicator**
- **Work lamp**
- **Full enclosure shielding**
- **Tapered box cleaning box**
- **Hand tools**
- **Tool box**
- **Operation panel with color LCD**
- **Pulse handle**

*1. Use water-based coolant.
*2. Okuma pull studs required.

### GENOS M460-VE-e & M560-V-e “Package” Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>15,000 min⁻¹ spindle</td>
<td>32-tool ATC</td>
</tr>
<tr>
<td>Shower coolant supply</td>
<td>Table both sides</td>
</tr>
<tr>
<td>In-machine chip conveyor (coil)</td>
<td>Large volume</td>
</tr>
<tr>
<td>Air blow during spindle rotation</td>
<td>Thru-spindle</td>
</tr>
<tr>
<td>Transformer</td>
<td></td>
</tr>
</tbody>
</table>

### Lift-up chip conveyor

For reliable and efficient handling of chips from machine tools.

<table>
<thead>
<tr>
<th>Conveyor Type</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hinge</td>
<td>To easily handle hot, wet or dry chips, or other scrap material from milling, boring, drilling and other machining center operations.</td>
</tr>
</tbody>
</table>

### ATC tool dimensions

- **Max tool size**: In tool magazine with adjacent tools
- **Max single tool size**: (Without adjacent tools)
- **Max tool mass moment**: 7.8 N·m

*Commercially available milling chucks may interfere with the ATC tool change arm and tooling outer portions. Please check dimensions with tool manufacturer documentation before use.*
Meet Okuma’s control package of “visual and digital” shop floor production instructions, setup data, cutting and utilization status, machine maintenance information, and more.

The control interface itself adds a new dimension to ease of use—the more intelligent and faster way to manufacture high-quality components.

■ “suite apps”
In addition to Okuma’s Intelligent Technology, a rich array of applications is available for visualization and digitization of information needed on shop floors to support high-level “Monozukuri” manufacturing.

A multi-panel display is used for intuitive graphic operation. Just like using a smart phone, enlarged display of the instruction manual, displays of tool data and program lists and other information can be brought up quickly and easily.

■ “suite operation”
A multi-panel display is used for intuitive graphic operation. Just like using a smart phone, enlarged display of the instruction manual, displays of tool data and program lists and other information can be brought up quickly and easily.

Interactive operations
Advanced One-Touch IGF-M (Optional)

The objective: simple programming
Machining processes can be newly added or revised on the Machining Order Table. Each process can be set freely with tool units, and knowhow can be input with the edit function with a high degree of freedom.

The recommended value is automatically set when new additions are made.

Simple operations for 1st part machining jobs
Can be operated directly from Machining Order Table. When a problem is detected it can be quickly corrected and checked, speeding up first part machining.
### Standard Specifications

**Basic Specifications**
- Control: 
- Position feedback: OSP full range absolute position feedback (zero point return not required)
- Coordinate functions: Machine coordinate system (7 axes), work coordinate system (20 axes)
- Min / Max inputs :
  - 8-digit decimal: 9999.9999 to 0.0001 mm, 0.001"
  - 16-digit decimal: 1 mm, 0.1 mm, 0.01 mm, 0.001"
- Field:
  - Cutting feed override 0 to 2000%, 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: 10.4-inch color LCD < multi-touch panel operation>
- Self-diagnostics: Automatic diagnostics and display of program, operation, machine, and NC system faults

**Programming**
- Program capacity:
  - Program storage: 4 GB, operation buffer: 2 MB
- Program operations:
  - Program management, editing, multitasking, scheduled program, fixed cycle, 0-M-code macros, arithmetic, logical statements, math functions, variables, branch commands, coordinate calculates, area calculates, coordinate convert, programming help

**Operations**
- "suite app": Applications to graphically visualize and digitize information needed on the shop floor
- "suite operation":
  - Highly reliable tool panel suited to shop floors. One-touch access to suite apps.

**Communications / Networking**
- Serial communications:
  - RS-232-C (1 channel)
- USB (2 ports)
- Ethernet

**High-speed/accuracy specs**
- YAS-5 (Thermo Active Stabilizer—Spindle), YAS-C (Thermo Active Stabilizer—Construction), Hi-S Control, Hi-Qu Pro

**Energy-saving function**
- ECO suite
- ECO Tiling Shop"1, ECO Power Monitor"2

**Featuring the PC-IGF...** Interactive Programming with Okuma’s Advanced One-Touch IGF-M

### 3D-E Kit Specifications (Europe Package Specs)

**Item**
- Machine
  - Auto program schedule update
  - Auto program schedule update

**Coordinate system selection**
- 2D: G54, G55, G56
- 3D: G54, G55, G56

**Tool change setting**
- Tool change setting: G66

**Program operations**
- Program branch: 2 sets

**Interactive functions**
- From chatter to optimum spindle speed

**3D-E Kit Specifications**

**Optional Specifications**

**System**
- Advanced One-Touch IGF-M

**Programmable mirror image**
- 200 sets (Std: 20 sets)

**Super-NURBS**
- 100 sets (Std: 20 sets)

**Sequence restart (Std)**
- 1 additional axis

**OSP-P300MA-e**
- On-machine wattmeter

**3 additional axis**
- Additional axis for rotary table

**OSP-VPS (Virus Protection System)**
- Mid-block restart

**Number of workpieces**
- 4 signals, 8 signals

**OSP-P220**
- Additional axis for rotary table

**OSP-LPS (Login Protection System)**
- Additional axis

**Super-NURBS**
- 1 additional axis

**Hi-Cut Pro**
- 1 additional axis

**Hi-G Control**
- 1 additional axis

**USB**
- 1 additional axis

**TAS-S (Thermo Active Stabilizer—Spindle), TAS-C (Thermo Active Stabilizer—Construction)**
- 1 additional axis

**Hi-Cut Pro**
- 1 additional axis
Okuma’s Global Support System

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.