

**Horizontal Machining Center That Reduces Environmental Load in the
Manufacturing Process and Achieves Excellent Production Capacity**

MA-600HIII

The MA-600H series horizontal machining centers, whose high machining capacity and stable accuracy have been highly evaluated in the domestic and overseas markets, have become the best-selling machines with a cumulative total of 3,000 units shipped since they were put on sale. We have developed a new product, MA-600HIII. It is a more advanced version of MA-600HII and has achieved greater reliability for stable, long-term unmanned operation and enables reduction in environmental load for a decarbonized society.

The MA-600HIII is a new model we will provide that boasts outstanding production capacity for a wide range of markets, including the semiconductor- and infrastructure-related markets, which are expanding their markets around the world, and the energy and automotive markets that are rapidly changing because of the acceleration of decarbonization.

Background

In recent years, growing markets have been undergoing major transformations on a global scale, including energy markets such as offshore wind power generation toward decarbonization, automotive markets where the shift to EVs is accelerating, and semiconductor markets that are responding to the shift to DX.

On the shop floors of the manufacturing industry, in addition to the need for automation to make up for the decrease in the working population, COVID-19 has increased the demand for even more unmanned operations. Moreover, there is a need for a rapid response to a mountain of issues such as the increasing severity of the problem of passing down skills because of the retirement of skilled workers.

Additionally, with the global efforts aimed at making the world carbon neutral, there is an even greater demand for production processes to reduce the environmental impact, including reducing power consumption.

Under these circumstances, there is a worldwide demand for machine tools that can achieve continuous stable operation for long runs without the need for human intervention, and that can machine a wide range of materials from difficult-to-cut materials to aluminum parts with high efficiency, while also reducing environmental load.

Development Objectives

The newly developed MA-600HIII has significantly improved the chip discharge performance, aiming to be a "machine that never stops" with enhanced high-speed and high-efficiency machining performance. In addition, the new MA-600HIII enables more stable unmanned operation for a longer period of time than the previous machine by expanding the automation support to meet a diverse range of needs.

Moreover, the machining size has been increased to meet the wide range of demand from the

growing market. (1.3 times the volume of the previous machine)

For a decarbonized society, we are working to reduce the environmental impact generated in the entire manufacturing process, including extending the life of coolant, which would otherwise become industrial waste, as well as working to reduce power consumption through OKUMA's unique AI and Intelligence Technologies.

Features and Key Enabling Technologies

[1] Machine that never stops: Improved reliability that allows long-time unmanned operation and enhanced automation specifications that meet a wide range of needs

- In addition to minimizing the amount of chips deposited inside the machine by optimizing the structure of the inside cover, we have enhanced the in-machine chip cleaning function that accurately washes away residual chips. In addition, even in dry machining using no coolant, it is now possible to set an optimal cleaning cycle for accurately washing away residual chips.
- **"Sludge-less tank (Optional)":** This tank automatically collects sludge (residual matter such as minute iron powder) that accumulates in the coolant tank to extend the life of the coolant and dramatically reduce the need for manual tank cleaning that requires human intervention. By this, **a sludge recovery rate of 99%** (actual figure when the machined material is a casting) has been achieved.
- **Enhanced automation:** The number of ports that supply hydraulic and pneumatic pressure to jigs that automatically clamp workpieces has been significantly increased.

Setup station side: **16 ports (previous model: 4 ports)**

Machining room side: **7 ports (previous model: 4 ports)**

This increase in ports allows increasing the number of independent movements of jigs, which will help the machine to automatically grasp various types of workpieces and flexibly respond to workpiece attachment and removal by robots.

[2] Evolved high-speed and high-efficiency machining performance

- The newly developed wide-range spindle (optional) supporting a wide range of materials has made highly efficient machining possible.

Maximum rotational speed 10,000 min⁻¹, torque 652/349 N·m, output 45/30 kW (short time / continuous)

<Heavy-duty cutting performance>

Cast iron FCD450 Face mill, maximum chip volume 1,496 cm³/min

Steel S45C Face mill, maximum chip volume 1,240 cm³/min

(Improved by 68% when compared with the previous standard spindle)

- Non-cutting time has been reduced by a major reduction in table indexing time

High-speed B-axis table 90° indexing time: **1.4 sec** minimum

(Up to 44% shorter than the previous machine)

(0.001° indexing specification, including clamping/unclamping time)

The optimum acceleration/deceleration is automatically set according to the workpiece inertia, and the table is quickly clamped with the acceleration-interlocked clamp system.

- “Thru-spindle coolant suction” is adopted as a standard feature: **Removes** residual coolant inside the tool and spindle **in 0.4 second with one action**.

Conventionally, air blowing (for at least 15 seconds) was required to remove residual coolant from tools and spindles during tool change. However, with the thru-spindle coolant suction, residual coolant can be removed in just 0.4 second (actual results with drill tools). This is a major reduction in tool change time.

- The X-axis stroke has been extended by 50 mm (1,050 mm), so that the maximum workpiece dimensions have been increased to allow for compatibility with a wider range of workpieces.

Maximum workpiece dimensions: $\phi 1,050 \times 1,200$ mm (2-pallet APC specification)

(1.3 times the volume of the previous model $\phi 1,000 \times 1,000$ mm)

[3] Contribution to a decarbonized society: Both a major reduction in the environmental impact and high productivity with excellent accuracy and stability have been attained

- Excellent accuracy stability under general factory environments. **Thermal deformation over time: 7 μm (improved by 13% when compared with the previous model)**

Through the use of Thermo-Friendly Concept, OKUMA Intelligent Technology, stable high accuracy has been achieved.

Because the Thermo-Friendly Concept does not require a thermostatic chamber to maintain a constant room temperature, it is possible to significantly reduce factory equipment costs and power consumption.

- **ECO suite, a new-generation energy-saving system** that "knows" and "reduces" energy consumption

The **ECO Power Monitor** visualizes the amount of power consumed per workpiece, allowing you to check the energy-saving effect on the spot.

The intelligent energy-saving function **ECO Idling Stop**, which is an application of the Thermo-Friendly Concept, makes the machine itself determine whether or not cooling is needed and cooler idling is stopped with no loss to accuracy.

- The service life of coolant, which will eventually become industrial waste, has been extended

The sludge-less tank, which collects sludge inside the tank with high efficiency, prevents coolant deterioration and greatly reduces the frequency of replacement, thereby reducing the environmental load at the time of coolant disposal.

< External Appearance >



< Machine Specifications > []: Optional

Items	MA-600HIII	
Travel	X-axis (column right/left)	1,050 mm
	Y-axis (spindlehead up-down)	900 mm
	Z-axis (table front-back)	1,000 mm
Spindle center to pallet surface		50 to 950 mm
Spindle nose to pallet center		70 to 1,070 mm
Pallet	Work surface size	630 × 630 mm
	Max loadable size	φ1,050 × 1,200 mm ^{*1}
	Max loading capacity	1,200 [1,400] kg
Spindle	Maximum rotational speed	6,000 min ⁻¹ [6,000 min ⁻¹ *2, 10,000 min ⁻¹ , 12,000 min ⁻¹]
	Maximum output	30/22 kW (10 min/cont) [45/37 kW (20 min/cont)] ^{*2} [45/30 kW (20 min/cont)] ^{*3} [45/30 kW (10 min/cont)] ^{*4}
	Maximum torque	606/349 N·m (10 min/cont) [1,071/637 N·m (3 min/cont)] ^{*2} [652/349 N·m (15%ED/cont)] ^{*3} [419/194 N·m (2 min/cont)] ^{*4}
	Spindle tapered bore	7/24 taper No. 50, [HSK-A100]
Feed rate	Rapid traverse	X-axis: 60 m/min, Y-axis: 60 m/min, Z-axis: 60 m/min
ATC	Tool storage capacity	60 tools ^{*5} [40] ^{*5} , [81, 111, 141, 171, 195, 225, 255, 285] ^{*6} , [320, 400] ^{*7}
	Maximum tool dia.	φ240 mm (with adjacent tools: φ140 mm)
	Maximum tool length	450 mm, [600 mm] ^{*6 *7} , [630 mm] ^{*5}
	Maximum tool weight	25 kg
Machine size	Height	3,174 mm
	Floor space (W × D)	3,435 × 7,068 mm ^{*8}
	Weight	25,000 kg ^{*9}

*1: 2-pallet APC specification, *2: Super-heavy spindle specification, *3: 10,000 min⁻¹ spindle specification,

*4: 12,000 min⁻¹ spindle specification, *5: Chain magazine specification, *6: Matrix magazine specification,

*7: Multiple magazine specification,

*8: Hinge-type + scraper-type (with a drum filter) machine external chip discharge specification,

*9: Not including the weight of workpieces and tools

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