

Accessories

Item	
1.Full Enclosure Guard	●
2.Coolant System Unit	●
3.Spindle Air Blow System	●
4.Lubrication System	●
5.LED Work Light ×1	●
6.LED Work Light ×2	○
7.Leveling Bolts and Pads	●
8.NC Rotary Table	○
9.Spindle Oil Cooler	●
10.Oil Mist Cooling System	○
11.Oil Mist Collector	○
12.Three-Axis Ballscrew Pre-Tension System	●
13.Chain-Type Chip Conveyor	○
14.Portable Chip Cart (1 Unit)	○
15.Oil Skimmer System	○
16.Chip Flushing System	○
17.M50 Chip Air Blow System	●
18.Coolant Gun	●
19.Air Gun	○
20.Tool Kit	●
21.One Set of Documentation	●
22.RS-232 Interface	●
23Automatic Power-Off Function	●
24.DNC Communication Software	○
25Automatic Tool Length Measurement System	○
26Automatic Workpiece Measurement System	○
27.Cycle Completion Warning Light	●
28.Full Closed-Loop Linear Scale Feedback System	○
29.HSK-E40 Armless Umbrella-Type Tool Magazine	○
30.HSK-E40 30,000rpm Built-in Spindle	●
31.HSK-E40 40,000rpm Built-in Spindle	○
32.HSK-E40 ATC Tool Magazine	●

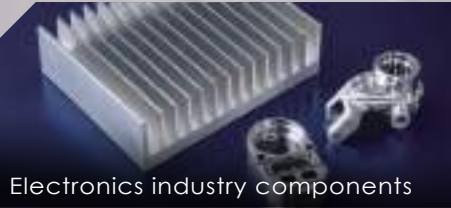
Electrical Functions Accessories

Hartrol	
Workpiece Calibration by MPG Directly	●
Tool Magazine Display	●
Parameter Package	●
Threading Cutting (Only for 0i & 31i)	●
Monitoring of Tool Status(Only for 0i & 31i)	●
Special engraving	●
Hartnet	
Management system of Utilizaion	○
Machining Time Countdown	○
Convenient File Transfer	○
Electrical Function	
Lifting Function against gravity	○
Retraction for Rigid Tapping	○
Intelligent MPG	○

Standard ● Optional ○

High Speed Machining Center

HSM-560 Series

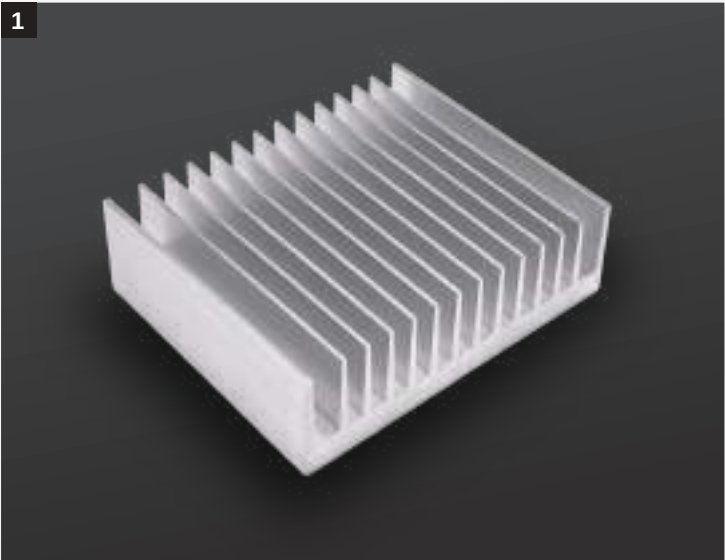
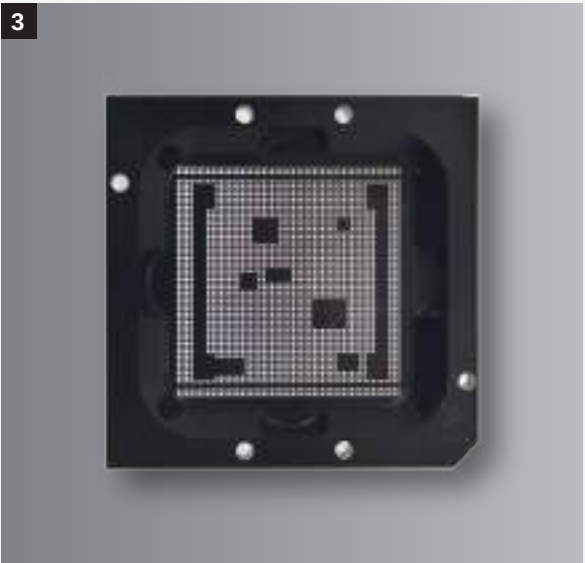
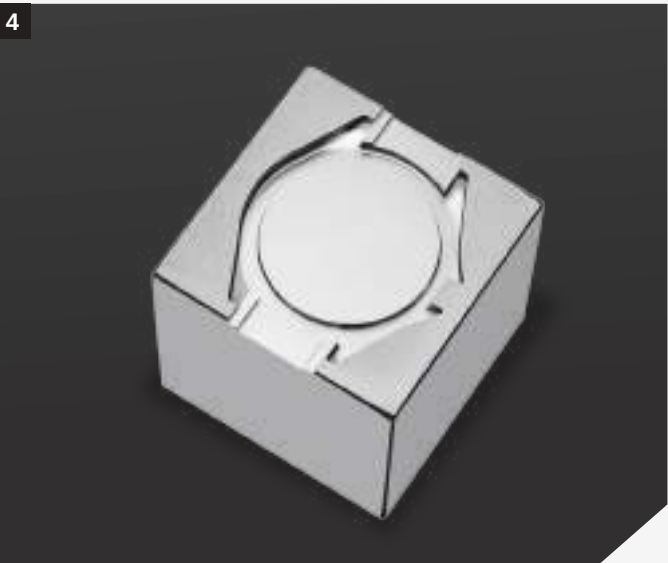


01 Workpiece Machining Applications



Premium High-Speed Engraving Machine Driving the Future of Semiconductors with a New Standard in Micro Machining

Designed for high-speed drilling, tapping, and precision engraving, this machine is ideal for machining metal and non-metal parts in the 3C industry. Equipped with a built-in high-speed spindle, it reduces vibration and supports higher speeds for better surface finish quality. Combining speed, stability, and precision, it delivers an efficient machining solution.



1	2
3	4

- Electronics**
 - 1 Electronic heat dissipation components
- Semiconductor**
 - 3 Engineering plastics

- Medical**
 - 2 Dental models
- Precision Mold**
 - 4 Metal housing fixture

02 Machine Structure Features

FEM-optimized structure ensures high rigidity, high-speed capability, and a low center of gravity. Full-travel support on all three axes eliminates overhang to minimize deformation, while the rear-mounted Y-axis servo enhances operational convenience.

● Armless Umbrella-Type Tool Magazine Opt.

Features a lightweight, high-speed tool change design with low vibration characteristics to reduce non-cutting time. Ideal for precision machining and frequent tool changes, it improves machining efficiency, accuracy, and ease of maintenance.

● Excellent Tool Change Time

- High-Rigidity and High-Precision Linear Guideways on All 3 Axes
- Wedge-Type Guide Blocks for Improved Machining Rigidity (48/48/48 Rapid Traverse Optional)
- Rapid Traverse Speed Up to **32,000mm/min** for High-Speed Machining

● Integrated Motor Bearing Design

The motor and bearing housing on the saddle are integrated into a one-piece design. The saddle features a ring-type rib structure for enhanced support, maximizing structural rigidity and stability.

● One-Piece Base Design

Features a high-rigidity one-piece base design. The base and column are constructed with Meehanite cast iron, providing excellent stability and deformation resistance to maintain high precision even under demanding machining conditions.

● Dual-Filter Circulation Protection System

The motor and bearing housing on the saddle are integrated into a one-piece design. The saddle features a ring-type rib structure for enhanced support, maximizing structural rigidity and stability.

● Integrated Metal Way Covers for Y · Z Axis

Effectively prevents coolant intrusion, protecting the ball screws and linear guideways from damage. Designed for high-speed movement, it also offers low noise and vibration-free operation.

● Direct-Coupled Drive Design for 3 Axis

Three axes use direct-coupled ball screw and servo motor drive with high-precision bearing support at both ends, reducing backlash and servo lag for improved motion performance, machining stability, and positioning accuracy.

5 YEAR Warranty on Guideways for All Models

Warranty coverage will not apply under following conditions :

- 1.Improper operation(collison)
- 2.Lack of regular cleaningof accumulated debris causing damage to the linear rails &carriages



One unit capable of connecting up to 10 or 20 machines

Smart i-Factory System with Superbox (Opt.)

Through i-Factory, all machinery and equipment in the factory can be connected, and the machine connections are no longer limited to Hartford. Machines from other manufacturers can also be connected for real-time visualization and management. The system is composed of five key components: real-time monitoring, production planning, alert notifications, data analysis, and remote connectivity, allowing you to move away from traditional management models and embrace a simpler and more convenient approach to factory management.



Tailored one-to-many automation planning

Intelligent Automated Production Line Unit (Opt.)

Customizing an automated factory just for you, effectively reducing costs and enhancing competitiveness.



Easy to get started

Hartford Robocell provides you a professional robot training and rich automation experience, to let you quickly learn and easily operate your automation systems.

Quality control monitoring

Automation systems have to pass all the strict Quality Control tests at every stage like design, assembly, testing, final inspection and shipment, complete quality control processes for all the products.

Professional analysis

Robocell Machining optimization service, to let you be on the top by using professional machining methods.



Design



Testing



Product inspection

Hartrol Premium

Hartford Smartcenter APPS

1 Automation & Smart Factory

- Autopilot V2 Package
- Real-time Monitor Package
- Efficiency Improvement Package
- Smart Lubrication System
- Machine Play – Smartphone Remote Operation
- Wireless Network Function (Wi-Fi)

2 Monitoring & Energy Management

- Real-time Monitor Package (CCD Monitor / IP Camera)
- Energy Monitoring

3 Tool Protection & Machining Stability

- Tool Protection Suite (TPS)
- AFC – Automatic Feed Control
- Rigid Tapping Automatic Learning

4 CNC Control & Operation Enhancement

- Handwheel Simulation Mode
- HP Level R1–R10 Parameter Package

5 High-Speed / High-Accuracy Machining

- SSS High-speed High-accuracy Control
- High-speed High-accuracy Control III (G5P20000)
- High Speed Milling

6 Programming & User Interface

- Conversational Programming (HCP)

24 HR

Online Update System

Keep your operating system in optimal condition and stay up to date with the latest features from Hartford.



Hartford ZDT

Early warning before machine failure helps reduce unexpected downtime, minimizing productivity loss and cost.



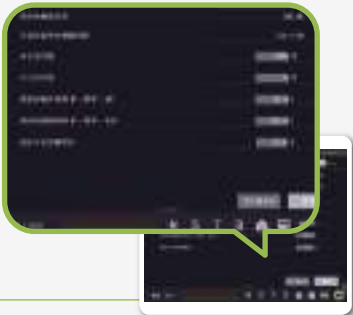
Chip Conveyor Opt.

Smart detection based on spindle current clears chips only when needed. The system runs on a 50% on/off cycle during cutting to save up to 50% motor power, and automatically reverses when chips build up to prevent overload and protect the conveyor.



Lubrication Opt.

The system smartly delivers oil based on machine and cutting conditions, saving up to 50% oil and reducing costs while supporting eco-friendly operation.



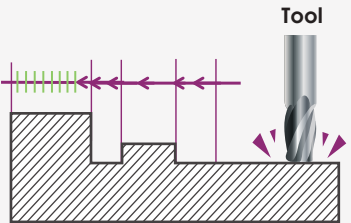
Position Opt.

When performing workpiece measurement with Hartrol Premium and Fanuc 15" IPC, operators can simply enter values through the intuitive guided interface—no need to memorize complex measurement commands, making the process effortless.



AFC Opt.

Spindle load monitoring allows users to set tool-specific load limits, boosting efficiency by up to 21% in heavy operations like face and side milling.



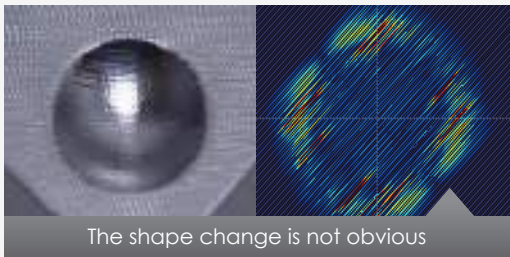
Eliminate interference and mechanical collision issues during the machining process

Digital Transformation (Opt.)

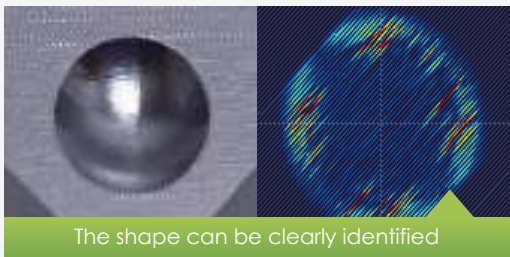
Digital Twin-NCVS software combines workpiece CAD, tools, and machine parameters to simulate the machining process in advance. It accurately reflects real conditions, going beyond traditional CAD/CAM by including machine data. The system verifies CNC parameter settings, analyzes part geometry and machine travel limits, and ensures alignment between programmed data and actual machine performance.. This helps prevent interference and collisions, ensuring safe, stable machining and better productivity.

Simulation vs. Actual Machining Results

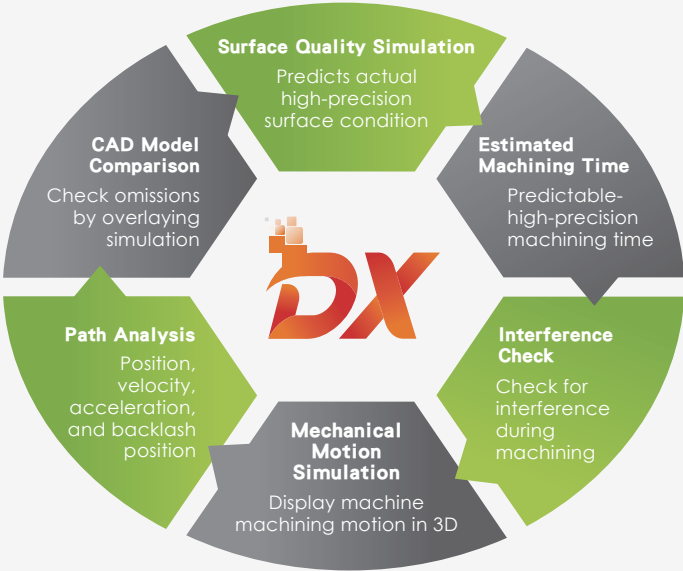
OFF



NO



6 Key Features



04 Hartrol Premium

Eco-Friendly Solutions for Energy Management

ECO and Energy Monitoring Dashboard (Opt.)



- All lighting equipment is LED
- FEM analysis for structural lightweight design

Energy Monitoring Dashboard

Real-time monitoring of energy consumption for each electrical component of the machine, with the ability to query historical energy consumption data and generate reports.

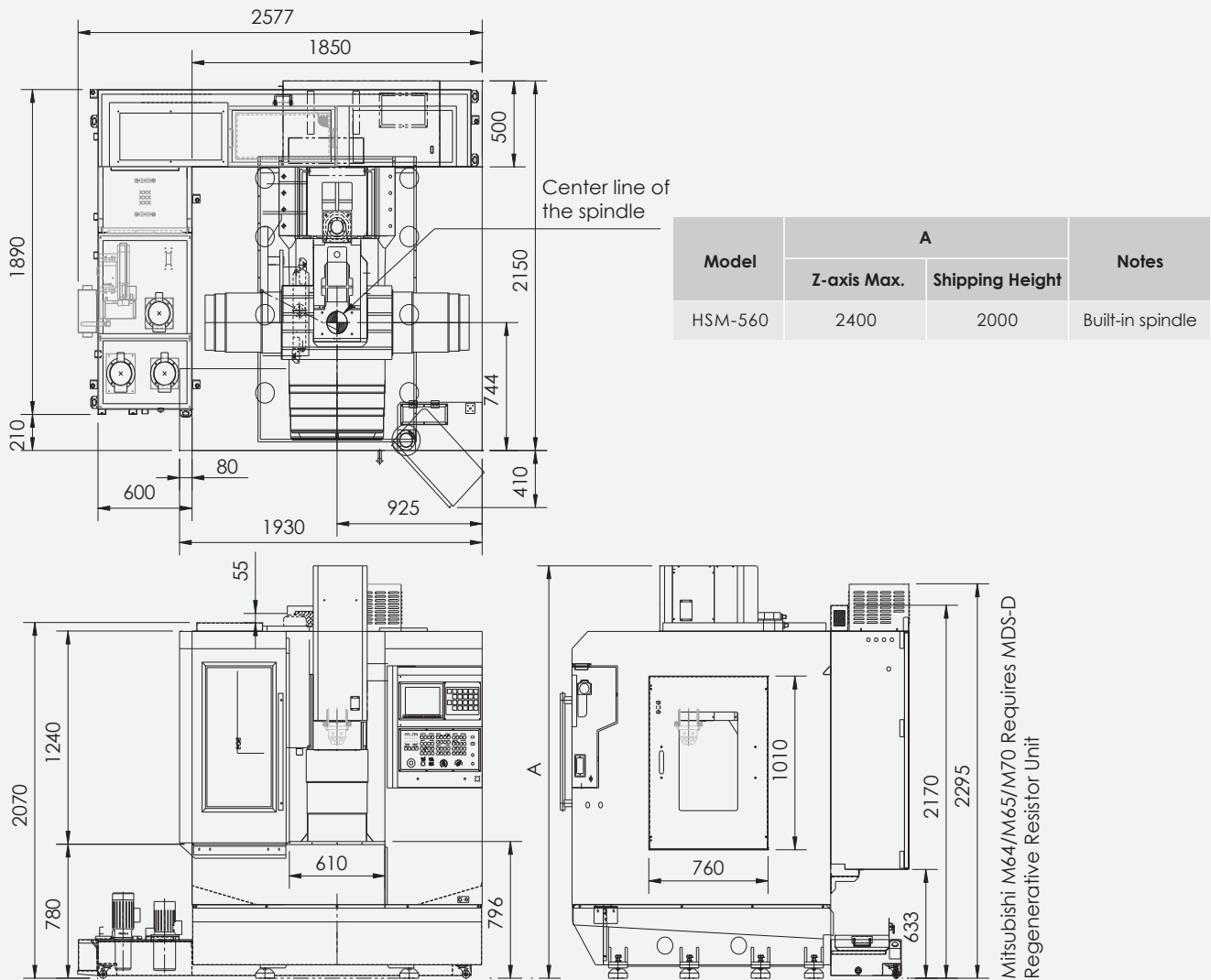


Eco Mode

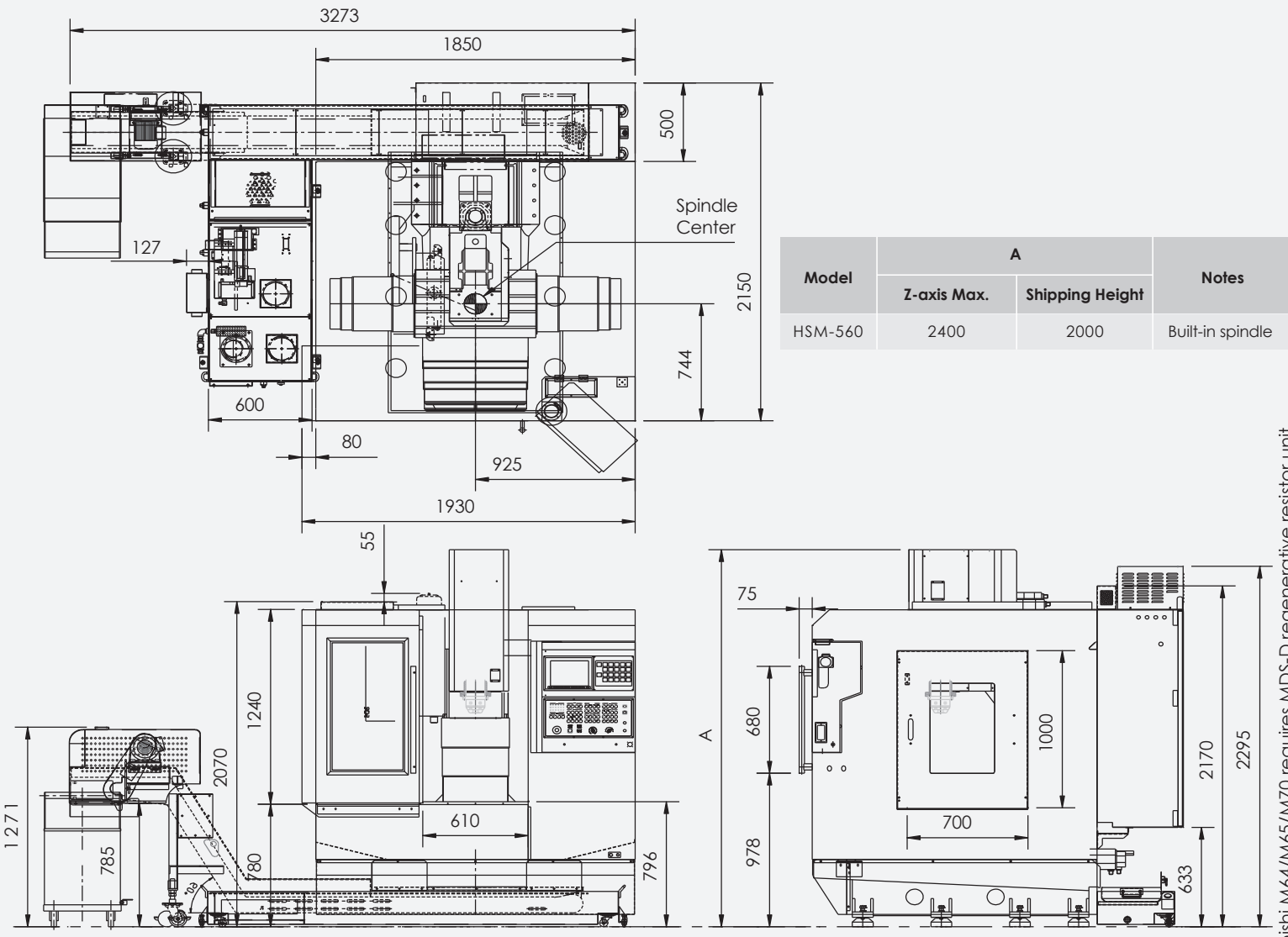
Helps you control five peripheral devices, including the hydraulic motor, oil cooler, mist collector, work lights, and chip conveyor, to prevent unnecessary energy consumption when the machine is idle.



■ Chip Collecting Tank Type



■ Hinge Belt Chip Conveyor



Mitsubishi M64/M65/M70 requires MDS-D regenerative resistor unit

30,000 rpm Built-in Spindle

Ideal for Drilling, Tapping & Engraving

1.High-Speed Precision Machining

Built-in motor design reduces vibration, increases speed by over 25%, and improves surface finish.

2.Powerful Cutting Rigidity

Optimized motor and wide bearing span deliver high torque and strong rigidity for heavy-duty cutting.

3.Fast & Stable Tool Change

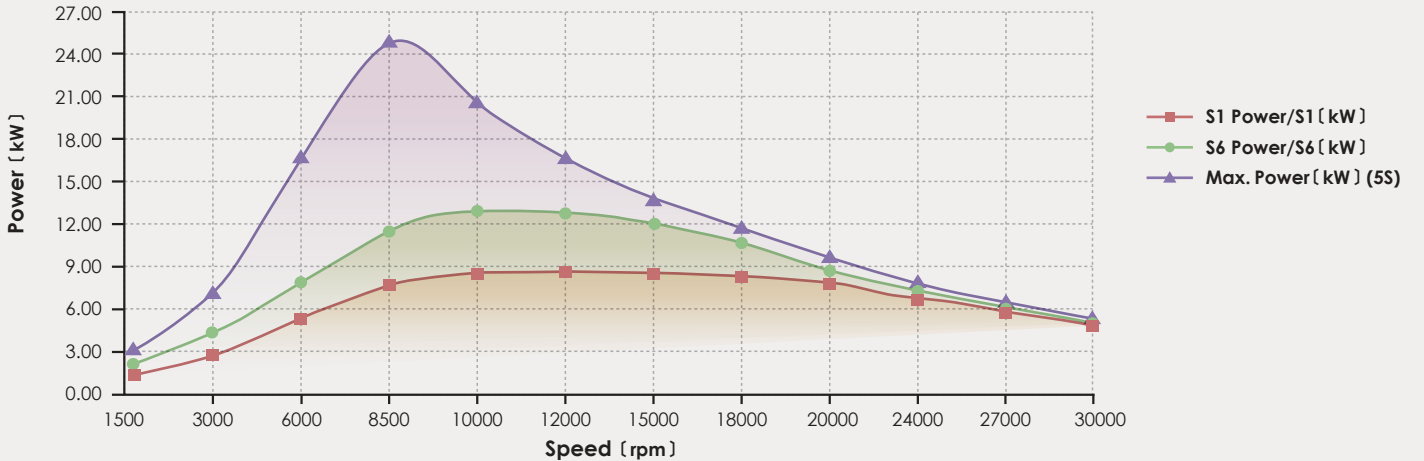
Low-inertia spindle with patented unclamp cylinder enables quick tool changes and long service life.

4.High-Speed Precision Tapping

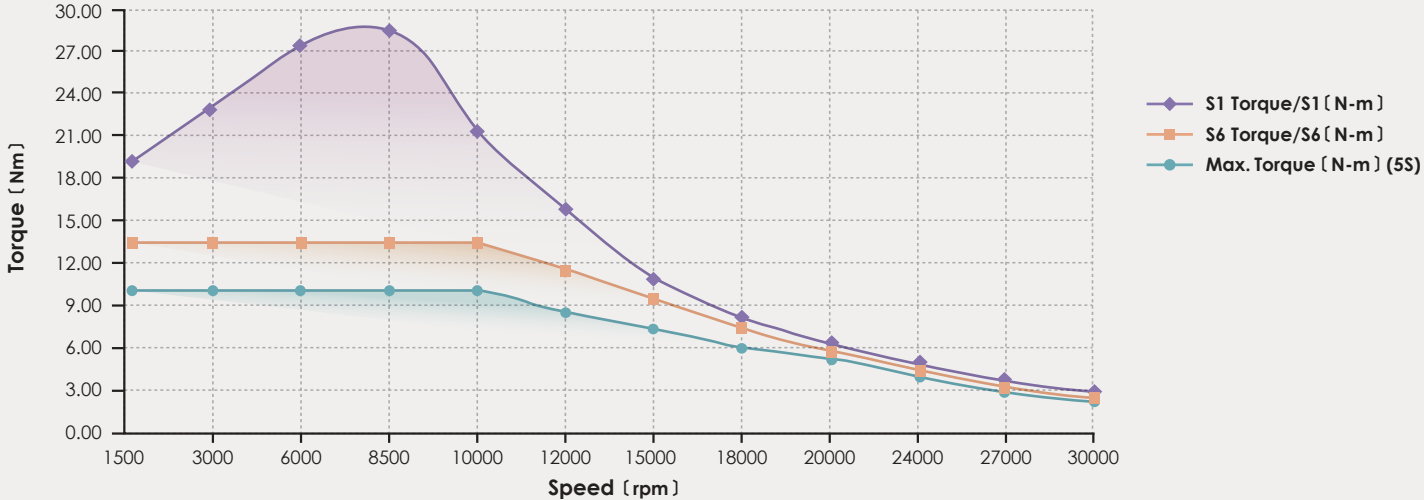
Accurate vector control supports tapping speeds up to 8,000 rpm for greater efficiency and quality.

Spindle Model DGZX -12030/8.5		
Speed(rpm)	Max. speed	30000
Power(kW)	Rated Power(S1-100%)	8.5
	Rated Power(S6-40%)	12.7
Torque(N-m)	Rated Torque(S1-100%)	8.1
	Rated Torque(S6-40%)	12.1
Maximum Voltage(V)		220/380
Tool Holder Type		HSK E40
Lubrication Type		Grease

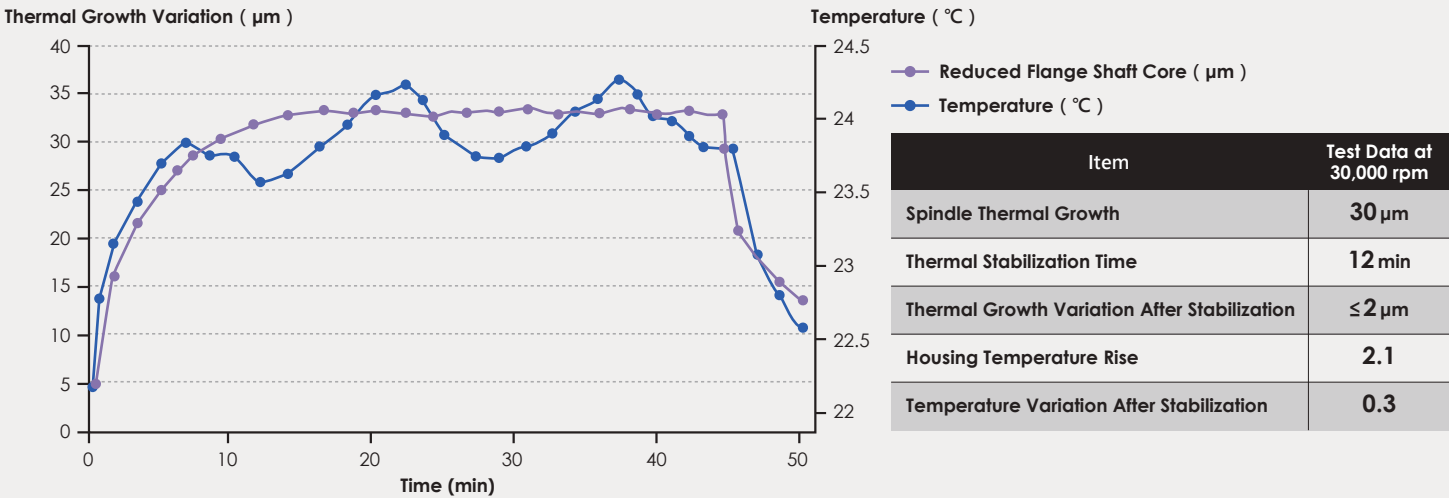
■ Power / Speed (P/n) Curve



■ Torque / Speed (T/n) Curve



■ Spindle Thermal Displacement Curve

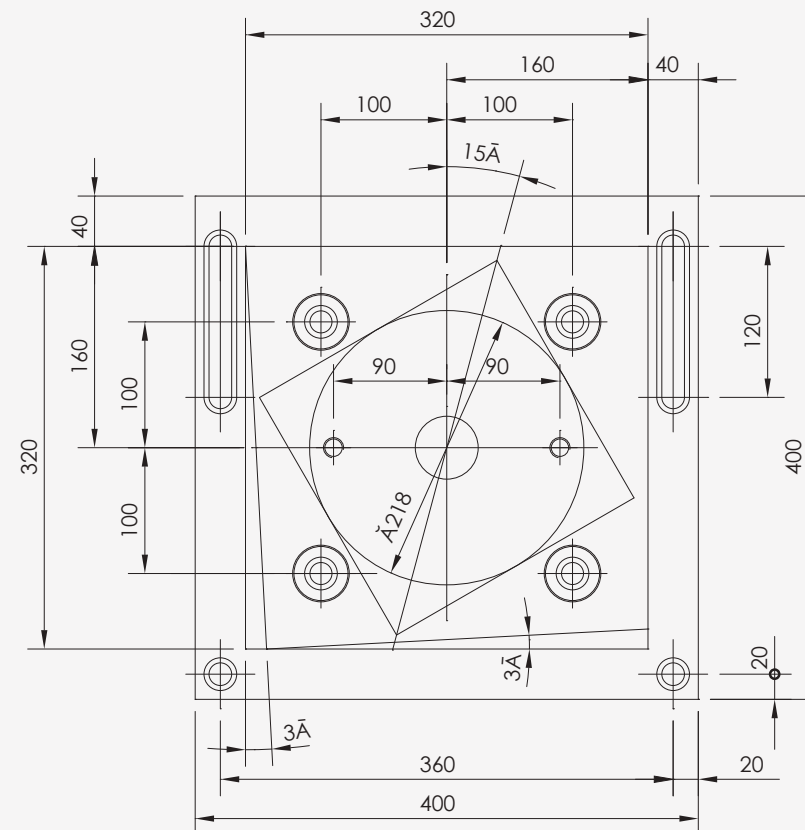


**The Finest Expression of
Machining Accuracy and Capability —
Maximizing Customer Value**

The HSM-560 motorized spindle features precision-driven design, delivering exceptional performance in high-speed drilling, tapping, and high-precision milling for non-metal applications. With spindle runout below 6 μm , every hole is machined with precise positioning accuracy.

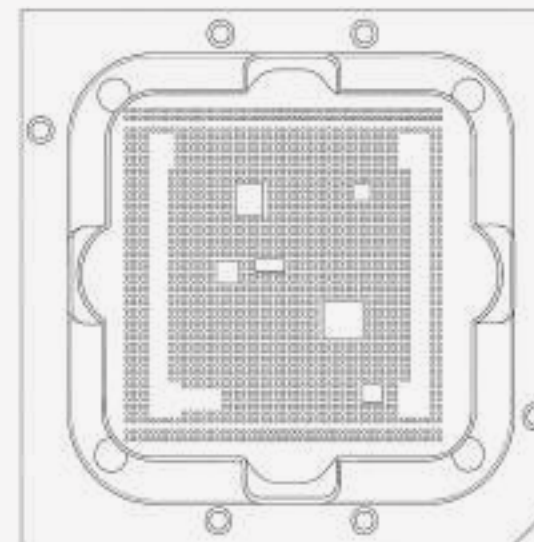
07 Actual Cutting Tests

■ Precision Fixture Machining Accuracy Validation Test



Item		
Straightness	X	0.010/Full Stroke
	Y	0.010/Full Stroke
	Z	0.010/Full Stroke
Squareness	X-Y	0.01/ 300
	Y-Z	0.01/ 300
	Z-X	0.01/ 300
Positioning accuracy (VDI3441)	X	0.003
	Y	0.003
	Z	0.003
Repetitive positioning accuracy(VDI3441)	X	0.002
	Y	0.002
	Z	0.002
The movement squareness of spindle and X axis or Y axes	300mm	0.01/300
Spindle run-out	At base	0.01
	At 300mm	0.015
Roundness(R150mm)	CW	0.01
	CCW	0.01
Positioning accuracy (hole to hole)		0.005

■ **Inspection Results – IC Test Socket Probe Plate D0.15 / D0.25 mm
(3.6 sec/hole → Spot Drilling → Drilling → Chamfering)**



Micro Hole Diameter : $\varnothing$ 0.15 mm

Total Number of Holes : 2,251

Roundness : 3 μm

Average Cycle Time per Hole : 3.6 sec/hole

Machining Accuracy : $\leq 5 \mu\text{m}$

Continuous Machining Capacity : 3,500 holes

Total Machining Cycle Time : 8,103 sec

Category	507-Hole	D0.15mm	D0.25mm
Appearance Criteria	No Burrs	None	None
	Uniform Chamfer	Uniform	Uniform
	Uniform Tool Marks	Uniform	Uniform
Dimensional Criteria	Position ≤ 0.05 mm	OK	OK
	Hole Size~ -0.02mm	OK	OK
	Roundness ≤ 0.01 mm	OK	OK

Note:

Power during acceleration is for acceleration/deceleration time calculation only and does not represent actual values.

		Unit	HSM-560
Table	Working surface	mm	700 x 430
	T-slot width x pitch(number)	mm	14 X 100(4)
	Max. load (Average)	kg	300
Travel	X-axis travel	mm	560
	Y-axis travel	mm	430
	Z-axis travel	mm	450
	Distance from spindle end to table	mm	110~560
	Distance from spindle center	mm	467.65
Spindle	Spindle nose taper	rpm	HSK-E40
	Spindle speed(Built-in)	rpm	30000
Feed	Cutting feedrate (X / Y / Z)	m/min	12 / 12 / 12
	Rapid traverse rate (X / Y / Z)	m/min	32 / 32 / 32 (48 / 48 / 48)
ATC	Capacity	pcs	A:24 / S:16(opt.)
	Max. tool weight	kg	3
	Max. tool size (Dia. x length)	mm	Ø 50x120L
	Tool shank		HSK-E40
	Pull stub bolt		HSK-E40
Motor	Spindle drive motor (cont.)	kW	8.5
Positioning Accuracy	Positioning Accuracy (JIS B6330), without linear scale	mm	±0.008
	Repeatability (JIS B6330), without linear scale	mm	±0.002
	Positioning accuracy (JIS B6330), with linear scale	mm	±0.006
	Repeatability (JIS B6330),with linear scale	mm	±0.002
	Positioning accuracy (VDI 3441)	mm	0.010
	Repeatability(VDI 3441)	mm	0.006
Other	Required air pressure	kg/cm²	6.5
	Electric power consumption	KVA	20
	Net weight	kg	3600
	Coolant capacity	L	250
	Floor space(full guarding)	mm	2450 x 2150 x2400
	Floor space	mm	3710 x 5100

