

Vertical Machining Centre

F8 • F9



Automotive Industry

Having a global production of 80 million, the industry has never been stronger, hence the need for a competitive machine that can achieve both the capabilities of material removal and ample surface finish for the industry

“Achieving High Precision Accuracy Through Mechanical Means”

Machine	Travel (X,Y,Z mm)	Table Working Area (L,W mm)
F8	1300x800x650	1550x800
F9	1600x800x650	1850x800

Rigid Structural Design

This is a fundamental requirement of a Large Vertical Machining center to ensure high performance and maintain high accuracy. 3D modelling and FEM analysis are used to determine the optimum ribbing and rigidity of these structures.

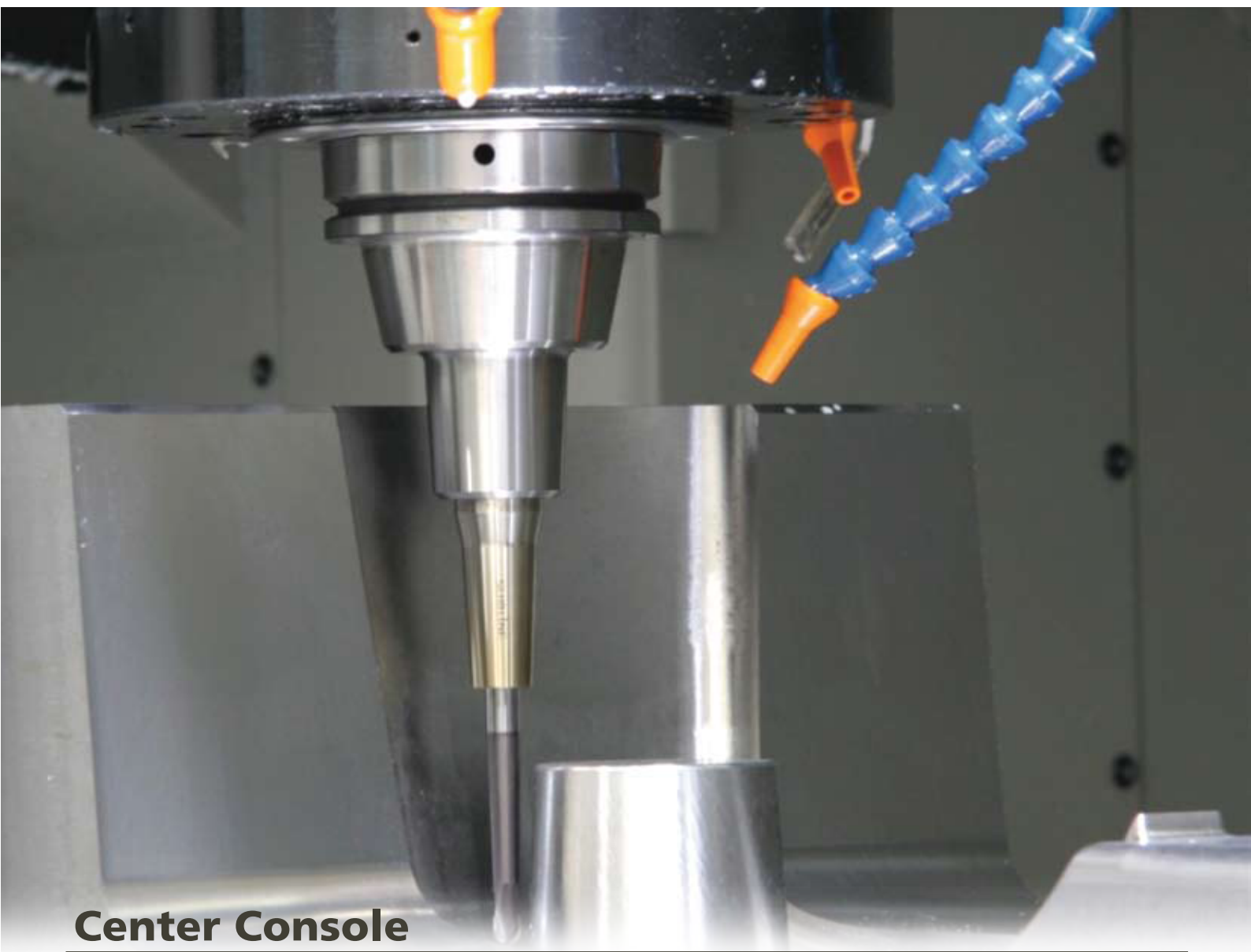
The location of the support and levelling screws below the bed are strategically placed to absorb the machining load and proper transferring to the floor.

The column and bed structures are symmetric in design. This enables even distribution of the heat due to environment changed and achieves good accuracy. The wide span of the linear guides on the axes provides stability of the movement.

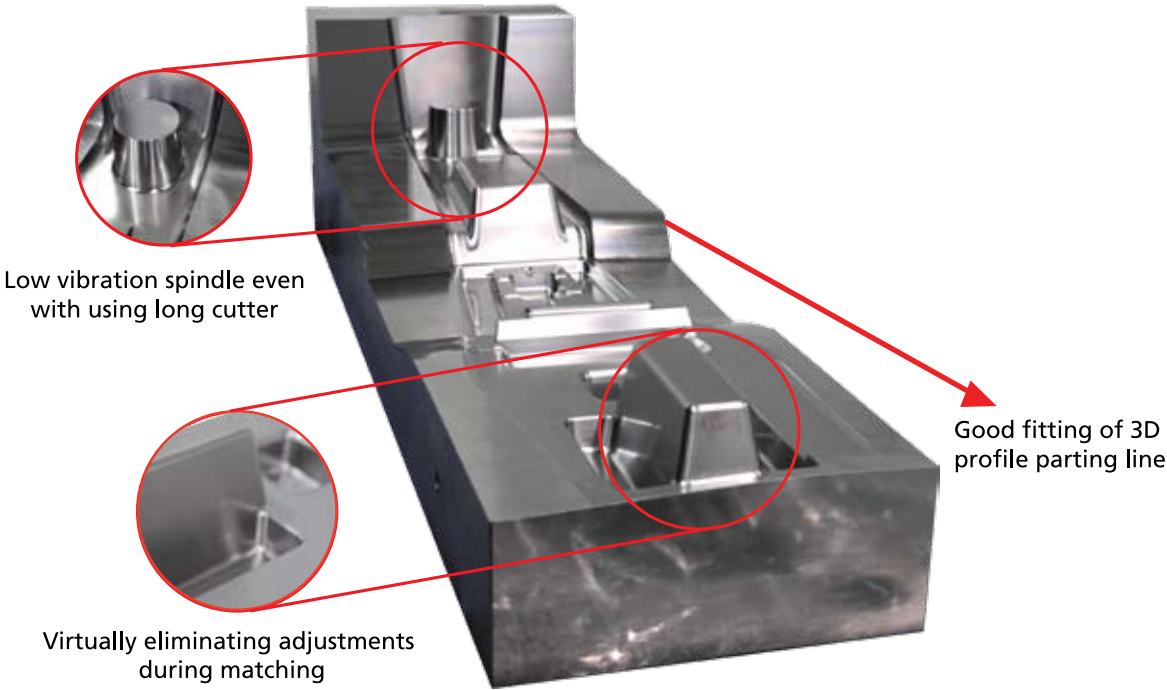


Parts are accurately manufactured, meticulously adjusted and assembled with exacting precision.

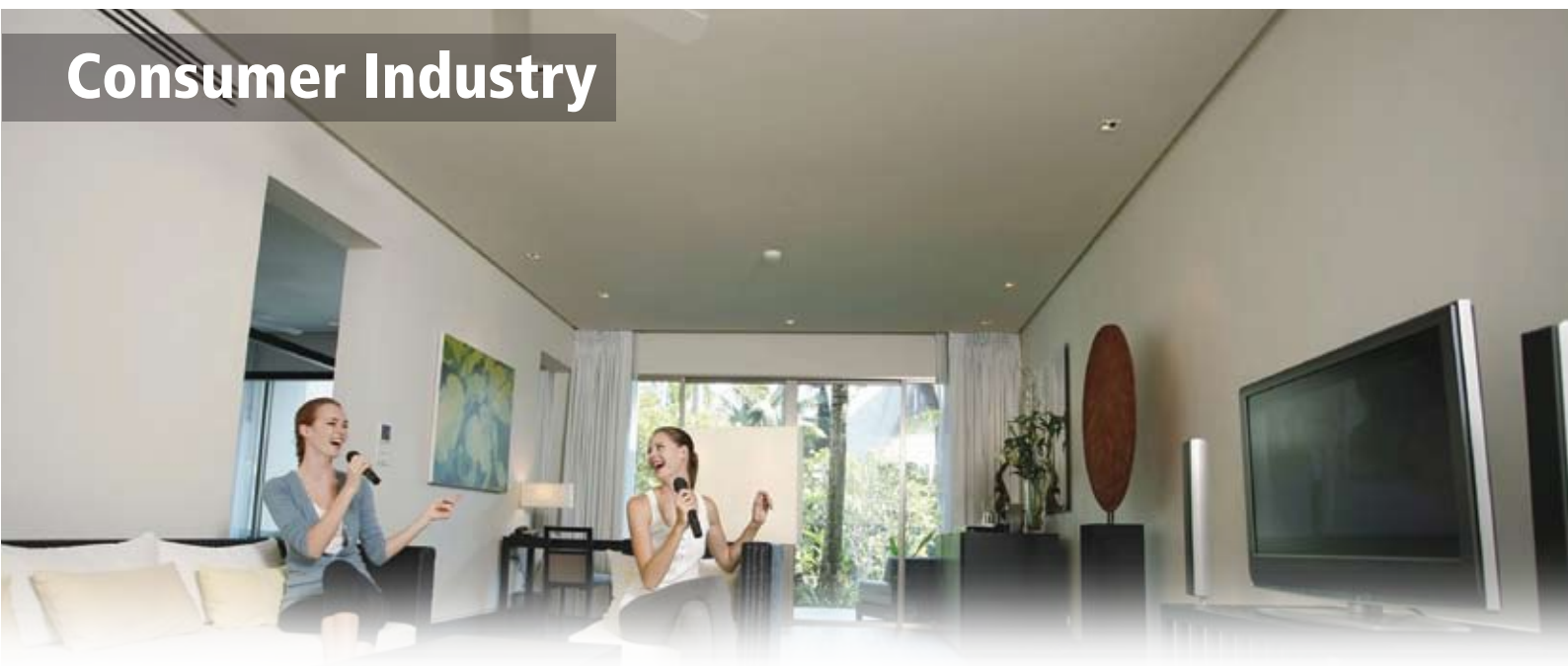
Scrapping is incorporated in the machine assembly in order to achieve better profile accuracy which results to mechanical accuracy in order to further enhance and increase the machine performance and increase the machine life at the same time.



Center Console



Consumer Industry



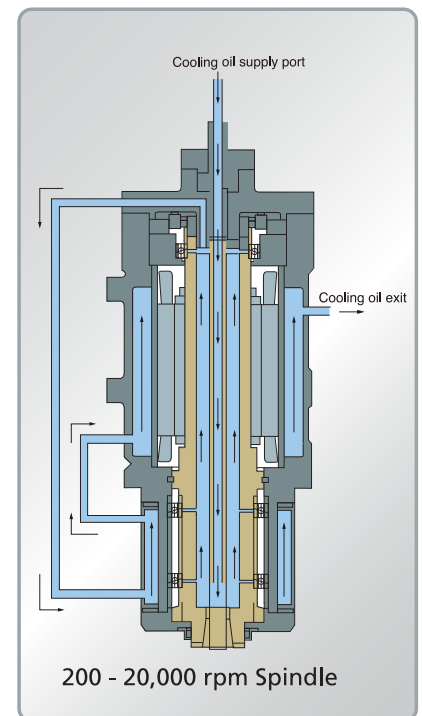
Spindle Design and Configuration

Spindle Speeds	Taper	Bearing (ID/OD)	Output power (10 min/Cont.)	Torque (25% ED/Cont.)
20 - 10,000 rpm	BT 50 (Std)	110/170 mm	37/25 Kw	426/294 Nm
	HSK A100 (Op)			
200 - 20,000 rpm	HSK A63 (Op)	80/125 mm	30/22 Kw	104/60 Nm

Key to the wide range of machining application is in the spindle design and configuration. With this arrangement, F series is able to machine wide variety of material ranging from aluminum, cast iron, steel and stainless steel.

Standard spindle of 10,000 rpm with BT 50 shank offers a variety of machining capabilities with option of having HSK A100 shank. Standard spindle comes with jacket cooling system and the spindle bearings utilize oil air lubrication system for thermal stability.

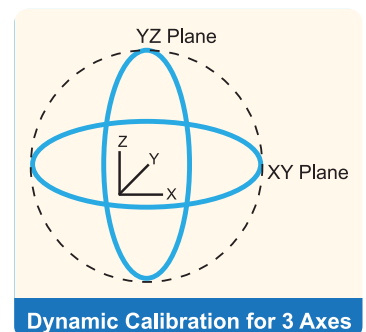
For high speed spindle of 20,000 rpm, F series offer Makino's unique spindle core cooling with under race lubrication system to minimise thermal effects on the bearing and extend spindle life. In addition, this system also enhances spindle rigidity and accuracy.



Motion Technology

Super Geometric Intelligence (SGI.4) software - developed specifically for high feedrate, tight tolerance machining of complex, 3D-contoured shapes involving continuous tiny blocks of NC data. It ensures production rates faster than standard CNC systems while maintaining high accuracy. SGI.4 helps provide the lowest cycle time and cost.

- Fine motion control even at high feedrate
- F Series Provides advanced acceleration and deceleration control technology
- High-speed & High-accuracy machining made possible



GI & SGI

- Enhanced cutting point accuracy
- Cutting mode selection
- CMD optimized machine
- Look ahead
- High Precision Contour Control



Air Conditioner Panel



- Good matching finish between two different tool diameters due to stable z axis stroke thermal control
- Low spindle vibration enhancing surface finish quality



Aerospace And Precision Industry

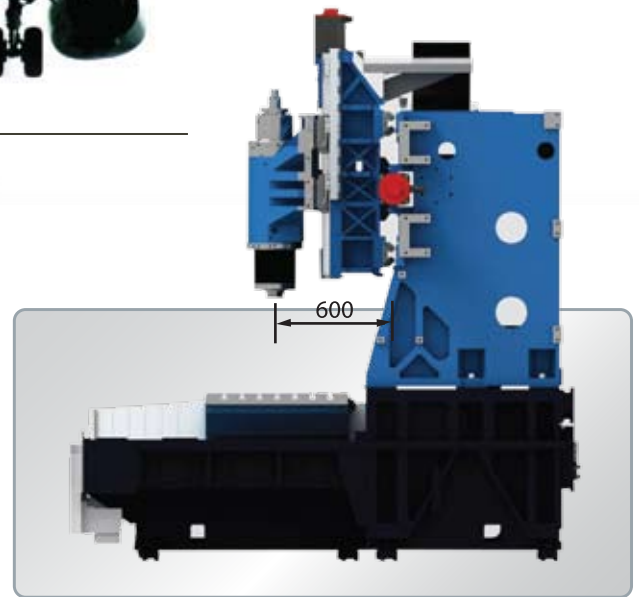
Today's modern aircrafts are constructed with strong and lightweight materials such as titanium and aluminum to maximize their fuel efficiency. We ensure our machines and application support will deliver you fast and precise parts production to meet the demands required in the aircraft industry.

Rigid Axis Layout

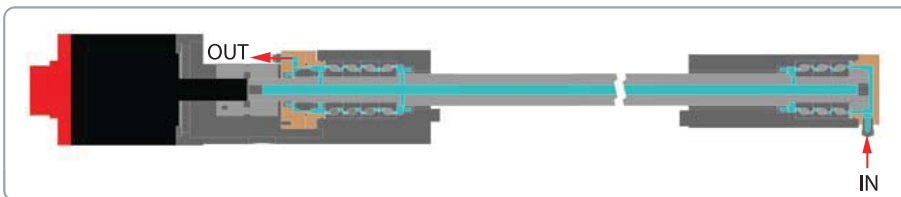
The structural layout of the axis is designed to minimise overhang. Even at Y travel of 800mm and with a maximum carrying capacity of 2,500Kg, high accuracy is ensured and the strokes provide a wider range of machining application.

The XZ axes on the column features the following benefits:

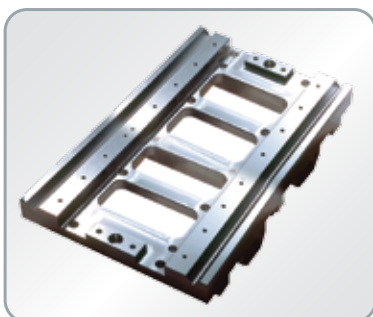
- Short distance from spindle center to X-axis slide provides good rigidity
- The table load variation will not affect the cutting accuracy and integrity of the surfaces
- Longitudinal Y-axis travel is free from any overhang problem caused by any load shift in X-axis



Ball Screw Inner Core Cooling System



Movement of the ball screws generate heat that will create linear growth and subsequently affects the positioning accuracy, especially at high speed and long time operation. In F series, heat generation is suppressed by the continuous flow of chilled oil through the inner core of the ball screws which results to the shortening of the thermal saturation time and virtually eliminating "warm-ups".



Assembly Part (Cast Iron)



Base Plate (Steel)



Aircraft Part (Aluminium)

Pro 5 Controller

F series utilizes the Makino Professional 5 Control which affords the perfect blend of a Windows CE graphical user interface (GUI), touch-screen selection that provides instant access to Information literally at your fingertip, user-friendly, efficient PC-like capability for data management and editing, and the networking and storage capability of a Makino proprietary data center.

Equipped with ECO function capabilities, the F8 optimizes the maintenance cost by counting the actual time the respective component (spindle, conveyor, ATC, etc.) is operated. As a result, inspection or replacement of consumables are used more effectively. Intelligently switching unutilized peripherals to standby mode during operation also minimizes the power consumption of the machine significantly.



Ease Of Operation And Access

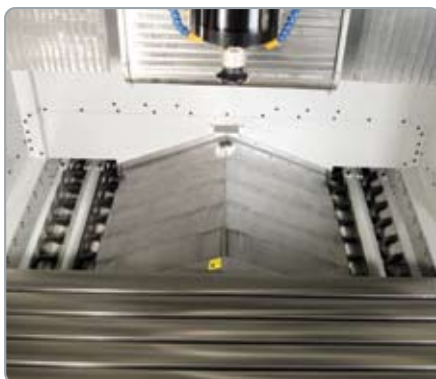
One of the key considerations for F series design is to ensure easy loading of large work pieces and easy access for the operator in preparing the work before machining or checking during operation.



The Splash guard doors are designed to slide open on both sides, giving access to the front and side of the table. The operator panel is designed to be flexible and swing both back and forth. The spindle can be moved close to the operator for easy tool loading or handling. In addition, portable MPG will be provided to further enhance this flexibility.



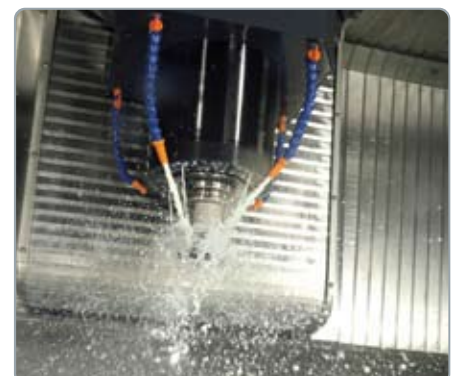
Effective Chip Management System



Unmanned machining application and highly efficient machining processes generate high volume of chips. Therefore, a quick, good and reliable machine chip evacuation system is required. In F series, four spiral type chip conveyors is used in transporting chips from the machining zone to the rear of the machine. This efficient system will enable operator to focus on the machining tasks and hence improve his work efficiency. An optional Lift up chip conveyor can be installed at the rear of the machine to further improve the chip management of the machine.

Coolant Nozzles

The enhanced arrangement of the nozzles will provide a more efficient cooling effect in the machining zone. F series has 4 built-in nozzle outlet and 2 flexible nozzle hoses which results in increased tool life and improved machining.

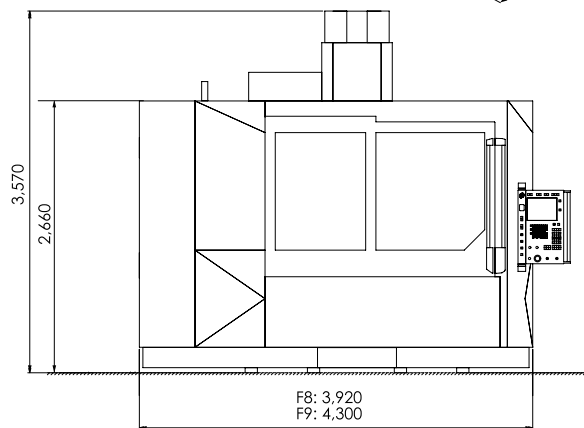
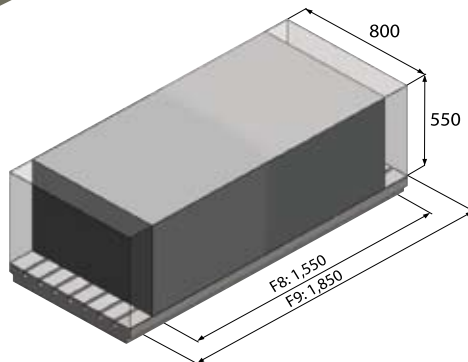


Machine Specifications

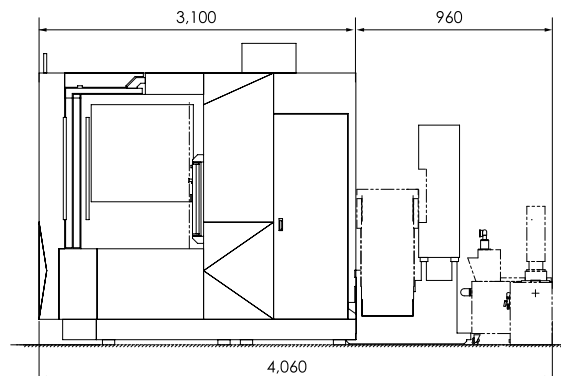
		Unit	F8	F9	Option
Travel	X	mm	1,300	1,600	
	Y	mm	800		
	Z	mm	650		
	Table Top to Spindle End	mm	250~900		
Table	Size	mm	1,550*800	1,850*800	
	Payload	kg	2500		
	Work Size	mm	1,550*800*550	1,850*800*550	
	Loading Height	mm	950		
Spindle	Taper		# 50		#40
	Speed	mm ⁻¹	10,000		20,000
	Power (10min / cont.)	kW	37 / 25		30 / 22
	Torque (25%ED / cont.)	Nm	426 / 294		104 / 59.7
Feedrate	Rapid/Cutting	mm / min	24,000		
ATC	Tool Capacity	-	30		48
	Tool Diameter / Length	mm / mm	200 / 400		150 / 300
	Tool Weight / Change Time	kg / s	20 / 4		7 / 2
Power	Electrical Power Supply		380V ~ 415V		
Machine Accuracy*	Positioning (Full stroke with/without scale feedback)	mm	± 0.0015 / ± 0.0025		
	Repeatability (Full stroke with/without scale feedback)	mm	± 0.001 / ± 0.002		
Machine	Floor Space	mm	3850 x 4090	4300 x 4090	
	Height	mm	3,560		
	Weight	kg	~16,000	~17,000	
	Coolant Capacity	L	750		

*Tolerance measured at Makino's assembly plant values are JIS Standards

Workpiece Envelope



Machine Front View



Machine Side View

Standard Specifications

- BT50 Integral Spindle
- Ballscrew Core Cooling System
- 30 Tool ATC
- Centralised Auto Grease System
- Splash Guard Interlock With Lock
- Automatic Air Blower
- Built-in 4 Screw Type Chip Conveyors
- Signal Light 3 Layer
- Rear Coolant Tank
- Makino Professional 5 Controller
- Portable MPG With LED Position Display
- Helical Interpolation
- Part Program Storage 320m
- Registered Program Number 1000
- Data Center 160MB
- Power Consumption Monitor Display
- Trouble Shooting Function
- Rigid Tapping

Optional Specification (not retrofittable)

- HSK A100 Spindle (10,000 rpm)
- HSK A63 Spindle (20,000 rpm)
- 48 Tools ATC (HSK A63)
- Through Spindle Coolant (1.5/3.0 MPa)
- Through Spindle Air
- Scale Feedback System
- ▲ Overhead Shower Coolant
- ▲ Lift Up Chip Conveyor
- ▲ Mist Collector
- ▲ 4th Axis Nc Rotary Interface
- ▲ ATLM (Automatic Tool Length Measurement)
- ▲ AWM (Automatic Work Measurement)
- ▲ Coolant Temperature Controller
- ▲ Air Dryer
- ▲ Auto Power Out
- ▲ Power Failure Monitoring
- ▲ SuperGI 4



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