



D series

OPEN THE FUTURE

HORKOS CORP

High-mix variable volume production horizontal **energy-saving** machining center **D series**



Cope with a range of applications, including everything from volume production to manufacturing a single unit.

Also accessible to the process of large parts with long stroke specification

High-level technology developed primarily for automobile production lines guarantees high productivity and high operation rates.

iMQL™ cutting system (optional)

A coolant system just short of the tool shank inside of the spindle that sprays a small quantity of cutting fluid combined with air into processing parts from the blade tip

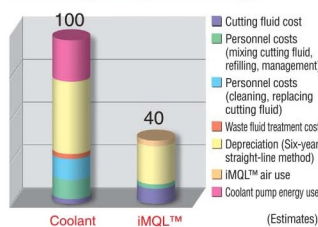
With much less cutting fluid than traditional coolant types, it contributes to significant decreases in energy use and CO₂ production.

In addition, by adjusting the amount of cutting fluid used, it enables the user to select the most ideal cutting conditions, providing high-speed, high-accuracy, and high-efficiency processing that also extends the blade tool life.



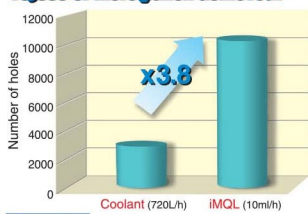
Energy Savings

Provides roughly 60% cost savings compared to medium-pressure coolant through.



Long tool life

10,000 or more punch achieved!



Work material: JIS S50C Tool used: ø 6.8mm drill Processing depth: 20mm
Main axis rotating speed: 5,600min⁻¹ Cutting depth: 1,100mm/min

High accuracy

High speed contouring circularity processing

Cutting material: A2017
Process details: ø 10 end mill
Inner diameter ø 60mm
depth 15mm
S = 8,500 F = 2,000



High speed, high accuracy process

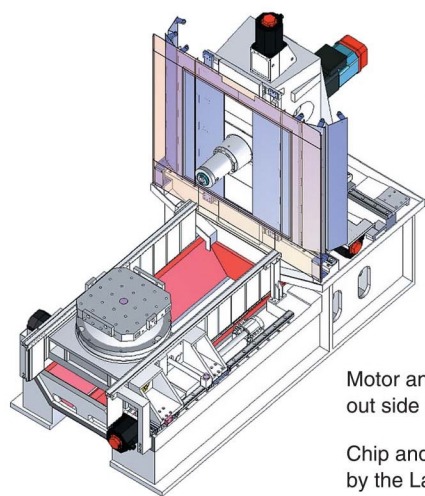
Cutting material: S50C
Process details: ø 5.0 Drill L=150
Spindle rotating speed: 6000min⁻¹
Feed speed: 1800mm/min

4.99 sec/hole (net processing time)

Cutting material: AC4B
Process details: ø 5.0 Drill L=195
Spindle rotating speed: 10000min⁻¹
Feed speed: 6000mm/min

1.95 sec/hole (net processing time)

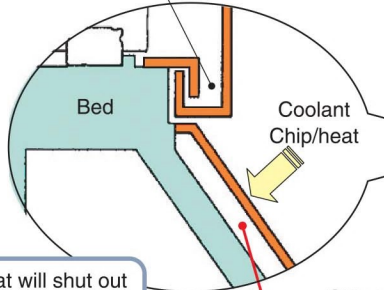
Down-time prevention/High operating rate



The bed is a direct under type, allowing chip to fall directly without accumulating. In addition, there are metal-covered openings located above the bed main body, ensuring that chip and coolant do not come into direct contact with the bed main body, insulating it from the thermal effects of chip and coolant during processing, allowing the machine to be operated for extended periods and maintaining high-accuracy processing.

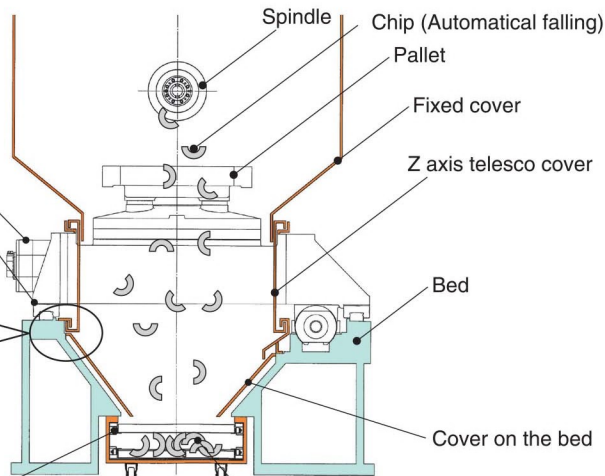
Motor and working parts are all installed out side of cutting area.

Chip and coolant are shut out by the Labyrinth structure.



Influence for the bed by heat will shut out by the heat resistance system of middle-empty structure.

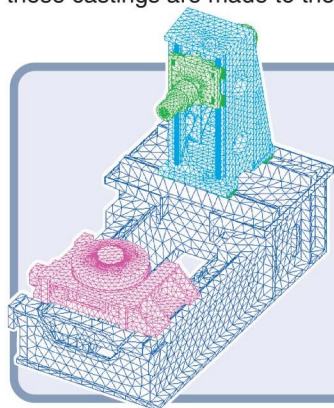
Gap



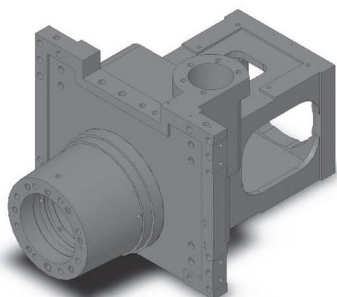
Chips fall directly from the cutting point and flow away smoothly to the outside of the machine by chip conveyor.

Lightweight and high rigidity

The casting of the main parts is done using internally-produced high-grade cast iron. At our state-of-the-art iron foundry, these castings are made to the highest levels of quality management, providing a light weight but durable machine.

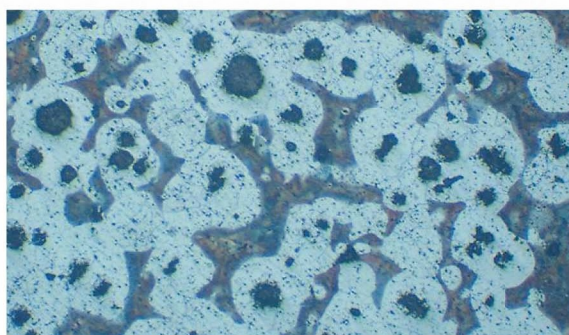


Light weight and durability were realized through the application of construction analysis based on finite element techniques. Column design employs polyhedral shapes, providing a structure that prevents stress concentration.

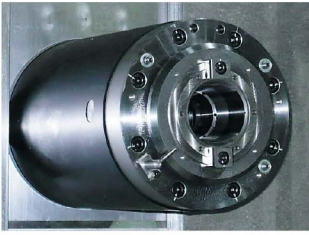


発行物07_06_01

材質試験成績書										株式会社 水一工業株式会社 〒738-8656 福山市東戸手2-24-20				
提出先		試験年月日				引張試験: JIS Z 2201-4準 硬質試験: JIS Z 2243 定量分析試験: JIS G 1204(S,Mn,P) G 1211(C), G 1215(S)による								
試験番号		試験片寸法		引張試験 (N/mm ²)		伸び (%)		ブリネル硬度 (HB)		成分試験 (%)				
材料		直径(mm)	長さ(mm)	引張強度(N/mm ²)	引張強度(N/mm ²)	%		C	Si	Mn	P	S	Mg	
軸2118-1		FCD600	13.99	153.7	79.5	517	20	156	3.56	3.08	0.28	0.023	0.008	0.038
写真NO.	前照X100	用食 45ピクラー	写真NO.	倍率X 200	用食 45ピクラー	備考								
[試験場所]		引張試験: 広島県立総合技術研究所産業加工機械センター 成分試験: 広島県立総合技術研究所産業加工機械センター												
目録														
備考														



Spindle

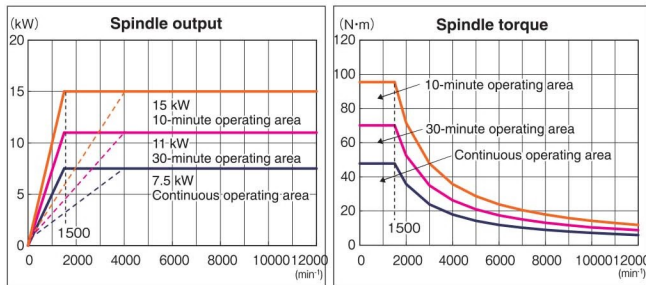


The durable Spindle unit, designed for mass production processing lines, is available in either high-speed (DM70H) or high-torque (DM100H) specifications. In addition, the main axis can also be fitted with a double-sided clamp holder for heavy-duty cutting or high-accuracy processing, providing a range of selections to meet our customers' needs.

- **Spindle taper** DM70H / DM80H: BT40, HSK-A63*, KM6350*
- DL80H: HSK-A63, KM6350*
- DM100H: BT50, HSK-A100*, KM10080*

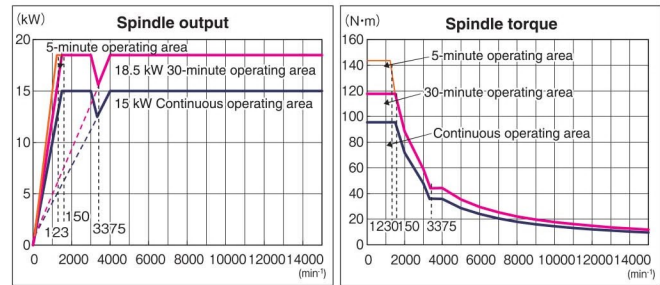
DM70H standard specifications

Maximum rotating speed: 12,000 min⁻¹
Spindle output: 15/11/7.5 kW (10 min./30 min./ Continuous)



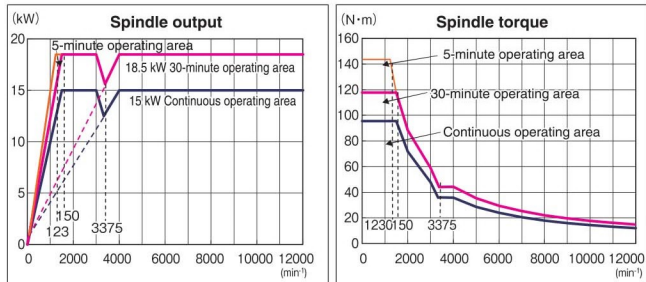
DM70H high-speed specifications*

Maximum rotating speed: 15,000 min⁻¹
Spindle output: 18.5/15 kW (30 min./ Continuous)



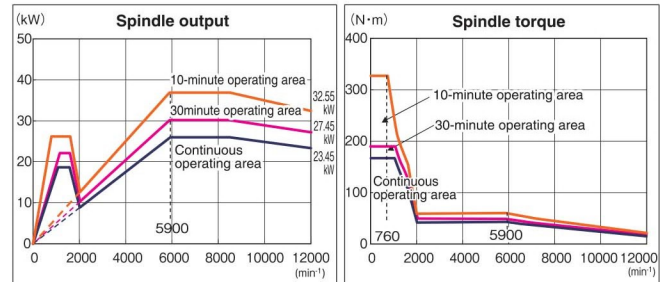
DM80H standard specifications

Maximum rotating speed: 8,000 min⁻¹
Spindle output: 18.5/15 kW (30 min./ Continuous)



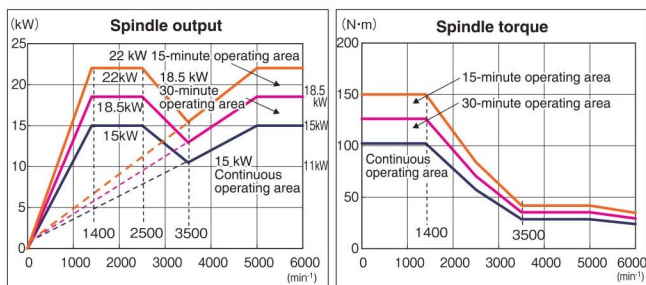
DL80H standard specifications

Maximum rotating speed: 12,000 min⁻¹
Spindle output: 30/26 kW (30 min./ Continuous)



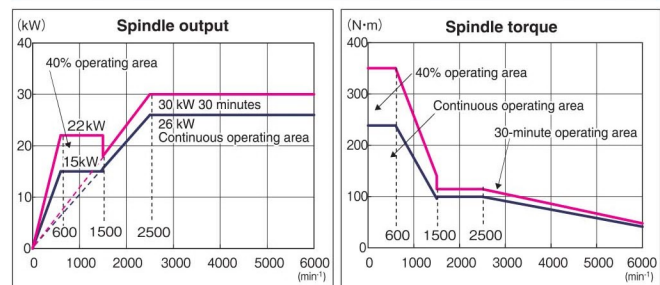
DM100H standard specifications

Maximum rotating speed: 6,000 min⁻¹
Spindle output: 22/18.5/15 kW (15 min./30 min./ Continuous)



DM100H high-torque specifications*

Maximum rotating speed: 6,000 min⁻¹
Spindle output: 30/26 kW (30 min./ Continuous)



Asterisk (*) denotes optional specifications

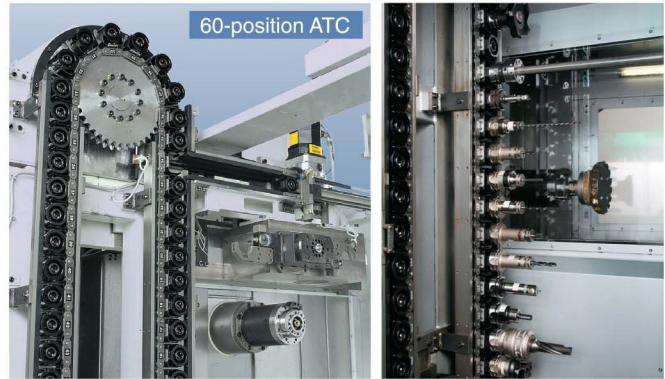
ATC device (auto tool changer)

Maximum tool diameter (when there is no adjacent tool)

DM70H,DM80H,DL80H	ø 200 mm
DM100H	ø 250 mm

Maximum tool length

- DM70H,DM80H Z: 650 stroke
495mm (BT40)
560mm (HSK-A63, KM6350)
(Note: Need to confirm there is no interference with the jig, etc.)
- DM70H,DM80H Z: 1000 stroke
595mm (BT40)
660mm (HSK-A63, KM6350)
- DL80H 560mm
(Note: Need to confirm there is no interference with the jig, etc.)
- DM100H
520mm (BT50)
600mm (HSK-A100, KM10080)
(Note: Need to confirm there is no interference with the jig, etc.)



Tool change override application

When using a precision tool, a tool change speed override function is provided to prevent damage when changing the tool. This feature requires the user to specify the tools which can override the tool change in advance.

APC device (auto palette changer)

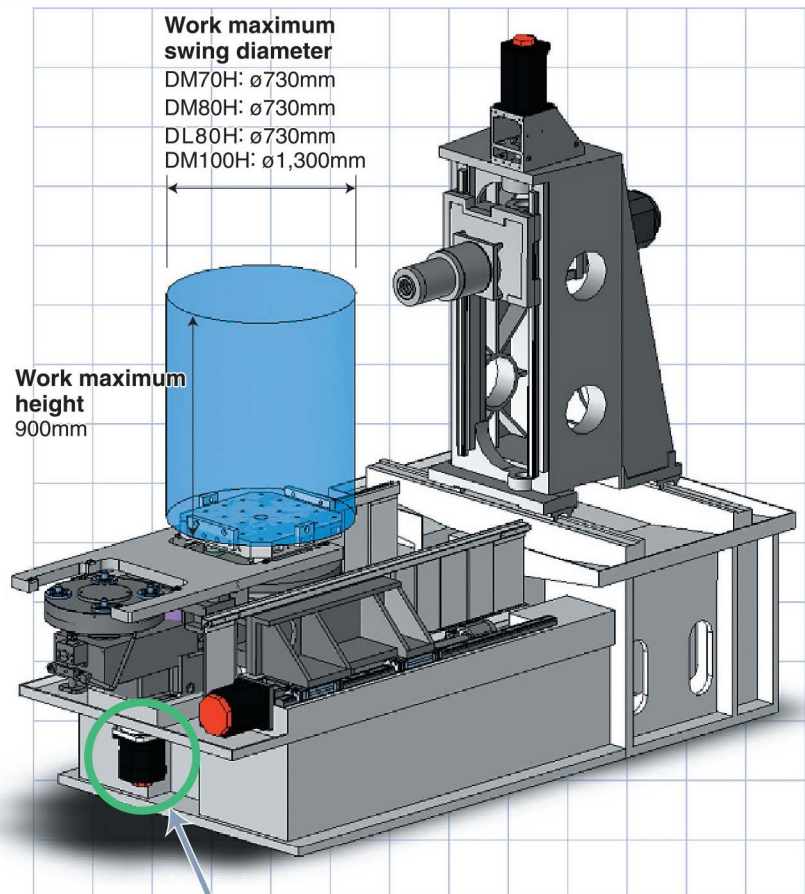
Palette change time

- DM70H: 6 seconds**
- DM80H: 6 seconds**
- DL80H: 6 seconds**
- DM100H: 15 seconds**

Palette clamp device



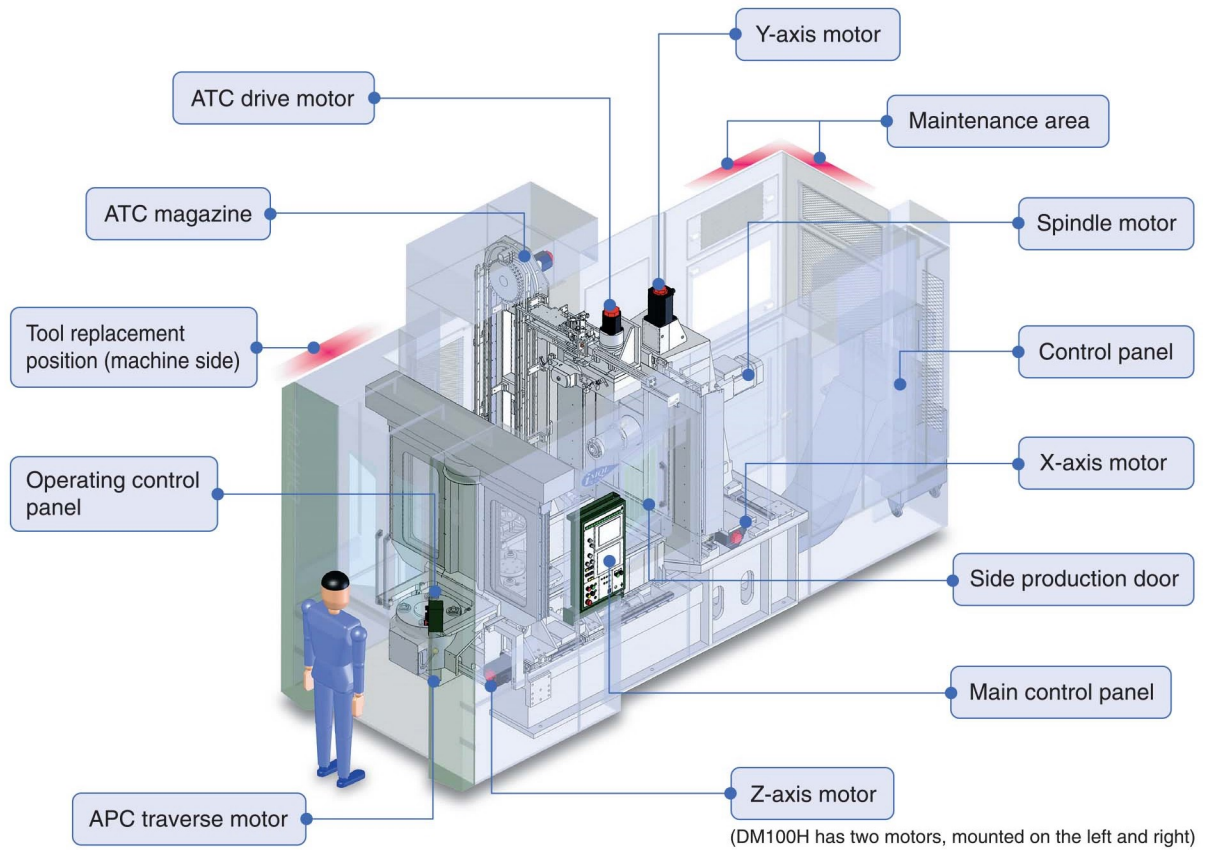
Uses a double-sided clamp system to position the palette highly accurately and keep it in place. The palette positioning unit uses an internal air blower to prevent the adhesion of cutting shavings.



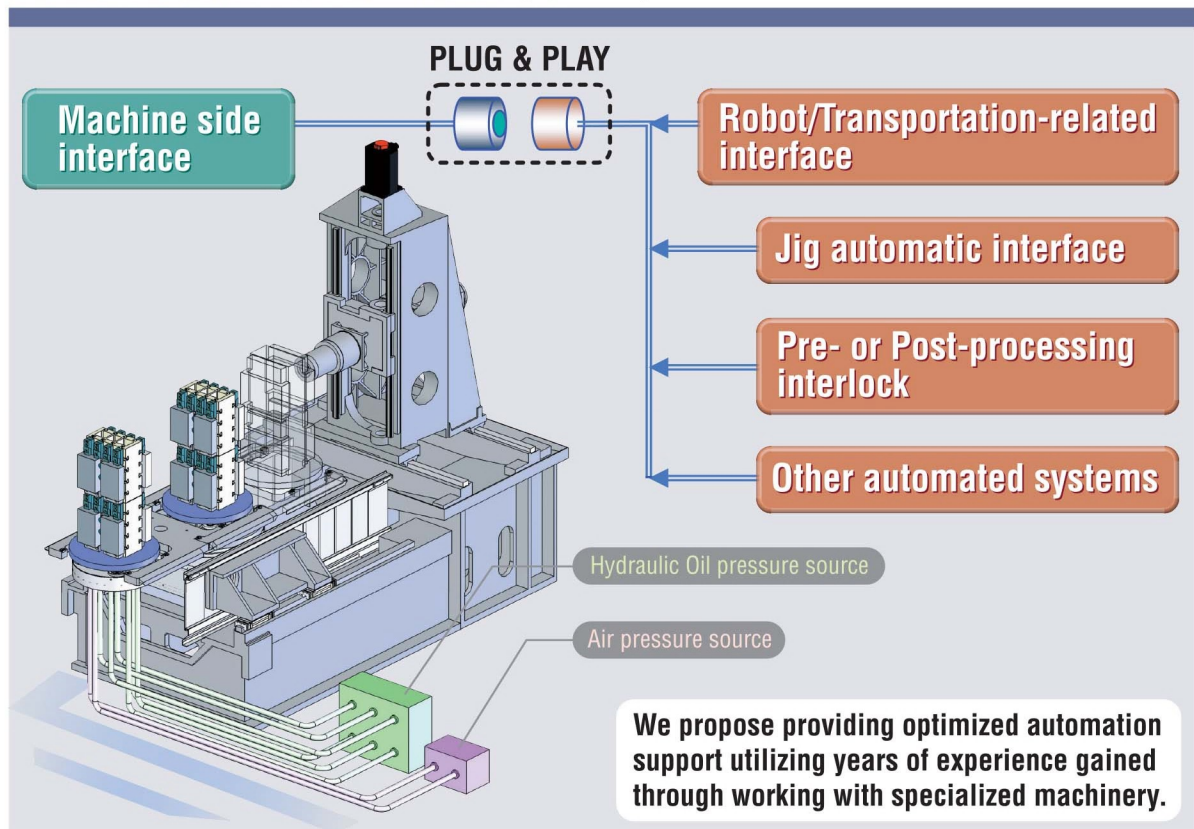
Traverse mechanism

Employs a servo motor for smooth acceleration / deceleration and high-speed traversing. In addition, the servo motor is located on the outside of the main unit for ease of maintenance.

Standard machine layout



Automatic interface (optional)



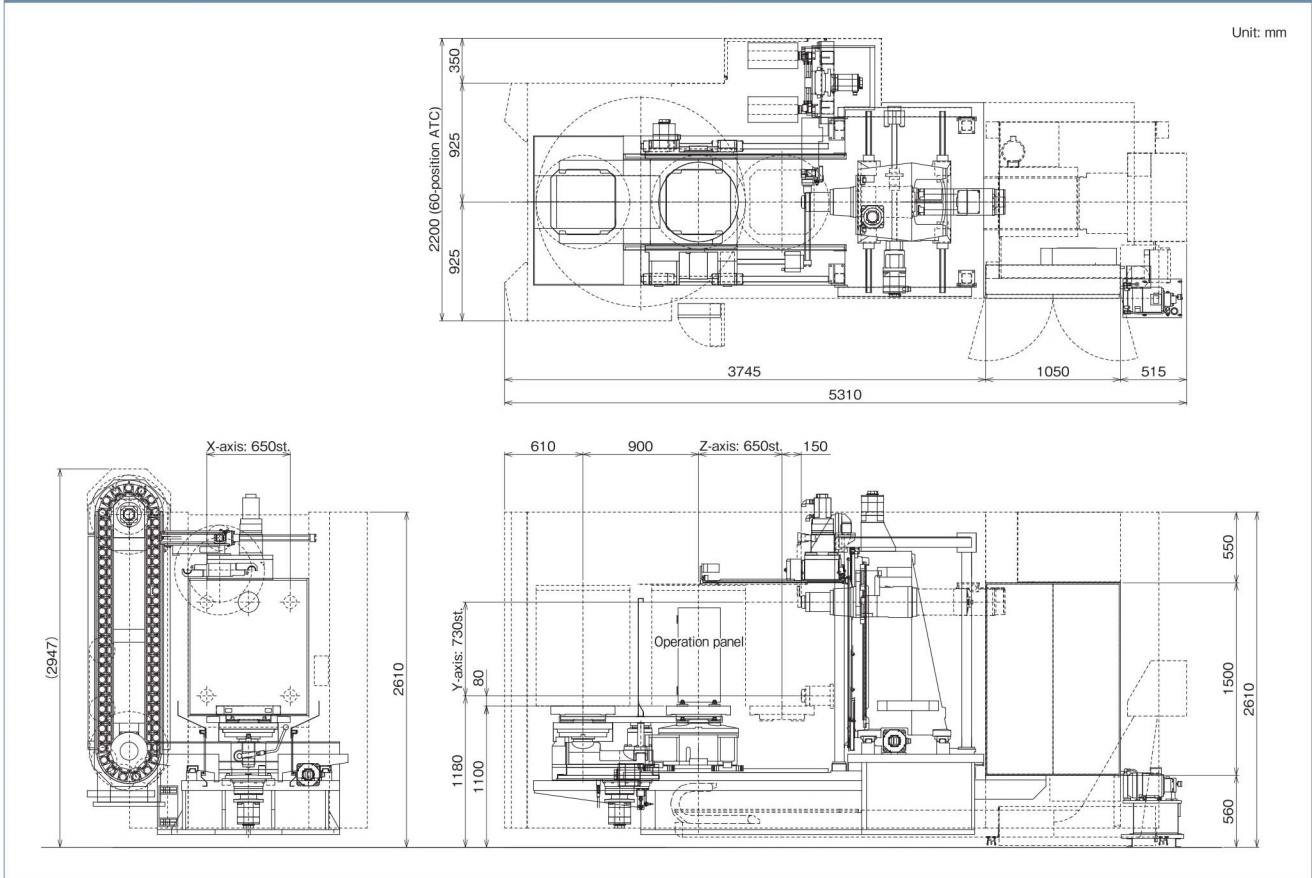
Machine Center main unit primary specifications

Item		DM70H		DM80H	DL80H	DM100H	
		Standard specifications	High-speed specifications	Standard specifications	Standard specifications	Standard specifications	High-torque specifications
Travel distance	X-axis (mm)	650 * 1,100			650	1,000 * 1,500	
	Y-axis (mm)	730			730	800	
	Z-axis (mm)	650 * 1,000			650	1,000	
Palette	Distance from palette top surface to main axis center line (mm)	80-810			80~810	80-880	
	Distance from palette center line to tip of main axis (mm)	150-800			150~800	200-1200	
	Palette work surface size (mm)	500 x 500			500x500	800 x 800 * 1000 x 1000	
	Work maximum height (mm)	900			900	930	
	Work maximum swing diameter (mm)	ø 730			ø 730	1300	
	Palette maximum laden weight (kg)	500			500	1500	
	Palette surface shape	Tap processing palette attached * T-slot processing palette attached			p processing palette attached slot processing palette attached	Tap processing palette attached * T-slot processing palette attached	
	Palette minimum index angle (°)	0.001			0.001	0.001	
	Height from floor to palette work surface (mm)	1,150			1,100	1,465	
Spindle unit	Spindle diameter (mm)	ø 70			ø 80	ø 100	
	Spindle bearing lubrication method	Mist lubrication	Mist lubrication	Mist lubrication	Mist lubrication	Mist lubrication	
	Spindle maximum rotating speed (min ⁻¹)	12,000	15,000	12,000	6,000	6,000	
	Base rotating speed (min ⁻¹)	1,500	1,500	5,900	1,400	600	
	Spindle output (kW)	15/11/7.5	* 18.5/15 (Liquid-cooled motor)	30/26 (Built-in motor)	22/18.5/15	*30/26 (Liquid-cooled motor)	
	Spindle taper	BT40 (MAS-I type) * HSK-A63 * KM6350		HSK-A63 *KM6350	BT50 (MAS-I type) * HSK-A100 * KM10080		
Feed unit	Fast feed speed (m/min)	62 (0.7G)			62 (1.0G)	48 (0.4G)	
	Motor output (X/Y/Z) (kW)	4.5/5.5/4.5			5.5/5.5/5.5	5.2/5.0/5.2 x 2 (Twin ball joint type)	
	Cutting feed speed (mm/min)	1-10,000			1-10,000	1-10,000	
	Strike origin	X/Y/Z axis			X/Y/Z axis	X/Y axis	
	Z-axis power (continuous rating /90% efficiency) (kN)	5.6			8	8	
Slide member	Linear guide with self-lubricating device attached			Linear guide with self-lubricating device attached	Linear guide with self-lubricating device attached		
ATC device	Tool shank shape	7/24 taper NO.40 * HSK-A63 * KM6350			HSK-A63 *KM6350	7/24 taper NO.50 * HSK-A100 * KM10080	
	Pull stud shape	MAS-I type			-	MAS-I type	
	Tool change system	Arm system			Arm system	Arm system	
	Tool selection system	Fixed location random shortcut			Fixed location random shortcut	Fixed location random shortcut	
	Number of tools stored	60 *16 *24 *124			60 *90	60 * 124	
	Maximum tool diameter (mm)	ø 75 (When there is no adjacent tool ø200)			ø 80 (When there is no adjacent tool ø250)	ø 120 (When there is no adjacent tool ø250)	
	Maximum tool length (mm)	(Z: 650 stroke) 495 (BT40) * 560 (HSK-A63, KM6350) (Note: Need to check if there is interference with jig, etc.) (Z: 1000 stroke) * 595 (BT40) * 660 (HSK-A63, KM6350)			560 (HSK-A63, KM6350) (Note: Need to check if there is interference with jig, etc.)	520 (BT50) * 600 (HSK-A100, KM10080) (Note: Need to check if there is interference with jig, etc.)	
	Maximum tool weight (kg)	12			12	25	
	Tool change time T to T (sec)	1.8			1.8	2.7 (When tool weight is 15kg or less)	
	Tool change time C to C (1/2 stroke)	4.0 (at standard stroke specification)			4.0 (at standard stroke specification)	5.5 (at standard stroke specification)	
	APC device	Number of palettes	2			2	2
Palette change system		Traverse type			Traverse type	Traverse type	
Palette change time (sec)		6			6	15	
Oil pressure unit	Tank volume (L)	20			20	20	
	Power source	2.2 kW-4P			2.2kW-4P	2.2 kW-4P	
	Discharge rate/Set pressure	24 · 28L/min (50 · 60Hz) 5MPa			24·28L/min (50·60Hz) 5MPa	24 · 28L/min (50 · 60Hz) 5MPa	
Machine exterior color	Silver			Silver	Silver		
Machine floor space (mm)	2,200 x 5,095			2,275 x 5,115	3,535 x 6,870		
Machine weight (kg)	9,400			12,000	20,000		
Power source	AC200/220V±10% 50/60Hz			AC200/220V±10% 50/60Hz	AC200/220V±10% 50/60Hz		
Power source rating (standard specification) (kVA)	32	48	48	33.5	61	81	

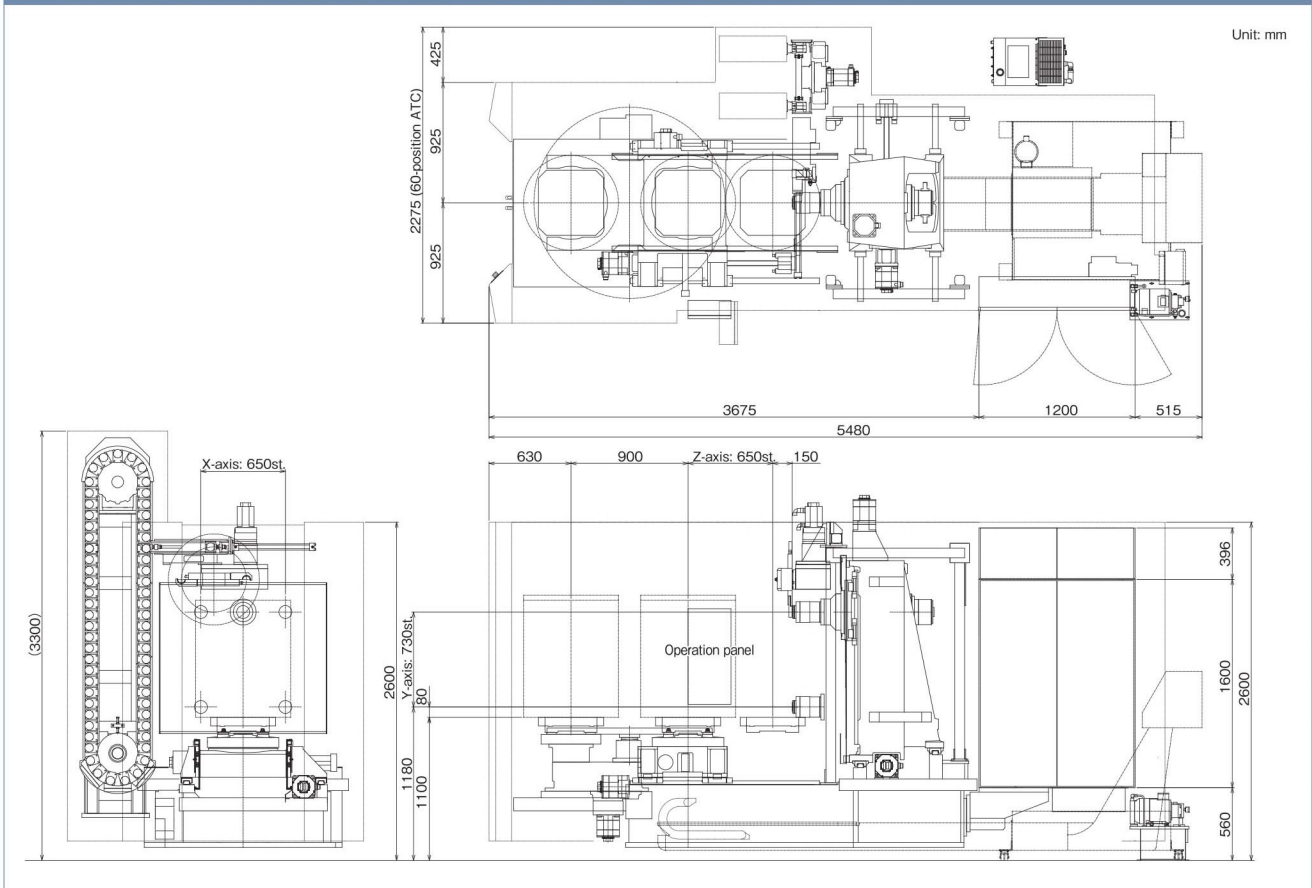
Asterisks (*) indicate optional specifications.

When the main axis maximum rotating speed is 15,000 min⁻¹, main axis cooling is required.

DM70H 60-position ATC specifications: Primary dimensions

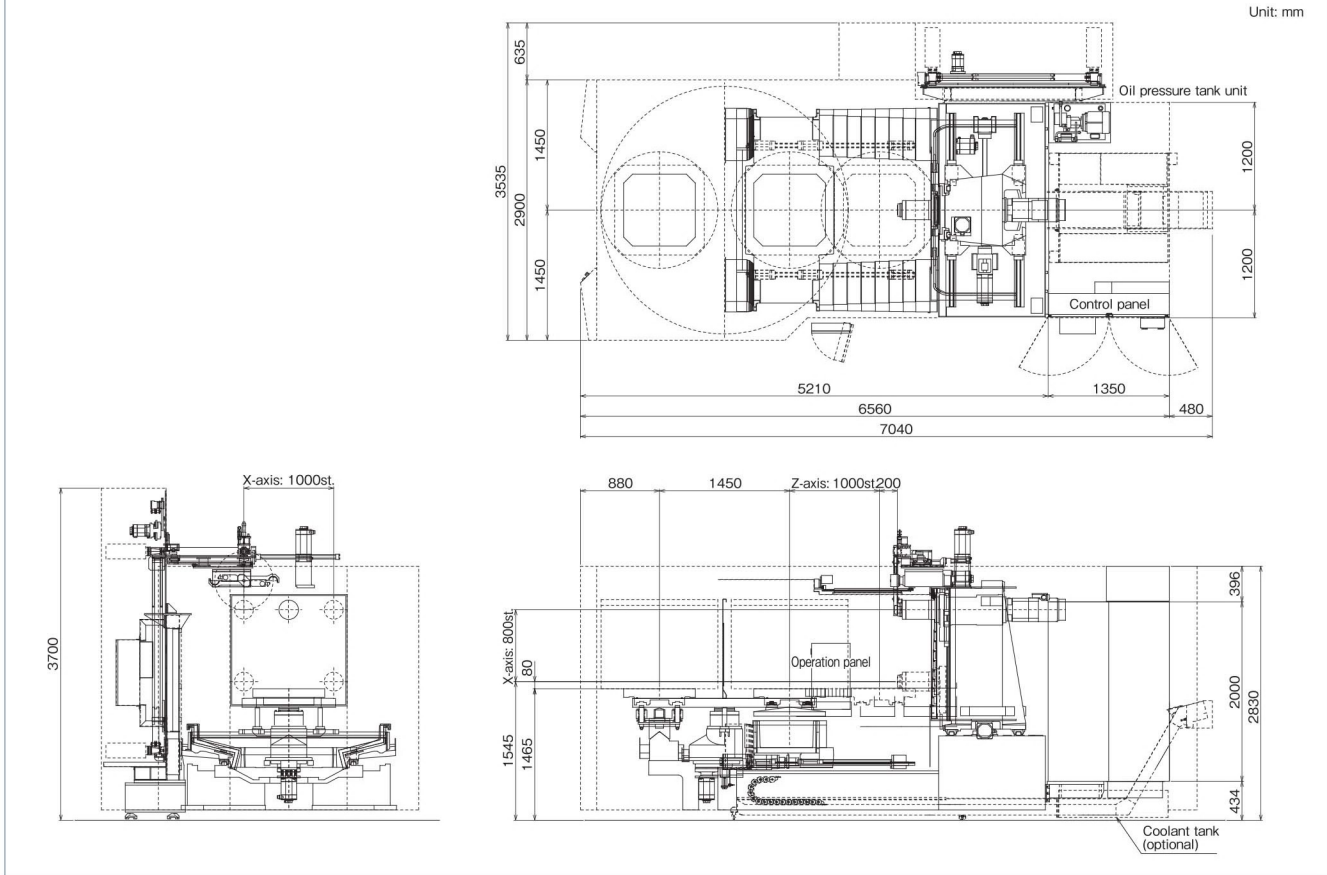


DL80H 60-position ATC specifications: Primary dimensions



DM100H 60-position ATC specifications: Primary dimensions

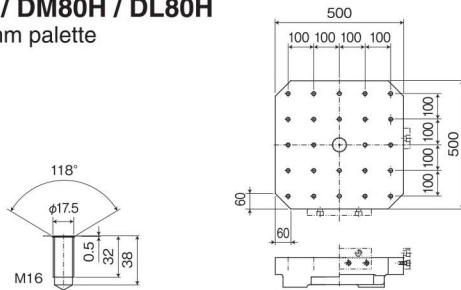
Unit: mm



Palette dimensions

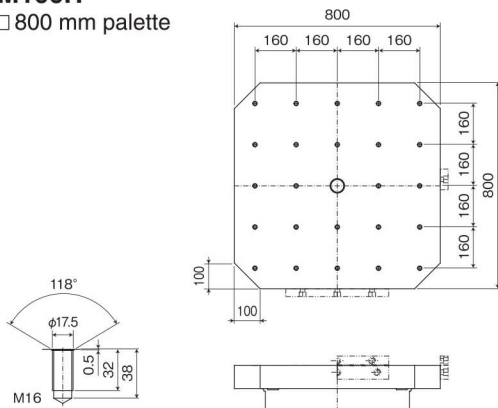
DM70H / DM80H / DL80H

□ 500 mm palette

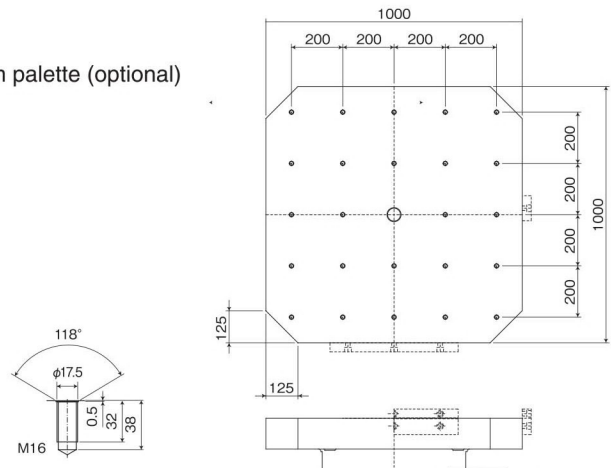


DM100H

□ 800 mm palette



□ 1,000 mm palette (optional)



Special specification options

iMQL cutting system
 Spindle through coolant
 Main axis cooling (with oil control unit)
 Ball joint cooling (X, Y, Z axes)
 Linear guide cooling (X, Y, Z axes)
 Coolant tank unit (Aluminum) with chip conveyor
 Coolant tank unit (Iron, cast iron) with chip conveyor
 MQI chip conveyor
 Medium-pressure coolant unit (2 MPa)
 High-pressure coolant unit (7 MPa)
 Oil skimmer
 Coolant temperature regulator
 Low-pressure coolant float switch
 Clean coolant float switch
 Low-pressure coolant pressure switch
 High/medium-pressure coolant pressure switch
 Through coolant float switch
 Chip box
 Coolant gun
 Air gun

3-point support bed
 Automatic damage avoidance function
 Touch-sensitive tool damage detector
 ATC internal tool damage detector
 Automatic measurement device (optical touch sensor)
 Tool length measurer
 Set position block
 Magnetic sensor (X, Y axes)
 Linear scale
 Palette auto measurement
 Electromagnetic lock of operator door
 Operator safety area sensor
 Automatic power cutoff device
 Short circuit breaker
 Control panel internal dehumidifier
 Warming up calendar timer
 Machine internal lighting
 Signal tower
 Mist collector
 Electrical collector

Specialized specification options (separate consultation required)

Multi-sided auto palette changer
 Palette/Auto couplings specification (for processed material oil pressure clamp)
 Jig oil pressure/air pressure interface
 Jig cleaning coolant pipe
 Jig base surface cleaning coolant pipe
 Single/Double/Four-sided standard ikele jig
 All types of jigs
 Operator table auto divider
 Machine solenoid valve for concentrated coolant
 Coolant shooter for concentrated coolant

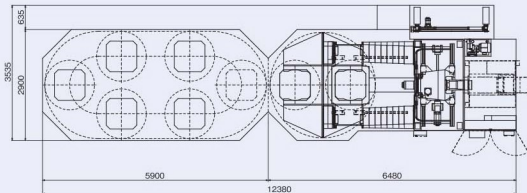
Specialized cover
 Loader interface
 Upper production information interface
 Tool length input interlock
 Pre-/Post-processing interlock
 Customer-specific control panel
 Electric control for all types of jigs
 Work automatic measurer
 Control panel internal cooler
 NC device (MELDAS, etc.)

Automation and power-saving option (separate consultation required)

It is possible to run the machine though Automation for a prolonged period of time by using an endless rotary conveyor system and vertical palette stocker or other multiple palette changer (optional part)

Reference

DM100H
 Endless conveyor system
 Number of palettes stored 6
 Palette dimensions 800mm x 800mm



Unit: mm



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- Machine Tool Dept.
- Environment Improving Equipment Dept.



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