



VESTA-660

Software-Optimized Advanced Vertical Machining Centers





SOFTWARE-OPTIMIZED VERTICAL MACHINING CENTER

Introducing the faster, more precise, more reliable vertical machining center for component machining.

Hwacheon's machining software monitors many environment and machining condition related variables and makes optimized adjustments for the best quality results at optimum work efficiency.

1 Engine Block / Auto mobile / Aluminum 2 Semiconductor equipment part / Semiconductor / Aluminum 3 Semiconductor equipment part / Semiconductor / Aluminum 4 Mani-Fold / Automobile / Aluminum 5 Aerospace Part / Aerospace / AL6061

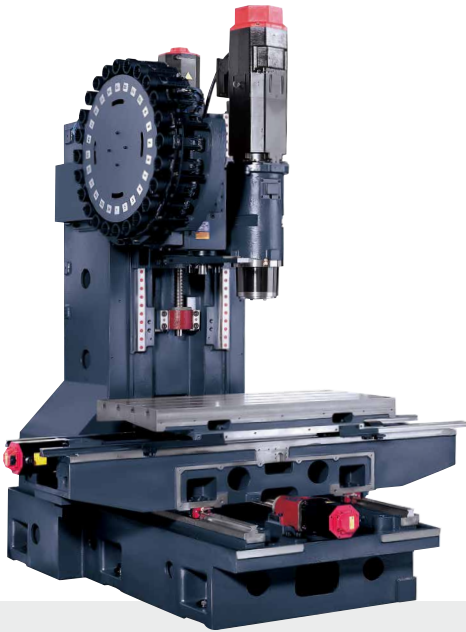


SUPER FAST ROUGHING AND ULTRA PRECISE FINISHING PERFORMANCE

The VESTA series of machining centers are the result of Hwacheon's technological innovation.

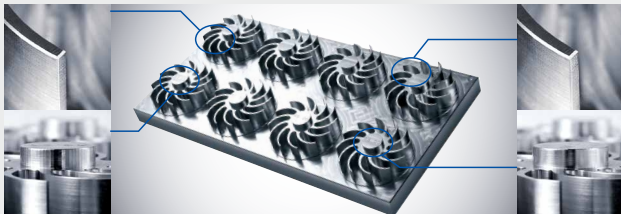
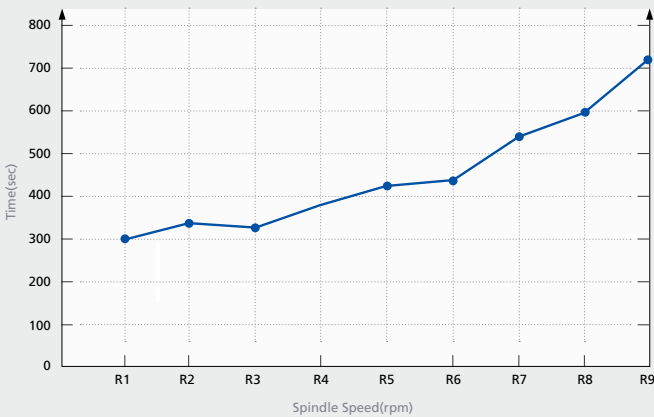
These high-performance machines are optimized for job shop machining applications, with the easy-to-use interface to maximize your productivity. HTLD increases the life of your tools; HECC provides perfect contour control for better machining efficiency; OPTIMA controls the feedrate and HTLD adjusts the temperature in real time. To minimize thermal displacement and to increase the life of the spindle assembly, the spindle unit is grease-lubricated and jacket cooled. The advanced feed drive complements the spindle for highly precise machining result every time. The super tough roller guide keeps its precision even at high speeds, and offers a variety of options for your convenience. Last but not least, VESTA's advanced chip removal and lube separation system help to save cost.





Machining example using HECC[®]

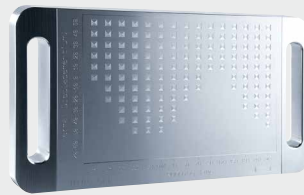
[Cutting time per HECC level]



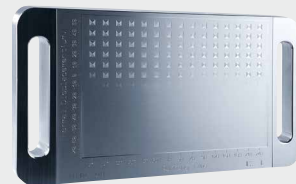
You can program the HECC system to operate in Fast Mode to prioritize speed over precision such as roughing; or have it run in Precision Mode when finish cutting. Better yet, you don't need to modify parameters every time you change your work you can easily switch from one mode to another by entering the NC data. This feature works not just for speed and precision, but also for setting the level of smoothness of the surface on a workpiece.



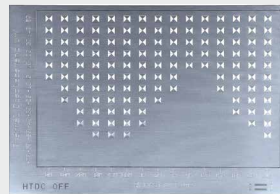
HTDC usage example



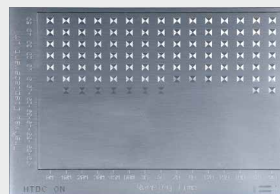
OFF



ON



Max.60μm / 24hr



Max.10μm / 24hr

HTDC monitors the temperature of different section of the machine with the highly sensitive sensors integrated within the spindle and the frame, to maintain the level of precision over long hours of operation. The left sample demonstrates how the precision level changes when the HTDC (Hwacheon Thermal Displacement Control) is turned off and on, to show that HTDC effectively helps to produces consistent machining results after 24 hours of operation.





MACHINING SOFTWARE

The Hwacheon Machining Software Components

The Hwacheon's developed machining software monitors different variables related to the work environment and machining conditions and makes adjustments for best quality results and optimum work efficiency.

+ RELIABILITY

HTDC (HSDC + HFDC)

Hwacheon Thermal Displacement Control System (HSDC + HFDC)

HTDC integrates the Hwacheon Spindle Displacement Control system and the Frame Displacement Control System.



HFDC

Hwacheon Frame Displacement Control System

HFDC is equipped with highly sensitive thermal sensors in the casting region where thermal activity is suspected; monitoring and correcting displacement.



HSDC

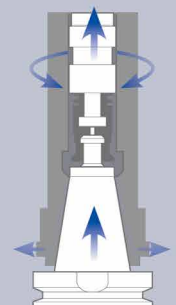
Hwacheon Spindle Displacement Control System

When the spindle rotates at high speed, the centrifugal force drives the taper to expand, causing errors in Z axis. HSDC constantly monitors the temperature at each spindle region and makes optimal prediction for thermal displacement. The system then makes necessary adjustments and effectively minimizing thermal displacement.



Static displacement compensation

The HSDC system corrects the Z-axis error occurring from the taper expansion during the spindle's high speed rotation.



PRECISION +



HTLD

Hwacheon Tool Load Detect System

HTLD constantly monitors the tool wear to prevent accidents, which may occur from a damaged tool and help to stop tool wear from deteriorating the workpiece.
(The load is measured every 8 msec to ensure accuracy)



HECC

Hwacheon High-Efficiency Contour Control System

HECC offers an easy-to-use programming interface for different work-pieces and different processing modes. The system provides a precise, custom contour control for the selected workpiece, while prolonging the life of the machine and decreasing process time. The customizable display provides real-time monitoring and quick access.

- Program offers different options for different cutting speed and accuracy for roughness and shapes.
- The customizable display provides real-time monitoring and quick, easy access.
- The program is executable on an existing NC DATA system and works with the G Code system.



OPTIMA

Cutting Feed Optimization System

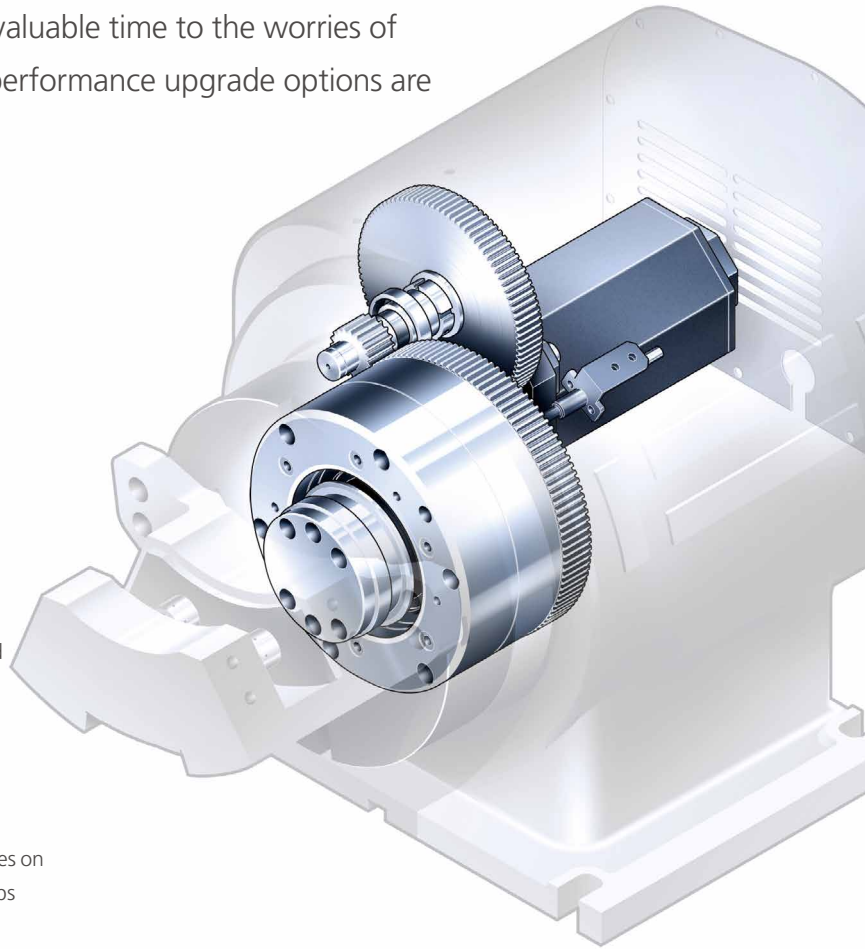
OPTIMA utilizes an adaptive control method to regulate the feed rate in real time, to sustain the cutting load during a machining process. As a result the tools are less prone to damage and the machining time is reduced.



SPEED +

USER FRIENDLY DESIGN, A WIDE RANGE OF OPTIONAL FEATURES

The VESTA-660 system offers user friendly design and a wide variety of useful options for practical applications, so you can concentrate on what you do best: creating quality products without losing your valuable time to the worries of machine failure and safety. A wide variety of performance upgrade options are available for faster, more precise machining.

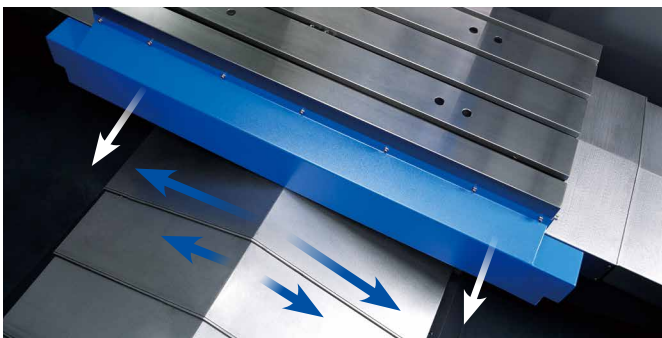


Index Table (Option)

Hwacheon's index table can be operated with ease without the need for additional 4-axis interface, and its 4.3 tons of clamping force and 5 degrees of division angle are ideal for hard turning.

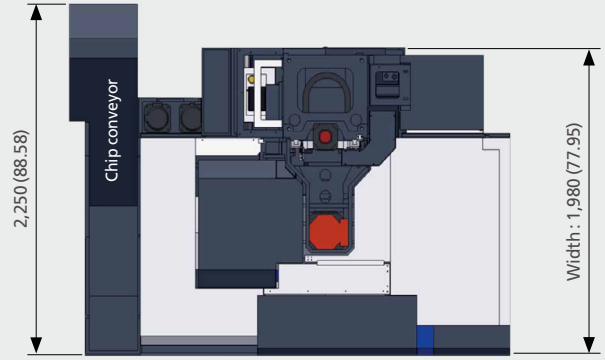
Fast Chip Removal Performance

The chip removal section in VESTA series of machining centers are designed with a wide-angle sliding cover and the chip flushing nozzles on each side of the table; and the coil conveyor in front removes the chips quickly and effectively, to make your work more efficient.

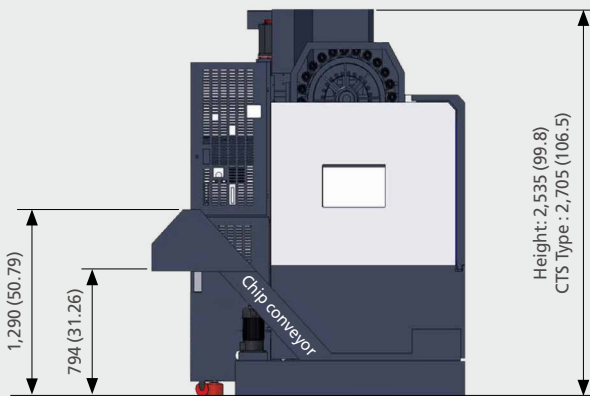


Product Data

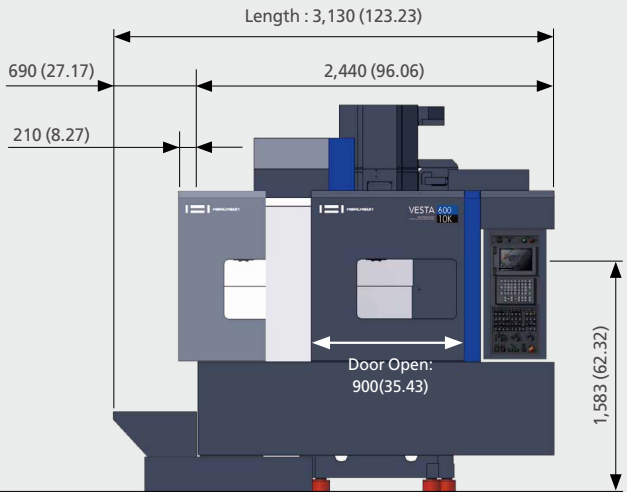
* Unit: mm(inch)



Top



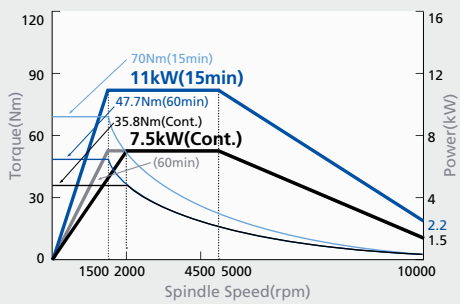
Left side



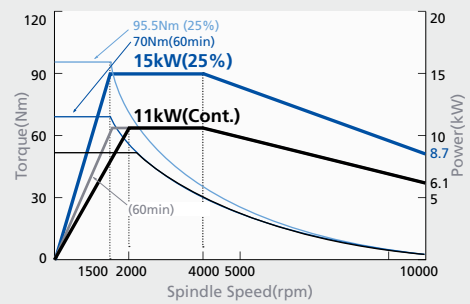
Front

Spindle Power – Torque Diagram

STD

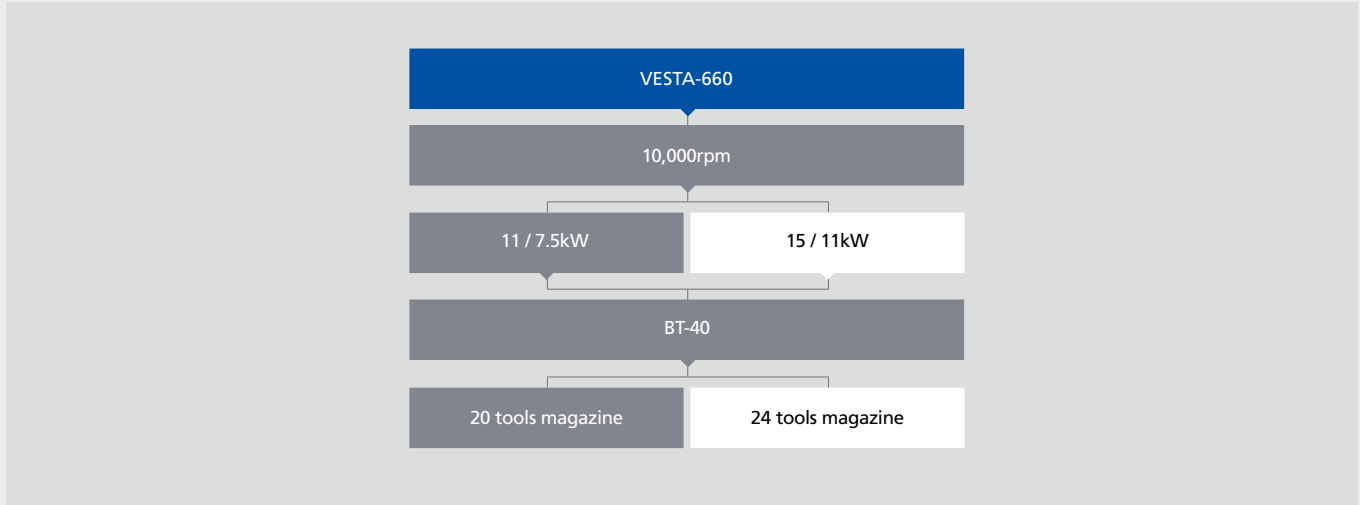


Through-Spindle



Product Configuration

Each product can be configured to fit your application.



Machine Specifications

ITEM	VESTA-660	
	11 / 7.5	15 / 11
Travel		
X-axis Stroke	mm(inch)	660 (25.98)
Y-axis Stroke	mm(inch)	430 (16.93)
Z-axis Stroke	mm(inch)	400 (15.75)
Distance from Table Surface to Spindle Gauge Plane	mm(inch)	150 ~ 550 (5.91 ~ 21.65)
Table		
Working Surface	mm(inch)	720 x 400 (28.35 x 15.75)
Table Loading Capacity	kg,(lb _f)	560 (1,234)
Table Surface Configuration (T slots WxP / No. of slots)	mm(inch)	18 x 100 (0.71 x 3.94) / 3ea
Spindle		
Max. Spindle Speed	rpm	10,000
Spindle Motor	kW(HP)	11 / 7.5 (15 / 10) 15 / 11 (20 / 15)
Feedrate		
Rapid Speed (X / Y / Z)	m/min(ipm)	36 / 36 / 30 (1,417 / 1,417 / 1,181)
Feedrate (X / Y / Z)	mm/min(ipm)	1 ~ 24,000 (0.04 ~ 945)
ATC		
Type of Tool Shank	-	MAS-403 BT-40 (OPT: BBT-40, CAT-40)
Type of Pull Stud	-	MAS P40T-1 (45°)
Tool Storage Capacity	ea	20 (24)
Max. Tool Diameter (Without Adjacent Tools)	mm(inch)	Ø80 / Ø150 (3.15 / 5.91)
Max. Tool Length	mm(inch)	300 (11.81)
Max. Tool Weight	kg,(lb _f)	8 (17.64)
Motor		
Feed Motor (X / Y / Z)	kW(HP)	1.8 / 1.8 / 3.0 (2.4 / 2.4 / 4.0)
Coolant Motor (Spindle / Chip Flushing)	kW(HP)	0.4 / 0.4 (0.54 / 0.54)
Spindle Cooler (50 / 60Hz): Inverter Type	kW(HP)	0.18 (0.24)
Power Source		
Electric Power Supply	kVA	25 30
Compressed Air Supply (Pressure x Consumption)	-	0.5 ~ 0.7MPa x 690Nℓ/min
Tank Capacity		
Spindle Cooling / Lubrication	ℓ (gal)	20 / 6 (5.28 / 1.59)
Coolant	ℓ (gal)	320 (84.54)
Machine Size		
Height	mm(inch)	2,535 (99.8)
Floor Space (Length x Width)	mm(inch)	3,130 (123.23) x 1,980 (77.95)
Weight	kg,(lb _f)	4,275 (9,425)
NC Controller		Fanuc 0i-MF

Standard and Optional product components

Standard Accessories		Optional Accessories	
• Adjust Bolt, Block & Plate	• Tool Kit & Box	• Air Dryer	• Spindle Cooler (Oil Cooler Type)
• Air Blower	• Work Light	• Air Gun	• Spindle Through Coolant (3 MPa, 7 MPa)
• Base Around Splash Guard	• Workpiece Coordinate System (48pairs)	• Auto Door	• Tool Measuring System-Renishaw / Blum (Touch Type, Laser Type)
• Coolant System	• 10.4" Color LCD	• Coolant Gun	• Transformer
• Coil Conveyor (1ea)	• Hwacheon Artificial Intelligence Control System (HAI) 40 block	• Data Server Interface	• Workpiece Measuring System - Renishaw / Blum (Touch Type)
• Door Interlock	• Hwacheon Efficient Contour Control System (HECC)	• Data Server (256MB / 1,024MB)	• 4-Axis Interface
• Ethernet Interface	• Hwacheon Tool Load Detect System (HTLD)	• High Pressure Coolant 0.6 MPa	• 15" Color LCD (only FANUC)
• Lubrication System	• Cutting Feed Optimization System (OPTIMA)	• Lift Up Chip Conveyor (Hinge, Scraper, Mesh-drum)	• Hwacheon Artificial Intelligence Control System (HAI) 200 / 400 Block
• Lub. Oil Separation Tank	• Hwacheon Thermal Displacement Control System (HTDC)	• Linear Scale (X / Y / Z)	
• MPG Handle (1ea)	• Hwacheon Spindle Displacement Control System (HSDC) +	• NC Cooler	
• Operation Manual & Parts List	• Hwacheon Frame Displacement Control System (HFDC)	• Manual Guide i	
• Part Program Storage Length 1,280m (512kB)		• Mist Collector	
• Pneumatics System		• MPG Handle (3ea)	
• Rigid Tapping		• Oil Mist (Semi Dry Cutting System)	
• Signal Lamp (R / G / Y, 3 Color)		• Oil Skimmer	
• Spindle Cooler (Fan Cooler Type)			

NC Specifications [Fanuc Oi-MF]

※ — : Not available S : Standard O : Option

ITEM	SPECIFICATION	ITEM	SPECIFICATION
Controlled Axis		Spindle Override	50 - 120% S
Controlled Axis	3-axis S	Rigid Tapping	S
Controlled Axis	5-axis (Max.) O	Tool Function / Compensation	
Simultaneously Controlled Axis	3-axis S	Tool Function	T4-digits S
Simultaneously Controlled Axis	4-axis (Max.) O	Tool Offset Pairs	±6-digits / 400ea S
Least Input Increment	0.001mm, 0.001deg, 0.0001inch S	Tool Offset Memory C	S
Least Input Increment 1 / 10 inch / metric conversion	0.0001mm, 0.0001deg, 0.00001inch O	Tool Length Compensation	S
Store Stroke Check 1 / 2, Mirror Image	G20, G21 S	Cutter Compensation C	S
Operation		Tool Life Management	O
Automatic & MDI Operation	S	Tool Length Measurement	S
DNC Operation by Memory Card	PCMCIA Card is Required S	Editing Operation	
Dry Run, Single Block	S	Part Program Storage Length	1,280m (512kB) S
Manual Handle Feed / Feed Rate	1Unit / x1, x10, x100 S	Number of Register Able Programs	400ea S
Feed Function		Background Editing	S
Rapid Traverse Override	F0, F25, F50, F100 S	Extended Part Program Editing / Play Back	S
Feedrate (mm/min)	S	Interpolation Function	
Feedrate Override	0 ~ 150% S	Positioning / Linear interpolation / Circular interpolation / Dwell (Per seconds)	G00 / G01 / G02, G03 / G04 S
Jog feed Override	0 ~ 4,000 mm/min S	Cylindrical Interpolation	4-axis Interface Option is Required S
Override Cancel	M48, M49 S	Helical Interpolation	Circular interpolation plus Max. 2-axis linear interpolation S
Program Input		Reference Position Return Check / Return	G27 / G28, G29 S
Tape Code	EIA / ISO S	2nd, 3rd, 4th Reference Position Return / Skip	G30 / G31 S
Optional Block Skip	9ea S	Setting and Display	
Program Number	O4-digits S	Display Unit	10.4" Color LCD S
Sequence Number	N8-digits S	Clock Function	S
Decimal Point Programming	S	Self-diagnosis Function / Alarm History Display	S
Coordinate System Setting	G92 S	Help Function / Graphic Function	S
Workpiece Coordinate System	G54 - G59 S	Run Hour and Parts Count Display	S
Workpiece Coordinate System Preset	S	Dynamic Graphic Display	O
Addition of Workpiece Coordinate Pair	48ea S		
Manual Absolute ON and OFF	S		
Chamfering / Corner R	S		
Programmable Data Input	G10 S		
Sub Program Call	10 Folds Nested S	Multi-language Display	English, German, French, Italian, Chinese, Spanish, Korean, Portuguese, Polish, Hungarian, Swedish, Russian S
Custom Macro B	S		
Addition of Custom Macro Common Variables	#100 - #199, #500 - #999 S	Data Input / Output	
Canned Cycles for Drilling	S	Reader / Puncher Interface CH1	RS232C S
Small-hole Peck Drilling Cycle	S	Reader / Puncher Interface CH2	RS232C S
Automatic Corner Override	S	Data Server	256MB / 1,024MB O
Feedrate Control with Acceleration in Circular Interpolation	S	Ethernet Interface	S
Scaling / Coordinate System Rotation	S	Memory Card Interface	S
Programmable Mirror Image	S	HWACHEON Machining Software	
Tape format for Fanuc Series 10 / 11	S	Hwacheon Artificial Intelligence Control System (HAI): 40 Block	S
Manual Guide i	O	Hwacheon Artificial Intelligence Control System (HAI): 200 / 400Block	O
Polar Coordinate System	S	Hwacheon Efficient Contour Control System (HECC)	S
Spindle Speed Function	S	Hwacheon Tool Load Detect System (HTLD)	S
Spindle Orientation	S	Cutting Feed Optimization System (OPTIMA)	S
		Hwacheon Thermal Displacement Control System (HTDC)	S

Hwacheon Global Network

 Hwacheon Headquarters  Hwacheon Europe  Hwacheon Asia  Hwacheon America



Please contact us for product inquiries.

www.hwacheon.com

The product design and specifications may change without prior notice.
Read the operation manual carefully and thoroughly before operating the product,
and always follow the safety instructions and warnings labels attached on the surfaces of the machines.

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