

VESTA-1000⁺

Software Optimized Vertical Machining Center



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- 1 LED Radiator / Aluminum
- 2 Part / Front Upright / Aluminum
- 3 Part / Air Flap Link / Aluminum

550 mm Y-axis Vertical Machining Center for Enhanced Productivity and Work Convenience

- VESTA-1000+ provides high efficiency and satisfactory result with its highly-strengthened productivity and better user friendliness
- It is equipped with Hwacheon's proprietary technologies such as productivity enhancement software (HECC, HTLD and OPTIMA) and precision enhancement software (HTDC and HAI) and provides differentiated quality different from existing machining center for parts.
- Installation area size has been minimized relative to the size of other tools of the same class for more efficient usage of space in customer's factory



Upgrades for Enhanced Machining Performance

- 1 Improved table utilization (Max 4ea 6" vice utilization)
- 2 Enhanced tool switch time and chip to chip time
(Cycle time 15% Improvement)
- 3 Hwacheon's proprietary software

Enhanced Work Convenience

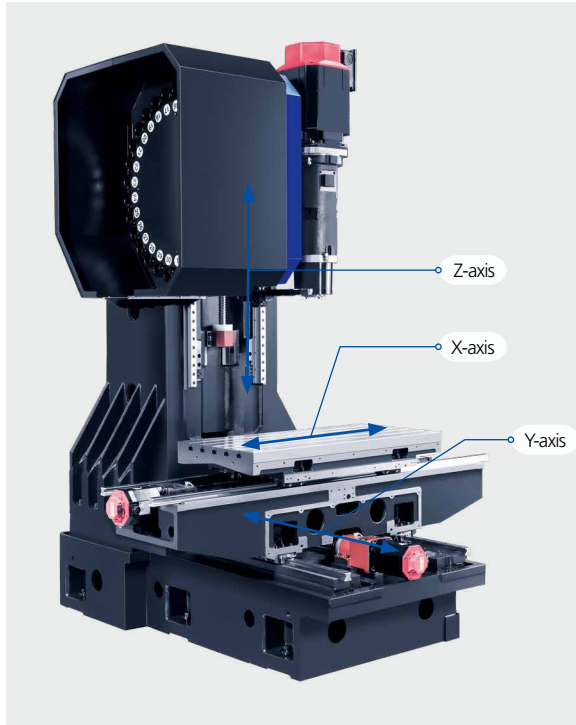
- 1 Reduction in work fatigue (Front Two-Door)
- 2 Pendant arm type operator panel
- 3 Lowered table height [950 mm (37.4 inch)]
- 4 The tempered safety glass ensures machining visibility

Easy Maintenance

- 1 Back & Side type chip conveyor
 - STD : Side chip bucket
 - OPT : Side type lift-up chip conveyor
Back type lift-up chip conveyor
- 2 Wide side door for user convenience

Basic Information

Basic Structure



"Machining Stability Ensured"

- Stable machine structure
(Outstanding rigid base and column structure ensured)
- C type structure for work accessibility
- High rigid roller LM guide for every axis
- Processing position with lower center point



※ High rigid roller LM guide for every axis

Stroke mm (inch)			Rapid Speed m/min (ipm)		
X-axis	Y-axis	Z-axis	X-axis	Y-axis	Z-axis
1,000 (39.37)	550 (21.65)	500 (19.69)	36 (1,417)	36 (1,417)	30 (1,181)

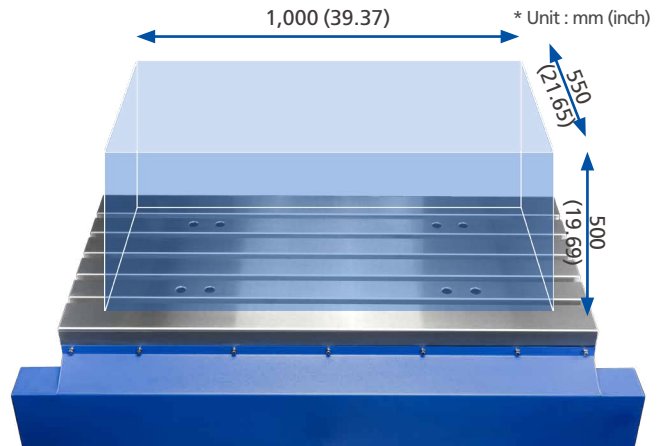
Table

"Wide Workpiece Mounting Area"

Possible to set workpieces and vices in various sizes

※ Max 4 ea 6" Vice Installation

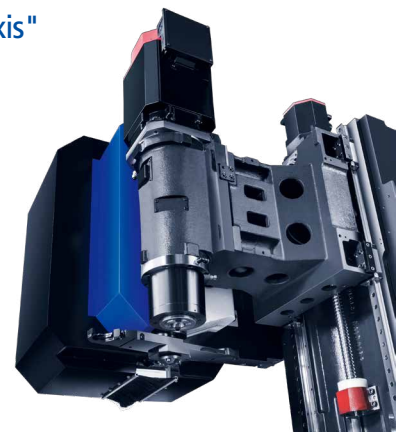
Table Size mm(inch)	T Slot W x P mm (inch)	Max Loading Capacity kg, (lb.)
1,100 x 502 (43.31 x 19.76)	18 x 80 (0.71 x 3.15) / 5 ea	700 (1,543)



Spindle

"Low Vibration and Low Heat Generation Directly Applied to Main Axis"

	Max Spindle Speed rpm	Spindle Motor kW	Max Torque Nm
STD: BT-40	12,000	Regular Type	117.7
		CTS (OPT)	
OPT: CAT-40, SK-40	10,000 (OPT)	Regular Type	95.5
		CTS (OPT)	117.7
	15,000 (OPT)	Regular Type	117.7
		CTS (OPT)	



Magazine



※ BT-40, 30 Tool Magazine

"30 Tool Magazine Applied"

Servo motor application brings less vibration during tool switching, and 30Tool magazine is applied as standard for various machining conditions

Item	Tool Shank	BT-40	CAT-40, SK-40 (OPT)
Tool Storage Capacity		30	
Method of Tool Selection		Memory Random	
Tool Change Type		Swing Arm	

Cover Design

"Compact Design"

Minimized floor space by installing coolant tank and chip bucket inside of the machine



Internal Coolant Tank




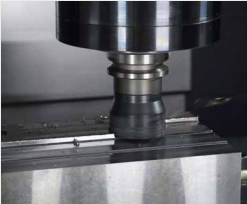


"Enhancement Table Accessibility"

Lowered table and widened doors allow easier work piece setting and pendant arm type control panel makes better use of the table

Pendant Arm Type Operator Panel

Wide Front Door Opening : 1,130 mm (44.49 inch)

BT-40 Cutting Performance

Face mill, Carbon Steel (SM45C)						
Tool Dia mm (inch)	Material Removal Rate cm ³ /min	Spindle Speed rpm	Feed mm/min (ipm)	Axial Depth mm (inch)	Radial Depth mm (inch)	
50 (1.97) / R8	400	1,500	5,000 (197)	2 (0.08)	40 (1.57)	
Face mill, Carbon Steel (SM45C)						
Tool Dia mm (inch)	Material Removal Rate cm ³ /min	Spindle Speed rpm	Feed mm/min (ipm)	Axial Depth mm (inch)	Radial Depth mm (inch)	
60 (2.36)	360	1,500	3,000 (118)	3 (0.12)	40 (1.57)	
Face mill, Carbon Steel (SM45C)						
Tool Dia mm (inch)	Material Removal Rate cm ³ /min	Spindle Speed rpm	Feed mm/min (ipm)	Axial Depth mm (inch)	Radial Depth mm (inch)	
80 (3.15)	317	1,500	2,640 (104)	2 (0.08)	60 (2.36)	
Tap, Carbon Steel (SM45C)						
Tap Size	Spindle Speed rpm	Feed mm/min (ipm)	Spindle Load %			
M28 x P3.0	300	900 (35.4)	100			

※ The machining results above are examples based on the factory test standards, and are subjected to the changes in conditions.

Processing cycle time test



- 3D Modeling -



- Actual Output -

Machining Test
Auto Mobil Part (Aluminum)

Total processing time

22min 16sec

※ Execute same processing program

Compared with previous model "Cycle Time 15% Improvement"

※ The machining results above are examples based on the factory test standards, and are subjected to the changes in conditions.

Standard / Optional Accessories Status

S : Standard O : Option

NO.	Item	Description			VESTA-1000*	
1	Spindle	#40	12,000 rpm (Regular Type)	18.5 / 11 kW	117.7 Nm	S
2			12,000 rpm (CTS)			O
3			10,000 rpm (Regular Type)	15 / 11 kW	95.5 Nm	O
4			10,000 rpm (CTS)	18.5 / 11 kW	117.7 Nm	O
5			15,000 rpm (Regular Type)			O
6			15,000 rpm (CTS)	18.5 / 11 kW	117.7 Nm	O
7	Magazine	#40	30 Tools Magazine		S	
8	Tool Shank	#40	BT-40		S	
9			CAT-40, SK-40		O	
10	Coolant Function	Head Coolant Pump (0.05 MPa, 0.4 kW)			S	
11		Bead Flushing Pump (0.15 MPa, 1.1 kW)			S	
12		CTS Coolant System	3 MPa	2.2 kW	O	
13			7 MPa	2.2 kW	O	
14		Oil Mist (Semi Dry Cutting System)			O	
15	Chip Removal Function	Air Blower			S	
16		Air Gun			O	
17		Coolant Gun			O	
18		Lift-up Chip Conveyor (Hinge Type / Scraper Type / Mesh-drum Type)	Back Type Lift-up Chip Conveyor		O	
19			Side Type Lift-up Chip Conveyor		O	
20	Mist Collector			O		
21	Precision Machining Function	Linear Scale (X / Y / Z)			O	
22		Hwacheon Artificial Intelligence Control System (HAI): 40 Block			S	
23		Hwacheon Efficient Contour Control System (HECC)			S	
24		Hwacheon Thermal Displacement Control System (HTDC) [Hwacheon Spindle Displacement Control System (HSDC) + Hwacheon Frame Displacement Control System (HFDC)]			S	
25		Hwacheon Artificial Intelligence Control System (HAI): 200 Block			O	
26		Hwacheon Artificial Intelligence Control System (HAI): 400 Block			O	
27		Lubrication System			S	
28		Spindle Cooler (Jacket Cooling)	Oil Cooler Type		S	
29			Fan Cooler Type (10,000 rpm Spindle)		O	
30	Measuring & Automation Function	Tool Measuring System: Renishaw / Blum (Touch Type, Laser Type)			O	
31		Workpiece Measuring System: Renishaw / Blum (Touch Type)			O	
32		Tool Life Management			O	
33		Auto Door			O	
34		Hwacheon Tool Load Detect System (HTLD)			S	
35	Cutting Feed Optimization System (OPTIMA)			S		
36	Convenient Functions	Ethernet Interface			S	
37		MPG Handle (1ea)			S	
38		MPG Handle (3ea)			O	
39		Signal Lamp with 2 Color (R, G)			O	
40		Signal Lamp with 3 Color (R, G, Y)			S	
41		10.4" Color LCD			S	
42		Tool Box			S	
43		NC Cooler			O	
44		Oil Skimmer			O	
45		Air Dryer	12,000 rpm / 15,000 rpm Spindle		S	
46	10,000 rpm Spindle		O			
47	Door Interlock			S		
48	Workpiece Coordinate System 48 pairs			S		
49	Lubrication Oil Separation Tank			S		
50	Perfect Base Around Splash Guard			S		
51	Part Program Storage Length 1,280m (512kB)			S		
52	Data Server (256MB)			O		
53	Data Server (1,024MB)			O		
54	Data Server Interface			O		
55	Manual Guide i			O		
56	Monitoring Solution of Real-time Operational Status (M-VISION Plus)			O		
57	Transformer			O		
58	4-axis Interface			O		

USER FRIENDLY DESIGN, A WIDE RANGE OF OPTIONAL FEATURES

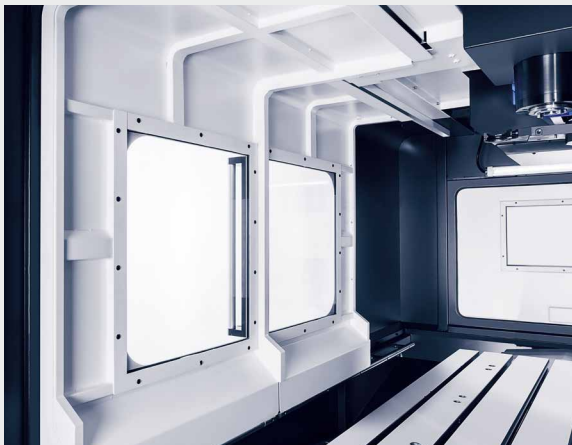
User convenience and various additional function

VESTA-1000+ presents various options through its user friendly design. Highly practical functions have been applied with considerations on real usage environments to help operator focus better on the machining process, leading to safer and more efficient work flows.



"Enhanced User Convenience"

The two lightweight doors at the front reduces fatigue and the wide side door allows for easier maintenance

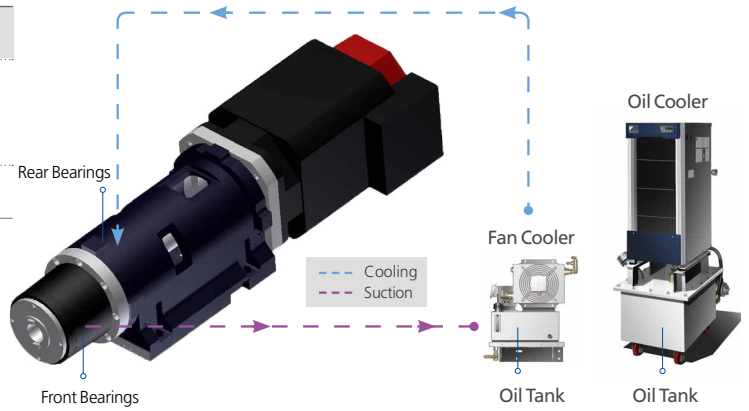


"Improve Working Environment"

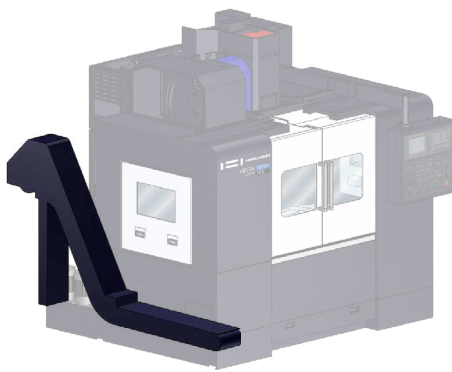
Totally enclosed cover design prevents scattering of chips and coolant while machining, maintaining pleasant work environment

Cooling System

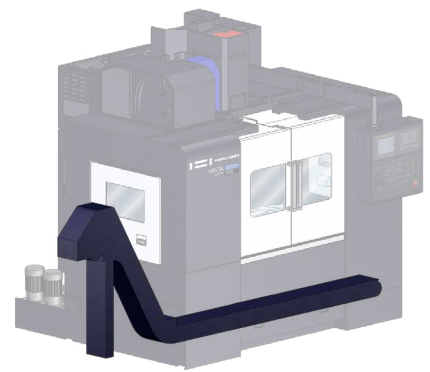
	Jacket Cooling	Bearing Lubrication
12,000 rpm (STD)	Oil Cooler	Air-Oil Type
15,000 rpm		
10,000 rpm	Fan Cooler	Grease Type



Chip Conveyor



Back Type
Lift-up Chip Conveyor

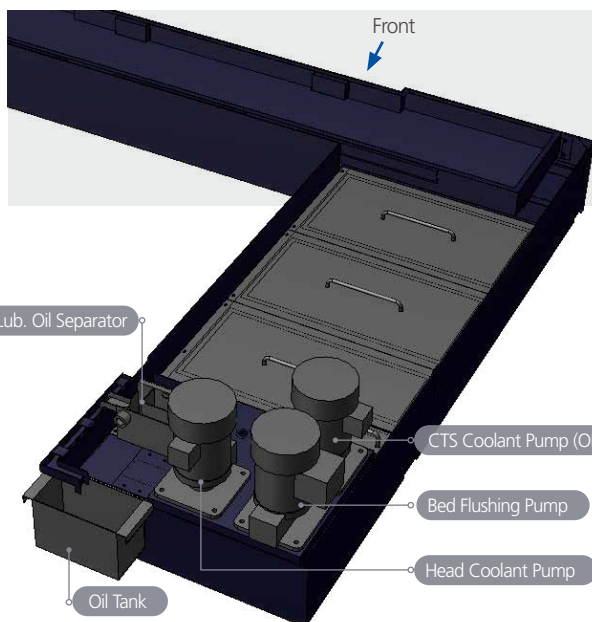


Side Type
Lift-up Chip Conveyor

"Back & Side Type Chip Conveyor"

Excellent Coolant Tank and Chip Removal

"Possible to Select Type of Chip Conveyor"



Coolant Tank

Tank Capacity : 250 l (66.04 gal)

- Coolant tank and chip bucket located on the bottom of the machine improve space usage efficiency

· **Coolant Pump Specifications**

Head Coolant Pump - Power : 0.4 kW

Bed Flushing Pump - Power : 1.1 kW

CTS Coolant Pump (OPT)

- Pressure : 3 MPa Power : 2.2 kW

- Pressure : 7 MPa Power : 2.2 kW

· **Micro Chip Separation (OPT)**

A separate mesh filter can be installed for better chip disposal when in case of machining material which carry generation of microchips like when machining aluminum

※ Internal Coolant Tank

Convenient Operator Panel

Pendant Arm Type Operator Panel (STD)



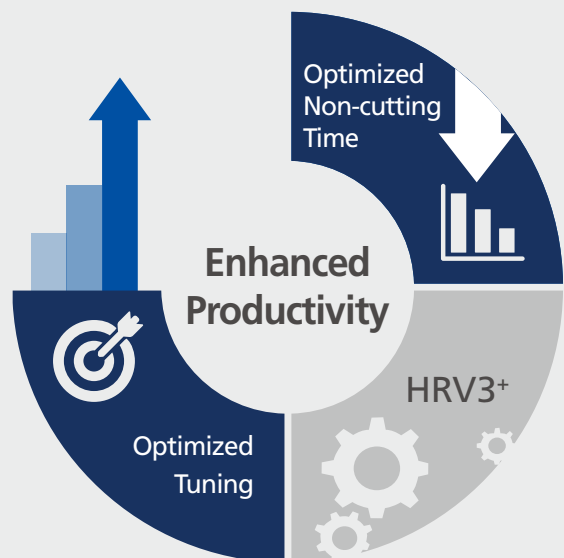
The operator panel is newly designed from the operator's viewpoint and thus enhances the operator's convenience.

"User Friendly Design"

- 10.4" display as standard (USB and PCMCIA cards as standard)
- Enhanced operability by optimizing the layout and improving the touch feeling of control buttons
- Horizontal keys enhance user convenience.
- Separately mounting MPG for workpiece setting convenience.
- Long time continuous DNC operation with the CF card even without the data server.

Machine Optimization (STD)

- Smart rigid tap function applied for machining time reduction.
- The cycle machining as well as the operating time and the acceleration / deceleration speed of feeding system are optimized.
- High-level precision, speed and smoothness are realized by enhanced processing performance of tiny segments.
- Dramatically reduced non-cutting time during machining ensures optimal productivity.
- The latest machining technology adopted.
- Machining surface quality enhanced by HRV3+ control. (HRV3+: effectively prevents machine oscillation by controlling the servo current to enhance the machining surface quality.)



"Enhanced Productivity"

Operating Convenience Function

< M-CODE LIST >



- M-CODE LIST
- The screen provides easy and quick search and utilization.

(However, it is necessary to discuss with factory in advance to add and / or change M-codes.)

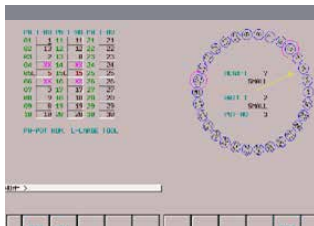
< GUI (Graphical User Interface) >



- Graphic interface for tool / workpiece measurement
- Automatic offset update function
- Tool setting and damaged tool detection, Workpiece setup and measuring while machining
- Optimized time and failure rate High competitiveness

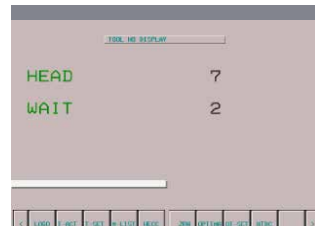
< Tool Management >

Large / Small Diameter Tool Management System



- Magazine tool management system
- Magazine tool check in real time
- Large / small diameter tools setting

< Tool View >



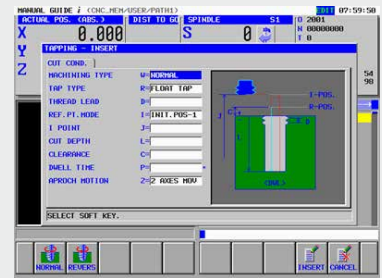
- Head mounted tool check in real time
- Waiting pot mounted tool check in real time

Manual Guide i

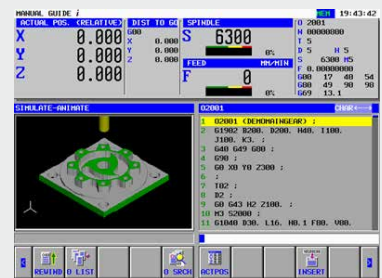
With the Manual Guide i, the operator is able to create a machining program for the desired geometry including the pattern simply if he / she enters numeric values for the basic machining geometry.



- Programming in convenient functions and rich machining cycles



- It displays the machine status and the tools in use while machining.



- The realistic machining simulation checks the program.

Hwacheon Software



Hwacheon Tool Load Detect System

"Detect and diagnose the most minute of tool-end point movement"

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.)



Hwacheon High Efficiency Contour Control System

"Roughing quickly, finishing is precisely"

HECC offers an easy to use programming interface for different workpieces 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.



Cutting Feed Optimization System

"Maximize your productivity with intelligent 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 optimized.



Hwacheon Spindle Displacement Control System

"Real-time correction for the displacement in the spindle"

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.



Hwacheon Frame Displacement Control System

"System for maintaining processing accuracy for a long period of machining"

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



Hwacheon Thermal Displacement Control System

"Hwacheon Spindle Displacement Control System + Hwacheon Frame Displacement Control System"

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



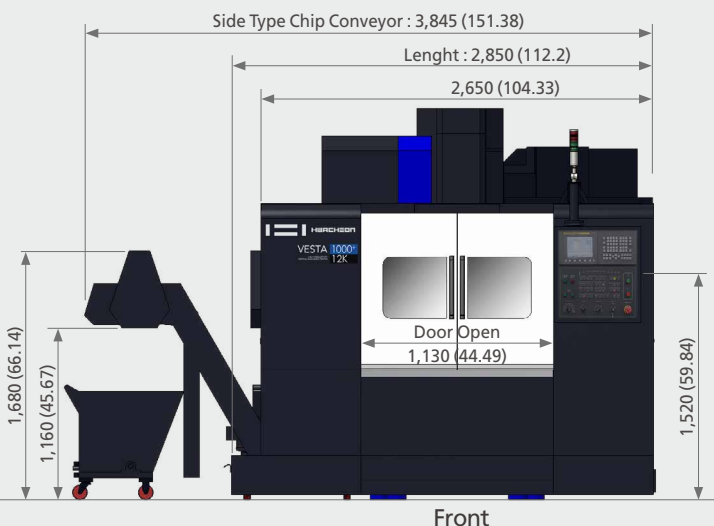
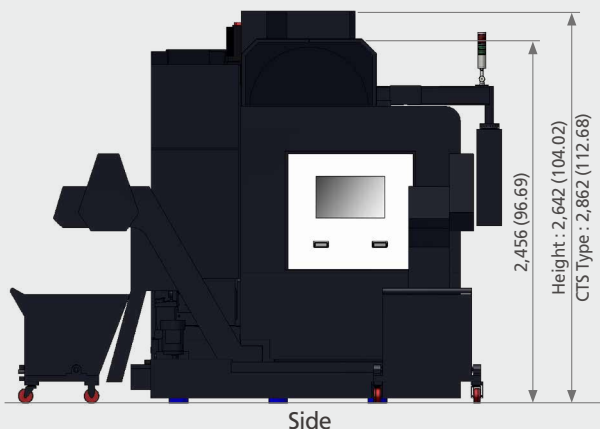
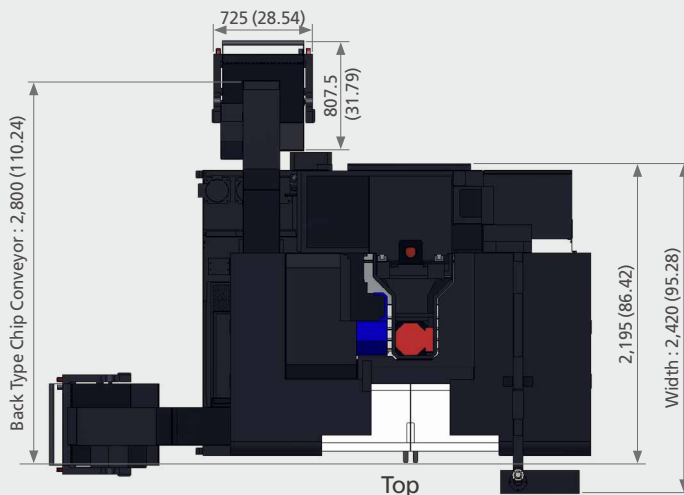
Monitoring Solution of Real-time Operational Status

"See everything everywhere"

- Monitoring system for the User's factory machine management
- User can always check the status of the machine utilizes a smartphone

Machine Size

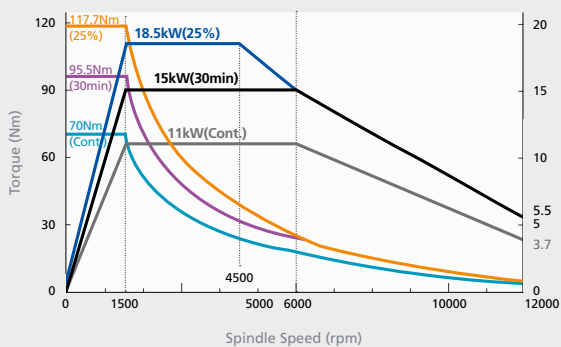
* Unit : mm (inch)



Spindle Power – Torque Diagram

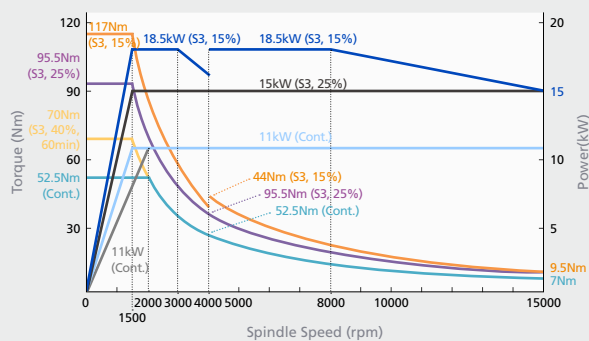
12,000 rpm Regular Type (STD) / CTS Type (OPT)

Max Power : 18.5 kW (25 HP) / Max Torque : 117.7 Nm



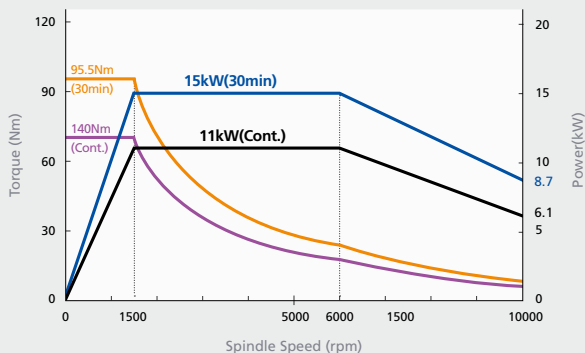
15,000 rpm Regular Type / CTS Type (OPT)

Max Power : 18.5 kW (25 HP) / Max Torque : 117.7 Nm



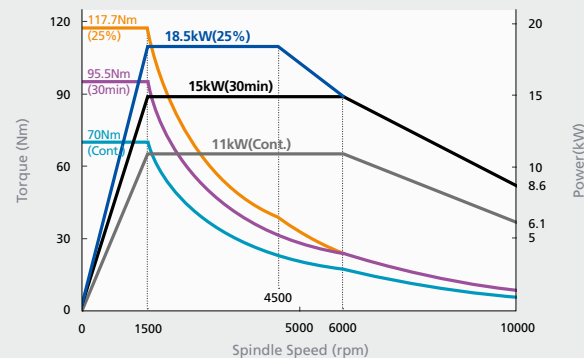
10,000 rpm Regular Type (OPT)

Max Power : 15 kW (20 HP) / Max Torque : 95.5 Nm

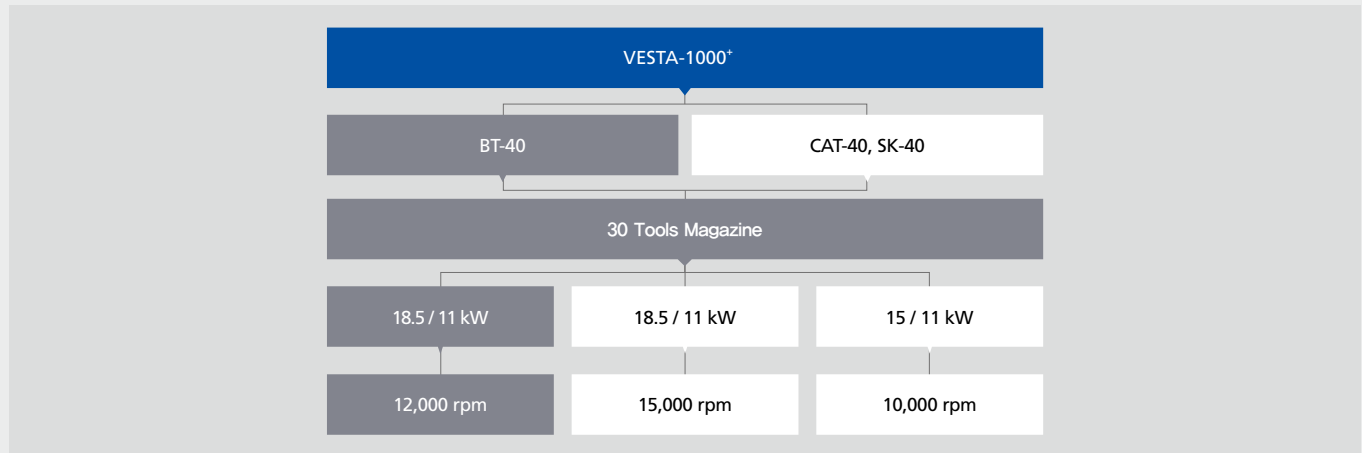


10,000 rpm CTS Type (OPT)

Max Power : 18.5 kW (25 HP) / Max Torque : 117.7 Nm



Product Line-up



Machine Specifications

ITEM		VESTA-1000+					
Travel							
X-axis Stroke	mm (inch)	1,000 (39.37)					
Y-axis Stroke	mm (inch)	550 (21.65)					
Z-axis Stroke	mm (inch)	500 (19.69)					
Distance from Table Surface to Spindle Gauge Plane	mm (inch)	130 ~ 630 (5.12 ~ 24.8)					
Distance between Columns to Spindle Center	mm (inch)	560 (22.05)					
Table							
Table Size	mm (inch)	1,100 x 502 (43.31 x 19.76)					
Table Loading Capacity	kg, (lb.)	700 (1,543)					
T Slot (WxP / No. of slots)	mm (inch)	18 x 80 (0.71 x 3.15) / 5 ea					
Spindle							
Max Spindle Speed	rpm	12,000	12,000 (CTS)	15,000	15,000 (CTS)	10,000	10,000 (CTS)
Spindle Motor	kW (HP)	18.5 / 11 (25 / 15)		18.5 / 11 (25 / 15)		15 / 11 (20 / 15)	
Type of Spindle Taper Hole	-	ISO#40, 7 / 24 Taper (BT-40)					
Spindle Bearing Inner Diameter	mm (inch)	Ø70 (Ø2.76)					
Feedrate							
Rapid Speed (X / Y / Z)	m/min (ipm)	36 / 36 / 30 (1,417 / 1,417 / 1,181)					
Feed (X / Y / Z)	mm/min (ipm)	1 ~ 24,000 (0.04 ~ 945)					
Motor							
Feed Motor (X / Y / Z)	kW (HP)	1.8 / 1.8 / 3 (2.5 / 2.5 / 4)					
Coolant Motor (Spindle / Bed)	kW (HP)	0.4 / 1.1 (0.5 / 1.5)					
Spindle Cooler Motor	kW (HP)	0.4 (0.5)			0.18 (0.2)		
ATC							
Type of Tool Shank	-	BT-40 (OPT: CAT-40, SK-40)					
Type of Pull Stud	-	MAS P40T-1 (45°)					
Tool Storage Capacity	ea	30					
Max Tool Dia (with / without Adjacent Tools)	mm (inch)	Ø75 / Ø150 (Ø2.95 / Ø5.91)					
Max Tool Length	mm (inch)	300 (11.81)					
Max Tool Weight	kg, (lb.)	8 (17.64)					
Method of Tool Selection	-	Memory Random					
Method of Operation	-	Servo Motor					
Power Source							
Electric Power Supply	kVA	30					
Compressed Air Supply (Pressure X Consumption)	-	0.5 ~ 0.7 MPa x 690 N l/min					
Tank Capacity							
Spindle Cooling / Lubrication	ℓ (gal)	20 / 6 (5.28 / 1.59)					
Coolant	ℓ (gal)	250 (66.04)					
Machine Size							
Height	mm (inch)	2,642 (104.02)					
Floor Space (Length x Width)	mm (inch)	2,850 x 2,420 (112.2 x 95.28)					
Weight	kg, (lb.)	5,040 (11,111)					
NC Controller		Fanuc 0i-MF					

NC Specifications [Fanuc 0i-MF]

※ S : Standard O : Option

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

HEAD OFFICE

HWACHEON MACHINE TOOL CO., LTD.

123-17, HANAMSANDAN 4BEON-RO, GWANGSAN-GU, GWANGJU, KOREA
TEL: +82-62-951-5111 FAX: +82-62-951-0086

SEOUL OFFICE

46, BANGBAE-RO, SEOCHO-GU, SEOUL, KOREA
TEL: +82-2-523-7766 FAX: +82-2-523-2867

USA

HWACHEON MACHINERY AMERICA, INC.

555 BOND STREET, LINCOLNSHIRE, ILLINOIS, 60069, USA
TEL: +1-847-573-0100 FAX: +1-847-573-9900

SINGAPORE

HWACHEON ASIA PACIFIC PTE. LTD.

21 BUKIT BATOK CRESCENT, #08-79 WCEGA TOWER,
658065, SINGAPORE
TEL: +65-6515-4357 FAX: +65-6515-4358

VIETNAM

HWACHEON MACHINE TOOL VIETNAM CO., LTD.

UNIT 507, 5TH FLOOR, LOT T2-4, D1 ROAD, SAIGON HI-TECH PARK,
TAN PHU WARD, DISTRICT 9, HO CHI MINH CITY, VIETNAM
TEL: +84 (0)28-2253-2613 FAX: +84 (0)28-2253-2614

GERMANY

HWACHEON MACHINERY EUROPE GMBH

JOSEF-BAUMANN STR. 25, 44805, BOCHUM, GERMANY
TEL: +49-234-912-816-0 FAX: +49-234-912-816-60

INDIA

HWACHEON MACHINE TOOL INDIA PTE. LTD.

103, GULMOHAR CENTRE POINT, 34/A, WADGAON SHERI,
PUNE 411 014, INDIA
TEL: +91-20-6560-0168

CHINA

HWACHEON MACHINE TOOL CHINA CO., LTD.

B03A LIANGUAN JUHE INTERNATIONAL HARDWARE CITY, NO.
143 ZHENANZHONG ROAD, JINXIA, CHANGAN TOWN,
DONGGUAN CITY, GUANDONG PROVINCE, CHINA #523852
TEL: +86-769-8932-0601 FAX: +86-769-8932-0602