

HEAVY-DUTY BOX WAYS

VMC VERTICAL MILL

HEAVY CUTTING

PRECISION CNC MACHINING

- ▶ Advanced dual Y-axis ballscrews
- ▶ 50-taper spindle
- ▶ Full box way structure



www.mightyviper.com

VIPER



ISO 9001:2008

*Powerful
high speed
spindle*

VMC-Series

1160

1370

1688

2600

4100

Machining on a small footprint.

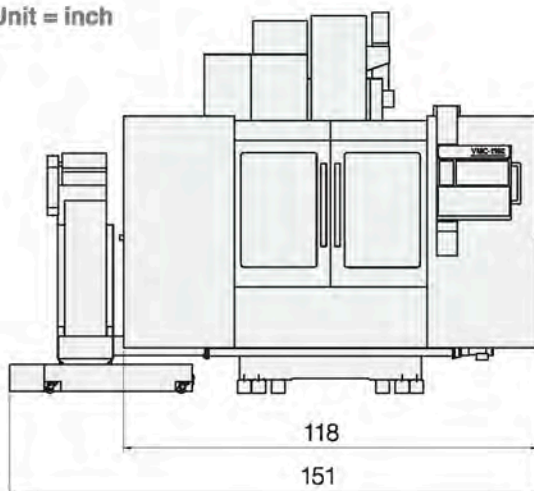
VMC-1160

- Base casting box structure provides high rigidity.
- Slide ways are precision hand-scraped and coated with friction reducing Turcite-B.
- Direct drive motors on 3-axes for precision machining and pre-tensioned ballscrews minimize backlash.
- One-piece base casting to ensure no leakage and excellent chip removal.
- Direct drive / belt drive / gear head (CAT-40 / CAT-50) are available to meet customer's needs.
- Spindle-to-table clearance can be extended 8" to accommodate a rotary table.
- The A-shaped column enhances structural support to the machine—bears heavy loading and cutting—increases spindle head rigidity and machining accuracy.



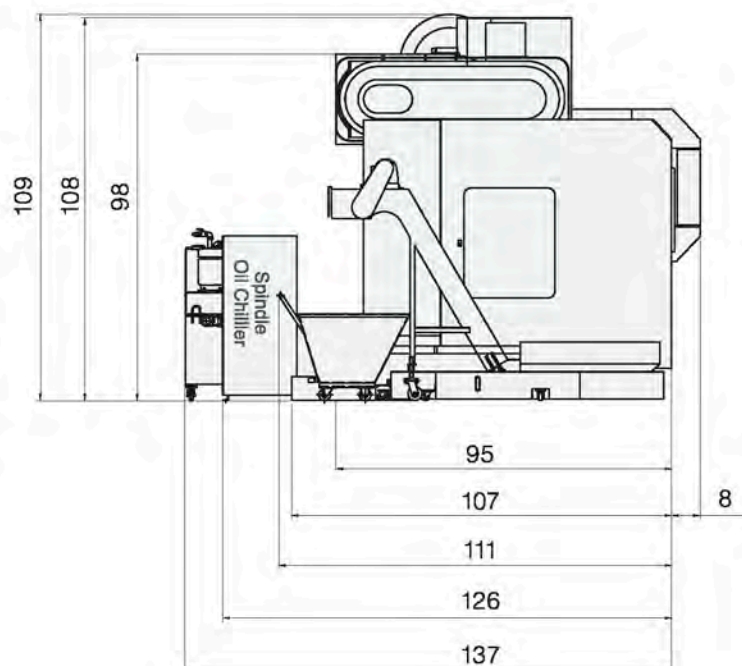
- The ratio for spindle vertical to Y-axis travel is almost 1:1

Unit = inch



VMC-1160

24-tool Magazine (standard)
Chip Conveyor
Spindle Oil Chiller
CTS System (Option)



Reduced cycle times. Higher parts volume.

VMC-1370

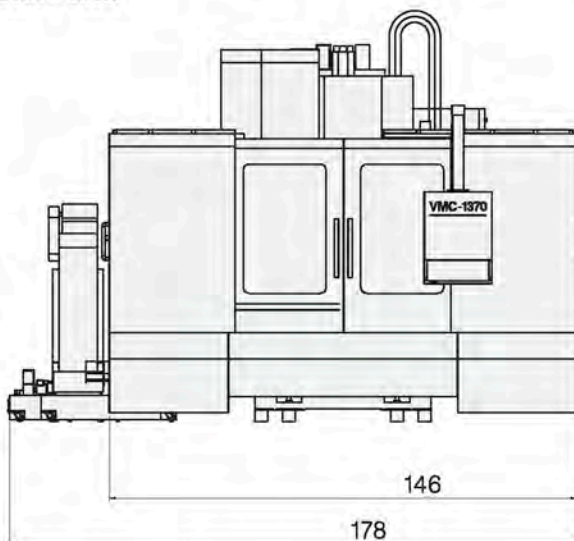
- Base casting box structure provides high rigidity.
- Box ways on all 3-axes are precision hand-scraped and coated with friction reducing Turcite-B for long service life.
- Direct drive motors on all 3-axes for precision machining, and pre-tensioned ballscrews minimize backlash.
- One-piece base casting to ensure no leakage and excellent chip removal.
- Base utilizes 4 box ways along Y-axis —provides heavy loading capacity and excellent cutting rigidity.
- The A-shaped column enhances structural support to the machine—bears heavy loading and cutting—increases spindle head rigidity and machining accuracy.



Chip
Conveyor
option.

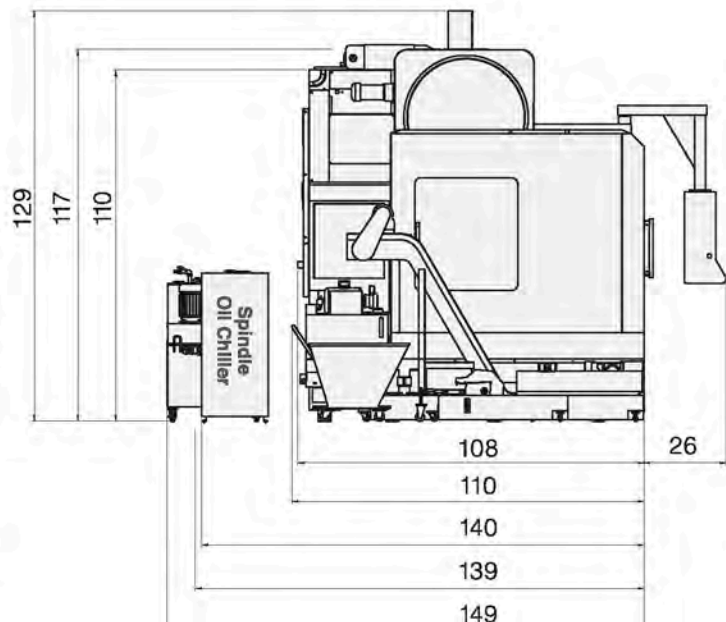
- Direct drive or gear head spindle are available to meet customer's needs.

Unit = inch



VMC-1370

24-tool Magazine (standard)
Chip Conveyor • Spindle Oil Cooler • CTS System (opt.)



Heavy-duty machining with shorter production time.

VMC-1688

- The A-shaped column enhances structural support to the machine—bears heavy loading and cutting—increases spindle head rigidity and machining accuracy.
- Direct drive motors on 3-axes for precision machining and pre-tensioned ballscrews to minimize backlash.
- Base casting box structure provides high rigidity.
- Direct drive / gear head are available to meet customer's needs
- One-piece base casting ensures no leakage and excellent chip removal.
- Slide ways are precision hand-scraped and coated with friction reducing Turcite-B.

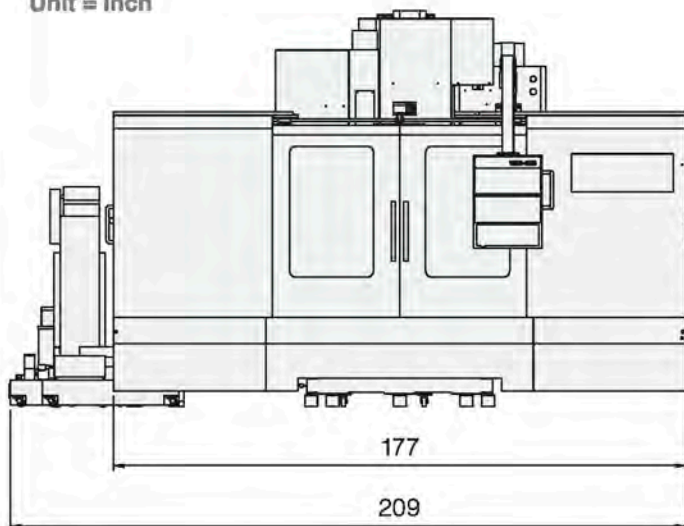
ATC 40 tools
as option



*4 slide ways along Y-axis
provide heavy loading capacity
and excellent cutting rigidity.*

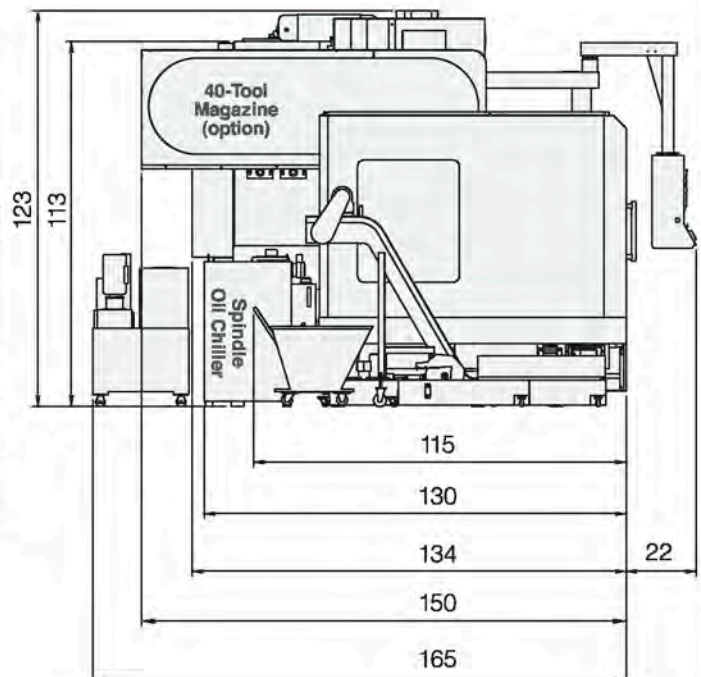
- Balanced casting design has a near one-to-one ratio. Base-column span / X-axis travel; and spindle head height / Y-axis travel.

Unit = inch



VMC-1688

24-tool Magazine (standard)
Chip Conveyor • Spindle Oil Chiller • CTS System (opt.)



Powerful high speed spindle.

VMC-2100

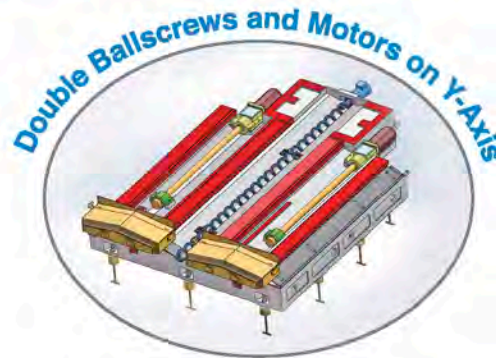
VMC-2600 / VMC-3100 / VMC-4100

- Base casting box structure provides high rigidity.
- Slide ways are precision hand-scraped and coated with friction reducing Turcite-B.
- Direct drive motors on all 3-axes for precision machining, and pre-tensioned ballscrews to minimize backlash.
- Base utilizes extra wide slide ways along Y-axis—provides heavy loading capacity and excellent cutting rigidity.
- Dual ballscrews on Y-axis enhances accuracy by eliminating uneven table load distribution.

4th axis interface available

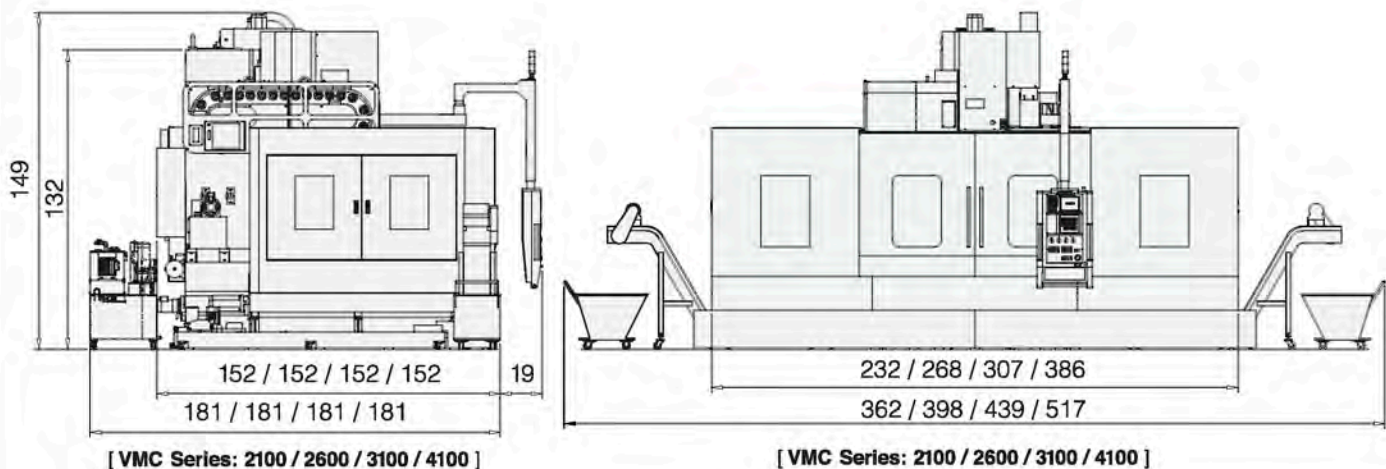


VMC-2100
model shown



Dual ballscrews on Y-axis provide fast traverse rates and high-speed acceleration.

Unit = inch



VMC-2100

VMC-2600 / VMC-3100 / VMC-4100

24-tool Magazine (standard)

Chip Conveyor • Spindle Oil Chiller • CTS System (opt.)

Wider design yields high rigidity.

Large Capacity—Rigid Construction

The Viper **VMC** series represents an innovative design concept for a modern vertical machining center. Its features are big in every way—capacity, rigidity and productivity—to satisfy the most demanding requirements and expectations. The unique structure design enables the VMC machine to deliver an exceptional value in machine rigidity, cutting precision, and more productivity for reliable performance.

Excellent Machine Design

Features that support greater productivity:

- Dual ballscrews and servo motors on Y-axis
- Robust cast iron headstock
- Wide A-shaped column
- Extra-wide Y-axis travel
- 3 axes direct-coupled servomotors
- 3 axes pretensioned ballscrews

* Optional accessory.

*Powerful
machining
on a
small
footprint.*

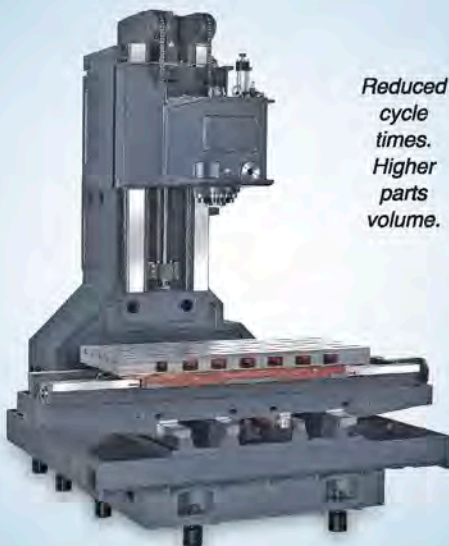


VMC-1160

X-Travel	43"
Y-Travel	24"
Z-Travel	25"
Max load	2600 lb
Table size	49" × 24"

Heavy Box Ways • 2 slide ways

*Reduced
cycle
times.
Higher
parts
volume.*



VMC-1370

X-Travel	51"
Y-Travel	28"
Z-Travel	28"
Max load	3300 lb
Table size	59" × 28"

Heavy Box Ways • 4 slide ways

VMC-1688

X-Travel	63"
Y-Travel	35"
Z-Travel	28" / (35.4")*
Max load	5500 lb
Table size	71" × 37"

Heavy Box Ways • 4 slide ways

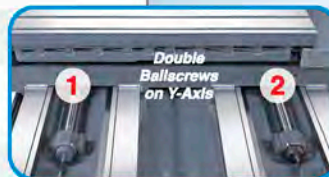
Heavy-duty machining with shorter production time.



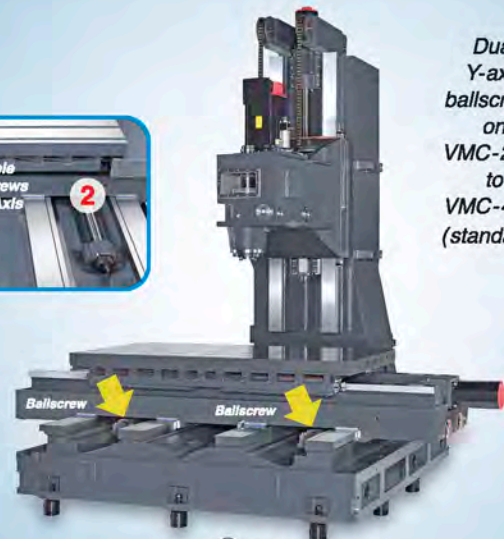
VMC-2100 / 2600

X-Travel	83" / 102"
Y-Travel	40"
Z-Travel	42"
Max load	6600 lb
Table size	83" × 39" / 102" × 39"

Heavy box ways • 4 slide ways



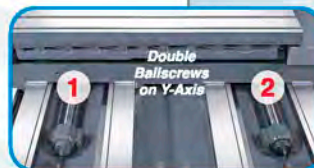
Dual Y-axis ballscrews on VMC-2100 to VMC-4100 (standard).



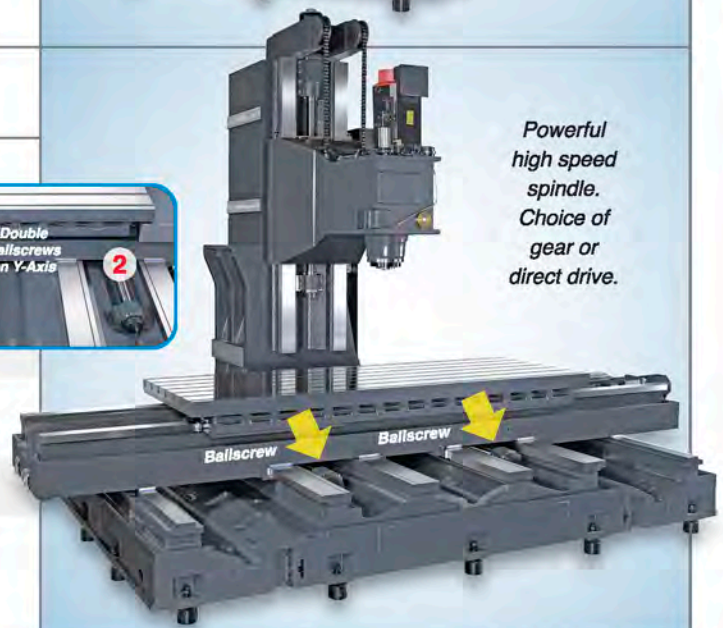
VMC-3100 / 4100

X-Travel	122" / 161"
Y-Travel	40"
Z-Travel	42"
Max load	8800 / 12,000 lb
Table size	122" × 39" / 161" × 39"

Heavy box ways • 6 slide ways



Powerful high speed spindle. Choice of gear or direct drive.



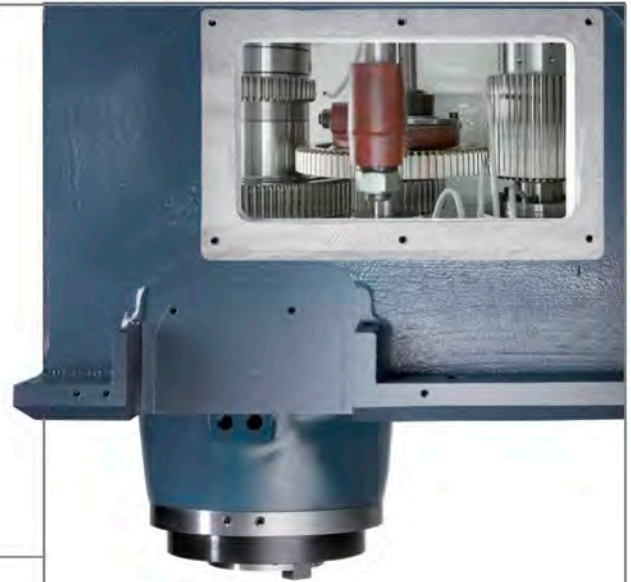
Excellent Gearbox Design

Smooth and stable gear shifting

Gear Head Features

- 2-speed precision gear system
- High-speed cutting with powerful torque
- Rigid spindle housing
- 8000 rpm

Spindle chiller circulates oil through the gears and **spindle cartridge**—eliminating thermal expansion and lengthens life of bearings.



*Box-type **headstock** provides absolute rigidity and stability during heavy machining.*

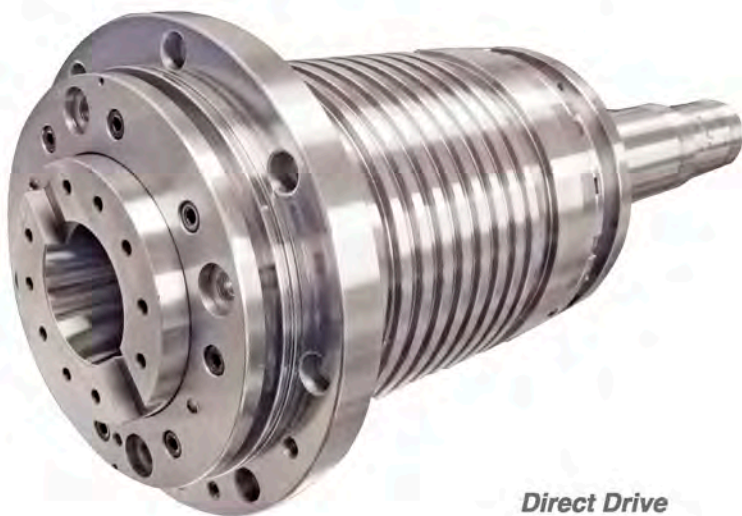


High Torque with Low Noise Performance

Two-speed gearbox consist of DIN level 5 gears, high performing bearings and oil cooling system to minimize thermal expansion. Every **gearbox** set is inspected using vibration and run-in tests to ensure each gear is shifting smooth and stable, achieving a G1 vibration level.

Outstanding Spindle Performance

Next generation design provides high speed, high precision and high performance.



*Direct Drive
Spindle
10,000 rpm*

CAT-50

Optional
BT-50

Gear
8000

Direct Drive
10,000

*Rigid tapping
without noise,
backlash
or vibration
problems.*



*Belt Spindle
10,000 rpm*

CAT-40

Optional
BT-40

Gear
8000

Belt
10,000

Direct Drive
12,000

*Spindle accuracy
enhanced with oil
coolant system.*

High Speed Spindle

Choice of Gear or Direct Drive spindle head

Featuring powerful 20, 25 or 35 hp high torque spindle motor. Big 50-taper and 40-taper spindle size. The maximum spindle speed is 8000 rpm for Gear and 10,000 rpm for Direct-Drive.

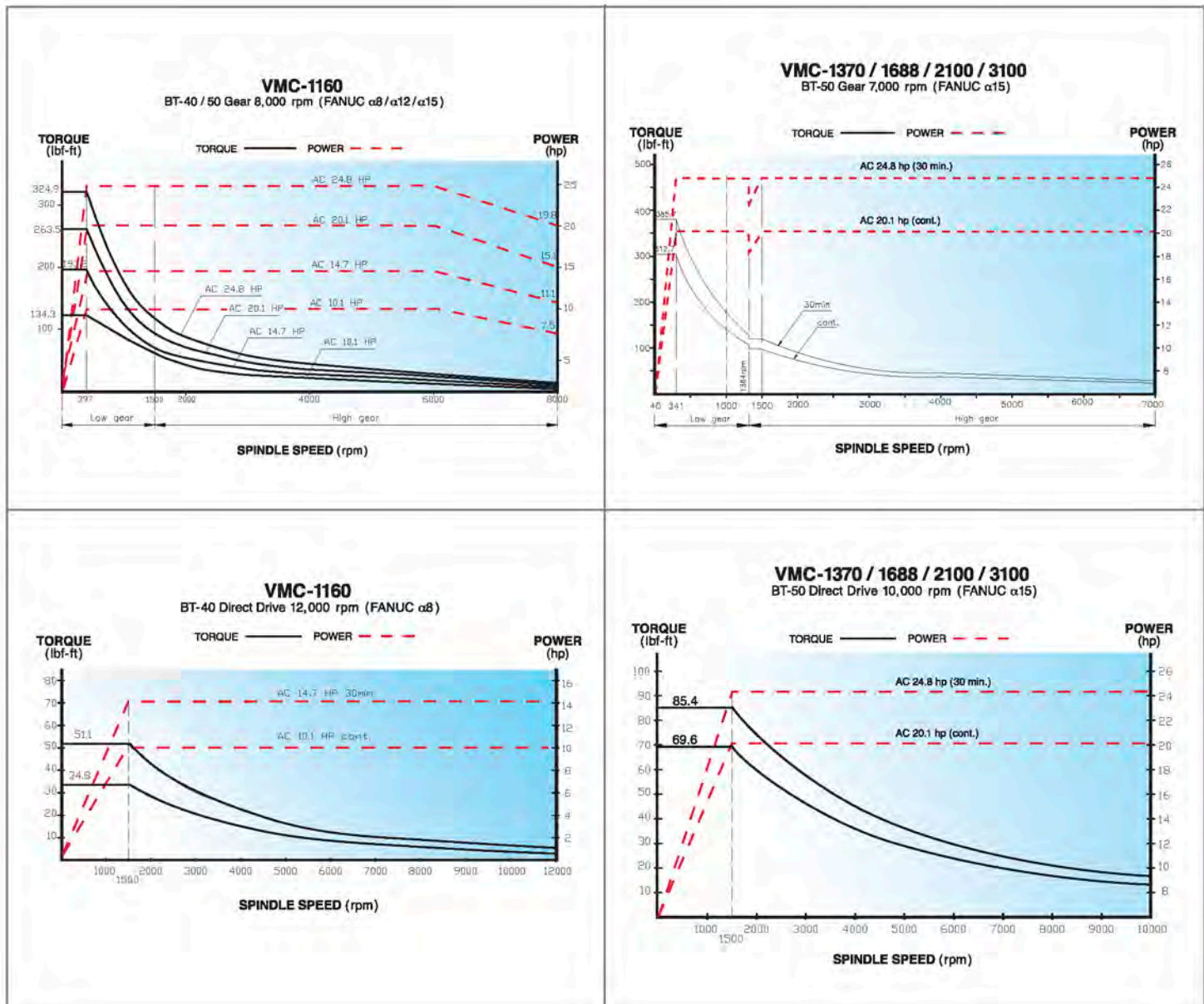
Forced cooling circulation around the spindle housing, bearings and gear box maintains a consistent temperature between the spindle and the machine with a coolant system as a standard feature.

Torque diagrams.

Excellent Spindle Performance

Features that push productivity:

- Coolant system
- Coolant through spindle
- Coolant through tool
- Large spindle head
- Fast spindle speeds
- Powerful gearbox



Cutting Performance

Face milling, end milling, drilling and tapping test results.

MACHINING SPECIFICATIONS

Taper: CAT-50 **Speed:** 6000 rpm (Gear) **Motor:** Fanuc (25 hp) α15i / 7000



FACE MILLING

Workpiece Material: S45C (SAE 1045)
Tool used: Ø3.2" Face Mill
Spindle speed: 700 rpm
Feedrate: 79 ipm
Depth/Width of Cut: 0.2" / 2.8"
Metal Removal Rate: 34 in³ / min



DRILLING

Workpiece Material: S45C (SAE 1045)
Tool used: Ø2.0" Insert Drill
Spindle speed: 1500 rpm
Feedrate: 7.1 ipm
Metal Removal Rate: 22 in³ / min



TAPPING

Workpiece Material: S45C (SAE 1045)
Tool used: M42 x 4.5P tap
Spindle speed: 200 rpm
Feedrate: 35 ipm



TAPPING

Workpiece Material: S45C (SAE 1045)
Tool used: M2 x 0.4P tap
Spindle speed: 1200 rpm
Feedrate: 19 ipm

Automatic Tool Change (ATC)

Double swivel arm type ATC uses a fast and accurate pneumatic system that selects tools through the shortest distance avoiding cutting chips and work piece interference.



High Speed ATC

Tool Size

- Magazine accepts tools with **4.3"** maximum diameter
- **8.5"** maximum diameter without adjacent tools
- **12"** tool length
- **33 lb.** maximum weight capacity

Tool Capacity

24
Tools
Standard

OPTIONAL TOOL CAPACITY
32 40 60

Tool Change Time

2.8
Seconds
Tool-to-Tool

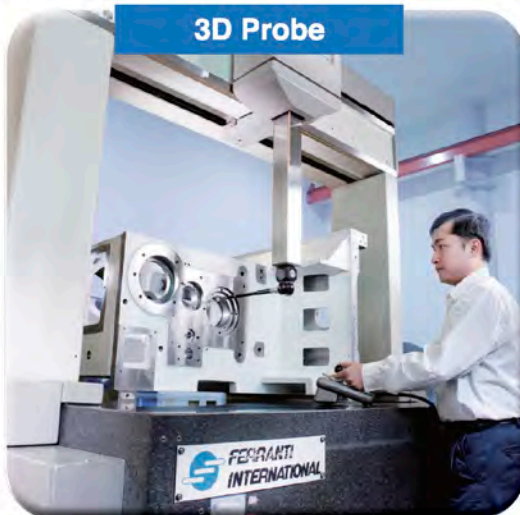
Tool Magazine

Arm style tool magazine is fully enclosed to prevent chips from lodging in the tool carousel.



Quality Assurance

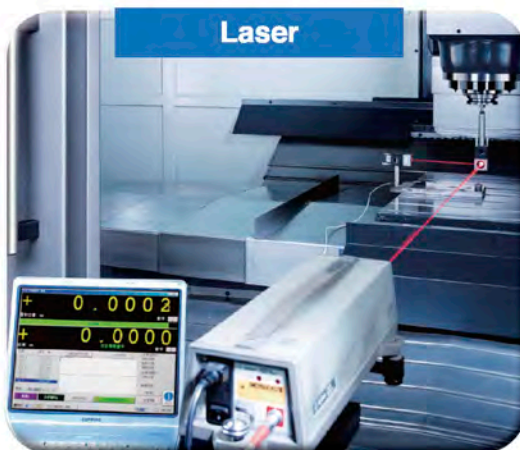
Rigorous tests and inspection—Extra level of quality control performed on key components.



3D probe system-quality assurance (CMM)



Heavy cutting test-face milling



Laser inspection



3D cutting test - circular ball milling



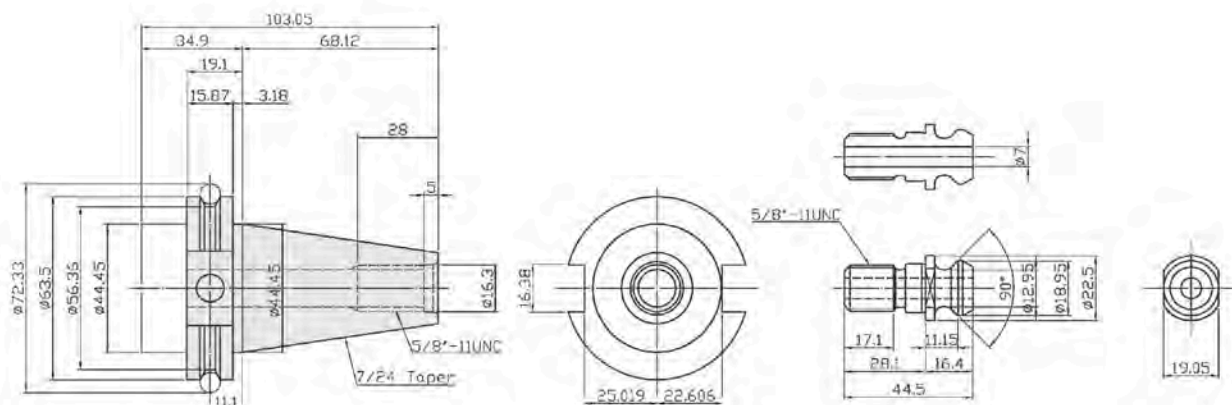
Light cutting test - 45° parallel
and 2D circular milling



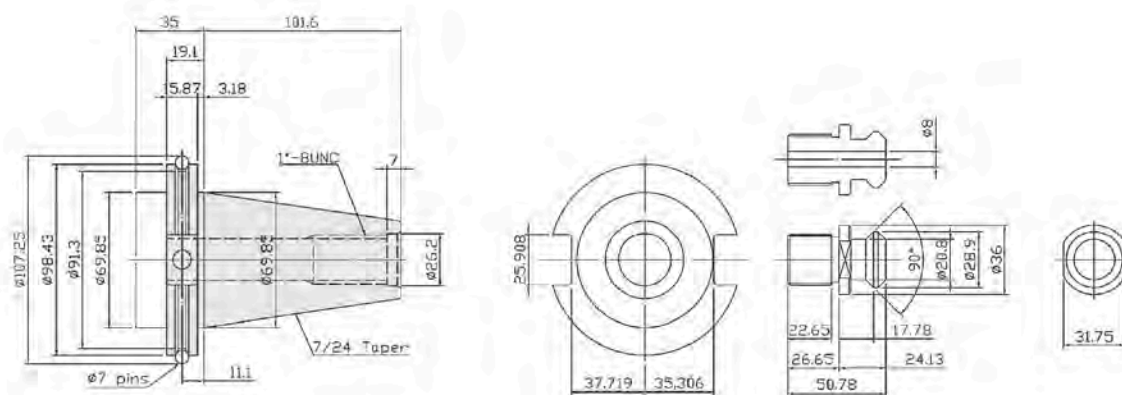
Ball bar inspection

Tool holder dimensions.

Tooling Dimension (CTS)



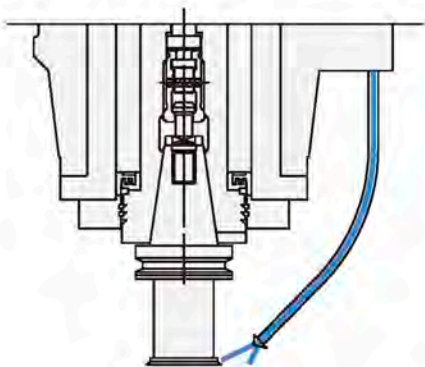
Tooling Dimension (CTS)



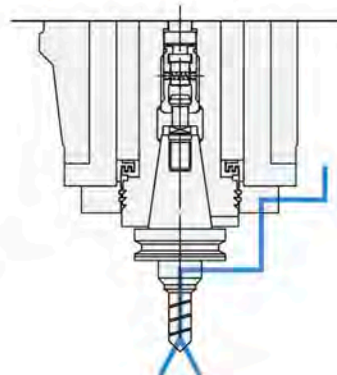
Tool Cooling

Spindle tool temperature cooling

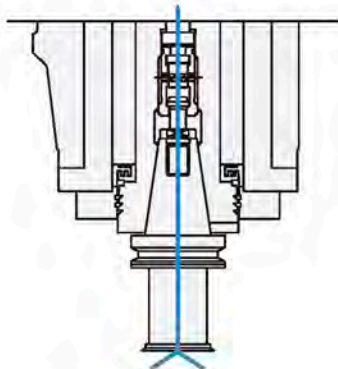
Coolant Nozzle
(Standard)



Coolant Through Tool
(Optional)



Coolant Through Spindle
(Optional)



Oil-mist Coolant System
(Optional)

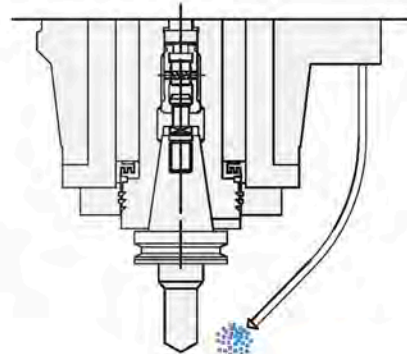
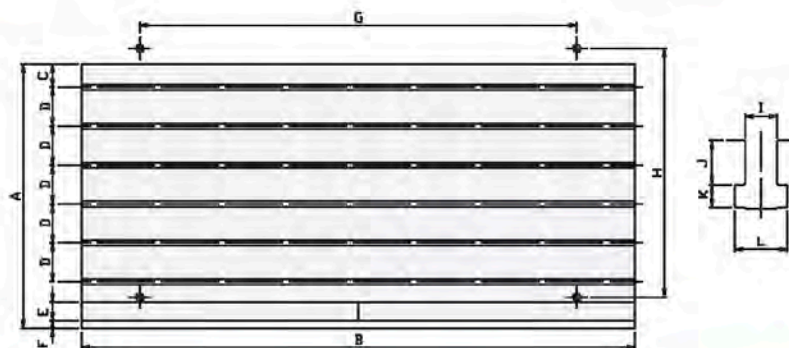


Table Dimensions

Table length, width and T-slot dimensions.



Item	A	B	C	D	E	F	G	H	I	J	K	L
VMC-1160	24	49	2	5	—	—	43	24	0.7	0.94	0.47	1.2
VMC-1370	28	59	4	5	—	—	51	28	0.7	0.94	0.47	1.2
VMC-1688	37	71	2.6	5	1.7	0.98	63	35	0.86	1.14	0.63	1.45
VMC-2100	39	83	2	6	—	—	75	39	0.86	1.18	0.63	1.45
VMC-2600	39	102	2	6	—	—	95	39	0.86	1.18	0.63	1.45
VMC-3100	39	122	2	6	—	—	114	39	0.86	1.18	0.63	1.45
VMC-4100	39	161	2	6	—	—	154	39	0.86	1.18	0.63	1.45

Machine Specifications

*Design and specifications subject to change without prior notice * (*) = Optional accessory.*

ITEM	UNIT	VMC-1160A	VMC-1160B	VMC-1370	VMC-1688
Travel					
X-travel	inch	43		51	63
Y-travel	inch	24		28	35
Z-travel	inch	25		28	28
Distance spindle nose to table surface	inch	4 ~ 29		8 ~ 35	8 ~ 35
Distance spindle centerline to Z-axis ways	inch	24.4		28	28 / (35)*
Table					
Table Size (X × Y)	inch	49 × 24		59 × 28	71 × 37
Max. table load	lb	2650		3300	5500
T-Slots (numbers x width × pitch)	inch	5 × 0.7 × 5			7 × 0.87 × 5
Spindle					
Spindle Speed - (Standard)	rpm	8000 (Gear)			
Spindle Speed - (Option)	rpm	10,000 / 12,000 (Direct Drive)	—	10,000 (Direct Drive)	
Spindle Taper	—	#40	#50	#50	
Feedrate					
Rapid (X/Y/Z)	ipm	945 / 945 / 787			787 / 787 / 590
Cutting feedrate	ipm	394			
ATC					
Tool Shank type	—	CAT-40	CAT-50		
Magazine Capacity (Standard)	tools	24			
Magazine Capacity (Optional)	tools	32* / 40*	—	30* / 40*	30* / 40* / 60*
Max Tool Diameter (with adjacent tools)	inch	Ø3.0	Ø4.3		
Max Tool Diameter (without adjacent tools)	inch	Ø5.9	Ø8.5		
Max Tool Length	inch	12			
Max Tool Weight	lb	15	33		
Tool Change Time (Tool-to-Tool)	sec	2.8			
Tool Change Time (Chip-to-Chip)	sec	6.0			
Motor					
Spindle Motor (30 min.)	hp	10 / 15	20 / 25		
Servomotors X / Y / Z	hp	4.0 / 4.0 / 4.0		5.4 / 5.4 / 9.4	
Power Supply					
Power Supply	kVA	20			35
Compressed Air Supply	psi	90			
Coolant Tank Capacity	gal	110			
External Dimension					
Width	inch	151	151	178	209
Length	inch	115	115	139	165
Height	inch	109	109	129	123
Weight	lb	16,710	16,710	28,700	37,100
Accuracy					
(following values were tested in the temperature-controlled room)					
Positioning Accuracy - JIS 6338 (within 12")	inch	±0.00020			
Repeatability Accuracy - JIS 6338 (within 12")	inch	±0.00012			

Machine Specifications

Design and specifications subject to change without prior notice • (*) = Optional accessory.

ITEM	UNIT	VMC-2100	VMC-2600	VMC-3100	VMC-4100
Travel					
X-travel	inch	83	102	122	160
Y-travel (Y ₁ / Y ₂) Dual Y-axis ballscrews	inch	40			
Z-travel	inch	35 / 42*			
Distance spindle nose to table surface	inch	4 ~ 39 / 4 ~ 46*			
Distance spindle centerline to Z-axis ways	inch	40			
Table					
Table Size (X × Y)	inch	83 × 39	103 × 39	122 × 39	161 × 39
Max. table load	lb	6600		8800	12,125
T-Slots (numbers × width × pitch)	inch	7 × 0.87 × 6			
Spindle					
Spindle Speed - (Standard)	rpm	8000 (Gear)			
Spindle Speed - (Option)	rpm	4000 (Gear) 10,000 (Direct Drive)			
Spindle Taper	—	#50			
Feed					
Rapid X / Y / Z	ipm	394 / 394 / 394			315 / 315 / 315
Cutting feedrate	ipm	275			
ATC					
Tool Shank type	—	CAT-50			
Magazine Capacity (Std.)	tools	24			
Magazine Capacity (Optional)	tools	30* / 40* / 60*			
Max Tool Diameter (with adjecent tools)	inch	Ø4.3			
Max Tool Diameter (without adjecent tools)	inch	Ø8.5			
Max Tool Length	inch	12			
Max Tool Weight	lb	33			
Tool Change Time (Tool-to-Tool)	sec	2.8			
Tool Change Time (Chip-to-Chip)	sec	6.0			
Motor					
Spindle Motor (30 min.)	hp	35			
Servomotors X / (Y ₁ /Y ₂) / Z	hp	Dual Y-axis Ballscrews	9.4 / (9.4 / 9.4) / 9.4		
Power Supply					
Power Supply	kVA	55			
Compressed Air Supply	psi	90			
Coolant Tank Capacity	gal	200			
External Dimension					
Width	inch	220	264	307	398
Length	inch	186	186	186	195
Height	inch	136 / 146	136 / 146	136 / 146	136 / 146
Weight	lb	47,100	50,700	53,000	68,300
Accuracy					
(following values were tested in the temperature-controlled room)					
Positioning Accuracy - JIS 6338 (within 12")	inch	±0.00020		±0.00031	±0.00004
Repeatability Accuracy - JIS 6338 (within 12")	inch	±0.00012		±0.00020	±0.00031

Optional Accessories

(●) = Standard (○) = Optional (X) = Not Available (■) = Consult Mighty USA

Item		VMC-1160A	VMC-1160B	VMC-1370	VMC-1688	VMC-2100	VMC-2600	VMC-3100	VMC-4100
Spindle									
CAT-40 Belt 10,000 rpm (7/10 hp)		●	X	X	X	X	X	X	X
BCAT-40 Direct Drive 12,000 rpm (7/10 hp)		●	X	X	X	X	X	X	X
CAT-40 Gear 6000 rpm (10/15 hp)		●	X	X	X	X	X	X	X
CAT-40 Gear 7000 rpm (10/15 hp)		●	X	X	X	X	X	X	X
CAT-40 Belt 10,000/12,000 rpm (10/15 hp)		●	X	X	X	X	X	X	X
CAT-40 Belt 12,000 rpm (15/20 hp)		●	X	X	X	X	X	X	X
CAT-50 Gear 6000 rpm (20/25 hp)		X	●	●	●	●	●	●	●
CAT-50 Gear 6000 rpm (30/35 hp)		X	X	●	●	●	●	●	●
CAT-50 Gear 8000 rpm (20/25 hp)		X	●	●	●	●	●	●	●
CAT-50 Gear 8000 rpm (30/35 hp)		X	X	X	●	●	●	●	●
CAT-50 Direct Drive 10,000 rpm (20/25 hp)		X	X	○	○	○	○	○	○
CAT-50 Direct Drive 10,000 rpm (30/35 hp)		X	X	X	○	○	○	○	○
Tool magazine									
Magazine capacity	24 tools	●	●	●	●	●	●	●	●
	30 tools	X	X	●	●	●	●	●	●
	32 tools	○	X	X	X	X	X	X	X
	40 tools	○	X	○	○	○	○	○	○
	60 tools	X	X	○	○	○	○	○	○
Tool									
Tool shank	—	—	—	—	—	—	—	—	—
	CAT-40	○	X	X	X	X	X	X	X
	DIN-40	○	X	X	X	X	X	X	X
	MAS BT-50	X	●	●	●	●	●	●	●
	CAT-50	X	●	●	●	●	●	●	●
Pull stud	DIN-50	X	○	○	○	○	○	○	○
	—	—	—	—	—	—	—	—	—
Coolant									
Coolant system		●	●	●	●	●	●	●	●
Coolant through spindle		○	○	○	○	○	○	○	○
Coolant through tool		○	○	○	○	○	○	○	○
Oil skimmer		●	●	●	○	○	○	○	○
Chip flush coolant system		○	○	○	○	○	○	○	○
Coolant gun		●	●	●	●	●	●	●	●
Chip disposal system									
Lift-up chip conveyor w/ bucket (Chain type)		●	●	●	●	●	●	●	●
Lift-up chip conveyor w/ bucket (Scrape type)		○	○	○	○	○	○	○	○
Screw type chip conveyor (Front of base)		●	●	●	●	●	●	●	●
Screw type chip conveyor (Behind table)		X	X	●	●	X	X	X	X
Screw type chip conveyor (Side/center of base)		X	X	●	●	●	●	●	●
Air blast function for workpiece		●	●	●	●	●	●	●	●
Spindle air blast		●	●	●	●	●	●	●	●
Oil-mist collection system		○	○	○	○	○	○	○	○
Measurement system									
Tool length measurement		○	○	○	○	○	○	○	○
Workpiece length measurement		○	○	○	○	○	○	○	○
Manual Pulse generator (MPG)		●	●	●	●	●	●	●	●
Operation support									
Auto power off (M30)		●	●	●	●	■	■	●	■
Automatic door		●	●	●	●	■	■	●	■
High accuracy control									
Liner scales (XYZ axes)		○	○	○	○	○	○	○	○
Safety system									
Full enclosure		●	●	●	●	●	●	●	●
Others									
Interior lighting lamp		●	●	●	●	●	●	●	●
Work light and tri-status light		●	●	●	●	●	●	●	●
Leveling bolts and pads		●	●	●	●	●	●	●	●
Tool box		●	●	●	●	●	●	●	●
4th axis interface		○	○	○	○	○	○	○	○
Rotary table 4th axis		○	○	○	○	○	○	○	○
Air conditioner unit for electric cabinet		○	○	○	○	○	○	○	○
Customized calculator software function		○	○	○	○	○	○	○	○
Z-axis riser		—	—	—	—	○	○	○	○
Z-axis travel extension		○	○	X	X	○	○	○	○

MIGHTY NOTES ...

VIPER MACHINING SOLUTION DETAILS

- 1. Mighty Viper has the best machine value.*
- 2. Visit www.mightyviper.com for innovative machining solutions.*
- 3. Over 25,000 machines sold in the USA ...*

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Over 45 years, **Mighty Viper** has sold more than 25,000 machines nationwide, resulting in a world of satisfied customers and a wealth of feedback that has added to our arsenal of experience and fine craftsmanship. In keeping with our commitment to provide only the highest quality machining centers, every available resource is utilized to maintain a state-of-the art manufacturing process and to continue the delivery of cutting edge technologies.

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