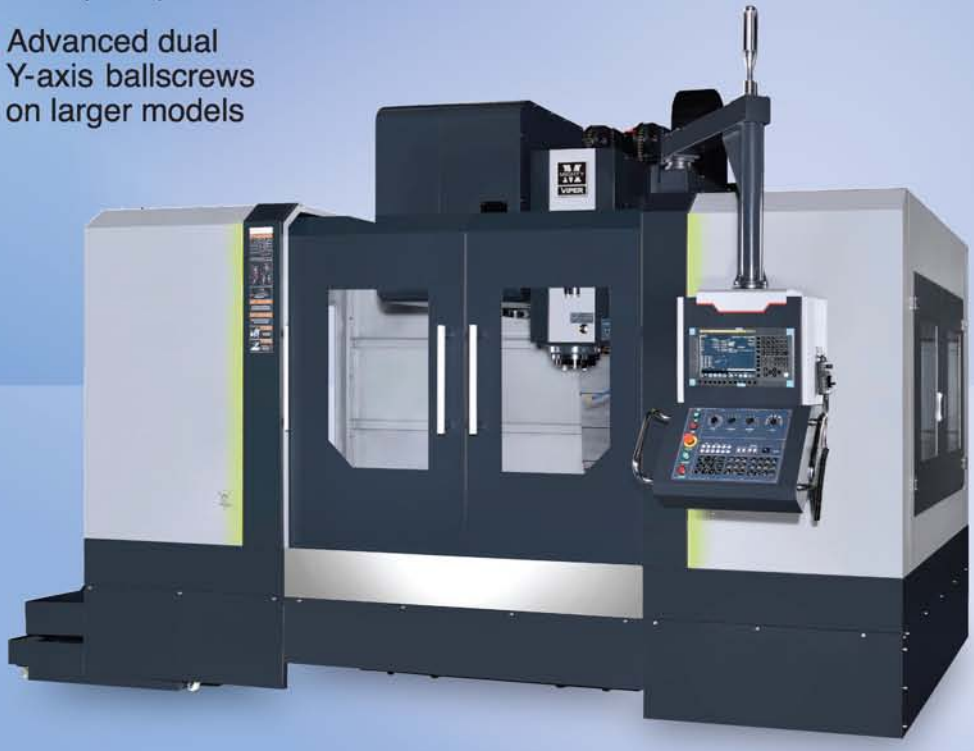
HEAVY-DUTY BOX WAYS

VMC VERTICAL MILL

HEAVY CUTTING

PRECISION CNC MACHINING

- Full box way structure
- 50-taper spindle
- Advanced dual Y-axis ballscrews on larger models



VIPER

MIGHTY VI MACHINE TOOLS

Powerful high speed spindle

VMC Series

1160
1265
1370
1688
2100
3100

www.mightyviper.com

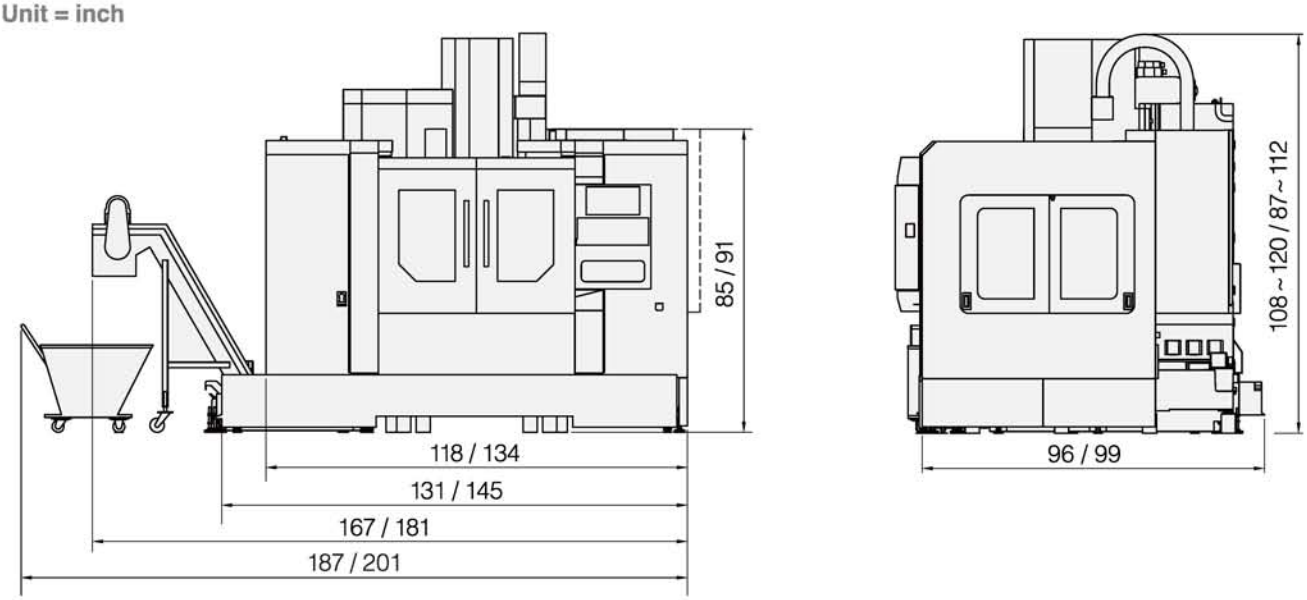
www.mightyviper.com

Machining on a small footprint.

VMC-1160/VMC-1265

- 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.
- One-piece base casting ensures no leakage and excellent chip removal.
- Direct drive / belt drive / gear head (CAT-40 / CAT-50) are available to meet all customer's needs.
- Spindle-to-table clearance can be extended 8˝ to accomodate 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 / VMC-1265

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

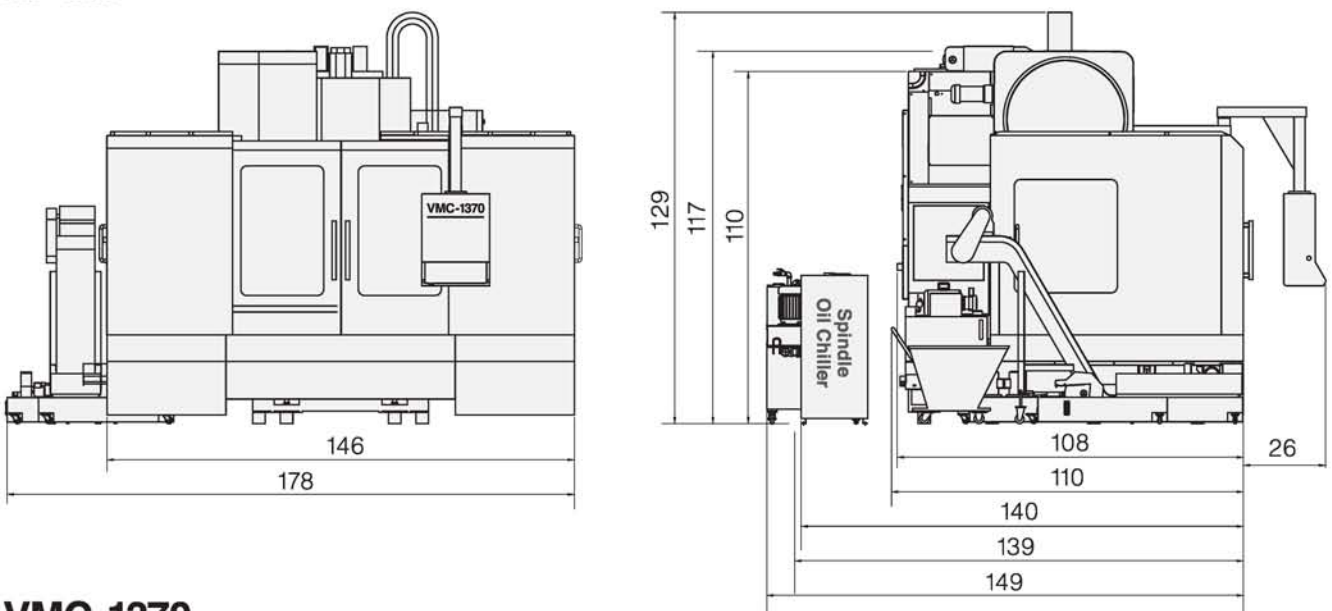
Reduced cycle times. Higher parts volume.

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 to 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.

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

Unit = inch



VMC-1370

24-tool Magazine • Chip Conveyor • Spindle Oil Cooler • CTS System (Option)

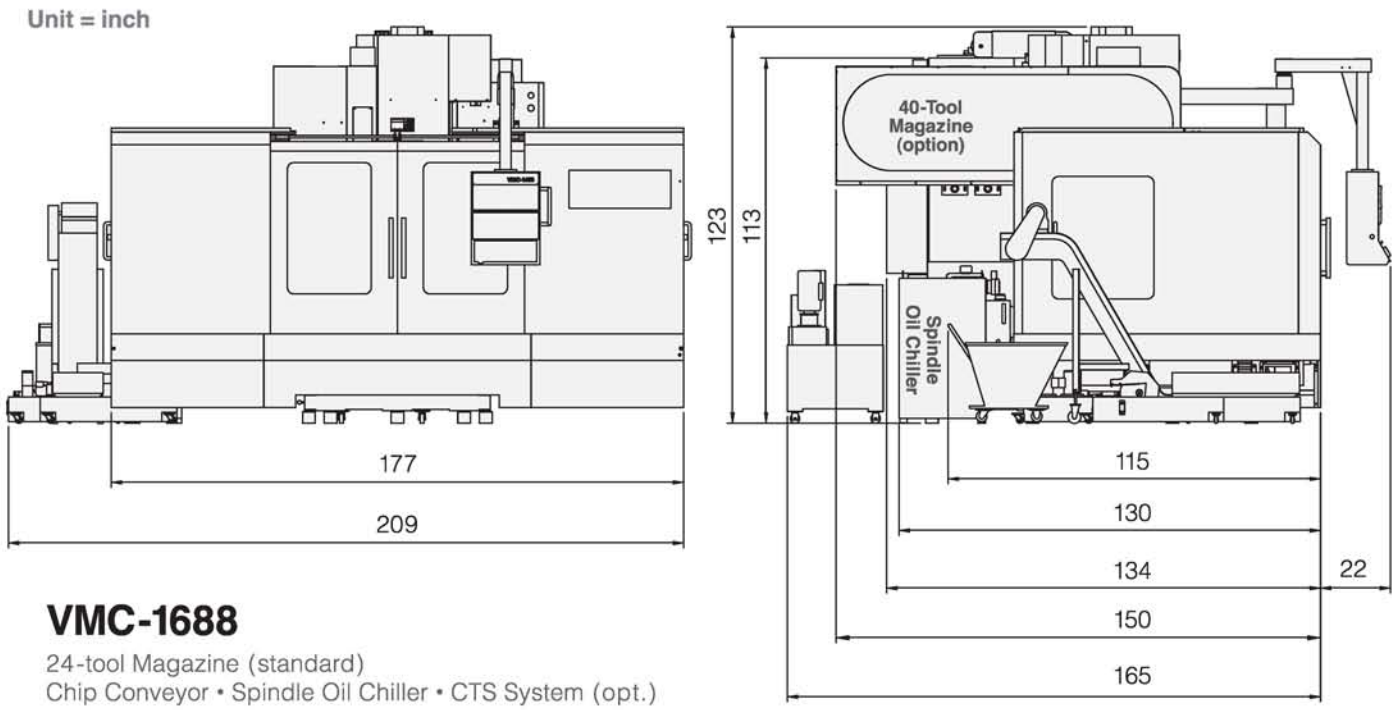
Heavy-duty machining with shorter production time.

VMC-1688

4 slide ways along Y-axis provide 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.
- 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.
- 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.

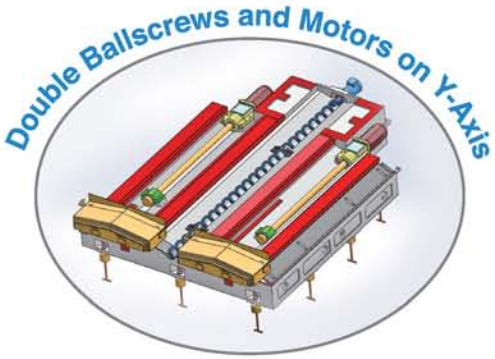
VMC-2100

VMC-2600 / VMC-3100

4th axis interface available

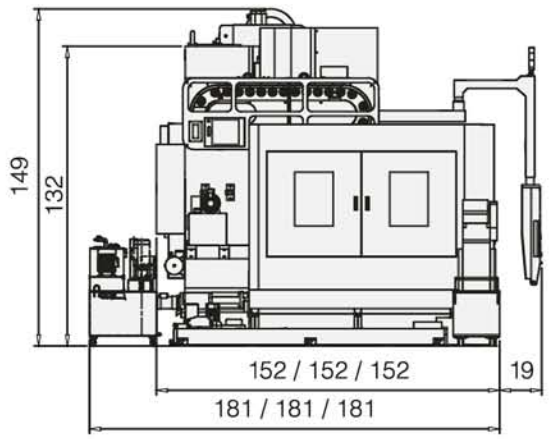
VMC-2100 model shown

- 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.

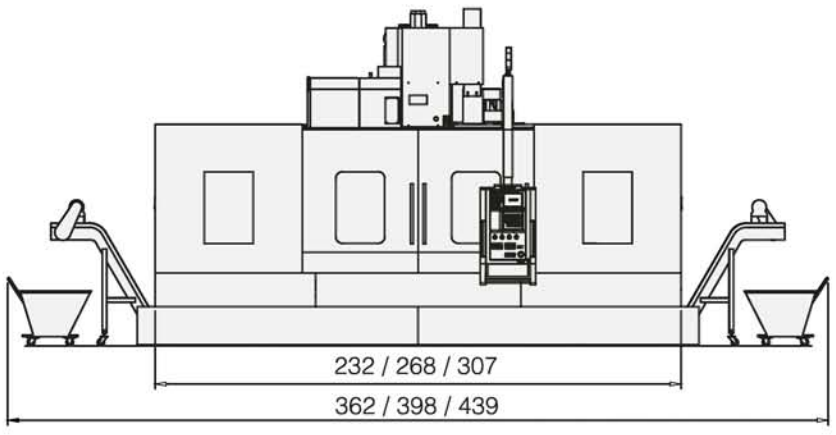


Dual ballscrews on Y-axis provide fast traverse rates and high-speed acceleration.

Unit = inch



[VMC Series: 2100 / 2600 / 3100]



[VMC Series: 2100 / 2600 / 3100]

VMC-2100 / VMC-2600 / VMC-3100

24-tool Magazine • Chip Conveyor • Spindle Oil Chiller • CTS System (option)

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 / VMC-1265

X-Travel	43″ / 50″
Y-Travel	24″ / 26″
Z-Travel	25″ / 26″
Max load	2600 / 2600 lb
Table size	49″ × 24″ / 53″ × 26″

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″

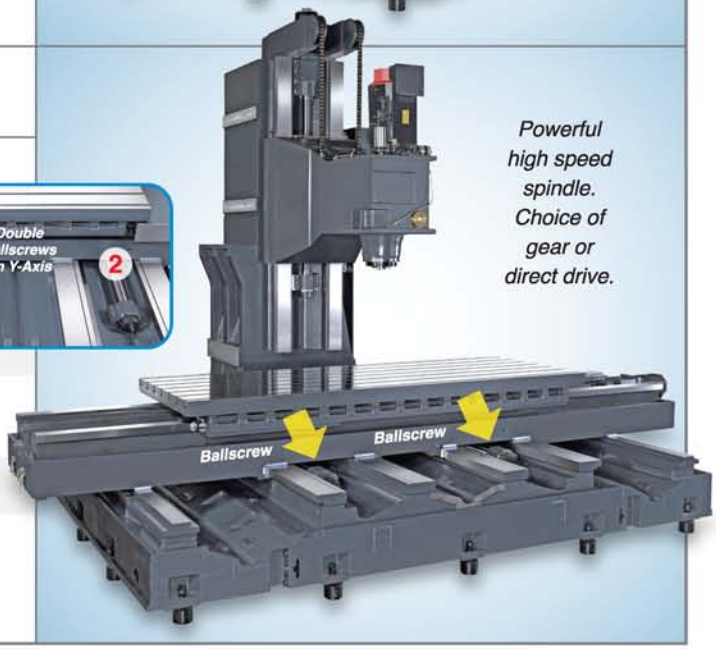
Heavy box ways • 4 slide ways

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

VMC-3100

X-Travel	122″
Y-Travel	40″
Z-Travel	42″
Max load	8800
Table size	122″ × 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

Torque diagrams.

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.

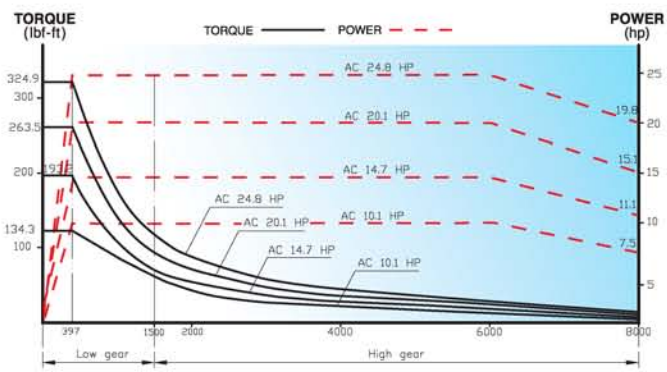
Excellent Spindle Performance

Features that push productivity:

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

VMC-1160/VMC-1265

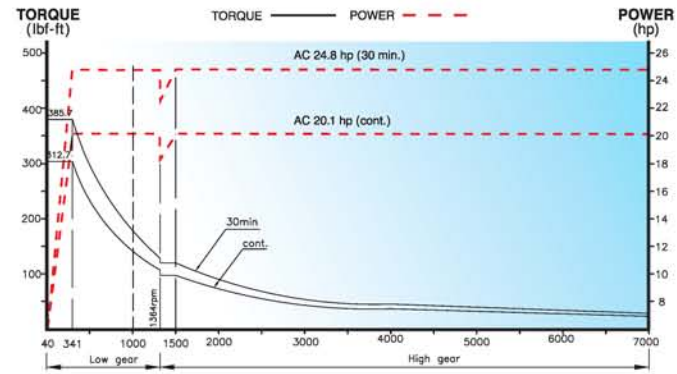
CAT-40 / 50 Gear 8,000 rpm (FANUC α8/α12/α15)



SPINDLE SPEED (rpm)

VMC-1370 / 1688 / 2100 / 3100

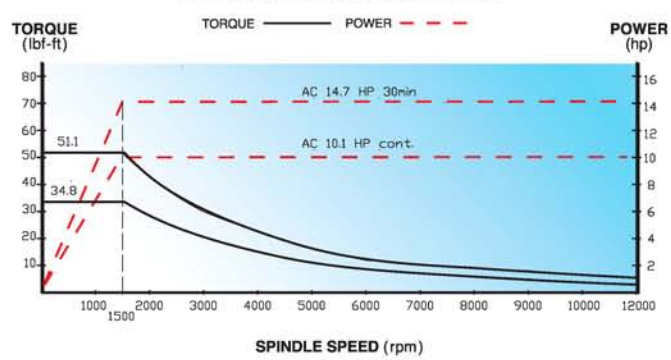
CAT-50 Gear 7,000 rpm (FANUC α15)



SPINDLE SPEED (rpm)

VMC-1160/VMC-1265

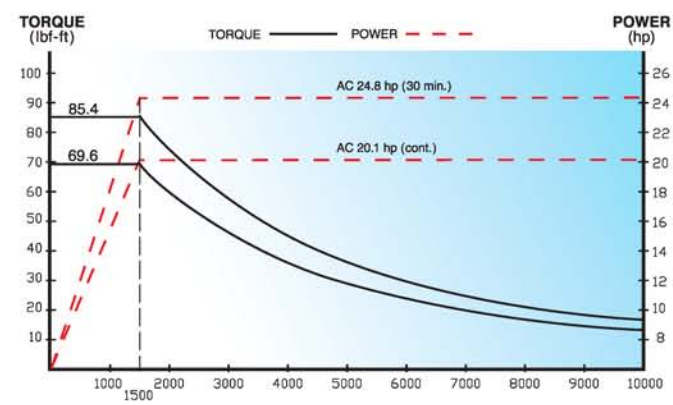
CAT-40 Direct Drive 12,000 rpm (FANUC α8)



SPINDLE SPEED (rpm)

VMC-1370 / 1688 / 2100 / 3100

CAT-50 Direct Drive 10,000 rpm (FANUC α15)



SPINDLE SPEED (rpm)

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

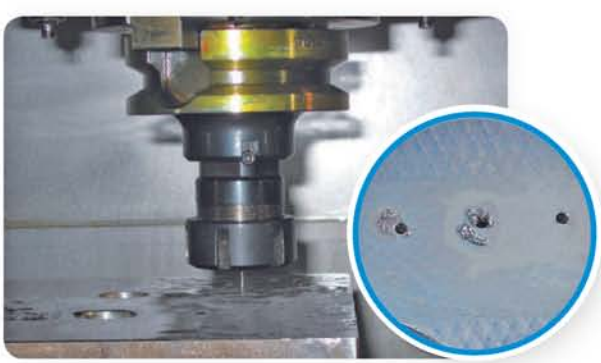
Workpiece Material	S45C (SAE 1045)
Tool used:	Ø3.2″ Face Mill
Spindle speed:	700 rpm
Feedrate:	79 ipm
Depth/Width of Cut:	0.2″ / 2.8″
Metal Removal Rate:	34 in^3 / min

DRILLING

Workpiece Material:	S45C (SAE 1045)
Tool used:	Ø2.0″ Insert Drill
Spindle speed:	1500 rpm
Feedrate:	7.1 ipm
Metal Removal Rate:	22 in^3 / min

TAPPING

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



TAPPING

Workpiece Material:	S45C (SAE 1045)
Tool used:	M2 × 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

3D probe system-quality assurance (CMM)

Heavy Cutting

Heavy cutting test-face milling

Laser

Laser inspection

Ball Milling

3D cutting test - circular ball milling

Cutting Test

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

Ball Bar

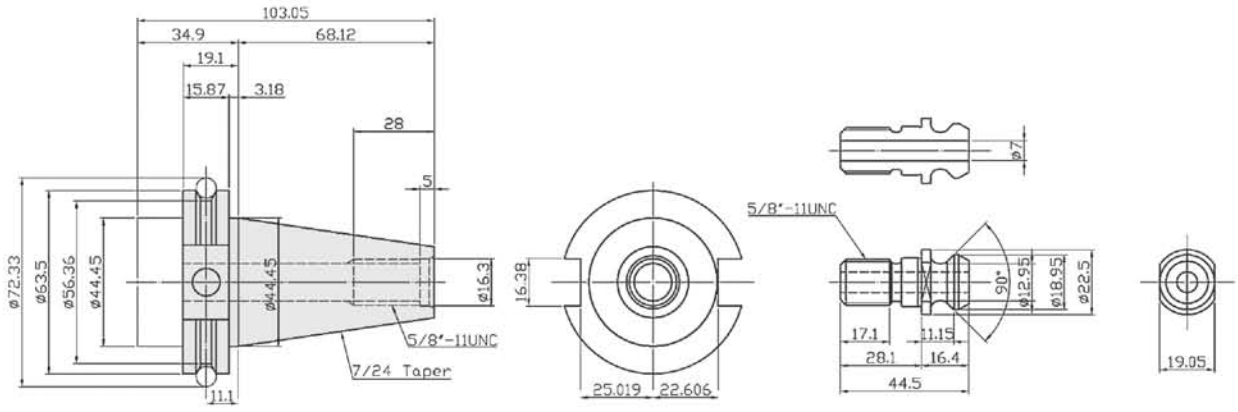
Ball bar inspection

Tool Shank

Tool holder dimensions.

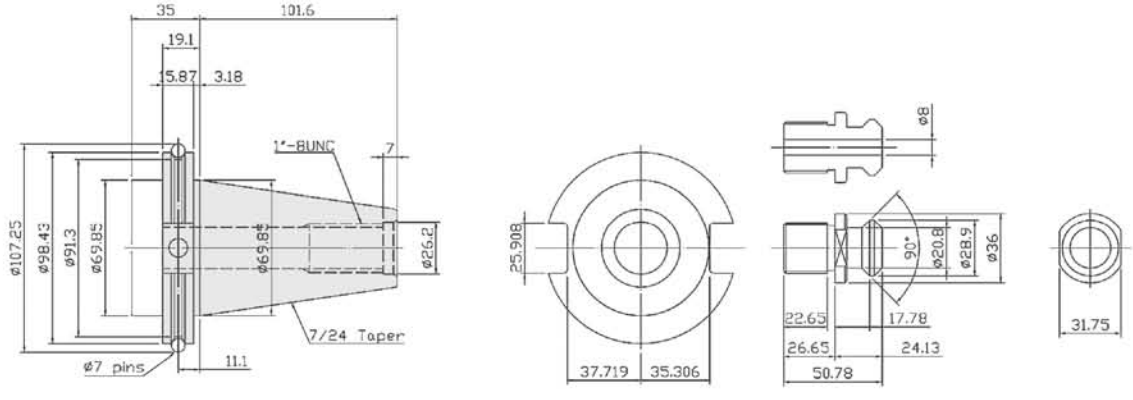
CAT-40

Tooling Dimension (CTS)



CAT-50

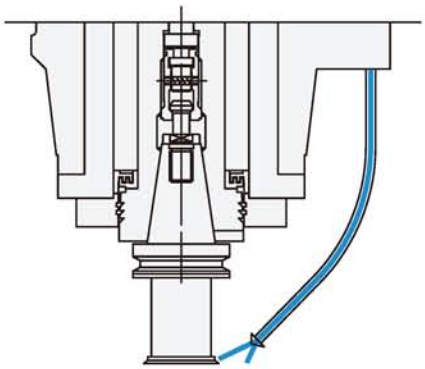
Tooling Dimension (CTS)



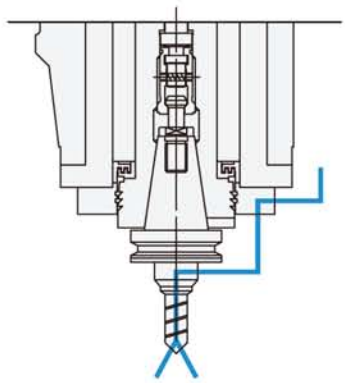
Tool Cooling

Spindle tool temperature cooling

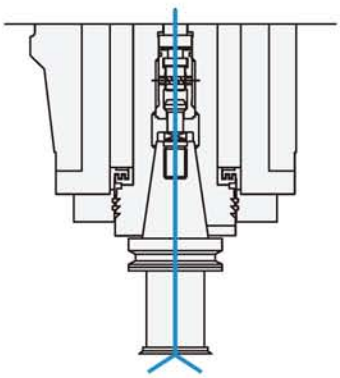
Coolant Nozzle (Standard)



Coolant Through Tool (Optional)



Coolant Through Spindle (Optional)



Oil-mist Coolant System (Optional)

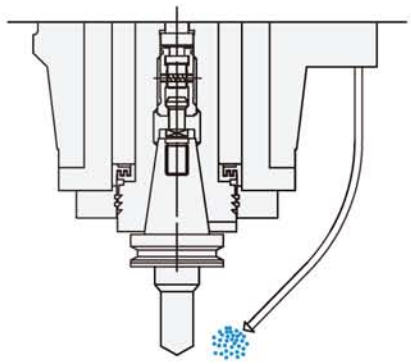
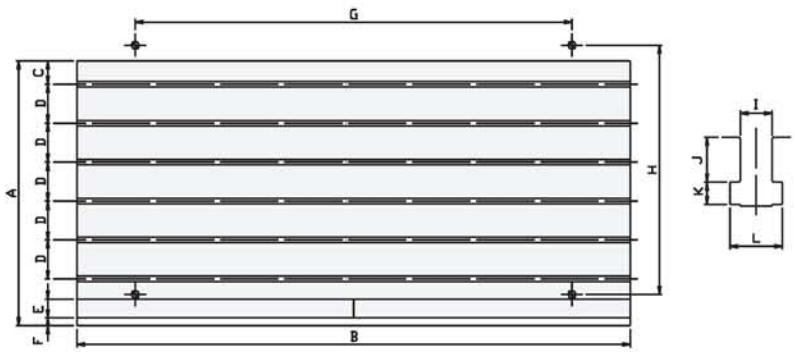


Table Dimensions

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	0.71	0.94	0.47	1.2
VMC-1265	26	53	3	5	—	—	50	26	0.71	0.94	0.47	1.2
VMC-1370	28	59	4	5	—	—	55	28	0.71	0.94	0.47	1.2
VMC-1688	37	71	2.6	5	1.7	0.98	63	35	0.87	1.14	0.63	1.45
VMC-2100	39	83	2	6	—	—	83	40	0.87	1.14	0.63	1.45
VMC-2600	39	102	2	6	—	—	102	40	0.87	1.14	0.63	1.45
VMC-3100	39	122	2	6	—	—	122	40	0.87	1.14	0.63	1.45

Machine Specifications

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

ITEM	UNIT	VMC-1160A	VMC-1160B	VMC-1265A	VMC-1265B	VMC-1370
Travel						
X-travel	inch	43		50		51
Y-travel	inch	24		26		28
Z-travel	inch	25		26		28
Distance spindle nose to table surface	inch	4 ~ 29		4 ~ 30		8 ~ 35
Distance spindle centerline to Z-axis ways	inch	24.4		28.5		28
Table						
Table Size (X × Y)	inch	49 × 24		53 × 26		59 × 28
Max. table load	lb	2650		2650		3300
T-Slots (numbers x width × pitch)	inch	5 × 0.7 × 5		5 × 0.7 × 5		5 × 0.7 × 5
Spindle						
Spindle Speed - (Standard)	rpm	8000 (Gear)		8000 (Gear)		8000 (Gear)
Spindle Speed - (Option)	rpm	10,000 / 12,000 (Direct Drive)	—	10,000 / 12,000 (Direct Drive)	10,000 (Direct Drive)	10,000 (Direct Drive)
Spindle Taper	—	#40	#50	#40	#50	#50
Feedrate						
Rapid (X/Y/Z)	ipm	945 / 945 / 787		945 / 945 / 787		945 / 945 / 787
Cutting feedrate	ipm	394		394		394
ATC						
Tool Shank type	—	CAT-40	CAT-50	CAT-40	CAT-50	CAT-50
Magazine Capacity (Standard)	tools	24		24		24
Magazine Capacity (Optional)	tools	32* / 40*	30	32* / 40*	30	30* / 40*
Max Tool Diameter (with adjecent tools)	inch	Ø3.0	Ø4.3	Ø3.0	Ø4.3	Ø4.3
Max Tool Diameter (without adjecent tools)	inch	Ø5.9	Ø8.5	Ø5.9	Ø8.5	Ø8.5
Max Tool Length	inch	12		12		12
Max Tool Weight	lb	15	33	15	33	33
Tool Change Time (Tool-to-Tool)	sec	2.0	2.8	2.0	2.8	2.8
Tool Change Time (Chip-to-Chip)	sec	5.8	6.0	4.5	6.0	6.0
Motor						
Spindle Motor (30 min.)	hp	10 / 15	20 / 25	10 / 15	20 / 25	20 / 25
Servomotors X / Y / Z	hp	4.0 / 4.0 / 5.4		4.0 / 5.4 / 9.4		5.4 / 5.4 / 9.4
Power Supply						
Power Supply	kVA	20		20		20
Compressed Air Supply	psi	90		90		90
Coolant Tank Capacity	gal	120		140		110
External Dimension						
Width	inch	187	187	201	201	178
Length	inch	96	96	99	99	139
Height	inch	120	120	112	122	129
Weight	lb	19,000	19,000	19,500	19,500	28,700
Accuracy		(following values were tested in the temperature-controlled room)				
Positioning Accuracy - JIS 6338 (within 12″)	inch	±0.00020		±0.00020		±0.00020
Repeatability Accuracy - JIS 6338 (within 12″)	inch	±0.00008		±0.00008		±0.00012

Machine Specifications

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

ITEM	UNIT	VMC-1688	VMC-2100	VMC-2600	VMC-3100
Travel					
X-travel	inch	63	83	102	122
Y-travel (Y_1 / Y_2) Dual Y-axis ballscrews	inch	35	40		
Z-travel	inch	28	35 / 42*		
Distance spindle nose to table surface	inch	8 ~ 35	4 ~ 39 / 4 ~ 46*		
Distance spindle centerline to Z-axis ways	inch	28 / (35)*	40		
Table					
Table Size (X × Y)	inch	71 × 37	83 × 39	103 × 39	122 × 39
Max. table load	lb	5500	6600	6600	8800
T-Slots (numbers × width × pitch)	inch	7 × 0.87 × 5	7 × 0.87 × 6		
Spindle					
Spindle Speed - (Standard)	rpm		8000 (Gear)		
Spindle Speed - (Option)	rpm	10,000 (Direct Drive)	4000 (Gear) 10,000 (Direct Drive)		
Spindle Taper	—		#50		
Feed					
Rapid X / Y / Z	ipm	787 / 787 / 590	394 / 394 / 394		
Cutting feedrate	ipm	394	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	20 / 25	35		
Servomotors X / (Y1 / Y2) / Z	hp	5.4 / 5.4 / 9.4	*Dual Y-axis Ballscrews*	9.4 / (9.4 / 9.4) / 9.4	
Power Supply					
Power Supply	kVA	35	55		
Compressed Air Supply	psi	90	90		
Coolant Tank Capacity	gal	110	200		
External Dimension					
Width	inch	209	220	264	307
Length	inch	165	186	186	186
Height	inch	123	136 / 146	136 / 146	136 / 146
Weight	lb	37,100	47,100	50,700	53,000
Accuracy		(following values were tested in the temperature-controlled room)			
Positioning Accuracy - JIS 6338 (within 12″)	inch	±0.00020	±0.00020	±0.00020	±0.00031
Repeatability Accuracy - JIS 6338 (within 12″)	inch	±0.00012	±0.00012	±0.00012	±0.00020

Optional Accessories

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

		VMC-1160A	VMC-1160B	VMC-1265A	VMC-1265B	VMC-1370	VMC-1688	VMC-2100	VMC-2600	VMC-3100
Spindle										
CAT-40 Belt 10,000 rpm (7/10 hp)		●	X	●	X	X	X	X	X	X
CAT-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	●	X	●	●	●	●	●	●
CAT-50 Gear 6000 rpm (30/35 hp)		X	X	X	X	●	●	●	●	●
CAT-50 Gear 8000 rpm (20/25 hp)		X	●	X	●	●	●	●	●	●
CAT-50 Gear 8000 rpm (30/35 hp)		X	X	X	X	X	●	●	●	●
CAT-50 Direct Drive 10,000 rpm (20/25 hp)		X	X	X	X	O	O	O	O	O
CAT-50 Direct Drive 10,000 rpm (30/35 hp)		X	X	X	X	X	O	O	O	O
Tool magazine										
Magazine capacity	24 tools	●	●	●	●	●	●	●	●	●
	30 tools	X	O	X	O	●	●	●	●	●
	32 tools	O	X	O	X	X	X	X	X	X
	40 tools	O	X	O	X	O	O	O	O	O
	60 tools	X	X	X	X	O	O	O	O	O
Tool										
Tool shank	—	—	—	—	—	—	—	—	—	—
	CAT-40	O	X	O	X	X	X	X	X	X
	DIN-40	O	X	O	X	X	X	X	X	X
	MAS BT-50	X	●	X	●	●	●	●	●	●
	CAT-50	X	●	X	●	●	●	●	●	●
	DIN-50	X	O	X	O	O	O	O	O	O
Pull stud	—	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—	—
Coolant										
Coolant system		●	●	●	●	●	●	●	●	●
Coolant through spindle		O	O	O	O	O	O	O	O	O
Coolant through tool		O	O	O	O	O	O	O	O	O
Oil skimmer		●	●	●	●	●	O	O	O	O
Chip flush coolant system		O	O	O	O	O	O	O	O	O
Coolant gun		●	●	●	●	●	●	●	●	●
Chip disposal system										
Lift-up chip conveyor w/ bucket (Chain type)		●	●	●	●	●	●	●	●	●
Lift-up chip conveyor w/ bucket (Scrape type)		O	O	O	O	O	O	O	O	O
Screw type chip conveyor (Front of base)		●	●	●	●	●	●	●	●	●
Screw type chip conveyor (Behind table)		X	X	X	X	●	●	X	X	X
Screw type chip conveyor (Side/center of base)		X	X	X	X	●	●	●	●	●
Air blast function for workpiece		●	●	●	●	●	●	●	●	●
Spindle air blast		●	●	●	●	●	●	●	●	●
Oil-mist collection system		O	O	O	O	O	O	O	O	O
Measurement system										
Tool length measurement		O	O	O	O	O	O	O	O	O
Workpiece length measurement		O	O	O	O	O	O	O	O	O
Manual Pulse generator (MPG)		●	●	●	●	●	●	●	●	●
Operation support										
Auto power off (M30)		●	●	●	●	●	●	●	●	●
Automatic door		●	●	●	●	●	●	●	●	●
High accuracy control										
Liner scales (XYZ axes)		O	O	O	O	O	O	O	O	O
Safety system										
Full enclosure		●	●	●	●	●	●	●	●	●
Others										
Interior lighting lamp		●	●	●	●	●	●	●	●	●
Work light and tri-status light		●	●	●	●	●	●	●	●	●
Leveling bolts and pads		●	●	●	●	●	●	●	●	●
Tool box		●	●	●	●	●	●	●	●	●
4th axis interface		O	O	O	O	O	O	O	O	O
Rotary table 4th axis		O	O	O	O	O	O	O	O	O
Air conditioner unit for electric cabinet		O	O	O	O	O	O	O	O	O
Customized calculator software function		O	O	O	O	O	O	O	O	O
Z-axis riser		—	—	—	—	—	—	O	O	O
Z-axis travel extension		O	O	O	O	X	X	O	O	O

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