VERTICAL
MACHINING
CENTER
LVC / MVC / RH / DC SERIES

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BLACKSMITH

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HEAVY DUTY
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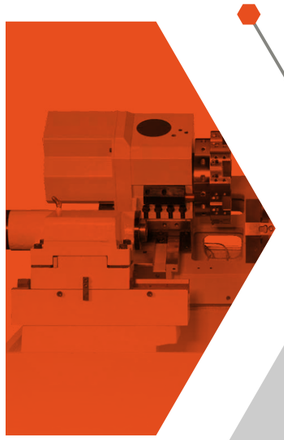
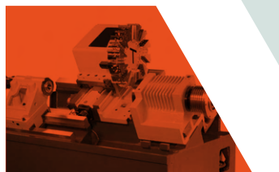
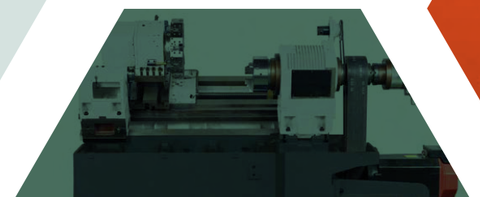
A pioneer in a new area who provides
products cross E generation







LVC SERIES

LINEAR WAY VMC

LVC-855

LINEAR GUIDEWAYS ON 3 AXES THE BEST CHOICE IN PRECISION PARTS AND SMALL MOLD MACHINING

The LVC and LVCQ series vertical machining centers from BLACK SMITH are designed and manufactured to meet the needs of high speed and high precision machining.
The X, Y, Z three axes on the LVC and LVCQ series are all mounted with roller type linear guideways, featuring outstanding heavy load resisting capability.
The base of the LVCQ series is designed with 4 linear guideways.
The standard spindle is designed with #40 taper and provides a selection of belt transmission or direct-drive high speed spindle. The LVCQ series can be operated with a #50 taper spindle.

LVCQ-1370

The highly rigid machine structure design combined with extra wide column structure allows the machine to exhibit superb stability and machine rigidity in high speed machining.

3 4 MACHINE SPECIFICATIONS

FEATURES OF LINEAR GUIDEWAY

· The linear guideways are preloaded to achieve zero clearance between guideways, and the machine's service life is longer than a machine with box ways.
· Through the linear contact among the rolling parts, guideway and block, there is only slight elastic deformation on the rolling parts when they withstand a heavy load. This enables the entire linear guideway to achieve equally high rigidity and heavy loading capacity in four directions. The use of linear guideways effectively improves the disadvantages of smaller cutting performance on a machine with box ways.
· Well suited for the machining of various precision parts, small molds, and parts requiring high accuracy.

LVC-855

LVCQ-1170 / LVCQ-1370 / LVCQ-1570 FOUR LINEAR GUIDEWAYS

ROLLER TYPE LINEAR GUIDEWAY

· Three axes are mounted with roller type linear guideways, featuring heavy loading capacity, low friction coefficient, effortless movement, as well as fast and smooth traverse and high positioning accuracy.

MODEL		Unit	LVC-855	LVC-860	LVC-1160	LVCQ-1170	LVCQ-1370	LVCQ-1570
TRAVEL								
X-axis		mm	800	800	1100	1100	1300	1500
Y-axis		mm	500	600		700		
Z-axis		mm	500	600		700		
DISTANCE								
Spindle center to column		mm	500	600		700		
Spindle nose to table		mm	110-610	150-750		150-850		
ROLLER TYPE LINEAR WAY								
X-axis			RGW30	RGW35		RGW45		
Y-axis			RGW30	RGW45		RGW45 x 4		
Z-axis			RGW35	RGW45		RGW45		
BALLSCREW								
3 axes (dia. x pitch)		mm	R32 x P12	R40 x P12		R50 x P16		
TABLE								
Size		mm	900 x 500	1000 x 600	1200 x 600	1200 x 700	1400 x 700	1600 x 700
Recommended safety load		kg	350	400	600	1500	1700	1800
T-slot (No. x W x dist.)		mm	5 x 16 x 100	5 x 18 x 100		7 x 18 x 100		
SPINDLE								
Spindle taper			BBT40			BBT40 or BT50		
Spindle driving method and speed	#40	RPM	Belt type 10000 or direct drive 10000/12000/15000					
	#50	RPM	-			Belt type 6000/8000		
TOOL MAGAZINE								
Magazine type and tool number	#40	T	Std. disk type 24/30 tools or double servo type 24/30 tools					
	#50	T	-			Standard disk type 24 tools		
Max. length of tool	#40	mm	(Standard) 300 or (double servo) 350					
	#50	mm	-			350		
Max. dia. of empty tool	#40	mm	(Standard) 135 or (double servo) 150					
	#50	mm	-			220		
Max. dia. of full tool	#40	mm	(Standard) 78 or (double servo 24T) 80 or (double servo 30T) 75					
	#50		-			110		
Max. weight of tool	#40	kg	8					
	#50	kg	-			20		
Time of tool to tool	#40	sec	1.3					
	#50	sec	-			2.5		
Tool change time	#40	sec	(Standard) 2.3 or (double servo) 1.8					
	#50	sec	-			4.0		
RAPID TRAVERSE RATE								
Axes feed		m/min	X:36, Y:36, Z:24			X:48, Y:48, Z:36		
MITSUBISHI CONTROL SYSTEM								
Version			M80-4A (10.4" full-color screen)					
Spindle motor		KW	5.5/7.5	7.5/11		11/15		
Three axes motors		KW	2.2 / 2.2 / 3.0	2.0 / 2.0 / 3.5		3.5 / 3.5 / 4.5		
FANUC CONTROL SYSTEM								
Version			0i-MF (Plus) (10.4" full-color screen)					
Spindle motor		KW	β8, 7.5/11			α12, 11/15		
Three axes motors		KW	1.8 / 1.8 / 2.5	2.5 / 2.5 / 3.0		4.0 / 4.0 / 7.0		
MACHINE								
Power required		kVA	30	35		38		
Air pressure required		kg/cm²	6					
Max. size (L x D x H)		cm	260 x 300 x 220	296 x 262 x 275	326 x 262 x 275	386 x 262 x 320	406 x 262 x 320	463 x 262 x 320
Net weight		kg	4150	5000	6000	9550	10500	11500
Container for export			40'HQ					

* The size includes screw type chip conveyor.
* Upon customer's request, customized design of machine is available.
* The machine design, sizes, specifications and structure are subject to change without prior notice.

HEAVY CUTTING RESISTANCE HIGH MACHINING EFFICIENCY

BLACK SMITH MVC and MVC-G series vertical machining centers are designed to enhance structural rigidity and heavy cutting capacity. X, Y, Z-axes on both series are designed with extra wide box ways.

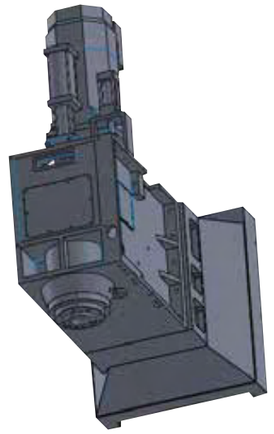
MVC-1370

FEATURES OF MACHINE

• The machine structure is manufactured from world-certified high quality Meehanite cast iron combined with optimal rib reinforcement, ensuring high rigidity of machine.
• The structural parts are box type structure, exhibiting extraordinary rigidity while remaining free of deformation year after year.
• The extra wide column structure and the wide box ways design provide solid support in heavy cutting.
• Slideway surfaces are hardened precision ground, coated with Turcite-B and hand scraped.
• Large diameter ballscrews on three axes are directly driven by servomotors.
• This machine is well suited for heavy cutting operations which require only general accuracy. Ideal for machining of large molds and high-hardness workpieces.

HIGH PRECISION BALLSCREW

• Three axes feeds are transmitted through large-diameter ballscrews to assure high rigidity of transmission.
• All ballscrews are pretensioned to eliminate thermal displacement, ensuring high positioning accuracy in axes feeds.

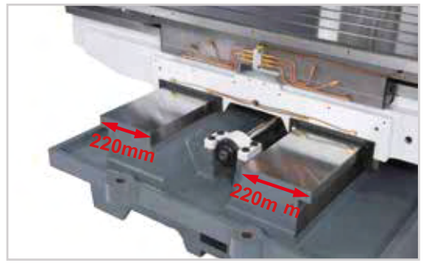


MVC-G SERIES WITH TWO-STEP GEARBOX

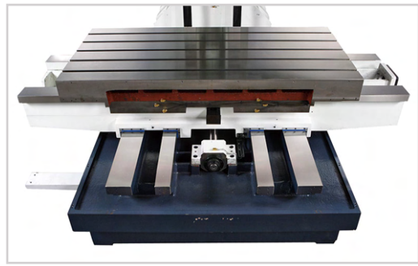
The spindle rotation on the MVC-G series of machine is transmitted through a two-step gearbox, allowing for high/low speed change. The low speed range provides great torque output, making the machine suitable for heavy cutting. The high speed range is suitable for high-speed precision machining and creating fine finish on machining surfaces. The spindle and gearbox are cooled by an oil cooler to maintain the bearings at a low temperature condition, helping to extend their service life.

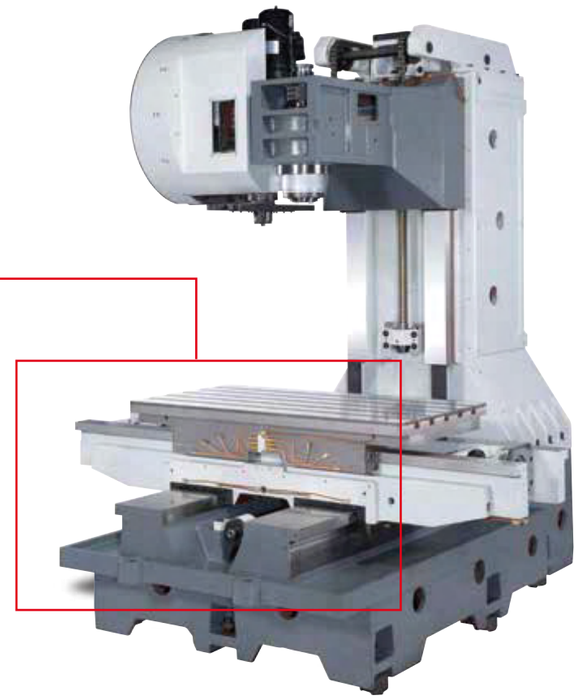
• The models MVC-955 / MVC-1160 / MVC-1160G feature larger box ways for dramatically increasing stability when the machine is performing heavy cutting. In addition, the base of the larger model is designed with 4 box ways that provide rock-solid support for larger workpieces.

MVC-1160



MVC-1370





MACHINE
SPECIFICATIONS

MODEL		Unit	MVC-955	MVC-1160	MVC-1370		MVC-1690	MVC-1890	MVC-1160G	MVC-1370G	MVC-1690G	MVC-1890G
TRAVEL												
X-axis		mm	900	1100	1300		1600	1800	1100	1300	1600	1800
Y-axis		mm	550	600	700		900		600	700	900	
Z-axis		mm	530	610	700		800		610	700	800	
DISTANCE												
Spindle center to column		mm	550	600	700		900		600	700	900	
Spindle nose to table		mm	150-680	150-760	150-850		150-950		150-760	150-850	150-950	
BALLSCREW												
3 axes (dia. x pitch)		mm	R40 x P10	R40 x P12	R50 x P12		R50 x P12		R40 x P12	R50 x P12	R50 x P12	
TABLE												
Size		mm	1000 x 510	1200 x 600	1400 x 700		1800 x 900	2000 x 900	1200 x 600	1400 x 700	1800 x 900	2000 x 900
Recommended safety load		kg	600	800	1200		1500	1700	800	1200	1500	1700
T-slot (No. x W x dist.)		mm	5 x 18 x 100	5 x 18 x 100	5 x 18 x 125		7 x 18 x 125		5 x 18 x 100	5 x 18 x 125	7 x 18 x 125	
SPINDLE												
Spindle taper			BBT40	BBT40 or BT50			BBT40 or BT50		BT50			
Spindle driving method and speed	#40	RPM	Belt type 10000 or direct drive 1000/12000/15000				Belt type 10000 or direct drive 1000/12000/15000		-			
	#50	RPM	-	Belt type 6000/8000			Belt type 6000/8000		Two-step gearbox 6000/8000			
TWO-STEP GEARBOX												
Speed reduction ration			–						1:44			
Spindle lubrication			–						Grease lubrication			
Positioning preload			–						Bearing preload			
Tool pulling force		kgs	–						2000	2000	2400	
Cooling method			–						Circulated oil cooling			
TOOL MAGAZINE												
Magazine type and tool number	#40	T	Standard disk type 24/30 tools						-			
	#50	T	-	Standard disk type 24 tools					Standard disk type 24 tools			
Max. length of tool		mm	(#40) 300 or (#50) 350						(#40) 300 or (#50) 350			
Max. dia. of empty tool		mm	(#40) 135 or (#50) 220						(#40) 135 or (#50) 220			
Max. dia. of full tool		mm	(#40) 78 or (#50) 110						(#40) 78 or (#50) 110			
Max. weight of tool		kg	(#40) 8 or (#50) 20						(#40) 8 or (#50) 20			
Time of tool to tool		sec	(#40) 1.3 or (#50) 2.5						(#40) 1.3 or (#50) 2.5			
Tool change time		sec	(#40) 2.3 or (#50) 4.0						(#40) 2.3 or (#50) 4.0			
FEED												
Rapid traverse rate		m/min	X:20, Y:20, Z:15						X:20, Y:20, Z:18	X:20, Y:20, Z:18	X:20, Y:20, Z:15	
MITSUBISHI CONTROL SYSTEM												
Version			M80-4A (10.4” full-color screen)						M80-4A (10.4” full-color screen)			
Spindle motor		KW	7.5/11	7.5/11	11/15		11/15		11/15	11/15	15/18.5	
Three axes motors		KW	2.0 / 2.0 / 3.5	2.0 / 2.0 / 3.5	3.5 / 3.5 / 3.5		4.5 / 4.5 / 4.5		2.0 / 2.0 / 3.5	3.5 / 3.5 / 3.5	4.5 / 4.5 / 7.0	
FANUC CONTROL SYSTEM												
Version			0i-MF (Plus) (10.4” full-color screen)						0i-MF (Plus) (10.4” full-color screen)			
Spindle motor		KW	β12, 11/15	β12, 11/15	α12, 11/15		α12, 11/15		β12, 11/15	α12, 11/15	α15, 15/18.5	
Three axes motors		KW	2.5 / 2.5 / 3.0	2.5 / 2.5 / 3.0	4.0 / 4.0 / 4.0		4.0 / 4.0 / 7.0		2.5 / 2.5 / 3.0	4.0 / 4.0 / 4.0	4.0 / 4.0 / 7.0	
MACHINE												
Power required		kVA	35	35	38		38		35	38	38	
Air pressure required		kg/cm²	6	6	6		6		6	6	6	
Max. size (L x D x H)		cm	313 x 258 x 230	352 x 263 x 270	392 x 310 x 280		533 x 387 x 330	553 x 387 x 330	352 x 263 x 270	392 x 310 x 280	533 x 387 x 330	553 x 387 x 330
Net weight		kg	5500	7700	9500		17000	17600	8500	10300	17800	18500
Container for export			40'HQ		Machine enclosure removed 40’ HQ		20‘ flat rack		40'HQ	Machine enclosure removed 40’ HQ	20‘ flat rack	

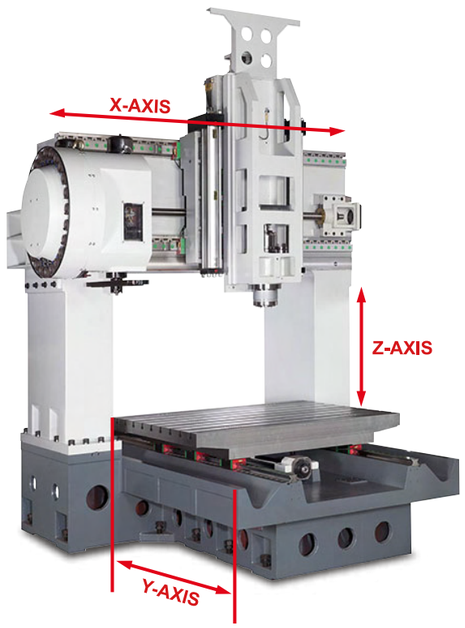
* The size includes screw type chip conveyor
* Upon customer’s request, customized design of machine is available.
* The machine design, sizes, specifications and structure are subject to change without prior notice.

DC SERIES
DOUBLE COLUMN VMC

9 10 MACHINE
SPECIFICATIONS

DOUBLE COLUMN STRUCTURE OUTSTANDING MACHINING STABILITY

· Designed and built for machining of small molds and precision parts.
· X, Y, Z-axes are all fitted with roller type linear guideways with features of heavy load resistance and low friction coefficient.
· Feed rates on X and Y-axes can reach 36 m/min to meet the requirements of high speed machining.
· The machine comes with a #40 direct-drive high speed spindle. Upon request, built-in type spindle is available.
· Tool change can be quickly accomplished in 2.3 seconds.



HIGHLY RIGID MACHINE STRUCTURE WITHOUT DEFORMATION

· The structural parts of the machine are manufactured from high quality Meehanite cast iron, and tempered to relieve internal stress. This ensures no deformation of the machine structure year after year.
· All structural parts are box type design in combination with optimal ribbing, allowing the machine to achieve excellent rigidity and stability.

MODEL	Unit	DC-1100	DC-1300	DC-1500
TRAVEL				
X-axis	mm	1100	1300	1500
Y-axis	mm	1100		
Z-axis	mm	750		
DISTANCE				
Spindle nose to table	mm	900		
ROLLER TYPE LINEAR GUIDEWAY				
X-axis		RGW55		
Y-axis		RGW45		
Z-axis		RGW45		
BALLSCREW				
3 axes (dia. x pitch)	mm	R50 x P12		
TABLE				
Size	mm	1200 x 1150	1400 x 1150	1600 x 1150
Recommended safety load	kg	1400	1600	1800
T-slot (No. x W x Dist.)	mm	9 x 18 x 125		
SPINDLE				
Spindle taper		BBT40		
Spindle driving method and speed	RPM	Direct drive 12000/15000 or built-in type 20000/24000		
TOOL MAGAZINE				
Magazine type and tool number	T	Std. disk type 24/30 tools or disk double servo 24/30 tools		
Max. length of tool	mm	(Standard) 300 or (Double servo) 350		
Max. dia. of empty tool	mm	(Standard) 135 or (Double servo) 150		
Max. dia. of full tool.	mm	(Standard) 78 or (Double servo 24T) 80 or (Double servo 30T) 75		
Max. weight of tool	kg	8		
Time of tool to tool	sec	1.3		
Tool change time	sec	(Standard) 2.3 or (Double servo) 1.8		
RAPID TRAVERSE RATE				
Axes feed	m/min	X:36, Y:36, Z:24		
MITSUBISHI CONTROL SYSTEM				
Version		M80-4A (10.4" full-color screen)		
Spindle motor	KW	7.5/11		
Three axes motors	KW	3.5 / 3.5 / 4.5		
FANUC CONTROL SYSTEM				
Version		0i-MF (Plus) (10.4" full-color screen)		
Spindle motor	KW	α8, 7.5/11		
Three axes motors	KW	4.0 / 4.0 / 7.0		
MACHINE				
Power required	kVA	38		
Air pressure required	kg/cm²	6		
Max. size (L x D x H)	cm	354 x 343 x 365	354 x 363 x 365	354 x 383 x 365
Net weight	kg	12000	12600	13750
Container for export		20' flat rack		

* The size includes screw type chip conveyor
* Upon customer's request, customized design of machine is available.
* The machine design, sizes, specifications and structure are subject to change without prior notice.

RH SERIES
RACK HOBBING MACHINE

FEATURES OF HEADSTOCK

• All gears in the headstock are carburized by heat treatment and precision ground for long service life.
• The spindle is driven by a wide speed motor, which provides high efficiency machining at low speed.
• The ball bearings used in the headstock feature larger contact area, enhancing resistance for heavier cutting loads in the axial and radial directions.

12 QUALITY
INSPECTION

DYNAMIC CHARACTERISTICS TESTING FOR HIGH-SPEED SPINDLE

• In order to ensure the performance of the high-speed spindle, we test dynamic characteristics of the high-speed spindle under different speeds. These include dynamic balance, vibration, noise, temperature rise, thermal deformation, and high-speed rotation accuracy.

STANDARD MOLD CUTTING TEST

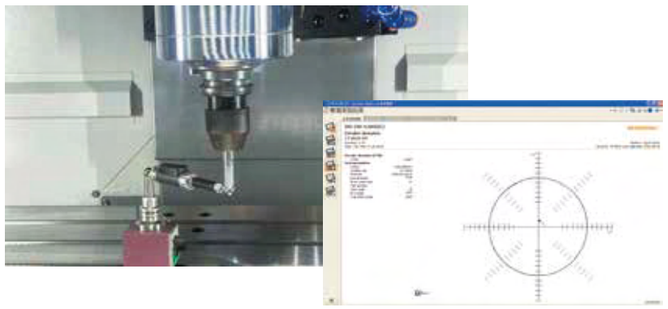
• Each machine is subject to a standard mold debugging cutting test, that ensures the mold quality meets customer's expectations and needs.

MACHINE
SPECIFICATIONS

MODEL	Unit	RH-1600
TRAVEL		
X-axis	mm	1600
Y-axis	mm	900
Z-axis	mm	800
DISTANCE		
Arbor center to table surface	mm	1100
BALLSCREW		
3 axes (dia. x pitch)	mm	R50 x P12
TABLE		
Size	mm	1800 x 900
Recommended safety load	kg	2000
T-slot (No. x W x Dist.)	mm	7 x 18 x 125
ARBOR		
Module range		M0.5-M12
Arbor speed	RPM	150
Arbor diameter	mm	50
Fixing key for hob and arbor engagement (W x H)	mm	12 x 8
Hob diameter	mm	145-200
Max. hob width	mm	100

MODEL	Unit	RH-1600
RAPID TRAVERSE & RATE		
Axes feed	m/min	X:20, Y:20, Z:15
MITSUBISHI CONTROL SYSTEM		
Version		E80 (8.4" full-color screen)
Spindle motor (wide speed range)	KW	7.5/11
Three axes motors	KW	4.5 / 4.5 / 4.5
FANUC CONTROL SYSTEM		
Version		0i-MF (Plus) (10.4" full-color screen)
Spindle motor (wide speed range)	KW	βP15, 7.5/9.0
Three axes motors	KW	4.0 / 4.0 / 4.0
MACHINE		
Power required	kVA	38
Air pressure required	kg/cm²	6
Max. size (L x D x H)	cm	480 x 392 x 287
Net weight	kg	14500
Container for export		20' flat rack

* The size includes screw type chip conveyor
* Upon customer's request, customized design of machine is available.
* The machine design, sizes, specifications and structure are subject to change without prior notice.



BALL BAR TESTING

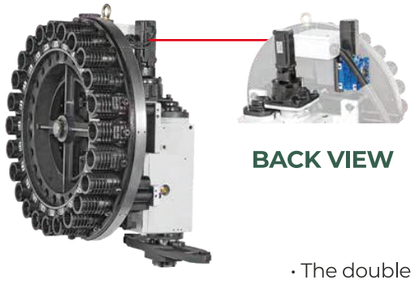
• The ball bar testing is conducted according to strict ISO specifications.

LASER INSPECTION

• Laser unit is employed to inspect the positioning accuracy and provide optimal compensation.
• The laser inspection is performed according to strict ISO inspection specifications. We conduct 5 instances of back and forth inspection and collect the statistical data.

ACCESSORIES

STANDARD DISK TYPE TOOL MAGAZINE



BACK VIEW

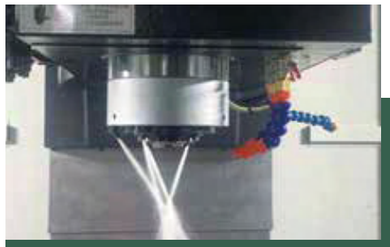
DISK TYPE DOUBLE SERVO TOOL MAGAZINE

VARIOUS TOOL MAGAZINES

· The indexing mechanism of the tool magazine is a cylindrgical cam which provides fast and stable tool change.
· High positioning, minimum trouble, and easy to maintain.

· The double servo-drive magazine is designed with an additional servomotor for the tool compartment. This feature can prevent vibration on the column due to an inertial force generated when the tool disk is rotating, and eliminate effects on machining accuracy.

CHIP HANDLING DEVICE



COOLANT RING

· This device is used for removing chips on the workpiece, and enhancing the cooling efficiency of the workpiece.

COOLANT THROUGH SPINDLE

· The coolant through spindle device provides efficient cooling on the cutting tool for extending the tool life.
It is especially ideal for deep hole drilling and blind pocket milling.
· The device is suitable for high speed machining and reducing cycle time, effectively upgrading machining efficiency.

COOLANT FLUSHING SYSTEM

· Each side of the table is equipped with at least 3 coolant nozzles.
· High pressure coolant flushing effectively removes chips on the table.

BOAT TYPE CHIP CONVEYOR

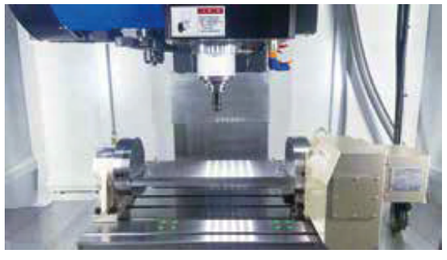
· The chip conveyor is suitable for automatically exhausting chips into the chip bucket, helping to keep the machine clean at all times.

STANDARD ACCESSORIES

MODEL	LVC SERIES	MVC SERIES	DC SERIES	RH SERIES
LED work light	•	•	•	•
Alarm light	•	•	•	•
Heat exchanger for electrical cabinet	•	•	•	•
Auto lubricating system	•	•	•	•
Auto power off system	•	•	•	•
Sheet-metal enclosure	Full enclosure	Full enclosure	Full enclosure	Semi-enclosure
Telescopic cover	•	•	•	•
Coolant flushing system	•	•	•	Headstock
Spindle oil cooler	•	•	•	-
Spindle auto flush/air blast device	•	•	•	-
A.I. contour control	•	•	•	-
Remote MPG	•	•	•	•
Handheld coolant gun and air gun	•	•	•	Coolant gun only
Counter-balance weight	-	-	Pneumatic	-
Air reservoir	-	-	•	-
Chip conveyor (with cart)	Boat type (LVC) Double screw type (LVCQ)	Screw type	Double screw type	Double screw type
Tool box and foundation pads	•	•	•	•

OPTIONAL ACCESSORIES

Air conditioner for electrical cabinet, coolant ring, coolant through spindle (CTS), oil skimmer, oil mist collector, spin window, tool setter, workpiece setter, 4th/5th axis rotary table, boat type chip conveyor, volt stabilizer.



4TH / 5TH AXIS ROTARY TABLE

· High positioning accuracy ensures maximum stability during machining.
· Can be used together with chuck, tailstock, and L-block.

TOOL SETTER

· It provides automatic measurement for tool travel and prevents tool wear and damage.
· Equipped with air blast device to ensure the cleaning of the measuring position.

OIL SKIMMER

· The device is mounted on the centralized coolant tank.
· It can remove the floating oil in the cutting fluid and separate oil from the cutting fluid, thus increasing the life of cutting fluid.

VARIOUS SPINDLES

Each machining center from BLACK SMITH is equipped with a high prec1s1on spindle. There are two types of spindle taper #40 and #50. In addition, to meet specific machining requirements, various spindle transmission methods are available, including belt type, direct-drive type, and built-in type.

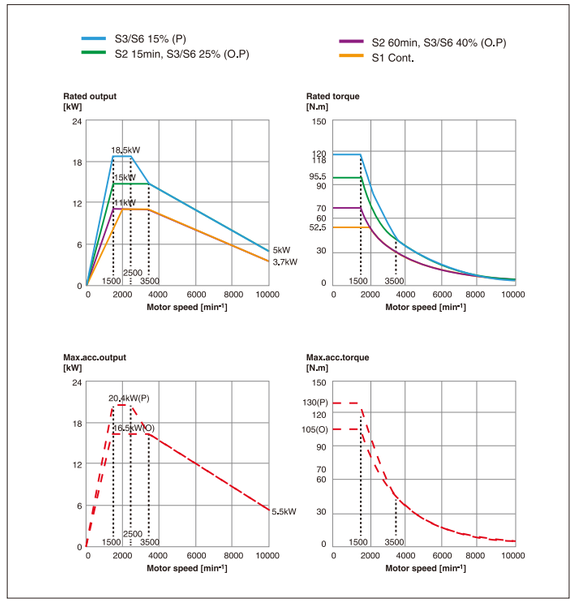
BELT TYPE SPINDLE BBT40

DIRECT-DRIVE SPINDLE BBT40

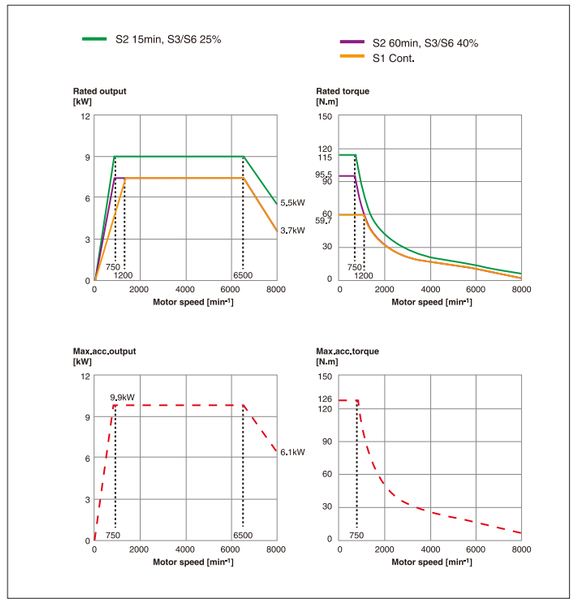
BUILT-IN TYPE SPINDLE BBT40

SPINDLE TORQUE OUTPUT DIAGRAMS

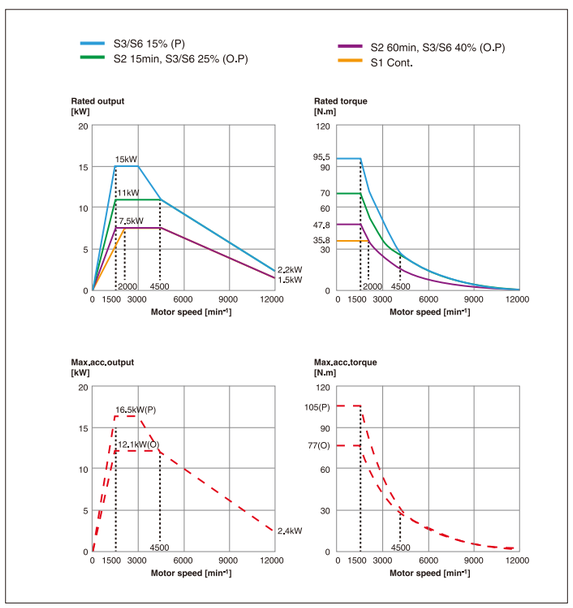
βiI 12



βiI 15



βiI 8



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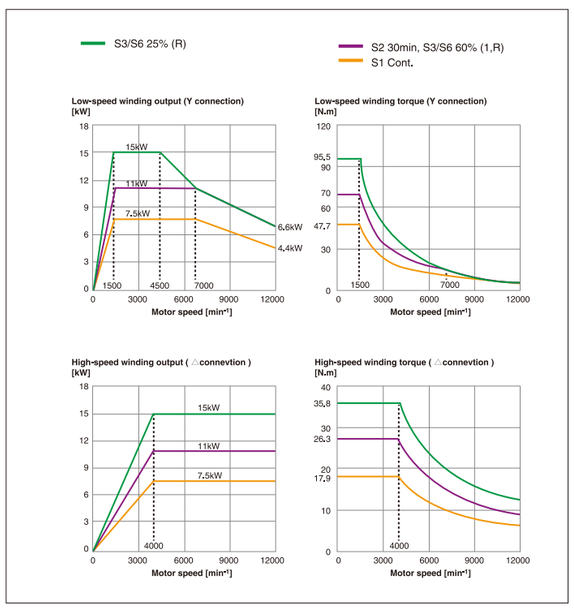

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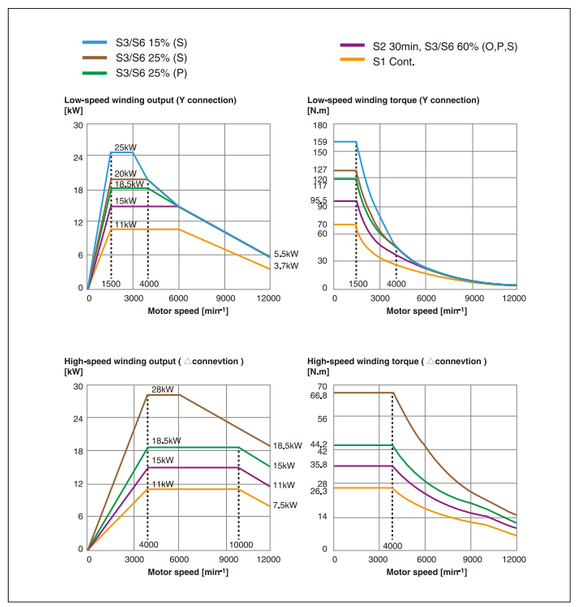

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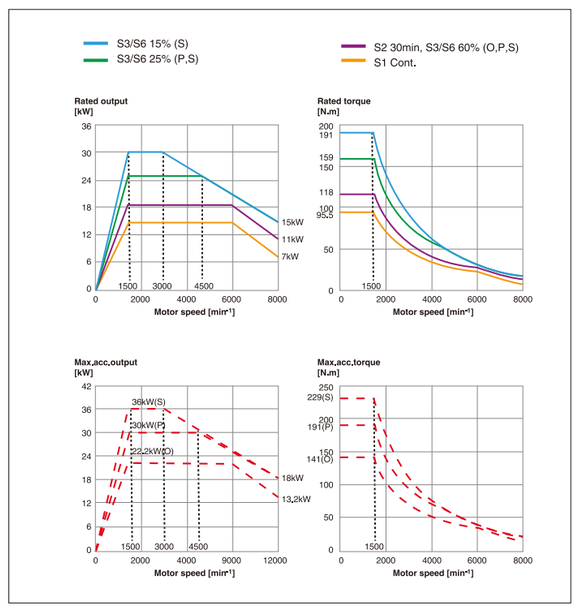
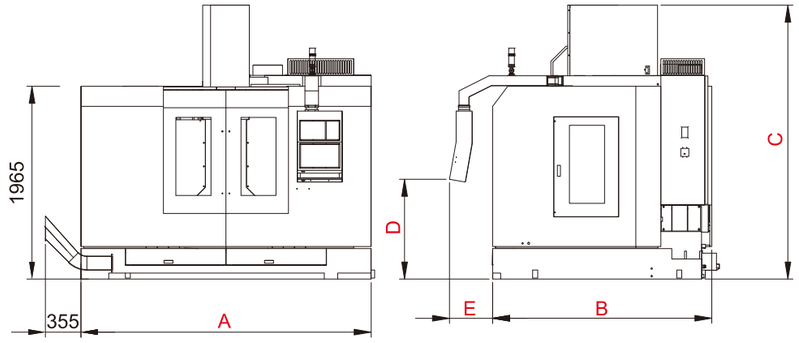


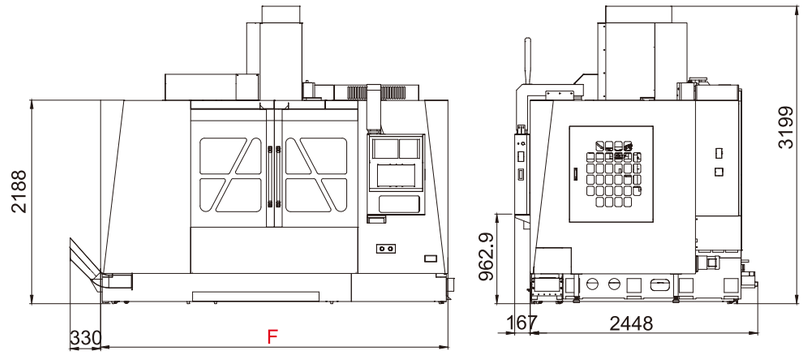
DIMENSIONAL DRAWINGS
OF MACHINES

LVC SERIES



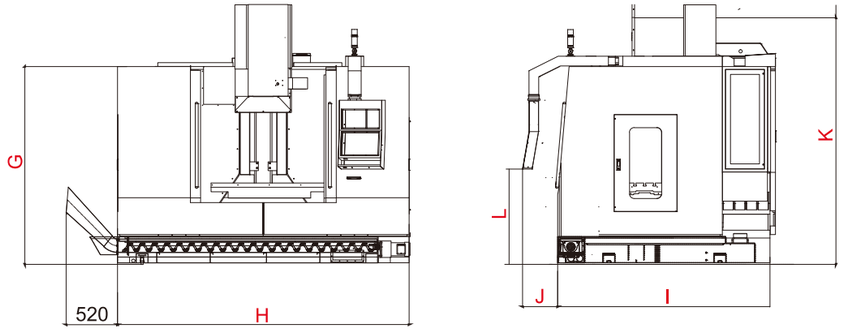
MODEL	A	B	C	D	E
LVC-855	2250	2442	2210	875	540
LVC-860	2610	2190	2735	997	431
LVC-1160	2900	2190	2735	997	431

LVCQ SERIES



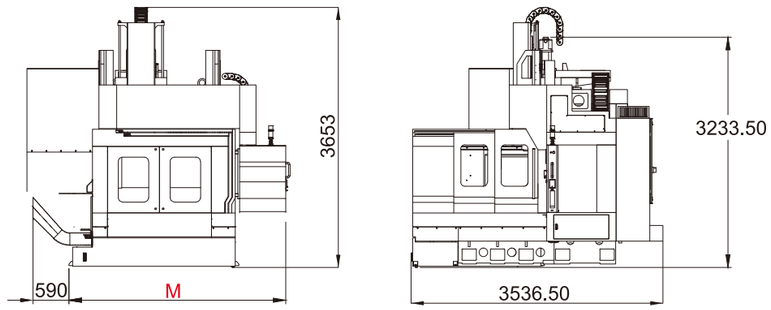
MODEL	F
LVCQ-1170	3536
LVCQ-1370	3736
LVCQ-1570	4300

MVC SERIES



MODEL	G	H	I	J	K	L
MVC-955	1906	2610	2190	392	2300	966
MVC-1160(G)	2037	3000	2270	362	2696	966
MVC-1370(G)	2059	3395	2580	523	2800	1140
MVC-1690(G)	2465	4808	3429	442	3307	1014
MVC-1890(G)	2465	5008	3429	442	3307	1014

DC SERIES



MODEL	M
DC-1100	2840
DC-1300	3045
DC-1500	3245

RH SERIES