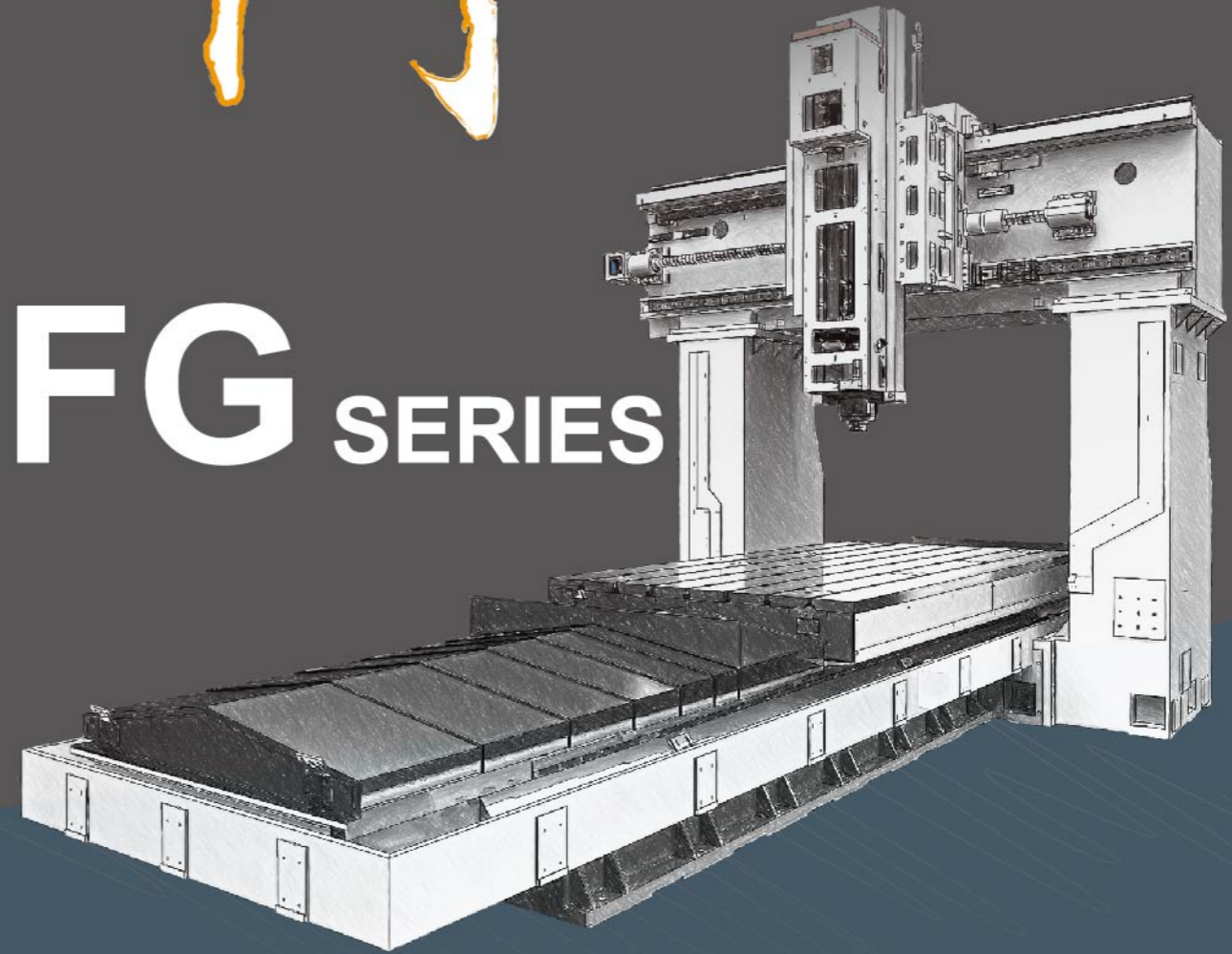


SOLUTION OF WORLDWIDE SALES NETWORK



FG SERIES



History



- 1976 Established the Metal processing department at MAR.01.
- 1992 Established the Machine Center R&D department.
- 1993 Continually 4th year of Knee-type Milling machine production reached 1800 sets monthly.
- 2003 Established the US branch office & warehouse at Feb.01.
- 2005 Established China branch as Twinhorn machinery co., Ltd.
- 2008 Started constructing China manufacture & production headquarters.
- 2009 Invested in the technical cooperation with Italian 5Ax maker on Movingcolumn and Gantry types 5Ax machining centers.
- 2010 Completed the construction of China manufacture & production
- 2012 Became the most biggest manufacturer of tapping center in greater China.
- 2014 Expanded the 4th assembly plant(factory area 4000m<sup>2</sup>) in Taiwan headquarters.

CNC Double Column Machining Center

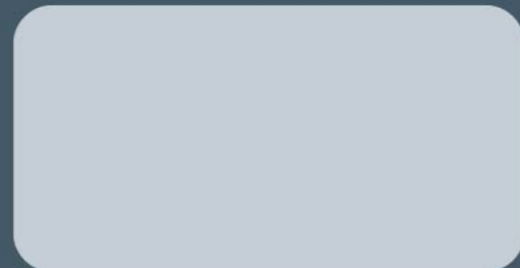
[www.twinhorn.com.tw](http://www.twinhorn.com.tw)



CHI-FA MACHINERY MANUFACTURER CO., LTD.  
No.44-8, MING-CHUNG RD., SHENG-KANG DIST.,  
TAICHUNG CITY, TAIWAN 42948

Tel: +886-4-2562-8747 (Rep.) Fax: +886-4-2561-4199  
E-mail: [chifald@ms36.hinet.net](mailto:chifald@ms36.hinet.net) ; [inquiry@twinhorn.com.tw](mailto:inquiry@twinhorn.com.tw)

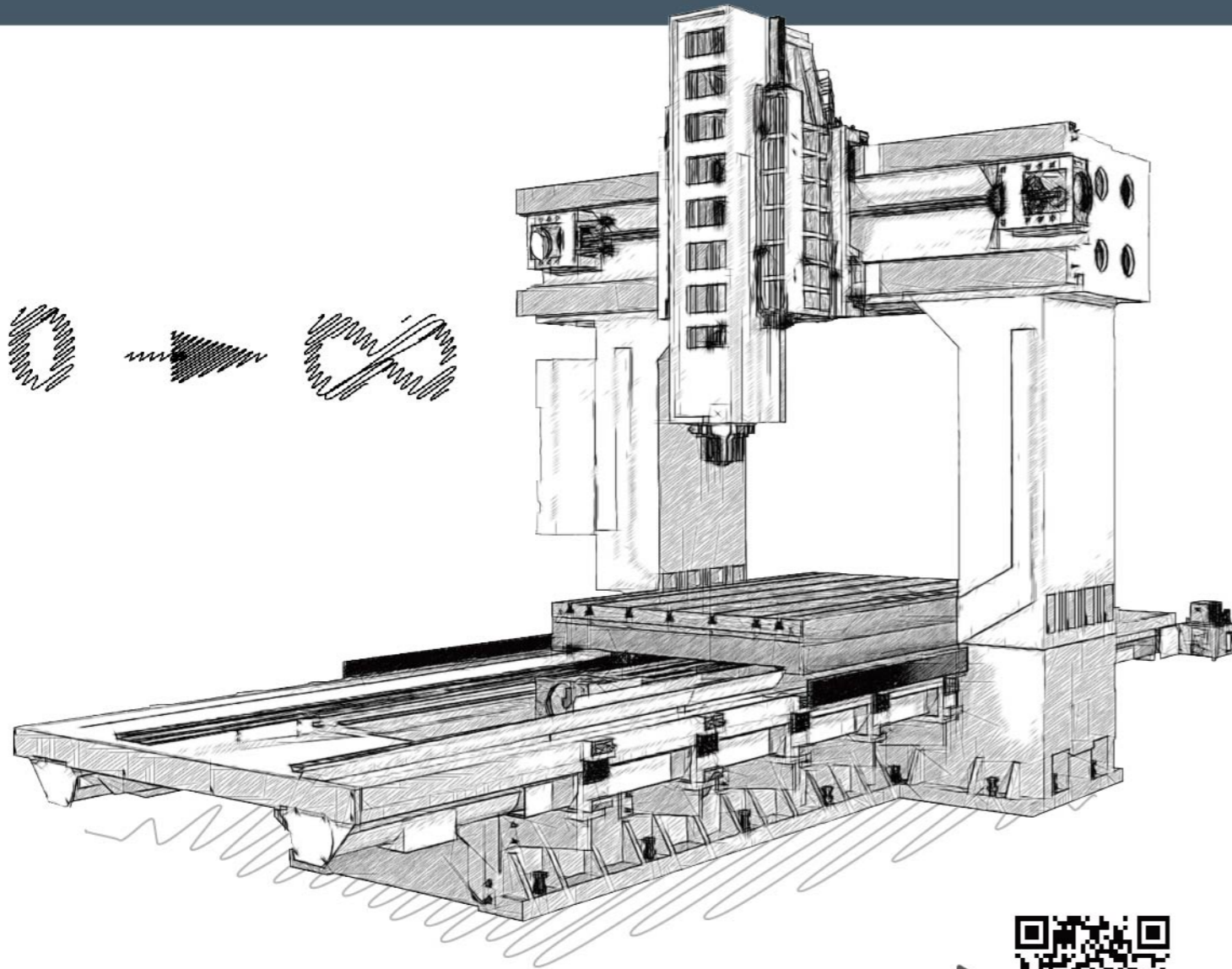
[www.twinhorn.com.tw](http://www.twinhorn.com.tw)



Twinhorn

# The Best Result Begins from Zero

To produce a high rigid machine tool, it needs to start from rigorous requirement of a small screw. With over 30 years of design and manufacturing experience, Chi-Fa's FG series double column machining center has been developed and manufactured in-house throughout the entire machine. Only with this way, we can fully understand how to optimize combination and running for the thousands of parts on a large machine tool, that also allow us to build the optimum machine structure.

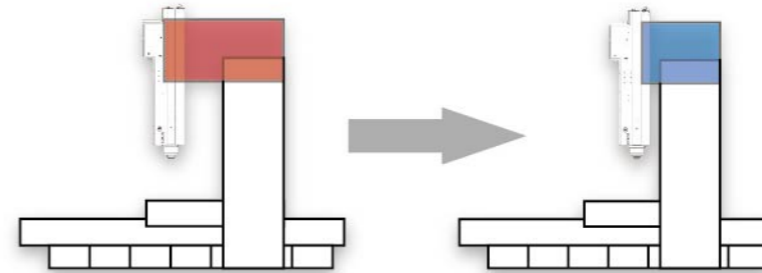


Q-VIDEO ▶



## Features of Double Column Structure

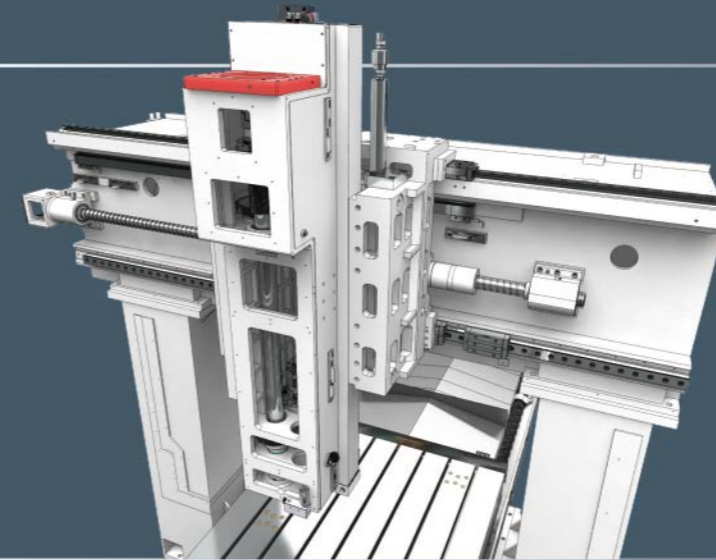
Special design for FG-series



As Chi-Fa attaches great importance to the fundamental and detail in mechanism design, the spindle head structure is simplified allowing Z-axis to close to the center of the column. This not only eliminates the error caused by bending stress, but also achieves the optimal rigidity.



Z-axis is a box way design and sliding surfaces are precisely scraped to ensure the service life of the slide ways. The box ways and the ram are one-piece fabricated to achieve no clearance between the slideways and the saddle. This feature is normally requested by a high end machine.



**Class C3 Ball Screws on Three Axes:** Ball screws have been pre-tensioned to ensure machining accuracy under heavy loading condition for a long time.



**Table, Spindle Head & Saddle:** Manufactured from high quality Meehanite cast iron, they feature ultra high rigidity, excellent absorbing capacity and wear-resistance.  
**Base, Beam & Column:** These structural parts are manufactured with multi-walls with internal rib, welded by high strength steel plates with tempered and stress-relieved. With the meticulous design, various structural parts will provide the best possible vibration absorbing performance and rigidity.

# Measurement and Inspection



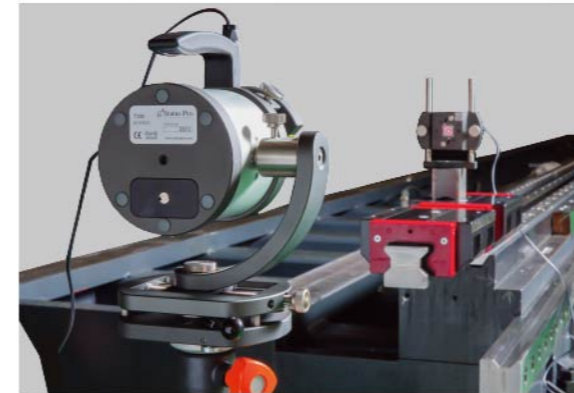
## Three-Dimensional Coordinate Measuring Machine

Chi-Fa is one of the few domestic manufacturers that have set up a large type three-dimensional coordinate measuring machine. It is especially suitable for parts inspection and calibration for a large machine, and provides true monitoring and improvement in quality.

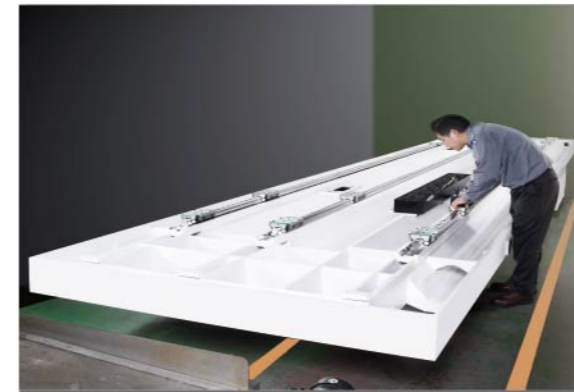
Q-VIDEO ▶



# Measurement



Straightness calibration with a laser unit is a necessity during assembling a large machine, so as to ensure high accuracy movement on each exit. Chi-Fa always pays special attention to every detail by employing the highest standard level in the assembly of a double column machine.



During manufacturing process, calibration of each machine must by highly skilled technicians. With rigorous quality control throughout in combination with meticulous attitude, each machine from Chi-Fa will be guaranteed in rigorous and satisfactory quality.

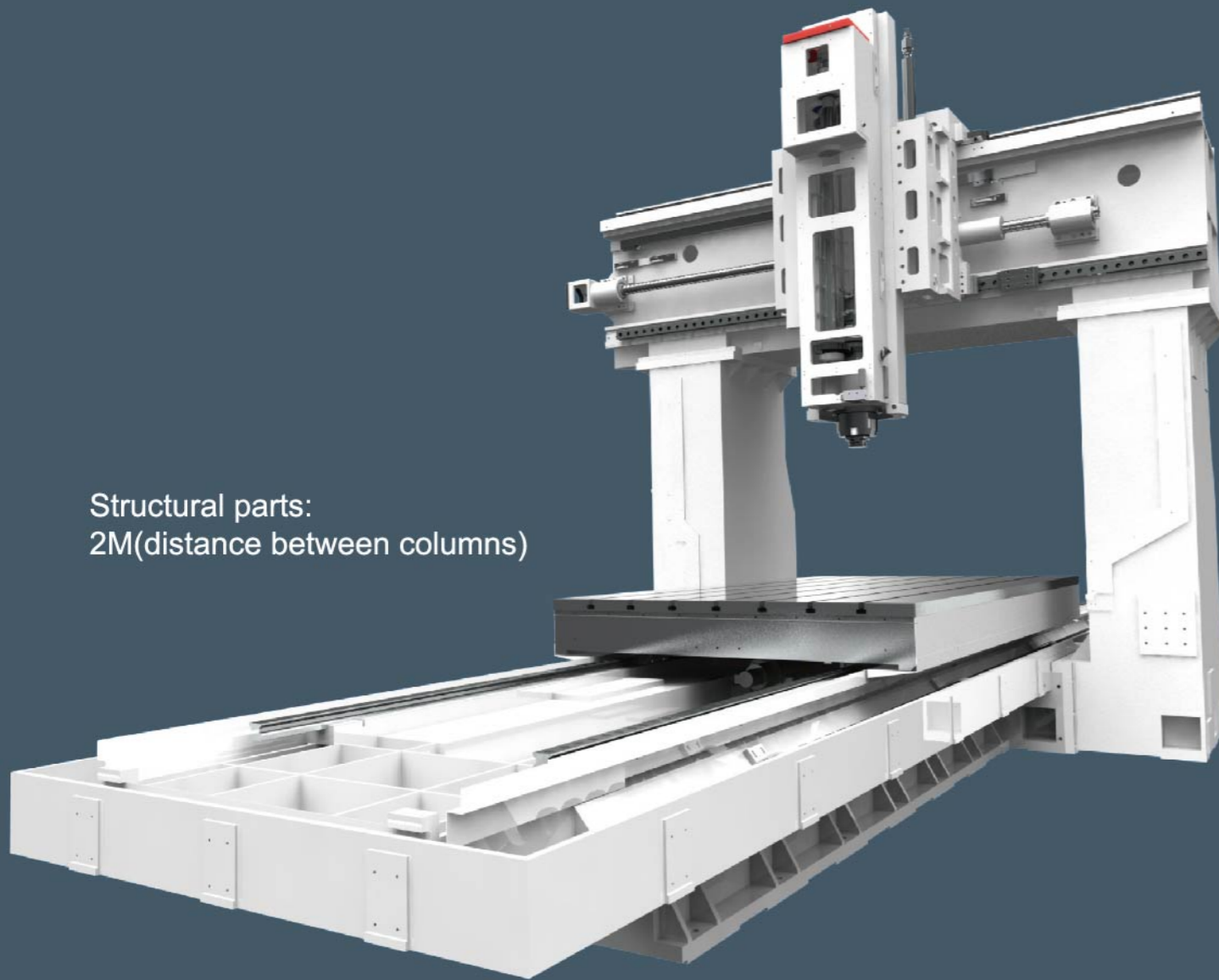


Spindle calibration may prevent a large machine from unnecessary power consumption and machine vibration under a heavy cutting condition. It also avoids parts wear, such as couplings, bearings and seals, etc. Each double column machine from Chi-Fa is subject to laser inspection and ball bar test prior to shipment for thorough control of quality.



Each double column machine is also subject rigorous dynamic cutting test prior to shipment so as to ensure its cutting performance meet customer's requirements. Chi-Fa always insists on quality, and we have no compromise and no negligence throughout the entire manufacturing process from parts machining to machine assembly.

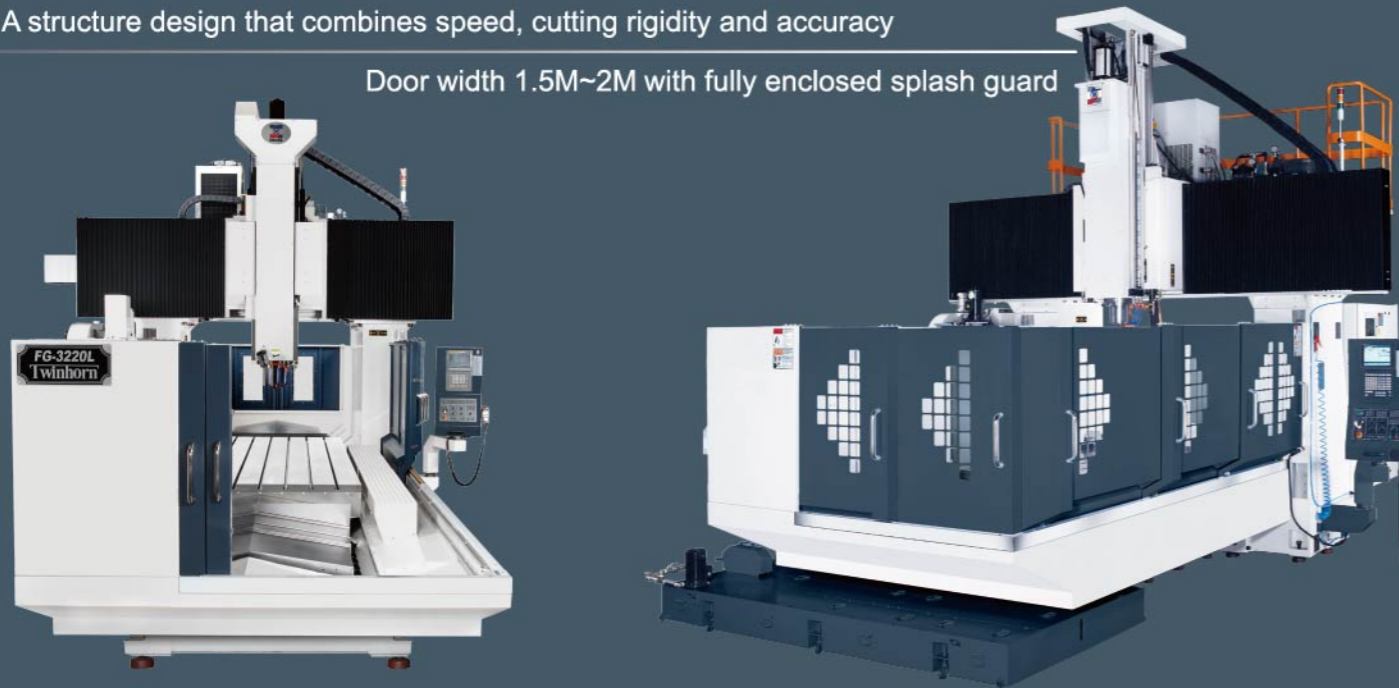
# Double Column Structure



Structural parts:  
2M(distance between columns)

A structure design that combines speed, cutting rigidity and accuracy

Door width 1.5M~2M with fully enclosed splash guard



# Super Structure

MODEL	UNIT	FG-2215L/LG	FG-2715L/LG	FG-3215L/LG	FG-4215L/LG
Table dimension	mm	2000x1200	2500 x1200	3200x1200	4200x1200
X-axis travel	mm	2200	2700	3200	4200
Y-axis travel	mm	1500			
Z-axis travel	mm	760			
Distance between columns	mm	1500			

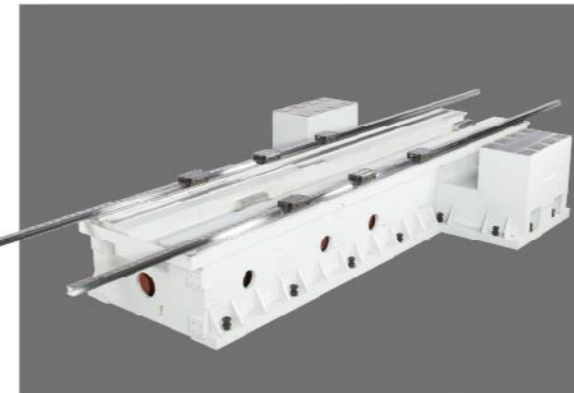
Structural Features of 1.5M Door Width: X-axis is fully supported by linear ways in its entire travel, resulting in a dramatic increase in structural stability and absorbing capacity. Box ways on Z-axis provides a solid support for the spindle head so as to offer great cutting capability.



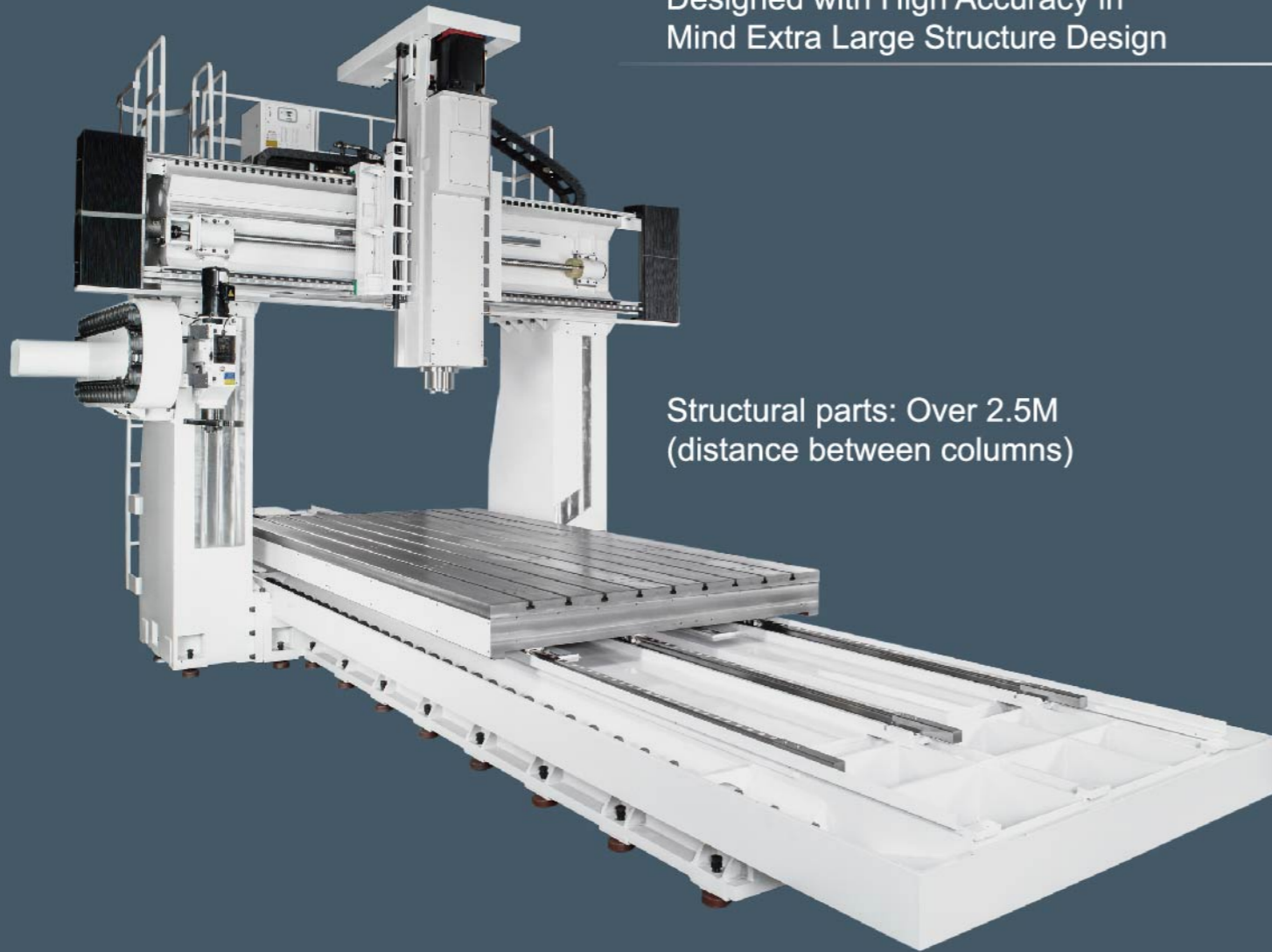
Z-axis box ways are widened for ultra high rigidity. The box type structure is designed with 3 x 4 layers sectional ribs. Y-axis linear ways are deployed in horizontal and vertical planes with over 30% of strength than the conventional parallel layout. In addition, the axial movement is more stable and accurate



The cross beam is a reinforced honeycomb shaped structure design together with one-piece type door shaped columns for exhibiting outstanding rigidity and vibration absorbing performance. Two roller type precise linear ways on y-axis not only upgrades rigidity, but also reduces bending stress on the spindle head to a minimum.



X-axis slide ways are mounted with two rigid, precise linear ways with greater span between ways, leading to an increase in table loading capacity, higher axial moving accuracy for large workpiece and improved feeding rigidity.



Designed with High Accuracy in Mind Extra Large Structure Design

Structural parts: Over 2.5M (distance between columns)

Excellent for machining large parts, large molds and dies, mold bases and aerospace parts

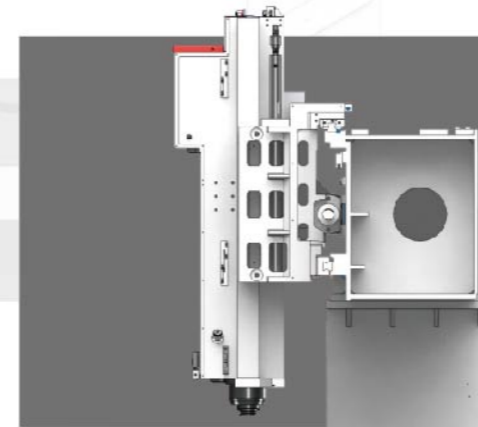
Door width 2.5M~3M with semi-enclosed splash guard.



MODEL	UNIT	FG-2220L/LG	FG-2720L/LG	FG-3220L/LG	FG-4220L /LG
Table dimension	mm	2000x1600	2500x1600	3000x1600	4000x1600
X-axis travel	mm	2200	2700	3200	4200
Y-axis travel	mm	2000			
Z-axis travel	mm	1000			
Distance between columns	mm	2000			

MODEL	UNIT	FG-3225L/LG	FG-4225L/LG	FG-5225L/LG	FG-6225L/LG	FG-4230L/LG	FG-5230L/LG	FG-6230L/LG
Table dimension	mm	3000x2000	4000x2000	5000x2000	6000x2000	4000x2500	5000x2500	6000x2500
X-axis travel	mm	3200	4200	5200	6200	4200	5200	6200
Y-axis travel	mm	2500				3000		
Z-axis travel	mm	1000				1000		
Distance between columns	mm	2500				3000		

Structural Features of Door Width Over 2M: A greater table area requires higher rigidity of column structure and linear ways/blocks to provide more efficient moving response and rigidity.



Two extra heavy duty roller type linear ways are fitted on Y-axis in combination with one mounted on the top and the other one mounted at the side, as a result an increase of rigidity in axial and radial directions are achieved. With 3 pieces of roller type blocks on the horizontal plane couples with 4 pieces of roller type blocks on the vertical plane, the combination of 3 pieces on the top and 4 pieces on the bottom will fully eliminate head tilting problem, and ensure long time machining accuracy and long service life of linear ways.



Enlarged and widened three pieces construction of the beam and columns with one-piece fabricated rigid make machining more stable. Both column bottoms have been widened to boost rigidity, providing excellent rigidity and absorbing performance especially when performing high cutting feedrates in heavy cutting.

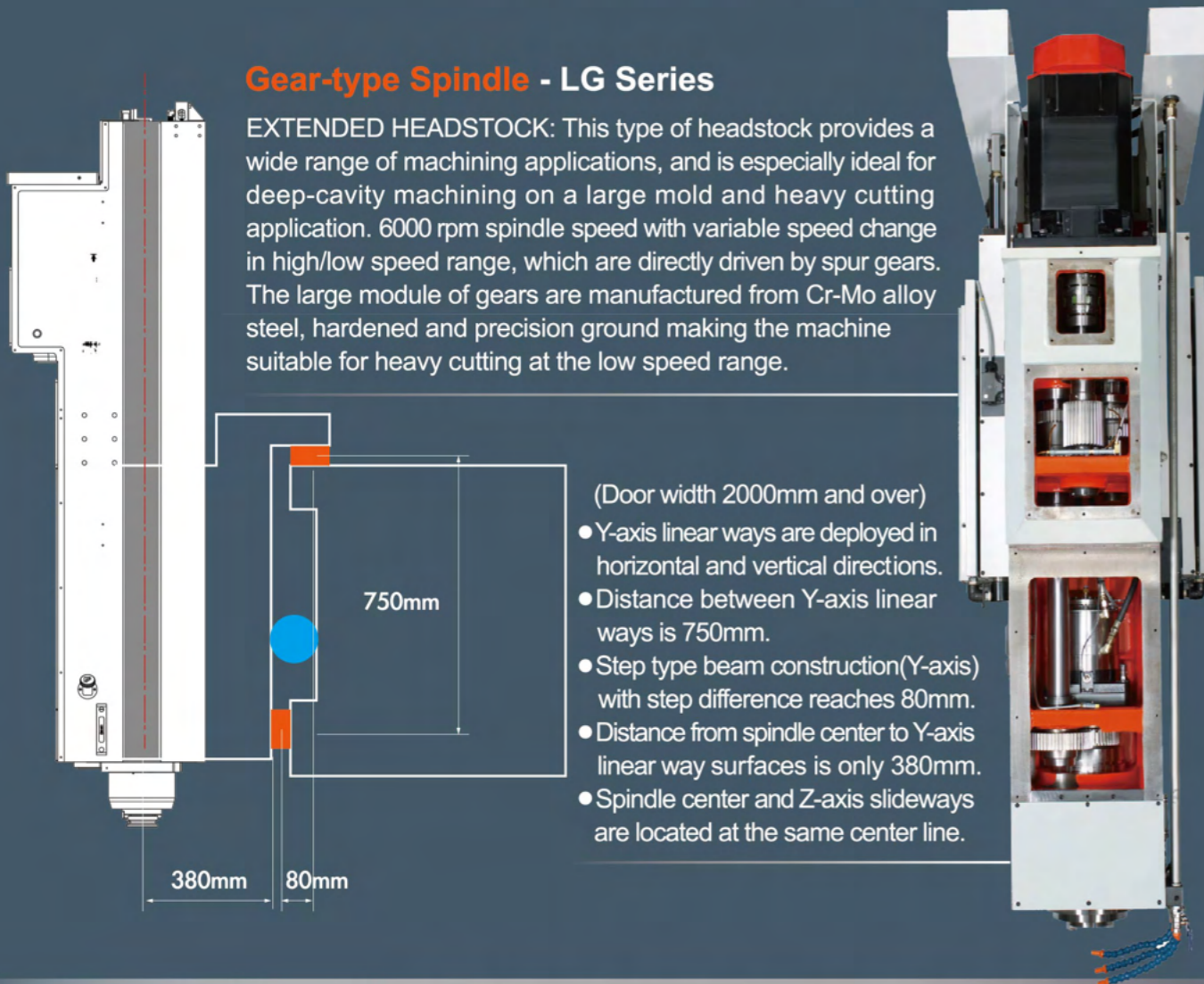


X-axis is mounted with three heavy duty, high precision and low friction roller type linear ways (two roller type linear ways for 2M models). Each linear way is equipped with several blocks with an aim to offer a solid support for the cutting travel, improve moving accuracy while saving energy consumption due to friction.

# Extra Powerful Spindle Head

## Gear-type Spindle - LG Series

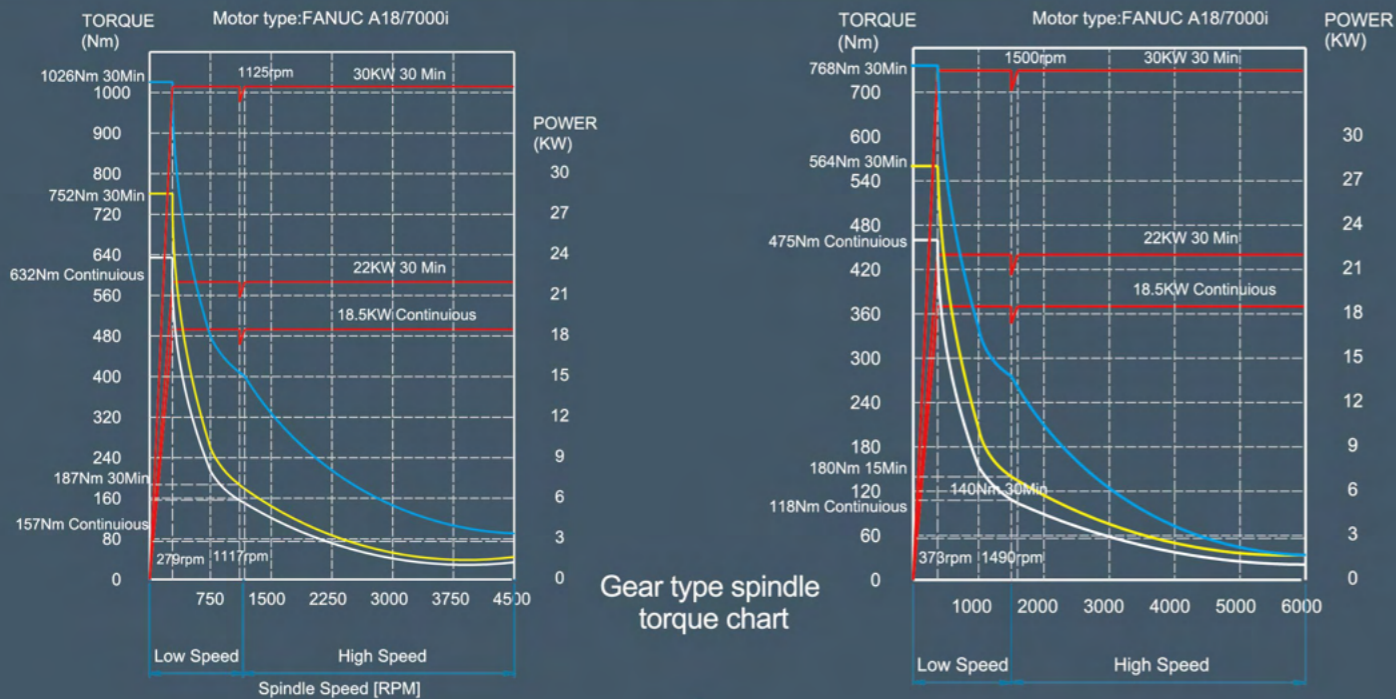
**EXTENDED HEADSTOCK:** This type of headstock provides a wide range of machining applications, and is especially ideal for deep-cavity machining on a large mold and heavy cutting application. 6000 rpm spindle speed with variable speed change in high/low speed range, which are directly driven by spur gears. The large module of gears are manufactured from Cr-Mo alloy steel, hardened and precision ground making the machine suitable for heavy cutting at the low speed range.



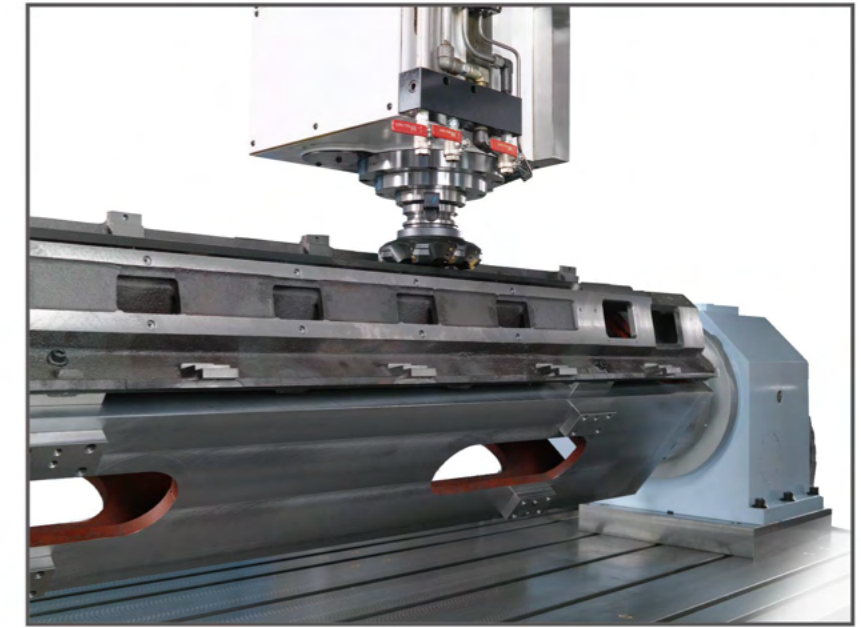
(Door width 2000mm and over)

- Y-axis linear ways are deployed in horizontal and vertical directions.
- Distance between Y-axis linear ways is 750mm.
- Step type beam construction (Y-axis) with step difference reaches 80mm.
- Distance from spindle center to Y-axis linear way surfaces is only 380mm.
- Spindle center and Z-axis slideways are located at the same center line.

Spindle Motor Torque Chart-LG Series Gear head BT-50



# Super Spindle



## Cutting Ability (Gear type spindle)

Face Milling	Workpiece material	S50C
	Spindle speed	420 RPM
	Feed rate	1,000 mm/min
	Cutting width	120 mm
	Cutting depth	6 mm
Material removal rate	720 cc/min	

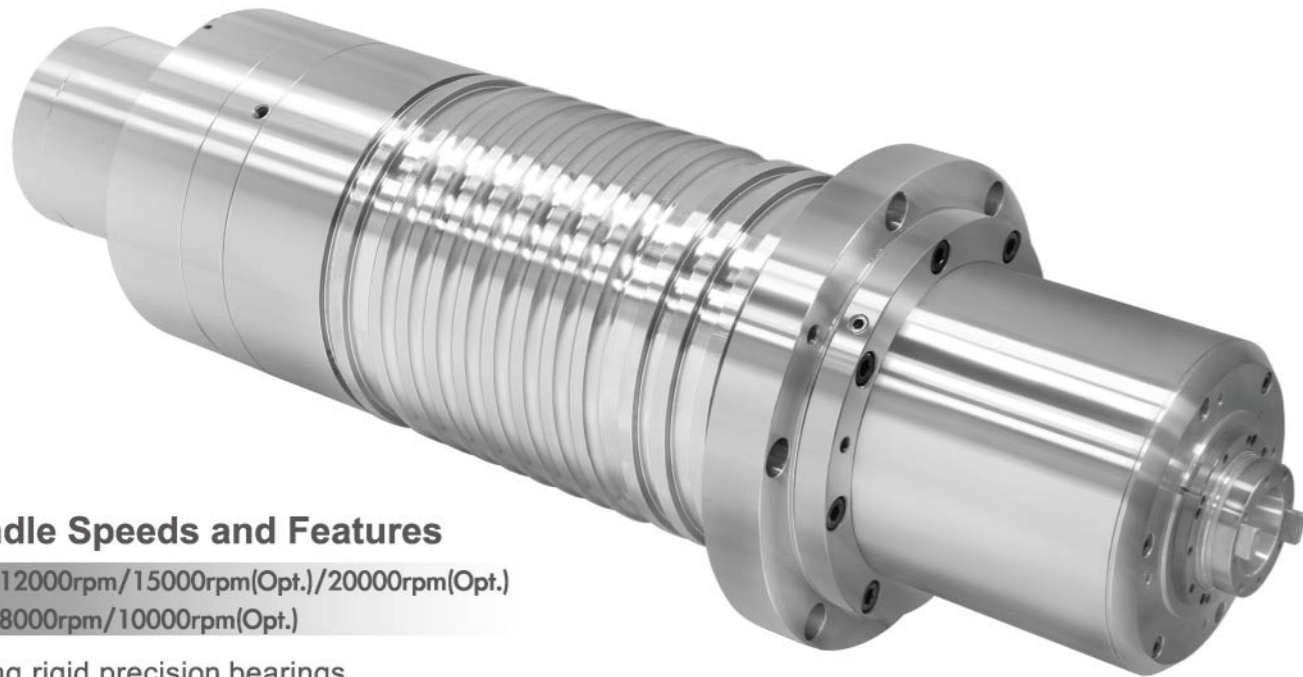
End Milling	Workpiece material	S50C
	Spindle speed	1500 RPM
	Feed rate	1,000 mm/min
	Cutting width	25mm
	Cutting depth	15 mm
Material removal rate	375 cc/min	

Drilling	Workpiece material	S50C
	Spindle speed	1300 RPM
	Feed rate	182 mm/mi
	Drill hole dia.	50 mm
	Material removal rate	375 cc/min

Tapping	Workpiece material	S50C
	Spindle speed	70RPM
	Feed rate	315 mm/min
	Tap	M45x4.5P

## Built-in Type Spindle BT40/50

Applicable for high speed, high accuracy machining



### Spindle Speeds and Features

BT-40 12000rpm/15000rpm(Opt.)/20000rpm(Opt.)  
BT-50 8000rpm/10000rpm(Opt.)

- Using rigid precision bearings
- Bearings are grease lubricated (Option: oil mist lubrication).
- The spindle uses external circulated oil cooling system.
- High precision, high rigidity and high power.
- Silent running and minimum vibration.

## Built-in type

### Quick Maintenance System



The front end of spindle can be removed quickly allowing maintenance to be accomplished in one hour. This reduces the loss of machine down caused by a spindle problem.

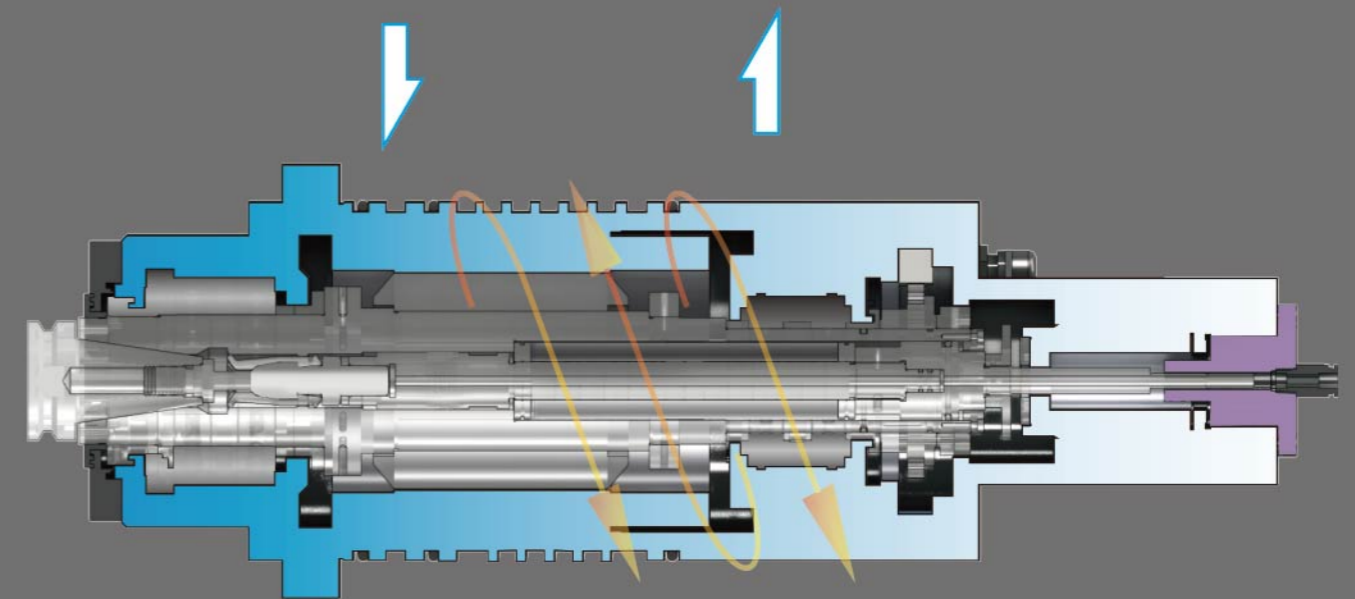


### Spindle Coolant System

With the use of the spindle oil cooler, the spindle temperature growth can be effectively suppressed by fast reducing working temperature in the spindle. It may avoid spindle center offset or thermal deformation, and thereby ensuring the machining accuracy.

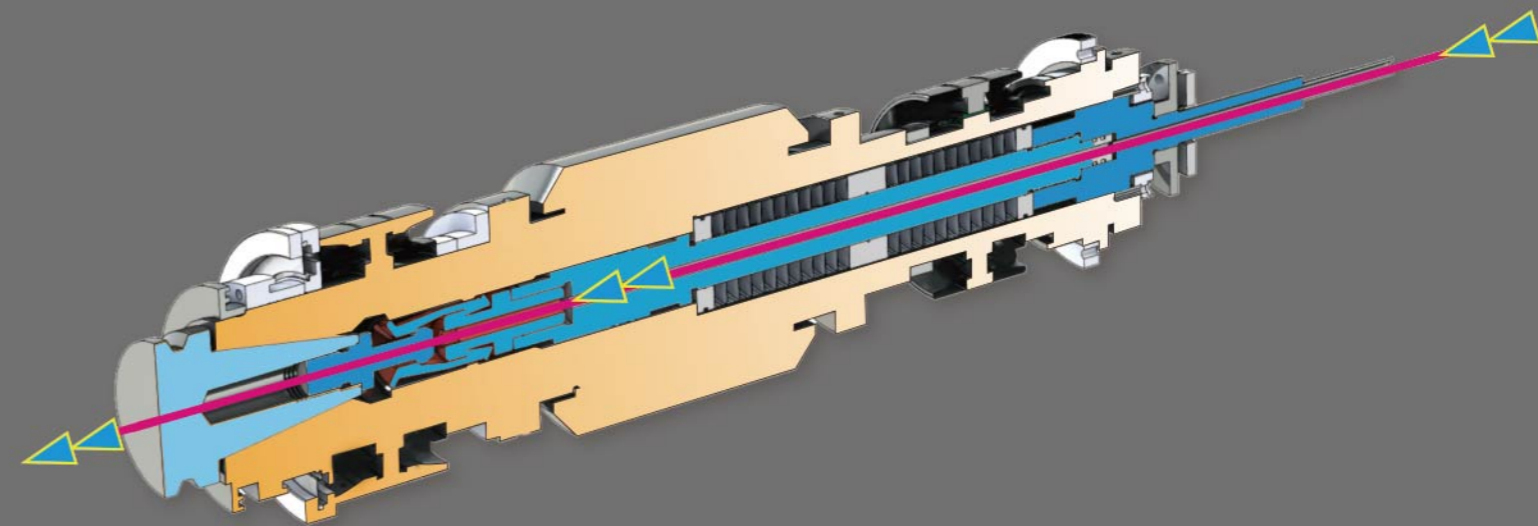
#### Control Of Thermal Errors And Compensation

Smart temperature detection and temperature growth feedback compensation control system

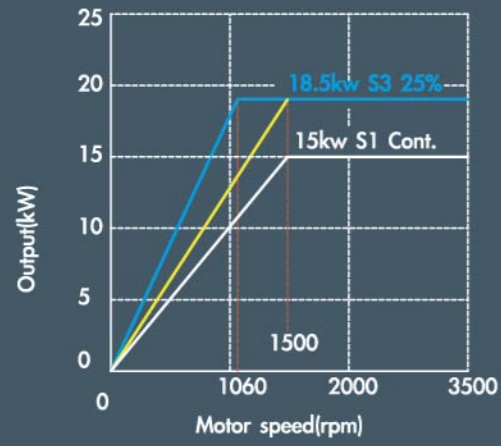


### Coolant Through Spindle (option)

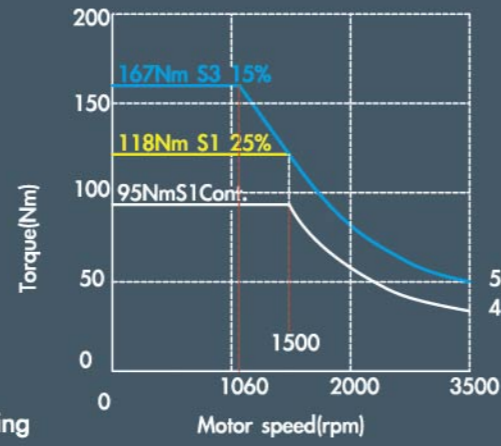
The coolant through spindle device has an independent coolant tank and filter system. Coolant is discharged from a high pressure pump, and flow through the spindle center and the tool to reach the cutting position. The coolant is capable of fast removing massive chips generated in drilling and tapping, to prevent chips from scratching on workpiece surfaces or damage to the cutting tool. Another benefits are reducing tool temperature, extending tool life and upgrading working efficiency.



### Spindle Motor Torque Built in Series BT-40 12000 rpm

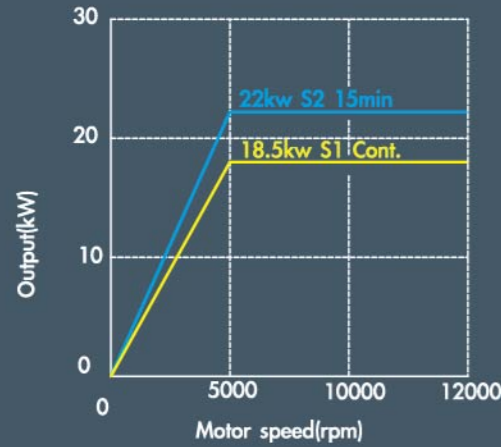


Low winding

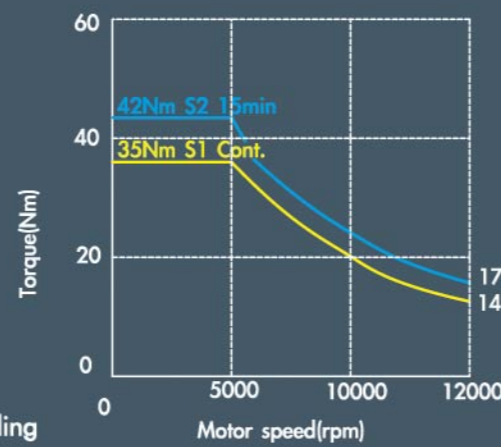


Motor speed(rpm)

Built-in Type Spindle Torque Diagram

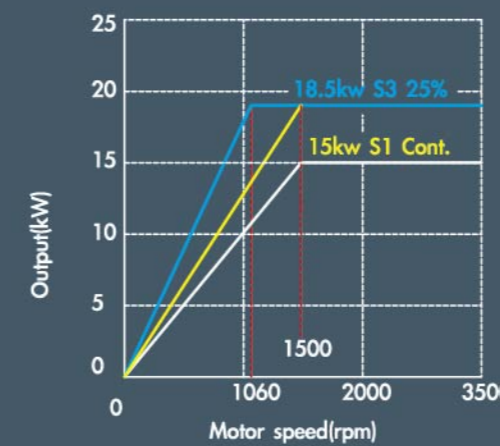


High winding

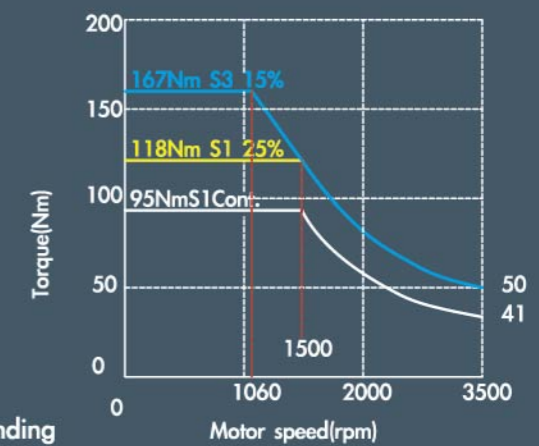


Motor speed(rpm)

### Spindle Motor Torque Built in Series BT-50 8000 rpm

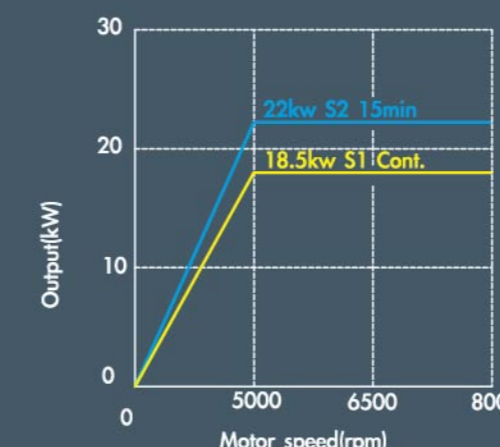


Low winding

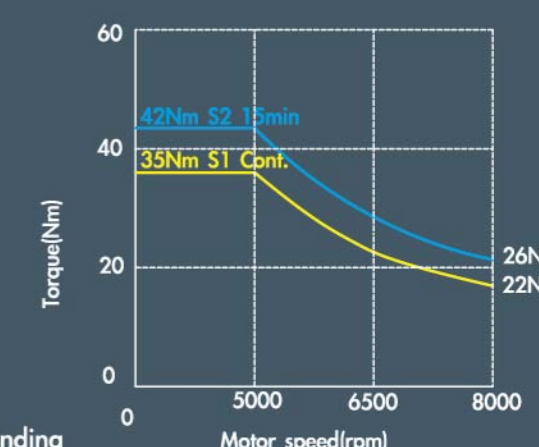


Motor speed(rpm)

Built-in Type Spindle Torque Diagram

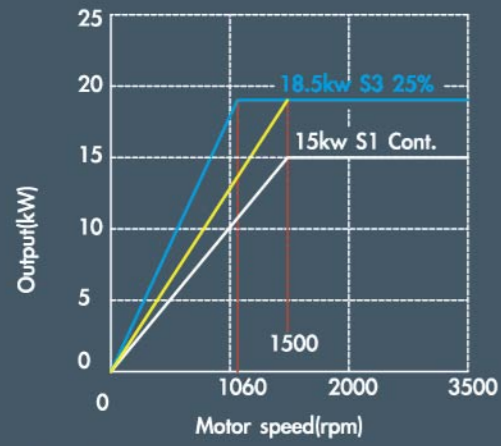


High winding

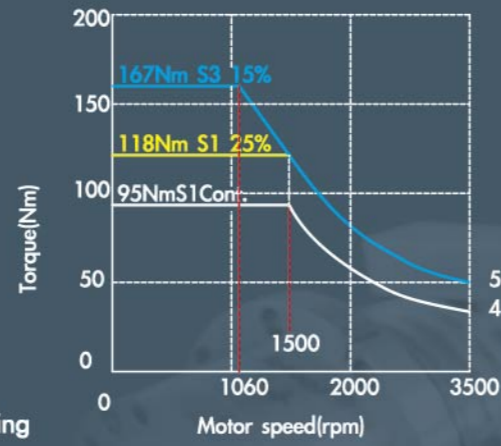


Motor speed(rpm)

### Spindle Motor Torque Built in Series BT-40 15000 rpm

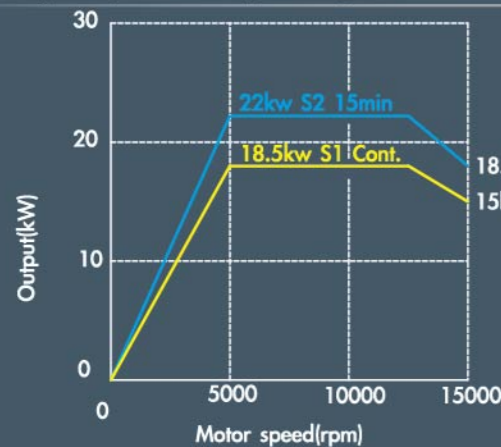


Low winding

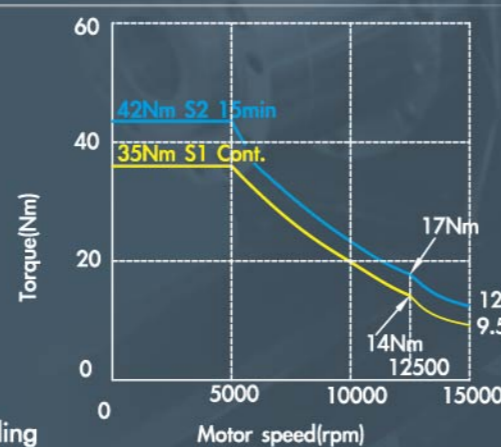


Motor speed(rpm)

Built-in Type Spindle Torque Diagram

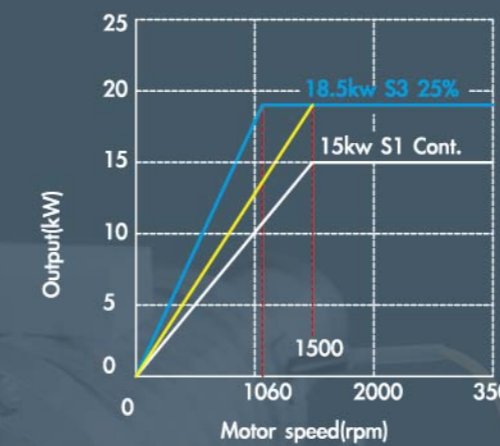


High winding

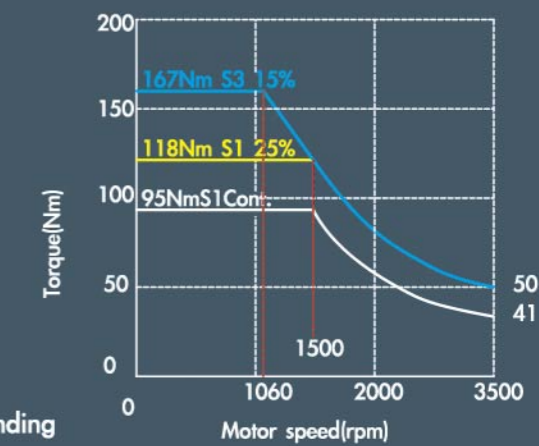


Motor speed(rpm)

### Spindle Motor Torque Built in Series BT-50 10000 rpm

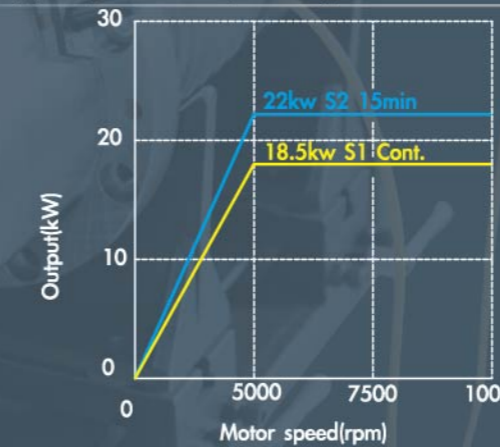


Low winding

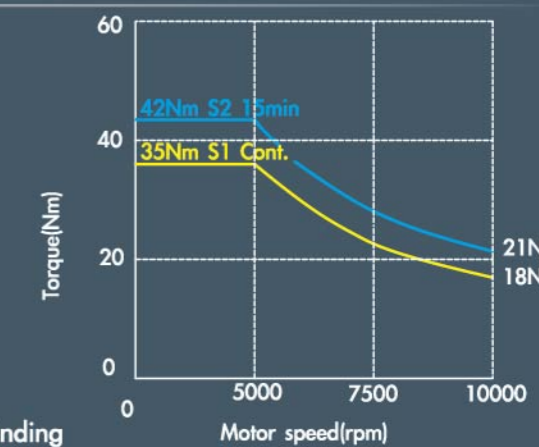


Motor speed(rpm)

Built-in Type Spindle Torque Diagram



High winding



Motor speed(rpm)



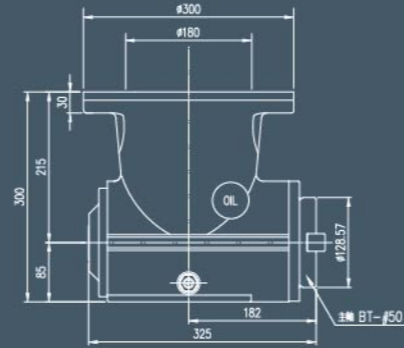
# Perfect Devices



## Five-Sided Machining Applications(option)

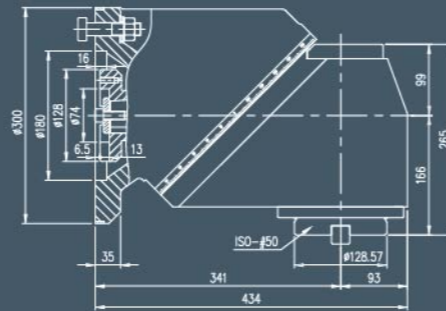
### 90° angle milling head

Tool clamp/unclamp	Manual
Head change	Manual
Max. power	38kw
Max. speed	2000rpm
Tool shank	BT50



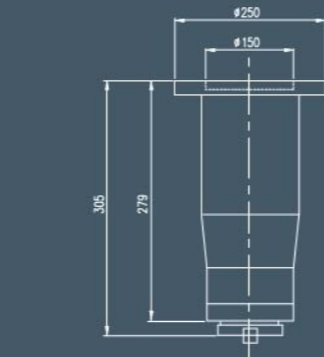
### Manual universal milling head

Tool clamp/unclamp	Manual
Head change	Manual
Max. power	42kw
Max. speed	1200rpm
Tool shank	BT50



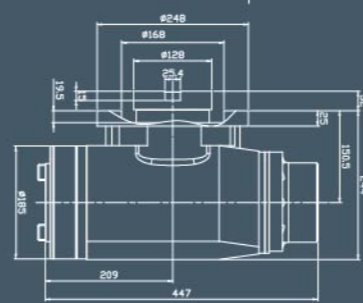
### Extension milling head

Tool clamp/unclamp	Manual
Head change	Manual
Max. power	38kw
Max. speed	2000rpm
Tool shank	BT50



### 90° angle auto indexing milling head

Tool clamp/unclamp	Manual
Head change	Manual
Auto indexing	5°
Max. power	40kw
Max. speed	3500rpm
Tool shank	BT50



## Measuring System (option)



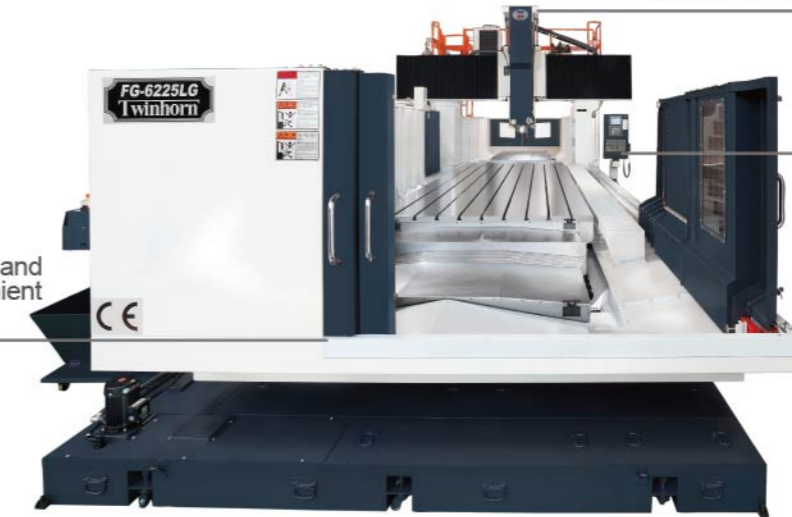
A. In-time Workpiece Measurement System: Allows for reducing product defect rate and increasing production efficiency.

B. Tool Measurement System: Capable of accurate feedback of tool consumed information and providing error compensation for dramatically upgrading machining accuracy and quality.

C. Available to use together with a contact or non-contact type laser inspection system for completely solving the problem of machining accuracy.

# Perfection

Hydraulic counter-balance for fast and sensitive response



Large swing type operation panel features personified design

The fast pulling door makes workpiece loading and unloading fast and convenient with added safety.

Legend: FG-6225LG

## Standard Features

### Maintenance Ladder

- The maintenance ladder provides convenience for machine maintenance and allows the operator to control the machine condition.
- The ladder is equipped with fences for protecting the safety of the maintenance personnel.

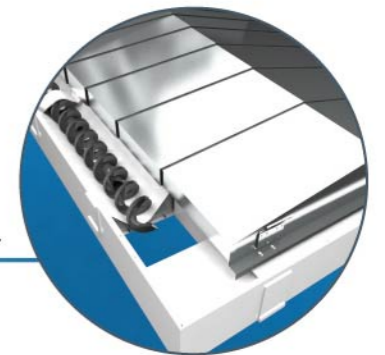


### Chain Type Chip Conveyor

- Featuring great chip delivery rate, high speed and high efficiency.
- Easy to move and clean.



Chip Auger: Great chip delivery rate and easy to clean.



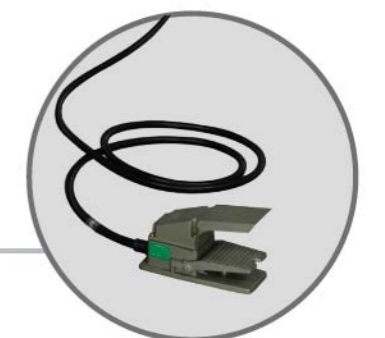
### 32 Tools Magazine

(option: 40/60 tools)

- Spindle tool clamp/unclamp motions are controlled by the foot switch.
- Convenient, fast, safe and no space-occupation.

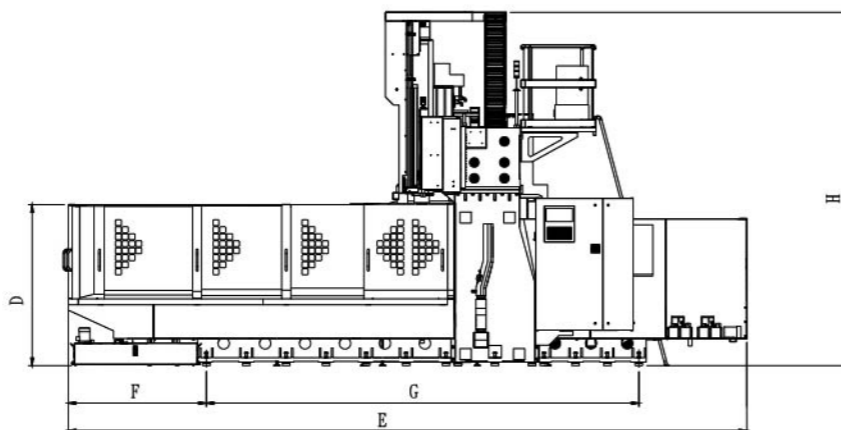
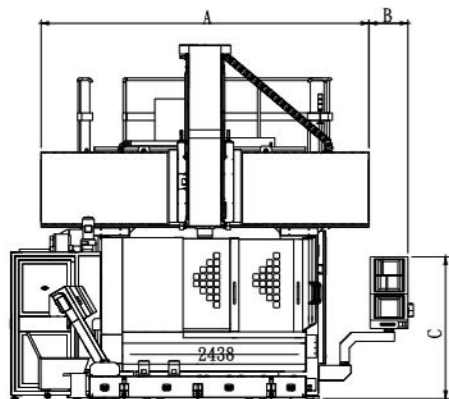
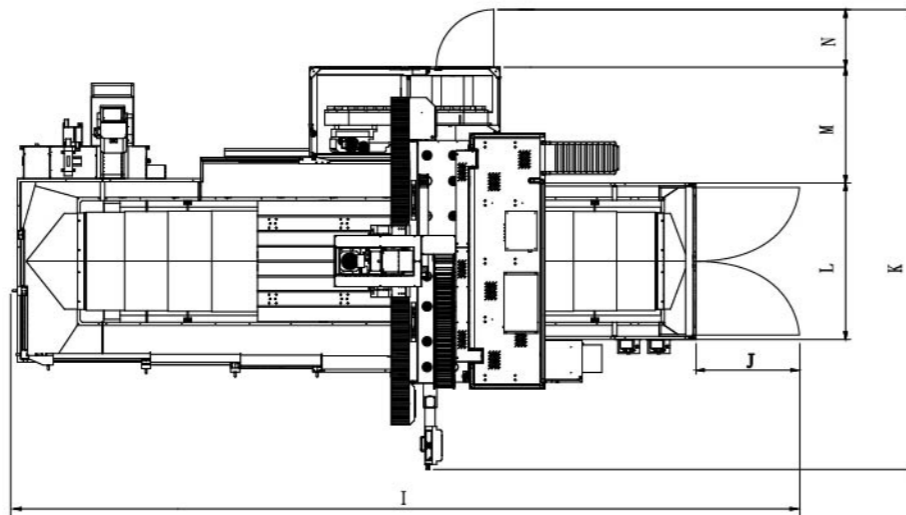
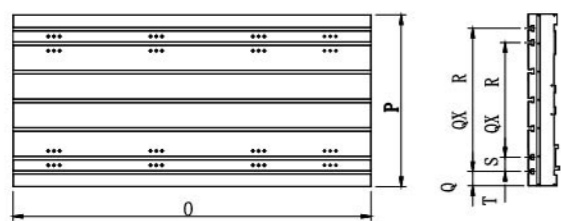
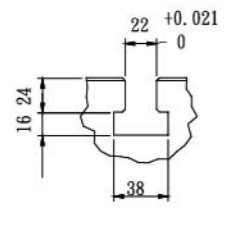


Foot Switch



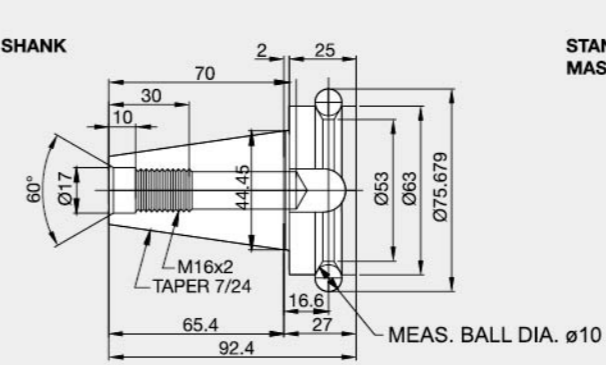
# Dimensional Drawings

MODEL	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	
FG -2215L/LG					6855	1870	3560	Max 3975	8855						2000						
FG -2715L/LG	3655	580	1880	1940	7970	1935	4530		9970	780	5340	1632	1434	780	2500	1200	100	4	200	100	
FG -3215L/LG					9278	2026	5660		11278						3200						
FG -4215L/LG					11701	2182	7760		13701						4200						
FG -2220L/LG									7072						1903						3780
FG -2720L/LG	4503	722	1880	2140	8073	1908	4735	10073	1000	6100	2112	1550	780	2500	3000	1600	200	6	200	-	
FG -3220L/LG					9073	1903	5740	11073						3000							
FG -4220L/LG					11193	2005	7670	13193						4000							
FG -5220L/LG					13313	2055	9600	15313						5000							
FG -3225L/LG					9070	1900	5740	Max 4990	12070					3000							
FG -4225L/LG	5013	600	2100	2050	11173	1998	7810		14173	1238	6550	2575	1537	780	4000	2000	200	8	200	-	
FG -5225L/LG					13422	2080	9790		16422						5000						
FG -6225L/LG					15672	2164	11770		18672						6000						
FG -4230L/LG									11200						2000						8000
FG -5230L/LG	5570	600	2100	2050	13500	2100	10000	17500	1450	7050	3075	1537	780	5000	2500	100	8	250	150		
FG -6230L/LG					15700	2200	11950	19700						6000							

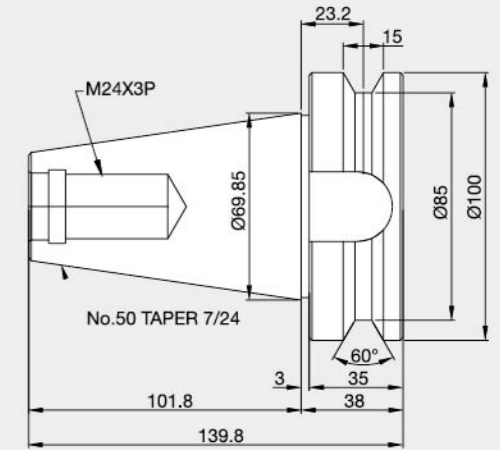


## Dimensional Drawings of Pull Stud and Tool Shank

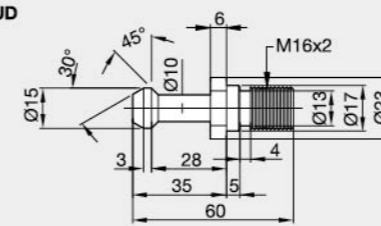
STANDARD TOOL SHANK  
MAS BT40



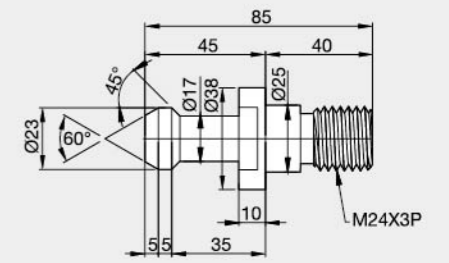
STANDARD TOOL SHANK  
MAS BT50



STANDARD PULL STUD  
MAS 403-P40T-1



STANDARD PULL STUD  
MAS 403-P50T-1



## NOTE

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# Machine Specifications

All machine specifications, accessories and machine appearance are subject to be changed without prior notice.

**FG-XX XX L/LG A B** A: X-axis travel ; B: Door width ; L: Built-in type spindle ; LG: Gear head

MODEL	UNIT	FG-2215L/LG	FG-2715L/LG	FG-3215L/LG	FG-4215L/LG	FG-2220L/LG	FG-2720L/LG	FG-3220L/LG	FG-4220L/LG
<b>TABLE</b>									
Table dimension	mm	2000× 1200	2500× 1200	3200×1200	4200×1200	2000×1600	2500×1600	3000×1600	4000×1600
T-slot(no. x width x pitch)		5× 22mm× 200mm + 2× 22mm× 100mm				7× 22mm× 200mm			
Max. table load	kg	4000	5000	6000	8000	8000	9000	10000	12000
<b>TRAVEL</b>									
X-axis	mm	2200	2700	3200	4200	2200	2700	3200	4200
Y-axis	mm	1500				2000			
Z-axis	mm	760				1000			
Distance from spindle nose to table	(L series ) mm	BT 40 : 130~890 (TH-230), BT 50 : 115~875 (TH-230)				BT 40 : 190 ~ 1190(TH-230), BT 50 : 175 ~ 1175(TH-230), 125 ~ 1125(TH-310)			
	(LG series ) mm	295 ~ 1055		285 ~ 1045		250 ~ 1250			
Distance between columns	mm	1500				2000			
<b>SPINDLE</b>									
Spindle taper	(L series ) (LG series )	BT 40 , BT 50 / DIN69871A (Option) BT 50 / DIN69871A (Option)				BT 40 , BT 50 / DIN69871A (Option) BT 50 / DIN69871A (Option)			
Spindle speed	(L series ) rpm (LG series ) rpm	Built-in type BT 40 : 12000, 15000 BT 50 : 8000, 10000				Built-in type BT 40 : 12000, 15000 BT 50 : 8000, 10000			
Spindle diameter	(L series ) mm (LG series ) mm	BT 40 : 70, BT 50 : 100 100				Two-step variable speed gear: 10~6000 rpm (option:10~4500 rpm) BT 40 : 70, BT 50: 100 100			
<b>FEED</b>									
Rapid feed rates(X)	m/min	20	15			20	15		
Rapid feed rates(Y/Z)	m/min	20 / 15				20 / 10			
Cutting feed rates (X/Y)	mm/min	1 - 10000				1 - 7500			
Ball screw dia. & pitch (X/Y/Z)	mm	ø50/45/45, P16/P10/P10		ø63/45/45, P25/P10/P10		ø80/45/45, P25/P10/P10		ø63/63/63, P25/16/10 ø80/63/63, P25/16/10	
Ball screw transmission (X/Y/Z)		Direct / Direct / Belt driven		Gear / Direct / Belt driven		Gear / Direct / Gear driven			
<b>ATC</b>									
Tool capacity	pcs	32 (Opt 40)				32 (Opt 40)			
Max. tool diameter(with/without adjacent tool)	mm	BT 40 : 75/125, BT 50 : 125 / 215				BT 40 : 75/125, BT 50 : 125 / 215			
Max. tool length	mm	BT 40 : 250, BT 50 : 350				BT 40 : 250, BT 50 : 350			
Max. tool weight	kg	BT 40 : 7, BT 50 : 20				BT 40 : 7, BT 50 : 20			
Pull stud		BT 40 : MAS403 P40T-1, BT 50 : MAS403 P50T-1				BT 40 : MAS403 P40T-1, BT 50 : MAS403 P50T-1			
<b>MOTOR</b>									
Spindle motor (cont./30min rating)	(L series ) kW (LG series ) kW	TH-230( αB112L) : 15/18.5 (Cont. / 15min) FANUC A18/7000i : 18.5/30 (Cont. / S3 25%) α B112L : 167 (S3 15%)				TH-230(α B112L) : 15/18.5 (Cont. / 15min) TH-310(α B160LL) : 15/22kW(Cont. / 10min) FANUC A18/7000i : 18.5/30 (Cont. / S3 25%) α B112L : 167 (S3 15%), α B160LL : 420 (S3 25%)			
Max. spindle torque	(L series ) Nm (LG series ) Nm	6000rpm : 769 (S3 25%) , (Opt. 4500rpm : 1026 (S3 25%) ) (F) 7/4/4 (A30/A22/A22B) (M) HF453S/HF354S/HF453BS				6000rpm : 769 (S3 25%) , (Opt. 4500rpm : 1026 (S3 25%) ) (F) 7/7/7(A30/A30/A30B) (M) HF453S/HF453S/HF453BS			
Feed motor (X/Y/Z)	kW	(F) 7/4/4 (A30/A22/A22B) (M) HF453S/HF354S/HF453BS				(F) 7/4/4(A30/A22/A22B) (M) HF453S/HF354S/HF453BS			
Cutting fluid pump motor	kW	0.75				0.75			
<b>ACCURACY</b>									
Positioning (JIS6338)	mm	± 0.005/300 mm, ± 0.015 total length				± 0.005/300 mm, ± 0.015 total length			
Positioning (VDI3441)	mm	P 0.020	P 0.025		P 0.030	P 0.020	P 0.025		P 0.030
Repeatability (JIS6338)	mm	± 0.003				± 0.003			
Repeatability (VDI3441)	mm	Ps 0.015	Ps 0.020		Ps 0.025	Ps 0.015	Ps 0.020		Ps 0.025
<b>OTHERS</b>									
Power required		50 kVA, 220V, 3 phase 50/60				50 kVA, 220V, 3 phase 50/60			
Air pressure required	kg/cm <sup>2</sup>	5				5			
Coolant tank capacity	liter	380	500			550			
Linear ways(X/Y/Z)		X: 2 ball type linear ways, Y: 2 roller type linear ways, Z: box ways				X/Y: 2 roller type linear ways, Z: box ways			
Machine dimensions (L)	mm	6230	7230	8230	10260	6300	7300	8300	10500
Machine dimensions (WxH)	mm	4430 x 3975				4950 x 5100			
Machine weight	kg	13000	19000	22000	26000	23000	25000	28000	33000

## Standard Accessories

- Spindle oil cooler
- Enclosed splash guard
- Centralized automatic lubrication system
- Coolant system
- Chip auger and chain type chip conveyor with cart
- Arm type 32 tools magazine
- Rigid tapping
- Working lamp
- Operation indication lamp
- Automatic tool unclamp foot switch
- RS-232 interface
- Leveling bolts and pads
- Remote MPG
- Heat exchanger for electrical cabinet
- Automatic power off(M30)
- Tool box with adjustment tools
- Operation manual

## Optional Accessories

- Fully enclosed splash guard
- 3 axes linear scales
- NC rotary table
- Auto tool length measurement device
- Auto workpiece measurement device
- Coolant through tool holder device (LG series)
- Manual 90° angle milling head (LG series)
- Manual universal milling head (LG series)
- Extension milling head (LG series)
- 90° angle auto indexing milling head (LG series)
- Transformer
- 4500 rpm two-step variable speed gear head (LG series)
- Oil skimmer
- Arm type 40 tools magazine
- Coolant through spindle device

# Machine Specifications

All machine specifications, accessories and machine appearance are subject to be changed without prior notice.

**FG-XX XX L/LG A B** A: X-axis travel ; B: Door width ; L: Built-in type spindle ; LG: Gear head

MODEL	UNIT	FG-3225L/LG	FG-4225L/LG	FG-5225L/LG	FG-6225L/LG	FG-4230L/LG	FG-5230L/LG	FG-6230L/LG
<b>TABLE</b>								
Table dimension	mm	3000× 2000	4000× 2000	5000× 2000	6000× 2000	4000× 2500	5000× 2500	6000× 2500
T-slot(no. x width x pitch)		9× 22mm× 200mm			9× 28 mm× 250mm+2x28mmx150mm			
Max. table load	kg	12000	15000	18000	20000	18000	22000	25000
<b>TRAVEL</b>								
X-axis	mm	3200	4200	5200	6200	4200	5200	6200
Y-axis	mm	2500			3000			
Z-axis	mm	1000			1000			
Distance from spindle nose to table	(L series ) (LG series )	BT 40 : 190 ~ 1190 (TH-230), BT 50 : 175 ~ 1175 (TH-230) , 125~1125 (TH-310)			BT 50 : 175 ~ 1175 (TH-230), 125 ~ 1125 (TH-310)			
Distance between columns	mm	250 ~ 1250			250 ~ 1250			
<b>SPINDLE</b>								
Spindle taper	(L series ) (LG series )	BT 40 , BT 50 / DIN69871A (Option)			BT 50 / DIN69871A (Option)			
Spindle speed	(L series ) (LG series )	Built-in type BT 40 : 12000, 15000 BT 50 : 8000 , 10000			Built-in type 8000 , 10000			
Spindle diameter	(L series ) (LG series )	100			100			
<b>FEED</b>								
Rapid feed rates(X)	m/min	15		15	12	15	15	12
Rapid feed rates(Y/Z)	m/min	15 / 10			15 / 10			
Cutting feed rates (X/Y)	mm/min	1 - 7500			1 - 7500			
Ball screw dia. & pitch (X/Y/Z)	mm	ø63/63/63, P25/16/10	ø80/63/63, P25/16/10	ø80/63/63, P40/16/10	ø80/63/63, P40/16/10	ø80/63/63, P25/20/10	ø80/63/63, P40/20/10	ø80/63/63, P40/20/10
Ball screw transmission (X/Y/Z)		Direct / Gear driven			Gear driven			
<b>ATC</b>								
Tool capacity	pcs	32 (Opt 40)			32 (Opt 40)			
Max. tool diameter(with/without adjacent tool)	mm	BT 40 : 75/125 , BT 50 : 125 / 215			125 / 215			
Max. tool length	mm	BT 40 : 250 , BT 50 : 400			400			
Max. tool weight	kg	BT 40 : 7 , BT 50 : 20			20			
Pull stud		BT 40 : MAS403 P40T-1 , BT 50 : MAS403 P50T-1			MAS403 P50T-1			
<b>MOTOR</b>								
Spindle motor (cont./30min rating)	(L series ) (LG series )	TH-230(α B112L) : 15/18.5 (Cont. / 15min) TH-310(α B160LL) : 15/22(Cont. / 10min)			TH-230(α B112L) : 15/18.5 (Cont. / 15min) TH-310(α B160LL) : 15/22 (Cont. / 10min)			
Max. spindle torque	(L series ) (LG series )	FANUC A18/7000i : 18.5/30 (Cont. / S3 25%) α B112L : 167 (S3 15%), α B160LL : 420 (S3 25%) 6000rpm : 769 (S3 25%) , (Opt. 4500rpm : 1026 (S3 25%) )			FANUC A18/7000i : 18.5/30 (Cont. / S3 25%) α B112L : 167 (S3 15%), α B160LL : 420 (S3 25%) 6000rpm : 769 (S3 25%) , (Opt. 4500rpm : 1026 (S3 25%) )			
Feed motor (X/Y/Z)	kW	(F) 6/7/7 (A40/A30/A30B) (M) HF703S/HF453S/HF453BS			(F) 6/7/7 (A40/A30/A30B) (M) HF703S/HF453S/HF453BS			
Cutting fluid pump motor	kW	0.75			0.75			
<b>ACCURACY</b>								
Positioning (JIS6338)	mm	± 0.005/300 mm, ± 0.015 total length			± 0.005/300 mm, ± 0.015 total length			
Positioning (VDI3441)	mm	P 0.025	P 0.030	P 0.040	P 0.050	P 0.025	P 0.030	P 0.040
Repeatability (JIS6338)	mm	± 0.003			± 0.003			
Repeatability (VDI3441)	mm	Ps 0.020	Ps 0.025	Ps 0.030	Ps 0.035	Ps 0.020	Ps 0.025	Ps 0.030
<b>OTHERS</b>								
Power required		65 kVA, 220V, 3 phase 50/60			65 kVA, 220V, 3 phase 50/60			
Air pressure required	kg/cm <sup>2</sup>	5			5			
Coolant tank capacity	liter	660			750			
Linear ways(X/Y/Z)		X: 3 roller type linear ways Y: 2 roller type linear ways Z: box ways			X: 3 roller type linear ways Y: 2 roller type linear ways Z: box ways			
Machine dimensions (L)	mm	8365	10500	12550	14750	11000	13000	15000
Machine dimensions (WxH)	mm	5450x5100			5950x5250			
Machine weight	kg	33000	38000	45000	52000	43000	50000	57000

## Standard Accessories

- Spindle oil cooler
- Semi-enclosed splash guard
- Centralized automatic lubrication system
- Coolant system
- Chip auger and chain type chip conveyor with cart
- Arm type 32 tools magazine
- Rigid tapping
- Working lamp
- Operation indication lamp
- Automatic tool unclamp foot switch
- RS-232 interface
- Leveling bolts and pads
- Remote MPG
- Heat exchanger for electrical cabinet
- Automatic power off(M30)
- Tool box with adjustment tools
- Operation manual

## Optional Accessories

- Fully enclosed splash guard
- 3 axes linear scales
- NC rotary table
- Auto tool length measurement device
- Auto workpiece measurement device
- Coolant through tool holder device (LG series)
- Manual 90° angle milling head (LG series)
- Manual universal milling head (LG series)
- Extension milling head (LG series)
- 90° angle auto indexing milling head (LG series)
- Transformer
- 4500 rpm two-step variable speed gear head (LG series)
- Oil skimmer
- Arm type 40 tools magazine
- Coolant through spindle device