

VM2000 DOUBLE COLUMN CNC MACHINING CENTER



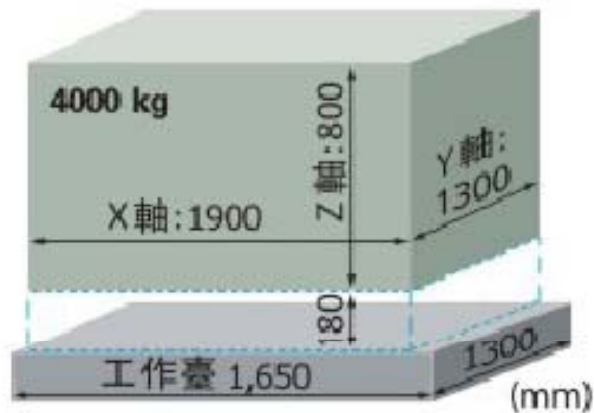
Version:TRJG-2018-A1



Supply the optimal solutions for customers by our professional technology

China-Germany investment

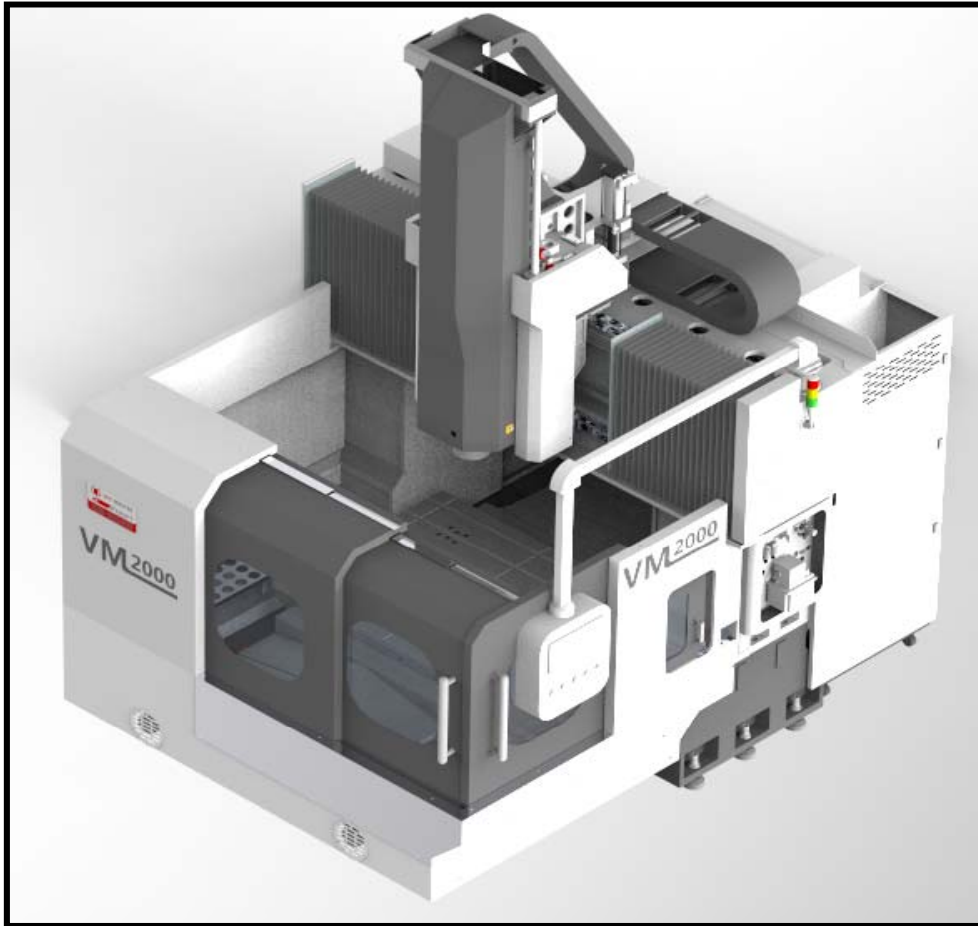
VM2000 technical parameter



※ We reserve the right to change technical parameter for improvement of our products without giving notice to customers.

Item			Unit	VM2000
Standard controller				FANUC Oi MF
Travel	X axis travel		mm	1900
	Y axis travel		mm	1300
	Z axis travel		mm	800
	Distance from spindle nose to table		mm	200-1000
	Distance between columns		mm	1822
	Work piece access height		mm	1000
Work table	Table size(length×width)		mm	1650×1300
	Max. table load		kg	4000
	T slot size (width×distance×quantity)		mm	22×180×7
Spindle	Spindle taper			BT50
	Max. spindle speed		rpm	6000 (direct driven)
	Spindle motor power (continual working/30mins)		kW	15 / 18.5
	Spindle torque		N.m	427/528
X/Y/Z	Rapid traverse (X axis)		mm/min	20000
	Rapid traverse (Y axis)		mm/min	20000
	Rapid traverse (Z axis)		mm/min	15000
	Cutting feed rate on X/Y/Z		mm/min	1-10000
ATC (Option)	ATC type			Arm type
	Tool capacity		pcs	24
	Max. tool diameter		mm	φ110 /φ220
	Max. tool length		mm	350
	Max. tool weight		kg	15
Accuracy	VDI/DGQ3441	Full travel positioning accuracy	mm	P0.015
		Repeatability accuracy	mm	Ps0.010
Air pressure			MPa	0.6-0.8
Supply voltage & frequency				3/PE , AC380V , 50Hz
Power requirement			kVA	40
Machine size(mm) (length)			mm	4632
Machine size(mm) (width)			mm	4802
Machine size(mm) (height)			mm	4480
Machine weight			kg	18000

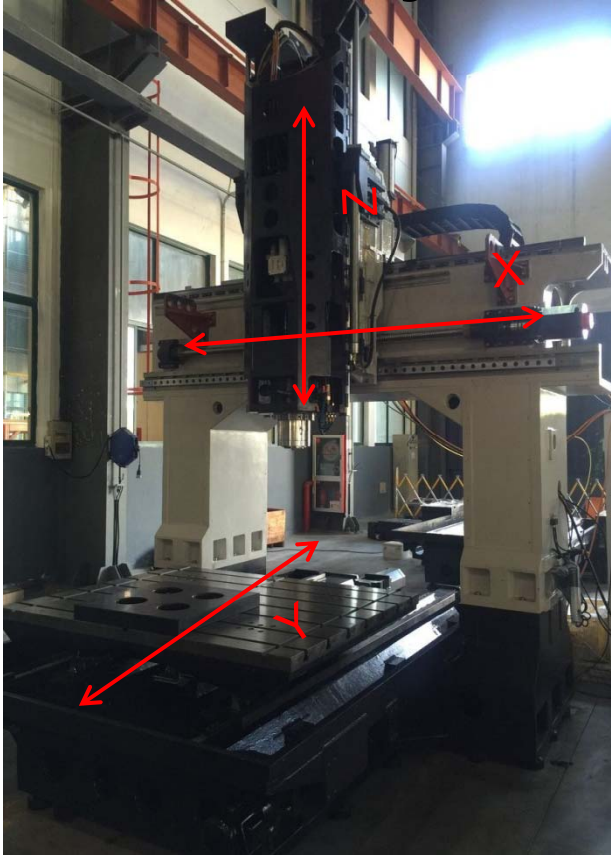
Machine features – whole machine



Apply to rough and finish machining for various parts such as plates and shell parts, mold, mold base and other parts.

1. High output torque and power, transmission performance parameters equal to or higher than benchmark products.
2. With high stability and low fault rate to improve production efficiency.
3. Machine was equipped with high quality components to maintain the operation stability, extend working life and reduce using cost.

Machine layout – main structure



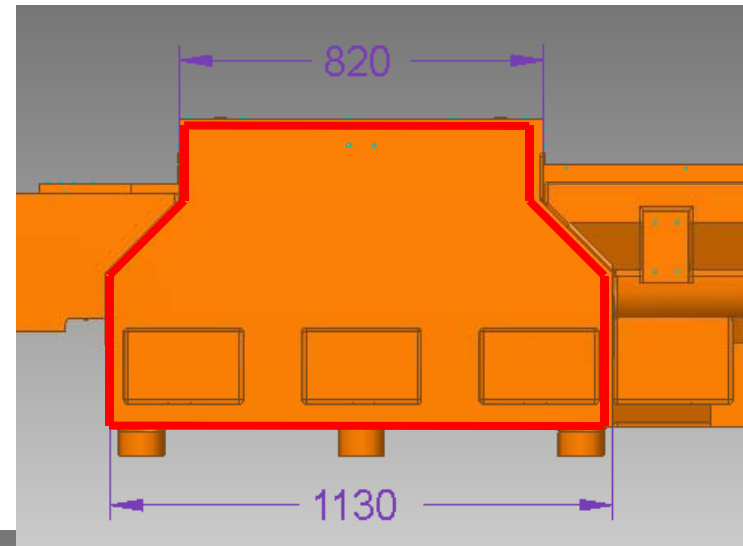
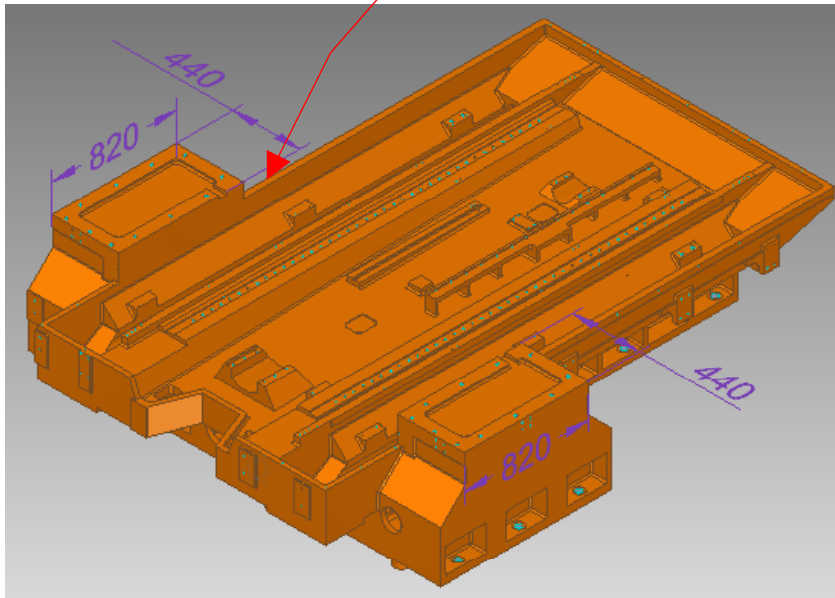
Worktable motion---Y axis
Slide saddle motion-----X axis
Spindle head motion---Z axis

- ◆ Double column machine with fixed beam
- ◆ Beam and column were casted into one-piece
- ◆ Reasonable machine layout to make operation more easy.
- ◆ Convenient for chip and coolant removal.

- ★ Adopting Germany's unique material ratio for machine die cast parts , the cost is 30% higher than .
- ★ Each casting is equipped with a test bar, through which the true material properties can be analyzed easily.
- ★ Adopting finite element analysis to ensure maximum rigidity of the machine .

Structure feature - base

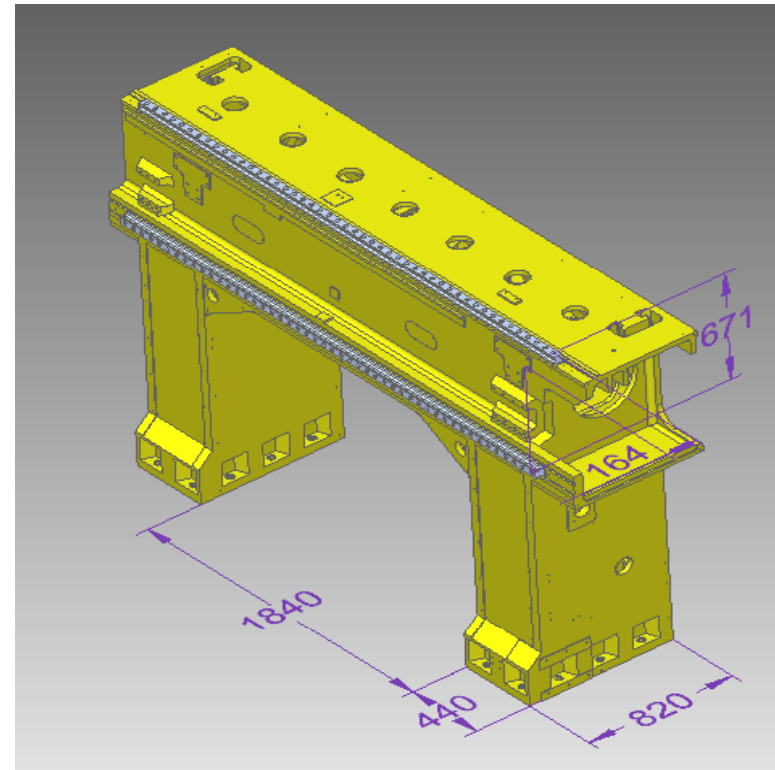
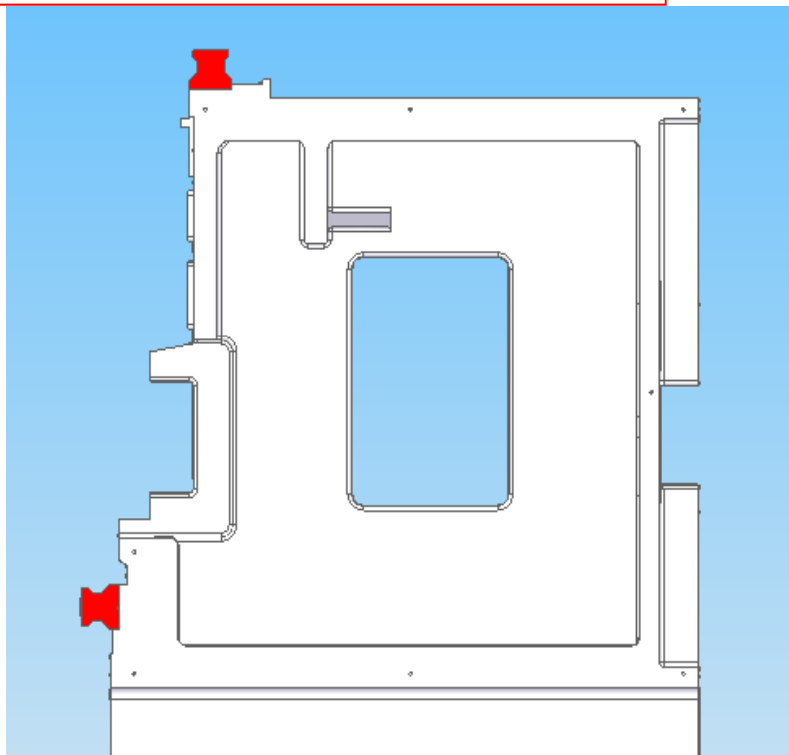
Large joint surface design for base and column to increase the stability of the machine.



Adopt a multi-layer rib reinforcement design for inner base and a triangular structure for column feet to achieve high rigidity and anti-deforming capability.

Structure feature - beam

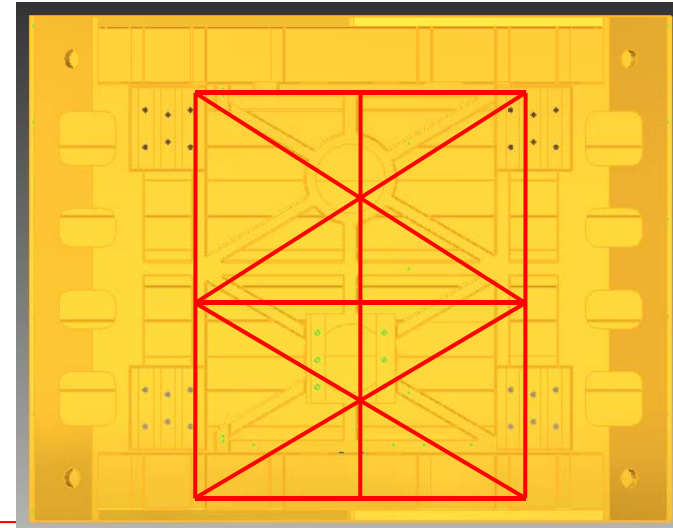
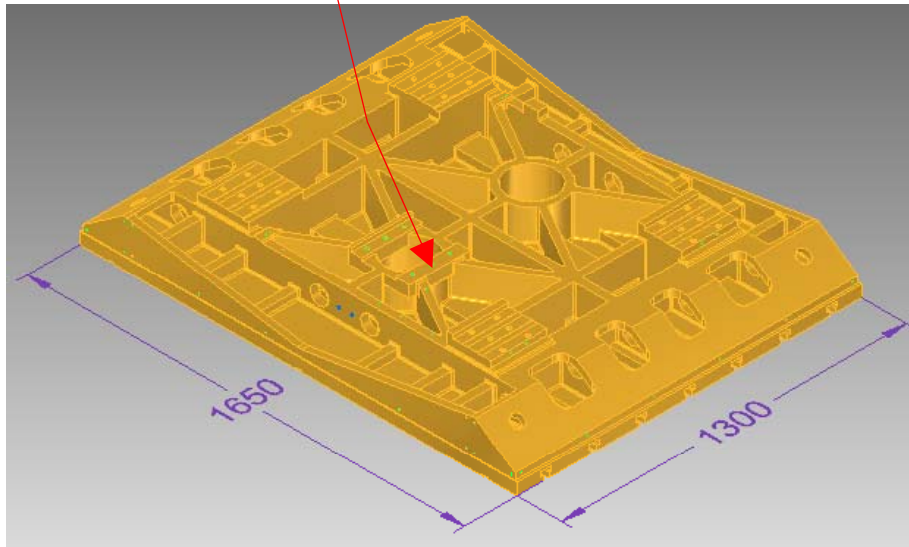
X axis' s slide way uses a laddering design for good cutting rigidity



Beam and column were integrate casted, good anti vibration ability, increase the stability for high-speed cutting

Structure feature - worktable

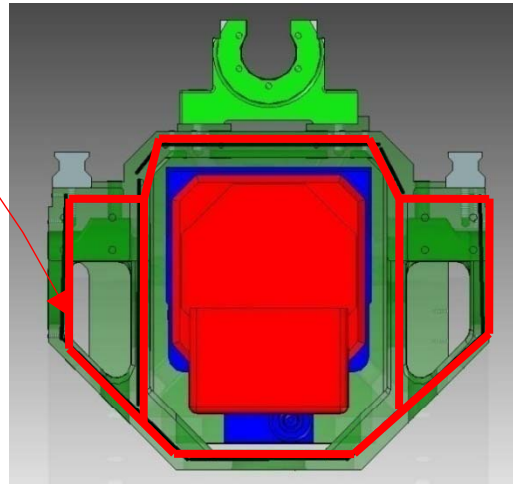
Y axis is equipped with heavy load and extended slide block, each slide block can carry max. 165KN of load, which ensure the optimal load capacity of worktable.



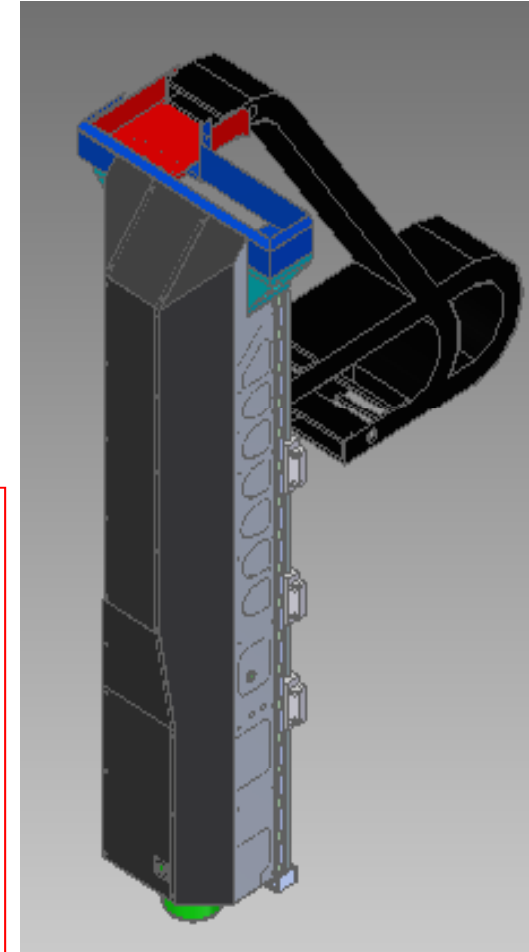
- ★ Adopt lightweight design for worktable, weight reduction about 100kg compares to other brands, improve the dynamic performance of the machine.
- ★ With *(asterisk)-shape rib structure, bearing stability, resistance to deformation

Structure feature – headstock

The headstock structure is designed with a multi-layer structure to provide excellent rigidity.



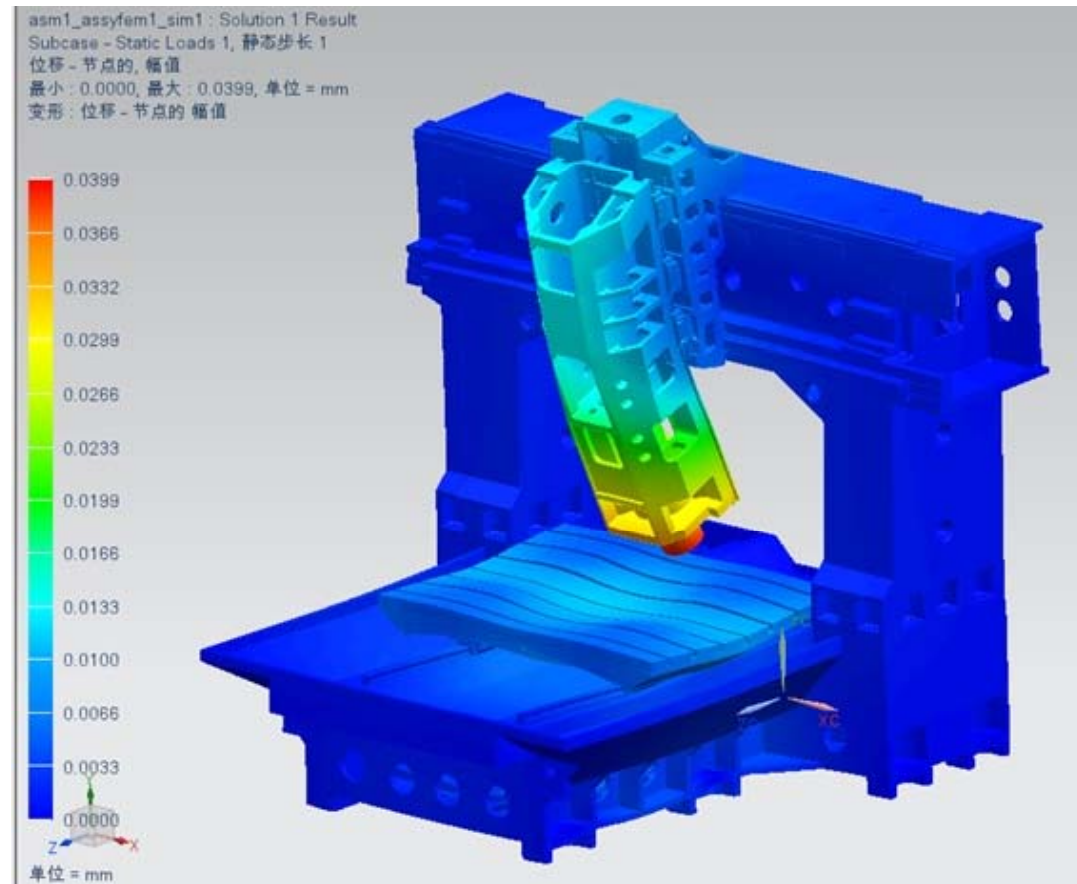
- ◆ The structure design of headstock is from German Kraft with FEA tested for good rigidity.
- ◆ Maximum spindle speed is 6000rpm, 10000rpm or 15000rpm, depends on the option.
- ◆ The headstock has a good and compact design, good anti-vibration ability while heavy cutting, provides an excellent rigidity for the whole machine.



Analysis and optimization - Force analysis diagram

Analyze condition:
With 6T weight on worktable,
headstock is at the lowest
position, add force from the
sideway of headstock

	Specified	Tested
Load	500kgf	800kgf
deformation	0.025mm	0.040mm

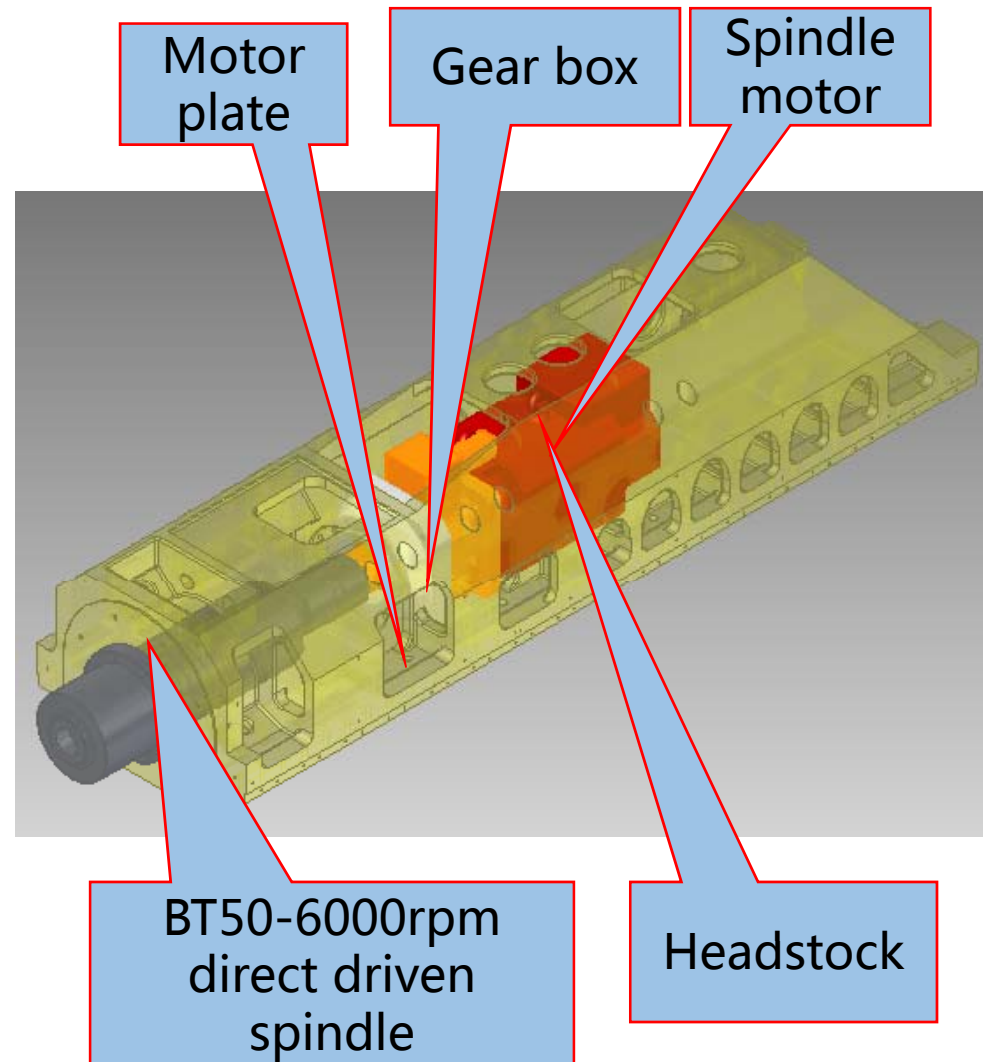


SETCO direct connection spindle 6000rpm

★ American SETCO is a company focus on designing and manufacturing high performance and high precision spindle.

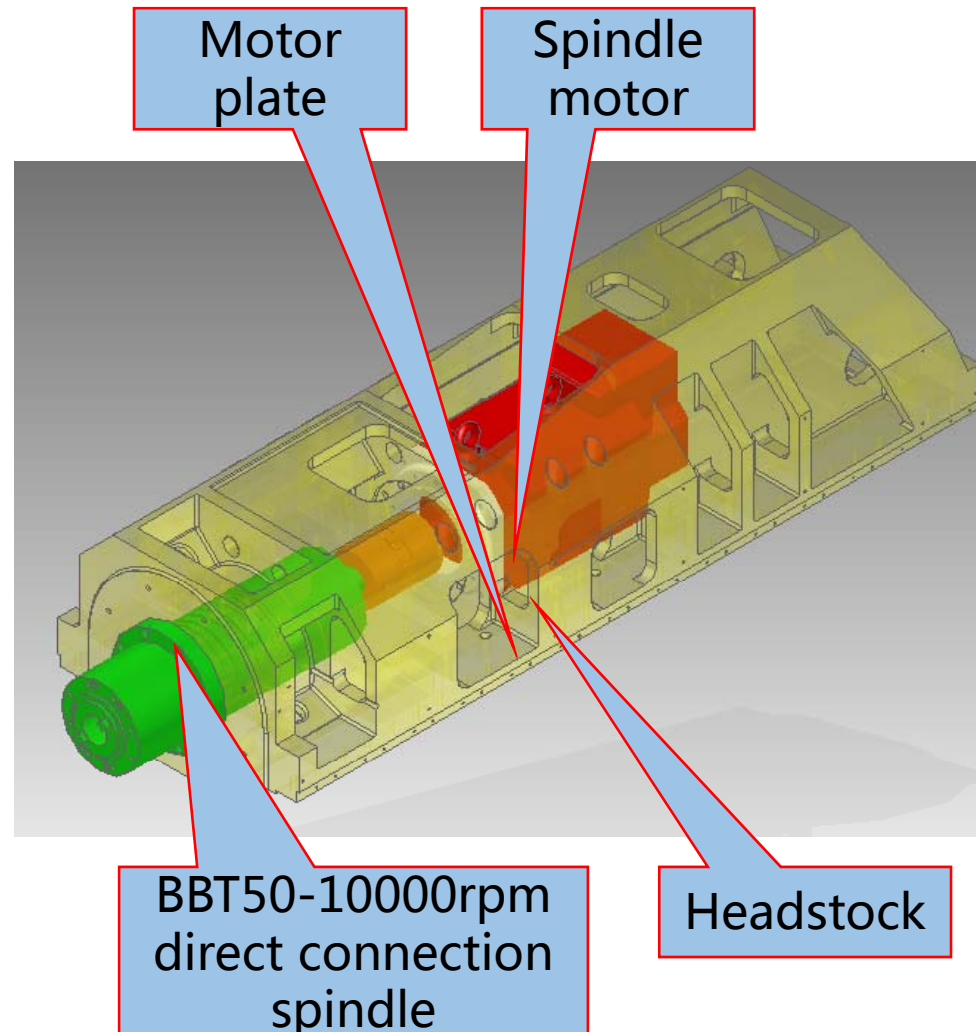
★ BT50 direct driven spindle with maximum spindle speed of 6000rpm, transmission ratio is 1:4.48, maximum output spindle torque is 528Nm.

★ The spindle motor is directly driven the spindle, reduce intermediate links, less vibration, increase the rotating precision and rapid response of spindle



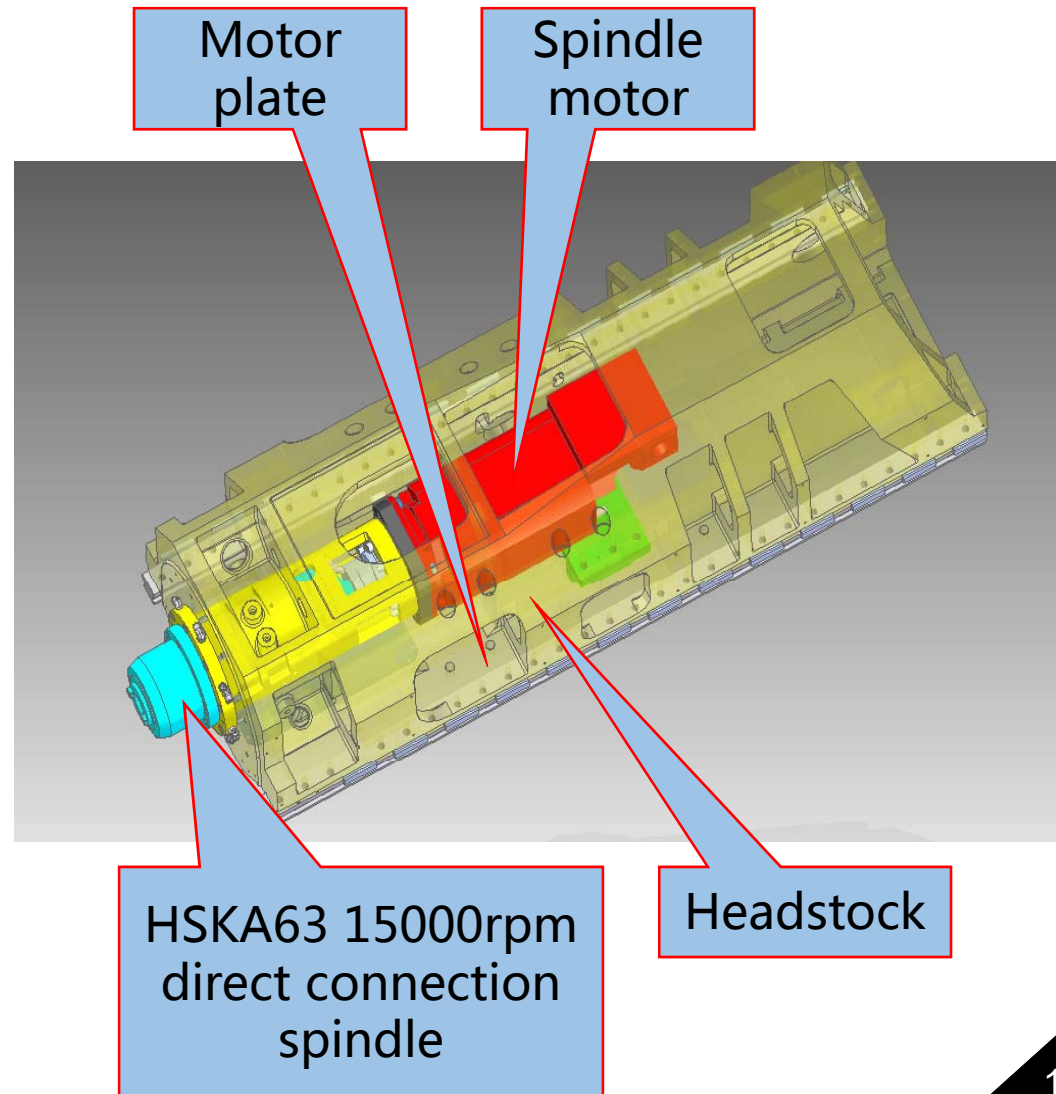
SETCO direct connection spindle 10000rpm

- ★ American SETCO is a company focus on designing and manufacturing high performance and high precision spindle.
- ★ BBT50 direct driven spindle with maximum spindle speed of 10000rpm, maximum output torque is 165Nm.
- ★ The spindle motor is directly connect to the spindle, reduce intermediate links, less vibration, increase the rotating precision and rapid response of spindle



SETCO direct connection spindle 15000rpm

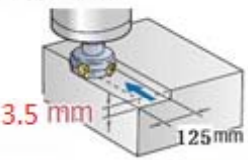
- ★ American SETCO is a company focus on designing and manufacturing high performance and high precision spindle.
- ★ HSKA63 direct driven spindle with maximum spindle speed of 15000rpm
- ★ The spindle motor is directly connect to the spindle, reduce intermediate links, less vibration, increase the rotating precision and rapid response of spindle



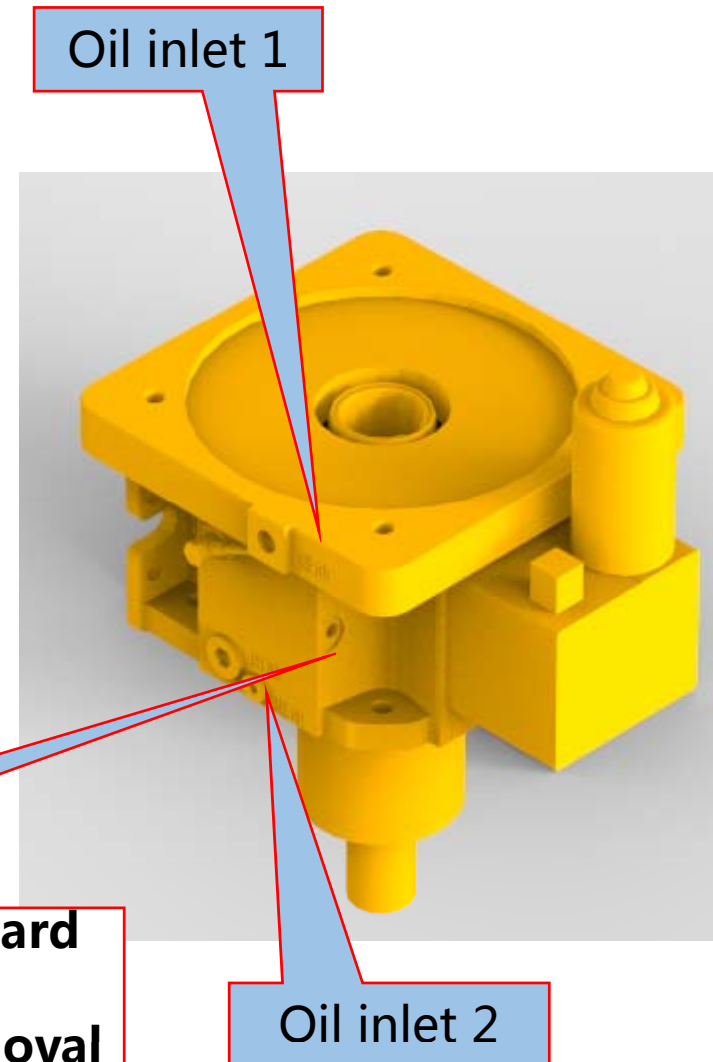
Italian BF Gearbox

BF gear box is imported straight from Italy, the main characteristics are listed below:

- ★ Easy to maintain, no need to warm up the gear shaft ;
- ★ maximum backlash is 15% less than ZF, gearbox vibration value is 30% less than ZF.
- ★ Gear box' s oil inlet and outlet are on the same side, easy to connect and maintain.

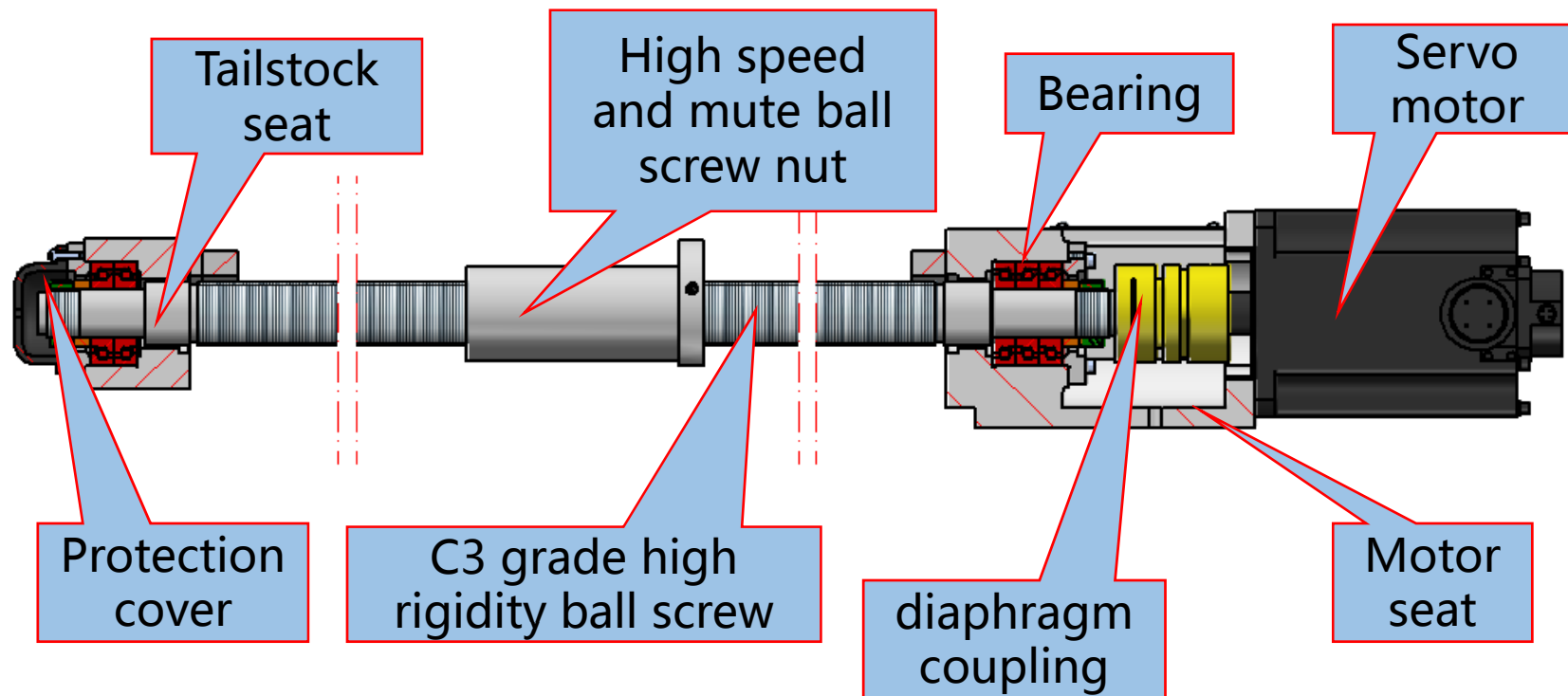
材料 45#钢	
• 160mm刀盘 8齿	
	
去除率	500 cm ³ /min
主轴转速	375 r/min
切削速度	1130 mm/min
主轴负载	112%

According to standard heavy cutting parameter, the removal rate can reach to **500cm³/min !**



PMI ball screw

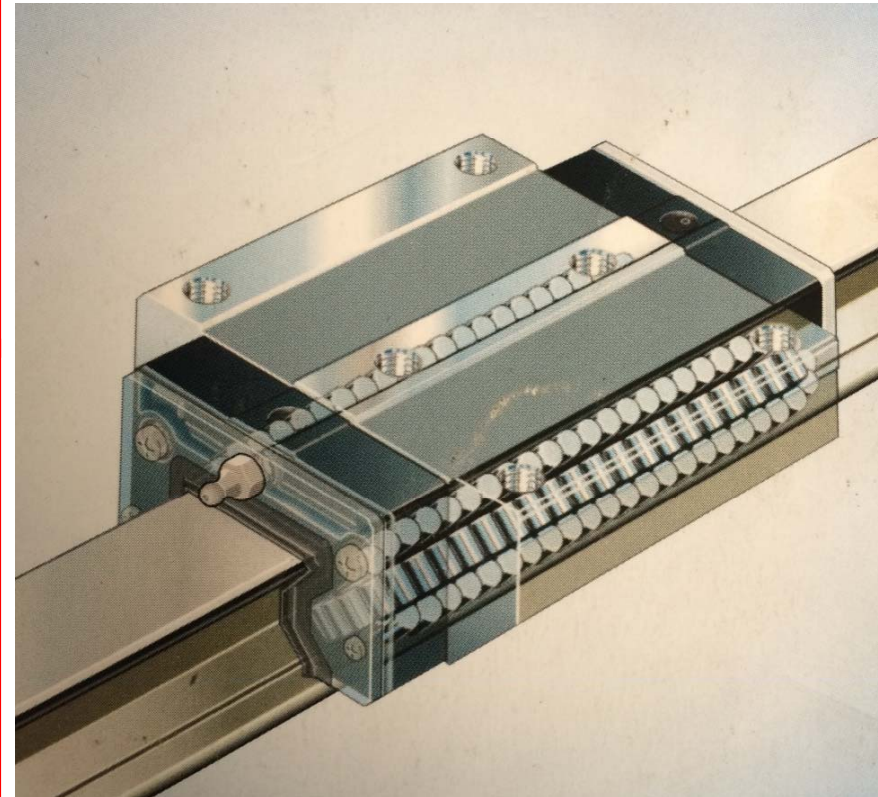
Three axes are connected directly by servo motor through the gapless diaphragm coupling to the ball screw with pre-stretching process to prevent thermal deformation caused by temperature rise, which can improve the positioning accuracy and stability.



Japanese THK/German Rexroth Linear Guide Way

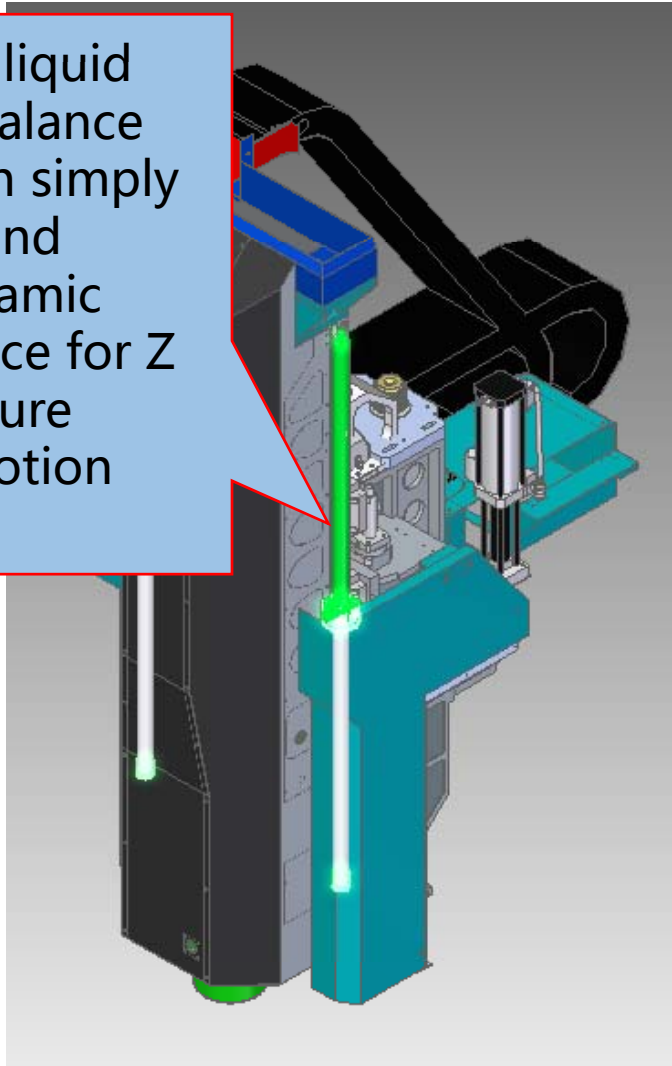
Three axes are equipped with Japanese THK/Germany Rexroth brand of P-grade roller-type linear guide way which has the features of high rigid, high bearing capacity, high precision, low wear, and can bear the load of cross-section from any direction.

The linear guide way and slider are produced by high precision machining technology, either side of the surface can be used for positioning. So, each components are interchangeable because they can be assembled in any combination. Other brand of linear guide way and slider which apply the single positioning technology, that makes the maintenance inconveniently.



Liquid nitrogen balance technology

Adopt the liquid nitrogen balance device with simply structure and stable dynamic performance for Z axis to ensure optimal motion accuracy.

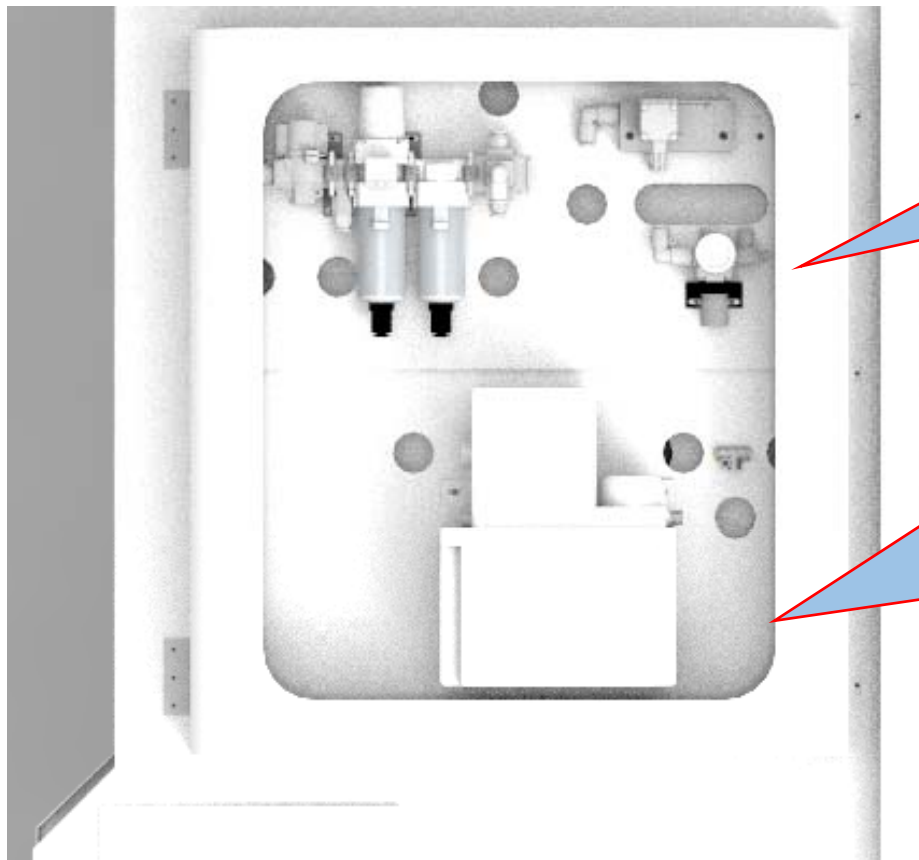


Head lamp

Equipped with a high power LED lamp on headstock to see clearly.



Pneumatic & lubricate system



Pneumatic system concentrates in this area for easy to observe and maintain

Lubrication system concentrates in this area for easy oil filling

Japanese SMC and French LEGRIS air tube

1. Use imported Japanese SMC and French LEGRIS brand of air tube to ensure high quality
2. Adopt different color air tube according to the different function, it's convenient for assembly and maintenance.



TNP spindle chiller

The powerful double pumps spindle chiller is standard, cooling power is 1.5KW, can forced cool the spindle and the gear box. Eliminates any heat extension of the spindle, increase machining precision and surface quality.

The temperature probe is fixed to the main body, so it can detect the real temperature.



Spindle
chiller



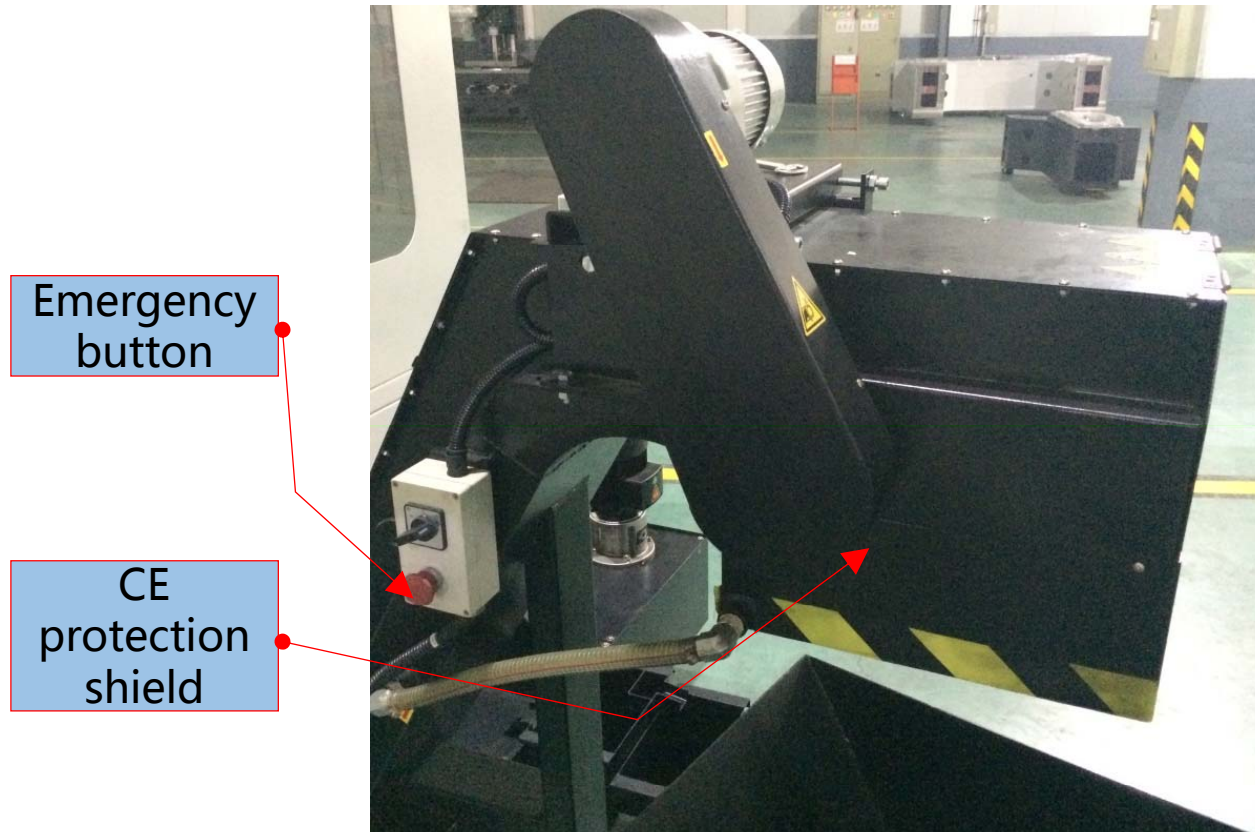
Cold Star (Italy) oil cooler

Equipped with 3.5kw cooling capacity for the 15000rpm spindle machine, **the spindle temperature rise is only 0.5 °C**, it can suppress the spindle thermal extension and improve the machining precision and stability.

Oil cooler

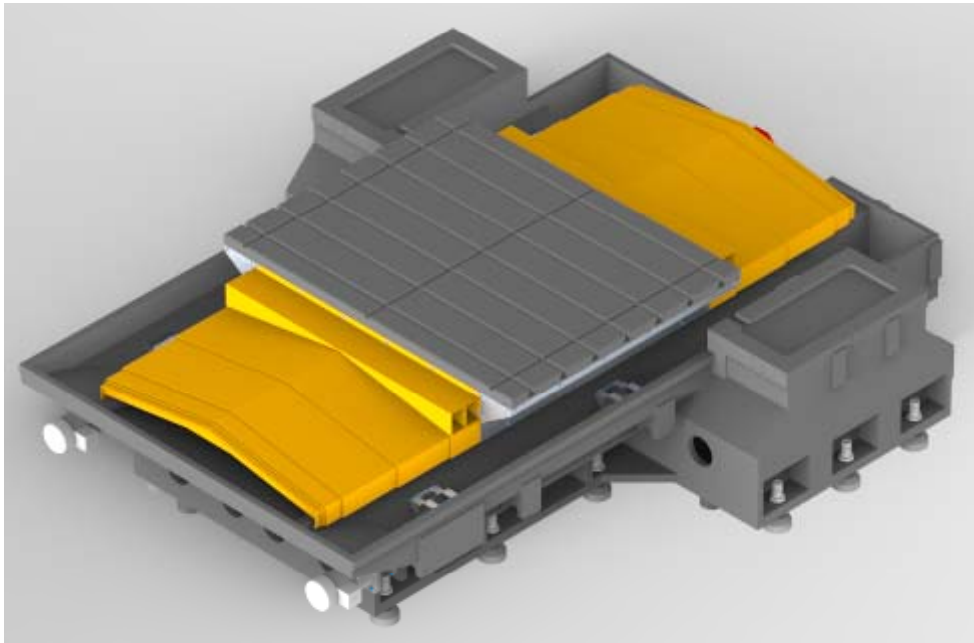


Taiwan Keyarrow Chain Chip Conveyor



Equipped with chain chip conveyor , clean chips safely and efficiently.
★ the chip collecting spot equipped with protection shield , protect operator from hazarded.
★ the chip conveyor equipped with emergency button.
(German TUV CE approved)

Protection Shield characteristics



★ Japanese **NAJEC** protection shield was use either side of the X axis (silver color also available).

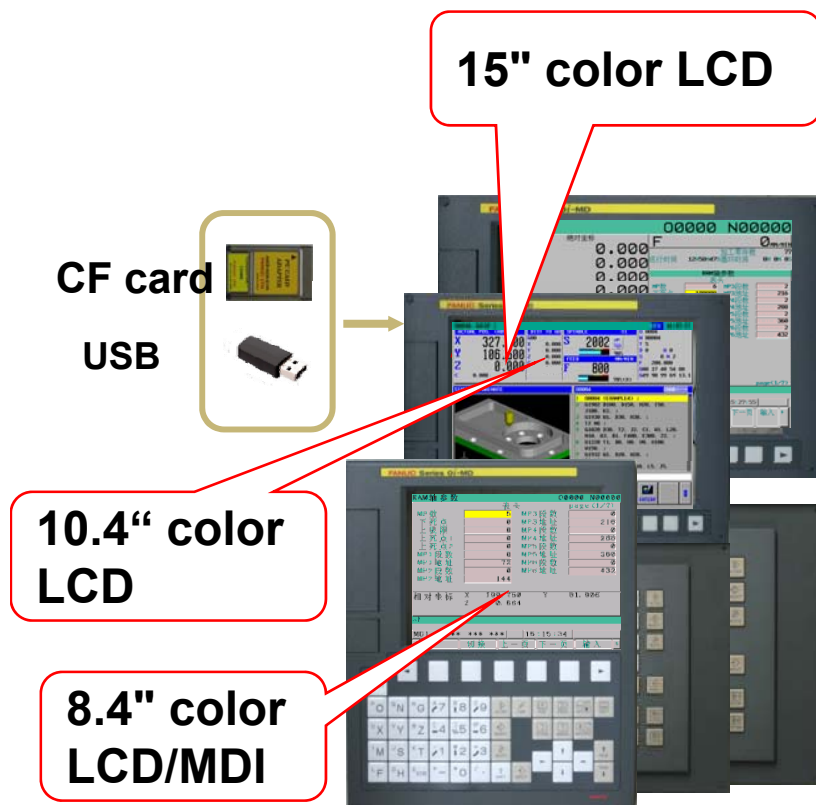
★ Both sides of the worktable are equipped with "herringbone" stainless steel telescopic shield, chips and water are not easy to retain, effectively protect the Y axis drive components.

★ The first piece of protection shield has foot treadle, make loading and cleaning easier.



FANUC NEW SERIES— **0i-MODEL F** SYSTEM

➤ SKY MASTER-KRAFT standard configure 0i-MODEL F
TYPE 1 (other manufactories normally choose TYPE 5)



- 15 " display is available
- Max. total control axes:
9 axes (one path)
Max. feed axes : 7 Max. spindle axes : 2
Max. feed axes: 11 axes (two paths)
Max. feed axes : 9 Max. spindle axes : 4
- Loader control: Max. 2 paths[☆]
- Servo HRV⁺ control
- High quality machining package[☆]
- FSSB high speed rigid tapping
- Machining preparing support[☆]
- Support various industrial bus
- Integrate Servo Guide Mate

MORE

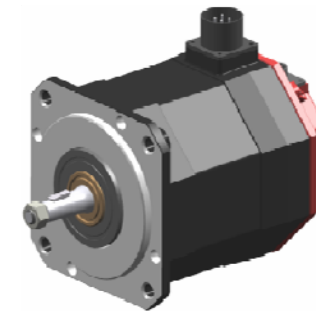
**MORE ACCURACY
AND EFFICIENT**

Automation+

FANUC NEW SERIES— **0i-MODEL F** SYSTEM

Servo control accuracy improvement

	Old	New
αi -B	αi A1000 1,000,000/rev.	αi A4000 4,000,000/rev.
	αi A16000 16,000,000/rev.	αi A32000 32,000,000/rev.
βi -B	βi A128 128,000/rev.	βi A1000 1,000,000/rev.

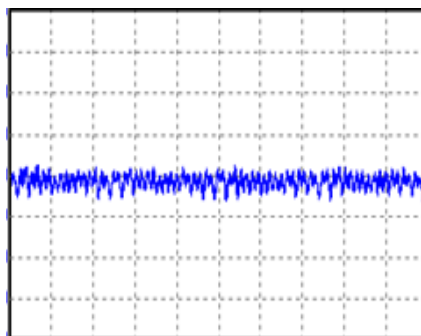


Electromagnet loop optimized

(αi S-B, βi S-B)

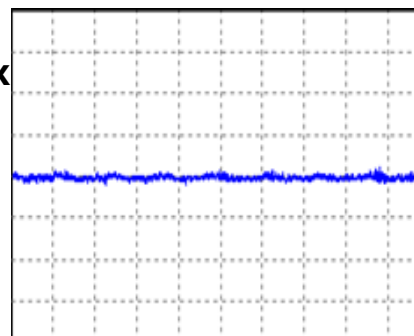
0.1 μ m control is available

αi S/ βi S motor



Approx
1/3
→

αi S-B/ βi S-B motor



300%

FANUC NEW SERIES— **0i-MODEL F** SYSTEM

FSSB HIGH SPEED RIGID TAPPING

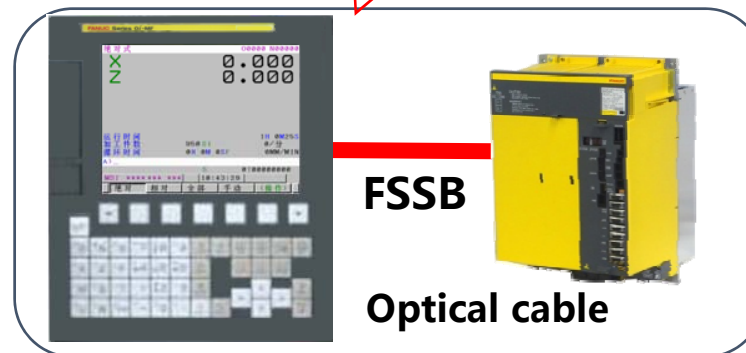
Advanced digital servo technology

23%

SKY
MASTER
STANDARD

Efficiency 1

Theoretical error display



E.g : S3000 20mm Pitch 1mm tap

Normal rigid tapping

**Synchronization
Error : 60pulse**

1 cycle : 1815ms

**Cycle time
save 23%**

**FSSB high speed
rigid tapping**

**Synchronization
Error: 50pulse**

1 cycle : 1392ms

FANUC NEW SERIES— **0i-MODEL F** SYSTEM

Spindle intelligent rigid tapping

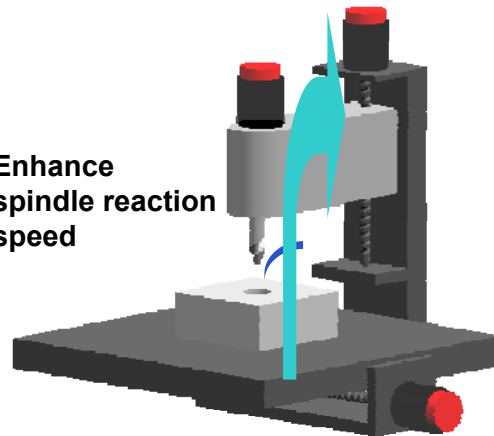
Advanced digital servo technology

26%

**SKY
MASTER
STANDARD**

Apply FSSB optical transmission

Enhance spindle reaction speed



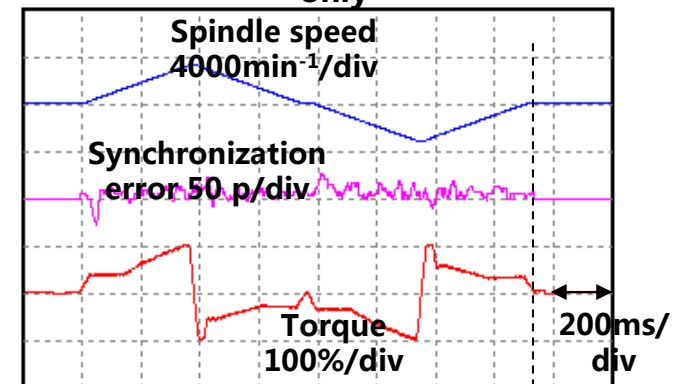
Efficiency 2

Theoretical error display

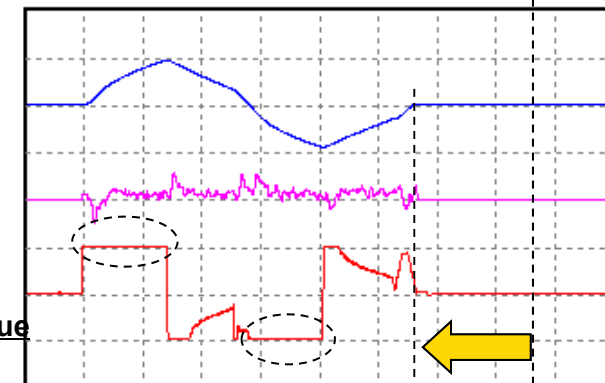
- Fully perform the spindle acceleration /deceleration capacity
- Reduce cycle time significantly
- No need to adjust

Use the max. torque

E.g.: Pitch 1mm, 25 circle thread,
S5000
Apply FSSB high speed rigid tapping only



Intelligent rigid tapping



FANUC NEW SERIES— **0i-MODEL F** SYSTEM

High quality machining package

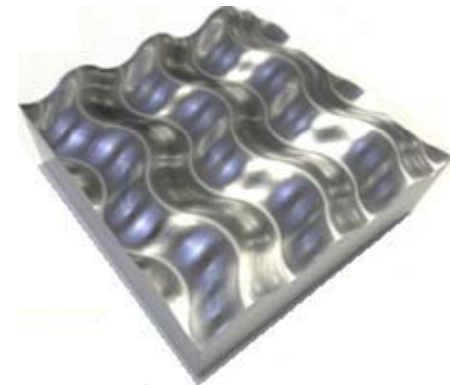
**SKY
MASTER
STANDARD**

Accuracy

Micro-line blocks processing
ability enhances 200%

AI contour control II
Jerk control
Smooth tolerance control
Machining quality level
adjustment function

Packaging function ,
especially for mould
machining



FANUC NEW SERIES— 0i-MODEL F SYSTEM

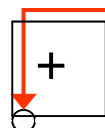
Intelligent backlash

Further optimize system function

Position compensation

Speed control

Motion command



+

-

Position deviation

Servo motor

Position feedback

Worktable

Motor load

Workpiece

Worktable

Ball screw

Error, reduce overcut

【模型】

Ball screw

Worktable

Close to motor

Extension

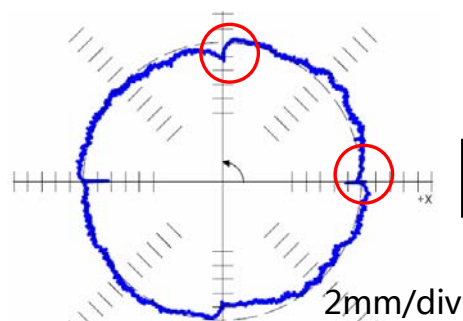
Far from motor

Retraction

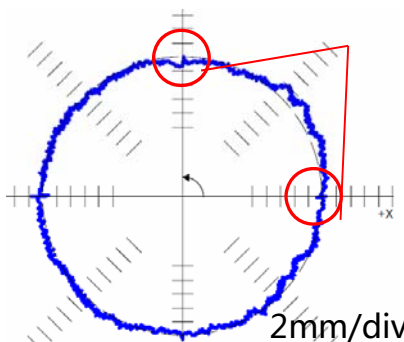
Backlash

SMART

e.g



Normal backlash compensation



Intelligent backlash compensation



FANUC NEW SERIES— **0i-MODEL F** SYSTEM

Smooth tolerance control

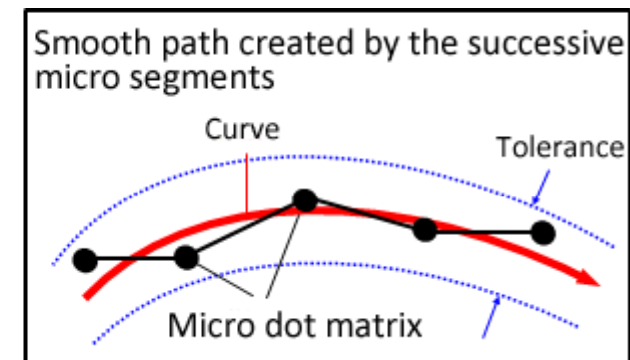
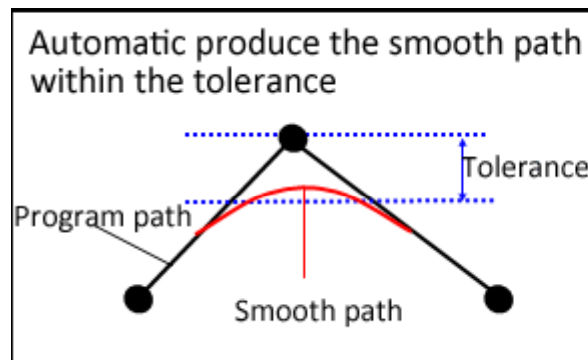
**SKY
MASTER
STANDARD**

Reduce the accuracy adjusting time and steps

Achieve the high accuracy machining.

- Automatic recognize the optimum machining speed.
- Reduce the mechanical shock during the processing of micro line blocks.
- Easy to adjust

Accuracy



FANUC NEW SERIES— **0i-MODEL F SYSTEM**

HRV+control

Advanced digit servo technology

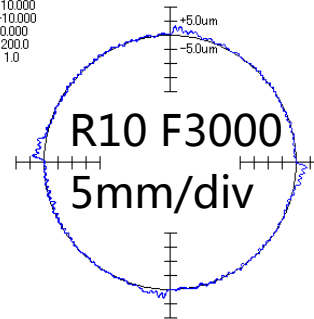


- Servo HRV+, optimize current loop control to achieve high respond
- Nanoscale high speed and high accuracy machining
- 0iF system, HRV+ control can also be applied on the β i-B servo motor

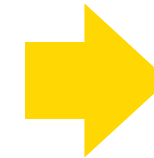


Servo HRV3 control

R: 10.000
X: -10.000
Y: 0.000
G: 200.0
Z: 1.0

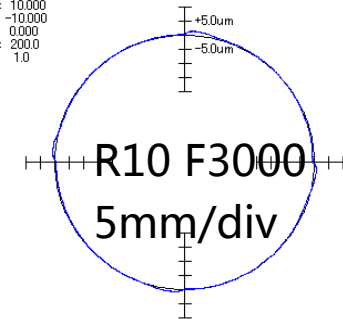


High gain



Servo HRV3+control

R: 10.000
X: -10.000
Y: 0.000
G: 200.0
Z: 1.0



HRV3

HRV3+

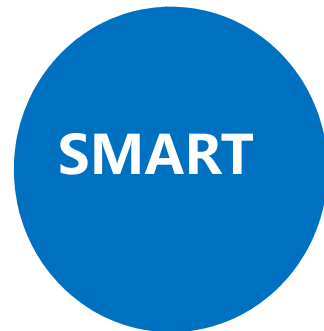


Iron F1000, 45deg

FANUC NEW SERIES— 0i-MODEL F SYSTEM

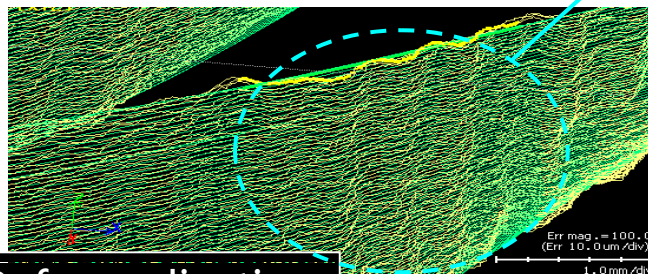
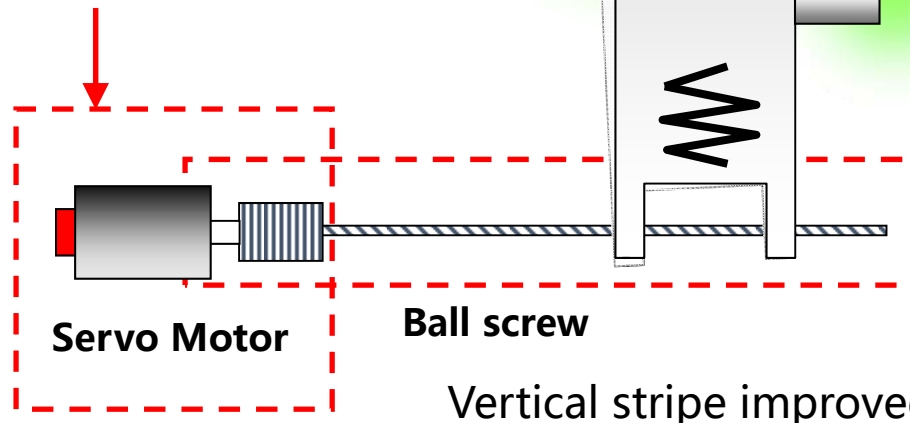
Smart front control

Further optimize system function

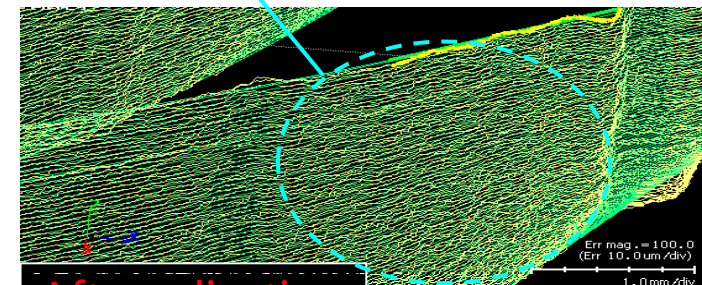


Suppress machine vibration

**SKY
MASTER
STANDARD**



Before adjusting



After adjusting

FANUC NEW SERIES— **0i-MODEL F** SYSTEM

**Special
option**

MANUAL GUIDE(operation guide)0i	MANUAL GUIDE(operation guide)i
PICTURE function	Dynamic graph display
Data server	Program storage capacity 2M
3-dimensional coordinate system conversion, handle interruption	AICC 2 (Max. preview blocks 400)
Machine alarm messages diagnosis	Nano smooth
Remote diagnosis	Interpolated straightness compensation 3027 points
CNC status informing function	Interpolation type pitch error compensation
CNC double display screen function	Optimum torque acceleration/deceleration
Quick macro call	5 axes system
Addition of custom macro common variables 1000	8 grades data protection
Addition of workpiece coordinate system 300	Handwheel feed retract

Main electrical components



French Schneider
circuit breaker

Main electrical components



Japanese OMRON
middle relay

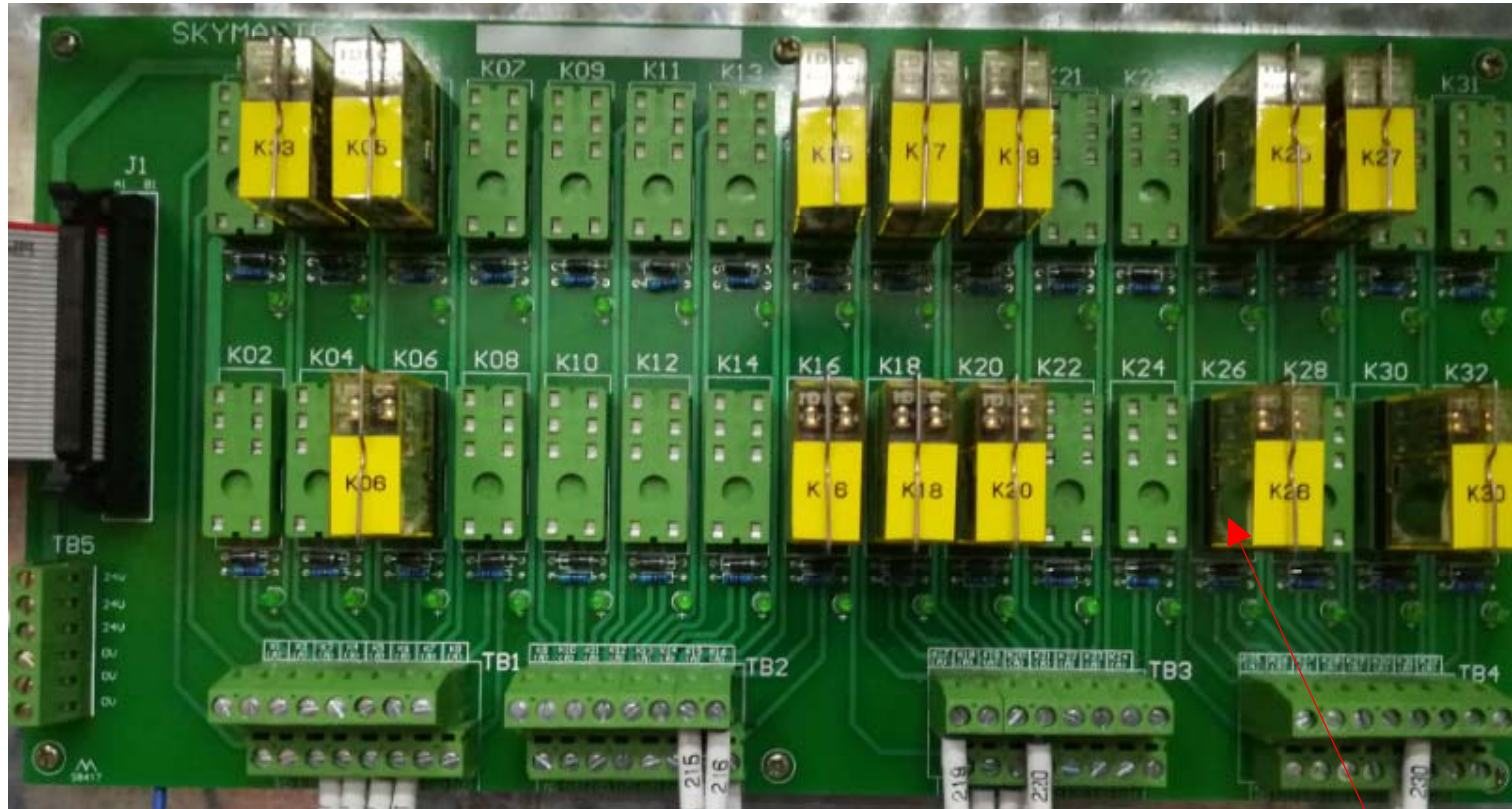
Main electrical components



Schneider
thermal overload
relay from France

Schneider AC
contactor from
France

Main electrical components



IDEC miniature
relay from Japan

Main electrical components

★ As the max. wire connection space has been reserved, the multi wires connection is convenient and available by using the spring connecting terminal.

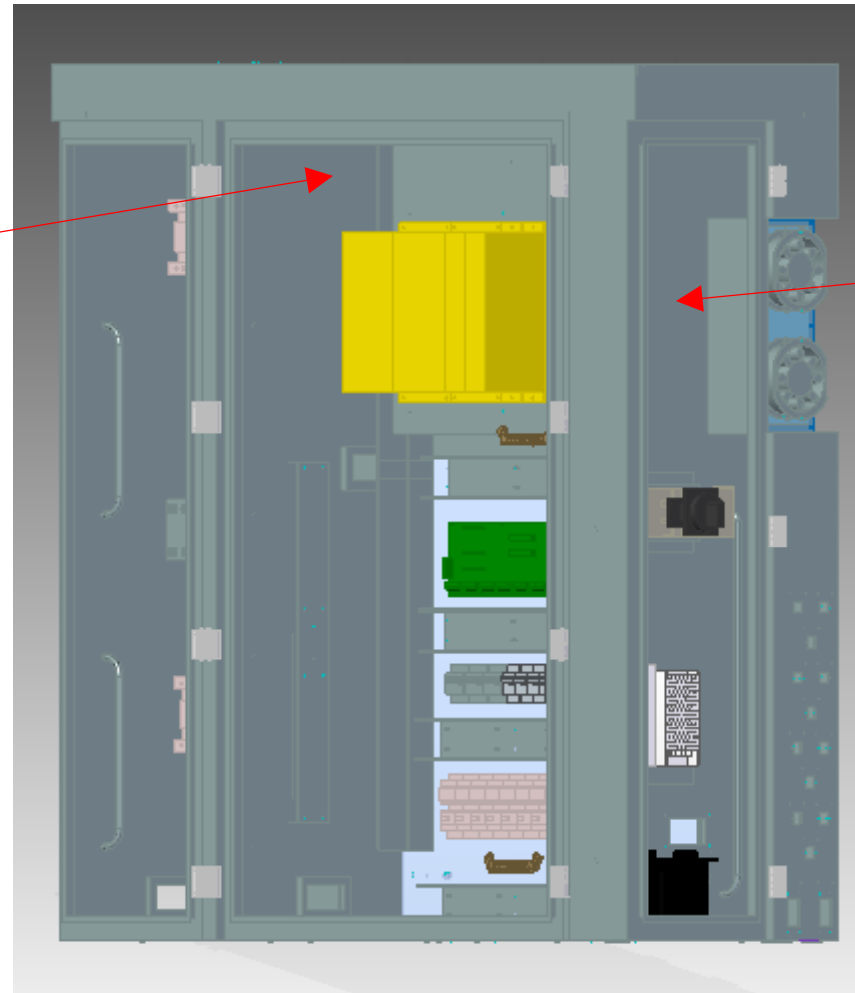
★ The terminal center use clear mark tag easy for wire connecting

★ The bridge pieces can connect any number of terminals, so that can achieve the multi position connection



**German PHOENIX
terminal/bridge piece/sign bar**

Electrical cabinet



Weak electric control cabinet: Isolation design with heat sink , can take away a great deal of heat generated by the drive, without affecting the service life and stability of the system components.

Strong electric control cabinet: Components like reactor, AC contactor, transformer and spindle filter will produce strong electromagnetic field during working process. To avoid interference from the system, these components are isolated separately.

Operation panel customized by Sky Master



The panel is designed to meet the national safety standards; stainless steel material is more resistant to oil, dirt; all the components on the panel are in line with the CE standard.

Ergonomic handwheel



Conform to national safety standard , equipped with EMG and enable buttons.

IGUS cable from Germany



**Apply IGUS cable
for electrical
assembling**

Meet TUV European
standard , classified
according to the color.

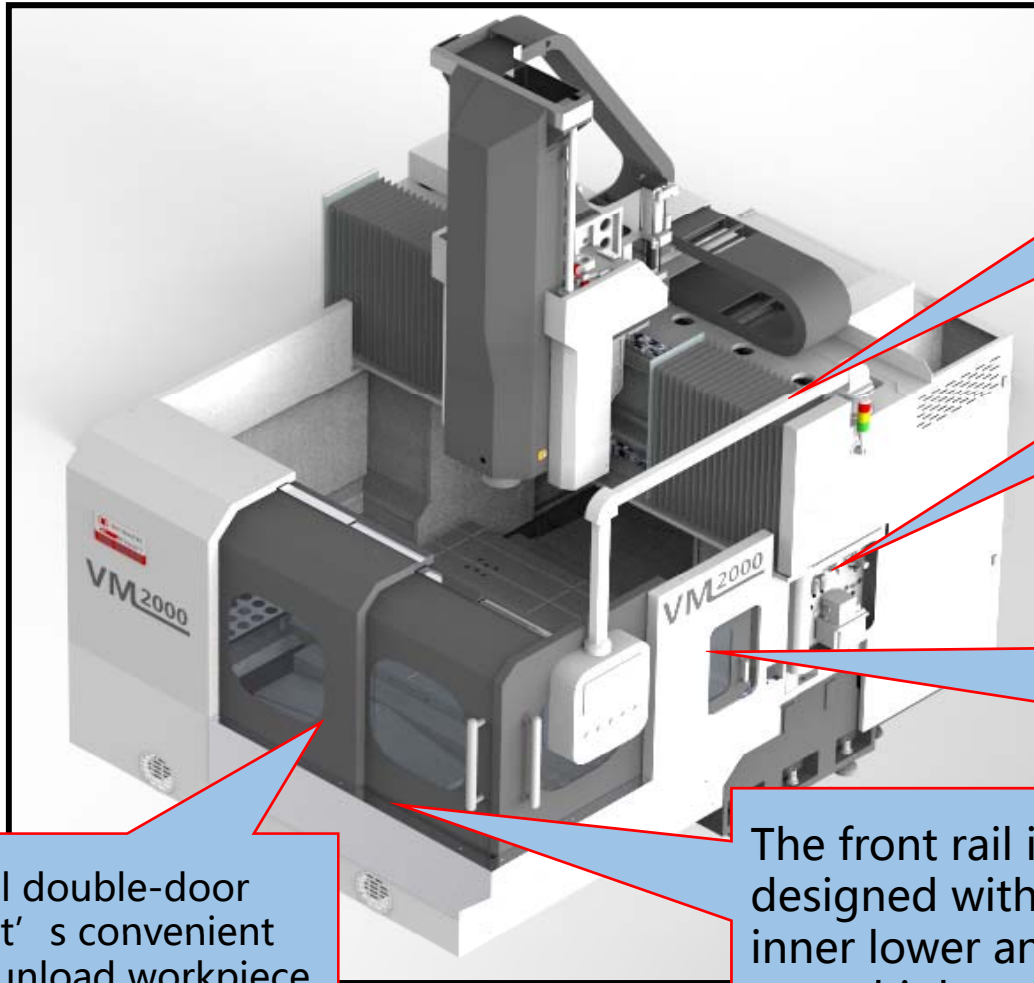
Grey: control cable
Black: power cable
Orange: servo power
cable

✂ We reserve the right to change technical parameter for improvement of our products without giving notice to customers.

Parts brand

No.	Name	Specification	Amount	Remarks
1	Control system	FANUC 0i MF	1set	FANUC(Japan)
2	Y axis ball screw bearing	40TAC90BSUC10PN7B	5 sets	NSK(Japan)
3	X/Z ball screw bearing	40TA720BSUC10PN7B	12 sets	NSK(Japan)
4	X axis ball screw	Diameter 50mm, pitch 12mm, high precision grade	1 set	PMI(Taiwan)
5	Y axis ball screw	Diameter 55mm, pitch12mm, high precision grade	1set	PMI(Taiwan)
6	Z axis ball screw	Diameter 50mm, pitch 10mm, high precision grade	1 set	PMI(Taiwan)
7	X/Y/Z linear guide way	55 grade heavy load roller guide way	3 sets	REXROTH(Germany)
8	Spindle unit	BT50-6000rpm	1 set	SETCO(USA)
9	Heat exchanger	TH-5R	1 set	TNP(Foreign)
10	Spindle cooler	TO-15P2TB-201	1 set	TNP(Foreign)
11	Gear box	CE11	1 set	BF (Italy)
12	Drag chain	68.125.250 series	2 sets	IGUS(Germany)
13	Coupling	ROTEX-GS28 98ShA series	3sets	KTR(Germany)
14	Operation box components	SL3500+GINII series	1 set	MECANO (Germany)
15	Organ flexible shield		2 sets	NAJEC (Japan)
16	Relay	MY2NGS-DC24V	5 pcs	OMRON(Japan)
17	Alternating current contactor	LC1D09M7C	5 pcs	SCHNEIDER(France)
18	Breaker	3P-32A	1 pcs	SCHNEIDER(France)
19	Breaker	DPNK10A2P	2 pcs	SCHNEIDER(France)
20	Breaker	C65N1P/6A	2 pcs	SCHNEIDER(France)
21	Thermal overload relay	LRD-10C	1 pcs	SCHNEIDER(France)
22	Thermal overload relay	LRD-07C	2 pcs	SCHNEIDER(France)

Protection characteristic



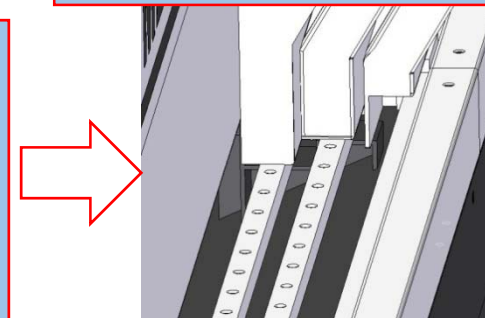
The rotating operating box with humanization design, making the operation more convenient.

Pneumatic and lubrication components are concentrated here, with a protective door for easy observation and maintenance.

There is a small protection door on the right side of machine, it's convenient for operators to manually change tool without entering the machining area.

Diagonal double-door design, it's convenient to load/unload workpiece

The front rail is designed with inner lower and outer higher to protect the rail



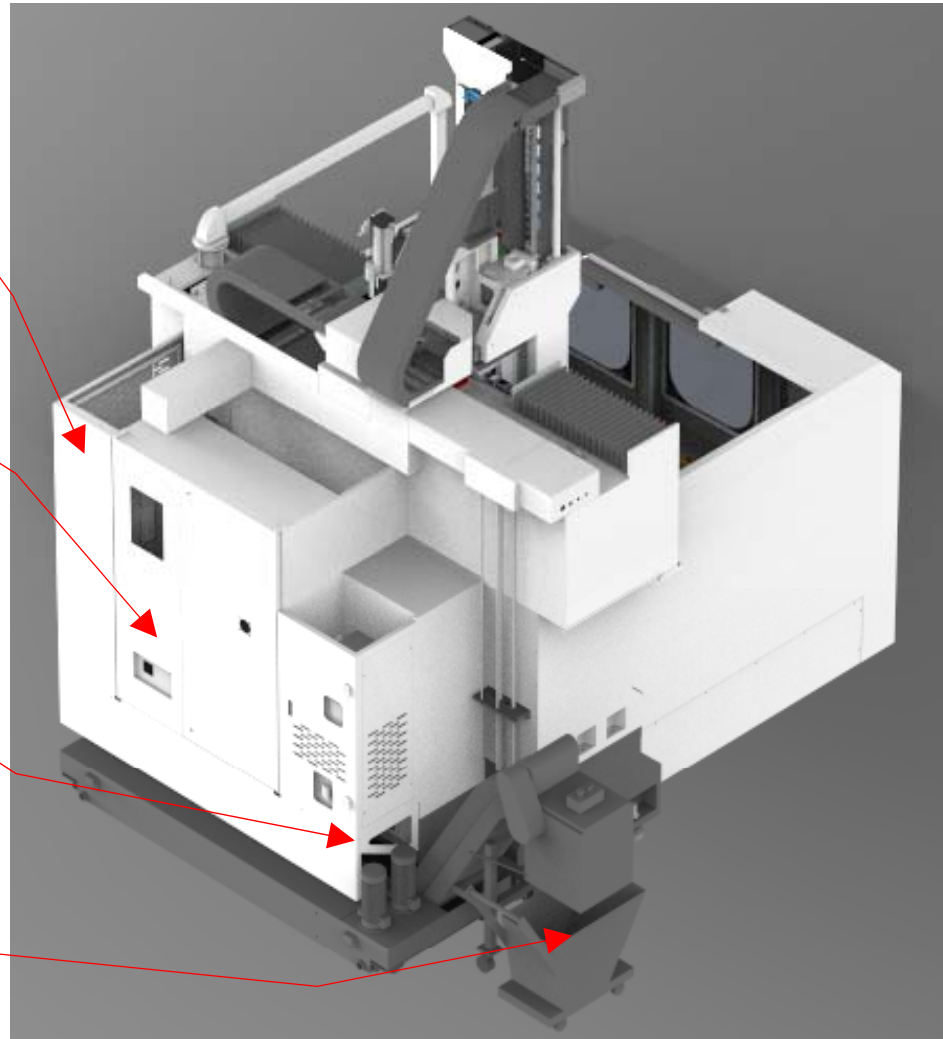
Protection characteristic

Full surrounded structure behind the machine, with neat appearance.

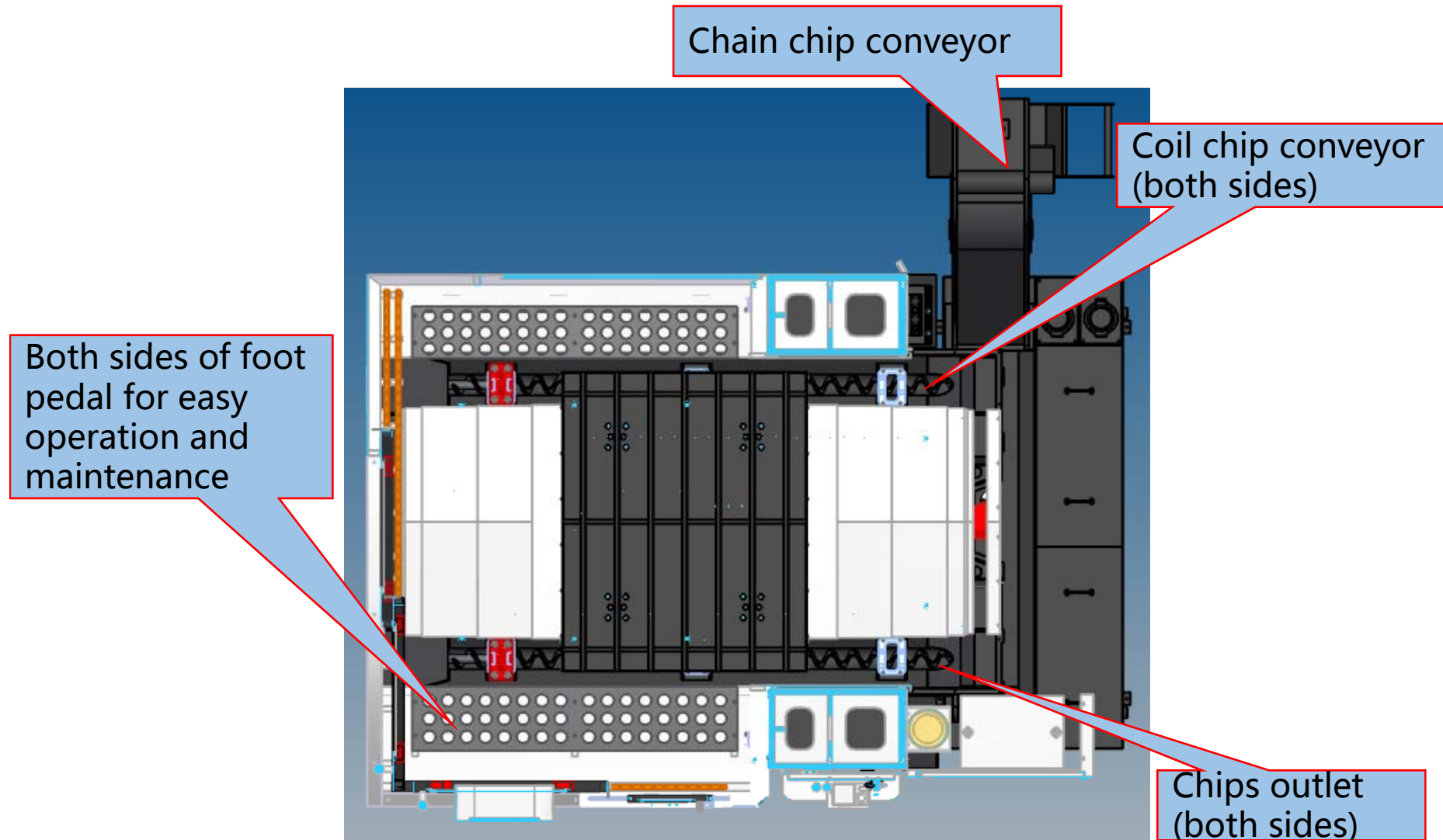
The cabinet is flush with the back sheet metal to reduce the space occupied

Oil cooler is installed in the right rear sides, with a protection door to facilitate regular inspection and maintenance.

The chip is concentrated in the rear of the machine, which makes chips disposal more efficient.



Protection characteristic



Option-measurement accessory



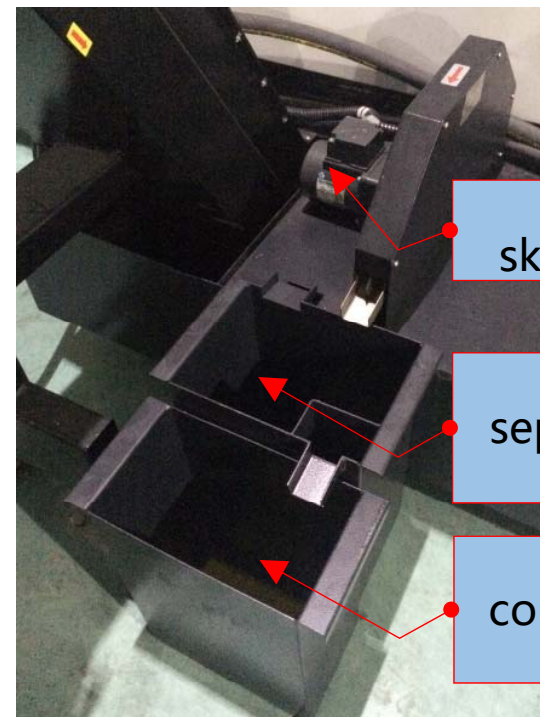
Blum touch
type tool
setter



Metrol
touch type
tool setter

Option-WoBang Oil skimmer

Equipped with oil skimmer to
separate the oil from the coolant,
prolong the service life of coolant



Oil
skimmer

Oil
separator
box

Oil
collecting
box

Optional intelligent X/Y/Z positioning compensation (FANUC/ MIT)

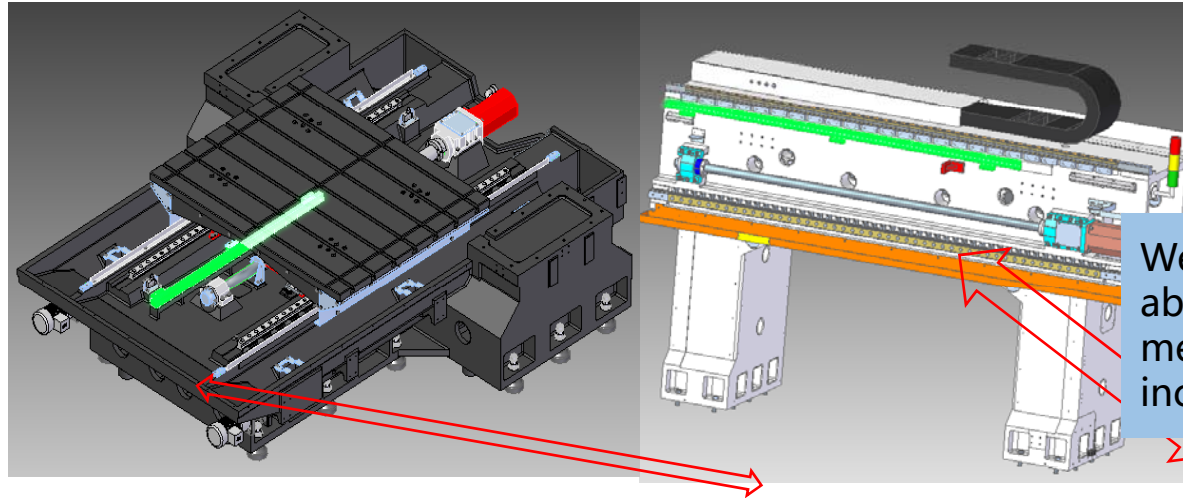
Three axes compensation controller



Inspection device installation position



Optional linear guide scale

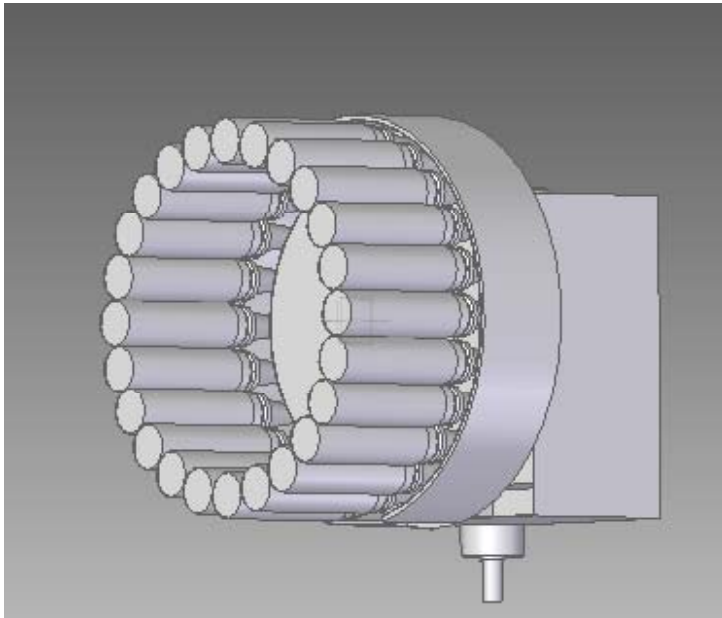


We only use FAGOR/HEIDENHAIN absolute linear guide scale, most mechanical manufacturers use incremental linear guide scale.

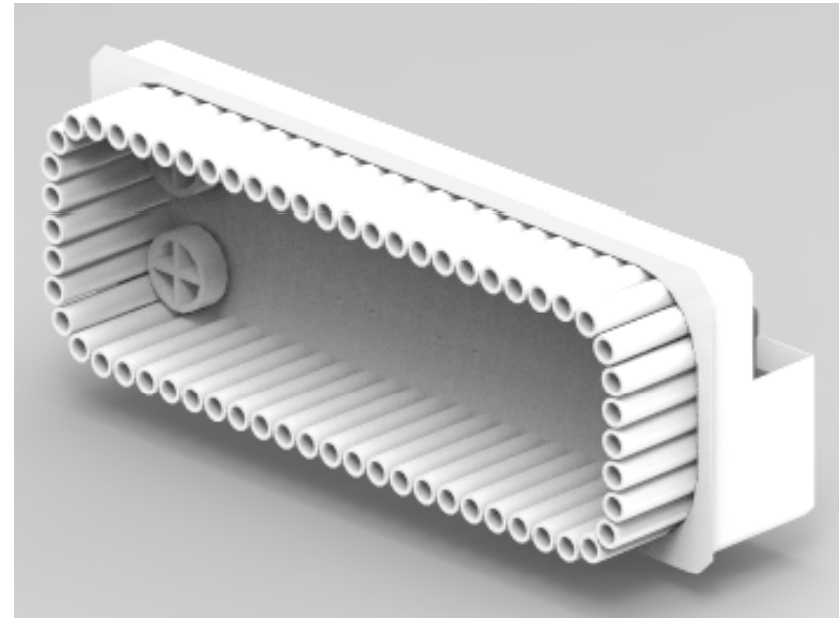
Equipped with FAGOR/HEIDENHAIN absolute linear guide scale with 0.005 μ m resolution for three axes, which can monitor the motion parts in real time to insure the repeated positioning accuracy for each axis.

Comparison	Absolute	Incremental
1	Get the position data immediately ,no need to make the moving axis back to reference point	Must execute the moving axis back home position every time
2	The reading head use two couple seal side by side with good protection	The reading head is protected by single seal
3	Transmission by digit signal which has excellent anti-interference ability	Transmission by sine waves which is easy to be interference

Option-Tool Magazine



Taiwan Gifu **24-tools**
disc type tool magazine,
maximum tool diameter
is $\varnothing 110/\varnothing 225\text{mm}$



Taiwan Gifu **60-tools** disc
type tool magazine,
maximum tool diameter
is $\varnothing 125/\varnothing 250\text{mm}$

Standard configuration

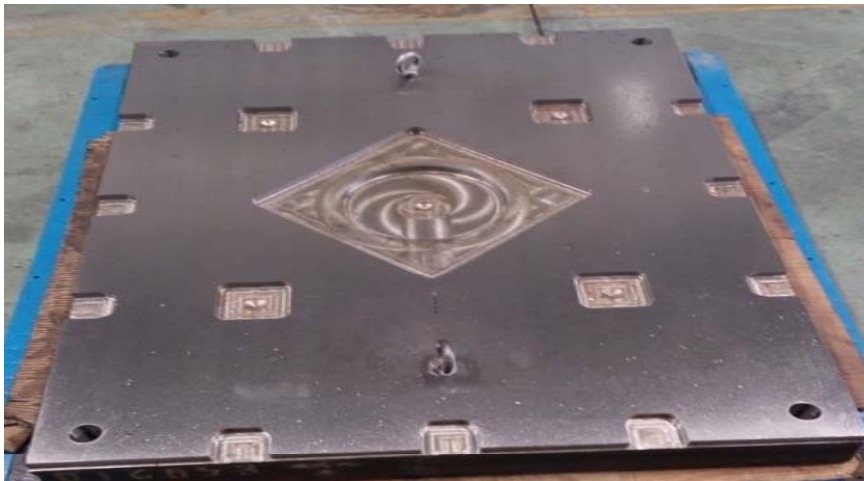
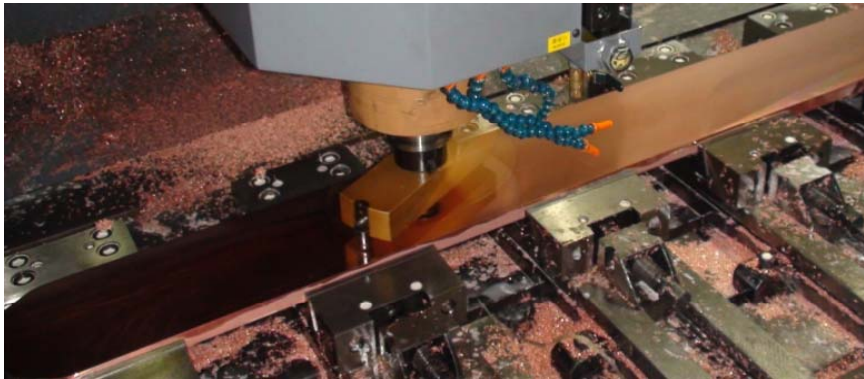
1	FANUC 0i MF absolute type 15inch screen	13	Transformer
2	Fine quality machining package a) AICC II b) Jerk control c) Smooth tolerance control d) Machining quality level adjustment function	14	3 colors warning light
		15	Portable MPG
		16	Spindle oil cooler
		17	Lubrication & Pneumatic unit
3	Automatically power off	18	Rigid tapping
4	Working light	19	Full enclosed splash guard
5	Safety door switch	20	Tool box
6	Direct driven spindle BT50-6000rpm with BF gear box	21	
7	Coolant unit	22	Ethernet DNC machining
8	Spindle air sealing	23	Chain chip conveyor
9	Air blowing device	24	Coil chip conveyor
10	Water gun/air gun with flushing function	25	
11	Heat exchanger in electrical cabinet		
12	Adjustable level bolts and foundation blocks	26	
13	Operation manual	27	

Option

1	MITSUBISHI M800S 15 inch display screen	
2	HEIDENHAIN TNC620 15 inch display screen	
3	Intelligent spindle compensation	Intelligent three axes compensation
	Linear scale (FAGOR)	Linear scale (HEIDENHAIN)
4	Voltage stabilizer	
5	Tool measuring system	
6	Workpiece measuring system	
7	Direct connection spindle 8000rpm BT50	
8	Direct connection spindle 15000rpm HSK-A63, FANUC 0i-MF (including CNC controller)	
9	Direct connection spindle 15000rpm HSK-A63, MitsubishiM800W(including CNC controller, 19inch display)	
10	Direct connection spindle 10000rpm BBT50	
11	Whole column heightened by 200	
12	Z axis heightened by 200/300mm (with heightened block)	
13	Z axis travel 1000mm (include whole column heightened by 200)	
14	CTS	Coolant around spindle
15	Oil-feed tool shank port (15KG, include pump)	
16	Disc type ATC with 24 tools (pneumatic)	
17	Chain type ATC with 32 tools (hydraulic)	
18	Chain type ATC with 40/60 tools (pneumatic)	
19	Full enclosed splash guard with multi-layer door	
20	A/C for electric cabinet	

Application scope

Suitable for large mould, box and extra long structure components machining



END THANKS

SKY MASTER KRAFT



※ We reserve all the right of technical data modification for improving our products without notification