

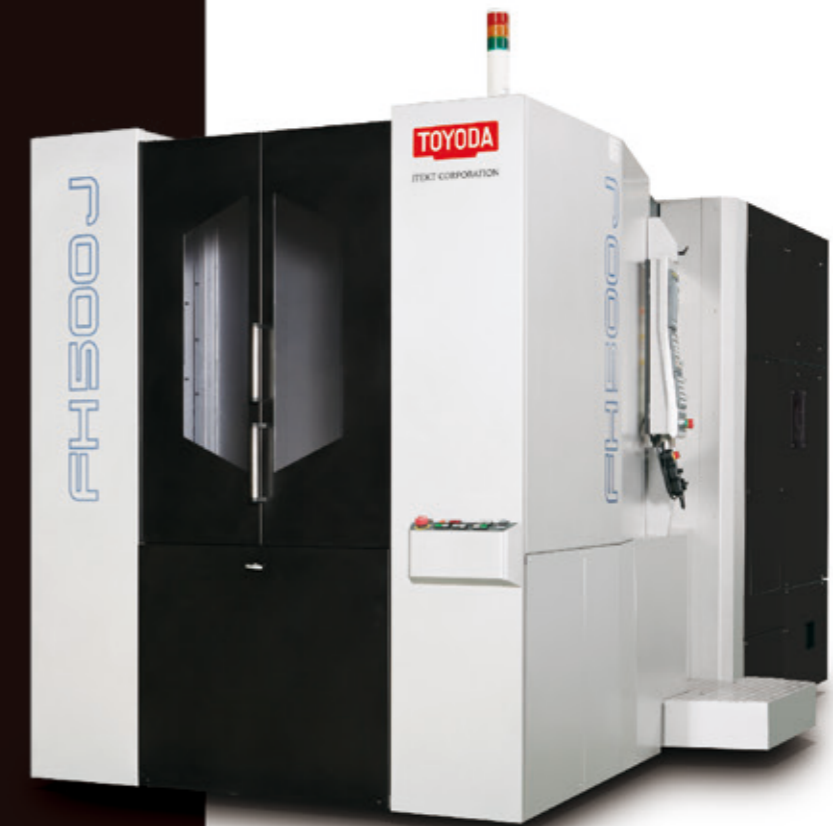
TOYODA

Horizontal Spindle Machining Centers

# FH SERIES

FH400J  
FH500J4  
FH500J5

# JTEKT



<https://www.jtekt.co.jp>

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Type of Machinery: Machining Center

Model Number: FH400J, FH500J

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# JTEKT

JTEKT CORPORATION

# JTEKT

Koyo TOYODA



Leading the way towards improving  
production efficiency

Car, motorcycle-related, energy-related industry, aerospace industry, construction machinery and transportation machinery

## Top-level performance in machining small parts for all industries

"Small", "Fast" and "Strong" - 3 features putting these models in the top-level of their class

A machine which grasps the strong demand for productivity improvement by surface area and is both compact and high performing.

FH400J & FH500J are high-speed horizontal machining centers featuring high quality,

increased production efficiency and high cost-performance.

■ ■ **Smallest installation  
surface area in the class**

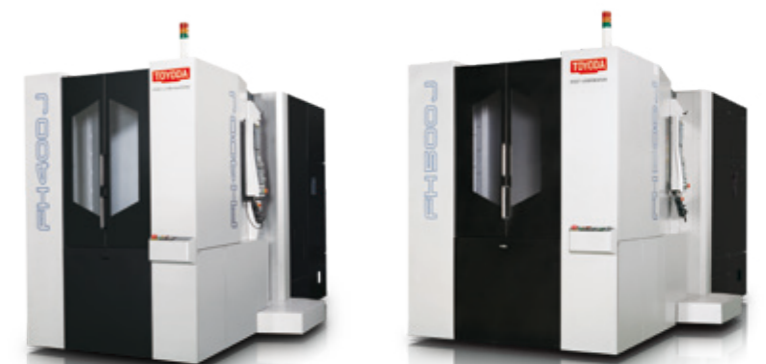
Achieving improved productivity in proportion to surface area by occupying the smallest installation space in the class.

■ ■ **Fastest rapid  
feed rate in the class**

Rapid feed rate and rapid feed acceleration features put these models in the top-level of their class.

■ ■ **Strongest cutting  
performance in the class**

Featuring a high-speed spindle capable of machining small parts of all industries with high efficiency.



**FH400J / FH500J**

minimum & fastest

# MINIMUM

	Required floor space (width × depth)	Max. workpiece range	Stroke (X×Y×Z)
FH400J	2,100mm×4,205mm	φ630mm× 900mm	600mm×560mm×630mm
FH500J	2,330mm×4,630mm	φ800mm×1,000mm	730mm×730mm×850mm

# FASTEST

	Rapid feed rate	Rapid feed acceleration	Tool changing time (C-C)
FH400J	60m/min	9.8m/s <sup>2</sup> (1G)	2.6sec.
FH500J	60m/min	9.8m/s <sup>2</sup> (1G)	2.6sec.

minimum

Boasting high expansion capability while being compact.

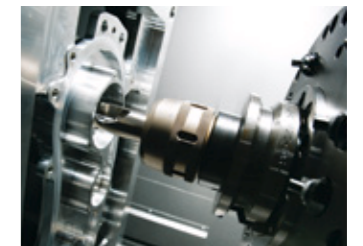
In recent years, the manufacturing of vehicle parts etc. has used a method known as cell manufacturing, involving multiple machining centers being placed in a row to construct a line. The FH400J and FH500J were developed to be compatible with this style of manufacturing. One key point of cell manufacturing is that the highest amount of productivity is achieved in the least amount of surface area, meaning that the "smaller" the machine, the "better". On the FH400J, dead space has been eliminated through efficient device layout, and required floor space is 35% less than that of conventional machines. Consequently, we have succeeded in developing a machine that uses the smallest amount of floor space in the 400mm pallet class. On top of this, whilst occupying minimum floor space, this model has a maximum workpiece swing of 630mm (dia.) and a maximum workpiece range bigger than that of conventional machines, allowing a maximum workpiece height of 900mm. Also, with the automatic jig-response option, the hydraulic pump and electromagnetic valve required by automatic jigs have been arranged into a package - an ideal layout which doesn't use up any more floor space than standard machines.



fastest

Boasts the highest speed of the class without sacrificing rigidity

Conventionally, small part machining centers were developed with a mind to achieving high speed and acceleration targeting the high speed machining of aluminum parts. However, material changes in recent years has led to an increase in hard-to-cut material and heavy load machining, creating a demand for machines with increased anti-cutting rigidity while still maintaining high speed performance. The FH400J and FH500J feed, in order to achieve both high-speed and high-rigidity, adopts cylindrical ball type linear guides, making the rapid feed rate of all axes to 60m/min and rapid feed acceleration to 1G. Furthermore, thanks to the introduction of a newly-developed ATC unit, "Chip to Chip" time has been reduced to 2.6 seconds. Also, as high speed performance is a strong feature of these models, ultimate design is made possible with CAE analysis in order to make the major components which support the moving parts of the machine, the bed, column table etc, sufficiently rigid.





# The performance of the machining center depends on the Spindle.

The spindle serves as a core of the machining center. JTEKT sticks to the spindle, which is important because it is located nearest the cutting point, to keep stable cutting accuracy.

## Standard spindle

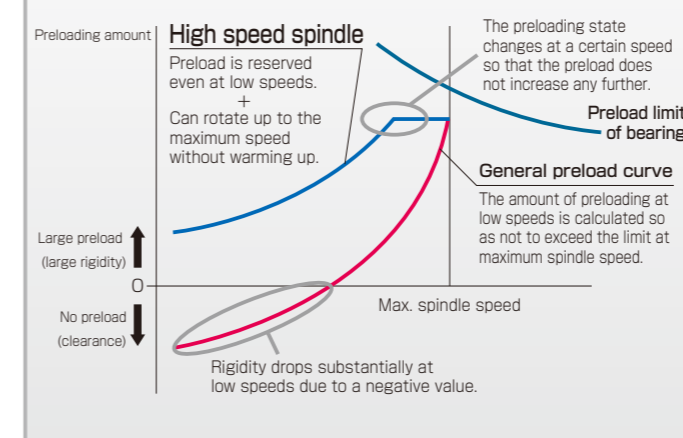
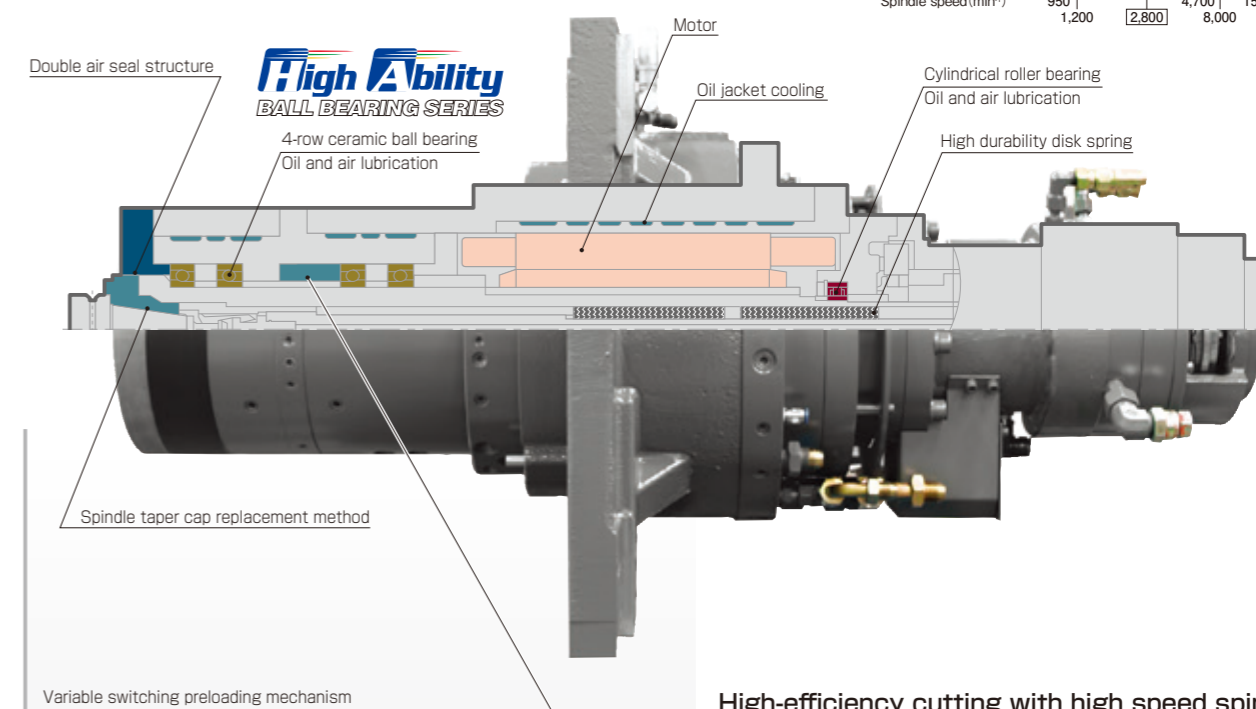
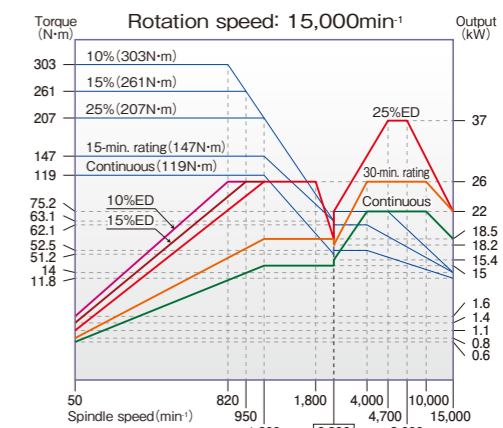
Performs high-efficiency and high-precision machining, covering all ranges from low to high speeds

[Spindle speed] 15,000min<sup>-1</sup>

[Spindle motor (short-time/continuous)] 37/22kW

[Max. torque] 303N·m

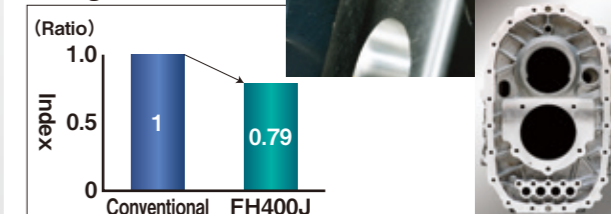
This is a high-speed/high-rigidity multi-use spindle, covering a wide range of applications from iron materials processed at low and medium speeds, to aluminum materials processed at high speeds and high feed rates. Ceramic ball bearings manufactured by JTEKT and original variable-switching-type preload functions are used. This reduces heat generation of bearings, and achieves a long service life.



## High-efficiency cutting with high speed spindle

■ Transmission case  
[Workpiece material] ADC12  
15,000min<sup>-1</sup>  
HSK A63 spindle

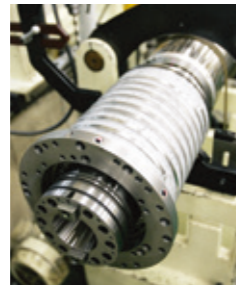
### Cutting time



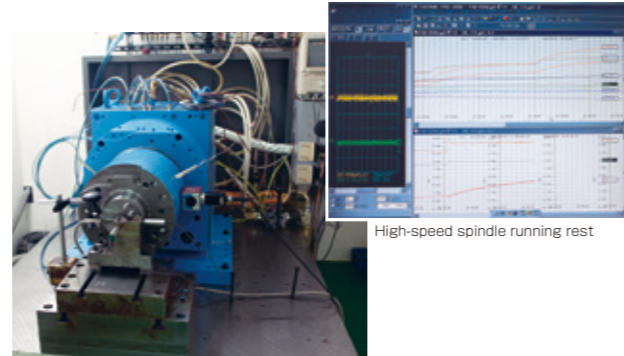
JTEKT's spindle promises assurance over a long period and takes maintenance into consideration.

**JTEKT's dedicated spindle manufacturing**

The spindle is the heart of the machining center, and as such it is manufactured under strict accuracy control. Confirmation checks look at dynamic balance, temperature, vibration, noise, and so forth, and, after ensuring all allowable limits have been maintained, the spindle is installed in the machine.



Dynamic balance measurement



High-speed spindle running test

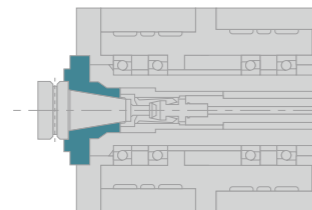
**Basic design particularly focusing on low vibration.**

**A spindle vibration within 2 microns has been accomplished** (measurement with a 15,000min<sup>-1</sup> spindle).

We have developed a low vibration, high speed spindle which suppresses vibration and runout across the entire range up to the maximum speed. This feature contributes not only to the improvement of cutting accuracy but also to the extension of tool life.

**The spindle taper cap replacement method takes ease of maintenance into consideration.**

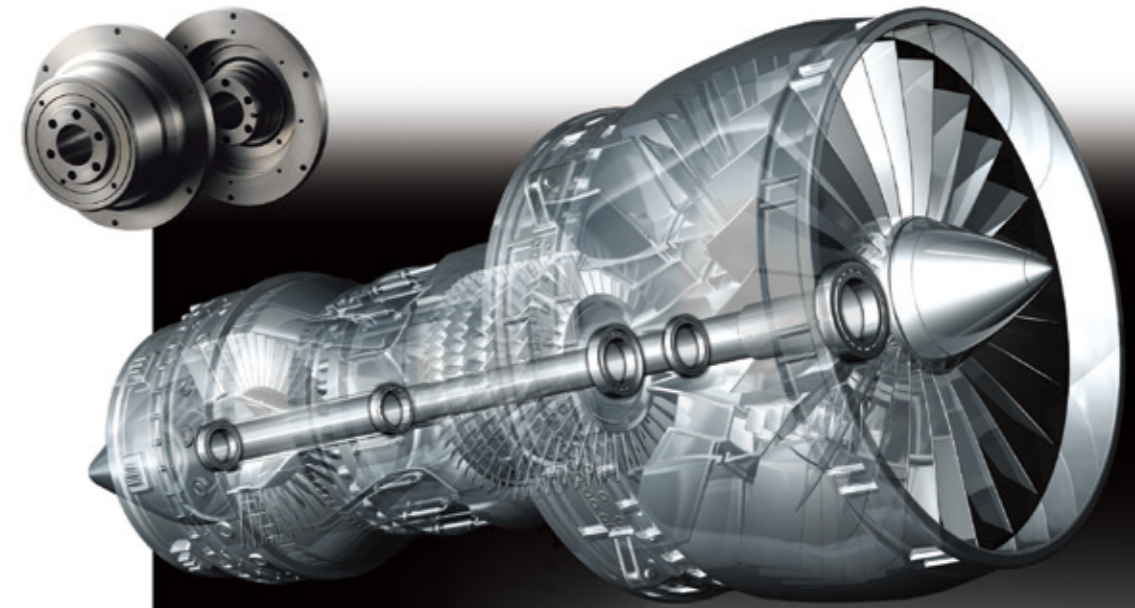
Even in the rare chance that a failure does occur, a replacement spindle cartridge that has been checked at JTEKT for operation and quality can be installed in its place, keeping restoration time down to a minimum. Furthermore, the separate spindle taper makes individual cap replacement possible as it is integrated with the taper, even in the event of taper damage caused by accidental interference.



※Not a guaranteed value

**Technologies which have continuously supported the aerospace industry down through time are materialized in our machining center bearings.**

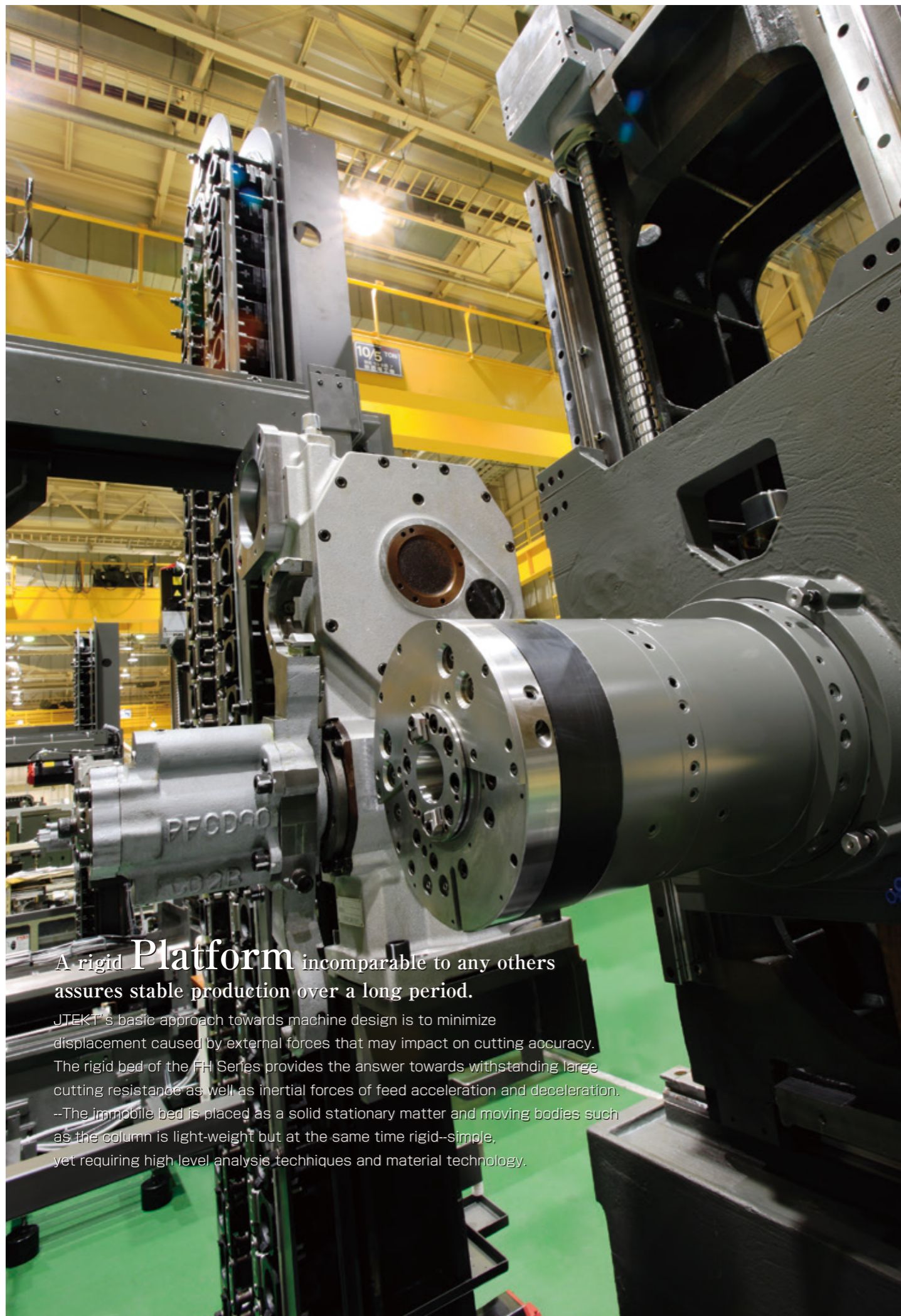
We have been supporting the aircraft and aerospace industry for 30 plus years and our bearings are used in many of the jet engines manufactured in Japan. By providing the latest technology, we keep satisfying every rotation technology need from the ground to outer space. The technology cultivated over this period has been materialized in machining center bearings.



**High Ability**  
BALL BEARING SERIES

High speed limit performance - 1.5 fold  
Temperature increase - 30% reduction

In 1984, JTEKT were the first in the world to succeed in the practical use of ceramic bearings. Over the years since, we have gradually built up the processes such as design technology, precision and high-efficiency machining technology and mass production needed to use ceramic materials in roller bearings, and consequently now meet those factors such as speed, reliability and price demanded of machining center spindles.

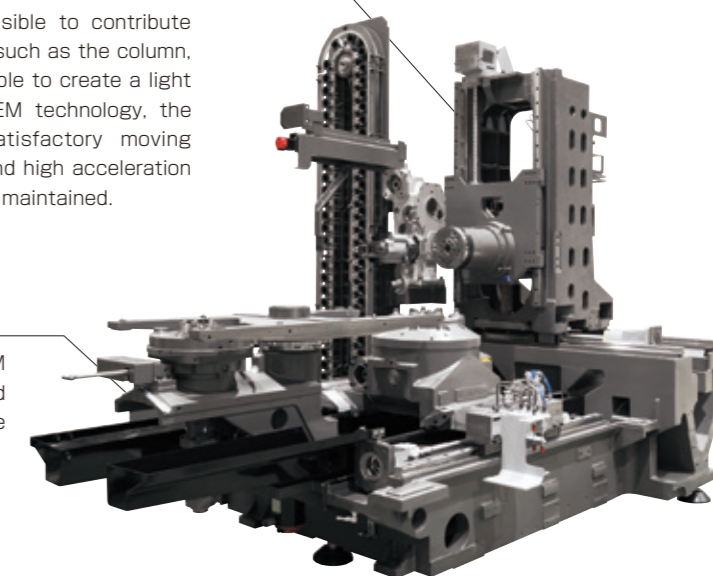


A rigid Platform incomparable to any others assures stable production over a long period.

JTEKT's basic approach towards machine design is to minimize displacement caused by external forces that may impact on cutting accuracy. The rigid bed of the FH Series provides the answer towards withstanding large cutting resistance as well as inertial forces of feed acceleration and deceleration. --The immobile bed is placed as a solid stationary matter and moving bodies such as the column is light-weight but at the same time rigid-simple, yet requiring high level analysis techniques and material technology.

Unrivaled rigid platform allowing the spindle to achieve it's full performance  
**FCD450 column**  
 featuring both high speed performance and heavy duty cutting capabilities

JTEKT's original high casting technology has made it possible to contribute materials which are not only complex in shape but also large, such as the column, to the creation of the FCD450. As a result, it has been possible to create a light weight machine with a rigid column. Furthermore, using FEM technology, the development of a low center-of-gravity column with satisfactory moving performance was completed. With this, high rapid feed rate and high acceleration are accomplished while a high rigidity against cutting forces is maintained.

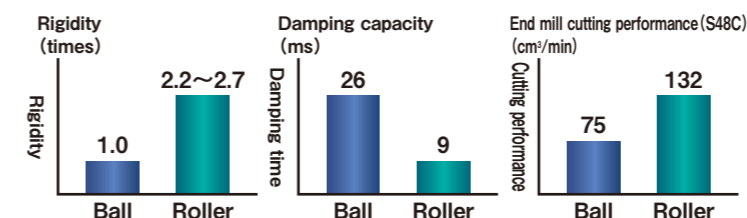


**High grade cast iron high rigid bed**  
 keeping machine level stable over a long period

The bed supporting the moving body is designed using FEM analysis technology. And the bed has sufficient rigidity and substantially improved moving level. This feature makes stable axial feed possible with high speed and high acceleration.

**A Rigid cylindrical roller slide**  
 able to withstand high speed, high acceleration travel while still maintaining rigidity is adopted

Compared to the ball guide, the cylindrical roller slide features less elastic deformation against loads and possesses superior vibration damping characteristics. This feature makes it possible to position quickly with smaller orientation changes upon sudden acceleration or stoppages, contributing to a higher level of production efficiency.

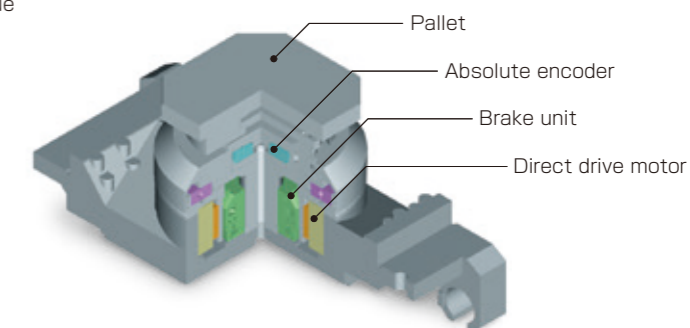
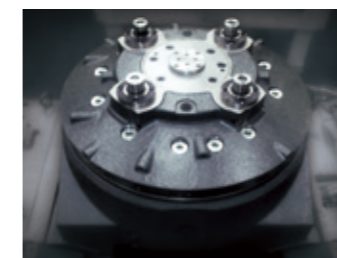


Because of JTEKT's assembling technology which allows for strict mounting face accuracies, the rigid cylindrical roller slide offers the best rapid feed rate and acceleration in it's class.

**DD table**

Option

The direct drive (DD) table driven with a built-in large torque motor has realized fast indexing operation.



The DD table can be equipped only to FH500J.

## Unique Precision technology only achievable with the inside-out knowledge of the cutting field that JTEKT possess.

Various factors can effect cutting accuracy. The FH Series is packed with a number of precision technologies that only JTEKT have had the opportunity to cultivate down through the years with strong involvement in the mass production of automotive parts.

### 3 approaches for achieving precision cutting

#### Suppress heat generation

- [Spindle variable changeover pre-load mechanism] Reduction of spindle temperature rises
- [High Ability bearing] 30% reduction of bearing temperature rise
- [Spindle oil jacket cooling] Reduction of spindle temperature rise
- [Coolant cooling] **Option**

#### Elimination of heat transmission

- [Center trough structure] Suppressing the effects of chips and coolant heat
- [Y-axis motor heat isolation coupling cooling] Suppression of ball screw elongation

#### Heat effect control

- [Large heat capacity bed] Reducing the effect of thermal displacement
- [Thermally symmetrical structure] Reducing heat-related column twist
- [BTS (Ball screw Thermo Stabilizer) function] Direct measurement and correction of ball screw elongation
- [Spindle Thermo Stabilizer function] Direct measurement and correction of spindle elongation **Option**
- [Scale feedback] **Option**
- [Touch sensor function] **Option**

### Manufacturing technology for realizing precision cutting



Spindle assembly clean room

Accuracy machining of linear guide mounting face

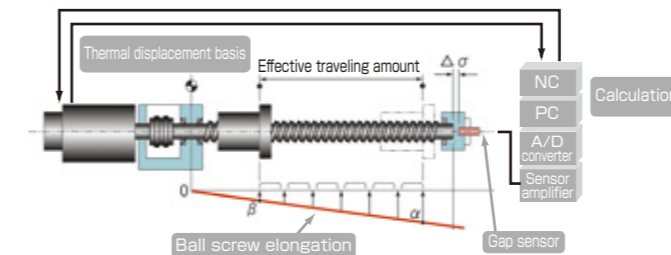
Spindle balancing

Precision assembling work

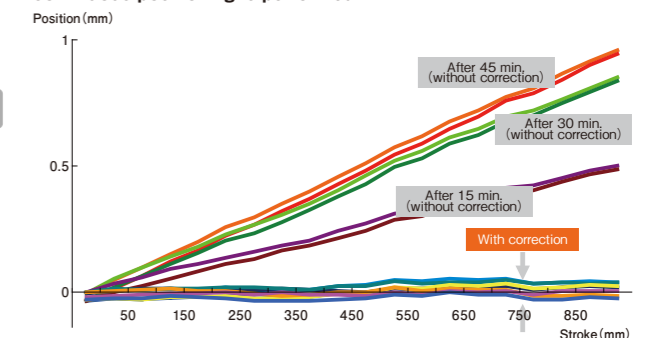
### BTS (Ball screw Thermo Stabilizer) function

#### Ball screw thermal displacement correction function stabilizing repetitive positioning accuracy

The BTS function is installed as a standard feature to stabilize the repetitive positioning accuracy in parts cutting. With the BTS function, the displacement sensor installed at the end of the ball screw measures the elongation of the entire screw, which is distributed into offsets for each stroke position to correct the positioning accuracy. With this function, accuracy can be stabilized without any costly accessories such as linear scales which require maintenance. Furthermore, continuous cutting operation over a long time becomes possible. In addition, the structure is simpler and the reliability is higher when compared with the ball screw shaft center cooling method, and the function is environmentally friendly.



#### Results of ball screw displacement correction after continuous positioning is performed

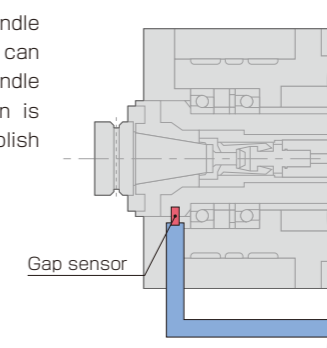


\*This is an image of compensation. The values shown are not actual machine values.

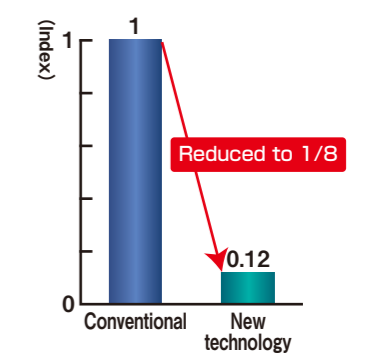
### Spindle Thermo Stabilizer function **Option**

#### Spindle thermal displacement correction function used to correct spindle elongation formed after an extended period of operation

A displacement sensor installed at the end of the spindle is used to directly detect spindle edge position, which can be easily displaced by heat generated inside the spindle during extended operation. Z-axis direction deviation is suppressed as much as possible in order to accomplish precision cutting.

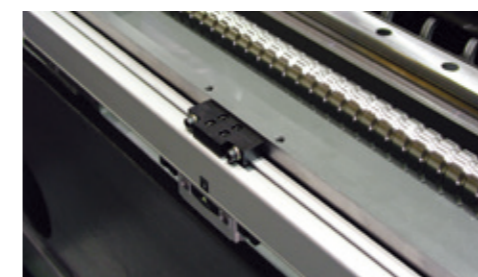


#### Amount of cutting edge variation



### Scale feedback (X, Y and Z axes) **Option**

An optical scale makes lasting precision positioning possible.



### Touch sensor function **Option**

The touch sensor is used to align the workpiece.



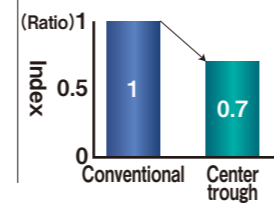
Reliability starts with chip disposal. The design of a center trough that makes it possible to deal with chip disposal directly beneath the cutting point.



**1 Center trough**

Chip disposal plays a critical role in machine operation efficiency. A chip disposal port located in the center of the bed makes for a chip disposal capacity 6 times greater than that of earlier methods. Furthermore, coolant consumption is substantially reduced, helping to make the equipment more environmentally friendly.

**Coolant consumption (Discharge)**



**2 Slant cover**

The slant internal cover keeps the accumulation of chips to a minimum.

**3 External nozzle coolant**

The nozzle installed at the spindle nose supplies coolant to the cutting point.

**4 Overhead shower coolant**

The coolant nozzle installed in the ceiling discharges coolant, keeping chip accumulation inside the machine down to a minimum.

**5 Spindle-through coolant 1MPa/ 3MPa/7MPa**

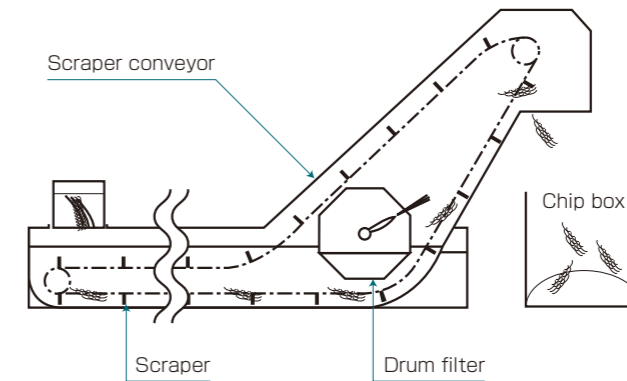
Coolant is supplied through the spindle center to the cutting edge. It is effective for lubrication and cooling of the cutting point, chip disposal and extension of tool life.



Spindle-through coolant 3MPa

**6 Coolant supply unit with take-up chip conveyor**

Chips collected to the center trough are discharged from the machine with the take-up chip conveyor.



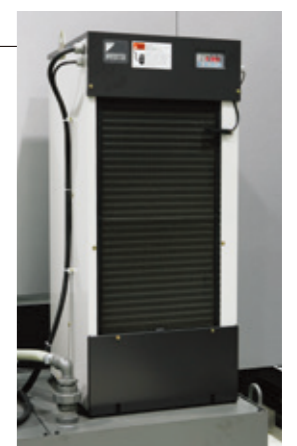
Splash gun



Oil skimmer

**Option Peripheral equipment**

Coolant cooling, chip box, mist collector and other optional accessories can be added.



Coolant cooling





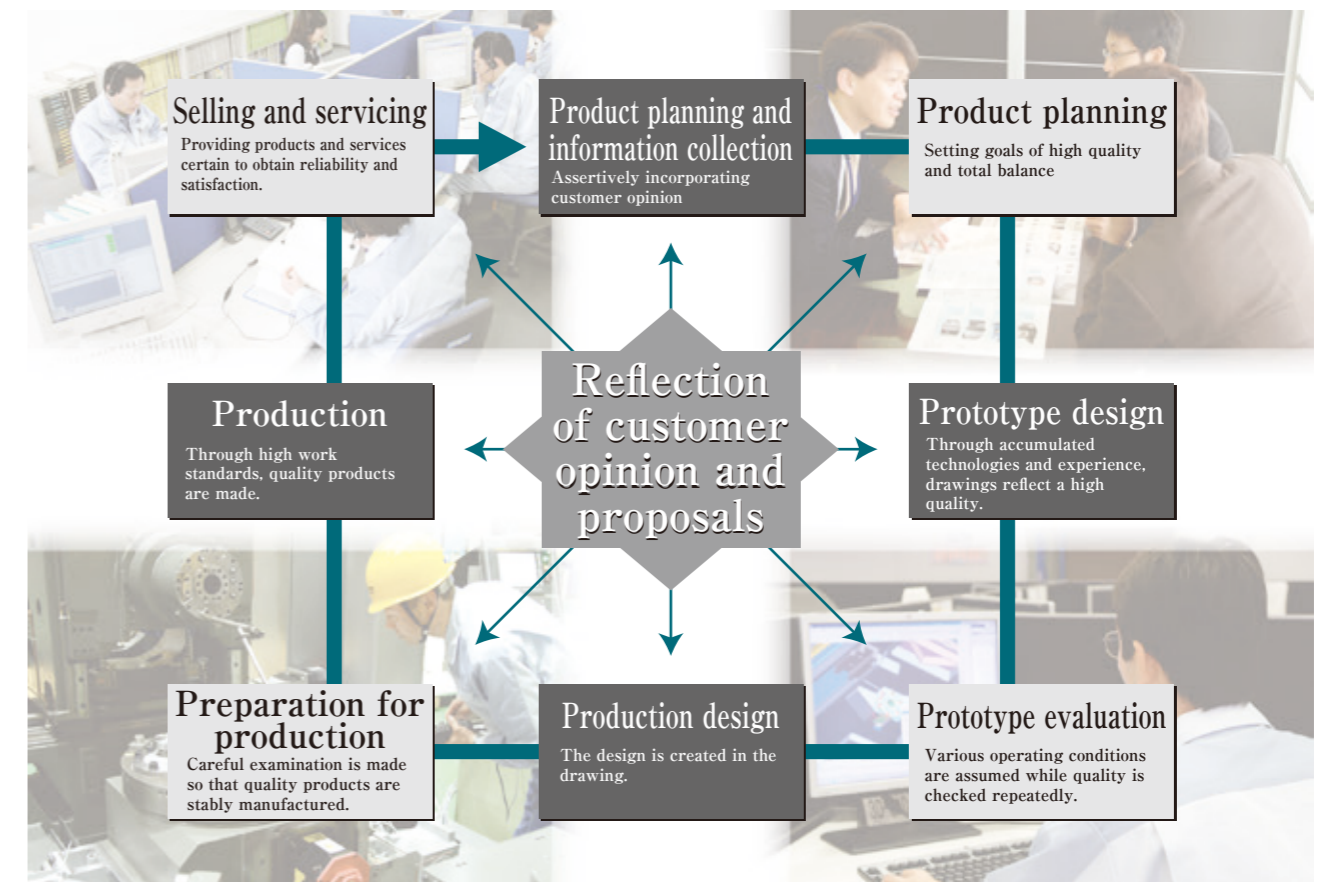
## The pursuit of Reliability - one of JTEKT's starting points

Stable accuracy and an improved MTBF (mean time between failures) are both necessary in order for the customer to feel assured with reliability. The design of the FH Series pursues high quality, high performance and long life.



## JTEKT don't take quality and performance as a given - we work for it.

When manufacturing a machine, JTEKT begin with understanding various customer needs and establishing a total control system, starting with a product design based on dedicated R&D activities through to a rigid quality control processes that ensure stable production.



JTEKT's leading edge technical development strength. This strength is supported by fundamental technologies ranging across various fields such as tripology, nano technology, material development and cutting technologies, heat treatment, control technology and much more.

Creating a feeling of assurance through the accumulation of material technology: Professionals majoring in material technology use cutting edge equipment to analyze and evaluate.

Research and development center in Kariya, Aichi Pref.



Material Technology Research Div., Research and Development Center



Using X-ray photoelectron spectroscopy to analysis fine matter adhered to a machined surface



Using a transmission electron microscope to survey metal structure

- Machined surface analysis(ultra precision field)
- Machining stress measurement
- Paint evaluation ● Coolant immersion evaluation
- Material mixture evaluation, etc.



## Workability

Aiming to perfect a production system both environmentally and people-orientated

At JTEKT, we never lose sight of our motto 'pursue technological dreams to deliver valuable innovations to you' and are always striving to achieve a style of manufacturing friendly to both people and the planet.

### Securing accessibility and work space

#### Accessible operation door

By positioning the operation panel on the left-hand side of the machine, we have created a wide opening and reduced the amount of eye travel required. This in turn reduces the physical strain on the operator by not demanding a constrained physical posture.



Rotary operation panel



Manual pulse generator (handheld type)

#### APC door with good accessibility

The wide door opening makes loading/unloading of the workpiece much easier. The open-out ceiling design ensures the safe loading and unloading of large parts, fixtures and angle steels with the use of the crane.



#### Tool magazine door with good accessibility

A sufficient opening is provided for the tool magazine door so that even heavy tools can be changed in a comfortable posture.



### OP Supporter

JTEKT's machining centers feature an automation function which makes the automation of the machine possible and supports the operator's work.

#### The 3 supporting features of the OP Supporter

##### Tool control support

- Simple program ... Tool number conversion function
- Detailed control ... Tool life control function
- Direct tool setting capability ... Tool offset function
- Tool teaching ... Tool list display function
- Limiting arm speed according to tool weight ... ATC speed variation function
- Faulty tool indexing ... Replacement tool automatic indexing function
- Manual tool data entry not required ... Tool ID function



##### Pallet control support

- Automatic cutting program call ... APC control
- Omission of unnecessary cutting operations ... Multi-workpiece installation skip function
- Correction between pallets ... Pallet correction function

##### Maintenance control support

- Notification of control device condition and position ... Signal status display function
- Periodic inspection item reminder ... Periodic inspection display function
- Equipment fault recording ... Fault history function

Division	Function name	Model OP***				Remarks
		10(i)	20iP	20iT	20iA	
① Tool control	Control function					
	Tool number conversion function			●	●	a
	Tool offset function			●	●	
	Tool life control function			●	●	
	ATC speed variation function			●	●	
	Offset update function			●	●	
	AC function(condition control)	—		□	□	*
	Cutting condition setting function	—		□	□	*
	Replacement tool automatic indexing function	—		□	●	*
	Tool data update during installation and removal	—		□	●	*d
	Storage tool data saving function	—		□	□	*
	Tool ID function	—		□	□	*b is necessary
2nd/3rd correction function	—		●	●		
Display function	Faulty tool list display			●	●	
	Spare tool list display	—		●	●	Set with 'a'
	Tool position display			●	●	
	Tool list display	—		□	●	
② Pallet	APC control	—	□	□	●	*C
	Pallet correction	—	□	□	●	
	Multi-workpiece installation	—	□	□	●	*c is necessary.
③ Miscellaneous	Function on/off switch	●	●	●	●	
	Startup using the M-codes list	●	●	●	●	
	NC data configuration diagram	—	□	□	●	
	Measurement result display	—	□	□	□	*
④ Maintenance	Signal status display	—	●	□	●	
	Fault history	●	●	●	●	
	Fault code-specific frequency	—	●	□	●	
	Periodic inspection display	—	●	□	●	
	Load maintior	—	□	□	□	
	Cycle time measurement	—	●	□	□	
	Counter	—	●	□	□	
	Diagnosis data	—	●	●	●	
⑤ DNC support function		□	□	□	□	
	Fault history	□	□	□	□	
⑥ Report	Machinig result					
	Operation result	□	□	□	□	
	Production result					



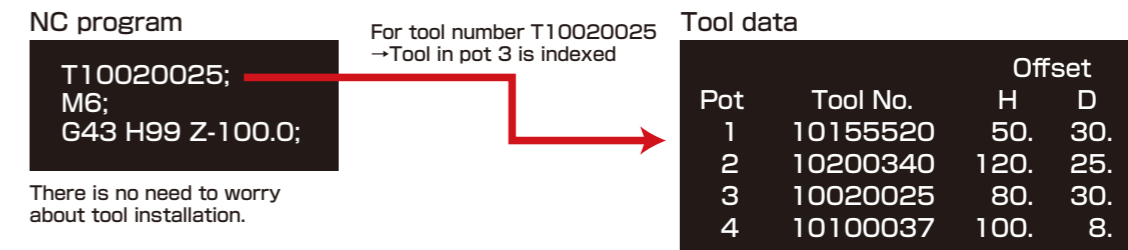
- Attached function
- Standard accessories
  - Options
  - Not available

1. Other functions can be added to the package specification (OP20P/T/A).  
 2. The \* mark in the remarks column indicates the items for which devices and other options apart from the software are required. Please contact us for details.  
 3. The ※ mark in the remarks column indicates those items which cannot be included with the FMS or pallet pool-connected machines.

##### Tool control support

#### NC program creation is simple.

Tool number conversion function: When a tool-specific number is commanded, this is automatically converted to an ATC magazine pocket number so NC programs can be made without worrying about pocket numbers.



#### Simple registration of tool data

Tool ID function: The ID chip containing tool data(correction data, tool life, AC data, machining condition, etc.)eliminates the need for manual tool data entry, thus removing the human error factor.

#### Accurate tool life appraisal

Tool life control function: A counting method giving readings at 0.1 sec accuracy. A double-layered fault warning system provides peace of mind, first generating a warning that the actual error. Tool breakages, AC faults and so on are displayed in addition to tool life.



#### Tool list display function

Program tool check function: The tools used in the program are analyzed and any tool shortages are notified.

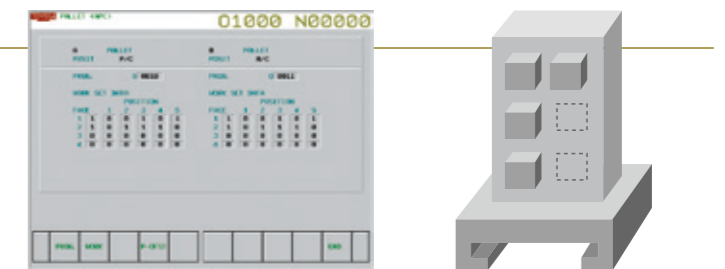


##### Pallet control support

#### Solid pallet control

Multi-workpiece installation function: Only registered mounting faces and/or processes are machined, therefore cycle time is significantly reduced.

Pallet compensation function: Compensation data recorded for each pallet switches automatically.



##### Maintenance control support

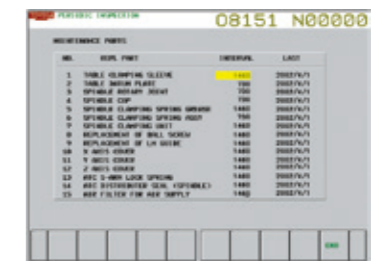
#### Visual status display

Signal status display function: The limit switch ON/OFF state is displayed in real time, thereby shortening maintenance time.



#### Straightforward inspection items

Periodic inspection display function: Displays regular inspection items and check completion status so regular inspection pre-checks can be performed. (preventative maintenance)



Machine specifications

Item	Unit	FH400J		FH500J4		FH500J5		
		No.40		No.40		No.50		
		Standard specifications	Special specifications	Standard specifications	Special specifications	Standard specifications	Special specifications	
Table & Pallet	Table dimensions (pallet dimensions)	mm	□400 (Pallet)	□500 (Pallet)		□500 (Pallet)		
	Rotary table indexing angle	°	0.001° (NC)	0.001° (NC)		0.001° (NC)		
	Pallet height (from floor)	mm	1,100	1,100		1,100		
	Max load on pallet	kg	400	500	700	500	700	
	Table indexing time (90° indexing)	sec	2.3	2.3	0.5 ※1	2.3	0.5 ※1	
	Pallet change time	sec	7.5	9.5	10.5 ※2	9.5	10.5 ※2	
Stroke	X-axis	mm	600	730		730		
	Y-axis	mm	560	730		730		
	Z-axis	mm	630	850		850		
	Distance between spindle nose and table center	mm	100~730	100~950		100~950		
	Distance between spindle center and top of pallet	mm	50~610	50~780		50~780		
	Max. workpiece swing x Max. workpiece height	mm	φ630×900 ※3	φ800×1,000 ※3		φ800×1,000 ※3		
Feeds	Rapid feed rate (X, Y and Z)	m/min	60	60		60		
	Cutting feed rate (X, Y and Z)	m/min	0.001~30	0.001~30		0.001~30		
	Rapid acceleration (X, Y and Z)	m/s <sup>2</sup> (G)	9.8 (1)	9.8 (1)		9.8 (1)		
	Ball screw diameter (X, Y and Z)	mm	φ40	φ40		φ40		
Spindle	Spindle speed	min <sup>-1</sup>	50~15,000	50~15,000		50~15,000		
	Spindle diameter (front bearing bore)	mm	φ80	φ80		φ90		
	Spindle nose shape		BT No.40	HSK	BT No.40	HSK	BT No.50	HSK
	Spindle motor, short-time/continuous	kW	37/22		37/22		37/22	
ATC	Tool holding capacity	tool	40	60, 119	40	60, 119	60	
	Tool selection		Absolute address		Absolute address		Absolute address	
	Tool (dia. × length)	mm	φ75×400 ※4		φ75×470 ※4		φ120×470 ※4	
	Tool mass	kg	8		8		27	
	Tool change time (Tool-to-Tool)	sec	1.0		1.0		2.5 (~15kg) / 2.8 (15~27kg)	
	Tool change time (Chip-to-Chip)	sec	2.6		2.6		3.6 (~15kg) / 4.0 (15~27kg)	
	Tools Holder		MAS BT40		MAS BT40		MAS BT50	
Pull stud		MAS P40T-1		MAS P40T-1		MAS P50T-1		
Dimensions & Weight	Floor space (width × depth)	mm	2,100×4,205 ※5		2,330×4,630 ※5		3,150×5,443 ※5	
	Machine height	mm	2,735		2,870		3,180	
	Machine weight	kg	11,000		13,500		15,100	
Various Capacities	Working oil	L	18		18		18	
	Slide lubricant	L	2.9		2.9		2.9	
	Spindle oil air	L	2.9		2.9		2.9	
	ATC lubricant	L	6.1		6.1		7.5	
	Table	L	1.5		1.5	— ※1	1.5	— ※1
	Spindle coolant	L	15		15	20 ※1	15	20 ※1
	Power supply capacity	kVA	31		31	35 ※1	34	36 ※1
	Control voltage	V	DC24		DC24		DC24	
	Air source capacity	NL/min	800		800		800	
Air source pressure	MPa	0.4~0.5		0.4~0.5		0.4~0.5		
Capability & Performance	Positioning accuracy ※6	mm	± 0.003	± 0.0015	± 0.003	± 0.0015	± 0.003	± 0.0015
	Repeatability ※6	mm	± 0.0015	± 0.001	± 0.0015	± 0.001	± 0.0015	± 0.001
	Table indexing accuracy ※6	sec	± 7		± 7		± 7	
	Table indexing repeatability ※6	sec	± 3.5		± 3.5		± 3.5	

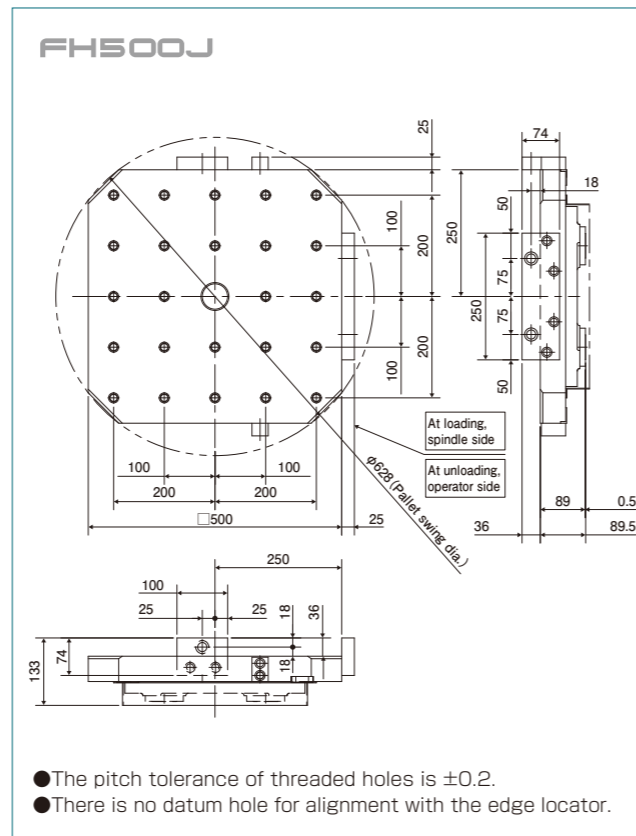
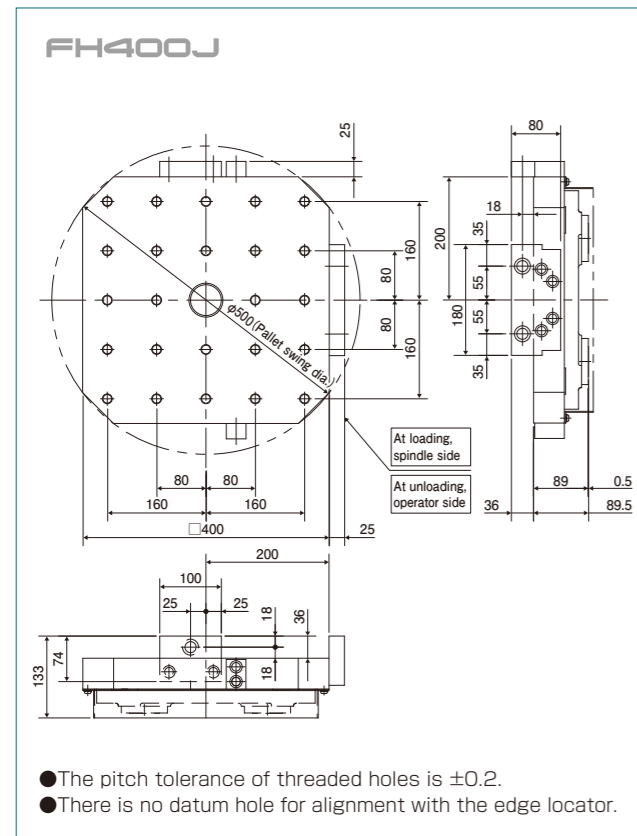
※1 When the DD table is equipped (Only FH500J can be equipped with the DD table). ※2 For when the loading mass on the pallet is 700 kg.  
 ※3 For detail shape, refer to the tooling data. ※4 For detail shape, refer to the tooling data. ※5 For details, refer to the layout plan. ※6 According to our inspection method.

CNC unit FANUC 32i. ● Standard / □ Optional

Division	Name	FH400J	FH500J
Axis control	Min. input increment (0.001mm)	●	●
	Machine lock	●	●
	Absolute position detection	●	●
	Inch/metric switch	□	□
Operation	Dry run	●	●
	Single block	●	●
	Manual handle feed 1 unit	●	●
	Program restart	□	□
	Manual handle interrupt	□	□
Interpolation function	Nano interpolation	●	●
	Positioning (G00)	●	●
	Exact stop mode (G61)	●	●
	Tapping mode (G63)	●	●
	Cutting mode (G64)	●	●
	Exact stop (G09)	●	●
	Linear interpolation (G01)	●	●
	Arc interpolation (G02, G03)	●	●
	Dwell (G04)	●	●
	Helical interpolation	●	●
	Reference point return (G28, G29)	●	●
	Second reference point return (G30)	●	●
	Third and fourth reference point return (G30)	●	●
Feed function	AI contour control I (pre-read 30 blocks)	●	●
	F1-digit feed	□	□
	AI contour control II (pre-read 80 blocks)	□	□
Program entry	Local coordinate system (G52)	●	●
	Machine coordinate system (G53)	●	●
	Workpiece coordinate system (G54 to G59)	●	●
	Additional workpiece coordinate systems (48 sets)	□	□
	Custom macro	●	●
	Additional custom macro common variables (#100 to #199, #500 to #999)	●	●
	Fixed drilling cycle (G73, G74, G76, G80 to G89, G98 and G99)	●	●
	Additional optional block skip (9 pieces)	□	□
	Automatic corner override	□	□
Spindle function	Rigid tap	●	●
Tool function	Tool corrections (99)	●	●
	Tool correction function	□	□
Tool correction function	Tool corrections (400)	□	□
	Tool position offset	●	●
	Tool diameter and cutter radius compensation	●	●
	Tool length compensation (G43, G44 and G49)	●	●
Editing operation	Program storage capacity (128K bytes)	●	●
	Program storage capacity (256K bytes)	□	□
	Program storage capacity (512K bytes)	□	□
	Program storage capacity (1M byte)	□	□
	Program storage capacity (2M bytes)	□	□
	Number of registered programs (250)	●	●
	Number of registered programs (500) ※Storage capacity 256K bytes compulsory	□	□
	Number of registered programs (1000) ※Storage capacity 512K bytes compulsory	□	□
	Simultaneous multi-program editing (incl. background editing)	●	●
Data entry/display	Touch panel control	●	●
Communication function	Built-in Ethernet	●	●
Others	10.4" color LCD	●	●

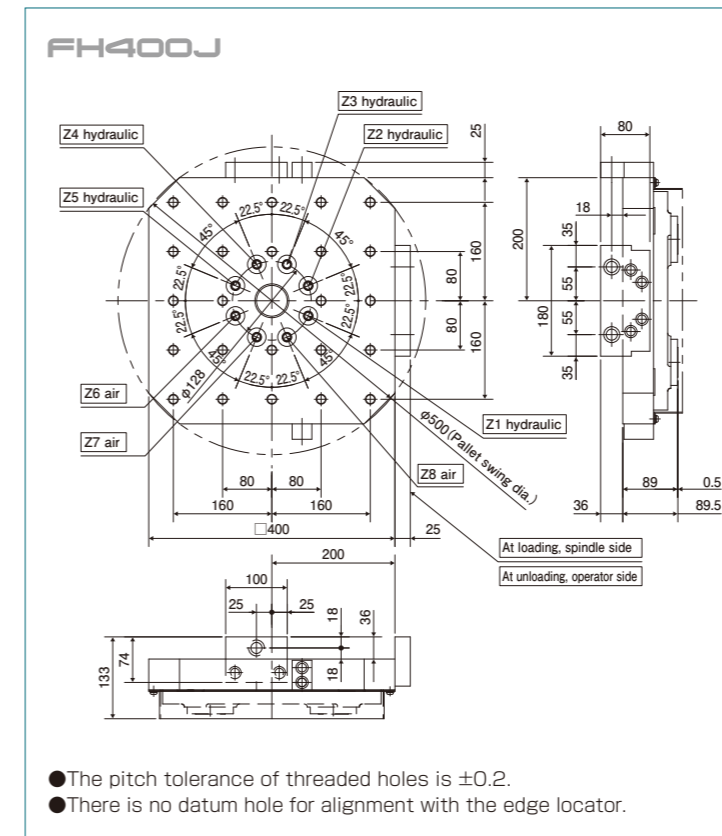
FANUC is a registered trademark of FANUC LTD.

Threaded hole



Pallet-through

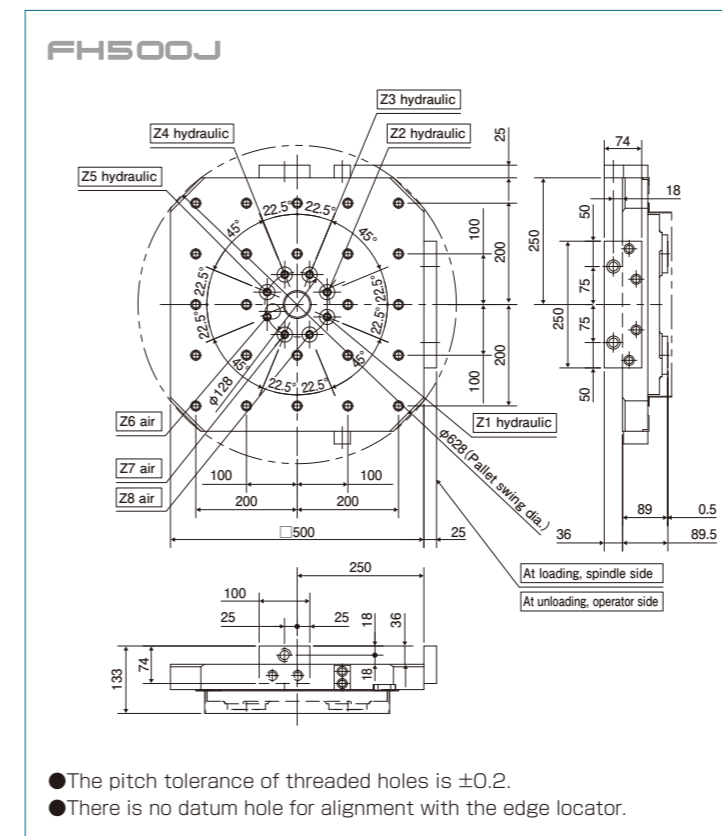
Option



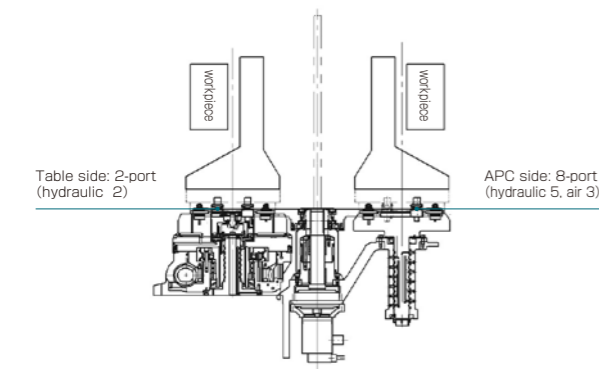
Port location	APC side	Table side
Z1	Jig motion 1-①	Jig clamping 1
Z2	Jig motion 1-②	
Z3	Jig motion 2-①	
Z4	Jig motion 3-②	
Z5	Jig motion 3-①	Jig clamping 2
Z6	Workpiece seating confirmation ①	
Z7	Workpiece seating confirmation ②	
Z8	Workpiece seating confirmation ③	

A space-saving design standardized for use with hydraulic jigs. Option

A pallet-through method has been adopted for supplying hydraulic oil to the jig. Furthermore, the jig hydraulic pump and electromagnetic valve have been arranged in a package, allowing the machine to be installed in a surface area no bigger than that required for standard machines.



Port location	APC side	Table side
Z1	Jig motion 1-①	Jig clamping 1
Z2	Jig motion 1-②	
Z3	Jig motion 2-①	
Z4	Jig motion 3-②	
Z5	Jig motion 3-①	Jig clamping 2
Z6	Workpiece seating confirmation ①	
Z7	Workpiece seating confirmation ②	
Z8	Workpiece seating confirmation ③	

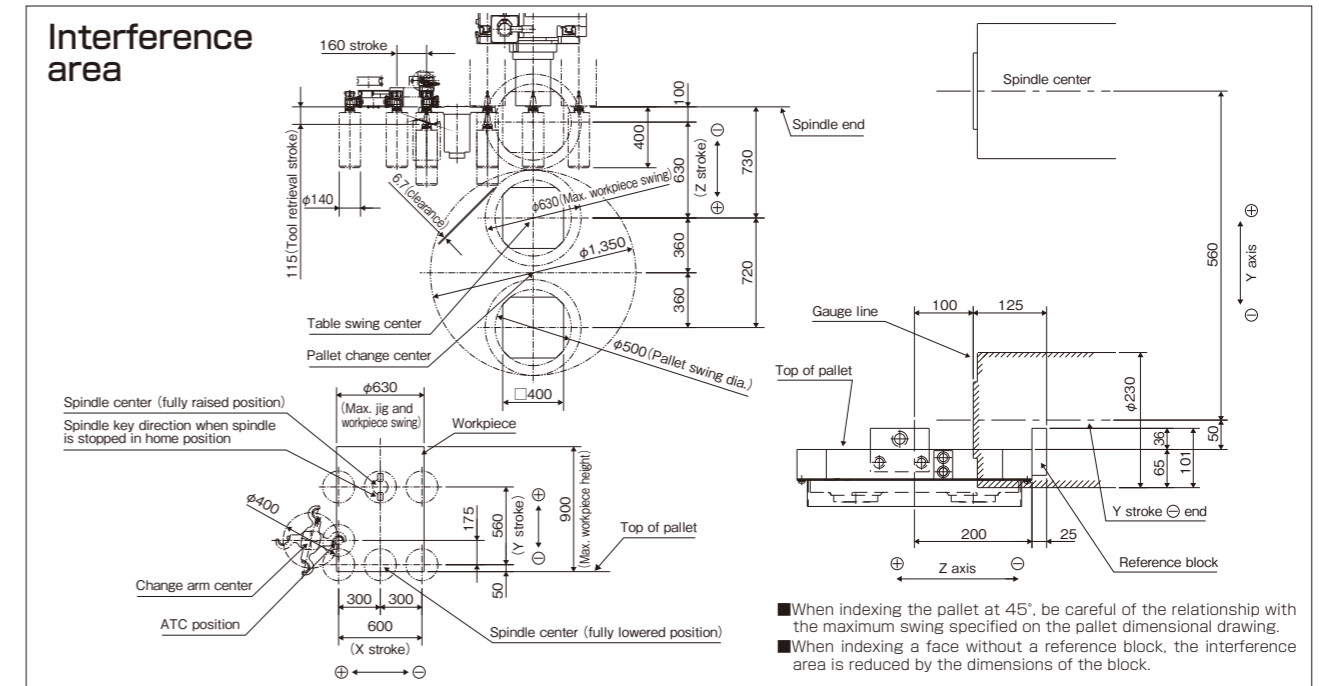
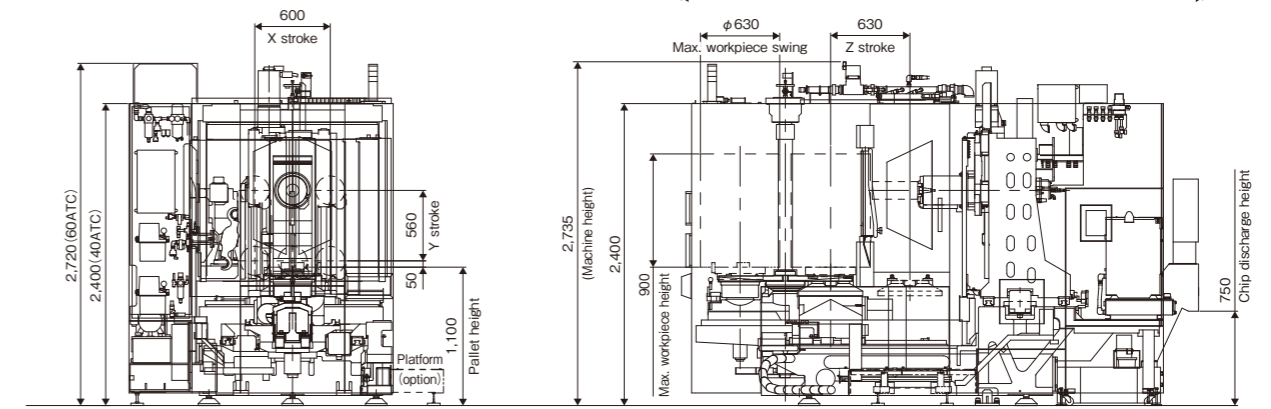


**Accessories** ●: Standard accessories / □: Optional accessories / -: Not available

Item	Equipment name		FH400J No.40	FH500J4 No.40	FH500J5 No.50	
Table and pallet	Indexing table	NC indexing table	●	●	●	
		NC indexing table (with encoder)	□	□	□	
		DD table (with encoder)	-	□	□	
Pallet	Additional pallet	Standard pallet Threaded hole	●	●	●	
		1 set Threaded hole	□	□	□	
Spindle related	Specifications	15,000min <sup>-1</sup> BT No.40 (37/22kW) spindle (with spindle-through coolant spec)	●	●	-	
		15,000min <sup>-1</sup> BT No.50 (37/22kW) spindle (with spindle-through coolant spec)	-	-	●	
		Filler block for oil hole holder	□	□	□	
		Positioning block for angle head holder	□	□	□	
		HSK specifications	□	□	□	
		BIG PLUS specifications	□	□	□	
		Collet	MAS I	●	●	●
			JIS	□	□	□
			MAS II	□	□	□
		Tool magazine	Tool capacity	40 tools	●	●
60 tools	□			□	●	
119 tools	□			□	-	
	□			□	-	
Coolant related	Coolant unit	Coolant unit (Water-soluble/with take-up chip conveyor/scrapper type/without spindle-through coolant/with oil skimmer)	●	●	●	
		Coolant unit (Water-soluble/with take-up chip conveyor/scrapper type/spindle-through coolant/1MPa through pump/with oil skimmer)	□	□	□	
		Coolant unit (Water-soluble/with take-up chip conveyor/scrapper type/spindle-through coolant/3MPa through pump/with oil skimmer)	□	□	□	
		Coolant unit (Water-soluble/with take-up chip conveyor/scrapper type/spindle-through coolant/7MPa through pump/with oil skimmer)	□	□	□	
			□	□	□	
	External nozzle coolant	●	●	●		
	Overhead shower coolant	Simultaneous discharge with external nozzle coolant	●	●	●	
		Individual discharge	□	□	□	
	Chip flushing coolant	●	●	●		
	Coolant cooling	□	□	□		
Oil skimmer	●	●	●			
Chip box	□	□	□			
Splash gun (at APC)	●	●	●			
Mist collector	□	□	□			
Air blower	External nozzle type	□	□	□		
	External holder type	□	□	□		
Splash guard	Enclosure guard		●	●	●	
		Door interlock at operating position	Electromagnetic lock type	●	●	●
		APC door interlock	Electromagnetic lock type	●	●	●
		Internal lighting	●	●	●	
Operation control function, others	Ground fault interrupter	□	□	□		
	Control cabinet internal cooler	□	□	□		
Labor saving function	Pallet changer (APC)	Swing type	●	●	●	
High accuracy support	Spindle cooling unit	BTS function (Ballscrew Thermo Stabilizer)	●	●	●	
		Scale feedback (X, Y, Z axis)	BTS function removed if included.	□	□	□
	Touch sensor function	Optical type (without energization) ; with alignment, datum face correction, gap elimination and tool breakage detection function.	□	□	□	
		Optical type (with energization) ; with alignment, datum face correction, gap elimination and tool breakage detection function.	□	□	□	
			□	□	□	
Operator support function	Package	OP10i Foundation model	●	●	●	
		OP20iP Maintenance model	□	□	□	
	Tool control	OP20iT Tool control model	□	□	□	
		OP20iA Advance tool control model	□	□	□	
		AC function (condition control)	□	□	□	
		Cutting condition setting function	□	□	□	
		Replacement tool automatic indexing function	□	□	□	
		Tool update during installation and removal	□	□	□	
		Storage tool data saving function	□	□	□	
		Tool ID function	□	□	□	
Tool list display	□	□	□			
Pallet control	APC control	□	□	□		
	Multi-workpiece installation	□	□	□		
Auxiliary function	Measurement result display	□	□	□		
Maintenance function	Signal status display	□	□	□		
	Fault history	□	□	□		
	Fault code	□	□	□		
	Periodic inspection display	□	□	□		
	Load monitor Load monitor	□	□	□		

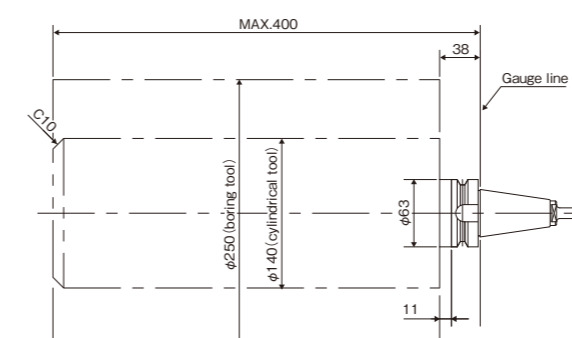
When the scale feedback is equipped, the model name becomes FH400J4-L, FH500J4-L and FH500J5-L.

**FH400J**  
**BT No.40**  
Layout plan



**Limitations in tool holder shape (JIS, BT NO.40)**

The tool holder is subject to limitations in the shape during ATC (automatic tool change). If the maximum tool diameter exceeds  $\phi 63$ , please make the outside diameter  $\phi 63$  for a 38mm range from the gauge line. The total mass must be within 8kg and the length from the gauge line must be within 400mm.



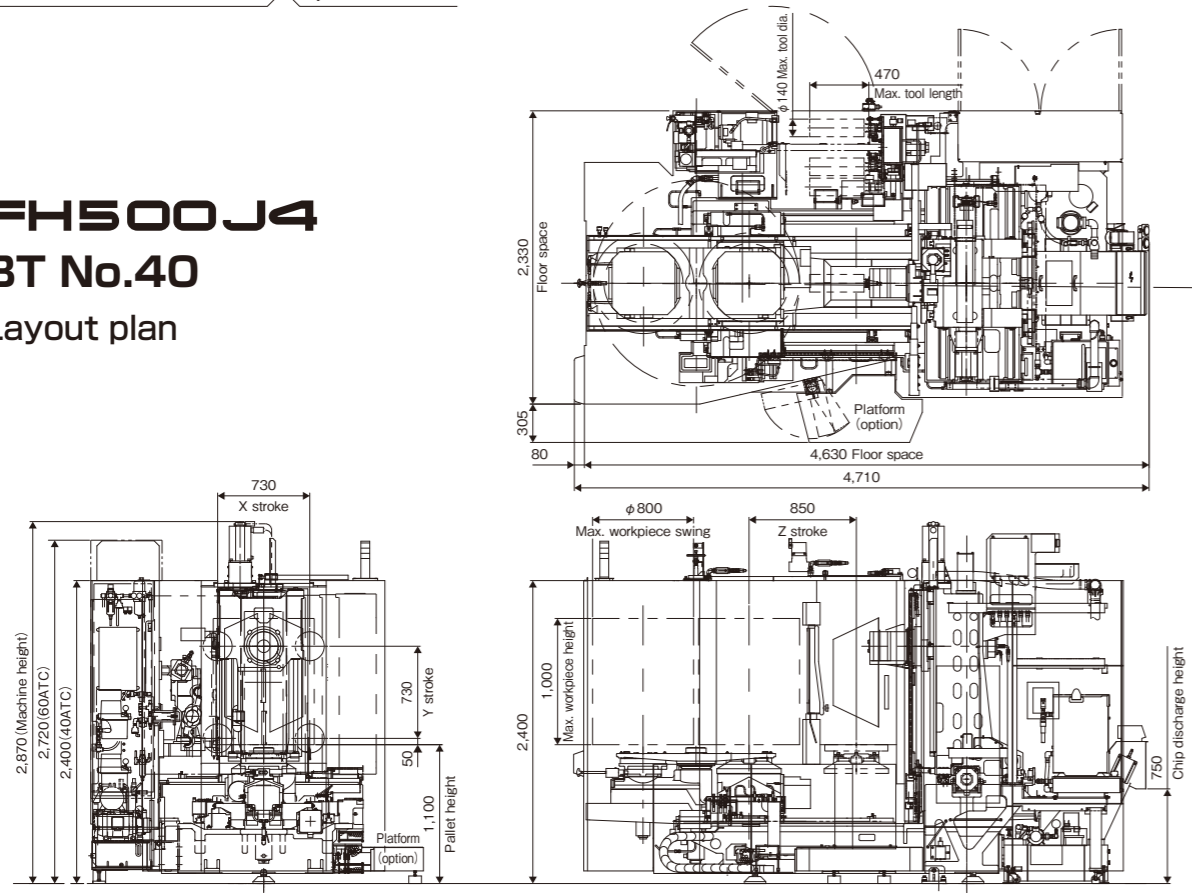
Item	Max. spec
Tool length	400mm
Tool diameter	With a 40 and 60 pocket magazine: $\phi 75$ mm (with no limitations caused by adjacent tools)
Tool weight	8kg Moment at the spindle nose shall be 11.8 N·m or less.
Tool imbalance amount	30x10 <sup>-5</sup> N·m or less (tools not exceeding 6,000 min <sup>-1</sup> ) 10x10 <sup>-5</sup> N·m or less (tools between 6,000 min <sup>-1</sup> and 8,000 min <sup>-1</sup> ) 30x10 <sup>-5</sup> N·m or less (tools exceeding 8,000 min <sup>-1</sup> )

Tools with diameters exceeding those given above are subject to limitations in the diameter of adjacent tools in the magazine, key groove position of the tool holder and so on.

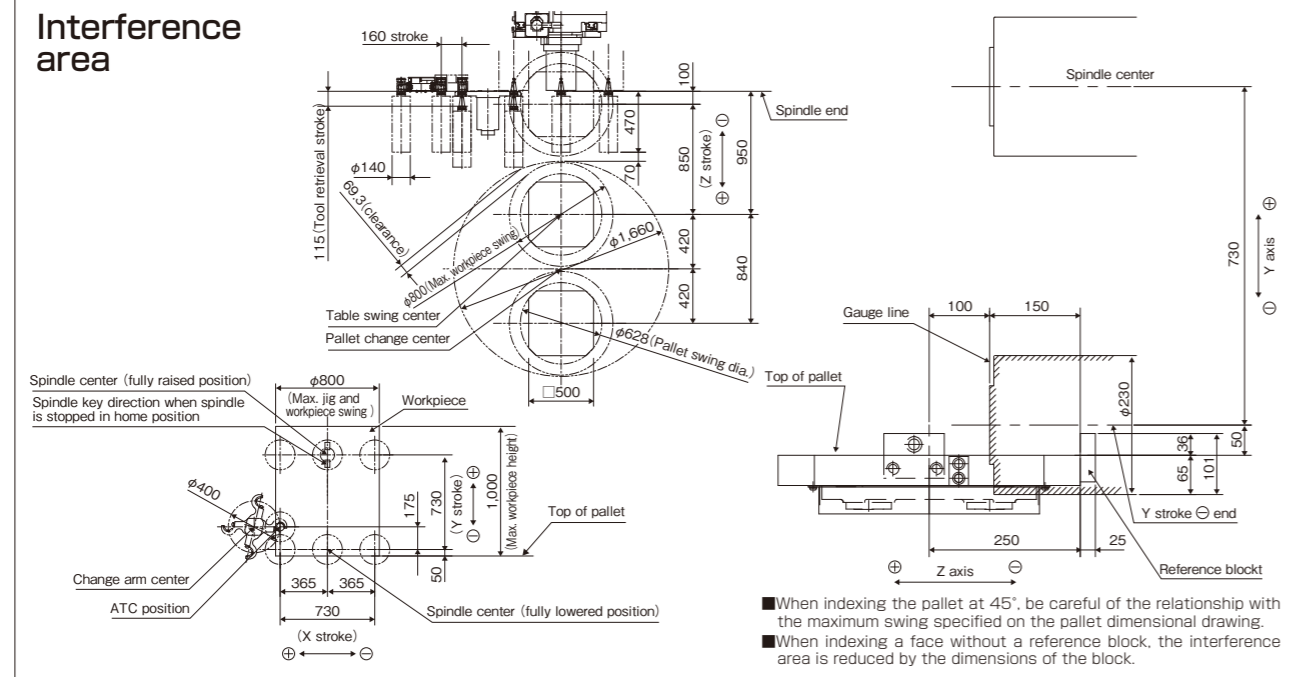
# FH500J4

## BT No.40

### Layout plan

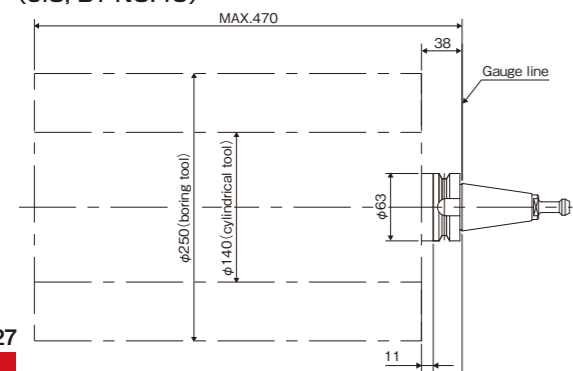


### Interference area



### Limitations in tool holder shape (JIS, BT NO.40)

The tool holder is subject to limitations in the shape during ATC (automatic tool change). If the maximum tool diameter exceeds  $\phi 63$ , please make the outside diameter  $\phi 63$  for a 38mm range from the gauge line. The total mass must be within 8kg and the length from the gauge line must be within 470mm.



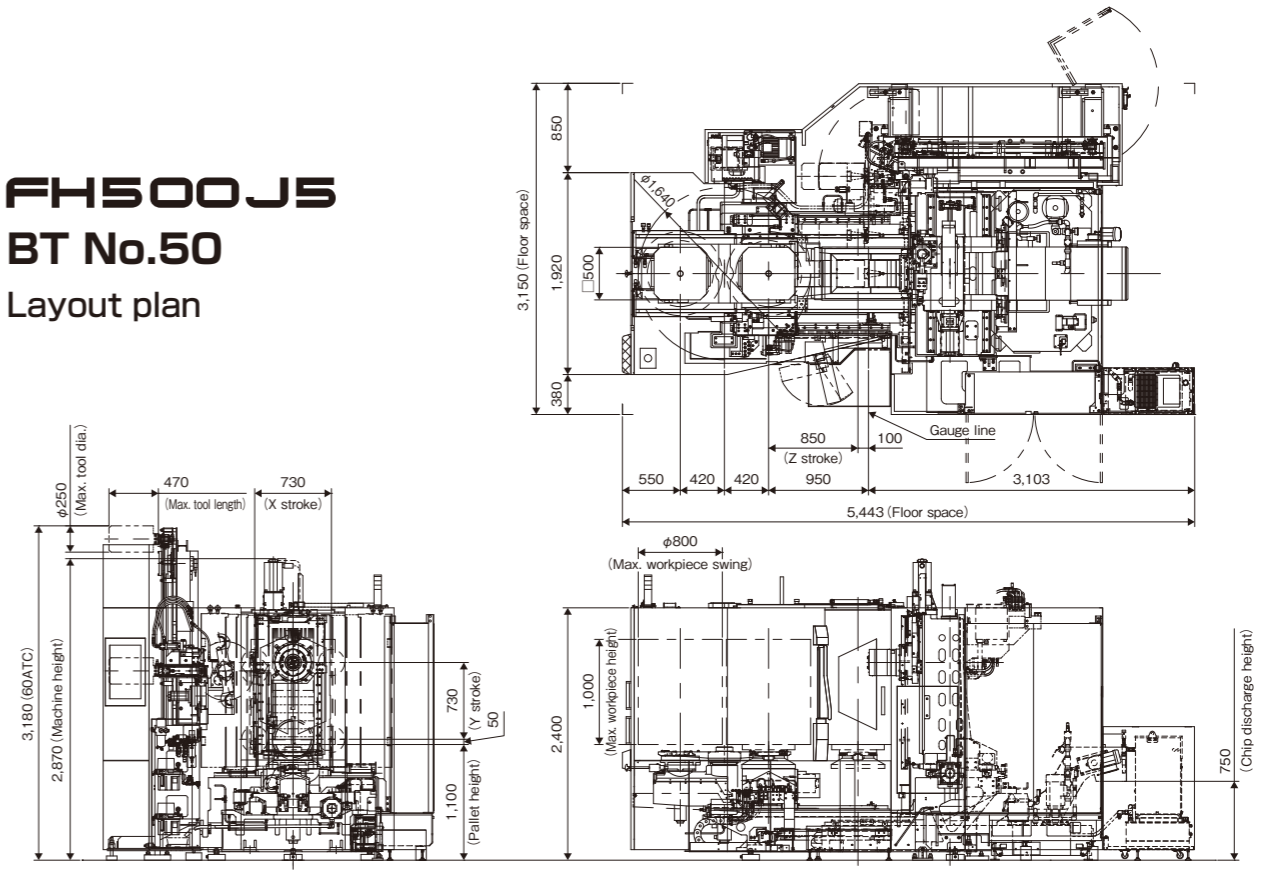
Item	Max. spec
Tool length	470mm
Tool diameter	With a 40 and 60 pocket magazine: $\phi 75$ mm (with no limitations caused by adjacent tools)
Tool weight	8kg Moment at the spindle nose shall be 11.8 N·m or less.
Tool imbalance amount	30x10 <sup>-5</sup> N·m or less (tools not exceeding 6,000 min <sup>-1</sup> ) 10x10 <sup>-5</sup> N·m or less (tools between 6,000 min <sup>-1</sup> and 8,000 min <sup>-1</sup> ) 30x10 <sup>-5</sup> N·m or less (tools exceeding 8,000 min <sup>-1</sup> )

Tools with diameters exceeding those given above are subject to limitations in the diameter of adjacent tools in the magazine, key groove position of the tool holder and so on.

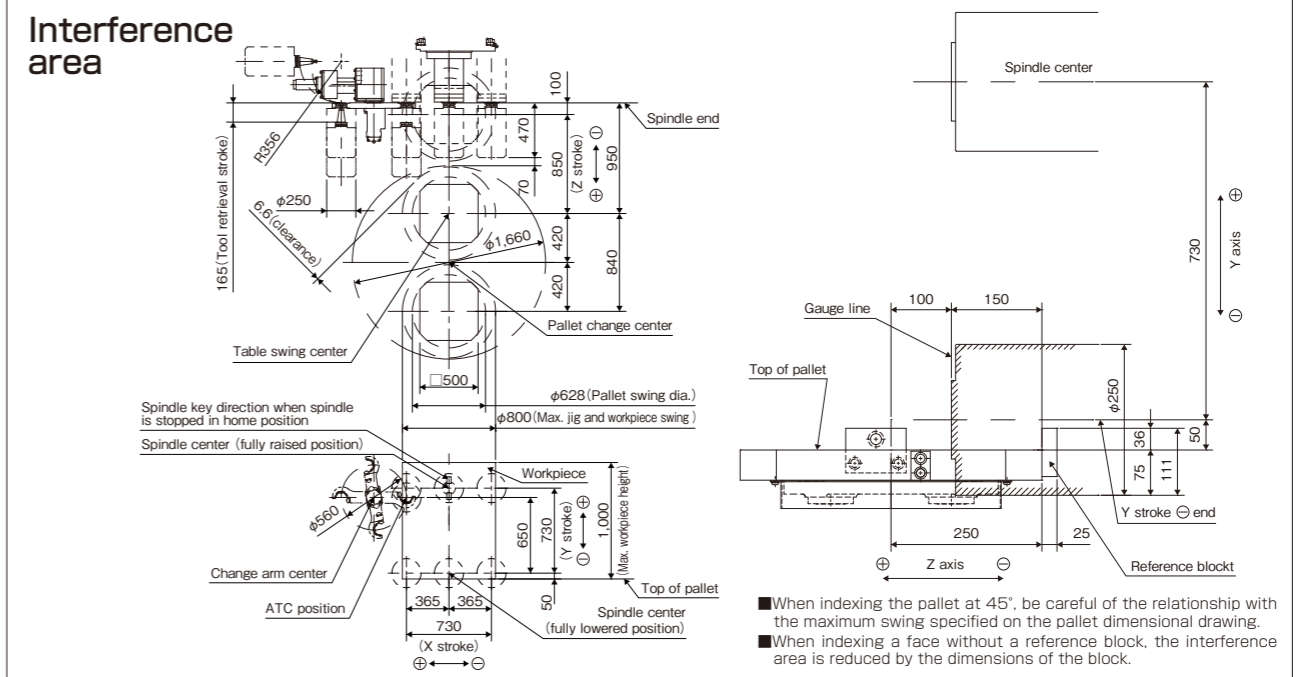
# FH500J5

## BT No.50

### Layout plan



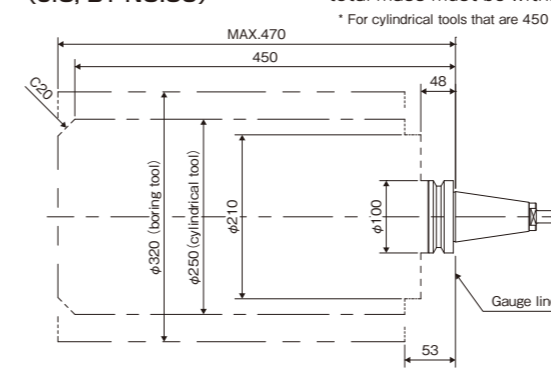
### Interference area



### Limitations in tool holder shape (JIS, BT NO.50)

The tool holder is subject to limitations in the shape during ATC (automatic tool change). If the maximum tool diameter exceeds  $\phi 100$ mm, please make the outside diameter  $\phi 100$ mm for a 48mm range from the gauge line. Ranges within 53 mm from the gauge line must have an outer diameter of  $\phi 210$ mm or less. The total mass must be within 27kg and the length from the gauge line must be within 470mm.

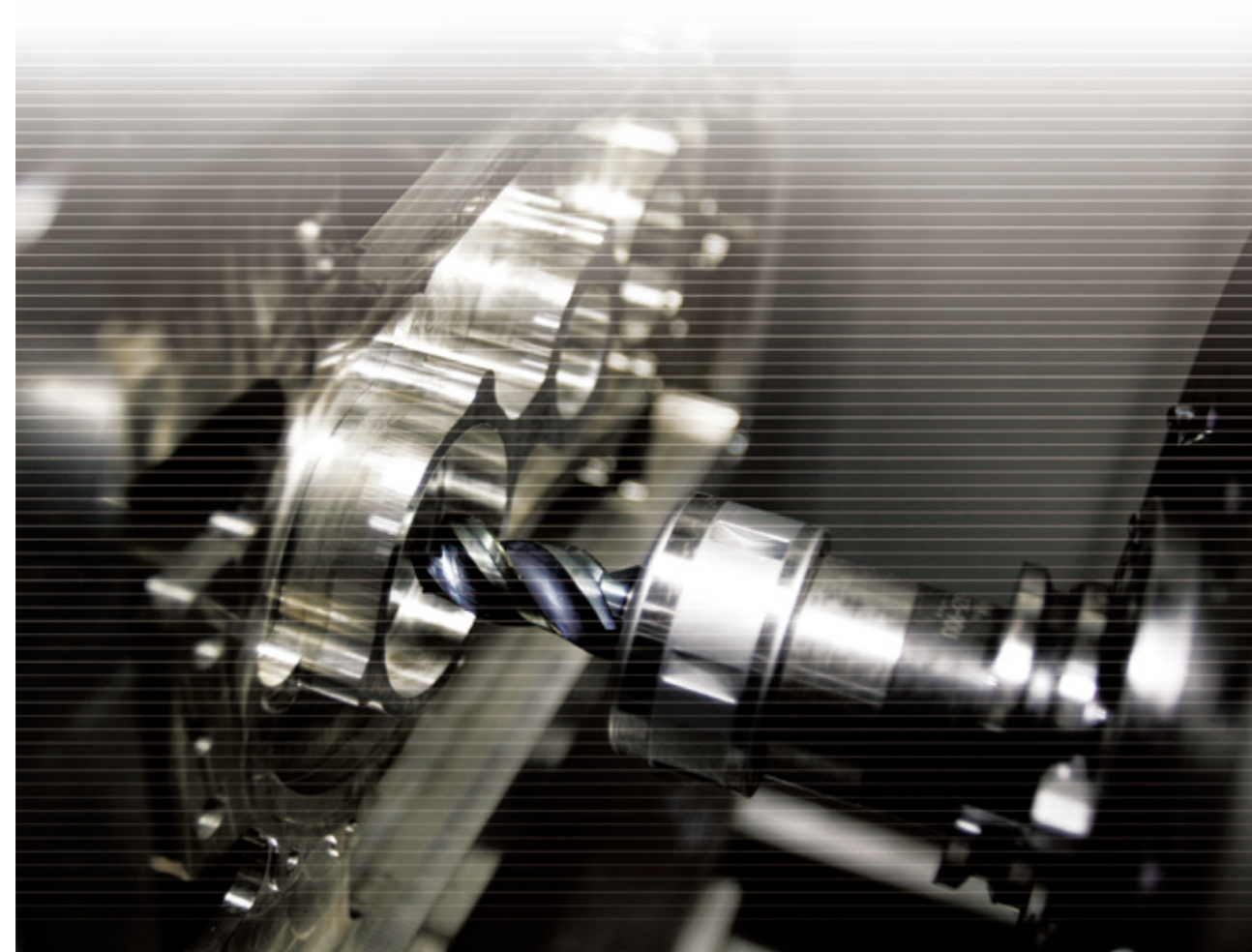
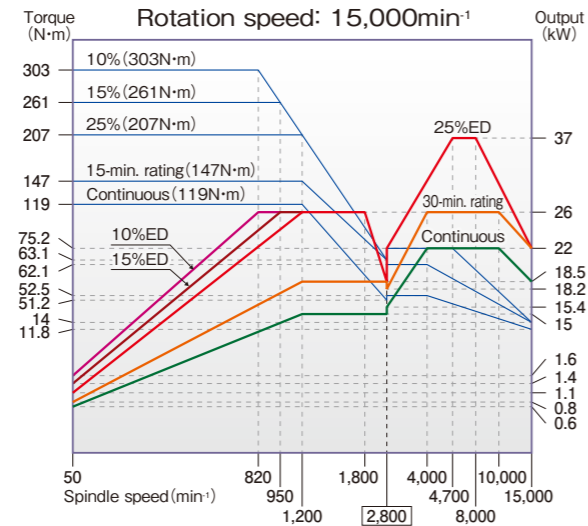
\* For cylindrical tools that are 450 mm or longer, chamfering of C20 or more is required at the tool tip, taking into account the maximum size of the workpieces.



Item	Max. spec
Tool length	470mm
Tool diameter	With a 60 pocket magazine: $\phi 120$ mm (with no limitations caused by adjacent tools)
Tool weight	27kg Moment at the spindle nose shall be 29 N·m or less.
Tool imbalance amount	30x10 <sup>-5</sup> N·m or less (tools not exceeding 6,000 min <sup>-1</sup> ) 10x10 <sup>-5</sup> N·m or less (tools between 6,000 min <sup>-1</sup> and 8,000 min <sup>-1</sup> ) 3x10 <sup>-5</sup> N·m or less (tools not exceeding 8,000 min <sup>-1</sup> )

Tools with diameters exceeding those given above are subject to limitations in the diameter of adjacent tools in the magazine, key groove position of the tool holder and so on.

Output and torque diagram



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