

TOYODA

FH SERIES

FH400J
FH500J

JTEKT



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

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JTEKT
JTEKT CORPORATION



Leading the way towards improving
production efficiency

Car, motorcycle-related, energy-related, aerospace industry, construction machinery, 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.



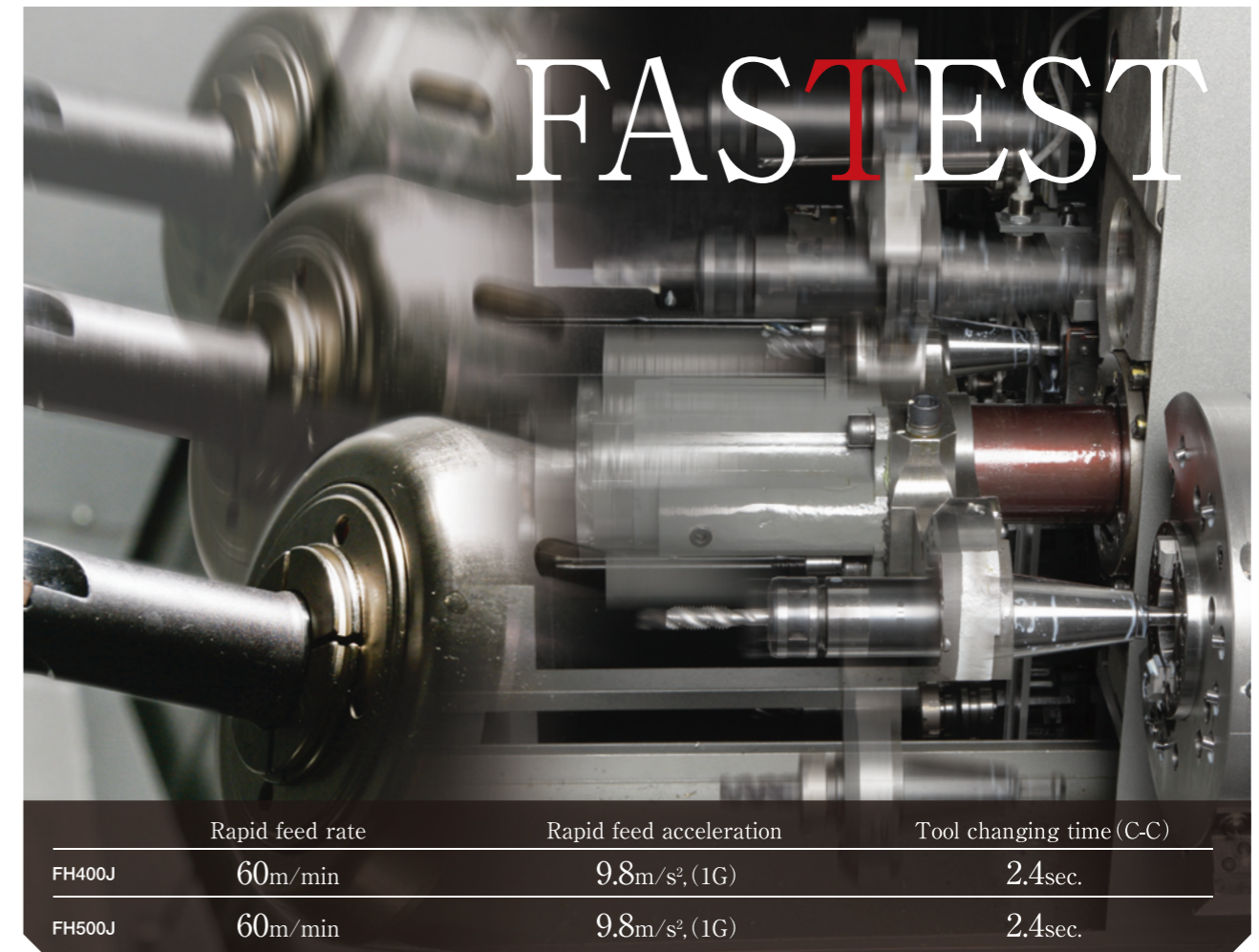
FH400J / FH500J

minimum & fastest



MINIMUM

	Required floor space (width×depth)	Maximum load on pallet	Stroke (X×Y×Z)
FH400J	2,100mm × 4,020mm	φ630mm × 900mm	600mm × 560mm × 630mm
FH500J	2,330mm × 4,530mm	φ800mm × 1,000mm	730mm × 730mm × 850mm



FASTEST

	Rapid feed rate	Rapid feed acceleration	Tool changing time (C-C)
FH400J	60m/min	9.8m/s ² , (1G)	2.4sec.
FH500J	60m/min	9.8m/s ² , (1G)	2.4sec.

minimum

Boasting high expansion capability while being compact.

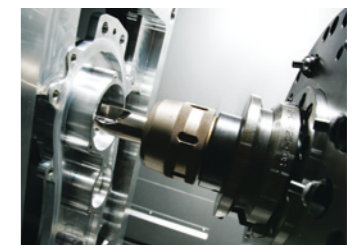
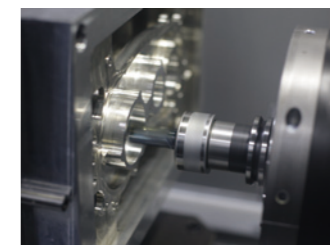
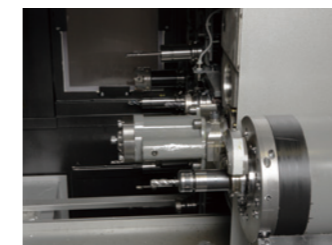
In recent years, the manufacturing of vehicle parts etc. has used a method known as cell manufacturing, involving multiple machining centers being placed in a row to construct a line. The FH400J and FH500J were developed to be compatible with this style of manufacturing. One key point of cell manufacturing 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.

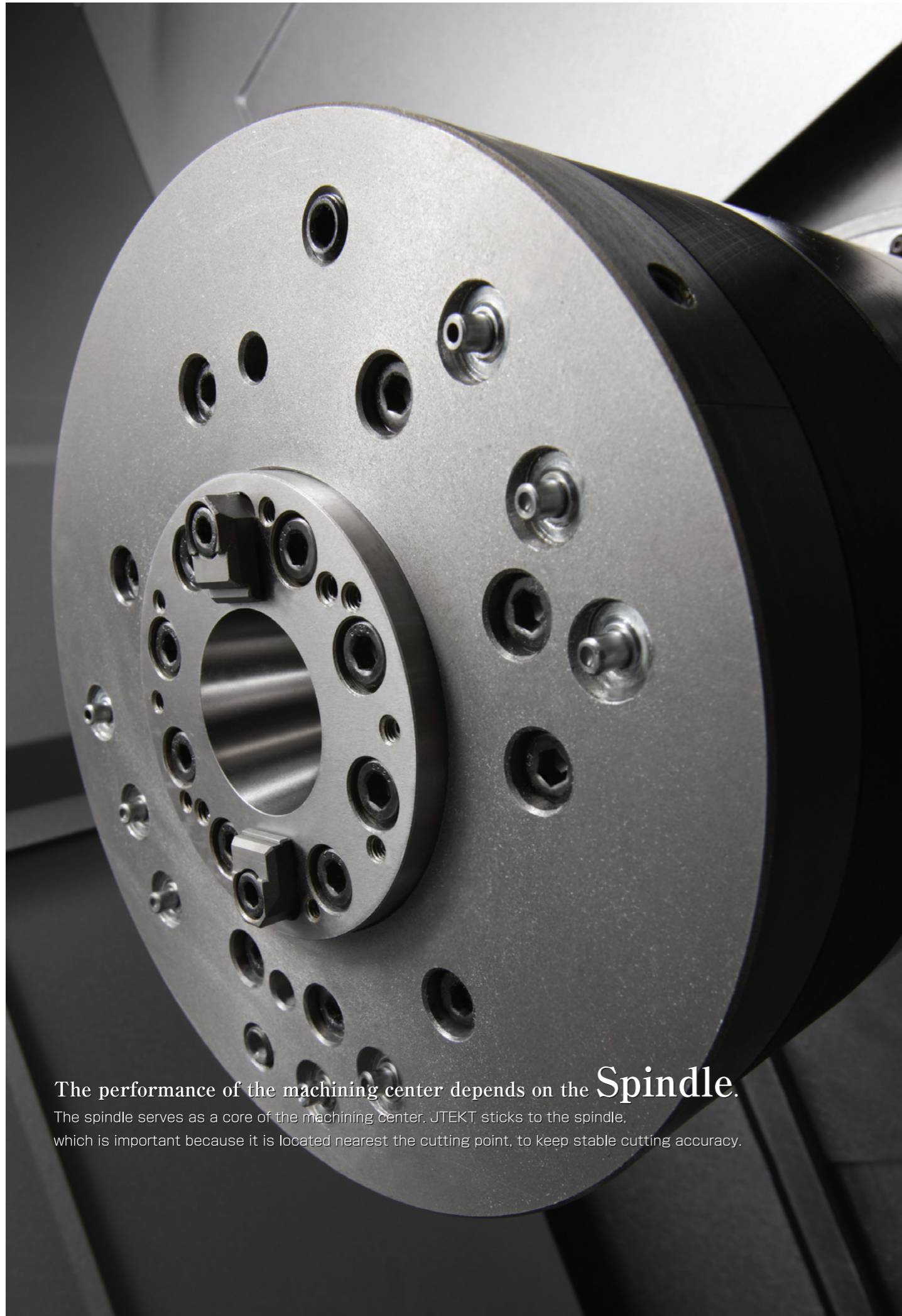


fastest

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 2.4 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.

High speed spindle

boasting superior rigidity and rotation accuracy in all zones ranging from low to high speeds

[Spindle speed] 15,000min⁻¹

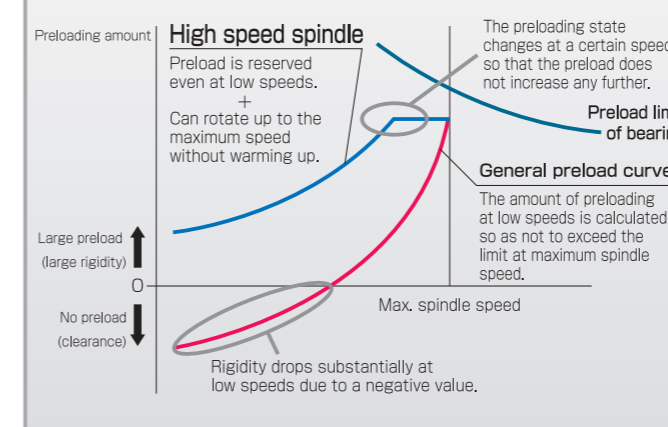
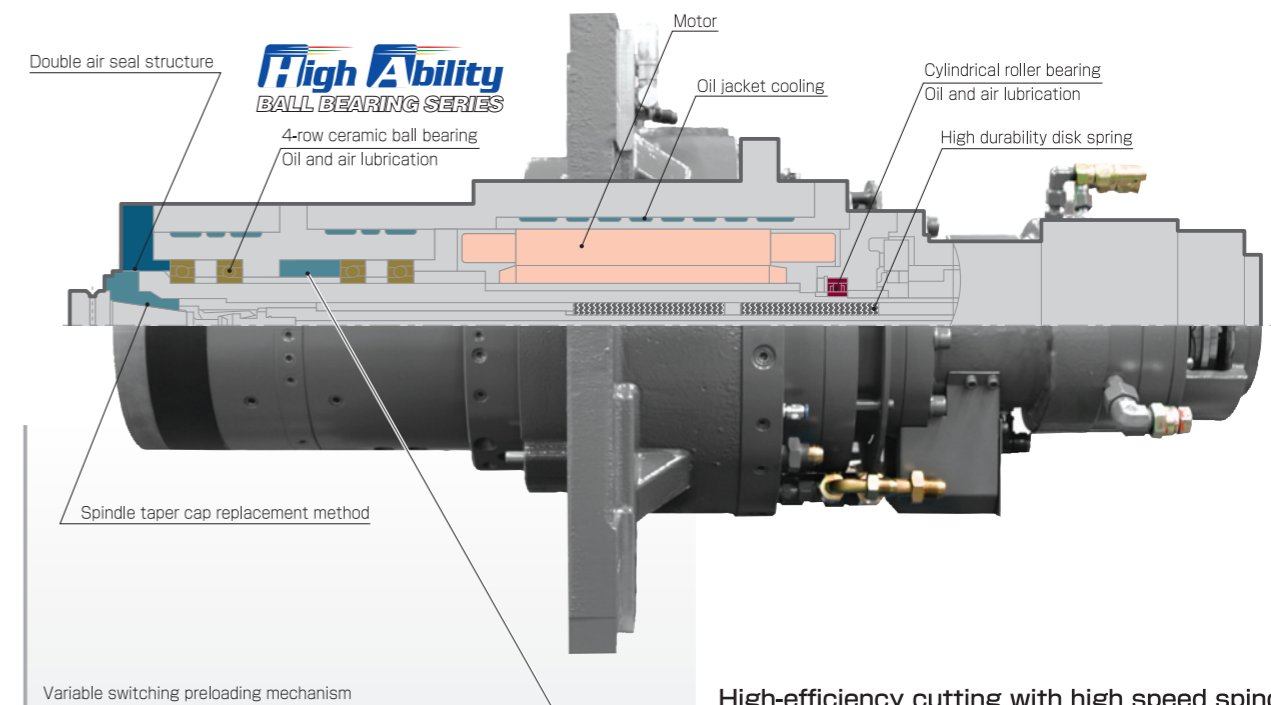
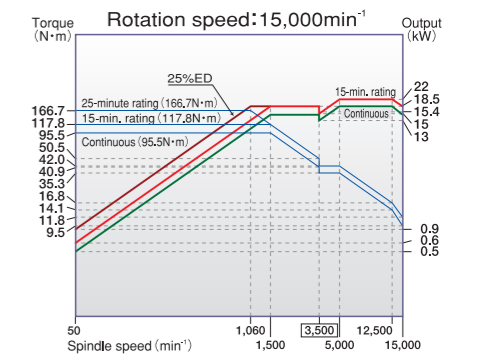
[Spindle nose shape] BT No.40

[Spindle motor (short-time/continuous)] 22/18.5kW

[Max. torque] 166.7N·m

[Spindle diameter (front bearing bore)] φ80mm

A high speed spindle covering all areas from the low speed cutting of cast irons to the high speed precision cutting of aluminum. A JTEKT-manufactured ceramic ball bearing suitable for high speed rotation is used to substantially reduce friction heat generation inside the bearing rotating at a high speed. An original variable changing preloading mechanism which keeps the spindle bearing preload at the optimum level suppresses heat generation and extends the service life.



High-efficiency cutting with high speed spindle

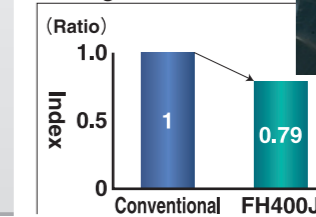
■ Transmission case

[Workpiece material] ADC12

15,000min⁻¹

HSK A63 spindle

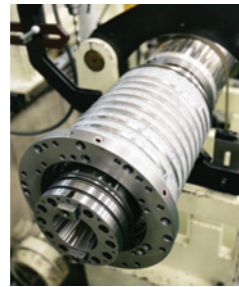
Cutting time



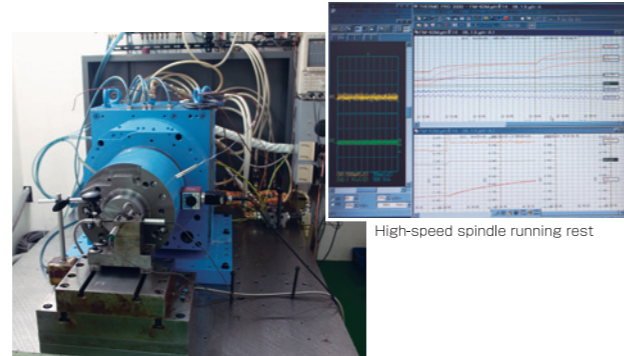
JTEKT's spindle promises assurance over a long period and takes maintenance into consideration.

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, 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 rest

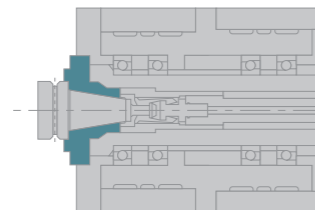
Basic design particularly focusing on low vibration.

A spindle vibration within 2 microns³ has been accomplished (measurement with a 15,000min⁻¹ 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.

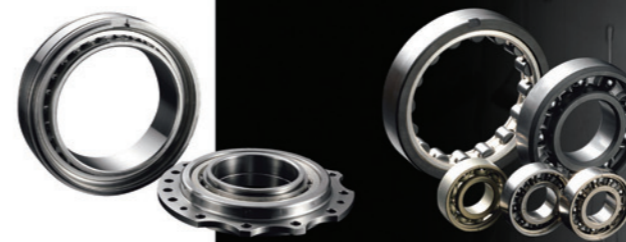
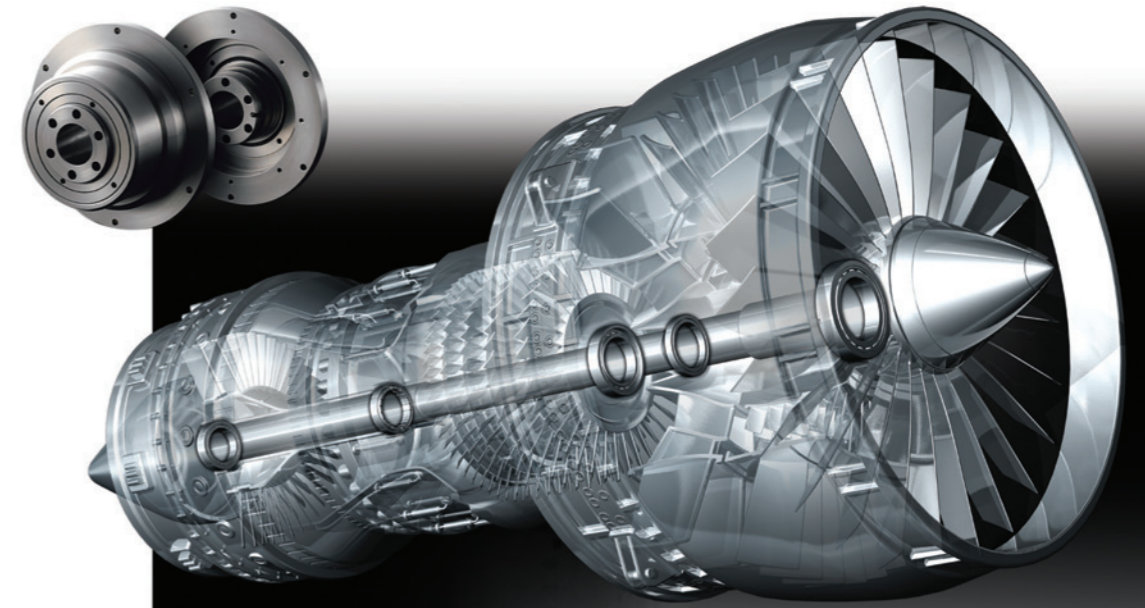
Even in the rare chance that a failure does occur, a replacement spindle cartridge that has been checked at JTEKT for operation and quality can be installed in its place, keeping restoration time down to a minimum. Furthermore, the separate spindle taper makes individual cap replacement possible as it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

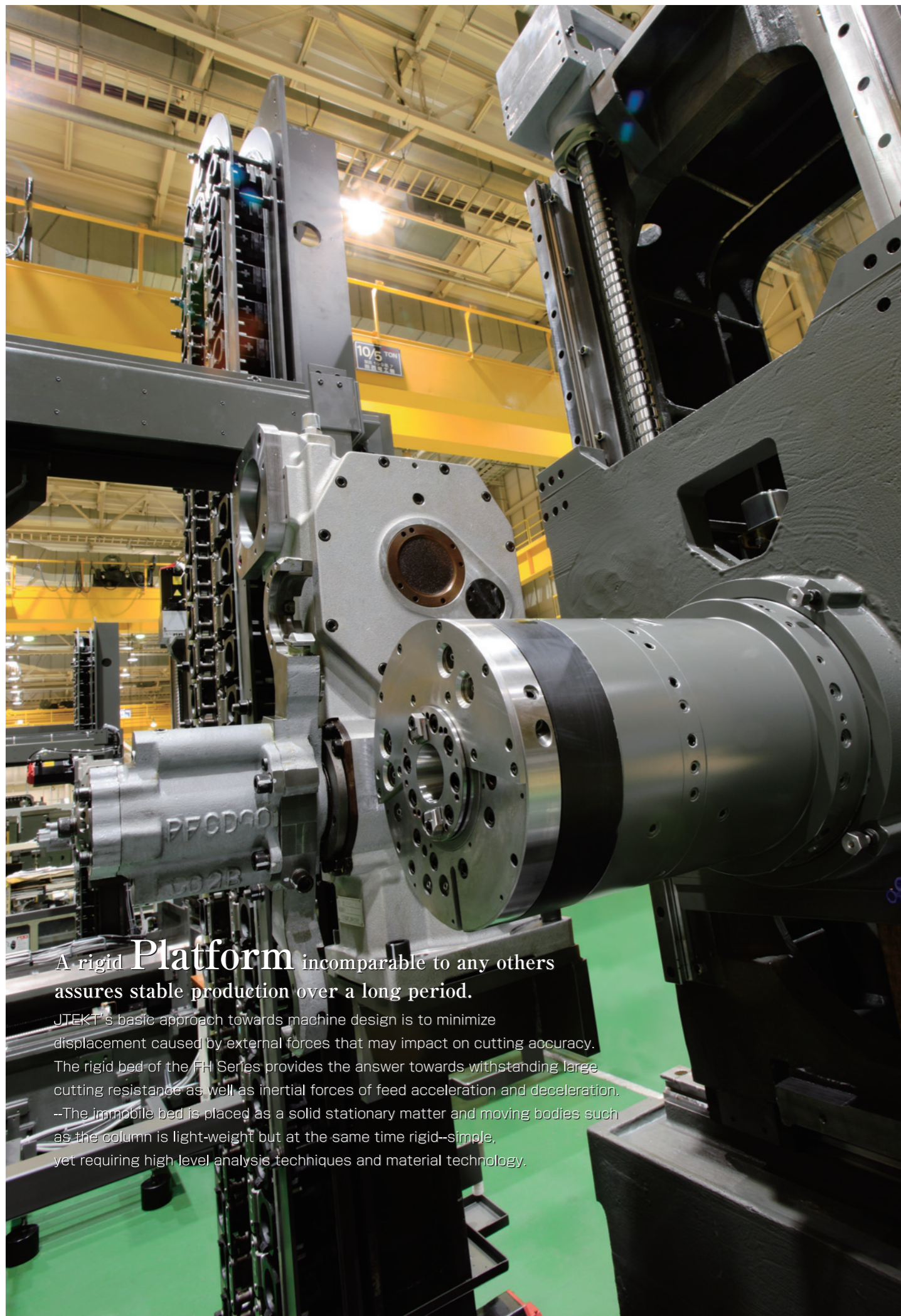
We have been supporting the aircraft and aerospace industry for 30 plus years and our bearings are used in many of the jet engines manufactured in Japan. By providing the latest technology, we keep satisfying every rotation technology need from the ground to outer space. The technology cultivated over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

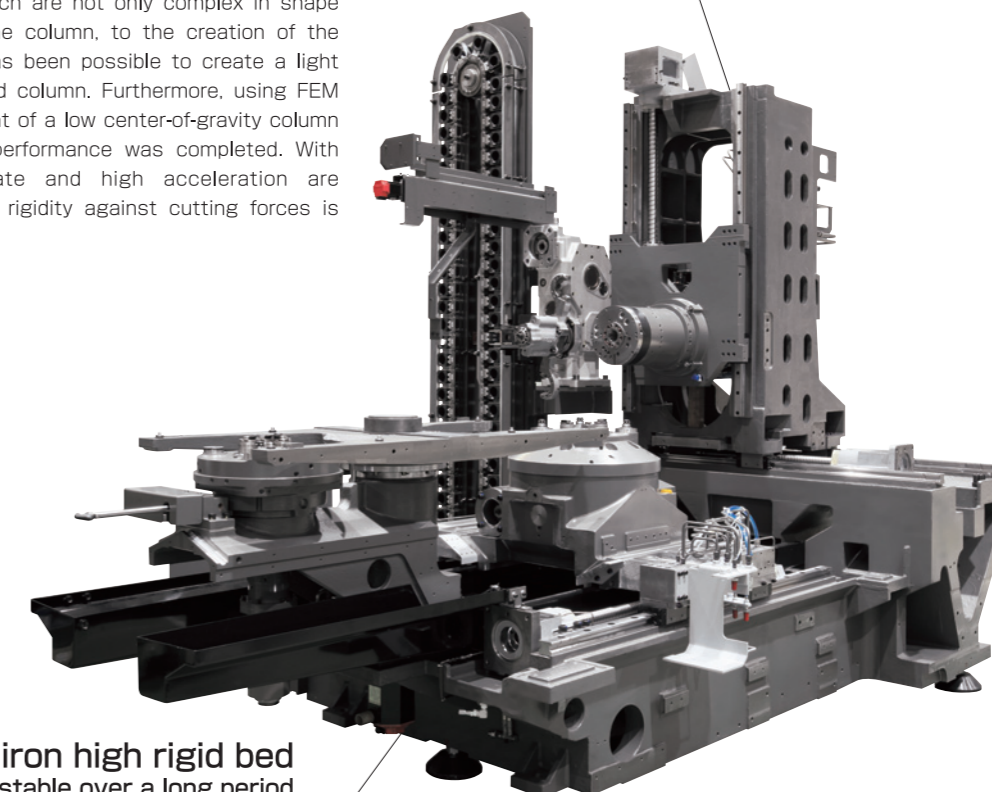


A rigid **Platform** incomparable to any others assures stable production over a long period.

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.

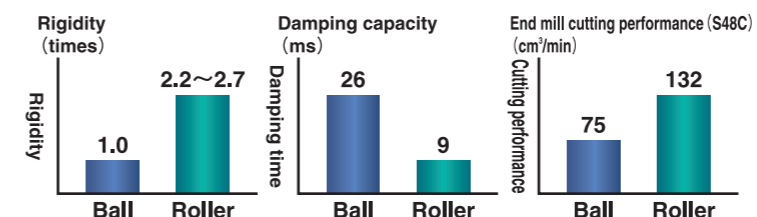


High grade cast iron high rigid bed keeping machine level stable over a long period

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 smaller displacement caused by load variation, as well as 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.

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.

4 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

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 (Ballscrew 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**

Cool

- [Coolant cooling] **Option**

Manufacturing technology for realizing precision cutting



Spindle assembly clean room

Linear guide mounting face scraping

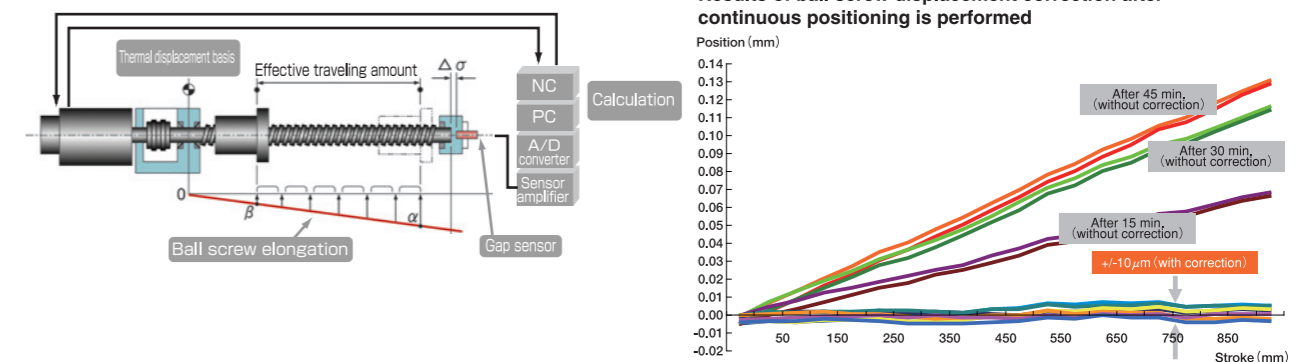
Spindle balancing

Precision assembling work

BTS (Ballscrew Thermo Stabilizer) function

Ball screw thermal displacement correction function stabilizing repetitive positioning accuracy

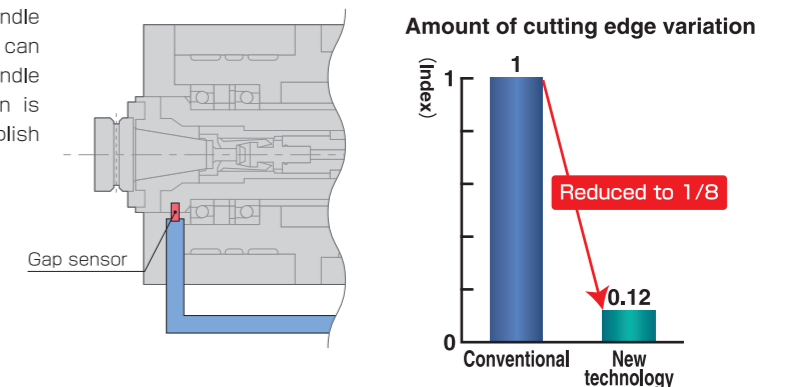
The BTS function is installed as a standard feature to stabilize the repetitive positioning accuracy in parts cutting. With the BTS function, the displacement sensor installed at the end of the ball screw measures the elongation of the entire screw, which is distributed into offsets for each stroke position 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.



Spindle Thermo Stabilizer function **Option**

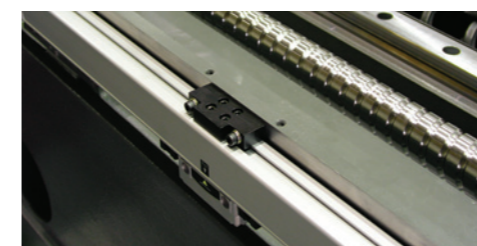
Spindle thermal displacement correction function used to correct spindle elongation formed after an extended period of operation

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.



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

An optical scale makes lasting precision positioning possible.

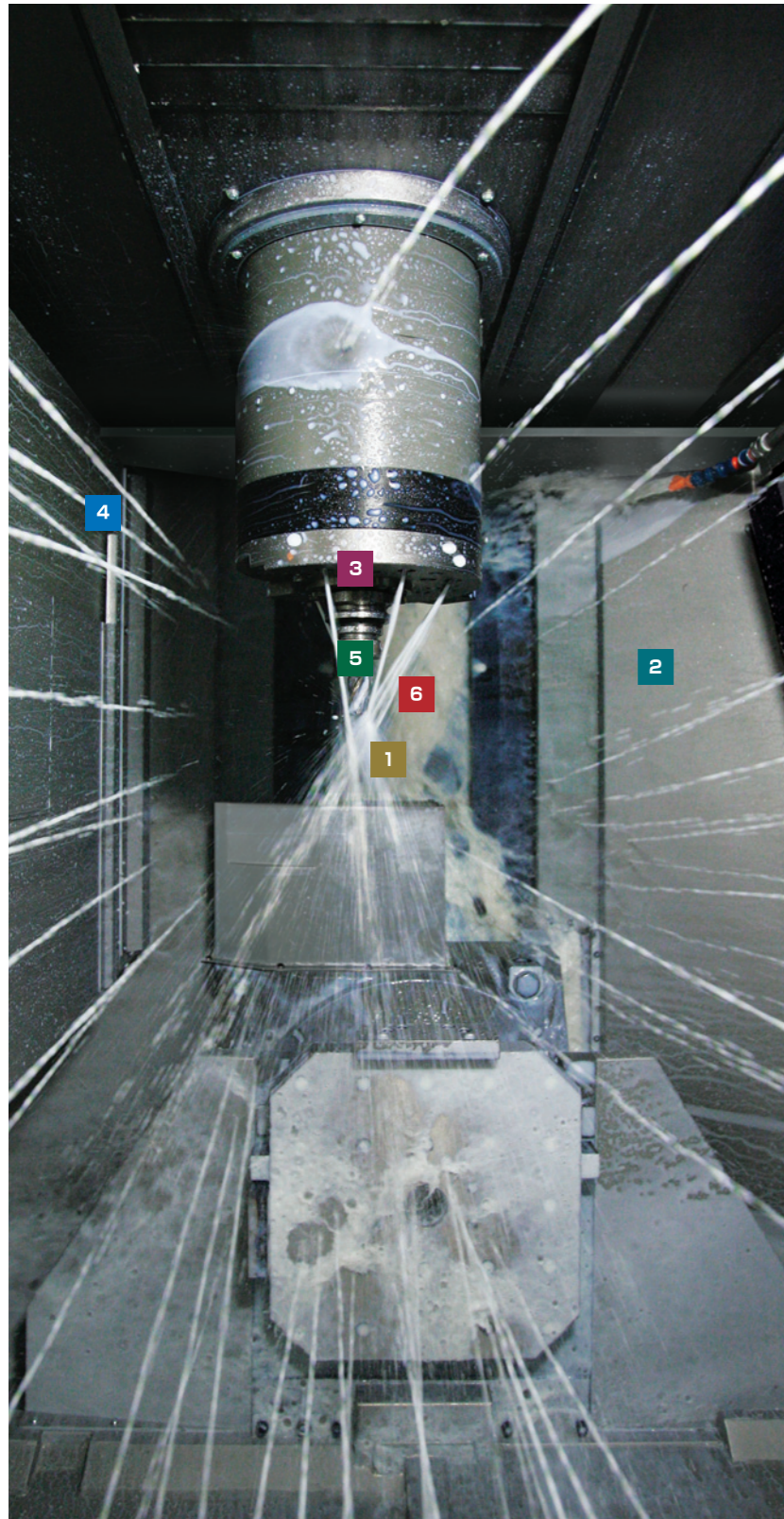


Touch sensor function **Option**

The touch sensor is used to align the workpiece. The receiving section will only open its shutter and receive when the touch sensor is used. The effects of chips, etc. are eliminated.

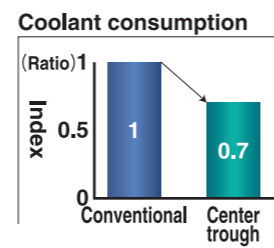


Reliability starts with chip disposal. The design of a center trough that makes it possible to deal with chip disposal directly beneath the cutting point.



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.



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

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. (Delivery pressure: 3MPa and 7 MPa are options.)

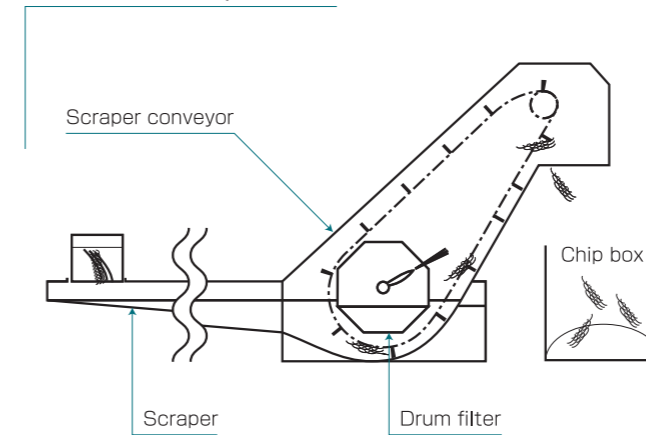


Spindle-through coolant 3MPa

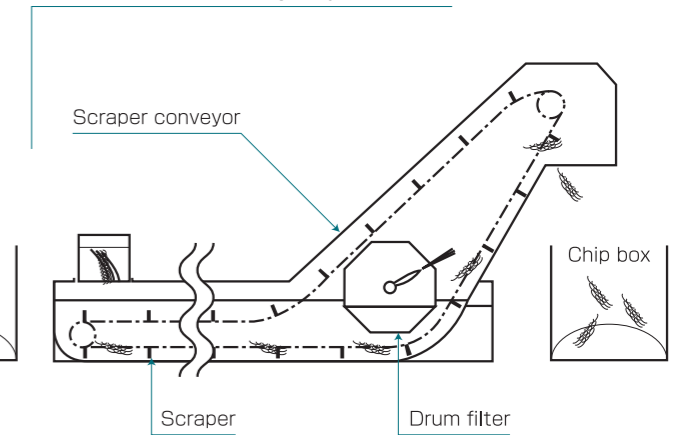
6 Coolant supply unit with take-up chip conveyor

Chips collected in the center trough are carried to the coolant tank through an internal chute and discharged from the machine by the take-up chip conveyor. An internal conveyor is available as an option.

Standard Chute specification



Option Internal conveyor specifications



Splash gun



Oil skimmer

Option Optional parts

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

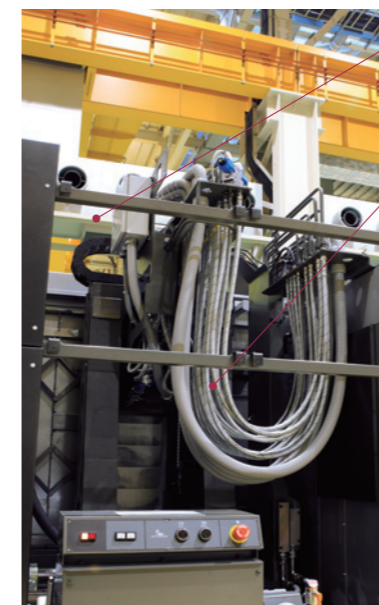
Stable accuracy and an improved MTBF (mean time between failures) are both necessary in order for the customer to feel assured with reliability. The design of the FH Series pursues high quality, high performance and long life.



To provide the customer with assured operation, we work hard to make even the unseen portions of the machine more reliable.

Improved reliability in wiring and piping supporting higher speeds and acceleration

Axial feed speeds and acceleration rates have increased and consequently the reliability of piping and wiring cable has become very important. Cables rub against each other which may lead to oil leaks or broken wires in axial travel. In addition, the damage on brackets caused by the weight of the cable itself becomes more severe as speed increases. On the FH400J and FH500J, cable carriers, wire braids and protective tubing are used and distributed appropriately for the space available. Furthermore, FEM analysis is used on brackets to check for adequate strength and durability.



■ Wiring and piping to the column is neat and concise, utilizing a cable carrier.

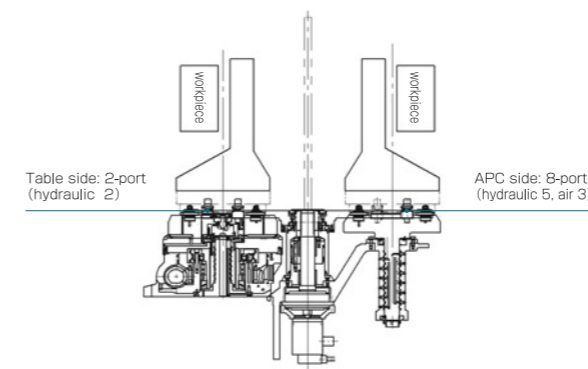
■ In response to the shift to high speed and high acceleration, wire braided pipe is used and wiring is installed in protective tubing.



■ Steel piping is used to suppress loss in the discharge pressure of coolant used for chip removal etc.

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

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.



*Hydraulic jig is applicable as option.





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.



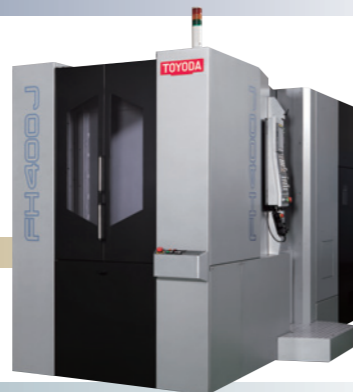
OP Supporter

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 correction function
- Tool counting ... Program tool check function
- Limiting arm speed according to tool weight ... ATC control function
- Faulty tool indexing ... Automatic magazine indexing function
- Manual tool data entry not required ... Tool ID function



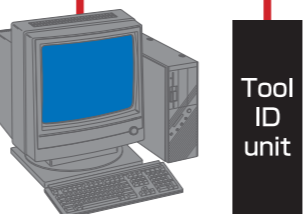
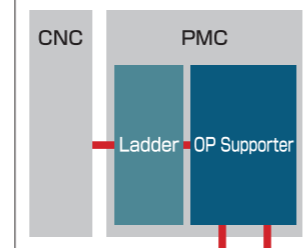
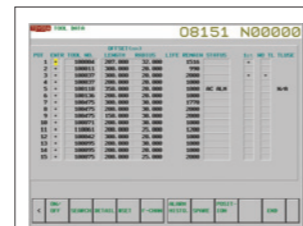
Pallet control support

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

Maintenance control support

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

Division	Function name	Model OP**				Remarks
		10(i)	20iP	20iT	20iA	
①Tool control	Tool number conversion function					
	Tool offset function					
	Tool life control function	×		○	○	a
	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	×			○	*b
	Storage tool data saving function	×				*
	Tool ID function	×				*"b" is necessary
	2nd/3rd correction function	×		○	○	
	Faulty tool list display					
Spare tool list display	×		○	○	Set with 'a'	
Tool position display						
Tool list display	×			○		
②Pallet	APC control	×				※C
	Pallet correction					
	Multi-workpiece installation	×			○	※"C" is necessary.
③Miscellaneous	Function on/off switch	○	○	○	○	
	Start from M code list	○	○	○	○	
	NC data configuration diagram	×			○	
	Measurement result display	×				*
④Maintenance	Signal status display	×	○		○	
	Fault history	○	○	○	○	
	Fault code-specific frequency	×	○	○	○	
	Periodic inspection display	×	○		○	
	Load maintior	×				
	Cycle time measurement	×	○			
	Counter	×	○			
	Diagnosis data	×	○		○	
⑤DNC support function						
⑥Report	Fault history					
	Machinig result					
	Operation result					
	Production result					



FA control system

Attached function	○	Attached as a package
	No mark	Can be attached as an option
	×	Cannot attach

- Other functions can be added to the package specification (OP20P/T/A).
- 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.
- 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: The tool identification number is automatically converted into the ATC magazine pot number, eliminating command errors.

NC program

```
T1002025;
M6;
G43 H99 Z-100.0;
```

There is no need to worry about tool installation.

For tool number T1002025
→ Tool in pot 3 is indexed

Tool data

Pot	Tool No.	H	D
1	10155520	50.	30.
2	10200340	120.	25.
3	10020025	80.	30.
4	10100037	100.	8.

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.

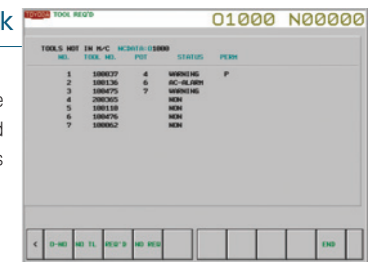
Accurate tool life appraisal

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.



Preliminary tool check

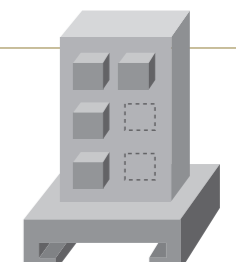
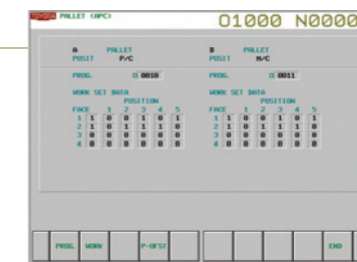
Program tool check function: The tools used in the program are analyzed and any tool shortages are notified.



Pallet control support

Solid pallet control

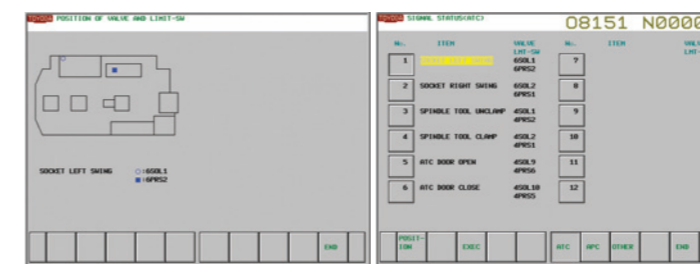
Multi-workpiece installation function: Only registered mounting faces and/or processes are machined, therefore cycle time is significantly reduced.



Maintenance control support

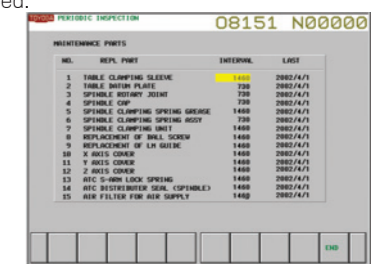
Visual status display

Signal status display function: Limit switch ON/OFF status is given in real-time.



Straightforward inspection items

Periodic inspection instruction function: Periodic inspection items and completion status are displayed.



Taking the global environment, society and our customers into consideration, we at JTEKT promote the production of products which are both people and planet-friendly.

JTEKT undertakes development activities with the belief that by reducing power consumption and conserving resources it is possible to slow down global warming, something essential to the protection of the global environment. The environmental impact of our products from production to disposal is assessed, so that those products which are less of a burden on the environment can be supplied to the customer.

The formation of an environment management system

JTEKT operates an environment management system in consistency with our business concept and environment policy. In this system, a PDCA (Plan > Do > Check > Action) cycle is used to constantly strive for better environmental preservation. Effectiveness of the system, environmental performance and compliance with laws and regulations are checked in periodic internal and external audits, and concise adjustments made to ensure activities are promoted systematically and sustainably.

Environment management system audits

- External inspections**
We have established an integral company-wide environment management system to promote systematical environmental preservation activities. JTEKT will continue to further improve environmental management activities.
- Internal environmental audits**
Mutual auditing amongst operating departments ensures quality internal auditing and any improvements made applied across the board. Also, results of our internal environmental audit are reported to all relevant management levels through a Planet Environment Preservation Committee.

Windmill power generator
Contains JTEKT bearings in the primary shaft and generator.



Obtaining ISO14001 certification

- Domestic offices**
Beginning with the 18 JTEKT Group companies participating in our environmental report committee, we are promoting accreditation and the development of environmental activities.
- Overseas offices**
As a company taking our business global, it is important for us that the entire group becomes assertively involved in environmental preservation. In order to actively promote environmental preservation activities on a consolidated basis, we have constructed a Global JTEKT Group environmental report committee, and are developing environmental activities.

Environmental consideration in the product development stage (applicable model: FH400J & FH500J)

Reduction in the number of parts 20% reduction

The number of parts is reduced in order to save on resources. A simpler structure not only reduces the burden on the environment but also strengthens reliability because of a reduction in the breakdown ratio.

Reduction of number of bolts 15% reduction

The reduction of the number of bolts caused through optimization of the structure is also effective towards reducing the amount of energy used in parts cutting.

Reduction of coolant consumption 40% reduction


Chip disposal characteristics of the machine body play an important role in the reduction of the amount of fixed energies necessary for the supply of hydraulic pressure, lubricant, coolant, pneumatic pressure, etc. This is due to the fact that a great amount of coolant is needed to discharge chips. To solve the problem, the center trough method is adopted so that a chip disposal space is provided directly beneath the cutting point.

Recycled magazine socket 4.8t reduction

The material of the magazine socket used for the machining center was changed from phenol resin to 66 nylon which is able to be recycled, contributing to the annual reduction of waste by 4.8 ton. This is to improve the recycling property of the product in the disposal stage.

Reduction of coolant pump power consumption 50% reduction

The center trough method not only reduces the coolant consumption but also reduces the amount of power used by the coolant pump. In addition, optimization of coolant piping has contributed to a 10% reduction in pressure loss.



A convincing before-after sales system centered on a permanent exhibition site

JTEKT's Customer Center was opened in Kariya, Aichi Pref. in 1999 as one of the largest permanent exhibition sites in Japan. The sales, before-sales and after-sales service and training school divisions accepting direct contact with customers are integrally located in this center so that the best solution to meet customer's requirements can be found.



Customer center outline
 Location: 1-1 Asahimachi, Kariya-shi, Aichi Pref.
 Opened in October 1999
 Exhibition area: 2,110m²
 Permanent exhibition: Various grinders, machining centers, cutting machines, flow forming machines, parallel mechanism type cutting machines, etc.

At the customer center the best solution for the customer's requirements are proposed on a 3 element basis. We hope that you will take the time to visit.

① Observe

- Exhibition**
- Exhibition of cells/machines most suited to the customer
 - Introduction to leading edge technologies
 - Exhibition of total engineering potentials including those of group companies



② Touch and confirm

- Confirm**
- Confirmation of technology by carrying out before-sales service tests
 - Operation training at the training school
 - Introduction to the service information network



③ Have discussions

- Consultation**
- Meetings for interchange of technical opinions
 - Exchange of the latest information through events
 - Machining consultation before the machines



We supply an enriched service to our customer.

① Before-sales service

The customer's product is test cut on an actual machine and a detailed report is given.



② SINOC (Service Information Network Operation Center) Service Information Network Operation Center

Installed in customer center, Kariya Factory



A solid after-sales service has been put in place to ensure we can provide quick solutions to customer inquiries. Experts in machining centers, special purpose machines and grinders are stationed at SINOC, providing 24-hour support to customers and carrying out remote breakdown diagnosis. We refer to the integral information system, covering sales, production, design, parts as well as the service history of the individual machine, in order to give a swift response to the customer's enquiry.

(Time)	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	1	2	3	4	5	6	7	8
Work days	Regular service										SINOC														
Saturday	SINOC																								
Sunday	SINOC														Phone answering machine										

- Upon opening for the day, regional service centers respond swiftly to customer call-outs.
 - SINOC : 17:00 or later on week days, all day Saturday, 8:00 to 17:00 Sunday via the service call window (Within the customer center at the Kariya plant)
 - Answering machine : The customer is able to record their message on the answering machine.
- *Closed over the O-bon and New Year holidays.

③ Service and maintenance information: Service and maintenance information can be downloaded from JTEKT's home page.

Log in on the service and maintenance information screen and enter the model or device, keyword or other data to search maintenance data.

*Accessible only for registered users



④ Visiting service

We visit the customer, inspect the machine and provide consultation.



⑤ Training school

Attend training courses on machine operation, programming, maintenance and so on using actual machines for each training curriculum.



Machine specifications

Item	Unit	FH400J		FH500J		
		Standard specifications	Special specifications	Standard specifications	Special specifications	
Table & Pallet	Table dimensions (pallet dimensions)	mm	□400 (Pallet)	□500 (Pallet)		
	Rotary table indexing angle	°	0.001° (NC)	0.001° (NC)		
	Pallet height (from floor)	mm	1,100	1,100		
	Max load on pallet	kg	400	500	700	
	Table indexing time (90° indexing)	sec	2.3	2.3		
	Pallet change time	sec	7.5	9.5	10.5	
Stroke	X-axis	mm	600	730		
	Y-axis	mm	560	730		
	Z-axis	mm	630	850		
	Distance between spindle nose and table center	mm	100~730	100~950		
	Distance between spindle center and top of pallet	mm	50~610	50~780		
	Max. workpiece swing x Max. workpiece height	mm	φ630×900 ※1	φ800×1,000 ※1		
Feeds	Rapid feed rate (X, Y and Z)	m/min	60	60		
	Cutting feed rate (X, Y and Z)	m/min	0.001~30	0.001~30		
	Rapid acceleration (X, Y and Z)	m/s² (G)	9.8 (1)	9.8 (1)		
	Ball screw diameter (X, Y and Z)	mm	φ40	φ40		
Spindle	Spindle speed	min ⁻¹	50~15,000	50~15,000		
	Spindle diameter (front bearing bore)	mm	φ80	φ80		
	Spindle nose shape		BT No.40	HSK	BT No.40	HSK
	Spindle motor, short-time/continuous	kW	22/18.5	22/18.5		
ATC	Tool holding capacity	tool	60	40	60	40
	Tool selection		Absolute address		Absolute address	
	Tool (dia. x length)	mm	φ70 x 400 ※2		φ70 x 470 ※2	
	Tool mass	kg	8		8	
	Tool change time (Tool-to-Tool)	sec	0.9		0.9	
	Tool change time (Chip-to-Chip)	sec	2.4		2.4	
	Tools Holder		MAS BT40		MAS BT40	
	Pull stud		MAS P40T-1		MAS P40T-1	
Dimensions & Weight	Floor space (width x depth)	mm	2,100×4,020 ※3		2,330×4,530 ※3	
	Machine height	mm	2,750		2,870	
	Machine weight	kg	11,000		13,500	
Various Capacities	Working oil	L	18		18	
	Slide lubricant	L	2.9		2.9	
	Spindle oil air	L	2.9		2.9	
	Table	L	2		2	
	Spindle coolant	L	15		15	
	Power supply capacity	kVA	51		51	
	Control voltage	V	24		24	
	Air source capacity	NL/min	800		800	
	Air source pressure	MPa	0.4		0.4	
Capability & Performance	Positioning accuracy※4	mm	± 0.003	± 0.0015	± 0.003	± 0.0015
	Repeatability※4	mm	± 0.0015	± 0.001	± 0.0015	± 0.001
	Table indexing accuracy※4	sec	± 7		± 7	
	Table indexing repeatability※4	sec	± 3.5		± 3.5	

※1 For detail shape, refer to the tooling data. ※2 For detail shape, refer to the tooling data. ※3 For details, refer to the layout plan. ※4 According to our inspection method

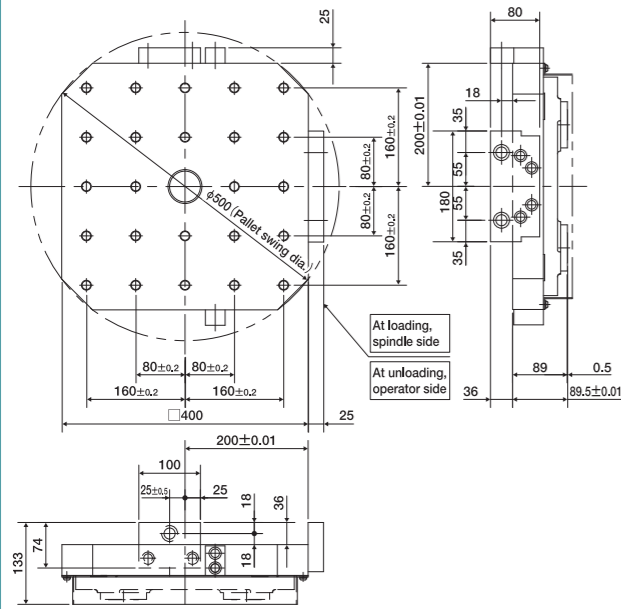
CNC unit FANUC 32i. ● Standard/□ Optional

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 (200)	□	□
	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.

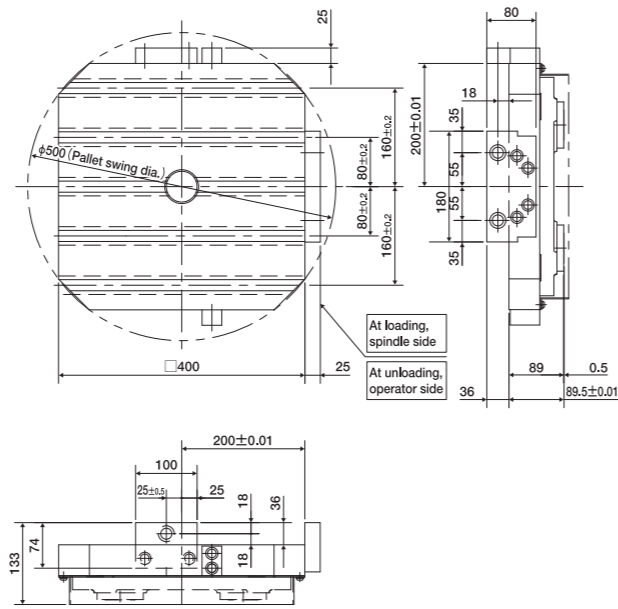
FH400J

Threaded hole



Using the datum block datum face when designing the jig has made installment easy.

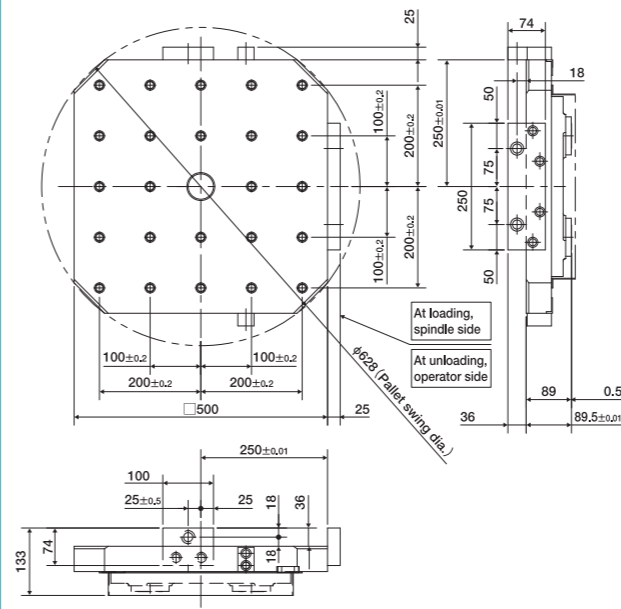
T-groove



Using the datum block datum face when designing the jig has made installment easy.

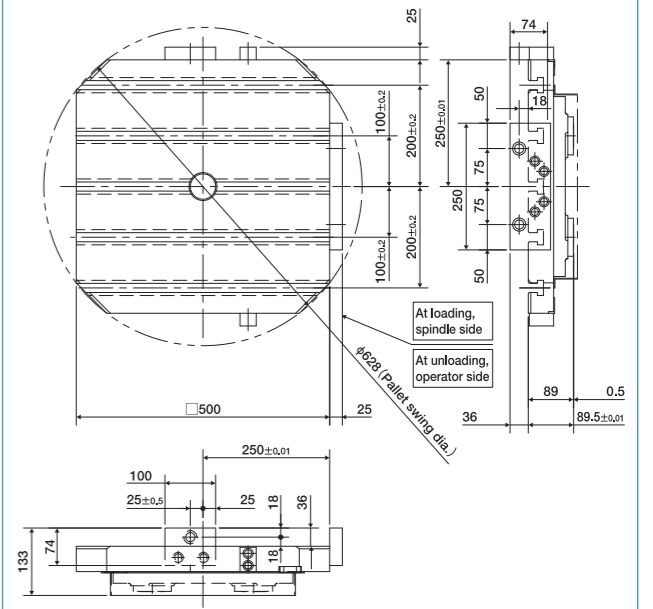
FH500J

Threaded hole



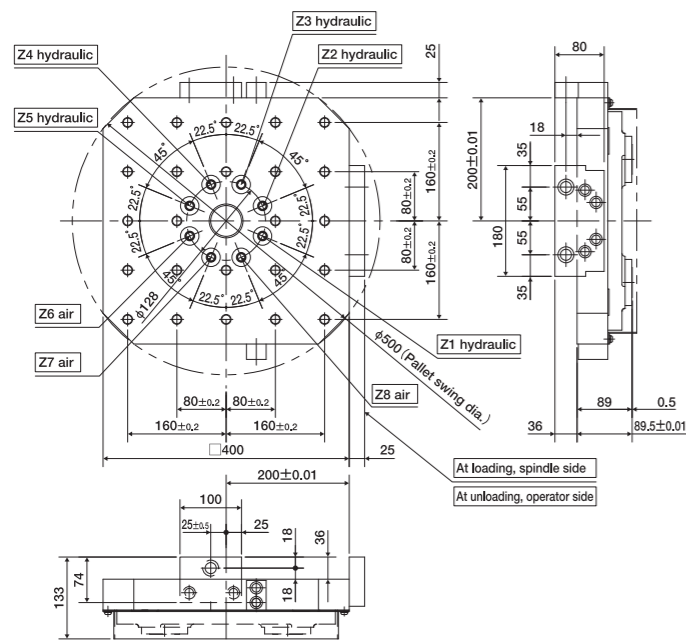
Using the datum block datum face when designing the jig has made installment easy.

T-groove



Using the datum block datum face when designing the jig has made installment easy.

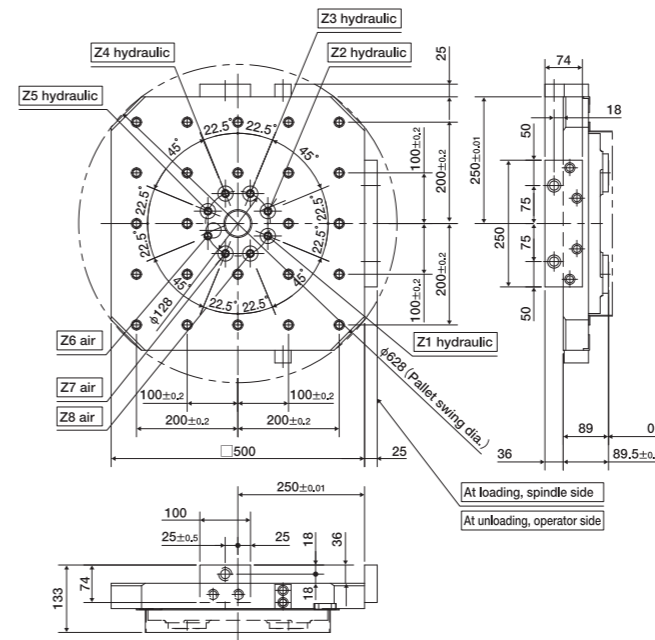
Pallet-through



Using the datum block datum face when designing the jig has made installment easy.

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	

Pallet-through

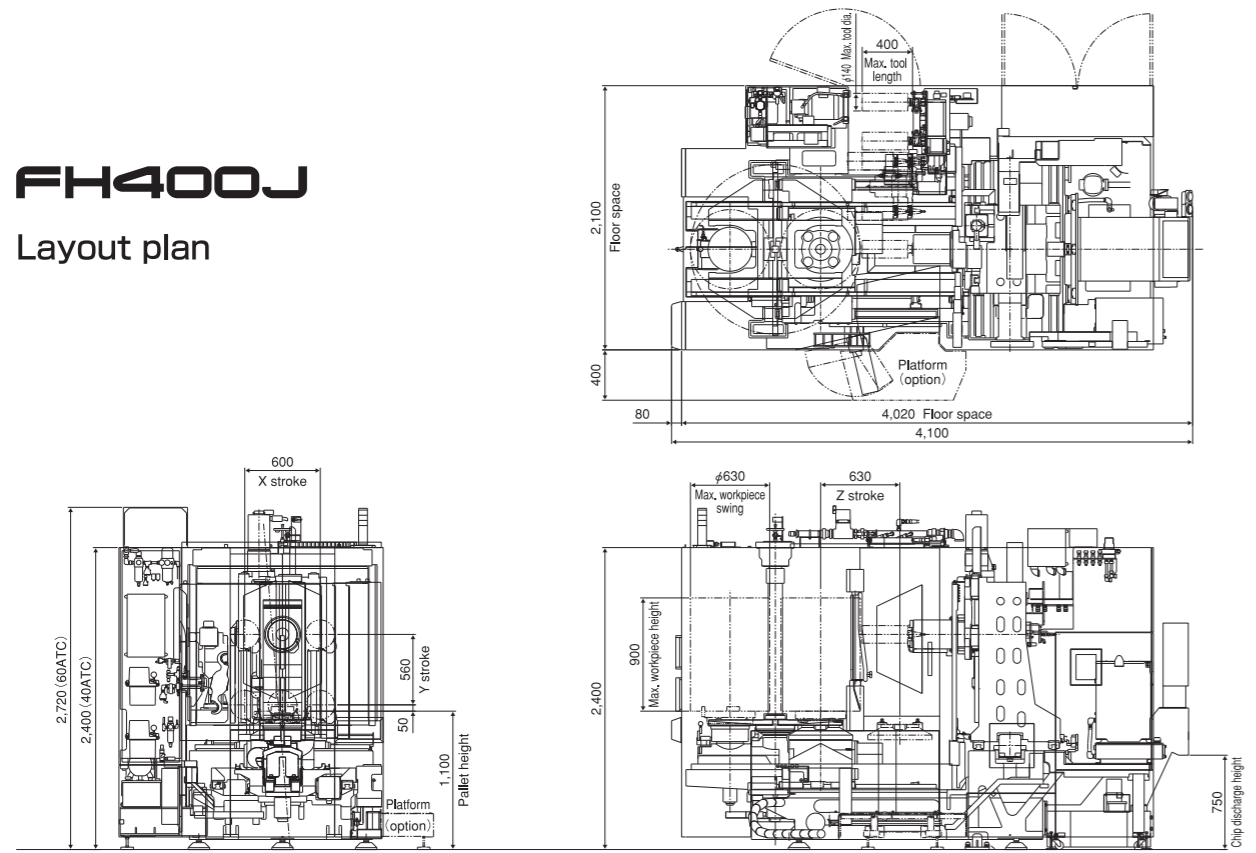


Using the datum block datum face when designing the jig has made installment easy.

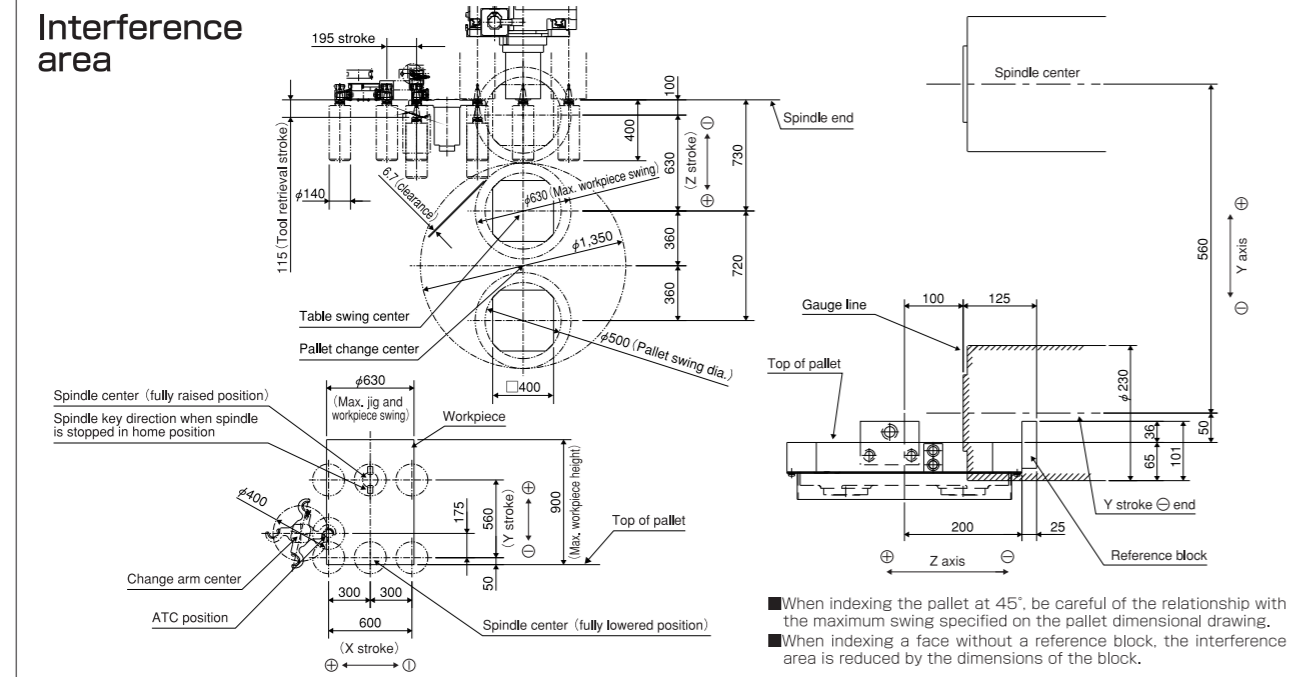
Port location	APC side	Table side
Z1	Jig motion 1-①	Jig clamping 1
Z2	Jig motion 1-②	
Z3	Jig motion 2-①	
Z4	Jig motion 3-②	
Z5	Jig motion 3-①	Jig clamping 2
Z6	Workpiece seating confirmation ①	
Z7	Workpiece seating confirmation ②	
Z8	Workpiece seating confirmation ③	

FH400J

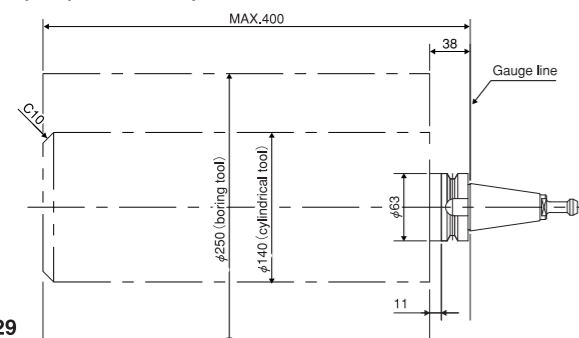
Layout plan



Interference area



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

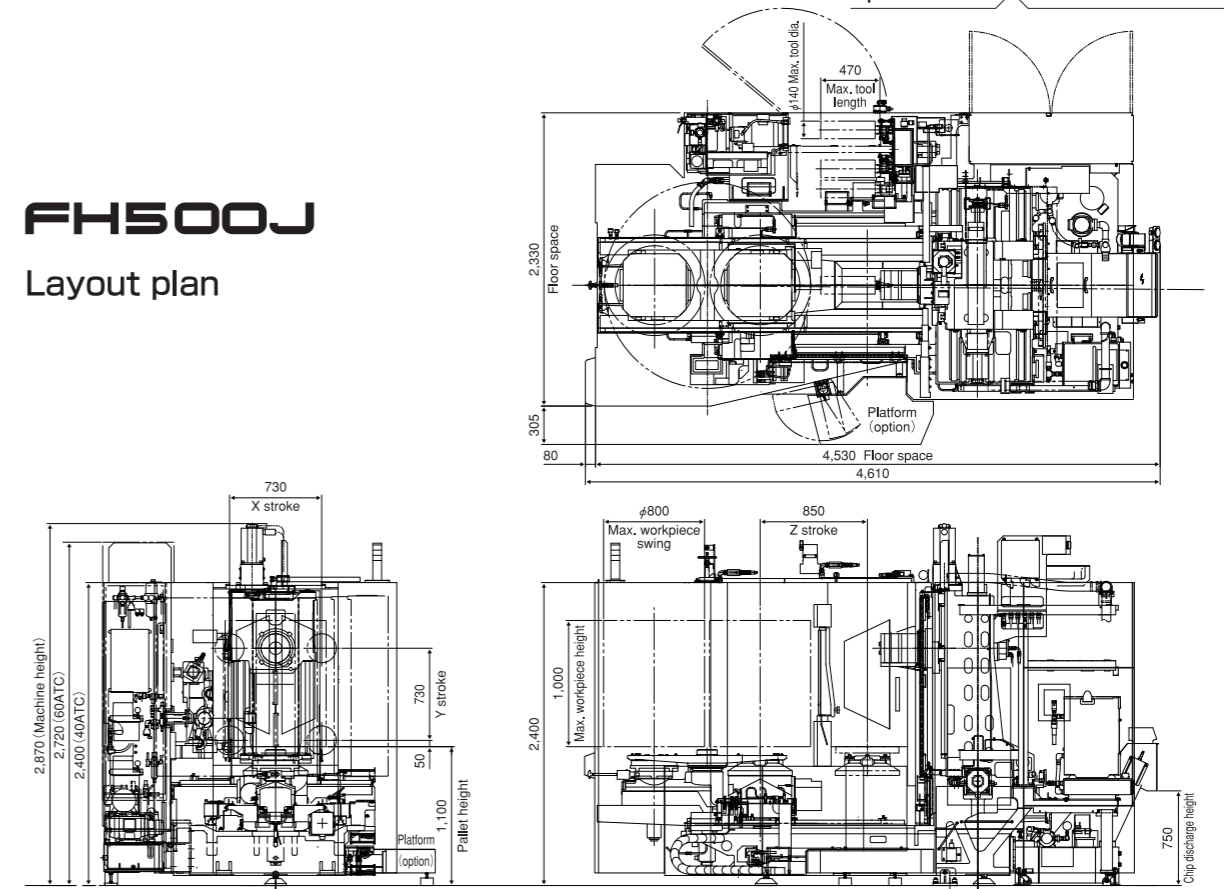


Item	Max. spec
Tool length	400mm
Tool diameter	With a 40 and 60 pocket magazine: φ75mm (with no limitations caused by adjacent tools)
Tool weight	8kg Moment at the spindle nose shall be 11.8 Nm or less.
Tool imbalance amount	30x10 ⁻⁵ N·m or less (tools not exceeding 6,000 min ⁻¹) 10x10 ⁻⁵ N·m or less (tools between 6,000 min ⁻¹ and 8,000 min ⁻¹) 30x10 ⁻⁵ N·m or less (tools exceeding 8,000 min ⁻¹)

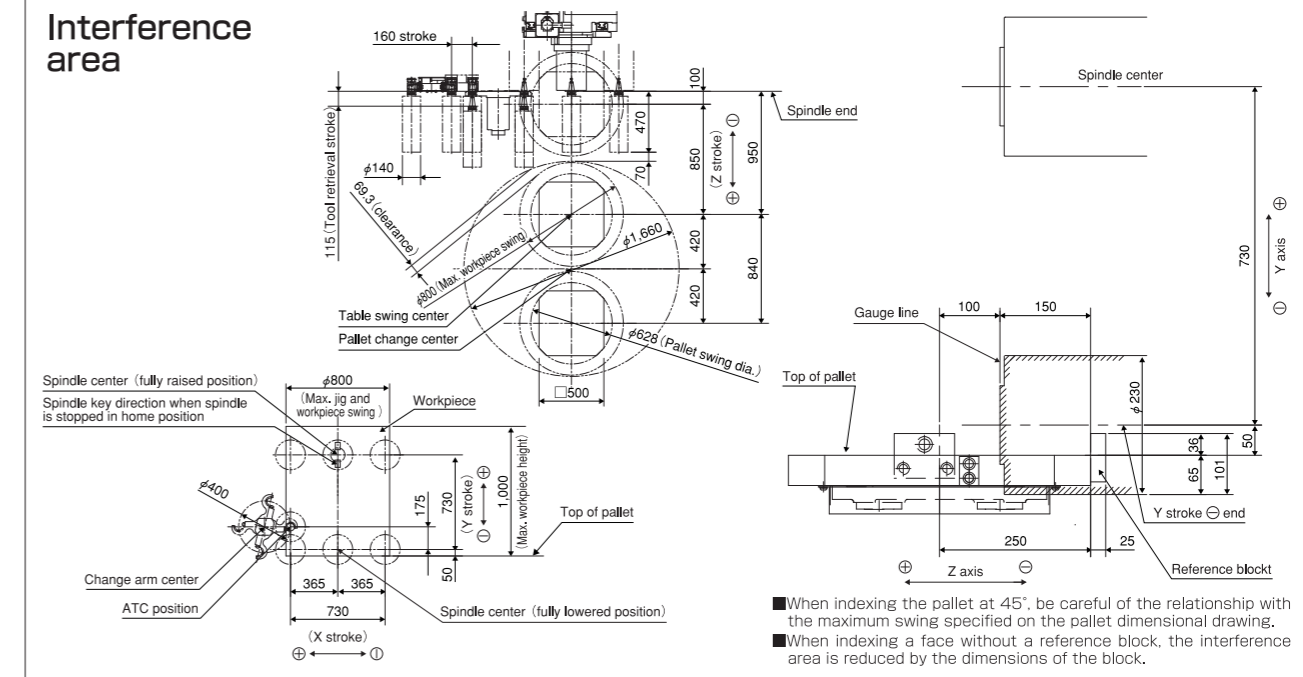
Tools with diameters exceeding those given above are subject to limitations in the diameter of adjacent tools in the magazine, key groove position of the tool holder and so on.

FH500J

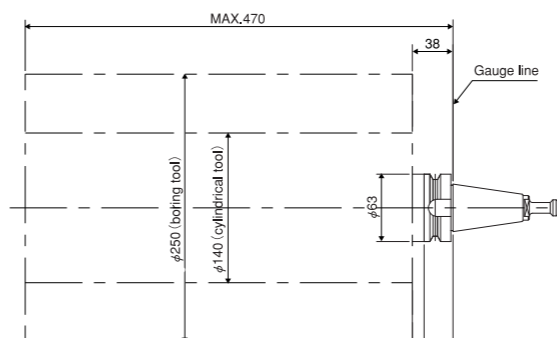
Layout plan



Interference area



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



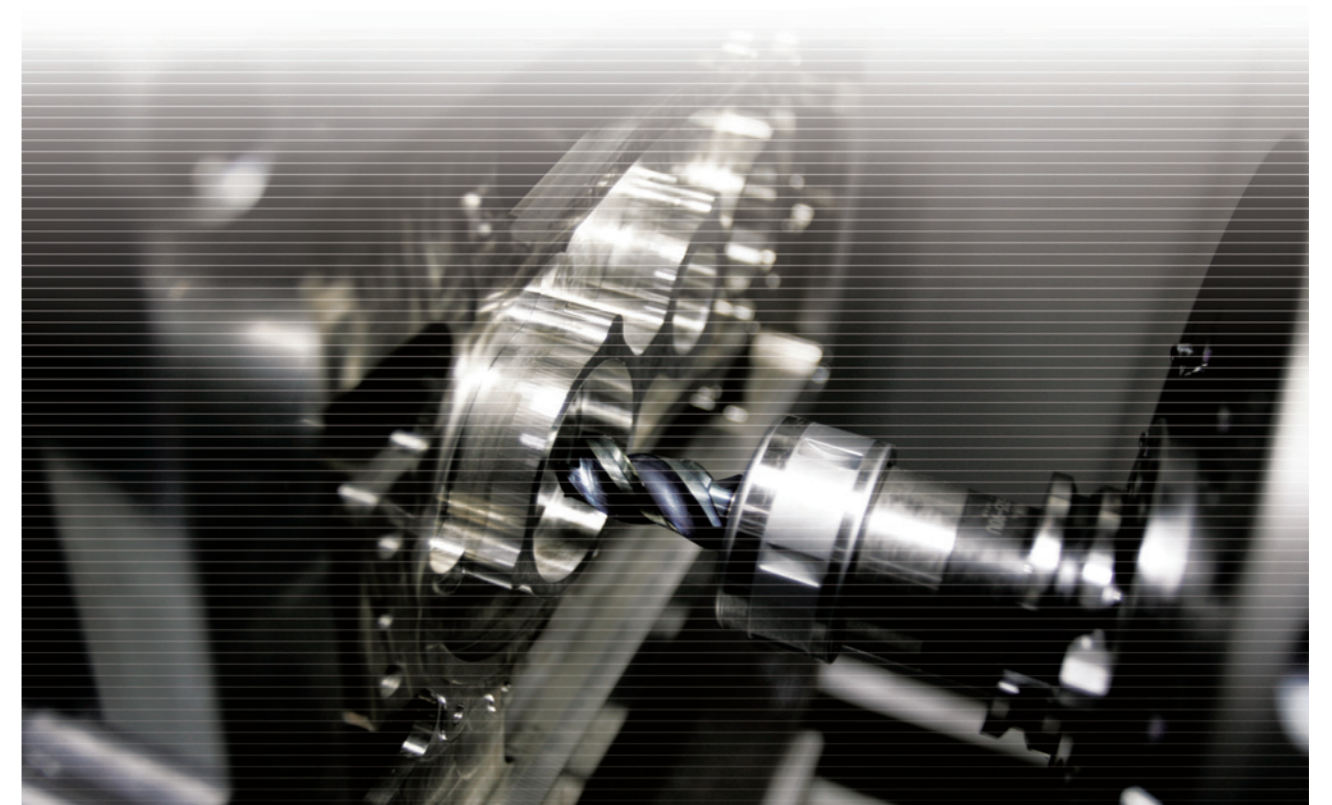
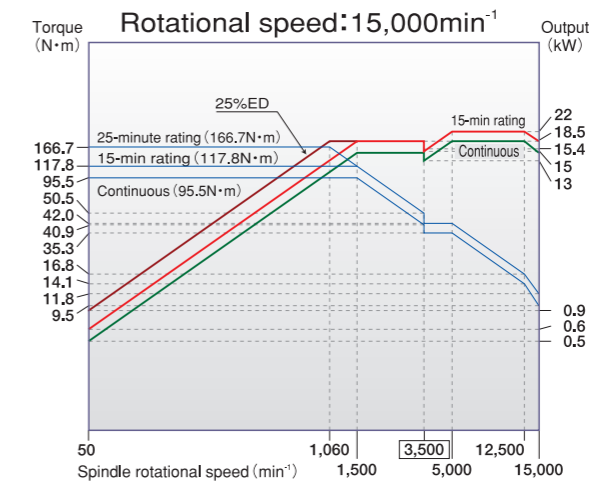
Item	Max. spec
Tool length	470mm
Tool diameter	With a 40 and 60 pocket magazine: φ75mm (with no limitations caused by adjacent tools)
Tool weight	8kg Moment at the spindle nose shall be 11.8 Nm or less.
Tool imbalance amount	30x10 ⁻⁵ N·m or less (tools not exceeding 6,000 min ⁻¹) 10x10 ⁻⁵ N·m or less (tools between 6,000 min ⁻¹ and 8,000 min ⁻¹) 30x10 ⁻⁵ N·m or less (tools exceeding 8,000 min ⁻¹)

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.

Accessories ● Standard accessories

Item	Equipment name		FH400J	FH500J		
Table and pallet	Indexing table	NC indexing table	●	●		
		NC indexing table (with encoder)				
	Pallet	Standard pallet Threaded hole	●	●		
		T-groove pallet				
	Additional pallet	1 set Threaded hole				
1 set T-groove						
Spindle related	Rotational speed	15,000min ⁻¹ BT No.40 (22/18.5kW) spindle (with spindle-through coolant spec)	●	●		
		Filler block for oil hole holder				
		Positioning block for angle head holder				
	Collet	HSK specifications				
		MAS I	●	●		
Tool magazine	Tool capacity	JIS				
		MAS II				
		60 tools	●	●		
Coolant related	Coolant unit	40 tools				
		Coolant unit (Water-soluble/chute/scrapper type/spindle-through coolant/1MPa through pump/with oil skimmer)	●	●		
		Coolant unit (Water-soluble/chute/scrapper type/spindle-through coolant/3MPa through pump/with oil skimmer)				
		Coolant unit (Water-soluble/chute/scrapper type/spindle-through coolant/7MPa through pump/with oil skimmer)				
		Coolant unit (Water-soluble/internal conveyor/scrapper type/spindle-through coolant/1MPa through pump/with oil skimmer)				
		Coolant unit (Water-soluble/internal conveyor/scrapper type/spindle-through coolant/3MPa through pump/with oil skimmer)				
	External nozzle coolant	Coolant unit (Water-soluble/internal conveyor/scrapper type/spindle-through coolant/7MPa through pump/with oil skimmer)				
		External nozzle coolant	●	●		
		Overhead shower coolant	●	●		
		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	Spindle thermal displacement compensation function				
		OP10i Foundation model	●	●		
		OP20iP Maintenance model				
		OP20iT Tool control model				
		OP20iA Advance tool control model				
	Tool control	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				

Output and torque diagram



JTEKT GROUP

The JTEKT group uses leading edge technology to deliver a form of manufacturing friendly to the planet's environment.

A group of people that pay particular attention to the basic starting points of manufacturing, striving to perfect a 'people-friendly' production system. That's us, the JTEKT group. We take on the task of improving quality with a "customer first" approach and aim to manufacture products that are both advanced and reliable. Group-wide activities have gained firm reliability all over the world. We promise to continue to adhere to the motto of "pursue technological dreams to deliver valuable innovations to you" in our daily operations, and aim towards a future of people and planet-friendly manufacturing.



●Machine tools

MITSUI SEIKI KOGYO CO., LTD.

6-13 Yahata, Kawajima-cho, Hiki-gun, Saitama Pref. 350-0193, TEL 049-297-5555 FAX 049-297-4714 www.mitsuisseiki.co.jp

KOYO MACHINE INDUSTRIES CO.,LTD.

2-34 Minami-uematsu-cho, Yao-shi, Osaka 581-0091, TEL 072-922-7881 FAX 072-924-1318 www.koyo-machine.co.jp

HOUKO CO., LTD.

1-3 Aza-ejiri, Oaza-hishiike, Kota-cho, Nukata-gun, Aichi Pref. 444-0113, TEL 0564-62-1211 FAX 0564-62-5401 www.houko.co.jp

●Heat treatment furnaces

KOYO THERMO SYSTEM CO., LTD.

229 Kabata-cho, Tenri-shi, Nara Pref. 632-0084 TEL 0743-64-0981 FAX 0743-64-2873 www.koyo-thermos.co.jp

●Control

KOYO ELECTRONICS INDUSTRIES CO., LTD.

1-171 Tenjin-cho, Kodaira-shi, Tokyo 187-0004 TEL 042-341-3111 FAX 042-343-0315 www.koyoele.co.jp

●Subsidiary equipment

TOYOOKI KOGYO CO.,LTD.

45 Aza-kaizan, Hatsuchi-cho, Okazaki-shi, Aichi Pref. 444-3592 TEL 0564-48-2211 FAX 0564-48-7850 www.toyooki.co.jp

CNK CO., LTD.

28 Bawari, Noda-cho, Kariya-shi, Aichi Pref. 448-0803 TEL 0566-21-1833 FAX 0566-21-6861 www.cnk.co.jp

TOYODA VAN MOPPEs LTD.

1-54 Aza-shiroyama, Maiki-cho, Okazaki-shi, Aichi Pref. 444-3594 TEL 0564-48-5311 FAX 0564-48-6156 www.tvmk.co.jp

*JTEKT Corporation and Mitsui Seiki Kogyo Co., Ltd. went into comprehensive business together.

JTEKT JTEKT CORPORATION

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— GLOBAL NETWORK —

MACHINE TOOLS & MECHATRONICS BUSINESS OPERATIONS

MACHINE TOOLS & MECHATRONICS OVERSEAS SALES DEPT.

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Arlington Heights, IL 60004
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Telephone : (1) 847-253-0340
Telefacsimile : (1) 847-577-4680

TOYODA MACHINERY (DALIAN) CO.,LTD.

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2 Wushaxinhui Road, Daliang Street Shunde District,
Foshan, Guangdong, 52833 CHINA
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Telefacsimile : (86) -757-2232-6650

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51300 W. Pontiac Trail
Wixom, MI. 48393-1003
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Telephone : (1) 248-624-5755
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94380 Bonneuil sur Marne, FRANCE
Telephone : (33) 1-49.56.85.80
Telefacsimile : (33) 1-43.77.47.50

TPA ENGINEERING CORP

97B1-17Lot,
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