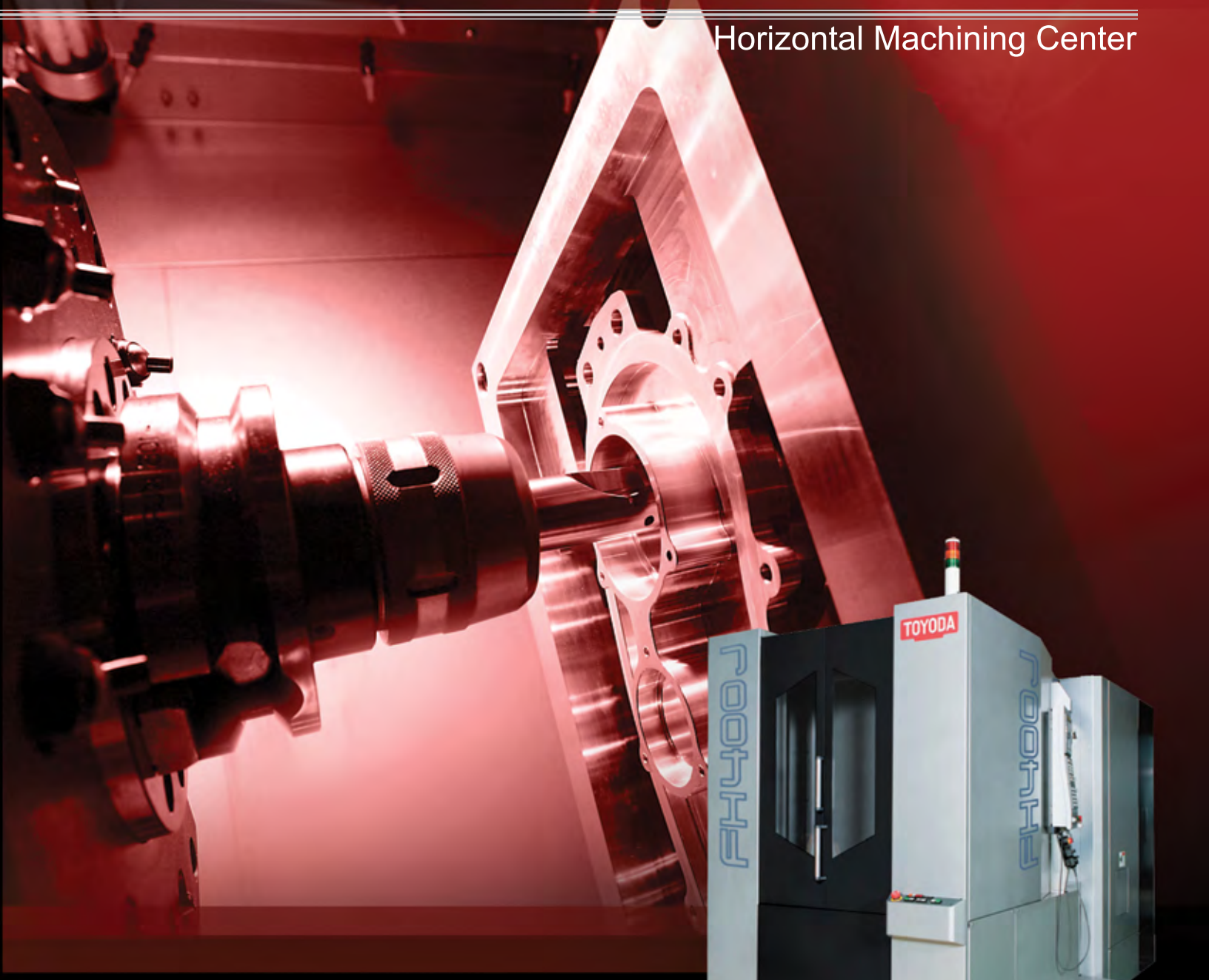
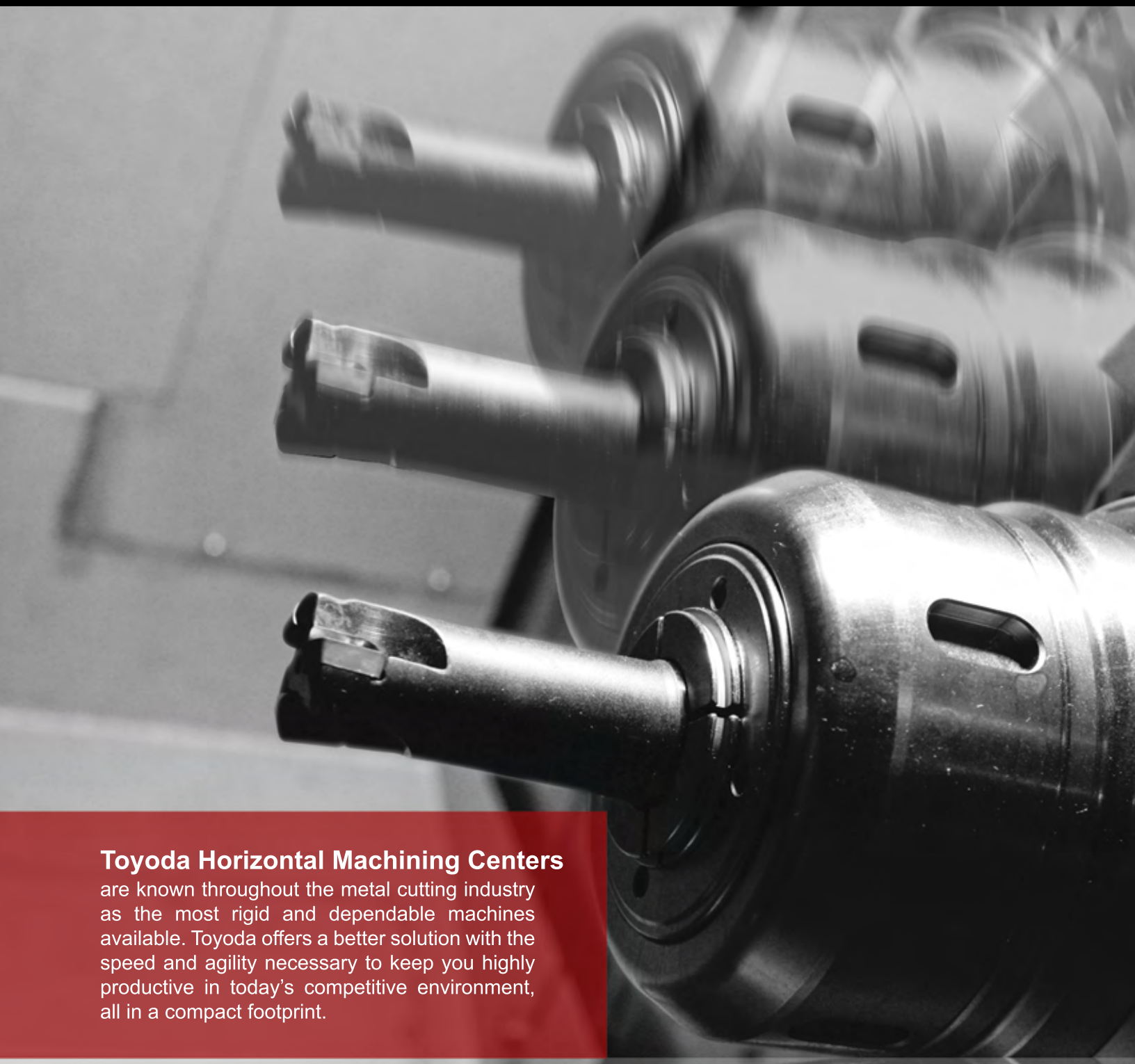
TOYODA

FH400J/FH500J

Horizontal Machining Center



JTEKT
Koyo TOYODA



Toyoda Horizontal Machining Centers are known throughout the metal cutting industry as the most rigid and dependable machines available. Toyoda offers a better solution with the speed and agility necessary to keep you highly productive in today's competitive environment, all in a compact footprint.

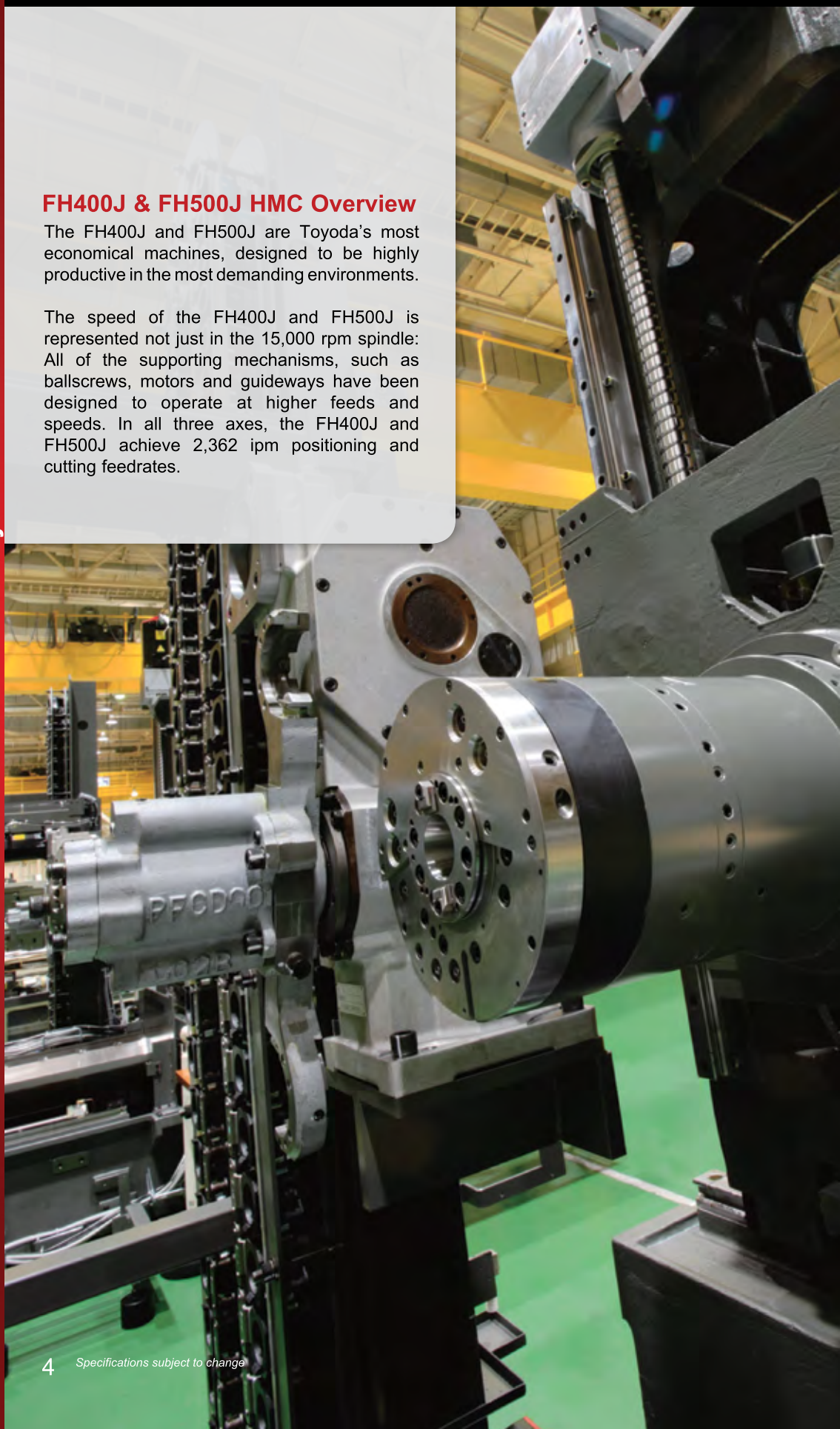
Contents

Built For Reliability

FH400J & FH500J HMC Overview

The FH400J and FH500J are Toyoda's most economical machines, designed to be highly productive in the most demanding environments.

The speed of the FH400J and FH500J is represented not just in the 15,000 rpm spindle: All of the supporting mechanisms, such as ballscrews, motors and guideways have been designed to operate at higher feeds and speeds. In all three axes, the FH400J and FH500J achieve 2,362 ipm positioning and cutting feedrates.

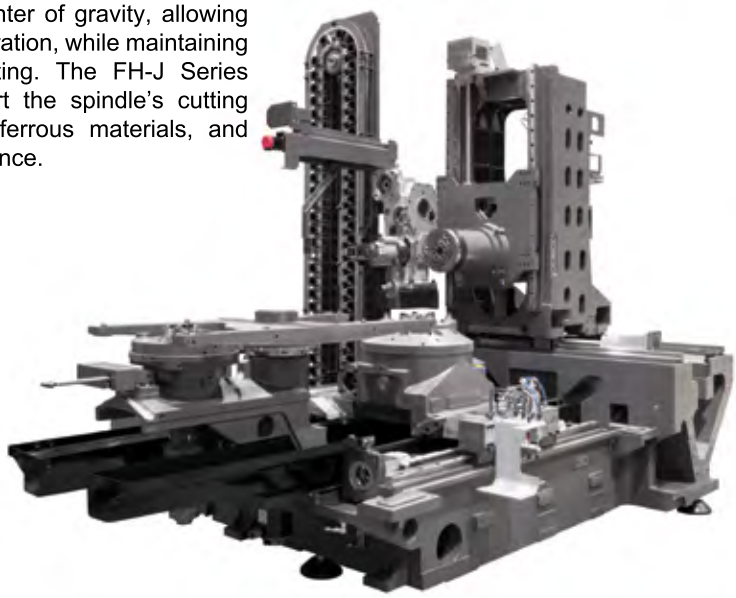


Solid Platform Construction

Toyoda's approach towards machine design is to minimize displacement caused by external forces that may impact cutting accuracy. The construction of the FH-J machines is designed to withstand large cutting resistance and inertial forces of feed acceleration and deceleration. Its incomparable platform assures stable production over time.

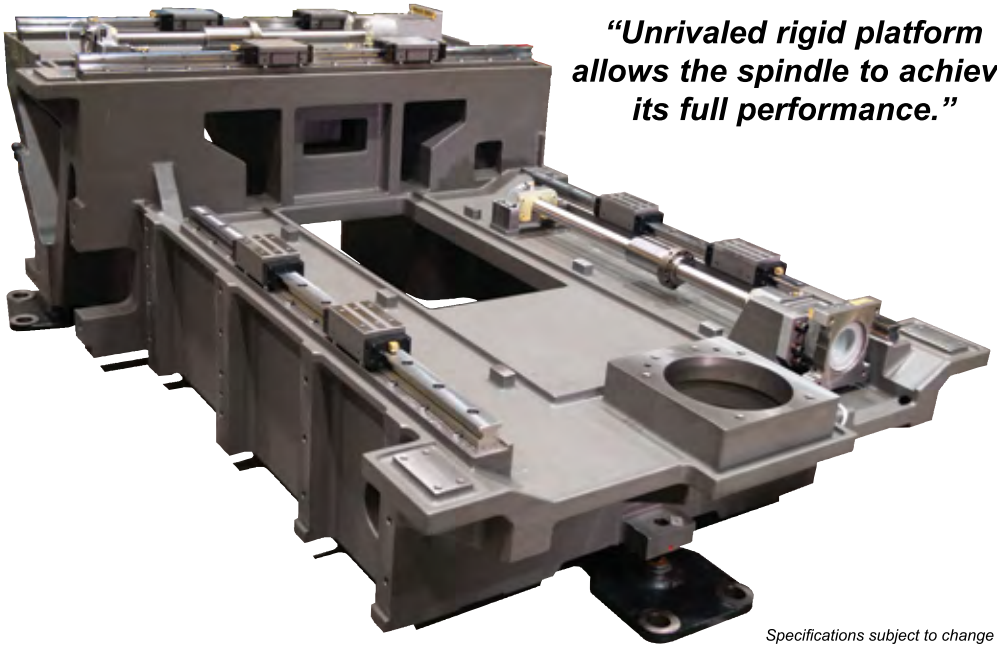
FCD450 Column

JTEKT's proprietary casting technology has a column that is designed with a low center of gravity, allowing rapid feedrate and quick acceleration, while maintaining rigidity during heavy-duty cutting. The FH-J Series column is designed to support the spindle's cutting power, maintain accuracy in ferrous materials, and maximize tool life and performance.



High Grade Cast Iron Bed

The immobile bed supporting the moving body is designed using FEM analysis technology. It has outstanding rigidity making stable axial feed possible with high speed and high acceleration.



"Unrivaled rigid platform allows the spindle to achieve its full performance."

Improved Reliability in Wiring and Piping

On the FH400J and FH500J, no detail is too small to be properly engineered. Cable carriers, wire braids, and protective tubing are used and distributed appropriately for the space available. This prevents the cables from rubbing against each other, which may lead to oil leaks or broken wires in axial travel. FEM analysis is used on brackets to check for adequate strength and durability, avoiding any damage caused by the weight of the cable as speed increases.

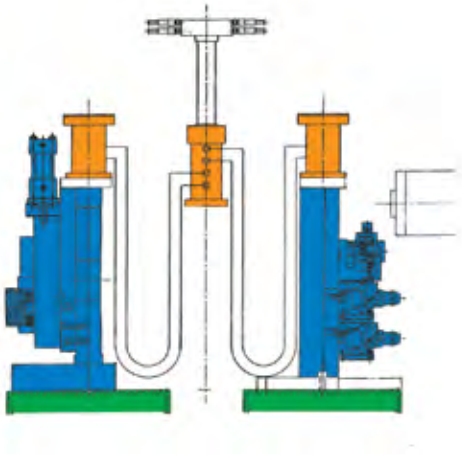
- Using a cable carrier, the wiring and piping to the column is neat and concise.
- Wire braided pipe is used and wiring is installed in protective tubing as demanded by the machine's high speed and acceleration
- Steel piping is used to suppress loss in the discharge pressure of coolant used for chip removal.

Space-saving Design for Hydraulic Jigs (Option)

An optional hydraulic system can be selected from the following types as needed for securing hydraulic fixtures.

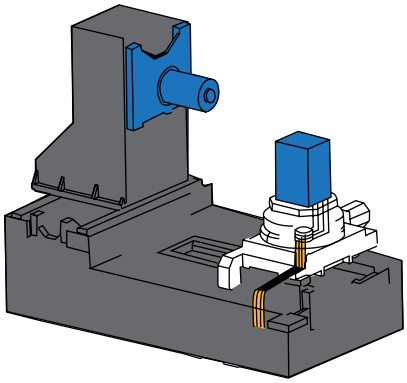
Distributor Type

A distributor with 6 ports is located at the center of the pallet changer and is used for actuating the hydraulic fixtures on the pallet.



Pallet - Through Type

A pallet-through method is incorporated for supplying hydraulic oil to the jig. The jig hydraulic pump and electromagnetic valve are arranged in a package, allowing the machine to be installed in a much smaller surface area.



High-speed Spindle

The Toyoda-built, 15,000 RPM spindle brings exceptional performance to the FH400J and FH500J. A fourth bearing pack has been added with automatic pre-load at the front of the spindle to reduce vibration. The Toyoda design is rigid, and able to sustain higher radial pressures than the typical 3-bearing design. Coolant through the spindle is standard. The spindle torque is 166.8 N-m (123 ft-lb) with an output of 22kW (30hp) .

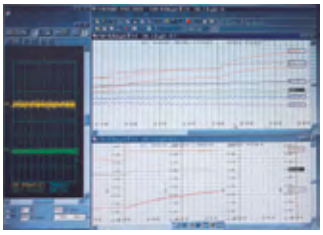
Dynamic balance measurement

JTEKT's Dedicated Spindle Manufacturing

The spindle is manufactured under strict quality control. Confirmation checks examine dynamic balance, vibration, and noise. The spindle is installed in the machine only after ensuring all allowable limits have been maintained.

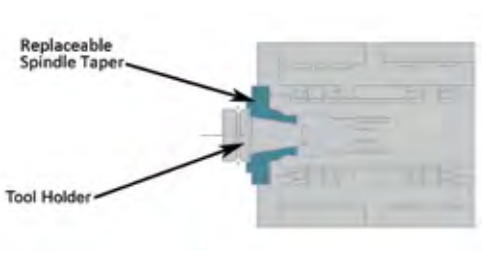
Focusing on Low Vibration

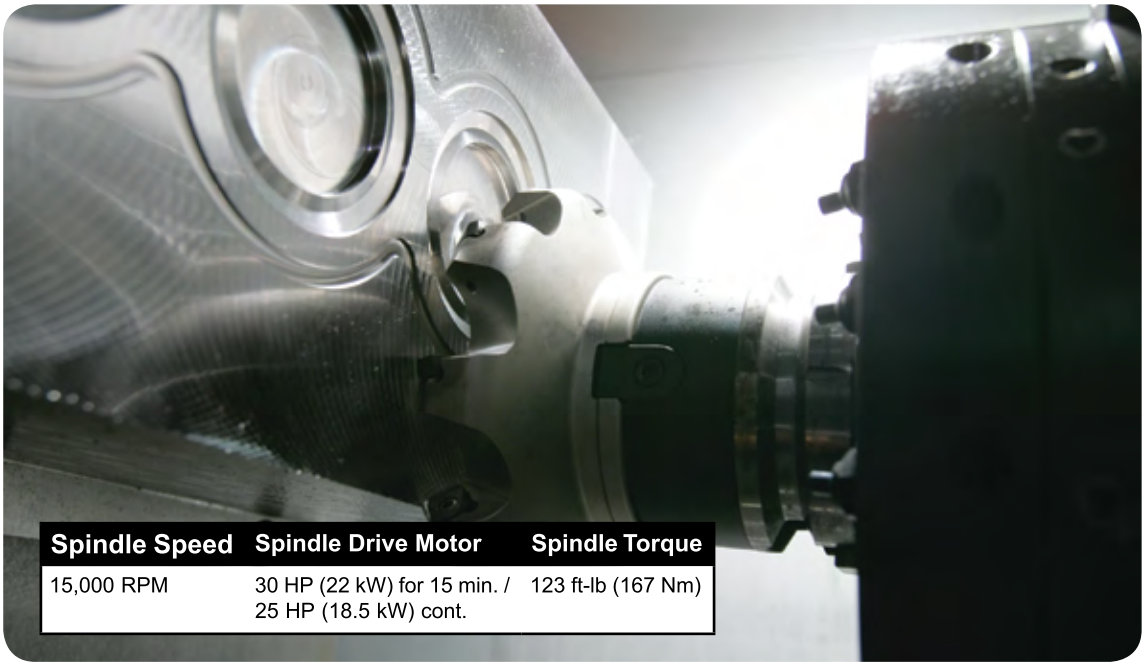
We have developed a high-speed spindle that suppresses vibration and runout across the entire range, up to the maximum speed. This feature contributes not only to the improvement of cutting accuracy, but also to the extension of tool life.


High-speed spindle running rest

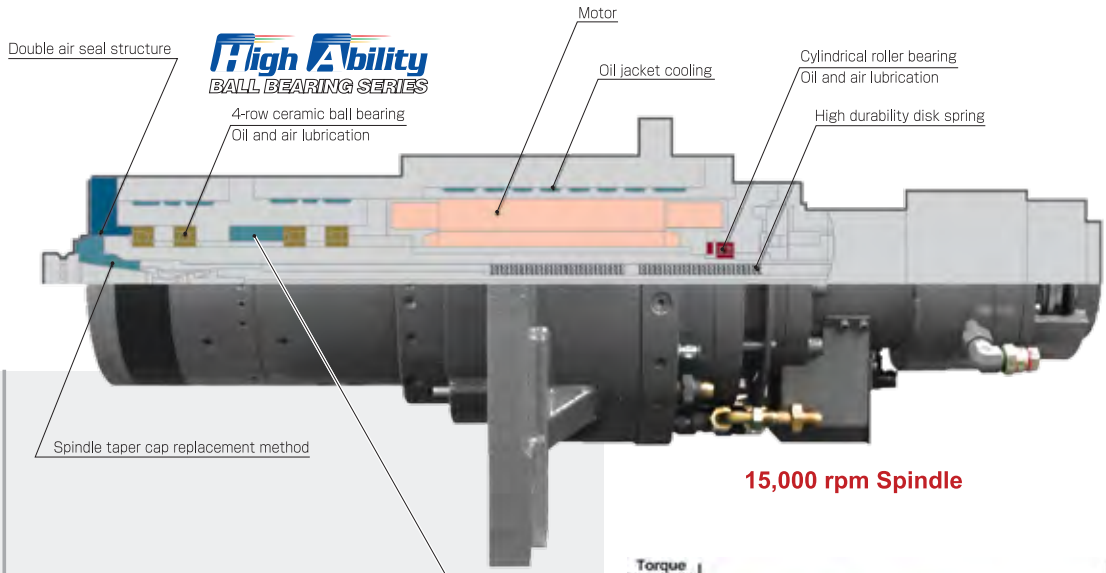
Replaceable Spindle Taper

In the rare chance that a failure does occur, Toyoda's patented replaceable spindle taper can be installed without removing the spindle, keeping downtime to a minimum. Individual cap replacement possible as it is integrated with the taper, even in the event of taper damage caused by accidental interference.

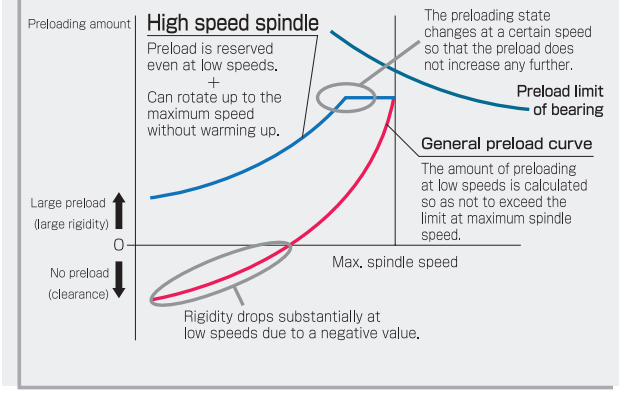


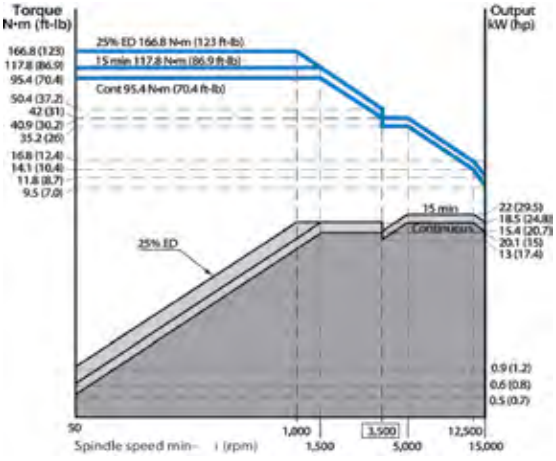


Spindle Speed	Spindle Drive Motor	Spindle Torque
15,000 RPM	30 HP (22 kW) for 15 min. / 25 HP (18.5 kW) cont.	123 ft-lb (167 Nm)



15,000 rpm Spindle





Built For Speed

Rapid Feed Rate	FH400J	FH500J
Traverse (X, Y, Z axes)	60 m/min (2,362 ipm)	60 m/min (2,362 ipm)
Rapid Acceleration		
(X, Y, Z axes)	1G	1G

Robust Linear Guideways

The low-friction IKO linear guideways on the FH400J and FH500J incorporate dowel-shaped roller bearings. This cross roller design provides more surface contact than regular ball bearings. It also provides for increased rigidity and vibration dampening characteristics up to three times that of other machines. The cylindrical roller slides position quickly with smaller orientation changes upon sudden acceleration, contributing to a higher level of production efficiency.

JTEKT's assembling technology developed a rigid cylindrical roller slide that offers the best rapid feed rate and acceleration in its class.

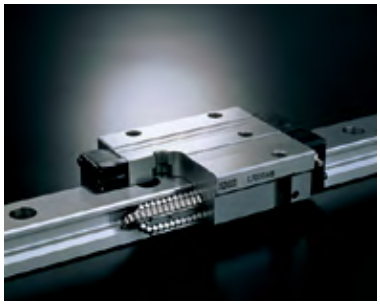


Table and Pallet Changers

FH400J and FH500J are equipped standard with a NC-controlled B-axis that is fully programmable to 360,000 positions. The table rotates 90º in 2.3 seconds or 180º in 3.0 seconds.

The pallet shuttle allows cutting to continue while the operator sets up the next part in a protected work area at the front of the machine.

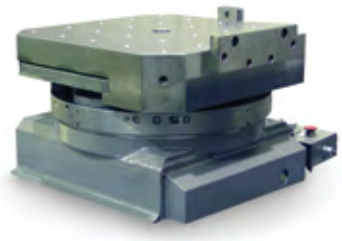
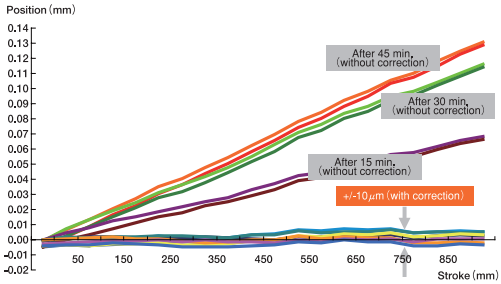


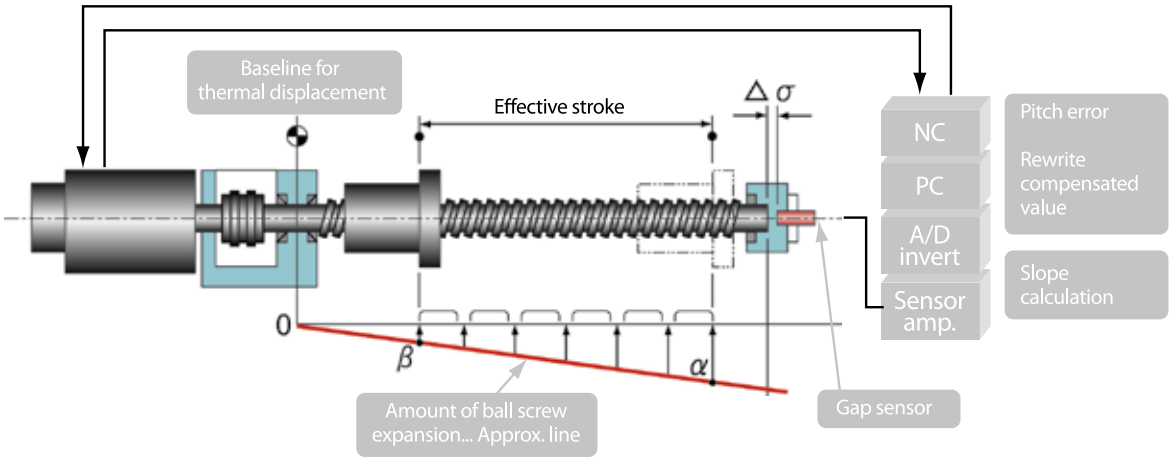
Table Indexing Time	FH400J	FH500J
90 degree index	2.3 sec	2 sec
Pallet		
Pallet size	400 mm x 400 mm (15.75 in x 15.75 in)	500 mm x 500 mm (19.68 in x 19.68 in)
Pallet height from floor	1,100 mm (43.31 in)	1,100 mm (43.31 in)
Pallet change time	7.5 sec	9.5 sec
Pallet load	400 kg (880 lbs)	500 kg (1,100 lbs)

Ballscrew Thermo Stabilizer

The FH-J series software has automatic compensation to protect against thermal growth in the ballscrew. A heat displacement sensor on the X-, Y- and Z-axis ballscrews directly measures any growth caused by heat generation and feeds back the measured results to the CNC (patent pending design). The positioning accuracy of each axis is stabilized automatically. This eliminates the need for internal cooling mechanisms, which may compromise the integrity of the ballscrew.

Results of ball screw displacement correction after continuous positioning is performed

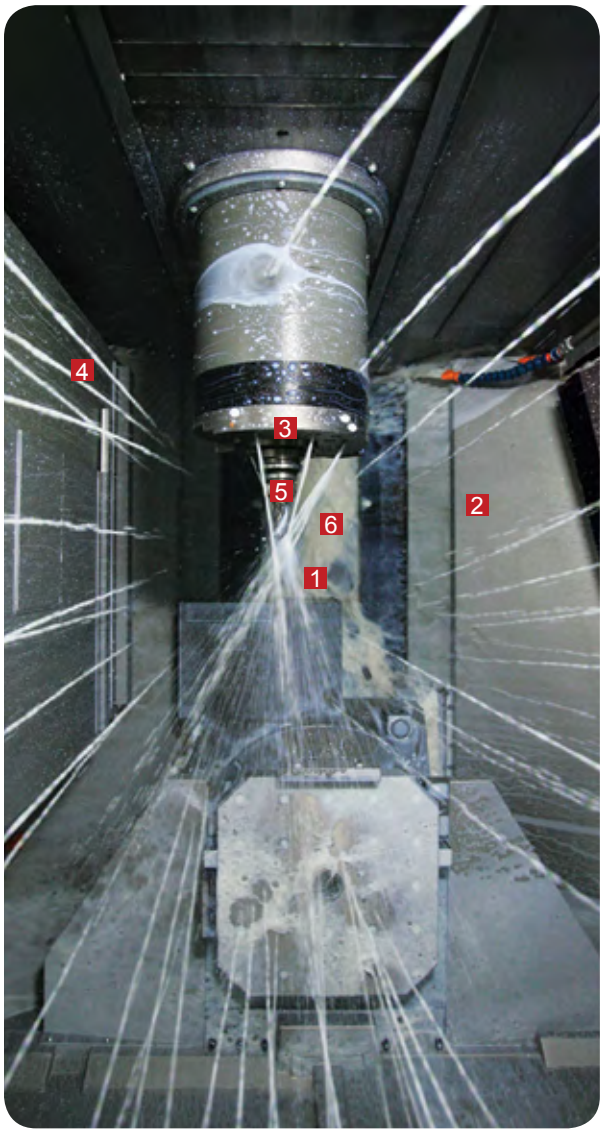




Tool Storage (ATC)

The standard tool magazine has 60 pockets, with available options accommodating up to 303 tools. Faster magazine indexing and spindle orientation work together with simultaneous high-speed tool change to reduce the chip-to-chip time by 50 percent.

Tool Change Cycle Time	FH400J	FH500J
Tool to tool	0.9 sec	0.9 sec
Chip to chip	2.7 sec	2.7 sec



Center Trough

A large open trough directly under the spindle allows for optimum chip flow to the chip conveyor below. Full advantage can be taken of the machines cutting capability even with heavy chip loads. Furthermore, coolant consumption is substantially reduced.

Slant Cover

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

External Nozzle Coolant

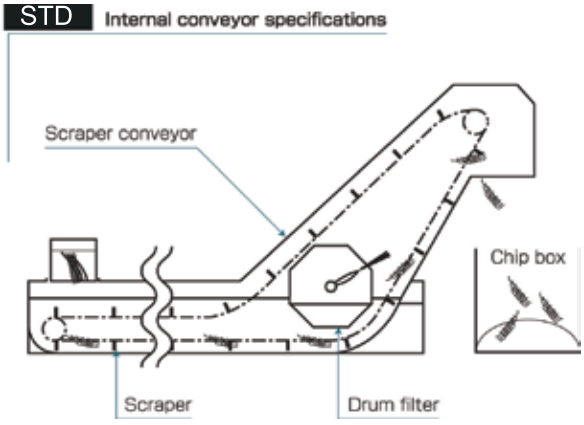
The nozzle installed at the spindle nose supplies coolant to the cutting point.

Overhead Shower Coolant

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

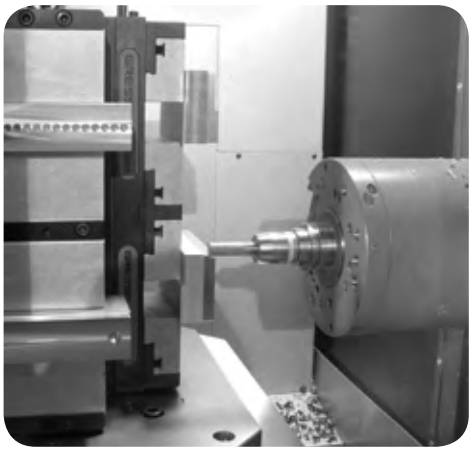
Spindle-through Coolant 1MPa

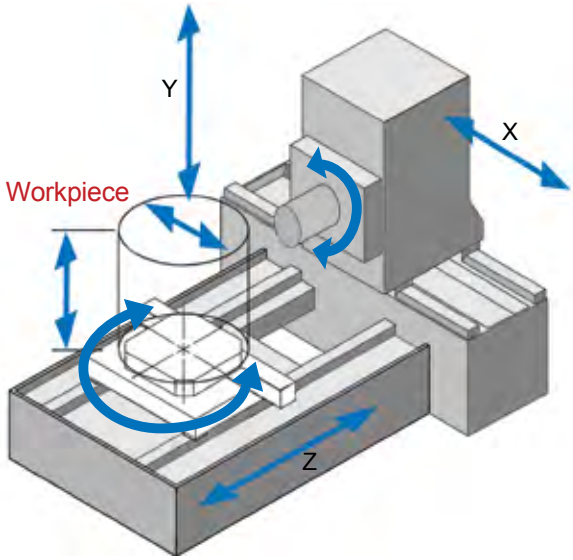
Coolant is supplied through the spindle center to the cutting edge. It is effective for lubrication and cooling of the cutting point, chip disposal and extension of tool life.



Coolant Supply Unit with Take-up Chip Conveyor

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





Large Work Envelope

The FH400J and FH500J are developed to be compatible with cell manufacturing that has been used in recent years in vehicle part manufacturing and other industries. The key point of cell manufacturing is to have a machine with the highest amount of productivity in the least amount of floor space. In these machines, dead space is eliminated through efficient device layout, giving more room for the work envelope.
The work envelope can load a maximum workpiece with a range bigger than conventional machines, allowing a maximum workpiece swing of 630mm and height of 900 mm for FH400J. (800 x 1,000mm for FH500J).

Stroke	FH400J	FH500J
X-axis	600 mm (23.62 in)	730 mm (28.74 in)
Y-axis	560 mm (22.05 in)	730 mm (28.74 in)
Z-axis	630 mm (24.80 in)	850 mm (33.46 in)
Floor Space		
Width	2500 mm (99 in)	2,635 mm (104 in)
Length	4,122 mm (163 in)	4,710 mm (186 in)

Automation Systems

The highly reliable FH400J and FH500J can be integrated into various systems or cells to automate production.

- Multi-level Flexible Manufacturing System (FMS) with Robot Guided Vehicle (RGV)
- Automatic Robot-type Loading

Workability

Aiming to perfect the production system, the FH-J Series is designed with features that contribute to the productivity, efficiency, safety, and ease of use for the operator.

Accessible Operation Door

The operation panel is positioned on the left-hand side of the machine providing a wide accessible door for the operator.

Rotary Operation Panel

Manual Pulse Generator

Wide APC Door

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

Easy-access Tool Magazine Door

Sufficient opening is provided for the tool magazine door, enabling the operator to change heavy tools securely.

Fanuc 31i Controls

The Fanuc 31i CNC delivers high-end features for a wide range of production and job shop environments. It adopts the Field Bus, which is a network that allows control devices such as PLC, PC, and sensor actuators to be easily connected with each other. This network permits cable savings and increased reliability.

A wealth of preventative maintenance information is displayed on the CNC screen. By selecting the advanced machine diagnostic function (option), it is easy to pinpoint the cause of machine failure.

Features of the OP Supporter (Optional)

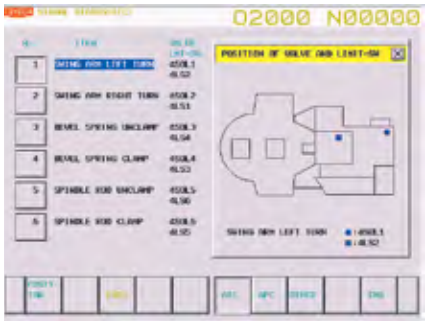
Maintenance Control Support

Visual Status Display

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

Straightforward Inspection Items

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



Tool Control Support

Simple NC Program Creation

Tool number conversion function: Tool identification number is automatically converted into the ATC magazine pot number, preventing command errors.

Accurate Tool Life Appraisal

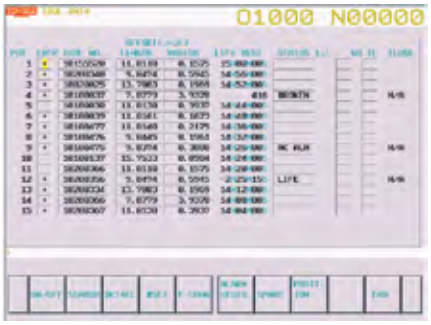
Tool life control function: A counting method giving readings at 0.1 sec accuracy. Provides a double-layered fault warning system that generates warning of actual error. Tool breakages and AC faults are displayed in addition to tool life.

Preliminary Tool Check

Program tool check function: Tools used in the program are analyzed and any tool shortages are reported.

Simple Registration of Tool Data

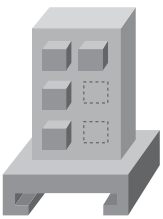
Tool ID function: The ID chip containing tool data (correction data, tool life, AC data, machining condition, etc.) eliminates manual tool data entry and human error.



Pallet Control Support

Solid Pallet Control

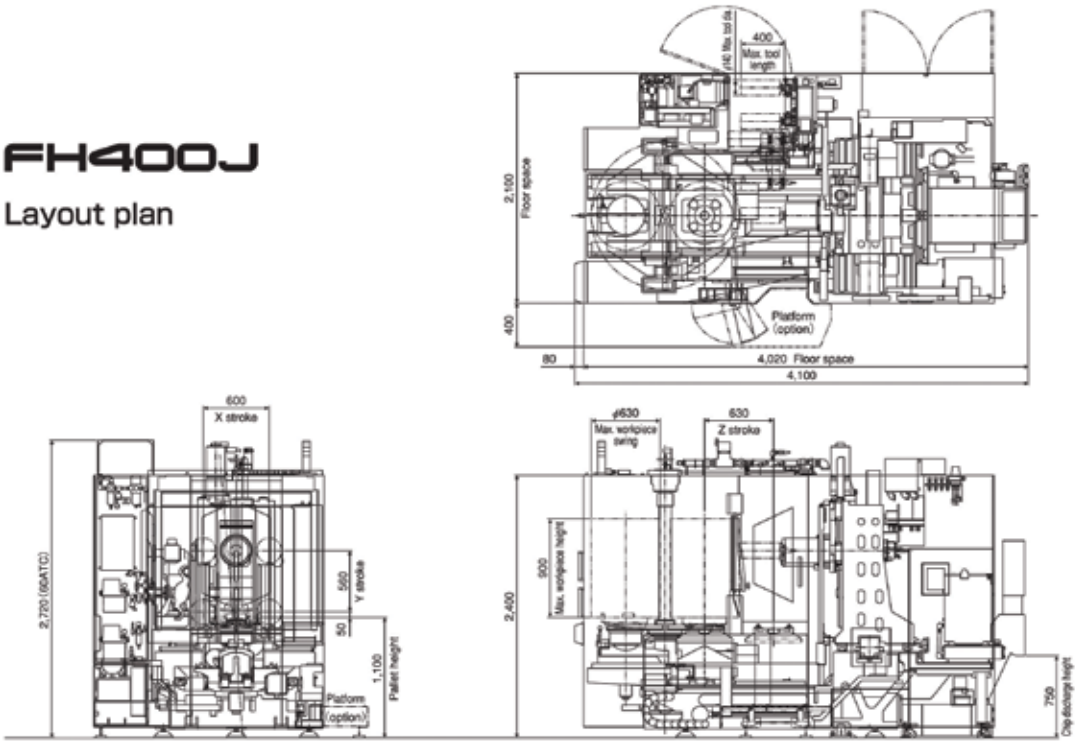
Multi-workpiece installation function: Only registered mounting faces and/or processes are machined. This reduce cycle time significantly.



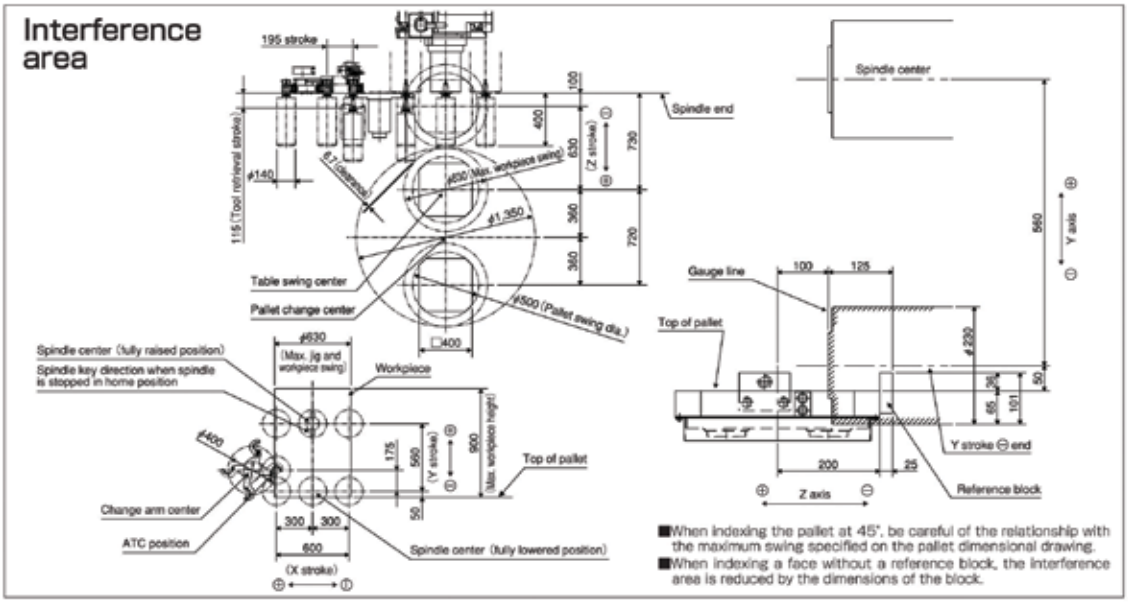
Work Area	Units	FH400J	FH500J
Axis travel X (column)	mm (in)	600 (23.62)	730 (28.74)
Axis travel Y (spindle head)	mm (in)	560 (22.05)	730 (28.74)
Axis travel Z (table)	mm (in)	630 (24.8)	850 (33.46)
Spindle nose to table center	mm (in)	100~730 (3.94~28.74)	100~950 (3.94~37.40)
Spindle center to pallet top	mm (in)	50~610 (1.96~24.02)	50~780 (1.96~30.70)
Workpiece swing (diameter)	mm (in)	630 (Ø24.80)	Ø800 (Ø31.50)
Workpiece height	mm (in)	900 (35.43)	1,000 (39.37)
Spindle			
Spindle speed, standard (infinitely variable)	RPM	15,000	15,000
Taper	-	CAT40	CAT40
Bearing diameter	mm (in)	Ø80 (Ø3.15)	Ø80 (Ø3.15)
Spindle motor, for 15 min	kW (hp)	22 (30)	22 (30)
Spindle motor, cont.	kW (hp)	18.5 (25)	18.5 (25)
Table and Pallet			
Size	mm (in)	400 x 400 (15.75 x 15.75)	500 x 500 (19.68 x 19.68)
Minimum indexing angle	NC (degree opt)	0.001 NC	0.001 NC (1 deg opt)
Indexing time, 90-degree index	sec	2.3	2
Pallet height from the floor	mm (in)	1,100 (43.31)	1,100 (43.31)
Pallet changing time	sec	7.5	9.5
Max load on pallet	kg (lb.)	400 (880)	500 (1,100)
Feeds			
Rapid feed rate (X, Y, Z)	m/min (ipm)	60 (2,362)	60 (2,362)
Acceleration (X, Y, Z)	G	1	1
Way design	-	Roller bearing	Roller bearing
Ballscrew diameter (X, Y, Z)	mm (in)	Ø40 (Ø1.6)	Ø40 (Ø1.6)
Accuracy			
Positioning accuracy (X, Y, Z)	mm (in)	± 0.003 (± 0.00012)	± 0.003 (± 0.00012)
Repeatability (X, Y, Z)	mm (in)	± 0.0015 (± 0.00006)	± 0.0015 (± 0.00006)
Table indexing accuracy	arc sec	± 7	± 7
Table indexing repeatability	arc sec	± 3.5	± 3.5
Automatic Tool Change			
Magazine capacity	-	60 std; Opt 119, 303	60 std; Opt 119, 303
Max tool weight	kg (lb)	8 (17.6)	8 (17.6)
Max tool size (diameter with adjacent x length)	mm (in)	Ø75x 400 (Ø2.95 x 15.75)	Ø75 x 470 (Ø2.95 x 18.5)
Tool change, tool-to-tool	sec	0.9	0.9
Tool change, chip-to-chip	sec	2.7	2.7
Dimensions			
Machine height	mm (in)	2,733 (108)	2,868 (113)
Floor space (width x length)	mm (in)	2,500 x 4,122 (99 x 163)	2,635 x 4,710 (104 x 186)
Weight	kg (lb)	11,000 (24,200)	13,500 (29,700)
Controls		Fanuc 31i	Fanuc 31i

FH400J

Layout plan

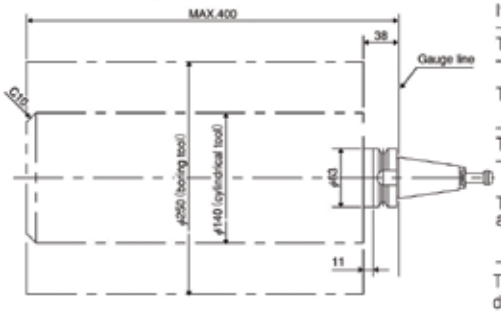


Interference area



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 φ63, please make the outside diameter φ63 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.

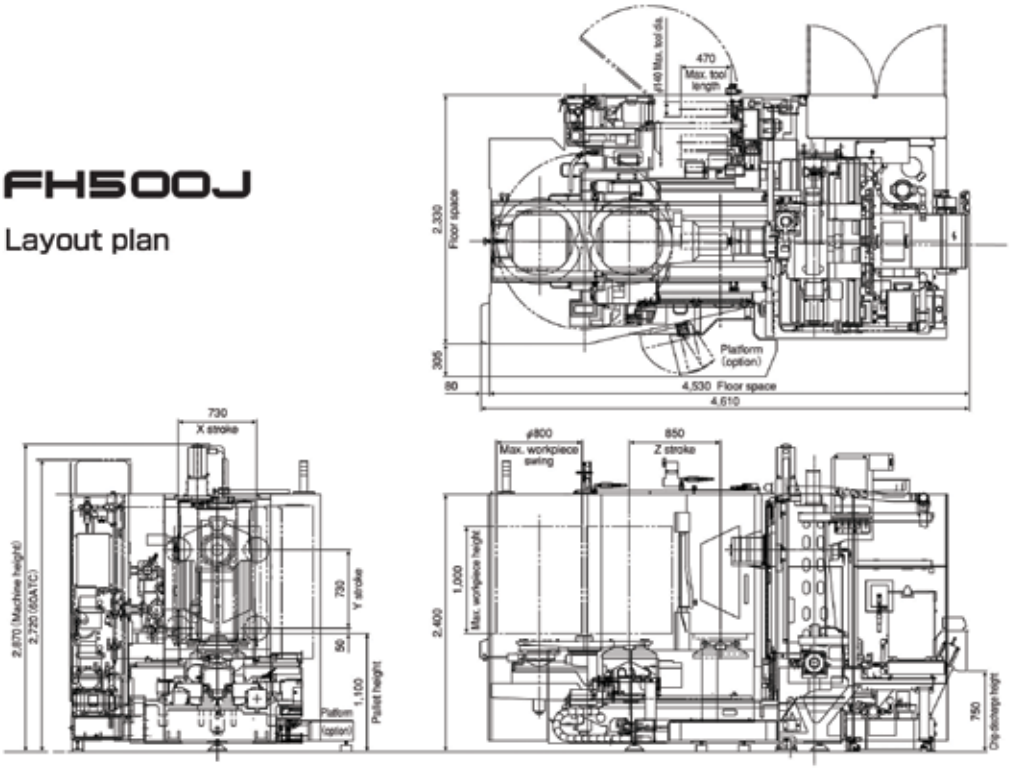


Item	Max. spec
Tool length	400mm
Tool diameter	With a 60 pocket magazine: φ75mm (with no limitations caused by adjacent tools)
Tool weight	8kg Moment at the spindle nose shall be 11.8 Nm or less.
Tool imbalance amount	30×10^{-6}N·m or less (tools not exceeding 6,000 min^{-1}) 10×10^{-6}N·m or less (tools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

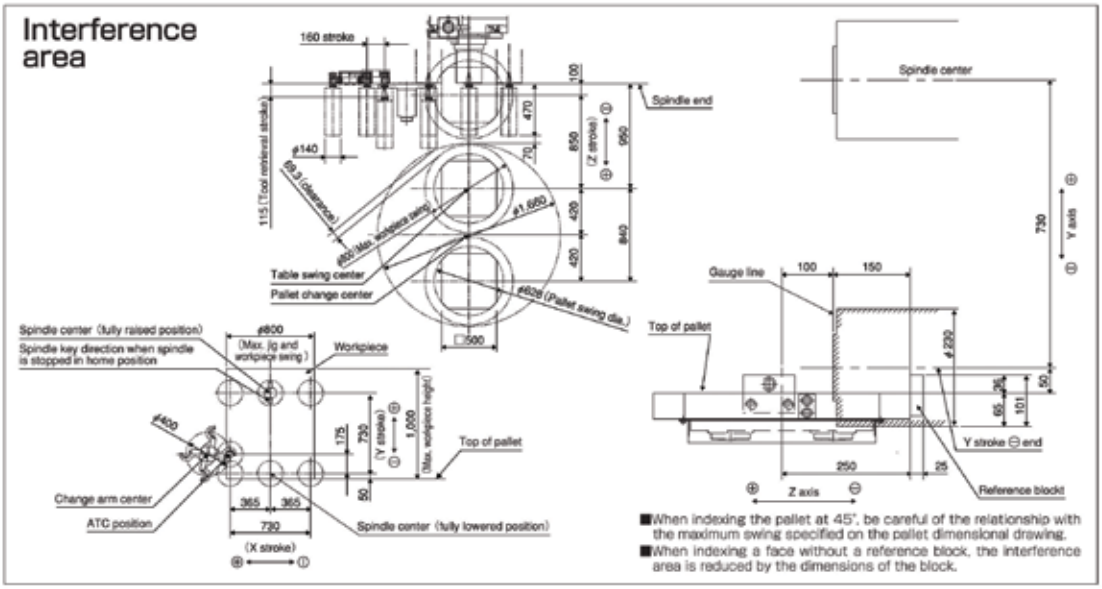
Tools with diameters exceeding those given above are subject to limitations in the diameter of adjacent tools in the magazine, key groove position of the tool holder and so on.

FH500J

Layout plan

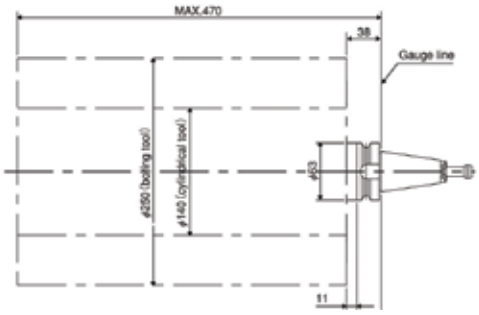


Interference area



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

The tool holder is subject to limitations in the shape during ATC (automatic tool change). If the maximum tool diameter exceeds ø63, please make the outside diameter ø63 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 60 pocket magazine: ø75mm (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	30×10^{-6}N·m or less (tools not exceeding 6,000 min^{-1}) 10×10^{-6}N·m or less (tools between 6,000 min^{-1} and 8,000 min^{-1}) 30×10^{-6}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.

Production Experience

Toyoda is one of the world's largest machine tool builders, but we also have a successful production side to our business. Every year, Toyoda manufactures and sells more than $1.5 billion in steering and driveline systems to automotive OEMs around the world. This gives our company unique insight into the shop floor challenges our customers face every day.

Proven Technology

Our experience with high-volume production helps us design and build machine tools that perform under pressure. We continually refine processes, build reliable machines, and test them in our own factories. When you decide to buy a Toyoda machining center or grinder for your business, you can be confident that you are investing in proven technology.

Customer Support

Toyoda works closely with its nationwide dealer network to keep local service engineers on call should you need them. In addition, our own factory-trained service engineers are stationed across the U.S., Canada and Mexico. Our extensive spare parts inventory ($20 million) ensures that virtually any replacement part will be shipped to you in 24 hours.

THE TOYODA DIFFERENCE

Toyoda Machinery USA

Toyoda Machinery USA is headquartered just northwest of Chicago in Arlington Heights, Illinois. Our office in Monterrey, Mexico proudly serves Toyoda's Central and South American customers, while our Minnesota- and Massachusetts-based Tech Centers cater to their respective regions. Toyoda's Remanufactured Products Division, located just outside Detroit, Michigan, provides rebuild, remanufacturing, and service support for the machine tool industry.

FH400J/FH500J Horizontal Machining Center

TOYODA

www.toyoda.com

Corporate Headquarters
316 West University Drive
Arlington Heights, IL 60004
Tel: (847) 253-0340
Fax: (847) 253-0540
E-mail: info@toyoda.com

Remanufactured Products Division
51300 W. Pontiac Trail
Wixom, MI, 48393
Tel: (847) 253-0340

Toyoda Northeast Tech Center
577 Hartford Turnpike, Suite B,
Shrewsbury, MA 01545
Tel: (847) 253-0340

Toyoda Upper Midwest Tech Center
711 5th St. SW, Suite 2
New Brighton, MN 55112
Tel: (847) 253-0340

Toyoda Machinery Mexico
Ave. Gonzalitos 460 Sur Local 27
Col. San Jeronimo
Monterrey, N.L.
C.P. 64640
Tel: 01152(81) 81231116

2014A2000-CP

Scan this QR code with your mobile phone to learn more about Toyoda horizontal machining centers.

Your local distributor is: