

TOYODA



FH450S

Horizontal Machining Center



JTEKT

Koyo | **TOYODA**



Toyota Horizontal Machining Centers

are known throughout the metal cutting industry as the most rigid and dependable machines available. Toyota 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.



Built For Reliability 4

FH400J & FH500J HMC Overview
FCD450 Column
High Grade Cast Iron Bed
Improved Reliability in Wiring and Piping
Hydraulic Fixturing

Built For Speed 7

Spindle Manufacturing
Replaceable Spindle Taper
Spindle Torque Chart
Guideways
Ballscrew Thermo Stabilizer
Table and Pallet Changer
Tool Storage

Built For Capacity 12

Chip Evacuation
Work Envelope
Automation Systems

Built For The Operator 14

Accessible Operation Door
Wide APC Door
Easy-Access Tool Magazine Door
Fanuc 31i Control

Specifications 16

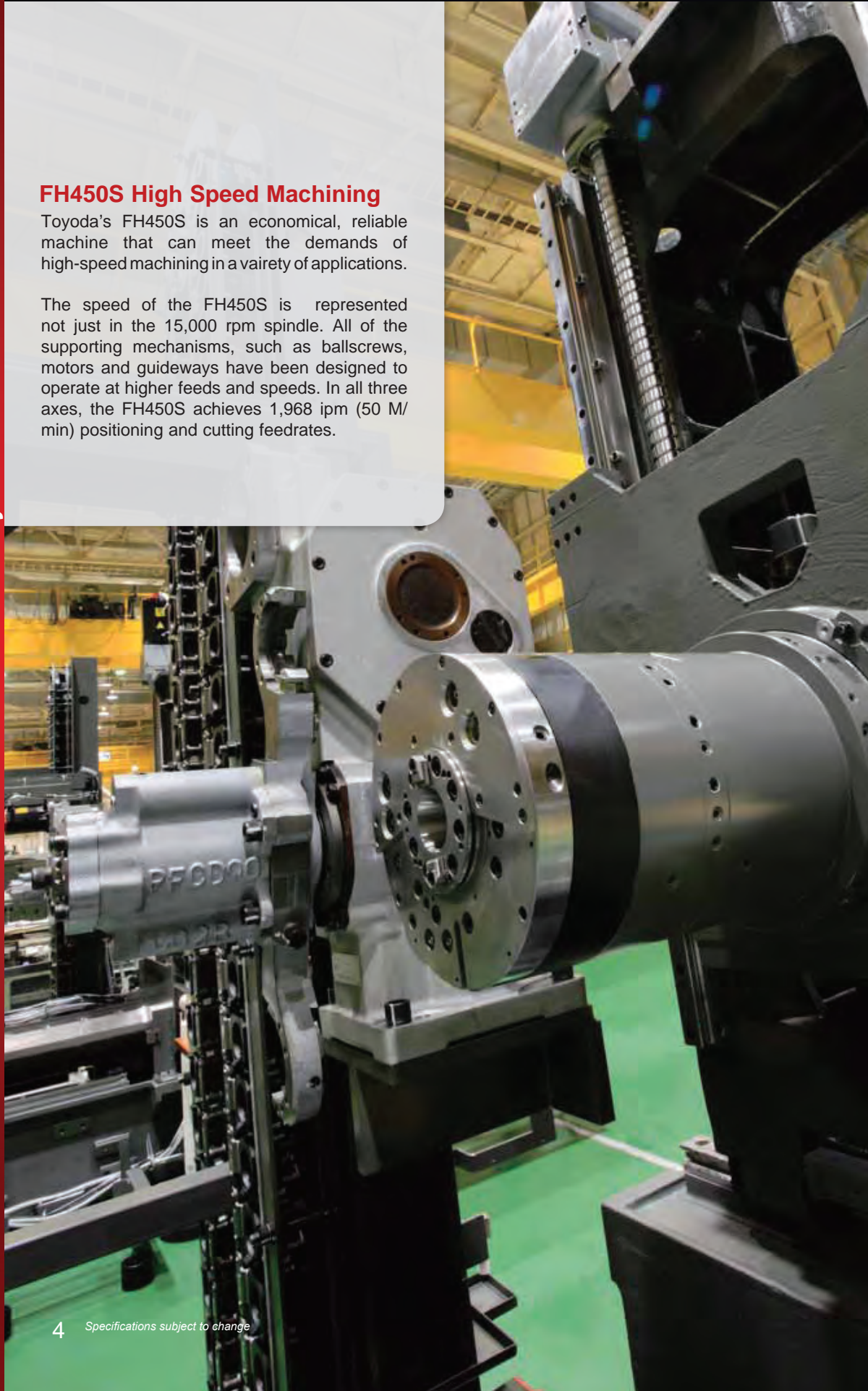
The Toyoda Difference 19



FH450S High Speed Machining

Toyota's FH450S is an economical, reliable machine that can meet the demands of high-speed machining in a variety of applications.

The speed of the FH450S 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 FH450S achieves 1,968 ipm (50 M/min) positioning and cutting feedrates.

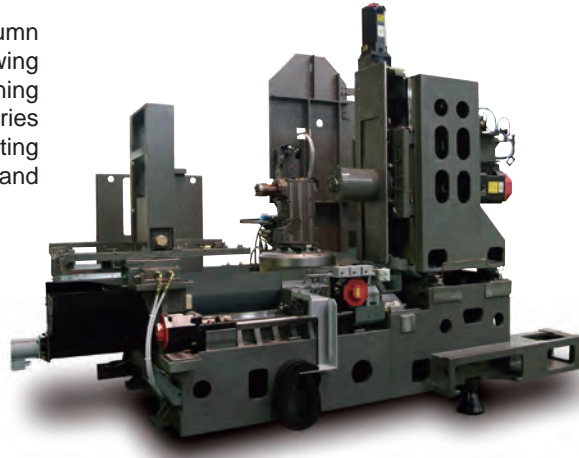


Solid Platform Construction

Toyota's approach towards machine design is to minimize displacement caused by external forces that may impact cutting accuracy. The construction of the FH450S machine 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

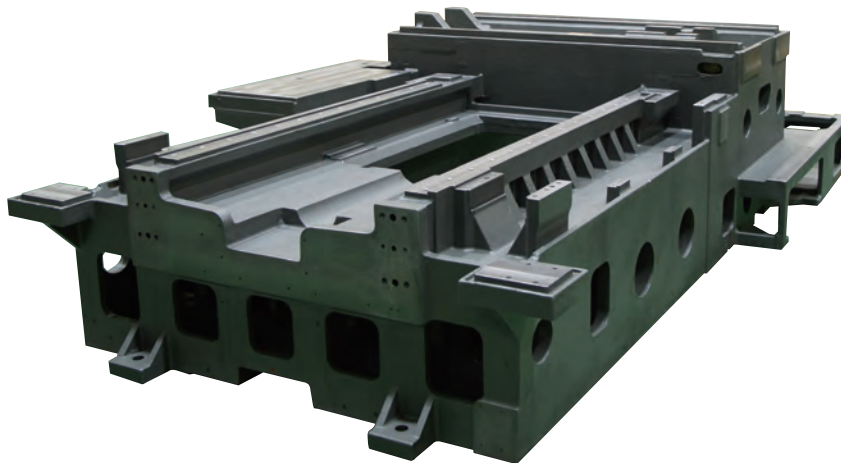
JTEKT's proprietary casting technology has a column that is designed with a low center of gravity, allowing rapid feedrate and quick acceleration, while maintaining rigidity during heavy-duty cutting. The FH-S Series column is designed to support the spindle's cutting power, maintain accuracy in ferrous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



“Unrivaled rigid platform allows the spindle to achieve its full 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.

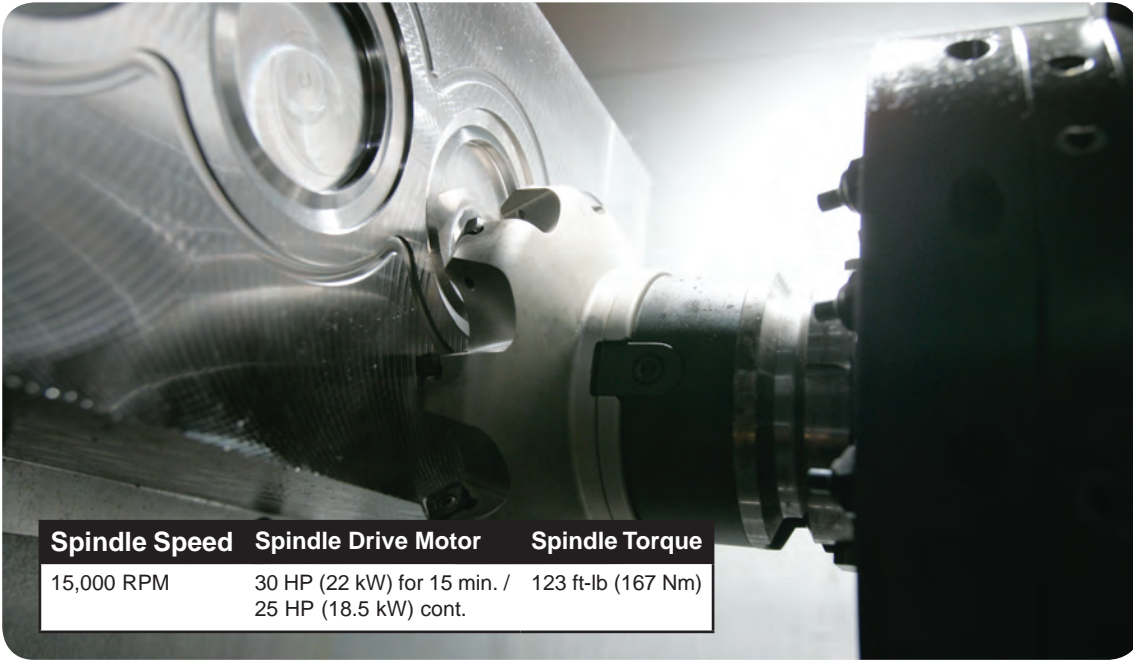


Built For Reliability

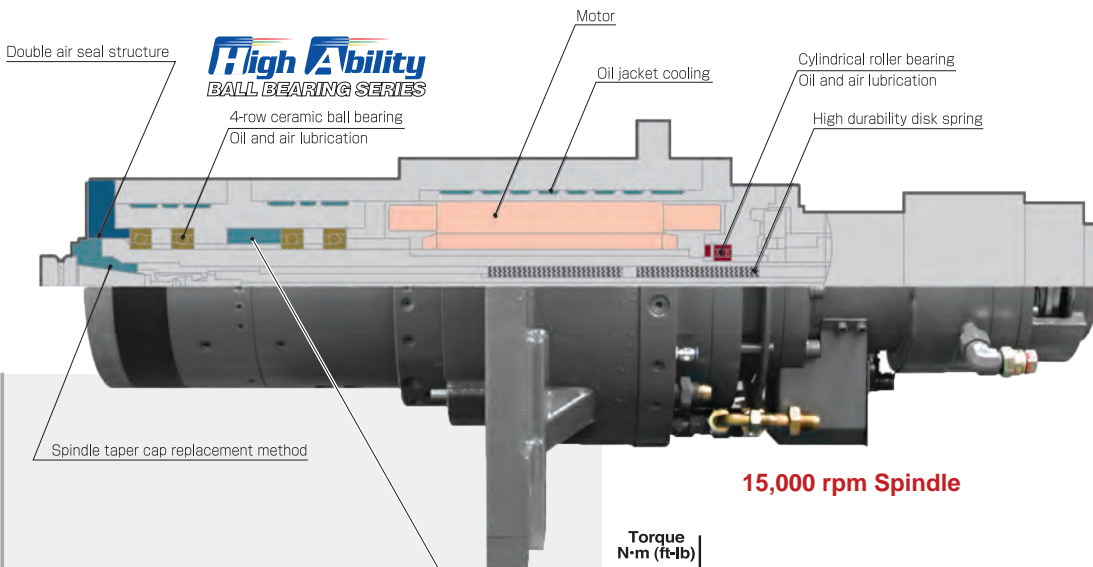
High-speed Spindle

The Toyoda-built, 15,000 RPM spindle brings exceptional performance to the FH450J.

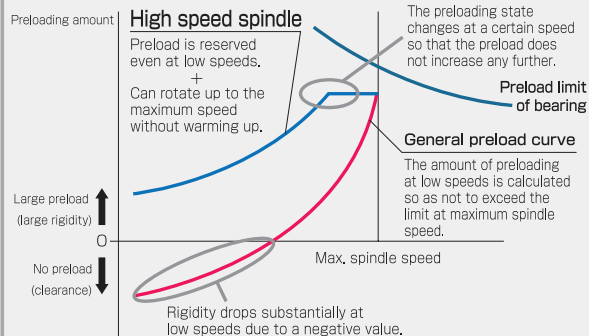
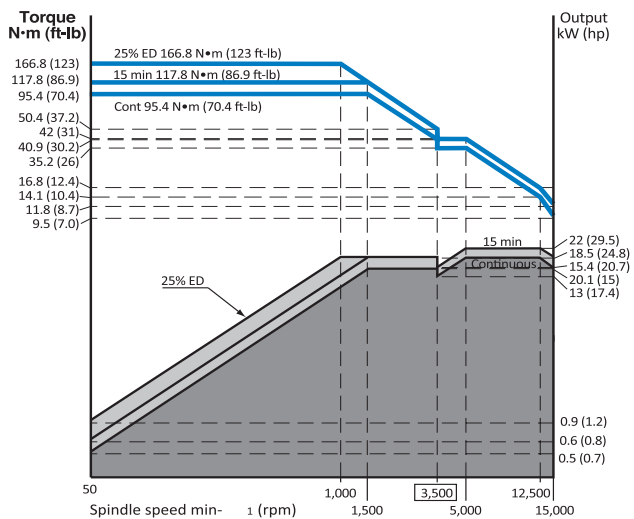
A fourth bearing pack has been added with automatic pre-load at the front of the spindle to reduce vibration. This improves machining accuracy and prolongs tool life. The Toyoda design is rigid, and able to sustain higher radial pressures than the typical 3-bearing design. Coolant through the spindle is standard. The spindle torque is 250 N-m (184 ft-lb) with an output of 22kW (30hp).



| 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



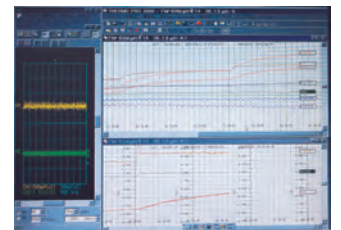
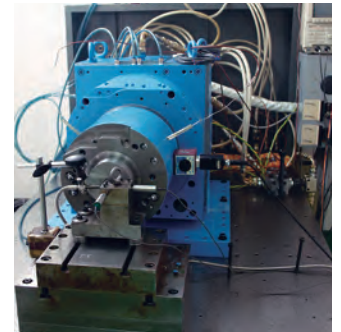
Dynamic balance measurement

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

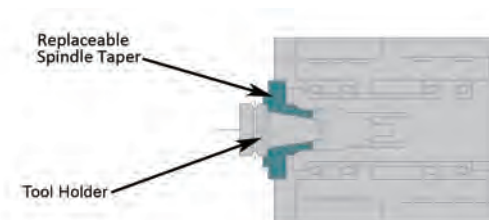
We have developed a high-speed spindle that suppresses vibration and runout across the entire range, up to the maximum speed. This feature contributes not only to the improvement of cutting accuracy, but also to the extension of tool life.



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.





| | |
|---------------------------|----------------------|
| Rapid Feed Rate | FH450S |
| Traverse (X, Y, Z axes) | 50 m/min (1,969 ipm) |
| Rapid Acceleration | |
| (X, Y, Z axes) | 0.7 G |

Robust Linear Guideways

The low-friction linear guideways on the FH450S incorporate dowel-shaped roller bearings. This 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.



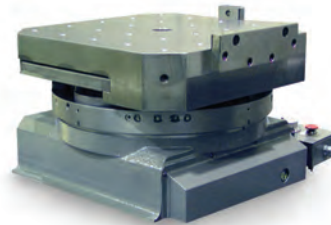
Dual Ballscrews

To achieve instantaneous acceleration, two Z-axis ballscrews are positioned on either side of the table. The CNC's tandem control function ensures they maintain perfect synchronization. High acceleration and deceleration rates further contribute to an overall reduction in cycle times..

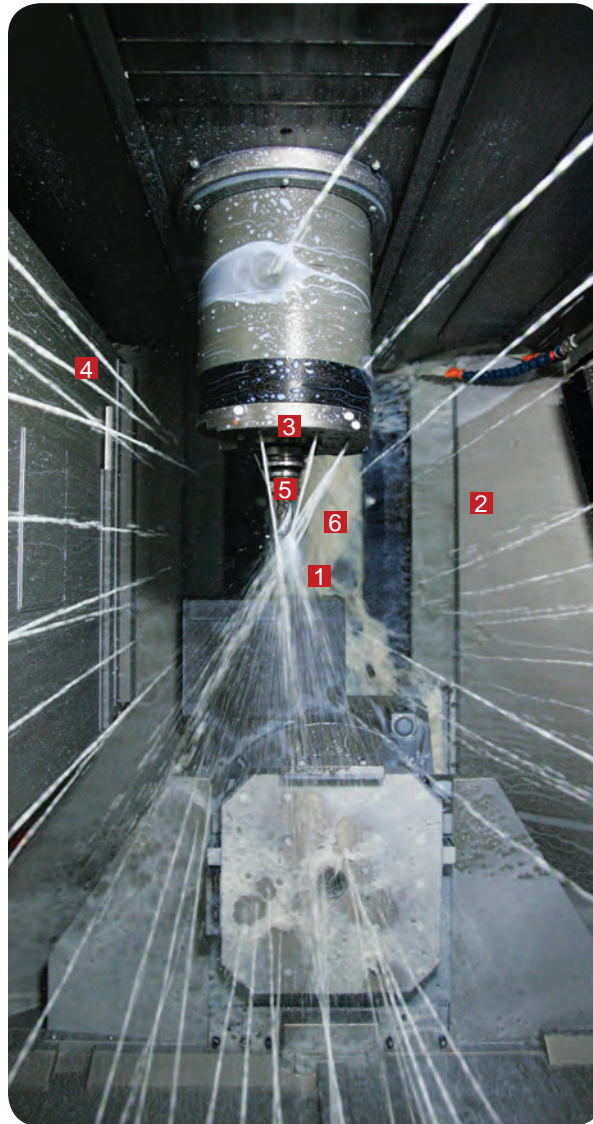
Table and Pallet Changers

FH450S is equipped standard with a NC-controlled B-axis that is fully programmable to 360,000 positions. The table rotates 90° in 2.2 seconds or 180° in 2.6 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.



| Pallet | FH450S |
|--------------------------|--|
| Pallet size | 450 mm x 450 mm (17.7 in x 17.7 in) |
| Pallet height from floor | 1,100 mm (43.30 in) |
| Pallet change time | 5 sec |
| Pallet load | 400 kg (880 lbs) |



1 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.

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

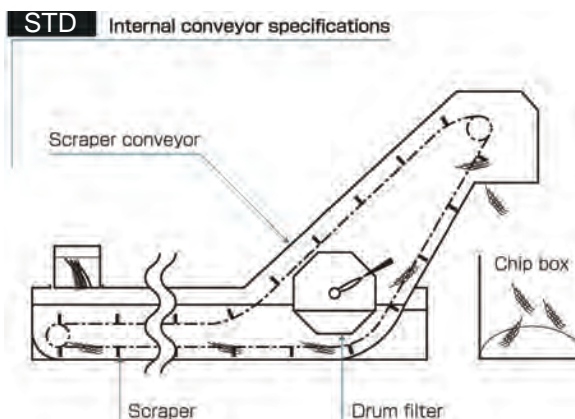
The coolant nozzle installed in the ceiling discharges coolant, keeping chip accumulation inside the machine down to a minimum.

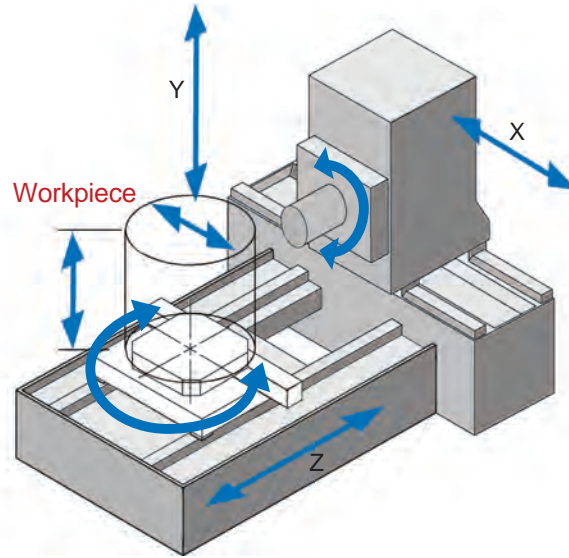
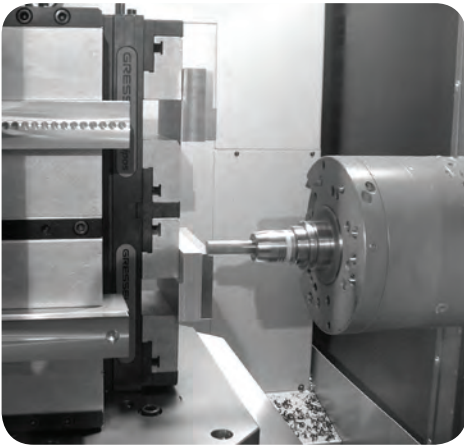
5 Spindle-through Coolant 1MPa

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.

6 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 FH450S is 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 $\varnothing 24.8''$ (630mm) and height of 39'' (990 mm).

| Stroke | FH450S |
|-------------|--------------------|
| X-axis | 600 mm (23.62 in) |
| Y-axis | 600 mm (23.62 in) |
| Z-axis | 600 mm (23.62 in) |
| Floor Space | |
| Width | 2,500 mm (98.4 in) |
| Length | 5,800 mm (211 in) |

Tool Storage (ATC)

The standard tool magazine has 60 pockets, with available options accommodating up to 494 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 | FH450S |
|------------------------|---------|
| Tool to tool | 1.3 sec |
| Chip to chip | 2.7 sec |



Automation Systems

The highly reliable FH450S 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-S 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)

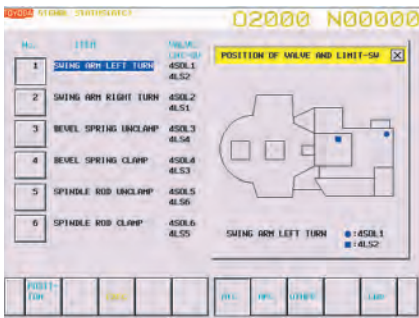
Maintenance Control Support

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

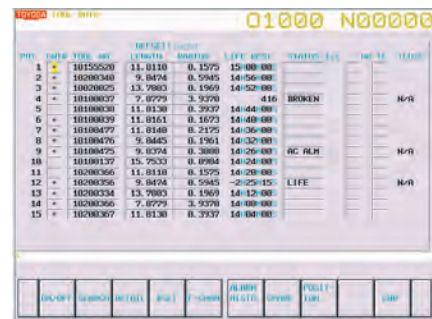
Tool life control function: A counting method giving readings at 0.1 sec accuracy. Provides a double-layered fault warning system that generates warning of actual error. Tool breakages and AC faults are displayed in addition to tool life.

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

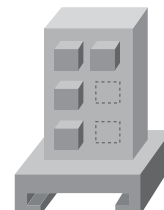
Tool ID function: The ID chip containing tool data (correction data, tool life, AC data, machining condition, etc.) eliminates manual tool data entry and human error.



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 | FH450S |
|------------------------------|---------|---------------------|
| Axis travel X (column) | mm (in) | 600 (23.62) |
| Axis travel Y (spindle head) | mm (in) | 600 (23.62) |
| Axis travel Z (table) | mm (in) | 600 (23.62) |
| Spindle nose to table center | mm (in) | 125~725 (4.9~29.52) |
| Spindle center to pallet top | mm (in) | 50~650 (1.96~25.59) |
| Workpiece swing (diameter) | mm (in) | 630 (Ø24.80) |
| Workpiece height | mm (in) | 990 (39) |

| Spindle | | |
|---|---------|------------|
| Spindle speed, standard (infinitely variable) | RPM | 15,000 |
| Taper | - | CAT40 |
| Bearing diameter | mm (in) | 80 (Ø3.14) |
| Spindle motor, for 15 min | kW (hp) | 22 (30) |
| Spindle motor, cont. | kW (hp) | 18.5 (25) |

| Table and Pallet | | |
|--------------------------------|-----------------|-------------------------|
| Pallet Size | mm (in) | 450 x 450 (17.7 x 17.7) |
| Minimum indexing angle | NC (degree opt) | 0.001 NC |
| Indexing time, 90-degree index | sec | 2.2 |
| Pallet height from the floor | mm (in) | 1,100 (43.30) |
| Pallet changing time | sec | 5 |
| Max load on pallet | kg (lb.) | 400 (880) |

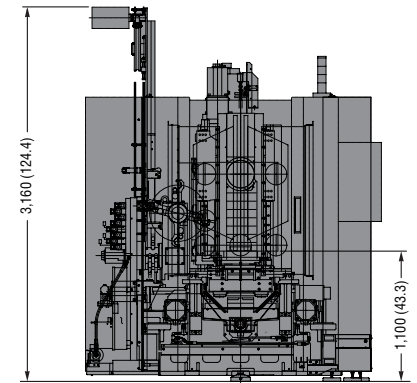
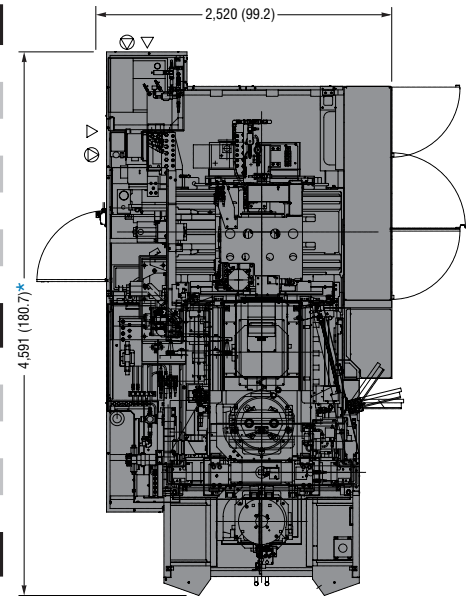
| Feeds | | |
|---------------------------|-------------|--|
| Rapid feed rate (X, Y, Z) | m/min (ipm) | 50 (1,969) |
| Acceleration (X, Y, Z) | G | 0.7 |
| Way design | - | Roller bearing |
| Ballscrew diameter | mm (in) | X and Y: Ø45 (Ø1.77) Z: Ø36 (Ø1.42) |

| Accuracy | | |
|--------------------------------|---------|----------------------|
| Positioning accuracy (X, Y, Z) | mm (in) | ± 0.003 (± 0.00012) |
| Repeatability (X, Y, Z) | mm (in) | ± 0.0015 (± 0.00006) |
| Table indexing accuracy | arc sec | ± 3 |
| Table indexing repeatability | arc sec | ± 3 |

| Automatic Tool Change | | |
|---|---------|----------------------------|
| Magazine capacity | - | 60 std; Opt 120, 280, 494 |
| Max tool weight | kg (lb) | 8 (17.6) |
| Max tool size (diameter with adjacent x length) | mm (in) | Ø180 x 350 (Ø7.08 x 13.78) |
| Tool change, tool-to-tool | sec | 1.3 |
| Tool change, chip-to-chip | sec | 2.7 |

| Dimensions | | |
|------------------------------|---------|--------------------------|
| Machine height | mm (in) | 3,160 (124.4) |
| Floor space (width x length) | mm (in) | 2,500 x 5,800 (99 x 211) |
| Weight | kg (lb) | 11,000 (24,200) |

| Controls | |
|-----------|--|
| Fanuc 31i | |



*Machine layout shown without required chip conveyor which will extend the length of the unit overall.

Actual dimensions may vary depending on optional equipment or design revisions. Contact your Toyoda representative for certified layout drawings.



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 Americas Corporation

JTEKT Toyoda Americas Corp. is headquartered just northwest of Chicago in Arlington Heights, Illinois. Our offices in Monterrey, Mexico and Brazil proudly serves Toyoda's Central and South American customers, while our California, Michigan, Minnesota, Ohio and Massachusetts 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.



The information provided herein should not be construed as a contract. Product designs are subject to change without prior notice. Available machines or machines shown may vary depending on optional equipment or design variations.

Some product features may be photographed with guarding removed for purposes of illustration only. Machinery should never be operated without all proper safety devices in place and functioning.

TOYODA

www.toyoda.com

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

Toyoda Northeast Tech Center
577 Hartford Turnpike, Suite B
Shrewsbury, MA 01545

Toyoda Upper Midwest Tech Center
711 5th Street SW, Suite 2
New Brighton, MN 55112

Toyoda West Coast Tech Center
700 Richfield Road
Placentia, CA 92870

Jones Machinery & Toyoda Tech Center
10701 Royalton Road, Suite B
North Royalton, OH 44133

Remanufactured Products Division
51300 W. Pontiac Trail
Wixom, MI, 48393

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

Toyoda Koki do Brasil
Alameda Ulderico Ferrari,
100 - Bairro Itaim Guacu
CEP 13312-655 = Itu/Sao Paulo - Brasil
Tel: +55 11 6724-5711

2016AFH450S
© 2016 JTEKT Toyoda Americas. All Rights Reserved.



Your local distributor is:

Horizontal Machining Center

AFH450S