# NFX 400A

High Performance 5-axis Vertical Machining Center

YCM

NFX 400A

The high performance YCM **NFX 400A** 5-axis vertical machining center is designed especially for small, complex high-quality parts mainly for aerospace, automotive, medical, job shop and die & mold applications. From roughing to finishing, the **NFX 400A** enables manufacturers to reduce setup time and overall lead-time while increasing machining quality and improving precision of complex machining processes.
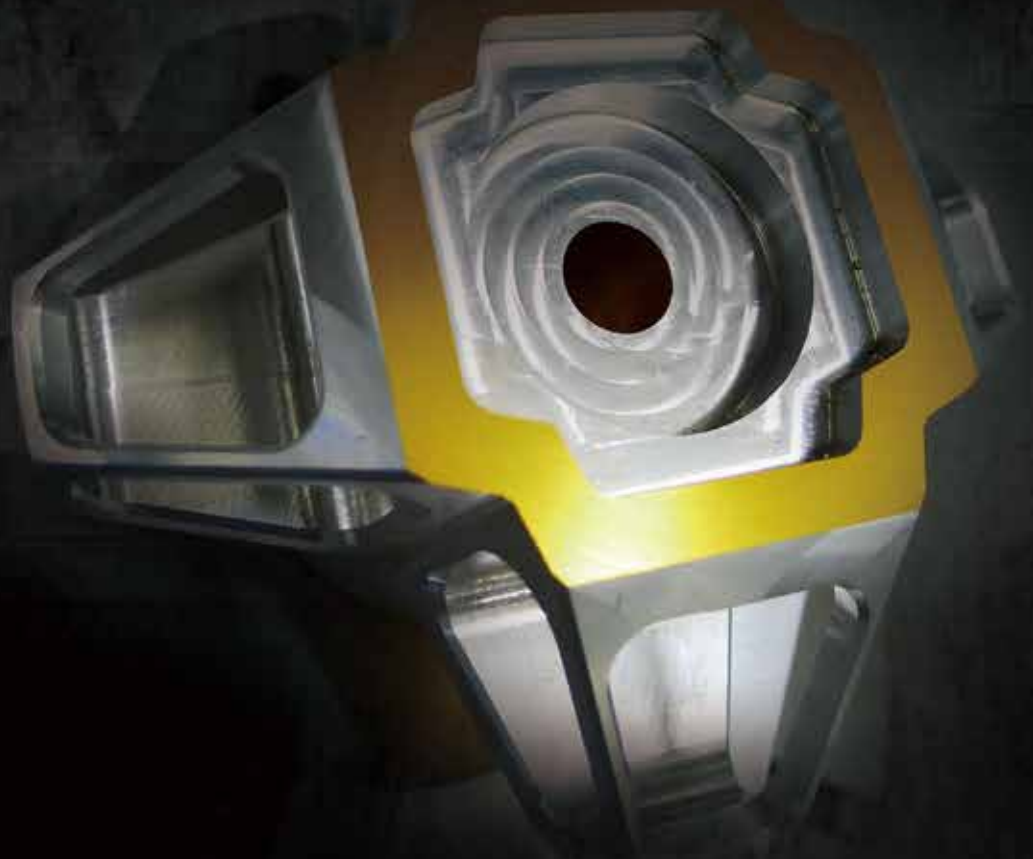
| 1.Engine Head | 2. Pump | 3. Shift Shaft | 4. Gear | 5. Pipe | 6. Valve |

High Rigidity Body Structure Design

- Extra wide column and base design to ensure best support and cutting rigidity.
- High quality and rugged MEEHANITE® casting maintains optimum accuracy.

High Accuracy Axial Movement

- Linear guideways adopted for fast and smooth axial movement.
- Pre-tensioned ball screws with direct drive motors achieve high torque and low backlash.

Working Envelope

ø400 (ø15.8")

ø210 (ø8.27")

150 (5.91")

310 (12.2")
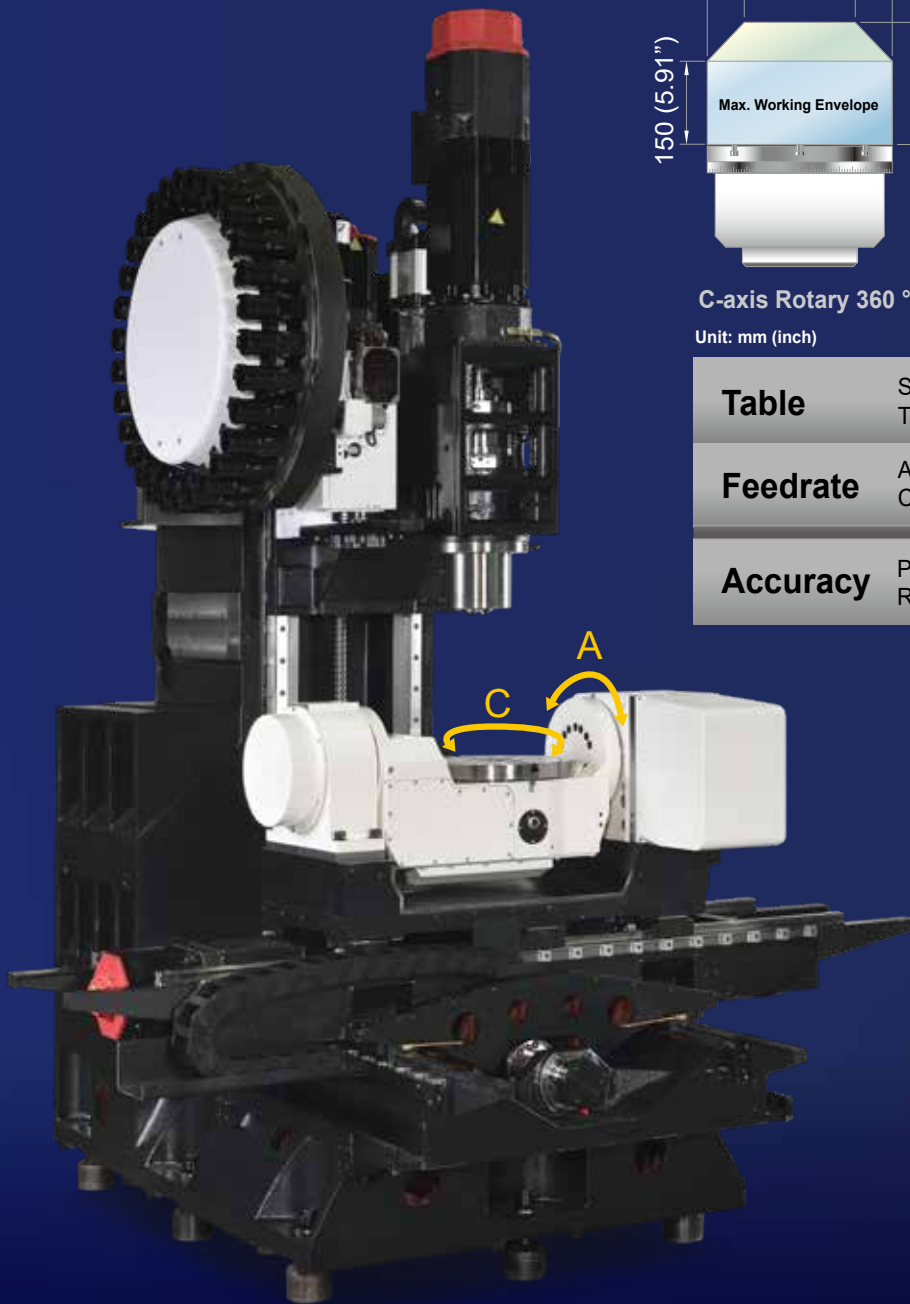
Max. Working Envelope
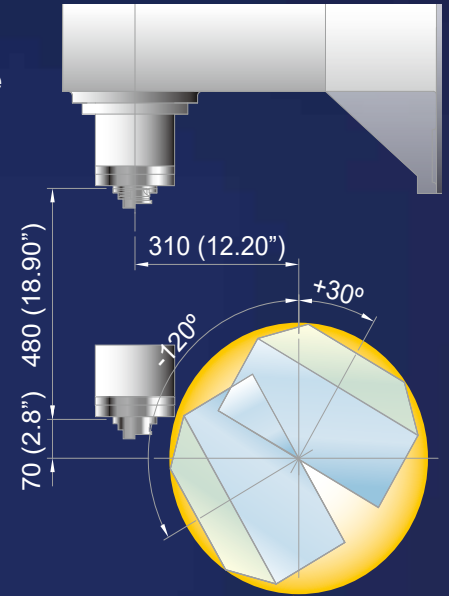
C-axis Rotary 360 °

Unit: mm (inch)

310 (12.20")

480 (18.90")

70 (2.8")

+30°

-120°

Table	Size: **350 mm** Thru Hole: **ø50 mm**
Feedrate	A-axis: **25 rev/min.** C-axis: **25 rev/min.**
Accuracy	Positioning (A/C): **50 / 20 sec.** Repeatability (A/C): **8 / 6 sec.**

FEM

Finite Element Analysis

MEEHANITE
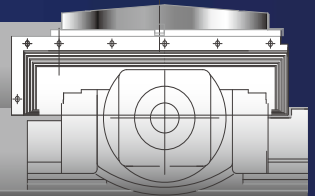
A/C-axis Rotary Table

■ 150˚(+30˚/ -120˚) A-axis tilting angle increases the ability of machining.
■ Rotary table surface is at the same level as the 5th axis centerline to ensure machining accuracy.
■ ø350 mm (ø13.8") table size with ø50 mm (ø1.97") table-through hole design.
■ Max. Workpiece Dimensions ø400x310mm (ø15.8"x12.2") .
■ 6 Piping preparation for fixture (Air pressure x 2 + Hydraulic x 4).
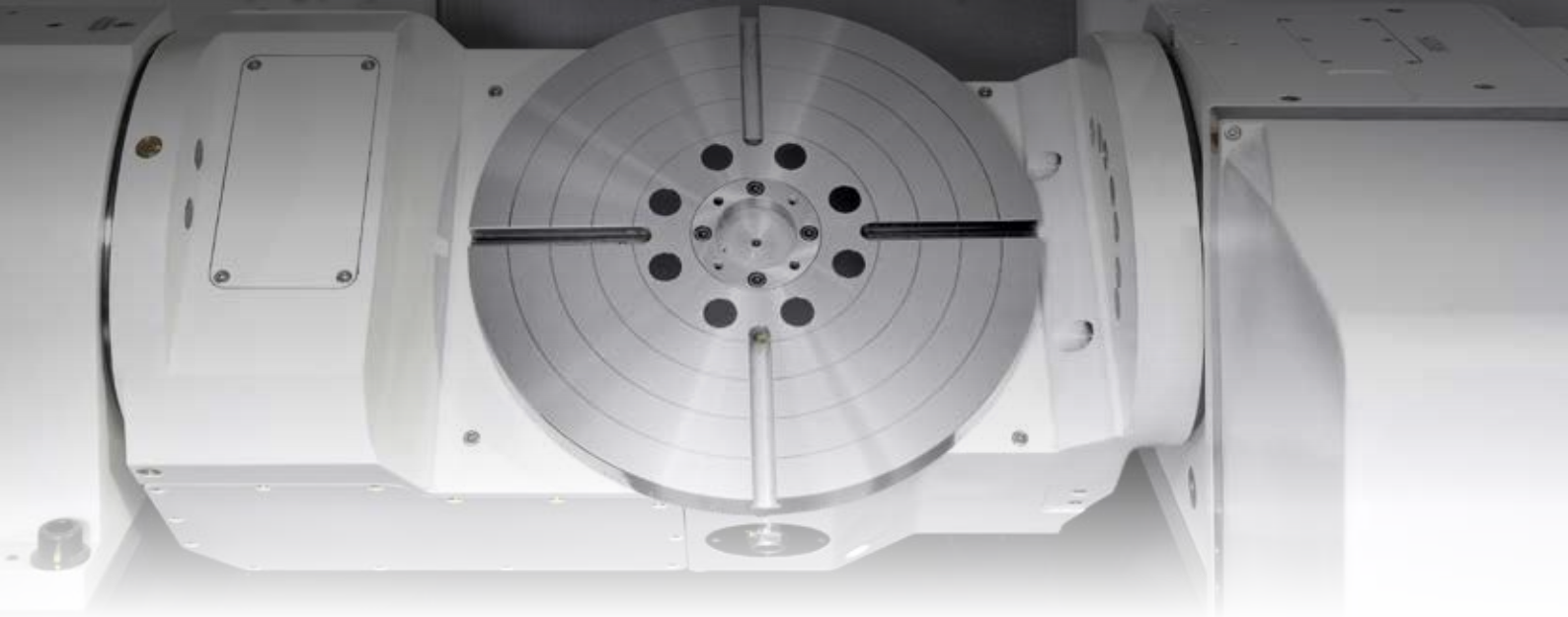
Tool Magazine

■ 24T (30T opt.) Disk Type.
■ 40 / 60 / 90 / 120T (opt.) Chain Type.
■ ATC door design is standard that prevents coolant and chips from entering tool magazine.

Close

Open

ATC Door
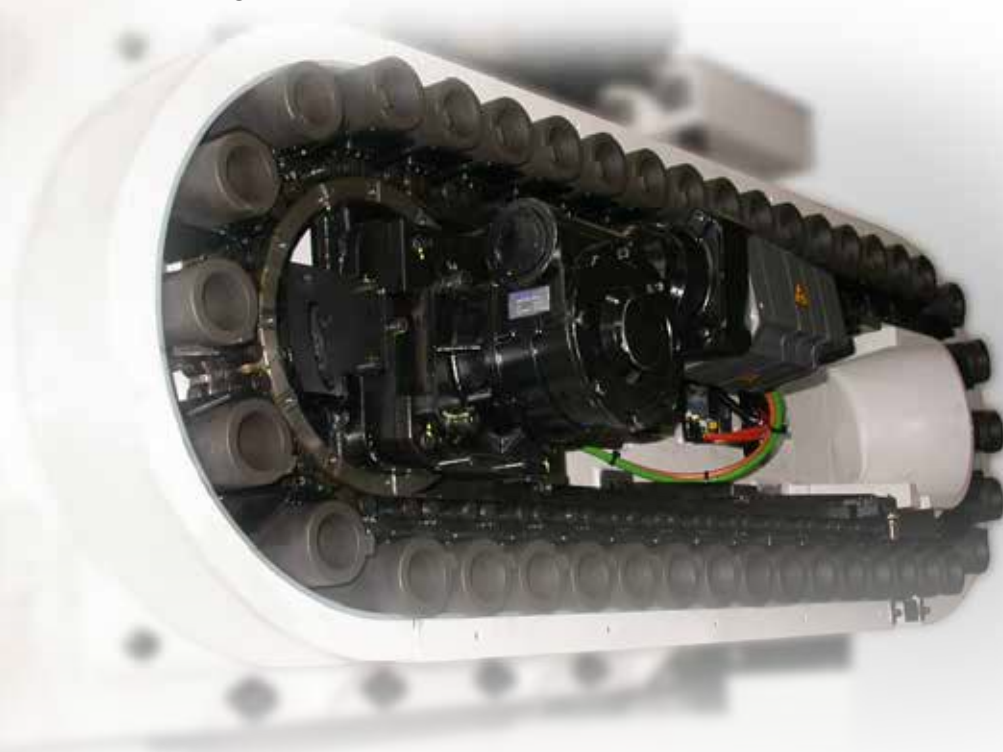
YCM In-house IDD PLUS Spindle

- YCM self-manufactured IDD PLUS spindle.
- Max. Spindle Power 22 kW, 15,000 rpm spindle (opt.) for hi-power, hi-speed machining.
- Cooling system design on spindle motor seat, quill, and bearing offers most reliable machining capability.
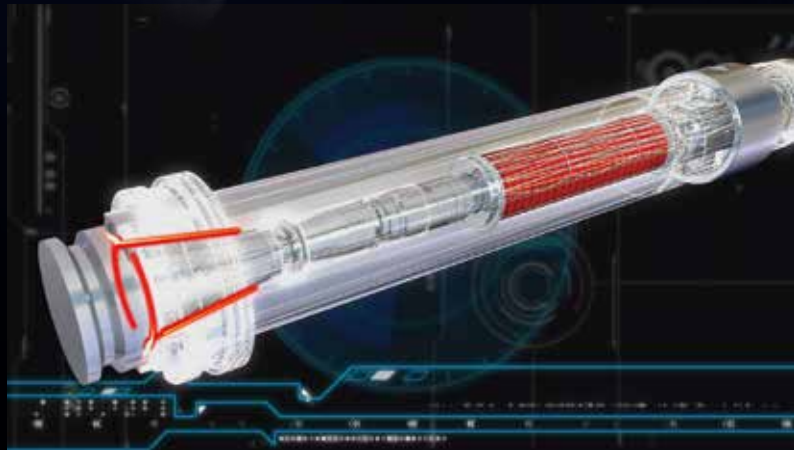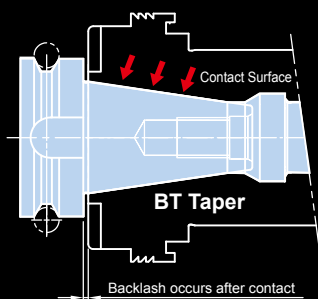

- Micro Oil-air Lubrication System (opt.)
- Reliable Helical Disc Spring
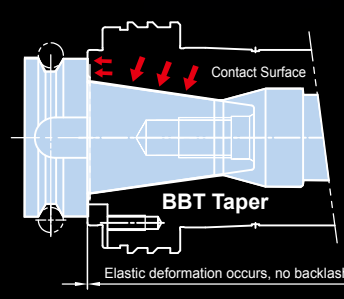- Simultaneous Taper & Flange Contact Design

BBT40 Spindle Design

- Spindle and taper dual surface contact.
- Exceptional cutting rigidity with high accuracy.
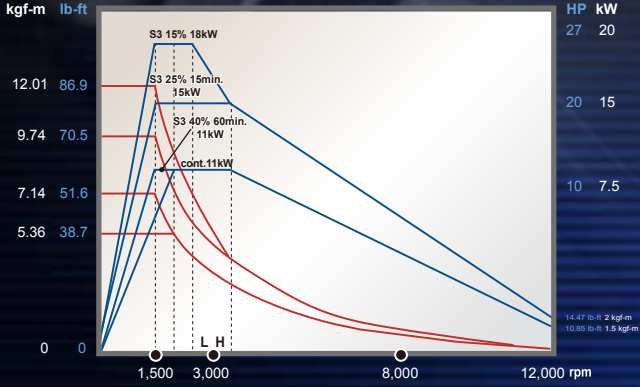- Longer tool life.

Contact Surface

BT Taper

Backlash occurs after contact

Single Surface Contact Spindle

Contact Surface

BBT Taper

Elastic deformation occurs, no backlash

Dual Surface Contact Spindle

Power Chart

SPINDLE SPEED (rpm) POWER TORQUE

FANUC

12,000 rpm (std.)

kgf-m	lb-ft		HP	kW
		S3 15% 18kW	27	20
12.01	86.9	S3 25% 15min. 15kW	20	15
9.74	70.5	S3 40% 60min. 11kW		
7.14	51.6	cont.11kW	10	7.5
5.36	38.7			
			14.47 lb-ft 2 kgf-m	
			10.85 lb-ft 1.5 kgf-m	
0	0	L H		

1,500 3,000 8,000 12,000 rpm

12,000 rpm (opt.)

kgf-m	lb-ft		HP	kW
		2min.22kW	30	22
12.99	93.9	2min. 20kW	25	18.5
11.69	84.6	5min. 18kW 5min.18.5kW		
9.74	70.5	10min.15kW	20	15
7.14	51.6	30min.11kW	15	11
4.87	35.2	cont.7.5kW	10	7.5
			14.47 lb-ft 2 kgf-m	
0	0	L H		

1,500 3,000 8,000 12,000 rpm

15,000 rpm (opt.)

kgf-m	lb-ft		HP	kW
		2min.22kW	30	22
12.99	93.9	2min. 20kW	25	18.5
11.69	84.56	5min. 18kW 5min.18.5kW		
9.74	70.45	10min.15kW	20	15
7.14	51.64	30min.11kW	15	11
4.87	35.23	cont.7.5kW	10	7.5
			14.47 lb-ft 2kgf-m	
			5.14 lb-ft 0.71kgf-m	
0	0	L H	3.54 lb-ft 0.49kgf-m	

1,500 4,000 15,000 rpm

HEIDENHAIN

12,000 rpm (std.)

kgf-m	lb-ft		HP	kW
11.04	88	S6 25% 17kW		
9.09	67	S6 40% 14kW		
8.12	53	S6 60% 12.5kW	16	12
6.49	42	cont. 10kW	15	11
			13	10
4	29		11	8
2	14.5			
			7.02 lb-ft 0.97 kgf-m	
			6.44 lb-ft 0.89 kgf-m	
			5.86 lb-ft 0.81 kgf-m	
0	0		4.7 lb-ft 0.65 kgf-m	

1,500 12,000 rpm

15,000 rpm (opt.)

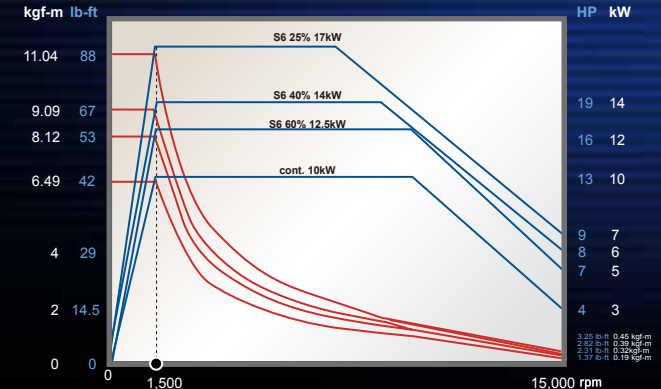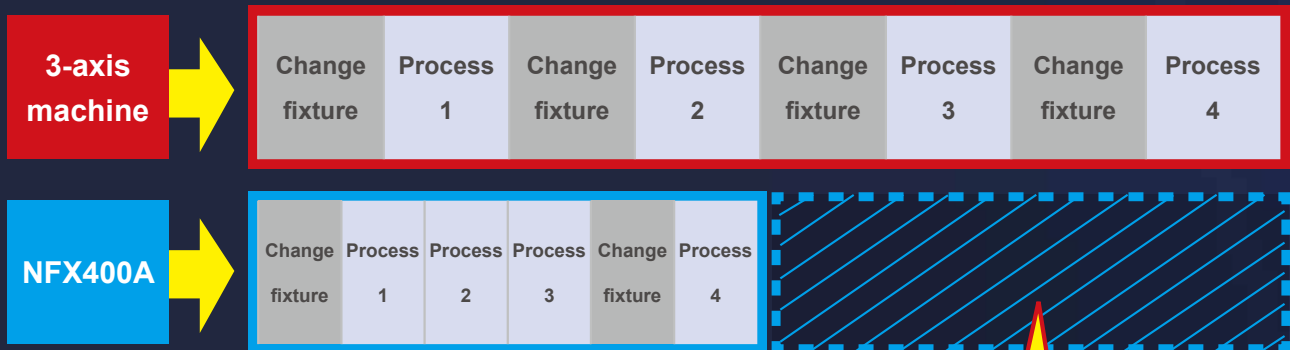| kgf-m	lb-ft		HP	kW
11.04	88	S6 25% 17kW		
9.09	67	S6 40% 14kW	19	14
8.12	53	S6 60% 12.5kW	16	12
6.49	42	cont. 10kW	13	10
4	29		9	7
			8	6
2	14.5		7	5
			3.25 lb-ft 0.45 kgf-m	
			2.82 lb-ft 0.39 kgf-m	
			2.31 lb-ft 0.32 kgf-m	
0	0		1.37 lb-ft 0.19 kgf-m 4	3

1,500 15,000 rpm

Advantages of 5-axis Machining

- Enhance precision, quality and efficiency of 3D surface machining.
- Reduce tool length and increase rigidity to obtain superior machining quality.
- Cutting with the belly and edge of the tool to increase tool life.
- Reduce fixture error and lessen workpiece loading/uploading time.
- Saves manufacturing cost for fixture and electrode costs.
- Reduces machining process, machining cost while improving productivity.

Differences between 3-axis and 5-axis machining

3-axis machine → | Change fixture | Process 1 | Change fixture | Process 2 | Change fixture | Process 3 | Change fixture | Process 4 |

NFX400A → | Change fixture | Process 1 | Process 2 | Process 3 | Change fixture | Process 4 |

- Shorten Process
- Reduce Fixture Cost
- Improve Accuracy

Automation Advantages

■ Increase productivity through unmanned machining.

■ Enhance quality and reliability of products.

■ Reduce non-cutting or change waiting time.

NFX 400 A

MXP-200FB+

by **FANUC**

Communication Interface

RJ45 Ethernet
RS-232C
USB
CompactFlash Card

Excellent Vision Quality

10.4" LCD display

User-Friendly Design

Detachable keyboard
(QWERTY)

Fine Surface Technology

1. AICC II+, high precision and high accuracy AI contour control
2. Smooth tolerance control+
3. Machining quality level adjustment function

Fast Cycle Time Technology

1. Maximum 400 blocks of look-ahead for pre-calculating the machining program
2. Block processing time 1ms for achieving high-speed machining requirement
3. Smart rigid tapping function combined with spindle capability for high-speed machining (*Note)

Program Dynamic Simulation

Manual Guide i features dynamic simulation of machining programs with full-screen display

Upgraded Memory and File Organization

1. 2 MB program storage size
2. Built-in memory card for easy program editing
3. Directory filing structure with organized file management
4. 400 pairs of tool offset, 1,000 registrable programs, 48 pairs of workpiece coordinate system, 256 pairs of tool life management

*Note: Applicable to vertical machining centers with IDD spindle and built-in motorized spindle.

YCM

i-OPERATION Plus II

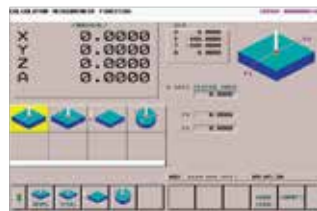Exclusive Software from **YCM**

Pre-Machining

Intelligent Tool Data Management

Comprehensive tool data management function allows operators to monitor and manage all positions in tool magazine

Workpiece Coordinate Calculation

Conversational window provides convenient and fast setup of workpiece coordinates

RENISHAW GUI System
(Conversational Graphic Operating Interface)

Tool Measurement & Measurement Calibration

Workpiece Measurement
(applicable to certain models)

Program Editing

CIRCULAR HOLE PATTERN
(G120 P1) Function

RECTANGULAR HOLE PATTERN
(G120 P4) Function
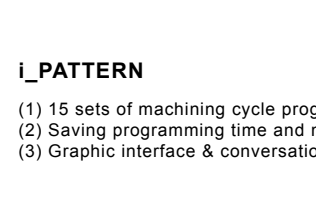
GRID HOLE PATTERN
(G120 P5) Function

i_PATTERN

(1) 15 sets of machining cycle program
(2) Saving programming time and memory time
(3) Graphic interface & conversational command input

Machining

High Performance Machining Mode M300

With 5 sets of parameter settings, it's easy to find suitable and optimized machining.
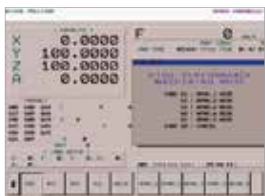
High Speed Machining Mode M400

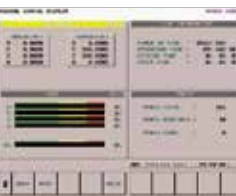Reducing machining time for drilling and tapping process

Tool Load Management

Instant tool load monitoring with alarm function

Multi-Display Function

Displaying 4 statuses simultaneously with configurable status display

Tool Life Management

Indicating tool status of each group with tool life alarm

Smart Control Panel

iPANEL

Easy to set up and operate important functions
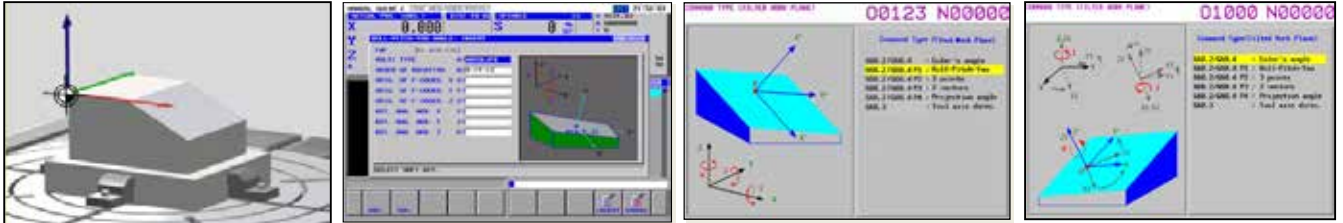

Intelligent Counter

Instantly providing users with periodic maintenance notifications and work-pieces counter management

FANUC MXP-200 FA / FC Control Standard Function (5-axis Control)
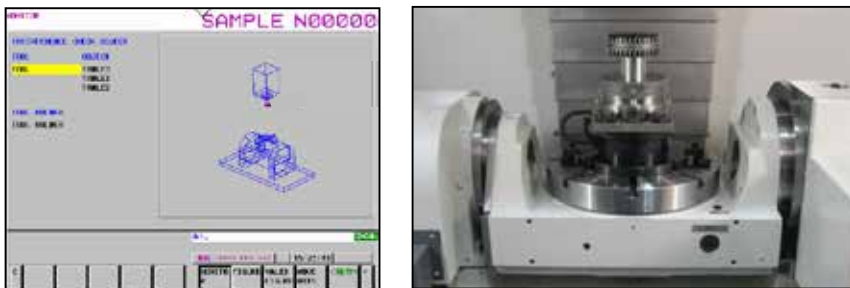
Tilted Working Plane Command

- Program order automatic exchange X-Y-Z coordinates.
- Easy program edition, easy machining for Tilted Working Plane.

# FANUC MXP-200 FC Control Standard Function

3D Interference Simulation

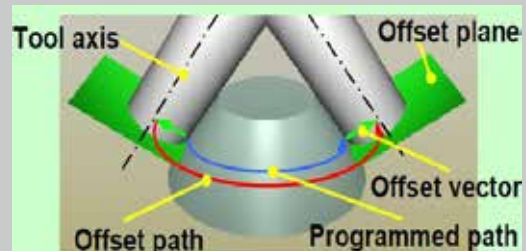- 3D Interference Simulation function can help to reduce the danger of collision in 5th axis application.

FANUC 31i-MB5 Control Exclusive Function

STCP (Smooth Tool Center Point)

- Simultaneous 5-axis Machining with tool end / tool side.
- Smooth motion with tool end by compensating tool direction (Angle of rotary axis)
- Smooth machining with tool side by smoothing tool posture

Tool side

Tool center point

With high-speed Smooth TCP
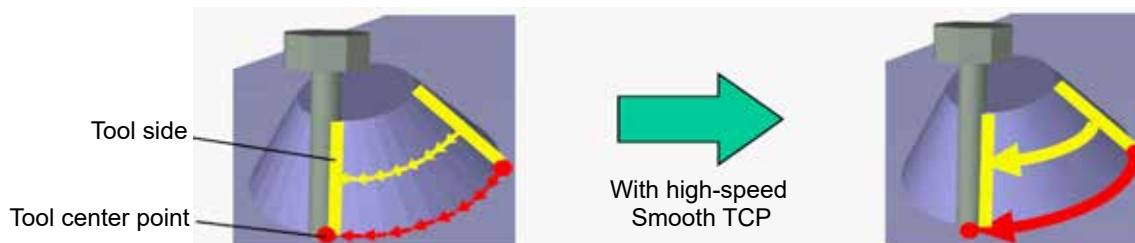
3-Dimensional Cutter Compensation

Tool axis

Offset plane

Offset vector

Offset path

Programmed path
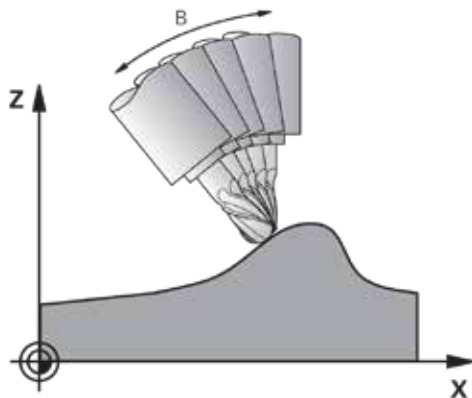
HEIDENHAIN TNC 640 Exclusive Function

HEIDENHAIN TNC 640

- Simultaneous 5-axis control
- TFT color flat-panel display 15-inch
- Storage medium: SSDR solid state disk with 21 GB
- Programming in HEIDENHAIN conversational format, with SmarT.NC or according to DIN/ISO
- Tool Center Point Management (TCPM)
- Dynamic Collision Monitoring (DCM)
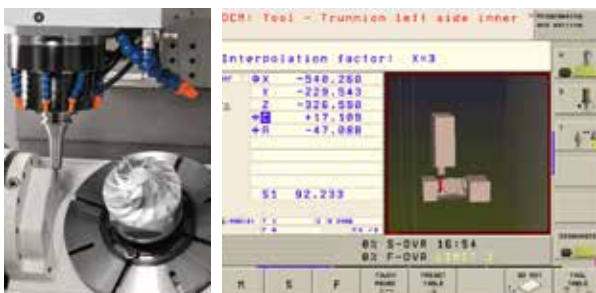- 0.5 ms Short block processing time

TCPM (Tool Center Point Management)

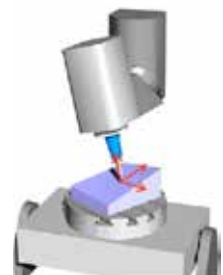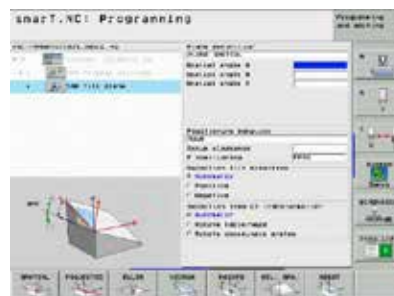The offset of the tilting axes is compensated so that the tool tip remains on the contour.

Tilted Working Plane Command

The PLANE function is a powerful function for defining tilted working planes in various manners.

Dynamic Collision Monitoring (DCM)

Dynamic collision monitoring to protect operators and machine.

Kinematic Compensation

1) Position of the rotary axis in the kinematics model of the control.
2) Actual position of the rotary axis.
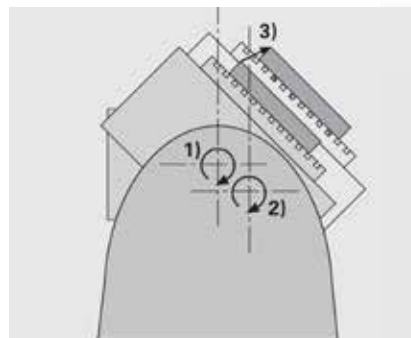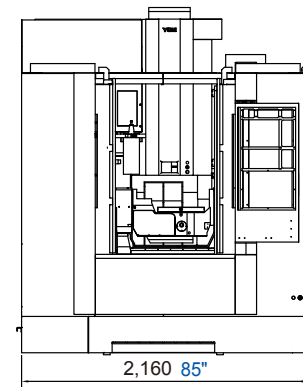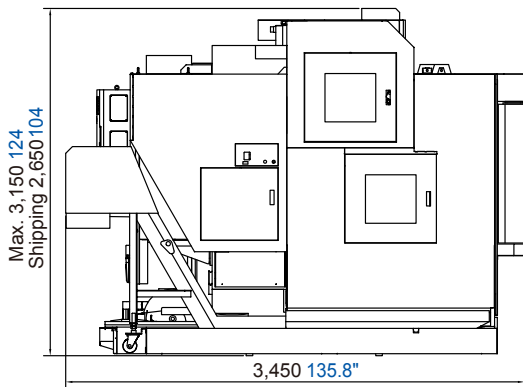3) Resulting position error during tilting.

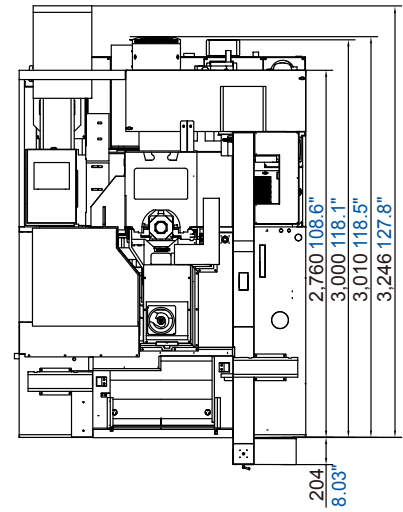# Table & Dimensions

24 / 30T

ø350 ø13.8"

2,760 108.6"
3,000 118.1"
3,010 118.5"
3,246 127.8"

204 8.03"

Max. 3,150 124
Shipping 2,650 104

3,450 135.8"

2,160 85"

Fixture Hole Position

T-SLOTS

12H8
0.47"

20 0.79"
9 0.35"

22
0.87"

+0.025
ø50+0
1.97"

8 0.31"

0.1
18-0.15
0.71"

A/D：Air pressure
B/C/E/F：Hydraulic

6-ø5 0.2" x M6 x 1P
ø10 0.39" x 1.4±0.05L
PCDø32 1.26"

A   B
F   C
E   D

45°
45°
45°

Specifications

	NFX400A
SPINDLE	
Spindle Speed/Power (std.) FANUC controller	12,000 rpm 11/11/15/18.5 kW 15/15/20/25 HP (cont./60min./15min.)
Spindle Speed/Power (opt.1) FANUC controller	12,000 rpm 7.5/11/15/18.5/22 kW 10/15/20/25/30 HP (cont./30min./10min./5min./1min.)
Spindle Speed/Power (opt.2) FANUC controller	15,000 rpm 7.5/11/15/18.5/22 kW 10/15/20/25/30 HP (cont./30min./10min./5min./2min.)
Spindle Speed/Power (std.) HEIDENHAIN controller	12,000 rpm 10/12.5/14/17 kW 13/17/19/23 HP (cont./S6-60%/S6-40%/S6-25%)
Spindle Speed/Power (opt.3) HEIDENHAIN controller	15,000 rpm 10/12.5/14/17 kW 13/17/19/23 HP (cont./S6-60%/S6-40%/S6-25%)
Spindle Taper	BBT40
TRAVEL	
X-axis Travel	650 mm 25.6"
Y-axis Travel	520 mm 20.47"
Z-axis Travel	480 mm 18.9"
TABLE	
Table Size/T-Slots	ø350 mm / 12 mm ø13.8" / 0.47" Radial
Max. Load on Table (Vertical)	200 kg 441 lb
Max. Load on Table (Horizontal)	200 kg 441 lb
Max. Workpiece Dimensions	ø400x310mm ø15.8"x12.2"
A/C AXIS	
A-axis	150˚ (+30˚/ -120˚)
C-axis	360˚
A/C Axis Feedrate	25 rev/min.
A/C Axis Positioning Accuracy	50 / 20 sec.
A/C Axis Repeatability Accuracy	8 / 6 sec.
FEEDRATE	
X/Y/Z Rapid Feedrate	36 / 36 / 36 m/min 1,417 / 1,417 / 1,417 ipm
Cutting Feedrate	1~20,000 mm/min 0.04~394 ipm

ACCURACY	ISO 10791-4	YCM*
Axial Travel	Full Length	
Positioning (X/Y/Z) A	0.025/0.025/0.022 mm 0.00098"/0.00098"/0.00086"	0.010/0.010/0.010 mm 0.00039"/0.00039"/0.00039"
Repeatability (X/Y/Z) R	0.015/0.015/0.012 mm 0.00059"/0.00059"/0.0005"	0.007/0.007/0.007 mm 0.00028"/0.00028"/0.00028"

*All values shown above are measured for the machine in good air-conditioned environment.

ATC	
Tool Magazine Capacity(opt.)	24T (30 / 40 / 60 / 90 / 120T)
Max. Tool Weight	6 kg 13.2 lb
Max. Tool Length	ø76 x 280 mm ø3" x 11.02"
GENERAL	
Pneumatic Supplier	5.5 kg/cm²
Machine Weight	6,200 kg 13,669 lb

Note: Above specifications may vary depending on the machine and the surrounding environment.
The manufacturer reserves the right to modify the design, specifications, mechanisms, etc., to improve the performance of the machine without notice.
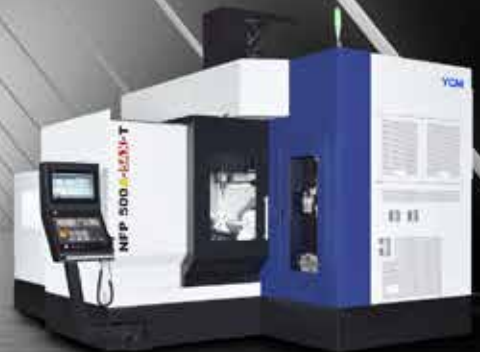The test data provided in this catalog is performed under specific test procedures and environmental conditions.

Accessories

●: Standard ○ Option

	NFX400A
Spindle Cooling System	●
ATS (Air through Spindle)	○
CTS (Coolant through Spindle) (20 / 30 / 70 bar)	○
Guideway Cover (X / Y / Z)	●
Linear Encoder (4 / 5-axis)	○
Heavy Duty Coolant Pump	●
Spindle Air Blast	●
Spindle Air Seal	●
Circular Coolant Nozzle	●
Oil-mist Coolant System	○
Oil-mist Collector	○
Cutting Air Blast	●
Automatic Lubrication	●
Dual-Chip Augers	●
Chip Conveyor	○
Shower Coolant	●
Air Gun	●
Coolant Gun	●
Oil Hole Holder Function	○
Automatic Tool Length Measurement System	○
Automatic Workpiece Measurement System	○
Oil Skimmer	●
CE	○
Work Lamp, Pilot Lamp	●
A/C. Cooler for Electrical Cabinet	○
Automatic Power Off Device	●
Safety Door	●
Automatic Door	○
ATC Door	●
Full Chip Enclosure with Top	●
Leveling Blocks & Screws	●
Foundation Bolts	○
Mechanical, Electrical and Operating Manuals	●
Tool Kit	●
CNC Control: MXP-200FA	●
CNC Control: 31iMB5	○
CNC Control: MXP-200FC	○
CNC Control: HEIDENHAIN TNC620	○
CNC Control: HEIDENHAIN TNC640	○

Above specifications may vary depending on the machine and the surrounding environment.
The manufacturer reserves the right to modify the design, specifications, mechanisms, etc., to improve the performance of the machine without notice.