# NFX 400A

High Performance 5-axis Vertical Machining Center

NFX 400A

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.
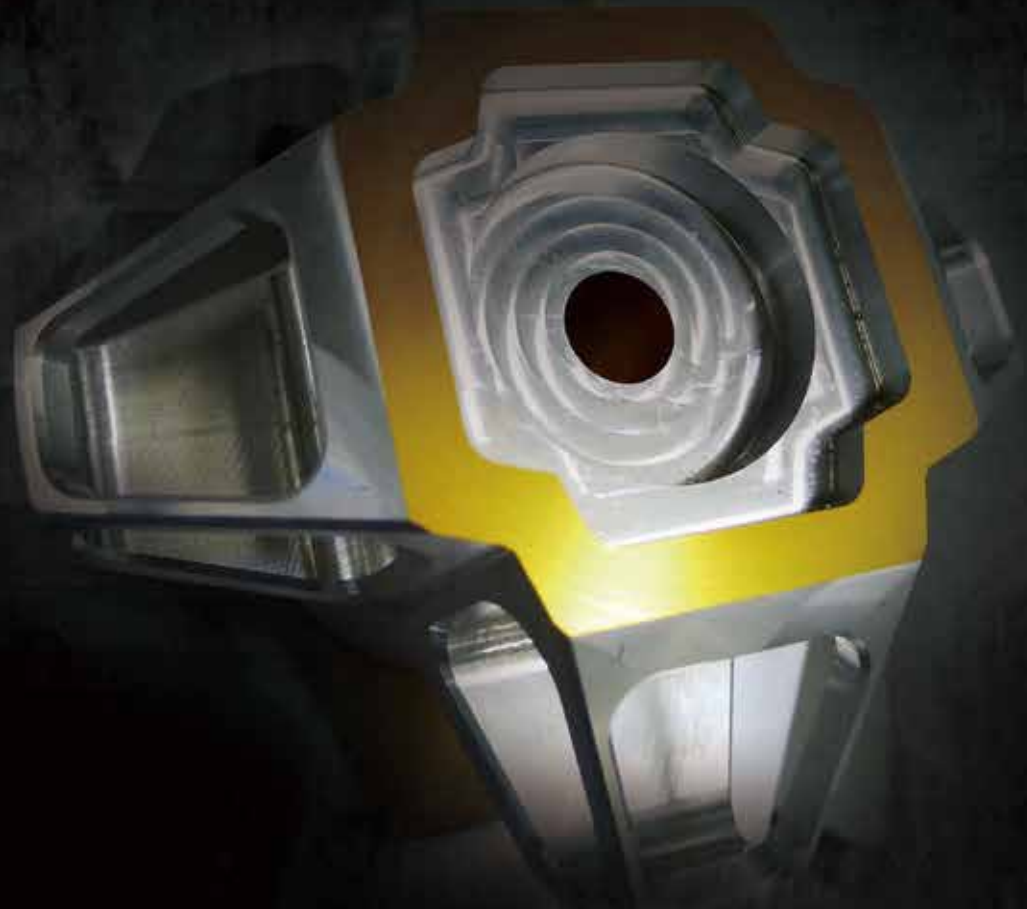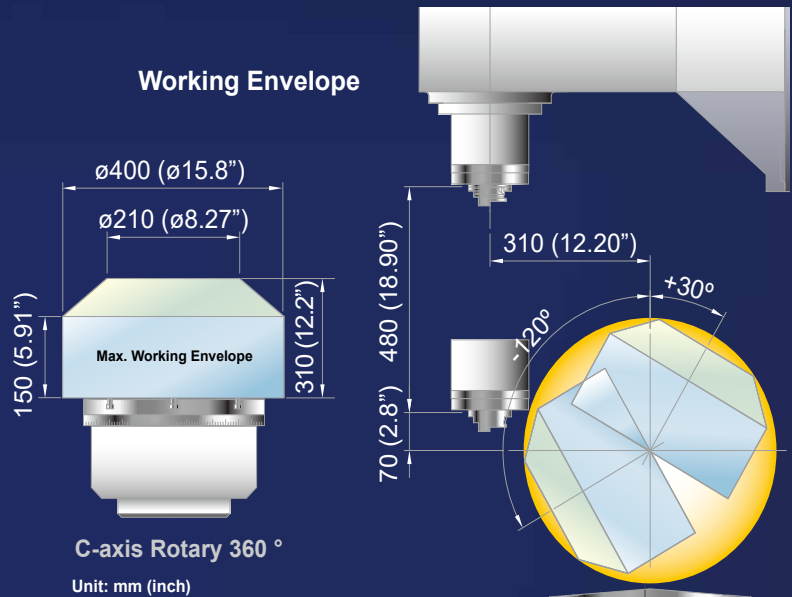
| 1.Engine Head | 2. Pump | 3. Shift Shaft | 4. Gear | 5. Pipe | 6. Valve |

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.
■ 6 Blocks of X-axis linear guide way support superior geometric stability control.

Working Envelope

ø400 (ø15.8")
ø210 (ø8.27")
150 (5.91")
310 (12.2")
480 (18.90")
70 (2.8")
310 (12.20")
+30°
-120°

Max. Working Envelope

C-axis Rotary 360 °

Unit: mm (inch)

Table	Size: **350 mm** Thru Hole: **ø50 mm**
Feedrate	A-axis: **25 rev/min.** C-axis: **25 rev/min.**
Accuracy	Positioning (A/C)(Encoder) : **20 / 20 (10 / 10) sec** Repeatability (A/C)(Encoder) : **8 / 6 (4 / 4) sec**

A
C

FEM
Finite Element Analysis

M
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 25 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.
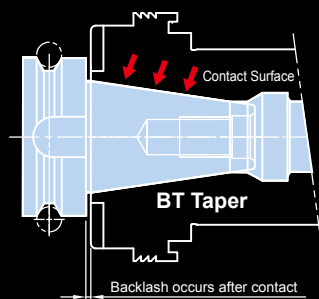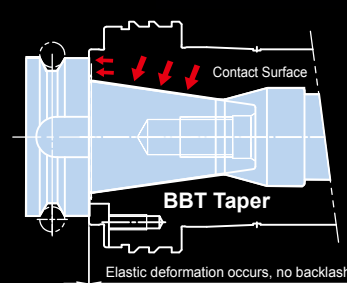

■ Micro Oil-air Lubrication System (opt.)   ■ Reliable Helical Disc Spring
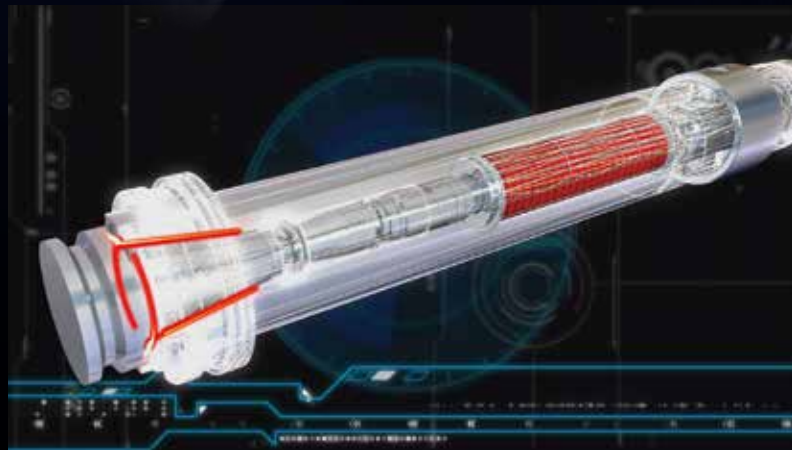
BBT40 Spindle Design

■ Flange and taper dual surface contact.
■ Exceptional cutting rigidity with high accuracy.
■ Longer tool life.

Contact Surface

BT Taper

Backlash occurs after contact

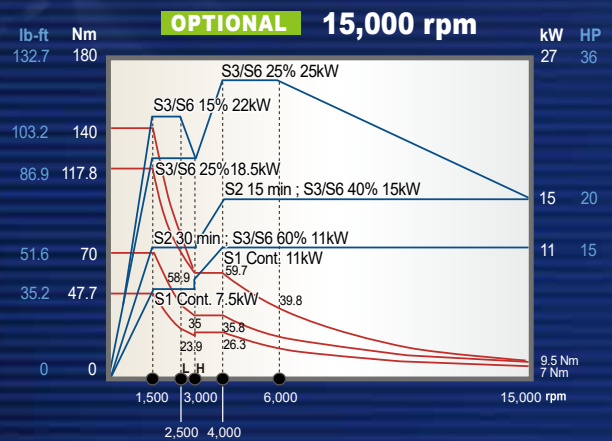**Single Surface Contact Spindle**

Contact Surface
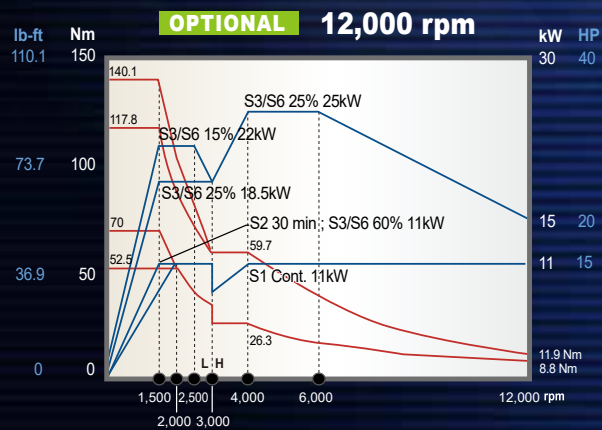
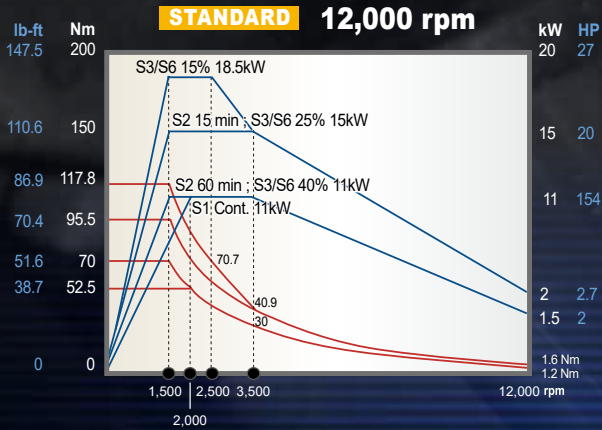**BBT Taper**
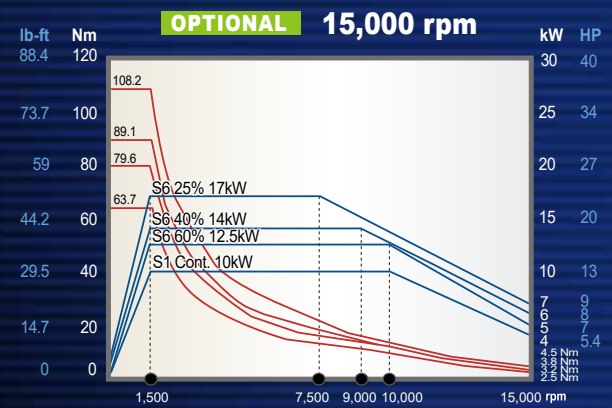
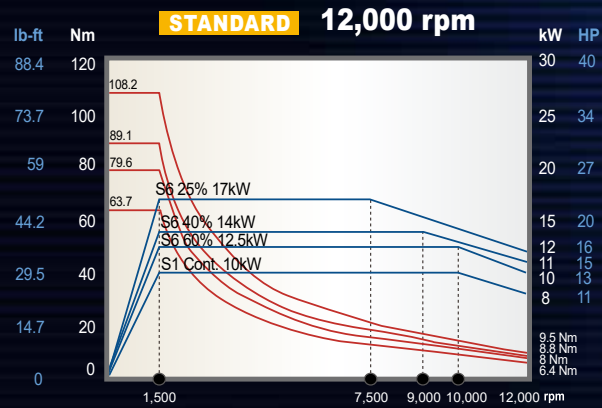Elastic deformation occurs, no backlash

Dual Surface Contact Spindle
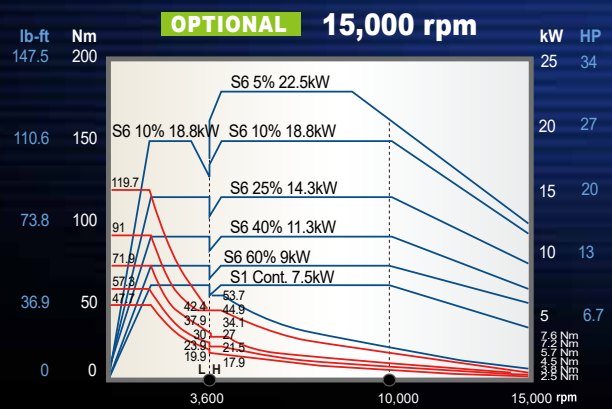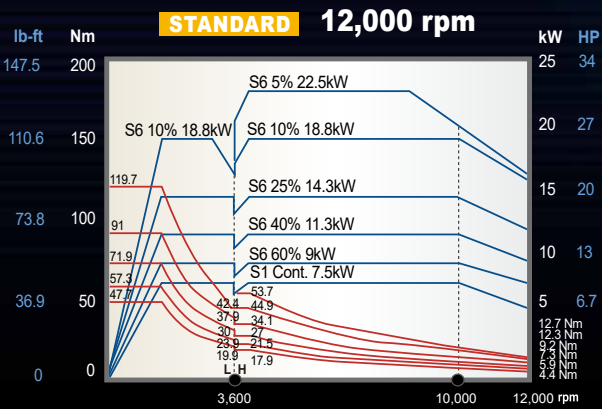
Power Chart

SPINDLE SPEED (rpm) POWER TORQUE

FANUC

STANDARD 12,000 rpm

lb-ft	Nm		kW	HP
147.5	200		20	27
110.6	150		15	20
86.9	117.8		11	154
70.4	95.5			
51.6	70			
38.7	52.5		2	2.7
			1.5	2
0	0		1.6 Nm	
			1.2 Nm	

S3/S6 15% 18.5kW
S2 15 min ; S3/S6 25% 15kW
S2 60 min ; S3/S6 40% 11kW
S1 Cont. 11kW
70.7
40.9
30

1,500 2,500 3,500 12,000 rpm
2,000

OPTIONAL 12,000 rpm

lb-ft	Nm		kW	HP
110.1	150		30	40
73.7	100			
36.9	50		15	20
			11	15
0	0		11.9 Nm	
			8.8 Nm	

140.1
117.8
S3/S6 25% 25kW
S3/S6 15% 22kW
S3/S6 25% 18.5kW
70
52.5
S2 30 min ; S3/S6 60% 11kW
59.7
S1 Cont. 11kW
26.3

1,500 2,500 4,000 6,000 12,000 rpm
2,000 3,000
L H

OPTIONAL 15,000 rpm

lb-ft	Nm		kW	HP
132.7	180		27	36
103.2	140			
86.9	117.8			
51.6	70		15	20
35.2	47.7		11	15
0	0		9.5 Nm	
			7 Nm	

S3/S6 25% 25kW
S3/S6 15% 22kW
S3/S6 25% 18.5kW
S2 15 min ; S3/S6 40% 15kW
S2 30 min ; S3/S6 60% 11kW
S1 Cont. 11kW
58.9
59.7
S1 Cont. 7.5kW
35 35.8
23.9 26.3
39.8

1,500 3,000 6,000 15,000 rpm
2,500 4,000
L H

HEIDENHAIN

STANDARD 12,000 rpm

lb-ft	Nm		kW	HP
88.4	120		30	40
73.7	100		25	34
59	80		20	27
44.2	60		15	20
			12	16
			11	15
			10	13
29.5	40		8	11
14.7	20			
			9.5 Nm	
			8.8 Nm	
0	0		8 Nm	
			6.4 Nm	

108.2
89.1
79.6
63.7
S6 25% 17kW
S6 40% 14kW
S6 60% 12.5kW
S1 Cont. 10kW

1,500 7,500 9,000 10,000 12,000 rpm

OPTIONAL 15,000 rpm

lb-ft	Nm		kW	HP
88.4	120		30	40
73.7	100		25	34
59	80		20	27
44.2	60		15	20
29.5	40		10	13
			7	9
			6	8
			5	7
			4	5.4
14.7	20			
			4.5 Nm	
			3.8 Nm	
0	0		3.2 Nm	
			2.5 Nm	

108.2
89.1
79.6
63.7
S6 25% 17kW
S6 40% 14kW
S6 60% 12.5kW
S1 Cont. 10kW

1,500 7,500 9,000 10,000 15,000 rpm

SIEMENS

STANDARD 12,000 rpm

lb-ft	Nm		kW	HP
147.5	200		25	34
110.6	150		20	27
73.8	100		15	20
			10	13
36.9	50		5	6.7
0	0		12.7 Nm	
			12.3 Nm	
			7.2 Nm	
			5.9 Nm	
			4.4 Nm	

S6 5% 22.5kW
S6 10% 18.8kW S6 10% 18.8kW
119.7
91
S6 25% 14.3kW
71.9
57.3
47.7
S6 40% 11.3kW
S6 60% 9kW
S1 Cont. 7.5kW
53.7
43.4 44.9
37.9 34.1
30 27
23.9 21.5
19.9 17.9

3,600 10,000 12,000 rpm
L H

OPTIONAL 15,000 rpm

lb-ft	Nm		kW	HP
147.5	200		25	34
110.6	150		20	27
73.8	100		15	20
			10	13
36.9	50		5	6.7
0	0			

S6 5% 22.5kW
S6 10% 18.8kW S6 10% 18.8kW
119.7
91
S6 25% 14.3kW
71.9
57.8
47.7
S6 40% 11.3kW
S6 60% 9kW
S1 Cont. 7.5kW
53.7
42.4 44.9
37.9 34.1
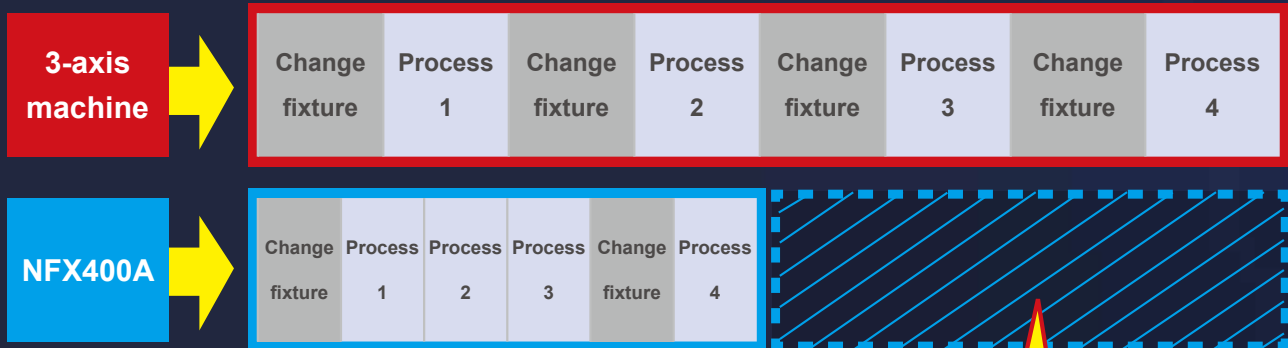30 27
23.9 21.5
19.9 17.9

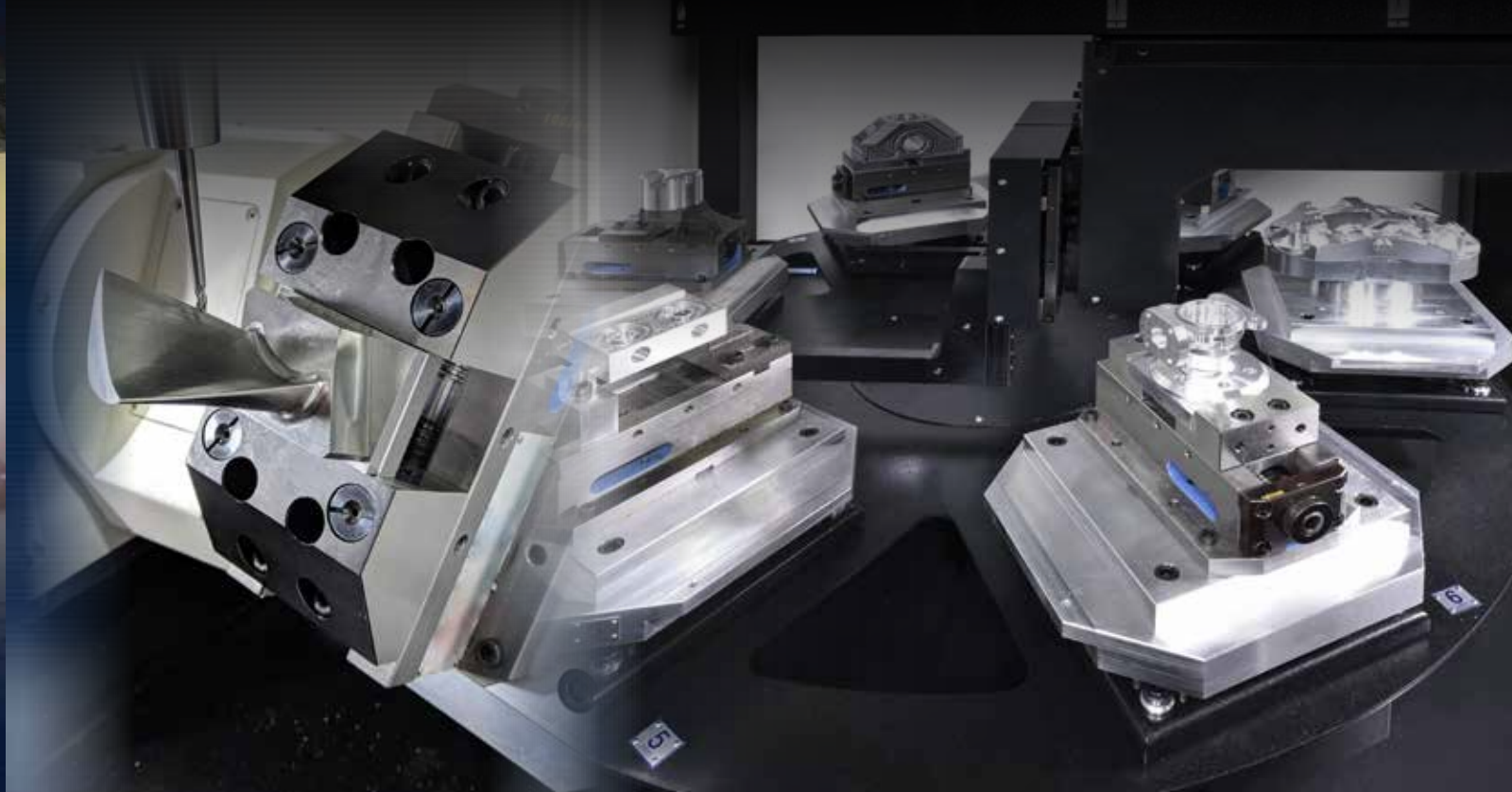3,600 10,000 15,000 rpm
L H

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.
■ 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

NFX400A MPS with integrated (6) Multi-Pallet System

- Best for small batch production or urgent order production
- The most profitable solution in sales per unit area.
- Flexible manpower deployment
- Reliable automatic 6 pallets changer
- Enable effective scheduling and pallet management
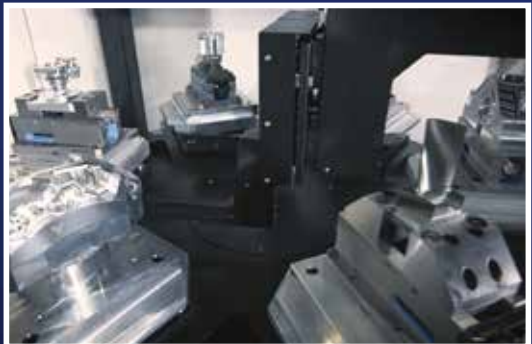
NFX 400A-MPS	
Pallet Quantity	6
Pallet size	320 x 320 mm 12.6" x 12.6"
Max. Pallet weight	155 kg 342 lb
Max. Workpiece Dimensions	ø400 x 212 mm 15.6" x 8.6"
Warehouse Dimensions	1,912(W) x 1,480(L) x 2,200(H) mm 75.3" x 58.3" x 86.6"

Note: For more details, please contact YCM sales representatives.

YCM®

MXP-200FB+

by **FANUC**

Communication Interface	Excellent Vision Quality	User-Friendly Design
RJ45 Ethernet USB CompactFlash Card	10.4" LCD display	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

Exclusive Software from YCM
Plus II

Pre-Machining

Intelligent Tool Data Management

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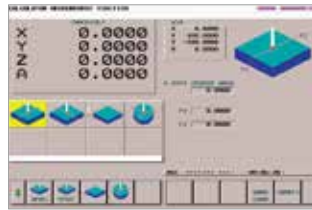
Workpiece Coordinate Calculation

Conversational window provides convenient and fast setup of workpiece coordinates

RENISHAW GUI System
(Conversational Graphic Operating Interface)
(This function may vary on TCV and NH/H series machine. For more details, please contact YCM sales representatives.)

Tool Measurement & Measurement Calibration

Workpiece Measurement
(applicable to certain models)

Program Editing
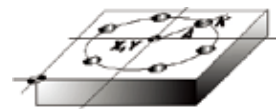
CIRCULAR HOLE PATTERN
(G120 P1) Function
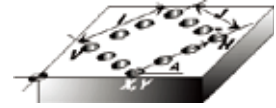
RECTANGULAR HOLE PATTERN
(G120 P4) Function
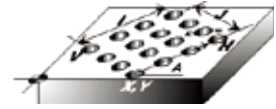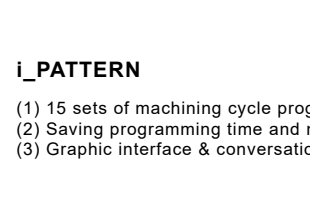
GRID HOLE PATTERN
(G120 P5) Function

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.

Tool Load Management

Instant tool load monitoring with alarm function

(This function may vary on TCV and NH/H series machine. For more details, please contact YCM sales representatives.)

Tool Life Management

Indicating tool status of each group with tool life alarm

(This function may vary on TCV and NH/H series machine. For more details, please contact YCM sales representatives.)

Multi-Display Function

Displaying 4 statuses simultaneously with configurable status display

Smart Control Panel

iPANEL

Easy to set up and operate important functions

(This function may vary on TCV and NH/H series machine. For more details, please contact YCM sales representatives.)

Intelligent Counter

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

*Above functions may vary from model to model.

Standard Control Function

■ Tilted Working Plane Command (MXP-200FB^{+} / MXP-200FC / FANUC 31i-MB5)

Program command enables to define X-Y-Z coordinates.
Efficient program editing, easy machining definition.
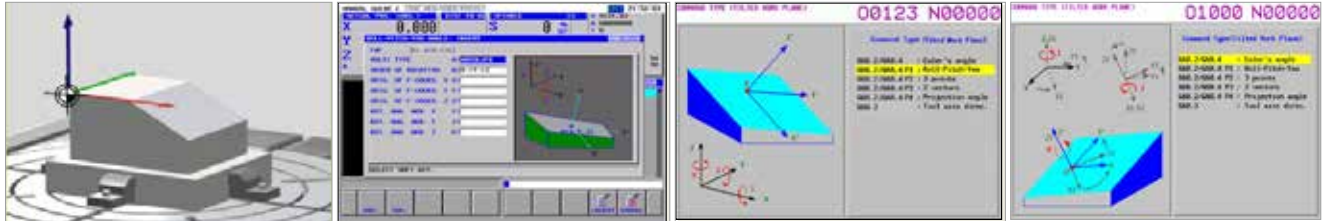
■ 3D Interference Check (MXP-200FC / FANUC 31i-MB5)

3D interference check function helps to reduce the collision while 5th axis application.
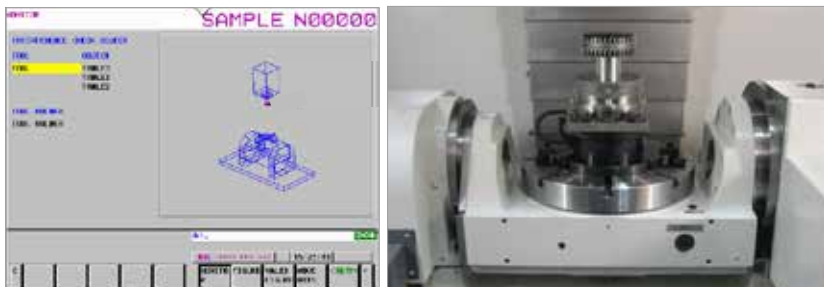
Exclusive Control Function

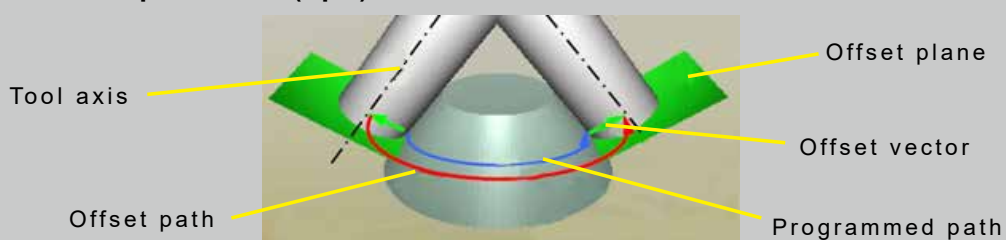### ■ STCP (Smooth Tool Center Point) (FANUC 31i-MB5)
High speed smooth tool center point control

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

Side-tool

End-tool

With STCP function

3D Cutter Compensation (opt.)

Tool axis

Offset plane

Offset vector

Offset path

Programmed path

HEIDENHAIN TNC 640 Exclusive Function

HEIDENHAIN TNC 640

- Simultaneous 5-axis control
- 19" color flat-panel display touchscreen
- 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)
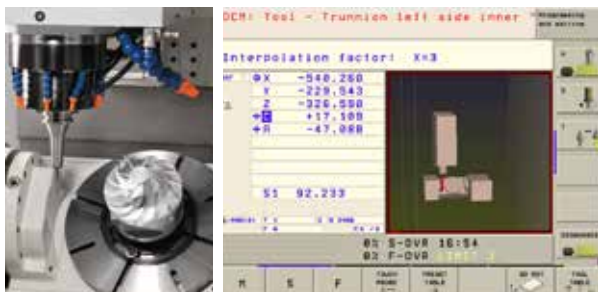- 0.5 ms Short block processing time

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.
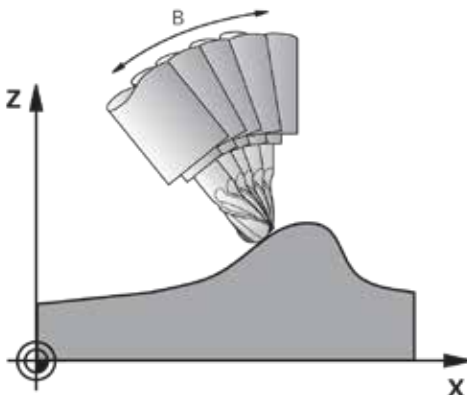
Dynamic Collision Monitoring (DCM)
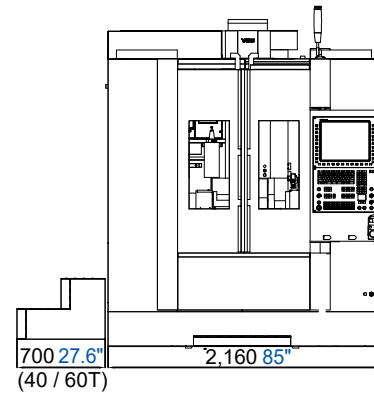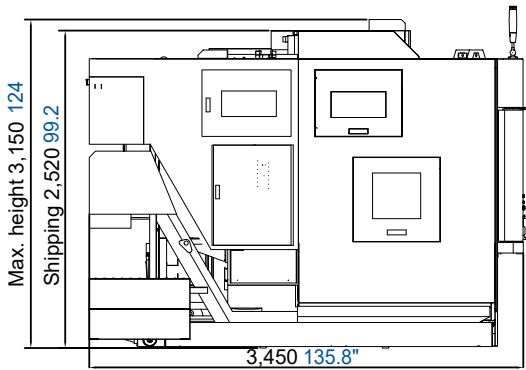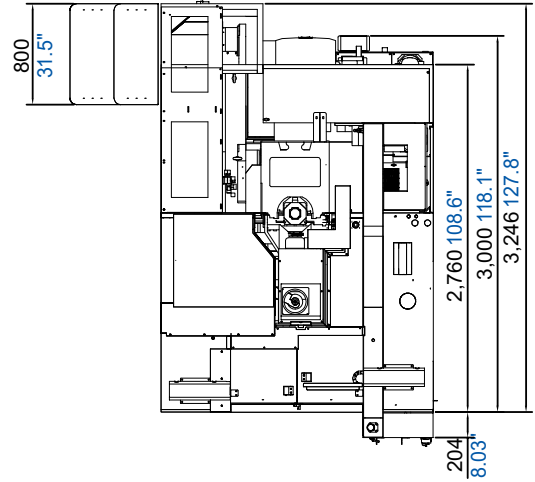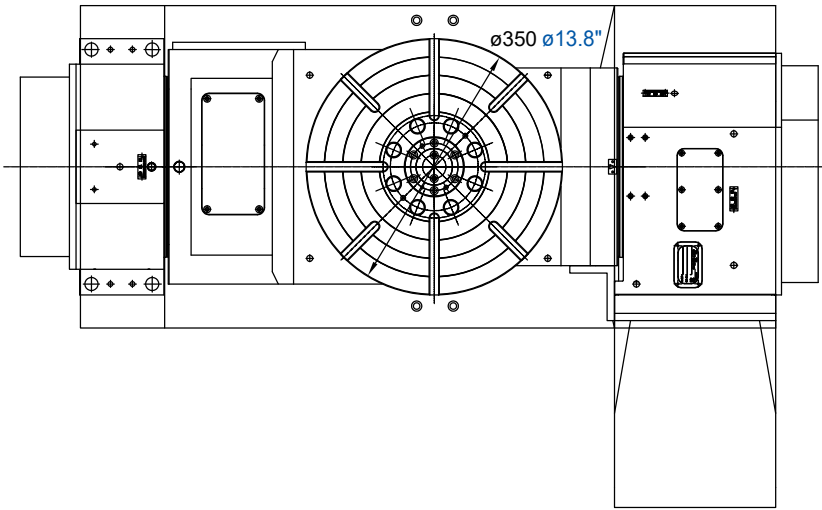Dynamic collision monitoring to protect operators and machine.
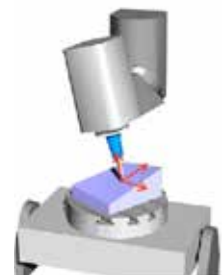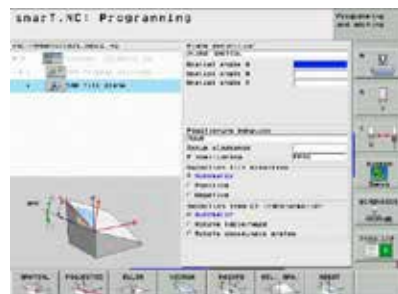
Kinematic Compensation
1) Position of the rotary axis in the kinematics model of the control.
2) Actual position of the rotary axis.
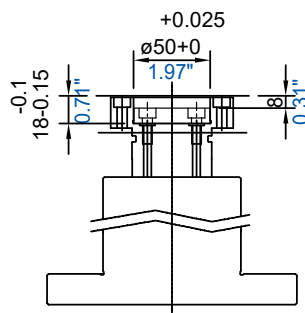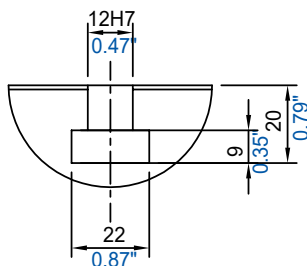3) Resulting position error during tilting.

Table & Dimensions

24 / 30T / 40T / 60T

ø350 ø13.8"

800 31.5"

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

204 8.03"

Max. height 3,150 124
Shipping 2,520 99.2

3,450 135.8"

700 27.6"
(40 / 60T)
2,160 85"
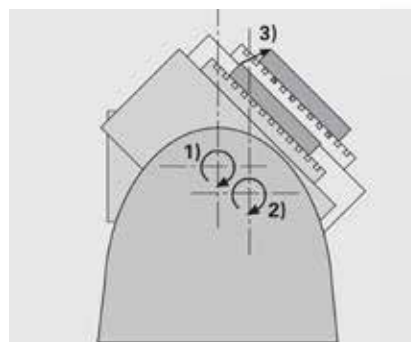
Fixture Hole Position

█ T-SLOTS

12H7 0.47"
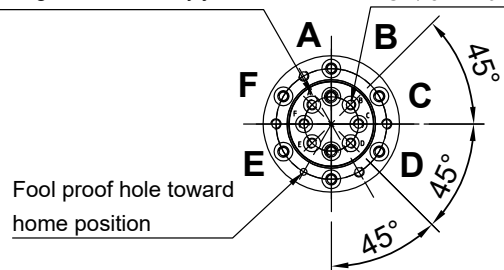20 0.79"
9 0.35"
22 0.87"

+0.025
ø50+0
1.97"
-0.1
18-0.15
0.71"
8 0.31"

A/D: Air pressure
B/C/E/F: Hydraulic

Marks engraved on rotary joint

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°

Fool proof hole toward
home position

Specifications

	NFX400A
SPINDLE	
Spindle Speed/Power (std.) FANUC controller	12,000 rpm 11/15/18.5 kW 15/15/20/25 HP (cont/60min/15min)
Spindle Speed/Power (opt.1) FANUC controller	12,000 rpm 11/18.5/22/25 kW 15/25/29.5/34 HP (cont/30min/10min/5min/1min)
Spindle Speed/Power (opt.2) FANUC controller	15,000 rpm 7.5/11/15/18.5/22/22.5 kW 10/15/20/25/29.5/30 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 Speed/Power (std.) SIEMENS controller	12,000 rpm 7.5/9/11.3/14.3/18.8/22.5 kW 11/12/15/19/25/30 HP(cont/S6-60%/S6-40%/S6-25%/S6-10%/S6-5%)
Spindle Speed/Power (opt.4) SIEMENS controller	15,000 rpm 7.5/9/11.3/14.3/18.8/22.5 kW 11/12/15/19/25/30 HP(cont/S6-60%/S6-40%/S6-25%/S6-10%/S6-5%)
Spindle Taper	BBT40
TRAVEL	
X-axis Travel	650 mm 25.6"
Y-axis Travel	520 mm 20.5"
Z-axis Travel	480 mm 18.9"
TABLE	
Table Size/T-Slots	ø350 mm / 12 mm ø13.8" / 0.5" 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/C Axis Rotation Rang	150˚ (+30˚/ -120˚) / 360˚
A/C Axis Feedrate	25 rev/min
A/C Axis Positioning Accuracy (Encoder)	20 / 20 (10 / 10) sec
A/C Axis Repeatability Accuracy (Encoder)	8 / 6 (4 / 4)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" / 0.00047"	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/cm^2
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 (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 / TS	○
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-200FB+	●
CNC Control: 31iMB5	○
CNC Control: MXP-200FC	○
CNC Control: HEIDENHAIN TNC640	○
CNC Control: SIEMENS 828D	○
CNC Control: SIEMENS 840D	○

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