



# D2-5AX

High-productivity 5-Axis Machining Center with Ø600 Table

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## Product Overview

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1 Hinge / Ti-6Al-4V



## Easily automated mid-sized 5-axis machining center affordable universal machining

D2-5AX is equipped with an acceleration/deceleration conveyance system design optimized for a minimal cycle time and has a structure that allows an easy access to robots and AWC, showing excellent performance in mass production. In addition, it is equipped with the processing software technology developed by Hwacheon to provide improved productivity and accuracy as well as excellent processing quality.



### High-productivity

- 1 High acceleration / deceleration : 0.7G
- 2 Tool to Tool time : 1.8sec
- 3 A wide range of high performance spindles (12,000 / 14,000 / 20,000 / 24,000 rpm)
- 4 Hydraulic table clamping system on B and C axes for high rigidity

### Enhanced User Convenience

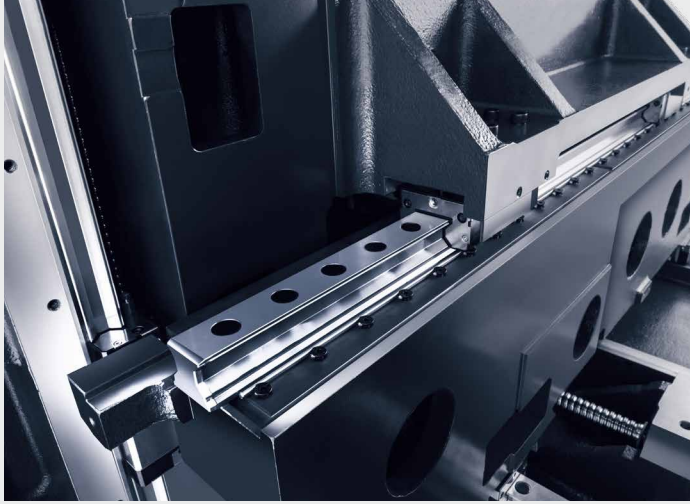
- 1 Structure that facilitates robot and AWC applications (Right side or Front)
- 2 Can select chip conveyer installation direction (Left or Back)
- 3 Automatic ceiling opening / closing system for convenient use of a crane
- 4 Excellent work accessibility

### 5-axis Machining Solution

- 1 Optimized system centered on rotary axis to improve the accuracy of processing with 5-axis (HRCC II)
- 2 It is possible to select various types of tables to minimize interference
- 3 High-precision rotary table 0.0001° res.

## Basic Information

### Basic Structure



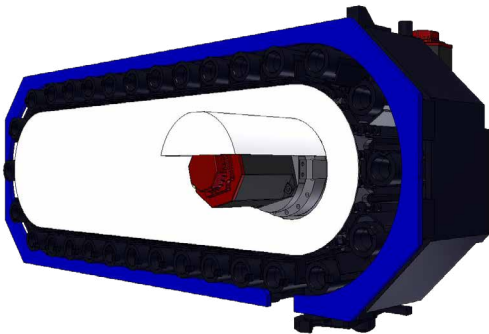
### "Machining Stability Ensured"

- Stable base and column frame
- Highly-rigid LM guide for every axis (roller pack)
- Rigid Gantry structure suitable for high acceleration / deceleration

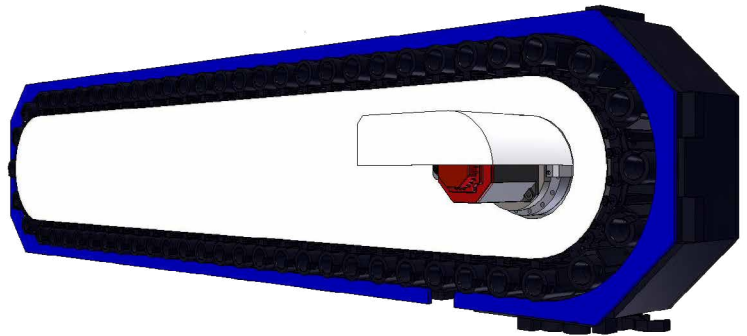
※High rigid roller LM guide for X / Y-axis

Stroke mm (inch)			Rapid Speed m/min (ipm)			Tilt Angle deg.	Rotation Angle deg.
X-axis	Y-axis	Z-axis	X-axis	Y-axis	Z-axis	B-axis	C-axis
650 (25.59)	500 (19.69)	500 (19.69)	36 (1,417)	30 (1,181)	30 (1,181)	-30 ~ +110	360

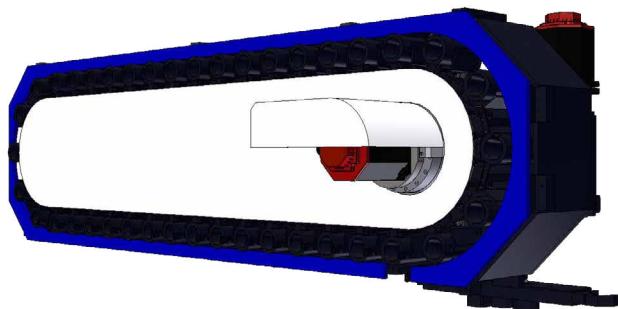
### Magazine



· 30 Tools Magazine



· 60 Tools Magazine



· 40 Tools Magazine

### "Magazines in Various Specifications"

Various specifications are available based on users' tool types

Item	Tool Shank	BBT-40 (OPT: CAT-40, HSK-A63, SK-40)
	Chain Type	
Tool Storage Capacity		30 ea (OPT: 40, 60 ea)
Method of Tool Selection		Memory Random
Tool Change Type		Swing Arm

## Spindle

Suitable for various types of part processing

### "High-speed and High-rigidity spindle"

	Max Spindle Speed rpm	Spindle Motor kW	Max Torque Nm
BBT-40, CAT-40, HSK-A63, SK-40	12,000 (STD)	37	250
	14,000	37	303
	20,000	37	221
HSK-A63	24,000		



## Table

### "High-precision rotary table"

\* Unit : mm (inch)

- Minimum input unit of 0.0001°
- For High-torque and High-precision machining, dual worm gear is applied in rotary & tilting table (B-axis and C-axis)
- Hydraulic clamping system
- Application of hydraulic/pneumatic lines for automation (OPT)

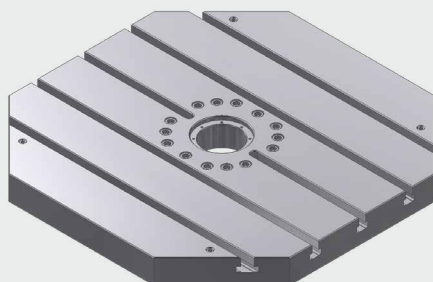
Table Size mm (inch)	TSlot W x P mm (inch)		Max Loading Capacity kg <sub>r</sub> (lb <sub>r</sub> )	Min. Rotation Angle deg.
	Round Type (STD)	Octagonal Type		
Ø600 (23.62)	14 x 80 (0.55 x 3.15) / 5 ea	14 x 100 (0.55 x 3.94) / 5 ea	500 (1,102)	0.0001

### "Various types of tables"

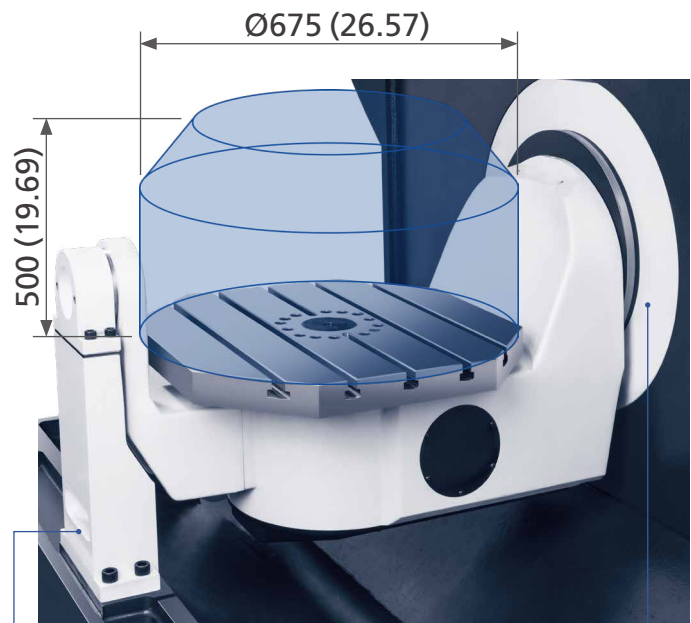
It is possible to select various types of tables to minimize interference



· Round Type (STD)



· Octagonal Type




**Built-in table structure**

Compact internal structure with a built-in design of B-axis

**Cantilever supporting table**

Improved table rigidity and processing accuracy

## Cutting Performance

	Face mill, Carbon Steel (SM45C)					
	Tool Dia mm (inch)	Material Removal Rate cm <sup>3</sup> /min	Spindle Speed rpm	Feed mm/min (ipm)	Axial Depth mm (inch)	Radial Depth mm (inch)
	80 (3.15)	264	1,500	2,200 (86.6)	2 (0.08)	60 (2.36)
	Face mill, Carbon Steel (SM45C)					
	Tool Dia mm (inch)	Material Removal Rate cm <sup>3</sup> /min	Spindle Speed rpm	Feed mm/min (ipm)	Axial Depth mm (inch)	Radial Depth mm (inch)
	60 (2.36)	288	1,350	2,400 (94.5)	3 (0.12)	40 (1.57)
	Face mill, Carbon Steel (SM45C)					
	Tool Dia mm (inch)	Material Removal Rate cm <sup>3</sup> /min	Spindle Speed rpm	Feed mm/min (ipm)	Axial Depth mm (inch)	Radial Depth mm (inch)
	50 (1.97)	256	1,350	3,200 (126)	2 (0.08)	50 (1.97)
	Drill, Carbon Steel (SM45C)					
	Tool Dia mm (inch)		Spindle Speed rpm	Feed mm/min (ipm)		Spindle Load %
	40 (1.57)		1,500	180 (7.1)		51
	Tap, Carbon Steel (SM45C)					
	Tap Size mm (inch)		Spindle Speed rpm	Feed mm/min (ipm)		Spindle Load %
	M33 (1.3) x P3.5 (0.14)		300	1,050 (41.3)		64
	Face mill, Carbon Steel (SM45C)					
	Tool Dia mm (inch)	Material Removal Rate cm <sup>3</sup> /min	Spindle Speed rpm	Feed mm/min (ipm)	Axial Depth mm (inch)	Radial Depth mm (inch)
	80 (3.15)	69.12	1,000	576 (22.68)	2 (0.08)	60 (2.36)
	Drill, Carbon Steel (SM45C)					
	Tool Dia mm (inch)		Spindle Speed rpm	Feed mm/min (ipm)		Spindle Load %
	40 (1.57)		1,500	160 (6.3)		50
	Tap, Carbon Steel (SM45C)					
	Tap Size mm (inch)		Spindle Speed rpm	Feed mm/min (ipm)		Spindle Load %
	M33 (1.3) x P3.5 (0.14)		300	1,050 (41.3)		64
	High Feed Cutter (KP4M)					
	Tool Dia mm (inch)	Material Removal Rate cm <sup>3</sup> /min	Spindle Speed rpm	Feed mm/min (ipm)	Axial Depth mm (inch)	Radial Depth mm (inch)
	40 (1.57)	210	1,600	5,000 (196.9)	1.5 (0.06)	28 (1.1)
	High Feed Cutter (KP4M)					
	Tool Dia mm (inch)	Material Removal Rate cm <sup>3</sup> /min	Spindle Speed rpm	Feed mm/min (ipm)	Axial Depth mm (inch)	Radial Depth mm (inch)
	33 (1.3)	144	2,000	6,000 (236.2)	1 (0.04)	24 (0.94)
	High Feed Cutter (KP4M)					
	Tool Dia mm (inch)	Material Removal Rate cm <sup>3</sup> /min	Spindle Speed rpm	Feed mm/min (ipm)	Axial Depth mm (inch)	Radial Depth mm (inch)
	50 (1.97)	180	1,200	1,800 (70.87)	2 (0.08)	50 (1.97)

\* The machining results above are examples based on the factory test standards, and are subjected to the changes in conditions.

## Standard / Optional Accessories Status

S : Standard O : Option

NO.	Item	Description			D2-5AX
1	Spindle	12,000 rpm	37 / 18.5 kW	250 Nm	S
2		14,000 rpm	37 / 22 kW	303 Nm	O
3		20,000 rpm			O
4		24,000 rpm	37 / 18.5 kW	221 Nm	O
5	Magazine	30 Tools Magazine			S
6		40, 60 Tools Magazine			O
7	Tool Shank	BBT-40			S
8		CAT-40, HSK-A63, SK-40			O
9	Table	Round Type			S
10		Octagonal Type			O
11	NC Controller	Fanuc 0i-MF		4+1 axis controlled	S
12		Fanuc 31i-B5		Simultaneous 5-axis controlled	O
13	Coolant Function	Head Flushing (0.12 MPa, 0.75 kW)			S
14		CTS Coolant System	3 MPa	2.2 kW	O
15			7 MPa	2.2 kW	O
16		Oil Mist (Semi dry cutting system)			O
17	Chip Removal Function	Air Blower			S
18		Air Gun / Coolant Gun			O
19		Lift-up Chip Conveyor	Hinge Type		O
20			Scraper Type		O
21			Mesh-drum Filter Type		O
22		Mist Collector (Separately Mounting)			O
23	Precision Machining Function	Linear Scale (X / Y / Z)			O
24		Hwacheon Efficient Contour Control System (HECC)			S
25		Hwacheon Thermal Displacement Control System (HTDC) [ Hwacheon Spindle Displacement Control System (HSDC) + Hwacheon Frame Displacement Control System (HFDC) ]			S
26		Hwacheon Artificial Intelligence Control System (HAI): 200 Block			S
27		Hwacheon Artificial Intelligence Control System (HAI): 400 Block			O
28		Lubrication System			S
29		Spindle Cooler	Oil Cooler Type		S
30		Table Hydraulic Clamping System			S
31	Measuring & Automation Function	Tool Measuring System: Renishaw / Blum (Touch Type, Laser Type)			O
32		Workpiece Measuring System: Renishaw / Blum (Touch type)			O
33		Tool Life Management			O
34		Auto Door			O
35		Hwacheon Tool Load Detect System (HTLD)			S
36		Cutting Feed Optimization System (OPTIMA)			S
37		Hwacheon Rotation Center Calibration System (HRCC II)			O
38	Convenient Functions	Ethernet Interface			S
39		MPG Handle (1ea)			S
40		Signal Lamp with 3 Color (R, G, Y)			S
41		10.4" Color LCD			S
42		Tool Box			S
43		NC Cooler			O
44		Oil Skimmer			O
45		Air Dryer			S
46		Door Interlock			S
47		Workpiece Coordinate System 48 pairs			S
48		Lubrication Oil Separation Tank			S
49		Perfect Base Around Splash Guard			S
50		Part Program Storage Length 1,280m (512 kB)			S
51		Data Server (256 MB)			O
52		Data Server (1,024 MB)			O
53		Data Server Interface			O
54		Transformer			O
55		Manual Guide i			O
56		Monitoring Solution of Real-time Operational Status (M-VISION Plus)			O

# HIGH-PRODUCTIVITY & USER FRIENDLY DESIGN

## High Productivity and User Convenience

Has a structure that allows an easy access to robots and AWC, showing excellent performance in mass production.

Also, it is easy to maintain the machine by user-friendly design as easy accessibility.

"A structure facilitating easy access to robots and AWC, optimized for automated system applications"

- Application of the front/right sides possible for robot loading
- Application of the right side possible for AWC use



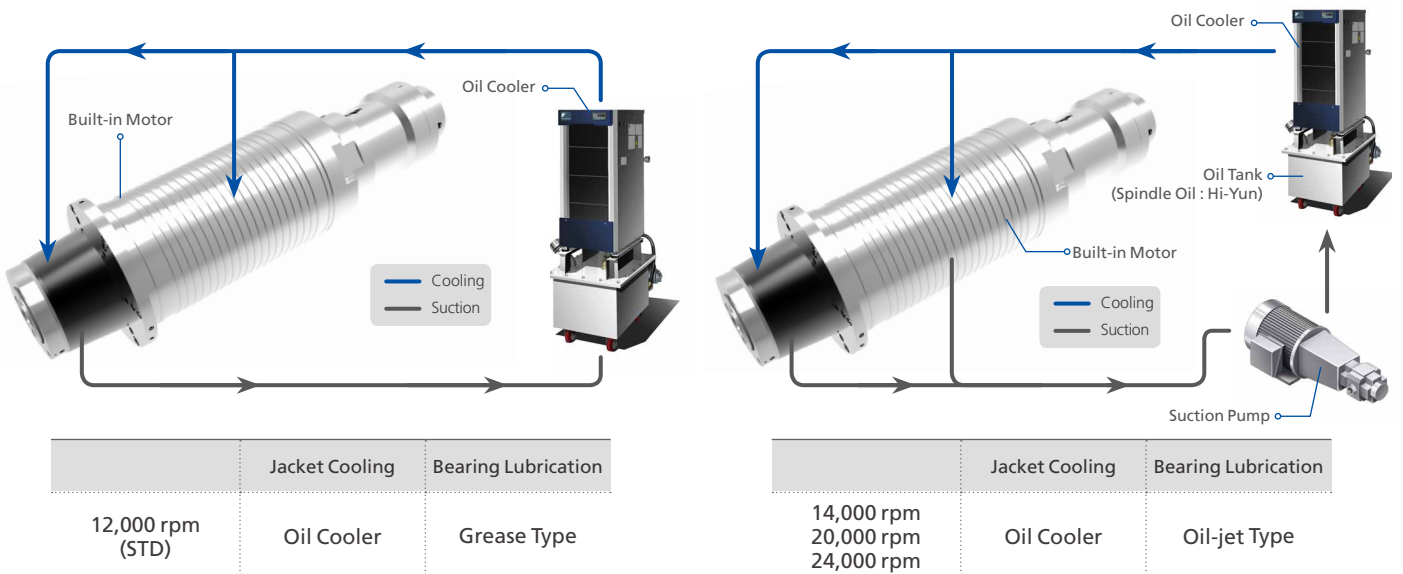
"Auto ceiling-opening/closing system"

Adopts easy-to-use auto ceiling-closing/opening system to the working environment refreshing

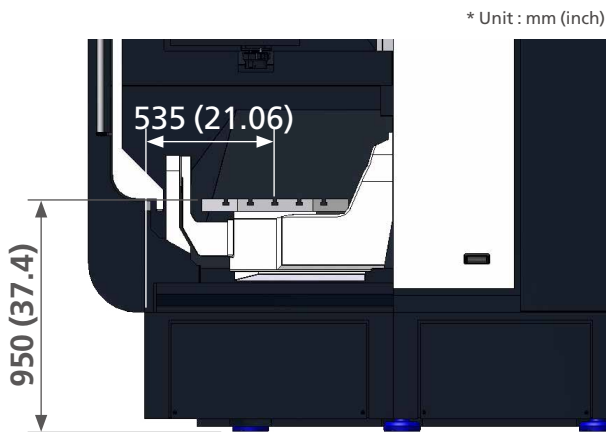




### Cooling System



### User Convenience



"Excellent ergonomics"



"Rapid chip discharge structure"

### Excellent Coolant Tank and Chip Removal

#### "Efficient coolant tank construction"

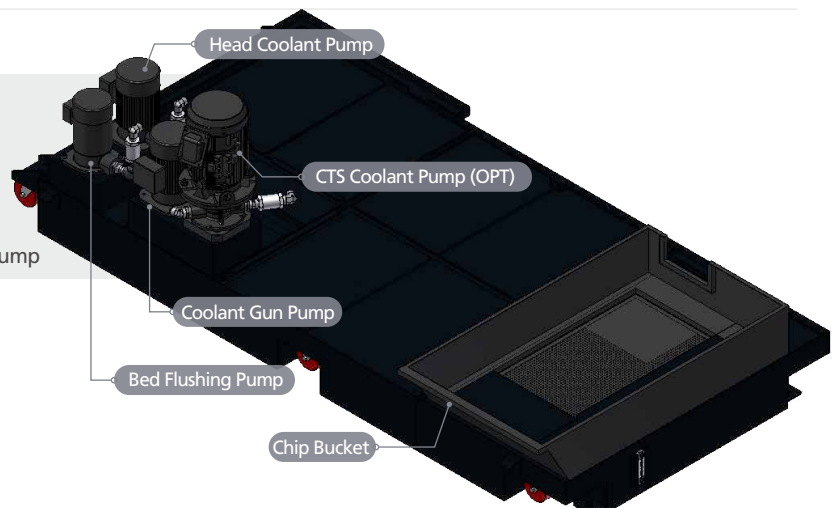
##### External Coolant Tank

Tank Capacity : 250 ℓ (66.04 gal)  
 [Mesh-drum Type : 407 ℓ (107.52 gal)]

- External coolant tank is installed at the side of machine  
 easy to exchange coolant, clean the tank and maintain pump

##### · Coolant Pump Specifications

- Bed Coolant Pump - Power : 0.4 kW
- Head Coolant Pump - Power : 0.6 kW
- Coolant Gun Pump - Power : 0.6 kW
- CTS Coolant Pump (OPT) - Pressure : 3 MPa
- Power : 2.2 kW



Convenient Operator Panel

90° Rotating Operator Panel (STD)



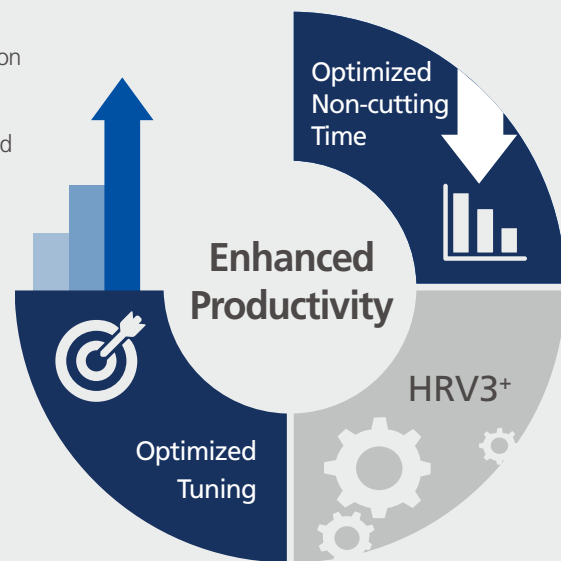
The operator panel is newly designed from the operator's viewpoint and thus enhances the operator's convenience.

"User Friendly Design"

- 10.4" display as standard (USB and PCMCIA cards as standard)
- Enhanced operability by optimizing the layout and improving the touch feeling of control buttons
- Horizontal keys enhance user convenience.
- Separately mounting MPG for workpiece setting convenience.
- Long time continuous DNC operation with the CF card even without the data server.

Machine Optimization (STD)

- Smart rigid tap function applied for machining time reduction.
- The cycle machining as well as the operating time and the acceleration / deceleration speed of feeding system are optimized.
- High-level precision, speed and smoothness are realized by enhanced processing performance of tiny segments.
- Dramatically reduced non-cutting time during machining ensures optimal productivity.
- The latest machining technology adopted.
- Machining surface quality enhanced by HRV3+ control. (HRV3+: effectively prevents machine oscillation by controlling the servo current to enhance the machining surface quality.)



"Enhanced Productivity"

## Operating Convenience Function

### < M-CODE LIST >



- M-CODE LIST
- The screen provides easy and quick search and utilization.

(However, it is necessary to discuss with factory in advance to add and / or change M-codes.)

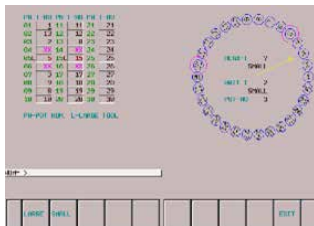
### < GUI (Graphical User Interface) >



- Graphic interface for tool / workpiece measurement
- Automatic offset update function
- Tool setting and damaged tool detection, Workpiece setup and measuring while machining
- Optimized time and failure rate High competitiveness

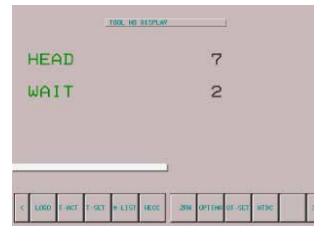
### < Tool Management >

Large / Small Diameter Tool Management System



- Magazine tool management system
- Magazine tool check in real time
- Large / small diameter tools setting

### < Tool View >



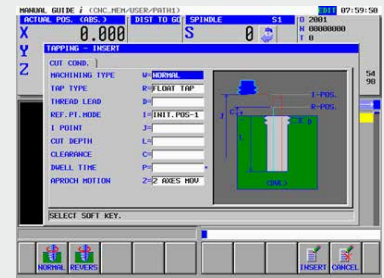
- Head mounted tool check in real time
- Waiting pot mounted tool check in real time

## Manual Guide i

With the Manual Guide i, the operator is able to create a machining program for the desired geometry including the pattern simply if he / she enters numeric values for the basic machining geometry.



- Programming in convenient functions and rich machining cycles



- It displays the machine status and the tools in use while machining.



- The realistic machining simulation checks the program.

## Hwacheon Software



## Hwacheon Tool Load Detect System

"Detect and diagnose the most minute of tool-end point movement"

HTLD constantly monitors the tool wear to prevent accidents, which may occur from a damaged tool and help to stop tool wear from deteriorating the workpiece.

(The load is measured every 8 msec to ensure accuracy.)



## Hwacheon High Efficiency Contour Control System

"Roughing quickly, finishing is precisely"

HECC offers an easy to use programming interface for different workpieces and different processing modes. The system provides a precise, custom contour control for the selected workpiece, while prolonging the life of the machine and decreasing process time. The customizable display provides real-time monitoring and quick access.



## Cutting Feed Optimization System

"Maximize your productivity with intelligent system"

OPTIMA utilizes an adaptive control method to regulate the feed rate in real time, to sustain the cutting load during a machining process. As a result the tools are less prone to damage and the machining time is optimized.



## Hwacheon Spindle Displacement Control System

"Real-time correction for the displacement in the spindle"

When the spindle rotates at high speed, the centrifugal force drives the taper to expand, causing errors in Z axis. HSDC constantly monitors the temperature at each spindle region and makes optimal prediction for thermal displacement. The system then makes necessary adjustments and effectively minimizing thermal displacement.



## Hwacheon Frame Displacement Control System

"System for maintaining processing accuracy for a long period of machining"

HFDC is equipped with highly sensitive thermal sensors in the casting region where thermal activity is suspected; monitoring and correcting displacement.



## Hwacheon Thermal Displacement Control System

"Hwacheon Spindle Displacement Control System + Hwacheon Frame Displacement Control System"

HTDC integrates the Hwacheon Spindle Displacement Control system and the Frame Displacement Control System.



## Hwacheon Rotation Center Calibration System

"Completes Complex 5-axis process with one-time setup"

The HRCC is used to calibrate and optimize the rotation center of 5-axis machining equipment. By optimizing the rotation center, then managing and loading the relevant data, you can minimize the possibility of errors during 5-axis machining.



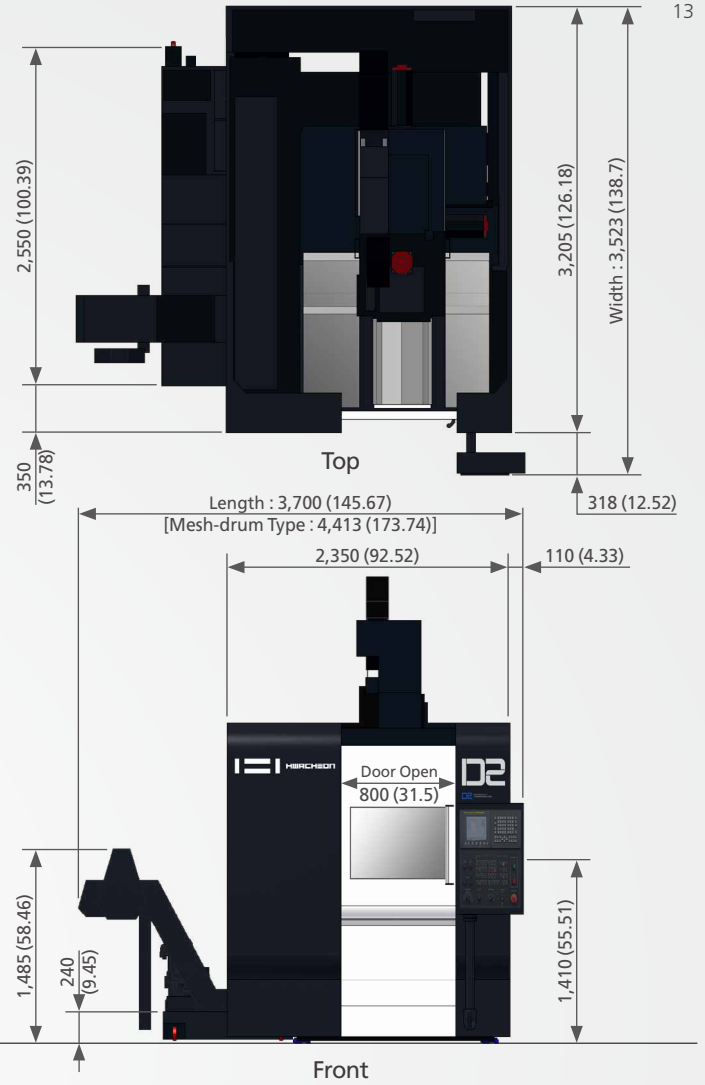
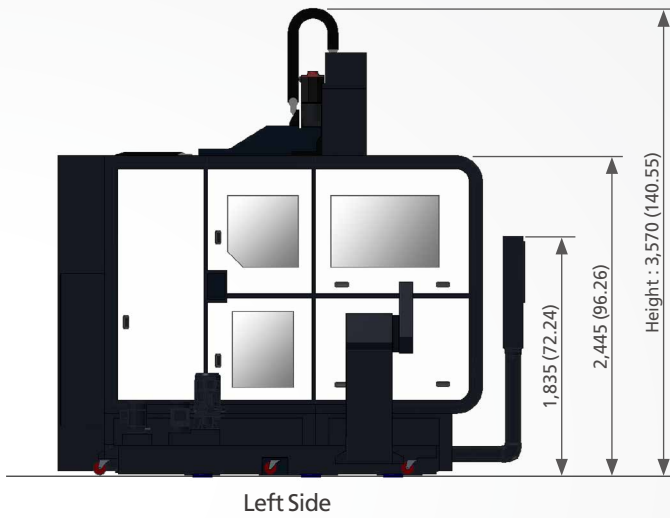
## Monitoring Solution of Real-time Operational Status

"See everything everywhere"

- Monitoring system for the User's factory machine management
- User can always check the status of the machine utilizes a smartphone

### Machine Size

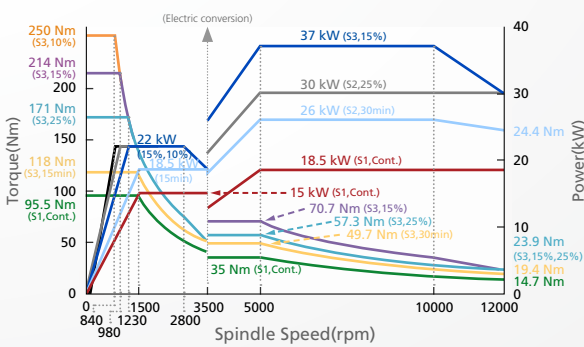
\* Unit : mm (inch)



### Spindle Power – Torque Diagram

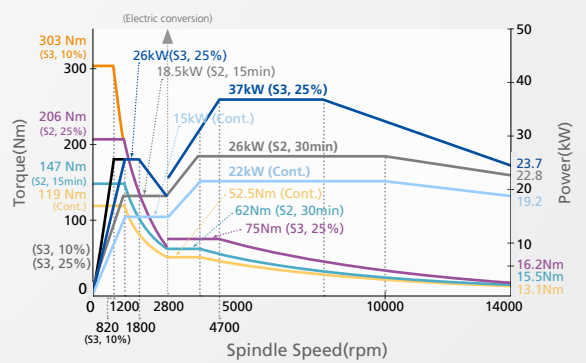
#### 12,000 rpm (STD)

Max Power : 37 kW (50 HP) / Max Torque : 250 Nm



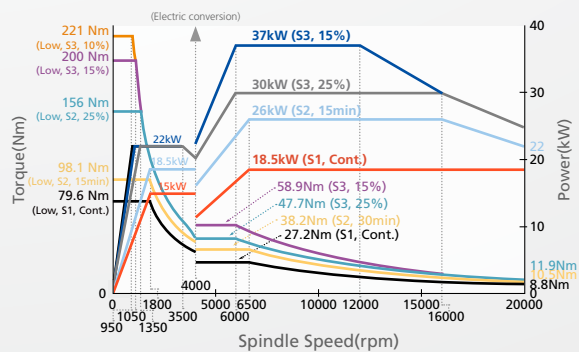
#### 14,000 rpm (OPT)

Max Power : 37 kW (50 HP) / Max Torque : 303 Nm



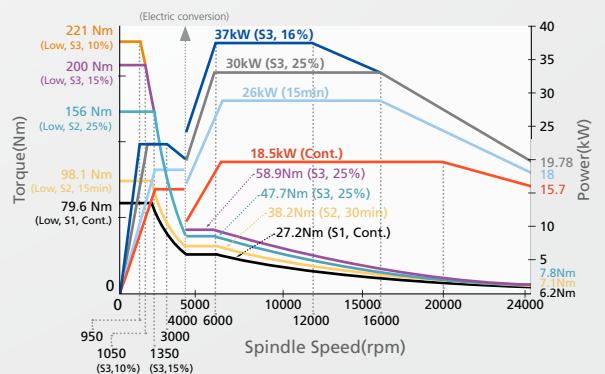
#### 20,000 rpm (OPT)

Max Power : 37 kW (50 HP) / Max Torque : 221 Nm

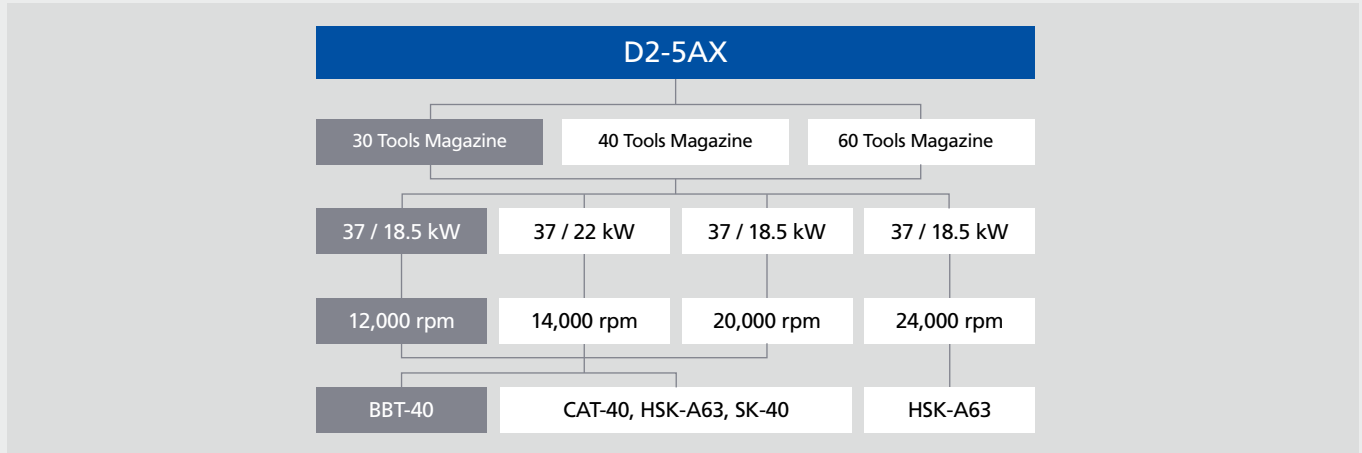


#### 24,000 rpm (OPT)

Max Power : 37 kW (50 HP) / Max Torque : 221 Nm



## Product Line-up



\* For 24,000 rpm, The tool type is only used 'HSK-A63'

## Machine Specifications

Item		D2-5AX			
<b>Travel</b>					
X-axis Stroke (X / Y / Z)	mm (inch)	650 / 500 / 500 (25.59 / 19.69 / 19.69)			
B-axis tilt angle / C-axis rotation angle	deg.	-30 ~ +110 / 360			
Distance from Table Surface to Spindle Gauge Plane	mm (inch)	185 ~ 685 (7.28 ~ 26.97)			
Distance from the top surface of X axis guide to the center of the spindle	mm (inch)	192 (7.56)			
<b>Table</b>					
Table Size	mm (inch)	Ø600 (Ø23.62)			
Table Loading Capacity	kg, (lb.)	500 (1,102)			
T Slot (WxP / No. of slots)	mm (inch)	Round Type: 14 x 80 (0.55 x 3.15) / 5 ea [Octagonal Type(OPT): 14 x 100 (0.55 x 3.94) / 5ea]			
<b>Spindle</b>					
Max Spindle Speed	rpm	12,000 (STD)	14,000	20,000	24,000
Spindle Motor	kW (HP)	37 / 18.5 (50 / 25)	37 / 22 (50 / 29)	37 / 18.5 (50 / 25)	
Max Torque	Nm	250	303	221	
Type of Spindle Taper Hole	-	ISO#40, 7/24 Taper (BBT-40)			
Spindle Bearing Inner Diameter	mm (inch)	70 (2.76)			
Method of Spindle Lubrication & Cooling	-	Oil Cooler			
<b>Feed Rate</b>					
Rapid Speed (X / Y / Z)	m/min (ipm)	36 / 30 / 30 (1,417 / 1,181 / 1,181)			
Rapid Speed (B / C)	rpm	25 / 25			
Feed (X / Y / Z)	m/min (ipm)	24 / 24 / 24 (944 / 944 / 944)			
<b>Motor</b>					
Feed Motor(X / Y / Z / B / C)	kW (HP)	7 / 4 / 4 / 7 / 2.7 (9.4 / 5.4 / 5.4 / 9.4 / 3.6)			
Spindle Coolant Motor	kW (HP)	2.8 / 3.2 (3.8 / 4.3)			
<b>ATC</b>					
Type of Tool Shank	-	BBT-40 (OPT: CAT-40, HSK-A63, SK-40)		HSK-A63	
Type of Pull Stud	-	MAS P40T-1 (45°)			
Tool Storage Capacity	ea	30 (OPT: 40, 60)			
Max. Tool Diameter (With / Without Adjacent Tools)	mm (inch)	Ø80 / Ø130 (Ø3.15 / Ø5.12)			
Max. Tool Length	mm (inch)	300 (11.81)			
Max. Tool Weight	kg, (lb.)	8 (17.64)			
Method of Tool Selection	-	Memory Random			
Method of Operation	-	Servo Motor			
<b>Power Source</b>					
Electric Power Supply	kVA	70			
Compressed Air Supply (Pressure)	MPa	0.5 ~ 0.7			
<b>Tank Capacity</b>					
Spindle Cooling / Lubrication	ℓ (gal)	50 / 6 (13.21 / 1.59)			
Coolant	ℓ (gal)	250 (66.04) [Mesh-drum Type: 407 (107.52)]			
<b>Machine Size</b>					
Height	mm (inch)	3,570 (140.55)			
Floor Space (Length x Width)	mm (inch)	3,700 x 3,523 (145.67 x 138.7) [Mesh-drum Type: 4,413 x 3,523 (173.74 x 138.7)]			
Weight	kg, (lb.)	11,500 (25,353) [Mesh-drum Type: 11,800(26,014)]			
NC Controller		Fanuc 0i-MF (OPT: Fanuc 31i-B5)			

**NC Specifications [Fanuc 0i-MF]** \* Please contact us for information of FANUC 31i-B5 controller.

※ S : Standard O : Option

Item	Specification		Item	Specification	
<b>Controlled Axis</b>			<b>Program Input</b>		
Controlled Axis	5-axis	S	Automatic Corner Override		S
Simultaneously Controlled Axis	4-axis	S	Scaling		S
Least Input Increment 1/10	0.0001 mm, 0.0001 deg, 0.00001 inch	S	Coordinate System Rotation		S
inch / metric Conversion	G20, G21	S	Guidance Index Instruction with Guide		S
Stored Stroke Check 1		S	Small-hole Peck Drilling Cycle		S
Stored Stroke Check 2		S	Program Restart		O
Mirror Image		S	Programmable Mirror Image		S
Stored Pitch Error Compensation		S	Tape Format For Fanuc Series 10 / 11		S
Backlash Compensation		S	Manual Guide i		O
<b>Operation</b>			<b>Spindle Speed Function</b>		
Automatic & MDI Operation		S	Spindle Serial Output		S
DNC Operation by Memory Card	PCMCIA Card is Required	S	Spindle Override	50 - 120 %	S
Program Number Search		S	Spindle Orientation		S
Sequence Number Search		S	Rigid Tapping		S
Dry Run, Single Block		S	<b>Tool Function / Compensation</b>		
Manual Handle Feed	1Unit	S	Tool Function	T4-digits	S
Manual Handle Feed Rate	x1, x10, x100	S	Tool Offset Pairs	±6-digits / 200 ea	S
Handle Interruption		S	Tool Offset Memory C		S
<b>Interpolation Function</b>			Tool Length Measurement		S
Positioning	G00	S	Cutter Compensation C		S
Linear Interpolation	G01	S	Tool Life Management		O
Circular Interpolation	G02, G03	S	Tool Length Compensation		S
Dwell (Per Deconds)	G04	S	<b>Editing Operation</b>		
Cylindrical Interpolation		S	Part program Storage length / Number of Register Able Programs	512 kB / 1,000 ea	S
Helical Interpolation	Circular interpolation plus max 2 axes linear interpolation	S	Background Editing		S
Nano Smoothing		O	Extended Part Program Editing		S
Reference Position Return Check	G27	S	Play Back		S
Reference Position Return Return	G28,G29	S	<b>Setting and Display</b>		
2nd Reference Position Return	G30	S	Clock Function		S
Skip Function	G31	S	Self-diagnosis Function		S
<b>Feed Function</b>			Alarm History Display		S
Rapid Traverse Override	F0, F25, F50, F100	S	Help Function		S
Feedrate		S	Run Hour and Parts Count Display		S
Feedrate Override	0 ~ 150 %	S	Graphic Function		S
Jog Feed Override	0 ~ 4,000 mm/min	S	Dynamic Graphic Display		O
Override Cancel	M48, M49	S	Multi-language Display	English, German, French, Italian, Chinese, Spanish, Korean, Portuguese, Polish, Hungarian, Swedish, Russian	S
<b>Program Input</b>			<b>Data Input / Output</b>		
Tape Code	EIA RS244 / ISO840	S	Reader / Puncher Interface CH1	RS232C	S
Optional Block Skip	1 ea	S	Data Server	256 MB / 1,024 MB	O
Program Number	O4-digits	S	Data Server Interface		O
Sequence Number	N8-digits	S	Ethernet Interface	Embedded Ethernet	S
Decimal Point Programming		S	Memory Card / USB Interface		S
Coordinate Dystem Detting	G92	S	Auto Data Backup	SRAM + Part Program	S
Workpiece Coordinate System	G54 - G59	S	<b>Others</b>		
Workpiece Coordinate System Preset		S	Display Unit	10.4" Color LCD	S
Addition of Workpiece Coordinate Pair	48 ea	S	Display Unit	15" Color LCD	O
Addition of Workpiece Coordinate Pair	300 ea	O	<b>HWACHEON Machining Software</b>		
Extend Program Edit Function	Copy / Move / Etc.	S	High Speed HRV3 <sup>+</sup> Function		S
Manual Absolute ON and OFF		S	Hwacheon Artificial Intelligence Control System (HAI): 200 Block		S
Chamfering / Corner R		S	Hwacheon Artificial Intelligence Control System (HAI): 400 Block		O
Programmable Data Input	G10	S	Hwacheon Efficient Contour Control System (HECC)		S
Sub Program Call	10 Folds Nested	S	Hwacheon Tool Load Detect System (HTLD)		S
Custom Macro B		S	Cutting Feed Optimization System (OPTIMA)		S
Addition of Custom Macro Common Variables	#100 - #199, #500 - #999	S	Hwacheon Thermal Displacement Control System (HTDC)		S
Canned Cycles for Drilling		S	Hwacheon Spindle Displacement Control System (HSDC)		S
Feed Rate Clamp Based on Arc Radius		S	+ Hwacheon Frame Displacement Control System (HFDC)		S

## Hwacheon Global Network

 Hwacheon Headquarters  Hwacheon Europe  Hwacheon Asia  Hwacheon America



Please contact us for product inquiries.

[www.hwacheon.com](http://www.hwacheon.com)

The product design and specifications may change without prior notice.  
Read the operation manual carefully and thoroughly before operating the product,  
and always follow the safety instructions and warnings labels attached on the surfaces of the machines.

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