HIGH PRODUCTIVITY COMPACT MACHINING CENTER
EQUIPPED WITH DUAL PALLET

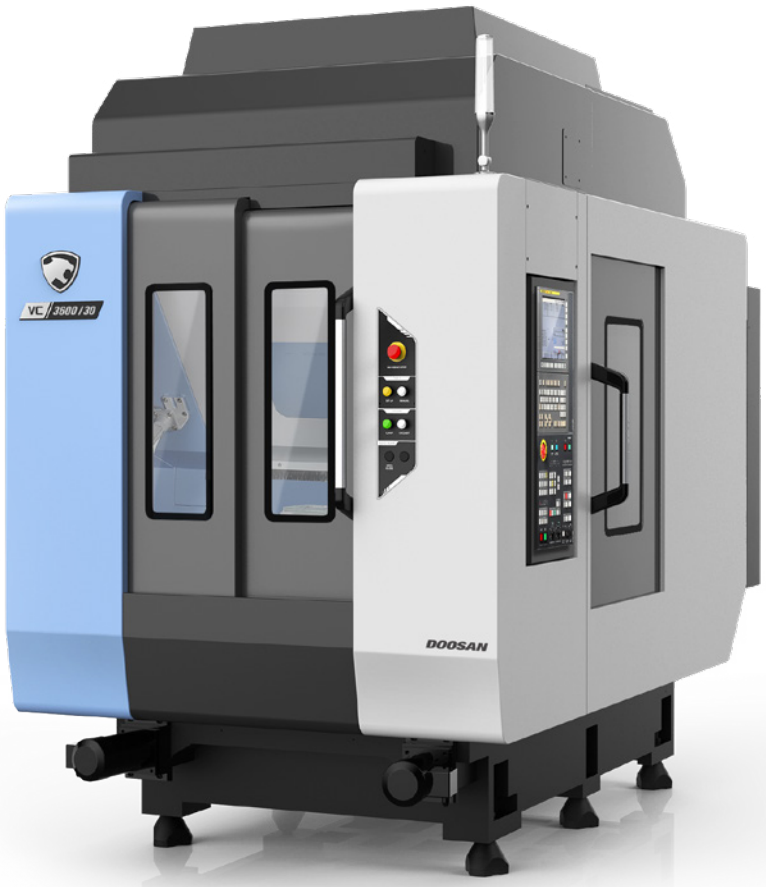
VC

3600/30

Doosan Machine Tools

VC 3600/30

The VC 3600/30 is a compact high-productivity compact machining center designed for the automotive and IT industries. It is equipped with a simultaneous operation function where rotary table turns and the all axes are positioned simultaneously when tools are changed. Durability and reliability have been further improved by adopting a more rigid frame and a servo unit.



Dual pallet was applied to improve productivity, and a thermal displacement compensation program was applied as standard for precise and fast processing of various parts. In addition, it provides various convenient functions such as EOP.

SERVO-TYPE APC AND ATCAS STANDARD FEATURES TO ACHIEVE EVEN HIGHER PRODUCTIVITY AND RELIABILITY

- Servo-driven APC reduces pallet change time by about 30%.
- Servo-driven ATC incorporating 14 tools as standard feature reduces tool change time by up to 11%.

NEWLY-DESIGNED DIRECT COUPLED SPINDLE WITH IMPROVED RIGIDITY AND PRODUCTIVITY

- The spindle design has been optimized by reducing acceleration and deceleration times by up to 30% to achieve even higher productivity.
- Adoption of dual contact spindle as standard feature improves heavy duty machining performance.

SMALL FOOTPRINT, VARIOUS USER CONVENIENCE FEATURES

- 1620mm (63.8 inch) machine width minimizes footprint.
- Auxiliary chip box (optional) effectively filters fine aluminum chips.

BASIC STRUCTURE

The VC 3600/30, a tool taper ISO #30 class dual pallet compact machining is equipped with a highlyreliable servo unit and a new frame, and offers superior productivity and reliability.

High-rigidity structure

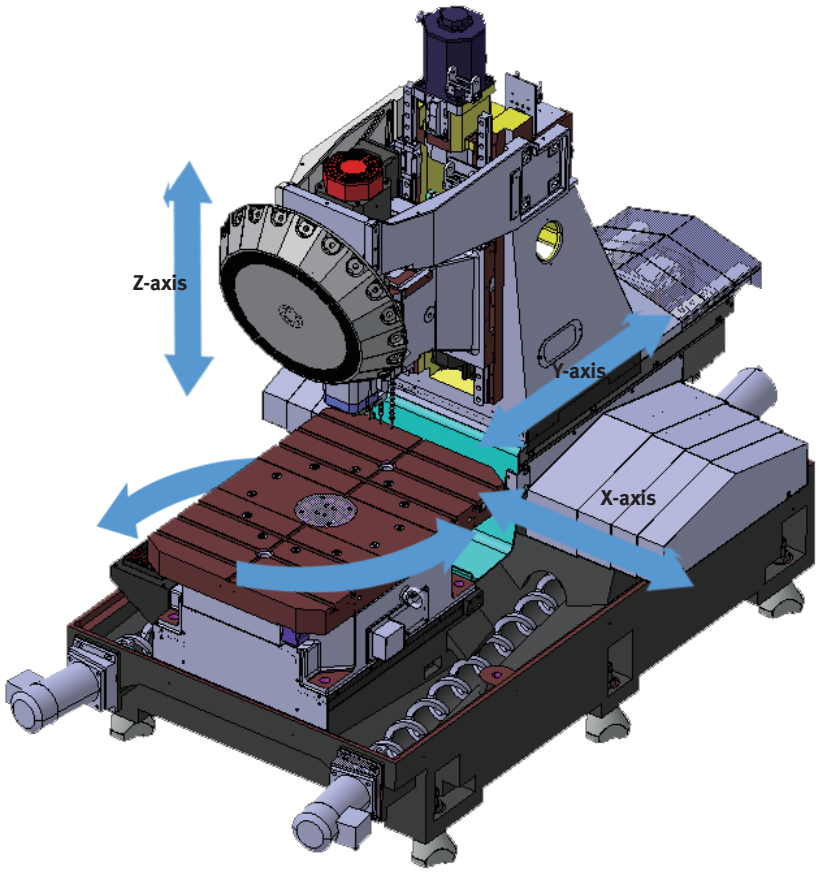
The machine's structure has been improved and optimized by CAE analysis to enhance rigidity and thereby ensure stable and accurate machining over long periods.

Travel distance

X-axis **520** mm
20.5 inch

Y-axis **360** mm
14.2 inch

Z-axis **350** mm
13.8 inch



AXIS SYSTEM

Environmentally friendly grease lubrication is adopted as standard for all of the axis feed system, and roller-type LM guides are provided to enhance the rigidity.

Rapid traverse rate

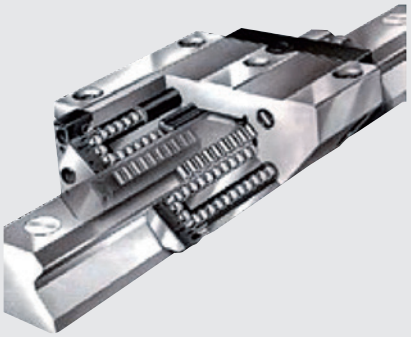
X-axis **48** m/min
1889.8 ipm

Y-axis **48** m/min
1889.8 ipm

Z-axis **56** m/min
2204.7 ipm

Roller-type LM guides are provided as a standard feature

A roller-type LM guide is applied to increase the precision of the linear feed system, which is advantageous for high-speed and high-precision machining.



Grease lubrication for all axes is a standard feature

Grease lubrication system

The standard grease lubrication system eliminates the need for an oil skimmer and reduces lubrication costs by about 60% compared to oil lubrication.

Yearly maintenance cost

Max. **60** % ↓

APC (AUTOMATIC PALLET CHANGER)

The servo driven system has been adopted to further reduce non cutting time (pallet change time), thereby enhancing productivity and reliability.

Variable control of work piece load

Issuing an M-code corresponding to the work weight can change pallets at a speed appropriate for the weight.

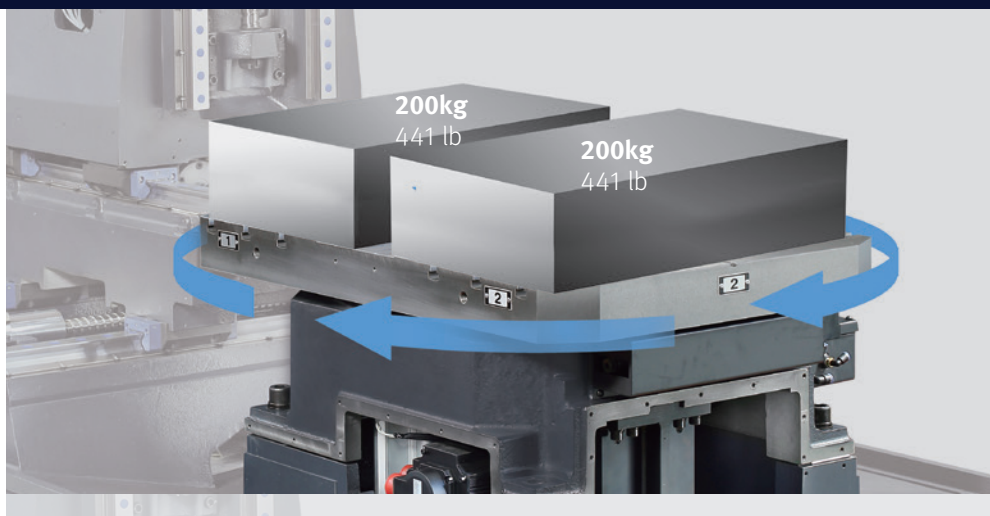


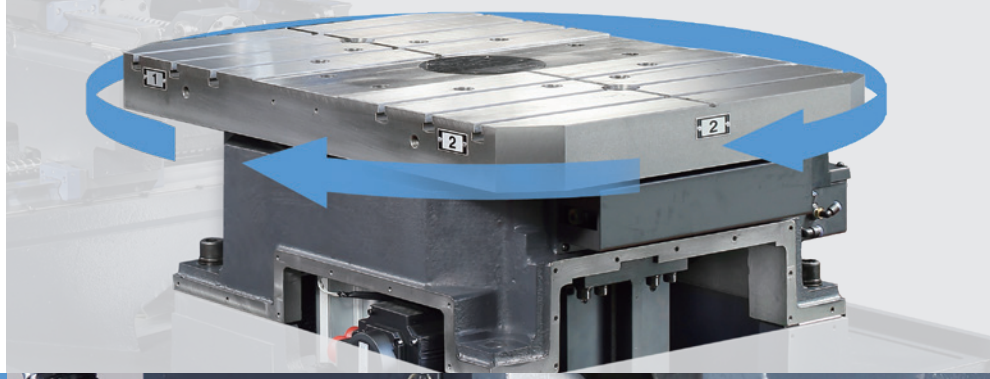
Table size

2-650 x 375 mm
2-25.6 x 14.8 inch

Max. load capacity

2-200 kg
2-441 lb

M 384 : 0~120 kg (biased load) **M 380 :** 120~200 kg (biased load)



Pallet change time

3 sec (120 kg on 1 pallet)

Max. work piece height

300 mm
11.8 inch

SPINDLE

The newly designed direct-coupled spindle offers enhanced productivity and precision with reduced acceleration / deceleration times and lower vibration / noise.

Max. spindle speed

12000 r/min
18000 r/min OPTION

MAGAZINE

Machine reliability has been optimized with the new servo tool magazine, while productivity has been enhanced by reducing the tool change time.

Tool storage capacity

14 ea
21/24 ea OPTION

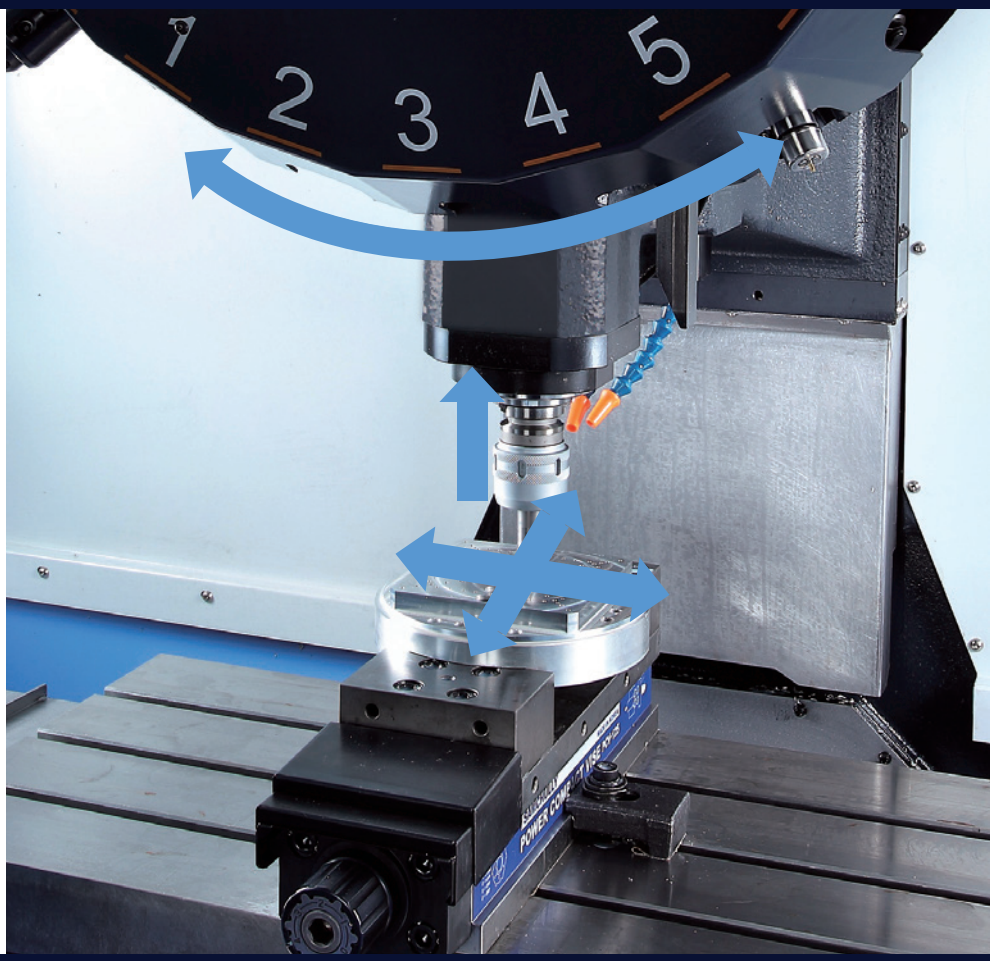
Tool to Tool

1.6 sec.

Chip to Chip

2.6 sec.

** The Chip-to-Chip time was tested in accordance with Doosan's strict testing conditions, but may vary depending on the user's operating conditions.*

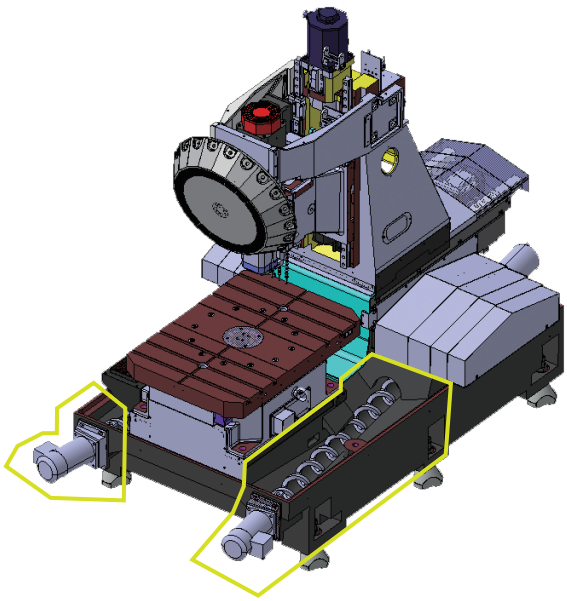


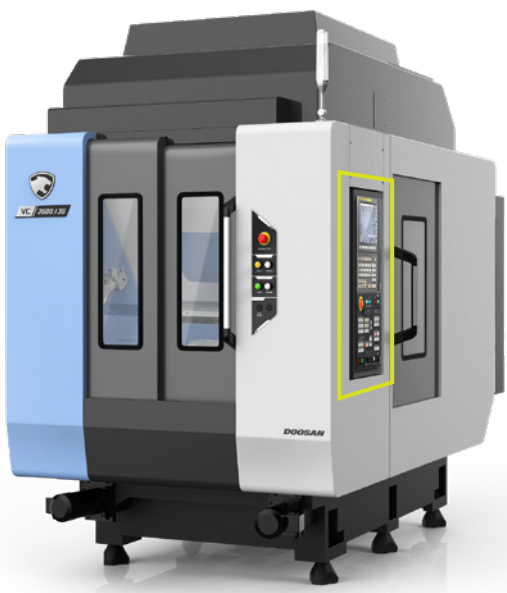
Simultaneous operation

The Simultaneous Operation Control performs pallet change, and axes home position return and tool change simultaneously to minimize non cutting time.

FEATURES

What's by applying a double chip screw in the machine, the chip disposal ability was improved. And by placing the control panel on the side, operation is easy and safe.





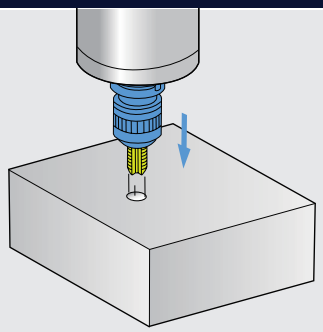
CUTTING PERFORMANCE

The high power and torque characteristics of the spindle motor provides superior milling and compact machining performance in steel at low rpm, while providing effective high speed machining for aluminum workpieces.

Machining capacity

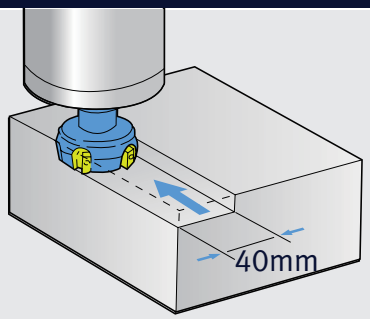
DOOSAN FANUC i (at 12000 r/min)

Tap



Tap Carbon steel (SM45C)		
Tap size (mm)	**Spindle speed (r/min)**	**Feedrate (mm/min (ipm))**
M20 x P2.5	240	600 (23.6)
Tap Aluminium (AL6061)		
Tap size (mm)	**Spindle speed (r/min)**	**Feedrate (mm/min (ipm))**
M30 x P2.5	212	742 (29.2)

Face mill (ø65mm)



Carbon steel (SM45C)		
Chip removal rate (cm^3/min ($inch^3$/min))	**Spindle speed (r/min)**	**Feedrate (mm/min (ipm))**
240 (14.6)	1500	2000 (78.7)
Aluminium (AL6061)		
Chip removal rate (cm^3/min ($inch^3$/min))	**Spindle speed (r/min)**	**Feedrate (mm/min (ipm))**
720 (43.9)	1500	6000 (236.2)

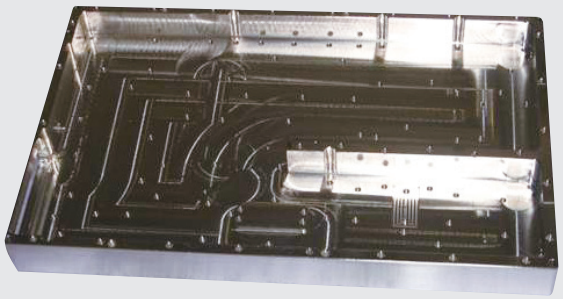
** The results, indicated in this catalogue are provides as example. They may not be obtained due to differences in cutting conditions and environmental conditions during measurement*

Productivity

DOOSAN FANUC i (at 12000 r/min)

Sample work piece

Material : Aluminium (AL6061)



Previous models	433 sec.
VC 3600/30	**375 sec.**

13 % Reduced by

STANDARD | OPTIONAL SPECIFICATIONS

A range of options is available to suit individual requirements.

Description	Features		VC 3600/30
Spindle	12000 r/min, 13 kW (17.4 Hp), 82.7 N·m (61.0 lbf-ft)		●
	18000 r/min, 3.7 kW (5.0 Hp), 11.8 N·m (87.0 lbf-ft)		○
Magazine	Tool storage capacity	14 ea	●
		21 ea	○
Tool shank type	BIG PLUS ISO #30		●
Coolant	FLOOD	0.17 Mpa (24.7 psi), 0.4 kW (0.5 Hp)	●
	TSC	None	●
		2 Mpa (290.1 psi), 1.5 kW (2.0 Hp)	○
	FLUSHING		●
	SHOWER, 40 L/min(10.6 gal/min)		○
	Oil skimmer (belt type)		○
	Coolant level switch : Sensing level - Low / High		○
Chip disposal	Chip conveyor	Chip pan	●
		Hinged type (Rear)	○
		Magnetic scraper type (Rear)	○
	Chip bucket		○
	Air blower		○
	Air gun		○
	Coolant gun		○
	Mist collector		○
Precision machining option	AICC I (40 block)		○
	AICC II (200 block)		○
Measurement & Automation	Automatic tool measurement	TS27R_RENISHAW	○
		NC4_RENISHAW	○
	Automatic tool breackage detection	NEEDLE SWING TYPE	○
		OMRON LIMIT SWITCH TYPE	○
	Automatic workpiece measurement	OMP40_RENISHAW	○
	Automatic front door with safty edge		○
Others	Top Cover		●
	LCD size	10.4 inch	●
	Signal tower	without Buzzer	●
		with Buzzer	○
	Fixture Interface (for each pallet)	Hydraulic (A/B LINE_1 PAIR)	○
		Pneumatic (A LINE_1 PAIR)	○
	Hydraulic unit (for hydraulic fixture, 2.2 kW(3.0 hp)		○
	Automatic power off		○
SMART THERMAL CONTROL	SENSORLESS TYPE (12k Standard)		○
	SENSOR TYPE (18k Standard)		○
Customized Special Option	DRUM CHIPCONVEYOR		○
	TOOL WASHING		○

** Please contact DOOSAN to select detailed steady rest specifications*

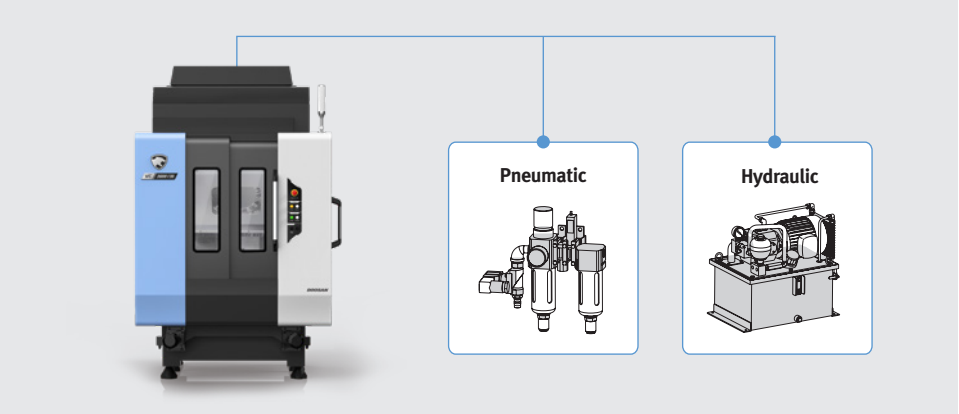
● *Standard* ● *Optional* X *Not applicable*

Fire Safety Precautions | There is a high risk of fire when using non-water-soluble cutting fluids, processing flammable materials, neglecting the controlled and careful use of coolants and modifying the machine without the consent of the manufacturer. Always check the SAFETY GUIDELINES carefully before using the machine.

PERIPHERAL EQUIPMENT

Hydraulic/Pneumatic fixtureline OPTION

Users who intend preparing equipment for hydraulic / pneumatic fixtures should consult Doosan to determine correct specification.

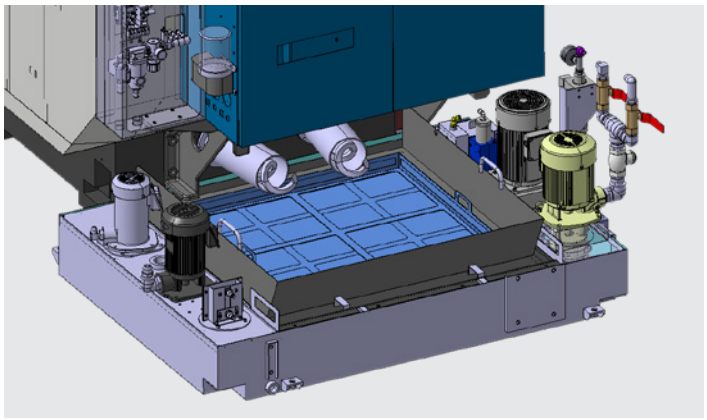


TSC OPTION

The through-spindle coolant (TSC) system delivers higher machining efficiency (optional).

An auxiliary chip box

An auxiliary chip box for effective filtering of fine aluminum chips is available as an optional feature



Top cover

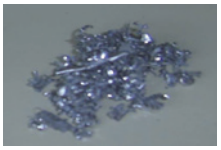
The top cover (standard feature) prevents coolant splash, thereby maintaining a clean working environment.

Chip conveyor OPTION

Long

Short

Needle


Sludge

Hinged belt type*

Most common type of chip conveyor. Appropriate for steel materials generating chips over 30mm.

Drum filter type**

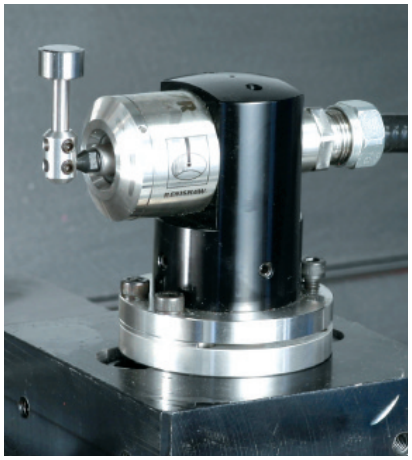
Chip conveyor with a magnet: Appropriate for machining cast iron and the generation of fine chips.

Chip conveyor type \ Material		Carbon steel			Cast iron		Aluminium		
		Long	Short	Needle	Short	Sludge	Long	Short	Needle
Hinged belt type		○	△	X	△	X	○	△	X
Scraper type	General type	X	○	△	○	△	X	△	X
	Magnetic type	X	○	○	○	○	-	-	-
Drum filter type	Hinged type	○	△	X	△	X	○	△	X
	Scraper type	X	○	△	○	△	X	○	△

○: Suitable, △ : Possible, X : Not suitable

Automatic tool Length measurement device OPTION

The Automatic Tool Length Measurement Device monitors excessive tool wear or breakage, and can be used for automatic tool setting.



DOOSAN FANUC i PLUS

Doosan Fanuc i Plus maximizes customer productivity and convenience.

10.4" Screen + New OP

Doosan Fanuc i Plus' operation panel enhances operating convenience by incorporating common-design buttons and layout. It features a Qwerty keyboard for fast and easy data input and operation.

Doosan Fanuc i Plus

- 10.4 inch color display
- Intuitive and user-friendly design

USB and PCMCIA card QWERTY keyboard

- EZ-Guide i standard
- Ergonimic operator panel
- 2MB Memory
- Hot keys

PCMCIA Card

The PCMCIA card enables uploading and downloading of the NC program, NC parameters, tool information, ladder programs, and also supports DNC operation.

USB Port

The USB memory stick enables uploading and downloading of the NC program, NC parameters, tool information and ladder programs. (DNC operation is not supported.)

NUMERIC CONTROL SPECIFICATIONS

FANUC

Division	Specifications	VC3600/30 Fanuc i PLUS
Controlled axes		3 (X,Y,Z)
Simultaneously controlled axes		4 axes
Additional controlled Axis	Add 1 Axis (5th Axis)	●
Fast data server		○
Memory card input/output		●
USB memory input/output		●
Large capacity memory(2GB)*2	Note *2) Available Option only with 15" Touch LCD (iHMI Only)	○
Embedded Ethernet		●
Fast Ethernet		○
Enhanced Embedded Ethernet function		●
DNC operation	Included in RS232C interface.	●
DNC operation with memory card		●
Workpiece coordinate system	G52 - G59	●
Addition of workpiece coordinate system	G54.1 P1 X 48 (48 pairs)	○
Tool number command		T2 digits
Tilted working plane indexing command	G68.2 TWP	○
AI contour control I	G5.1 Q_, 40 Blocks	X
AI contour control II	G5.1 Q_, 200 Blocks	●
AI contour control II	G5.1 Q_, 600 Blocks	○
AI contour control II	G5.1 Q_, 1000 Blocks	X
High smooth TCP		X
EZ Guidei (Conversational Programming Solution)		○
iHMI with Machining Cycle	Note *1) Only with 15" Touch LCD standard	X
EZ Operation package		●
CNC screen dual display function		●
FANUC MTConnect		✪
FANUC OPC UA		✪
Display unit	10.4" color LCD	●
	15" color LCD	X
	15" color LCD with Touch Panel	X
Part program storage size & Number of registerable programs	640M(256KB)_500 programs	X
	1280M(512KB)_1000 programs	X
	2560M(1MB)_1000 programs	X
	5120M(2MB)_1000 programs	●
	10240M(4MB)_1000 programs	X
	20480M(8MB)_1000 programs	X
	2560M(1MB)_2000 programs	X
	5120M(2MB)_4000 programs	X
	10240M(4MB)_4000 programs	X
	20480M(8MB)_4000 programs	X

Fanuc i plus iHMI available.

● *Standard* ● *Optional* X *N/A* ✪ *Available*

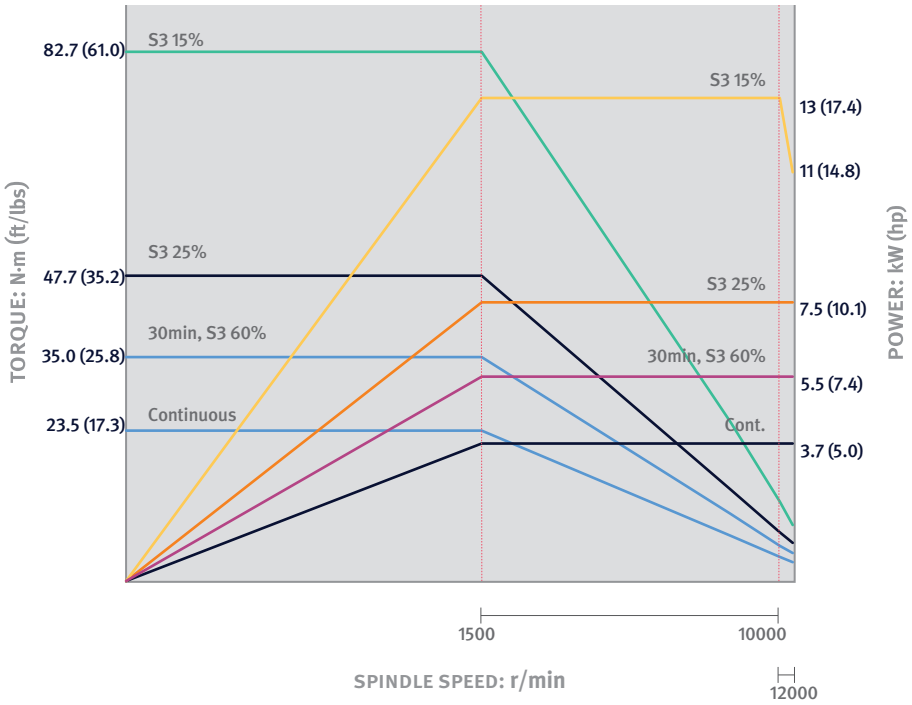
POWER | TORQUE

DOOSAN FANUC i

Max. spindle speed :
12000 r/min

Max. spindle motor power :
13 kW
17.4 Hp

Max. spindle motor torque :
82.7 N·m
61.0 lbf-ft

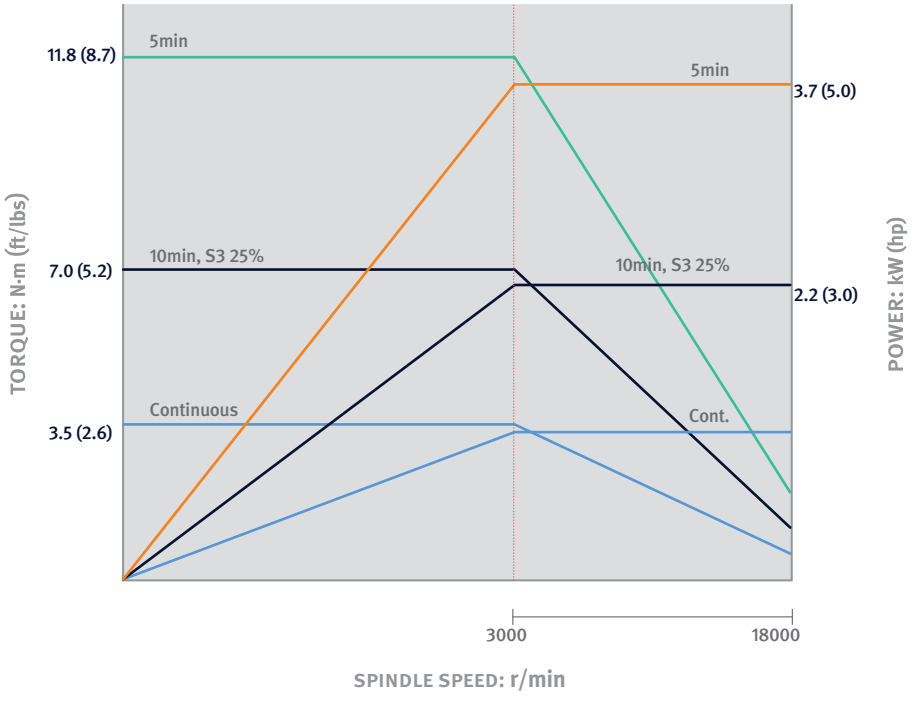


DOOSAN FANUC i OPTION

Max. spindle speed :
18000 r/min

Max. spindle motor power :
3.7 kW
5.0 Hp

Max. spindle motor torque :
11.8 N·m
8.7 lbf-ft

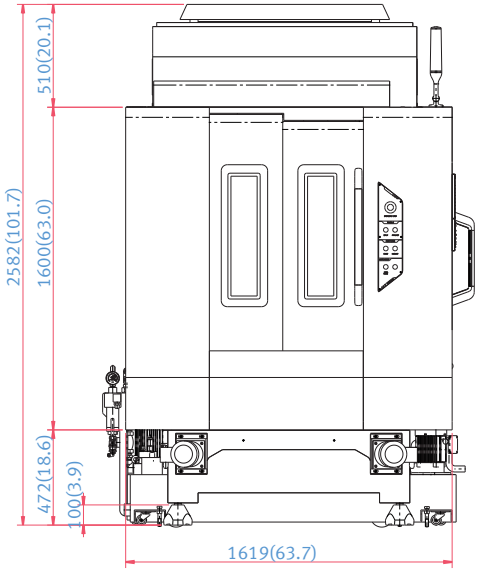


EXTERNAL DIMENSIONS

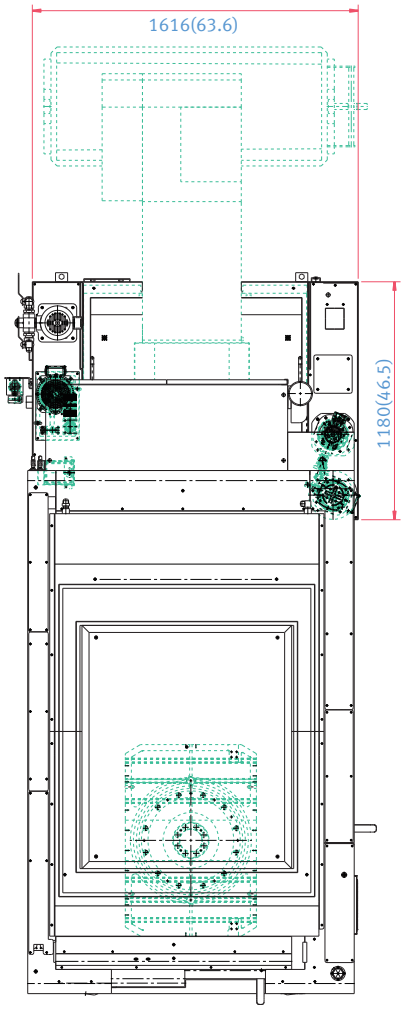
ARMLESS TYPE

Unit : mm (inch)

FRONT



SIDE



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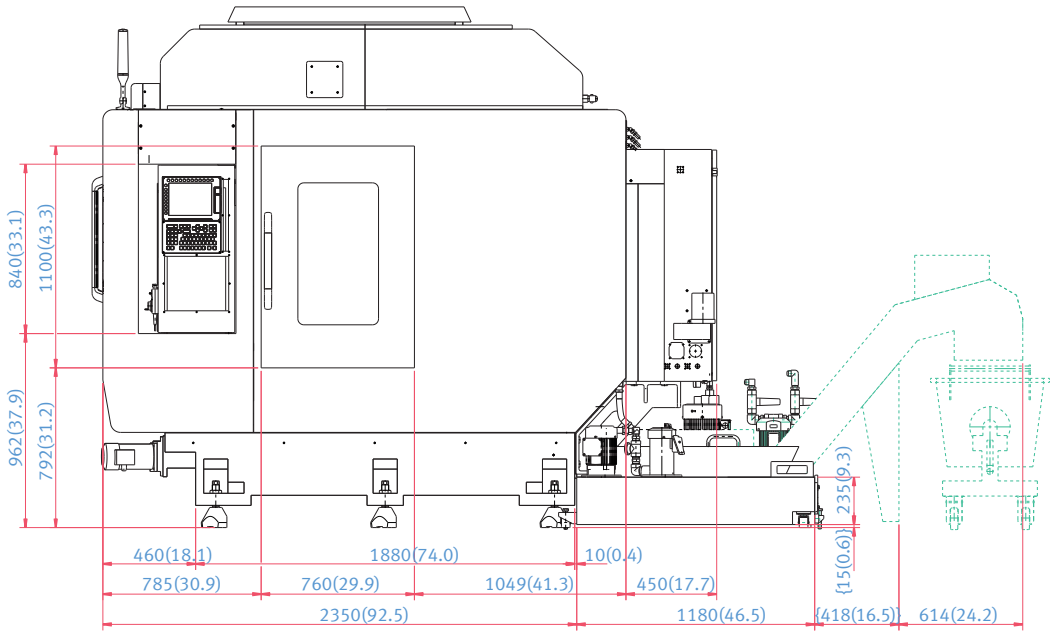


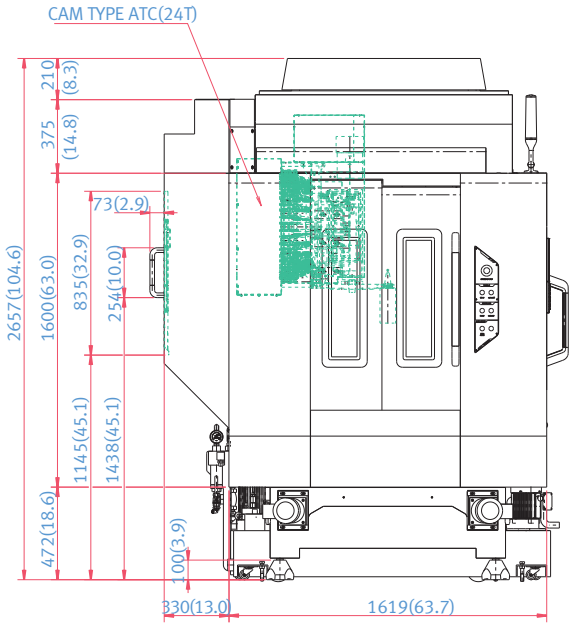
** Some peripheral equipment can be placed in other areas.*

EXTERNAL DIMENSIONS

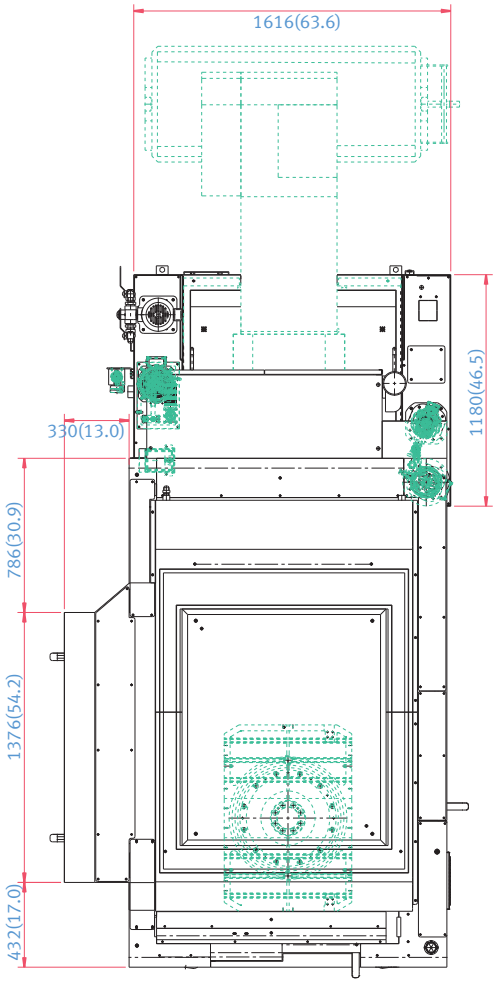
CAM TYPE

Unit : mm (inch)

FRONT



SIDE



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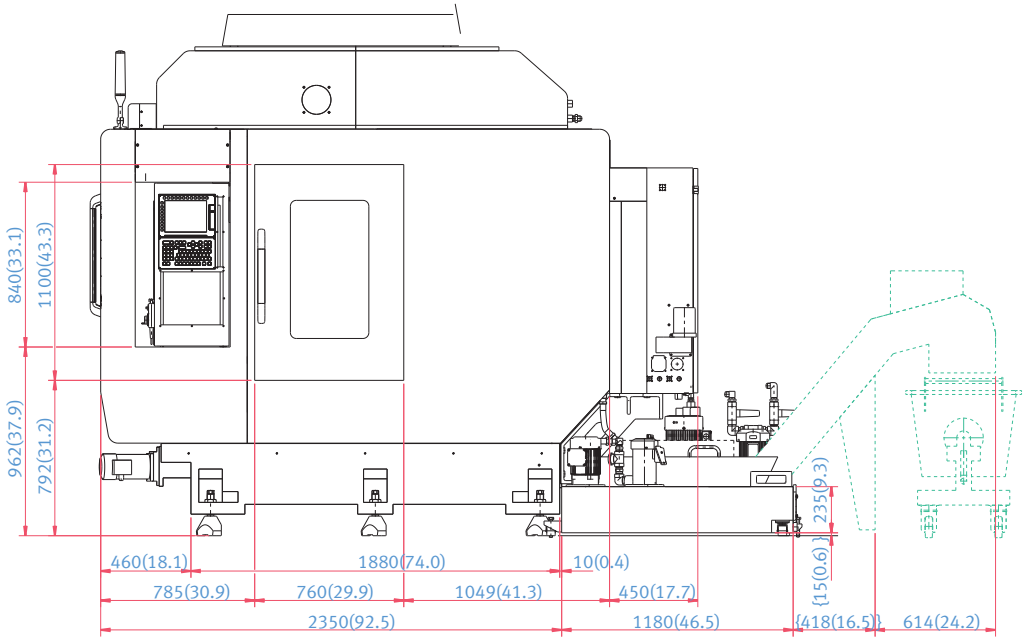
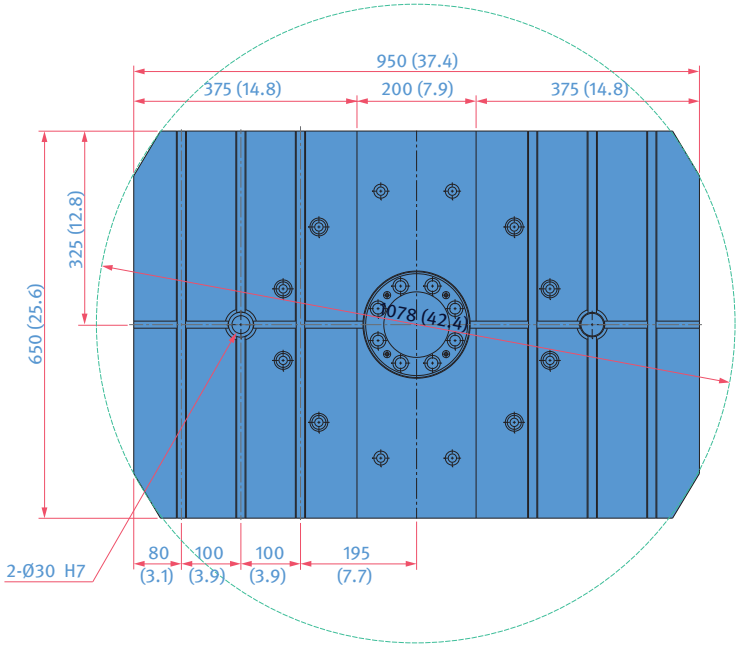


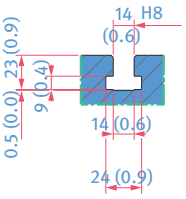
** Some peripheral equipment can be placed in other areas.*

TABLE DIMENSIONS

Unit : mm (inch)

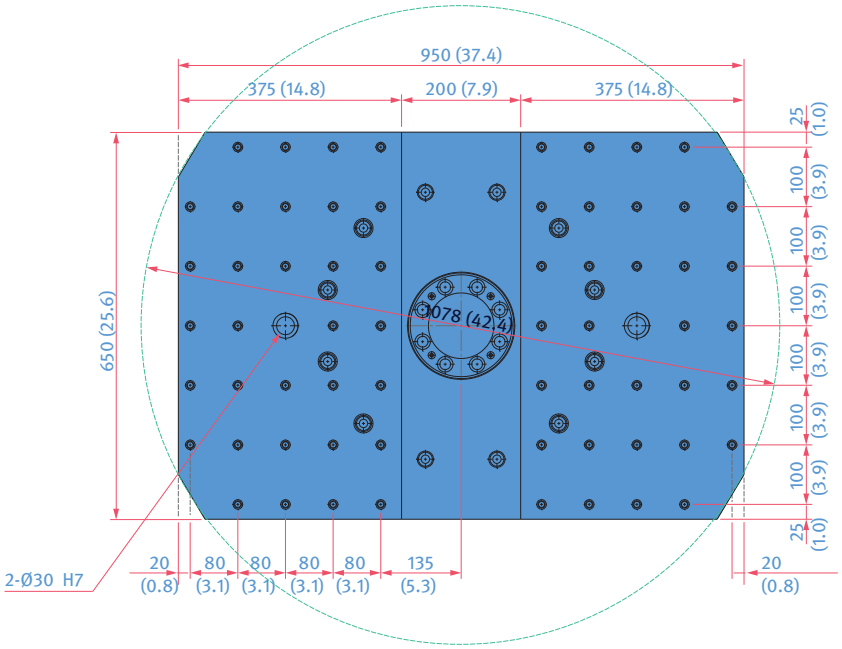
T-SLOT

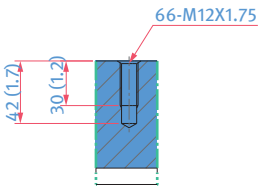




T-SLOT

TAP HOLE





TAP SECTION

MACHINE SPECIFICATIONS

Description			Unit	VC 3600/30
Travels	Travel distance	X axis	mm (inch)	520 (20.5)
		Y axis	mm (inch)	360 (14.2)
		Z axis	mm (inch)	350 (13.8)
	Distance from spindle nose to table top		mm (inch)	150 ~ 500 (5.9 ~ 19.7)
Table	Table size		mm (inch)	2-650 x 375 (2-25.6 x 14.8)
	Table loading capacity		kg (lb)	2-200 (2-441)
	Table surface type		mm (inch)	TAP HOLE TYPE 2X32(0.1X1.3)-M12(0.5)XP1.75(0.1) {T-SLOT TYPE 2X3-100X14H8 (0.1X0.1-3.9X0.6H0.3) } *
Spindle	Max. spindle speed		r/min	12000 {18000}*
	Taper		-	ISO #30
	Spindle power		kW (Hp)	13(17.4)(S3 15%)/3.7(5.0)(cont.) {3.7(5.0)(S2 5min)/1.1(1.5)(cont.)}*
	Max. spindle torque		N·m (lbf-ft)	82.7(61.0) {11.8(8.7)}*
Feedrates	Rapid traverse rate	X axis	m/min (ipm)	48 (1889.8)
		Y axis	m/min (ipm)	48 (1889.8)
		Z axis	m/min (ipm)	56 (2204.7)
Automatic Tool Changer	Type of tool shank	Tool shank	-	BT 30
		Pull stud	-	MAS403 P30T-1 45deg.
	Tool storage capa.		ea	14{21}*(Armless type) / 24(Cam type)
	Max. tool diameter	Continous	mm (inch)	80(Armless type) / 60(Cam type)
		Without Adjacent Tools	mm (inch)	150(Armless type) / 130(Cam type)
	Max. tool length		mm (inch)	200 (7.9)
	Max. tool weight		kg (lb)	2.8 (6.2)
	Max. tool moment		N·m (lbf-ft)	1.47 (1.1)
	Tool selection			FIXED ADDRESS
	Tool change time	Tool-to-tool	sec	1.6(Armless type) / 1.1(Cam type)
		Chip-to-chip	sec	2.6(Armless type) / 2.8(Cam type)
Power source	Electric power supply (rated capacity)		kVA	20.81{17.49}*
	Compressed air supply		MPa (psi)	0.54 (78.3)
Tank capacity	Coolant tank capacity		L (gal)	270 (71.3) {300 (79.3)}**
Machine Dimensions	Height		mm (inch)	2552 (100.5) {2657(80.3)}
	Length		mm (inch)	3684 (145.0)
	Width		mm (inch)	1729 (68.1) {2131(83.9)}
	Weight		kg (lb)	5200 (11463.9)
Contrel	CNC system		-	DOOSAN Fanuc i Plus

**{ } : Option **{ } : Coolant tank capacity for chip conveyor*

Doosan Machine Tools

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