

**DOOSAN**



# T 3600D

High Productivity Tapping Center  
Equipped with Dual Pallet



**MACHINE  
GREATNESS™**

Basic Information

Basic Structure  
Cutting  
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# T 3600D

The T 3600D is a compact high-productivity tapping 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.

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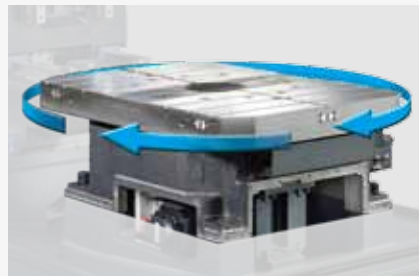
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#### Servo-type APC (Auto Pallet Changer) and ATC (Auto Tool Changer) as standard features to achieve even higher productivity and reliability

- 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%.



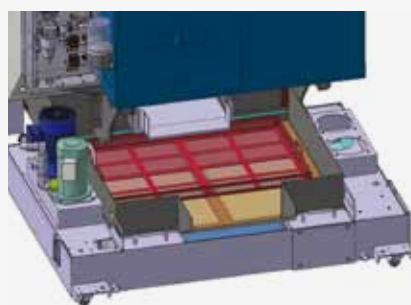
#### Newly-designed direct coupled spindle with improved rigidity and productivity

- 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 T 3600D, a Tool Taper ISO #30 Class Dual Pallet Tapping Center, is equipped with a highly-reliable 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 / Y / Z)

**48 / 48 / 56 m/min**  
(1889.8 / 1889.8 / 2204.7 ipm)



Roller-type LM guides are provided as 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%** ↓



Grease lubrication for all axes is a standard feature





### 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.

Table Size

**2-650 x 375 mm**  
(2-25.6 x 14.8 inch)

Max. Load Capacity

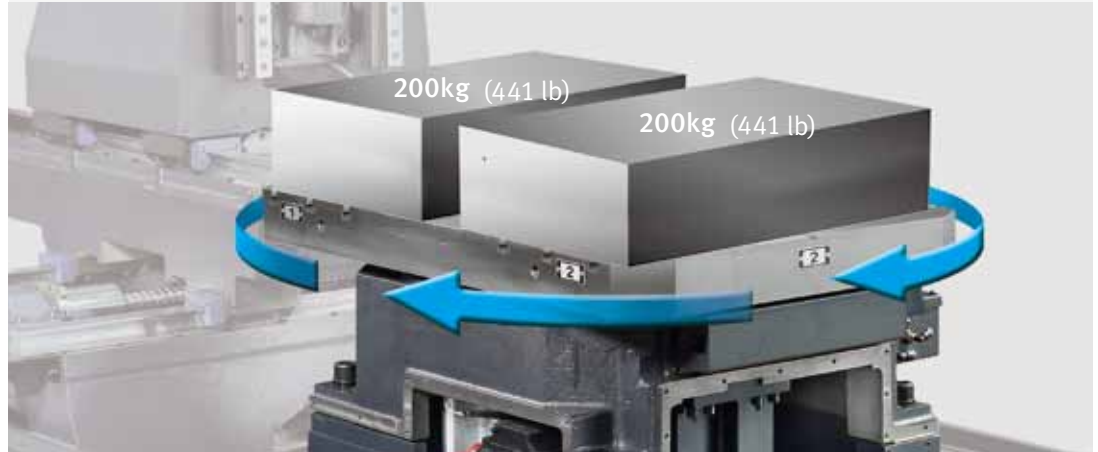
**2-200 kg**  
(2-441 lb)

Pallet Change Time

**2.9 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



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### ATC (Automatic Tool Changer)

The servo-type ATC improves reliability and reduces idle time.



Tool storage capacity

**14 ea, 21 ea** option

Tool to Tool

**1.7 sec.**

Chip to Chip

**2.5 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.



### Cutting Performance

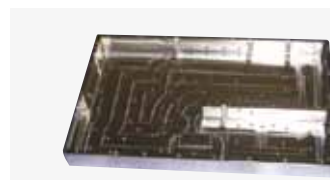
The high power and torque characteristics of the spindle motor provides superior milling and tapping performance in steel at low rpm, while providing effective high speed machining for aluminum workpieces.

### Machining Capacity [DOOSAN FANUC i (at 12000 r/min)]

<b>Tap</b> Carbon steel (SM45C)			
Tap size (mm)	Spindle speed (r/min)	Feedrate (mm/min (ipm))	
M20 x P2.5	240	600 (23.6)	
<b>Tap</b> Aluminium (AL6061)			
Tap size (mm)	Spindle speed (r/min)	Feedrate (mm/min (ipm))	
M30 x P2.5	212	742 (29.2)	
<b>Face mill (ø65mm)</b> Carbon steel (SM45C)			
Chip removal rate (cm³/min (inch³/min))	Spindle speed (r/min)	Feedrate (mm/min (ipm))	
240 (14.6)	1500	2000 (78.7)	
<b>Face mill (ø65mm)</b> Aluminium (AL6061)			
Chip removal rate (cm³/min (inch³/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: Aluminum

Previous models 433 sec.

**T 3600D 375 sec.**

Reduced by

**13%**



## Standard / Optional Specifications

Various optional features are available for customer-specific work environments.

● Standard ○ Optional X N/A

No.	Description	Features	T 3600D	
1	Spindle	12000 r/min, 13 kW (17.4 Hp), 82.7 N·m (61.0 lbf-ft)	●	
2		18000 r/min, 3.7 kW (5.0 Hp), 11.8 N·m (87.0 lbf-ft)	○	
3	Magazine	Tool storage capacity	14 ea	●
4			21 ea	○
5	Tool shank type	BIG PLUS ISO #30	●	
6	Coolant	FLOOD	0.17 Mpa (24.7 psi), 0.4 kW (0.5 Hp)	●
7		TSC	None	●
8			2 Mpa (290.1 psi), 1.5 kW (2.0 Hp)	○
9		FLUSHING		●
10		SHOWER, 40 L/min(10.6 gal/min)		○
11		Oil skimmer (belt type)		○
12		Coolant level switch : Sensing level - Low / High		○
13		Chip disposal	Chip conveyor	Chip pan
14	Hinged type (Rear)			○
15	Magnetic scraper type (Rear)			○
16	Chip bucket		○	
17	Air blower		○	
18	Air gun		○	
19	Coolant gun		○	
20	Mist collector		○	
21	Precision machining option	AICC I (40 block)	○	
22		AICC II (200 block)	○	
23	Measurement & Automation	Automatic tool measurement	TS27R_RENISHAW	○
24			NC4_RENISHAW	○
25		Automatic tool breackage detection	NEEDLE SWING TYPE	○
26			OMRON LIMIT SWITCH TYPE	○
27		Automatic workpiece measurement	OMP40_RENISHAW	○
28		Automatic front door with safty edge		○
29	Top Cover		●	
31	LCD size	10.4 inch	●	
32	Signal tower	without Buzzer	●	
33		with Buzzer	○	
34	Fixture Interface (for each pallet)	Hydraulic (A/B LINE_1 PAIR)	○	
35		Pneumatic (A LINE_1 PAIR)	○	
36	Hydraulic unit (for hydraulic fixture, 2.2 kW(3.0 hp)		○	
37	Automatic power off		○	
38	SMART THERMAL CONTROL	SENSORLESS TYPE (ONLY SPINDLE)	○	
39		SENSOR TYPE (ONLY SPINDLE)	○	
40	Customized Special Option	DRUM CHIPCONVEYOR	○	
41		TOOL WASHING	○	

\* Please contact Doosan to select detail specifications.

Peripheral Equipment

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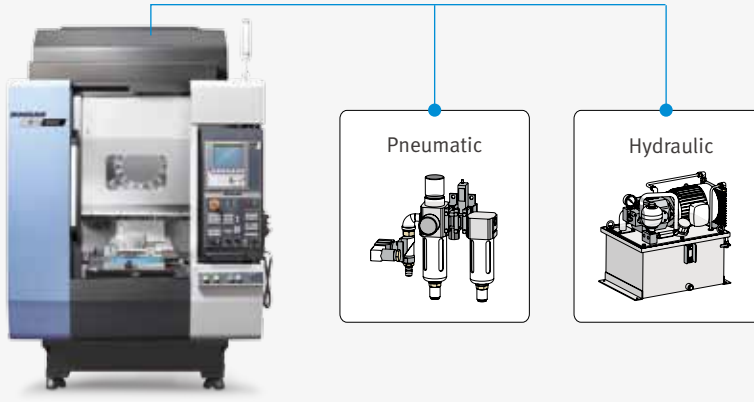
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Hydraulic/Pneumatic Fixture Line **option 33-34**

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



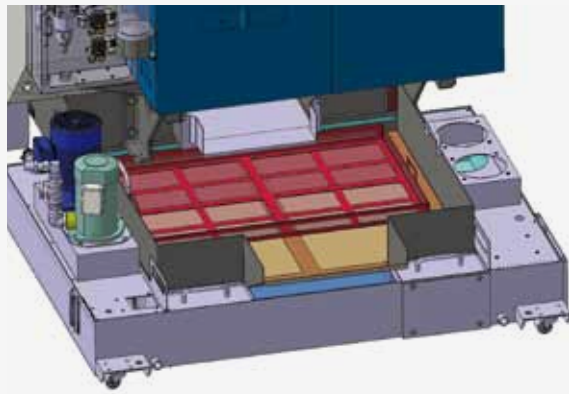
TSC **option 8**

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 13-14**



Long Short Needle Sludge

Work & Chip Size		Carbon steel			Cast iron		Aluminium		
		Long	Short	Needle	Short	Sludge	Long	Short	Needle
Conveyor Type									
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, △ : Allowable, X : Unsuitable

Automatic Tool Length Measurement Device **option 22**

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 is optimized for maximizing customer productivity and convenience.

### 10.4 inch screen + New OP

DOOSAN Fanuc i Plus' operation panel enhances operating convenience by incorporating common-design buttons and layout, and features the Qwerty keyboard for fast and easy operation.



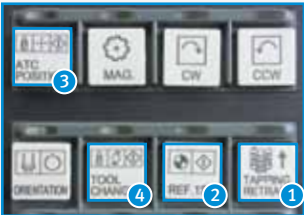
**DOOSAN Fanuc i Plus**

- 10.4 inch color display  
Intuitive and user-friendly design

**USB & PCMCIA card  
QWERTY keyboard**


- EZ-guide i standard
- Ergonomic operator panel
- 2MB Memory
- Hot key

### Hot Keys



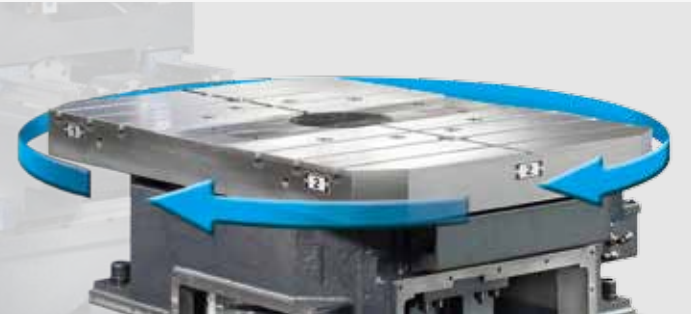
Frequently used functions can be accessed quickly and easily by clicking the hot key buttons.

- 1 Tapping Retract function: A function for releasing a tool by reverse rotating the spindle in the Manual mode when the tool is caught due to power shutdown, emergency stop or NC resetting during the machining process.
- 2 Return to home position with single-touch operation: Pressing the button in the Manual mode returns the z axis to the primary home position.
- 3 Return to ATC position: Pressing the button in the Manual mode returns the z axis to the secondary home position, where the tool magazine can rotate.
- 4 Next Tool Change function: Pressing the button to exchange adjacent tools in the Manual mode calls [Present Tool Number + 1] of the adjacent tool for automatic exchange of the tool.

 Pressing the button in the Manual mode moves the Y and Z axes to the primary home positions to enable APC function. While the One-touch APC CHANGE POSITION key is active, the "REF" selector button lamp flashes.

### 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.



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

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

## Spindle Power – Torque Diagram / Table

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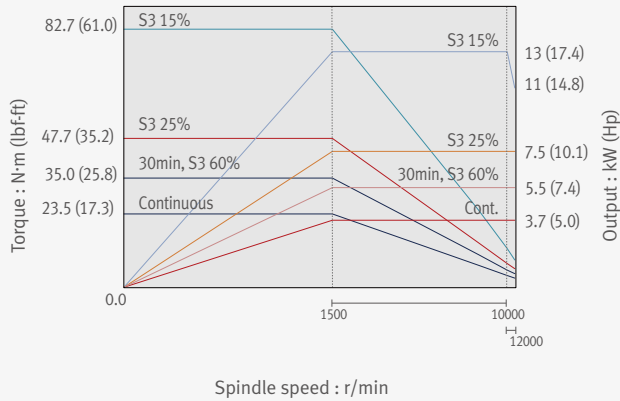
Detailed Information

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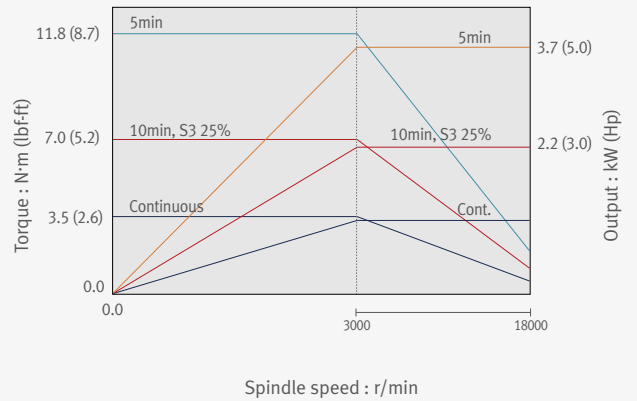
Customer Support Service

### Spindle (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)**



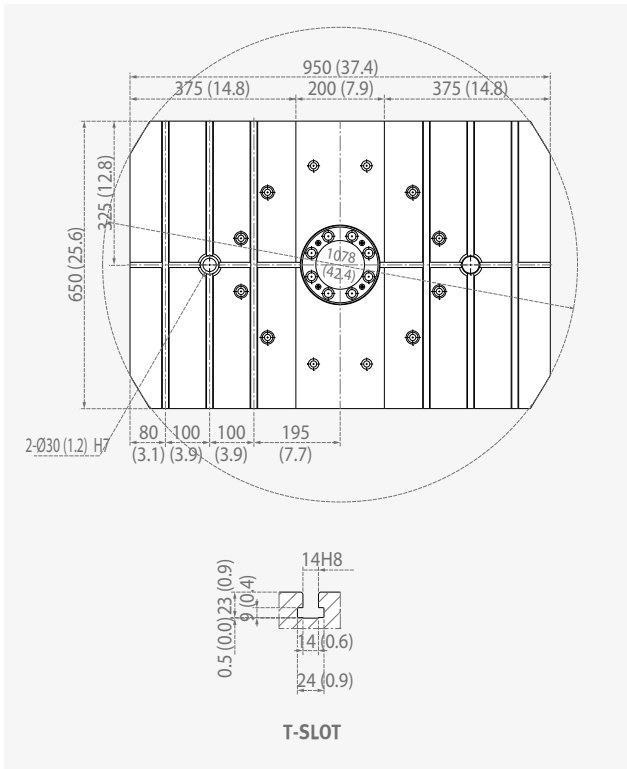
Max. Spindle speed **18000 r/min** option  
 Max. Spindle motor power **3.7 kW (5.0 Hp)**  
 Max. spindle motor torque **11.8 N·m (8.7 lbf-ft)**



### Table

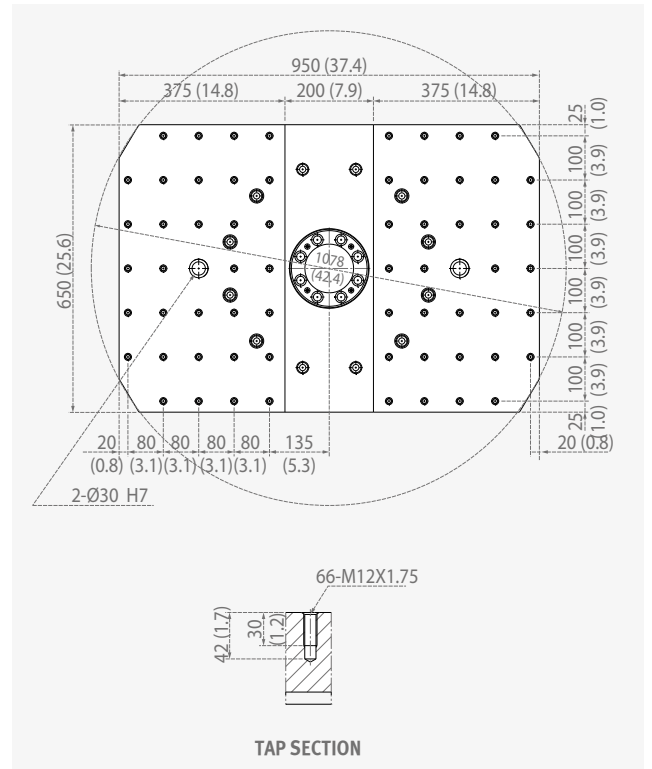
#### T-SLOT

Unit: mm (inch)



#### TAP HOLE

Unit: mm (inch)

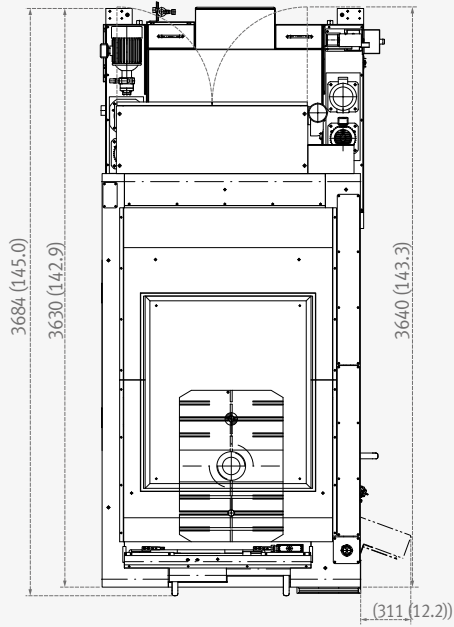


## External Dimensions

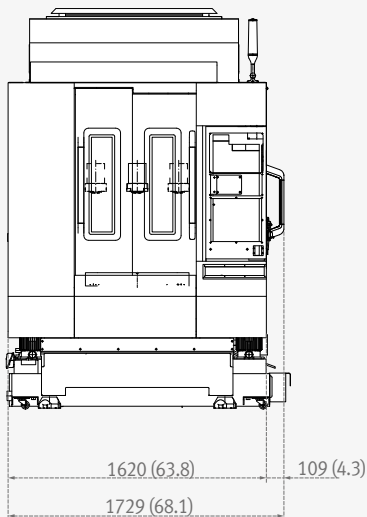
### T 3600D

Unit: mm (inch)

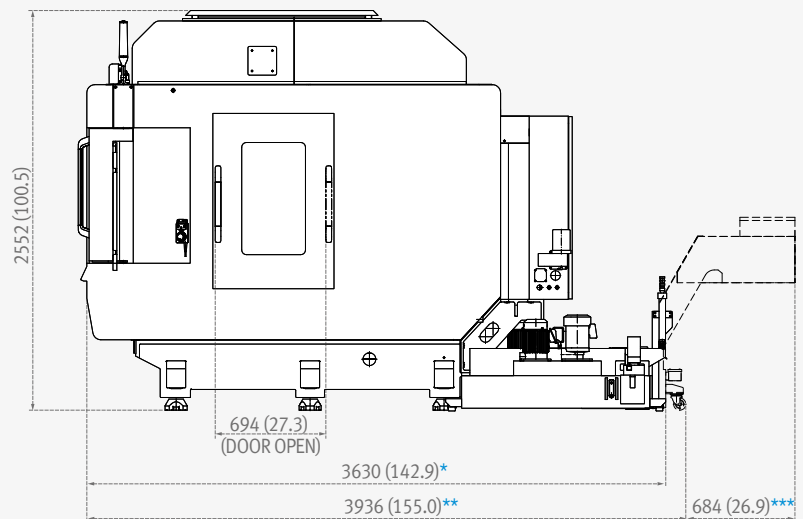
Top View



Front View



Side View



\* Max. machine length without chip conveyor(including standard coolant tank).

\*\* Machine length with coolant tank for chip conveyor.

\*\*\* Additional space required for the machine to accommodate a rear side chip conveyor.

\* Some peripheral equipment can be placed in other places

## Machine Specifications

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Description		Unit	T 3600D
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)
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}*
	Max. tool diameter	Continous	mm (inch) 80 (3.1)
		Without Adjacent Tools	mm (inch) 150 (5.9)
	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 1.7
Chip-to-chip		sec 2.5	
Power source	Electric power supply (rated capacity)		kVA 19 {15.7}*
	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)
	Length		mm (inch) 3230 (127.2)
	Width		mm (inch) 1620 (63.8)
	Weight		kg (lb) 5200 (11463.9)
Control	CNC system		- DOOSAN Fanuc i Plus

\*{ } : Option

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

# CNC Specifications

● Standard ○ Optional X N/A

**FANUC**

No.	Division	Item	Spec.	DOOSAN Fanuc i Plus	
1	Controlled axis	Controlled axes	3 (X, Y, Z)	X, Y, Z	
2		Additional controlled axes	5 axes in total	○	
3		Least command increment	0.001 mm / 0.0001"	●	
4		Least input increment	0.001 mm / 0.0001"	●	
5		Interpolation type pitch error compensation		●	
6	Interpolation & Feed Function	2nd reference point return	G30	●	
7		3rd / 4th reference return		●	
8		Inverse time feed		●	
9		Cylindrical interpolation	G07.1	●	
10		Bell-type acceleration/deceleration before look ahead interpolation		●	
11		Automatic corner override	G62	●	
12		Automatic corner deceleration		●	
13		Manual handle feed	Max. 3unit	1 unit	
14		Handle interruption		○	
15		Manual handle retrace		○	
19		AICC II	200 BLOCK	●	
20		AICC II (Preview block number increase)	400 BLOCK (Special hardware and AI contour control II)	○*1)	
21		Fine Surface Machining	Look-ahead block no. is Max Ø200 - AI contour control II+ - Smooth tolerance control+ - Jerk control	●	
22		Spindle & M code Function	M- code function		●
23			Retraction for rigid tapping		●
24	Rigid tapping		G84, G74	●	
25	Tool Function	Number of tool offsets	400 ea	400 ea	
26		Tool nose radius compensation	G40, G41, G42	●	
27		Tool length compensation	G43, G44, G49	●	
28		Tool life management		●	
29		Tool offset	G45 - G48	●	
30	Programming & Editing Function	Custom macro		●	
31		Macro executor		●	
32		Extended part program editing		●	
33		Part program storage	512KB (1280m)	X	
34			2MB (5120m)	5120m	
35		Inch/metric conversion	G20 / G21	●	
36		Number of Registered programs	400 ea	X	
37			1000 ea	1000 ea	
38		Optional block skip	9 BLOCK	●	
39		Optional stop	M01	●	
40		Program file name	32 characters	●	
41		Sequence number	N 8-digit	N8 digit	
42		Playback function		●	
43		Addition of workpiece coordinate system	G54.1 P1 - 48 (48 pairs)	48 pairs	
44	G54.1 P1 - 300 (300 pairs)		○		
45	OTHER FUNCTIONS (Operation, setting & Display, etc)	Embedded Ethernet		●	
46		Graphic display	Tool path drawing	●	
47		Loadmeter display		●	
48		Memory card interface		●	
49		MDI / DISPLAY unit	10.4" color LCD	●	
50		USB memory interface	Only Data Read & Write	●	
51		Operation history display		●	
52		DNC operation with memory card		●	
53		Optional angle chamfering / corner R		●	
54		Run hour and part number display		●	
55		High speed skip function		○	
56		Polar coordinate command	G15 / G16	●	
57		Programmable mirror image	G50.1 / G51.1	●	
58		Scaling	G50, G51	●	
59		Single direction positioning	G60	●	
60		Pattern data input		●	
61		Jerk control	AI contour control II is required.	●	
62		Fast Data server with 1GB PCMCIA card		○	
63		Fast Ethernet		○	
64		3-dimensional coordinate conversion		○	
65		Figure copying	G72.1, G72.2	○	
66		Machining condition selection function	10 LEVELS	●*2)	
67		Machining quality level adjustment	3 LEVELS	○*2)	
68		EZ Guide i (Conversational Programming Solution)		●	
69		iHMI with Machining Cycle		X	
70		MANUAL GUIDE i		X	

\*1) AICC2 (400block) of 0iMF must be changed to High Speed Main board. Ask R&D center for information.

\*2) If This function is selected, Step of Machining condition selection function is changed from 10 levels to 3 levels.



# Responding to Customers Anytime, Anywhere

## Doosan Machine Tools' Global Network, Responding to Customer's Needs nearby, Anytime, Anywhere

Doosan machine tools provides a system-based professional support service before and after the machine tool sale by responding quickly and efficiently to customers' demands.

By supplying spare parts, product training, field service and technical support, we can provide top class support to our customers around the world.



### Global Sales and Service Support Network

Corporations	Dealer Networks	Technical Centers Technical Center: Sales Support, Service Support, Parts Support	Service Post	Factories
4	167	51	200	3

# Doosan Machine Tools Customer Support Service

We help customers to achieve success by providing a variety of professional services from pre-sales consultancy to post-sales support.



## Supplying Parts

- Supplying a wide range of original Doosan spare parts
- Parts repair service



## Field Services

- On site service
- Machine installation and testing
- Scheduled preventive maintenance
- Machine repair



## Technical Support

- Supports machining methods and technology
- Responds to technical queries
- Provides technical consultancy



## Training

- Programming / machine setup and operation
- Electrical and mechanical maintenance
- Applications engineering



## Major Specifications

### T 3600D



Description	Unit	T 3600D
Max. spindle speed	r/min	12000 {18000}*
Spindle motor power	kW (Hp)	13/3.7 (17.4/5.0) {3.7/1.1 (5.0/1.5)}*
Tool taper	-	ISO #30
Travel distance (X / Y / Z axis)	mm (inch)	520 / 360 / 350 (20.5 / 14.2 / 13.8)
Tool storage capacity	ea	14 {21}*
Table size	mm (inch)	2-650 x 375 (2-25.6 x 14.8)
Max. workpiece weight	kg (lb)	2 - 200 (2-441)
Machine size(Width x Length)	mm (inch)	1620 x 3230 (63.8 x 127.2)

\*{ } : optional

## Doosan Machine Tools

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



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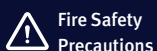
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\* For more details, please contact Doosan Machine Tools.

\* The specifications and information above-mentioned may be changed without prior notice.

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**Fire Safety  
Precautions**

There is a high risk of fire when using non-water-soluble cutting fluids, processing flammable materials, neglecting use coolants and modifying the machine without the consent of the manufacturer. Please check the SAFETY GUIDANCE carefully before using the machine.

ver. EN 201012 SU