Doosan Machine Tools

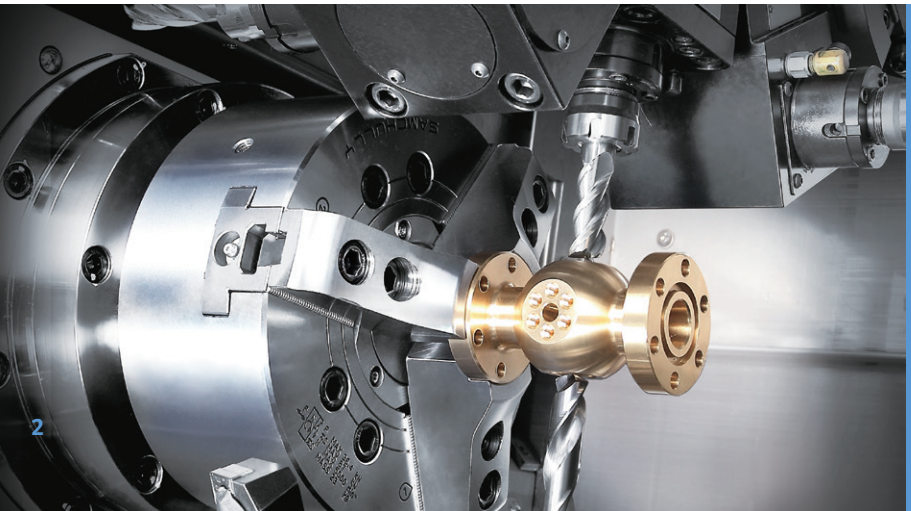
TWO-SPINDLE TWO-TURRET WITH Y-AXIS TURNING CENTERS

PUMA TT

2500MS/SY

PUMA TT2500 SERIES

High performance turning center featuring first & second spindle that have the same power and capacity, withupper & lower turrets on the grounded box type bed. Simultaneous machining on two faces with both spindles and turrets and virtual realization of Y-axis function will bring you double productivity.



The compact PUMA TT is packed with one-setup efficiency. Thanks to its 24 tool positions in the upper and lower turrets, you'll complete complicated parts that require plenty of tools in just one setup.

EXCELLENT RIGIDITY AND POWER

The left and right spindles and the upper and lower turrets operate independently to double the machine's productivity.

DOUBLED PRODUCTIVITY

All guide ways are wide wraparound rectangular type for unsurpassed long term rigidity and accuracy.

ADVANCED UNLOADER SYSTEM

The left and right spindles are equipped with independent part catcher and unloader systems to provide a fully automated manufacturing system.

VARIATION PROCESSING

A : Max. turning dia. (on Upper turret)

390 mm
15.4 inch

A : Max. turning dia. (on Lower turret)

300 mm
11.8 inch

B : Max. turning length

350 mm
13.8 inch

C : Max. bar working dia.

81 mm
3.2 inch

Y-axis Working Range

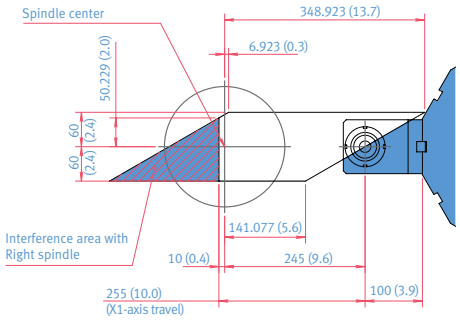
By simultaneous X-Y-Z-axis feed control and C-axis function to guide precise circular orientation of spindle, Y/X axes circular interpolation simplifies the machining of complex shapes in faster cycle time.

Y-axis travel

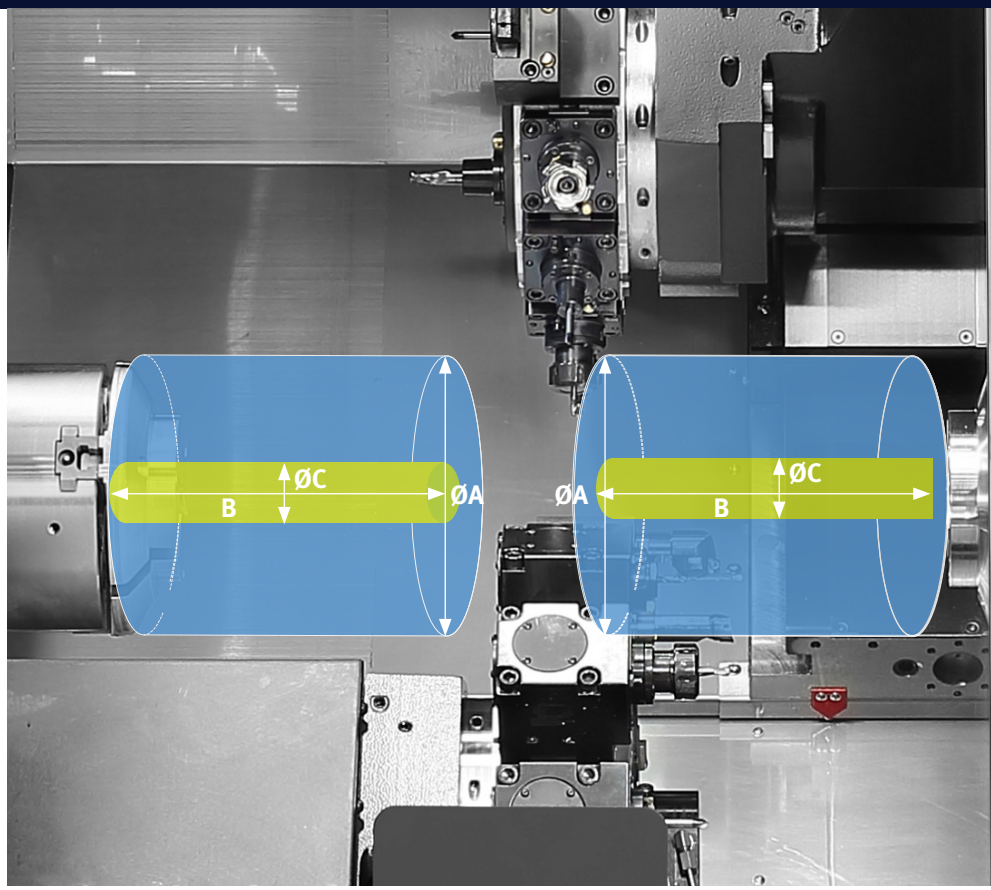
120 (±60) mm
4.7 (±2.4) inch

Y-axis rapid

7.5 m/min
295.3 ipm



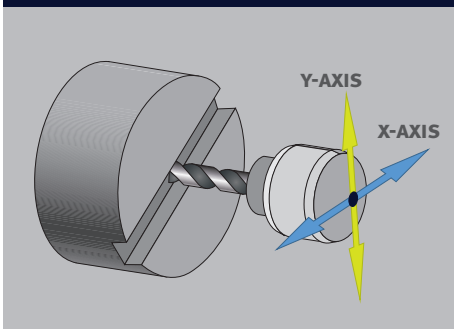
Angular Milling unit moving area



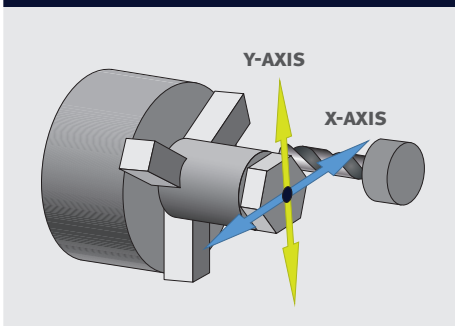
Y-Axis Milling

A wide variety of multi-axis milling cycles can be achieved using the Y-axis.

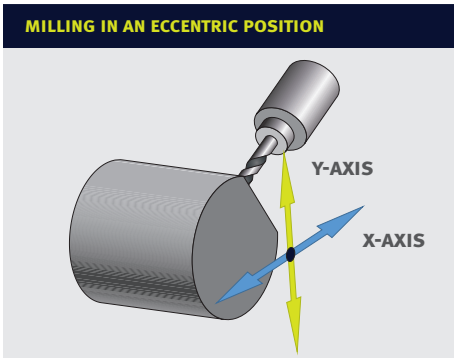
GROOVE FINISH CUTTING USING THE Y-AXIS



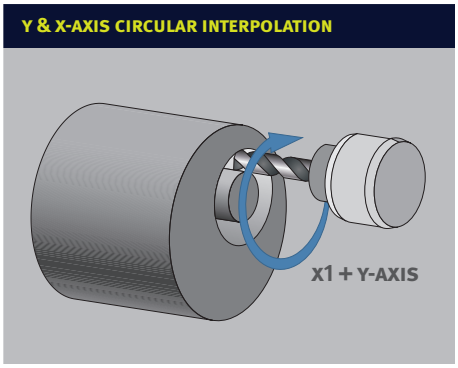
MULTI-FACE CUTTING



MILLING IN AN ECCENTRIC POSITION



Y & X-AXIS CIRCULAR INTERPOLATION



SPINDLE

High productivity achieved with highspeed, high-power spindle motor.

Built-in Structure

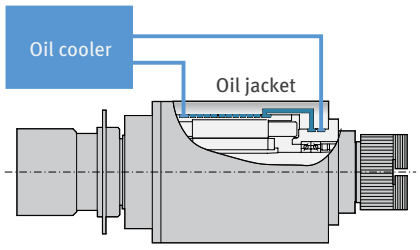
Both left and right spindle have built-in motor spindles that wholly covered with oil cooling system to ensure remarkable range of applications from heavy duty cutting with high power at low speed to fine to finish cutting at high speed and optimize thermal displacement.
Both Left and Right spindle are designed to minimize maleffects of thermal distortion which can hit continuous machining precision seriously. Especially the same capacity of both spindles improves productivity remarkably of single machine.

Max. Power (30 min)

26 / 22 kW

Max. spindle speed (10inch)

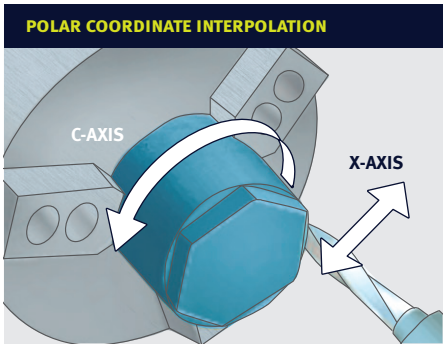
3500 r/min

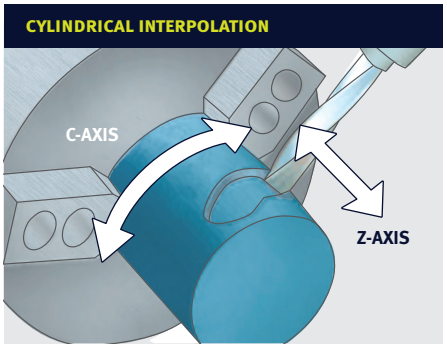


Oil Cooling Unit for Spindles

C-axis Accuracy

The positioning and repeatability of the C-axis has been enhanced.





BASIC STRUCTURE

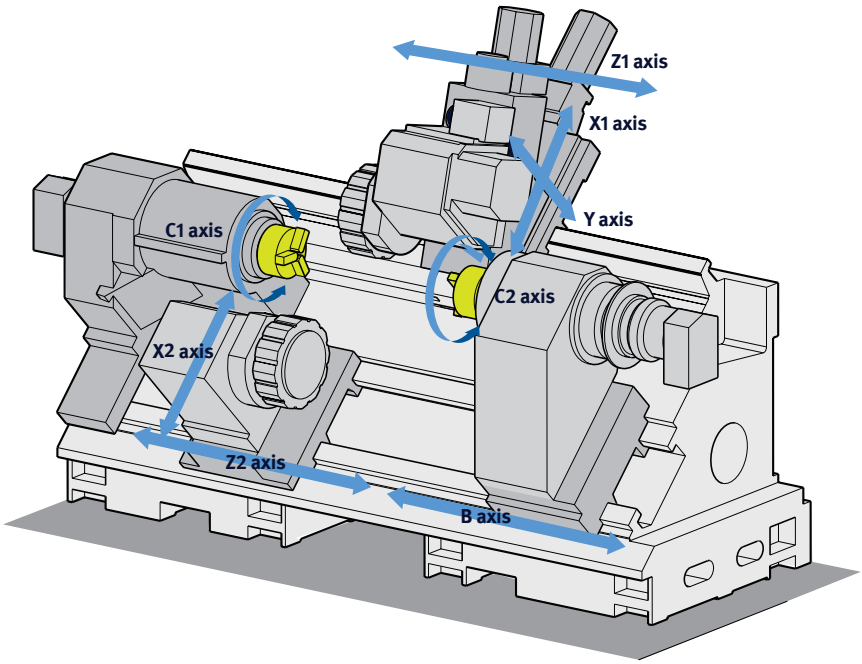
Machine construction

Perfect integration of multi-process and high productivity are achieved by Left & right spindle of the same power and capacity, with upper & lower turrets on the grounded box type bed.

Achievement of PUMA TT machines

Continuous process accuracy, Shorten setting time, Optimal distribution of cycle and Automated works.

Outstanding rigidity for high feedrates



Travel

X1-axis (Upper turret)

255 mm
10.0 inch

Z1-axis (Upper turret)

800 mm
31.5 inch

A-axis

810 mm
31.9 inch

X2-axis (Lower turret)

190 mm
7.5 inch

Z2-axis (Lower turret)

900 mm
35.4 inch

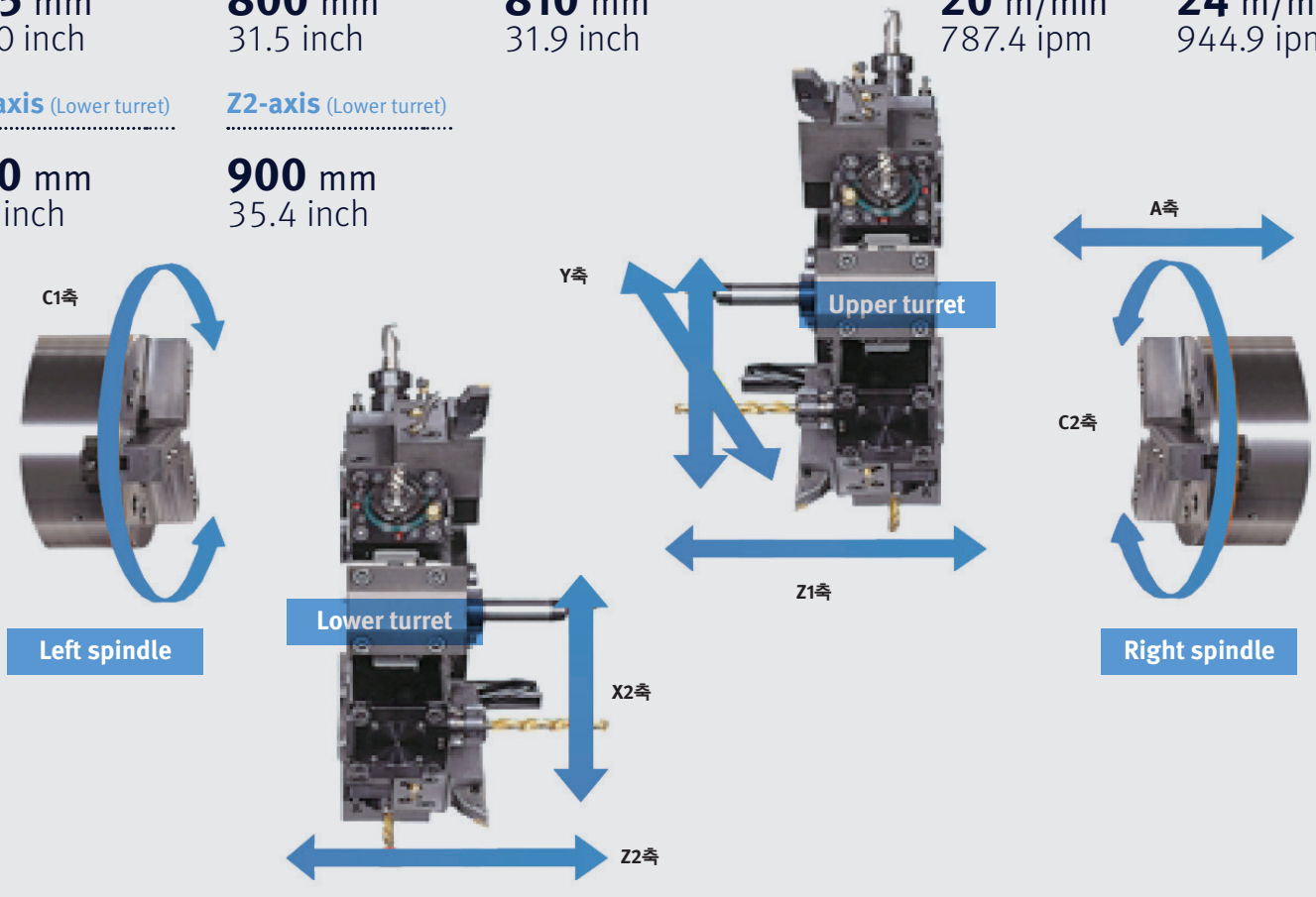
Rapid Traverse

X-axis

20 m/min
787.4 ipm

Z-axis

24 m/min
944.9 ipm



TURRET

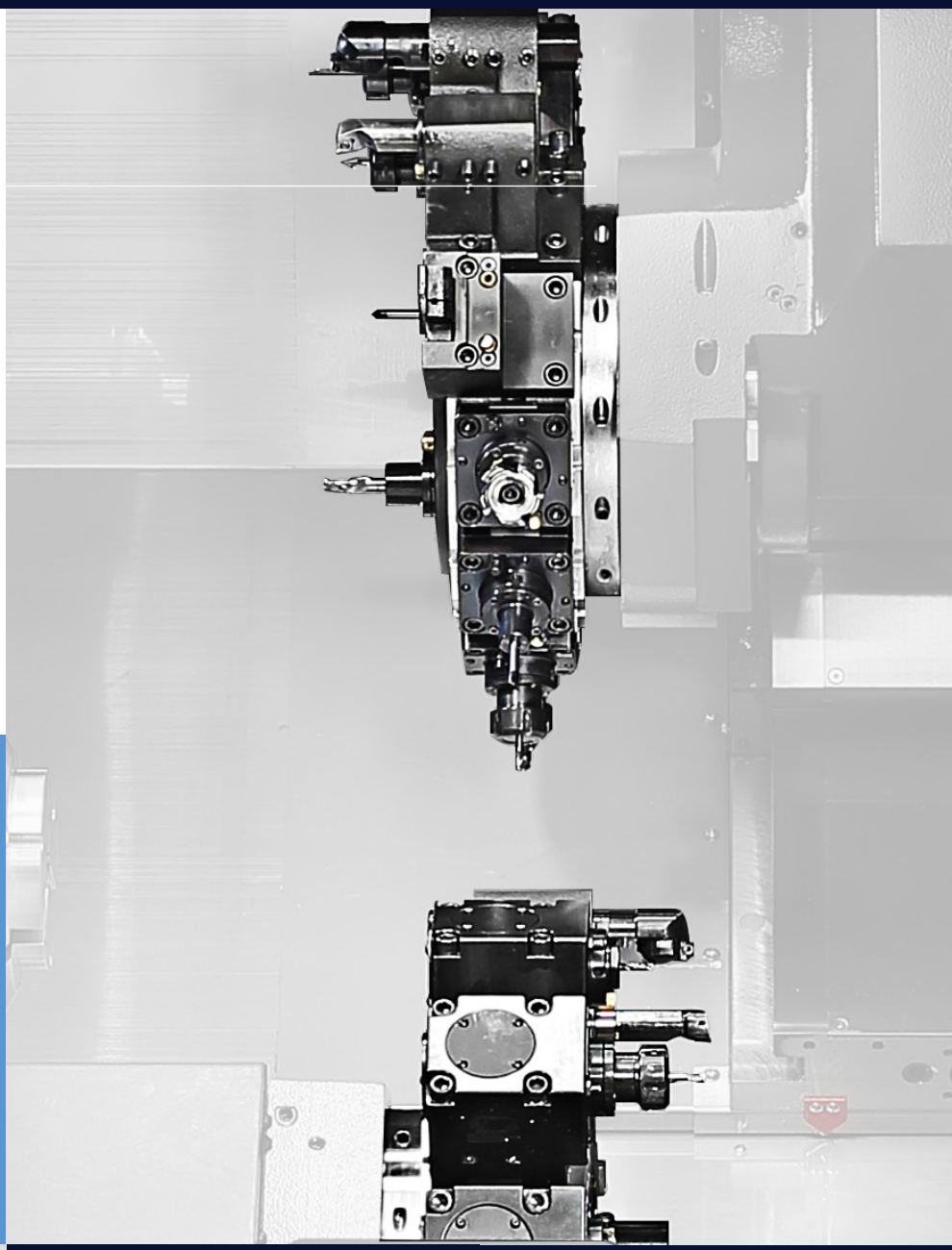
Features stronger and faster turrets; upgraded servo motors for faster and more accurate tool rotation; and a stabilized structure for higher productivity and heavier-cutting capability.

Index time (1-station swivel)

0.20 s

No. of tool station (Upper+Lower turret)

24 (12+12) st

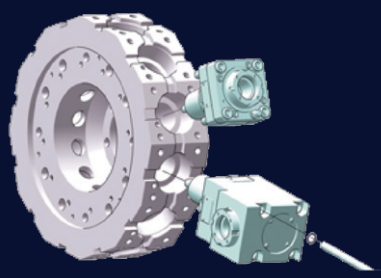


Turret

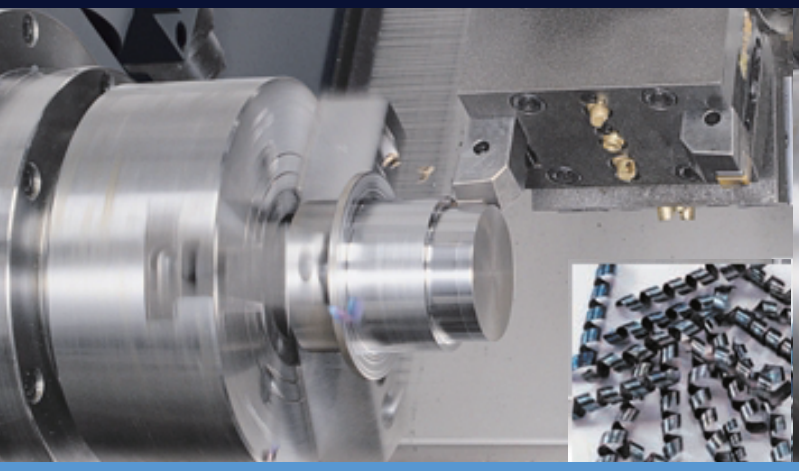
Total of 24 tool stations upper and lower turret(BMT65P) make it possible to complete complicated parts requiring many tools in just one set-up. Reliable servo driven turrets reduce the total cycle time required to machine parts.

Radial BMT65P

The turret features BMT65P style tooling in which the toolholders are mounted directiy to the turret's periphery using 4 large bolts.



MACHINE CAPACITY



Heavy-Duty Cutting, OD (Left spindle & upper turret)

Making full use of the high output motor, heavyduty
O.D. cutting is powerful and precise even with large workpieces.

Balanced Cutting, OD (Left spindle & upper - lower turret)

The synchronous control of Upper and Lower turrets makes
O.D. cutting with high precision balanced cutting.

Chip removal rate

348 cm³/min
21.2 inch³/min

Cutting depth

10mm
0.4 inch

Material	Cutting speed (m/min (ipm))	Feedrate (mm/rev (ipr))	Spindle speed (r/min)
SM45C	120 (4724.4)	0.36 (0.0)	320

Chip removal rate

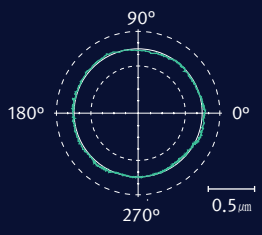
367 cm³/min
22.4 inch³/min

Cutting depth

5mm x **2**
0.2 inch

Material	Cutting speed (m/min (ipm))	Feedrate (mm/rev (ipr))	Spindle speed (r/min)
SM45C	120 (4724.4)	0.4 (0.0)	320

Reliable Long-Run Machining Accuracy



Tool	Ø 20 HSS drill
Material	AL2024
Outer diameter (mm (inch))	60 (2.4)
Spindle speed (r/min)	1300
Feedrate (mm/rev (ipr))	0.05 (0.0)

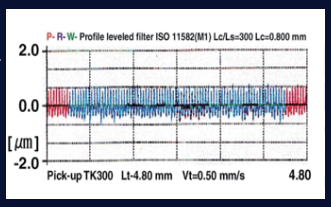
Roughness

0.40 ㎛

Surface roughness

0.23 ㎛ Ra

** The machining accuracy indicated is just for reference. Depending on cutting and environmental conditions during measurement, the results can be different..*



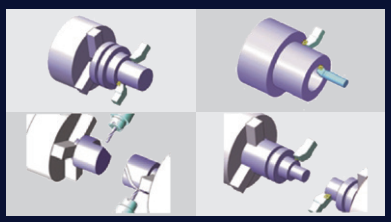
Drilling

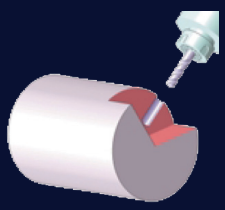
Tool	Ø 20 HSS drill
Material	SM45C
Rotary tool spindle speed (r/min)	1,000
Feedrate (mm/min)	0.3 (0.0)
Chip removal rate (cm³/min (inch³/min))	60 (3.7)
Drilling depth (mm (inch))	10 (0.4)

Tapping

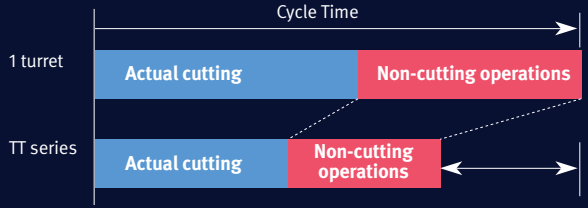
Tool	M16×2.0
Material	SM45C (JIS S45C)
Rotary tool spindle speed (r/min)	600
Feedrate (mm/min (ipm))	1200 (47.2)

Machining examples





High productivity



Productivity

x 1.7

STANDARD & OPTIONAL SPECIFICATIONS

Description	Features	PUMA TT2500series
Chuck (Left / Right)	10 Inch	●
	None	○
Jaws (Left / Right)	Soft Jaws	●
	Hardened & Ground Hard Jaws	○
Chucking option	Dual Pressure Chucking	○
	Chuck Clamp Confirmation	●
Tailstock	Tail Center For Turret	○
Coolant Pump	1.5 bar	●
	4.5 / 7 / 10 / 14.5 / 28 bar	○
Coolant options	Oil Skimmer	○
	Coolant Chiller	○
	Coolant Pressure Switch	○
	Cooling Flow Switch	○
	High Coolant Interface	○
	Chuck Coolant (Left / Right)	○
	Through Spindle Coolant(T.S.C) For Spindle (Left / Right)	○
	Coolant Gun	○
Chip processing options	Chip Conveyor_Side Type	○
	Chip Conveyor_Rear Type	○
	Chip Bucket	○
	Air Blow (Left / Right)	●
	Mist Collector	○
Measurement & Automation	Tool Setter (Manual / Auto)	○
	Parts Catcher And Box	X
	Parts Unloader And Conveyor	○
	Work Ejector	○
	Auto Door	○
	Cut-Off Confirmation	○
	Work / Tool Counter	○
	Robot Interface (PMC I/O, Profibus)	○
	Bar Feeder Interface	○
Optional devices	Tool Load Monitoring	○
	Linear Scale (X1, X2, Z1, Z2, Y)	○
	Signal Tower	○
	Air Gun	○
	Air Conditioner For Electric Cabinet	○
	Light For Electric Cabinet	○
	Extra M-Code (4ea)	○
	Auto Power Off	○
	Quick change tooling(CAPTO)	○
Customized Special Option	Coolant level switch : Sensing level - Low	○
	Parts Unloader And Conveyor_Gripper Type	○
	Automatic Top Door	○
	Coolant Gun	○
	Coolant Chiller	○
	Chip Coveyor_Drum Filter Type	○
	Shower Coolant	○
	Air Limit Sensing On Chuck_Preparation	○
	Rotary Type Window Wiper_Eletrical	○
	TSC For Main/Left Spindle	○
	TSC For Sub/Right Spindle	○
	TSA For Main/Left Spindle	○
	TSA For Sub/Right Spindle	○
	Work & Tool Counter	○
	Tool Setter Extension For Special Chuck	○
	Main/Left Spindle Air Curtain	○
	Sub/Right Spindle Air Curtain	○
	MQL System	○
	Chuck Pressure Switch	○

Please contact your Doosan Machine Tools representative for detailed machine information.

● *Standard* ○ *Optional* X *N/A*

PERIPHERAL EQUIPMENT

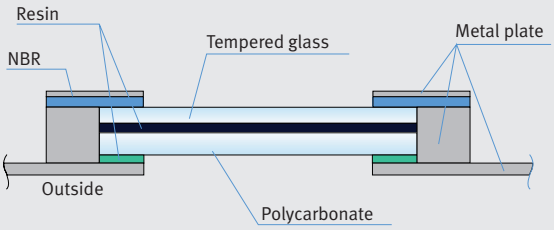
Ergonomic Design

Swivel type operator panel

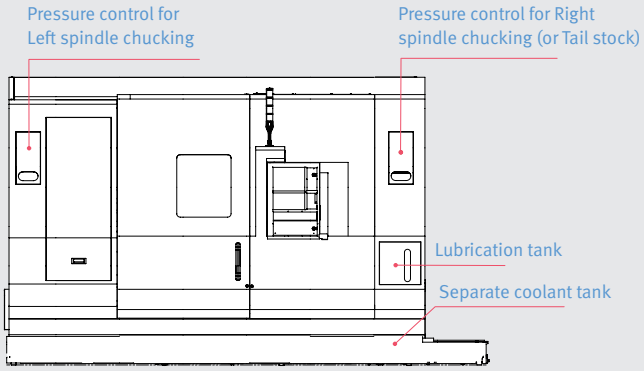
Operator oriented design
with 90°swivel

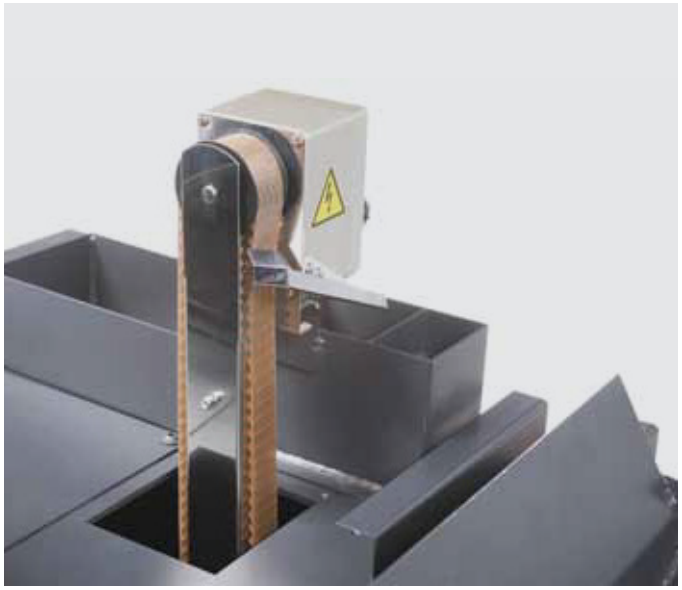
Safety window on front door

Viewing window is designed and was tested under heavy condition to protect operator against possible dangers during real cutting thanks to its shock absorbing laminated glass and double panel construction. The window without grating also provides a clear view of the machine inside.



High maintainability





Eco-Friendly Design

Oil Skimmer OPTION

Another suggestion to prolong the life time of the coolant water. A belt-driven type oil skimmer picks up and removes waste oil from the coolant tank that is easily drained.

Collection of Waste Lubrication Oil

Less waste lubrication oil extends the life time of the coolant water and cut down the grime and offensive smell of the machine inside.

No Coolant Leakage

Rigorously designed, manufactured and tested machine covers do not permit coolant leakage in any condition. The factory always keeps our environment clean.

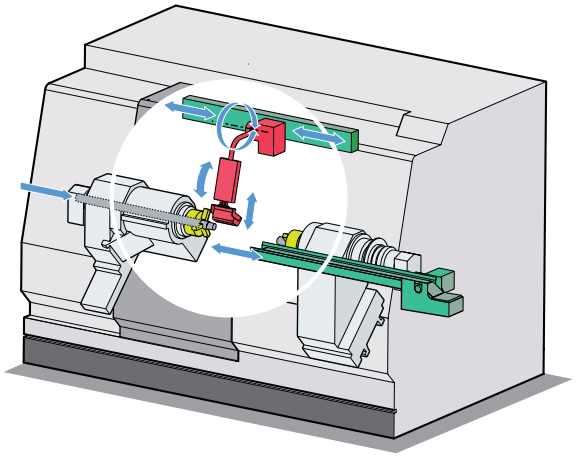
PERIPHERAL EQUIPMENT

Optimal Support System of Automatic Operation OPTION

Parts unloader & conveyor

Parts unloader system built inside the machine can receive workpieces from both spindles. Automated operation is realized perfectly when the system is coupled with bar feeder system.

Max. work diameter	Ø81 mm (3.2 inch)
Max. work length	160 mm (6.3 inch)
Max. work weight	4kg (8.8 lb)

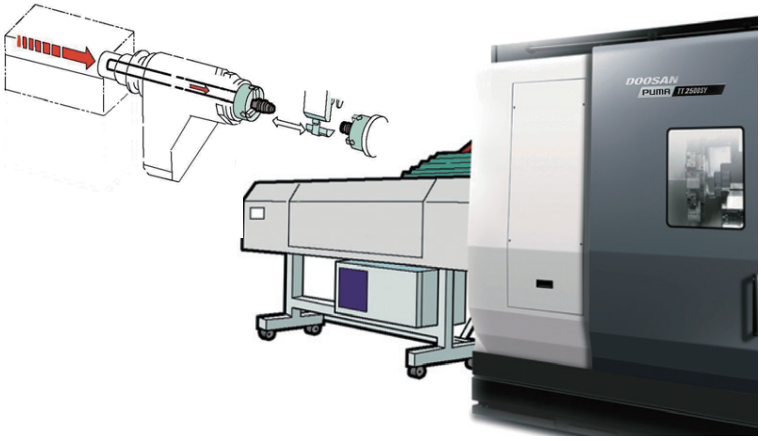


Bar feeder system

Automated bar working is possible by bar feeder system. When parts unloader system is added, its value of use will be in the best.

Max. Bar Working dia

ø81 mm
3.2 inch



** Depending on the chuck and cylinder spec. used in the machine, the bar working dia. can be reduced.*

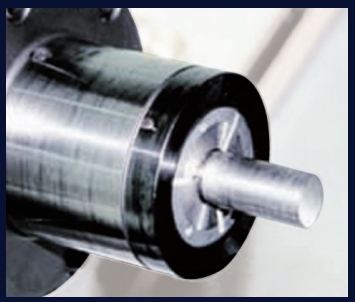
Optional Devices

AUTO TOOL SETTER

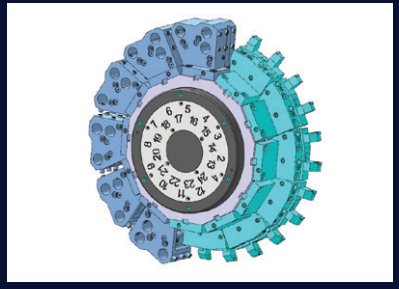
COOLANT BLOWER

SIGNAL TOWER

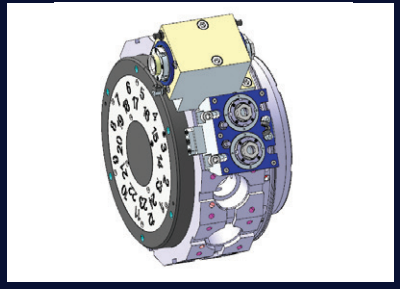
COLLET CHUCK



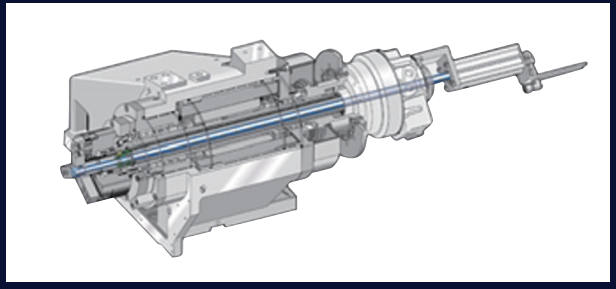
ID/OD SPECIAL HOLDER
(each turret 12ea/tool 24ea)



MILLING SPECIAL HOLDER
(each turret 12ea/tool 24ea)



WORK EJECTOR



DOOSAN FANUC i PLUS

15” Screen + New OP

Doosan Fanuc i Plus’ operation panel enhances operating convenience by incorporating common-design buttons and layout. Features a Qwerty keyboard for fast and easy operation.

Doosan Fanuc i Plus

- - 15-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

iHMI Touch Screen OPTION

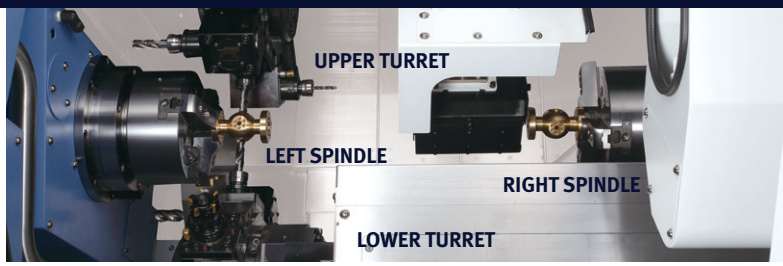
iHMI provides an intuitive interface that utilizes a touch screen for quick and easy operation.

Variety of Applicationst

Providing various applications related to planning, machining, improvement and utility, for customer convenience.

Real-Time Custom Macro Function OPTION

During operation of the parts unloader of the right spindle, this function allows the lower turret to conduct the cutting operation for the left spindle. This function also further improves the productivity.



NUMERIC CONTROL SPECIFICATIONS

FANUC

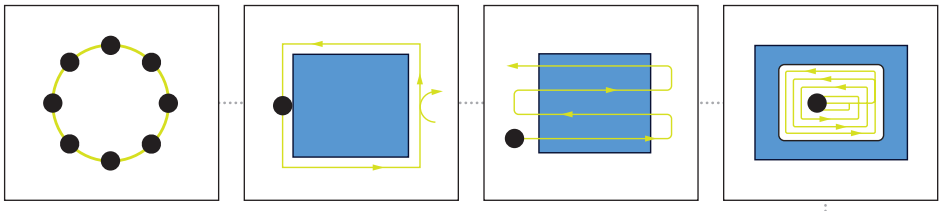
	구분	상세	MS Doosan Fanuc i (F0i-F Plus)	SY Doosan Fanuc i (F0i-F Plus)	MS Fanuc 31i (F31i-B)	SY Fanuc 31i (F31i-B)
Controlled axis	Controlled axes		7 (X1,Z1,C1, X2,Z2C2,A)	8 (X1,Z1,C1,Y, X2,Z2,C2,A)	7 (X1,Z1,C1, X2,Z2C2,A)	8 (X1,Z1,C1,Y, X2,Z2,C2,A)
	Simultaneously controlled axes		4 axes (each path)	4 axes (each path)	4 axes (each path)	4 axes (each path)
Data input/output	Fast data server		○	○	○	○
	Memory card input/output		●	●	●	●
	USB memory input/output		●	●	●	●
Interface function	Embedded Ethernet		●	●	●	●
	Fast Ethernet		○	○	○	○
	Enhanced Embedded Ethernet function		●	●	●	●
Operation	DNC operation	Included in RS232C interface.	●	●	●	●
	DNC operation with memory card		●	●	●	●
Program input	Workpiece coordinate system	G52 - G59	●	●	●	●
Feed function	AI contour control I	G5.1 Q_, 40 Blocks	●	●	●	●
	AI contour control II	G5.1 Q_, 200 Blocks	○	○	○	○
Operation Guidance Function	EZ Guidei (Conversational Programming Solution)		●	●	●	●
	iHMI with Machining Cycle	Note *1) Only with 15" Touch LCD standard	○ *1)	○ *1)	X	X
	Multi path function	Supporting 2 or 3 path machine	●	●	●	●
	EZ Operation package		●	●	●	●
Setting and display	CNC screen dual display function		●	●	●	●
Network	FANUC MTConnect		✪	✪	✪	✪
	FANUC OPC UA		✪	✪	✪	✪
Others	Display unit	15" color LCD	●	●	●	●
		15" color LCD with Touch Panel	○	○	X	X
	Part program storage size & Number of registerable programs	1280M(512KB)_1000 programs	X	X	●	●
		5120M(2MB)_1000 programs	●	●	○	○

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

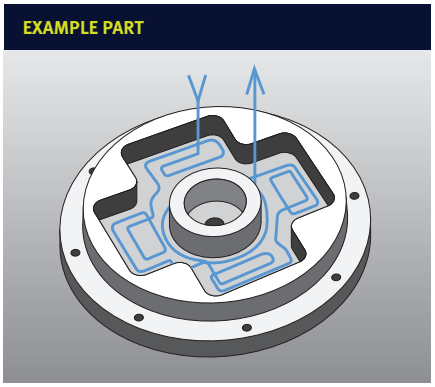
EZ-Guide i

Using the Doosan EZ-Guide i, users can create a cutting program for any desired shape, including patterns, by entering figures only.

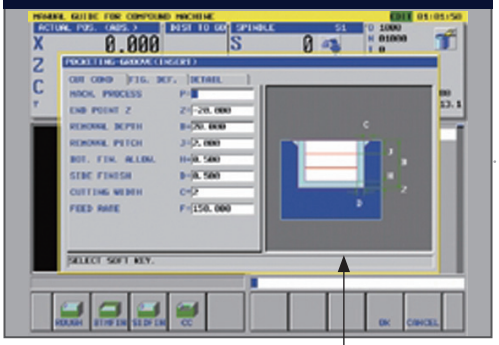
EXAMPLE PROGRAMMING : CUTTING SHAPE



EXAMPLE PART



EZ-GUIDE i SCREEN



Enter the dimensions of the shape

AUTOMATIC CREATION OF CUTTING PROGRAM

```
O7000 (SAMPLE PROGRAM) ;
...
M3 S1500 ;
G0 X50. Y125. ;
G0 Z30. ;
G1040 T0.5 J3. H0.2 K0.5 ... ;
G1020 H120. V50. U37. W68. ... ;
G0 Z80. ;
M5 ;
```

A cutting program is automatically created with the entered values.

Easy Operation Package

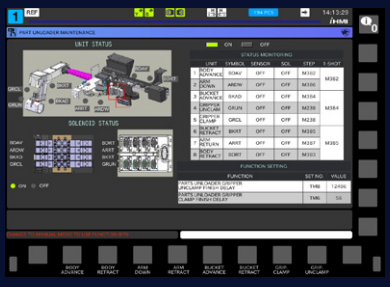
Doosan's Easy Operation Package (EOP) supports the user with functions relating to tool data, error diagnostics, set up and machine monitoring.

Tool monitoring screen

Tool Load Monitoring Function

During cutting operation, abnormal load caused by wear or damage of the tool is detected and an alarm is triggered to prevent further damage.

Parts unloader maintenance and service screen



Convenience of Maintenance and Service

The condition and service procedures of the sensors are provided for easy maintenance and servicing of major units.

Crash Avoid Check

Set the interference area between turret and sub spindle to avoid collision.

Tool Management

Q-setter Automatic measurement

Convenient set up for peripheral equipment

Helps tool setter guide, work setting, tailstock setting, and other measurement and parameter control to reduce setting-up time and facilitates operation.

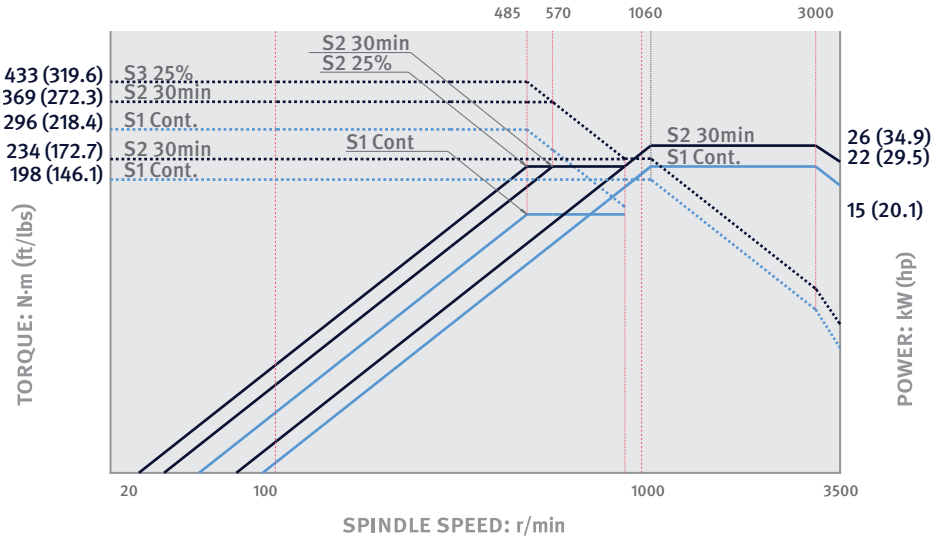
POWER & TORQUE

PUMA TT2500MS/SY

Max. spindle speed : **3500** r/min

Max. power : **26** kW
34.9 Hp

Max Torque : **433** N·m
319.6 ft-lbs

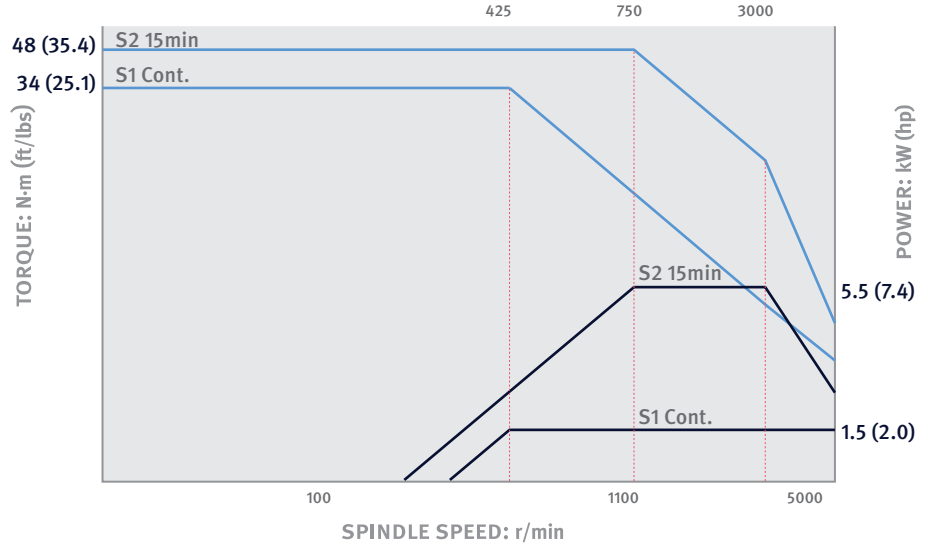


Rotary tool spindle PUMA TT2500MS/SY

Max. spindle speed : **5000** r/min

Max. power : **5.5/1.5** kW
7.4/2.0 Hp

Max Torque : **48** N·m
35.4 ft-lbs

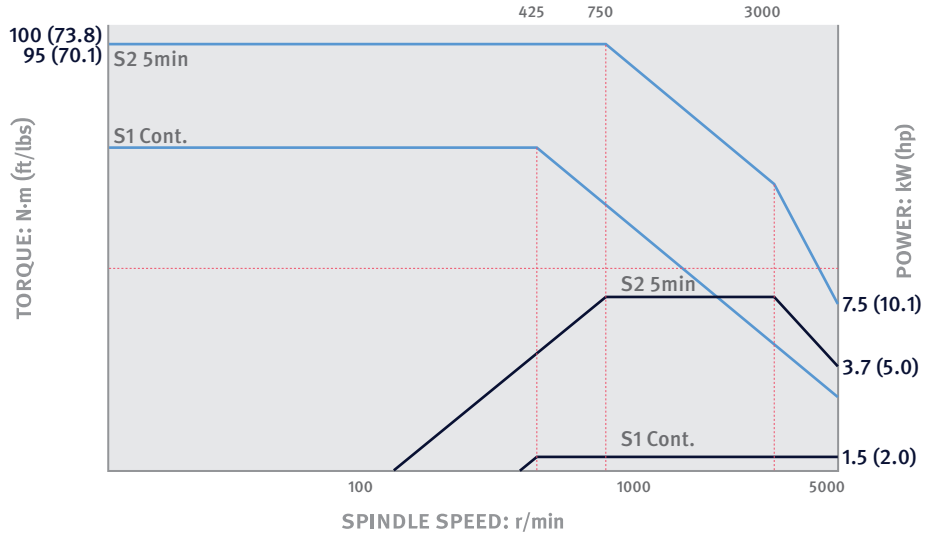


Rotary tool spindle PUMA TT2500MS/SY OPTION

Max. spindle speed : **5000** r/min

Max. power : **7.5/1.5** kW
7.4/2.0 Hp

Max Torque : **48** N·m
35.4 ft-lbs

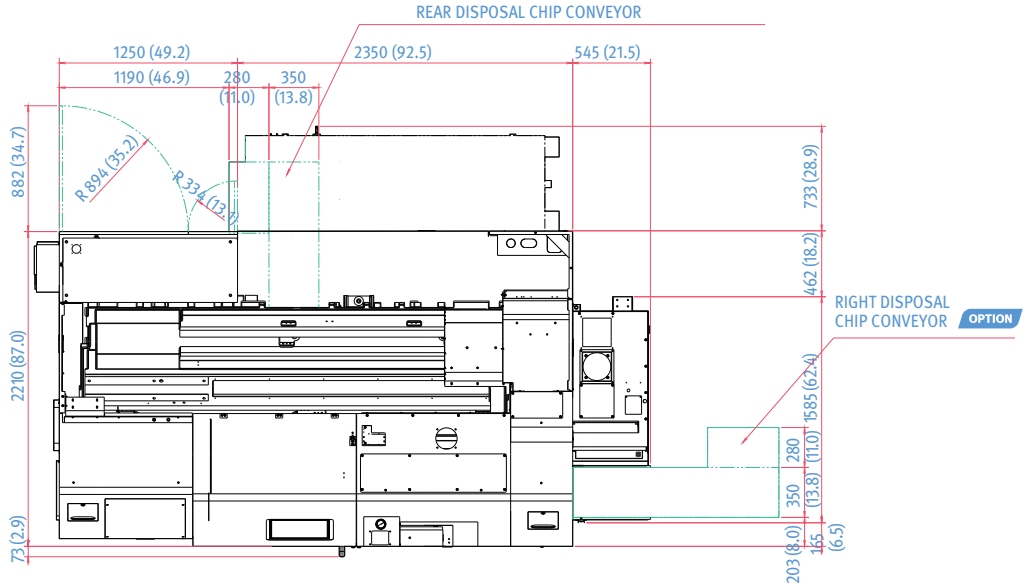


EXTERNAL DIMENSIONS

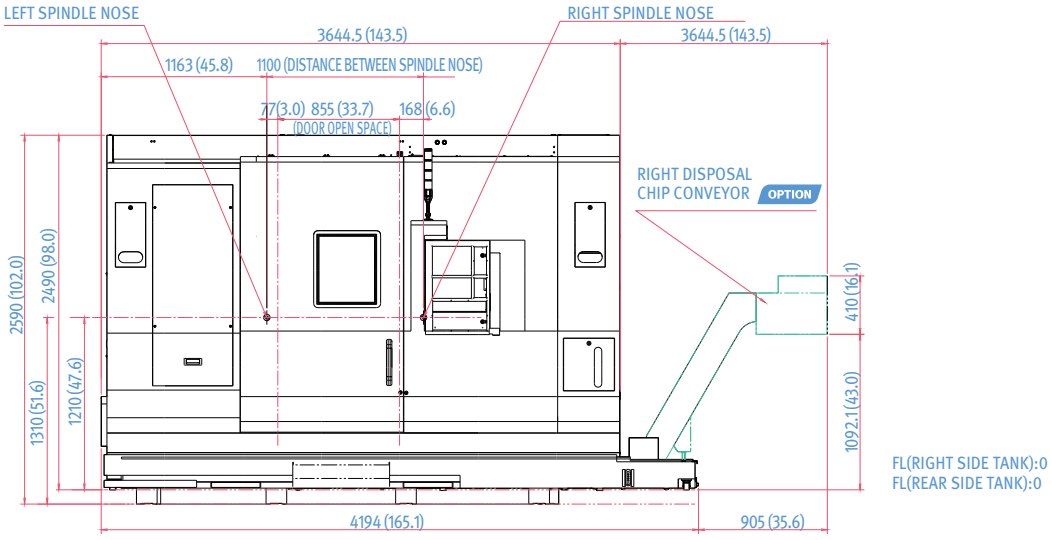
PUMA TT2500 MS / SY

Unit : mm (inch)

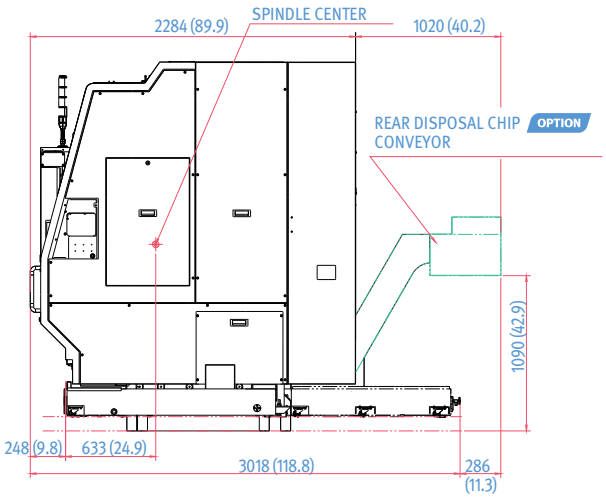
TOP



FRONT



SIDE



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

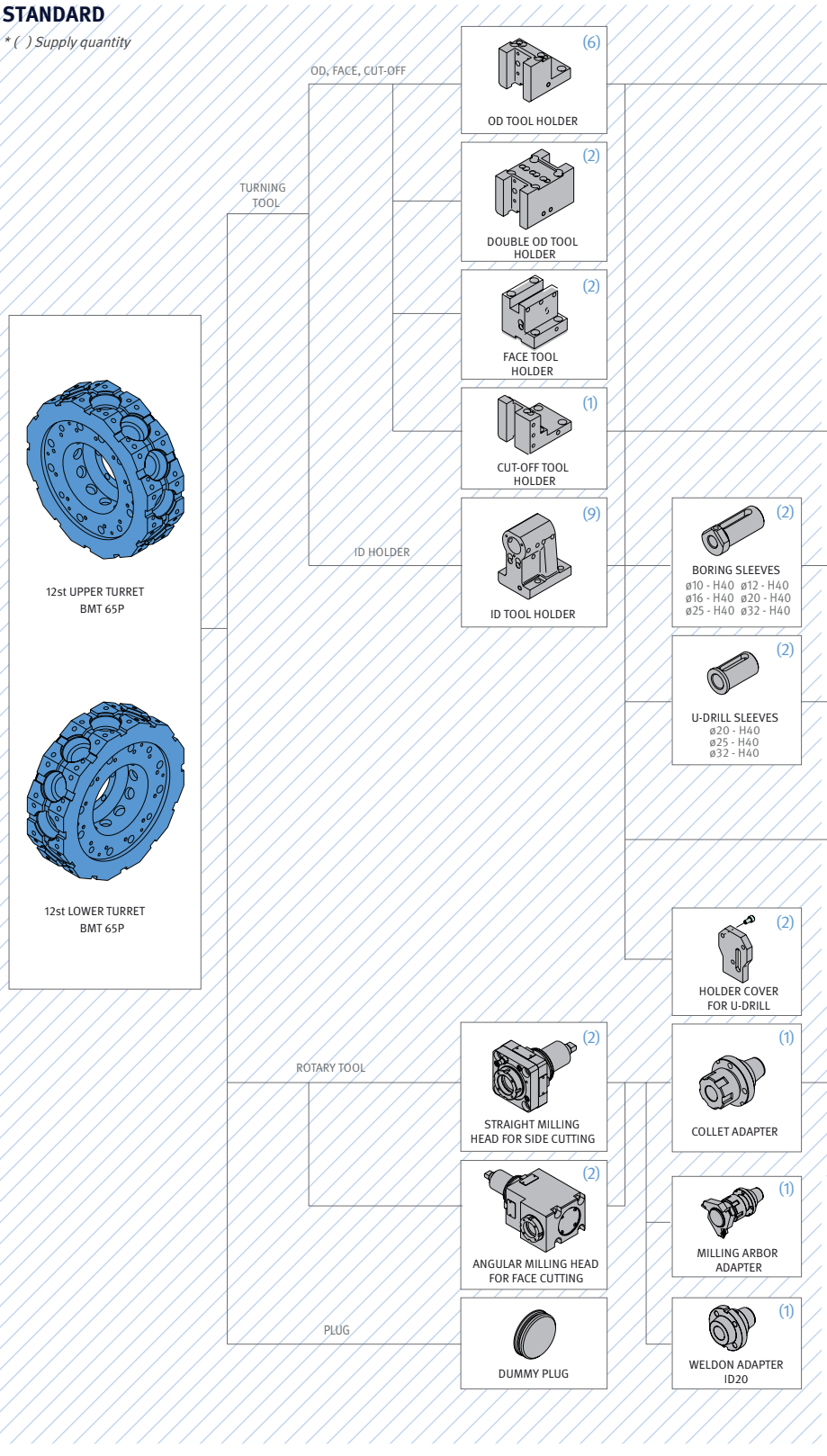
TOOLING SYSTEM

PUMA TT2500 MS / SY

Unit : mm (inch)

STANDARD

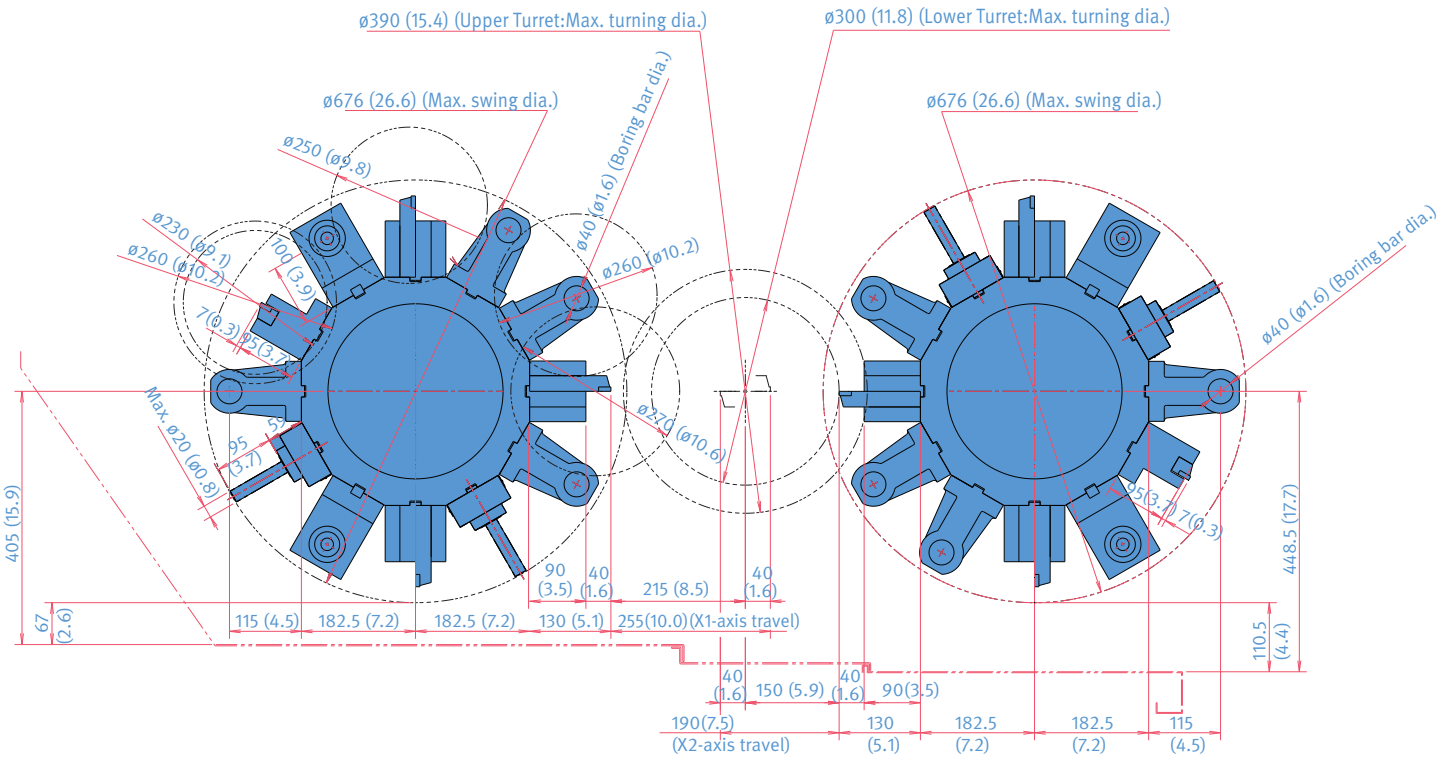
** ( ) Supply quantity*



TOOL INTERFERENCE DIAGRAM

PUMA TT2500 MS / SY

Unit : mm (inch)



UPPER TURRET

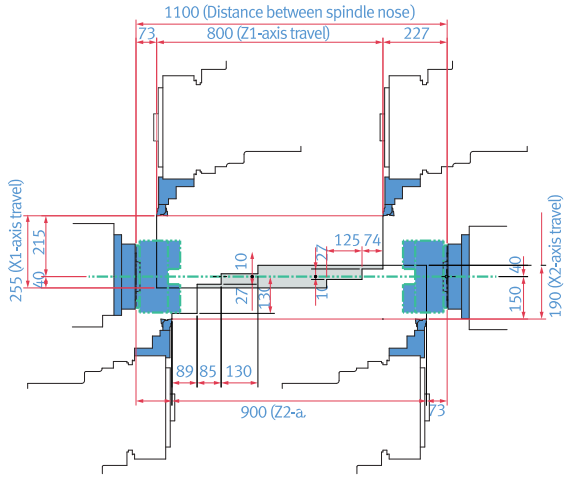
LOWER TURRET

WORKING RANGE DIAGRAM

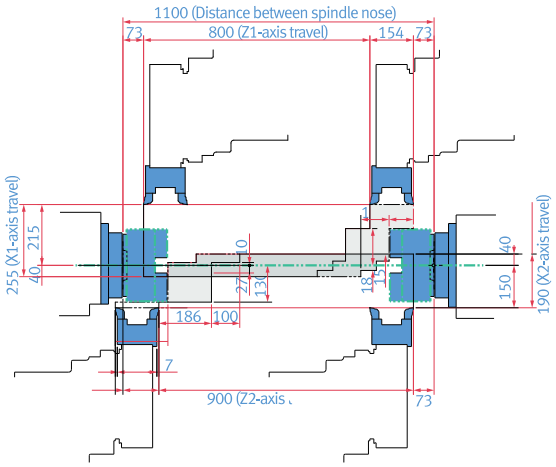
PUMA TT2500 MS / SY

Unit : mm (inch)

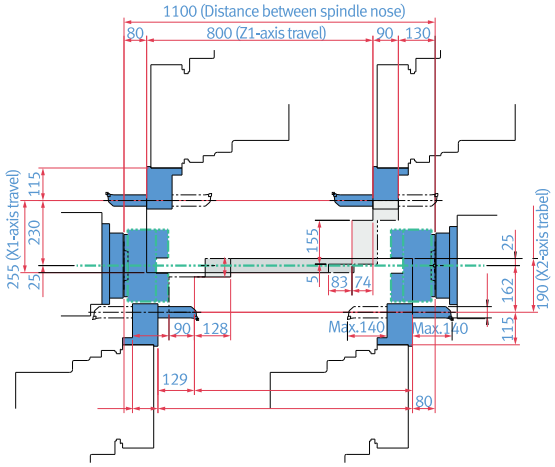
SINGLE OD TOOL HOLDER



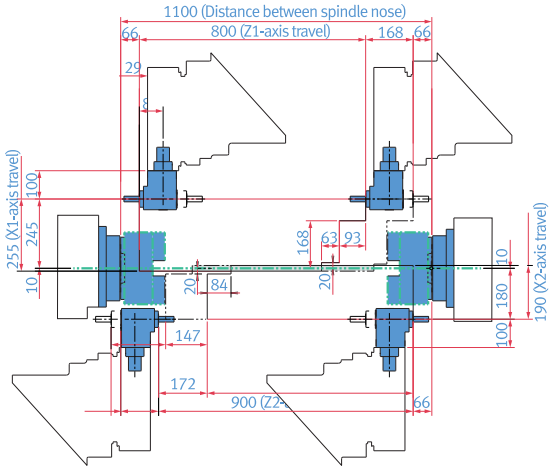
DOUBLE OD TOOL HOLDER



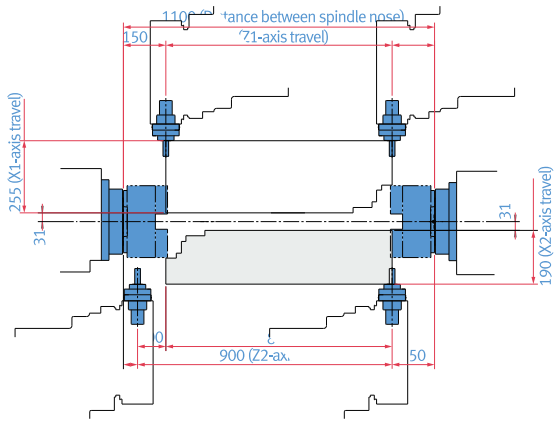
SINGLE ID TOOL HOLDER



ANGULAR MILLING HEAD



STRAIGHT MILLING HEAD



MACHINE SPECIFICATIONS

PUMA TT2500 MS / SY

Description			Unit	PUMA TT2500MS	PUMA TT2500SY
Capacity	Swing over bed		mm (inch)	800 (31.5)	
	Swing over saddle		mm (inch)	620 (24.4)	
	Max. turning diameter	On upper turret	mm (inch)	390 (15.4)	
		On lower turret	mm (inch)	300 (11.8)	
	Recommended turning diameter		mm (inch)	255 (10.0)	
	Max. turning length		mm (inch)	350 (13.8)	
	Bar working diameter		mm (inch)	81 (3.2)	
Spindle (Left/Right)	Spindle speed		r/min	3500	
	Spindle nose		ASA	A2-8	
	Spindle bearing diameter (front)		mm (inch)	130 (5.1)	
	Spindle through hole diameter		mm (inch)	Letf : 91 (3.58) / Right : 86 (3.4)	
	C1-axis minimum indexing increment		deg	0.001	
Travels	X1-axis		mm (inch)	255 (10.0)	
	Z1-axis		mm (inch)	800 (31.5)	
	A-axis		mm (inch)	810 (31.9)	
	X2-axis		mm (inch)	190 (7.5)	
	Z2-axis		mm (inch)	900 (35.4)	
	C1, C2-axis		deg	360	
	Y-axis		mm (inch)	-	120 (±60) (4.7 (±2.4))
Rapid traverse rate	X1, 2-axis		m/min (ipm)	20 (787.4)	
	Z1, 2-axis		m/min (ipm)	24 (944.9)	
	A-axis		m/min (ipm)	24 (944.9)	
	C1, C2-axis		r/min	-	200
	Y-axis		m/min (ipm)	-	75 (2952.8)
Turret (Upper/Lower)	Number of tool stations		ea	12	
	OD tool size		mm (inch)	25 x 25 (1.0 x 1.0)	
	Max. boring bar size		mm (inch)	Ø40 (Ø1.6)	
	Turret indexing time	1 station swivel	sec	0.2	
	Max. rotary tool speed		r/min	5000	
Motor	Spindle motor power (Left/Right)		kW (Hp)	26 / 22 (34.9 / 29.5) (30min/Cont.)	
	Servo motor power	X1-axis	kW (Hp)	4 (5.4)	
		X2-axis	kW (Hp)	3 (4.0)	
		Z1, 2-axis	kW (Hp)	4 (5.4)	
		A-axis	kW (Hp)	4 (5.4)	
		Y-axis	kW (Hp)	-	3 (4.0)
	Coolant pump motor power		kW (Hp)	0.4 (0.5)	
Power source	Required power capacity		kVA	95.77	
Machine Dimensions	Machine size	Floor space	mm (inch)	4050 x 2210 (159.4 x 87.0)	
		Height	mm (inch)	2480 (97.6)	
	Machine weight (Net)		kg (lb)	12700 (27998.3)	
Control	CNC system		DOOSAN Fanuc i Plus {Fanuc 31i} *		

*{ } : option

WHY Y-AXIS?

DOUBLE THE PRODUCTIVITY

Adding a single Y-axis to your machine allows for single-setup efficiency and a new level of accuracy. But if you add a dual Y-axis—as you can in the PUMA TT series—the productivity difference is so striking that you won't ever go back.

DUAL POWER

The PUMA TT series doubles productivity with independently-operating left/right spindles and upper/lower turrets. What's more, the lower Y-axis increases productivity 20% more than having only an upper Y-axis. (PUMA TT1300/2100SYY)

MORE VERSATILITY

With a Y-axis (or, in the case of the PUMA TT, a dual Y-axis), machine shops are capable of a wide variety of multi-axis milling cycles. That means there's a greater potential for done-in-one parts.

WHY DOOSAN?

The Doosan promise, MACHINE GREATNESS, has two important meanings. The first is simple: Doosan makes great machines. The second is a challenge to our end-users. With a product line that is this comprehensive, accurate and reliable, we equip our customers to machine greatness. The big question: ***Why should you choose Doosan over other options?***

Here's why...

WHAT YOU MAKE AND HOW YOU MAKE IT MATTERS—SO MAKE IT GREAT WITH DOOSAN.

UNBEATABLE MACHINES

You won't find a broader range or better combination of value, performance and reliability.

READY-TO-MOVE GLOBAL INVENTORY

Machining, turning and 5-axis—with generous standard performance options—are ready to install now.

ROBUST PRODUCT LINE

We offer dozens of machine models and hundreds of configurations. If you have a machining need, there's a Doosan for you.

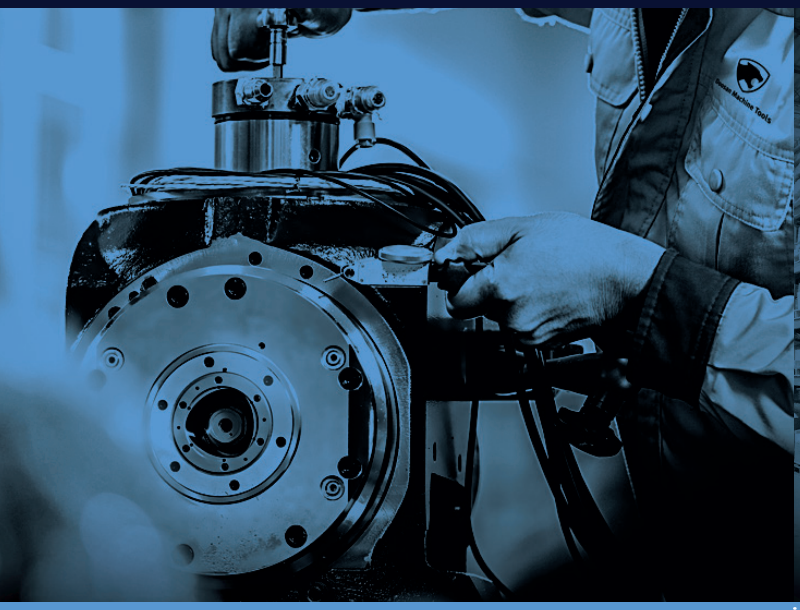
EXPERT SERVICE

Our dedicated and knowledgeable team is 100% invested in the productivity, growth and success of your shop.

CUSTOMER SUPPORT AND SERVICES

We’ re there for you whenever you need us.

We help our customers produce at maximum efficiency by providing a variety of professional services from pre-sales consultancy to post-sales support.



FIELD SERVICES

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

PARTS SUPPLY

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

TRAINING

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

TECHNICAL SUPPORT

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

RESPONDING TO CUSTOMERS
ANYTIME, ANYWHERE

Doosan Machine Tools' Global Network

Doosan Machine Tools provides a system-based professional support service before and after the machine tool sale by responding quickly and efficiently to customers. By supplying spare parts, product training, field service and technical support, we can expertly assist our1 customers around the world.

Global Sales and Service Support Network

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

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Sales inquiry
sales@doosanmt.com

*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 or 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.

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