

CNC Piston Machines

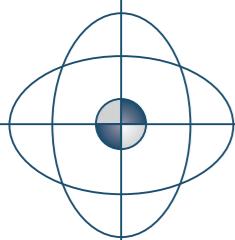
# TPS-Series

Non-Circular Machining CNC Lathe



**TAKISAWA®**

Non-Circular Machining CNC Lathe



## WORLD STANDARD

# TPS-Series

TPS Series—Suitable for Machining of Versatile Next-Generation Pistons

### TPS is a Global Standard Piston Making Machine!

TPS is suitable particularly for high speed machining of oval workpieces such as engine pistons, piston rings, and pin holes of the automobiles (gasoline and diesel vehicles).

New machining techniques developed by this machine boost further the energy-saving piston design and provides unlimited opportunity to design for manufacture of Eco-friendly pistons having very complicated Profiles.

**Formula-1 engine makers adapted TAKISAWA TPS!**

**TPS has been used in the production lines of piston manufacturers in world wide.**

Owing to TAKISAWA's own special piston machining programming software and outstanding high accuracy ceramic mechanism, TPS has obtained the trust of engineers in the machining of pistons for general automobiles and for the Formula-1.



Sample Workpiece(TPS-3100HII) : Aluminum  
TAKISAWA letters are embossed  
by 0.5 mm on cylindrical surface.

Sample Workpiece(TPS-3300HII) : Aluminum  
material is machined into an oval shape (out-side and inside diameters).

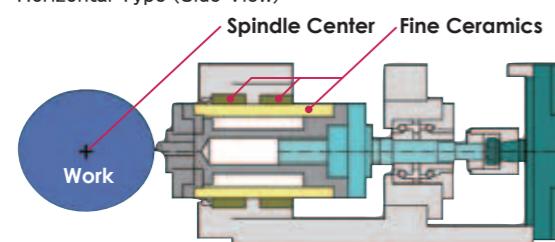
High Technology Cutting Techniques designed by Own Know-How

### TPS Non-Circular Machining (TAKISAWA System)

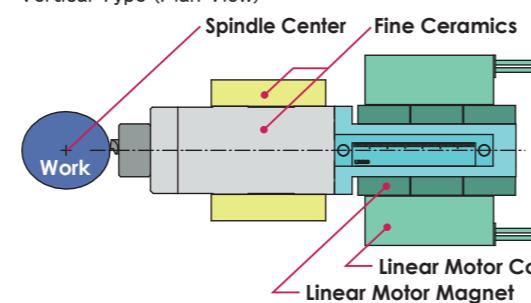
#### High Accuracy Non-Circular Machining Unit Ensures Exact Reproducibility of Profiles

A combination of high grade servomotor and high precision ball screw is built in the actuator that reciprocates the tool 2 times per one spindle revolution, and also high precision fine ceramics are employed for the slide where high rigidity, low inertia, and high wear resistance are required.

Horizontal Type (Side View)



Vertical Type (Plan View)



### World Fastest Oval Machining Function and Programming Software

The high-speed oval machining function distributes moving commands to the servo systems at every specified cycle (0.25 mm/sec) to drive the motors in each axes at high speed. The programming software TPPF3, TPPF4 enables the operator to create the programs easily for high speed oval machining.



TAKISAWA Original Programming Software for Piston Machining  
(TAKISAWA PISTON PROGRAMMING FUNCTION)

### TPPF3, TPPF4

The TPPF3, TPPF4 are unique software developed by TAKISAWA with vast experience gained over the years in machining of pistons. Substantial improvement in operability and work efficiency enables a creation of almost all machining programs including that for typical piston profiles. The programs use the G code language (in text format) that conforms to the NC statements. Program management is easy. Also, the created programs (profile programs) can be easily verified by graphic display of section profile (SECTION) and side profile (SIDE).

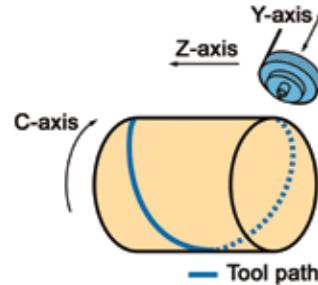
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# TPS-Series

## Non-Circular Machining Unit

TPS provides rapid machining of oval sectional profile by completely synchronizing axes, C axis(spindle), Z axis(feed axis), and Y axis(oval machining axis), and move the tool repeatedly along helical path over full length of the work pieces.



## Oval Machining By Ultra-High Speed Follow-Up Feature

Horizontal TPS with 8G feed acceleration for oval machining (Y axis) increases the productivity. TPS-V1000(vertical type) enables highly accurate oval machining at high speed by adapting ceramic slide and liner motor drive. Max acceleration is 16G.



## T4 Turret (Optional)

T4 turret has automatic tool change as an option. When cutting work pieces such as Edsel engine pistons, where different material is casted into piston ring mounted portion, automatic tool change boosts tool life remarkably.

T4 turret is not available on TPS-1000V.

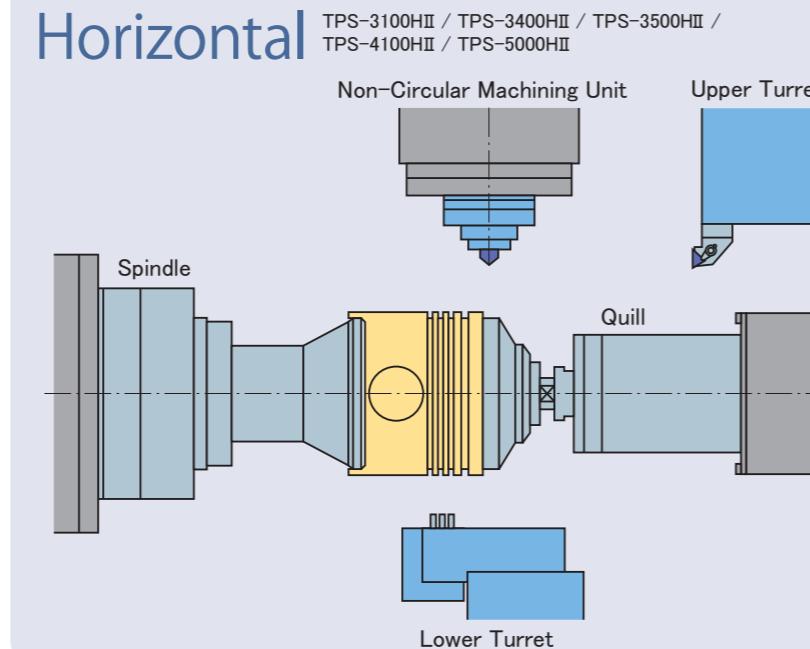


## Tool Spindle (TPS-3300H II)

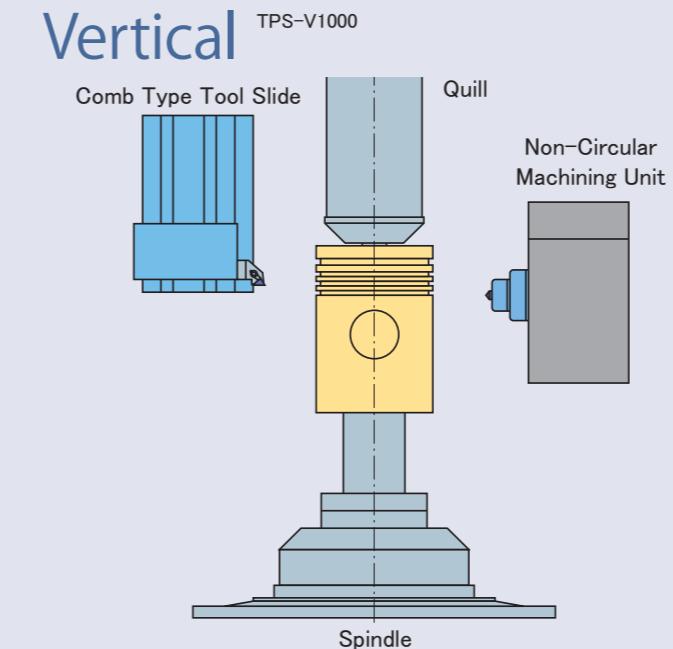
The tool spindle on TPS-3300HII specialized for piston pin machining has a built-in spindle motor of  $42,000 \text{ min}^{-1}$  for rotary tools, realizing highly accurate machining at a high speed.

## Machine Configuration

### Horizontal



### Vertical



## Spindle

### Non-Circular Machining (C-Axis)

Max.  $4000\text{min}^{-1}$  ...TPS-3100HII / TPS-3400HII / TPS-3500HII / TPS-4100HII / TPS-5000HII / TPS-V1000  
Max.  $1000\text{min}^{-1}$  ...TPS-3200HII / TPS-3300HII

Other Operations : Max.  $4000\text{min}^{-1}$  ...TPS-3500HII / TPS-4100HII / TPS-5000HII / TPS-V1000

Built-In Motor Spindle ...TPS-4100HII / TPS-5000HII / TPS-V1000  
Belt-Drive Spindle...TPS-3100HII / TPS-3200HII / TPS-3300HII / TPS-3400HII / TPS-3500HII

## Turrets for Lathing (Upper and Lower)

With the turning turret, processes such as grooving, chamfering, and top face finishing other than oval machining can be integrated into one chucking.

TPS-5000H II with the upper and lower 8-station turrets having 16-tool storage capacity can provide a high efficiency machining by 2-turret simultaneous machining. Also, TPS-3500HII / TPS-4100HII is equipped with the upper 8-station turret only.

NC servo control provides high-speed, high-accuracy indexing of 0.1 second per index.

TPS-V1000 corresponds to comb plate (optional). Up to four tools can be attached by mounting a double square holder.



## Quill

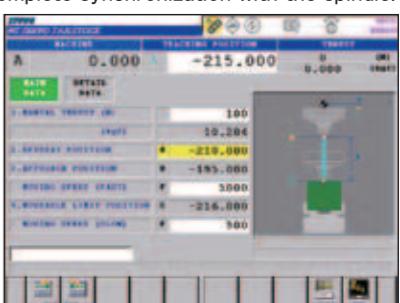
- TPS-3100HII / TPS-3400HII ...Pneumatic Quill  
Optional : M Function, Quill Travel 150mm
- TPS-3200HII ...Hydraulic Quill  
Optional : Built-In Type (Quill Travel 45mm), M function
- TPS-3500HII / TPS-4100HII / TPS-5000HII ...Hydraulic Servo Quill

The quill pressure can be set arbitrary by program. A combination of scale function and hydraulic servo function slows down the quill immediately before the workpiece to detect the presence of workpiece, or the workpiece having different length.

### TPS-V1000 ...NC Servo Quill

Positioning and thrust can be controlled freely. The quill rotates in complete synchronization with the spindle. Slip of workpiece is eliminated by pushing with a minute thrust. The quill operation and thrust can be set on the dedicated screen easily.

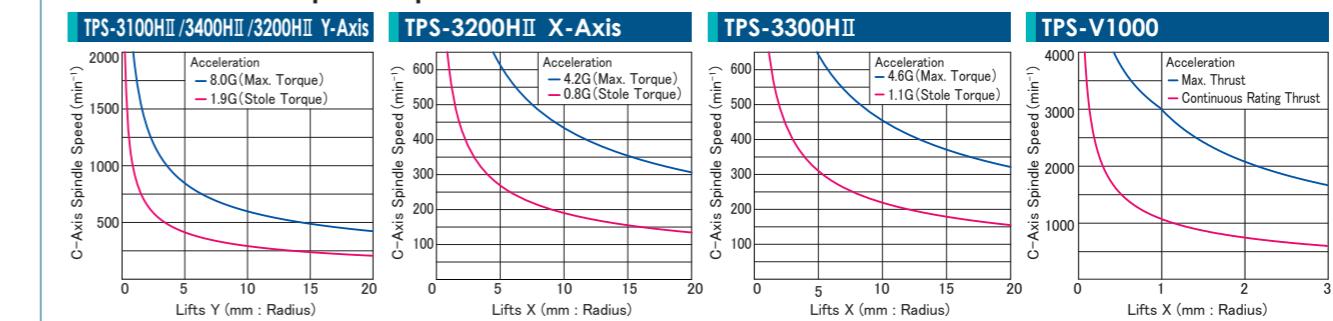
Quill setting screen ▶  
(the function of TPPF4)



## Learning Function

With one spindle revolution specified as one cycle, the positional deviation is added to the commanded value, and in this way the positional deviation will settle by about 10 revolutions for an oval command.

## Relation Between Spindle Speed and Lift Amount

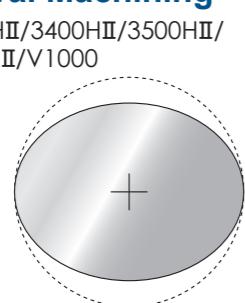


# TPS-Series

The processes necessary for piston machining are covered by TPS.

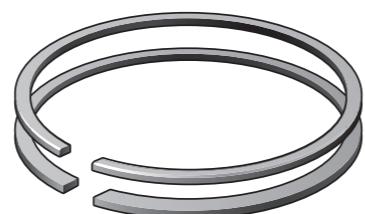
## Piston OD Oval Machining

TPS-3100HII/3200HII/3400HII/3500HII/  
4100HII/5000HII/V1000



## Piston Ring ID & OD Machining

TPS-3200HII



## Preparatory Machining

TPS-3500HII/4100HII/5000HII/V1000

## Piston Pin Hole Oval

TPS-3300HII



Diesel Piston (example)

## Grooving

TPS-3400HII

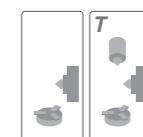


	Max. Turning Diameter	Max. Turning Length	Quill	Turning Turret	Turning Turret #2	Tool Spindle
TPS-V1000	130	160	○	○ (Left)	-	-
TPS-3100HII	290	370	●	-	-	-
TPS-3200HII	246	320	●	-	-	-
TPS-3300HII	-	-	-	-	-	●
TPS-3400HII	260	285	●	-	-	-
TPS-3500HII	260	250	●	● (Upper)	-	-
TPS-4100HII	320	250	●	● (Upper)	-	-
TPS-5000HII	320	250	●	● (Upper)	● (Lower)	-

● : Standard ○ : Optional - : None

## Vertical Piston OD Oval Machining

### TPS-V1000



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TPS-V1000



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TPS-3100HII

## Piston OD Oval Machining

### TPS-3100HII

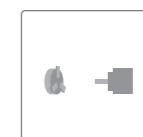


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TPS-3200HII

## Piston Ring ID & OD Apple-Shaped Machining

### TPS-3200HII



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TPS-3300HII

## Piston Pin Hole Oval + Bell-Shaped Machining

### TPS-3300HII



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TPS-3400HII

## Piston OD Oval Machining + Grooving

### TPS-3400HII

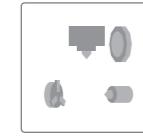


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TPS-3500HII

## Piston OD Oval Machining + Preparatory Machining One Turret

### TPS-3500HII



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TPS-4100HII

## Piston OD Oval Machining + Preparatory Machining One Turret

### TPS-4100HII



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TPS-5000HII

## Piston OD Oval Machining + Preparatory Machining Two Turrets

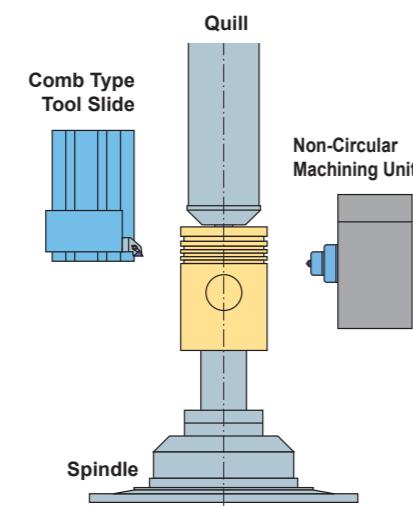
### TPS-5000HII

# TPS - V1000

Vertical Piston  
OD Oval Machining

Next-Generation vertical machine is newly added to world-leading TAKISAWA's piston machining lathes!!

Incomparably small machine width of 1180 mm.  
It saves the space for automatic machining lines.  
The vertical structure facilitates workpiece loading/unloading, and reduces idling time.



## High power/high precision built-in spindle.

Highly responsive C-axis positioning ( $0.001^\circ$ ) is possible.  
The short acceleration/deceleration time reduces machining cycle time.  
Beltless structure provides you maintenance-free, and quite machine!

## ■ Machine Specifications

Items	TPS-V1000	TPS-V1000T
Structure	Tailstock	-
Number of Tool Slide	1	1
Type of Tool Slide	Turret for Non-Circular Machining	Turret for Non-Circular Machining
Capacity	Maximum Turning Diameter mm inch	$\phi 30 \sim 130$ $\phi 1.18'' \sim 5.12''$
	Maximum Turning Length mm inch	160 $6.3''$
Spindle	Spindle Speed $\text{min}^{-1}$	40 $\sim$ 4000
	Minimum Index Angle deg	0.001
	Spindle Nose (Nominal No.)	F140
	Spindle Bearing Inside Diameter mm inch	$\phi 90$ $3.54''$
Feed	Travel mm inch	X : 120 Z : 220 Y : 3 X : 4.72'' Z : 8.66'' Y : 0.12''
	Rapid Traverse Rate m/min ipm	X : 15 Z : 20 Y : 6 X : 590.55'' Z : 787.40'' Y : 236.22''
Y-axis Unit	Number of Attachable Tools	1 2
	Tool Shank mm inch	for Non-Circular Machining : $\phi 8.0$ $0.32''$
	Max. Acceleration *1 G	16
	Drive System	-
Tailstock	Guide System	NC Servo Torque Control
	Quill Diameter mm inch	-
	Quill Taper Bore	$\phi 90$ $3.54''$
	Quill Taper Bore	MT. 3
Motors	Spindle Motor (Continuous/30 min) kW HP	15/11 $20/14.7$
	Tailstock Synchronizing Motor kW HP	-
	Feed Axis Motor kW HP	X : 2.4 Z : 3.3 Y : 1.1
	Spindle Cooling Motor kW HP	0.75 1
	Coolant Cooling Motor kW HP	0.75 1
	Coolant Pump Motor kW HP	0.4 0.5 (Exclude chip flow coolant)
Cooling Capacity	Spindle Cooling Motor kW HP	2.8/3.2 $3.7/4.3$ (50/60 Hz)
	Coolant Cooling Motor kW HP	3.2/3.5 $4.3/4.7$ (50/60 Hz)
Power Sources Required	Electric Power kVA	20
	Air Source Pressure MPa	0.5
	Air Source Flowrate NL/min	170
Tank Capacity	Hydraulic Tank L gal	30 $7.92$
	Lubricant Tank L gal	6.5+2 $1.72+0.53$
	Coolant Tank L gal	335 $88.44$
Machine Size	Machine Height mm inch	2200 $86.61''$
	Height from Floor Level to Spindle Centerline mm inch	865 $30.06''$
	Floor Space Required *2 mmxmm inchxinch	1180x3075 $46.46''\times121.06''$
	Machine Weight kg lbs	4000 $8800$

## ■ Standard Accessories

- TPPF4J Software
- Coolant Unit (400W×3)
- Oil Controller (for Spindle Cooling)
- Oil Controller (for Coolant)
- Chip Conveyor (Aluminum Only (Scraper))
- Lighting Apparatus
- Spindle Air Purge
- Y-Axis Air Purge
- Y-Axis Airblow
- Front Door Locking Mechanism
- Oil skimmer
- Adjustment Tool Set
- Instruction Manual

## ■ Optional Accessories

- Chuck
- Cylinder
- Chuck Open/Close M-Function
- Chuck Open/Close Footswitch
- Chuck Open/Close Button
- Hydraulic Unit
- With heater on Oil Controller (for Coolant Cooling)
- Chuck Airblow
- Tailstock Airblow
- Spindle Above Coolant
- Auto Door
- Powered Door
- Comb Plate
- Block for Chamfering
- RS-232C Interface

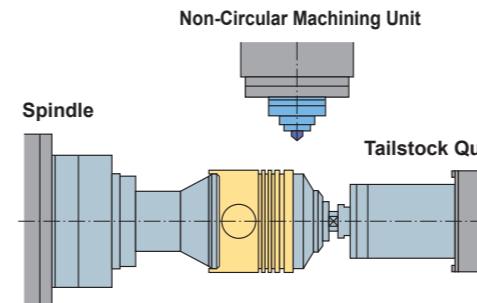
Red is Optional.  
\*1) Cutting reaction force : 100N  
\*2) With chip conveyor.

# TPS-3100HII

Piston OD Oval Machining

All necessary functions for engine piston OD oval machining are integrated into one machine. Simple, compact and easy-to-operate constructions with reasonable price.

With these features, TPS-3100HII, providing high maintainability, can be installed into piston production lines easily.



## ■ Machine Specifications

Capability · Capacity	Maximum Turning Diameter mm inch	290 $11.42''$
	Maximum Turning Length mm inch	370 $14.57''$
Spindle	Spindle Speed $\text{min}^{-1}$	4000
	Minimum Index Angle deg	0.001
	Spindle Nose (Nominal No.)	JIS A2-6
	Spindle Hole Through Diameter mm inch	63 $2.48''$
	Spindle Bearing Inside Diameter mm inch	100 $3.94''$
Turret	Type of Turret	Turret for Non-Circular Machining
	Travel mm inch	X : 135 Z : 370 Y : 25 X : 5.31'' Z : 14.57'' Y : 0.98''
	Rapid Traverse Rate m/min ipm	X, Z : 20 Y : 6 X, Z : 707.4'' Y : 236.22''
	Cutting Feedrate	for Non-Circular Machining : 1 ( OP : 4 )
	Tool Shank mm inch	for Non-Circular Machining : $\phi 10$ $0.39''$
Tailstock	Travel mm inch	175 $6.89''$
	Quill Diameter mm inch	75 $2.95''$
	Quill Taper Bore	MT4
	Quill Travel mm inch	100 ( OP : 150 ) $3.94''$ ( OP : 5.91'' )
Motors	Spindle Motor kW HP	11 15
	Feed Axis Motor kW HP	X : 1.2 Z : 1.8 Y : 2.5 X : 1.6 Z : 2.4 Y : 3.3
	Coolant Cooling Motor kW HP	0.75 1
	Coolant Pump Motor kW HP	0.4 0.5
Power Sources Required	Electric Power kVA	21.3
	Air Source Pressure MPa	0.5
	Air Source Flowrate NL/min	100
Tank Capacity	Coolant L gal	245 $64.68$
	Machine Height mm inch	1970 $77.56''$
Machine Size	Height from Floor Level to Spindle Centerline mm inch	1070 $42.13''$
	Floor Space Required mmxmm inchxinch	1600x2370 $62.99''\times93.68''$
	Machine Total Weight kg lbs	3000 $6600$

## ■ Standard Accessories

- TPPF3 Software
- Work Tool Set
- Instruction Manual
- Front Door Interlock
- Coolant Unit (400W)
- Oil Controller (for Coolant)
- Pneumatic Tailstock (MT4)
- Chip Conveyor (Aluminum Only (Scraper))

## ■ Optional Accessories

- Work Holding Fixture
- Hydraulic Unit
- With heater on Oil Controller (for Coolant)
- Quill M Function
- Footswitch (Chuck, Quill)
- Air Blower (Outside of Spindle)
- T4 turret (Y-Axis/4-Station Turret)

# TPS-3200HII

Piston Ring ID &  
OD Apple-Shaped Machining

Oval machining of piston ring ID and OD, and Cut off can be done.

With the X-axis ID turning tool holder and cut-off tool holder installed on the main tool post, after OD turning of workpiece is performed with normal tool post, the ID turning and cut-off are executed sequentially.

Note: Special Tool holder may be required for individual application.



## ■ Machine Specifications

Capability • Capacity	Maximum Turning Diameter mm inch	246 9.69"
	Maximum Turning Length mm inch	320 12.6"
Spindle	Spindle Speed min <sup>-1</sup>	1000
	Minimum Index Angle deg	0.001
	Spindle Nose (Nominal No.)	JIS A2-6
	Spindle Hole Through Diameter mm inch	63 2.48"
	Spindle Bearing Inside Diameter mm inch	100 3.94"
	Type of Turret	Turret for Non-Circular Machining
Turret	Travel mm	X : 135 Z : 370 Y : 25
		X : 53.1" Z : 14.57" Y : 0.98"
	Rapid Traverse Rate m/min ipm	X, Z : 20 Y : 6 X, Z : 707.4" Y : 236.22"
	Number of Attachable Tools	3
Tailstock	Tool Shank mm inch	□20 0.75"
	Travel mm inch	175 6.89"
	Quill Diameter mm inch	75 2.95"
	Quill Taper Bore	MT4
Motors	Quill Travel mm inch	100 (OP : 45) 3.94" (OP : 1.77")
	Spindle Motor kW HP	7 9.3
	Feed Axis Motor kW HP	X : 2.5 Z : 1.8 Y : 2.5 X : 3.3 Z : 2.4 Y : 3.3
	Hydraulic Pump Motor kW HP	1.5 2
	Coolant Pump Motor kW HP	0.25 0.3
Power Sources Required	Electric Power kVA	14.0
	Air Source Pressure MPa	0.5
	Air Source Flowrate NL/min	100
Tank Capacity	Hydraulic Unit L gal	10 2.64
	Coolant L gal	120 31.68
Machine Size	Machine Height mm inch	1900 74.8"
	Height from Floor Level to Spindle Centerline mm inch	1000 39.37"
	Floor Space Required mm x mm inch x inch	1795x1850 70.67" x 72.83"
	Machine Total Weight kg lbs	2600 5720

## ■ Standard Accessories

- TPPF3 Software
- Work Tool Set
- Instruction Manual
- Hydraulic Unit
- Front Door Interlock
- Coolant Unit (250W)
- Hydraulic Tailstock (MT4)

## ■ Optional Accessories

- Work Holding Fixture
- Coolant Unit (400W)
- Built-In Tailstock (MT3)
- Quill M Function
- Chip Conveyor (Caterpillar)
- Footswitch (Chuck, Quill)
- Air Blower (Outside of Spindle)
- T4 turret (Y-Axis/4-Station Turret)

# TPS-3300HII

Piston Pin Hole Oval +  
Bell-Shaped Machining

**TPS-3300HII providing breakthrough solutions for pin hole machining!**

- 3D Piston Pin Hole Machine at the Fastest Speed and the Highest Accuracy in the World.
- TAKISAWA's original piston machining programming software (TPPS3) enables easy programing for 3D workpieces the programs for 3D machining.
- Main Spindle and 40,000 rpm Tool Spindle are Synchronized for High Speed Finishing of Small Holes to 3D Profile (Bell-Shape + Oval)

## ■ Main Specifications

Rotary Tool Built-In Spindle Speed : Max. 42000min<sup>-1</sup>  
Main Spindle Speed : Max. 1000min<sup>-1</sup>  
Spindle Motor : 7.0kW (9.3HP)  
Rotating Tool Spindle Motor : 15kW (20HP)



**Max. 42000min<sup>-1</sup>**

42,000 rpm spindle motor is built in for rotary tools to provide high speed and high accuracy machining.



## ■ Machine Specifications

Spindle	Spindle Speed min <sup>-1</sup>	1000
	Minimum Index Angle deg	0.001
	Spindle Nose (Nominal No.)	JIS A2-6
	Spindle Hole Through Diameter mm inch	63 2.48"
	Spindle Bearing Inside Diameter mm inch	100 3.94"
Spindle for Tool	Travel mm inch	X : 230 Z : 260 X : 9.06" Z : 10.24"
	Rapid Traverse Rate m/min ipm	X, Z : 20 X, Z : 707.4"
	Number of Rotating Tools	1
	Type of Tool Spindle Taper Bore	HSK-C40
Motors	Spindle Speed min <sup>-1</sup>	42000
	Spindle Motor kW HP	7.0 9.3
	Rotating Tool Spindle Motor kW HP	15 20
	Feed Axis Motor kW HP	X : 2.5 Z : 1.8 X : 3.3 Z : 2.4
	Hydraulic Pump Motor kW HP	1.5 2
	Coolant Pump Motor kW HP	0.4 0.5
Power Sources Required	Electric Power kVA	30.3
	Air Source Pressure MPa	0.5
	Air Source Flowrate NL/min	100
Tank Capacity	Hydraulic Unit L gal	10 2.64
	Coolant L gal	245 64.68
Machine Size	Machine Height mm inch	1970 77.56"
	Height from Floor Level to Spindle Centerline mm inch	1070 42.13"
	Floor Space Required mm x mm inch x inch	1795x2640 70.67" x 103.94"
	Machine Total Weight kg lbs	2800 6160

## ■ Standard Accessories

- TPPF3 Software
- Work Tool Set
- Instruction Manual
- Hydraulic Unit
- Front Door Interlock
- Coolant Unit (400W)
- Oil Controller (for Coolant, for Tool Spindle)
- Chip Conveyor (Aluminum Only (Scraper))

## ■ Optional Accessories

- Work Holding Fixture
- With heater on Oil Controller (for Coolant)
- Air Blower (Outside of Spindle)
- Footswitch (Chuck)

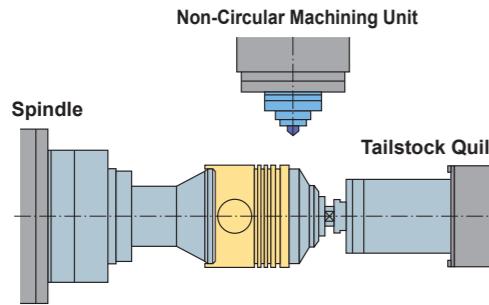
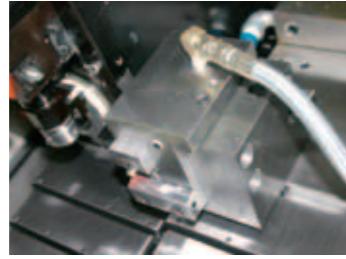
# TPS-3400HII

Piston OD Oval Machining +  
Grooving

## Process Reduction by OD Oval Machining and Ring

### Groove Machining of Automobile Engine Pistons

- TAKISAWA Original Piston Machining Programming Software (TPPF3)
- TAKISAWA Original oval machining unit providing machining at the fastest speed and the most accurate in the world.
- Turning tool post for ring groove on piston OD.
- High Speed Machining Function Synchronizes the C, Z, and Y Axes Completely to Provide High Speed Machining of OD to Oval Sectional Profile



### Machine Specifications

Capability • Capacity	Maximum Turning Diameter mm inch	260 14.24"
	Maximum Turning Length mm inch	285 11.22"
Spindle	Spindle Speed min <sup>-1</sup>	4000
	Minimum Index Angle deg	0.001
	Spindle Nose (Nominal No.)	JIS A2-6
	Spindle Hole Through Diameter mm inch	63 2.48"
	Spindle Bearing Inside Diameter mm inch	100 3.94"
	Type of Turret	Turret for Non-Circular Machining Turret for Turning
Turret	Travel mm inch	X, A : 135 Z : 370 Y : 25 X, A : 5.31" Z : 14.57" Y : 0.98"
	Rapid Traverse Rate m/min ipm	X, Z : 20 Y : 6 X, Z : 707.4 Y : 236.22
	Number of Attachable Tools	for Non-Circular Machining : 1 (OP : 4) for Turning : 1
	Tool Shank mm inch	for Non-Circular Machining : φ10 0.39" for Turning : □20 0.75"
Tailstock	Travel mm inch	175 6.89"
	Quill Diameter mm inch	75 2.95"
	Quill Taper Bore	MT4
	Quill Travel mm inch	100 (OP : 150) 3.94" (OP : 5.91")
Motors	Spindle Motor kW HP	11 14.6
	Feed Axis Motor kW HP	X, A : 1.2 Z : 1.8 Y : 2.5 X, A : 1.6 Z : 2.4 Y : 3.3
	Coolant Cooling Motor kW HP	0.75 1
	Coolant Pump Motor kW HP	0.4 0.5
Power Sources required	Electric Power kVA	22.2
	Air Source Pressure MPa	0.5
	Air Source Flowrate NL/min	100
Tank Capacity	Coolant L gal	245 64.68
Machine Size	Machine Height mm inch	1970 77.56"
	Height from Floor Level to Spindle Centerline mm inch	1070 42.13"
	Floor Space Required mmxmm inchxinch	1600×2370 62.99"×93.68"
	Machine Total Weight kg lbs	3000 6600

### Standard Accessories

- TPPF3 Software
- Work Tool Set
- Instruction Manual
- Front Door Interlock
- Coolant Unit (400W)
- Oil Controller (for Coolant)
- Pneumatic Tailstock (MT4)
- Chip Conveyor (Aluminum Only (Scraper))

### Optional Accessories

- Work Holding Fixture
- Hydraulic Unit
- With heater on Oil Controller (for Coolant)
- Quill M Function
- Footswitch (Chuck, Quill)
- Air Blower (Outside of Spindle)
- T4 turret (Y-Axis/4-Station Turret)

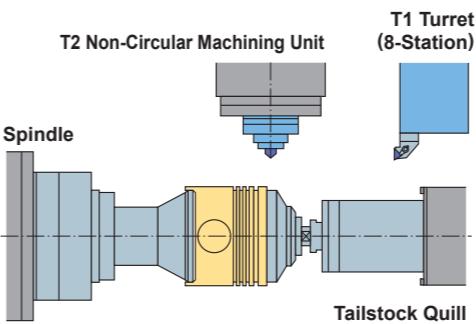
# TPS-3500HII

Process Integrating Machine  
Piston OD Oval Machining +  
One Turret for Preparatory Machining

## Total solution for piston OD machining in a compact machine body.

TAKISAWA Non-circular machining unit and TPPF3 with a proven track record open the door to the next stage of piston machining.

Rear discharge chip conveyor enables the machine to fit in a line.



### Machine Specifications

Capability • Capacity	Maximum Turning Diameter mm inch	260 10.24"
	Maximum Turning Length mm inch	250 9.84"
Spindle	Spindle Speed min <sup>-1</sup>	40 ~ 4000
	Minimum Index Angle deg	0.001
	Spindle Nose (Nominal No.)	JIS A2-6
	Spindle Hole Through Diameter mm inch	63 2.48"
	Spindle Bearing Inside Diameter mm inch	100 3.49"
	Type of Turret(T1)	Octagonal Drum Turret
Turret	Type of Turret(T2)	Turret for Non-Circular Machining
	Travel mm inch	X : 190 Z : 410 A : 135 Y : 25 X : 7.48" Z : 16.14" A : 5.31" Y : 0.98"
	Rapid Traverse Rate m/min ipm	X : 20 Z : 24 A : 20 Y : 6 X : 707.4 Z : 944.88 A : 707.4 Y : 236.22
	Number of Attachable Tools	T1 : 8 T2 : 1 (OP : 4)
	Height of Square Tool mm inch	T1 : □ 25 T2 : φ10 (OP : φ8) T1 : □ 0.75" T2 : φ0.39" (OP : φ8)
	Diameter of Boring Bar mm inch	40 1.57"
Tailstock	Travel mm inch	410 16.14"
	Quill Diameter mm inch	75 2.95"
	Quill Taper Bore	MT.4
	Quill Travel mm inch	145 5.71"
Motors	Spindle Motor (30 min/continuous) kW HP	11/7.5 14.7/10
	Feed Axis Motor kW HP	X:1.2 Z:1.8 A:1.2 Y:2.5 X:1.6 Z:2.4 A:1.6 Y:3.3
	Turret Turning Motor kW HP	1.2 1.6
	Hydraulic Pump Motor kW HP	1.5 2
	Coolant Cooling Motor kW HP	0.75 1
	Coolant Pump Motor kW HP	0.4 0.5
Power Sources Required	Electric Power kVA	23
	Air Source Pressure MPa	0.5
	Air Source Flowrate NL/min	100
Tank Capacity	Hydraulic Unit L gal	30 7.92
	Coolant L gal	245 64.68
Machine Size	Machine Height mm inch	1725 67.91"
	Height from Floor Level to Spindle Centerline mm inch	1170 46.06"
	Floor Space Required mmxmm inchxinch	2125×2500 83.66"×98.43"
	Machine Total Weight kg lbs	3600 7920

### Standard Accessories

- TPPF3 Software
- Work Tool Set
- Instruction Manual
- Hydraulic Unit
- Front Door Interlock
- Coolant Unit (400W)
- Oil Controller (for Coolant)
- Hydraulic Servo Tailstock (MT4, with Manual Traction Unit)
- Quill M Function
- Chip Conveyor (Aluminum Only (Scraper))

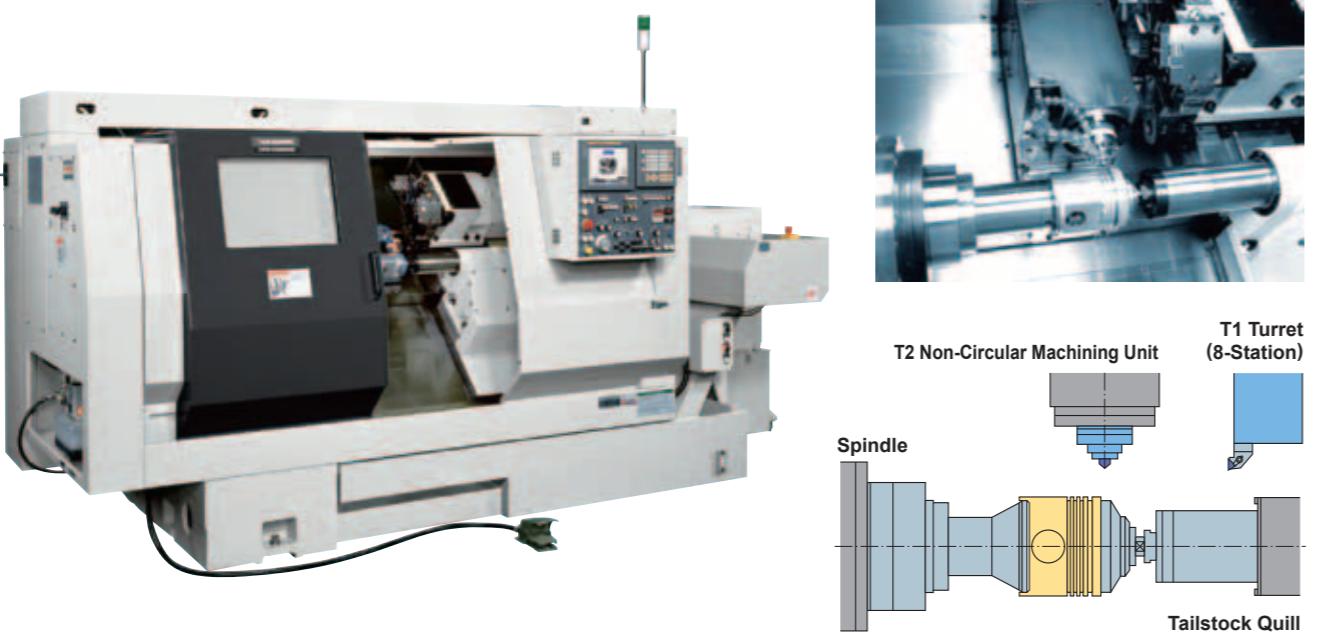
### Optional Accessories

- Work Holding Fixture
- With heater on Oil Controller (for Coolant)
- Footswitch (Chuck, Quill)
- Air Blower (Outside of Spindle)
- T4 turret (Y-Axis/4-Station Turret)
- Auto Door
- Powered Door

# TPS-4100HI

Process Integrating Machine  
Piston OD Oval Machining +  
One Turret for Preparatory Machining

■ Capable of pistons up to 12" (305mm).



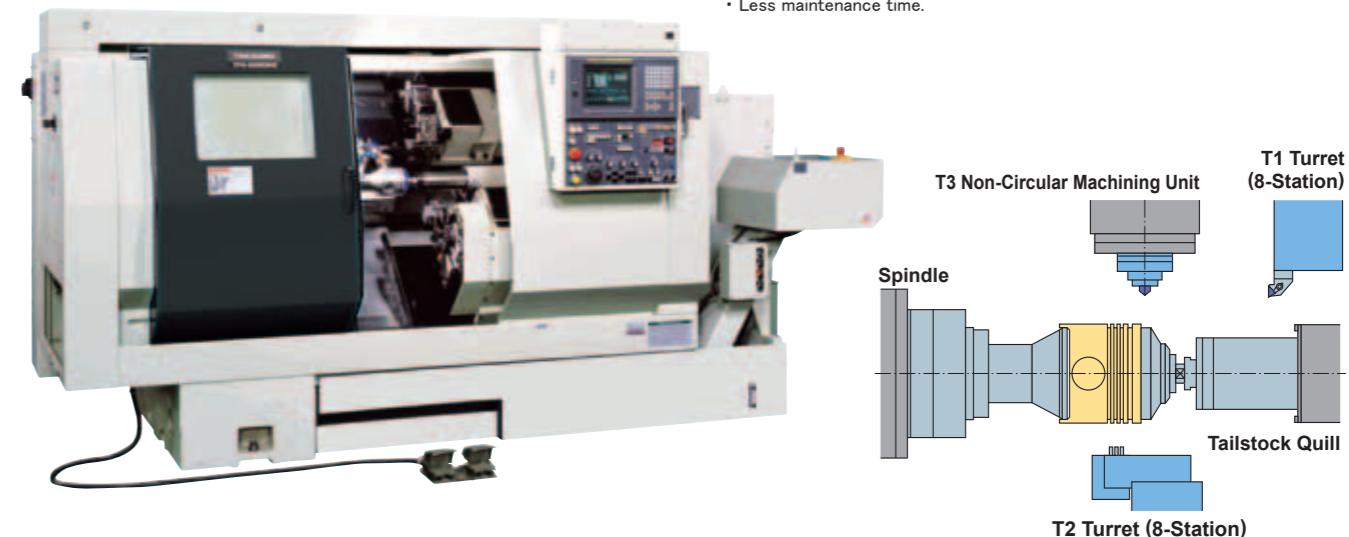
■ Machine Specifications

Capability · Capacity	Maximum Turning Diameter	mm inch	320 12.6"
	Maximum Turning Length	mm inch	250 9.84"
Spindle	Spindle Speed	min <sup>-1</sup>	40 ~ 4000
	Minimum Index Angle	deg	0.001
	Spindle Nose (Nominal No.)		JIS A2-6
	Spindle Hole Through Diameter	mm inch	45 1.77"
	Spindle Bearing Inside Diameter	mm inch	100 3.94"
	Type of Turret (T1)		Octagonal Drum Turret
Turret	Type of Turret (T2)		Turret for Non-Circular Machining
	Travel	mm inch	X : 170 Z : 410 A : 125 Y : 25 X : 6.69" Z : 16.14" A : 4.92" Y : 1"
	Rapid Traverse Rate	m/min ipm	X, Z, A : 20 Y : 6 X, Z, A : 70.4 Y : 236.22
	Number of Attachable Tools		T1 : 8 T2 : 1 (OP : 4)
	Height of Square Tool	mm inch	T1 : □ 25 T2 : φ10 T1 : □ 0.75" T2 : φ0.39"
	Diameter of Boring Bar	mm inch	40 1.57"
Tailstock	Travel	mm inch	380 14.96"
	Quill Diameter	mm inch	90 3.54"
	Quill Taper Bore		MT.4 (OP : MT.5, Built-In MT.3)
	Quill Travel	mm inch	150 3.54"
Motors	Spindle Motor (30 min/continuous)	kW HP	11/7.5 14.7/10
	Feed Axis Motor	kW HP	X : 1.6 Z : 3 A : 1.6 Y : 2.5 X : 2.1 Z : 4 A : 2.1 Y : 3.3
	Turret Turning Motor	kW HP	1.8 2.4
	Hydraulic Pump Motor	kW HP	2.2 2.9
	Spindle Cooling Motor	kW HP	1.5 2
	Coolant Cooling Motor	kW HP	1.5 2
Power Sources Required	Coolant Pump Motor	kW HP	0.25×2 0.3×2
	Electric Power	kVA	28.1
	Air Source Pressure	MPa	0.5
	Air Source Flowrate	NL/min	200
Tank Capacity	Hydraulic Unit	L gal	65 17.16
	Coolant	L gal	340 89.76
Machine Size	Machine Height	mm inch	1850 72.83"
	Height from Floor Level to Spindle Centerline	mm inch	1100 43.31"
	Floor Space Required	mmxmm inchxinch	3880×2673 152.76"×105.24"
	Machine Total Weight	kg lbs	5500 12100

# TPS-5000HI

Process Integrating Machine  
Piston OD Oval Machining +  
Two Turrets for Preparatory Machining

■ Capable of pistons up to 12" (305mm).



<Comparison with Process Separate Type Production System>

- Higher accuracy machining thanks to multiple-process machining by one chucking.
- Less re-setup time required for changing jigs, tools, and programs.
- Less floor space for 4 to 5 processes of process separate type.
- Less maintenance time.

■ Machine Specifications

Capability · Capacity	Maximum Turning Diameter	mm inch	320 12.6"
	Maximum Turning Length	mm inch	250 9.84"
Spindle	Spindle Speed	min <sup>-1</sup>	40 ~ 4000
	Minimum Index Angle	deg	0.001
	Spindle Nose (Nominal No.)		JIS A2-6
	Spindle Hole Through Diameter	mm inch	45 1.77"
	Spindle Bearing Inside Diameter	mm inch	100 3.94"
	Type of Turret(T1)		Octagonal Drum Turret
Turret	Type of Turret(T2)		Octagonal Drum Turret
	Type of Turret(T3)		Turret for Non-Circular Machining
	Travel	mm inch	X1, X2 : 170 Z1 : 410 Z2 : 350 A : 125 Y : 25 X1, X2 : 6.69" Z1 : 16.14" Z2 : 13.78" A : 4.92" Y : 1"
	Rapid Traverse Rate	m/min ipm	X, Z, A : 20 Y : 6 X, Z, A : 70.4 Y : 236.22
	Number of Attachable Tools		T1, T2 : 8, T3 : 1 (OP : 4)
	Height of Square Tool	mm inch	T1, T2 : □ 25 T3 : φ10 T1, T2 : □ 0.75" T3 : φ0.39"
Tailstock	Diameter of Boring Bar	mm inch	40 1.57"
	Travel	mm inch	380 14.96"
	Quill Diameter	mm inch	90 3.54"
	Quill Taper Bore		MT.4 (OP : MT.5, Built-In MT.3)
Motors	Quill Travel	mm inch	150 3.54"
	Spindle Motor (30 min/continuous)	kW HP	11/7.5 14.7/10
	Feed Axis Motor	kW HP	X : 1.6 Z : 3 A : 1.6 Y : 2.5 X : 2.1 Z : 4 A : 2.1 Y : 3.3
	Turret Turning Motor	kW HP	1.8 2.4
Power Sources Required	Hydraulic Pump Motor	kW HP	2.2 2.9
	Spindle Cooling Motor	kW HP	1.5 2
	Coolant Cooling Motor	kW HP	1.5 2
	Coolant Pump Motor	kW HP	0.25×3 0.3×3
Power Sources Required	Electric Power	kVA	30.8
	Air Source Pressure	MPa	0.5
	Air Source Flowrate	NL/min	200
Tank Capacity	Hydraulic Unit	L gal	65 17.16
	Coolant	L gal	340 89.76
Machine Size	Machine Height	mm inch	1850 72.83"
	Height from Floor Level to Spindle Centerline	mm inch	1100 43.31"
	Floor Space Required	mmxmm inchxinch	3880×2673 152.76"×105.24"
	Machine Total Weight	kg lbs	6000 13200

■ Standard Accessories

TPPF3 Software
Work Tool Set
Instruction Manual
Hydraulic Unit
Front Door Interlock
Coolant Unit (250W)
Oil Controller (for Coolant)
Hydraulic Servo Tailstock (MT4)
Quill M Function
Traction Type Auto Clamp
Footswitch (Chuck)

■ Optional Accessories

Work Holding Fixture
Coolant Unit (400W)
With heater on Oil Controller (for Coolant)
Chip Conveyor (Aluminum Only (Scraper))
Footswitch (Quill)
Air Blower (Outside of Spindle)
T4 turret (Y-Axis/4-Station Turret)

TPPF3 Software
Work Tool Set
Instruction Manual
Hydraulic Unit
Front Door Interlock
Coolant Unit (250W)
Oil Controller (for Coolant)
Hydraulic Servo Tailstock (MT4)
Quill M Function
Traction Type Auto Clamp
Footswitch (Chuck)

■ Optional Accessories

Work Holding Fixture
Coolant Unit (400W)
With heater on Oil Controller (for Coolant)
Chip Conveyor (Aluminum Only (Scraper))
Footswitch (Quill)
Air Blower (Outside of Spindle)
T4 turret (Y-Axis/4-Station Turret)

# TPS-Series

\* The screens shown here are TPPF4.

## TPS-Series standard specification.

### Unique Piston Machining Programming Software.

(TAKISAWA PISTON PROGRAMMING FUNCTION)

## TPPF3, TPPF4

The original software TPPF3/TPPF4 is developed by concentrating Takisawa's know-how of oval workpiece (piston) machining. It powerfully supports creation of machining programs.



### Touch Panel Support

Items		TPPF3	TPPF4
Model		TPS-3100HII/3200HII/3300HII/3400HII /3500HII/4100HII/5000HII	TPS-V1000
High Speed Cycle Machining	Data Variables	#2000000 ~ #3999999	#2000000 ~ #4999999
	Maximum Registrable Points	900000	1450000
	Maximum Registrable Cycles	300	300
	Call Format	G105 P10*** L** G205 P10*** L** C/H_	G105 P10*** L** G205 P10*** L** C/H_
Programming	ITP	0.25msec	0.25msec
	Format	G Code (Conforms to NC Language)	G Code (Conforms to NC Language)
	Compatibility	Completely Compatible with TPPF and TPPF2 Programs	Completely Compatible with TPPF, TPPF2 and TPPF3 Programs
	Side Profile Maximum Elements	400	400
	Sectional Profile Maximum Elements	2880 (in Use of Linear Interpolation)	2880 (in Use of Linear Interpolation)
Main Functions	Side Profile Graphic Function	●	●
	Sectional Profile Graphic Function 1 (Angle Drawing)	●	●
	Sectional Profile Graphic Function 2 (Oval Drawing)	●	●
	Sectional Profile Analyzing Function	●	●
	High Speed Cycle Machining Data Converting Function	●	●
	High Speed Cycle Machining Data Graphic Function	●	●
	High Speed Cycle Machining Data Transfer Function	●	●
	System Parameter Function	●	●
	Program Editing Function	●	●
	Program I/O Function	●	●

### Program Editing

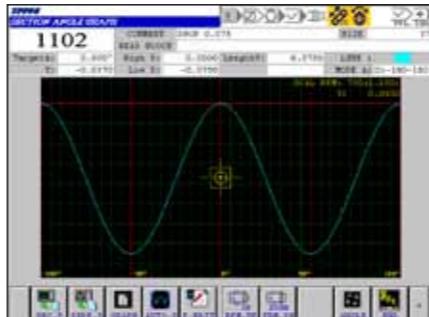


Program List

Program Editing

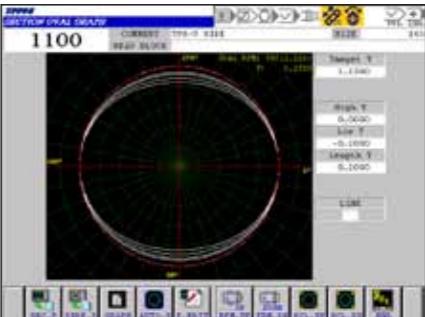
Side face shape definition/cross section shape definition programs can be created and edited.  
Programs are stored in the built-in memory card.

### Sectional Profile Graphic (Angle)



A cross section shape definition program is read and an angle development graph is drawn to check the program.

### Sectional Profile Graphic (Oval)



A cross section shape definition program is read and an oval graph is drawn to check the program.

### Side Profile Graphic



A side face shape definition program is read and a graph is drawn to check the program.

### Sectional Profile Analyzing

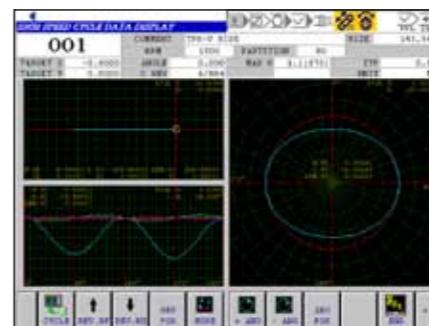


A cross section shape definition program is read and analyzed. Operations such as rotation and center movement and Fourier transformation can also be performed.

### High Speed Cycle Machining



High Speed Cycle Machining Data Converting



High Speed Cycle Machining Data Graphic

High speed cycle machining data can be created from a side face shape definition/cross section shape definition program. Created high speed cycle machining data is read and a graph is drawn to check the data. Rotation operation and whole cross section drawing can be performed.



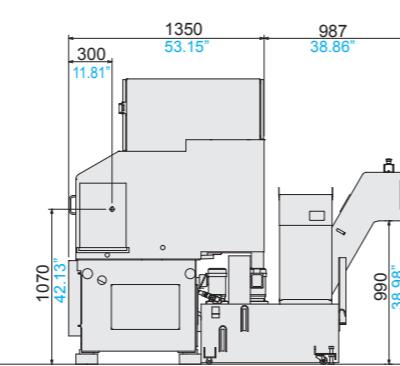
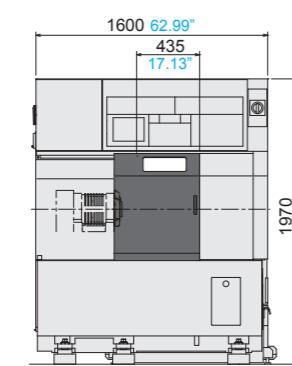
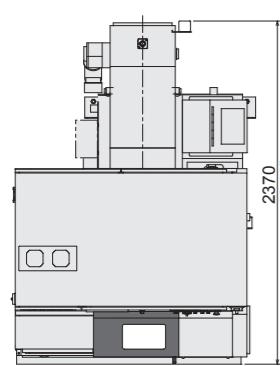
# Machine Dimensional Drawing

## Machine Dimensional Drawing

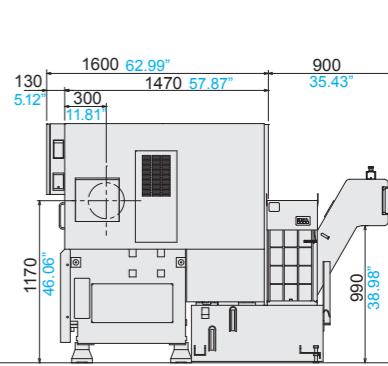
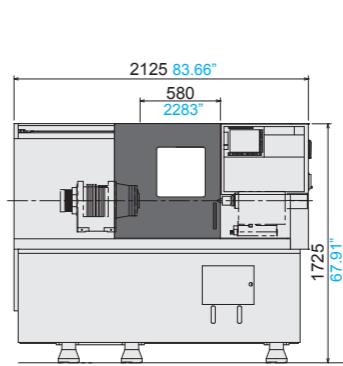
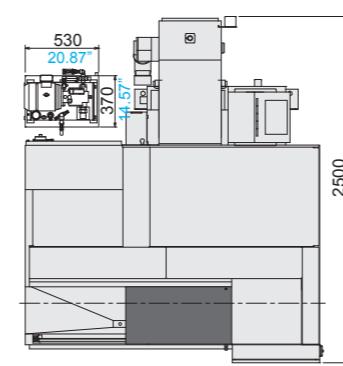
Unit : mm inch

Unit : mm inch

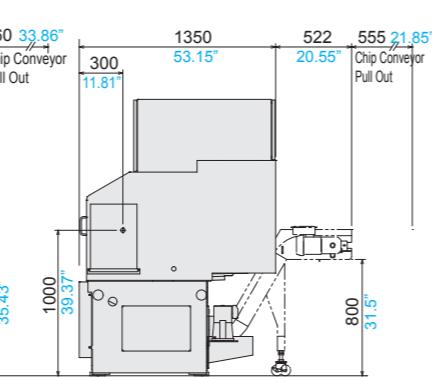
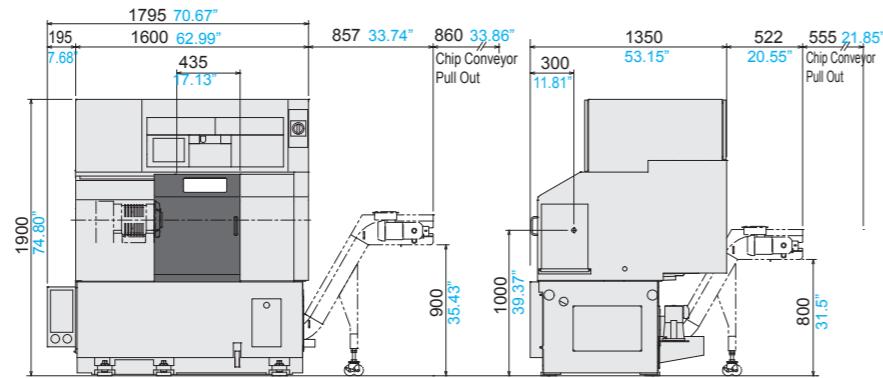
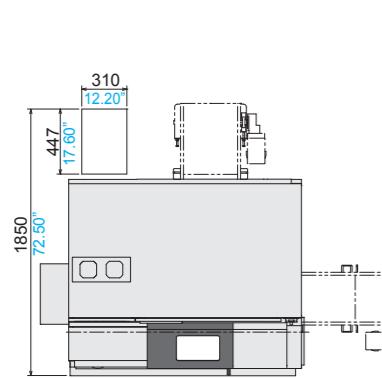
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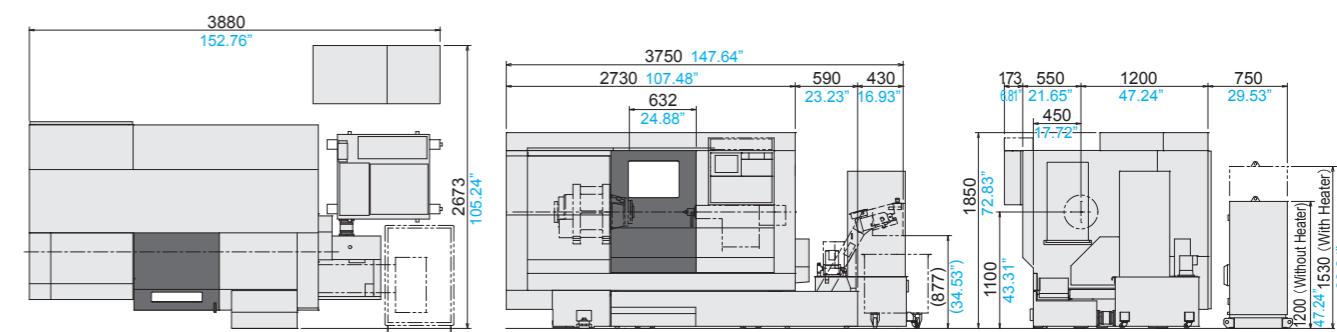
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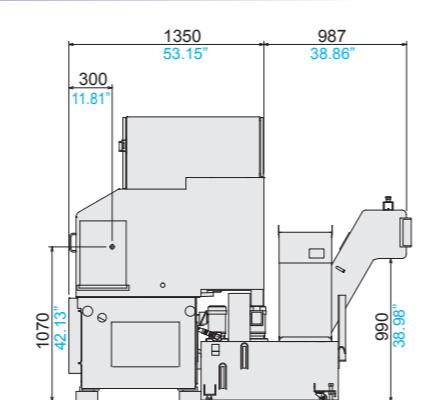
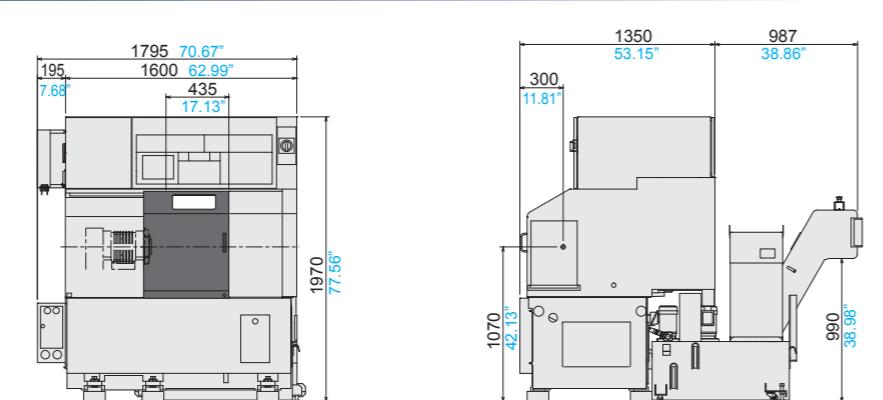
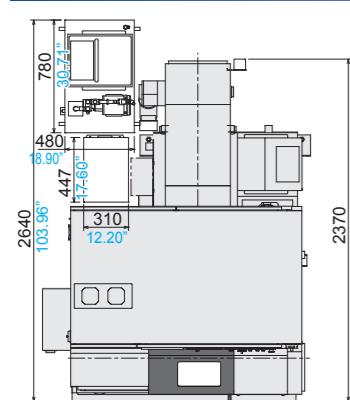
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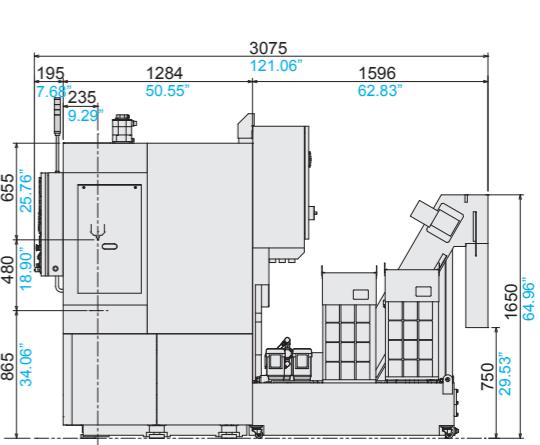
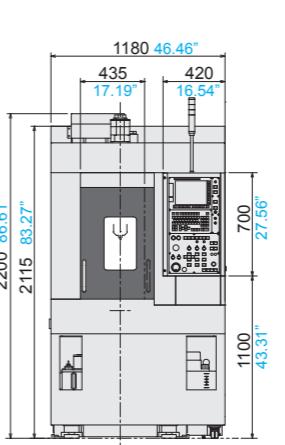
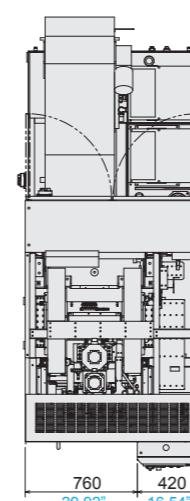
**TPS-4100H II / TPS-5000H II**



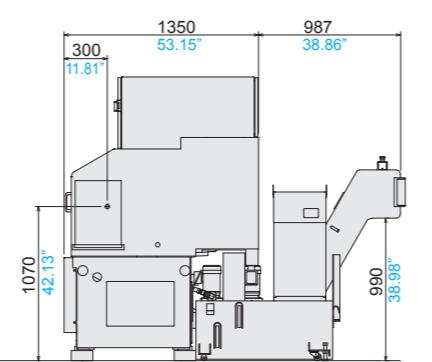
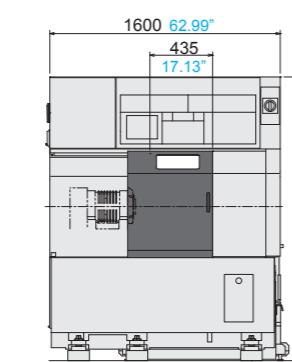
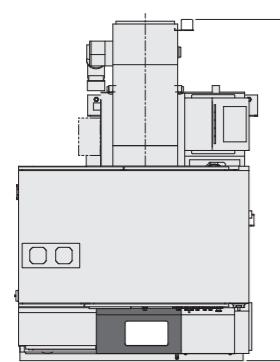
**TPS-3300H II**



**TPS-V1000**



**TPS-3400H II**



# TPS-Series

## NC Unit Specifications

FANUC : 31i-A, 31i-B

\* Please contact our sales persons  
for further information.



## Composition

Specifications:	TPS-Series							
Contents	3100HII	3200HII	3300HII	3400HII	3500HII	4100HII	5000HII	V1000
NC Unit	31i-A			31i-B				

### 【Controlled Axes】

X	0.0001mm Radius Command	0.0001mm Diameter Command	0.0001mm Radius Command
Z		0.0001mm	
Y	0.0001mm Radius Command	-	0.0001mm Radius Command
C		0.001deg	
B	-		0.001deg <sup>*12</sup>
A	-	0.0001mm Radius Command	0.001mm <sup>*12</sup>
X2	-		0.0001mm Diameter Command
Z2	-		0.0001mm

### 【NC Unit】

10.4" Color LCD (Touch Panel + Soft Keys)	●
Pen for Touch Panel	●
<b>【Software】</b>	
RAKU-RAKU Monitor	○
Measurement Monitor *1	○
TPPF3	●
TPPF4	-
●	
<b>【Safety Devices】</b>	
Front Door Interlock	●
Front Door Locking Mechanism	●
Control Panel Breaker with Tripper	○
Safety Relay	●
Fixed Door Safety Switch	○
Fixed Door Safety Switch	○

## Main Function List

Specifications·Contents	TPS-Series							
	3100HII	3200HII	3300HII	3400HII	3500HII	4100HII	5000HII	V1000
<b>【Controlled Axes】</b>								
Max. Programmable Dimension *13	●	●	●	●	●	●	●	●
Cs Contouring Control	●	-	-	●	●	●	●	●
Increment System C *2 *13	●	●	●	●	●	●	●	●
Preview Repetitive Control	●	●	●	●	●	●	●	●
Inch/Metric Conversion	●	●	●	●	●	●	●	●
Interlock	●	●	●	●	●	●	●	●
Emergency Stop	●	●	●	●	●	●	●	●
Stored Stroke Check 1	●	●	●	●	●	●	●	●
Stored Stroke Check 2, 3 *3	○	○	○	○	○	○	○	○
Stored Limit Check Before Move	○	○	○	○	○	○	○	○
Chuck and Tail Stock Barrier *4	○	○	○	○	○	○	○	○
Mirror Image (Each Axis)	▲	▲	▲	▲	▲	▲	▲	▲
Unexpected Disturbance	○	○	○	○	○	○	○	○
Torque Detection Function								
Position Switch	◎	◎	◎	◎	◎	◎	◎	◎
<b>【Operation】</b>								
Automatic Operation (Memory)	●	●	●	●	●	●	●	●
MDI Operation	●	●	●	●	●	●	●	●
Program Number Search	●	●	●	●	●	●	●	●
Sequence Number Search	●	●	●	●	●	●	●	●
Sequence Number Comparison and Stop	○	○	○	○	○	○	○	○
Program Restart	○	○	○	○	○	○	○	○
Wrong Operation Prevention	▲	▲	▲	▲	▲	▲	▲	▲
Buffer Register	●	●	●	●	●	●	●	●
Dry Run	-	-	●	●	●	●	●	●
Single Block	●	●	●	●	●	●	●	●
Manual Continuous Feed (JOG)	●	●	●	●	●	●	●	●
Manual Reference Position Return	●	●	●	●	●	●	●	●
Reference Position Setting without DOG	●	●	●	●	●	●	●	●
Manual Handle Feed, 1 Unit	●	●	●	●	●	●	●	●
Handle interruption	○	○	○	○	○	○	○	○
<b>【Interpolation Functions】</b>								
Positioning (G00)	●	●	●	●	●	●	●	●
Linear Interpolation (G01)	●	●	●	●	●	●	●	●
Circular Interpolation (G02/03)	●	●	●	●	●	●	●	●
Dwell (G04)	●	●	●	●	●	●	●	●
Skip (G31)	○	○	○	○	○	○	○	○
Torque Limit Skip	○	○	○	○	○	○	○	○
Reference Position Return (G28)	●	●	●	●	●	●	●	●
Reference Position return Check (G27)	●	●	●	●	●	●	●	●
2nd Reference Position Return (G30)	●	●	●	●	●	●	●	●
3rd, 4th Reference Position Return	○	○	○	○	○	○	○	○
High-Speed Cycle Cutting	●	●	●	●	●	●	●	●
High-Speed Cycle Machining	●	●	●	●	●	●	●	●
Retract Function	●	●	●	●	●	●	●	●
<b>【Feed Functions】</b>								
Rapid Traverse Override *14	●	●	●	●	●	●	●	●
Feed Per Minute	●	●	●	●	●	●	●	●
Feed Per Revolution	●	●	●	●	●	●	●	●
Constant Tangential Speed Control	●	●	●	●	●	●	●	●
Cutting Feedrate Clamp	●	●	●	●	●	●	●	●
Automatic Acceleration/Deceleration	●	●	●	●	●	●	●	●
Rapid Traverse Bell-Shaped Acceleration/Deceleration	●	●	●	●	●	●	●	●
Bell-shaped Acceleration/Deceleration After Cutting Feed Interpolation	○	○	○	○	○	○	○	○
Feedrate Override	●	●	●	●	●	●	●	●
Jog Override	●	●	●	●	●	●	●	●
Override Cancel	●	●	●	●	●	●	●	●
Manual per Revolution Feed	▲	▲	▲	▲	▲	▲	▲	▲
<b>【Program Input】</b>								
Tape Code (EIA/ISO Auto Recognition)	●	●	●	●	●	●	●	●
Label Skip	●	●	●	●	●	●	●	●
Parity Check	●	●	●	●	●	●	●	●
Control In/Out	●	●	●	●	●	●	●	●
Optional Block Skip, 1 Piece	●	●	●	●	●	●	●	●
Optional Block Skip (2 to 9 Pieces)	○	○	○	○	○	○	○	○
Program Number O4 Digits	●	●	●	●	●	●	●	●
Program File Name 32 Characters	●	●	●	●	●	●	●	●
Sequence Number N8 Digits	●	●	●	●	●	●	●	●

Specifications·Contents	TPS-Series							
	3100HII	3200HII	3300HII	3400HII	3500HII	4100HII	5000HII	V1000
<b>【Controlled Axes】</b>								
Absolute/Incremental Programming	●	●	●	●	●	●	●	●
Decimal Point Programming/ Pocket Calculator Type Decimal Point Programming	●	●	●	●	●	●	●	●
Diameter/Radius Programming	●	●	●	●	●	●	●	▲
Rotary Axis Designation	●							

# TPS-Series

**TAKISAWA®**

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Japanese laws prohibit this machine from being used to develop or manufacture "weapons of mass destruction" or "conventional arms", as well as from being used to process parts for them.

Export of the product may require the permission of governmental authorities of the country from where the product is exported.

Should you wish to resell, transfer or export the product, please notify Takisawa Machine Tool Co., Ltd. or our distributor in advance.

\*The appearance, specifications, and relevant software of the product are subject to change for improvement without notice.

\*Please make an inquiry to our sales representatives for details of the product.



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