

PRECISION CYLINDRICAL PINCH/PEEL GRINDER



TP-4

TP-4 is a step machine for the preparation of cutting tool blanks. It serves as a bridge between a centerless grinder and a 5-axis tool grinder.

TOPWORK

TP-4

PRECISION CYLINDRICAL PINCH/PEEL GRINDING

TP-4 is a smart tech high precision CNC cylindrical pinch/peel grinder with two grinding wheels operating simultaneously for grinding cylindrical materials of cutting tools and form punches. This model is used after doing centerless grinding and before doing the pre-process work on 5-axis tool grinder. It has applied to various industries, mainly used in high-precision tool industry, mold industry, and electronic and medical parts industry.

TP-4 Can meet all your application needs for grinding carbide and endmill, drill and form blanks.



Grinding Range
Ø0.1-20 mm

Grinding Length
Max. 330 mm

L/D ratio
350x D.

Concentricity
< 3 µm

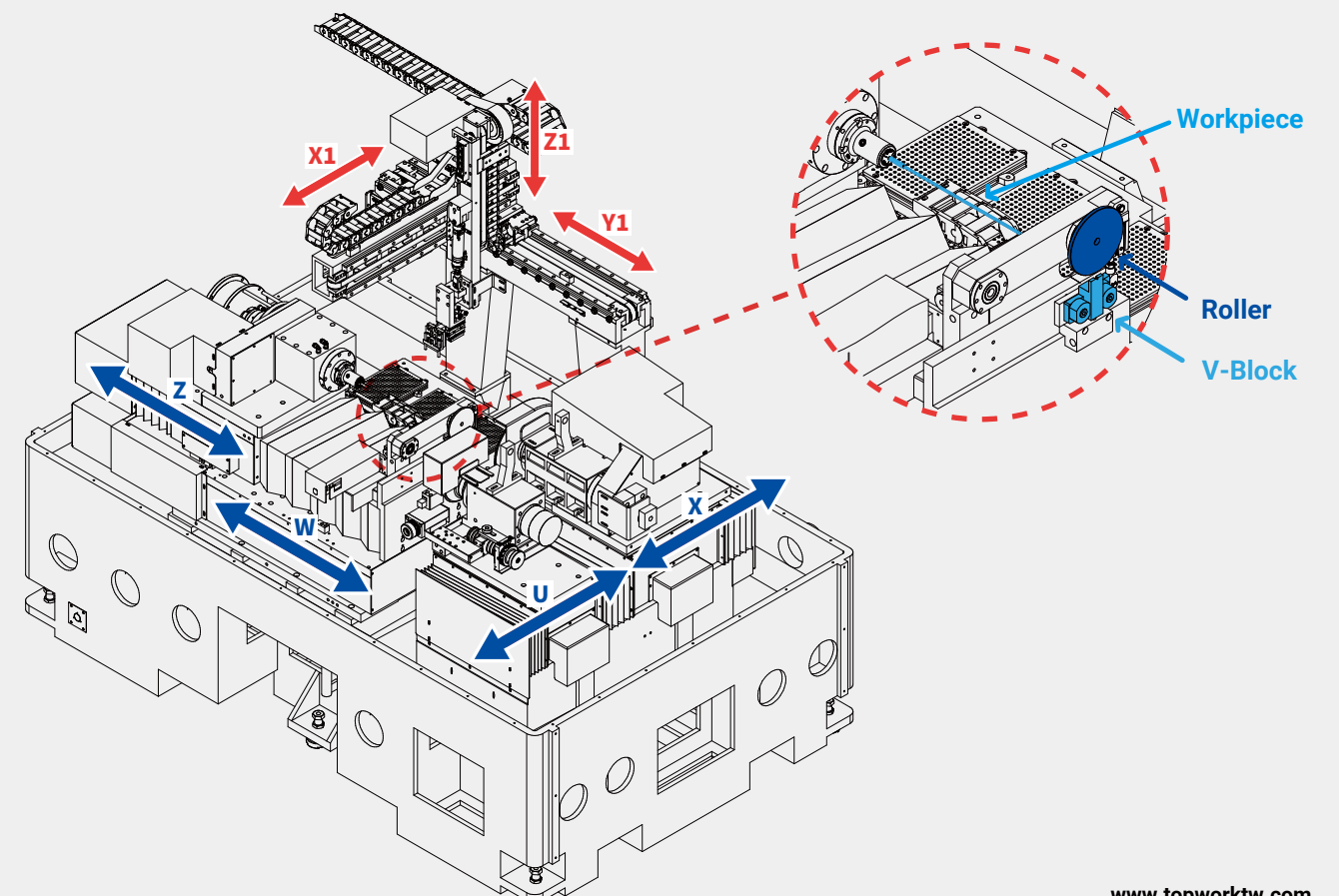
Unparalleled Precision and High Stability

The machine follows ISO 230-2 and we ensure the repeated positioning accuracy (R) is as low as 2 µm and the positioning accuracy (A) is 4 µm. The cutting tool blanks cover a range from diameter 0.1 to 20 mm. The maximal grinding length is 330 mm and the length/diameter ratio is up to 350x D.



Mechanical Structure

The bed of the machine is designed as box-type structure, equipped with double grinding wheel spindles (X & U-axis); Z & W-axis adopt high-precision parallel axis structure, which shows the capacity of grinding with roughing pass numerous as well as roughing and finishing in a single pass.



Grinding Spindle



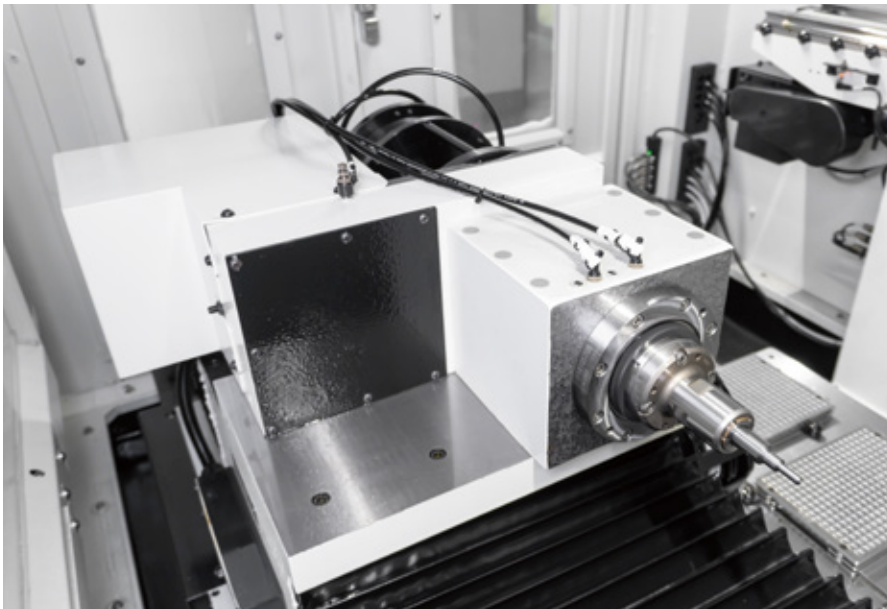
Rough and Finish in a Single Pass

TP-4 adapts two grinding wheels engaging synchronously and moving parallel to axis for material removal. The close loop design of the linear scales allows the dimensional accuracy to be managed within $\pm 2 \mu\text{m}$.

Roughing grinding spindle uses HSK32E belt-driven type(4 kW). HSK50 built-in spindle is provided as option for large material removals. Its motor enlarged to 16 kW gives a huge savings on cycle time and guarantees a higher production capability.

HSK32E built-in type is chosen for finishing grinding spindle. Equipped with different granularity of the grinding wheels, it can carry out high-quality surface finishes and considerable grinding results.

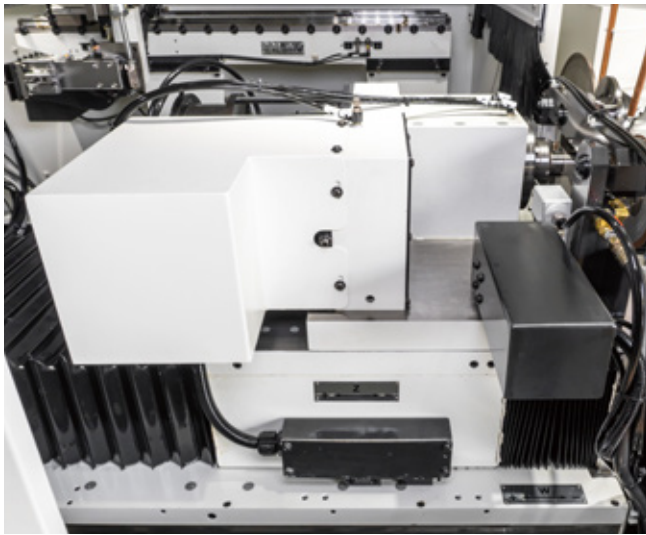
Working Spindle



Spindle Design

Best-in-class workhead spindle incorporates high-precision bearings for better rigidity and stability. With the grease lubrication used on spindle and bearings, it ensures unmatched longevity. The taper of the spindle is designed to be BT40.

It can be shared between multiple clamping systems by installing relative bolts and rods.



Grinding Methods

Two grinding methods are offered for different types of cutting tools and blanks. The first method is called “fixed mode”, which utilizes W axis for re-grinding production and is mainly used on formed cutting tools. The second one “swiss mode” provides a single pass for blank removals on Z axis. This process mostly applied in the production of drills, reamers, formed punches, tungsten pins, and special shaped of cylindrical parts.



V-Block & Roller

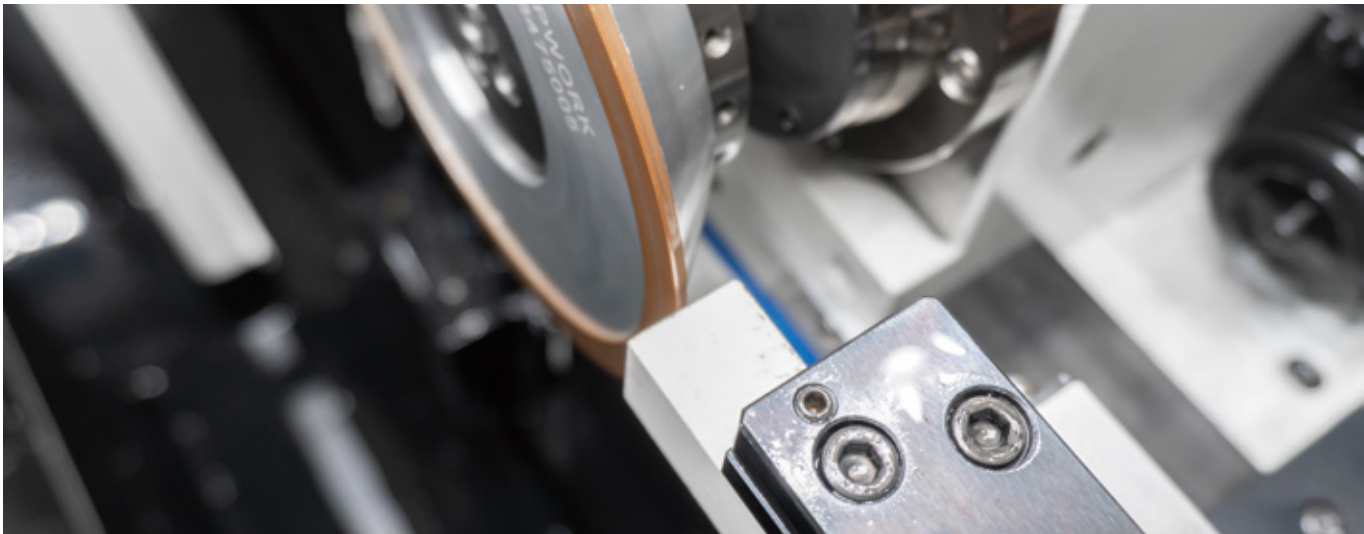
V-Block and roller enables dimensional size consistency to be controlled within $4 \mu\text{m}$ and the concentricity to be less than $3 \mu\text{m}$.

Feature



Probe Positioning Function

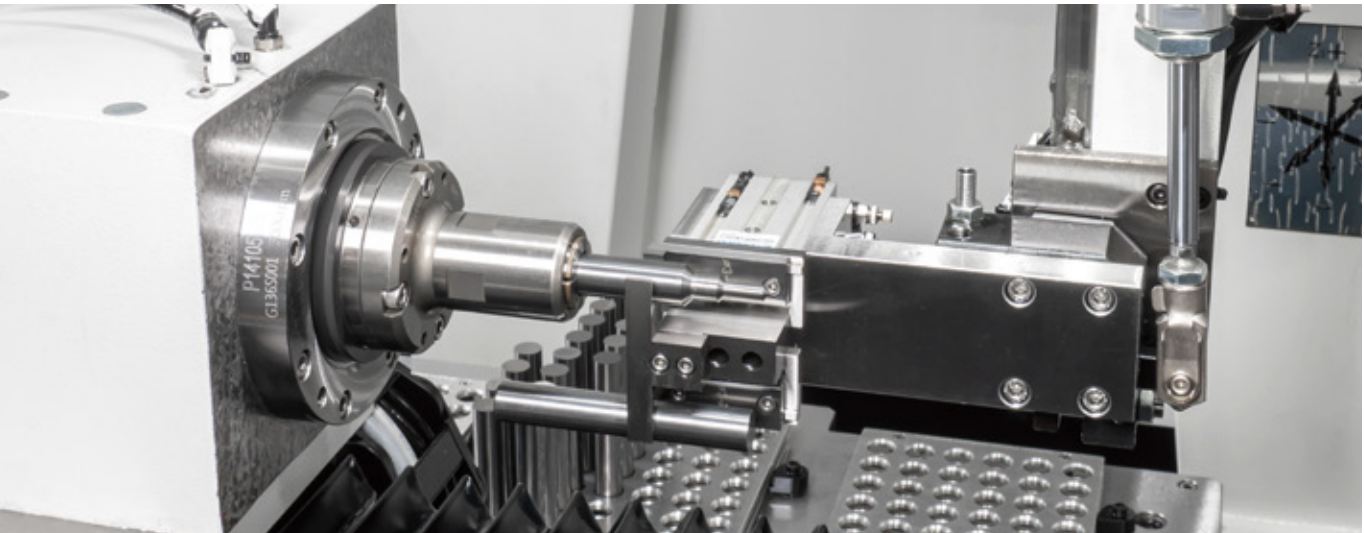
With the design of the pre-positioning detection, the clamping length of each tools can be recorded. According to this measurement, more accurate and excellent parts can be produced.



Wheel Sharpening Device (For Finishing Grinding Wheels)

In order to maintain grinding accuracy and increase efficiency, manual wheel dressing device for finishing grinding wheels, as standard, is provided.

Automatic Loading/Unloading System



A 3-axes automatic loading/unloading system is offered as a part of the standard machine and it allows unattended and high-speed production. During production, it can carry up to 2 loading trays at the same time with a capacity of up to 1'300 tools.

Maximum Loading Quantity (Two Loading Trays)

- Ø3-6 mm : 600 pcs.
- Ø8 mm : 240 pcs.
- Ø10 mm : 180 pcs.
- Ø12 mm : 160 pcs.
- Ø16 mm : 96 pcs.

User-friendly

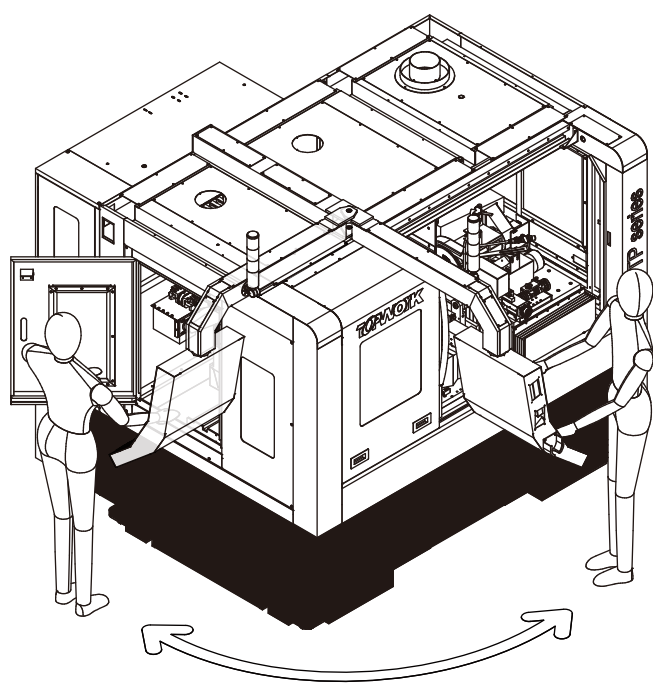


HMI Interface

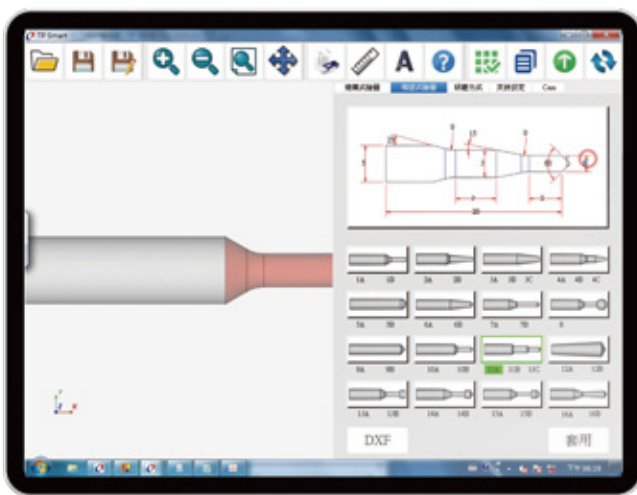
The main page of the interface is designed on the user-friendly and intuitive basis, showing axes position, cycle time, spindle load, feed speed, roughing speed, NC number info, and error message. The right side of the interface offers easy-to-use functions of grinding mode selection, TP Smart CAM software, parameter setting, loading/unloading system setting, and warmup.

Perfect Integration : Hardware and Software

The 90° rotation change of the control box shows greater flexibility, offering sufficient space in the working and loading areas. Under the concept of all in one, TOPWORK intergrates self-developed HMI interface with FAUNC controller, automatic loading/unloading system, and TP SMART software in IPC, presenting easily operated and optimal grinder for the users.



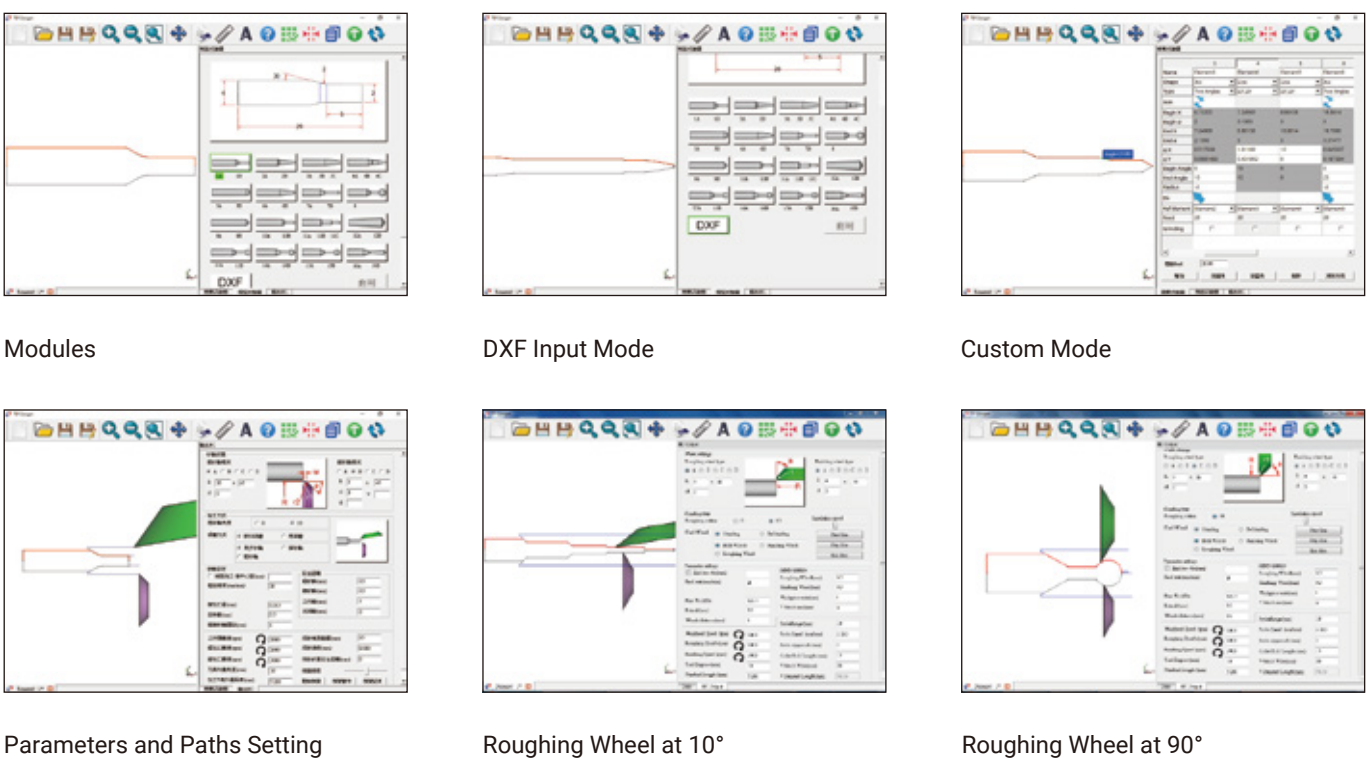
Software



TP SMART

TP Smart software is main core of TP-4 precision cylindrical pinch/peel grinder. 34 built-in quick setup modules are achieved to be used for grinding milling cutters, drills, punches, and all other cylindrical or stepped applications. CAD mode of the software allows operators to create any type of tool profile in just few settings. With the import of DXF format, it is possible for the users to grind special shaped tools, especially in the profile design of the formed punches.

In CAM function, two modes are offered respectively to the operators for choosing to do grinding or regrinding. Triple approaches can be selected for the use of grinding wheels, including simultaneous grinding of both wheels, roughing grinding, and finishing grinding. Operators just need to sequentially input workhead speed, wheel speed, wheel distance, finish depth, and safety distance, then simulation of the grinding path will be generated successfully. The NC program can be carried out and transferred to the controller after confirming simulated path. This can provide TOPWORK machine users with a completely perfect using experiences and enable them to conduct an inestimable volume of applications with the machine.



Modules

DXF Input Mode

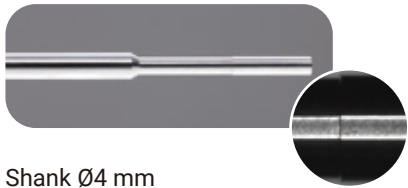
Custom Mode

Parameters and Paths Setting

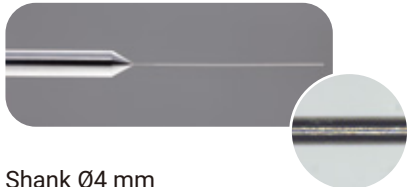
Roughing Wheel at 10°

Roughing Wheel at 90°

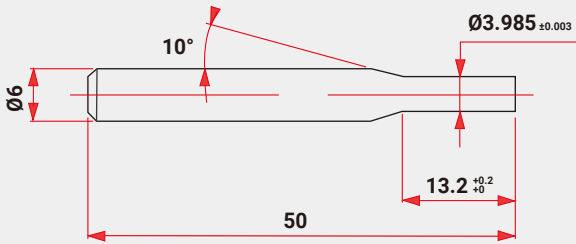
Application



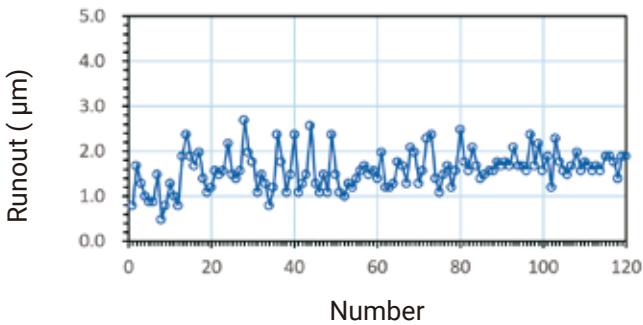
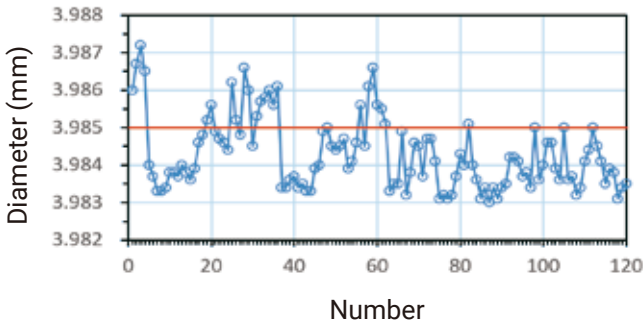
Shank Ø4 mm
Front Ø2.878 mm, Length 12 mm
Middle Ø2.600 mm, Length 14 mm
Magnification 1X (Nikon Microscopes)



Shank Ø4 mm
Front Ø0.1 mm, Length 35 mm
A ratio of 350 between length and diameter
Magnification 5X (Nikon Microscopes)



Roughing Wheel D64 / Finishing Wheel SDC 1500
Cycle time : 46 sec
Surface roughness : Ra 0.12 µm
Controller : FANUC 0i-TF Plus
Software : TP SMART
Coolant : OELHELD ToolGrind TC-X 620



Acessories

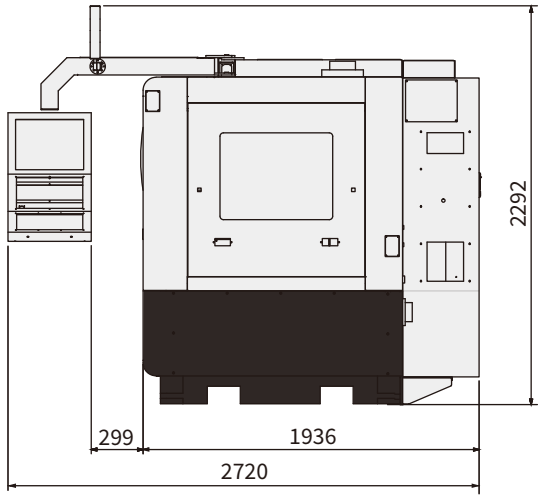
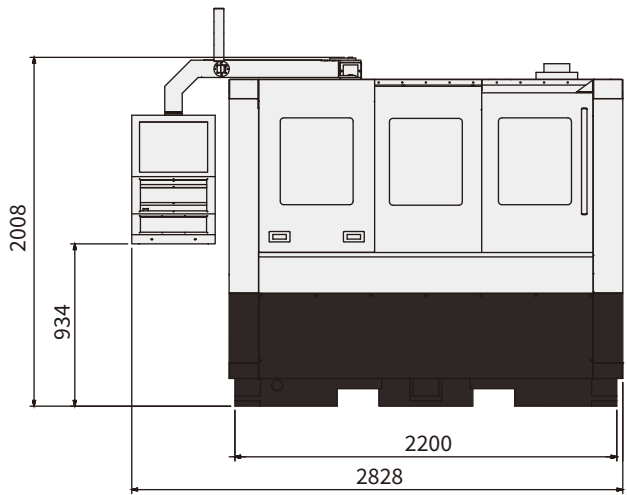
Standard Accessories

3D Touch Probe for Workpieces (European Brand)
X&U-axis Linear Scale
Automatic Loading & Unloading System
Loading and Unloading Jaw (Ø3 – Ø20 mm)
Loading Tray (Ø6 mm)
V-Type Support Block (Ø6 – Ø9 mm)
Collet Holder (SPC8, for collet Ø3 – Ø8 mm)
Collet (Ø6 mm)
Grinding Wheel Flange (Ø31.75 mm)
Full Enclosure Splash Guard
Automatic Lubrication System
Halogen Lamp
Tool Box & Adjusting Tool
Leveling Bolts & Blocks

Optional Accessories

Transformer
Voltage Stabilizing Transformer
Cooling System
Magnetic Separator for Filtering HSS
Loading Tray (Ø3/Ø4/Ø8/Ø10/Ø12/Ø16 mm)
V-Type Support Block (Ø3 – Ø5/Ø9 – Ø13/Ø14 – Ø16/Ø20 mm)
Collet Holder (W20, for collet Ø3 – Ø20 mm)
Collets (Ø3/Ø4/Ø8/Ø10/Ø12/Ø16/Ø20 mm)
Rough Diamond Wheel SDC for Carbide
Finish Diamond Wheel SDC for Carbide
Spare Belt

Machine Layout



Unit : mm

Specifications

Mechanical Axes Strokes and Resolutions

X-axis/Resolution	30 mm/0.0001 mm
U-axis/Resolution	30 mm/0.0001 mm
Z-axis/Resolution	370 mm/0.001 mm
W-axis/Resolution	100 mm/0.001 mm
Accuracy (A)	≤ 0.004 mm
Repeatability (R)	≤ 0.002 mm

Axes Motor

X-axis	0.75 kW
U-axis	0.75 kW
Z-axis	1.20 kW
W-axis	1.20 kW

Roughing Spindle

Type	Belt-Drive Spindle HSK32E Built-in Spindle HSK50 - opt.
Rotational Speed	Max. 4500 rpm (Belt-Drive Spindle) Max. 10000 rpm (Built-in Spindle) - opt.
Spindle Power	4.0 kW (Belt-Drive Spindle) 16 kW (Built-in Spindle) - opt.
Grinding Wheel Diameter	Ø250 mm

Finishing Spindle

Type	Built-in Spindle HSK32E
Rotational Speed	Max. 10000 rpm
Spindle Power	4.2 kW
Grinding Wheel Diameter	Ø150 mm

Working Spindle

Taper	BT40 BT50 - opt.
Rotation Speed	Max. 3000 rpm
Spindle Power	2.5 kW (BT40) 2.7 kW (BT50) - opt.

Grinding Range

Shank	Ø3 – 20 mm
Diameter	Ø0.1 – 20 mm
Grinding Length	Max. 330 mm

Manual Loading & Unloading

Shank	Ø3 – 20 mm
Overall Length	35 – 350 mm

Loading & Unloading System

Shank	Ø3 – 16 mm
Overall Length	35 – 110 mm

Controller

Type	FANUC 0i-TF Plus
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Machine Dimensions

Dimensions (W x D x H)	2877 x 2764 x 2294 mm
Weight	4700 kg
Total Power	Max. 20 kVA
Air Pressure	Min. 5 Kg/cm ²
Rated Flow	Min. 40 L/min

※ All specifications are subject to alternations without prior notice.

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