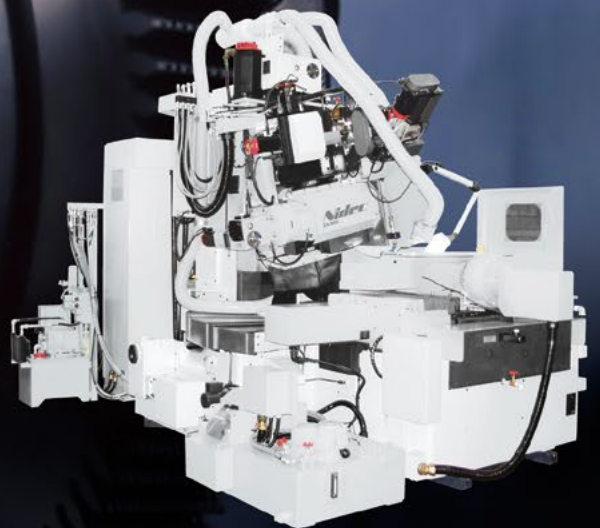


Nidec
All for dreams

CNC SHAVING CUTTER GRINDER

ZA30A



NIDEC MACHINE TOOL CORPORATION

www.nidec.com/en/nidec-machinetool/

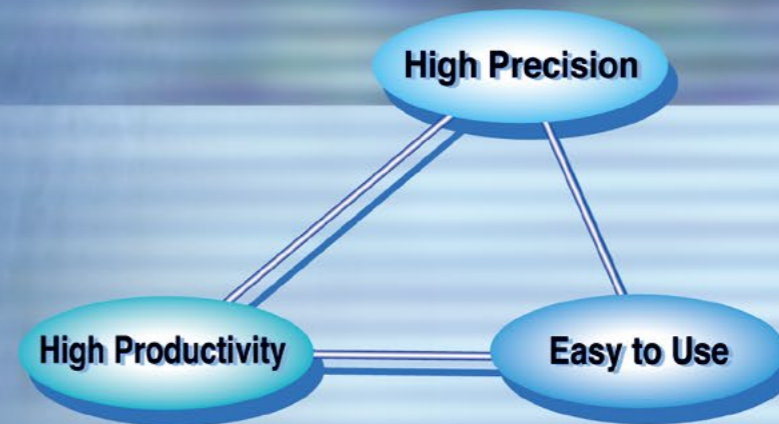
HIGH QUALITY CNC SHAVING CUTTER GRINDER ZA30A CREATES EXACT TOOTH MODIFICATIONS

The demand for higher accuracy and higher productivity for automotive transmission gears and industrial use gears are in the increase. Gear shaving process, which is the final finishing process before the gear goes for heat treatment, requires high technological knowledge to control the tooth profile considering the amount of heat treatment distortion.

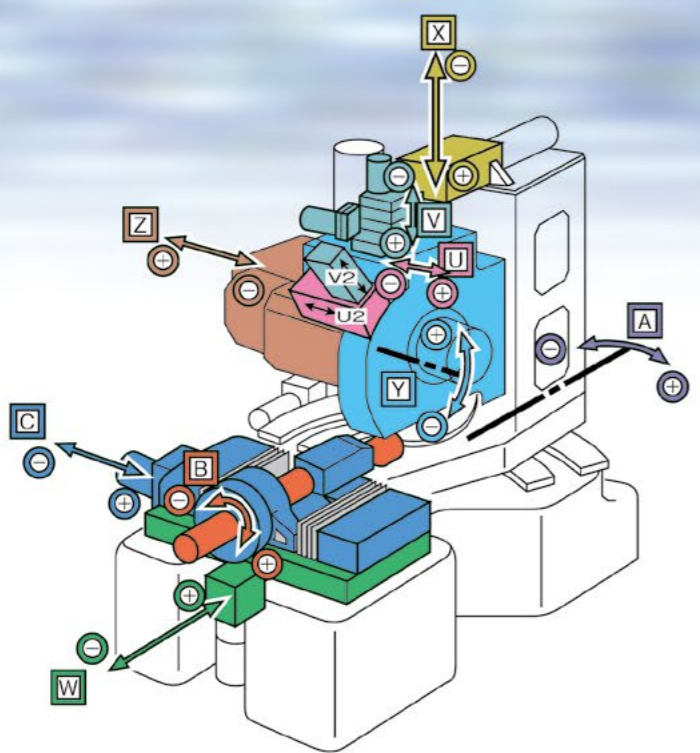
In gear shaving, it is very important to produce a shaving cutter with an accurate tooth profile as the tooth profile accuracy of gears during shaving rely upon the accuracy of the shaving cutter.

With our knowledge as the manufacture of shaving cutters, we have built an 11-axis CNC Shaving Cutter Grinder ZA30A.

We will contribute to the profit of the customer by changing its style of tooth profiling process of shaving cutters with its new "standard" aiming for a higher level specification along with the high performance that develops with the customers.



Grinding data control system



No.	Axis	Nomenclature
1	B	Cutter rotation
2	C	Table
3	W	Cutter position
4	U	NC dressing, in/out
5	V	NC dressing, up/down
6	X	Grinding wheel, up/down
7	Y	Pressure angle
8	Z	Grinding wheel position
9	A	Helix angle
10	U2	Rear face dressing, in/out
11	V2	Rear face dressing, up/down

CNC SHAVING CUTTER GRINDER **ZA30A**

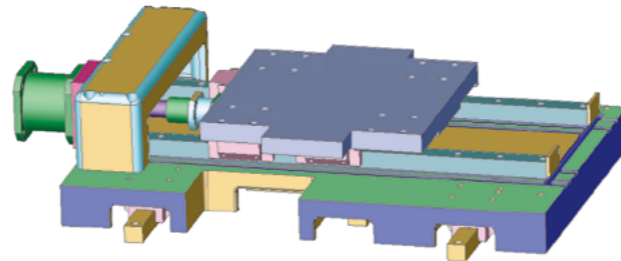
HIGH PRECISION

High precision tooth profiling is made simple.
Accurate gear shaving tools with complicated tooth profiles are created easily.

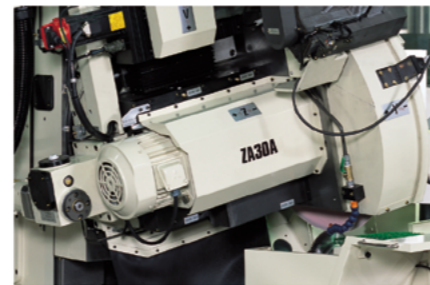
High Precision Grinding

Machine Structure

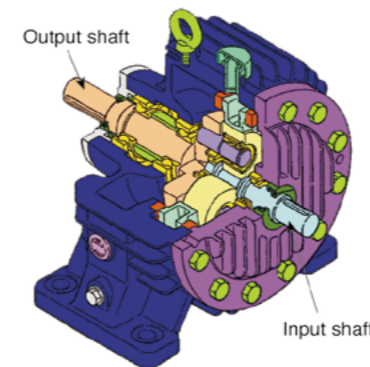
ZA30A employs a robust drive mechanism based on rigidity analysis by 3-D CAD and cast iron bed having excellent damping features.



The grinding wheel spindle mounted on high precision angular contact bearings is enclosed in a rugged spindle unit and driven directly from a motor. Also, the grinding wheel spindle is equipped with wheel balancing device.

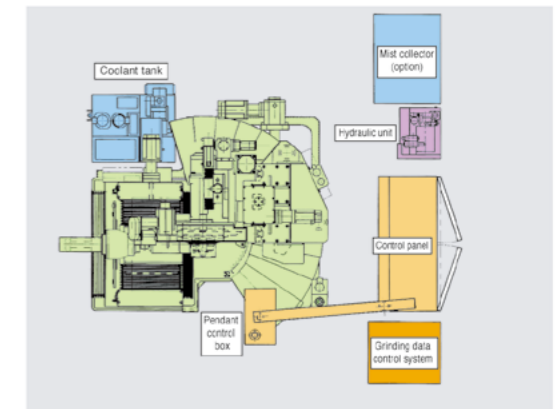
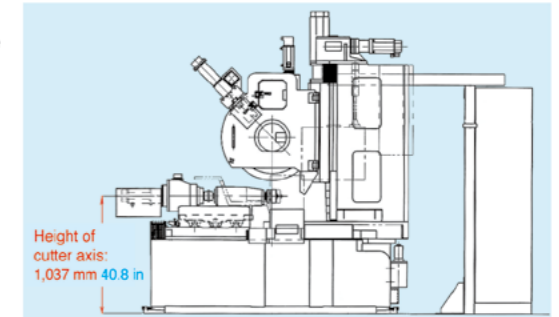


Our original traction drive reduction gear is employed for the cutter rotation (B) axis. Therefore, harmful vibrations found on conventional reduction gears cannot be found with our drive resulting in smooth rotational drive.



The cutter rotation (B) and table (C) axes, which will influence the cutter profile accuracy, are mounted on a robust bed having low center of gravity to maintain accuracy. This reduces the undulation of tooth profile, minimizes vibration caused by the tooth generating action. Furthermore, cutter change is made easy.

The ill effects of heat and vibration are nullified by separating the control panel, hydraulic unit, mist collector and coolant tank from the base machine.



High Precision Grinding of Optional Tooth Profile

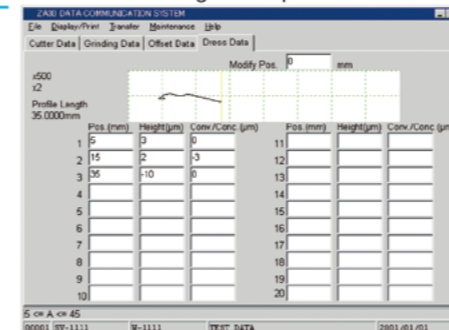
Control system and software

- All axes controlled under CNC control system having a resolution of 0.1micron **0.000004 in.**
- The cutter movement against the grinding wheel creates the generative motion. This requires synchronous motion between the cutter rotation (B) and table (C) axes. We were able to obtain a higher accuracy than before without the need of pitch block and index plate. Thanks to our abundant experience in manufacturing CNC synchronized control technology of gear cutting machines.
- A fully closed loop control using high precision scale is employed for the two axes to control tooth profile generation and tool face dressing axis.

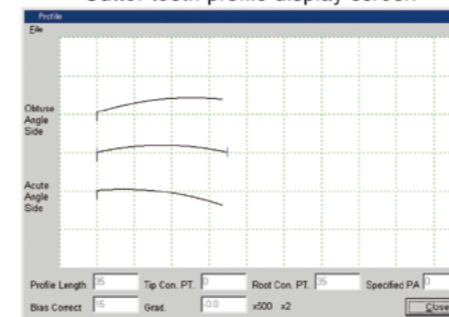
Software for high precision machining of optional tooth profile

- Chart image input of proposed cutter tooth profile
- NC bias compensation

Dressing data input screen



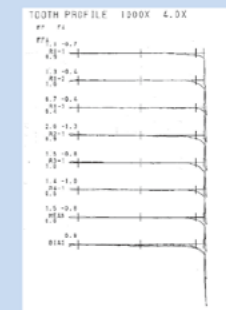
Cutter tooth profile display screen



Machining Example (1)

Cutter Specifications

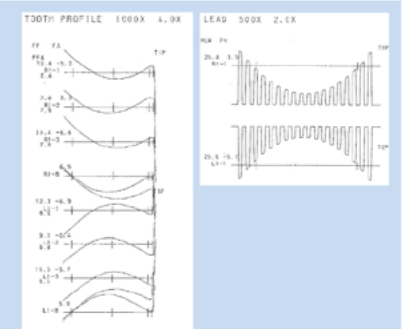
- Module 2
- Diametral pitch 12.70
- Pressure angle 17.5 deg.
- Helix angle 12 deg. (RH)
- Number of teeth 97
- Face width 25.4 mm **1.0 in**



Machining Example (2)

Cutter Specifications

- Module 1.5
- Diametral pitch 16.93
- Pressure angle 17.5 deg.
- Helix angle 12 deg. (RH)
- Number of teeth 151
- Face width 36 mm **1.4 in**



HIGH PRODUCTIVITY

Complicated tooth profile cutters can be ground with short set-up times.

Reduced Set-up Times and Test Cut Adjustment Times

CNC Drastically Reduces Set-up Times

First part :

CNC will calculate the set-up and carry out set-up changeover by inputting necessary data. (No manual operation required)

Repeated parts :

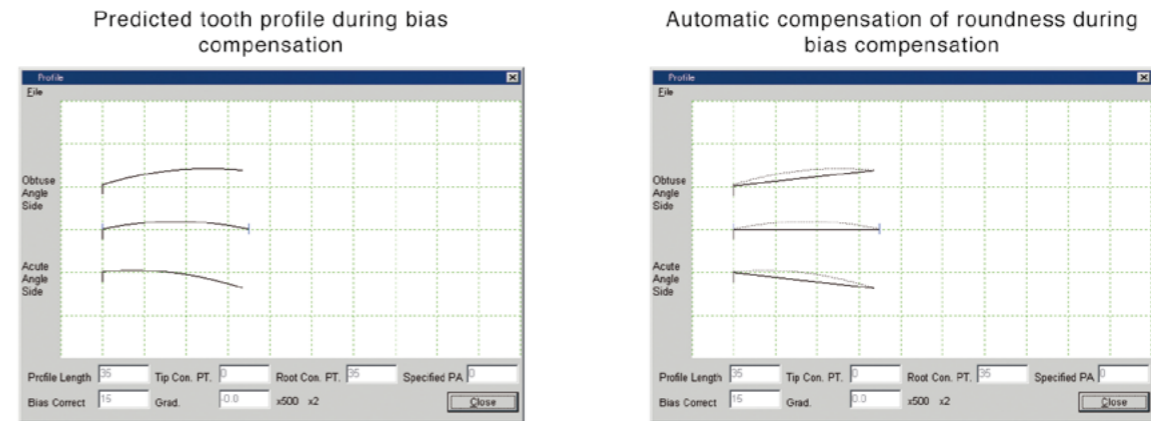
Set-up will be completed instantly by just recalling the data from memory and the machine will be ready for start-up. Accuracy repeatability is remarkable.



Note: Does not include times required for wheel dressing, 1 tooth cutting and measuring.

Instant Accuracy Correction during Bias Compensation

Predicting tooth profile roundness that occurs during bias compensation can automatically compensate the roundness of tooth profile.



Dress Teaching Function Reduces Grinding Wheel Dressing Time

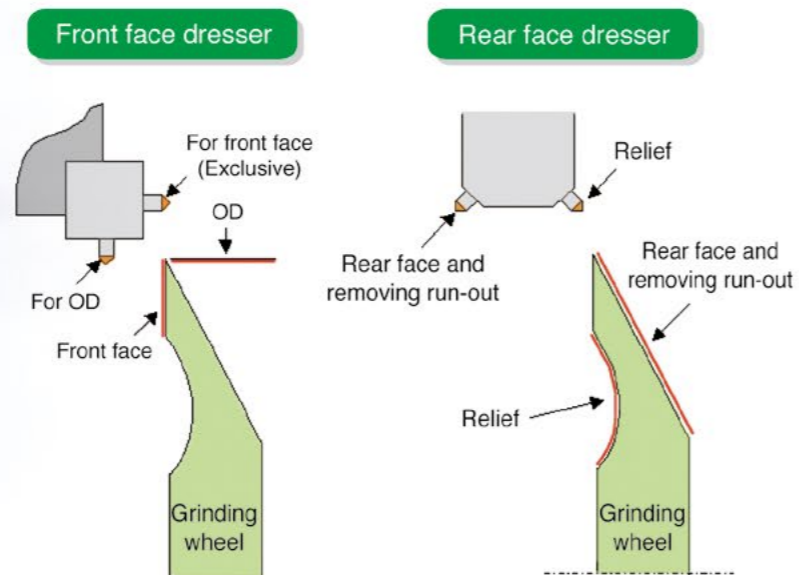
No idle dressing is required for the next dressing and without the need for adjustment between the dresser and grinding wheel, even though the dressing form differs between set-ups.

Wet Grinding Also Available

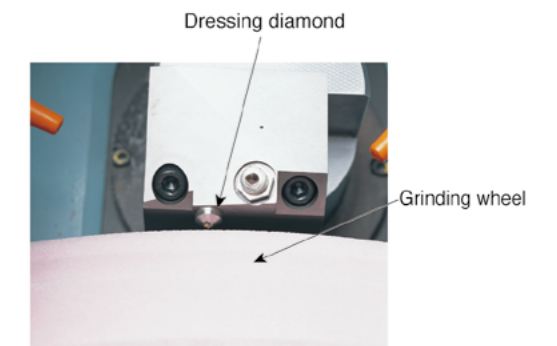
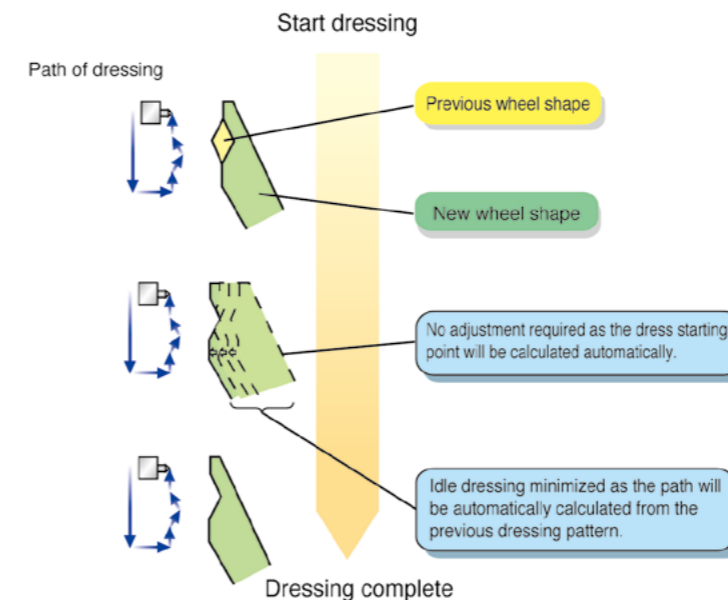
Burning during high performance grinding can be prevented with wet grinding available with ZA30A. What's more, with wet grinding, tool life of the diamond dresser can be greatly extended.

CNC Rear Face Dressing

Automating rear face dressing and relief dressing will become possible by adding the optional 2-axis NC rear face dresser.



A typical example of dress teaching function



CNC and Tooth Profile Control System

CNC Allows Quick and Easy Setup

- The CNC can control the five kinds of grinding wheel dressing operations. That is tooth profile, relief, outer diameter, runout, and rear face of wheel.
- The CNC can control the accurate value of grinding wheel outer diameter and tooth profile. (Tooth profile is derived from dress teaching function)
- The machine condition can be monitored with the diagnosis function.



Operator control panel

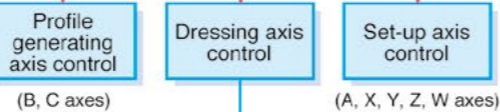
Tooth Profile Grinding Data Control System

- Conversational input
 - Cutter specifications
 - Grinding conditions
 - Dress tooth profile
- Data storage
- Data calling
- Printing

(RS232C)

NC Device (FANUC)

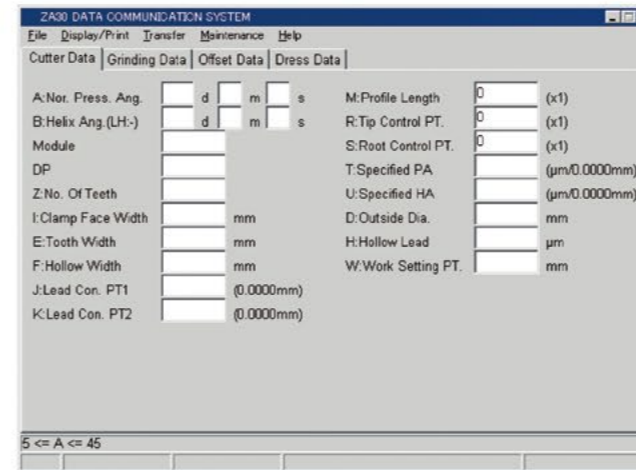
ZA30A Base Machine



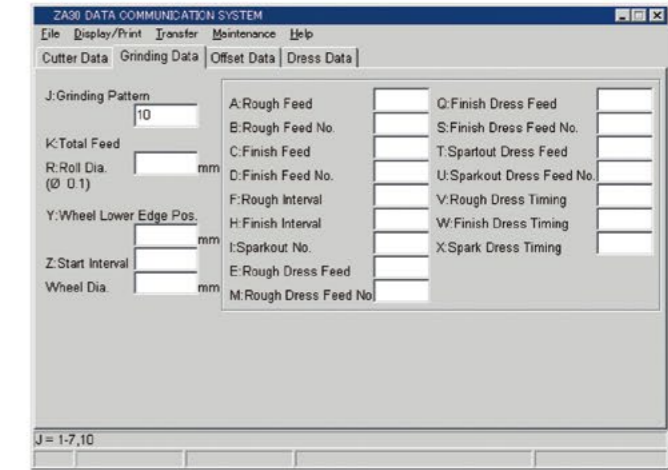
Printer

- Tooth profile dressing (U, V axes)
 - Front face dressing
 - Outer diameter dressing
- Auxiliary dressing (U2, V2 axes)
 - Rear face dressing
 - Relief dressing
 - Runout dressing

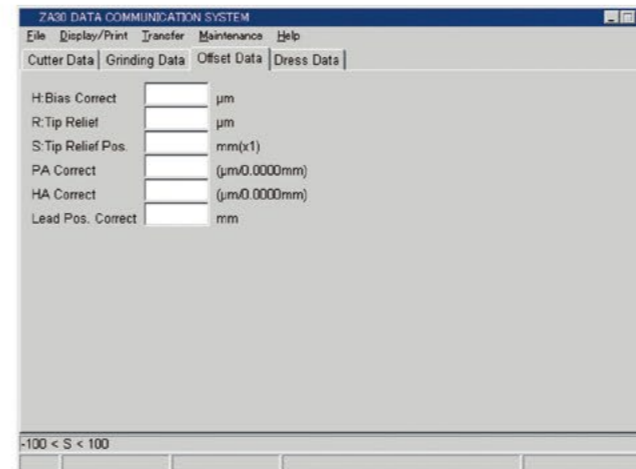
Cutter data input screen



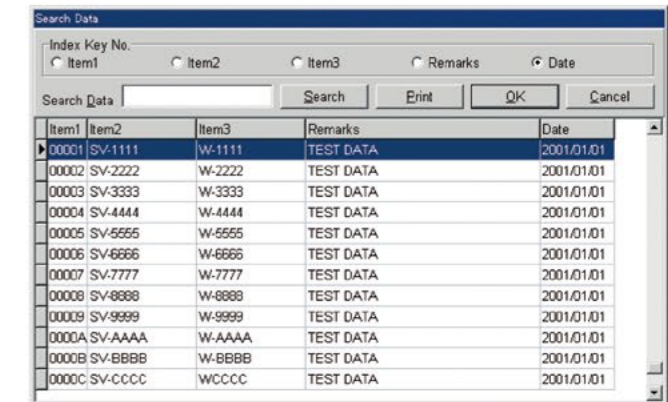
Machining data input screen



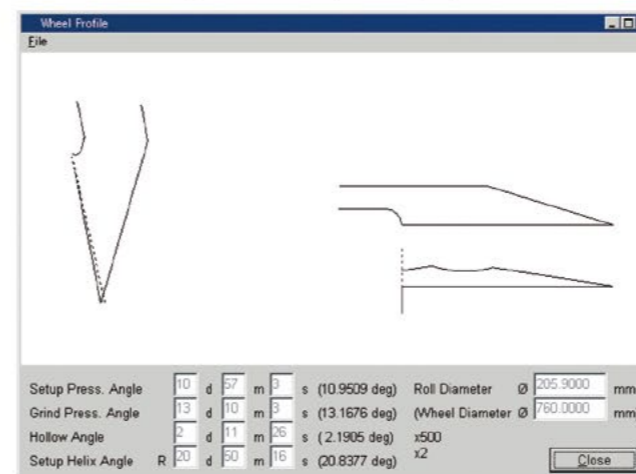
Compensation data input screen



Data calling screen



Set-up value, wheel profile display screen



Lead display screen



Cutter Specifications and Machine Specifications

Cutter Specifications

Item		ZA30A
Outer diameter	mm in	φ 150~350 φ 5.9~13.8
Module (Diametral pitch)		1~14 (25.4~1.81)
Face width	mm in	60 2.4 (opt. 70 2.8)
Pressure angle (Working pressure angle)	deg.	0~25
Helix angle	deg.	±35

Machine Specifications

Item		ZA30A
Travels	X-axis (Wheel up/down)	mm in 250 9.8
	W-axis (Cutter position adjustment)	mm in 130 5.1
	Z-axis (Wheel position adjustment)	mm in 31 1.2
	V-axis (Dressing up/down)	mm in 105 4.1
	U-axis (Dressing in/out)	mm in 65 2.6
	C-axis (Table position adjustment)	mm in 300 11.8
	A-axis (Helix angle)	deg. ±35
Feedrate	Y-axis (Pressure angle)	deg. -0.5~25
	Grinding wheel up/down	mm/min ipm 1~300 0.04~11.8
	Cutter positioning	mm/min ipm 1~2,400 0.04~94.5
	Dressing up/down	mm/min ipm 1~500 0.04~19.7
	Dressing in/out	mm/min ipm 1~500 0.04~19.7
Table in/out	mm/min ipm 1~9,000 0.04~354.3	
Cutter speed (B-axis)	min ⁻¹	1~15
Grinding wheel	Speed	min ⁻¹ 0~880
	Outer diameter	mm in φ 650~760 φ 25.6~29.9
NC minimum input increment	Linear motion (C, U, V, X, Z, W axes)	mm in 0.0001 0.000004
	Rotary motion (B, A axes)	deg. 0.0001
	Linear motion (U2, V2 axes)	mm in 0.0001 0.000004
	Rotary motion (Y axis)	deg. 0.0001
Wheel drive motor	kW HP	1.5 2.0
Floor space	mm in	2,200×4,300 86.6×169.3
Machine mass	kg lb	approx. 8,500 18,800

Grinding Data Control System

Item		ZA30A
PC Specifications	Type	PC-AT compatible
	Display	15" color
	Printer	Laser type
	OS	Windows
Standard Optional Specifications	Language	<input type="checkbox"/> Japanese <input type="checkbox"/> English
	Input increment	<input type="checkbox"/> Metric <input type="checkbox"/> Inch
	Angle input	<input type="checkbox"/> XX° XX' XX <input type="checkbox"/> XX.XXX°
	Pressure symbol	<input type="checkbox"/> Chart std. <input type="checkbox"/> Machine std.
Helix angle symbol	<input type="checkbox"/> Machine std. <input type="checkbox"/> Measuring machine std.	

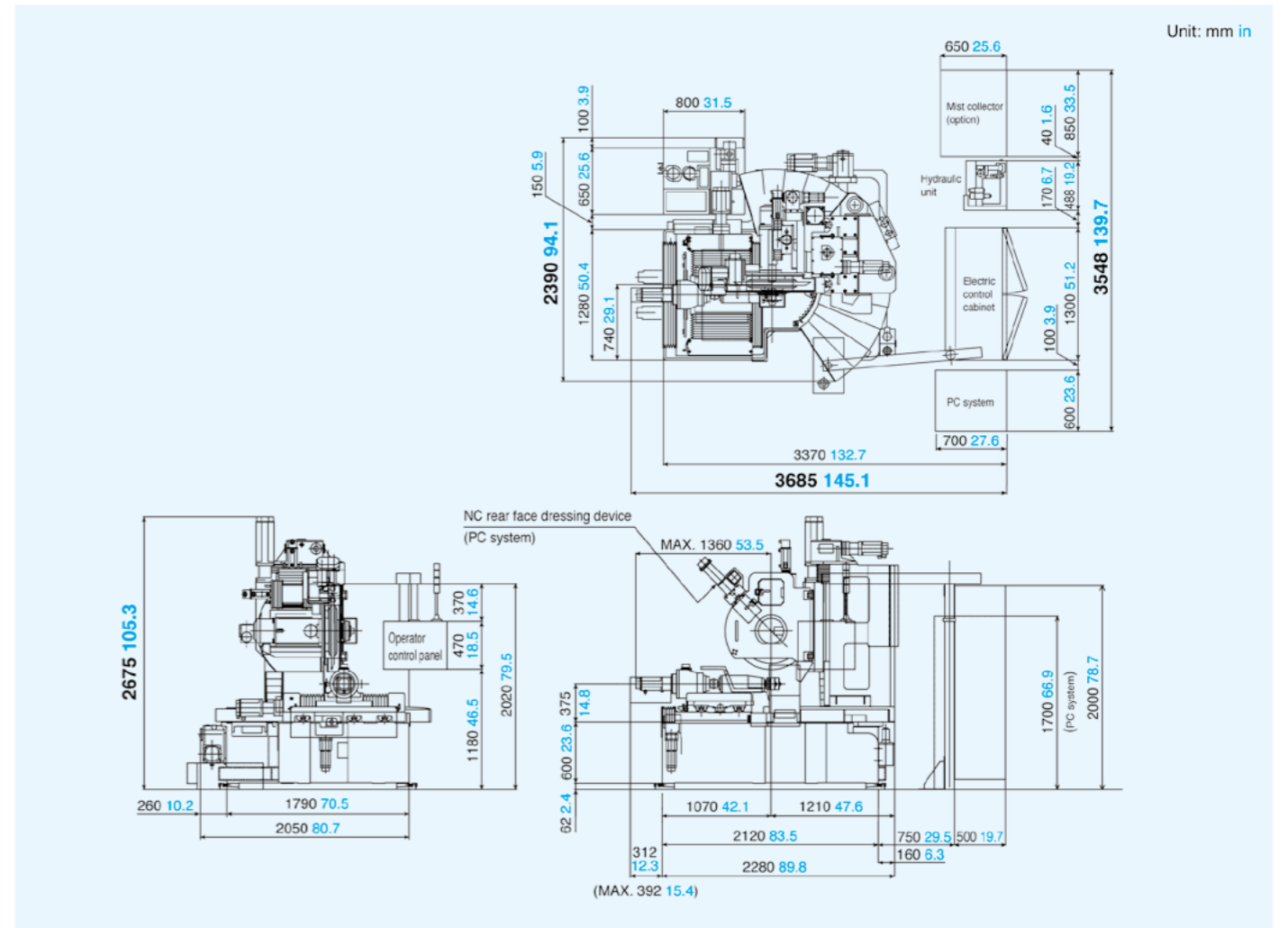
Standard Equipment

- NC device (FANUC 31i-B)
- Coolant supply system
- Hydraulic system
- Automatic wheel balancing system
- Lubricant oil supply system
- Grinding wheel flange
- Cutter holder
- Ball gauge
- Diamond tool
- Tool block for diamond dressing
- Diamond tool setting jig
- Leveling blocks and Maintenance tool kit
- Grinding data control system
- NC rear dressing device
- Grinding wheel brake
- Status indicator, tower type (red, orange, green)
- Earth leakage breaker
- Energy saving circuit
- Dress teaching function
- Bias roundness compensating function
- Torque wrench

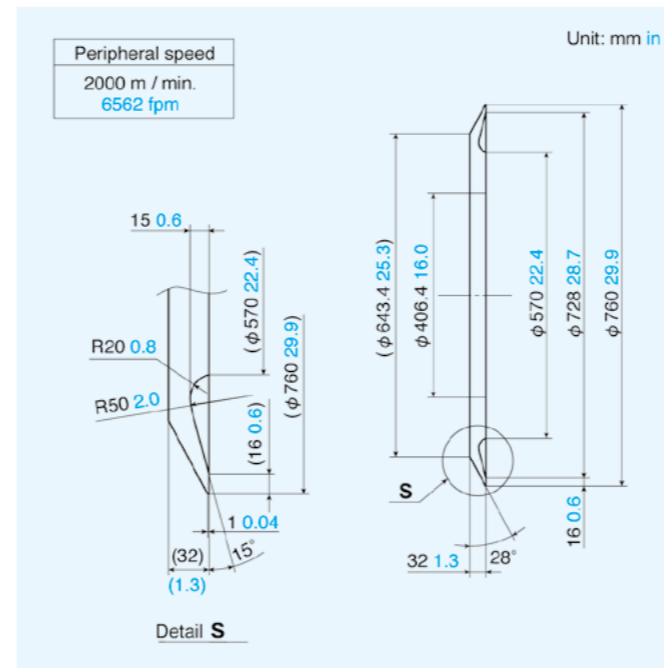
Optional Equipment

- Double ended tailstock (for shaft parts)
- Mist collector (for wet type)/Dust collector
- Cutter holder (spare/special spec.)
- Ball gauge (spare/special spec.)
- Spare Tool block for diamond dressing
- Grinding wheel flange (spare/special spec.)
- Diamond tool (spare/special spec.)
- Spare grinding wheel (760 mm 29.9 in diam.)
- Measuring arbor
- Safety door
- Countermeasure for Power Failure

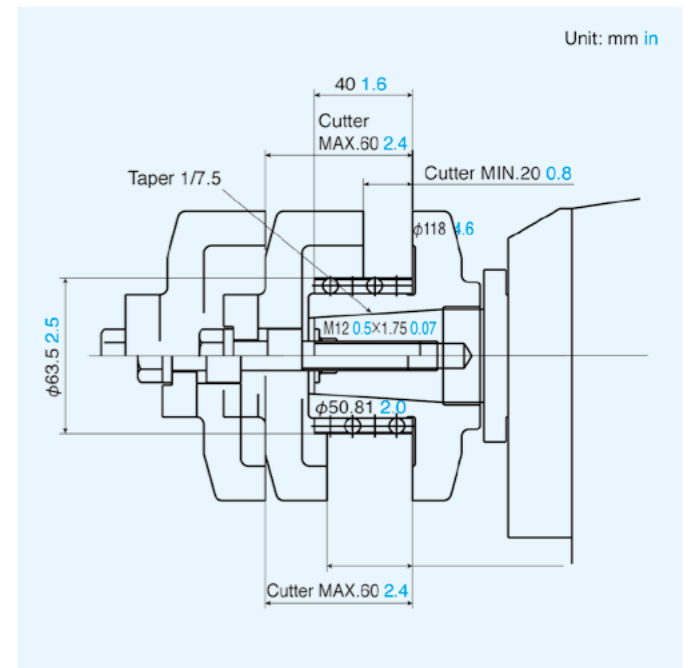
Machine Dimensions



Dimensions of standard grinding wheel



Details of cutter mounting arbor (standard)





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Machine specifications such as dimensions etc., are fixed using SI units including the metric system.
In case data are shown in other units in blue, such as inches, pounds and gallons etc. they are for reference only and the formal data
in black supersedes any equivalent data given in blue when fractions caused by conversion become an issue.
Specifications are subject to change without prior notice.
The export of this product is subject to Japanese Governmental approval.