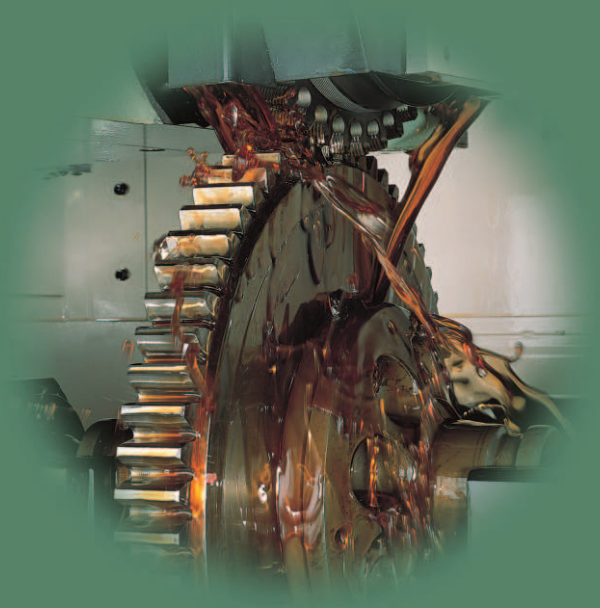
MITSUBISHI
GEAR SHAVING MACHINE

F Series

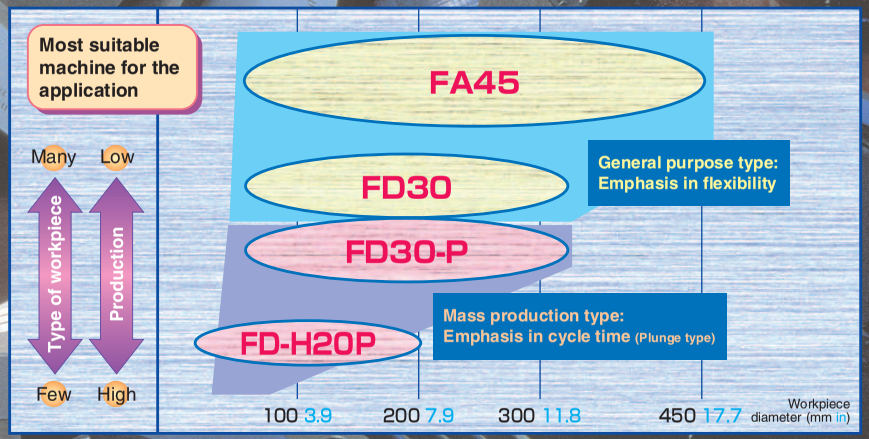


MITSUBISHI
HEAVY INDUSTRIES, LTD.

VARIOUS MODELS AVAILABLE FROM MITSUBISHI TO MEET CUSTO MER NEEDS

Mitsubishi's supreme technology and its long experience in gear manufacturing produces the most advanced gear cutting machines.

The world's highest technological level of manufacturing aircraft, ships, power systems, and other products equipment is integrated in the machine tools produced by Mitsubishi. Having share of 70% in gear cutting machines in Japan, we are enjoying high reputation from overseas customers for its reliable high level performance. Mitsubishi is always producing the most advanced gear cutting machines taking into consideration the future needs of the users.

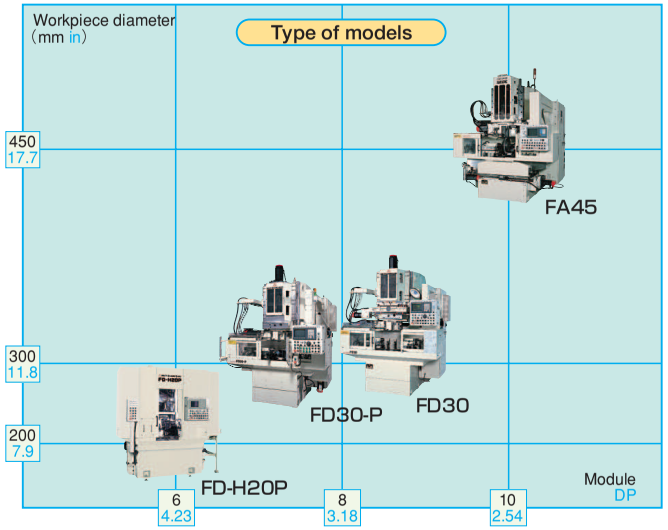


Mitsubishi, as a pioneer of gear cutting machines, has been the leader in both technology and actual delivery of gear machines in Japanese market.
Utilizing advanced mechanism and original machine control technology, we have improved the efficiency and upgraded accuracy of gear cutting machines in the field of automobile parts to construction machinery gears. We also make flexible production possible to cope for diversified type of products and further aggressively venture into FA systems to achieve better efficiency. We venture every angle to best supply our customers with user-friendly CNC gear shaving machines that meets the demand of the times.

■ Main Features

- Excellent high accuracy shaving and consistent quality.
- Introduction of new shaving method for higher production efficiency.
- Simple programming reduces operator fatigue.
- Abundant peripheral equipment designed for FA systems.

	NC controlled axes (std)	Possible shaving methods			
		Plunge	Conventional	Diagonal	Underpass
FA45	4 axes	○	○	○	○
FD30	4 axes	○	○	○	○
FD30-P	3 axes	○	—	—	—
FD-H20P	3 axes	○	—	—	—



ADVANCED TECHNOLOGY PROVEN FEATURES

FEATURE ① Excellent High Accuracy Shaving and Consistent Quality

High Accuracy

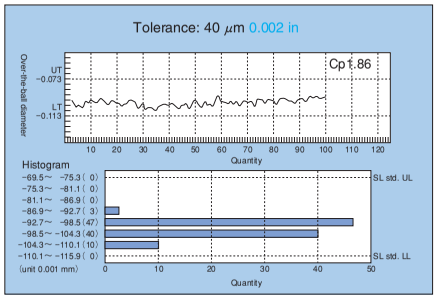
Shaving accuracy, DIN 6, ISO 5, JIS Class 2:

High shaving accuracy based on robust, high precision mechanism. High accuracy positioning obtained from rigid radial feed, in/out feed and table feed axes. As a result, repeatability of 1 μm 0.00004 in obtained in both tooth profile and tooth trace after part changeover.

Consistent Quality

Cp value 1.66 for Cold Start
(Over-the-ball diameter tolerance: 40 μm 0.002 in)
Consistent quality from long run machining made possible.
Thanks to improvement in positioning accuracy and reduction of thermal effect.

● Repeatability (over-the-ball diameter)

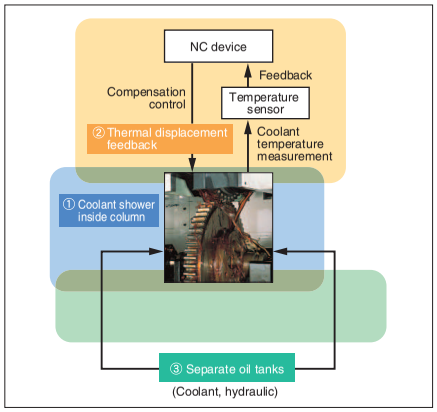


Thermal Displacement Control

- Coolant shower inside column prevents thermal displacement ····· (Applied to all vertical machines)
- Automatic sizing compensation by coolant temperature measurement ····· (All machines)

FD30-P, FD30 and FA45 have coolant shower system inside the column. All models have coolant temperature feed back system under NC control, which compensates gear dimension and results to consistent gear thickness.
Moreover, separate location of the hydraulic and coolant tanks from the machine proper prevents thermal effect and makes consistent quality under continuous machining possible.

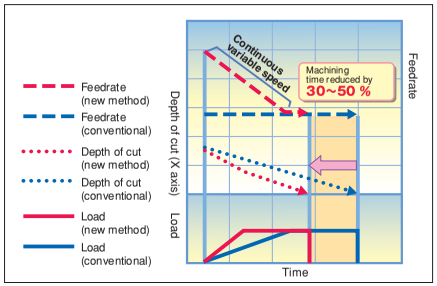
● Thermal displacement control



FEATURE ② Introduction of New Shaving Method for High Efficiency Production

High Efficiency Shaving

Machining time has been reduced by employing continuous variable plunge feed for roughing and finishing to apply uniform load in plunge shaving.
(FD-H20P, FD30-P, FD30)



FEATURE ③ Simplified Programming

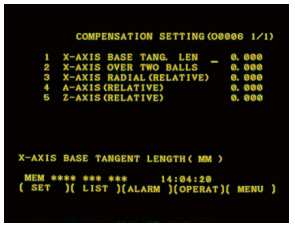
Operator Friendly Operation Panel and Screen

Eye level operation panel and large character CRT screen makes operation easy for the operator.

Operation panel screen

Tool Wear Compensation Made Easy

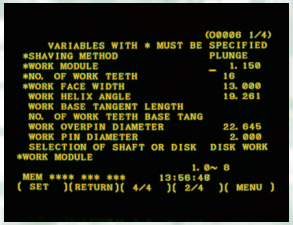
Setup time after cutter blade resharpening is greatly reduced by base tangent length wear compensation input method.



Tool compensation screen

Advanced "MENU Programming"

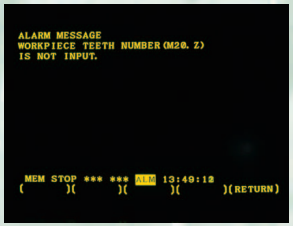
The "MENU (Mitsubishi Enhanced Numerical Control) Program" automatically sets up the cutting conditions by simply inputing the workpiece and cutter dimensions. Data input further simplified. Input can be done in argument input method or conversational graphical input method as required.



Conversational graphical input example

Alarm Message Prevents Programming Input Error

An alarm message will appear on the CRT screen when operator makes a program input error. This makes programming easy for beginners.

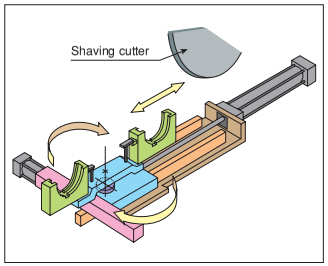


Alarm message screen

FEATURE ④ Peripheral Equipment

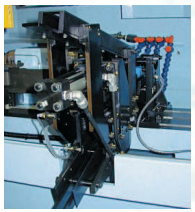
High Speed Gear Meshing Device

Non-cutting time is reduced to 1/2 by rotation type high speed work changing and meshing device.

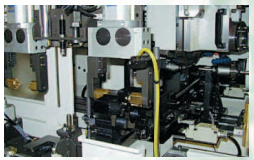


Automatic Loader

Users may select the loader most suitable for their production application from the standardized loaders.



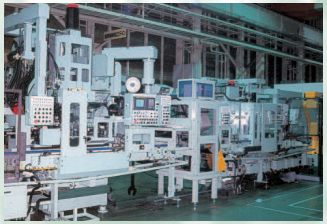
Chute type high speed gear meshing device



Automatic loader/unloader

Production Line for Gear Manufacturing

Mitsubishi supports you with a total gear production system
— from rough to finish.



Automatic gear production line

FD-H20P

ROBUST HORIZONTAL TYPE PLUNGE MACHINE

Machining pinion gear within a cycle time of 9 seconds!
(Module: 1.4 18.1 DP, NT: 21)

Features

High Productivity

- Horizontal type construction with extremely high rigidity.
  Shaving possible without any back movement.
  - Robust bed construction based on Finite Element Method (FEM) analysis.
  - Cutter supported on both ends.
  - Slant type headstock and tailstock.
- Employment of continuous variable plunge feed mechanism reduces machining time by 30 - 50 %.
- High speed shaving is possible
  (Max. cutter speed 500 min^{-1}, high speed tailstock)
- Two-arm rotation type high speed loader with gear meshing (optional) realizes workpiece change and meshing during machining of another work and reduces non-cutting time to 1/2.

Maintains High Accuracy Under Continuous Production

- Vibration minimized due to low profile horizontal construction.
- One level higher Cp value obtained due to horizontal construction and minimized thermal displacement.
  (Cp=1.66, over-the-ball diameter tolerance: 40 μm 0.002 in)
- Chip removal is improved with the horizontal concept. No chip jamming.

Space Saving, Easy Line Integration

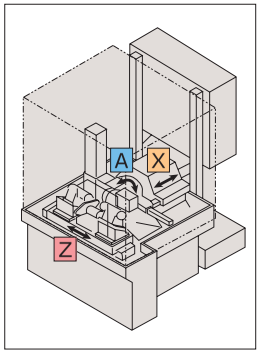
- Machine dimension (W 1,550 mm 61.0 in × D 2,440 mm 96.1 in) saves space and is easy for line integration.
  Foot print is saved by 20% and width is reduced by 30% compared to conventional type.

Peripheral Equipment for High Productivity, Simple Setup (optional)

Many peripheral equipment is standardized to meet various customer needs.

- Two-arm rotation type high speed loader
- Gantry type loader
- Automatic tool changer (ATC)
- Taper adjustment mechanism (manual table swivel axis)

Main Particulars

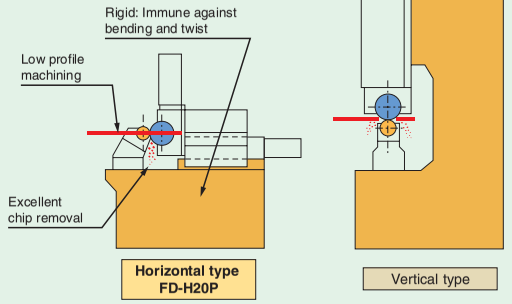


Controlled axes		Standard
X	Radial feed	○
Z	Table horizontal feed	○
A	Cutter head swivel	○

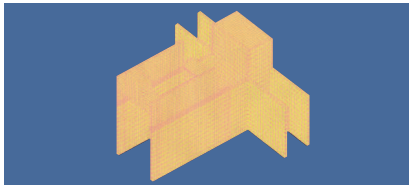
Main Particulars		Standard
Max. workpiece diameter	mm in	ϕ200 ϕ7.9
Max. module		6
Max. workpiece width	mm in	40 1.6
Max. distance between tailstock and spindle center	mm in	250 9.8
Distance between cutter and workpiece center	mm in	105~230 4.1~9.1
Cutter size (Max. dia. x Max. width)	mm in	250×50.8 9.8×2.0
Main motor	kW hp	5.5 7.5

Advantages of Horizontal Construction

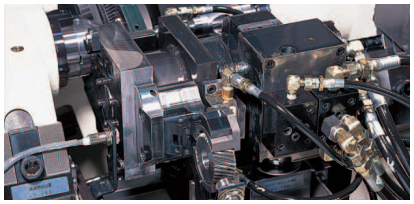
- Extremely high machine rigidity
- Low profile, vibration minimized
- Improved chip removal
- Minimized thermal displacement



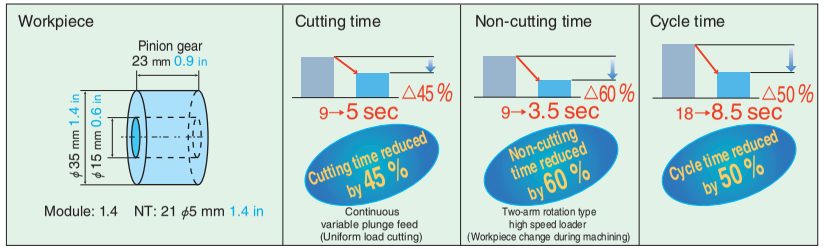
FEM Analysis of Bed Rigidity



Two-arm Rotation Type High Speed Loader (Optional)

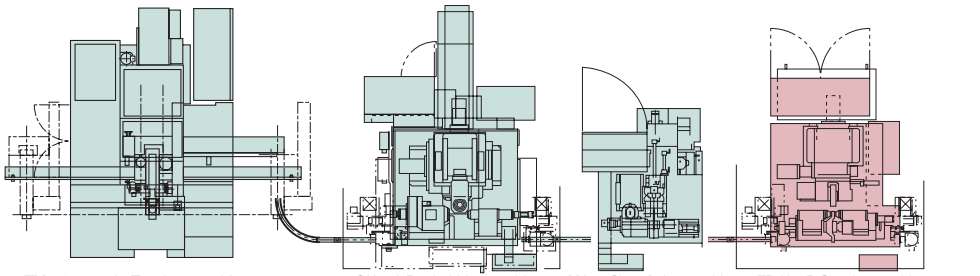


Machining Examples



Total Gear Production Line System

- Example of pinion gear production line
- Mitsubishi provides total system.



FD30-P

ROBUST HIGHLY EFFICIENT VERTICAL TYPE PLUNGE MACHINE

Machines large differential gear in 30 seconds!
(Module: 2.4 10.6 DP, NT: 76, OD: 216 mm 8.5 in)

Features

High Rigidity, High Accuracy

- Rigidity is upgraded by eliminating table oscillating axis.
- Integration of cutter head slide.
- Elimination of Y and Z axes from the headstock and U axis from the table.

High Efficiency

- High speed shaving is possible by increasing cutter and work axis rotation speed.
  Max. cutter speed: 500 min^{-1}
  Max. workpiece speed: 3,000 min^{-1}
- Cutting time is reduced by the continuous variable plunge feed method.

Easy Line Integration

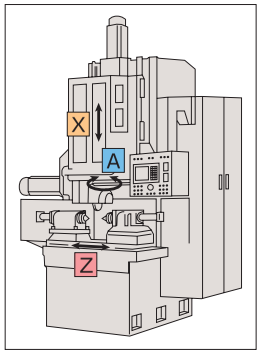
- Flexible work transfer direction (either parallel or longitudinal) realized easy line integration.
- Column through type loader is applicable and back deburring unit can be easily mounted.

Peripheral Equipment for High Productivity, Simple Setup (optional)

Many peripheral equipment is standardized to meet various customer needs.

- Two-arm rotation type high speed loader
- Automatic tool changer (ATC)
- Work handling and tool changing robot
- Various conveyors
- Taper adjustment mechanism (manual Y-axis)

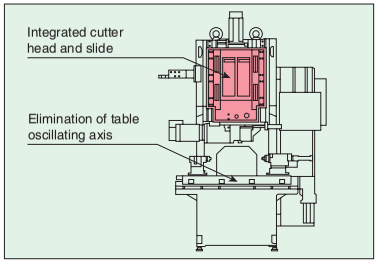
Main Particulars



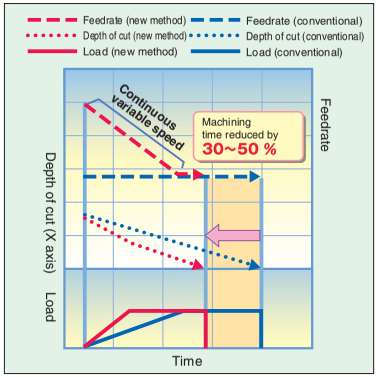
Controlled axes		Standard
X	Radial feed	○
Z	Table horizontal feed	○
A	Cutter head swivel	○

Main Particulars		Standard
Max. workpiece diameter	mm in	ϕ310 ϕ12.2
Max. module		8
Max. workpiece width	mm in	40 1.6
Max. distance between tailstock and spindle center	mm in	500 19.7
Distance between cutter and workpiece center	mm in	105～265 4.1～10.4
Cutter size (Max. dia. x Max. width)	mm in	250×50.8 9.8×2.0
Main motor	kW hp	7.5 10

Robust Construction



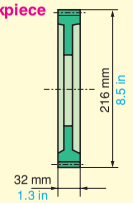
Continuous Variable Plunge Feed Method



Machining Examples

Workpiece

Module: 2.4 10.6 DP
NT: 76
Width: 32
Pressure angle: 20°
Helix angle



Cutting conditions

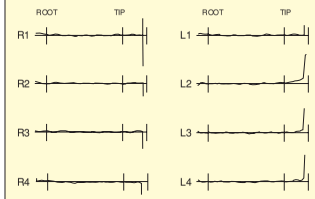
Spindle speed: 350 min^{-1}
Cutter speed: 244 m/min 9.6 in/min
Continuous variable feed
Dwell: 12 sec.

Actual machining time
30 sec

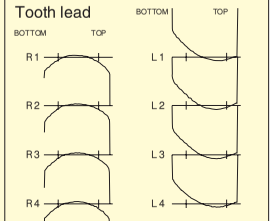
Cycle time
36 sec

Machining accuracy

Tooth profile

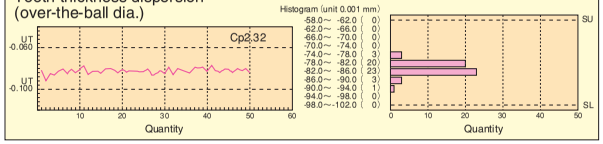


Tooth lead



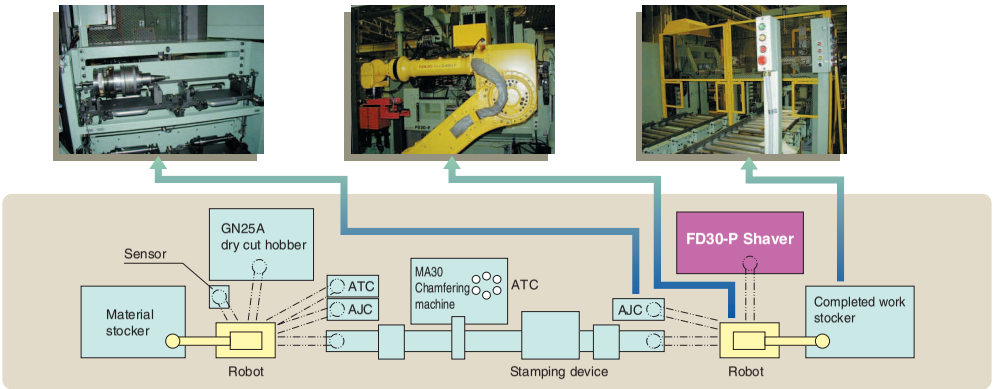
Right tooth face: Crowning
Left tooth face: Tapering and crowning

Tooth thickness dispersion (over-the-ball dia.)



Total Gear Production Line System

FMS gear production total system line consisting of dry hobbing machine, chamfering machine and FD30-P shaver.



FD30

GENERAL-PURPOSE SHAVING MACHINE

Easy tooth profile correction. Tapering and crowning program can be made easily by MITSUBISHI's new method with 4-axis.

Features

High Accuracy

- Fixed type table is applied. Rigidity is upgraded by eliminating table oscillating axis. Mitsubishi's new original tapering and crowning adjusting method (patent pending) is applied.

High Efficiency

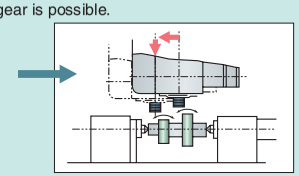
- High speed shaving made possible by increasing cutter and work axis rotation speed.
  Max. cutter speed: 500 min^{-1}
  Max. part speed: 3,000 min^{-1}
- Cutting time is reduced by the continuous variable plunge feed method.

Easy Setup Change and Workpiece Transfer

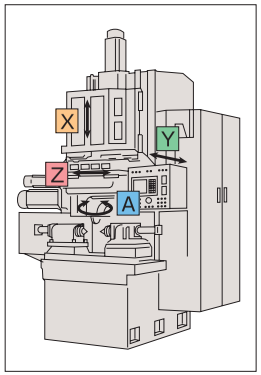
- Setup change is simplified as workpiece center need not to be aligned to oscillation center of conventional type.
- Flexible work transfer direction (either parallel or longitudinal) realized easy line integration.

Flexible

- This 4-axis machine is capable of NC programed tapering and crowning in all conventional, diagonal, underpath and plunge machining. Moreover, adjustment of tapering and crowning can be done by simple data input from operation panel.
- One chucking machining of two stage gear is possible.
  (This type of machining was not possible, except for plunge feed, with conventional machine where the workpiece face width had to be aligned to the oscillating axis center.)



Main Particulars



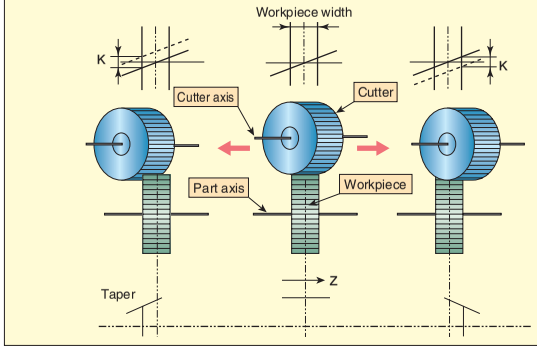
Controlled axes		Standard
X	Radial feed	○
Y	Cutter head	○
Z	Table horizontal feed	○
A	Cutter head swivel	○

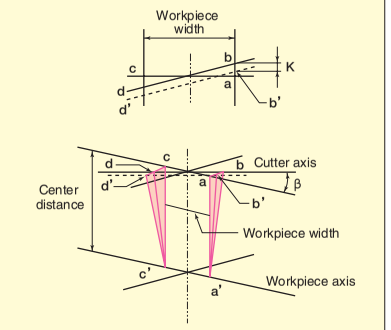
Main Particulars	Standard
Max. workpiece diameter mm in	ϕ310 ϕ12.2
Max. module	8
Max. workpiece width mm in	150 5.9
Max. distance between tailstock and spindle center mm in	575 22.6
Distance between cutter and workpiece center mm in	105～265 4.1～10.4
Cutter size (Max. dia. x Max. width) mm in	250×50.8 9.8×2.0
Main motor kW hp	7.5 10

Principle of Tapering and Crowning

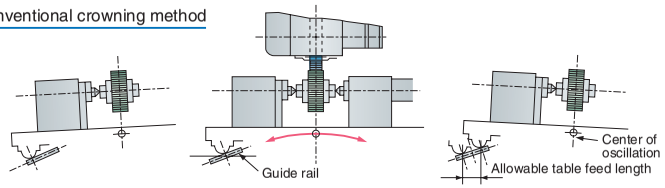
[Explanation based on conventional method]
Crowning is done by utilizing taper compensation principle explained on the right column. Crowning is generated by the continuous variation of Y-axis (K value) relative to Z-axis movement. In actual machining, the amount of crowning will be calculated automatically by simply inputting the crowning amount per workpiece width.

●Taper compensation principle
The taper is obtained by shifting the cutter in Y-axis direction with this machine, whereas in the conventional machine the workpiece had to be tilted to obtain a taper. The initial condition a'b=c'd will become a'b'< c'd' by offsetting amount of K. In other words, a taper can be obtained from the deviation of the center distance between the workpiece and cutter at both ends of the workpiece width.





Conventional crowning method



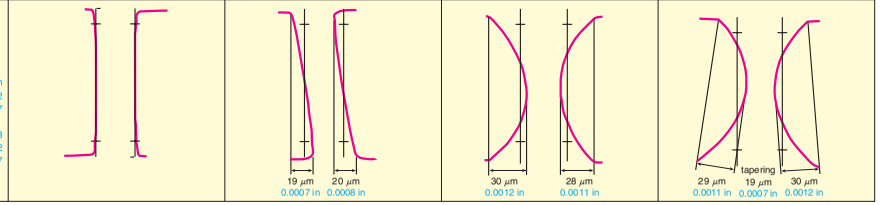
①Table at left end ②Table at center ③Table at right end

Machining Examples

Compensation for crowning, tapering and crowning can be made easily by simple data input from the CRT screen.

		Zero setting	Tooth lead compensation	Crowning	Tapering & crowning
Data input (mm/in)	Amount of crowning	0.0 0.0	0.0 0.0	0.03 0.0012	0.03 0.0012
	A-axis compensation	0.0 0.0	0.02 0.0008	0.0 0.0	0.0 0.0
	Amount of taper	0.0 0.0	0.0 0.0	0.0 0.0	0.02 0.0008
Tooth lead accuracy					

Workpiece mn 3 0.2 / ϕ 144 5.7 / β 0 0 / Z 46 1.8 / β 30 1.2 / Cutter ϕ 220.3 8.7 / β 12RH / Diagonal machining



FA45

GENERAL-PURPOSE SHAVING MACHINE
Designed for medium sized gears.

Features

High Speed High Accuracy Machining

- High speed high accuracy shaving of gears up to Module 10 2.54 DP, 450 mm 17.7 in in diameter.
- Improved rigidity of table, column, bed and spindle.
- Equipped with a rugged taper crowning device (5 axes) employing table supported at both ends.

Easy Automation

- Factory automation made possible with peripheral equipment such as Automatic Tool Changer (ATC), Automatic Jig Changer (AJC), In-Process Gaging and Robots.

Simple Operation

- Cutting conditions are set by automatic programming.
- 60 different machining programs can be stored in memory and called out by program number.
- Cutter change is easily made.

Setup Time Reduction

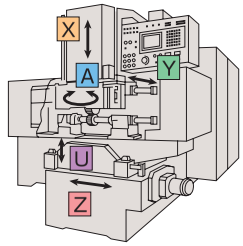
- Application of two axes (Y, Z) simultaneous control.
- Automatic diagonal angle setting.
- High accuracy cutter head swivel angle positioning of 15" .
- Automatic positioning of workpiece and cutter.
- Instant operation from trial machine data.
- No test cut required for repeat production.
- Tapering and crowning are made by full NC 5-axis control.

HIGH PRODUCTIVITY WITH CYCLE TIME REDUCED BY 20%

Consistent Machining Accuracy

- Automatic sizing compensation
- Separate hydraulic and coolant oil tanks minimize thermal displacement.

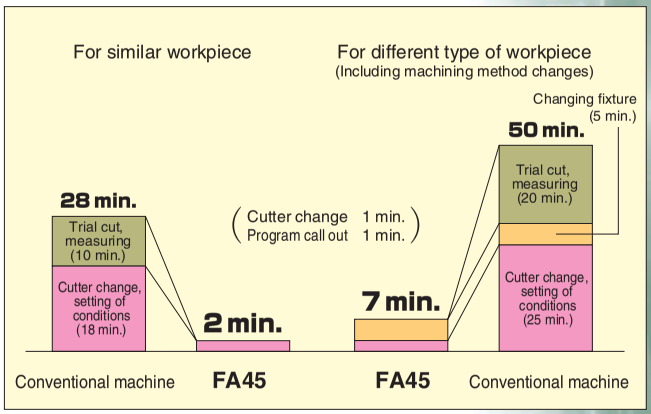
Main Particulars



Controlled axes		4-axis control (std)	5-axis control (option)
X	Radial feed	○	○
Y	Cutter headin/out	○	○
Z	Table horizontal feed	○	○
A	Cutter head swivel	○	○
U	Taper and crowning adjustment	—	○

Main Particulars	4-axis control (std)	5-axis control
Max. workpiece diameter mm in	ϕ450 ϕ17.7	
Max. module	10	
Max. workpiece width mm in	150 5.9	
Max. distance between tailstock and spindle center mm in	810 31.9	
Distance between cutter and workpiece center mm in	140~340 5.5~13.4	
Cutter size (Max. dia. x Max. width) mm in	325×50.8 12.8×20	
Main motor kW hp	5.5 7.5	

Example of Setup Time Reduction

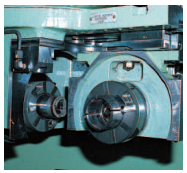


SPECIFICATIONS

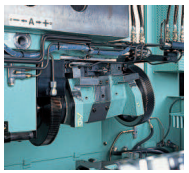
■ Standard Specifications

	Model		FD-H20P	FD30-P	FD30	FA45
Capability	Maximum diameter	mm in	φ200 φ7.9	φ310 φ12.2	φ310 φ12.2	φ450 φ17.7
	Maximum module		6 4.2DP	8 3.2DP	8 3.2DP	10 2.54DP
	Maximum face width	mm in	40 1.6	40 1.6	150 5.9	150 5.9
	Maximum distance btwn. centers	mm in	250 9.8	500 19.7	575 22.6	810 31.9
	Cutting method		Plunge	Plunge	Plunge, underpath, diagonal, conventional	Plunge, underpath, diagonal, conventional
	Maximum workpiece speed	min^{-1}	3,000	3,000	3,000	1,000
Cutter head	Maximum cutter diameter	mm in	φ250 φ9.8	φ250 φ9.8	φ250 φ9.8	φ325 φ12.8
	Maximum cutter width	mm in	50.82	50.82	50.82	50.82
	Cutter inner diameter	mm in	63.5 2.5	63.5 2.5	63.5 2.5	63.5 2.5
	Cutter speed	min^{-1}	40～500 (infinitely variable)	40～500 (infinitely variable)	40～500 (infinitely variable)	30～400 (infinitely variable)
	Swivel angle (A-axis)		±20°	±20°	±20°	±23°
	Cutter head travel (X-axis)	mm in	125 (105～230) 4.9 (4.1～9.1)	160 (105～265) 6.3 (4.1～10.4)	160 (105～265) 6.3 (4.1～10.4)	200 (140～340) 7.9 (5.5～13.4)
	In-feed feedrate	mm/min ipm	0.1～2.5 0.0004～0.1	0.1～2.5 0.0004～0.1	0.1～2.5 0.0004～0.1	0.1～2.5 0.0004～0.1
	In-feed method		Cutter head travel by ball screw	Cutter head travel by ball screw	Cutter head travel by ball screw	Cutter head travel by ball screw
	Minimum in-feed increment	mm in	0.001 0.00004	0.001 0.00004	0.001 0.00004	0.001 0.00004
	In/out travel (Y-axis)	mm in	———	———	±30 ±1.2	±10 ±0.4
	Horizontal travel (Z-axis)	mm in	———	———	±75 ±3.0	———
	Horizontal travel feedrate	mm/min ipm	———	———	30～300 1.2～11.8	———
Table	Horizontal travel (Z-axis)	mm in	±75 ±3.0	±75 ±3.0	———	±75
	Horizontal travel feedrate	mm/min ipm	———	———	———	30～300
	Diagonal angle		———	———	±90°	±90°
Main motor (AC spindle)		kW hp	5.5 7.5	7.5 10	7.5 10	5.5 7.5
Total power consumption		kVA	35	35	35	36
Floor space		mm in	1,600×2,460 63.0×96.9	2,100×2,200 82.7×86.6	2,100×2,200 82.7×86.6	2,400×2,670 94.5×105.1
Machine weight		kg lb	5,000 11,100	5,000 11,100	5,000 11,100	8,000 17,700

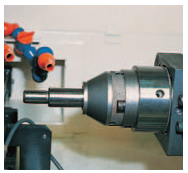
OPTIONS



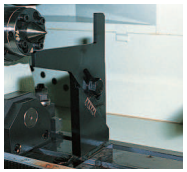
Cutter Support Reversing Device
A device to make cutter change easy from the front.



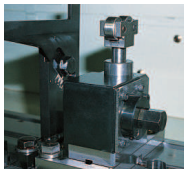
Dual Cutter Spec.
A device to change the two cutters automatically.



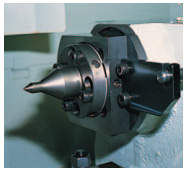
Automatic Work Arbor
Work arbor for automation.



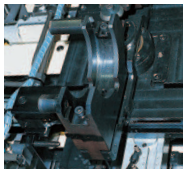
Rough Locator
To support shaft workpieces or manual arbor before clamping.



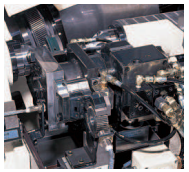
Manual Work Rest
A device for supporting long shaft workpiece.



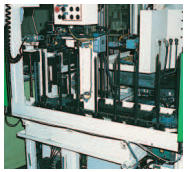
Special Center
A center designed for shaft workpieces with a special center hole.



Automatic Workpiece Changer
A device for changing workpieces automatically. (for vertical machines)



Two-Arm Rotation Type High Speed Loader
A device for changing workpieces automatically.



Skew Type Work Stocker
For ring type workpieces.

■ Standard Equipment

Model	FD-H20P	FD30-P	FD30	FA45
Coolant supply unit	○	○	○	○
Hydraulic and lubrication unit	○	○	○	○
Door interlock	○	○	○	○
Work counter	○	○	○	○
Tool counter (software)	○	○	○	○
Quality check counter (software)	○	○	○	○
Puncher interface (RS232C port)	○	○	○	○
Maintenance tool kit	○	○	○	○
NC Control Device ・3-axis model (X-, Z-, A-, axes)	○	○	———	———
NC Control Device ・4-axis model (X-, Y-, Z-, A-, axes)	———	———	○	○
NC Control Device ・Infinitely variable cutter speed (AC motor direct drive)	○	○	○	○
NC Control Device ・Automatic program search	○	○	○	○
NC Control Device ・Conversational MENU programming	○	○	○	○
Cutter head automatic clamping	○	○	○	○
Automatic sizing compensation	○	○	○	○

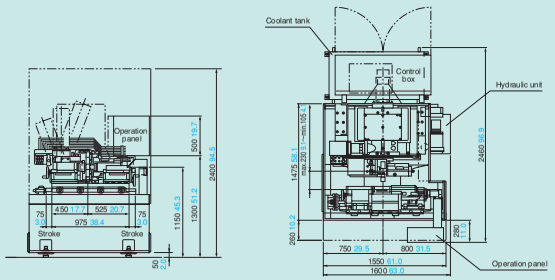
■ Optional Equipment

Model	FD-H20P	FD30-P	FD30	FA45
Circuit breaker	○	○	○	○
Double palm start button	○	○	○	○
Work light	○	○	○	○
Light for control box	○	○	○	○
Coolant separator	○	○	○	○
Hydraulic unit	○	○	○	○
Main spindle load monitor	○	○	○	○
Cutter power clamp	○	○	○	○
Rough locator	○	○	○	○
Automatic collet type work arbor	○	○	○	○
Solid type work arbor	○	○	○	○
Special center	○	○	○	○
Cutter collar (additional)	○	○	○	○
Signal tower	○	○	○	○
Doubled hinged automatic splash guard door	○	○	○	○
Loader robot interface	○	○	○	○
Fixture cleaning system	○	○	○	○
Automatic gear meshing device	———	○	○	○
High speed gear meshing device (Dual magazine, rotation type)	○	○	○	○
High speed gear meshing device (Chute type)	———	○	○	○
Auxiliary control panel	○	○	○	○
Stroke type headstock	○	○	○	○
Quality check counter	○	○	○	○
Oil tank level detector	○	○	○	○
Dual cutter spec.	———	○	○	○
Taper adjusting control (manual)	○ (table)	○ (cutter head)	———	———
Taper adjusting control (NC)	○ (table)	○ (cutter head)	———	———
Autoloaders	○	○	○	○
Work handling system, workpiece stocker	○	○	○	○
ATC	○	○	○	○
AJC	○	○	○	○
Easy shift and easy clamping of headstock and tailstock	○	○	○	○
NC options	○	○	○	○
Additional memory	○	○	○	○
Tailstock travel extension	○	○	○	○
Work rest	○	○	○	○
Hydraulic pressure and temperature control	○	○	○	○
Hydraulic tank capacity increase	○	○	○	○

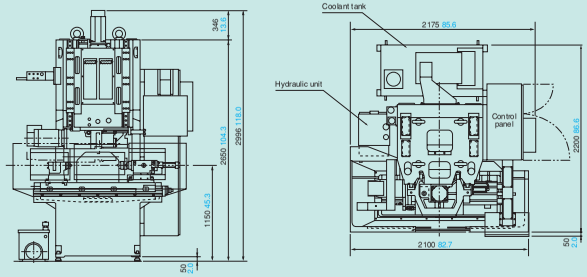
○ : Option applicable

Dimensions unit: mm in

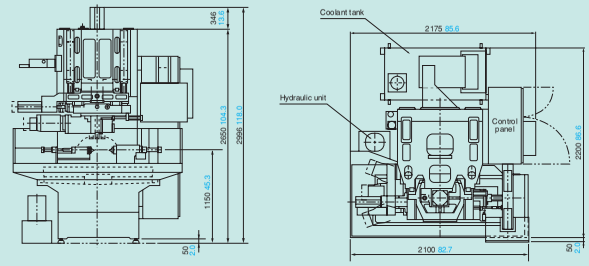
FD-H20P



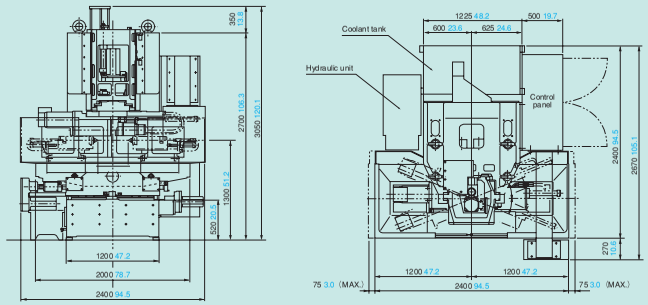
FD30-P



FD30

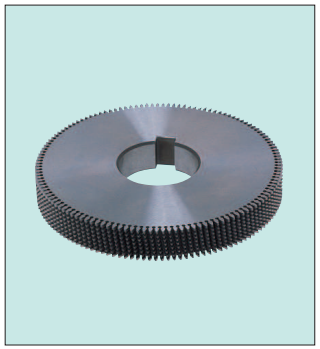


FA45



Shaving Cutter

Mitsubishi can offer various types of cutters best suited for the customer.



Gear Grinding Machine, ZG Series

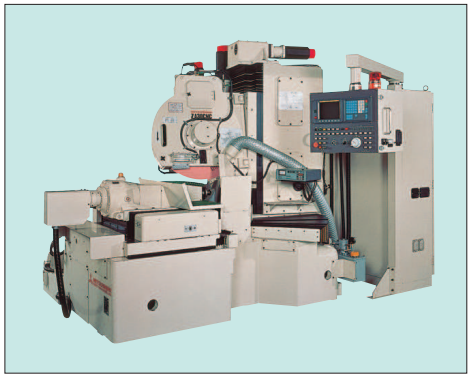
High accuracy, high productivity user oriented gear grinder

Main Particulars

Item \ Model	ZG200CNC	ZG400CNC	ZG1000CNC
Maximum diameter mm in	φ200 φ7.8	φ400 φ15.7	φ1,000 φ39.4
Maximum module	4 6.4DP	8 3.2DP	18 1.4DP
Maximum face width mm in	260 10.2	300 11.8	600 23.6
Maximum length mm in	500 19.7	500 19.7	800 31.5
Helix angle	±45°		
Grinding wheel speed min⁻¹	1~8,000	200~6,000	
Wheel shaft diameter mm in	φ800 φ3.1		
Maximum wheel diameter mm in	φ170 φ6.7	φ300 φ11.8	
Radial axis travel (Center distance) mm in	515 (25~530) 20.3 (1.0~20.9)	350 (40~390) 13.8 (1.6~15.4)	600 (100~700) 23.6 (3.9~27.6)
Radial rapid (Feedrate) mm/min ipm	10,000 (1~1,000) 393.7 (0.04~39.4)	5,000 (0.01~20) 196.9 (0.0004~0.8)	
Table rapid (Feedrate) deg/min	16,200 (0.01~5,000)	11,880 (0.01~3,600)	
Wheel drive motor (30 min rating) kW hp	110 15		
Machine weight kg lb	9,000 19,900	14,500 32,000	16,000 35,300

Shaving Cutter Grinding Machine, ZA30CNC

The ultimate machine with shaving cutter.



Main Particulars

Item \ Model		ZA30CNC
Cutter specs.	Pitch circle diameter mm in	φ150~300 φ5.9~11.8
	Module	1~4 25.4~6.35DP
	Maximum face width mm in	60 2.4
	Maximum pressure angle	25°
	Helix angle	±35°
Control	Cutter speed/Table	Simultaneous 2-axis control
	Dressing: In/out, Up/down	Simultaneous 2-axis control
Wheel diameter mm in		φ650~750 φ25.6~29.5
Table horizontal feedrate mm/min ipm		1~6,000 0.04~236.2
Wheel dresser		Single diamond dresser
Wheel spindle motor kW hp		1.5 2.0
Distance from floor to workpiece center mm in		1,040 40.9
Machine weight kg lb		8,500 18,800

MITSUBISHI GEAR SHAVING MACHINE F SERIES

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Machine specifications such as dimensions etc., are fixed using SI units including the metric system.
Data shown in other units in blue, such as inches, pounds and gallons etc. are for reference only and the formal data in black supercede 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.

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