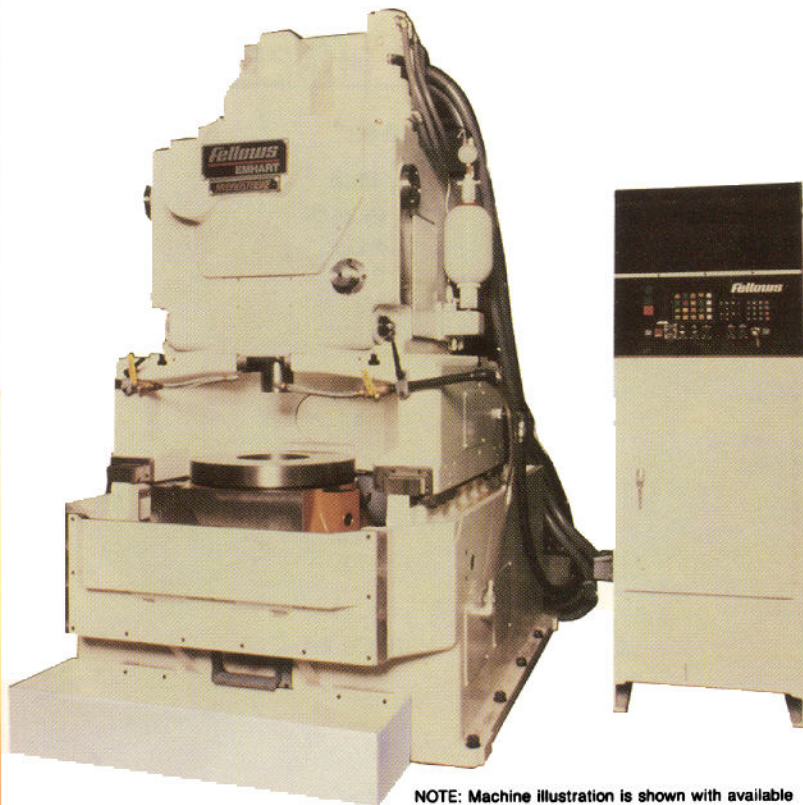


**Fellows**

**FS400 CNC HYDROSTROKE® GEAR SHAPER**

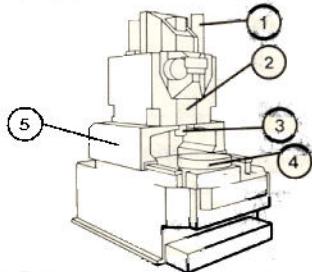


NOTE: Machine illustration is shown with available guarding removed to clarify features.

**General Description**

The Model FS400 CNC HYDROSTROKE® Gear Shaper combines the proven, patented hydromechanical stroking system with a custom 5-axis CNC system designed specifically for gear processing. Adaptive controls continuously monitor machine functions to optimize cutting conditions and achieve near optimum productivity. Basic workpiece capacity is up to 400mm (15.75") nominal pitch diameter and 90mm (3.54") or 127mm (5") face width. Standard machine features include: electronic ratio drives, electronic stroke position adjustment, automatic cutter positioning at top of stroke, cutter spindle elevating, hydromechanical stroking with quick return ratio, dual worm worktable drive, and adaptive cutting force sensing and control. Also, the machine is readily adapted to automation.

**NC Controlled Axes**



1. Stroking Speed; 2. Stroke Position;  
3. Cutter Rotation; 4. Work Rotation;  
5. Infeed/Rapid Traverse

**CNC Control**

The unique 5-axis CNC control system is designed specifically for the gear shaping process. It includes: electronic ratio drives, automatic calibration of process sensors, setup data storage and recall for 50 parts, switchable metric/inch operation, redundancy of critical control elements and self diagnostics for the control system and machine. The control is user friendly, so operators with normal gear processing skills do not need special computer training.

**Adaptive Controls**

**Temperature**

Temperature compensation is provided through adaptive loops which sense temperature variations in the machine structure and automatically modify machine settings to adjust for thermally induced changes.

**Rotary Feed**

Rotary Feed rates are adaptively optimized by continuously monitoring the actual cutting force of each stroke and comparing this to preset force limits. During low cutting force/low chip crowding conditions, rotary feeds are increased for higher production without increased tool wear.

**FS400**

**Hydraulic Power Demand Control**

Hydraulic flow and pressure are controlled as a function of actual stroking speed and cutting force.

**Stroking Speed**

The FS400 provides DC servo-controlled, infinitely variable stroking speeds within a speed range of 50:1. Maximum cutting force is available through the entire speed range.

**Quick Return**

Hydromechanical stroking permits rapid spindle return at speeds up to twice the cutting portion, significantly increasing basic machine productivity. This feature provides either a 25% increase in stroking speed with no increase in tool wear or a 50% increase in tool life over conventional machines at equal stroking speeds.



Operator's console and CRT display.

**Variable Degressive Infeed**

The FS400 variable infeed rate feature provides higher production through higher average infeed rates. Presets to the CNC establish a high initial infeed rate where light cutting forces are encountered. As the cutter nears full depth, where cutting forces are highest, infeed rates are reduced to a preset lower rate. The result: cycle time to full depth in less than one half the time required by "constant infeed rate" gear shapers.

**Improved Production, Tool Life, Quality**

Fellows FS400 provides significant increases in production, tool life and part quality, when compared with conventional crank-driven gear shapers.

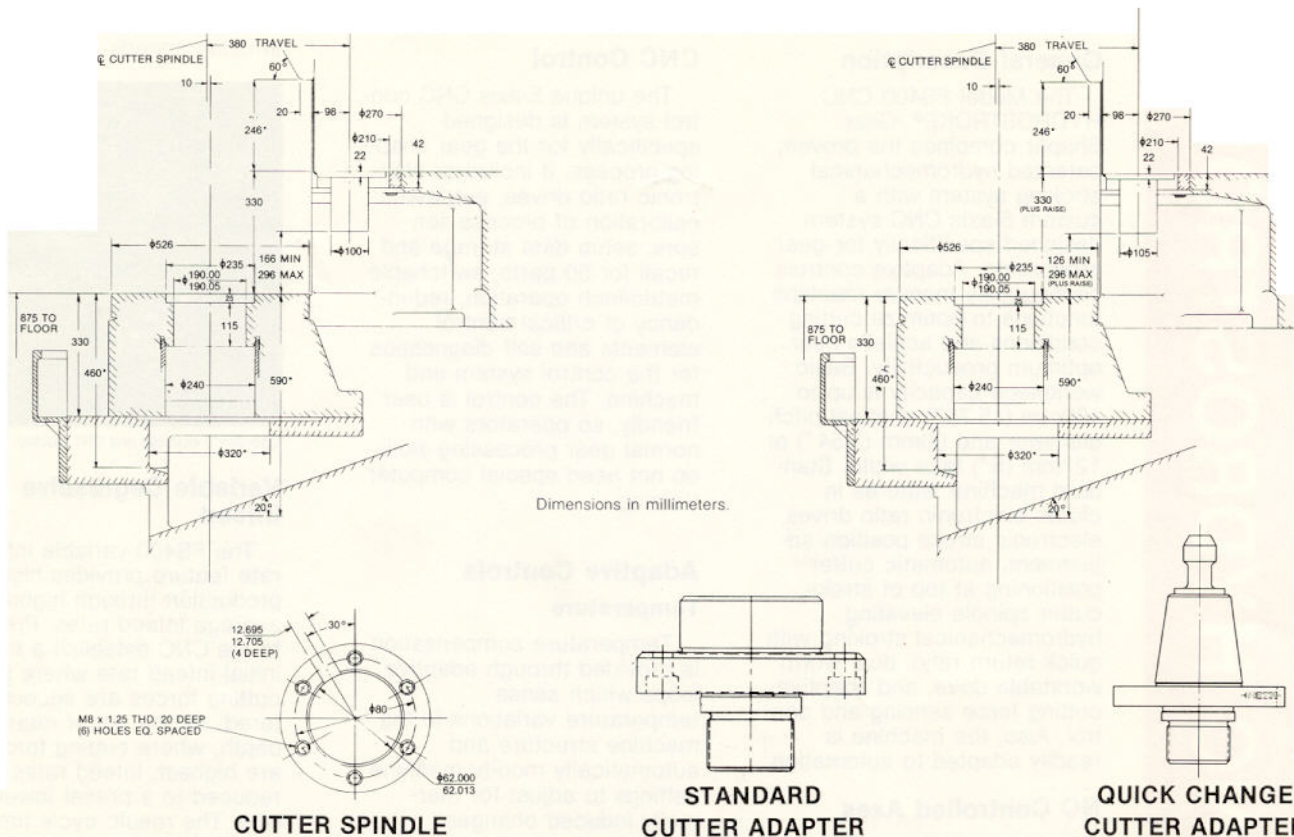
# MODEL FS400 HYDROSTROKE GEAR SHAPER SPECIFICATIONS

|                                   | MODEL FS400-90 |             | MODEL FS400-125 |             |
|-----------------------------------|----------------|-------------|-----------------|-------------|
|                                   | Metric         | Inch        | Metric          | Inch        |
| <b>Capacities:</b>                |                |             |                 |             |
| Nominal P.D. External/Internal    | 400mm          | 15.75"      | 400mm           | 15.75"      |
| Rated Module/D.P. Spur or Helical | 6.35mod        | 4 D.P.      | 7.25mod         | 3.5 D.P.    |
| Maximum Gear Face Width           | 90mm           | 3.54"       | 127mm           | 5"          |
| Min./Max. Stroking Speed          | 20-1100 SPM    |             | 20-800 SPM      |             |
| Maximum Spindle Travel            | 130mm          | 5.12"       | 170mm           | 6.7"        |
| Maximum Helix Angle               | 45°            |             | 45°             |             |
| Maximum Center Distance           | + 370mm        | + 14.6"     | + 370mm         | + 14.96"    |
| Minimum Center Distance           | - 10mm         | - .394"     | - 10mm          | - .394"     |
| <b>Dimensions:</b>                |                |             |                 |             |
| Maximum Overall Length            | 3.7m           | 12.2'       | 3.7m            | 12.2'       |
| Maximum Overall Width             | 2.1m           | 6.8'        | 2.1m            | 6.8'        |
| Maximum Overall Height            | 2.3m           | 7.6'        | 2.3m            | 7.6'        |
| <b>Weight:</b>                    |                |             |                 |             |
| Machine and Standard Equipment    | 8,165 kg       | 18,000 lbs. | 8,400 kg        | 18,500 lbs. |

## WORKING LIMITS

MODEL FS400-90

MODEL FS400-125



NOTE: The information included herein was correct at the time of publication. However, it is our policy to continually improve our product to insure ever better performance. Consequently, current Fellows' machines and products may incorporate modifications not shown or described on these pages.

IMPORTANT: For purposes of clarity, machine illustrations may appear without usual guards and covers. Machines should NEVER be operated without guards in place.

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