

PFM/NC
ROLL FORMING

Roll Forming Machine



A New Generation of Technology



NACHI

NACHI MACHINING TECHNOLOGY CO.



The Most Advanced & Energy S

Innovation in Roll Forming Technology Produces Results

In recent years, industry has increasingly paid attention to the importance of energy conservation, noise reduction, floor space, and high precision. Nachi Machining Technology considered these primary factors, in the search of more efficient machine tools-the result is the PFM NC Roll Forming Machine.

Nachi Machining Technology has been a world leader in the roll forming machine market. Our technical expertise with the design and manufacture of these machines and rolling racks has enabled us to develop the PFM. This vertical roll forming machine utilizes a servomotor in place of hydraulic cylinders to provide greater control over the process.

Efficiency

The tool drive was changed from a mechanical "Hydraulic Cylinder Method" to a digital "Servomotor + Ball-Screw Method," which results in a much smaller hydraulic power unit. As a result, we have reduced noise and energy consumption, along with the floor space needed for rolling machines. [see chart below]

	PFM-610FS	Traditional	DIFFERENCE
ENERGY *	0.0163kwh	0.0480kwh	66% less
FLOOR SPACE	3.74m2	5.11m2	26% less
NOISE LEVEL**	73dB(A)	80dB(A)	9% less

*1 cycle (30 sec)

**while forming

Smaller Footprint-The vertical PFM takes up approximately 25% less floor space due to the elimination of a large hydraulic system.

Quiet Operation-The PFM operates at 75dB compared to the 85-90 dB of conventional machines.

Energy Efficient-The PFM requires 66% less energy than conventional hydraulic machines.

Improved Quality-Step control of roll forming speed raises product quality.

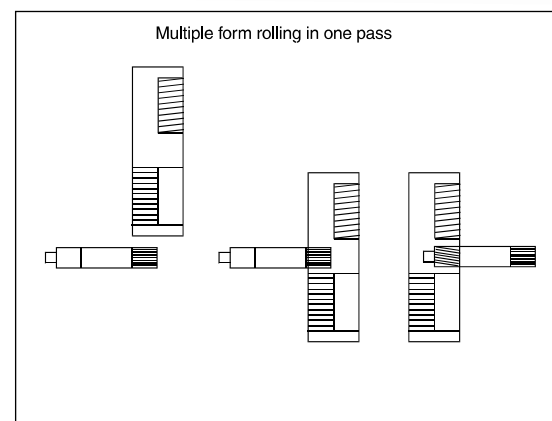
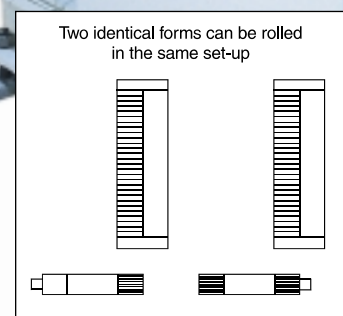
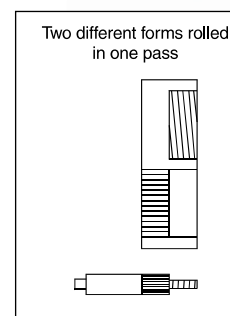
Precision

The introduction of "Rolling Speed Phased Control" (patent pending) makes it possible to change the rolling speed at any point during the roll forming process. In traditional hydraulic roll forming, the racks are driven at a fixed speed. By utilizing a servomotor, the operator can change the speed at will. This gives the operator the means to adjust the motion of the tools, which optimizes contact with the part. As a result of this feature, the part can be successfully interlocked between the tools, reducing part slippage or skidding during initial contact between the roll forming racks. Therefore providing improved quality of the work piece, particularly accumulated pitch error and index.

Flexibility

The PFM is extremely versatile due to the NC Controller and Servo motor drive. The roll forming speed can be varied at any point during the rolling cycle, which helps accommodate various materials. With the easy changeover of the PFM, many different forming conditions can be achieved. [see typical examples]

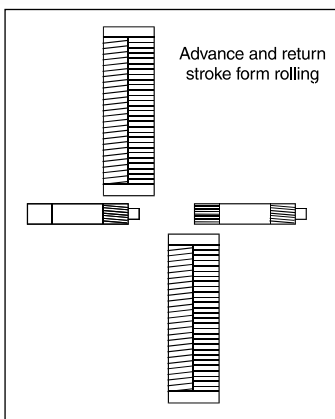
The PFM can be fitted with an autoloader such as a lift & carry, robot, magazine, or a combination of elements. The optional auto-loader can be controlled by the same NC controller that the PFM uses.



Saving Roll Forming Machines!



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In addition, the PFM can be equipped with our patent registered ATC (Auto Tool Change) device and our patent registered Auto Over-pin Size Adjustment. These additional features make it possible for the PFM to operate in a lights out facility.

The PFM series comes in a variety of machine sizes to meet your particular application: 400mm, 610mm, 915mm, 1220mm

The Rolling Process

The rolling process is used to manufacture precision screws, splines, and worms in a few seconds. The part to be rolled is supported between a headstock and tailstock. A set of rolling rack tools is installed in the tool holders, which are located on both sides of the part. A servomotor drives both tool holders vertically through a ball-screw, which maintains proper timing of the rolling racks. One half of the tooth is formed by gradual penetration of the work piece, and the other half is formed by displaced material.

Applications:

Industries-Automotive, Truck, Marine, Electric Motor, Appliance, and Off-road

Components-Transmissions, Steering, Suspension, Engine Parts, Electric Motor Shafts, Spline Shafts, and Appliance, and Appliance Parts

Geometries-Involute Splines, Involute Serrations, Threads, Oil Groove, Worms, Knurls Helical Involute Splines

AC Servo-Motor

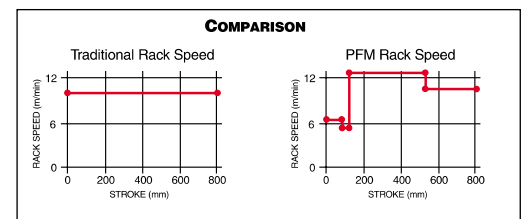
The PFM has a Fanuc AC servo-motor, ball screws and a gear box as opposed to the hydraulic cylinders of conventional machines. The ball screws are 63mm with a 20mm lead made by NSK. The life of the ball screw can be expected to exceed 10 years.

NC Controls

The Sanyo Denki electric NC control panel is normally attached on the right side of the machine but can be attached to the left side or rear of the machine. The NC controls now allow the operator to control the adjustment of the tailstock and the headstock.

Variable Rolling Speed

Variable rolling speed improves part quality because it makes it possible to slow the forming racks at the time of contact with the workpiece. This reduces impact, minimizes oscillation, and prevents slippage. The result is a reduction in accumulated pitch error. The PFM forms parts with rolling speeds from 4m/min. to 12m/min.



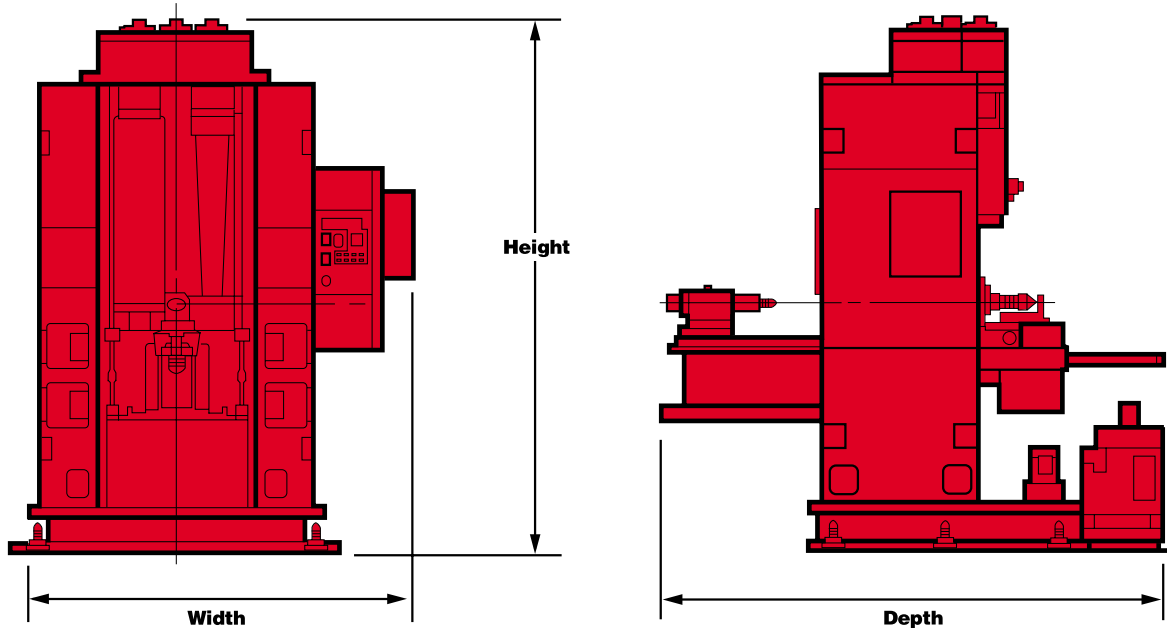
Changeover Time

Changeover time for the PFM rolling rack tools is typically about 10-15 minutes. This can be shortened with the automatic tool change options available for each machine.

Tool Life

Tool life for the PFM rolling racks is comparable to conventional machines and in most cases better due to the reduction in initial contact speeds, which reduces impact force.

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PFM Main Specifications

Machine Model		PFM-400	PFM-610	PFM-915	PFM-1220	PFM-1220SP
Maximum rolling dia	(in / mm)	.78 / 20	1.57 / 40	1.75 / 45	2.00 / 50	3.00 / 75
Maximum rack holder width	(in / mm)	1.57 / 40	6.0 / 150	6.0 / 150	6.0 / 150	6.0 / 150
Maximum rolling module	(recommended)	25.4 / m 1.0	20 / m 1.3	20 / m 1.3	20 / m 1.3	20 / m 1.3
Maximum rack length	(in / mm)	18 / 460	24 / 623	36 / 928	48 / 1220	48 / 1220
Maximum rack stroke	(in / mm)	22 / 560	31.5 / 800	42.25 / 1200	53 / 1350	53 / 1350
Opening section distance	(in / mm)	3.5 / 90	5.5 / 139.7	6.0 / 152.4	6.0 / 152.4	8.0 / 203.2
Floor space	(WxD) (in)	67x89	69x89	98x157	118x157	118x157
	(mm)	1700x2250	1750x2250	2500x4000	3000x4000	3000x4000
Machine Height	(in / mm)	87 / 2200	95 / 2400	165 / 4200	191 / 4850	191 / 4850
Mass of Machine	(Tons / kg)	4.5 / 4,500	8 / 8,000	14 / 14,000	16 / 16,000	17 / 17,000

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