Kinefac Corporation

KINE-FLOW RADIAL FORMING MACHINES

EQUIPMENT

RP-8, RP-16, RP-24, RP-48 Kine-Flow, Hydraulically Actuated Forming Machines

FUNCTION

Forming of pinions, splines, convolutes and similar axial forms on solid or tubular blanks.

OPERATION

The Kine-Flow process creates the axial forms by actuating a system of dies radially toward the center of the work piece. The operating surface of the dies carries the shape of the space to be formed between two adjacent teeth. The dies are moved inward radially by a hydraulically driven actuation ring with a wedge system which converts the axial hydraulic force into increased radial mechanical forming force.

CAPACITY

Axial forms up to approximately 1-1/2" (37mm) in diameter and 2-1/2" (62mm) in length which are within the forming force capability of the specific machine selected (see chart on reverse side). Since the forming force required is determined by the number of teeth, the depth, the flank shape, and the length of the axial form in addition to the flow resistance of the material, specific applications must be analyzed on an individual basis.

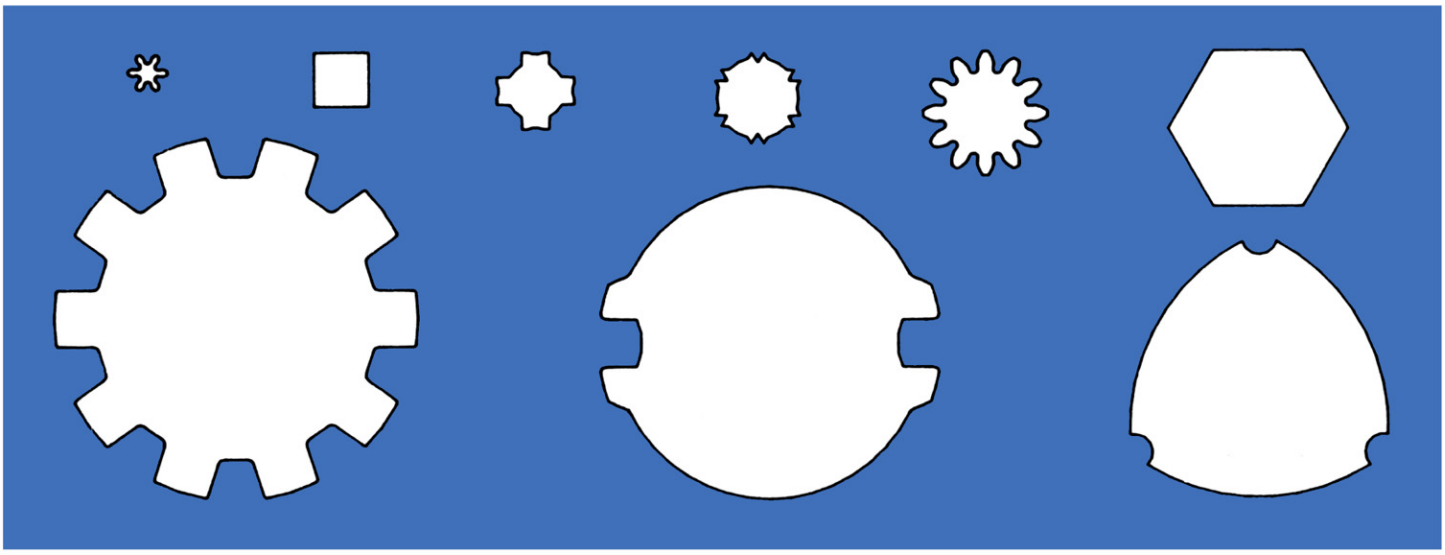
MACHINE CONFIGURATIONS

Kine-Flow machines can be provided with either a horizontal or vertical work piece axis, depending upon the part handling or operator requirements. The tool area is easily accessible for efficient manual operation and easy automation. The hydraulic power unit can be located within the support frame or externally, as required for the best work handling layout.

RP-8, KINE-FLOW MANCHINE

FORM CAPABILITY

Most tooth shapes can be formed if the space between the teeth is such that the forming die may be withdrawn radially without being obstructed by the flanks of the formed teeth. The flanks of the formed tooth may have straight, involute or other complex, convex forms provided that there are not sharp corners between the root of the form and the flanks and all the surfaces of the flanks have an angle of at least 2 degrees with respect to the local radius.



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FORM CHARACTERISTICS

Spacing and form tolerances are a function of the form being produced. However, the overall part configuration is highly repeatable provided there is good blank control. In general, spacing errors of less than .002" (.05mm) are practical for many typical involute and similar forms. The crest of the teeth will generally fall away at each end of the form because the process does not axially constrain the growth of the part during forming.

MATERIAL REQUIREMENTS

Generally, materials having a hardness of RC 25 or less and elongation of at least 15% can be used to produce forms with adequate die life. As the hardness increases and elongation decreases the depth of form that is practical to produce declines accordingly. Also, as the flank angle with respect to the local pitch radius decreases, the die loads increase to further affect die life and tooth spacing accuracy.

AUTOMATIC FEEDING

The machines are designed for simple mounting of feeders, and pick and place units. With such equipment, production rates of up to 12 parts per minute can be achieved.

MANUAL PRODUCTION RATES

Forming times are generally from 3 to 6 seconds, depending upon the size of the machine and the depth of the form.

SETUP

The dies and die holder system are designed for quick change and easy regrind. Therefore, changeover of a manual machine from one part to another requires only about 15 to 30 minutes, depending upon the size of the machine and the number of dies. Three die holders handle the full range of teeth from 2 to 10.

		RP-8	RP-16	RP-24	RP-48
Max. Form Dia. *	in.	3/4(18mm)	1(25mm)	1-1/4(31mm)	1-1/2(37mm)
Max. Form Length *	in.	3/4(18mm)	1-1/2(37mm)	2-1/2(62mm)	2-1/2(62mm)
Total Radial Force On All Dies **	1000#	400	800	1900	3200
Max. No. Dies		8	10	12	12
Max. Dia. Through Axial Discharge Bore Hole	in.	1(25mm)	1.125(28mm)	1.5(37mm)	2.25(56mm)
Die Cross Section	in.	1x1	1.25x2	1.5x3	1.5x3
Typical Cycle Time (without handling)	sec.	3	4	5	6
Total Axial Hydraulic Force	1000#	30	110	270	450
Hydraulic Cylinder Bore Dia.	in.	6	8	12	16
Hydraulic Cylinder Stroke	in.	2.5	3	4	4
Hydraulic Power Source **	hp	5	5	10	15

* Depends on depth, Shape of form and material ductility
** Specifications are adjustable to meet specific operational requirements

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