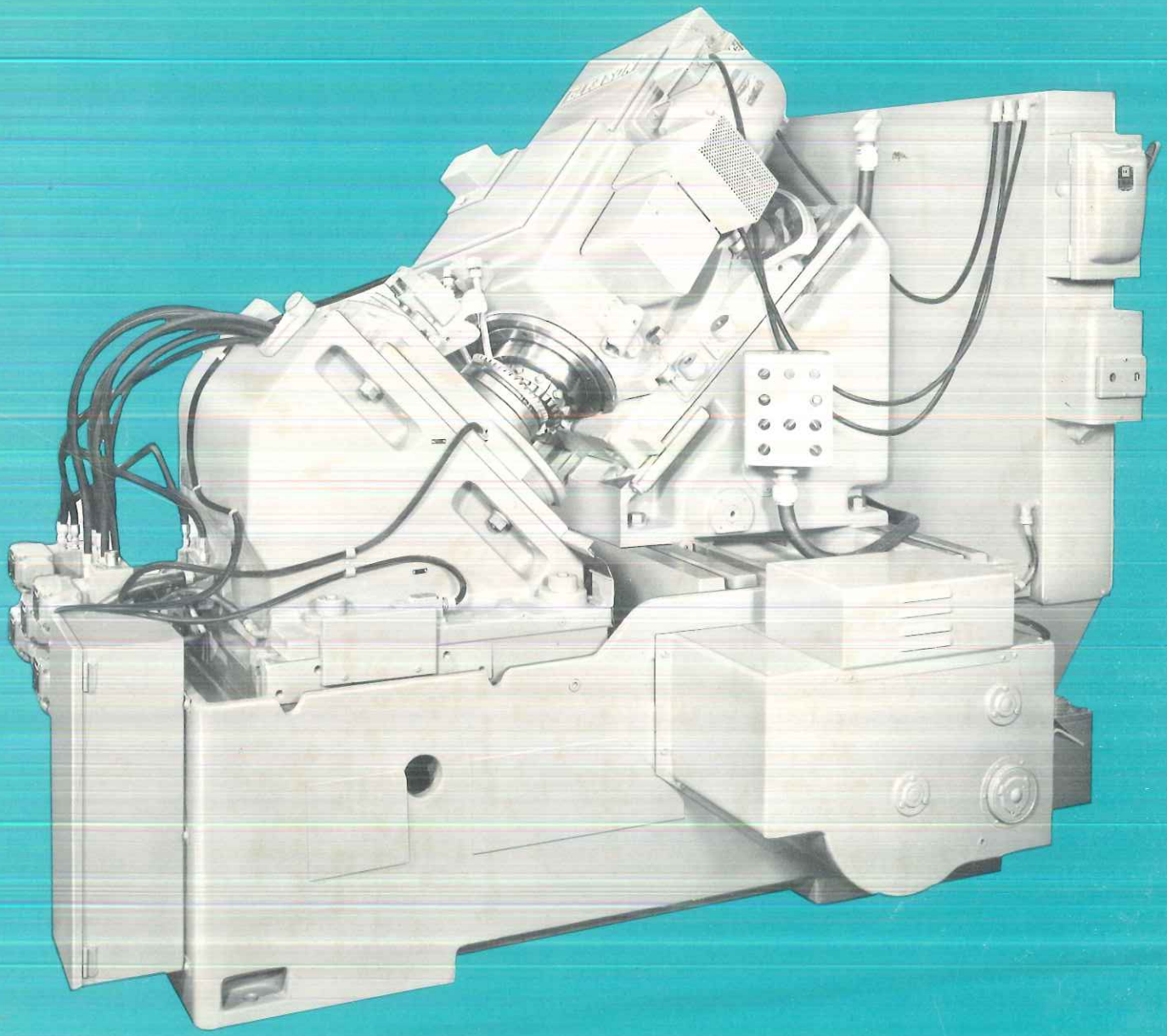
Gleason No. 607
Hypoid Helixform®
Gear Finisher



Gleason

Gleason No. 607

The Gleason No. 607 Hypoid Helixform® Gear Finisher sets new standards in precise, high speed finishing of non-generated hypoid and spiral bevel gears up to 10½" diameter at 10 to 1 ratio and 2½ diametral pitch. This versatile machine can produce non-generated gears by either the Equicurv*, Helixform, Formate® or Single Cycle® method.

Gleason No. 607 advantages

the Equicurv* method

The Equicurv Method is a recent development for high production of non-generated Equidep* spiral bevel and hypoid gears. Equidep is the generic name applied to Gleason spiral and hypoid gears with constant depth teeth cut with relatively small diameter cutters.

The Equicurv cutting method affords a procedure whereby equalization of tooth thickness taper is obtained between the gear and pinion member.

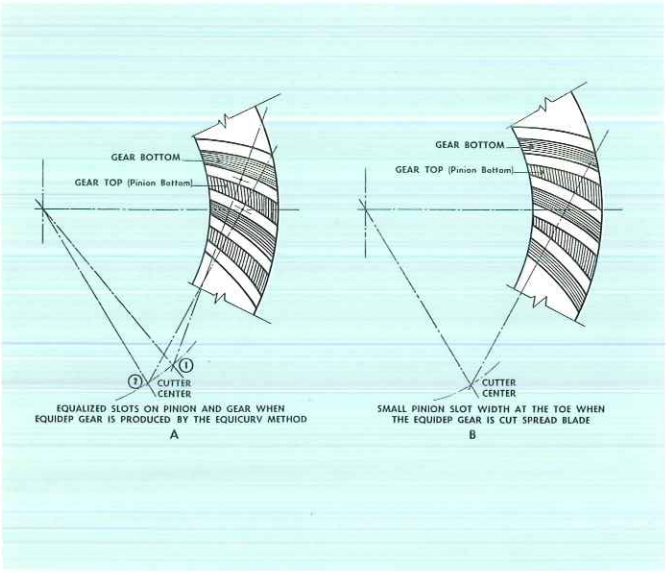
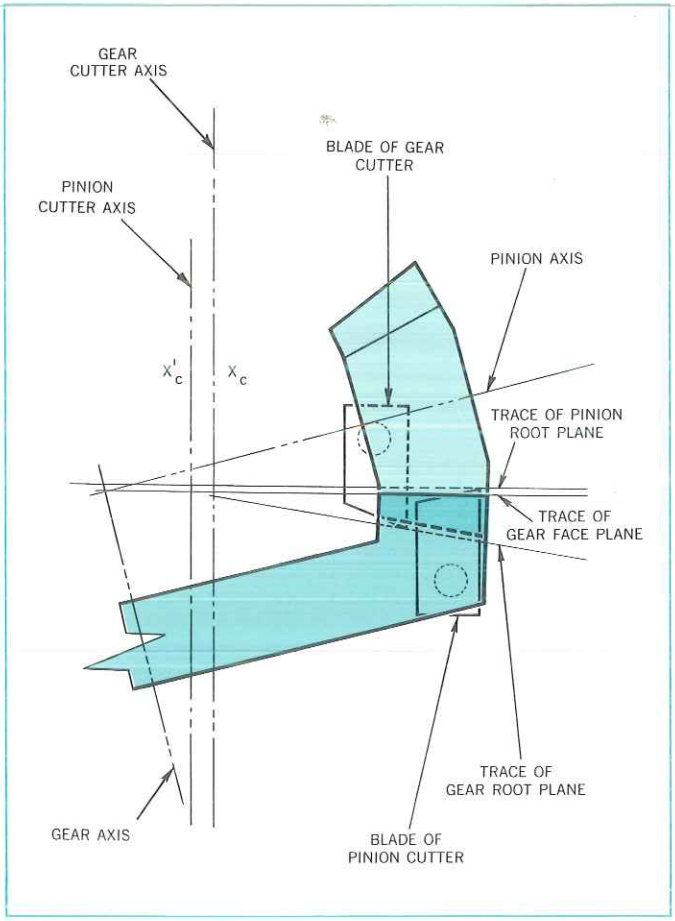


Figure A shows the equalized slots produced by the Equicurv Method. The taper is not removed but divided between the pinion and gear. The gear slot is tapered because the cutter center is at position 1 for cutting the convex side and at position 2 for the concave side. For an Equidep gear cut spread blade as shown in Figure B, the same cutter position is used for both sides.

the Helixform process



The Helixform process is a method for finishing non-generated hypoid and spiral bevel gears. A single rotation of the Helixform cutter finishes a single tooth slot. As each blade of the cutter passes through the tapered tooth slot, the cutter is advanced axially and then returned before entry of the subsequent blade. This combination of rotational motion and axial advance enables the path of the cutter blade tips to follow the root plane of the gears, while keeping the gear cutter axis parallel with the pinion axis as shown. These parallel axes lead to gear and pinion tooth surfaces which approach true mathematical conjugacy.

*Trademark

minimum development

Equidep and Helixform gears cut on the No. 607 Machine can be easily produced with any desired tooth bearing. Because the gears are essentially conjugate with their mating pinions, quiet operating gear sets are obtained directly from the calculated settings. If refinements are required for particular applications or to allow for heat treat distortion, only minor machine changes are required.

longer cutter life

Cutter life is increased on the No. 607 Finisher because of the rigid machine and spindle mounting design. A new coolant system, with splash guards enclosing cutter and work, forces the flow of coolant directly into the cut.

long gear life

The Equicurv and Helixform methods produce a rectangular tooth bearing, which is longer when positioned at the toe than when positioned at the heel, and spreads in length and moves toward the heel as load is applied. As a result, when load on the gear is increased, the rectangular bearing moves slightly toward the heel and remains relatively constant in length. The bearing characteristics are therefore optimum for both light and heavy loads.

high quality

Along with excellent bearing characteristics, the Equidep and Helixform gears are manufactured with the ultimate quality of surface finish and accuracy of tooth shape and spacing. Simple accurate stock dividing, rigid holding of work, and effectively directed cutting forces, work together to produce the highest quality automotive ring gears.

increased production

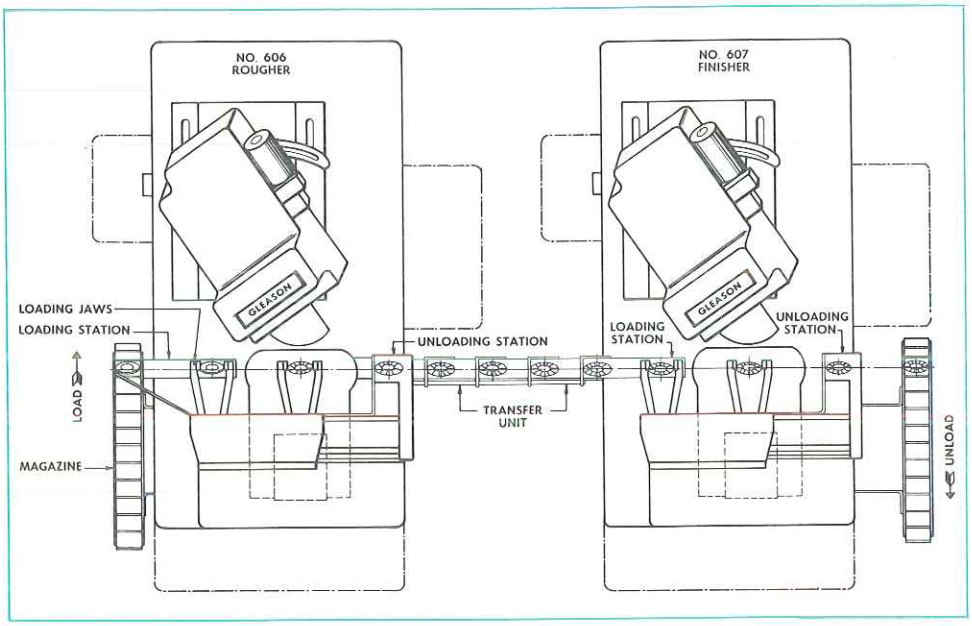
Greater machine rigidity, new and faster index, plus optional automatic loading, make possible production increases up to 30%. In addition, the No. 607 Finisher and companion No. 606 Rougher, when equipped with automatic loaders, can be joined with a transfer unit to automatically convey rough cut gears to the finisher and thereby provide a 20% increase in production over manual loading machines.

occupies less floor space

The new compact inclined spindle design of the No. 607 Finisher makes possible a 35% savings in floor space over previous machines, while attaining the advantages of improved quality and increased production.

Gleason No. 607 features

automatic loader and transfer unit



The Gleason No. 607 Hypoid Helixform Gear Finisher and its companion No. 606 Hypoid Gear Rougher can be equipped with a unique automatic loader and transfer unit, which has been designed and developed for low cost, large scale production.

The operating cycle and load units for both the roughing and finishing machines are electrically and hydraulically interlocked. Each time a blank is delivered to the rougher, simultaneously a rough cut gear is delivered to the finishing machine. The transfer unit automatically conveys rough cut gears from the Rougher to the Finisher.

operation

No. 606 rougher

1. The magazine for the rougher is supplied with gear blanks, which are swept into the loading jaw at the roughing station.

Simultaneously

2. The blank previously delivered to the roughing station is picked up by the loader jaws, placed on the work arbor, and hydraulically chucked. The loader unit returns to its original position. The workhead advances and the rough cut begins.

Simultaneously

3. After the gear has been rough cut, the arbor dechucks, and the tooth slot checking device determines that every tooth in the blank has been cut. The gear is then delivered to the unloading station of the No. 606 Rougher.

Simultaneously

4. The rough-cut gear is swept from the unloading station of the rougher to the transfer unit.

No. 607 finisher

5. From the transfer unit the rough cut gear is progressively advanced to the loading station of the No. 607 Finisher.

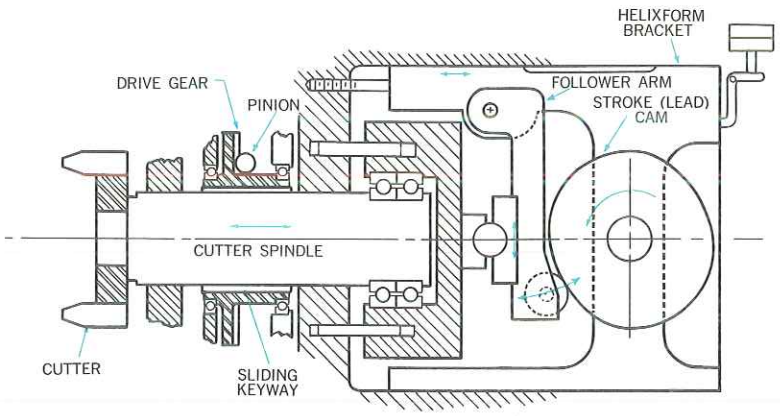
6. The roughed gear is picked up by the loader jaws of the finisher and pre-stock divided. After the loader jaws have positioned the gear on the arbor, it is final stock-divided and hydraulically chucked. The workhead moves forward and begins to finish cut.

7. After the gear has been finish cut, the arbor dechucks, and the gear is moved to the unload station.

Simultaneously

8. The finished gear is swept into the unload magazine ready for further processing.

cutter stroke and drive mechanism



The diagram shows the cutter spindle, cutter drive gears and Helixform stroke cam mechanism. The cutter is driven by a pair of high reduction hypoid gears. The gear hub is rigidly mounted and restrained from axial motion in the cutter spindle housing by means of anti-friction bearings. The cam-reciprocated cutter spindle, radially supported in the housing on two plain bearings, is connected to the gear hub by a pressure lubricated sliding key.

work spindle clamp

A new hydraulic mechanism clamps the work spindle to the housing with a pressure of more than 20,000 lbs., adding rigidity during cutting. The clamp is automatically released each time the work is indexed.

precision stock divider

A stock dividing gage provides convenient angular positioning of the roughed gear prior to the finishing operation. The locating finger of the gage is manually pressed into a tooth slot, and an indicator light signals when the gear is precisely stock divided. The gear is then chucked and advanced into cutting position.

An electrical interlock system prevents cutting until the gear has been properly stock divided, thus avoiding any possibility of damage to the cutter or the work from improperly positioning the rough-cut gear on the work spindle.

No. 607 features

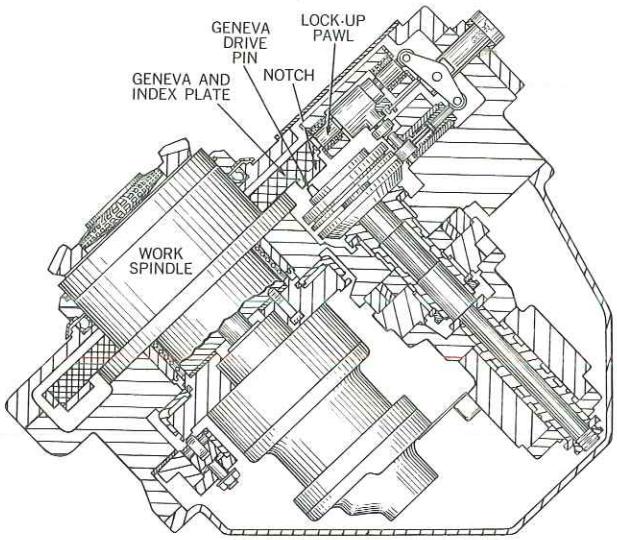
magnetic chip removal

A magnetic separator is used to remove chips from the cutting oil. Coolant oil and metal chips are flushed into a reservoir. Here the rotating magnetic drums remove the chips and the cleaned oil returns to the sump. A constant flow of coolant oil is assured, coolant loss is reduced to a minimum, and periodic cleaning of machine beds is eliminated.

coolant system

A new coolant system integral with splash guards encloses the cutting area. A direct and positive flow of coolant is delivered at the rate of approximately 40 gallons per minute to assure abundant supply of coolant for maximum cutter life.

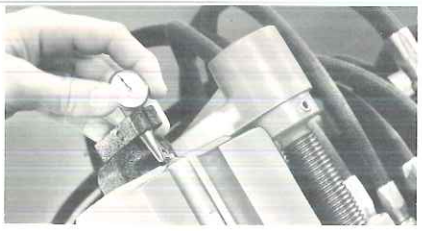
index mechanism



Indexing is accomplished by an entirely new mechanical-hydraulic system to assure a faster and more accurate index.

When a tooth slot is completed, the cutter withdraws and the hydraulic sequence indexes the gear. The work spindle clamp is released, and the lockup pawl is withdrawn. The Geneva and index plate is then rotated by the Geneva drive pin, rotating the work piece one tooth space. The lockup pawl is again advanced for exact positioning and locking of the index plate. Lastly, the work spindle clamp is applied and cutting again takes place. This complete indexing sequence takes place in approximately 0.2 seconds, minimizing production time.

precision setting gage bars



High production is aided by ease of setup and job change-over. Four simple adjustments accurately relate the cutter and work. The machine settings are quickly made with precision settings bars and an indicator assembly. Scales, verniers, and setup fixtures are eliminated. One set of gage bars can be used to set any number of machines to produce identical gears.

cutter handling device

An optional cutter handling device permits easy cutter changing —resulting in reduced machine down-time. Access to the cutter head may be from either side of the machine, and this device may be mounted on whichever side is most convenient for the particular hand of the gear being cut.

automatic deburring unit

An optional deburring unit which is mounted on the workhead (as shown above) provides a quick and efficient means of removing the burr from the root of the finished tooth slot, thereby eliminating a separate deburring operation.

Gleason No. 607 specifications

capacity

	English	Metric
Pitch diameter (Maximum)		
10 to 1 ratio	10½″	266mm
2½ to 1 ratio	9⅜″	238mm
Diametral pitch (Coarsest)	2½″ D.P.	10 mod.
Extreme ratio (Minimum)	2½:1	
Face width (Maximum)	1⅝″	41mm
Full depth	.750″	19mm
Number of teeth	20-150	

work spindle

Diameter taper hole at large end	3 27/64″
Taper per foot	½″
Depth of taper	⅝″

cutter diameters

5″, 6″, 7½″ and 9″

feeds and speeds

Cutter speeds (feet per minute)	10-75	3m-22m
Feeds (seconds per tooth)	2-8	

electrical equipment

		60 cycle	50 cycle
Main Motor	3 HP	1800 RPM	1500 RPM
Hydraulic Motor	3 HP	1800 RPM	1500 RPM
Coolant Motor	1 HP	1800 RPM	1500 RPM
Magnetic chip separator	⅛ HP	1800 RPM	1500 RPM

miscellaneous

	English	Metric
Floor space	92″ x 75″	233 cm x 190 cm
Height (approximate)	80″	203 cm
Net weight	13,500 lbs.	6,123 Kg.
Shipping weight (boxed for export, approximate)	14,500 lbs.	6,577 Kg.
Size of case	102″ x 85″ x 94″	259 cm x 216 cm x 238 cm

standard equipment

Index arrangement for one gear (less index and Geneva plate)
Stock divider
Hydraulic chuck
Complete electrical equipment

extra equipment

Index and Geneva plate
Cutter length fixture
Cutter handling equipment
Machine setting bars and indicator assembly
Magnetic chip separator
Automatic loader
Workholding equipment

operation

The rough-cut gear is placed on the workholding arbor, aligned with the cutter by locating finger of stock divider, and chucked. The start button is pushed and operation is then entirely automatic. The workhead slide advances into cutting position and cutting begins. Each cutter rotation finishes one tooth space — and machine indexes for the next tooth as gap in the cutter blades passes across gear face. Machine stops automatically when last tooth space is cut — workhead slide automatically withdraws and the finish-cut gear is dechucked.

GLEASON WORKS
1000 UNIVERSITY AVENUE
ROCHESTER, N.Y. 14603
U.S.A.

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