

GEAR HOBBING GUIDE

THE HOBBING PROCESS

In hobbing a spur gear with a single thread hob, the contours of the gear teeth are generated by feeding a revolving hob across a rotating blank. A hob is basically like a worm with cutting edges. On the hobbing machine, the gear blank and the hob are both rotated by power, and their relative speeds are fixed by means of index change gears, so that the blank will move exactly one revolution. (ie) When hobbing a 30 tooth gear, the hob will rotate 30 times while the blank rotates once.

THE GENERATING ACTION OF A HOB

The drawing illustrates the generating action of the hobbing process. The teeth of the hob cut into the work piece in successive order, and each in a slightly different position. All hob teeth which come in contact with the work will remove a small chip to help form the full tooth profile. the cutting action is continuous, and several hob teeth will be cutting at the same time, each working on different portions of adjacent teeth. Thus, in the course of this uninterrupted working process, the teeth of the hob in positive progression envelop the teeth of the work with a network of cuts. The number of hob teeth that are involved in generating the work piece tooth profile increases with the number of flutes in the hob and the number of teeth in the work piece.

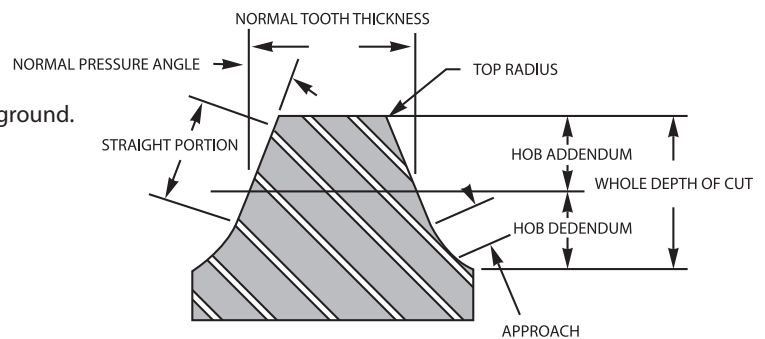
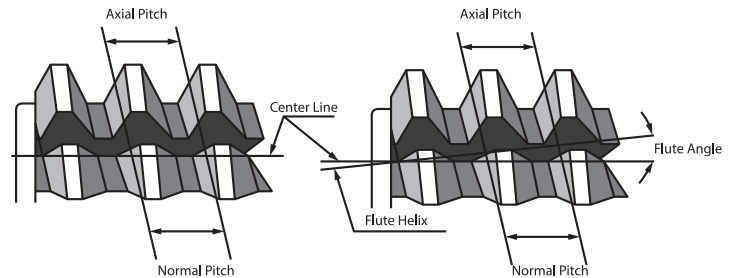
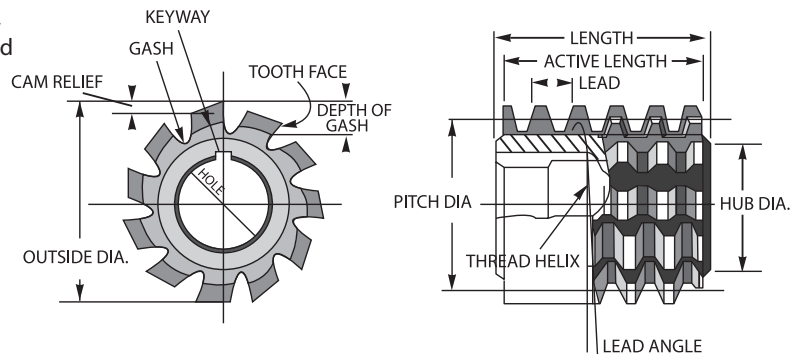
Since the gear hobbing process is a generating type of operation, the form of the hob the tooth is always different from the form of the tooth that it produces. For example, an involute form of gear tooth is produced by a hob having angular straight sides. A straight-sided spline tooth is produced by a hob having a curved tooth shape.

ACCURACY AND BASIC TYPES

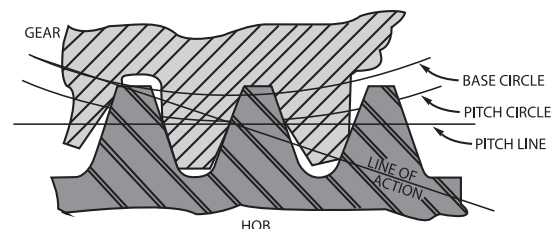
Hobs are generally put into five basic classes depending on accuracy - **AA** - Ultra Precision, **A** - Precision Ground, **B** - Ground, **C** - Unground (Accurate) and **D** - Commercial Unground.

The requirements of a specific job will determine what class of hob should be used. However, keep in mind, that the results obtained when using any hob are dependent on the accuracy and condition of the machine and tooling with which the hob is used. Proper machine set-up, careful preparation, design of the workpiece holder, proper hob sharpening and inspection all are essential to obtain accurate results on a final part.

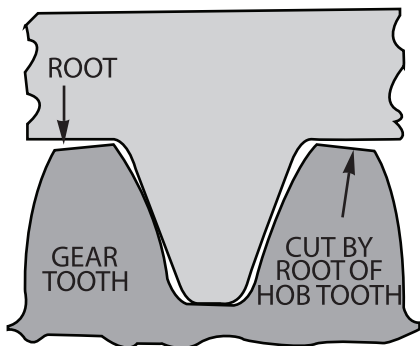
Hobs are made in three different types: Roughing, Semi-finishing, and Finishing. Roughing hobs usually allow more stock for finishing than a corresponding semi-finishing hobs since the part is usually finish hobbled or shaped. Semi-finishing hobs allow only a small amount of stock for finishing either by shaving or by grinding. Finishing hobs are made to produce the finished tooth form of the part with no subsequent operations needed.



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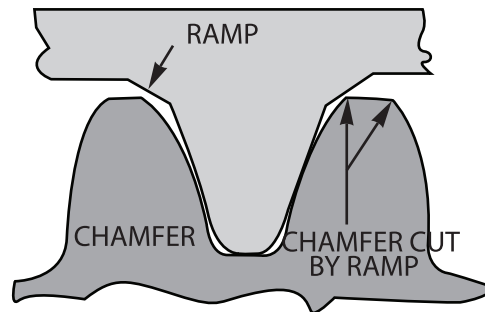


Special Gear Hob Tooth Forms



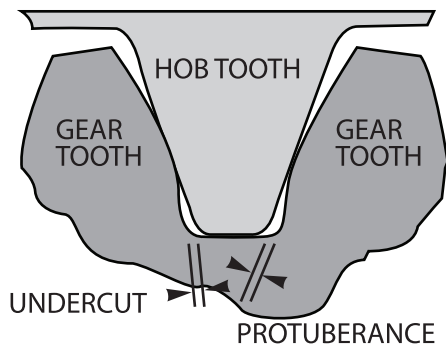
TOPPING

Topping hobs cut the outside diameter of the gear blank at the same time that the gear tooth is generated.



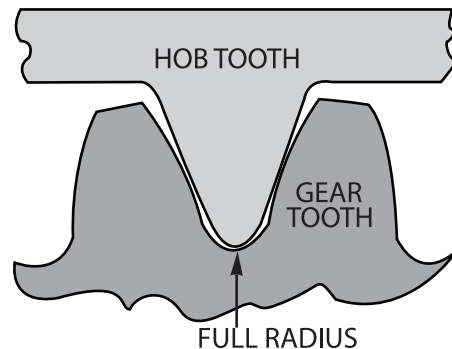
SEMI-TOPPING

A hob can be designed to chamfer the outside corners of the gear teeth at the same time that the teeth are generated. These chamfers are extremely beneficial in avoiding handling nicks which could interfere with correct rolling action.



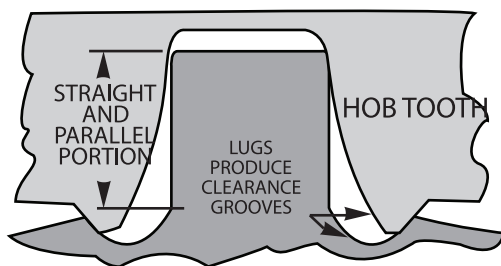
PROTUBERANCE TYPE

When hobbing operations are followed by gear shaving operations, it is important that the tip of the shaving cutter does not dig into the gear tooth fillet. A protuberance-type hob with projection as on the tip of the teeth actually undercuts the gear tooth profile in such a manner that the shaving operation can produce a blended fillet profile.



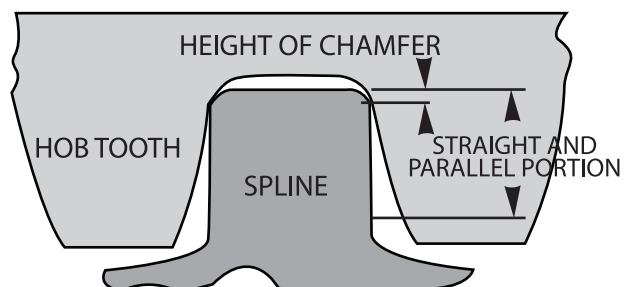
FULL RADIUS

When maximum strength is required a full radius is desirable, which produces a smoothly blended round bottom between the gear teeth.



STRAIGHT SIDE CLEARANCE GROOVE

Proper fit of straight-sided spline members can be achieved by hobbing a clearance groove in the area where the straight side meets the minor diameter of the spline. Small projections called lugs (or ears) on the tips on the hob teeth provide a blended clearance groove.



SEMI-TOPPING FLAT ROOT

A semi-topping hob can be used in straight-sided splines to produce a chamfer on the outside corners of the spline teeth.