


LATEST ADVANCES IN CHAMFER HOBBING





With the addition of the new Genesis® 280HCD Gear Hobbing Machine, the many benefits of gear chamfering in parallel to gear hobbing are now available for a wider range of automotive and industrial applications.

By GOTTFRIED KLEIN

While not considered a “value adding” process such as hobbing and fine finishing, cylindrical gear chamfering and deburring are getting the recognition they have long deserved today. Gear manufacturers understand that premature transmission failure, less-than-optimal efficiency, and unacceptable noise can result from application of transmission gears operating with anything less than a flawless tooth flank. Thus, generating a chamfer to precise customer specifications is of critical importance in order to minimize the potential for sharp, brittle edges after heat treat, as well as to avoid excessive stock and hardened burrs in the tooth flank prior to the hard finishing operations, which can greatly diminish tool life.

CHAMFER HOBGING: WIDENING THE APPLICATION RANGE

The growing awareness of the benefits of chamfering and deburring has coincided with the dramatic increase in dry cutting and hard finishing, as well as the drive for noise reduction (particularly in e-Drive applications). Gleason has kept pace, most recently with its breakthrough Chamfer Hobbing technology. Chamfer Hobbing first became available with the Genesis® 160HCD Vertical Hobbing and Chamfering Machine. Now, with the introduction of the new Genesis® 280HCD, the Chamfer Hobbing range has been expanded to include spur and helical gears up to module 5 mm, 280 mm workpiece outside diameter, and 380 mm shaft length. While the 280H version is designed as a pure hobbing machine, the enhanced 280HCD combines hobbing with an integrated chamfering/deburring station to perform the highly efficient Chamfer Hobbing process in parallel to hobbing. With this expanded working range, the new machine covers not only the full range of automotive applications, including final drive ring gears and shafts, but job shop, industrial, and light-truck applications as well.

It should be noted that, while chamfering with hobs has been known for decades, Chamfer Hobbing

on the 280HCD takes the process to a completely new level. Chamfering is performed using a Gleason Chamfer Hob, and the process is performed in the 280HCD's integrated chamfer station. The cutting tool has characteristics very similar to a conventional gear hob. A Chamfer Hob is used for each tooth flank with a tooth profile specifically designed for the particular chamfer form that is required. This design delivers greater flexibility: Comma or parallel-chamfer forms are possible, as well as chamfers along the tooth edge



While the 280H is available with a 2-station ringloader, the 280HCD features an additional gantry loader to link gear hobbing with chamfer cutting and external automation/storage. (Courtesy: Gleason)

AT A GLANCE

- ▶ Workpiece diameter, max. 280 mm
- ▶ Module, nominal 5 mm
- ▶ Axial travel, max. 390 mm
- ▶ Hob dia., max. 140 mm
- ▶ Hob length (toothed), max. 240 mm

only or including the root area. By cutting into the gap, burrs are avoided on the face side of the gears; no measurable burrs on the flank are produced, and downstream processes to remove the burr are eliminated. Finally, the Gleason Chamfer Hobbing process offers tool shifting, which delivers increased tool life resulting in the absolute lowest tool cost-per-piece —



Dry hobbing of final drive ring gear with G50 hob material and AlCroNite® Pro coating for highest efficiency. (Courtesy: Gleason)

just 1 cent for the typical automotive workpiece.

For job shop applications where higher flexibility and small batch production are desirable, the 280HCD can employ Fly Cutter Chamfering, a Gleason process that uses standard carbide inserts for chamfering. With this process, a single tool can be used for different modules, pressure angle, and number of teeth. Size and chamfer angle can easily be programmed with the machine's intuitive machine software.

FASTER CHIP-TO-CHIP

Most importantly, the 280HCD sets a new benchmark for chip-to-chip times with an integrated high-speed ring loader and a fast, flexible CNC gantry that connects the hobbing station to the integrated chamfer hobbing unit as well as to the customer's parts processing systems. Shorter cycle times and more efficient, error-free operation also result from Gleason's new GEMS HMI Hobbing software, which makes setup and changeover more intuitive and simpler to learn. This new Human Machine Interface, coupled with Siemens 840Dsl control, provides several new process options and guides the operator intuitively through the workflows of the machine. Additionally, new Gleason 4.0 capabilities such as gTools will, in the future, automate tooling data input to simplify changeover and minimize the potential for operator error. Additionally, Gleason Fingerprint for predictive maintenance can help ensure problem-free operation downstream.

ADAPTABLE FOR TODAY ... AND TOMORROW

A gear-driven hob head delivering speeds up to 2,000 rpm, combined with several hob clamping alternatives, ensures every application can benefit from the best possible cutting tool solutions, now and in the future. For dry cutting, for example, the latest G50, G90, or carbide hob cutter material is ideal. Several chip evacuation options



Quick-Flex® Plus clamping fixture for hobbing and Chamfer Hobbing cuts changeover time for different part types to just seconds. (Courtesy: Gleason)

ensure dry, hot chips won't interfere with the highly productive cutting process. For smaller batches and higher versatility, wet cutting options with magnetic chip conveyor are available. The NC driven tailstock will support clamping disc-type workpieces as well as shaft-type parts, using the fast, adaptable Quick-Flex® Plus workholding system, which cuts workholding changeover in both the hobbing and Chamfer Hobbing stations to under a minute each.

Like all the latest generation of Gleason machines, the 280HCD is supported by Gleason's complete manufacturing system, including hobs, milling cutters and chamfer hobs, modular workholding and smart grippers, as well as process engineering and on-going training to help ensure the system is operating at peak efficiencies and producing the optimum in quality.



The new Genesis 280HCD with Chamfer Hobbing in parallel with hobbing. (Courtesy: Gleason)

IN SUMMARY

It's only been in recent years that gear manufacturers have begun to fully recognize the true significance of chamfering and deburr-

ing. Fortunately, gear manufacturers now have the technologies they need to perform these valuable processes with minimal cost and no loss of precious production time. 📺

ABOUT THE AUTHOR

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