

Q&A

INTERVIEW WITH AN
INDUSTRY INSIDER

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“A single system for fast and high-quality production with up to 100 percent gear inspection – long the dream of many customers, and now, a reality.”

What's significant about Gleason's new Hard Finishing Cell (HFC) with integrated gear inspection?

The Gleason HFC combines the latest threaded wheel grinding with revolutionary new GRSL gear rolling with integrated laser inspection in a single, fully automated system to finally solve the challenge of random gear inspection that has long existed in high-volume gear production.

What are the drawbacks of conventional, random inspection?

When producing gears in higher volumes for automotive applications, for example, quality control and actual inspection of finished gears is generally performed randomly and on a relatively small sampling. In order to guarantee an almost 100 percent reliability, statistics are used to validate most of the gears produced. Typical measuring characteristics can be represented and statistically evaluated on a Gaussian bell curve. By deliberately narrowing down the tolerances on the actually measured components, it is possible to guarantee compliance with the actually required drawing tolerances with a sufficiently high probability (typically > 99.99 percent).

This method is commonly used for machine and process-capability studies and is recognized worldwide. The machine or process capability values cmk and cpk frequently taken as a basis are usually above 1.67. Statistically, the reject rate is only 0.57 components per 1 million manufactured components, but this means that only about 50 percent of the actually intended drawing tolerances are available as manufacturing tolerances.

How does integration of the GRSL into the HFC improve upon this?

The constantly increasing power density of gears and the growing importance of noise behavior are leading to increasingly tight tolerances. Clearly, the heavy reliance on statistics poses a significant problem for a growing number of gear manufacturers.

Gleason's new GRSL roller testing device with integrated optical measuring technology opens up a world of new possibilities by reducing measuring time so it can realistically be done within the actual production time. This provides the possibility of up to 100 percent inspection of all manufactured components. Now, there is no need for additional narrowing of tolerances, and the 100 percent inspection of all manufactured components can be accomplished in-process.

How does the HFC inspection capability work in practical application?

HFC is a fully automated system with robot loading that integrates modules for auxiliary processes in order to meet specific customer

requirements easily and flexibly. The complete process sequence includes gear grinding, washing, laser marking, measuring, and part handling in a stackable basket system. Finished components to be tested are loaded by robot onto the GRSL. During the gear inspection, a laser scanner is used to measure all gear characteristics, thus, all relevant information for profile, pitch and runout, and, if desired, lead measurement is available. This is done for each tooth and not, as is usually the case, only on four teeth distributed over the circumference.

Deviations are fed back directly into the production machine by means of a closed-correction loop. Both fully automatic correction



For the first time, the Gleason HFC combines the latest threaded wheel grinding with revolutionary new GRSL Gear Rolling System with Integrated Laser Technology in a single system. (Courtesy: Gleason)

and real-time adjustment of the corresponding parameters can be achieved. Compare that to the conventional measurement process in the quality lab, where 45 to 60 minutes may well pass between removing the component from the machine and providing the measurement result. With HFC's in-process inspection and closed loop, the desired correction ensuring optimum quality during the ongoing production process is much faster.

Components whose characteristics lie outside the tolerances are automatically rejected. It is also possible to create extensive trend analyses of individual features and perform further gear noise analysis.

Bottom line, what makes the HFC a must-have machine?

HFC is indeed a highly desirable solution for many industries and applications where consistent high quality is important, such as the production of high-precision eDrive gears with minimal noise characteristics. It's a single system for fast and high-quality production with up to 100 percent gear inspection – long the dream of many customers, and now, a reality. 🤖

MORE INFO

www.gleason.com/HFC