Gleason

OFFERS NEW SOFTWARE TO REDUCE NON-PRODUCTIVE GRINDING TIME

Gleason Corp. has developed three optional software modules designed to reduce overall machining time in its P 600/800 G profile grinder through faster axial feed rates, shorter set-up times and through dual-flank grinding.

The latest modules feature one for adaptive process control. Available since the second half of 2005, the software reduces grinding time by running the grinding wheel at its normal operating feed rate only during actual contact between wheel and workpiece.

The P 600/800 G can profile grind internal and external cylindrical gears with maximum workpiece diameters of up to about 800 mm.

During rough grinding, the P 600/800 G's grinding wheel may sometimes have no contact with its workpiece due to gear tooth inaccuracies, whether from cutting deviations or heat treat distortion. When gears are larger, such inaccuracies may result in non-contact areas that are significant in size. The P 600/800 G's adaptive process control software detects non-contact areas and increases the axial feed rate to speed the wheel through them.

Using an acoustic sensing device, the grinder recognizes the non-contact areas based on changes in grinding spindle load. Also, the recognition parameters may be changed by the gear manufacturer based on his own experience. For example, the manufacturer can set the P 600/800 G to recognize a 10 percent drop in spindle load as the start of a non-contact area. At that point, the grinder will increase its axial feed rate to shorten the non-productive time.

Likewise, the manufacturer can set a percentage increase in spindle load as marking the end of a non-contact area. If the spindle's torque increases five percent, for example, the P 600/800 G will see that increase as the end of the non-contact area and will slow the wheel down to its normal feed rate for grinding.

Richard Scoda, The Gleason Works' product manager–cylindrical gear grinding, says the grinder uses percentage changes in spindle loads rather than absolute values because loads and burn thresholds can vary considerably. For example, spindle load will be very small when the P 600/800 G is grinding a small, fine-pitch gear, but it'll be heavy when grinding a coarse-pitch gear with a low number of teeth.

Gleason tested the adaptive software on helical pinions with 500 mm face widths. The software reduced the grinding time from 60 minutes to 40 minutes per pinion.

The tests were conducted on two grinders, one without the adaptive software, the other one with it. The machine without the technology took 60 minutes to grind each of several helical pinions, while the one with the adaptive software took 40 minutes to grind each of its pinions. Afterward, both sets of pinions were checked for grinding burn via nital etch. Gleason reports that neither set suffered thermal damage.

Scoda says the example may seem extreme, but the benefit of the adaptive technology is greatest when the manufacturer is grinding gears and pinions with long faces, which tend to have a greater amount of distortion. "The larger the gear and the coarser the pitch/module, the more pronounced the heat treat distortion and possibility of burning," he says. "As a result, adaptive process control has more of an impact on potential savings."

Other recent software modules involve dual-flank grinding. In late '05, Gleason finished a module for dual-flank grinding that removes twist (also called profile bias) from crowned helical gears. Then, this year, the company introduced a

module that allows for dual-flank grinding of asymmetrical tooth forms. Scoda says this latest feature is possible because of the grinder's continuous swivel axis, adding that this axis normally is locked in a fixed position during dual-flank grinding, but not in the P 600/800 G. Scoda says the main advantage of dual-flank grinding over single-flank grinding is reduced machining time.

Also, Gleason is field testing a software module for reducing set-up time. The module would allow the P 600/800 G to compensate for an amount of radial eccentricity and axial runout, eliminating the need for an operator to precisely align a gear with the grinder's table and axes when clamping the workpiece.

The P 600/800 G uses electromagnetic probes to determine eccentricity and runout and can then compensate during grinding by positioning the tool via machine kinematics. Scoda says electromagnetic probes had to be used because the range of gear shapes and sizes precluded the use of mechanical probes.

"We're trying to eliminate the dead time, the non-productive time," Scoda says. ■

For more information:
Gleason Corp.
1000 University Ave.
P.O. Box 22970
Rochester, NY 14692-2970
Phone: (585) 473-1000
Fax: (585) 461-4348
E-mail: *sales@gleason.com*
Internet: *www.gleason.com*

Timken Software

OFFERS BEARING SELECTION FLEXIBILITY AND IMPROVES DESIGN TIME FOR LUFKIN

Whether it's a replacement, design improvement or consideration for a new design, selecting the appropriate bearings that provide optimal performance is critical. Although they can be time-consuming tasks, looking at bearing catalogs and figuring complex calculations will certainly get the job done. To better maximize its engineering capability, Lufkin Industries, a leading supplier of oil

field pumping units, industrial gears, foundry castings and truck trailers, has begun using an electronic bearing selection guide.

Developed by The Timken Co., the *Tapered Roller Bearing Selection Guide* (TRBSG) version 2.0, provides Lufkin's Power Transmission Division with access to data and calculations. The guide also offers the ability to model bearing applications or to generate automated bearing selection alternatives consistent with size and performance requirements of its customers' applications.

Having access to in-depth bearing information and calculations helps design and application engineers calculate bearing life based on a variety of criteria. The resulting data can be saved in electronic, print or report form. Without having to draw bearing designs from scratch, the software enables companies like Lufkin to review built-in examples, create new designs and, over time, build a library of previous work that can easily be modified for new projects.

"Some applications are so demanding and specific, that we need to know if a bearing is available to match a request before we can even quote it," says Chris Peterson, manager of applications engineering, PT Division at Lufkin. "Before this software was implemented here, we would go back and forth a number of times with manufacturers to find the best bearing for the job. The value of this software is that now we have the information we need at our fingertips and can quickly review a large number of Timken bearings to find ones that work so we can get results and answers to our customers."

"Regardless of location, our sales and application engineers can provide the same product data and calculated results to our customers," says Svens Milenbachs, application analysis software manager for Timken. "Our primary mission in

developing this software for customers was to create an easy-to-use tool that helps improve our customers' performance. Although it's a rather comprehensive and sophisticated software program, the user interface makes it very simple to navigate and allows our customers to get results quickly."

Peterson shared that sometimes the program will provide 30 or more bearings that may fit the needs of the design. In other cases, it returns just one or two bearings that would serve as acceptable candidates.

"The old methods certainly worked, but our team could spend hours going through the process," Peterson says. "This software not only saves us costs in time, but it helps us find bearings for extreme applications that we may not have otherwise known were available. That kind of value means we can produce better designs for our customers, do it faster than ever before and win business because of it."

The *Tapered Roller Bearing Selection Guide* is available in six languages.

For more information:
The Timken Co.
1835 Dueber Ave. SW
P.O. Box 6932
Canton, OH 44706-0932
Phone: (330) 438-3000
Fax: (330) 471-4388
Internet: *www.timken.com*

Ricardo

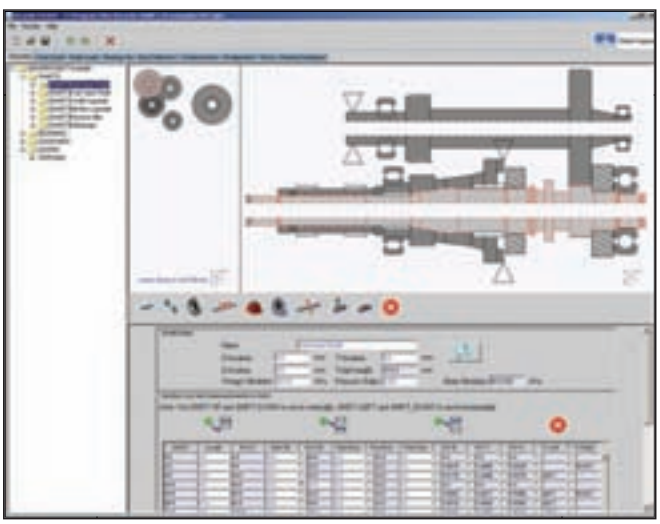
LAUNCHES *SABR* SOFTWARE FOR TRANSMISSION ENGINEERS

With the launch of its new *SABR* product, Ricardo Software has introduced a package specifically designed to meet the needs of transmission design engineers. Based on technology developed by Ricardo's transmission and driveline engineering teams, whose application experience ranges across all types of vehicle from off-highway to motor sports, *SABR* provides a comprehensive toolkit for the simulation, analysis and concept design of transmission gear, shaft and bearing systems.

Version 1.0 of *SABR* comprises a 3-D quasi-static modeling capability integrated and supplied with the gear design module, *GEAR*.

This combination provides feedback on transmission design layouts and enables a high standard of strength, weight and cost optimization of new designs. The software's solver enables the transmission to be assessed in terms of bearing life, shaft deflection and shaft stress concentration, and the gear design module enables the design and rating of spur and helical cylindrical gears based on Ricardo's knowledge base of experience in the calculation of bending and contact stresses and endurance, and tip relief under specific loads.

The graphical user interface and building-block modeling approach used in *SABR* allows virtually any transmission



design to be constructed and simulated, including, for example, the latest dual-clutch transmission systems. Shafts are modeled with a simple spreadsheet style of input.

Features such as oil holes and surface grooves can easily be included, as can other non-standard stress concentration factors. A global bearing catalog can be used to allow consistent development across an organization, and local catalogs can be set up to store individual conceptual bearing designs.

SABR allows any number of power flows to be specified with torque and speed directions clearly identified, and torque reduction or losses specified at any point.

Stresses at known concentrations are automatically calculated for each section and fillet radius, as well as features such as oil holes and 'O' ring grooves. Gear misalignments are identified and compared against user-defined targets, allowing the rapid identification of potential weaknesses. For bearings, life and accumulated damage are presented and compared against design targets.

In addition to *SABR*, Ricardo offers software for gear tooling design (*GTS*), gear topology assessment (*TOPGEAR*) and dynamic modeling of drivelines and transmissions (*VALDYN*). ■

For more information:
Ricardo Inc.
Detroit Technical Center
40000 Ricardo Dr.
Van Buren Township, MI 48111-1641
Phone: (734) 397-6666
Fax: (734) 397-6677
Internet: *www.ricardo.com/software*

GPSYS

ENABLES MORE ACCURATE PREDICTIONS OF GEAR FAILURE

Impact Technologies has developed a gear prognostic module that integrates advanced physics-based failure mode modeling, HUMS vibration feature analysis and inspection/operational data to enable spiral bevel gear failure predictions in critical drivetrain applications.

The software, called *GPSYS*, uses a modeling approach that includes 3-D finite element and fatigue models. The software incorporates information about the design, operation and monitoring aspects of gears to produce remaining useful life predictions. It also includes an adaptive updating technique that allows users to "tune" key failure mode variables.

According to product literature, the software's integrated modeling scheme is aimed at minimizing uncertainties by updating crack initiation and propagation rates, as well as validating system measurements that evolve as damage progresses.

GPSYS automates the process for model generation, stress analysis and 3-D fracture mechanics of spiral bevel gearing. ■

For more information:
Impact Technologies LLC
200 Canal View Blvd.
Rochester, NY 14623
Phone: (585) 424-1990
Fax: (585) 424-1177
Internet: *www.impact-tek.com*

GearSoft Pty

ANNOUNCES SOFTWARE UPDATES

GearCAD 3.60 has been released by GearSoft Pty of Australia. The gear design software calculates involute gear geometry and generates DXF files for internal, external and planetary spur and helical gear sets.

Also, the company has released version 3.56 of its *ProXpt* software, which is designed to manipulate gear tooth profiles and CAD designs. The user is able to apply tip relief, gear tooth rounding and other features.

The latest release of *ProXpt* includes its own built-in gear design software. It can create profiles of pinion-type cutters and racks. It also has a built-in extended profile check. ■

For more information:
GearSoft Design
Unit 8, 26 Huxtable Ave.
Lane Cove, NSW 2066
Australia
Phone: +(61) 2-9411-1984
Fax: +(61) 2-9411-1282
Internet: *www.gearcad.com*