

## Carl Zeiss' Updated Software

SPEEDS GEAR MEASUREMENT



Carl Zeiss has updated its *Gear Pro* software to include the ability to calculate a gear's mass and moment of inertia after end users enter data representing the number of gear teeth, module, pressure angle, root diameter, major diameter and center bore diameter.

According to the company's press release, this calculation allows the coordinate measuring machine (CMM) to control acceleration of the rotary table, allowing for maximum throughput.

"This may be of no importance to the operator, but it will put a smile on the face of the production manager," says Mark Busha, technical sales engineer.

*Gear Pro* software is designed to measure gear teeth using CMMs and can be used with or without a rotary table. However, the rotary table can reduce production time.

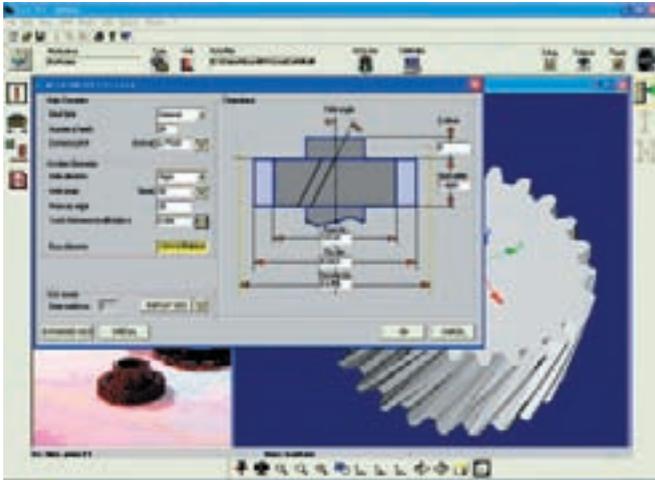
The software works in conjunction with the *Calypso* prismatic measuring software from Zeiss. Gear tooth measurements can be integrated into a *Calypso* measurement plan or manually started from *Gear Pro*.

Busha says *Calypso* establishes the alignment used for gear evaluation. "The real advantage is that, in one CNC program, not only is the standard gear evaluation accomplished (profile, lead and index), but all of the other print requirements as well. In other words, with one button push, 100% of the part inspection is completed, something not possible with a dedicated gear checker."

After the gear is inspected, Busha says the same Zeiss CMM inspects the gear's housing.

Two software versions are available. *Gear Pro Bevel* measures bevel gears and *Gear Pro Involute* is designed for spur gears. Both permit measurements without a rotary table, depending on the workpiece geometry. An integrated interface to the third-party statistical software *QDAS qs-STAT* enables transfer of measuring results for statistical evaluation.

*Gear Pro Bevel* offers the possibility of "traditional" measurements using nominal data, but it is also equipped with tools optimized for comparison measurements using CAD models. This makes it possible to inspect bevel gears, pressure rams or blanks for which only CAD data is available.



*Gear Pro Involute* offers the possibility of integrating customer-specific requirements into the evaluation. Several corporate standards have already been built in. It also accepts various tolerances and geometries for the left and right flanks of a gear tooth. Furthermore, *Gear Pro Involute* supports self-centering measurements of the pitch.

With *Gear Pro*, the measuring run is always based on the gear tooth geometry. The CAD model is derived from the actual datasets and the geometry definitions. The definition of a measuring task—from the complexity of the measurement to the tolerances—is graphically supported and can also be entered interactively using a mouse. *Gear Pro* guides the user throughout the measuring process, from moving into the tooth space to retraction of the stylus. The measurement results are displayed as a measurement log or a graphic. A subsequent evaluation makes it possible to re-evaluate using already captured measurement data with modified parameters.

Evaluations using *Gear Pro* are based on a 3-D analytical model of the gear. The software also permits the measurement of large point quantities for the exact description of the tooth profile and the determination of parameters at any measuring point. If gear flanks are captured three-dimensionally using a coordinate measuring machine, a direct comparison is made with the CAD data, thus providing more detailed information on the gear geometry.

*Gear Pro* can be used on Zeiss active-scanning CMMs with C99 controllers and *Calypso* software. ■

**For more information:**

Carl Zeiss IMT Corp.  
6250 Sycamore Lane North  
Maple Grove, MN 55369  
Phone: (800) 752-6181  
E-mail: [imt@zeiss.com](mailto:imt@zeiss.com)  
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## Process Equipment

### INTRODUCES SMALL-FOOTPRINT CNC GEAR INSPECTION SYSTEM

Process Equipment introduced its new Next Dimension model ND300 CNC gear inspection system.

The ND300 is a Class 1 gear inspection system in accordance with VDI/VDE 2612 and 2613 guidelines. (*Editor's note: Equipment that meets Class 1 compares profile and helix accuracies against a traceable gear artifact. The guideline allows 1.5 microns for helix slope and profile slope variations to the artifact.*)

The system is volumetrically error-mapped and employs an on-board thermal compensation system. The thermal compensation allows for cold start-up conditions of the machine and temperature changes of 20° +/-2.0°C or 68° +/-3.6°F in a shop or laboratory environment. Combined with the company's *Automatic Datum Axis Compensation* software, operators can perform gear tooth form geometry measurements at the gear's true pitch diameter and measure actual tooth thickness, bearing journals, bore diameters and form-roundness measurement, all in one fixture setup.

According to the company's press release, the ND300 is the smallest footprint CNC gear inspection system in its operating class. The gear inspection system is especially designed for



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applications requiring measurement of cylindrical gears, splines, worm shafts, and related tooling less than 305 mm (12") in diameter. Targeted customers include automotive, powdered metal, plastic and other manufacturers providing gears less than 12" in diameter.

The software platform is written and displayed in the MS Windows environment. MS Visual Studio C++ language is used to write modular base code and inspection programs such as cylindrical gear, root scanning, comparison (before and after, heat treat and trend analysis), SPC, form roundness, 3-D related features, hob, shaper, shaver and worm. The GUI is intuitive with context-sensitive help and provides user-friendly navigation with data transfer into and out of applications programs without the need for software customizations. ■

**For more information:**

Process Equipment Co.  
4191 U.S. Route 40  
Tipp City, OH 45371  
Phone: (937) 667-7105  
Fax: (937) 667-2591  
Internet: [www.gearinspection.com](http://www.gearinspection.com), [www.processeq.com](http://www.processeq.com)

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## Fowler

### INTRODUCES NEW BORE GAGES

Fred V. Fowler introduced the updated XT series bore gaging system, which allows for greater range and capacity without the need to switch or replace measuring anvils. The units are available in pistol, micrometer and mechanical styles.

Features include resolution to 0.00005", blind bore anvils on heads above 1/2", two pre-set memories for ring gages, carbide anvils on heads above 1/2", direct inch-to-metric conversion, direct SPC RS-232 output, two-point heads from 0.080"-0.236", and three-point heads from 0.236"-12".

Custom gage heads are available for gear teeth, internal slots, deep splines, recesses, ball races, shallow bores and other applications. ■

**For more information:**

Fred V. Fowler  
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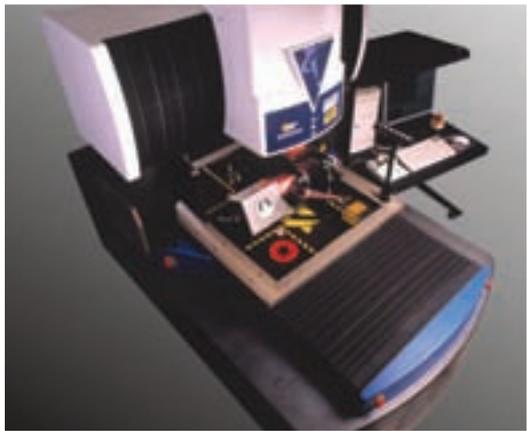
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## Optical Gaging Products

ANNOUNCES FIVE-AXIS  
MEASUREMENT CAPABILITY



The SmartScope Quest 650 from Optical Gaging Products is a programmable five-axis measuring system for large volume dimensional metrology. A motorized, heavy-duty dual rotary indexer allows SmartScope Quest sensors to measure features anywhere on complex parts. OGP *MeasureMind* metrology software supports simultaneous five-axis motion, keeping the coordinate system aligned with the rotating part. The automatic system measures parts such as turbine blades, vanes and air folds.

According to the company's press release, the SmartScope measures a wider variety of part features in a single setup and includes high-speed linear motors, a large working volume, support of video, touch probes, laser scanners and micro probes. Since touch probes and lasers work efficiently at measuring surfaces, and the video measures edges, multi-sensor measurement provides more complete information about complex parts than a single sensor system.

Assorted touch probes can be available in a change rack, accessible under program control. SmartScope Quest can be equipped with a SP25 scanning probe to automatically acquire surface data points via continuous contact between user-defined start and end points. Feather Probe adds micro-probing capability with milligram-level probing pressure for small features on fragile or sensitive parts. Laser sensors and the Rainbow Probe white light sensor add non-contact surface measurement capability. Sensors are calibrated to a common reference frame in *MeasureMind 3D MultiSensor* metrology software and can be used interchangeably within the same

measurement program.

The measuring system offers modern video measurement capabilities with the high-magnification, telemetric Teeter zoom lens. A granite base and thermally-stable mechanized bridge provide stability over an XYZ measurement column of 600 x 660 x 300 mm. The Z-axis range can be extended to 400 mm. Its high-speed, liquid-cooled, linear motor-driven stages and 50-nanometer scale resolution provide higher throughput and accuracy.

Software options include applications for 3-D CAD import, contour analysis and fitting, shop floor user interface and customized report generation and data export. ■

### For more information:

Optical Gaging Products Inc.  
850 Hudson Ave.  
Rochester, NY 14621  
Phone: (800) 647-4243  
E-mail: [info@ogpnet.com](mailto:info@ogpnet.com)  
Internet: [www.ogpnet.com](http://www.ogpnet.com)