

BIG GEARS

Better Inspection

By Michael T. Hayes

Gleason's new analytical gear inspection system helps Schafer Gear Works meet its big gear production challenges, opening the door to more opportunities.



Even in this tough economic environment opportunity continues to knock on the doors of companies like Schafer Gear Works Rockford LLC. This division of the company, which is headquartered in South Bend, Indiana, has both the expertise and the willingness to take on the production challenges of large, custom, and very high precision spur and helical gears, both external and internal. As a result customers are some of the world's biggest names in agriculture, construction, and mining equipment—and among the most demanding, particularly where quality and delivery are concerned.

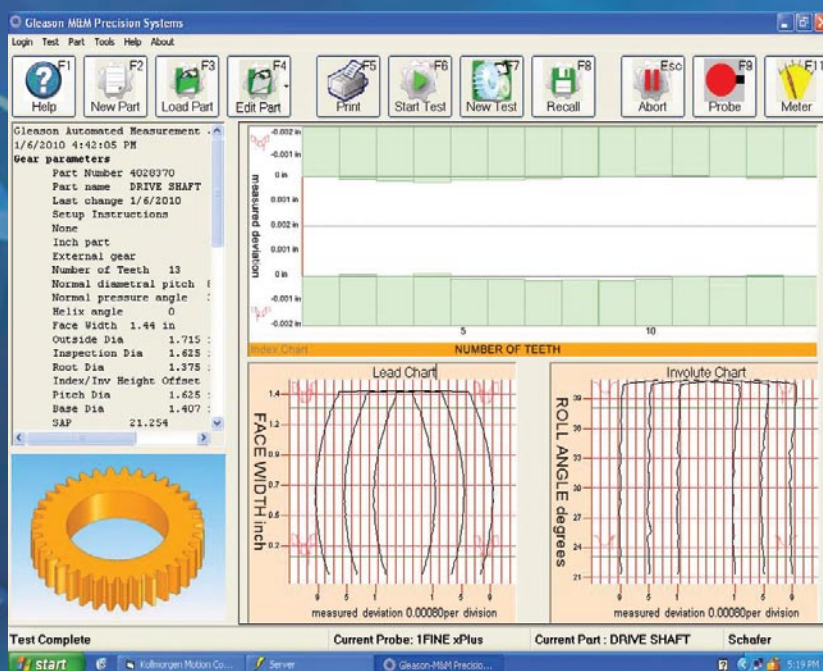


Fig. 1: A typical screen has “quick buttons” across the top, giving the operator immediate access to the most common system operations.

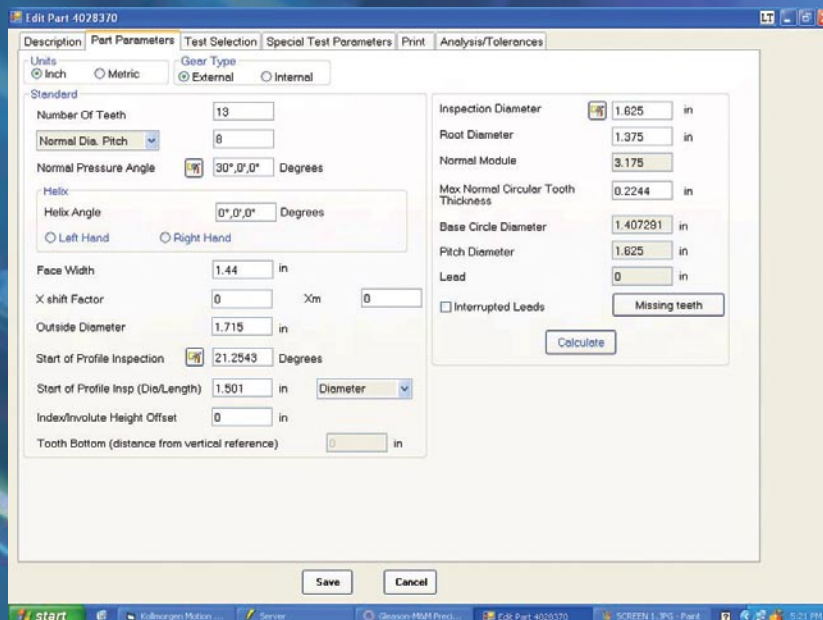


Fig. 2: Operators select from a list of typical machine configurations, enter a part number, and click a “create” button so that a series of tabs then appears across the top of the screen.

SOLVING THE INSPECTION CHALLENGE

With its larger gear business in full swing and the shop running two shifts a day, five days a week, Schafer Gear Works' most recent investment in expanding its capacities—including 800mm turning, 900mm hobbing, and 800mm profile grinding—is

paying off, with the pipeline full and flowing smoothly. But it has also put increasing pressure on an older gear inspection system that has struggled to keep up with demand, according to Carl Wedig, manufacturing engineer manager. "Meeting the rigorous inspection requirements of these larger gears, many with accuracy

requirements as high as AGMA 14, was becoming increasingly difficult, if not altogether impossible, with our circa 1995 gear inspection system," he says. "It also lacked the capacity to handle gears upwards of 1 meter in diameter, a size range that is becoming a larger percentage of our business day to day. Gears of that size would have to be outsourced for inspection."

Help came in the form of a new Gleason 1000GMM analytical gear inspection system, which almost literally hit the ground running just weeks after Wedig and his team began their search for a new metrology solution. "We were charting parts just four days after delivery," he says, "a testament not only to Gleason's excellent installation and training, but also to how

ECONOMICAL SOLUTIONS FOR PRECISION GEAR GRINDING

Riverside Spline & Gear is proud to feature our new Hofler Rapid 900 Gear Grinder, offering the latest in form grinding technology. With AGMA class 14+ capability, and on-board gear inspection, you are assured that your gear will meet all design specifications.

EXTERNAL GEARS

Gear Diameter	50-1000 mm
Center Distance Above Table	360-1360 mm
Axial Stroke (Max)	650 mm
Helix Angle	+ 45°, 90°
Module	1-25 mm (extendable to 34 mm)
Profile Height	41 mm (extendable to 60-80 mm)
Grinding Wheel Width	60 mm (extendable to 90 mm)
Grinding Wheel Diameter	400 mm
Table Load	3000 kg



WITH OVER 45 YEARS OF EXPERIENCE, IT'S EASY TO SEE WHY INDUSTRY LEADING MANUFACTURERS CHOOSE RIVERSIDE AS THEIR #1 GEAR GRIND SOURCE.

RIVERSIDE
SPLINE & GEAR INC.

Riverside Spline & Gear Inc.
P.O. Box 340 • Marine City, MI 48039
Phone: (810) 765-8302 • Fax: (810) 765-9595
valerief@splineandgear.com

splineandgear.com



Fig. 3: Schafer Gear Works' new 1000GMM analytical gear inspection system can accommodate gears as large as 1000mm in diameter and 1300mm in length.

easy it is to bring operators up to speed on the Gleason system.”

CUTTING INSPECTION TIME IN HALF

Wedig says the new Gleason 1000GMM has brought a level of performance and big gear capacity to Schafer that enables the company to now meet all its inspection requirements in-house for gears as large as 1000mm in diameter and 1300mm in length. The Gleason GMM, as compared to other inspection systems in its class, is also particularly robust, making it well suited for Schafer’s typically large and heavy workpieces. The GMM’s solid granite base, Meehanite® cast-iron slide assemblies, and heavy duty rotary table with 985mm diameter table top give it exceptional stiffness and rigidity, accommodating gears weighing as much as 2200kg. But what really stands out for both he and his operators is its ease of programming, which Wedig claims cuts the inspection time normally required for a new gear in half. “This is an enormous benefit to us since, in the interest of efficiency, we require that our machine operators also use the inspection system to perform all the measurements on a finished part,” he explains. “Where programming for first or ‘one off’ parts might have taken 20 or more minutes on the older inspection system, we now can do it in under 10 minutes on the Gleason GMM. It’s just so much more user-friendly and powerful.”

What Wedig is referring to is Gleason’s new GAMA™ (Gleason Automated Measurement and Analysis) operating software, a Windows-based application that puts a host of features right at the fingertips of the operator in a simple, highly intuitive graphical user interface (GUI). Here’s how it makes life easy for Schafer’s operators:

- A typical screen has “quick buttons” across the top, giving the operator immediate access to the most com-

CUSTOM CUT GEARS

**PRECISION AND COMMERCIAL
3D.P. - 120D.P. - 1" TO 40" DIA.**



**Complete Machining
ALL MATERIALS - ANY QUANTITY**

Inspection Facilities, Custom Packaging, Prompt Quotations

**NOW IN OPERATION
New Bourn & Koch CNC Gear Hobber**

Fax: (716) 731-2553

• STANDARD • METRIC • SPECIAL

- INTERNAL & EXTERNAL GEARING
- SHAPING UP TO 18" O.D.
- HOBGING UP TO 40" O.D.
- SPURS / HELICALS / SPLINES
- WORMS & WORM GEARS
- TIMING PULLEYS
- SPROCKETS TO 1-1/2" C.P
- CLUSTERS
- SECTORS
- RING GEARS
- C.N.C. TURNING
- THREAD MILLING
- C.N.C. MILLING
- BROACHING
- KEY SEATING
- THREAD GRINDING
- O.D. & I.D. GRINDING
- GEAR TOOTH FLAME HARDENING
- CLIMATE CONTROLLED INSPECTION FACILITIES



BUFFALO GEAR INC. 3635 LOCKPORT RD. • SANBORN, NY 14132-9704
(716) 731-2100 Email: buffalogear@aol.com • www.buffalogear.com



It's amazing how far you can go with the right travel gear.

You could travel the world and not find a gear manufacturer who combines a range of capabilities, quality and commitment to customer service the way Schafer Gear does. Schafer manufactures gears for many industrial applications including transportation and agricultural equipment. Our gear products range from spur and helical to bevel and worm. And every gear we make comes with one thing standard – prompt, courteous and exceptional service.



SCHAFER
GEAR WORKS, INC.

Find out more at schafergear.com
or call us at 574-234-4116.

mon system operations (see fig. 1). All important gear and specific test information is shown down the left side of the screen, with tabs and forms making it easy for the operator to quickly and accurately establish gear parameters. The majority of the screen is used to chart the inspection results of, say, lead and involute tests, which appear in real

time as the tests are performed. There is also a status bar at the bottom of the screen detailing the stage of the operation, who is operating the system, part number, and so on.

- Operators start the process by either recalling, loading, and activating existing part programs with the click of a mouse, or by creating a completely new part pro-

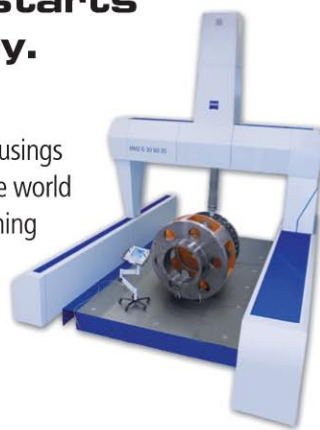
gram, which can be done in just minutes in a few easy steps. The operator simply selects from a list of typical machine configurations, enters a part number, and clicks a “create” button. A series of tabs then appears across the top of the screen (fig. 2). The operator clicks on these tabs one by one, filling out the necessary fields with pertinent gear data, special tests required for highly modified gear profiles and geometry, the type of analysis required—GAMA supports all global industrial standards such as DIN, AGMA, ISO, JIS, etc.—and so on. The operator also can select a variety of options for how a permanent record of



Effective wind energy starts with high part accuracy.

The reliability of wind turbines depends highly on the accuracy of critical parts such as pinion cages and housings of planetary gears. Leading manufacturers around the world rely on Carl Zeiss MMZ CMMs with VAST Active Scanning and CALYPSO software to verify critical components and ensure part quality.

www.zeiss.com/mmz



Carl Zeiss
IMT Corporation
(800) 327-9735
www.zeiss.com/imt



Styli & Accessories

- Same-day Shipping
- ZEISS Components
- Dedicated Service
- M2-M5 In-stock



We make it visible.




Fig. 4: Using Gleason’s GAMA software, Schafer operators can check important characteristics such as lead, index, and profile in half the time on this large 109-tooth, internal spur gear. Note the use of a Renishaw SP80H 3-D scanning probe, with various stylus sizes and configurations, interchangeable from an automatic probe changer.

the inspection is stored, whether in PDF format, SVG (Scalable Vector Graphics), or even HTML for easy e-mailing.

In addition, GAMA is a true Windows VB.NET application, making it fully compatible with the latest LAN and WAN networks, so that users can easily interface inspection results with their gear design and production resources for corrective actions downstream.

NEW PROBE MAKES BETTER "SENSE"

The Gleason 1000GMM is just one of a new-generation GMM family ranging in size from 350mm capacity all the way up to a 3000mm capacity. Among the most important characteristics of the new design is their use of a series of Renishaw SP80H 3-D scanning probes, with various stylus sizes and configurations, including 500mm long styli to reach deep into internal gears and all interchangeable from an automatic probe changer. Wedig says that the Renishaw probe provides a high speed, high accuracy measurement capability vastly superior to the 2D probe system used by the older system. "The old probe system can gather information only at discrete points up and down or side to side on the X and Y axes, while the new GMM has a true scanning probe that acquires much more data faster by traveling along the surface of the part in all three dimensions—up, down, side to side, and in and out," he says. "It gives us a level of inspection that you would normally associate with a CMM in a quality lab."

Wedig says that he couldn't be happier with the results to date. In fact, he's already looking downstream, with the company making plans to market yet another Schafer Gear Works capability: "inspection only" work. "Fast, accurate, and economical inspection of larger parts is something we can now offer customers who don't have that capability in-house," he says. "We expect the Gleason GMM will be very busy in the coming months." 

ABOUT THE AUTHOR:

Michael T. Hayes represents Gleason as president of Hayes Marketing Services, Inc. To learn more about Gleason go to [www.gleason.com]. For more information on Schafer Gear Works visit [www.schafergear.com].

Your Ground Gear Outlet.



Plug into Niagara Gear for your next ground gear requirement. Ground gears manufactured to the highest quality standards at an affordable price.

Sizes from 1/2" to 12" diameter • Customer supplied blanks accepted
Stocking programs available • Dedicated, personal service

1.800.447.2392
niagaragear.com

