

# INSPECTING GEARS FOR WIND

The new 3000GM analytical gear inspection system from Gleason helps its global wind customers achieve faster, more-accurate gear production.

By Mike Hayes



Mike Hayes represents Gleason. More information is available at [www.gleason.com](http://www.gleason.com). Also visit [www.breviniwind.com](http://www.breviniwind.com) and [www.guibe.com](http://www.guibe.com).

**WITH SOME 60,000 OF ITS WIND TURBINE** pitch and yaw systems installed worldwide, the Brevini Group is no stranger to wind power. Yet today the stakes, and opportunities, have never been greater. With the establishment of its Brevini Wind division—and a \$90-million, 100,000 square-foot, ultramodern factory in Yorktown, Indiana—Brevini has entered the main wind turbine gearbox business in a big way. It's expected that as many as 40,000 new wind turbines could be deployed in North America by 2015, and many will be equipped with a new generation of lighter, more-efficient, and highly reliable Brevini main gearboxes ranging in size from 0.9 to 3.5MW capacity.

So when Brevini Wind USA Director of Facility Operations Dale Harder learned that a Gleason 3000GMM analytical gear inspection system was going into the new factory's QC room, he couldn't have been more pleased.

"Many of us have had experience in the past with M&M Precision, which ultimately became Gleason Metrology Systems, so the brand is highly respected," he says. "We have established very ambitious quality and throughput objectives for the large internal ring gears and sun and planetary gears we're producing here for these new gearboxes, so you can imagine the very important role gear inspection is playing."



**Fig. 1: Brevini Wind USA gears up for fast-growing North American wind turbine demand with a new ultra-modern \$90 million, 100,000 sq. ft. factory in Yorktown, IN USA.**



**Fig. 2: New Gleason P 2400 large hobbing (top) and profile grinding machines (bottom) perform complete cutting and hard finishing operations on a new generation of very high quality internal ring gears, sun and planetary gears for Brevini's main drive gear boxes.**

### QUALITY IS CRITICAL

A critical driver of gear quality standards at Brevini is of course the need for exceptional gearbox reliability. Wind turbine installations are often in inaccessible areas and operating in adverse conditions that make repair and maintenance both difficult and expensive. Increasingly important is the need for quiet-running wind turbines, particularly for wind towers in close proximity to populated areas. Despite their size (Brevini internal ring gears are as large as 2.2 meters in diameter with 400 mm face widths and weigh upwards of 3,000+ kg), part prints call for Brevini gears to be made to ISO Grade 6 or better, all with surface finishes to Rz

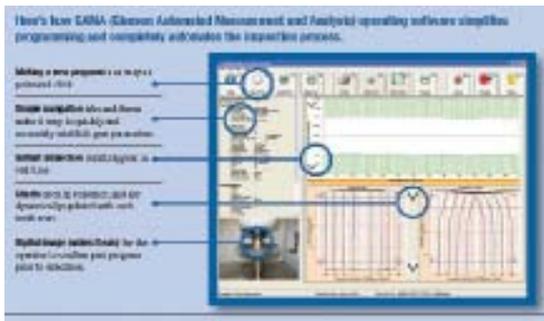
3  $\mu$ m. Mr. Harder says his two new Gleason P 1600 and P 2400 Hobbers and two P 1600 G and P 2400 G Profile Grinders are easily achieving these levels, and better. The challenge, he says, is ensuring that inspection keeps up with production. "We're keen on demonstrating, both internally and to our customers, that our new processes can achieve the highest quality levels, which



**Fig. 3: New Gleason 3000GMM analytical gear inspection system speeds and simplifies the critical quality verification process for any gear, enabling Brevini to keep pace with its new gear production machines.**



**Fig. 4: “Stirring in” setup time is greatly reduced with Gleason’s Journal Reference software, which takes minutes, even hours out of the time usually required to ‘true up’ large gears manually.**



**Fig. 5: Here’s how GAMA (Gleason Automated Measurement and Analysis, operating software simplifies programming and automates the inspection process.**

puts the burden on our gear inspection system,” says Mr. Harder. “That’s what we really like about the new 3000GMM. If you can read a part print, you’re practically ready to set up the part and run the machine. It’s that fast and easy.”

## A STIRRING EXPERIENCE

For example, Harder says that the initial “stirring in” of the part during setup is traditionally one of the most time-consuming stages of the large gear inspection process. In the case of a two or three ton internal ring gear this can consume a considerable amount of time, with several people delicately lower the part onto the worktable and work to manually “true it up”—a painstaking process of moving part datums incrementally until they’re zeroed in precisely to a pre-established starting point. But the 3000GMM eliminates much of this setup time with its “journal reference” software. This allows the operator to simply position the part anywhere to within 10 mm of the desired location—something most operators can “eyeball”—and then the journal reference software takes it from there. It automatically probes to determine the actual location of a datum such as the OD, takes a radial and axial measurement, and corrects for the new zero location so that no additional stirring in time is required. Harder says it’s just one of the many features available to his operators through the system’s extremely friendly user interface called GAMA, a software suite designed to greatly simplify the inspection process. It’s particularly easy to learn and use, with a highly intuitive Windows-based graphical user interface and a host of features including help menus, language translation, multiple security levels, and even online support. Several other important features stand out as well, including:

- A solid granite base, providing considerably more stability for, say, a 3,000+ kg gear than competitive models with cast-iron bases. Its Meehanite® cast iron slide assemblies provide vastly better damping characteristics as well.
- The use of the Renishaw® SP80H probe, which is an advanced 3D scanning probe that’s light years ahead of older model scanning probes. It acquires data faster and more accurately on even the most complex gear tooth profiles and features industry leading probe axis travels—X axis is plus or minus 1.5 mm; Y and Z axes are plus or minus 2.5 mm—with each axis driven on 20 nanometer resolution glass scales for exceptional measuring accuracies.

Finally, Gleason’s localized service and support network has been instrumental in the successful startup of the new technology. Gleason Metrology Systems, based in Dayton, Ohio, is in relatively close proximity to the Brevini plant and has provided onsite technical expertise and application support throughout the installation and launch period.

“The 3000GMM is the perfect complement to the highly productive Gleason machines,” Harder explains. “Those of us employed here with Brevini Wind clearly realize what a unique opportunity we have been presented with. We are very fortunate to work for a company that is willing to make the significant investments



**Fig. 6: Talleres Guibe's New Gleason 2000GMS performs the complete inspection of increasingly complex gear geometries up to 25% faster, while meeting VDI/VDE Class 1 specifications.**

necessary to provide us with such tremendous gear manufacturing and inspection capabilities.

"Additionally, we are also very fortunate that Gleason has proven itself to be a very dependable partner in our startup efforts by providing us with the necessary

training and applications assistance that allows us to utilize these latest technologies in the most proficient ways," he says. "The most demanding of our gear manufacturing applications have been easily accommodated although the level of experience

amongst our workforce with large gear manufacturing in the beginning was quite minimal.

"Our manufacturing team is extremely pleased with the simplicity of setting up and operating all of the Gleason equipment," Harder says. "I don't know how Gleason could have made this any better for our particular situation."

## BARS & RESTAURANTS

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## GAINS IN SPAIN

It might surprise you to learn that Spain is the world's fourth biggest producer of wind energy, right after the United States, Germany, and China, with an installed capacity of 19,959MW at the end of 2010. And the number of wind turbine installations in Spain is expected to rise. For companies like special gear and gear reducer manufacturer Talleres Guibe, situated in the heart of northern Spain's industrial region of Irura, Guipuzcoa, that's good news.

But according to company officials, the enormous productivity and quality gains made possible with new Gleason grinder installations were being limited by the deficiencies found in the company's large gear inspection system. This older system was suddenly rendered almost completely obsolete, since its measurement capabilities were far below the exceptional accuracy levels achievable on the new Gleason machines. Furthermore,

spare parts and service for the old system were almost nonexistent. As a result, large gear inspection would now have to be performed elsewhere, adding to cost and delivery time; neither of which was acceptable to Talleres Guibe or its customers.

No wonder Talleres Guibe is so excited about their new Gleason 2000GMS analytical gear inspection system. With a 2-meter workpiece diameter capacity, the new 2000GMS can handle almost any gear produced at Talleres Guibe. Better yet, it performs the complete inspection of today's increasingly complex gear geometries up to 25 percent faster, while meeting VDI/VDE Class 1 specifications.

### POWERED BY GAMA

Equipped with a new and improved GAMA 2.0 applications suite of software, the GMS series is unquestionably the easiest and most intuitive system of its kind to operate, empowering even less experienced operators with the ability to inspect any gear faster and more efficiently. GAMA 2.0 puts a host of powerful new features right at the fingertips of the operator, creating a simple and intuitive human/machine interface to improve their performance.

For example, the process of creating a new program is as easy as point and click, and it can be done in just minutes in a few easy steps, and regardless of the operator's level of experience or the gear or gear cutting tool type. This even includes an "unknown" gear, where parameters aren't defined and even a drawing might not exist. The operator simply selects from a list of typical machine configurations, enters a part number, and clicks the "create" button. Once the necessary fields are filled out with pertinent gear data, special tests required for highly modified gear profiles and geometry, and the type of analysis required, GAMA 2.0 does the rest. It draws from a suite of applications software supporting the complete topographical inspection and prismatic measurement of any rotationally symmetrical workpiece, including cylindrical, bevel, conical and cycloid gears, shaper and shaving cutters, hobs, bevel blades, rotors, etc., and the programming process is complete. In addition, the human/machine interface has been further enhanced on the new GMS series with a newly-designed operator work station, which puts the operator in a better position to quickly, easily, and more comfortably perform tasks.

Also available is a unique handheld remote pendant workstation that allows the operator to be productive anywhere and is also ideal for large gears and particularly complex part setups. This remote pendant control comes complete with video telephony support, Internet connection, touchscreen input, and a host of other important features. ✨

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