ANNA CLAIRE HOWARD
ASSOCIATE EDITOR
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QUALITY CONTROL AND INSPECTION

When it comes to manufacturing high-quality gears, quality control and inspection play crucial roles in meeting industry standards and a customer's specific needs.

GEAR QUALITY CONTROL AND INSPECTION ARE IMPORTANT steps in the process of checking the overall quality of manufactured gears and parts. It also provides insight into the levels of efficiency and control as they pertain to the manufacturing process, ensuring that the parts are made to meet high-quality standards as well as the customer's specific needs. It begins on the shop floor with everyday tasks and extends its reach to the manufacturing lab for complex analytical evaluations of the gear. All of these steps are necessary to consistently maintain control of the manufacturing process and keep the following factors in check: gear size, gear quality, fixture mounting on the machine, machine setup, part blank quality, cutting tool accuracy, mounting of the cutting tool, cutting tool sharpening, and heat treating.

To address the industry's measurement and inspection needs, companies have created technology to reduce the cost of specialized and dedicated devices, such as Hexagon Manufacturing Intelligence's PC-DMIS Gear metrology software.

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According to Christopher Fleshood, applications engineer supervisor for Hexagon Manufacturing Intelligence, the inspection of gears can be a time-consuming project, and factors such as table setup, correct tools, and proper training can cause the process to be inaccurate and slow. PC-DMIS Gear 2.5 helps eliminate all these problems by having a simple fill-in-the-blank interface that allows anyone with basic CMM knowledge to generate an inspection routine for a gear.

"This reduces the time to check a gear from hours to minutes," Fleshood said. "PC-DMIS Gear can check complex geometry on a spiral bevel gear with ease. Now, instead of buying an expensive dedicated gear-checking machine, you are able to use the tools you already have to generate concise, accurate reports with a few clicks of the mouse. Also, PC-DMIS Gear does not require an expensive rotary table for measuring spur and bevel gears and supports inspection of small spur gears with optical measurement devices."

Smaller companies such as Washington state's Geartrology are doing their part to meet gear manufacturers' needs in these areas, too.

The company was founded in January 2014 by Gerry Rouillard who first learned the art of gear grinding at the age of 14 on a Reishauer gear grinder at his father's gear manufacturing company. Four years later, he worked his way up to the quality control department and then onto process engineering and sales. Rouillard later founded his own aerospace gear manufacturing company, International Gear Technologies (IGT), and following in his father's footsteps, made a name for himself in the industry.

"I owe my success to my father who gifted me the knowledge and ingenuity that has inspired me to pursue advances in manufacturing technology and to create based on an actual need or shortcoming in the manufacturing process to improve speed and accuracy," Rouillard said.

Geartrology offers complete rebuilding and retrofitting of instruments including Fellows 12M involute testers, Fellows 12H lead testers, Fellows No. 8 Microdex, and all varieties of double flank gear testers. Additionally, the company sells master gears and spline gages and can present, propose, and create software for gear design and manufacturing engineering, as well as offer calibration services for all the above-mentioned instruments.

Some of the challenges the industry faces with quality control and inspection include a push to move toward more automated solutions for checking gears and an increasing demand for more informative reports that are easier to interpret with more graphical representations and a heavier use of CAD for mapping data points.

"Our customers express a strong desire to recognize salvageable gear parts to help manage scrap through re-workable production processes, which is especially important on low-volume projects," Fleshood said. "And the need for newer, faster, more accurate data collection technologies, such as laser and vision, is always a top priority. For example, while vision systems have limited support now for gear inspection, the need for non-contact data acquisition will continue to drive software development and hardware support."

Additionally, the challenges typically boil down to cost. More and more gear manufacturers require these automated solutions, yet some on the market can be costly. According to Fleshood, PC-DMIS Gear is an ideal entry-level package that can effectively check a variety of gear types without the enormous price tag for a dedicated system.

Gear manufacturers must uphold a high standard of quality and inspection to address the growing needs of the industry, and meeting those needs will lead to an increased level of customer satisfaction as their unique requirements are met, keeping the industry moving in the right direction.

ABOUT THE AUTHOR: Contact Anna Claire Howard, the associate editor of *Gear Solutions,* at 800-366-2185 ext. 204.