

Quality Assurance Gains on the Manufacturing Floor

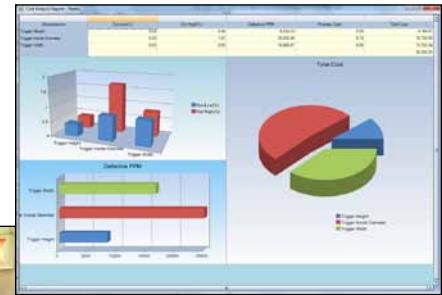
ZONTEC'S SPC SOFTWARE INCREASES PRODUCTIVITY FOR GEAR MANUFACTURER

In today's increasingly competitive landscape, companies that do not pay attention to their quality data do so at their own peril, according to Danei Edelen, marketing manager at Zontec Inc. "Capturing and utilizing quality data can reduce scrap, reduce work, increase user productivity, assist with tool lifecycle management and help generate new business."

Zontec Inc., located in Cincinnati, Ohio, is an international developer of Statistical Process Control (SPC) software solutions. The company recently updated its *Synergy 2000* software to maximize the users' access to information. "These new capabilities are focused on running a business more efficiently and effectively," says Warren Ha, Zontec president. "We are leading the industry by providing superior functionality so users have multiple ways to access the wealth of information available at the click of mouse."

This includes increasing productivity, reducing product defects, boosting production rates and generating new business. "*Synergy 2000* enables you to fine-tune your business by adding value at every step in the process. It's logically designed with the user in mind. Therefore, you are able to rapidly implement a quality solution, saving you time and money. Your users are easily able to navigate the system and utilize numerous ways to input data efficiently. Data is passed through SPC calculations, so that real-time charting and reporting is constantly available for decision-making," Edelen says.

Synergy 2000 is designed in three levels: engineer, manager and operator. This means that as operators are enter-



ing data, managers and engineers can be monitoring and reviewing this data in real-time. If a process goes out-of-specification, the appropriate people can view this information immediately on their screens and automatic e-mail notifications are sent out as well. With the tools available, a customer can integrate *Synergy 2000* with any system in your enterprise. With company-wide monitoring in place, key individuals, regardless of location, can supervise production to meet company objectives. Also, if your industry requires secure controls over your quality data, *Synergy 2000* has such security measures available.

United Gear Gains Business with *Synergy 2000*. When Douglas Winfrey, director of quality, started at United Gear and Assembly, the *Synergy* software had already been purchased, but was not fully utilized. "I inherited *Synergy*, and I enforced it," Winfrey says. He immediately saw the benefits of utilizing the quality assurance soft-

ware. "The real issue was that we were collecting all of this data, but not looking at the data. *Synergy* gave us a way to easily pull up the data and act on what we are seeing; it also gave us the ability to access the data anywhere in the world, including our customer sites."

United Gear has been in business for 50 years. During that time, they have evolved from a family-owned business into a multi-million dollar company and a core supplier of precision gears, shafts and related assemblies to companies in the automotive, agriculture, forestry, construction, mining, marine and rail industries. "We are now expanding our presence along with our parent company, United Stars, based out of Beloit, Wisconsin, into the Pacific Rim and recently opened an office in China,"

continued

Winfrey says.

Once United Gear began using *Synergy*, they found that the software made it easy for individuals without a statistics background to create charts on their machines, setup to receive notifications, reduce the number of errors and assist the inexperienced operator in understanding the process clearly. "It's a very good teaching tool

to be able to explain with visuals to describe where the process is running at and where we want to be," Winfrey says. "Within seconds, we can call up a part number on a machine and know what's going on with that machine or the current production run."

"Since implementing *Synergy*, the reduction in paperwork is huge. Before every entry took us about 3½ minutes

per sample size and now it takes us less than 30 seconds. There are 240 critical characteristics we could be measuring at any given time. Using *Synergy* has saved us about 12 man-hours per day," Winfrey adds.

One of the benefits United Gear has experienced is that they came to a better understanding of their machines and their capabilities. "Through data gathering, charting and analysis, we can analyze data on every product produced in a particular machine. We can get to the root cause, whether it is the people, the process or the machine," Winfrey says. "We run product on several machines; with *Synergy* we can compare a machine's capability, which gives us the least variation and best product. We can see inconsistencies and make systematic changes across the entire process; we can see data points for all products, regardless of machine and resolve inconsistencies for all processes."

Synergy also gives United Gear the ability to effectively manage the life-cycle of its tools. Through the use of Run Charts and other *Synergy* tools they can determine tool life and predict how many parts can run before needing to make adjustments or change out the tool. "We can budget our tool life management more accurately and effectively based on this data," says Winfrey. "*Synergy* can show us if a particular machine can't produce a particular product in a specific tolerance range. This data can then be used to justify procurement of new equipment."

Additionally, *Synergy* has helped United Gear with their Six Sigma and continuous improvement initiatives. "In the aspects of our business where we are using *Synergy*, we have seen our PPM (parts per million) decrease," Winfrey says. "On average, we have reduced our non-conformities by 20 percent. We also have a very low scrap rate in those applications."

Winfrey says they use *Synergy* for new business development. "I have been in meetings at the customer's location where we are discussing a new product. *Synergy* gives us the ability

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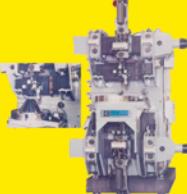
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to log into our server, show them the exact machine that would be used to produce the new product, what tolerance the machine is currently running and the capability history of that machine," Winfrey said. "This type of information shows the customer what they need to see before moving forward. *Synergy* provides us that edge to win the business."

The Future of SPC. From a quality management perspective, Zontec has developed a solution that fully supports mobile technology and cloud computing architecture. Zontec's *Synergy 3000* SPC software was designed from the outset so that users can gather, organize, analyze and report on the huge data sets dictated by real-time, statistical process control over the Internet from highly dispersed global locations. "We see the use of cloud computing and mobile technology particularly applicable as it relates to managing your suppliers," Edelen says. "With *Synergy 3000*, suppliers have access to customer standard operating procedures, engineering drawings and contract specifications during their production runs. Suppliers enjoy data collection and gage interfacing through the browser in addition to charting, process monitoring, real-time feedback and reporting."

For more information:

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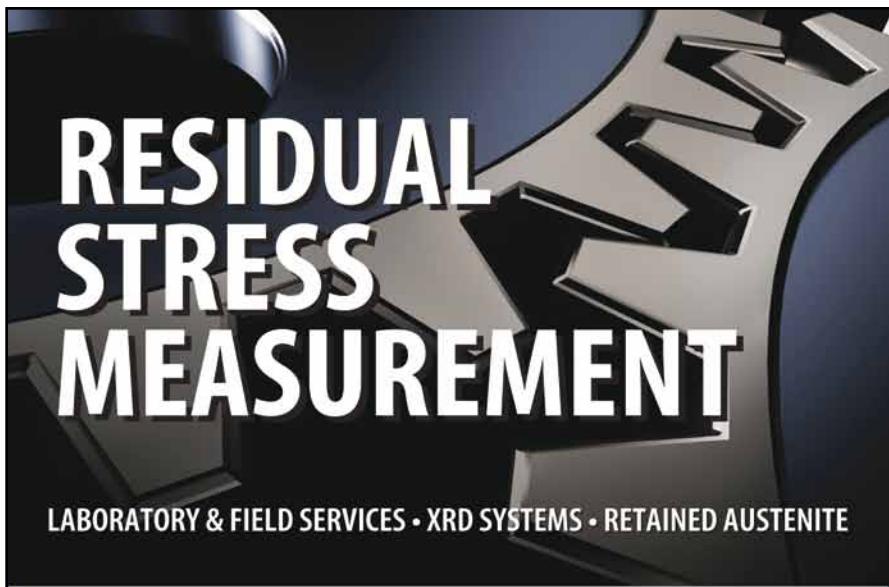
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GWJ UPDATES GEARENGINEER SOFTWARE

GWJ Technology GmbH, headquartered in Braunschweig, Germany,

recently introduced a new version of its *GearEngineer* software. The version comes with a variety of new features and functions including profile and flank modifications as well as the tooth contact analysis (TCA). Additionally, the user can calculate the load capacity of bevel gears according to ISO 10300. The *GearEngineer* is a software

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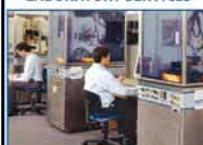
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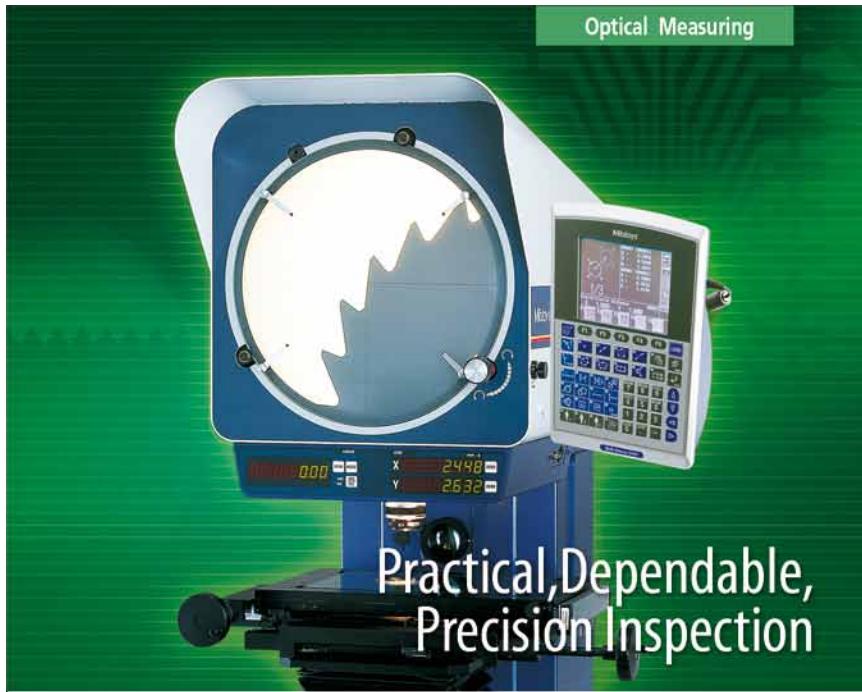
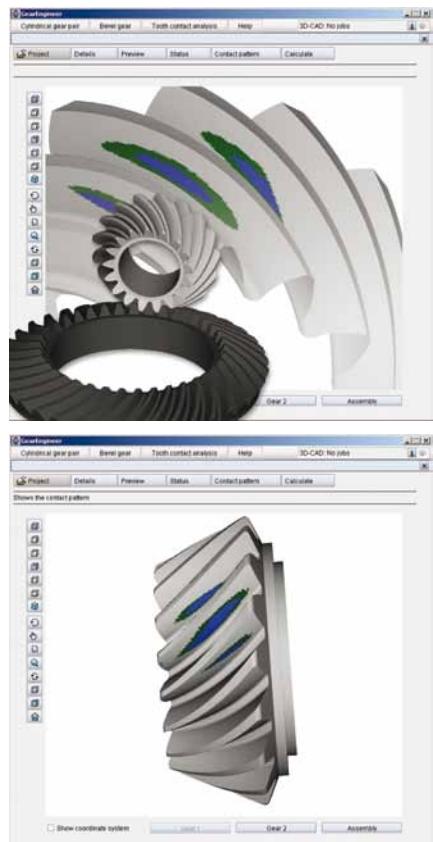
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Proto Manufacturing KK
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PRODUCT NEWS

application for the calculation of the accurate 3-D gear tooth form of cylindrical and bevel gears based on the mathematical simulation of the manufacturing process.

The accurate gear tooth form is the basis for manufacturing gears, in conjunction with multi-axis machining centers or non-cutting manufacturing processes. The standard exchange for-

mats STEP and IGES serve as a neutral file format to transfer the accurate tooth geometry. The geometry data can be used for further developmental purposes, for example for a universal manufacturing or used as 3-D nominal data for additional measurements. Profile and flank modifications were now added to the *GearEngineer* calculation module for cylindrical gears. A drop-



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down menu allows the user to select linear and circular tip or root relief as well as symmetric profile crowning.

In addition to the profile modifications, the gear flank modifications lead crowning and profile crowning are available. The user can decide between symmetric and asymmetric lead crowning. End relief can be applied to both tooth ends or to the left or right end of the tooth.

Additionally, the *GearEngineer* now includes TCA to calculate and visualize the contact pattern of gears. After completion of the gear calculation, the tooth contact analysis allows the calculation of the size and position of the contact pattern without load. The contact pattern is visually displayed in the 3-D model. The analysis is possible for external and internal spur and helical gears and helical, straight and Zyklo-Palloid spiral bevel gears. The engineer can optimize spur and bevel gears before the manufacturing begins. Deviations and displacements from the ideal position are taken into account. The new *GearEngineer* version provides the possibility to determine the

load capacity of straight, helical and spiral bevel gears according to ISO 10300.

For more information:

GWJ Technology GmbH
Rebenring 13
38106 Braunschweig
Germany
Phone: +(49) 531 129 399
www.gwj.de

Birchwood Casey

IMPROVES BLACK OXIDE COATING

Metal surface cleaners and conditioners from Birchwood Casey improve black oxide coating and other metal finishing processes. Available in a range of biodegradable liquid cleaners and mild acid conditioners, they provide the just-right surface preparation to achieve top quality finishes. For example, most machined and fabricated metal components carry cutting oils or coolants that coat the metal surface and collect in threaded holes and recessed areas. Heat treat scale and light rust are also commonly seen. These surface soils must be completely removed prior to blackening or coating in order to achieve high quality results. These conditions are easily handled by choosing the right surface preparation from the following products:

Birchwood Casey's Presto Kleen powdered cleaner and Safe Scrub ST biodegradable liquid cleaner are designed for medium- to heavy-duty soak tank cleaning of iron and steel parts. These products mix easily with water and operate at temperatures of 120–180 degrees F to quickly lift oily residues from the metal surface and hold them in suspension. Their unique blend of detergents make them free-rinsing in cold water, giving them the ability to produce waterbreak-free surfaces that are receptive to subsequent coating operations. Also available is Safe Scrub M for effective cleaning of

light metals, such as aluminum, brass and zinc without discoloring the metal.

Birchwood Casey's Oxyprime primer/surface prep serves as an activator and primer to make the metal surface more receptive to the subsequent coloring or blackening operation. Tool steels and heat treated parts must be activated and/or de-scaled by means of a surface



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conditioner prior to subsequent finishing operations. The Oxyprime solution provides that function for black oxide, cold blackeners and antique finishing. It provides a mild acid surface conditioning to ensure uniform adhesion across the part, without the risk of hydrogen embrittlement. In some cases, the Oxyprime descaling operation can also be used in conjunction

with ultrasonic rinsing to remove all traces of surface particulates, thereby producing a white-glove clean black oxide finish.

Oxyprime is available in powdered and liquid concentrate for a variety of finishing jobs, including activation, oxide removal or the formation of a base coat for subsequent Tru Tempo low temperature black oxide finishing.

All metal cleaners and surface conditioners from Birchwood Casey are available in container sizes for small and large scale finishing operations and for use in various types of process lines, such as black oxide, phosphatizing and other metal coating systems.

Complete technical information for each Birchwood Casey product is available online. A technical service expert is also available by phone to determine which metal cleaner and surface conditioner is best for a specific application.

For more information:

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Phone: (800) 328-6156
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Mitutoyo

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16 GEAR TECHNOLOGY

March/April 2012

www.geartechnology.com

Absolute rotary sensor (patent pending) manufactured utilizing Mitutoyo's own high precision screw machining technology. This sensor reduces instrument error to $\pm 0.5 \mu\text{m}$ to deliver high accuracy with no trade-off in operability. The Absolute system eliminates the need to reset the origin each time power is turned on thus enabling measurement immediately upon start-up. In addition, the measurement origin can be preset to any value within the display range to reduce set-up time and improve repeatability. The display can be zeroed at any position, making comparison measurement easier. Display resolution can be switched to $0.5 \mu\text{m}$ if $0.1 \mu\text{m}$ measurement is not required.

The Digimatic Micrometer features an extremely rigid frame for stable measurement while a constant-force barrel/spindle mechanism eliminates the possibility of overspeed errors. Transference of body heat to the instrument is reduced by use of a heat shield (removable), minimizing errors attributable to thermal expansion while handheld measurements are performed.

Additionally, it supports output to measurement data applications such as *MeasurLink*, Mitutoyo's proprietary statistical-processing and process-control program which performs statistical analysis and provides real-time display of measurement results for SPC applications. The program can also be linked to a higher-level network environment for

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Micro Precision Gear

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Holroyd Precision, a division of the Precision Technologies Group, has recently completed a customer satisfaction survey with major customer Micro Precision Gear Technology Limited of Hemel Hempstead, Hertfordshire. Having supplied Micro Precision Gear Technology Limited with a GTG2 model gear and thread grinder



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some eight years ago, the Milnrow, Lancashire operation canvassed Micro Precision Gear Technology's Phil McIntyre, section leader, gear grinding, for feedback on living with the machine on a daily basis.

The GTG2 machine in question is used by Micro Precision Gear Technology Limited in the manufacture of worms, helical and spur gears while Holroyd is also currently working with the company to develop bespoke worm software for the machine. The machine is used to grind worms from 15 mm to 250 mm in diameter with a smallest gear of 0.6 module right up to the largest of 4 module. According to McIntyre, "The machine has been extremely reliable. It's incredibly accurate and will run all day for six days a week. Its flexibility is another major plus. And, just as importantly, it's also remarkably easy to use and program with a new operator usually able to get the hang of things within just two weeks."

The Holroyd GTG2 is an extremely versatile, multi-purpose grinding system for the batch or volume production of precision spur and helical gears, worms, screws and rotors. Sophisticated yet simple to operate, the machine combines rigidity with high power for either CBN or conventional deep grinding operations with class-leading levels of accuracy and finish. Fast setups optimize productivity while the advanced and highly integrated user interface facilitates the production of a finished component from the initial design drawing. In addition to the production of all types of spur, helical and worm gears, the machine can also be configured for grinding ball-screws,

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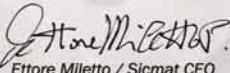
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way throat, air jacket on inner oven for cooling, $\frac{1}{2}$ " thick silicone rubber atmosphere seal, blower shaft seal, positive latching door hardware, adjustable offset door hinges, outlet with pressure relief, interior seams welded gas-tight and all wall penetrations fitted with compression fittings. A 325 CFM blower pulls air through the air jacket on the inner oven for cooling. Controls on No. 855 include a special heating/cooling temperature controller to control heating elements for heating and modulating damper on cooling blower for cooling. The oven also has an SCR power controller and circular chart recorder onboard.

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During the upcoming AISTech show, May 7-10 in Atlanta, MAE Maschinen-und Apparatebau Götzen GmbH (Erkrath, Germany) will display its various press technologies for the iron and steel industry and related business sectors in Booth 1536. MAE recently announced its formation of a partnership with American Wera here for representation throughout North America. In the last decades, MAE has developed increasingly from a manufacturer of standard hydraulic presses to specialists for select niche markets. The company has established a market position with products in the fields of straight-

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ening machines, hydraulic presses and assembly machines, serving metals producers, rail, heavy equipment, energy and marine markets.

Straightening. MAE has the broadest portfolio of manual and automatically controlled straightening machines for handling round, profiled and complexly shaped workpieces available worldwide. Press forces from 15 to 25,000



kN make it possible to straighten workpieces with lengths from 40 mm to 30 m and weights from 5 g to 20 tons. Straightening accuracy to 0.01 mm is possible. In addition to the conventional bending-straightening method, MAE also offers peening-straightening for through-hardened workpieces and torsion-straightening for twisted section bars. The MAE straightening controller for the manual straightening presses in the S-RH and P-H RH Series guarantees precise and repeatable metalworking and does not necessitate specially trained operators. Measurement and straightening in one setting ensures optimal cycle times. The M-AH, ASV and ASRU Series enable automatic straightening of small, large and complex shaped workpieces. The software of the RICOS straightening controller is the result of decades of experience with various applications. Innovative

MAE design ideas are further making the straightening process increasingly more powerful and faster. Various interlinking concepts allow continuous operation with low manpower requirements.

Hydraulic presses. The broad range of hydraulic standard presses in the S and DS Series with C- and O-frames as well as the four-column presses in

the VS Series are based on a modular system. By recombining and adapting the individual modules, MAE finds an inexpensive, individually optimized solution with press forces up to 25,000 kN for customer needs. Hydraulic presses are exposed to considerable stresses in daily use. With 60 years of experience, MAE has a reputation for sturdy dimensioning on all components.

Assembly. Whether you want to assemble gear parts, rotor shafts or wheelsets, MAE offers many suitable solutions. The MAE machine Series S and M-S with hydraulic or mechanical servo drive are robust machines tailored to customer application. The OPUS controller with flexible software that can be modified to fulfill customer-specific requirements guarantees control and documentation of the entire assembly process. Our horizontally

acting wheel set presses in the RADS Series with forces up to 8,000 kN are the industry choice for mounting and dismounting wheel sets from railway vehicles. They stand out primarily for their innovative underlying concept, rational interlinking systems and extensive control functions.

Service. An innovative and high-quality machine is only the basis for high customer satisfaction. Equally important for continuous duty with high availability are quick-response service from experienced technicians and spare parts available immediately from stock. North American installation and service is provided by American Wera service technicians in Ann Arbor, Michigan and Queretaro, Mexico. Additionally, optimally staffed service centers are located in Erkrath, Germany and Beijing, China. Telephone support and remote diagnostics onboard the machines usually allow MAE to correct minor problems without complication or onsite service.

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Helido S890 FSN is a new family of right-hand indexable face mills with an 88 degree cutting edge angle with eight helical cutting edges, which can be used for up to 9 mm depth of cut. The new family was designed for rough to semi-finish, high-efficiency face milling, primarily on cast iron and steel components. The Helido S890 FSN face mills are available in a diameter range of 50 to 160 mm in coarse and fine pitch configurations. Every cutter body features coolant holes directed to

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the insert cutting edges, for the most efficient cooling effect.

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Ticona

**SUPPORTS HI-LEX
POWER LIFT GATE
TRANSMISSION**

An innovative transmission from Hi-Lex America Inc. continues to reliably and quietly open and close auto-

motive lift gates thanks to design and development assistance from Ticona Engineering Polymers, which helped the automotive tier supplier create new injection molded high-precision plastic shafts and gears.

"For several years, Hi-Lex customers have used a two-stage reduction transmission that relies on precision steel ball bearings mounted on plastic shafts and accompanying 2.5-inch diameter plastic gears to achieve the desired reduction between the electric motor and a flexible torsional cable assembly to lift and close big, heavy automotive rear lift gates," said Fred Eberle, technical engineer at the Hi-Lex Automotive Center in Rochester Hills, Michigan. Hi-Lex is a supplier of automotive electromechanical, power closure devices and control cables. "A first generation model used a powder metal shaft system, which was subsequently replaced with a plastic shaft system that provides an



immense improvement in NVH (noise, vibration and harshness) and makes our customers very happy."

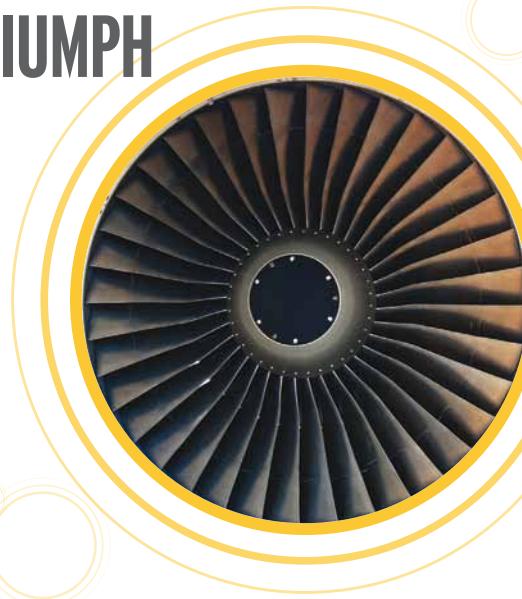
With input from Ticona, the American Gear Manufacturers Association, Ohio State University Gear and Power Transmission Research Laboratory and gear software developer Universal Technical Systems, Hi-Lex optimized and refined

the second generation lift gate transmission via extensive research and development and testing. It relies on first- and second-stage plastic splined shafts attached to plastic gear wheels in a gearbox with a rated torque output capacity of about 12 Newton meters (106 inch pounds).

"From the outset we knew we want-

continued

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ed to design the transmission with plastic gears to reduce cost, weight and especially, noise," Eberle said. "We knew Ticona had the gearing and material expertise to help Hi-Lex achieve its business goals."

To avoid any timely and costly setbacks during development of the two-stage transmission, Hi-Lex established a plastic gear team early on that includ-

ed Eberle and David Sheridan, senior design engineer at Ticona. The team defined, analyzed and highly optimized the design to take advantage of many considerations unique to plastic gearing. These considerations can be significantly more complex than those for standard metal gears and they pose challenging implications for gear and drive designers.

"Although Eberle has extensive experience and skill in regards to gearing and drive development, the Ticona/Hi-Lex gear team took the design and optimization process to the highest level of geometry analysis, material application and plastic gear experience," Sheridan said. "Ticona used its 50-plus years of plastic gear experience to help Hi-Lex develop this high-precision plastic gear transmission."

Once the requirements were defined, the team identified materials for the gears and shafts that would maintain the required mechanical properties and dimensional stability, even at elevated temperatures. The gear team selected Ticona grades of Celcon acetal copolymer (POM) and Celstran long fiber reinforced plastics (LFRT): Celcon M90, a general purpose, unreinforced POM that provides a good balance of toughness and fatigue strength for the first-stage gear and shaft, Celcon GC25T, a 25 percent glass-coupled POM that provides the necessary stiffness and fatigue strength for the second-stage output gear and Celstran PA 66-GF50-02, a 50 percent long glass fiber polyamide 66 with high strength and stiffness combined with high heat deflection for the second-stage output shaft.

"For several years, original equipment manufacturers have used our power lift gate transmissions in a variety of automotive platforms," Eberle said. "Not once has a gear broken, worn out or failed in any of our testing, even with multiple design lives, or in service. The gears are nice and quiet. In fact, they get even quieter at elevated temperature, exactly like they were designed to do." Added Sheridan: "It's nice when things work out the way you expect them to. You know you have it right when the design behaves the way the analytical models predicted it would."

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