

# IMTS 2012

## Product Preview



### LIEBHERR GEAR TECHNOLOGY, INC.

Booth N-6930

The LFG1000 CNC Gear Profile Grinding Machine, and the LCS 500 CNC Gear Generating and Profile Grinding Machine, which are ready to use the latest and proven grinding technology in the marketplace, will be featured at IMTS 2012. Both gear grinding machine types are good for machine shops which have to produce a single part or higher batch sizes. Liebherr offers several technologies including gear hobbing, profile milling, gear shaping, generating gear grinding and profile gear grinding.

Recently, Liebherr's engineering and sales team weighed in on the trends that are driving innovation in gear manufacturing today and the technologies that will be available at IMTS.

"On profile and generating grinding, most gear manufacturers need the possibility to create gear flanks with special topological modifications on a high quality level. With these modifications, it is possible to increase the load-carrying capacity of gears, and also to reduce the gear

noise behavior," says Dr.-Ing. Andreas Mehr, technology engineer, Liebherr-Verzahntechnik GmbH in Kempten, Germany. "We see this trend on all gears, from the small module gears used in automotive, to the larger ones used in trucks and tractors, and even up to the coarse-pitch applications for wind energy and heavy industrial transmissions. If you can grind these topological gears in addition with a higher efficiency—for example, with dressable CBN tools, or generating-grinding of large module (up to module 14 mm with our LCS 700, 1200), instead of profile grinding—then these customers will have a big productivity advantage against their competition."

"The need for chamfering and deburring of gears in the green manufacturing process chain has led to innovative integrated chamfering and deburring systems within gear hobbing machines," says Scott Yoders, vice president sales at Liebherr Gear Technology, Inc. "In this regard, years ago Liebherr successfully introduced ChamferCut Technology

(together with the cutting tool company LMT-Fette) to industrial mass and medium-size production applications. Recently these integrated chamfering systems within the LC gear hobbing machines have been expanded upon by Liebherr to include separate 'parallel processing' stations such as Rausch-Gratomat, or roll-press deburring. Within the



same machine, and with the parallel processing, the total cycle time for both hobbing and chamfering is not elongated. For coarse-pitch gear applications, carbide indexable inserted tools (milling cutters and hobs) have definitely gained more and more importance in North America. Although gear manufacturers' initial investment in hob cutting tools is higher, the productivity due to larger batch sizes is much better, so it pays off. Therefore, for the production of coarse-pitch gears, Liebherr hobbing machines equipped for carbide-insert tooling have become more and more the state-of-the-art."

Adds Dr.-Ing. Oliver Winkel, technology engineer, Liebherr-Verzahn-technik GmbH, "At Liebherr there has been focus on the reduction of machine idle times, which fits to the trend of decreased cutting times coming from improved cutting tool materials, and technology parameters (speeds, feeds). This means, faster loading/unloading of workpieces, easier setup or changeovers, and measuring within the machine. Lower idle times by faster load and unload, as well as improved control programs, immediately reduces the cost per piece for our Liebherr customers."

"With regards to gear grinding, the





use of dressable CBN, or other powerful abrasives, will have a very important impact, because the grinding time (which influences mainly the workpiece costs per part) is drastically reduced,” Mehr says. “Where in the past you may have needed three machines to produce a specific quantity of gears per day, you now would need only one.”

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**KLINGELNBERG  
GMBH**

Booth N-6930

Klingelnberg presents its latest skiving innovations at IMTS 2012. This tool system can be used on bevel gear milling machines and allows



for a productive, stable and precise production process, particularly for internal gears. Despite high productivity and system-inherent accuracy, the breakthrough of skiving has been denied due to the tool problem. The chip formation process in skiving is very complex whereby large nega-

tive rake angles and only very small clearance angles arise during the process. The current tools, mostly cylindrical or conical solid carbide cutting wheels, have no degree of freedom for the necessary optimization. In addition to high machining forces, negative cutting angles also consistently lead to excessive wear of the tools, meaning that the tool costs per component largely surpass the proportional machine costs.

Klingelnberg’s newly developed

software shows the exact chipping conditions and therefore allows for a targeted optimization of the cutting geometry and the production movement. The new stick blade tool system uses carbide technology, which has long been used for bevel gears. “Skiving itself is in fact an ancient concept. The key innovation hereby lies in the use of stick blades and the resulting design possibilities for the cutting edge—a breakthrough in cutting technology,” says Dr. Hartmuth

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See us in Booth N-6918

Müller, CTO of Klingelberg.

The stick blade has the distinct advantage of offering optimal cutting geometry through grinding. This is a necessary condition for the optimization of the chip formation process and therefore forms the basis for the breakthrough of skiving. The entire process is highly energy-efficient, productive and flexible. In addition to the free design of the tool, tooth flank modifications can also be applied by superimposing additional movements during the skiving process. These advantages in comparison to gear hobbing, gear shaping or broaching are of particular importance for the production of internal gears. A simple comparison of shaping and skiving productivity shows that skiving is up to ten times quicker and offers a significantly longer tool life. Although skiving is a machining process using a defined cutting edge, the surface qualities achieved are outstanding. Due to the

very high frequency with which the cutting edges move across the tooth flanks to be produced, a completely different surface texture is achieved than, for example, that of gear hobbing or shaping. In the image, the movements of two successive cutters in the tooth space are displayed as blue tracks. The distance of these tracks is determined by the axial feed rate with which the tool is moved along the face width of the gear to be produced. The cutting frequency is up to ten times higher than that of gear hobbing. As a result, a finer surface texture is achieved without the hollows created by gear hobbing or the grooves created by shaping and caused by tool wear. The incorporation of all steps along the process chain to form a continuous data network, guarantees stable and secure manufacturing processes. For Klingelberg this is a trusted and globally approved approach within the scope of the closed-loop concept.

In order that the user is able to benefit from the same process security for skiving as that for bevel gearing, Klingelberg has developed the closed loop for skiving which also incorporates tool preparation operations. Skiving can be executed on the Oerlikon C29 and C50 bevel gear milling machines. These machines ensure a highly precise coupling of all movements which are necessary for skiving. The highly dynamic process also requires a rigid machine design. The vertical arrangement of the tool and workpiece spindle offers particularly favorable conditions for chip removal. The C29 and C50 machine series meets all conditions required for skiving.

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## SANDVIK COROMANT

Booth W-1500

The Sandvik Coromant Smart Hub at IMTS 2012 will focus on helping attendees discover new ways to boost their business through knowledge, tooling solutions and services. With demands from the growing manufacturing industry being high, the Sandvik Coromant Smart Hub will bring visitors solutions in hole-making, gear milling, automotive, energy and aerospace.

High-tech, dedicated areas in the “must see” hub will highlight application specific tips and techniques needed to optimize programming strategies for successful manufacturing. A visit to the Smart Hub will provide the opportunity to preview some of the new developments in high-performance drilling products offering tremendous opportunities for customers to explore productive methods in various operations.

On display, the new Sandvik Coromant CoroDrill 860 solid carbide drill provides fast, economical, problem-free drilling, optimized for steel and most recently for high productivity in all types of aluminum. In addition, visitors can preview a multi-application, high-performance drill that can be used across a wide range of materials. For the exchangeable-tip drills, the CoroDrill 870 will be extended with an optimized grade and geometry for cast iron materials.

Gear milling is an area that is developing fast, and the CoroMill 176 indexable insert cutter can help attendees overcome challenges in productivity, cost and accuracy. Sandvik Coromant also invites its visitors to learn more



about its unique and highly competitive machining solutions intended to provide efficient production in the automotive, energy and aerospace sectors.

The company's CoroMill Plura family sees an extension for aluminum, optimized for machining in thermoplastics, which is excellent for die and mold applications. The CoroDrill 861, on the other hand, is suitable for applications that need a stable tool for the deepest holes and is a high-performance choice for a typical cast iron engine block.

With the introduction of the CoroMill 600 at IMTS, Sandvik Coromant will now offer a full program of blade machining milling tools for the power generation industry. For demanding applications in the oil and gas and aerospace industries, a new counter bore, to be launched in October, offers high process security.

# ATLAS

Ipsen's ATLAS® integral quench furnaces are highly engineered, sophisticated machines that are easy to operate and maintain, all while being extremely cost effective. ATLAS delivers top quality uniformity through cutting-edge technology and design:

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ery Express” seminars will emphasize application techniques that can be used in various operations. Topics will range from effective chip thinning to pitfalls in reconditioning.

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## HEXAGON METROLOGY INC.

Booth E-5202

Hexagon Metrology Inc. will exhibit a full complement of metrology solutions with a spotlight on the new Cognitens WLS400A for automated measurement applications and *PC-DMIS 2012* inspection software. The company will also demonstrate recently released products: Romer portable arms, Optiv Vision 321, Sheffield and Brown & Sharpe 4.5.4 SF CMMs, and *PC-DMIS* software.

Hexagon will also showcase an official racecar from Hendrick Motorsports, winner of a record 10 NASCAR Sprint Cup Series championships. Hendrick Motorsports is a long-time user of Hexagon Metrology products for inspection and assembly of auto body, chassis and engine components for both pre-race adjustment and post-race evaluation.

At IMTS, Hexagon Metrology will debut the Cognitens WLS400A, designed for automated inspection applications. The 3-D optical measurement solution can transform a robot into a high-accuracy metrology device. Suitable for the motor vehicle or aerospace industries, the white light



“As a market leader in the industry, Sandvik Coromant always strives to stay at the forefront of innovation by working directly with our customers to offer them the solutions they need to meet their demands,” said Jamie Price, president, Sandvik Coromant U.S. “We are looking forward to interacting with our customers and being a part of this great event.”

To help visitors take full advantage of tooling solutions and technologies, Sandvik Coromant will offer short technical seminars, presented by yellow coat experts. The “Discov-



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ments and new enhancements have been added to *PC-DMIS 2012*, which is used to create, automate and customize inspection routines, and to build lean manufacturing operations. The extensive product line includes *PC-DMIS CMM*, *PC-DMIS NC*, *PC-DMIS Planner*, *PC-DMIS Portable*, *PC-DMIS Vision*, *PC-DMIS Reshaper*, *PC-DMIS Gear*, *PC-DMIS Blade*, *PC-DMIS Retrofits*, and *DataPage*.

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based system is used to accurately measure large components, analyze early root causes of potential assembly issues, and lower scrap costs during assembly ramp-up. The manual version of the system, the Cognitens WLS400M can also be utilized for rapid prototype part development, and used to certify holding fixtures and assembly tools.

The WLS400A uses digital stereo vision technology to generate highly accurate 3-D data in vibration-prone shop floor environments. Due to the system's ultra-fast data acquisition rate (less than 10 milliseconds), any vibration in frequencies up to hundreds of Hz do not affect the results. The device's performance is not impaired by variable lighting or temperature changes, making it a robust troubleshooting tool for complex engineering issues during product development or for automated measurement tasks. The 3-D measurement solution can also be used to standardize quality criteria across global production facilities and with suppliers

Hexagon will also feature *PC-DMIS 2012*, the company's popular CMM software developed for the collection, evaluation, management and presentation of manufacturing data. The software is standard on all Hexagon Metrology measurement devices, and also available on non-Hexagon equipment. Incremental improve-

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## WALTER USA, LLC

Booth W-1700

Walter USA, LLC, will feature Tiger-tec Silver for turning; Walter Titex X-treme Inox solid carbide drills; Walter Prototyp Proto-max Inox solid carbide end mills; the new ValCool VPLFC low-foaming coolant; and a new generation of Walter Valenite indexable milling cutters. Tiger-tec Silver delivers superior resistance to crater and flank wear, plastic deformation, considerably reduces machining times and ensures higher process reliability. The combination of three new insert grades and four new geometries developed in parallel increases tool life and boosts productivity of steel turning applications. The new grade designated WPP10S offers the highest temperature resistance and hardness. It is suitable for processes ranging from continuous cutting to minor interrupted cuts at very high cutting speeds. WPP20S, the medium-grade, is suitable for use as a universal cutting material for processes ranging from roughing to finishing. WPP30S, the toughest of the three, brings maximum reliability to difficult applications such as interrupted cuts and unstable



conditions. In addition to the three grades, Tiger-tec Silver for turning includes four new geometries. For facing and light cuts, the FP5 provides reliable chip control during turning operations from 0.008-in. depth of cut. The MP3 geometry is suitable for medium machining. The versatile MP5 geometry was specifically designed for general machining and the RP5 geometry is designed for roughing. Walter Titex X-treme Inox solid carbide drills for stainless steel provide for a new flute profile, point geometry and TTP coating for reduced cutting force and longer tool life. Walter Prototyp Proto-max Inox solid carbide end mills for stainless steel achieve material removal rates up to 50 percent greater than stan-

dard solid carbide end mills. These include an optimized geometry that provides enhanced stability for the cutting edges, and a special surface treatment on the shank for a firm grip. ValCool VPLFC is a heavy-duty, non-chlorinated, semi-synthetic low foaming cutting fluid which helps reject tramp oils is very clean and stable and is ideal for high pressure (1,000 psi +) applications. A new line of indexable milling cutters to enhance productivity and speeds and feeds will also be unveiled during IMTS.

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## SAINT-GOBAIN ABRASIVES

Booth N-7051

Saint-Gobain Abrasives, the world's largest abrasives manufacturer, has recently introduced Norton Paradigm Diamond and CBN Wheels which are positioned in the "Best" tier of Norton grinding products. Paradigm wheels feature a new proprietary, patent-pending bond delivering high grinding performance on carbide and high-speed steel round tool fluting, resulting in exceptionally fast cycle times and lower cost per parts. "The new patent pending bond on Paradigm Diamond and CBN wheels enables high performance one-pass flute grinding for highly efficient round tool manufacturing operations," said Matt Simmers, product manager at Norton. For maximum

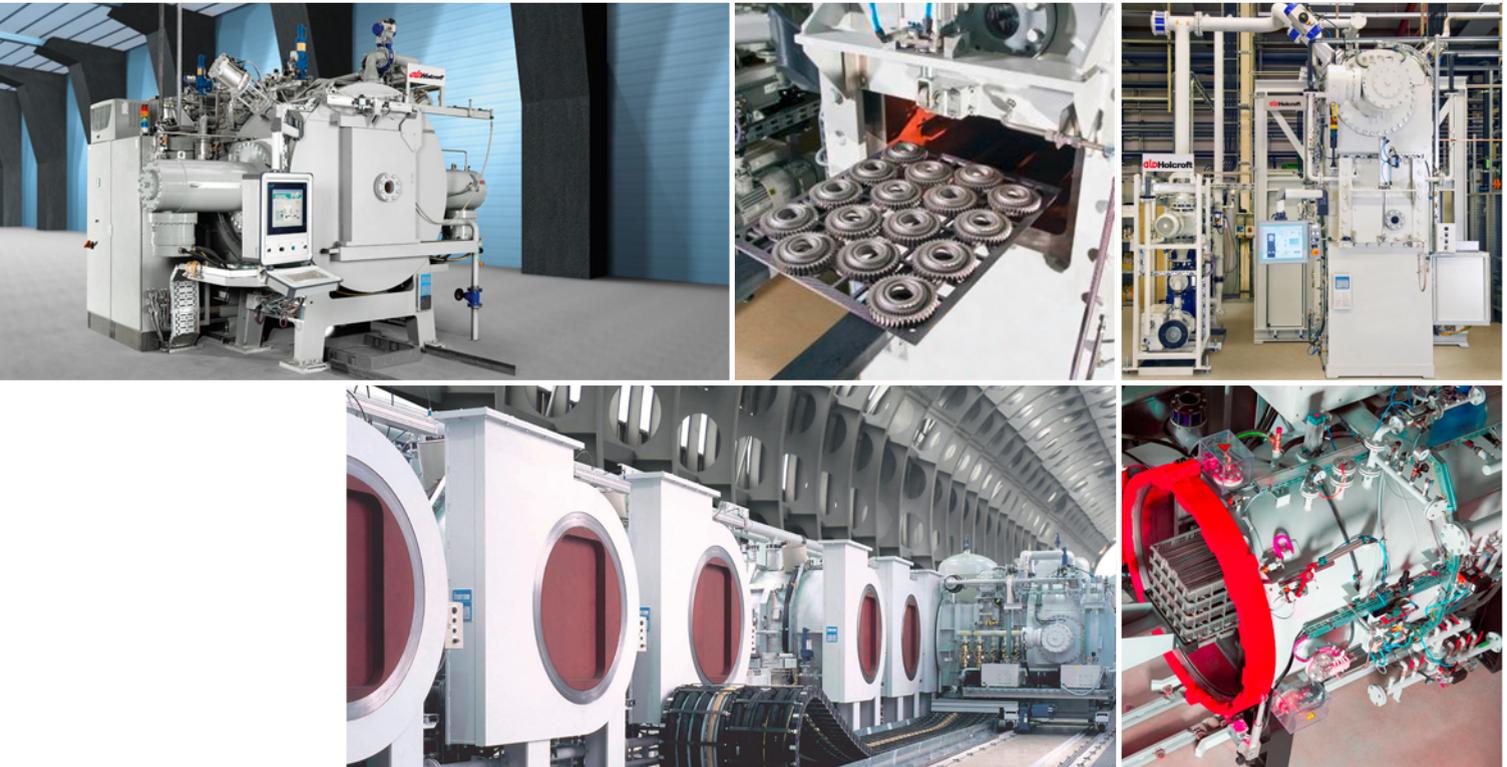
productivity, new Norton Paradigm wheels are online and offline truable. Wheels are wear/load resistant for superior grinding on 6 to 12 percent cobalt, and offer better control over core growth. A high grain retention and uniform structure provides a high G-ratio (ratio of material removal rate versus wheel wear) up to 2.5x longer wheel life and a 30 percent higher material removal rate than other superabrasive wheels. Paradigm Diamond and CBN Wheels also offer low specific cutting energy, which enables faster grinding with a lower power draw and less burn. All Paradigm Diamond and CBN Wheels

are custom-manufactured to precisely meet end-user requirements. Wheels are available for Anca, Makino, Rollomatic, Star, Walter and other leading grinding systems. Diamond wheels are available for tungsten carbide and CBN wheels are offered for



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high-speed steel applications.

Additionally, Norton Abrasives will be featuring several Machine to Grind (MTG) solutions. For example, with Norton's MTG analysis, a gear manufacturer eliminated rough cutting the gears through the use of formed cutters, broaching or hobbing. They ground from solid to eliminate the need for a cutting/milling machine and all the complementary tooling and equipment required to start and maintain the rough cutting

operation. Norton provided wheel specifications to create the flexibility to combine grinding in the soft state from solid to hard finishing with only one grinder.

Opportunities for the MTG solutions include small to medium job shops where there are two similar machining operations followed by grinding or where an antiquated cutting machine has caused the need for a rough machining process followed by a rough grind before the heat treat

and finally a finish grind. Other typical industries for MTG include aerospace, land-based heavy, off-road truck gears (soft machine, hardened and finish grind). To learn much more about a case study including a key OEM who greatly benefited by applying a Norton MTG solution to grind large spiral bevel and pinion gear sets from a solid, visit the booth N-7051 at IMTS.

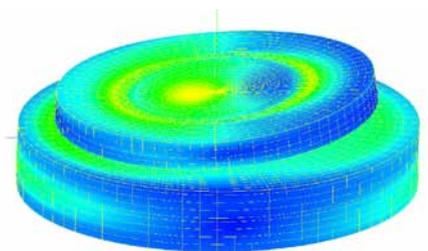
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**DONTYNE SYSTEMS**

Booth N-6791

Dontyne Systems has developed a Gearbox Model to simulate deflection of a fully coupled system of gear, shaft and bearing components including the housing. The tool can utilize FE data from 3rd party software. Deflection data can be passed directly to the tooth contact analysis module *Gates* to provide a substantial improvement for the existing customer base. Detailed component design can be called directly within the model. Further development will see planetary systems and NVH analysis possible. Dontyne has integrated MESYS AG calculations for shafts and



bearings with a significant increase in the capability of the *Gear Production Suite*. *MESYS* bearing calculation considers the load distribution in the bearing and therefore can take into account operating clearance, tilting angle or moment load. The shaft calculation uses the resulting non-linear bearing stiffness and is therefore

# Geared on Value



Booth #E-5261

The target is clear when it comes to supplying the best value in gear inspection. Our mission is to offer the widest selection of reliable, productive and precise Gear Inspection Machines. We aim to be at the pinnacle of design and through our global partnering with the finest manufacturing processes, materials and components, we deliver durable, robust machines with a high degree of up time.

At Wenzel America we believe that when advanced German engineering meets American ingenuity we produce a product line with:

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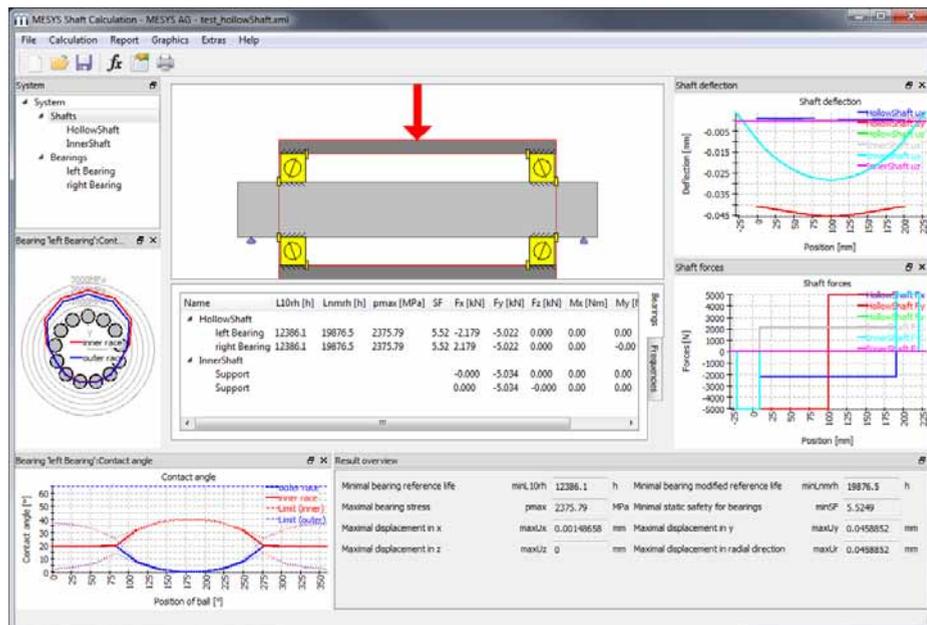
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suiting for statically indeterminate systems.

“We are very excited about the relationship developing with MESYS,” says Mike Fish of Dontyne. “The software produced by MESYS is of high quality and fits precisely with our strategy. As with our own approach to gears, the new software calculates according to standards but also give access to higher level of detailed analysis required for high performance applications. We are also well aware of the pedigree of MESYS to be sure of providing the fast and flexible support for our customers.”

“Considering housing stiffness, bearing clearance and stiffness and automatic calculation of shaft deflection will increase the accuracy of inputs for TCA,” says Markus Raabe of MESYS. “Like the integration of MESYS shaft and bearing calculation in Dontyne software, parts of Dontyne gear calculations and TCA should be accessible from MESYS software in the future.”

Renishaw continually develops its MODUS metrology software appli-



cation to meet the demanding requirements of customers in a global market. A joint development with Dontyne Systems has resulted in the release of MODUS Gear and MODUS Spline software. The gear metrology expertise from Dontyne and the applications experience of Renishaw was an ideal combination to pro-

duce software that offers a high level of functionality and exploits the benefits of Renishaw’s coordinate measuring machine (CMM) scanning systems.

Eaton and Dontyne Systems have completed the improvement and integration of design and manufacturing software to significantly reduce

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product development time in the production of bevel gear systems. The dramatic improvements have demonstrated Dontyne's ability to deliver complex development in a relatively short time frame. Tom Riley of Eaton Corporation said of the collaboration, "Dontyne's software brought us a huge improvement in productivity: reducing hours of work to seconds. The visual representations make the software very intuitive to use and understand, and the results are quite accurate. The endeavor was so successful that more collaboration is inevitable."

"We were delighted to work with Eaton on the recent project, and very happy to hear about the significant improvements in production enabled by the development," Fish said. "This has once again proven Dontyne can deliver customer specific requirement to utilize a large internal knowledge base of design and machining procedure, which can be developed as a stand-alone program or integrated to our off-the-shelf design and analysis tools in the *Gear Production Suite* if required."

This and other developments at Dontyne will be discussed during IMTS in Chicago.

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**SCHUNK**

Booth W-2000

"Success in Manufacturing" will be Schunk's theme for IMTS 2012. On a 4,000 sq ft booth, visitors will experience the "Schunk Blueboard," which presents straightforward stories of how manufacturers stay competitive. Each story compares a successful company with a non successful company and asks the question, "What leads to success in manufacturing?" The "Schunk Blueboard" will give answers to this question. Each Blueboard station will be an interactive experience for the visitor, highlighting a different problem such as reducing part cost, increasing flexibility, and improving machine idle

times. Products highlighted include the electrically driven small parts gripper EGP. Compared with other electrically driven small parts grippers on the market, it scores points with respect to its high speed and simultaneous high gripping force. A powerful roller guide ensures high efficiency and makes the gripper highly dynamic, especially for demanding pick and place applications.



DLC Taps



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Schunk will also highlight its premium gripper range with multi-tooth guidance. The guidance tasks in parallel and centric grippers are not carried out using the classical T-slot but with a multiple prismatic guidance arranged in parallel. Therefore forces and moments are distributed across multiple guiding areas. As a result, the guidance has a higher load capacity. The three-finger centric gripper PZN plus series has been extended with the new size 380 to cope with the constantly increasing performance requirements of the manufacturing industry. This series can be used to handle workpiece weights over 300 kg (660 lbs).

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**EMUGE CORP.**

Booth W-1536

Emuge Corp. will showcase their comprehensive line of clamping solutions at IMTS 2012. Emuge's workholding division specializes in providing highly accurate, almost maintenance-free customized solutions for applications from low volume job shops to high volume automotive production environments. "Our workholding group stays close to our customers to learn about their unique challenges and



production environments. Doing so helps us develop the best solutions for their applications," says David Jones, precision workholding manager at Emuge Corp. Highlights at IMTS 2012 include: Emuge's System SG used in many machining operations such as hobbing, shaping, and shaving for gear production, as well as milling and inspection. The System SG's large surface area contact with the workpiece provides a clamping solution which is very rigid, accurate and repeatable. The high preci-

sion System SP is used not only to clamp workpieces but also to clamp tools. By applying an axial force, the clamping sleeves move in the direction of the force and expand radially. This eliminates the clearance between clamping sleeve and body, and between clamping sleeve and workpiece. System SP achieves concentricity of  $\leq 0.002$  mm (corresponding to  $\leq 0.0001$  inch). For workpieces that have a short clamping base or for diameters with a very large tolerance, System SZ is a suitable choice.

## 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.

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| 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<br><i>(extendable to 34 mm)</i>  |
| Profile Height              | 41 mm<br><i>(extendable to 60-80 mm)</i> |
| Grinding Wheel Width        | 60 mm<br><i>(extendable to 90 mm)</i>    |
| Grinding Wheel Diameter     | 400 mm                                   |
| Table Load                  | 3000 kg                                  |

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# A Better Way

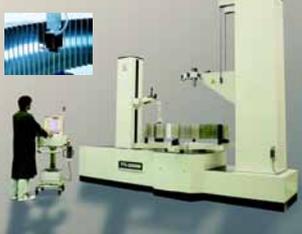
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By applying an axial force, a slitted collet is radially expanded by a cone. Simultaneously an axial movement occurs, clamping the workpiece. When the eccentricity between pitch circle and seating bore is very small, diaphragm clamping System SM is ideal. It allows clamping of the gear wheel at the pitch circle for machining the seating bore. The gear wheel is clamped in both axial and radial directions. System SH is the solu-

tion if there is not enough room for a mechanical clamping system and for clamping long, thin-walled workpieces or a number of similar workpieces. System SH is a closed system which uses hydraulic pressure to clamp the workpieces.

#### For more information:

Emuge  
1800 Century Drive  
West Boylston, MA 01583  
P: (800) 323-3013  
[www.emuge.com](http://www.emuge.com)

## HOMMEL-ETAMIC AMERICA CORP.

Booth E-5545

Jenoptik Industrial Metrology will demonstrate the new Hommel-Etamic F435 and F455 automatic form measuring system at IMTS 2012. The system completes fully automatic measurement of geometrical tolerances, surface roughness and straightness in a single setup. An advanced probe design permits roughness and waviness inspections along with form and position tolerance measurements via a simple adjustment on the rotary control, thus significantly enhancing productivity. Designed for workpieces of up to 40 kg weight and 430 mm in diameter, the systems can measure products such as gear shafts, injection parts, bearing rings, valves, connecting rods and pistons. Jenoptik offers specialized solutions to extend the application scope to include brake disc measurement as well. Individual configuration allows optimum measurement situations for specific tasks.

Available as a compact desktop version or a complete ergonomic measurement workstation, the systems include a frictionless air bearing rotary table that ensures the reproducibility of the smallest tolerances over long periods of time.

Automatic centering and leveling of the workpiece helps deliver the highest possible precision over the full measuring distance and compensates for possible inaccuracies caused

by wobble. High precision guides equipped on both the R and Z axes and specially designed drive systems all combine to deliver superior precision and speed.

A CNC rotation and tilt module provides fully automatic axial and radial measurements without interruption. Individually motorized axes for tilting (90°) and rotating (270°) allow the probe to access difficult to reach measuring positions. The probe direction is reversible with variable free-stroke limits in both directions.

#### For more information:

Hommel-Etamic America Corp.  
1505 Hamlin Road  
Rochester Hills, MI 48309  
P: (248) 853-5888  
[www.hommel-etamic.com](http://www.hommel-etamic.com)



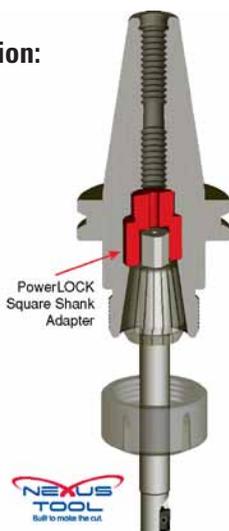
## NEXUS TOOL

Booth W-1732

Nexus Tool will introduce its patented ShrinkMILL System at IMTS this year. The ShrinkMILL uses shrink fit technology to make a perfect connection between the arbor and face mill for maximized performance. This is done by heating the face mill in the shrink fit machine, which expands the bore to receive the face mill arbor. The ShrinkMILL System eliminates any tolerance between the arbor and the face mill creating the shrink fit connection. Because the connection is shrink fit, runout and vibration are reduced, permitting increased feeds, extended insert life, and better surface finish. Nexus provides complimentary shrink fit services to its customers who do not own their own machine. According to Mike Raper, Nexus Tool national sales manager, "The ShrinkMILL System brings the greater rigidity and accuracy of shrink fit to milling applications for faster cutting and better surface finish. Also, scrap rates are reduced and insert life is improved." The ShrinkMILL System includes Nexus Tool's face mill arbors and face mills that are manufactured to precise tolerances required by the shrink fit process. Choose from a wide range of Nexus multi-coated inserts for all materials as well high-polished inserts optimized for aluminum. Additionally, Nexus will introduce its PowerLOC system at IMTS, a product that significantly improves T.I.R compared to standard end mill holders.

### For more information:

Nexus Tool  
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Indianapolis, IN 46236  
P: (877) 616-6016  
[www.nexustool.com](http://www.nexustool.com)



# HIGH PRECISION

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### Aerospace Precision

As an AS 9100 & ISO 9001 Registered Company, Delta Gear provides aircraft quality gears and machined components at automotive prices. Since 1964, Delta Gear (formerly Tifco Gage & Gear) has been producing precision parallel-axis gears. It is our continued passion to expand our capabilities in high precision gears, machined components, assemblies and inspection – giving you the highest quality, convenience and on-time delivery.

### Inspection & Testing

Our newest addition to the Delta Family of Companies is Delta Inspection. Inspired on the understanding that the industry needs expert abilities for contract gear inspection services, Delta Inspection has been introduced to meet your gear inspection and testing needs. Our abilities range from gear inspection up to 39 inches (1 meter) to prismatic inspection of machined components, roundness, laser guided concentricity analysis, surface testing, material testing, Nadcap certified magnetic particle inspection, nital etch and much more.

### Automotive Quality & Speed

Delta Research is a world class provider of CNC 3-Axis, 4-Axis and 5-Axis precision machining, jig grinding, cylindrical grinding, precision gears and complete assemblies for automotive, aerospace and industrial applications. From complete automotive prototype transmissions or components, to defense, to aerospace machining and assembly, you will be impressed by our capabilities and commitment to quality.



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