

The following product items are highlights from Gear Expo 2017 in Columbus, Ohio. Please check back to www.geartechnology.com for additional information on the new technologies discussed during the event.

Klingelnberg

EXHIBITS SPEED VIPER 300 AND GEARENGINE ARCHITECTURE SOFTWARE

On display front and center at Klingelnberg's booth was the Speed Viper 300, a machine designed for generating grinding small parts. The machine is catered specifically towards the automotive industry, a first attempt to break into the field for Klingelnberg. Originally introduced at EMO in September, Gear Expo was the Speed Viper 300's U.S. debut.

The Viper series of grinders has a number of different features under its belt. The platform is designed to be flexible, with tool diameters ranging from 210 mm to 320 mm and travel paths that allow for machining a broad range of components, and is built to be easily maintained. It features a cutting speed of up to 100 m/s, vibration-damping cast polymer and a compact frame. The 300 specifically is a single spindle machine, but Klingelnberg has plans for a double-spindle model by mid next year.

The Speed Viper is designed to integrate Industry 4.0 (Industrial Internet of Things) technology, and it's in this field that Klingelnberg is shining. They have developed a new software they've dubbed the *GearEngine Architecture* which is designed for a closed loop machining process and features a digital twin that follows a workpiece through every step of the entire value chain, from bar metal to end of line tests, across every machine it's used on.

The software tracks the machines themselves, as well. It keeps an eye on the tooling used in the machine, looking at how long it's been used for, as well as its performance over time, to analyze wear on the tool and when it's time to swap out for a new one.

Another main feature is that the software's evaluation parameters, which Klingelnberg has designed to one-up established paper parameters such as $fH\ \alpha$ and β and cut out some of the guesswork involved in the process.



Students from Ohio State University tour the Klingelnberg booth at Gear Expo 2017.

"You get it printed out on a sheet, and then you have to type in the deviations of these evaluation parameters," Dr. Hartmuth Müller, head of technology and innovation at Klingelnberg, said. "The big 'but' is this is not directly related to the chart. And what we have is we can now numerically, precisely describe the manufacturing imperfection and then we can create a software package that automatically minimizes these manufacturing errors without going into this abstract world of evaluation parameters like $fH\ \alpha$, $fH\ \beta$ and so forth."

Müller describes the new *GearEngine Architecture* as "a data lake," a vast pool of information compiled by the software constantly monitoring every step of the manufacturing process. And from that lake of data comes many of the possibilities you're used to hearing about from Industrial Internet technology: preventative maintenance solutions

such as the one described with machine tools, opportunities to iterate on product design or streamline the manufacturing process based on the data seen and more.

For more information:

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The GRSL Gear Rolling System with Laser provides both double flank roll testing as well as analytical index and involute measurement on all teeth during the same inspection cycle in a matter of seconds. It made its debut during Gear Expo in Columbus.

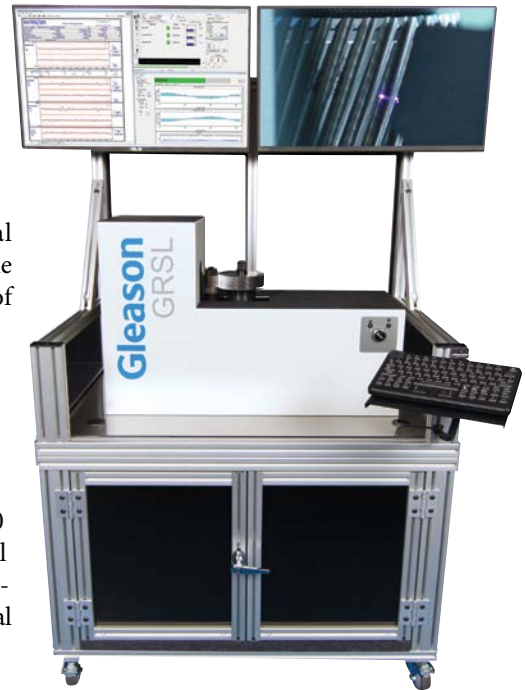
This new technology is available in a manual, semi-automatic or fully automatic configuration depending on the needs of the customer. The index and involute measurements are analyzed using Gleason Metrology's *GAMATM* gear analysis software which allows the operator to see common charting between the GMS analytical inspection machine and the GRSL gear rolling system. With *GAMA*, over fifty analysis packages are available for our customers with all major industry standards such as AGMA, DIN, ISO, etc., along with customer specific analysis requirements developed for industry in the *GAMA* platform.

This patent pending design measures external, cylindrical gears up to 250 mm in diameter and in a range of 0.4 to 7.2 module. The double monitor option provides a simple view of ongoing trends in the high speed inspection environment where one monitor can display results of several hundred parts inspected over time while the other can show real time results of the gear being inspected.

Additional highlights include: Composite testing and index and profile inspection are performed in the same test cycle. Inspection of all 31 teeth on a typical helical gear can be performed in under 10 seconds compared to 160 seconds on a conventional analytical machine. The workstation comes standard with a single 22" monitor with dual monitors and touchscreen also available.

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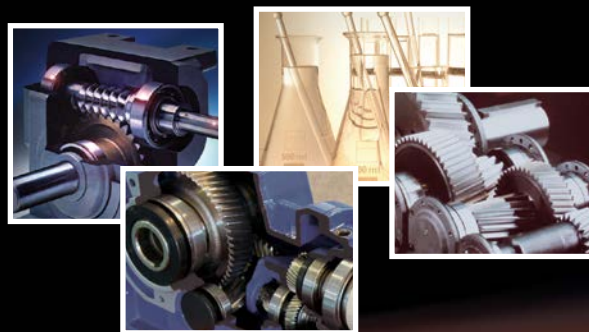


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Liebherr

INTRODUCES NEW MACHINES IN MULTIPLE FIELDS

Over the course of the last few years, Liebherr has released four new machines, many of which were revealed at EMO 2017. Each machine is an advancement for Liebherr in a separate field of gear manufacturing.

Liebherr's new offerings include the LK 300 and 500 skiving machines featuring an all-new skiving head and plug-in coolant nozzles. The machines' new skiving head is designed to be vibration free, which alongside a number of other features such as a rigid machine design and a table with a direct drive make for steady, consistent machining processes. And the LK series machines allow for enough nozzles to be plugged in for every workpiece to get its own. The result is Liebherr's flagship wet internal skiving machine line.

Another advance this year, the LD 180 C, is a chamfering and deburring machine that was released this year. A primary selling point for the machine is that it can be inserted into an already existing production line. Liebherr also designed the machine with precision, flexibility and consistency in mind. The LD 300 C is also available for those needing a bigger machine, with a third option, the 280, on its way soon.

There are also the LC 180 α/280 α modular hobbing machines. Much like

with Liebherr's new skiving machines, the LC series comes with a brand new hob head designed for increased flexibility and productivity. Other improvements include better chip removal, optional equipment such as cranes and conveyors and a 50 percent faster spindle speed. The LC series is capable of machining workpieces to a module of five millimeters.

And finally, the LS 180 E gear shaping machine, is a resizing of last year's LS 180 F. The LS 180 E is half the size of the 180 F, making it more ideal for

small job shops without losing any of the performance ability of its predecessor and making it easier and faster to set up manufacturing runs. The series as a whole is considered by Liebherr to be ideal for helical gearing.

Going along with the LS 180 series is the brand new SKE70 shaping head that was revealed at EMO. The new gear shaping tool is the smallest of Liebherr's shaping heads, measuring only 70 mm.

For more information:

Liebherr Gear Technology, Inc.
Phone: (734) 429-7225
www.liebherr.com



DVS Technology America

CREATES CUSTOM FLY-CUTTING SOLUTION FOR AUTO SUPPLIER



Close-up of crown gearing of a claw clutch component machined by the new DVS fly cutting process.

DVS Technology America received an inquiry from a Tier 1 supplier from the U.S. automotive industry. The inquiry concerned the complex challenge of realizing a highly productive as well as precise production cell for manufacturing castle teeth components with crown gearing on the face side, which are used in a 9-speed automatic transmission by the American end customer. According to the supplier, the manufacturing requirements for this com-

ponent could not be met using any of the solutions currently available on the market.

The user required the working of a special tooth flank shape on both sides of the workpiece, in an extremely tight tolerance range of only a few micrometers. In addition, it was necessary to make the tooth base flat, with a very strict tolerance. Together with the DVS gearing specialist Präwema Antriebstechnik, DVS Technology America achieved a solution which involves two fly cutting twin spindle milling machines of the type Präwema

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WPSLV 2-2 custom-designed for the application of the U.S. supplier.

An innovative axis system with synchronized CNC axes was implemented to comply with the special requirements of the customer application. Accompanying this, the production of the required flank modification of the crown gearing in combination with the special machine kinematics was simulated and analyzed in detail first using a CAD system in 3-D view. Constant achievement of the strict manufactur-

ing tolerances was confirmed ultimately during the actual machining operation of the two Präwema machines.

In addition to maximum thermal and dynamic machine stability, one of the keys to the process was the tool concept, which was on display at Gear Expo in Columbus. The tool had been developed on the basis of precise tool geometry and application parameter design, in the form of a multi-blade fly cutter equipped with shaped indexable inserts. This stands out both on account of its



The multi-blade fly cutter with shaped indexable inserts, recently shown at Gear Expo 2017 in Columbus, OH.

extremely smooth running and the consistently high service life of the inserts used. The Präwema fly cutting method with only one direction of cutting from the inner to the outer diameter performed by rotating the cutter effectively prevents the formation of burrs in the groove of the inner diameter, which can otherwise only be removed later in a costly and labor-intensive process. The burr produced at the outer diameter is removed during the milling process in the Präwema machine using integrated deburring operations which have no effect on the cycle time. The use-optimized synchronization of tool and workpiece in a constant speed and angle ratio permits the U.S. supplier to achieve extremely short cycle times and thus maximum productivity.

The production cell comprising the two Präwema machines was implemented in the existing infrastructure of infeed and outfeed conveyors – also with the support of local experts from DVS Technology America – and put into operation there. The raw parts are picked up from the customer-side automation by a shuttle system integrated in each machine and then transferred to the two spindles from behind through the respective machine. Following machining, the finished parts are col-

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lected automatically by the shuttle system and returned to the customer's automation system. The machines are also equipped with an engraving device which labels the machined castle teeth components with their respective drawing number, machining date, time and spindle, thus permitting permanent traceability of the finished workpieces for customer and end user.

For more information:

DVS Technology America
Phone: (734) 656-2080
sales.america@dvs-technology.com
www.dvs-technology.com

Kennametal

OFFERS TWO NEW SOLUTIONS FOR ROUGHING AND FINE FINISHING

Iron's everywhere. The turbines in those big windmills popping up all over the place. Engine blocks, transmission cases, and turbocharger housings. The pumps that bring water to our faucets and the hydraulic manifolds that put the "move" into earthmoving machinery. Without iron, none of these would be possible. This is why Kennametal has put so much effort into producing cutting tools that make iron machining both cost-effective, efficient, and ensures easy handling.

One significant step in this direction came a little over one year ago, when Kennametal announced its Mill 16 face mill, the next generation in roughing tools designed specifically for removing large amounts of cast iron quickly, offering the highest productivity and lowest cost per edge in roughing and semi-finishing applications.

Making a change

Kennametal is pleased to announce that it is building on that success by expanding the Mill 16 platform by introducing new cutter body styles, new insert geometries and grades, and a split case design for large diameter bodies that reduces spindle bearing loads.

With these new additions the portfolio will fit any cast iron face milling applications. From fine pitch wedge style cutters for highest productivity and very powerful machines to medium and coarse



Chad Carrico
Schafer A-Team member

Material flow/CS manager and world-class gearhead

Open-minded. It's how Chad and his team address your gear needs. They know there are multiple variables that can improve your parts. Their job is to explore the possibilities and zero-in on the raw materials, castings, heat treatment sources, etc. that will help us make your precision gears more cost-effectively ... then deliver them 100% on time. We'll go the extra mile for you. Let's talk.

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pitches screw-on cutters where horsepower is limited (the machining of small components to very large components).

The Mill 16's new split case design meets truly massive machining needs, with wedge-style cutter bodies ranging from 300 to 500mm (12 to 20 in.) in diameter. And for those worried about hanging such humungous cutters off their machine spindles, there's good news: the largest split case Mill 16 cutter body weighs only 20.4 kg (48.45 lb.), roughly one-third that of competing designs, but

still able to rotate at up to 2,800 rpm.

And there is even more good news. All cutters use the same innovative, multi edged design insert. An insert with 16 cutting edges that provides lowest cost per cutting edge.

Finishing Up Consistently with KCFM

To an engine manufacturer, flatness and finish is everything. Without it, leaks are sure to occur, leading to expensive warranty claims and unhappy custom-

ers. The same can be said for those making transmissions, hydraulic manifolds, pump bodies, and anywhere a smooth sealing surface is needed. Unfortunately, the material used to make many of these components—cast iron—can be challenging to machine.

There are many options available on the market for fine finishing of cast iron these days. And most of them can achieve the required surface finish.

The deterioration of the finishing occurs as soon as the inserts show slight wear. That causes an increase in cutter pressure, resulting in vibration, and feeding marks are observed. The result is downtime due to frequent insert exchange.

The super positive KCFM — Kennametal Cast Iron Finishing Milling—with the new KBK50 full top PCBN (polycrystalline cubic boron nitride) grade was developed to address these issues.

Now customers can produce much more parts per edge in a reliable and consistent manner, so the cost per component will decrease.

And keep in mind machining time reduces drastically since PCBN can be applied with 3 times higher cutting speeds compared to carbide inserts.

Additional Options

Combining the semi finishing KY3500 silicon nitrate ceramic with KBK50 finishing wiper inserts is also a very productive, and cost effective solution for customers that don't want to have a full load PCBN inserts in the cutter.

PCBN and ceramic grades are perfect for mass production and stable conditions.

But in many cases there is also the need for fine finishing on rather unstable conditions, such as weak workpiece clamping, limited spindle speed, long overhang, or when tooling cost is the primary consideration.

The answer to that the carbide grade KC514M. A TiAlN PVD coating that is both tough and wear resistant. Designed for light to medium machining, KC514M can be applied with or without cutting fluids.

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Koepfer America

TM200 R3 GEAR DEBURRING MACHINE OFFERS AUTOMATIC LOADING

As automation continues to transform the manufacturing industry, gear deburring often remains an operation performed by hand. This burdens gear manufacturers in several ways. First, quality control remains a challenge because each technician's skill impacts the final product. Second, as other processes become automated, deburring labor continues to grow as a portion of a finished part's overall cost. Finally, deburring time is highly variable because of breaks, distractions, tardiness, sickness, and other human effects. Consequently, manufacturers both large and small are looking to automated deburring solutions to remain competitive in today's market. The TM 200 R3 machine tool is such a solution.

Koepfer America now offers the TecnoMachine ("TM") model 200 R3 gear deburring machine, which benefits gear manufacturing job shops and other gear manufacturing departments with a wide variety of part types and sizes. Adam Gimpert, business manager of Koepfer America, said "The versatility of these deburring machines helps job shops and gear manufacturers keep a competitive edge into the future."

The TM 200 series of gear deburring machines features 5 workstations that can be equipped with milling tools, cutoff wheels, and brushes to achieve the exact

edge break, deburring, and/or chamfering operation required on multiple edges. These tools are easily adjusted for position, orientation, pressure, and speeds up to 24,000 rpm. The machine also includes radial CNC tool wear compensation. Lastly, work holding is flexible to accommodate most part types and sizes. Together, these features allow straightforward, versatile gear deburring with changeovers in under 30 minutes.

The TM 200 R3 features a rotary-magazine-type ("carousel") CNC loading and unloading system. This solution accommodates stackable work pieces up to 7.874" diameter (alternative TM models can deburr larger work pieces). The dual rotary magazines each comprise 8 easily adjustable towers. Each tower can hold parts up to 17.7" high. For example, 283 pieces can be loaded assuming a 0.5" face width gear. This allows the machine to



Carol Hibschan
Schafer A-Team member

Quality manager and world-class gearhead

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deburr unattended for hours.

During operation, the machine's SPC (statistical process control) station allows an operator to check quality mid-process. Additionally, for small lot sizes, the machine can also be used in manual-mode. In this case, the SPC station allows easy loading and unloading of a single work piece.

The TM 200 R3 produces finished work pieces in as little as 20 seconds for 3" diameter parts or 55 seconds for 7.8" diameter parts. This productivity combined with the machine's flexible automatic loading and unloading system offers gear manufacturers a long-term competitive deburring solution. The TM 200 R3 provides an optimum balance between productivity and flexibility, which is perfect for job shops as well as gear manufacturing departments with a complex variety of parts.

For more information:

Koepfer America
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KISSsoft

TWO SOFTWARE SOLUTIONS, ONE SYSTEM DESIGN INTERFACE

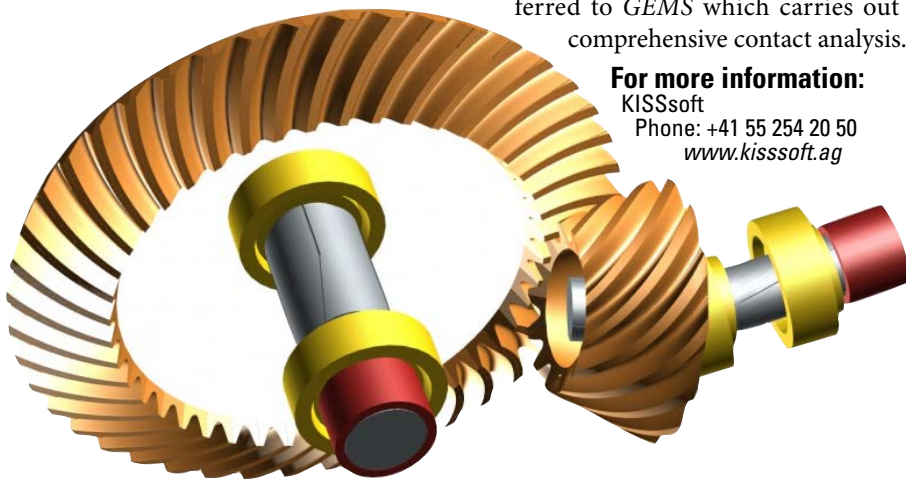
KISSsys is KISSsoft's system add-on that enables you to model complete gear units and drive trains. KISSsoft calculates the service life and strength of the different machine elements, and transfers the results to KISSsys, where they are displayed in clear overviews. To achieve this, KISSsys brings together kinematic analysis, service life calculation, 3D graphics, and user-defined tables and dialogs. With GEMS Gleason has introduced the next-generation design and manufacturing system for bevel gears. It is a powerful new software platform that provides highly desirable gear design and analysis

capabilities, seamlessly connects with all your existing Gleason design software. GEMS helps optimize the complete bevel gear manufacturing process - from the idea to the finished, tested gear.

GEMS and KISSsys programs are now linked by a direct interface to exchange gear tooth and system design data between the two software packages. GEMS supplies the values for the geometry data of the bevel gear pair, which is imported into KISSsys. KISSsoft determines the EPG misalignments for the specified load points, taking shaft bending values into account. Results are transferred to GEMS which carries out a comprehensive contact analysis.

For more information:

KISSsoft
Phone: +41 55 254 20 50
www.kisssoft.ag



Jenoptik

OFFERS FULLY AUTOMATED MEASURING SYSTEM FOR ROUGHNESS, CONTOUR

The Jenoptik Industrial Metrology division offers a fully automated measuring station which can be operated directly by staff on the production line. The HOMMEL-ETAMIC wavemove combines high-precision roughness and contour measurement technology with innovative CNC technology and eight fully automatic CNC axes to measure both roughness and contours in a single measuring run, recording as many data points as necessary. The system is well-suited to automotive production.

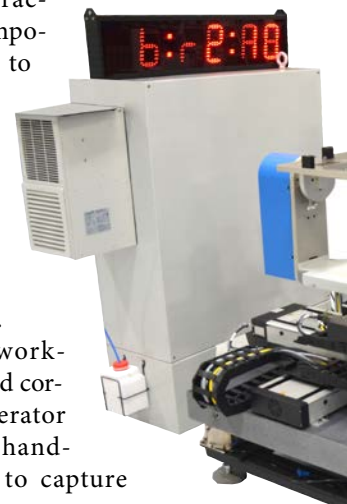
wavemove is integrated directly into the production process as an SPC measuring station. The workpiece can be

clamped into the measuring system at any stage of production — wavemove recognizes the workpiece and automatically suggests the predefined measuring points via the operating program.

The wavemove allows manufacturers to perform twist measurements on sealing surfaces. On camshafts, roughness is typically measured at bearing points, in grooves and on the cam itself. The machine is also capable of performing highly complex measurement tasks on and in cylinder blocks. In this application, roughness measurements are performed in cylinder bores, on sealing surfaces and in the crankshaft bearing

channel. In practice, these components have up to 70 defined measuring points, which are processed sequentially in a single measuring run.

Once the workpiece is clamped correctly, the operator uses a DMC hand-held scanner to capture



the data matrix code. Depending on the stage of production and the workpiece type, the operator selects the appropriate measuring program and starts the measuring run.

The measurement process itself is fully automatic — the measuring probes independently travel to the predefined measuring points on the workpiece, and the movable axes allow the measuring column to be moved upwards and downwards, crossways and lengthways. In addition, the pick-up element for the workpiece is mounted on a 360° turntable and can also be moved in different directions. Similarly, the traverse unit and measuring probe can be tilted, swiveled and rotated. This freedom of movement allows the sleeve to move the roughness probe to any measurement position, even those that are difficult to access.

If required, the contour probe can be operated in parallel with the roughness probe, which provides convenient top and bottom measurement via two probe heads. The high degree of flexibility in axis positioning means that the probes can access almost any point on the workpiece.

The software is designed to react flexibly to changes, and the presentation of measurement results can be customized, with printed reports including a high level of detail based on the customer's specific requirements. Any characteristics falling outside tolerance limits are flagged visually, and immediate

reactive measures can be initiated by the machine operator thanks to the system's close proximity to the production line.

The measuring station itself is designed to meet the requirements of manufacturing environments. The motorized positioning unit is mounted on a granite plate and can be programmed to move the measuring column on an air slide. The control panel for the WAVECONTROL provides a simple interface that can be used to pro-

gram the CNC programs. The operator uses a joystick to navigate to the relevant positions and then stores these values in the measuring program, ensuring that preparations for the fully automated measurement process can be quickly completed.

For more information:

Jenoptik
Phone: (248) 537-1471
www.jenoptik.com/metrology



Ryan Finrock
Schafer A-Team member

Engineering manager and world-class gearhead

Exceed expectations. That's the goal of every engineer on Ryan's team. He says they constantly raise the bar. Excelling at tooling and cutting processes so you get precisely the gears you want. Troubleshooting and fixing noise and failure issues that other gear makers can't solve. Driving down costs without compromising quality. Ryan's team thrives on your gear challenges. Call us.

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