

Gear Grinding Today

New divisions, open houses and the continued rise of the Industrial Internet of Things – there's been a lot going on in gear grinding the past year. Here are a few highlights of what people are doing in industry today.

Alex Cannella, Associate Editor

Gear grinding is growing at a steady pace.

It continues to be an essential part of the gear manufacturing process, business is on the up and individual markets such as aerospace and automotive are holding strong. While there's no imminent overhaul of the industry or sudden shift in economic fortunes that gear grinders need to brace for, the industry is still moving forward, and different machine manufacturers have come up with a few new ways to compete for your dollar and provide added services for your gear grinding needs. Here are a few of the latest opportunities and new technologies you might want to take advantage of.

Product Spotlight: Samputensili's SG 160 Skygrind

The SG 160 Skygrind from Samputensili is the world's first gear dry grinding machine. This process removes the need for cooling oils during the hard finish grinding of the gear after heat treatment. Roughly 90 percent of the stock allowance is removed in the first pass using a hobbing tool, and subsequently in the

second pass, a grinding wheel removes the remaining stock without causing problems of overheating the workpiece, which results in a fully dry process. The structure with two spindles actuated by the linear motors and the use of more channels simultaneously ensures a chip-to-chip time of less than two seconds.

The SG 160 splits the X-axis into two liner slides, each of which carries tool spindles. Both work spindles are in full position control at any time.

The SG 160 Skygrind ensures cycle times at a low comparative cost to traditional manufacturing solutions in the automotive industry.

According to the manufacturer, the SG 160 Skygrind is even faster than traditional dual table grinding machines, featuring a small footprint and lower cost for auxiliary equipment. The most important piece however is the eliminated need for cutting tools, creating an extremely green machine.

To see the SG 160 in action, you can watch the video at www.geartechnology.com/videos.

Company Spotlight: Kapp Niles Metrology (KNM)

There's a new Kapp Niles in town named Kapp Niles Metrology GmbH (KNM). According to Bill Miller, VP — sales and service for Kapp Technologies (KTLP), after KTLP acquired controlling interest in U.S.-based Penta Gear Metrology in 2015, it was evident by customer response that a full metrology product line should be offered globally. KTLP already distributed the larger metrology systems (R&P) built in Aschaffenburg, Germany, and extending operations globally was an attractive prospect. Further study indicated that with additional resources and technology from Kapp, founding a new company would yield significant synergies. Hans Rauth and Chris Pumm agreed and become founding partners in the formation of KNM and bring familiar engineering and technical staff with them.

The new division launched on April 1, 2017 and Miller elaborated that demand from the company's established customer base is a primary focus of the new division, but growing demands in the market as a whole for innovative metrology solutions present exciting opportunities especially as part of Kapp's Industry 4.0 initiatives.

"Often we're asked by customers: 'who do you recommend for measuring?' They want to know what we use and how we measure," Miller said. "A couple of times I'd ask if they wanted us to get in this business. And they said: 'would you, please?'"

Kapp Niles has had their own metrology technology built directly into their grinding machines for over two decades so it is a logical step. But while a built-in measuring system offers closed loop corrections for setup time savings for a grinding machine, it isn't certified to use as the final measurement.



“It’s been a long time coming in that we’ve heard this for decades,” Miller said. “The customers’ message is clear: why don’t you build a measuring machine so that we can buy the system from you. And so finally, we had the opportunity and the time was right, and so we stepped into with the new entity: Kapp Niles Metrology.”

KNM is not meant to replace Penta Gear, and Miller emphasizes that the two companies are highly complementary. KNM will give Penta Gear’s products worldwide reach.

That said, there are more differences between the two companies than just the markets they’ll be selling to. They will continue to release metrology solutions that will cover different manufacturing needs and work with different sized workpieces. Penta Gear’s products primarily consist of analytical machines capable of measuring workpieces up to 400 mm in diameter, recontrolled used machines up to 650 mm, and gear size (DOB) and double flank functional gages. KNM constructs custom gear analytical machines with up to 5.5 m of capacity, portable checkers, and integrated inspection systems.

“The existing products and unique strengths of these companies together provide a full range of products and services to the market,” Miller said.

Hot Topic: Improving Workspeed and Productivity

Hardinge Grinding Group’s General Manager — Director of Sales, Daniel Rey, has noted a number of trends amongst the company’s customers. Most of them surround a familiar desire: to reduce setup time, and thus put out more product faster. A common method that Rey’s noticed is becoming more prevalent is to grind multiple distinct features simultaneously, but notes that the manner in which manufacturers are pursuing that goal can vary depending on how deep their pockets are.

“So we kind of see two trends,” Rey said. “One area is for the high-end machines, where cycle time is important, where automation is important, where grinding features simultaneously is of importance. There is another trend with sub-suppliers. They don’t have the amount of investments available to be

made in these high-end machines, so they are looking basically to adapt certain features to universal grinders so it gets them by, so to speak...These are kind of two contradictory trends, if you will.”

Meeting the demands of one of these trends is the Hauser H40-400, a universal jig grinder now being sold by the Hardinge Grinding Group. The H40 comes with numerous base features, including automatic taper grinding, an automatic grinding tool changer and an

automatic pallet changer. The machine also features a dual-frame design in which the machining head is positioned in the middle of the machining area. The design is meant to improve the grinder’s rigidity, and thus accuracy, as well as improve control of machining and transverse forces and reduce effects from thermal expansion.

Also in an effort to improve work-speed, the Hardinge Grinding Group has incorporated internet connectivity and other technologies that fall under

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the Industrial Internet of Things' (IIoT) umbrella. IIoT technology has become increasingly relevant in every industry, and gear grinding is no different. What is different is that now we're reaching the tipping point where we see IIoT services become more widely adopted and, with an increasing number of customers, even expected.

"Some of that we clearly see filtering through now and becoming more and more of a requirement for customers in their buying decision," Rey said.

One area of IIoT technology that is

seeing wide adoption is in the field of connectivity. Alongside numerous other machine manufacturers, the Hardinge Grinding Group has opted to design all their machines to leave the factory floor capable of connecting to the internet. It's a seemingly simple, almost innocuous upgrade, but it's also one that wouldn't have been widely considered five years ago. Now it's a standard feature. And one can expect that other, more complex concepts related to IIoT — preventative maintenance through self-monitoring products, for example — will follow suit

and become standard tools a gear manufacturer can expect to use to improve productivity.

"Some people that are well-read, they expect things to be available today," Rey said. "They don't want to wait until the future is here, so to speak."

One of the primary benefits of internet connectivity is that it allows the Grinding Group to connect to a machine anywhere, even remote regions where they may not necessarily have an engineer on hand. When there's a malfunction or error, Hardinge's team can troubleshoot the machine online instead of forcing the customer to wait an extra day for an expert to arrive on-site, potentially reducing downtime.

"We try to basically become more responsive and faster in our responses..." Rey said. "If a customer calls, whoever is on the other line will tell you a certain set of information, which then the best way for us to verify would be to be in front of the machine. And short of being in front of the machine due to not having a local service engineer available would be to access the machine online."

Rey stressed that the technology is not meant to replace Hardinge's force of service engineers. Instead, it's designed to provide customers more options to get back on their feet as quickly as possible if something goes wrong with a machine. Both avenues will still be available for the customer to utilize at their discretion.

Product Spotlight: Klingelberg's Cylindrical Gear Machines

During a two-day in-house show on November 9 and 10 at the Ettlingen Oberweier (Germany) works, Klingelberg presented its wide range of Höfler cylindrical gear machines. A total of 13 exhibition areas at the Ettlingen works were dedicated to showcasing the company's innovative and versatile solutions as well as the very latest technological processes.

The latest development from Klingelberg enables direct networking of a closed loop cylindrical gear machine with a measuring device. This technology was previously only possible with bevel gear machines. "By transferring the established Klingelberg closed loop concept for cylindrical gears, we link the machining centers with the measuring machine

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and are therefore driving digitization of gear manufacturing firmly forward,” explains Dr. Christof Gorgels, head of the Precision Measuring Center product line. “The closed loop concept for cylindrical gears is based on an open interface and automates machine correction.”

To demonstrate how the latest Industry 4.0 compliant development can be used for practical production, a VIPER 500 cylindrical gear grinding machine was networked with the P 40 measuring machine at the works. “We have been waiting for this interface!” Willi Humbel, chairman of the board of directors of Humbel Zahnräder AG, commented. “This development will help us tremendously to simplify production of our toothed gears and improve the quality of our components at the same time.”

Digitization in production was the main topic at the two-day event. Höfler cylindrical gear grinding machines are not only designed to be reliable and highly-developed hardware, but the company’s GearPro software also guarantees convenient machining and ensures maximum efficiency in daily use.

In addition, attendees were able to obtain information about the wide range of services of the machine construction company. With the Höfler Service Gate remote maintenance concept, a global communication network will be established in the future from the Ettlingen Oberweier site. At the beginning of the technology show, visitors already marveled at the sight of a customized eight-

meter-high Höfler HF 6000 cylindrical gear cutting machine at the plant entrance. The Höfler HF 6000 cylindrical gear cutting machine for workpieces has a diameter of up to six meters.

Product Spotlight: Luren Precision’s LVG-100

The LVG-100 is Luren’s latest and most advanced 6-axis CNC machine to date. Designed to grind spiral bevel gears efficiently and with high precision, the LVG-100 grinding machine can produce

spiral bevel gears up to AGMA class 14 accuracy. It features a cup type CBN grinding wheel and an HSK tool holder designed to maximize stability and provide quick tool replacement. Other physical features include a Siemens controller, separate cooling system for the spindle and direct drive motors and a rigid high-speed spindle. The LVG-100 also has an optional probe for automatic tooth positioning.

One feature not limited to Luren’s LV-series machines, however, is the com-

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pany's software. Designed and created by Luren's software department, it's designed to provide a friendly user interface by generating automatic CNC programs and providing versatility for all types of gear designs, including an automatic path generating compensation feature.

"With our software, minimal CNC code knowledge is needed to run our machines, the operator simply needs to input the specifications right from the gear drawing, and our software actually generates the whole CNC program," Darian Ditzler, north american sales representative at Luren Precision, said. "It will suggest a machining program, generate a grinding path, allow for modification of tip, root, chamfer, and crowning. Our software is intuitive and conversational, making it the best feature of our machines. Designed as a turnkey machine, we can put our machine on your shop floor and within two or three days you can be grinding production parts."

The LV-series machines are part of Luren's ongoing focus on building high quality, advanced CNC machines.

"To make a high-quality machine requires attention to every detail to meet Luren's requirements for high precision grinding and solid long term reliability," Ditzler said. "That has always been our focus on

making our grinding machines."

According to Ditzler, the LVG-100 has received a warm reception in the two years it's been on the market. The grinding machine has become a regular part of Luren's booths at trade shows. Luren took the LVG-100 on the road to the last Taipei International Machine Tool Show (TIMTOS) and Japan International Machine Tool Fair (JIMTOF), where it received positive attention, and if you want to get a good look at it yourself, the LVG-100 will be at Gear Expo in October.

Event Spotlight: GrindDate 2017

Amongst the numerous massive trade shows that happen every year, Haas Schleifmaschinen (German parent company of Haas Multigrind) put on their own open house show, GrindDate.

The show was designed to give attendees an opportunity to learn about the company's products and latest developments in a calmer setting than the frantic hustle and bustle of mainstay trade shows. Haas organized the show at their headquarters in Trossingen, a small German town on the edge of the Black Forest, to set the backdrop for the show's relaxed tone.

"GrindDate is intended to encourage two-way communication with our customers and prospects, in a much

more relaxed, personal, and focused setting compared to the traditional trade shows," David Drechsler, business development manager — Americas at Haas Multigrind, said. "We bring our prospects up to date on recent and planned innovations at Haas and we have time to get more detailed and interactive feedback from our customers."

Amongst their usual established products, Haas used GrindDate to introduce their latest wheel loading station. The station is designed to operate with their Multigrind CA and CB machines, five-axis grinding centers that are built using Haas' Multicube design. The loading station system allows users to load wheels and wheel sets for more part numbers, reducing setup and change-over time, and is capable of storing up to 70 wheel flanges and 20 coolant nozzles.

Alongside the latest technology from the company, 18 presentations were given at the show. English and German presentations covered a full range of grinding and related technologies, including grinding wheels, grinding fluids, wheel dressing, coolant filtration and software, and Haas even brought in speakers from outside companies, including Oelheld, Kaiser and Krebs & Riedel.

2017 was the second ever installment of Haas's show, and according to Drechsler, GrindDate 2017 outstripped its predecessor with double the attendance. ⚙️

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Industry Spotlight: The Future of Automotive

In automotive, as with many other industries, gear grinding is an unquestioned cornerstone of the gear production process, and according to Walter Graf, Reishauer's marketing manager, it will only continue to grow in importance, particularly with the rise of electric cars. Though electric cars won't be completely taking over the market any time soon, they are expected to grow in popularity, and when they do, it will be important that gear manufacturers are ready to meet new demands.

According to Graf, a primary concern for electric cars will be gear noise. When the usual petrol-based motor is cut from an electric car, one of the loudest remaining noises comes from the gears, and Graf believes that reducing that noise will not only become a matter of concern for automotive manufacturers in the future, but also that reiterating on current gear grinding techniques can provide the solution to that demand.

Just last month, we took an in-depth look at the outlook for the automotive industry. If you want to learn more about upcoming trends gear manufacturers working in the automotive industry should be keeping tabs on, check out "Transmission Throwdown" in the May 2017 issue of *Gear Technology* or online at www.geartechnology.com. 

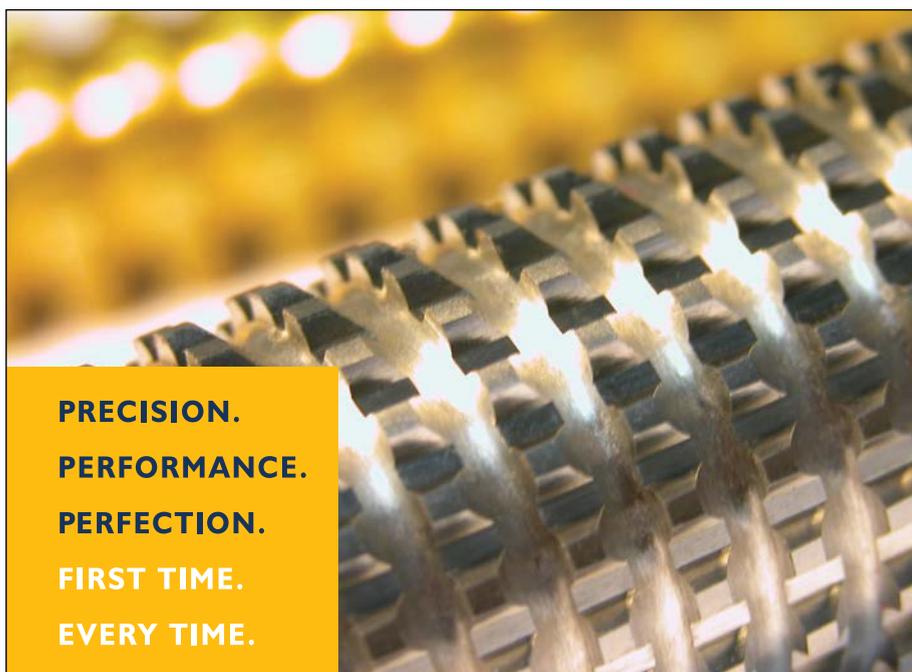
Product Spotlight: Liebherr's IG Opal 4.0 Technology

Liebherr has reiterated on past designs and come out with their next generation of internal gear tooth profile grinding technology. IG Opal 4.0 allows users to change over from external to internal gear grinding in under a half hour and is compatible with grinding disks 100 or 125 millimeters in diameter.

Interested in hearing more about Liebherr's new technology? You can find more details in our product new section online at www.geartechnology.com or in the May 2017 issue of *Gear Technology*. 



To read about Reishauer's latest gear grinding technology, see the technical article, "Twist Control Grinding," on page 48.



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