

Slow and Steady

Gear Industry Focuses on Productivity, Quality and Innovation in 2017

Matthew Jaster, Senior Editor

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state of the gear industry

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The results of our Annual State of the Gear Industry Survey (See page 26) provided insight on 2016 as well as forecasts for 2017.

We received feedback from nearly 300 gear manufacturing professionals for the online survey.

If you're a fan of political theater, congratulations 2016 was YOUR year. After a nasty, controversial election cycle, a new administration is taking over in Washington D.C. The presidential election came up as an answer to several survey questions including Reason for Change in Production in 2016, Reason for Expected Change in Production in 2017 and Reason for Expected Change in Employment in 2017. Some merely cited the elections in general, while others felt that an increase in production will come courtesy of one word: Trump.

Looking at production output, 2016 was strikingly similar to 2015. For many of our respondents, production output was either a little better (25 percent saw a production increase between 1-10%), a little worse (21 percent saw a production decrease between 1-10%) or it stayed the same according to 20 percent of those surveyed.

And this seems to mirror the overall state of gear manufacturing today. Many believe that 2017 will be better than 2016, but only by the slightest of margins. AGMA President Matt Croson said that the AGMA tracked 11 gear markets in 2016 and only one (aerospace) was up .7 percent.

"Six of the 11 are predicted to be up in 2017, so we're coming back," Croson said. "But clearly we're coming back from a starting point that was very low."

Many of our survey participants expect modest production increases this year and 47 percent of our survey respondents work in heavy industrial markets like oil and gas, mining and construction (areas that have been hit the hardest economically).



Photo by David Ropinski

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The overall consensus regarding 2017 comes down to two keywords: innovation and productivity. As manufacturing production slowly increases here and abroad, gear manufacturers would be wise to stay on top of megatrends like the Industrial Internet of Things (IIoT), additive manufacturing, robotics and emerging alloys and new materials.

All of these trends could play a much larger role in our industry in the next 3-5 years. They're also emerging technologies that organizations like the AGMA will be monitoring for its members moving forward.

In addition to our reader's survey, *Gear Technology* caught up with representatives from Gleason, Liebherr, AGMA, Koepfer and EMAG to share their thoughts on the current state of gear manufacturing, plans for Gear Expo and modest expectations for 2017.

John J. Perrotti, Gleason Corp.

We are cautiously optimistic for 2017 even though overall demand for gear equipment has not seen growth in the past two years. We expect that pro-business policies in the United States may stimulate new demand which can help lift demand in other global markets. Also investments in infrastructure and energy policies both in the United States and abroad can help the recovery of many industries which have been depressed the past few years.

One of the key challenges will be the successful market launch of many of the new products and technologies we introduced in 2016. At IMTS, we displayed several of these new solutions including our new *GEMS* gear design software, our 260GX double spindle threaded wheel grinder, Genesis 400HCD hobbing machine with integrated chamfer cutting capability, 300PS power skiving machine for the hard finishing of internal gears, 300GMSL multi sensor inspection machine which opens a new era of gear measurement and the 500CB automated cutter build machine. These are all designed with potential to implement as part of a machine systems approach and deploy our Gleason 4.0 solutions to integrate into a digital manufacturing



environment.

Trends within gearing are largely shaped by the end-markets that we serve. The electrification of vehicles, robotics, renewable energy to name a few megatrends that are driving different gear forms, power, efficiency and noise requirements all with the expectation of lower cost and consistent quality.

Trends within manufacturing are more integrated manufacturing systems and use of increased data to optimize production processes. Gleason is building our future strategies around these trends with fully automated, integrated machine systems complete with closed loop capabilities to create a highly efficient and precise gear-making capability.

When the industry meets at Gear Expo this year our solutions will provide the gear community the capabilities to remain competitive with the evolution of new power transmission requirements. We expect continued focus on gear design and the linkage to the manufacturing process, hard finishing of gears, elimination of idle times through automation and integration of secondary operations and digital manufacturing or what we refer to as Gleason 4.0. Gleason will have all of these solutions on display.

In order to be successful in the future we must innovate at an even faster rate. Education is the foundation for rebuilding and becoming once again the leader in the creation of manufacturing technology. Certainly government can assist by lowering the operating burden that companies face in the United States and helping to promote manufacturing as a desired career path. Also continuing to develop partnerships with basic research institutions (many which are sponsored through government funding) and the private sector will be increasingly important to continuously innovate. (www.gleason.com)

Scott Yoders, Vice President Sales, Liebherr Gear Technology

In the world of parallel-axis gear manufacturing, Liebherr is known for techniques such as dry-hobbing, twist-free grinding, and ChamferCut.

Additionally, as Liebherr makes gears



for our own equipment (Liebherr cranes, construction equipment, aerospace systems, diesel engines, etc.), our state-of-the-art solutions in hobbing, shaping, gear-grinding, skiving – and automation are practical and experience based. Together with our colleagues at Wenzel for gear inspection, we are a team of manufacturing engineering professionals that can indeed provide real world gear cutting experience, and turn-key solutions, to our customer base worldwide.

Some trends we see are at the extremes of gear design, ranging from nano-level technologies, up through heavy-duty gear applications. For example, as the topology of tooth flanks is concerned, we have made developments on the micro-geometry of tooth-flank modifications. Some industry trends illustrate the effect of deviations on flank-modified gear teeth, with the aid of topological measurements (from Wenzel WGT machines). These discrepancies have an impact on load carrying capacities and noise generation. To solve this problem, Liebherr has developed a deviation-free topological (DFT) generating- grinding technique. DFT allows our Liebherr customers to correct deviations, and even give options to the design engineer -- such as Generated End Relief (GER) and Noise Excitation Optimization (NEO).

At GearExpo, Liebherr will showcase an abundance of innovations, like how we are transforming gear-skiving into a reliable process and thus creating new gear machining possibilities. We will present a small gear shaping machine, which was specifically designed for high precision shaping of small pinions and multiple gear teeth, meeting the high standard of the aerospace industry. Additionally, Liebherr will highlight new LGG- grinding arms for internal gear teeth, as well as a basic-platform gear hobbing machine for job shops.

Additionally, we would like to introduce a new colleague, who has joined the management board of Liebherr-Verzahntechnik GmbH -- Dr. Hans Gronbach. Dr. Gronbach has been the chief development and design engineering officer since June 2016, and is responsible for championing innovation. His CV includes positions in both science and business; in-depth development experience and knowledge of

machine tool markets. This makes him a perfect addition to our team. He will help guide Liebherr-Verzahntechnik GmbH into a successful future and enable the company to provide the best products for the markets of tomorrow. (www.liebherr.com)

David Harroun, Sales Manager, Koepfer America, LLC.

I am optimistic. We had positive reaction to our products during IMTS and we are seeing a lot of activity. Automotive is supposed to weaken slightly in the next years but it is still strong and there are new programs set to launch. Other markets that use our products such as aerospace and even medical are still strong.



One of our challenges remains recruiting talent. We are growing as a company and will be adding people in sales, application engineering, and technical service. We find these positions are difficult to fill.

We need to attract younger talented people to want to have a career in the

gear industry. Many knowledgeable people in this industry are getting close to retirement age. The gear industry is a highly technical field and can't be taught in a short amount of time. If we can't attract younger people to be interested enough to enter *and stay* in the industry we will have many problems as the baby boomers retire.

Our normal customer is no longer looking for a machine to produce gears. They are looking for a process, specifically a very productive process. This means that you need to be able to provide equipment, processes, and systems in order to be prepared for this challenge. We take on this challenge by continuously developing the equipment with software, special cycles, and integration of additional processes to make the machines more productive.

Furthermore, Koepfer America, brings together several European companies to be a complete gear manufacturing system supplier of hobbing, shaping, chamfering/deburring, inspection, and gear tool sharpening equipment. Additionally, we supply hob/milling cutter, gear grinding wheel/honing wheel,

and sharpening service.

Most of our customers are always looking for additional training. The gear industry is highly technical and is a little more difficult to learn, unless you have access to somebody with knowledge to help you along. We have reacted to this by providing an annual gear school training program which covers manufacturing and inspection of gears. Occasionally, we will hold these schools within the customer's facility to make it easier for them.

Regarding Gear Expo 2017: The talking points are always decreasing cost with a constant desire for increasing the quality level of the components. Grinding and honing have always been very expensive processes, however, the dressers and abrasives have taken great strides to bring this cost down significantly. Furthermore, since most grinding and honing operations are influenced by the pre-hobbing, it is also incredibly important to be able to hob parts with short cycle times while producing the best quality of part. (koepferamerica.com)

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D. Kirk Stewart, Jr., Director of Sales, EMAG

EMAG is very optimistic about the gear industry going into 2017. Many regions and industries outside of the automotive business have been slow or declining in the last two years. However, consumption of machine tools is anticipated to increase for 2017.



EMAG's "Modular Standard" product line, which was launched in 2012, is now a mature and competitive platform which allows us to compete over a much more broad market. As such, to be successful in more regions, our sales coverage must provide local, pertinent knowledge to customers which are being exposed to the inverted spindle lathe solution for the first time.

2017 will be the year of increased productivity. All of our customers strive to gain more business and retain that which they already have. Yet at the same time, finding the skilled workforce to support this growth remains a challenge. EMAG is well positioned to support manufacturers in this growth mode, given the self-loading principle of the VL and VT line of machines for chucker and shaft type parts, respectively. What this means is that with the same number of operators, more EMAG machines can be running, without any lost time for loading or unloading of components.

No doubt, maintaining the knowledge base of our engineers is a key to our success. As a wholly owned subsidiary of EMAG GmbH, we regularly 'trade' resources. Meaning that when we need help in North America, as an example, it is common for our colleagues to support us from Europe (or China, India, France, etc.), and vice versa. Having standard products around the world (rather than customized regional solutions – perhaps through third-party distributors) allows us to leverage the collective knowledge of our global organization, locally.

It is a recurring talking point that there is a generational gap between those with decades of invaluable experience to that of the younger generation of manufacturing engineers. As such, we find many customers looking for companies like EMAG which are able to pro-

vide value through providing more content. This content can come in the form of providing machine tools or systems which are doing more than one technology or machine in isolation. In the case of EMAG this may translate to a cell of machines which includes turning, hobbing, induction hardening, hard turning, welding, hard milling, and finish grinding with all the required automation thereof. EMAG is one of few companies which provide such a wide range of technologies focused on core components.

I expect that the dynamic nature of our business will be energized by the recent election of Donald Trump. In the last weeks, the election results have been met positively by small business owners and the customers they serve. As such, I expect that there will be much optimism at Gear Expo and increase buying at this time. (www.emag.com)

Matt Croson, President, AGMA

The theme of 2017 might be doing more with less. Our members will be very cautious this year regarding hiring and machine tool investments. They're going to want to believe in the upturn and they are going to be cautious managing their cash and investments. Many are hesitant to jump back in until they really start seeing some positive results. It's going to be a slow and steady climb.



I'm optimistic now and I was optimistic before the election. The optimist in me says that under the new administration areas hit hard like mining, oil & gas and construction will finally start moving in the right direction. This administration is already talking differently about energy. It will be interesting to see

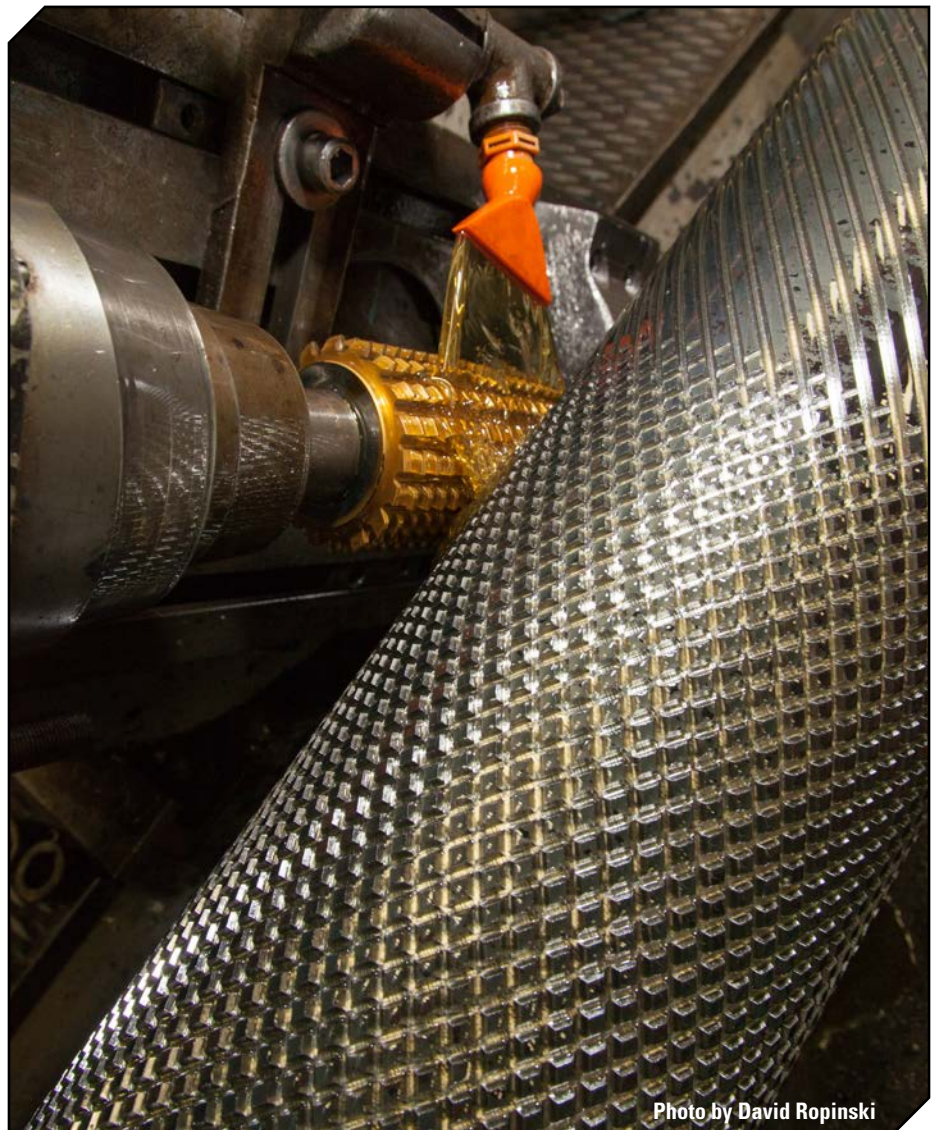


Photo by David Ropinski

how this plays out in the coming years.

We'll also see more mergers and buyouts in our industry in 2017. There are smaller companies (second and third generation owners) that might want out. They are taking the time to see what equipment they have, what products they're delivering and what their customer base looks like. I would expect to see maybe 10 to 15 companies involved in mergers and buyouts. It's not going to be a massive consolidation, but some are looking at other options.

As far as emerging technologies and trends within the gear industry, the AGMA is tracking a few different areas that will be valuable to our members.


For example, we're paying close attention to additive manufacturing. It's a disruptive technology. ANSI has put together a group to look at standards development in that area. If you can make gears in a new and different way using additive, that is an interesting thing to look into. Companies like Boeing and GE are spending a ton of time examining the technology. They're looking beyond developing prototypes and determining

if they can create full systems and products. It's one thing to make plastic gears this way, but if they can make gears that go into critical systems, people should really start paying closer attention to this.

Another area is the Internet of Things or Industry 4.0. We're going to have a special presentation on this at our Annual Meeting on the use of Industry 4.0 in the manufacturing sector. John Brandt, CEO of the Manufacturing Performance Institute (MPI) will deliver key findings followed by speakers from the industry and AGMA members that are successfully applying this technology today. We plan on discussing reasonable, pragmatic approaches to these systems. It could be as simple as putting a sensor at the end of your line to count the gears, but it could also be a plant where every gear, bearing and tool has a sensor of some sort that is helping companies with predictive maintenance and failure analysis.

Another trend we're keeping a close eye on is emerging alloys and new materials. We recently announced a new AGMA class in 2017 that will focus on new steels in gear applications. There

are many new products and tools in the toolbox for today's engineers to leverage. Our members will need to stay on top of these changing technologies. We're seeing lighter and stronger products. Those involved in gear manufacturing are going to have to figure out what these new alloys and materials mean for their products moving forward.

Our focus now and in the future is to stand side-by-side with our members to drive power transmission innovation. This is our vision. It's exciting because it touches on the fact that our members will always be at the center point of innovation when it comes to gears. This is what they do. We have a communication role, a trade show role, with our members. Gear Expo is an example of how we can express innovation through our members. Additionally, our educational sessions, emerging technology research and online resources will benefit our members as well. (www.agma.org) 



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