

2017-01

# solutions

gear manufacturing technology magazine

**Closing the Loop...**  
**Connecting GMS<sup>®</sup>**  
**Metrology with**  
**GX Hard Finishing:**  
**Automated, Fast,**  
**Reliable**



closed loop

Total Gear Solutions

**Gleason**

# Welcome to Gleason



John J. Perrotti

President and  
Chief Executive Officer

Dear Valued Customers:

Today, technology is evolving at an ever-faster rate. This impacts all facets of our lives including the world of global manufacturing. The growing trends of automation and robotics, Industry 4.0, the Industrial Internet of Things, and advanced design and simulation tools linking design and manufacturing are some of the more important developments driving unprecedented changes in all corners of manufacturing.

Gleason, which today is the world's largest and most diverse supplier of gear technology solutions, is very much focused on the future state of gear design and production and how this can benefit our customers.

Beginning with design, Gleason is introducing in 2017 its new GEMS software which provides an advanced platform with the most powerful tools for the design, analysis, simulation and manufacturing of all types of bevel gears. This suite of software provides a simple touch screen user interface with well-proven calculation engines and finite element analysis tools. In February 2017, Gleason acquired KISSsoft AG, a leader in design, analysis and simulation tools for all types of gears and power transmission systems. These added capabilities will complement our GEMS solutions and we are excited about the new products ranging from design to production to inspection that will result.

Gleason 4.0 is how we describe our vision for an ecosystem of linked solutions creating connectivity throughout the entire value chain for gears with enhanced data collection, analysis tools and real-time feedback to the design and manufacturing process. A few examples of Gleason 4.0 solutions include improving machine uptime

in the form of predictive maintenance, smart tools that can optimize tool costs per piece and "communicate" directly with our machines and various Closed Loop systems for both bevel and cylindrical gears which seamlessly provide real-time data back to the production process to improve productivity and quality.

Machine systems will define our products of the future. Machine systems we now offer include a combination of a machine coupled with robotics or other forms of automation with other secondary operations being performed within an integrated production cell. Examples of some of the secondary operations already in our portfolio include integrated chamfering, in-process inspection, part marking and part washing.

Manufacturing globally is at an important transition point. Those that can successfully take the next step and cross that bridge will prosper. We hope you consider Gleason as your partner to take that next step. We welcome the opportunity to share with you our exciting vision for the future.



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# Closing the Loop

The GX Series Travels the World to Demonstrate Revolutionary New Features – with Visits to Germany, Japan, China and the United States

**Y**ou won't want to miss it. Gleason's GX Days is traveling the world to introduce the powerful new capabilities of the Genesis® 200GX and 260GX Threaded Wheel Grinding Machines, and the benefits of the Gleason Closed Loop System. "In contrast to a trade show, this kind of event enables us to demonstrate the numerous features and functions of these machines live in an environment similar to that of the actual production environment," says Dr. Antoine Türich, Director Product Management, Hard Finishing Solutions, Gleason Corporation.

GX Days launched in Japan earlier this year where over 90 customers experienced the new 260GX Threaded Wheel Grinder live at Gleason Asia's showroom in Nagoya.

GX Days' next stop was at Gleason-Pfauter Maschinenfabrik in Ludwigsburg, Germany, involving another 80 customers from Germany and other parts of Europe.

Most importantly, GX Days gives attendees the opportunity to attend technical presentations about the new Gleason technologies and the latest trends in threaded wheel grinding, and experience live demonstrations of important GX machine features and, especially, the Gleason Closed Loop System.

## Just as Easy to Use as a Photocopier

The demonstration of the speed and simplicity with which the grinding machine can be set up and re-tooled using just a single tool has amazed even veteran gear grinding professionals. The new set-up trolley developed by Gleason for this particular process, and the



**Closed Loop capabilities first introduced by Gleason in 2015 have continued to evolve...**

The Gleason Closed Loop System allows measurement data to be seamlessly networked from a Gleason GMS inspection machine directly to the GX grinding machine.

With Closed Loop, it is no longer necessary to transfer the necessary measured values manually, a process which frequently leads to costly errors and wasted time during setup. Now, production is much more reliable. The grinding machine automatically compares the data transmitted with the nominal values and automatically calculates the corrections required.

menu-guided setup, makes it easy for customers to get a hands-on experience of the simplicity of the setup in a do-it-yourself exercise. Remarkably, everyone that has tried it has succeeded in setting up the machine, including customers with no previous setup experience. The comment made by one customer summarizes the experience:

“The machine is just as easy to use as a photocopier!”

## First Part Cycle

The new First Part Cycle, a fully automatic workflow which follows set-up and then continues until the first two workpieces are ground, has also met with great approval. It's a 'first' in gear manufacturing. The machine completes all the steps required after mechanical set-up independently and fully automatically. This includes automatic meshing of the newly-changed dressing and grinding tools in relation to one another and with the gears for cutting. The grinding worm is likewise dressed until it has the correct profile. The First Part Cycle concludes with grinding of the first workpieces, which are then automatically discharged for inspection

into the SPC station – part of the automated system provided by Gleason Automation Systems.

The Closed Loop developed by Gleason is also demonstrated live, and is of enormous interest to customers, Türlich says. The Closed Loop allows measurement data from a Gleason GMS inspection system to be seamlessly networked directly to the grinder. It's no longer necessary to transfer the necessary measured values manually, a process which frequently involves errors; production is consequently much more reliable. The grinder automatically compares the data transmitted with the specifications and automatically calculates the corrections necessary.

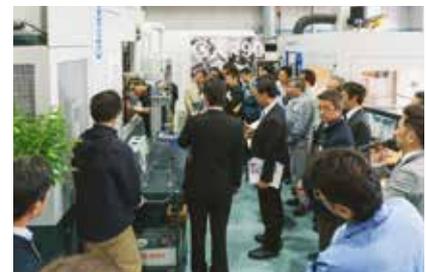
The program typically finishes up with a demonstration of the machine's capabilities in twist-controlled grinding. Gears with different twist values, up to and including different values on the left and right flank, are machined without additional grinding time. Impressive evidence of the high quality achievable and the reliability with which the desired values are met are provided in real time by immediate inspection of the gears on Gleason inspection machines.



A do-it-yourself demonstration gives customers a chance to set up the machine in a few simple steps: “As easy as a photocopier.”



GX Days in Ludwigsburg, Germany, gave customers from all over Europe an opportunity to see powerful new GX Series capabilities for the first time.



Customers in Japan got an up-close, hands-on opportunity to experience GX Series technology at a recent GX Days.

Each individual GX Day wraps up with a pleasant evening function to complete the numerous technical discussions of the day in a relaxed atmosphere.

## Next Steps: CIMT and Gear Expo – Huányíng – Welcome!

The next stops on the GX Days will be China at CIMT and the United States. At these events we will be presenting Closed Loop and First Part Cycle live.

We are looking forward to welcoming you at the upcoming events.



**Dr. Antoine Türlich**  
Director Product Management  
Hard Finishing Solutions  
Gleason Corporation

# Taking Power Skiving to New Levels

The enormous productivity and quality benefits of the Gleason Power Skiving process are now available for a wide range of applications. Whether you're producing small or large, internal or external cylindrical gears, soft cutting or fine-finish machining – there's a Gleason Power Skiving solution to fit your needs.

Most gear manufacturing applications typically fall between the two worlds of highly efficient mass production and more flexible, on-demand manufacturing of smaller, fast-changing batches. As the Total Gear Solutions Provider, Gleason has long been on the forefront of offering solutions across the complete spectrum, with systems that include gear engineering and simulation software, production machines, inspection systems, workholding, tools and supporting services.

Our approach to Power Skiving is no different. The process is recognized as a real breakthrough in gear manufacturing. It is, for example, many times faster than shaping and much more flexible than broaching. But that's not enough. Practical solutions need to exist to meet the requirements of, for example, small, complex, high-precision gears for electromobility or robotics, as well as the heavy-duty machining requirements of

large internal gears up to module 9 and diameters up to 800 mm. Furthermore, there is the need to apply Power Skiving to achieve the higher accuracy and torque for more efficient machining of hardened gears.

Only Gleason now has a complete toolkit of solutions to cover all of these requirements. Here is a brief overview...

### Power Skiving of Small Internal and External Gears

Internal gears and external gears with small overrun space can be produced on the 100PS, the smallest machine in the Power Skiving portfolio in a more economic way compared to shaping or hobbing with very small hob diameters. Due to the horizontal workpiece axis configuration, the 100PS is dedicated for shaft and internal gear applications.

The 100PS can further be equipped with an integrated chamfering-deburring station working with a rotary chamfering





Application Examples		
	100PS	600PS
Module	2.2 mm	9.7 mm
Number of teeth	20	60
Helix angle	32.5° right	0° right
<b>Cutting time</b>	<b>41 seconds</b>	<b>26 minutes</b>

tool. The chamfering process takes place before the last cut in order to obtain finishing quality on the flanks.

### Power Skiving of Medium and Large Workpieces

For medium and large workpieces, Gleason offers the 300PS, 400PS, 600PS series of machines including an extension up to 800 mm. Combined with modular workholding in different sizes, and the extremely stiff machine concepts, Gleason can offer more reliability, shorter cycle times, and outstanding quality and surface roughness of the gear.

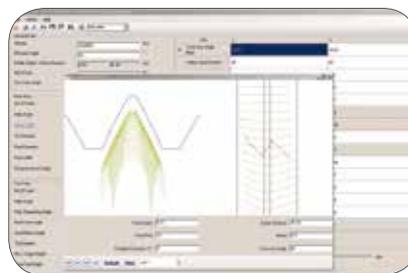
### Powerful Process Simulation

Until recently, it was impossible to effectively establish the boundaries at which the skiving process exceeds its limits and isn't effective. Nor was it possible to truly optimize the process in advance due to the lack of appropriate software. Anticipating and evaluating chip formation and collision points was difficult, if not impossible.

Today however, Gleason offers comprehensive Power Skiving Technology and Simulation Software that enables end users to easily simulate the entire cutting process and determine the most effective process strategy.

The software can analyze the influence of different cutting tool geometries and process parameters on chip formation, gear quality, collision situation and cycle time. Now, the total cost per gear can be calculated, factoring in the optimum cutter size, the cost for a new cutter, and the cost for resharpener in combination with anticipated cutter life. The software allows end users to decide if a given part can be safely and economically manufactured by Power Skiving or whether shaping is the better process.

Design of Power Skiving tools is always based on a simulation and technology requirements. This differentiates Gleason from competitive suppliers. Ultimately, it makes the implementation and application of Power Skiving as simple and familiar as shaping.



Before the first chip is removed, Gleason's process and application specialists know the results using powerful simulation software.

### Hard Power Skiving

The requirements for quieter gears and/or higher torque are increasingly driving the need for fine finishing of hardened gears.

Until now, the hard finishing solutions available for small and medium internal gears were not efficient – and very costly. Power Skiving and our process know-how are opening up exciting new hard finishing possibilities for internal gears. It's interesting to note that as far back as the 1990's Pfauter had developed a very successful process for 'hard' Power Skiving. But at that time the cost of carbide tools was prohibitive. The mechanical structure of the machines with mechanically connected spindles and axes created vibrations that resulted in high levels of wear which, in connection with the high cost for carbide tools, was simply not practical.

Now, however, the combination of the latest generation of extremely rigid and stiff machines, direct drive technology, Gleason's simulation and technology know-how, and the capabilities to manufacture carbide tools, are helping make Hard Power Skiving a practical reality.

# Power Skiving



## Cutting Tools and Tool Management

Carbide tools are designed and manufactured by Gleason application specialists in close collaboration with Gleason Cutting Tools operations. The carbide cutter for Hard Power Skiving and the cutter for Soft Power Skiving need to match in order to provide the optimum result and cutter life.

Setting of the cutter is done with the help of a specially developed 160CPS Cutter Positioning System (shown below). This not only allows the setting of the cutter

in an optimum way, but also allows the analysis of the wear of the cutter through an integrated microscope and PC. More important, it is equipped with an RFID reader, which allows reading the data from an RFID chip included in the cutter. This is part of the Gleason 4.0 initiative called gTools.



The Hard Power Skiving machines are equipped with a stock dividing sensor to detect the position of the tooth gap.

## Dedicated Machines, or Add On

For customers with low volumes who can't perhaps justify dedicated Power Skiving machines – but already have bevel gear cutting machines – Gleason can offer Power Skiving solutions as an add-on to these bevel machines. Different cutter systems, including solid carbide cutters, cutters with inserted carbide blades and stick blade cutter systems are part of the 'Total' Power Skiving Solution from Gleason.

## Closing the Loop on Quality

For many years, Gleason has developed closed loop systems for our bevel gear manufacturing systems. 'Closed loop' optimizes gear production by connecting the Gleason production machines to Gleason inspection equipment. A similar software capability exists for Gleason Power Skiving machines in connection with Gleason's line of GMS<sup>®</sup> metrology equipment. Measurements and corrective actions can be performed quickly in an automatic mode, monitored by the operator.

In conclusion, it's gratifying to know that the enormous potential of Power Skiving is finally being realized. Even more developments are ahead. Stay tuned...



**Udo Stolz**  
Vice President  
Worldwide Sales  
and Marketing  
Gleason Corporation

# Power Skiving in China

Installation of one of China's first Gleason Power Skiving machines at Shanghai Chuanlin Precision Parts Co., LTD. gives this fast-growing manufacturer an important new capability for faster production of precision internal and external ring gears.

There is an ancient Chinese saying: "Above we have heaven, on earth we have Shuzhou and Hangzhou."

Now they have Gleason Power Skiving as well.

A fast-growing manufacturer located just outside of the famous garden city of Shuzhou will be one of the first in China to realize the many benefits of the new Gleason 100PS Power Skiving Machine.

Shanghai Chuanlin Precision Parts Co., Ltd., is part of a joint effort of four Chuanlin companies that, together, are among the largest privately owned companies in the great Shanghai area, and among the most modern.

Their products are used in applications that range from automotive to aviation, compressors to satellite communications. Most importantly, their ISO/TS 16949, ISO 9001 certified machine shop is among the most modern of its kind, and geared to the production of high precision parts.



Company officials say they are excited by the potential of the Power Skiving process. They cite a variety of reasons why the Gleason 100PS is expected to be a particularly strong contributor to the company's ambitious plans for expanded production capacity, and the need to reduce the production cost per piece for several important gear types, particularly as compared to the conventional shaping process that would typically be used in this application.

For example, the machine will annually produce as many as 100,000 high precision 84T and 75T internal ring gears as part of an important new planetary gear set product – as well as perform Power Skiving operations on external gears, worms and worm wheels – all with sizes ranging from 20 to 100 mm in diameter and quality to DIN 7 and higher as a result of the machine's particularly robust, rigid construction.

In addition, the company will take advantage of Gleason's ability to provide a 'total' Power Skiving solution that will include cutting tools and quick-change workholding designed specifically for these applications.

The large selection of optional equipment that Gleason makes available for the 100PS, including automation, provides a degree of flexibility that will help the company accommodate future workpiece types, production volumes and lot sizes.

## Bevel Gear Design Power at Your Fingertips



# GEMS

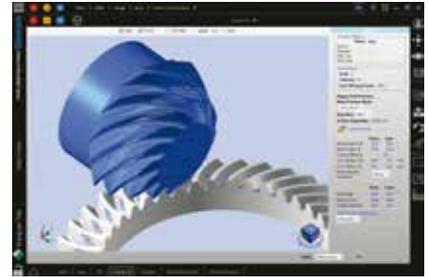
With GEMS™, we've introduced the next-generation design and manufacturing system for bevel gears and some specific types of cylindrical gears. It's a powerful new software platform that provides highly desirable gear design and analysis capabilities, seamlessly connects with all your existing Gleason design software – and helps optimize the complete bevel gear manufacturing process.

GEMS is the world's first gear design software that can be operated entirely via touch screen. It is also fully compatible to keyboard and mouse operation for instantaneous changeover between, for example, an initial touch interaction and keyboard to enter numerical data during a tooth contact optimization. GEMS software also works equally well on a tablet or a smart phone.

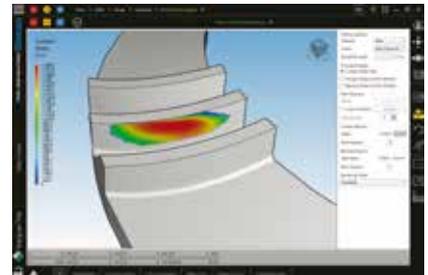
GEMS easily connects to the entire Gleason program suite as well as institutions and associations. This makes it possible to check some AGMA standards or run a chip formation study with the WZL tool box from within GEMS. GEMS might be the only software application a gear engineer will ever need during a working day.

In addition to the many user interface and data processing innovations, GEMS offers a large variety of new gear engineering capabilities and 3-D graphics that make the gear design and manufacturing easier and allow better decisions. The analysis capabilities and the easy-to-understand graphical representation open possibilities for creativity and the potential for extraordinary accomplishment.

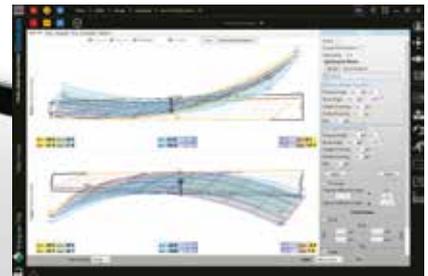
3D Tooth Contact Analysis



Strength Calculation: FEA Analysis, Contact Stress



Ease-Off Modification



# New Solutions for Bevel and Cylindrical Gears



## Gleason-HELLER 5-Axis Powerhouse

Now 5-axis machining of larger high quality gears in low volumes has never been faster or more affordable, with a new generation of Gleason-HELLER machines.

These machines can easily produce all types of gears and gear tooth geometries – everything from spiral and hypoid bevel gears, straight bevel

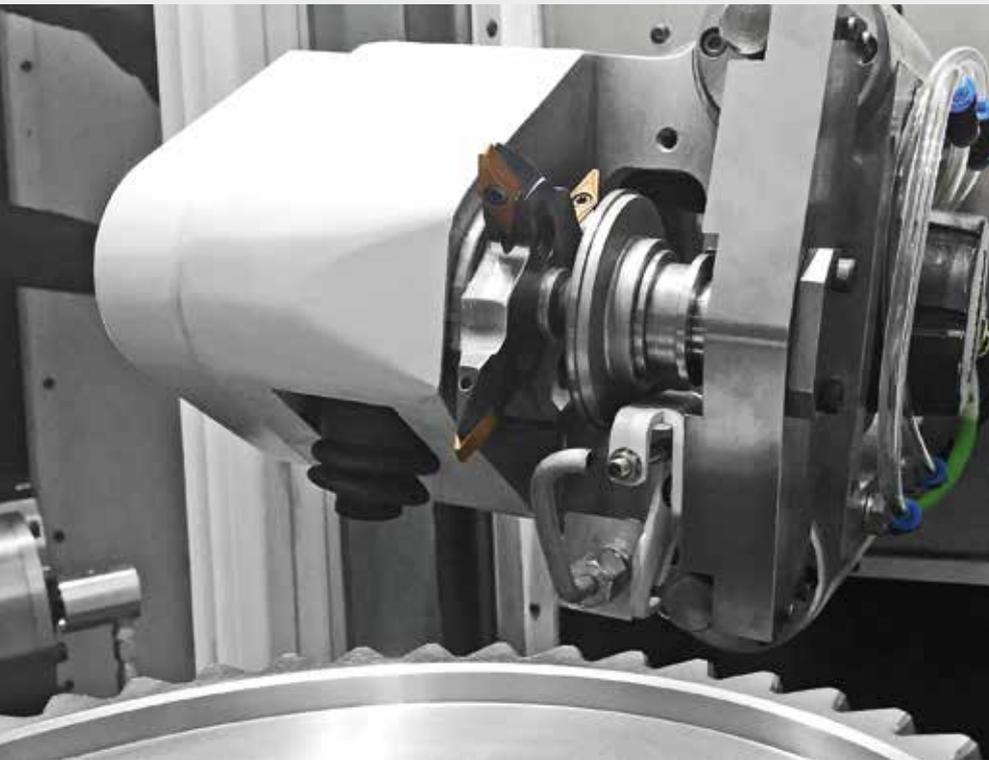
gears to spur, helical, double-helical and herringbone cylindrical gears – and perform all the other general machining tasks typically required of 5-axis machines. The end result is the nearest thing yet to a universal 5-axis machine.

Several 5-axis horizontal-spindle machining centers now comprise the Gleason-HELLER line, ranging from the 6000 series for workpiece diameters up to 1,000 mm, to the FT 16000 for workpiece diameters as large as 2,500 mm. The inherent static and dynamic stability of the HELLER machine platform and its extremely robust, high-torque/high power spindle design provide the ideal platform for the application of a wide range of highly productive inserted-blade disk-type cutters.

Most significantly, the new Gleason 5-Axis Gear Studio (G5S) software system seamlessly interfaces with the HELLER uP-Gear CAM system, providing all the input data, corrections and flank modifications needed for uP-Gear to generate a 3D geometry model of the gear for visualization, and the optimum NC parts program needed to produce it. Ultimately, machining a gear complete from a blank can now take place in as little as two to three hours, vs. the two to three days needed with a standard 5-axis milling machine using end mills.



# New Solutions for Cylindrical Gears



## Defined Chamfers on Larger Gears – a New Solution

Adding a CNC chamfering/deburring module at a 90° angle to the main work area of Gleason's proven 400H Hobbing Machine has created the 400HCD, a machine capable of parallel hobbing and chamfering/deburring workpieces as large as 400 mm in diameter without any productivity loss.

A four-station ring loader transfers workpieces between the central worktable and the chamfering/deburring station, which performs contour milling using a fly cutter.

Even with the added chamfering/deburring module floor space requirements remain very compact.

The fly cutting chamfering method employs milling cutters with indexable carbide inserts featuring two or four blades. Due to the cutter geometry a few insert sets can cover a wide range of modules making the fly cutting process extremely flexible while at the same time relatively inexpensive.



### Features include:

- Very compact: same work area dimensions as the 400H.
- Highly flexible operation: only a few insert sizes will cover a wide range of workpieces.
- Chamfer sizes and angles can be flexibly and easily defined via the Gleason Operator Interface.
- Low tool cost due to universal tool with standard carbide inserts.
- Dry or wet processing.

## Integrated Chamfering/Deburring for Smaller Workpieces

Two new Gleason horizontal hobbing machines also integrate chamfering/deburring, providing optimized solutions for particularly high productivity and efficiency:

### P90CD Hobbing Machine for Automotive Pinions and Short Shafts:

- With integrated CNC chamfering/deburring station working in parallel to the cutting process.
- For hobbing parts up to 60 mm diameter and module 3 mm.
- Cycle times are as short as 10 sec. for planetary pinions.

### P90iC Hobbing Machine for Geared Shafts and Disc-Type Workpieces:

- With integrated chamfering/deburring unit to eliminate burrs and create precise chamfers.
- For workpieces up to 100 mm diameter and module 3 mm.
- Ideal for one or two-cut processes for finish hobbing or to create a quality base for subsequent hard-finishing operations.





## Automated Cutter Build, Truing and Inspection



**T**he new Gleason 500CB Cutter Build Inspection Machine is the first machine of its kind to fully automate most of the critical steps in the cutter build, truing and inspection process for stick-blade type bevel gear cutters.

Now, most of the steps that take so much time, and depend on the operator and his expertise are performed automatically by the 500CB. Blades are positioned in their slots, clamp screws precision-torqued, and blade axial and radial position measured. The 500CB actually learns from the measurement

feedback it receives, and loosens, tightens and measures blades again as needed – just as the technician would do – until blades are trued to their optimum radial and axial position within +/- 2 microns.

Depending on skill level and the size, number of blades and type of cutter system, what once took an hour or two of meticulous, labor-intensive manual work now can be done in about 40 minutes – almost all of it with no operator involvement at all.

At any point in the process, start to finish, the operator can use the intuitive operator interface with software 'Wizards' to guide him through every step of setup and operation.

This impressive functionality can be easily applied to a wide range of stick-blade face mill and face hob cutters, from as small as 70 mm (2.75") to as large as 533 mm (21"), including the latest Gleason Pentac®Plus, Pentac®Aero, and Pentac®Plus RT systems, and even comparable non-Gleason cutter systems.

### Pentac®Plus RT Cutter System

**Fast, Precise Cutter Build; Improved Productivity**

New Pentac®Plus RT Cutter System, in conjunction with a Gleason 500CB Cutter Build Machine, can be built and 'trued' much faster and more precisely than possible with stick blade systems of the past. The new design also assures a very high blade seating stiffness during cutting, ultimately resulting in greatly improved cutting productivity and tool life.



Pentac®Plus RT

### Pentac®Mono RT Cutter System

**Half the Blade Blanks, 50% Longer Tool Life**

New Pentac®Mono RT is the world's first cutter system that features outside and inside slots using the same identical blades. As a result, it's possible for users to reduce the number of different blade blanks by 50%, and double tool life by swapping the blades from the outside slots to the inside slots and vice versa, and then using the cutter with the same blades for a second run.



Pentac®Mono RT

# New Solutions for Workholding

## New Workholding for Faster Bevel Gear Development



**B**evel gear manufacturers now can greatly reduce the time it takes to get fully functional, extremely accurate workholding for their gear testing and development efforts, with Gleason's new FLEX-SPAND™ (gears) and FLEX-GRIP™ (pinions) workholding solutions.

Without sacrificing functionality or typical workholding accuracies of  $\pm 0.005$  mm (0.0002") total indicator reading, just three standard size modules can meet the requirements of gears and pinions

ranging in size from 3.5" in diameter up to 8" in diameter. For gear development and short-run prototyping or even some production, users now need far fewer Gear Lab workholding systems, on order or in inventory, for a wider range of gears.

FLEX-SPAND and FLEX-GRIP function much like the other bevel gear workholding in Gleason's wide array of solutions, where a workpiece is chucked firmly in place when the production

machine's draw rod pulls back on an expander in the arbor to actuate the collet that grips the gear. The gear is, at the same time, pulled securely against a backing ring to ensure precision. In the case of FLEX-SPAND and FLEX-GRIP, however, the expanding collet has been replaced with a set of bolt-on, interchangeable jaws to perform the clamping function, and one backing ring can be used for a wider range of gear diameters. While the application of standard workholding is inherently limited by the exact gear diameter that its collet and backing ring were designed for, the use of interchangeable jaws design means that jaws can be easily ground to accommodate a different gear diameter and changed out in an existing arbor much faster and at less expense than ordering a completely new system.

The systems can be applied to Gleason bevel gear cutting and grinding machines for both soft cutting and hard finishing of gears and pinions, as well as Gleason bevel gear lapping and testing machines – and competitive machines with workspindles that have a Gleason-type taper.



## Quik-Flex® Plus: A Change Will Do You Good

**I**ncreased spindle time, more productivity and lower cost per workpiece are just a few of the many benefits users can experience with the new Quik-Flex® Plus, Gleason's latest generation of modular, tool-less and extremely accurate workholding solutions for cylindrical gears and pinions:

- Cuts gear changeover time to just 30 seconds or less.
- Eliminates all the usual tools and hardware.

- Helps ensure exceptional accuracy and repeatability.
- Available in different modular sizes to meet the requirements of various processing applications on both Gleason and non-Gleason machines.



## Laser Scanning Revolutionizes Gear Measurement



(Above) Laser scanning capability speeds development of increasingly complex, high quality gears.

In response to increasing gear profile complexity and quality requirements, Gleason introduces the new 300GMSL, combining four different gear inspection capabilities in one compact, reliable and easy-to-operate platform. Gear producers now have a single platform for:

- Laser probing of a wide range of workpieces, a process particularly well-suited for gear development efforts where massive amounts of data need to be collected many times faster than conventional tactile probing.
- Tactile probing, for traditional gear feature data collection on spur and helical gears and spiral and straight bevel gears and beveloid gears up to 300 mm in diameter; and many types of gear cutting tools.
- Surface roughness probing, for measurement of the surface texture of gear teeth, shaft journals and faces.
- Barkhausen noise detection, and the analysis for residual and compressive stresses in the material after grinding on gear tooth flanks and shaft bearing race features.



Tactile probing, for the complete inspection of a wide range of gear types, gear cutting tools and even non-gear, CMM-type measurement.



Surface roughness measurement, to help ensure consistently high-quality surface finishes.



Barkhausen noise analysis, for evaluating surface modifications after finishing processes.

## Gear Inspection for the Factory Floor



Now manufacturers of complex, high-quality gears can eliminate quality lab transport and queue time with the new 300GMSL. It's designed to withstand the conditions found in the widest possible range of working environments and work alongside production machines – while still delivering lab-level inspection capabilities. These include:

- Complete gear inspection, from fine pitch gears as small as .2 module, to shaft-type gears up to 450mm in length, as well as surface finish measurement on gears down to 1.2 module. It's even capable of 3D measurement.
- GAMA 3, the object-oriented Windows® compatible operating software that puts a host of powerful features right at the operator's fingertips, creating a simple, intuitive human/machine interface.
- Compact, highly ergonomic, with variable workstation placement.
- An Advanced Operator Interface (AOI) with dual display SPC, voice, photo, video, QR code/barcode read/import, and environmental monitoring/recording.
- High accuracy 3D scanning probes and convenient, easy access probe storage. A 6-position Automatic Probe Change (APC) is also available.

# KISSsoft AG Joins Gleason



**G**leason has acquired KISSsoft AG, headquartered in Bubikon, Switzerland and a leader in the development of design software for gears and power transmission systems.

KISSsoft is best known for its modular calculation program for verifying, optimizing and sizing machine elements. The application ranges from handling simple machine elements to automatic

sizing. It performs strength calculations quickly and accurately, and provides detailed documentation, including safety factors and service life values. The KISSsys system additionally can be used to model complete gearboxes and drive train systems.

Dr. Ulrich Kissling, the founder and Chief Executive Officer of KISSsoft, says: "We are excited about our future partnership with Gleason. Given Gleason's mission as a Total Gear Solutions Provider, its strength in bevel gear design and its position as a world leader in gear manufacturing and metrology solutions, the potential opportunities to provide our customers with new solutions is compelling. In addition, Gleason's global reach and long-time customer relationships will open up new doors for our products."

John J. Perrotti, President and Chief Executive Officer of Gleason Corporation, adds: "KISSsoft joining Gleason will deliver significant

synergies and provide our customers greater value by linking design and manufacturing expertise, having the potential to radically improve the efficiency of designs and the manufacturing solutions optimum for those designs. The KISSsoft team has developed a strong base of loyal customers that we look forward to serving together with KISSsoft."

## Background...

In the early 1980s, Dr. Ulrich Kissling developed a calculation software for his family company, gearbox manufacturer L. Kissling & Co. AG. Called KISSsoft, the software was originally intended for purely in-house use, but quickly spread to other mechanical engineering sectors, and was implemented by a growing number of firms.

Over time, demand for KISSsoft became so great that an independent company – KISSsoft AG – was founded in 1998, to maintain, develop and market the popular product. Since then, KISSsoft AG has continued to grow steadily. The company is headquartered in the idyllic Zürcher Oberland region of Switzerland. For more information about the company and its products visit: [www.KISSsoft.AG](http://www.KISSsoft.AG).



The KISSsoft Management Team:  
Dr. Ulrich Kissling (Founder and CEO) and  
Dr. Stefan Beermann (CEO)

Fast and Agile at  
**AxleTech®**  
**International**



AxleTech® has invested in new Gleason bevel gear cutting, lapping and testing machines at its US Gear® facility to add much needed capacity, and agility, to fast-growing precision gearing operations.

# AxleTech® International

Well over 100 bevel gear cutting machines crowded this Chicago, IL factory floor just a few years ago, all busy producing spiral bevel gearsets by the thousands. Now those machines are gone. If you guessed that this is yet another example of a rust belt manufacturer losing its competitive edge, or shipping jobs offshore, you'd be wrong. In fact, bevel gear manufacturing at this US Gear® facility of AxleTech International is not only alive and well, but running 2-1/2 shifts a day five days a week and producing more gearsets than ever for the high performance gearing and aftermarket axles that the company is famous for around the world. If ever there was a testament to the power of new technology this is it, says US Gear Manufacturing Engineering Manager Mike Lobaugh, as he proudly points to the cell of three Gleason Phoenix® 600HC Bevel Gear Cutting Machines now doing the work of the 100 machines they replaced.



“They’ve made my job much easier,” says Machine Operator Rosendo Lopez, a 20-year US Gear veteran, cutting at US Gear.

## The High Cost of Wrench and Idle Time

“This was a ‘sea of green,’” Lobaugh says, alluding to the distinctive green color of the Gleason ‘five-cut’ mechanical machines that once occupied much of this factory floor. “But the old tried and true five-cut face milling process (requiring two machines for ring gear roughing and finishing, three machines for pinion roughing and finishing of the convex and concave sides of the tooth) becomes a liability when today’s customers expect shorter leadtimes on smaller batches of our fast growing product families.”

According to Lobaugh, it could take an experienced machine operator as long as two days of tedious, labor-intensive ‘wrenching’, cutting parts and making adjustments just to change over his five machines from one gearset model to another. Then, once the first ring gear was cut, the machines could sit for days waiting for the ring gear to return from heat treat. Only then could the pinion be cut to match the gear, and full-scale production begin. “This process was acceptable when lot sizes were in the many hundreds or thousands,” Lobaugh explains, “But today, we need to accommodate batches of as few as 25

from dozens of different gearset product families and gear ratios. Fortunately, what once took many days now can be done in just a few hours with our new Gleason machines.”

## From Five-Cut to Phoenix®

US Gear began making the transition from its older Gleason five-cut machines in 2011, when it installed two Gleason Phoenix® 600HC Bevel Gear Cutting Machines. Based on the success of these two machines, a third 600HC was installed in late 2016, enabling US Gear to move all of its spiral bevel gearset production to the three-machine Phoenix® cell. These gears range in size from 2" to 23" in diameter, and include hot-selling products like their new Ford Super 8.8" IRS gearset.

“The difference between changing over a five-cut versus a Phoenix® is like night and day,” says Lobaugh. “Steps that used to require hours of wrench time now resides in a gear summary and the CNC.

“AxleTech gears operate in some of the most demanding applications including off-highway and performance coupled with the high-mix nature of our business, which necessitates lots of changeovers. We therefore needed a partner that we could rely on and Gleason has been that company for us for 50 years.

– Bill Gryzenia / Chief Executive Officer / AxleTech International





shown here operating the new Gleason 600HC, and one of three 600HCs that do all the spiral bevel gear

Once you've verified the first part, every run thereafter is 'plug and play'. With the mechanical machines, you started from scratch each and every time."

Lobaugh also says that the Phoenix® machines have cut cycle times in half, using Gleason's PowerDryCutting™ process. The 600HC's clean work chamber ensure that high volumes of hot chips produced are easily collected away from the cutting zone. It's an ideal platform for Gleason's highly productive Pentac®Plus, a cutter system that couples Gleason's AICroNite® Pro-coated carbide stick blades with an innovative design that prevents the chip packing common in dry, high speed cutting applications.

The cutter systems are also easy to build, using a Gleason CB Cutter Build Machine. The CB is used to build and 'true' different diameter Pentac® Plus cutters in as little as 45 minutes.

Gleason TurboLapping and TurboTesting machines have greatly streamlined the lapping and testing processes.

Blade re-sharpening and re-coating is performed at the Gleason Cutting Tools facility in Loves Park, IL.

Finally, The Phoenix® machines make parts load/unload and tooling changeovers much faster and less fatiguing, and significantly reduce the non-productive time typically required to perform these operations. Their unique monolithic column puts the pivoting cutter spindle and work spindle in close proximity to the operator, and the latest Gleason bevel gear quick change tooling greatly eliminates costly non-productive time.

Gearsets then are lapped and tested on two Gleason 600HTL TurboLappers and two Gleason 600HTT TurboTesters that have also replaced mechanical counterparts.

"TurboLapping is of course much faster, but what's really significant is the TurboTester," says Lobaugh. "The old roll testers only checked contact pattern and the operator had to rely a lot on 'tribal knowledge' – and what he sees and hears. Now, we've got a lot more actual data to work with, such as single-flank measurement of transmission error."

This inspection data can be easily networked with Gleason's Engineering and Manufacturing System (GEMSTM) and its CAGETM gear design software to calculate machine corrections and make summary changes.

Lobaugh says that the new machine selection process was weighted not only on machine capabilities but also on US Gear's 50-year association with Gleason. "There's no learning curve. And their service is exceptional. If there's an issue we pick up the phone. We know them, they know us."

Mark Kay, AxleTech Senior Director, Operations, concurs. "In 2017 with increased internal and external demand for our spiral bevel gear sets and to support our long term growth strategy we again turned to Gleason to provide the technology and equipment we need to expand our business. I am very pleased with the results and Gleason's commitment and look forward to continuing our partnership."



For more information about AxleTech International, visit: [www.axletech.com](http://www.axletech.com)

# See You at These Events

## 2017

Control	Stuttgart, Germany	May 09-12
Machine Tools Africa	Johannesburg, South Africa	May 09-12
Metalloobrabotka	Moscow, Russia	May 15-19
Gleason Application Seminar	Osaka, Japan	June 2
Gleason Works (India) New Facility Inauguration	Bangalore, India	August 17-18
EMO	Hanover, Germany	September 18-23
IMT	Plovdiv, Bulgaria	September 25-30
MSV	Brno, Czech Republic	October 9-13
Gear Expo	Columbus, OH USA	October 24-26
Gleason Japan Seminar	Tokyo, Japan	November 10
Metalex Thailand	Bangkok, Thailand	November 22-25



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