



MOTION+POWER
TECHNOLOGY EXPO



American
Gear Manufacturers
Association



Power Transmission
Engineering

2021

OFFICIAL SHOW GUIDE

GEAR
ELECTRIC
FLUID POWER

»»»»»»»»»» MOVING THE FUTURE.

SEPTEMBER 14–16, 2021

AMERICA'S CENTER CONVENTION COMPLEX
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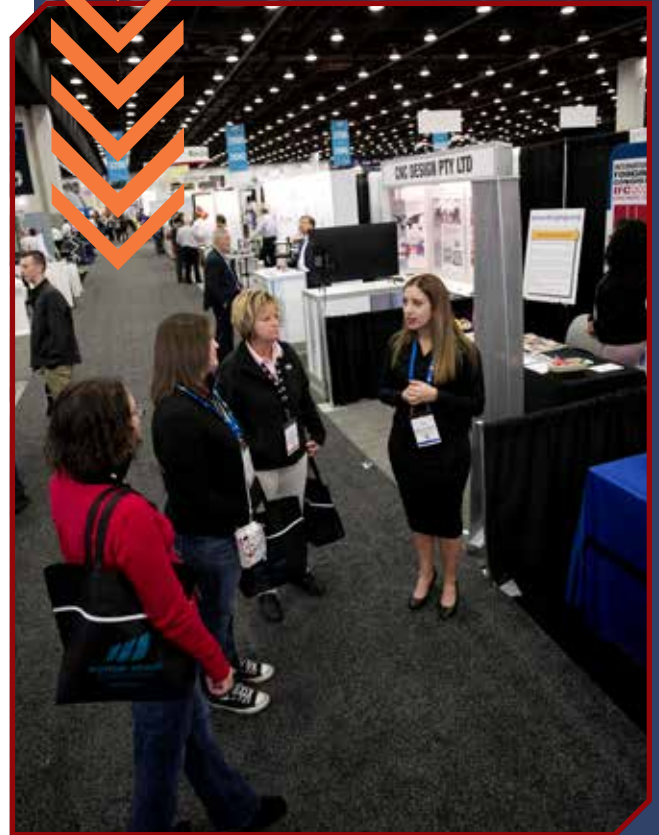
Make the Most of Your MPT Expo Presence

Exhibitors at MPT Expo 2021 in St. Louis will have the opportunity to connect with the top manufacturers, suppliers, buyers and experts in the gear manufacturing, power transmission, electric drive and fluid power industries. The 2021 MPT Expo Official Show Guide is your place to stand out from the crowd by making sure that the gear and power transmission market knows about your company and your commitment to our industry.

- Reach the 3,000+ expected attendees in the printed show guide distributed to attendees
- Reach the entire AGMA/AGMA Media power transmission world (over 25,000 strong) in the digital edition launching early September
- Make sure you are seen with the complete directory of the show's exhibit halls, events and educational opportunities, along with all the maps, contact information and tips every visitor needs to make his 2021 MPT Expo trip a success.

Every exhibitor at MPT Expo will have a presence in the Show Guide, including booth listings and category listings in our product guide. But we're also offering exhibitors the opportunity to enhance their presence in a number of ways:

- Expanded booth listings. Need more than the standard 100-word description to let potential visitors know about all the new products and services your company is offering? No problem! You can pay for additional space (see page 3).
- Featured Articles. Do you want to be seen as a thought leader in the motion and power transmission space? Do you have new technology that needs a more in-depth approach? How about an application story that showcases that new technology. You can place an article in the show guide to help get the word out (see page 4 for rates and details).
- Display advertising. We offer a full range of display ads in the Show Guide, from two-page spread down to ¼ page ads (see page 5 for rates and details).



Booth Listings

Free listings are available for all M+PT Expo exhibitors. If you're an exhibitor, you should have received a link to fill out your basic information and categories. In addition, we'll be contacting all exhibitors as we get close to the show in order to make sure all listings are up to date.

Basic booth listings are limited to 100 words. If you'd like to add a more in-depth description of your products and services, you can do so for a small fee:

Up to 100 words and one photo	FREE (included with exhibit space)
Up to 400 words and two photos	\$599
Up to 800 words and three photos	\$999
Up to 1,500 words and five photos	\$1,399

Exhibitors who are interested in reaching the gear and mechanical power transmission industry should contact Dave Friedman, friedman@agma.org, in order to ensure that your company will be included in the MPT Expo Show Guide. Both free and paid options are available.

**LOOKING FOR EXTRA ATTENTION?
HAVE A LOT OF PRODUCTS?
NO PROBLEM! BOOTH LISTINGS CAN BE
UPGRADED WITH ADDITIONAL TEXT AND PHOTOS**

feature MOTION + POWER TECHNOLOGY EXPO BOOTH PREVIEWS

Also on display will be the fully remanufactured CNC Fellows 10-4 with electronic guide and CNC backoff allowing for crown and taper. Numerous mechanical guides and cams are no longer required to shape a wide array of gears on a Fellows 10-4. Bourn & Koch has long provided quality OEM remanufactures of Fellows 10-4 gear shapers, but has now engineered their electronic guide and CNC backoff software into the machine, which is operable through their conversational programming. The addition of electronic guide and CNC backoff offers an efficient and affordable entry into the world of advanced gear shaping.

Bourn & Koch will also feature their 25H gear hobber in their booth. Designed for the economical hobbing of fine pitch gears up to 25 mm, the 25H is a compact machine capable of producing high quality gears for a wide variety of applications and industries.

www.bourn-koch.com

CINCINNATI GEARING SYSTEMS
BOOTH 3018

Cincinnati Gearing Systems is recognized for precision gear and transmission design and manufacturing. More than just a gear manufacturer, CGS offers customers 100 years of gear design and manufacturing experience, producing reliable, high quality, cost effective products for a wide range of power transmission applications.

cincinnati gearing systems.com

CIRCLE GEAR AND MACHINE COMPANY
BOOTH 4318

Circle Gear specializes in quality custom gearing in small to medium lot sizes. They are one of the only companies in the country that will reverse engineer and manufacture spiral bevel gear sets. Circle Gear services include bevel gears (straight and spiral up to 36" diameter), spur gears, helical gears, herringbones (up to 60" diameter), internals, racks, sprockets, worm and worm gears and all other types of power transmission products. Circle provides servicing on splines (involute and straight-sided, internal and external). They offer reverse engineering as well as breakdown services on many products. Circle Gear currently resides in a 125,000 sq. ft. full service production facility. They also house a full service gearbox rebuild division, QRS (Quality Reducer Service). QRS specializes in rebuilds of all major brands of gear reducers as well as manufacturing of custom designed units.

www.circlegear.com

CUMI AMERICA INC.
BOOTH 4139

Achieve higher precision and productivity with high performance ceramic grains for gear grinding. Time tested and compatible with all major gear grinding machines, CUMI grinding wheels are now represented by a dedicated North American sales office.

www.cumiusa.com

DTR CORPORATION
BOOTH 3818

DTR is a supplier of high-performance, long-life gear manufacturing tools for small and large gear cutting applications. Established in 1976, DTR is one of the world's largest producers of cutting tools, shipping to more than 20 countries. DTR offers a full line of gear cutting tools, including hobs, carbide hobs, shaper cutters, milling cutters, chamfering and deburring tools, broaches and master gears.

Every tool is precision-made using high speed steel, premium powder metal or carbide, along with the latest in coatings, to achieve superior cutting and long life.

www.dtrtool.com

DURA-BAR
BOOTH 2937

Dura-Bar continuous cast gray and ductile iron is an alternative to steel, castings and aluminum that offers reliability and improved profitability for many applications, including gears.

Engineered to machine fast and consistently, Dura-Bar is customizable and available in a wide variety of sizes and shapes in the standard ASTM A48 and ASTM A536 gray and ductile iron grades.

Recently, Dura-Bar has added a tube portfolio with the launch of Dura-Tube. The new tube portfolio, produced utilizing either a proprietary continuous cast process or trepanned process, is now available in a selection of sizes and grades. The flexibility to choose Dura-Tube provides customers with options to select tube products to specifically meet requirements such as wall thickness, concentricity and even volume.

www.dura-bar.com

DVS TECHNOLOGY AMERICA
BOOTH 400

Pravema interna offer significant internal gears. They provide for gear and are ideal for high torque. Two available for high machine process grinding.

The Pittler Sk turning, milling, deburring and Stable gear cutting technology can be step pinion made other application

EMUGE
BOOTH 330

In addition to rotary cutting to design and build devices for specifications. Emuge's specializes in pro almost maintenance solutions for ap some job shops tive production e

Due to its in ing element d adapt its install devices to meet

GLEASON
BOOTH 3400

Gleason Corporation will showcase a wide array of new design, manufacturing and inspection technologies for cylindrical and bevel gears.

KISSsoft's Release 2019 includes: *KISSdesign*, an instrument that allows intuitive concept design at system level; an interface to the latest bearing data from SKF; and power skiving manufacturability evaluation based on workpiece and tool data. The interface between *GEMS* and *KISSsoft* provides an exchange of gear and system information between the two software packages. This allows the user to realistically evaluate and optimize every type of bevel and hypoid gear—with a closed loop between the design and manufacturing software.

Gleason will demonstrate the 260GX Threaded Wheel Grinding Machine with twist-control and polish grinding, soft-

workpieces are two important features which are ideal for producing large quantities of parts as small batches.

The electromechanical technology enables energy saving and reduced floor space, flexible layout, low noise level, accessibility from three sides and reduced maintenance. PAS machines are the best technical straightening solution to achieve accurate tolerances in short cycle times.

The straightening process is fully automatic and 100% of parts are monitored and controlled; production statistics generated by machine software allow all the most significant production data (cycle time, initial and final tolerance.) to be recorded.

methods for cylindrical and bevel gears with the power of non-contact laser scanning of tooth flank forms. The integration of laser scanning and associated 3-D graphics with a CAD interface considerably expands both the functionality and the range of applications for the machine platform and is designed for thorough gear analysis and development. Achieving a more complete analysis of process variable changes becomes much more intuitive with the high-resolution topographical surface mapping capabilities.



Standard booth listings are included for FREE to all MPT Expo exhibitors. You get up to 100 words and one photo (optional).



Sponsored Content

The Show guide will include feature articles and information about the latest technology being shown at Motion+Power Technology Expo. You can make sure your story is included by placing a sponsored content article. Each page of content allows for approximately 700 words of text and 1-2 photos.

- First page - \$1,350
- Each additional page - \$350

sponsored content

Power Skiving - High Quality, Productivity and Cost Efficiency in Gear Cutting

DR. MANFRED BERGER, MAG - STEPHAN DOERR, HESSAPP - MARIO GRUEBERG, MODUL

Like electric mobility, the technology of power skiving has been known for more than 100 years (Ref. 1) and, with the availability of 5-axis machining centers, has found its way into individual and series production due to its convincing process flexibility. With e-mobility, a market is now growing which demands high precision (low running noise), high power transmission (torque and speed) from the product and equally high product flexibility in volume production. The use of planetary gears for reduction or as a differential in the drive system also increases the demand for internal gears. As with all manufacturing technologies, quality, cost optimization, flexibility and productivity are the top issues. "Power Skiving" makes a significant contribution to each of these aspects.

In addition to traditional gear machining processes such as hobbing, gear shaping and broaching, skiving is a continuous machining process for soft and hard machining of internal and external gears (Ref. 2). The skiving process is characterized by the tool and workpiece axes arranged in a certain relationship to each other: the axis cross angle (Fig. 1). With the coupled

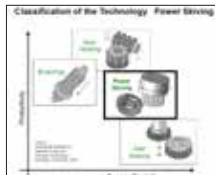


Figure 3 Power Skiving in comparison to other gear manufacturing processes.

rotation of workpiece and tool, a relative movement of the cutting edge in the tooth space is thus created. By superposing a feed motion, both add to the movements to the feed speed and guide the cutting edge along the workpiece axis. In this way the tooth space is "beveled out" of the workpiece in several cuts (Fig. 2). The cutting speed results from the rotational speeds of tool and workpiece in relation to the axis cross angle. Significant for the skiving process is the short machining time (approx. 30 to 50%) in comparison to the likewise flexible gear shaping and the ability to apply the gearing close to an interfering contour (workpiece shoulder). The smaller the axis cross angle, the closer towards the interference contour can be machined.

While the traditional alternative processes for gear machining such as broaching, gear shaping and gear hobbing are mainly used in technology-specific, special machines, gear skiving can be applied on special machines and on modern 5-axis machining centers. In recent years, skiving has made a quantum leap in industrial manufacturing with the availability of modern control technology for spindle synchronization, tool technology for high-performance cutting and machine structure that meets the high demands for rigidity and dynamics.

The main advantages of the above mentioned process are:



Figure 4 Evaluation matrix of gear machining in series production [5].

machine for disc-type components with swiveling workpiece axis or the Boehringer shaft turning centers with optional tool spindle). In an isolated comparison of the machining scope for gear cutting, Power Skiving can keep up with broaching and gear shaping and only has to admit defeat to classical gear hobbing in terms of economy. However, for series production on a greenfield site, costs, quality and productivity must be assessed as a whole, and the evaluation matrix for Power Skiving can be even more advantageous (Fig. 4).

- Advantages of Power Skiving:
- Elimination of the loss of accuracy with multiple clamping in subsequent operations (quality improvement) - turning (as well as other operations) and gear cutting in one clamping.
 - Floor space-saving process due to less logistics space for subsequent machining.
 - Lower tool investment (no special foundations (broaching), periphery, operating and maintenance costs in the system).
 - Economical machining due to short machining times (compared to gear shaping).
 - Process flexibility (process optimization, retooling, path compensation, tools, cutting material).
 - Dry machining possible, no need for cooling lubricant or oil

(environment, costs)

- Product flexibility (quick changer to other workpiece types, gear profiles, straight and helical gearing)
- Production of gears close to interfering contours (shaft shoulder)
- Internal and external gearing
- Soft and hard machining - Broaching and finishing
- Hardening distortions can be compensated by low path correction
- Broad competence of machine and tool suppliers

The obvious advantage of "Power Skiving" can be found in process integration. This background also explains the FFG Group's multiple path approach to machine development. Both machines for "Power Skiving" offer additional machining technologies such as turning, drilling and milling in addition to the gear skiving process. In the process combination, a workpiece can be almost completely machined on the machines. With the "Power Skiving" option on the Hessesap DVH 500, which is very well established in the market, we approach those customers that have to apply a gear to the turned part. With the Modul VS 250, the focus is on the classic manufacturer of gears and transmissions.

A special software package for technology and process development, for simulation and for process visualization is available for both machines. FFG skiving software is compatible with the SkivAll design and simulation software from FVU Chemnitz, an institute of the Fraunhofer Gesellschaft (Ref. 6, 7).

A special software package for technology and process development, for simulation and for process visualization is available for both machines. FFG skiving software is compatible with the SkivAll design and simulation software from FVU Chemnitz, an institute of the Fraunhofer Gesellschaft (Ref. 6, 7). SkivAll contains algorithms for the optimization of component quality. A kinematic process model is created from the workpiece analysis and the required tool geometry is calculated. In order to fully exploit the potential of skiving, this digital process twin also takes into account the machining forces, tool wear and stress on the processing machine (Fig. 5). The process (cutting sequence, cutting values, machine settings and other data) is exported to the machine where it serves as the basis for the automatic generation of the NC machining programs.

When coupled with a measuring machine, the data is



Figure 1 Gear skiving of internal and external gears with a relation of tool and workpiece axes arranged at an angle to each other.

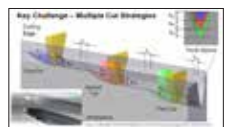


Figure 2 Production of the tooth space on the workpiece using the multi-cut skiving (3) and illustration of the kinematics with stick-shaped chip formation when rotating the workpiece and tool with increased axis arrangement (axis cross angle).

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Rebuilding a Legacy BOURN & KOCH PROVIDES RETROFIT MACHINE FOR GEAR SHAPING

JOE GORAL, BOURN & KOCH

Fellows 10-4 Retrofit by Bourn & Koch.

When Bourn & Koch purchased the Fellows Gear Shaper Company in 2002, there was considerable excitement about the possibilities for the little-known machine tool company from Rockford, Illinois. Though the purchase of Fellows wasn't their first foray into acquiring a gear company, it had been 17 years since Bourn & Koch had bought Barber-Colman's machine tool division, acquiring their gear hobbing machine designs and repair parts and service business. The acquisition of Fellows offered numerous opportunities to expand Bourn & Koch's footprint into the world of gear manufacturing.

Since the acquisition of Fellows in 2002, Bourn & Koch has developed new models of Fellows gear shapers and has been awarded patents on designs that have been incorporated into these machines, most notably the use of flexure plates to increase stiffness in the cutter spindle housing, removing the need for hydrostatic pads. Though their new machine designs offer a long list of cutting-edge technologies, Bourn & Koch has always had a strength in remanufacturing older Fellows gear shapers.

A typical remanufacture process will not only bring the machine up to today's standards for CNC controls and machine systems but will also restore the machine's alignments or original factory specifications. In essence, it is a new machine using very well-seasoned castings. As one might imagine, the process is time consuming and costly, but typically results in a machine that is two-thirds the price of new. On specialty machine tools, such as gear manufacturing equipment, this can mean considerable cost savings to the customer.

Understanding the increasing need for many companies from job shops to OEMs to update their gear manufacturing machinery or to outright add this to their capabilities, Bourn & Koch took the time to rethink their offering to the market for gear shaping machines, focusing on the Fellows 10-4 in particular.

Lloyd Koch, co-founder of Bourn & Koch and machine tool guru,

Fellows 10-4 Retrofit by Bourn & Koch.



headed up the effort to provide a more cost efficient and adjustable version of the Fellows 10-4 to the market. Koch, a former engineer at Sundstrand Machine Tools, knows the rebuilding process like the back of his hand; it is how Bourn & Koch got started in 1975, rebuild and retrofitting Sundstrand's machines. Larry Bourn & Loyd Koch started rebuilding machines in 1971, eventually forming Bourn & Koch in 1975.

Starting with an original Fellows 10-4 serial number 34807, Loyd and the team of gear technicians at Bourn & Koch disassembled the machine, painstakingly inspecting the parts as they were removed to determine if they met OEM tolerances. The parts that did not pass inspection were discarded and replaced with new, manufactured per Fellows OEM prints.

Once disassembled, the bare castings were now a blank canvas for Loyd and

the engineering team at Bourn & Koch to start anew, attempting to balance the delicate task of reducing cost while maintaining quality. Any gear shaper whether new, remanufactured, that leaves Bourn & Koch must produce AGMA class 10 gears on all measured features. The goal for the rebuilt machine was to be able to provide a minimum of AGMA class 9 gears. The result was a class 10 gear produced at run-off.

Two of Bourn & Koch's current engineering staff, Wayne Densmore and Steve Ray, started their careers at Fellows, accepting positions with Bourn & Koch when the company was acquired. Densmore is a mechanical engineer by training, responsible for numerous designs both at Fellows and Bourn & Koch that have stood the test of time. Around the office, Densmore has a reputation for designing machine tools that are of an equivalent duty to those made in the heyday of American

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FVA

PRESENTS LOCAL LOAD CARRYING CAPACITY ADVANTAGES COMPARED TO STANDARDIZED METHODS

The FVA-Workbench is a manufacturer-independent tool for the simulation and calculation of transmission systems. As product development cycles become shorter, powerful modeling approaches and calculation algorithms become increasingly important. The predominantly analytical approaches in the FVA-Workbench deliver fast and reliable solutions to all important issues related to drive technology, for bodies that cannot be accurately described analytically, the results are supplemented by suitable numerical methods. The intuitive modeling techniques in the FVA-Workbench enable simulation of consistent, valid, and manufacturable gears every time.

The calculations are developed, analyzed, and validated in research projects by Forschungsvereinigung Antriebstechnik e.V. (FVA, the Research Association for Drive Technology). Through member contributions and public funding, the FVA is able to organize 17 million euros annually in research projects at leading German universities, chairs, and research institutions. The FVA-Workbench serves as a knowledge platform that makes the results of FVA research projects available and accessible to all engineers, without having to read through and study countless pages of scientific documentation.

Cylindrical gear calculations in the FVA-Workbench

The FVA-Workbench features the world's most comprehensive library of standard methods for calculating the load carrying capacity of cylindrical gears. In addition to the latest national and international standards such as ISO 6336, DIN 3990, and AGMA 2101, the library also includes calculation guidelines for all major classification societies, the calculation of plastic gears according to VDI 2736, as well as all older versions of these standards.

The load capacity calculation is always preceded by a rolling simulation with one or two tools to determine the cylindrical gear geometry. This ensures that the gear can realistically be manufactured and will run as intended.

In addition to the geometry and the material used, the load distribution during mesh has a significant influence on the load capacity of a cylindrical gear. In the calculation, the influence of uneven load distribution across the face width is taken into consideration via the face load factor KH (DIN 3990 and ISO 6336) or KH (AGMA 2101). However, the formulas included in the standards only provide a very rough estimation. A detailed deformation analysis of the complete gear system is necessary to be able to quantitatively evaluate the effective influences on the load distribution across the face width.

In the FVA-Workbench, the total gear deformation is calculated based on a method developed for FVA and validated using deformation measurements at the Technical University of Munich Institute of Machine Elements, or FZG (see Figure 1 and 2). The following elastic deformations and static displacements can be taken into account, among others:

- Gear stiffness
- Flank modifications
- Shaft deflection and torsion
- Deflections and clearances of rolling and plain bearing
- Casting deformations
- Manufacturing deviations

The deformation analysis in the FVA-Workbench can be performed in a few seconds, even with complex gear structures. The face load factor is automatically determined for each cylindrical gear stage and can be taken into account in the selected load carrying capacity calculation.

The calculation of the load distribution across the face width of a planetary stage can be used as an example (Figure 1). If the load distribution across the face width in this stage is calculated based on the torsion of the sun pinion, as in a simplified calculation according to the standard, the result for this example is a face load factor of KH=1.83 with a maximum load on the output side of the sun pinion (Figure 2a). However, if the tilting of the planet gears due to deformation, the play of the planet bearings, and the elastic deformation of the planet carrier including the deformation of the pin are also considered, the result is a face load factor of KH=1.65, and with the maximum load located on the



Figure 1 Example of a planetary stage (Source: FVA-Workbench 3D model).

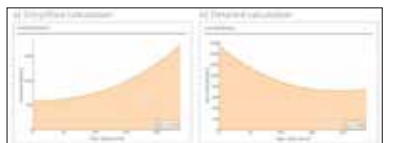


Figure 2 Comparison of the face load factors for a simplified (a) and detailed (b) deformation calculation (Source: FVA-Workbench reporting).

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Display Advertising

Don't forget to support your exhibit with additional promotional opportunities in GearTechnology and PowerTransmission Engineering, both in print and online. Turn your MPT Expo Exhibit into a full-blown marketing campaign by adding:

- Show Stopper ads in GearTechnology (July and August 2021 issues)
- Show Stopper ads in PowerTransmission Engineering (August 2021 issue)
- Digital ads in the GT or PTE e-mail newsletter and Product Alerts
- Custom e-blasts
- See 2021 Media Kit for details

Ask **Dave Friedman** to help you put together a show package to maximize discounts and make the most of your marketing dollars! Contact friedman@agma.org.



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\$950	One-Third Vertical	2¼" × 9¾" (57 × 247.5 mm)	
\$800	Quarter Page	3½" × 4¾" (89 × 120.5 mm)	
\$650	One-Sixth Page	2¼" × 4¾" (57 × 120.5 mm)	



MOTION+POWER TECHNOLOGY EXPO

2021 Motion+Power Technology Expo Show Guide Order Form

(Deadline: August 19 2021 for all orders AND materials)



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- ___ \$800. 1/4 page
- ___ \$650. 1/6 page vertical

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