Gear Expo 2017

Gears, Bearings and Software Highlight Columbus Event

The following recap looks at some of the exhibitors from Gear Expo that manufacture mechanical power transmission components or provide resources for these components. Check *www.powertransmission.com* for additional material from the show.

How to Qualify a Bearing Supplier

Managing Editor Randy Stott sat down with Chris Napoleon, President of Napoleon Engineering Services, to discuss the importance of qualifying your bearing supplier, especially in consideration of today's global supply chain.

To see the full 12-minute interview, visit *www.powertransmission.com/tv/*

The highlights of the interview can be summarized by these eight steps:

1. Acknowledging that there is risk and allocating the necessary resources.
2. Defining the suppliers you will work with and understanding their structure: buying direct, through distribution, brokers, etc.
3. Defining the level of engineering support you need from the bearing supplier and evaluating how they will service this need.
4. Perform a quality system audit by your own quality department
5. Perform a bearing design and manufacturing audit at the plant using a bearing specialist.
6. Product inspection to determine design intention , actual manufacturing capability to carry out the design intention and overall quality of workmanship.
7. Use of modeling to determine stress distribution and theoretical product life based on actual inspection characteristics.
8. Physical testing based on expected failure mode sitting the application. Typically related to static/impact testing, environmental test to evaluate seal efficiency, or life testing under accelerated or application conditions.

The entire process is detailed in Figure 1. According to Napoleon, steps 5–8 are typically carried out by an independent bearing lab, such as Napoleon Engineering Services.

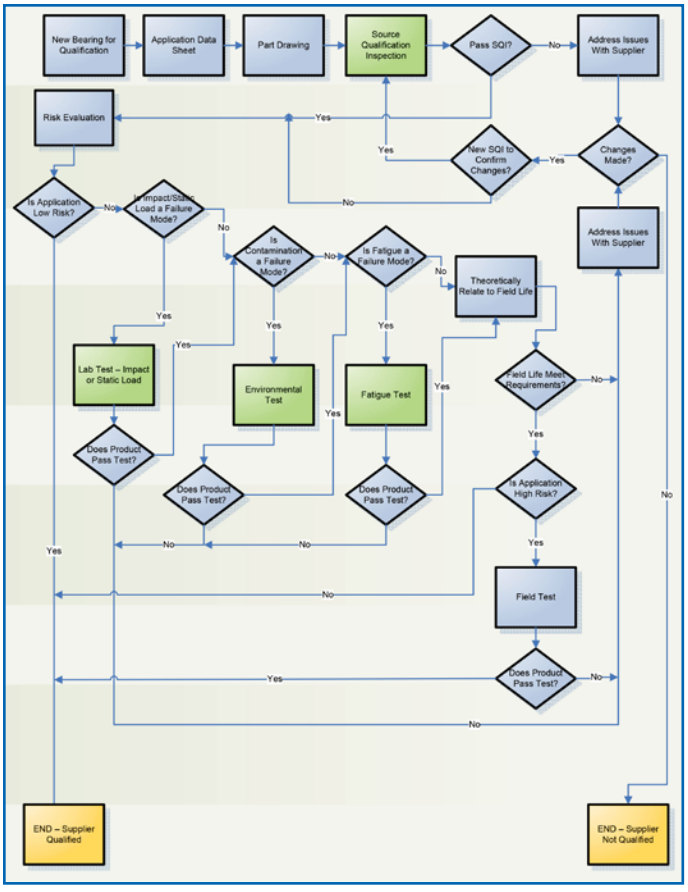


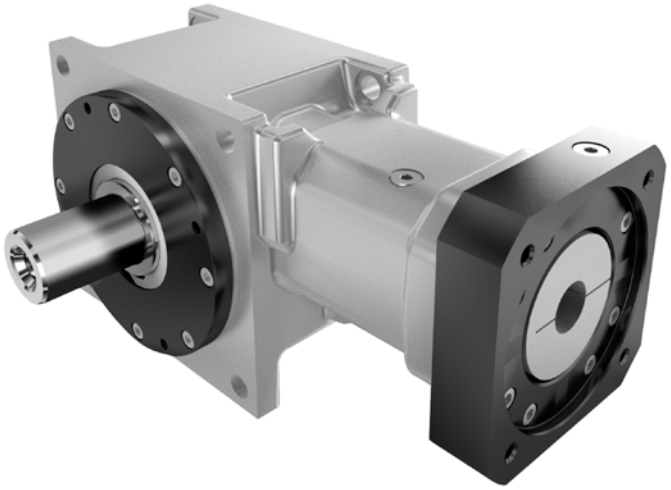
Figure 1 Flowchart of the bearing supplier qualification process.

For more information:
Napoleon Engineering Services
www.nesbearings.com/technical-information/steps-for-risk-mitigations/

Exsys Upgrades Gearbox Capabilities

Exsys Tool offered a line of high-quality Eppinger Spiral Bevel Gearboxes during Gear Expo 2017. Eppinger's BT (bevel torque) and BM (bevel maximum torque) compact spiral bevel gears deliver high torque and maximum efficiency for gear applications that require extreme reliability and variability at speeds over 1,000 rotations per minute, as is the case for vehicle differentials.

Each of these bevel gearbox types offers minimized tooth clearance and optimal transmission properties via precision axes and bearing seats combined with Gleason bevel gears that can withstand high loads.



The single-component steel housings for these bevel gearboxes feature mounting threads on all sides to ensure stable attachment in a variety of installation positions. The heavy-duty bevel gears inside these housings offer high-transmission precision and reduced stress on the bearings. A friction-locked, zero backlash connection of the crown gears on the drive shaft reduces the mass of the gearing component.

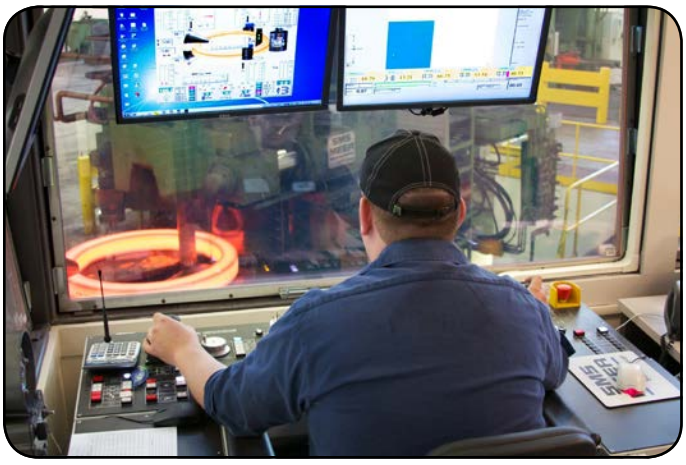
Both BT and BM gearboxes come in solid or hollow shafts in standard and custom designs. BT-type models are available in seven sizes with a transmission ratio of i = 1:1 to 5:1, while BM-type models are available in five sizes with a ratio of i = 1:1.

After the show, Exsys also announced the expansion of Eppinger gearbox offerings to include the HT-type hypoid gearboxes that feature compact, robust designs suitable for both specific and dynamic applications.

The Eppinger HT-type hypoid gearboxes have mono-bloc housings that distinguish this series with extreme stability and offers maximum precision and efficiency. A highly flexible flange and coupling system enables the gearboxes to be connected to a host of servo motors without difficulty.

With solid steel alloy and hollow shafts for shrink disc connection, users can install the gearboxes in various positions with a choice of the output side. Currently, the gearboxes are available in four sizes in the ratio range from i = 5:1 to i = 15:1.

Heavy-duty bevel gears, designed and manufactured according to the Gleason process provide optimal gearing efficiency, high transmission precision and reduced load on bearings. Users also gain extremely secure torque transmission through a friction-locked, zero backlash connection of the crown gears on the drive shaft. The tooth flanks are



ground to handle heavy operating demands on transmission performance at minimal tooth clearance. Such precise gear settings are achieved through constant measuring of the gear components and 100 percent test running during assembly.

In addition to extreme stability and precision, the hypoid gearbox housing offers exact positioning of the bearing seats and an integrated reinforced input neck that ensures a secure motor connection. Screw holes in the housing edges also enable a stable connection of the gearbox for various installation positions.

For more information:
Exsys Tool, Inc.
Phone: (800) 397-9748
www.exsys-tool.com

McInnes Rolled Rings

FOCUSES ON SPEED AT GEAR EXPO

"Lead time is an opportunity to differentiate ourselves from the competition," explained Shawn O'Brien, vice president sales and marketing at McInnes Rolled Rings. The company has established 1 to 2 week lead times as standard. In many

cases, they are shipping in a matter of days. "Our mission is to offer industry leading cycles in every market. When our customers realize that they can consistently rely on this it gives them an advantage over their competition and enables them to avoid carrying excess inventory," he added.

Speed has been the cornerstone of the McInnes brand. While the company is always looking for new efficiencies, lead times have remained consistent. There are no premiums or special programs. McInnes continues to invest in both its team as well as its equipment. The new $8 million heat treat investment enables the company to process significantly more tonnage. "Maintaining a full staff of experienced associates in our plant, office and in the field enables us to meet any demand surges in stride," O'Brien said.

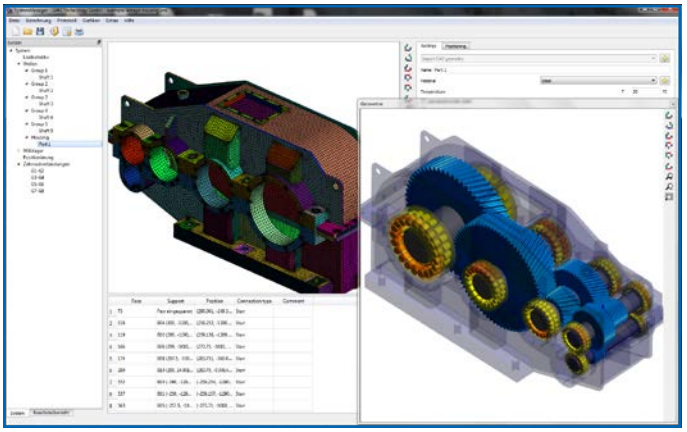
Gear Expo gave the organization the opportunity to spread the word on everything they've been doing to enhance capabilities and increase lead times. The company sees an increased value on service in the coming years and plans to focus on being the best value option for the gear market.

For more information:
McInnes Rolled Rings
Phone: (800) 569-1420
www.mcinnesrolledrings.com

GWJ

EXAMINES GEARBOX CALCULATIONS AT GEAR EXPO

GWJ presented a system calculation using its *SystemManager* software during Gear Expo. The presentation at the Solutions Center took a closer look at the combination of FEM and analytical methods with just one calculation system and which interactions can occur (*SystemManager* to do the FEM calculations together with the analytical calculations e.g. for gears according to different standards like DIN 3990, ISO 6336 or ANSI/AGMA 2101/2001). The influence of the bearing and housing stiffness were also considered.



GWJ released new developments with *SystemManager* earlier this year. The software can be utilized for complete systems of machine elements, i.e., the software is a coupled FE calculation of multi-shaft systems with gears as non-linear coupling elements. *SystemManager* runs as a desktop application, making it possible to configure and calculate entire systems with just a few mouse clicks. *SystemManager* also allows the import of 3D housings as STEP files. The software meshes the parts automatically to consider deformation and stiffness of the housing throughout the system. A further extension of the 3D elastic parts function is the support of planet carriers and imported shafts. Planet carriers can be imported as CAD models or be defined parametrically; various basic designs are available for the parametric planet carriers.

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Cincinnati Gearing Systems

DISCUSSES WHAT QUESTIONS A GEAR BUYER SHOULD ASK A POTENTIAL SUPPLIER

Matthew Jaster, senior editor at *Power Transmission Engineering*, sat down with Patrick Potter, director of sales at Cincinnati Gearing Systems during Gear Expo to discuss some of the questions a gear buyer should ask of a potential supplier. Here's a quick overview of that discussion.

What kind of gears do you specialize in?

While this seems obvious, it's important to know that the supplier has the knowledge and experience with the type of gears the buyer needs. If you're buying a small automotive spur gear they should be able to show they have made plenty of these types of gears. If they're buying turbomachinery (a two-meter, high-speed, high-powered bull gear, for example) you want to be sure they've made these before and have the experience and the knowhow necessary to be successful.

Can you audit my design and make suggestions?

One feature you would like to have is some engineering expertise, both from a design standpoint and a manufacturing standpoint, according to Potter. You may have a design that you're comfortable with, but it wouldn't hurt to have the gear manufacturer look at the design to make it more economical and possibly function better in the application. Added value is so important to look for when shopping for a supplier.

Do you have your own heat treat facilities?

Ideally, they should own a heat treat facility, though this is not common. The benefits include that they are accustomed to dealing with distortion issues and the various problems that can occur during the heat treat process. This should also make things more economical from a cost perspective. Scrap should be lower and lead times and delivery times should be better.

Does the company offer engineering services?

This goes back to the design side of things. A good gear manufacturer should be able to provide 3D models that can match up with the buyer's software. If they're doing high-speed gearing, they should be able to offer vibration analysis. They should also be able to manufacture to different standards, not just AGMA. (API, DNV, ABS, for example).

How important is quality and the quality system you have in place?

It is not a complete requirement that your gear manufacturer be ISO-certified, but it does give you a certain comfort level. In lieu of maybe having many, many references for a specific design, if they can demonstrate that they are ISO-certified it gives you a feeling that they're going to be reliable in terms of quality.

A really good gear shop would be ISO 9001. Those involved in automotive gearing, you'd expect them to be TS16949.

Going into next year, you'd also expect them to be IATF certified (International Automotive Task Force).

Do you offer any field services?

You would really like to have field service support from your supplier whether you're working with single gears or complete gear drives. Knowing they can come out tear down a unit, inspect it and support that equipment is a nice feature to have.

What about rebuild and remanufacture capabilities?

This fits in with service. If you have units out in the field and your technician goes out and finds issues that cannot be addressed, you'll want to be able to send the unit back to the gear manufacturer and have them tear it down completely and rebuild it to new specifications.

More importantly, if you have many different models of gearboxes, a refinery for example that may have a lot of different products onsite, you'd like to have a gear manufacturer that can service all those units in their own shop.

What kind of gearbox testing can you do?

Whether you rebuild a unit or build a new one from scratch, you want to be able to spin test it according to the latest standards. These are both AGMA and API standards, but a no-load, 4-hour, full-speed spin test with complete vibration and temperature data you'd expect to get from a top tier gear manufacturer.

How long has your company been in business?

This relates to the stability of a company. These days there are so many mergers and acquisitions and it's hard to tell who is going to be there a year from now. If you buy millions of dollars of equipment and three years from now you can't get it serviced that's not a great scenario. 10 years of stability is a great starting point.

Is your company privately or publically held?

This is more of a personal preference. A family-owned company can give you that more direct level of service and a large, publically held company might have deeper pockets and might be more table, though we've seen lately that this is not the case every time. The buyer should always know what he or she is getting into. **PTE**

For more information:

Cincinnati Gearing Systems
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www.cincinnatigearingsystems.com