Basic Gear Noise Short Course Covers Fundamentals

More than 1,350 engineers and technicians from more than 320 companies have participated in this basic course, which The Ohio State University's Gear Dynamics and Gear Noise Research Laboratory (GearLab) has conducted for more than 29 years. Gear designers and noise specialists with little to no knowledge of noise analysis learn about the mechanisms of gear noise generation, the methods used to measure and predict gear noise and the techniques for reducing vibration and gear noise.

Engineers and technicians who analyze, manufacture, design specs and use gear systems in industries such as automotive, transportation, machine tool, process machinery, aircraft, appliance and general manufacturing will study how to reduce transmission error, dynamic friction forces. Some companies that have attended in the past include Caterpillar, John Deere and General Motors, according to Dr. Donald Houser, Emeritus Professor and founder of the GearLab. Houser has organized the course since its inception and lectures on gear noise measurement and modeling. Dr. Rajendra Singh also instructs the course.

Even perfect gears make noise, and this is the basis for the first day's lectures. Qualitative and quantitative terms are used to describe how design factors and manufacturing mistakes play into the noise equation. Houser and Singh teach attendees how these details can help predict transmission errors. Demonstrations of the GearLab's custom-made equipment and software occur throughout each day. "We run a very accurate spur gear set that is in an offset gearbox of a UH-1 helicopter," Houser says. "It is a demonstration of how a tremendously accurate gear can be tremendously noisy.

"We do a lot of signal processing demonstrations of how you look at the data in different ways using spectrum analysis to view different properties of the signal. We can compare predictions of noise with measurements of noise," Houser says.

Past attendees have commented on the practical nature of the curriculum. The workshop aims to discuss real-life problems of gear noise and dynamics. The highlight of this goal is a case history workshop that takes place on the third day. The attendees are asked to present issues of gear noise they've come across, and the group responds by offering possible solutions to each problem. This segment of the program typically takes up two or three hours, but there is no limit.

"We spend sometimes as much as a half a day just talking about problems they bring to class," Houser says. "They make a brief presentation of their problems, and then everyone sits down and discusses; what they're doing, what they need to do, ask them questions. It's kind of a brainstorming session on how do we go about solving this problem."

The course is continuously being modified to reflect new technology. The analysis techniques in particular are constantly changing, Houser says. Some material is added to a two-day advanced course offered every other year, which is designed to follow up the basic short course.

The advanced course will be offered in 2009. Information will be available on the GearLab website (*www.gearlab.org*). It is designed for people who attended the basic course or work at a more advanced level.

For companies with more than a few interested attendees, Houser has offered the course at individual companies. This allows for more flexibility because it can take place a day at a time over the course of a few weeks depending on what the company prefers. Bringing the course directly to a specific company also allows Houser to customize it, and feature information that applies directly to the company's needs. "Last year we were up at Ford. We gave this course over six days, two days at a time," Houser says.

The 2008 Basic Gear Noise Short Course is being held September 16–18 at The Ohio State University, Columbus, OH. For registration, contact Jonny Harianto at (614) 688-3952 or *harianto.1@osu.edu*. To inquire about a customized version of the course, contact Dr. Donald Houser at *houser.4@osu.edu*. For general information, visit *www.gearlab.org*.

September 8–10—Furnaces and Atmospheres for Today's Technology Seminar. Holiday Inn Express, Meadville, PA. Seco/Warwick organizes this three-day seminar providing heat treating equipment information and best practices. Attendees will learn the vital furnace design and plant management options to better assess their equipment options with various heat treat furnaces and atmospheres. Dan Herring, aka "the heat treat doctor," is the seminar's guest speaker. He will discuss the heat treating industry's future in North America and how it will progress. Herring will also focus on new quality standards, training, education and how to keep heat treating affordable. Seco/Warwick intends that content be non-commercial and objective. The tuition includes hospitality, lunch and dinner meetings where staff, colleagues and Herring participate. The program also includes a tour of Seco/Warwick's manufacturing facility. Equipment operators, heat processing supervisors, plant engineers, metallurgists and manufacturing personnel should attend as well as equipment owners who will learn how to improve efficiency and minimize waste. For more information, contact Elisha Schreiber at *emink@secowarwick.com* or (814) 332-8576.

September 22–23—Geometric Dimensioning and Tolerancing Seminar. Hilton St. Louis Airport, St. Louis. As more enterprises add Geometric Dimensioning and Tolerancing (GD&T) requirements to their conventional engineering drawings, an understanding of GD&T is required in order to accurately interpret them. This seminar will review the basics of GD&T including the symbols, terminology and rules that are based on the current version of the ASME Y14.5M-1994 standard. Once the seminar is completed, participants will know how to identify datums and their use; understand the relationship of size dimensions to the form of the part; interpret feature control frames; compute maximum and least material condition values; compute positional tolerance zones; interpret the general rules of GD&T; inspect to composite positional tolerancing requirements; and apply graphical inspection analysis to GD&T control. The course is repeated September 25–26 in Kansas City, MO and September 29–30 in Minneapolis. For more information, including registration, visit *www.hightechnologyseminars.com*, e-mail Ben Marguglio at *ben@hightechnologyseminars.com* or call (845) 265-0123.

September 22–23—Fastener Fair. SYMA Event Centre, Budapest, Hungary. The Fastener Fair represents every aspect of the fastener and fixing market by bringing together manufacturers, machine suppliers, wholesalers, distributors, importers, exporters and tool suppliers. The fair aims to create an environment for new ideas and partnerships, so professionals can come away with new business. The event also intends to highlight Europe's near East as an appealing market for manufacturing and assembly because of low-cost labor and economies and new members of the EU. The primary objective of the exhibition is to be cost- and time-efficient, meaning all booths will be closely monitored in size. The Fastener Fair is marketed to large end users in order to gauge both ends of the market. For more information, visit *http://www.fastenerfair.com/page2153/budapest-2008.aspx*.

September 23–25—Canadian Manufacturing Week/Weld Expo Canada. International Centre, Mississauga, ON, Canada. Design engineering, maintenance products and industrial support services are showcased at Canadian Manufacturing Week. The event, sponsored by the Society of Manufacturing Engineers, is for OEMs that deal with overall product design, fluid power, motion control, electronics or materials. Attendees will watch demonstrations, participate in technical sessions and learn how to reduce downtime and get the most out of MRO operations and machines while cutting costs. Weld Expo is co-located concurrently where companies will show new productive welding equipment, machinery, products and services. Within Weld Expo is the Metal Finishing and Coatings Pavilion where finishing and coating systems are on display and demonstrated. For more information, visit *www.sme.org*, e-mail *canadasales@sme.org* or call (888) 322-7333.

September 24–25—AWEA Wind Resource and Project Energy Assessment Workshop. Portland Marriott Downtown Waterfront Hotel, Portland, OR. This third installment of the annual American Wind Energy Association's two-day workshop will discuss current practices in the industry and their effectiveness, how to reduce bias and uncertainty in energy estimates, up-and-coming tools and new industry concerns. Turbine manufacturers are encouraged to attend along with project developers/operators, government agencies, consultants, academics and landowners. Other topics addressed include recent studies of wind speeds in North America and how to identify and reduce bias and uncertainty in data analysis, flow modeling and technical loss estimates. A pre-conference seminar will take place the day before as an introduction to wind energy, with a separate registration. For more information, contact Lori Rugh at *lrugh@awea.org* or (661) 821-2149.

September 29–October 1—Tooling for Composites. Doubletree Hotel, Seattle. Sponsored by the Society of Manufacturing Engineers, this event focuses on the approaches and materials needed to manufacture tooling for composites. Attendees will learn some common pitfalls and best practices for production. Tooling for Composites provides cross-industry information about tooling in aerospace, wind energy and transportation industries. For more information, visit *www.sme.org*, e-mail *service@sme.org* or call (800) 733-4763.