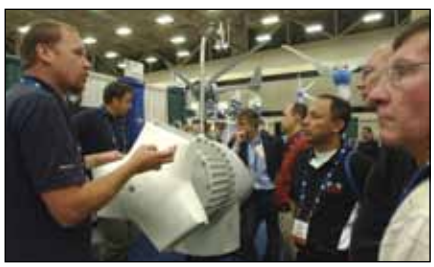
Gear Applications
ALL THE RAGE AT WINDPOWER 2010

Capitalizing on a burgeoning new technology where gears are of great import, the gear community gathered en masse at the American Wind Energy Association's Windpower Expo 2010.



Dallas hosted some 20,000 visitors for AWEA's Windpower 2010 show, the largest conference for wind in the world (Courtesy AWEA).

Some 20,000 attendees came to Dallas to see the latest wind energy trends from almost 1,400 exhibitors over an expo space spanning six football fields. Windpower is the largest energy trade show in America and the worlds' largest wind energy conference.

Some of the familiar gear industry faces exhibiting included GE Drivetrain Technologies, Hansen Transmissions, Gleason Corporation, Brad Foote Gear Works, Fairfield Manufacturing, Ingersoll Cutting Tools, Moventas, Liebherr, Romax, Winergy Drive Systems and ZF Services North America. Following is a summary of what a few gear industry exhibitors had on display.

Gleason Corporation (*www.gleason.com*). Wind turbine gears produced by Gleason gear production machines and cutting tools are estimated to supply over 50 percent of wind turbines worldwide. The company displayed examples of the Opti-Cut family of indexable carbide-insert milling, hobbing and shaping cutters, which are designed to reduce wind power gear cutting costs by up to 50 percent. Visitors to Gleason's booth also learned about the series of quick-change workholding equipment for large production machines, such as the Gleason X-Pandisk fixture system, which automatically aligns workpieces weighing up to 2,000 kg to reduce changeover time by up to 70 percent.

Klüber Lubrication (*www.kluber-solutions.com/wind*). The Klüberplex BEM 41-141 is a beige grease that features a special blend of base oil and additives to cover the varying lubrication requirements of the individual bearing applications within wind power stations. These include pitch and yaw bearings (high stresses, oscillations, vibrations), main bearings (low rpm, high stresses, vibrations), and generator bearings (high rpm and temperatures).

Also on display was the Klüberplex AG 11-462, which is a gear grease that provides adhesion and protection against high loads and corrosion. The white grease lubricates the control gears for pitch and yaw systems while reducing the risk of migration inside the nacelle and onto the tower.

Ingersoll Machine Tools (*www.ingersoll.com*). In a major diversification of its activities, Ingersoll introduced two product lines specifically designed for the wind industry, supported by a $5 million grant awarded through the Green Industry Business Development Program, a component of the Illinois State's Energy Plan, administered by the Department of Commerce and Economic Opportunity and funded by the American Recovery and Reinvestment Act. According to Tino Oldani, president and CEO, "Ingersoll's activities are tailored to meet the new manufacturing requirements of the wind power generation industry and foster an evolution that will propel the U.S. manufacturing in a leading position in the global market."

The MasterWind Lean Manufacturing Center is a large, multipurpose milling machine that is introducing lean machining processes for the large wind components: gearboxes, hubs, upper and lower plates. Nacelles will be completely machined in one setup with cost reduction and improved quality and process reliability. The first MasterWind will be in operation in the third quarter 2010 from Ingersoll's headquarters in Rockford, IL. The other major product funded from the grant is a Wind Blade Demonstrator for the automation of blades production.

Sage Oil Vac (*www.sageoilvac.com*). The Gear Oil Exchange System for wind turbines features a flush system that improves fluid changes on gearboxes hundreds of feet above the ground, which can be operated from the ground. The unit can deliver ISO 320 viscosity grade gear oil at a rate of 15–22 liters (4–6 gallons) per minute while used gear oil can be vacuumed directly from the tower gearbox at a rate of 4–8 liters (2–4 gallons) per minute.

The flush system has a 454 liter (120 gallon) tank with a 100.5 meter (330 foot) hose, hose reel and pump, and it allows operators to winch the

used oil hose, fresh oil hose and flush fluid hose up at the same time. The flush system works in conjunction with the Gear Oil Exchange System's standard operating features. It is available in skid, open trailer or enclosed trailer configurations. The system features two 946 liter (250 gallon) or 1476 liter (390 gallon) tanks. Longer hose lengths are available for taller towers.

Brevini Wind (*www.breviniwind.com*). On display by Brevini Wind was its portfolio of pitch and yaw drives and glimpses of its main drives under design. The company offered updates on its ongoing investment in a new production plant in Yorktown, IN, which will manufacture a complete range of main gearboxes for wind turbines ranging from 0.9 MW to 3.5 MW. Phase one of the $50 million investment will have capacity for 1,000 main gearboxes a year, which will expand to up to 2,000 main gearboxes a year. Production is scheduled to begin in the fourth quarter of 2010, and job opportunities were the buzz for Brevini, looking to fill 450 jobs in Indiana. According to Jacopo Tozzi, Brevini Wind president, "So this will be a gradual buildup of employees that will last for the next three or four years."

Brevini also expressed great optimism for the market potential in wind energy. "We are preparing ourselves for a robust market around the corner. We have the wind, we have the technology and, thanks to the support of the state of Indiana, the local authorities and the U.S. Department of Energy, we have the opportunity," says Renato Brevini, president and founder of Brevini Group. "That is why I am absolutely confident that the U.S. wind market will be the biggest in the world, and Brevini Wind will be a major player."

Parker Hannifin Corporation (*www.parker.com*). A new lubricating system from Parker Hannifin is a turn-key solution for wind turbine gearboxes. The complete system package includes pumps, filters, coolers, tanks, sensors and piping integrated for installation directly to the gearbox. The system includes manifold block lubricating filters and the icount PD for monitoring the condition of the system oil. The design addresses the filtration challenge of high viscosity, up to 30,000 cSt, oils experienced during wind turbine start-ups in the harshest environments.

Liebherr (*www.liebherr.com*). As a system supplier, Liebherr can provide bearings as well as drive units and control technology. The harmonization of its components was demonstrated by a powered rotor blade adjustment system consisting of the Liebherr DAT 300 planetary gear and a two-row interior-toothed KUD 128 four-point bearing.

The DAT 250 rotary drive with angle transmission was designed for the blade adjustment of a 2 MW system, and the angle format serves as a space-saving arrangement. The DAT 400 is used for the azimuth adjustment of a 3 MW system and features a compact design combined with low weight. Liebherr emphasized how it manufactures the teeth arrangements on the large roller bearings and gear and transmission systems on teeth milling and shaping machines of its own brand name.

Bonfiglioli (*www.bonfiglioliusa.com*). The focus for Bonfiglioli is fully-integrated systems, and on display at Windpower 2010 was its full range of products for wind businesses: gearboxes, motors and inverters; and specifically, the VER/S regenerative active front end (AFE), 700T Series yaw and pitch drive for wind turbines and the ACTIVE solution control drive.

As part of the Bonfiglioli regenerative system, the VER/S AFE is the first of two stages that transfer energy to the grid connection as an application demands. The VER/S regenerative AFE stage interfaces with the electrical grid while the ACU vectorial Field Oriented Control (FOC) stage provides active current control of the current from the permanent magnet synchronous generators (PMSG) in the gondola.

The 700T Series yaw and pitch drive controls functions like yaw and pitch drives and are used in the latest state-of-the-art wind turbines. The 700T series planetary speed reducers feature flange mount, output shaft: splined or with integral pinion, rugged construction, high torque capacity and output shafts supported by heavy duty capacity bearings.

The ACTIVE solution control drive features a full series of flexible solution drives, control for high performance and advantages in scalability and compact size.

"Our approach was well-received at Windpower 2010," says Greg Schulte, president, Bonfiglioli USA. "We experienced very positive responses to our product lineup, and we were very pleased with our booth traffic. We will absolutely attend the event again in 2011 and are already hard at work preparing the solutions we'll introduce next."

Some of the many gear products on display at Windpower 2010 included (from top to bottom) the 700T Series yaw and pitch drive from Bonfiglioli, Gleason's Opti-Cut family of tools and the ACTIVE solution control drive also from Bonfiglioli.