

FEATURES

Company Profile:
Gearbox Express

Making the Cut With HGG
Profiling Machines

Wind Turbine Capacity
Frontier From SCADA

Using Sealants, Lubricants
and Surface Treatments in
Turbine Manufacturing

**HURRICANE OUTLOOK:
WHAT WIND OPERATORS
SHOULD EXPECT**

DEPARTMENTS

Construction—Crane Service, Inc.
Maintenance—Performance Composites, Inc.
Business—Jones Day
Logistics—Vectora Transportation LLC

Q&A: James Lenzen
Northeastern Junior College





enXco is now...



TRUSTED LEADER
IN DEVELOPMENT
AND O&M

- **Project Development**
- **Operations & Maintenance**

With over 4,500 MW of development expertise, [EDF Renewable Energy](#) is the trusted leader in the development and operations of wind energy projects.

As part of a global organization, we bring a depth of experience to every project.

Through our O&M affiliate, [EDF Renewable Services](#), we ensure the performance of your investment over the long-term.

Southwire Solutions

Energize Renewable Networks



Wind and solar systems demand a variety of highly engineered and reliable cables. Southwire's innovative solutions range from control cables to collection systems to substation wiring to transmission lines to serve all your needs. Call us at **770.832.4242** or visit us online at **www.southwire.com** for more.

Southwire Solutions—EnergizeSM



Southwire[®]



Wind + Schaeffler = Wind Power

If your wind turbine isn't using Schaeffler parts and services, it's just another windmill.

Four reasons why this is no idle boast:

Experience

With our renowned INA and FAG brands, Schaeffler has more bearings currently operating inside wind turbines than any other manufacturer. That's unmatched know-how.

Research & Development

Schaeffler has the world's largest, most powerful test rig for large-size bearings. Which means we can improve the reliability, safety and cost-effectiveness of future wind turbine designs like no other company.

Innovation

Schaeffler's new, ultra-durable X-life™ quality E1 spherical roller bearings now feature black-oxidized rollers and a 2-piece cage design that generate less wear and improve lubrication. Bottom line: they last longer and reduce downtime.

Service

A genuine breakthrough in condition monitoring, Schaeffler introduces WiPro_M with FisNet: the industry's first truly cost-effective diagnostic tool for analyzing the performance of wind turbine components. Did we mention that it all fits inside our signature yellow carrying case?

Superior-quality products.

Comprehensive reliable solutions.

www.schaeffler.us



FEATURES



22

COMPANY PROFILE: GEARBOX EXPRESS

BY SHERRI MABRY

Gearbox Express is fulfilling a niche in gearbox repair that the wind power industry is only just learning it needs.



24

MAKING THE CUT WITH HGG PROFILING MACHINES

BY ANDREAS PETROSINO

The Leica Absolute Tracker monitors cutting of wind turbine tripods with an accuracy of 0.5 millimeters for precision cutting.



30

HURRICANE OUTLOOK: WHAT WIND OPERATORS SHOULD EXPECT

BY JEFF JOHNSON

Wind farm operators who have the right tools and an emergency plan that can be executed on very short notice will be able to weather any storm as safely as possible.



36

WIND TURBINE CAPACITY FRONTIER FROM SCADA

BY ANDREW KUSIAK, ANOOP VERMA,
AND XIUPENG WEI

The wind industry is experiencing rapid growth across the globe. Data envelopment analysis is used to identify critical faults of wind turbines.



40

USING SEALANTS, LUBRICANTS AND SURFACE TREATMENTS IN TURBINE MANUFACTURING

BY JASON SPENCER

Wind operations that use adhesives, surface cleaners and sealers during installation and maintenance enjoy longer life.

SEE THIS AND MANY MORE SECOVATIONS
IN BOOTH W-1564 AT IMTS 2012

DISC MILLING SECOVATION FOR HIGH PRODUCTIVITY AND RELIABILITY



Through a full range of insert geometries and grades, Seco's 335.25 Disc Milling Cutter achieves excellent performance across all workpiece materials. Expanding Seco's line of disc milling cutters, the 335.25 optimizes productivity with high material removal rates in 1" slots. Integrated coolant holes help to maximize chip evacuation, tool life and accuracy, while inserts feature a positive-geometry edge prep to minimize cutting forces and optimize quality. Use the 335.25 Disc Milling Cutter for reliable and productive machining in some of your most challenging applications.

SEE THIS SECOVATION IN ACTION.

Scan this QR code for video of the 335.25 Disc Milling Cutter in action.



SECOVATION

[SEE-KOH'-VEY-SHUH'N]

noun A productivity enhancing, profitability boosting, process redefining technological innovation developed as a direct result of Seco's close relationships with its customers.

SECO



www.secotools.com/us

DEPARTMENTS

VOLUME 3 NO.09

8

NEWS

Developments in technologies, manufacturing processes, equipment design, wind-farm projects, and legislation of interest to all wind-industry professionals.

17

CONSTRUCTION

CHRIS MARTIN—CRANE SERVICE, INC.

Common workdays provide interesting stories about wind farm construction when looking back over the years.

18

MAINTENANCE

CRAIG GUTHRIE—PERFORMANCE COMPOSITES, INC.

In-house telephotographic blade inspections reduce repair costs and turbine down time.

20

LOGISTICS

MICHAEL E. GRASKA—VECTORA TRANSPORTATION LLC

Have a PIP Method in Place to plan, identify and process shipments.

21

BUSINESS

KELSEY I. NIX AND THOMAS J. BASSOLINO—JONES DAY

Recently patented innovations address technical problems facing the wind industry.

43

PRODUCT SHOWCASE

News of products, equipment, and resources from across the wind industry that will help propel your company toward success.

48

Q&A JAMES LENZEN

ASSISTANT DIRECTOR OF RENEWABLE ENERGY

Northeastern Junior College

RESOURCES

MARKETPLACE 46

ADVERTISERINDEX 47



canwea
CANADIAN WIND ENERGY ASSOCIATION | ASSOCIATION CANADIENNE DE L'ENERGIE EOLIENNE



EWEA
THE EUROPEAN WIND ENERGY ASSOCIATION

BPA Worldwide Membership Applied for August 2012.

Wind Systems magazine, published by Media Solutions, Inc. Publications mail agreement no. 40624074 Return undeliverable Canadian addresses to: PO Box 503 | RPO West Beaver Creek | Richmond Hill, ON L4B 4R6

I've been working with a major turbine supplier for the past several months developing an article for an upcoming issue. We were on the final rounds of discussions regarding the content and scope of the interview when our work screeched to a halt. The delay wasn't because of changes in the article or a negative turn in business for this manufacturer, but because the company had an unprecedented order that took priority over work with me.

I was happy for my contact and his company. They received an order for work on more than 1,000 towers, and his revisions with me were put on the backburner. I understand. Priorities are priorities and business is business. I also know those types of out-of-the-blue orders are an indication that business is good for the entire wind industry.

This person isn't the only one in the industry who has mentioned recent and unexpected orders. I'm having daily conversations with insiders across the industry that say that while there is a considerable uncertainty hanging over the wind business, that dark shadow seems to be lifting and orders are coming in.

It reminded me of my work in other industries, where the news seems all doom and gloom for a while, but then a small shift occurs and spirits are lifted. Those tiny upticks in the market are positive indicators and should not be ignored. It's usually a sign of good things to come.

I thought about some information that recently came across my desk about more than 10,000 MW of wind projects under construction in the United States on top of the 21 projects already installed in the second quarter of this year.

I thought about a Dow Jones & Company Market Watch report that said electricity generated by the U.S.'s growing crop of giant turbines in the past four years now equals the output of 11 nuclear power plants. That's enough wind output to supply electricity to nearly 13 million American homes.

These milestones come as the industry waits for Congress to pass the Production Tax Credit, which is set to expire at the end of the year. The U.S. Senate that is controlled by Democrats and the Republican-held house are at odds on whether to extend the credit or let it die.

I don't like beating a dead horse on the PTC or the state of the economy, but it seems until we have some resolution with this tax credit for renewable energy, many people only look at the glass as almost empty, when the rest of us know the glass is closer to full.

I tend to be an optimist and I like to encourage optimism when I see positive information. If you aren't feeling optimistic about wind's future, you are listening to the wrong people. Turbine manufacturers, component suppliers, developers, land developers and the people who are educating the next wave of wind industry workers are all upbeat about the future of wind in the United States and around the world. They see renewable energy, and wind energy in particular, as the future of America's commitment to a self-sustaining, clean lifestyle.

As the United States moves into the second place as the largest wind energy producer in the world, we are the only things that can stop us now.



Sherri Mabry, managing editor
Wind Systems magazine
sherri@windssystemsmag.com
(800) 366-2185 ext. 205



David C. Cooper
Publisher

Chad Morrison
Associate Publisher

EDITORIAL
Sherri Mabry
Managing Editor

SALES
Glenn Raglin
National Sales Manager

Mike Barker
Regional Sales Manager

Tom McNulty
Regional Sales Manager

CIRCULATION
Teresa Cooper
Manager

Kassie Hughey
Coordinator

Jamie Willett
Assistant

ART
Jeremy Allen
Creative Director

Michele Hall
Graphic Designer

CONTRIBUTING WRITERS

Chris Martin
Craig Guthrie
Michael Graska
Kelsey I. Nix
Thomas J. Bassolino
Andreas Petrosino
Jason Spencer
Jeff Johnson
Andrew Kusiak
Anoop Verma
Xiupeng Wei



PUBLISHED BY MEDIA SOLUTIONS, INC.

P. O. BOX 1987 • PELHAM, AL 35124
(800) 366-2185 • (205) 380-1580 FAX

David C. Cooper
President

Chad Morrison
Vice President

Teresa Cooper
Operations

No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or any information storage-and-retrieval system without permission in writing from the publisher. The views expressed by those not on the staff of *Wind Systems* magazine, or who are not specifically employed by Media Solutions, Inc., are purely their own. All "News" material has either been submitted by the subject company or pulled directly from their corporate web site, which is assumed to be cleared for release. Comments and submissions are welcome, and can be submitted to sherri@windssystemsmag.com.



Gear oils that drive efficiency

You understand the value of efficient equipment... Low operational costs. We understand how to generate more output from less input... Effective lubrication. Our gear oil is formulated to increase efficiency and protect your drive systems.

Klüber Lubrication offers a line of gear oil that optimizes the performance of gear systems by preventing the damages caused by extreme loads, challenging environments and long maintenance cycles.

Please contact one of our specialists to learn how Klüber Lubrication can help you increase the efficiency of your mechanical systems.

Klüber Lubrication North America L.P.
info@us.kluber.com / www.klubersolutions.com/wind2

your global specialist

KLÜBER
LUBRICATION



WIND SYSTEMS MAGAZINE APPLIES FOR BPA WORLDWIDE BUSINESS PUBLICATION MEMBERSHIP

Wind Systems magazine has applied for business publication membership in BPA Worldwide. The magazine is published by Media Solutions, Inc. (Pelham, AL).

BPA Worldwide will track circulation for Wind Systems based on business/distribution, demographics and geographic coverage. The magazine will have 12 months to complete its initial circulation audit.

“The strong growth of *Wind Systems* magazine has made it a perfect time to apply for membership with BPA Worldwide,” said Publisher David Cooper. “Our firm commitment to our recipients and advertisers will be enhanced by our future membership in BPA.”

“We are pleased that *Wind Systems* magazine has applied for membership in BPA Worldwide,” said BPA president and CEO Glenn Hansen. “We applaud the publisher for providing advertisers and prospects with the solid assurance of an independent circulation audit conducted according to our world-respected, uncompromising standards. With a BPA audit, media buyers can be confident that circulation claims are accurate, and that they have the verified data that they need to assess a publication’s effectiveness in serving its market.”

BPA Worldwide is a not-for-profit organization since 1931 and headquartered in Shelton, CT, USA. BPA has the largest membership of any media-auditing organization in the world, spanning more than 30 countries. The organization conducts 2,600+ audits for media brands in print, online/digital and live events. Additionally, under the iCompli brand, BPA documents compliance to defined standards including data protection, provides assurance of sustainability reporting, and verifies technology, service and privacy claims. BPA is supported by 2,700 advertiser and agency members.

For more information, visit www.bpaww.com.



KLÜBER LUBRICATION PRESENTS PORTFOLIO OF SPECIALITY LUBRICANTS AND SERVICES

As the importance of wind power increases, so will the challenges to be met by wind power plants, also in terms of efficiency. Downtime, short maintenance intervals, complex supplier management, high storage costs for lubricants and gear oils are just some of the challenges influencing operators’ success. Klüber Lubrication will present high-quality speciality lubricants and tailor-made services for the wind energy industry under the motto “Wind beneath your wings” at the HUSUM WindEnergy 2012 in hall 3, stand 3E 08.

The new adhesive lubricant Klübersynth AG 14-61 has been especially designed for girth gear/pinion drives and plain bearings, e.g. yaw bearings, in wind turbines. The wide service temperature range of the synthetic lubricant, which is also spreadable at low temperatures, ensures trouble-free operation. Klübersynth AG 14-61 can be applied by central lubrication systems down to -30 °C. The product ensures excellent wear protection and contributes to longer girth gear/pinion drive lifetime due to

Companies wishing to submit materials for inclusion in this section should contact Sherri Mabry at sherri@windssystemsmag.com. Releases accompanied by color images will be given first consideration.

its combination of selected solid lubricants and additives. Furthermore, the new lubricant is very versatile.

Besides this newly developed product, visitors can also find out about Klüber Lubrication's speciality. The synthetic gear oils of the Klübersynth GEM 4 N series offer high scuffing load capacity, micro-pitting resistance and wear protection, meeting the specific requirements of the wind industry. They are also resistant to aging and oxidation and have a good viscosity-temperature behavior. Additionally, the synthetic gear oils of the Klübersynth GEM 4 N series also have excellent anti-foam properties, as they contain raw materials with low tendency to foam combined with highly-effective anti-foam additives.

Klüber Lubrication will also present a wide range of services in the field of speciality lubrication. The Grease Condition Analysis (GCA) service has been added to the portfolio this year. Availability is a key factor for operators of wind turbines. Lubricant analysis can provide information that helps to optimize availability. Bearing grease condition analyses by means of standardized methods on a regular basis provide information on the current condition of the grease. Based on analysis results, the failure risk of expensive components or systems can be reduced and useful life be increased. Grease condition analysis is available for selected lubricating greases from Klüber Lubrication.

For more information, visit www.kluber.com.

ECOTECH INSTITUTE ANNOUNCES FIRST GRADUATING CLASS

Ecotech Institute, the first and only college entirely focused on preparing America's workforce for careers in clean technology and sustainability, held its first graduation on Thursday, June 21, 2012. Forty-two students received their associate's degree, which prepares them for a career in the clean technology industry. The graduates received degrees in Wind Energy Technology, Solar Energy Technology, Renewable Energy Technology and Electrical Engineering Technology. Former Governor Bill Ritter, who currently serves as the Director of the Colorado State University Center for the New Energy Economy, delivered the commencement speech at the graduation.

"As Governor, I was proud when Ecotech Institute chose Colorado as the place to locate the country's first private technical institute devoted solely to preparing the workforce for the clean energy economy," said Ritter, "It is a privilege to play a role in Ecotech's first commencement, and to see the efforts of the staff and faculty come to fruition."

Students in this first graduating class began classes in a temporary facility in June 2010 as Ecotech completed an overhaul of an existing vacant building.

In January 2011, they moved to the current LEED gold-certified campus in Aurora, Colorado. Today, Ecotech has more than 500 students and continues to grow.

"This initial group of students are visionaries, as they signed up for classes before they were able to see the beautiful campus and cutting-edge labs," said Mike Seifert, president of Ecotech Institute. "Now, a variety of clean tech companies are offering them excellent positions and their forward-thinking commitment is paying off. We applaud each of them and look forward to watching their success."

At Ecotech all students develop soft skills (communication, workplace etiquette), and math and science basics and technology skills, but the educational emphasis is on hands-on, practical training. Ecotech's prestigious national board of advisors, who all work in clean tech industries, helped design the school's curriculum, providing coursework that reflects what the students will experience upon graduation. For a demographic breakdown of this first graduating class, please visit <http://www.ecotechinstitute.com/pdf/ecotech-graduate-information.pdf>.

"Ecotech is producing well-prepared graduates that are highly sought in industries such as ours," said Jesse Masters, Recruiter from M-I SWACO, a Schlumberger Company. "Its curriculum and practical labs offer complete training that makes new employees ready to hit the ground running. We were very impressed with the interviews we conducted with students from this graduating class and are excited to have several of these graduates join our team."

Ecotech's campus is LEED-gold certified and supports a commitment to sustainable living. The school generates approximately 5-10 percent of its energy from on-site clean, renewable energy sources such as rooftop wind turbines, solar panels, integral thin solar technologies embedded into the glass of the building canopy, and solar trees.

Ecotech Institute, which is accredited by the Accrediting Council for Independent Colleges and Schools, offers five highly practical associate's degree programs that provide graduates with skills valued by today's alternative renewable energy employers.

To learn more about Ecotech Institute, visit us online at www.ecotechinstitute.com or call 877-326-5576. The next round of classes begins in July and applications are being accepted now. Financial assistance is available to those who qualify.

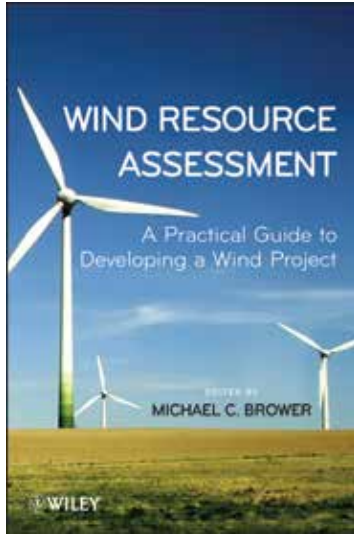
AWS TRUEPOWER RELEASES COMPREHENSIVE GUIDE TO WIND RESOURCE ASSESSMENT

AWS Truepower, LLC, an international leader in renewable energy consulting and information services, announces the release of "*Wind Resource Assessment: A Practical Guide to Developing a Wind Project*"

(Wiley, 2012). The book provides authoritative, practical guidance wind energy planners, managers, developers, tower installers, and others involved in wind monitoring and resource assessment for utility-scale wind projects around the world.

Michael Brower, PhD, lead author and Chief Technical Officer of AWS Truepower, noted, "Every industry needs standards to succeed. This is especially true of wind resource assessment. This new book – representing the knowledge of a team of AWS Truepower experts who have assessed over 60,000 MW of wind projects – will help readers avoid costly mistakes in a project's development."

The book explains how readers can achieve a high standard of resource assessment, reduce the uncertainty associated with long-term energy performance, and maximize the value of their wind assets. Topics addressed include siting, installation, and operation of a high-quality wind monitoring program, methods of data quality control and



validation, extrapolating measurements from anemometer height to turbine height, adjusting short-term observations for historical climate conditions, and wind flow modeling to account for terrain and surface conditions. In addition, special topics such as remote sensing (sodar and lidar), offshore resource assessment, climate change, uncertainty, and plant design and energy estimation are reviewed.

Visit <http://www.wiley.com/WileyCDA/WileyTitle/productCd-1118022327.html> or www.awstruepower.com.

AVAILON CERTIFIED AUTHORIZED SERVICE PROVIDER BY WINERGY DRIVE SYSTEMS

Availon, Inc. announces that it is now a certified ASP (Authorized Service Provider) for Winergy Drive Systems Corporation, USA. Winergy offers a full range

of components for the wind turbine drive train including gearboxes, couplings, and generators.

To gain ASP Certification, a team of Availon's

SIFCO® APPLIED SURFACE CONCEPTS

On-Site, In-Place Wind Turbine Repairs



Slip Rings



Damaged Bearing Journals

Avoid costly disassembling, packing and round trip shipping of your parts to a repair facility for traditional repairs. The portable SIFCO Process® of selective plating allows our experienced technicians to return wind turbine components to their original tolerances, on-site, up-tower – saving your operation valuable time and money.



To learn more please contact Tony Arana at 281-444-6500 or aarana@sifcoasc.com, or visit tinyurl.com/6eq8sra



5708 E. Schaaf Road
Independence, OH 44131, USA
Toll Free: 800-765-4131

Phone: +1-216-524-0099 Fax: +1-216-524-6331
Email: info@sifcoasc.com
Website: www.sifcoasc.com



engineers and technicians attended extensive training at the Winergy Plant in Elgin, IL. The subject of hands-on training was the up-tower gearbox repair for GE 1.5 wind turbines. As a result, Availon's personnel are certified in borescope services for identifying of the gear and bearing damages inside the gearbox; high speed bearing replacement; high speed shaft replacement; intermediate speed bearing replacement (generator side only); intermediate speed shaft replacement; low speed bearing replacement (generator side only); pitch tube replacement and/or repair.

All works performed by factory-trained Availon technicians are covered under the Winergy standard one-year warranty. In addition to the certified services, Availon is stocking Winergy-manufactured parts needed for repair and replacement of gearbox components at Availon's Service and Distribution Centers in Des Moines, Iowa, and Sweetwater, Texas.

Availon and Winergy plan to continue training and the certification process to allow Availon's wind technicians to perform up-tower services for other wind turbine brands and makes.

John Brown, Availon North America's Special Projects Manager and a Winergy-certified technician said, "The gearbox converts the low speed high torque energy produced by the blades into a high speed low torque energy that drives the generator, and as such it is truly the central component of the drive system. If any component in the gearbox has been damaged, the entire drive system may be compromised causing serious loss of production.

The ability to perform up-tower gearbox repairs helps

cut crane costs and significantly reduces a turbine's downtime. For more information, visit www.availon.com.

NEW REPAIR FACILITY RECONDITIONS WORN-OUT OR DAMAGED CABLE LASHING MACHINES

General Machine Products Company, Inc. reintroduces its repair facility dedicated to the reconditioning of the company's brand of cable lashing machines. Staffed by a team of experts with decades of hands-on experience, GMP's Lasher Repair Center facility thoroughly inspects, reconditions or replaces worn-out or damaged cable lasher components with

When Every Lift Counts, Count on Delta.

When your people, your project, and your reputation are on the line, you can't afford lifting and rigging equipment that doesn't measure up. Delta is the name you can trust. Every lift. Every time.



- Safety
- Service
- Quality
- Value



- Sales
- Rental
- Service

Angleton, TX • Baton Rouge, LA • Grand Junction, CO • Houma, LA
 Hurst, TX • Lafayette (Broussard), LA • Odessa, TX • Pasadena, TX
 Pearland, TX • Sulphur, LA • Victoria, TX • Williston, ND

www.deltarigging.com

1-877-408-8008

original quality parts. Cable lashing machines, sometimes called “lashers” or “spinners”, are designed to wind stainless steel wire around telephone, power, and other utility cable, thereby securing or “lashing” the cable to the supporting messenger strand that spans between utility poles. Since its introduction, GMP has produced over 30,000 lashing machines, with some manufactured in the 1950’s still in service today.

Accepted as the industry standard, GMP lashers have been known to operate typically for 25 years or more, lashing thousands of miles of cable in their lifetimes.

This wear and tear can necessitate factory-authorized repairs during the life of the machine. The Lasher Repair Center provides a convenient solution for keeping lashers on the job longer. GMP also discounts the parts used in its repairs, adding more value to this needed maintenance function.

To offset the purchase price of brand new units, the company also accepts GMP brand lasher trade-ins. Contact the sales department at 215-357-5500 or info@GMPtools.com for details about the lasher trade-in program or visit www.GMPtools.com.

FT TECHNOLOGIES OPENS NORTH AMERICAN OFFICE

Located in Austin, Texas, FT Technologies announces the opening of its office. Gordon Bease will manage all business operations from this site.

“FT Technologies has been very successful in creating a portfolio of established clients in North America, and the N.A. office and operations will capitalize on our geographical proximity to existing and new markets. I believe that excellent in-region customer service, in addition to superior and differentiated products, are the keystones to business success,” said Bease.

With over 10GW of installed wind power capacity, Texas has a significant installed base of FT Technologies’ FT702LT ultrasonic wind sensors, and also has a strong academic focus on wind power. Austin, in particular, is very active in attracting investment from leading-edge Cleantech companies and provides an excellent business environment.

Greg Wortham-Executive Director, Texas Wind Energy Clearinghouse, added “TWEC is delighted to have FT Technologies setup their North American headquarters in Texas. This reflects our State’s leadership in wind energy and is indicative of



Environmentally Friendly
Power Sources Deserve
Environmentally Friendly
Components

Multi-Turn Absolute Encoders
From Encoder Products Company
Compact
Reliable
No Batteries to Replace - Ever

 **ENCODER**
PRODUCTS COMPANY

www.encoder.com
800-366-5412





CANADIAN WIND ENERGY ASSOCIATION ANNUAL CONFERENCE & EXHIBITION

TORONTO, ONTARIO
OCTOBER 14–17, 2012

This premier event will bring together over 2,500 experts from around the world to discuss opportunities in Canada's growing wind energy industry. It will provide an exclusive opportunity to network and generate new business leads.

JOIN US AT CANADA'S LARGEST WIND ENERGY CONFERENCE



www.canwea2012.ca

 **canwea**
CANADIAN WIND ENERGY ASSOCIATION | ASSOCIATION CANADIENNE DE L'ÉNERGIE ÉOLIENNE

the potential of the North American wind industry as a whole.”

The new office is located at: 12600 Hill Country Boulevard, Suite R-275, Bee Cave, TX 78738.

For more information, call 512-329-2622 or visit www.fttech.co.uk.

LORD ANNOUNCES WIND ENERGY SOLUTIONS

LORD Corporation—a global leader in the management of motion, vibration and noise—now offers gearbox bushing and generator mounts for the growing wind turbine industry.

According to Susan Alice, LORD National Account Manager, at the request of OEMs, LORD entered the wind energy market by applying technological solutions proven in other industries.

“With more than 80 years of experience in vibration isolation and industrial damping applications, LORD is uniquely qualified to respond to the growing industry need for solutions in the wind energy market,” said Alice. “Our expertise serving the demanding global aerospace and industrial markets makes us a prime candidate to be a major supplier to the wind energy market because we understand the importance of durability and long life-cycles for all components.”

Vibration and motion can contribute to premature failures in wind turbine gearboxes and generators, and the cost of service and the associated downtime

is significant. LORD is able to leverage its engineering design, testing and quality systems developed to make mission critical parts on helicopters and industrial vehicles to provide isolation and motion control products to more than meet design requirements.

LORD Corporation’s first production contract is for a major North American manufacturer of large wind turbines. This OEM sought a local source for key critical components of their turbines in order to reduce supply risk. LORD responded with a design for gearbox bushing and generator mounts. Not only does LORD Corporation’s vast global manufacturing capabilities ensure local production, but the bushing and mount design has proven, through internal testing, to exceed the 20-year service life requirement.

“As a North American supplier, we offer the market the opportunity to design and manufacture components here in the United States, eliminating the need to import large, heavy parts,” said Alice. “But, as a global supplier with manufacturing throughout the world, we can meet customer requirements on a global scale.”

LORD is now working on vibration and motion control products for larger turbines and for new applications including pitch control box mounts. For more information on custom or off-the-shelf design solutions for the wind energy market, please contact LORD at +1 877 ASK LORD (275 5673) or visit www.lord.com/products-and-solutions/wind-energy.xml.

PROTECT YOUR BOLTS



IRONCLAD EXTREME DUTY BOLT CAP

- SHEILD AGAINST SALT WATER INTRUSION
- RESISTS ICE DAMAGE
- 4 SEPERATE SEALING SURFACES
- ADDITIONAL UV PROTECTION

INTRODUCING IRONCLAD GROUT SLEEVE



Protects the bolt from contact with grout and prevents grout from going down into the bolt sleeve.

NORM TOOMAN CONSTRUCTION, INC.
THE STANDARD OF THE INDUSTRY.
800.359.0372
INFO@NORMTOOMANCONST.COM
NORMTOOMANCONST.COM



reliable expertise

UniversalPegasus International is a leader in engineering and project management for the energy transmission industry. Our Power Division offers a full spectrum of electrical power engineering solutions for renewable energy generation and transmission clients throughout the United States and Canada.

universalpegasus.com
303.462.1100

- Substation Engineering
- Transmission and Distribution Line Design
- Collector System Design
- Generation Interconnect
- System Planning
- Power Studies
- EPC/EPCM



POWER DIVISION 

UniversalPegasus INTERNATIONAL

Universal EnSCO, Inc., Pegasus International, Inc., UP International Inc. and Peak Power Engineering, Inc. are UniversalPegasus International companies.

CANWEA COMMENDS QUEBEC'S VISION IN WIND ENERGY

The Canadian Wind Energy Association (CanWEA) applauds the Québec government announcement of a fourth call for tenders for the commissioning of a new 700-MW wind energy block. In issuing this new call for tenders, Québec Premier Jean Charest reaffirms his government's commitment to renewable energy by seeking to attain the 4,000-MW objective set in its 2006-2015 energy strategy.

"This is great news for communities where new projects will be developed. In addition to the significant investment it will bring into the province, new wind energy projects will create new jobs throughout Québec," said Chris Forrest, vice-president of Communications at CanWEA. "We applaud the Quebec government for its vision and leadership in supporting the development of more wind energy to deliver clean electricity, new jobs and regional economic investments."

Experience has shown that the economic impact of wind energy is considerable. Between 2005 and 2015, wind energy is expected to generate investments in Québec exceeding \$10 billion and economic benefits for municipalities and landowners in the tens of millions, as well as create some 37,000 jobs (person-years). In 2011, the Gaspésie region – birthplace of Québec's wind energy industry and home of several businesses operating in this sector – posted its lowest unemployment rate since 1987 and positive net migration for the first time in a decade.

Quebecers show strong support for continued development of their province's wind energy sector, the highest level of enthusiasm being among those who live closest to wind farms. A new survey, conducted earlier this year by Léger Marketing, found that 83 per cent of Quebecers see wind energy in a positive light.

The wind energy industry is very well established in Québec and continues to show growth. In 2010, CanWEA unveiled its strategic vision for development of this form of energy in the province beyond 2015.

"Québec's wind energy potential is immense. Almost 4,000 MW will be installed by 2015, and we expect to increase this objective by another 8,000 MW between 2016 and 2025 –which will generate \$25 billion in investment and create 90,000 jobs in the construction phase," said Jean-Frédéric Legendre, Québec regional director for CanWEA. "Revenues to landowners and municipalities could reach as much as \$25 million annually by 2015," he added.

The document, titled *WindVision 2025 –A Strategy for Quebec* can be found online at: http://www.canwea.ca/windvision_quebec_e.php.

2012 WORLD ENERGY ENGINEERING CONGRESS IN ATLANTA, OCT. 31 - NOV. 2

AEE announces the 35th anniversary of the World Energy Engineering Congress (WEEC) at Atlanta's Georgia World Congress Center, October 31 - November 2, 2012. The WEEC is recognized as the most important energy event of national and international scope for end

users and energy professionals in all areas of the energy field. This year's keynote speakers will include General Colin Powell and legendary newsman Ted Koppel. The WEEC will feature 14-track conference agenda, a full line-up of seminars on a variety of current topics, and a comprehensive 100,000-square-foot exhibition of the world's most promising new technologies. Topics will include energy policy, high performance buildings and energy management "best practices" for the federal, commercial, institutional and industrial marketplace. Stimulus funding updates, green jobs and financing will be covered in detail. For more information, please visit <http://www.energycongress.com>.

For more information, visit www.aeecenter.org.

GE-TAMOIN SIGN MILESTONE WIND TURBINE SERVICE AGREEMENT WITH IBERDROLA

A consortium including GE and Spanish energy services company Tamoin Energias Renovables signed the largest single GE wind turbine maintenance agreement in Europe with Iberdrola Renovables S.A. of Madrid. The contract with Iberdrola, one of the largest wind energy companies, covers servicing 310 GE wind turbines installed in Spain.

The agreement is set for three years with an option to extend for two additional years and provides the foundation for a long-term relationship among Iberdrola, GE and Tamoin. GE will act as the technology partner in the consortium to provide high availability and reliability for the installed GE wind turbine fleet by supplying parts, specialized labor and technological support, while Tamoin will supply skilled labor. The scope of the agreement includes planned and unplanned maintenance for the GE wind turbines at the following Iberdrola wind farms: Cuesta Colorada, Cerro Calderon, Cerro Palo, Muela 1, Maza, Calleja, Isabela and Sierra Quemada y Gavilanes.

GE also announces that it has received commitments to provide its 1.6-100 wind turbine for projects that will add 1.8 gigawatts of capacity to the world's clean energy supply by the end of 2012. Agreements for the 1.6-100, the highest capacity factor wind turbine operating in North America, have totaled \$3.6 billion since its introduction a year ago, with projected volumes of more than 1,500 units installed globally by 2013.

Recent commitments for the 1.6-100 have come from Canada, Brazil and Turkey, as well as the United States, according to the company. With blades and towers that extend 100 meters, the 1.6-100 wind turbine captures additional wind energy. It offers a 47 percent increase in swept area over previous megawatt-class models, resulting in a 19 percent increase in annual energy production at wind speeds of 7.5 meters per second. This enables the turbine to deliver moderate wind speed performance even when operating in low-wind environments.

The 1.6-100 wind turbine builds on GE's global fleet of 18,000 operating wind turbines. It is based on the proven hub and blades of GE's 2.5-100 and the nacelle and electrical system of GE's 1.6-82.5,

which is currently operating at 98.5 percent production-based availability.

For more information, visit www.ge.com.



WIND TOWER GEARBOX BREATHER IS FIRST LINE OF DEFENSE

The heart of a wind tower is a large metallic box filled with specially designed gears, bearings, an input shaft, an output shaft and a couple gallons of highly engineered lubricating oil. It's the gearbox and its job is to help convert the rotary movement of the impeller blades, into energy. If it's working well it's an asset, generating Kw's and revenue, but when it fails, it quickly becomes a liability costing thousands of dollars and lost revenue.

Every minute of every day the gearbox is exposed to many high stresses and the only thing preventing its immediate deterioration and eventual failure is the specially designed lubricating oil. It reduces friction between wear surfaces. Typically it is not the gearbox that fails, it is the lubricant that breaks down due to heat, moisture, or particulates. No generator is 100% efficient, so heat will be a condition of all gearboxes. The lubricant is designed to help reduce and dissipate the heat and as long as the heat doesn't become excessive, it shouldn't be an issue in the lubricant degradation. Moisture and particulate however are two conditions that are usually over-looked.

When the wind starts blowing and blades start to turn, that means the gearbox is turning also and the oil

is going to warm up. That thermal expansion of the oil means that air will be evacuated from the gearbox (this is the exhale of air). When the blades slow or stop turning, the gearbox will also decrease in speed, causing the oil to cool and a thermal contraction (this is the inhale of air). This cycle of air into and out of the gearbox occurs all day, everyday, it's how the gearbox allows for the various operating temperatures. It is also single leading cause of lubricant failure, external contamination sources.

Ask your maintenance staff what type of breather is on your gearbox. Most breathers consist of a small plastic or metallic body with a coarse screen inside. They cost around \$10 and only prevent large obstacles from entering the gearbox, but they do not filter out humidity, condensation, or smaller contamination particles. Those are the attributes that will accumulate and break down lubricating oils, causing premature failures.

A Guardian gearbox breather is a desiccant type breather that filters both humidity and small particulates from the air, before it enters a gear box or comes into contact with the lubricating oil. It is specially designed to protect lubricating oils with two 2 micron absolute particulate filters and a solid bed of desiccant that the air must pass through, proving three layers of high efficiency air filtration. This helps elongate the life of the lubricant and allows for longer, more efficient operation of the gearbox.

Whether on a family farm or offshore platform, all wind tower gearboxes require better air filtration to protect gearbox lubricant longevity and integrity. The Guardian breather was designed to provide that barrier of protection and help extend the life of gearbox lubricants.

For more information, visit www.airsentry.com.

TRELLEBORG OFFSHORE PASSIVE FIRE PROTECTION AWARDED ISO ACCREDITATION

Leading global developer and manufacturer of polymer and


syntactic foam-based solutions for the offshore industry, Trelleborg Offshore, has been awarded the ISO 22899 certification for its passive fire protection material, Firestop. The official certification, which was awarded by the International Organisation for Standardization, confirms that the company's innovative solution can safely and confidently be used for Jet Fire protection within pipes and hollow sections.

Oddvar Kopstad, Senior Design Engineer at Trelleborg Offshore, commented: "Passive fire protection systems are designed to contain fire and provide protection for people and equipment when it matters the most. In the extreme conditions of the offshore oil and gas industry, it is absolutely essential that engineers have the peace of mind that only comes from high performance, quality products.

"Achieving the ISO 22899 certification is an extremely positive step for Trelleborg Offshore and clearly demonstrates our dedication to continually ensuring the upmost quality and performance of our passive fire products and solutions."

Firestop is a rubber-based passive fire protection solution, which can be customized to meet the demands of specific offshore oil and gas projects and installations. By utilizing a layered construction, Firestop provides corrosion, thermal, fire and mechanical protection.

Applications for Firestop include rigid riser or tubular fire protection, flexible riser fire protection, ESD valve protection, escape way tunnel seal and protection of riser Hang off arrangements.

For more information visit www.trelleborg.com/offshore. 

Common workdays provide interesting stories about wind farm construction when looking back over the years.

CRANE SERVICE, INC has a diverse history since we opened back in 1960 when Emmet Storks opened our first branch in Albuquerque. Our growth was directly related to the growth of Albuquerque. We have been a silent partner in the building and construction of iconic buildings to the less known industries. We pride ourselves in the knowledge we have of the business world at large. We are versed in the language of all industries, especially the wind sector.

All of our customers are smart, creative, and passionate about what they do. At Crane Service, Inc. we support them by making their job easier and making the difficult projects a success. But we don't have to insert ourselves into their story and that is okay. We are the silent partners in the business, we don't mind dodging the limelight, and staying in the shadows – because the end result is success of the project manager/director and company. We enjoy making projects appear effortless for the head of projects and companies. But from our standpoint there is a sense of silent pride; a pride we don't boast upon. It is an extremely good feeling driving by a project and knowing that you were a part of that somehow; whether it is preplanning, working on site, operating the crane, or our service crew. All of the small efforts add up to a success. One success in particular that is interesting is the construction of Trent Mesa Wind Park near Sweetwater, Texas.

Then operator now branch manager, Bob Strohecker, tells the story of how Trent Mesa was constructed and why it was important to the industry and himself. The story starts back in 2001 when operator Bob Strohecker traveled from Albuquerque to Trent to build the wind turbine site for then Enron.

"I don't think we really realized what we were getting into. We have done windmills in the past, but they weren't this large. [Referring to the Enron 1.5mW]. We didn't really realize what it would bring. What it brought was that we were actually the first ones to actually put up the 1.5's. Now reality has kind

of set in and it is like, wow you know what, I was kind of involved in the beginning of windmills – major 1.5's -- I was the one who was able to set the first base section. It is a good feeling, especially standing here today realizing back in 2001 of what it really brings today. Wow it is a good part of history and has been really a good part of my life," Bob said.

The project came with unique challenges for not only our crews, but also everybody involved in the project. There was a lot of learning for every craft. On our end we had to learn what our equipment and we were truly capable of in the wind. It is worth noting at the time the Enron 1.5mW turbine was the largest in the United States and Trent Mesa was the proving ground – this is where it all started. Another challenge involves



the sheer size of the park. The park consists of more than 100 turbines. In order to qualify for the tax breaks the whole park had to be built and producing energy. There was no second place on this project. Even if we fell short and missed it by three turbines, there would be no tax breaks for the entire park. In this time frame we had to stop construction due to the migration of birds that were coming up from Mexico. This did actually become an issue as we were nearing the end of our time frame we had to stop and wait for the migration to pass. This gave us a small window to construct the last three turbines in time. We accomplished what we said we would do and have since been

maintaining the turbines in the now GE park.

In this industry the stories you experience never really get told to the public at large. The silent pride takes over and you don't share your everyday stories. The interesting part is the fact the everyday stories to you are actually amazing stories to your family, friends, and the public at large. Everyday we are taken to another challenge and experience that will help shape and create the world around us. That is not the mindset at the time. It is a job. We are there to accomplish a task. Only later in this case, 10 years later, can you truly reflect on what seemed like a "usual" day back in 2001. ✨

In-house telephotographic blade inspections reduce repair costs and turbine down time.

AS WE KNOW, WIND TURBINES must be periodically inspected and maintained throughout the twenty plus year life of the turbine. Gearboxes, generators, drive motors, bearings, and electrical components are commonly inspected and maintained on a scheduled basis. Oddly enough, the blades, which are the largest of the operational components and the first critical component that converts wind energy into mechanical energy, tend to be neglected.

Although blade inspection and repair is an integral part of the operations and maintenance schedule, it is commonly overlooked or performed superficially with a quick visual of the blades from the ground or the nacelle top during maintenance using a pair of binoculars or just the naked eye.

The new wind turbines blades are getting longer and more sophisticated and the manufacturers are pushing the limits on engineering design and material capabilities in order to generate more energy out of the same wind. Today's blades are engineering marvels and they rival the complexity of aircraft wings. The blades must be strong enough to handle severe wind conditions, stiff enough not to strike the tower or create dynamic instabilities and have to endure varying dynamic loads 24 hours a day for twenty plus years -- all while maintaining the aerodynamic efficiency to convert as much wind energy into mechanical energy as possible.

For this reason, blade maintenance must be approached in a proactive, rather than reactive manner. Catching small problems early can make a huge difference in the cost of repair and in some cases save a blade from catastrophic failure. By the time an anomaly has grown large enough to be seen from the ground with the naked eye, it may be too late.

A major contributing factor in the lack of blade maintenance is that inspecting the blades has a unique set of difficulties. Being a component that is external of the nacelle, with a surface area of thousands of square feet, and being hundreds of feet above the ground, makes any work on the blades a difficult and time consuming task. External access to the blades is possible via crane basket, rope rappel and cable suspended platform but all of these options may not be cost-effective for full site annual or semiannual inspections.

For scheduled periodic visual inspection, from-ground telephotography inspection is the best great option. A good quality telescope or high power lens with a large aperture and an in-line high resolution digital SLR

camera allows the inspector to quickly scan the surface of the blades and instantly capture high quality images of findings or areas of question. With the ability to accurately inspect multiple turbines per day without all of the up tower access, weather and cost limitations, makes telephotography efficient and cost-effective for full-site rotational inspections, end of warranty inspections, quick checks on suspect blades after a lightning storm or wind event, and inspections of failed components from a safe distance. Purchasing the right equipment, understanding inspection methods, and knowing what to look for is the key to being able to performing effective inspections.

The setup for wind project owners and/or operators to do this type of inspection in-house is fast and cost-effective by simply contacting a blades/composites expert company to both provide the proper equipment and conduct onsite training for the selected technicians to become certified blade inspectors. The training can be done in two to three days and should also include up tower internal blade inspection training. Inspecting the internal structural components of the blades is equally important to the external surface.

The telephotography equipment and detailed inspection methods training is a relatively small cost with a huge return on investment for years to come. With the site operations company having the ability to capture high quality close up images of possible issues on the blades, there is no need to bring in a third party to inspect. The full resolution images can be emailed immediately to the blade/composites expert partner company to evaluate and help decide when or if the blades even need repair. Many times, anomalies found on the blades are not real damage at all but simply grease, oil or dirt. Even if a blade does require repair work to be scheduled, the damage may not be structurally critical and the turbine could be running while until a repair crew can get to the site. These are just a few simple examples of how the right equipment and training can save days or weeks of unscheduled turbine down time on top of reducing third-party contractor costs.

Many wind project owners and operators across the country have found real value in the ability to properly inspect their own blades, reducing the major problem/failure rate and being able to better forecast the blade maintenance costs. Efficient preplanning, a realistic budget to work with, and having the right tools to know the current condition of the blades is imperative to the long term success of any wind project. ✎

Craig Guthrie is technical manager at Performance Composites, Inc. Field Service Division, a blade inspection, repair and specialty expert services company. To learn more contact Craig at cguthrie@performancecomposites.com or visit www.performancecomposites.com.

Truck Rentals



- Dodge
- Ford
- Chevrolet

3/4 Ton Trucks:

- Crew Cab Diesel
- 2wd/4wd
- Towing Allowed

1 Ton Trucks:

- Crew Cab Diesel
- Flatbed/Pickups
- Towing Allowed

- Receiver/Pintle Hook
- Gooseneck/5th Wheel

Serving the continental U.S.

All Trucks Set Up For Trailer Towing!



866.320.9000 • BRYAN@GOCAPPS.com

Have a PIP Method in place to plan, identify and process shipments to deal with damaged cargo.

AFTER WORKING 25 YEARS IN THE SUPPLY chain business there are two things that I personally know as true. One: forecasts are almost always wrong and if not you are lucky. And two: no matter how well you plan, secure and protect the shipment, cargo can still be damaged. I'd like to talk on the second item since we are in the middle of wind farm construction season and there is no escaping having to deal with damage cargo. For all of my projects I use what I call the PIP method covering cargo damage. PIP stands for Preparation, Identification and Process.

Preparation covers such items as route planning, packaging, securement analysis, insurance coverage and contingency planning. Understanding the route before shipping can actually eliminate surprises. For example, after reviewing a rail route we discovered that there were bushes that had not been cut back and would scrape against or over wide wind tower sections. We had the railroad perform track maintenance and cut the limbs back prior to delivery.

Proper packaging may seem obvious, especially with high value cargo, but I have experienced projects where OEM's neglected the proper packaging, which resulted in damage during transport. Always review the packaging details with the manufacturer before shipment.

One of the tasks prior to shipment especially for oversize and overweight cargo is to create a securement plan. This plan is an analysis of how the cargo will be secure based on the mode of shipment and includes not only lashing or rigging diagrams and instructions, but also an analysis of the forces the cargo will incur during transport. These plans should be approved either by the carrier or the manufacturer.

Align your insurance coverage with all the other parties involved in the project. Make sure there are no gaps. And communicate with the insurance company your plans and analysis.

Last, remember to have a contingency plan in place in case there is damage. Can you easily replace the cargo? Can the cargo be repaired, onsite or returned to the factory? Have this plan in place and communicated prior to the shipment.

Identification simply means documenting the damaged cargo. The best time to document the damage is at the moment it occurs. Have a simple procedure to follow and most importantly train the

personnel involved on how to use the procedure. I cannot emphasize the importance of having oversized cargo inspected at every touch point. What I mean by a touch point is when it is handled. Either have the carrier inspect the cargo or have an independent surveyor perform this inspection and reporting task. One of the things I do is to have inspections sheets made up with a cargo diagram, so if someone notices damage during the transport they can easily show on the diagram where the damage is. I also advise personnel to take pictures and lots of them. When reporting the damage, make sure all documents reflect the damage, including packing lists and Bills of Lading. These documents along with a formal damage claim and pictures will assist in processing claims quickly.

“I cannot emphasize the importance of having oversized cargo inspected at every touch point. What I mean by a touch point is when it is handled.”

Have a process in place to document, report and follow up on damage. This process includes filling claims and processing to completion, but may also be used as an analysis on the incident itself. Do a root cause analysis of the damage and use this experience for improvement with the next shipping order. Having a process in place gives structure to events that can often be stressful and chaotic, and it greatly helps in capturing all the necessary data required for damage claims.

Damaged cargo is a fact of life in the transportation industry, but how one mitigates damaged cargo and responds to the incident can spell success or failure for a project or even a company. Try using my PIP method as a guideline when dealing with damaged cargo.

Now if I could just figure out how to improve my forecasting. ✈

Michael E. Graska is senior manager of operations and engineering for Vectora Transportation LLC. For more information, email him at mgraska@vectoratransportation.com or visit www.vectoratransportation.com.

Recently patented innovations address technical problems facing the wind power industry.

THE VALUE OF PATENTS to the wind power industry is evident when studying recent patents. A search for patents related to wind power systems that issued within the past twelve months yielded over 1100 results. These patents cover a broad scope of subject matter, and include many innovations that address the technical and practical problems facing the wind power industry.

WIND SPEED & VIBRATION

U.S. Patent No. 8,133,023, which is assigned to Lockheed Martin Corp., is directed to an apparatus and method for reducing wind turbine damage through the design of overlapping blades. The patent describes blades that can be adjusted to form variable cross-sections that either increase or decrease propeller rotation speed dependent upon wind speed and weather conditions. The patent describes controlling the threshold of destruction in the turbine propeller through the adjustment of the overlapping blades in different wind conditions.

Over time, forces of varying magnitudes are transmitted from the blades to the generator, and in turn the generator frame. These forces may lead to fatigue failure of the generator frame in the form of cracks or other defects. Because the generator frame is disposed at or near the top of the tower, the generator frame's weight is a primary concern.

TRANSPORTATION & CONSTRUCTION

U.S. Patent No. 8,172,493, which is assigned to GE, is directed to transporting a multiple piece rotor blade, and then aligning and coupling the rotor blade pieces at a wind turbine installation site. The patent describes using a platform, such as a flatbed trailer, where a first part of the platform supports a root piece of the rotor blade and a second part supports a cooperating end of a tip piece of the rotor blade. The second part of the platform is "pivotally movable" with respect to the first part to facilitate alignment and coupling of the cooperating ends of the rotor blade.

CLEANING ROTOR BLADES

U.S. Patent No. 8,192,163, which also is assigned to GE, is directed to an apparatus for cleaning the outer surface of a wind turbine's rotor blades. Dirty rotor blades can alter the aerodynamic characteristics of the blade, which can decrease the performance of the wind turbine and increase the probability

of stalling the blade. The patent describes how the cleaning apparatus (labeled 200c) may be attached to, and is conformable with, the outer surface of the rotor blade (140).

WIND TURBINE NOISE

The noise generated by wind turbines has been at issue in several recent legal disputes. See, e.g., *In re AWA Goodhue Wind, LLC*, No. A11-2229 (Minn. Ct. App. June 25, 2012). *Concerned Citizens to Save Roxbury v. Bd. of Envtl. Prot.*, 2011 ME 39, 15 A.3d 1263 (aff'd Bd. of Envtl. Prot.'s decision to grant wind energy facility permit despite residents' concerns regarding noise); *Residents Opposed to Kittitas Turbines v. State Energy Facility Site Eval. Council*, 197 P.3d 1153 (Wa. 2008) (holding that the governor properly exercised authority to approve site certification for a wind energy project despite residents' concerns that included noise).

U.S. Patent No. 8,157,532, which is assigned to Gamesa Innovation & Tech., is directed to a wind turbine blade with an anti-noise device formed by a plurality of elements with a substantially arrowhead shape that are located on the blade. The anti-noise device is intended to reduce noise by altering both "the scale of turbulence and its power distribution in the frequency domain by the use of elements introducing coherent fluidic structures, placed behind the location of the transition line, where the change from laminar to turbulent boundary layer occurs."

The average time from filing to issuance of these patents was approximately three years, which is on par with the average pendency of patents in general. Thus, recently issued patents are generally based on research and development conducted before 2009. However, the pendency of the patent for pre-stressing a generator frame was only seventeen months, because the applicants utilized the U.S. Patent and Trademark Office's "Green Technology Pilot Program," which expedites the review of applications pertaining to green technologies. This program is now unfortunately closed, but there are discussions to implement similar programs in the future.

Although the patents discussed above represent a miniscule sample of the intriguing innovations emanating from the wind power industry, they are good examples of the industry's ability to overcome obstacles. The obvious need for renewable energy sources combined with the value of patents will hopefully continue to stimulate research and development to address the technical and practical problems facing the wind power industry. ✎

COMPANY PROFILE

GEARBOX EXPRESS

By Sherri Mabry



Gearbox Express is fulfilling a niche the wind power industry is only just learning it needs.

The Gearbox Express founders from left to right: Brian Halverson, COO; Bruce Neumiller, CEO; and Brian Hastings, CFO.

"WE ARE GEARBOX GUYS and gearboxes are all we do," said Bruce Neumiller, CEO of Gearbox Express.

Opened in 2010, Gearbox Express is an independent company that focuses on gearboxes and proactive gearbox life-cycle management with an eye toward speed, quality and customer service.

"Nearly 40 percent of all failures are mainly due to components' failure with the gearbox contributing the most. The industry is still in its infancy and we are only now learning about the volume of gearboxes that will fail before they reach their anticipated 20 years of useful life," Neumiller said. "Many customers will need multiple gearboxes during the life of their turbines."

Targeting a very narrow section of the market was an intentional plan based on research and experience. Neumiller, and his two founding partners, Brian Halverson, COO, and Brian Hastings, CFO, all have solid backgrounds in gearboxes, including work with major global gearbox manufacturers.

"We truly are gearbox guys," he said. "We focus only on down-tower services, but we can provide technical advice and field support. We don't compete with any channel partners, including O&M Providers. We are completely independent in the market and we know that repairing gearboxes will become a necessity for OEMs and operators."

Gearbox Express chose a business model that would support and complement other repair services. "We don't perform up-tower work on the installed wind turbine, so we are free to work with the operations and maintenance companies, and we don't manufacture gearboxes, so we have good relationships with most gearbox OEMs and turbine owners. Many owners have multiple makes of gearboxes in their fleet, and with Gearbox Express, they can have one supplier for all of them."

Along these lines, Gearbox Express saw a need for aftermarket infrastructure, stocking new and used gearboxes from major OEMs such as Gamesa, Vestas, and GE.

"I don't know of anyone but us who has an extensive gearbox exchange pool. Some owners have spares, but they usually are not well maintained," he said. "Gearboxes need to be properly maintained to prevent dust and moisture from entering the assembly. That's why our 43,000-square-foot facility is clean and climate-controlled with segregated clean and dirty areas. We keep a stock of load-tested wind turbine gearboxes and mainshaft assemblies ready to go in our GBXchange to eliminate downtime."

The 43,000-square-foot facility offers 40- to 50-ton lifting capacity along with offices, a training center for technicians and customers, and a 3.1-MW regenerative test stand, which was designed to test a variety of gearboxes with real-life variable conditions. The lobby is dedicated to different failure modes, offering a visual message to visitors that this business is all about gears.

Each gearbox is inspected and tested to stringent standards to ensure customers obtain the maximum life from each gearbox that leaves the Wisconsin plant.

The custom-designed test stand allows for varying torque throughout the test to induce spike loads to more accurately simulate the operating conditions within a Turbine.

"With the design of our test stand, we are able to far more accurately replicate the conditions that a gearbox may see compared to using a traditional load test stand," he said.

Providing gearboxes for the wind industry is different from providing remanufactured gearboxes to other industries, according to Neumiller, who says wind gearboxes have much tighter tolerances and higher quality standards.

"Using original equipment gearing when possible, along with our sophisticated test stand is the reason the three year warranty we offer is possible. It's unique in the industry," he said. "With traditional rebuilds, many people are using reverse-engineered gears. If you aren't aware of the heat treat tolerances or material specifications, then you don't know how a gear will operate so you may have premature component failure," he said.

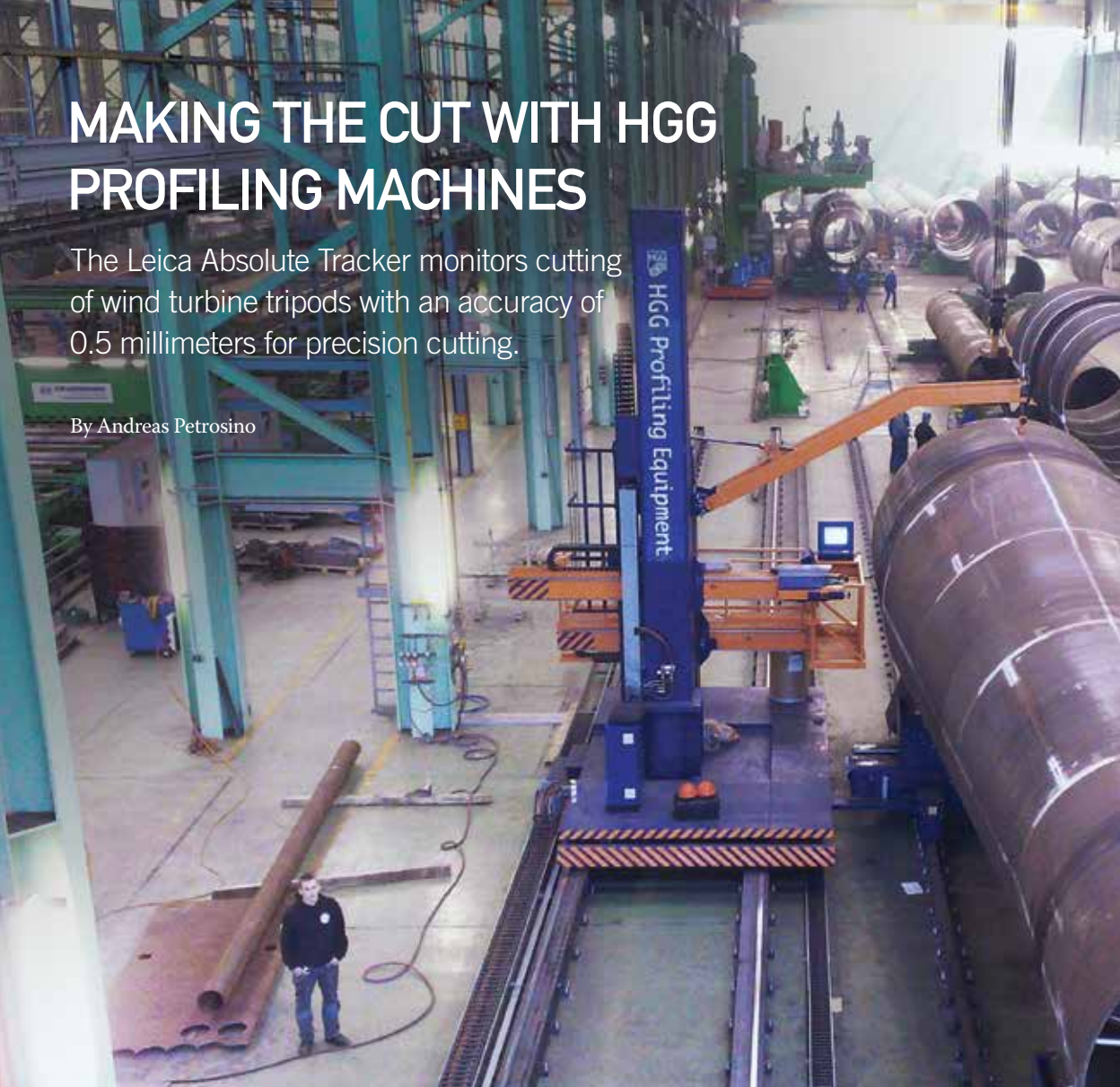
"By using original equipment when possible, every component we replace in the gearbox is done to OEM specifications which gives our customers a better product in the end," he said. "We make a variety of upgrades to gearboxes to address infant mortality. We install coated bearings to alleviate cracking and we also address filters and water removal systems. We take what's already a good product and make it better."

"Turbines are just now starting to come out of warranty," he said. "We have entered a specialized niche as the only truly independent, high quality, third-party remanufacturer of gearboxes in the United States. That was by design. We are entering an area where many people don't yet know they need our services," he said. "As the industry reaches maturity, there will be a rude awakening as to the volume of gearboxes that will fail. We are ready for that day." ↵

MAKING THE CUT WITH HGG PROFILING MACHINES

The Leica Absolute Tracker monitors cutting of wind turbine tripods with an accuracy of 0.5 millimeters for precision cutting.

By Andreas Petrosino



Andreas Petrosino is Marketing and Communications Manager for Leica Geosystems (A part of Hexagon). For more information, call 847-931-0100 or visit www.hexagonmetrology.us.

MANY 3D CUTTING JOBS WORLDWIDE are done through HGG machinery. Founded in 1984, HGG Group is the world's only company fully devoted to steel profile cutting, providing both tailor-made machinery and knowledge to the highest standards. Their machines are sold worldwide to leading companies in the offshore, steel construction, process piping, shipbuilding and other industries.

HGG profiling machines provide quality cutting according to the latest ISO standards, (ISO 9013) which enable easy operating, programming, industry specific customization, and durability. HGG

manufactures bevel cutting machines that are particularly suited for processing large components. "We like challenges," says Peter Tool, R&D manager at HGG. "Our greatest strength is that we design our systems and software from the bottom up – so we retain flexibility. Short channels of communication allow us to come up with completely new processes in very little time."

MEASURING TECHNIQUE: THE KEY TO SUCCESS

A German manufacturer of wind turbine components, EEW located in Erndtebrück Germany,



Fig 1: How the Leica Absolute Tracker “sees” the cutting machine.

drifts. However, the changes in diameter are not constant; when the tube rotates on the cutting machine – the ovality changes with the movement of the tube. In addition, a 60-meter long tube sags several centimeters at mid-span between supports. The structural frame of the cutting machine itself also deforms while supporting this extremely heavy load. In the face of deformations like these, even the most accurate machines are incapable of delivering a clean cut. With tubes costing around 100,000 € (approximately \$122,000USD) each, cutting errors cannot be allowed to happen. Therefore Tool and his team decided to integrate a measuring system into the cutting machine.

NO EXPENSIVE SCRAP

To address this challenge, the users needed to know the position of the tube relative to the cutting machine at all times. If the exact coordinates and deformation of the tube on the machine are always known, it is possible to continuously compensate for the movement of the cutting head thereby eliminating expensive scrap.

Peter Tool quickly found a suitable method of control. He had become aware of the potential of laser trackers at an earlier trade show and recognized that there was no alternative to the range capability of laser metrology for the dimensions of the parts in the EEW project. HGG decided to couple the Leica AT901 Absolute Tracker to the cutting machine to ensure the necessary accuracy and adequate measuring range for the 60-meter long tubes. Their requirement necessitated the positioning of the measuring instrument in front of the tube. The typical measurement volume of the tracker can extend to 160 meters and no other laser tracker could offer the desired accuracy over the large distances.

LASER TRACKER MONITORS CUTTING HEAD AND COMPONENT

From the start, the company had one objective: the machine had to be capable of being properly operated by a single person. Therefore HGG fully integrated the laser tracker into the cutting machine so the operator does not even have to know how to use it. The instrument tracks several reflectors on the cutting head and on the tube. Every section of the tube is fitted with a reflector, which lets the cutting machine operator know how much the tube bends. The laser tracker supplies the coordinates of one point every 100 milliseconds. These coordinates are then fed back to the cutting ma-

placed an order with HGG. EEW wished to manufacture foundation structures, known as tripods, for an offshore wind farm using high quality steel. The task was to produce cylindrical members cut precisely in 3D from 400-ton, 60-meter long, 6-meter high steel tubes. HGG realized from this basic information that adopting the correct measuring technique would be key to the success of the project.

A tube weighing 400 tons deforms under its own weight when placed on the cutting machine. This deformation changes the diameter of a tube by up to 20 millimeters and leads to undesirable

FORGET THE FLIMSY SOLUTIONS



WINDTRACKER™ REENGINEERING SERVICES

A service dedicated to performance and reliability.

These services are available at your sites:

- Electrical maintenance training.
- Slip-ring performance diagnostic.
- In-situ slip ring repair.
- Re-engineering and retrofit process.



For more information,
www.mersen.com

MERSEN
Expertise, our source of energy

chine software, which has also been configured to control the tracker – a task made possible by the programming interface of the system.

HGG installed the new cutting machine in the EEW production facility in Rostock, Germany. Mounted on an 8-meter high platform, tracker monitors the movement of the cutting machine and the supported tube. This measuring system



Fig 2: The 60-meter, 400-ton tubes are readied for cutting.



AWEA Educational Program

Fall 2012

The American Wind Energy Association (AWEA) creates industry events that capture the energy of this ever-important global wind energy segment. Offering unparalleled educational sessions and discussions, and led by the industry's foremost authorities in wind energy issues, AWEA events are a necessary piece of any serious wind professional's development.

Save the dates NOW for these invaluable Fall 2012 events:

AWEA Regional Wind Energy Summit – New England

September 5 – 6, 2012 ▶ Portland, ME

AWEA Wind Resource & Project Energy Assessment Seminar

September 13 – 14, 2012 ▶ Pittsburgh, PA

AWEA Offshore WINDPOWER Conference & Exhibition

October 9 – 11, 2012 ▶ Virginia Beach, VA

AWEA Wind Energy Fall Symposium

November 14 – 15, 2012 ▶ Chandler, AZ

AWEA Regional Wind Energy Summit – Southwest

December 5 – 6, 2012 ▶ Houston, TX

Scan this code with your smartphone for event details. ▶

www.awea.org/events



Booth Space Still Available!!



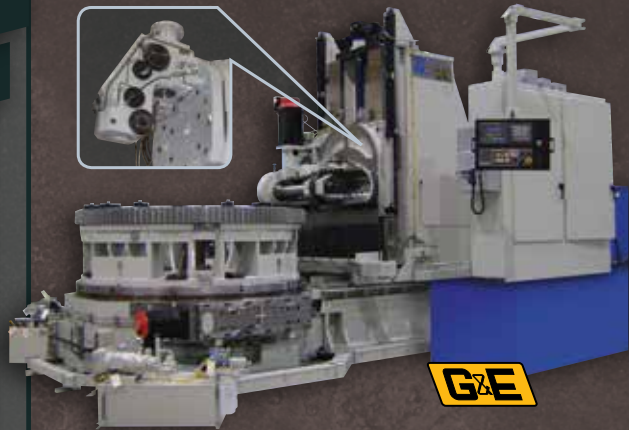


Fig 3: The Leica Absolute Tracker (upper right) is positioned to measure the top of the oversized tubes.

Your #1 Source for Gear Machinery

Gould & Eberhardt is a pioneer in high-speed gear gashing with large diameter carbide-inserted cutters. Our new line of machines has a rigid design and heads engineered with state of the art gear gashing cutter technology. Gear gashing technology has opened many gear cutting applications in wind energy, mining, off-highway construction and other coarse pitch gearing.

Our gasher/hobbers are equipped with the new G&E interchangeable cutter head design. This design provides the option for both internal and external heads on a single column machine with capacities up to 5.5 meters.



866.342.9073

RP MACHINE
ENTERPRISES, INC.

820 Cochran Street • Statesville, NC 28677
F: 704.872.5777 • www.rpmachine.com
sales@rpmachine.com



has to work in a very difficult environment. Components of these extreme dimensions and weights frequently give rise to vibrations. The tracker dealt with these issues without any problems and the dust created from the cutting operations did not adversely affect measurements. As Tool mentions, “Even with several millimeters of dust in the reflectors, they always continued to work perfectly.”

PERFECT FOR WIND FARM INFRA-STRUCTURE DIMENSIONS

HGG developed a new type of bevel cutting system, which integrated the laser tracker to continuously monitor the cutting process. Using the measured data in the metrology-aided cutting system, the machine cuts the 60-meter long, 400-ton tubes into individual sections with an accuracy of 0.5 millimeters. Peter Tool is proud of this development, “Thanks to the Leica Absolute Tracker, the HGG machine is capable of cutting extremely large components such as those now in common use by wind turbine manufacturers. Our customer successfully performed this task with precision and reliability.”

Transshield.

The Shrinkable Fabric™ for Wind Power Applications.

Custom Fit Covers for Shipping/Transportation

Transshield custom fit covers are a superior alternative to heavy, expensive tarps or conventional hand wrapping. Transshield is a unique combination of shrink wrap and fabric that provides premium protection for wrapping products for transportation or storage. This material is made into custom fit covers, tailored to fit your application.

Transshield covers are easy to install and the added ability to shrink the cover allows for a tight fit, resulting in quality protection from the factory to the field for nacelles, tower sections, root ends, hubs, gearboxes, blades and other products. This results in a smoother transition from factory to field.

Patented shrinkable fabric offers three layers of protection during transportation and storage.

**Quick like a cover.
Tight like a shrink wrap.**

888.731.7700
www.transshield-usa.com



2012 HURRICANE OUTLOOK: WHAT WIND OPERATORS SHOULD EXPECT

Wind farm operators who have the right tools and an emergency plan that can be executed on very short notice will be able to weather any storm as safely as possible.

By Jeff Johnson

Jeff Johnson is the Chief Long Range Forecaster and Chief Science Officer for Telvent DTN. Johnson focuses on medium and long range weather forecasts for Telvent DTN. For more information, visit www.telvent.com.

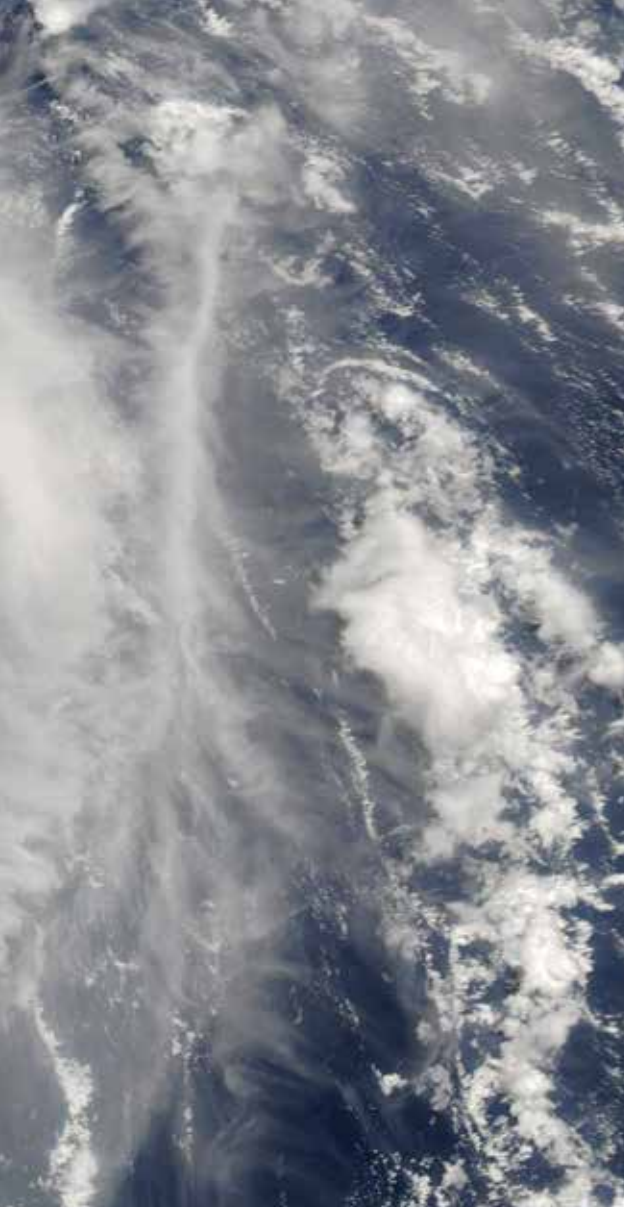
HURRICANE SEASON OFFICIALLY BEGAN

June 1, but activity started early this year with four named storms appearing before July 1, making 2012 the only year on record that this many storms developed so early in the season. This continues the enhanced storm activity that we saw in 2011, which produced 19 named storms compared with a typical year's 11. This total tied the record for the third highest number of named storms in a single year.

While traditional hurricane season forecasts attempt to estimate the number of named storms that will form during the year, of greater interest is how many of these storms will impact the U.S. and its

business operations. On average, the U.S. experiences 1.78 hurricane landfalls per year. The most likely number for annual hurricane landfalls is one, which occurred 30 percent of the time between the start of hurricane records in 1861 until 2011. In recent years, hurricane landfalls have been much less frequent, with only one U.S. strike in the past three seasons (Hurricane Earl landed on the Eastern Seaboard last year).

It's important to avoid complacency, however from this recent quiet landfall trend: The challenge for the wind power industry – especially operations in the Gulf Coast states – is to stay alert and be aware of



the nuances in this year's climate conditions and how these patterns and storms could affect operations.

THE BIG PICTURE

Each hurricane season depends on two ocean temperature cycles, one short-term and one long-term. The long-term Atlantic multi-decadal oscillation (AMO) cycle is, as the name suggests, a time of either warmer or colder water in the Atlantic Ocean that can last for several decades. We are currently in the warm phase, which typically leads to an increased frequency of hurricane development in the Atlantic Ocean (while the cooler water phase inhibits them). The short-term, more

annual cycle is the better known as El Niño/La Niña climate patterns in the Pacific Ocean, which can influence storm numbers from year to year.

The El Niño/La Niña patterns can vary from year to year and refer to deviations in the surface temperature of the tropical eastern part of the Pacific: warmer surface temperatures are known as El Niño ("little boy" in Spanish), named after the Christ child because the effects of the pattern are often felt around Christmastime in South America. The opposite, cooler temperature pattern is dubbed La Niña ("little girl"). The more extreme the El Niño or La Niña is, the more extreme the weather can become in many regions, bringing about floods, droughts and storms.

Climate scientists and weather forecasters recognize the formation of an El Niño climate pattern when the surface pressure over the Indian Ocean and South Pacific begins to rise, accompanied by a fall in air pressure over the central and eastern Pacific. The sustained warming of the central and eastern region often brings heavy rainfall with it, while the western Pacific is steeped in drought.

An El Niño also brings about increased wind shear (differences in wind speed or direction over a short distance in the atmosphere) downstream into the Atlantic region. Increased wind shear creates unfavorable conditions for storms to form or intensify in the Atlantic basin because there are stronger winds aloft in the tropical regions. In general, the El Niño effect tends to inhibit tropical storms from developing in the Atlantic (or if they do develop, they are more likely to remain less intense or of fewer numbers), while La Niña conditions are more favorable for the formation of storms. Studies have shown that there are many more storms on average during La Niña years, and fewer during El Niño seasons.

We are currently in a developing El Niño phase, although a weak one. We are predicting these conditions continuing through the fall and impacting hurricane development by making it a relatively quieter end to the year in terms of total numbers of storms that form in the Atlantic during the more active September/October part of the season. Conversely, the warmer waters we have been seeing in the Gulf of Mexico and off the southeastern coast of the U.S. this year are more likely to feed any storms that do develop and may help them reach hurricane intensity more quickly as they approach the mainland.

The bottom line: We are predicting an average or below-average year for the number of tropical storms and hurricanes that form, especially the latter half of the season due to El Niño, but those storms that do develop and head into the Gulf of Mexico and the southeastern U.S. could become more intense due to the warmer waters near the U.S. this year.

THE GOOD NEWS: THE ATLANTIC COAST

As mentioned above, El Niño's increased wind shear creates less favorable conditions for storms to form in

the Atlantic basin. In addition, this year there is a large patchwork of cooler than normal sea surface temperatures in the central and eastern Atlantic area, where many late-season storms develop. This colder water may also help to reduce the number of the longer-tracked hurricanes that develop off the west coast of Africa and track westward. These storms can become stronger hurricanes as they travel for a long time over the open waters of the Atlantic. Many of these storms tend to curve north as they approach the East Coast of the U.S., so reducing the number and probable intensity of these storms is a step in the right direction. The exact track of any individual storm however is dependent on the steering winds in place at the time of each storm, so land falls or lack of them anywhere cannot be foreseen more than a few days in advance.

These conditions lead us to forecast a near-average or below-normal

number of tropical storms in the Atlantic region this season. This is good news for the relatively few wind farms up and down the coast: Although operators should always have a plan in place, we believe there is a reduced risk compared to average for an interruption because of tropical storms or hurricanes.

WHERE TO BE WATCHFUL: THE GULF REGION

While the wind shear conditions generated by El Niño lower the likelihood of storms and hurricanes, we have also been watching the warmer sea surface temperatures in the Gulf of Mexico that have existed since the spring. This warmer water could contribute to more hurricane development closer to the U.S. mainland. In addition, we don't have the strong area of high pressure that we saw last year in the Gulf, which helped steer away hurricanes (and which also caused the unprecedented drought conditions).

These factors have led us to forecast an average or slightly above-average risk of tropical storms in the Texas coast and Gulf region for the remainder of the season.

But the simple number of storms isn't the whole story: The warmer waters in the Gulf also create more favorable conditions for storms to intensify quickly as they near the U.S. We are concerned that storms could strengthen rapidly as they approach the continent, giving us a shorter lead-time to secure business operations and evacuate the area.

This is one of the most important details to be aware of if you are in the wind power industry: conditions that encourage storms to intensify quickly mean shorter notice of destructive storms. Storm intensity is generally volatile and difficult to predict, and the warmer Gulf waters may make that even more challenging. This year, do not assume a multiple-day lead-time on hurricane development: Ensure crews and

When precision, reliability and quality are your expectations... **TURN TO SOTEK/BELRIX**

A leader in the manufacturing of precision metal stampings. We supply custom stamped laminations and assemblies to a variety of customers – large and small.

Whether your need is for immediate turn around or delivery of production quantities on a regular basis, we are equipped to meet your needs.

- Stator, Rotor, and Pole Laminations
- Stator, Rotor, and Pole Assemblies
- Vent and Finger Plates
- Stamping and Laser Capabilities
- Complete In-House Tooling Capabilities



Sotek, Inc. and Belrix Industries, Inc. • 3590 Jeffrey Boulevard • Buffalo, NY 14219
716-821-5961 • fax: 716-821-5965 • www.sotek.com • info@sotek.com • ISO REGISTERED

SERVING MEDIUM TO HEAVY INDUSTRIAL MOTOR AND POWER GENERATION INDUSTRIES

available equipment are ready to move on short notice.

WHAT THIS MEANS FOR THE WIND INDUSTRY

While we don't believe this will be a gangbuster year for tropical storm total numbers, any wind power operation in the Gulf of Mexico region should be aware that current and forecasted conditions can facilitate more storm development in the area and contribute to a storm swiftly intensifying. Rather than a week's notice, operators may only have a few days, so monitoring storm conditions closely will help ensure crews are kept safe and damage to movable equipment is minimized.

Typical threats to a wind farm from hurricane landfall include strong winds, storms and flooding: An average hurricane is about 300 miles wide with outer rain bands made up of dense thunderstorms. Damaging winds are generally confined to within 100 miles of the coastline, but tornadoes from the outer bands of a hurricane can reach as far inland as several hundred miles and are a risk for several days after the storm makes landfall. The stronger the hurricane, the more likely that tornadoes will result. Flooding rains can travel even further inland – even as far inland as the Midwest – where wind farms are more prevalent.

TOOLS FOR MITIGATING RISK

While good wind farm operators always keep an eye on the weather, there are a few tools that can help increase an operator's understanding of conditions, how they will affect operations and when action needs to be taken to prepare for damaging weather and evacuate crews.

A comprehensive weather forecasting and detection solution should provide fast, accurate information with features specific to the wind industry, including wind speeds and lightning detection. Telvent's MxVision WeatherSentry Online® provides this level of service, including location-specific information, precipitation forecasts that

have earned awards for accuracy and the best lightning-alerting technology on the market.

MxVision WeatherSentry Online allows wind farm operators to easily assess risk with a display of all active hurricanes and tropical storms around the world. Users can also select individual storms for viewing, along with the ability to view mul-

iple forecasts along with the official track for any tropical storm or hurricane across the globe.

Because field workers typically do not have access to a computer, communicating via cell phone is critical. Telvent's MxVision WeatherSentry Online solution and its mobile application can provide detailed weather information about a wind farm

WIND TURBINE TECHNICIAN ACADEMY

Competency Based, Hands-On Training
Industry Guided Curriculum
Safety Training Certification
BZEE Certified Graduates
24 week, Full Time Program
Competitive Application Process

KalamazooVALLEY™
community college

269.353.1250 kvcc.edu/wind






Fig 1: Telvent MxVision WeatherSentry's Wind Edition, showing actual lightning strikes on a map – the rings on the map are wind farms watch and warning ranges.

maintenance crew's specific location based on a cell phone's GPS signal. This is especially helpful to the wind industry, which often has crews moving across vast areas that would typically require them to enter new GPS coordinates into

the weather detection system every time their location changed. Instead, a crew's location is automatically updated, the forecasts are adjusted accordingly, and alerts will sound on a crewmember's phone when severe weather moves

into a predefined area (30 miles out, for example). Specific thresholds can be set for conditions like wind speed and lightning, providing crews with a customized detection system and alerts for their geographic area. This efficient solution gives them enough time to exit the area safely and seek shelter.

Lightning can be a major concern during tropical storms, especially for wind farm maintenance crews working on turbines. Telvent's tool is the only one in the industry to offer future lightning forecasts, which allows users to better visualize where lightning may strike in the next hour through a color-coded map, demonstrating the probability of lightning strikes. Future lightning allows wind farm operators to plan appropriately for crew safety.

Telvent's tool provides detailed, hourly forecasts three days out, making it particularly useful if hurricanes are approaching and crews need to be aware of high wind speeds that put maintenance activities at risk, or potential lightning strikes from subsequent thunderstorms. While operators will be aware of a hurricane's landfall several days out, the erratic nature of the resulting weather can affect operations for several days. Close monitoring of weather conditions and readiness to change course quickly will ensure that no one is caught off guard.

THE FORECAST: KEEP AN EYE OUT IN THE GULF

The good news is that we expect an average or quieter-than-average fall season for total tropical storm and hurricane activity in the Atlantic basin. In the event that storms do develop, there is a greater chance however that they will be located near the U.S. – especially the Gulf region – and gain strength more quickly than expected. Wind farm operators who have the right tools and an emergency plan that can be executed on very short notice will be able to weather any storm as best and as safely as possible. ✈

MAKE TOOL MANAGEMENT A BREEZE

CUSTOM TOOL KITS

Safety and productivity are critical success factors for Wind Turbine Maintenance. Having the "right tool for the job" can prevent injury and equipment damage. Leaned out toolkits with asset management systems drive productive behavior. Imagine being able to inventory a technician kit in 30 seconds, or a complete truck in 5 minutes?

SNAP-ON LEVEL 5™ TOTAL ASSET MANAGEMENT

Snap-on developed Level 5™ based on the principles of 5S. Organization, Visibility, Security, Trackability and Accountability are the foundation of tool management. Our proprietary TCMax® Asset Management Software system takes things to the next level. TCMax® tracks capital assets and calibrated equipment. The bar code driven program provides extensive reporting capability, and GET THIS.....THE SOFTWARE TALKS TO YOU.



Call toll-free 877-740-1900 or
Wind Energy Mgr - John Tremblay 413-519-3380
snaon.com/industrial

Snap-on
INDUSTRIAL

WIND TURBINE CAPACITY FRONTIER FROM SCADA

The wind industry is experiencing rapid growth across the globe. Data envelopment analysis is used to identify critical faults of wind turbines.

By Andrew Kusiak, Anoop Verma and Xiupeng Wei



Dr. Andrew Kusiak is a Professor and Chairman of the Department of Mechanical and Industrial Engineering at the University of Iowa, Iowa City, IA. He can be contacted at andrew-kusiak@uiowa.edu. Anoop Verma and Xiupeng Wei are doctoral students pursuing research in wind energy at the University of Iowa.

THE WORLD HAS SEEN A significant expansion of renewable energy generation over the last decade. Wind energy has become the greatest contributor to this growth. The wind turbine generated energy depends on the wind potential and the turbine availability impacted by faults and repairs. Faults are responsible for reduction of the overall capacity of wind turbines. Supervisory control and data acquisition (SCADA) systems record wind turbine parameters, which can be used to monitor their performance. Successful applications of SCADA data usage include: power optimization [1], power curve monitoring [2], and fault diagnostics and prognostics [3].

Data envelopment analysis (DEA) is an analytical technique to assess capacity factor of wind turbines. DEA has been successfully applied in healthcare, marketing, and manufacturing. However, the application of DEA in wind energy is new. Assessment of turbine capacity in presence of faults is performed using SCADA data and fault logs. The results of this analysis are useful in prioritizing maintenance operations.

TURBINE CAPACITY AND DATA ENVELOPMENT ANALYSIS

The capacity of a wind turbine can be measured by its power producing capability in a given operational time

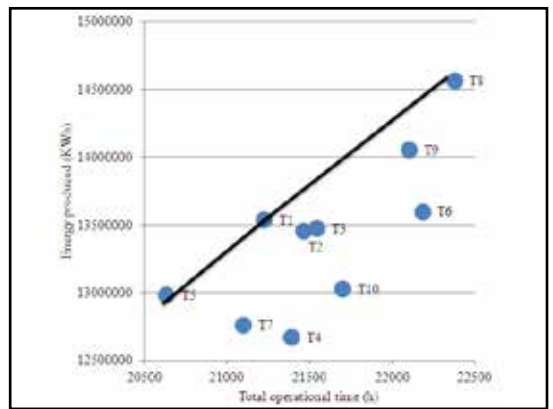


Figure 1: Performance of wind turbines over a three-year period.

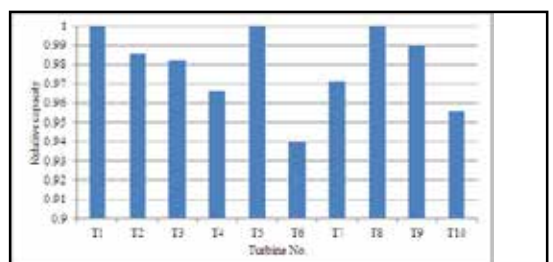
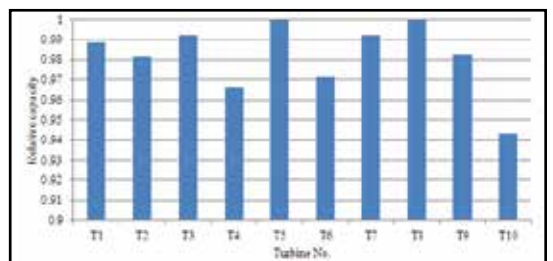
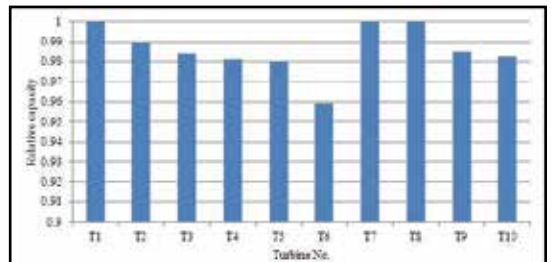
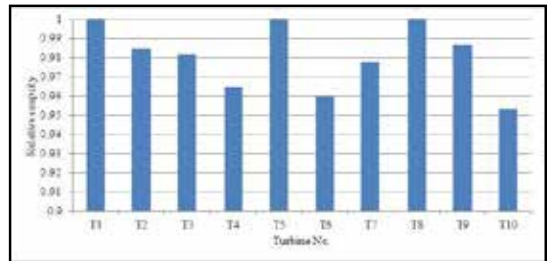
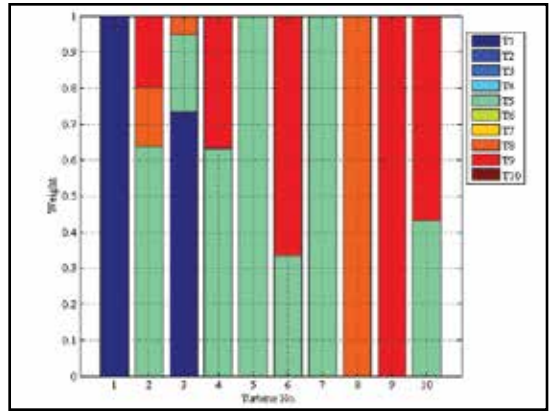
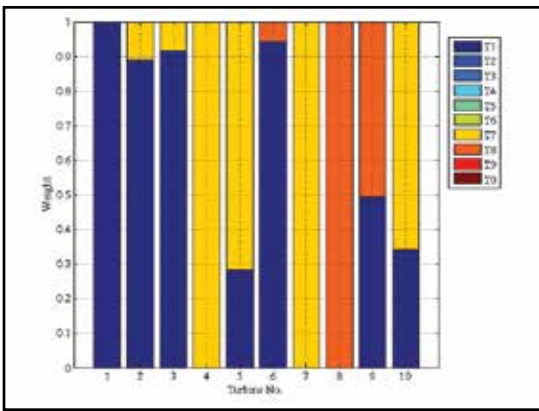


Figure 2: Turbines capacity: (a) base relative capacity (b) relative capacity with maintenance downtime. (c) relative capacity with fault downtime. (d) relative capacity with external downtime.

period. Of two turbines operating for a certain fixed time, a turbine producing more power is considered to be more efficient. Apart from the wind speed, downtime caused by turbine faults and power curtailment leads to power generation losses. In simple terms, the capacity factor of a wind turbine is expressed as the ratio of actual power generated by a wind turbine over the maximum power that could be produced. The capacity of a wind turbine can be affected by factors such as repair and maintenance downtime and external downtime (power curtailment), and fault downtime. Analysis of the impact of the faults on the capacity of wind turbines is imperative.



Figures 3: (a)-(b) present the weights associated with wind turbines in evaluating their relative capacity. Efficient turbines have the weights equal to unity. However, in case of inefficient turbines, the weights are a linear combination of efficient turbines. In both cases, turbine 5 contributes most to the weights of other inefficient turbines. Similarity analysis on turbine performance with maintenance downtime and grid downtime is performed.

DATA ENVELOPMENT ANALYSIS SINGLE INPUT-SINGLE OUTPUT

Data envelopment analysis is a powerful technique for the assessment of relative capacity of wind turbines [4]. The analysis presented in this article is based on data (Jan 2006 - Dec 2008) from 10 wind turbines, each 1.5 MW. The cut-in, cut-out, and the rated wind speed were 3.5m/s, 25 m/s, and 12 m/s, whereas, the rotor speed ranged from 0-23 rpm. Figure 1 illustrates the performance of wind turbines by DEA. Clearly, turbine 1, turbine 5, and turbine 8 are efficient and thus makes the capacity frontier, whereas, turbine 4, turbine 6, and turbine 10 are inefficient. DEA assesses relative capacity of wind turbines. Turbines with relative capacity score of 1 are considered to be efficient, whereas turbines with relative capacity less than 1 are inefficient.

MULTIPLE INPUT-SINGLE OUTPUT

To gain more insights into turbine performance, operational time, maintenance and repair downtime, external downtime (power curtailment), and fault downtime are considered. An input oriented data envelopment analysis approach is used to assess the turbine capacity under different downtime scenarios. Figure 2 (a)-(d) illustrate the capacity of 10 wind turbines for different downtime scenarios. The results provided in Figure

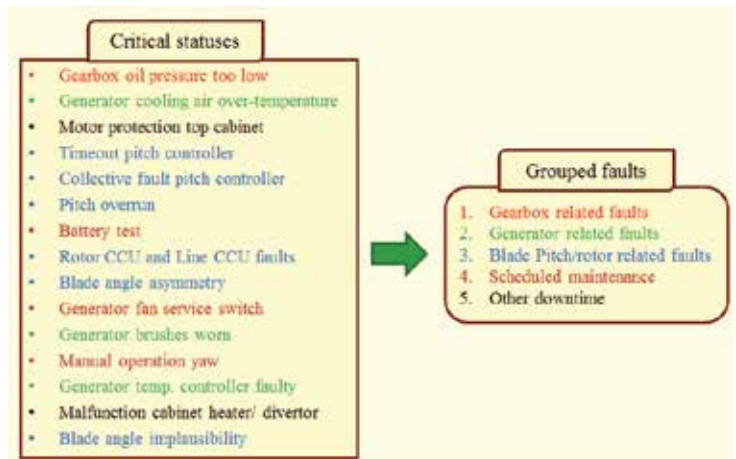


Figure 4: Critical faults in wind turbines.

Case No.	Average relative capacity	Efficient turbines
(a) Power with normal operational time	0.990	1, 5, 8, 9
(b) Power with normal operational time and scheduled downtime (maintenance and repair)	0.985	1, 7, 8
(c) Power with normal operational time and fault downtime	0.982	5, 8
(d) Power with normal operational time and external downtime (power curtailment)	0.979	5, 8

Table 1: Based on the analysis, the capacity degradation is higher in scenarios considering fault downtime.

2 (a)-(d) are summarized in Table 1. Based on the analysis, the capacity degradation is higher in scenarios considering fault downtime (Figure 2(c)), and external downtime (Figure 2(d)). Turbine 8 found to be the efficient in all scenarios. While the downtime due to scheduled repair and maintenance, and power curtailment cannot be avoided, analyzing the fault

information is useful in improving capacity factors of wind turbines.

Even though the turbines analyzed here are from the same original equipment manufacturer (OEM), certain replacement components such as generators, brush type, and bearings might possess different characteristics. For example, the ABB generators installed in certain wind turbines may

have poorer performance (due to overheating issues) than the Hitachi generators. Thus, the inefficient turbines identified here can be made efficient by closely following the components of efficient turbines.

MULTIPLE INPUT-SINGLE OUTPUT WITH FAULT INFORMATION

A typical wind turbine issues many status codes. Wind turbine statuses can be a system update only (turbine curtailment, turbine idling) or fault informative (blade pitch fault, generator fault). The fault informative statuses triggering more than the specified limit may cause the turbine to shut down or run sub-optimally, resulting in poor capacity factor. Figure 4 represents such fault informative statuses observed from 10 different wind turbines over a period of three years.

The figure 5 graph presents the turbine capacity under different fault scenarios. The analysis is done on the data combined from 10 wind turbines. Based on the results, turbines without any statuses is the ideal condition, however, while just fixing the critical statuses (as mentioned in Figure 4); the efficiency can be improved to a greater extent. Among faults, fixing the blade pitch faults and timely performing the battery test can improve the turbine capacity. Generators, gearbox related faults do not differ much from the original (real) capacity due to their less frequent observations in the data. While the relative capacity score under different fault scenario does not seem to be differing, it has bigger implications in terms of overall production loss (Figure 6). Based on the historical data, turbines on average produce 39000 KWh of energy per month. Thus, in one year, by fixing certain faults, the overall yield can be improved.

CONCLUSIONS

The downtime related with power curtailment and faults are the main factors responsible for tur-

Figure 5: Turbine capacity for different fault scenarios

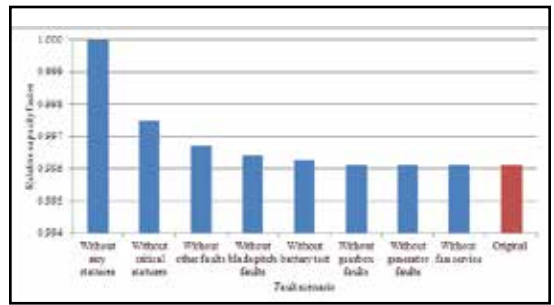
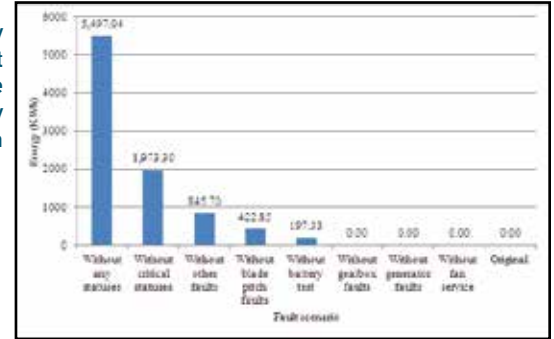



Figure 6: Yearly improvement in the turbine energy generation



bine inefficiency. The analysis performed here clearly indicates the role of data envelopment analysis approach in wind turbine capacity evaluation. The approach is particularly useful in prioritizing maintenance tasks. In the event of several concurrent faults in a wind farm, faults causing the most degradation in turbine capacity should be fixed first. ✎

United Equipment Accessories, Inc.
Solving Challenges from the Inside Out.™



CREATING A WIND REVOLUTION

UEA is creating a wind revolution with our wind turbine slip rings. Our customers receive comprehensive solutions with premium UEA performance and unmatched customer service.

800-394-9986 · www.uea-inc.com · Waverly, IA

USING SEALANTS, LUBRICANTS AND SURFACE TREATMENTS IN TURBINE MANUFACTURING

Wind operations that use adhesives, surface cleaners, sealants and other materials during installation and maintenance enjoy longer life and better performance.

By Jason Spencer



Jason Spencer is director of business and market development, Adhesive Technologies, Henkel Corporation. For more information, visit www.henkelna.com/windpower.

SILENT BEHEMOTHS SUPPORTING 60-meter blades that rotate at up to 300 km/h, industrial wind turbines are modern engineering miracles. These sentinels of electric power stand up to 152 meters tall and must withstand decades of harsh environmental conditions found offshore, in coastal regions and on mountaintops.

Industrial wind turbines cost roughly \$1.2 to \$2.6 million to build, and installation costs increase the average investment to approximately \$3.5 million per turbine. Turbine manufacturers and owners are constantly looking for ways to reduce manufacturing and maintenance costs and increase profitability

by shortening production cycles, increasing production volume, and simplifying maintenance requirements.

Adhesives, sealants, lubricants and surface treatments play critical roles in the life, health and financial soundness of wind turbines. These materials are used during every phase of manufacturing, installation and day-to-day operation.

TURBINE MANUFACTURING AND ASSEMBLY

For blade and nacelle production, gigantic molds are first treated with semi-permanent mold release agents that allow large-scale composite parts to be easily removed from



When metal tower components are manufactured, surface treatments such as coatings, conversion coatings and cleaners/degreasers prepare the surface to improve corrosion resistance and paint adhesion. These large parts are then ready for assembly.

On the tower, sealants prevent moisture from penetrating in through tower section breaks and prevent corrosion on load support plates, platforms, bolt heads, ladder frames and other metal surfaces. Anaerobic threadlockers lock and seal large threaded fasteners. Structural adhesives are used to bond and secure ladders and other components.

Anaerobic adhesives play critical roles throughout the turbine assembly, locking and sealing threaded fasteners found on the base, tower, nacelle and blades. Anaerobic materials are widely used in hub, bearing and the gearbox assembly where they retain pitch and yaw bearings, and seal gearboxes, flanges and hydraulic fittings. Anti-seize lubricants protect power train splines, mounting bolts, and exposed fasteners.

Throughout the turbine, heavy duty solvent-based and aqueous cleaners remove dirt and residues from composite and metal parts and prepare them for installation and operation in the field.

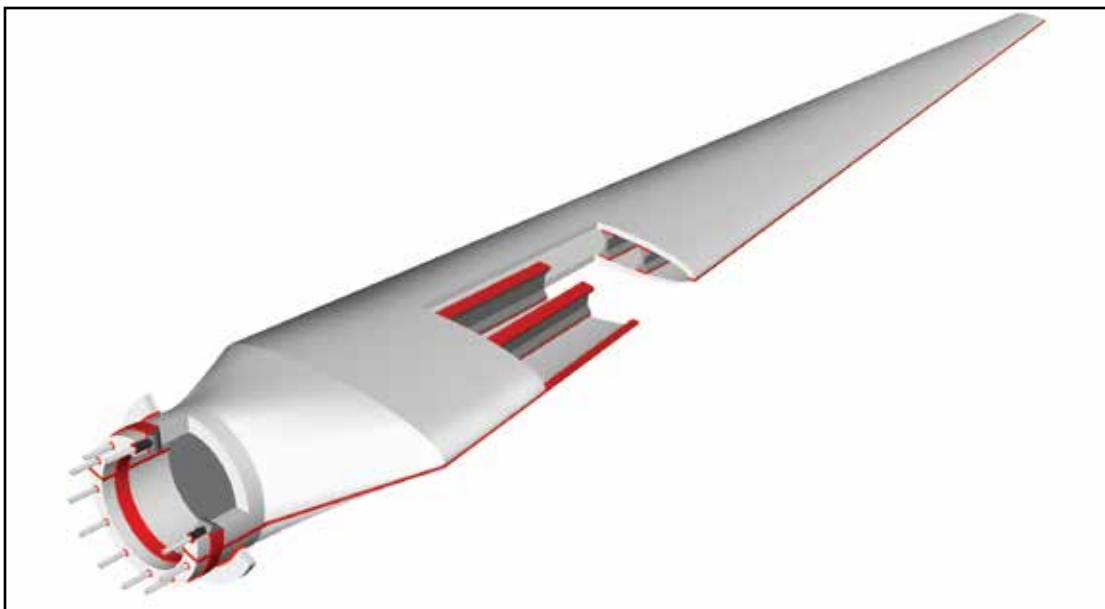
During installation, epoxy grout materials are used to create a level, secure base for tower assembly. High strength epoxy grouts bond to steel, concrete and other construction materials and withstand high torque loads. Urethane sealants bond, seal and waterproof tower bases. Cables that route out of the turbine to deliver electricity must be sealed to stop moisture/water from entering the turbine, preventing corrosion. Highly flexible silane modified polymers demonstrate good adhesion to many substrates and create a soft, elastic seal.

TURBINE MAINTENANCE

From the moment a turbine is assembled and begins to turn, it is exposed to environmental hazards. Lightning, turbulence, sand, rain, hail, snow and bird-strikes all contribute to wear and damage to the blades and nacelle. Corrosion affects the aesthetics and eventually compromises the strength of the tower, while erosion damages the concrete foundation, causing cracks, chips and spalling.

the mold. Blade halves and nacelle body components are bonded together and sealed using structural adhesives such as two-part polyurethanes that prevent crack propagation, micro-cracking and fatigue, and ensure the long-term integrity of the structure. Two-part polyurethanes also fill voids found on the molded assemblies.

Two component polyurethane adhesives and MS polymer sealants are used to permanently bond components such as access doors, rain deflectors and gurney flaps to the blades. Color-matching, weather-resistant MS polymers and high performance sealants protect and seal the blade and nacelle interior and exterior from moisture and environmental contaminants.



Composite blade tips commonly experience micro-cracking and structural cracking that can be significant and require installation of a new tip or a structural patch. Bird and lightning strikes can penetrate the blade and require repair to the core material, the blade substrate and the blade surface. Pitting and wear caused by weather and environmental elements can decrease the aerodynamics and efficiency of the wind turbine.

High viscosity, structural polyurethane putties are hand applied to the eroded edges of the blade. Fast-curing, abrasion-resistant putties fill large gaps and holes caused by lightning or bird strikes. Cartridge dispensed two component polyurethane adhesives patch damaged tips and fixture in just 75 minutes. To reduce the chance of subsequent lightning strikes, lightning diverter strips designed to transmit and ground lightning away from the blades, can be applied to blade surfaces using a structural adhesive. Working together, these adhesives and sealants return the blades to their original smooth and wind resistant design and allow the blades to rotate again with little downtime.

On and in the nacelle, sealants are used to protect the generator and motor housing, panels, hinges, service doors, man-holes and exterior appliances such as wind indicators, lights, rails or cable breakthroughs from moisture ingress and corrosion. Anaerobic materials protect yaw bearings and keep gearboxes operating efficiently and reliably. Anti-slip coatings create walking surfaces with good traction so that maintenance workers will not slip in cold, wet and icy conditions outside the nacelle or slippery, lubricant and coolant-coated surfaces inside the nacelle.

The tower assembly must be treated on an ongoing basis with maintenance chemicals to keep it strong and solid throughout the long life of the turbine. High flexibility adhesives and sealants ensure the tower sections stay together and seal out water and chemicals that can cause corrosion and enter the tower assembly. Chemically resistant coatings and galvanizing compounds protect the metal

towers from corrosion and damage. Threadlocking and structural adhesives keep accessories such as ladders and platforms in place and prevent threaded fastener failure.

To ensure that blades achieve maximum aerodynamic efficiency, they must be regularly cleaned of contaminations such as algae, dirt and sand. Water-based cleaners quickly cut through grime and reduce the effort and time required for cleaning. By applying specially formulated coatings, maintenance crews can reduce the likelihood of new contaminants sticking to the blades and can increase the turbine's total power production until the next scheduled cleaning.

On the base of the turbine, damage and cracks in concrete pads will deteriorate over time from exposure to outside elements. Repairing damaged areas using crack fillers and fast-fixturing concrete repair products increases the life of the concrete structure and helps it resist future damage.

By incorporating adhesives, sealants and surface coatings from start to finish in wind turbine production, manufacturers can produce more robust turbine components and longer-lasting assemblies. Automated processes shorten production cycles, increase production volume and reduce manufacturing costs. And stronger, more reliable turbine components mean less maintenance when the turbine is assembled and in operation in the field.

During installation and maintenance, wind farms that use adhesives, sealants, lubricants, surface treatments and cleaners top to bottom on their turbines simplify and speed installation, minimize downtime and ensure a safer work environment for crews. The turbines are more efficient structures that operate more reliably and provide greater energy output over the expected lifespan, therefore the wind farm is more profitable and less manpower and money is dedicated to maintenance issues. ✈

T-Micro: Manufacturing Solutions for Miniature ID Applications



Ingersoll Cutting Tools introduces the T-Micro system specifically designed for the machining of very small internal diameters. The T-Micro system is a 2-piece design, consisting of a sleeve and replaceable carbide inserts. Applications include grooving, profiling, chamfering, face grooving/deep face grooving, threading, and back turning starting at .024" (.6mm). The inserts feature coolant thru capabilities and are available in grade TT9030, a submicron substrate with PVD-TiAlN coating, making them the perfect solution for all miniature internal applications.

Inside the new T-Micro sleeve design is a locating pin to ensure repeatability when indexing the inserts. This allows operators to return to machining without resetting the tool. The locating pin also allows operators to replace inserts without removing the sleeve from the tool post. The T-Micro sleeve also features an angular clamping design to avoid interference when replacing the insert allowing simplified tool change on Swiss-type and other multi-spindle lathes. Ingersoll offers this sleeve in many shank sizes .500", .625", .750", and 1.00" also 12mm, 14mm, 16mm, 20mm, 22mm, and 25mm to accommodate all machines. For more information visit www.ingersoll-imc.com.

ASM Smart Switch Simplifies Current Load Monitoring



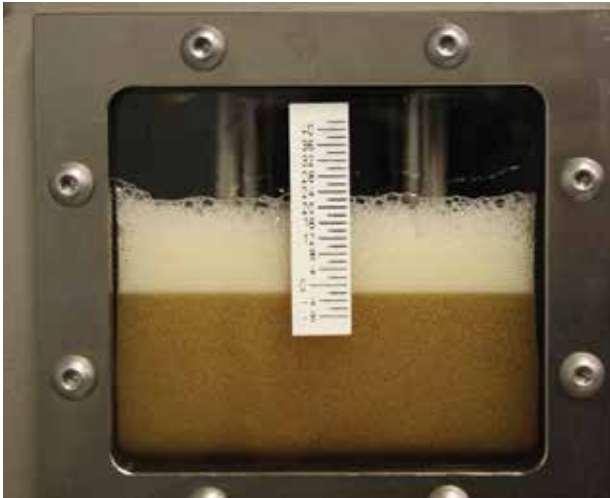
NK Technologies introduces the newly re-designed ASM Series Smart-Switch. These self-calibrating switches use the actual load current to set the trip point and provide the simplest way to ensure that a motor is working properly. These current sensing Smart-Switches are self-powered and self-calibrating to speed start-up and minimize installation costs. Three models are available to provide status monitoring, overload or underload, or operating window (overload and underload) functionality to suit particular pump,

fan, heating element, conveyor or multi-load safety-interlocked application needs. The output contact is AC and DC compatible for use with any automation system.

The ASM sensor slides or snaps over one conductor feeding the load. The contact controls the input voltage, AC or DC, to 135 volts to a controller or small relay. It takes just a couple of seconds of steady running conditions before the sensor locks onto the normal current level. If the load draws more current than normal or the current drops significantly, the sensor output will open. If the current falls below 85% of normal or increases above 125% of normal the contact will open, with no manually setting trip points and no adjustments needed unless a motor is replaced. Should a motor be replaced calibration is very easy, and within a matter of minutes the system is back in operation.

For more information, visit www.nktechnologies.com.

Herguth Laboratories Introduces New Flender Foam Test



Herguth Laboratories, the industry leader in specialized and innovative oil analysis and tribology testing is proud to announce the introduction of its new Flender Foam Test.

Critical foaming and air release properties of wind turbine gearbox lubricants are effectively measured and analyzed using the Flender Foaming Test procedure ISO/DIS 12152.

Excessive foaming and too slow of a release of dispersed air in gear oils have a negative influence on the load-carrying capacity of gears and bearings and causes low oil trips costing thousands of dollars if not corrected. Additionally, excessive foaming can result in oil leaking at shaft seals and breather screws. For this reason, gear oils should be checked for foaming characteristics and air release properties using an appropriate test method.

A gear pair rotates in the oil to be tested and thus mixes air into the oil. In this way it is possible to rapidly evaluate how oil behaves with regard to the absorption of air, oil-air dispersion, and surface foam at various temperatures.

Herguth Laboratories has a full complement of state-of-the-art testing equipment. All equipment is calibrated to the most demanding industry standards to provide customers with quality decision data.

For more information visit www.herguth.com or call 1-888-HERGUTH (1-888-437-4884).



Alignment Supplies Introduces ALiSENSOR LEVEL

Greg Knitz, President of Alignment Supplies, Inc., announces the ALiSENSOR™ LEVEL, for super-accurate geometric measurements. The ALiSENSOR™ platform, which is known as Industrial MFi (Made for iPad), is a groundbreaking integration of the iPad and other iOS devices into industrial-grade tools and equipment.

The ALiSENSOR™ LEVEL system consists of a sensor unit and an iOS unit (iPad, iPhone or iPod Touch). The ALiSENSOR™ LEVEL sensor unit is a complex but rugged data collector that contains MEMS gyros, accelerometers, and a microprocessor. Data of angular and translational movements are provided via Bluetooth® to the iOS unit, which provides an unsurpassed user-friendly environment for

the operator to analyze the data. Typical measurement applications to be performed with the ALiSENSOR™ LEVEL are: straightness, level, inclination, and base flatness, with the accuracy required by precision machine workshops.

The ALiSENSOR™ LEVEL is supported with a dedicated App (Application), downloadable for free from the App Store, which guides the user throughout the measurement. The ALiSENSOR™ LEVEL hardware will be supported by several free Apps that can use the functionality of the hardware to implement different types of measurements. New Apps designed for use with the ALiSENSOR™ LEVEL will soon be available for use in measurement applications such as: flatness, squareness, parallel, milling machines, lathes, and more. For more information, visit www.alignmentsupplies.com.

Made in the USA

We are Serious About Magnets...

Alpha Workholding is the premier manufacturer—made in the USA—of permanent electromagnetic and material handling products.

Our company's dedication and expertise in developing material handling solutions provides efficient and competitive new standard products that benefit simple everyday applications.

- Greater Workpiece Accessibility
- Failsafe Switching
- Customized to your Application
- Better Accuracy
- Failsafe Switching

704.871.2183

127 Advantage Place • Statesville, NC 28677
F: 704.872.5777 • www.alphaworkholding.com



Gearbox Repair

From the world's reliable gearbox specialist.

ZF is a trusted and reliable transmission technology partner for top OEMs worldwide. We use our 95 years of experience when it comes to servicing your wind turbine gearboxes.

- Multi-brand capability
- Global service network
- Supplier quality management
- Complete drivetrain overhaul
- Up-tower repair and exchange units
- Availability assurance programs

Contact ZF today, we're here to help; now with expanded services to cover all legacy models of Hansen wind turbine gearboxes.

www.zf.com/windenergy | 800.451.2595

Driveline and Chassis Technology 

Stahlwille Tools is the ONLY tool company with dimensionally accurate hand tools!



TORQUE WRENCHES

- Super accurate scale designed for industrial applications
- Can be used as a breaker bar with no damage
- Designed to ISO 12 month calibration cycle
- Does not need to be "zero'd" after use
- Interchangeable insert heads



MOBILE TORQUE TESTERS

STAHLOWILLE TOOLS NA, SARASOTA FL. 877-548-1617
WWW.STAHLOWILLETOOLS.COM

Dealer Inquiries Invited



Professional Tools made in Germany
877-548-1617



BIG SUPPORT IN A SMALL PACKAGE

Blade Stabilizer Bags

- Affordable
- Adjustable
- Convenient
- Durable/Reusable
- Environmentally Safe




10'Lx5'Wx6.5'H

Replaces Styrofoam, Hay, etc...



3 Blade stabilizer bags ground tarps, 12 stakes, Blower and storage bags.

Call us at 806.336.3068 or www.AirUps.com



BS ROTOR TECHNIC USA, LLC


Rotor Blade Inspection & Repair Services
Wind Turbine Spare Parts

SERVICES:

- Inspection with documented reports
- Repair and cleaning of rotor blades
- End of warranty inspections and repairs
- Dynamic rotor balancing
- Service & repairs of fall protection systems
- Int. and ext. cleaning of surface coatings

REPLACEMENT PARTS:

- Brake Pads
- Filters
- Capacitors
- Switches
- Hydraulics
- Climb Assist Systems



Exchange Gearbox available for many Turbine types from Multigear GmbH:

- DeWind D4 / D6
- ZOND/ENRON (GE) TZ 750i
- GE 1.5
- NEG MICON NM600 / 750, NM900 / 950, NM72 / NM82
- Nordtank NTK300 / 500 / 550 / 600
- Vestas V 39, V42, V44, V47, V80

(888) 44-ROTOR (447-6867)
www.bs-rotorusa.com
Anaheim, California

Need to improve your windmill production?

Invite a yellow coat.



SANDVIK Coromant

Your success in focus

www.sandvik.coromant.com/us

IRONCLAD EXTREME DUTY BOLT CAP



- SHEILD AGAINST SALT WATER INTRUSION
- RESISTS ICE DAMAGE
- 4 SEPERATE SEALING SURFACES
- ADDITIONAL UV PROTECTION

NEW!

NORM TOOMAN CONSTRUCTION, INC.
THE STANDARD OF THE INDUSTRY.

800.359.0372
NORMTOOMANCONST.COM



ADINDEX

Airups	46
Alpha Magnetic Workholding	45
American Wind Energy Association (AWEA)	27
BS Rotor Technic USA LLC	46
CanWEA	13
Capps Van & Truck Rental	19
Castrol Industries	BC
Cincinnati Gearing Systems	34
Delta Rigging & Tools	11
Encoder Products	12
EDF Renewable Energy	IFC
Kalamazoo Valley Community College	33
Kluber Lubrication North America LP	7
Mersen	26
Norm Tooman Construction	14,46
Romax Technology US Wind	47
RP Machine Enterprises Inc	28
Sandvik Coromant	46,IBC
Schaeffler Group USA Inc	2
Seco Tools Inc	4
SIFCO	10
Snap-On Industrial	35
Sotek/Belrix Industries	32
Southwire	1
Stahlwille Tools NA Inc	46
Trachte Inc	47
Transhield Inc	29
United Equipment Accessories	39
Universal Pegasus	14
ZF Services North America	46




Preassembled Collector and Interconnect Substation Control Buildings



www.TrachteUSA.com/ws.html
800-837-5707
sales@TrachteUSA.com
Oregon, WI
Eastanollee, GA







The No. 1 Partner for Multi-Megawatt Gearbox Design

Romax's GL Certified multi-megawatt gearbox designs have been selected by over nine major wind turbine manufacturers for their proven reliability and ease of manufacture.


Providing full designs as well as manufacturing support, Romax works in partnership with its clients allowing rapid advances in their wind gearbox product portfolio and capability.



WT2000-2MW





WT3000-3MW



WT5000-5MW

Gearbox designs certified & in production include:

T: +1 303 351 5418
 E: sales@romaxtech.com
www.romaxtech.com



to understand and the most important when it comes to safety in a wind turbine. Electricity is the one hazard that you cannot see and is the easiest to mitigate if you follow the right procedures. The students will also complete several rescue scenarios every semester to keep the skill set up to date.

All our students start our safety course in the fall and have to pass with 90% before they can continue on into the remainder of the program. I was a safety trainer for NextEra Energy before coming to NJC and I take safety very seriously as do our other two instructors.

DO STUDENTS HAVE AN OPPORTUNITY TO GAIN HANDS-ON EXPERIENCE?

Our students all get up a turbine during their time here. As a freshman you are looking at 60% classroom time and 40% lab time because they do not have the fundamentals of electrical, moving machinery, or hydraulics to keep them safe. Their lab time is spent mostly on simulators. Moving into the sophomore year things tend to get more hands on. We have an advanced lab with trainers that we built, and we dive heavily into schematics, component functions, troubleshooting and the 'why' factor. Why did this break? We have duplicated some of the most complex problems that we faced as technicians to challenge our students and make them think.

HOW MANY STUDENTS HAVE ATTENDED OR COMPLETED THEIR ASSOCIATE DEGREE REQUIREMENTS?

The last graduating class in May 2012 was 17 who all achieved their AAS degree and 14 of the 17 went on to take jobs in the industry. We are very proud of this but at the same time we understand that the student is the most important person to us and we keep our classroom size to a minimum of 22, which gives our students the best opportunity to succeed and gain the most from each instructor.

DO ALL INSTRUCTORS HAVE A BACKGROUND IN WIND TRAINING?

Jason Hazlett is the director of the program and he has two years with NextEra Energy working on GE 1.5 SLE's & XLE's. Neil Browne was a former GE technician and has a strong teaching background. I was a five-year tower technician for GE and NextEra Energy at Peetz, CO, which is just north of the school. During this time I was in charge of all climb & clearance training that went on at the Peetz site. I am certified by GE, NextEra Energy and Siemens in multiple rescue devices and was a certified rescue trainer for NextEra Energy. I was also a technician and fixed and performed maintenance on towers daily. I have worked on GE 1.5 SLE's & XLE's, Siemens, and Vestas towers. I was fortunate enough to be able to be on loan to Siemens for a summer and became familiar with the Siemens 2.3 turbine.

WHAT IS THE COST FOR THIS PROGRAM?

A typical semester is around \$5,000 for tuition, fees, books, room and board. Since NJC is a residential junior college, we offer everything that you would expect from the larger four-year institutions except our programs are typically only two-year associate degrees. We offer more than 80 programs of study in both the career and technical areas and in transfer programs. ↘

WHAT ARE YOUR DUTIES?

I handle everything from recruiting to teaching and everything in between.

NJC IS LOCATED IN STERLING, COLORADO. HOW MUCH WIND ENERGY IS GENERATED THERE AND WHO ARE THE MAIN PLAYERS?

What sets NJC apart is the large amount of wind energy that is close to use. We have nine sites operating within a 100-mile radius of the campus and two more sites being built this summer. As of 2012, there are 10 wind companies/employers operating these sites. There are over 800 MW and another 200 MW being added this summer. The biggest player here is NextEra Energy and GE, but Vestas, Invenergy, enXco, Mitsubishi and BP are all operating sites near us. We have great relationships with the companies and they have been a tremendous help in our success, each company has a representative that sits on our advisory council.

WHAT ARE SOME OF THE COURSES A STUDENT CAN EXPECT?

We offer a diverse curriculum ranging from basic electrical to hydraulics. The students will also take preventative maintenance, industrial problem solving, and wind turbine systems. About half of our classes deal with electricity, electronics, control systems, and programmable logic controllers. These concepts are the hardest

For More Questions and Answers with James Lenzen visit windssystemsmag.com



Can you see the difference?



The ring gear to the right takes 20% less time to machine.

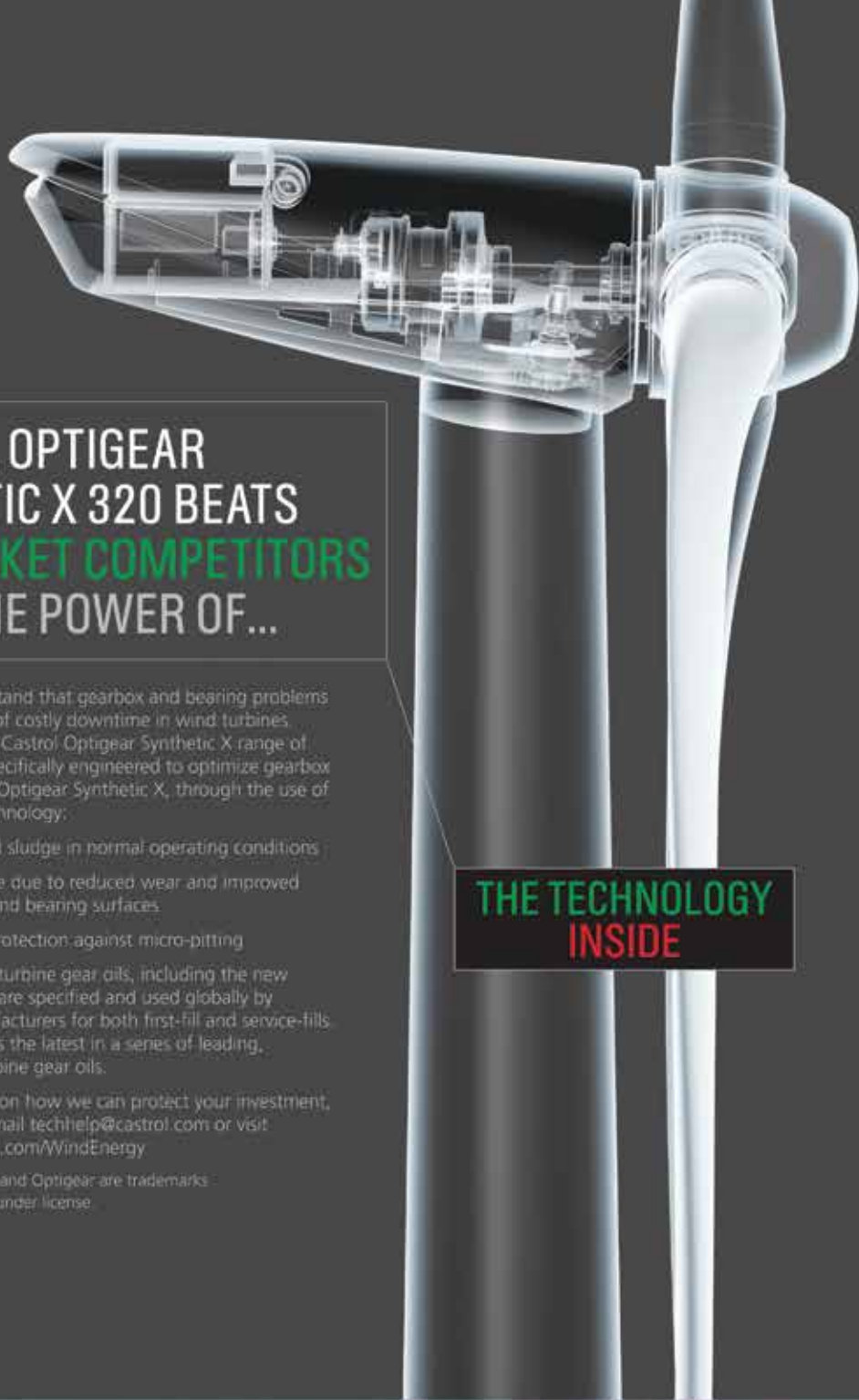
How is that possible? CoroMill® 170 is a high performance cutter for large gears in module range 12-22. In combination with our latest grades, your gear machining simply is more efficient, leaving minimal and even allowance for subsequent operations. Use it for precision and reliability in roughing of external and internal gears.

Sound interesting? It's just one solution we have for gear machining. Visit www.sandvik.coromant.com/us or better yet, get in touch with a Sandvik Coromant specialist at **1-800-SANDVIK**.

Think smart | Work smart | Earn smart



Your success in focus



CASTROL OPTIGEAR SYNTHETIC X 320 BEATS THE MARKET COMPETITORS THAT'S THE POWER OF...

At Castrol, we understand that gearbox and bearing problems are a common cause of costly downtime in wind turbines. So, we developed the Castrol Optigear Synthetic X range of gear oils which are specifically engineered to optimize gearbox performance. Castrol Optigear Synthetic X, through the use of advanced additive technology:

- > Eliminates foam and sludge in normal operating conditions
- > Extends gear box life due to reduced wear and improved protection of gear and bearing surfaces
- > Provides excellent protection against micro-pitting

Castrol's full range of turbine gear oils, including the new Optigear Synthetic X, are specified and used globally by leading turbine manufacturers for both first-fill and service-fills. Optigear Synthetic X is the latest in a series of leading, innovative Castrol turbine gear oils.

For more information on how we can protect your investment, call 877-641-1600, email techhelp@castrol.com or visit www.CastrolIndustrial.com/WindEnergy

Castrol, the Castrol logo and Optigear are trademarks of Castrol Limited, used under license.

THE TECHNOLOGY
INSIDE



IT'S MORE THAN JUST OIL. IT'S LIQUID ENGINEERING.


Castrol
Industrial