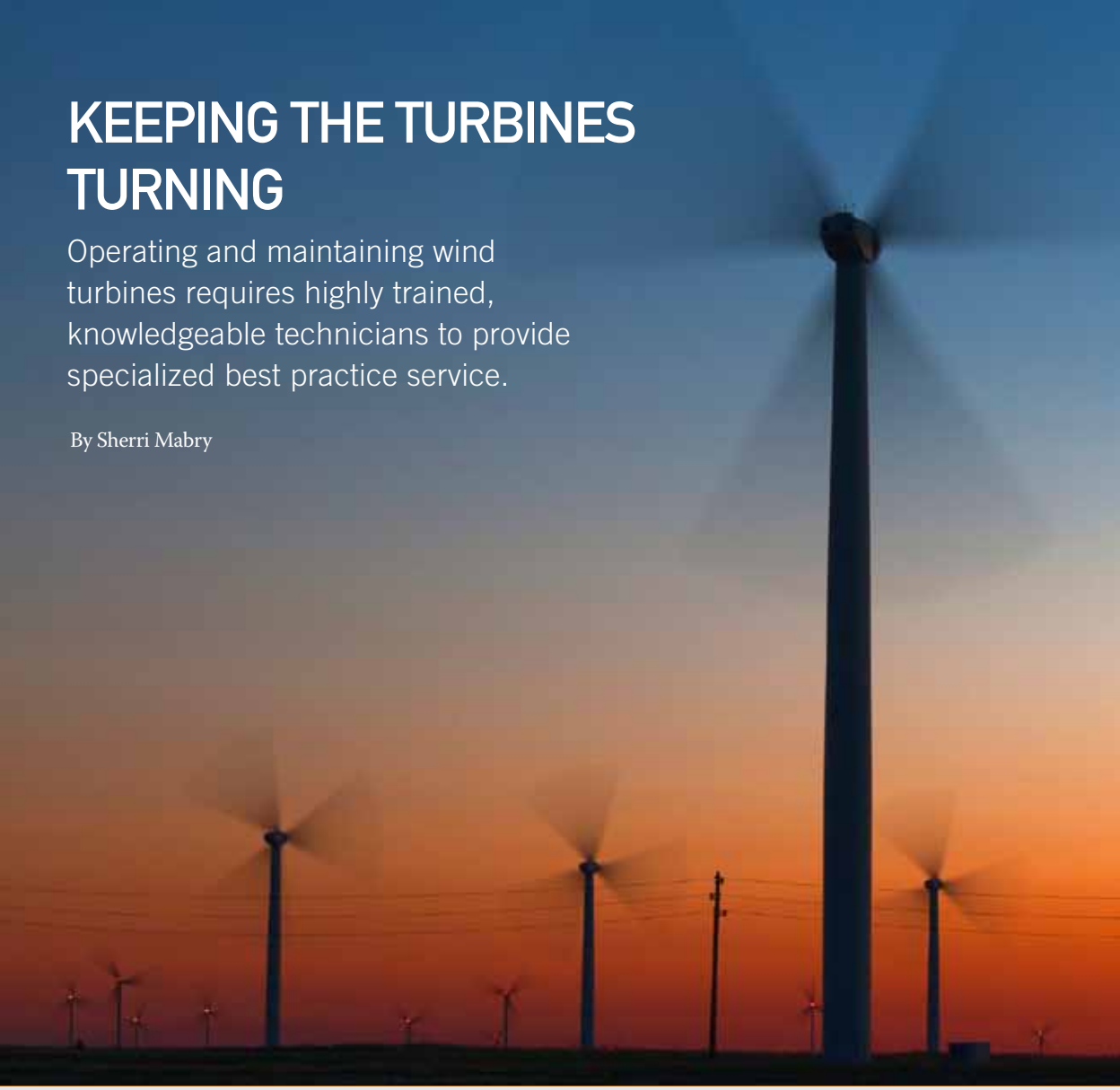
KEEPING THE TURBINES TURNING

Operating and maintaining wind turbines requires highly trained, knowledgeable technicians to provide specialized best practice service.

By Sherri Mabry



For more information, please visit www.moventas.com, www.GE.com, www.mfgwind.com, www.gl-group.com, www.psi-online.com, or www.renewable-concepts.com and www.gearboxexpress.com.

WIND TURBINE OPERATIONS AND MAINTENANCE (O&M) is a growing business segment in the U.S. wind energy market. Wind farm owners must now decide whether they will handle O&M service with their own staff or contract with OEMs or private service providers to keep the wind turbines turning.

With more than 48,611 megawatts of wind power capacity installed in the United States and another eight megawatts under construction, the need for best practices in safety, diagnosis, repairs, and the use of trained and knowledgeable technicians is becoming more important than ever.

With approximately $40 billion worth of wind installations in the U.S. reaching the end of OEM warranty periods, operations and maintenance becomes one of the most talked about issues in terms of maintaining profitability and reliability, while trying to keep pace with increasing electrical generation demands.

A report by business intelligence company, GBI research, indicates that technological advancements in wind power mechanisms will allow wind farms to run far more efficiently and reap more profits as older wind turbines are upgraded. They say the immediate increased demand for global wind energy operations

and maintenance may eventually cause a reduction in revenue, but for now, business is booming.

GL Garrad Hassan, one of the world's largest renewable energy consultancies and a technical authority on renewable energy, says owners must carefully consider which post-warranty model of O&M to adopt. According to Cathy Syme, senior project manager for GL Garrad Hassan's asset management and operational services team, delivering a return on investment has always been the key focus, but there are also significant financial gains to be made in other ways by striving to maximize production and minimize costs.

Wind farm owners may focus on performance and reliability of the turbine and its components to understand why projects underperform or fail and what can be done to keep the wind project operating as expected. They must also consider safety standards, estimating costs, predictive maintenance and data analysis to improve performance and extend the life of the entire system.

Among some of the recent industry announcements, turbine OEMs, component manufacturers, service providers and other specialists in operations and maintenance are offering customers options for maintaining their assets.

PSI Repair says its off-warranty repair support for wind energy owners and O&M is a fast and affordable solution for upgrading and extending the life of out-of-warranty products. The service includes upgraded electronic, hydraulic and precision mechanical components that drive the turbines' pitch and yaw systems as well as down tower electronics. The company offers component repair on printed circuit boards, PLCs, control cards, VRCC components, IGBTs, thyristors, converters, pitch motors, hydraulic pumps, servomotors and transducers using the latest diagnostic tools to detect failures down to the microchip level. Service solutions range from minor component changes to full replacement of circuit boards to improve performance and reliability. All repairs come with a free evaluation and one year warranty.

The company also provides comprehensive remanufacturing services for unsalvageable, obsolete components and restocking programs to provide fast turnaround and reduce inventories.

"PSI is a one-stop resource for wind farm O&M professionals," said Mike Fitzpatrick, general manager of PSI Repair Services. "No other repair service provider in the wind industry can match PSI's breadth and depth of cost-saving services or has a dynamic engineering services department quite like PSI."

OEM's are also expanding their services to meet the needs of turbine owners. GE is expanding its wind industry services to include "Production-Based O&M, according to Andy Holt, general manager of wind services for GE Energy, in a recent industry announcement.

Production-based O&M agreements use a fixed and variable fee structure instead of a time-based availability with the goal of maximizing production for customers. The variable portion of the agreement is based directly on wind farm production relative to megawatt hour with GE and its customer. The total cost of the O&M agreement, not just the availability bonus to reduce upfront costs, balance risks, and promote a "run it like we own it" approach to service, is one way GE is helping customers.

"By focusing on production, we are adding value for our customers," he said. "We are better aligning our goals with theirs and better sharing the risk between

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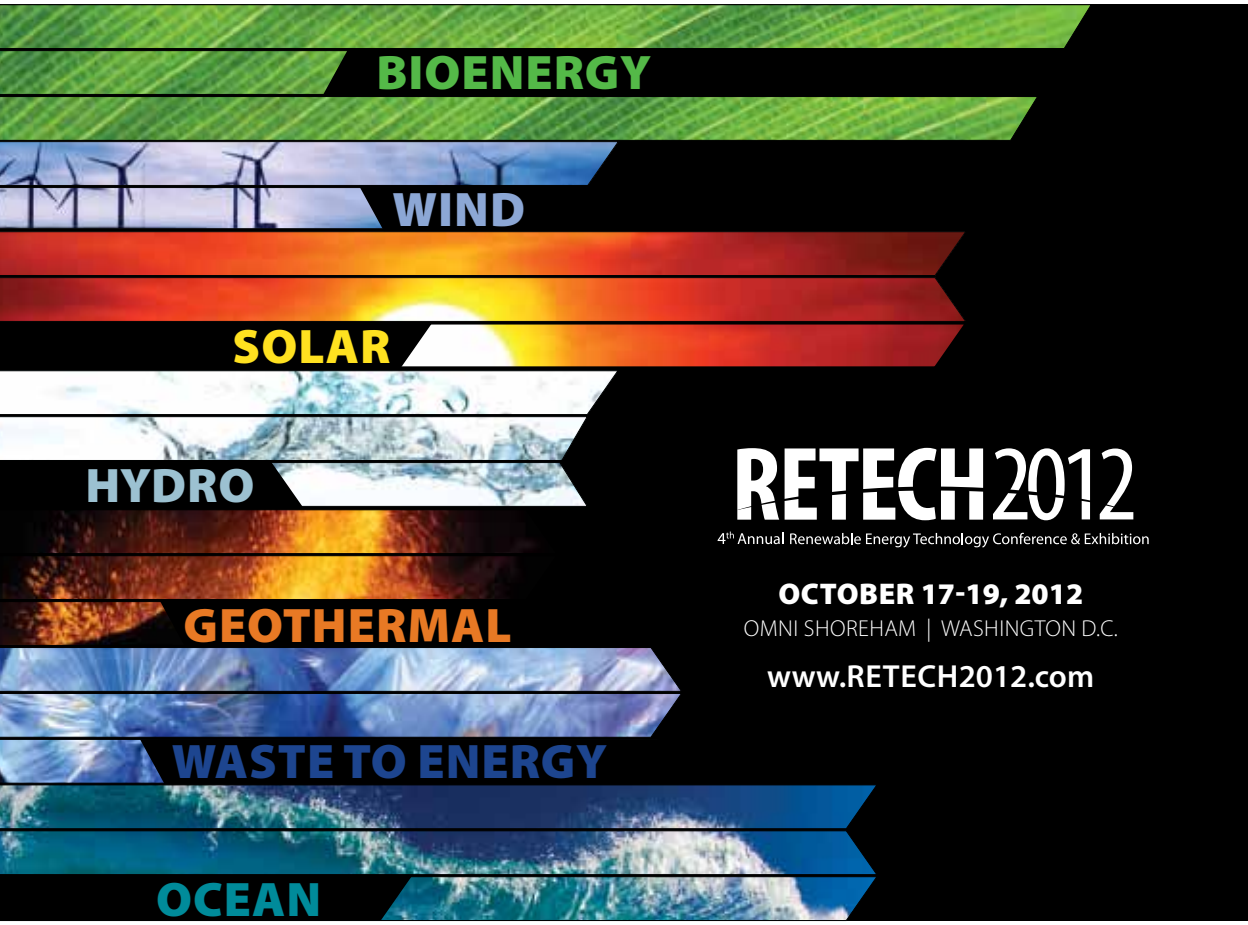

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GE and our customer. Production-based O&M brings us another step closer to running the turbines like we own them."

The contracts with GE give customers access to wind turbine upgrades, service facilities and a network of skilled, highly trained local technicians who are connected to GE's engineering organization, according to the manufacturer.

Like GE, other manufacturers and suppliers are offering specialized service or contracts for customers with O&M needs for their turbines.

Moventas, one of the world's leading wind gear manufacturers is expanding its up-tower repair service globally to offer its customers better cost-savings and less downtime in repairs, maintenance and monitoring.

Steve Casey, general manager of Moventas, Inc. says the company is providing up-tower repair service in North America to replace the high-speed, intermediate and low speed assemblies on site, thus eliminating the need to ship the gearbox to the manufacturing facility for repairs.

"This began last year when we performed the first full helical up-tower gearbox repair," he said. "We have since performed numerous full helical repairs, including one in Germany. The real credit goes to our Field Service Manager, James Macik and his team of technicians for making the concept a reality. This service eliminates the need for the large boom and secondary cranes normally required to take the entire gearbox down tower. This is a significant cost savings for our customers."

By using a mobile service and small hydraulic crane, field service technicians can bring the complete gearbox down from the nacelle.

In addition, Moventas' up-tower repair service makes it possible to perform end of warranty inspections, condition monitoring, standard high-speed pinion and bearing change-outs and pitch tube repairs.

"The CMaS unit, which is unique in that it was designed specifically for wind gears, monitors the condition of the oil in addition to providing 24/7 vibration feedback. Since we cannot dyno-test our up-tower helical repairs,

we install our CMaS system on each repair to ensure that the gearbox is operating on the same standards as it would if it were repaired in our facility."

Casey says Moventas also started a mobile workshop that is deployed to the site to provide customers with immediate response time and reduced travel costs. Moventas is also adding more mobile units throughout the U.S. and Europe with expansion planned in India, Australia, Brazil and China.

"Our goal is to significantly shorten response time, reduce customer costs and to continue to lead the industry in repairs that can be done on-site rather than in a workshop," says Olli Valimaki, Senior Vice President of Service with Moventas. "This is a significant cost-saver for the industry, making it even more competitive compared to traditional energy forms than before."

Another specialty provider is Gearbox Express. This company targets a very narrow section of the market focusing on down-tower services, 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," said Bruce Neumiller, CEO of Gearbox Express.

Since Gearbox Express doesn't perform up tower work on the installed wind turbine, the company can maintain a good working relationship with O&M providers, and since they don't manufacture gearboxes, OEMs and turbines owners are also open to working together.

"Many owners have multiple makes of gearboxes in their fleet, and with GBX, they can have one supplier for all of them," he said. "We know replacing the gearbox quickly is better for our customers."

Gearbox Express uses original gearing when possible and they provide a 43,000-square-foot facility with a 3.1 MW regenerative test stand designed to test a variety of gearboxes in real-world, variable conditions that allows engineers to vary torque to induce spike loads to replicate conditions the gearbox might encounter on-site.

Neumiller says the company is also able to load test speed, vibration and oil cleanliness in addition to offering enhanced filtration systems, lube system upgrades, oil sampling kits and water removal devices during the remanufacturing process.

Gearbox Express believes it has positioned itself to be a niche service provider concentrated on gearboxes for wind turbines. "As the industry reaches maturity, there will be a rude awakening "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."

MFG companies also launched MFG Wind, a new brand that represents the comprehensive wind-focused capabilities of the company's network of factories and engineering resources, which includes Wind Energy Services Company for field repair and maintenance services, replacement parts, reconditioning services and factory repairs to improve the life of older, smaller turbines.

Molded Fiber Glass Companies (MFG) says it provides a one-stop resource for 'all things composite' across the entire lifespan on the wind turbine, including support to OEM manufacturers and wind farm operators as well as emerging O&M companies. "The mission at MFG Wind is to be a fully resourced composites partner to the wind industry, and the recognized standard for quality workmanship," said Gary Kanaby, director of sales and marketing. "MFG has been visionary about wind energy since the beginning, and we believe MFG Wind is configured to provide customers with the quality of support they need to maintain healthy operations."

For engineering and technical workforce solutions, Renewable Concepts, Inc. offers specialized solutions with 24-hour-lead times to help customers complete their projects in a timely manner.

Renewable Concepts is a division of RTP, Inc., which provides a wide range of general contracting services with more than 50 years experience in construction, operation and maintenance.

RCI performs on-site and off-site tower source inspections and carries out repairs on components in the pre- and post-construction stages. Services include special projects personnel, owners representatives, construction and commissioning manager and I&C technicians and can work with owners in power generation from initial development and planning to final turnover.

Working in construction since 1996, the founder and CEO, Rob Tinsley started Renewable Concepts to address the unique needs of the wind industry. "The wind industry now needs an "Angie's List" to help wind farm owners choose between all the O&M service providers on the market," he said. "We have service providers who are more about quantity than quality. This hurts the industry."

One of the driving forces for creating the company was Tinsley's belief that it was possible to deliver quality maintenance, construction and repair services to wind farm owners while maintaining a professional working relationship that solved customer problems.

"Our reputation is unchallenged. I would rather close the doors and keep my reputation than have a large company with lower standards."

RCI does not use subcontractors and each employee participates in a six-week evaluation period and training in addition to required refresher training each year. Tinsley says he hires the most experienced employees and has worked with educational programs and instructors to design courses for new students entering the field. "When we do hire students, they have to have some other tangible skills to relate, like a strong electrical background or a fabrication background. Construction is still basically construction. It doesn't matter whether you work on water tanks, in ethanol plants or on wind turbines, and I've done it all. You need the right people, the right tools and the right training for the job you're doing."

With the main headquarters in Kansas, RCI is centrally located for rapid deployment to minimize job costs.