To maximise wind turbine productivity – start with the right lubricants

Wind turbines are extremely sophisticated pieces of machinery and require an application-specific expertise to maximise their life and profitability. The main gearbox is a particularly critical component of the wind turbine that needs careful consideration from a lubrication perspective. Recently, PES had the opportunity to speak with Michael Hawkins, Global Brand Manager for Mobil SHC products at ExxonMobil Lubricants and Specialties, about the wind industry and how high performance lubricants can help companies stay ahead of the competition.

PES: How long has ExxonMobil been developing lubricants for wind turbines?

Michael Hawkins: ExxonMobil has been pioneering synthetic lubricant technologies for nearly half a century and has a long-standing reputation for serving the most demanding applications - and wind turbines are extremely demanding. More than a decade ago, ExxonMobil entered into a research and development collaboration with a major gearbox manufacturer to explore a synthetic-based lubricant solution to address the micro-pitting issue that was prevalent in using traditional hydrocarbon base stocks.

This cooperation led to the introduction of Mobilgear SHC XMP 320, the new generation synthetic gear oil for wind turbines, brought to the market by Mobil Industrial Lubricants. Today, Mobilgear SHC XMP 320 is used in more than 30,000 wind turbines worldwide and is the initial-fill gear oil of choice for the majority of the world’s top 12 wind turbine builders.

The proven performance of Mobilgear SHC XMP 320 was recently demonstrated in a series of wind turbines from REpower Systems AG operating at the Thornton Bank offshore wind farm in Belgium. REpower Systems carried out research which revealed the availability of the six REpower 5M turbines in the Thornton Bank wind farm has been consistently above 97 per cent over a period of six months. The use of a high-performance gear oil contributes to improved reliability in a turbine and despite the adverse conditions in the open seas, since the turbines were officially commissioned, over 4,000 full load hours have been recorded per turbine.

We are also proud to offer many other high-performance lubricants to customers in the wind-sector beyond our well-known Mobilgear SHC XMP 320. In fact, we have a full line of Mobil-branded synthetic greases to lubricate the main, pitch, yaw and generator bearings, as well as hydraulic oils that help pitch the huge rotor blades. In fact, roughly 60 per cent of gear-driven wind turbines manufactured in recent years are lubricated with Mobil Industrial Lubricants.

PES: What role does lubrication play in maximising wind turbine profitability and productivity?

MH: The main gearbox is the heart of a wind turbine. With their advanced designs and overall importance to system performance, gearboxes can be very costly to repair or replace. For example, when factoring in all expenses, replacing a gearbox can cost a company more than €400,000, including the price of a new gearbox, labour costs, crane rental and lost revenue from turbine downtime. In remote locations like offshore, costs might be even higher and after the warranty period, the operator becomes responsible for keeping the turbine running for the remainder of its service life.

For the main gearbox, as for all pieces of industrial equipment, lubrication plays a vital role in optimising performance and minimising downtime. As the lifeblood of the equipment, lubrication mitigates friction between components of the main gearbox. Considering that the average wind turbine is designed to operate for up to 20 years and the potential challenges and costs associated with maintaining a wind turbine gearbox, it is recommended that maintenance professionals utilise a well-balanced synthetic gearbox lubricant that can deliver exceptional protection in the long-term and, most importantly, maximise productivity.

PES: What are the key challenges facing wind turbine operators and maintenance personnel?

MH: Wind turbine maintenance presents many challenges that can impact productivity. Maintaining and prolonging
the performance of the main gearbox is a great lubrication challenge in a wind turbine. One common cause of gearbox downtime is related to bearing failure. Considering the variable load, speed and dramatic temperature conditions wind turbines operate under, bearings are put under a significant amount of stress. These factors, combined with improper lubrication, can result in the need for bearing replacement and if damaged bearings are not replaced promptly, significant gear damage can result.

The drive to minimise up-tower weight has resulted in compact gearbox designs which, in combination with high loads, makes these gears susceptible to micro-pitting, which can cause numerous surface cracks. The cracks propagate at a shallow incline to the surface, forming extremely small micro-pits that can reduce gear tooth accuracy and lead to significant gear damage.

In addition to protecting against micro-pitting and other forms of equipment wear, Mobilgear SHC XMP exceeds the performance of traditional oils by extending the interval between oil changes from 18 months to three years or more. It enables turbines to perform optimally in extreme ambient temperature conditions and maintain performance even in the harsh environments faced in offshore applications.

PES: What recommended proactive maintenance strategies can companies implement to maximise wind turbine performance?

MH: First and foremost, companies need to employ a high-performance synthetic gearbox lubricant that delivers exceptional micro-pitting and anti-scuffing protection, excellent viscometrics over a wide temperature range, first-rate filterability and high-quality water tolerance. Maintenance professionals should select a gearbox oil that embodies all these performance characteristics to help increase productivity, minimise downtime and reduce maintenance and component costs.

Once a lubricant has been selected, it should be supported by routine, scheduled maintenance of the gearbox and oil circulation system, including oil analysis. Routine oil analysis is one of the most widely used proactive maintenance strategies for wind turbines and employs a test slate that is designed to evaluate the condition of the in-service lubricant and to help evaluate the condition of internal hardware. Using routine oil analysis as part of a preventative maintenance programme, maintenance professionals can extend the lives of both the gear oil and the gearbox by detecting and acting on early warning signs, such as contamination or increasing wear metals.

To obtain the greatest benefit from oil analysis, it is imperative to work closely with an expert lubricant manufacturer and participate in oil analysis every six months. Identifying trends in the data will help maintenance professionals make better informed oil suitability decisions.

PES: What is the future of wind power and what is ExxonMobil doing to help its customers meet their production goals?

MH: I am excited about the potential of wind power in the future. Although it starts from a small base relative to conventional sources, we expect electricity generated by wind to grow 12 per cent a year through 2030. Our wind lubricant technology helps support this growing industry by reducing maintenance requirements and ultimately lowering costs.

ExxonMobil will continue to work closely with its customers and leading turbine manufacturers around the world to understand their demands and goals and deliver the application-specific expertise to help them stay competitive.
Keep maintenance costs down and send productivity soaring with the complete range of Mobil SHC synthetic lubricants and greases. Each one is formulated to offer outstanding all-around performance, including equipment protection, keep-clean characteristics and oil life. Take Mobilgear SHC XMP. Used in more than 30,000 wind turbine gearboxes worldwide, it’s trusted by builders, proven in the field and supported by exceptional application expertise. Just a few of the reasons we don’t simply make things run. We make them fly.

To find out more come and see us at the HUSUM WindEnergy on the 21st-25th September, stand number 6C11, or visit www.mobilindustrial.com.

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