WindEnergy NETWORK

COMMUNICATION HUB FOR THE WIND ENERGY INDUSTRY

SPECIALIST SURVEYING

WORKING AT HEIGHTS

LAW

SPOTLIGHT ON TYNE & TEES

APRIL/MAY 2013 | £5.25

WIND TURBINES LUBRICATION & FILTRATION TIPS

WHETHER ONSHORE OR OFFSHORE, KEEPING COMPLEX WIND TURBINES OPERATING AT PEAK PERFORMANCE CAN BE EXTREMELY CHALLENGING.

FOR WIND TURBINE OPERATORS, CHOOSING THE RIGHT LUBRICANTS IS ESSENTIAL AS IT HELPS PROLONG TURBINE PERFORMANCE AND DURABILITY.

Recently, we caught up with Robert Pears, Industrial Lubricants expert, ExxonMobil Lubricants & Specialties, to better understand the lubrication and filtration needs of wind turbines.

Q: WHY IS LUBRICATION SUCH AN ESSENTIAL COMPONENT OF WIND TURBINE PERFORMANCE?

Robert: *"Wind turbine maintenance presents an array of challenges that can hinder productivity.*

"The main gearbox drives the generator and is the heart of a wind turbine. With their advanced designs and overall importance to system performance, gearboxes can be very costly and time consuming to repair or replace after the warranty expires.

"For example, when factoring in all expenses, replacing a gearbox for a 1.4 MW turbine can cost a company more than US $625,000, including the price of a new gearbox, labour costs, crane rental and lost revenue from turbine downtime.

"In remote locations like offshore, maintenance and repair costs are likely to be even higher and after the warranty period or extended service contract period, the operator becomes responsible for keeping the turbine running for the remainder of its service life.

"For the main gearbox – just as for all pieces of industrial equipment – lubrication plays a vital role in optimising performance and minimising downtime."

Q: WHAT ARE THE KEY CHALLENGES FACING WIND TURBINE OPERATORS AND MAINTENANCE PERSONNEL?

Robert: *"Maintaining the performance and prolonging the life span of the main gearbox is the greatest lubrication challenge in a wind turbine. The most common cause of gearbox downtime is related to bearing failure. Considering the variable load, high 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 replacements, and if damaged bearings are not replaced promptly, significant harm to the gear can occur.*

"Another issue is the industry-wide drive to minimise up-tower weight. It has resulted in compact gearbox designs which, in combination with high loads found in wind turbines, means the surface-hardened gears are susceptible to micro-pitting, which can cause numerous surface cracks. The cracks propagate at a shallow incline to the surface, forming extremely small pits that may 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 320 exceeds the performance of traditional oils by extending the interval between oil changes from 18 months to five years or more. Extended oil life translates into a variety of benefits, including reduced volume of oil purchases, used-oil disposal volumes, maintenance effort and lubricant-related downtime for oil changes."

Q: WHY DOES USING SYNTHETIC LUBRICANTS VS. CONVENTIONAL OILS MAKE SUCH A DIFFERENCE IN WIND TURBINE APPLICATIONS?

Robert: *"Case-hardened gears exposed to unpredictable winds and high loads means wind turbines are susceptible to micro-pitting, and require a gear lubricant that protects against this type of wear.*

"Upgrading to synthetic lubricants brings a number of advantages, including longer equipment life, high-temperature capability and excellent resistance to oxidation - which can help maximise the performance of wind turbines.

"The extreme conditions wind turbines are subjected to are easily endured by high-performance synthetic lubricants, which can improve film strength at operating temperature by nearly 50 percent. By comparison, conventional, mineral-based fluids cannot deliver the same level of protection. These kinds of performance advantages can help companies generate significant bottom line savings and enable them to maximise productivity."

Q: WHAT ARE THE BEST PRACTICES FOR WIND TURBINE OIL FILTRATION?

Robert: "There are several types of oil filters. The first step in identifying the appropriate filter for a turbine is to determine what level of oil cleanliness is required for proper function.

"There are a variety of factors to consider when making this decision, including the machine's OEM cleanliness standards, filter micron size, beta rating and the kinds of contaminants being removed, be they dirt, water or wear metals. Manufacturers must also consider oil flow and determine the flow-rate of the pump moving the oil. Filter capacity has to either match or exceed the pump flow rate, to prevent filter malfunction or back-pressure build up.

"Typically wind turbines are equipped with two oil filtration systems. The primary system filters oil prior to delivering it to the gears and bearings. The auxiliary system employing finer filtration is designed to augment the primary system, focusing on maintaining the required system cleanliness. A duplex housing should be used as it allows for filter changes during normal operation.

"Finally, proactive filter maintenance is critically important. Maintenance personnel should take routine samples to determine overall cleanliness of the oil and effectiveness of the filter. The filter should also have a tattletale—usually a pressure gauge mounted in the housing—that indicates when the filter needs to be changed."

Q: WHAT ARE THE MOST COMMON MISTAKES MADE WITH RESPECT TO OIL FILTRATION?

Robert: *"Over-filtration is a common problem.*

"While a filtration system is designed to eliminate contaminants, removing excessively fine particles may negatively impact oil additive balance. It is crucial to pay close attention to the OEM recommendations for oil system cleanliness, as exceeding that specification may actually hinder the performance of the lubricant."

Robert Pears
Industrial Lubricants expert
ExxonMobil Lubricants & Specialties
www.exxonmobil.co.uk