TRIBOLOGIK®
NEWSLETTER

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December 2012

In this issue:

Season's Greetings to all our clients and partners!

Turbine Oil Analysis

Turbines and auxiliary equipment such as pumps, generators and compressors are key to electric power generation. Maintaining them in top conditon is therefore essential to prevent failures and power breakdowns, which can be extremely costly to power generation companies as well as to the populations that depend upon them.

In past issues of this Newsletter, we have discussed oil analysis for compressors (November 2012), pumps, hydraulics (October 2012) and diesel engines used in generators (August 2012). You will find them on the Tribologik® web site :
http://www.tribologik.com/predictive.php?section=PAST_ISSUES

To generate power, the blades of the turbine are driven by gas, steam, wind or hydraulic power. In thermal power plants, coal, fuel oil, gas (some use biogas) or nuclear energy are used to generate steam.

Turbines rotate at high speed and high temperature. Oil is used to lubricate and protect the turbine bearing against wear and contamination particles, water and oil degradation products. However, the severity and high temperature generated by turbine operations cause thermal shocks to the lubricant which can block filters and generate lacker deposits on servovalves. The useful life of the lubricant can therefore be shortened significantly and it is important to test it on a regular basis.

Gas Turbines
In gas turbines, the main concern is **contamination** resulting from particles and oil degradation products. These contaminants reduce the oil viscosity and may cause bearing wear and quick degradation of the oil.

Cleanliness is an essential property of gas turbine lubricants. Degradation products, sludge deposits and varnish formation can choke the system, block close tolerance valves and filters, cause unexpected breakdowns, requiring more maintenance and causing increased operating costs.

Hydraulic and Steam Turbines
The main concern in hydraulic and steam turbines is with **water emulsion** in the oil. Water is a cause of rust, corrosion and fast bearing degradation. In this respect, turbines require high performance lubricants, with antifoam and antiwear additives, water separation power and adequate viscosity in order to allow gears resisting heavy charges and heat.

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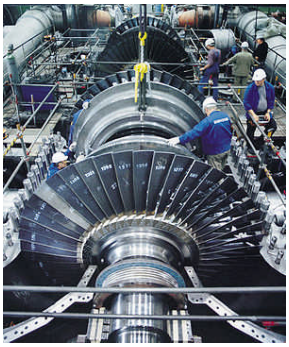
Turbine Oil Analysis

Preventing the above listed problems requires an exhaustive oil analysis program which includes at least six (6) oil tests : 1) Detection of wear metal particles (**spectroscopy)**; 2) Additive depletion (**infrared)** 3) **Viscosity** ; 4) **Particle counting**; 5) **Karl Fischer** Water test and 6) **Total Acid Number (TAN).**



Particle counting is required as a complement to spectroscopy which is unable to identify large, severe wear particles, Particle Counting counts particle sizes greater than 4, 6, 14, 25, 50, and 100 microns in size and are reported through the ISO 4406 Cleanliness Code.

The **Karl Fischer** water titration test is also required because water and oil oxidation can cause major failures and because particle counting is unachievable if water is present at levels greater than 300 ppm. KF is used for components and applications where water contamination can cause severe lubricant breakdown and must be kept extremely low. The Karl Fischer titration method measures and reports water content in ppm.

Total Acid Number (TAN) is the sixth basic oil test to perform on turbines. The TAN test measures the total amount of acidic material present in a lubricant. An increase in the TAN above that of the new oil indicates its degradation by oxidation or contamination. The results are expressed as a numeric value corresponding to the amount of the alkaline chemical potassium hydroxide (KOH) required to neutralize the acid in one gram of sample.

When necessary, one or more of the following six additional tests will be added :

1. **Analytical Ferrography :** Microscopic Analytical Ferrography is one of the most effective and versatile tools for large wear particle (larger than 10 microns) analysis. This test can be performed to visually determine the types and amount of wear particles, contaminants and depletion products in suspension in the lubricant. This test provides additional information on the mechanism, location and extent of wear e.g. : if gear tooth wear is due to excessive charges or speed , misalignment, a fracture or a defective rolling contact. Analytical ferrography also allows detecting external contaminants such as dust, sand or water or camshaft, cylinder wall or filter damage.

2. **Viscosity Index :** The Viscosity Index measures the variation in kinematic viscosity due to changes in the temperature of a lubricant between 40°C and 100°C.The viscosity index is used as a single number indicating the effect of temperature change on the kinematic viscosity of oil.

3. **Quantitative Spectrophotometric Analysis** (varnish detection) : Quantitative Spectrophotometric Analysis extracts and measures insoluble contaminants formed as a result of lubricant degradation. These by-products of used oil form a varnish, which builds up on surfaces of equipment, impeding performance and leading to mechanical breakdown. If not detected in time, varnish can cause sudden stops and severe operational problems.

4. **RULER®** (Remaining Useful Life Evaluation Routine): this test provides information on the condition of the lubricant by monitoring its antioxidative concentration (amine,

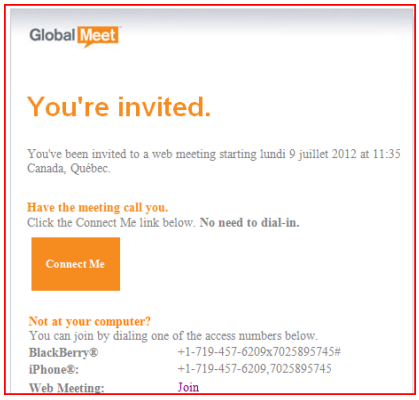
phenol). RULER® identifies abnormal operating conditions prior to equipment failure signalled by abrupt antioxidant depletion rates.

5. **Demulsibility :** Demulsibility is the ability of oil to quickly and effectively separate from condensation water. Water condensation in the oil tank and the resulting oil-water emulsion cause power breakdowns and overheating problems to hydraulics.

6. **Foaming :** is acollection of closely packed bubbles surrounded by thin films of oil. Foam is a major cause of poor lubrication, power loss, cavitation and overheating.

Contact your sales representative for additional information on the tests and test packages applicable to your equipment.

Friday December 14 WEBINAR : Oil Analysis Fundamentals



By **Jeremie Verdene**

When: Friday December 14, 2012

Time :

- **Ontario-Manitoba : 11:00 AM, Toronto time**
- **Saskatchewan-Alberta : 10:00 AM, Calgary time**

Duration : 30 minutes

Reserve now with Jeremie : jeremie@tribologik.com

info@tribologik.com