TRIBOLOGIK®

NEWSLETTER

ISO 17025:2005 **www.tribologik.com**

March 2015

Stay Connected:

Reminder – Training Session – Tuesday March 24, 2015

INTRODUCTION TO OIL ANALYSIS

Please contact Jaime
Tel: 312 800-2888 or 219 228-4844, Ext 204
jaime@tribologik.com

Foaming in oil – A Source of Concern

Foam in oil consists of the accumulation of small air bubbles at the surface of the lubricant. It is is caused by excessive agitation, inadequate levels of fuel, air leaks, contamination or cavitation.

Foaming is an undesired phenomenon in engines, hydraulics, turbines and cooling systems. In severe cases, it can even leak through breathers, sight glasses and dipsticks.

Harmful impacts

Foam acts as a thermal insulator, so the oil temperature can become difficult to control. It is a major cause of overheating, pumping, loss of power, cavitation, oxidation and failure of hydraulic systems.

It has a direct impact on the greasing of the engine by creating air buffer zones in the circuit, which annihilate the lubricating properties of the oil.

In order to prevent or reduce the formation of foam, lubricants contain anti-foaming additives, mostly silicon based addivites. Their role consists in breaking the air bubbles. These additives, however, do not always play their part as they should, and this for various reasons.

Causes of Foaming

There are roughly three categories of causes for the formation of foam in oil:

1. **Contamination** is a very frequent one. Common contaminants consist of water, solid particles, grease or cross contamination of the oil with another fluid.

2. **Depleted antifoaming additives** .

3. **Mechanical issues** causing excessive aeration of the fluid, leaky seals, etc.

Oil analysis is therefore of utmost importance in order to determine the specific causes of foaming and adopt suitable corrective measures. (Source: Noria)

Testing

The tests recommended here below will indicate if the formation of foam is due to water or particle contamination, or to the depletion of additives. Based on the results of these tests, the expert system will recommend a course of action in order to fix the problem before it becomes critical and prevent them from recurring:

- **Karl Fischer water titration** : The Karl Fischer titration method measures and reports water content as a percentage (e.g. 0.005% = 50 ppm). It is used for components and applications where water contamination can cause severe lubricant breakdown and must be kept extremely low.

- **Particle Counting counts pa**rticle sizes greater than 4, 6, 14, 25, 50, and 100 symbol microns in size and are reported through the ISO Cleanliness Code, ISO 4406. If water is present at levels greater than 300 p.p.m., particle counting is unachievable.

  The Patch Test is useful where particle counting is not conclusive. It determines the level of solid particulate matter (metal and non metal) derived from the filter by filtration method. The presence of contaminants will cause accelerated equipment wear.

- **Pentane Insolubles** are wear metal contaminants derived from the oxidation of resins, dust, soot and other similar materials. Coagulated pentane insolubles can plug oil filters, resulting in unfiltered oil circulating in the engine leading to piston deposits, bearing wear and engine failure.

- **Infrared Analysis (FTIR)** detects the presence of chemical degradation products due to oxidation, nitration, sulfate formation, lub breakdown, and anti-wear additive depletion, and contaminants such as soot, water, ethylene glycol and unburned fuel is used to measure the degradation of the oil :

  Oxidation: Oil exposed to oxygen from the air at elevated temperature will oxidize to a variety of compounds, the majority of which are carbonyl compounds including carboxylic acids. These substances contribute to the acidity of the oil, depleting the basic additives present in the oil and contributing to corrosion.

Nitration: Nitrogen oxides produce from the oxidation of atmospheric nitrogen during the combustion process. It increases the oil viscosity and is the major cause of the build-up of varnish or lacquer.

Sulfate: Sulfur oxides are produced by the combustion of sulfur compounds present in the fuel and can react with water to form sulfuric acid. The sulfuric acid is neutralized by the oil's basic additives, forming inorganic sulfates.

Lube breakdown: The lube breakdown products are mostly composed of weakly hydrogen bonded alcohol, acid groups or numerous hydrogen bonded by-products formed by the polyester lubricant.

Most of the time, an excessively foaming oil must be drained and changed. It is however important to identify the source of the problem (e.g. eliminate the source of contamination, repair the mechanical problem, etc.) otherwise your action will be useless.

For additional information and details, please contact your account manager.

info@tribologik.com

Your equipment's best friend!

Stay Connected: