HTI FILTRATION

Technical Bulletin #03-02

OIL ANALYSIS TECHNIQUES AND INTERPRETATIONS

HTI strongly advocates establishing periodic oil analysis as part of your production quality control program. Regular diagnosis of the lubricating and hydraulic fluid can establish both the efficiency of the filtration process and create benchmarks for monitoring the mechanical condition of your equipment. For a testing process to yield accurate results, it is imperative that a representative sampling point, a consistent method of drawing fluid samples and standardized tests be established at the start of the quality control program. The test results from a properly set up sampling program will reveal the most effective maintenance practices and produce the highest productivity efficiencies.

ESTABLISHING THE SAMPLING PROGRAM

The best sampling points are the middle of the fluid reservoir, or a port just upstream from the filter itself. These are areas that are resistant to debris accumulation and where the oil is typical of what the machine components are seeing. On HTI filtration systems, the bleed cock on the canister lid is an ideal sampling point. Once a sampling point has been established, it should be used for all testing sequences. A pre-cleaned sample bottle should always be used. Most analytic laboratories will supply a sample bottle as part of their program. The sample should be pulled while the machine is running, and the machine's sampling point, fluid extraction method, and sampling frequency should be the same for all subsequent samples.

WHICH TESTS SHOULD YOU USE ?

There are a wide variety of tests available which reflects the equally wide variety of lubricants available. When setting up your program, you should consult your oil supplier and lab representative to which testing criteria are meaningful to your operations. The analysis parameters of each oil will change depending on which additives are blended in. These additives include oxidation chain stoppers, metal deactivators, film strength agents, rust inhibitors, extreme pressure additives, viscosity improvers, and demulsifiers, just to name a few. Your oil supplier is your best guide to selecting the tests and establishing the values that are important to your operating environment and objectives.

A basic package would include tests for viscosity, water content, total acid number (TAN) or oxidation absorption, particle count and possibly spectrographic analysis. The chemical components used in building your fluid and the operating environment in your process, will determine the amount of degradation and contamination it can absorb before its protective properties begin to decline. Again, the specific values for each of the tests should be established in coordination with your equipment and oil suppliers.

TYPICAL TESTING PARAMETERS AND GUIDELINES

Viscosity in cSt - The term centistokes (cSt) refers to how many cubic millimeters of oil flows through a calibrated orifice tube per second at 40^0C (104^0F). This measurement can also be expressed in Saybolt Universal Seconds (SUS, SSU) and wells as Centipoise. This measurement is considered by many to be the most important physical property measurement of lubricants. Variations in this number can imply oxidization, lubrication film breakdown or dilution. A change of +/- 15% should trigger a fluid change out.

Water Content – The amount of water found in oil is often reported in either % volumes, or in parts per million (PPM) depending on the test method. Any reading over .2% (2000 ppm) requires correction to prevent damage, and any reading over .5% (5000 ppm) requires immediate action to dry or replace the fluid. Rises in acid content test numbers (TAN or Oxidation Absorption), increased sodium content and fluctuations in viscosity are typical results of water contamination.

Total Acid Number – The TAN level measures the acid content of oil by counting the number of drops of potassium hydroxide required to neutralize 1 gram of oil. An increase of 2 points over the original level indicates that the oil has lost its' ability to provide a lubricating film. Continued use of degraded oil will result in accelerated adhesive and fatigue type wear on metal surfaces. Water contamination and age are typical reasons for increased TAN numbers.

Oxidation Absorption – This test expresses the amount of oxidized oil present and the measures the ability of the anti-oxidant additives to protect the lubrication film properties of the oil. This is an Infra-Red Spectrographic test that may be available only through complete spectrographic analysis of the oil. The higher the test result numbers, the less protection and more oxidized oil your fluid has. The oil supplier can provide the critical reporting levels for your fluid.

Particle Count - The amount of particulate debris contained in oil is typically expressed in reference to an ISO 4406 or NAS 1638 rating code. These codes categorize the amount of debris found in oil by establishing numerical ranges for two or three different micron sizes of solid particles found in 1 mL oil samples. A complete explanation of these codes is shown in Technical Bulletin #03-01. The minimum contamination level required for your equipment depends on the pressure and clearances inside the machinery. Your equipment and oil suppliers can help you establish what makes the most sense for your monitoring program.

Spectrographic Analysis – By analyzing the light spectrum emitted or absorbed when an oil sample is burned, scientists can identify and quantify the elements present in the oil. This test can reveal the presence of wear metals and foreign contamination in the oil in sufficient time to plan for preventive maintenance.

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