CSI Oil Laboratory

- Wear, contamination, and chemistry testing for complete oil analysis
- Industrial machinery focus
- Scanning Electron Microscope-Energy Dispersive X-ray Spectrometer offers advanced wear debris analysis and positive wear particle identification
- Direct integration with other predictive technologies through AMS Suite: Machinery Health Manager
- Easy-to-read results in spreadsheet format
- Complete data interpretation and recommendations

An onsite oil analysis lab enables you to take control of your lubricant cleanliness and re-test samples without delay.

Introduction

Emerson has one of the most advanced industrial oil analysis laboratories in the United States. The CSI Oil Lab is specifically designed to handle industrial oils used in gearboxes, pumps, hydraulic systems, compressors, etc.

Lab analysis goes beyond the detection of particulate matter to answer questions regarding oil applicability, viscosity, and contamination, as well as testing for the presence of water and other chemicals.

Types of Analysis

The CSI Oil Lab is independent of any lubricant vendor to ensure that the results you receive are completely unbiased. No contract is required. Pricing is based on prepaid cases of 25 sample bottles and all necessary consumables. Billing upon completion of work can also be arranged. Multiple levels of testing are offered, including Advanced Machinery Diagnostic Profiles, Industrial/Clean Profiles, and CSI Minilab Support Profiles.

Since the lab results can be directly transferred into AMS Machinery Manager, oil analysis data can be integrated with your vibration, thermography, precision alignment, ultrasonics, and balancing data for a complete machinery health program that reduces costly downtime and unnecessary repairs.

EMERSON™
Process Management

Rotrode Emission Spectroscopy

Dissolved or fine particulate metals using Spectoil M Rotrode

Emission Spectrometer

Monitoring dissolved and fine metallic oil content allows you to trend mechanical wear aiding in early detection and corrective action. The monitoring of additive elements can also help determine depletion of additives. Additive elements also help identify the type of lubricant being used and its potential problems, such as topping off with the wrong lubricant.

Particle Count

Particulate material by size distribution using CSI 51PC Laser

Particle Counter

A particle count quantifies particulate contaminants in each size range, usually greater than 2, 5, 15, 25, 50, and 100 microns. This shows the filter's efficiency and operability and is used to calculate the lubricant's ISO cleanliness code. A change in particle count levels or size distribution may indicate the onset of abnormal wear, a missing oil filler cap, a broken suction hose, a clogged or damaged air filter, a change in maintenance habits, or a contaminated new lube.

Rotrode Filter Spectroscopy

Particulate material by elemental composition using Spectoil

Rotrode Filter Preparation Technique

This technique complements particle counting and Rotrode Emission Spectroscopy by providing information about the elemental composition of larger particles.

Ferrous Material Characterization

Detection of ferrous wear materials using CSI 51FW

Ferrous Wear Monitor

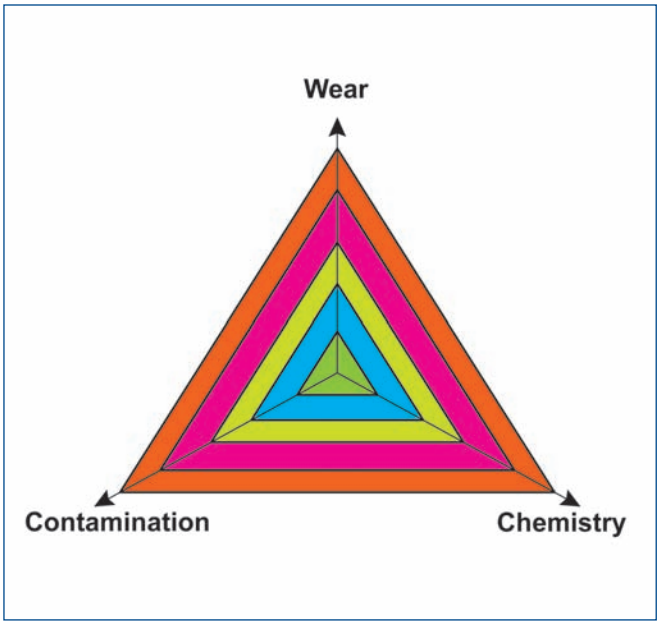
The amount of ferrous debris in most reservoirs increases during episodes of abnormal wear, causing secondary damage. The CSI 51FW determines bulk settled ferrous contamination, so action can be taken before any significant secondary damage occurs.

Viscosity

Viscosity at 40°C, 100°C, and viscosity index using ASTM

D445 using ISL Automatic Viscometers

The viscosity index is the rate of change in viscosity due to ISO at 40°C and internal combustion oils by SAE at 100°C. The viscosity index is the rate of change in viscosity due to changes in temperature. Viscosity changes may also be due to solvent contamination, adding the wrong oil, oxidation, and molecular shearing. Lubrication of the wrong viscosity leads to mechanical damage.



Trivector examines three essential elements that determine oil and machinery condition.

Water

Detection of water contamination using Crackle Test backed by Karl Fisher

Water Titration

Water in small concentrations (200 to 1000 ppm) accelerates lube oxidation, damages rolling element bearings, and affects the performance of additives. Higher concentrations, such as lubricity and viscosity, affect lubricating properties. This could reduce the oil film thickness, known as the hydrodynamic wedge, allowing metal-on-metal contact. A high moisture contamination will also directly attack metal components.

Neutralization Numbers

Determination of TAN or TBN using Acid/Base Titration ASTM

D974 and ASTM 2896

The Total Acid Number (TAN) measures the progression of oxidative lube degradation or the presence of acidic contaminants in industrial oils, while the Total Base Number (TBN) reflects the reserve of acid neutralizing additives in engine oils.

Fourier Transform Infrared (FTIR)

Chemical changes using *Nicollet Infrared Spectrometer*

FTIR absorption spectroscopy determines molecular constituents related to lube chemistry, degradation, and contamination. It also determines whether lubricants with differing base stocks have been mixed.

Wear Debris Analysis

Characterization of wear process using *Olympus Light Microscope*

Wear debris analysis is the study of the morphology (size, shape, texture, color) and the quantity of wear and contaminant particles. When the origin and cause of wear debris are determined, maintenance personnel can act on specific problems, such as contamination and damage from abrasives, bearing degeneration, lube starvation, and gear fatigue.

Advanced Wear Debris Analysis

Using the SEM-EDX Characterization of wear with AMRAY Scanning Electron Microscope

Energy Dispersive X-Ray Spectrometer

The SEM-EDX (Scanning Electron Microscope-Energy Dispersive X-Ray Spectrometer) offers high resolution three dimensional imaging. With its high magnification power (up to 400,000x), it shows important particle surface features and provides detailed elemental analysis of particles, allowing identification of the particle's component of origin. Its digital onscreen scale can be calibrated and overlaid as part of the photo documentation to illustrate accurate particle size.

Oil analysis data can be integrated with your vibration, infrared thermography, laser alignment and balancing data for a complete look at your machinery health.

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