

S•O•SSM FLUID ANALYSIS

Oil Analysis



Toromont S•O•SSM analysis service includes a combination of tests such as metal analysis, oil condition, viscosity, antifreeze and fuel detection, water contamination, wear particles, and other internal and external contaminants. We monitor your oil with methods developed by Caterpillar and designed to evaluate the condition of your machine components, not just the condition of your oil.

Other specific tests are also provided upon request such as oil acidity, alkalinity, oil cleanliness, ferrous index, Karl Fischer water determination, pentane insolubles, flash and fire points, pour point and the validation of biodegradable oil conversion.

Wear rate analysis

This program detects the amount and type of wear metal elements present. When samples are taken at regular intervals these elements can be tended to often spot the onset of a progression towards failure.

When classic wear element combinations are observed the source of rapid wear can often be determined. We monitor elements such as silicon that indicate dirt entry into the system as well as certain additive levels in the oil.

Oil cleanliness analysis

70% of hydraulic system failures are caused by some form of contaminant. Particle count analysis is used to detect metallic and non-metallic impurities in oil such as friction disc material or contamination, that are otherwise undetectable.

Combined with wear rate analysis this provides a more comprehensive evaluation of hydraulic and powertrain component health.

Oil condition analysis

This program determines lubrication properties of your oil. Infrared analysis is used to test for soot, sulphation, oxidation and nitration, and it determines the extent of oil deterioration and if your oil is performing to spec.

Detection of fuel, water & glycol

Fluid contaminants can degrade oil performance rapidly and are often signs of problems elsewhere that could require immediate attention.

Water is the number one enemy of oil. It can cause oil emulsion and reduce its lubricating properties. The test is performed on a hot plate for a qualitative result and uses Karl Fischer titration for a more precise result in parts per million. The presence of water in oils creates cavitation and causes premature wear.

Motor oils are fluids subject to numerous forms of contamination that can damage an engine prematurely. Fuel dilution is attributed to worn rings and cylinders and/or faulty injection. It becomes critical when the oil loses its viscosity and with it, the lubricating film.

In the engine, a damaged radiator, corrosion or electrochemical erosion can cause contamination with glycol, a coolant. Such contamination has a devastating effect on the engine by transforming the oil into highly corrosive glycolic acid. A gas chromatograph is the best choice for accurate and reproducible detection of fuel and glycol and is fully automated.

Viscosity

It is the most important property of an oil. The analysis verifies the condition of the oil by comparing it with the viscosity value when the oil is new. Normal viscosity ensures adequate lubrication. The measurement is performed in temperature-controlled baths. The capillary action is calibrated and validated using a certified standard.

Additional tests

- **TAN (Total Acid Number)** is a measure of the build-up of acidic by-products in your oil which can lead to corrosion and premature wear of internal metallic components.
- **TBN (Total Base Number)** is a measure of your oil's alkalinity reserve and its' ability to neutralize acidic contaminants and preventing corrosion.
- Both TAN and TBN numbers can help to indicate when your oil should be changed.

Bio oil

With the use of biodegradable oils, FTIR analysis (Fourier-transform infrared spectroscopy) is a reliable tool for validating the quality and success of the conversion. The spectrum of a mineral oil and that of a biodegradable oil differ, allowing identification of nature by the wavelength of the compounds. The Toromont Fluid Analysis lab developed an organic certification program including a range of biodegradable oils.



Questions about our oil analysis program?

Contact the Toromont SOS Fluid Analysis lab team:



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MACHINE-SPECIFIC OIL ANALYSIS TESTS

Tests	Diesel engine	Natural gas engine	Transmission	Gear	Hydraulic system
ICP - Wear metal analysis	✓	✓	✓	✓	✓
INFRARED - Oil condition	✓	✓	✓	✓	✓
Viscosity - 40 °C			✓	✓	✓
Viscosity - 100 °C	✓	✓			
ISO - Particle count			✓		✓
Water - Hot plate	✓	✓	✓	✓	✓
Water - Karl Fisher				✓	✓
Glycol contamination	✓	✓			
Fuel dilution	✓				
PQI - Ferrous particle	✓	✓		✓	
AN - Acid number				✓	✓
BN - Base number	✓				
CON - Bio oil conv. vali.					✓

TOROMONT FLUID ANALYSIS PROGRAMS

Type of test	Part number	Service	Brief description of test
Basic oil analysis	SOSOIL SOSOIL-X SOSOIL-L SOSOIL-C	SOS kits 10 SOS kits 50 SOS kits 100 SOS kits	<ul style="list-style-type: none"> • Elemental analysis (23 elements) - ASTM D5185 • Crackle test • Fuel dilution percentage by GC, if required • Oil condition analysis for soot, oxidation, sulfation and nitration, ASTM E2412 – FTIR method • Viscosity at 100 °C – ASTM D445 • ISO particle count on hydraulic systems • PQI for all other systems
Coolant analysis – Level 1	SOSCOOL1	Basic coolant analysis kit – Level 1	<ul style="list-style-type: none"> • Elemental analysis (14 elements) • Glycol percentage, freezing point and boiling point • pH • Conductivity • Nitrite levels • Coolant physical characteristics, foam, colour, oil, contamination, precipitates and odour
Coolant analysis – Level 2	SOSCOOL2	Advanced coolant analysis kit – Level 2	<ul style="list-style-type: none"> • Level 1 coolant analysis • Total dissolved solids • Chlorides/carbonates/sulfates • Glycolic acid • Phosphates • Sebacic acid
Diesel fuel analysis	SOSFUEL	Diesel fuel analysis kit	<ul style="list-style-type: none"> • Elemental analysis • Sulfur analysis • API[SB1] • Water content using Karl Fischer method • Bacteria (if water is positive) • Visual inspection • ISO particle count