

## Scheduled Oil Sampling Analysis

A tool for maintenance management that evaluates oil degradation and also detects the early signs of wear on internal components. This tool for oil analysis is called S·O·S Oil Analysis and the tool is part of the S·O·S Services programme. S·O·S Oil Analysis divides oil analysis into the following categories:

- Wear Analysis
- Oil condition
- Additional tests

The wear analysis monitors metal particles, some oil additives, and some contaminants. Oil condition uses infrared (IR) analysis to evaluate the chemistry of the oil. Infrared analysis is also used to detect certain types of contamination. Additional tests are used to measure contamination levels from water, fuel or coolant. Oil viscosity and corrosion protection can be evaluated as needed. These three types of analysis are used to monitor the condition of your engine and potential problems can be detected. A properly administered S·O·S Oil Analysis programme will reduce repair costs and the programme will lessen the impact of downtime. The S·O·S Oil Analysis programme uses a wide range of tests to determine the condition of the oil and the condition of the lubricated compartment. Guidelines that are based on experience and a correlation to failures have been established for these tests. See the following chart for the guidelines. Exceeding one or more of these guidelines could indicate serious fluid degradation or a pending component failure. A trained person at your Caterpillar dealership should make the final analysis.

**Note:** Cooling system problems will also reduce the life of engines. The combination of S·O·S Coolant Analysis and S·O·S Oil Analysis provides a complete, accurate method for monitoring the health of all engines and other oil lubricated components. Refer to the S·O·S Coolant Analysis information in this publication. A properly administered S·O·S Services programme will reduce repair costs. The programme will also lessen the impact of downtime.

### Obtaining S·O·S Oil Samples

Before you obtain an S·O·S oil sample, operate the engine until the oil is warm and the oil is well circulated. Then obtain the S·O·S oil sample. In order to obtain a good oil sample, do not take the oil sample from the drain stream. The drain stream method can allow a stream of dirty oil from the bottom of the compartment to contaminate the sample. Likewise, never dip an oil sample from an oil container or pour a sample from a used filter.

**Note:** Always use a designated pump for oil sampling and use a separate designated pump for coolant sampling. Using the same pump for both types of samples may contaminate the samples that are being drawn. This contamination may cause a false analysis and an incorrect interpretation that could lead to concern on the part of both dealers and customers.

There are two ways to obtain S·O·S oil samples. The following methods are listed in the order that is preferred:

- Use an in-line sampling valve for pressurised oil systems.
- Use a sampling gun that is inserted into the sump.

Use of the in-line sampling valve is the preferred method. This method provides samples that are less likely to be contaminated. Whenever you obtain the samples, obtain the samples from the same point. This makes the samples more representative of the oil that is in the system.

In order to obtain an oil sample from the engine compartment, it may be necessary to increase the engine's speed. Normally, the oil sample is taken at low idle. If the flow rate is too low, increase engine speed to high idle in order to obtain the oil sample. Refer to the Operation and Maintenance Manual, "Maintenance Interval Schedule" for the proper interval.

### Sampling Interval

Take the oil samples as close as possible to the standard intervals. In order

### S·O·S Oil Analysis Guidelines

Test Parameter	Guideline
Oxidation	(1)
Soot	(1)
Sulfation	(1)
Wear Metals	Trend Analysis and Cat Wear Table (1) norms
Water	0.5% maximum
Glycol	0%
Fuel Dilution	4% maximum
Viscosity - engines by "ASTM D445" measured at 100°C (212°F)	± 3 centistoke (cSt) change from new oil viscosity.
Total Base Number (TBN) by "ASTM D2896"	50% of new oil TBN
Total Acid Number (TAN) "ASTM D664"	2.0 greater than new oil by TAN or 3.0 maximum

(1) Acceptable values for these parameters are proprietary to the S·O·S Oil Analysis program.

Compartment	Engine
Recommended Sampling Interval	24 140 kilometers (15 000 miles) (1)
Sampling Valve	Yes
Oil Type	DEO
Recommended Oil Change Interval	(2)

(1) Under certain conditions, the Engine manufacturer or the Operation and Maintenance Manual may allow a longer interval between oil samplings.

(2) Consult the Operation and Maintenance Manual that came with your engine for the recommended oil change intervals.

to receive the full value from S·O·S oil analysis, you must establish a consistent trend of data. In order to establish a pertinent history of data, perform consistent oil samplings that are evenly spaced.

Consult your manufacturer/dealer for complete information and assistance in establishing an S·O·S program for your equipment. Traditionally, the suggested S·O·S sampling intervals have been at each oil change. However in severe applications, more frequent oil sampling is recommended. If the engine is operated under a high load and/or high temperature condition, sample at every 250 hours of operation.

### Application

Studies have revealed that obtaining oil samples at every 24 140 kilometers (15 000 miles) is too long a time interval in some applications in order to predict potential failure modes. A sampling interval at every 16 093 kilometers (10 000 miles) provides more data between oil change intervals. More data increases the chance for detecting a potential failure.

### Determining Optimum Oil Change Intervals

Sampling the compartments at every 16 093 kilometers (10 000 miles) provides information for oil condition and for oil performance. This information is used to determine the optimum usable life of a particular oil. Also, more points of data will allow closer monitoring of component wear rates. Close monitoring also allows you to obtain the maximum use of the oil. For detailed information on extending oil change intervals, please contact your Engine manufacturer.

### Optimising the Component Life Cycle

An increase in the number of oil samples provides a better definition of the trends in data between oil change intervals. More oil samples will allow you to closely monitor wear patterns of components. This action will ensure that the full life of the components are achieved. □