Tips for Effective Oil Sampling

A consistent oil sampling program can check equipment condition and help users make proactive decisions based on sample data.

By Bret Winberg, LubeTrak

When equipment and oil conditions begin to deteriorate, they usually give off a minor indication or problem. Over time, as the severity of the problem increases, these clues become obvious symptoms of equipment distress.

Monitoring equipment condition using oil analysis can reveal problems before they cause major damage. Addressing problems identified after viewing oil samples will prevent equipment tear down and repair. Staggering repair and replacement costs, including lost production and employee labor, can be avoided.

Start with proper sampling

Pulling a proper oil sample is essential to a good oil analysis program. Erroneous readings may occur if proper extraction, shipping, packaging, or handling practices are not taken seriously prior to testing the lubricant.

One of the most common ways of pulling an oil sample is the drop tube method using a vampire-style pump and some clear tubing. While this works in some situations, it is not always the most sanitary method of getting a clean oil sample.

The tube may turn in the sump and a sample may be pulled from oil at the bottom or top of the reservoir. If the tube is handled for long periods of time, a high potassium reading may show up on the report. The dipstick might be full of dirt or soot and give a false reading. This method should be one of the last options for obtaining an oil sample.

If possible, install a sample port valve. This will assure that the oil sample is clean of external particles. There

TABLE 1. SAMPLING INTERVAL CHART

Fluid Type or System	Regular Use	Intermittent Use
Stationary equipment		
Gear drives	500 hr or monthly	Quarterly
Compressor	500 hr	Quarterly
Gas turbines	500 hr	Quarterly
Hydraulic systems	500 hr or monthly	Quarterly
Diesel engines	500 hr	Quarterly
Natural gas engines	500 hr	Quarterly
Transformers	Quarterly	Annually
Hot oil systems	500 hr	Quarterly
HVAC compressors	250 hr	Quarterly
HVAC refrigerants	Quarterly	Annually
Coolants	500 hr	Quarterly
New diesel loads	Every shipment of new product or supplier	Every shipment of new product or supplier
Diesel storage tanks	Quarterly	Quarterly
Mobile equipment		
Diesel engines	10,000 miles or 250 hr	Quarterly
Gear boxes	20,000 miles or 500 hr	Quarterly
Hydraulic systems	20,000 miles or 500 hr	Quarterly
Coolants	20,000 miles or 500 hr	Quarterly
Gasoline or LPG engines	3000 miles or 150 hr	Quarterly
Vehicle fuel tanks	As needed for troubleshooting	As needed for troubleshooting
New diesel fuel loads	Every shipment of new product or supplier	Every shipment of new product or supplier
Storage tanks (bottom)	Quarterly	Quarterly

are many styles of valves to choose from. Pushpin, push button, and turn valves are some of the most popular used in industrial applications.

Putting the cap of the oil sample bottle in a pocket can result in a high copper or nickel count if the cap comes in contact with coins. Pocket lint and silicon also can provide false readings on equipment reports.

Using sample port identification tags is an important part of setting up a sampling program. These tags help minimize confusion regarding the actual location of a sample port on the equipment and ensure samples are drawn from the correct location. When installing a sample port, always check with a professional to ensure proper positioning of the valve.

Avoid sampling in dead flow areas where lubricants may settle. Otherwise, wear debris settling, water, and other particles may indicate false abnormal wear on the machine. Make sure the oil is flowing, and always take a warm oil sample if possible. Keep the oil sample tube in a clean area, such as in a plastic bag.

Never use the same tube to pull different oil samples, as this will cross-contaminate samples. Always clean the vampire pump after each use. And always use clean, approved bottles for sampling. Reused sample bottles will always result in false readings.

Sampling intervals

Scheduling oil sampling intervals is a common practice. The frequency may be based on drain intervals or operating hours. Criteria to determine the proper frequency of sampling include:

- Penalty if a failure occurs. Potential downtime, repair cost, business interruption, and other costs must be considered.
- Equipment age. For most equipment, chances of failure are greatest during break-in and after major overhauls. The risk also increases as a piece of equipment nears the end of its expected life. A good practice is to increase oil sampling during these periods.
- Fluid environment severity. Operating conditions, including loads, temperatures, speeds, pressures, and contaminant rate, influence the frequency and rate of machine failure.

As new equipment is purchased and installed, sampling intervals may need to be changed to assure that problems are caught before downtime occurs. For example, on new diesel engines with exhaust gas recirculation valves, soot levels are more severe in the earlier stages of operation. Instead of 250 hr or 10,000 miles, it is recommended to pull an oil sample earlier, at 150 hr or 6000 miles.

Once sampling frequency is determined, it is important to adhere to the schedule so consistent results can be reported.

Once sampling frequency is determined for a piece of equipment, it is important to adhere to the schedule so consistent results can be reported.

The oil sampling chart (Table 1) provides recommended guidelines for sampling programs for different machines and components. The chart also can be used as a reference to compare against current sampling intervals. If scheduled sampling intervals are not closely followed, there is a real risk of missing the one report that may result in reduced or eliminated downtime.

Maximizing sampling opportunities

A maintenance organization needs a sampling schedule to maximize its program and successfully move to condition based monitoring. Automating the program can help minimize human error.

It is important to be well informed about new options for sampling efficiencies. For example, analysis laboratories can send e-mail reminders when it is time to sample important equipment. Or oil sample kits may be shipped according to predetermined intervals as a reminder.

Oil sampling ROI

What is a typical return on investment (ROI) for an oil sampling program? It depends on the industry. The chemical, petroleum, and utility industries usually have the highest oil sampling ROI.

Table 2 provides an ROI breakdown by industry based on a 12-month payback. The information in the table can provide a good argument for justifying an oil sampling program. A modest investment can yield a high reward with little risk.

Extended equipment life, reduction of lube oils, less oil to dispose, and more time spent on critical issues instead of changing oil every day are all results of a successful oil sampling program.

Information supplied by Bret Winberg, LubeTrak, 11255 S. 1740 East, Sandy, UT 84092; (866) 582-3872; Internet www.lubetrak.com

TABLE 2. AVERAGE RETURN ON INVESTMENT BY INDUSTRY

Industry	Average ROI
Chemical	11:1
Petroleum	11:1
Utilities	11:1
Paper	10:1
Automotive	8:1
Metals	8:1
Manufacturing	7:1
Mining	3:1