

Oil analysis is a vital tool in machine condition assessment because it offers a means to improved machine reliability and support for operations and maintenance decisions.

Today, oil analysis should be considered as one of a core group of technologies in a predictive maintenance program. It is complemented by vibration analysis, airborne ultrasound, infrared imaging, motor testing, and nondestructive testing. Together these technologies can pinpoint or confirm all types of problems with specific machine components.

"By using multiple technologies and trending results, maintenance managers can make better machinery health decisions much in the same way a doctor can make better human healthcare decisions after multiple tests," commented Terrence O'Hanlon of ReliabilityWeb.com.

### Elements of an analysis program

A complete analysis program should encompass three areas:

- Fluid health analysis. The oil's physical, chemical, and additive properties can be measured and trended to guide decisions about if and when oil should be changed or regenerated with an additive package.
- Contamination monitoring. Abrasive particles and moisture lead to most of the wear in various applications, so monitoring their presence in oil and fluids enables organizations to make effective decisions to control this cause of machine degradation and failure.
- Wear debris detection and analysis. Studying particles in oil assists in scheduling maintenance actions and in determining the root cause of any problems with the machinery.

### Value of oil and fluid analysis

Suppliers for this guide were asked if they felt most companies realize the place oil analysis should have in their maintenance program, or if many of them were still clueless as to its value. Did they see ignorance or a lack of finances behind most failures to do oil analysis, or were other factors involved.

The majority commented that indeed many companies do not see the value in oil analysis:

- "Over the years, I have seen more emphasis put on oil analysis but I still see it 'governed' by finance and lack of knowledge. We see a lot of run-to-failure type maintenance programs instead of predictive/preventive maintenance programs put in place," noted Linda Perry of Herguth Laboratories, Inc.

- "Our experience has been that many are uneducated regarding the cost and labor benefits provided by a lubrication management program, thus generating a lack of prioritization and interest in oil analysis. In addition, most maintenance departments deal with tight budgets, forcing them to choose where to focus their dollars.

- "Maintenance departments then see the free sampling offered by many oil companies as the answer. However, oil companies sample to ensure the quality of their own product; they are not typically focused on machine condition. As a result, the maintenance department does not experience the benefits of a properly implemented oil analysis program and perpetuates the low priority placed on oil analysis," stressed Ian Liddle, Design Maintenance Systems Inc.

- "There is an ignorance about the benefits of oil analysis. It is not as flashy or trendy as vibration and infrared" was the comment from Curt Carlberg, Progressive Maintenance Technologies, Inc.

- "Many companies do not realize the financial benefits oil analysis can bring to the table. It can be shown to save money in most situations so lack of finances is not really an excuse. Sound financial analysis mostly shows that companies can't afford not to do oil analysis.

"However, it takes more than simply oil analysis to realize the full potential. Companies must have the supporting framework of reliability methodologies that fully utilize the information from oil analysis. Without these, results can be disappointing and patchy. This, coupled with the fact that it requires some knowledge of oil analysis to draw sound conclusions from test results, means that many companies may have 'dabbled' in oil analysis, found it not to save much, and given up," said Andrew Ling, Dingo Maintenance Systems.

- "Most companies do not realize the benefits of an oil analysis program, mostly a lack of knowledge or indifference of the value. Most maintenance managers don't have the authority to implement programs without upper management approval and they may not know how to sell such concepts or have the initiative to do so" was the comment from Ron Hemming, Maintenance Technologies International LLC.

- "Unfortunately, many are still clueless on the value of any predictive maintenance program. Most still prefer to wait until something goes wrong rather than spend money up front to alert them there may be a problem," suggested Christia Schutt of PREDICT.

- "I feel it's a second thought, and those who control the dollars do not see the value. Perhaps they do not have the budget, and hope the problems, if any, will go away. My guess is that those in the maintenance department have asked for the help until blue in the face, and in many cases given up—afraid to fight the battle for budget, only to perhaps lose the war, and possibly their job. Deciding finally to give up, shut up, and allow things to go on," offered Brian Reno, Dow Corning Corp.

Take a different approach

Perhaps part of the problem lies in the way companies approach oil and fluid analysis.

"Most companies still miss the comprehensive philosophy behind oil analysis. These companies are still thinking in terms of oil analysis for 'oil condition,' when in reality their concerns are for the 'equipment condition'," noted M. Grimes of REAL Services.

"For all practical purposes, virtually all lubricants and fluids are stable and produced in accordance with established standards. It is the various contaminants, whether intrinsic to the operation of the equipment or external to the equipment, which cause fluid degradation or contribute to adverse wear modes. Through analytical techniques, identification of these contaminants can be used to address the root cause of the problems and take corrective action prior to failure."

### Value of education

Education is a vital element in the acceptance of oil analysis programs.

"One of the main problems is lack of trained personnel interpreting the results provided by oil analysis labs and using this data appropriately as part of the maintenance program," noted David E. Banks, Lubri-Tech Consulting Inc.

"There's a very small percentage of companies who could benefit from oil analysis actually doing oil analysis and about half of those are more than likely doing it wrong or not utilizing it to its fullest. The main reason for this is lack of education. They simply don't know what it is and what it can do for them" was the comment from Jacque Powers of Polaris Laboratories.

### Analysis technologies

Major analysis technologies include:

- Spectrographic analysis: determines the concentration of elements represented in the fluid contaminant. It identifies particles smaller than 10 microns.
- Particle analysis: examines the particles generated by a machine during operation. The size, shape, and makeup of these particles give information on the wear mode and wear rate of the machine.
- Ferrography: quantifies and examines ferrous wear particles larger than 10 microns suspended in the lubricant or hydraulic fluid.

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- Chemical/physical property analysis: measures physical properties of a lubricant, such as viscosity, acid number for organic acids that degrade the oil, base number for activity level of the additive package, and presence of water.
- Continuous on-line monitoring systems: provide on-demand, real-time analysis of lubricant condition and eliminate oil sampling.
- Software packages: help users manage condition monitoring programs and facilitate trending of oil analysis data.

### Analysis resources

Many oil analysis functions must be conducted by an organization dedicated to that service, so the accompanying two-part guide is presented as a foundation for a list of contacts and resources for reference when oil and fluid analysis may be needed.

The technology supplier section lists companies and indicates their product or service offerings; suppliers of only single-point lubricators are not included. The company directory lists specific information about these suppliers, including addresses and telephone numbers, as well as Web sites when available. The information was supplied directly by the companies listed.