How to Develop a "Win-Win" Relationship

With Your Oil Analysis Lab

How to Develop a "Win-Win" Relationship with Your Oil Analysis Lab

By James C. Fitch

Turning an oil analysis program into a feisty profit center is well within reach of today's modern maintenance organizations. In fact, it is commonly achieved. The strategy, perhaps, depends less on what the data is trying to communicate than the confidence the user assigns to the data. In fact, successful users of oil analysis have learned that achieving high confidence in oil analysis data is a team effort; the goals and responsibilities are shared equally between both the user and the laboratory. Such programs, when well-applied, result in a satisfying win-win business relationship.

From the user's perspective, there are many strategic elements to developing a positive working relationship with commercial oil analysis laboratories. When the end user has a basic understanding of the business needs of the laboratory and structures a program consistent with satisfying those needs, the underpinnings of a successful relationship exist. Likewise, the laboratory needs to provide the essential services needed to insure that the oil analysis program is sufficiently information-intensive and builds core value from the point of view of the user and his goals. These goals vary in emphasis from user to user but typically relate to subjects such as reduced lubricant consumption, root cause condition control, and incipient fault detection.

Because a high percentage of today's oil analysis users are setting up primary or auxiliary labs onsite, the lab-user relationship is changing and needs to be redefined. In such cases the service provider is internal and, being a stakeholder in the organization, would share many of the goals of reliability and cost reduction. However, unlike the commercial lab the onsite or corporate lab may not be motivated to achieve high sample volume, peak productivity, and near term profits. Consequently, the relationship must mold to the business environment.

Below is a listing of the key strategic elements for cultivating a win-win relationship with an oil analysis laboratory. And, because the business environment does vary along with program goals and objectives these elements will need to be tweaked and customized by the user in most cases.

Learn the Language of Oil Analysis

Regardless of the product or service, good buying decisions always begin by assimilating knowledge and information. This is particularly true when it comes to oil analysis. Like many rapidly evolving technology-based fields, there are numerous forks in the road that need to be navigated. Without a basic understanding of the goals of oil analysis and the language that surround its use, well-conceived decisions will, by default, be replaced by guesswork.

This can be overcome by a liberal amount of training and education. And, this should not simply be concentrated on a single individual but should be spread about to all those that benefit from and contribute to machine reliability. In fact, for users, training and education should occur at several different levels including craftsmen, operators, engineering, and management.

Equally important is training for the lab analyst, to build knowledge not only of oils, test instruments, and data interpretation, but also the machine, application, and tribology. This expanding knowledge base by both the user and lab increasingly creates open lines of meaningful communication (see Figure 1). Below are a few subjects for which seminars and training classes are generally available:

1. Lubrication fundamentals and their use
2. Mechanical failure analysis
3. Proactive maintenance and root cause analysis
4. Troubleshooting hydraulic systems
5. Lubrication and maintenance of bearings and gear units
6. Oil analysis fundamentals
7. Oil analysis data interpretation
8. Filtration and contamination control
9. Wear particle analysis and machine fault detection

Once these fundamentals are in place, oil analysis can move forward

enthusiastically, beginning with the development of its mission and goals. And, instead of indifference to oil analysis exceptions, the communication and understanding that exist will result in rapid-fire corrections followed by proactive measures that preempt their reoccurrence.

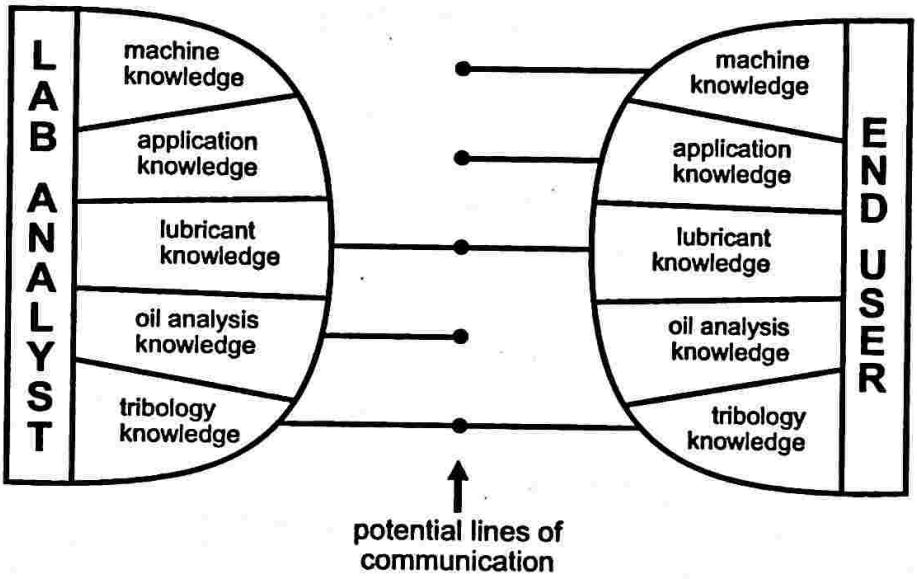

Figure 1. Illustration of how education and training influence can open lines of communication.

Create an Oil Analysis Performance Standard

We have all heard the words of ignorance that when it comes to lubrication "oil is oil". Such folklore has been discarded by leading maintenance organizations that go to great lengths to create sophisticated performance standards used for both the selection and purchasing of lubricants. This practice ensures that the right lubricant is applied to the right application and that the lubricant supplied meets this pre-engineered performance specification.

This same concept works equally well for oil analysis, as it is equally false that "oil analysis is oil analysis". There needs to be a pre-engineered task description of the work to be done–basically an oil analysis performance standard. The performance standard can encompass plant level activities (defining procedures and best practices) as well as requirements for the lab. After all, when it comes to best practice, knowing is not doing.

There are distinct benefits to creating a performance standard prior to engaging the services of an oil analysis lab, including the onsite lab. Specifically, the expectations of the user (client) is not left to perception but is instead detailed in writing and can be discussed thoroughly in advance. This prevents misunderstandings and conflict as the program proceeds. The task description, or standard, is best written by someone with prior experience and education in the field and needs to reflect specific program goals. A buying team can also provide collective input to the creation of the standard.

The following are a few suggested subjects that might be covered in an oil analysis standard and discussed with candidate labs:

1. The routine tests to be conducted for each machine category.
2. The exception or confirmation tests to be conducted when alarms are experienced.
3. The length of time unused oil will be retained by the lab.
4. The turnaround time for routine and exception testing.
5. The manner in which data will be reported, e.g., paper report, faxes, electronically, calls for criticals, etc.
6. The information to be included on oil analysis reports.
7. How limits will be set and alarms communicated.
8. Discussion of expectations regarding quality assurance (e.g., ISO 9002, Guide 25).
9. Supply of bottles, types, sizes, cleanliness, etc.
10. Availability of software or suitable data links with independent oil analysis software.
11. The manner in which test report comments are generated (computer, analyst, combination, etc.).
12. Minimum frequency of site visits by the lab analyst.

Ask to take a Lab Tour, Meet the Analysts, then Reciprocate

Relationship building provides sound footing upon which a successful oil analysis program can build. For each candidate lab being seriously considered, it is best to first take a lab tour and get acquainted with the peo-

ple and their mode of operation. Talk to the lab manager about their client base and ask for references of customers in your line of business. Talk to the lab about quality and performance testing. Get familiar with the skill and training of the technicians and analysts employed. Observe tests being performed and ask lots of questions. Review the details of your task description (oil analysis standard) with the lab manager and ask them to submit a price proposal.

Before a relationship is consummated, if this is a large corporate program, ask the lab analyst to agree to visit your plant for a walk-around tour of the machinery to be included in the program. At that time encourage the lab analyst to comment on sampling procedures and issues relating to data interpretation and troubleshooting. The lab might also be willing to do a short training seminar for plant personnel on oil analysis. By building a meaningful personal relationship there is greater probability of a lasting win-win business relationship.

Figure 2. Things important to test result accuracy

	Influencing Area or Activity					
Test	Proper Sample Location	Clean Sample Containers	Proper Agitation	Regular Instrument Calibration	Test Procedure Precision	Skill of Lab Technician
Particle Count	●	●	●	●	◒	◒
Moisture Contamination (KF)	◒	⊗	●	◒	●	●
Viscosity (D445)	⊗	⊗	⊗	◒	◒	○
TAN/TBN	○	⊗	○	◒	●	●
Elemental Analysis	◒	◒	◒	●	◒	◒
Ferrous Density	●	○	●	●	◒	◒
Analytical Ferrography	●	◒	●	⊗	○	●
Patch Test	●	◒	●	⊗	○	◒
Fuel Dilution (Flash)	○	⊗	⊗	◒	◒	◒
Glycol (Reagent Method)	○	○	○	⊗	●	◒
FTIR	○	◒	○	●	●	●

● Highly Important ◒ Important ○ Minor Importance ⊗ No Effect

Be Open and Upfront about Quality

Remember that quality begins at home. The task description described above needs to include quality standards that relate to both the lab and plant. Important client-based issues relating to quality include sampling procedures, sampling hardware, sampling location, and sample bottles. Besides being the client of oil analysis, the user is the sole supplier of the raw material to the lab. The lab can't convert a bad oil sample into a good one. It has to work with what it gets. When plant level training and quality standards don't exist, we frequently have the condition of garbage-in-garbage-out.

Next, talk to the lab about quality and ask to understand how quality is measured and controlled (see Figure 2). Discuss with the lab specific internal checks on test quality and instrument precision. Inquire about the use of Statistical Process Control (SPC) and control charts. Ask them about certification efforts in meeting ISO 9002/Guide 25 requirements. Review their use of reference standards and frequency. Ask about other external checks on their program such as participation in round robin testing and independent blind testing. Inquire about whether test procedures are documented and the level of training and qualifying tests routinely given to lab technicians.

Don't Let Price Drive the Lab Selection Decision

In the process of selecting a commercial oil analysis lab and negotiating price it is best to leave nothing to chance. The task description helps insure that what the end user thinks he is buying dovetails with what the laboratory thinks he is quoting. Once the task description is in place a meaningful discussion of cost can begin.

Large corporate users should avoid the temptation of buying oil analysis services by going out on bid and buying from the lowest bidder. What message is this sending the lab about the value assigned to quality and service? A company should be focused on cost savings springing from the value that a quality oil analysis program creates, such as reducing operating costs and maximing machine reliability.

It is never wise to push a laboratory on price to the realm of unprofitability. This takes the lab out of the comfort zone as the service provider and puts stress in the business relationship. The concept that "you always

get what you pay for" rest in the minds of those locked into such low-margin contracts. And, when it comes to oil analysis, end-users should take the view that no data is preferred to unreliable or untimely data. It is a very basic principle that the lab must be in a profitable relationship to be motivated and stay viable as a value-producing business entity.

Efficient Test Bundles Keep Costs Low and Savings High

Users should get involved in selecting test bundles for each machine category (see Figure 3). It is not realistic to expect the lab to anticipate the needs and objectives of each user. These objectives can vary considerably. For instance, the test bundle for a crankcase lubricant that is operating in an extended oil drain program or an condition-based oil drain program will likely not be the same for users who do highly routine oil changes.

	Large Gear Boxes	Large Bearings	Air/Gas Compressors	Hydraulic Systems	Industrial Turbines
Particle Count	X	X	X	X	X
Viscosity	X	X	X	X	X
Moisture Analysis	X	X	X	X	X
Total Acid Number			X		X
Infrared (FTIR)	X	X	X		
Elemental Spectroscopy	X	X	X	X	
Wear Particle Density	X	X	X	E	X
Analytical Ferrography	E	E	E	E	E

X = Routine E = Exception

Figure 3. Examples of possible test bundles for industrial lubricants.

Many sophisticated industrial reliability teams seek to maximize the generation of fault revealing data in all aspects of predictive maintenance. In such cases, strategies for detecting incipient failure and wear conditions

are customized to the application and involve a detailed understanding of failure modes, machine metallurgy, and machine stressing conditions. Other oil analysis programs emphasize the routine detection and monitoring of lubricant conditions that lead to failure, i.e., root causes. For instance, the rigorous control of base oil condition, including cleanliness and dryness, would likely be emphasized in such cases.

When the test bundles are well engineered, not only are non-conforming conditions revealed, but lab costs are kept to a minimum. The laboratory can be an important resource in helping the user define the optimum test slate that meets both application demands and objectives of the user. However, the ultimate decision on test slate should rest with the user and incorporated by him in the task description (oil analysis performance standard). This can also be important to reducing the costs that might come from the performance of unnecessary or redundant tests.

When routine test bundles are coupled with strategic exception tests, a systematic step-stage program results. In many cases the routine test is, in fact, performed onsite using a small lab or portable instruments. The exception tests are designed to look deeper into the suspected or non-complying condition in order to assist in the troubleshooting effort and define the corrective measure. Many exception tests, such as analytical ferrography, are costly and time-consuming; therefore, screening and prudent use saves program costs.

Get Involved in Setting Alarms and Limits

In the same sense that test bundles require user-level participation, so too, there is a need for the user to be involved in the setting of alarms and limits (see Figure 4). This helps create an essential shared understanding for the basis of the alarm, as well as the assigned degree of urgency in responding to it. Without doubt, such joint ownership and participation in alarm setting is important to a quality interactive lab-client relationship.

In the past, users of oil analysis have relied almost exclusively on the commercial laboratory to set and enunciate data alarms. This has put an unrealistic burden on the labs to understand information about user-equipment they have often never seen. Likewise, the goals and objectives of the user with respect to reliability and maintenance may not be fully under-

stood. Usually, this leaves the lab with no alternative other than to use standard default alarms. When these one-size-fits-all alarms are used, many of the opportunities and objectives of a modern condition-based maintenance program are missed.

Goal-Based Limits (upper)			Aging Limits		
	Caution	Critical		Caution	Critical
Cleanliness	14/11	16/13	Viscosity	+5%	+10%
Dryness	200	600	RBOT	-30%	-60%
TAN	0.2	0.4	FTIR-Ox	0.3	1.0
Fuel	1.5%	5%	Zinc	-15%	-30%
Glycol	200 ppm	400 ppm	Calcium	-10%	-20%
Soot	2%	5%	TBN	-50%	-75%

Figure 4. Example of limits for a specific oil-machine application.

In recent years, with the advent of sophisticated user-level oil analysis software, many plant-level oil analysis users are taking responsibility for setting alarms and limits independent of the lab. The lab, in turn, is being asked to only deliver accurate and timely oil analysis results, leaving interpretation and exception reporting to the user. With the user being familiar with the lubricants, machines, historical problems, and general reliability goals, the most proper and effective limits can then be established. The key to user-level participation in limit setting is training and education.

Maintain a Regular Dialog with Your Lab

Develop an ongoing dialog with your lab analyst. Talk to him regularly about issues relating to your machinery and oils. Bring him up-to-date on changing operating conditions and machinery problems and tap into his knowledge on troubleshooting and root cause analysis. Give the lab regular updates on how oil analysis alarms are responded to and the final outcome. For instance, when oil analysis plays a key role in avoiding an expensive repair or a downtime-producing failure, share the "save" with the lab. The enthusiasm and success will be a source of pride that will direct even more attention and effort towards advancing your oil analysis program.

Occasionally give your oil lab a report card, in writing, on their performance relating to service and quality. Include constructive criticism

and helpful advice on how they can improve. Tell the lab the good things as well. If possible, provide discussion or listing of all the cost reductions (e.g., lubricant consumption) and savings from problems that were avoided. Share with them your goals and onward plans for improving the oil analysis program, especially any key role the lab will need to play in insuring its success.

Provide Accurate Machinery and Lubricant Registration Information

When you enroll as a client for oil analysis services your lab will ask you to register your equipment and lubricants with them. This is a critical procedure that will influence the program's success. Take quality time to build their file by providing the following:

Machine Identification Name or Number. This could be an asset number, a serial number, or a name. If the component to be sampled has more than one sample point, an additional identifier must be used to distinguish it from other sample locations.

Unit Type. This identifies the component that is being sampled. This is the most mis-identified part of most equipment lists, and it is the most critical item of information from the standpoint of interpretation. The more information provided, the more specific the lab analysis can be in interpreting the data.

Manufacturer and Model of Machine or Component. If the component is a centrifugal pump for instance, the make and model of the pump is need. If it is a hydraulic system the make and model of the hydraulic pump is neededed. This information is helpful in identifying the metallurgy, and the ranges of wear metals that can be expected.

Fluid Manufacturer, Fluid Type (name) and Grade (ISO or SAE for instance). A complete identification of the fluid is nearly as important as the component information. Many labs use tables of standards against which used-oil physical and chemical properties are compared. If an oil type is not properly identified it will be compared to the wrong standard leading to erroneous conclusions.

Equally important is the information provided with each oil sample sent

to the lab for analysis. Share with the lab anything you know about the machine or oil that could influence data interpretation. Don't forget to identify hours on machine, hours on oil, and in some cases, hours on filter. Identify any recent repair or interruption of service that could have a bearing on oil analysis.

Final Words

Over a span of a year, a great deal of time and money can be expended on an active oil analysis program. Therefore, every defining element that can advance or limit success merits attention and consideration of the end-user. The evolving partnership relationship between the laboratory and user, in large part, will ultimately define the degree of success achieved from oil analysis. Many of these critical elements are described in this special report while others are discussed in seminars and technical documentation. Over time, a maturing program that combines these elements and features will certainly be one that is the source of considerable pride and enthusiasm for the modern maintenance organization.