Jack Poley

The economic state of oil analysis

While the costs may be rather inexpensive, the importance in utilizing this valuable tool still remains the same.

In March we discussed the notion that oil analysis was more cost-effective than ever. This month please indulge my shameless bias as I prove this point from personal history.

In 1960 the first commercial oil analysis featured wear metals detection for the purpose of machine condition monitoring. Previously, I've discussed this history, but this time let's look at it from an economic as opposed to technical perspective.

The fundamental oil analysis tests in the 21st Century are:

- Metals (usually over 20): wear, contaminant, additive.
- Infrared analysis: oxidation, nitration, glycol, lube mixing, water contamination, etc.
- Particle analysis: size distribution, morphology, composition.
- Viscosity: not usually the most important datum for a used lubricant, but still essential in the overall evaluation scheme.
- There are other tests that could be considered routine, but they are employed with certain kinds of lubricants or certain specific applications. Then, too, as with infrared analysis, additional data can be gleaned from the same instrument.

AUTOMATION

Sophisticated instruments, designed or adapted for used oil analysis and usually semi- or fully automated, currently perform all of these tests. Circa 1960, no instruments were automated, and only the metals spectrometer was semiautomated. Over 20 elements were detected and measured simultaneously, but one had to record the data output manually from synchronous motor clocks. On a good day, one could memorize half or more of the results in order to write them down while the clocks were resetting and the next sample was being analyzed, squeezing the time down to about a minute overall.

BATCH PROCESSING

The closest thing to batch processing in the '60s would have been a centrifuge holding, perhaps 48-72 glass tubes, spinning down solids (soot) in batches. The notion of spinning six dozen 15-ml* centrifuge tubes at once posed its own challenges. Imbalance in the centrifuge load was always a potential hazard, occasionally resulting in an ear-splitting crash of glass and metal, as well as a huge dent in the centrifuge's bowl casing and the company's wallet.

** Even in the '60s, the pressure was on to condense and make tests more efficient. The actual insolubles test in ASTM demanded 100-ml samples, but a certain chemist decided the amount was, perhaps, overkill for the mission at hand. Thus, up to six dozen soot tests could be simultaneously accomplished using smaller tubes. Yes, this chemist noted that he was improving the environment, as well, by cutting down on solvent usage.*

Thus we had one semiautomated method and one batch method, with the rest of the test results being manually entered. Today nearly every test is automated from start to finish, owing to economies and, of course, technological developments. In my next column, we'll discuss whether or not these inferential methods are actually more accurate than their ASTM predecessors.

In the old days nearly every sample received at most commercial labs was from a diesel engine and, accordingly, one set of tests was prevalent. Today any sump is fair game for oil analysis: turbines, gearsets, hydraulics, etc.

What were the tests then and now?

Figure 1

	"Old" Days (circa 60s/70s)	Currently
Spectrometric Metals	X	X
Viscosity	X	X
Fuel Soot	X	X
Water, cursory	X	X
BN (Base No.)	X	X
Glycol	Y	Y
Oxidation	n/a	X
Nitration	n/a	X
Sulfation	n/a	X

X = matched
Y = equivalent inference
n/a = not available

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And what were and are the costs for this package? Answer: about the same based on casual survey of various users. In 1961 the oil analysis shown in Figure 1 went for $5 to $8 depending on the volume submitted. In 2009 this same package is usually less than $9 and even less than $6 for large volume accounts.

Part of the pricing parity is due to the fact that several tests, such as soot, oxidation, nitration and sulfation (and sometimes water, glycol, BN, AN and even more) come from one instrument (again, for now, we'll ignore the comparative accuracy against alternative tests). Nevertheless, there's no denying that dollar-for-dollar testing is roughly equal which, of course, means that today's testing is way less expensive than in prior decades. Cost of labor, loss of production and lubricants/filters, however, is clearly greater than ever before (perhaps near-equal with the '60s on a relative basis but certainly nothing approaching less).

It is unnecessary to perform a detailed economic analysis, as the facts presented clearly underscore the decreased cost of an oil analysis over time. What's wrong with this picture? Nothing, if you're using oil analysis in an effective manner! Everything if you're still wondering about using it or, more egregiously, have decided not to engage or have curtailed your program due to the economy.

Following are the facts involved in employing oil analysis in a tough economy:

1. Funding for new equipment is choked off for most companies, which means companies will be desperate to make existing equipment last longer. Oil analysis is a perfect monitoring technique for this need. It always was, but it's more important when alternatives are reduced to near zero, as they are today.

2. While new equipment is somewhat off-limits at this time, replacing existing equipment is an area of avoidance, and again oil analysis is one of the best ways to minimize such events whenever possible.

3. Oil is not cheap, even though its price has plummeted in the last few months (it seemed, however, to be rising as this column was being developed—in any event we know it will rise again). Oil analysis is the way in which safely extended oil drain intervals can be vetted. Why would one not want to employ this tool to:
   a. Vet one's existing products (oil and filters).
   b. Explore other products to see if there is a specific product that works best in one's particular operation.
   c. Disclose contaminants such as soot in diesels or water in many other sump types. These can lead to root cause fixes, resulting in increased lube drain savings, as well as savings in improved operating efficiency.

Oil analysis is more affordable than it's ever been and has a more important role than ever in preserving machine life and maximizing production. Clearly the case for using oil analysis is made, and there is no logical reason not to employ this valuable tool if one maintains as little as a single stamping machine, compressor or truck.

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