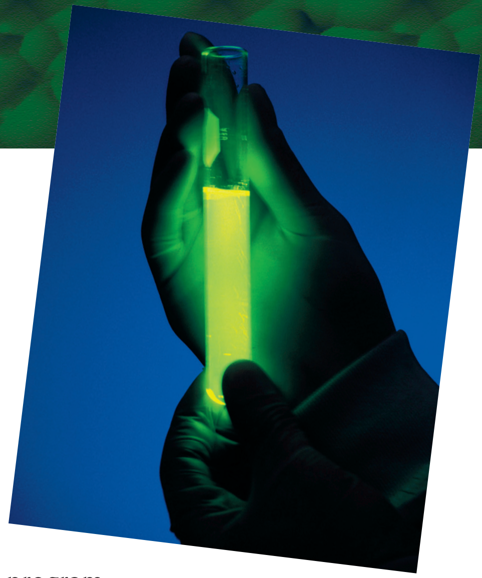
Selecting effective test packages



By Jack Poley

Having discussed various methods and techniques for determining particulate contamination, including wear metals, along with investigation for contamination and degradation of the lubricant, we now present a table of test groups that are applicable to the systems represented therein. There are primary tests that I recommend be performed on every sample submitted. There are also ancillary tests that would be performed, at minimum, to glean additional information before making a critical decision or what would be performed in instances where failure of a component would result in catastrophic loss. This table, while certainly not exhaustive, is emblematic of programs in place at this time. Note that there are suggested alternatives in several cases.

- Color-coding is used to indicate the primary purpose of the test in each component application.
- The subscript indicators for Y-O suggest: Cu [copper] for bronze systems, Fe [iron] for ferrous systems. Note that micropatch testing is not limited by metallurgy configurations.
- Grayed-out areas do not necessarily preclude such testing, but testing is either not possible with any degree of confidence, not meaningful or substituted for with a recommended alternative.

Ideally the selection of a suite of tests should be determined by assessing all the factors involved, including: (1.) the component, (2.) its metallurgical characteristics, (3.) the application (usage) of the component, (4.) the environment, (5.) the duty cycle, (6.) the lubricant, (7.) filtration, (8.) the cost of outage (criticality), (9.) sampling frequency—all balanced to overall program objectives.

A note about sampling intervals: While most testing provides valuable information at very reasonable prices, no one wishes to over-test for reasons of economy and workload (someone has to secure the samples). Nevertheless, it is worse to test so infrequently that one is reduced to 'go-no-go' analysis, primarily used to determine lube condition but not very conducive to assessing wear development.

If one is securing a sample only at an annual shutdown procedure, there is little to be learned other than the suitability of the lubricant for continued use. Such time-spaced testing is probably best applied to very large lube systems, where the cost of a change out is substantial. Special situations like nuclear plants may, of course, impose limitations on sampling frequency due to access issues. <<

While most testing provides valuable information at very reasonable prices, no one wishes to over-test for reasons of economy and workload.

Jack Poley is president of Jack Poley International, LLC, Miami, consultants in fluid analysis. You can reach him at **poleyj@bellsouth.net**.

Test Package Selection

Test Application	Hydraulic System	Gear System	Steam Turbine	Gas Turbine	Rotary Compressor	Reciprocating Compressor	Diesel Engine	Natural Gas Engine
Spectro Metals	Y	Y	Y	Y	Y	Y	Y	Y
Particle Count	Y		Y-O	Y-O	Y			2-CYCLE
Ferrous-based large particle screening, e.g., DRF, PQ	O	Y_{Fe}		O	O	O	Low-Medium Speed	4-CYCLE
Micropatch	O	Y_{Cu} O_{Fe}	Y-O	Y-O	O	O		O
Viscosity	Y	Y	Y	Y	Y	Y	Y+ fuel	Y
Infrared Spectro	Y	Y	Y	O	Y	Y	Y	Y
Total Acid No.	Y	Y	O	O	Y	Y	Y-O	Y-O
Total Base No.						Evaluating Lube Change?	Y-O	4-CYCLE
Fuel Soot {IR}						If so, "Y"	Y	4-CYCLE
Water, cursory		Y	Y		O	Y	Y	Y
Water, Karl Fischer	Y		O		O	O		O
↓ IF Indicated								
Analytical Ferrography		Y= recommended			O= optional			
↓ IF Indicated								
SEM/EDAX		Wear Particle Analysis		Degradation Factors		Contamination Factors		