An alternative to men in white coats

As the lifeblood of industrial processes, it is essential that lube oil is monitored and its properties properly understood. However, as Martin Lucas, MD of Kittiwake Developments explains, this no longer means that samples have to be sent off to men in white coats for analysis

The direct correlation between uptime and revenue is indisputable. So with the spectre of downtime ever present, condition monitoring systems and oil analysis programmes are the first means of defence in diagnosing problems with critical machinery and equipment. Providing laboratory grade results for a range of test parameters, the impact of successful troubleshooting using onsite diagnostic equipment can equate to millions of pounds in savings.

To diagnose a suspect piece of equipment, a lubricant sample can be taken and quickly tested onsite. Obtaining a representative lubricating oil sample is one of the most important parts of a scheduled oil analysis programme.If a sample does not represent the true condition of the lubricant and component at the time of sampling, the reliability of both the test result and its interpretation is compromised. Using a representative sample to apply the following test parameters is essential to maintain and protect equipment, preventing damage in advance.

KEY FACTS:

- Onsite diagnostic equipment provides laboratory grade results and empowers engineers to make fast, informed decisions
- Trending of lubricant test parameters is important; the more regular the data the better

Viscosity

Viscosity is the most important property of the oil and is fundamental to providing optimum film strength, with minimal frictional losses, preventing metal-to-metal contact, scuffing, microwelding and wear of sliding surfaces. The viscosity of engine oil may fall due to fuel dilution, by topping up with an incorrect oil grade, or shear of polymer additives.

Conversely, viscosity may increase due to excessive soot loading (insolubles content) or if the filtration system is not operating correctly. For all oils, ageing caused by oxidation and thermal degradation may lead to thickening and an increase in viscosity.

Water in oil

Water in lubricating oil can enter from many sources including condensation, leakage and malfunction of oil treatment systems. Water contamination will cause corrosion and cavitation, compromise the stability of additive packages and encourage the growth of microbes, yeasts, moulds and bacteria that will clog filters and corrode fuel systems. Water can displace the oil at contacting surfaces, reducing the effective amount of lubrication and activating surfaces which may themselves act as catalysts for degradation of the oil.

Total Base Number

Diesel engine oil is continuously exposed to acidic combustion products and these must be neutralised before they can corrode engine parts. Alkaline additives are present to neutralise both the acids derived from combustion (mainly strong sulphuric and nitric acids) and those weaker, organic acids resulting from oxidation of the oil during its ageing. The TBN of an oil is the measure of this alkaline reserve.

Insolubles

Insolubles are a build up of combustion related debris and oxidation products. Contamination comes mainly from combustion products; fuel ash, carbon and partially oxidised fuel, plus a small contribution of oil oxidation products and spent lubricant additive. High insoluble levels will cause increased oil viscosity, wear of bearings and running surfaces and blockage of oil ways and filters.

Wear Debris

Wear Debris Analysis, or Analytical Ferrography, is a method of predicting the health of equipment in a non-intrusive manner by studying the wear particles present in the lubricating oil. The continuous trending of wear rate monitors the performance of machine components and provides early warning and diagnosis of worn parts.

Particle Content

The presence of particulate contamination in hydraulic fluids can cause rapid wear and failure of seals, pumps and other critical components. Particulate contamination within hydraulic systems can arise from internal sources, such as the top-up oil and the surrounding air. Particulates can also be generated internally within the systems.

Trending of these test parameters is extremely important and the more regular the information the better; even with the best sampling practices, occasional laboratory results can be unrepresentative and sometimes cause false alarms.

The collection and analysis of intelligent data to monitor the condition of critical machinery and facilitate proactive rather than reactive maintenance is vital for productivity and, therefore, key to revenue generation.