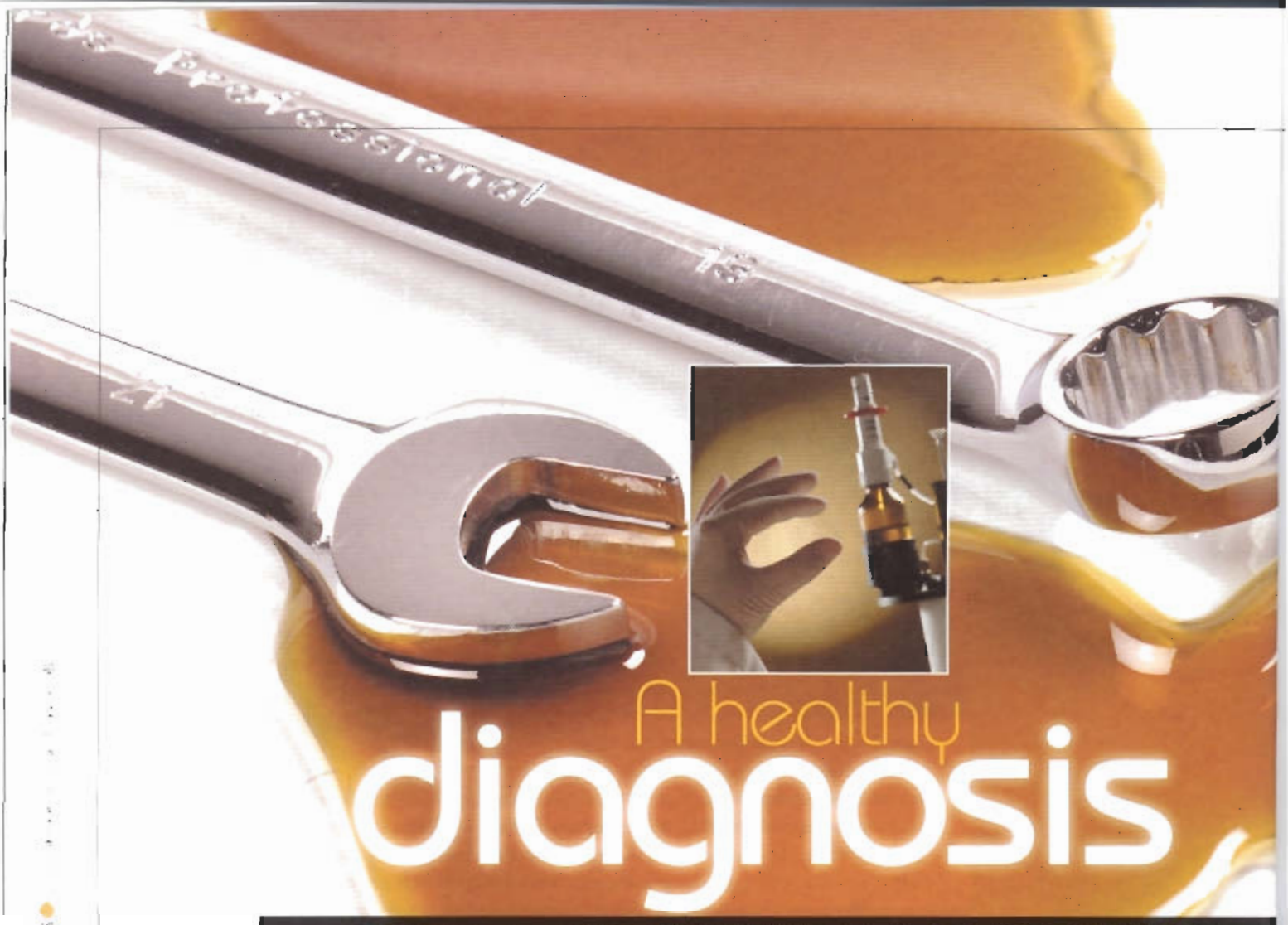

A healthy diagnosis

MICHAEL DINES OF KITTIWAKE DEVELOPMENTS EXAMINES THE POWER AND IMPORTANCE OF ONBOARD LUBE OIL DIAGNOSTICS

Equipment durability and reliability are the cornerstones of a successful drilling process and as the lifeblood of the operation, it is essential that lube oil is monitored and its properties properly understood. Sending lubricant samples off to the laboratory for analysis is an effective means of condition monitoring, if you are graced with the blessing of time. However, depending upon the rig's geographical location and laboratory of choice, the delay in receiving results may vary from several days to a number of months. And by the time the results come back it may be too late to heed the warning and implement preventative measures.

Relying solely on men in white coats to analyse and interpret test results is no longer necessary – on board diagnostic equipment provides laboratory grade results and empowers engineers to make fast and informed decisions with confidence.

The significance of increasing operational profitability through preventative maintenance to minimise equipment downtime is hardly a revelation to anyone in the offshore industry. However, identifying and employing the most effective tools to achieve this is a continuous quest, as new discoveries have the potential to reap considerable financial rewards. The direct correlation between uptime and revenue is indisputable; with average day rates ranging from $31,000 for a jackup MC < 200' WD to $397,335.19 for a semi-submersible 4000'+ WD (Rigzone, June 2009), the cost of any loss of productivity can quickly escalate. Exceeding the agreed levels of downtime during a tender can incur a fine, and of course records from previous tenders can also give an advantage over the competition. No matter which way you look at it, uptime equals money.

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 rig machinery and equipment. Providing laboratory grade results for a range of test parameters, the impact of successful troubleshooting using on board diagnostic equipment can equate to millions of dollars in savings, whilst also avoiding increased workload and stress levels for maintenance supervisors and the crew when systems fail.

To diagnose a suspect piece of equipment, a lubricant sample can be taken and quickly tested onboard. Obtaining a representative lubricating oil sample is one of the most important parts of a scheduled oil analysis programme and most onboard test equipment will provide simple guidelines to follow. 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 to is essential to maintain and protect equipment, preventing damage in advance.

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, micro-welding 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 (insoluble's 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 rapidly 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 (TBN)

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 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. This technique can diagnose active machine wear earlier than using vibration techniques. Production can be maintained, machinery life extended and the return on capital investment increased.

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. Achievement of problem-free operation of hydraulic systems is highly dependent on maintenance of cleanliness and this is a critical maintenance function.

Trending of these critical lubricant 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.

Rigzone's overall rig utilisation statistics for the entire competitive rig fleet (based on a snapshot rig count) show a drop from 87 per cent a year ago to 81.1 per cent today. The continuing global credit squeeze has fuelled the scrutiny of every operational area for potential cost savings – some of which involve stripping out costs and others that focus on investment to realise efficiencies and fundamentally improve performance. Focus on the bottom line is unwavering, so return on any investment must be quickly evident and pronounced. The rate of payback from establishing an on board oil analysis programme is dependent upon several factors, for example the cost of physically repairing assets should they fail, the availability of replacement equipment and related personnel costs, the cost of lost revenue during down time, and the expense of unnecessarily replacing and disposing of the lubricant.

Efficiency has fast-become the crucial factor by which any operation that wants to survive the global recession is judged. Those most adept at generating more from less, prolonging the life of assets and eliminating waste are the ones who will stay afloat and emerge from the economic crisis leaner, stronger and more profitable.

KITTIWAKE DEVELOPMENTS

Michael Dines is fuel and oil testing manager at Kittiwake Developments, a leading global provider of marine technology solutions. With offices in the UK, US, Germany and Malaysia, Kittiwake is an expert in machinery condition monitoring, fuel and lube oil analysis and water testing.

For further information please visit: www.kittiwake.com

A healthy diagnosis

01/07/2009 | Channel: Technology

Michael Dines of Kittiwake Developments examines the power and importance of onboard lube oil diagnostics

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