Better, quicker decisions from fuel monitoring

The increasing advantages of monitoring fuel quality are outlined by Martin Lucas, managing director of Kittiwake Developments

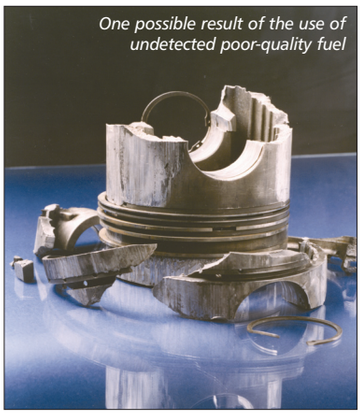
Anybody involved in the supply and use of marine fuels knows how variable quality can be.

Driven by developments in refining and bunkering technology, as well as stricter emissions regulations and the growing emphasis on fuel sulphur content, industry bodies and fuel testing agencies continue to correlate declining sulphur levels, increasing levels of catalyst fines and subsequent engine damage.

This is likely to be exacerbated in July 2010 when the sulphur limit is set to drop to 1.00% in line with the revised MARPOL Annex VI. It is predicted that large amounts of low sulphur cutter stock will be required to blend residual fuels to achieve compliance, probably resulting in large regional variations in marine fuel quality, especially with regard to density and viscosity. As these fuels are known to have an increased level of catalyst fines they will potentially contribute to increased engine damage.

Recently released data on marine fuel quality from DNV Petroleum Services (DNVPS) show that the world average aluminium and silicon (Al+Si) content in intermediate fuel oil (IFO) grades of marine fuel has increased. Also known as catalyst fines, DNVPS data shows that Al+Si content in IFOs has gone up from 19.0 mg/kg in 2005 to 23.5 mg/kg in 2008, while the average sulphur content has dropped.

Even when fuel has derived from reputable and trusted sources, significant wear to critical equipment and machinery is not uncommon. Indeed a considerable number of the vessel problems reported to DNVPS originated from fuels that had met the ISO 8217 marine quality specification. Viswa Lab reported that four vessels using fuel bunkered in Long Beach between late December 2008 and February 2009 experienced machine problems, including wear out of main engine fuel pumps and main engine fuel nozzle, white smoke, and loss of main power. In a technical update sent to its customers, Viswa Lab said although some of the parameter values were unusually low, routine ISO 8217 test results were within specifications.



One possible result of the use of undetected poor-quality fuel

Intertanko has also recently expressed concern over the growing number of hull and machinery incidents on tankers caused by engine problems, the majority of which it attributes to poor low sulphur fuel quality. Figures released by Intertanko demonstrate that there were 87 hull machinery incidents involving tankers last year, 59 of which resulted from engine problems. They say that this offers a stark comparison to the late 1980s and early 1990s, when most hull and machinery incidents were related to the hull, and even in 2002, when only 22 engine incidents involved tankers.

The composition of marine fuel oils is changing and the resulting impact on combustion and engine damage becoming increasingly pronounced. Marine fuel quality directly affects performance, efficiency and maintenance costs, so the testing of bunker samples is central to mitigating this concerning trend. The normal requirements of testing density, viscosity, water and pour point are simply to ensure that the correct fuel and the specified amount is delivered. However with the growing use of low sulphur fuels and increased frequency of bunkering, the stability of the fuel and its compatibility for blending are also very important.

As for so many industries, one of the main victims of the current economic climate has been cash flow and, as a result, many vessels are bunkering smaller volumes more frequently. This leads to several different fuel oils in the same tank and related compatibility issues, further perpetuated by sulphur targets and the blending of fuels to achieve compliance.

Ideally, the mixing and blending of fuels from different sources should be avoided. However bunkering in differing ports necessitates the use of varying fuel suppliers, and with the fuel switching implications of MARPOL Annex VI regulation it is no surprise that the industry is blending and mixing fuels more often than ever before; incompatibility issues are simply inherent by-products.

Onboard testing for compatibility is extremely simple and can take just 20 minutes, providing engineers with information that can confirm that the fuel delivery will remain stable in the bunker tanks or identify possible stability problems before blending and mixing two fuels. Compatibility testing can prevent sludge deposits, eliminate failure of fuel handling systems and reduce costly combustion related engine problems.

In conjunction with on board fuel testing, monitoring wear is central to identifying problems at a very early stage. Online diagnostic equipment can continuously and automatically provide complete sets of trend data showing levels of wear in all vital equipment and machinery, enabling immediate action. Sending samples off to the laboratory for analysis is an effective means of condition monitoring, if you are graced with the blessing of time. But by the time the results come back it may be too late to heed the warning and implement effective preventative measures. Spotting problems at such an early stage can ultimately make the difference between damage control and financial catastrophe.