Lab On A Ship™ tested for "proof of concept" on two Lauritzen Bulkers vessels.

Seagoing lab helps vessels run better and cleaner

It is about the size of a standard refrigerator, although it has also been likened to an ice-cream machine. It is designed to sit unobtrusively onboard ships, automatically analysing fuel and lubricants, transmitting data and generating reports. And it is on the verge of making a big difference in bunkering, engine maintenance and engine performance. Two of these systems – called Lab On A Ship™ (LOAS) – are being tested now on Lauritzen Bulkers vessels, the *Sofie Bulker* and the *Amine Bulker*. "I think it's fair to say these systems are a significant breakthrough. They'll help make vessels more reliable and efficient for owners and customers and also help ensure compliance with environmental standards," says Poul Martin Kondrup, marine technical manager for Lauritzen Bulkers. "LOAS can measure and analyse as accurately as any land-based lab, and it operates automatically, with virtually no interference from the crew." The system is programmed to perform tasks – such as adding an appointment into Outlook® – on a regular schedule with a 45-minute cycle time. It provides information to the vessel control room, but also communicates efficiently with an onshore server and automatically generates customised reports and e-mails them to recipients such as technical or fleet managers.

LOAS promises to dramatically streamline the bunkering process. Standard procedure today for ships taking on fuel includes a delay of three or four days – sometimes longer – until results from an onshore lab can confirm the composition and quality of the oil. LOAS is capable of analysing the fuel during bunkering and providing results within 30 minutes. Which means vessels will have the immediate option of not taking on fuel that does not meet quality standards, thus avoiding loss of time and money and perhaps being stuck with a load of oil that can neither be used nor readily disposed of.

Tracking engine performance

LOAS also tests the main engine oil just before it goes into combustion chamber and constantly measures and analyses engine lubrication oil. "This gives us the ability to repeatedly track and observe specific trends in engine performance," says Poul Martin Kondrup. "Essentially, the LOAS system brings modern process management to ship propulsion systems. This has big implications for engine performance and maintenance since it

has the potential to eliminate guesswork." Instead of roughly estimating maintenance intervals based on past experience, LOAS allows specific tracking of trends that provide better indications of time for maintenance. Over time, for example, the system will show changes such as increased water content in the lubrication oil, which could indicate coolant system leakage. Ultimately the system could lead to substantial cost savings and help cut pollution by reducing excessive burning of oil mixed in with fuel. The main benefit is the ability to improve scheduling for engine maintenance and overhauling, which affects everything from engine performance and efficiency to spare parts stocking. Such information tracked over time might also allow ship owners to work with engine manufacturers to refine and maximise engine operation.

Additionally, LOAS can be used to manually measure and analyse hydraulic oil – for example, from hydraulics systems on hatches and cranes – to allow early detection of potential mechanical problems. During 2009 the system will also be extended to include automatic measurement of cat fines (small metal particles) in heavy fuel. A second analysis unit, a gas analyzer that has the capability to measure NO_X, SO_X, CO, CO_2 and O_2, will also be added to the vessels. "Then we'll have a complete system to measure oil in and gas out, which will give a very good picture of how efficiently the engine is burning oil," says Poul Martin Kondrup. "The system also provides absolute proof that you're in compliance with the required sulphur content of fuel. Once the exhaust gas measurement component has been tested and approved, we'll also be able to provide proof of emissions compliance. LOAS has passed an accredited ASTM correlation test and has a pending approval from Lloyd's Register EMEA for oil analysis. In fact, Lloyd's Register EMEA has been an important project partner in analysing data and in the education of the engineers and superintendents who work with the LOAS system and interpret data. The professional cooperation between vendor, classification society and owner has been essential for the outcome of the project."

Worldwide market potential

LOAS was developed by NanoNord A/S – an Aalborg, Denmark-based company founded by entrepreneur Ole Jensen – and is largely funded by Vesterhavet A/S, the holding company for J. Lauritzen. "Vesterhavet originally invested in NanoNord's nano-technology work, but about three years ago Ole Jensen and I decided to look for a shipping-related project that would generate more immediate revenue," says Bent Østergaard, president of Vesterhavet A/S. "We hit upon the idea of bunker analysis and oil analysis. We currently have five systems on ships – including the two Lauritzen Bulkers vessels – being tested for proof of concept. So that's pretty fast work, although we're still fine-tuning the equipment. The goal is to have the five current systems running with all components, including cat fines analysis, by the end of this year." Bent Østergaard further points out that LOAS is a flexible, scalable concept. Less expensive, more targeted systems that, for example, measure only cat fines or sulphur could easily be produced.

"We see a large potential market in Denmark and worldwide," says Ultan O'Raghallaigh, NanoNord's director of business development and sales. "The test trials underway by our first four customers, including Lauritzen Bulkers have the potential to lead to fleet installations on more than 100 vessels over the next three years. Worldwide, in roughly the same time frame we see a pool of approximately 7,000 newbuildings that are in the size range to be customers for LOAS. We've already introduced the system to 45 leading shipping companies in Asia, North America, the Middle East and Europe. These companies were encouraged by the initial Lloyd's approval. They all expressed intense interest and are awaiting the proof-of-concept results from our five current installations."

Ole Jensen, Director, NanoNord A/S, (on left) and Poul Martin Kondrup, Lauritzen Bulkers' technical manager, with the LOAS system.

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