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Crew training is key to better ship efficiency

SHIPOWNERS need to be aware of the impact well-trained crews can make on a vessel's overall efficiency and environmental performance. Environmentally aware crews are an essential ingredient to a well-run vessel, according to Grieg Shipping newbuilding project manager Jan Svardal. Bergen-based Grieg is installing efficiency monitoring systems on its four newbuildings, which at 207 m will be the largest in the Grieg fleet. The Star Kirkenes , the first of the new 49,924 dwt K-class, was delivered in June this year. The family-owned shipping group has set itself a specific target of reducing energy consumption onboard all its vessels by 20%. To help achieve this the new open-hatch general bulk vessels will have an onboard efficiency monitoring system that will be able to give the crew a constant read-out as they adjust the vessel to gain minimum fuel consumption.

"To gain this kind of efficiency it is important to get it into the mindset of the crew. This allows them to monitor their progress," said Mr Svardal. The systems could be developed for further installation into the company's existing 46,200 dwt J-class, which were built between 2004 and 2006. "It is important to monitor energy consumption as it gives a chance to break down components. Only by doing this can further savings be made. It means turning every stone. It is not easy for existing ships, but you have to look for improvements everywhere," Mr Svardal said. The main feed into the monitoring system is from the main propulsion and the key is to give officers knowledge of the torque and shaft power and so give them an understanding of the power requirements for a specific performance.

However, the energy monitoring system also takes data from the main engine and auxiliary fuel supply, generator power, alarm and monitoring system, speed, ship's position, route planning and the cargo loading computer. In this way all the variables on the vessel are recorded and a given energy use is measured. "When you know the energy of the fuel going to the engine you can get a fixed reference point. Then, as you know what is happening on the outside of the hull and what is occurring on the inside of the hull, you can make improvements," Mr Svardal said. "For example, fouling of the propeller or hull is a big factor on speed and power consumption. That's why we need to see the output of the main engine." The trim of the vessel is also an important influence on fuel consumption and the energy monitoring system will be a guide to achieving best settings.

Ensuring the trim has been set at an optimum level for a specific draft and voyage is usually the task of the navigating officer on a vessel. If it is often achieved by optimised loading configuration of the cargo, or ballast water. Some owners - including AP Moller-Maersk - have used their fleets of same-class vessels to compare performance, in order to see where gains can be made. With two identical vessels running on a similar route, the main variable is the crew, and with the correct training they have been made aware of the benefits of fuel saving and to look for ways of achieving it, such as switching off the fuel heating coils in empty or unused bunker tanks. Maersk has been recording vessel performance data for many years, so also has the advantage of vast amounts of performance statistics to analyse when looking for improvements.

Training is so important that the Danish Maritime Authority has written environmental awareness into the training of young seafarers in Danish colleges. The Hamburg Marine Training Centre has also updated its courses to ensure simulator training includes work with

new engine technologies, especially electric controlled engines which have the capability of offering vastly improved fuel consumption compared to earlier mechanically controlled models. In conjunction with accurate measurement, trim optimisation can result in improvements of 2%, although some owners have claimed to have achieved up to 6% according to hydrodynamics expert Friedrich Mewis, who has been working with Grieg Shipping to improve the performance of its vessels.

Figures found using the onboard energy monitoring systems, which include speed optimisation and power-saving devices as well as the trim optimisation tool, have led to observed power reduction of about 20%, which equates to a 5% saving in costs, Mr Mewis said. Mr Mewis has lent his name to a propeller duct with an integrated fins system, the Mewis Duct, which he invented and patented. It has the capability of reducing power by up to 7% when attached close to the propeller to streamline waterflow. His work with various trim settings and different power reduction devices, including work with Grieg Shipping has led him to claim that a 12,000 dwt bulker could save 27% power, and a 46,000 dwt vessel - such as the Grieg J-class - 22.5%.

Danish Technical University senior researcher Professor Hans Otto Kristensen has also developed software capable of squeezing even more efficiency out of ship design. Funded in part by the Copenhagen-based Lauritzen Foundation, Mr Kristensen has been working on the program for more than a decade. The software tool is designed to calculate ship energy consumption, as well as exhaust emissions for bulk carriers, tankers, ro-ro vessels containerships and passenger vessels.

Currently at an intermediate stage, the program has already been made available for container vessels and ro-ro vessels. As cargo has a huge influence on ship design, the program has been written for different cargo and vessel types. The goal though, regardless of the hull form or vessel purpose, is to improve the ship design. It is possible to use the software to determine the impact of the energy efficiency design index that is being discussed within the International Maritime Organization, Prof Kristensen said.

The close tie between efficient design and efficient operations has led some experts in the industry to argue that the various measures being discussed in the IMO to measure and help reduce carbon dioxide emissions should be combined to give an overall efficiency index of a specific vessel. The current proposal is for an operational figure as a guideline and a mandatory benchmark, set for seven specific ship types, which a design must exceed in terms of efficiency, known as the energy efficiency design index.

The relevance and accuracy of the EEDI was recently questioned by Hamburg-Harburg Technical University's head of ship design and safety Stefan Kruger. He argued that the maths in the benchmark, and formula used to set a ship against it, are flawed. A number of participants at the ship efficiency conference in Hamburg last week agreed with this, although there was less accord with his view that fuel prices should become more expensive and market competition allowed to control emissions.