Digitalisation and focused automation can reduce the administrative and operational burden on seafarers and let them enjoy life at sea a lot more, writes Mikael Laurin, Head of Vessel Optimization at Yara Marine Technologies.

Seafarers are the backbone of global trade. They ensure that goods are transported safely and efficiently across the world’s oceans, but they work in a very challenging environment. Vessels are becoming increasingly complex to operate, with new fuels and technologies on the horizon. At the same time, seafarer training is known to be lagging industry developments.

Last year, the International Maritime Organization (IMO) approved a comprehensive review of the Standards of Training, Certification and Watchkeeping for Seafarers (STCW) convention and code to address inconsistencies and bring it up to date with existing and emerging technologies.

These increased complexities will no doubt create an additional burden upon the seafarers unless emerging technologies that automate certain processes are implemented. If properly designed and based on first-hand knowledge of the maritime sector and onboard environment, modern technologies can lighten the load and assist seafarers in operating vessels as safely and efficiently as possible.

Furthermore, using these solutions will also allow land-based staff to support those at sea more effectively and increase transparency across an organisation through data gathering, sharing and analysis.

**DYNAMIC APPROACH TO FUEL CONSUMPTION**

Many seafarers are currently working to optimise their vessels in order to consume less fuel, which reduces both cost and emissions. This is in particular focus at present as all operators are getting to terms with how to gather data and calculating the fuel consumption of each ship in order to determine its carbon intensity, as per the mandate from the IMO.

While reducing the speed of a ship and weather routing are widely accepted pathways to reducing fuel consumption, a path less taken is the ability to adjust the power needed by a ship to navigate its specific operating environment. Yara Marine’s FuelOpt offers dynamic propulsion optimisation by leveraging advanced technologies to get the best possible results for each voyage.

FuelOpt is similar to a sophisticated cruise control system on cars adapted the ship operation that controls vessel speed, fuel consumption or shaft power. On vessels with controllable pitch propellers, the FuelOpt system also works to dynamically tune the propulsion machinery. It separately manages the propeller’s pitch and engine rpm to produce the greatest amount of thrust with the least expenditure of power, thereby further improving energy efficiency. Plus, it adds an extra layer of operational safety by avoiding the risk of overload on the engine system and propulsion line.

FuelOpt is designed to ensure that gathering information and analysing the data needed to fine tune vessel operations does not add to crew workload. The system software receives information from the ship’s instruments and, based on considerations of changing environmental conditions, it makes adjustments to the propulsion line in real-time. As the data collection...
is automated, vast quantities of information about the ships’ performance can be gathered, including how the equipment on board responds to changing sea conditions.

When data gathering and analysis is applied on a ship-wide scale, it can be sent to the cloud and compiled as reports, as part of a network cloud-based platform called Fleet Analytics. The performance of that vessel can be analysed during a voyage or period, and compared with that of the others in a fleet, yielding many valuable insights. This means that individual vessels are always operating at peak performance for their surroundings, reducing fuel consumption and saving money. Several of our customers measure savings of more than 10% in fuel consumption and related emissions.

**EMPOWERING CREW WITH CONTROL**

The system is designed to provide a direct interface between the machinery and the bridge, allowing the captain and crew to maintain full control of these key vessel efficiency parameters. This means that the safety of the vessel is never at risk.

When commands are set, the automated system dynamically monitors and controls vessel propulsion power in real-time, allowing it to optimise energy efficiency. Operating with a constant consumption or shaft power setpoint ensures that the crew can avoid unwanted overconsumption during harsh weather, while reaping the rewards during good weather. In other words, the system provides the onboard team with full control of fuel consumption, emissions, and operations.

Since FuelOpt automates many of the tasks involved in fuel optimisation, this frees up seafarers to spend their time focusing on other critical tasks. By presenting them with information in a user-friendly manner, it allows them to make quicker and more informed decisions without expending too much energy. This can also improve safety, reduce the risk of accidents and significantly boost seafarer morale by simplifying daily operations.

**HARNESSING ARTIFICIAL INTELLIGENCE**

Data-powered artificial intelligence already underpins many of the world’s industries and is being used in a number of arenas in the maritime sector. As administrative tasks and regulatory compliance increases, seafarers and shore-side personnel are unlikely to have the time necessary to track data patterns, particularly in large amounts of data across several voyages in specific environments. However, lacking insight from data tracking could potentially leave operations open to subjective decision-making, which is unlikely to match the peak performance possible by combining data tracking with AI.

AI and machine learning algorithms can process vast amounts of data at an incredible speed, perform calculations with a high degree of accuracy, identify patterns and make predictions that are objectively based on vessel and environmental data. Furthermore, algorithms can perform repetitive analysis on the same dataset repeatedly without making mistakes or becoming fatigued, unlike individuals, and can scale up or down to handle large or small datasets without any loss of performance.

While it is unlikely that AI will ever replicate the twinge in a chief engineer’s gut when he hears a sound out of place in an engine room, there is no doubt that AI solutions are the best way to facilitate the work on decision-making through big data. Furthermore, these solutions can make sure that out of place data always gets noticed by a crew member, even if they are not in the room at the time that something goes wrong.

**DATA DRIVEN VOYAGES**

In our portfolio, AI can be found in the semi-autonomous system Route Pilot. AI certainly does exactly what it says on the label and uses machine learning and AI to assist operators and their crew to plan and execute more energy-efficient sea voyages. The software can monitor everything from fuel consumption to engine performance, and even weather conditions to provide recommendations that can be harnessed to improve efficiency and reduce costs.

FuelOpt and Fleet Analytics both feed data into the Route Pilot AI ship operation support system. The data gathered from these inputs is used by deep learning technologies to predict the specific vessel’s performance in different conditions, thereby making it easy to identify the most energy-efficient voyage within the constraints of the route and vessel. As soon as Route Pilot AI has enough data to simulate the ideal route for the vessel’s journey, FuelOpt becomes the interface between the captain and Route Pilot AI, empowering the seafarer to cooperate and execute the voyage accordingly.

As the sector becomes more data-friendly and there are larger data pools available, the software will become more sophisticated and allow for even more precise calculations. In the long term, this information and automation can be used to minimise human error and improve the safety of the ship and its crew, while also freeing seafarers and shore staff to focus on priorities that specifically require human intervention.

**A HELPING HAND**

Despite advances in technology, the future of shipping is likely to rely heavily on human guidance, particularly as we navigate uncharted waters of low- and zero-carbon fuels. It must be remembered that it is the skills and expertise of seafarers that really allow systems to perform optimally and yield impressive results.

We at Yara Marine Technologies believe that using marine technologies to reduce seafarer workload will play an important role when it comes to recruitment and retention of the brightest minds in the sector. The ability to eliminate repetitive or overly complex tasks will create a more balanced and rewarding work environment for the maritime workforce of the future.

This integration of data insights, vessel optimisation solutions, AI-powered solutions, and navigational systems can deliver immense value to our industry, supporting our industry’s transition to a better, greener future.

For more information, visit: yaramarine.com