

BUNKERSPOT

TAKING DECARBONISATION BY THE HORNS

**SURVEYING BUNKERING OPTIONS
IN THE YEAR OF THE OX**

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Lean and green

Mikael Laurin explains to **Ian Taylor** how Lean Marine's automated systems can help ship operators reduce fuel costs and increase their vessels' operational efficiency

A shipowner's bunker bills are the product of two factors: the price of the fuel, and the amount of fuel their ships consume. The first factor is notoriously difficult to control or predict (even with risk management tools), but the shipowner does have more power over the second.

By maintaining a consistent speed, rather than adopting a cavalier 'hurry up and wait' approach, a ship's fuel consumption can be reduced significantly. Ships' captains – and indeed the owners of any mechanised vehicle – have always known this and, when incentivised to do so, they have adjusted their speeds accordingly. In the past, this was as much an art as a science, because it is so difficult to take into account natural conditions like winds and currents and also commercial imperatives such as changing ETAs. However, in recent years science has come to fore: computerised systems enable ships to take a holistic view of the entire journey and devise routes and speed plans which ensure the very

best fuel efficiency. Furthermore, these calculations continuously adjust to maintain the optimal – not just a consistent – speed.

FUELOPT INSTALLED BASE

Since it was first set up by a team of Gothenburg-based maritime specialists in 2012, Lean Marine has been at the forefront in this field. After two years of fine-tuning and development, the company unveiled the first commercial installation of its FuelOpt system in 2014. Four years later, the company hit the 100th-installation landmark. Today, there are more than 190 ships running with FuelOpt and the company has the 200-vessel target in its sights.

DIRECT CONTROL

In essence, the FuelOpt system works by constantly monitoring and adjusting the propeller's pitch and the engine's RPM in order to optimise the ship's speed and fuel consumption with a degree of efficiency and precision that would not be humanly, or manually, possible.

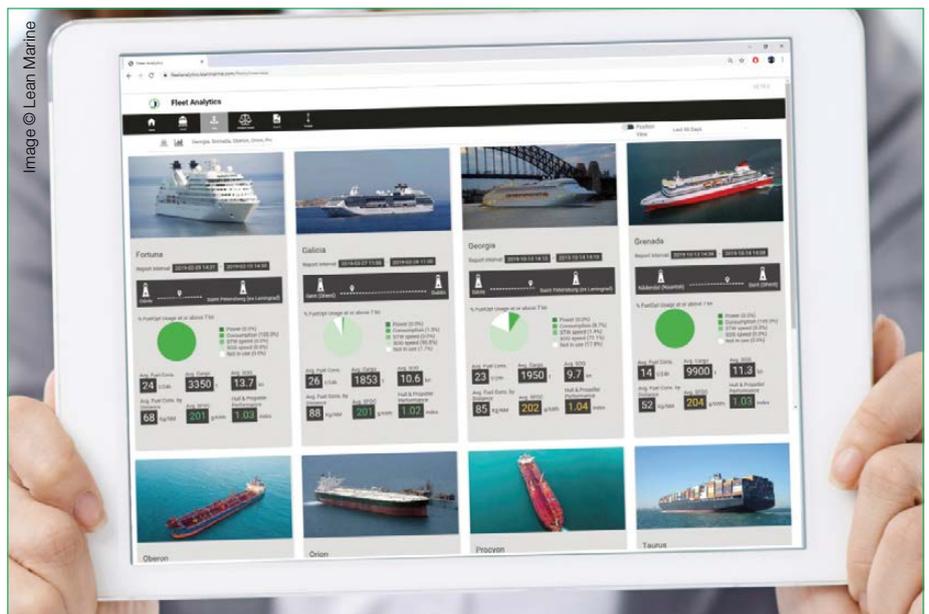
Importantly, FuelOpt controls the propeller's pitch and RPM *separately* in order to produce the most amount of propeller thrust with the least amount of power. This means less wasted energy – which in turn means less fuel consumption. In a typical manual set-up, you just have control of the engine RPM. With the FuelOpt system, you have tools that give you direct control over speed, consumption or kilowatt outage from the engine.



AI-POWER

While systems like FuelOpt have been successfully taking the guesswork out of performance optimisation and delivering measurable savings in fuel costs, the maritime industry has also been exploring the capabilities of autonomous ships. Now, the industry is looking at the possible benefits of bringing these two complementary technologies together.

Lean Marine has been at the cutting edge of these developments and in December the company announced that it is working with the AI-application developer Molflow as well as academics from the Chalmers University of Technology in Gothenburg to develop a new AI-powered, semi-autonomous system for planning and executing more energy efficient sea voyages.



VIA KAIZEN

The Via Kaizen project, which is being funded by the Swedish Transport Administration, Trafikverket, and coordinated by CIT Industriell Energi AB, will incorporate Lean Marine's FuelOpt and Fleet Analytics with Molflow's Slipstream technology. FuelOpt optimises the propulsion line dynamically, based on orders given by the AI system, and also feeds the data it gathers from the AI system and other signals onboard into the Fleet Analytics performance management platform. This data will be shared with Molflow's vessel modelling system which will then determine the most energy-efficient voyage and calculate the commands that need to be set to reach the destination with the least possible amount of fuel consumed.

Slipstream determines 'the perfect simulated journey'; FuelOpt steps in and – in the words of Lean Marine – 'creates an interface between the captain and the AI-based voyage planning solution, empowering them to cooperate and execute the voyage accordingly'.

The Via Kaizen project is a big team effort, with a lot of academic input. Naval architect researchers at the Chalmers University of Technology are working with Lean Marine and Molflow on the development of new methods, models, and algorithms. Meanwhile, social anthropologists at the University of Gothenburg and Linnaeus University are studying the 'human factor', assessing how the new technology impacts working practices both onboard and ashore.

The Swedish Shipowners' Association is also participating in the project, and tanker owner and operator, Rederiet Stenersen, and the pure car and truck carrier (PCTC) owner and operator, UECC, are offering their vessels for the on-board testing of the technology.



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As we await the results of the ongoing Via Kaizen study, *Bunkerspot* caught up with Lean Marine's CEO Mikael Laurin at the end of December to get an update on the company's progress.

Laurin clearly has high hopes for the Via Kaizen study. The project is still in the start-up phase, and Lean Marine is planning to introduce AI-powered services

already in 2021. 'The project is slated to run through 2021 and into 2022,' said Laurin. 'Although it is early days a lot of the practical work has begun and we are starting to get some results. We are hoping to get data we can evaluate during the course of 2021.'

RETROFITS AND NEWBUILDS

In the meantime, Laurin reported, Lean Marine is pressing ahead with the FuelOpt roll-out. As we mentioned earlier, Laurin told us that the installed base has now topped 190 ships. Once Lean Marine hits the 200-mark it will be aiming for the next milestone of a thousand ships, which Laurin hopes to do 'by 2025 or earlier.'

Lean Marine's initial FuelOpt installations were all retrofits. It is now seeing 'a fair proportion' of installations on newbuilds, although retrofits still account for the majority of its orders. 'Retrofits are usually the more complicated installation,' said Laurin, 'because you need to adapt to different control systems and so on. And I think that this is one area where we as a company are really strong: in the tailored fitting for a specific vessel.'

As one may have expected, the expansion slowed up a little bit in 2020 as a result of the pandemic, but Laurin told

'On some big-engine ferries, we have seen a return on investment in less than three months. But we can't say that this is a standard for everyone'



Mikael Laurin

Image © Lean Marine

us that prior to this there had been 'a big influx' of Ro-Ro and Ro-Pax systems.

'We believe that's a trend that we are going to see more of,' continued Laurin, 'since these vessels usually have big engines, often with a controllable pitch propeller, the product suits them well and the return on investment (ROI) is usually really good.'

With its roots in the Gothenburg shipping community, Lean Marine had a high proportion of tankers in its installed base in its early years for the simple reason, as Laurin pointed out, 'there are a lot of tanker owners in Scandinavia'. However, Laurin added, there is now a 'fairly diverse base of ships'. Alongside the tankers, Ro-Ros and Ro-Paxes, there are now bulkers, car carriers, container vessels, fishing vessels, cruise ships and even research vessels.

'The system works for any type of ship – over a certain size,' said Laurin – although there are some sectors where the ROI is particularly good.

RETURN ON INVESTMENT

At the moment, the measurable ROI comes from the reductions in fuel consumption, where there are often direct reductions of 15%-20%, and long-term reductions in the 10%-15%-range, and Laurin told us that most customers recoup their investment 'in less than a year'.

However, as we said at the start of this article, a shipowner's bunker bills are the product of the quantity of fuel consumed (which FuelOpt can help to control) and the fuel prices (which are subject to all sorts of

pressures that nobody can control). In 2020, these pressures included the implementation of the IMO 2020 sulphur cap, which pushed prices up, and then the COVID-19 pandemic, which drove prices down in a big way.

'Yes, 2020 was an interesting year, with the oil prices being historically low,' recalled Laurin. 'But they are coming back up now and, with the current oil prices, most of our customers are again seeing a return on investment in less than a year.'

'But this does depend a little bit on the engine type and the engine size,' advised Laurin. 'On some big-engine ferries, we have seen a return on investment in less than three months. But we can't say that this is a standard for everyone.'

ENERGY TRANSITION

Importantly, the FuelOpt systems works irrespective of the type of fuel that a ship is using, and Lean Marine positively welcomes the 'energy transition'.

'We believe the FuelOpt system will have an important role to play when you start having several fuel sources,' explained Laurin. 'If you have a battery pack onboard or wind-assisted propulsion, then you need some way of ensuring that you don't just add more power, but instead *control* how you work the engines or the sails or the kite and maintain the optimal speed no matter where that energy is coming from.'

At the moment, Laurin told us, it is still not clear whether ammonia, methanol

or hydrogen will become the key 'clean' marine fuel of the future – although LNG does appear to be the most likely 'bridging' fuel over the next few decades.

But whichever contender does come to the fore, it is likely that the fuels of the future will be more expensive than today, making FuelOpt's energy-saving capabilities even more advantageous. And for shipowners who continue to use conventional fuels (at least until a switch-over becomes mandatory), there could well be a 'carbon tax' or other measures on the horizon which will also push up their costs. Furthermore, there will be increasing pressure on all companies – particularly the global retailers for whom brand reputation is crucial to reduce their carbon footprint. This will require them to overhaul their supply chains and prune back both their energy usage and emissions.

Laurin foresees that we will see 'more products showing their carbon footprint' and charterers will ask for declarations of ships' CO₂ emissions and proof that every effort is being made to save energy. 'I think it is very positive to see that the industry is now taking its responsibility in moving forward with the environmental challenge,' said Laurin, who believes that Lean Marine's tools will enable the shipowners to demonstrate and promote the work they are doing to meet this challenge.

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