

# FORMING A FIGUREHEAD FOR CHANGE

**Frank Harteveld, Wärtsila Gas Solutions, Julien Bec, GTT, and Rolf Stiefel, WinGD,** describe how three industry leaders have joined forces to promote LNG as a marine fuel.

Three of the marine sector's major technology companies, WinGD, Wärtsilä and GTT, have agreed to collaborate in making the use of LNG fuel a truly viable option for ship owners and operators.

The transition from diesel to LNG as a marine fuel has been underway for some 20 years already. The change began when, in the early 1990s, Wärtsilä introduced the first dual-fuel engines capable of running on both conventional liquid fuels as well as LNG. While this had an immediate impact on certain sectors of the shipping industry, most notably LNG carrier vessels, the subsequent switch to LNG fuel has been, for the most part, slow and steady rather than dramatic.

However, as the LNG bunkering infrastructure becomes ever more developed, and as increasingly stringent environmental legislation is causing decisions on compliance to be made, there are clear signs that attitudes are changing, with more and more owners of a variety of vessel types opting for the benefits that LNG fuel offers. The collaboration agreement between these three companies is aimed, therefore, at delivering a streamlined approach for achieving compliance with regulations. Their joint leadership can also help break down the conservative barriers that have, until recently, been a significant obstacle in the adoption of a cleaner, but very different, type of fuel.

## An historic order

The catalyst for this agreement was an historic order placed in 2017 for the first ever ultra large container vessels (ULCVs) to be fuelled by LNG. The nine vessels, each with a record capacity of 22 000 TEU, were ordered by CMA CGM, the

France-based global shipping group, and are currently being built at shipyards in China.

For these ships, GTT, an engineering company specialising in containment systems with cryogenic membranes used to transport and store liquefied gas, was chosen to design and supply the LNG tanks. These tanks, which will be capable of holding 18 600 m<sup>3</sup> of LNG fuel per ship, have been designed to optimise the available space to allow maximum use of the ships' cargo capacity.

For the fuel gas supply system, Wärtsilä's innovative LNGPac™, which is compatible with GTT's membrane tank technologies, was selected. This system is customised to the needs of each individual project in order to match the operational, safety and classification requirements. It is designed to ensure the correct gas temperature and pressure for the engine. Wärtsilä will also supply six Wärtsilä 34DF auxiliary engines and the propulsion control system for each vessel.

The main engines are being provided by Switzerland-based WinGD, a developer of two-stroke gas and diesel engines for marine propulsion. The 12-cylinder X92DF dual-fuel engines, when running on LNG, comply with limits on nitrogen oxide (NO<sub>x</sub>) emissions when operating in Emission Control Areas (ECAs) imposed by the International Maritime Organization (IMO), and with the 0.5% limit on the sulfur (SO<sub>x</sub>) content of marine fuel that comes into effect in 2020. Limits on emissions of particulate matter are also met.

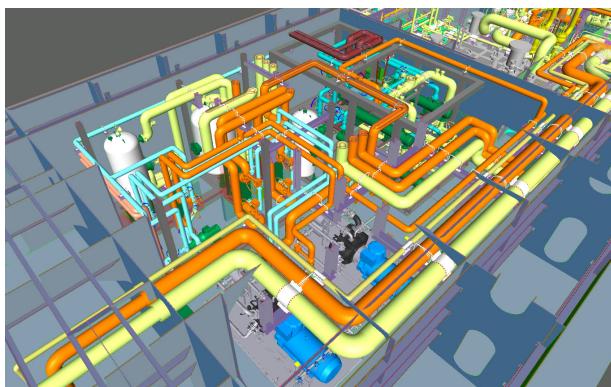
The overall provision of the LNG fuel system for these huge vessels required close cooperation between the three companies, since the engines, tanks and fuel supply controls all need to be closely and carefully integrated. The



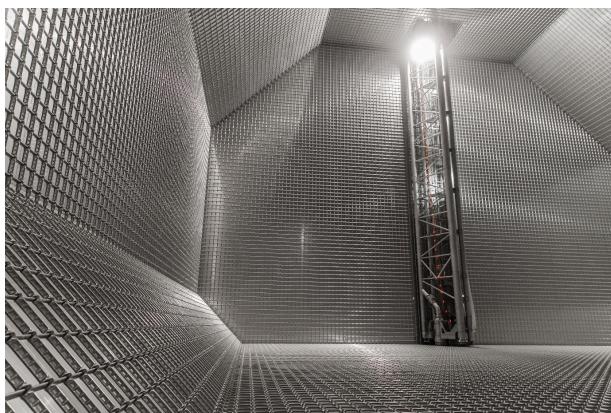
inter-company interfacing for this particular project led the three partners to the conclusion that by continuing to cooperate, and by sharing the expertise they have, each in their own field, the integration process could be optimised for the benefit of owners and operators everywhere, and for the industry as a whole. Hence, the collaboration idea was born.

## Sending a message

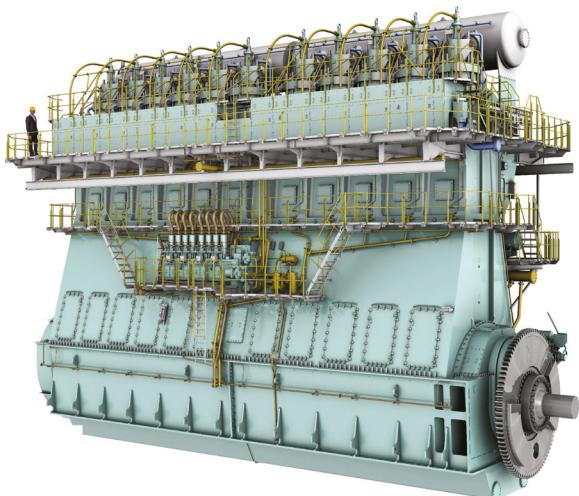
The marine industry is undergoing a period of fairly rapid transformation. The development of digital solutions and the



**Figure 1.** The Wärtsilä LNGPac™ system.



**Figure 2.** GTT containment systems.



**Figure 3.** The WinGD X92DF engine.

use of increasing levels of connectivity have spawned new and highly innovative technologies. Wärtsilä, in particular, has emerged as a leader in moving shipping into a new era of far greater efficiency, increased safety, and better environmental performance. The company's Smart Marine vision is one in which smart ships, utilising the latest technologies in engineering, automation and digitalisation, will be capable of operating with optimal efficiency and sustainability to deliver and maintain high profitability for their owners.

Collaboration between expert specialist companies will play a major role in realising this vision. The agreement between WinGD, Wärtsilä and GTT can be seen, therefore, as sending a strong message to the marine industry that this is the way forward. As we get further into the 21<sup>st</sup> century, ship propulsion needs to be as efficient and as 'green' as possible. Considering the multiple types of vessels sailing the seas of the world, it is highly unlikely that any single company can achieve this entirely on its own. Inter-company cooperation will become increasingly essential.

## Lowering the total cost of ownership

The overall total cost of ownership (TCO) was undoubtedly a prime consideration in CMA CGM's game-changing decision to have these nine mega-sized container vessels built with LNG-fuelled propulsion.

The various environmental restrictions being placed on ship propulsion give owners and operators essentially three options for compliance. The first option is to continue operating as before on heavy fuel oil (HFO), but with exhaust scrubbers installed to clean the exhaust gases of harmful emissions. This is currently a favoured choice for retrofitting projects with existing vessels, but is less popular for newbuilds. The downsides include higher maintenance costs, the fact that scrubbers require additional energy to operate and there is a need for water treatment and waste disposal.

The second option is to switch to low-sulfur content diesel fuel, but the bunkering availability is uncertain and while the cost has yet to be fully established, many industry analysts predict that it is likely to be high.

This leaves switching to LNG fuel as the third, and in many cases the most viable, option. TCO studies can indicate that taking into consideration lifecycle costs, LNG fuel operation makes the most sense. The biggest gain is in its environmental friendliness. Compared to diesel, LNG emissions contain 85% less NO<sub>x</sub>, 99% less SO<sub>x</sub>, 95% less particulate matter, and some 25% less CO<sub>2</sub>.

## Conclusion

The world is moving towards a future that is increasingly connected, and this is especially true in the marine sector.

A new era of ultra-high efficiencies, greater safety and enhanced environmental sustainability is emerging. Conservative operating devices are being replaced by fully integrated and automated systems that support the crew in achieving optimally efficient operation of the vessel. Meanwhile, traditional diesel fuel is gradually being replaced by alternative cleaner burning fuels, such as LNG.

Yes, the times are changing, and collaboration between providers of complementary technologies is likely to be the key to a better future for the industry. **LNG**