

# PROVEN PROPULSION OPTIMIZATION SOLUTION

SmartPropulsion automatically optimizes propulsion efficiency with dry dock-free installation and OPEX savings in just a few days

## Emerson and Frugal Technologies in Strategic Partnership

New global environmental regulations have sparked innovation to support shipping companies in their sustainability journey. The International Maritime Organization has stated its goals to reach net zero GHG emissions from international shipping by 2050.

To help shipowners, operators and managers to further reduce CO2 emission and fuel costs, Emerson has made a strategic partnership with Frugal Technologies, a Danish-based company that offers fuel optimization technologies that reduces energy use and emissions in vessel fleets.



### The Solution Package

A **SmartPropulsion** package consists of four main components:

- The HMI panel, an easy-to-use interface on the bridge for controlling and optimizing
- An electronics cabinet that serves as the main integration point for on-board sensors, the HMI panel, the existing propulsion control system, and our cloud calculation engine.
- The Cloud Calculation Engine (CCE) which accumulates all the data we collect on vessels into shore. Processes data through machine learning to generate optimized propeller curves for significant fuel savings, ensuring confidentiality and cybersecurity.
- My Data platform in the cloud, assisting you to enhance your fleets operations and reduce environmental impact. Includes a powerful data analysis tool, to turn data into actionable insights.

### Safety Stays Intact

**SmartPropulsion** does not directly interface with propeller and engine but rather via the existing propulsion control systems (PCS).

We do this to ensure the preservation of the established safety features for both the engine and propeller, ensuring their functionality even during system activation. We have established interfaces in cooperation with multiple PCS.

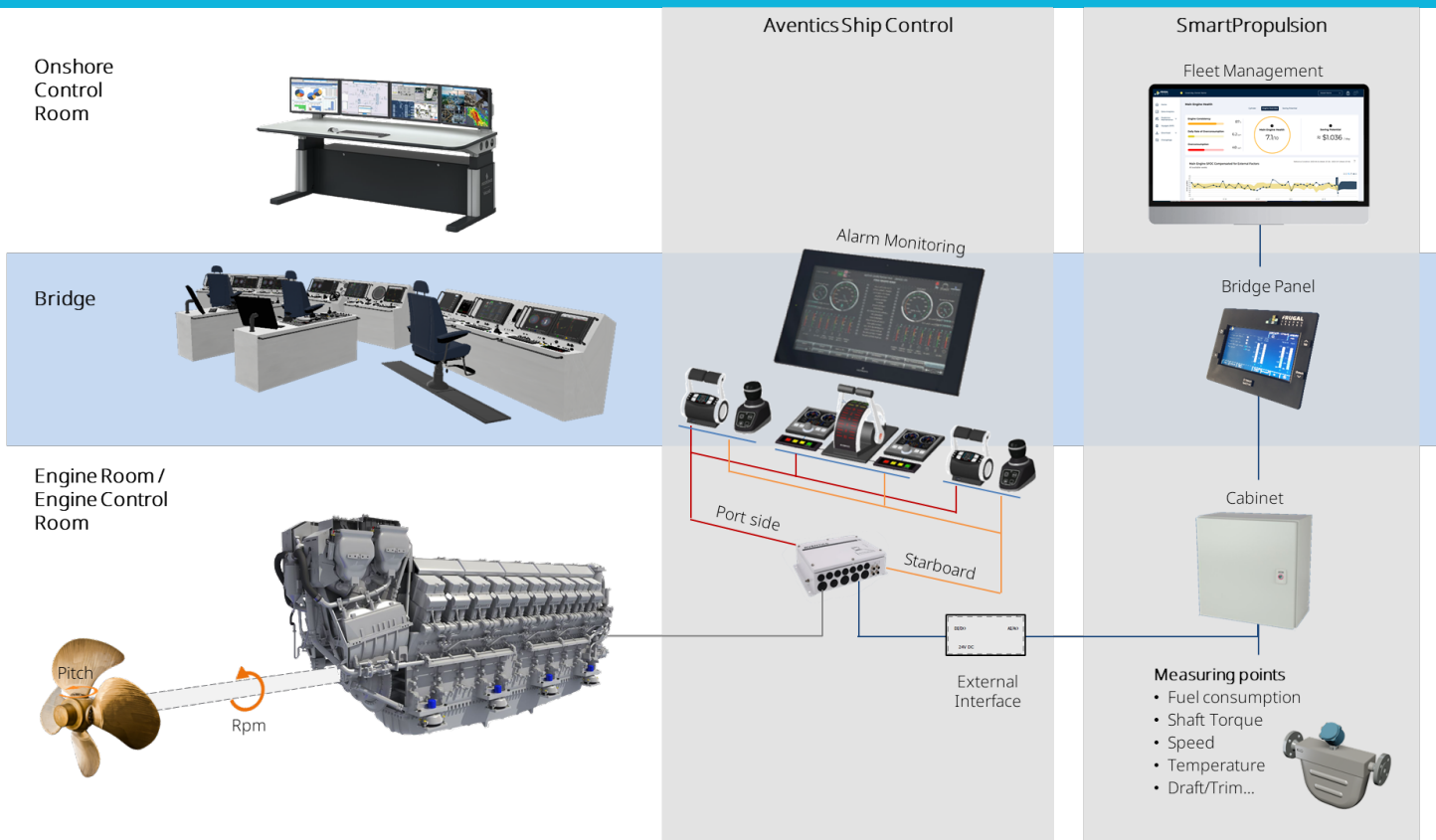
On top of that, we add additional safety mechanisms, such as a light running margin that is defined by engine health parameters to further safeguard all components involved. Unlike a classical regulation loop, we identify bad sensor data. If a critical sensor should fail, SmartPropulsion will work just fine, using the latest propeller curve and wait until a better curve is available.

### Intelligent Technologies

**SmartPropulsion** is built upon the principles of Model Predictive Control which is a well-established control principle that has been in use in various industries and enhanced with latest AI technology.

The core benefit to combining these methods is that it enables learning systems that benefit from experience, as opposed to traditional regulation loops that only know about right now. In our case, the system needs to learn mainly about three different aspects of vessel propulsion:

- Which areas of operation are the most efficient for the engine on a particular vessel?
- How do combinations of engine RPM and propeller pitch map to vessel speed and slip to provide best Specific Fuel Oil Consumption?
- What is the relation between vessel condition and the optimal propeller curve?



## Additional Automation Advantages

Once we have established an optimal propeller curve, there are several other things we can do on top of that to save even more fuel. SmartPropulsion comes with two types of additional automation:

- **Speed pilot:** By enabling the speed pilot, we can maintain a desired GPS speed simply by monitoring the actual speed and adjusting propulsion power according to the optimized propeller curve. This makes it much easier to ensure vessels do not consume too much fuel by ensuring speed is kept at the necessary level to meet just-in-time arrivals.
- **Power pilot:** Much like the speed pilot, using a desired power level as a setpoint ensures fuel consumption does not exceed a given value, since power output is directly proportional to fuel consumption.

## Lower Vessel Fuel Consumption and Comply with CII

**SmartPropulsion** not only has a lower CAPEX investment but also reduces your OPEX cost significantly. Savings up to 15% can be achieved depending on the vessel's design, setup and operational pattern.

Additionally, **SmartPropulsion** learning algorithm logic helps in making a vessel compliant not only today but also helps in maintaining compliance next year when CII limits becomes more stringent. With SmartPropulsion your journey towards fuel saving and decarbonization becomes easier.



Delivers CO<sub>2</sub> regulatory emission compliance



Creates fuel savings in range of 10-15%



Provides owners with fleet performance data