

# 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 reduce carbon intensity of international shipping by at least 40% by 2030 and 70% by 2050.

To help shipowners, operators and managers to further reduce CO<sub>2</sub> 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 shipping fleets.



### What is in the 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.

### Built on Top

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

We have established interfaces in cooperation with MAN Energy Solutions, Norisys GmbH, Wärtsilä Lyngsø, Kongsberg and others at this point.

We do this to ensure existing engine and propeller safety features remain in place, even when system is active.

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 with updates until problem is fixed.

### Machine Learning

**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 development.

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, we need 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?
- What is the relation between vessel condition and the optimal propeller curve?



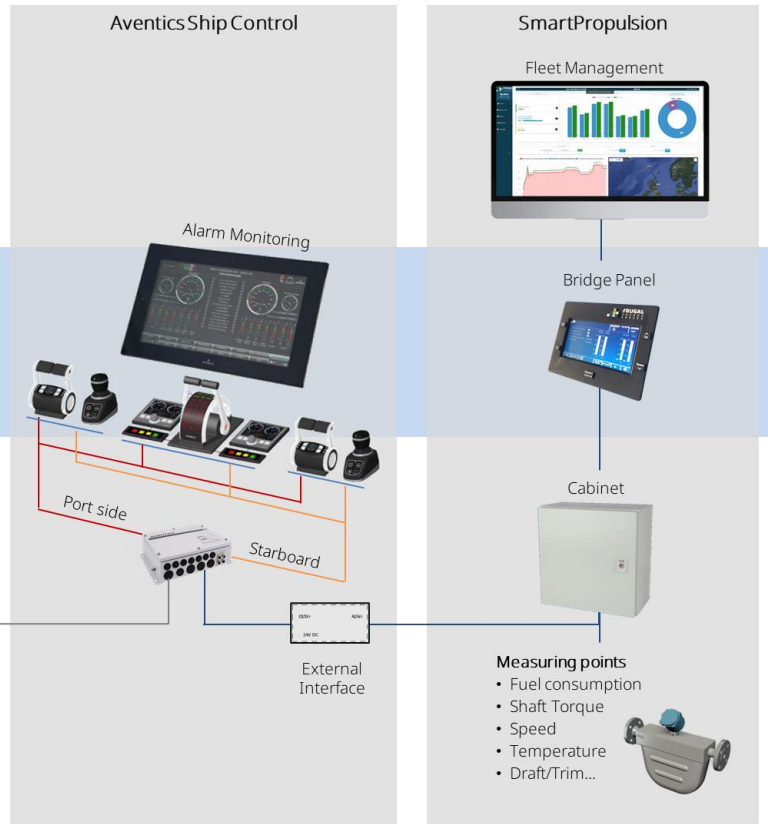
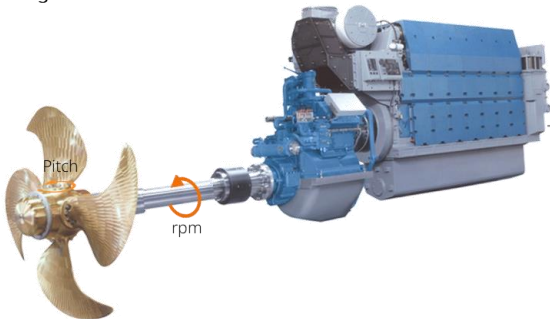
Onshore Control Room



Bridge



Engine Room /  
Engine Control Room



## Additional Automation

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.

## Archiving your EEXI compliance

Our power pilot are certified according to ShaPoLi norms (Shaft Power Limitation) to ensure EEXI compliance, simply by enforcing a power cap. Capping power obviously also means capping speed, but by using our power pilot feature in conjunction with our continuously optimized propeller curve, you get as much speed as possible, using the power available, minimizing the environmental impact.



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



Creates fuel savings in range of 10-15%



Provides owners with fleet performance data

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