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PACIFIC
SHIPPING

EPS Research

The Case for Wind-Assisted Propulsion

The Project

The Vessel

- 2019 Hyundai Mipo-built MR Tanker at first Special Survey (dry dock) - March 2025

The Installation

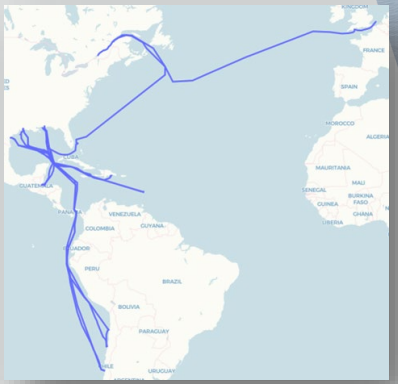
- Retrofitted three 22m span bound4blue suction sails
- Retrofitted high frequency data acquisition system and state-of-the-art sensors

The Route

- Sails utilised between April and September 2025 while sailing from UK to, and within the Americas on spot market voyages.

- Vessel-specific weather routing, including sail's modelling, used for continuous voyage optimisation.

- Predominantly unfavourable wind conditions (head winds) faced during the testing period.



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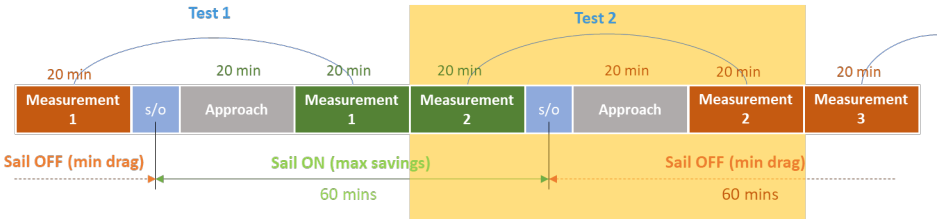
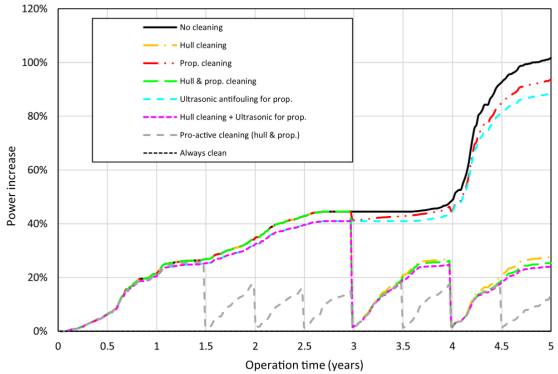
Test & Analysis Method

Robust Testing Protocol

- Data collection using continuous ON-OFF testing following DNV-RP-0686 procedure to compile a database of tests under varying wind conditions
- Number of tests maximised by stringing them together
- Using only sensor data as noon data does not contain enough resolution

- The method does not rely on pre-dry dock condition for comparison which would include the effect of pre-dock fouling against post-dock new paint and other efficiency gains and would lead to significant over-estimate of the effect of the sails [1]





[1] *GEF-UNDP-IMO GloFouling – Bulk carrier case study Partnerships Project and GIA for Marine Biosafety, 2022, Analysing the Impact of Marine Biofouling on the Energy Efficiency of Ships and the GHG Abatement Potential of Biofouling Management Measures.*

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Test & Analysis Method

Transparent Analysis Method

1. Data filtered for steady operation and environment

2. Sensor data averaged for valid test runs.

3. Compile database of runs

4. Calculate power savings for each run

5. Calculate fuel savings for each run

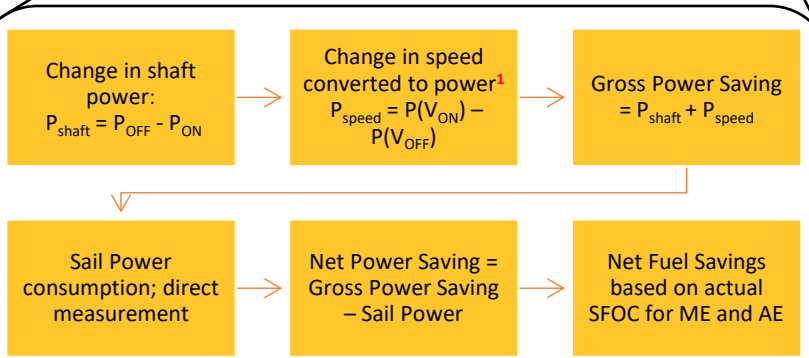
Filter thresholds set as per DNV DNV-RP-0686

Vessel Operation:

- Constant Propeller Shaft Speed
- Constant Course Over Ground
- Constant Heading

Environmental Conditions:

- Constant Wind Speed
- Constant Wind Direction



[1]*Speed-power is derived from a digital twin built from specific CFD & propulsion models, calibrated to the sensor data. This differs from the sea trial curve prescribed by DNV-RP-0686 but is far more representative of the current vessel performance*

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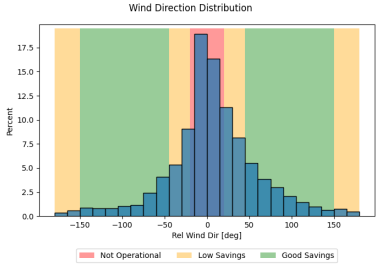
Results

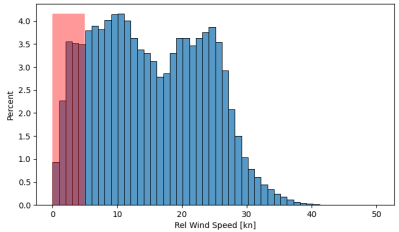
In close agreement with the expected performance

Wind Conditions

- Wind Direction most often outside the sails' operational range

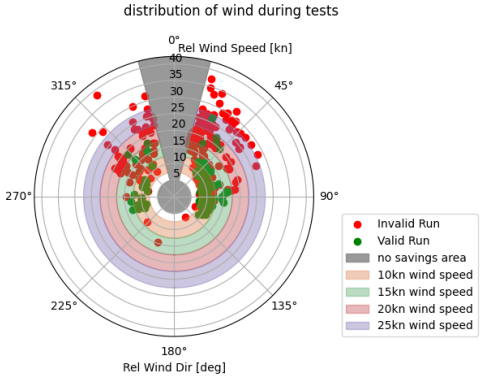


- Suitable Wind Speed experienced

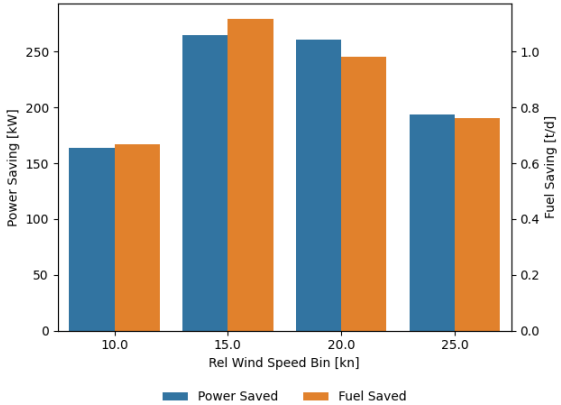


Test Runs

- 379 ON-OFF tests completed
- 102 pass filtering criteria for steady operation (valid runs)



Results



- Observed **average net power reduction** around **8.0%** and **net fuel reduction** around **5.5%**, in-line with the initial expectations
- Measured **maximum power savings** in beam winds (most favorable conditions) of **20.6%**

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Summary

DNV-RP-0686 test and analysis method provides a **fair and objective framework to test and analyse the performance of wind sails** in short time frames

Transparent analysis procedures are crucial to realising the real-world benefit between different vessel operational conditions, sail technologies and vessel classes

The sails on Pacific Sentinel provided an average **net 8.0% power reduction and net 5.5% fuel reduction during our initial testing programme** despite unfavourable wind direction. This rose to **20.6% reduction in favourable wind conditions**

Substantially enhanced savings expected in more favourable wind conditions (more windy routes and winter months)

Second set of b4b Suction Sails are currently being installed on an EPS newbuild MR Tanker after this successful trial.

In light of the IMO Net Zero Framework delays and continued policy uncertainty for alternative fuels, **it is important to maintain focus on deploying such innovative energy efficiency solutions.**

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