EEXI – SHaPoLi

Shaft Power Limitation System

Sustainability Through Innovation

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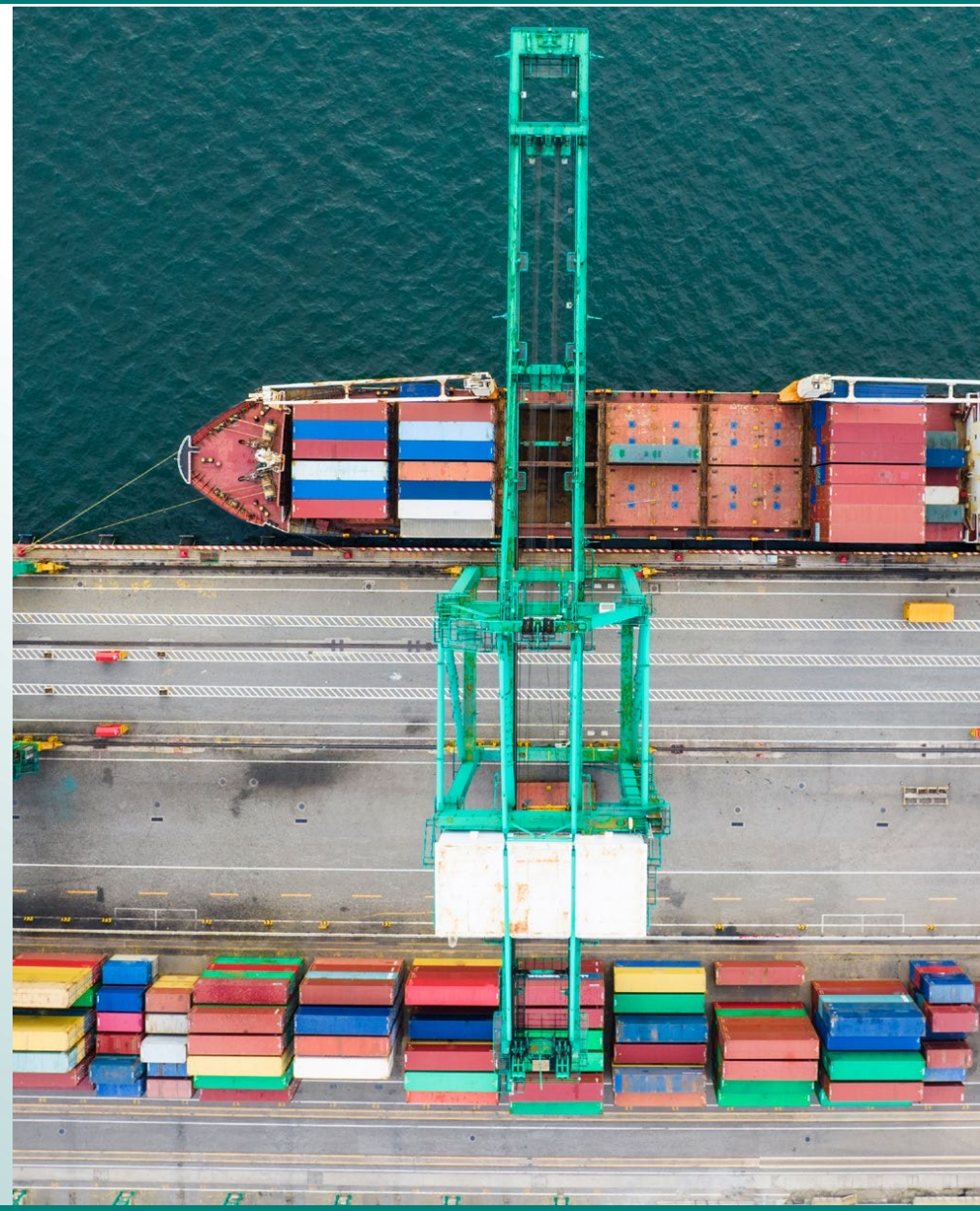
Outline

- Company Overview
- Shaft Power Meter System (SPM)
- EEXI Regulations Overview
- EEXI SHaPoLi Solution & Key Functionalities
- Live Demo
- Future integration with Datum Hawk

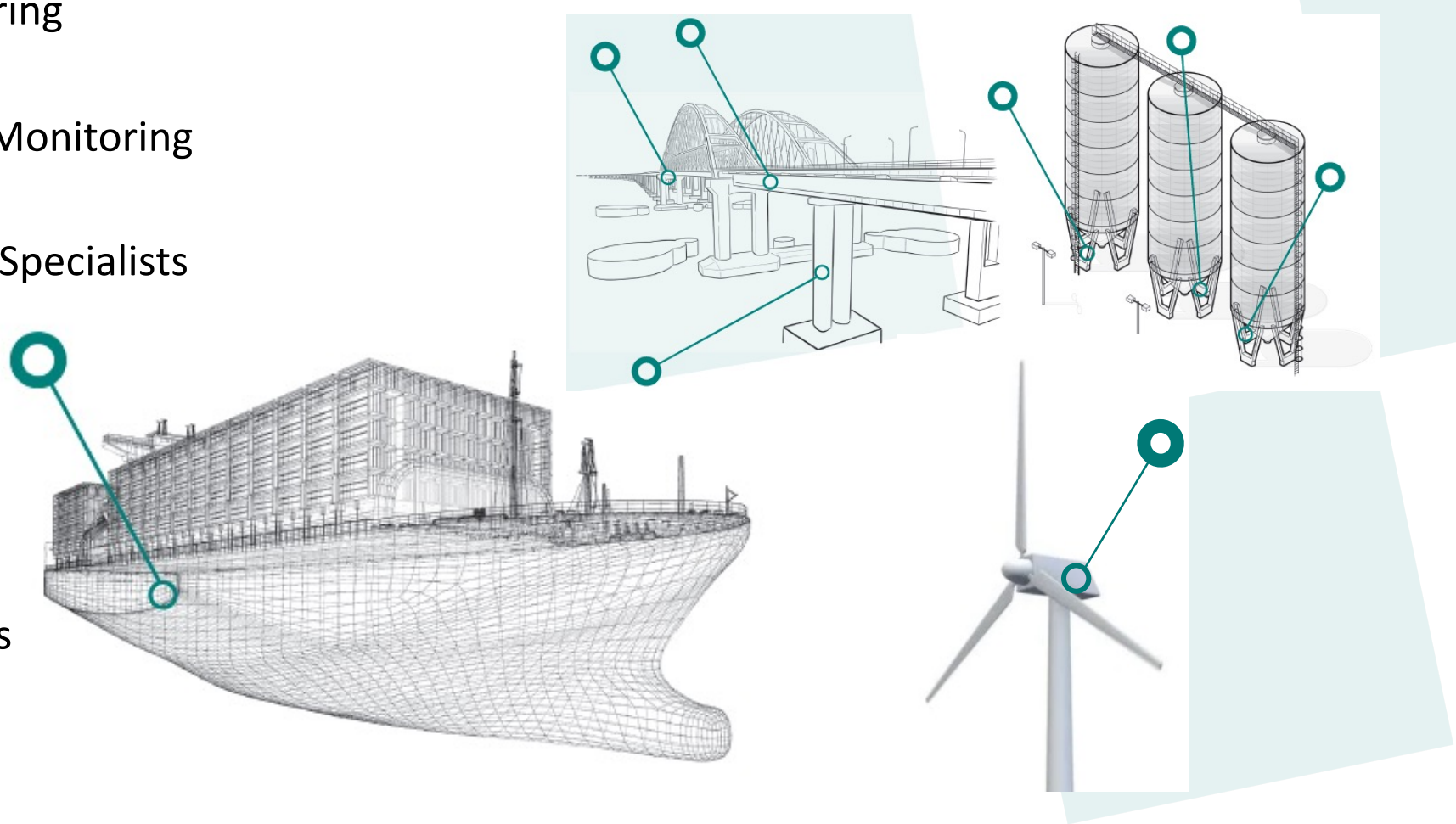


Company Overview

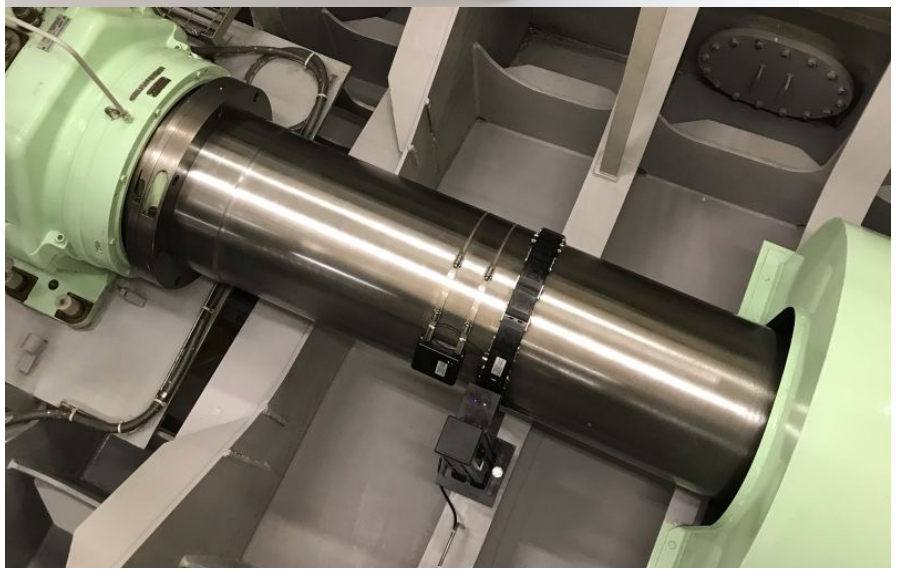
- Founded in 1989 on the Isle of Wight, UK
- Leading global manufacturer of strain gauge-based technologies
- Shaft power measurement solutions
- OEM Product Suppliers
- Global Distribution Network
- Global Service and Installation Partners

Company Overview - Solutions

- Vessel Condition-Based Monitoring
- Turbine Shaft Condition-Based Monitoring
- Automotive Test Measurement Specialists
- Structural Health Monitoring
- Silo Mass Monitoring
- Predictive Maintenance Analysis



Marine – Shaft Power Meter System



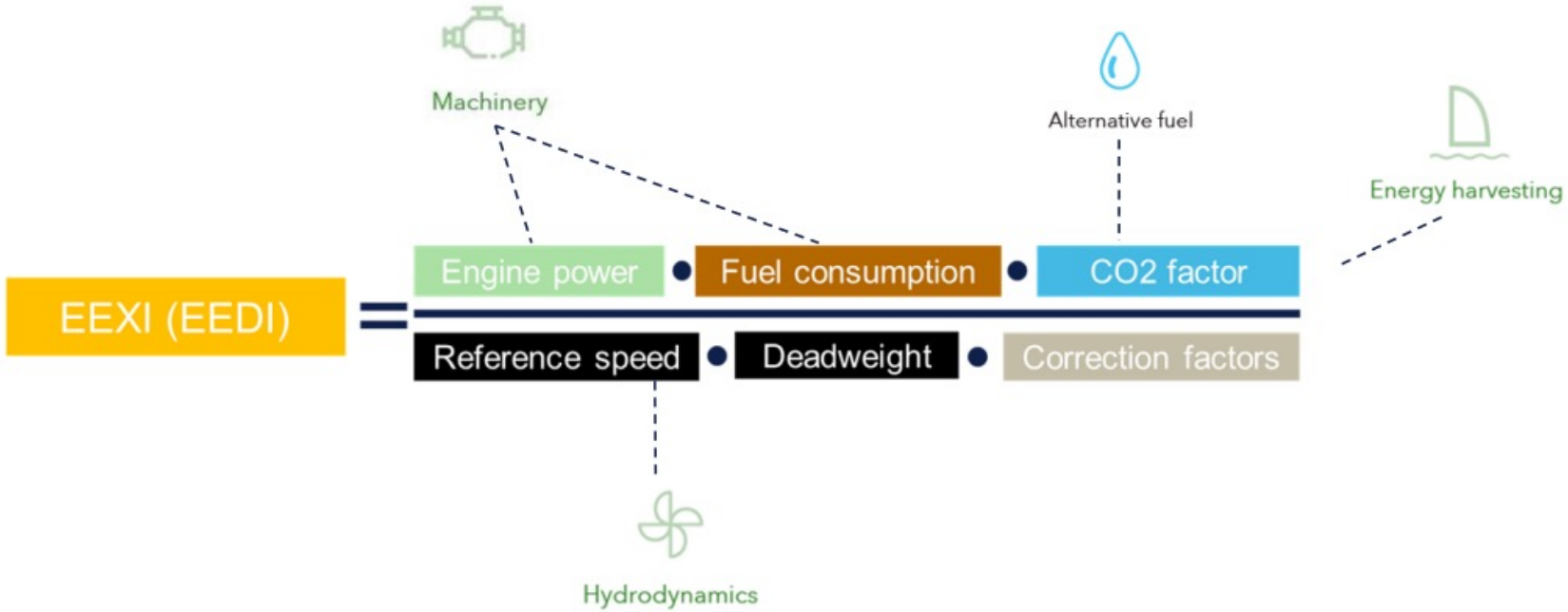
EEXI

datum electronics

- Innovative Modular Design
- Shortest lead times in the market
- Installed in 1-2 days (1 Time Calibration - Fit & Forget)
- Class Approved & Tested to EN60945
- Highly Reliable – Maintenance Free
- Cost-Effective
- The most versatile solution to support EEXI - SHaPoLi
- Essential for vessel performance monitoring & optimisation
- High Measurement Accuracy – Up to 2000 samples per second
- Upgradeable to Datum Hawk
- Numerous data outputs as standard

Marine - Shaft Power Meter System

EEXI – Regulations Overview



Revised MARPOL Annex VI – In effect from January 2023

New EEXI requirements related to CO2 emissions per cargo ton & mile

EEXI Technical file must be submitted to class for approval

Power reduction through **ShaPoLi or EPL**

EEXI SHaPoLi Solution - Overview

EEXI Shaft Power Limitation

- Integrates seamlessly with Shaft Power Meters
- Standalone system – No main engine integration
- Non-intrusive and quick retrospective installation
- Intuitive and easy to use user interface
- Complies with MEPC.335(76) & IACS Rec No. 172
- System meets EN60945 testing standards
- Live power monitoring and automated reporting
- Does not limit operational flexibility for vessels
- Tamper proof
- Lloyd's Register Type Approval in progress

EEXI SHaPoLi Solution – Key Functionalities

EEXI SHaPoLi Solution – Key Functionalities

GPS

(NMEA Protocol - provided by vessel)

SPM

USB Port

EEXI Premium*

(Via LAN RJ-45 GbE Port)

* Subscription fees apply

Alarm Panel Output

(Connection to Alarm Panel made by vessel)

EEXI SHaPoLi Solution – Regulatory Clarifications: MEPC.335(76) + IACS Rec.172

ANNEX 9

RESOLUTION MEPC.335(76)
(adopted on 17 June 2021)

2021 GUIDELINES ON THE SHAFT / ENGINE POWER LIMITATION SYSTEM TO COMPLY WITH THE EEXI REQUIREMENTS AND USE OF A POWER RESERVE

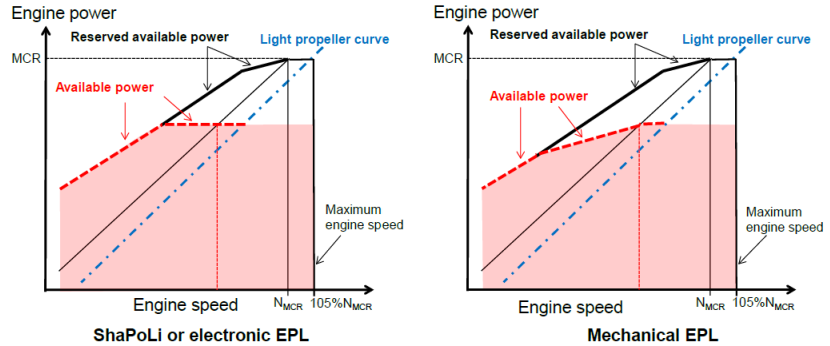


Figure 1: Engine load diagram on Shaft/Engine Power Limitation

2 Technical requirements for the SHaPoLi / EPL system

2.1 Required main systems

The SHaPoLi / EPL system should consist of the following main arrangements:

.1 SHaPoLi:

.1 sensors for measuring the torque and rotational speed delivered to the propeller(s) of the ship. The system includes the amplifier and the analogue to the digital converter;

.2 a data recording and processing device for tracking and calculation of the data as given in paragraph 2.2.5.1 of these Guidelines; and

.3 a control unit for calculation and limitation of the power transmitted by the shaft to the propeller(s);

No. 172 (June 2022)

EEXI Implementation Guidelines

Introduction

These guidelines have been developed by IACS in response to the Resolutions MEPC.333 (76), MEPC.334 (76), and MEPC.335 (76) relating to EEXI. The document may be updated whenever new issues are brought to the attention of IACS.

No. 172 (cont)

6.6 Onboard Management Manual (OMM)

- Regarding Resolution MEPC.335(76), section 2.1.1.3 *"a control unit for calculation and limitation of the power transmitted by the shaft to the propeller(s)"* : If this control is independent from the engine automation the following shall be satisfied:
  - Override of limitation is indicated by giving an alarm on the bridge, clearly informing the ship's master or OICNW:
    - In case of exceedance, the ship's master or OICNW to manually reduce the power within the limit;
    - In case of deliberate use of power reserve, data recording to commence automatically;
  - Data recording device as defined in section 2.1.1.2.

  The OMM should clearly define this confirmation of the alarm as the deliberate action in agreement with requirement in chapter 2.2.1.

- Regarding Resolution MEPC.335(76), section 2.1.3 "*where technically possible and feasible, the SHaPoLi/EPL system should be controlled from the ships' bridge and not require attendance in the machinery space by ship's personnel*" : It is clarified that strictly speaking there is no mandatory requirement to retrofit a new control system from bridge provided in any critical operating condition *(such as adverse weather, piracy, traffic separated zone, maneuvering)*, other than normal seagoing, the engine control room will be manned as per ship's safety management system procedures. If applicable, this needs to be covered in the OMM.

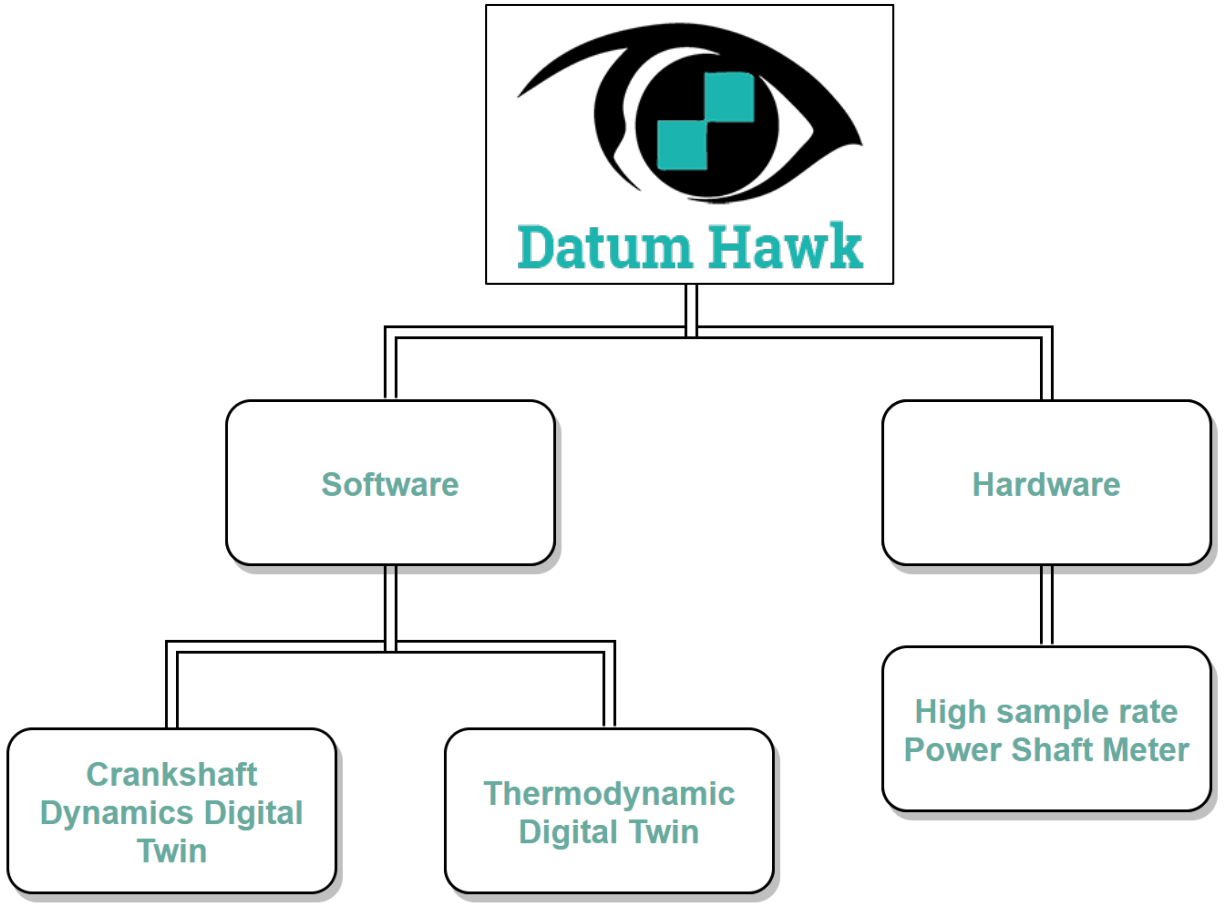
- A SHaPoLi / EPL system (or each sub system) in the context of section 2.2 of MEPC.335(76), is considered tamper-proof if it prevents the following actions:
  - Overriding the limitation without authorization, from any operating or control position;
  - If applicable, intentionally disabling the alerting-monitoring system;
  - In case of SHaPoLi, intentionally disabling sensors, control unit, data recording and processing devices.

EEXI SHaPoLi Solution – Key Headlines

- ✓ Class Type Approval (LR/ CCS/ DNV/ABS) In Progress
- ✓ Compliance and TA to MEPC. 335(76) & IACS PR172
- ✓ Available for Q4 2022 Installations
- ✓ Cutting Edge Hardware (2000 samples per seconds)
- ✓ Easy Upgrade for Existing Datum Customers
- ✓ EEXI Premium – Cloud Hosted Fleet EEXI data
- ✓ Future integration with Datum Hawk (inc. SFOC)

Future Integration with Datum Hawk

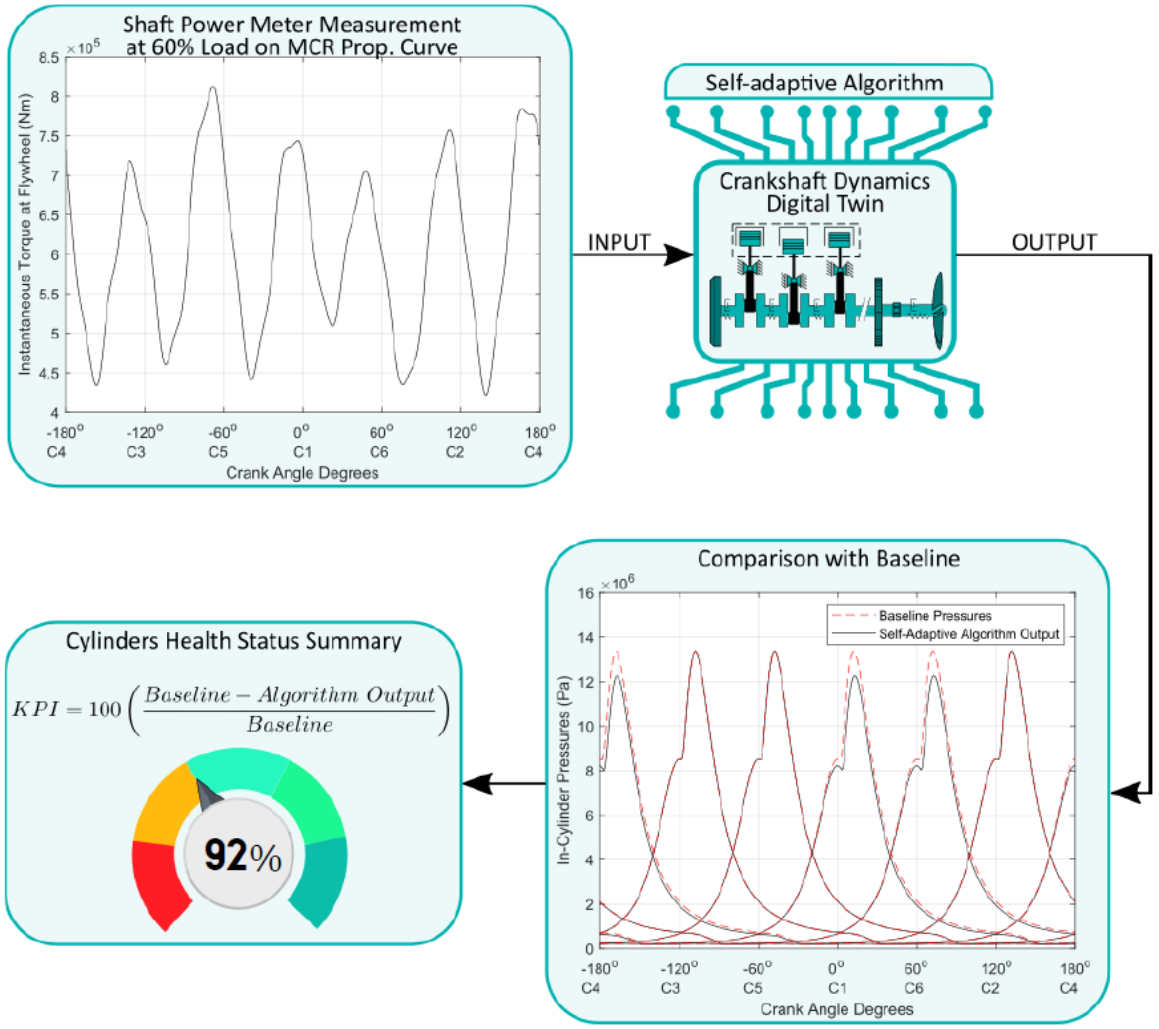
Innovative approach in engine condition monitoring



Future Integration with Datum Hawk

Process

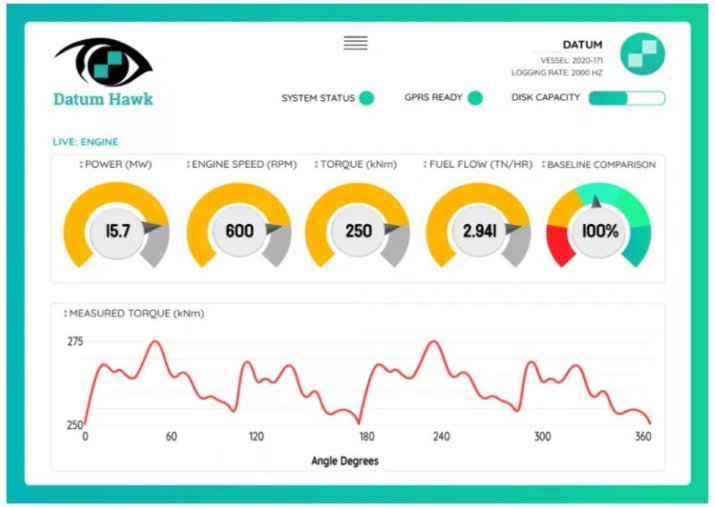
- Instantaneous torque measurement
- Torque input to Engine Digital Twins
- Derive engine performance data
- Development of performance KPIs

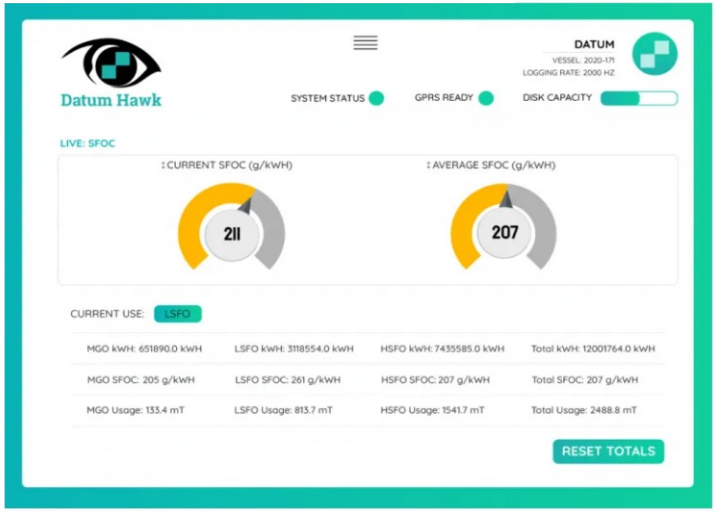


Future Integration with Datum Hawk

Key Features

- Cost-effective solution for condition-based monitoring
- Live Performance & Engine Predictive Maintenance
- Seamless integration with other systems onboard
- Flow meters & other interfaces
- Live engine performance dashboard displays all current data
- Vessel Speed – Fuel Consumption – Power – Torque – Pressure
- Report dashboard
- Downloaded onboard sent ashore





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Thank you for your time

Any questions?