

Technical  
**BULLETIN**

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**Continuous engine performance monitoring, assessment, and alerting platform using data from standard onboard sensors**

**ABSTRACT**

Ataraxia® (peace-of-mind) is a novel application for continuous assessment of marine engine performance, which offers consecutive verifications that the engine has nominal performance or else it displays a warning of engine deterioration or sensor fault. Ataraxia® requires a small set of routine onboard measurements, from standard sensors, without the necessity of continuous full telemetry.

The novelty of Ataraxia® is based on the principle that at any engine operating point, the actual parameters (pressures, temperatures...) have a unique inter-relation, dependent on the internal thermodynamics. Any deviation from this relation is interpreted by a ruleset to point out a possible sensor or process fault (Fig.1).

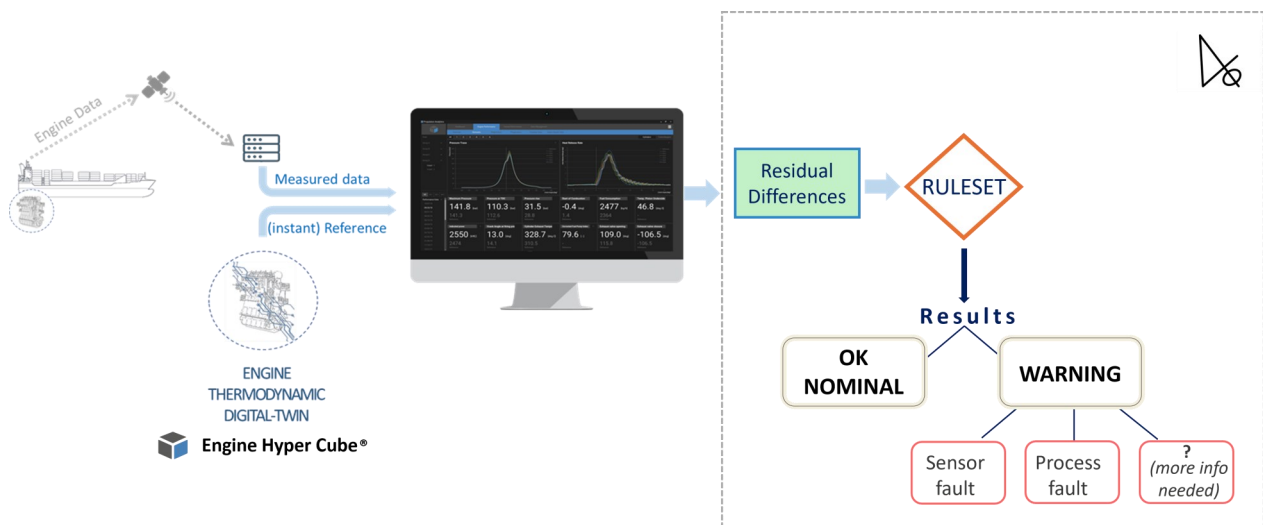


Figure 1. Principle of Ataraxia®

## CONTINUOUS ENGINE PERFORMANCE MONITORING, ASSESSMENT, AND ALERTING PLATFORM USING DATA FROM STANDARD ONBOARD SENSORS

Ataraxia® leverages the Engine Hyper Cube® (EHC) digital-twin by Propulsion Analytics which uses thermodynamic analysis and AI for performance assessment and fault diagnostics. The digital twin is produced by constructing a detailed thermodynamic process model, unique for each engine serial number.

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The target of Ataraxia® is to capture any slowly developing engine faults, malfunctions and performance deterioration, so a few ship-to-shore data communication instances per day are adequate for the procedure. Only a few recorded parameters need to be communicated, so as to “peg” the thermodynamics and initiate the evaluation procedure. A few additional on-board recorded “actual” values are also needed to compare with the “expected” predictions from the EHC® digital-twin and through a diagnostics ruleset yield a fundamental health status for the engine.

Any persistent divergence in the compared values is used by the diagnostics ruleset to deduce the cause e.g. due to a measurement error or an emerging engine fault. A warning is then issued by the Ataraxia® application to the operator to take appropriate action. Occasionally a request for further detailed actual measurements may be issued, akin to the process of human medical diagnostics. The core procedure is schematically depicted in Fig.2.

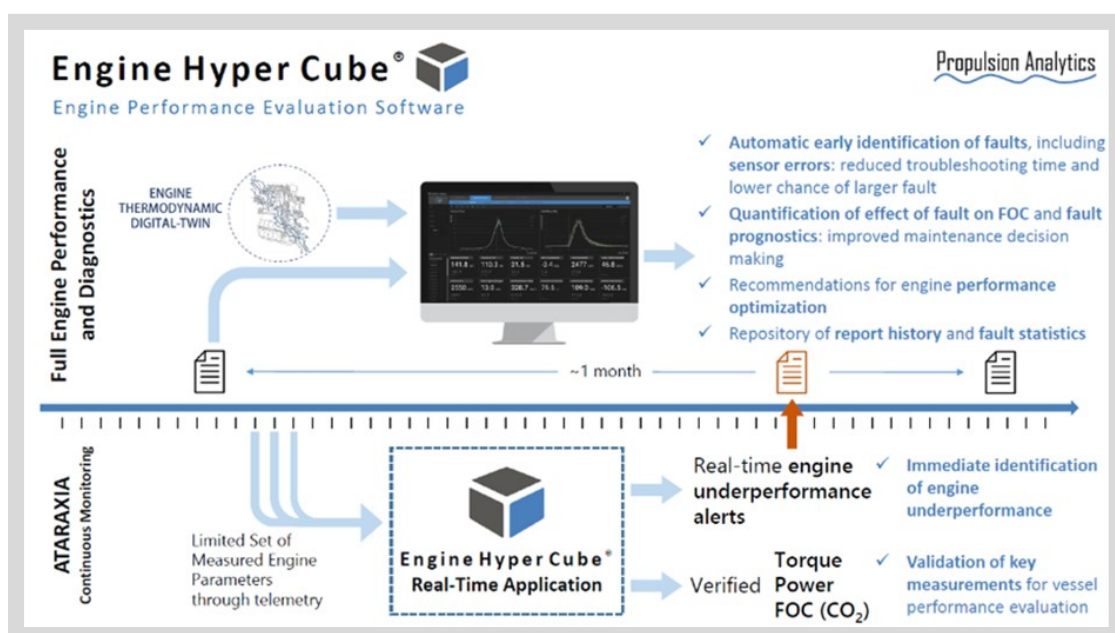


Figure 2. Procedure of Ataraxia®

Ataraxia® offers a cost-effective solution using the existing data monitoring and telecom infrastructure of current vessels, without the need for additional sensors. In all cases the operator may have peace-of-mind that there is no developing fault which may stay undetected till its implications are severe enough to be sensed by the AMS and is possibly too late to avoid serious consequences.

Ataraxia® is widely applicable to any ship, any engine, from any maker and any communications and data transfer system, from a series of emails to extensive telemetry.



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