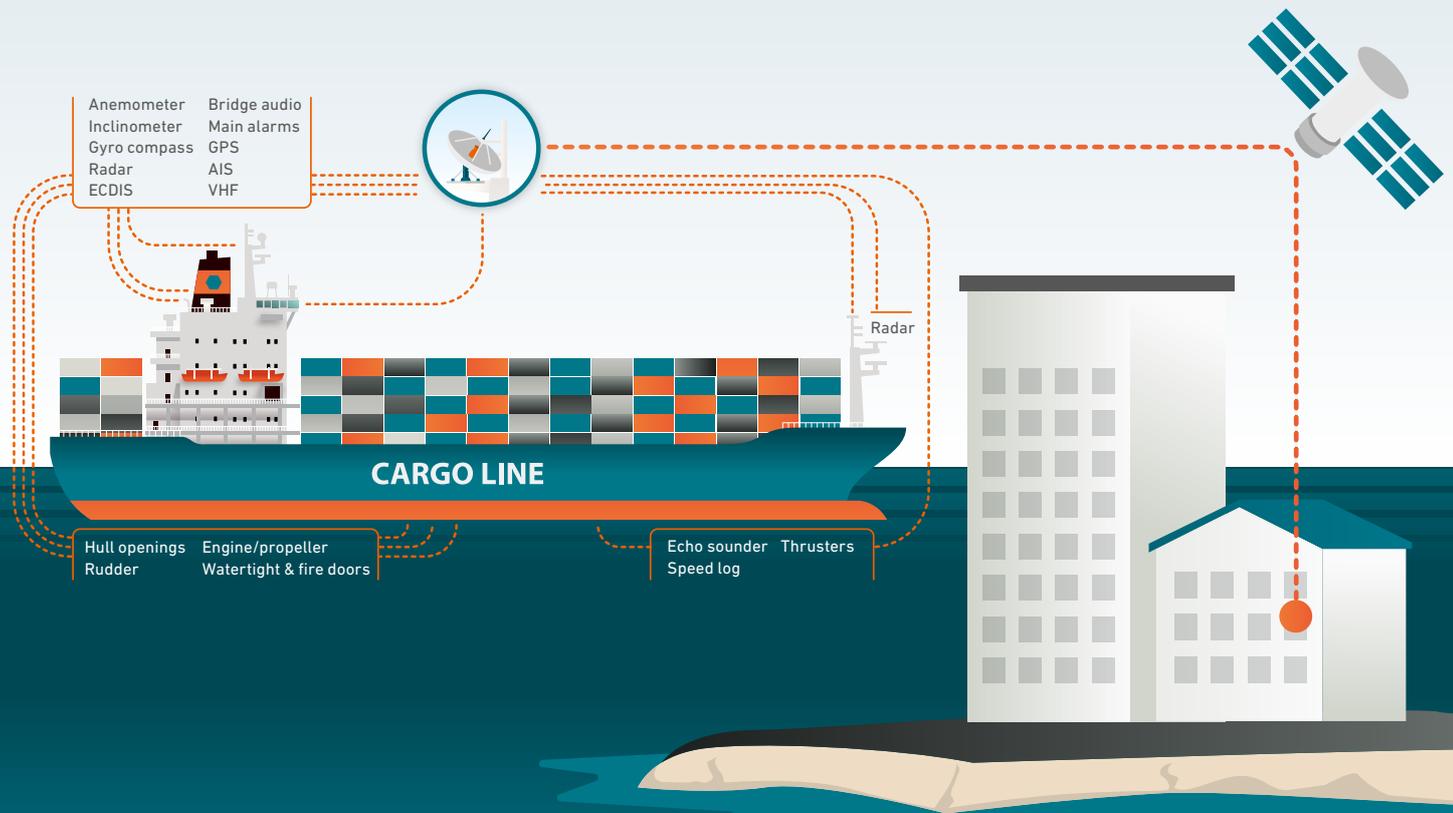




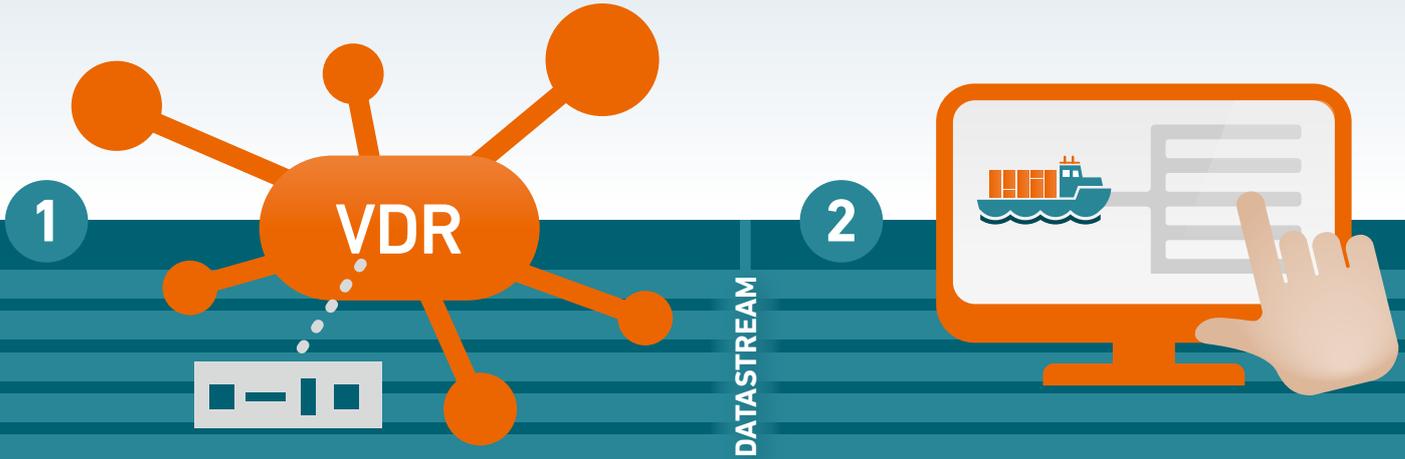
Software, Services and Data Analytics
for Ship Design and Operations

A Complete Cloud-Based IoT Solution for Ship Performance Analysis and Optimization

by Danelec Marine and NAPA



DanelecConnect Intelligent and cost efficient ship-2-shore data solutions



1. COLLECT

An Internet-of-Things (IoT) infrastructure collects data onboard via a Vessel Remote Server module (mini VDR)

2. SELECT

Data is pre-processed on board and can be managed and customized from shore

NAPA Office is a web based business intelligence service for a front end of ship performance and operational data. The data for the service is collected from various systems, such as onboard flow meters, torque/thrust meters, automation systems, and navigation systems or meteorological services.

Main characteristics

- Web based reporting framework
- One centralized place for all operational data from the ships
- Centralized administration of users, ships and templates
- Fleet view with alert functions on user-set KPI
- Flexible and customizable reports
- Different dashboards for different KPIs
- Data mining and Business Intelligence (BI) tool

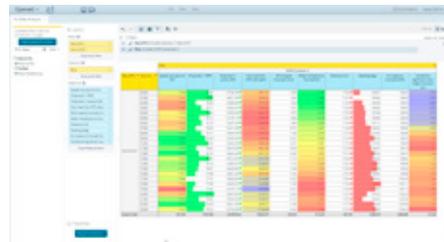
Benefits of NAPA Office

- Improved fuel efficiency
- Emission reporting at ship and fleet level
- Uniform reporting of fuel and energy consumption
- Close monitoring of movement and day-to-day fleet operations
- Performance benchmarking of the fleet
- Improved ship-shore communication
- Reduced workload onboard

Fleet View



Data Analyzer



Cargo Tank Status Chart



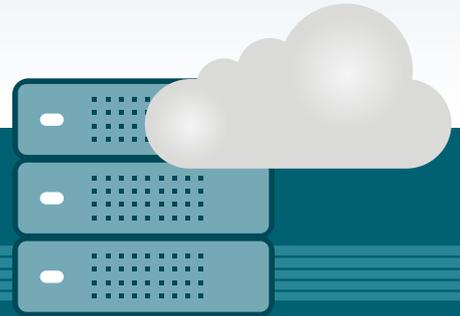
Dynamic Voyage Viewer Dashboard





DATASTREAM

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3. TRANSFER

Less than 1MB data per day is transferred to shore at fixed intervals or if triggered by special events

4. STORE

Data is stored on a Danelec server (Danelec Cloud solution)

Ship Performance Analytics Services is a state-of-art analysis service for ship and fleet performance. By using NAPA 3-D ship model, latest hydrodynamic research, powerful and scalable cloud computing, ingenious in-house algorithms and supervised learning, NAPA is able to normalize the ship performance measurements to any desired reference condition.

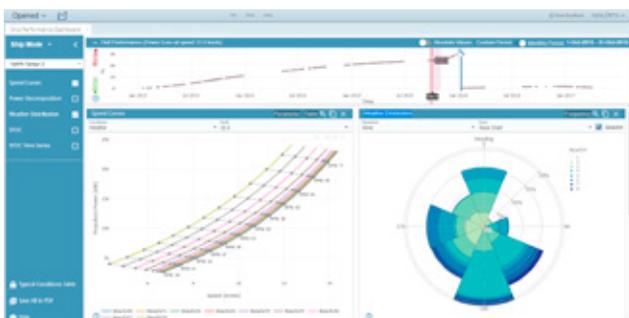
Features and Functionalities

- Sensor data collection onboard the ship and storing in a cloud database
- Data enrichment with the metocean (meteorology and oceanology) data from top class weather providers
- Data analysis with sophisticated proficient algorithms and statistical modeling
- Results reporting and visualization to the user via NAPA Office, which is NAPA's data presentation tool for centralized business intelligence

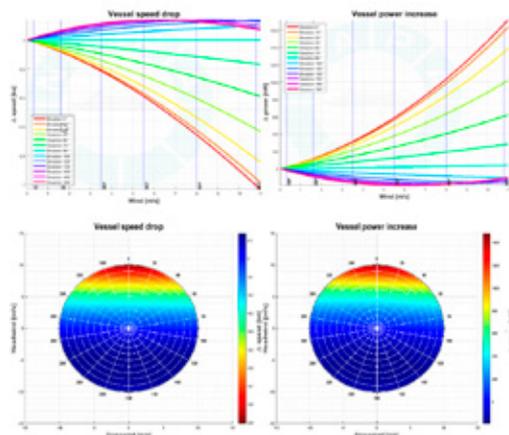
Benefits of Ship Performance Analytics

- Ship operational conditions
- Vessel performance follow-up
- Energy saving device and other performance studies
- Accurate hull condition estimates
- Fleet-wide benchmarking and comparison of different types of ships
- Accurate information on how external conditions affect the power and fuel consumption
- Key Performance Indicators (KPI) for ship engines

Dynamic Performance Dashboard



Various Performance Reports



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5. EXTRACT

The ship manager assigns data access to authorized users

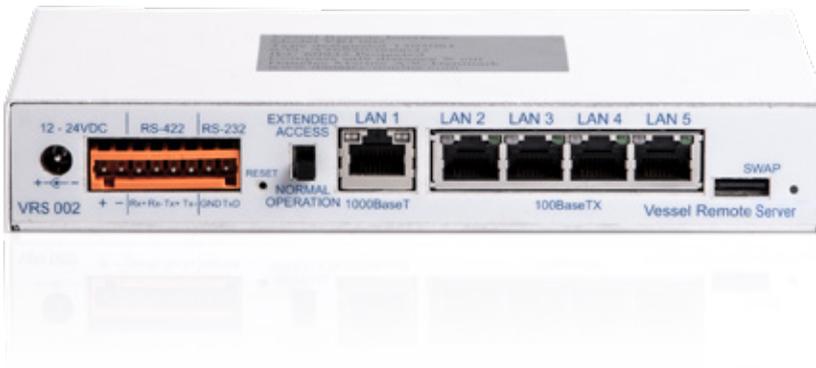
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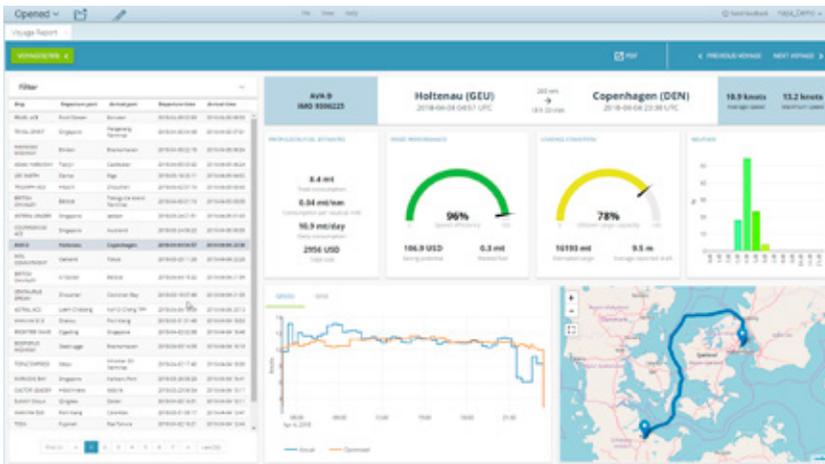
6. ANALYZE

Data is applied in NAPA Office and NAPA Ship Performance Analytics Services

DATASTREAM



Danelec's ship-2-shore data solutions are powered by the connectivity Hardware modules which pick up analog, digital or serial sensor data throughout the ship for onboard data collection, and connect it to the vessel's existing network and communication infrastructure for data transfer to shore.



The data for the service is collected from various systems, such as onboard flow meters, torque/thrust meters, automation systems, and navigation systems or meteorological services.

Danelec Marine and NAPA Offer a Complete End-to-End Internet of Things Cloud Solution

The new shipping IoT package combines Danelec's efficient, low-cost shipboard data collection and data transfer platform with NAPA's advanced analytics and optimization tools. The integration with DanelecConnect allows NAPA to offer its shipping customers a comprehensive turnkey IoT package encompassing numerous elements from onboard data collection to actionable ship and fleet performance analysis.

Danelec's second-generation DanelecConnect platform, which was launched in 2017, makes it easy for NAPA to capture data from shipboard sensors to use in their cloud-based applications thanks to the inclusion of an application programming interface (API) tool.

The partnership with Danelec Marine eliminates one of the biggest barriers to delivering a true integrated IoT experience to ship owners, operators and charterers. Until now, accessing timely data from ships at sea has been challenging, typically requiring a bespoke shipboard data collection and processing networks with connections to hundreds of data points. Often this involves custom interfaces with older legacy equipment or slow and sometimes unreliable manual data entry by ships' personnel. This has been manageable for some big companies, but on chartered vessels, for example, the initial investment has often been too high.

DanelecConnect's universal data interface and wide service network solve these problems, enabling visibility into ships' performance parameters from shore at a far lower cost. With this solution, we can add value with high quality analytics and optimization for a much wider range of vessels, including time chartered vessels.

DanelecConnect uses a small electronic remote server that connects with the ship's Voyage Data Recorder and other data sources. It collects and processes the desired datasets for transmission via satellite to Danelec's cloud-based server ashore.

NAPA pulls this data from DanelecConnect into its NAPA Office and NAPA Ship Performance Analytics platforms. These platforms offer a wide range of business intelligence and fleet optimization services for shipping companies, including machinery monitoring, fuel efficiency and hull condition analysis. This allows users to set key performance indicators and benchmarks, and use statistical modeling to predict performance.

The automatic data collection package from Danelec is a technology spin-off from their Voyage Data Recorder (VDR) business. As one of the largest suppliers of marine VDRs, Danelec Marine has many years of experience in interfacing with all types of data sources on ships - now applying that accumulated expertise to the problem of capturing data and making it available to the maritime cloud-based specialists NAPA, so they can focus on what they do best - providing ship operators, charterers and other maritime stakeholders with crucial data for better decision making ashore.

Another barrier in the past has been the high cost of ship-2-shore communications. Solving this, Danelec has designed an onboard interface to transmit data efficiently and inexpensively through narrowband satellite channels. This solution enables Danelec to send hundreds or even thousands of accurate data samples per sensor over satellite for only \$1 USD per day in total satellite airtime costs.

Danelec's worldwide network of more than 600 certified service technicians, in more than 50 countries covering all the main seaports in the world, removes another worry for software service providers by maximizing uptime and minimizing service interruptions or delays.

IoT is growing at a head-spinning pace worldwide. By bringing together the shipboard and shoreside components in a cost-effective integrated cloud-based package, the shipping industry can now become part of the IoT revolution with far-reaching benefits across all aspects of ships, shipping and the logistics value chain of which they are a part.



Headquartered in Denmark, Danelec Marine is a leading supplier of Voyage Data Recorders (VDRs), ship-2-shore data communication systems, and Electronic Chart Display and Information Systems (ECDIS).

Danelec Marine was one of the first companies to bring to market VDRs and Simplified VDRs (S-VDRs) to meet the original IMO carriage requirements.

More than 6,000 vessels today are equipped with a VDR or S-VDR designed and manufactured by Danelec Marine. The company has service facilities with factory-trained personnel in more than 50 countries, and Certified Service Centers at strategic locations worldwide.

For information visit
www.danelec-marine.com



NAPA Group is a world leading software house, providing solutions for ship design and operation with the mission to improve safety and eco-efficiency of the global maritime industry.

In its nearly 30 years of operation, NAPA has become a global leader in software, services and data analysis for the maritime industry; providing best in class data-led solutions for safety, efficiency and productivity in both ship design and operations.

NAPA operates globally, with eleven offices across Asia, Europe and the Americas supported by its Helsinki headquarters.

To date, NAPA has nearly 400 user organizations for its design solutions and over 2,500 installations onboard vessels.

For more information visit
www.napa.fi