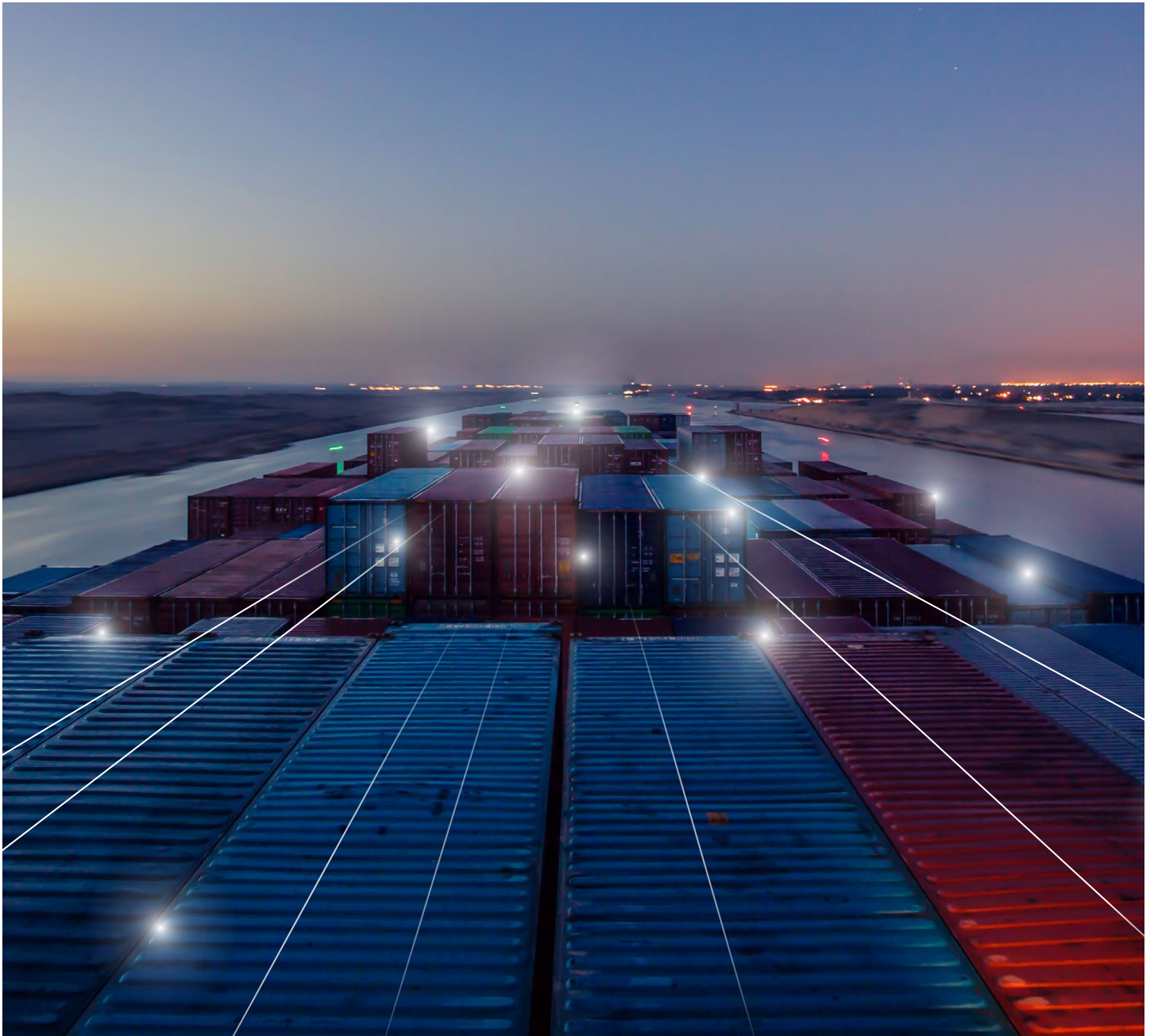




HIGH QUALITY DATA

Available. Reliable. Secure.



70 YEARS OF MARINE PRECISION

In 1949 the German engineer Hans Hugo Karl Hoppe founded the company Hoppe Bordmesstechnik. His business idea was to deliver precise instruments and measuring equipment that could exactly determine the speed and power of seagoing vessels. Many technical inventions and patents for on-board measuring systems have characterized the work-life of Hans Hoppe. Today Hoppe is a family-owned group of companies with a **global presence**. In many years of organic growth, the company started businesses in various maritime markets to cater to globalized shipbuilding. Combined with countless inventions and patents Hoppe has reached a leading position in several maritime business areas like **marine digitalization**.

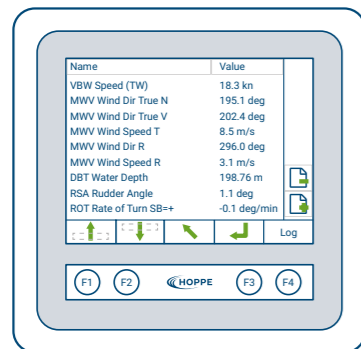
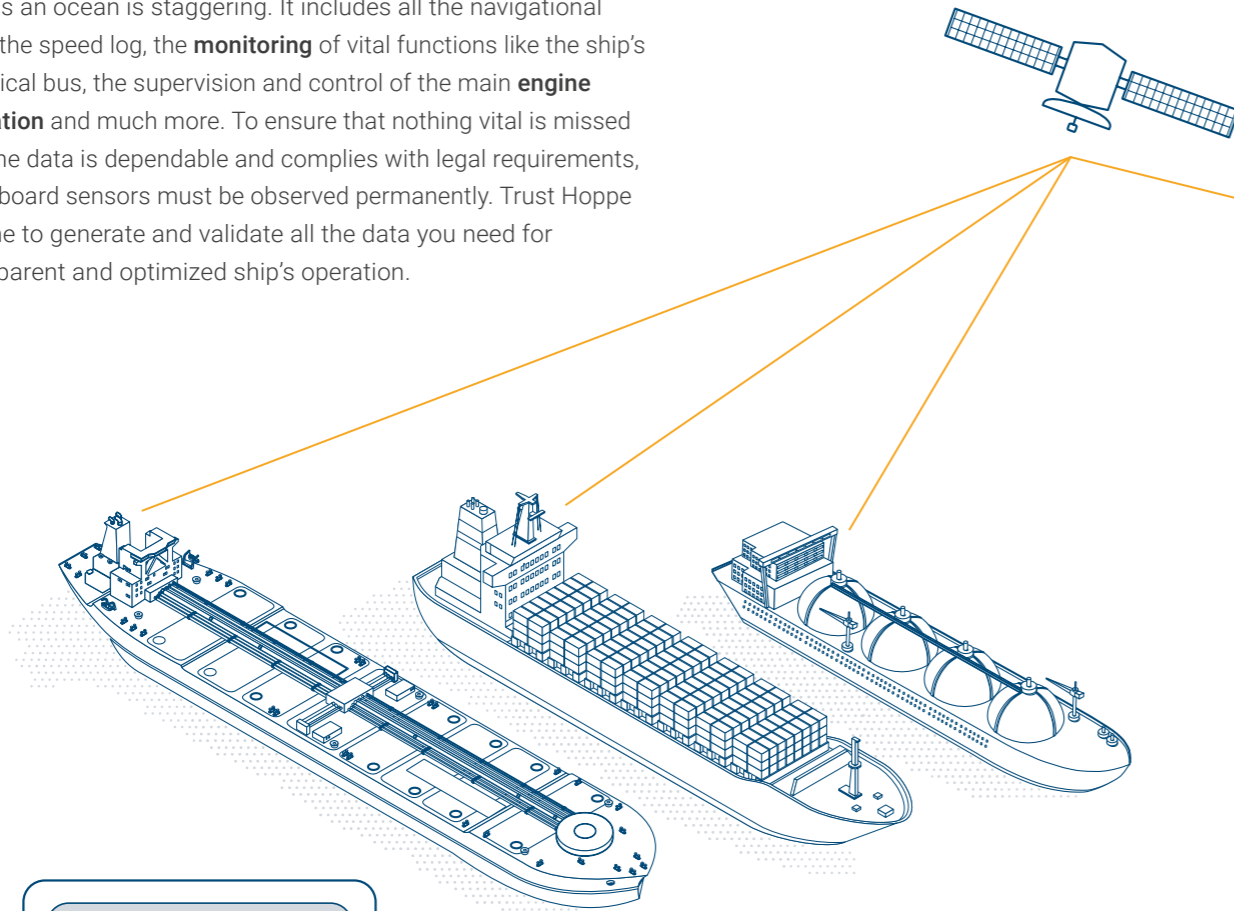
The company's continued passion for technology and the permanent motivation to deliver customer-oriented products and services have been the keys to its success. The combination of seven decades of engineering know-how, sustainable on-board experiences with the continuous development of new technologies has made Hoppe a major player in the digitalization process of the marine industry. A key demand of today's maritime data acquisition is the exact validation of a large number of a ship's operational and nautical measurements after receiving them onshore. Hoppe offers you a convenient one-stop solution with **high data quality** on-board and superior analysis ashore.

With **over 70 years of experience** and more than 7,000 installations, Hoppe Marine can be the trusted technology partner in the vessels digitalization process and helps relieve the owners and operators technical personnel. As we have always done and always will do.

ON BOARD

OPTIMIZATION AND AUTOMATION BY SENSOR FUSION AND QUALIFIED DATA ON BOARD.

The amount of data generated onboard during a freight passage across an ocean is staggering. It includes all the navigational data, the speed log, the **monitoring** of vital functions like the ship's electrical bus, the supervision and control of the main **engine operation** and much more. To ensure that nothing vital is missed and the data is dependable and complies with legal requirements, all onboard sensors must be observed permanently. Trust Hoppe Marine to generate and validate all the data you need for transparent and optimized ship's operation.



The heart of every Hoppe Performance Monitoring system is our class approved PLC unit HOMIP. It is a state-of-the-art PLC including sufficient processing power, supports all common interfaces (analogue, digital, serial, Ethernet) and a 6" operational display.

ON SHORE

DATA MAINTENANCE AND OPEN INTERFACE WITH DATA QUALITY ON SHORE.

Depending on your needs, Hoppe provides you with many possibilities to use the **operational and performance data** of your ships. After the ship to shore transmission, all the data is processed and then stored in an internal **Hoppe Datapool** that has multiple features. These include the provision of all collected data to your exact

specifications via a **standardized API**. This comes with detailed documentation, allowing interfacing with a wide range of systems. Internal **services** and analysis by Hoppe staff, can assist you with a complete fleet performance optimization. Thus offering all services under one roof.



All services under one roof: from data acquisition on board to validated data on shore.



Sensors



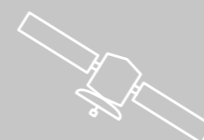
On board data acquisition



Data integration and Database



Monitoring and control



Data storage



Data processing



Data analysis



Data maintenance and API with qualified data



DATA INSPECTOR

... ENSURES HIGH DATA QUALITY AS A SERVICE

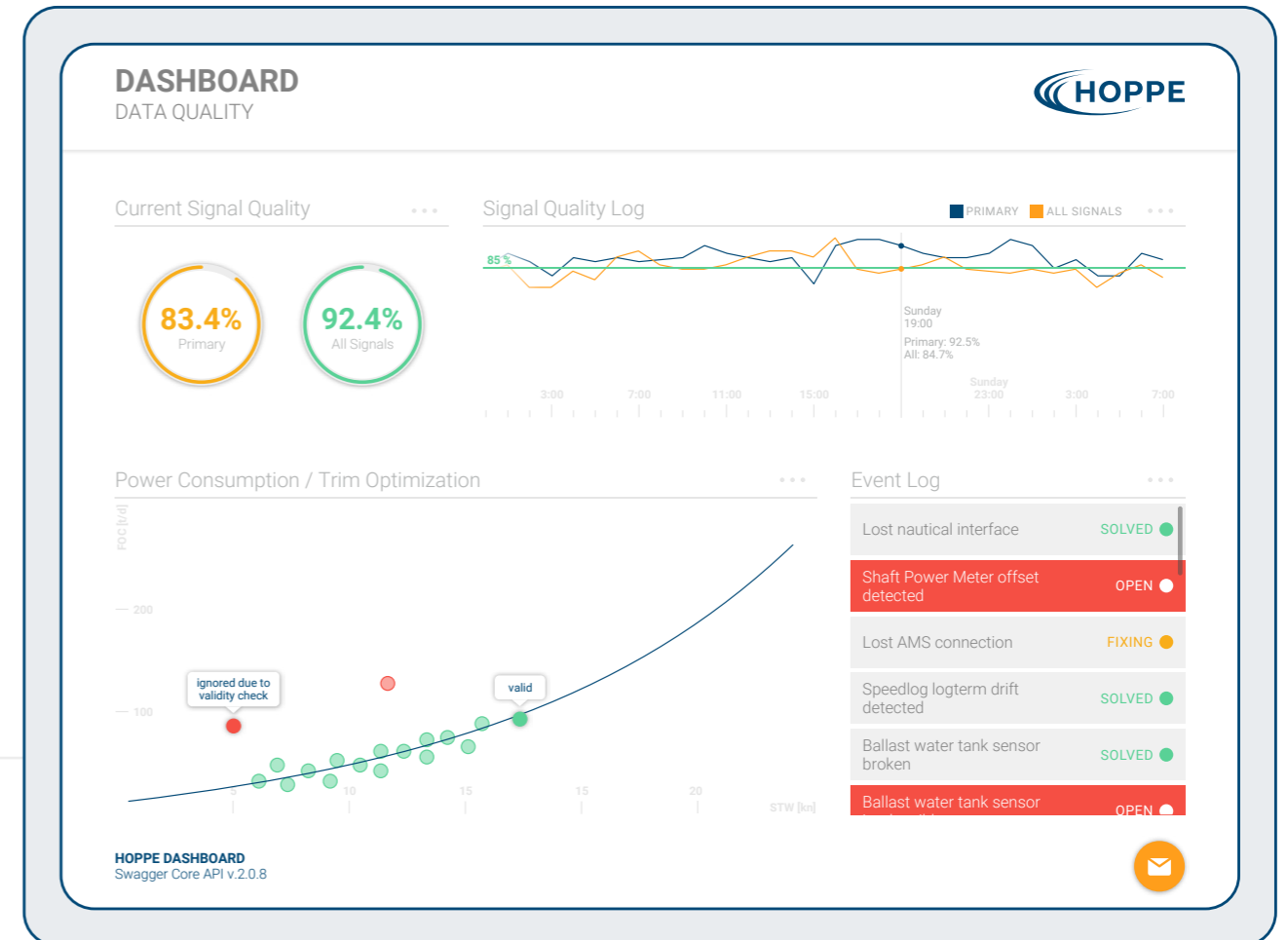
For any kind of operational or performance recommendation to be of any value, the underlying operational and nautical data needs to be valid and absolutely exact. For example, if a speed log does not measure reliably, any further optimization is not possible because it would be based on unsound data. This is where the Data Inspector by Hoppe excels because it will not just collect data and send it ashore – the **Data Inspector** will analyze, verify and clean this data beforehand to enable superior recommendations that are **based on facts** and not on assumptions.

Unclean data can significantly lower the potential for optimization and might even lead to disadvantages in vessels operation.

KEY FACTS

- The overall data quality gets improved by continuous data check
- Data inspectors are experienced service technicians and marine engineers
- Fast response – service attendance or remote service demand can be detected on short notice
- Evaluation of primary signal as an early warning system
- Downtime will be reduced to a minimum

Validation of a large number of the ship's operational and nautical measurement data onshore – this is the key demand of today's maritime data acquisition. If e.g. the speedlog does not measure reliably, further optimization is not possible.



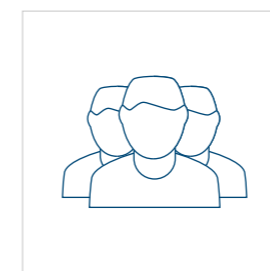
DATA BUTLER

IS THE INDEPENDENT SUPPLIER OF VALIDATED DATA VIA API

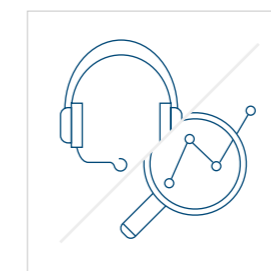
Whether your ship's data is fed to the internal data warehouse, provided to a fleet management system or even exported as high-resolution data for specialized analysis, the Hoppe **Data Butler** provides the customer-oriented and tailored solution that fit your needs. All data is fully encrypted in transport and at rest in the data-pool. Depending on the package, the Data Butler as well as the Data Inspector offers a quarterly deep validation of measuring devices, primary signals and the correlation matrix in the form of a generated **summary**. A standardized API documentation is automatically provided.

KEY FACTS

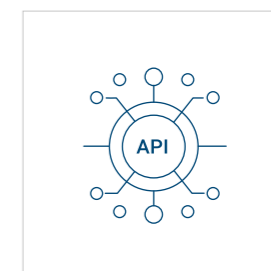
- Fully encrypted on ship-to-shore transfer
- Standardized API documentation
- Continuous or on-demand data access to high-resolution data
- Flexible configuration of requested vessel data
- Transparency
- Data quality API available



Customer



Data Maintenance / Services



Data Quality API on shore

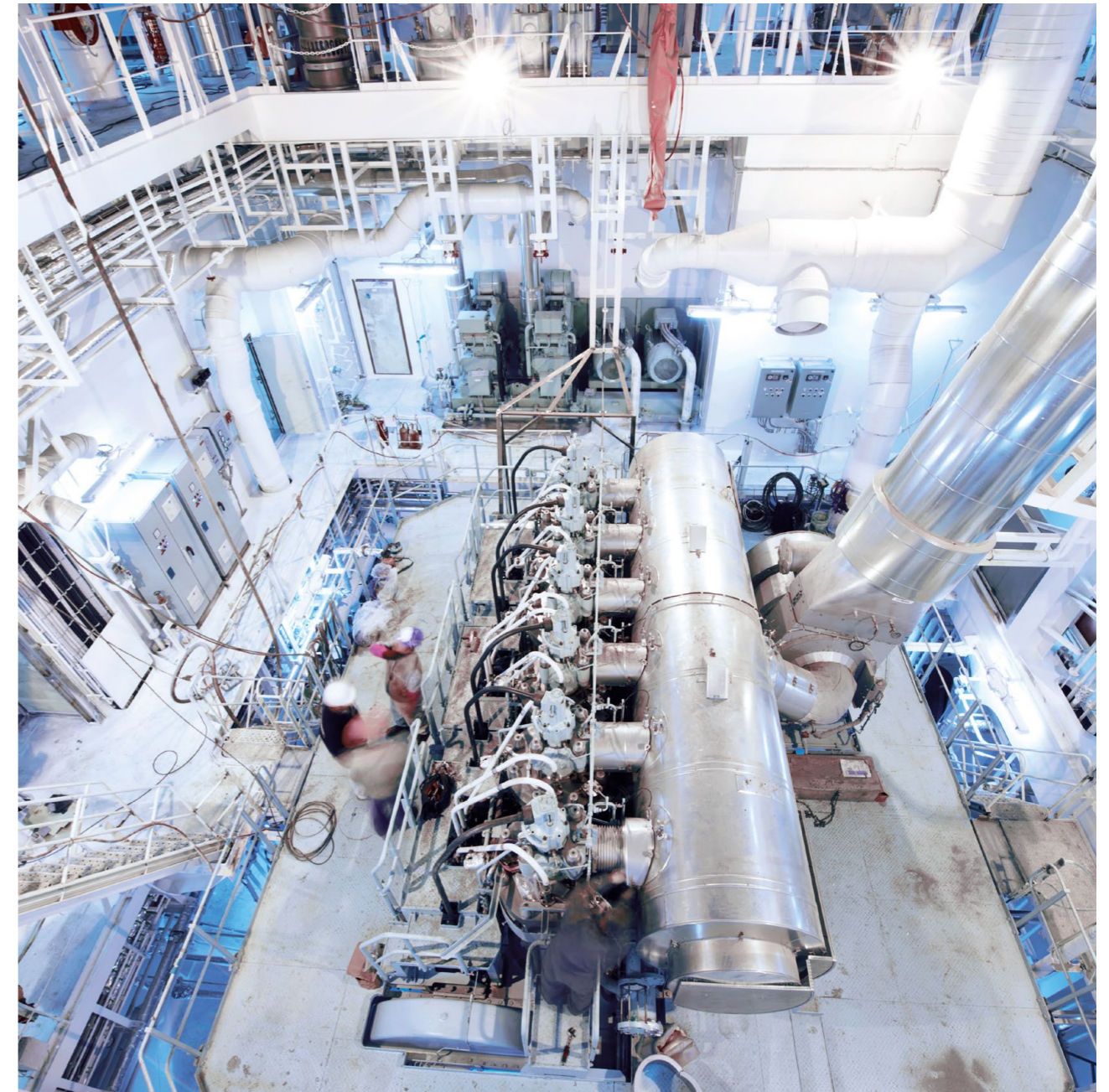
CHOOSE YOUR PERFECT FIT – OUR DATA PACKAGES

	DATA INSPECTOR			DATA BUTLER	
	Data Inspector Basic	Quality Expert	Operational Analyst	Basic Data	Quality Data
	<i>basic</i>	<i>profound data validation</i>	<i>vessel evaluation</i>	<i>provider of data via API</i>	<i>quality data via API</i>
DAILY CHECK OF INCOMING DATA					
<ul style="list-style-type: none"> • Check data for completeness, validity and threshold exceedances • Information of respective crew or inspector • Determine vessels total signal quality 	•	•	•		
MONTHLY FLEET SUMMARY					
<ul style="list-style-type: none"> • Fleet summary including operational KPI • Data quality timeline 		•	•		
PROFOUND VALIDATION – quarterly					
<ul style="list-style-type: none"> • Measurement devices • Primary signals • Incl. correlation matrix • Summary 		•	•		•
CUSTOMIZED ANALYSIS CATALOG – quarterly					
		•	•		
CUSTOMIZED ANALYSIS CATALOG – FULLY EVALUATED – quarterly					
			•		
SUMMARIZED OPERATIONAL ADVISORY – yearly, based on Hoppe Marines Data Analysis Catalog					
<ul style="list-style-type: none"> • Main Engine operation • Fuel Change over • AE operation in port • Trim behaviour • Suspicious device 			•		
FULL ACCESS TO RAW DATA IN HOPPE DATA FORMAT				•	•
FULL ACCESS TO QUALITY INFORMATION					•

OPTIMAL OPERATION AND PERFORMANCE

Reliability in fuel stock planning and fuel consumption forecasts are fundamental in daily operation. Regardless of which stakeholder or fleet optimization platform manager is interested in the further use of clean data: To **optimize the operation** of a ship, the crew, the operations, the route planning and the bunker departments need valid data of the expected fuel

consumption. Deciding factors are the ship's speed through water (STW) in knots, the Main Engine Power in kW and the respective fuel oil consumption (FOC) in tons per day. To **optimize the performance**, the charter curve is used. It can provide a big potential to boost earnings due to more attractive conditions along the curve. But this is only one option for usage.



FLEET DATA QUALITY

Validation of a large number of the ship's operational and nautical measurement data on-shore – this is the key demand of today's maritime data acquisition.

The major challenge for vessel owners and operators to verify and validate the large amount of data after receiving them on shore still increases. Unclean data can significantly lower the potential for optimization and might even lead to disadvantages in vessel operation.

KEY INFORMATION

- The procedures provide a wealth of opportunities to create a clean data base and to continuously improve quality.
- The evaluation of indicators as an early warning system as well as the fulfillment of the required maintenance activities with regular reporting form the basis for further work. The comprehensive amount of data can be systematically examined and the overall quality of the data gets improved.



ANALYSIS CATALOG


Hoppe Marine is a system provider which offers a wide range of products for validation, monitoring and optimization of ship operation.

In order to meet the requirements of a full vessel operation rating, the Analysis Catalog was developed.

The Analysis Catalog allows an individual catalog configuration – with a selection of over 100 visualizations and evaluation features as well as the integration of charter and shop test curves in order to compare the target and actual condition.

CORE FUNCTIONALITIES

- Detects and excludes severe measuring errors by long term data analysis and thereby offers the full package from measurement, validation and monitoring to evaluation.
- Enables to pin down the most favorable operation state by processing dynamic measurement data and early on detection of deficiencies by trend analysis.
- Allows consistent and reliable performance improvements by analysis of real-world energetic data and KPIs.



Fact Sheet	Data Analysis Catalog	Issue Date 25.07.2018
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HOPPE MARINE DATA SOLUTIONS – ANALYSIS CATALOG

The ability to reduce emissions and operational costs is a major factor of success in the increasingly competitive shipping market. Hoppe Marine is a system provider who offers a wide range of products for validation, monitoring and optimization of ship operation.

The Hoppe Data Analysis Catalog features

- individual catalogue configuration – choose from over 60 visualisations,
- integration of charter and shop test curves,
- with its ship-specific visualizations the catalogue is suitable for superintendents, ship owners and the crew on board alike,
- detects and excludes severe measuring errors by long term data analysis and thereby offers the full package from measurement, validation and monitoring to evaluation,
- enables to pin down the most favourable operation state by processing dynamic measurement data and early on detection of deficiencies by trend analysis,
- allows consistent and reliable performance improvements by analysis of real-world energetic data and KPIs.

"Offers an in-depth look into all areas of ship operations with target-oriented visualizations."

CATALOG CONTENT

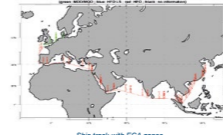
CHOOSE FROM OVER 60 VISUALIZATIONS IN HIGH-RESOLUTION

1. General Trends

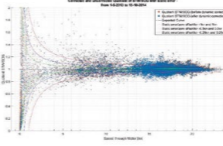
- Lists all ship-specific data
- Automated ECA and port detection with travel distances and fuel consumption as well as ship track visualization on chart
- Trend analysis and visualization of common parameters of ship operation for a quick overview of ship performance and data quality
- Optional: Extensive evaluation of data quality, operational abnormalities and optimization potential by an expert

2. Validation of Sensors and Systems

- The validation chapter provides information about the functionality of the used measuring equipment
- Dynamic error and static offset detection of the speed log by evaluation of representative ship-specific data sets
- Validation of flow meters and shaft power meter for direct monitoring of offsets and drifts and evaluation of leakages in the fuel oil service system with calibration advice
- Lists all signal parameters including logging rate, averages, validity and plausibility in tabular form




Ship track with ECA zones



Validation of speedlog with dynamic correction

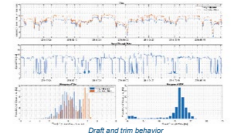
Doc. No.	Sales Documentation	Revision
F-08064-02150-FS	1/2	1.0



Fact Sheet	Data Analysis Catalog	Issue Date 25.07.2018
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3. Nautical Trends

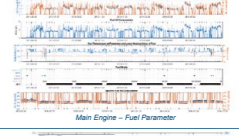
- Visualization of general nautical trends such as trim, STW, SOG, current, draught and rudder angle with histograms
- Identification of the influence of true on-ship performance and fuel consumption
- Visualization of the rudder behaviour and its influence on fuel consumption



Draft and trim behavior

4. Engine Trends

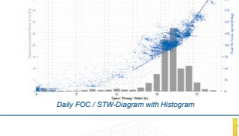
- Treats main engine, auxiliary engines and boiler
- Clear visualization of trends for common operational parameters such as power, torque, RPM and ship speed
- Clear visualization of fuel-related trends including FOC, SFOC, SFOC TW, fuel grades and fuel temperature
- Direct detection of deviation of exhaust gas temperature and charge air parameters



Main Engine - Fuel Parameter

5. Performance Monitoring and Validation

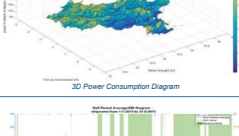
- SFOC / SFOC ISO - graph with additional load histogram for evaluation of the energetic condition of the engines
- Specific and daily fuel consumption of the main engine correlating with propeller curve data
- Monitoring of auxiliary engines with focus on efficient operation and load distribution



Daily FOC / STW Diagram with Histogram

6. Ship Performance Optimization


- ISO 19030 speed loss diagram with the lowest speed loss and power consumption for every mean draft and trim provides optimal hydrostatic operating point
- Propeller slip grid for the determination of the most favourable draught-trim combinations



3D Power Consumption Diagram

7. Ship Motion Analysis Features (HOSIM)

- HOSIM (Hoppe Ships Inertial Measuring System) roll period analysis including estimated GM and with trends and histograms
- HOSIM pitch period analysis with trends and histograms
- Visualizations of events with maximum roll angle
- Evaluation of roll angles during critical periods conditions



Roll period with port detection and GM est. value

Doc. No.	Sales Documentation	Revision
F-08064-02150-FS	2/2	1.0

HOPPE SYSTEMS AND COMPONENTS

	Electronic Devices		Valve-Actuator-Combinations				Motion Sensors				Heel Control and Trim units		Level Sensors			Power and Performance Meter	
	PLC unit HOMIP	I/O Modules	HOPAC (pneumatic)	HOHAC (hydraulic)	HOHEA (electro hydraulic)	electric	Inclination Sensor	Electronic Inclinomometer	Inertial Measuring unit HOSIM 2	GPS Sensor	Reversible propeller pump	Blower unit	HCG2011 (electric)	HCG 4011 (electric BUS)	HOBUB (pneumatic)	Shaft Power Meter	Fuel Counter
Fluid Management	Valve Remote Control	•	•	•	•	•											
	Tank Content Measurement	•	•				•						•	•	•		
	Ballast Management	•	•	•	•	•	•						•	•	•		
	Bunker Management	•	•				•		•				•	•	•		
	Draught Measurement	•	•				•						•	•	•		
Dynamic Draught Measurement	•	•				•		•	•			•	•	•			
Motion Control	Heel Control	•	•	•	•	•	•		•		•	•	•	•			
	Trim Control	•	•	•	•	•	•		•		•	•	•	•			
	FLUME® Roll Damping	•	•	•	•	•			•				•	•			
	U-Tank Roll Damping	•	•	•	•	•			•				•	•			
	Load Moment Control	•	•	•	•	•	•		•		•	•	•	•			
	Dock Control	•	•	•	•	•	•		•	•	•	•	•	•	•		
Ship Performance	Maihak Shaft Power Meter	•	•													•	
	Fuel Consumption Measurement	•	•													•	•
	Trim and Motion Measurement	•	•							•							
	Performance Monitoring	•	•						•				•	•	•	•	•

COMPACT OVERVIEW

Fluid Management

- Valve Remote Control
- Tank Content Measurement
- Bunker Management
- Ballast Water Management
- Draught Measurement
- Dynamic Draught Measurement
- Sensor Toolbox HOSET

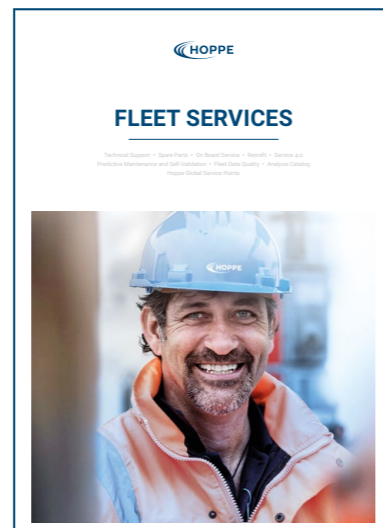


Motion Control

- Heel Control
- Trim Control
- Roll Damping
- Load Moment Control
- Dock Control
- Tailored Control Systems
- Monitoring
- Electronic Inclinator
- Engineering Service

Ship Performance

- Mähak Shaft Power Meter
- Fuel Consumption Measurement
- Dynamic Draught, Trim and Motion Measurement
- Performance Monitoring
- Fleet Data Quality
- Analysis Catalog



Fleet Services

- Technical Support
- Spare Parts
- On Board Service
- Retrofit
- Service 4.0
- Predictive Maintenance and Self-Validation
- Fleet Data Quality
- Analysis Catalog
- Hoppe Global Service Points

CONTACT

Germany

Hoppe Marine GmbH
Kieler Straße 318
22525 Hamburg

Tel. +49 (0)40 561 949 - 0
sales@hoppe-marine.com

China

Hoppe China Co., Ltd.
German Center, Room 708,
Tower 1, 88 Keyuan Road
201203 Shanghai Pudong

Tel. +86 21 50 278 040
service@hoppe-china.com

Singapore

Hoppe Singapore Pte., Ltd.
18 Boon Lay Way # 04-93
609966 Singapore

Tel. +65 67 17 48 88
service.singapore@hoppe-marine.com

Republic of Korea

Hoppe Korea Co., Ltd.
No 485-3, Gu Pyeong-Dong,
Sa Ha-Gu
604-866 Busan

Tel. +82 51 4 035 851
hoppe@korea.com