# FLEET SERVICES

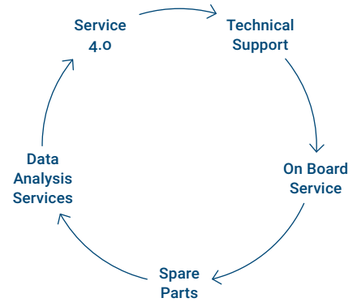
Technical Support • Spare Parts • On Board Service • Retrofit • Service 4.0
Predictive Maintenance and Self-Validation • Fleet Data Quality • Analysis Catalog
Hoppe Global Service Points

# FLEET SERVICES

The HOPPE ship service starts with the new building phase of the ship. With the system design of our ship specific solutions, we generate a full digital twin of all installed components and software, to have all detailed information available when it comes to ship services.

The digitalization of all information is needed to be prepared for the future. This is one part of our customer oriented services. Immediate availability of technicians and spare part in combination with a short reaction time worldwide is our major focus. It is our daily aim to increase the established good customer reputation.

With Service 4.0, Hoppe is preparing for the demands of tomorrow. Data validation and the predictive maintenance of sensors and system components form the basis for a smooth and trouble-free operation. Rounded off by a full-service maintenance contract, the ship owner will again be able to focus on ship operations.




**www.hoppe-marine.com**

## Content

# ABOUT HOPPE

Hoppe is a family owned group of companies with global presence and activities focused and dedicated to the maritime market. It's passion for Technology has been the company's key of success in seven decades with the permanent motivation to deliver customer-oriented products and services.

Starting with the business idea to deliver precise instruments and measuring equipment for seagoing vessels (ship speed and power), Hoppe Bordmesstechnik was founded in 1949 by the German engineer Dipl.-Ing. Hans Hugo Karl Hoppe. The work life of Hans Hoppe was characterized by many technical inventions and patents for on-board measuring systems. After 35 years of successful work life Hans Hoppe passed away and his colleague Jürgen Haas took over the company and put things on the right track for the future of Hoppe. Four years later (1990) Helmut Rohde joined Hoppe as partner before finally taking over all shares of the company in 1997. The Hoppe era of the Rohde family business started.

Besides many years of organic growth the Rohde family established business in further maritime markets to follow the globalization of the shipbuilding business. In 1997 Hoppe Korea was established, followed by Hoppe China in 2010 and Hoppe Singapore in 2017. In parallel, strategic investments were made with the acquisitions of Meramont Automatyka (Poland), MAIHAK Marine (Germany), Flume Stabilization (USA) and INTERING ship stabilization systems (Germany). Combined with many new inventions and patents Hoppe has established a leading position in several maritime business areas.

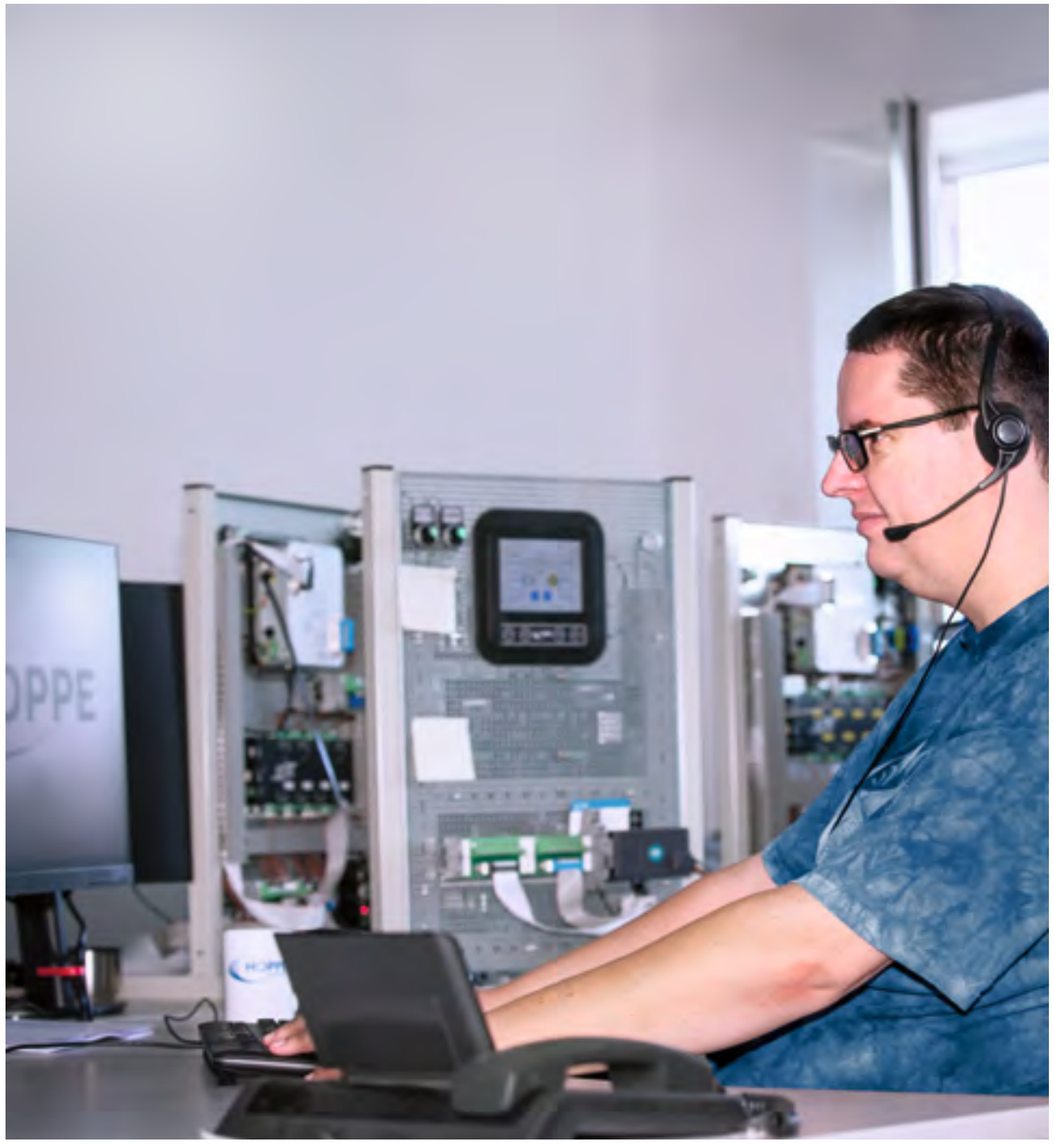
The passion for technology is still unbroken and all Hoppe products are fully designed in Germany by our skilled engineers. This means that Hoppe has the full technical control over its portfolio and remains dedicated to quality, accuracy and reliability. With this approach Hoppe has maintained a very good market reputation ever since.

Being a fully independent family-owned company Hoppe is well known in the market as a reliable long-term partner. Hoppe combines decades of engineering know-how, sustainable on-board experiences with the continuous development of new technologies and innovations. Based on the strategic product- and service-focus approach Hoppe is a key player also in the digitalization process of the marine industry.

# TECHNICAL SUPPORT

Our **Help Desk** offers assistance in fault identification, fault analysis, cause investigations, preventive mitigation and maintenance strategies. Including a 24/7 **Hotline** with fast response and action in any case, it is a service on which shipping companies and ship crew can rely.

Taylor-made on-board crew **trainings** as well as in-house trainings at Hoppe facilities or customer facilities assure the knowledge transfer to the people which are finally operating the Hoppe systems, resulting in proper handling and maintenance “without questions”.



# SPARE PARTS

We are processing your inquiries and orders within 24 hours. So our **high quality parts** have a **short-term availability**.

With our technical analysis and examination of all inquiries and orders, we support you in case of any inconvenience or incomplete information. We offer **alternatives for outdated parts** as well.

Quick inspection and repair for your damaged return delivery. Fast delivery in Asia from our stock in Singapore.

# ON BOARD SERVICE

Our local service points all over the world enable Hoppe Marine to carry out ambitious and extensive **installation** and **commissioning** projects at competitive rates.

Commissioning, regular maintenance, **repair**, modification and upgrades are essential parts of our scope of services, which is not limited to Hoppe Marine products and ships. Service and commissioning can also be requested for equipment from other manufacturers on docks, offshore platforms and multiple other facilities.

We take care of the complete service process, as well as the whole travel organization, which includes a **health check**, organized by our professional On Board Service coordination team.

# RETROFIT

With more than 65 years in the maritime business with a wide spectrum of systems and products, Hoppe Marine owns the expertise you need, to **increase your system's performance** and to find a solution for your problem.

Retrofits, conversions, upgrades, system extensions and installation works are not limited to Hoppe Marine products and can be offered for various manufacturers.

Our experienced service engineers could attend your vessel and perform the service job from harbor to harbor, influencing the vessel operation as little as possible, which gives you the opportunity for upgrades and **implementing the newest technology** "on the way", which **extends the vessel lifetime** and **saves energy**.

Plenty of remarkable and successfully realized retrofit projects in the offshore (Lewek Champion), yacht (M2), military (Asterix) and merchant fleet, certify the competence of Hoppe Marine in this challenging business.

# SERVICE 4.0

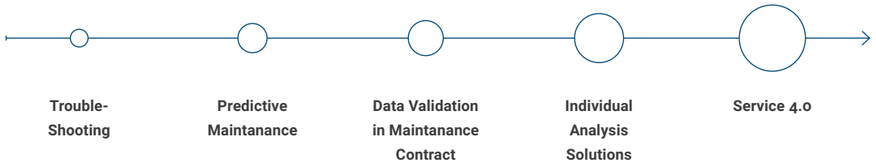
According to the motto **The market is heading towards 4.0**, Hoppe Marine is preparing for the future and maritime market requirements.

Thanks to years of experience in the field of troubleshooting, our service engineers gained valuable insights which allow, in particular for Hoppe Marine System Solutions, predictive maintenance work to be carried out before costly repair measures are required.

The close cooperation of service technicians with extraordinary experience on board together with data scientists enables well-founded data validation as a big step towards Service 4.0.

### SPECIFIC CUSTOMER ANALYSIS AND DATA VALIDATION

The team consisting of ship engineers, navigation officers, mathematicians and physicists is continuously working on the development of validation algorithms and methods to detect correlations in the ship data to uncover the potential for performance optimization and cost reduction. Ship-specific analyses and evaluations as well as tailored optimization recommendations are part of our portfolio.




### EXAMPLES OF SPECIFIC ANALYSIS

- Individual troubleshooting with manual evaluation and status summary
- Data validation of primary signal parameter with detection of static / dynamic offset and drift for shaft power meter, speedlog and flowmeters
- Torque meter and SFOC validation for main engine and auxiliary engines allow predictive maintenance tasks
- Power consumption maps with determination of most efficient operation point. Vessel specific diagram is based on validated and filtered operation data.

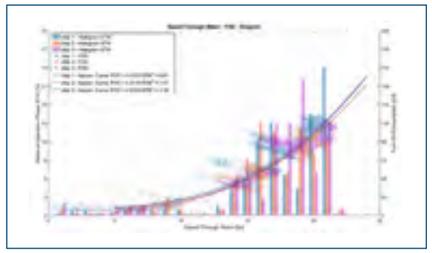
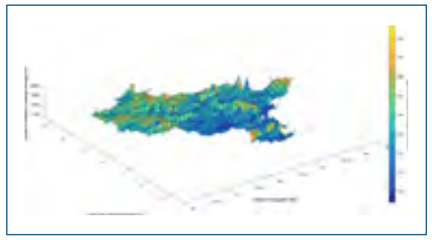


Figure 2 FOC – STW Diagram – Vessel Comparison



3D Power Consumption Diagram



# PREDICTIVE MAINTENANCE AND SELF-VALIDATION

### WHY PREDICTIVE MAINTENANCE?

Especially in the maritime environment, predictive maintenance is becoming increasingly important. To reduce costly repair work, predictive maintenance has become a competitive advantage.

The development of algorithms is still in its beginning as part of the **Service 4.0 movement** but already provides an immense value added to the core components of Hoppe Marine – Ship Performance.

Validated systems with no downtime also represent the basis for further optimization possibilities beyond the actual operational requirements.

### WHAT DO WE DO?

For trouble-free operation, the primary parameters of **performance measurement**, **fuel consumption** and **ship speed** are increasingly coming into focus.

The validation of these measured values with early detection of drift rates, offsets or speed-related distortions has an influence on on-board fuel calculation, reporting and further efficiency models.

Hoppe Marine's increasing focus lies on recognizing and reporting these abnormalities. Data validation thus forms the basis for the information gained from ship operation.

### VALIDATION OF MAIHAK TORQUE POWER METER

The following methods for the main engine power determination with Maihak Torque Validation show the possibilities of self-validation.

- An offset algorithm informs the user if the engine-specific limit for the torque offset is exceeded during standstill. In this case, a calibration of the system is essential.
- The dashed line shown in the figure indicates this limit for a short-term permitted offset at standstill. If this behavior remains undetected, it can lead to a mismatch of several percent.
- In the dynamic case, the frequencies of the negative-correlating vibrating sides are monitored. If this behavior changes, the user receives a message for implausible operation.

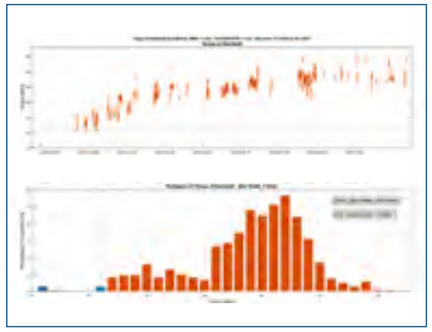


Figure 3 Offset Drift of Torque Power Meter

# FLEET DATA QUALITY

The validation of a large number of the ship's operational and nautical measurement values on-shore for measurement optimization – 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.

HOPPE

**Fact Sheet** | **Data Analysis Catalog** | **Issue Date 25.07.2018**

## 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

*Ship track with ECA zones*

**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

*Validation of speedlog with dynamic correction*

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

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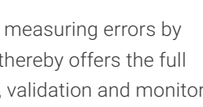
**Fact Sheet** | **Data Analysis Catalog** | **Issue Date 25.07.2018**

**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



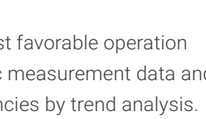
*Draft and trim behavior*

**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



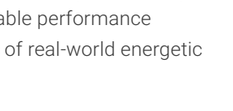
*Main Engine – Fuel Parameter*

**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*

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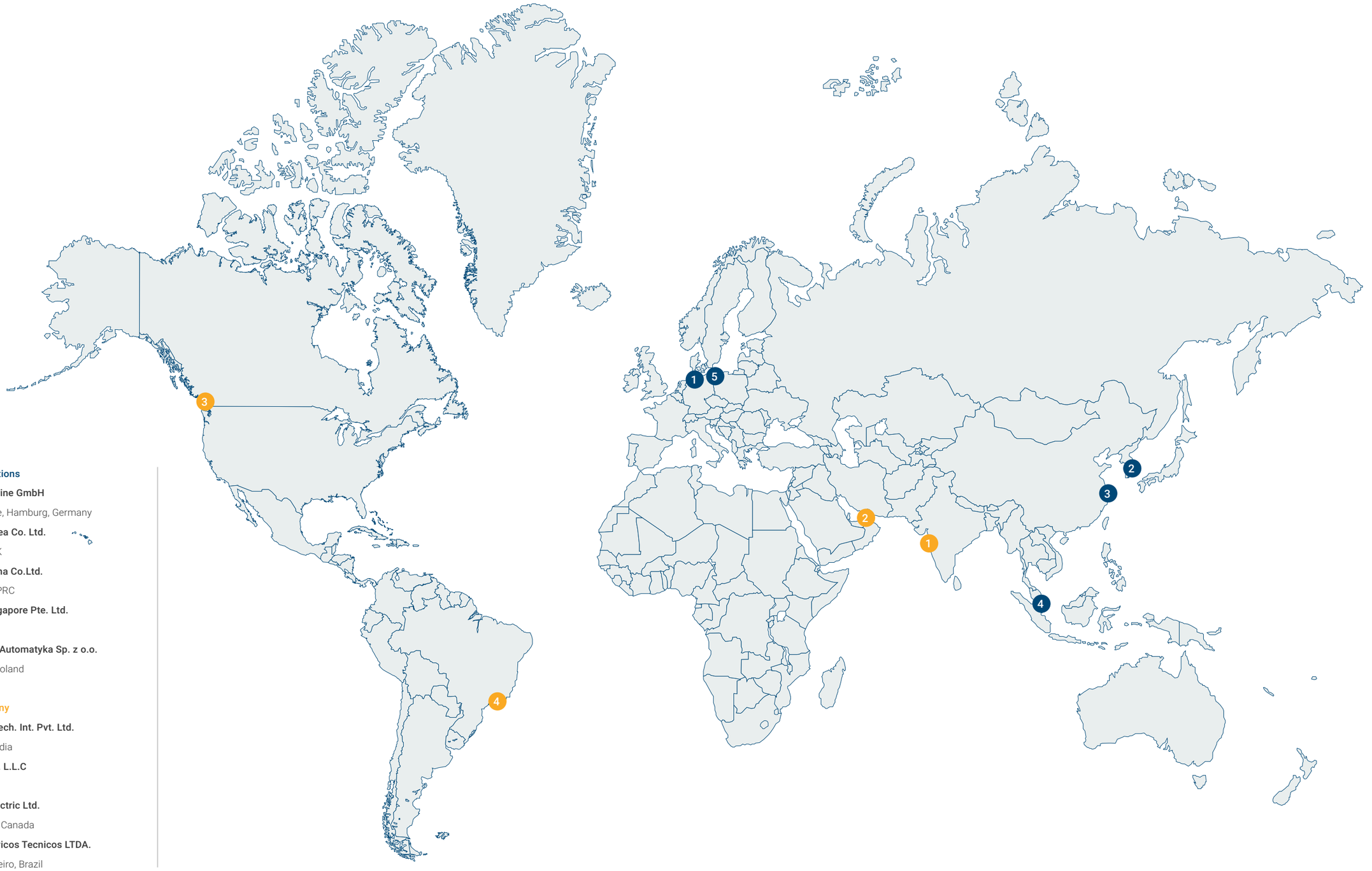
# HOPPE GLOBAL SERVICE POINTS




**Company Locations**

1. **Hoppe Marine GmbH**
   Head Office, Hamburg, Germany
2. **Hoppe Korea Co. Ltd.**
   Busan, ROK
3. **Hoppe China Co.Ltd.**
   Shanghai, PRC
4. **Hoppe Singapore Pte. Ltd.**
   Singapore
5. **Meramont Automatyka Sp. z o.o.**
   Szczecin, Poland

**Partner Company**

1. **Navicom Tech. Int. Pvt. Ltd.**
   Mumbai, India
2. **Elcome Int. L.L.C**
   Dubai, VAE
3. **Mc Rae Electric Ltd.**
   Vancouver, Canada
4. **Dinavi Servicos Tecnicos LTDA.**
   Rio De Janeiro, Brazil

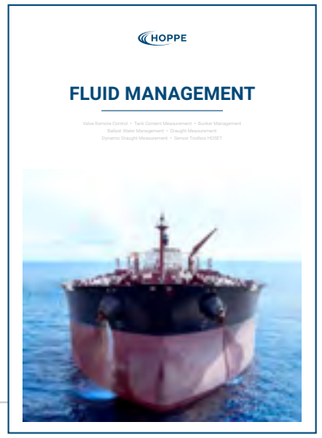
# HOPPE SYSTEMS AND COMPONENTS

| | | 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 Inclinometer | 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



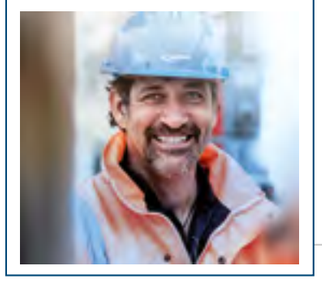


**Motion Control**

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

**Ship Performance**

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