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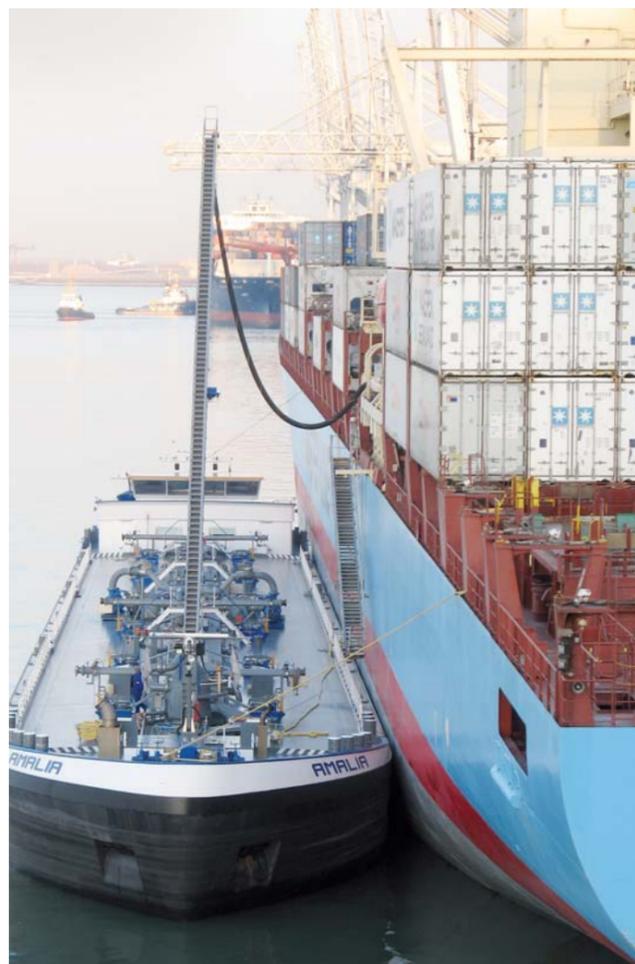


EMMA™ Advisory Suite
The complete, easy-to-use energy
management solution - including both
monitoring and optimization

Meeting the challenge

Today fuel costs account for up to 60% of a vessel's operating cost. In addition to the high cost of fuel and tightening competition, new global and regional environmental regulations are challenging ship owners and operators to make energy-efficiency their top priority.

The future frontrunners in the shipping industry will be the companies that attain competitiveness and profitability by adopting energy-efficient and environmentally-friendly operations.



Go energy smart with EMMA™

EMMA Advisory Suite helps shipping companies operate whole fleets of ships with the best possible energy efficiency and environmental responsibility. It puts energy on the agenda throughout the company and makes it possible to optimize energy-related processes, practices and decisions, all the way from the engine room to the board room.

As a straightforward software solution, EMMA is easy to install on a new-build or to retrofit on existing vessels. EMMA can be used on any PC onboard and ashore. This way EMMA is able to deliver important advice and notes to users exactly where they are working, including:

- officers on the bridge
- captain's and chief engineer's office and cabin
- engine control room
- cargo control room
- head-office personnel 24/7 through internet

EMMA can be supplied as a turnkey delivery, with training provided by ABB's energy coaches. Expert training ensures that customers receive maximum benefit by using the full potential of EMMA.

Improve by using EMMA™ Advisory Suite...

...know



EMMA™ Onboard Tracker

- Consumption
- Energy Production
- Environment

...understand



EMMA™ Fleetwide control

- Status
- Baseline
- Target

...change



EMMA™ Optimizer

- Engine mode
- Trim
- Hull cleaning

Based on knowledge and understanding, the iteration cycle of EMMA™ advises changes, updates benchmarks, and continuously contributes to optimizing the vessels energy efficiency and environmental performance. EMMA™ provides real-time operational support to the crew, the vessel and the whole fleet.

Improving by EMMA uses an iterative cycle: know where you are (measure and show onboard) – understand the situation (calculate results, compare ships, set targets) – change the way you operate (based on knowing and understanding).

This is iterative. After optimizing your operation, you need once again to know where you stand, how it compares to the past, and what can you change again to improve further in the future.

Know the status

Using EMMA's onboard tool called Onboard Tracker the crew can see and understand the current status very clearly. This includes, for example, energy production/consumption, costs, and environmental impact.

Understand the effects

All the onboard tools in an EMMA solution automatically replicate the data to an advanced cloud service called EMMA Fleet Control. Using the modern data discovery and benchmarking tools the current status of individual vessels and the whole fleet is fully understood.

Change and improve

Only with the foundation of knowing and understanding the vessel and fleet status is real improvement possible. With EMMA Advanced Optimizer, the operations can be evaluated and improved, and the changes can be clearly seen.

EMMA™ Advisory Suite consists of three different products for monitoring and optimization. Each product has different modules for different needs. The required modules are selected to fit the operations of the customer and vessel in question.

EMMA™ Advisory Suite consists of the following three products:

- EMMA™ Onboard Tracker
- EMMA™ Fleet Control
- EMMA™ Advanced Optimizer

EMMA™ Onboard Tracker

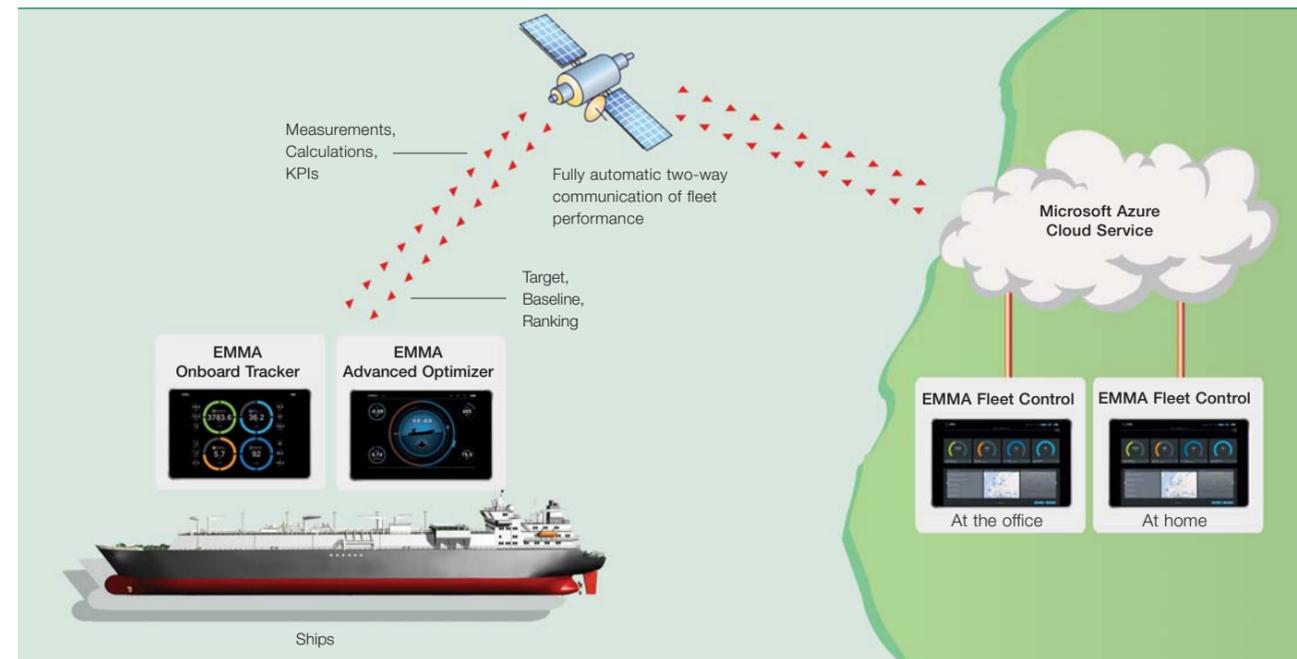
The EMMA Onboard Tracker consists of a history database, a user interface, and advanced algorithms for calculating ship-wide key performance indicators (KPIs). All the KPIs are adaptive, meaning that operating conditions are taken into account. This provides realistic targets and more motivating measures for the crew in any operating condition.

EMMA Onboard Tracker has an innovative display, showing four segmented dials on the main screen. These are clearly visible from a distance, so it is easy to read the current performance in the sector being measured. The more segments are missing, the more improvement is possible in the current operating conditions.

Main functions include:

- Power plant monitoring
- Calculating and reporting energy consumption and cost
- Reporting energy efficiencies both as actual performance and against targets
- Drill down energy analysis for main consumers like HVAC, hotel and machinery spaces

The figure gives an overview of an EMMA Advisory Suite for a fleet operator. As a modern cloud-based service, EMMA can be efficiently used onboard, at the office, at home, or anywhere on the road.



EMMA Onboard Tracker's main dashboard indicates the four top-most key performance indicators and has links to all essential subpages.

EMMA™ Fleet Control

EMMA Fleet Control is used in day-to-day ship operations and for long term fleet planning and energy optimization. The target audience for EMMA Fleet Control is the head office personnel of the shipping company, all the way from technical personnel to the top decision makers. The Fleet Control software has reliable and easy-to-use functions for selecting and transferring data via satellite link between ship and shore.

The benefits include:

- Access to the whole fleet's energy performance
- Accurate fuel predictions for efficient fuel management
- Vessel benchmarking and comparison for best practices and ship designs
- Fleet oversight with customer-specific and regulatory reports
- Data discovery tools for easy analysis of historical data

EMMA™ Advanced Optimizer

EMMA can be extended with the Advanced Optimizer decision-support tool. Advanced Optimizer includes modules for several different operational challenges, such as power-plant configuration, dynamic trim, hull condition, speed and RPM.

The EMMA framework gives decision support by predicting and calculating exact energy production and consumption, and calculating the condition which requires the least power. Combined with real-time monitoring of operational and process data, these predictions enable EMMA to help the operator control and manage the energy balance onboard.

To optimize energy use and supply, predictions of future energy demand are done by historical data collection and by modeling both vessel internal processes as well as all external forces on the hull, such as wind, waves, squat and trim. Power plant optimization also includes all the major consumers onboard, such as HVAC and machinery spaces.

Fully automatic performance monitoring increases awareness by allowing dynamic comparison and benchmarking of any new processes or equipment. Using benchmarking, the best practices can be selected and shared across the whole fleet.

Adaptive performance targets motivate the crew to improve energy efficiency and environmental performance

EMMA™ uses ground-breaking technology to relate the operating conditions (environment, cargo, speed etc.) to the performance targets. Instead of comparing current performance to a fixed value, EMMA constantly calculates and detects good or bad performance in any given condition. The selected indicators collectively describe how energy is generated, distributed and consumed throughout the vessel. Individually they provide essential data for ongoing benchmarking and improvement.

Drill down analysis from main dashboard

All relevant performance indicators are summarized on the EMMA dashboard in four distinctive key performance indicators. These four areas are:

- Cost of operation
- Power production/consumption balance
- Navigational aspect
- Overall optimization level

These main figures summarize all the relevant and available information for the crew to utilize. The main purpose is to increase awareness: e.g. showing lost fuel or loss of monetary value is a very effective motivator.

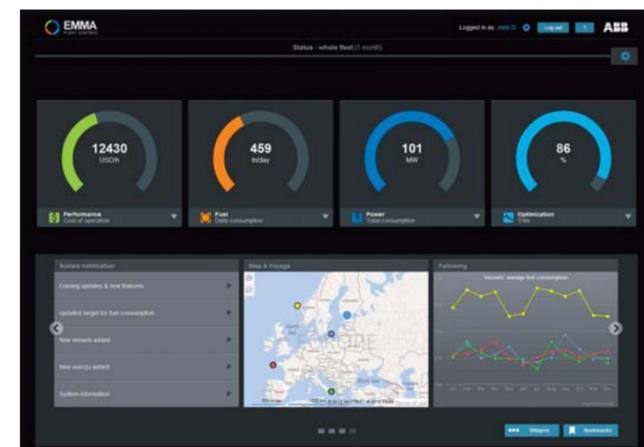
Benchmarking and target setting

The benchmark function in EMMA gives the user a simple aid to fine-tuning vessel energy efficiency. The benchmark level is set to describe the expected performances of the vessel under varying conditions such as speed, temperature, fuel type, etc.

Taken together these comprise a performance target that EMMA automatically calculates and compares with the actual ship performance. It continuously displays deviations from the target, initially for each KPI in a graphical format for quick warning, and with detailed information available for inspection.

A fleet operator can apply a benchmark to compare ship to ship, or voyage to voyage and thereby identify the vessels and areas that will benefit most from special attention. This is achieved easily with EMMA Fleet Control and its advanced data discovery tools.

Real-time decision support enables crew to take action to control energy usage and reduce energy consumption.



EMMA Fleet Control main dashboard shows the overall performance of the whole fleet, visually and effectively.



Rickmers-Linie MPC is equipped with EMMA Onboard Tracker and EMMA Advanced Optimizer.



The trim and list optimization display gives a clear indication of the utilized optimization potential. The top right corner indicates a very important performance indicator: lost fuel due to sub-optimal trim.

The power plant optimization display shows all the energy producers onboard and advises on the optimum balance between them. As in all EMMA modules, this view also indicates lost fuel per hour due to sub-optimal operation.

