Performance Management

- Identify Potential
- Evaluation and Planning
- Establish a Baseline
- Implement and Monitor
- Identify Improvement Potential

MARPOL COMPLIANT

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**What is SEEMP?**  
SEEMP became mandatory for all vessels at their first renewal or intermediate survey after 1 January 2013. (IMO MEPC 62, July 2011)  
- Under the proposed amendments to MARPOL Annex VI, Regulation 22, all ships must have an International Energy Efficiency Certificate (IEEC).  
- The IEC requires, amongst other things, the presence of a SEEMP on board.  
- The SEEMP may form part of the ship’s Safety Management System (SMS).

**Why SEEMP?**  
- Implement a plan to improve the energy efficiency of a ship’s operation (part of a broader corporate energy management policy)  
- Fuel cost is the largest cost element for shipping companies – 35-65% of operational costs, depending on type of vessel  
- Energy efficiency improvements can give cost savings of 5-15% and bring down Greenhouse emissions  
- Port fees based on environmental impact  
- Global players are demanding emission data (DHL, IKEA …)  

**Who should implement SEEMP?**  
- SEEMP is a ship specific plan to be developed by the shipowner, operator or charterer  
- The plan should be adjusted for the characteristics of individual companies and ships  
- SEEMP is a management tool and should limit the onboard administrative burden.

**IMO Implementation Guidelines**

**Planning**
- Current status of ship energy usage and the expected improvement of ship energy efficiency is determined. Establish a baseline!  
- Define and prioritize initiatives  
- Both ship internal processes and operational aspects should be covered (speed optimization, weather routing, hull maintenance, “just in time” etc.).

**Identify**
- Define how the prioritized initiatives are to be implemented on each ship  
- Define the owner(s) of each measure  
- Define each project with a start and end date  
- Keep records to assist in self evaluation.

**Implementation**
- Ensure benefit realization! (Requires a well established baseline with repeatable measurements)  
- Continuous and consistent data collection is the foundation for monitoring.  
- Performance monitoring that is standardized for the whole fleet is recommended (IEEO)  
- A good monitoring system should track the benefits of each prioritized initiative  
- The burden on ships staff should be minimized.

**Evaluation**  
- Progress of different improvement initiatives should regularly be followed-up  
- Establishing well defined self-evaluation periods will give an understanding of cause and effect that will improve the efficiency of future investments  
- An understanding of the overall characteristics of the ships operation will result in a better prioritising of future stages of the management plan.  
- Self-evaluation and improvement  
- Evaluate the effectiveness of the implemented improvements  
- Set new goals and implement the next cycle of the plan  
- SEEMP is not a static tool, but a continuous “work in progress”.

**The Insatech Performance Management System**
- Information display onboard in realtime  
- Aid in on-board decision making  
- Only useful information is sent to HQ  
- Ensures responses by use of “guidance system” for vessel operations

**Why SEEMP?**
- Ticket to Trade  
- Decision support  
- Optimize operation  
- Creates added value for shipowners if vessel performs above average

**A Practical Approach to Performance Management**
- Establishing a good and repeatable baseline is key for implementation of Performance Management  
- Define the requirements for data acquisition, ensuring the system is expandable to handle all future requirements  
- Define how data will be transferred from the vessel, data safety requirements, storage and use at HQ  
- Minimize crew involvement i.e. automate data acquisition and transfer  
- Start with “the low hanging fruit”, i.e. the largest energy consumers on board.

**Defining a good baseline**
- One approach is to use design documents or sea trial data if these have the necessary values  
- Main energy consumers are: Main engine(s), electrical production and boilers  
- Define an operational profile including Routing (plan and weather), Trim, cargo operations, autopilot use etc.

**The practical baseline**
- Start with “the low hanging fruit”, i.e. the largest energy consumers on board  
- Evaluate the quality of the information currently available on board  
- Typical fuel flow measurement systems have low accuracy and repeatability that will make evaluation of the results a waste of time!
Challenges to achieve repeatable fuel flow measurements
- Most vessels are equipped with volumetric flowmeters—typically a sliding vane meter
- These have a full scale accuracy
- Correct sizing is important
- Volumetric flowmeters need to compensate for density variations as we require a readout in kgs or tons
- Base density can vary up to 100 kg/m³! This is 10%.

Lowering the uncertainty of flow measurements
- Correct sizing of flowmeters
- Calibration of temperature sensors
- Manual input of the correct base density in the flow computer!
- Not practical!

The optimal solution for measuring fuel flow
- Use a Coriolis mass flowmeter that can handle the vibrations and flow pulsations (not all designs can)
- Pipe stress is a challenge for some types
- Uncertainty of a Rotamass system is: 0.1% of actual value
- Density output can be monitored for alarming of “capuccino effect” in fuels.

Data Acquisition
- Use industrial grade systems that can handle the tough environment found on board
- Challenges: Vibration, quality of power supply, ambient atmosphere, expandability
- Data collection speeds vary greatly, e.g. wave monitoring needs higher speed than COG
- Interconnectivity to other systems, e.g. navigation systems (NMEA)
- Access to reports/KPIs on board is a must
- Data compression and encryption to save costs.

Advantages of the Insatech Performance Management Data Acquisition System
- Minimises necessary data volumes without losing crucial details. Event based detailing
- Open Industrial systems for ease of integration to existing systems
- Built in Report functions
- Encrypted data – Read only format.
- Modular and expandable
- Manual inputs and local operator interfaces.

Event based logging
- The use of event based logging ensures the detail required for the specific channel, without collecting unnesessary data.

KPI values in real time
Built in report functions for on board use – influence behaviour
- The built-in report functions enable us to make locally viewable reports that can be designed to have a positive influence on crew behaviour and decision making.
- No need to send data to HQ, make reports and send them out again.
- Strong mathematical functions allow real time calculated values to be displayed, e.g. Tons fuel/NM/Ton displacement
- Such values can be used to create new baselines for performance if wind and sea state values are compensated.

Minimising data
- Even though all values are read, e.g. every second, we can minimise data amounts.

Important features for data retrieval
- Automatic system sends encrypted Noon Reports. (Push)
- Automatic archiving – based on vessel and time/data stamp
- Conversion to “open format” and use in standard systems
  e.g. SQL databases

Influence decisions on board
- Design/understand
- Evaluate
- Action/Change
- Measure

Create an Accurate and Trustworthy Baseline

Realtime values on board influence crew behaviour
- Correct fuel consumption is vital
- Realtime values on board influence crew behaviour

The “improvement loop.”
Decision support - on board as well!

Key Performance Indicators - KPI’s
- We recommend the use of KPIs as the base for easy comparison of performance.
- Use KPIs to influence on board behaviour as well as for monitoring performance degradation.
- Easy access to KPIs with a strong graphic presentation, and warnings/alarms can ensure due diligence on board.

KPI main groups
- Main engine performance (g/kWh)
- Aux. engine performance (g/kWh)
- Vessel performance:
  - Thrust/displacement (if available)
  - Fuel consumption (kg/NM/ton)
- Electrical power consumption per area
- Vessel Trim especially in Ballast mode.

Overview of all relevant KPI’s giving decision support
- Buffer time, idle time
- Speed / RPM deviation
- Propeller & Hül maintenance
- Weather effect
- Lube oil consumption
- Fuel statistics / Bunker
- Fuel alerts
- Anti-fouling evaluation
- Speed / consumption prediction, speed optimization
- Engine efficiency, engine utilization and optimizing
- Energy profiles
- Voyage optimization
- Operational profiles
- Warnings and triggers
- Environmental statistics & EEOI.

Screen menus
- Voyage Performance
- Main & Aux Engine
- Energy Consumers
- Vessel Performance
- Fuel Management
- Environmental
- Operations
- Guidance / Warning
- Boiler(s) and Incinerator
- Vessel KPI’s
- Trends & Tests
- Administration Setup.

Credible measurements = Better decisions
- For crew to take responsibility, it is important that the values displayed are credible
- Take “Raw” values and normalise them for display (Speed/Power curve to be normalised for displacement, wind speed/direction and wave action)
- Less scatter and a better aid in decision making
- Advisory messages, e.g. best power plant configuration at the given operating conditions.

CO2 emission reporting

Fuel consumption vs. speed.

Mileage per ton fuel vs reference.

Key features of the Insatech SEEMP System
- Industrial proven in use components
- Data transfer to shore minimised
- Real time KPI’s on board
- Built in guidance on board requiring crew acknowledgement ensures actions are taken. If not, the responsible crewmember can be found.

Other features
- Data accessible on board, HQ and “home”
- Ranking system for the fleet – competition = motivation.
Insatech A/S was established in 1989, and has, over the years, had a positive business development; today we are more than 50 employees, and are considered one of the market leaders.

We are based in Vordingborg in the south of Zealand, Denmark in an old historic building.

Since December 2005 we are part of the Addtech Group of companies – Addtech AB, Stockholm.

As a result of our longstanding partnership with some of the world’s leading manufacturers within instrumentation and automation, we are able to provide a global service.

We supply quality products, solutions and services in the fields of measurement, control and calibration to nearly all industrial segments, as well as utilities, and we work as a professional partner for our suppliers and for our customers – we believe in long term relationships.

Our main markets are in the Pharmaceutical, Food, Energy, Marine/Oil & Gas Industry, which means we have a strong knowledge of the special applications, as well as the requirements for documentation in these areas.

Our main business areas:

- Process instrumentation and calibration equipment
- Automation, control and data acquisition
- System design, engineering and validation (DCS and Safety Systems)
- Service/maintenance and calibration (ISO 17025 accreditation)
- Site surveys and evaluation of process optimization based on better control practices
- Marine- and ship solutions, Cargo Management Systems
- Project Management
- Flow rigs / calibration rigs
- Special fittings
- Product enhancements
- Wireless solutions for monitoring and control
- Complete solutions including panels and commissioning
- Seminars and training.