Sikkerhetsfokus fra systemintegrator ved overgang til ny teknologi

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Westcon Power & Automation in brief

- Complete supplier of power and automation systems.
- Engineering, installation and system integration
- Product range branded e-SEA® for tailored products and e-SEAMatic® for standardized platform.
  - IAS, PMS, EMS, cargo control, winch control, propulsion systems and more.
  - Switchboards, ac-drives, propulsion drives, hybrid battery systems and more.
- Part of Westcon Group with ~1000 employees in four business areas
  - Yards: Four yards in Norway
  - P&A: Products, installation and commissioning
  - Lifting technique
  - Geo: Seismic fleet
- Headquartered on the west coast of Norway
- Serving clients with turnkey projects in both rig, marine and landbased industries.

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Product brands

future oriented and far ahead in developing **electronic** control systems

aims to be a leading supplier of automation systems for **sea**-going vessels

focus on user friendliness and **easy** configuration, installation and expansion

tailor made automation systems with **seam**less, integrated solutions

no restrictions in complexity of auto**matic** and mathe**matic** tasks

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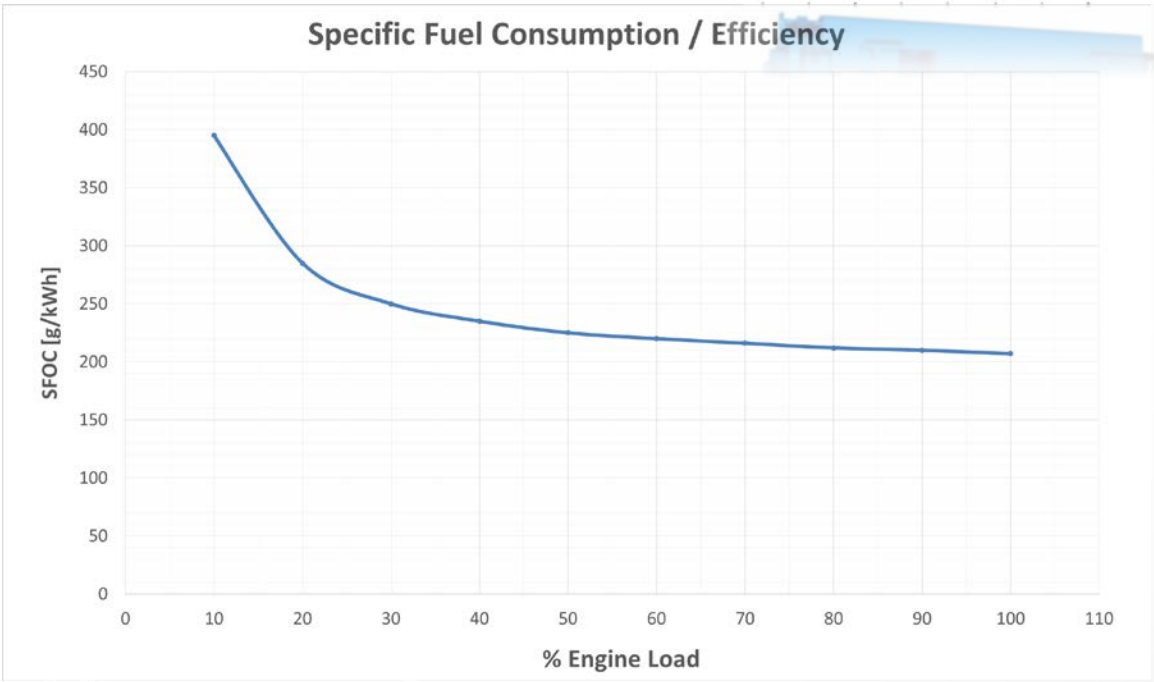
Background

- Long experience as system integrator and supplier of advanced control systems.
- Focus on concepts for energy efficient solutions for vessels and rigs – working on battery hybrid systems for more than 3 years.
- Member and contributor Maritime Cleantech (Norwegian Centre of Expertise) and Maritime Battery Forum.
- Involved in early hybrid ferries as vendor of existing automation systems.
- **Delivery of World First battery hybrid system approved as spinning reserve for DP offshore vessel, MV «Viking Energy» to Eidesvik Offshore.**

Optimal load

- Typical curve for engine specific fuel consumption.
- Depending on engine type.
- Fuel per kWh typically increases rapidly below 50% load.



Battery Hybrid benefits in general

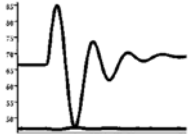
Reduced fuel consumption as fewer engines are neccessary - and online engines run on more optimal load

Lower engine maintenance cost due to less running hours

Reduced CO2- and NOX-emissions

Peak shaving of power demand seen by engines

Greater redundancy due to added «spinning reserve». Possibly improved ERN-numbers.



Improved dynamic performance, instant power available to support running gensets.

The Viking Energy challenge

- Customer requirements:
  - Designed and approved with newly released DNVGL Battery notation.
  - Approved as spinning reserve on DP: Battery(Power)
  - Capacity for >10 minute alone to abort DP-operation in case of failure on parallel genset.
  - Start/Stop philosophy
  - Peak-shaving capability
  - Short delivery time due to scheduled Yard stay
  - Short commissioning time
  - Coordination of complex interface with existing PMS- and DP-systems.
  - Designed to fit dual fuel engines on gas and diesel.

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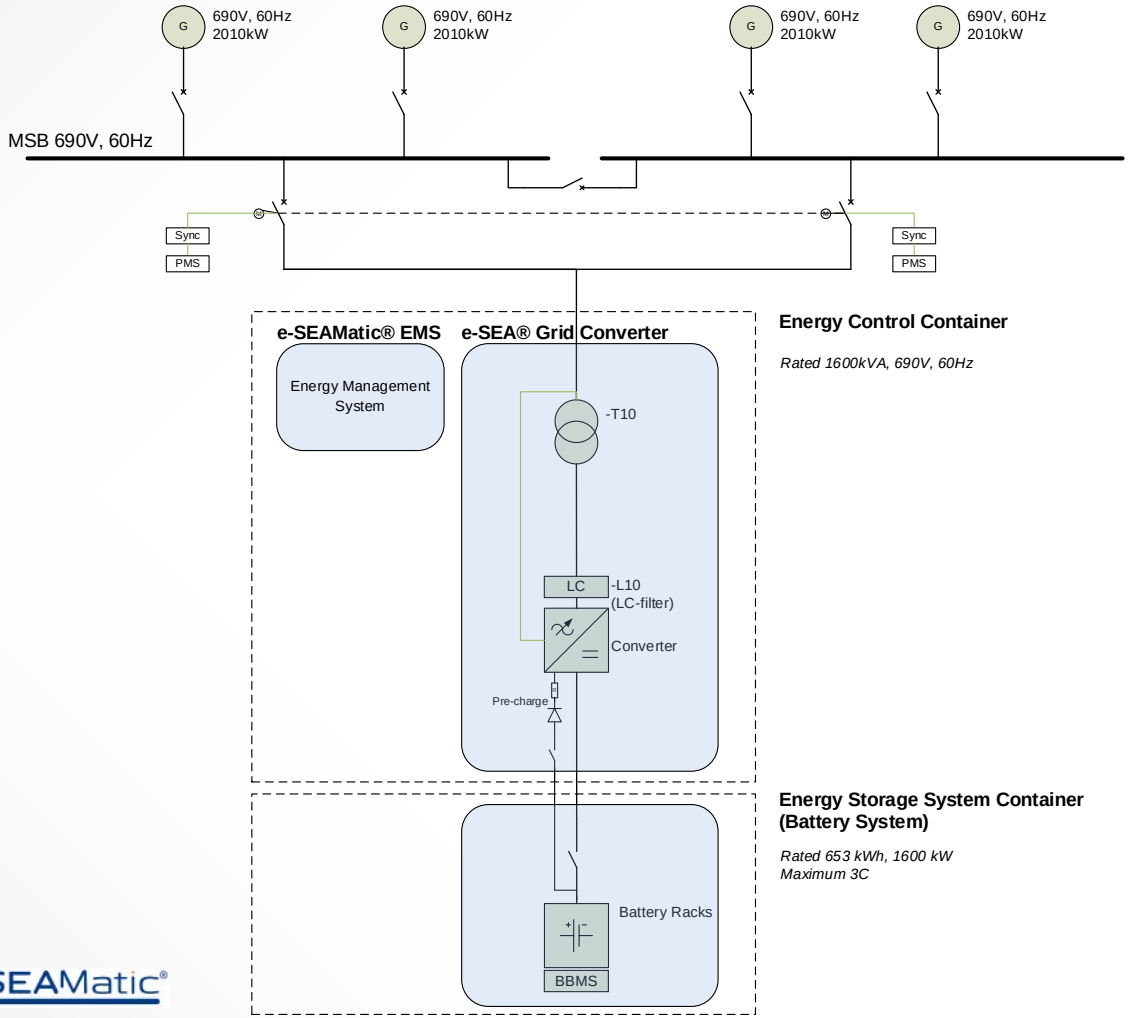
Delivery



Energy Control Container

Rated 1600kVA, 690V, 60Hz

Energy Storage System Container (Battery System)

Rated 653 kWh, 1600 kW
Maximum 3C

- Complete system delivery.
- Integration&interface on vessel.
- e-SEAMatic® EMS
- e-SEA® Grid Converter
- Battery Storage System

eSEAMatic®

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Project risks

- Safety risks
  - New techology introducing chemically stored energy (batteries). Risk of fire and explosion.
- Operational risks
  - Essential equipment, part of the redundancy on DP (spinning reserve)
  - Integration with ship system (DP, PMS, MSB, aux)
- Performance risks
  - Control of power electronics vs rotating machines
  - Energy savings
  - User experience and -confidence

Risk mitigation

- Close dialogue with DNVGL and NMA
- Class approved systems:
  - Battery system including BMS and safety systems
  - Control System (EMS)
  - Battery charger (power electronics)
- Safety assessment
- Gas- and explosion analysis
- Propagation tests
- Additional, independent shutdown system.
- Fire integrity, minimum A-0 and A-60 towards machinery space and escape routes
- Location of containers (battery space)
- Battery space not containing other systems for essential services
- Battery space temperature control

Risk mitigation

- Alarms from EMS integrated with ship's alarm system
- Gas- and fire detection system
- Fire extinguishing systems (Novec1230 and sprinkling)
- Exhaust fan to safe area for gas extraction
- Strength requirements for containers and foundations
- Explosion hatch
- Hardwired Emergency stop circuits (local, bridge and ECR)
- DP requirements for supply auxiliary equipment
- Selectivity and coordination of protection devices
- Thorough internal testing on testlab
- Thorough FAT-testing and integration tests
- Thorough SAT- and FMEA-testing onboard

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Battery hybrid testlab

- Marine type main switchboard with generator cubicles, bustie and feeders.
- Drive cabinets and lab PLC
- Complete hybrid system with e-SEAMatic® EMS
- 2 electrical driven gensets operating in parallell with battery system
- Frequency controlled electrical motors to simulate dynamic changes in load
- Detailed and realistic testing of system and regulation before applied in real life.

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Working with NMA

- NMA is a «contributor to achieve innovative and environmental friendly solutions»…….
- …..without compromising safety!
- «Better safe than sorry» when the technology is new and experience limited. The better approach for all parties in the long run.
- Positive with a pro-active approach and open-door policy to discuss challenges and solutions.
- Important to work for international acceptance and common rules.
- General requirement of class certificates on all equipment? Equal practice for all parties is very important.

Summary

- New technology such as battery solutions may result in signficantly reduced fuel consumption, emissions and maintenance cost.
- Improved dynamic performance and better utilization of grid
- Risks must be identified and handled, a strong and clear ruleset is necessary to achieve it.
- Special attention to integration, control and testing at sea is important. System integration is essential.

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Thanks for your attention!