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.
Product brands

- Future oriented and far ahead in developing electronic control systems.

- Focus on user friendliness and easy configuration, installation and expansion.

- No restrictions in complexity of automatic and mathematic tasks.

- Aims to be a leading supplier of automation systems for seagoing vessels.

- Tailor made automation systems with seamless, integrated solutions.
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 necessary - 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.
Delivery

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

• Safety risks
  – New technology 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
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 parallel 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.
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 significantly 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.
Thanks for your attention!