



ASSERTIVE TECHNICAL REVIEW AND VERIFICATION ENABLES FIRST HYBRID-POWER INTEGRATION ABOARD SEACOR VESSEL

CHALLENGES

Provide technical guidelines and approvals required for the installation of a novel, lithium-ion battery power system aboard the SEACOR Maya to improve safety, drive energy efficiencies and reduce overall environmental impact.

SOLUTION

Conduct technical reviews and survey verifications of vendor supplied equipment and their installation aboard the SEACOR Maya.

RESULTS

The integration of the lithium-ion battery system aboard the SEACOR Maya was completed with all necessary approvals and made operational within 90 days, reducing the vessel's average-fuel consumption by 20%.



OVERVIEW

Offshore supply vessels (OSV) have traditionally used two main diesel engines driving twin shafts and propellers, with auxiliary generators providing electrical power. Although, the idea of integrating hybrid-electric power systems with conventional power sources has become more attractive to vessel owners in the past few years. In development since the early 2000's, auxiliary hybrid-electric power aboard vessels is supplied by lithium-ion battery banks, which are charged and discharged through a switchboard that modulates energy use. The technology keeps generators from running more than necessary, and at their sweet spot: between 75% and 80% of the maximum continuous rating. At higher power demands, the batteries are supplying power, and at lower power demands the generators are recharging batteries, enabling the generators to run constantly near or at their operational load sweet spot.

CHALLENGES

SEACOR recognized that auxiliary hybrid-electric power aboard their OSVs could substantially reduce fuel consumptions and emissions. Because of this, they decided to integrate a lithium-ion battery system aboard their OSV SEACOR Maya, a 285-foot dynamically positioned diesel-electric vessel in March 2018. But, while SEACOR could design the system in cooperation with vendors Kongsberg Maritime and Corvus and develop a plan to integrate the battery system with the ship's control and power management disposition, this was SEACOR's first attempt at this type of power integration aboard one of their vessels. Added to this the lithium-ion battery system was complex. The battery, enclosed in a 20-ft shipping container, weighs approximately 28 tons. And, like other battery-based technologies, the lithium-ion batteries require risk management: temperature control, power management, backup and redundancy, and modulation of charging and discharging; it is also surrounded by a heating and cooling system to maintain those parameters. Beyond their need for HSE and operational oversight and review, SEACOR needed an organization that had experience with the new technology they wanted to employ. For this reason, they selected ABS to provide technical reviews and survey verifications of vendor supplied equipment and installation aboard the SEACOR Maya.

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SOLUTION

ABS is an industry leader in providing guidance for the safer development and deployment of hybrid power and is supporting its adoption with a strategy that focuses on the three areas of storage, distribution and generation, and advances integration of hybrid power systems into marine and offshore assets. For the SEACOR lithium-ion battery integration project, ABS provided several key reviews and verifications:

- Reviewed and approved test reports, specifications, and safety features
- Reviewed and approved structural documentation on battery container
- Witnessed testing of converters that transform battery voltage to ship system voltage
- Reviewed technical documentation for structural, electrical, HVAC, safety system and the testing of system batteries, convertors, transformers, HVAC units
- Reviewed technical documentation for installation of container on board that covered stability calculation, structural and electrical drawings
- Reviewed modification of the switchboard drawings for hybrid system

RESULTS

With its design and components tested and approved for hybrid-power integration, the SEACOR Maya was converted at Bollinger Shipyards in Morgan City, Louisiana, followed by sea trials in May 2018.

The integration of the lithium-Ion battery system aboard the SEACOR Maya was completed with all necessary approvals and made operational within 90 days, reducing the vessel's average-fuel consumption by 20%. As a result of this performance, SEACOR adapted three more vessels for service with plans to adapt an additional six.

“The hybrid solution has the potential to cut the ship’s fuel consumption by as much as 20%, reduce emissions and support the company’s compliance with the ever-tightening environmental regulations in the U.S. and abroad.”

Tim Clerc
Vice President of Engineering, SEACOR