
HYBRID ELECTRIC POWER SYSTEMS

As technology evolves and regulatory complexities increase, the maritime industry is faced with the reality of both complying with environmental requirements and meeting operational demands.



To deal with these challenges, owners and operators are turning to more non-conventional sources of energy to power and propel vessels. As the industry moves ahead, hybrid electric power systems will play a key role in meeting the regulatory and operational demands placed on vessels.

HOW HYBRID ELECTRIC POWER SYSTEMS SUPPORT OFFSHORE OPERATIONS

Current technological advances are increasing the number of options available for owners and operators which can better suit the specific needs of a vessel for a range of operational circumstances while meeting the

current and foreseeable environmental concerns. One alternative to the conventional mechanical propulsion arrangement is an electric propulsion system. An electric propulsion system allows for the propulsion capability of the vessel to be provided by electric propulsion motors. These propulsion motors are supplied by a common set of generators that also supply the asset's hotel loads.

One of the main benefits of electric propulsion systems is the ability to optimize the loading of the prime movers for the generators (diesel engines, gas turbines, etc.) to obtain maximum efficiency and reduce fuel consumption.

Modern electric propulsion systems are being further enhanced by the incorporation of new technology. One example is the incorporation of alternative electrical power sources such as fuel cells, solar panels and wind turbines. Other designs employ one or more methods of energy storage such as batteries, super-capacitors and flywheels to supply and/or supplement the electrical power needs of the vessel.

HOW ABS CAN HELP

To help guide the industry in the development of new concepts, ABS has introduced the *ABS Advisory on Hybrid Electric Power Systems* which takes a measured approach to



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evaluating the potential advantages and disadvantages, challenges and level of readiness for the primary hybrid electric power systems and components that are most suited for marine and offshore applications. The comprehensive list of technologies addressed in the Advisory includes lithium-ion batteries, supercapacitors, flywheel energy storage, fuel cells, wind and solar. Following the Advisory, ABS released a comprehensive suite of Guides to facilitate effective installation and operation of energy generation, storage and distribution systems.

- *ABS Guide for use of Lithium Batteries in the Marine and Offshore Industries*, April 2017
- *ABS Guide for use of Supercapacitors in the Marine and Offshore Industries*, December 2017
- *ABS Guide for Direct Current (DC) Power Distribution Systems for Marine and Offshore Applications*, June 2018

- *ABS Guide for Fuel Cell Power Systems for Marine and Offshore Applications*, November 2019

ABS offers a full range of services that support the development and integration of hybrid electric power systems:

- Approval in Principle (AIP)
- Component and Equipment Certification and Type Approval
- System Design Approval
- Class approval on hybrid system integration on board a vessel

KEY EXPERIENCE HIGHLIGHTS ENERGY STORAGE TECHNOLOGIES

ABS has also classed vessels with lithium-ion battery installations.

- Offshore support vessels for SEACOR Marine in the Gulf of Mexico (GOM) operate using hybrid power ESS-LiBATTERY notation is given to SEACOR Maya OSV currently

operated by Mantenimiento Express Maritimo SAPI de CV (MEXMAR), SEACOR Marine's joint venture in Mexico upon review and survey of the installation. SEACOR has engaged ABS to provide the optional ESS-LiBATTERY notation, on three additional OSVs operated by MEXMAR, planned to upgrade to a similar battery system. ABS also classed SEACOR Maya's sister vessel SEACOR Azteca with ESS-LiBATTERY notation.

- Harvey Energy will become the first ABS-classed dual-fuel (LNG/marine diesel) and battery vessel and the first U.S. flagged OSV equipped with a battery/converter system. The installation of a 1,450 kW battery hybrid solution is anticipated to reduce the Harvey Energy's exhaust emissions, fuel consumption, and noise level. The overall fuel cost savings are expected to be in the range of 10 to 20 percent, according to Harvey Gulf International.



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