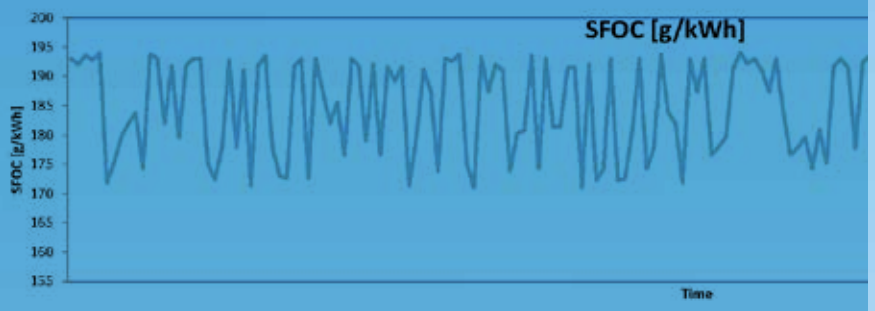
høglund
POWER SOLUTIONS



Energy storage and optimisation

Accelerating the shift to greener shipping...

...international and national incentives and regulations are being enforced to reduce emissions from ships.

Høglund's energy storage systems reduce emissions, fuel consumption and maintenance.

Benefits

- Reduced emissions
- Reduced fuel consumption
- Reduced maintenance
- Spinning reserve delivers reliable power supply
- Increased redundancy
- Lowest possible OPEX

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Energy storage and optimisation

FACT Diesel engines have high emissions and poor fuel economy when partially loaded. FACT Modern gas and diesel engines have poor load change capabilities.

Høglund's lithium-based energy storage system is designed to deliver the lowest possible operating expense (OPEX), alongside the lowest capital expenditure. By monitoring and controlling all the battery cells in the system we can ensure our customers enjoy long and trouble-free operations.

Newbuild and retrofit applications

Standard mitigation techniques have been developed for shipyards to fit out a battery room internally within a ship's superstructure. For retrofit projects a containerised system can be installed, preconfigured with battery and power electronics compartments.

Easy debugging and troubleshooting

The Genius Modular Redundancy (GMR) Human machine interface (HMI) software delivers a wide range of debugging and troubleshooting capabilities.

Playback

Høglund's bespoke solution comes with a data logging facility which can easily be played back if there are issues with the system. The operator can also use this function to monitor the nominal working values of the system at any time.

Remote connection

If a remote connection option is installed, Høglund engineers will log onto the system, perform remote troubleshooting and implement programme changes. 95% of all operational issues are solved remotely. Ship owners benefit through lower mean time to repair (MTTR) hours and reduced service costs.

Seamless integration

By selecting a Høglund control system it is simple to mix and match with other Høglund systems and amalgamate all the data within one presentation interface. Interfaces for other IAS vendors are also available.

Modular approach

Both hardware and software modules are designed as changeable units with clear interfaces. This approach enables future retrofits and upgrades by replacing only the faulty or obsolete unit.

General specifications

- Voltage: any (selecti appropriate transformer)
- Frequency: 50 or 60Hz
- Capacity: 100-3000kWh
- Power: 50-5000kW
- 8000 cycles@60% DOD typical
- Chemistry: Li-ion NMC
- Battery efficiency: 98% typical
- 50-1200V
- 5.7-137kWh
- C-rate peak 6C
- Integrated BMS: measures cell voltage, temperature and calculated max/min current.
- Hardware: emergency stop loop
- IP 44 system
- IP56 (IP67) optional battery modules
- Air or liquid cooled versions available
- Cell-level thermal runaway isolation
- Integrated thermal runaway gas venting

Approvals

- DNV GL Battery Power/Battery safety
- Other class societies on demand

Energy management system (EMS)

- IEC 61131 compliant software code
- Interface to IAS
- Interface to DP
- Interface to BMS
- Interface to MSB
- Interface to Aux system
- Local operation panel
- Active load sharing method: Isochronous, Droop
- Reactive load sharing method: Droop
- Power: 50-5000kW
- Voltage: 500 or 690V AC
- Drive efficiency: 97%
- Air and Water cooled versions available
- Cooling water max temp: 38°C
- Max ambient temp: 45°C
- IP 44 enclosure

The power conversion between DC and AC is controlled by a highly efficient insulated-gate bipolar transistor (IGBT) converter. We use second generation thermal runaway management to prevent the cells becoming thermally unstable and the high heat of the failing cell propagating to the next cell, causing it to become thermally unstable as well. The battery rack is type approved. Two different cell chemistries are available producing either high-specific energy or high-specific power.

Peak shaving mode

Load peaks are shaved off, making generators power ramping smoother. Average loads on generators will be the same as the average grid consumption.

Spinning reserve mode

Where a spinning reserve is required to fulfill class requirements when operating (ie during dynamic positioning operation) Høglund's energy storage system will charge batteries to a high state of charge (SOC) level. This will be maintained in case it is required to take over the load of a faulty generator.

Harbour low-load mode

When a vessel is docked, the main engine's auxilliary systems may be shut down. By applying the low load mode, this enables the ship to be fully powered by battery for extended times. When the battery is discharged, the first available generator will be started to charge the battery under optimum load. Høglund's energy storage system will also work as a peak-shaver, together with the shore connection, to supply the ship's grid.

Emergency mode

Høglund's energy storage system will automatically activate the emergency mode if generators trip unexpectedly. The system will activate a high power switchboard to manage operations while waiting for additional generators to take over.

Optimum load mode

When in optimum load mode, the load on the generators is optimised according to the actual specific fuel oil consumption (SFOC) curve of the connected generators. Høglund's energy storage system will begin charging if the grid load is below the generator optimum load and discharge if the grid load is above the generator optimum load. Høglund's energy management system will also control a number of connected generators.

Ramp assist mode

Høglund's energy storage system will only deliver power if the load ramp of the connected generators is close to being exceeded. This type of operational mode can be beneficial for TIER III compliant diesel or gas generators. This function improves the propulsion response of a vessel because power is available instantly, within milliseconds.

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