

xero | point
hybrid



HYBRID MARINE POWER

clean and simple



XeroPoint Hybrid Solution . . . clean and simple

The XeroPoint Hybrid system combines diesel and electric power on the same shaft line. A motor-generator (a single machine that can act as either a shaft motor or a shaft generator) and a diesel engine are able to drive the shaft independently or together. Auxiliary diesel generators meet the requirements of hotel and drive shaft motor loads.

For standing-by or for very low power operations, electrical energy storage - e.g., batteries - permits the vessel to be operated in zero emissions mode, with no rotating machinery running.

At low power, the unique XeroPoint Hybrid arrangement operates as a conventional diesel electric plant. Propulsion

and hotel loads are met by a combination of diesel generator sets and electrical storage.

When vessel power requirements are within the efficient operating range of the main propulsion diesels, the vessel operates as a conventional, diesel-only system. Shaft generators support hotel loads, using modern conversion technology to provide constant voltage regardless of shaft speed.

At high power, the diesel and shaft motor work together to provide propulsion. The shaft motor augments diesel power while simultaneously increasing system responsiveness with its superior low-end torque characteristics.

XeroPoint Hybrid vs. Diesel-Electric

The XeroPoint Hybrid system is not simply diesel-electric by another name. The technology has important advantages compared to conventional diesel-electric systems.

Our unique load-sharing technology creates the possibility for a wider range of highly efficient configurations with less installed machinery than a diesel-electric design.

In comparison to a conventional diesel-electric system of similar power, XeroPoint Hybrid provides:

- reduced system size and weight
- lower capital cost
- greater overall efficiency
- higher level of safety and reliability

hybrid technology

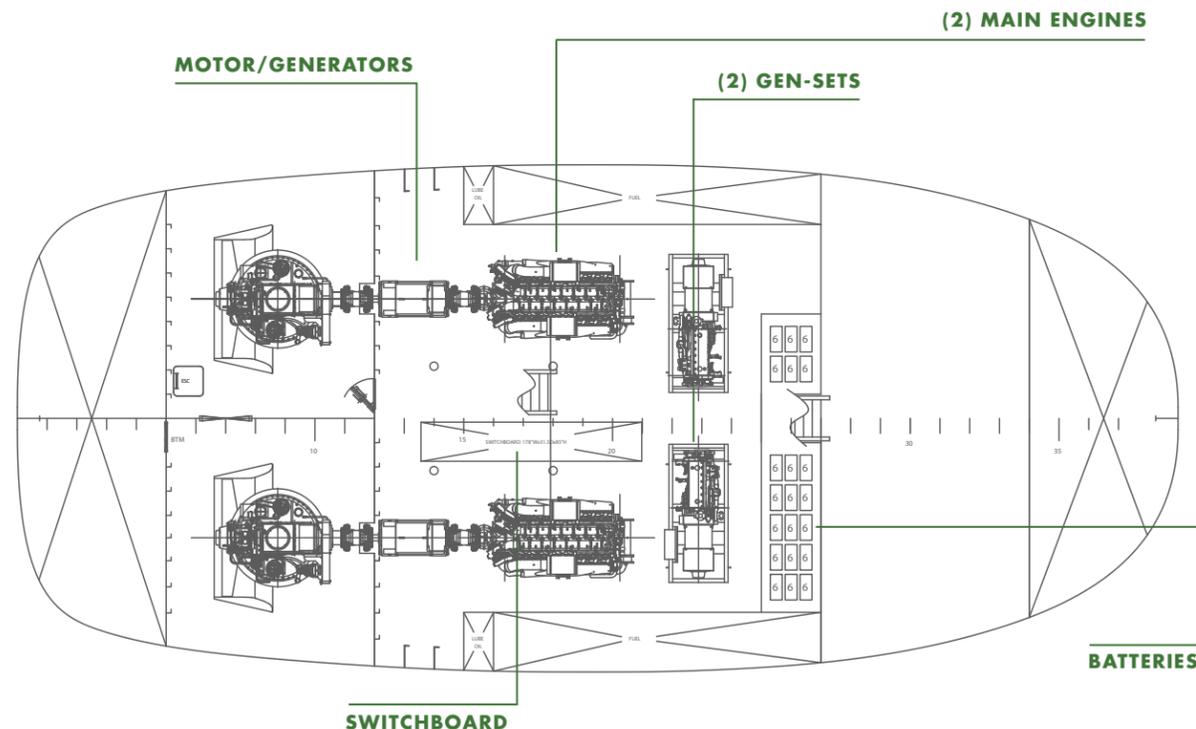
Reduced harmful emissions
Lower maintenance costs • Improved fuel economy
Economical power when you need it

Hybrid by the Numbers

A recently published study released by the California Air Resource Board provides independent verification for the merits of hybrid propulsion. The study compared a conventional tug to one fitted with a XeroPoint Hybrid Power system. The results are summarized in the statement below;

“The reductions in overall PM2.5, NOx and CO2 emissions for the hybrid tug compared to the conventional tug was found to be 73%, 51% and 27% respectively. The tug company saw a fuel savings of about 25-28% while comparing a conventional tug with the hybrid over an eight month period. The CO2 reductions calculated from this study are in good agreement with the fuel savings seen by the tug owner, thereby increasing confidence in the test protocol and analysis technique.”

From the Study: Evaluating Emission Benefits of a Hybrid Tugboat, University of California Riverside



ABOUT AKA / ENGINEERING INNOVATIVE SOLUTIONS

The AKA Group of Companies provides innovative engineering solutions to a global marine and offshore market.

The company offers a unique range of system-specific services including electrical, mechanical and marine engineering.

With core competencies in marine and offshore operations and technology development, Aspin Kemp & Associates has a history of successfully combining and re-purposing existing technologies to produce new innovations.

AKA's XeroPoint Hybrid propulsion system evolved from blending our high-reliability electrical engineering technology for offshore oil production with a high efficiency/low cost

hybrid propulsion design we developed for a clean and quiet eco-tourism platform.

www.aka-group.com

Why XeroPoint Hybrid?

As the marine industry strives to improve efficiency, reduce emissions and meet emerging environmental standards, hybrid propulsion technologies are getting a closer look from vessel operators around the world.

What makes XeroPoint Hybrid right for your operation? XeroPoint Hybrid technology works by exploiting variability in ship power requirements. It has proven to be a good fit for the ship assist industry where tug operators have extreme needs for high power, but only for limited periods of time.

There are many other examples where XeroPoint Hybrid makes great sense for the marine industry. Vessels with a frequently-occurring mix of loiter and working times, or high and low power requirements, are good candidates for hybrid power systems.

XeroPoint Hybrid technology is suitable for new construction and retrofits of existing vessels. The system reduces all emissions, creates significant fuel and maintenance cost savings and contributes to a healthier workplace for crews:

- **Reduced Emissions:** With XeroPoint Hybrid technology, engines run at or near best efficiency - and only when needed. Lower fuel usage and cleaner combustion both contribute to reducing harmful emissions.
- **Improved Fuel Economy:** Because XeroPoint Hybrid technology shares the propulsion load between diesel and electrical sources, it means no unnecessary idling.
- **Lower Maintenance Costs:** XeroPoint Hybrid technology means minimized engine use - more time between engine overhauls and oil and filter changes.
- **Healthier Workplace:** XeroPoint Hybrid technology allows engines to be shut down at sea, without sacrificing readiness; the vessel is fully operable on battery power alone at low power. Reduced engine running drastically cuts engine room noise, helping to create a healthier workplace.

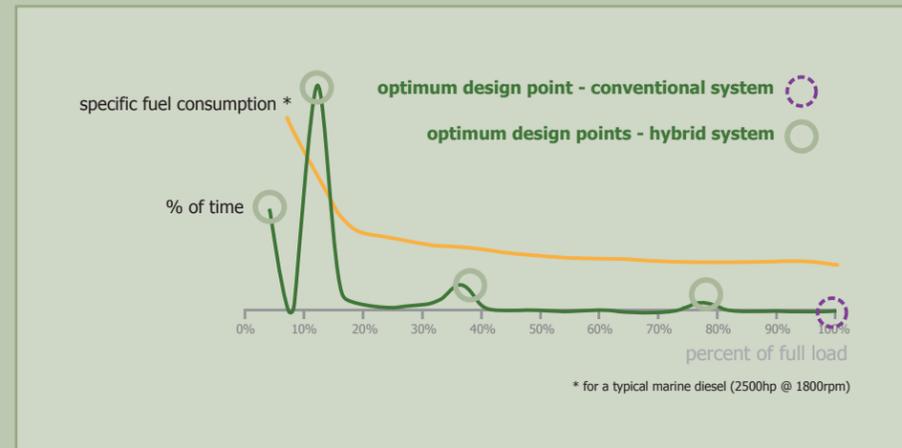
Design Approach

AKA's XeroPoint Hybrid design team takes a holistic approach to hybrid vessel design. Starting with understanding the owner-operator's goals and the vessel's duty cycle, we consider the entire vessel operation, including crew and maintenance staff, as a complex integrated system.

Duty cycle analysis involves finding the important load points in a vessel's operational profile, and designing specific machinery

configurations around those spots. The traditional propulsion design approach has been to optimize around a single load point at or near maximum power.

But workboats and other multi-function vessels typically spend a large amount of time operating at low load, where specific fuel consumption performance for diesel engines is well off optimum.



hybrid marine power

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The XeroPoint Hybrid design approach focuses on your specific vessel, team, and operational realities to eliminate system inefficiencies and deliver significant fuel economy, maintenance savings and emissions reductions. We will work with your team to assemble the data - using existing data or putting a team onboard to measure power levels directly - and prepare a complete analysis and business case before you commit to capital spending.



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The future is green and the XeroPoint Hybrid system from AKA represents the marine industry's true green technology debut. Applicable to a wide range of vessels in such diverse sectors as towage, offshore services, ferries, eco-tourism and beyond, XeroPoint Hybrid is the only full hybrid technology available for marine propulsion - clean and simple. Contact us to find out how easy and cost effective it can be to build or retrofit the green way.



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