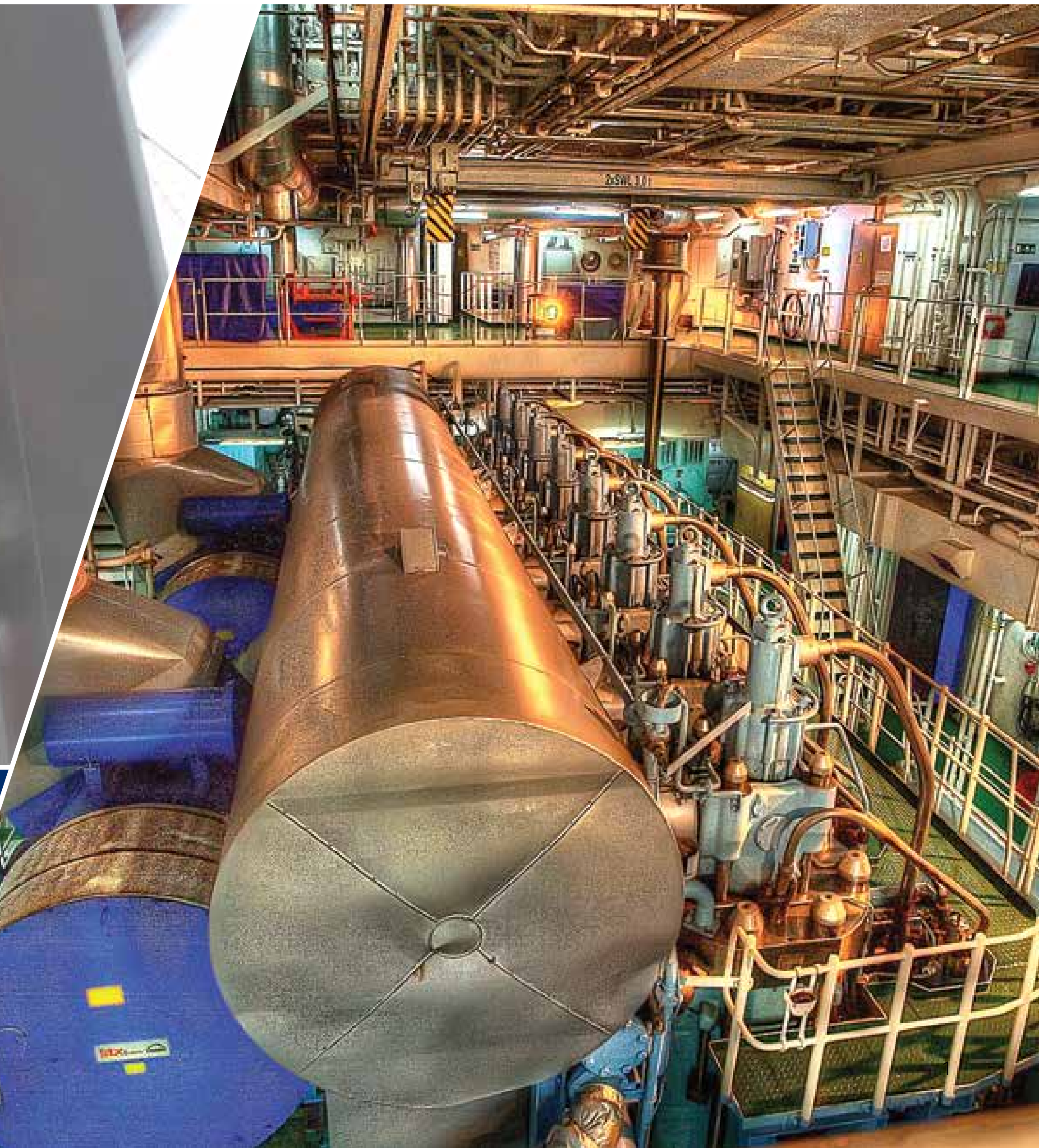
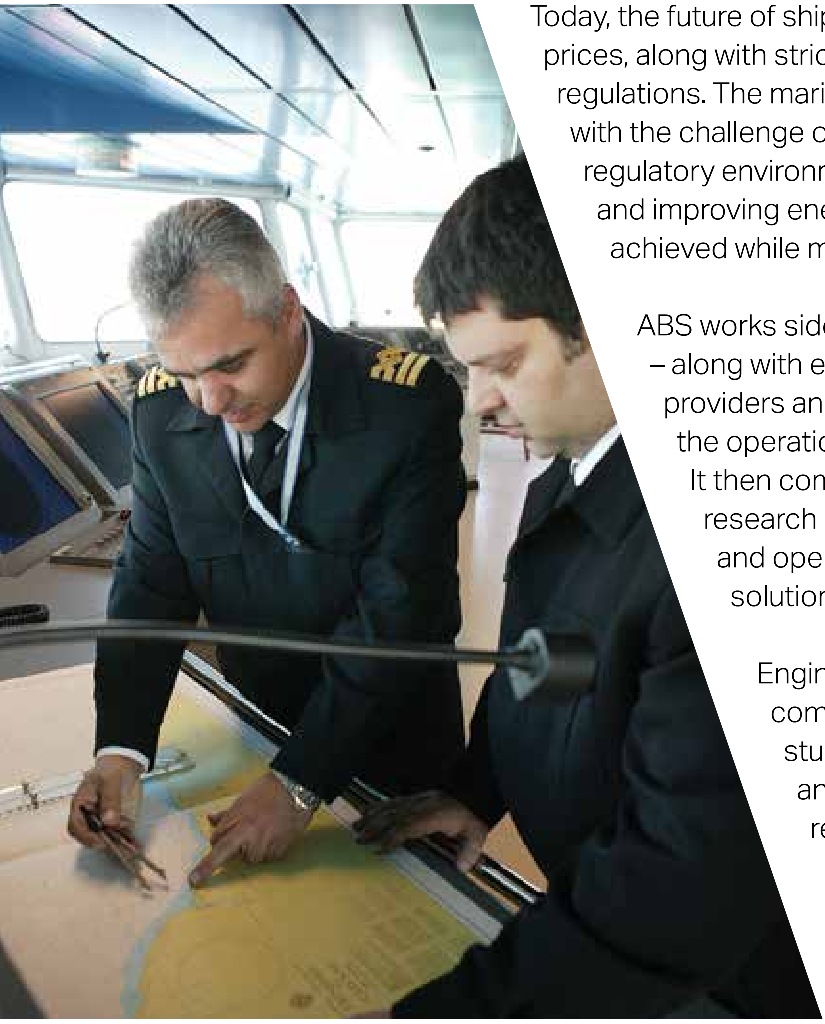
FOUNDED 1862

Energy Efficiency

Technical Solutions for Operational Challenges



Data Driven Analyses

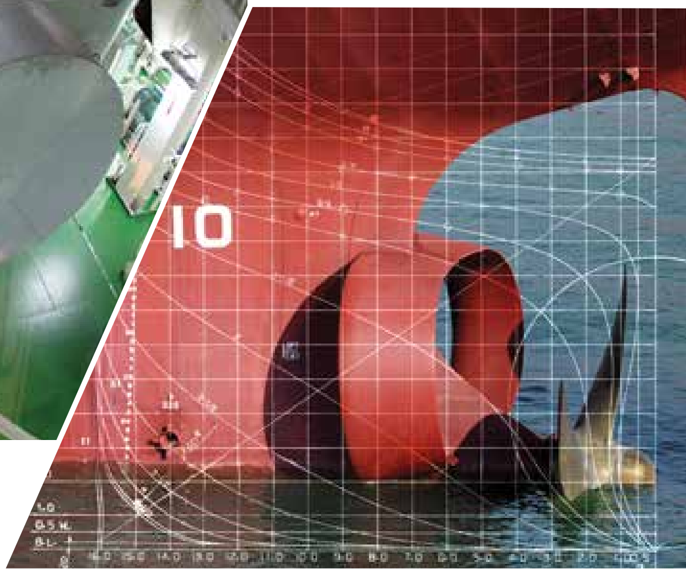


Today, the future of shipping is responsive to high fuel oil prices, along with stricter air emission and environmental regulations. The marine and offshore industries are faced with the challenge of addressing the new environmental regulatory environment, while lowering fuel consumption and improving energy efficiency. These goals must be achieved while maintaining the highest level of safety.

ABS works side by side with its members and clients – along with engineers, designers, technology providers and researchers – to better understand the operational challenges faced by the industry. It then combines the benefits of its expansive research and modeling resources to offer owners and operators access to the latest technical solutions available.

Engineers assist in determining cost effective compliance options. Risk-based analysis studies take into account characteristics and operating profiles, regulatory requirements and potential technical or operational solutions. These are further investigated to determine comparative total cost of ownership. Clients apply the results to create efficiencies driven by the need for energy conservation and regulatory compliance.

Streamlined EEDI Verification



The Energy Efficiency Design Index (EEDI) is a metric for ship designs, expressed in grams of carbon dioxide (CO_2) per ship's capacity-mile and calculated by a formula based on technical design parameters.

ABS provides estimates as part of EEDI preliminary verification during the concept design stage to account for type of ship, speed-power curve for loading conditions, engine characteristics, energy-saving equipment and devices, fuel type, and ship's cargo capacity (deadweight).

ABS also offers guidance for the planning of towing tank (model) tests to optimize the scope for EEDI preliminary and final verification requirements, assisting its clients with meeting the International Maritime Organization's (IMO's) environmental standards for obtaining minimum propulsion power.

At the end of construction/sea trials and before delivery, ABS provides support for the planning and conduct of speed trials required for EEDI verification, as well as attendance on board. Upon recognition of meeting the IMO's Marine Environment Protection Committee (MEPC) requirements, ABS will issue the International Energy Efficiency (IEE) certificate.

Performance Benchmarking

Performance benchmarking is an important step toward improving a vessel's operational traits. The process provides information on how a vessel's as-built performance characteristics are compared with those of its peers, and whether consideration should be given to retrofit solutions aimed at improving energy efficiency.

ABS can provide services to benchmark energy efficiency performance and allow shipowners and managers to identify energy-saving opportunities and make informed decisions from design to operation.

In providing guidance for newbuilds, ABS utilizes the EEDI metric, a mandatory introduction to propulsion performance evaluation. This is supplemented by the application of ABS' unique benchmarking methodology, producing a more purposeful comparison between designs of similar capacity at loading condition and speed of interest.

For vessels in service, ABS uses a data depository supplemented by public domain statistics to assist clients. With the application of regression tools, baselines can be created to benchmark existing ship metrics (for example, speed and power performance characteristics) against vessels similar in capacity.

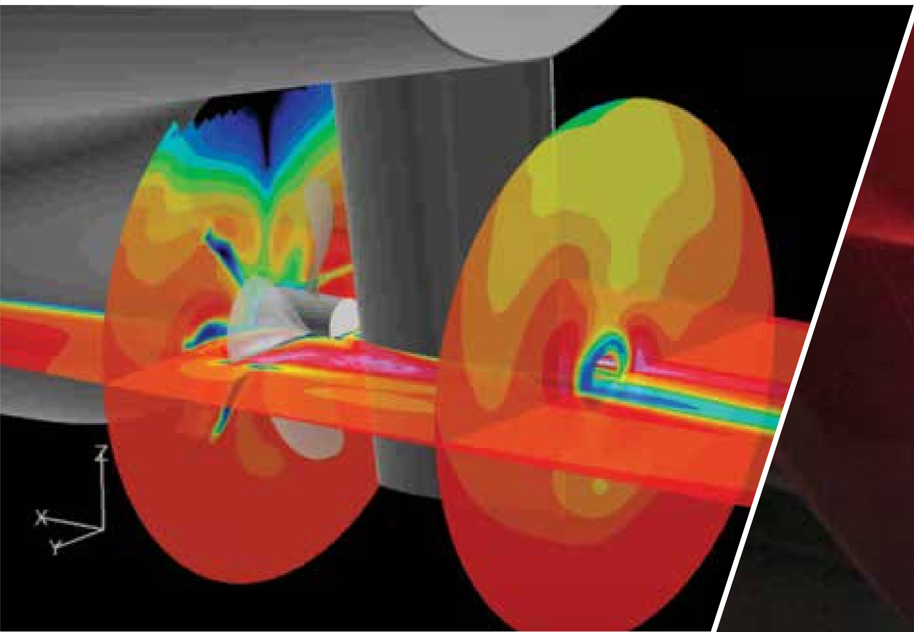
Hull and Propeller Analyses

The best way to increase newbuild energy efficiency and reduce fuel consumption is to optimize the hull shape, propeller and rudder, and the interaction amongst them all. ABS targets energy efficiencies created by improving ship construction; minimizing hull resistance and increasing propulsion efficiency; and modifying vessel design and operation to account for additional resistance caused by specific service conditions.

A dedicated Computational Fluid Dynamics (CFD) team working in concert with ABS' Chief Scientist for CFD can provide analyses by using RANS-based CFD to accurately calculate the flow around hull, propeller and appendages to assess the resistance and powering characteristics. By applying hull and propeller optimization techniques, ABS can identify ways for owners and builders to develop more fuel efficient vessels.

Current containership freight load and market developments in other shipping segments are demanding changes that involve slow-steaming to optimize operational efficiency. ABS tools evaluate bulbous bow geometry configurations using advanced CFD techniques and lead to recommendations to improve fuel efficiency at a given operational profile.

ABS uses state-of-the-art propeller analyses and CFD software to predict propeller behavior and study propeller-hull interactions. Given its understanding of engine technology, ABS can offer guidance for selecting the most optimum engine as part of the propulsion train. The sum contribution of the ABS team is a sea change toward energy efficiency.



Evaluating Energy-saving Devices

Many energy-saving devices have been studied to either correct the performance of a suboptimal ship design or improve on existing designs. A range of these devices are aimed at maximizing propulsion, reducing skin friction, and using renewable energy sources.

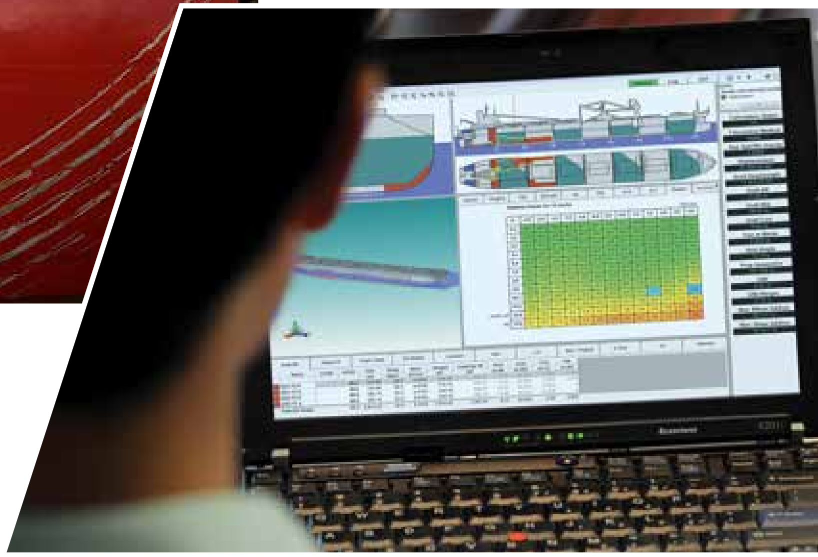
To provide guidance to a vessel owner on enhancing energy efficiency, ABS applies CFD technology to measure various compatible combinations. Energy-saving devices can be explored and their potential application benefits analyzed.

In addition, ABS provides a CFD-based integrated hull, propeller, rudder and energy saving device analysis of a vessel. This cost-effective approach allows owners to assess the ship's performance, providing an opportunity to evaluate various design concepts.

Specification Reviews – Decision-making Guidance

ABS reviews specifications of the hull and machinery for newbuild vessel construction with regard to energy efficiency and environmental performance. Feedback is provided in an ABS report outlining the areas where improvements can be realized during the design phase, to improve the operational performance of the vessel. Combining this feedback with techno-economic modeling offers prospective owners a sound understanding of the vessel in the marketplace and allows them to evaluate the impact of making capital investments in additional environmental and energy-saving devices.

Techno-economic Modeling



Techno-economic modeling evaluates technology investment options to assess competitiveness of newbuilds or existing ships as new eco designs enter service, or new regulations come into force. The approach simulates newbuild and retrofit technology decisions, using regulatory compliance, payback period, net present value (NPV), return on investment (ROI), life cycle cost approach (LCCA) and other key criteria.

ABS analysis bridges the gap between technical design and economic assessment to optimize solutions for owners that will result in the reduction of operating costs, the increase of charter rates, and the rise in a ship's resale value.

Techno-economic assessment can provide guidance on fuel operating expenses. It can examine the NPV between a scrubber and LNG-ready retrofit, study the ROI of a bulbous bow retrofit on a container carrier or assist with the selection of a ballast water management system by evaluating available market options. It can compare life cycle asset values for a current vessel versus a newbuild benefiting from eco features.

Throughout the process, ABS strives to yield the most representative model, and a set of scenarios against which performance is assessed and the investment decision is made.

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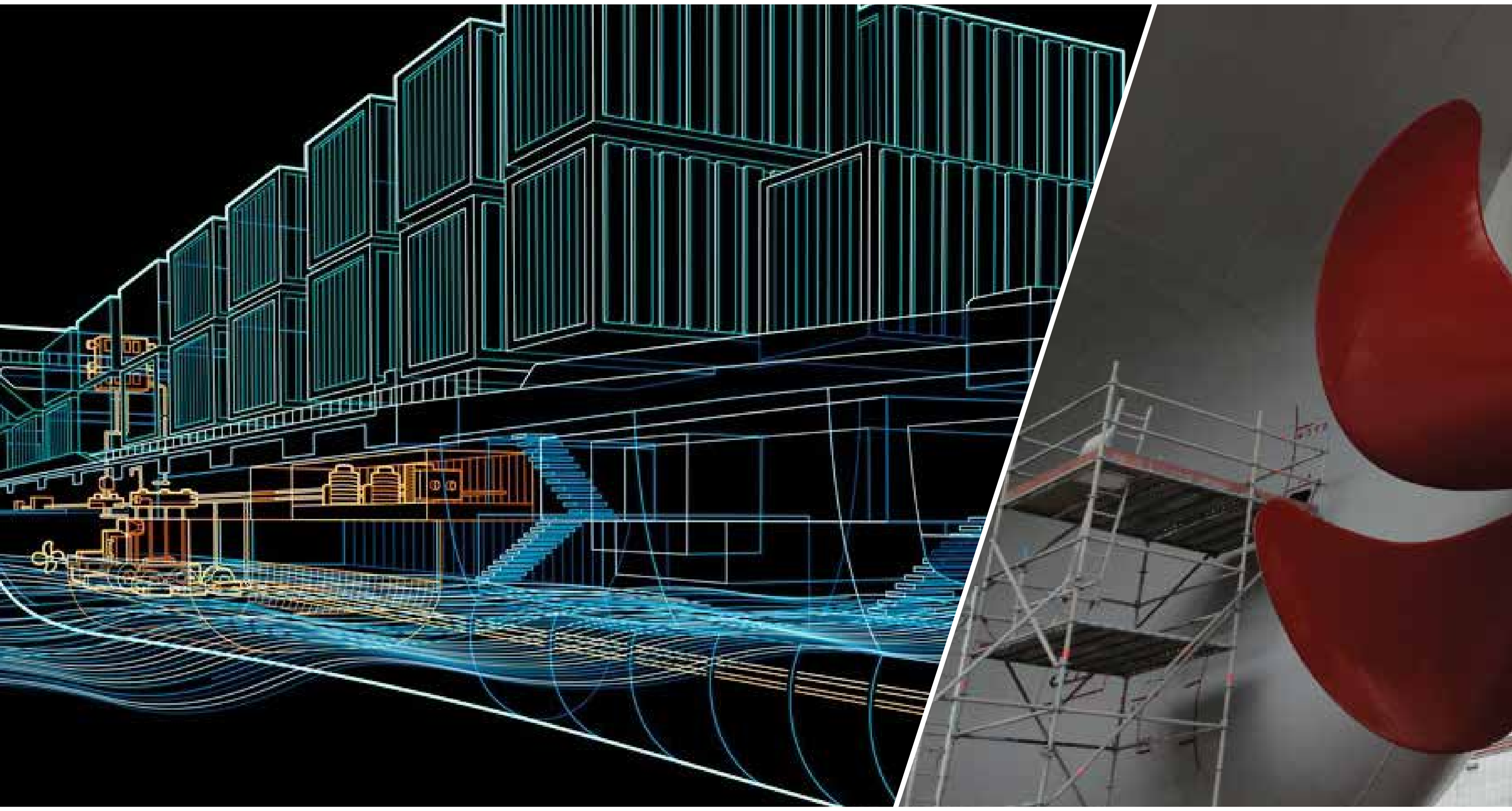
ABS Asset Performance Management services build on the benefits of classification, assisting owners and operators with evaluating and optimizing their assets for maximum performance from initial design to decommissioning.



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