Energy Efficient Ships

International Conference

Energy Efficient Ships
23-24 November 2016,
RINA HQ, London, UK

www.rina.org.uk/EES_2016

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This paper explores the use of simulation-based framework for early design stage of ships. The methodology herein presented is built within the computer aided engineering (CAE) software CAESES that integrates in the design process CFD codes. It can be successfully used for the optimization of either of the hull form design of a vessel or the optimization of an existing vessel with regards to the maximization of the efficiency, safety and competitiveness of the final design. The model is created based on a large bulk carrier and a simulation model consisting of modules that cover most aspects of the design, propulsion, strength and safety. It can be used for operational and maintenance and in service management considerations are tightly integrated with a fully parametric model. This tight integration enables the user to simulate the total ship performance with in very economic and efficient way. The optimization of the vessel (including its propeller) and investigate the impact of operational parameters such as speed, loading condition and route. Using this model, on this two case studies are considered.

10.45-11.15 COFFEE

11.15-11.50 WITH NUMERICAL SIMULATIONS TO MORE EFFICIENT SHIP DESIGNS, Dr Norbert Buiten, Wartslato, Netherlands. The design process of ships has changed over the years from a naval architecture approach to the current day ship system design and the propeller design. The overall vessel performance was established in the self-propulsion model test. The propeller-hull interaction factors were regarded as outcome, which was then used for the fluid-structural interaction. Nowadays, numerical approaches through hydrodynamic simulations (CFD), better understanding can be obtained of the occurring phenomena. Therefore it will become possible to understand the interaction phenomena. Since the achievable performance gains are often in the range of a few percent, it is necessary to develop and how this framework the CFD analysis this is well within reach. Another important issue is the impact of the Reynolds scaling effects. Full scale CFD simulations can reveal energy saving solutions which do not seem beneficial when analysed at model scale. This is actually the other side of the coin, where high potential solutions from the model basin fail in the actual full scale implementation. In the paper, the implementation process of the CFD self-propulsion methodology, including the very important validation part, will be discussed as well as various examples, where the added value of the approach will be shown. A detailed analysis of the flow provides knowledge, which is essential to understand the actual working principles of various Energy Saving Devices (ESD) as they are nowadays on the market. Moreover, it helps to understand why some ESD do not provide the expected gains as well.

11.50-12.25 ENERGY EFFICIENCY SIMULATION-BASED SHIP DESIGN AND SYSTEM ENGINEERING, Norwalk, Connecticut (NTNU), Norway. This paper explores the use of simulation-based framework for early design stage and verification of vessel performance with reference to particular marine related systems and equipment. This presents a complementary approach to system engineering and to focus the design towards energy efficiency and low emission outcomes. The influence of numerous design parameters, operational concepts and weather condition (wind/waves) on the vessel’s performance is taken into consideration. This is achieved through the utilization of virtual models to simulate the behaviour of the ship and its systems in operation, and models to compute the sea-state along the sailing routes and the anticipated operational scenarios. The current focus of this paper is to discuss the potential of Energy efficiency improvements and as an alternative approach to the existing design methodologies, a discussion on how the total ship performance can be evaluated over extended periods to have a framework to evaluate the system efficiency and efficiency gains with requirements’ generators and stakeholders.

12.25-13.30 LUNCH
10.00-10.45 ASSESSMENT OF SMART MATERIAL BASED PROPULSORS, ENERGY SAVING DEVICES AND CONTROL SURFACES FOR MARINE APPLICATIONS, Nitin J. Patil, Cornish Trench (IAPSO), London, UK.

Smart materials have been used in the marine sector for some time as single point solutions. However, the potential in the integration of multiple technologies into a controllable system to optimize propulsion, trim and stability in real-time has not been explored. Subject to the availability of the smart materials, along with geometric morphing capabilities. With the advent of smart materials and recent heightened research activity, this dream will soon be a reality. Usage of smart materials in combination with traditional materials is aimed at increasing the efficiency and reducing the carbon footprint of ships. Further, research findings of studies on Smart Pitched Propeller (SPP) are shared. Hybrid "Smart propellers" concept being researched at Indian Institute of Technology Delhi is also presented. The work presented at this conference will enable the marine community to understand the potential and importance of smart materials and other smart solutions in the marine sector.

10.45-11.15 COFFEE

11.15-11.50 COMMERCIAL WIND PROPULSION SOLUTIONS: PUTTING THE 'SAIL' BACK INTO SAILING, Gavin Allison, International Windship Association (IWSA), UK.

For quite some time, the potential of commercial wind propulsion has been discussed. Driven by the current high fuel price and the need to reduce the carbon footprint of shipping, this has become a reality. This talk will give an overview of the current status of wind propulsion, some of the challenges faced and also the potential ways forward.

11.50-12.25 SENSITIVITY STUDY ON CHOOSING PROPPELLER TYPE AND VESSEL HULL DESIGN (SMAs) FOR SHIP POWERING PERFORMANCE IMPROVEMENT, Karakitsos, Mott MacDonald, UK.

The optimal ship design and propeller choice for marine vessels can be found through various methods, one of which is the sensitivity study. This study evaluates the impact of ship design and propeller choice on the performance of the ship. The results of the study can be used to guide the design of future ships.

12.25-13.30 COFFEE

13.30-14.05 SHIP POWERING PERFORMANCE - LEARNING FROM THE CHALLENGES FACED BY OWNERS, L Karanikas, T Shen, F Violette, American Bureau of Shipping, USA.

The shipping industry is facing a number of challenges, such as high fuel costs, regulations, and environmental pressures. This talk will present an overview of these challenges and how they are being addressed by ship owners and operators.

14.05-14.40 AN INNOVATIVE APPROACH TO CONTINUOUS DIESEL ENGINE PERFORMANCE ANALYSIS THAT PROVIDE 5% FUEL SAVING, Malcolm Hobbs, Jodi Lamb, Datum Electronics, UK, Peter Mantel, BMT SMART, UK.

The innovative approach to continuous diesel engine performance analysis that provides a 5% fuel saving is presented. The analysis tools developed by Datum the individual cylinder power levels and power cycle performance are used in conjunction with the evolution of the operating condition. This provides a valuable insight into the operating condition and efficiency of the engine. Identifying and correcting poor cylinder power and engine balance will save in excess of 5% fuel.


This talk discusses the development of a pressurised soft-gas turbine (soft-GT) electric propulsion power plant for LNG vessels. The power plant demonstrates 49% electrical efficiency and when combined with a Gas Turbine Electric Propulsion (GTEP) system, it provides a 72% electrical efficiency for powering a LNG vessel in the range of 14MW to 26MW.

15.15-15.45 COFFEE

15.45-16.20 THE ROLE OF DISTRIBUTED COGNITIVE SYSTEMS FOR OPERATIONAL ENERGY EFFICIENCY, Martin Viktoriolas, Chalmers University of Technology, Sweden.

The use of distributed cognitive systems in the ship industry can improve operational energy efficiency and reduce emissions. This talk discusses the concept and the benefits of using distributed cognitive systems in the ship industry.

16.20-16.55 SETTING THE INDUSTRY BENCHMARK IN DRIVING SUSTAINABILITY AND OPERATIONAL EFFICIENCY THROUGH PROVEN TECHNOLOGY, Silverstream Technologies, Silverstream Technologies, pioneers of air lubrication technology, has achieved a new benchmark in fuel efficiency with its latest product - the X3000 air lubrication system. This system, funded by Shell and conducted in collaboration with Lloyds Register, Dannebroeg Rederi and other leading industry partners. The results of the trial, combined with ongoing modeling, proved that the fully optimised system will produce a 25% fuel efficiency gain in excess of 5%. This paper will go beyond the landmark sea trials and reveal how this unique technology is being operated commercially - offering the shipping industry an insight on the opportunities of implementing a technology that offers up to 5% fuel and emissions savings with a short payback period.
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VENUE
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ACCOMMODATION

Upon registration you will be provided with details of a hotel booking service offering reduced rate accommodation for conference participants.

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STUDENT SPONSORSHIP
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