Royal Institution of Naval Architects North West Branch

A Local Branch of the RINA
Chairman: Duncan Swinson
Hon Secretary: Jonathan Happs
Hon Treasurer: Matt Slater

The Royal Institution of Naval Architects

Date: **Thursday 25th February 2021**
Time: 7pm
Venue: Via Video Conference
Zoom Meeting ID: 997 0686 5674
Passcode: 550846
Organiser: RINA North West Branch
Contact Information: Rina.NWbranch@gmail

Liverpool John Moores University: Research work within the Maritime Industry

Presented by Augustine Ehiagwina, Liam Sanders and Andrew Spiteri

JMU
Liverpool John Moores University

This seminar will be presented by three PhD students currently at Liverpool John Moores University. The subjects to be presented are:

- Modelling Marine Traffic
- Human- Centred design in ship bridge design
- Natural air layering drag reduction

Liverpool John Moores University has a great link to the maritime industry. The first Nautical College was in fact part of LJMU in 1892. It later expanded to research whilst still keeping the Nautical College. Research done at LJMU covers a wide spectrum of topics offshore energy, safety at sea, drag reduction, maritime logistics and more.

The talk is free and open to all those interested.

Continued Professional Development	Certificate of Attendance at Technical Meeting by Branch Committee Member Name …………………………………. Signed ……………………………….

APPLICATION OF MIXED SIMULATION METHODS IN MODELLING MARINE-TRAFFIC

Augustine Ehiagwina

This study uses mixed agent-based and discrete event models to simulate maritime traffic in a congested port area. The movement of vessels and tides is simulated using an agent-based model which interacts with port process events generated by the discrete-event model. This mixed modelling method is implemented using Anylogic. The agent model is built around objects which can be interfaced to interact with each other by passing messages or continuous-time variables. An object may encapsulate other objects to any level of detail. Vessels are modelled as objects and their movement and interactions with other agents are expressed through statecharts. This presentation will focus on the model construction and initial testing using real-world vessel data (AIS). The initial results suggest similarities between the real-world data and the model output.

Does being Human cause human Errors? Consideration of Human-Centred Design in Ship bridge design

Liam sanders

Human error attributed to being responsible for 75% of maritime accidents in 2018 (Allianz, 2018). One of the most critical reasons was the design of the controls (interfaces) and the lack of proper procedures (Norman, 2018). Currently, it is unclear if ship bridge design entirely takes into consideration of user experience in workplace/equipment design. The crews are operating in an increasingly time and resource pressured industry, mainly when hazardous scenarios occur. During these scenarios, the information being processed by sea-farers increases and decision-making time decreases, adding an extra layer of complexity to the user experience in terms of cognition.

This presentation aims to offer an alternate viewpoint to human error, one that explores ship bridge design with the understanding that human beings are programmed to make errors. Understanding the users and level of human factors within the vessel, specifically the different interfaces on the bridge, allows de-signers to optimise their skills whilst incorporating seafarers in the design pro-cess. Designing the bridge of the future optimises product semantics to optimise the most critical interface information. Recognition rather than recall and ultimately reducing cognitive load when interpreting and operating controls, this is considered the second level of ergonomics, which this research advocate as a way of reducing human error.

Keywords: Human Error, human-centred design, human factors, cognitive ergonomics.

Natural Air Layering Drag Reduction Technology

Andrew Spiteri

A fundamental modification has been applied to the Kriso Container ship (KCS) hull which demonstrates a reduction in viscous drag. This modification is aimed to lower shipping emissions through the reduction of fuel consumption, thus helping ships to meet the new International Maritime Organisation (IMO) requirements for the new Energy Efficient Design Index (EEDI) regulations and overall decarbonisation targets. The hull was modified to induce a natural air layer underneath the hull. This air layer helps to reduce the drag force by reducing the wetted area, turbulence and wall shear stresses.

Two different models were tested over a range of Froude Numbers which translated to air flowrate. A parametric study was carried out on the air entrance width as well to investigate its impact on the air flowrate. Additionally, the impact of the air outlet position on the hull bottom was considered. The models were designed with minimal change in gross tonnage (≤1%).

A numerical simulation approach was utilised using Averaged Navier Stokes Equation and $k - \varepsilon$ models to capture a turbulent flow. Parametric testing on the number of prism layers and a Richardson extrapolation was done to ensure accurate and factual results. This led to a decrease in drag ranging from 1 to 3%. The sinkage and trim were calculated, which showed a negligible effect, thus giving further confidence in the ship design.