

RINA

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International Conference

SURV 7 - SURVEILLANCE, SEARCH AND RESCUE CRAFT

27 - 28 MAY 2009

THE LIFEBOAT COLLEGE, POOLE, UK

The Royal Institution of Naval Architects will continue its successful SURV series of International Conferences in 2009 now in its seventh edition. Held at the home of the Royal National Lifeboat Institution in Poole, this is an apt venue for the discussion of such vessels and there will be an opportunity to view the RNLi's facilities and a range of equipment during the course of the proceedings.

With ever greater recreational and commercial use of the marine environment there is inevitably a higher rate of incidents where external assistance is required. This increased pressure on resources provides a new set of challenges that organisations need to adapt to, in order to continue to provide their high level of service.

The conference will provide a forum for discussion of both military and civilian vessels. Papers cover the full range of vessels, equipment and methods, used by pilot craft, coastguards, and police as well as search and rescue organisations. Topics will include analysis of new designs, applications, and operations of these vessels, as well as review existing vessels and their use across all marine environments.

day 1

09.00 - 09.30 **Coffee and Registration**

09.30 - 10.05 **Balancing Performance and Seaworthiness**
D Pike, Dag Pike Associates, UK

High performance and seaworthiness tends to be at opposite ends of the design spectrum with conventional wisdom suggesting that you can only achieve one at the expense of the other. The paper will explore how these two apparently conflicting requirements are now coming closer together and that there fewer compromises necessary to achieve both high performance and good seaworthiness in the one design.

10.05 - 10.40 **The Seakeeping Assessment of Candidate Hullforms for the RNLi's Fast Carriage Boat Replacement.**
J Horton, R Scott, Frazer-Nash Consultancy Limited, UK.
S Austen, P Eyre, Royal National Lifeboat Institution, UK

This paper presents the seakeeping simulations Frazer-Nash have recently conducted to support the RNLi during their development of the fast carriage boat replacement, FCB2. The analyses presented build upon the simulation techniques used during the development of previous lifeboats, including Atlantic 85 and Tamar classes.

10.40 - 11.10 **Coffee**

11.10 - 11.45 **The development of a new high payload multi-functional RIB, the Halmatic Pacific 950**
C Cain, R Cripps, J Fox-Robinson, A White, BVT Surface Fleet Support, UK

The design of modern military small craft requires high levels of operational capability and this is particularly the case when designing for any Special Forces application. Complex functionality must be integrated together on comparatively small platforms and requirements often directly compete in areas such as space, performance and cost. As such innovative engineering solutions must be applied. This paper describes the development, construction and trial of a new 9.5m RIB, the Halmatic Pacific 950.

11.45 - 12.20 **Towards fully recyclable composite craft**
M Otheguy, G Gibson, M Robinson, Newcastle University, UK
E Findon, R Cripps, BVT Surface Fleet Support, UK

The currently available recycling technologies for end-of-life thermosetting composites, i.e. polyester, epoxy resins reinforced with glass, carbon or aramid fibres address the recovery of the fibres as both fillers (short fibres) or recycled strong fibres that can be used with new resins (long fibres), whereas the existing matrix cannot be recovered, being incinerated or milled and used as a filler in further structural and decorative composite applications. Due to their environmental advantages compared to thermosetting resins in terms of gas emissions, cycle times and recyclability, thermoplastic matrix composites are under significant development in boatbuilding. These resins can be remelted and recycled in closed loop and open loop, enabling recovery of resin and fibres following many different processes with various outcomes.

12.20 - 12.55 **High Speed Craft Coxswain Workload**
T Dobbins, S Myers R Dyson, University of Chichester, UK

The operation of small High Speed Craft (HSC), particularly in poor sea conditions, is reliant on the coxswain's capabilities and performance. HSC can operate at high speed (e.g. 40-50 kts), and experience high levels of Repeated Shock & Vibration (RS&V). Therefore the control of a HSC in austere conditions demands enhanced concentration, quick reactions, rapid decision-making and the ability to cope with RS&V exposure. Previous research with HSC passengers demonstrated that RS&V motion increased transit physical work-rate and degraded post-transit performance. HSC coxswains often report that their work-rate is greater than that of the passengers; this is supported by comparative measures of transit heart rates.

12.55 - 14.30 **Lunch** -There will be an opportunity to view a number of vessels moored on site for the event

14.30 - 15.05 **Understanding the Up Sea Performance Aspects of All Weather Lifeboats**
P Eyre, R Moss, H Phillips, S Austen, RNLi, UK
S Phillips, D Hook, Seaspeed Marine Consulting

The development of the Royal National Lifeboat Institution's 25 knot carriage-launched lifeboat (FCB2) has highlighted some key issues regarding up sea performance of planing hull forms and has resulted in a greater understanding of the challenges faced when designing a boat to meet the broad and demanding operational envelope of an ALB. Data collected during extensive full-scale trials of the FCB2 experimental lifeboat illustrated some specific and operationally unacceptable up sea seakeeping characteristics. Analysis of these characteristics was extended beyond previously well-documented phenomena, such as slamming-induced vertical acceleration and shock loading. Specific behaviour, such as the combined effect of slamming with a high roll angle has been observed and measured.

15.05 - 15.40 **Development and Validation of a Design and Analysis Process to Optimise High-Speed Planing Mono-hulls.**
H Gordon-Wright, R Scott, Frazer-Nash Consultancy Limited, UK.

This paper presents the automated optimisation of a planing craft based around the extensively validated HydroDyna motion simulation software. Hydrodyna is a code that has been developed over many years by Frazer-Nash to calculate the time domain motion and pressure loading of marine craft. The accuracy of the method has been demonstrated using a concept high-speed mono-hull and the paper presents comparisons of simulation with scale measured data. This craft then formed the basis from which the hullform was optimised in terms of peak acceleration and hull pressure. This paper will show examples of the key sensitivities of acceleration and hull pressure to hullform in a range of sea-states, forward speeds and headings.

15.40 - 16.10 **Coffee**

16.10 - 16.45 **Risk Assessment and Training for Operation(s) of Powered Small SAR Craft in the Flood Environment.**
D Lane, Lane, Jefferies & Associates Ltd - Fire and Marine Safety Consultants, UK

The post 'Pitt Review' water rescue climate for small vessels following devastating UK Floods of 2007 has led to a greater need for inland floodwater capable small fast response SAR vessels with specialist capabilities encompassing fresh design, new crew practices together with new operating philosophies for this highly stressed environment. This has led to the search for different vessels, control systems, navigation methods and innovative propulsion plant. This paper will examine the UK's Fire and Rescue Services requirements, give examples of how to meet them and the Training regimes required to fulfill the expectations of Inland floodwater SAR vessels together with experiences in the UK and USA.

16.45 - 17.20 **Hovercraft to the Rescue**
B Russell, the Hovercraft Society, UK

The application of amphibious hovercraft in rescue roles falls into two categories: those that have been established for some time and those implemented more recently. Prior to the floods in the UK in 2007, most fire and rescue services maintained that the occasional requirement for flood rescue did not warrant dedicated resources. This has changed, with both Avon and Somerset and Gloucestershire purchasing hovercraft.

17.20 - **General Discussion and Evening Drinks Reception**

day 2

09.00 - 09.30 Coffee and Registration

09.30 - 10.05 **Impact Count Index For High Speed Craft Motion Assessment**
T Dobbins, S Myers, R Dyson, W Withey, University of Chichester, UK
T Gunston, SIG SCP, UK
S King, QinetiQ, UK

The Repeated Shock (RS) motion of High Speed Craft (HSC) is associated with reduced human performance, and acute and chronic injury. The standard method of reporting vibration and shock exposure is using root-mean-square and the Vibration-Dose-Value, however their suitability to describe HSC motion is questionable. An alternative method is suggested to describe the RS motion, using an Impact Count analysis to produce an impact distribution histogram. An IC analysis of data from a side-by-side sea trial of two HSCs fitted with fixed and suspension seats, showed that there was no difference for the boats deck ICs but a clearly identifiable one between seat ICs. The results indicate that the IC and ICI analysis more effectively and intuitively described the RS environment than the RMS and VDV. Development of the analysis technique is ongoing but is believed that the IC and ICI are suited to side-by-side craft comparisons, towing tank modelling trials and examining the differences between the accelerations of HSC hull, deck, and seat structures.

10.05 - 10.40 **High Performance With Improved Onboard Comfort: Introducing ASV "Soft Motion" Mono With Water Jet Propulsion.**
U Tudem, Effect Ships International AS, Norway

Most market leading fast planing patrol vessels offer unpleasant ride qualities in waves. Slamming impacts in the magnitude of 20 G have been measured, and frequent impacts of 1 G and more are common. Impact accelerations are known to cause severe injuries to personnel onboard. Frequent accelerations, particularly caused by bow pitching, already at 0,1 G will cause discomfort and "motion sickness". Performance of the craft and the personnel's ability to carry out vital obligations at sea are severely limited, particularly during long exposure time. Effect Ships International AS has developed a brand new Air Supported Vessel (ASV) primarily designed for enhanced onboard comfort when travelling at high speed in a sea state. The paper will present a 22 m variant adapted to fast surveillance and patrol missions.

10.40 - 11.10 Coffee

11.10 - 11.45 **The Design and Production of a 15m Patrol boat for UK MoD Police.**
A Cameron, P Graville, Camarc Ltd, UK

This paper describes the project, from tender brief through contract to the design and build of the first of class 15m Fast Patrol Boats for the UK MoD Police. The MoD are satisfied with the design and a further 5 boats are on order. The requirement is for a 30 knot plus craft for surveillance and protection duties at HM Bases around the UK and Gibraltar. The design produced is a twin waterjet boat built in GRP by Holyhead Marine Services, Anglesey, Wales. This first boat was evaluated by the 3 main MoD Police bases in the UK, Portsmouth, Devonport and Faslane, Clyde.

11.45 - 12.20 **U.S. Coast Guard Response Boat - Medium (RB-M)**
D Shepard, J Curtis, USCG, USA

The U.S. Coast Guard's 45' Response Boat - Medium (RB-M) will replace the Coast Guard's fleet of 41' Utility Boats that have been in service for more than 30 years. Used for a wide range of missions including Search and Rescue (SAR) and Ports, Waterways and Coastal Security (PWCS), the RB-M provides vastly improved capabilities including increasing speed from 26 knots to over 42 knots, improved seakeeping, self-righting stability, and enhanced crew accommodations. The first production RB-M was delivered in March 2008, and Low Rate Initial Production continues at a delivery rate of approximately 1 boat per month. The first 6 boats are undergoing extensive Operational Testing and Evaluation (OT&E). Once OT&E is complete, production will ramp up to approximately 30 boats per year. This paper will cover all aspects of the RB-M acquisition from the initial requirements

12.20 - 12.55 **A Unique Stern Landing Vessel Design for Rescue Operations**
J Keegan, Sea Transport Solutions, UK

Recent natural disasters such as tsunamis in Asia and hurricanes / cyclones have highlighted the need for improved rescue services in coastal areas. Traditional landing craft designs have a number of disadvantages and are indeed unsafe in certain conditions. Sea Transport Solutions has developed a much improved "Stern Landing Vessel" which not only has overcome the disadvantages of traditional landing craft, but offers owners and operators of such vessels a flexible design capable of redeployment in other roles.

12.55 - 14.00 Lunch

14.00 - 14.35 **A Cost Benefit Analysis for Autonomous Underwater Vehicles for Marine Search and Rescue Operations**
A Murphy, M Landamore, Newcastle University, UK

This paper extends the work of the authors, Murphy et al, 2008, Underwater Technology, in which the technical feasibility of using Autonomous Underwater Vehicles (AUVs) to provide additional search capabilities in marine SAR scenarios is demonstrated. In this paper a cost benefit analysis of the concept systems are presented as well as a study considering the issues involved in the accession of the novel concept to the SAR sector. The work examines selected SAR operations and re-analyses these scenarios assuming the addition of AUVs in a search capability to clearly identify the tangible benefits they would offer. The analysis is based on guidelines and methods published in the International Aeronautical and Maritime Search and Rescue Manual.

14.35 - 15.10 **The development of an Unmanned Minesweeping Vessel**
R Featherstone, C Cain, R Cripps, BVT Surface Fleet Support
G Snowball, Systems Engineer, Atlas Elektronik
L Campbell, Lorne Campbell Design

The Royal Navy has committed to 'remove the man from the minefield' and the last Combined Influence Sweep (CIS) gear was removed from Hunt Class Mine Counter Measures Vessels (MCMV) in 2005. However there is still a requirement to tow a variety of sweep equipment using small unmanned vehicles deployed as daughter craft from the MCMV. Such craft need to operate remotely and need to carry large equipment payloads such as specialist sweep equipment and power generation sets. Once fully loaded they must then be able to continuously tow high resistance sweeps at both displacement and semi-displacement speeds. This unusual and arduous requirement called for an innovative approach to vessel design from the hull form through to the electronic control systems. This paper describes the development of the Halmatic unmanned vessel platform to support the requirements of Flexible Agile Sweep Technology (FAST).

15.10 - 15.40 Coffee

15.40 - 16.15 **Theoretical and Practical aspects of Conducting a Major Composite Repair**
H Phillips, P Sheppard, G Venning, S Austen, S Houchen, RNLI, UK

This paper discusses the theoretical and practical processes carried out as a result of sustaining substantial structural damage to an RNLI lifeboat built from advanced composites. In parallel with the practical aspects, the paper also discusses the part that theoretical calculations and finite element analyses played in using the recorded damage to quantify the loading scenario, support the structural repair process and inform subsequent future design reviews. Finally, conclusions are drawn and comparisons made with other major repairs that have been carried out in the public domain.

16.15 - 16.50 **Advanced High Speed Craft Coxswain Training**
J Hill, 10 (Landing Craft) Training Squadron, RM Poole. UK
T Dobbins, STRResearch Ltd, Chichester, UK
S Myers, University of Chichester, UK

There are many training courses available to mariners but relatively few that prepare them for operating High Speed Craft (HSC) in poor sea conditions. The formal training of HSC coxswain has changed little over time, whilst the performance of craft has increased dramatically. Rarely will HSC crew obtain formal HSC handling qualifications past that of the RYA Level-2. There are examples of advanced courses, e.g. in-house courses run by the military and emergency services, but these are often unrecognised by legislative organisations. The coxswain has direct control over the craft, and therefore the shock & vibration exposure, which results in both fatigue and a risk of injury. It is therefore imperative that coxswains gain the appropriate craft control skills in the minimum training time. However, training (e.g. increasing speed) must also progress at an appropriate rate, as operating at high speeds in poor sea conditions carries an increased risk of injury. This paper will present the requirements of advanced HSC coxswain training for operating effectively and safely in austere sea conditions, and how technology (e.g. dual control, performance data analysis and video feedback) may be used to enhance and optimise the learning process.

16.50 - General Discussion

