WARSHIP 2013
Minor Warships

The Royal Institution of Naval Architects

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WARSHIP 2013
MINOR WARSHIPS

12-13 June 2013, Bath, UK

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DAY 1 PAPERS:

08.30-09.00 **COFFEE & REGISTRATION**

09.05-09.40 **Keynote Speech- Director Ships (MoD)**

09.40-10.15 **THE EVOLUTION OF MINOR WARSHIPS IN THE LAST DECADE: GENERAL CONCEPTS AND PRACTICAL EXAMPLES**
Serpagli S., Ferraris S., FINCANTIERI Naval Vessel Business Unit, Genoa, Italy
Present paper aims at analysing the modification of minor warship characteristics in the last decade, in terms of physical data, functions to accomplish and technology integration, starting from the historical definitions of minor warships and going to a modern vision of such vessels, their capabilities and their increasingly multipurpose role in nowadays operational scenarios (not only limited to restricted areas but indeed widened into more extended ones), characterized by more demanding and diversified mission profiles.

10.15-10.50 **HOW TO SQUARE THE CIRCLE FOR THE NEXT GENERATION OF PATROL SHIP DESIGNS**
Andy Kimber, Jay Hart, BMT Defence Services, UK
BMT Defence Services developed the "Venator" concept in 2007 to investigate and illustrate the design of a platform which would deliver capability through the use of off-board systems and would allow a common class of platforms to individually embark different mission equipment's. Since the original concept BMT has continued to evolve both the concept and the underlying understanding of capability. This paper presents aspects of this further work, including the use of capability mapping and characterisation methods to better understand the achievability of both the required operational performance and a balanced affordable design

10.50-11.20 **COFFEE**

11.20-11.55 **MULTI-MISSION SMALL SHIPS: MYTH OR REALITY?**
Jeffrey Bowles, Donald L. Blount and Associates, Inc, USA
The increasing need for small warships to have the capability to perform multiple missions from the same platform brings many challenges to designers, builders, and operators. This paper addresses the specific challenges inherent to the concept and the different possible working solutions that can be employed during the design, production, and operation. The ultimate question to be answered is if the multi-mission small platform the way of the future or a concept that is too challenging to produce and operate in cost effective manner?

11.55-12.30 **ASSESSMENT OF THE USE OF A DESIGN MATURITY METHOD FOR A MODERN SHIPBUILDING PROJECT**
Cody Lyster, Babcock International, UK
The paper "A Method for Measuring Design Maturity During the Development of a Complex Engineering Artefact" by Rowell and Rogers (2012) described a method of assessing Design Maturity during the design phase of the design and build of a 90 metre Offshore Patrol Vessel. This paper discusses the issues that arose with the method including the collection of data and management of the Design Maturity Matrix during the design phase. In addition this paper demonstrates how rework is minimised and problems are prevented during construction by having a high level of Design Maturity.

12.30-13.05 **DESIGN METHODOLOGIES AND PROGRAMMATIC APPROACHES TO DEVELOPING A PURPOSE-BUILT OFFSHORE PATROL VESSEL**
Anissa Stansfield, General Dynamics NASSCO, USA
This paper will present General Dynamics NASSCO's approach to the purpose-built design of an Offshore Patrol Vessel. The flexible approach employed by the program and design team allowed for efficient response to change while maintaining an open platform from which to continue development. From the first breakdown of the requirements, through the design process, and to the eventual design convergence, an outline of the multiple stakeholders involved in the process will be discussed along with their key contributions and processes to achieving a balanced and optimized ship.

13.05-14.00 **LUNCH**

14.00-14.35 **HOW THE USE OF A NEXT-GENERATION 3D CAD TOOL IN BASIC DESIGN STAGE LEVERAGES TO IMPROVE THE OVERALL WARSHIP DESIGN AND PRODUCTION**
Verónica Alonso de los Rios, Carlos Gonzalez, Rodrigo Pérez, SENER, SPAIN
This paper describes in detail about the benefit of changing the process of minor warships design, by means of using an advanced CAD tool from the early stages, describing how it will be an advantage in terms of quality and costs. The most remarkable benefits are the data integrity and the avoidance of long design periods and cost increases due to errors, re-work and inconsistencies. This paper describes SENER findings in minor warships, as an example of engineering work, by means of an approach based on the use of FORAN, a shipbuilding oriented CAD System.

14.35-15.10 **APPLICATION OF SLAM PRESSURE LOADS TO A QUASI-STATIC FINITE ELEMENT ANALYSIS OF A PATROL BOAT**
Teresa Magoga, Seref Aksu, Terry Turner, Jenny Mathew and Stephen Kennett, Defence Science and Technology Organisation, AUSTRALIA.
This paper presents a methodology for the application of slam pressure loads idealised as an impulse to a finite element model of the patrol boat. Model scale seakeeping experiments were undertaken and the slamming pressures at several locations in the bow region were recorded. These pressure/time histories were then scaled up to full scale values and an equivalent impulse was applied to a finite element model of the patrol boat in a quasi-static analysis. The subsequent predicted stresses were then compared to data obtained from the full scale monitoring system. This procedure enables verification of the idealisation of a dynamic slamming event as an impulse, and subsequent finite element modelling and analysis of the patrol boat.

15.10-15.40 **COFFEE**

15.40-16.15 **MILITARY HOVERCRAFT WORLDWIDE**
Brian Russell, Hovercraft Society, UK
The use of hovercraft in a range of military roles around the World, some of the uses centre on amphibious hovercraft in the assault and logistics support roles, largely in areas not accessible by traditional means. In addition, the high speed of these craft enables the high value mother ship to be based further off-shore with less vulnerability to shore based weapons. The USA, Russia and the UK Royal Marines are active in this role. In the Middle East and Scandinavia, hovercrafts were and are used for border patrol and on counter insurgency tasks, being able to operate close to the coast, regardless of water depth. At one stage Iran had a large fleet of hovercraft, some configured for missiles.

16.15-16.50 **MRCH- A MULTI- ROLE COMBAT HOVERCRAFT**
John Marks, Wallop Defence Systems Ltd.
MRCH is of riveted aluminium construction, gas-turbine powered, fully amphibious and with ducted air fan propulsion. The design premise is that the comparatively high construction, running and maintenance costs of MRCH are offset by its performance and versatility. With a length of 42 metres, full load displacement 180 tons and maximum speed 60 knots, MRCH can perform patrol, strike, mine warfare, anti-submarine warfare, electronic warfare (deception) and beach landing operations, often with minimal or no changes to its weapon systems fit. Whilst the design concept was developed some 40 years ago, MRCH benefits fully from advances in propulsion, construction methods, materials and electronic systems within the intervening period. In particular, it employs a local area network concept enabling efficient use of a minimal crew number. The paper provides full details of the MRCH general arrangement, structure, weights, stress analysis, performance across a range of sea states and weapons fit. The author was a member of the Vosper VT-1 design team, and as Advanced Projects Designer was editor and main contributor to the associated 2-year study of open-sea hovercraft.

16.50- **GENERAL DISCUSSION & EVENING DRINKS RECEPTION**

MINOR WARSHIPS
2013, Bath, UK

DAY 2 PAPERS:

08.30-09.00 **COFFEE & REGISTRATION**

09.00-09.35 **APPLICATION OF MECHANISED HANDLING SYSTEMS TO ENABLE MULTI-ROLE CAPABILITY ON MINOR WARSHIPS**
Daniel Pettitt, Babcock, UK
It is anticipated that future naval scenarios will require the capability to respond to unpredictable, asymmetric threats. Consequently, future warship platforms are being designed with multi-role capability and mission-modularity at their core. This will be enabled by a new generation of handling systems technology, which can perform a variety of operations such as launch and recovery and pallet or mission-module handling. These systems are already being accommodated in large vessels such as frigates and aircraft carries, for example the UK Type 26 Mission Bay and the Highly Mechanised magazine on the UK Queen Elizabeth-class.

09.35-10.10 **A GROUP SYSTEM APPROACH TO NAVAL WARFARE – THE UXV MOTHERSHIP CONCEPT**
Richard Braithwaite, Naval Design Partnership, UK
The UXV Mothership concept is for a low cost platform optimised for storage, maintenance, launch and recovery of offboard assets such as UAV's, USV's and UUV's together with the command control and communications systems required to control them. The military effect of the group system is delivered by these offboard assets (primarily unmanned) and its mission survivability is achieved by its distributed nature. The effect of this is to considerably reduce the cost of the platform, as requirements for crew numbers, speed of tactical manoeuvre and (individual platform) survivability can be substantially relaxed.

10.10-10.45 **LARGE UNMANNED VEHICLES AND THE MINOR WAR VESSEL**
Rachel Pawling & David Andrews, Design Research Centre, UCL
This paper describes a UCL Design Research Centre study of conceptual future unmanned systems featuring relatively large deployed surface and sub-surface vehicles to provide for expected increased capability. It considers the impact of these vessels on the design of an OPV or "second-rate frigate" type vessel with limited own-ship capabilities. The vessel design draws on concepts used in superyacht and superyacht tender designs, many of which have sophisticated systems for deploying and recovering smaller watercraft and helicopters.

10.45-11.15 **COFFEE**

11.15-11.50 **COST EFFECTIVE SURVIVABILITY REQUIREMENTS FOR SMALL WARSHIPS**
David Manley, RCNC, UK
In the ongoing climate of fiscal austerity small warships and auxiliaries are finding themselves increasing employed in what were "front line" roles, increasing their exposure to hostile action and increasing the importance of effective survivability features to protect both the capability in the vessel and her crew. This paper discusses a report written for the NATO Specialist team on Ship Combat Survivability that addresses the question of small warship survivability, contrasting some of the design approaches applicable for destroyers and frigates with their smaller cousins, and addresses the issues of cost, classification, time and effectiveness.

11.50-12.25 **DESIGN AND CONSTRUCTION OF SM16 FAST INTERCEPTOR CRAFT: CASE STUDY**
P.Kamath, SOLAS Marine Lanka, Sri Lanka A.Nazarov, Albatross Marine Design, Thailand
The paper presents the process and results of development of 16m composite fast interceptor craft for Indian Navy built by SOLAS Marine Lanka following the design by Albatross Marine Design. Requirements and approaches to design analysis and optimization presented using parametric design methods. The performance and seakeeping of craft at design stage studied by tank testing and compared with results of sea trials. Special consideration is given to vertical acceleration levels and reduction of their impact on personnel by using shock-mitigation measures. Structural design and optimization made with comparison of different structural rules, also using FEA methods and testing of samples.

12.25-13.00 **AFFORDABLE CAPABILITY**
Alastair Stangroom, CTruc, UK
The recent emergence of private navies to police international waters is a clear indication that the days of procuring low numbers of highly sophisticated and eye-wateringly expensive warships to the detriment of a balanced force must be nearing its end. Providing value driven capability is the current challenge. This paper will expand on CTruk's modular philosophy, experience to date and vision for the future.

13.00-14.00 **LUNCH**

14.00-14.35 **THE SEAKEEPING PERFORMANCE OF USV LAUNCH AND RECOVERY SYSTEMS ONBOARD MINOR WARSHIPS**
P Crossland, D Wise-Mann, QinetiQ Ltd
This paper describes two experiments undertaken by QinetiQ to support the evaluation of the launch and recovery of USVs from surface ships. A model of a mine countermeasures vessel was fitted with representations of potential launch and recovery systems and tested with USVs of varying sizes and launch positions in a range of wave conditions. A series of model tests were also conducted on a scale model of a generic naval hull form in support of a European Joint Industry Project related to the launching and recovery of marine vehicles from naval platforms. The generic design included different stern and dock designs which were evaluated during comprehensive seakeeping and flow characterisation experiments. Surface flow characteristics, velocity and direction, along the side of the hull and aft of the transom have been recorded using a novel video based particle tracking method.

14.35-15.10 **TOPSIDE PREDICTION OF EMI COUPLING FOR EARLY STAGES OF SHIP DESIGN**
David Andrews and Ajmal Gharib, UCL, UK
Electromagnetic Interference (EMI) is a particular problem in the concept phase of ship design. In the concept phase, the designers produce balanced design studies with initial estimates of the ship's weight, stability, manoeuvrability, survivability and hydrodynamic performance. They also analyse the trade-offs between emerging requirements and performance. However, later in the design, when they incorporate electromagnetic sensors to the design, the problem of EMI, or lack of electromagnetic compatibility (EMC), is often revealed. As a result, the designers have to go back and modify the design putting in a lot of efforts until acceptable EMC is achieved. This paper discusses a method, based on modelling and simulations, for discovering the EMI problems early in the design process.

15.10-15.40 **COFFEE**

15.40-16.15 **THE HOVCAT – A NEW CONCEPT IN FAST AMPHIBIOUS LANDING CRAFT**
John C Lewthwaite, IMAA Ltd, UK
The HOVCAT concept embodies a catamaran hull-form with air-cushion support. The cushion is retained by side fingers directly attached to the side-hulls and fore/aft end seals. This method of direct attachment permits the craft to operate at higher cushion pressures than typical of conventional hovercraft, permitting heavier loads to be carried. Adequate roll stiffness is acquired when operating in rough beam seas by partial immersion of the buoyant side-hulls which generate a restoring moment as the craft heels. This novel design has been covered by a UK patent.

16.15-16.50 **PARTIAL AIR CUSHION SUPPORTED CATAMARANCONCEPT DESIGN**
H.M. Rizwan Amir, and Jawad Khan, PN Dockyard, PAKISTAN Han Duan Feng, College of Shipbuilding Engineering, CHINA
The purpose of this paper is to present the initial design of the newly proposed concept of Partial Air Cushion Supported Catamaran (PACSCAT). The proposed PACSCAT measures 28 m overall and designed to carry one battle tank weighing 50 tons. Because of the novelty of concept of the craft, no existing resistance and powering formulation can be applied directly to estimate its resistance and powering. Therefore, procedures for estimating resistance of ACV and SES have to be manipulated to choose appropriate components of resistance for PACSCAT.

16.50- **GENERAL DISCUSSION**

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International Conference

WARSHIP 2013: MINOR WARSHIPS

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