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David Griffiths
Librarian
BMT Ltd
Goodrich House
1 Waldegrave Road
Teddington
Middlesex
TW11 8LZ

Tel: +44(0) 208 614 4277
Fax: +44(0) 208 943 5347
E-mail: dgriffiths@bmtmail.com

NAVAL VESSELS AND DEFENCE TECHNOLOGY

2009010222

Common FREMM work for neighbours' frigate projects.

Jane's Navy Intl, v 113 n 8, Oct 2008, p 18 [8 p, 13 fig]

Toremans, G.

English

Europe's largest naval programme emerged from the meeting of operational requirements and procurement timescales for multi-mission surface combatants in France and Italy. The two navies have joined forces to procure a new class of frigate – the Frégates Européenes Multi-Mission (FREMM). The initial requirements called for the construction of a total of 27 FREMM vessels in four variants: 17 for the French Navy, eight of them optimised for anti-submarine warfare (ASW, local designation F-ASM), and nine for land attach (F-AVT); and 10 for the Italian Navy, comprising four for ASW missions and six general-purpose/land-attack (GP ships). When France's Horizon anti-air warfare (AAW) destroyer programme was cut from four to two ships, the government subsequently decided to include two AAW variants in the FREMM mix. Known by the unofficial designation FREDA, they will probably replace two of the later F-AVT ships. This article describes the FREMM vessels.

Frigates
Naval vessels

2009010223

Chile receives first Fassmer OPV 80.

Warship Technology, Oct 2008, p 18 [3 p, 4 fig]

No author given

English

The first of two Fassmer OPV 80 offshore patrol vessels built for Chile at ASMAR shipyard was handed over in June 2008. The vessel was designed to fulfil a wide range of naval and coastal guard missions in the EEZ. Based on a modular platform, the design supports simple integration of different combat systems, and the hull form has been optimised for exceptional seakeeping, even in high seas states. The design also incorporates a level of 'stealth' features in order to reduce radar cross section to a minimum.

Naval vessels
Patrol craft

2009010224

Review finds MRV design and acquisition shortfalls.

Warship Technology, Oct 2008, p 22 [2 p, 2 fig]

No author given

English

A review of the safety and functionality of the Royal New Zealand Navy's new Multi Role Vessel (MRV), CANTERBURY, has found shortfalls in the ship design and the acquisition process, but that with remedial work it will deliver the primary capability required.

Multipurpose ships
Naval vessels

2009010225

Maintaining naval combatants in ABS classification in-service.

Naval Engrs J, v 120 n 2, 2008, p 31 [10 p]

Ashe, G.M.

English

The American Bureau of Shipping and the US Naval Sea Systems Command have been working together over the last several years in a measured initiative to develop and apply classification Rules for naval vessels, and currently both littoral combat ship (LCS) programs and the DDG-1000 program require that the vessels be built and delivered in class to the Naval Vessel Rules. In addition, the JHSV platform will be delivered in class with ABS. It has been decided that the LCS platforms will be retained in class as a part of their maintenance philosophy. If this is successful, then DD-1000 will also be retained in class. The JHSV, as are all Military Sealift Command ships, will be retained in class in-service. This paper reviews the background supporting this initiative, describes the concept of retention in class, outlines the approach adopted, and reviews the current status of application.

Classification society rules
Naval vessels

2009010226

Advanced waterborne maintenance and salvage operations for the Royal Navy.

Naval Engrs J, v 120 n 2, 2008, p 41 [11 p, 12 fig]

Blair, I., Richards, D.

English

The Salvage and Marine Operations Integrated Project Team (S&MO IPT) is the principal authority in the UK Ministry of Defence (MoD) charged with providing salvage, blue water towing, specialist moorings, and heavy lift expertise to the UK armed forces. It has recently become the MoD centre of expertise for in water maintenance and repair. UMC International Plc is a commercial enterprise specialising in the development and execution of waterborne maintenance both on commercial and military vessels worldwide. A unique partnering of industry and the UK MoD has led to the expansion of waterborne and underwater maintenance, providing the Royal Navy (RN) with significant opportunities for cost reduction, increased periods between dockings and enhanced platform availability. This paper discusses the various technologies developed for both waterborne maintenance of the RN fleet and specific tasks undertaken by the S&MO IPT.

Naval vessels
Underwater maintenance

2009010227

Carrier team one: making decisions "mindful that a carrier must last 50 years".

Naval Engrs J, v 120 n 2, 2008, p 61 [7 p, 9 ref, 1 fig]

Blanton, G.B.

English

For more than 10 years, Carrier Team One has effectively coordinated cross-organisational process reviews to improve the execution of US carrier maintenance availabilities. As noted in the Team One charter, these improvement efforts are "mindful that a carrier must last 50 years." In recognising the challenges of a 50-year service life, Team One has adopted principles intended to ensure that an as yet unborn chief engineer on USS George H.W. Bush (CVN 77) can maintain high levels of ship material readiness in 2050. This paper reviews the "50-year" principles that influence Carrier Team One efforts, focusing on three such principles. This paper does not suggest that the submarine and surface communities do not observe similar principles; undoubtedly, they do. And admittedly, these principles are interrelated, but are reviewed separately to emphasise each principle's contribution to improving carrier availabilities. The three principles are: Core values - how a 50-year service life influences decision making; Process focus - how a 50-year service life influences long-term improvement methodologies; Technical focus -how a 50-year service life influences technical improvement decisions. In examining these principles, the paper considers their long-term contributions to carrier readiness and their influences on Team One's efforts to improve carrier maintenance.

Aircraft carriers
Service life

2009010228

Identification of supplementary metrics to sustain fleet readiness from a maintenance perspective.

Naval Engrs J, v 120 n 2, 2008, p 81 [8 p, 9 ref, 1 tab, 4 fig]

Dean, A.W., Reina, J.J., Bao, H.P.

English

A wide variety of programs and schemes are in place (and many programs are in continuous development by organisations such as the US Office of Naval Research) that address the sustainability of the Navy's fleet. Newly developed technologies are allowing for the continued design and development of much more complex ships with a host of innovative concepts and requirements. The cost of construction of these next-generation ships, budgetary restraints, and other factors have also made it so necessary to maintain, adapt, and extend the life of the legacy fleet to meet operational requirements and maintain our maritime dominance. As technology is extended and adapted to become implemented across the wide variety of vessel platforms in existence in the legacy fleet, manning reductions are being implemented across the various ship-type classes. As more and more maintenance is being shifted from the sailors on the ships to various off-ship organisations, this brings into question the level of training necessary for ship's personnel in the maintenance area that is required when manning the ship from a tactical or operational perspective. Decision tools need to be developed for senior Navy management for use in evaluating and determining the optimal balance in manning ships from not only the operational perspective but also from the maintainability/survivability perspective. It is believed evaluation of the requirements, benchmarking, and the development of assessment metrics for determining the requirements of the fleet for capable maintainers are of vital importance and will have far-reaching impact on the Sea Warrior, Sea Trial, and Sea Enterprise programs in support of the "Sea Power 21" strategic concept of the US Navy. This paper explores the necessity of benchmarking current ship's force capabilities, establishing manning requirement metrics, and evaluation of current maintenance policies.

Naval vessels
Ship maintenance

2009010229

Shipboard maintenance: what do surface warfare officers need to know – and when do they need to know it?

Naval Engrs J, v 120 n 2, 2008, p 89 [10 p, 16 fig]

Sydow, K.R.

English

As the Navy has moved into the 21st century and the war on terror has unfolded, the challenges to ship maintenance management have never been greater. These

challenges include: a continuing high operating tempo compounded by less predictable schedules and coupled with fewer, shorter scheduled opportunities to conduct maintenance; a fleet of fewer albeit more capable and therefore more complex ships; a trend toward smaller, perhaps less stable crews to operate and maintain the ships; and continuing competition for the available budget dollars between operations and maintenance, as well as between current and future readiness concerns. In an era of "operations focused maintenance," what is the role of the Surface Warfare Officer (SWO) in managing their shipboard maintenance? What do they need to know, and when do they need to know it? This paper addresses these questions and related issues and offers, where applicable, some near-term and long-term recommendations for improvement.

Naval vessels
Ship maintenance

2009010230

Virtual ship clusters: a new layout concept for a ship repair and maintenance facility.

Naval Engrs J, v 120 n 2, 2008, p 99 [13 p, 4 ref, 20 fig]

Mayer, B., Irani, S., Adra, H.

English

Organic ship maintenance facilities and depots of the US Navy are mostly organised as trade-specific shops rather than by product (or process) families. For example, welders are in the weld shop, machinists are in the machine shop, pipe-fitters are in the pipe shop, etc. There is a belief that this guild-type organisational structure is what enables a repair facility to do almost anything, albeit at the cost of moving product all over the "factory." At the US Navy's Southeast Regional Maintenance Centre (SERMC), a typical repair job must visit multiple shops that pass work back and forth between them. Thereby, significant delays and operational wastes occur. This paper describes a pilot project to assess the feasibility of cellular manufacturing at SERMC. The fundamental hypothesis that was tested is that even in a repair and maintenance facility there could exist several families of repair jobs where jobs grouped into a family require similar combinations of processes, equipment, materials, etc. that can be provided by a small group of shops. In fact, several potential families of repair jobs, and the appropriate cluster of shops for each family of repair jobs, were identified using the Production Flow Analysis and Simplification Toolkit (PFAST) software. Based on these results, it was decided to implement a shop cluster (or focused factory, or repair cell) to complete any repair jobs done by the dive shop. It was recommended that the dive shop be merged with a few other shops, and be provided the necessary tools, cross-trained personnel, equipment, and other support systems to become an autonomous multi-function shop. Simulation using the SimCAD software from CreateAsoft Inc. was used to verify the results expected from making the proposed changes. The primary analysis was intended to evaluate the benefits of implementing a focused factory in the dive shop. The secondary analysis was intended to evaluate the advantages of implementing a

virtual shop cluster (or focused factory, or repair cell) in any ship repair facility like SERMC. The simulation results showed that implementing either physical cells or virtual cells based on the different families of repair jobs identified by PFAST could improve job turnaround times at any Navy ship repair facility like SERMC. Both the types of delays as well as the time values of these delays differed significantly across the existing and alternative shop configurations that were proposed.

Naval vessels
Ship maintenance
Ship repair

2009010231

Fast LCT gains a foothold on the beach.

Warship Technology, Oct 2008, p 26 [2 p, 3 fig]

No author given

English

BMT Defence Services Ltd, Bath, UK, has designed a new Landing Craft Tank (LCT) concept designed to carry up to 200 tonnes of payload at speeds much higher than conventional displacement monohull designs. The company claims that innovative design features incorporated into its proposed Caimen-200 LCT enable the vessel to overcome some of the traditional challenges of landing craft design. These novel features include a low-resistance hull form and an 'active' bow ramp to deliver an excellent balance of speed and beached stability. At 68.5m in length, with a breadth (waterline) of 10m, and a draft of 2.3m, the Caimen-200 design is constructed in steel and has a displacement of 840 tonnes.

Landing craft
Naval vessels
Ship design

2009010232

ONR trials superconducting degaussing system.

Warship Technology, Oct 2008, p 38 [2 p, 2 fig]

No author given

English

A revolutionary high-temperature superconducting degaussing system has been installed on the destroyer USS HIGGINS in order to test the effectiveness of the technology over a two-year period. The new system replaces the heavy copper cables used in conventional degaussing systems. Instead of copper cables, the revolutionary system uses a single cable made from high-temperature superconducting wire that significantly reduces overall weight and installation costs.

Naval vessels
Superconductivity

2009010233

Adjustable-length trimaran proposed for high-speed sealift.

Warship Technology, Oct 2008, p 61 [5 p, 5 fig]

No author given

English

This article describes a concept for a novel adjustable-length trimaran designed for service as a high-speed sealift vessel. The three hulls of the trimaran are of approximately equal length (the austere-port constrained length) and of nearly equal displacements. A trimaran of this type, with the hulls staggered, can achieve substantial wave-resistance advantages compared with other configurations.

High speed vessels
Naval vessels
Ship design
Trimarans

2009010234

Gas turbine power and propulsion options for the modern warship.

PACIFIC 2008, Intl Maritime Conf; 29-31 Jan 2008; Sydney, Australia. Organised by RINA and IMarEST, Australia. CD-ROM. Day 1, Session 3 [10 p, 3 ref, 1 tab, 16 fig]

Bricknell, D.J., Partridge, R.

English

Modern naval combatants appear to be dividing into three distinct ship types: ocean capable patrol-craft, globally deployable combatants, and the developing new class of fast littoral combatant. Each ship type places different and significant demands on the power and propulsion system. This paper describes the technical and operational issues driving the demands on the power and propulsion system including ship speed, un-refuelled endurance, fuel type, on-board maintenance and the new electric mission-systems. Gas turbine powered mechanical-geared systems, gas turbine alternator powered integrated full-electric systems and hybrid mechanical/electrical systems are all examined and their contribution to the success of the system is discussed.

Naval vessels
Propulsion systems

2009010235

Cost savings for warships using the reconfigurable hull form concept.

PACIFIC 2008, Intl Maritime Conf; 29-31 Jan 2008; Sydney, Australia. Organised by RINA and IMarEST, Australia. CD-ROM. Day 1, Session 4 [6 p, 4 ref, 2 tab, 2 fig]

Renilson, M.

English

Many warships are required to operate over two distinct speed ranges. This gives the naval architect quite a challenge when it comes to optimising the design. It is widely accepted that a single set of prime movers will not be able to efficiently cope with the vastly differing power requirements for these two speed ranges, and hence warships are often fitted with two sets of prime movers for this purpose. On the other hand, it is also obvious that a single hull form cannot be optimised for these two distinct speed ranges. Earlier work (Renilson et al, 2006, 2007) demonstrated possible modifications to the hull that could be made to improve efficiency at the two distinct speeds. The most promising modifications identified from this work were changes in the stern shape, and the propulsion type. This paper focuses on these modifications, and discusses possible practical arrangements to achieve the changes necessary, along with estimated fuel savings as a function of vessel speed profile. It is concluded that considerable fuel savings are possible, and that this concept warrants further consideration in order to reduce the through life cost of warship operation.

Cost reduction
Hull form
Naval vessels

2009010236

Reduction of roll motion of a surfaced submarine in beam seas.

PACIFIC 2008, Intl Maritime Conf; 29-31 Jan 2008; Sydney, Australia. Organised by RINA and IMarEST, Australia. CD-ROM. Day 1, Session 4 [10 p, 6 ref, 17 fig]

Davies, A., Ranmuthugala, D., Et al

English

In 2004, the Canadian submarine HMCS Chicoutimi was immobilised on the surface in sea state eight due to an onboard fire. This prompted the Defence, Science, and Technology Organisation (DSTO) to instigate a joint project with the Australian Maritime Collage (AMC) to investigate the parameters influencing the roll of intact and damaged surfaced submarines in beam seas, and to identify methods to reduce the roll motion. The parameters investigated included: the effect of entrained water in the submarine top casing, (including the size of its draining ports); orientation of the stern control surfaces between the “x” and “+” configurations; addition of “wing tips” to the control surfaces; addition of bilge

keels; and the effect of adverse trim due to damaged conditions. The experimental investigation consisted of testing a scaled model submarine in AMCs towing tank and test basin. The model was tested in fixed beam seas and in a free-to-drift condition, while subjected to a variety of wave velocities. The damaged condition, when required, was simulated by ballasting the forward compartment. The experiments determined the best options for the top casing (including port opening sizes and the effect of entrained water), and quantified the effects of various appendages for different encounter frequencies (ωe) and vessel headings. The effects of adverse trim on the above results were also analysed. A newly developed vessel hydrodynamic software package by Defence Research and Development Canada-Atlantic (DRDC Atlantic) in collaboration with DSTO was also used to theoretically model the submarine and analyse its motions. This allowed comparison with the experimental results and validation of the package.

Beam seas
Rolling
Submarines

2009010237

Amphibious ships.

PACIFIC 2008, Intl Maritime Conf; 29-31 Jan 2008; Sydney, Australia. Organised by RINA and IMarEST, Australia. CD-ROM. Day 1, Session 5 [9 p]

Brown, P.

English

On the 9th of October last year, the Commonwealth signed a contract with Tenix Defence Pty Ltd for the supply to the Royal Australian Navy of two 27,000-tonne Amphibious Landing Ships, or LHDs. The acquisition will be administered by Joint Project 2048 Phase 4A/B, 'Joint' meaning that it is not just a Navy ship, but a Navy and Army capability. Navy will operate the ships, Army the watercraft and both services the helicopters; Army forces are transported and inserted; and the joint force headquarters aboard is multi-service, including RAAF air traffic control. So the services cooperated in the development of the capability. This paper gives an overview of the ships and the capability they represent. How Australian industry was involved is outlined and the systems are described - primarily the electronic and landing systems.

Amphibious ships
Naval vessels

2009010238

The Tenix Marine LHD ship build program.

PACIFIC 2008, Intl Maritime Conf; 29-31 Jan 2008; Sydney, Australia. Organised by RINA and IMarEST, Australia. CD-ROM. Day 1, Session 5 [6 p]

Malpress, K.

English

Some military and industry personnel and observers mistakenly refer to the Landing Helicopter Dock (LHD) ship as a large amphibious truck designed to move troops and equipment in and out of operational areas. While an LHD can be employed in such a role, the observation only serves to illuminate the degree of capability ignorance that surrounds an LHD platform. The origin of such a perception in Australia may be embedded within the historical role played by the converted aircraft carrier, HMAS Sydney which was widely known for transporting troops and equipment between Australia and South Vietnam during the Vietnam War. This transport perception continued with the introduction into service of the Landing Ship Heavy (HMAS Tobruk) and the two Landing Platform Auxiliary (LPA) ships during the 1980s and 1990s, when they deployed troops on exercises around the coast of Australia because it was often cheaper than alternative methods. Whatever the reasons, RAN ships with amphibious potential were largely employed for over 30 years in sea lift and sea transport tasks and this has served to shape the Australian perception of amphibious capability. The paper provides an overview of the LHD build program.

Amphibious ships
Naval vessels

2009010239

Integrated ship survivability for the Royal Australian Navy.

PACIFIC 2008, Intl Maritime Conf; 29-31 Jan 2008; Sydney, Australia. Organised by RINA and IMarEST, Australia. CD-ROM. Day 2, Session 8 [10 p, 7 ref, 2 fig]

De Yong, L.

English

Survivability of a modern warship is dependent on several fundamental factors – its susceptibility, its vulnerability and its recoverability. These three factors are widely seen as the key elements in the equation to describe survivability. For many years, research programs have provided advice to many navies on the individual survivability factors but largely in isolation to each other. This is now changing with an emphasis on the provision of advice on a ship's overall survivability or the relationship between susceptibility, vulnerability and recoverability and the "trade space" between them. This paper discusses the fundamental elements of survivability, their relationship to each other and how various methods of survivability estimation have been developed. It also discusses the areas that need to be further explored to evaluate ship survivability and the balance of investment and mission effectiveness.

Naval vessels
Ship survivability

2009010240

The use of warship vulnerability analysis tools as a measurement of blast and ballistic protection requirements.

PACIFIC 2008, Intl Maritime Conf; 29-31 Jan 2008; Sydney, Australia. Organised by RINA and IMarEST, Australia. CD-ROM. Day 2, Session 10 [10 p, 6 ref, 8 fig]

Buckland, M.

English

The recent trend towards performance based requirements by naval regulators has forced a rethink on how vulnerability design features are specified and the performance criteria, against which they can be measured. The development of requirements for the Royal Australian Navy (RAN) to protect its naval vessels against the effects of conventional weapon events i.e. requirements for blast protection, ballistic protection, shock protection, and zoning, separation, and redundancy poses challenges in assigning the performance parameters against the level of protection for a particular asset, and what capability is essential to be retained after an explosive event. This paper provides an overview of the use of the Defence Science and Technology Organisation (DSTO) developed Vulnerability Assessment Method CVAM as a tool to measure the required minimum retained capability post a conventional weapon event in order to meet the requirement set for naval ships. The tool can be used to identify both systems and structure which may be modified to maximise the performance of a design to both external and internal conventional weapon detonations.

Naval vessels
Protection
Vulnerability

2009010241

Naval ship assurance – a new approach.

PACIFIC 2008, Intl Maritime Conf; 29-31 Jan 2008; Sydney, Australia. Organised by RINA and IMarEST, Australia. CD-ROM. Day 2, Session 10 [9 p, 2 ref, 1 tab, 2 fig]

Buckley, J., James, P., Et al

English

It is widely recognised that Navies around the world are subject to increasing pressure from their Governments to reduce the cost and establish a more consistent approach to the design, operation and assurance of naval fleets. The UK Ministry of Defence (MoD), in conjunction with Class and industrial stakeholders has been investigating, and increasingly adopting, a more commercially based approach for the assurance of naval ship acquisition and operation in an effort to reduce costs, whilst maintaining safety, environmental, and military capability. The approach being taken in the UK is based on a Naval Ship Assurance (NSA) framework.

Significant work has been undertaken towards development of the NSA framework. This paper begins by describing the UK MoD's approach to NSA and how it is working to define a framework for its implementation. The paper concludes by outlining some potential adaptations in order to suit other Navies' ship assurance requirements or other applications.

Naval vessels
Standards

2009010242

Seakeeping behaviour of a damaged warship.

PACIFIC 2008, Intl Maritime Conf; 29-31 Jan 2008; Sydney, Australia. Organised by RINA and IMarEST, Australia. CD-ROM. Day 2, Session 11 [12 p, 9 ref, 2 tab, 7 fig]

Andrewartha, T., Thomas, G., Cannon, S.

English

In the unfortunate event that a naval vessel is damaged, decisions must be made regarding the reduction in the vessel's capability and what damage control procedures can be initiated to both restore this capability and minimise further damage. In order to make an informed decision, it is vital that Commanding Officers (COs) have access to reliable information regarding the vessel's structural integrity, stability and seakeeping performance. A reduction in any of these parameters may have a significant influence on the operability of the vessel. A preliminary program of work has been conducted to investigate the change in ship motions due to an angle of list induced on the vessel after sustaining damage. This study incorporates both experimental and numerical simulations of a listed vessel at rest in a seaway. During the experimental program several parameters were investigated to ascertain their influence on the vessel's motions. These parameters include initial list angle, direction of list and wave conditions. The results from this study show that for a vessel in beam seas there is no significant effect on vessel motions due to an angle of list. However, in head seas the introduction of an angle of list has a marked effect on the amplitude of roll motions. The example operator guidance generated shows that numerical modelling can be applied to the analysis of the operability of a vessel against set limiting criteria. This information and methodology could be incorporated into a rapid damage assessment tool along with sea-load predictions to assist COs in their decision making process in the event of an emergency.

Damage
Naval vessels
Seakeeping

2009010243

Minor warship roles – how technology is leading to a new vessel type.

PACIFIC 2008, Intl Maritime Conf; 29-31 Jan 2008; Sydney, Australia. Organised by RINA and IMarEST, Australia. CD-ROM. Day 2, Session 13 [10 p, 2 ref, 5 fig]

Kimber, A., Giles, W.

English

Minor warships are a category of naval vessel covering a range of roles, including Mine Counter Measures (MCM), offshore patrol and survey. These vessels may be deployed in a war role, within threat environments, but are often small and of a specialised nature. To date, the roles have generally been achieved through the design of specialised vessels for each role with little commonality. This is particularly true of the MCM vessel, a highly optimised platform due to the demanding and specific nature of its role. Previous attempts to provide a common platform to meet these varying roles have met with mixed results. The emergence of new technologies, particularly the expected wide spread use of off-board, unmanned systems offers new potential for a single common platform to be reconfigurable across these roles; the role optimisation becomes focused on the offboard systems and not the mother platform. This paper discusses the work conducted into a concept for a multi-role small surface combatant focused on the roles of MCM, maritime security, hydrographic and environmental assessment and patrol. The objective of this work was to identify how much commonality can be achieved in the platform, the art of the possible in terms of a small, globally deployable warship and the advantages and disadvantages of navies adopting the multi-role approach. Key aspects investigated include: the type of hull form adopted, comparing monohull and multi-hull performances to achieve global deployment requirements, issues of modularity, arrangement of multi-missions spaces, and deployment of unmanned vehicles to perform some missions.

Mine countermeasures vessels
Naval vessels
Patrol craft
Survey vessels

2009010244

Innovative gear solutions in naval propulsion systems.

PACIFIC 2008, Intl Maritime Conf; 29-31 Jan 2008; Sydney, Australia. Organised by RINA and IMarEST, Australia. CD-ROM. Day 2, Session 13 [10 p, 4 ref, 10 fig]

Hoppe, F.

English

However, such statement is invalid as main gearing is to be steadily oriented to demands imposed by enhanced vessel designs impacting continuously propulsion

configurations for utmost flexible and redundant operation. The propulsion system aboard a naval vessel has to include features to cope with requirements of state of the art, followed by incremental innovational designs steps which need to be introduced to modern vessel propulsion concepts. Naval projects for new building vessels are normally asking for the latest technology state. Today, combining propulsion systems are the trend, whether in form of CODAG as mechanical solution or in form of CODELAG as electro-mechanic propulsion. In all cases, innovation with marine gearing has to be translated into trustworthy and reliable designs ever meeting the specifications of newly developed ship technologies. In addition, damages to main gearing components are being considered as hazardous to the propulsion train because of their vital importance to reliable vessel propulsion performance. By all means, operational failures need to be minimised to practically zero events on all levels. This is only possible by respecting all interfaces in mechanical and electrical ways matching with the environment aboard the vessel. For example, the main reduction gear operates in a vibratory active surrounding, and has to cope with sometimes indefinable external forces. Overall, the experience in design and production of marine gearings, encountered by numerous applications throughout the world's Navies, provides the fundament for further enhancement of propulsion systems. Below given aspects and examples view into the spread of available gearing configurations and their critical components.

Gears
Naval vessels
Propulsion systems

2009010245

Submarine power and propulsion – trends and opportunities.

PACIFIC 2008, Intl Maritime Conf; 29-31 Jan 2008; Sydney, Australia. Organised by RINA and IMarEST, Australia. CD-ROM. Day 2, Session 13 [14 p, 23 ref, 1 tab, 4 fig]

Buckingham, J., Hodge, C., Hardy, T.

English

The aspiration to improve submarine Power and Propulsion System (P&PS) performance without hazarding the platform's safety and increasing whole life cost continues to challenge the designers of the world's SSKs. In-service costs can be reduced through judicious manning reductions achieved through improved automation and improved availability, reliability and maintainability. The technologies under review will seek to improve these aspects in the context of the use of more COTS type equipment. Recent technological developments and improvements have created the potential to improve overall power and propulsion performance and therefore overall submarine capability with a reduced risk to these hazards. To bring to maturity, prove and ultimately integrate such technology into a submarine design requires a firm understanding of the actual technology in terms of the benefit it offers and its limitations, complemented by knowledge of integrating such technology within the host submarine. This paper

begins by defining the future challenge for SSK designers and then considers how this could be translated into P&PS requirements. The technologies that may allow such a requirement set to be met and the anticipated performance that may be achieved are then explored. The paper emphasises energy storage, power generation and propulsion trends and opportunities. The paper concludes by proposing a vision for a future putative submarine that exploits appropriate technologies that would enter service in the near (e.g. 2020) term.

Propulsion systems
Submarines

2009010246

The application of classification to high performance craft.

PACIFIC 2008, Intl Maritime Conf; 29-31 Jan 2008; Sydney, Australia. Organised by RINA and IMarEST, Australia. CD-ROM. Day 2, Session 14 [11 p]

Ingram, T., Novak, D.

English

The American Bureau of Shipping (ABS) and the US Navy have been working together over the last several years in a measured initiative to develop and apply classification rules for naval vessels. The first complete set of rules resulting from this effort was embodied in the ABS Guide for Building and Classing High Speed Naval Craft. It laid the foundation for the subsequent development of the ABS Rules for Building and Classing Naval Vessels. In addition, in its own right, it has been used in the classification of the US Navy SEA FIGHTER, SWIFT, Torpedo Recovery/Security Craft, US Naval Academy Training Boats, the Egyptian Fast Missile Craft, Egyptian Fast Patrol Boat, Omani Patrol Boats and Canadian Navy Patrol Boats. In addition, the High Speed Naval Craft Rules were used as a core of the ABS classification requirements for the US Navy's Littoral Combat Ships, both the monohull and trimaran versions. Finally, this Rule set will be used to class the US Navy Joint High Speed Vessel and the US Coast Guard Deepwater Fast Response Cutters. This presentation summarises the approach to applying this tool on naval craft and addresses how the requirements fit together. In addition, valuable lessons learned from the ongoing applications are presented.

Classification society rules
High speed vessels
Naval vessels

2009010247

A trial sensor network for the Armidale class patrol boat.

PACIFIC 2008, Intl Maritime Conf; 29-31 Jan 2008; Sydney, Australia. Organised by RINA and IMarEST, Australia. CD-ROM. Day 2, Session 14 [11 p, 7 ref, 3 fig]

Gardiner, C.P., Vincent, P., Et al

English

A sensor network being trialled on a Royal Australian Navy Armidale Class Patrol Boat in a collaborative project between the Defence Science and Technology Organisation and Austal Ships is described. The network includes novel sensors that have not previously been used for ship hull monitoring. Potentially, they will provide versatile, small, energy-efficient options for strain, motion and corrosion sensing of hull structures. The evolution to a larger semi-planing hull form and an all aluminium construction provides an opportunity to deliver significant benefits with the installation of a hull-condition monitoring system. Improvements in assessing hull structure performance for the benefit of through-life fleet management and service life assessment can be realised if the system is complemented with strategic data analysis and modelling and these are also briefly discussed in the paper.

Condition monitoring
Hull surveillance
Patrol craft
Sensors

2009010248

DAD helicopter-ship aid for maximising helicopter and ship operational capability, improving safety and usage monitoring.

PACIFIC 2008, Intl Maritime Conf; 29-31 Jan 2008; Sydney, Australia. Organised by RINA and IMarEST, Australia. CD-ROM. Day 2, Session 14 [11 p, 8 ref, 9 fig]

Howe, D.

English

Navy ships need to have the flexibility to manoeuvre to avoid threats and provide expansive operating envelopes for helicopter operations to maximise operational effectiveness. Safe operating limits are required to enable the flight crew and deck crew to perform particular on-deck operations. These include landing and takeoff, traversing the helicopter from the hangar to the flight deck, or use of a particular lashing scheme or restraint system to secure the helicopter. Traditionally Royal Australian Navy limits have been based on simulation for a wide range of conditions and have been conservatively defined using just pitch and roll at worst case wave encounter frequencies. Little account has been made for the effects of ship manoeuvring and list. A ship based helicopter aid, termed the Deck Availability Designator (DAD) is being developed. The system couples the Australian Defence Science and Technology Organisation (DSTO) Ondeck helicopter-ship dynamic simulation code with an Inertial Motion Unit (IMU) to provide a real time predictive capability of the helicopters response to actual ship motion as well as an estimate of the loads transferred through the helicopter. By using real-time ship motion data and direct measures of limit exceedence like wheel sliding, wheel lift off or lashing load levels the DAD system will provide an optimal solution for maximising the operational envelope of both the helicopter

and ship and will improve flight crew and deck crew safety as well as provide a means of helicopter usage monitoring. Advanced VTOL Technologies in collaboration with the Australian Defence Science and DSTO have been modelling helicopters on ships for many years. This paper discusses the attributes and benefits of the proposed system.

Helicopters
Naval vessels
Ship operation

2009010249

The graduated application of survivability modelling in the warship design process.

PACIFIC 2008, Intl Maritime Conf; 29-31 Jan 2008; Sydney, Australia. Organised by RINA and IMarEST, Australia. CD-ROM. Day 3, Session 16 [32 p, 2 tab, 22 fig]

MacDonald, G., Horstmann, P.

English

Warships represent a significant investment for any country. It follows that, regardless of whether they are being used to defend national boundaries or project power, that they are as survivable as possible. In times of war, warships can expect to come under attack e.g. HMS Sheffield and HMS Coventry. Even in times of relative peace warships are still likely to be targeted, e.g. the USS Stark and the USS Cole. It is imperative that the investment a warship represents is capable of withstanding these attacks and is able to continue fighting. This paper describes how the three aspects of warship survivability: susceptibility, vulnerability and recoverability can be assessed together to optimise survivability.

Design process
Naval vessels
Ship survivability

2009010250

Alternative shock trial techniques for the RAN air warfare destroyer.

PACIFIC 2008, Intl Maritime Conf; 29-31 Jan 2008; Sydney, Australia. Organised by RINA and IMarEST, Australia. CD-ROM. Day 3, Session 16 [10 p, 7 ref, 6 fig]

Reid, W., Deyong, L., Elischer, P.

English

Naval front-line combatant vessels by their very nature are expected to be able to survive the loadings of various above and below water weapon attacks and continue fighting. Near misses by underwater weapons such as mines and torpedos may not damage a vessel from the structural view point, however

equipment and systems may be seriously damaged, often to the extent of incapacitation of power, navigation, propulsion and combat systems. Incapacitation is due to the resulting shock wave generated by an underwater explosion transmitted through the vessel structure, resulting in mechanical loadings and possible damage to equipment and systems. Vital equipment and systems are therefore usually shock tested prior to installation aboard a vessel and a shock trial on the First-of-Class vessel performed to ensure that, as a whole, systems continue to operate as installed on the vessel. A conventional shock trial requires an explosive charge to be detonated adjacent to the ship to simulate a weapon attack. First-of-Class ship shock trials can however be very expensive, time consuming and increasingly require extensive environmental considerations. This paper outlines an alternative technique that could be used in a trial to shock test vital equipment and systems aboard the First-of-Class Royal Australian Navy Hobart Class Air Warfare Destroyer. The technique involves the underwater use of air-guns to produce a mechanical shock load upon a vessel and a similar loading on equipment and systems that would be produced by an underwater explosive. Potentially, air-guns may offer numerous advantages over explosives, including cost of testing, time, safety and a considerably lower environmental hazard during a shock trial. DSTO is investigating the use of air-guns in collaboration with the US Navy and private industry to further develop this technology.

Destroyers
Naval vessels
Shock tests

2009020489

Preliminary frigate design using a multi-objective evolutionary algorithm.

PACIFIC 2008, Intl Maritime Conf; 29-31 Jan 2008; Sydney, Australia. Organised by RINA and IMarEST, Australia. CD-ROM. Day 3, Session 16 [10 p, 11 ref, 3 tab, 3 fig]

Smith, W., Ray, T.

English

Using optimisation methods, preliminary ship design is a multidisciplinary task that aims to identify basic ship dimensions and corresponding performance measures that maximise a set of design objectives. The process involves a search through a large variable space in the presence of highly nonlinear constraints arising out of user requirements, statutory norms and physical laws. In this paper, a multi-objective evolutionary algorithm that is capable of effectively and efficiently solving single/multi-objective, unconstrained/constrained optimisation problems with mixed variables is utilised. The underlying algorithm relies on a stochastic, population based, elitist, zero order model which explicitly maintains diversity of solutions in both the objective and the variable space. This is unlike most which consider diversity of solutions solely in the objective space. The performance of the algorithm is illustrated using a frigate design problem with an aim to minimise the building cost. The frigate is equipped with an anti-submarine

helicopter and appropriate handling system, a medium calibre gun, surveillance radar, a point-defence weapon system and is intended for long-distance patrol duties. The results are better than previously published results based on a goal programming approach and they highlight the ease of modelling objectives and constraints for such classes of problems.

Frigates
Ship design

2009020490

Classification of naval support ships.

PACIFIC 2008, Intl Maritime Conf; 29-31 Jan 2008; Sydney, Australia. Organised by RINA and IMarEST, Australia. CD-ROM. Day 3, Session 17 [17 p, 10 ref, 4 fig]

Simpson, R.

English

Lloyd's Register's naval ship classification regime was developed primarily for naval ships that have or will be designed/constructed in accordance with standards applicable to frontline naval ships and that will be operated in a naval environment. The regime covers a range of ships such as destroyers, aircraft carriers and frigates, and includes vessels with offensive and defensive roles. The advantages of ships operating within the naval ship classification regime are recognised by different navies. Changes to Lloyd's Regulations for the Classification of Naval Ships now allow for auxiliary naval ships used for the support of civil and naval operations to be brought within the scope of the naval ship classification regime. Naval auxiliary support ships may have a variety of roles including the movement of military and other personnel, ammunition, vehicles, stores and fuels and their transfer other naval ships. They do not have a defined offensive role but may have limited self defensive capability. In general, the ships will also need to comply with other Lloyd's Register classification rule requirements of the International Convention standards for arrangements and equipment which are applicable to the ship type. This paper describes the requirements and processes for the classification of auxiliary naval support ships within the scope of Lloyd's Register's Naval Ship classification regime. It will include the types of ships that can be brought within the regime and the standards that need to be addressed, as well as the need for the submission of a design and operating scenario statement and additional assessments of the hull structure and machinery system arrangements. The key differences in the classification requirements relating to ships that have been designed in accordance with other Lloyd's Register classification Rules and the requirements that have been developed specifically for frontline naval ships are also highlighted.

Auxiliary ships
Naval vessels
Ship classification

2009020491

Optimal naval warship design for fabrication and maintenance.

PACIFIC 2008, Intl Maritime Conf; 29-31 Jan 2008; Sydney, Australia. Organised by RINA and IMarEST, Australia. CD-ROM. Day 3, Session 17 [14 p, 2 ref]

Sloan, G.W.

English

The optimal warship design is no longer merely the one that has the greatest fire power, endurance and detection systems for its class. The Navies of the world are now including the additional requirements of reduced acquisition costs and through-life costs into the equation and are then expecting an optimum balance of all these issues in the end product. This paper explores the impacts this has on the design of the product for both fabrication and maintenance with respect to welding and structural design to reduce fabrication and through-life maintenance costs as well as the skill set required by the designer and fabricator.

Fabrication
Naval vessels
Ship design
Ship maintenance

2009020492

Canterbury tales: NZ MoD slated over flawed MRV deal.

Jane's Navy Intl, v 113 n 9, Nov 2008, p 14 [7 p, 9 fig]

Rosamond, J., Scott, R.

English

HMNZS Canterbury was commissioned into New Zealand's navy in 2007 as part of its 'Project Protector' acquisition program. Two incidents not long afterwards led to an independent inquiry into CANTERBURY's acquisition and introduction into service, focusing on the ship's safety and functionality. This article outlines the findings of the inquiry.

Naval vessels
Safety

2009020493

Defence mechanism: naval BMD comes into its own.

Jane's Navy Intl, v 113 n 9, Nov 2008, p 22 [5 p, 7 fig]

Hollosi, C.

English

As emerging ballistic missile threats become more significant, a trend has developed, particularly in the West, to counter them with the insertion into naval platforms of BMD functionality. This article looks as existing and new programmes.

Missiles
Naval vessels

2009020494

Sensors hold key to the unattended engine room.

Jane's Navy Intl, v 113 n 9, Nov 2008, p 36 [3 p, 7 fig]

Henderson, K.

English

This article looks at sensor technology and condition-based maintenance that are fuelling the drive towards the automation of naval vessel propulsion systems.

Engine room automation
Naval vessels
Sensors

2009020495

OTTO SVERDRUP – Navantia delivers the third of five F-310 frigates to the Royal Norwegian Navy.

Ships and Shipping, v 8 n 12, Sept 2008, p 20 [1 p, 2 fig]

No author given

English

The Royal Norwegian Navy frigate OTTO SVERDRUP is described. The vessel, built by Navantia, Spain, is equipped with the American AEGIS combat system and has a full load displacement of 5,130 tonnes.

Frigates
Naval vessels
Vessel descriptions

2009020496

Research on vibration isolation and anti-shock design of ship's superstructure.

J of Jiangsu Univ of Science and Technology (Natural Science Ed), v 22 n 4, Aug 2008, p 12 [6 p, 8 ref, 10 fig]

Wang, G., Liu, Z.

Chinese

As lots of precision instruments are installed in warship's superstructure, vibration isolation and anti-shock is of great importance. Vibration isolation and anti-shock of warship's superstructure were designed by numerical simulation based on finite element method. FEA model of ship including vibration isolation systems were established and its dynamic properties were analysed. To reveal the discipline of vibration isolation and anti-shock of warship's superstructure, the influences of isolation form and isolation parameters on vibration transmission from engine room were investigated, as well as the influences of the underwater explosion, including its explosive blast and the secondary pulsation generated by explosion. That provides the basis for vibration isolation and anti-shock design of warship's superstructure.

Finite element method
Naval vessels
Shock
Vibration isolators

2009030739

L-Cat design brings variable geometry ashore.

Warship Technology, Jan 2009, p 12 [3 p, 4 fig]

No author given

English

The French Navy is starting an evaluation of a novel variable-draft landing craft, known as the L-Cat, to assess its suitability as a potential future expeditionary watercraft. The ro-ro design is intended to meet emergent operational requirements for a fast 'ship-to-shore connector', combining the attributes of both a deep-draft vessel and a landing craft to offer high speed, excellent manoeuvrability and increased payload.

Landing craft

2009030740

UK sets sights on new high-speed landing craft.

Warship Technology, Jan 2009, p 16 [2 p, 2 fig]

No author given

English

The UK Ministry of Defence is exploring plans to acquire a new design of Fast Landing Craft (FLC) to support future amphibious surface assault operations. A class of up to six vessels is planned. Key performance requirements/constraints outlined for FLC include the lift capacity to transport loads up to and including a main battle tank, sufficient speed to give operational flexibility to the Amphibious

Task Group Commander, and a form sized to fit within the docking facilities of the landing platform dock and landing ship dock (auxiliary).

High speed vessels
Landing craft

2009030741

Power and propulsion sub-alliance formed for CVF.

Warship Technology, Jan 2009, p 20 [3 p, 3 fig]

No author given

English

This article describes the integrated power and propulsion system for the UK Royal Navy's two new 65,000 tonne aircraft carriers. A combination of two gas turbine alternators and four diesel generators will generate in excess of 108MW at 11kV to meet the propulsive power demand for a speed in excess of 25 knots, while at the same time meeting shipwide LV power needs.

Aircraft carriers
Propulsion systems

2009030742

Acceptance grows for classification of combatants.

Warship Technology, Jan 2009, p 29 [5 p, 4 fig]

No author given

English

Naval classification continues to evolve as both sides involved – navies around the world and the classification societies that have entered this arena – gain a better understanding of each other's needs and capabilities. This article discusses recent developments.

Naval vessels
Ship classification

2009030743

Li-ion batteries store up long-term potential.

Warship Technology, Jan 2009, p 36 [3 p, 3 fig]

No author given

English

A battery manufacturer is investigating application of a new generation of safe Li-ion batteries on the Scorpéne type submarine, which, if successful, could double submerged endurance.

Electric batteries
Submarines

2009030744

F125 steaming on.

Marine Engrs Rev, Dec/Jan 2009, p 21 [2 p, 3 fig]

No author given

English

This article reports on the onboard power generation and propulsion system for the German Navy's Class F125 frigates.

Frigates
Propulsion systems

2009030745

Shipbuilders see potential at the bottom for smaller, more affordable submarines.

Jane's Navy Intl, v 113 n 10, Dec 2008, p 14 [2 p, 4 fig]

Rosamond, J.

English

As the Type 209 submarine is upsized, a new breed of coastal submarine is emerging to exploit a gap in the market. This article examines the contenders.

Submarines

2009030746

French predator waits to surface.

Jane's Navy Intl, v 113 n 10, Dec 2008, p 22 [6 p, 8 fig]

Scott, R.

English

This article discusses the French Navy's next-generation Barracuda nuclear attack submarine. Six submarines are to be built to replace the ageing Rubis-class and Améthyste-class SNAs.

Submarines

2009030747

A wind tunnel study on the interaction of hot exhaust from the funnel with the superstructure of a naval ship.

Oceans '08 MTS/IEEE Kobe-Techno-Ocean; 8-11 April; Kobe, Japan. Publ by IEEE; ISBN 978-1-4244-2125-1

Vijayakumar, R., Seshadri, V., Et al

English

Prediction of temperature profile and trajectories of the ship exhaust plume from the funnel around the superstructure is not amenable to theoretical analysis and empirical calculation procedures. These predictions are of vital importance for Naval Architect from the initial phase of design for positioning and arranging of various superstructure electronics (radars, antenna), weapons and intakes (gas turbine, ventilation) in the superstructure and with the least interference with the hot exhaust flume from the funnel. However all Modern naval ships tend to favour short funnels and tall mast to house electronics. This makes them prone to the problem of smoke nuisance where hot exhaust gas gets entrapped

into turbulent wake of the superstructure and deteriorates the performance of electronics, weapons, sensors, increase the ships infra red signature and hampers the internal ventilation and GT intakes. Experiments conducted in wind tunnel on the model ship superstructure are the only reliable tool that is available to estimate temperature field as well as to study the exhaust smoke superstructure interaction on ships. This paper presents the mapping of the temperature field around a simplified topside configuration of a generic frigate. The configuration comprises of two funnels (forward and aft) a superstructure block consisting of bridge, mast and two intakes (fwd and aft) ahead of respective funnels along with piping network with blowers to achieve the desired air flow through funnels and intakes. A set of electrical heaters has been fitted in the funnel inlet pipe to provide hot gases. The exhaust temperature from the funnel has been maintained at 50degC above the ambient temperature throughout the experiment. The mapping of temperature profile was conducted by measuring temperature using RTD. Six measurement planes were chosen so as to cover the most critical region around the superstructure with a total of 1344 discreet measurements. The study provides an understanding of the near field behaviour of hot flumes and also suggests possible location of intakes and regions of hot spots in the superstructure. These results can serve as reference data for Naval Architects for their use in the validation of the numerical simulation using CFD.

Exhaust gases
Interactions
Naval vessels
Superstructures
Wind tunnel tests

2009040993

Less-capable vessels seek innovative solutions for C2.

Jane's Navy Intl, v 114 n 1, Jan/Feb 2009, p 28 [4 p, 7 fig]

Ebbutt, G.

English

Major warships have sufficient crew to require the installation of a number of different communication systems. Less-capable vessels, perhaps with crew and space constraints and limited communications, face a much greater challenge. The same is true of ships from countries that have limited access to satcom or sophisticated shore headquarters. These could be described as 'disadvantaged platforms'. Despite these constraints, the 'disadvantaged platform' can achieve the complex fusion of sensor data, weapon systems and communications via internal or external solutions. This article explores the options.

Command and control
Naval vessels

2009040994

Turbines and diesel gensets for German frigates.

The Motor Ship, v 89 n 1055, Dec 2008, p 24 [2 p, 2 fig]

No author given

English

MTU has been awarded a contract for delivery of diesel gensets and gas turbines for the future F 125 frigates of the German Navy. On each vessel, four diesel gensets producing a total of 12,060kW will generate electricity for the on-board power supply system and diesel-electric propulsion power for cruising speeds of up to 20 knots. A gas turbine with a power output of 20MW can support the propulsion system and accelerate the vessel up to 26 knots.

Diesel electric propulsion
Frigates
Gas turbines
Naval vessels

2009040995

Largest aero-derivative turbine enjoys warship orders.

The Motor Ship, v 89 n 1055, Dec 2008, p 26 [1 p, 2 fig]

No author given

English

Rolls-Royce's MT30 aero-derivative gas turbine is proving a popular choice in warship propulsion. The MT30 forms the core of the propulsion and power system for the UK's two new 65,000 tonne aircraft carriers. The Lockheed Martin version of the MT-30 powered Littoral Combat Ship (LCS-1) for the US Navy had its power plant fired up and tested in 2008, in preparation for trials on the Great Lakes.

Gas turbines
Naval vessels

2009040996

Aero-derivative turbine in hybrid configuration.

The Motor Ship, v 89 n 1055, Dec 2008, p 27 [2 p, 3 fig]

No author given

English

GE Marine's LM2500 + marine derivative gas turbines have been selected to power the US Navy's new LHA 6 amphibious assault ship. The LHA 6 ship's hybrid mechanical-electric propulsion system will consist of two LM2500 + gas turbines, each rated at 35,290 hp at US Navy standard conditions and two, 5,000 hp auxiliary propulsion motors.

Gas turbines
Naval vessels

2009040997

Real-time simulation of a COGAG naval ship propulsion system.

Instn of Mechanical Engrs Procs, Pt M: J of Engng for the Maritime Environment, v 223 n 1, 2009, pp 47-62

Altosole, M., Benvenuto, G., Et al

English

Design and optimisation of the propulsion system is a crucial task of the ship design process. The behaviour of the propulsion system, in transient conditions as well as in steady state, is greatly affected by the capability of the control system to manage the available power and to achieve the desired performance in the shortest time. The selection of a proper control scheme is a trade-off between different and conflicting needs. Two of the opposites are: increasing the ship operability by adding more functions and more controls; and reducing the control system development and installation time and cost. In this paper, the rapid prototyping and testing procedure for the development of the propulsion controller of the new Italian aircraft carrier CAVOUR is presented, using real-time hardware-in-the-loop (RT-HIL) simulation. The procedure is based on a wide use of simulation technology. First, a complete dynamical model of the ship propulsion plant was developed. Then, batch simulation was used to develop the best possible control

scheme. Finally, RT-HIL simulation was used to debug the real controller software and to tune the controller parameters before sea trials. The application of the procedure led to a significant reduction in the development phase of the controller design. Furthermore, the adoption of the RT-HIL technology greatly reduced the time spent to tune the control system during the ship delivery phase.

Control systems
Naval vessels
Propulsion systems
Simulation

2009040998

LCS power plant still in the balance.

Marine Propulsion & Auxiliary Machinery, v 30 n 6, Dec/Jan 2008/9, p 28 [3 p, 4 fig]

Henderson, K.

English

This article looks at the technical features of the three proposals for the design of the US Navy's Littoral Combat Ship (LCS). Primary missions of the new LCS are antisubmarine warfare in coastal waters, mine countermeasures, interdiction of small craft and intelligence, surveillance and reconnaissance. A total of 55 hulls are planned for this class, making it one of the most valuable naval contracts ever.

Naval vessels
Propulsion systems
Ship design

2009051234

Intelligent ship arrangements: a new approach to general arrangement.

Naval Engrs J, v 120 n 3, Dec 2008, p 51 [14 p, 22 ref, 1 tab, 20 fig]

Parsons, M.G., Chung, H., Et al

English

A new surface ship general arrangement optimisation system developed at the University of Michigan is described. The Intelligent Ship Arrangements system is a native C++, Leading Edge Architecture for Prototyping Systems–compatible software system that will assist the designer in developing rationally based arrangements that satisfy design specific needs as well as general Navy requirements and standard practices to the maximum extent practicable. This software system is intended to be used following or as a latter part of ASSET synthesis. The arrangement process is approached as two essentially two-dimensional tasks. First, the spaces are allocated to Zone-decks, one deck in one vertical zone, on the ship's inboard profile. Then the assigned spaces are arranged in detail on the deck plan of each Zone-deck in succession. Consideration is given

to overall location, adjacency, separation, access, area requirements, area utilisation, and compartment shape. The system architecture is quite general to facilitate its evolution to address additional design issues, such as distributive system design, in the future.

Artificial intelligence
General arrangement
Naval vessels
Ship Design

2009051235

Intelligent electromechanical actuators to modernise ship operations.

Naval Engrs J, v 120 n 3, Dec 2008, p 77 [12 p, 12 ref, 4 tab, 6 fig]

Tesar, D., Krishnamoorthy, G.

English

The US Navy is determining the viability of replacing hydraulic actuation for Navy platforms by using advanced torque-dense electromechanical actuators (EMAs). The goal is to create a Standardised Actuator Building Block (SABB) to open up the ship architecture, enhancing performance while reducing the threat of obsolescence, enable rapid reconfiguration (fight through) after attack, expand performance, and dramatically shorten the associated logistics trail. This can make refreshment even at sea feasible with significant improvements in ship availability and reduced dock time. Cost is also of increasing interest to the Navy in order to produce more combatant platforms for a given budget. SABBs can be downgraded (to reduce cost) or upgraded (to meet more demanding performance requirements) all within the same set of standards (quick-change interfaces, sizes, geometry, etc.). These modules can be rapidly replaced even by a nominally trained technician (reducing training costs) and therefore reducing the number of ship personnel. This paper outlines the merits of the crucial component to achieve the abovementioned objectives: the EMA. The EMA is the exact equivalent of the computer chip to computers—to drive anything that moves on the ship. In conjunction with the intelligent actuator control framework, developed based on extensive research in robotics and intelligent machines at The University of Texas Robotics Research Group, this technology can now be leveraged to make a significant contribution to the modernisation of future ships and submarines.

Actuators
Electronic equipment
Naval vessels

2009051236

Express delivery: JHSV closed gap from sea base to shore.

Jane's Navy Intl, v 114 n 2, March 2009, p 12 [6 p 9 fig]

Scott, R.

English

With the benefit of several years' operations with chartered high speed vessels, the US Navy and Army have established a multi-service acquisition initiative to introduce a new class of shallow draft, fast logistics vessel. Due for delivery in 2011, the Joint High Speed Vessel (JHSV) promised to radically change the way that seaborne intra-theatre logistics missions are performed in the US military. Austal USA has been awarded the contract for detailed design and build of the lead JHSV, with options for the build of up to nine additional ships. The JHSV will be a 103m, 635 tonne displacement fast catamaran.

Catamarans
High speed vessels
Naval vessels

2009051237

Analysis of requirements by means of the application of AHP as a basis for the development of the conceptual design of a LCU type ship.

Ship Science & Technology, v 2 n 3, July 2008, p 47

Araníbar, L.E., Callamand, R.L.

Spanish

This article summarises the study of the requirements and necessities which are taken into consideration in the development of the conceptual design of a Landing Craft Utility (LCU), in which the AHP hierarchic analysis methodology was used, in order to qualify and classify the requested by the Colombian Navy (ARC), which will be the user of the ship. This way, it was possible to establish the importance which each of the necessities exposed has for the shipbuilder, in order to include them directly in the design process.

Landing craft
Ship design

2009051238

Capacity of surface warship's protective bulkhead subjected to blast loading.

J of Marine Science and Application, v 8 n 1, March 2009, pp 13-17

Peng, X-n., Nie, W., Yan, B.

Chinese

The protective bulkhead of a large surface warship needs to be designed working in the membrane mode. In this paper, a formula is derived for calculating the plastic deformation of the protective bulkhead subjected to blast loading by the energy method, and the ultimate capability of the protective bulkhead can be calculated. The design demand of the protective bulkhead is discussed. The

calculation is compared with external experiments, which indicates that the formula is of great application value.

Bulkheads
Naval vessels
Plastic deformation

2009051239

An application of ubiquitous technologies for naval ships: crew location recognition system.

ICMRT '07, 2nd Intl Conf on Marine Research and Transportation; 28-30 June 2007; Naples, Italy. Organised by Univ Naples, Italy. [10 p, 8 ref, 9 fig]

Lee, J-T., Park, J-H., Et al

English

New information and communication technologies are developing which provide a ubiquitous environment and make the ubiquitous world possible. Some important emerging technologies, which have potential for shipboard applications, are reviewed and up-to-date developments are summarised. Shipboard application areas for utilisation of the ubiquitous technology are suggested, which would enhance the operational efficiency of a ship. Application of the ubiquitous technologies for a naval ship would enhance the operation efficiency and combat efficiency of the naval ship, being supported by a system of networked computers in real time. Since a large number of crew are based on a naval combatant ship, the location of each crew member is not always monitored even in the most critical situation, such as in the combat ready situation. The concept of the Crew Location Monitoring System is presented and the preliminary architecture of the system is given. Locations of crews can be monitored by using ubiquitous sensor network technologies. An active type Radio Frequency Identification (RFID), would be distributed to, and carried by, each crew. Readers of the RFID are located at major places where crews are likely to visit. Locations of crews are monitored and displayed at computer terminals and/or handy terminals, such as PDAs. Possible areas for extended application of the crew location recognition system are suggested.

Monitoring systems
Naval vessels
Position (location)
Recognition
Ship personnel

2009051240

OPVs offer small navies greater presence.

Ship & Boat Intl, March/April 2009, p 18 [5 p, 5 fig]

Reynolds, H.T.

English

Offshore patrol vessels (OPVs) are an effective means of providing small navies with tailor-made ships for specific maritime security roles. This article looks at some of the latest vessels for navies worldwide.

Naval vessels
Patrol craft

2009051241

Arctic patrol ship could have double-acting hull form.

Warship Technology, March 2009, p 12 [3 p, 4 fig]

No author given

English

This article discusses Canada's proposed Arctic Offshore Patrol Ship (AOPS) which could be the first warship to be built with an icebreaking double-acting hull form. An overview of the key elements of the program is given including: the main particulars; hull form; propulsion machinery; general arrangement arrangements for landing craft and boarding boat; aviation facilities; and key mission systems. A profile drawing is given.

Icebreaking
Naval vessels
Patrol craft

2009051242

New rescue craft for South Korea and Singapore.

Warship Technology, March 2009, p 22 [3 p, 3 fig]

No author given

English

UK engineering and services group James Fisher Defence has recently shipped two new Deep Search and Rescue (DSAR) 500 series free-swimming submarine rescue vehicles for service with customers in South Korea and Singapore. Depth rated to 500m, the DSAR 500 is 9.6m in length, 3.8m in beam and weighs 23 tonnes in air (the pressure hull being constructed from Q1N steel). It is certified to carry up to 16 rescuees, or a total rescue payload of 1200kg.

Rescue vessels
Submersibles

2009051243

Developing an original naval ship concept design of T-ARS(X).

Tug & Salvage Technology Symposium; 29-30 Jan 2009; Arlington, VA, US. Organised by ASNE, Alexandria, VA, US.

LaPenna, J., Douglas, K., Et al

English

The US Navy is looking to replace its aging fleet of salvage ships and ocean going tugs with a new single platform design (T-ATS(X)). The combined platform is expected to include several improvements to the in-service platforms and to integrate much of the Navy's current rescue and salvage equipment as well as upgradable features for future systems. The authors are exploring two designs for the next-generation ARS/ATF ship: first, a traditional monohull with increased capabilities and improved propulsion; second, a multihull to provide increased working deck space, large transverse stability and increased fuel efficiency. With the aid of ASSET 6.0 software (Advanced Ship and Submarine Evaluation Tool), the optimal arrangement for each design will be evaluated using the following six distinguishing design variables: ships length; manning; propulsion arrangement; endurance; aft deck space; presence of crane aft. The levels for each of these design variables were chosen in accordance with the stakeholder's thresholds and objectives. All variants will be designed to meet the minimum requirements contained within the proposed T-ATS(X) top level characteristics developed by NAVSEA 00C. The Overall Measure of Effectiveness (OMOE) tree being used to determine the optimal design is presented, including the results of a survey which polled the key stakeholders on the weighting factors to be used for assessing ship performance.

Naval vessels
Salvage tugs
Ship design
Tugs

2009051244

The history of towing system aboard US Naval salvage ships past, present and future.

Tug & Salvage Technology Symposium; 29-30 Jan 2009; Arlington, VA, US. Organised by ASNE, Alexandria, VA, US.

Durar, B.

English

This paper discusses the advantages and disadvantages of current towing systems onboard the T-ARS 50 and T-ATF 166 class salvage ships, lessons learned and new technologies commercially available to the US Navy for the next 30 years of ships service.

Naval vessels
Salvage tugs

2009051245

T-ARS 50 class design, lessons learned and implication for next generation vessels.

Tug & Salvage Technology Symposium; 29-30 Jan 2009; Arlington, VA, US. Organised by ASNE, Alexandria, VA, US.

Bebar, M., Byers, D., Et al

English

The US Navy's T-ARS 50 Class ships are nearing the end of service life, having been delivered in the mid-1980s. This presentation provides a brief summary of the requirements and key design aspects of T-ARS 50 Class vessels. Lessons learned during the design of these ships and from in-service experience are explored, and design implications for replacement vessels are proposed.

Naval vessels
Salvage tugs

2009051246

Adapting advance technologies from the offshore oil and gas industry.

Tug & Salvage Technology Symposium; 29-30 Jan 2009; Arlington, VA, US. Organised by ASNE, Alexandria, VA, US.

Lebans, G., Race, R.

English

Future deck machinery systems installed aboard offshore supply, tug and salvage vessels will incorporate automation and robotics. This will increase safety and reduce the number of crew required on deck. This presentation reviews several advanced technologies and outlines how they can be utilised for naval tug and salvage operations.

Naval vessels
Salvage tugs
Tugs

2009061485

Integrated bridge holds key to giving collisions a miss.

Jane's Navy Intl, v 114 n 3, April 2009, p 38 [2 p, 5 fig]

Rosamond, J.

English

Navies are increasingly looking to the benefits of an integrated bridge (IB) to bolster safety and avoid potential fatal collisions. This article looks at several IB systems including the IB system specified for the German Navy's Braunschweig-class corvette program.

Collision avoidance
Integrated bridge systems
Naval vessels

2009061486

USNS AMELIA EARHART.

Ships and Shipping, v 9 n 5, Feb 2009, p 18 [1 p, 1 fig]

No author given

English

This article describes USNS AMELIA EARHART, the sixth Lewis and Clark (T-AKE) class dry cargo/ammunition ship delivered by General Dynamics National Steel and Shipbuilding Company to the US Navy. With a cargo capacity of more than 10,000 tonnes, the primary mission of T-AKE ships is to deliver food, ammunition, fuel and other provisions from shore stations to combat ships at sea.

Auxiliary ships
Naval vessels
Vessel descriptions

2009061487

Trends for future high-performance naval platforms.

Australian J of Mechanical Engng, v 4 n 2, 2007

Beauchamps, B., Bertram, V.

English

The survey discusses trends including high-speed vessels including new hybrid concepts, unmanned drones, reduction of crews, all-electric ship, podded drives and stealth. The literature survey focuses on developments of the past three years and was developed within the framework of a recent and continuing study for the French Navy.

High speed vessels
Literature reviews
Naval vessels
Surveys
Trends

2009061488

Development of a naval ship product model and management system.

J of the Soc of Naval Architects of Korea, v 46 n 1, Feb 2009, p 43 [14 p, 10 ref, 24 fig]

Oh, D-K., Shin, J-G., Et al

Korean

The Korean Navy has made many efforts to apply the concepts of product lifecycle management and M&S to its naval design and production. However, most of the efforts that have being applied to some acquisition processes, focused only on the element technologies without information models and data frameworks. This study discusses an information model of naval ships for advanced naval acquisitions. A naval ship product model is introduced, and it refers to the distributed product description concept of simulation-based acquisition. To realise the product model concept, a data architecture is designed and a Product Model Management System (PMMS) based on a PDM system is developed. It is validated through the case study of building the product model of a naval ship that the PMMS has the applicability to effectively manage the naval ship acquisition data on the basis of a 3D product model.

Acquisition
Naval vessels
Product models

2009061489

A study of product information quality verification in database construction of naval ship product models.

J of the Soc of Naval Architects of Korea, v 46 n 1, Feb 2009, p 57 [12 p, 8 ref, 3 tab, 11 fig]

Oh, D-K., Shin, J-G., Coi, Y-R.

Korean

In automotive industries, reusability of product information is increasing through database construction of previous product data. The product data is stored by data quality management in product information systems. Naval ships have functional similarity by ships of the same classification and class that are built by series. Information of hull structures as well as embarked equipment are similar., so it would be effective to use database systems that are considered product information quality of previous ships in design and production processes. This paper discusses product information quality in database construction of naval ship product models. For this, a basic concept and reference model for data quality verification is proposed. Based on this concept, a verification guideline is defined and it is applied for the case study of the digital naval ship which was built to the naval ship product model.

Databases
Naval vessels
Product models

2009061490

Real-time realities: the application of commercial information technology to combat control systems.

Naval Engrs J, v 121 n 1, 2009, p 17 [17 p, 7 ref, 6 fig]

Zilic, A.M., Baron, N.T.

English

The US Navy is steward to the most lethal arsenal of national and combat power ever amassed. The command responsibilities associated with such destructive force require us to always be in complete positive control over these weapons. The Navy, to meet this mission requirement, traditionally developed its systems using special purpose technology to achieve "Deterministic Control." Control system technologies are fielded in all aspects of shipboard combat systems with specific challenges in timing and safety in the surface anti-air warfare systems, the submarine launched ballistic missile systems, and air launched missile systems. Today's naval combat system is a highly complex, computer-based control system that is evolving within the framework of the commercial computer industry. This paper briefly describes some critical and unique characteristics of a large-scale digital weapon control system and identifies emerging technologies that have the potential to respond to the Navy's war fighting needs.

Combat systems
Control systems
Naval vessels
Weapons

2009061491

Ship service life and naval force structure.

Naval Engrs J, v 121 n 1, 2009, p 69 [9 p, 23 ref, 1 tab, 2 fig]

Koenig, P., Nalchajian, D., Hootman, J.

English

The US Naval Sea Systems Command has conducted several interdisciplinary studies recently, motivated by a need to address the high cost and extended duration of naval vessel design and construction. Naval architecture and force structure studies have been key components of these efforts. Two general approaches are available: development of alternative future fleet design and programming concepts, and changes in ship expected service life policy. These are not mutually exclusive alternatives, service life is a key variable in future force planning regardless of any other variables considered. In this paper, issues

associated with both approaches are described and discussed. Potential implications for future naval force structure planning are identified and recommendations for future work are suggested.

Life (durability)
Naval vessels

2009061492

Modelling breaking ship waves for design and analysis of naval vessels.

DoD High Performance Computing Modernisation Program Users Group Conf; 18-21 June 2007; Pittsburgh, PA, US. Publ by IEEE; ISBN 978-0-7695-3088-5

Weymouth, G., Hendrickson, K., Et al

English

One of the remaining challenges involved in modern naval ship design and analysis is to account for the effects of breaking waves, spray and air entrainment on the performance and non-acoustical signature of a surface ship. The challenges associated with this task are twofold. The first is robustly simulating the large-scale problem which involves the flow about an entire surface ship. The second is the development of physics-based closure models for steep breaking waves in the presence of turbulence. A two-pronged approach consisting of developing an understanding for closure model development and applying cutting-edge computational capabilities has been developed to accurately simulate the free-surface flow around naval combatants. Using high-resolution direct numerical simulation of the Navier-Stokes equations employing the level set method, an ensemble of unsteady breaking waves at Reynolds numbers O(103-4) has been simulated. This includes steady and unsteady as well as spilling and plunging events. The goal of this core research area is to develop understanding of the physics of breaking waves to help guide the development of physics-based breaking wave modes. The dataset is being used for the evaluation of closure models for inclusion in current larger scale simulations such as large eddy simulation and Reynolds-Averaged Navier-Stokes. Robustly simulating the near-field flow of a surface ship requires the development of new models and numerical techniques suitable for use in large scale applications. More moderate-scale simulations have been performed to design, verify, and validate these capabilities before their implementation on the large- scale simulations. Using Numerical Flow Analysis (NFA), simulations of several naval combatants were performed at a range of speeds. The numerical results show wave overturning at the bow and flow separation at the transom. Air is entrained along the side of the hull and in the rooster-tail region behind the stern. In both regions, numerical predictions agree well with experimental measurements. This work marks the first time that NFA has been used to simulate an entire ship hull.

Breaking waves
Naval vessels

2009061493

JHSV set to take shape.

Maritime Reporter & Engng News, v 71 n 4, April 2009, p 30 [3 p, 2 fig]

Trauthwein, G.

English

Austal USA is building a Joint High Speed Vessel (JHSV) for the US Department of Defence with options for nine additional vessels. The JHSV will be capable of transporting troops and their equipment, supporting humanitarian relief efforts, operating in shallow waters and reaching speeds in excess of 35 knots fully loaded. Built from aluminium, the catamaran will measure 103 x 28.5 x 3.8m and will be powered by 4 x MTU 20V8000 M71L diesel engines.

High speed vessels
Naval vessels

2009061494

Enabling interoperability through the ship life cycle.

J of Ship Production, v 25 n 1, Feb 2009, p 33 [12 p, 10 ref, 19 fig]

Briggs, T.L., Gischner, B., Et al

English

Shipyards are increasingly responsible for the life cycle support of ships, including maintenance and logistics data over the life of the ship. Hence, it has become important for shipyards to efficiently integrate acquisition product model data with the life cycle support product model data. The use of Integrated Data Environments (IDE) for Navy ship programs has fostered the integration of design, logistics, and production information for the ship. However, it has not been possible to exchange this integrated data set; rather, different data are typically transferred at different times, often resulting in inconsistency. The Product Life Cycle Support (PLCS) STEP standard (ISO 10303-239) for logistics data and life cycle support provides the capability to exchange logistics data linked back to design data. The standard was developed and has been implemented by the aero-space and defense industry. The ISE-6 project demonstrated the feasibility of using the PLCS standard for naval shipbuilding. This approach should also enable interoperability of life cycle data with other defense programs. The ISE-6 team mapped naval shipbuilding requirements into PLCS, while preserving compatibility with existing PLCS implementations. A unique feature was the automated mapping via template expansion and identification. The ISE-6 team conducted a demonstration of this capability, exchanging data between two IDES and a knowledge management tool, which was used to modify and update the data for the receiving IDE. During the next phase of the project, the ISE-6 team will be investigating interoperability using the S1 000D Specification for the procurement and production of technical publications.

Computer-aided ship design
Life (durability)
Naval vessels

2009061495

Ready to design a naval ship? – Prove it!

J of Ship Production, v 25 n 1, Feb 2009, p 45 [14 p, 11 ref, 3 tab, 11 fig]

Keane, R., Fireman, H., Et al

English

Last year, the US Naval Sea Systems Command (NAVSEA) sponsored the Navy's Center for Innovation in Ship Design (CISD) to establish a framework for developing ship design capability readiness levels as part of a business case to provide incentives for the naval ship enterprise to invest in developing, sustaining, and improving mature naval ship design capabilities. The authors describe the accomplishments thus far and note that there is now enough documentation that new ship acquisition programs can specify design readiness requirements and have valid criteria for evaluating the design capabilities of contractors proposing to perform early stage naval ship design. They actually apply the framework to NAVSEA and assess NAVSEA's readiness to design a naval ship. Although significant progress is being made on developing Ship Design Capability Readiness Models (SDCRM), much work remains to be done!

Naval vessels
Ship design