THE AUSTRALIAN NAVAL ARCHITECT

Volume 16 Number 3
August 2012

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THE AUSTRALIAN NAVAL ARCHITECT

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Cover Photo:

The RAN's second LHD, the future HMAS *Adelaide*, enters the water for the first time at her launching by Navantia on 4 July 2012
(Navantia Photograph)

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CONTENTS

RINA Australian Division
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From the Division President

The purpose of the Division is to further the objectives of the Royal Institution of Naval Architects in a practical and meaningful way throughout the length and breadth of Australia, to promote and support the profession and professionalism of naval architecture in all its varied guises. These guises are many and seem to be ever increasing, with the rapid growth of offshore exploration and development, specialised defence work, the challenges of the Single National Jurisdiction — the list is endless and varied.

While the Division Council plays an important role in coordinating and focussing this support, we are generally one step removed from the membership — it is the Sections which undertake this vital function and the Section committees that put in the "hard yards". Without them we would effectively have no Division. The objectives of the Sections are "*to promote the learned society activities through holding technical and other meetings for the presentation of papers and/or lectures and to increase the membership of the Australian Division of the Royal Institution of Naval Architects and, through it, membership of the Section*". It is primarily through these "technical and other" meetings that members and colleagues can get together for cross-fertilisation of ideas and for their own continuing professional development. I cannot emphasise strongly enough how important it is for members to do their best to attend these meetings and to encourage others to do so.

I am well aware that attendances can be low at Section technical meetings and I invite everyone stick their oar in with new ideas for these meetings, be it timing, venue, format, content or any other relevant thought that could encourage increased participation and improved outcomes for members. One such "innovation" is the imminent revival of the Walter Atkinson Award to encourage the presentation of papers at technical meetings — watch these pages for further details.

For those of you recording your CPD, putting in some volunteer work for the profession can add significantly to your recorded hours and I know that all Section committees would welcome your contribution. There are almost always vacancies on Section committees and currently we are also looking for additional professional review interviewers in some areas, an advertising manager for *The ANA*, a representative on the Standards Australia Shipbuilding Committee, and an additional Division Council member — we look forward to being overwhelmed with volunteers!

On a completely different note, I was in Irvine, Scotland, last week and had a look at the clipper ship *City of Adelaide* which will hopefully be rescued from her present exposed location before deteriorating any further and shipped to Port Adelaide for permanent conservation. I wish Peter Roberts and his team the very best for the mammoth task they have ahead of them.

Meanwhile, I am always available for discussion and comment on any topic of relevance to Australian naval architects, by email at jimb@austal.com or telephone (0418) 918 050.

Jim Black

Jim Black
President, RINA Australian Division

Editorial

Once again that remarkable occasion, the Olympic Games, is over. Despite some people's dire predictions, particularly about the weather, London put on a great event full of colour and emotion.

One unfortunate feature of the Olympic Games is the extraordinary expectations placed on the athletes, particularly by the media. I find it hard to understand why missing out on first place at that level by a mere fraction of a second can be regarded as a failure. Perhaps that is just the Olympics — certainly in Sydney the pressure on all Olympic athletes was very evident which made the following Paralympics, in many ways, more relaxed and fun.

Those of us with a maritime bent must have been very happy to see the gold medals won by the sailors, in the sport regarded by many as 'boring' and which is so seldom televised. Gold in Weymouth? Fancy that. Congratulations to our sailors and, indeed, to all Australian Olympians. It is a great achievement to be selected to compete at that level with the rest of the world.

The Olympic Games is an expensive show when there are many other demands on resources, but it is far better to enjoy that kind of international competition than suffer the strife which besets the world every other day of the year.

Only four short years to Rio 2016!

John Jeremy

LETTERS TO THE EDITOR

Dear Sir,

I am interested in the current usage of design software in different shipyards, ship design consultancies and countries, and have briefly researched the usage in my home country, China, with some interesting results.

Tribon software is an excellent integrated system and a large database as well, and it has advantages that many other systems do not have. The major companies using Tribon in China are Guangzhou Shipyard International Co. Ltd. and Jiangnan Shipbuilding (Group) Co. Ltd. However, this software has some shortcomings, in that there is not enough open-source data, the database systems are self-contained sets and lacking in standard formats for data interchange with other software.

FORAN is one of the world's most widely-used shipbuilding professional software programs, and is used by more than 120 design firms and shipyards. In recent years, its use has been growing fast. Compared to Tribon, FORAN provides a series of interface formats for data exchange with a variety of software systems, including IGES, DXF, DWG, STEP, XML, etc. and the Oracle database is completely open to users.

CADDS 5 consists of several modules for hull design, including piping systems, outfitting, electrical systems, air conditioning and ventilation systems, etc. The unique architecture of CADDS 5 enables hundreds of designers to work concurrently on a design project, thereby allowing simultaneous design, documentation, assembly, and machining.

In China, some shipyards are using NAPA software in detail design, others are using Tribon for production design, and CADDS 5 can be interoperable with them. In China, Jiangnan, Dalian, Liaoning South, Wuchang, Changjiang Ship Design Institute and other shipyards and design institutes are using CADDS as the preferreed solution.

ShipConstructor caters for many aspects of ship design, including hull fairing, lofting, equipment, piping, the output of the graphics and building strategy plans, combined with steel plate nesting, hull surface nesting, assembly drawings and piping diagram, and including NC-coding. All models with the SQL database can also be easily used in conjunction with other database systems.

Major Chinese domestic shipyards usually use some of this international ship-design software during the design process. However, due to data conversion and interface problems, the software usually requires secondary development.

With the transformation of international industry and the change of the division of work, much shipbuilding is gradually transferring to China. So the release of Chinese versions of the software should be expected soon, and CSSC's subsidiary, Hudong Zhonghua Shipyard, has had some significant achievements in this area.

Li Chen
UNSW Student

Dear Sir,

I would like to draw the attention of naval architects to the aesthetic part of design.

Every day, marine engineers and naval architects design lighter, faster and more energy-efficient ships which let sailors dream of science fiction. I think that, as engineering improves, the aesthetics should play a greater role. I'm not only talking about the good looks of a yacht, but how naval architects could better differentiate themselves from others by improving their own aesthetic style, which is also how a buyer can gain his first impression of a vessel when he sees it. Thinking about it more deeply, we can ask ourselves how would it be if every boat looked the same? It is similar with other machinery, such as cars: could you imagine a world where all cars looked the same? When walking along a street we see that there are only a few cars which really look different — and that's the point, you remember these cars.

The company Wally Yachts is known worldwide for its great combination of technology and aesthetics, and they clearly stand out by getting race results and by cultivating their own artistic style.

Many naval architecture consultancies require the help of designers to provide good aesthetics for the ship they just designed but, often, the ideas of the designer don't match with the hydrostatic or structural problems. Also, a great designer will still need the help of a naval architect in order to create a boat that won't fall to pieces, losing a lot of work during the process. What about designing a yacht with a great aesthetic style and knowing that this design will be a match for the different problems that a boat encounters?

I think learning a bit of art and aesthetics would help naval architects designing vessels that sailors will love not only for their mechanical engineering side, but also for their good looks.

Thomas van Peteghem
UNSW Student

THE AUSTRALIAN NAVAL ARCHITECT

Contributions from RINA members for *The Australian Naval Architect* are most welcome

Material can be sent by email or hard copy. Contributions sent by email can be in any common word-processor format, but please use a minimum of formatting — it all has to be removed or simplified before layout.

Photographs and figures should be sent as separate files (not embedded) with a minimum resolution of 150 dpi. A resolution of 300 dpi is preferred.

NEWS FROM THE SECTIONS

Tasmania

The second RINA technical meeting for 2012 was held at the AMC on 31 May. Nick Davies from Lester Franks gave a presentation entitled *Laser Scanning in the Marine Environment*.

With 3D laser scanning, Lester Franks has developed a safer, more accurate alternative to traditional surveys applicable to the marine environment. Their team of terrestrial laser scanning professionals provide expert consultation for any 3D modelling requirement applied to all kinds of seagoing platforms.

Highly-specialised laser scanning is particularly suited to the complex shapes and difficult-to-access locations prevalent within the marine industry. The presentation included some recent projects conducted, highlighting the benefits of 3D laser scanning, including:

- 3D scanning of large vessels as built;
- dimensional control through survey and photogrammetry during production;
- verification, fairing and optimisation of moulds for CRP construction;
- heritage surveys and documentation;
- pre-fitout and refit surveys; and
- LNG tank inspection and deformation analysis.

Nick started his talk by going through the basic options for laser scanning from microns to kilometres, the variation in applications is quite incredible. Then the really incredible information — entire ships laser scanned and digitised to millions of points. With enough diligent work, these points turn into accurate surface modelling of the ship inside and out. The possibilities for accurate assessment and optimisation resulting from this technology are only just being realised.

Jonathan Binns

Western Australia

As we missed the boat on submission for the May issue, we've now had six months of excellent technical presentations as well as tour of a local shipping simulator.

NOPSEMA/NOPTA Accountabilities, AMSA MoU and Oil-spill Assessment

Matthew Smith, NOPSEMA Environmental Manager—Spill Assessment, made an interactive presentation on *NOPSEMA/NOPTA Accountabilities, AMSA MoU and Oil-spill Assessment* in February.

The National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) was established on 1 January 2012, and is Australia's first national regulator for health and safety, well integrity and environmental management for offshore oil and gas operations. NOPSEMA has superseded NOPSA, the National Offshore Petroleum Safety Authority, which was established in Australia in 2005 with a remit to regulate the health and safety of workers on offshore facilities in Commonwealth waters, and in waters where State powers had been conferred.

The presentation covered the following topics:

- NOPSEMA/NOPSA—their respective accountabilities and why it was necessary to supersede NOPSA.
- The NOPSEMA Memorandum of Understanding with AMSA—why is it in place and what is the role of AMSA whilst onboard with NOPSEMA, compared to when attending in their own right as Flag Administration.
- Oil Spill preparedness—NOPSEMA's expectations for Oil Spill Contingency Plans and what that means in real life.

Naval Architecture in Subsea Construction

Tim Brazier, Engineering Manager for DOF Subsea, made a presentation on *Naval Architecture in Subsea Construction* in March.

As the offshore oil and gas industry booms in Western Australia, the focus of naval architecture in Perth is changing from ship construction to the oil and gas industry. This presentation gave a brief overview of the role which naval architecture plays within a subsea construction project. Additionally, an overview of the new vessels being brought into the region for these projects provided an overview of the systems and technologies being utilised onboard to complete a construction project.

Fabrication and Load Out: An Alternative Approach

Mark Sawyer, Business Development Manager for BAE Systems, made a presentation on *Fabrication and Load Out: An Alternative Approach* in April.

With the resources and energy projects in Western Australia reaching an all-time high, the fabrication and loading in and loading out of locally-fabricated and modularised packages is becoming a major obstacle for some companies. This presentation provided an overview of how BAE Systems are transitioning their Henderson shipbuilding facilities to embrace these challenges.

Farstad Shipping Offshore Simulator

In May, the IMarEST arranged for a visit to the Farstad Shipping Offshore Simulator (FSOSC) at Bibra Lake. The FSOSC is the first offshore-specific simulation centre in Australia, and the largest integrated centre of its kind in the world, featuring the latest in simulator technology. The centre was formally opened on 9 December 2011 and features eight offshore simulators. See www.farstadsimulation.com for further details.

Emergency BOP ROV Intervention

Brett Phillips, Subsea Tooling Operations Manager for Oceaneering, made a presentation on *Emergency BOP ROV Intervention* in June.

As regulations and restrictions on Blow-out Preventer (BOP) intervention become more stringent, Oceaneering has developed engineering solutions for accessible subsea volume, routine testing and high-flow remote operated vehicle (ROV) interfaces. This presentation covered the challenges of secondary BOP intervention and detailed the work that the company has undertaken in this area.

Oceaneering is an industry leader in the development of high-flow components for subsea BOP intervention. The design of the intervention panel is critical for reducing pressure drop and increasing flow capability. Oceaneering BOP intervention panels are designed for ROV-friendly operation and can be designed to individual customer specifications with features such as ROV-operable ball valves.

Seakeeping Behaviour of Fast Vessels

Frans van Walree, Project Manager at MARIN (Maritime Research Institute Netherlands) made a presentation on *Seakeeping Behaviour of Fast Vessels* in July.

Although there exists a wide variety of possibilities for going fast at sea, for a large number of applications the relatively simple and robust monohull is favoured. Typical applications are patrol vessels for the navy, coastguard and police, rescue boats, and offshore crew suppliers.

This presentation focussed on the hydrodynamic research on this type of vessel carried out during the completed FAST 1 and 2 Joint Industry Projects (JIP) and the ongoing FAST 3 JIP. The FAST 1 JIP focussed on the better understanding of extreme behaviour of this type of vessel at sea, while the FAST 2 JIP was aimed at the development and validation of computational tools to aid in the prediction of this behaviour during the design phase of fast vessels. The FAST 3 JIP aims at the consolidation of the FAST 1 and 2 projects and broadening the horizon to the manoeuvring of fast vessels in waves, wave loads, and resistance as well as the further optimisation and enhancement of the computational tools developed.

Frans van Walree has been project manager at MARIN since 1985, and is currently on a research visit at DSTO Melbourne. His main research interest is the seakeeping behaviour of fast vessels and dynamic stability in waves.

If you have a technical presentation which you would like to present, then please drop us an email at rina.westaus@gmail.com, as we are always looking for new and exciting topics.

Also, if you have recently changed addresses, or wish to be added to the circulation list for notices of upcoming events, then please send details to rina.westaus@gmail.com to ensure that you receive up-to-date information.

Jesse Millar
Chairman RINA WA

New South Wales

Committee Meetings

The NSW Section Committee met on 14 June and, other than routine matters, discussed:

- SMIX Bash 2012: Sponsorship is being pursued; ticket pricing will depend on early commitments; early-bird pricing was discussed.
- TM Program: A presentation for September has been secured.
- Committee Membership: The possibility of having a student member on the Committee was discussed.
- Medal for Presenters: The possibility of presenting a medal and certificate to each presenter (in addition to the traditional bottle of wine), as is done by the Victorian Branch of IMarEST, was discussed.

The NSW Section Committee also met on 26 July and, other than routine matters, discussed:

- SMIX Bash 2012: Sponsorship is being pursued; early-bird pricing was discussed further; possibilities for larger numbers are being pursued.
- TM Program: Further re-arrangement of presentations have had to be made, and a backup presentation called in.
- Webcast Arrangements: URLs for webcasts will be circulated to Section Secretaries as they become available, and will be detailed in the following issue of *The ANA*.
- Attendance Sheets at TMs: EA use attendance sheets mainly for verification of CPD, but would also use for public liability insurance purposes if necessary; RINA and IMarEST should therefore also hold copies for record purposes.

The next meeting of the NSW Section Committee is scheduled for 12 September.

Marine Fouling Control Technologies

Jonathan Crossen of Akzo Nobel (International Paints) gave a presentation on *Marine Fouling Control Technologies* to a joint meeting with the IMarEST attended by 20 on 6 June in the Harricks Auditorium at Engineers Australia, Chatswood.

Introduction

Jon began his presentation by asking "Why is fouling control necessary?" Any naval architect will tell you that it is necessary for the avoidance—or, at least, the minimisation—of drag. This allows the ship to minimise fuel consumption and costs, meet charter agreements, keep to scheduled arrival times, reduce engine wear, reduce maintenance costs, and maintain readiness for action in naval vessels, for example.

However, the world is changing and ship operators are now starting to select fouling control for other reasons. The International Maritime Organisation (IMO) has introduced the Energy Efficiency Design Index (EEDI), the Ship Energy Efficiency Management Programme (SEEMP) and the Energy Efficiency Operational Index (EEOI) which is part of the SEEMP. All are targeted at reducing greenhouse-gas (GHG) emissions in the future. The EEDI and SEEMP become mandatory this year. Hull husbandry and, hence, choice of fouling-control system, forms part of the guidelines.

In addition, there are market-based measures to reduce GHG emissions, and these include carbon trading and bunker taxes. Australia's carbon tax became law on 1 July, and the full impact on shipping has yet to be seen.

The IMO also has an invasive species initiative. The Ballast Water Convention has been agreed and is expected to be ratified in 2012. A guidance document has been issued for the prevention of invasive species from outer hulls. In Australia, control of invasive species is governed by the Australian Quarantine Inspection Service (AQIS) through specific local regulations. Current advice is that there is a code of best practice which involves keeping a "fouling record" such as type of antifouling, when applied, and dates of underwater inspections, underwater cleaning, etc. The view is that this will probably be made mandatory in the not too distant future (3–4 years).

Fouling Organisms—Knowing the Enemy

Here Jon showed a slide with a breakdown of organisms into plant — micro, such as slimes (made up of bacteria and diatoms), and macro, such as weeds (green, red and brown); and animal — soft bodied (limited or rooted, e.g. hydroids, and unlimited or spreading, e.g. polyzoa), and hard bodied (barnacles, tubeworms and mussels). The key message is that there are over 5000 different fouling species and these are the common types.

Fouling "challenges" vary around the world according to salinity, temperature, water depth, nutrients, oxygen levels and light. Commercial shipping encounters many different ecologies, all of which give rise to varied fouling challenges—there is simply no "one fix for all".

Development of Fouling Control Technologies

Control of fouling growth on structures has been a requirement since humans started using water as a means of transport. The fact is that the challenge is not new. The earliest records of fouling control go back to the Phoenicians in about 2000 BCE. Historically, whatever was available was used, including pitch/tar, copper and lead.

It is documented that knowledge of fouling control gave the British the edge over their European rivals in the Battle of Trafalgar, where Napolean was defeated by Nelson with a much smaller but highly-mobile fleet made so due to the absence of fouling.

Recent history of fouling causing issues during warfare shows that, during the first Gulf War, a US aircraft carrier was so heavily fouled that it could not reach launching speed for its jet aircraft!

Two step changes in antifouling technology occurred in the early 1970s: tributyl tin (TBT) self-polishing copolymers, and silicone elastomers (foul release coatings) were introduced. TBT would become the ultimate "winner" at the time.

Tributyl tin oxide (TBTO) was a well known biocide but expensive. The aim was to bind TBTO to an acrylic polymer to make the paint last longer and cost less. The result was a hydrolysing polymer which released TBTO and dissolved away itself, and self-polishing copolymers were born, and IP gave theirs the name InterSMOOTH®.

In a similar project, rubber tiles had been impregnated with biocides and were glued onto a larger base-plate using silicone sealant. On inspection, biocide impregnation failed but the silicone sealant remained clean and as a result of this chance discovery, foul-release coatings were born, and IP gave theirs the name Intersleek®.

TBT self-polishing copolymers (SPCs) became the industry standard; they were easy to apply, similar to existing technologies, and relatively cheap. TBT SPC antifouling paints influenced commercial shipping, allowing five-year docking cycles for the first time and extending in-service periods through providing long-term antifouling protection. Prior to their introduction in 1974, the average docking cycle was 18 months. The advent of TBT coincided with the first oil crisis (the "Suez crisis") which resulted in poor earnings and high bunker prices. Extension of dry-docking cycles was an important way to save costs for owners and TBT became the industry standard almost overnight. However, negative effects on non-target organisms ultimately led to TBT application being banned under the IMO AFS Convention in 2003.

During the 1990s, silicone-based foul-release coatings became commercial realities. Being biocide-free, foul-release coatings became the choice for environmentally-aware ship operators. Application to aluminium craft was possible (no electrochemical corrosion), and significant vessel efficiency improvements were seen for fast vessels consuming large quantities of fuel oil. The drive for banning TBT really brought the silicone systems back to life and renewed development. The challenge was "how do you get a non-stick coating to stick?". Solving this allowed the first commercial systems to become a reality.

Current Fouling Control Technologies

Current fouling control technologies include biocidal (both self-polishing copolymers and soluble-matrix types) and non biocidal (pure silicones and modified silicones).

Biocidal antifoulings all work through the same principle—the delivery of biocides which can kill and deter settlement of fouling organisms. The choice of biocide is critical to the efficacy of the antifouling against the fouling organisms. Here Jon showed a slide of the effectiveness of biocidal antifoulings.

Compounds	Slime	Weed	Animals
Tin	✓	✓	✓
Copper	x	x	✓
Organic "boosters"	✓	✓	x

Tin compounds are no longer used. Organic "boosters" have a variety of chemistries available, e.g. pyrithiones and isothiazolinones. However, copper compounds are the most-common biocide in use today.

Soluble-matrix systems are the oldest antifouling technology. They use rosin, a natural product from pine trees, and put it through several reactions to increase the solubility. Rosin, though versatile, is very brittle and, to create paint films, it needs to be reinforced, typically by insoluble acrylic resins. The acrylic resins are compatible with the rosin and form a network within the coating when dried.

The way they work is that sea water migrates into the paint film. The dissolved rosin and biocides migrate into the sea, leaving the insolubles in the leached layer. This process continues until the leached layer becomes too thick, and the coating then stops working. There are many brand and "technology" names for these sorts of coatings, such as controlled-depletion, self-polishing, eroding, etc.

Self-polishing copolymers are based on the technology first discovered with TBT systems, and modern SPC antifoulings use similar chemistries. The way they work is that the salt in sea water reacts with the insoluble acrylic polymer backbone containing a reactive group to form a soluble compound. As it is a chemical reaction, the rate of dissolution of the soluble species is fixed, dependent upon temperature and the rate of production. Reactive groups in current commercial SPCs are metals (zinc or copper) and silyl groups.

Unlike rosin-based soluble matrix systems, SPCs are mechanically strong and so do not require reinforcing. Dissolution of the paint matrix is via a chemical exchange which creates a route to control the release of the biocides.

A side-effect of the chemical dissolution of SPC systems is that the coating naturally smoothes (or polishes) with time, a real advantage. Unlike the soluble matrix systems, the SPC film becomes thinner over time, and only stops working when a very thin leached layer remains.

The longevity of biocidal antifoulings depends upon how efficiently and for how long the coatings deliver biocides above the "critical biocide level", which is the level above which fouling organisms cannot settle onto the surface. SPCs and soluble-matrix systems differ in this due to their chemistries. Soluble-matrix systems have finite lifetimes due to insoluble reinforcing agents forming leached layers, whereas SPCs are only limited by the film thickness applied. Lifetimes are determined through measurement of biocide release rates.

Here Jon showed a graph illustrating that soluble-matrix type release rates are higher early on, but fall below the "critical" rate by about 30 months, whereas SPC release rates are lower early on, but do not fall below critical until about 60 months.

Non-biocidal antifoulings (foul-release coatings), as the name suggests, do not contain biocides. Foul-release coatings work through purely physical means, by modifying the surfaces of the coatings and making it difficult for fouling organisms to attach. The surface properties ensure that the fouling species cannot attach strongly and so are easily removed through the action of the vessel passing through the water. All commercial foul-release coatings are based on siloxanes, commonly called silicones. They have key properties which make them ideal for foul-release coatings: low modulus and surface energy, and are self-levelling and chemically and UV stable.

There are three classes of commercial foul-release coatings which are differentiated by the surface energy: hydrophilic ("water liking") with high surface energy, hydrophobic ("water-hating") with low surface energy, and amphiphilic (both hating and liking) with intermediate surface energy. Silicones are naturally hydrophobic and so to create different surface energies it is essential to modify the coating chemistry.

Foul-release capabilities are measured using the ASTM 5168 Barnacle Push-Off Test. The amphiphilic fluoropolymer system has significantly lower barnacle adhesive strength than any other coating.

In general, the performance and cost per unit area both increase as we move through the biocidal (soluble matrix, hybrid and SPCs) to the non-biocidal (pure silicones and amphiphillic silicones). The amphiphilic silicones perform the best, but typically have the highest cost per unit area.

Influence on Vessel Efficiency

To propel a vessel at a given speed, you need to overcome a series of resistances, including those due to wave-making, frictional, form, appendage and air (there are others but these are the main ones).

The key influence on frictional resistance is *roughness*, in which coatings have a significant role to play. Depending upon ship type and speed, frictional resistance can account for between 50 and 70% of the total resistance. For a container ship travelling at 20 knots, the propulsion system is roughly 15% efficient (converting 15% of the energy in the fuel into usable thrust, the rest going as waste). Of that 15%, 70% can be needed to overcome frictional resistance; so 1, 2 or 3% reductions in frictional resistance can have significant impacts on performance.

The classic view of roughness is that it includes fouling (slime, weed and animal) and surface effects (detachment of coating, corrosion and cracking, repairs, and cold flow of coating). The correlation between hull roughness and ship efficiency can be made with a variety of equations derived from empirical studies, e.g. the equations for increase in the frictional resistance coefficient due to hull roughness proposed by Marintek or Bowden and Davidson, or the increase in power due to hull roughness proposed by Townsin *et al*. Hull roughness is typically measured using the BMT hull roughness gauge, giving R_{t50} which is the average peak-to-trough height over a distance of 50 mm. Typical coating surface roughnesses after three years in service are 300+ microns for rosin-based biocidal antifouling, 200–300 microns for SPC biocidal antifouling, and 60–100 microns for foul-release coating.

Real-life antifouling performance can be merged together with the Townsin roughness equation to show the potential impact of different coating technologies on vessel performance. Here Jon showed a slide illustrating the fact that, after 60 months, there will be a fuel penalty of about 8% if using a self-polishing co-polymer, while the penalty will be more like 12% if using a controlled-depletion polymer.

Foul-release technologies add a different perspective to vessel efficiency. They are self levelling and so automatically create smoother surfaces. Commercial systems have a typical roughness of 60–100 μm and, according to Townsin, give a fuel benefit of around 1–3% compared to biocidal antifoulings. However, surface roughness is not everything with FR coatings. Candries *et al*. showed that silicones had lower drag coefficients compared to freshly-applied SPC coatings. Their study also showed that rougher FR surfaces (created through surface defects) still maintained the drag reductions. There is strong evidence that roughness of FR coatings is not the controlling factor. An AMBIO EU project showed that fluoropolymers had lower skin friction than silicones.

Future Fouling Control Products

So what does the future hold for fouling control? The development of fouling-control systems is driven by two main factors, legislation and competition.

Legislation is driving fouling-control products in the direction of high solids (SED, CAFE, VOHAP, Hong Kong, etc.), and environmentally-benign biocide choices (BPR, EPA, IMO, etc.) There is heavy focus on biocidal antifoulings. Products of the future through legislation drivers will therefore be high in solids (VOC levels less than 240 g/L), with most biocidal antifoulings between 360 and 500 g/L. Some will be water-borne, and use biocides which rapidly degrade in the natural environment.

Products of the future through competition drivers will be high in solids, have proven fuel-saving benefits, and be application friendly.

Conclusion

Fouling-control technologies have come a long way in the 4000 years since the Phoenicians. Much is now understood about what they are required to do, the way they work, and the benefits which can accrue if used properly. The development goes on.

Questions

Question time was lengthy and elicited some further interesting points.

TBTs were more effective than any current technology. However, the current technology is working satisfactorily on current vessels.

According to divers, there is little growth, even now, on the underwater areas of HMAS *Swan*, which used TBT antifouling and was sunk as a dive wreck off the coast of Dunsborough, WA, at the end of 1997.

The ban on TBTs was due to the problems associated with marinas and slipways, and small vessels not moving much. The irony is that we now have a world fleet of large vessels with less-effective antifoulings and, hence, emitting more GHGs!

The first use of TBT on naval vessels in Australia was at Cockatoo Dockyard in 1982, when TBT antifouling was applied to HMAS *Canberra*. After two years, the antifouling was in excellent condition and only required touching up, not repainting.

The US Navy has started using copper-free antifoulings on a number of vessels due to plans to impose a copper ban in the state of California. At present, there is no reason to move away from copper-based antifoulings in Australia; it would cost a lot to do so and there is no legislation pending in terms of a potential copper ban in Australian waters. However, you need to be careful when applying these all biocidal (and non-biocidal) antifoulings, and wear the appropriate personal-protective equipment (PPE).

An air curtain could be quite effective. FRCs are less effective under static conditions and generally need movement of the hull through the water to be fully effective. The combination of the FRC with an air curtain when alongside could be very effective.

For FPSOs, which don't move often, FRCs are often used, because they are easier to clean than conventional antifoulings.

Cruise vessels which use FRCs come into dock with a light layer of slime, and this can be hosed off and return the surface to good condition easily, only needing a top-up coat after five years. There is typically a payback period of two years on a $1 million investment in blasting to bare metal and completely painting with the FRC. However, after the two-year payback period, the fuel savings mount up.

The vote of thanks was proposed, and the "thank you" bottle of wine presented, by David York.

Jonathan's presentation was recorded by Engineers Australia and is available as a webcast at www.mediavisionz.com/ea/2012/easyd/120606-easyd/index.htm.

Phil Helmore

Thordon Bearings

Josh Sayed, Thordon Manager for Jacmor Engineering, gave a presentation on *Thordon Bearings* to a joint meeting with the IMarEST attended by 18 on 4 July in the Harricks Auditorium at Engineers Australia, Chatswood.

This presentation covered:

- Thordon Product Range and Bearing Systems
- Propeller Shaft Bearing Systems
- Rudder Bearings
- On–board and Deck Applications
- Installation Techniques
- Bearing Clearances

The vote of thanks was proposed, and the "thank you" bottle of wine presented, by Bill Bixley.

Josh's presentation was recorded by Engineers Australia and is available as a webcast at www.mediavisionz.com/ea/2012/easyd/120704-easyd/index.htm.

John Jeremy

The Age of the Armoured Battleship

John Jeremy of the Royal Institution of Naval Architects gave a presentation on *The Age of the Armoured Battleship* to a joint meeting with the IMarEST attended by 14 on 1 August in the Harricks Auditorium at Engineers Australia, Chatswood.

Just over 150 years ago, there was a battle between two small warships which has been regarded by many as a turning point in warfare at sea and in warship design. That battle, between the ironclads USS *Monitor* and CSS *Virginia* during the American Civil War, was largely a draw but it proved to be a remarkable demonstration of the effectiveness of armour plate in protecting a warship from her enemy's guns.

This presentation traced the development of the armoured battleship from the earliest use of armour during Crimean War to the arms race of the early 20th Century and the ultimate gun ships of World War II.

Whilst the development of the aircraft and the submarine heralded the end of the great battle fleets, one important role of the battleship, that of naval gunfire support, has continued and the gun still has a role in naval forces today. The presentation concluded with a glimpse of the future — the extraordinary American Zumwalt-class destroyers which are intended, amongst their roles, to provide gunfire support — ships which some think may be as revolutionary as USS *Monitor* of 1862 and HMS *Dreadnought* of 1906.

The vote of thanks was proposed, and the "thank you" bottle of wine presented, by Len Michaels. The vote was carried with acclamation.

John's presentation was recorded by Engineers Australia and is available as a webcast at www.mediavisionz.com/ea/2012/easyd/120801-easyd/index.htm.

Phil Helmore

CLASSIFICATION SOCIETY NEWS

Update to GL Rules for Seagoing and Naval Ships

Germanischer Lloyd (GL) has released updates to its Rules for Seagoing Ships and Naval Vessels. The updated Rules came into effect on 1 May 2012.

Changes have been made to the following GL Rules for Seagoing Ships: Classification and Surveys, Hull Structures, Machinery Installations, Electrical Installations, Automation, Structural Rules for Container Ships and Stowage and Lashing of Containers. Additionally, new Rules have been developed for the classification of Crew Boats and Offshore Wind Farm Service Craft.

For Naval Ships updates have also been carried out for the following Rules: Classification and Surveys, Propulsion Plants, Electrical Installations, Automation and Ship Operation Installations and Auxiliary Systems.

The GL Rules and Guidelines are also available for download for the first time in their entirety. Up to this point the Rules and Guidelines have only been available on a section-by-section basis. Visitors to Germanischer Lloyd's website will now be able to download a complete PDF version of any of the individual Rules or Guidelines free of charge.

Some of the most-notable changes to individual rules include the Rules for Machinery Installations which now have new requirements for exhaust gas cleaning systems. These requirements address system layout, safety concept (hazard analysis), materials, and handling of noxious process substances. The requirements for functional testing onboard are also covered.

In the Rules for Stowage and Lashing of Containers, Annex C — Container Lashing Fittings — sets out a new standard for operational tests for fully automatic locks. The specified requirements comprise test setup, loading scenario and test forces for compression, racking and lifting.

GL's Structural Rules for Container Ships have undergone major amendments, including the following changes: Section 8 — Bottom Structures — introduces an entirely new Sub-section D which specifies structural requirements for transverse thrusters. In Section 14 — Rudder and Manoeuvring Arrangement — a new Sub-section H has also been added, covering devices for improving propulsion efficiency. Section 17 — Hatchways — has been extensively revised due to the new IACS Unified Requirement S21A — Evaluation of Scantlings of Hatch Covers and Hatch Coamings and Closing Arrangements of Cargo Holds of Ships.

GL has also released the first comprehensive set of rules for the classification of Crew Boats and Offshore Wind Farm Service Craft. These rules have been developed by bringing together, for the first time, all of the relevant GL rules and the international codes and recommendations which can be used for the classification of crew boats. The rules will allow designers to develop vessels built to the special needs of clients according to the Rules with full confidence in the fact that their vessel can meet with classification approval.

GL releases Crew Manager: Get ready for the MLC 2006

The recent announcement of Sweden's ratification of the Maritime Labour Convention 2006 (MLC 2006) means that only two further International Labour Organisation member ratifications are required before the Convention's entry into force. With only twelve months between final ratification by the 30th ILO member and the Convention coming into effect, ship owners, operators and manning agencies should be preparing for the wide-ranging impact of the Convention. Germanischer Lloyd (GL) recommends combining the adjustments which the MLC 2006 will require to crewing processes with the implementation of an electronic system to support these processes and provide evidence of compliance. To support the maritime industry in this process GL has developed the Crew Manager software system.

Designed to ensure that seafarers are provided with fair, safe and decent working and living conditions, the MLC 2006 Convention requires the documentation of many crewing processes, including checking that all required positions on board are filled, that the seafarers are medically fit, well trained and qualified for the duties they are assigned to, and that records are maintained of the seafarers' daily hours of work and rest.

GL Crew Manager helps ship owners, operators and crewing agencies to meet these requirements, by enabling the standardisation and optimisation of many tasks, including recruitment, planning, safe manning, management of personal data, hiring, vacation and leave management. An optional on-board system also supports on-board management of crew data, certificates and licences, registration of resting hours and wage calculations — smoothing the process of proving compliance in on-board audits. The system can also aid in the preparations for MLC audits by generating a pre-audit checklist, the required documentary evidence, while also highlighting items of non-compliance which need to be addressed.

For each individual crew member there may be hundreds of associated pieces of data — qualifications, certificates, licenses, contract data, and training needs. GL Crew Manager allows for the efficient management of large crew pools through a graphical view of the current and planned assignments for each individual vessel, and automatic matching of crew availability and suitability with vessel manning requirements.

The data generated by the system can be accessed anywhere, through a remotely-managed server, with role-based user access levels determined by the user's login. An intelligent data-transfer routine allows synchronisation of the data between office and any vessels using the optional onboard system.

The MLC 2006 will bring together and update more than 60 existing ILO conventions and recommendations, with enforceable requirements for crew managers and manning agencies. Over 55 000 seagoing vessels will have to be inspected and certified before the MLC 2006 enters into

force, as is expected to take place in 2013. Statements of Compliance are currently being issued by some of the flag states who have already ratified the MLC 2006. Once the Convention enters into force, ships that hold a Statement of Compliance can obtain a final MLC certificate.

Mike Mechanicos

World's Largest Heavy-lift Vessel to be classed by DNV

Dockwise's new heavy-lift vessel, *Dockwise Vanguard*, will be able to lift and transport units of up to 110 000 t. The maximum capacity of an existing heavy lift vessel is 75 000 t.

With its beam of nearly 80 m and length of 275 m, this is the first semi-submersible heavy lift vessel to be built in accordance with DNV's new class rules for this type of ship. The vessel has no forecastle, which allows it to carry cargo of "unlimited" length. Its deckhouse is mainly positioned outside its hull, allowing it to carry 70 m wide cargo.

"As DNV is the leading class society when it comes to heavy lift vessels, and as Dockwise is a front runner within this ship segment, the two organisations have cooperated to ensure that this innovative vessel meets all the safety standards," said DNV Regional Manager Central Europe, Torgeir Sterri. "Not only were DNV's existing rules essential for scaling up this unique semi-submersible heavy lift vessel concept, but DNV's risk assessment capabilities were also key to meeting all the SOLAS requirements for this unconventional design," he added.

At the annual gala for the Dutch maritime cluster, the Royal Dutch Association of Shipowners chose *Dockwise Vanguard* as the most innovative and daring project launched by the Dutch maritime sector during the past year. When accepting this award, Dockwise's CEO, André Goedée, expressed his appreciation of the Dutch flag administration and DNV. "I am pleased and impressed by the way the owner, flag and class have managed to work together. By thinking 'outside the box', we have been able to form a new concept and bring the whole industry a huge step forward," he said.

The vessel will be built by Hyundai Heavy Industries in Korea. The keel was laid in December and the vessel is due to be delivered in October 2012, when its first cargo will be ready to be transported from South-East Asia to Brazil.

First True Hybrid System to be Installed On-board an Offshore Supply Vessel

A true hybrid energy system is currently being developed for installation on board the offshore supply vessel *Viking Lady*. An impressive battery pack for energy storage will soon be installed. When the new system is complete, the operation of the engine will be more smooth and cost effective, giving further emission reductions.

Viking Lady is not like any other offshore supply vessel. The three-year-old LNG-fuelled vessel, which is owned by Eidesvik Offshore, was the very first merchant ship to use a fuel cell as part of its propulsion system. The fuel cell, which generates an electric output of 330 kW, was installed in the autumn of 2009 and has successfully run for more than 18 500 h. Based on this, *Viking Lady* is already one of the world's most environmentally-friendly ships.

Now another first step is to be taken to reduce the vessel's emissions even more. Once the battery pack is in place, the ship will operate using a hybrid system similar to that which has been installed in hybrid cars for a number of years. However, the potential emission reductions are higher and the return on investment period is shorter for ships than it is for cars.

DNV is heading this research project, which is called FellowSHIP. Its partners are Eidesvik Offshore, the owner of the ship, and Wärtsilä, who provides power solutions for the marine market. In this, the next project phase, an energy-storage capability is to be introduced to the energy system. This allows the benefits of a true hybrid energy system to be explored.

The primary potential benefits of the hybrid energy system for a ship like *Viking Lady* are a 20–30% reduction in fuel consumption and CO_2 emissions through smoother and more-efficient operation of the engines and fuel cell. The reductions of other exhaust components are even higher.

The whole shipping industry is currently facing record-high fuel costs. Based on these actual costs, the return on investment period for the hybrid system is estimated to be less than two years.

Bjørn-Johan Vartdal, DNV's project manager said "We know that the hybrid system will reduce the energy consumption. When operating, for example, on dynamic positioning, there will be a major fuel saving potential. When in harbour, too, the ship should be able to operate on the fuel cell and its battery power alone, which will reduce emissions significantly. For environmentally-sensitive areas, this will be an essential benefit. Additional benefits are related to reductions in machinery maintenance costs and in noise and vibrations."

A comprehensive measurement program will be carried out to verify the savings potential. The hybrid system will also be modelled in detail. Calibrated and verified process models will facilitate simulation and optimization of future hybrid systems.

The new DNV class rules for battery-powered ships have been developed in parallel with this. These are the first class rules developed in order for batteries to be used as part of a vessel's propulsion energy—both as hybrid solutions and for "pure" battery-driven vessels.

The project is due for completion in 2013.

DNV Reveals Technology Uptake Towards 2020

DNV has developed a simulation model using global shipping data and technology-specific information to predict the deployment of emission-reduction and energy-efficiency technologies up to 2020. The results show that high fuel costs will result in a drive towards more energy-efficient ships ahead of the Energy Efficiency Design Index (EEDI) regulatory timeframe. Fuel choices up to 2020 will be driven by the time spent in an Emissions Control Area (ECA), but distillate is a more likely option than scrubbers for most ships towards 2020.

By 2020, it is expected that new tankers, bulk cariers and container vessels will be up to 30 per cent more energy efficient than today's newbuildings. DNV predicts that one-

third of the reductions will be cost effective for shipowners. The EEDI will be the driver for the remaining two-thirds of the efficiency gains.

These results have been obtained by examining the technology choices available to ensure regulatory compliance and how these technology options will be adopted, based on simulated investment decisions for individual ships.

The model can support owners and managers in their business-critical decisions by providing a ship-specific scenario analysis as well as market predictions for specific ship segments or the entire world fleet. The model is not restricted to the newbuilding market alone, and offers insights on fuel choice, exhaust gas treatment and ballast water treatment for existing ships as well. Over 20 technology options have been included in the modelling process.

The results of a survey conducted in March 2012 and involving a number of the world's leading shipping companies have been used as the basis for the investment decisions. The model also factors in fuel availability, regulatory timelines and the net growth in the world fleet, amongst other things. This is not an optimisation model trying to predict the optimal choices for the world fleet, but a model which aims to simulate the most-likely outcomes amongst a multitude of technology options and preferences in a highly-uncertain world.

An analysis of fuel choices reveals that between 10 and 15 per cent of the newbuildings delivered up to 2020 will have the capacity for burning LNG as fuel. This equates to about 1 000 ships. Larger vessels will benefit more from using LNG than smaller vessels. Furthermore, a gas-fuelled engine can be justified if a ship spends about 30 per cent of its sailing time in ECAs. In 2020, the number of ships using LNG will increase significantly with the introduction of a global sulphur limit.

"Incorrect investment decisions could be devastating for individual shipowners and, collectively, they could impact negatively on the environment as well," said DNV President, Tor Svensen. DNV believes that the industry must work together to avoid a legacy of sub-optimal ships entering the global fleet in the lead up to 2020. "This model gives shipowners a clear technology and market context to work in, with the opportunity for targeted analysis of individual ship profiles."

Current annual demand for distillate fuels is around 30 million tonnes. This will rise to 45 million tonnes when the 0.1 per cent limit comes into force in ECAs and will be around 200–250 million tonnes by 2020. Conversely, the demand for heavy fuel oil will plummet from around 290 million tonnes in 2019 to 100 million tonnes once expected global emissions regulations enter into force in 2020.

"Shipowners' costs will increase sharply in 2020 when even more-stringent air-emissions regulations take effect. It will be unfamiliar territory for us all as the fuel market adjusts," says Mr Svensen. "The investment decisions made over the next few years will be critical preparation for this time and DNV is dedicated to ensuring that the industry as a whole is ready and able to make the correct decisions to ensure responsible environmental stewardship that also makes good business sense."

Offshore Support Ship of the Year Award given to the DNV-classed *North Sea Giant*

The prestigious Offshore Support Vessel of the Year Award for 2012 was recently given to *North Sea Giant*, which was built to DNV class at the Metalships & Docks shipyard in Vigo, Spain.

Introduced in 2010, the Offshore Support Journal Awards have been very well received by the industry and this award recognises the owner, designer and builder of an offshore support vessel that has been delivered in the past calendar year and is considered to have set an industry benchmark through innovative design and efficient operation.

North Sea Giant is considered to be the largest offshore vessel of this type ever built, with her overall length of 156 m, beam of 30 m and installed power of more than 22 MW. The vessel was given the prize for her innovative features, which include advanced dynamic positioning (DP) capability for DP operations based on a high redundancy level and high propulsion power.

Large LNG-fuelled Container Ship Granted Approval in Principle

Kawasaki Heavy Industries has completed the development of a large, 9 000 TEU container ship fuelled by LNG and obtained Approval in Principle from DNV. The ship is designed with a new type of LNG tank which provides more space for container cargo.

The LNG is stored in prismatic low-pressure insulated tanks (Type B) and this is the first time that such tanks have been proposed for a large container ship. They are different from cylindrical pressure tanks (Type C) as they utilise the available space much better due to their prismatic, rectangular shape. KHI has also adopted a unique technology, the Kawasaki Panel System, for heat insulation in order to reduce the rate of evaporation of LNG.

B-type tanks produce evaporating LNG continuously which must be used for propulsion or auxiliaries. Reefer containers will consume the boil-off in port, eliminating any emission of LNG to air, as well as eliminating the need for cold ironing.

KHI obtained DNV Approval in Principle for both the gas supply system of the vessel and the LNG fuel tanks. Next, KHI plans to perform a safety assessment of the vessel with DNV.

The LNG fuel tank and diesel oil tanks are located under the forward superstructure, minimising the loss of cargo space. The design criteria for ships using LNG as fuel are currently being studied by IMO (BLG). The location of LNG tanks under the accommodation has been a subject for discussion in the industry. DNV plays an active role in these discussions.

"It is important to understand the environmental imperatives that shipowners face, but it is also important to recognise that, in reality, the uptake of new technologies is a balance between risk and business need. Together, DNV and KHI have struck just the right balance with this vessel," said Tor Svensen, COO at DNV.

There are high expectations for LNG as an alternative, next-generation clean fuel to reduce reliance on heavy fuel oil which is currently used for large container ships. LNG was

chosen as the fuel for the vessel because it reduces carbon dioxide (CO_2) emissions which contribute to global warming as well as dramatically reducing nitrogen oxides (NOx) and sulphur oxides (SOx) which are major health hazards.

DNV is also promoting LNG as it is proving to be an economically-favourable emissions-reduction solution for shipowners. Decoupled from oil prices due to sources such as shale gas, it is expected to remain competitive for the lifetime of new vessels entering the market. 25 ships in Norway are already floating evidence of LNG's safety and technical feasibility, and DNV has had rules in place for over 10 years.

The new container ship design features:

(1) A twin-island design maximising cargo space available for loading containers.

(2) A two-stroke dual-fuel main engine which is electronically controlled with a high combustion efficiency coupled with a hullform optimised for safety and fuel efficiency.

(3) The engine may be equipped with an exhaust gas recirculation (EGR) system which satisfies IMO Tier 3 requirements for voyages in North American and European Emission Control Areas (ECAs).

KHI will apply the technology and design principles used to other container ships as part of the company's goal to be world leaders in the development and construction of innovative eco-friendly vessels. With KHI technologies acquired through the past development and construction of LNG carriers, KHI also plans to move into the field of LNG bunkering vessels to further extend the scope of their environmental offerings.

DNV has demonstrated the feasibility of a range of large LNG fuelled ships through concept studies such as the container vessel *Quantum 9000*, the VLCC-size oil tanker *Triality*, and two different sized bulk carriers. "DNV is proud to be working with forward-thinking companies such as KHI to help make clean shipping a reality," said Tor Svensen.

Principal particulars of the new 9 000 TEU LNG-fuelled container vessel are

Length OA	308 m
Breadth	48.4 m
Draught	14.5 m
LNG fuel tank	7 000 m^3

DNV Establishes Deepwater Technology Centre in Singapore

DNV has launched a Deepwater Technology Centre in Singapore. The aim is to serve the oil and gas industry in the whole Asia–Pacific region and to become a sizeable and complete competence centre for deepwater oil and gas developments. DNV's long track record in R&D, experience in the deepwater oil and gas industry, and its strong position in developing industry-acclaimed technical standards, create a perfect strategic fit with Singapore's strategy of becoming a hub for deepwater competence in Asia. "The establishment of the new Deepwater Technology Centre in Singapore has become a reality due to a very constructive cooperation with Singapore's Economic Development Board (EDB)," said Remi Eriksen.

The Guest-of-Honour at the opening ceremony, Minister of State for Trade and Industry, Mr Teo Ser Luck, affirmed this close relationship between Singapore and DNV: "DNV and Singapore have enjoyed a strong partnership over the years. With the Deepwater Technology Centre, Singapore would become DNV's first and only deepwater hub in the Asia-Pacific. This will take our partnership to a higher level. Thank you for this strong vote of confidence in Singapore" he said.

"The Deepwater Technology Centre will focus on three core sectors," said Alex Imperial, Managing Director of the Deepwater Technology Centre. "The first of these sectors includes subsea, umbilicals, risers, flow lines and pipelines. Secondly, we will focus on floating systems, including production and drilling. Finally, it will work within the fields of drilling and wells. Our ambition is to have 55 highly qualified professionals at the centre five years from now," he added.

DNV in Singapore is building a sustainable competence centre to support the whole Asia–Pacific region in its deepwater challenges, benefiting from the full breath of DNV's competence and cross-disciplinary technical capabilities to provide high-end advisory services. For that the Deepwater Technology Centre will collaborate closely with the industry, universities and governmental R&D institutes.

The Asia–Pacific region is a booming deepwater oil and gas market with various field developments, both in the planning and development phases. The deepwater market will experience massive investments and consistent growth. In the next five years, the deepwater capital expenditure (capex) is expected to increase by more than 200%, totalling US$21bn, and be the highest capex after the Golden Triangle consisting of Brazil, the Gulf of Mexico and West Africa. Given its sheer size and diversity, the Asia–Pacific region is facing vast challenges as the countries in this region present different maturity levels in exploration and production activities.

Innovative technologies and methodologies related to drilling and well integrity, subsea processing and hardware, and floating systems will play a major role as enablers and enhancers. However, new technologies—or the lack of experience with proven ones—also bring uncertainties which need to be properly addressed in the conceptual phase. Availability of qualified human resources, increased local content vs installed capacity, new entrants, stricter operational safety requirements and new regulatory frameworks, and societal pressure add complexity to the traditional technical challenges.

Singapore plays a major role in this context, paving the way to become a major offshore and deepwater cluster and complementing its current leading position as a hub for the conversion and newbuilding of offshore units. Singapore's outstanding global competitiveness supports its ambition of becoming a regional deepwater cluster. Its strategic geographic position, which allows serving the Asia–Pacific region from within the same time zones and being supported by the quality of its institutions and higher education, world-class infrastructure as well as the country's sound and rapidly expanding R&D strategy, makes Singapore the obvious location for DNV's new Deepwater Technology Centre.

Rod Humphrey

COMING EVENTS

NSW Section Technical Meetings

Technical meetings are generally combined with the Sydney Branch of the IMarEST and held on the first Wednesday of each month at Engineers Australia, 8 Thomas St, Chatswood, starting at 6:00 pm for 6:30 pm and finishing by 8:00 pm.

The program of meetings remaining for 2012 is as follows:

5 Sep Rod Humphrey, Det Norske Veritas
Project FellowSHIP — Sustainable Energy for Marine Applications

3 Oct Wärtsilä
Wärtsilä Scrubbing Technologies for Reduction of Different Air Emissions (NOx, SOx, CO and VOCs)

6 Dec SMIX Bash

Fremantle Celebrate Maritime Day Expo

Held on Saturday 1 September from 10 am to 4 pm at B Shed, Victoria Quay, Fremantle, this free annual expo celebrates the maritime industry and Fremantle Ports, and provides the public with information about maritime education and careers. With more than 35 industry booths, the expo offers people the chance to talk to representatives from companies involved in the maritime industry. Celebrate Maritime Day 2012 is supported by the Company of Master Mariners of Australia, Fremantle Ports and the Department of Transport. The Dixie group and jazz quintet of the Western Australian Detachment of the Royal Australian Navy Band will be performing throughout the day to entertain the crowds.

Future Submarines—Few Easy Choices

Rear Admiral Rowan Moffitt AO, RAN, Head of the Future Submarine Program, Department of Defence, will make a presentation on *Future Submarines — Few Easy Choices* in Engineers Australia's Eminent Speaker Series, and will be hosted by the Australian Society for Defence Engineering. The Government's intention to double the size of Australia's submarine force is a bold, game-changing rebalancing of Australia's military order of battle. There will be few easy choices, especially since we are starting from a submarine capability that is challenged and has been delivering below expectation.

The Defence White Paper 2009 plan to assemble new submarines in South Australia will be a long, expensive undertaking with significant risk. For the Future Submarines Program to succeed there needs to be a national determination and willingness to work through the challenges, which we will inevitably confront. Scoping the undertaking realistically will be essential, as will setting a clear vision of what we want to achieve and why. A key part of that will be a clear understanding of what we need from industry and academia—especially in the engineering disciplines.

RADM Moffitt has been Head of Australia's Future Submarine Program since February 2009. Born and schooled in Sydney, Admiral Moffitt graduated from the Royal Australian Naval College, Jervis Bay, at the end of 1975. A surface-warfare officer and specialist navigator, he completed a number of sea and shore postings before commissioning the frigate HMAS *Newcastle* as Commanding Officer in mid-1993. A tour as the Fleet Operations Officer followed, after which he undertook a year of full-time study to achieve a Master of Business Administration. Command of the destroyer HMAS *Brisbane* preceded his promotion to Commodore and posting to Navy Headquarters as Director General Navy Capability Management at the end of 1999. In mid-2001 he took command of the Australian Defence Force Warfare Centre located on the RAAF Base at Williamtown.

Promoted to Rear Admiral in mid-2002, he served as the Deputy Chief of Navy, Maritime Commander Australia and Deputy Chief of Joint Operations before undertaking a study of submarine workforce sustainability in 2008, a period which gave him useful preparation for his role as Head of the Future Submarine Program.

Presentations have already been made in Newcastle, Adelaide and Fremantle; further presentations are scheduled at 5:30 pm for a 6:00 pm start as follows:

Melbourne Tuesday 4 September, Victoria Division, Level 2, 21 Bedford St, North Melbourne

Sydney Tuesday 2 October, Sydney Division, Level 3, 8 Thomas St, Chatswood

Launceston Thursday 11 October, Australian Maritime College, Building 8, 8 Maritime Way, Newnham

Brisbane Tuesday 30 October, Queensland Division, Engineering House, 447 Upper Edward St, Brisbane

Registration is required; to do so, visit www.engineersaustralia.org.au/eminentspeaker/

Australian Fluid Mechanics Conference

To be held at the Australian Maritime College on 3–7 December 2012, the Australasian Fluid Mechanics Conference provides a national and international forum for presentation of current research in all areas of fundamental and applied fluid mechanics including but not limited to aerodynamics, hydrodynamics industrial flows, combustion aero-acoustics, wind engineering, oceanography, atmospheric research, computational fluid dynamics, experimental techniques, multiphase flows, non-Newtonian flows, jets and wakes, boundary layers, gas dynamics, hydraulics, pipe flows, ground-water flows, microfluidics, fluid-structure interaction and heat transfer. The 18th Conference will be the first of the series to be held biennially under the auspices of the Australasian Fluid Mechanics Society. The program will feature a diverse range of invited lectures by international experts as well as tours of the host institution's laboratories.

For further details see www.18afmc.com.au/.

Dry Dock Training Course

DM Consulting offers comprehensive dry dock training for all levels of personnel involved in dry docking ships and vessels. Attendees include

- Dock Masters
- Docking Officers
- Dry dock crews
- Engineers
- Naval Architects
- Port Engineers
- Program/Project Mangers
- Marine Surveyors
- Owners Representatives
- On-site Representatives
- Consultants
- Others involved/interested in the dry docking of ships and vessels

The course is presented through classroom lectures, student participation in projects and practical application exercises. The course addresses the deck-plate level of practical operation needed by the dock operator and the universally-accepted mathematical calculations required to carry out operations in accordance with established sound engineering practices. The course has accreditation with the Society of Naval Architects and Marine Engineers (SNAME) and the Royal Institution of Naval Architects (RINA). The course curriculum includes

- Dry docking terminology
- Calculations
- Vessel stability
- Dry dock planning
- Dry docking procedures
- Lay period
- Undocking procedures
- Incidents/accidents

More details of the course content are shown on the website www.drydocktraining.com/outline.html; click on the Course Outline chapters.

The course is presented by dockmaster Joe Stiglich and is scheduled for 21–24 January 2013 in Melbourne, with the times and location to be advised.

For further details, contact Joe Stiglich at jstiglich@aol.com.

Registration forms are available for download at www.drydocktraining.com/Registration_Australia_2013.html and may be returned by e-mail (jstiglich@aol.com), by fax (1-858-538-5372) or by post (12316 Dormouse Rd, San Diego CA 92129, USA.

Symposium on Marine Propulsors

The 3rd International Symposium on Marine Propulsors will be held at the Tramsheds Function Centre in Launceston, Tasmania on 5–8 May 2013.

SMP'13 is the third in a series of international symposia dedicated to the design and hydrodynamics of all types of marine propulsors. SMP'13 provides a forum to present state-of-the-art research and studies on existing marine propulsors as well as a platform for introduction of new types of propulsors.

SMP'13 will also include, as a mini symposium, the 3rd T-Pod Conference on Technological Advances in Pod Propulsion. Environmental issues are addressed through topics on green propulsion and the hydrodynamic aspects of renewable energy devices.

The call for abstracts closed in early August, and the deadline for author registrations for the conference is 1 December 2012.

Further information can be found on the website

www.certain.com/system/profile/web/index.cfm?PKWebId=0x3678222da1 or by contacting the Symposium Manager, Leishman Associates at renee@leishman-associates.com.au, or Neil Bose, Professor of Maritime Hydrodynamics and Acting Principal, Australian Maritime College, University of Tasmania at n.bose@amc.edu.au or phone (03) 6324 9403.

RAN 100th Anniversary International Fleet Review

On 4 October 1913 the first Royal Australian fleet entered Sydney Harbor led by battlecruiser HMAS *Australia*, followed by cruisers HMAS *Melbourne*, *Sydney* and *Encounter* and destroyers HMAS *Warrego*, *Parramatta* and *Yarra*. Many of the vessels featured in this historic event were newly commissioned for the Royal Australian Navy, including HMAS *Australia*. On the steps of Admiralty house, Admiral Sir George King-Hall, the last flag officer of the Royal Navy's Australian Station handed over command of the Australian station to the Royal Australian Navy.
In order to mark the 100th Anniversary, the Royal Australian

Navy will hold an International Fleet Review of participating vessels in early October 2013. Proposed events include:

Late September	RAN and International naval vessels rendezvous in Jervis bay
Wed 2 Oct	Briefing and preparations for review; vessels sail with VIPs and media on board
Thu 3	Tall ships (up to a dozen expected) entry to Sydney Harbour
Fri 4	Fleet entry to Sydney Harbour
Sat 5	International Fleet Review, followed by evening pyrotechnics/light display
Sun 6	Religious services and ships open for inspection

For further details of planned events, contact CAPT Nick Bramwell at nick.bramwell@defence.gov.au.

Pacific 2013

The Pacific 2014 International Maritime Exposition and Congress has been brought forward by a few months to October 2013, in order to coincide with the 100th anniversary celebrations of the Royal Australian Navy.

The Pacific 2013 International Maritime Exposition and Congress will be held at the Sydney Convention and Exhibition Centre in Darling Harbour from Monday 7 to Wednesday 9 October 2013. It will include:

- The International Maritime and Naval Exposition, organised by Maritime Australia Ltd, to be held from Monday 7 to Wednesday 9 October.
- The Royal Australian Navy Sea Power Conference 2013, organised by the Royal Australian Navy and the Sea Power Centre — Australia, to be held from Monday 7 to Wednesday 9 October.
- The International Maritime Conference, organised by the Royal Institution of Naval Architects, the Institute of Marine Engineering, Science and Technology, and Engineers Australia, to be held from Monday 7 to Wednesday 9 October.

Pacific 2013 IMC

The Pacific 2013 International Maritime Conference, organised by the Royal Institution of Naval Architects, the Institute of Marine Engineering, Science and Technology, and Engineers Australia, to be held from Monday 7 to Wednesday 9 October.

The proposed timescale for submission of papers for the International Maritime Conference is as follows:

Call for abstracts	October 2012
Registration opens	November 2012
Deadline for submission of abstracts	5 March 2013
Authors notified of acceptance	8 April
Deadline for submission of refereed papers	15 July
Deadline for submission of non-refereed papers	5 August
Deadline for presenter and early-bird registration	5 August

For any queries on submission of papers, contact the Chair of the IMC Papers Committee, Adrian Broadbent, at adrian.broadbent@lr.org.

Further information on the conference, including the conference and social programs, can be obtained from the conference website www.pacific2013imc.com (when more information appears) or by contacting the conference organisers, Arinex Pty Ltd GPO Box 128, Sydney, NSW 2001, phone (02) 9265 0700, fax (02) 9267 5443 or email pacific2013imc@arinex.com.au.

The Pacific 2016 International Maritime Exposition and Conferences are expected to be held, as usual, in late January–early February 2016.

GENERAL NEWS

Austal Fast Ferry Speeds Travel for Mine Workers

A 41 m high-speed aluminium passenger catamaran, *Vale Grand Sud*, has recently entered into operation for mining company Vale Nouvelle-Calédonie, marking the fourth Austal-built vessel to operate in New Caledonia.

Vale Grand Sud was designed to provide new levels of speed and comfort for members of the company's 1000-strong workforce as they commute between Noumea and the Goro mine site's Prony Port.

The vessel will offer Vale's Goro workforce a safe, reliable and comfortable journey of approximately one hour, which makes it possible for mine workers to return home each day, instead of staying on the mine site or driving approximately two hours through mountainous terrain from Goro to Noumea. The introduction of *Vale Grand Sud* makes a considerable difference in improving quality of life for employees.

Vale Grand Sud is a milestone vessel in that it is the first significant step in Austal's strategic plan to work more closely with resource companies and provide both marine and non-marine products utilising Austal's extensive capability in design, modular manufacturing and in-service product support.

Earlier this year, Austal delivered a 35 m monohull passenger ferry, *Mary D Odyssey*, to Noumea-based tourism operators, Mary D Enterprises. It has been successfully transporting passengers between Noumea and Amadee Island, as well as servicing other locations on New Caledonia's south and west coasts, since April 2012. *Mary D Odyssey* joined Austal-built *Mary D Dolphin*, which has transported more than 300,000 passengers on the Amadee Island route since its delivery in 1998.

The 52.4 m passenger catamaran, *Betico*, delivered to Compagnie Maritime des Iles in 1999, is the largest Austal-built vessel to operate in New Caledonia to date.

Austal Chief Executive Officer, Andrew Bellamy, said that Austal is pleased to have delivered another quality product to New Caledonia, and commented that the company works hard to create and maintain strong relationships with all of its customers.

"Throughout the sales, design and construction process of *Vale Grand Sud*, Austal worked closely with Vale's Marine Operations team in New Caledonia. Our Design Manager and Sales Manager spent a significant amount of time assessing every detail of the operational requirements between Noumea and Prony Port," he said.

"This close interaction between client and builder benefited the development of this vessel immensely, as we were able to see first-hand the operating environment of the vessel.

"This close relationship continued with Austal's Project team during the construction and commissioning stages, and resulted in a vessel which is truly customised for optimal passenger convenience and operational efficiency," said Mr Bellamy.

The Head of Vale Nouvelle-Calédonie's Maritime Section,

Vale Grand Sud
(Photo courtesy Austal)

Olivier Rousseau, commented that Austal impressed throughout the design, construction and delivery process of *Vale Grand Sud*.

"We were most impressed with the Austal sales, design and project teams we worked with throughout the build process. Austal always sent us very professional teams, which gave us confidence in the product, and the feeling that our assets were always in good hands," said Mr Rousseau.

Seating for *Vale Grand Sud's* 439 passengers is spread over two decks, with functionality and comfort a priority. The spacious upper deck also includes a large meeting room, captain's office and crew mess. A kiosk is located on the main deck. Flat-screen televisions are located throughout the vessel, and all passengers are provided with comfortable Beurteaux reclining seats.

Working closely with the customer, Austal's designers developed an interior colour scheme which complements Vale's brand identity while matching the vessel's sleek green, yellow and white exterior. The interior of the vessel was also designed to reduce maintenance requirements with the selection of hard-wearing easy-to-clean materials for bulkheads and flooring.

The vessel's wheelhouse contains ergonomically-designed navigation and control stations as well as Austal's Marine Link fully-integrated monitoring and control system. This provides the ferry's engineer with the ability to monitor and control the vessel's safety, propulsion, generating and other operationally-critical systems, as well as the option to be monitored remotely.

Capable of travelling at speeds of up to 37 kn, *Vale Grand Sud* offers a fast, smooth and quiet journey, powered by four MTU 16V 2000 M72 engines coupled to KaMeWa waterjets through Reintjes gearboxes.

Vale Grand Sud was based on the same hull design as used for four 41 m catamarans designed and constructed for the National Infrastructure Development Company of Trinidad and Tobago. Delivered in mid-2010 and able to carry 405 passengers at speeds of more than 37 kn, the Trinidad and Tobago vessels were designed to help reduce road congestion by establishing a water-taxi service between San Fernando and Port of Spain in southwest Trinidad.

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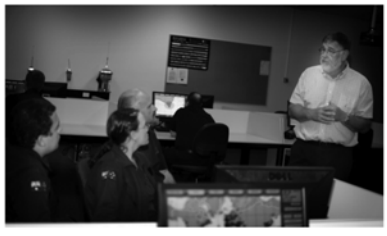

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At present, Austal is contracted to build 24 vessels at its shipyards in Australia, the Philippines and the United States.

Austal is currently building an 80 m vehicle-passenger catamaran ferry for French Polynesian operator, Aremiti Cruise. The vessel will have the capacity to carry up to 967 passengers and 146 cars at speeds of approximately 20 kn, and is due for delivery in late 2013.

The company is also building a 27 m TRI SWATH wind-farm support vessel for UK operator, Turbine Transfers Limited. Launched in mid-2010, Austal's Wind Express vessel range has been designed specifically for the burgeoning offshore wind-farm support market, offering safer and more efficient offshore wind turbine service.

On the defence side, Austal is contracted to build eight 58 m monohull Cape-class Patrol Boats, nine 103 m catamaran Joint High Speed Vessels and five 127 m trimaran Littoral Combat Ships.

Austal also continues to provide support for vessels operating worldwide, including from its three shipyards; service centres in Darwin (Australia), Europe, the Caribbean, and the Middle East; and its recently opened Marine Support Base in Henderson, Western Australia.

Cape-class Patrol Boat Keel Laid

On 8 June Austal hosted a keel-laying ceremony for the first of eight high-performance patrol boats it is building for the Australian Customs and Border Protection Service.

The ceremony included placing specially-minted coins under a keel block as a symbol of good fortune and to bless the ship. These coins will be removed just prior to the patrol boat's launch which is scheduled for later this year.

Coins were placed by Australia's Minister for Home Affairs, the Hon. Jason Clare MP; Customs and Border Protection Chief Executive Officer, Michael Carmody; and Austal Chief Executive Officer, Andrew Bellamy. Austal also invited Mr Clare to authenticate the keel by marking his initials on part of the boat's aluminium structure. He was assisted by Richard Taylor, Austal's Apprentice of the Year for 2011, who has now completed his apprenticeship and is working as a fabricator on the Cape-class program.

Austal CEO Andrew Bellamy places a coin in a keel block, watched by the Hon. Jason Clare, Australia's Minister for Home Affairs (centre) and Customs and Border Protection CEO, Michael Carmody (right)
(Photo courtesy Austal)

Speaking at the ceremony, Mr Bellamy said that the Cape-class patrol boat program was demonstrating Austal's broad capability and world leadership in the defence field.

"Like our US Navy projects, this program shows that Austal can do more than design and manufacture world-class ships. We are also taking the prime contracting role and using in-house expertise to develop and integrate sophisticated electronic systems for command, control and communication. We are also building on our existing capabilities to establish and operate a comprehensive and effective in-service support system for the fleet," Mr Bellamy said.

"This total-solution capability represents the future of our Australian business, as we continue to expand and enhance the strategic industry capability necessary to meet the current and future defence needs of Australia and other nations," he said.

Mr Bellamy said the fact that Austal had been awarded the contract after a rigorous, open international tender process by a highly-experienced and meticulous customer reflected the company's ability to successfully compete in the global market.

"This is the Australian Government getting the best possible value regardless of supplier nationality, and that's the basis upon which we secured this work.

"The fact that we are on track to deliver that capability, as promised, is a credit to all involved. It reflects the skills and hard work of our staff, many of whom bring invaluable experience from previous government contracts carried out both here in Australia and at our US shipyard," he said.

The first Cape-class patrol boat under construction in Western Australia
(Photo courtesy Austal)

The first Cape-class patrol boat is expected to be launched in December this year prior to sea trials and delivery to Customs and Border Protection in March 2013. Austal's eight year support contract for the fleet encompasses a full range of intermediate and depot-level maintenance activities.

The Cape-class patrol boats will play a significant role in protecting Australia's borders from multiple maritime threats and have been designed to have greater range, endurance and flexibility, as well as enhanced capability to operate in more severe sea conditions than the current Customs and Border Protection fleet. The aluminium ships can operate at 25 kn and will have a range in excess of 4000 n miles. Each can undertake simultaneous operations with two embarked 7.3 m rigid-hulled response vessels.

RAN Explores Alternative Fuels

The Royal Australian Navy has signed an agreement with the US Navy to explore the increased use of environmentally friendly fuels.

Australia's Chief of Navy, Vice Admiral Ray Griggs AO CSC RAN, and the US Secretary for Navy, Ray Mabus, have signed a Statement of Cooperation which recognises the potentially-significant benefits which research into alternative fuels can bring. It acknowledges the importance of the project, both for the environment and for national security.

The RAN's Fleet Commander, Rear Admiral Tim Barrett AM CSC RAN, delivered the Statement of Cooperation for the signing ceremony on board the aircraft carrier USS *Nimitz* with Secretary Mabus on 19 July.

Rear Admiral Barrett said that the project had enormous potential.

"All of us have a responsibility to be more environmentally aware. As things stand today, biofuel remains too costly to use across our fleet. However, this project could lead to a cheaper alternative fuel," he said.

The US Navy is moving towards the general use of a 50–50 blended biofuel product by 2020.

The RAN will observe the USN as it further develops the use of alternative fuels in time for a joint deployment in 2016. The 'Great Green Fleet' initiative aims to emulate the famous 'Great White Fleet' deployment when US ships circumnavigated the globe in 1907.

"We are making sure that we look to the future so that we can continue to operate with the US as we do in company around the world," Rear Admiral Barrett said.

As part of the event, a Royal Australian Navy Seahawk helicopter landed on USS *Nimitz* and refuelled with a biofuel blend, before flying the Fleet Commander to HMAS *Darwin*. This is the first time a RAN aircraft has flown with a biofuel blend.

Mast Modules for LHD Leave WA

Mast modules for the Landing Helicopter Dock (LHD) *Canberra*, fabricated and constructed at BAE Systems' Henderson facility have been completed and transported to Melbourne.

The three mast modules weighing between 19 and 36 t will form part of the superstructure of the ship and will house equipment including communication and combat systems, navigation and air traffic control radars and infrared search and track sensors.

The mast modules were loaded onto the heavy-lift ship, *Henan Scan*, berthed at BAE Systems wharf at their Henderson load-out facility.

The mast modules will be consolidated together with the superstructure being constructed at BAE Systems Williamstown. The superstructure together with the masts, and all the control, combat and communications systems, will be installed, integrated and tested at the BAE Systems Williamstown shipyard.

Director of Maritime for BAE Systems, Bill Saltzer, said the manufacture, outfit, blast and paint work on these three mast modules began last September.

"It was decided to construct the mast modules at the Henderson facility because of its proven track record for fabricating vessel masts for the Royal Australian Navy and, by keeping the superstructure build on BAE Systems sites, we can ensure consistent quality in the LHD project.

"Also with the amount of work currently being undertaken at the Williamstown yard, with two major projects, it made sense to utilise our workshops and personnel in Western Australia.

"Complete with its own 6000 t load-out facility, our Henderson site sits on 14.5 hectares with direct waterfront access and has the facilities, capacity and technical capability to accommodate this part of the build," he said.

BAE Systems is the prime contractor for the LHD Project.

Mr Saltzer said that BAE Systems had also commenced the first phase of a major upgrade to the Henderson facility.

"The upgrade to the site includes expansion of the existing rail system which will allow more capacity for ship dry-dockings along with a number of other facility improvements to enhance the overall working environment.

"Upgrading this well-located waterfront facility will put us in a prime position to secure future opportunities within Western Australia, both in the naval and commercial markets" he said.

Spanish AOR to Deploy to Australia

The Minister for Defence, Stephen Smith, announced on 2 July that the Royal Australian Navy would participate in a unique deployment to Australia of the Spanish Armada Ship, SPS *Cantabria*, with a series of training exercises in Australia from mid-February until November 2013.

The *Cantabria* deployment will strengthen the bilateral relationship between Spain and Australia, as well as providing important training and capability assessment outcomes for both the Spanish Armada and the RAN.

Cantabria is a modern Auxiliary Oil Replenishment ship, similar to HMAS *Success*, which is capable of supplying fuel, food, stores and ammunition to ships underway.

This will be the longest deployment undertaken by *Cantabria* and will allow the Spanish Armada to trial the ship's full range of capabilities including through activities involving both *Cantabria* and RAN ships and helicopters.

This training program will also include an exchange program between personnel from *Cantabria* and RAN units.

These exercises with RAN ships and helicopters will culminate with *Cantabria's* participation in the Australian International Fleet Review in October 2013.

Cantabria's deployment will also provide a valuable opportunity for the RAN to conduct early training for personnel earmarked for service in the Australian Navy's new Canberra-class Landing Helicopter Dock (LHD) ships and Hobart-class Air Warfare Destroyers (AWD).

Many of *Cantabria's* systems are the same as the LHDs and AWDs, which are based on Spanish ship designs.

The deployment will provide a unique opportunity for Defence to undertake an assessment of the capability offered by *Cantabria* as Defence considers the replacement of HMA ships *Success* and *Sirius*.

The deployment of *Cantabria* will also reduce the capability risk during the next major maintenance period for *Success* in 2013.

Cantabria will augment the afloat support capability provided by HMAS *Sirius*.

SPS *Cantabria*
(Photo Spanish Arrnada)

HMAS *Farncomb* Sinks Ship at RIMPAC

The Royal Australian Navy's Collins-class submarine HMAS *Farncomb* successfully sank a target ship, the 12 106 t former USNS *Kilauea* in Hawaii.

Farncomb fired one Mark 48 Torpedo and achieved a hit just below the bridge of the ship as part of a sinking exercise, or "SINKEX," at Exercise Rim of the Pacific (RIMPAC) 2012.

The former USNS *Kilauea* broke into two parts and sank about 40 minutes later.

The submarine's commanding officer, CMDR Glen Miles, said that the firing is a significant milestone for both himself and his 60-strong crew.

"This is the result of professionalism and teamwork," CMDR Miles said.

"Those of us who drive these boats know that the Collins' weapons systems are among the most capable in the world."

Australia is among 22 nations attending RIMPAC 2012 that included six submarines and 40 surface ships participating in a realistic maritime warfare scenario.

Australian soldiers from 1 RAR also participated in the amphibious aspect of the exercise, alongside US Marines. RAAF AP-3C Orions and a Wedgetail aircraft also provided air support.

Australia's contingent commander, CDRE Stuart Mayer, said that RIMPAC provided the ADF with a realistic, high-tech and challenging training opportunity.

"HMAS *Farncomb's* success reminds us yet again of the invaluable role submarines play in modern warfare," CDRE Mayer said.

"RIMPAC allows us to train with our allies for a worst-case scenario in a real-life environment."

RIMPAC 2012 concluded on 3 August 2012.

ex-USNS *Kilauea* sinking
(RAN Photograph)

RIMPAC 2012 Test for RAN Frigates

HMAS *Perth* has completed an advanced air-warfare weapons event during a multinational firing serial at Exercise Rim of the Pacific (RIMPAC) 2012, the world's largest maritime exercise in Hawaii.

HMAS *Perth* joined HMAS *Darwin* in a six-ship formation with Canadian and US ships which conducted a coordinated 'defence' of the group against multiple target drones flying realistic profiles against the ships.

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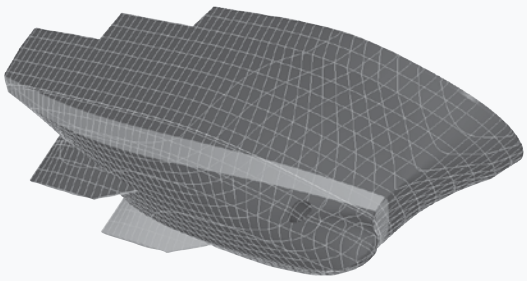

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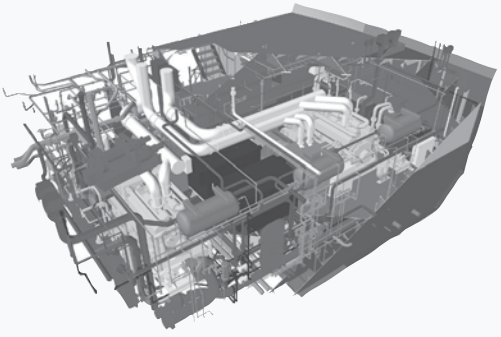

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HMAS *Perth* firing an Evolved Sea Sparrow missile during RIMPAC 2012
(RAN Photograph)

Perth fired two Evolved Sea Sparrow missiles at two of the four targets and employed the Australian-designed Nulka anti-missile systems to decoy another, while the US ships fired the SM2 missiles at the remaining targets.

The Commander of Australia's RIMPAC Contingent, CDRE Stuart Mayer, said that the firings mark the culmination of more than a year of painstaking planning by the ship and the Australian Maritime Warfare Centre team.

"This firing was a keystone event in demonstrating the RAN's ability to operate with our closest allies in the most challenging of warfare situations," CDRE Mayer said.

"Success and defeat are managed in seconds when it comes to winning the fight at sea. *Perth's* team has been put to a tough test and excelled. I am very proud of what they have achieved."

While firings of this complexity take time to analyse, initial

A sight not often seen today — a large fleet of naval ships in formation.
Twenty-two nations, more than 40 ships and six submarines, more than 200 aircraft and 25 000 personnel participated in the biennial Rim of the Pacific (RIMPAC) exercise from 29 June to 3 August in and around the Hawaiian Islands. RIMPAC is the world's largest international maritime exercise
(US Navy Photograph)

reports suggest outstanding results which marks another important achievement for Australia's first upgraded Anzac-class frigate.

Perth has recently completed the Anti Ship Missile Defence (ASMD) upgrade which included the installation of the Australian-designed CEAFAR radar which is a cutting-edge phased-array radar, as well as an upgraded combat system.

Perth's commanding officer CAPT Mal Wise said that the firings put the new system to a rigorous test and was one in which the ship and crew performed to an outstanding standard.

"This was a complex test of the CEAFAR radar and it has proven itself beyond expectations," CAPT Wise said.

"What we accomplished today is a win not only for the RAN but also for Australia's defence industry."

LHD *Adelaide* launched

Chief of Navy, Vice Admiral Ray Griggs, attended the launch of Australia's second landing helicopter dock (LHD), the future HMAS *Adelaide* at the Navantia shipyard in Spain on 4 July.

The LHDs *Canberra* and *Adelaide* are the largest ships ever built for the Royal Australian Navy and will provide the ADF with one of the most-capable and sophisticated amphibious deployment systems in the world.

The LHDs are bigger than Australia's last aircraft carrier, HMAS *Melbourne*, and when completed will be more than 230 m long, 27.5 m high and displace around 27 500 t.

Each ship can carry a combined armed battlegroup of more than 1100 personnel, 100 armoured vehicles and 12 helicopters and features a 40-bed hospital.

Spanish shipbuilder Navantia, as a subcontractor to BAE Systems Australia, has constructed and is fitting out the hulls of both amphibious ships.

The superstructure, combat and communications systems will be consolidated with the hulls in Australia at the BAE Systems shipyard in Williamstown, Victoria.

The arrival of the first amphibious ship, *Canberra*, at BAE's Williamstown dockyard is expected later this year. She was loaded on board Dockwise heavy-lift ship, *Blue Marlin*, in early August for transport to Australia. When the hull arrives in Melbourne the complex task of marrying the superstructure, hull, combat system and communications system can commence, in preparation for delivery of the first ship to the Australian Defence Force in 2014.

Anzac-class Frigate Maintenance Contract

Naval Ship Management (Australia) Pty Ltd (NSM), an incorporated 50–50 joint venture between UGL Infrastructure Pty Ltd and Babcock Pty Ltd, has finalised contract negotiations for the Anzac Ship Group Maintenance Contract (GMC) with the Defence Materiel Organisation.

The Anzac GMC is a five-year contract with an end value of approximately $300 million and the potential for further extensions out to 10 years, based on performance. Under the contract, NSM (Aust) will provide ship repair and maintenance services for the eight Royal Australian Navy Anzac-class frigates.

The RAN's second LHD, *Adelaide*, ready for launching on 4 July 2012
(Navantia Photograph)

UGL's Managing Director and CEO, Richard Leupen, said "UGL is proud to have secured this prestigious contract, extending our Royal Australian Navy ship maintenance and support activities for the Anzac class. Securing this award reflects the capabilities of NSM (Aust) which combine the strength of UGL's asset management and maintenance capabilities in the defence sector and Babcock's international expertise in naval ship sustainment and class output management. The Anzac GMC is an important win for UGL, reflecting the opportunities for growth in the defence sector and delivering further support to our stable, recurring revenue streams."

Submarine Support Contract

On 30 June the Minister for Defence, Stephen Smith, the Minister for Finance and Deregulation, Penny Wong, and the Minister for Defence Materiel, Jason Clare, announced that a new maintenance-and-support contract for the Collins-class submarines had been signed.

The In-Service Support Contract (ISSC) has been signed following negotiations between the Defence Materiel Organisation (DMO) and ASC Pty Ltd.

The new contract has been put in place to deliver more-efficient and effective sustainment services which will improve the availability and reliability of the Collins-class submarines.

Phase 1 of the Coles Review into Submarine Sustainment, conducted by Mr John Coles and released by the Government last year, emphasised the importance of entering into the ISSC. Mr Coles described it as a "game changer" for Collins sustainment.

Mr Coles that found there was a strong perception "that the ASC was operating inefficiently on a forward-funded cost-plus contract for sustainment". The ISSC sets out to provide a mechanism for performance-based contracting.

The new ISSC is a rolling five-year contract with options to be exercised subject to satisfactory performance. It started on 1 July this year.

The contract will replace the Through-Life Support Agreement (TLSA) entered into in 2003 which failed to deliver the required operational outcomes for Navy.

The sustainment of the submarine fleet is a complex task which has proven challenging for Defence and for ASC, the prime contractor, for a lengthy period of time.

Sustainment of the Collins-class submarines is at the top of the Government's Projects of Concern list and the Government has undertaken a number of measures to address the availability and reliability of the submarine fleet.

The report of Phase 1 of the Coles Review, made a number of interim recommendations:

- Resources should be directed to the provision of spares, leading directly to increased availability. Any decision to reduce the agreed Materiel Ready Days in a year should only be taken by the Collins-class Program Manager.
- The In-Service Support Contact (ISSC) between the Defence Materiel Organisation and ASC should be placed as planned.
- The classification of Priority 1 Urgent Defects by the submarine commander should be moderated by Commander SUBFOR to avoid over classification purely to increase priority of spares.
- As part of the crew-training program, Commanding Officers, Marine Engineering Officers and Weapons Electrical Engineering Officers should undertake a pre-joining course at ASC and Pacific Marine Batteries (and other key suppliers) to gain a better insight into some of the intrinsic submarine design and equipment characteristics.

Implementation of these recommendations is well underway.

In May, the Government announced that it had agreed to the recommendation of the Secretary of the Department of Defence, Duncan Lewis, that a senior Defence position be dedicated to focusing exclusively on the oversight of all existing and future materiel-related submarine activities in the Department of Defence.

Mr David Gould was appointed as the General Manager of Submarines to take responsibility for all materiel-related aspects of submarine support across Defence. He will report to Mr Warren King, Chief Executive Officer of the Defence Materiel Organisation.

In May, the Government also approved $214 million to go towards further detailed studies and analysis, building on work already undertaken, to inform the Government's decision on the design of Australia's next submarine. Lessons learnt from Defence's experience with the Collins-class submarines, along with the outcomes of the Coles Review, will inform development of the Future Submarine project

In May, the Government allocated an additional $700 million for Collins-class submarine sustainment as part of the 2012–13 Defence Budget.

Be Very Careful with Vacuum Cleaners

In a recent report the Portsmouth Naval Shipyard provided initial findings regarding a recent fire onboard the submarine USS *Miami* (SSN 755).

The US Navy is conducting formal Judge Advocate General Manual and safety investigations to address lessons learned, and corrective actions to prevent recurrence. These investigations are still on-going and initial reports of their conclusions and recommendations are expected soon.

USS *Miami* in refit at the Portsmouth Naval Shipyard
(US Navy Photo)

Preliminary findings indicate that the fire started in a vacuum cleaner used to clean worksites at end of a shift, which was stored in an unoccupied space. Specific details as to the cause and subsequent damage assessment were still being evaluated as part of on-going investigations.

The shipyard's workforce was authorised to return to work in the forward compartment to begin cleanup and support damage assessment as well as to continue work in other areas throughout the ship. The first phase of the clean-up process included dewatering the ship and installation of temporary services (i.e. lighting, staging, etc.) For the next phase, detailed cleaning, the US Navy engaged contracted cleaning services.

The US Navy has developed an initial rough repair cost estimate of $US400 million, plus approximately 10 percent for the secondary effects (such as disruption to other planned work across all naval shipyards, and the potential need to contract work to the private sector).

Ocean Shield Arrives

The Navy's newest ship, Australian Defence Vessel *Ocean Shield*, arrived at HMAS *Stirling* in Western Australia late on 28 June.

In March the Government announced that it had purchased the Offshore Support Vessel *Skandi Bergen* to add to the Royal Australian Navy's current amphibious ships, HMAS *Choules* and HMAS *Tobruk*, and subsequently announced that *Skandi Bergen* would be renamed *Ocean Shield*.

Defence took ownership of the vessel after extensive sea trials oversighted by international shipping firm, Teekay Shipping.

The arrival of this vessel will ensure that Defence has the humanitarian and disaster-relief capability required between now and the arrival of the two new landing helicopter dock (LHD) ships in the middle of the decade.

It will primarily be used to transport troops and supplies in support of humanitarian and disaster-relief operations domestically and in the region.

As well, it will be able to undertake patrols in the Southern Ocean providing surveillance, detection and apprehension of any vessels operating illegally. *Ocean Shield* is able to operate in sub-Antarctic weather conditions.

Ocean Shield is the sister ship of *Ocean Protector* which is currently operated by Customs and Border Protection and undertakes these patrols.

The 6500 t ship is 105 m long and 21 m in beam. She has accommodation for up to 100 people, more than 1000 m^2 of deck area, and a helipad.

ADV *Ocean Shield* proceeding to sea from Fleet Base East
(Photo John Jeremy)

After Defence introduces the first LHD into service, *Ocean Shield* will be transferred to Customs and Border Protection to provide a long-term capability for Customs and Border Protection.

Ocean Shield will join HMAS *Tobruk* and HMAS *Choules* in providing Australia's amphibious humanitarian and disaster-relief capability.

HMAS *Tobruk* recently completed sea trials following maintenance at Garden Island in Sydney and is currently at 48 hours readiness notice.

HMAS *Choules* is currently in Sydney undergoing repairs to a defect on one of the six transformers which form part of the ship's propulsion system.

The Navy and the Defence Materiel Organisation are working closely with the original manufacturer of the transformer to have it repaired and the ship return to sea. The estimated time for this work is 6 months.

First Wind Express Vessels Delivered to Europe

Three recently-completed 21 m Austal wind-farm support vessels set sail for Europe in May to commence operations for UK operator, Turbine Transfers.

The Wind Express 21 catamarans will be used to transport service crews and equipment to the many offshore wind farms which are located off the coastlines of several European countries. Turbine Transfers has confirmed that one is due to operate from Belgium, while another will work within the London Array wind farm.

Foryd Bay, Malltraeth Bay, and *Aberffraw Bay* are the first in the Turbine Transfers fleet of 27 vessels to be commissioned outside the United Kingdom. Turbine Transfers is a wholly-owned subsidiary of Holyhead Towing Company which has been operating workboats since the early 1960s. Its long-term customers include Siemens, RWE NPower, Van Oord, Dong Energy, EnBW and Royal Boskalis Westminster.

The Austal-built wind-farm support vessel *Foryd Bay*
(Photo courtesy Austal)

Managing Director of Turbine Transfers, Captain Mark Meade, commented "We have been very happy with the construction of the three 21 m vessels by Austal. Their professional approach has ensured a smooth process throughout the construction and delivery period.

"The vessels have performed well on trials, meeting performance expectations, and we are especially pleased with the exceptional seakeeping coupled with the hull's ability to carry additional deadweight with a minimal loss

of speed, provided by Austal's fine-entry Z-bow hull form," said Captain Meade.

Austal Chief Executive Officer, Andrew Bellamy, said that the delivery of the company's first wind-farm boats marked a successful entry into a new and buoyant market.

"We are very pleased that such a highly-experienced operator will soon be showcasing the capabilities of Austal vessels in service. We are confident that, when other European operators see how they perform, they will also recognise the benefits which Austal brings to the offshore wind-farm vessel market," he said.

"These three vessels are the result of extensive research and development, building upon Austal's advanced hull design and engineering capabilities. The Wind Express 21 vessels demonstrate our extensive intellectual property with the design of highly-efficient vessels which will achieve greater speeds while using less fuel."

Mr Bellamy noted that those benefits extended beyond providing safer, more productive vessels for Europe's wind farm operators.

"Austal is able to provide high-quality in-service support for wind-farm vessels, including boats not built by Austal that may require maintenance, repair or modification. We already have a well-established European Service Centre and plan to grow our regional support presence further, including in the UK," he explained.

The Wind Express 21 vessels are specifically designed for operation in rough sea conditions, and offer stability and fuel efficiency through the highly-refined catamaran hullform which requires less power and fuel to meet operational requirements. In association with a high tunnel height, Austal's advanced Z-bow chine hullform enables the vessels to operate at speeds of up to 30 kn with targeted seakeeping ability in up to 2 m significant wave height.

The vessels are each powered by two MTU 10V 2000 M72 diesel engines driving Rolls Royce 45 A3 waterjets. This power combines with the Austal hullform to deliver greater range and lower operating costs.

The Wind Express vessels, practical arrangement enables comfortable transits for up to 12 wind-farm personnel, with a high-quality interior fitout, good visibility and ample fore-and-aft cargo stowing, as well as accommodation for the vessel's crew. Austal also has a fourth wind-farm support vessel, a 27 m TRI SWATH, under construction for Turbine Transfers at its shipyard in Cebu, Philippines. Due for delivery in late 2012, this is the first of a new Austal design which capitalises on Austal's expertise in trimarans to enable even safer and more-efficient offshore wind turbine service.

Four 35 m Catamaran Ferries for Gladstone

Aluminium Boats Australia and One2three Naval Architects have delivered four more catamaran ferries to Transit Systems Australia, all destined for Gladstone. The first, *Capricorn Dancer*, is described in the February 2012 edition of *The ANA*. The second, *Capricornian Spirit*, operates with *Capricornian Dancer* to support the Santos/GLNG LNG Plant. The third and fourth vessels, *Capricornian Surfer* and *Capricornian Sunset*, complete the Santos and APLNG contracts.

The final vessel was ordered to supplement *Dancer* and *Spirit*. Named *Capricornian Sunset*, she was handed over in July.

Capricornian Sunset
(Photo courtesy One2three)

The five ferries have the following principal particulars:

Length OA	37.00 m
Length WL	33.35 m
Beam OA	10.49 m
Depth	2.70 m
Draft	1.30 m
Deadweight	Max 45 t
Passengers	400
Crew	5
Main engines	4 × Scania DI12-69M, each 499 kW at 2275 rpm
Waterjets	4 × Rolls Royce 40A3 Service
Auxiliary	2 × MTU Kohler 65
Speed	25 kn
Max speed	30 kn at full load 34 kn light
Range	380 n miles at 25 kn, full load
Ride Control	Humphree interceptor system

Continuing the supply of purpose-built vessels for Gladstone, ABA and One2three have delivered two smaller vessels this year.

A 24 m Commuter Ferry

Aluminium Boats Australia has recently launched their fourth 24 m One2three-designed low-wash commuter ferry for operations in Brisbane and Gladstone. *Brahminy Kite* joins her sister vessels *Kurrowera 1*, *A. L. Robb* and *Torresian*. The boats are required to exhibit an extremely low-wash profile at service speeds up to 24 kn.

Both Moreton Bay in Brisbane and Gladstone Harbour are designated dugong breeding grounds. Transit Systems Australia has operations in both areas and, hence, *Brahminy Kite* forms part of the on-going fleet replacement program using environmentally-sensitive vessels.

Accordingly, the boats are waterjet powered to remove any possibility of open-water propeller damage to marine life. Like the sister ships, the bows of *Brahminy Kite* have been custom-designed to include a shallow forefoot with a blunt, rounded entry to minimise the possibility of injury to dugongs at or close to the water surface.

The vessel is powered by two Scania DI 1259M engines producing 499 kW each, driving a pair of Hamilton HJ403 waterjets with inlet girds.

Brahminy Kite and *Duffy*
(Photo courtesy One2three)

The vessel's configuration allows for 200 passengers, of which 150 can be seated. The new vessels form the main transportation system to and from the island communities in Moreton Bay and, as such, are required to carry all sorts of luggage and cargo, ranging from lawn mowers to shopping trolleys and the odd goat and other family pets. In addition, the vessels also operate in Gladstone carrying workers and their equipment to the LNG plant construction zones. Extensive luggage racks and storage areas are provided both internally in the cabin and externally on the foredeck. A lightweight and durable fitout was selected to handle the rigours of the service, and the vessel's superstructure is fabricated from composite cored structure utilising resin-infusion to One2three's design and is fixed to the alloy hulls and cross structure.

17m Ambulance Vessel

Aluminium Boats Australia have delivered a 17 m One2three-designed high-speed, low-wash ambulance vessel to Transit Systems Australia.

The vessel has been named *Duffy*, in recognition of the Anzac legend of Simpson's Donkey. For those needing a history update, Simpson served in the Gallipoli campaign as a stretcher bearer. He and the donkey he 'adopted' on the beach and named Duffy, are credited with saving over 300 wounded men and bringing them back from the front lines under constant enemy fire. He gave his own life rescuing others. It is not known what became of the donkey, Duffy.

The vessel is stationed in Gladstone to provide medical evacuation from the LNG construction sites on Curtis Island. Powered by a pair of Scania DI1269M engines producing 515 kW each, driving Hamilton 364 waterjets, the vessel has a service speed of 32 kn.

The vessel's configuration allows for three stretcher-based passengers and accompanying medical staff. Her particulars are:

Length OA	17.4 m
Length WL	15.3 m
Beam moulded	6.0 m
Depth	2.1 m
Draught	0.7 m
Fuel oil	2000 L
Fresh water	250 L
Sullage	250 L
Main engines	2 × Scania DI1269M, 515 kW
Cruising speed	32 kn

America's Cup World Series

The 2011–12 World Series events have reached an exciting conclusion with the final races held in Newport. Australian skipper, James Spithill, and the Oracle Team finished with a second place in both the last match racing and last fleet racing events, enough to take a Series first place ahead of Emirates Team New Zealand. Spectators onboard the One2three mark boats were treated to a close view of Team New Zealand as they failed to pass the mark, the rudder blade on the windward flying hull clipping the mark boat's bow rail — such is the closeness of Cup racing!

The 2012–13 Series begins in San Francisco on 21 August. This series will continue to use the AC45 catamarans, before these are replaced with the larger AC72s for the Louis Vuitton Cup in 2013, followed by the America's Cup.

EAC Composites continue to produce the One2three-designed committee/mark vessels for the America's Cup Race Management. Four vessels have been delivered, with

A bit too close for comfort!
(Photo courtesy Giles Martin-Raget and ACRM)

an additional two vessels currently under construction by EAC Composites in China. All six vessels have been named, starting appropriately with *America* which defeated 15 yachts from the British Royal Yacht Squadron in 1851 to begin a tradition lasting 161 years and providing the oldest active trophy in international sporting history. For perspective, nine challenges had already been held prior to the first modern Olympics in Greece.

The next few seconds must have been interresting!
(Photo courtesy Giles Martin-Raget and ACRM)

The remaining vessels are called *Deception*, *Relentless*, *Stars and Stripes* (after the 1987 challenger), *Puritan* (the 1885 defender) and *Enterprise* (the 1930 defender). The boats have the following particulars:

Length OA	13.9 m
Length WL	12.9 m
Beam OA	5.5 m
Depth	1.65 m
Draft	0.67 m
Deadweight	3 t
Guests	12
Crew	2
Service Speed	28 kn
Main Engines	2 × Volvo Penta D4 IPS, 199 kW at 3500 rpm
Dynamic Positioning	Enabled for mark positioning

Wild Oats XI smashes Audi Sydney–Gold Coast Race Record

In a record time of 22 hours, 3 minutes 46 seconds, *Wild Oats XI* won the 384 n mile Audi Sydney–Gold Coast race for the third year in a row and, in the process, wiped 5 hours 31 minutes off the previous race record (28 hours) set by *Brindabella* back in 1999. Skippered by Mark Richards with a crew of 18, including One2three's Managing Director, Steve Quigley, the boat averaged a speed of 17.4 kn for the race and 22.2 kn for the first 20 hours. The top speed recorded was 34.6 kn in 25 knots of breeze in the middle of the night — not bad for a boat now in her seventh year of racing.

Wild Oats XI
(Photo courtesy One2three)

As well as the Audi Sydney–Gold Coast record, *Wild Oats XI* holds the race record for Australia's other premium long-distance blue water event, the Rolex Sydney Hobart, and has also backed up the Gold Coast win with the line honours and IRC double in the Brisbane to Keppel race held in predominately light winds which had previously been an Achilles heel for the boat.

One2three Naval Architects has been part of the ongoing *Wild Oats XI* development team since 2007. Numerous CFD investigations into the vessel's performance across all wind speeds and points of sail have seen One2three recommend the following modifications, all of which have been successfully carried out:

- bow removed, extended new bow shape fitted;
- stern extension;
- new larger lead bulb;
- new fin keel;
- weight reduction program saving approximately 2 t;
- sail selection and rationalisation program;
- new canting-keel arrangement to increase cant angle;
- supervision of an aero- and hydro-balance study; and
- installation of a forward centreboard foil for improved light-air performance.

A 9 m Landing Barge made of HDPE

In a challenging diversion, One2three and Plastic Fabrications Hobart have delivered a 9 m oil-response landing barge, built in plastic. Made from welded High Density Polyethylene (HDPE), the vessel is in Western Australian 2C survey. Unlike smaller products on the market, the vessel is not rota-moulded but is actually plastic welded together in a plate and stiffener style. This enables cost-effective solutions for a wide range of applications to be produced.

The HDPE landing barge *Responder*
(Photo courtesy One2three)

The vessel has a number of roles, including primary configuration as an oil-skimming response vessel with dirty-oil storage capacity of 4850 L. When not required to provide an environmental response, the vessel functions a robust workboat. It can carry 2.5 t of deck cargo, has an onboard crane, a bow ramp and can carry a fully-loaded Toyota Landcruiser.

The landing barge is powered by a pair of Yamaha 112 kW 4-stroke outboards. The top speed recorded on trials was 33 kn.

HDPE has been used locally in Tasmania for some years, providing tough, virtually-indestructible small monohull workboats for the fish-farm industry. Advantages of HDPE are:

- robust material;
- high UV resistance grades available;
- virtually maintenance and corrosion free; and
- extremely cost effective.

The principal particulars of the landing barge are:

Length OA	9.00 m
Length WL	7.00 m
Beam OA	4.00 m
Depth	0.88 m
Draft	0.33 m
Deadweight	6.40 t
Passengers	6
Crew	2
Speed (maximum)	33 kn
Speed (service)	25 kn
Main Engines	2 × Yamaha 112 kW 4-stroke outboards
Survey	NSCV 2C Workboat

One2three and Plastic Fabrications have commenced construction on a production 5.5 m centre-console runabout.

The 5.5 m series is suited to both commercial and recreational users and has multiple options and configurations, enabling end usage as a work boat, centre-console or forward-console platform, high-performance fishing vessel or simply just a robust, maintenance-free family day boat.

An impression of the 5.5 m plastic runabout
(Image courtesy One2three)

ASP Tyne and *ASP Thames* from Incat Crowther

Incat Crowther has announced the launch of *ASP Tyne* and *ASP Thames*, two 18 m catamaran wind-farm service craft. They were constructed by Topaz Marine at their Abu Dhabi yard in the UAE, and will be delivered to ASP Holdings in the UK. They are the latest in a line of successful wind-farm service craft from Incat Crowther, offering excellent efficiency and seakeeping, combined with practical and rugged operation.

The vessels have dual cargo zones forward and aft, allowing maximum operational flexibility. The aft cargo deck can carry a 10 ft sea container, typically fitted with support equipment for the vessel's turbine-maintenance operations. The forward cargo deck carries supplies and parts to be transferred to the turbines. A Palfinger PK4501M crane is mounted to the port side of the forward cargo zone to facilitate transfer of this cargo to the turbines. Handrails are also fitted forward, allowing for safe transfer of personnel.

The vessels are fitted with a rugged replaceable bow appendage featuring vertical d-shaped fenders. Substantially stronger than the industry standard, this appendage allows *ASP Tyne* and *ASP Thames* to dock against turbines in rough conditions without risk of structural damage.

Inside, large suspended seats accommodate 12 personnel, with a galley and mess space opposite. Two wet rooms are provided aft, one with lockers and a bench to allow personnel to change out of wet clothes, whilst the other houses a WC and shower. Overnight accommodation is provided in the hulls for the four crew.

ASP Tyne and *ASP Thames* are fitted with Scania DI16 42M main engines, each producing 503 kW. The vessels are driven by 5-bladed propellers. They have a maximum speed of 26 kn, and a service speed of 23 kn.

The vessels are designed and built to Det Norske Veritas' new Wind Farm Craft rules, and will enter service under UK's MCA code.

Additional wind-farm-specific vessels are currently under construction to Incat Crowther designs at several

Starboard bow of *ASP Tyne*
(Photo courtesy Incat Crowther)

shipyards and are due to be launched shortly. For shipyards and operators looking to enter this market with reduced technical barriers, Incat Crowther offers wind farm vessels in aluminium kit form.

Incat Crowther continues to use its experience and expertise to support the growing wind-farm service industry. *ASP Tyne* and *ASP Thames* represent the latest technology and offer class leading efficiency, ruggedness and flexibility.

Principal particulars of the new vessels are

Length OA		18.05 m
Length WL		17.74 m
Beam OA		7.50 m
Depth		2.80 m
Draft	(hull)	1.00 m
	(propeller)	1.45 m
Passengers		12
Crew		4
Fuel oil		4000 L
Fresh water		800 L
Sullage		250 L
Aft deck capacity		10 t
Aft deck load		3 t/m^2
Fwd deck capacity		4 t
Fwd deck load		3 t/m^2
Main engines		2×Scania DI16 42M each 503 kW @ 2100rpm
Propulsion		2×5-bladed propellers
Generators		1×Cummins Onan 19 kW
Speed	(service)	23 kn
	(maximum)	26 kn
Construction		Marine-grade aluminium
Flag		UK
Class/Survey		DNV ✠1A1 HSLC R1 Wind Farm Service 1 UK MCA SCV Category 1

Cahaya Baru from Incat Crowther

Incat Crowther has announced the launch of *Cahaya Baru*, a 20 m Catamaran Ferry which will operate in the Cocos-Keeling Islands. Another product of the partnership between Richardson Devine Marine and Incat Crowther, the vessel was commissioned by the Commonwealth Government of Australia. The vessel is flagged by the Australian Maritime Safety Authority (AMSA).

Starboard quarter of *ASP Tyne*
(Photo courtesy Incat Crowther)

Cahaya Baru was designed to integrate with the existing infrastructure and ensure ease of access across a broad range of tides and vessel loading conditions. Waterjet propulsion was selected to meet the draft requirement of the operation. *Cahaya Baru* has been optimised to transit between the Cocos-Keeling islands, which are located in the Indian Ocean [*about half-way between Sri Lanka and Australia* — Ed.] The remote location calls for reliability, ruggedness and ease of maintenance.

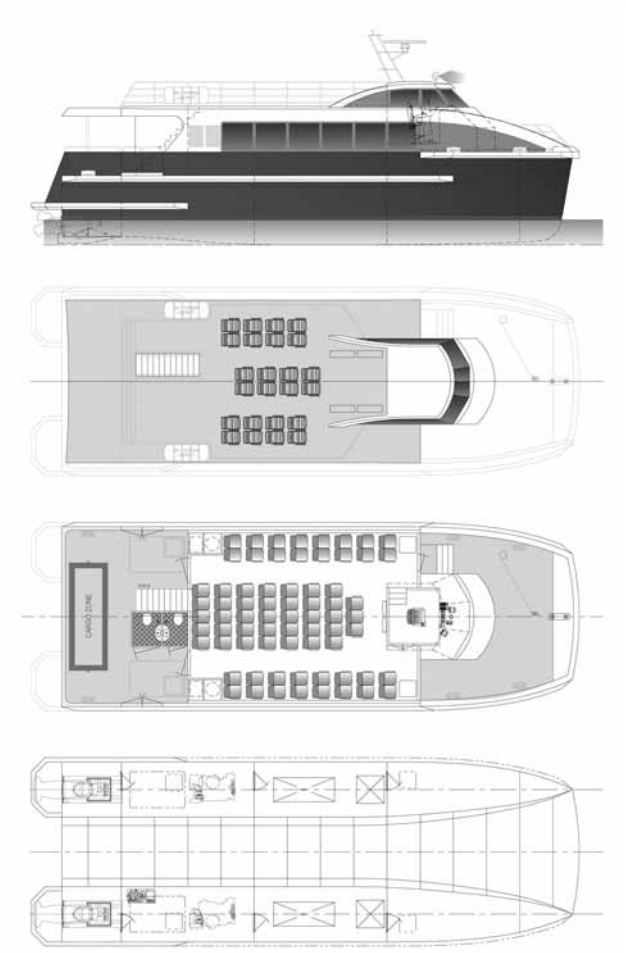
The vessel's air-conditioned main-deck cabin has seating for 70 passengers in forward-facing seats. Aft of the main passenger cabin is a pair of toilets, one of which is wheelchair accessible.

The aft deck features a cargo area for transferring supplies and luggage between the islands. This cargo space has a capacity of 2 t. A wide boarding zone facilitates rapid transfer for both passengers and freight. Also located in the aft deck area is a pair of large engine-maintenance and machinery-removal hatches.

From the aft deck, stairs lead up to the roof deck, where there are seats for a further 24 passengers. Forward of this is a half-height wheelhouse which affords excellent visibility from the central helm position.

Cahaya Baru is powered by a pair of Cummins QSM11 main engines, each rated at 455 kW at 2300 rpm. Power is transmitted via ZF360 gearboxes to a pair of Hamilton HM422 waterjets. On recent trials, a cruising speed of 20 kn was achieved at 80% MCR, with a top speed of 24.5 kn.

Starboard bow of *Cahaya Baru*
(Photo courtesy Incat Crowther)



General Arrangement of *Cahaya Baru*
(Drawing courtesy Incat Crowther)

Cahaya Baru will be loaded aboard a transport ship for transport to the Cocos Keeling islands, and entered service in July.

Principal particulars of *Cahaya Baru* are

Length OA	19.8 m
Length WL	18.1 m
Beam OA	6.5 m
Draft	0.9 m
Depth	2.5 m
Crew	3
Passengers	94
Cargo deck capacity	2 t
Cargo deck loading	0.65 t/m^2
Fuel oil	2400 L
Fresh water	500 L
Sullage	500 L
Main Engines	2×Cummins QSM11HX each 455 kW @ 2300rpm
Propulsors	2×Hamilton HM422 waterjets
Generator	1×Onan 17.5 MDKBR/96118 17.5 kW
Speed (maximum)	24.5 kn @100% MCR
(service)	20 kn @80% MCR
Construction	Marine-grade aluminium
Flag	AMSA/Cocos-Keeling Islands
Notation	USL Code Class 1D

Runö from Incat Crowther

Incat Crowther has announced the launch of the 24 m catamaran ro-pax ferry, *Runö*. The vessel was recently launched by Baltic Workboats in Estonia and successfully completed sea trials. *Runö* is the second Incat Crowther-designed vessel to be built by Baltic Workboats, after *Vėjūnas*, a 24 m catamaran scientific research vessel. *Runö* will be operated in the Gulf of Riga, Estonia, between the mainland port of Parnu and the islands of Runhu and Saaremaa.

Incat Crowther worked closely with Baltic workboats to secure the build contract for *Runö*, offering a vessel based on *Vėjūnas*, including some refinements which included the extensive use of pre-fabricated extruded panels.

Port bow of *Runö*
(Photo courtesy Incat Crowther)

Port quarter of *Runö*
(Photo courtesy Incat Crowther)

In addition to passengers, *Runö* features a small cargo deck aft which can carry two passenger vehicles (up to 6.5 m in length), a mini-van or deck cargo. These are loaded onto the vessel over the hydraulically-operated stern visor. An 8 t-m Guerra M 75.90A1 deck crane handles the loading and unloading of mixed freight.

Side passenger gates forward of the aft deck lead passengers directly to the cabin, which features 60 seats. Passenger toilets are accessed from a central corridor, and there is a small bar to port. Large luggage racks in this corridor allow passengers to place their bags upon boarding, streamlining the process. To starboard is a crew accommodation space, featuring a mess, dedicated crew bathroom and bunk beds. There is also a large storeroom.

Upstairs, the wheelhouse features a guest lounge and navigation table. Good all-round visibility from the helm seat ensures safe berthing operations.

Runö is powered by a pair of Volvo D16MH R2 main engines, each producing 560 kW. The vessel will have a cruising speed of 22 kn and achieved a top speed on trials of 24.7 kn.

Strengthened structure and associated foundations have been included to allow four-point lifting of the vessel for transportation and dry docking.

Incat Crowther is proud of the support offered to Baltic Workboats that allowed them to efficiently construct a competitive vessel.

Principal particulars of *Runö* are

Length OA	23.9 m
Length WL	23.3 m
Beam OA	8.00 m
Depth	3.40m
Draft (hull)	1.28 m
Draft (propeller)	1.40 m
Passengers	60
Crew	3
Vehicles	2
Vehicle axle load	1.85 t
Fuel oil	5000 L
Fresh water	1500 L
Sullage	1500 L
Main Engines	2×Volvo Penta D16MH R2 each 560 kW @ 2200rpm
Propulsion	2×propellers
Speed (cruising)	22 kn
(maximum)	24.7 kn
Generators	2×Cummins 17.5 MDKBR
Bow thrusters	2×Side Power SH550 each 33 kW
Construction	Marine-grade aluminium
Flag	Estonia
Class/Survey	LR ✠100A1 SSC Passenger Catamaran HSC G3 MCH UMS

Hai Ju and *Hai Yao* from Incat Crowther

Incat Crowther has announced the delivery of two 35 m catamaran passenger ferries built by Afai Southern Shipyard in China. *Hai Ju* and *Hai Yao* were commissioned by Zhuhai High Speed Ferry Co. following a competitive tender process. Incat Crowther is proud of its partnership with Afai Southern Shipyard in both the successful bid and the construction process.

The vessels accommodate 198 passengers, all seated on the main deck in comfortable reclining seats. A large bar is situated amidships, serving beverages and snacks as well as offering a tourist information service. A pair of VIP rooms is located at the aft end of the main passenger cabin, each offering six business-class seats with a small table. A large crew accommodation space is located aft, adjacent to the passenger amenities. This area features a pantry, electrical rooms and a bunk room for six crew members.

The vessels are powered by MTU 16V2000 M70 main engines, each producing 1050 kW. *Hai Ju* and *Hai Yao* have both completed sea trials, and comfortably achieved their loaded service speed of 28 kn.

Of over 340 vessels built worldwide to Incat Crowther

designs, over 20 have been constructed in Chinese shipyards. Afai Southern recently delivered a pair of 34 m catamaran ferries, *Xun Long 5* and *Xun Long 6*. In addition, a pair of 36 m monohull crewboats are under construction at Cheoy Lee's facility in Doumen, South China. Incat Crowther's relationship with Chinese yards such as Afai and Cheoy Lee opens up new opportunities for operators worldwide to source high-quality Chinese-built vessels, whilst giving operators in China access to Incat Crowther's world-leading product range.

Principal particulars of the new vessels are

Length OA	34.9 m
Length WL	33.0 m
Beam OA	9.0 m
Depth	3.5 m
Passengers	198
Crew	9
Fuel oil	5000 L
Fresh water	1000 L
Sullage	1000 L
Main engines	2×MTU 16V 2000 M70 each 1050 kW @ 2100 rpm
Propulsion	2×fixed-pitch copper alloy propellers
Gearboxes	2×ZF 4650
Generators	2×Cummins Genset CCFJ-75JYA 75 kW 50 Hz
Speed (service)	28 kn
(maximum)	29 kn
Construction	Marine-grade aluminium
Class/Survey	China MSA Coastal Service Restriction
Flag	China

Hai Ju under way
(Photo courtesy Incat Crowther)

Zenith from Incat Crowther

Incat Crowther has announced the launch of *Zenith*, a 40 m catamaran motor yacht constructed by Sabre Catamarans in Western Australia. The vessel is the result of a collaborative process whereby all partners brought their best ideas to the table. Incat Crowther performed naval architecture and engineering work on the vessel, whilst exterior design was supported by Waterline Design who also designed the opulent interior. Incat Crowther worked closely with the designer to interpret the aesthetic features of the vessel and resolve the designer's vision into a workable, buildable structure.

Zenith's structure is all aluminium, and has been finished to a very high standard. All fittings and systems are of the highest grade, and the outfitting second-to-none.

Guests will board the vessel via gates to starboard, which feed into a lavish foyer amidships. Aft of the foyer is an expansive main-deck saloon and dining area, adjacent to a commercial kitchen. Forward on the main deck are three large guest cabins, each featuring ensuites, lounges and robes. A gymnasium is also situated forward.

The mid deck features an additional guest cabin and the captain's suite. The immaculately-appointed bridge has an elevated guest lounge and access to the external bridge wings and forward outdoor lounge. The aft end of the mid deck is dedicated to a luxurious owner's suite with lounge, walk-in robe and desk. The owner's suite has direct access to a private aft deck with day bed.

The sun deck features day beds, bar and barbecue. Tender storage and a crane are situated aft on this deck.

Below decks, *Zenith*'s crew members are comfortably accommodated with a total of three cabins with ensuites, laundry, crew galley and mess.

Zenith is powered by a pair of MTU 12V4000 engines and cruises at 20 kn, with her efficient hullform giving a range in excess of 3500 n miles. *Zenith* is in survey to Lloyd's Register, under the Cayman Islands flag.

Zenith is an excellent example of Incat Crowther's experience and expertise being involved in a collaborative process. *Zenith* is currently available for sale.

Principal particulars of *Zenith* are:

Length OA	40.5 m
Length WL	35.7 m
Beam OA	10.3 m
Depth	3.60 m
Draft (hull)	1.50 m
Guests	10
Crew	4
Fuel oil	51 800 L
Fresh water	3790 L
Sullage	940 L
Main engines	2×MTU 12V4000 M71 each 1850 kW @ 2000 rpm
Propulsion	2×propellers
Speed (cruising)	20 kn
(maximum)	29 kn
Construction	Marine-grade aluminium
Flag	Cayman Islands
Class/Survey	Lloyd's Register MCA LY2

Zenith at rest
(Photo courtesy Incat Crowther)

Zenith on trials
(Photo courtesy Incat Crowther)

Owner's suite on board *Zenith*
(Photo courtesy Incat Crowther)

Zenith on trials
(Photo courtesy Incat Crowther)

Wheelhouse on board *Zenith*
(Photo courtesy Incat Crowther)

Large entertaining area on sundeck on *Zenith*
(Photo courtesy Incat Crowther)

Upper-deck forward lounge on *Zenith*
(Photo courtesy Incat Crowther)

Dining area of the main saloon on *Zenith*
(Photo courtesy Incat Crowther)

Galley on board *Zenith*
(Photo courtesy Incat Crowther)

25 m Catamaran Wind-farm Service Vessel from Incat Crowther

Incat Crowther has been awarded a contract to design a 25 m catamaran wind-farm service vessel. Construction of the vessel has commenced at MMS Ship Repair in Hull, UK.

Designed to meet an industry demand for increased cargo capacity and flexibility, the vessel will feature a large forward cargo deck which caters for a single 20 ft container, or a pair of 10 ft containers. 20 ft containers can be mounted longitudinally or transversely, allowing additional cargo to be carried as required. A deck crane is mounted at the forward end of the cargo deck.

A passenger cabin at the aft end of the main deck will house 12 technicians, with a galley, wet room, dive stores and bathroom. Four berths for crew members are located in the hulls. The open cargo-deck arrangement affords the wheelhouse excellent visibility over cargo-handling operations and enhances safety when docked at turbines. Turbine docking is also improved with the fitment of a concave fendering arrangement across the bow. As with many Incat Crowther WFSVs, this reinforced bow appendage is fitted in a bolt-on arrangement, allowing for quick and easy replacement in the case of damage for job-specific attachments.

The vessel will be powered by a pair of Caterpillar C32 ACERT main engines, each developing 970 kW. Propelled by a pair of 5-bladed propellers, the vessel will reach a fully-loaded speed of 23 kn, with a top speed of 25 kn.

As well as being highly flexible, the vessel will become a member of the "two-metre club", meaning that it can maintain operation in seas of up to 2 m significant wave height. This is a massive advantage to the profitability of the vessel, as vessels of this capability see approximately twice as much work as vessels capable of operating in seas of up to 1.2 m significant wave height.

Starboard bow of 25 m wind-farm service vessel
(Photo courtesy Incat Crowther)

The vessel is classed to DNV's Windfarm Service Craft rules, under the UK MCA flag.

With over 350 passenger, workboat and leisure vessels in operation, Incat Crowther brings decades of experience and the expertise to the wind-farm service vessel marketplace. This experience and expertise offers operators unparalleled ruggedness, reliability and efficiency.

Principal particulars of the new vessel are

Length OA		25.2 m
Length WL		24.6 m
Length measured		23.99 m
Beam OA		8.00 m
Depth		3.40 m
Technicians		12
Crew		3
Deck cargo		20 t
Fuel oil		9000 L
Fresh water		800 L
Sullage		1000 L
Main engines		2×Caterpillar C32 ACERT each 970 kW @ 2100 rpm
Propulsion		2×fixed-pitch 5-bladed propellers
Generators		2×Cummins Onan MDKBU 27 kW
Speed	(service)	23 kn
	(maximum)	25 kn
Construction		Marine-grade aluminium
Class/Survey		DNV ✠1A1 HSLC R1 Windfarm Service 1
Flag		UK MCA SCV Category 1/Workboat

Ava Pearl from Incat Crowther

Incat Crowther has announced the launch of the 34 m catamaran passenger ferry, *Ava Pearl*. Built by Gladding-Hearn Shipbuilding in Massachusetts, USA, *Ava Pearl* has been delivered to Rhode Island Fast Ferry, where she will contribute to an expansion of operations. As a long-time operator of Incat Crowther ferries, Rhode Island Fast Ferry turned to Gladding-Hearn and Incat Crowther to develop and build a ferry with twin engines and propellers, with a view to more-efficient operation. Designed specifically for the operation, the lighter, simpler vessel is driven by propellers. *Ava Pearl* has entered service, replacing the former Boston Harbor Cruises vessel *Millennium* (also designed by Incat Crowther) on the ferry run between Quonset Point and Martha's Vineyard. This has freed up *Millennium* to increase the sightseeing cruise operation, which will now run daily. *Ava Pearl* features 130 seats on the main deck, configured at tables. A large bar is situated aft, with ample luggage racks and toilet spaces. The upper deck features 81 seats in forward-facing configuration, with further seats located outdoors on the aft deck.

The vessel features both trim-tab ride control and a resiliently-mounted superstructure. Combined with an S-bow hullform, these features afford *Ava Pearl*'s passengers a smooth and comfortable ride.

Ava Pearl is powered by two MTU 12V4000 M53 main engines, each producing 1380 kW. In recent trials, she achieved a loaded speed of 31.5 kn and has a top speed of 33 kn.

Incat Crowther is proud of its long-term relationships with operators such as Rhode Island Fast Ferry and yards like Gladding-Hearn. Incat Crowther continues to offer the latest design technology to help operators improve efficiency and deliver improved service.

Principal particulars of *Ava Pearl* are

Length OA		33.1 m
Length WL		32.5 m
Beam OA		9.65 m
Depth		3.80 m
Draft	(hull)	1.50 m
	(propellers)	2.00 m
Passengers		150
Crew		3
Fuel oil		7570 L
Fresh water		1514 L
Sullage		3028 L
Main engines		2×MTU 12V4000 M53 each 1380 kW @ 1800 rpm
Propulsion		2×propellers
Generators		2×Cummins Onan 55MDDCB each 55 kW
Speed	(service)	31.5 kn
	(maximum)	33 kn
Construction		Marine-grade aluminium
Flag		USA
Survey		USCG Subchapter T

Stewart Marler

Ava Pearl on trials
(Photo courtesy Incat Crowther)

Ava Pearl shows her paces
(Photo courtesy Incat Crowther)

EDUCATION NEWS

Curtin University

Course in Seakeeping

The Centre for Marine Science and Technology recently delivered a one-week intensive ship seakeeping course to engineers and scientists at the Defence Science and Technology Organisation in Melbourne. The course started with a refresher on wave and ship-motion theory, before moving on to the latest developments in strip theory and panel-method codes, as well as model tests and full-scale trials. Lectures were given by Dr Tim Gourlay (CMST), Dr Kim Klaka (CMST), Dr Tony Armstrong (Fastships) and Mr Alan Haywood (SSAC). The course included a full-scale seakeeping trial on a charter vessel on Port Philip Bay. As luck would have it, the day turned out to be glassy calm, so we took the opportunity to measure and analyse short-duration roll motions up to 27 degrees double-amplitude caused by a passing workboat; free roll-decay tests at 0, 4 and 8 kn in order to calculate natural roll period and roll damping; free pitch-decay tests; and standard turning circle and zig-zag tests.

DSTO staff disembarking from Magic Charters after full-scale ship motion trial
(Photo courtesy Tim Gourlay)

Course on Ship Motions

Another short course on ship motions was presented to engineers at Fugro-TSM in Perth by Tim Gourlay. This half-day course covered the basic concepts of ship stability and wave-induced motions, and was intended to give participants a better understanding of the inputs and outputs of commercial ship-motions software. A new lecturing gimmick—anonymous audience response devices—were used to give the lecturer instant feedback on how well the participants understood the material, and to help keep the participants awake! These devices have proved very popular in Curtin's *Design for Small Craft* lectures, and will be used in CMST's short courses from now on.

Tim Gourlay

Australian Maritime College

Marine Renewable Energy Research

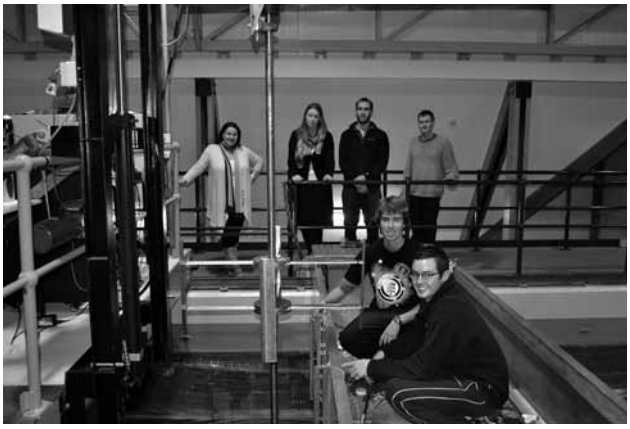
A final-year undergraduate research project has been developed by Dr Irene Penesis at AMC in conjunction with the marine renewable-energy sector of the Engineering Committee on Oceanic Resources (ECOR) to investigate the efficiency of a Darrieus-style vertical-axis turbine.

The research involves the construction of a 1:5 scale model turbine based on the NECi ENC-025L-F4 design and testing of the model device at the AMC's circulating water channel facility.

The research examines the effects of both blade configuration and blade angle-of-attack on the efficiency of the turbine as well as the limitations of both the facility and the turbine design. In addition, the results will facilitate the validation of numerical models and provide vital insight into the optimization of future experimental turbine research.

The project has been undertaken by undergraduate students Christopher Hawtone and Matthew Skledar under the supervision of Irene Penesis and David Harte in the National Centre for Maritime Engineering and Hydrodynamics.

The supervisors and students wish to acknowledge the support and guidance provided by the Circulating Water Channel staff, Facility Manager Rowan Frost and Technical Officer Alan 'Porky' Faulkner.



Some members of the AMC marine renewable energy research team inspecting the experiments at the circulating water channel, including (from left) Dr Irene Penesis, Dr Jess Walker, Rowan Frost, Alan Fleming, with (foreground) Matthew Skledar and Chris Hawtone
(Photo courtesy AMC)

AMC final-year students Matthew Skledar and Chris Hawtone undertaking tests on the tidal turbine
(Photo courtesy AMC)

Pasta Bridge Competition

The fifth annual AMC Pasta Bridge competition took place at the Seafarers bar on Friday 18 May. After passing strict measurements, 18 bridges were allowed to take part in this year's competition.

The bridges, designed and constructed by teams of second-year maritime engineering students, had to be made out of nothing but commercially available pasta and glue, had to span 1 m, could not exceed 1 kg in weight, and had to be wide enough for a model car to pass through.

A good job it was only made of pasta!
(Photo courtesy AMC)

Although the competition record (176 kg) was not broken in this year's edition, the winning bridge, named *Harder, Stiffer, Stronger*, was able to hold a very competitive weight of 144 kg. The Tasmanian Division of RINA provided RINA wall clocks as a prize for each winning team member. Congratulations to victorious team members, Jack Osborne, Bakari Sammir, Hau Joe Lew and Jeremy Nolan!

Presenting the prizes to the winners
(Photo courtesy AMC)

More information and images of the competition can be found on the event's Facebook page www.facebook.com/pages/AMC-Pasta-Bridge-competition/163783340352191.

Final Year Research Project Mini-Conference at AMC

Six final year students from the naval architecture, the ocean engineering, and the marine and offshore systems programs at AMC presented the results and outcomes from their year-long research projects on 4 June. Some of these projects were supported by industry, resulting in some very useful and relevant results.

Assessment was carried out by Alan Muir from Alan Muir Engineering, Mike Seward from Seward Maritime and Lou Mason from AMC. AMC is very grateful to them for giving up their time to do this, and to support the final year students in this way.

As usual, the standard of presentations was very high, and the work reported was extremely interesting, with projects ranging from those involving advanced CFD, to a physical scale-model experimental study of wave set-up on a shallow reef top in the Maldives. A range of disciplines was covered, including 'traditional' naval architecture, ocean engineering and those applicable to the oil and gas industry.

The presentations were followed by a meal, when students and staff were able to relax with the external assessors.

For more information, please contact Jonathan Duffy at the AMC, email j.duffy@amc.edu.au.

Prestigious award for AMC graduate

A former AMC student has been awarded a prestigious international prize by the Royal Institution of Naval Architects.

Tristan Andrewartha graduated from the AMC in 2007 with a Bachelor of Engineering (Naval Architecture) with first-class honours. He is now working for the leading Danish Naval Architect firm Knud E. Hansen A/S.

Tristan Andrewartha
(Photo courtesy AMC)

The Samuel Baxter Prize is awarded annually for the best paper published by RINA in the International Journal of Maritime Engineering (IJME) on the subject of safety by a member under the age of 30.

The paper, entitled *Ship Motions during Replenishment-at-sea Operations in Head Seas*, was co-authored by A/Prof. Giles Thomas, and Terry Turner and Brett Morris of the Defence Science and Technology Organisation (DSTO).

"The paper is based on research started while I was a student at the AMC and it was done in close co-operation with DSTO," Tristan Andrewartha said.

"The work was started while on an industry placement with DSTO, continued as my final-year research project, and then as an employee of DSTO from 2007 until mid-2008."

The aim of the research was to validate numerical predictions using scale-model experiments for the motions of two

vessels travelling side by side in head seas, typical for replenishment-at-sea operations. The software can then be used in conjunction with additional model tests to investigate the optimal relative positioning of the vessels to minimise ship motions, hence improving safety for the crews.

It was the second paper published on the topic by Andrewartha, Thomas and Turner, with the first being published in 2007 (also awarded a RINA prize).

Search for a new Principal of the Australian Maritime College (AMC)

In early 2012, Prof. Malek Pourzanjani resigned from his position at the AMC as Principal/Pro Vice Chancellor to take up a position in Malaysia. Malek oversaw a critical time in AMC's history during the successful integration with the University of Tasmania. Most in the maritime industry would have come across Malek's good work at some stage over the last few years.

Prof. Neil Bose has been seconded from AMC's National Centre for Maritime Engineering and Hydrodynamics to be Acting Principal of AMC. Neil is taking up the acting role after two years as Director of the National Centre and two prior years as manager of the centre's testing facilities. The international recruitment search for a new principal has commenced. We look forward to an announcement in the next few months, advising who will fill this nationally/internationally-important position.

Jonathan Binns

University of New South Wales

Undergraduate News

Thesis Topics

Among the interesting undergraduate thesis projects under way this year are the following:

Investigation of Historic Vessel Bergalia

The Illawarra and South Coast Steam Navigation Company serviced the ports on the Illawarra and south coast of NSW for many years. There is interest in these ports in building models of the ISCSNCo vessels. Some drawings, including a general arrangement and structural details of the vessel *Bergalia* have been obtained from the National Maritime Museum in Greenwich, and the University of Glasgow, but these do not include a lines plan.

William Birdsall is undertaking a project to search the literature for information on *Bergalia*, to find as many details as possible and to write up some of the history. The investigation will then concentrate on modelling the hull shape and deriving a lines plan from the information shown on the general arrangement and structural drawings to obtain the correct displacement. This will lead on to an investigation of the stability characteristics by way of a mass estimate and comparison with modern stability criteria (stability criteria were almost non-existent in her heyday!) and looking at resistance and seakeeping.

Investigation of Catamaran Motion Dependence on Vessel Parameters

The motions of catamarans in a seaway have not been well researched, and the loads on hull plating derived from the rules of the classification societies are dependent on the values used.

Braden Holgate has obtained a typical hard-chine catamaran hullform from industry, and is using the Maxsurf module Seakeeper to investigate the motions for varying parameters. The results will be compared with the results from classification society rules to come up with some guidelines.

Post-graduate and Other News

Laboratory Block Refurbishment

Over the past three months, the demolishers have been in and demolished much of the south end of the ground floor of the Laboratory Building (the Willis Annexe) to make way for the refurbishment of that area. Watch this space.

School Office

The School Office has also had the centre counter and filing cabinets removed, and the floor re-carpeted in that area, in preparation for the re-location of two secretaries to the School Office so that they are all together.

Vale John Harrison

Early graduates of the naval architecture program will recall A/Prof. John Harrison, the Olympic oarsman, surf champion, engineer and inventor whose creative genius and humanity ranged across sport, the medical profession, industry and education. John was appointed to UNSW as a lecturer in mechanical engineering in 1957. His PhD, which he obtained in 1966, centred on a rowing machine which he designed and built as an ergometer, and many students tried their prowess against the flywheel brake on this machine. In 1974 he developed a new winch-grinder mechanism for *Gretel II*, the yacht owned by Sir Frank Packer and which had challenged for the America's Cup in 1970. He made many other contributions to rowing and engineering in general. He is also remembered around the school for spurning the use of lifts, and always running up and down the stairs.

John passed away in February this year, and is survived by wife Jean, daughter Lorna, stepdaughter Janine, seven grandchildren, two great-grandchildren and brother Tom.

Friends can see a lengthy tribute at www.smh.com.au/national/obituaries/rowing-champ-a-gifted-inventor-20120724-22n6q.html.

Engineering Annual Dinner

The Engineering Annual Dinner for 2012 was held on Friday 3 August 2012 in the Leighton Hall of the Scientia Building, for the graduates of 1962, 1972, 1982, 1992 and 2002.

Drinks and nibbles beforehand allowed old friends to catch up and new ones to be made before sitting down to a three-course dinner. A slide display, titled *Then and Now*, showed photos from all stages of the Faculty's past, from beginnings up to the present day, and entertainment was provided by the UNSW String Quartet. Speeches were made by the Dean of the Faculty of Engineering, Prof. Graham Davies, and the Deputy Vice-Chancellor (Academic), Prof. Richard Henry. The highlight of the evening was the witty, topical and engaging after-dinner speech by Mr James O'Loghlin, comedian and former presenter of the ABC's television show, *The New Inventors.*

Phil Helmore

THE PROFESSION

National Registration of Engineers?

Tony Armstrong

As detailed in the previous edition of *The Australian Naval Architect*, Australia is progressing rapidly to implement a Single National Jurisdiction (SNJ) approach to the certification of all new commercial vessels, which is intended to simplify trade and operation of these vessels operating anywhere in Australia.

The approach will also implement a uniform set of rules and regulations (the NSCV) and thereby remove any inequalities in standards that might currently exist between the existing Marine Laws and Regulations of the different States and Territories.

With standardised Rules and Regulations, the obvious question that may be asked is whether the capabilities of designers, naval architects and surveyors and those certifying new vessels will also be standardised.

Existing requirements for Registration of Engineers

Engineers Australia has been promoting the idea of formal Registration of Engineers since 2001, principally for reasons of competency, safety and simplicity. At present there is no formal system of regulations for engineers, except in Queensland, although engineering services are regulated under a wide variety of Acts in many ad-hoc areas, most of which relate to the building and construction industries, supporting many pieces of subordinate legislation enacted by a large number of local councils.

Currently the practices of naval architecture and associated marine engineering areas, including surveying, are not regulated in any way except in Queensland, which in 2002 introduced the Professional Engineers Act, requiring *professional engineering services* to be carried out by a *registered professional engineer* (both of the italicised terms are defined within the Act).

Elsewhere, there is a self-regulatory (non-mandatory) system available within all States and Territories operated by the National Engineering Registration Board (NERB) in which a professionally-qualified engineer (i.e. including a naval architect) can register if suitably qualified and committed to engineering ideals such as professional development. Considerably more detail can be found at www.nerb.org.au.

Guidelines for eligibility criteria and procedures for registration in the general practice of naval architecture have been jointly developed by RINA and Engineers Australia, and can be downloaded at http://www.engineersaustralia.org.au/nerb/naval-architecture. The Guidelines outline the areas of practice and the eligibility criteria for someone to be able to call themselves a "naval architect". However, this scheme is not mandatory and only the most discerning client might request that their naval architect be registered under NERB.

Engineers Australia have for several years been promoting this optional NERB scheme to be adopted throughout Australian legislation as a mandatory scheme, with national registration of naval architects. This has only been adopted in Queensland, and as far as I can find there is currently no legislative activity by any of the other States to implement such a mandatory system.

Implications of the Single National Jurisdiction for Naval Architects

The SNJ is being implemented primarily to standardise the operation of commercial vessels throughout Australia in such a way as to minimise risk to public safety. the SNJ would also facilitate workforce mobility and skills acquisition. Integral to this approach is the professional capability of the engineers creating the vessel, including the designer(s), the naval architect(s), the marine engineer(s), the ship- or boat-builder, the surveyor and, indeed, the certifying authority.

So to meet the aims of the SNJ there needs to be an associated standard of engineering competency, which might imply a register of accredited persons who have proven their ability to provide the requisite professional engineering services. This would appear to be identical to the function of the National Engineering Registration Board and it is, but there is a difficulty in that, despite its name, the NERB is a *State-based* engineering model. However, the SNJ comes under the Maritime Safety *National* Law.

I do not know if the NERB model can be adapted to suit the National Law, nor whether the soon-to-be-released Regulatory Requirements under the Maritime Safety National Law Act will include the professional capabilities of naval architects and associated professions including surveyors. It is to be hoped that AMSA will at least nominate a minimum standard (such as membership of RINA perhaps), because the alternative is to maintain aspects of the somewhat inequitable system currently in force where, for example, some systems or arrangements might be permitted under survey by some Marine Authorities, but not by others despite being designed in accordance with the NSCV.

I do not expect any change in the immediate future, but this is a challenge that will need to be addressed over the next three years after the National law is implemented and a new system is progressively introduced. The Queensland model (and NERB) might be seen as a solution, although there is a loophole in the Queensland Professional Engineers Act whereby if a boat designer is purely following a set of guidelines or a published standard, such as the NSCV or a set of Classification Society Rules, then this activity is not interpreted as being a "professional engineering service" and, hence, there is no need for such a person to be registered or indeed qualified.

For the Maritime Safety National law to work effectively to ensure crew and passenger safety, I am committed to the belief that it requires professional designers, working together with professional surveyors and certifiers, and that the competencies of these persons need to be guaranteed.

VALE FRANK LAST

It is with sadness that *The ANA* records the passing of Frank Bernard Last on 6 May 2012.

Frank was born in Barrow-on-Furness, UK, on 18 June 1922 to Frank and Annie Last, and he had a younger sister, Peggy. He attended the local schools; he was a bright student and excelled in his studies. He also played football at school and afterwards. His interest in football was transferred to the National Rugby League when he moved to Australia.

In about 1938 he commenced his apprenticeship as a ship draftsman at the Vickers shipyard in Barrow, where he worked until 1947 when he joined Lloyd's Register of Shipping. The war years saw the introduction of welding in UK ship construction. Frank had obtained experience in this method of construction at Barrow and he believed that this experience was one of the reasons why he obtained the position with Lloyd's. He was appointed to the Ship Plans Department in London headquarters. 1947 was a busy year for Frank: in addition to changing jobs, he married Betty McWilliams and they subsequently had two daughters, Celia and Marian.

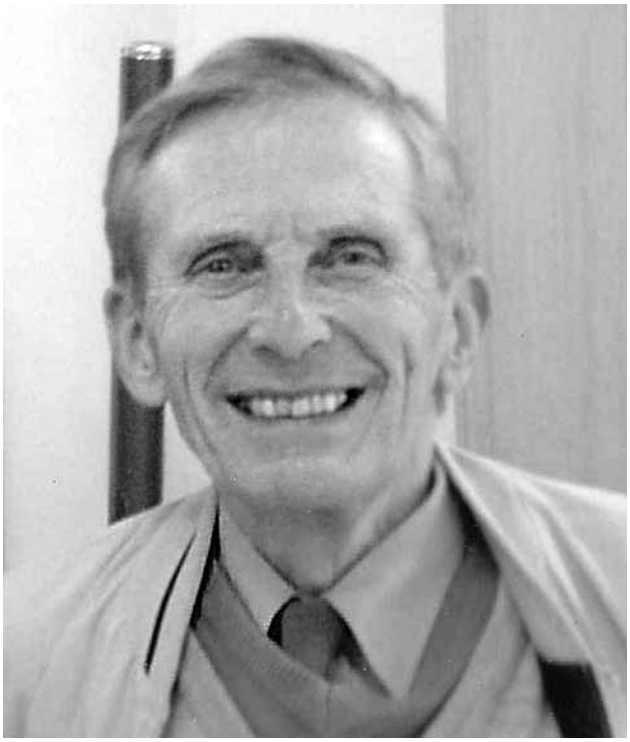
Frank remained in Lloyd's London office until 1958. He wrote a paper on the design of rudders and stern frames for their Staff Association in 1957, and this was considered to be the standard reference on the subject and was still in use as late as the 1990s.

Frank was slated to take up a position in Germany in 1958; however, he had an attack of gallstones which prevented the move. In 1959 he was promoted Senior Surveyor and then, to the local shipbuilding industry's advantage, he was transferred to Lloyd's Sydney office as the Hull Plan Approval Surveyor for the whole of Australia.

Frank's arrival coincided with the time when the Australian steel shipbuilding was extremely active. There were recognised shipyards, i.e. those which attracted the Federal Government subsidy, in Maryborough, Brisbane, Newcastle, Sydney, Adelaide, Whyalla and Fremantle. In addition, there were the unrecognised shipyards, i.e. those which did not attract the Federal Government subsidy, in Cairns, Bundaberg, Brisbane, Ballina, Newcastle, Lake Macquarie, Newcastle, Sydney, Launceston, Adelaide, Whyalla, Port Lincoln, and Fremantle. Frank was required to approve all of the hull plans for vessels built to Lloyd's classification in all of these yards.

The range of vessels which were constructed under Frank's watchful eye in Australia included bulk carriers, tankers, general cargo vessels, roll-on/roll-off vessels, container vessels and passenger vessels which were built in the larger-capacity shipyards. For the smaller shipyards, he approved the hull plans for myriad smaller vessels which included tugs, fishing vessels, supply vessels, landing craft, small cargo vessels and specialised vessels such as lighthouse-supply vessels and military landing craft. Also, during this period, the world's first fully cellular purpose-built container ship, *Kooringa*, was built to Lloyd's classification by State Dockyard in Newcastle.

In the early years of Frank's tenure in Australia, Lloyd's rules were still written for riveted construction while the local industry had embraced welded construction. This



Frank Last

required a broad interpretation of the rules, particularly where reference to built-up riveted-section data had to be transposed to suit welded built-up sections. It was in situations such as this that Frank was most helpful in providing advice on how to manipulate the rules from one medium of construction to the other.

For those of us who are old enough to remember ship design without the aid of calculators or computers, 1968 was a significant year. Until 1967 Lloyd's rules were presented in tabular form and it was a simple procedure to interpolate plate thicknesses and section moduli where they fell between successive values in the tables which were provided in the rules. However, the 1968 rules dispensed with the tabular presentation and, in their stead, they contained mathematical equations which needed to be solved to determine the required scantlings. Frank was one of those fortunate people who possessed a 20 inch (51 cm) slide rule, while we lesser mortals had only 10 inch (25 cm) slide rules. The advantage of a 20 inch slide rule was that a greater degree of accuracy could be obtained in solving these equations.

Some of the equations that were required to be solved contained so many variables that they extended right across the two-column page. The new rules caused a considerable amount of consternation in at least one hull design office. I recall Ron Freestone, who was the Senior Design Draftsman in the Hull Design Office at the Australian Shipbuilding Board, remarking to Frank that he was not sure whether he should sit down and solve these lengthy equations or open up his piano and play them. Frank was able to convince Ron that the equations were, with a little perseverance, solvable.

In addition to his heavy workload associated with the steel shipbuilding industry, it was Frank's responsibility to approve the hull drawings and survey the construction for

timber vessels which were built to obtain Lloyd's classification. These included yachts and all of the timber 12 metre yachts which were built in Australia as challengers for the America's Cup. He was also required to survey timber vessels which were classed with Lloyd's.

Frank retired from Lloyd's Register in 1986, but his expertise was still required in the industry. Amongst other appointments he was invited back to Lloyd's office for some two years at about the time that Gavin Jones took over the hull plan-approval duties from Alan Shepherd. He also spent a considerable period of time in the naval architecture section of the Maritime Services Board of NSW (now the NSW Roads and Maritime Services) and spent time assisting at least one itinerant consultant in preparing the stability data for the sailing vessel, *One and All*.

Frank was elected to the class of Associate Member of the Institution in 1949, Member in 1959 and Fellow in 1971. He was an active member of the Australian Division as a member and vice-president of its Council until well into the 1990s.

I first met Frank in 1960, when I was a very junior draftsman, and I soon learned that he did not suffer fools gladly. However, as I matured and got to know him better I, like my colleagues in the shipbuilding industry, developed a profound respect for his experience, judgement, and unfailing assistance in matters related to the hull structural design of vessels built to Lloyd's classification.

Frank's contribution to the Australian Shipbuilding industry, in the latter part of the twentieth century, was of immense significance and those who worked with him benefitted greatly from his experience and guidance.

Lloyd's Register has a display in the Australian National Maritime Museum which was opened at a cocktail evening on 9 September 2010 to celebrate 250 years of Lloyd's operation (see *The ANA*, November 2010). The display includes Frank's 20 inch slide rule as a lasting memorial to a fine man.

His funeral service was held in the South Chapel of the Northern Suburbs Crematorium on Thursday 10 May, and was attended by family and some friends from industry.

He is survived by his daughters and their husbands, Celia and Michael, and Marian and John; grand-children, Michael, Sarah, Kate, David, Andrew and Matthew; and great-grandchildren Isabella, Chloe and Saskia.

Noel Riley

Defence Capability Plan Reform

On 2 July the Minister for Defence, Stephen Smith, and the Minister for Defence Materiel, Jason Clare, announced further reforms to the Defence Capability Plan (DCP) based on consultation with Australian Defence Industry.

Earlier this year, Minister Smith and Minister Clare met with Australian Defence industry representatives and sought advice on ways to improve the DCP.

Based on Defence industry feedback, future public versions of the DCP will contain those priority projects planned for either first, or second, pass approval over the four year Forward Estimates period.

The purpose of this reform is to align the DCP with the four-year Forward Estimates period in the Budget and provide greater certainty for industry.

These reforms reflect the consultations undertaken with industry and align with industry's focus on projects approaching Government consideration.

The public DCP will provide information for industry on project cost, project schedule and local industry content.

As the public DCP will include only those projects approaching either first pass or second pass in the four-year Forward Estimates period, it will be a much more reliable guide of the Government's priorities for investment in Australian Defence Force (ADF) capability.

A new document to complement the public DCP, the Defence Capability Guide (DCG), will provide general guidance for industry on projects over the six-year period following the four years of the DCP.

The DCG will ensure that industry has information about the Government's longer-term capability intentions, noting that, beyond the four-year DCP, there is more uncertainty, and historically projects are less well defined and have been subject to change, both in terms of scope, cost and schedule.

The level of information on projects in the DCG for the general guidance of industry will necessarily be less definitive than that in the DCP.

Projects in the DCG will enter the DCP as they become better defined and if Government decides that they are of sufficient priority to be included in the Forward Estimates years and funded in the Budget.

As is the case with the current DCP, both the four-year DCP and the six-year DCG will be subject to change as strategic circumstances evolve, new technologies emerge and priorities are updated to reflect the changing needs of the ADF.

This reform will ensure that the Defence capability planning information available to industry is based on affordable and realistic views about the priority equipment the ADF needs.

A new public DCP and DCG will be published this quarter. It is proposed that future publications be aligned with the Annual Defence Budget, with subsequent six-monthly updates.

This reform follows a range of reforms to the Defence Capability Plan announced in 2010 and 2011 and which are being implemented.

These reforms will ensure that Defence Capability Plan projects are aligned with the Government's priorities. The reforms will also ensure that project risks are understood when decisions about projects are made and that these risks are effectively mitigated.

A key reform has been to reduce the level of over-programming in the DCP.

Over-programming has previously been a deliberate strategy to manage the risk of projects being delayed, so that funding can be diverted to other high-priority Defence capability projects.

However, what over-programming has meant in practice is that more projects are included in the Defence Capability Plan than can ever be realised. This is not of assistance to Australian industry.

All versions of the Defence Capability Plan since it was first published in 2001 have been over-programmed.

A comprehensive review of the Defence Capability Plan to minimise over-programmming was effected in the Budget process. This work will continue.

This comprehensive review also brought the Defence Capability Plan into closer alignment with the Defence Planning Guidance.

The Defence Planning Guidance aligns strategic guidance, capability decisions and resource planning on an annual basis.

Detail on the range of further capability and procurement reforms currently being implemented is as follows:

Capability and procurement reforms in Defence

Over the past year, the Government has announced a series of reforms to strengthen procurement processes within Defence:

- reforms to project management accountability (announced in May 2011);
- reforms to strengthen the projects-of-concern process (announced in June 2011);
- reforms to support ship repair and management practices – the Rizzo Report (announced in July 2011); and
- reforms in the sustainment of Australia's Collins-class submarines – the Coles Review (announced in August 2011).

Implementation of all these reforms is well underway, with the majority already implemented.

An effectively-functioning Defence organisation, including the Australian Defence Force (ADF), is a critical part of protecting and defending Australia's national security interests.

There will always be risk in complex, costly procurements involving cutting-edge technology.

To minimise that risk and to manage it effectively, we need to continue to instil greater rigour and greater individual and institutional accountability in our consideration and management of major capability projects, both acquisition and sustainment.

This in particular applies to the early stages of projects — 80% of problems with Defence capability projects emerge in the first 20% of the project's life.

Project Management Accountability

In May last year, a number of reforms were announced to increase the level of project management accountability including:

- project directives issued by the Secretary of the Department of Defence and the Chief of the Defence Force to ensure Defence acquisitions progress according to Government direction;
- benchmarking all acquisition proposals against off-the-shelf options where available;
- the introduction of a two-pass approval system for minor capital projects valued between $8 million and $20 million;
- implementation of an Early Indicators and Warning system;
- the expansion of the Gate Review system; and
- the introduction of quarterly Accountability Reports.

All of these reforms have now been implemented.

Projects of Concern

The Projects of Concern process was established by the Government in 2008 to focus the attention of the highest levels of Government, Defence and industry on remediating problem projects.

Since inception, 19 projects in total have been placed on the list. Of those, 13 have been removed, 11 due to remediation and two cancelled (Watercraft for Amphibious Ships, and Sea Sprite Helicopters).

In December 2011, a further three projects were removed from the Projects of Concern list — halving the number of projects on the list in one year.

This cut the number of projects on the Projects of Concern list from 12 at the beginning of 2011 to the current six.

In June last year a number of reforms were announced to strengthen the Projects of Concern process, including:

- the establishment of a more-formal process for adding projects to the list;
- the establishment of a more-formal process for removing projects from the list;
- the development of agreed remediation plans, including formal milestones for the removal of a project from the list;
- increased Ministerial involvement and oversight of the process; and
- incentives for companies to fix projects on the list by taking into account the performance of companies in addressing Projects of Concern when evaluating their tenders for other projects.

All of these reforms have now been implemented.

Reforms to Support Ship Repair and Management Practices

In July last year a number of reforms were announced to support ship repair and management practices through the Rizzo Report including:

- that Navy engineering be rebuilt and reorganised, led by a two-star Navy Admiral to give the necessary weight to this critical function;
- that the Defence Materiel Organisation (DMO) undertake a fundamental restructure of its Amphibious and Afloat Support Systems Program Office; and
- that the DMO increase the Systems Program Office by over 20 new positions.

These three key recommendations have been implemented.

Capability and Procurement Reform

These reforms complement a number of other important initiatives which were announced last year.

In 2011 the full implementation of all the Kinnaird and Mortimer recommendations previously agreed by Government were accelerated.

In 2003, the Kinnaird Report led to the two-pass approval system, the creation of the Capability Development Group and the Defence Materiel Organisation as a prescribed agency under the Financial Management and Accountability Act.

Most of the Kinnaird reforms have been implemented and have had a positive impact.

In 2008, the Mortimer Review into Defence Procurement and Sustainment made 46 recommendations. The Government agreed to 42 of them in full and three in part.

Many of these recommendations have been implemented, including increased investment in Defence industry skills and incorporation of improved commercial practices into Defence procurement.

Some of the key recommendations have not yet been fully implemented. Defence has accelerated the implementation of all outstanding agreed recommendations made by Mortimer as a matter of priority.

These include:

- project directives issued by the Secretary of the Department of Defence and the Chief of the Defence Force to ensure acquisitions progress according to Government direction; and
- benchmarking all acquisition proposals against off-the-shelf options where available.

Implementation of these important reforms to capability development and procurement continues, with specific action including:

- introducing new rigour into the management of so called 'minor' projects, including a modified two-pass approval system for minor capital equipment projects valued between $8 million and $20 million;
- implementing an Early Warning and Indicator system to address the early stages of capability planning and prevent problems early in the life of a project;
- expanding the use of the Gate Review process for mature projects to ensure that the desired operational capability is being delivered; and
- providing enhanced and more rigorous reporting to Government on high-priority projects further capability development and procurement reforms will enhance the delivery of Defence capability projects, strengthen Australian Defence industry and improve accountability.

These reforms include the Government's response to the Coles Review of the Sustainment of Australia's Collins-class submarines.

Coles Review

This Review is examining complex engineering issues associated with submarine sustainment.

In December last year the Government released the report

of Phase 1 of the Coles Review. Phase 1 identifies a range of key issues which need to be addressed and interim recommendations about how to address some of these issues, including:

- resources should be directed to the provision of spares leading directly to increased availability;
- any decision to reduce the agreed Materiel Ready Days in a year should only be taken by the Collins-class Program Manager;
- the In-Service Support Contact between the Defence Materiel Organisation and ASC, currently under discussion, should be placed as planned; and
- the classification of Priority 1 Urgent Defects by the submarine commander should be moderated to avoid over classification purely to increase priority of spares.

Implementation of these recommendations has commenced.

Phase 2 of the Coles Review will put forward evidence-based findings and recommendations on how to improve performance in Collins submarine sustainment. Phase 2 is due in the coming weeks.

Lessons learnt from the Coles Review will also play an important role in the development of the Future Submarine Project, including the need to take a long-term view of maintenance and sustainment of the Future Submarine from the outset of the project.

Commission of Inquiry into the Capsize and Sinking of MV *Rabaul Queen*

Further to the information provided in the May edition of *The ANA*, the Commission of Inquiry completed its hearings in Port Moresby on 6 June and, according to the Commission's web-site, the report was submitted to the Papua New Guinea Prime Minister on 28 June.

Release of the report is understood to have been delayed pending the outcome of the Papua New Guinea election and had not occurred time of writing.

However, a guide to the likely findings of the Commission may be taken from the final submissions of Counsel Assisting, Mr Mal Varitimos, in which the following points were made:

- Over 140 lives were lost, but the exact number is unknown.
- The underlying reasons for the tragedy result from arrogance, apathy, lack of accountability over many years, complacency and incompetency manifesting themselves in gross negligence.
- MV *Rabaul Queen*, having been built in Japan for operation on the "smooth waters" of the Inland Sea, was unsafe for operation in PNG waters; its suitability had been queried by the Principal Marine Surveyor of the PNG Department of Transport shortly after its purchase.
- The ship had a certificate of survey for 295 passengers but was insured for carriage of 350 and carried at least 360 on its final voyage. However, the figure of 500 plus passengers on board (suggested by some) should not be accepted.
- The ship should not have sailed on its final voyage from Kimbe to Lae due to the severity of forecast wind and sea conditions.
- The master did not undertake any assessment of the ship's stability prior to departure and had not seen the ship's trim and stability book. The restriction in the trim and stability book of the number of passengers on the uppermost (promenade) deck was not enforced.
- The PNG NMSA should not go without severe criticism for allowing unsafe and unseaworthy vessels to sail in Papua New Guinea for years in unacceptably dangerous waters.
- Every ship operator, particularly passenger ship operators, based in Papua New Guinea should be required to introduce and implement a safety management system for any ships operated by it to suit local conditions in line with international safety management codes.
- The *Merchant Shipping Act 1975* and the *Merchant Shipping Safety Regulations 2006* need urgent amendment. There needs to be enforcement of the laws of the country in relation to breaches of safety regulations.
- Ship owners and operators in Papua New Guinea, particularly of passenger ferries, should ensure that they are familiar with appropriate International Maritime Organisation documents, such as *Revised Guidance to the Master for Avoiding Dangerous Situations in Adverse Weather and Sea Conditions*.
- Other detailed proposals to improve life-saving, search and rescue.

With regard to the penultimate dot point, Counsel Assisting made no submissions on the direct cause of the capsize; the referenced IMO guidance document relates to surf-riding and broaching behaviour that had been put forward in evidence as a likely direct cause.

Counsel for the vessel's owners refuted a number of these points. In particular, he pointed out that shortfalls in meeting the IMO intact stability criteria (weather criterion not considered) were marginal. He also advised that the owners had ceased operating on 2 and 3 June, the weekend before the Commission's final hearings.

The report, when released, will no doubt be an interesting read and may lead to widespread follow-up action.

INDUSTRY NEWS

Austal Appointed Defence Distributor for Kelvin Hughes in Australia and New Zealand

Leading electronics provider, Kelvin Hughes, has appointed Austal to lead its defence, border protection and paramilitary sales and support activities in Australia and New Zealand. The agreement, announced on 26 June, will enable both companies to best support customers in Australasia.

Under the agreement, Austal will sell and support Kelvin Hughes' naval and marine products, including the KH-2007 Naval Transceiver; Naval MANTADigital™ (NMD) Display and Processor System; Naval Tactical Display (NTD); SharpEye™ I- and F-band Transceivers and spare parts. Austal has provided systems maintenance, repair and integration services for Kelvin Hughes products since 1993.

Austal's Chief Executive Officer, Andrew Bellamy, said: "We have developed a unique relationship with Kelvin Hughes over many years which we have now strengthened to best support our shared customer base. We believe this agreement will provide enhanced value to these customers in terms of cost, expertise and operational efficiency."

Commenting on Austal's appointment, Kelvin Hughes' Chief Executive Officer, Russell Gould, said: "We are very pleased to have formalised our relationship with Austal as there are a number of synergies between our companies. These include growing our regional systems capabilities and the strengthening of our defence offerings to customers including the Royal Australian Navy, the Royal New Zealand Navy and the Australian Customs and Border Protection Service."

Andrew Bellamy said that the Kelvin Hughes appointment demonstrated further progress in the expansion of the company's defence and systems activities.

"This agreement, and the one with mission system integrator General Dynamics Advanced Information Systems which we announced in March, demonstrates our ability to leverage our in-house capabilities and market position to expand the Austal business," he said.

Rolls-Royce to Power New Cruise Ferries

Rolls-Royce has signed a contract with ship owner Fjord Line A/S to install LNG based power and propulsion systems in two cruise ferries being built at the Bergen Group Fosen AS yard in Norway. Each vessel will be equipped with four gas engines, powering a highly-efficient Promas integrated rudder and propeller propulsion system.

The gas-only fuelled engines will reduce nitrogen oxide (NOx) emissions by about 90% while sulphur oxide (SOx) and particulates emissions will be negligible. Emissions from Rolls-Royce gas engines are already within the limits of IMO Tier III environmental legislation, due to come into force in 2016. Rolls-Royce General Sales Manager Merchant and Navy Engines, Odd Magne Horgen, said "These vessels are the first international LNG-fuelled passenger vessels in operation and we are very pleased to be a part of this ground breaking project."

Chief Executive of Fjord Line A/S, Ingvald Fardal, said: "Fjord Line has a clear environmental strategy and choosing single-fuel gas engines makes us pioneers in the cruise-ferry industry. We will have the first and the largest cruise ferry ever to run on LNG as the sole fuel type. Rolls-Royce is the leading manufacturer of these well-proven gas engines and we are very pleased to have their technology onboard."

Fjord Line has chosen this gas solution because of its operational efficiency and low NOx emissions; in addition to the proven performance of similar systems onboard other ferries that manoeuvre in and out of highly-congested ports. Each of the vessels will have a deadweight of 4000 t and a length of 170 m. They will have 306 cabins, and room for 1500 passengers and 600 cars. The first ship, MS *Stavangerfjord*, will enter regular service operating out of Bergen, Norway, in May 2013. MS *Bergensfjord* will be ready to sail a few months later.

The scope of the Rolls-Royce delivery is four Bergen BV12PG engines rated at 5.6 MW each, two 296 m^3 LNG tanks with ACON-Gas control system, two shaftlines including CPP, rudders and steering gear as well as tunnel thrusters.

ShipConstructor Showcases New DesignSync Product

ShipConstructor Software Inc. (SSI) will be showcasing its new DesignSync product at user conferences in Europe and America later this year.

DesignSync allows users of ShipConstructor's CAD/CAM application to intelligently capture, reuse, change and then sync back portions of a design along with the associated production documentation. This has numerous practical applications including increased capabilities when working with sister ships, design tests, recovery from errors, and for general reuse of design data to increase efficiency.

"DesignSync starts by allowing what we call 'intelligent capturing'," said Denis Morais, Chief Technology Officer for SSI. "DesignSync is intelligent in that it involves more than just copying and pasting simple geometry; all of the complex relationships within a design are preserved as well. A significant additional benefit allows changes on the copied portion of the design to be synced back, automatically updating the original project."

Engineers can select and then reuse various portions of a design, complete with production documentation such as assembly drawings, arrangement drawings and isometrics, while preserving all the associated linkages to other aspects of the ShipConstructor Marine Information Model (MIM) including stock and catalogue information. Any modifications to the copies can then be 'DesignSynced' back into the original design with all the complex relationships intelligently updated.

The ability to reuse design data in this way addresses a variety of cost-cutting requirements identified by shipbuilders. For example, parallel testing of multiple possible designs is a common requirement of naval projects. When the Navy requires a shipyard to test the implications of incorporating different weapon systems into a vessel's design, DesignSync will provide a snapshot for each design variation. Each variation can be engineered

in parallel as required and then merged, using DesignSync, into the continuously-evolving overall design in order to assess the impact on the whole project. When the final decision is made by the Navy, the approved variation would be merged into the baseline project and the other variations could be archived for future use.

A similar advantage would result when modelling sister ships, because these also require parallel engineering on copied design data. In a sister-ship scenario, engineering teams have to start modelling the second ship in a series even before the work on the first ship has been completed. DesignSync reduces engineering time by allowing them to copy and reuse the design of the first ship for use on the sister vessel. As time passes, more of the first vessel will be modelled and other changes may be made to the original design. The engineering team for the second vessel can then chose to incorporate those changes into the design of the sister ship by using the DesignSync product.

Another efficiency promoting utilisation of this product is the ability to reuse design data when modelling blocks (or any smaller units) which repeat. Additionally, DesignSync is a useful tool for recovering from human errors because it allows the creation of duplicate copies of sections of a project that can be synced back if later needed.

A further key point to note is that DesignSync continues to strengthen ShipConstructor's core competency of making complex engineering software as intuitive as possible. DesignSync uses a familiar central interface and conveniently captures all the information into a single package; it doesn't require the use of multiple different programs with varying interfaces, storing the data in multiple locations.

Former Deputy Chief of Navy joins Austal

To strengthen its defence business development activities and capabilities, Austal has appointed former Deputy Chief of the Royal Australian Navy, Rear Admiral Davyd Thomas AO CSC RANR, to the executive position of Vice President — Defence.

Austal Chief Executive Officer, Andrew Bellamy, said the skills, experience and contacts which Rear Admiral Thomas had gained in a nearly 40-year naval career would be instrumental in progressing Austal's defence activities in Australia and internationally.

"Davyd is a dynamic, highly-skilled executive-level leader and his capabilities are directly relevant to growing our business as a defence prime contractor," he said.

"In addition to extensive fleet and ship operations and sustainment management experience within the RAN, he has strong international-relations expertise gained through the successful management of navy-to-navy relationships with 14 different navies in recent years. That experience, and his recent activities within the Defence Export Unit, will be instrumental in supporting our international business development efforts, particularly through the provision of strategic advice."

Rear Admiral Thomas said he was excited about the prospect of joining the Austal team.

"Throughout my career I have been passionate about championing the capabilities of Australian industry, and Austal is arguably the best example of a locally-based company which has made a major impression in the global defence market," he said.

"Austal's achievements, particularly its highly-successful entry into the US defence market, demonstrate the world-leading nature of its technology and the company's ability to develop and execute major strategy initiatives.

"Austal has a strong vision for further growth in the defence market and I look forward to applying my naval experience and skills to help Austal implement that both locally and overseas. It is an honour to join such a successful and highly-skilled team," he said.

Mr Bellamy said that Rear Admiral Thomas will be based in Austal's Canberra office and will work across all aspects of the company's defence business, including ships, electronic systems and in-service support.

"Having Davyd based in Canberra will assist in developing and maintaining client relationships within the defence sector," Mr Bellamy said.

"Of course, the principal players within the Australian defence organisation are there but so are many foreign defence representatives. That makes Canberra a natural destination for visiting overseas officials. Basing our senior defence representative in Canberra will make engaging our potential customers more efficient for all parties," he said.

Rear Admiral Thomas served as Deputy Chief of Navy between June 2008 and February 2011.

His other senior RAN appointments included Commodore Flotillas, Maritime Commander and Commander Australian Fleet, and Commander of the Australian Defence College. His distinguished service in these roles was recognised with his appointment as an Officer of the Order of Australia in 2009. This was a promotion from the Member of the Order of Australia (AM) awarded in 2002 for exceptional service to the RAN.

Rear Admiral Thomas joined the RAN in 1974. A graduate of the RAN College at Jervis Bay, he served as a Seaman Officer in a wide variety of platforms, including patrol boats, guided-missile destroyers, destroyer escorts and guided-missile frigates. As a Principal Warfare Officer he specialised in above-water warfare.

Rear Admiral Thomas was awarded the Conspicuous Service Cross in 1997 in recognition of his performance as the commanding officer of the frigate HMAS *Darwin*. In 2003 he was awarded the Commendation for Distinguished Service for his role in commanding the frigate HMAS *Newcastle* during Operation Slipper in the Persian Gulf.

Admiral Thomas is a graduate of the US Naval Command College and has completed a Master of Science (Management) degree at Salve Regina University, Newport RI, USA. He completed the Advanced Management Program at Harvard Business School and is a Graduate Member of the Australian Institute of Company Directors.

Since transitioning from full-time Navy service, Rear Admiral Thomas has been working as a naval specialist within the Defence Materiel Organisation's Defence Export Unit, helping to connect export-ready defence contractors with opportunities overseas.

Wärtsilä to Supply Dual-fuel Engines for China's first LNG Powered Tugs

Wärtsilä is to supply the main engines for two environmentally-sustainable tugs being built for CNOOC Energy Technology and Services Limited (CETS), a subsidiary of the state-owned China National Offshore Oil Corp. (CNOOC). The vessels are the first in a planned series to be fuelled by liquefied natural gas (LNG), and will be the first tugs in China ever to be operated on gas. These will also be the first tugs globally to take advantage of the dual-fuel benefits offered by the Wärtsilä DF engine technology. The contract was signed at the beginning of July 2012.

The strategy of CNOOC is aimed at achieving more clean energy in its operations and the Wärtsilä dual-fuel engine solution fits this profile perfectly. The low emission levels made possible by this technology are particularly beneficial for vessels operating close to population centres, as tugs frequently are, while the high fuel efficiency enables lower operating costs. These 4850 kW tugs will operate along China's coastline and will be fuelled from the company's own bunkering terminals.

"We are delighted to be co-operating with CNOOC in supplying the main engines for these gas-fuelled tugs. It is a landmark project which is very much in line with the marine sector's key targets of achieving greater sustainability with better fuel efficiency. We endorse CNOOC's strategic move towards cleaner energy and the use of LNG as a marine fuel, which is precisely in line with Wärtsilä's own strategy," said Aaron Bresnahan, Vice President Wärtsilä Ship Power Specials.

The vessels will each be powered by two 6-cylinder Wärtsilä 34DF in-line dual-fuel engines. Delivery of the engines is scheduled for the beginning of 2013 and the first of the tugs is expected to be delivered in June 2013.

Wärtsilä dual-fuel (DF) engines

Wärtsilä's advanced dual-fuel technology was first launched in the early 1990s for use in land-based power-plant applications. The first marine installation came a decade later. The technology enables the engine to be operated on either natural gas, light fuel oil (LFO), or heavy fuel oil (HFO), and switching between fuels can take place seamlessly during operation without loss of power or speed. This ensures safety and continuous installation operability. Wärtsilä DF engines are designed to have the same output regardless of the fuel used.

The fitting of Wärtsilä DF engines onboard the first LNG carriers in 2006 set a trend in the industry. Since that introduction, 65% of all new LNG carriers have been fitted with Wärtsilä dual-fuel engines. One of the reasons for the strong success of this particular engine over the alternatives is its superior propulsion efficiency. The clear environmental advantages that operating on gas allow, is another factor in the success of this technology. When operating in gas mode, the nitrogen oxide (NOx) emissions are at least 85% below those specified in the current IMO regulations, and CO_2 emissions are some 25% less than those of a conventional marine engine running on diesel fuel. Additionally, the sulphur oxide (SOx) and particle emissions are negligible at almost zero percent.

Wärtsilä has recently achieved the notable milestone of supplying dual-fuel propulsion engines to 100 LNG carrier vessels. By the of end May Wärtsilä had sold some 720 DF engines, and had accumulated more than 5 million running hours of experience with this technology.

Wärtsilä signs Long-term Service Agreement with Princess Cruise Lines

Wärtsilä has been awarded a long-term service agreement by global cruise operator Princess Cruise Lines Ltd. The contract covers seven Princess Cruise Line vessels, each of which is powered by Wärtsilä 46 common-rail engines. In total, the engines represent 270 MW of power.

The broad scope of services covers technical management and logistics support, spare parts for scheduled engine maintenance, workshop services, an on-board technical advisor during major overhauls, annual training of the engine-room crew, continuous condition monitoring of equipment and reporting, and bi-monthly technical visits to each vessel.

"This agreement optimises the maintenance schedules for these seven vessels and provides the customer with technical expertise at a fixed budget price. In particular, Wärtsilä's deep know-how in the field of common-rail technology was a key factor in the award of this contract," said Andy Edwards, Vice President, Strategic Accounts.

Tailor-made agreements with a wider scope of services which extend beyond the traditional standard are increasingly becoming more common in the marine industry. Wärtsilä has a proven track record in operation and maintenance services. Globally, more than 16 GW of generating capacity in both marine- and land-based installations is covered by Wärtsilä's operations and maintenance and other service agreements.

Wärtsilä is the market leader in common-rail technology for electronically-controlled low-speed marine engines. This technology provides a high degree of flexibility in engine settings to give lower fuel consumption, very low minimum running speeds, smokeless operation at all running speeds, and outstanding control of exhaust emissions. Furthermore, the integrated redundancy of the engines ensures high reliability.

Wärtsilä to Supply Integrated Power and Propulsion Systems for Three Offshore Service Vessels

Wärtsilä is to supply complete and fully integrated power-generation and propulsion packages for three vessels being built for Pacific Radiance Ltd., a Singapore-based company specialising in offshore service activities. In each case, the company's main requirements were to achieve greater efficiency, better fuel consumption, and lower emission levels. The orders were received during the second quarter of 2012.

Two 86 m platform supply vessels (PSV) are to be built at the Huang Pu shipyard in China, while the Zhenjiang shipyard, also in China, will build a hybrid anchor-handling tug/supply (AHTS) vessels with more than 210 t bollard pull. The Wärtsilä equipment for all three ships is scheduled for delivery during 2013 and the vessels are due to be delivered to Pacific Radiance during the first half of 2014.

Wärtsilä's scope of supply includes four 6-cylinder Wärtsilä 26 in-line main engines, thrusters, and the electrical and automation systems for the two PSVs, and two 6-cylinder Wärtsilä 32 in-line main engines, two generating sets based on 6-cylinder Wärtsilä 32 in-line engines, two controllable-pitch propellers, thrusters, and the electrical and automation systems for the AHTS vessels. The PSVs will utilise the Wärtsilä Low Loss Concept (LLC) power-distribution system for electric propulsion applications. These will be the first vessels built in China to install the LLC system.

"The Wärtsilä LLC system incorporates high redundancy, high efficiency, and fuel economy for the entire electric propulsion application," said B. H. Lau, Chief Operating Officer of Pacific Radiance Ltd. "The design of the 690 V switchboard and power distribution system gives less single failure consequences and more available power, better operability and safety during the vessels' dynamically-positioned mode. The company's extensive after sales support was another key factor in selecting Wärtsilä for these new construction projects."

The notable feature of the AHTS vessel is that it is a hybrid vessel, combining both diesel-mechanical and diesel-electric propulsion. "The Wärtsilä hybrid propulsion system is designed to minimise the total installed power and to create efficient propulsion throughout the entire operating profile of the vessel," said Magnus Miemois, Vice President, Wärtsilä Ship Power, Offshore. "The hybrid solution results in fuel cost savings and reduced levels of exhaust emissions, both of which are key market requirements."

"By opting for complete integrated solutions for these vessels, the customer benefits in several ways. The fully-integrated power-generation and propulsion systems ensure optimal performance, while having a single point of contact for the entire systems not only reduces the completion risks, but notably enhances efficiency throughout these complex projects," said Magnus Miemois.

Wärtsilä Tests New RT-flex50 Version D Low-speed Engine

Wärtsilä has successfully tested its first Wärtsilä RT-flex50 version D engine with a turbocharger installed on the driving end side. With the addition of this engine, Wärtsilä now has an additional 2-stroke engine which can be fitted to smaller vessel types. The derated engine runs at lower rpm's and features reduced fuel consumption, thereby enabling lower emission values to be achieved — including smokeless operation, especially at low engine loads.

Due to its narrow design, the new engine version will be used for ship designs with slim stern sections where the current standard execution, with turbochargers mounted on the exhaust engine side, does not fit. The RT-flex50 version D can now be used instead of other engine types featuring a smaller cylinder bore and higher speed. In many cases the higher performance of the cylinders allows the use of one less cylinder and can, for example, reduce maintenance costs. Thanks to the low speed of the engine and propeller, the total fuel consumption of the vessel is considerably reduced.

The Wärtsilä RT-flex50 is a low speed, 2-stroke engine with fully electronic control of the exhaust-valve activation and fuel injection. It is designed to operate on a wide range of fuels, from marine diesel oil to heavy fuel oil, of different qualities.

The turbocharger on the new engine is positioned directly above the flywheel at the driving end of the engine to save space. Typical applications would be in small bulkers and tankers, 'handysize' and container vessels, and feeder ships.

Most engine components for the existing RT-flex50 version D turbocharger exhaust side and the new RT-flex50 version D with turbocharger on the driving end side are the same. This makes the new product attractive for owners with RT-flex50 type engines already in their fleet, since there is a commonality of spare parts.

THE ECONOMIC IMPORTANCE OF SUBMARINE CABLES

Submarine communication cables (submarine cables) are laid along the seabed to carry telecommunications signals between land-based stations. They remain more reliable than satellites and possess a much larger capacity, transmitting approximately 95% of all international data between continents and islands. Submarine cables are considered reliable because multiple paths are available for transmitting data in the event of a cable malfunction — they are also capable of transmitting terabits of information per second compared with often only megabits per second via satellite services. Modern submarine cables use fibre-optic technology and cost hundreds of millions of dollars to construct and lay, but they transmit the digital payloads for telephone and internet, and private data traffic to which consumers worldwide have become accustomed.

Submarine cables link together the world's continents — currently active or due to enter service by 2014, 150 submarine cables facilitate global communications. The first submarine cables were laid during the 1850s and initially linked Great Britain to Ireland, France, the Netherlands and Germany, with other links between Italy and Corsica, and Sardinia and Africa. In 1866 the steamship, SS *Great Eastern*, laid the first cable across the Atlantic Ocean linking Ireland to Newfoundland. Four years later, a cable was laid from Yemen to India and in 1872 Australia was linked to India by a cable via Singapore. Traversing the Pacific Ocean, Canada, Fiji, Australia, and New Zealand were linked in 1902 [1].

Due to the speed with which information could be exchanged, the use of submarine cables proved a catalyst for globalisation and international engagement because they significantly reduced communication times between continents. Submarine cables quickly became important international assets for news agencies, trading and shipping companies, governments and their armed forces, and the public. They enabled ship captains and companies to communicate from distant ports, immediately improving logistic management for industries such as cotton, and they dramatically enhanced communication between various states and colonies aiding diplomatic relations during peacetime and facilitating communication during conflict. Historically, the demand for submarine cables was proportional to a nation's naval forces, distant colonies, and the perceived threat of conflict. The British government, for example, considered cables to be of strategic importance particularly for long-distance colonial issues which provided the impetus behind its major contribution to the international cable-laying industry. During the 1920s, submarine cables came into competition with radiotelegraphy. Governments were also prepared to sponsor radio technology development as it enabled long-distance voice communication, which was primarily important for communicating with warships. Although radio technology continued to expand and proliferate, the British government, in particular, was intent on retaining its submarine cable capacity in case of another war because telegrams via cable remained secure and were not as vulnerable to interception by enemies as radio messages were [2].

Following World War II, the global telecommunications network expanded to include satellites, a new wireless communication technology which, for a short time, outperformed submarine cables. Yet by the mid-1970s, competition for new technology that could cope with increasing consumer demand for international telephone and data-transfer services spurred on the development of fibre-optic submarine cables, capable of transmitting large amounts of data. By 1988 the first transoceanic fibre-optic cables were being laid-linking the United States, the United Kingdom and France. With major improvements in design and the increased capacity available for international data transfers, retrospectively, these new cables proved to be the foundation for the internet. The result was a radical change to the communications, business, commerce, education and entertainment industries over the next 15 years.

Submarine cables are continually redesigned to maximise their capacity, and to improve their protection in the sea environment; cables have shrunk in size, reliability of components has increased and their life expectancy has extended out to 15-20 years. A modern cable is capable of carrying millions of telephone calls along with large amounts of internet and video data. The globalised international system is dependent on the security of these submarine cables. Whilst satellites remain useful as a back up and allow communication with remote regions, they are not capable of transmitting the volume of data transmitted along submarine cables. The last decade has also witnessed a shift away from the traditional Atlantic submarine cable networks towards the Pacific region reflecting the growing importance of, and expectations from, Asian markets [3].

Given the critical importance of international communications, submarine cables are protected by international treaties including the *International Convention for the Protection of Submarine Cables 1884*, and the *United Nations Convention on Law of the Sea 1982*. These treaties establish norms that enable nations to lay and repair cables outside of territorial sea limits, afford special status to ships laying and repairing cables, indemnify vessels that sacrifice equipment to avoid damaging cables, and provide universal access to courts to enforce treaty obligations [4].

Today, submarine cables are the cornerstone of globalisation and worldwide communication. For Australia, far away from other continents, submarine cables are vital infrastructure that is essential to the daily functioning of society. Their value to the Australian economy was estimated in 2002 to be in the order of $5 billion. Nevertheless, these cables are vulnerable assets, susceptible to accidental damage by earthquakes, trawlers, anchors, dumping, sand dredging, turbidity currents, and espionage by state actors and terrorists. An example of damage to Australian submarine cables occurred in July 2001 when a merchant ship cut both the Southern Cross cable and the Tasman 2 cable (linking Australia to New Zealand) as it dragged anchor off Sydney. Magnifying the impact of this incident, the second arm of the Southern Cross cable was undergoing maintenance at the time. If

cables are damaged, the flow of information to and from Australia is impeded and data may be lost, affecting commercial transactions and personal communication. The repair of cables can reach into millions of dollars, depending on the extent of the damage [5].

Australia has a number of major submarine cables. The Southern Cross cable network connects Australia and New Zealand to North America via Fiji and Hawaii. The Australia–Japan cable connects Sydney to Japan via Guam. The Gondwana cable connects Sydney to New Caledonia. The PPC-1 cable links Sydney, Papua New Guinea and Guam. The Endeavour cable connects Sydney to Hawaii. The APNG-2 cable links Sydney directly to Papua New Guinea. The Pacific Fibre cable, due to come into service in 2014, will link Sydney to North America via New Zealand and the proposed OptiKor cable will link Sydney to New Zealand, and will compete for business with the Southern Cross cable. The SEA-MEWE3 cable connects Perth to Asia, the Middle East and Europe. The ASC cable links Perth to Singapore. The ASSC-1 cable will link Perth, Indonesia and Singapore by the end of 2013. These cables not only connect Australia to the world but are also critical for connecting Australia's smaller neighbours to the international community [6].

Cable Name	Exit point
Southern Cross	Sydney (protection zone)
Australia-Japan	Sydney (protection zone)
Gondwana – 1	Sydney
PPC – 1	Sydney
Endeavour	Sydney
APNG – 2	Sydney
Pacific Fibre	Sydney
OptiKor	Sydney
SEA-ME-WE-3	Perth (protection zone)
ASC	Perth
ASSC-1	Perth

Source: Submarine Telecommunication Map, TeleGeography, 2012.

Cables connecting Australia to the World

Aware of the vital importance of submarine cables to the Australian economy, and concerned about the lack of security and protection for the cables, the Australian government has implemented a tough cable protection regime. The *Telecommunications and other Legislation Amendment (Protection of Submarine Cables and other Measures) Act 2005*, enables the Australian Communications and Media Authority (ACMA) to establish submarine cable protection zones safeguarding cables that are considered to be of national importance. ACMA has subsequently declared three protection zones — two covering the Southern Cross and Australia–Japan cables off the New South Wales coast and one covering the SEA-ME-W3 cable off Western Australia. The protection zones extend 1 n mile either side of the submarine cable out to a depth of 2000 m. Activities regarded as illegal in protected zones include fishing; lowering, raising or suspending an anchor from a ship; sand mining; exploring for or exploiting natural resources; mining; and any activity which involves a serious risk that an object will connect with the seabed. Penalties include fines of up to $A66 000 and/or ten years imprisonment for an individual, or up to $A330 000 for a corporation [7].

The greatest threats to submarine cables appear likely to come from accidents as a result of fishing, shipping, mineral and hydrocarbon exploitation, or renewable energy generation; although they have been considered a legitimate target in war. As examples of the latter, during World War I the German warship SMS *Emden* conducted an operation in November 1914 to cut cables on the Cocos Islands — they were successful in cutting the cable to Perth, but were interrupted by HMAS *Sydney* before being able to cut the cable to South Africa. Towards the end of World War II, Australia led an operation in July 1945 to cut two cables off French Indochina to disrupt Japanese communications. During the Cold War the United States tapped Soviet cables near the Sea of Okhotsk and in the Barents Sea [8].

In Australia, if a cable is damaged or a threat to the cable system arises, Australian authorities may be called upon to respond. Any involvement by state police and/or the RAN will be determined on a case-by-case basis according to jurisdictional factors and relevant capabilities.

Kathryn Young

References

1. See 'Landing the New Zealand cable', *The Colonist*, p. 3, 19 February 1876; Juan Pablo Conti, 'Frozen out of broadband', *Engineering & Technology*, 4(21), 2009, pp. 34–36; *TeleGeography*, www.telegeography.com/telecom-maps/submarine-cablemap/index.html; and International Cable Protection Committee (ICPC) UNEP Report, www.iscpc.org/publications/ICPC-UNEP_Report.pdf.

2. See Daniel Headrick and Pascal Griset, 'Submarine Telegraph Cables: Business and Politics, 1838-1939', *The Business History Review*, 75(3), pp. 543-578.

3. See Annie Lindstrom, 'Taming the terrors of the deep', *America's Network*, 1 January 1999, http://findarticles.com/p/articles/mi_m0DUJ/is_1_103/ai_n27546809/pg_4 /?tag=content;col1; and ICPC UNEP Report, p. 16.

4. See International Cable Protection Committee, www.iscpc.org/publications/About_SubTel_Cables_2011.pdf.

5. House of Representatives, *Telecommunications and other Legislation Amendment (Protection of Submarine Cables and other Measures) Bill 2005, Explanatory Memorandum, 2004-2005*, Parliament of Australia, Canberra.

6. See *TeleGeography*, www.submarinecablemap.com; Huawei Marine Networks press releases on 16 and 20 January 2012, www.huaweimarine.com/marine/marine/homeWeb.do?Method=showIndex; and Pacific Fibre, http://pacificfibre.net/news/.

7. See ACMA, 'Submarine telecommunications cables', 5 February 2010 www.acma.gov.au/WEB/STANDARD/pc=PC_300133; Border Protection Command, *Guide to Australian Maritime Security Arrangements*, Commonwealth of Australia, Canberra, 2009, p. 30; *Telecommunication Act 1997*; and *Telecommunications and other Legislation Amendment (Protection of Submarine Cables and other Measures) Act 2005*.

8. See Bill Burns, 'Direction Island Cable Station and the Battle of Cocos', http://atlantic-cable.com/Article/1914BattleOfCocos/index.htm; Department of Veteran Affairs, 'Cutting Cables', *Australia's War 1939–45*, www.ww2australia.gov.au/farflung/cuttingcables.html; and Sherry Sontag and Christopher Drew, *Blind Man's Bluff: The Untold Story of American Submarine Espionage*, Public Affairs, New York, 1998.

Reproduced from Semaphore *No. 2, 2012, published by the Sea Power Centre, Australia*

The Chilean sail-training ship *Esmeralda* sailing from Sydney recently after a visit during a world cruise
(Photo John Jeremy)

THE INTERNET

Webcasts of NSW Section Technical Presentations

Engineers Australia records technical presentations made to RINA (NSW Section) and IMarEST (Sydney Branch) for webcasting. The webcasts are placed on the Engineers Australia website, usually within a few days of the presentation, and recent URLs are as follows.

Jonathan Crossen of Akzo Nobel (International Paint) gave a presentation on *Marine Fouling Control Technologies* to a joint meeting with the IMarEST attended by 20 on 6 June in the Harricks Auditorium at Engineers Australia, Chatswood. The webcast of Jonathan's presentation is available at www.mediavisionz.com/ea/2012/easyd/120606-easyd/index.htm.

Josh Sayed, Thordon Manager for Jacmor Engineering, gave a presentation on *Thordon Bearings* to a joint meeting with the IMarEST attended by 18 on 4 July in the Harricks Auditorium at Engineers Australia, Chatswood. The webcast of Josh's presentation is available at www.mediavisionz.com/ea/2012/easyd/120704-easyd/index.htm.

John Jeremy of the Royal Institution of Naval Architects gave a presentation on *The Age of the Armoured Battleship* to a joint meeting with the IMarEST attended by 13 on 1 August in the Harricks Auditorium at Engineers Australia, Chatswood. The webcast of John's presentation is available at www.mediavisionz.com/ea/2012/easyd/120801-easyd/index.htm.

The presentations continue to be written up in the *News from the NSW Section* column of *The ANA*.

Phil Helmore

MEMBERSHIP

Australian Division Council

The Council of the Australian Division of RINA met on Wednesday 20 June 2012 by teleconference based in Canberra. The President, Mr Jim Black, chaired the meeting.

Some of the matters raised or discussed during the meeting are outlined below.

Membership of the Division Council

Council considered the resignation of Mr Sam Abbott, who has been posted to the United Kingdom and will endeavour to make an appointment to the vacancy prior to the September meeting.

Council noted that, subsequent to appointments announced at the Division's Annual General Meeting, Mr Ian Laverock had been re-nominated to Council by the ACT Section.

Amendment of the Division's By-Laws

Council noted that the amendments to the Division's By-Laws that were passed by the Annual General Meeting on 27 March had subsequently been endorsed by the Institution's Council at its meeting on 17 April.

The Walter Atkinson Award

Further to the in-principle decisions at its preceding two meetings to re-activate this award, Council established a committee headed by Dr Kim Klaka to recommend, to the September meeting, guidelines for the administration of the award.

Commercial Vessels Single National Jurisdiction and Registration of Engineers

Dr Tony Armstrong presented a report on progress made by AMSA and the relevant State/NT authorities towards the implementation of the "new system". Members may obtain a copy of the report from the Division Secretary.

Council re-iterated the Division's willingness, expressed at a meeting in April 2011 between our President and AMSA, to take a central role in coordinating communication between AMSA and the marine professionals who would be involved in implementing the new survey and certification arrangements.

In particular, Dr Armstrong noted that it was apparently AMSA's intention to bring forward a registration scheme for all practitioners (naval architects and surveyors) under the Single National Jurisdiction. Details of proposed registration are not yet available, but may follow the models of NPER and RPEQ.

Advertising in *The Australian Naval Architect*

Noting that little progress had been made in securing advertising to ensure the future of this journal, Council noted that some limited contribution may be available from copyright and undertook to pursue this possibility. Members are urged to maximise published references to this journal in order to generate such revenue.

Members are urged to actively pursue possible sources of advertising, in consultation with the Secretary who is currently coordinating these efforts. The Secretary (phone 0403 221 631, email rina.austdiv@optusnet.gov.au) can supply copies of the flyer detailing advertising rates, specifications and deadlines.

Next Meeting

The next meeting of the Council of the Australian Division is scheduled for Wednesday 19 September 2012.

Rob Gehling
Secretary

Continuing Professional Development

Continuing Professional Development (CPD) is the systematic maintenance, improvement and broadening of knowledge, understanding and skills, and the development of the personal qualities, necessary to carry out professional and technical duties throughout a member's working life.

Continuing Professional Development will therefore enable the member to:

- Update professional competence, so that practice is fully in line with current requirements.
- Develop personal and management skills.
- Broaden experience leading to new career opportunities.

Continuing Professional Development can be achieved through a range of activities, both in and outside the workplace, which are related to members' careers as professional engineers. The types of activity which contribute towards members' Continuing Professional Development and their obligations as a member of the Royal Institution of Naval Architects are described in the RINA publication *Guidance on Continuing Professional Development* available at www.rina.org.uk/guidance_notes.html.

All Fellows, Members and Associate Members who are in or seeking active work are required to take all reasonable steps to maintain and develop their professional competence and knowledge after election. The Institution requires that members achieve a minimum of 35 hours of CPD activity per annum. However, it is expected that most members will exceed this amount.

The Institution requires that CPD activities should be authenticated either by mentors, employers or the providers of CPD. Some informal learning activities may be self-authenticated. The roles of the mentor, employer and the Institution in assisting members to achieve their CPD are described in the *Guidance* document.

The Institution places an obligation on its members to plan and record their CPD and to produce evidence of their CPD achievement. The Institution may request to see a member's CPD Plan and Record at any time, and when upgrading class of membership.

RINA Council and Committee Members

To keep members up-to-date with who is doing the hard yards on their behalf in Australia, current council, section and committee members are as follows:

Australian Division

President	Jim Black
Vice-president	Tony Armstrong
Secretary	Robin Gehling
Treasurer	Craig Boulton

Members nominated by Sections

Adrian Broadbent (NSW)
Antony Krokowski (Qld)
Ian Laverock (ACT)
David Sherwood (WA)
Lance Marshall (Vic)
Alan Muir (Tas)
Graham Watson (SA&NT)

Members elected or appointed by Council

Tony Armstrong
Danielle Hodge
Craig Hughes
Tim Lyon
Jon Pattie
Mark Symes
One vacancy

ACT Section

Chair	Martin Grimm
Deputy Chair	Peter Hayes
Secretary	Richard Milne
Assistant Secretary	Kerry Johnson
Treasurer	Tim Lyon
Nominee to ADC	Ian Laverock
Members	John Colquhoun
	Richard Dunworth
	Ian Laverock
	John Lord
	Bruce McNeice
	Brocque Preece

NSW Section

Chair	Alan Taylor
Deputy Chair	Valerio Corniani
Secretary	Anne Simpson
Assistant Secretary	Nathan Gale
Treasurer	Adrian Broadbent
Nominee to ADC	Adrian Broadbent
Auditor	Rozetta Payne
TM Coordinator	Phil Helmore
Members	Craig Boulton
	Graham Taylor

Queensland Section

Chair	Peter Holmes
Deputy Chair	Tommy Ericson
Secretary	Mark Devereaux
Treasurer	Gillian Carter
Nominee to ADC	Antony Krokowski
Members	Doug Matchett
	James Stephen
	Jon Pattie

South Australia and Northern Territory Section

Chair	Graham Watson
Deputy Chair	Malcolm Morrison
Secretary	Danielle Hodge
Treasurer	Danielle Hodge
Nominee to ADC	Danielle Hodge
Members	Neil Cormack
	Peter Dandy
	Nik Parker
	Adam Podlezanski
	Jan Verdaasdonk
	Sam Baghurst

Tasmanian Section

Chair	Jonathan Binns
Secretary	Mark Symes
Treasurer	Jonathan Duffy
Nominee to ADC	Alan Muir
Members	Guy Anderson

Victorian Section

Chair	Karl Slater
Secretary	Simon Kelly
Treasurer	Sam Tait
Nominee to ADC	Lance Marshall
Members	Stuart Cannon
	Sean Johnston

Western Australian Section

Chair	Jesse Millar
Secretary	Graham Jacob
Treasurer	David Sherwood
Nominee to ADC	David Sherwood
Member	Timothy Brazier
	Malcolm Waugh
	Matthew Williamson

The Australian Naval Architect

Editor-in-chief	John Jeremy
Technical Editor	Phil Helmore
Referee	Noel Riley

Safety Group

In recess

RINA London

Council Members	Jim Black (*ex officio*)
	Robin Gehling
Safety Committee	Robin Gehling
High-speed Vessels	Tony Armstrong

RINA/Engineers Australia Joint Board of Naval Architecture

Members	Stuart Cannon
	Robin Gehling

National Professional Engineers Register Naval Architecture Competency Panel

In recess

Pacific 2013 IMC Organising Committee

Chair	John Jeremy
Members	Adrian Broadbent
	Stuart Cannon
	Tauhid Rahman (representing IMarEST)

Pacific 2013 IMC Program Committee

Chair	Adrian Broadbent
Members	Craig Boulton
	Rob Gehling
	Gangadhara Prusty
	Tauhid Rahman
	Martin Renilson

Standards Australia Committee AS1799 Small Pleasure Boats Review

Member	Doug Matchett
	Steven McCoombe

Standards Australia Committee CS051 Yachting Harnesses and Lines

Member	Bruce McRae

Changed contact Details?

Have you changed your contact details within the last three months? If so, then now would be a good time to advise RINA of the change, so that you don't miss out on any of the Head Office publications, *The Australian Naval Architect*, or Section notices.

Please advise RINA London, *and* the Australian Division, *and* your local section:

RINA London		hq@rina.org.uk
Australian Division		rina.austdiv@optusnet.com.au
Section	ACT	rinaact@gmail.com
	NSW	rinansw@gmail.com
	Qld	m-dever@hotmail.com
	SA/NT	danielle.hodge@defence.gov.au
	Tas	mfsymes@amc.edu.au
	Vic	srkelly@globalskm.com
	WA	rina.westaus@gmail.com

Phil Helmore

NAVAL ARCHITECTS ON THE MOVE

The recent moves of which we are aware are as follows:

Sam Abbott has moved on within the Austal Ships organisation and has taken up a 12-month secondment as Technical Manager in the Austal European Sales Office located in Farnham, Surrey, UK.

Gordon Blaauw has moved on within the Austal Ships organisation and has taken up the position of Structural Design Manager in Fremantle.

Liam Finegan has moved on from McFarlane Ship Design in Monaco, returned to Australia, and has taken up a position as a naval architect with ASO Marine Consultants in Chatswood.

Andrew Hoff, a graduand of the University of New South Wales, has taken up a position in the bar at the Golden Sheaf Hotel in Sydney.

Zoran Jaksic has moved on from Burness Corlett Three Quays Australia and has taken up the position of Functional Engineering Manager with Rolls Royce Australia Systems in Sydney.

Gavin Jones has moved on within the Lloyd's Register organisation, and has taken up the position of Hull Principal Specialist with Lloyd's Register Asia in Singapore.

Anthony Kovacevic has moved on and has taken up the position of Manager of Ensign Ship Brokers at Mooloolaba, Qld. Friends can check Ensign out at www.ensignbrokers.com.au.

Mervyn Lepper moved on from Austal Ships many moons ago, returning to Fiji and took up a position as a naval architect with Suilven Shipping. However, a year later he moved on from Suilven and is now in the home straight of an MBA degree at the University of the South Pacific in Suva.

Jaime Sotelo moved on from Transfield Services (TS) Rail many moons ago, and took up a position as Quality and OHS Manager at Cormack Contracting, a company providing abrasive blasting and metal sprayed anti-corrosion coatings, in Sydney. He has recently moved on from there and taken up the position of Quality, Environmental and OHS Manager with Global Marine and Engineering in Darwin.

Lachlan Torrance has moved on from Reichel Pugh Yacht Design in San Diego, returned to Australia, and has taken up a position as a naval architect with ASO Marine Consultants in Chatswood.

Ivy Zhang, a recent graduate of the University of New South Wales, has moved on from ASO Marine Consultants; she has commenced a TAFE course and has taken up a position as a volunteer tour guide with the Australian National Maritime Museum in Sydney.

This column is intended to keep everyone (and, in particular, the friends you only see occasionally) updated on where you have moved to. It consequently relies on input from everyone. Please advise the editors when you up-anchor and move on to bigger, better or brighter things, or if you know of a move anyone else has made in the last three months. It would also help if you would advise Robin Gehling when your mailing address changes to reduce the number of copies of *The Australian Naval Architect* emulating boomerangs.

Phil Helmore

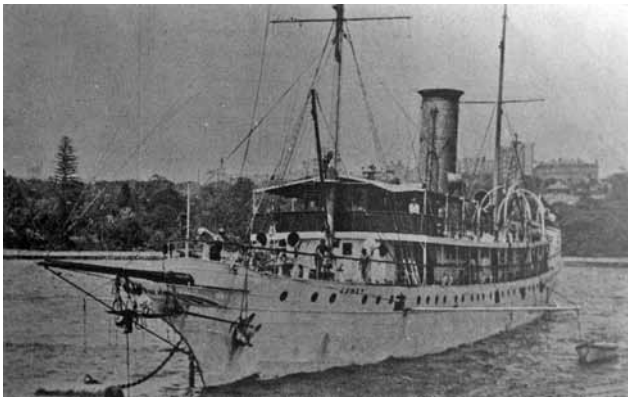
FROM THE ARCHIVES

HMAS *Una*

John Jeremy

In 1911 a graceful steam yacht, with a clipper bow and raked funnel and masts, was launched in Bremerhaven, Germany and named *Komet*. Her displacement was 1464 t and she was 64 m long with a beam of 9.44 m and a speed of 16 kn. She was no ordinary yacht for, shortly after completion, *Komet* sailed for the Pacific and Rabaul where she was to serve the administration of German New Guinea. After the outbreak of war in 1914 she was commissioned into the German Navy as SMS *Komet*.

On 11 October 1914 at Komethaven, New Britain, *Komet* was captured by the RAN's small armed yacht *Nusa*. The only German warship captured by the RAN during World War I, *Komet* was taken to Sydney where she was refitted for RAN service at Garden Island and at the Commonwealth Naval Dockyard, Cockatoo Island. She was commissioned as HMAS *Una* on 19 November 1914.



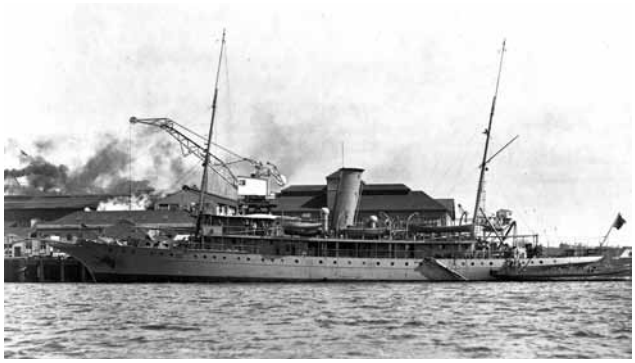
Komet
(RAN Historical Collection)

HMAS *Una* returned north to the Bismark Archipelago where she was used by the Administrator of the Occupied Territories and, for most of 1915, carried out patrol and survey duties. Late that year she was taken over by the Commander in Chief of the China Station and was employed on patrol duties in Malayan and nearby waters.

In 1916 HMAS *Una* returned to more-familiar waters around New Guinea and remained there until the end of the war. After her return to Sydney she was laid up, although temporarily recommissioned for the visit of the Prince of Wales in 1924.

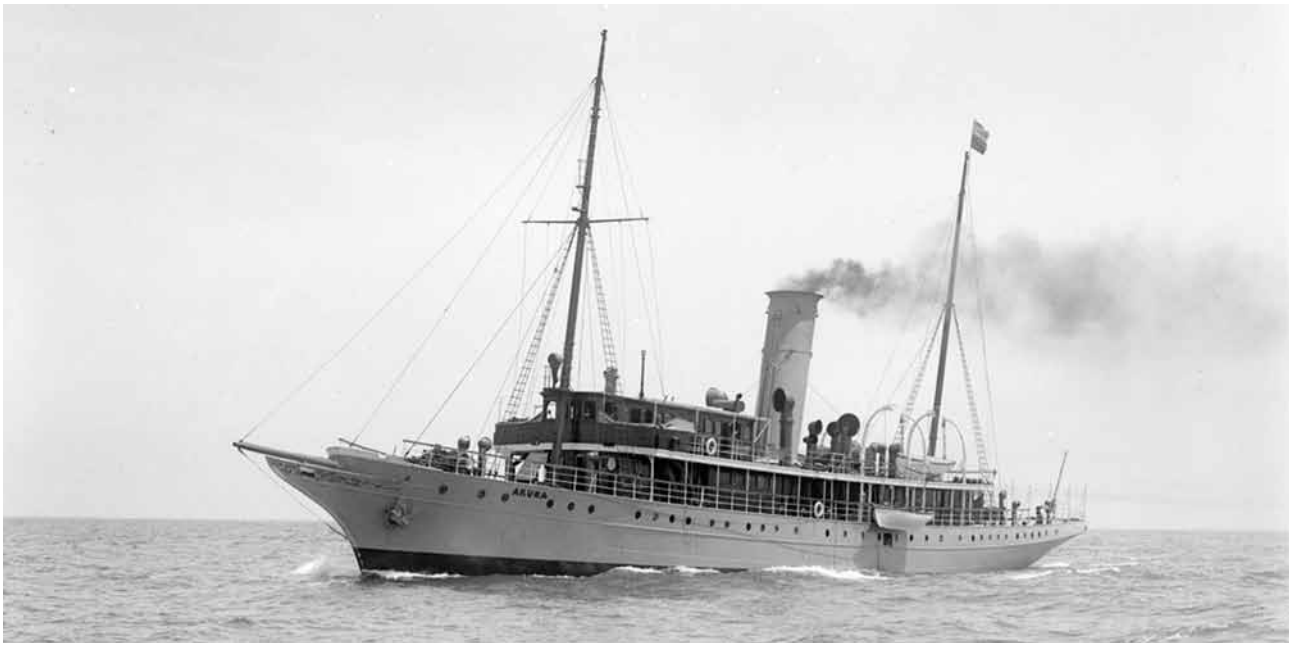
Una was acquired by the Port Phillip Sea Pilots Association in 1924 and was renamed *Akuna*. She worked as a pilot vessel on Port Phillip Bay for the next three decades. During World War II she also served as an examination vessel.

Akuna was finally decommissioned in 1953. She was sold to Mr John Dent of Melbourne on 23 March 1954, and was broken up at Footscray on the Marybyrnong River.

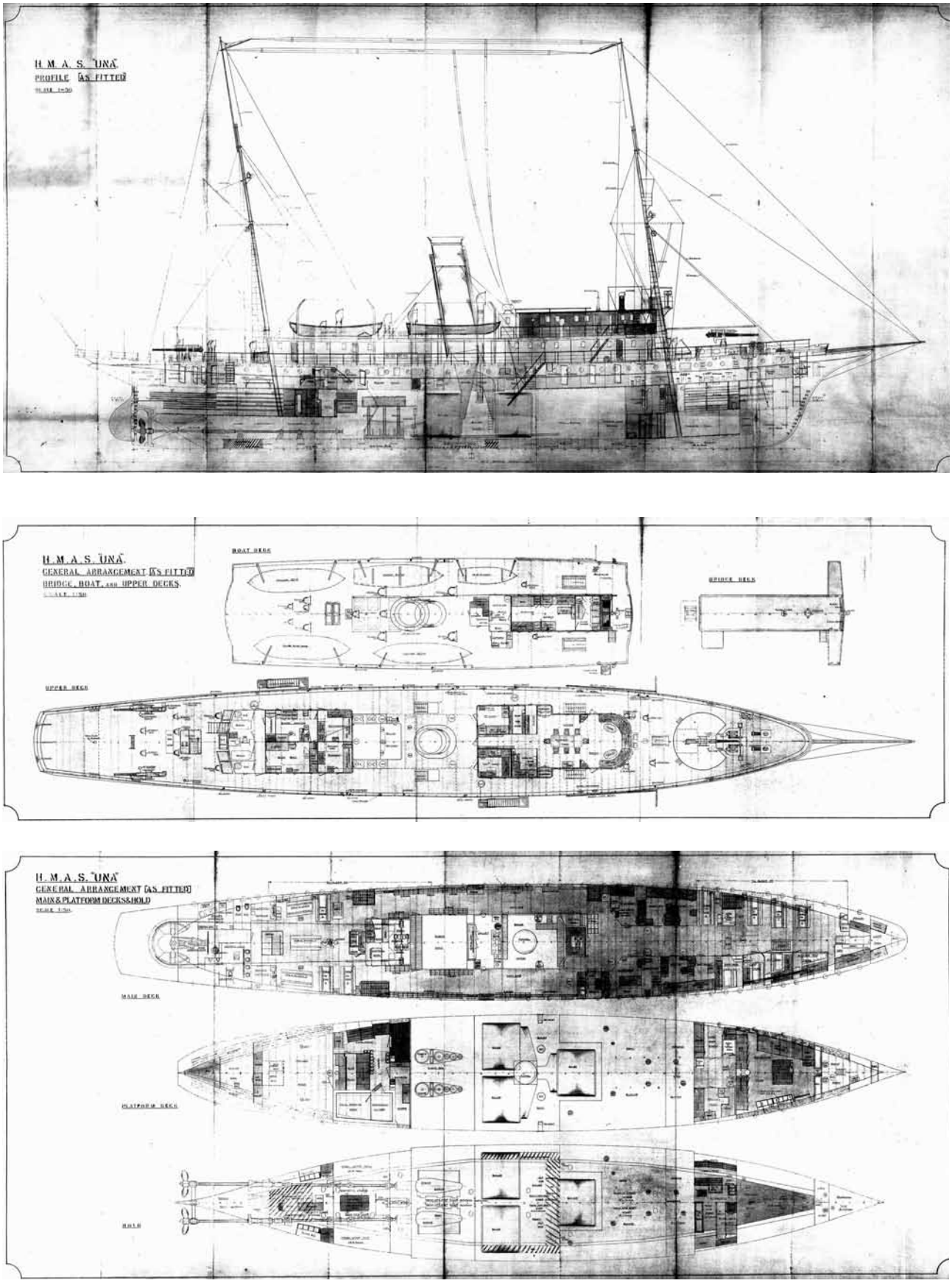


HMAS *Una* at Cockatoo Island, Sydney, 1917
(J C Jeremy Collection)

Reference: Bastock, J,; *Australia's Ships of War*, Angus and Robertson, Sydney, 1975.



The pilot vessel *Akuna*
(State Library of Victoria)



General Arrangement drawings of HMAS *Una*, 1914
(NAA: M2983 Items 252, 253 and 254)