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Volume 16 Number 1
February 2012

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THE AUSTRALIAN NAVAL ARCHITECT

Journal of
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(Australian Division)

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Cover Photo:

HMAS *Choules* arriving in Sydney for the first time on 21 December 2011
(Photo John Jeremy)

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From the Division President

I had a most enjoyable time attending Pacific 2012 in Sydney in the first week of February. This was a great opportunity to speak to a wide range of naval architects and others in the profession. Although the exhibition certainly does have a defence focus, the papers presented at the International Maritime Conference covered a very wide range of topics and it was great to see a number of old friends there.

It was good to see our Chief Executive, Trevor Blakeley, out in Australia again. He spent a lot of time manning the RINA stand and encouraging maritime professionals to consider joining the Institution. I'd like to thank Graham Taylor for organising the stand, and for ensuring that it was manned throughout the exhibition. I'd also like to thank those members who gave up their time to assist.

Of course, the International Maritime Conference would simply not happen if it were not for the drive and energy put into its organisation by John Jeremy. Once again he and his team are to be congratulated on a very good job.

Please note that the next Pacific will not be held at its usual date in late January, but will be held in early October 2013 to coincide with the International Fleet Review in Sydney to celebrate the 100th anniversary of the arrival of the RAN's new fleet on 4 October 1913.

This year the Australian Division Council decided to reinstate the Walter Atkinson Award for the best paper presented at a RINA technical meeting in Australia during the year. We are currently in the process of putting together a sub-committee to make a recommendation for this prize for 2012. During the year if you are aware of a particularly good paper please do let Council members know about this. To be eligible it must be a written paper which is also presented to a RINA technical meeting in Australia.

On a different note, it is sad to see that a number of recent maritime tragedies have been making the news recently. We have the *Rena* in New Zealand, *Costa Concordia* in Italy, and *Rabaul Queen* in Papua New Guinea. The latter resulted in a major loss of life.

Looking at the photographs of *Costa Concordia* on her side it is amazing to think that there were not more people killed. It certainly brings home the difficulty of evacuating so many people from a stricken ship and again raises the question of the safety of such vessels. Imagine what would have happened if this had occurred in a more remote part of the world or in adverse weather? From first reports it seems that many of the lifeboats were not able to be used shortly after the initial incident. Hopefully, in due course, there will be a fuller understanding of what happened. In addition to finding out why the accident occurred in the first place, technical lessons will be learned regarding the adequacy of the rescue equipment, etc. As such ships continue to increase in size, this is of critical importance to our profession.

The reason for the sinking of the *Rabaul Queen* is less clear at this stage. Reports suggest that it may have been operating in severe weather in an overloaded state. Again, it is vital to our profession to understand the technical aspects of this disaster and to try to ensure that ships are designed and operated in a way that means that such tragic events do not occur in the future.

I hope that each of these incidents will be investigated fully and carefully, and look forward to learning the lessons from them such that they will not occur again. As a profession it is important that we are involved in such investigations. I hope that the Institution will be able to assist with the enquiries and that it will be able to ensure that all the lessons learned are promulgated across the industry.

Finally, this will be my last President's column as I have accepted the position of Dean of Maritime Engineering at the Higher Colleges of Technology in UAE, and will be based in Abu Dhabi for three years. Consequently I will be resigning from the position of President of the Australian Division, although hope to maintain contact whilst I am overseas.

Martin Renilson

Martin Renilson
President, RINA Australian Division

Editorial

Our biennial International Maritime Conference seems to come around each time with remarkable speed. The Pacific 2012 IMC, held at Darling Harbour in Sydney between 31 January and 2 February was a great success with 71 papers presented by speakers from ten countries on a wide range of topics. Whilst over 280 delegates registered for the IMC, many delegates from the RAN Sea Power Conference also attended IMC sessions and for some there was barely standing room in a hall with seating for 200.

It was rewarding for those of us involved in the organisation of the conference and I would particularly like to

acknowledge the efforts of the programme committee — Adrian Broadbent (Chairman), Craig Boulton, Rob Gehling, Gangadhara Prusty, Tauhid Rahman and Martin Renilson — all of whom put a great deal of time into the task.

Not surprisingly, there was a lot of interest in papers on topics relating to current and planned RAN ship acquisition projects, in particular the air-warfare destroyers and the future submarine. There are challenges aplenty for those engaged in constructing the RAN's new ships but nothing, perhaps, compared with the challenges that we will face addressing the RAN's requirement for twelve new submarines to replace and supplement the present Collins-class submarines.

The recently-released RAND report into the capability of Australian industry and Defence to design Australia's future submarines makes sobering reading (see page 22). The estimate of some 8 to 12 million manhours over 15 years to design a new submarine from scratch may astonish some people, but it appears to be soundly based and emphasises the challenge we face in coming years.

Of course, there are also many opportunities. Twelve new submarines are likely to be built over a period of some 25 years and we can be sure that submarine technology will advance and the needs of the RAN will change over a quarter of a century. The last of the new submarines could be expected to still be in service well into the latter part of this century. We are really talking about a developing class of submarines, not twelve built to a single design. This presents the opportunity to grow our design capability and industry and sustain it over time. As the future submarine is likely to be unique to the RAN we will have to do just that.

If the interest and enthusiasm evident at the Pacific 2012 IMC is any guide, those presently involved with submarines in Australia (and those who would like to be) are itching to get on with the job.

John Jeremy

The RINA stand at Pacific 2012
(Photograph courtesy arinex)

The Minister for Defence, The Hon Stephen Smith MP, speaking at the opening of the Pacific 2012 International Maritime Exposition and Congress.
At the table are VADM Chris Ritchie RANR, Chairman of Maritime Australia Ltd, John Jeremy, Chairman of the Pacific 2012 IMC organising committee, The Hon Andrew Stoner MP, Deputy Premier of NSW and VADM Ray Griggs RAN, Chief of Navy
(RAN photograph)

NEWS FROM THE SECTIONS

ACT

On 24 August 2011 Graham Langdown, of the Navy Engineering Division of the Department of Defence, gave a presentation on his recent experience in the recreational boatbuilding business, having worked on the design of motor boats at Mustang Marine Pty Ltd on the Gold Coast prior to his return to the Department of Defence. Graham's presentation made an interesting change of topic from the larger ships most Canberra-based members are usually dealing with. Sadly, Mustang Marine did not survive the effects of the financial crisis, but Graham clearly gained a great deal of experience and satisfaction in his role as design manager with the company, which included the development of a number of new vessel designs at the time.

On 9 November 2011, ACT Section members and their partners attended our annual dinner at Delissio restaurant, with our guests being Guy Powers and Allison Brown. Prior to the dinner, members had the opportunity of a guided tour by Guy and Allison of their backyard yacht-building project in the Canberra suburb of Curtin. As a result of their previous ocean sailing experience, Guy and Allison decided to build their own cruising yacht based on a design by Jon Sayer. Construction of the 15.15 m aluminium yacht is well underway with metal work largely complete and outfitting now in progress. When the yacht is largely complete, it will be lifted with a mobile crane over their home to an awaiting low loader for a trip to Sydney and launching. The family then plan to live and cruise in the yacht in which they have invested significant funds for equipment and their own time in building. This may eventually include sailing the boat to Antarctica. The tour and dinner were enjoyed by those who were able to attend and we hope to be able to visit again when the boat is lifted from its backyard construction site. More details and photos of the yacht are available at: www.sayerdesign.com and clicking "New Projects" and finally "C - 1524 Fast cruising yacht".

On 15 November 2011 David Drohan, of the Navy Engineering Division, gave a presentation on *Development of new RAN Personal Lifesaving Equipment*. The talk covered a range of investigations David has in hand to better quantify the capabilities of existing RAN lifesaving equipment, focusing on life jackets, with the aim of developing improved requirements and assessments for any future equipment acquisitions. This presentation was a precursor to David's presentation at the Pacific 2012 International Maritime Conference on the same subject. The meeting was scheduled for an earlier start than our usual 1730 for 1800, with Campbell Park Offices as the venue, with staff from Navy Engineering Division also invited to attend. Perhaps in part as a consequence, attendance was significantly greater than our usual numbers.

On 14 December 2011 Peter Hayes, also of the Navy Engineering Division, provided an update on his ongoing landing-craft stability research as part of his Masters research project. This presentation was also a precursor to Peter's presentation at the Pacific 2012 IMC on this subject though the Canberra presentations allowed both David and Peter to delve into their topics more widely.

The RINA CEO, Trevor Blakeley, visited Canberra on 8–10 February following his attendance at Pacific 2012. Rob Gehling, the Division Secretary, accompanied Trevor to a number of meetings with employers of naval architects in Canberra and Trevor also presented 50-year RINA Membership Certificates to local members Alexander Townsend at his home on 8 February and Ian Williams during a dinner and social gathering of local members on 9 February.

Martin Grimm

Western Australia

Prior to the holiday season the committee convened to discuss ideas for 2012, as well as fill several vacancies. The positions which have changed are:

- Honorary Secretary — Kris Rettke stepped down with Graham Jacob duly stepping up;
- Assistant Secretary — previously vacant with Matthew Williamson throwing his hand in to help Graham;
- Honorary Treasurer — Jeremy Gordonnat stepped down with our newest committee member, David Sherwood, taking on the role; and
- Australian Division Representative — Ken McAlpine has stepped down, with Jesse Millar accepting the duties.

Should anyone wish to contact the committee or nominate as a Committee Member, please send an email to the section at rina.westaus@gmail.com.

Items discussed at the meeting were initiatives to boost numbers at the technical presentations, as well as developing a social side to the committee to facilitate networking. With more and more naval architects heading west to join the ever-expanding workforce here, it is important that we stick together to maintain coverage of, and share the vast array of experiences within, the growing industry.

Following on from this, we hope to continue last year's good work in getting the committee back up and running and engaging more of our members. As such, we encourage anyone with an enthusiasm for our industry to help us along through active participation.

We are still working to update the members' database so if anyone has recently changed addresses, or wishes to be added to the distribution list, please send though details to rina.westaus@gmail.com to ensure you receive the most relevant and up to date information. [*Changes of address must also be advised to Rob Gehling at rina.austdiv@optusnet.com.au please* — Ed.]

Jesse Millar

Queensland

A Century of Designing and Boat Building

In his presentation *A Century of Designing and Boat Building* to the Queensland Section of RINA on 18 October 2011, William [Bill] Wright detailed the development of his family's firm congruent with the growth of the boatbuilding and boat-designing industry at Bulimba on the bank of the Brisbane River.

Bill Wright graduated from the boat-building apprenticeship class at the South Brisbane Technical College in 1976. Bill

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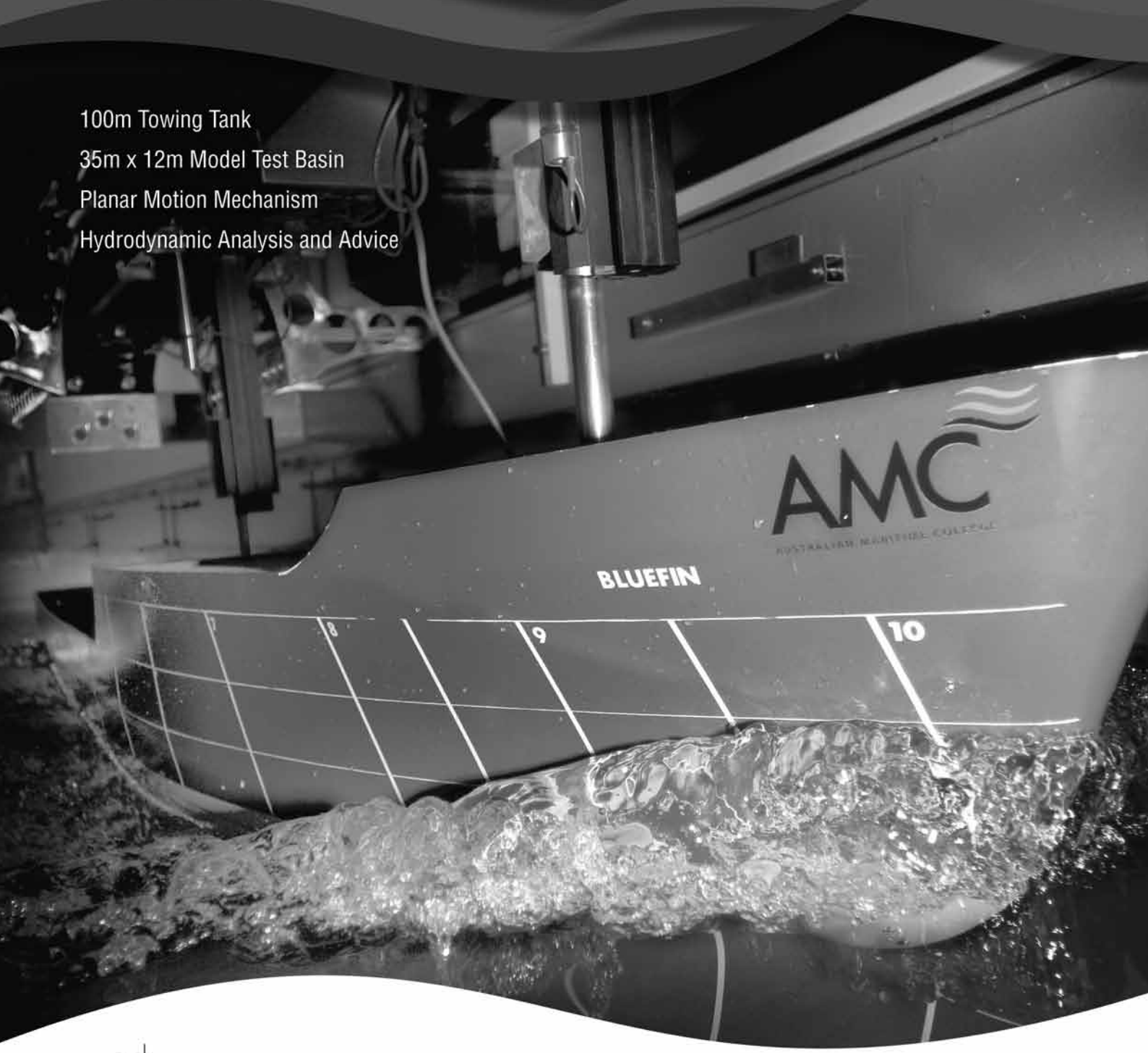

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was a quick and dedicated learner — he was an honours student in all aspects of the course, from hands-on practical work to mind-stretching design and building processes. Bill's younger brother Ian also completed the boat-building apprenticeship course in 1979 which had been relocated to the Ithaca College of TAFE. Bill and Ian are the third generation in the family boat-building business — their grandfather, Norman R. Wright, started the business more than 100 years ago.

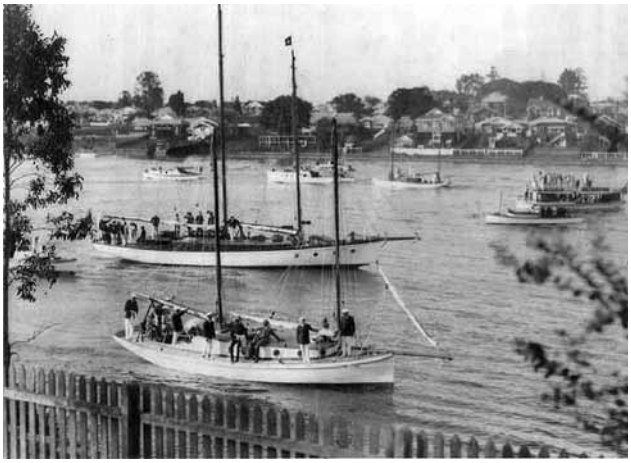
Norman R. Wright, in his pre-teenage years, was at the operational end of small wooden boats, delivering produce from Moreton Bay Islands up the Brisbane River to markets. This required analytical skill: how to contend with wind and tide; put into design parameters — how to deliver on time but minimising rowing and sailing effort. No doubt this honed the young Norman R. Wright's thirst for boatbuilding and design and steered him to a job in a boat yard. When he was 16 years of age in 1901 he started in the boat-building trade at the J. H. Whereat yard on the Brisbane River, where he became foreman when he was 21 years of age.

At the age of 24 years Norman R. Wright commenced building in his own right next to the historic Newstead House at the mouth of Breakfast Creek which flows into the Brisbane River, and established Norman R. Wright and Sons Pty Ltd. In 1936 the yard was relocated (lock, stock and barrel) from Newstead across the Brisbane River to Quay Street, Bulimba, and in 1989 to its current premises on the bank of the Hamilton Reach of the Brisbane River at McConnell Street, Bulimba.

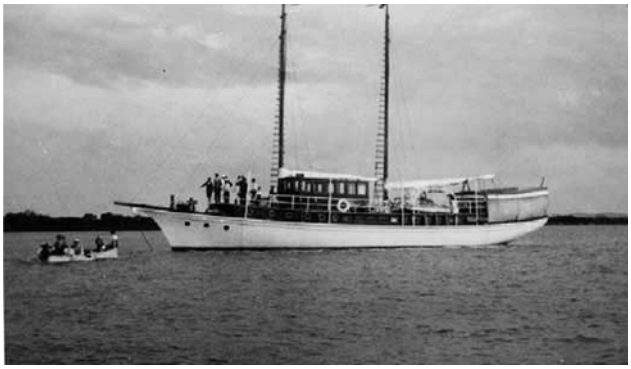
Bulimba, for many sailing seasons, was the home of Australian Champions in the 12-foot, 16-foot and 18-foot skiffs. Such was the high standard of design, building and fierce competitive sailing in the 16-foot skiffs in particular, that a skiff winning a Brisbane Skiff Club scratch club race on the Hamilton Reach of the Brisbane River was at Australian Championship standard.

Bill Wright's presentation made clear the inter-relationship of the Wright family boatbuilding, designing and sailing activities. While Norman R. Wright had numerous sailing results attributed to him for races on the Brisbane River, his sons Norman J. (Norm) and Ronald (Ron) were also champion sailors. Bill and Ian Wright's uncle Norm was Australian and World 18-foot Skiff Champion, crewed aboard *Gretel,* Australia's first challenger for the America's Cup, and competed with distinction in numerous ocean events, including setting the course record in *Flying Saucer* for the Brisbane-to-Gladstone Yacht Race. Bill's Dad, Ron was Australian Champion in the Cadet Dinghy Class and in the 16-foot skiffs, and reserve to Roly Tasker in the 12 square Metre class in the 1956 Melbourne Olympic Games. Bill and Ian Wright are extremely competent sailors, particularly in offshore events — winning the Brisbane-to-Gladstone Yacht Race eight times.

In his presentation, Bill did not dwell on the numerous, or any, family sailing achievements, but it is considered that these activities had a significant influence in the operation of the boat yard and contributed to its longevity. At that time sailing, boatbuilding and the Bulimba community had a symbiotic relationship. Wright's yard built for the local community, for local Brisbane owners, providing jobs for



Tabinga, an 11.8 m wooden yacht launched in 1913, had her builder's certificate renewed in 1988. The 21.2 m auxilliary schooner is *Francois* which was launched on 30 July 1926 and lost near Singapore during World War II
(Photo Norman R Wright & Sons Archives)



Stradbroke II was a 28.5 m wooden motor yacht launched in November 1928. She was wrecked at Cape Lambert in 1956
(Photo Norman R Wright & Sons Archives)

highly-skilled Bulimba workers, apprenticeships for local school leavers, work for local foundries, marine engineers, and small businesses.

Importantly, the association continued on the weekends — through sailing; bosses and workers crewed together in local club and championship events on the Hamilton Reach of the Brisbane River. This relationship, not peculiar to Wrights, existed in the other boat yards, but perhaps not to the same extent, given that most are no longer operating. Bill Wright acknowledged the contribution of other boat yards — C.E. Crowley, Watts and Wright, Spring and Denaro, and Millkraft — in building the skill base and reshaping the operation and building practices of Wright's boat yard, from the initial training of his grandfather to tradesmen who moved to Norman R. Wright and Sons, in many cases bringing experience in other mediums of construction.

Indeed, the ability of Norman R. Wright and Sons to create and to take on ideas in their own designs and building mediums and processes is reflected in the way that the yard has responded to technological change over the hundred years: from copper-sheathed, oakum-caulked carvel-planked wooden boats; large double-diagonal planked wooden boats; ship's wood clinker or lapstrake lifeboats; cold-moulded wooden hulls; wooden hulls having a metal or composite superstructure, composite FRP and wood (and other materials) high-speed boats.

Bill Wright described how his grandfather Norman had left

primary school at what would be considered well before the regulatory school leaving age expressed in today's language, and set up his boat yard. He built to his own designs and costings. Plans were drawn using splines or battens held in place with drawing ducks for fairing, and refined using design half models. The yard has on file plans of all of the boats built there, and in its office has an impressive collection of their half models used to finalise the lines.

Such was the dedication of Norman R. Wright that he recorded the particulars of boats built in his yard. To his credit, Bill Wright has compiled a 40-page document identifying all of the boats built in the family yard. This includes particulars recorded by his grandfather, father and uncle — contract price, when the keel was laid, who was responsible for the job, launching date, and in many cases the service of the boat. Imagine — the contract price for a 14.8 m motor sailer built in 1927 was only £649/-/- ($1298).

Through his application to detail and experience, Norman R. Wright became an authority — his opinion was sought on aspects of construction, design and materials of construction. For example, his analysis of the suitability of some species of wood for boat construction is included in *The Timbers and Forest Products of Queensland* published by the Queensland Government Printer in 1928.

This 12.1 m Admiral's Barge was built of cold-moulded wood and was delivered to the RAN in 1992
(Photo Norman R Wright & Sons Archives)

Norman R. Wright and Sons built for the domestic, commercial and pleasure market — contracted specified-performance high-speed motor vessels, motor sailers, racing yachts, finely-finished champion racing skiffs and dinghies, heavily-constructed fishing boats, pilot boats, customs boats, surf life-saving planked and cold-moulded double enders, traditional cross-river ferries, and 11 of the 19 ever-popular multi-hulled Brisbane River City Cat Ferries. Wrights have also built for international clients, and for the armed services. In World War II the yard built four 33.9 m Harbour Defence Motor Launches — it had a workforce of 180 boat builders and skilled tradesmen.

In his presentation, Bill outlined the current challenges faced by Norman R. Wright and Sons Pty Ltd in building offshore in the Peoples' Republic of China. It seems that this is predicated by trends, not only in the boat building industry, but across the manufacturing industry to reduce cost to be competitive and continue in the market. From Bill Wright's remarks there is an element of concern at the move by any industry to total or partial production offshore. Bill drew on his, and Ian's, experience, and that of a number of

Whistler, a 30.8 m composite FRP motor yacht, was launched in 1997
(Photo Norman R Wright & Sons Archives)

Wright's former apprentices in his audience, of the valuable training that they gained onshore in Australia, lamenting that such skill and knowledge acquisition experiences will be lost with the move of industry offshore. Our society will become skill deficient.

Vocational education and training through completion of boatbuilding apprenticeships and in-the-yard experience since then have served Bill and Ian Wright well. As directors of Norman R. Wright and Sons they have taken up the baton for the responsibility for the conduct of the family business from their naval architect father Ron who before them took over the business from its founder, Norman.

Ron Wright graduated from the University of Queensland in engineering in 1943 and naval architecture in 1950. He is a Fellow of The Royal Institution of Naval Architects and has been a member since 1950. Norman R. Wright and Sons have Maritime Safety Queensland Accreditation as a Ship Designer (Aluminium, FRP, Timber and Machinery) and as a Ship Builder (FRP and Timber).

In Bill's very polished presentation, he provided comprehensive detail for each of the 86 slides which traversed 100 years of boat building by yards in Bulimba. Bill stressed the need, especially in the current economic climate, for yards remaining on the banks of the Brisbane River to maintain professional contact, especially to ensure appropriate skills levels. He is concerned that the industry must not only continue but also that all working in it prosper.

Brian Hutchison

New South Wales

Committee Meeting

The NSW Section Committee met on 9 November and, other than routine matters, discussed:

- SMIX Bash 2011: Places are now fully booked and ticket sales have closed. Bill Bollard has completed his model of *Australia II* for the silent auction.
- Webcast arrangements: Due to technical difficulties, the Engineers Australia recording of John Jeremy's presentation on *One Hundred Years of Destroyers in the Royal Australian Navy* on 30 March 2011 cannot be uploaded to the EA website.
- RINA Database of Consulting Naval Architects: This has been advertised in *The ANA* and an email has been circulated to members, but the response has been low.

It is in the interest of members who are consulting to list on the RINA site at www.rina.org.uk/maritime_services_directory.html.

- Technical Meeting Program for 2012: The first two presentations for 2012 have been arranged, with suggestions for others being made. The first presentation in February will need to be postponed by one week, as it coincides with the Pacific 2012 IMC Cocktail Party, and will also require an alternative venue.

The next meeting of the NSW Section Committee is scheduled for 22 February.

SMIX Bash

The twelfth SMIX (Sydney Marine Industry Christmas) Bash was held on Thursday 1 December aboard the beautifully-restored *James Craig* alongside Wharf 7, Darling Harbour, from 1730 to 2130. The Bash was organised jointly by the IMarEST (Sydney Branch) and RINA (NSW Section). About 200 guests came from the full spectrum of the marine industry, including naval architects, marine engineers, drafters, boatbuilders, machinery and equipment suppliers, regulators, classifiers, surveyors, operators, managers, pilots, navigators, researchers, and educators. Equally importantly, the full spectrum of age groups was represented, from present students to the elders of the marine community.

It was also great to see intrastate, interstate and international visitors in the throng, including RINA Australian Division President, Prof. Martin Renilson from Launceston, RINA Australian Division Secretary, Rob Gehling from Canberra, Prof. Neil Bose, Dr Gregor Macfarlane and Dr Irene Penesis from the Australian Maritime College in Launceston, Liz Hay from IMarEST in Brisbane, and Ton and Inge Schijindel, ex P&O Nedlloyd from The Netherlands.

Sydney turned on a beautiful evening, and many partners in attendance enjoyed the view from the decks of *James Craig*. Drinks (beer, champagne, wine and soft drinks) and finger food were provided. A delicious buffet dinner was served in the 'tween decks, and many tall tales and true were told.

Some of the crowd enjoying drinks on board *James Craig*
(Photo John Jeremy)

"Early bird" pricing and credit-card facilities for "early bird" payments continue to be successful, and all tickets were sold before the event — you really do have to be early!

Formalities were limited to one speech from the Chair of the NSW Section of RINA, Graham Taylor, who welcomed the guests and thanked the industry sponsors, and one from Peter Cole of the Sydney Heritage Fleet who thanked the guests for their attendance and added that *James Craig* is open to the public daily for guided tours and sails most weekends, either on Saturday or Sunday, and carries 80 passengers at sea and 200 in the harbour.

The raffle was drawn by Ms Jenny Jones from Svitzer Australasia, and the winners were:

First	Ms Kate Thomas from FlowTech	$150 gift voucher to the ANMM shop
Second	Mr Dusko Spalj from TAFE Sydney	$75 gift voucher to the ANMM shop
Third	Mr Steve Ryder from AusGrid	$50 gift voucher to the ANMM shop

The lucky-door prize was also drawn by Ms Jenny Jones and the winner was Ms Sue Machan from the NSW Maritime Authority who scored a $50 gift voucher to the Australian National Maritime Museum's shop.

Bill Bollard had built a magnificent half-block waterline model of *Australia II*, the Australian 12-metre winner of the 1983 America's Cup for the Royal Perth Yacht Club, becoming the first successful Cup challenger and ending a 132-year tenure by the New York Yacht Club. Designed by Ben Lexcen, built by Steve Ward, owned by Alan Bond and helmed by John Bertrand, *Australia II* featured a winged keel which gave the boat a significant advantage. *Australia II* is now on permanent display at the Western Austalian Maritime Museum in Fremantle. Bill Bollard's model was put up for silent auction during the evening. Gregor Macfarlane submitted the winning bid and the model was presented to him by Ms Helen Parmeter from Teekay Shipping. Our thanks to Bill for his expertise in building and generosity in donating the model.

Bill Bollard's beautiful model of *Australia II*
(Photo Phil Helmore)

This year's event was sponsored by the following organisations:

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- Edwards Marine Services Pty Ltd
- Formation Design Systems Pty Ltd (Ship Constructor)
- One2three Naval Architects
- Twin Disc (Pacific) Pty Ltd
- Shearforce Maritime Services Pty Ltd

Our thanks to them for their generosity and support of SMIX Bash 2011.

Some of the stayers, who were shown the gangplank late in the peace, rocked on to other venues and continued to party until the wee small hours.

Marine Emissions

Bill Bixley, Principal of RoTech Engineering Services, gave a presentation on *Fuel, Diesel Engines and Exhaust Gas Emissions* to a joint meeting with the IMarEST attended by 23 on 8 February in the Conference Room at Lloyd's Register Asia, Sydney.

Introduction

Bill began his presentation by saying that his background is as a seagoing marine engineer. When he came ashore he worked in the ship-repair industry for Storey & Keers for 20 years, then for Adsteam and Svitzer on the tugs, and now does freelance and project work on ships, tugs and engines.

This presentation was first made about 18 months ago to a group of lawyers and insurance people on the new fuel standards. It has been expanded and updated to the current MARPOL rules and the latest developments and discusses what the rules have and have not done.

There are thousands of papers around on gas emissions, and you can't possibly read everything. So, for the marine industry, it is best to start with the International Maritime Organisation (IMO), because they regulate the marine industry and spell it out well. In the 2000s they conducted studies to see what gases there were, what proportions were coming from ships, and what countries wanted.

However, it is important to keep politics out of it, because everyone has a different view. Shipping is being regulated by IMO. Directives for low-sulphur fuel are coming from IMO and they are telling engine builders and naval architects what they will have to do to meet the new standards. IMO will control the marine industry irrespective of politics!

Greenhouse Gas Emissions from Ships

Emissions of greenhouse gases from ships include exhaust gases from diesel engines, cargo emissions, refrigerants and other emissions.

Emissions from diesel engines include carbon monoxide, methane, nitrous oxide, carbon dioxide, sulphur dioxide, nitrogen dioxide, and particulate matter (typically soot, which is carbon and sulphur dioxide; add water and you obtain sulphurous acid—not a good combination!)

Marine emissions
(Photo courtesy Bill Bixley)

Definitions

Carbon monoxide is produced from partial oxidation of the carbon compounds in the fuel.

Methane is produced by oxidation of the cylinder lubricating oils.

Nitrous oxide is a product of the combustion process.

Carbon dioxide is a product of the combustion process.

Sulphur dioxide is a product of the combustion process. The amount of sulphur dioxide produced by the engine is directly related to the amount of sulphur found in heavy marine diesel fuels. IMO is therefore trying to reduce the amount of sulphur dioxide produced by mandating low-sulphur fuels.

Nitrogen dioxide is a product of the combustion process, especially at high temperatures. It contributes to smog, acid rain and global warming, yet it is one of the most-difficult pollutants to eliminate from diesel exhausts. For example, many technologies which reduce NOx gases result in increases in undesirable particulate emissions.

IMO tested average gas emissions in 2007 and 2009, and the best they could do was to come up with figures with an uncertainty of 20%. The short answer is that none of the figures quoted are accurate!

Global CO_2 Emissions

Bill then showed a pie chart, indicating proportions of global carbon dioxide emissions due to various industries, as follows:

International shipping	2.7%
International aviation	1.9%
Rail	0.5%
Other transport (road)	21.3%
Domestic shipping and fishing	0.6%
Manufacturing industries and construction	18.2%
Other energy industries	4.6%
Electricity and heat production	35.0%
Other	15.3%
Total	100%

Overall, shipping is a small contributor, but everything adds up. It is hard for diesel engine designers to reduce emissions. However, the naval architects and diesel engine designers are looking closely at efficiencies like air lubrication for hulls, propeller-boss cap fins, tip-loaded (CLT) propellers, etc.

Sulphur Emission Control Areas

There are designated geographical areas where the use of high-sulphur fuels is prohibited, and these are called Sulphur Emission Control Areas (SECA). The currently include

Area	Prohibited	From
Baltic Sea	SOx	19 May 2006
North Sea	SOx	22 Nov 2007
North America	SOx, NOx and PM	1 August 2012
US and Caribbean Sea	SOx, NOx and PM	1 January 2014

This is going to be difficult for shipowners who have to change to fuels with less than 1.5% sulphur content. Dual-fuel engines are able to run on either high-sulphur or low-sulphur fuel. The ship then carries both fuels in separate tanks, using high-sulphur fuel for the long voyage legs, and switching to low-sulphur fuel while in a SECA. Change-over needs to be up to 48 hours before entering a SECA, the time lag being necessary to drain the service tank of high-sulphur fuel and replace it with low-sulphur fuel.

Regulations

What are the rules and who sets them? They are contained in MARPOL Annex VI, which sets limits on NOx and SOx emissions from ship exhausts, and prohibits the deliberate emission of ozone-depleting substances.

Date	SOx for SECA	Global limit
2000	1.5%	4.5%
2010	1.0%	
2012		3.5%
2015	0.1%	
2020		0.5%

Fuel quality is important; low-quality fuel can wear out piston rings and cylinder liners in one week! Some say that refineries will not have the capacity to produce the amount of low-sulphur fuel which will be required. Fuel quality is monitored while bunkering by having a drip feed from the supply line, which fills three 1 L cans. One goes to the shipowner, and one to the fuel supplier, and the third s sent to be tested. The ship then receives and email specifying the fuel quality, contents and comparison with the ISO standard, and recommending to the chief engineer how to use the fuel (temperature required, passing through purifiers to remove impurities like vanadium, etc.) In particular, the catalytic ("cat") fines (a by-product of the catalytic process) need to be removed, and engine manufacturer MAN places an upper limit of 80 mg of cat fines per tonne of fuel.

Marine diesel fuel is ultra-low sulphur fuel, and requires different engine settings to those from heavy fuel oil.

NOx Limits

Bill then put up a slide with a table showing the timetable for the implementation of limits on NOx emissions for slow-speed, medium-speed and high-speed engines.

		Engine speed		
Tier	Date	Slow	Medium	High
I	2000	17	45	9.8
II	2011	14.4	44	7.7
III	2016	3.4	9	1.96

All limits are in g/kW-h.

MAN and all the main engine manufacturers are ahead of the schedule. They already have engines that will meet Tier III requirements due in 2016, and are busy developing Tier IV right now.

Historical

Traditionally, shipowners and charterers have opted for bunkers of the lowest quality and cost, with scant regard for the environment. However, we live in a changing world where the maritime nations are being made accountable and responsible for the environment.

The problem now for shipowners is to cope with mandatory low-sulphur fuels. Newer vessels are being built with segregated fuel systems (to handle both high- and low-sulphur fuels), while older vessels have to change over to low-sulphur fuel.

The removal of NOx emissions from diesel exhaust gases rests with the engine designers, but gas scrubbers and catalytic converters can also be used to reduce NOx emissions.

The current fuel standard, ISO 8217:2010 was released in July 2010, but does not specify a maximum sulphur value for bunker fuels, although it does reduce the allowable aluminium and silicon by 25%.

Future Trends

Future trends include new technology in the form of more efficient engines, gas scrubbers and catalytic converters, alternative fuels, LPG dual-fuel engines, solar and wind power, nuclear power, fuel cells [*Siemens had a fuel cell on display at the Pacific 2012 Exposition* — Ed.] and cold ironing (connecting shore-side electrical power to a ship at berth while its main and auxiliary engines are shut down).

Questions

Question time elicited some further interesting points.

There is a move by shipowners for IMO to review the timetable for the introduction of low-sulphur fuels, and the oil companies don't think that they can produce the quantities of low-sulphur fuel that will be required.

The US Navy is the largest consumer of light diesel fuel in the world.

LNG may be the way of the future!

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

Phil Helmore

COMING EVENTS

Australian Division AGM

The Annual General Meeting of the Australian Division of RINA will be held on Tuesday 27 March at 6:00 pm at the Maritime Queensland offices, 747 Lytton Road, Murarrie, Brisbane: see notice on page 54 and associated papers mailed to members with this issue.

NSW Section AGM and Technical Meetings

The Annual General Meeting of the NSW Section of RINA will be held on Wednesday 7 March immediately following the scheduled technical meeting of RINA (NSW Section) and IMarEST (Sydney Branch) at 6:00 for 6:30 pm at Engineers Australia, 8 Thomas St, Chatswood (see notice mailed to NSW members with this issue).

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 for remaining 2012 (with exceptions noted) is as follows:

7 Mar Andrew Baglin, University of New South Wales
Racing for the America's Cup
NSW Section Annual General Meeting

4 Apr Steve Raaymakers, EcoStrategic Consultants
Maritime Developments in Papua New Guinea: Opportunities and Threats in our Nearest Neighbour

2 May Wärtsilä
Fuel Savings through Redesign of Propeller Blades/Nozzles

6 Jun Jonathan Crossen, International Paints
Developments in Paints

4 Jul John Jeremy, Royal Institution of Naval Architects
LHD and LSD — the Evolution of Australia's Amphibious Capability

1 Aug IMarEST

5 Sep RINA

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

6 Dec SMIX Bash

Fourth High Performance Yacht Design Conference

The fourth High Performance Yacht Design Conference (HPYD4) will be hosted by the Royal Institution of Naval Architects and the University of Auckland in Auckland, New Zealand. It will take place on 12–14 March 2012, during the Auckland stopover of the Volvo Ocean Race. The boats are scheduled to arrive on 8 March, with in-port racing on 16–17 March and a re-start on 18 March.

The conference venue will be in the heart of the Viaduct Basin in the purpose-built Marine Events Centre. The HPYD conference will be a fully-refereed technical conference of the highest standard. A full social program will be provided. Meet the sailors, see the yachts and attend this highly acclaimed, world-class technical conference.

The focus is on the design, analysis, testing and performance of cutting-edge racing and super yachts. A list of abstracts submitted is available at www.hpyd.org.nz, and this is under review. The final program is expected on the website by mid-February.

Events associated with the conference include:

- Sun 11 Mar Cocktail reception; 1900–2100, venue TBA
- Mon 12 University of Auckland launch MEng Studies in Yacht Engineering; 1900 at Viaduct Events Centre
- Mon 12 Public session with Volvo sailors and designers talking about design and sail ability of their vessels; 1930–2100 at Viaduct Events Centre
- Tues 13 Harbour networking cruise; 1600–1730
- Tues 13 Conference dinner, RNZYS, 1930–late

The conference now has a group on LinkedIn which you can join at

www.linkedin.com/groups?home=&gid=3918059&trk=anet_ug_hm to find out what's being presented, swap contact details and share information about accommodation, travel, etc.

Registration can be carried out online at www.hpyd.org.nz with payment by credit card or direct deposit.

For further details please see www.hpyd.org.nz or email the conference Chair, David Le Pelley, at info@hpyd.org.nz.

Contract Management for Ship Construction, Repair and Design

Fisher Maritime's widely-respected three-day training program, *Contract Management for Ship Construction, Repair and Design*, will be available in Perth on Tuesday 22 to Thursday 24 March and in Sydney on Monday 26 to Wednesday 28 March 2012.

This program is a lessons-learned one, not a theoretical course on contract management. It bears a lot of "scar tissue" from marine contractual disasters. It is designed for:

- Project Managers (Yards and Owners)
- Contract Managers and Specialists
- Newbuilding Shipyards, Repair Yards
- Fleet Managers
- General Managers of Shipyards
- Financial Managers (Yards and Owners)
- Ship Conversion Specialists
- Naval Architects, Marine Surveyors
- Federal, State, and Provincial Agencies
- Ferry Operators (Public and Private)
- Naval Shipyards
- Owner's Representatives
- On-Site Representatives
- Major Equipment Vendors
- Marine Superintendents
- Consultants and Attorneys

The presenter, Dr. Kenneth Fisher, is recognised worldwide as the leading authority on the development and management of complex contracts and specifications for ship construction, conversion, repair, and design. He is author of the 2004 RINA publication, *Shipbuilding Specifications: Best Practices Guidelines*, and of the 2003 SNAME publication, *Shipbuilding Contracts and Specifications*. As an arbitrator, expert witness, consultant, and instructor for nearly 30 years, he brings clarity and organization to an otherwise-complex set of management requirements unique to the maritime industry.

For details of topics covered, visit www.fishermaritime.com/publications/pdf/cm.pdf, and for registration, visit www.fishermaritime.com/projecttraining/registration.html and click on the button for *Register for our Australia Programs*.

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 currently scheduled for February 2013 in Australia, with exact dates and location to be advised.

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

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 pyrotechnics/light display in the evening
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 in Sydney from Tuesday 8 to Friday 11 October 2013. It will include:

- The International Maritime Exposition, organised by Maritime Australia Ltd, to be held from Tuesday 8 to Friday 11 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 Tuesday 8 to Thursday 11 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 Tuesday 8 to Thursday 11 October.

Pacific 2013 IMC

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

Deadline for submission of abstracts	4 March 2013
Authors notified of acceptance	8 April
Deadline for submission of refereed papers	3 June
Deadline for submission of non-refereed papers	15 July

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 in due course.

CLASSIFICATION SOCIETY NEWS

ABS Classes Series of Four LNG Carriers

ABS will class four liquefied natural gas (LNG) carriers on order by Mitsui OSK Lines to be chartered by ExxonMobil. The 170 000 m^3 carriers will be built at Hudong Shipyard in Shanghai, China, to the Gaztransport and Technigaz NO96 membrane system design. The completion of these four vessels will mark ten ABS-classed LNG carriers built at the Hudong Shipyard.

These carriers will feature both an onboard reliquefaction plant and slow-speed diesel propulsion. Two vessels will be headed to the Gorgon field in Australia, and the other two will be serving fields offshore Papua New Guinea. Delivery is expected around 2014–16.

Craig Hughes

RAN appoints LR as its First Recognised Organisation

Adoption of ANEP 77 as a Regulatory Framework is progressing with the Royal Australian Navy (RAN) now adopting it as part of their governance model, and has recently appointed Lloyd's Register to act as its first Recognised Organisation and to issue a range of statutory certificates on their behalf. On 29 September, RADM Mick Uzzell, Head of Naval Engineering and Naval Flag Administrator (NFA) of the RAN, signed the formal delegation.

This follows the formal appointment of RADM Uzzell as the NFA in a significant policy decision where the RAN will now adopt the Naval Ship Code as its framework for Ship Safety Management and use classification societies to provide independent third-party assurance that vessels have been certified to an agreed extent to reflect their operational requirements. The policy announcement follows several years where Lloyd's Register has worked extremely closely with a number of navies to develop the Naval Ship Code as a framework for naval ship safety, in the same manner that SOLAS does for commercially-operated ships.

The appointment of LR as the first class society is closely linked to the purchase of the ex-RFA *Largs Bay*, renamed HMAS *Choules* in service with the RAN, and the very large LHDs, HMA Ships *Canberra* and *Adelaide*, being built in Spain to LR's Naval Ship Rules.

LR will be issuing a full suite of statutory certificates for HMAS *Choules*, including Passenger Ship Safety Certificates and a Naval Ship Safety Certificate, demonstrating compliance with the Naval Ship Code.

Responding to the formal delegation, Bob Simpson, LR's Global Lead — Naval Ships, commented "This was the culmination of several years hard work from a team of dedicated LR staff to help navies understand how safety was regulated for commercial ships and to adapt the principles into the Goal-based Framework of the Naval Ship Code, and to deliver this assurance through the use of the Naval Ship Rules as the underpinning certification."

New Surveyors at LR Australia

The local Lloyd's Register surveyor team has grown again throughout 2011, and LR is pleased to welcome new recruits Daniel Cho, who joined the Cairns office in December, and Andy McNeill, who started in Melbourne in June. In the Perth office, C.H. Lim, Charlie McGee and Peter Hatton have all joined the team in 2011, having transferred from LR's Singapore, Southampton and Sydney offices respectively.

LR Australia Training Calendar

Provisional dates in the first half of 2012 have been set for LR's most-popular training courses as follows:

Classification and Statutory Surveys:

Perth	2–4 April
Sydney	13–15 June

Hull Inspection, Damage and Repair:

Sydney	19–21 March
Perth	29–31 May

Internal ISM Code Auditor:

Perth	5–6 March
Melbourne	8–9 May

ISPS Company and Ship Security Officer:

Perth	7–9 March (directly after the ISM course)

Subject to demand, LR will also be running these courses in other locations and dates, along with the following:

Practical Approach to Ship Surveys

Risk Management and Incident Investigation

International Maritime Labour Convention 2006

Introduction to the SSC Rules and Software

To register interest in any of the courses above, or to subscribe to updates by email, send your details to sydney@lr.org. More details on the courses are also available at www.lr.org/training

World's first LNG-fuelled Tanker Newbuilding to Lloyd's Register Class

The world's first new LNG-fuelled tanker has been delivered in Rotterdam to Lloyd's Register class, heralding the start of a new era of cleaner shipping for Europe's local waterways. The delivery of MT *Argonon*, a 6100 dwt dual-fuelled chemical tanker, represents a significant milestone for the Deen Shipping subsidiary, Argonon Shipping B.V., in its pursuit of cleaner transport solutions for Europe. Lloyd's Register helped the owners and regulators to identify their risks, meet regulatory requirements and overcome the technical challenges for the precedent-setting tanker.

"This has been a great project and it is a significant first," said Piet Mast, Lloyd's Register's Marine Business Manager for Western Europe. "The nature of inland waterways traffic, which passes through or close to major population centres, makes LNG an attractive way to reduce harmful local emissions. We had to look carefully at the risks and worked closely with the owner and the regulators to ensure that they understood, and were comfortable with, the technical solutions that were developed."

The dual-fuel system is designed to burn an 80/20 mixture of natural gas and diesel, reducing SOx, NOx and particulate-matter emissions, as well as reducing the greenhouse-gas emissions from tank to flue. The LNG is stored in a transport tank located on deck, supplied by Cryonorm Projects, based near Amsterdam.

"The inland shipping industry, as far as we know, is the safest and cleanest mode of transport. But, to keep this lead, we have to take a big step forward in environmental performance," said shipowner Gerard Deen. "I think that the dual-fuel principle is a way to reduce the emissions in our sector. Lloyd's Register was very pragmatic in their approach to finding solutions to convert seagoing regulations into inland shipping rules regarding dual fuel."

Along with Lloyd's Register, the Netherlands Shipping Inspectorate approved the vessel's LNG system for operation in the Netherlands and the ship has taken on its first load of LNG bunker fuel. The next step is to secure the regulatory approvals from the Central Commission for Navigating on the Rhine and the UN-ECE ADN Safety Committee, to open the way for navigation beyond the Netherlands.

"The owners are to be congratulated for being pioneers," said Mast. "At Lloyd's Register, we have been involved with LNG for a long time, and so were able to provide support through the plan-approval and construction processes. We now look forward to supporting the ship through many years of 'clean' trading."

Argonon has entered service and commenced operating with gas following some final main-engine tests. Built by Rotterdam's Shipyard Trico B.V., the tanker is 110 metres in length and propelled by two, dual-fuel Caterpillar DF3512 engines, each providing 1115 kW.

The ship has the capacity to transit from Rotterdam to Basel and back without bunkering.

"We are currently providing technical and regulatory guidance for 20 confirmed or proposed inland-waterway applications which intend to use LNG as fuel," says Bas Joormann, West European Area Inland Waterway Product Manager for Lloyd's Register. "There is a lot of interest, and for good reason. Tankers on inland waterways, like ferries in emission-control areas, are very suitable for LNG. But the regulatory regime is different. We're helping owners and governmental bodies to identify the risks and manage them to at least the level of safety provided by the existing fuel-management and combustion requirements."

Greece's Maran Tankers Receives LR's first Energy-management Certification Awarded to the Merchant Fleet

Lloyd's Register has awarded Maran Tankers Management, Inc. (MTM), the oil-tanker management company of the Angelicoussis Shipping Group, with ISO 50001 certification as commercial ship operators continue to search for ways to lessen their environmental impact and operating costs.

ISO 50001 is a voluntary international standard which specifies the requirements for establishing, implementing, maintaining and improving an energy-management system. It offers companies a systematic approach to continually improve energy performance, including energy efficiency, use and consumption.

"Certification to ISO 50001 was a milestone for our company," MTM Managing Director, Stavros Hatzigrigoris, said. "Having in place an effective and efficient energy-management system for the operation of our fleet brings real benefits to the company and it allows us to be proactive in satisfying upcoming regulations, customer requirements and society's expectations."

Energy management has become a critical part of ship operations, in part because fuel is an increasingly-major cost element for any shipping company, according to Sokratis Dimakopoulos, MTM's HSQE Manager.

"Improving energy efficiency reduces fuel consumption and operating costs for MTM and its clients. In addition, being energy efficient has become a legal and industry requirement and assists in reducing the environmental impact associated with CO_2 emissions from shipping operations," said Dimakopolous. "Certifying our energy-management system in accordance with the ISO 50001 standard came at the right moment for us, since it assisted in formulating a structured methodology to enable us to put a system in place to improve energy performance on a continual basis."

MTM, with its 36-ship strong oil-tanker fleet, is one of the largest crude-oil tanker managers in the world. In addition to ISO 50001, it is also certified to the international standards ISO 14001 (environmental management) and OHSAS 18001 (health and safety).

"We have embraced an integrated health, safety, environmental and energy-management approach which has worked very well since the structure, methodology and basic contents of these management systems are harmonised to complement each other efficiently, providing key drivers for an enhanced overall business performance," Dimakopolous said.

The audit was conducted by experts from Lloyd's Register's marine and management systems divisions, the latter known in the market as 'LRQA'.

Gaining accreditation to the ISO 50001 standard is one way ship operators can answer society's demand to reduce the environmental impact of their getting goods to market, according to Apostolos Poulovassilis, Lloyd's Register's Regional Marine Manager for Europe, the Middle East and Africa.

"Energy management and the improvement of energy-efficiency levels are clearly going to be key success factors going forward, particularly for achieving compliance with new regulations and gaining a competitive advantage in an increasingly-complex business environment," Poulovassilis said. "By achieving ISO 50001 certification, the management and staff of MTM have demonstrated their commitment by early implementation of management best practices. They are one of the industry's visionaries with regard to environmental and energy performance."

Chris Hughes

Carrying Capacity of Liferafts — Revision to LSA Code Chapter IV

Amendments to Chapter IV of the International Life-Saving Appliance (LSA) Code, adopted at the 87th session of the Maritime Safety Committee (MSC 87) through Resolution MSC.293(87), introduce an increased assumed mass of occupants for the approval of liferafts.

From 1 January 2012, all inflatable and rigid liferafts should be constructed on the basis of an average person mass of occupants of 82.5 kg (increased from 75 kg). [*Compare with 80 kg in the NSCV* — Ed.]

Lloyd's Register's interpretation of the impact of this change on ships is as follows:

- All ships constructed (having their keel laid) on or after 1 January 2012 should carry liferafts approved on the basis of an average person mass of occupants of 82.5 kg. The safe working load (SWL) of any davits used for launching these liferafts should be adequate for their fully-laden weight.
- All ships constructed before 1 January 2012 may continue to use liferafts approved on the basis of an average person mass of occupants of 75 kg. It is acceptable for "75 kg liferafts" on these vessels to be exchanged at service intervals with "82.5 kg liferafts" and vice versa at a subsequent service. It is also acceptable for these vessels to have both 75 kg and 82.5 kg liferafts on board at the same time.
- On passenger ships constructed before 1 January 2012 Circular MSC.1/Circ.1347 permits the determination of the required SWL of a liferaft launching appliance to continue to be based on an assumed occupant mass of 75 kg, even though the liferaft has been tested to a higher mass standard. The installation and periodic "lowering test" should also continue to be based on an assumed occupant mass of 75 kg.
- On cargo ships constructed before 1 January 2012, any liferaft launching appliance should be based on the occupant number and mass stated on the liferafts

it will handle (i.e. 75 kg or 82.5 kg, as applicable). If the SWL of the launching appliance will be exceeded through the liferaft having been approved to a higher mass standard then it will be necessary for the davit to be reapproved, modified or replaced to achieve the required SWL, or the flag administration should be contacted for guidance.

Classification societies will conduct inspections to verify that this requirement is complied with, as part of Cargo Ship Safety Equipment and Passenger Ship Safety surveys.

Lloyd's Register, *Classification News*, No. 37/2011

New Requirements for the Periodical Survey of Bow, Inner, Side-shell and Stern Doors on Ro-ro Ships

IACS Unified Requirement Z24 introduced new periodical survey requirements for the bow, inner, side-shell and stern doors of ro-ro ships. These have been incorporated into Notice No. 2 to the Lloyd's Register's 2011 *Rules and Regulations for the Classification of Ships*. A free PDF copy of this Notice can be downloaded from the Lloyd's Register Webstore at

http://lloydsregister.axinteractive.com/products/312-rules-regulations-for-the-classification-of-ships-2011-notice-no2.aspx?utm_source=Class+News&utm_campaign=ebc60cbac0-Subscription_to_Classification_News7_19_2011&utm_medium=email

(existing webstore users will need to log-in first; new users will need to create an account.)

The new requirements will apply to Annual and Special Surveys commenced on or after 1 January 2012. The requirements for Annual Surveys will be included in the updated Survey Checklist which will be available on ClassDirect Live. These include a requirement for Close-up Surveys of securing, supporting and locking devices to be carried out.

- At Special Survey, in addition to the Annual Survey requirements, the following are to be carried out:
- The securing, supporting and locking devices, including their weld connections, are to be subjected to non-destructive testing and thickness measurement to the extent considered necessary by the Surveyor. The maximum allowable diminution is 15 per cent of the as-built thickness.
- The effectiveness of the sealing arrangements is to be verified by carrying out a hose test, or equivalent.
- The clearances of hinges, bearings and thrust bearings are to be measured. Unless otherwise specified in the Operation and Maintenance Manual (OMM), or by the manufacturer's recommendation, the measurement of clearances may be limited to representative bearings where dismantling is needed in order to measure the clearances. If dismantling is carried out, a visual examination of hinge pins and bearings, together with non-destructive testing of the hinge pin, is to be carried out.
- The non-return valves of the drainage system are to be dismantled and examined.

Special Survey master lists are being amended to add items for thickness measurement and hose test for bow, inner, side-shell and stern doors, as applicable.

Lloyd's Register, *Classification News*, No. 38/2011

LR's *Classification News* available by Email

LR's *Classification News* delivers up-to-date information on issues requiring urgent and immediate dissemination to the marine industry. It typically includes details on changes to statutory and class requirements, safety, and other technical issues. *Classification News* is now available by email: to subscribe, visit www.lr.org/classnews.

Germanischer Lloyd Accredited for Energy Management Systems Certification

Germanischer Lloyd (GL) has been accredited by DAkkS (Deutsche Akkreditierungsstelle), the national accreditation body for the Federal Republic of Germany, to provide worldwide certification of energy-management systems according to DIN EN ISO 50001:2011. GL is among the first certification organisations worldwide to be able to offer accredited certifications according to ISO 50001. A company's energy efficiency and performance can be sustainably improved by implementing systems and processes which conform to the new standard.

"The continuing increase in global greenhouse gas emissions should prompt many companies to rethink the energy-management systems they have in place", says Bernhard Ständer, Global Head of ISO Systems Certification at Germanischer Lloyd. "I am convinced that this new ISO-Norm will have a positive impact on the energy efficiency of many firms. Our experience has shown that implementing systematic energy management can not only improve the environmental performance of a company, but result in significant savings. In many countries, governmental support is available for the implementation and maintenance of such management systems."

The core rationale behind the ISO 50001 is to promote continuous improvement in the "energy and environmental performance" of a company. The norm describes the requirements for energy management systems, which will improve energy performance, increase energy efficiency and optimise the use of energy.

The European predecessor of the ISO 50001, the EN 16001 which was introduced in 2009, will be withdrawn as of 24 April 2012. During the transitional period, which extends until 24 April 2013, a conversion protocol has been implemented whereby companies with existing EN 16001 certificates can obtain ISO 50001 certification.

Seal of Approval for Caterpillar Marine Dealer Network

Caterpillar Marine Power Systems has contracted Germanischer Lloyd (GL) to certify the Marine Service Assessments (MSA) of its worldwide marine dealer network. The network consists of independent companies which provide sales services, commercial and technical support, as well as maintenance and repair of marine diesel engines and generator sets. Caterpillar® will use GL's MSA certification as the basis for standardising Caterpillar dealer after-sales

performance and quality worldwide in an effort to improve end-user satisfaction on a global scale.

The MSA process was established by Caterpillar to assess and set annual product-support related goals for their dealers. The need to standardise the service capabilities of its regional dealers globally quickly became a priority. GL was selected to conduct the certification due to its worldwide auditor presence and its in-depth experience in second- and third-party audits. Germanischer Lloyd will conduct the MSA certification using standardised audit methods, i.e. audits performed according to its own ship classification rules. Upon a successful Marine Service Assessment by GL, dealers will be given a GL certificate as independent evidence demonstrating capabilities as measured using a global standard.

The objective of an independent assessment of the technical and commercial performance of the worldwide dealer network is to set a benchmark for Caterpillar's service centres and to establish a common standard of evaluation. Another objective of the certification program is to help identify areas for improvement in the scope of dealer services, including functions such as: technical support, main shop repairs, field repairs, upgrades, parts sales, qualification of technical staff, back-up support, administration, disposition, customer satisfaction, and service and parts delivery time.

GL is continuously expanding its service portfolio by offering independent second- and third-party audits and due to Caterpillar's worldwide relevance and volume, certification of the MSA represents an important milestone for GL's certification services.

Mike Mechanicos

FROM THE CROW'S NEST

World's First Aluminium Floating Dry Dock

Allen Marine in Sitka, Alaska, has come up with what is claimed to be the world's first aluminium floating dry dock. The goal was to maximise lifting capacity, consistent with structural requirements and operational considerations, in order to be able to service vessel customers.

The floating dry dock is 160 ft (48.8 m) long with 42 ft (12.8 m) between the 26 ft (7.9 m) tall wing walls. The dock has a rated lifting capacity of 1000 tons (1016 t) at 5 tons/ft (16.7 t/m) of keel-block loading. It is segregated into pairs of compartments with a safety deck 6 ft (1.8 m) above the pontoon deck. The design incorporates features such as side-access doors through wing walls for moving machinery, pumping system, generator and control housing.

Allen Marine's floating dry dock provides marina operators and boat yard owners with a unique solution to the ever-increasing loss of premium waterfront land to residential and commercial development. The dock is eco-friendly; all wash-off from the cleaning operation is collected and disposed of strictly in accordance with local environmental laws. This is achieved by pumping the wash off from the integrated slurry tank to existing shore-based facilities or by installing the optional on-board water-treatment plant.

Principal particulars of the dock are

Length OA	160 ft	48.8 m
Beam OA	54 ft	16.5 m
Beam working deck	42 ft	12.8 m
Draft to top of keel blocks	12 ft 7 in	3.84 m

Maximum dimensions of docked vessels are

Length WL	125 ft	38.1 m
Beam	38 ft	11.6 m
Draft	11 ft 7 in	3.53 m
Displacement	1000 tons	1016 t

For more information and a photograph of the dock, visit http://allenmarine.com/boat-specs/floating-dry-dock

Phil Helmore

GENERAL NEWS

New Austal Vessel for Wind-farm Support

On 10 January 2012 Austal confirmed a contract for a fourth wind-farm support vessel for Turbine Transfers Limited. The order is the first for a new Austal design which will enable safer and more-efficient offshore wind-turbine service.

Welcoming the follow-up order from the UK-based company, Austal Chief Executive Officer, Andrew Bellamy, said that the shipbuilder had continued to refine and enhance its Wind Express vessel range following its launch in mid-2010 as part of a strategy to pursue new commercial vessel markets.

"There is clearly an increasing desire in the industry for vessels with enhanced capability, particularly in terms of performance in rough conditions," Mr Bellamy said.

"This is a challenge that we have already successfully addressed in the ferry and naval markets with our unique trimaran technology. We have now applied that expertise to develop and prove a new hullform which provides a step change in capability for the offshore industry."

The new design combines the seakeeping and fuel-efficiency benefits of Austal's trimaran hull configuration with a small waterplane area at rest, to deliver low vessel motions both in transit and when alongside turbines. This enables wind-farm personnel to be successfully transferred in considerably higher sea states than is practical with catamarans of similar size.

"For offshore wind-farm industry operators seeking to maximise productivity and safety in rough seas, this new hullform provides the highest possible levels of seakeeping, passenger comfort and fuel efficiency," Mr Bellamy said.

Managing Director of Turbine Transfers, Captain Mark Meade, said his company was using Austal technology to support the next phase of wind-farm development which would see a much larger number of turbines installed farther offshore and in other areas with rougher sea conditions.

"To do that we need to be able to transfer further, and in larger waves, while still providing the technicians we carry with comfortable transits and safe turbine step-offs," he said.

"The extensive analysis and tank testing that Austal has done makes me very confident that this new boat will enable us to do that, and provide us with a competitive advantage."

Andrew Bellamy said the new design would improve the viability of offshore wind farms by overcoming the seakeeping limitations of the support vessels currently used in the industry.

"To date most wind farms have been relatively close to the coast, and serviceable with fairly basic boats. Now as they move further offshore there is a need for a second generation of vessels that can address the significant challenges this brings.

"Being able to transport wind-turbine technicians comfortably in the rougher sea conditions over longer distances is the key requirement, and we have produced the solution to that need," he said.

As well as minimising seasickness amongst personnel and providing safer transfer conditions, the new design's enhanced seakeeping performance can improve the economics of offshore wind farms.

"Being able to operate in a broader spectrum of sea conditions increases overall operability which means that there is the potential to reduce the number of vessels and personnel required to support a given site; reducing capital and operating costs without sacrificing power generation reliability," Mr Bellamy explained.

Turbine Transfers is a wholly-owned subsidiary of Holyhead Towing Company, which has been operating work boats since the early 1960s. Turbine Transfers currently operates a fleet of over 20 fast catamarans that transport personnel and equipment to and from offshore wind turbines. Its long-term customers include Siemens, RWE NPower, Van Oord, Dong Energy, EnBW and Royal Boskalis Westminster.

The order is part of the company's ongoing fleet expansion plans which already includes three 21 m catamarans ordered from Austal in July 2011. Construction of those vessels is progressing well, with delivery scheduled for May 2012.

The new Turbine Transfers vessel is designed to operate in ocean areas of all European countries, including in the demanding conditions of the North, Irish and Baltic Seas. It is designed to operate in up to 3 m significant wave height.

The 27.4 m long, 10.5 m wide vessel will be operated by three crew and be able to transfer 12 wind-farm technicians, their effects and over four tonnes of deck cargo, stores and miscellaneous equipment.

Two 900 kW MTU diesels coupled to waterjets will provide a service speed of 23 kn, with the directional thrust of the waterjets being supplemented by a bow thruster for low-speed manoeuvring and station keeping. With an operating range in excess of 360 n miles, the vessel will be able to operate up to 75 n miles offshore, well beyond the distances of current wind farms.

The vessel will initially be chartered to Turbine Transfers for a period of up to five years. It is scheduled for completion in November 2012.

An impression of Austal's wind-farm support vessel
(Image courtesy Austal)

Austal Launches Second LCS

On 10 January 2012 Austal's Mobile, Alabama, shipyard completed the launch of the second 127 m Independence-variant littoral combat ship, *Coronado* (LCS 4).

The roll-out marked Austal's second use of an innovative self-propelled modular transporter system to transfer the ship from the yard's final assembly bay onto a floating dock for

Coronado (LCS4) after her launching
(Photo courtesy Austal)

launching. This system was first used in September 2011 to successfully launch USNS *Spearhead* (JHSV 1). Austal and the US Navy collaborated in the design of a new set of keel stands to support the ship during construction and to facilitate the transition from the assembly bay. Austal's own self-propelled modular transporters (SPMTs) supplemented those of Berard Transportation of New Iberia, Louisiana, to provide a total of 3869 t lift capacity on some 104 axle lines. In a three-step process, SPMTs lifted the entire ship and keel stands, raised *Coronado* almost one metre and moved the littoral combat ship into the moored floating dock. Supporting close to 2000 t, the SPMT operators aided by tug captains, the dock master and the Austal launch master, manoeuvred *Coronado* aboard the floating dock in an incident-free operation.

A major improvement in safety and efficiency, the new roll-out method has shaved hours off the transfer process, and serves as a capstone in Austal's effort to reduce cost and time required in future LCS deliveries.

The LCS and dock were then transported down river by tug to BAE Systems Southeast Shipyard, Mobile, where the ship was ultimately floated free of the keel stands, and was manoeuvred from the dock. The vessel was then towed back upriver to Austal's facility, where she will undergo final outfitting and activation before sea trials and delivery to the US Navy.

The 127 m Austal trimaran seaframe is the platform for the LCS's mission and weapon systems. This seaframe provides superior seakeeping and aviation capability as a result of its long, slender central hull and smaller side hulls ("amahs"). The trimaran hullform provides a large internal mission deck with a high-payload carrying capacity. Located above the mission bay is the enormous flight deck capable of conducting dual H-60 helicopter operations. The vertical location of the flight deck on the trimaran hull form provides the highest flight deck elevation on a combatant ship other than a major amphibious vessel or an aircraft carrier.

Coronado emerging from her assembly building before launch
(Photo courtesy Austal)

The launch of *Coronado* (LCS 4) closely follows the christening of the 103 m USNS *Spearhead* (JHSV 1) and the keel laying ceremony for *Choctaw County* (JHSV 2). Modular construction has also begun on JHSV 3 and *Jackson* (LCS 6) — the first of the 10-ship US Navy contract awarded to Austal, as the prime contractor, a year ago — in Austal's 65 000 m^2 Module Manufacturing Facility (MMF). Austal also has *Montgomery* (LCS 8) and JHSV 3 through JHSV 7 under contract.

For the LCS and JHSV programs, Austal is working in a partnership with General Dynamics Advanced Information Systems, a business unit of General Dynamics. As the ship systems integrator, General Dynamics is responsible for the design, integration and testing of the ship's electronic systems including the combat system, networks, and seaframe control. General Dynamics' proven open architecture approach provides affordable capabilities to the fleet quickly and efficiently.

Austal employs over 2100 highly-qualified shipbuilders, engineers and support staff in the United States and is steadily growing towards 4000 employees.

Submarine Sustainment Review Phase 1 Report

On 13 December 2011 the Minister for Defence, Stephen Smith, and the Minister for Defence Materiel, Jason Clare, released the report of Phase 1 of the *Review of the Sustainment of Australia's Collins Class submarines*, the Coles Review.

The review is being led by Mr John Coles, an independent expert from BMT Defence Services in the UK.

Sustainment of the Collins Class submarines is at the top of the Government's Projects of Concern list.

Mr Smith said the sustainment of the submarine fleet was a complex task that has proven challenging for Defence and ASC for a lengthy period of time.

In August, Minister Smith and Minister Clare released the terms of reference for the Review of the Sustainment of Australia's Collins Class submarines.

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

Just as the Rizzo Report provides a plan to improve the repair and management of the Navy's amphibious fleet, Mr Coles is developing a plan to improve the repair and management of our submarine fleet.

"The Coles review is an important step in implementing improvements to the way the Collins class submarines have been sustained over a long period," Mr Smith said.

Key Findings

Phase 1 of the report identifies a range of key issues that need to be addressed:

- Poor submarine availability caused by a crew shortfall, lack of spares and unreliable equipment;
- A lack of cohesion in strategic leadership;
- Department of Finance and Deregulation, the Defence Materiel Organisation (DMO), Navy and Industry not working collectively as an "Enterprise";
- A lack of clarity around accountability, authority and responsibility;
- Submarine knowledge thinly spread;
- Lack of robustness of Navy's contribution to manning and sustainment;
- No long-term strategic plan for efficient use of assets;
- DMO seeking direct involvement at the tactical level;
- A performance-based ethos not being embedded in ASC;
- No long-term strategic plan for efficient asset utilisation; and
- Unclear requirement and unrealistic goals.

Interim recommendations

Phase 1 makes interim recommendations about how to address some of these issues.

Mr Coles' interim recommendations are:

- 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, currently under discussion, 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; and
- 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 will commence immediately.

The Phase 1 report proposes the scope of work for Phase 2 of the review. Mr Coles has proposed four areas for detailed analysis:

(i) Integration and Program Management;

(ii) Commercial;

(iii) Engineering Reliability and Navy; and

(iv) Costing.

In Phase 2, the review team will gather and analyse data to put forward well-evidenced findings and recommendations on how to improve performance in Collins submarine sustainment.

Mr Coles will provide the Phase 2 report in April 2012.

The Coles Review will also inform development of the Future Submarine Project.

Minister Smith said that "Problems with the Navy's current Collins class are of long standing and well known. It is essential that Navy and Defence learn everything they possibly can from the experience with the Collins lass to inform development of the Future Submarine project."

"The implementation the Coles Review will help build confidence in our capacity to sustain our current fleet of submarines, so that we can turn with confidence to the acquisition program for our Future Submarine."

The report of Phase 1 of the Review of the Sustainment of Australia's Collins Class submarines is available at: http://www.defence.gov.au/dmo/

Progress with Australia's Future Submarine

On 13 December 2011 the Minister for Defence, Stephen Smith, and the Minister for Defence Materiel, Jason Clare, provided an update on the Future Submarine Project, SEA 1000.

The 2009 Defence White paper outlined the Government's commitment to acquire 12 new future submarines, to be assembled in South Australia.

Minister Smith said that the future submarine project is a major national undertaking and is of a scale, complexity and duration never before experienced within Defence. The submarines will be constructed over the course of the next three decades.

Options for the future submarine range from a proven fully-military off-the-shelf design through to a completely new

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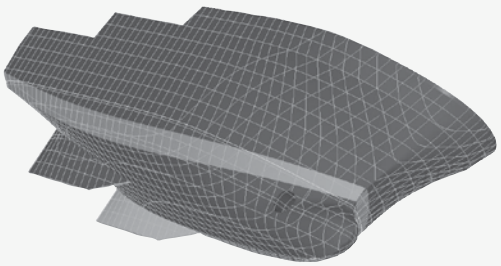

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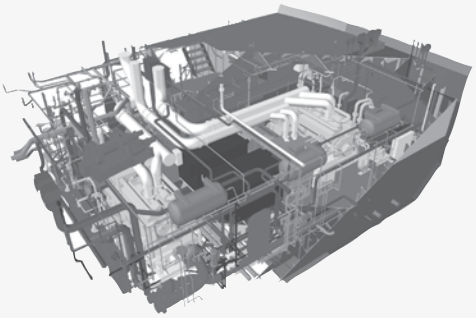

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submarine. All options are being considered, other than nuclear propulsion which the Government has ruled out. Development of the future submarine project is being informed by careful consideration of lessons learnt from the Collins-class project.

Minister Stephen Smith said that "Problems with the Collins class are of long standing and well known. It is essential that Navy and Defence learn everything they possibly can from the experience with the Collins class to inform development of the future submarine project".

The Government and the RAND Corporation also released the RAND study into *Australia's Domestic Submarine Design Capabilities and Capacities*.

The RAND Report has identified that Australia has a considerable amount of expertise but there are gaps. One key area in which we need to build expertise is in submarine propulsion systems. RAND has suggested that land-based test facilities are a useful way to begin to build that expertise.

The RAND report also found that Australia will need a significant amount of help from overseas to deliver the future submarines.

During 2011 the Government held high-level discussions with the United States on the future submarine project.

Minister Stephen Smith said that, at AUSMIN in November 2010, Australia and the United States agreed that Australian–United States cooperation on submarine systems was strategically important for both countries.

The high level of submarine interoperability between Australia and the United States and our technical cooperation will extend into the future submarine acquisition program.

The Government also announced that three important steps had been taken in the development of the future submarine programme:

- The Government has approved the release of Requests for Information to three overseas submarine designers offering off-the-shelf submarine designs which will provide a better understanding of the capabilities of off-the-shelf options. The designers are:
  - DCNS (France), designer of *Scorpene*;
  - HDW (Germany), designer of the Type 212 and Type 214 submarines; and
  - Navantia (Spain), designer of the S-80 submarine.
- Defence has entered into a contract with Babcock for a study into the establishment of a land-based propulsion-systems test facility which will inform engineering development of the future submarines.
- The Chief Executive Officer of the Defence Materiel Organisation will develop, in close consultation with the Australian Defence Industry, a Future Submarine Industry Skills Plan.

Government is expected make further announcements regarding the future submarine project in 2012.

In their study into Australia's submarine design capability, RAND estimated that designing a conventional submarine today would require an effort of 8 to 12 million man-hours over 15 years from a workforce of fully proficient, experienced submarine design personnel. This translates into a labour pool that, at its peak, would involve 600–900 submarine-proficient draftsmen and engineers in industry, plus 80–175 oversight personnel in Government.

The RAND team found that, while Government employs enough oversight personnel to meet its peak demand in most skill areas (although the availability of some may be in question insofar as they are involved with other naval and commercial programmes), such is not the case for Australian industry.

RAND estimated that Australia's present capability totalled 475 draftsmen and engineers, many of whom may be engaged in supporting the Collins-class submarine or other naval programmes and thus unavailable for a new submarine design team. RAND suggested that it was entirely possible that as few as 20 percent of today's workforce might be available to work on the new submarine.

In these circumstances RAND presented three options for Australia to consider:

Industry Option 1: Hire and train personnel from within Australia. This would require recruiting and training draftsmen and engineers with no submarine experience. Not only would this workforce need more man-hours and a longer schedule to design the new submarine, it would need to shrink as the design programme nears completion. However, the result would be the capability to design submarines solely within Australia.

Industry Option 2: Infuse submarine-experienced personnel from abroad. Adding submarine-experienced personnel from abroad to the design workforce — by recruiting internationally, by having Australia-based companies draw from their international offices, or by partnering with another country's design organisation — would shorten the schedule and lessen the cost increase. The advantage of this approach would be that, as the new design programme winds down, international personnel could return to their home countries. The disadvantage is that new submarine design programmes in the USA and UK may preclude the availability of experienced submarine design personnel from those countries, and Australia may not be left with the total capability needed to design a new submarine.

Preferred Option: Draw core personnel from the Collins class to start the future submarine programme, then grow new personnel. This would draw a core group of technical personnel from the workforce supporting the Collins class and other maritime programmes, and hire additional personnel both as replacements for that core and as a way to fill out the future submarine programme. This option would draw from the Collins-class experience, reduce the risk of under-resourcing the Collins class and other programmes, and likely incur reasonable costs in training. [1]

The RAND Corporation study *Australia's Domestic Submarine Design Capabilities and Capacities* is available at www.rand.org.

Reference

1. RAND Corporation Research Brief RB-9562-AUS, *Australia's Domestic Submarine Design Capabilities — Options for the Future Submarine*, 2011.

LHD Progress Report

On 13 December 2011 the Minister for Defence, Stephen Smith, and the Minister for Defence Materiel, Jason Clare, provided an update on the $3 billion LHD project. The two Canberra-class LHDs are the largest ships ever to be built for the Royal Australian Navy. The hulls are being constructed by Navantia in Spain with the superstructures and integration work being done by BAE Systems at their Williamstown Shipyard in Melbourne.

Work on the first ship, HMAS *Canberra*, is progressing on schedule. All 105 blocks that make up the hull of the first ship have been constructed and the hull is now complete. She is currently undergoing final fit-out with the installation of hospital, storeroom and accommodation facilities. The hull is expected to depart from Spain in July 2012 to be transported via heavy-lift ship to Melbourne where it is expected to arrive in August 2012.

In June this year work began on the four superstructure and three mast blocks at the Williamstown Shipyard. The superstructure and hull are expected to be consolidated in Melbourne in late 2012.

Work on the second ship, HMAS *Adelaide*, is progressing ahead of schedule. The keel was laid in February 2011, and so far, 60 of the 105 blocks have been erected on the slipway. Of the remaining blocks, 27 are currently in construction and final fit-out and 18 are in final paint and fit-out prior to moving to the slipway. The hull is expected to be launched in Spain in the third quarter of 2012.

More than 400 000 hours of labour have been worked on the LHD so far this year in Australia.

Upgrade for Anzac-class Frigates Approved

On 28 November 2011 the Minister for Defence, Stephen Smith, and the Minister for Defence Materiel, Jason Clare, announced that the Government has approved the upgrade of all eight of the Royal Australian Navy's Anzac-class frigates with an advanced anti-ship missile defence system.

The total project cost is in excess of $650 million, including the funds already spent upgrading HMAS *Perth*.

The Anzac-class Anti-Ship Missile Defence (ASMD) project has also been removed from the Projects of Concern list.

The 2009 Defence White Paper outlined the Government's intent to put all of the Anzac-class ships through an ASMD upgrade program, subject to the successful outcome of at-sea trials on the first ship. The upgrade of HMAS *Perth* as the lead ship for the ASMD program was successfully completed earlier this year.

Following exhaustive testing, including in the United States, the Chief of Navy agreed to the operational release of the system in July 2011. Government has now approved the installation of the system on the remaining seven ships of the Anzac class by 2017.

Minister Stephen Smith said that this was the latest weapon in Navy's arsenal and meant that the Navy's Anzac frigates would be a lot more capable. At the moment the frigates can track and destroy one target at a time. The new system is able to identify, track and guide missiles to multiple targets at the same time.

Minister Jason Clare said that the project was a great Australian success story — cutting-edge technology developed right here in Australia by CEA Technologies. The remaining upgrade installation and integration work will be undertaken by the Anzac Ship Integrated Materiel Support Program Alliance, comprising SAAB Systems, BAE Systems and the Defence Materiel Organisation.

Force Posture Review Progress Report

On 30 January the Minister for Defence, Stephen Smith, released a progress report from the expert panel preparing the Defence Force Posture Review.

The Force Posture Review is addressing the range of present and emerging global, regional and national strategic and security factors which require careful consideration for the future. It is being undertaken by the Department of Defence and overseen by an expert panel comprising two of Australia's leading national security experts, Dr Allan Hawke and Mr Ric Smith, both former Secretaries of the Department of Defence.

These strategic and security factors include:

- the rise of the Asia-Pacific as a region of global strategic significance;
- the rise of the Indian Ocean rim as a region of global strategic significance;
- the growth of military power-projection capabilities of countries in the Asia-Pacific;
- the growing need for the provision of humanitarian assistance and disaster relief following extreme events in the Asia-Pacific region; and
- energy security and security issues associated with expanding offshore resource exploitation in our north west and northern approaches.

The Force Posture Review report will feed into the 2014 Defence White Paper.

"It is essential that the Australian Defence Force (ADF) is appropriately positioned for the future", Mr Smith said.

"The progress report offers a range of thoughts and options on how the ADF could be better geographically positioned to respond in a timely way to Australia's strategic and security demands," said Mr Smith.

The progress report points to the Asia-Pacific Century as reinforcing the need for a force posture which can support operations in Australia's northern and western approaches, as well as operations with our partners in the wider Asia Pacific region and the Indian Ocean Rim.

The Review Panel identifies Defence's international engagement as a significant strategic asset.

Dr Hawke and Mr Smith point to expanding maritime capabilities as significantly influencing Australia's future force posture. Joint amphibious capability is envisaged as having a transformational effect on Navy, Army and the ADF generally, driving force posture considerations.

The Review Panel examines possible basing options in the north and north-west of Australia and the possibility of arrangements which enhance access to commercial ports.

The Review Panel also highlights the potential for greater wharf capacity and support facilities at HMAS *Stirling* (Fleet Base West) to support major surface combatant capability and operations.

Dr Hawke and Mr Smith also consider the potential for the Air Force to upgrade some of its bases to optimise the operational capability of new platforms and for Army to ensure that basing allocations best match our strategic objectives.

These initiatives, like many others discussed in the progress report, are longer-term options for consideration. No decisions have been made about individual proposals. Many of these options, including development of any new bases, involve substantial additional investment. No decisions on such options will be made until they have been considered as part of the 2014 White Paper process.

More broadly, the Review is also examining logistics support requirements, training areas for large-scale and joint training exercises, demographic and economic factors, public communications strategies, and engagement with industry, particularly the minerals and petroleum resources industries in Australia's north and west.

The Review's final report will be submitted to the Government at the end of March this year.

"The Government will then closely examine the Force Posture Review, which will form part of the security and strategic considerations for the 2014 White Paper", said Mr Smith.

With regard to RAN requirements, the progress report states:

"Permanent Navy bases in the north-west are not operationally necessary, given the availability of bases at Perth and Darwin, but there is a case for Defence to pursue improved access arrangements at commercial ports such as Exmouth, Dampier, Port Hedland and Broome.

"Defence to proceed with its plans to homeport the air-warfare destroyers and LHDs at Fleet Base East in the short term, but also develop additional options as set out below.

"Defence to develop options to expand wharf capacity and support facilities at Fleet Base West to:

(a) support major surface combatant capability and operations by:

(i) providing adequate infrastructure and facilities, including missile loading and maintenance facilities, to homeport at least one air-warfare destroyer as well as the future-frigate class; and

(ii) providing facilities which are also able to be used for deployments and operations in Southeast Asia and the Indian Ocean by US Navy major surface combatants and aircraft carriers;

(b) support submarine capability and operations by:

(i) enabling Fleet Base West to continue as the primary submarine homeport when the expanded future submarine fleet enters service; and

(ii) providing facilities that are also able to be used by US Navy nuclear-powered submarines.

"Defence to develop a long term option for establishing an additional east-coast fleet base for the LHDs and/or the future submarine, noting that Brisbane is:

(a) well provided with industry capacity for maintenance, repair and sustainment;

(b) closer to mounting bases (for embarking land forces) and likely operating areas in the archipelago to our north and the South Pacific;

(c) out of the 'cyclone belt'; and

(d) located in a nuclear-powered warship-rated port, to facilitate US Navy visits.

"Defence to plan to expand the capacity of bases at Darwin and Cairns to accommodate the OCV and replacement LCH:

(a) the scale and cost of any expansion at Darwin and Cairns would depend on the final size of the OCV; and

(b) the OCV will also need to be postured for its mine counter measures and hydrographic survey roles.

"Defence to develop a more consolidated long-term master plan for meeting Navy's Force 2030 basing requirements, which also addresses the implications of increased US activities and presence in Australia."

The progress report is available at: http://www.defence.gov.au/oscdf/adf-posture-review/

New Charter for Austal's *Westpac Express*

In December the Austal-designed, built and supported high-speed vessel *WestPac Express* was re-chartered for use by the United States Marine Corps, continuing a success story that began over 10 years ago.

Commencing as a direct continuation of the ship's current charter, the new contract with the United States Navy's Military Sealift Command (MSC) will start in February 2012 and last between six and 24 months. The contract is valued at approximately $US30.3 million if all options are exercised.

The charter will see the 101 m, US-flagged catamaran continuing to transport troops and equipment from the Marine Corps' Third Marine Expeditionary Force (III MEF). It is base ported in Okinawa, Japan where the III MEF is based, and operates throughout the Western Pacific.

Austal Chief Executive Officer, Andrew Bellamy, said that the charter reflected the ability of Austal to provide highly-successful long-term integrated ship and support solutions to military requirements.

"The ship has been meeting the Marine Corps' logistics requirements for over a decade, and doing so with virtually 100% reliability, reflecting the quality of both the ship and the in-service support we have supplied over the same period," he said.

"The ship's success was a significant factor in us becoming prime contractor for the US Navy's Joint High Speed Vessel and Littoral Combat Ship programs and, indeed, demonstrates the value that these new classes of ship will bring to the US Navy.

WestPac Express sailing from Okinawa
(Photo courtesy Austal)

"The fact that we have helped *WestPac Express* to maintain exemplary performance since delivery demonstrates our ability to provide effective support services to the JHSV and LCS fleets in the future, which is part of our strategy to develop the support part of our business."

Originally described as a Theatre Support Vessel (TSV), *WestPac Express* was first chartered to the III MEF in July 2001 for a "proof of concept" period. This was the first time the US military had contracted a commercial vessel of this type for military support. This charter was so successful that, after competitive tenders, the MSC signed a three year charter in January 2002 which was subsequently extended to February 2007. In 2005, MSC again sought competitive tenders for a new charter of up to 55 months and, after strong international competition from other high-speed vessel designs, *WestPac Express* once more proved to offer the best value, commercially and technically. That charter was subsequently extended to February 2012. The new charter was awarded after a similar competitive tendering process. Included in the ship's many achievements over the years was its support of humanitarian relief operations following the Japanese earthquake and tsunami in 2011. As part of Operation Tomodachi, *WestPac Express* delivered a Forward Arming and Refueling Point for use in the assistance operations. This enabled aircraft to conduct continuous operations without having to return to an established airport to obtain fuel, meaning helicopters could fly rescue and transport missions almost non-stop. The high speed catamaran also transported other supplies, communications equipment and personnel used in the relief operations.

In recognition of this service, MSC Admiral Buzby presented the ship's crew with United States Merchant Marine Medals for Outstanding Achievement at a ceremony on board the ship in Yokohama, Japan

HMAS *Kanimbla* Decommissioned

The last of the Royal Australian Navy's Amphibious Landing Platforms, HMAS *Kanimbla*, was decommissioned at her homeport of Garden Island, in Sydney on 25 November 2011.

Kanimbla's dedicated service was acknowledged in a traditional ceremony attended by the Chief of Navy, Vice Admiral Ray Griggs AM CSC RAN, and past and present crew.

During the ceremony the Australian White Ensign was lowered for the last time and handed to the Commanding Officer, Commander Brendon Zilko RAN.

"Today represents the closing of a fine chapter in the history of Navy's amphibious fleet," Commander Zilko said.

"HMAS *Kanimbla* has provided outstanding service and dedication to duty over her 17 years, actively supporting National and coalition operations spanning from the Western Pacific to the Middle East.

"*Kanimbla* was the first Coalition vessel to supply urgently-needed medical supplies to civilian hospitals in Baghdad. She also undertook numerous humanitarian aid and disaster-relief missions, providing relief to thousands of people in Vanuatu, Indonesia and East Timor."

"Today it is also important to acknowledge the hard work of *Kanimbla's* past and present serving personnel. They

The ship's company of HMAS *Kanimbla* marching off their ship during her decommissioning ceremony on 25 November 2011 (RAN Photograph)

are the lifeblood of the ship and *Kanimbla's* proud history is theirs. Their dedication is what has allowed *Kanimbla* to respond to the numerous tasks directed by Government in both war and peace."

HMAS *Choules* Reaches her Home Port

The Royal Australian Navy's newest ship, HMAS *Choules,* has arrived at her homeport at Fleet Base East in Sydney after being formally commissioned into service in Fremantle on 13 December 2011.

The Commander of the Australian Fleet, Rear Admiral Steve Gilmore AM CSC RAN, welcomed the ship and her crew of 158 and said that she would make an exciting addition to the Navy.

"It was terrific to see her sail through Sydney Harbour flying the White Ensign for the first time," Rear Admiral Gilmore said.

HMAS *Choules* has been named after the longest-surviving World War One veteran, Claude Choules, who passed away in April 2011 at age 110.

"The crew has already given the ship a strong sense of character through the hard work that has been undertaken in the lead up to HMAS *Choules'* commissioning," Rear Admiral Gilmore said.

The acquisition of this ship will help ensure that the Royal Australian Navy has the amphibious capability it needs for operations and humanitarian support in our region in the period leading up to the arrival of the Royal Australian

A mexeflote from HMAS *Choules* manoeuvring near the ship after her arrival in Western Australia in December
(RAN photograph)

Navy's Landing Helicopter Dock ships in 2014 and 2015. With a cargo capacity the equivalent of HMA Ships *Manoora*, *Kanimbla* and *Tobruk* combined, HMAS *Choules* has a proven capability, having provided humanitarian relief when she was under Royal Navy command as RFA *Largs Bay*, assisting as part of the international response to the Haiti earthquake in 2010.

The 176 m long vessel has a crew of 158 officers and sailors and can accommodate two large helicopters such as Sea Hawks or Black Hawks, 150 light trucks and 350 troops. HMAS *Choules* also carries two mexeflotes, which are landing rafts, designed to move goods and vehicles between the ship and the shore.

Austal Order for Efficient Medium Speed Ferry

In February Austal secured an order for a highly-efficient medium-speed ferry with leading French Polynesian operator and existing customer, SNC Aremiti Ferry. The 80 m vehicle-passenger catamaran is scheduled for delivery in October 2013.

This is the fourth vessel Austal has sold to Aremiti and its associated companies. The new ferry is expected to operate alongside an existing Austal catamaran between the islands of Tahiti and Moorea, expanding access to the area for locals, tourists and business operators.

With a fully-loaded speed of 20 kn, the new design brings the efficiency and other operating cost advantages which result from Austal's expertise in aluminium construction and multihull vessel design to the medium speed ro-pax ferry market. In particular, Austal leverages off its experience of producing over 220 vessels, including more than 130 catamarans and trimarans, to provide a very efficient hullform and combine it with a fully-optimised propulsion system.

Austal Chief Executive Officer, Andrew Bellamy, said that he was happy to be welcoming Aremiti back as a customer, and that the contract provided further evidence that the company's strategy was working.

"Repeat business is the ultimate measure of customer satisfaction, and so it is particularly gratifying that our first two new contracts for the year have come from existing clients," he said.

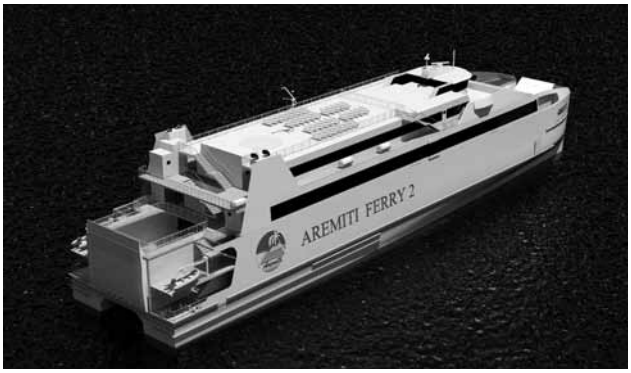
With a capacity for up to 967 passengers and up to 146 cars, or a mix of cars and trucks, the new ferry will be French-flagged and is designed to meet EU domestic voyage rule requirements. In addition to enabling local tourism and personal transport, the ferry will support inter-island trade. To do this the vessel has substantial truck capacity and will be certified to carry dangerous goods including flammable gases and flammable liquids.

With bow and stern ramps enabling drive-through operation, the vehicle deck features hoistable mezzanine decks and nearly 230 freight lane-metres suitable for trucks weighing up to 50 t.

Passenger seating will be split over two levels, with the bridge deck accommodating up to 435 passengers in one spacious lounge. The 532 passengers on the upper deck will be divided between two lounges, increasing comfort and reducing passenger disruption. The aft section features table-and-chair arrangements as well as tub- and lounge-style seating ,with the forward section predominantly aircraft-style seating. A kiosk is located in the middle of the upper deck, and passengers are also able to access a 114-seat sun deck.

The design meets the latest EU regulations governing access for disabled persons and persons with reduced mobility. This includes providing facilities for up to 24 passengers in wheelchairs, with a lift aft providing access between the main, upper and bridge decks.

Crew facilities include a laundry and separate crew and officers' mess areas.



An impression of the new ferry for SNC Aremiti Ferry
(Image courtesy Austal)

The ferry will be powered by four MTU 16V 4000 M53R engines coupled to fixed-pitch propellers. Four rudders and twin bow thrusters combine to provide excellent manoeuvrability. The Austal ride-control system comprising forward T-foils and aft interceptors will enhance passenger comfort by reducing vessel motions, and enables trim to be adjusted to enhance operating efficiency.

Aremiti has been operating shipping services between Tahiti and Moorea since 1991. Its current fleet includes the 56 metre high speed ferry *Aremiti 5* which Austal delivered in 2004.

Principal particulars of the new vessel are:

Length OA	79.6 m
Length WL	78.2 m
Beam (moulded)	17.0 m
Depth (moulded)	5.9 m
Hull draft (approx)	3.5 m
Passengers	967
Vehicles	146 cars, up to 228 truck lane-metres
Crew	20
Main engines	4 × MTU 16V 4000 M53R
Propulsion	4 × Fixed pitch propellers
Speed	20 kn
Classification	Germanischer Lloyd
Flag	France

One2three Vessels for Gladstone

Gladstone harbour is abuzz with shipping associated with the new LNG plants being constructed on Curtis Island. Three LNG Plants are being constructed by Bechtel on Curtis Island: Santos GLNG Plant, Australian Pacific LNG Plant, and British Gas LNG Plant.

Both the Santos/GLNG and Australian Pacific/LNG transportation networks have been awarded to Transit Systems Australia (TSA), who have extensive bus transportation networks both onshore in Adelaide (250 buses) and Perth (430 buses), and marine in Queensland with Big Red Cat, Bay Island Transit and Stradbroke Ferries. TSA, in conjunction with Forgacs, is one of three companies shortlisted to operate Sydney Ferries.

The Prime Minister, Julia Gillard, turned the first sod of soil to officially launch the $16 bn GLNG project, arriving on Curtis Island after taking a turn at the helm of the 24 m eco-ferry *Torresian* designed by One2three Naval Architects.

Julia Gillard at the helm of *Toressian*
(Photo courtesy One2three Naval Architects)

Kurrowera 1
(Photo courtesy One2three Naval Architects)

The scale of the construction operation is amazing, with multiple support vessels required. TSA's fleet requirements for Gladstone include the following:

Santos GLNG Plant

- 24 m One2three eco-ferry *A.L. Robb*
- 24 m One2three eco-ferry *Kurrowera 1*
- 24 m One2three eco-ferry *Torresian*
- 35 m One2three *Mandurama,* ex *Simply Magistic* from Sydney Harbour
- 35 m One2three enviro-cat *Capricornian Dancer*
- 35 m One2three enviro-cat *Capricornian Spirit*

Australian Pacific LNG Plant

- 24 m One2three eco-ferry *Brahminy Kite*, delivered January 2012 (more details in next issue)
- 17 m One2three emergency response vessel *Duffy*, delivered January 2012 (more details in next issue)
- 35 m One2three enviro-cat, on order for 2012 launch
- 35 m One2three enviro-cat, on order for 2012 launch

The British Gas LNG plant ferry transport has been awarded to Riverside Marine.

Mandurama ex *Simply Magistic* from One2three

Simply Magistic was acquired by Transit Systems Australia in September 2011. The 35 m catamaran was originally delivered to Blue Line Cruises from the North West Bay Ships yard as a charter vessel in 2003. The vessel was moved to Aluminium Boats Australia where she underwent an extensive refit to meet the Bechtel requirements for the Gladstone–Curtis Island route.

The extensive galley and bar fitout was removed, and the cabin re-configured for mass seating. All carpets were

Mandurama ex *Simply Magistic*
(Photo courtesy One2three Naval Architects)

removed and hard flooring added in accordance with Bechtel requirements. The vessel is now configured with 254 internal seats on the main deck and an additional 52 external seats on the open upper deck. Service speed is in excess of 20 kn using the existing 2×Cat 3406E engines, each rated at 522 kW brake power.

Capricornian Dancer from One2three

Capricornian Dancer is the first of five 35 m high-capacity ferries for operation on the Gladstone–Curtis Island Route. Built by Aluminium Boats Australia (ABA) and launched by the Premier of Queensland, Anna Bligh, in October 2011, *Capricornian Dancer* is configured for 400 passengers, with 304 internal seats on the large main deck and an additional 99 internal seats located in the upper deck cabin. Bechtel, the construction company for both LNG plants, requires all workers to be transported in air-conditioned comfort. A further 33 'excess' seats are located on the open decks for those who prefer to enjoy the Gladstone mornings outside.

The vessel features large-capacity boarding arrangements, with two streams of passengers aft via two gates and a double-width accessway midships providing for rapid embarkation of passengers. Immediately on entry is a large open-shelved luggage rack, principally for carriage of tools and daily equipment.

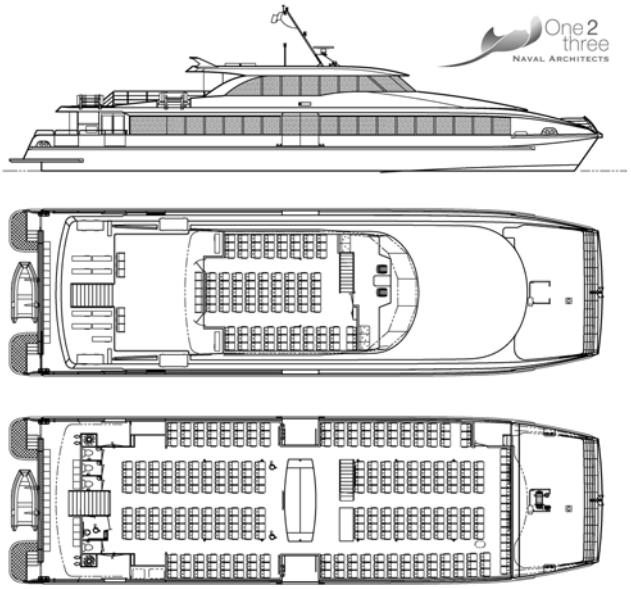
The hullform is based on the ABA/One2three 24 m low-wash ferry hull, which is the only Australian hull to be approved by the Environmental Protection Authority for use in sensitive areas. As well as being low wash and low draft, the hull package features waterjet drive, no appendages, and a rounded bluff bow, allowing the vessel to operate in shallow sea-grass bed feeding areas.

Australian dugongs are particularly threatened by private and commercial vessels, due to their slow-moving ability, extremely-poor eyesight and regular surfacing characteristics. Whilst they live for up to 70 years, they are slow to reproduce, females being typically 10–17 years old before producing a single calf once every 3–5 years. Both Moreton Bay and Gladstone Harbour support dugong populations and are well-known breeding areas.

Capricornian Dancer is the first commercial vessel world-wide to be fitted with the newly-released Rolls-Royce 40A3 series waterjet, providing increased thrust and better cavitation characteristics. Rolls-Royce developed the waterjets around this project and, in fact, have supplied the jets pre-mounted to the transom and bottom shell for ease of installation. The vessel is powered by quadruple Scania DI12-69M engines rated at 499 kW brake power at 2275 rpm, driving through ZF-500 gearboxes and composite single-span lightweight shafts.

Weight control was paramount during design, and the vessel has been 3D modelled in ShipConstructor, including all structure for nesting and major machinery components. Further attention to low-weight components during the build in conjunction with the Rolls-Royce waterjets has seen impressive performance figures achieved on trials. With a top speed in excess of 35 kn, the vessel can transport a full load of 400 passengers and luggage at 30 kn.

Extensive CFD modelling of the hull was undertaken in-house to investigate further resistance-reducing



General arrangement of *Capricorn Dancer*
(Image courtesy One2three Naval Architects)

modifications, principally aimed at better mid-speed performance in the 22–28 kn range. This has resulted in a cruising speed of 25 kn with 400 passengers being achieved at a modest 70% MCR, where fuel consumption is less than 400 L/h.

Cruising speed inside Gladstone Harbour is sub-25 kn. *Capricornian Dancer* can maintain service speed when fully loaded on three engines, providing a high level of redundancy which is a requirement in her daily operation to maintain 100% servicability. The return journey, when empty of passengers, can be achieved comfortably on just two engines, without cavitation concerns or manoeuvring issues.

The vessel has been designed for future coastal operation up to 30 n miles seaward, and is fitted with an active Humphree interceptor ride-control system. This permits operation out to nearby Barrier Reef islands and allows TSA to transfer the vessel anywhere within its transport operations network.

TSA have a further three 35 m ferries on order, bringing the total ABA-built vessels in their fleet to twelve.

Principal particulars of *Capricornian Dancer* are

Length OA		37.00 m
Length WL		33.35 m
Beam OA		10.49 m
Depth		2.70 m
Draft		1.30 m
Deadweight		45 t
Passengers		400
Crew		5
Main Engines		4×Scania DI12-69M each 499 kW at 2275 rpm
Waterjets		4Rolls-Royce 40A3
Auxiliaries		2×MTU Kohler 65
Speed	(service)	25 kn
	(maximum)	30 kn at full load 35 kn light
Range		380 n miles at 25 kn with full load
Ride Control		Humphree interceptor

Capricorn Dancer on trials
(Photo courtesy One2three Naval Architects)

Main deck of *Capricorn Dancer*
(Photo courtesy One2three Naval Architects)

80 m Ro-pax Vessels for Curtis Island

In addition to the ferry fleet, Transit Systems Australia is also purchasing three 80 m ro-pax vessels to supply heavy trucking to Curtis Island. The three steel vessels are being constructed in China to full DNV Class, with the first vessel due for delivery in March 2012. Detailed design work is being undertaken in Korea. One2three has been appointed as technical advisor for the project, supporting the vessel's design compliance with the NSCV.

Profile of the 80 m ro-pax vessels
(Image courtesy One2three Naval Architects)

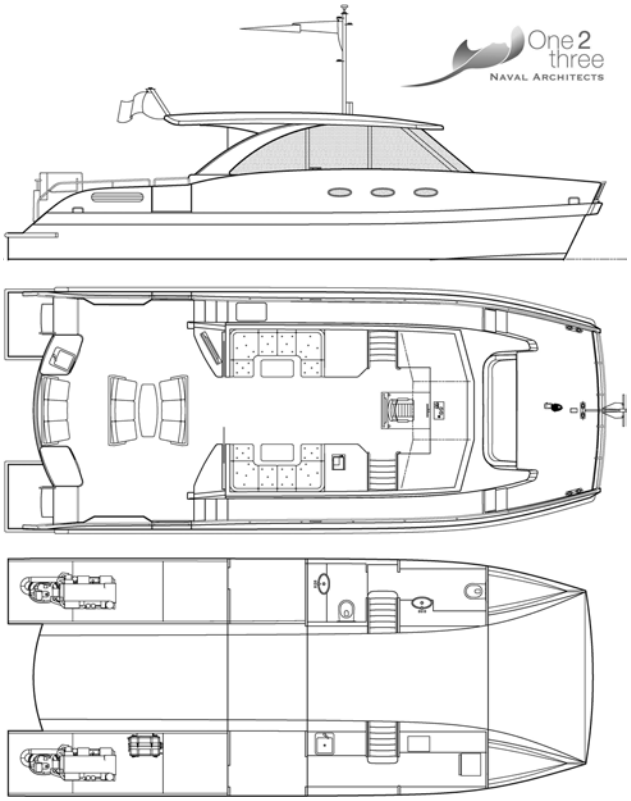
America's Cup Race Management Vessels from One2three

The 34th Americas Cup events have begun, with nine teams from around the globe sailing in identical AC45 sailing catamarans with wing sails. The series began in August in Portugal, with Round 3 just completed in San Diego. The world series events form the training ground for the Louis Vuitton Cup, which will be sailed in AC72s, developed by individual teams to a construction rule. The Louis Vuitton Cup is in its 30th anniversary with the winner earning the right to become the Challenger for the America's Cup. The Louis Vuitton Cup has special significance for Australia,

the winner of the first Louis Vuitton Cup being *Australia II*, which became the first challenger to beat the defender and claim the cup in 132 years.

The America's Cup Finals will be held in San Francisco in 2013.

One2three has been commissioned to provide the design for six America's Cup Race Management vessels to provide course marks and guest vessels for the America's Cup Race Management committee. These vessels are unique in the history of the racing event, being actual marks of the course and, at the same time, providing the ultimate ringside seat for guests. Imagine being onboard, watching duelling AC72s bearing down on you at speeds exceeding 30 kn and jostling for position metres from your seats!



General arrangement of the 13 m America's Cup Race Management vessels
(Image courtesy One2three Naval Architects)

The 13 m catamarans designed by One2three are set up as day-cruising vessels, with an open cockpit style ringed by foredeck and aft-deck seating. Bathrooms are provided in the port hull, while the starboard hull is dedicated to galley service and cocktail mixing.

The vessels are powered by a pair of Volvo IPS 450 units, each developing 246 kW brake power to give the vessel a cruising speed in excess of 28 kn. The IPS pods are fitted with dual counter-rotating propellers, fitted forward of the pods. To facilitate their duties as marks of the course, the vessels have been equipped with dynamic positioning software, with further enhancements to allow all vessel's positions to be controlled by the race controller, enabling course changes/adjustments to be made with ease.

The vessels are currently under construction by EAC Composites in China, using resin-infusion technology. Being for an initial order of six vessels, almost every composite part of the vessel is produced in moulds, developed by One2three. The first vessel has recently completed sea

First America's Cup Race Management vessel on the water
(Photo courtesy One2three Naval Architects)

trials and handover in San Diego, with the second and third vessels due to be delivered to the following World Series events in Naples and Venice, and the remainder to follow at four-weekly intervals.

The vessels are EU certified for operation in a number of European countries following the World Series events, and certified for operation in the United States. Each vessel has a One2three-designed dedicated shipping cradle, enabling the vessels to be loaded, along with the remainder of the America's Cup fleet, onto a transport ship for relocation to the next event.

Rob Tulk

15 m Catamaran Fish-farming Workboats from Incat Australia and Plastic Fabrications

One2three have custom-designed a fleet of 15 m catamaran multi-purpose workboats for servicing the offshore fish-farming industry. The new boats have been commissioned by Hobart-based Plastic Fabrications.

Incat Australia, in a return to traditional company links, constructed the first vessel, MV *Lindoy*, and assisted Plastic Fabrications with the specialist net gear equipment installation. Interestingly, MV *Lindoy* is the second-smallest catamaran to be produced by Incat Australia in 35 years of manufacturing, and is some 3 m smaller than the original Hull 001, *Jeremiah Ryan*, delivered by Incat Australia in 1977. The new boats will complement the client's existing fleet to service the significant aquaculture industry in the coastal areas around Scandinavia.

Plastic Fabrications have been extremely successful in developing and selling their net-cleaning MIC equipment to a worldwide market. The equipment is based around a sophisticated remotely-controlled submersible cleaning head that scrubs/blasts fouling and growth from the fish nets. The residue is removed from the fish net area to avoid causing health issues to the captive salmon. The market has demanded an increasingly-large platform to support this MIC equipment, so they approached One2three to assist them to develop a suitably-rugged platform to expand their range and market penetration.

The vessels feature a large open aft deck, powerful 20.8 t-m Hiab 224 hydraulic crane, hoppers, and specialist net-cleaning equipment from Plastic Fabrications. Yanmar engines coupled to conventional propellers power the vessels. Each vessel is designed to the EC and Nordic Yacht rules, and is maximised in length to remain inside the 15 m length limit which accounts for their straight stem.

Side boarding doors and water-access ladders are incorporated into the vessel's side to support net repair and cleaning operations, making the boat a true multi-purpose low-speed offshore support vessel.

There are two twin-berth cabins fitted into the side hulls forward, with appropriate services to provide comfortable accommodation for the crew who routinely operate on week-long shifts.

Principal particulars of the vessels are

Length OA	15.0 m
Beam moulded	5.9 m
Deck load capacity	8 t
Fuel oil	3100 L
Fresh water	1000 L
Sullage	1000 L
Main Engines	2×Yanmar 6CX-BMGT each 268 kW @ 2400 rpm
Cruising Speed	15 kn

Judy Benson

Lindoy returning from trials
(Photo courtesy Incat Australia)

Wheelhouse on *Lindoy*
(Photo courtesy Incat Australia)

Perez and *Deborah* from Incat Crowther

Incat Crowther has announced the launch of two 30 m monohull crewboats by Veecraft Marine in South Africa. *Perez* and *Deborah* are the first Incat Crowther-designed vessels to be built by Veecraft, and mark a fast-growing relationship between the yard and designer. Incat Crowther has developed a strong relationship with Veecraft Marine, and is pleased to be working with an accomplished shipyard in South Africa. The relationship not only gives Incat Crowther a presence in Africa, but it also offers the builder access to a world-leading portfolio of marine designs.

The vessels will be delivered to C&I Leasing in Nigeria, where they will operate in support of offshore energy installations. The vessels were specifically designed to be robust in operation, with simple systems, in line with the demands of the region.

Each vessel features a large working deck, protected by guard rails, with available cargo space of nearly 80 m^2. The main passenger cabin features doors forward and aft. There is a toilet and luggage rack aft, and comfortable seats for 30 passengers. The forward cabin doors lead directly to the bow-transfer station, protected by handrails, which allows safe, direct transfer to oil rigs. The wheelhouse features both forward and aft control stations with excellent visibility.

Each vessel is powered by three Caterpillar C32s, each producing 1081 kW, with propulsion by fixed-pitch propellers. Loaded service speed is 25 kn.

Perez and *Deborah* demonstrate Incat Crowther's diversity in product range, and will be joined shortly by a 20 m crewboat for the same operator.

Principal particulars of *Perez* and *Deborah* are

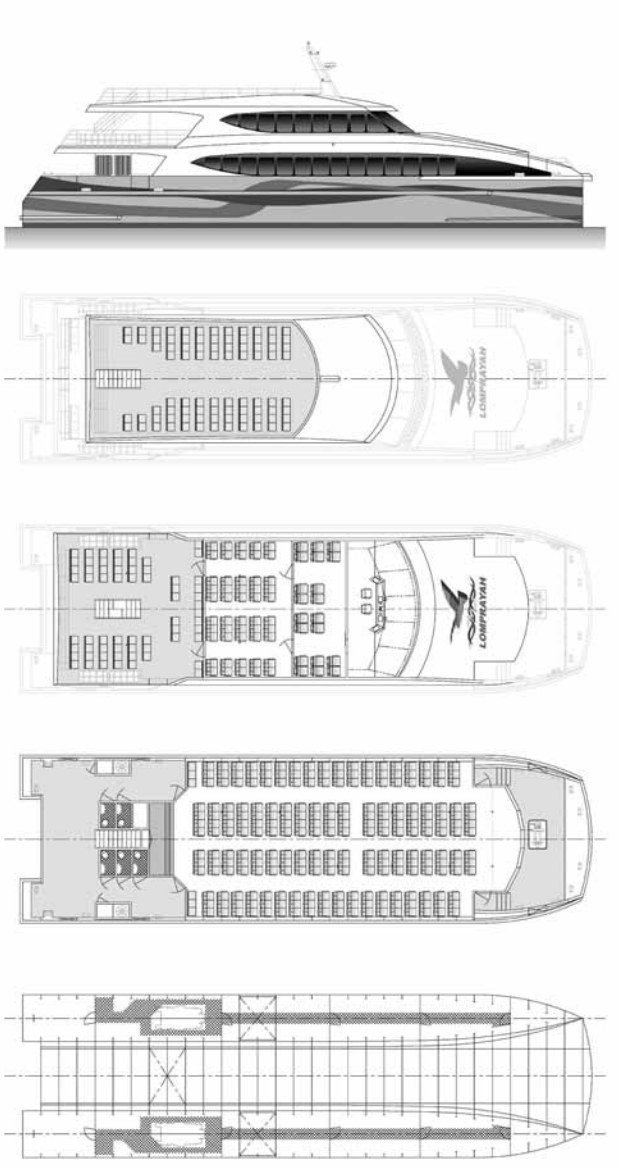
Length OA	30.0 m
Length WL	29.0 m
Beam OA	7.0 m
Depth	3.5 m
Draft (hull)	1.5 m
(propeller)	2.1 m
Special personnel	30
Crew	6
Deck cargo capacity	10 t
Fuel oil	20 000 L
Fresh water	10 000 L
Sullage	3000 L
Main engines	3×Caterpillar C32 (C rating) each 1081 kW @ 2300rpm
Propulsion	3×propellers
Generators	2×Caterpillar C4.4 86 kVA
Speed (service)	25 kn
(maximum)	30 kn
Construction	Marine-grade aluminium
Flag	Nigeria
Survey	Bureau Veritas
Notation	✠ HULL MACH Crew Boat Coastal Area

Perez and *Deborah* show their paces
(Image courtesy Incat Crowther)

32 m Catamaran Ferry from Incat Crowther

Incat Crowther has been contracted to design a 32 m catamaran ferry to carry 461 passengers, to be constructed by Seacrest Marine in Thailand. The new vessel will be the sixth vessel designed by Incat Crowther for Lomprayah,

following on from the 29 m catamaran ferries *Thongslah* and *Koh Prab*, which have been very successful, leading to a growth in Lomprayah's operation. The new vessel utilises Incat Crowther's plumb-stem hullform which delivers excellent fuel economy and seakeeping, and gives it a very low cost per passenger mile.



General arrangement of 32 m catamaran ferry for Lomprayah
(Drawing courtesy Incat Crowther)

Incat Crowther has been contracted to deliver a full production/design package for this project, which improves build efficiency and reduces material wastage. The design package consists of all major structure, including nested and cut aluminium, as well as major fitout components such as windows and air conditioning. The package also includes three-dimensional systems design, which will detail all piping runs and fittings.

Passengers will board the vessel through bulwark gates on both decks. The main deck has a large luggage area aft, as well as five toilet spaces. There is a large canteen at the aft end of the main-deck cabin, whilst a second luggage area is provided at the forward end, with 241 passengers accommodated on this deck.

The upper-deck cabin has a mix of economy-class seats and VIP seats in a separate rooms. Outdoor seats are provided on the aft upper deck, whilst there are also seats on the roof deck.

A pair of MTU 16V2000 M72 main engines, each producing 1440 kW, will easily push the vessel to a service speed of 25 kn, with propulsion by propellers.

Incat Crowther is pleased to extend their successful relationship with Lomprayah to this sixth vessel, and proud of the level of service offered in this design package.

Principal particulars of the new vessel are

Length OA	32.0 m
Length WL	31.0 m
Beam OA	9.0 m
Depth	3.2 m
Draft (hull)	1.2 m
Draft (propeller)	1.9 m
Passengers	461
Crew	4
Fuel oil	6000 L
Fresh water	2000 L
Main engines	2×MTU 16V2000 M72 each 1440 kW @ 2250 rpm
Propulsion	2×propellers
Generators	2×Caterpillar C4.4 86 kW
Speed (service)	25 kn
(maximum)	27 kn
Construction	Marine-grade aluminium
Flag	Thailand
Survey	Government Marine Department

Ahuva from Incat Crowther

Incat Crowther has announced the launch of the 20 m monohull crewboat *Ahuva*. Built by Veecraft Marine in South Africa, *Ahuva* will join the 30 m monohull crewboats *Perez* and *Deborah* in the C&I Leasing fleet in Nigeria. *Ahuva* is specifically designed for efficient and safe crew transfer to offshore energy installations.

Accommodating 25 passengers inside, the main-deck cabin features a forward-facing door on the port side which leads to a passenger walkway adjoining the bow passenger-loading area. The foredeck also accommodates a 27 m^2 cargo deck.

Stairs lead from the main cabin down to the hull, where four crew are accommodated in twin cabins. A bathroom, mess and galley are also fitted, as is a storage area for supplies.

Ahuva shows her paces
(Photo courtesy Incat Crowther)

Ahuva is powered by a pair of MAN 284LE410 main engines, each producing 820 kW. The vessel is propelled by Hamilton HM521 waterjets. The vessel will operate at a service speed of 25 kn, and is capable of a top speed in excess of 32 kn.

As with *Perez* and *Deborah*, the vessels were specifically designed to be robust in operation, with simple systems, in line with the demands of the region. Also like *Perez* and *Deborah*, *Ahuva* is classed by Bureau Veritas.

The diversity of these products is further proof of Incat Crowther's experience and capability.

Principal particulars of *Ahuva* are

Length OA	19.2 m
Length WL	18.5 m
Beam OA	5.5 m
Depth	3.0 m
Draft (hull)	1.1 m
Passengers	25
Crew	4
Fuel oil	5200 L
Fresh water	1300 L
Sullage	300 L
Main engines	2×MAN 284 LE 410 each 820 kW @ 2100rpm
Propulsion	2×Hamilton HM521 waterjets
Generators	1×Perkins 4.4gM 48 kVA
Speed (service)	25 kn
(maximum)	32 kn
Construction	Marine-grade aluminium
Flag	Nigeria
Class/Survey	Bureau Veritas ✠ HULL MACH Crew Boat

Titiroa from Incat Crowther

Incat Crowther has announced the launch of the 24 m catamaran ferry *Titiroa* by Q-west Boatbuilders in Wanganui, New Zealand. The vessel has completed sea trials, and has been delivered to Real Journeys, who will operate the vessel on New Zealand's South Island.

The delivery of the vessel is a story in itself. *Titiroa* will operate on land-locked Lake Manipouri, in the middle of the South Island near Queenstown. The delivery journey entailed sailing *Titiroa* to Bluff, on the southern tip of the island, removing the roof and transporting the vessel to the lake by truck. *Titoroa* was specifically designed and built with the removal of the roof and upper-deck side structure in mind.

Titiroa is the fourth Incat Crowther-designed vessel to be built for Real Journeys, following on from *Fiordland Flyer*, *Patea Explorer* and *Luminosa*.

As well as considerations for transporting the vessel, it was designed with three priorities. Real Journeys wanted to maximise passengers' experience of the outside environment. Incat Crowther has implemented design features such as low window sills, large forward windows and a polycarbonate roof on the upper exterior deck. All windows are double glazed to minimize fogging, whilst the main-deck windows also feature gutters above to keep them clear of rainwater.

The second goal was to create a vessel which has minimal impact on the environment in which it is operating. Significant steps were taken to reduce the wash generated by the vessel, as well as the fuel used in operation. All waste is stored on board and discharged shore-side.

The third goal was to have the vessel be as reliable as possible and minimise maintenance. Due to the remote location of the operation, breakdowns can have a disastrous effect on the operation. The main engines and other equipment were selected on the basis of their track record and availability of parts and are operated well below 100% MCR. The vessel's systems have been simplified and the structure has been over-designed to reduce fatigue.

The vessel is fitted with a pair of MTU 12V 2000 M70 main engines, each producing 787 kW. On trials, *Titiroa* easily achieved her service speed of 25 kn fully loaded at 66% MCR, as well as exceeding 30 kn in the light-load condition.

This vessel, including its specific design considerations for transport and environmental impact, once again demonstrates why Incat Crowther remains at the forefront of marine design.

Principal particulars of *Titiroa* are

Length OA	24.0 m
Length WL	22.0 m
Beam OA	7.5 m
Depth	2.4 m
Draft (hull)	1.0 m
(propeller)	1.8 m
Passengers	150
Crew	7
Fuel oil	6000 L
Sullage	1500 L
Main engines	2×MTU 12V 2000 M70 each 787 kW @ 2100 rpm
Propulsion	2fixed-pitch propellers
Generators	1×Caterpillar C4.4 51 ekW 1×Caterpillar C4.4 38 ekW
Speed (service)	25 kn
(maximum)	30 kn
Construction	Marine-grade aluminium
Flag	New Zealand
Class/Survey	New Zealand MSA Part 40A

Titiroa on trials
(Photo courtesy Incat Crowther)

Vėjūnas from Incat Crowther

Incat Crowther is pleased to announce the launch of a 24 m catamaran scientific research vessel. Built by Baltic Workboats in Estonia, *Vėjūnas* is a demonstration of the yard's experience, capability and build quality. *Vėjūnas*

also demonstrates Incat Crowther's expertise in designing a vessel with a large, practical work deck area and excellent stability and seakeeping for scientific work.

Classed by DNV, *Vėjūnas* has completed sea trials and has been delivered to Lithuania's Ministry of Environment for operation in the Baltic Sea. The vessel will monitor the Baltic Sea nearshore area and the Curonian Lagoon.

The aft deck features lower platform access, hydraulic A-Frame, 6.4 t-m Fassi deck crane and moonpool. The main-deck cabin features two work spaces. To port is a hydrological lab, with three workstations and bathroom. To starboard is a chemical-biological laboratory with sinks, four workstations and an 8 m^2 storage room. At the forward end of the cabin is a crew mess and galley facilities.

The upper-deck wheelhouse has excellent all-round visibility with direct access to the foredeck.

The hulls accommodate 11 crew members in five twin cabins and a single cabin for the captain. Each hull has a shower and toilet space.

Powered by a pair of Sisu CTIM84 main engines, each producing 302 kW at 2100 rpm, *Vėjūnas* easily exceeded 14 kn top speed in recent trials. She will operate at a service speed of 12 kn. The vessel's exceptional fuel economy of just 37.5 L/n mile at 10 knots gives *Vėjūnas* a range of over 2000 n miles.

Incat Crowther is proud to be working with Baltic Workboats. The relationship sees Incat Crowther reach a new geographical market, and brings Baltic Workboats a new range of technologically-advanced products to offer to its clients. An LR-classed passenger vessel based on a similar platform is due to be launched later this year.

Principal particulars of *Vėjūnas* are

Length OA		23.9 m
Length WL		23.3 m
Beam OA		8.00 m
Depth		3.40 m
Draft	(hull)	1.10 m
	(propeller)	1.50 m
Crew		4
Special personnel		6
Fuel oil		9000 L
Fresh water		1500 L
Sullage		1500 L
Main engines		2×Sisu CTIM 84 each 302 kW @ 2100rpm
Gearboxes		2×ZF 325-1
Reduction ratio		2.25:1
Propulsion		2×propellers
Generators		2×Sisu BMG 52
Bow Thruster		1×DTG GT320 20 kW
Speed	(service)	12 kn
	(maximum)	14 kn
Construction		Marine-grade aluminium
Flag		Lithuania
Class/Survey		DNV ✠1A1 LC R3 Cargo

Stewart Marler

Vėjūnas on trials
(Photo courtesy Incat Crowther)

High-speed Patrol Boats for Indonesia

Three high-speed patrol boats built by Strategic Marine for the Australian Federal Police (AFP) were delivered to the Indonesian Police Department last December.

The patrol boats, built at Strategic Marine's Singapore shipyards, were specifically designed for maritime conditions in Indonesia and surrounding waters and have the capability to pursue at high speed, intercept and board other vessels.

In announcing the contract earlier this year, the Minister for Home Affairs, Brendan O'Connor, said that the patrol boats would help tackle people smuggling in the region.

"The 16 m patrol boats are worth almost $5 million and will help the Indonesian National Police respond to and deter people smuggling in the region," Mr O'Connor said.

"These high-speed patrol boats will be based at strategic locations across Indonesia as an active force in the ongoing fight against people smuggling," he said.

Strategic Marine's Chief Operating Officer, Scott Nicholls, said that his team would be providing the Indonesian Police with training on key design features and operation of the vessels.

"We are excited to have been provided this opportunity by the AFP and look forward to delivering world-class patrol vessels, designed to take on the operational challenges faced by today's law-enforcement and defence departments," he said.

"Strategic Marine has a strong history of producing vessels for defence and police service contracts with over 240 maritime security vessels delivered to date world-wide."

Cruising

The summer cruise season has moved into high gear, with visits to Sydney in December by *Pacific Sun, Ocean Princess, Radiance of the Seas, Volendam, Rhapsody of the Seas, Pacific Pearl, Sea Princess, Zaandam, Pacific Jewel, Diamond Princess, Spirit of Adventure, Silver Shadow, and Celebrity Century.*

In addition to returns by many of these vessels, January added visits by *Seven Seas Voyager* and *Christopher Columbus,* and early February added visits by *Athena, Crystal Serenity, Seabourn Odyssey, Discovery, Amadea, Aurora, Albatros, Costa Deliziosa,* and *Regatta.*

Phil Helmore

Pacific Sun in Athol Bight in Sydney on Australia Day.
Due to the shortage of berths in Sydney, several cruise ships will be securing to the buoy in Athol Bight this season
(Photo John Jeremy)

EDUCATION NEWS

University of New South Wales

Undergraduate News

Thesis Projects

Among the interesting undergraduate thesis projects recently completed are the following:

Analysis of Submarine Hull Parasitic Drag

Adrian Phua conducted a numerical and experimental investigation into the parasitic drag (resistance) generated by a submarine's appendages and hull fittings. He used the Defense Advanced Research Projects Agency (DARPA) Suboff hullform and conducted a computational fluid dynamics analysis of the bare hull, and compared that to the DARPA towing-tank results and to the results of a model which he made and tested in the wind tunnel. He then added the appendages, principally the sail and fins, and compared the results, and then varied the position of the sail along the hull and the length/diameter ratio of the hull and compared results. One interesting outcome was that the sail had to be placed well forward, rather than around midships, for minimum resistance.

Post-graduate and Other News

Engineering Alumni Dinner

The year of graduation is taken as the year in which your testamur was awarded. For most graduates, this is usually in the year following that in which their last coursework requirements were completed. For example, if you completed your coursework requirements at the final exams in November 2011, then you would expect to graduate in April 2012, and 2012 would be the year of your graduation.

The Engineering Alumni Anniversary Dinner for 2012 will be held on Friday 17 August 2012 at 1830 in Leighton Hall, Scientia Building, for the graduates of 1962, 1972, 1982, 1992 and 2002. So, if you graduated with Greg Shannon (2002), John Colquhoun (1992), Frank Jarosek (1982), or Richard Hallett (1972), then you should be dusting off the tux or cocktail dress, polishing your shoes and asking your partner to keep that evening free.

The 1972 class is distinguished by being UNSW's seventh graduating class of naval architects, the first having been Brian Robson in 1963.

For further information, please contact Effy Ofidis on (02) 9385 7324, email invitations@eng.unsw.edu.au, or check www.eng.unsw.edu.au/info-about/news-events/events, and click on Coming Events, set the date to 2012 Aug, and click Apply.

Building Works

Major building works are about to commence for the Mechanical Engineering buildings. The tutorial building will be extended out to the laneway between the tutorial and laboratory buildings, and a further floor added on top of the tutorial building to provide more offices and classrooms. The laboratory building will be re-arranged, with the workshop moving to the southern end, and a large, open-plan lab space at the northern end which will cater for different types of portable experiments. Watch this space!

Within the Faculty, the new Tyree Energy Technology Building opens at the commencement of Semester 1, on the corner of Anzac Parade and the main walkway (where the tennis courts used to be). This will be the new home for the School of Photovolatic and Renewable Energy Engineering, and provide more much-needed classrooms.

Phil Helmore

New Chief Defence Scientist

On 23 December the Minister for Defence Science and Personnel, Warren Snowdon, announced the appointment of Dr Alexander Zelinsky as Chief Defence Scientist and Head of the Defence Science and Technology Organisation.

Mr Snowdon said that Dr Zelinsky is an internationally-recognised scientist who has made substantive technical contributions in addition to providing leadership to the high-technology community.

Dr Zelinsky has worked with private and public sector organisations at the senior executive level and is currently the Group Executive, Information Sciences Group, in the Commonwealth Scientific and Industrial Research Organisation (CSIRO).

"Since joining the CSIRO in 2004, Dr Zelinsky's focus has been on building the research capabilities of his Group to address Australian national challenges, particularly in energy, health, agriculture, mining and environment sectors," Mr Snowdon said.

"In his previous role as a Professor at the Australian National University, Dr Zelinsky was known for his pioneering work in developing novel technologies for human-machine interaction, which has been recognised as a key breakthrough technology by academia, industry and the wider community," he said.

Dr Zelinsky will assume the Chief Defence Scientist appointment in early 2012. His selection follows the retirement of Professor Robert Clark, which was announced on 1 August 2011.

Mr Snowdon also joined the Secretary of Defence in offering his thanks to the acting Chief Defence Scientist Dr Ian Sare, and the entire DSTO leadership team, for their excellent work during this time of transition.

"Dr Sare has done a wonderful job steering the DSTO team over the past several months, and I trust that the coming period will prove to be just as productive under Dr Zelinsky's leadership," Mr Snowdon said.

Emax E-Volution

Emax E-Volution is a solar hybrid schooner with a maximum speed of 28 kn and an unlimited zero-carbon cruising range at 14 kn. Designed by SAuter Design and built by Ned Ship, the 66 m Emax E-Volution is a culmination of the very best the yachting world has to offer.

The vessel has a number of solar hybrid power sources, including 2 MW of renewable energy supplied by wind, sun, waves and currents, 2 MW of ZF hybrid power supplied by MTU 2000 Series Tier 4i engines, the cleanest marine diesels on the market, and an additional 3 MW of energy harnessed from sustainable sources is stored and employed as ballast in a Lithium-ion UPS.

Emax E-Volution's stabilizing propulsion system features anhedral ZF 4000 Pods and a retractable anhedral foil. Combining the azimuth pods with a solar-powered bow thruster provides the advantage of full-time global positioning.

The photovoltaic exoskeleton embedded into Ned Ship's epoxy composite structure generates up to 300 MW of solar energy per year, enough to run all hotel services and offer up to 4000 n miles of carbon-neutral cruising at 22 kn.

Emax E-Volution's high aspect-ratio DynaWing sails are 20% shorter than a conventional rig, yet produce twice as much power. When moored or under severe weather conditions, the mainsails are reefed and the stay-less fully-rotational wingmasts are feathered into the wind. As a wingsail schooner, *Emax E-Volution* inherits the legacy of the greatest sailing vessels of all times, past and present.

Readily-available green OEM technology present in *Emax E-Volution* includes

- High modulus DynaWing stay-less schooner rig
- SunPower Solbian marine solar panels
- MTU Series 2000 Tier 4i 858 kW V12 engines
- Tesla 200 kW electric motors
- Tesla electronic controller with (KER) power sailing regeneration
- ZF 4000 azimuthing pods
- Ocean Yacht Systems rim-drive bow thruster
- MDI retractable anhedral foil
- Corvus lithium-ion 3 MW UPS
- Ned Ship Bio epoxy carbon-Kevlar composite structure
- Energy Star equipment, Ocean LED lighting, AC and refrigeration with waste-heat recovery

Principal particulars of *Emax E-Volution* are

Length OA	66 m
Beam	12 m
Draft	1.8 m
DynaWing sail area	1600 m^2
Power	2×ZF MTU Hybrid each 1050 kW
PV Power	Up to100 kW Over 300 MW-h per year
Sailing power	Up to 100 kW regeneration with 2×ZF 4000 Pods

For further details and arrangement drawings in colour, see

www.pressure-drop.us/forums/showthread.php?2065-The-E-Max-Evolution

and

www.sautercarbonoffsetdesign.com/ned-ship-emax-dyna-wing-evolution-66-web-page.html

Phil Helmore

RAN Sea Power Conference 2012

If you did not attend Pacific 2012, or did not find time to slip away from the International Maritime Conference to sit in on the occasional session at the RAN's Sea Power Conference, can catch up any time you like in the comfort of your own home (or office, perhaps). All sessions were recorded on video and are available on YouTube — simply search for 'sea power conference'.

John Jeremy

High Manoeuvrability at Low Speed with a Cyclic and Collective Pitch Propeller

Poowadol Niyomka, Neil Bose, Hung Nguyen and Jonathan Binns
National Centre for Maritime Engineering and Hydrodynamics
Australian Maritime College/University of Tasmania

A novel propulsion system, which promises high manoeuvrability at low speed, has been designed for an underwater vehicle to operate a long-range mission at low speed. The novel propulsion system is the cyclic and collective pitch propeller.

This article presents a brief background of underwater vehicles and examines their manoeuvrability The cyclic and collective pitch propeller, which is the focus of this research, is then introduced.with a description of how it works.

The research on this novel propeller provided many challenges, such as the uncertainty of the hydrodynamic behaviour of the propeller and difficulty of controlling an underwater vehicle with this novel propulsion system. This is a report on the current stage of this research and the details of the experiments which were used to assess the true performance of the propeller. The last section describes future work which needs to be completed in order to fully control the novel propulsion system on an underwater vehicle.

Introduction

General Background on an Underwater Vehicle

There are many different applications of underwater vehicles, such as ocean exploration, leisure activities, search-and-rescue operation, and inspections. Underwater vehicles can be categorised into two main groups according to their controlling methods. The first group is Manned Underwater vehicles (MUVs). This type of vehicle is not a new concept. Back in 1576, William Bourne, a British mathematician, published the first known detailed plan of an underwater navigation vehicle. His vehicle was capable of submerging by decreasing the internal volume. In 1620, Cornelius van Drebbel, a Dutch inventor, built an underwater vehicle possibly from Bourne's proposals. The vehicle was made of a wooden rowboat tightly wrapped with waterproofed leather. The detailed history of submarines can be found in (Field 1908).

The second group is Unmanned Underwater Vehicles (UUVs). The unmanned underwater vehicles gain popularity in submersible operations because MUVs can be hazardous to life and expensive to operate. The US Navy developed many of the technologies of UUVs in the 1960s and 1970s (Walsh 2008). UUVs can be categorised into four sub-types, based on the method of control and the energy supply. The simplest ones are the submersibles which are towed behind a ship and they have several sensors attached to the underwater vehicle's frame or body. Remotely Operated Vehicles (ROVs) are the second type of submersible vehicle. In operation, ROVs are attached with a power supply cable and a communication cable, usually from a mother ship and they are controlled directly by a remote operator. The third type is Unmanned Untethered Vehicles (UUVs). They are untethered and have their own energy supply on board, but they still need to be controlled by a remote operator via some type of a communication link. The last type is Autonomous Underwater Vehicles (AUVs). AUVs are similar to UUVs, as they are untethered and have their own energy supply. The difference between AUVs and UUVs is that AUVs do not require communication during their assigned mission (Mooney 2001). AUVs can operate independently without human support, and keep human personnel at a safe location on the water surface. In the scientific community, AUVs are becoming a less expensive method of obtaining ocean data compared with manned submersibles and surface science vessels. In addition, researchers can also deploy and monitor a number of AUVs at the same time to maximise the amount of data in the same expedition by using the AUVs' capability. The data from each AUV are transmitted back to a support base.

This research work focuses on a propulsion system for UUVs and in particular for AUVs for survey missions. The survey performance capabilities of these vehicles are usually assessed by their endurance and speed, the limited energy supply being a constraint on performance. To enhance their performance, their designs need to have a high-efficiency propulsion system and hullform. A torpedo-shaped hullform with a propeller mounted at the stern and the surfaces (sail, rudder, and hydroplanes) for control are the common designs of these survey-style AUVs.

Manoeuvrability of an Underwater Vehicle

To manoeuvre an underwater vehicle there must be force acting on the vehicle. A conventional control surface generates a lift force when its position has an angle to the flow. The magnitude of the lift force depends on the angle of the control surface, the area of the surface and the relative velocity of the flow over the surface. At low-speed operation, the relative velocity of the flow is too low to generate a sufficient amount of lift to manoeuvre an underwater vehicle. The generation of significant force at zero speed can, however, increase the capacity to survey significantly. The use of multiple thrusters is the simplest method; however, this requires more space, higher energy consumption and a higher-resistance hullform. This approach is typically taken for ROVs, where power limitations are not as great due to a constant supply through an umbilical cable. In addition, through-body thrusters are used in streamlined AUVs but they have limited effectiveness (Saunders 2003).

Another device is the use of oscillating flexible foils to generate and control propulsion and manoeuvring of underwater vehicles. The oscillating flexible foils imitate the movement of fish fins. Many fish robots have been built to demonstrate this technology. The details of some oscillating propulsors can also be found in Bose 2008, p. 135.

Another device which is suitable for AUVs is a vectored thruster. Instead of using each thruster to provide the control force in a particular direction (as does the propulsion system on ROVs), one vectored thruster can generate and control thrust in any desired direction. A vectored thruster works similarly to an azmuthing or podded propulsors. For example, the Bluefin-21 AUV has a single vectored thruster

to enhance its manoeuvrability during cruising, (Bluefin Robotics Corporation 2011).

The last device which can provide low speed manoeuvrability for an AUV is a Cyclic and Collective Pitch Propeller (CCPP). This device is a combination of propulsion and manoeuvring system for an underwater vehicle.

How the Cyclic and Collective Pitch Propeller Works

The mechanism of the CCPP allows the angle of each propeller blade to be positioned while the propeller shaft is turning. The operator can change the angle of every propeller blade to a particular angle, similarly to a controllable-pitch propeller, CPP. The angle of each propeller blade can also be positioned periodically. The most notable example of a rotor of this CCPP is the main rotor of a helicopter. The mechanism of the CCPP has a component called the swash plate. It provides the adjustment of the angle of the propeller blades. The swash plate assembly consists of two parts, the stationary and the rotated swash plates as shown in Figure 1.

The rotated swash plate rotates with the propeller blades and the propeller shaft.

The connecting linkages allow the rotated swash plate to change the pitch of the propeller blades.

The attached linear actuators change the angle of the stationary swash plate.

The operator can control the cyclic and collective pitch via the linear actuators.

The stationary and the rotated swash plates are connected with a spherical swash plate bearing between the two plates. The bearing allows the rotated swash plate to spin around the stationary swash plate.

The propulsion system in this research was designed and built at the Memorial University of Newfoundland in Canada. This CCPP was considered for alternative propulsion of the Canadian Self-Contained Off-the-shelf Underwater Test (C-SCOUT) vehicle and the research on this type of propulsion began in 2001. Bijleveld (2002) at Memorial University investigated the feasibility of this technology. The result of the investigation and experiment on a two-bladed propeller showed that this technology was feasible and that it had a high potential to be a combination of propulsion and manoeuvring system for an underwater vehicle. Humphrey began an in-depth study of this system in 2002 (Humphrey 2005). He achieved the development of a prototype of a CCPP. The section drawing of the prototype is shown in Figure 1, and Table 1 presents the specification of the prototype of the CCPP.

Development of Cyclic and Collective Pitch Propellers

There are other CCPPs which have different mechanisms. Although propulsion technology with the capability to generate side forces has been investigated within the surface vehicle industry for a long time, many questions have been left unanswered. In 1963 in Sweden, a ship propeller with separate turntable blades was patented (Lindahl 1965). The propeller pitch was controlled as a function of the angular position and it could be selected (Joosen et al. 1963). Haselton et al. (1966) conducted tests with a ship propeller model whose pitch angle could be varied in angular position in order to provide steering forces to a ship or submarine.

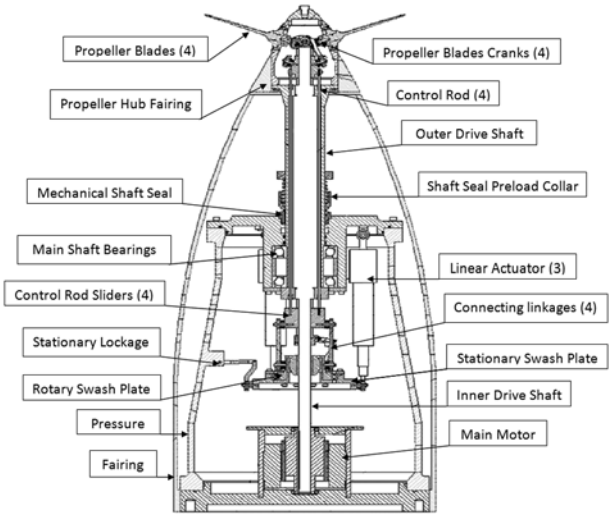


Figure 1: Hull mounted Mechanism of the CCPP (Humphrey 2005)

Overall Length:	838mm
Propeller Diameter:	305mm
Overall Diameter:	400mm
Propeller Area Ratio:	0.15
Blade Rake Angle:	20°
Blade Angle:	±29°collective, ±20° cyclic pitch
Number of Blades:	4
Main Motor Power:	1.1 HP (800 W)
Propeller Speed (max):	500 RPM
Main Motor Voltage:	48 V DC
Actuators Voltage	24 V DC
Control Voltage:	±12 V DC
Control Options:	TCP/IP, USB, PCI NI 6036E

Table 1: Specifications of the CCPP (Humphrey 2005)

Jessup (1976) conducted an experiment to demonstrate the reduction of propeller vibration and cavitation by the cyclic variation of blade pitch. Simonsson (1981) designed a Pinnate propeller. The pinnate propeller was a programmable pitch propeller. It had an even number of blades and the opposing blades were assembled in pairs on axles, which passed through the hub as shown in Figure 2. In 1984, Simonsson did full scale tests with the pinnate propellers on a Swedish Navy Patrol boat.

In the submersible-vehicle field, scientific investigations of the marine environment may employ underwater vehicles to monitor, survey, map the sea-bed and collect data. These kinds of missions require more time to take samples, and analyse and record the samples locally. Therefore, the underwater vehicle is required to hold its position to

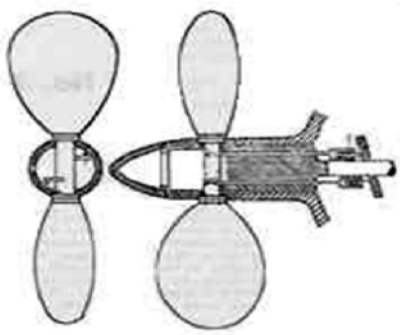


Figure 2: Principles of the pinnate propeller
(Simonsson 1981)

complete the tasks. The Tandem Propeller System (TPS) was proposed for a novel submarine propulsion and control system by Haselton (1961). The TPS is capable of manoeuvring in all six degrees of freedom. It has a pair of CCPP with one propeller at the bow and another at the stern. The TPS configuration is shown in Figure 3.

The TPS concept was not extensively developed at the time due to mechanical complexity and control issues, (Benjamin et al. 2008). They completed a renewed design of the TPS concept with an advanced control system, electric motors, and electric actuations. Figure 4 shows the initial demonstration vehicle.

In Japan, a compact autonomous underwater vehicle using a variable-vector propeller as shown in Figure 5 was developed by Nagashima et al. (2002). The development of this variable-vector propeller system utilised radio control helicopter elements of a swash plate and DC servomotors.

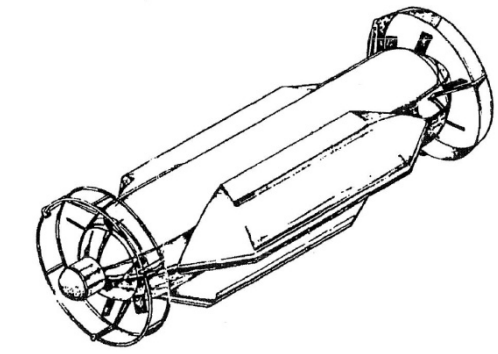


Figure 3: The configuration of the Tandem Propeller System
(Haselton et al.1987)

Challenges of Research

The objectives of this research are to develop and operate a remotely controlled underwater vehicle which is propelled by the CCPP, and then define the operational limits of this underwater vehicle. The CCPP is able to assist an underwater vehicle to perform complex manoeuvres, such as up and down, side to side, forward backward, pitch, and yaw.

The CCPP was only tested in a captive condition without any AUV body or any fairing. That test does not represent its performance in the real situation where the CCPP is attached behind an AUV body. The first research question arises from uncertainty of performance of the CCPP. In the experiment, the CCPP is attached behind an AUV body. In addition, the type of experiment is a self-propulsion test, which utilises the load varying (or constant speed) method (ITTC 2002).

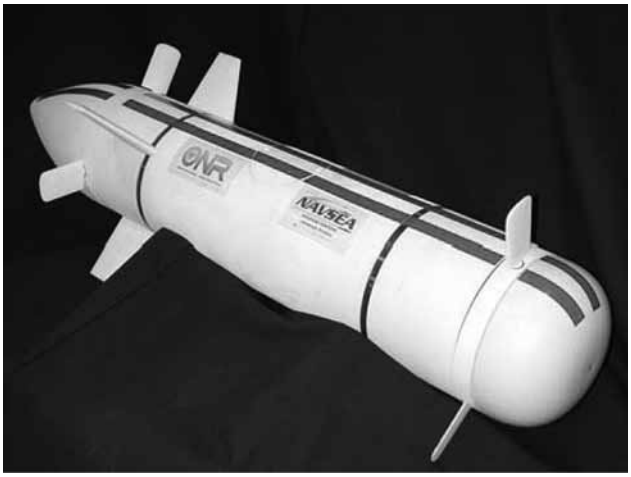


Figure 4: Initial demonstration vehicle
(Benjamin et al. 2008)

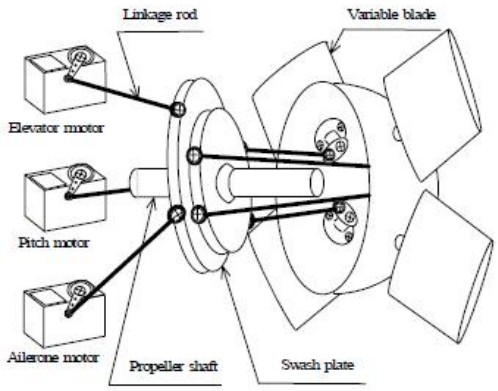


Figure 5: Assembly of Variable vector propeller
(Nagashima et al. 2002)

Its true propulsive performance will be found from tests in the Circulating Water Channel at the Australian Maritime College. Not only will the fore-and-aft performance be found in the experiment, but also the influences of thrust directions will be measured.

The second research question is "Can the CCPP be utilised to propel an underwater vehicle?" There is a number of tasks to be completed, before the answer is positively confirmed. The most important work is the completion of the control program required to control cyclic and collective pitch and to control RPM of the main shaft of the propeller.

With only the basic control system developed and many uncertainties about the hydrodynamic characteristic of the CCPP, it may be uncontrollable. The following issues may be causes for the difficulty of controlling the CCPP:

- According to Humphrey (2005), if the thrust coefficient, K_T, variation with blade angle is non-linear, then the CCPP will be difficult to control.
- According to Humphrey (2005), the measured thrust directions were not the same as the assumed thrust directions because the oscillating blades of the propeller created an unsteady flow effect. In his preliminary test, the unsteady flow effects were found to depend only on axial thrust magnitude.
- A generated torque is inherent when the propeller is operating. A cylinder-shaped underwater vehicle tends to roll if it does not have any devices which can generate torque to counter the torques generated by the propeller.

These issues lead to the third research question "Can an underwater vehicle with the CCPP be controlled by any operator with only minimal training?" In order to shorten the learning period, all mentioned issues must be overcome. The control algorithm for the blade angles must be modified to compensate for the non-linearity in the response curve of the thrust coefficient, K_T, to provide a linear thrust output for operation of a vehicle. The thrust coefficient in various conditions can be quantified by conducting captive experiments. The experimental data can also be used to assess the issue of lag of thrust direction. The issue can be solved by modifying the control algorithm for the propeller pitch by taking into account the relationship between thrust directions and input variables such as pitch angles, RPM of propeller, water speed, and angle of attack of a vehicle.

Research Outcomes

1. Measuring the current performance of the CCPP. The results of the experiment will be used to verify the mathematical model of the control system. In addition, the results could be used as a reference for future modifications of the CCPP.

2. Verification the mathematical model of the control system of the CCPP. The results would be used in the field of simulation of the behaviour of an AUV with the CCPP as its propulsion.

3. Demonstration of the employment the CCPP on an underwater vehicle in a restricted space such as in a swimming pool or in a test basin. The CCPP will be controlled manually or semi-automatically to operate on pre-defined courses.

Current Stage of Research

Currently, the research is at the stage of conducting preliminary captive experiments. In those experiments, the CCPP has been attached behind a body of an underwater vehicle. The underwater vehicle and its fairings have been designed and built as shown in Figure 6. The experiment adopts the load varying (constant speed) method to determine the performance of the propeller (ITTC 2002). Furthermore, the control system, which is capable of controlling the pitch of the propeller blade and the RPM of the propeller shaft, has also been developed.

The vehicle has been designed to be streamlined in shape with a cylindrical mid body, and an ellipsoidal nose. The overall length of the vehicle is 2.210 m and the diameter is 0.406 m. The underwater vehicle is attached to a large 6-DOF force balance through two stainless steel struts. Both struts are covered by a foil shaped fairing to reduce vibration and to provide a good quality flow to the propeller.

Test Setup

The large 6-DOF force balance was mounted on a steel frame, which was attached to hydraulic lifting equipment at the back. The front of the steel frame attaches to an aluminium barge as shown in Figure 7. The blades of the CCPP cannot be turned parallel to the flow. Therefore, in order to check the alignment of the vehicle to the flow, a dummy of the CCPP was designed and built. The dummy did not have any propeller blades. The underwater vehicle was located at 0.9 m below the water surface. The setup diagrams are presented in Figures 8 and 9.

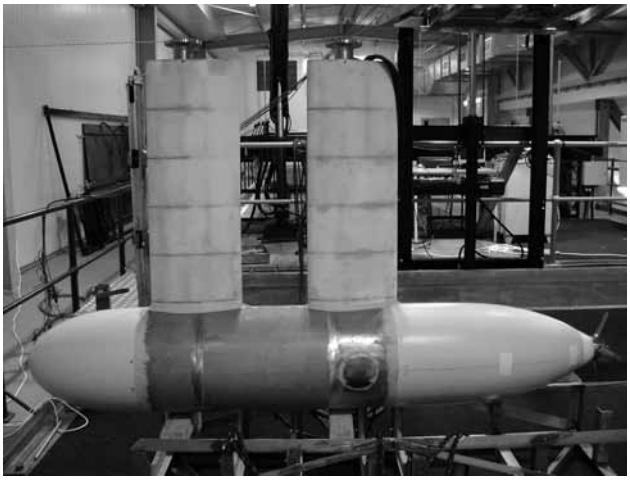


Figure 6: Photo of the underwater vehicle with the attachment

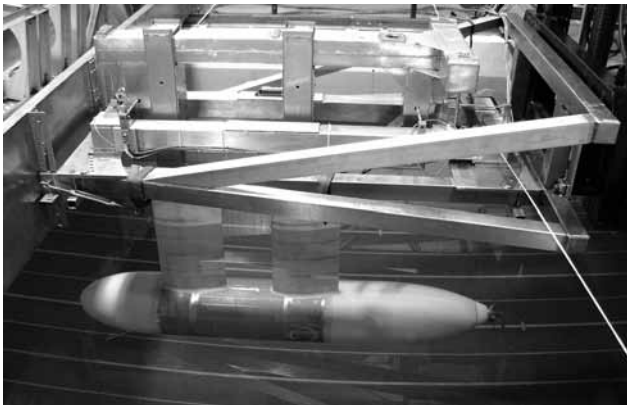


Figure 7: The large 6-DOF force balance mounted on a steel frame which is attached to the hydraulic lifting equipment.

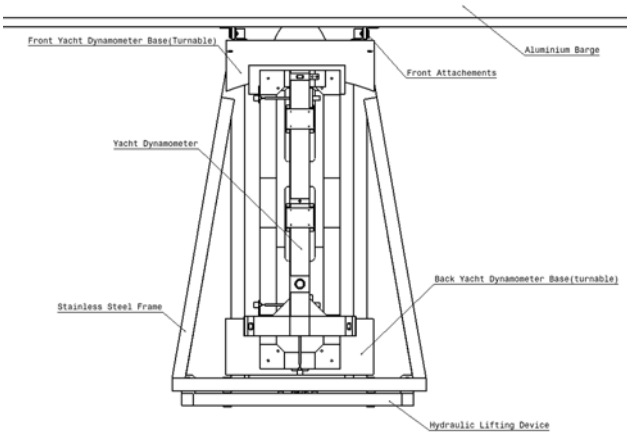


Figure 8: Setup diagram, top view

Future Work

After the captive test, all data will be analysed and will be used to modify the control algorithm. After the control program is modified, the control system of the vehicle with the cyclic and collective pitch propeller will be tested in an untethered test. The next process is to perform simulations of an underwater vehicle with the CCPP. After the simulation program is implemented, the vehicle will be conducted another experiment. This will be a free running experiment. The underwater vehicle will not be fully autonomous. The purposes of the experiment are to verify the simulation program and to demonstrate the capability of the underwater vehicle with the novel propulsion system.

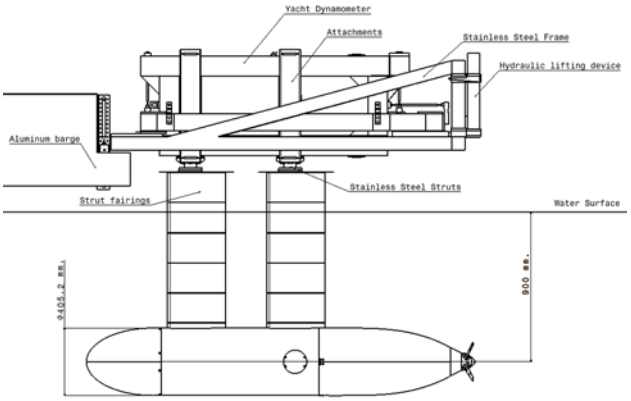


Figure 9: Setup diagram, side view

Conclusions

An underwater vehicle with the cyclic and collective pitch propeller will enhance manoeuvrability at low-speed operation. This novel propulsion system can both generate axial and side thrusts. Therefore, an underwater vehicle with this enhanced manoeuvrability can complete a survey mission, which requires the vehicle to be stationary or operating at low speed. The feasibility of using the CCPP was investigated. The result of the investigation and preliminary experiments showed that the technology of this propeller was feasible and that it had a high potential to be a combination of propulsion and manoeuvring systems for an underwater vehicle. However, there are still many uncertainties about the hydrodynamic characteristics of the CCPP that may cause an underwater vehicle to be uncontrollable. The captive test will determine the true propulsive performance of the CCPP behind an underwater vehicle. The test will determine the axial force, side forces and moments that the CCPP produces at different speeds. The information from the experiment will clarify the doubts, which concern the non-linear thrust and the shifting of the thrust directions. The information of the generated torque will be used to assess and select the method to prevent the vehicle from spinning.

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National System for Commercial Vessel Safety

AMSA thanks everyone who has participated in the development of the National System for Commercial Vessel Safety during the past year. The progress made would not have been possible without the generous help of industry stakeholders from Broome to Bateman's Bay, Cairns to Port Lincoln, and Darwin to Hobart. Everyone at the National System Project Office in Canberra and maritime agency colleagues around the country have benefited from this close collaboration. Comments and suggestions made during this time have been taken into account in developing a new version of the Regulatory Plan which will be released in early 2012. There may still need to be a few tweaks here and there along the way as we head towards implementation in January 2013, but this will be done through consultation and dialogue.

To register for updates on the National System and for any general enquiries or comments please email nationalmaritimereform@amsa.gov.au

Richard Wallace

Regulatory Plan Outcomes to be Released

In 2013, the Australian Maritime Safety Authority will become the national regulator for all domestic commercial vessels and their crews, and a National System will be established.

Given the differences between current state and Northern Territory marine safety laws, the creation of the National System will bring some changes to all states and territories. These changes will both establish national consistency and create a modern best-practice regulatory system which supports safety, productivity and efficiency.

In June 2011, AMSA released its vision for the National System in a document called the Regulatory Plan. The Regulatory Plan formed the basis for 29 consultation meetings around Australia through which over 1000 stakeholders had an opportunity to provide feedback.

Stakeholders were particularly concerned about the definition of a commercial vessel, grandfathering and transitional arrangements, consistency in survey outcomes, and arrangements for specific vessel types such as research, yacht race and heritage vessels.

In December 2001 AMSA released a report on the outcomes of the consultations. The report identifies all of the issues raised at consultation meetings and in submissions, as well as outlining the proposed treatment of these issues.

The Regulatory Plan will be amended in line with the recommendations contained in the report, and a final version will be issued in early 2012.

Discussion Paper on National Law Bill Released for Comment

A discussion paper summarising the essential elements of the still-developing National Law Bill has been released for consideration and comment. The Bill proposes to establish a new National Law for the safety of domestic commercial vessel operations in Australia, and the discussion paper summarises its following key parts:

- Scope, Objectives and Key Definitions
- National Regulator
- General Safety Obligations
- Certificates for Vessels and Seafarers
- Assistance and Reporting Requirements
- Maritime Safety Inspectors
- Infringement Notices
- Other Matters

Please visit www.nationalsystem.amsa.gov.au to access the Discussion Paper, which should be read in conjunction with the exposure draft of the Bill which was released for public consultation in early 2012.

In parallel, work on the Bill has focussed on the detail of the changed definition of "domestic commercial vessel" agreed in the Inter-governmental Agreement, as well as changes to the marine safety inspector provisions so as to more-closely align those provisions with existing laws in the jurisdictions.

Marine Orders and Regulations under the new Bill

The new Bill provides for both Marine Orders and regulations to be made for those matters which need to be prescribed.

Regulations are prepared for the Department and are made by the Governor-General on the advice of the Executive Council. Marine Orders are drafted by AMSA's Office of Legislative Drafting and are made by the CEO of AMSA. AMSA is obliged to make Marine Orders in accordance with the Inter-Government Agreement.

In either case (orders or regulations), the instruments must be tabled in Federal Parliament and are subject to disallowance. Transitional provisions or matters dealing with the definitions of a vessel, commercial vessel and recreational vessel must be prescribed by regulations, not Marine Orders.

There are 50 current Marine Orders under the Navigation Act, numbered from 1 to 97. We propose to have a separate series of Marine Orders under the Bill, numbered from 501 to make it clear that they are distinct from the Navigation Act orders.

Marine Orders will follow the structure of the Bill and provide for four kinds of certificates: survey, operations, vessel identification, and crew qualifications. The orders will give effect to the National Standards for Commercial Vessels by incorporating them by reference. The Bill also allows for exemptions to be made (e.g. for vessels not required to be in survey), and these will also be prepared by AMSA's drafters.

The regulations will provide transitional provisions so that an existing certificate of survey, registration, operation or other licence will permit continuation of the activities it currently covers until the certificate expires or needs to be renewed, or until the end of the phase-in period.

Draft of Marine Safety (Domestic Commercial Vessel) National Law Bill Released

The exposure draft of the Marine Safety (Domestic Commercial Vessel) National Law Bill 2012 is now available for public comment at www.nationalsystem.amsa.gov.au. The National Law Bill will implement the decision made by the Council of Australian Governments (COAG) in August 2011 to create a single National Law to regulate the safety of all commercial vessel operations in Australian waters. It will also establish a single National Regulator for commercial vessel safety — the Australian Maritime Safety Authority (AMSA).

The National Law primarily aims to provide the legislative basis for the National Regulator and allow the implementation of the new National System for the regulation of commercial vessels and crew in Australia to commence on 1 January 2013. The National Law is intended to replace current state and territory laws governing the operational safety of commercial vessels, in particular their construction, operation, and crew-qualification standards. Although it is being developed using these laws as a base, the National Law will be one Commonwealth law applied by the jurisdictions to fill any 'gaps'. This will ensure national coverage and allow any standards, rules and subordinate legislation (such as regulations and Marine Orders) to have consistent application and effect around the country.

The National Law is also designed to apply the National Standard for Commercial Vessels (NSCV) throughout Australia. The NSCV is a set of standards covering commercial vessel operation, construction and crew qualifications which has been developed by all state and territory transport agencies and agreed by transport ministers. The NSCV will be implemented through subordinate legislation made under the National Law.

As the National Regulator, AMSA will be responsible for the development and implementation of commercial vessel standards nationally, covering vessel construction, operation and crew qualifications. However, the National Law will allow AMSA to delegate certain functions to state and territory maritime safety agencies, which will undertake day-to-day interaction with the commercial vessel industry and implement the National Law.

Please note:

1. This exposure draft of the National Law Bill has not been cleared by Australian Transport Ministers,

2. As a general rule in Commonwealth legislation, 1 Penalty Unit = $110 for an individual and $550 for a body corporate.

We welcome your feedback, but hurry; the closing date for public comment is 29 February.

Richard Wallace
Manager Regulatory Communications and Consultation
Regulatory Affairs and Reform
AMSA

NSCV Part D Consultation Process Update

NSCV Part D consultations kicked off on the Gold Coast on 21 November 2011 and was followed by a three-week consultation period in Queensland. Over 400 stakeholders attended the 10 consultation sessions in different locations along the Queensland coast.

The second week of December saw the consultation move to the state of NSW involving three separate locations.

The most common issues raised during the consultation process were:

- The proposal for a new General Purpose Hand qualification.
- The introduction of a task book for sea-service accrual.
- The limitation of some certificates with regards to the Australian Coastal Middle Waters.
- The proposal for a new Coxswain Sail qualification, and
- Sea service accrual.

After a break for the festive season and taking into account the busiest period for vessel operators, public consultation recommenced during the last week of January and extended to the remaining states and territory. The dates and venues for the forthcoming consultation sessions are available on the NMSC website at www.nmsc.gov.au, where you will also find more information on the proposed changes to NSCV Part D. For dates and venues, click on News and Events/ Current Events/.

Please don't hesitate to contact the NMSC secretariat at secretariat@nmsc.gov.au for further enquiries.

National System Implementation Project Update

The heads of all State and Territory Maritime Agencies met in Canberra in December to discuss the approach for the implementation project and the schedule of key activities for 2012 in preparation for the commencement of the National System.

AMSA, as the National Regulator, will be responsible for developing and implementing the legislative framework, common regulatory and administrative outcomes, structures, protocols and reporting arrangements that make up the National System.

The Inter-governmental Agreement for Commercial Vessel Safety Reform identified a number of elements which would make up the National System. These include

- development and maintenance of relevant legislation and subordinate legislation;
- maritime standards development and maintenance;
- administrative and regulatory outcomes;
- vessel and seafarer certification activities;
- auditing and assurance mechanisms; and
- national maritime data management.

AMSA team leaders have been conducting extensive planning in their areas of responsibility and detailed plans are being produced. These plans will be shared with the jurisdictions so that the effort to establish the National Regulator and implement the National System can be effectively coordinated.

In a spirit of partnership, and addressing the need to minimise the initial impact of the National System to both regulators and the industry, delivery of the project will be a collegiate process between AMSA and the State and Territory maritime agencies. A multi-jurisdictional taskforce has been created to develop and deliver the operational system and the project-management team will be assisting with the deployment of the taskforce in each element of the National System.

National System for Commercial Vessel Safety, *Stakeholder Bulletin,* December 2011

Amendments to the IMDG Code

IMO Resolution MSC.294(87) introduces amendments to the International Maritime Dangerous Goods (IMDG) Code. These came into force on 1 January 2012, and include many editorial and technical changes to the operational requirements contained in the Code. The amendments will not affect the scope of surveys or certification carried out by recognised organisations.

The amendments to various sections of the Code include:

Part 1: Definition revisions, and revised text on training for shore-side personnel and provisions for high-consequence dangerous goods.

Part 2: Numerous updates to the classification of substances, and the inclusion of UN 3077 and UN 3082 entries for environmentally-hazardous substances.

Part 3: Various updates including guidance on cargoes which are mixtures or solutions, many cargo schedule updates, and packaging and labelling requirements for limited quantities and IBCs.

Part 4: Updates to packing and tank provisions.

Part 5: Revised transportation documentation requirements and special provision for segregation including updated requirements for consignment procedures.

Part 6: Updated requirements for construction and testing of packages.

For detailed information on the changes and other useful information relating to the IMDG Code, log in to the IMO's Global Integrated Shipping Information System at http://gisis.imo.org/Public/IAS/Public/Login.aspx (registration is free) and click on the 'IMDG Code' link. The amendments have also been incorporated into the 2010 Edition of the IMDG Code which is available from the IMO bookshop www.imo.org/Publications/Pages/Home.aspx.

Dangerous Cargoes — Grain

Lindsay Emmett

Have you ever stopped to consider that the grain in your humble sandwich can be one of the most dangerous cargoes a ship can carry in bulk? So much so that it is the only dry bulk cargo regulated by the International Maritime Organisation. Grain is among the earliest of cargoes, first carried in bags aboard ancient trading vessels. Ships continued carrying grain in bags until the mid-nineteenth century when the transport of grain in bulk began. The first to recommend methods to carry bulk grain safely were the 19th century underwriters whose business it was to insure grain cargoes. Their recommendations were not binding, but were accepted by shipowners for the purpose of obtaining insurance and they appeared to work well for sailing ships.

With the loss of many steam ships during the 1870s, in 1880 the British introduced the Carriage of Grain Act which outlined general grain carriage regulations for British ships. These regulations were extended to cover foreign ships in British ports by the Merchant Shipping Act of 1906. However, there was occasional criticism of the grain cargo regulations in that ships loading at foreign ports for countries other than Britain were not required to comply with the costly requirements set out in the grain cargo regulations for ships sailing to Britain.

The 1948 Convention on the Safety of Life at Sea (SOLAS 48) addressed these concerns by introducing the first set of rules for the carriage of bulk grain by vessels of all countries undertaking international voyages. SOLAS 48 basically formalised what was generally standard practice at that time. If you take the time to read the rules set out in SOLAS 48 for the carriage of grain, then you will find them to be very basic.

Up until the early 1960s, most ships which carried grain were 'tween deckers. Dedicated vessels for the carriage of bulk grain didn't appear until the mid 1960s. The SOLAS 48 grain rules stipulated the fitting of temporary longitudinal bulkheads, or shifting boards, in the lower holds and 'tween decks to stop the grain's tendency to shift transversely. In the 'tween deck, the rules required the fitting of feeder trunks. The idea of the feeder trunk was to act as a reservoir feeding the lower hold as the bulk grain there settled. This would keep the lower hold full as the grain settled so that a grain shift could not occur.

The Australian delegation at the 1948 SOLAS Conference also proposed the omission of shifting boards in holds due to timber and labour shortages if the grain carried was wholly in bags. The delegates accepted the proposal.

Although it was expensive to fit out a vessel to carry grain in bulk, the requirements of SOLAS 48 worked fairly well throughout the 1950s. By the 1960s, the success of the SOLAS 48 requirements raised questions suggesting that they may have been too stringent as well as time consuming to prepare a ship to carry bulk grain. One of the drivers for change was the cost burden on grain shippers.

So the 1960 SOLAS Convention modified the grain regulations and this turned out to be a mistake. The 1960 SOLAS conference basically adopted and extended the rules employed for the carriage of grain on the River Plate in South America and those used in the Persian Gulf trade, considering these services equivalent to the ocean trade.

The 1960 SOLAS Convention further relaxed the 1948 Convention by reducing the reliance on certain fittings and also allowed the stowage of bulk grain in partially-filled holds. Although the 1960 SOLAS Convention did no enter force until 1965, grain shippers recognising the significant cost savings under the new rules and adopted them immediately upon publication. Then the problems started.

One vessel to find herself in trouble was the American liberty ship, *Elaine*. In January 1965 one day out of Portland, Oregon, without warning the grain cargo shifted and *Elaine* took a serious list to starboard. Fortunately *Elaine* made it back to Portland under US Coast Guard escort. With the survival of *Elaine*, investigators were able to partially understand some of the problems associated with the carriage of grain.

Loaded in accordance with the SOLAS 60 requirements, *Elaine* should have had no trouble reaching her destination because the aim of rules was to immobilise the grain against shifting by the use of shifting boards. Regulators at the time considered the shifting of grain as the primary transport hazard. Shippers had also deduced from centuries of observation that grain settled and shifted during a voyage. The long-established thinking was that, because grain could flow, it had the same properties as a liquid.

From the investigations carried out on *Elaine* and other vessels, investigators were able to conclude that, no matter how carefully crews filled the holds, there would always be a void space under the deck over. This was because holds were impossible to completely fill. Investigators also found that feeder trunks were generally ineffective and, in some instances, actually caused stability problems.

It turned out that the ever-present void allowed the grain to shift as the vessel rolled and the feeders could never compensate because, in practice, the grain did not flow like a liquid. Investigators then considered that the vessel's stability was the key to the safe carriage of grain, rather than solely relying on immobilising the grain.

So, instead of assuming the holds were full, they made the assumption that there was a void space over the entire surface of the cargo and you should calculate whether the ship would survive if the grain ran to one side. This introduced the now-familiar grain-heeling moments. The ship would list, but the calculation would ensure that the vessel had sufficient reserves of stability to endure the heeled condition.

The end of the 60s saw the development of 'equivalent rules' for grain loading. The most important aspect of the equivalent rules was that the stability characteristics of a vessel determined its capability to carry grain safely.

These equivalent rules formed the basis of the 1974 SOLAS amendments concerning grain, and went on to form the basis of the International Grain Code in use today.

What does all this mean for today's naval architect? Fortunately, bulk grain is today primarily carried in vessels

specifically designed for the task. Even so, it is the duty of the naval architect, when calculating grain-heeling moments or developing a grain stability booklet, to ensure that the vessel meets the requirements of the International Grain Code in all respects.

If a naval architect has any concerns with the application of the International Grain Code, he or she should discuss them with their friendly government regulator.

Another concern is to ensure that the grain remains dry. A long-held view is that if the grain gets wet it will expand and could cause structural damage, but the author has never heard of a case where this has happened.

INDUSTRY NEWS

Wärtsilä to Supply Design for State-of-the-art Pipe Laying Vessels

Wärtsilä is to supply the design and propulsors/positioning system for two new flexible pipe-laying vessels (PLVs) for advanced operations in Brazil. The vessels are to be built at the Daewoo Shipbuilding and Marine Engineering (DSME) shipyard in the Republic of Korea. The owner and operator of the vessels is a joint venture formed between France-based energy-industry company Technip and the Brazilian oil-and-gas-industry company Odebrecht Óleo and Gás (OOG). The vessels will work on a long-term charter in Brazilian waters for Petrobras.

The contract represents a major breakthrough for Wärtsilä Ship Design in Brazil and is further recognition of Wärtsilä's leading position in ship design with one of the world's major shipyards. The new VS 4146 PLV design has been tailored to the stringent requirements of both the owners and Petrobras. The 145.6 m long vessels, which have a high pipe-lay tension capacity of 550 t, are designed to achieve optimal fuel consumption in the design condition, and to meet the need for efficient flexible pipe-laying operations. They will be utilised mainly to install umbilical and flexible flow lines and risers to connect sub-sea wells to floating production units in waters more than 2500 m deep.

"The selection of Wärtsilä Ship Design for this important and challenging project reflects our strong global track record in designing state-of-the-art pipe-laying vessels," said Riku-Pekka Hägg, Vice President Ship Design, Wärtsilä Ship Power. "These ships will be a high-profile representation of our capabilities in this area for oil and gas companies operating in Brazilian waters."

DSME, Technip, and OOG are all existing customers of Wärtsilä, having earlier ordered equipment and/or design services for numerous new construction projects.

Wärtsilä Completes Unique Conversion of Vessel to LNG Operation

The product tanker *Bit Viking* is the first vessel ever to undergo a conversion by Wärtsilä from heavy fuel oil to liquefied natural gas (LNG) operation.

The unique fuel conversion was completed in October 2011 and the ship was returned to the customer, Tarbit Shipping. The re-commissioned vessel is operated by Statoil along the Norwegian coastline and the conversion carried out by Wärtsilä enables it to qualify for lower NO_X emission taxes under the Norwegian NO_X fund scheme. The fund is a cooperative effort whereby participating companies may apply for financial support in return for introducing NO_X-reducing measures. Furthermore, LNG operation means lower carbon oxide emissions, and virtually no sulphur dioxide or particulate emissions whatsoever.

An impression of the new pipe-laying vessels to be designed by Wärtsilä Ship Design for service in Brazil
(Image courtesy Wärtsilä)

Bit Viking
(Photo courtesy Wärtsilä)

First Marine Dual Fuel (DF) Conversion

This is the first marine installation in the world to involve converting Wärtsilä 46 engines to Wärtsilä 50DF engines, and the first 50DF marine installation with mechanical propulsion. By operating on LNG, *Bit Viking* becomes one of the most environmental-friendly product tankers in the world.

In August 2010, Wärtsilä announced that it had signed a turnkey project with Tarbit Shipping to convert *Bit Viking* to LNG operation. The scope of the conversion package from Wärtsilä included deck-mounted gas-fuel systems, piping, two six-cylinder Wärtsilä 46 engines converted to Wärtsilä 50DF units with related control systems and all adjustments to the ship's systems necessitated by the conversion. The vessel's classification certificate was also updated. The engines are connected directly to the propeller shafts through reduction gearboxes, thus avoiding the electrical losses that are an unavoidable feature of diesel-electric configurations. This enables a significant improvement in propulsion efficiency, reduced fuel consumption, and corresponding reductions in emissions. This is the first LNG-fuelled vessel to be classified by Germanischer Lloyd.

New LNG Storage System

Bit Viking utilises Wärtsilä's new LNGPac system, which enables the safe and convenient onboard storage of LNG. The two 500 m^3 LNG storage tanks are mounted on the deck to facilitate bunkering operations and permit the bunkering of LNG at a rate of 430 m^3 per hour. The storage tanks provide the vessel with 12 days of autonomous operation at 80 per cent load, with the option to switch to marine gas oil if an extended range is required. When visiting EU ports, which have a 0.1% limit on sulphur emissions, the vessel operates on gas.

First Module to Berth for DDG 1000

The keel for the US Navy's first Zumwalt-class destroyer, *Zumwalt*, (DDG 1000) was laid at General Dynamics-Bath Iron Works shipyard in Bath, Maine on 17 November 2011 when the first module for the extraordinary ship was placed on the berth for assembly.

DDG 1000 is the lead ship of a class of next-generation multi-mission US Navy surface combatants. DDG 1000 will triple naval surface-fire coverage as well as tripling capability against anti-ship cruise missiles. DDG 1000 has a 50-fold radar cross section reduction compared to current destroyers, improves strike group defence by a factor of ten and has ten times the operating area in shallow water regions against mines. DDG 1000 is intended to fill an immediate and critical naval-warfare gap, meeting validated Marine Corps fire-support requirements.

The ship will carry two 155 mm Advanced Gun Systems (AGS) which fire the long-range land-attack projectile. DDG 1000's AGS battery is designed to satisfy Marine Corps naval gunfire support requirements by providing sustained precision and volume fire-support for US and coalition forces inland. AGS will fire precision-guided long-range land-attack projectiles which can reach up to 63 n miles, tripling fire-support coverage compared to the Mk 45 5-inch (127 mm) gun (widely used in the US Navy and RAN). In July 2008 the US Navy announced its decision to truncate the DDG 1000 program at three ships because of their very high cost and restart the construction of ballistic-missile defence capable DDG 51-class destroyers.

Construction began on DDG 1000 in February 2009 and, over the last two years, the US Navy and its industry partners have worked to mature the ship's design and ready their industrial facilities to build this advanced surface combatant. *Zumwalt* is currently more than 60% complete and is scheduled to be delivered in 2014. Construction on the second ship of the class, *Michael Monsoor* (DDG 1001), began in March 2010.

Designed for sustained operations in the littorals and land attack, the multi-mission DDG 1000 will provide independent forward presence and deterrence, support special-operations forces, and operate as an integral part of joint and combined expeditionary forces. This warship integrates numerous critical technologies, systems, and principles into a complete warfighting system. These include employment of optimal manning through human systems integration, improved quality of life, low operational and support costs, multi-spectral signature reduction, balanced warfighting design, survivability, and adaptability.

DDG 1000 will be 181.8 m long with a beam of 24.45 m. She will have a displacement of 15 763 t and gas-turbine electric propulsion with installed power of 78 MW for a speed of over 30 kn and a complement of only 148. In addition to the two 155 mm guns the ship will have 20 Mk 57 VLS modules with 80 launch cells for Evolved Sea Sparrow, Tomahawk and Asroc missiles. She will also be able to carry two MH60R helicopters or one helicopter and two UAVs.

These ships are enormously expensive. Some $US9 billion has been invested in research and development, and the unit cost of each ship is about $US6.6 billion.

The keel-laying ceremony for DDG 1000
(US Navy photograph)

An impression of USS *Zumwalt* in action
(US Navy image)

Sea Riding on *Aurora Australis*

Over the last year the RAN has chartered several vessels to fill the gap left by the early departure of HMA Ships Kanimbla *and* Manoora*. This article, by Lieutenant Commander Tony Paterson, RANR, gives an insight into the RAN's experience with one of these ships. It was published by the Sea Power Centre — Australia as* Semaphore*, Issue 7, October 2011.*

In order to maintain an amphibious capability, the Australian government chartered the research and resupply vessel, the icebreaker *Aurora Australis*, from P&O Maritime Services as a possible humanitarian assistance vessel over the period 8 May to 12 August 2011 [1]. While she was on standby for that tasking, the RAN used the vessel for sea familiarisation training with a number of such voyages undertaken during the charter.

The Australian Antarctic Division (AAD) also leases *Aurora Australis* to resupply its Antarctic and Southern Ocean bases and had a voyage to Macquarie Island scheduled for July–August 2011. The purpose of the voyage was to complete a personnel exchange, deliver cargo, and recover a significant amount of refuse which could not be disposed of on the island, including four Squirrel helicopters for planned maintenance in Hobart; 54 drums of aviation fuel which had passed their use-by date; and a lighter, amphibious, resupply, cargo (LARC) vehicle which was due for servicing and refurbishment [2]. The RAN saw this particular voyage as an opportunity for its 'Gap Year' participants, as well as a variety of other junior sailors, to sea ride and gain valuable experience [3]. Thirty-one trainees and a naval staff contingent of five, along with the crew of *Aurora Australis* and AAD personnel, undertook the resupply voyage to Macquarie Island, some 810 n miles south of Hobart [4].

Aurora Australis departed Sydney at 1500 on Monday 11 July for passage to Hobart. Sea conditions for the first day and night were good, but deteriorated in the afternoon of Tuesday 12 July when *Aurora Australis* left Gabo Island behind and ventured into Bass Strait where seas were very rough and the trainees quickly discovered what it is really like to be at sea. The weather, as well as many of the trainees, did not improve until late the following day when *Aurora Australis* was in the lee of Flinders Island and Tasmania itself. There was a slight detour to Port Arthur on Thursday 14 July where many went ashore and spent the afternoon wandering around the historic site before *Aurora Australis* weighed anchor late in the day and arrived in Hobart alongside Macquarie Berth No. 3 early on Friday 15 July. She moved to Macquarie Berth No. 4 at 0700 on Tuesday 19 July to enable the loading of stores and equipment, and sailed for Macquarie Island at 1610. A major pest-eradication program was underway on Macquarie Island, so many personnel onboard the ship spent the transit cleaning their clothes and equipment with virkon (a multipurpose disinfectant) prior to arrival.

Aurora Australis arrived off Macquarie Island just before sunrise on Friday 22 July. Weather conditions were too poor to allow helicopter operations, but watercraft operations in the morning saw the embarked LARC as well as the shore-based LARC begin moving the aviation fuel drums from shore to the ship and moving some personnel and cargo. A member of the RAN contingent with suspected appendicitis and the ship's doctor were also landed. In the early afternoon the wind picked up, leading to a halt in watercraft operations with the LARCs remaining ashore with some ship personnel and *Aurora Australis* in Buckles Bay with winds gusting at 50 knots. The weather temporarily abated as one weather system passed over the island, so one LARC attempted to ferry personnel to the ship but was forced to turn back when the swell picked up. At 1630 all operations were cancelled due to poor weather and light, with *Aurora Australis* leaving Buckles Bay and heading out to sea for the night, sheltering in the lee of the island.

Saturday 23 July provided the trainees with an example of typical Southern Ocean weather with a swell of 6 m, a Force 10 wind and a temperature of -4°C plus wind chill, hail and snow. The weather made the decks very unsafe so upper-deck access was limited to essential personnel only and the trainees spent the day working in various parts of the ship. The poor weather also meant that *Aurora Australis* could not enter Buckles Bay to continue operations — instead she steamed up and down the coast, which was relatively smooth, until she had to turn across the swell when reversing direction.

Sunday 24 July saw improved weather, and operations recommenced. One of the shore-based Squirrel helicopters was used for transporting personnel and cargo until poor weather shut down operations again at 1130, and *Aurora Australis* was forced to steam down the coast to Sandy Bay where conditions were more settled. When the weather ashore improved slightly, operations recommenced at 1240, albeit from Sandy Bay, and continued for four hours during which all cargo was moved ashore, all personnel were exchanged and one helicopter was packed away. The remaining three helicopters were recovered the next morning. That evening *Aurora Australis* was advised by the Australian Rescue Coordination Centre that FV *Janas* was nearby (about 32 n miles southeast of Macquarie Island) with a broken engine but did not require assistance.

Early on Monday morning, *Janas* contacted *Aurora Australis* to advise that engine repairs were still underway but at 0700, as *Aurora Australis* was approaching the anchorage in Buckles Bay to receive the remaining helicopters, *Janas* issued a distress call seeking a tow to the lee of Macquarie Island. *Janas* could not repair her engine and was drifting further away from *Aurora Australis,* which was the only vessel close enough to render assistance. *Aurora Australis* altered course towards *Janas* with the crew debating whether it was still possible to quickly embark the three helicopters from shore (it was not) and she sighted *Janas* at 0930 and joined at 1000. Notwithstanding the quick response of *Aurora Australis* there was a delay of four to five hours as the lawyers from the respective companies negotiated the legalities of *Aurora Australis* taking *Janas* under tow. P&O Maritime Services gave the go ahead and, after a number of attempts over a couple of hours, as the light was fading at about 1615, *Aurora Australis* managed to grapple the second messenger deployed by *Janas* (the first having parted), and

Aurora Australia
(Photo courtesy Department of Defence)

commenced the transfer of the towing hawser (with the trainees assisting in hauling it onboard). At 1717 *Aurora Australis* began the slow tow back to Macquarie Island to seek refuge from the impending poor weather.

Given the sea conditions, the tow back to Macquarie Island was at a speed of about 6 knots and it was not until 0300 on Tuesday 26 July that the ships were close enough to Macquarie Island to gain some respite from the winds and sea. That said, the conditions remained too rough (40–55 knot winds, showers, hail and snow) to do anything but remain under tow in the lee of the island, steaming up and down the east coast at 2–3 knots. The crew of *Janas* continued with efforts to repair their engine but the poor weather precluded *Aurora Australis* from transferring personnel and equipment to help with the repairs, although both *Aurora Australis* and station personnel provided advice by radio.

During Wednesday 27 July, *Janas* continued efforts to repair its engine while in the afternoon *Aurora Australis* recovered the three helicopters. She steamed up to the coast inside Buckles Bay to lessen the effects of the weather on the helicopters, clothed the naval contingent in polar protection gear and issued them with shovels and had them scraping and sweeping the ice and snow off the heli-deck — in an hour all three helicopters and crew were onboard. However, conditions remained poor and *Aurora Australis* had to leave its LARC behind as it could not be recovered. As *Janas* could not repair her engine under current weather conditions it was decided that a safe harbour was needed, the closest being the Auckland Islands (350 n miles from Macquarie Island). *Aurora Australis* sent its fast boat to *Janas* to pick up engine parts for its engineers to both repair and fabricate spares, as well as charts for the Auckland Islands. At a towing speed of 6 knots it took about 63 hours for both vessels to reach the Auckland Islands.

During the transit the crew of *Janas* continued work on their engine using engine parts repaired by *Aurora Australis*. Their major activity was cleaning the engine as their previous repair attempt had mixed oil together with water. Just after lunch on Friday 29 July, *Janas* started her engine and kept it running for the rest of the day, albeit without any pitch on the propeller. Onboard *Aurora Australis* the appendicitis case had worsened and it was decided that a medi-vac to a New Zealand hospital was necessary and this was requested through New Zealand's Rescue Coordination Centre.

On the morning of Saturday 30 July *Janas* successfully applied pitch to her propeller and about 0830 slipped the bridle with *Aurora Australis* recovering the towing hawser. *Aurora Australis* left *Janas* to undertake a series of engine trials and slowly proceeded into Port Ross, navigating carefully past nearly 300 southern right whales that were frolicking nearby. About noon, two Squirrel helicopters from Southern Lakes Helicopters arrived after a 243 n mile open-ocean flight to effect the medi-vac; some 80 minutes later after refuelling and, with the patient onboard, they departed for Dunedin Hospital, arriving four hours later [5]. *Janas* also entered Port Ross confident that her engine repair had been successful, as did a vessel from New Zealand carrying spare parts. The New Zealand Department

of Conservation lifted its bio-security requirements to allow *Aurora Australis* personnel to set foot on the World Heritage-listed Enderby Island, albeit there was frantic cleaning of clothing (and helicopters in case they were needed) before visiting the island. The highlight for many was watching 12-month-old albatross chicks still sitting in their nests and being buffeted by the strong winds. *Aurora Australis* then anchored deeper in Port Ross for the night in case she was needed again by *Janas*. She was not, and *Janas* was able to continue her three-month voyage fishing for Patagonian Toothfish in the Southern Ocean.

Sunday 31 July saw *Aurora Australis* commence her transit to Dunedin in very rough weather conditions. The pilot boarded her around 1000 on Monday 1 August to guide *Aurora Australis* into Port Chalmers and at 1215 she was alongside Beach Street Wharf. By 1400 many personnel were going ashore. Many New Zealanders left the ship here and flew 'home' while some cargo was also unloaded.

On Tuesday 2 August at around 1300 the lines were let go and *Aurora Australis* began her transit back to Hobart. The weather conditions were favourable and many spent their time cleaning their cabins before *Aurora Australis* tied up at Macquarie Berth No. 4 around 1400 on Friday 5 August, concluding the cruise.

While gaining valuable time at sea and the rare opportunity to work on a civilian vessel in the Southern Ocean, what did the trainees learn? The RAN has not operated in support of AAD since HMAS *Stalwart* undertook a resupply mission to Macquarie Island in December 1985 and, while the RAN has also undertaken the occasional fisheries patrol (to intercept illegal fishing vessels) in the Southern Ocean, it is now rare to venture that far south [6]. A major lesson was the impact of weather on ship operations and, in this particular case, its impact on the ability of *Aurora Australis* to resupply personnel on Macquarie Island [7]. A more important lesson was that all seafarers are essentially battling the elements each time they go to sea. For that reason, there is a centuries-old tradition, which long predates the *International Convention on the Safety of Life at Sea*, that ships will come to the aid of other vessels which are in distress. The assistance provided by *Aurora Australis* to *Janas* is but a recent example of this tradition — one to which the RAN adheres.

1. *Amphibious Ship Update*, Defence Media Release, MR129/11, 11 May 2011; and *Decommissioning of HMAS Kanimbla*, Defence Media Release MR234/11, 18 August 2011.

2. The lighter, amphibious, resupply, cargo (LARC) vehicle can operate on both land and water and is thus invaluable for Antarctic and Southern Ocean resupply missions. The LARCs were previously owned/operated by the Australian Army and eight were sold to AAD in 2009.

3. The ADF Gap Year provides an opportunity for individuals aged between 17 and 24 years of age who have completed high school to experience military training and lifestyle during a 12 month program.

4. This account draws heavily on *Aurora Australis'* daily situation reports.

5. She returned to Australia on a commercial flight on 3 August, accompanied by a medical officer.

6. Surveillance and enforcement is now conducted with leased civilian vessels by Border Protection Command. For RAN operations see Andrew Forbes, 'RAN Activities in the Southern Ocean', *Semaphore,* Issue 18, 2006.

7. See Andrew McCrindle and Rebecca Jeffcoat, 'The Effects of Weather on RAN Operations in the Southern Ocean, *Semaphore*, Issue 13, 2006.

Duyfken, the replica of the 17th century Dutch 'jacht', taking part in the Tall Ships Race on Sydney Harbour on Australia Day (Photo John Jeremy)

Australian Division Council

The Council of the Australian Division of RINA met by teleconference on Thursday 1 December 2011, chaired by the President, Prof. Martin Renilson.

The main item discussed was advertising in this journal, *The Australian Naval Architect,* to secure its future in its current form. While Council members are applying themselves to approaching corporate interests who may be interested in advertising and/or the future of the journal, all members are urged to identify such interests to the Secretary and approach them directly where appropriate. In relation to the current call that this journal places on the resources of the Division, Council gave initial consideration to developing a policy on the use of those resources. This will be further considered at the March meeting.

Other issues of note included:

- Council noted that preparations were in place for a successful Pacific 2012 IMC.
- Council considered the invitation from the Senate Committee on Foreign Affairs, Defence and Trade to make a submission to its Defence Trade Controls Bill inquiry and agreed to give the matter further consideration.
- Council adopted the Division's Budget for 2012.
- The President proposed that the Walter Atkinson Prize be re-activated for the best paper presented to a RINA forum in 2012. Council gave in-principle approval to this proposal, with details to be finalised at subsequent Council meetings.

The next meeting of Divisional Council will be held on Tuesday 27 March in Brisbane with the Division's Annual General Meeting being held later that day, also in Brisbane.

Rob Gehling
Secretary

Free Papers for Members

Members (including student members) should be aware that they are entitled to four free copies of RINA papers each year. This includes papers from previous transactions, conferences, etc., and is especially useful if you are interested in just one or two papers from a particular conference as you don't then need to buy a copy of the entire proceedings.

Papers published by RINA are searchable on the RINA website www.rina.org.uk; click on

Publications>Search Publications and Order.

The procedure for obtaining a free copy is to email your request to publications@rina.org.uk, with the subject line "Member's Free Paper", and specify the author(s) and year, the title of the paper, where the paper appeared (transaction year/volume, conference name and year, etc.) and, finally, your name and RINA membership number.

Free Places for Student Members at RINA Conferences

RINA also makes available two free places for Student Members of RINA at conferences organised by the Institution, including the Pacific International Maritime Conferences in Sydney.

The procedure for obtaining a free student place is to email your request to the Chief Executive, Trevor Blakeley, at tblakeley@rina.org.uk, and specify the conference, your name and membership number.

Phil Helmore

Trevor Blakeley presenting a 50-year membership certificate to Alex Townsend in Canberra on 8 February, watched by June Townsend. He also presented a 50-year certificate to Ian Williams during his visit to Canberra
(Photo Martin Grimm)

THE ROYAL INSTITUTION OF NAVAL ARCHITECTS

AUSTRALIAN DIVISION

NOTICE OF ANNUAL GENERAL MEETING

TUESDAY 27 MARCH 2012

Notice is hereby given that the Annual General Meeting of the Australian Division of the Royal Institution of Naval Architects will be held at the offices of Maritime Queensland, Level 2, Building 3, Gateway Office Park, 747 Lytton Road (cnr. Creek Street), Murarrie, Brisbane 4172, on Tuesday 27 March 2010 at 6.00 pm Eastern Standard Time. The meeting will be followed immediately by a Technical Meeting of the Queensland Section of RINA.

AGENDA

1. Opening
2. Apologies
3. To confirm the Minutes of the AGM held in Sydney on Wednesday, 30 March 2011
4. To receive the President's Report
5. To receive, consider, and adopt the Financial Statements and Auditor's Report for the year ending 31 December 2011
6. Announcement of appointments to the Australian Division Council
7. Consideration of amendments to the By-Laws of the Australian Division (refer insert)
    a. Resolution 1 - Insertion of 1(i)
    b. Resolution 2 - Amendment 6(a)
    c. Resolution 3 - Amendment of 6(b)
    d. Resolution 4 - Amendment of 6(c)(ii)
    e. Resolution 5 - Deletion of 6(f) and subsequent sentence
    f. Resolution 6 - Amendment of 9
    g. Resolution 7 - Amendment of 11
8. Other Business

R C Gehling
Secretary
12 February 2012

NAVAL ARCHITECTS ON THE MOVE

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

Guy Anderson moved on from Incat Tasmania many moons ago, and has taken up the position of Senior Advisor—Technical Regulation in the Maritime Safety Division of the Australian Maritime Safety Authority in Canberra.

Anthony Brann has moved on within the Defence Materiel Organisation and has transferred from the Centre for Maritime Engineering to take up a position as a naval architect with the Amphibious and Afloat Support Systems Programs Office (AASSPO) of the Defence Materiel Organisation at Garden Island, Sydney. AASSPO provides in-service support to HMA Ships *Tobruk, Sirius, Success,* the Landing Craft Heavy class, the sail training ship *Young Endeavour,* and the Army marine equipment fleet.

Hamish Bush has moved on from Burness Corlett Three Quays and has enrolled in the Bachelor of Medicine/Bachelor of Surgery program at Griffith University in Southport, Qld.

Alexander Conway, a graduand of the University of New South Wales, competed in the World 470 dinghy championships in Perth in December. He then took up a position as a naval architect with Austal Ships in Fremantle to complete his industrial training, and will then head off to Europe for more 470 sailing.

Dan Curtis has moved on within the Defence Materiel Organisation and, having completed his Executive Masters in Complex Project Management with the DMO and the University of Queensland, has taken up the position of Project Manager for JP 3033, providing an additional interim amphibious capability, in Canberra.

Kristian Fet has moved on from Incat Crowther and has taken up a position with Odim/Rolls-Royce in Ålesund, Norway.

Matthew Fox has moved on within the Department of Defence and has transferred from the Centre for Maritime Engineering in Sydney to take up a position as a naval architect with the Stability Technology Department of the Directorate of Navy Platform Systems in Canberra.

Nathan Gale, a graduand of the University of New South Wales, has taken up a position as a naval architect with the Centre for Maritime Engineering of the Defence Materiel Organisation in Sydney.

Peter Gawan-Taylor has moved on from Singapore Technologies Marine in Singapore and has taken up a position with Braemar Falcon in Perth, mostly dealing with offshore transportation of modules and equipment for the Gorgon project.

Alan Goddard has moved on from Premier Composite Technologies in Dubai, UAE, and is now evaluating opportunities.

SBLT Geordie Grant, a graduand of the University of New South Wales, has commenced the six-month New Entry Officer Course at HMAS *Creswell*, Jervis Bay, NSW, to be followed by the six-month Engineer Officer Application Course at HMAS *Cerberus*, Westernport, Vic.

Peter Hatton has moved on within Lloyd's Register Asia, and has taken up a position as a surveyor in the Perth Office.

Zensho Heshiki, a graduand of the University of New South Wales, has converted his part-time position as a naval architect to full-time at Burness Corlett Three Quays in Sydney.

Chris Hughes has moved on within the Lloyd's Register Asia organisation and has taken up the position of Marine Client Manager in the Sydney office.

Jun Ikeda has moved on from Clough Engineering and has taken up a position as a naval architect with DOF Subsea in Perth, and gets to go offshore on the vessels every couple of months doing subsea construction.

Frank Jarosek has returned to the Department of Transport WA following his secondment as Projects Officer to the National Marine Safety Committee, and has taken up the position of Principal Policy and Projects Advisor in the Commercial Vessel Safety Branch of the Marine Safety Division in Fremantle.

Claire Johnson has moved on within the Department of Defence and has transferred from the Defence Materiel Organisation's Air 9000 Phase 8 (Helicopter Acquisition) project in Canberra to take up a position as a naval architect for six months with G.A. Glanville and Co. (Naval Architects) in Cairns.

Regina Lee completed her Diploma of Education at Bond University and has been teaching at The Scot's College in Sydney for a couple of years. She is now Senior Mathematics Teacher there, non-resident boarding-house tutor, and community service facilitator. As if that isn't enough to keep her busy, she has started an MBA degree at the University of Technology, Sydney!

Geoff Leggatt has moved on from London Offshore Consultants and has taken up the position of Supervising Engineering Specialist with the Floating Systems Group at INTECSEA in Perth.

Murray Makin has moved on within the Thales Group, and has taken up the position of Naval Architecture Support Manager in the Mission Solutions Section, Naval Branch, at Garden Island in Sydney.

Joanna Mycroft has moved on from Tony Castro Naval Architects and Yacht Designers and, after some serious sailing (including the 2011 Fastnet) and visiting family in Australia, has taken up a position as a structural engineer with Lloyd's Register in Southampton, UK.

Michael O'Connor moved on within the Rolls-Royce organisation many moons ago, transferring from Sydney to the UK, and has now taken up the position of Principal Engineer—Propulsion Systems in Bristol.

Mate Ostojic has moved on from Austal Ships and has taken up a position as a project engineer with Jeyco in Fremantle. The primary business of the company is the design, supply and installation of cyclone moorings.

Rozetta Payne has moved on from consulting and has taken up a position as a naval architect with the Centre for Maritime Engineering of the Defence Materiel Organisation in Sydney.

Brocque Preece has moved on from One2three Naval Architects and has taken up the position of Assistant Hydrodynamics Technology Manager with the Directorate of Navy Platform Systems in Canberra.

Alex Robbins has moved on from Royale Oceanic and has taken up a position as Project Manager with Defence Maritime Services in Sydney.

Felix Scott has moved on from SP–High Modulus in Auckland and is evaluating opportunities.

Matthew Stevens has moved on from the Amphibious and Afloat Support System Program Office of the Defence Materiel Organisation and has taken up a position as a Block Superintendent with the Air Warfare Destroyer Alliance in Newcastle, supervising the construction of modules for the AWD project by Forgacs.

Jason Steward has moved on within Austal Ships and has taken up the position of Regional Manager Austal Service in Chaguaramas, Trinidad.

Darren Toohey has moved on after 25 years in the Australian Public Service, including Defence and the Australian Customs Service, most recently as Director Cape Class Patrol Boat in the Customs Marine Acquisitions Branch, and has taken up a position with Seaforce Naval and Maritime Consulting Engineers in Canberra.

Malinda Wickramaarachchi, a graduand of the University of New South Wales, has converted his part-time position as a naval architect with Sofraco Engineering Systems in Sydney to full time.

Jonathan Windsor has moved on within the Navy Platform Systems section of Navy Engineering Division of the Department of Defence in Canberra and has taken up the position of Assistant Project Liaison Officer for Surface Combatants.

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 (see *Missing in Action)*.

Phil Helmore
Maghfar Chowdhury
Martin Grimm
Richard Milne

MISSING IN ACTION

The Division Secretary has been unable to locate Ante Sambrailo of Cottesloe, WA and would appreciate any updated information on his whereabouts that members can provide. His whereabouts are also unknown at RINA HQ. Updating your contact details with both RINA HQ and the Division Secretary will ensure that you receive your member's copy of future issues of *The ANA*.

When changing address, members are requested to advise the Division Secretary at rina.austdiv@optusnet.com.au or telephone (0403) 221 631 as well as updating contact details on-line at www.rina.org.uk. This is necessary as the Division has no on-line access to contact details held by RINA HQ and is dependent upon periodically-updated lists.

Rob Gehling

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.

FROM THE ARCHIVES

IRON MONARCH

The end of an era

The recent announcement by Bluescope Steel that it intended to sell the roll-on roll-off cargo ship *Iron Monarch* signalled the end of a very long service life for a remarkable Australian-built ship.

Iron Monarch was the first merchant ship in the world to be propelled by a heavy-duty industrial gas turbine. Designed to carry steel products on the Australian coast, *Iron Monarch* and her sister ship, *Iron Duke,* were intended to provide an integrated transport system which was competitive with rail. Specialised terminals were built at ports of call with ship- and shore-based straddle carriers provided for cargo handling. Overhead 35 t gantry cranes were fitted on the vehicle deck to serve the holds below the vehicle deck. Cargo was loaded on bolsters carried by the straddle carriers via a folding, angled Navire stern ramp.

Iron Monarch
(Photo courtesy Teekay Shipping Australia)

As completed in September 1973, *Iron Monarch* was 178.3 m long with a beam of 24.8 m and had a capacity of 14 940 t deadweight. She was propelled by one gas turbine geared to a single shaft delivering 14 MW for a speed of 20.5 kn. The engines were able to burn a derivative of Bass Strait waxy crude oil which was regarded at the time as a waste product.

In 1980 both ships were withdrawn from service to modify the gas turbine system to improve reliability, and the service speed was reduced to 16 kn. Rising fuel costs, the high fuel consumption and the lower speed made the two ships commercially unattractive and both were laid up for sale. *Iron Duke* was sold for scrap in January 1986, but *Iron Monarch* had been reprieved the previous year when it was decided to re-engine her to replace the ANL ships *Lysaght Endeavour* and *Lysaght Enterprise* on the Port Kembla–Westernport–Port Kembla service.

The gas turbine and regenerators were removed and replaced by two Wärtsilä 12V32 engines, each of 4095 kW, geared to the single shaft. The overhead cranes were fitted with magnet beams to handle steel slabs, and other cargo-handling modifications were made. With the changes it became possible to load some 14 000 t of slabs in less than 24 hours.

Iron Monarch recommenced trading on 23 June 1986 and has operated out of her home port of Port Kembla ever since. Over the last quarter century, *Iron Monarch* has made 1572 voyages to Westernport totalling some 2 million n miles and has carried over 21 million tons of slabs.

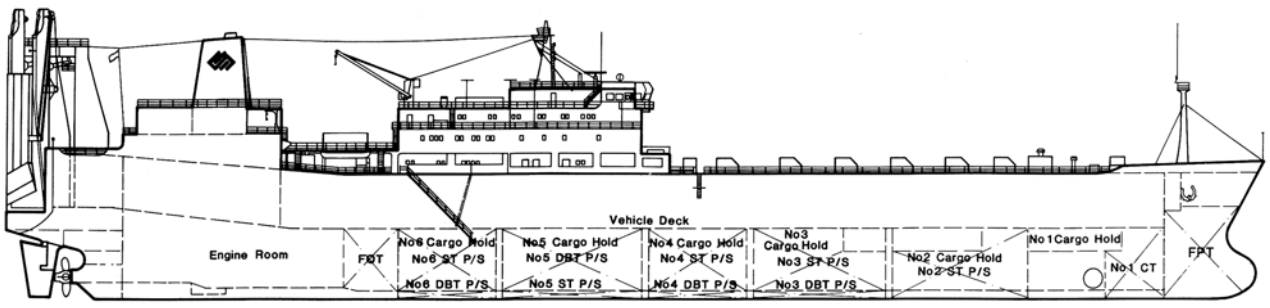
A straddle carrier handling a steel slab in *Iron Monarch*
(Photo courtesy Teekay Shipping Australia)

Time has finally caught up with the old ship and Bluescope Steel apparently intends to ship slabs by rail in future.

John Jeremy

Reference

Riley, D.M. (1992), *The Iron Ships: a Maritime History of BHP 1885–1992*, BHP Transport Limited.



Profile of *Iron Monarch*
(Drawing from the reference)

Closer relationships for a safer world.

We have an international network of more than 8,000 people across 246 offices. This global reach gives us an unrivalled view of the marketplace and the technical developments shaping today's marine industry. It also ensures that, wherever you are, we will be nearby and able to apply a genuine understanding of local issues and help you operate more safely and sustainably.

Learn more about our global network – contact
Lloyd's Register Asia, Level 17, 44 Market Street, Sydney 2000
or email sydney@lr.org

Lloyd's Register

LIFE MATTERS