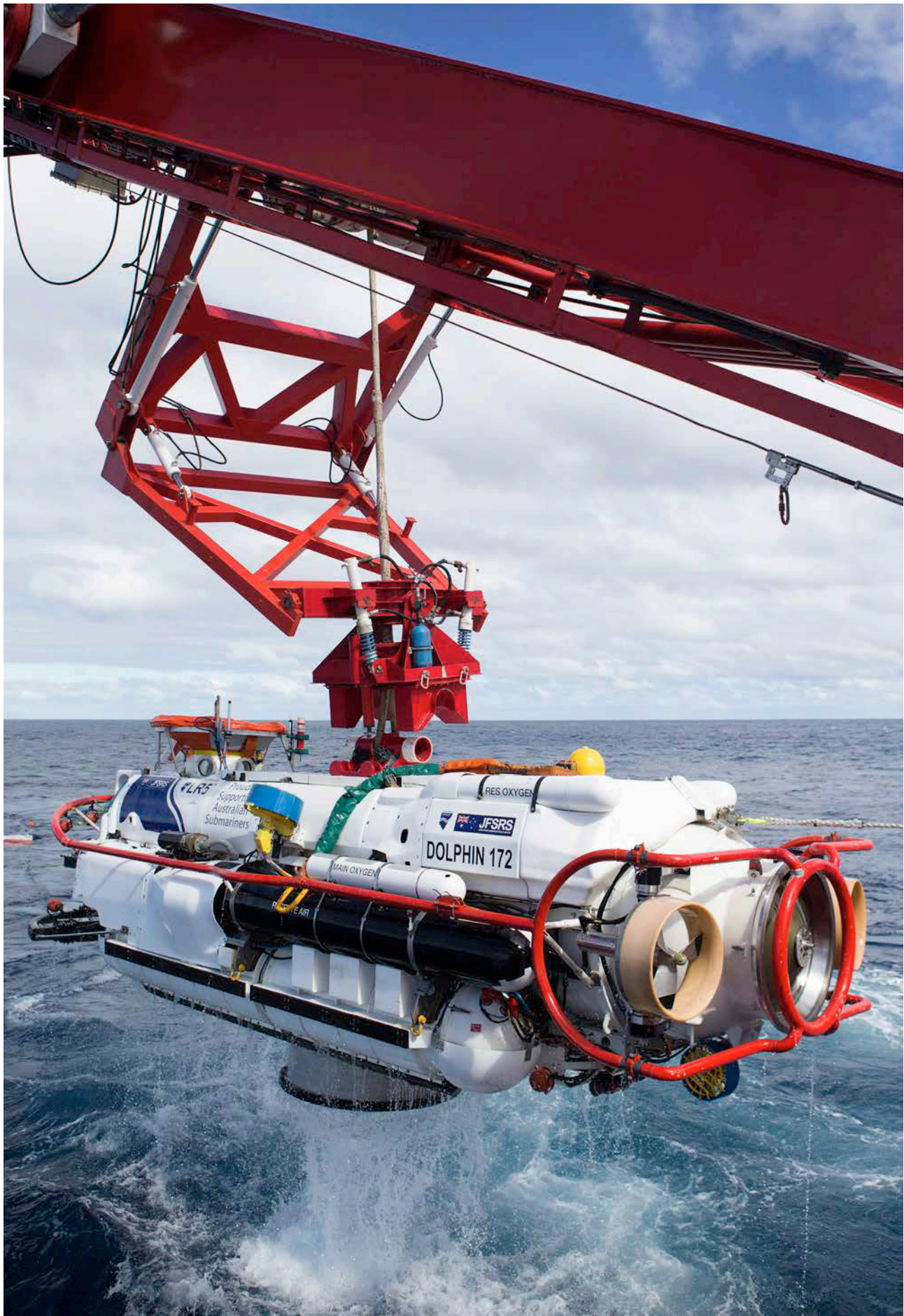


THE AUSTRALIAN NAVAL ARCHITECT



Volume 20 Number 4
November 2016



The LR5 Rescue Submarine being brought back on board the submarine support ship *Stoker* after completing a docking evolution with HMAS *Dechaineux* during Exercise Black Carillon 2016
(RAN photograph)

THE AUSTRALIAN NAVAL ARCHITECT

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(Australian Division)

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Cover Photo:

The first of the RAN's new guided missile destroyers, *Hobart*, during sea trials off Adelaide in September
(Photo by Don Brice, courtesy AWD Alliance)

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The Editor
The Australian Naval Architect
c/o RINA
PO Box No. 462
Jamison Centre, ACT 2614
AUSTRALIA
email: jcjeremy@ozemail.com.au

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RINA Australian Division

on the

World Wide Web

www.rina.org.uk/aust

From the Division President

Welcome to the November edition of *The Australian Naval Architect*. There is certainly a lot going on in the maritime industry in Australia at the moment and I hope that, like me, you will find that reading *The ANA* is a good way of keeping up to date with what is happening. To that end, I would like to encourage those of you with news of interest to make a contribution to *The ANA* — after all it is a good way of publicising what you're doing.

Innovation is without doubt the current flavour. Of course this is important, and one of the best ways of fostering innovation is to have a healthy interaction between industry and academia. I am aware that many academics publish their work in peer-reviewed journals which are often not read by those in industry. Equally, many in industry perhaps don't communicate their issues and needs particularly well to those at the universities. One of the roles of the Institution is to try to foster innovation in the maritime field and so I believe that we should be trying to bridge this gap. *The Australian Naval Architect* is a good venue for the cross pollination of ideas and I encourage you to make use of it in this way. After all, it is widely read by most of the naval architects in Australia, and what better way to get your ideas "out there"?

As I mentioned in my last column, it is very interesting that the Government has created the position of Minister for Defence Industry. The Institution has written to the Minister, Senator Pyne, congratulating him on his appointment and wishing him well in his task of re-establishing appropriate levels of indigenous capability, both in Defence as the 'smart buyer' and in Australian industry, working closely with the relevant designers, prime contractors, builders and classification societies. We also offered to provide independent assistance in the task which he has, noting that we are not a trade union, nor a lobby group, but a learned society whose primary goal is to advance the art and science of ship design.

Two interesting initiatives have flowed from the White Paper on Defence — the Centre for Defence Industry Capability and the Defence Innovation Hub. We have written to the Minister for Defence asking for more information about these when it is available, and offering to assist if appropriate.

Members may be aware that the IMO has established an Intact Stability Intersessional Correspondence Group to continue to work on the items contained in the revised plan of action for the second-generation intact stability criteria. This group is chaired by Prof. Naoya Umeda from Japan, who has done a lot of very good work in this field. The Institution, at international level, is represented on this group and we have been able to provide input to it. If any members are interested in the work of the group please contact me for further information.

The Council has reactivated the Joint Board of Naval Architecture with Engineers Australia under the chairmanship of Jim Black, (a past President of the Australian Division). A beneficial effect of this has been the inclusion of RINA in communications from Engineers Australia to its technical societies. In recent months there has been communication regarding Engineers Australia's review of its competency



Martin Renilson

requirements and rationalisation of Continuous Professional Development delivery, to which we have either replied or have distributed as appropriate. We have also been specifically included in Engineers Australia's distribution of notices for the forthcoming DST Group-EA lectures.

Members may have seen various articles in the press regarding concerns about a skills crisis in maritime engineering in defence, with particular reference to the submarine program. The institution is engaging with CASG to assist with its graduate scheme with a view to accreditation in relation to the CEng registration process. This is being led by our Vice President, Jesse Millar, and any members who feel that they can assist with this should contact either Jesse or me. We feel that the Institution is well placed to assist with such a graduate training scheme.

On that note, I'd like to remind members that the provision of a pathway to Chartered status is an important role for the Institution. Some members and their organisations take this very seriously; however, it may be that some companies are not engaged as fully as they could be. To that end, I think that it is important to encourage all members of the Institution and, in particular, those with responsibility for training the next generation of maritime professionals, to engage with RINA, and work together to develop training schemes leading to Chartered status for their staff.

On the topic of the role of the Institution, our Chief Executive, Trevor Blakeley, was interviewed at the Safety4Sea conference in Athens earlier this year regarding the role of a modern professional society such as RINA and how RINA can contribute to the future of the maritime industry. The interview can be found at www.youtube.com/watch?v=FkiSC34lsgM&feature=youtu.be.

I strongly recommend that members have a look at this as Trevor outlines what he believes is the purpose of the Institution and its future role.

I mentioned the development of the proposed Maritime

Engineering Technology Research and Innovation Centre in my last column. The proponents have held a number of meetings since then, and the name has changed slightly to The Australian Maritime Innovation Centre. Professor Ian Young AO is leading this initiative and he described the plans for the centre recently at a lunch hosted by the Committee for Economic Development for Australia. During his speech he said that it is important to attract industry support for the Centre. As one of our Institution's objectives is to "Encourage and promote the carrying out of experiments and other enquiries intended to assist the advancement of knowledge in the science, technology and management of shipbuilding, marine technology and shipping", we have offered our support to this exciting new venture. Karl Slater has represented RINA at a number of meetings; however, he was unable to attend the last one which was attended by Jesse Millar, our Vice-President.

Members in Victoria may be aware of the recent proposal in that state to develop a registration process for engineers. Craig Boulton attended the first consultation meeting on behalf of the Institution. I understand that the proposal is for the process to be along the lines of that which already exists in Queensland. The Institution has been asked to comment and we have made a submission which emphasised our preference for a national system, pointing out that we provide Chartered registration through the UK Engineering Council (CEng) and noted that any Victorian registration process should recognise this in parallel with Engineers Australia's CPEng. We will continue to monitor progress with this initiative and report to members on any developments as appropriate. In the meantime, please don't hesitate to contact the Council if you would like to find out more, make any comments and/or contribute to our input in future.

AMSA has recently finalised its consultation regarding the levy structure for the new national system. We didn't participate in this consultation but are currently preparing a paper on the operation of the system which we are planning to submit to AMSA. This is intended to be a constructive document, outlining some of the issues we see with the new system and suggesting how it could be improved. Members have noted that some of the early teething issues are already being improved and it is hoped that our paper will assist AMSA to make further improvements. This is being coordinated by Craig Boulton and members who would like to contribute are encouraged to contact him as soon as possible.

The participation of the Institution in the Australasian Oil and Gas Exhibition and Conference (AOG 2017) in Perth on 22–24 February 2017 is progressing as planned. The call for papers attracted a number of high-quality submissions for the RINA conference stream on Fixed and Floating Offshore Structures and we are looking forward to another interesting technical event. We will also have a stand within the maritime zone of the exhibition. The WA Section is putting significant effort into making this successful and to further promote RINA as the leading professional society in the maritime engineering and energy sectors. I hope that as many members as possible will attend and support this conference. Please also try to spend some time at our stand. I am planning to attend to represent the Division and Trevor Blakeley will also be attending. For further information

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please contact Yuriy Drobyshevski of the WA Section.

Arrangements are also progressing well for the Pacific 2017 International Maritime Conference to be held in Sydney on 3–5 October 2017. The call for papers is announced in this edition of *The ANA*.

I'm very pleased to report that Dr Stuart Cannon (a past President of the Australian Division) has recently been elected as a Fellow of the Australian Academy of Technological Sciences and Engineering. This is a very prestigious recognition for all the good work that Stuart has done over the years and we congratulate him on this fantastic achievement. Recognition by the Academy of Stuart's work also raises the profile of the profession and, in particular, of RINA nationally.

Finally, I wish you all the best for the festive season, and hope to see you at the SMIX Bash in Sydney on 1 December.

Martin Renilson

Editorial

Readers of this edition of *The ANA* will not fail to notice that a major milestone has been achieved with the air-warfare destroyer project — the first sea trials of NUSHIP *Hobart* which were carried out during September. Going to sea for the first time in any new ship is a special moment for her builders and future owners, and particularly so when the ship is complex and the project has been demanding. I hope that all involved with *Hobart's* trials enjoyed the satisfaction which comes with taking a new ship to sea for the first time.

I suspect that I must read the wrong newspapers or watch the wrong television news, but the national press coverage of this significant event disappointed me. I confess that the first report I saw was from an overseas news service. In my past life I have been frustrated when trying to get good news published. On one occasion we sent out 150 press releases with photographs (this was in the days before email and the internet) to achieve about a column inch in the *Canberra Times* and a bit more than that in the *Manly Daily*. I complained about how hard it was to get good news reported to a senior journalist at a conference in Canberra some years ago to be told "that's not news, it's just 'man does job'".

If our press believes that good news is no news then I think they are failing us. Report the bad news by all means, but to leave out the good is to provide an unbalanced view of our world, particularly for the general public who do not have access to specialised news services. Rest assured that the editors of *The ANA* are great believers in good news. Reporting it is encouraging to us and, I hope, to everyone in our business world — if you have good news let us know so that we can tell everyone about it.

John Jeremy

LETTERS TO THE EDITOR

Dear Sir

Imagine, for a moment, that you were invited to take part in the oldest continuously-conducted sailing event anywhere in the world, with a tradition dating back 180 years! Who wouldn't jump at such an opportunity?

Well the good news is that you are invited! The 181st Australia Day Regatta will be sailed on Sydney Harbour, throughout coastal NSW and other inland and enclosed waterways on 26 January 2017.

The popularity of the regatta grew quickly from its inaugural 1837 race; 167 years ago the Sydney Morning Herald reported *"If New South Wales ever becomes a great nation, it must be by the agency of her maritime advantages. In former years every variety of amusement used to be brought into play on the anniversary, cricket matches, horse races, dances, shooting matches, and all sorts of fun: but the absorbing interest in the Regatta has gradually led to the suspension of these less attractive sports during this one day, and the harbour is the grand theatre of attraction to which citizens resort on an anniversary."* This year almost 700 vessels took part, from dinghies as small as 2 m up to the larger offshore racing yachts.

Personally, I love the event. I have been fortunate to attend the Sydney Town Hall Presentation ceremony as a class winner, but then relished the last three years as I watched my son, along with other kids, some as young as 7 years old, receive their Australia Day Regatta medal alongside some of yachting's greatest ambassadors. What other sport offers such generational opportunities? Or, indeed, the promise and potential of further generations into the future, especially if we continue to have the dedication and support of hard-working volunteers who make it all happen.

One of these volunteers is our own John Jeremy — congratulations John! I know John has been involved for over 14 years on the committee, and was Chairman for ten of these.



David Tulk and Harry Parker sailing a Manly Junior on Australia Day 2015
(Photo courtesy Rob Tulk)

I encourage all of you to get involved, find a ride, enter a yacht, and just generally enjoy Australia Day on the water and immerse yourself in a historical event by becoming a part of history itself. Further information can be found at www.australiadayregatta.com.au.

Rob Tulk

Dear Sir,

I would like to make some comments on the flag-of-convenience (FoC) system, and give some suggestions for addressing this issue.



Sydney Harbour Spectacle — the start of the Classic Division in the 180th Australia Day Regatta in 2016 near *Pacific Pearl* moored off Point Piper, as seen from the Flagship, HMAS *Yarra*
(Photo courtesy Steve Oom)

Flag-of-convenience is one of the most criticised systems in the maritime industry because it is often linked to labour exploitation, illegal fishing, drug smuggling, people trafficking, and other crimes. The International Transport Workers' Federation (ITF) has been advocating for seafarers' welfare for decades. However, it is not easy to eliminate the whole FoC system since it brings huge benefits to privately-owned shipping companies. As of 2009 there are still 34 countries on ITF's FoC registry list, and over 50% of merchant ships in the world are registered with these. If we take a closer look and examine the open registries on the list, it isn't difficult to find that most of them are based in small countries in Africa, Latin America and the Asian-Pacific region; and some of them are even land-locked countries such as Bolivia, Mongolia and Moldova.

Most serious registries in the world do not allow ships from foreign countries to be registered, but the right of land-locked countries to a Flag of State was recognized in the Barcelona Convention of 1921. However, this convention has been abused since the 1950s when large private shipping companies realized that the FoC system could help them to reduce the costs of items such as tax and labour. FoC countries allow foreign ships to be registered, but usually fail to enforce the international minimum social standards on ships flying their flag.

Since 2006 the international conventions for the maritime industry have been updated in order to disclose ship ownership, prevent crimes as well as terrorism, and improve working conditions for seafarers. However, nine FoC countries have not ratified the updated regulations, making it extremely difficult to identify the true owners. These open registries help the beneficiary owners to conceal their identity and maximise their profit and, in exchange, they are making revenue of \$3.5 million (US) each year. In contrast, it is estimated that illegal fishing alone costs the world a loss of \$20 billion each year.

I would like to suggest two possible solutions to this issue:

1. *Impose sanctions on FoC countries which fail to fulfill their responsibilities*

Most FoC countries have insufficient regulations and their existing regulations and laws are poorly enforced. Port state countries should be granted the right under international law to detain any vessels that are suspected of illegal fishing, crime, or labour exploitation, and these vessels should not be discharged until their issues have been fully investigated and rectified.

2. *Close all FOC registries*

Many organisations have suggested gradually tightening the international rules on FoC ships, closing FoC to foreign-owned fishing vessels, and then eventually abandoning the whole FoC system. A new international law should then permit shipowners to register their vessels in their home country only.

Yun Wang
UNSW Student

Dear Sir,

Readers of *The Australian Naval Architect* will be interested to learn that the Mary Rose Museum in Portsmouth, England, has been recently reopened after refurbishment. *Mary Rose*

is a Tudor ship, built in 1510 and was in service for 34 years. The vessel sank in 1545 during a battle which was being observed by King Henry VIII. It was rediscovered in 1971 and carefully raised in 1982. Much technical effort was taken to conserve it by spraying the fragile remains of the wooden hull with special chemicals. The purpose of the chemicals was to prevent further deterioration of the hull and to give it some minimal strength. Despite this, the vessel requires a steel frame to provide it with sufficient structural integrity.

Mary Rose is housed in a stunning and unique museum, which is within five minutes' walk of Portsmouth Harbour railway station. The atmospheric conditions, such as temperature and moisture content, are carefully controlled in order to protect this historic ship. The hull is on view through many large windows on three levels so that visitors can view it from all angles. In addition to the hull itself, there is a large number of rescued and restored artifacts which can be examined at close range, while many museum staff are available to answer questions of the visitors. Further information can be obtained from the website: www.maryrose.org

A very attractive feature of the museum is that one can purchase a Jutland All Attraction Package. This allows the visitor to return for a full year and to visit all eleven attractions at Portsmouth Historic Dockyard and surrounding area. These attractions include the blockbuster exhibition on the Battle of Jutland, the Harbour Tours and Waterbus services, as well as the off-site attractions Royal Navy Submarine Museum and HMS *Alliance*, Explosion Museum of Naval Firepower in Gosport and Royal Marines Museum in Eastney.

A further point of interest is the nearby hovercraft service from Southsea to Ryde on the Isle of Wight. This service has now been running for over fifty years. The service was initially operated by the single-engine gas-turbine powered SR.N5 and SR.N6 craft. More efficient and quieter diesel-powered hovercraft are now used. These include the older four-engined AP.1-88 and the very new 12000TD hovercraft. These craft complete the trip in about 10 minutes. This is one half the time taken by the Australian-designed and -built catamaran vessels [*Our Lady Pamela* and *Our Lady Patricia*—Ed.] which previously travelled to Ryde. Further information can be obtained from the website of Hovertravel: <https://www.hovertravel.co.uk>.

Lawrence Doctors



The new 12000TD Hovercraft *Solar Flyer*
(Photo courtesy Hovertravel)

COMING EVENTS

NSW Section

The seventeenth SMIX (Sydney Marine Industry Christmas) Bash will be held on Thursday 1 December aboard the beautifully-restored *James Craig* alongside Wharf 7, Darling Harbour, from 1730 to 2130. This party for the whole marine industry is organised jointly by RINA (NSW Section) and IMarEST (Sydney Branch). Join your colleagues in the maritime industry and their partners for drinks and a delicious buffet meal on board the unique 19th century iron barque. Cost is \$55 per head. Dress is smart casual, but absolutely no stiletto heels!

Those wishing to attend this Sydney Maritime Industry Christmas Party should purchase their tickets through www.trybooking.com. Search for SMIX and follow the prompts. Payment accepted only by Visa and Mastercard.

Alternatively, you may mail your details (including names of guests and your email address for confirmation of booking), together with your cheque, to the RINA (NSW Section) Treasurer, Adrian Broadbent, at 27 Manning St, Queens Park NSW 2022.

There is a maximum limit of 225 attendees on board *James Craig* and we have had to turn away members and friends in previous years, so you are urged to book early.

AOG 2017

The Australasian Oil & Gas Exhibition (AOG) is a three-day event being held from 22 to 24 February 2017 at the Perth Convention Exhibition Centre in Perth.

Following its successful participation in AOG 2016, the Royal Institution of Naval Architects will be again be organising a conference stream at AOG 2017. Expressions of interests and submissions of abstracts were sought from members of the international maritime industry, and closed on 30 September.

The RINA conference stream *Fixed and Floating Offshore Structures* will cover design, construction, installation and decommissioning of structures and systems:

- Fixed and floating structures
- Ships for offshore operations
- Station-keeping systems
- Renewable energy offshore structures and systems

The stream will provide a forum for interaction of all professionals in the area of offshore structures and vessels. Submissions which reflect the current oil and gas market, and focus on its economic implications and engineering innovation in the offshore industry, were targeted.

Attendance at the conference stream will be complimentary for the AOG Exhibition delegates.

For more information about AOG Events and the 2016 conference, visit <http://aogexpo.com.au/conference/overview/>

To register interest, please email wa@rina.org.

Pacific 2017 IMC

The next Pacific International Maritime Conference, held in conjunction with the Pacific International Maritime Exposition and the Royal Australian Navy's Sea Power Conference, will be held in Sydney on 3–5 October 2017 to coincide with Navy Week, and Pacific 2017 will be held at the brand-new Sydney Exhibition Centre at Darling Harbour.

Abstract submission opened on 14 November, and closes on 13 March 2017. More information can be found in the advertisement in this edition of *The ANA* and at www.pacific2017.com.au. For further initial details, contact imc@amda.com.au.

Put these dates in your diary and watch this space!

HPYD6

HPYD is a series of conferences on high-performance yacht design organised by the Royal Institution of Naval Architects NZ and the University of Auckland. The first conference was held in December 2002. Since then, the conferences in 2006, 2008, 2012 and 2015 have showcased the latest developments in yacht research from around the globe. The conference enables naval architects, engineers, designers and researchers to present and hear papers on the current state of high performance yacht and power craft technology.

Agreement has been reached between HPYD, SNAME (Chesapeake Section) and Ecole Navale (Innov'Sail) to provide a coordinated rolling three-year program of high-quality yacht technical conferences. As a result, HPYD6 will be held in Auckland, New Zealand, in early 2018 during the stopover of the Volvo Ocean Race.

The details of the program and the call for papers will be posted in 2017. You can follow HPYD on Facebook, on LinkedIn or sign up for their mailing list to get the latest news.

See www.hpyd.org.nz for more details or, for general information, email info@hpyd.org.nz; for registrations: registrations@hpyd.org.nz; for technical enquiries: technical@hpyd.org.nz; or for sponsorship opportunities: sponsorship@hpyd.org.nz



The Royal Institution of
Naval Architects



ENGINEERS
AUSTRALIA

PACIFIC 2017 International Maritime Conference

International Convention Centre Sydney, Australia

3-5 October 2017

PRELIMINARY ANNOUNCEMENT AND CALL FOR ABSTRACTS

KEY DATES

- Abstract Submissions Open
14 November 2016
- Registrations Open
20 February 2017
- Abstract Submission Deadline
13 March 2017
- Author Acceptance Notification
3 April 2017
- Refereed Paper Submissions
12 June 2017
- Full Paper Submission Deadline
24 July 2017
- Early Bird and Presenter Deadline
11 August 2017
- Conference
3-5 October 2017

Organised by The Royal Institution of Naval Architects, Institute of Marine Engineering, Science & Technology and Engineers Australia, the Pacific 2017 International Maritime Conference will coincide with the prestigious Royal Australian Navy Sea Power Conference and the **PACIFIC 2017** International Maritime Exposition which is organised by Industry Defence and Security Australia Limited.

The conference program will be conducted in two streams of parallel sessions and will cover the following topics:

- Commercial Ship Technology
- Naval Ship Technology
- Submarine Technology
- Commercial Ships Operations
- Maritime Safety
- Maritime Environment Protection
- Offshore Resource Industry

Abstract submissions open from 14 November 2016 and prospective authors are invited to submit an abstract relating to the conference program topics in accordance with the instructions on abstract format and guidelines available on the conference website menu.

Abstracts are to be submitted online

www.pacific2017.com.au/conferences/imc.asp



For further information contact the

PACIFIC 2017 International Maritime Conference Secretariat at:

PO Box 4095, Geelong VIC AUSTRALIA 3220 P: +61 (0)3 5282 0543 F: +61 (0)3 5282 4455 E: imc@amda.com.au

NEWS FROM THE SECTIONS

ACT

Committee Meetings

A Committee Meeting was held on 20 June over a restaurant meal to socialise and discuss the schedule for upcoming and future technical meetings, and to review the Division Council's Report.

Another Committee Meeting was held on 18 October 2016 at the Campbell Park Offices to plan towards technical meetings for 2017, and coordinate arrangements for end-of-year dinner celebrations.

The Section now has a representative on the Pacific 2017 IMC Program Committee and looks forward to making a contribution to the success of this event.

Technical Presentations

Since the Section's last report in May, the ACT Section has convened three technical presentations and attended a fourth, as described below.

OPV Dilemma: Requirements versus Solution

On 31 May the ACT Section had a very interesting meeting with a presentation entitled *OPV Dilemma: Requirements versus Solutions* by John Lord with the ensuing discussion facilitated by Dr Warren Smith. The meeting was integral on its own but also formed part of an ongoing discussion within the Section regarding naval ship structural assurance. Thirty-one members of the Section and the Canberra Defence community attended.

John Lord is a naval architect, chartered professional engineer and registered project manager, with interests in shipbuilding including benchmarking, process improvement, and industry policy. He is a practitioner in naval ship design and construction projects, with qualifications including: BE (Naval Architecture), and Masters Degrees in Engineering Science and Strategic Studies.

Dr Warren Smith is a Senior Lecturer in the School of Engineering and IT at UNSW in Canberra, with teaching responsibilities in mechanical engineering design and naval architecture. Prior to joining UNSW, he spent 20 years as a naval architect with the Australian Department of Defence (Navy). Dr Smith's technical research interests span systems design and design optimisation. He is also very interested in engineering design education, and is strongly of the opinion that design is learnt through doing.

The aim of the meeting was to facilitate discussion from the previous presentation by Rob Gehling, Secretary RINA Australian Division on *High Speed Craft — Considerations for Naval Operations* (see *The ANA*, Vol. 20, No. 2, May 2013), using the example of the OPV. It followed from the paper presented by John and Warren at the Pacific 2015 International Maritime Conference entitled *Offshore Combatant Vessel — Concepts That Did Not Float*.

For the purpose of the presentation, the focus was on the RAN's Maritime Materiel Requirements for Surface Ship Structures. John used this standard as an example of an assurance basis, and then posed the thought-provoking question: who is responsible for the fitness for purpose of ship structure? Is it the designer, the owner, the operator

or the Classification Society? This question triggered a lively debate.

The presentation and ensuing discussion was complemented by some examples of typical solutions, and implications of the National Standard for Commercial Vessels.

On 29 June the ACT Section held a follow-up technical meeting on this subject to give those particularly interested an opportunity to continue the discussion. Fourteen people attended this meeting.

Production Application based on the Product Model for use in the Yard Manufacturing Environment

On 27 July the ACT Section was fortunate to host a very interesting and contemporary presentation from Intergraph Corporation representatives entitled *Production Application Based on the Product Model for use in the Yard Manufacturing Environment*. Marcel Veldhuizen has multiple qualifications, including the 'most important degree' in Naval Architecture. He has worked for Intergraph since 1997 and is now the Global Business Development Manager for the Marine Industry. Robert Patience is the Intergraph Marine Centre Manager based in Geojje, Republic of Korea, and Scott Robertson is the local Senior Sales Representative.

The contemporary nature of the presentation addressed the situation where design engineering is undertaken remotely from the construction activity, as is typically the case for off-the-shelf procurement. Addressing the need to translate foreign design into local construction, Intergraph presented an integrated family of yard applications which stem from a fabrication product model that is design-system agnostic. They described how the fabrication product model accepts importation of the design model and responds to incremental updates in order to support the critical change-management processes. The presentation detailed the content of the product model, its interaction with different design models, and ability to maintain an optimised fabrication/yard process.

Exploring Innovation in Australian Maritime Defence Science and Engineering

On 11 October a number of RINA ACT Section members also participated in an Engineers Australia — Australian Society for Defence Engineering (ASDE) organised Canberra session of the *Exploring Innovation in Australian Maritime Defence Science and Engineering* lecture series arranged with the Defence Science and Technology Group. The two DST Group presenters were Dr Andrew Amiet discussing *The Development of Radar Absorbing Materials (RAM) for Australian Defence Platforms*, followed by Dr Stephen Burke on the topic *Fatigue Cracks, Fast Jets and Faraday's Law: Non-destructive Evaluation for Structural Integrity*. In introducing the lecture series, ASDE National President, Denton Bocking, noted that this was the third time this lecture series has been provided and that the intention would be to make a video of the lectures available online.

Dr Amiet, who has worked in the field of RAM for a number of years, briefly outlined the history of the development of radar and, consequently, the use of RAM dating back to experimentation on aircraft during WWII and German

submarine conning towers and snorkels. He then described the use of RAM on RAN warships deployed to the first Gulf war and DST Group's evolution of RAM since the time of those deployments. Bespoke RAM is now applied to some RAN vessels based on the research and IP held by DST Group. Radar-absorbent materials are also applied on some ADF aircraft. The process of developing and testing such materials was described.

Dr Burke's presentation focussed primarily on techniques used for fatigue-crack detection in ADF aircraft, including the advantages and limitations of the various methods. Inspection methods ranged from visual inspection, X-ray, ultrasound, eddy-current and magnetic rubber. He described the use of these inspection methods on such well-known RAAF aircraft as the F111 which, for many years, the RAAF had been the sole operator after the type was withdrawn from US service. He stressed that the crucial consideration in inspection was to understand what the largest undetected crack could be following such an inspection, as this dictated the inspection frequency. Experiments were undertaken to answer this question.

Questions were fielded following the pair of presentations. Asked for his thoughts concerning the parallels that could exist between the aviation and maritime sector in relation to fatigue design and monitoring, Dr Bourke noted that, while his expertise was focussed on the inspection aspect rather than the design aspect of fatigue, it would be a brave person who sought to predict the fatigue life of an aircraft without the benefit of extensive fatigue testing on a full-scale aircraft followed by a regular inspection regime.

Overview of Naval Ship Concept Design

On 25 October Joe Cole from the Naval Technical Bureau (NTB) in the Department of Defence gave a presentation entitled *Overview of Naval Ship Concept Design in the NTB — Design Approach, Tools and Example Designs*.

Joe addressed a number of topics, including the purpose and role of concept design in Navy, the Navy's approach to concept design, an overview of the in-house design tools used, and an overview of some exemplar designs.

The Purpose and Role of Concept Design in Navy

Joe explained that the primary purpose of concept design work for the RAN is to inform requirements development. Concept design provides a means of exploring a design space to enable Navy to understand potential solution families and

assist Navy in setting requirements which are aligned with the desired capability. Concept design is also employed in feasibility studies for the integration of innovative and emerging technologies on new platforms. The NTB's concept-design process automates a number of iterations of the design spiral to identify and investigate platform characteristics and systems affected by the new technologies. An example cited was unmanned aerial vehicles.

Joe highlighted that concept design is not a new function for the RAN and that many other navies also run equivalent programs — the US Navy historically do concept design work in-house while the UK's Royal Navy has established the "Naval Design Partnership" between the Ministry of Defence and a number of key industry organisations.

The Approach to Concept Design

Joe gave an overview of the process that is employed by the NTB when undertaking a concept design project. Once a clear scope of work is agreed with the project customer (key requirements and focus areas), the design team is formed by specialists sourced from the NTB and, if required, the wider Defence organisation. A baseline design is then defined for the project, to which systematic modifications are made. Suitable solutions are then identified, and output can be manipulated to produce 3D hull and superstructure models and 2D general arrangement drawings.

Design Tools

A number of design tools are utilised in the concept design process. The central program is called the Concept Exploration Program (CEP) and has been developed in-house by the NTB and utilises historical data. An article detailing the principles and methodology of CEP was previously published in *The ANA* (Vol. 13 No. 4, November 2013). Recent CEP developments involve a 3D hull module which incorporates parametric scaling of a Rhino mesh model.

Exemplar Designs

Joe presented three concept design examples that have been produced by the NTB and explained the goals of each project.

Surface Combatant (2009)

The key features and technologies studied in the project were survivability, growth margins, RAN habitability requirements, mission modularity, primary radar redundancy and separation, and a combined hangar/mission bay.

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Multirole Vessel

This was a larger project which produced a series of vessels of different sizes. In total 19 separate parametrically scaled designs were produced. Key features and technologies studied in the project included the boat/mission bay, survivability, and accommodation flexibility to support various crew combinations (crew/embarked forces and male/female).

Example Landing Craft

This was developed as a potential successor to the Landing Craft Heavy (LCH) and, in keeping with this earlier design, was intended to be able to operate independently rather than as a ship-to-shore connector. The key features and technologies studied in the project included improved speed in waves, flexibility of load conditions, and troop accommodation.

The design team conducted a historical survey of larger, more seaworthy landing craft designs to identify previous attempts at solving the ubiquitous landing craft dilemma — high payload-to-displacement ratio, ability to land cargo on a beach, and good seakeeping and speed.

Some notable features of the final concept design included a relatively high L/B ratio to reduce resistance in waves, a stepped deck line and ‘drive-through’ vehicle deck to lower VCG, and troop accommodation within the bulwark. A series of lightweight bow-ramp concepts were also investigated.

Overall, Joe gave a very interesting presentation and stimulated a range of worthwhile discussions, both in relation to the concept designs presented and about the future role of concept design within the RAN.

*Tom Dearling
Jason Steward*

Western Australia



The RINA (Australian Division) prize for 2016 for the best-researched project by a final-year student in the BE (Naval Architecture) program at the AMC (see *The ANA*, August 2016, p. 41) was presented to Matthew Trump at the WA Section meeting on 21 September. The presentation was made by Tony Armstrong, on behalf of the Australian Division.
(Photo courtesy Yuriy Drobyshovski)

Tasmania

The Annual General Meeting of the Tasmania Section was held on 13 September 2016 at the Australian Maritime College, Launceston. Fostering closer links with industry and increasing awareness of RINA amongst the AMC student body were identified as two strategic objectives for the section going forward. Consequently, the section pledged to increase the number, quality and diversity of technical presentations and agreed to fund prizes for several AMC student competitions.

Nominations were received for the following roles and all were elected unopposed.

Chair	Mark Symes
Secretary	Gregor Macfarlane
Treasurer	Jonathan Duffy
ADC Nominee	Michael Woodward
Junior Member Representative	

Daniel Clayton

Technical Seminar Coordinator

Jonathan Binns

The ANA Coordinator

Lauchlan Clarke

AMC Student Prizes Coordinator

Nick Johnson

Members

Alan Muir

Henk Kortekaas

Ashleigh Harris

Nigel Hay-Smith

Konny Zurcher

Lauchlan Clarke

New South Wales

Committee Meetings

The NSW Section Committee met on 30 August and, other than routine matters, discussed:

- SMIX Bash 2015: Accounts finalised with one sponsor written off, and a small surplus resulted.
- SMIX Bash 2016: Trybooking system set up with cost \$55/h; sponsorships coming in; caterer's quote accepted.
- Visit of Chief Executive: Itinerary proposed, including NSW Section TM and AGM, presentation on the route to chartered status, visit to a company, and presentation to students at UNS Australia.
- TM Program for 2017: Several presentations proposed.
- Recording of TM Presentations: To trial making our own recordings.

The NSW Section Committee also met on 25 October and, other than routine matters, discussed:

- SMIX Bash 2016: Flyer circulated to members and then non-members three weeks later; bookings coming in; more sponsorship needed.
- Visit of Chief Executive: Changed itinerary for visit to have presentation on route to chartered status prior to TM and AGM to boost attendance.
- TM Program for 2017: Program roughed out, with first IMarEST presentation and first two RINA presentations arranged; more presentations proposed and to be checked.

- Recording of TM Presentations: Recorded two presentations with home video camera, but quality not the best and slides do not show up well; to request slides from authors to graft into video.

The next meeting of the NSW Section Committee is scheduled for 7 February 2017.

Australia's New Antarctic Vessel

Nick Browne, Research Supply Icebreaker Project Manager, Australian Antarctic Division, gave a presentation on *Australia's New Antarctic Vessel* to a joint meeting with the IMarEST attended by 46 on 7 September in the Harricks Auditorium at Engineers Australia, Chatswood. This was the fifth-highest attendance of the 93 presentations held in Chatswood.

Introduction

Nick began his presentation by saying that the project began in 2010–11 with discussion with the Commonwealth Government about the need to replace the ageing icebreaker *Aurora Australis* for research and re-supply of stations in the Australian Antarctic Territory (AAT). He went on to describe the AAT and our three coastal stations there, Casey, Davis and Mawson. Other stations within the AAT belong to other countries, but Australia projects its presence into the territory, which is the largest in Antarctica. In addition, a wedge out of the AAT is claimed by France. Mawson Station is the furthest from Hobart, requiring a 14-day transit voyage for re-supply, while Casey is the closest, requiring a 7-day transit voyage.

Australian Antarctic Strategy

Australia's Antarctic strategy and 20-year action plan [see www.antarctica.gov.au/about-us/publications/20-year-australian-antarctic-strategic-plan — Ed.] was announced the day before the contract for the new icebreaker was signed. The report provides a blueprint for Australia's future engagement in Antarctica and options to expand Tasmania's role as a leading Antarctic science and logistics hub. It examines the challenges ahead and provides recommendations on how the Federal and State Governments, working with business, researchers and the wider community can achieve that outcome. The report was prepared by Dr Tony Press, former Director of the Australian Antarctic Division and former CEO of the Antarctic Climate and Ecosystems Cooperative Research Centre.

The modernisation program examines the shipping, aviation, station, traverse and other requirements. Shipping forms the backbone of the Australian Antarctic Program.

Seed funding is provided for year-round inter-continental aviation access, where only summer access is possible at present to the Wilkins Runway near Casey.

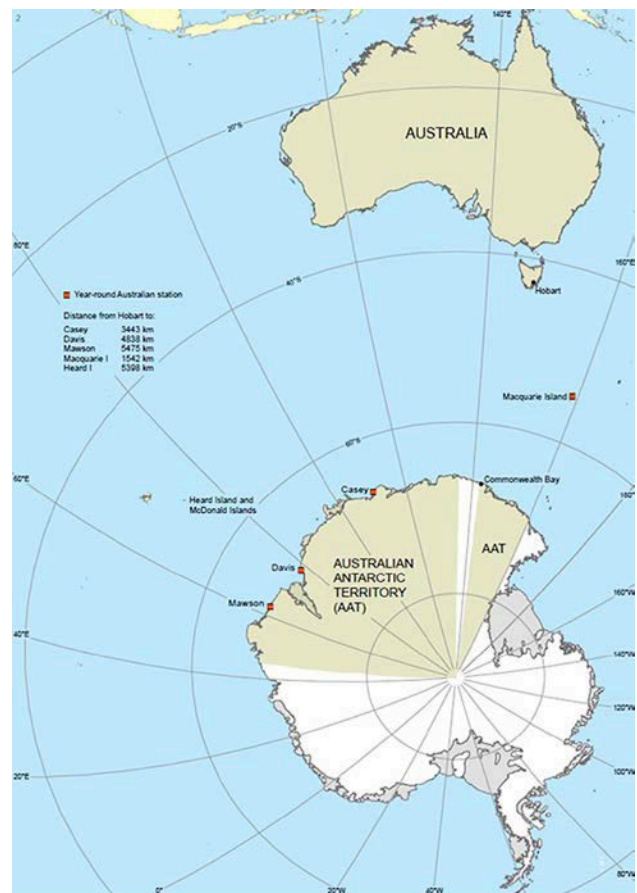
Station infrastructure is being investigated, as our stations are now 40 years old. The locations are being checked, their footprints, and what would new stations look like?

Under traverse, we also want an inland presence in the AAT, as the UK, USA and France are quite active in this area.

In other areas, we are looking at small UAV or drone-type operations to help the reconnaissance for ice leads for navigation, rather than using helicopters which are more expensive to purchase and operate.



Australian Antarctic Territory
(Map courtesy AAD Data Centre)

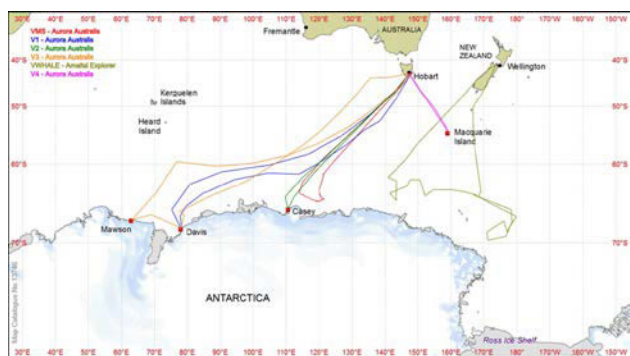


Australian Antarctic Territory relative to Australia
(Map courtesy AAD Data Centre)

Shipping Season

Nick then showed a slide of the 2012–13 shipping season as an example.

However, there is always the A (Antarctica) Factor: If something can go wrong, then it will! The shipping season can be unpredictable, and this can be expensive. At Mawson one year, the ship could not get into the usual position (within 100 m of the shore) due to the ice not breaking out and so, instead of fuel being transferred by hose, it had to be ferried to the station by helicopter, 1 t at a time. This meant that the station did not receive a full re-supply, and the operation was expensive.



Shipping season 2012–13
(Map courtesy Nick Browne)

In 2012–13, Voyage 1 by *Aurora Australis* was to Davis to get in early, and making use of the ice by setting the ship in 1.5 m thick ice and using 1.5 t vehicles for transfer of supplies. Voyage 2 was for re-supply of Casey, using every cubic metre of cargo and fuel capacity to keep Casey supplied for 12 months. Voyage 3 was for re-supply of Davis and Mawson. Voyage 4 was a short voyage to Macquarie Island. This is not always done by *Aurora Australis*, but sometimes by the French vessel *Astrolabe*. Macquarie Island is visited late in the season due to the birds breeding there earlier. There is no sea ice at Macquarie, and so no problem with the season.

At Davis Station, the ship breaks ice to approximately 1 n mile offshore. The ice is tested, and trucks drive cargo from ship to store. Refuelling is conducted by hose across the sea ice. Helicopters may be used, but are always carried as cargo for transfer to the station.

At Casey Station, the ship anchors about 1 n mile offshore. Barges are used to transfer cargo ashore, and tenders transfer personnel. Refuelling is conducted with a floating hose across the water. Casey is the largest AAT cargo resupply, currently 800 t of dry cargo and 900 000 L of bulk fuel.

At Mawson Station, the ship is moored with shore lines within 100 m of the shore (or sometimes closer!) Barges are used to transfer cargo ashore, and tenders transfer personnel. Refuelling is conducted with a floating hose across the water.

At Macquarie Island, the ship is anchored offshore in Buckles Bay. LARCs are used to transfer cargo ashore, and IRBs transfer personnel. Helicopters may be used to transfer personnel and sling-load cargo. Refuelling is conducted with a floating hose across the water.

Heard and McDonald Islands are sub-Antarctic islands in the Southern Ocean, and there is a periodic requirement to support landings and summer science research parties. Unlike the others, there is no permanent occupancy, and occupancy is limited to field huts. There is an ocean roadstead anchorage, and LARCs and IRBs are used for cargo and personnel, with surf landings! There is no ship-to-shore refuelling.

***Aurora Australis* and the Need for Replacement**

RSV *Aurora Australis* is the main platform for resupplying our research stations and conducting scientific research. She is owned and operated by P&O Maritime Services and chartered by the Australian Antarctic Division of the Department of the Environment and Energy. She was launched in 1987 and commenced operational service in 1990. A Life-Extension Refurbishment Program (LERP)

The Australian Naval Architect

was completed during 2012–15 to ensure continued support for the Australian Antarctic Program. In 2020 the vessel will reach 30 years age, and new Antarctic shipping capability is required.

Principal particulars of the vessel are

Length	94.91 m
Beam	20.3 m
Depth	10.43 m
Draught	7.86 m
Tonnage	6574 GT
Displacement	8289 t
Passengers	116
Crew	24
Capacity	1800 m ³ break-bulk cargo 1000 m ³ supply fuel in tanks 29 TEU
Aircraft carried	Up to 4 helicopters
Aviation facilities	Hangar and helideck
Installed Power	Wärtsilä 16V32D 5500 kW and Wärtsilä 12V32D 4500 kW
Propulsion	Controllable-pitch propeller in nozzle
Thrusters	One bow, two stern
Speed (maximum)	16.8 kn
(cruising)	13 kn
(icebreaking)	2.5 kn in 1.23 m ice
Ice class	LR 1A Super Icebreaker

Aurora Australis was introduced to work in conjunction with cargo ship *Icebird* and to increase the number of days for scientific research to 60. She worked in conjunction with other leased ships for 18 out of the first 23 years of service to meet overall logistic needs of the research stations. The mean number of days funded during the period 2000–01 to 2011–12 was 239, consisting of 166 days on resupply and 73 days on scientific research. She has operated primarily as a single-ship service since the introduction of the Airlink (Airbus A319 aircraft) between Hobart and Wilkins Runway in the 2007–08 season.

Aurora Australis has had several single points of failure, including the single main cargo crane, the single shaft/CP propeller, and the single rudder. There is limited volumetric cargo deadweight capacity of approximately 1800 m³/700 t with maximum fuel bunkers on board. There is limited icebreaking capability to deal with an increasingly-complex Antarctic sea-ice environment. The modern-day equivalent is the South African vessel *Agulhas II* at 135 m length [40% longer—Ed.], reflective of modern day design practices. Due to the constraints and limitations, *Aurora Australis* does not provide a reasonable point of reference or comparison for the new vessel. Notwithstanding these limitations, *Aurora Australis* has been the flagship icebreaker for Australia's Antarctic Program for the last 26 years and provided excellent service.

Project Assumptions

Assumptions for the vessel replacement project included the following:

- Shipping capability will have a 30-year service life, and will be owned and flagged by the Commonwealth of Australia.
- Shipping capability will be primarily provided by

means of a single multi-purpose icebreaking vessel to support the AAP.

- The preferred means of supplying logistics flow to Antarctica is by a combination of shipping and aviation links.
- Shipping capability will be responsible for the primary mission of scientific research and annual station resupply.
- Shipping capability will be responsible for secondary missions including emergency response and support for other agencies.

Antarctic vessels spend most of their time on re-supply operations, but can also do research — which is the primary aim of the stations.

Project Scope

The required project outcome was stated as

“The provision of a sustainable, modern and efficient sea transport capability to the AAD for the next 30 years beyond the retirement date of the RSV *Aurora Australis*.”

Project Output 1 — Compliance

Project Output 2 — A Research Supply Icebreaker

Project Output 3 — Associated Infrastructure and Equipment

Project Output 4 — Contractor Services

Project Output 5 — Transition / Change Management

Procurement Process

The procurement process consisted of a non-binding RFP (request for procurement) to produce a shortlist of respondents who were subsequently invited to respond to a prequalified RFT (request for tender).

The procurement process commenced with release of the RFP in January 2013, continued with release of the RFT in July 2014, and concluded in April 2016 when the Department of Environment and Energy signed a contract with DMS Maritime for the procurement of a new vessel under a DBOM (design, build, operate and maintain) contract. The design process is currently underway and the new vessel is expected to be delivered in mid-2020. The initial operation and maintenance term of the contract is 10 years.

Here Nick showed a video [*available on the AAD website* — Ed.] of the procurement process. DMS Maritime (as the primary contractor) has sub-contracted the design and build to Damen Schelde in the Netherlands, with DMS providing the project management. The design concept was completed by Knud E. Hansen (a Damen company), with Damen Schelde now being responsible for the final design. The Damen Shipyard in Galati, on the Danube River in Romania, will complete the detail design and build the vessel.

New Antarctic Vessel

Principal particulars of the new vessel are

Length	156.0 m
Breadth	25.6 m
Draught	9.3 m
Displacement	14 700 t lightship 23 800 t full load
Special personnel	116
Total complement	150
Range	16000+ n miles
Endurance	90 days

The base crew is 29, but there is flexibility between the special personnel and the crew, with the cabins meeting the MLC requirements for either one or two occupants.

In comparison with *Aurora Australis*, we see the following:

Item	New Antarctic vessel	<i>Aurora Australis</i>
Length	156 m	95 m
Expeditioners	116	116
Containers	96	24
Cargo	1200 t	800 t
Cargo hold space	5030 m ³	1790 m ³
Fuel	1.9 ML (incl. 0.5 ML aviation)	1.1 ML

Regulatory

The vessel will be flagged under Commonwealth of Australia and certified as a Special Purpose Ship under the IMO SPS Code 2008 and will be IMO Polar Code compliant.

Lloyd's Register have been contracted by Damen to class the vessel with the following class notations:

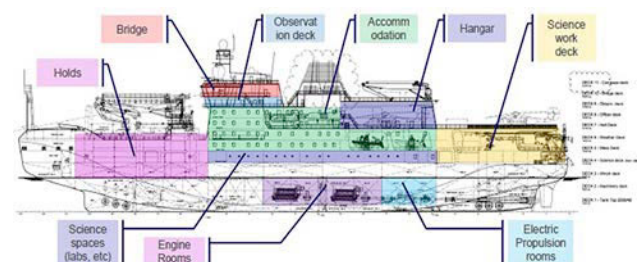
✱100A1 Research/Supply Ship, Icebreaker(+), Ice Class PC3, *IWS, Helideck, TA3, Winterisation H(-40)*, D(-30)**, S(B), ECO (BIO, BWT, GW, NOX-2, OW, P, R, SOX, IHM, SEEMP, EnMS, IBTS), LA

✱LMC, UMS, DP(AA), CAC(2), PSMR* Shipright (SERS, ES, SCM)

DNV Silent R notation standards applied to acoustic noise

Functional Zones

Here Nick put up a slide showing the main functional zones on board the vessel.



Functional zones on the new Antarctic vessel
(Drawing courtesy Australian Antarctic Division)

Power

For the propulsion system, the vessel has two direct-drive diesel engines of 9.6 MW each and two electric motors of 3.7 MW each, giving a total propulsion power of 26.6 MW. However, the installed power includes two direct-drive diesel engines of 9.6 MW each, three diesel gensets of 3.0 MW each, and one diesel genset of 2.0 MW, giving a total installed power of 30.2 MW.

Icebreaking Capability

The vessel will be capable of continuous icebreaking at a speed of 3 kn in an ice thickness of 1.65 m with a snow loading of 0.3 m, with ice of flexural strength minimum 500 kPa. The level of propeller-ice interaction is critical to full-scale performance. Model testing has been done both ahead and astern in level ice, but also testing ridge performance and manoeuvring. In 10/10 ice (i.e. full ice coverage) there is no interaction with the propellers, but in 8/10 coverage, the flow is asymmetrical and so there is some interaction with the propellers. The ice knife at the forward end of the underwater body is good for breaking the flexural strength of the ice.

Cargo Capacity

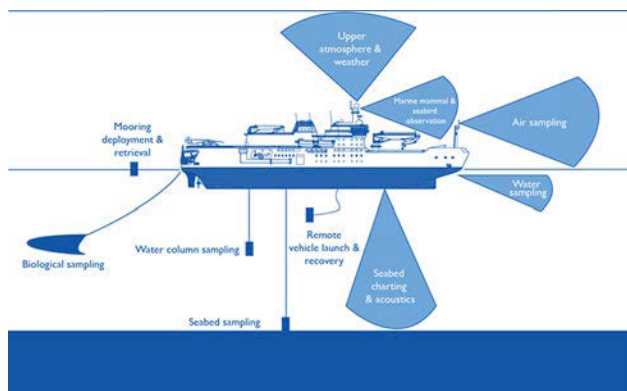
The vessel has two main cargo holds. No.1 Cargo Hold is configured for efficient TEU storage (48 TEU plus wing space) and rated for dangerous goods. No.2 Cargo Hold is configured for flexible break-bulk and general cargos (48 TEU plus wing space). There are two main cargo cranes, each of 55 t SWL. These are offshore rated and can be used in up to Sea State 4 for operations at Macquarie Island.

Helicopter Capability

The vessel has a flight deck and hangar aft which are suitable for four light helicopters (represented by the Eurocopter AS350B3), or two medium helicopters (represented by the Sikorsky S-92). Forward there is a winch-only position on the No.1 Hold Hatch Cover which has suitable clearances for light and medium helicopter winch operations.

Scientific Research

The vessel is jam-packed full of scientific instruments for sampling and research: radars, air sampling, water-column sampling, trawling, etc. Here Nick showed a slide of some of the capabilities of the vessel.



Scientific research capability on the new Antarctic vessel
(Diagram courtesy Australian Antarctic Division)

Acoustic Noise Performance

Low acoustic noise is critical for effective scientific research operations and is measured as underwater radiated noise and self-noise (at the location of the ships transducers). This was a major driver for the design and arrangement of the propulsion system, and is in direct conflict with the requirements for icebreaking! Cavitation played a significant part in the design of the propellers.

Science Working Deck

The science working deck is aft (under the main deck), and covers approximately 500 m². There are eight designated science container laboratory positions. Large trawl-net drums are located aft on the Mezzanine Deck.

Access is provided to the stern-quarter towing booms and stern A-frame which has a 30 t static SWL and 10 t dynamic SWL.

Moon Pool

The vessel has a moon pool amidships, located asymmetrically on the starboard side of the vessel's centreline. Deployment of CTD (conductivity, temperature and depth) sampling devices, nets, grabs, ROVs, etc., can all be done within the dimensional constraints (3.2 m diameter). There is an internal wave-damping system on the sides of the moon pool. This is supported by a cursor frame system for

bottom deployments, and there are non-watertight closing arrangements on the bottom shell and at Deck 4 level.

CTD Deployment

The CTD hangar position is located amidships on the starboard side. There are two CTD winches capable of deployment to a depth of 7500 m, and a CTD overhead crane with a telescopic boom for side deployments. The side-shell opening doors are in two sections (upper and lower) for protection. The moon-pool cursor frame is used for bottom deployments. Operations can be carried out in up to the top of Sea State 6 (6 m waves) and Beaufort Force 8 (34–40 kn).

Drop Keels

Two drop keels are fitted forward of midships, located asymmetrically on the starboard side of the vessel's centreline. Dimensions are length 3.9 m × width 1.4 m × height 6 m. At full extension the projection is 3 m below the hull, with several incremental positions. There are non-watertight closing arrangements on the bottom shell, and temporary positions for short-term installation of sensors of up to 1 × 2 m. Operations can be carried out at up to 16 kn, with activation at up to 4 kn.

Design and Build Process

Design of the vessel included basic engineering design, CFD modelling and optimisation, and extensive model-testing program, and the detailed engineering design.

Construction at the Damen shipyard in Galati, Romania will be in individual blocks (110+) which will be fabricated in module halls. These blocks will be consolidated over 58 building steps. Over 8000 t of steel will go into the construction of the vessel.

Galati is approximately 200 km up the Danube River from the Black Sea, so sea trials will take place in the Black Sea, covering the usual scope of testing. Special sea trials will then take place in the North Sea and the Norwegian and Greenland Seas, covering deep-water tests, acoustic noise trials, and icebreaking trials, i.e. replicating Antarctic conditions as closely as possible without having to go there.

Build Strategy

Nick then showed a video of the proposed construction process, including an overview of the shipyard at Galati, surface treatment of steel as it arrives in the yard, transport of build sections to the build location, block outfitting, hull assembly in the dry dock, installation of the shafts, propellers and rudders, floating of the hull and movement to the wet dock, assembly of the superstructure, turning of the vessel for crane access to the other end, movement of the ship to the quay, installation of the cranes, setting-to-work of equipment, sea trials, transport to Bergen, Norway, and special sea trials, the inspection docking, ship acceptance procedure, transit to Hobart, and final acceptance.

Conclusion

Australia has set in motion an acquisition process for a new Antarctic vessel to replace the ageing *Aurora Australis* which will deliver a significantly-larger and more-capable vessel, and which will demonstrate commitment to Australian Antarctic Territory, the Casey, Davis, Mawson and the island stations, and project her presence inland on the territory.

Questions

Question time was lengthy and elicited some further interesting points.

A side air-bubbling system to reduce friction with the ice was considered but not adopted. The Japanese icebreaker *Shirase* has this system, but experience with it has been mixed, i.e. it has not been a total success. They were looking to reduce complexity on the new vessel, and it was considered not worth the risk.

The scientific research capability for the new vessel was benchmarked against CSIRO's new research vessel, *Investigator*, and the new vessel can continue research south from where *Investigator* leaves off. In the re-supply area, the new vessel is state-of-the-art. She is different to the South African vessel *Agulhas II*, because they only have two stations to service, they are closer together, and they can use the ice shelf. The propulsion system is good—they worked closely with the contractor to mitigate the risks. In the area of icebreaking, if we achieve everything predicted, then we will have an icebreaker for heavier ice than most, and more quiet.

In the class notations the safety case, common in the defence industry, was not required by the AAD. The class notations were to meet the commercial requirement of class and flag. Safety was considered in the design of the vessel. The safety case was not considered the best value, where you populate a matrix with hazards and then put mitigations in place post-design completion. The focus in design is to eliminate safety hazards in the first place.

The requirements for the new vessel were not based on *Aurora Australis*, but by looking at shipping as a whole and building into the new vessel. Some things were not done in *Aurora Australis* which we now have the opportunity to do, as well as crystal-balling the future. *Aurora Australis* was examined closely for lessons learned and problems.

The capital cost of the vessel is of the order of \$500 million, but there is a range of considerations for the capability of the vessel, such as fitting for, but not with (yet!) This vessel represents a significant investment, and re-affirms our presence in Antarctica by having a ship as the collaborator of choice.

The colour of the ship shown in videos (orange/red) was

produced as part of the tender; the final colour has not been decided. The naming of the vessel will be run in the fourth school term this year, and the likelihood is that they will pick the five best submissions and make a decision!

The vote of thanks was proposed, and the certificate and “thank you” bottles of wine presented, by Adrian Broadbent. The vote was carried with acclamation.

Salvage of *Rena* in New Zealand

Drew Shannon, Manager East Coast, London Offshore Consultants, gave a presentation on *Salvage of Containership Rena off Tauranga in New Zealand* to a joint meeting with the IMarEST attended by 30 on 5 October in the Harricks Auditorium at Engineers Australia, Chatswood.

Introduction

Drew began his presentation by saying that *Rena* was a 236 m, 3351 TEU Panamax containership, built in 1990 by Howaldtswerke-Deutsche Werft AG in Kiel, Germany, and owned by the Greek shipping company Costamare Inc. through one of its subsidiaries, Diana Shipping Co.

Principal particulars of the vessel were

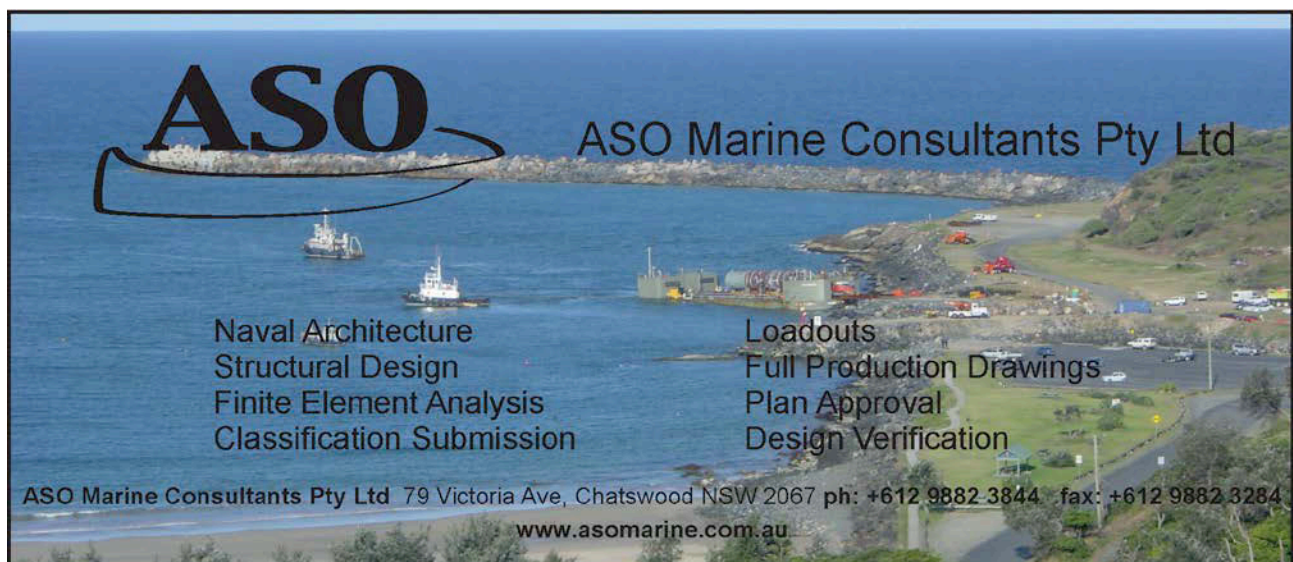
Length OA	236 m
Beam	32.2 m
Depth	18.0 m
Draft	12.0 m
Crew	20
Container capacity	3351 TEU
GRT	38 788
NRT	16 454
Main engine	Sulzer 8RTA76 21 996 kW @ 98 rpm
Propulsion	Fixed-pitch propeller
Speed	21 kn

On 5 October 2011, while on passage from Napier to Tauranga, *Rena* ran aground on Astrolabe Reef off Tauranga, New Zealand. The ship was carrying 1368 containers, eight of which contained hazardous materials, as well as 1692.8 t of heavy fuel oil and 63 t of marine diesel.

The initial report received from the ship's agent advised as follows:

05/10/2011 04:16:35

Aground — Astrolabe Reef in position



ASO ASO Marine Consultants Pty Ltd

Naval Architecture
Structural Design
Finite Element Analysis
Classification Submission

Loadouts
Full Production Drawings
Plan Approval
Design Verification

ASO Marine Consultants Pty Ltd 79 Victoria Ave, Chatswood NSW 2067 ph: +612 9882 3844 fax: +612 9882 3284
www.asomarine.com.au

37°32.42'S 176°25.75'E
3.75 n miles north of Motiti Island
1692.8 tonnes HFO 63 tonnes MDO.

The location was significant, as Tauranga was where the Maori first landed in New Zealand, and Motiti Island and Astrolabe Reef are traditional Maori fishing grounds!



Rena aground on Astrolabe Reef on 5 October 2011
with an 11° list to port
(Photo courtesy Svitzer Salvage)



Aft container stack on *Rena*
(Photo courtesy Svitzer Salvage)

Timeline

A timeline of the events following the grounding sets the scene:

Stage 1	<i>Rena</i> aground 5 October 2011
Stage 2	Salvors appointed 6 October
Stage 3	Vessel abandoned (due to heavy weather) 11 October
Stage 4	Constructive total loss agreed 17 October
Stage 5	Oil removal 12 October–14 November
Stage 6	Cargo removal November 2011 –January 2012
Stage 7	Break Up/Sinking 7–10 January 2012

Here Drew showed a video clip of the NZ News from early October, in which the grounding was declared the most significant marine pollution disaster in decades!

The vessel was working on the reef in way of the forward fuel tanks, and fuel oil was escaping, prompting the use of an aerial dispersant after preliminary tests showed it to be effective. Conditions around the reef were not feasible for booming operations around the ship. Containing the oil that had leaked and pumping oil off the vessel was the priority.

The Australian Naval Architect

Initial Response

Maritime New Zealand personnel were on board the casualty on the day of the incident, and appointed London Offshore Consultants as technical advisors. A salvage inspection team from Svitzer in Sydney was mobilised and already en route to New Zealand. A Marine Incident Response Team (MIRT) was established in Wellington, a National On Scene Commander (NOSC) appointed, and an Incident Command Centre (ICC) established in Tauranga. An exclusion zone was established around Astrolabe Reef, as this was a local fishing ground.

Stage 2 — Salvors Appointed

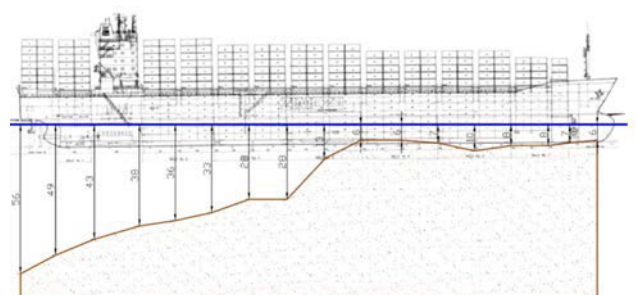
Svitzer were appointed as salvors on 6 October (the day after the grounding) and they commenced mitigation works on board. The Swedish Club, insurers of *Rena*, appointed a Special Casualty representative (SCR) who arrived on site on 6 October. Svitzer's naval architect arrived from The Netherlands to begin essential assessments, and Svitzer chartered the bunker barge *Awanuia* and tug *Waka Kume* from Auckland and they arrived on site on 9 October, with oil removal equipment arriving on the same day. *Awanuia* was connected to the stern of *Rena* and held off by the tug, and the first stage of oil removal was underway, direct hot dipping into tanks.



Awanuia and *Waka Kane* removing oil from *Rena*
(Photo courtesy Svitzer Salvage)

However, oil continued to escape, and a wildlife facility was set up in Tauranga to clean and rehabilitate up to 500 oiled birds should the need arise. A wildlife base was also established on Motiti Island with the centre being staffed by Massey University wildlife experts. A beach clean-up team was established.

LOC calculated the ground reaction as 9000 t. Here drew showed a profile of *Rena* aground on the reef.



Rena ground reaction on Astrolabe Reef
(Diagram courtesy Svitzer Salvage)

Stage 3 — Vessel Abandoned

Deteriorating weather on 11 October caused the decision to be taken to abandon the vessel. NZ naval vessels assisted the crew and salvage team in leaving the vessel. Larger quantities of oil were being released from the casualty. The worsening weather caused major changes to *Rena*: she changed from an 11° list to port to a 23° list to starboard, a crease developed in the hull in way of Frames 191P to 181S, there was a large release of bunkers, and the loss of large quantities of containerised cargo. The exclusion zone was therefore extended, and navigation warnings promulgated. The owner's P&I Club appointed Braemar for container and debris recovery. However, some of the containers were never seen again!

The anchor handler *Swiber Torin* arrived from New Plymouth, and remained connected to *Rena* throughout the bad weather.

Stage 4 — Oil Removal

The salvage team managed to re-board the vessel on 13 October, but the 23° list made movement around the vessel precarious. Serious structural damage was noted — the vessel was effectively broken into two sections in way of Frames 191P–181S; i.e. at No. 3 hatch.

Amazingly, most of the twist locks on the container stacks held, despite the 23° list!



Container stacks on *Rena* on 13 October
(Photo courtesy Svitzer Salvage)

However, the salvage plan had to change dramatically to remove the bunkers, as the tanks on the starboard side were now 20 m underwater and no longer heated; they had to be reached from the port side! The watertight integrity of the engine room was maintained. *Awanui* was re-connected for oil removal on 20 October, but the oil was getting colder and harder to pump.

Maritime NZ and the owners agreed on 17 October that the vessel was a constructive total loss, but this did not stop the salvage operation.

Additional personnel and salvage and oil-removal equipment were delivered to the vessel. However, the pumps would not work at 23° inclination. The salvors asked Maunganui Engineering to build platforms which could be rigged over the port side of the vessel for mounting the pumps, and the Manager played the Australia Card: he said that the Australians didn't think that they could build one platform overnight. So the Kiwis built five overnight, and they were installed next day!

The ICC was developed and expanded into a major crisis centre, taking over a complete supermarket in Tauranga for the exercise! There was an extraordinary number of authorities involved: apart from the salvors and the project-management team, they had representatives from other agencies in an all-of-government response, and the Maori elders, and they all worked pretty well together.

The beach clean-up continued. The Tauranga coast is the Gold Coast of new Zealand, with beaches and surfing, and *Rena* was not popular at the height of their summer season.

At this stage, the salvors believed that the stern section of the vessel could still be salvaged and refloated.

Another anchor handler, *Go Canopus*, arrived carrying sixteen 20 000 L tank-tainers, so she could carry significantly more than the bunker barge, *Awanui*. Each hose had to be at least 200 m in length to reach from the bunker tanks to *Awanui*. A water-injection system was used for bunker transfer.



Go Canopus
(Photo courtesy Svitzer Salvage)

A broken container full of Mrs Mac's pies was going off—and smelling—so these were hosed over the side.

There is not a lot of heavy engineering in New Zealand, and they did not have barges and cranes to offload the containers. They could not blast the twist locks to jettison the cargo, and so had to wait for equipment. After many discussions, they ended up with heavy crane barge *ST60* having a 30-day passage from Singapore to arrive. By this stage, there was a project-management team of ten ashore, making such arrangements.

Dive inspections of the damage were undertaken. There were signs of damage just forward of the accommodation block, but the vessel did not break there.

A minimum team of three remained onboard to maintain machinery each night. In the smoke room, they cut the legs of tables and chairs to allow for the 23° list and make the tops level!



Smoke room on *Rena*
(Photo courtesy Svitzer Salvage)

The tide range was of the order of 1.0–1.5 m and, in the event, the salvors were a victim of their own success—the more mass they took off the vessel, the more the two halves moved relative to one another. The bow was wedged high and dry, but it destroyed the bulbous bow.

Bulk oil removal was completed on 14 November. Of 1700 m³ of HFO, the salvors recovered 1200 m³ and 300 m³ escaped, so they removed most of it — and the authorities understood the impossibility of extracting absolutely everything.

Stage 5 — Cargo Removal

Heavy crane barge *ST60* had arrived from Singapore and, on 15 November, was positioned at the stern of *Rena* for cargo-discharge operations. Containers were recovered to *ST60* and then transhipped to *Go Canopus* for discharge ashore in Tauranga. The lifeboats had to come off too, and there were questions about import tax! Eventually the lifeboats were sold to a local polytechnic for \$1.



Rena with crane barge *ST60* ready for cargo discharge
(Photo courtesy Svitzer Salvage)

A wildlife preservation unit was set up in Tauranga, and they had to treat some penguins, but no dopey dotterels (a local bird) were affected. When the penguins were judged safe to go back into the water, they had a special releasing day, with a crowd of several hundred on the beach to watch.

A container bund was established within Tauranga port for initial cleaning and handling of containers. Braemar established a container cleansing and cargo-disposal facility outside of the port area. Some of the containers contained timber, cars, etc., but a container load of powdered milk was condemned.

There was much media attention—they came in dozens, and even the Prime Minister of New Zealand turned up.

The Australian Naval Architect

A level platform was built on top of the forward container stacks (the last to be offloaded) from which personnel could be winched up to or down from the Bell 214B helicopter. The helo had a 2 t payload, and could carry 4 personnel in addition to the pilot.

Smit and Svitzer agreed terms on a joint venture, and *Smit Borneo*, having a larger crane and larger container capacity, arrived on 11 December and replaced *ST 60*. The speed of discharge improved significantly, as *Smit Borneo*'s crane could reach either side from port or starboard, and was not held up by weather as was *ST60* whose crane could not reach both sides. Containers could also be lifted off in stacks of six at a time with the bigger crane. However, *Smit Borneo* did not have great deck space, and so offloaded containers to *ST60*.



Smit Borneo unloading a stack of six containers
(Photo courtesy Svitzer Salvage)

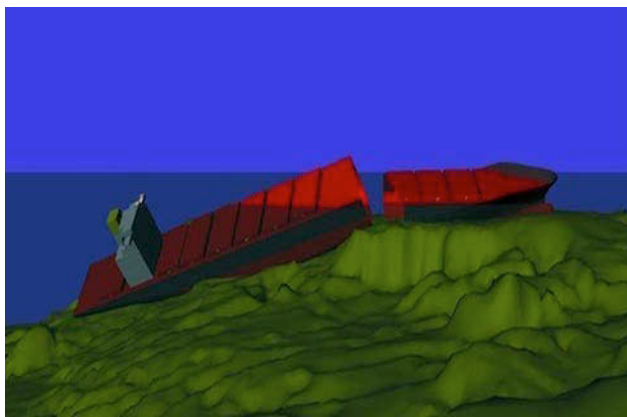
Stage 6 — Wreck Break-up

The new year (2012) brought a protracted period of unsettled weather, and each weather event had a detrimental effect on the wreck. On 7 January they had 11 m seas (recorded on the ocean data buoy) due to a cyclone which had passed by to the north and, by that time, no-one was living on board *Rena*; they had moved onto *Smit Borneo*. On 8 January there was total separation of the aft section from the forward section.



Rena on 10 January 2011
(Photo courtesy Svitzer Salvage)

On 10 January the double bottom ripped out of the aft section on the reef and, later that day, the bridge went under water. There were 18 containers left on the aft section (all scrap) and 100 on the forward section, and there was still \$350 000 of salvage equipment left on board. The Lloyd's Open Form contract was terminated and the salvors signed a Wreck Removal contract.



Rena resting
(Image courtesy Svitzer Salvage)

Then they had to determine what to do. They removed the accommodation block from the aft section, and the forward section was cropped to the waterline, so there was not much left, but a fair amount of scrap steel. The vessel has subsequently moved twice, slipping further down the reef. In the event, the court has said that this can remain.

Conclusion

The circumstances changed significantly over the course of the event, from a salvage to a constructive total loss, and then to a wreck removal. There were many regulatory authorities involved, as well as the Maori, and eventually all worked well together. The wreck was finally reduced so that it is no longer a danger to navigation, and the harm to the environment and to wildlife was minimised.

Questions

Question time was lengthy, and elicited some further interesting points.

The vessel was proceeding at about 17 kn when she struck the reef.

There was sufficient buoyancy in the side ballast tanks and the engine room to float the vessel if they could have removed all the fuel and all of the containers.

They asked the Maori elders where they could dump pieces of the wreck. The Maori gave them six sites; five where they



Graham Taylor (R) thanking Drew Shannon
(Photo Phil Helmore)

absolutely could not dump, and one where it was preferred not. When asked the difference, they replied that these are burial sites known from the warring days when the English landed. Maori were buried in the five sites, but pakeha (white men) were buried in the other site!

There was no question of the accuracy of the charts on board *Rena*; the vessel was taking a short-cut.

The vessel was declared a constructive total loss, and the P&I Club paid all the bills. The total cost of salvage and wreck removal amounted to something like \$0.5 billion, behind *Costa Concordia* at about \$2.5 billion and *Exxon Valdez*.

All of the lube oil was removed from the engine room.

A highlight of the presentation was the huge number of photographs which Drew showed, illustrating every aspect of the operation.

The vote of thanks was proposed, and the certificate and “thank you” bottle of wine presented, by Graham Taylor. The vote was carried with acclamation.

Phil Helmore

THE INTERNET

Webcasts of NSW Section Technical Presentations

In 2011, Engineers Australia began recording selected technical presentations made to RINA (NSW Section) and IMarEST (Sydney Branch) for webcasting using Mediavisionz. The recordings were placed on the Engineers Australia website. All of the recorded webcasts up to 30 September 2014, together with hotlinks to each one, are listed at

www.rina.org.uk/NSWwebcasts.html.

In October 2014, Engineers Australia started using a new system for recording presentations, using three cameras and a hand-held microphone, with an audio technician in attendance. Webcasts were then placed on the Engineering on Line (EoL) website at www.engineeringonline.com.

However, in early 2015, Engineers Australia discontinued the new recording method and the EoL website for regular monthly presentations, and resumed using Mediavisionz while considering options for future recordings.

In 2015, only one recording of our presentations was made, of Warren “Skip” Miller’s presentation on *Side Lifting Foils and Support Structure on Wild Oats XI* on 1 April, and the presentation is shown, with a hotlink, on the NSWwebcasts website.

In 2016, Engineers Australia discontinued recording presentations in the Harricks Auditorium. Recordings may still be made, but must be arranged/paid for by the society using the Auditorium. We are currently investigating the option of making our own recordings.

Watch this space!

Phil Helmore

CLASSIFICATION SOCIETY NEWS

Meeting of LR's Australian Technical Committee

The Australian Technical Committee of Lloyd's Register met on 18 August to consider proposed changes to Lloyd's Rules. Comments from the Australian Technical Committee will be

considered, along with comments from other LR Technical Committees around the world, by Lloyd's Technical Committee in London in November, and the changes will be promulgated in 2017.

Phil Helmore

FROM THE CROWS NEST

Ballast Water Management Convention to Enter into Force

The International Convention for the Control and Management of Ships' Ballast Water and Sediments (the Ballast Water Management Convention) will enter into force on 8 September 2017. This follows the IMO confirming that the conditions for initiating entry into force were met on 8 September 2016.

What does this mean for you?

By 8 September 2017, all ships (i.e. vessels of any type operating in the aquatic environment, including submersibles, floating craft, floating platforms, floating storage units (FSUs) and floating production, storage and offloading (FPSO) units) will be required to:

- have an approved ballast-water management plan on board;
- maintain a ballast water record book;
- manage their ballast water on every voyage by performing ballast-water exchange (or by treating it using an approved ballast-water treatment system); and
- undertake an initial survey and be issued with an International Ballast Water Management Certificate (for ships of 400 gross tonnage and above to which the Convention applies, excluding floating platforms, FSUs and FPSOs). Ships which are registered with flag administrations that are not yet a party to the Convention will need to demonstrate compliance and may wish to undergo surveys and be issued with a document of compliance.

At a later date, ships will also be required to:

- manage their ballast water on every voyage by treating it using an approved ballast-water treatment system.

The compliance schedule for when ships will be required to install and use a treatment system is as follows:

New ships Compliance on delivery for ships constructed on or after entry into force.

Existing ships Compliance by first IOPP renewal survey on or after entry into force.

A treatment system is required to be fitted to vessels which carry out an IOPP renewal survey on or after 8 September 2017. The IOPP renewal survey refers to the renewal survey associated with the IOPP Certificate required under MARPOL Annex I.

The Convention does not normally apply to:

- ships not carrying ballast water;
- domestic ships;
- ships that only operate in waters under the jurisdiction of one party and on the high seas;

The Australian Naval Architect

- warships, naval auxiliary or other ships owned or operated by a state; or
- permanent ballast water in sealed tanks on ships, which is not subject to discharge.

Additionally, under certain circumstances, flag administrations may issue exemptions from the Convention requirements for:

- ships engaged on occasional or one-off voyages between specified ports or locations; or
- ships which operate exclusively between specified ports or locations.

Lloyd's Register, *Class News* 30/2016, 14 September 2016

Papers from Ergoship 2016

Papers from *Ergoship 2016: Shaping Shipping for People*, the Maritime Human Factors conference held in Melbourne on 6–7 April 2016, are now available for free download via the University of Tasmania Library's open repository website,

http://eprints.utas.edu.au/cgi/search/archive/simple?q=ergoship&_action_search=&screen=Search&dataset=archive&order

Chris Haley

Team Britannia

Team Britannia is a multi-million-pound British bid to design and build the fastest and most fuel-efficient powerboat to circumnavigate the globe for the much-coveted UIM world record, currently held by New Zealander Pete Bethune, a promoter of bio-fuels and conservationist, in *Earthrace* at 60 days 23 hours 49 minutes.

The vessel is currently under construction and is expected to be launched in November for an extended programme of sea trials in the Solent and around the British Isles, ensuring that it exceeds all safety requirements before setting off on the global voyage.

To complete the record attempt, the boat must pass through the Suez and Panama Canals, cross the Tropic of Cancer and the Equator, and start and finish in the same place.

The world-record authority, the UIM (Union Internationale Motonautique), has approved Team Britannia's proposed route which will start in Gibraltar and call at Puerto Rico, Acapulco, Honolulu, Guam, Singapore, Oman, and Malta to take on fuel.

Led by ocean adventurer Alan Priddy, Team Britannia will launch their record bid on Sunday 12 March 2017.

Phil Helmore

GENERAL NEWS

Austal Awarded Armidale-class Patrol Boat Remediation Work

On 10 October Austal announced that Austal Australia will deliver an important mid-life remediation program to the Royal Australian Navy's Armidale-class patrol boat (ACPB) fleet.

Austal will undertake a number of hull remediation and configuration changes as well as planned and corrective maintenance work on up to seven ACPBs at the company's Henderson, Western Australia, shipyard from October 2016.

The activity, won in a domestic and international environment, will provide immediate, ongoing work for over 120 Austal employees and provides continuity of work between the completion of two Cape-class patrol boats for the Royal Australian Navy and a major export contract for Mols Linien, commencing April 2017.

The work on the ACPBs adds to the company's growing service and sustainment business. Austal is already delivering in-service support to the Australian Border Force's fleet of eight Cape-class patrol boats (designed and constructed by Austal) and has been contracted to provide in-service support for nineteen steel Pacific patrol boat replacement (PPB-R) vessels, as they enter service from late 2018.

Austal's Chief Executive Officer, David Singleton, commented "As the original designer and builder of the Armidale Class, Austal is in an ideal position to deliver

this important, mid-life enhancement work to a proven naval platform. Our inherent knowledge base and practical experience building and servicing the hard-working Armidale fleet will ensure the vessels depart Austal in 2017 with fully operational and effective capability."

"This order is indeed timely for Austal and ensures that key skills in naval shipbuilding and repair are maintained in Henderson during the lead up to the placement of the offshore patrol vessel contract.

"Once again, by winning this competitively-bid contract, we have demonstrated that Australian shipbuilding can be internationally competitive."

The Armidale-class patrol boat is a 56 m all-aluminium monohull patrol boat designed and constructed by Austal for the Royal Australian Navy. Fourteen ACPBs were delivered from 2005 to 2007 and the vessels continue to play an integral role in Australia's naval capability in the lead up to the arrival of the new offshore patrol vessel fleet from 2020.

Austal Delivers Second HSSV to Oman

In September Austal delivered the high-speed support vessel (HSSV) RNOV *Al Naasir* (S12) to the Royal Navy of Oman.

Less than four months after the successful, on-time and on-budget delivery of RNOV *Al Mubshir* (S11), in May 2016, RNOV *Al Naasir* (S12) is the second of two 72 m HSSVs built under a \$US124.9 million design, construct and integrated logistics support contract.



The advertisement for Muir Australia features a large, stylized 'muir' logo in blue and white, with 'SINCE 1968' written vertically to its right. Below the logo, there are three main images: a large industrial winch on the left, a yellow and blue offshore supply vessel in the center, and a close-up of a worker in a blue uniform on the right. The background is a light yellow with faint technical drawings. At the bottom left, there are logos for 'AUSTRALIAN MADE', 'ISO 9001', and 'ISO 14001', along with a Facebook icon. The text 'High quality products, for exceptional projects' is prominently displayed in the center.

Muir Australia Head Office:
Tel +61 (0) 3 6229 0600
E sales@muir.com.au
muir.com.au

High quality products, for exceptional projects

Muir offers a comprehensive range of commercial equipment for work boats, including fast ferries, fishing, charter, defence and offshore vessels.

Our range includes anchoring and mooring systems, manufactured in aluminium, bronze, cast steel and stainless steel, and we'll also happily custom design equipment to suit your requirements.

Muir is accredited to Det Norske Veritas Certification and our equipment is tested to all classification societies. **There's so much more to a MUIR.**



BUILDING WINCHES FOR OVER 45 YEARS...PROUDLY SUPPORTING AUSTRALIAN NAVAL ARCHITECTS

Austal commenced construction of the HSSVs in August 2014 at its Henderson, Western Australia, shipyard and hosted a naming ceremony for both vessels in April 2016. RNOV *Al Mubshir* is operating successfully in the Gulf of Oman and Arabian Sea.

With a large, 900 m² vehicle deck, seating capacity for 260 embarked troops and a top speed of 38 kn, the all-aluminium HSSV offers a range of capabilities to support naval operations, including helicopter operations, rapid deployment of military personnel and cargo, humanitarian, disaster-relief and search-and-rescue operations. Based on the proven 103 m Expeditionary Fast Transport (EPF) developed by Austal for the US Navy, the HSSV offers outstanding multi-mission flexibility and is redefining naval capability.

Austal's Chief Executive Officer, David Singleton, said that the delivery of RNOV *Al Naasir* was further proof of Austal's ability to win internationally-competitive export contracts and successfully deliver innovative, naval vessel programs from its Australian shipyard.

"This second HSSV reinforces Austal's position as the Australian shipbuilder and defence prime contractor of choice, developing and delivering customised solutions based on proven design platforms to naval fleets around the world" Mr Singleton said.

"As we gear up for the 19-vessel, 40 m Pacific patrol boat replacement program at the Henderson shipyard, we continue construction on two 58 m Cape-class patrol boats for the Royal Australian Navy, on schedule for delivery in the first half of 2017."

NUSHIP *Hobart* at Sea

On 24 September, the Air Warfare Destroyer Alliance achieved a major milestone with the successful completion of builder sea trials for the first destroyer *Hobart* following several days at sea off the coast of South Australia.

AWD Alliance General Manager, Lloyd Beckett, said that sea trials was the commencement of an exciting new phase for the air-warfare destroyer project.

"This first phase of sea trials, conducted over several days in the local South Australian waters, marks the successful testing of the ship's hull, propulsion and navigation systems. A second phase of more advanced trials will take place in early 2017 when *Hobart* trials its combat and communications systems," he said.

The successful completion of *Hobart*'s builder sea trials represents a decade of dedication and effort by the AWD workforce on one of the most-complex shipbuilding projects in Australia's history. "It's the culmination of years of design and procurement, construction and outfitting, system testing, training and equipment activation. It gives me an enormous sense of pride in seeing our hard work culminate in a successful trial period at sea," said Mr Beckett.

Significant progress has been made on the AWD project and *Hobart* to reach this milestone with the ship's construction commencing in January 2010, hull consolidation in March 2014, and launching in May 2015.

AWD Alliance Program Manager, CMDRE Craig Bourke,



The first of the RAN's new guided missile destroyers, *Hobart*, at sea during her builder's sea trials in September
(Photo courtesy AWD Alliance)

also expressed his satisfaction: “The completion of *Hobart*’s builder sea trials is a significant step towards delivery of the first AWD to Defence and the most-capable warships ever operated by the Royal Australian Navy.”

“The AWD Alliance team of shipbuilders and systems integrators can take great pride in attaining this major milestone of sending our first AWD to sea and successfully completing its platform trials,” he said. Over the coming months, further progress on the AWD Project will be demonstrated when the second destroyer, *Brisbane*, enters the water following its launch in December 2016, as well as hull consolidation of the third destroyer, *Sydney*, in August 2017.

Collins-class Sustainment Progress

The Minister for Defence, Senator the Hon. Marise Payne, the Minister for Defence Industry, the Hon. Christopher Pyne MP, and the Minister for Finance, Senator the Hon. Mathias Cormann, have congratulated the Collins-class submarine sustainment program at ASC, following an independent follow-up review on the progress made in addressing the findings of the original 2012 Coles Review.

Minister Payne said that the follow-up review, *Beyond Benchmark*, completed by John Coles, found a remarkable improvement in the capability to successfully manage the sustainment of the Collins-class submarines.

“The review considered current Collins-class sustainment performance, plans for sustaining Collins performance during transition to the future submarine, and opportunities for improving Collins beyond international benchmarks,” Minister Payne said.

“Improvements to the availability and reliability of the



NUSHIP *Brisbane* will be launched in December 2016
(Photo courtesy AWD Alliance)



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Collins-class submarines mean that they can spend more days at sea conducting exercises and operations which directly contribute to our strategic defence capability.”

Minister Pyne said that *Beyond Benchmark* also provides a number of observations and additional recommendations for sustaining and improving performance into the future.

“This is a strong endorsement of the capability of Australia’s defence industry and those involved should be commended for taking a project facing significant issues and transforming it into one which is a shining example of what can be achieved.

“This report reiterates that we have the capability and skills to deliver large complex defence projects — a skills base which needs to be nurtured, expanded and then exported to the world.”

“Defence intends to adopt a tailored set of these observations and recommendations to assure the performance of the Collins-class submarine capability into the future,” he said.

“ASC’s turnaround in performance in relation to submarine sustainment demonstrates the significant progress that this business has made in both experience and capability. The Government’s decision in October to create a separate submarine sustainment business will ensure that these enhanced skills and expertise will continue to be deployed in the best possible way to support future submarine sustainment,” Minister Cormann said.

Business of Sustaining Australia’s Collins Class Submarine Capability: Beyond Benchmark can be downloaded from www.defence.gov.au/casg/Multimedia/Coles%20Beyond%20Benchmark%20Report.pdf

Austal Delivers 70 m Vessel to Azerbaijan

On 14 September Austal announced the on-time and on-budget delivery of the Incat-Crowther designed Offshore Express 70 large crew-transfer vessel, *Rashid Behbudov*, to Caspian Marine Services Limited (CMS) of Azerbaijan.

The vessel was delivered less than 12 months after construction commenced in October 2015.

The impressive 70 m catamaran, featuring DP2 (DYNPOS-AUTR) dynamic positioning and an Ampelmann ‘walk to work’ gangway, was officially handed over to CMS at a ceremony at the Western Australian Maritime Museum in Fremantle, attended by Ms Aydan Rzaeva, the Honorary Consul of the Republic of Azerbaijan and Board Members of CMS. Austal Chairman, John Rothwell AO, congratulated CMS Chairman, Carl Rolaston, on taking delivery of the company’s newest maritime asset.

“This project successfully demonstrates Austal’s ability to successfully collaborate with our valued client and their designer to deliver a customised vessel, efficiently and cost effectively. We are justifiably proud of our shipbuilding teams to deliver this impressive vessel in less than 12 months, and congratulate CMS on their latest addition to the fleet.”

Austal worked closely with CMS and their designer, Incat Crowther, to integrate Marine Link, Austal’s proven control and monitoring system and Austal’s proprietary ride control technology with T-foils and interceptors which improve the

vessel’s seakeeping characteristics and crew comfort.

The Austal Offshore Express 70 is an effective transport and logistics solution, featuring more than 400 m² of cargo deck area and the ability to carry 150 passengers (plus 16 crew) 400 n miles at 30 kn. The vessel offers oil and gas industry operators greater safety, reliability and economy than alternative offshore transportation modes, such as helicopters. .

Austal won the A\$44.5million contract to build the sister ship to CMS’ *Muslim Magomayev* in June 2015.



Rashid Behbudov, a 70 m offshore crew-transfer vessel constructed by Austal for Caspian Marine Services of Azerbaijan (Photo courtesy Austal)

Submarine Combat System Integrator Selected

On 30 September the Minister for Defence, Senator the Hon. Marise Payne, and the Minister for Defence Industry, The Hon. Christopher Pyne MP, announced that Lockheed Martin Australia had been selected as the preferred combat system integrator for Australia’s Future Submarine Program, subject to further discussion on commercial matters.

Minister Payne said that this is an important step in the development of Australia’s regionally-superior future submarines.

“Lockheed Martin Australia will be our combat system Integrator to partner with Defence and DCNS to design and integrate the combat system of our future submarine, which meets our unique capability requirements.”

“By partnering with an Australian-based company with strong links to the United States, we will ensure that we get the best Australian and US technology, while ensuring that our sensitive technology is protected.”

Minister Pyne said that Lockheed Martin Australia intends to team with other Australian companies to provide the local engineering capacity needed to support the program.

“Lockheed Martin Australia’s involvement in the Future Submarine Program is likely to create around 200 skilled Australian jobs during the design and build phases of the program,” he said.

“The 200 full-time combat system integration jobs form part of around 2800 jobs associated with the broader future submarine program.

“I am pleased that a team of Australian companies will

integrate the future submarine combat system in a dedicated facility in Adelaide.

“This will see investment in engineering, project management and other high-technology industries in Australia,” he said. Minister Pyne said that Lockheed Martin Australia will draw upon expertise from Lockheed Martin Mission Systems and Training, and General Dynamics – Electric Boat, both of which are based in the United States.

“Australian industry will be directly involved in the highly technical work of designing and integrating the combat system for the future submarine, further developing our own capability in this specialised area,” he said,

“This is another step towards building and harnessing the innovation potential of Australia’s defence industry, as outlined in our 2016 Defence Industry Policy Statement.”

Minister Payne and Minister Pyne both acknowledged the quality of the proposals received from Lockheed Martin Australia and Raytheon Australia, which reflected the high standing of both companies, each of which is a significant partner to Defence in Australia.

“Raytheon Australia will continue to provide critical in-service support for the Collins submarines,” Minister Payne said.

Submarine Design Contract Signed

On 30 September the Minister for Defence Industry, the Hon. Christopher Pyne MP, and the Minister for Defence, Senator the Hon. Marise Payne, announced the next significant step in the building of Australia’s future submarines with the signing of the contract between the Government and DCNS to commence the design phase of the program.

Minister Pyne said that the signing of the design and mobilisation contract with DCNS was ahead of schedule and not only represented another significant step along the path to developing a regionally superior future submarine, but also was good news for Australian Defence industry.

Minister Payne said that the start of design marks a significant milestone in the development of regionally-superior future submarine capability for Australia.

“The design phase will enable Australia, in partnership with DCNS and Lockheed Martin Australia, to design a submarine which meets our unique capability requirements, including superior stealth and sensor performance,” Minister Payne said.

“We look forward to cooperation with France and the United States to support the development of this most important Defence capability for our nation,” she said.

BAE Systems to Refine Type 26 Design for New Australian Frigates

The Australian government has awarded BAE Systems a contract to further refine its design of the Type 26 Global Combat Ship (GCS) for the Royal Australian Navy under the SEA 5000 (Future Frigate) program.

BAE Systems said that a team of the company’s Australian engineers would be deployed to the UK to join BAE’s design team to facilitate the transfer of technology to Australia.

This is part of the Australian Department of Defence’s

Competitive Evaluation Process for the program. The Commonwealth has also entered into similar agreements with Fincantieri and Navantia.

BAE Systems Australia’s Chief Executive, Glynn Phillips, said “We look forward to demonstrating the adaptability and maturity of the Global Combat Ship design to meet Australia’s requirements for an anti-submarine warfare frigate. The Global Combat Ship design is the most modern, adaptable and flexible of all possible options available today, and I am confident that we will be able to demonstrate that it is the best able to meet the requirements of the Royal Australian Navy.”

BAE also revealed that a three-dimensional visualisation suite would be delivered to Australia to help improve understanding of the features of the ship design. This would, according to the company, enable conversations about design modifications which the Royal Australian Navy requires, and would help demonstrate how the Global Combat Ship could accommodate the required CEA Technologies’ phased-array radar system.

CDIC Board Announced

On 22 October the Minister for Defence Industry, the Hon Christopher Pyne MP, announced the appointment of board members of the new Centre for Defence Industry Capability Advisory Board (CDIC).

The CDIC Advisory Board is co-chaired by Paul Johnson, former Chief Executive Officer (CEO) of Lockheed Martin Australia, and Kim Gillis, Deputy Secretary, Capability Acquisition and Sustainment in the Department of Defence.

The new members are former Senator, the Hon. David Johnston, Chris Jenkins (CEO of Thales Australia), Tim Shaw (CEO of Micro), Merv Davies (CEO of CEA Technology), Karen Stanton (Director Strategy and Corporate of Heat Treatment Australia), Amanda Holt (CEO of Sypaq), Sharon Wilson (Head of Industrial Strategy for BAE Systems Australia), and John O’Callaghan (Director of Defence and Government Relations for Ai Group).

The Minister said that the CDIC Board members were selected to provide broad representation across industry and Defence.

“Defence Industry is an exciting growth area for the Australian economy and this new centre will help coordinate all our efforts to become a world player in defence industry exports,” Minister Pyne said.

“The CDIC will be headquartered in Adelaide and will receive around \$230 million investment over the next decade which will drive industry growth across the country.”

The CDIC will work with small-to-medium enterprises across Australia to promote competitiveness and guide priorities across defence industry.

The CDIC was announced earlier this year as a cornerstone initiative of the 2016 Defence Industry Policy Statement and will commence operations later this year. It will offer a range of advisory services, including mentoring, defence market access, export facilitation and global supply-chain development.

Naval Shipbuilding Advisory Board Chair Appointed

The Australian Government has appointed Prof. Don Winter as the Chair of the newly-established Naval Shipbuilding Advisory Board.

Prof. Winter is a former Secretary of the United States Navy and has held senior executive positions in the private sector and in academia.

The Minister for Defence Industry, the Hon. Christopher Pyne, said that Prof. Winter was both an expert in naval shipbuilding and highly familiar with Australia's naval shipbuilding industry.

"Prof. Winter has extensive experience and has already made an invaluable contribution to Australia's defence capability as Chair of the Expert Advisory Panel for the Future Submarine Program Competitive Evaluation Process," Minister Pyne said.

"As chair of the Naval Shipbuilding Advisory Board, Prof. Winter's expertise will be a valuable asset in supporting the Government's plans for a secure, sustainable, long-term future for the Australian naval shipbuilding industry.

"The establishment of the Advisory Board is an important milestone in the Government's naval shipbuilding strategy.

"The Advisory Board will provide expert, independent advice to Government on all aspects of naval shipbuilding as plans are finalised for establishing and sustaining a viable, continuous naval shipbuilding capability in Australia.

"Importantly, the Board's establishment delivers upon the significant regeneration of the Royal Australian Navy's capability outlined in the 2016 Defence White Paper."

The Advisory Board will report to the Minister for Defence Industry, and provide advice to the Prime Minister and other members of the Government on naval shipbuilding.

Incat Order from Malta's Virtu Ferries

On 7 October Incat Tasmania announced that it had been selected by Virtu Ferries of Malta to design and build a 110 m vehicle passenger (ro-pax) ferry.

Robert Clifford, Chairman of Incat, said "Virtu Ferries is amongst the oldest, most respected and most discerning fast ferry operators in the world; they operate a variety of high-speed craft services throughout the Mediterranean and Adriatic seas, and this vessel is intended for their year round lifeline service between Malta and the European Union which is an immense responsibility to the people of the islands served. Virtu Ferries were looking for increased reliability, seakeeping, passenger comfort, capacity and economy, with less operational downtime, and we are pleased to welcome them to the Incat family of shipowners".

This new 110 m wave-piercing catamaran will become the 15th fast ferry Virtu has acquired; it will be the largest high-speed catamaran in the Mediterranean and, with a service speed up to 38 kn, it will complete the crossing to from Malta to Sicily, berth to berth, in around 90 minutes.

For Virtu Ferries this new vessel provides a significant increase in capacity offering 43% more truck capacity, 15% more passenger capacity and 7% more car capacity. The vessel will incorporate a three-class interior (VIP, business

and economy) with a total of 1134 seats of which 996 seats are inside and 138 outside.

The design was developed by Revolution Design and Seaspeed Consulting, and then extensively tank tested and optimised at QinetiQ.

The ferry will be built under the DNV GL classification society rules and comply with the IMO HSC Code 2000 rules, the Malta flag statutory requirements and Italian port state requirements. As with all other Virtu vessels, the new Incat-built ferry will fly the Maltese flag.

Construction of the vessel will commence in early 2017 with delivery scheduled at the end of 2018. Incat currently has a 500 strong workforce at its Hobart shipyard and the yard is geared for delivering up to two large HSC per year.

In announcing the purchase, Virtu Ferries Chairman and Owner, Francis Portelli, said "We simply want to provide our passengers and freight operators with the highest levels of service, reliability and comfort yet, at the same time, operate an economical and environmentally-sustainable high-speed service. As this project has evolved over more than 12 months, we have enjoyed an excellent cooperative working relationship with Incat, Revolution Design and Seaspeed Marine, where they have listened to our particular requirements and continually evolved the design to a point where we are confident that we will be delivered a fantastic vessel suited not only to our requirements but the design is suited to many other island communities around the world.



An impression of the new 110 m ferry for Virtu Ferries
(Image courtesy Incat)

24 m and 33 m Catamaran Ferries from One2three Naval Architects

2016 began with a rush, with deliveries from Incat Tasmania of two 24 m and two 33 m commuter ferries designed by One2three Naval Architects, as part of a major capital expansion at Manly Fast Ferry to support the growth occurring on the Circular Quay to Manly fast-ferry service.

To foster operational experience, all staff in the Sydney Office of One2three were despatched to Hobart to join the delivery trips to Sydney on the 24 m and 33 m vessels. A memorable journey ensued, standing watches and helming into a strong 25 kn northerly and 2 m seas across Bass Strait under cover of darkness, followed by a glorious run up the east coast in brilliant sunshine.

The 33 m vessels carry 375 passengers and were explicitly designed to suit the Circular Quay–Manly commuter service. Powered by MAN D2862-LE463 engines rated for 1029 kW brake power, the vessels achieved 31.5 kn fully loaded. Running on Sydney Harbour, the vessels operate at 25 kn fully loaded, and run at 65% MCR.



24 m catamaran ferries for Manly Fast Ferry
(Photo courtesy Manly Fast Ferry)

The two 24 m vessels also service the Manly–Circular Quay route, with the lower capacity offering valuable flexibility throughout the low-peak periods. These vessels have a more multi-purpose layout, carrying 260 passengers in commuter service, but also up to 160 passengers for offshore whale-watching and tourist cruising on the harbour.

Ten months on, and all four vessels have been hard at work, carrying just over 2 million passengers across Sydney Harbour, ably supported by One2three 30 m Catamarans *Ocean Dreaming II* (built 2006) and *Ocean Rider* (ex *Sun Cat*, built 2005). One2three are looking forward to supporting Manly Fast Ferry and the people of Manly and surrounds with a ten-year refit of *Ocean Rider* in early 2017.



33 m catamaran ferry for Manly Fast Ferry
(Photo courtesy Incat Tasmania)

Galaxy Clipper and Neptune Clipper from One2three Naval Architects

These two vessels highlight a marked return to the smaller catamaran market for Incat Tasmania, delivering two One2three-designed 33 m low-wash ferries for operation on the River Thames, UK, in December 2015. These were the first two in a new Hunt-class series, named after the long serving Clive Hunt whose career spanned five decades and who, in his last months, remained a staunch supporter of MBNA Thames Clippers, Incat Tasmania and One2three, continuing to be involved with the build of *Galaxy Clipper* and *Neptune Clipper* during his battle with cancer.

November 2016



Galaxy Clipper offloaded in the Thames River, UK
(Photo courtesy MBNA Thames Clippers)

Sea Quest from One2three Naval Architects

Marine Engineering Consultants (MEC) has recently handed over the One2three-designed 30 m tourist-service catamaran *Sea Quest* to owners Cruise Whitsundays (CWS).

Launched in October 2016, the MEC-built vessel was pressed immediately into service, operating on the busy Cruise Whitsundays tourist network servicing Hamilton Island, Whitehaven Beach, and surrounding islands and reef pontoons. Following delivery of the One2three 24 m catamaran *Kingfish* in 2014, CWS returned to One2three for their next vessel, specifying a 30 m vessel with increased passenger capacity and an ability to interchange across all routes but, in particular, servicing Hamilton Island and Whitehaven Beach.

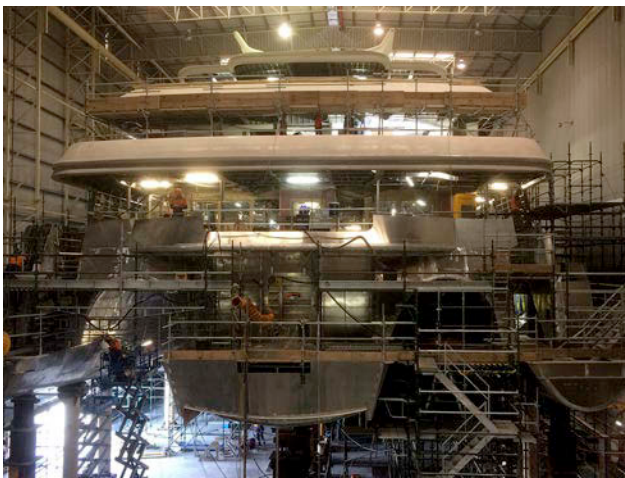


30 m tourist service catamaran *Sea Quest*
(Photo courtesy Cruise Whitsundays)

The vessel features an air-conditioned main deck for 150 passengers with large kiosk and separate servery. Upstairs is seating for 100 passengers in a 50/50 split internal/external. A large extendable bow ramp enables easy access to the sands of Whitehaven Beach, and a large multi-purpose tender at the transom allows for passenger transfers, divers and not to mention barbecues and the full buffet servery to host banquets on the beach.

84 m and 120 m Trimaran Superyachts from One2three Naval Architects

With aluminium fabrication work approaching 80% complete and fitout and engineering in full swing, the 84 m motor yacht *White Rabbit Golf* is taking shape and filling the Echo Yachts shed. Delivery is scheduled for 2018, and, when completed, she will be the largest superyacht built in Australia and the largest trimaran superyacht in the world.



84 m trimaran superyacht *White Rabbit Golf*
(Photo courtesy One2three Naval Architects)

As an insight into where Echo Yachts may be heading in the future, Echo released a concept design at the Monaco Boat Show for a 120 m trimaran superyacht styled by Sam Sorgiovanni Designs with naval architecture by One2three.



Starboard bow of 120 m trimaran superyacht
(Image courtesy Echo Yachts and Sorgiovanni Designs)

26 m Catamarans from One2three Naval Architects

Marine Engineering Consultants (MEC) have confirmed an order with South Sea Cruises (SSC) for two 24 m catamarans, each carrying 200 passengers. Following on from the success of the One2three 24 m catamaran *Cougar II* which was delivered in September 2014, SSC returned to One2three for a further two vessels.

The Australian Naval Architect

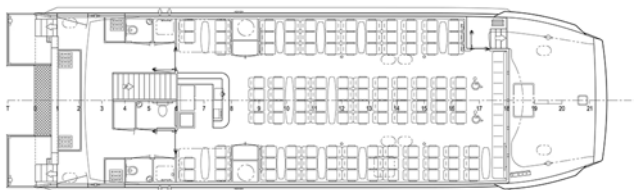
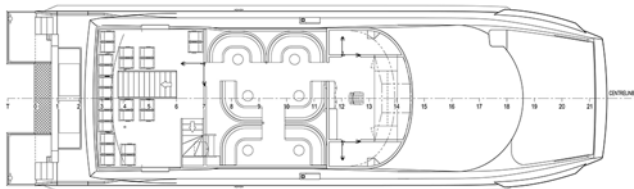
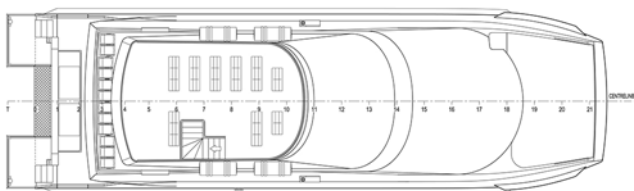
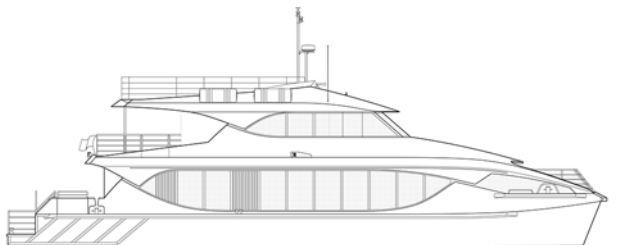


Port quarter of 120 m trimaran superyacht
(Image courtesy Echo Yachts and Sorgiovanni Designs)

The new vessels will service the outer islands in the Fiji group, in addition to providing transit services for the booming cruise-ship market. Shore facilities are limited and, in many cases, passengers and luggage are transferred to long boats for access to the island beaches. The aft deck is dedicated to long-boat boarding from the swim platforms and the provision of large luggage-storage spaces. Internally, 130 passengers are seated on the main deck, with an expansive kiosk and separate servery, similar to *Cougar II*.

Upstairs, however, the layout has changed, with the new vessels providing for a lounge premium-service cabin for 30 passengers with external seating aft. The wheelhouse roof is now a sundeck, with further external seating having superior views provided for 25 passengers.

Below decks the two vessels are different, with one vessel housing a pair of Yanmar 6AY-WGT engines rated at 680 kW brake power at 1940 rpm to provide a service speed of 25 kn at maximum displacement.



General arrangement of 26 m catamarans for South Sea Cruises
(Drawing courtesy One2three Naval Architects)

The second vessel hosts a pair of MAN D2862-LE 463 engines rated at 1029 kW brake power at 2100 rpm. Maximum load service speed is anticipated to be greater than 30 kn. The intention is to deploy the MAN vessel on the longer transits, whilst the first vessel will operate alongside *Cougar II* which also has the Yanmar engine package.

Despite the power differential, care has been taken to keep all drive-train components identical to maintain fleet commonality and reduce maintenance and spares cost.

Principal particulars of the new vessels are

Length OA	26.2 m
Beam OA	7.85 m
Depth	2.75 m
Passengers	200
Luggage	3 t
Fuel capacity	5000 L
Speed (Yanmar)	25 kn
(MAN)	31 kn
Flag	Fiji
Survey	AMSA

Red Jet 6 from One2three Naval Architects

I was on the bridge wing of Britain's most-recent fast ferry, *Red Jet 6*, as Captain Howard Ray slipped her moorings for the first time and pushed the MJP control lever to port. As if by magic, a hole in the heavy Solent traffic appeared where there was no hole, and Howard calmly placed *Red Jet 6* in the fast-flowing tide. Five metres off our starboard bow, a group of young kids waved from their UKSA Cavalier 26 ft (7.9 m) keel yacht (UKSA is a charity focused on youth development through sailing, based on the Isle of Wight). As I returned the wave, a young girl, no more than eight years old, pointed at us and exclaimed proudly to her friends "Look, it's the new Red Jet!" In that moment the full realisation of the local community integration with the *Red Jet 6* build program hit me.

"Built for the Island, on the Island, by the Island", was the mantra of Kevin George, CEO of Red Funnel Ferries, the oldest continuously-operating ferry company in the world. Step back two years, and Kevin and the Board of Directors had a vision of building a new fast ferry in the UK, and thereby reinvigorating fast-ferry shipbuilding in Britain. Enter Peter Morton, CEO of Shemara Refit LLP, heading up a team that had just completed an incredible restoration of MY *Shemara* to her former glory [see <http://www.boatinternational.com/yachts/editorial-features/superyacht-shemara-the-65m-classic-motor-yacht-is-restored-to-her-former-glory--349> for the full story]. Passionate about boats, Peter Morton, with backing from Sir Charles Dunstone (owner of MY *Shemara*), undertook to build *Red Jet 6* for Kevin, on the Isle of Wight at Cowes which Red Funnel has served for over 190 years. Partnered with One2three, whose principals had designed and built *Red Jet 4* under the North West Bay Ships banner, the team was in place to build the first fast ferry in over 15 years in the UK.

Bigger, faster and meeting the latest MCA requirements, including full HSC Code, *Red Jet 6* is a brand-new design. Configured for 278 passengers, *Red Jet 6* operates at a service speed of 35 kn across the Solent Channel with her four MTU 10V2000 engines running at 75%. At full power



Red Jet 6 naming ceremony at Cowes, UK
(Photo courtesy Andrew Sassoli-Walker)

and with full deadweight, *Red Jet 6* recorded a two-way average speed of 39.2 kn. Howard reports her maximum speed so far is 42.3 kn in the light condition.

All passengers are seated of course, and located on the main deck to ensure rapid turnaround times, which are essential in a service carrying over a million passengers annually. Dedicated luggage and bicycle storage areas on the main deck further enhance passenger comfort and speed of loading. The bridge is located on the upper deck, offering clear all-round vision. The upper deck is designed to take passenger traffic, allowing the vessel to undertake corporate charter work on demand.

Whilst slightly heavier in construction, the superstructure is resiliently mounted, resulting in an incredibly smooth and quiet passenger cabin. Below the isolated superstructure, the hulls house four MTU 10V2000 engines driving MJP DB500 waterjets via ZF 3050 gearboxes. The main machinery was carefully selected to enable the vessel to maintain a 35 kn service speed in event of loss of one driveline, with an ability to run in this configuration for days, or weeks if necessary, without impacting on the timetable.

Red Jet 6 was launched by HRH the Princess Royal in July before a crowd of thousands — literally the whole city of Cowes was on the foreshore enjoying the event festivities. Afterwards at the launch event, HRH approached One2three, enquiring about the ferry's innovations over *Red Jet 4*; she is now fully appraised on the benefits of quad-jet propulsion, the intricacies of cavitation margins, and the long-term cost benefits of utilising vinyl film over traditional topsides paint.

The *Red Jet 6* program has spawned a new shipyard (Shemara has rebranded to Wight Shipyard Co.), created 50 new jobs on the Island at Cowes and fulfilled Kevin's local-building initiative. And, who knows, the little girl on the Cavalier 26, with such a keen eye for maritime matters, may yet follow the path of countless men and women before her, and call Cowes her home port as she embarks on nautical adventures as yet unknown.

Principal particulars of *Red Jet 6* are

Length OA	41.1 m
Beam OA	11.1 m
Depth	3.05 m
Passengers	275
Luggage	3 t
Fuel oil	5000 L
Main engines	4×MTU 10V2000
Gearboxes	4×ZF 3050 gearboxes
Waterjets	4×MJP DB500
Speed	39 kn fully loaded
Flag	UK
Survey	MCA UK Cat D

33 m Low-wash Catamarans from One2threeNaval Architects

Following the delivery of *Red Jet 6*, Wight Shipyard (formerly Shemara Refit LLP) has announced its determination to continue the revival of aluminium shipbuilding in the UK, securing the largest fast passenger ferry order for a UK shipyard in 25 years. Two new Hunt-class Series II One2three-designed low-wash 33 m catamarans are under construction for MBNA Thames Clippers.

Due for delivery in 2017, the two new vessels will join the two Incat Tasmania-built, One2three-designed fast ferries *MV Galaxy Clipper* and *MV Neptune Clipper*. The four ferries represent an investment of £14 million, and will provide a 30% increase in capacity on the MBNA Thames Clippers central-London network, making it the largest commercial passenger fleet operating solely in English waters.

Sean Collins, founder and CEO of MBNA Thames Clippers explained "In 2016 alone, the MBNA Thames Clippers fleet will carry over four million commuters and visitors around London. We are investing in an expanded fleet, built in the UK, as well as exploring new options for piers to enhance London's infrastructure and maximise the River Thames as a thoroughfare. Our commitment to enhancing the London river transport network is moving at a considerable pace.

"This is the first order for the new shipyard following its rebranding. The experience and track record of the company means that we have found a new innovative yard with ambition who shares our vision for high-quality, safe and environmentally-efficient fast ferries. The complex nature of the tidal Thames means that it takes a specialist design-and-build team. We are thrilled to have found the right partners using One2three Naval Architects to design the vessels and a UK shipyard for the build, to make this important investment within the British Isles."

Like her sister vessels, the two new ferries are powered by Scania DI-16 072M engines rated at 625 kW brake power each, driving Rolls-Royce 40A3 waterjets via ZF gearboxes with a service speed of 25 kn fully loaded at 80% MCR.

Principal particulars of the new vessels are

Length OA	35.4 m
Beam OA	8.20 m
Depth	2.75 m
Draft	1.05 m at full load
Passengers	178
Fuel oil	3000 L
Main engines	2×Scania DI-16 072M each 625 kW
Gearboxes	2×ZF
Propulsion	2× Rolls-Royce 40A3 waterjets
Speed	28.5 kn fully loaded 100% MCR
Flag	UK
Survey	MCA UK Cat C
Class	Combined DNV HSLC/ Lloyds SSC'✱A1 Passenger G1 LMC

Expeditions Six from One2three Naval Architects

Located in La Conner, an hour north of Seattle, USA, Mavrik Marine is a specialist modern aluminium boatbuilder, servicing the north-west coast fishing industry with innovative and high-speed fishing vessels. With extensive prior experience in fast ferries, Mavrik has teamed with One2three to produce a 21 m catamaran for operations by Expeditions Lanai in Lahaina, Hawaii.

Expeditions Six was launched in August 2016 and is a 149 passenger USCG Cat T vessel configured for commuter transits between the islands of Maui and Lanai. In addition, she can undertake charter work and whale-watching tourist operations. The harbour in Lahaina is very small, and length restrictions are applied to commercial vessels operating there. Working within this brief, the design is focussed on robustness and maximising seakeeping performance for operations offshore into strong prevailing breezes. The hull shape features a high tunnel clearance, raked bows and pronounced spray chines for reserve buoyancy, and is configured for excellent dynamic stability and manoeuvrability in following seas. The main cabin is fitted with internal air-conditioned seating for 120 passengers and a large bar/kiosk. The external upper aft deck is devoted to sightseeing passengers to maximise views, and has seating for another 35 passengers.

Reflective of increased safety requirements, *Expeditions Six* is also USCG approved for 250 passengers in the event of an emergency allowing her to be pressed into disaster-relief service if required.

Powered by twin MAN 2862-LE422 engines rated at 749 kW brake power driving Veem propellers via ZF2050 gearboxes, *Expeditions Six* achieved a two-way average speed of 28.5 kn at full load displacement. Contract cruising speed of 25 kn was achieved at 70% MCR, providing for low-cost economical offshore running.

Principal particulars of *Expeditions Six* are

Length OA	21.5 m
Beam OA	7.9 m
Depth	2.75 m
Passengers	149
Fuel oil	3600 L
Main engines	2×MAN 2862-LE422
Gearboxes	2×ZF2050
Propulsion	2× Veem fixed-pitch propellers
Speed	28.5 kn fully loaded 100% MCR
Flag	USA
Survey	USCG Cat T
Class	DNV HSLC R3 Passenger (structure)

Island Explorer 5 from One2three Naval Architects

With *Expeditions Six* safely delivered to Hawaii, Mavrik Marine's attention is now devoted to completing the next build, a 30 m One2three-designed catamaran for operations along the north-west coast of the USA.

At 30 m long and with three passenger decks for just 149 passengers, *MV Island Explorer 5* is all about passenger amenity and comfort. The new vessel is the company's



Port bow of *Expeditions Six*
(Photo courtesy Mavrik Marine)

first foray into multihulls and will go into service in 2017 alongside their 85 ft (25.9 m) and 100 ft (30.5 m) monohulls. With operations in and around the San Juan Islands, the vessel is configured for whale watching and charter service. The main cabin seats 100 passengers internally, and has a dedicated galley, large bar/servery and tourist booking and naturalist stations. All seats have tables to support hot meal service.

The upper deck has 55 internal seats, 34 external sets and full walk-around capability, including direct access to the grandstand seating across the front of the vessel and down to the foredeck. A flybridge deck, complete with bimini cover and a helm station, provides for excellent whale observation and is fitted with 33 seats and provision for 50 standing passengers along the side rails.

Powered by twin MAN 2862-LE463 engines rated at 882 kW brake power driving fixed-pitch propellers via ZF gearboxes, the vessel's service speed is 25 kn fully loaded at 80% MCR.

Principal particulars of *Island Explorer 5* are

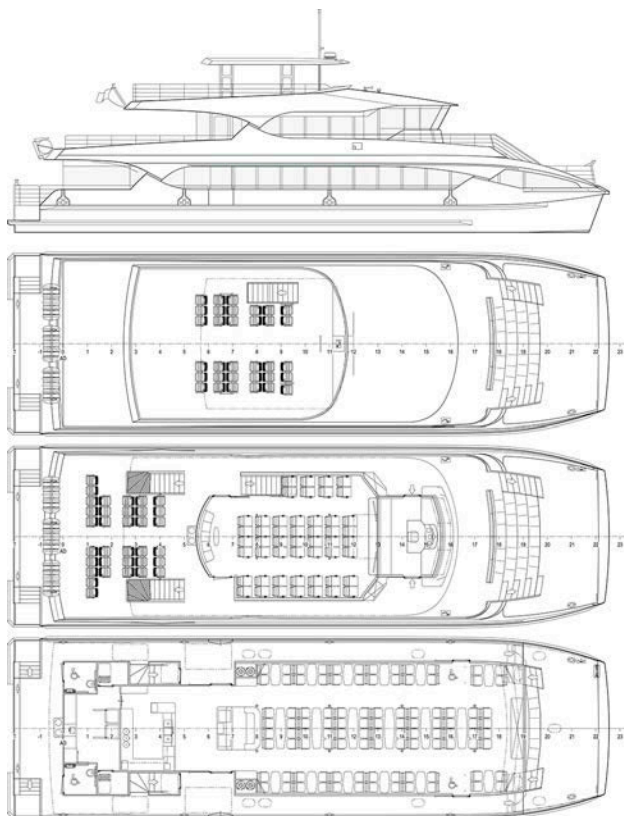
Length OA	30.0 m
Beam OA	9.1 m
Depth	2.71 m
Passengers	149
Fuel capacity	7600 L
Main engines	2×MAN 2862-LE463
	each 882 kW
Gearboxes	2×ZF
Propulsion	2×fixed-pitch propellers
Speed	29 kn fully loaded 100% MCR
Flag	USA
Survey	USCG Cat T

***Glacier Spirit* from One2three Naval Architects**

Also under construction at Mavrik Marine is a 28 m One2three-designed catamaran for operations in Alaska. *Glacier Spirit* is due for delivery in 2017 and will run charter and sightseeing operations in the Prince William Sound area. Rated for ice, the vessel will regularly cruise through broken pack ice on tours from Valdez up to the Meares and Columbia Glaciers.

Licensed for 149 passengers, the main deck features a large galley and bar for hot lunch and dinner service, with 100 seats all with tables. A further 56 internal seats are provided in the upper deck cabin with 24 external seats on the aft deck, all connected with full external walk-arounds to maximise sightseeing opportunities.

November 2016



General arrangement of *Island Explorer 5*
(Drawing courtesy One2three Naval Architects)

Powered by twin MAN 2862-LE463 engines rated at 882 kW brake power driving fixed pitch propellers via ZF gearboxes, the vessel's service speed is 24 knots fully loaded at 80% MCR.

Principal particulars of *Glacier Spirit* are

Length OA	27.4 m
Beam OA	9.1 m
Depth	2.74 m
Passengers	149
Fuel capacity	7600 L
Main engines	2×MAN 2862-LE463
Gearboxes	2×ZF
Propulsion	2×fixed-pitch propellers
Speed	27 kn fully loaded 100% MCR
Flag	USA
Survey	USCG Cat T

30 m Catamaran Sightseeing Vessel from One2three Naval Architects

The Mavrik Marine construction facility is large enough to support the concurrent construction of a third One2three-designed vessel. Both major tour operators in the Prince William Sound area have placed orders with Mavrik Marine, with this particular vessel being a 30 m catamaran scheduled for a mid 2017 delivery.

As an extension of their current fleet servicing the area, this catamaran is USCG rated for 149 passengers with full hot servery meals and dining experience on offer in the main-deck cabin. An upper deck provides seating for 76 passengers, complete with sightseeing walk-arounds whilst an extensive sundeck caters for 100 passengers with open-air views under bimini protection.

Powered by twin Cat C32 engines rated at 1080 kW brake power driving fixed pitch propellers via ZF gearboxes, the vessel's service speed is 28 knots fully loaded at 85% MCR.

Principal particulars of the new vessel are

Length OA	29.8 m
Beam OA	9.1 m
Depth	2.75 m
Passengers	149
Fuel capacity	7600 L
Main engines	2×Cat C32 each 1080 kW
Gearboxes	2×ZF
Propulsion	2×fixed-pitch propellers
Speed	30 knots fully loaded 100% MCR
Flag	USA
Survey	USCG Cat T

33 m Trimaran Windfarm Service Vessels from One2three Naval Architects

One2three have partnered with ShipCon Esbjerg for two 33 m advanced trimaran windfarm service vessels for World Marine Offshore for deployment on the Wikingier wind farm in the German Baltic Sea. ShipCon Esbjerg is providing the design and class-approved drawings and project management, and One2three is providing the 3D structural modelling and construction drawings. The vessels are being built in modules in Poland and the Netherlands.

World Marine Offshore, building on their operational experience, is pushing the design boundaries and the vessels feature a number of modern design elements targeted to reducing vessel motions as much as possible when alongside the wind turbines, thereby enhancing operator safety during transfers. The trimaran hullform offers stability with minimum side-hull waterplane area. The centre hull has a SWATH-like appearance with the middle section completely removed, thereby eliminating much of the hull's waterplane when at rest.

Motion-damping foils with an integrated active surface at speed provide for ride control, both stationary and during transit. One2three will be conducting CFD design studies to optimise the passive damping foils.

Propulsion power is provided by a total of five Scania DI-16 engines and two electric motors. Three Scania engines are dedicated to propulsion of the centre hull via HM571 waterjets. The side hulls feature HM461 waterjets powered by two electric motors to reduce required hull width and remove ventilation ducting and engine cooling from the



Starboard bow of windfarm trimaran
(Image courtesy ShipCon Esbjerg)

side hulls. The remaining two Scania engines are located in the centre hull and act as gensets to provide the vessel with propulsion and ship's power.

Principal particulars of the new vessel are

Length OA	33.00 m
Beam OA	12.0 m
Depth	5.15 m
Passengers	24
Deck cargo	20 t
Cargo deck	59 m ²
Fuel capacity	50 000 L
Main engines	5×Scania DI-16 2×electric motors
Waterjets	5×HM571 2×HM461
Speed	27 kn
Flag	Denmark
Class	Bureau Veritas

33 m Hydrographic Survey Vessels from One2three Naval Architects

One2three Naval Architects were invited to tender, and subsequently won, an international tender with Grade One Marine Shipyard (Thailand) for construction of two 33 m hydrographic survey vessels for the Bangladesh Navy. Construction has commenced at Khulna Shipyard in Bangladesh with delivery expected in 2018. The aluminium catamarans are configured primarily as hydrographic research ships, with a large open work deck featuring an A-frame, deck winches and an extensive array of sonar and survey equipment:

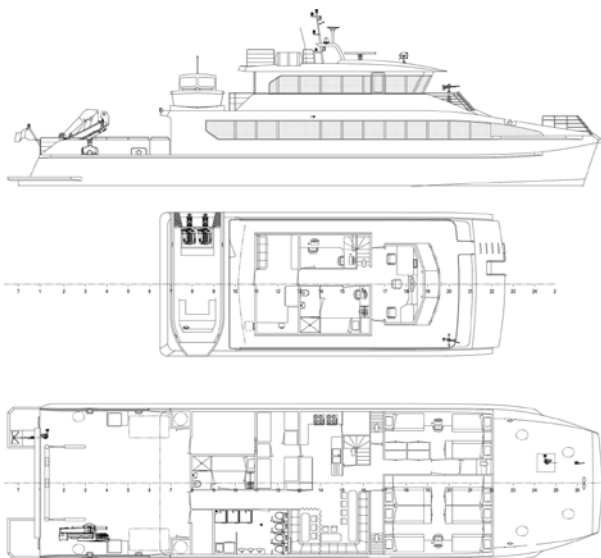
- Hull-mounted retractable multi-beam echo sounder
- Hull-mounted single-beam echo sounder
- Portable single-beam echo sounder
- Sidescan sonar
- Acoustic doppler profiler
- Auto tide gauge
- Sound velocity profiler
- Grab sampler

An 8 m survey workboat is stored on the upper deck, and launched by crane to either side of the vessel. The workboat provides for parallel survey opportunities and shallow-water operations where depths are less than the 1.65 m minimum working draft of the catamarans.

Secondary operations include search-and-rescue, disaster-relief operations, diving operations and naval training programs. Each vessel can take up to 36 crew for mission profiles of two weeks.

Principal particulars of the new vessels are

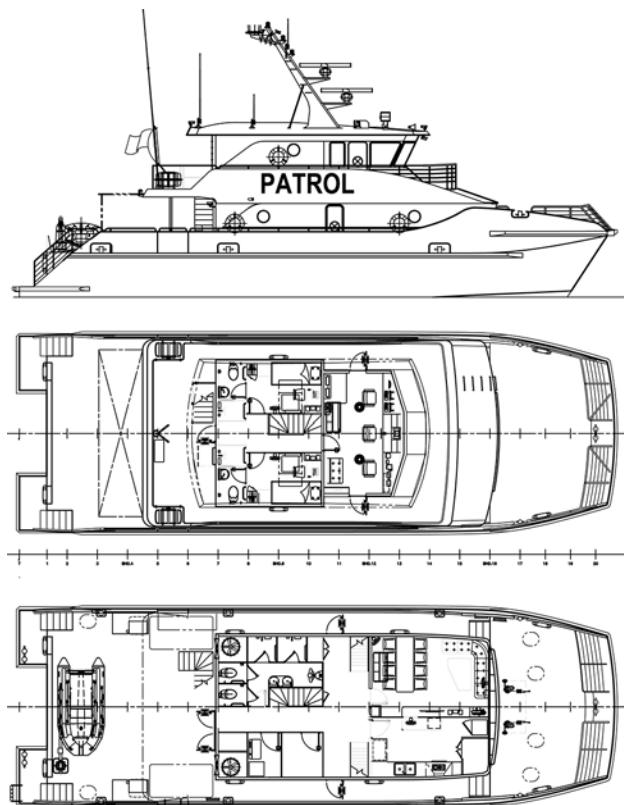
Length	33.4 m
Beam moulded	8.40 m
Draft	1.65 m
Crew	10
Fuel oil	10 000 L
Fresh water	14 000 L
Speed	16 knots
Range	800 n miles
Operation	Long-range offshore, sea state 5
Class	Bureau Veritas



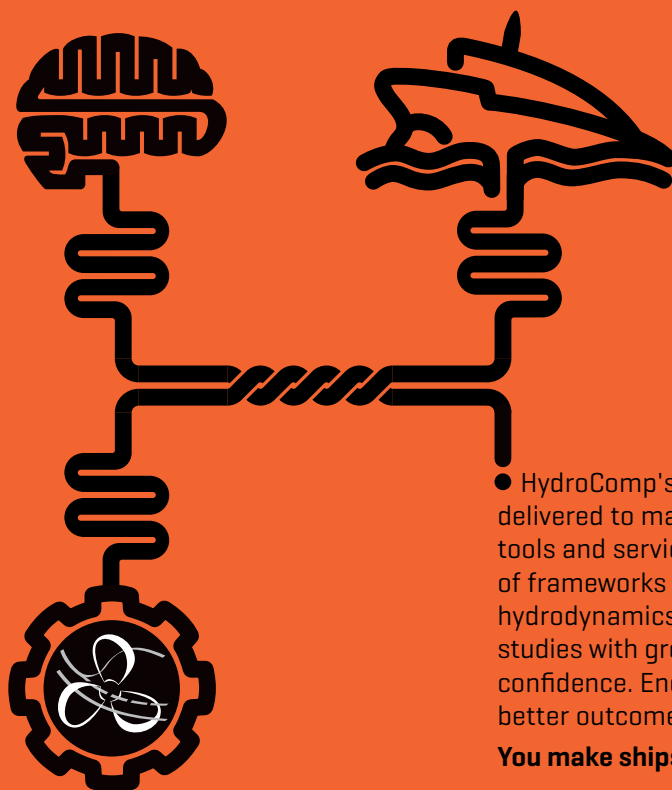
General arrangement of 33 m hydrographic survey vessels
(Drawing courtesy One2three Naval Architects)

23 m Police Patrol Catamarans from One2three Naval Architects

One2three has designed two 23 m patrol catamarans which are under construction with Marsun in Thailand for the Thailand Police. Based on the successful and highly-robust One2three-designed Queensland Police catamarans (three built by Austal at Margate in 2009, and three built by Aluminium Boats Australia in Brisbane in 2015), the vessels are designed to DNV GL Patrol Craft notation for offshore patrol, search and rescue operations to 200 n miles.



General arrangement of 23 m police patrol vessels
(Drawing courtesy One2three Naval Architects)



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The Marsun vessels are configured with four 2-berth cabins in the hulls, together with Captain and Engineers en-suite cabins on the upper deck behind the wheelhouse. Each vessel is equipped with a fresh-water maker, a sewage treatment plant, and WC and shower facilities on each deck, in addition to an impressive array of electronic and communications equipment.

Propulsion is via twin MAN V12-1650 diesels rated at 1213 kW brake power driving Veem propellers through ZF3050 gearboxes, giving the vessels a sprint speed in excess of 32 kn.

Both vessels are due to enter service in 2017.

Principal particulars of the new vessels are

Length	24.0 m
Beam moulded	7.80 m
Crew	10
Fuel oil	2×2600 L
Fresh water	1200 L
Sullage	1500 L
Main engines	2×MAN V12-1650 each 1213 kW
Gearboxes	ZF3050
Propulsion	2×Veem fixed-pitch propellers
Speed	32 kn

Rob Tulk

38 m Monohull Tour Vessel from Incat Crowther

Incat Crowther has announced the design of a high-end monohull tour vessel for Mary D Cruises of New Caledonia. With styling reminiscent of a yacht, the new vessel will be delivered by Strategic Marine in late 2016 and will replace an existing vessel with an expanded operational role. The vessel will ply an existing route to the tourist destination Amedee Island and offer evening dinner cruises, thereby providing greater utilisation of the asset.

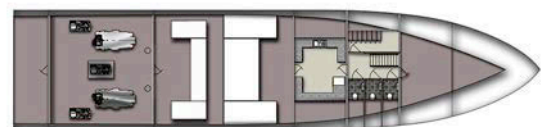
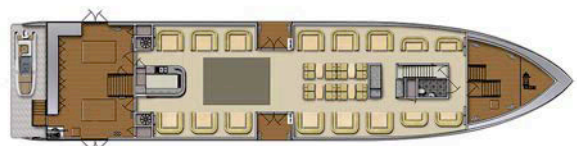
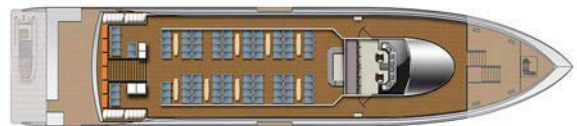
The main deck is arranged to support the transit operation by day, and dinner cruises in the evening. The deck features 108 passenger seats, primarily in booth seating with tables, an outdoor servery with chilled-food storage and food-display area. The toilets and scullery are located in the hull away from passenger view, with the scullery served by a dumb waiter to the main deck. A bar and a dance floor for the evening's entertainment are included. By day the dance floor converts to a baggage store, with the upper deck seating an additional 88 passengers for outdoor under-cover viewing on the lagoon cruise.

Additional operational features include a dedicated rubbish storage and removal system, and fold-out landing ramps to meet with the operator's existing infrastructure. The vessel is also fitted with cargo fuel and water tanks as it doubles as the supply vessel for Amedee Island.

The vessel is powered by two MTU 16V2000 M61 main engines rated at 800 kW each for a service speed of 20 kn. Electrical power is supplied by multiple Caterpillar C4.4 generators for redundancy, fitted in sound enclosures. The vessel will be classed by Bureau Veritas and complies with local French flag rules.

Principal particulars of the new vessel are

Length OA	38.4 m
Length WL	34.6 m
Beam OA	8.12 m
Depth	3.25 m
Draft	1.40 m
Passengers	196
Crew	8
Fuel oil	5000 L day 8600 L cargo
Fresh water	1250 L day 3600 L cargo
Sullage	1250 L
Main Engines	2×MTU 16V2000 M61 each 800 kW @ 1800 rpm
Propulsion	Fixed-pitch propellers
Generators	3×Caterpillar C4.4 each 96 kW
Speed (service)	20 kn
Construction	Marine-grade aluminium
Flag	France
Class/Survey	BV 1✱Hull ✱Mach Passenger Vessel Coastal Waters



General arrangement of 38 m tour vessel for Mary D Cruises
(Drawing courtesy Incat Crowther)

45 m Catamaran Passenger Ferry from Incat Crowther

Incat Crowther has announced a contract to design a 45 m catamaran passenger ferry for Seastreak of New York. The vessel has been developed in response to significant growth in passenger volume at Seastreak, and will increase the operator's fleet of Incat Crowther-designed vessels to a total of eight. Incat Crowther has worked closely with Seastreak to provide an operational advantage in a very competitive market. The new vessel will continue this approach and be

based on the fleet's largest ferries, *Seastreak Wall Street*, *Seastreak Manhattan*, *Seastreak Highlands* and *Seastreak New York*.

Passenger capacity is increased to 600. The vessel's boarding arrangement aligns with existing shore-based infrastructure and includes large forward and aft side gates as well as an adjustable bow ramp facilitating fast turnaround at many of the network's wharves.

The main deck features 234 passenger seats in a mix of forward-facing and booths. Toilets are located aft, whilst a large snack bar is located amidships. Three sets of stairs lead to the mid deck, which seats 271 passengers inside and 52 outside. The third deck features a further 160 exterior seats and the vessel's wheelhouse, with excellent visibility and forward-sloping windscreens.

The vessel will be built by Gulf Craft, Louisiana, and will be powered by a quartet of MTU 12V4000 M64 EPA Tier III main engines providing redundancy whilst operating efficiently at a modest rating. The vessel will be propelled by four KaMeWa 63S4 waterjets.

Principal particulars of the new vessel are

Length OA	45.0 m
Length WL	41.9 m
Beam OA	12.0 m
Depth	3.90 m
Draft (hull)	1.63 m
Passengers	600
Crew	6
Fuel oil	15 142 L
Fresh water	1893 L
Sullage	2650 L
Main engines	4×MTU 12V4000 M64 each 1398 kW @ 1800 rpm
Propulsion	4×KaMeWa 63S4 waterjets
Generators	2×John Deere 6068 SFM85
Speed (service)	33 kn
(maximum)	35 kn
Construction	Marine-grade aluminium
Flag	USA
Class/Survey	USCG Subchapter K



Starboard bow of new 45 m catamaran ferry for Seastreak
(Image courtesy Incat Crowther)

Sea Star from Incat Crowther

Incat Crowther has announced a contract to design a 50 m catamaran passenger ferry for South Korean operator Seaspovill. The vessel will join the operator's existing

fleet which runs from the mainland ports of Donghae and Gangneung to the island of Ulleung-do, a renowned destination for outdoor activities such as hiking. Incat Crowther worked with Seaspovill to develop the design of the vessel, and then assisted in the preparation of a preliminary design package and the selection of Austal Philippines to construct the vessel. During this process, Incat Crowther representatives attended operations with Seaspovill and performed detailed route operability analysis. The fully IMO HSC compliant vessel is optimised for through-life efficiency. Long waterline length combines with low structural weight to provide low capital costs and low fuel burn. Structure mass has been reduced by the use of Incat Crowther's advanced FEA systems to develop efficient cross structure which increases tunnel clearance without undue increase in hull depth and mass.

The operational envelope of the vessel is enhanced, allowing operation in rougher conditions, significantly reducing the number of lost days. Seakeeping will be exceptional, with a combination of Z-bow hullform and centre bow giving the operator new levels of operability and comfort.

To integrate seamlessly with the existing fleet and infrastructure, the vessel is configured around multiple boarding and mooring configurations and maintains existing key points.

The vessel's primary boarding location will be the midship doors, which are fitted with hinged ramps operated by electric winches. From here, passengers will enter a large central space with plenty of luggage storage and a stairway to the upper deck. Bathrooms and a kiosk are located aft. A total of 346 passengers are accommodated on the main deck.

The upper deck seats 100 passengers, plus four passengers in a VIP cabin. A crew room is located adjacent to the elevated wheelhouse, whilst two additional toilets are located aft.

Below decks, the engine rooms are laid out in a clean, accessible manner and feature removal hatches over each engine, completely clear of overhead obstructions.

The vessel will be powered by four MTU 16V2000 M72 main engines, each producing 1440 kW, driving KaMeWa 56A3 waterjets. Capable of reaching a maximum speed of 40 kn, the vessel has been optimised for a loaded operating speed of 33 kn at a modest MCR.



Starboard quarter of *Sea Star*
(Image courtesy Incat Crowther)

Principal particulars of the new vessel are

Length OA	49.9 m
Length WL	47.6 m
Beam OA	11.5 m
Depth	3.90 m
Draft (hull)	1.30 m
Passengers	450
Crew	8
Fuel oil	17 000 L
Fresh water	1500 L
Sullage	1500 L
Main engines	4×MTU 16V2000 M72 each 1440 kW @ 2250 rpm
Propulsion	4×KaMeWa 56A3
Generators	2×Cat C4.4
Speed (service)	33 kn
(maximum)	40 kn
Construction	Marine-grade aluminium
Flag	Republic of Korea
Class/Survey	DNV ✕1A1 HSLC Passenger R2 E0 IMO HSC Category A



Seats in main cabin on *Sea Star*
(Photo courtesy Incat Crowther)

Grey Lady IV from Incat Crowther

Incat Crowther has announced the launch of *Grey Lady IV*, the fourth catamaran ferry designed by Incat Crowther and built by Gladding Hearn for Hyline Cruises of Hyannis, Massachusetts. The new vessel was commissioned in response to increased patronage and a passenger preference for a fast service with better amenity, and is an evolutionary step from the three previous vessels from the designer/builder collaboration.

The 47 m catamaran is the largest in the fleet with additional passenger capacity, an increased luggage space and a VIP lounge. The capacity increase was at odds with docking constraints, which enforced upper limits on both the length and beam of the vessel. In the face of these challenges, Incat Crowther proposed moving the wheelhouse to a third deck, freeing up the front end of the second deck for VIP passengers. Balancing the extra deck's mass with increased capacity and amenity of the passenger spaces, Incat Crowther were able to propose a design which met performance and revenue requirements. The VIP cabin has a superb forward-facing view which is the only such cabin on a fast ferry serving the route.

With the increased passenger capacity and the addition of a service class, special attention was given to boarding arrangements and passenger flow. A mid-deck boarding door was added both forward and aft. Stair towers arranged in an efficient manner improve passenger flow and reduce turn-around times. Passengers who board over the bow are served by a stair tower from the main deck cabin, via the mid deck to the outdoor roof deck. The arrangement not only improves passenger flow, but adds a further dimension to Hyline's segregated passenger and luggage movements by giving VIP passengers a dedicated access as well.

Designed to perform at a service speed of 30 kn, *Grey Lady IV* is powered by a quartet of Cummins QSK60-M main engines. With a rating of 1641 kW each, they were selected to be run at a modest engine speeds in day-to-day running, with reduced wear and tear and increased time between overhauls. The rating allows the vessel to maintain its service schedule on three engines.

Principal particulars of *Grey Lady IV* are

Length OA	48.0 m
Length WL	45.7 m
Beam OA	10.5 m
Depth	4.30 m
Draft (hull)	2.10 m
Passengers	493
Crew	7
Fuel oil	15 000 L
Fresh water	2500 L
Sullage	2500 L
Main engines	4×Cummins QSK60-M EPA Tier 3 each 1641 kW @ 1800 rpm
Propulsion	4×Hamilton HM721 waterjets
Generators	2×Cummins QSB7-D (M) EPA Tier 3
Speed (service)	30 kn
(maximum)	35 kn
Construction	Marine-grade aluminium
Flag	USA
Class/Survey	USCG Subchapter K



Grey Lady IV on trials
(Photo courtesy Incat Crowther)

30 m Catamaran Ferry from Incat Crowther

Incat Crowther has announced the design of a new catamaran ferry for Cat Cocos of the Seychelles. To be built by Richardson Devine Marine Constructions, the 292

passenger, 30 m vessel will capitalize on the experience of the operation of the Incat Crowther-designed *Isle of Praslin* (delivered 2006) and *Isle of La Digue* (delivered 2009). These vessels have proven to be reliable, robust and efficient through years of operation, and the new vessel is designed to take those characteristics a step further.

The vessel will feature a shallow draft, including the use of an efficient propeller tunnel to afford access to the operation's confined harbour berth. Propulsion is via Cummins main engines, running at modest engine speeds, which will combine with hulls optimised by CFD to deliver low fuel burn. Maintenance is facilitated with a large engine-room access and clear engine-removal path.

As with all Incat Crowther-designed vessels, attention has been paid to highly-loaded areas of the vessel's structure, providing a robust and durable vessel. The structure has been optimised for the route's specific sea conditions, using Incat Crowther's in-house FEA systems.

The vessel's 292 passengers will be in three classes, Interior Economy, Exterior Economy and Business. Loading of the vessel, including baggage handling, has been optimised, with four access locations on the port side. Luggage is directly loaded into the enlarged luggage room via the aft-most ramp. Economy passengers are loaded via the next two gates, with those destined for the upper-deck aft exterior space afforded a clear path to the aft stairs. At midships, a boarding location is reserved for business-class passengers, who move directly onto a dedicated staircase to the business-class cabin.

Multiple features have been implemented to enhance passenger comfort, including a wave breaker, an active interceptor ride-control system, natural fresh-air ventilation, and large windows and blinds in the business-class cabin to reduce heat and glare.

Principal particulars of the new vessel are

Length OA	31.9 m
Length WL	29.8 m
Beam OA	9.00 m
Depth	3.25 m
Draft (hull)	1.30 m
(propellers)	1.70 m
Passengers	292
Crew	7
Fuel oil	8000 L
	3000 L day tanks
Fresh water	1200 L
Sullage	1500 L
Main engines	2×Cummins KTA50-M2 each 1342 kW @ 1900 rpm
Propulsion	2×propellers
Generators	2×Cummins 6B-CP80DM/5
Speed (service)	25 kn
(maximum)	31 kn
Construction	Marine-grade aluminium
Flag	Seychelles
Class/Survey	NSCV 1C

Stewart Marler



Starboard side of *Isle of La Digue*
(Image courtesy Incat Crowther)

AMD Marine Consulting



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Offshore Industry News

Preparations are Under Way for Modifications on Woodside's Nguijima-Yin FPSO

Woodside Energy contracted Keppel Offshore and Marine for the modification and upgrading of the FPSO vessel *Nguijima-Yin* to support the Greater Enfield Project, according to information released by the shipyard. The shipyard's work scope includes marine and hull-life extension and refurbishment works; installation of new customised water flood module, turret risers and power and control module; as well as modification of swivel system, marine and topside related piping.

In July 2016, Aibel Pte Ltd in Singapore announced the award of a contract for engineering, procurement and commissioning services for the FPSO modifications. The shipyard construction work is targeted to start in the second-quarter of 2018. Upon its completion, the Woodside-operated *Nguijima-Yin* FPSO will be deployed back to the Greater Enfield area, which is located 37 n miles off Exmouth in Western Australia.

Floating Systems for the INPEX Ichthys Project are Taking Shape

The Ichthys FPSO, a 336 metre-long ship-shaped, weather-vaning vessel, is being constructed in Korea by Daewoo Shipbuilding and Marine Engineering, according to INPEX,

a Japanese energy company. The FPSO, designed to hold more than one million barrels of condensate, will process and store most of the condensate delivered from the Central Production facility (CPF) before periodically offloading it to carriers for export to market. It will be permanently moored with a non-disconnectable turret about 3.5 km from the CPF and will be able to accommodate a workforce of up to 200. A semisubmersible-type CPF is expected to be the largest floating structure of this type ever built. Once constructed, both floating facilities will be stationed at the Ichthys field in the Browse Basin, offshore Western Australia.

INPEX recently announced that part of the mooring system for both facilities has been set up. It included 49 chain mooring lines laid on the seabed (a total of 77 km of chain) in water depths of up to 250 m and anchored to foundation piles which are 5.5 m in diameter and 63 m long. The mooring system will, according to INPEX, secure the project's two floating systems for at least 40 years of continuous operation.

INPEX said that the large-scale anchor chains weigh 40 000 t and that the 28 CPF mooring chains required more than 25 000 t of mainly 178 mm diameter chain, while the 21 FPSO mooring chains needed more than 15 000 t of mainly 161 mm diameter chain. In addition to the mooring system, more than 16 000 t of subsea structures and 140 km of rigid flowlines have been installed across the Ichthys field.

Yuriy Drobyshevski

Cruising in Sydney

The winter quiet saw *Pacific Eden*, *Pacific Jewel*, *Pacific Pearl*, *Sun Princess*, *Sea Princess*, *Golden Princess* and *Carnival Spirit* working out of Sydney, the increasing number of seven vessels (up from two a couple of years ago) being indicative of the increasing demand for winter cruises.

The arrival of *Dawn Princess* on 27 September signalled the start of the summer season. She was followed in October with return visits by these vessels plus *Celebrity Solstice*,

Radiance of the Seas, *Carnival Legend*, *Maasdam*, *Noordam* and *Costa Luminosa*.

November moved into a higher gear, with return visits by these vessels plus *Voyager of the Seas*, *Amsterdam*, *Explorer of the Seas*, *Pacific Aria* and *Emerald Princess*. Vessels berthing regularly at the Overseas Passenger Terminal at Circular Quay is a sure sign that the summer cruise season is under way.

Phil Helmore



Costa Luminosa at the Overseas Passenger Terminal at Circular Quay on 25 October
(Photo John Jeremy)

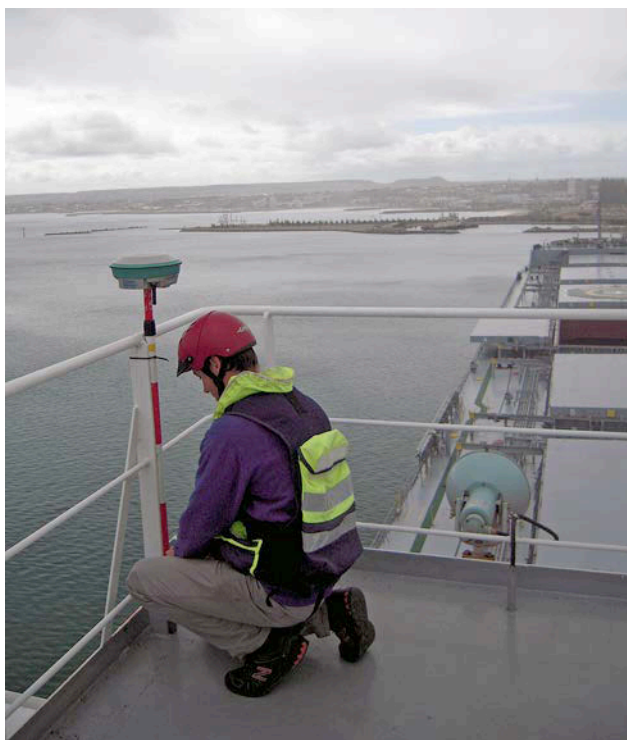
EDUCATION NEWS

Curtin University

Centre for Marine Science and Technology Refocussing

The Centre for Marine Science and Technology is now refocussing on being a specialist research centre in marine acoustics. Ship hydrodynamics consulting is being moved into the new business Perth Hydro (www.perthhydro.com) being set up by Dr Tim Gourlay. Tim will provide specialist ship hydrodynamics consulting to industry, government and defence. He can be contacted at tim@perthhydro.com.

Tim Gourlay



Tim Gourlay on trials at Geraldton, WA
(Photo courtesy Tim Gourlay)

University of Tasmania

Australian Maritime College

Chief of Navy Welcomed to AMC

In an important step for enhanced engagement, the Australian Maritime College was honoured to welcome the Chief of Navy, Vice Admiral Tim Barrett AO, CSC, RAN, to its campus on 14 October.

VADM Barrett — who holds the most senior appointment in the Royal Australian Navy — visited the College along with Commanding Officer Navy Headquarters Tasmania, Lewis Gaha, and Flag Lieutenant Chris Clarke. They were joined by Dr Stuart Cannon, Research Leader Maritime Platform Performance, at DST Group.

The delegation toured the Australian Maritime College's facilities — including being the first visitors to the newly-constructed Autonomous Underwater Vehicle Research Laboratory — and learnt about the Defence-related research collaborations being undertaken in AMC's Cavitation Research Laboratory.

November 2016

VADM Barrett then heard from four of the twelve PhD students from the Australian Research Council's Research Training Centre for Naval Design and Manufacturing. Steven De Candia, Samuel Smith, Jane Cullum and Martin Friebe explained how their investigations — which are being carried out together with Defence and industry — will contribute to the Government's ambitious ongoing naval ship-building program.

VADM Barrett remarked on the relevance to the Navy of their research, which included:

- Investigating improvements to the survivability of defensive systems on modern surface combat vessels.
- Reducing vibration and noise pollution from vessels by shaping the design so they handle turbulent conditions better.
- The application of risk-based maintenance practises to naval vessel systems for greater efficiency, and
- Predicting the response of submarine platforms and equipment to underwater explosive loads.

During a session discussing strengthening strategic relations, DST Group's Stuart Cannon described AMC as a "trusted defence partner," and VADM Barrett expressed his interest in ways of inspiring more young people to enter the defence industry and how the Navy plays a role in this.

He explained that continued growth is needed across the maritime industry as a whole in order to sustain the maritime defence sector over a prolonged period, and expressed interest in engaging with AMC on Australia's shipbuilding plans and on policy which affects the education sector.

Following the discussion, VADM Barrett witnessed AMC Principal, Prof. Neil Bose, signing the Terms of Reference for a new Steering Group which has been established between the Navy and AMC to realise opportunities for complementary activities in the areas of training and education.



L-R: Prof. Neil Bose, Vice Admiral Barrett, Paul Gregg, Dr Damien Guihen, Dr Stuart Cannon and Peter King alongside the AUV *Gavia* in AMC's newly-completed AUV research laboratory
(Photo courtesy AMC)

Undergraduate Thesis Projects

The AMC undergraduate thesis research conference was held on 21 October, 2016. The conference allowed final year maritime engineering students the opportunity to present their research. A total of 77 students presented their work at the conference which ran across six rooms simultaneously. The conference was well attended by members from industry and academia, including Alan Muir & Associates, Dr Andreas Marouchos, CSIRO, Art Shrimpton, former AMC lecturer, Prof. Charles Lemckert, Griffith University, David Hughes, CSIRO, James Davies, Dawn Engineering and Consulting, Sam Watkins, Jacobs, Prof. Laurie Goldsworthy, former AMC lecturer, Jonathan Vogt, Damen Shipyards, Mike Seward, Seward Maritime, Scott Hunter, Wave Swell Energy, Brett Morris, DST Group, Simon Little, Southern Prospect, Trevor Dove, BMT Design & Technology, Michael Lonsdale, Serco Asia Pacific, Martin Grimm, Naval Technical Bureau, Department of Defence and Adjunct A/Prof. Alex Robbins, Defence Contractor, MATV Project.

Many of these individuals travelled from interstate to attend the conference and the AMC would like to acknowledge their time and efforts. The external attendees played an important role in assessing the student's presentations and raise the profile and significance of the conference.

The conference was followed by a formal reception which was attended by the students, assessors and supervisors. The following students were recognised for their outstanding presentations.

RINA Tasmanian Section award for the best presentation

Student: Tobias Aldridge Supervisor: Mark Symes

Drift Characteristics of an Inertial Navigation System without External Aiding

Equal runners up

Student: Dylan Dwyer Supervisor: Max Haase

Force/Moment Response and Added Resistance of a Fixed Full-Scale Wave-piercing Catamaran in Waves

Student: Lily Webster Supervisor: Max Haase

Investigation into the effect of Nose- and Tail-cone Shape on drag of an AUV considering Laminar-turbulent Transition

Special mentions:

Student: Mark Bennet Supervisor: Irene Penesis

Experimental Study into the Diffracted Wave Field Downstream of an Array of Wave-energy Converters in Irregular Waves

Student: Scott Forrest Supervisor: Gregor Macfarlane

Ship-Generated Solitons and the Dynamic Vessel Response as a Function of Blockage

The conference was a great showcase of student talent at the Australian Maritime College. Alan Fleming deserves special praise for coordinating the thesis projects throughout and organising of the conference with the assistance of Leslie Lundie.



Tobias Aldridge Receiving the RINA Tasmanian Section award for the best presentation from A/Prof Jonathan Binns
(Photo courtesy Gregor Macfarlane)

Postgraduate research

Tom Mitchell-Ferguson

Tom Mitchell Ferguson recently completed his PhD at the Australian Maritime College. His research focussed on improving the model-scale testing of wave-energy devices through the use of advanced experimental techniques such as particle image velocimetry (PIV). PIV captures velocity fields and can be used to provide both qualitative and quantitative flow visualisation.

Tom conducted scale-model experiments to investigate the impact of wave type on the operation of a wave-energy converter. Regular, polychromatic and irregular waves were tested. While regular and irregular waves are commonly used, Tom's research showed that polychromatic waves offer an alternative and allow more targeted testing.

The use of PIV to explore three-dimensional flows was shown to be a useful tool to guide the design of wave energy devices, potentially leading to efficiency gains and an increase in power generated during outflow.



PIV experiments being conducted on a wave energy device
(Photo Tom Mitchell-Ferguson, courtesy AMC)

His study demonstrated the importance of performing experiments in realistic sea states and highlighted the value of experiments in polychromatic and/or irregular waves early in the design process. PIV provided a vast amount of information on the operation and performance of wave energy converters and will no doubt serve as a benchmark for future research on quantitative flow visualisation,

comparative studies and validation of numerical models. Tom was supervised throughout his PhD by A/Prof. Irene Penesis, A/Prof. Gregor Macfarlane and Dr Alan Fleming. Tom is currently working as a post-doctoral research fellow at the AMC. He is involved in the installation of a prototype tidal turbine in the Tamar River Estuary and life-of-type analysis of steel naval vessels. Congratulations Tom on completing your PhD and good luck in the future.

Arno Dubois

Arno Dubois had his PhD candidature confirmed at the Australian Maritime College. The confirmation of candidature is undertaken after 11 months and is a major milestone for students completing their PhD.

Arno is using computational fluid dynamics to understand the flow behaviour and hydrodynamic forces acting on a new propeller concept. The collective and cyclic pitch propeller (CCPP) is a viable design option for Autonomous Underwater Vehicles (AUVs). Due to their mission requirements, AUVs require propulsion which combines efficient, long-endurance travelling capabilities with effective operation at low speeds. Arno's research will help quantify the benefits of the CCPP and allow the concept to realise its full potential.

Arno came to the AMC in 2015 after completing his Master of Science degree at Delft University of Technology. His PhD is being supervised by Dr Hung Nguyen, A/Prof. Jonathan Binns and Dr Zhi Leong. Congratulations on receiving your confirmation of candidature and we look forward to your future findings.



A collective and cyclic pitch propeller installed on an AUV
(Photo Arno Dubois, courtesy AMC)

Available PhD Projects

Polar-class Propeller-design Strength and Evaluation

The aim of this research project is to compare the design strength of new and as-built polar-class propellers using

the URI3 requirements and ultimate strength theory. The research is mainly experimental and the successful candidate will design and build an apparatus to acquire measured data from a polar-class propeller. The research will also involve some computational work using the existing software 'Propella' or another similar CFD package. This PhD scholarship provides \$26 288 pa (2016 rate) and a living allowance for three years, with a possible six month extension.

For more information regarding this scholarship along with many others, visit the University of Tasmania's website. www.utas.edu.au/research/degrees/available-phd-projects.

Lauchlan Clarke

University of New South Wales

Undergraduate News

Visit to McConaghy Boats

The Year 3 and 4 naval architecture students accompanied by David Lyons and Phil Helmore visited McConaghy Boats at Mona Vale on 23 August. We were shown over the facility by General Manager, Eric Desjardins, and saw the laying up of the deck of a Frers-designed carbon fibre 17 m yacht with pre-preg woven fabrics and uni-directionals, prior to being vacuum bagged and cooked in the company's curing oven. We also saw a completed hull being fitted out with bulkheads, etc. They have models of many of the famous super-maxis which have been built there, including *Wild Oats XI*, and we saw lots of go-fast bits, including boards, helms and a complete rudder, stock and bearings.

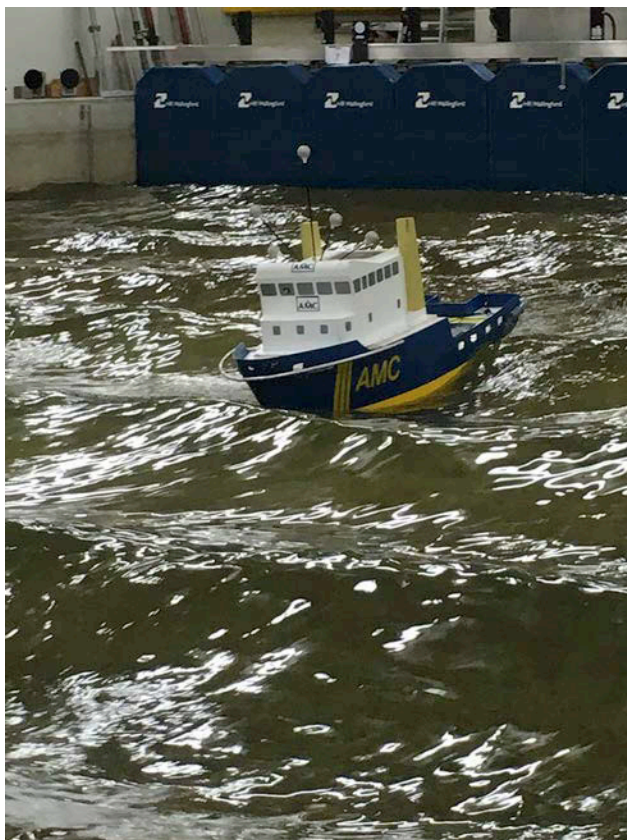
Visit to AMC

On the 8 and 9 September the Year 3 students studying Ship Hydrodynamics visited the Australian Maritime College accompanied by Dr Rozetta Payne. The visit was organised by Dr Tim Lilienthal, and UNSW is grateful for AMC's hospitality. The group visited several of AMC's facilities, including the towing tank where experiments were being conducted by Dr Valentinis from DST Group using the horizontal planar-motion mechanism. There was a lecture on cavitation given by Dr Bryce Pearce along with a demonstration of the cavitation tunnel.



UNSW students setting up the *Bluefin* model for tests under the Supervision of Tim Lilienthal (L)
(Photo courtesy Rozetta Payne)

The students particularly enjoyed undertaking experiments in the model test basin, where they investigated the effects of sea state on an oscillating water column as well as on manoeuvring and ship motions using the model of AMC's vessel *Bluefin*. The visit finished with a session in the ship-handling simulator with Damian Freeman. The students came away with a better understanding of ship model testing and how it is done in practice. It certainly helped to have naval architects talk about the various aspects of testing and research, and their explanations of the processes brought out the realities and practicalities which you don't get in the theory.



Bluefin model in head seas
(Photo courtesy Rozetta Payne)

Thesis A Conference

The following Thesis A progress presentations on naval architecture student projects were made on 1 November:

Adela Greenbaum	<i>Assessment of Risk for Heritage Vessels</i>
Geoffrey McCarey	<i>Resistance and Seakeeping Assessment of Warped Planing Hullforms and Validation of Prediction Methods</i>
Abdullah Syahmi	<i>Interlaminar Performance of Different Types of Resins in Composites</i>
Mohd Lokman	
Arif Otman	<i>Investigation of the Effects of Low-velocity Impacts on Composites and Metals</i>
Tsoritselaju Saniyo	<i>Material Selection for High-speed Craft: Composites vs Aluminium</i>

Thesis B Conference

The School's undergraduate Thesis B Conference for Semester 2 took place on 31 October and 1 November. The following presentations on naval architecture student projects were made on 1 November:

James Johnson	<i>Comparison of Physical Sailing Yacht Performance to Velocity Prediction Program Outputs</i>
Kasyfil Aziz Ani	<i>Material Selection for High-speed Craft: Composites vs Aluminium</i>
Muhammad Izzuddin Noor Rahimi	<i>Embodied Energy as a Criterion in Material Selection: Comparison between Composites, Aluminium and Steel</i>
Muzhen Zhang	<i>Effective and Efficient Recycling Approach for Composite Materials</i>
Samuel Free	<i>Fire safety of Composite High-speed Passenger Ferries</i>

Post-thesis Party

The annual Thesis Conference Dinner died in 2010 with the arrival of a new Head of School, much to the dismay of all the final-year students. The annual Naval Architects' Dinner was inaugurated that year for the final-year naval architecture students.

The new Thesis B Coordinator this year, Ronald Chan, has taken the pleas of the students to heart and, following the Thesis B Conference, on Tuesday 1 November held a Post-thesis Party in the Design Studio on Level 5 of the Ainsworth building. Beer, wines, soft drinks and canapes were served, and many tall tales and true were told.

The students instituted the First Annual MECHE Awards with the following for staff announced at the Post-thesis Party:

- Lecturer with the Best Accent: Zoran Vulovic, who said that *he* doesn't have an accent, all of the students do!
- Lecturer with the Least-pronounceable name: Sangarapillai Kanapathipillai.
- Most-peaceful Lecturer: Zoran Vulovic, the prize being a collapsible camp chair!
- Hardest-to-find Lecturer: Garth Pearce.
- Lecturer Never Heard of: Ka Ching Chan.
- Lecturer with the Best Facial hair: Zoran Vulovic.
- Lecturer with the best Catch-phrase: Ganga Prusty — *Use your engineer's eyes!*
- Most-diligent Phone Confiscator: John Olsen.

RINA–DST Group Award

RINA and DST Group jointly offered an award and certificate for the best presentation by a student member on a naval architectural project at the Thesis B Conference. Assessment was made on the basis of marks awarded by School staff. The award went to James Johnson for his presentation on *Comparison of Physical Sailing Yacht Performance to Velocity Prediction Program Outputs*. The award will be

presented at the Naval Architects' Annual Dinner.

Thesis Topics

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

Embodied Energy as a Criterion in Material Selection: Comparison between Composites and Metals

A major contributor to the sustainability value of any material is its embodied energy. A complete life cycle analysis of a product must account for the embodied energy, which should be minimised in order to maximise sustainability. Muhammad Izzuddin Noor Rahimi, has investigated the major sources of embodied energy within composites and metals (aluminium and steel) as the major shipbuilding materials, and comparisons have been made.

Embodied Energy, Greenhouse Performance, Life-cycle and Recyclability of Composite Materials

Embodied energy, greenhouse gas performance, life-cycle and recyclability are all major contributors to the sustainability value of any material. Muzhen Zhang has investigated the relative importance of these contributing factors.

Graduation Ceremony

At the graduation ceremony on 8 November, the following graduated with degrees in naval architecture:

Bing Zheng Ho Honours Class 2, Division 1

James Phillips Honours Class 2, Division 1

Graduates Employed

He is now employed as follows:

Bing Zheng Ho Royal Singapore Navy, Singapore

James Phillips One2three Naval Architects, Sydney



Phil Helmore and James Phillips
at the UNSW Graduation Ceremony on 8 November
(Photo courtesy James Phillips)

Accreditation of Degree Streams by Engineers Australia

Engineers Australia accredits engineering degrees around Australia every five years. Having been last re-accredited in 2011, engineering degrees at UNSW Australia were all up for re-accreditation this year.

The School's submission on our five degree programs, aerospace engineering, mechanical engineering, mechanical and manufacturing engineering, mechatronic engineering and naval architecture, was mainly put together by Director of Undergraduate Teaching, Garth Pearce, Nathan Kinkaid and Catherine Pogonowski. The submission included details of the program structure revision undertaking following the last re-accreditation, and the refurbishment of the laboratory and tutorial buildings.

The visiting team from Engineers Australia comprised

- Prof. Adrian Mouritz, Dean of Engineering, RMIT University
- Prof. Friso de Boer, Head of School Engineering and Information Technology, Charles Darwin University
- Mr Neville Probert, Royal Aeronautical Society, recently retired from CASA
- Mr Ken Hannah, Chief Engineer Maritime, BAE Systems
- Mr Charles Tan, Observer from Myanmar

and they visited UNSW on 25–27 May.

The draft report from Engineers Australia has been received, and assessed the four-year Bachelor of Engineering (Honours) and two-year Master of Engineering program implementations.

The range of engineering specialisations offered by UNSW has been relatively stable over a considerable time period. The Bachelor of Engineering (Honours), [BE (Hons)], has been introduced from 2015, and replaces the Bachelor of Engineering in each of the key specialisations considered at the previous general review visit in 2011. In responding to the revised AQF 8 requirements, a significant revision of the generic structure and content of the individual BE streams has occurred since 2011. New structural constraints and mandated core requirements for the BE (Hons) have overcome many of the issues that were raised by the 2011 panel. The Faculty of Engineering has experienced significant growth in student numbers and academic staff since 2011 and claims to be the largest Engineering Faculty in Australia. Very significant investment has occurred, and is continuing, in buildings refurbishment, new building construction and re-equipping of laboratories, workshops, and learning spaces.

The recommendation of the panel was that "Full accreditation of the Bachelor of Engineering (Honours) be accorded, from 2015 through to the first intake of students in 2022, at the level of Professional Engineer, for each of the following specialisations:

- Aerospace Engineering
- Mechanical Engineering
- Mechanical and Manufacturing Engineering
- Mechatronic Engineering
- Naval Architecture

A number of recommendations were also made for continuing improvement of degree streams.

Phil Helmore

Post-graduate and Other News

Peachman Lecture 2016

Em/Prof. Lawry Doctors was recently honoured by being invited to present the 2016 Captain Ralph and Florence Peachman Lecture to the Department of Naval Architecture and Marine Engineering at the University of Michigan in Ann Arbor, Michigan. This endowed lecture was arranged to take place on 20 October 2016. The University of Michigan is undoubtedly one of the most active and well-known institutions in all areas of engineering and scientific endeavour. It houses a large department of Naval Architecture and Marine Engineering with an outstanding cohort of undergraduate and graduate students. Its research standing is of an international level.

On this occasion, Prof. Doctors was invited to present a summary of his recently-published two-volume book, *Hydrodynamics of High-Performance Marine Vessels*. The audience comprised undergraduate and graduate students as well as academics at the University. In addition, the lecture was timed to complement the Homecoming Weekend, so that alumni of the University visiting the town for the Homecoming events could also attend the special lecture.

A/Prof. Kevin Maki introduced Prof. Doctors to the audience. The theme of the talk was to unify the hydrodynamic theory for resistance and wave generation of high-efficiency vessels, such as monohulls, catamarans, air-cushion vehicles and surface-effect ships. After his presentation, he was presented with a specially-engraved plaque by the Chair of the Department, Prof. Steven Ceccio. An informal reception followed the Peachman Lecture.

Prof. Doctors took the opportunity of his trip to also give a seminar on the same subject to the Faculty of Engineering and the Environment at the University of Southampton in Southampton, England, on 6 October 2016.

Lawrence Doctors



Prof. Stephen Ceccio (L) presenting Em/Prof Lawry Doctors with his engraved plaque
(Photo courtesy Lawry Doctors)

Ainsworth Building and Willis Annex Win Educational Architecture Award

Mechanical and Manufacturing Engineering's building precinct has received a highly-coveted Australian Institute of Architects' 2016 NSW Architecture Award. The Educational

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Architecture Award went to the Ainsworth Building and Willis Annex which re-opened last year following refurbishment

The NSW President of the Institute of Architects, Shaun Carter, congratulated all the winners. "The winning work from this year's Awards showcases the exemplary skill and creativity of architects who make extraordinary architecture and public spaces which are the cornerstone of great city and place making."

The architectural firm behind the building's unique design, Bates Smart, said "Our vision was to create a design that reinforces the key principles established by the original buildings in a confident and contemporary manner while uniting the group of adjacent buildings through carefully considered massing and design expressions."

A total of 79 projects from a pool of more than 170 entries were shortlisted, and selected by a team of 19 jurors through a process of presentations and site visits.

This award is testament to the ambitious and transformational campus development program underway to create a world-leading campus.

School Website



The Ainsworth Building from the John Lions Garden
(Photo courtesy Grant Turner)

UNSW Rises in Times HER

UNSW has continued its steady march up the Times Higher Education World University Rankings, improving four places to 78 for 2016–17. The University has advanced 36 places over the last four years, and is now firmly entrenched in the world's top 100 universities of the UK-based Times Higher Education rankings.

Welcoming the rankings rise, UNSW Deputy Vice-Chancellor Research, Prof. Nicholas Fisk, said that the result reflected UNSW's continued strong performances in research and teaching. "UNSW is among a limited group of universities worldwide capable of delivering research excellence alongside the highest quality education on a large scale, and this is reflected in this year's Times Higher Education ranking. Academic excellence in research and education will continue to be our first priority as we look to achieve our ambition to be among the world's top 50 universities by 2025," he said.

The Times Higher Education rankings are calculated using 13 performance indicators grouped into five areas: teaching, research, citations, international outlook and industry income. The research and teaching components of the rankings are each worth 30% of the total score.

UNSW increased its research score by 4.7 percentage points, the most significant increase across Australia's Group of Eight (Go8) universities. International co-authorship also increased by 3.2 points, highlighting UNSW's strong

collaboration internationally. The University's teaching score was also up, rising 2.5 points. UNSW is one of only three universities from the Go8 to increase its rank from last year.

The Times Higher Education Rankings Editor, Phil Baty, said that this year's expanded list is testament to just how competitive global higher education has become. "For starters, our top 980 universities come from 79 different countries," he said.

Australia has eight universities represented in the top 200 and 23 in the top 400.

Prof. Fisk said that universities were now just as likely to be competing with institutions thousands of kilometres to the north, as with those in our own cities.

"The competition is completely global these days. Good research is done by large interdisciplinary teams; indeed all our centres of excellence have nodes in other universities in Australia, and collaborate with groups overseas. It is a very international outlook," he said. "With more and more universities on the list and the huge rise in east Asian universities, even staying still is a huge achievement."

Dan Wheelahan
UNSW Media Office

INDUSTRY NEWS

Austal Wins Two WA Industry Export Awards

Austal Australia's strong export success in FY2016 has been recognised by the Export Council of Australia with the awarding of two Western Australian Industry and Export Awards.

Austal Australia is the recipient of the Western Australian Manufacturing Exports Award and the Marketing and Design Excellence Award for 2016.

Accepting the two awards at the Gala Ceremony held in Perth on Friday 28 October, Austal Chief Executive Officer, David Singleton, said that the awards were a reflection of Austal's international competitiveness in the design, construction, delivery and support of revolutionary defence and commercial vessels.

"Our Australian shipyard continues to contribute tremendous value to the WA economy, creating jobs, developing skills and growing Australia's sovereign shipbuilding capability," Mr Singleton commented.

The Western Australian Industry and Export Awards is an annual program which aims to recognise excellence in the export of goods and services by WA businesses.

In FY2016, Austal Australia delivered five new vessels including two 58 m Cape-class patrol boats for the Australian Border Force, two 72 m high-speed support vessels for the Royal Navy of Oman and one 70 m large crew-transfer vessel for Caspian Marine Services of Azerbaijan from the company's shipyard in Henderson, Western Australia.

Austal Australia's export programs continue into 2017, with construction of a 109 m high-speed vehicle-passenger ferry for Mols Linien of Denmark commencing in April, as well as nineteen 40 m Pacific Patrol Boats for 12 Pacific Island nations.

As a winner of two 2016 Western Australian Industry and Export Awards, Austal progresses to the finals of the 54th Australian Export Awards to be held in Brisbane on 24 November 2016. Twelve national category winners will be selected from the various state and territory winners, one of whom will receive the 2016 Australian Exporter of the Year award.

ASC to be Split into Three

On 11 October the Government announced that it will separate ASC into three individual Government-owned companies.

These three new companies will support the key capabilities of:

- shipbuilding
- submarine sustainment; and
- infrastructure.

The new submarine-sustainment and shipbuilding companies will continue ASC's role in the sustainment of the Collins-class submarines and completion of the Hobart-class destroyers respectively.

The creation of these three new companies follows a strategic review of ASC which was conducted in 2015. The review sought to identify the best-possible corporate, capital and governance arrangements to help maximise the future success of ASC and the Australian naval shipbuilding industry. The Government does not have a plan to privatise these three new companies.

The Government said that these changes will have no impact on ASC employees' current terms and conditions and will provide the right structure for the growth of the workforce as a result of major infrastructure investment and the construction of offshore patrol vessels, future frigates and future submarines.

Work will begin immediately to separate ASC into the three new companies, with the full separation expected to be completed in 2017.

The Government will also enter into discussions with the South Australian Government on the future of the Common User Facility at Techport to ensure a cohesive approach in support of future naval projects.

ASC Upgrades its Virtual Shipyard

ASC is upgrading its 'virtual shipyard' system. Dassault Systèmes ENOVIA, to the 3DEXPERIENCE platform in preparation for work on the navy's new submarines.

ASC's move will optimise its Collins-class submarine maintenance, design, engineering and construction services

and prepare it for work on Australia's future submarine project.

The next generation 3DEXPERIENCE platform is a virtual design, functional mock up, collaboration, product lifecycle management and data intelligence package which integrates complex systems and infrastructure and provides end users with accurate, advanced and up-to-date information to make informed decisions.

ASC first selected ENOVIA ten years ago to manage all product-related data for its Collins-class submarine maintenance activity. Since that time, ASC has migrated data from diverse obsolete IT applications to the ENOVIA system, increasing efficiency and innovation.

ASC Interim Chief Executive, Stuart Whiley, said that the upgrade will enhance ASC's major maintenance activity for the Collins fleet.

"ASC has significantly improved its Collins-class maintenance in recent years and this decision will consolidate our gains and lay the groundwork for further improvements towards international benchmarks," he said.

OSI to Supply Integrated Bridge Systems for new Australian AORs

Navantia has contracted Canadian OSI Maritime Systems to supply two integrated bridge systems (IBS) to the Royal Australian Navy for the AOR program.

The IBS is based on OSI's warship INTS (integrated navigation & tactical system) design which OSI said would be custom engineered and built to the RAN's standards and requirements.

According to OSI, the INTS's scalable architecture allows for core capability to be designed into a range of bridge configurations, such as those found in offshore patrol vessels and frigate programs, supporting navies' alignment with commonality and interoperability objectives.

INTS is currently being supplied to other programs, including the Royal Canadian Navy's arctic offshore patrol ship and Resolve-class programs, the Royal Malaysian Navy's littoral combat ship program, and the Royal New Zealand Navy's Anzac-frigate modernisation program.

As part of the Navantia agreement, OSI will also provide the ECPINS warship navigation software.

"We are pleased to be working with Navantia to deliver this important project, and equally pleased with our continued relationship with the RAN" said Ken Kirkpatrick, OSI President and CEO. "The Australian naval market presents significant IBS opportunities for OSI and this project will provide us the foundation to build on."

Saab's Combat Systems for RAN AORs

Navantia has contracted Swedish defense supplier Saab to deliver an integrated combat system for the two new Royal Australian Navy replenishment ships (AORs). According to Saab, the contract is worth about \$US25 million.

Helicopter control radar and a decoy system are included in the procurement. The contract will also have Saab provide combat system engineering services including system design, integration and integrated logistic support.

The Australian Naval Architect

"Saab will deliver an integrated combat system based on the latest Saab 9LV Combat Management System. Thanks to system integration, Saab's products can communicate seamlessly over different platforms, which means that resources can be utilised more efficiently," said Thomas Kloos, head of the business unit Combat Systems and C4I Solutions within Saab business area Surveillance.

The majority of the combat system engineering work will be undertaken in Adelaide with installation and acceptance testing of equipment to be completed in Spain.

The Saab 9LV system is already in service with the Anzac- and Canberra-class ships of the Royal Australian Navy.

Huntington Ingalls Industries to Open Australian Office

Huntington Ingalls Industries (HII), one of the largest shipbuilders in the United States, has announced that it plans to establish a permanent presence in Australia by opening an office in Canberra.

"Establishing a permanent presence in Australia demonstrates HII's commitment to supporting Australia and the US military forces in the Pacific," said HII President and CEO, Mike Petters. "It also facilitates our ability to conduct real-time, frequent engagement with the Royal Australian Navy and the US Navy located in this critical region of the globe."

The US-based shipbuilder has hired Jeff McCray as Vice President, Business Development of HII Australia, responsible for developing new business opportunities for HII to support the Royal Australian Navy and the US Navy in the South Pacific. Mr McCray will report to Mike Smith, HII's Executive Vice President, Strategy and Development.



Jeff McCray will lead HII's team in Australia
(Photo courtesy HII)

"HII already has people and facilities in Pearl Harbor, Taiwan and Japan, and expanding our presence to Australia makes sense for HII," Mr Smith said. "We intend to leverage our core competencies for work in Australia to include workforce development, fleet sustainment and other related ship design and construction expertise. It will allow us to better support the US Navy in the western Pacific, and having a presence also affords us the opportunity to support the Royal Australian Navy as they upgrade their fleet, train their navy and shipbuilders, and enhance their shipbuilding capabilities."

Mr McCray has extensive experience in international defence and advising companies entering the international arena. Prior to joining HII, he was the Vice President for Sales for Symetrica Inc. From 1999–2014, he held several business-development positions with BAE Systems, including Vice President, International Business Development, in Asia and Europe. He is a graduate of Randolph-Macon College, where he earned a bachelor's degree in political science, and the University of Southampton in the United Kingdom, where he earned a master's degree in international relations.

The HII office is centrally located in Canberra, near Parliament House, the Defence Department's Russell Offices and the airport. HII said that it is hiring office staff and expects to officially open the office in the next two months.

Upgrade for Anzac-class Frigate Air-conditioning and Ventilation Systems

By 2021, the Royal Australian Navy's Anzac-class frigates will be equipped with innovative NOSKE-KAESER technologies as part of a major upgrade of ship systems.

Founded about a year ago, NOSKE-KAESER Marine Australia, a subsidiary of NOSKE-KAESER GmbH, the maritime technology company with operations worldwide, has secured an order to modernise the air-conditioning and cooling systems on the eight RAN frigates. NOSKE-KAESER will be carrying out a comprehensive overhaul of the air-conditioning, ventilation and cooling systems on the Australian ships, fitting them with more efficient, modern systems.

The Royal New Zealand Navy Anzac-class frigates were modernised to the same extent by NOSKE-KAESER back in 2011.

Upgrading the air-conditioning and ventilation systems as well as the engine room ventilation systems on the eight frigates is part of the company's scope of services. "In future, the ships should be able to operate under severe climatic conditions. Amongst other things, this will be required to support operations in and around Australia as well as wider global operations", said Joachim Bunnies, NOSKE-KAESER Head of Sales. In future, the engine rooms will also have to be optimally cooled to ensure safe operation of the systems and proper manoeuvrability of the ships, even at an outside temperature of 40 °C and sea temperatures of 36 °C. Upgrading the air-conditioning system will require greater cooling capacities. The existing chillers will be replaced by new NOSKE-KAESER chillers. "Along with our individually-designed, shock, and vibration-proof systems we will also be increasing chiller-cooling capacity to 1100 kW", Bunnies said.

The scope of NOSKE-KAESER's order also includes retrofitting 15 air-recirculation cooling units to environmentally-friendly cold water cooling and increasing performance of the food-storage refrigeration systems.

Austal Awarded New US Navy EPF Contract

On 16 September Austal Limited announced that Austal USA has been awarded a \$A434 million contract for the design and construction of two Expeditionary Fast Transport (EPF) vessels (EPF 11 and EPF 12) for the US Navy. This amount includes contracts for long-lead time materials which were previously announced.

This new fixed-price-incentive contract adds to the current block-buy contract for ten EPF awarded in 2008 and extends Austal's total build for the program to twelve ships, valued at \$US1.9 billion. The two additional EPFs grow Austal's extensive order book to over \$A3.3 billion and extend Austal USA's contracted production schedule into 2022.

Announcing the contracts, Austal Chief Executive Officer, David Singleton, said "This new order for a further two EPFs reflect the US Navy's continued confidence and investment in a proven product. The EPF is a unique vessel that is re-defining naval sealift capability and exceeding expectations in various military and civilian operations around the world."

"Two more EPFs signal a commitment by the US Navy to further expand the EPF roles and reach — and represent a significant opportunity for the Austal USA workforce who have been achieving impressive production efficiencies and improved margins across the program."

To date, Austal USA has delivered seven EPF, with five now deployed by the United States Military Sealift Command with various US Navy fleets around the world. Three EPF are under construction at Austal USA's advanced modular manufacturing facility in Mobile, Alabama, including the future USNS *Yuma* (EPF-8).

The EPF is a unique, 103 m catamaran offering significantly enhanced naval support capability to transport troops, vehicles and cargo quickly and efficiently. With 35 kn performance, a large 1800 m² cargo deck, medium-lift helicopter deck and seating for over 300 embarked troops, the ship has the unique ability to support a variety of operations, including military and civilian logistics missions, humanitarian and disaster-relief missions and other maritime law-enforcement activities.

New Austal Support Contract

On 19 October Austal announced that the US Navy had awarded a contract to Austal USA to provide engineering and management services support for the Post Shakedown Availability for Independence-variant Littoral Combat Ship *Gabrielle Giffords* (LCS 10).

The \$US12 million cost-plus-award-fee order adds to Austal USA's growing support business, which provides critical support to both the LCS and EPF fleets. Austal USA will provide design, planning, and material support services for *Gabrielle Giffords*, including program management, materials planning, engineering and design, material kitting, liaison and scheduling.

Austal USA is currently completing an 11-ship Independence-variant LCS contract for the US Navy worth over \$US3.5

billion. The program is maturing rapidly with four of the 127 m ships delivered and seven ships under construction — USS *Montgomery* (LCS 8) was delivered to the US Navy in June 2016 and commissioned in September 2016, the future USS *Gabrielle Giffords* (LCS 10), USS *Omaha* (LCS 12) and USS *Manchester* (LCS 14) are undergoing sea trials. Final assembly continues on the future USS *Tulsa* (LCS 16) and USS *Charleston* (LCS 18), whilst modules for the future USS *Cincinnati* (LCS 20) are under construction in Austal's advanced module manufacturing facility.

Wärtsilä wins Nacos Platinum Systems Contract for New Cruise Ships

Wärtsilä has been awarded the contract to supply a broad range of integrated automation, navigation and dynamic-positioning equipment, as well as the complete uninterruptible power systems (UPS) for four new cruise ships. Two of the vessels are being built at the Meyer Werft shipyard in Papenburg, Germany, while the other two vessels are to be built at Meyer Turku in Finland. The contract with Wärtsilä was signed in the second quarter of 2016.

The Wärtsilä Nacos Platinum system comprises 12 multifunction workstations for combined displays of ARPA radar, ECDIS conning and dynamic-positioning operations, in addition to those for automatic steering and voyage planning. The scope of navigation equipment also includes the subsidiary sensors, as well as associated communications facilities covering a full range of GMDSS A3 equipment.

Wärtsilä's Nacos Platinum series is complemented by an advanced integrated dynamic-positioning system. Three compact workstations provide full access to the customised

cruise software from the main bridge and from both bridge wings.

Wärtsilä Nacos Valmatic Platinum is an integrated automation system which includes numerous individual systems handling power management, energy measuring, LNG plant control, the HVAC, cabin control, emergency shutdown, information management and safety-management control, video walls and tactical tables, as well as an extended alarm system. The complete system is operated and controlled from a total of 24 work stations at different locations. In addition, the HVAC system has local control from 55 locations.

Each vessel will be equipped with Wärtsilä Jovystar Ocean UPS systems, including eight 100 kVA UPS, five 20 kVA UPS, and two 40 kVA UPS. Altogether, there will be 1 MW of UPS power for each vessel. The UPS systems secure the power supply for critical and essential systems, such as those serving the fire zones, bridge, navigation functions and broadcast systems.

Wärtsilä to Participate in Research Programme aimed at creating an Ecosystem for Autonomous Marine Transport

Wärtsilä's strong commitment to developing the technologies, the system reliability, and the essential designs to enable the viability of autonomous shipping is again emphasised through its participation in an important research program. Together with other leading marine sector and information and communication technology companies, Wärtsilä is supporting a project aimed at creating the world's first autonomous marine transport system.



The Wärtsilä Nacos Platinum series of navigation, automation and control systems in *Quantum of the Seas*
(Photo courtesy Wärtsilä)

The initial focus will be on developing a fully-autonomous system for the Baltic Sea by 2025, with cargo ships and freight transportation being the first pilot applications. The program is being largely financed by Tekes, the Finnish Funding Agency for innovation, and the ecosystem platform is being handled by DIMECC, a leading breakthrough-oriented co-creation ecosystem provider. The main corporate investors in the programme, apart from Wärtsilä, are Rolls-Royce, Cargotec, Ericsson, Meyer Turku, and Tieto.

“This is an important and ambitious project and we are very happy to be involved. Wärtsilä is contributing its technological know-how and experience and fully supports the project’s goals. We are happy to work and cooperate with other industry players for the ultimate benefit of the industry as a whole,” said Mikael Simelius, Vice President, Marketing, Wärtsilä Marine Solutions.

Wärtsilä believes that artificial intelligence, robotics, and remote connections will play an important role in the shipping industry’s future as a means of increasing efficiency and lowering operating costs. The company is committed to developing a strong digital offering and has recently acquired Eniram, a leading provider of energy management and vessel performance systems, as well as launching its updated Wärtsilä Nacos Platinum platform for navigation, automation, and control systems.

Wärtsilä also recently published its *Visions for Future Shipping*, which outlines various scenarios that could shape the way that shipping companies operate in the future. System autonomy is one of several future scenarios covered in the concepts. “Our participation and contribution to important research programs, such as this one promoting autonomous shipping, highlights Wärtsilä’s ongoing development work to enable these visions to become eventual reality,” said Simelius.

Rolls-Royce’s Wave-piercing Hullform for new RNZN Tanker

The Royal New Zealand Navy’s new 23 000 t Polar-class logistics support vessel, which will replace the 30-year-old tanker HMNZS *Endeavour*, will become the first naval vessel to feature Rolls-Royce’s Environship Leadge bow, the company announced on 20 September.

Rolls-Royce has signed a contract with Hyundai Heavy Industries (HHI) to provide a concept design based on the Rolls-Royce Environship Leadge bow.

HHI will undertake detailed design and build the vessel as part of the NZDF’s Maritime Sustainment Capability project, using the Rolls-Royce Environship concept design under licence.

The vessel design will be modified to meet NZDF requirements for a heavily winterized, ice-strengthened vessel capable of carrying out operations in a challenging Antarctic environment.

In addition to design, the Rolls-Royce scope of supply includes a Combined Diesel Electric and Diesel (CODLAD) propulsion plant based on twin Bergen main engines. These will each drive, via reduction gears, a controllable-pitch propeller. Rolls-Royce will also supply the propeller shafts.

Electrical power will be supplied by Rolls-Royce in the form of four MTU gensets from Rolls-Royce Power Systems, which will also provide power to the Rolls-Royce-supplied switchboards, motors, drives, bow thruster and the electric RAS/FAS system, which allows for simpler and quieter replenishment/fuelling-at-sea operations. Rotary-vane steering gear and rudders form part of a stand-alone package, the company said.



An impression of the new RNZN logistic-support vessel
(Image courtesy Rolls-Royce)

BOOK REVIEW

The Silent Deep: The Royal Navy Submarine Service since 1945

Peter Hennessy and James Jinks

To many people the submarine is a mystery — what do they do and why do we need them? The popular perception is often aligned with the role of the submarine in World War II, where they played such a dramatic role in anti-ship warfare on both sides. The decades after World War II saw the development of the nuclear submarine with high underwater speed and endurance, limited only by the submarine's capacity to sustain her crew. Nuclear deterrence has become a submarine role with ballistic-missile-equipped submarines haunting the ocean depths with nuclear attack submarines seeking to track and shadow them.

The story of the Royal Navy's submarine service through this era is grippingly told in this new book by Peter Hennessy and James Jinks. The authors remind the reader that their book is not an official or an authorised history of the RN submarine service but one which has been written with unprecedented access to documents, personnel and submarines which enabled them to tell the story of RN submarines in considerable detail.

For two decades after World War II the Royal Navy stationed a number of submarines in Australia to help with the training of RAN and RNZN ships in anti-submarine warfare. Amongst those boats were HM Submarines *Tabard* and *Taciturn*, for example. Few would have known of these boats' involvement in the Cold War covert intelligence-gathering operations in which they were engaged before coming to Australia. These operations are described in this book, some of which are only known of by operation names as the reports remain secret even today. Intelligence, surveillance and reconnaissance are primary roles of the modern submarine and are a recurring story throughout the book.

The visit of the US Navy's first nuclear submarine, USS *Nautilus*, to Britain in 1957 demonstrated to the Royal Navy the advantages of this revolutionary craft and the need for the Royal Navy to have such boats was made very clear. For Britain to proceed alone with the development of such submarines, much time would have passed before a Royal Navy nuclear submarine could be at sea — cooperation with the United States was the practical path to follow.

The US Navy's nuclear submarine program was driven by that remarkable man, Admiral Hyman G. Rickover, the head of the US Naval Reactor Division. Rickover was reluctant to help the British, fearing that it would interfere with the US program but, fortunately, he developed a special relationship with Lord Louis Mountbatten which paved the way for an agreement to cooperate on the development of military nuclear reactors.

Britain's first nuclear submarine, HMS *Dreadnought*, built by Vickers at Barrow-in-Furness and completed in 1962, was a hybrid design with a US-supplied power plant as used in the latest US nuclear submarine, USS *Skipjack*. Initially, the possibility of building the power plant in Britain was explored. Rickover was against it, saying to a Congressional committee "To supply them with all the necessary details would be an endless, time-consuming proposition and would require a very large expenditure of effort on our part and would seriously interfere with our ability to do our work. You know how it is if one company makes a machine and another wants to make one exactly like it but use their own standards and techniques. It is an almost impossible situation."

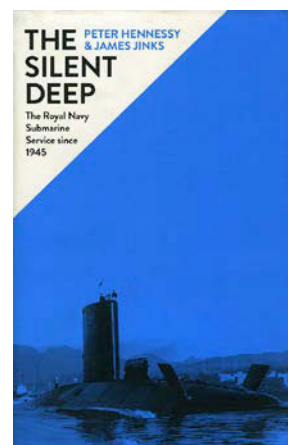
The Australian Naval Architect

The first nuclear submarine to have a British nuclear plant was HMS *Valiant*, ordered from Vickers in August 1960. The RN's transition to nuclear power was soon followed by the program to build four submarines to carry the British nuclear deterrent — the Polaris submarines, *Resolution*, *Renown*, *Repulse* and *Revenge*. That program was controversial, costly and full of challenge.

The stories of Britain's submarines during the Cold War, the challenge of keeping the nuclear deterrent at sea with the transition from Polaris to Trident, and the actions of the submarines Falklands War of 1982 make fascinating reading. The problems which Britain has faced in recent years with the design and construction of the latest class of British nuclear submarine, the Astute class, also provide many lessons for those facing major programs such as these. The Astute class was a new design, and the first to be designed with the aid of 3D CAD software. When the programme began years had passed since the Barrow shipyard had completed the last of the Vanguard-class SSBNs. Much submarine experience and knowledge had been lost in the meantime. Construction of *Astute* began in January 2001, but the work was beset with problems and the completion of the submarine was years late, in August 2010. The story of this project should be studied closely by anyone interested in the challenges involved with the design and construction of modern submarines.

The Silent Deep is strongly recommended for anyone with an interest in submarines and their operations.

John Jeremy



THE SILENT DEEP

The Royal Navy Submarine Service since 1945

Peter Hennessy & James Jinks

Allen Lane (an imprint of Penguin Books), 2015

ISBN 978 1 846 14580 3

MEMBERSHIP

Australian Division Council

The Council of the Australian Division of RINA met on Wednesday 21 September 2016 by teleconference under the chairmanship of our President, Dr Martin Renilson.

The meeting had a very full agenda and some of the more significant matters raised or discussed during the meeting are outlined as follows:

Division Vision Statement

Council finalised the vision statement based on the objects of the Institution, and individual Council members were asked take the lead in implementing items of the statement.

Australian Naval Shipbuilding and Repair Capability

The Division is seeking to follow-up the Senate Foreign Affairs, Defence and Trade Committee's report into Defence's Physical Sciences and Engineering Workforce to which it made an inquiry submission. In particular, information on the response to, and implementation of, that report is being sought.

Subsequent to the Council meeting, the Division has been invited to make a submission to a new Senate Committee inquiry into Naval Shipbuilding. Members' input to that submission has been invited.

Walter Atkinson Award for 2016

Following the assessment of the nominated papers by a panel reporting to Council, it was agreed that the Award should be made to Denehy, S.P., Duffy, J.T., Ranmuthugala, D. and Renilson, M.R., (2015), *Mooring Arrangement Design to Minimise Berthed Ship Motions due to a Passing Ship*, Proceedings Pacific 2015 International Maritime Conference, RINA and IMarEST, Sydney (nominated by NSW Section).

Centre of Excellence in Maritime Engineering

Council received a report from its representative at the meetings conducted in relation to the establishment of the Centre. It agreed that the Division should support the Centre and involve itself in the Centre's operations to the fullest extent possible, taking into account the resources at the Division's disposal.

Victorian Engineer Registration Proposal

In relation to an invitation by Mr Daniel Mullino, Parliamentary Secretary, to make a submission responding to the consultation document on this subject, Council received a report from our Treasurer who had attended a round-table meeting the previous day. Council agreed to make a submission to Victoria:

- stating a preference for a national system over state-based systems;
- seeking recognition for CEng registration obtained through RINA; and
- drawing attention to the problem experienced with the RPEQ system, whereby the extensive legal implementation of prescriptive standards in shipping and shipbuilding raises questions of whether individual naval architects will indeed be required to register.

AMSA Domestic Vessels

Council received a report detailing some shortcomings observed by members in some states with regard to the implementation of the National System. Council agreed that these matters represented serious problems for industry. While noting that wide-ranging organisational changes were expected within AMSA in the coming months, Council agreed to open a discourse with AMSA in relation to the identified problems in accordance with the cooperative approach followed from the start of the National System.

London Council Meeting on 9 August

Council received a report on the outcome of this London Council meeting. Since a number of interested members were unable to be present, firm decisions on the report of the working group in relation to the re-organisation of the technical committees were held over until the October meeting.

Next Meeting of Council

The next meeting of the Council of the Australian Division will be held on Thursday 1 December 2016, tentatively at 1500 Eastern Summer Time (1200 Western).

In closing, I would bring your attention to the notice in this issue of *The ANA*, for nomination of Council members for the two years commencing after the 2017 Division Annual General Meeting. I would urge any corporate members interested in participating in the Division's affairs to lodge your nomination.

Rob Gehling

Secretary

ausdiv@rina.org.uk

Changed contact Details?

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

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

RINA London	hq@rina.org.uk
Australian Division	austdiv@rina.org.uk

Section

ACT	rinaact@gmail.com
NSW	rinansw@gmail.com
Qld	m-dever@hotmail.com
SA/NT	danielle.hodge@defence.gov.au
Tas	mfsymes@amc.edu.au
Vic	andrew.mickan@dsto.defence.gov.au
WA	wa@rina.org.uk

Phil Helmore

Dr Stuart Cannon FTSE

On 26 October the Australian Academy of Technology and Engineering (ATSE) announced the election of 26 new Fellows of the Academy, including prominent leaders in business and academia, prominent commercial innovators, professional and business leaders and respected public sector figures. Amongst those elected this year is past President of the Australian Division of RINA, Dr Stuart Cannon, a Research Leader with the Defence Science and Technology Group in Victoria.

In announcing the 2016 elections, ATSE said ‘Dr Cannon is a world-leading naval architect transforming naval shipbuilding and safety nationally and internationally. He is the Royal Australian Navy’s trusted advisor on warship technology and approaches to improve the performance of warships and submarines, to ensure their safety and cost effectiveness. He has deployed theoretical knowledge and hands-on experience in naval architecture, structural engineering and systems analysis to solve challenging naval architectural problems.’

ATSE was founded in 1976 as one of Australia’s four learned academies, and was originally established as the Australian Academy of Technological Sciences. In 1987, it was renamed to incorporate engineering and is made up of some of Australia’s leading thinkers in technology and engineering. The mission of ATSE is to:

- Advocate the application of technological sciences and engineering to innovation.
- Deliver robust, independent and trusted evidence-based advice on technological issues of national importance.
- Promote national and international collaboration in technological science, engineering and innovation.



Dr Stuart Cannon FTSE

- Celebrate the success of individuals and companies in technological innovation.
- Promote science, technology, engineering and mathematics education at secondary and tertiary levels.

ATSE is made up of more than 800 Fellows from Australia and Overseas.



NOMINATIONS FOR DIVISION COUNCIL

Nominations are invited from Members (FRINA or MRINA) and Associate Members (AMRINA) for election to Division Council for a term of two years from March 2017. The majority of these elected members must be Corporate Members. Nominations, which must be in writing and include the signatures of the proposer, seconder and nominee, should be received by the Secretary no later than Friday 23 December 2016.

Current Council members whose terms end in March 2017 are Jim Black, Gerard Engel, Danielle Hodge*, Craig Hughes*, Jesse Millar, Mark Symes* and Matthew Williamson.

*Note: * indicates maximum term served and not eligible for re-election.*

Rob Gehling
Secretary, Australian Division
PO Box 462, Jamison Centre, ACT 2614
ausdiv@rina.org.uk
Phone: 0403 221 631

NAVAL ARCHITECTS ON THE MOVE

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

Dean Fletcher moved on from BMT Design and Technology in 2011 and has taken up a position as a naval architect with McAlpine Marine Design in Fremantle.

Martin Grimm has moved on from his position as Principal Naval Architect in the Directorate of Navy Platform Systems within the Department of Defence and has taken up the position of Signatures Cell Lead within the Navy Technical Bureau in Navy Engineering Division. This is a result of a re-organisation in which Navy Platform Systems and Navy Warfare Systems Directorates and Navy Communications and Intelligence Engineering Branch (predominantly located in Canberra) have all combined with the Centre for Marine Engineering (in Sydney) to form one group, the Navy Technical Bureau.

Adela Greenbaum, a student in the naval architecture program at UNSW Australia, has taken up a part-time position with Vopak Terminal Sydney at Port Botany while she completes the requirements for her degree.

Pranjal Gupta moved on from Alba International a year ago and, after some time at Cubic Corporation and Holland Insurance, has taken up the position of Claims Officer with BT Financial Group in Sydney.

Muhammad Syahmi Hashim has moved on from Johor Shipyard and Engineering and has taken up the position of Wealth Planner with Prudential BSN Takaful Berhad in Klang, Malaysia.

Nigel Hay-Smith has moved on from Bakewell-White Yacht Design in Auckland and has taken up a contractor position as a naval architect with Revolution Design in Hobart. He has also been accredited as a Domestic Commercial Vessel surveyor and will be doing contract work with a Hobart-based company.

SBLT James Heydon has moved on from the Naval Technical Bureau and has commenced training as a Mechanical Engineering Officer in the Royal Australian Navy at HMAS *Cresswell*, Jervis Bay, NSW.

David Lugg has moved on from the Department of Transport WA and has taken up the position of Senior Naval Architect with the Australian Maritime Safety Authority in Perth.

Scott McErlane moved on from MY *Mylin IV* eighteen months ago and has taken up the position of Service Technician with Sea Coast Fire in Fort Lauderdale, Miami, USA.

Gregor Macfarlane continues as the Manager of the Towing Tank and Model Test Basin at the Australian Maritime College in Launceston.

Teresa Michell moved on from Yanco Agricultural High School some time ago and has taken up the position of Mathematics Coordinator at St Peter's Catholic College at Tuggerah, NSW.

Brett Murrie continues consulting as Brett Murrie Marine Design in Brisbane.

Alex Nolan moved on from Bakewell White Yacht Design in 2007 and, after some time with Nolan Yacht Solutions and Team Telefonica, has taken up the position of Boat Captain with the Black Jack Sailing Team in Brisbane.

Robert Ochtman-Corfe continues with the Royal New Zealand Navy, where he is now the Technical Seaworthiness Authority in Auckland, New Zealand.

Brett Oldham moved on from Brisbane City Council in 2000 and, after a year at Mincom, took up the position of Toht Product Manager/System Architect with UXC Engineering Solutions in Brisbane.

Peter Öman continues with Kockums where he is the Senior Hydrostatical Engineer in Göteborg, Sweden.

Simon Orr has returned from his six-month sailing sabbatical in the West Indies, and continues as Engineering Manager with Cecon Contracting AS in Oslo. Cycling aficionados can follow him around Oslo on Strava.

Tim Paton moved on from Brivis Climate Systems in 2002 and, after two years at Cargo Cycles, took up a position with FMP Group (Australia), where he is now the Consulting Test and NVH [*Noise, Vibration and Harshness* — Ed.] Engineer in Ballarat.

Randall Peterie has moved on in the Royal Australian Navy and, after some time with the Fleet Support Unit, in 2015 took up the position of MCD Class Lifecycle Engineer Officer at HMAS *Waterhen* in Sydney.

Minh Pham moved on from Hyundai Vinashin Shipyard in 2004 and, after some time at Shipbuilding Science and Technology Institute and Vinashin Shipbuilding Engineering, in 2013 took up the position of Business Director at Shipbuilding Industry Corporation in Hanoi, Vietnam.

Xuan Pham completed his PhD at the University of Glasgow in 2007 and, after three years as a research assistant there, moved on to the Oil and Gas Production Division of the PetroVietnam Group, where he is now the Deputy General Manager in Hanoi, Vietnam.

Andy Phillips moved on from McAlpine Marine Design a year ago and has taken up a position as a naval architect at Austal Ships in Fremantle.

Brocque Preece moved on from Eagle Lyon Pope in 2015 and, after a year at Global Maritime Group, has taken up the position of Naval Architect with Ports and Harbours in New York, USA.

David Purser moved on from the Defence Materiel Organisation in 2010 and, after two years with the ACT Territory and Municipal Services, has taken up the position of Director Goods and Services, Procurement and Capital Works with the ACT Government in Canberra.

Trevor Rabey continues consulting as Perfect Project Planning in Perth.

Elizabeth Reynolds Boyd moved on from the Glostén Associates in 2000 and, after some time at Foss Maritime, Marine Exhaust Solutions, and Atlantic Advanced power Systems, in 2014 took up the position of President at Nautican in Charlottetown, Prince Edward Island, Canada.

Andrew Richards moved on from Commercial Naval Architects in 2007 and, after six years at OSD-IMT Ltd, in 2013 took up the position of Naval Architect at Aurora Marine Design in Brisbane.

Robert Rostron continues as a Surveyor with DNV GL in Oslo, Norway.

Sam Shepherd moved on from BMT Design and technology six years ago, and taught in Ballarat, Vic, for four years while doing his teaching degree at the same time. He then moved back to his home town of Moruya, NSW, and has taken up a position teaching mathematics at St Peter's Anglican College in Broulee, NSW.

Robert Skerman has moved on from Jacobs Australia and has taken up the position of Manager with KPMG Australia in Canberra.

Hamish Stevens moved on from Tamar Marine in 2013 and has taken up a position as a naval architect with McAlpine Marine Design in Fremantle.

Harry Stronach moved on from Dickson Marine many moons ago, and is now consulting as Stronach and Company, Naval Architects, in Akaroa, New Zealand.

Graham Watson has moved on from his position as Principal Naval Architect in the Directorate of Submarine Engineering within the Department of Defence and has taken up the position of Principal Structural Engineer in the Design and Engineering Department of ASC in Adelaide.

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

Phil Helmore

Martin Grimm



The Chilean sail training ship *Esmeralda* arriving in Sydney on the morning of 3 November 2016 for a five day visit.
She last visited Australia in 2012
(Photo John Jeremy)

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 200 dpi. A resolution of 300 dpi is preferred.

FROM THE ARCHIVES

HMAS HOBART (II)

John Jeremy

In September this year, a new destroyer for the Royal Australian Navy named *Hobart* began her sea trials out of Adelaide. The third RAN ship of the name, this *Hobart* will be one of the most powerful ships ever to serve in the RAN and, with her sister ships *Brisbane* and *Sydney*, she will bring a new level of capability to the Navy. Half a century ago the previous *Hobart*, with her sister ships *Perth* and *Brisbane*, also dramatically changed the RAN's capabilities as the Navy's first guided missile destroyers and the first US-designed-and-built combat ships in the RAN.

Even before the 1959 decision of the Australian Government to disband the Fleet Air Arm in 1963 (which was subsequently reversed) the RAN was exploring the possibilities for introducing long-range surface-to-air guided weapons into the RAN and had initiated discussions with the RN and USN about suitable ship designs. The 1963 decision meant that the RAN would be left without air defence at sea and gave impetus to the discussions.

Three ships were considered for the RAN — the Royal Navy's County-class destroyer which was designed around the very large Sea Slug missile, the US Charles F. Adams-class destroyer, and the smaller US Brooke-class destroyer escort. Both the US ships were designed to carry the Tartar missile system which was judged to be superior to Sea Slug. Modification of the British design to carry Tartar and the preferred US 5-inch (127 mm) gun was possible but declined by the Admiralty because of the delay that the workload would impose on Royal Navy projects.

On 29 June 1961 the Minister for Defence announced the selection of the Charles F. Adams-class guided missile destroyer (DDG) for the RAN and approval was given for the order of two ships (which became *Perth* and *Hobart*) from the United States. The first ship of the class, USS *Charles F. Adams*, had been completed in September 1960 but the Tartar missile system was in some trouble, with a very low level of performance. It was one of three similar missile systems being developed by the US, all expensive and complex. A 'get well' program for Tartar, initiated in 1962, ultimately produced the very successful Standard SM-1 medium-range missile, the precursor of the missiles in service today.

The RAN ships were a modified version of the early US design incorporating the Mk 13 Tartar missile launcher, bow-mounted sonar and, most importantly, the Australian-developed Ikara anti-submarine guided missile as a replacement for the much less capable US ASROC system. A third ship, *Brisbane* was ordered in 1963 and a fourth was sought by the Navy in 1965 but not approved by the Government.

The RAN DDGs became part of the US construction programme, as DDG 25, 26 and 27. The order for the ships was placed with the Defoe Shipbuilding Company, Bay City, Michigan. Defoe was an interesting shipyard. A family-owned yard, it grew out of a wooden boat business started in 1905. Bay City had a long history of shipbuilding but Defoe's finest years, perhaps, were during World War II when Defoe was heavily involved in the construction of 170 ft (51.5 m) patrol craft (PC) for the US Navy. Defoe built 56 of the 361 ships of the class which were completed, and were the lead yard for the construction of these small ships which were built in sixteen yards throughout the United States. To simplify their construction, Defoe built them

upside down to maximise down-hand welding and rolled the completed hulls over into an upright position for fitting out prior to launching sideways into the water. At the peak of production, Defoe was completing a PC every week. A very similar roll-over method of construction was used in Australia to build 75 ft (22.7 m) all-welded steel tugs for the US Army during World War II at Hexham, NSW.



A PC hull being rolled over at Defoe during WWII
(Photo courtesy Bay County Historical Society)

Defoe also used the roll-over construction method for the twenty-eight 309 ft (93.6 m) destroyer escorts which they built between 1943 and the end of the war.

After World War II, Defoe built a variety of vessels including yachts, lightships and bulk carriers. Naval work returned after 1954 with the construction of two Dealey-class destroyer escorts, four Charles F. Adams-class destroyers (in addition to the RAN ships) and three Knox-class destroyer escorts. The company, originally a partnership, was incorporated in 1956.



Hobart on launching day, 9 January 1964
(RAN Historical Collection)



Hobart afloat for the first time on 9 January 1964
in what appears to be a snow flurry
(RAN Historical Collection)

By modern standards, the shipbuilding facilities at the Defoe yard were basic and simple, yet they built some fine ships. The yard was closed in 1976.

The first of the RAN DDGs, HMAS *Perth*, was commissioned on 17 July 1965, HMAS *Hobart* on 18 December 1965 and HMAS *Brisbane* on 16 December 1967. The ships had a displacement of 4,582 t (full load) and an overall length of 440 ft 10 in (133.6 m). They were powered by General Electric steam turbines of 52 MW on two shafts for a speed of 35 kn. The three ships gave outstanding service to the RAN. HMAS *Hobart* was finally decommissioned on 12 May 2000, after almost 35 years' service.

In retrospect, the decision to buy the three destroyers was good one, although the purchase introduced new standards, more weapons systems and a different logistic system to a navy which was predominantly based on British standards at the time, with the extra cost and training challenges which that meant. Moreover, the construction of the ships in the United States ended the continuous construction of combat ships in Australia which had begun during World War II and introduced the stop-start building cycle from which we are still trying to escape.

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Hobart during fitting out in 1964, with *Perth* astern
(RAN Historical Collection)



Hobart approaching completion during 1965. The photo appears to have been taken from the foremast of *Perth*. Two ships can be seen in the course of erection in the background. The destroyer escort alongside is the future USS *Voge* (DE1047)
(RAN Historical Collection)



HMAS *Hobart* at sea
(RAN photograph)

NUSHIP *Hobart* during sea trials off Adelaide
in September
(Photo courtesy AWD Alliance)

