THE AUSTRALIAN NAVAL ARCHITECT

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NUSHIP *Hobart*, the first of Australia's new air-warfare destroyers, arriving at her home port of Sydney for the first time to prepare for commissioning in September
(RAN photograph)

THE AUSTRALIAN NAVAL ARCHITECT

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Cover Photo:

ADV *Cape Fourcroy*, one of two Cape-class patrol boats built by Austal in Western Australia for the Royal Australian Navy
(RAN photograph)

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From the Division President

Welcome to another edition of *The Australian Naval Architect.*

Recently I was asked to give a talk on the naval architecture profession at the Australian Maritime College (AMC) to school students. This was an event organised by Engineers Australia (EA), and it was thought that, as this was at AMC, perhaps there should be somebody speak about naval architecture too. The EA General Manager for Tasmania gave a very good introduction to engineering as a profession. Amongst other things, she pointed out that an engineering degree gives you a solid basis for many future careers, including senior management. I've also heard this from many senior managers, who say that the engineering degree has taught them all sorts of things about the way things work, which a qualification in many other disciplines doesn't do. Perhaps we ought to try to identify those with naval architecture (or related) degrees who have reached senior management positions?

When my turn to speak came I was introduced as representing a very specialised part of the engineering discipline. Whilst I didn't want to start an argument with my EA colleague, I tried to explain the broad aspects of naval architecture and the other maritime engineering disciplines which we cover. As I have stated before in this column, a naval architect is required to be able to understand a wide range of disciplines. Naval architecture is probably one of the broadest engineering disciplines. Which other engineering discipline covers such a wide spectrum of technical aspects, including structural strength, corrosion, stability, hydrodynamics, machinery arrangement and layout, air-conditioning, accommodation design, aesthetics and, of course, the design of a major structure, with no prototype to use as a test bed?

As an aside, I'd like to thank our Chief Executive, Trevor Blakeley, for providing me with slides that I was able use when preparing my presentation. I had only been asked to do this the day before and, overnight, he emailed me his slides, broken down into a number of smaller emails. He then rang to check that I had them all, despite heading to Plymouth for a RINA dinner event. These slides were very useful and made it possible for me to give a reasonable presentation with such little notice. I would be happy to share these with anyone else who might be interested in giving such a presentation.

When I give presentations on the maritime profession, I often show a photograph of a containership and a cargo-carrying jumbo jet. I ask the students how many aircraft it would take to carry the same number of containers as the containership. Usually I get answers in the low hundreds, with many giggles. In this case I did get close to the correct answer — about 1500 — which surprised me. Perhaps there is a better understanding of global transportation issues amongst school students in Tasmania than elsewhere?

I also mentioned the America's Cup races. A few students had been watching this, which was no surprise. I have to say that, when the AC committee changed the format to multi-hulls a few years ago, I lost interest in this event. However, my brother showed me a video of a couple of the recent races and I was completely converted. They are so

Martin Renilson

exciting — and the technology is explained by the presenters. I can't help feeling that this will raise the interest of our profession amongst many youngsters. Certainly, the reason that I got into naval architecture in the first place was my great enthusiasm for dinghy racing, although I decided early on to keep the two separate. I'll look forward to seeing what format the new organisers choose!

As I mentioned above, naval architecture is a very wide career, and covers many different aspects. Early in my career I was fortunate enough to work for two shipyards in Scotland (neither exist anymore — but not my fault). I then worked for a large consultant (subsequently bought by BAE). I recall during my time there discussing my career with a senior staff member. At that stage I was looking to get into ship design as a career. I always remember that he said that it was good that I had had experience with a shipyard, as that would enable me to understand the requirements for building any ship that I designed. He strongly recommended that I work for an owner next. He said that, this way, I would understand in-service issues and maintenance requirements. He felt that this would make me a much better ship designer. I can certainly understand this advice and often give it to young naval architects looking for guidance on their career. I often also include this in my presentations on the profession, as it well explains the wide variety of careers that are available in the maritime industry.

Of course, I decided to do a PhD and moved into research — yet another aspect of the industry.

Recently I met with a young person working in the maritime industry whose first degree was in aeronautical engineering and was having some troubles with some of our terminology. In fact, I have often met with people in our industry whose first degree is not in naval architecture. In many cases they are from an aeronautical engineering background. I have no idea why this is the case. Perhaps the universities which teach aeronautical engineering do a better job of "selling" their courses and attract lots of students — more than that

industry can support in Australia. Conversely, as I mentioned in an earlier column, UNSW wasn't able to attract sufficient students to keep its naval architecture course going. Perhaps, as a profession, we are not good at promoting ourselves at school level. Certainly everybody knows about aircraft (who hasn't been on an airliner, for example) but many don't seem to know about the maritime industry. Shipyards and ports tend to be hidden behind barbed wire and the general public doesn't know about our industry. What they do know makes them think it is a sunset industry.

However, there are lots of exciting developments in the maritime industry. It is a vital industry which is going to grow as commercial trade around the world grows and marine renewable energy becomes more important. Yet somehow we don't seem to be able to spread the word about this to youngsters, nor perhaps to school career advisers.

On a different matter, members will be aware that the Senate Enquiry into the Future of Naval Shipbuilding is ongoing. You can follow the oral evidence, which is all included in the transcripts, if you are so inclined. I happened to notice (actually, I had it pointed out to me) that a senior member of one of the large naval shipbuilding companies represented in Australia was asked what sort of training a naval architect requires. His reply was that "Naval architecture is like any other architecture type degree, but is specifically done from a maritime perspective; it is a full-blown university course." Needless to say, the Institution wrote to him explaining that naval architecture is an *engineering* discipline! We also wrote to the Senator who asked him this question, clarifying this point. So far we've not heard back from either of them.

However, it is quite telling that the shortage of naval architects for the naval program keeps coming up again and again in this enquiry.

In my last column I mentioned how successful the SMIX Bash in Sydney has been and also that other sections are thinking of arranging something similar. Well, I'm very pleased to say that the Victorian Section is arranging a Victorian Maritime Industry Social Event to be held on 25 August 2017. I hope to see a lot of old friends there.

It is the time of year when final preparations are being made for the Pacific 2017 International Maritime Conference. By the time that this edition of *The ANA* is published the reviews of all the papers for which peer review was requested will have been completed. This was a slightly bigger exercise than last time as more authors requested that their paper be reviewed. I'd like to thank all the reviewers who undertook these independent reviews, sometimes with very short turnaround times. Also, special thanks to the papers committee, chaired by Adrian Broadbent, for coordinating this work.

In case you don't know, Pacific 2017 will be held in Sydney 3 to 5 October 2017. I hope to see as many members there as possible.

Martin Renilson

Editorial

As the May edition of *The ANA* was being finalised, the Commonwealth Government released the long-awaited Naval Shipbuilding Plan. The plan seeks to set out how the Government will deliver on the 'commitment to build a strong, sustainable and innovative Australian naval shipbuilding industry.' Furthermore it 'provides the foundation for implementing the Government's unprecedented commitment to the greatest regeneration of our country's naval capability since the Second World War. At the same time it will create a long-term sustainable naval shipbuilding and ship sustainment capability that will serve our strategic and economic interests for many decades' [1].

The Plan is based around the Government's commitments to build 12 offshore patrol vessels, 12 future submarines and nine future frigates in Australia in a program planned to start next year and run until the 2040s and 2050s. The construction of these ships will be centred in Western Australia for the OPVs and South Australia for the submarines and the frigates. The plan provides for considerable investment in these locations to support the program.

The Naval Shipbuilding Plan has been widely supported by industry — not surprisingly, as many have advocated such a plan for many years to avoid the costly and inefficient 'stop-go' planning of the last few decades.

It is not entirely correct to describe this plan as unprecedented. In the aftermath of the Second World War, a program of construction of destroyers and frigates was begun in Australia to ensure stability in the shipbuilding industry, which had declined to a bare minimum during the 1930s. The program was required to be implemented 'in an orderly and economic manner, and continuity of employment on naval shipbuilding is to be assured' [2].

As a consequence, four Daring-class destroyers were ordered from the Williamstown Naval Dockyard in Victoria and Cockatoo Dockyard in Sydney, with an extremely high level of Australian-manufactured equipment, including armament and main machinery. Money was also invested in the shipyards in order to prepare them for the construction of modern warships. The destroyers were followed, four years later, by a program to build six anti-submarine frigates in the same yards.

The initial plans conceived in 1946 were not achieved, for a number of reasons including post-war priorities to rebuild merchant fleets, shortage of skilled labour, financial restrictions and the outbreak of war on the Korean peninsula. Nevertheless, over the following two decades a substantial capability was created and sustained. What did not happen was the creation of an innovative naval shipbuilding industry which was world-competitive as is part of today's plan. Again, there were many reasons why that did not happen, and there are lessons to be learned from this past experience for those who will structure and develop the industry we are planning for the 21st century.

Naturally, there will be those who will criticise the Naval Shipbuilding Plan, fearing the worst that monopoly/monopsony relationships can engender. However, there is absolutely no reason why the ambitious aims of the plan cannot be achieved if we put our minds and collective efforts towards a successful outcome. There are examples from the commercial shipbuilding world in Australia where the industry is a world leader in aluminium ship construction and totally export focussed, for example.

There have also, perhaps inevitably, been complaints that the bulk of the workload has been given to South Australia on

a plate without consideration of the benefits which industry in other states, particularly Western Australia, could bring to the program. The reality is that someone will miss out on the primary construction site but all states will benefit from the industrial impetus provided by the program. John Rothwell, Chairman of Austal, was recently reported as saying: 'Frankly we don't care very much whether the vessels' future fleets are built in South Australia or a bit there and a bit here or whatever. We think it's really important to focus on the fact that it's an Australian shipbuilder and not a foreign shipbuilder who does that' [3]. That is a constructive approach — interstate rivalries in the past meant that we ended up with railway rolling stock manufacturers in each state, none really large enough to be sustainable. Today there are almost none.

It will be many years before we know whether the objectives of the Naval Shipbuilding Plan will be achieved. The environment in which we live and work is rapidly changing. Nevertheless, every journey begins with a first step — let's set out on this journey with optimism and determination.

John Jeremy

1. Commonwealth of Australia (2017), *Naval Shipbuilding Plan*, p. 4.

2. Donohue, H. (1996), *From Empire Defence to the Long Haul — Post-war defence policy and its impact on naval force structure planning 1945–1955*, RAN Maritime Studies Program, Department of Defence, Canberra, p. 32.

3. *The West Australian*, 12 August 2017

LETTERS TO THE EDITOR

Dear Sir,

The current increase in popularity of quadcopters and similar vehicles follows the recent resurgence of the DIY movement. With the advent of microcontrollers such as Arduino and the increasing accessibility of 3D printing, the creation of sophisticated machines has never been easier.

Of notable popularity are first-person view (FPV) drones, which allow hobbyists to become front-seat pilots of their creations. The ability to explore the world from the lofty heights of a drone taps into the inquisitive nature of our species. It is small wonder then that these devices have garnered such interest.

If the desire to explore the unknown is an innate human trait, then why has there not been an equal surge in the creation of DIY submarines? The underwater world is perhaps the final earthly frontier — we know even less of our oceans than we do of our solar system. Why then the lack of hobbyist aquatic exploration? The answer may simply be one of technical limitations.

Most remotely-controlled vehicles rely on communication via radio waves. This works well for land-, air- and sea surface-based craft, allowing the remote operation of vehicles in the range of kilometres. Once under the sea, however, this means of control rapidly fails, as water readily absorbs radio waves.

The current means of countering this issue has been to use a tether to provide power and a means of communication with the vessel. This has its limitations, and increases the risk of damage to the vessel or aquatic environment as the tether can get caught up on rocks or plant life.

There is, however, hope yet for a wirelessly-controlled underwater vehicle. Underwater acoustic networks (UAN) have been in development over the past thirty years, and recent advances are showing promising results. These technologies use sound instead of electromagnetic waves to transmit information, much in the same way that marine mammals do. The applications for UANs are many, most notably in the fields of oceanography and tsunami monitoring. Improved underwater communications will hopefully allow a quicker response to natural disasters.

Although UANs may not currently provide the high-speed communication required for remotely-controlled vehicles, it is certainly an interesting new technology. With the ever-increasing demand for unmanned vehicles, such technologies may soon play a leading role in a new era of naval engineering.

Patrick Doherty
UNSW Student

Dear Sir,

I am writing to draw your attention to the intended closure by UNSW Sydney of the Naval Architecture program. I believe that this closure presents the profession and industry within Australia with a number of challenges. I also believe the closure to be inconsistent with current Government policy and investment.

On 5 December 2016 UNSW Sydney announced the suspension of enrolments into the Naval Architecture program with a view to its eventual closure. It has been stated that this decision was made due to low student numbers and therefore limited prospects for profit from the program.

The announcement was made without consultation with industry or approval from the Government — which I believe to be a requirement for the closure of a program at a public institution. UNSW is a public institution and, irrespective of the program's current economic potential, there are many reasons to keep it running at university level in Australia. It is in the industry's best interest to continue this program as there is significant and emerging world-class work undertaken in Australia in the fields of small craft and of multihulls. The outcome of closing one of the only two programs in Australia which offer naval architecture would be the graduation of fewer skilled professionals, a detriment to the industry.

The Australian Government has put billions of dollars into the Australian naval construction industry. With $89 billion committed to construction of submarines in South Australia over the next 30 years, the construction of new offshore and Pacific patrol vessels as well as new frigates. Further, the Government has regeared the skilled migration visa with a priority for "Australian jobs for Australians". Maintaining the UNSW naval architecture program would be a prudent investment in intellectual capacity and property, and would maintain the level of the Australian skilled workforce

required in the long-term commitment to the Australian naval shipbuilding industry.

Maintaining the naval architecture program at UNSW would be consistent with the direction of the Australian Government in its recent and clear attempts to support the Australian work force and industry. It is my opinion that maintaining the naval architecture program would be a prudent investment for Australia, as it would guarantee the supply of skilled professionals in a nationally-vital industry for the next 40 years.

Patrick McManus
UNSW Student

COMING EVENTS

NSW Technical Meetings

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

The program of meetings remaining for 2016 (with venues noted) is as follows:

6 Sep Selwyn Oliviera, Energy and Marine Division Manager, Alfa Laval Australia
Ballast Water Treatment
Royal Prince Edward Yacht Club,
160 Wolseley Rd, Point Piper

4 Oct No meeting; Pacific 2017 events

7 Dec SMIX Bash 2017
On board *James Craig*, Wharf 7, Darling Harbour

FAST 2017

FAST 2017, the Fourteenth International Conference on Fast Sea Transportation, will be held in France in the beautiful town of Nantes, at the Cité des Congrès on 27–29 September 2017, promoting world-wide cooperation between academia and the industry, as well as with other branches (such as aviation), with the aim of transferring knowledge and experience to sea transportation. Application of new materials, types of propulsion systems, fuel and emission are key issues for both sea and air transportation.

The technical program will focus on high-quality papers, panel discussions and invited keynote lectures from various fields. A thorough review process of both abstracts and full manuscripts will be used to select papers whose originality, relevance, timeliness, and significance meet the standards which FAST attendees have come to expect. The conference will be conducted in English.

For FAST 2017, contributions will be prioritised and presentations in the area of propulsion, such as electrical power, batteries, hydrogen, propulsion systems and the use of new materials will be the focus. Within the area of operations, the focus will be on safety, economy, emissions and technological innovations in equipment and decision systems.

The conference website URL is http://fast2017.com/

In the past, Australia has played a leading role in presenting papers to the FAST conferences. Indeed, the Fourth International Conference on Fast Sea Transportation was held at UNSW Sydney in July 1997.

The conference program is now up on the conference website and includes papers in the following streams:

- Composites
- Hullform — Design and New Concepts
- Advanced Products
- Operations, Safety and Logistics
- Corrosion and Biofouling
- Aerology
- High Speed and Seakeeping
- Fast Transportation
- Hullform — Hydromechanics and Structures
- Energy Propulsion
- Slamming
- Materials
- Flaps and Foils
- Underwater Noise
- CORICAN
- Propellers
- Surface Effect
- Additive Manufacturing
- Smart yard

See http://fast2017.com/practical-information/schedule/ for the conference program, and click on any of the above streams to show the papers scheduled for that stream, day and time.

Further information can be obtained from Lawry Doctors at l.doctors@unsw.edu.au

Pacific 2017 Exposition

Pacific 2017, the biennial Pacific International Maritime Exposition, will be held in Sydney from Tuesday 3 to Thursday 5 October 2017. As the only comprehensive international exhibition of its kind in the Indo-Asia-Pacific region, Pacific 2017 will again provide the essential showcase for commercial maritime and naval defence industries to promote their capabilities to decision-makers from around the world.

Held in the heart of Sydney and on the shores of one of the world's most beautiful harbours, Pacific 2017 will be the tenth in the series and builds on the highly-successful biennial events since 2000. Specifically developed to satisfy the needs of industry, government and defence professionals across the broad spectrum of maritime affairs, Pacific 2017 is not open to the general public.

The world's leaders in the commercial maritime and naval defence sectors will be at Pacific 2017:

Manufacturing,
Shipbuilding and repairs
Components
Communications
Maintenance and sustainment
Maritime facilities and stevedoring
Shipping supplies and services
Maritime and naval technology

Naval and maritime aviation
Training and simulation
Design and development
Propulsion systems
Electronics and navigation
Defence systems
Port management and services
Logistics and freight forwarding
Maritime security
Autonomous systems
Underwater technology.

Pacific 2017 Conferences

The following is a list of conferences, seminars and symposia to be held in conjunction with Pacific 2017 on 3–5 October in Sydney. These will all be held within the International Convention Centre (ICC) in Darling Harbour, Sydney and will have direct access to the Pacific 2017 exhibition.

Royal Australian Navy Sea Power Conference 2017

Date	Tuesday 3–Thursday 5 October
Time	0900–1700
Registration	This event is open to all Pacific 2017 trade visitors, exhibitors and conference delegates however, pre-registration is required.
Hosted By	The Royal Australian Navy

The 2017 Sea Power Conference will explore the broad theme of The Navy and the Nation, focusing on maritime identity, the significance of maritime economics and use of the oceans, and the critical importance of defence industry to developing and maintaining naval capability. Navies do not exist for their own sake, nor do they exist in isolation. While navies are an expression of government resolve in managing and protecting the oceans, they are also a national enterprise drawing heavily upon civil infrastructure and society. It is this aspect that is oft neglected in discussions about defence in general and navies in particular.

For further information contact the Conference Secretariat, seapower.conference@defence.gov.au.

Pacific 2017 International Maritime Conference

Date	Tuesday 3–Thursday 5 October
Time	0830–1700
Registration	This event is open to all Pacific 2017 trade visitors, exhibitors and conference delegates however, registration fees apply.
Hosted By	The Royal Institution of Naval Architects, The Institute of Marine Engineering, Science and Technology, and Engineers Australia

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

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

Registration is now open on the conference website:

https://www.pacific2017.com.au/international-maritime-conference/registration.asp

For further information contact the Conference Secretariat, imc@amda.com.au, (03) 5282 0543.

2nd Navy Aviation Symposium

Date	Thursday 5 October
Time	0900–1700
Registration	This event is open to all Pacific 2017 trade visitors, exhibitors and conference delegates however, pre-registration is required.
Hosted By	Helicopters, Tactical Unmanned Aerial Systems and Guided Weapons Division of Defence's Capability Acquisition and Sustainment Group (CASG)

This event will include invited presentations on acquisition and sustainment of naval air platform and guided-weapon systems, an update to delegates on programs, aviation regulations, research and technology, including engineering and support issues.

For further information and to register contact Arvind Sinha, arvind.sinha1@defence.gov.au, (0429) 455 028.

Future Submarine Supply Chain Briefing

Date	Wednesday 4 October
Time	1400–1600
Registration	This event is open to all Pacific 2017 trade visitors, exhibitors and conference delegates however, pre-registration is required.
Hosted By	Capability Acquisition and Sustainment Group (CASG) and DCNS Group in conjunction with Lockheed Martin

This forum will see a panel of presenters from Defence and the key industry players, DCNS and Lockheed Martin, in the Future Submarine Project, Sea 1000. The panel will update industry and supply-chain partners on the development of opportunities to participate in this project.

For further information contact Jessica Thomas, jessica.thomas@au.dcnsgroup.com, (02) 6285 0911.

Higher Education for Development of the Maritime Industry

Date	Wednesday 4 October 2017
Time	1000–1100
Registration	This event is open to all Pacific 2017 trade visitors, exhibitors and conference delegates and no registration is required.
Hosted By	The Australian Maritime College,

For further information contact Jonathan Binns, jonathan.binns@utas.edu.au, (03) 6324 9847 or Aaron Ingram, aaron.ingram@ utas.edu.au, (0427) 589 046.

IndPac 2017

Date	Thursday 5 October
Time	0900–1200
Registration	This event is open to all Pacific 2017 trade visitors, exhibitors and conference delegates however, pre-registration is required.
Hosted By	Curtin University, Industry Defence and Security Australia

The theme for IndPac 2017 will be Up Periscope: RAN's SEA 1000 and SEA 5000 and the evolving threat landscape in the Indo Asia Pacific.

For further information contact Alexey Muraviev, a.muraviev@curtin.edu.au, (08) 9266 2234.

The Royal Institution of Naval Architects

Institute of Marine Engineering, Science & Technology IMAREST

ENGINEERS AUSTRALIA

PACIFIC 2017 International Maritime Conference

International Convention Centre Sydney, Australia **3-5 October 2017**

REGISTRATION NOW OPEN

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

Collectively, the conference and exposition will offer a rewarding program for all those with a professional interest in maritime affairs. The conference program will be designed to permit all delegates to visit the many industry displays in the exposition itself, and to conduct informal professional discussions with exhibitors and fellow delegates. Registration for the International Maritime Conference includes free access to the exposition.

An impressive list of Keynote Speakers has been assembled for the conference program:

- **Dr David Kershaw** *Chief of Maritime Division*
  Defence Science and Technology Group - Department of Defence
- **Dr Margaret Law** *Submarine Capability and Strategy Manager*
  ASC Pty Ltd
- **Mr Paddy Fitzpatrick** *Director General Future Frigates*
  Capability Acquisition and Sustainment Group - Department of Defence

For further information and to register
http://www.pacific2017.com.au/international-maritime-conference/

For further information contact the ***PACIFIC 2017*** International Maritime Conference Secretariat:
PO Box 4095, Geelong VIC AUSTRALIA 3220 **P**: +61 (0)3 5282 0543 **F**: +61 (0)3 5282 4455 **E**: imc@amda.com.au

Maritime Australia Industry Innovation Awards

Date	Wednesday 4 October
Time	1620–1700
Registration	This event is open to all Pacific 2017 trade visitors, exhibitors and conference delegates and no registration is required.
Hosted By	Industry Defence and Security Australia Limited (organisers of Pacific 2017)

The Chairman of Industry Defence and Security Australia will present the 2017 Maritime Australia Industry Innovation Awards, SME Grants and Young Innovator Scholarships to the six smartest and most innovative companies and individuals in Australia's naval and maritime industries.

For further information contact Gregor Ferguson, gferguson@amda.com.au, (0414) 803 717.

Basic Dry Dock Training Course

DM Consulting's Basic Dry Dock Training is a four-day course which covers the fundamentals and calculations of dry docking. The next courses in Australia will be held on

31 Oct–3 Nov 2017	Osborne, SA
7–10 Nov 2017	Henderson, WA

with venues to be advised.

The course begins with the basics and safety concerns, and progresses through all phases of dry docking: preparation, docking, lay period, and undocking. The course ends with a discussion of accidents and incidents.

It is designed to be relevant to dock masters, docking officers, engineers, naval architects, port engineers and others involved in the dry docking of ships and vessels. The course is presented through classroom lectures, student participation in projects, and practical application exercises. The course addresses the deck-plate level of practical operation needed by the dock operator and the universally-accepted mathematical calculations required to carry out operations in accordance with established sound engineering practices.

"The course was excellent, straightforward and comprehensive. Instruction was great, expected 'death-by-PowerPoint, but was pleasantly surprised. I am better acquainted with dry dock basics after the course and can trust the accuracy of the training based on the extensive experience of the instructors. Thank you! Very informative, very thorough."

Topics to be covered include:

- Basic dry docking community terminology
- Calculations
- Safe dry docking procedures
- Lay period
- Undocking evolutions
- Docking Plans
- Docking and undocking conferences
- Hull boards
- Vessel stability
- Incidents/accidents

Joe Stiglich, the course leader, is a retired naval officer, qualified NAVSEA docking officer and holds a master's degree from MIT in naval architecture and marine engineering. Responsible for over 250 safe docking and undocking operations, he currently runs a series of conference and training courses for personnel involved in all phases of the dry docking industry and acts as a consultant for ship repair companies.

For further information, please see www.drydocktraining.com/.

This training will be held in conjunction with the Australian Shipbuilding and Repair Group (ASRG). Registration and payment may be made directly to ASRG. Contact Liz Hay at liz.hay@asrg.asn.au or call (07) 5597 3550.

SMIX Bash

To be held this year on 7 December, SMIX Bash was inaugurated in 2000 and is organised as a joint-venture function by the Royal Institution of Naval Architects (NSW Section) and the Institute of Marine Engineering, Science and Technology (Sydney Branch). It is a Christmas party for those involved in various marine industries and activities based in the Sydney area and those from further afield.

The name was derived as a contraction/acronym for "Sydney Marine Industries Christmas Bash". The inaugural function was held on board the Sydney Heritage Fleet's beautifully-restored barque, *James Craig*, at Darling Harbour, and was so successful that the same venue has been booked for the event every year.

The essential principles are:

- SMIX Bash provides an informal, convivial atmosphere in which as many people as possible who share a maritime interest can meet, with the primary intent of promoting friendship, mateship and networking.
- SMIX Bash provides an opportunity for people to meet others who they do not encounter in their day-to-day activities but with whom they share a common maritime interest, be it in ship and boat design, construction, survey, classification, operation, management, navigation, brokerage, repair, equipment/material supply, pilotage, towage, research, training, etc. SMIX Bash also welcomes people who have no day-to-day involvement with the maritime industries but who have a love of or fascination with those industries.
- Partners are also most welcome, as it is intended that the event be a fun social occasion as well as a get-together for industry hacks!
- There will be no speeches, other than a short welcome from the Chair of the SMIX Bash Organising committee.
- *James Craig* makes a delightful venue for SMIX Bash, and will be at her usual berth at No. 7 Pyrmont, adjacent to the Australian National Maritime Museum at Darling Harbour. Access is easy, by public transport or car. There is ample parking at the Casino, just across the road from the wharf.
- The function will run from 5:30 pm to 9:30 pm. Drinks (beer, wine, and soft drinks) will be served throughout the evening, and a buffet-style meal will also be served. Guests are welcome to arrive at any time and stay as long as they like within the 5:30 to 9:30 pm time frame.

- Those who attend SMIX Bash are asked to pay a nominal amount which only partly covers the cost, but there is a group of sponsors who are each prepared to make a contribution in order to ensure the success of the event and to have their names associated with SMIX Bash.

Bookings will open on the Trybooking website on 1 September, and an alerting email will be sent to RINA and IMarEST members on that date. A similar email will be sent to non-members and friends on 1 October. The cost is $55 per head. Early booking is recommended, as we have had to turn people away in previous years!

HPYD6

HPYD is the 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.

The High Performance Yacht Design Committee has announced that HPYD6 will take place in Auckland, NZ, on 10–13 March 2018 during the stopover of the Volvo Ocean Race.

Due to a lack of high-quality technical abstracts submitted, the HPYD committee has made the decision to change the format of the HPYD6 conference. As such, there will be no publication of papers and no formal conference presentations. Instead, there will be a focus on providing a range of exciting, publicly-accessible presentations and keynote addresses delivered by some of the top designers and engineers involved in the America's Cup and Volvo Ocean Race.

Planning for HPYD7 has already begun. It will coincide with the America's Cup in Auckland in 2021, and will return to a more traditional format with a full complement of papers and speakers.

You can follow HPYD on Facebook, LinkedIn or sign up for their mailing list to receive 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; or for sponsorship opportunities: sponsorship@hpyd.org.nz

NEWS FROM THE SECTIONS

ACT

Annual General Meeting

The 2017 Annual General Meeting of the ACT Section was held on 12 April 2017 at the Campbell Park Office in accordance with the circulated Agenda. The minutes were published and circulated to members.

Continuous Naval Shipbuilding

RADM Mick Uzzell RAN (Retd) gave a presentation on *Continuous Naval Shipbuilding* to the ACT Section on Wednesday 21 February 2017 at the Campbell Park Offices of the Department of Defence, i.e. his views on a how a continuous naval shipbuilding program could be established in Australia. RADM Uzzell recently retired from the position of Head Navy Engineering in the Royal Australian Navy.

Mick began his presentation with a description of the context for continuous shipbuilding in the Australian environment, including keeping up with the rate of technology change in competing regional military forces, and the socio-political influences (such as effective and efficient use of limited funds, and the drive for workforce employment in a diminishing manufacturing sector).

The overall thrust of the presentation was the proposal that the core of the RAN fleet (excluding large, small-quantity ships such as LHDs or AORs) be based on two hullforms; one for larger ships, such as frigates and destroyers, and one for smaller ships, such as patrol vessels, minehunters, and hydrographic vessels. It was further suggested that economies could be realised by using similar plant and machinery in both hullforms.

Mick argued that, in order to sustain continuous shipbuilding in a relatively small navy, the whole approach for acquisition and operation of our assets needs to be re-thought. This includes identifying the need, the requirements to satisfy that need, and how those assets are contracted and managed through-life. For example, a proposal to contract the build of vessels in flights, where any major upgrade would be included in later versions of a vessel type, rather than updating existing vessels.

He acknowledged that there were significant challenges facing this approach but argued that, with the right ground work and a sustained drive from the head of the organisation, the approach was possible and presented the possibility of a significantly-improved and capable navy in the future.

The Management and Assurance of Safety in the RAN (Part 1)

Gordon MacDonald, Associate at BMT Design & Technology, gave a presentation on *The Management and Assurance of Safety in the RAN—the Journey and Way Forward* to the ACT Section on Wednesday 22 March 2017 at the Campbell Park Offices of the Department of Defence, a topic and presentation which generated much stimulating discussion.

Gordon opened with on overview of the management and assurance of safety in the RAN, stating that it has been in a state of continuous change and development since the HMAS *Westralia* incident on 5 May 1998, in which four sailors died in an engine-room fire. One finding of the Board of Inquiry stated "The Board suggests that a disciplined, systematic approach to safety be more closely embraced".

From this beginning, the RAN has been on a journey to establish a safety system which best satisfies a range of expectations and constraints. This journey coincided with similar efforts in allied navies with which the RAN has been closely involved. The presentation provided the background to the journey so far, and provoked much participation in the

discussion on the way forward from here as we approach the 20th anniversary of the incident.

Much interactive discussion arose, expending the available time and leading to a Part 2 of the presentation in May.

Autonomous Vessels

Grant Judson, Principal Advisor Navigation, Australian Maritime Safety Authority, gave a presentation on *Autonomous Vessels* to a joint meeting with the Nautical Institute and students from UNSW Canberra on 26 April 2017 at the Australian Maritime Safety Authority's head office in Canberra.

Grant opened with a thought-provoking scenario, describing the familiar Manly ferry being physically and functionally transformed into an autonomous vessel, to get us all in the mind-set. To emphasise that the hypothesis was not too unrealistic, Grant mentioned that the real world is moving very quickly, citing some significant activity underway in Australia, including the Slocum Glider for oceanographic research, with unlimited endurance and "propulsion" by movement up and down as a result of changing buoyancy; the Liquid Robotics wave-glider with one-year endurance; the Ocius unmanned surface vessel (USV); the C-Worker 5 and C-Worker 7 USVs; and the REMUS autonomous underwater vehicle (AUV). By these accounts, there is interesting work underway in Australia within the autonomous vessel domain. Grant furthered the product and technology scope by talking about international activity including the unmanned surface vehicles test-site opened on the Trondheim Fjord, Norway, and the US Navy's new autonomous warship, the Sea Hunter, an interesting proposition for the naval architects, being an unmanned trimaran.

Grant then discussed the important activity from some classification societies and the IMO, mentioning the Lloyd's Register Guidance Note on cyber-enabled ships; the LR ShipRight Design Code for Unmanned Marine Systems; the DNV GL ReVolt ship concept; and the IMO MSC 98 regulatory scoping exercise for Maritime Autonomous Surface Ships (MASS) to be introduced by IMO instruments. He talked about how the Australian national law applies to maritime safety, and how progress through autonomy levels from fully-manned to partially-manned to unmanned may become uneconomical because of the cost of legal compliance.

Questions concluded the presentation, with many coming from RINA members.

The Management and Assurance of Safety in the RAN (Part 2)

Gordon MacDonald, Associate at BMT Design & Technology, gave a follow-up presentation on *The Management and Assurance of Safety in the RAN—the Journey and Way Forward* to the ACT Section on Wednesday 17 May 2017 at the Campbell Park Offices of the Department of Defence.

Gordon opened his follow-up by outlining critical developments in the history of the Safety Case within the RAN. The first RAN safety case was for the Minehunter Coastals, about ten years ago. This document simply became 'shelf-ware' due to the minimal guidance which was available to the authors as to how to produce a meaningful case. At that time, the Royal Australian Navy was at an embryonic stage in learning about safety cases.

The RAN initially embraced the offshore industry's model of a safety management system (SMS) and safety case. This model put the focus on the platform operator to demonstrate safety. However, this approach encountered resistance from the RAN operational community, who claimed that a safety case was only related to 'engineering'. Hence the safety case within the RAN became materiel-focussed only. This didn't change until mid-way through the LHD program.

Gordon then explained how the goal-based system for safety arguments came about by referring to Lord Cullen's report, *The Public Inquiry into the* Piper Alpha *Disaster*, published in 1990. This report concluded that offshore industry safety cases at the time were:

- Too superficial.
- Too restrictive or poorly scoped.
- Too generic.
- Overly mechanistic.
- Demonstrating insufficient appreciation of human factors.
- Carried out by managers who lacked key competencies.
- Applied by managers who lacked understanding.
- Failing to consider interactions between people, components and systems.

It was as a result of this report that safety cases moved from being 'prescriptive' to being 'goal-based'.

The Safety Case Philosophy

Gordon outlined the following points as being key to the philosophy behind safety cases:

1. Those who create the risks are responsible for controlling those risks.
2. Safe operations are achieved by setting and achieving goals rather than by following prescriptive rules.
3. All risks must be reduced such that they are below a specified threshold level of acceptability.

Gordon noted that the Safety Goal Structuring Notation argument is the same construct as lawyers use when prosecuting or defending someone. He acknowledged that creating a safety case requires a huge amount of effort. It is fully justified for completely new activities or products (e.g. the first nuclear submarine).

The Work Health and Safety Act

Gordon outlined some limitations of using the Work Health and Safety Act in the RAN context:

1. It was developed for land-based persons conducting a business or undertaking; not maritime. An alternative that *may* be more appropriate is the AMSA Act 1990.
2. It is a 'one-size-fits-all' model and is mandated by Government.
3. The focus of the Act is entirely on hazard management; it does not facilitate a holistic argument to give overall proof that a system is safe.

The Search for MH370

A presentation was given on *The Search for MH370* to a joint meeting with the Nautical Institute 6 June 2017 at the Australian Maritime Safety Authority's head office in Canberra.

The presentation was delivered in two parts, with the first part being delivered by Craig Longmuir, Response Centre Chief—Maritime at AMSA. During the response for MH370, he led the drift working group which guided the search-area determination. He covered the following points:

- Introduction: Including transition to the Australian Search and Rescue Region (SRR).
- Search area determination: The science around splash-point area determination, and then drift planning.
- Search logistics: Assets, briefing and challenges.
- Transition: Transition to major incident coordination, including whole-of-government liaison and Joint Agency Coordination Centre (JACC) set-up

The second part of the presentation was delivered by Peter Foley, General Manager Surface Safety Investigations at the Australian Transport Safety Bureau. He has held the position of Program Director, Operational Search for MH370, since May 2014. He is responsible for all of the ATSB's operational search activities for missing Malaysia Airlines flight MH370. He covered the following points:

- Sub-surface search.
- Accident investigation.
- Final conclusion/findings/decision to end search.
- Lessons/summary.

The presentation was well received and well attended. It also attracted many questions about future work at international level on the tracking of commercial aeroplanes, and emerging technology to conduct subsea searches more efficiently and effectively.

Jason Steward
Tom Dearling
John Colquhoun

New South Wales

Committee Meetings

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

- SMIX Bash: Sponsorships all received for 2016, and accounts to be finalised; *James Craig* to be booked for 2017; SMIX Bash Committee to meet.
- TM Program and Venue: Program re-arranged to cater for a booked venue being unavailable and meeting subsequently held at Royal Prince Edward yacht Club at Point Piper; meeting with EA to be arranged to discuss venue in future.
- Member Benefits: RINA members receive benefits (typically 10% redustion) on registration for conferences in the UK, but members receive no benefit on registration for Pacific IMCs; this to be investigated.

The next meeting of the NSW Section Committee is scheduled for 29 August.

Hydrodynamics of High Performance Marine Vessels

Lawry Doctors, Professor Emeritus at UNSW Sydney, gave a presentation on *Hydrodynamics of High-performance Marine Vessels* to a joint meeting with the IMarEST attended by 8 on a dark and stormy night on 7 June in Room 101 of the Ainsworth Building at UNSW Sydney, Kensington.

Lawry began his presentation by saying that the idea for writing his book was suggested by Ms Kelly Cooper, Program Officer, Sea Platforms and Weapons Division, US Office of Naval Research, who said that it would be a shame to lose all the information which he had collected over the years. The book was developed as a sponsored project by the ONR, and ended up at twice the envisaged length at 888 pages in two volumes. The book is now available via the Amazon website.

Lawry's presentation is written up in this edition of *The Australian Naval Architect*.

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

Efficiency in Marine Diesel Engines

Lachlan Colquhoun, Marine Engine Sales Manager and Eric Clarke, Service Division Manager, MAN Diesel & Turbo gave a presentation on *Approaches to Efficiency in Marine Diesel Engines* to a joint meeting with the IMarEST attended by 20 on 5 July in the Harricks Auditorium at Engineers Australia, Chatswood.

The IMO's Energy Efficiency Design Index (EEDI) mandates efficiency benchmarks for a range of ship types and sizes. The EEDI is a non-prescriptive, performance-based mechanism which is being progressively tightened to drive development of more fuel-efficient systems.

Lachlan's presentation explored recent developments by MAN Diesel & Turbo's four-stroke Marine Engine Division to improve the fuel efficiency of propulsion systems, including diesel-electric and hybrid technologies. It also highlighted some incremental benefits being achieved by implementing more-efficient engine systems including lubrication and cooling systems.

Eric's presentation looked at the approach taken by MAN Diesel & Turbo in the development of their two-stroke marine engine range from MC to ME, including the introduction of electronic fuel-injection control on its large-bore ME-C engines and the advantages which it brings. These include improved emission characteristics, smokeless operation at any load and lower NOx on command. These advantages are gained by the use of variable, electronically-controlled timing of fuel injection and exhaust valves during operation. Additionally, all software and hardware are upgradable for the lifetime of the engine.

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

Technical Developments and Innovations on *Wild Oats XI*

Steve Quigley, Managing Director of One2three Naval Architects, gave a presentation on *Techncial Developments and Innovations on* Wild Oats XI to a joint meeting with the IMarEST attended by 50 on 2 August in the Harricks Auditorium at Engineers Australia, Chatswood. This was the fourth-highest attendance of the 100 meetings held at the Chatswood venue.

Wild Oats XI is a state-of-the-art maxi yacht designed by Reichel/Pugh and built by Mcconaghy Boats, launched in December 2005 and won her first Sydney-Hobart the same

month. She is distinctively narrow with a 5.1 m (17 ft) beam and originally featured canting-ballast twin-foil appendages. One2three joined the *Wild Oats* development team in 2009. Since then she has undergone many modifications over time to maintain her competitiveness.

In 2009 she was lengthened at bow and stern from 29.8 to 30.5 m (98 to 100 ft) to meet the new limit in the Sydney–Hobart Yacht race. In 2011 her forward balanced spade canard was removed and twin daggerboards were added amidships. In 2012 she received a bow centreboard as well as caudal fin winglets on her torpedo bulb. In 2013 she was equipped with a Dynamic Stability System (DSS) foil, i.e. a retractable horizontal foil deployed on the leeward side of the boat. In 2015 her stern was shortened by 2 m and her 12 m forward sections was dramatically removed with a chainsaw and replaced by a 14 m longer, sleeker bow, keeping her midship sections unmodified and, in effect, moving her entire existing sail plan aft by 2 m.

Wild Oats XI has undergone both significant changes and subtle refinements over the past six years to maintain her competitiveness with the latest thinking and developments in maxi-yachts. It has been an interesting — and ongoing — project for One2three Naval Architects. She is a very good all-round yacht, and has had a brilliant racing career, being one of the most-successful maxi-yachts of all time. *Wild Oats XI* has won line honours in the Sydney–Hobart yacht race eight times from eleven starts, and is the only yacht to have taken the "triple crown" (line honours, handicap honours, and broken the race record) since *Rani* in the inaugural 1945 race; *Wild Oats XI* has done it twice.

Steve's presentation detailed the innovations made on *Wild Oats XI* since 2011, giving insights into the inner thoughts of the design team, the rationale behind the changes and the results they achieved.

Question time was lengthy, and provided some further insights.

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

Phil Helmore

Victoria

Victorian Section AGM

The Victoria Section held its AGM on the evening of 10 August 2017, hosted by BMT Design &Technology at their offices in Melbourne's CBD. The meeting was chaired by the outgoing Chair, Hugh Torresan.

Hugh briefed the meeting on some of the highlights of the Victorian Section's activities over the past year, including six technical meetings hosted jointly with IMarEST (Melbourne Branch). The committee wishes to thank Jacobs Engineering Group, for their long-standing support in hosting the section technical meetings. Trevor Dove presented the Treasurer's Report, and Hugh Torresan briefed the meeting on news from the RINA Australian Division Council in Karl Slater's absence.

A new executive committee was elected unopposed. The committee for 2017–18 is follows:

Chair	Siobhan Giles (BMT)
Secretary	Owen Tregenza (DST Group)
Treasurer	Trevor Dove (BMT)
Nominee to AD Council	Karl Slater (DST Group)
Social Media Manager	Sam Hunnibell (BMT)
Members	Riley Graham (TKMSA), James Nolan (BMT)

The Victorian Section Committee expressed its thanks and admiration to outgoing Chair, Hugh Torresan, who has chaired the Victorian Section for the past year, and we appreciate his efforts in co-ordinating the committee and running technical meetings.

CSIRO Engineering and Technology

Mark Underwood, Research Director, Engineering and Technology for the Oceans and Atmosphere Business Unit, CSIRO, gave a presentation on *CSIRO Engineering and Technology — Bespoke CSIRO Engineering Solutions for Ocean Science and Marine Industry Applications* to a joint meeting with IMarEST in February at Jacobs Engineering. The presentation was well received and prompted many question and considerable discussion.

Mark joined CSIRO in 1998, has been a Program Director since 2009, and currently leads the Engineering and Technology program within the Oceans and Atmosphere business unit. The program has an impact focus on developing innovative scientific instrumentation which enables research in the marine space, and in delivering technical capacity for a number of externally-facing multi-organisational science infrastructure programs, such as the Marine National Facility, and the Integrated Marine Observing System (IMOS).

Mark's training was as an electronics engineer, focussed on sensor systems. His early career was with the Australian Antarctic Division and included projects delivering innovative technical solutions to answer specific research needs in Antarctica. This covered a wide range of projects, including designing and building automatic weather stations for Antarctic deployment, research-vessel operations and a helicopter-borne data-acquisition system to monitor seal populations.

Mark was a founding director and key instrumentation designer for a small local technology company, which has recently celebrated its twentieth anniversary and enjoys worldwide sales.

He left this role to join CSIRO, and settled in the marine technology sphere with technical work on CSIRO's blue-water research vessels. While at CSIRO, Mark has taken on increasing leadership roles. He has built capability in his teams in metrology and calibration of marine instrumentation, and instrumentation for blue-water science, fisheries research and aquaculture. He has managed large technical groups within CSIRO and facilitated engagement with external partners domestically and internationally.

Model-based Control of Maritime Drivetrains

Noam Olshina of the University of Melbourne gave a presentation on *Model-based Control of Maritime Drivetrains with Waste-Heat Recovery* to a joint meeting with IMarEST in late May at Jacobs Engineering.

The overall energy efficiency of maritime platforms is increasingly important, for both commercial and military applications. The energy available on board a maritime platform is limited by the size of its fuel tanks. Using the available energy efficiently provides increased platform range and endurance, reduced fuel-tank volume, reduced fuel use and reduced exhaust emissions. Typically, 30% of the energy in the fuel is lost through the diesel engine exhaust, which makes the exhaust an attractive target for waste heat recovery (WHR).

Noam discussed the ongoing research project undertaken by DST Group and the University of Melbourne exploring Waste Heat Recovery using a turbo-compounding system consisting of a radial-flow turbine coupled to an electrical generator. This system is retrofittable to existing diesel engines and only marginally increases the engine mass, volume and complexity. In addition, the reduced exhaust-gas temperature reduces the vessel's thermal signature. A previously-developed model-based control technique has been extended to include control of the integrated turbo-compounded engine system. This enables the engine and turbo-compounding system to operate optimally to minimise fuel use or, alternatively, to maximise power output, while ensuring that engine operational limits are not exceeded.

DST's Hedemora V6 submarine research engine at HMAS *Cerberus*
(Photo courtesy DST Group)

Bluebox turbogenerator energy-recovery system
(Photo courtesy Bluebox Energy)

Noam graduated from the University of Melbourne in 2007 with bachelor degrees in Mechanical Engineering (with honours) and Applied Mathematics. Since then, he has worked as a consulting engineer, starting in the building services industry. His most recent position as a senior engineer included a portfolio of diverse projects ranging from pressure-vessel design for the petrochemical industry to structural design of large sculptures. Noam is currently a PhD candidate in the department of Mechanical Engineering at the University of Melbourne, collaborating with the Defence Science and Technology Group on model-based control of maritime drivetrains with waste-heat recovery.

The Whipping Response of a Submerged Free-free Cylinder

Steven de Candia of the Australian Maritime College gave a presentation on *The Whipping Response of a Submerged Free-Free Cylinder Due to Underwater Explosions* to a joint meeting with IMarEST in early August at BMT Design & Technology.

Underwater explosions (UNDEX) generated by torpedos and mines present one of the most significant threats to the survivability of naval vessels. A non-contact UNDEX event produces two distinct pressure-loading phenomena: an initial short-duration high-frequency shock wave, followed by a relatively low-frequency pulsating bubble containing the gaseous products of detonation. The pulsating bubble may excite global beam-like structural response modes of the vessel, known as UNDEX-induced whipping. Depending on the size and position of the explosive charge relative to the vessel, the maximum strain levels during whipping may exceed those during the initial shock phase. Due to the large costs of full-scale explosive trials, development of validated numerical-modelling procedures for UNDEX whipping and shock response are required to assess the survivability of naval vessels.

Cylinder for UNDEX trials being lowered into the water
(Photo courtesy Steven de Candia)

An experiment has been conducted to investigate the UNDEX whipping response of a fully-submerged cylindrical pipe structure, considering the effects of different charge sizes, stand-off distances and longitudinal positions along the hull. It was found that the longitudinal stand-off location has a significant influence on the whipping response and that the peak whipping response may not always occur at the stand-off point.

UNDEX trial for measuring the whipping response of a cylinder
(Photo courtesy Steven de Candia)

Steven de Candia is a PhD candidate at AMC through the Research Training Centre for Naval Design and Manufacturing (RTCNDM). Steven has previously performed analysis for the whipping and shock response of naval platforms, through the summer vacation scholarship program with the Defence Science and Technology Group (DST Group). Currently he is working with the AMC, DST Group and Babcock Australasia on the analysis of submerged structures in response to underwater explosions for his PhD research.

Siobhan Giles

CLASSIFICATION SOCIETY NEWS

ABS Approval in Principle for Floating LNG Power Plant Concept

ABS has granted Approval in Principle (AIP) for a floating LNG power plant and Floating Storage and Regasification Unit (FSRU) design concept developed by Japan's Chiyoda Corporation.

"As the energy mix shifts and global demand for gas increases, concepts like this will reshape how energy is supplied," says ABS' Vice President for Global Gas Solutions, Patrick Janssens. "By working closely with Chiyoda, we were able to help them prove the feasibility of this novel and innovative concept."

This concept offers a new approach to delivering new sources of power to remote areas of the world. The conceptual design is based on existing LNG carriers which are converted into floating power plants with small (~72 MW) to medium (~400 MW) scale power generation capabilities. In reviewing Chiyoda's floating LNG power plant concept, ABS applied its relevant Rules and Guides to confirm that the conceptual design meets the intent of applicable class requirements.

"By applying ABS' robust guidance, we were able to develop a concept which meets operational demands and advances safety," says Chiyoda Corporation's Project Manager, Toyomitsu Kanai. "By basing this concept on existing LNG carriers, we are able to reduce constructions costs and shorten delivery times. We look forward to developing this concept further and expanding the LNG value chain to new markets."

Recognising the changing landscape and increased industry focus on gas, ABS launched its Global Gas Solutions team in 2013 to support industry in developing gas-related projects. The ABS Global Gas Solutions team provides industry leadership, offering guidance on liquefied natural gas (LNG) floating structures and systems, gas fuel systems and equipment, gas carriers, and regulatory and statutory requirements. ABS has extensive experience with the full scope of gas-related assets and has been the classification society of choice for some of the most advanced gas carriers in service.

Craig Hughes

World's First Cyber-safe Ships Delivered

The first ships to be classed with Lloyd's Register's cyber notations have been delivered to Global United in Korea. Built by Hanjin Heavy Industries in collaboration with Alpha Ori Technology, the ships have been awarded the notation Cyber (AL-SAFE) certifying the autonomous systems onboard as safe.

This is the first real example of the digital transformation in shipping—the ships will operate in an autonomous mode for selected functions using cutting-edge digital technology. The new cyber-enabled features allow crew to operate ships more efficiently. This is also the first example of a ship certified to stream data into a big data platform.

The autonomous systems were enabled by Alpha Ori Technology with the purpose of several systems being able to operate with a level of automation onboard three vessels to varying degrees. The aim was to minimise human error and make the operation of ships' systems safe and more efficient when running in autonomous mode. LR provided independent assurance services to the shipowner during these important first steps, with the objective of applying descriptive notation to the vessels in recognition of the work and certifying the systems as safe.

Elements of the navigation, cargo and machinery systems have been certified AL2, which means 'systems provide on- and off-ship decision support for operators'. This provides operators and shore-based support staff with instant access to operating data from these systems for monitoring and diagnostics through the cloud, with which they can make more-informed decisions and respond to issues faster and more efficiently.

The air-handling unit has been certified AL3 which means 'systems that operate autonomously but with an active human in the loop'. The system continuously monitors operational information from fire and gas systems, cargo systems and navigational positioning systems, and then uses this information to automatically adjust the unit's operating parameters to maintain a safe and comfortable environment within the accommodation space.

Nick Brown, LR's Marine and Offshore Director, said "LR's innovation, consultancy and assurance teams have performed exceptionally as part of this dynamic project, working with a product entirely new to us and our clients. From this point, the degree of autonomy on cyber-enabled ships will only grow, and comprise more and more functions

and reach higher and higher levels and, thanks to LR's procedures, this will be achieved safely."

Tatsuya Okamoto, of Mitsui & Co. on behalf of Global United Gas Carriers, added "We, Global United Gas Carriers Pte Ltd, wish to thank Alpha Ori team for delivering the SMARTShip technology to our vessel, *Trammo Dietlin*, and Lloyd's Register for their assessment and assigned class notation of Cyber (AL-SAFE). It was a matter of great pride for Global United that its vessel was the first ship in the world to achieve this autonomous level of certification."

Sam Jha, CBO of Alpha Ori Technology, said "We are thrilled to announce that *Trammo Dietlin,* fitted with our SMARTShip technology, is certified with AL-SAFE notation—the first ever in the world—by Lloyd's Register. We believe it to be the beginning of maritech transformation that will revolutionise the maritime transportation industry and drive economic value for all stakeholder including ship owners and operators."

Captain Rajesh Unni, CEO of Synergy Marine Group, commented "Our business involves providing comprehensive tailor-made vessel-management services to our clients. The technology of Alpha Ori has high-powered our solutions. We are delighted to use the Digital Product Suite of Alpha Ori which offers us cutting-edge technologies to enable remote vessel monitoring, diagnostics and control."

LR Press Release, 29 May 2017

Trammo Dietlin alongside
(Photo from Shipspotting website)

New LR Code to Certify Unmanned Vessels

Lloyd's Register (LR) has launched the LR Unmanned Marine Systems Code, a goal-based code which takes a structured approach to the assessment of unmanned marine systems (UMS) against a set of safety and operational performance requirements.

With current and expected developments in autonomous and remote systems LR envisages that, within the near future, UMS will enter into widespread use through many sectors of the maritime industry. LR has been active in understanding how it can support the industry to demonstrate safe design and quality manufacture of critical aspects for unmanned systems.

The LR Unmanned Marine Systems Code provides an assurance process in order to certify the safe design, build and maintenance of UMS against an established framework which minimises the effort required by an owner or operator to achieve certification and which is acceptable to flag states, local regulators and other parties. Whilst initially targeted at small non-convention sized UMS, including naval systems, it is scalable and is capable of application to larger, more-complex vessels as technology and regulation develops.

The Code has been written to support innovation by establishing requirements for which compliance can be demonstrated using a tailored combination of standards, or, where standards do not exist, the application of risk-based assessment techniques. LR then applies verification methods according to the solution selected. The benefits of using the goal-based structure is that it defines an ultimate safety objective whilst allowing for the consideration of alternative designs and solutions which meet the safety objective, thereby supporting innovation in an area which is developing rapidly.

The Code has been developed against a hazard analysis of UMS design and operation and benchmarked against existing commercial and naval regulatory requirements, including SOLAS and the Naval Ship Code, using LR's depth of experience in these sectors and in the development of goal-based standards. It has been validated against several existing UMS designs.

Tim Kent, LR's Marine and Offshore Technical Director, said "The Code provides a unique and valuable method

of providing an assurance process for the safe design of unmanned marine systems in what is a rapidly-developing area of the industry. It allows for the certification of novel and emerging technologies against a structured framework and is scalable according to the risk profile and autonomy of the systems, from the very small or simple to the very large or complex. It complements our existing work on cyber-enabled ships and is also intended to support any future regulatory development by the IMO or national bodies."

Anderson Chaplow, LR Lead Specialist—Naval, spoke about the Code at Seawork International in Southampton on 14 June at in the Upper Deck Conference Room on board *Ocean Scene*, berthed in the Seawork Marina.

LR Press Release, 13 June 2017

New IACS Unified Interpretations on Downflooding Points

New unified interpretations have been developed to highlight the issue of openings on ships that may be left uncovered. This follows an accident where a vessel sank — resulting in the loss of life — because some openings (fitted with closing appliances and therefore not considered as downflooding points in stability calculations) were left uncovered in order for the vessel to carry out her normal duties.

The International Association of Classification Societies (IACS) has identified all the instances where downflooding points are mentioned in statutory requirements and has developed new unified interpretations. These new unified interpretations now make it clear that if, for operational reasons, openings that are fitted with covers will be uncovered, the opening needs to be considered as a downflooding point in stability calculations. The new unified interpretations have been agreed by the International Maritime Organization and appropriate circulars have been issued.

Owners of existing vessels should be aware of the new unified interpretations and always consider the closing appliances and their status. For exact details of the new unified interpretations, please see the following:

MSC.1/Circ.1543: Unified Interpretation relating to the IGC Code

MSC.1/Circ.1538: Unified Interpretation relating to the International Grain Code

MSC.1/Circ.1537: Unified Interpretation of the 2008 IS Code (note that only part of this circular relates to unprotected openings)

MSC.1/Circ.1539: Unified Interpretation of SOLAS Chapter II-1 (note that only part of this circular relates to unprotected openings)

MSC.1/Circ.1534: Unified Interpretation relating to the International Convention on Load Lines, 1966 (note that only part of this circular relates to unprotected openings)

UI CC7 (New): Unprotected openings

UI MPC11 Rev.2: Interpretation to MARPOL I/27

UI CG17 (New): Unprotected openings

UI MPC129 (New): Unprotected openings (MARPOL I/28.3.3)

UI SC280 (New): Angle of down-flooding (ϕf)/Angle at which an opening incapable of being closed weathertight (θv)

UI LL80 (New): Unprotected openings

LR Class News, No. 11/2017

Bureau Veritas and Ascenz Join Forces in Ship Performance Agreement

In July Bureau Veritas and Singapore-based Ascenz signed a memorandum to provide ship performance and monitoring solutions to shipowners world-wide.

The agreement will enable Bureau Veritas to offer Shipulse, Ascenz's solution for real-time ship performance and monitoring. Shipulse captures critical shipboard data to provide insights for better decision making, fuel savings and optimised vessel performance. The data captured covers fuel consumption, bunkering activity, engine, hull and propeller performance.

Bureau Veritas will market Shipulse across its network to offer complementary services and analysis tools based on ship-modelling capabilities, data analysis across fleets, and the ability to integrate BV software — such as weather routing and trim optimisation — with Shipulse.

Ascenz CEO, Chia Yoong Hui, said, 'The key value of Shipulse is to bring critical performance information as accurately and seamlessly as possible to shipowners. We are excited that through this co-operation agreement we will be able to enhance our offering and leverage BV's expertise in vessel performance.'

Bureau Veritas' Regulatory Services Director, Tihomir Kezic, said, 'By joining forces with Ascenz we are able to provide solutions to shipowners which connect compliance with performance management to help ensure efficiency and environmental performance as well as safe operations.'

Shipulse's CarbonComply module supports MRV monitoring and reporting requirements. As an EU MRV Recognized Organization, Bureau Veritas recognizes Ascenz's CarbonComply module.

CarbonComply enables automated monitoring and reporting of ship CO_2 emissions under EU MRV regulation requirements. Reporting is a natural output of the Shipulse fuel consumption data and performance analysis. A unique capability of CarbonComply is to register voyages automatically without the need for manual calculations to break down fuel consumption or emissions on a per voyage basis. Furthermore, the system is able to detect and classify different voyage stages such as sea passages, manoeuvering, drifting and to identify when a ship is either moored or at anchor. This then allows for greater granularity from profiling emissions associated with a sea passage versus that from time spent when anchored.

Ultimately, CarbonComply makes the monitoring and reporting process for EU MRV compliance more efficient for shipowners and helps shipowners address their risk of non-compliance.

BV Press Release, 12 July 2017

FROM THE CROWS NEST

Team Britannia

Team Britannia is a multi-million pound British bid to design and build the fastest and most fuel efficient semi-wave-slicing powerboat to circumnavigate the globe for the much-coveted Union Internationale Motonautique (UIM) world record, currently held by the New Zealander Pete Bethune in *Earthrace* at 60 days 23 hours 49 minutes. Team Britannia expects to cut about seven days from this record.

The team is led by adventurer Alan Priddy, with a completely new design of vessel by Prof. Bob Cripps, former Technical Director of VT Halmatic. It has been designed in the UK and is being constructed by the Aluminium Boatbuilding Company on Hayling Island, Portsmouth, in marine-grade aluminium. The vessel will be powered by a revolutionary fuel emulsion, a mixture of diesel, water and emulsifying agent from Clean Fuel Ltd.

Principal particulars of the vessel are

Length OA	80 ft (24.32 m)
Beam	19 ft (5 79 m)
Draft	2.50 ft (0.762 m)
Displacement	20 t
Crew	20 (12 onboard with 5 rotating on and off the boat plus 3 shore based)
Engines	2×customised Fiat Power Train C13 500, 6 cylinders each 373 kW @ 2000 rpm
Propulsion	2×Castoldi turbo-drive 490 HC waterjets
Fuel	Emulsified diesel
Range	4000 n miles
Construction	Marine-grade aluminium
Hull thickness	8–10 mm

The Team Britannia *Newsletter*, December 2016, said that the hull was turned right-side up on 5 December 2016.

At the end of March, the Team Britannia *Facebook* page said "We are so close to the Super Boat being launched. The engines are all tested and waiting to be fitted. The drives have been run in Milan and are ready to be bolted to the hull and the two Centa couplings ready to join the main parts of the power plant together. The wheelhouse is part built and all components cut and folded ready to be welded onto the deck."

The Team Britannia website still states that the record bid will commence in October 2017 from Europa Point, Gibraltar.

For further details, see the Team Britannia website, www.teambritannia.co.uk.

Team Britannia website
Team Britannia Newsletter, December 2016
Team Britannia on Facebook

Alan Priddy with the newly-turned hull of *Team Britannia* in December 2016
(Photo Chris Davies)

GENERAL NEWS

Keel Laying of First Pacific Patrol Boat

On 31 July the Minister for Defence Industry, the Hon. Christopher Pyne MP, visited Austal in Western Australia for the keel laying of the first vessel for the Australian Government's Pacific Patrol Boat Replacement (PPB-R) Project.

Minister Pyne authenticated the keel by committing his signature to a plate that was subsequently welded and placed in the hull of the vessel.

Austal Chief Executive Officer, David Singleton, said that the ceremonial keel laying was a significant milestone in the $306 million PPB-R Project, which is the first major element of the Australian Government's $89 billion Naval Shipbuilding Plan.

"Austal is delivering on every aspect of the Pacific Patrol Boat Replacement project, from the design and build here in Henderson, to the sustainment of the vessels in Cairns," Mr Singleton said.

"This project is anticipated to employ more than 200 people directly at Austal and hundreds more through our growing Australian supply chain, providing outstanding career opportunities for both qualified workers and apprentices across the country.

"We've already employed more than 30 new apprentices so far this year and we anticipate having 100 on board by the end of 2017," he added.

"The Pacific Patrol Boat Replacement contract further highlights Austal's inherent capability to deliver the Royal

Australian Navy's new Offshore Patrol Vessels, with joint-venture partner Fassmer of Germany and our established supply chain of over 1000 companies Australia-wide." Mr Singleton concluded.

The PPB-R contract was awarded to Austal following a competitive tender in May 2016 and comprises the design, build and sustainment of nineteen 39.5 m steel-hulled patrol boats for 12 Pacific Island nations. The vessels are being gifted by the Australian Government to enhance practical maritime security cooperation across the South Pacific region.

The first vessel, one of four to be delivered to Papua New Guinea, is due for completion in the last quarter of 2018.

Minister Pyne's signature was welded onto a plate that was in turn welded into the hull by the Minister, with assistance from one of Austal's newest apprentice fabricators, Ricardo De Oliveira (Photo courtesy Austal)

Austal Delivers First High-speed Passenger Ferry to South Korea

Austal has announced the company's first-ever delivery to South Korea, a 50 m high-speed passenger ferry to Seaspovill from the Austal Philippines shipyard.

The $16 million contract for the Incat Crowther-designed, all aluminium catamaran — named *Seastar 11* — was awarded in June 2016 and is the thirteenth vessel to be constructed at Austal Philippines in the last five years.

Speaking at the vessel handover ceremony, Austal Philippines President, Wayne Murray, said that the Seaspovill delivery was another great achievement for the company.

Seastar 11, the thirteenth vessel constructed by Austal Philippines and the first new build for Seaspovill of South Korea (Photo courtesy Austal)

"Austal Philippines is proving itself a world leader in internationally-competitive commercial vessel construction and we are delighted with what we have delivered to Seaspovill," Mr Murray said.

"Our last three boats have come out on time and on budget and we certainly plan to continue this enviable record with our current and future contracts," he said.

"*Seastar 11* will transport up to 450 passengers at speeds greater than 40 knots, from the mainland ports of Donghae and Gangneung to the island of Ulleung-do in South Korea," Mr Murray said.

Austal Philippines continues construction on a 56 m high-speed catamaran ferry for Förde Reederei Seetouristik (FRS) of Germany.

Further details of *Seastar 11* are given on Page 27.

Second Cape-class Patrol Boat for RAN

At the end of May Austal delivered *Cape Inscription,* the second Cape-class patrol boat for the Royal Australian Navy.

The Australian Defence Vessel (ADV) *Cape Inscription* is the tenth Cape-class vessel designed and constructed by Austal. *Cape Inscription* joins *Cape Fourcroy*, which was delivered to the RAN in April 2017 and a further eight Cape-class vessels delivered to the Australian Border Force between 2013 and 2015.

Austal's Chief Executive Officer, David Singleton, said that the delivery confirmed Austal's position as Australia's pre-eminent patrol vessel builder, with 32 deliveries in total to the Commonwealth since 1998.

"Austal is proud to have delivered Australia's entire border patrol capability over the past 19 years, through the Bay-, Armidale- and Cape-class patrol vessels. This work has enabled us develop an unrivalled local shipbuilding capability — we have a highly-motivated and competent workforce and a comprehensive supply chain from across Australia. " Mr Singleton said.

"With the delivery of *Cape Inscription* and construction of 19 steel Pacific Patrol Boats underway, we are now preparing for both the Offshore Patrol Vessel (OPV) and Future Frigate projects, which are due to commence next year," he added.

ADVs *Cape Inscription* and *Cape Fourcroy* at Austal's Henderson shipyard (Photo courtesy Austal)

First Steel Cut for Australia's New Polar Research Ship

Marking the commencement of construction of Australia's new Antarctic Supply Research Vessel (ASRV), a steel-cutting ceremony has been held at Damen Shipyards Galati, Romania. Damen is constructing the ASRV for Serco Defence, a wholly owned subsidiary of Serco Australia who, in turn, signed a contract with the Australian Government last year for the delivery, operation and maintenance of the vessel.

"Cutting the first steel for any vessel is always significant. However, the fact that the ASRV is such a ground-breaker makes this a very exciting moment," said Damen Project Director, Joop Noordijk. "The whole team is looking forward to building what is actually an icebreaker, survey vessel and resupply vessel all rolled into one."

The 160 m ASRV will perform numerous tasks for the Australian Antarctic Division (AAD). "The new vessel is a multi-mission ship designed to sustain our geographically-dispersed stations, support helicopter operations, sustain shore parties on remote islands, map the seafloor and undertake a variety of scientific activities across the Southern Ocean," said AAD Modernisation Program Manager, Rob Bryson.

To fulfil these diverse roles, the ASRV boasts considerable cargo capacity: up to 96 TEU below decks and 14 TEU and six 10 ft (3 m) containers on the aft deck, as well as more above the helicopter hangar and in front of the helideck. This represents a substantial increase in container-carrying capacity from the AAD's current vessel, *Aurora Australis*, which can transport a total 19 containers. In practical terms, this means that the ice-breaking ASRV will be able to resupply two stations in one voyage.

In addition to supplying Australia's three permanent research stations on the Antarctic continent as well as its research station on the sub-Antarctic Macquarie Island with cargo, equipment and personnel, the ASRV will be able to carry out comprehensive scientific research activities. To this end, the vessel will be equipped with a 500 m^2 on-board laboratory which will serve as the workspace for up to 116 AAD scientific staff.

In terms of research possibilities, the ASRV will serve as a valuable asset towards the advance of scientific knowledge and understanding of the Southern Ocean. The vessel will feature a 13 m deep, wide moon-pool for deployment of conductivity, temperature, acoustic and depth measurements.

The ASRV design also incorporates a 'wet well' sampling space, a scientifically pioneering installation which consists of a watertight room below the water line that can be used for biological sampling. Further activities such as seismic mapping, AUV operation and net deployment can be performed on the sizeable aft deck.

A key part of the vessel design lies in the fact that the ASRV is expected to be in service — and therefore to continue to perform cutting edge research — for 30 years. "What this means is that we went for a more-modularised approach to the science spaces, with a preference for containerised laboratory spaces rather than fixed labs. This allows us to adapt the ship for the science questions which need to be answered in the future," Bryson said. Construction and outfitting of the vessel will be carried out at Damen Shipyards Galati, with engineering and project management being provided by Damen Schelde Naval Shipbuilding in the Netherlands.

The steel-cutting ceremony for Australia's Antarctic research ship at Damen Shipyards in Romania
(Photo courtesy Damen)

ASC West Facility Upgrade

An innovative major upgrade to ASC's Western Australian submarine maintenance facility was opened on 31 July 2017.

The upgrade is part of ASC's continuous improvement of the maintenance of Australia's Collins-class submarine fleet, as part of the Submarine Enterprise, which has achieved international benchmark performance this year

The $12.5 million redevelopment will improve productivity

and reliability through a maintenance support tower, sky bridge and new amenities and office areas, significantly cutting the time workers spend accessing a submarine under maintenance.

The Finance Minister, Senator the Hon. Mathias Cormann, and the Defence Industry Minister, the Hon. Christopher Pyne MP, jointly opened the redevelopment at ASC West, in Henderson, at a ceremony attended by ASC management and personnel, senior Department of Defence, Royal Australian Navy (RAN) and defence industry leaders.

"This major redevelopment at ASC's Western Australian facility lays a solid foundation for ASC's future as a key sovereign asset delivering Australia's submarine capability," said ASC Interim Chief Executive Officer, Stuart Whiley.

"It is an exciting development which comes at a time of significant investment and commitment to growing Australia's future submarine capability by the Federal Government. ASC looks forward to being a key part of delivering that capability growth."

The redevelopment comes after ASC and the Department of Defence agreed a further five-year performance period for the sustainment of the Collins-class submarine fleet, which commenced on 1 July this year.

The awarding of the next performance period of the In Service Support Contract (ISSC) came after the Submarine Enterprise achieved international benchmark submarine maintenance performance this year.

ASC has committed to go "beyond benchmark" with its partners in the Submarine Enterprise, made up of the Department of Defence, RAN, ASC and Raytheon Australia (combat system).

The Federal Government reviewed Collins-class submarine maintenance last year and found it to be an "exemplar program".

Mr Whiley said ASC's experience and know-how, from 30 years building and sustaining Collins-class submarines in Australia, made it a critical capability partner in Australia in coming years to meet increased submarine capability requirements, including the maintenance, upgrade and life-of-type extension of the Collins-class fleet as well as assisting in the delivery of the future submarine program.

ASC West was opened in 2008 and carries out in-service maintenance of Collins-class submarines. Its workforce has grown significantly in the past two years, up from approximately 250 employees then, to today employing more than 380 permanent personnel and more than 120 contractors.

ASC's facility in South Australia carries out submarine deep maintenance and employs more than 900 personnel.

The upgrade of ASC's submarine facility at Henderson builds on the facility upgrade at ASC's South Australian facility in 2014, which delivered approximately 30 percent productivity improvements in submarine deep maintenance.

"ASC's successful innovation and transformation of deep maintenance in South Australia led to the adoption of similar reforms at ASC West, which will lead to further productivity improvements in our submarine operations," said Mr Whiley.

"The more time workers can spend working on submarines means more-efficient cost-effective and productive submarine maintenance and, ultimately, greater submarine availability and reliability for the Royal Australian Navy.

"This project is demonstration of our commitment to Australia's naval defence capabilities, now and into the future."

Service Life Extension for Minehunters

It was announced on 11 August that the Australian Government has granted First Pass Approval to extend the service life of Navy's Huon-class Minehunter Coastal vessels.

The Head of Navy Capability, RADM Jonathan Mead, said that the project forecast in the Defence White Paper 2016 will ensure that Defence is able to provide an effective maritime mine-countermeasure capability out to the 2030s.

"Minehunters play a vital role in protecting Australia's ships, harbours and infrastructure from the threat of sea mines," RADM Mead said.

"First Pass Approval is a major milestone for this project that will see the life of the Minehunters extended to ensure there is no gap in mine warfare capability as we determine the replacement vessels.

"The Huon class has proven highly capable, supporting Defence's international engagement strategy through participation in exercises and operations to secure our sea lanes and disposing of Second World War explosive remnants, and they will continue to serve Australia for years to come.

"In addition to their mine-warfare role, the Huon-class vessels play a unique role in Defence assistance to the civil community and in 2011 provided support in response to severe flooding in Queensland, including the disposal of debris which posed a navigational hazard," RADM Mead said.

The Australian defence industry will be heavily involved in the future of the ships. Negotiations are underway with Thales Australia to engage them as the Prime Systems Integrator to deliver the project. Under Thales' lead there will be opportunities for other Australian companies to support the Minehunters through their service life.

The Huon-class minehunters were built by Thales Australia, formerly ADI, and were introduced into service in the early 2000s.

Delivery of NUSHIP Hobart

On 16 June the Minister for Defence Industry, the Hon. Christopher Pyne MP, attended a ceremony at the Osborne Naval Shipyard in Adelaide to mark the Government's provisional acceptance of the first air-warfare destroyer (AWD) *Hobart.*

"The acceptance of this first-of-class ship is a further demonstration of the success of the Government-led reform initiative, with the program meeting all budget and schedule targets. *Hobart* will enter service later this year," Minister Pyne said.

"Hobart will play a critical role for Defence by providing new interoperable capabilities for the Royal Australian Navy.

"By using a combination of US and Australian technologies, these ships will allow us to work even closer with our allies.

"Importantly, these ships will provide a safer environment for Australia's entire Defence Force, as they have the ability

The future HMAS *Hobart* arriving in Sydney for the first time
(RAN photograph)

to move faster for longer, whilst forming a protective bubble around themselves and other assets in a task force," he said. Over the last decade, more than 5000 skilled Australians have constructed all three AWD's whilst also creating a new combat and support system to meet the unique needs of the Australian Defence Force.

Minister Pyne said that provisional acceptance represented some of the most complex and innovative engineering accomplishments ever undertaken in Australia.

"These skills have taken over a decade to build, and position Australia well to support the Government's new Naval Shipbuilding Plan," he said.

"The AWD program underscores the importance of Australia's defence industry as a fundamental input into capability.

"Rather than just being a supplier for Defence, this program proves how Australian defence industry is truly a strategic partner with Defence."

NUSHIP *Hobart* arrived at her home base, Fleet Base East, on 10 August to prepare for commissioning in September.

The Hon. Christopher Pyne MP signing the provisional acceptance form for *Hobart*
(Photo courtesy AWD Alliance)

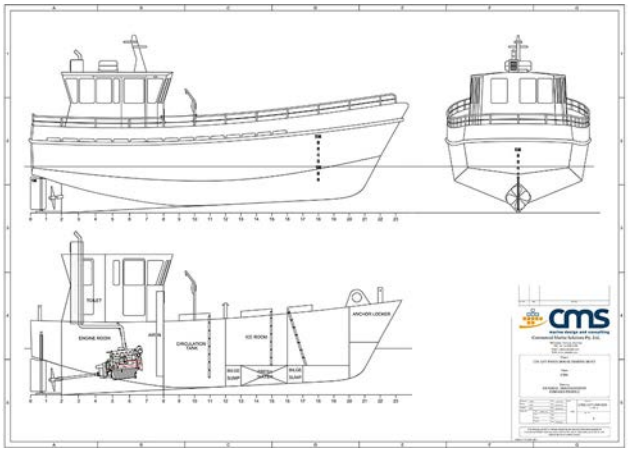
12 m Fishing Vessel from Commercial Marine Solutions

Commercial Marine Solutions commenced the design of a 12 m commercial fishing vessel, following on from the recent successful completion of a 19 m shark fishing vessel. This boat is designed to carry 40 lobster pots, but it can be modified to suit the needs of most fishing operations. With a measured length of just under 12 m, the vessel can be operated by a coxswain. The vessel is designed to withstand the challenging marine conditions around Tasmania and coastal Australia, in line with the latest NSCV requirements.

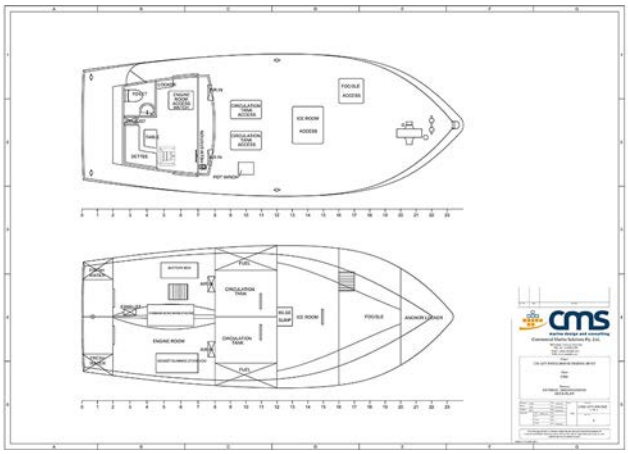
Principal particulars of the new vessel are

Length OA	12.26 m
Length measured	11.95 m
Beam	4.70 m
Depth	2.10 m
Draft	1.50 m
Fuel oil	3750 L
Fresh water	2350 L
Ice room	12 m^3
Circulating tank	11 m^3
Main engine	97 kW
Class/Survey	NSCV Class 3C

Sean Johnston



Profile of 12 m fishing vessel
(Drawing courtesy CMS)



Plan of 12 m fishing vessel
(Drawing courtesy CMS)

MATV *Sycamore* for the RAN

On Friday 28 July 2017 the Multi-Role Aviation Training Vessel (MATV) MV *Sycamore* was formally accepted by the Commonwealth of Australia and successfully entered into service with the Royal Australian Navy. This milestone was the culmination of four years' concerted effort by a truly dedicated team which saw the project deliver on-time and on-budget, and meet or exceed all functional requirements.

Sycamore is unique in being a commercial Special Purpose Ship providing MILSPEC Aviation Training Services to the Australian Defence Force (ADF). She is fully certified by both civilian and ADF regulators. This achievement is significant, as it is first within Australia and possibly in the world. The outcome was achieved due to the flexibility of thought and pragmatism exhibited by all parties involved during the design, build and test phases.

Sycamore was designed by Damen in The Netherlands, and built by its partner shipyard 189 in Hai Phong, Northern Vietnam. The parent design was Damen's DN2000 offshore patrol vessel. During the acquisition, DMS Maritime provided project management as well as design-and-build supervision. The vessel was built and is maintained under survey by Lloyds Register, with Australia being the Flag State, administered by AMSA.

Sycamore is a Royal Australian Navy helicopter training platform supporting the Fleet Air Arm at HMAS *Albatross* in Nowra, NSW, and other Defence helicopter operators. MATV primary operations will normally be carried out along the east Australian coast in the East Australian Exercise Area (EAXA) with occasional deployments as far north as the Townsville exercise areas and south to the Melbourne or Adelaide exercise areas. MATV primary activities include (a) helicopter pilot training; (b) flight-deck crew training; and (c) aircraft control training. ADF helicopters typically operating to and from the vessel will be the MRH-90, MH-60R and EC135. The MATV home port is currently HMAS *Waterhen* in Sydney.

Sycamore during sea trials
(Photo courtesy Damen)

Sycamore arriving in Sydney for the first time
(Photo courtesy Damen)

Sycamore is an ocean-going vessel, capable of day/night/NVG continuous operations, in up to Sea State 5 for 14 days. The MATV has power to achieve a maximum speed of over 17 kn @100% MCR in Sea State 4, with an operating range of over 4400 n miles @ 85% MCR in Sea State 4.

Sycamore is operated by the commercial vessel operator, Teekay Shipping (Australia). ADF personnel will be embarked to conduct all aviation training activities and may be embarked for any other Fleet Marine Services Activities (typically officer sea-familiarisation training, mine-warfare support, practice weapon recovery, and consort duties).

Sycamore's name pays homage to the first British-designed helicopter to fly and serve with the Royal Australian Air Force, being the Bristol Type 171 Sycamore. Seven Type 171s served in the Fleet Air Arm between 1953 and 1965, and saw active service in search-and-rescue and anti-submarine warfare roles.

Principal particulars of *Sycamore* are

Length OA	93.94 m
Beam	14.40 m
Draft	3.64 m
Displacement	2654 t (including 425 t deadweight)
Gross tonnage	3541
Complement	Commercial crew 22 RAN Special Personnel 71 +RAN SP day only 20
Fuel oil	354 000 L
Fresh Water	139 000 L
Main engines	2×CAT 3616C
Gearboxes	2×Reintjes LAF
Propulsion	2×2.8 m 4 blade CPP with loiter capability
Bow thruster	1.3 m diameter 4 blade FPP 400 kW
Stabilisation	2×non-retractable hydraulic active-fin stabilisers
Generator	4× with auto synchronisation and paralleling 1×emergency generator
Speed (maximum)	17+ kn @ 100% MCR in Sea State 4
Range (economical)	4400+ n miles @ 85% MCR in Sea State 4
Endurance	14 days with full complement
Statutory	SOLAS Special Purpose Ship
Flag State	Australia Australian Maritime Safety Authority
Classification	Lloyd's Register Hull ✠100A1 IWS ECO (GW IHM OW P), WDL (5 t/m^2 flight deck) Machinery ✠LMC UMS NAV1 Descriptive AIR, Shipright (SERS), Training Vessel SoC (N+V/DP) CAC 3 Cargo/DP (CM)

Alex Robbins
MATV Engineering Manager

Hydrus from Incat Crowther

Incat Crowther has announced that *Hydrus*, the first in a series of 400 passenger catamaran ferries for the Water and Emergency Transportation Authority (WETA) in San Francisco, has been completed and has entered service. Built by Vigor in Seattle, Washington, *Hydrus* is the first of this new class of vessel, with additional ferries to follow.

"In the spring of 2015, Vigor began construction on the first of two WETA ferries in this class" said Tim Kolb, General Manager of Vigor Ballard. "It's an efficient design and very environmentally friendly".

Following trials of the first vessel, two additional vessels were ordered by WETA. "The four Vigor vessels will play critical roles in maintaining service reliability in WETA's planned expansion of the ferry service on San Francisco Bay" said Nina Rannells, WETA Executive Director.

Hydrus is powered by a pair of MTU 12V4000M64 EPA III main engines, each producing 1453 kW. One of the earliest passenger vessels to enter service with advanced exhaust after-treatment, the system ensures that *Hydrus* complies with the latest US emissions regulations and is one of the lowest-emission ferries currently operating in North America. Incat Crowther worked with suppliers to create an efficient layout for the system which minimises noise ingress to the cabins and has minimal effect on passenger flow and operations.

Port side of *Hydrus*
(Photo courtesy Incat Crowther)

Hydrus has a top speed of 29 kn and a service speed of 27 kn with full load at reduced MCR. The vessel also demonstrates low wake wash characteristics.

Hydrus will be joined mid-year by a second vessel, *Cetus*, with a further two vessels due in 2018.

Principal particulars of *Hydrus* are

Length OA		41.15 m
Length WL		40.80 m
Beam OA		11.30 m
Depth		3.55 m
Draft	(hull)	1.63 m
	(propeller)	2.00 m
Passengers		328 internal
		75 external
Bicycles		58
Fuel oil		11 356 L
Fresh water		2840 L
Sullage		2840 L
Main engines		2×MTU 12V4000 M64 each 1453 kW @ 1800 rpm
Propulsion		2×5-bladed propellers
Speed	(service)	27 kn
	(maximum)	29 kn
Construction		Marine-grade aluminium
Flag		USCG Subchapter K

Hydrus in service
(Photo courtesy Incat Crowther)

Lunch Box from Incat Crowther

Incat Crowther has announced the christening of the first ferry in NYC Ferry's fleet, as a subsequent pair of vessels arrive in New York. The first vessel has been christened *Lunch Box*, following a naming competition held amongst New York school students.

Lunch Box is the first vessel in a fleet of 26 m catamaran ferries commissioned by Hornblower Cruises to form NYC Ferries, a government initiative to bring an affordable city-wide ferry network to the Big Apple. Over the coming year, the fleet will grow to some 20 vessels and the network will grow to six routes. On Manhattan, the routes will be based out of Wall Street and East 34th streets and will serve areas such as Dumbo, Rockaway, Astoria, Brooklyn and Sunset Park.

The aggressive delivery schedule required by the network is being met by two shipyards, Horizon Shipbuilding and Metal Shark. Incat Crowther is working closely with the two shipyards, having developed a design which is efficient to produce in the volumes required and in the timeframe required. New systems and communication methods were developed to allow designer and yards to share information and work collaboratively.

The vessels offer quick turn-around using the standard New York City bow-loading geometry. This allows the vessel to nose into wharves with minimal mooring. The wheelhouse of the vessel is situated immediately behind the foredeck with excellent views over the boarding area, enhancing operational safety.

Once aboard, passengers are greeted with a large, open main-deck cabin seating 119 passengers in addition to multiple wheelchair and stroller spaces. The vessel is fully accessible and ADA-compliant.

The upper deck seats 28 passengers in an open configuration, affording excellent views of the famous Hudson River and its landmarks. This deck is immediately accessible to the foredeck via forward stairs.

A concession stand will offer food and beverage service to commuters, who will also be connected by free onboard wi-fi and supported by multiple device-charging stations.

The vessel will be one of the cleanest operating in American waters, with efficient Tier 3-certified main engines, dry exhausts, and vinyl coating in lieu of toxic solvent-based paints.

Powered by a pair of Baudouin 6M26.3 main engines rated at 599 kW each, *Lunch Box* has a top speed in excess of 27 kn.

Incat Crowther is proud of its role in the development of a world-class mass transportation network.

Principal particulars of *Lunch Box* are

Length OA		26.0 m
Length WL		24.5 m
Beam OA		8.00 m
Depth		2.70 m
Draft	(hull)	1.00 m
	(propeller)	1.85 m
Passengers		150
Crew		2
Fuel oil		5680 L
Fresh water		757 L
Sullage		1900 L
Main engines		2×Baudouin 6M26.3 P3 each 599 kW @ 2100 rpm
Propulsion		2×5-bladed propellers
Generators		2×R.A. Mitchell Custom Built
Speed	(service)	25 kn
	(maximum)	27 kn
Construction		Marine-grade aluminium
Flag		United States
Class/Survey		USCG Subchapter T

Lunch Box on christening day
(Photo courtesy Incat Crowther)

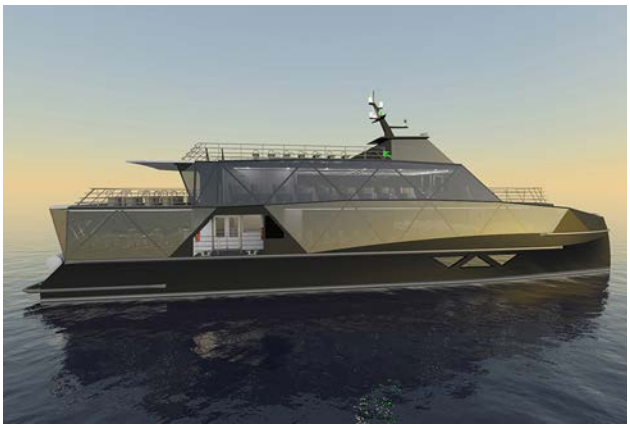
33 m Catamaran Passenger Ferry from Incat Crowther

Incat Crowther has announced that construction is underway on an innovative tour vessel to operate in Tasmania's south west. The vessel will be operated by Gordon River Cruises and will offer interpretive tours into the heart of the UNESCO Tasmanian Wilderness World Heritage Area. From the inception of the project, priority was put on delivering a superb customer experience. Incat Crowther developed a concept which utilised triangular side structure to enlarge openings and minimise vertical window posts which create obstructed viewing locations. Dark reflective floor-to-ceiling glass will provide an unparalleled viewing experience and will help the vessel 'disappear' whilst cruising on the river.

Bathrooms were moved to the hull, whilst the galley and servery areas were constrained to the centre of the vessel and aligned with areas already posing viewing obstructions, such as side structure and life-saving appliances. The main-deck side boarding areas, involving engine room ventilation and engine removal hatch, were minimised, whilst the main staircase is of open-tread type.

The main deck seats 144 economy-class passengers, with the central passenger seating mounted on a raised platform for better vision. The cabin comprises a mix of individual seats and lounge seats, some at tables, whilst others have either fold-down tables in front, or side tables.

The upper-deck cabin seats 48 first class-passengers, in seats angled to face the side windows and fitted with side tables. Casual lounge seating adjacent to a private bar, dedicated amenities and a private forward exterior deck complete the first-class experience.



Starboard side of 33 m catamaran for Gordon River Cruises
(Image courtesy Incat Crowther)

Port bow of 33 m catamaran for Gordon River Cruises
(Image courtesy Incat Crowther)

The vessel will provide optimal efficiency at a cruise speed of 25 kn across Macquarie Harbour and clean, very low wash running at 6 kn along the Gordon River.

Principal particulars of the new vessel are

Length OA		33.8 m
Length WL		33.3 m
Beam OA		9.00 m
Depth		3.25 m
Draft	(hull)	1.20 m
	(propellers)	1.60 m
Passengers		192
Crew		8
Fuel oil		8000 L
Fresh water		3000 L
Sullage		3000 L
Main engines		2×MTU 10V2000M72 each 749 kW @ 2250 rpm
Propulsion		2×fixed-pitch propellers
Generators		2×Kohler 175EFOZDJ each 175 ekW
Speed	(service)	25 kn
	(maximum)	25 kn
Construction		Marine-grade aluminium
Flag		Australia
Class/Survey		NSCV Class 1D

Upper-deck lounge seating for first-class passengers on 33 m catamaran for Gordon River Cruises (Image courtesy Incat Crowther)

Main deck galley and servery on 33 m catamaran for Gordon River Cruises (Image courtesy Incat Crowther)

Mary D Seven from Incat Crowther

Incat Crowther has announced the delivery of *Mary D Seven*, a 36 m monohull passenger ferry developed for Mary D Cruises in New Caledonia. Offering a very high-end passenger experience, *Mary D Seven* couples Incat Crowther's monohull and passenger-vessel design expertise. Built by Strategic Marine, the vessel will operate with yacht-like style on the route between Noumea and Amedee Island during the day, and as a dinner-cruise vessel in the evenings, returning greater utilisation of the asset.

Main deck seating on 33 m catamaran for Gordon River Cruises (Image courtesy Incat Crowther)

Upper-deck window seating for first-class passengers on 33 m catamaran for Gordon River Cruises (Image courtesy Incat Crowther)

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. An area of the main deck doubles as luggage storage by day and dance floor by night.

Upstairs, a semi-enclosed passenger area seats 88 passengers with a dedicated bar.

The vessel has a high-end finish including artificial teak flooring, extensive use of polished stainless steel, and a 'yacht like' appearance.

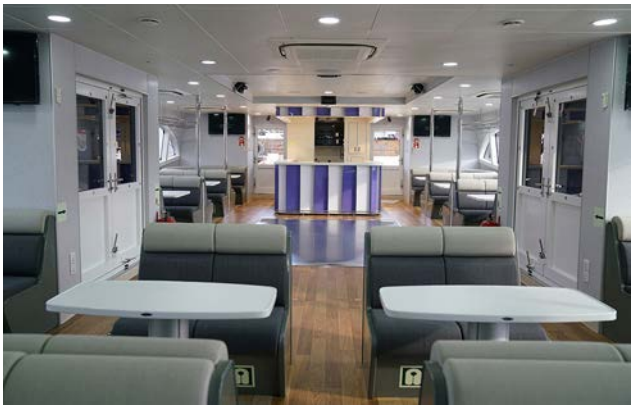
Additional operational features include a dedicated rubbish storage-and-removal system and fold-out landing ramps to meet with the operator's existing infrastructure. The vessel is fitted with cargo fuel and water tanks because it doubles as the supply vessel for Amedee Island.

The vessel is powered by two MTU 16V2000 M61 main engines with a rating of only 800 kW for a service speed of 19.9 kn. Electrical power is supplied by multiple Caterpillar C4.4 generators for redundancy, fitted in sound enclosures. The vessel is classed by BV and complies with local French flag rules.

Principal particulars of *Mary D Seven* are

Length OA	38.40 m
Length WL	34.39 m
Beam OA	8.12 m
Depth	3.25 m
Draft	1.40 m
Passengers	196
Crew	8
Fuel oil	5000 L (day)
	9425 L (cargo/delivery)
Fresh water	1250 L (day)
	3750 L (cargo)
Sullage	1300 L
Main engines	2×MTU 16V2000 M61
	each 800 kW @ 1800 rpm
Propulsion	Fixed-pitch propellers
Generators	3×Caterpillar C4.4
	each 96 ekW
Speed (service)	19.9 kn
Construction	Marine-grade aluminium
Flag	France
Class/Survey	Bureau Veritas 1 Hull Mach
	Passenger Vessel Coastal Waters

Starboard bow of *Mary D Seven*
(Image courtesy Incat Crowther)



Main-deck cabin on *Mary D Seven*
(Photo courtesy Incat Crowther)

SeaStar 11 from Incat Crowther

Incat Crowther has announced the launch of *SeaStar 11*, a 50 m catamaran passenger ferry for South Korean operator Seaspovill. The vessel will join the operator's existing fleet running from the mainland ports of Donghae and Gangneung to the island of Ulleung-do, a renowned destination for outdoor activities such as hiking

Dance floor on *Mary D Seven*
(Photo courtesy Incat Crowther)

Incat Crowther worked with Seaspovill to develop the design of the vessel, offering the operator many advantages over an off-the-shelf production design. Incat Crowther 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 lower fuel burn. Structural weight 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.

SeaStar 11's primary boarding location will be the midship doors, which are fitted with hinged ramps operated by electric winches. From here, passengers 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 is accommodated on the main deck.

SeaStar 11 on launching day
(Photo courtesy Incat Crowther)

The upper deck seats 96 passengers, plus 8 passengers in a VIP cabin. A crew room is located adjacent to the elevated wheelhouse, whilst an additional two toilets are located aft.

Below decks, the engine rooms are laid out in a clean, accessible manner and feature removal hatches over each engine with overhead obstacles eliminated.

Powered by four MTU 16V2000 M72 main engines, each producing 1440 kW and driving KaMeWa 56A3 waterjets, *SeaStar 11* is 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.

Principal particulars of *SeaStar 11* are

Length OA		49.9 m
Length WL		47.7 m
Beam OA		11.5 m
Depth		3.90 m
Draft (hull)		1.30 m
Passengers		450
Crew		6
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 waterjets
Generators		2×CAT C4.4
Speed	(service)	33 kn
	(maximum)	40 kn
Construction		Marine-grade aluminium
Flag		Republic of Korea
Class/Survey		DNV GL 1A1 HSLC Passengers R2 E0 IMO HSC Passenger Category A

Majestic Dream from Incat Crowther

Incat Crowther has announced that Majestic Ferries' Incat Crowther-designed fleet continues to grow with the delivery of *Majestic Dream*, the first of a new class of fuel-efficient 39 m HSC-compliant passenger vessels. Majestic Ferries operates vessels between Singapore and Batam in a competitive marketplace. The operator worked with Incat Crowther to develop a cost-effective vessel which offers comfort, performance and fuel consumption superior to that of the competition. This process saw the construction of a trio of 33 m vessels; *Majestic 7, Majestic 8* and *Majestic 9*.

Since introducing the catamaran service, Majestic Ferries has grown its market share, validating the development effort and triggering the commissioning of additional vessels to a larger design.

Majestic Dream is the first of these higher-capacity vessels. With an extra 1.5 m beam and 6 m more length, *Majestic Dream* increases passenger capacity to 317. In a similar configuration to the 33 m vessels, *Majestic Dream* features toilets aft and midship boarding doors and adjacent luggage storage, with all passengers on a single deck. *Majestic Dream* also adds a pair of VIP rooms featuring private accommodation in larger seats.

Fitted with larger MTU 16V2000 M72 main engines, *Majestic Dream* achieved a loaded speed of 32 kn on trials and cruises at a speed of 28 kn at less than 85% MCR. The vessel is fully compliant with the HCS Code.

Majestic Dream will be joined by a sister ship later in 2017, with further vessels under construction.

Principal particulars of *Majestic Dream* are

Length OA		39.0 m
Length WL		38.7 m
Beam OA		10.0 m
Depth		3.25 m
Draft	(hull)	1.16 m
	(propellers)	2.03 m
Passengers		317
Crew		8
Fuel oil		7 000 L
Fresh water		2000 L
Sullage		1000 L
Main engines		2×MTU 16V2000 M72 each 1440 kW @ 2250 rpm
Propulsion		2×propellers
Generators		2×CAT C4.4 ACERT each 995 ekW 50 Hz
Speed	(service)	28 kn
	(maximum)	32 kn
Construction		Marine-grade aluminium
Flag		Singapore
Class/Survey		BV 1 Hull Mach Passenger vessel Coastal waters

Stewart Marler

Seating on *Majestic Dream*
(Photo courtesy Incat Crowther)

Bridge on *Majestic Dream*
(Photo courtesy Incat Crowther)

Majestic Dream on trials
(Photo courtesy Incat Crowther)

Hydrodynamics of High-Performance Marine Vessels

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1. Introduction

High-speed vessels are typically characterised by having slender or thin hulls. The reason for this is that the wave resistance is relatively lower for such hullforms and it is important to minimise, as much as possible, the wave resistance, which is a significant component of the resistance budget for these vessels.

The other significant resistance component is the frictional resistance. The frictional resistance can be minimised by selecting a hull cross section for which the local beam is approximately twice the local draft. This choice leads to sections which are essentially semicircular; this is the ideal hydrodynamic choice because it minimizes the wetted surface.

The total resistance of the vessel is essentially the sum of the wave resistance and the frictional resistance. Minimising this sum requires a compromise between separately minimising these two primary resistance components, because the wave-resistance requirement dictates that the vessel should be long and slender, while the frictional-resistance requirement dictates that the vessel should be short.

Radical improvements in hydrodynamic performance and considerable freedom of design for the naval architect are provided by choosing a non-traditional hullform, such as a catamaran or a trimaran. Such vessels have different characteristics in their curves of resistance versus speed. However, these vessels can be analysed by the same idealized thin-ship theory—with some straightforward modifications—as that developed by Michell (1898).

The invention of the air-cushion vehicle, or hovercraft, has also radically altered the paradigm of the traditional marine vessel. The almost total elimination of frictional resistance means that the question of trade-off between the two main contributions to the total resistance no longer applies. Furthermore, the distribution of the weight of the vessel over a large area of the free surface of the water leads to a reduced wave resistance.

The surface-effect ship can be considered to be a compromise between an air-cushion vehicle and a catamaran, in that most of its weight is supported by the air cushion and a small proportion of its weight is supported by the two sidehulls. This vessel requires less power to sustain the air cushion because there is no air leakage at its sides. Furthermore, the sidehulls provide for better coursekeeping—at the expense of some additional frictional resistance.

Because the level of pressure within the air cushion is relatively low, both the air-cushion vehicle and the surface-effect ship can be analysed by theories which can be considered to be modifications of the method of Michell (1898).

The data collected by Ritter and Templeman (1998) has been plotted in Figure 1. This is the speed in knots of different types of advanced marine vessels plotted as a function of the displacement in tonnes. It is curious that the speeds range between about 35 and 90 knots, with no discernible effect of vessel size. This is despite the accepted formulation of the International Maritime Organization (IMO), which indicates that the speed of a high-speed vessel should be proportional to the one-sixth power of its displacement. The IMO definition appears as the straight line in Figure 1, which is presented on a doubly-logarithmic basis.

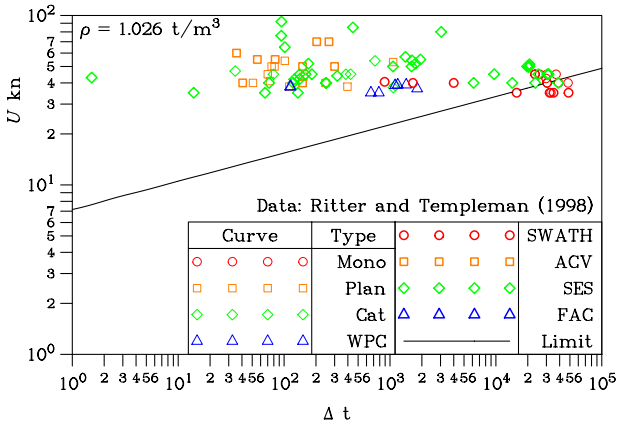

Figure 1 Scatterplot of high-speed vessels
(Image courtesy Lawry Doctors)

2. Examples

Figure 2 provides illustrations of some modern high-speed vessels. These are all Australian designs, with the exception of the last example, which is Russian. A slender monohull, designed by WaveMaster International, is the motor vessel *Super Flyte*, which carried passengers from Perth to Rottnest Island in Western Australia. It is depicted in Figure 2(a). A number of this vessel class was built.

Figure 2(a) WaveMaster International's *Super Flyte*
(Photo courtesy Boat Torque Cruises)

An example of a catamaran with very slender hulls is the RiverCat *Dawn Fraser*, conceived by Grahame Parker Design, and shown in Figure 2(b). Seven of these vessels operate on the Parramatta River leading into Sydney Harbour. The demihulls of this vessel are notable in that their beam is 1.0 m and their length is 30 m. With such an extreme aspect ratio, this catamaran is significant in that the wave generation is minimal. The minimisation of the wave

generation was the chief goal in the development of this concept. It was described more fully by Doctors, Renilson, Parker and Hornsby (1991).

Figure 2(b) Grahame Parker Design's RiverCat *Dawn Fraser*
(Photo courtesy Lawrence Doctors)

An early and relatively large powered trimaran is *Triumphant*, designed by One2three Naval Architects. A photograph appears in Figure 2(c). This vessel was renamed *Dolphin Ulsan* and now operates between Kitakyushu, Japan, and Ulsan, South Korea. A central feature in the design process of this trimaran was the sizing and the location, both longitudinally and transversely, of the two small sidehulls. Considering the discussion above with respect to the optimal hydrodynamic proportions of a monohull, it generally transpires that such a monohull is so slender that it is laterally unstable. Thus the problem can be corrected through the addition of a pair of very small sidehulls. Consequently, well-proportioned trimarans are frequently referred to as stabilised monohulls.

Figure 2(c) One2three Naval Architects' trimaran *Triumphant*
(Photo courtesy One2three Naval Architects)

Figure 2(d) is *Pioneer 3.1*, designed and constructed by AirLift Hovercraft in Alberton, Queensland. This air-cushion vehicle can carry 25 passengers or up to 2.5 tonnes of payload. It is powered by a single diesel engine positioned near the stern, between the pair of ducted propellers which are driven directly from the engine. The engine also drives a hydraulic pump which supplies a matching hydraulic motor connected to the pair of contra-rotating ducted lift fans located in the bow.

Figure 2(d) AirLift Hovercraft's *Pioneer 3.1*
(Photo courtesy Airlift Hovercraft)

Lastly, Figure 2(e) is a photograph of the Zarnitsa/Zarya-class surface-effect ship designed by the Uritsky Ship-Repair Yard in Astrakhan. It is depicted here operating near the Kalinsky River Station in Tver, Russia. This vessel is characterised by its relatively high length-to-beam ratio and its very low draft, enabling it to operate in shallow water and even to partly beach itself on a riverbank.

Figure 2(e) Uritsky Ship-Repair Yard's Zarnitsa/Zarya-class
(Photo courtesy RIA Novosti)

3. Monohulls

An example of the application of thin-ship theory applied to a monohull is presented in Figure 3. Most modern high-speed monohulls are fitted with transom sterns, which ventilate at sufficiently-high forward speeds. The computer software models the hull of the vessel, together with the hollow in the water behind the transom, as a single extended hydrodynamic disturbance. The typical panelling of the hull is illustrated in Figure 3(a). Typically, one only needs 60 panels longitudinally and 20 panels vertically in order to accurately represent the hull. The panels are overlapping *tent* functions which are an efficient way of modelling the surface of the hull in a continuous manner.

The particular formulation of the theory adopted for this work is based on the analysis developed by Newman and Poole (1962). Their approach allows one to incorporate the effects of finite depth of the water, as well as the influence of sidewalls of the channel. This second feature permits one to fully model a towing-tank experiment, in which the presence of the tank walls might play a significant part. Figure 3(b) is the computer representation of Australian High-Speed Monohull Series (AHSMS) Model No. 6.

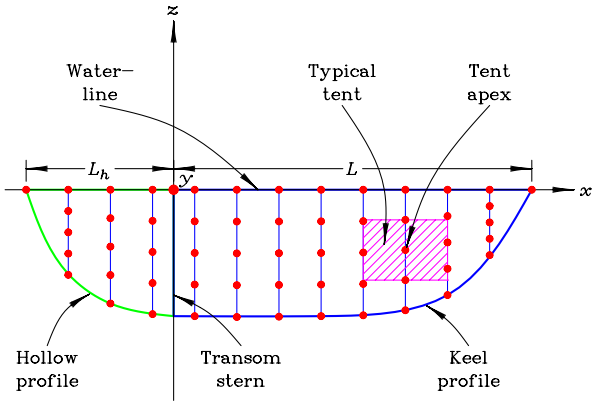

Figure 3(a) Source distribution on the centreplane
(Image courtesy Lawry Doctors)

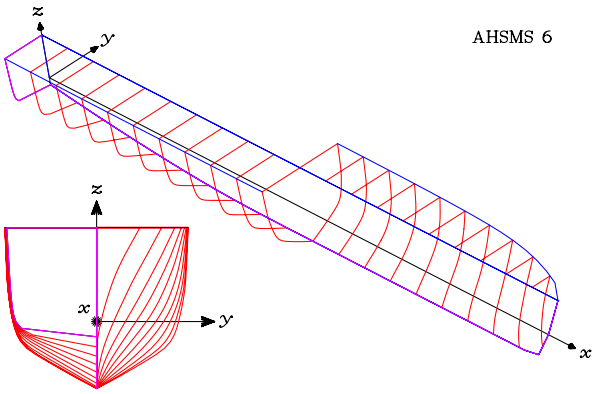

Figure 3(b) Geometry of the AHSMS Model No. 6
(Image courtesy Lawry Doctors)

Figure 3(c) shows the results of the computations and the comparison with experimental data. The theoretical resistance components are all rendered dimensionless with respect to the weight W of the vessel. The data is plotted as a function of the length-based Froude number F. The short-dashed curve is the wave resistance R_W, which is a major part of the total resistance. The next dashed curve is the hydrostatic or transom resistance R_H, this being the drag experienced by the vessel due to the lack of hydrostatic pressure acting on the face of the transom. The hydrostatic resistance is very small in this example. The next curve is the frictional resistance R_F computed by the International Towing-Tank Conference (ITTC) correlation line, described for example by Clements (1959, p.374).

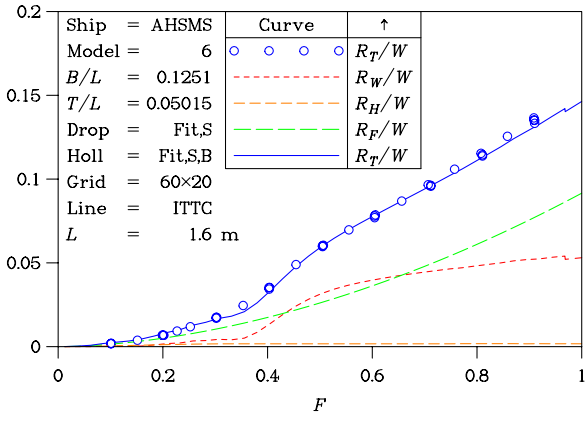

Figure 3(c) Resistance predictions for the AHSMS Model No. 6
(Image courtesy Lawry Doctors)

The last and continuous curve in Figure 3(c) is the simple sum of the three resistance components; however, a form factor of 1.20 has been applied to the frictional resistance. This theoretical total resistance correlates very closely with the experimental data for the model, which are represented by the circular symbols. The experimental data contains repeated points, which also demonstrate a high degree of consistency in the towing-tank work.

4. Catamarans

An example of the linear thin-ship theory applied to a catamaran is presented in Figure 4. The principal geometric features of a catamaran are presented in Figure 4(a). The demihull-centreplane spacing s is a fundamental characteristic of a catamaran. The subject vessel was based on the Series 64 monohulls, described by Yeh (1965). [*The Modified Series 64 hullform is identical to Series 64 below the waterline but, in lieu of tumblehome above the waterline aft, the waterline beam extends up to the deck* —Ed.] The computer representation appears in Figure 4(b).

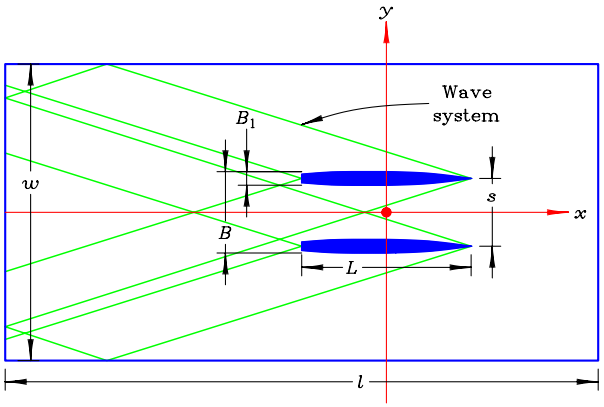

Figure 4(a) Notation for a catamaran in a towing tank
(Image courtesy Lawry Doctors)

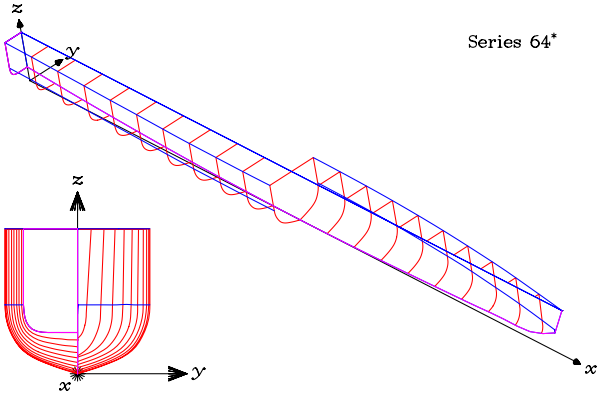

Figure 4(b) Geometry of the Modified Series 64 catamarans
(Image courtesy Lawry Doctors)

Figure 4(c) provides some results, applicable to the dimensionless demihull spacing s/L of 0.4, as noted on the plot. The wave resistance is seen to be relatively less here—in comparison with the corresponding data for the monohull in Figure 3(c). This is because the wetted surface of the catamaran is disproportionately larger, leading to a larger relative frictional resistance. The simple sum of the resistance components leads to the second-last curve, which falls somewhat short of the experimental data. However, when a form factor of 1.18 is applied to the frictional resistance, excellent agreement with the experimental data is achieved.

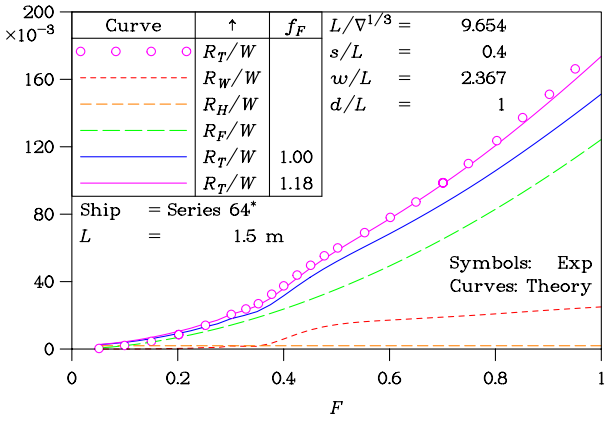

Figure 4(c) Resistance components of the Modified Series 64 (Image courtesy Lawry Doctors)

5. Trimarans

The general notation required to define the layout of a trimaran is presented in Figure 5(a). As well as the spacing between the two sidehulls, there is the additional parameter specifying their stagger [*the fore-and-aft location relative to the main hull* — Ed.]. A detailed investigation of the hydrodynamics of such a multihull was performed by Wilson and Hsu (1992). A diagram of their subject model appears in Figure 5(b). This particular model could also be designated as a small-waterplane-area design, because most of its buoyancy is derived from the torpedo-like component under the centre strut.

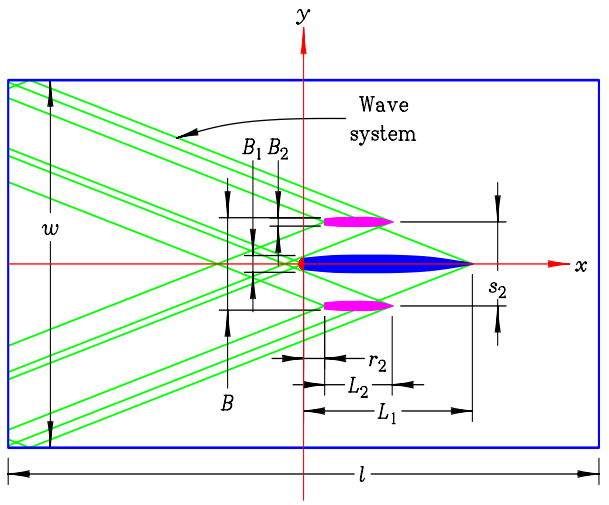

Figure 5(a) Notation for a trimaran in a towing tank (Image courtesy Lawry Doctors)

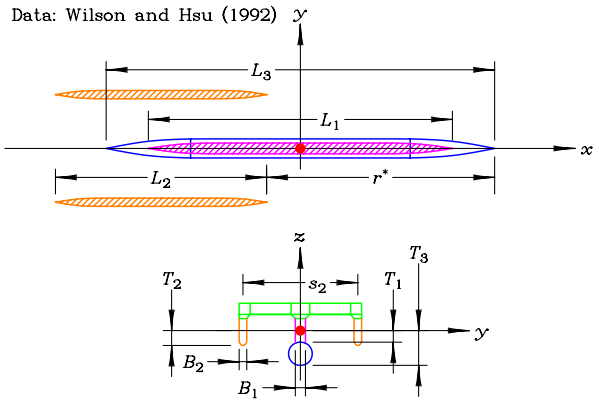

Figure 5(b) Schematic of O'Neill hullform Model 5355-2 (Image courtesy Lawry Doctors)

The theoretical wave resistance is expressed as the traditional wave-resistance coefficient in the plot of Figure 5(c). The wave-resistance coefficient is the wave resistance divided by the free-stream dynamic pressure and the static wetted surface. It is plotted as a function of the full-scale vessel speed. The towing-tank model was tested with three different values of the setback r^* of the sidehulls (the negative of the stagger). The results suggest an excellent correlation between the theory and the experiment. This research also proves that the sidehulls should ideally be adjustable in stagger so that the vessel could be optimised for the required operational speed.

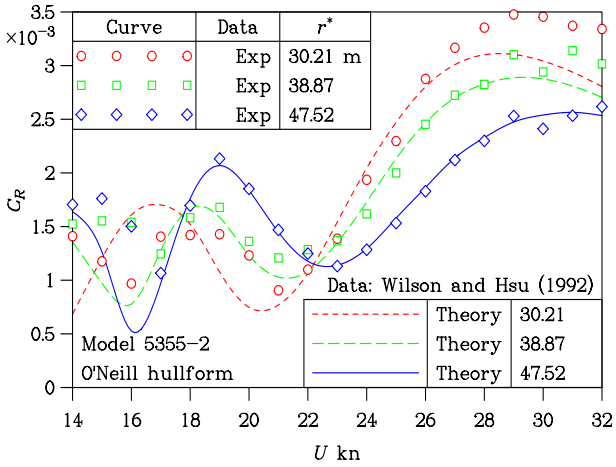

Figure 5(c) Wave resistance of O'Neill Hullform Model 5355-2 (Image courtesy Lawry Doctors)

6. Air-Cushion Vehicles

Most traditional research on the wave resistance of an air-cushion vehicle has been done on simple planform shapes, such as a rectangle or an ellipse. Two early examples of such research are those of Newman and Poole (1962) and Barratt (1965). However, it is possible to extend the analysis to include practical planforms, which generally possess a semicircular bow in front of an otherwise rectangular form. The analysis can be achieved by approximating the planform by means of a polygon with a sufficiently large number of vertices. This process is illustrated in Figure 6(a).

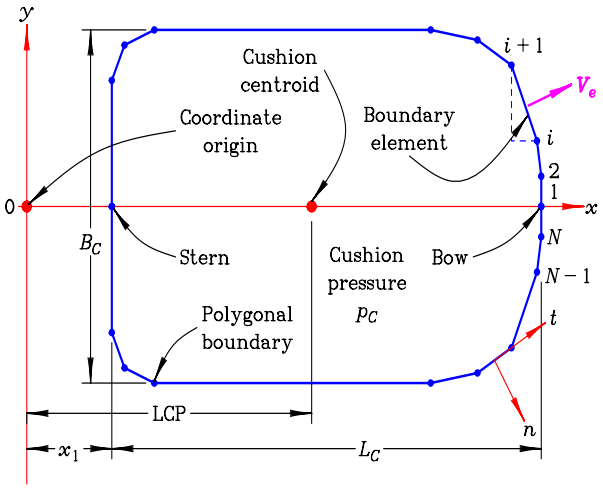

Figure 6(a) Polygonal approximations to air-cushion planform (Image courtesy Lawry Doctors)

A model of the Hovercraft Development Limited *HD.2* is shown under test in Figure 6(b). The model was fitted with a fully-functional bag-and-finger skirt. Figure 6(c) compares the theoretical wave resistance using the abovementioned methodology with the experimental data. In this example the experimental wave resistance was derived by means of an analysis of the experimentally-measured wave system generated by the model in the towing tank. This is an alternative approach to measuring the total drag on the model and then subtracting the other components of resistance—which would have to be estimated.

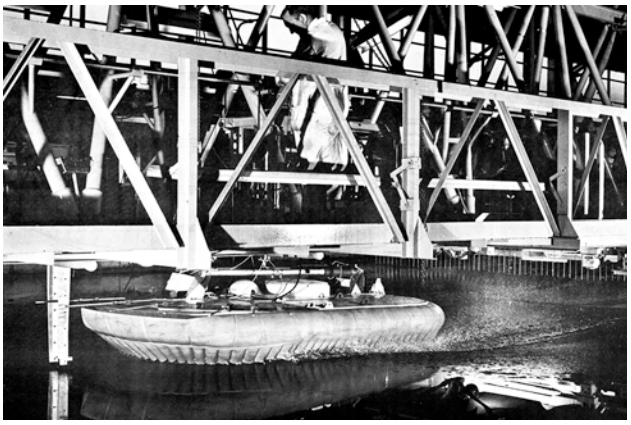

Figure 6(b) Hovercraft Development Limited *HD.2*
(Image courtesy National Physical Laboratory)

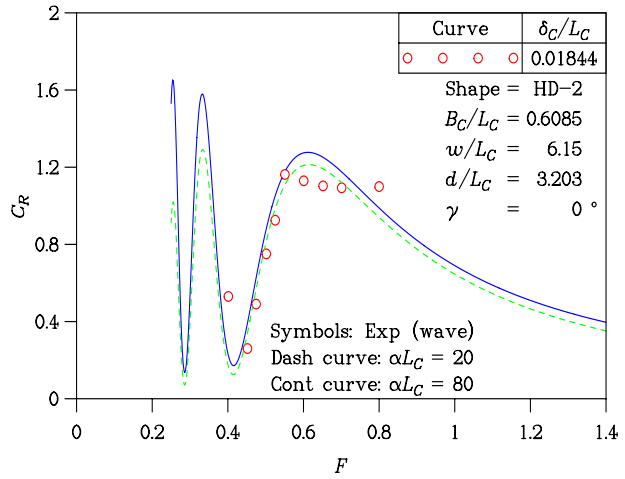

Figure 6(c) Wave Resistance of *HD.2*
(Image courtesy Lawry Doctors)

There is generally very good correlation between the theory and the experiment. Two slightly different versions of the theory have been considered in this work. That is, two values of the cushion-pressure fall-off parameters α have been employed. The use of these parameters was first described by Doctors and Sharma (1972). These model experiments were described in detail by Everest and Hogben (1969).

7. Surface-Effect Ships

The application of linearised wave-making theory is applied to a surface-effect ship in Figure 7. The basic notation is provided in Figure 7(a). The essential hydrodynamic components are an air cushion and a pair of sidehulls, yielding three sources of wave generation. The seals, one at the bow and one at the stern, present additional sources of resistance. The littoral-combat-ship concept designed by John J. McMullen Associates, Inc. of Alexandria, Virginia, is shown in Figure 7(b). This was described in detail by Doctors, Tregde, Jiang, and McKesson (2005).

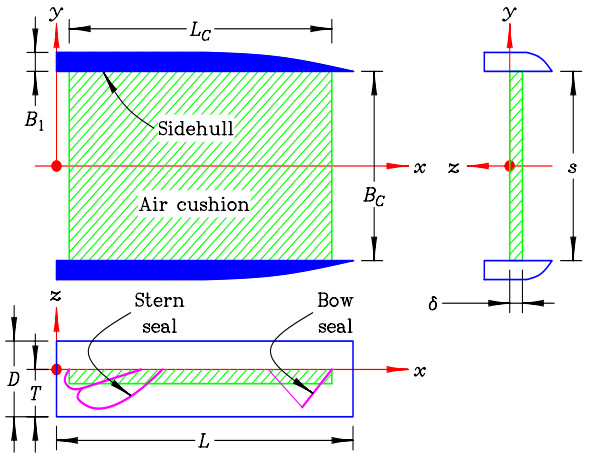

Figure 7(a) Notation for a surface-effect ship
(Image courtesy Lawry Doctors)

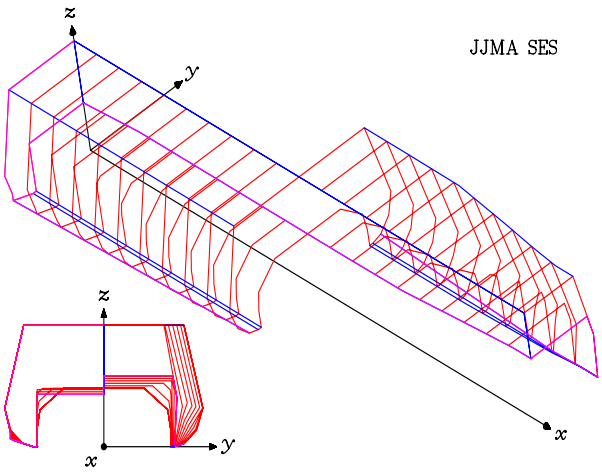

Figure 7(b) Geometry of a littoral-combat-ship concept
(Image courtesy Lawry Doctors)

Figure 7(c) shows the theoretical values of the wave resistance R_W, the hydrostatic resistance R_H and the frictional resistance R_F, plotted as a function of the Froude number F. The experimental data for the total resistance R_T is also indicated as a set of circular symbols. The remaining theoretical results are shown in Figure 7(d). These are the aerodynamic resistance R_a (quite small) and the momentum drag R_M. The latter component of resistance relates to the drag induced on the vessel by the ingestion of the air required to supply the cushion; it can be computed by means of Newton's Second Law of Motion, as it relates to the increase in momentum experienced by the air entering the cushion.

The theoretical total resistance R_T is obtained by summing the resistance components, after utilising a form factor of 1.18 on the frictional resistance. Acceptable correlation is then obtained between the theoretical and the experimental results for the post-hump speed range. However, there is clearly a shortfall in the resistance predictions at low speeds. This matter is considered in more detail in Figure 7(e), in which various idealized models of the hydrodynamic behaviour of the seals have been studied and incorporated in the prediction of resistance. The last curve in Figure 7(d) is replotted as the first curve in Figure 7(e); the seal resistance has been ignored in its calculation. Progressively more sophisticated theories have been used to analyse the seal resistance in Figure 7(e). The last (continuous) curve

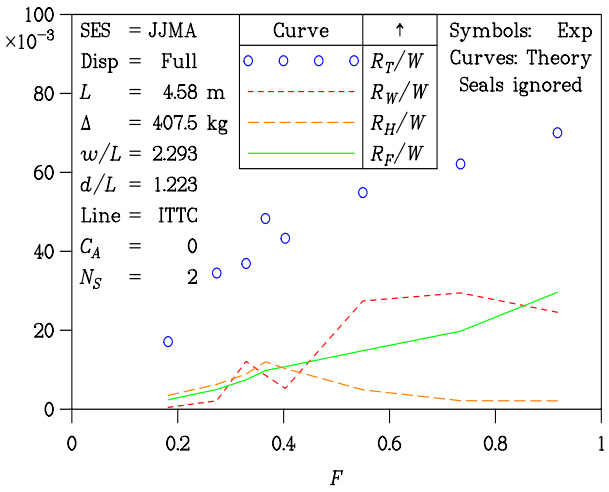

Figure 7(c) Hydrodynamic resistance components
(Image courtesy Lawry Doctors)

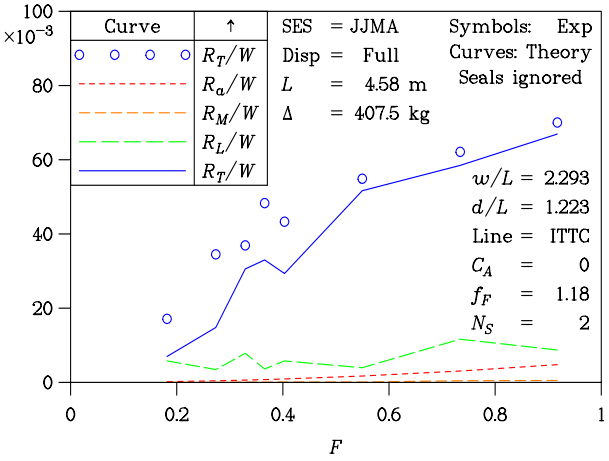

Figure 7(d) Aerodynamic resistance components
(Image courtesy Lawry Doctors)

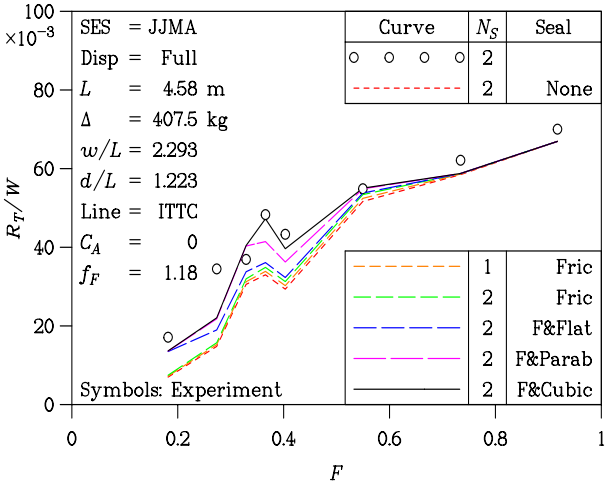

Figure 7(e) The influence of seal resistance
(Image courtesy Lawry Doctors)

accounts for the frictional resistance of both the bow and the stern seal. It also accounts for the planing-type behaviour of the bow seal, assuming that the wetted and buckled portion of the seal is cubic in form. This last computation shows much-improved correlation with the experimental data, thus providing us with confidence that an improved understanding of the nature of surface-effect-ship resistance has been developed. These points were described in more detail by Doctors and McKesson (2006).

8. Concluding Remarks

This presentation has touched on the steady-state resistance of five types of high-speed marine vessels. In addition to this basic question, linearised theory can also be applied to planing craft and to other important hydrodynamic questions. These questions include wave generation, as well as sinkage and trim.

In recent years, the difficulties of conducting reliable tests for resistance and wave generation in a towing tank in conditions approaching those of the critical speed (when the depth-based Froude number approximates unity) have been addressed and solved by using the unsteady version of the theory. The work of Doctors, Day and Clelland (2008) and Day, Clelland and Doctors (2009) demonstrated excellent agreement between unsteady theoretical predictions and carefully-made experimental measurements.

Lastly, the motions of vessels induced by wind-generated waves can also be analysed with good accuracy for engineering purposes. The work of Salvesen, Tuck and Faltinsen (1970) and Day and Doctors (1997) can be consulted here.

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EDUCATION NEWS

$25 million for Australian Universities to Work with Top US counterparts

In May the Minister for Defence Industry, the Hon. Christopher Pyne MP, announced a $25 million investment program inviting Australian universities to collaborate with some of the top universities in the United States.

"Defence will invest up to $25 million over nine years for Australian universities to leverage the existing US Multidisciplinary University Initiative (MURI) grant program, which is administered by the US Department of Defense," Minister Pyne said.

This is a part of the government's $1.6 billion investment in Defence innovation to build the innovation capabilities of Australian industry and research organisations, and to deliver innovative solutions for Defence capability.

"The new Defence innovation system, encompassing the Next Generation Technologies Fund and the Defence Innovation Hub, supports an agile, transparent approach to innovation, ensuring Australian industry is prepared to meet Defence's future capability needs", Minister Pyne said.

The funding is being provided under the Next Generation Technologies Fund. The Australian program, called AUSMURI, will provide grants to support multi-disciplinary teams of Australian university researchers who collaborate with US academic colleagues on high-priority projects for future defence capabilities.

"I strongly encourage universities to apply for AUSMURI funding and take advantage of the opportunity to undertake joint research on cutting-edge technologies for defence," Minister Pyne said.

Until recently, Australian universities could collaborate on US MURI projects but were not eligible for grant funds.

Eligible universities which are successful in a collaborative US MURI submission will receive an AUSMURI grant of up to $1 million per year for three years to support their research in Australia.

At the end of the three years, the AUSMURI grant may be extended for a further two years based on performance and prospects, with an additional budget of up to $1 million per year.

"The AUSMURI program will build Australian expertise, capacity and networks in critical technology areas to give Defence a capability edge," Minister Pyne said.

For further details about AUSMURI program guidelines visit www.business.gov.au/ausmuri.

RINA Prize for AMC Researcher

A paper on underwater robots operating near submarines has been recognised by the Royal Institution of Naval Architects as the best internationally by a researcher under the age of 30.

Australian Maritime College researcher Dr Zhi Leong was awarded the W. H. C. Nicholas Prize for the best paper published in the RINA *Transactions* in 2016.

"I feel very honoured to be recognised for this work, which was the final paper of my PhD," Dr Leong said.

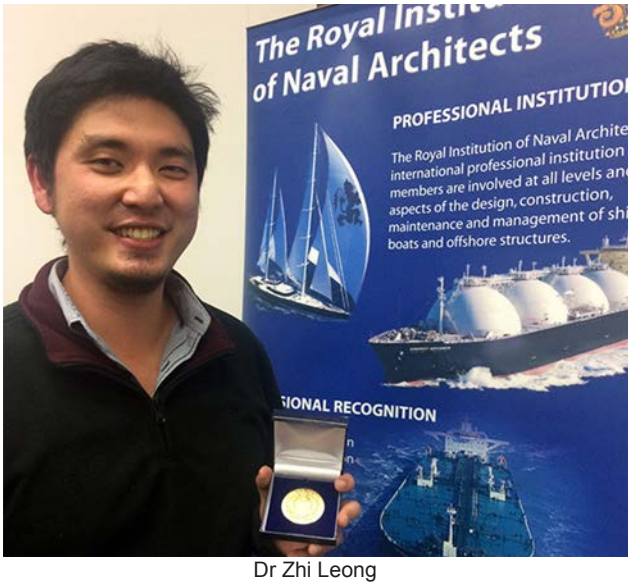
"RINA is *the* international institution for naval architecture, and my paper was selected from submissions from all around the world, which is very humbling."

"Research is all about the team, and I'd like to thank my supervisors, Prof. Dev Ranmuthugala, A/Prof. Irene Penesis and Dr Hung Nguyen."

Dr Leong's findings could help underwater robots — autonomous underwater vehicles (AUVs) — operate safely alongside much larger moving submarines.

Hydrodynamic interaction can adversely affect the AUV's ability to manoeuvre, threatening safe AUV-submarine inter-operations and potentially causing collisions.

Understanding and minimising the effects of hydrodynamic interaction is important for defence organisations as they increasingly adopt AUV technology to assist with their submarine operations.



Dr Zhi Leong
(Photo courtesy AMC)

Prof. Martin Renilson, President, RINA Australian Division, presented Dr Leong with his prize during a ceremony held at the Australian Maritime College in June.

Prof. Renilson said that the quality of Dr Leong's research would have far-reaching benefits for the safe operation of the vessels.

"Dr Leong's paper was highly regarded by the peer reviewers. His work is not only of a high standard, but it is significant because of the increased use of unmanned underwater vehicles operating in conjunction with submarines.

"An understanding of the hydrodynamic interaction between them and the mother submarine is essential for their safe and effective operation.

Dr Leong is now a post-doctoral researcher at the Australian Maritime College, where he's researching the hydrodynamics of underwater vessels.

UNSW Sydney

Undergraduate News

Prize-giving Ceremony

At the prize-giving ceremony on 19 June, the following prizes were awarded in naval architecture:

The Royal Institution of Naval Architects (New South Wales Section) Prize 1 for the best performance by a student in Year 1 of the naval architecture degree program to Gianluca Viluce.

The Royal Institution of Naval Architects (New South Wales Section) Prize 2 for the best performance by a student in Year 2 of the naval architecture degree program to Edward Hawkins.

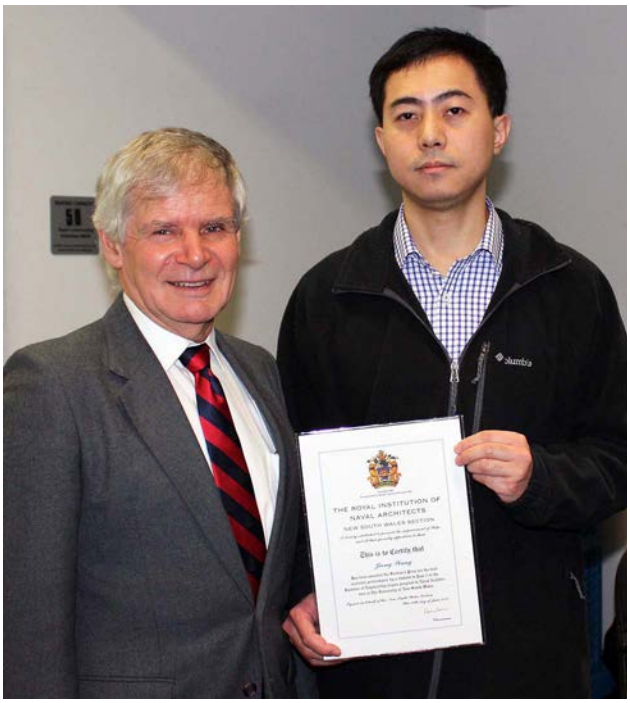
The Royal Institution of Naval Architects (New South Wales Section) Prize 3 for the best performance by a student in Year 3 of the naval architecture degree program to Jiong Wang.

The Royal Institution of Naval Architects (Australian Division) Prize for the best ship design project by a student in the final year to Geoffrey McCarey for his design of a 40 m aluminium ferry carrying 285 passengers and operating out of Port Douglas to the outer Great Barrier Reef. This prize was presented by Craig Boulton, Treasurer of RINA (Australian Division).

The David Carment Memorial Prize and Medal for the best overall performance by a student in the final year to Bing Zheng Ho. Bing is currently a Combat Officer in the Royal Singapore Navy and was unable to attend the ceremony, so his award has been posted to him.

Congratulations to all on their fine performances.

Edward Hawkins with the RINA (NSW) Prize 2
(Photo courtesy Diane Augee)



Jiong Wang (R) accepting the RINA (NSW) Prize 3 from Phil Helmore
(Photo courtesy Diane Augee)

Graduation

At the graduation ceremony on 22 June, Samual Free and Andrew Hoff graduated with degrees in naval architecture.

Graduates Employed

Our 2017 graduates are now employed as follows:

Samuel Free Certificate II in Maritime Operations (Coxswain Grade 1 Near Coastal) at North Coast TAFE, Ballina

Andrew Hoff Evaluating opportunities

Geoffrey McCarey (C) accepting the RINA (Australian Division) Prize and Medal from Craig Boulton (R) and Acting Head of School, A/Prof. Con Doolan
(Photo courtesy Diane Augee)

Phil Helmore (R) accepting the David Carment Memorial Prize and Medal on behalf of Bing Zheng Ho from Acting Head of School, A/Prof. Con Doolan
(Photo courtesy Diane Augee)

Samuel Free, Phil Helmore and Andrew Hoff at UNSW Graduation Ceremony on 22 June
(Photo courtesy Trish Hoff)

Student Visits to Industry

The Year 3 students in NAVL3610 Ship Hydrostatics and Practice have continued the usual industry visits accompanied by David Lyons and Phil Helmore:

On 10 May we visited Lloyd's Register at their new offices in North Sydney. Paul O'Connor and Joanna Mycroft

gave the students an introduction to ship classification with a short history of LR, an overview of classification society operations in general, and then the details of ship classification; how, where and why it is done. The students were introduced to design appraisal, construction surveys; special, docking and continuous surveys, to the relationship between the IMO, flag states and classification societies, and to Rules for Special Service Craft. They were all impressed with the overall coverage of classification, and the highlighting of various aspects by talking about particular vessels and problems encountered (and photos of them) brought it all to life. The videos of the Clarke and Dawe commentary on the bow of *Kirki* falling off and the theory of the sinking of *Derbyshire* were particularly impressive.

On 24 May we visited One2three Naval Architects on board the 34 m Manly fast catamaran ferry *Ocean Surfer,* berthed at the Sydney Fish Markets at Blackwattle Bay. *Ocean Surfer* is one of the two 34 m 375 passenger vessels designed for Manly Fast Ferries by One2three and built by Incat Tasmania in Hobart. Rob Tulk, Senior Naval Architect at One2three, and Steve Quigley, Managing Director of One2three, gave the students a presentation on the vessels which they design, some of the problems, how they go about solving them, and some of the skills required in a graduate naval architect. They followed this with a tour of the vessel, visiting the bridge, passenger cabins, engine room, void spaces and fore and aft decks, pointing out features, structure and design points.

Thesis Topics

Among the interesting undergraduate thesis projects newly under way is the following:

Investigation of Historic Vessel Merimbula

The Illawarra and South Coast Steam Navigation Company serviced the ports on the Illawarra and south coast of NSW for many years. There is interest in these ports in building models of the ISCSNCo vessels. TSS *Merimbula* was built by the Ailsa Shipbuilding Co. in Troon, Scotland, and launched in 1909. She was the largest vessel ever ordered by the company, having a length of 209' 6" (63.86 m). She ran successfully until 27 March 1928 when, in worsening weather on a voyage south, she ran aground on Abraham's Bosom at Beecroft Head. The loss of *Merimbula* marked the termination of the ISCSNCo.'s passenger services, and after 1928 they confined their activities to cargo services. *Merimbula* is a gazetted Historic Shipwreck, under Section 5 of the Commonwealth Historic Shipwrecks Act 1976.

Brett Ryall is searching the literature for information on the vessel, to find as many details as possible and to write up some of the history. Some drawings have been obtained from Glasgow University, including a general arrangement drawing and a midship section but, unfortunately, no lines plan. The Museum of Applied Arts and Sciences has the builder's model of the vessel, and Brett has visited the museum and lifted several sections of the vessel to help put together a lines plan in Maxsurf, aided by the general arrangement and section drawings.

Rob Tulk discussing naval architecture with the students
(Photo courtesy David Lyons)

Ocean Surfer berthed at the Sydney Fish Markets
(Photo Phil Helmore)

The investigation will then proceed with a mass estimate, and an investigation of the stability, and comparison with modern stability criteria (stability criteria were almost non-existent in her heyday!) and checking resistance and seakeeping.

Phil Helmore

INDUSTRY NEWS

'Team Damen' Unites Dutch and Australian Industry

Australian Maritime Systems Group (ASMG) is entering into a joint venture with one of Europe's leading marine technology companies as part of a tender for Australia's next giant defence contract. The Brisbane-based company is partnering with Dutch firm Alewijnse Marine to support the Damen Group's bid to build the next generation of 12 Offshore Patrol Vessels (OPVs) for the Royal Australian Navy. The vessels will be mainly constructed in Adelaide and Perth, but AMSG's involvement would generate highly-skilled and long-term electrical engineering jobs for the Queensland-based company.

AMSG Managing Director, John Sugarman, said that the company had been impressed by the extent of Damen's engagement with Australian industry—as well as that of its long-established partners. "Damen's commitment to collaboration and knowledge-sharing with Australian firms like ours is truly outstanding," Mr Sugarman said. "But we haven't just been impressed by Damen. It has many partners in the Netherlands with whom it has forged strong relationships over many decades, such as Alewijnse. Damen has built more than 250 ships with Alewijnse and that track record proves that teamwork and knowledge-sharing are central to its culture. The formation of our joint venture with Alewijnse demonstrates the close and co-operative relationships the Damen Group and its trusted partners will build Down Under."

Under the joint venture, Alewijnse Marine and AMSG Defence would collaborate on the design and integration of the OPVs' electrical systems. Knowledge transfer between the companies would begin with Vessel One and be completed during construction of Vessel Five. Alewijnse has pledged to maximise Australian employment opportunities and the transfer of technology and intellectual property. The company is also committed to establishing an Australian training centre and to co-operating with Australian universities and research institutes.

Damen Asia-Pacific Director, Roland Briene, said that the company spoke with more than 800 business contacts at local industry briefings in Brisbane, Melbourne, Perth and Adelaide earlier this year, and that relationships with some 50 Australian firms were further developed during follow-up visits to Perth, Adelaide and Sydney earlier this month.

"The joint venture between AMSG and Alewijnse is a prime example of the relationships we want to grow in Australia," Mr Briene said. "We are committed to creating long-term naval and commercial shipbuilding capacity here. Fostering enduring relationships and knowledge transfers—not just procuring local components—are key to achieving that long-term goal. We're also keen to work with leading companies across the whole of Australia, and not just those based in South Australia and Western Australia."

AMSG is a specialised communications system contractor supporting the RAN's Anzac-class frigate navigation radars. The Damen Group has also forged strong links with the RAN through construction of its new Multi-Role Aviation Training Vessel, MV *Sycamore*, in which Alewijnse is also a key project partner. Damen is also building the Commonwealth's new $500 million Antarctic Supply Research Vessel.

MarineLink, 1 August 2017

Austal and ASC Shipbuilding Join Forces

On 8 June Austal and ASC Shipbuilding announced a teaming agreement for the construction of the SEA5000 future frigates.

Under this arrangement, ASC Shipbuilding and Austal will act as one in support of the program, pooling their complementary strengths, skills and experience.

"The Austal/ASC Shipbuilding teaming arrangement offers a compelling, low risk, Australian shipbuilding solution for each of the three shortlisted international designers; BAE, Fincantieri and Navantia," Austal CEO, David Singleton, said.

"ASC Shipbuilding and Austal represent the success and excellence in Australia's sovereign naval shipbuilding capability, a capability established through years of investment and experience in developing an Australian skilled workforce", Mr Singleton said.

"This partnership will bring Austal's unparalleled record in aluminium shipbuilding, exports and operational efficiency to combine with ASC Shipbuilding's expertise in steel warship manufacturing," he said.

"We are exceptionally proud of Austal's export heritage, a record that has seen us sell more than 255 ships to 100 customers in 44 countries, including the United States.

"The opportunity to work with ASC Shipbuilding to bring Australia's shipbuilding industry into an export-competitive position is a game-changing announcement and something we are both very excited about", Mr Singleton said.

ASC Shipbuilding CEO, Mark Lamarre, said that the company and its 1100 skilled and experienced shipbuilders in Osborne, South Australia, were a national asset which had proved in recent years its ability to deliver major naval warships, as shipbuilder for the Air Warfare Destroyer Alliance.

"This is a powerful partnership which not only achieves the Government's objectives for a sovereign and sustainable shipbuilding capability in Australia, as set out in the recent Naval Shipbuilding Plan, but confirms to all those in the industry that there is a bright and successful future ahead", Mr Lamarre said.

"Australia deserves an industry that designs, builds, upgrades, maintains and exports naval vessels in Australia, by Australians working for Australian companies which are also headquartered and have ultimate decision making authority in Australia.

"This agreement delivers on that objective. With our combined strengths, we will deliver the best capability for the Australian Navy and, for the first time ever, we will be on track to building a truly sovereign and sustainable shipbuilding capability for decades to come", Mr Lamarre concluded.

Austal's Naval Design Team passes the Century

In May Austal welcomed the Minister for Employment, Senator the Hon. Michaelia Cash, to a ceremony recognising the company's milestone of employing over 100 people in its naval design team.

Minister Cash toured Austal's Henderson facilities to see first-hand how Austal is contributing to Australian capability in the shipbuilding industry, especially with respect to exports.

Austal's Chief Executive Officer, David Singleton, said that the company is realising its commitment to make Australia a world leader in shipbuilding design and construction.

"Austal is delivering a national industry, led by an internationally-competitive, successful Australian shipbuilder who can deliver customised detailed designs completed by Australians in Australia," Mr Singleton said.

"Our increasing design capability — the largest in Australia — will offer more opportunities in Australia for the local workforce and for our Australian suppliers," he said.

Minister Cash with David Singleton, CEO, Gordon Blaauw, Head of Design, and Abby Krause, the 100th designer, with Austal's design team
(Photo courtesy Austal)

Austal Opens Cairns Office

On 10 July Austal officially opened its vessel sustainment office in Cairns. The new Cairns sustainment facilities will employ nearly 30 people to support the Austal-built Cape-class fleet for the Australian Border Force, the Royal Australian Navy and the future Pacific Patrol Boats (PPB) which Austal is currently building for the Australian Government.

Austal's Vice President Defence, Davyd Thomas AO CSC, who was in Cairns to meet with staff and to host supplier-engagement forums for the company's bid for the $3 billion Offshore Patrol Vessel (OPV) program, said that the opening of the Cairns office marked the next big step for Austal's national expansion.

"Austal is Australia's largest defence exporter and we are continuing to grow our operations in Australia and overseas," Mr Thomas said.

"Cairns and Darwin are the two most important naval bases in northern Australia. They provide essential sustainment support for Australia's naval maritime requirements, including support for the offshore patrol vessels in the future.

"Given our sustainment program on the Cape-class fleet and upcoming work on the PPB support, it makes sense for Austal to establish a more prominent and permanent base in Cairns.

"Our skilled local team will provide the highest quality service to the Royal Australian Navy, the Australian Border Force and, eventually, the 12 Pacific Island nations who will use the PPB fleet.

"As the last of ten Cape-class Patrol Boats have been delivered and we are underway on constructing the first of the Pacific patrol boats, it is important that we continue to build our team and our local supply chain here in Cairns." Mr Thomas said.

Australian Involvement in Defence Projects

On 29 June the Minister for Defence Industry, the Hon. Christopher Pyne MP, announced changes which will strengthen the requirement for Australian involvement in Defence projects.

"We are changing the process which companies undergo when responding to tenders for defence equipment," Minister Pyne said.

"The Australian Industry Capability Plan Template has been strengthened in line with Government's defence industry policy of maximising Australian industry involvement in meeting Australia's defence capability goals, creating thousands of long-term jobs across the country and economic growth.

"This new template demands more than ever before from defence companies, driving them to outline how and where they will involve Australian industry, before we will even consider their bid".

The changes have been made to explicitly address:

- the tenderer's strategy for maximising Australian industry involvement in the project and enduring Australian industry capability benefit beyond the work period;
- maximised inclusion and evidence of having positively engaged Australian Small to Medium Enterprises and Indigenous Business Enterprises;
- proposed investment in innovation, and collaborative research and development efforts in Australia;
- establishing, transitioning or enhancing skills, knowledge, systems, technology and infrastructure within Australian industry; and
- identification and promotion of Australian defence export opportunities and as a contributor to the global supply chain.

"We have already used the new template in our Offshore Patrol Vessel and Future Frigate Requests for Tender and are now rolling it out across all relevant materiel procurements," Minister Pyne said.

"This reflects the seriousness with which this Government takes ensuring that we are maximising Australian industry involvement in our defence capability and the thousands of jobs that will flow from this commitment,"

"It is also a clear signal to overseas large contractors wishing to do business in Australia that they need to take Australian defence industry capability seriously," he said.

Minister Pyne said that this improved approach to Australian industry content is fully aligned with the *2016 Defence White Paper*, the Integrated Investment Program and the Defence Industry Policy Statement, and shows the Government's commitment to supporting Australian industry.

DCNS Changes Name to Naval Group

French state-owned shipbuilder DCNS announced recently that it was changing its name to Naval Group, for better "exposure and credibility in international markets".

"The creation of a strong, unifying brand which embodies both our heritage and our expertise will enable us to meet two major objectives: continuing to attract and retain the best and brightest talent for our workforce to ensure that we have the critical skills required to maintain our clients' sovereignty, and to increase our international reach and win new markets in an extremely competitive landscape*,"* Naval Group CEO Hervé Guillou said.

The company said that the name Naval Group clarified both who they were and their mission.

Naval Group Communications Director, Claire Allanche, said "Simple, international and comprehensible in all languages, our new name focuses on the fundamentals of our identity: the heritage of 400 years of experience, established in the 17th century and passed down from generation to generation, allowing France to become and remain a great naval power, today exporting its know-how to support the sovereign interests of its international partners at sea."

Naval Group has appointed a new executive director to work with the Commonwealth of Australia on the Australian future submarine program. Jean-Michel Billig joined Naval Group in May 2017 as special advisor to Hervé Guillou.

In his role as Naval Group's Executive Director, Jean-Michel Billig will be responsible for working with the Commonwealth of Australia and Lockheed Martin Australia (the combat system integrator) in finalising all the contractual and industrial provisions. Meanwhile, the Australian and American teams continue to settle into Cherbourg to commence the future submarine design studies

Billig earlier served as CEO of Zodiac Seats and member of the Executive Committee of Zodiac Aerospace. Between 2012 and 2015, he joined Renault Group (Renault, Dacia, Samsung) as Executive Vice President Engineering and Quality and was a member of the executive committee. Prior to that, he spent most of his career in the EADS Group, now known as Airbus. From 2009 to 2012, he was responsible for the technical management of Eurocopter, which later became Airbus Helicopters, and was a member of the executive committee. In 2007, he was appointed Director of Systems Engineering at Airbus. Previously, and over a period of five years from 2003 to 2007, he was appointed director at Airbus Military on behalf of France for the European A400M multipurpose military transport aircraft program. Jean-Michel started his career in 1988 at the then Aerospatiale (now Airbus Group) in several project-management functions, working on programs such as the Franco-German Tigre attack helicopter.

Naval Infrastructure Head Announced

In June the Government appointed David Knox as interim Managing Director and Chief Executive Officer of Australian Naval Infrastructure Pty Ltd (ANI) for three months from 13 June 2017.

In October 2016, the Government announced the separation of ASC to deliver a more flexible approach to managing the investment required in shipbuilding infrastructure to support the Government's continuous shipbuilding program.

In March, the Government established ANI, which will facilitate the development and construction of new

infrastructure at the Osborne shipbuilding facility as outlined in the Naval Shipbuilding Plan released on 16 May 2017.

Mr Knox has more than 30 years' experience in the global oil and gas industry and will bring significant skills and experience to ANI as it begins its operations.

He is the former Managing Director and Chief Executive Officer of Santos and holds executive positions including Director of the CSIRO.

Australia's Future Submarine Project opens French Office

Australia's Future Submarine project officially opened an office in Cherbourg, France, in a ceremony attended by Australian Prime Minister Malcolm Turnbull on 9 July.

The office is a tripartite secure facility which will house submarine designers, naval architects and engineers who will work alongside each other on Australia's Future Submarine Program.

The facility will be known as 'Hughes House', in recognition of RADM 'Oscar' Hughes AO RAN, and his role in Australia's submarine history as Director of the Collins Submarine Project.

"Today marks an important and tangible milestone for the program as the facility allows all three partners to work together in a modern and highly-secure environment to further enhance and develop the already-close partnership," said Hervé Guillou, Chief Executive Officer and Chairman, Naval Group.

More than 50 Australians will join Naval Group and Lockheed Martin Australia employees to progress the work of developing a mature design of the future submarine.

Agreement reached on Common User Facility

In May the Commonwealth Government announced that it had secured the purchase of the Common User Facility and surrounding land at Osborne from the South Australian Government for $230 million to substantially increase the size of the ship and submarine building facility there.

The facility will now be fully owned and operated by the Federal Government and is an important part of getting the infrastructure up and ready to cut steel on the Offshore Patrol Vessels next year.

Defence Industry Minister, the Hon. Christopher Pyne MP, said that the Federal Government was pleased to work with the South Australian Government to deliver this important outcome for the state.

"The Government is committed to delivering its $89 billion naval shipbuilding program on time and on budget in order to deliver the jobs and economic growth to South Australia as soon as possible," Minister Pyne said.

"The purchase of the Common User Facility and associated parcels of land at Osborne is an important step in delivering on our commitments to naval shipbuilding."

"As part of the deal, the State Government has promised to provide assistance to the Commonwealth to progress the development of the shipyards at Osborne. This assistance includes items such as assisting with relevant approvals, providing utilities and services, road, rail and emergency services access, and stamp-duty relief," he said.

The Finance Minister, Senator the Hon. Mathias Cormann, said that the deal was an important part of setting the organisational foundation for the program.

"The acquisition of land and facilities at Osborne marks the successful completion of the first stage of the structural separation of the ASC," Minister Cormann said.

"This is a critical step in the Government delivering on its commitment to an historic, $89 billion continuous naval shipbuilding program in Australia," he said.

Austal Welcomes the Naval Shipbuilding Plan

Austal has welcomed the release of the Government's Naval Shipbuilding Plan. The plan builds on the Government's commitment in the 2016 Defence White Paper to local shipbuilding and outlines the plan to deliver an Australian sovereign shipbuilding and sustainment industry.

This plan identifies enormous sustainment opportunities for the Henderson Precinct in Western Australia in line with the projects announced for the Osborne Hub, both of which will provide long-term jobs and sustainable export opportunities

"The Government's plan to deliver a national shipbuilding industry perfectly complements Austal's ambitions to make Australia a design and construction centre for the sector," Austal's Chief Executive Officer, David Singleton, said "We are already a major partner for the Government in the naval shipbuilding endeavour, having delivered all offshore patrol vessels for the Border Force and the Navy since 1998," Mr. Singleton said.

"Australia is already the global leader in shipbuilding for aluminum and dominates the fast-ferry market. There is no reason that we cannot have similar success with naval exports and steel ships" he said.

"Austal has always been export focused, it has underpinned this company for the last 30 years and it is what we will do if successful in the offshore patrol vessel and frigate programs.

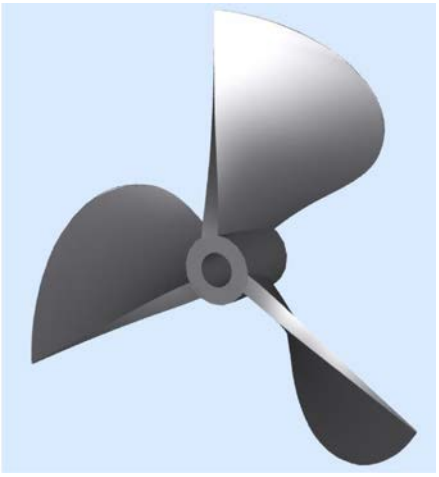
"Our increasing design capability — the largest in Australia — will continue to deliver more opportunities in Australia for our local workforce and for our Australian suppliers," Mr Singleton said.

HydroComp PropCad® 2017 Released

HydroComp PropCad is the industry-standard software for geometric modeling of marine propellers for design and manufacture. This tool provides automatic preparation of 2D design drawings, 3D offsets, thickness classification reports, and CAD/CAM data. Manufacturers, researchers and designers rely on PropCad for their modeling needs. The tool is widely used in over 40 countries for quickly generating propellers and design variants, from small outboard production lines to large merchant ship propellers. The 2017 release of PropCad includes new features for weedless, cleaver, and surface-piercing style propellers, updated classification society thickness rules, improved CAD/CAM export, and a greater control of edge radius conditions.

Blending of Blade Trailing Edge to Hub Face

A new option has been introduced to modify the trailing edge offsets in order to progressively blend the trailing edge surface smoothly into the hub. For many surface-piercing and weedless propellers, this transition is important for performance, and critical for manufacturing. The special treatment of this trailing edge surface was previously done manually — a very painstaking, time-consuming, and complex process. PropCad's "Blend TE to hub face" option will save time and frustration and ensures that the resulting surface is mathematically smooth.



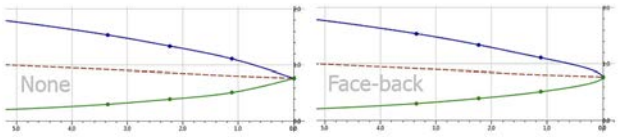
Cleaver-style propeller with trailing edge progressively blended into the aft hub face
(Image courtesy HydroComp)

Classification Society Thickness Rules

PropCad features a number of Classification Society blade-thickness calculations and strength rules which dictate the required root, edge, and tip thickness. With the 2017 addition of the Indian Register of Shipping classification thickness rules, PropCad now supports nine of the most popular classification societies. Each society includes rules for fixed-pitch and controllable-pitch propellers — however, many of the societies also include special rules for highly-skewed blades, naval-classed vessels, and ice-classed propellers.

Improved edge radius treatment

There are also several improvements for defining the edge radius. Users can now select edge radius options for "Entered" section offsets, allowing them to set the proper spline tangency and greatly improve the smoothness of the edges.



Demonstration of improved edge radius treatment for "Entered" sections
(Image courtesy HydroComp)

Export all blades

The CAD/CAM exports have been updated with the option to export a single blade or all the blades. This option is particularly useful for the IGES export, and gives the user the choice between minimal file-size (single blade) or a more complete representation of the propeller (multiple blades).

For more information visit hydrocompinc.com.

Wärtsilä HY Hybrid Power Module

The technology group Wärtsilä has announced the introduction of a unique hybrid product, the Wärtsilä HY, representing an unprecedented innovation in marine propulsion systems. By leveraging its technical strengths in both engine design and electrical and automation (E&A) systems, Wärtsilä is launching a fully-integrated hybrid power module combining engines, an energy storage system, and power electronics optimised to work together through a newly-developed energy-management system (EMS). It is the marine sector's first hybrid power module of this type produced, thereby establishing a new industry benchmark in marine hybrid propulsion.

There is a notable trend in the marine sector towards hybrid propulsion solutions, which are anticipated to represent a significant percentage of all contracted ships within the coming ten years. The new EMS represents the latest-generation integrated control system, and has been specifically designed for this application. It creates an outstanding means of interaction with the ship's onboard systems.

The Wärtsilä HY will provide a wide range of customer benefits through increased operational efficiency and flexibility, resulting in lower fuel consumption, reduced emissions, and improved vessel performance. When operating in 'Green Mode', zero emissions can be achieved. Smokeless operation is also achievable at all load points and in all operating modes, thanks to a new patent pending automation procedure. Furthermore, the reduction in engine operating hours lowers maintenance requirements and extends the intervals between overhauls. The Wärtsilä HY ensures that the overall vessel performance is greatly improved compared to operating on conventional machinery solutions or hybrid solutions, while the higher level of redundancy promotes increased safety. Other benefits include instantaneous load acceptance with rapid response to step-load changes, entire system certification and guaranteed performance.

Maritime classification society Lloyds Register (LR) has issued an Approval in Principle certificate for the Wärtsilä HY. The certificate is based on technical material and safety analyses concerning normal operation of the system and a presentation of risk scenarios. In effect, it means that the system design as examined can be expected to be granted full approval by classes for actual projects.

LR's Marine & Offshore Director, Nick Brown, commented "LR is proud to issue an Approval in Principle certificate to the Wärtsilä HY hybrid power module. LR, like Wärtsilä, is committed to tackling the big challenges facing the industry, especially those environmental challenges related to carbon emissions. LR is focused on supporting the safe and effective introduction of new technologies offering potential solutions, and Hybrid technology is one of those."

The Wärtsilä HY will have dedicated versions for each category of vessels. While the first versions being made available will be designed for tugs and medium-sized ferries, Wärtsilä also sees big potential in other types of vessels as well.

The Wärtsilä HY is a fully integrated hybrid power module in a diesel-mechanical configuration.

BRITAIN'S NEW CARRIER ON TRIALS

Launched on 17 July 2014, the future HMS *Queen Elizabeth* left Rosyth Dockyard in Scotland on 26 June 2017 for sea trials. At 70 600 t full load displacement, the 280 m long carrier and her sister ship HMS *Prince of Wales* are the largest ships ever built for the Royal Navy. Despite her size, the complement of HMS *Queen Elizabeth* will be a relatively modest 679, made possible by the maximum use of automation throughout the ship
(Photo MOD Crown Copyright)

On 8 August *Queen Elizabeth* took a break from her trials to join the USS *George H W Bush* battle group engaged in exercise Saxon Warrior. Other ships in the photograph are USS *Donald Cook*, USS *Philippine Sea*, HMS *Iron Duke*, HMS *Westminster* and KNM *Helge Ingstad*
(Photo MOD Crown Copyright)

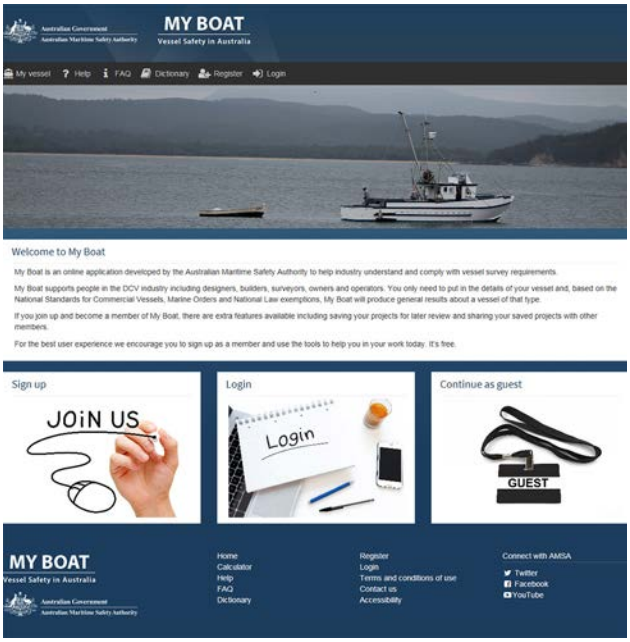
AMSA's *My Boat* makes Standards Accessible

In a world with an increasing focus on safety, the designers, builders and operators of commercial vessels must comply with strict regulations, but AMSA's online My Boat application means building a new boat to the right standards doesn't need to be complicated.

Australia's National System for Domestic Commercial Vessels captures a broad range of commercial vessels, ranging from rowing dinghies up to large passenger, fishing and trading ships. To cater for this broad scope, the regulatory scheme has the flexibility to provide for a wide range of vessel types.

AMSA believes that regulations should be streamlined and simple to understand. We hope the My Boat application will provide easy access and clarity for everyone in the industry.

The home page is at https://apps.amsa.gov.au/myboat.



Home page of AMSA's My Boat
(Image courtesy AMSA)

My Boat is designed around the idea that standards should be accessible to anyone and that you shouldn't need a degree to navigate them. Developed in-house by AMSA, the application asks users to input the details of a planned new vessel and then uses these to identify the applicable standards.

We believe that this is the first online application of its kind in the world for our industry, but we have taken inspiration from other online government services such as MyTax. Just as you don't need to read the Income Tax Assessment Act 1997 to lodge your tax return, boat builders and operators shouldn't need to carry around the Marine Safety (Domestic Commercial Vessel) National Law Act 2012 to check the safety standards for a vessel.

Of course, an online application will never replace the expert advice of a naval architect, but My Boat does give boaties the ability to self-check when it comes to commercial safety standards.

My Boat has been available for public use since August 2016 and has received more than 47 000 page views. These visits have been primarily from Australian users, but we've seen overseas site visits too, including from the UK, US and New Zealand. We're pleased to see this potential for boat builders and designers from around the world to access Australian standards using My Boat.

Version 1.0 of the application was largely designed around helping users understand equipment requirements and provided outputs from:

- Parts of the Machinery Section (NSCV Part C Subsection 5A);
  - Bilge pump requirements; and
  - Simple shaft calculations;
- Safety Equipment (NSCV Part C Subsection 7A);
- Communication equipment (NSCV Part C Subsection 7B);
- Navigation equipment (NSCV Part C Subsection 7C);
- Fast Craft (NSCV Part Subsections F1A, F1B and F1C);
- Navigation lights (Col Regs); and
- Restricted C (Exemption 40).

Following on from the success of this release, AMSA is now looking to expand the application to cover more sections of the standards. Version 2.0 is in development and will add further guidance to cover:

- Leisure craft (NSCV Part F Section 2);
- Non Survey vessels (NSCV Part G);
- Anchoring (NSCV Part C Subsection 7D);
- Fire Safety (NSCV Part C Section 4);
- Accommodation, Arrangement and Personal Safety (NSCV Part C Section 1);
- Intact Stability (NSCV Part C Subsection 6A);
- Damaged stability (NSCV Part C Subsection 6B); and
- Watertight and weathertight integrity (NSCV Part C Section 2)

AMSA is committed to simple, accessible standards and customer-centric digital services, and we want My Boat to evolve with feedback from users. We encourage you to give the app a try and get in touch with any suggestions for improvement. You can email us in the Vessel Safety Unit at my.boat@amsa.gov.au.

Rob Maher
Principal Naval Architect
AMSA Vessel Safety Unit

LR Australia Services for Certification of Non-classed DCVs

With the September 2016 changes to Marine Order 503, the Australian Maritime Safety Authority (AMSA) added the option for designers and shipyards working on non-classed domestic commercial vessels (DCVs) to use the services of Recognised Organisations (ROs), i.e. classification societies. This extends from design approval and survey during

construction to periodic surveys throughout the vessel's life. The change was not widely advertised but is of significance to designers, builders and owners of locally-operated vessels in the context that some Safety Agencies are already in the process to pulling out of their duties as AMSA delegates.

After consulting with AMSA's Domestic Vessel Division, LR decided to adapt its offering to the local marine industry with the provision of a new range of competitive plan-approval and survey services specifically aimed at the Australian domestic market. During the past six months, LR's plan-appraisal naval architects and local surveyors have used their class experience to write new streamlined processes for the survey of vessels against the National Standard for Commercial vessels (NSCV).

While there is already an alternative offer available from independent AMSA-accredited surveyors, LR believes that there is a market for actors of the maritime industry wanting to show they had their vessel designed, built and maintained under the survey of LR's naval architects and surveyors for compliance with the NSCV.

With the structures part of LR's rules already being a popular deemed-to-satisfy solution for demonstrating compliance with the structural requirements of the NSCV, LR Sydney's plan-approval surveyors are best placed to provide efficient support to local designers. Their high level of knowledge and understanding of the latest versions of the rule sets should prove to be a significant advantage for designers wishing to optimise their designs by pushing the boundaries of the rules.

As a differentiator, all vessels design-appraised and surveyed during construction by LR will be provided with a specially created LR DCV plaque similar to that shown below.

For any enquiry, contact AustralianDCVsurveys@lr.org.

Pierre de Chateau Thierry
Marine Business Development Manager Australasia
Lloyd's Register International

Mark of Quality: LR's DCV Certification plaque
(Image courtesy Lloyd's Register)

IMO BWM Convention — New Implementation Dates for Ballast Water Treatment Systems

IMO's Ballast Water Management (BWM) Convention will enter into force on 8 September 2017. All applicable ships* over 400 GT are required to have Certification, confirming compliance with, as a minimum, the D-1 (i.e. ballast water exchange) requirements of the BWM Convention, prior to entry into force on 8 September 2017.

The IMO's MEPC Committee on 7 July 2017 agreed amendments to Regulation B-3 of the Convention, to implement a new schedule for the D-2 requirements (i.e. ballast water treatment). The changes supersede the implementation schedule contained within IMO Res. A.1088(28).

New Ships

The requirements are unchanged. That is, ships constructed (keel lay date) on or after 8 September 2017, to which the Convention applies*, will be required to be fitted with a ballast water treatment system at delivery.

Existing Ships

The amendments delay the treatment system mandatory installation schedule for two years after entry into force of the Convention, giving vessels 2 to 7 years from entry into force before needing to fit a treatment system, depending on their International Oil Pollution Prevention (IOPP) renewal survey dates.

Ships constructed (keel lay date) before 8 September 2017, to which the Convention applies*, are required to be fitted with a ballast water treatment system:

(1) No later than the first IOPP renewal survey on or after 8 September 2017, provided that this survey takes place on or after 8 September 2019; or that the vessel has undertaken an IOPP renewal survey on or after 8 September 2014 but prior to 8 September 2017. Putting it in simpler terms, if the completion date of the vessel's last IOPP renewal survey was between 8 Sept 2014 and 7 Sept 2017 then treatment system installation is required at the next IOPP renewal survey on or after 8 Sept 2017.

(2) No later than the second IOPP renewal survey on or after 8 September 2017, provided that the first IOPP renewal survey on or after 8 September 2017 takes place before 8 September 2019, and the vessel has not undertaken an IOPP renewal survey on or after 8 September 2014 but prior to 8 September 2017. Putting it in simpler terms, if the completion date of the last IOPP renewal survey was between 8 September 2012 and 7 September 2014, then treatment system installation is required at the second IOPP renewal survey on or after 8 September 2017.

Existing Ships (without IOPP surveys)

Ships constructed (keel lay date) before 8 September 2017, to which the BWM Convention applies*, which are not subject to Marpol Annex I surveys (i.e. oil tankers <150 GT, and other ships <400 GT), a ballast water treatment system is required to be fitted to vessels from the date decided by the Administration, but not later than 8 September 2024.

* Please note that 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;
- warships, naval auxiliary or other ships owned or operated by a state (although states are encouraged to adopt appropriate measures to ensure that the ships act in a manner consistent with the Convention); or
- permanent ballast water in sealed tanks on ships, which is not subject to discharge.

Lloyd's Register, *Class News,* No. 16/2017

MEMBERSHIP

Australian Division Council

The Council of the Australian Division of RINA met on the evening of Wednesday 7 June 2017 by teleconference under the chairmanship of the President, Prof. Martin Renilson in Launceston.

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

New Council Members

The President welcomed Walid Amin, David Gonzalez Pastor and Gordon MacDonald to their first meeting.

Survey of Members Expectations

Following completion of the survey earlier in the year, Council considered the outcomes and members' input and established a Committee headed by the President to develop proposals of actions in response to the survey. By the time of writing, members will have received an invitation from the Chief Executive to participate in a similar Institution-wide survey which was developed taking account of the Division's survey results — members are urged to respond.

AMSA Liaison

Council considered a proposal by the Chief Executive of AMSA for a number of actions to promote closer consultation between the Division and AMSA in relation to matters relating to AMSA's activities both nationally (domestic vessels) and internationally (IMO). An AMSA Liaison Committee convened by the President was established to further consider these matters.

Naval Shipbuilding College

The attention of Council was drawn to the announcement in March by the Minister for Defence Industry, the Hon. Christopher Pyne MP of the establishment of this College as part of the Naval Shipbuilding Plan.

Council confirmed the desirability for the vocational courses offered by the College to be structured and accredited by the Institution in accordance with the provisions of the Dublin and Sydney Accords and undertook to develop a "white paper" on the subject for forwarding to the Minister's office.

Division's Representatives on Standards Australia Committees

Council agreed to appoint David Gonzalez Pastor and Mark Devereaux as its representatives on Committees ME059 (Shipbuilding) and CS114 (Small Pleasure Boats) respectively.

London Council Meeting on 19 April 2017

The main matters of significance at London Council related to the first meetings of the Maritime Safety, Maritime Environment and Maritime Innovation Committees in implementing the Institution's new technical committee structure.

Next Meeting of Council

The Council tentatively agreed to its next meeting being held on Wednesday 13 September 2017.

Rob Gehling
Secretary

Continuing Professional Development

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

Continuing Professional Development will therefore enable the member to:

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

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

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

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

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

RINA Council and Committee Members

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

Australian Division Council

President	Martin Renilson
Vice-president	Jesse Millar
Secretary	Rob Gehling
Treasurer	Craig Boulton
Members nominated by Sections	
	Tom Dearling (ACT)
	Mark Deveraux (Qld)
	Sue-Ellen Jahshan (NSW)
	Kalevi Savolainen (WA)
	Karl Slater (Vic)
	TBA (SA&NT)
	Michael Woodward (Tas)

Members elected or appointed by Council
Walid Amin
Jim Black
Gerard Engel
David Gonzales Pastor
Gordon MacDonald
Jesse Millar
Matthew Williamson

AMSA Liaison Committee

Chair	Martin Renilson
Members	Walid Amin
	Craig Boulton
	Tom Dearling
	Mark Devereaux

Membership Follow-up Survey Committee

Chair	Martin Renilson
Members	Walid Amin
	Gordon MacDonald
	Jesse Millar
	Karl Slater

ACT Section

Chair	Tom Dearling
Deputy Chair	Ray Duggan
Secretary	Jason Steward
Assistant Secretary	John Colquhoun
Treasurer	Caitlin Hoey
Nominee to ADC	Tom Dearling
Members	Martin Grimm
	Peter Hayes
	Ian Laverock
	Warren Smith

NSW Section

Chair	Valerio Corniani
Deputy Chair	Nathan Gale
Secretary	Anne Simpson
Assistant Secretary	Nathan Gale
Treasurer	Adrian Broadbent
Nominee to ADC	Sue-Ellen Jahshan
Auditor	Sue-Ellen Jahshan
TM Coordinator	Phil Helmore
Members	Craig Boulton
	Rob Tulk

Queensland Section

Chair	Tommy Ericson
Deputy Chair	Peter Holmes
Secretary	Hamish Lyons
Treasurer	James Stephen
Nominee to ADC	Mark Devereaux
Members	Misha Merzliakov
	Tom Pipon
	Adam Podlezanski
	Tim Vaughan

South Australia and Northern Territory Section

In recess

Tasmanian Section

Chair	Mark Symes
Secretary	Gregor Macfarlane
Treasurer	Jonathan Duffy
Nominee to ADC	Michael Woodward
TM Cooordinator	Jonathan Binns
Members	Daniel Clayton (student)
	Lauchlan Clarke
	Ashleigh Harris
	Nigel Hay-Smith
	Nick Johnson
	Henk Kortekaas
	Alan Muir
	Konny Zurcher

Victorian Section

Chair	Siobhan Giles
Secretary	Owen Tregenza
Treasurer	Trevor Dove
Nominee to ADC	Karl Slater
Social Media Manager	Sam Hunnibel
Members	Riley Graham
	James Nolan

Western Australian Section

Chair	Yuriy Drobyshevski
Deputy Chair	Nick Bentley
Secretary	Dimitrije Radukanovic
Treasurer	Andrew Phillips
Nominee to ADC	Kalevi Savolainen
Member	Tim Gourlay
	Matthew White

International Journal of Small Craft Technology

Editor	Martin Renilson
Editorial Board Member	Phil Helmore

The Australian Naval Architect

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

Walter Atkinson Award Committee

Chair	Kim Klaka
Members	Alan Muir
	Karl Slater

RINA London

Board of Trustees	Rob Gehling
Council Members	Martin Renilson (*ex officio*)
	Rob Gehling
Maritime Safety Committee	
	Robin Gehling
	Doug Matchett
High-speed Vessels Group	
	Tony Armstrong

RINA/Engineers Australia Joint Board of Naval Architecture

Chair	Jim Black
Members	Rob Gehling

National Engineering Register Naval Architecture Competency Panel

In recess

Standards Australia Committee CS114 (Small Pleasure Boats)

Member	Mark Devereaux

Standards Australia Committee ME059 (Shipbuilding)

Member	David Gonzalez Pastor

Pacific 2017 IMC Organising Committee

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

Pacific 2017 IMC Papers Committee

Chair	Adrian Broadbent
Members	Craig Boulton
	Robin Gehling
	Ganga Prusty
	Martin Renilson
	Karl Slater
	Jason Steward
	Tauhid Rahman (representing IMarEST)

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		ausdiv@rina.org.uk
Section	ACT	rinaact@gmail.com
	NSW	rinansw@gmail.com
	Qld	hamish@oceanicdesign.com.au
	SA/NT	danielle.hodge@defence.gov.au
	Tas	gregorm@amc.edu.au
	Vic	sgiles@bmtdt.com.au
	WA	wa@rina.org.uk

Phil Helmore

VALE

Thomas Boddy

It is with sadness that *The ANA* records the passing of Thomas Andrew Stuart Boddy on 4 June 2017 from complications suffered following a recent surgery. Tom was born in Sydney on 22 March 1967, the youngest of four children, to proud and loving parents, Valma and Thomas. He always had a love of, and showed great potential with, drawing and mathematics even as a young child.

Tom commenced his career in January 1986 as a draftsman in the Shipbuilding and Ship Refit/Repair Design Drawing Office at Cockatoo Island Dockyard. During his time there he was involved in various drawing and design projects, including those on HMA Ships *Success, Parramatta* and *Stuart*. His time there also saw him complete training on the AUSTCAD/CADAM computer-aided drafting/design and manufacturing system.

In March 1988 he moved to the Ship Drawing Office, Section B, at Garden Island which specialised in guided-missile destroyers, destroyer escorts, auxiliary ships and small craft. Here he worked on the preparation of refit and repair packages for ship structures and systems for the Fremantle-class patrol boats, and HMA Ships *Swan* and *Success*.

In March 1989 he moved on to Australian Defence Industries, Naval Engineering Division, where he worked on projects including engineering investigations, preparing docking and undocking calculations, quality control inspections, tests and trials of ship systems, and ship checking of design packages, both marine engineering and naval architecture.

Then in March 1989 he commenced studying part-time for his Bachelor of Engineering degree in Mechanical Engineering at the University of Technology Sydney. At ADI during this time, he worked on emergency refit packages for HMA Ships *Hobart*, B*risbane*, A*delaide*, C*anberra*, and S*ydney* for possible future deployments. He graduated with his degree in Mechanical Engineering in 1995.

In March 1996 he commenced studying part-time for his Bachelor of Engineering degree in Naval Architecture at

Thomas Boddy
(Photo courtesy Rosalie Reid)

the University of New South Wales (now UNSW Sydney). He continued through to 2003, but discontinued for some years due to health problems and not being able to continue work and study simultaneously. He returned to UNSW in 2012, and graduated with his degree in Naval Architecture with honours in 2014, a very proud day following his brother William who graduated with the same two degrees!

In April 1995 he transferred to ADI Design Engineers Research and Development Special Projects Group, where he worked on HMAS *Westralia* and, for HMAS *Success*, prepared the design drawings for the diesel generator space

ventilation, deck strengthening under the main deck (port and starboard), checked the CIWS Structural drawings and design, and handled many other projects.

In October 1997 he transferred to the ADI Submarine Certification Group and acted as Manager for Certification of submarine components and spares for refit and urgent defect (URDEF) work carried out on HMA Submarines *Otama* and *Onslow*.

In March 1998 he moved on to Sofraco Engineering Systems, where his work included many design and refit drafting packages projects for HMA Ships *Success*, *Shoalwater, Tobruk* and *Westralia*.

In February 1999 he moved on to Victory Naval Engineering, where his work included undertaking several small engineering contract packages, both marine and structural, and consulting and providing research technical material for a maritime law case.

In July 2000 he moved on to the Defence Materiel Organisation's Procurement and Contracting Branch, where his work included many projects under the Ship Repair Contract Office, including complex procurement activities for AASSPO naval ships, preparation of complex tender and contract documents relating to ship repair, acting as Commonwealth Technical Representative during negotiations, providing technical advice in relation to naval ship repair and system refit, and undertaking or participating in procurement planning, contract formation, and contract management activities while ensuring compliance with legislation and DMO procurement policies, processes and procedures.

In February 2010 he transferred to the Capability Acquisition and Sustainment Group's Materiel Procurement Branch, where his work included reviewing higher delegate submissions for Endorsements to Proceed, participating in FFG's EMA as a probity advisor for CSB, participating in HMAS *Parramatta*'s SRA 05 for CSB, participating as part of the TEWG for the Disposal of 30-calibre machine guns via Aus Tendering and wrote the Tender Evaluation Plan for the disposal, undertaking complex procurement activities for all naval ships based on the east coast and providing guidance and support to the Anzac SPO and AASSPO (including HMA Ships *Tobruk*, *Success, Kanimbla,* and *Manoora*. He was still employed when he died.

Tom was a long-term member of both the Royal Institution of Naval Architects and the Society of Naval Architects and Marine Engineers.

He was very strong, mentally and physically, intuitive and loyal to his friends, family and his employers. He showed great determination throughout his life, to achieve success in whatever he aimed for.

Thomas' funeral service was held at St Stephen's Presbyterian Church at 197 Macquarie Street, Sydney, on 15 June 2017. The service was attended by many of his work colleagues past and present, friends and family. He was buried at Rookwood Cemetery, and will be sadly missed by all who knew him.

He is survived by his brother William, sisters Heather and Rosalie, and brother-in-law Robert Reid.

Rosalie Reid
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. Our first presentation to be recorded with this new system was Graham Taylor's presentation on *LNG — The New Marine Fuel?* on 1 October, and the presentation is up on the EoL website at www.engineeringonline.com/video/xjkrsdrf/lng-the-new-marine-fuel. Details of how to access this recording were given in the February 2015 issue of *The Australian Naval Architect*.

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 Auditorum. 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. We have so far made two recordings and are in the process of placing these on the web. We are learning and have ideas to improve the viewing experience.

Watch this space!

Phil Helmore

NAVAL ARCHITECTS ON THE MOVE

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

Li Chen has moved on from Incat Crowther and has taken up the position of naval architect with Austal Ships in Fremantle.

Samuel Free, a recent graduate of UNSW Sydney, has moved on from Incat Crowther and is undertaking a Certificate II in Maritime Operations (Coxswain Grade 1 Near Coastal) at the North Coast TAFE in Ballina.

Siobhan Giles has moved on from Qinetiq Australia and has taken up the position of Modelling and Simulation Engineer at BMT Design & Technology in Melbourne.

Ruth Jago has moved on from BW Offshore and has taken up the position of Turret and Mooring Manager at Petrovietnam Technical Services Corporation in Ho Chi Minh City, Vietnam.

Hamish Lyons has taken up a position as a naval architect at Oceanic Design & Survey in Coomera, Qld.

Jaime Sotelo has moved on from Beca and has taken up the position of Certification Manager on the DDG (AWD) Project with BAE Systems at Garden Island in Sydney.

Carl Vlazny has moved on from consulting and, after some time at John Butler Design, has taken up the position of NPD Product Manager with Vesco Foods in Perth. In addition to his MBA from Curtin University, Carl is undertaking a master's degree in Project Management with the University of Sydney which he expects to have completed by the end of this year.

Nigel Watson moved on from Peritus International in 2012 and, after some time at Intecsea, Satas Pacific and Viking SeaTech, is now consulting as a naval architect, engineer, analyst, developer and programmer in Perth.

Stephen Watt moved on from Heerema Marine Contractors in 2012 and, after some time at Fugro TSM, SapuraKencana Australia and BW Offshore, in 2016 took up the position of Senior Subsea Engineer with Neptune Marine Services in Perth.

Ryan Watts moved on from Subsea 7 in 2011 and took up the position of Project Technical Manager with Ocean Installer AS in Stavanger, Norway.

Geoff Wilhelm has retired from the Capability Acquisitions and Sustainment Group of the Department of Defence in Sydney. He has taken on the myriad responsibilities of a house husband, and is loving it.

Martin Williams moved on within the Thales Group in 2012 and took up the position of Project Engineering Manager in Newcastle, NSW.

Tristan Williams moved on from Sea Transport Solutions in 2008 and, after some time at Sea Life Designs and Azure Naval Architects, in 2013 took up the position of Assistant Manager Shipbuilding Engineering with Heesen Yachts in Oss, The Netherlands.

Nigel Winter moved on from Incat Tasmania in 2007 and, after some time at Riverside Marine, has taken up the position of Project Manager with Crisp Bros Haywards in Margate, Tasmania.

Adrian Woodhouse has moved on within the Department of Defence and, in 2011, took up the position of Anzac System Program Office Engineering Assurance Manager in Rockingham, WA.

Jinzhu Xia moved on from the Australian Maritime College in 2005 and, after some time at Intecsea, and KBR/Granherne, in 2010 took up the position of Director and Principal Consultant at Advanced Marine Structures, in Perth and Houston, USA.

Shaun Yong continues as a Surveyor at DNV GL in Singapore.

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

Phil Helmore

FROM THE ARCHIVES

In 1946 the Commonwealth Government approved the construction in Australian yards of four destroyers of the Daring class. They were the first all-welded warships built in Australia and a large proportion of their equipment was built in Australia, including guns, torpedo tubes, boilers, turbines and auxiliaries.

In addition to providing modern warships for the RAN, the program was intended to sustain naval shipbuilding capability in the post-war period. This is HMAS *Vendetta* entering the water on 3 May 1954 at Williamstown Dockyard in Victoria. HMAS *Voyager* and HMAS *Vampire* were built in Sydney.

A fourth ship, HMAS *Waterhen*, to heve been built at Williamstown, was cancelled in March 1953 to release funds for the purchase of anti-submarine aircraft for the Fleet Air Arm
(Photo Naval Historical Collection)

HMAS *Adelaide* in the Captain Cook Dock at Garden Island in Sydney (RAN photograph)