# THE AUSTRALIAN NAVAL ARCHITECT


VOLUME 28 NUMBER 3
AUGUST 2024


The annual Sydney International Boat Show, held in Darling Harbour from 1 to 4 August, attracted some 40,000 visitors, with 185 exhibitors and 618 boats on show
(Photo John Jeremy)

# THE AUSTRALIAN NAVAL ARCHITECT

Journal of
**The Royal Institution of Naval Architects**
**(Australian Division)**

**VOLUME 28 NUMBER 3**
**AUGUST 2024**

*Cover Photo:*

*Frances Bodkin*, the first of seven new ferries for service in Sydney, built in Tasmania by Richardson Devine Marine
(Photo courtesy Incat Crowther)

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## CONTENTS

2 From the Division President

3 Editorial

4 Coming Events

5 News from the Sections

13 Warship 2024 Conference

14 Classification Society News

16 From the Crows Nest

20 General News

33 Frigates for the RAN 1941 to 1971—John Jeremy

43 Industry News

46 Education News

47 The Profession

49 Membership

52 Naval Architects on the Move

52 The Internet

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# From the Division President

To all our Australian Division RINA members and everyone reading this freely-distributed journal, welcome to the August edition of your favourite, informative and most relevant publication on naval architecture in Australia. I did manage to get a photo of me on a boat, so thought I should put it in as a new photo.

Since May we have seen technical presentations on:

- *SS President Coolidge* presented by Carl Linkenbagh at the View Hotel, Briabane, and online
- *IT Earthing Systems and the Evolution of Insulation Monitoring Devices* presented by Thomas Frank (Ausbright Electrical Solutions) at the Sydney Mechanics School of Arts and online
- *The New AIMS Research Vessel* presented by Peter Thurling (Gibbs & Cox Australia and Elettra Ganoulis (One2three Naval Architects) at the Sydney Mechanics School of Arts and online
- *Warship Environment Protection: Avoiding Utopian Aspiration in Favour of Rational, Balanced, Objective Pursuit* presented by John Polglase (PGM Enviro) at UNSWCanberra @ ADFA and online
- *Decarbonising Shipping—Exploring the Marine Industry's Technological Pathways to Net-Zero* by Nick Bentley, at EA Perth and online
- *The AMC Towing Tank: Four Decades Solving Hydrodynamic Problems for the Maritime Industry* by Gregor Macfarlane and Thomas Rehrmann at the Australian Maritime College and online

These offer an amazing way to find out what naval architects are doing around Australia and increase your CPD. They were all publicised through your local secretaries; you can attend in person if you're in the state at the time and meet up with other professionals just like you!

Leading into the last Australian Division Council meeting, we were able to elect a new Vice-President in Sammar Abbas. So, firstly, congratulations to Sammar and thank you, and to the other candidates, for putting yourselves forward to contribute more to the Division. Sammar has been a member of RINA since 2013, has been volunteering continuously for RINA since 2017 including serving as committee member for the WA Section from 2017 to 2021, and chaired the WA Section from 2018 to 2020. He has been a member ofRINA Australian Division Council since 2021 and is also an active member of the RINA Improvement Committee. I'm looking forward to working more with Sammar in the coming years. One final point: both of Sammar's children are now naval architects, so there has obviously been great mentoring direction from Sammar!

I attended my first UK Council meeting in July. Perhaps the most interesting discussions were on how RINA is organised internationally. Presently there are only two divisions, one in Australia and one in New Zealand; the rest of RINA is organised largely into branches which vary enormously in size, function and effectiveness. The Australian Division is held up as showing the best way forward due to its effectiveness and sustainability, something that has been


Jonathan Binns

built up over the 46 years we have been a division (the Australian Branch was formed 70 years ago). It will be exciting to see how our model of being a division can adapt for us as well as showing the way forward for other groups around the world.

At a recent international conference, uncrewed vessels certainly formed a centrepiece. Parallels were drawn with the mining industry which has embraced autonomous vehicles and the human-in-the-loop mantra. In my work with Defence, autonomous systems are key to so many capabilities that I now find that many, many naval architects who I know (some I taught) are making their careers, even fortunes, in autonomy. The rubber has certainly started to hit the road for autonomous systems, and it is now up to us as naval architects to make it work. Listening to the keynote address at the conference, it seems to me to be key to make the best use of autonomy without thinking of it as a complete replacement of human interaction on the system(s) we're designing.

But the biggest news of all is, of course, that conference I referred to leading the way for international industry leaders to talk on uncrewed ships, was the 2024 Warship Conference held in Adelaide in June, focussed on Australian-led naval shipbuilding. This amazingly successful edition of the Warship Conference was managed, executed, packaged, and ready for the next instalment with the SA&NT Section of the Australian Division of RINA in close collaboration with RINA HQ. With over 230 delegates, this was by far the most successful running of this conference, and the first ever outside the UK. There is further information later in this edition of *The ANA*, but I would like firstly to express a great thanks to everyone who made this event possible, especially the local volunteers in Adelaide and around Australia for all their tireless efforts. I would also like to particularly thank Andy Harris, Jim Black and Rob Gehling, but there were

many others as well—thank you all for making an amazingly successful conference. Plans are already underway to bring it back in two years' time!

I did attend the Warship Conference, and a couple of standouts to me were the shipyard tour at BAE Maritime Systems Australia and the open discussions to finish off each day. These provided excellent opportunities to learn more, my ultimate goal at work!

This conference has reinforced to me the strength of our industry and the willingness of all our stakeholders to engage in achieving more.

Signing off—please do join your local committee, please do contribute to the activities of the local sections and, indeed, those of the Division and the wider Institution; our members are what have made and continue to make us.

*Jonathan Binns*
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# Editorial

The ceremonial cutting of steel for the first Hunter-class frigate by BAE Systems Maritime marks the official start of the most ambitious naval construction program in Australia's history—the construction of the six Hunter-class frigates, a yet to be selected class of eleven general-purpose frigates and, of course, SSN AUKUS, a large nuclear-powered submarine.

Unseen to most observers, design work and pre-production activities have been underway at Osborne for some years, an investment of effort which should benefit the efficient production of the new ships. To minimise potential delay, the general purpose frigates, to be acquired under project SEA 3000, are intended to be built to a design selected from a number of existing overseas designs and built overseas (the first three) and in Australia to the existing design without design changes. Experience suggests that the condition 'without design change' may be difficult to achieve in practice.

These projects, in addition to providing necessary naval combat vessels for the RAN, are intended to provide the foundation for a continuous program of naval construction in Australia to prevent the costly and inefficient stop-start nature of warship building in Australia of recent times.

This is not the first time that an Australian government has sought to prevent the loss of essential national capability by setting out on a program of continuous naval construction. When World War II broke out, Australia had a very small naval shipbuilding industry which had to be rapidly expanded during the war years. After the war the government decided that a continuous program of naval construction should be maintained at the two Commonwealth-owned shipyards—Cockatoo Dockyard in Sydney and Williamstown Dockyard in Melbourne. The program was to comprise the construction of much-needed destroyers and frigates of modern design.

In its day the plans were ambitious, and the program suffered from time and cost overruns from a number of causes including financial restrictions, shortages of labour, and many design changes. Nevertheless some fine ships were built with a very high level of Australian industry involvement and, importantly, a very capable skill base of naval architects, engineers and designers created as a result of the design adaptation experience. By the 1960s we were designing and building our own naval auxiliaries and small warships in Australia.

This continuous program of warship construction in Australia continued until the early 1970s, then plans changed and, unfortunately, a substantial level of capability was lost. Of course, that program is now history and the world of today is very different. Nevertheless, there are still lessons to be learned from the experience of decades ago. Inevitably, the passage of time means that there are now few of us who recall those times as participants. In this edition of *The ANA* we have included an article describing those times, focussing on the plans of the day to provide Australian-built frigates, in particular, for the RAN in the decades immediately following World War II.

*John Jeremy*


HMAS *Anzac* prepares to berth alongside HMAS *Stirling*, the ship's home port, for the final time prior to decommissioning on 18 May 2024
(RAN photograph)

# COMING EVENTS

## NSW Section Technical Meetings

Technical presentations are generally combined with the ACT & NSW Branch of the Institute of Marine Engineering, Science and Technology and held on the first Wednesday of the month (February through October) at the Sydney Mechanics School of Arts, 280 Pitt St, Sydney, or at a yacht club, and streamed live, starting at 18:00 for refreshments and 18:30 for the presentation, and finishing by 20:00. Guests are welcome.

The program of meetings remaining for 2024 is as follows:

4 Sep Ashar Khan, Manager New Builds Marine, Wärtsilä Australia
*Ship Electrification: A Viable Pathway for Decarbonisation*

2 Oct Torsten Lau, Eliah Cameron and Michael Reilly, Gibbs & Cox Australia
*Autonomous Surface Vessel Design Considerations*

5 Dec SMIX Bash 2024

## Tasmanian Section Technical Presentations

Technical presentations are generally arranged as in person venues in either Launceston or Hobart, with a video link between them and large screens at each location, and streamed live, starting at 17:30 for refreshments and 18:00 for the presentation, and finishing by 20:00. Guests are welcome.

The program of meetings remaining for 2024 is as follows:

17 Sep Launceston
Stephen Turnock, University of Southampton
*Routes to Zero Carbon Shipping*

8 Oct Hobart
Graeme Elphinstone, Elphinstone Engineering
*Antarctic Expedition Programs*

## EXA 2025

For over 40 years Energy Exchange Australia (EXA), previously known as AOG Energy, has cemented itself as a critical event in the oil, gas and energy market. Held annually in Perth, EXA builds on the strong legacy AOG Energy has established but with a modern outlook and new opportunities.

EXA is dynamic and immersive, with improved experiences to connect, inspire, and exchange initiatives. It tackles key industry challenges, encourages disruptive conversations, and showcases prominent influential industry figures who are making a difference in the energy transition, accelerating us to a decarbonised future.

EXA 2025 will be held on 11–13 March 2025 at the Perth Convention and Exhibition Centre.

For further information, contact <exa@divcom.net.au>.

## Indo Pacific 2025

The Indo Pacific International Maritime Exposition is the region's premier commercial maritime and naval defence exposition, connecting Australian and international defence, industry, government, academia and technology

leaders, in the national interest. The three-day event is a platform for engagement and incorporates an international industry exhibition, specialist conference program featuring presentations and symposia from leading maritime institutions and networking opportunities. Indo Pacific is strongly supported by the Royal Australian Navy, the Australian Department of Defence and the NSW State Government.

AMDA Foundation in conjunction with the Royal Australian Navy has committed to the future dates of the Indo Pacific International Maritime Expositions. Indo Pacific is a critical platform for engagement where customer and industry connect and commercial maritime and naval defence suppliers promote their capabilities to decision-makers from around the world.

Planning has begun for the International Maritime Conference 2025 (IMC2025), organised by the Royal Institution of Naval Architects, the Institute of Marine Engineering, Science and Technology and Engineers


Australia, and will be held at the International Convention Centre Sydney on 4–6 November.

Indo Pacific 2027 is also planned for early November in that year. Put these dates in your diary now and plan to be there!

# NEWS FROM THE SECTIONS

## ACT

### Naval Ship Concept Design: Design for Upgrade

Joe Cole, Systems Engineering and Analysis Domain Lead, Department of Defence, gave a presentation on *Design for Upgrade: Managing the Platform to Combat System Interface* to a meeting at UNSW Canberra at ADFA and streamed live on 30 July. The presentation was attended by 16 with a further 7 participating online.

The presentation was based on the recent RINA Warship 2024 Conference paper by Joe Cole, Alistair Smith and Gethin Barden, *Design for Upgrade: Managing the Platform to Combat System Interface*, and presented by Joe at the conference in Adelaide.

Joe commenced the presentation by showing three profile photos of Anzac-class frigates, demonstrating how the class had evolved over time, as evidenced by their changing external appearance. The lead ship of the class achieved a 28 year life.

As one means of providing for future growth, Joe identified the various margins which are typically applied at an early design stage. Aside from the usual consideration of margins for additional weight, increase in VCG, space, deck area, power, control interfaces and cooling, this extends to considerations such as making provision for reserve capacity in cable trunks and penetrations.

Modularity built into designs was also identified as a means to facilitate through-life upgrades, with past examples including the Danish Stanflex, the German Meko variants, and the concept for the USN LCS being mentioned. However, modularity extends below complete weapon or sensor systems and includes standardisation on equipment interfaces and rack sizes. He noted that work is ongoing between NATO members on achieving greater standardisation and modularity.

Ultimately, platform design changes were also an option to provide warships with further room for capability updates, as has been the case for the Anzac class to achieve a higher limiting displacement while maintaining adequate stability.

Joe proposed that, to more directly make provision for future upgrades, consideration should be given to allocating at least a pair of specific areas in combatants for integrating systems for future upgrades, including planned removal routes and provision of cable routes between such locations.

The presentation generated a lively discussion on the RAN experience with upgrading the Anzac-class frigates and earlier generations of combatants.

The presentation was not recorded.

Joe Cole making his presentation
(Photo courtesy Warren Smith)

*The Presenter*

Joe was awarded his Bachelor of Engineering degree in Naval Architecture with honours from the Australian Maritime College in 2002, and has spent the bulk of his career with the Department of Defence. He has been the Australian Naval Liaison Officer in Bristol, UK, and, back in Australia with the Navy Engineering Branch, had a strong interest in early-stage design and has contributed to studies and concepts associated with future surface combatants, patrol vessels and landing craft. He has extensive experience

in the RAN surface combatant program. He is now the Systems Engineering and Analysis Domain Lead, and is responsible for leading the rebuild of the Navy Engineering Branch's capability for early-stage design and trade studies in support of capability development.

*Martin Grimm*

## Tasmania

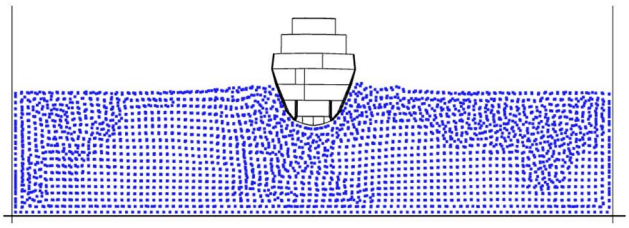
### Structural Integrity and Safety of Older Ships in a Seaway

Martin Renilson, Adjunct Professor at AMC/UTas, gave a presentation on *Structural Integrity and Safety of Older Ships in a Seaway* to a meeting at the Australian Maritime College in Launceston, Zoomed to Taylor Bros in Derwent Park, Hobart, and streamed live to the wider fraternity on 14 May. The presentation was attended by 10 in Launceston, 5 in Hobart, and a further 15 participating online.

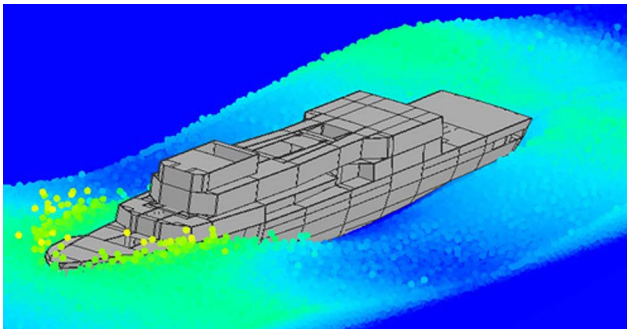
Older ships can suffer from corrosion which results in wastage of hull plating and stiffeners, hence reducing their strength and increasing the possibility of failure when encountering severe waves. Maintenance is expensive, and the costs of "over maintaining" can be prohibitive. On the other hand, if corrosion in critical areas in the ship are not repaired in a timely manner, then the resulting failure caused by the stresses when operating in a seaway can be catastrophic.

It is therefore important to understand how any corrosion influences the residual strength of the ship, and the consequent stresses in structural members as the ship encounters waves.

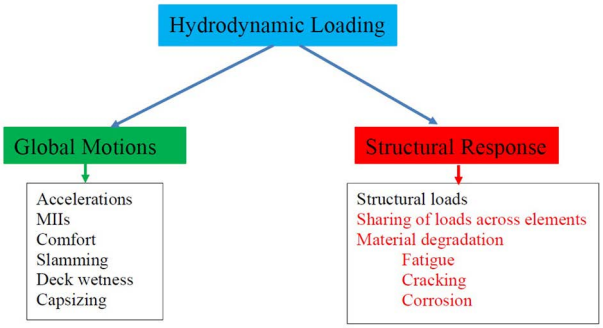
This presentation discussed how smoothed-particle hydrodynamics (SPH) can be used together with finite-element analysis (FEA) to study the stresses in the ship as it encounters waves. It is felt that this approach can lead to a reduction in maintenance costs and ensuring that aging ships can be operated safely beyond their originally-planned lifetimes.



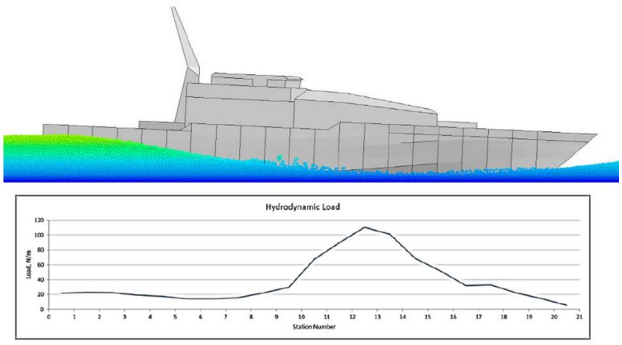
Cross section showing how the SPH particles are maintained in the tank and outside of the ship, by a "contact interface"
(Diagram courtesy Bruce Cartwright)



Numerical simulation of a ship in waves using SPH
(Diagram courtesy Bruce Cartwright)

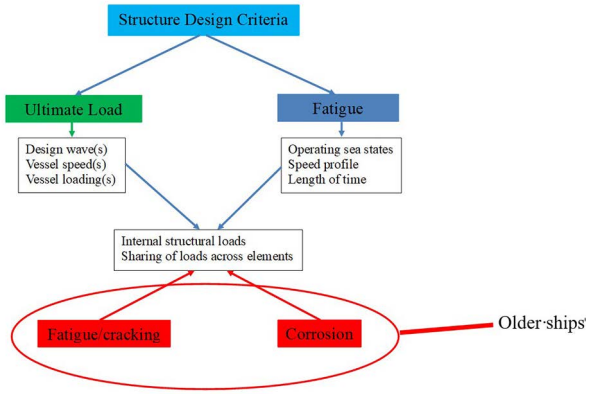



The hydrodynamic loading is used to predict both the global motions and the structural response of the ship
(Diagram courtesy Bruce Cartwright)

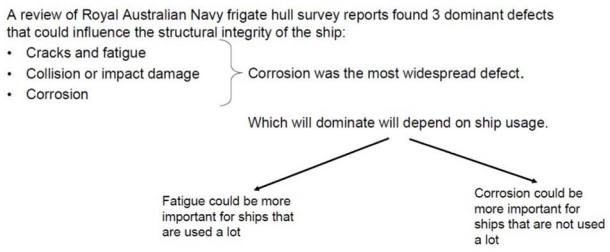



Prediction of loading on the ship as a function of longitudinal position
(Diagram courtesy Bruce Cartwright)

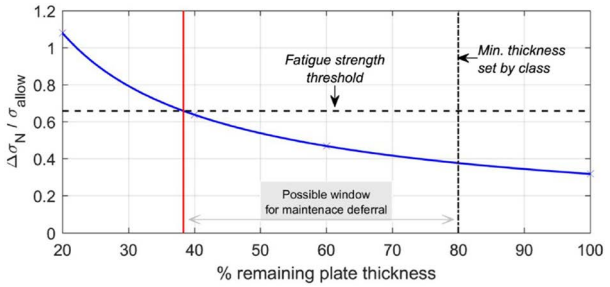
The numerical predictions were validated against published resultsobtained using a segmented model
(Photos from Reference 1)




Structural design criteria were developed for both ultimate load, and fatigue; older ships suffer from fatigue cracking and corrosion, reducing their strength
(Diagram courtesy Bruce Cartwright)




Dominant defects from a RAN frigate hull survey
(Diagram courtesy Bruce Cartwright)




Change in the normal stress rage at the reference structural location with change in thickness for the given load case
(Diagram from Reference 2)

Using the hydrodynamic loading the local structural loading can be predicted. The stress as a function of the percentage of remaining plate thickness can be obtained. Hence, it is possible to determine whether maintenance is required, or can be deferred

Charts indicating stress magnification as a function of plate thickness, as shown above, can be used by capability managers to understand:

- relative criticality of structural defects;
- relative risks of deferring defect rectification; and
- how such defects will influence life extension.

This may result in considerable cost saving, and increased ship availability, whilst ensuring adequate safety.

*References*

1. Morris, B., Hutchison, C., Thomas, G., Phelps, B. and Lilienthal, T., (2010), Hydroelastic Response of a Segmented Frigate Model, *Proceedings Pacific International Maritime Conference*, Sydney, Australia, 2010.
2. Cartwright, B., Renilson, M., McGuckin, D., Magoga, T., Mulcahey, L., Melchers, R. and Chor, A. (2022), Towards a Cost-effective Approach to Extending the Life of Naval Surface Ships, *Proceedings Indo Pacific 2022 International Maritime Conference, Sydney, Australia.*

The presentation was not recorded.

*The Presenter*

Martin Renilson graduated from the University of Glasgow with a BSc degree in naval architecture. He moved to Tasmania in 1983 to work at the Australian Maritime College, where he established the Ship Hydrodynamics Centre in 1985, and the Department of Naval Architecture and Ocean Engineering in 1996, with the first naval architecture and then ocean engineering degrees at AMC.

In 2001 he moved to the UK to work at QinetiQ as Technical Manager, Maritime Platforms and Equipment. In this role he was responsible for all hydrodynamic research for the UK Ministry of Defence.

In 2007 he returned to Australia where he now has a position as Adjunct Professor at AMC/UTas.

He has recently been involved in a research project on the numerical modelling of ship response under corrosion, fatigue and complex sea-state environments which was funded by the Australian Research Council.

*Martin Renilson*

## The AMC Towing Tank

Gregor Macfarlane, Associate Professor, and Thomas Rehrmann, Engineer, Australian Maritime College/Utas, gave a presentation on *The AMC Towing Tank: Four Decades Solving Hydrodynamic Problems for the Maritime Industry* to a meeting at the Australian Maritime College in Launceston, Zoomed to the Royal Yacht Club of Tasmania in Hobart, and streamed live to the wider fraternity on 9 July. The presentation was attended by 14 in Launceston, 3 in Hobart, and a further 24 participating online.

The presentation began with Gregor giving a brief history of towing tanks in general, with the first tank built in 1872 by William Froude on his own land in Torquay, England. This was followed by the first tank built for a commercial shipbuilder, William Denny & Brothers, in Dumbarton, Scotland. In recent years this tank was utilised by the University of Strathclyde, but is now part of the Scottish Maritime Museum. It was noted that the presenter performed experiments in this tank while on sabbatical in the late 1990s, while living 17 miles away at a fourth-generation family business on Loch Lomond: Macfarlane & Son Boatyard in Balmaha.

The AMC Towing Tank was built in the basement of AMC's Swanson Building in 1980, but it took the arrival of Dr Martin Renilson in 1983 before key equipment like the carriage and wavemaker started to be commissioned. The first laboratory sessions for students and commercial consultancies both took place around 1984. By the 1990s the tank was in heavy demand, particularly by academic and industry participants within the Australian Maritime Engineering Cooperative Research Centre (whose HQ was based at the AMC).

It is claimed that this tank performed scale model experiments on more catamarans than any other tank internationally, reflecting the successes of many Australian naval architects and shipbuilders of the time. This success, and the growing need to test models of high-speed craft, provided the support required to secure funding to extend the tank length from 60 to 100 m in 2005. Also of note was the development of the complementary shallow-water wave basin in 2000–01, with dimensions of 35 m long × 12 m wide, in contrast to the tank of 100 m × 3.5 m × 1.5 m deep.

The importance of manufacturing bespoke scale models and test rigs which are appropriate for high-fidelity hydrodynamics experiments was communicated. It was noted that these specialist capabilities were developed continuously over the life of the towing tank, but particularly over the past 15 years as the demand for more-complex and geometrically-accurate models increased, mainly through

Defence research contracts. According to facility records, in excess of 860 models have been tank tested over the past four decades. A large number of selected models have been retained in a secure store at AMC.

Gone are the days when the most-common experiments performed in the AMC tank are simple calm-water resistance tests to predict the powering required for a new design or modification to an existing hull. These experiments accounted for almost 50% of the consultancy projects undertaken during the first decade of the AMC facility's operation. The past two decades has seen a gradual but clear shift towards much more complex experiments—often to provide vital support in validating numerical techniques such as potential-flow codes and computational fluid dynamics (CFD) models. Simple "bread and butter" calm-water resistance experiment now only occupy about 5% of the available time in AMC's heavily-utilised towing tank and shallow-water wave basin.

Some background on each of the following three clientele categories were presented:

- Education and training
- Research
- Commercial consultancies

Each year, approximately 12 different laboratory sessions are run by facility staff, predominantly for those students enrolled in AMC's naval architecture and maritime engineering degrees, but also for seafarers. Over the life of the facilities, many BEng students have taken advantage of the opportunity of using the tank and basin as part of their capstone research project in their final year. To highlight this, a scrolling list of ~470 different student project titles which involved such experiments was presented, many of which also involved industry participation.

AMC's continuous support for the training of naval architects enrolled at other Australian academic institutions was noted, especially UNSW Sydney and, more recently, UNSW Canberra at ADFA.

Due to time constraints, only a very brief description of one recent PhD research project was presented as an example of the novel types of research performed in the tank. AMC have used the relatively small size of this facility to benefit by undertaking novel and unusual experiments which are often too challenging and expensive to do in larger facilities. Gregor indicated that further details on some example projects are available in the paper which he presented at the Pacific IMC in 2017.

To highlight the large number and variety of commercial clients which the team running these facilities have serviced since 1984, a scrolling list of over 200 companies and organisation who had used the tank and basin was presented.

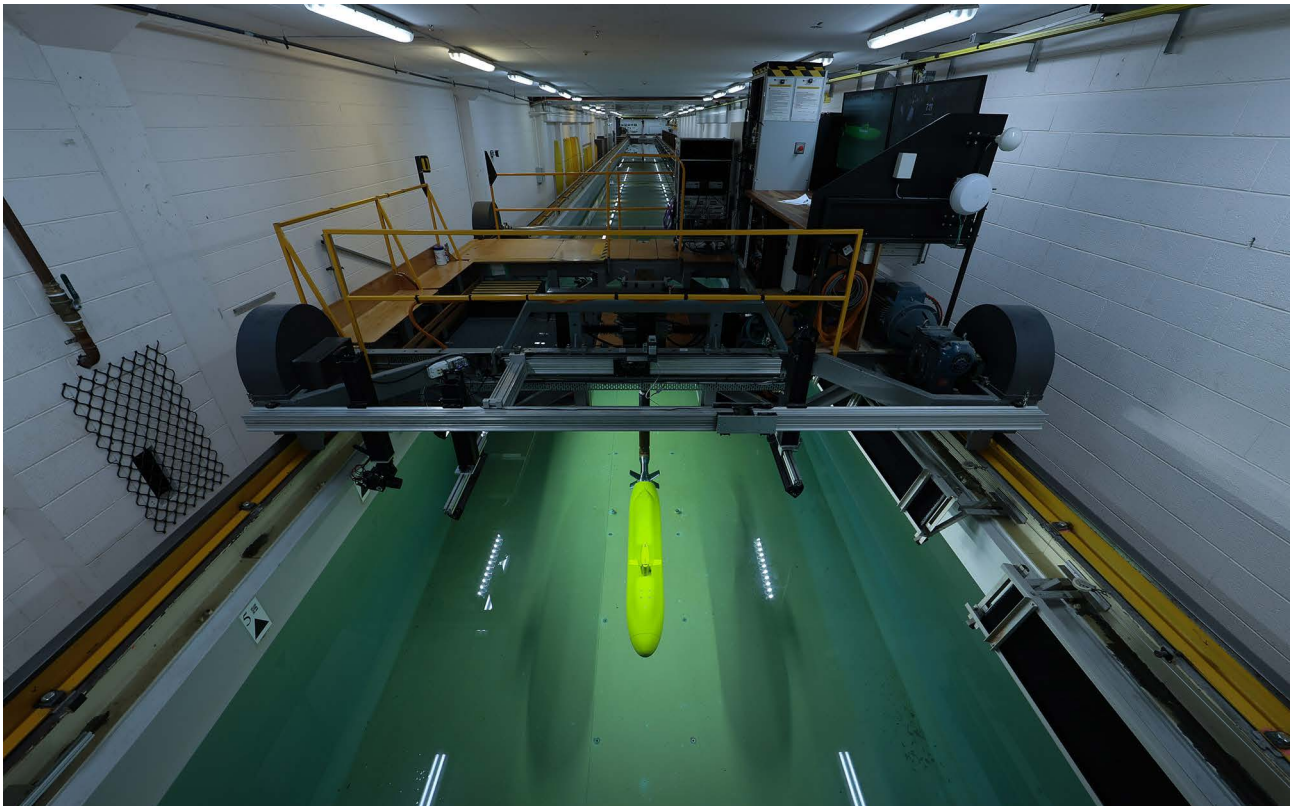
Gregor finished his part of the presentation by describing the importance of being proactively involved in the International Towing Tank Conference (ITTC), which is the peak body for maritime hydrodynamics, where one of their many roles is to develop the recommended procedures for carrying out physical model experiments and numerical modelling of ships and marine installations. Given our geographical remoteness, involvement with the ITTC has provided many AMC staff with extremely valuable experience and professional development. It is believed that AMC's contributions to the ITTC has been relatively high for a small institution, which partly led to AMC securing the right to host the next full ITTC conference in Tasmania in September this year.

Gregor then handed over to Thomas Rehrmann who presented details of recent enhancements to the towing tank and new capabilities developed. Specific examples included a new state-of-the-art wave generator and inertial properties measurement system, both commissioned in 2023. The new electrically-driven wavemaker consists of six individual dry-backed paddles which enables better controllability by using force feedback (hydrostatic pressure exists on just one side of the paddles, unlike the old wet-backed paddle). The new wavemaker comes with significantly advanced control software, which permits remote operation that will assist the AMC team to achieve their goal of being able to remotely operate the whole towing tank operation, including carriage motion, data acquisition, wavemaker operation and video recording. Experiments performed in the shallow-water basin at AMC can already be automatically/remotely operated.

The inertial properties measurement system, alternatively termed a 'shaker table', measures inertial properties of rigid objects of almost any size and shape having a mass up to approximately 500 kg. It consists of a platform constrained from underneath by soft coil springs and supported at its centre by five degree-of-freedom air-bearing mechanisms. Sensors measure the platform's free vibration following excitation. The rigid-body properties are obtained by fitting a numerical model to the free vibration signals.

This capability means that there is no longer a requirement to reposition a model to quantify or adjust its mass properties for each individual axis, as has been done for the past forty years using traditional methods, as all axes can now be determined from a single setup. Not only does this save considerable time, but it can provide significantly more accurate measurements by avoiding the many errors which can accumulate from having to set up the model for each axis of interest separately, and adjust for changes in LCG/TCG

Dr Martin Renilson onboard the AMC Towing Tank carriage circa 1990, prior to digital data acquisition systems. Note the paper chart recorder, calculator, clipboard and liquid paper (Photo courtesy Gregor Macfarlane)



The AMC Towing Tank with a scale model of a generic BB2 submarine mounted fully submerged at mid-water depth beneath the carriage (Photo courtesy Gregor Macfarlane)

after each adjustment of mass position(s). This equipment is particularly suited to models/objects of odd shape which are difficult to support in multiple-axis orientations, such as a yacht with a bulbous keel.

Other recent enhancements include an improved design of conventional two-post dynamometer; new water filtration system, commissioning of an array of self-calibrating non-contact wave probes; and several improvements of the carriage, such as a revamp of the carriage layout, refined speed control, and progress towards its remote operation.

*The Presenters*

Dr Gregor Macfarlane is an Associate Professor in Maritime Hydrodynamics at the Australian Maritime College, a specialist institute of the University of Tasmania. He is a naval architect with 30 years' experience in experimental techniques applied to engineering hydrodynamic problems. Water waves are a central theme to his work: quantifying waves created by moving boats and ships; how ocean waves affect the motions and loads of ships and offshore structures; and extracting renewable energy from ocean waves.

Thomas Rehrmann is a local Launcestonian and has a passion for the maritime industry, having spent much of his free time boating and fishing around the state of Tasmania. After graduating with a bachelor's degree in naval architecture from the Australian Maritime College, he took up a full-time role as an engineer with the hydrodynamic testing facilities—the towing tank and the model test basin—where his duties for a two-year period were focused on research capability enhancement. He is now employed by the Autonomous Maritime Systems department at AMC, servicing and operating autonomous underwater vehicles.

*Richard Boult*

## Western Australia

### Decarbonising Shipping

Nick Bentley, Director, BE&R Consulting, gave a presentation on *Decarbonising Shipping—Exploring the Marine Industry's Technological Pathways to Net Zero* to a meeting in the Auditorium at Engineers Australia, Perth CBD, and streamed live to the wider fraternity on 28 May.

According to the International Energy Agency, more than 5 000 million tonnes of $CO_2$ per year is required to be captured and sequestered by 2050 to achieve net-zero emission goals.

Shipping is responsible for 3% of global emissions, set to rise to 10% by 2050, as shipping is seen as a hard-to-abate sector.

There is a range of technologies available and under development which can help shipping reach its Net Zero targets by 2050, including alternative low-emission fossil fuels, hydrogen-derived fuels, on-board carbon capture, and electrification through installation of fuel cells and batteries.

We have the potential through the application of technology, carbon management and logistic processes to eliminate or capture, transport and store $CO_2$ in large quantities, transitioning shipping to enable the reduction of emissions across the value chain of energy products.

The presentation was not recorded.

*The Presenter*

Nick Bentley is a decarbonisation and sustainability-focussed energy professional who champions identifying and unlocking opportunities enabled by technological advances. A founding director of an energy-transition consultancy, Nick is a strong advocate of using Australia's geographic and

expansive natural resource position to develop a sustainable shipping industry.

Nick gathered 15 years' experience in WA offshore oil and gas, working on floating production projects.

Currently he is a Director and R&D Lead for the energy transition consulting company BE&R in Perth. His focus is on alternative fuels and the phasing in of clean technologies to the transportation and power industries.

*Ken Goh*

## New South Wales

### Committee Meetings

The NSW Section Committee met on 4 June and, other than routine matters, discussed:

- SMIX Bash 2024: Booking for *James Craig* confirmed for 5 December; letter to sponsors finalised; Trybooking website set up; draft budget prepared.
- TM Program
  - 2024: IMarEST have secured a presentation for August, so program for this year is now complete.
  - 2025: Two presentations booked in and a further one proposed for request.
- Section Committee: Peter Blackwood confirmed as new member of NSW Section Committee, and as NSW Nominee to AD Council.
- Walter Atkinson Award 2024: Eight papers from Indo Pacific 2023 considered and short list of three prepared for further consideration.

The NSW Section Committee also met on 16 July and, other than routine matters, discussed:

- SMIX Bash 2024: Letter to sponsors completed and being circulated; some sponsors already signed up; hire of *James Craig* paid and deposit on catering paid.
- TM Program
  - 2024: August presentation changed to mid-August to suit presenters.
  - 2025: Five presentations now booked in.
- Walter Atkinson Award 2024: Two papers decided for nomination and advice to AD Council.
- Signatories to Bank Account: One additional signatory decided for implementation.

The next meeting of the NSW Section Committee is scheduled for 10 September.

### IT Earthing Systems and the Evolution of Insulation Monitoring Devices

Thomas Frank, Principal Engineer, Ausbright Electrical Solutions, gave a presentation on *IT Earthing Systems and the Evolution of Insulation Monitoring Devices* to a joint meeting with the IMarEST on 5 June in the Henry Carmichael Theatre at the Sydney Mechanics School of Arts in the Sydney CBD and streamed live. The presentation was attended by 19. However, due to an oversight, the Zoom ID for the meeting was not circulated, so there were none participating online.

Thomas began his presentation with a brief explanation of IT earthing systems which all vessels implement. Essentially, an IT earthing system is a distribution system in which all live parts of a power source are isolated from the earth or one live part of the power source is earthed through an impedance (I), and exposed conductive parts of an electrical installation are connected to earth electrodes of the electrical installation by protective earthing conductors (T).

He went on to describe the insulation monitoring systems which were employed 50 years ago and how they worked, with an incandescent bulb turning on at the breakdown of insulation between phase and earth, and the bender device which has been in use for the last 30 years.

Recent bender devices now employ current transformers on outgoing circuits to give maintainers the earth fault location.

The presentation concluded with a snapshot of Ausbright Electrical Solutions and their electrical services, engineer services, and company history.

The presentation was recorded and is now available on the RINA YouTube channel.

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

*The Presenter*

Thomas Frank graduated with his Bachelor of Electrical and Mechatronic Engineering from the University of Adelaide, and an Advanced Diploma in Electronics and Communications from TAFE South Australia. He commenced his career in 2011 in Engineering and Production at ASC Shipbuilding, working on the DDG construction program. From there he moved to Atlantic and Peninsula Australia as the Electrical Engineering Manager, working principally on HMAS *Choules*. In 2023 he moved to Ausbright Electrical Solutions, where he is now the Principal Engineer.

Thomas Frank (L) and Steve Morant
(Photo Phil Helmore)

## The New AIMS Research Vessel

Peter Thurling, Senior Project Manager, Gibbs & Cox Australia, and Elettra Ganoulis, Naval Architect and Project Manager, One2three Naval Architects, gave a presentation on *The New AIMS Research Vessel* to a joint meeting with the IMarEST on 3 July, with Peter Thurling presenting via Zoom and Elettra Ganoulis presenting in person in the Henry Carmichael Theatre at the Sydney Mechanics School of Arts in the Sydney CBD, and streamed live. The presentation was attended by 17 with a further 12 participating online.

The Australian Institute of Marine Science (AIMS) is a Commonwealth marine science research organisation which supports the sustainable use and protection of Australia's tropical marine ecosystems. AIMS is a world leader in tropical marine research, providing a unique insight into Australia's tropical waters, and knowledge to develop globally-relevant and innovative research solutions to improve ocean health, and protecting coral reefs from climate change.

AIMS conducts research from Shark Bay in Western Australia, across the northern coast and its marginal seas, and to the southern extremity of the Great Barrier Reef on the east coast. AIMS' world-class research infrastructure includes two coastal research vessels, and the Sea Simulator National Facility, the world's most advanced research aquarium complex.

The AIMS research vessel fleet consists of two purpose-built ships, RV *Cape Ferguson* and RV *Solander*, and a number of smaller vessels which take researchers to the diverse habitats of Australia's northern coasts. Both large vessels are approaching end-of-life, and replacement vessels need to meet the current and future needs of AIMS and its stakeholders.

The presentation outlined the challenges and opportunities in delivering the next AIMS research vessel and its supporting infrastructure. It discussed the development of requirements, the design process, construction limitations, the development of the supply chain, stakeholder engagement, environmental and social impacts, and the expected benefits of the new vessel. The presentation addressed program challenges associated with the development of a Business Case for approval by Government, the schedule constraints around delivering a new vessel before the retirement of an existing vessel, and the two-stage procurement process for selecting shipyards and modular capability contractors.

The presentation was not recorded.

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

*The Presenters*

Peter Thurling has a Bachelor of Engineering with Honours degree from the Australian National University and a Master of Engineering Science degree in Project Management from the University of NSW. He has more than 20 years' experience in marine engineering projects, for public and private industry in Australia, including the FFG Upgrade, the Air-warfare Destroyer, Landing Helicopter Dock ships, upgrades to HMAS *Success* and HMAS *Choules*, Offshore Patrol Vessels and support to RV *Investigator*, RSV *Aurora Australis*, and RSV *Nuyina*. Peter is a Senior Project Manager at Gibbs & Cox Australia. Contracted to the Australian Institute of Marine Science, Peter provides project-management services for the program to deliver Australia's next regional-class research vessel.

Elettra Ganoulis graduated with a Master's degree in Naval Architecture from the University of Southampton in 2018. She began her career as a Junior Naval Architect at One2Three in 2019 and has been involved in the design of high-speed passenger ferries and motor yachts for both the American and European markets. She is now a Naval Architect and Project Manager with One2three. She became the North America Project Manager of One2Three in 2022, and has been looking after the AIMS project since its inception in 2022.

*Phil Helmore*

Elettra Ganoulis (R) and John Jeremy
(Photo Phil Helmore)

# WARSHIP 2024 CONFERENCE

For the first time in the 30 year history of the Conference, the Royal Institution of Naval Architects and its sponsors conducted this annual event outside the United Kingdom—on 18 and 19 June at the Adelaide Convention Centre—with resounding success. The conference was organised by RINA HQ and conducted under its long-time sponsor BMT and supported by ANSYS, ASC, Babcock, Defence SA, SH Defence and the University of Adelaide.

The conference focussed on various aspects of the theme *Future Surface Combatants* such as:

- Future Navy surface fleet mix
- Design for constructability and supportability
- Facilities and shipbuilding
- Automation in design and construction
- Digital Engineering use of offboard autonomy—partially or fully autonomous ships
- Disruptive technologies.

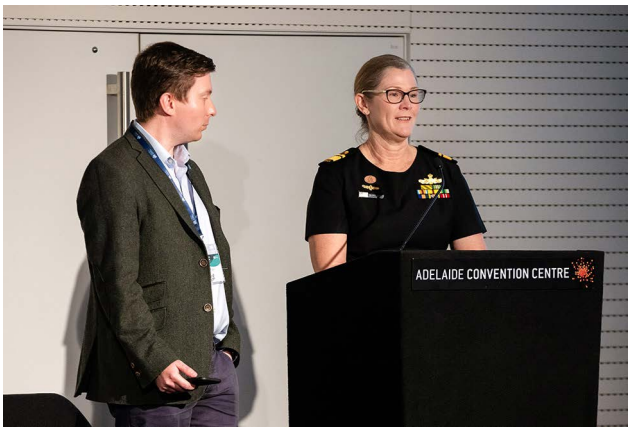
ASC Shipbuilding (BAE Systems) conducted very informative group tours of their Osborne South shipyard on the afternoon preceding the Conference.

Following strong support from industry sponsors and registrations running ahead of expectations before the Conference, RADM Rachel Durbin (Head of Naval Engineering) pronounced the Conference's success in her opening keynote address before a single paper had been delivered. Her address included a strong explanation of the Government's plan to implement the Enhanced Lethality Surface Combatant Fleet review.

The second keynote address was presented by Glen Callow, Chief Technology Officer of Austal Limited in which he drew parallels between his pre-Austal experience in the establishment of autonomous trucks in the mining industry and the development of autonomous ships.

The conference was run in two streams over the two days, with papers covering subjects including:

- Large unmanned surface vessels
- Ship design
- Production




Conference Chair, Jake Rigby, with RADM Rachel Durbin (RINA photo)


Glen Callow of Austal delivering the second keynote address (RINA photo)


The Organising Committee: Andrew Harris (BMT Australia), Jake Rigby (BMT Global), Rob Gehling (RINA Australian Division), Rusne Ramonaite and Neil Hancock (RINA HQ), (absent Jim Black (RINA Australian Division))
(RINA photo)

Standing room only for Stream 2 Session 3 on the first day of the conference
(RINA photo)

- Energy
- Human factors
- Digital engineering
- Survivability
- Structures

In addition to the many papers from around Australia, there was good representation of speakers from overseas including the UK, Canada, USA, Denmark, The Netherlands, Sweden and Singapore, with registrants also from Japan and New Zealand.

It would be impractical to summarise the breadth of presented papers in this report but, at the time of writing, the program could still be viewed on RINA's Past Events page (https://rina.org.uk/events/events-programme/warship-2024-future-surface-combatants/).

Registrants had access to the papers through an app which had the capability of booking a seat for individual sessions to prioritise their attendance should disproportionate numbers wish to attend Stream 2 sessions in the smaller room. The importance of this facility became apparent particularly in the after-lunch session on the first day when the Stream 2 room was at capacity.

Q&A panels were conducted at the end of each session covering all of the papers presented at the session, the intention being to take questions through the app rather than from the floor. This was generally successful in maximising use of the available time when some papers drew more of the questions than others, but there was variable use of the app with many questions being taken from the floor.

The final session concluded with an open wrap-up discussion chaired by Jake Rigby of the primary sponsor, BMT, who had acted as Technical Chair of the conference, touching on many of the subjects listed above. But the main message I gained from this exchange was the need to facilitate the next generation of naval architects.

Through the app and the attendee hub website, registrants can now access proceedings and video recordings where authorised by the presenter.

This summary would be incomplete without commenting on the catering provided by the Adelaide Convention Centre. The lunches, morning and afternoon teas laid on could only enhance the host State's reputation for culinary excellence.

Finally, the success of the conference as illustrated by registrant numbers being significantly greater than in previous years being largely due to the tireless organisational skills of RINA HQ Events Executive, Rusne Ramonaite, and Operations Director, Neil Hancock. I understand that initial consideration is being given to bringing the conference back to Australia in coming years, perhaps in Perth—watch this space!

*Rob Gehling*

RINA Events Coordinator Rusne Ramonaite
supervising self check-in
(RINA photo)

Presentation by Neil Hancock, RINA Operations Director, to Rob Gehling at the conference closure to mark his retirement from RINA's Board and Council
(RINA photo)

# CLASSIFICATION SOCIETY NEWS

## ABS Advisory on Ammonia Bunkering

ABS has released guidance focused on ammonia bunkering, the first such advisory for the industry. The ABS *Ammonia Bunkering: Technical and Operational Advisory* considers the aspects of bunkering ammonia as a fuel, providing the maritime industry with a better understanding of the challenges involved and how best to address them.

Due to its greenhouse gas emissions-reduction potential, ammonia is widely considered a leading alternative fuel candidate. However, given its toxicity, safe bunkering capabilities, whether by truck, ship or land storage terminal, will be critical to enabling its adoption by the industry.

"ABS has been leading the development of ammonia as a marine fuel and this advisory is the next step in this process. We have built up extensive insight into the application of ammonia at sea, which we are now sharing with the industry. The advisory supports owners, operators, designers, shipyards, ammonia suppliers including terminals and port authorities with comprehensive guidance on the latest thinking around ammonia bunkering, which presents a specific set of new challenges for the industry," said John McDonald, ABS President and COO.

The advisory covers ammonia bunkering design, operations, risk assessment and dispersion analysis, safety procedures and training.

Download a copy of the ABS Ammonia Bunkering: Technical and Operational Advisory from

https://ww2.eagle.org/en/publication-flip/ammonia-bunkering-advisory.html

More information on ABS services for ammonia as a marine fuel is available from

https://ww2.eagle.org/en/Products-and-Services/sustainability/alternative-fuel-options.html

*ABS News*, 24 July 2024

## ABS and Additive Manufactured Parts

ABS is working on a new project to develop a model-based additive manufacturing (AM) qualification framework for the maritime industry with the aim of reducing lead time and cost for AM part approvals.

Traditional manufacturing processes rely on physical tests for verification and validation of their mechanical performance, including test coupons, specimens and prototype components. Additive manufacturing, while also currently dependent on physical tests, may potentially leverage its digital manufacturing nature to adopt model-based approaches to streamline and enable rapid qualification, eventually reducing costs and lead time associated to getting a part approved.

"AM is commonly pitched as the solution to on-demand manufacturing, but a 'next-day' approval remains a practical challenge. This novel method of model-based qualification is a promising approach for the rapid qualification of an AM part, potentially addressing such challenges associated with the qualification of AM applications which could lead to increased adoption of the technology within maritime," said Dr Gu Hai, ABS Vice President of Technology.

Based on evaluation results, the framework will be refined, and guidelines will be developed to implement the models for AM qualification of marine parts.

During the project, ABS will work with the Agency for Science, Technology and Research (A*STAR) and Mencast Marine. A*STAR's Singapore Institute of Manufacturing Technology (SIMTech) will develop data-driven models to predict the probabilities of defect formations in AM parts for verification and validation, while Mencast Marine will provide industrial use cases to validate the developed models. The project is supported by the Maritime and Port Authority of Singapore (MPA) under the Maritime Innovation and Technology Fund.

"MPA is glad to support the model-based qualification project by ABS, A*STAR's SIMTech and Mencast, with the Maritime Innovation and Technology Fund. The project could potentially reduce the business costs and expedite the approval and certification of AM parts. Building on the success of MPA's JIP for ABS's participation from earlier AM JIP projects, MPA is committed to collaborating with industry partners, such as ABS, to grow Maritime Singapore's AM ecosystem," said Mr Kenneth Lim, Assistant Chief Executive (Industry & Transformation) of MPA.

"A*STAR's SIMTech is excited to work with ABS to refine their novel approach of model-based qualification, which will enhance the productivity of the maritime industry. SIMTech will work to develop data-driven models by collecting real-time data from sensors deployed for AM process monitoring, to derive insights on quality of AM parts and reduce the number of physical qualification tests. This collaboration underscores our commitment to supporting the industry in overcoming challenges and becoming more efficient, with capabilities in advanced manufacturing," said Dr Wang Wei, Deputy Executive Director, Research and Development, A*STAR's SIMTech.

"We are excited to collaborate with ABS and A*STAR's SIMTech in this pioneering project to develop a model-based qualification framework for additive manufacturing in the maritime industry. By providing industrial use cases, Mencast Marine is committed to driving innovation and enhancing the efficiency of AM part approvals, ultimately helping accelerate the adoption of AM technology in the maritime sector," said Mr Glenndle Sim, Executive Chairman and CEO of Mencast.

ABS has been involved in a range of industry-leading AM initiatives, including a joint development project to manufacture and class a 3D-printed propeller. More information on ABS AM services is available from

https://ww2.eagle.org/en/innovation-and-technology/technology-advancements/additive-manufacturing.html

Download a copy of the ABS Requirements for Additive Manufacturing from

https://ww2.eagle.org/content/dam/eagle/rules-and-guides/current/other/322-requirements-for-additive-manufacturing/322-additive-manufacturing-reqts-July22.pdf

*ABS News*, 31 July 2024


(L to R): Dr. Michalis Benakis, Senior Scientist at A*STAR's SIMTech; Liang Xinying, Manager at Mencast; Glenndle Sim, CEO of Mencast Group; Dr. Chia Boon Tat, Head of R&D of Mencast Innovation Centre; Dr. Wu Wenjin, ABS Principal Engineer; and Angie Ng, ABS Principal Engineer
(Photo from ABS website)

## DNV Rules Enable Hydrogen Vessels and On-board Carbon Capture

DNV has published updates to its rules for classification of ships and offshore structures. In addition to rules supporting the development and deployment of decarbonisation technologies, the new in-operation class notations seek to bring clarity to the responsibilities of class customers for notations which have a mix of design and operational requirements.

"One of the most striking aspects of the maritime industry today is the huge diversity of challenges and opportunities where our customers are looking for classification support," said Geir Dugstad, DNV Maritime's Global Technical Director. "It's not just new fuels, but ways for owners and managers to demonstrate their own efficiencies, new vessel types to unlock new markets, through to advanced technologies like on-board carbon capture."

With the in-operation notations, DNV has developed the first classification framework with dedicated fleet in-service notations which enable owners and operators to showcase how they are differentiating themselves in the market by deploying advanced procedures and reporting processes for greater safety and efficiency. The new notation clearly shows the split of responsibilities between the yards for the newbuilding phase and the owners and operators in the operational phase of the vessel.

Designed to unlock innovation in the shipping industry while enhancing safety, the new rules also build on DNV's leading expertise in maritime decarbonisation with the introduction of two new class notations, Gas Fuelled Hydrogen, and OCCS (for on-board carbon capture and storage).

While hydrogen is a potential zero-carbon fuel for shipping, it is presently not covered by international regulations. The Gas Fuelled Hydrogen notation sets out the requirements for the ship's fuel system, fuel bunkering connection, and consumers, providing owners with a practical path to develop hydrogen-fuelled newbuildings.

On-board carbon capture and storage (OCCS) systems are currently being trialled and offer a way for vessels to reduce emissions and contribute to greater sustainability and regulatory compliance. The OCCS notation offers a framework and requirements for these new systems, including exhaust pre-treatment, absorption, after-treatment systems, liquefaction, $CO_2$ storage, and transfer ashore.

Some of the additional highlights of the rules include:

- The new BOG (boil-off gas) notation provides requirements for the design and installation of pressure and temperature control systems for liquefied gas tanks.
- New notation for the transport of live fish creates a new vessel type for this growing industry.
- New class notation for stability pontoons provides guidance and requirements for pontoons used in heavy lift operations to increase stability.
- Introduction of a new qualifier "NC" for the notation

Hatchcoverless, enables vessels not intending to transport combustible materials to reduce investments in fire-detection and fire-fighting equipment.

- New service notation for Floating Spaceports sets requirements for units and installations intended for launch and/or recovery of spacecraft.
- New qualifier "EV" for the class notation Additional Fire Safety, specifically developed to target vessels transporting electrical vehicles.
- Revised rules and standards for diving systems aligned with IMO 2023 diving code.

The publication of the new rules took place on 1 July 2024 and the new rules will enter into force on 1 January 2025. To find out more head to https://standards.dnv.com/.

*DNV News*, 9 July 2024

## LR gives Approval in Principle to World's Largest Car Carrier

Lloyd's Register has awarded Approval in Principle (AiP) to the Marine Design & Research Institute of China (MARIC) for a dual-fuel 12 800 CEU capacity pure car and truck carrier (PCTC) design—the world's largest car carrier.

The carrier is part of a new generation of ultra-large environmentally-friendly roll-on-roll-off (ro-ro) car carriers with a load capacity of around 12 800 vehicles. The vessel is equipped with an advanced ammonia-fuel power system. Solar energy and batteries can also be integrated. By using green ammonia, greenhouse gas emissions can be reduced by 89% compared with fuel oil.

The previous generation could accommodate between 9 000–10 000 units and, whilst the number of vehicles has been greatly increased, the uplift in daily fuel consumption is marginal. The effective loading capacity and space utilisation rate of the vessel has also been improved.

The multi-layer lifting deck can be adjusted to different types and sizes of vehicles according to loading needs, and maximising the ship's transportation capacity and space efficiency. Furthermore, the interior is equipped with efficient and flexible ro-ro loading and unloading systems.

The ship type can support a variety of propulsion options including conventional fuel, LNG, methanol and dual-fuel.

The AiP was awarded in a ceremony at Posidonia, taking place in Athens, Greece, in June following a joint development project (JDP) between the parties.

Sau Weng Tang, LR Commercial Manager, Greater China, said "LR is delighted to award MARIC with Approval in Principle for this dual-fuel PCTC design, cementing our strong relationship with MARIC, working as a trusted adviser to support this ambitious project which will help the industry meet its emission reduction targets."

*LR News,* 7 June 2024

# FROM THE CROWS NEST

## RAN Officers Graduate from RN Nuclear Reactor Course

Following their completion of the Officers Nuclear Operator Course and Engineering Administration Course, the first three Royal Australian Navy officers have graduated from the Royal Navy's Nuclear Reactor Course at HMS *Sultan* in Gosport, UK. LCDR James, LEUT Isabella and LEUT Stephen were among the top of their class in the Royal Navy's elite program.

The officers' graduation marks the end of their shore-based requirements as part of the Royal Navy's nuclear submarine training program. The three will now begin practical training, deploying alongside Royal Navy sailors, in the UK Astute-class submarines based at HM Naval Base *Clyde* in Faslane, Scotland.

Director-General of the Australian Submarine Agency, VADM Jonathan Mead AO, RAN, said that the training was a critical step towards Australia operating and maintaining a sovereign fleet of nuclear-powered submarines from the early 2030s.

"The incredible training opportunities we are accessing through our AUKUS partners will ensure that we can safely operate and maintain our sovereign fleet of nuclear-powered submarines," said VADM Mead. "We are grateful for the solid support of the United Kingdom and the United States along with their enduring commitment to help Australia build a highly-skilled and capable submarine workforce."

This practical qualification enables the officers to undertake their general submarine qualification and complete their engineer officer-of-the-watch training, while also learning the fundamentals of operating nuclear-powered submarines, and building upon the program already underway for Australian Defence Force personnel to gain education, experience and training in both UK and US shipyards, facilities and fleet vessels.


VADM Mark Hammond (L), LCDR James, LEUT Isabella, LEUT Stephen and VADM Jonathan Mead at the graduation ceremony at HMS *Sultan* (Department of Defence photo)

Chief of Navy, VADM Mark Hammond AO, RAN, a submariner himself, congratulated the three graduates on the significant achievement of their critical training.

"It was a pleasure to be at HMS *Sultan* for the first graduation ceremony for our people partaking in the world-class Royal

Navy training program," said VADM Hammond. "I am incredibly proud of all three of our remarkable officers for their achievements and especially acknowledge LEUT Isabella who was awarded Dux of the graduating class [*Congratulations, Isabella!*—Ed.]

"This demonstrates the exceptional skillset and knowledge of our people undertaking this unique training from the Royal Navy—a long-standing partner and friend of the Royal Australian Navy. The graduation marks another significant step forward for the Royal Australian Navy's ability to operate, maintain and support Australia's future nuclear-powered submarine capability," said VADM Hammond.

## PIANC Congress 2024

The four-yearly PIANC (Permanent International Association of Navigation Congresses—the World Association for Waterborne Transport Infrastructure) Congress 2024 was held in the port city of Cape Town, South Africa from 29 April to 3 May.

Presentations on ship manoeuvring and ship mooring by Australians at the congress included:

- Jordan Butler, WGA: *Snapback to the future — new methods for parted mooring-line analysis*
- Tim Gourlay, Perth Hydro: *The effect of combination mooring lines on ship mooring operability in wave-exposed ports*
- Richard Morgan, Aspec Engineering: *Hay point ship loader and berth replacement — retrofit to extend the service life by 50 years*
- Simon Mortensen, DHI: *Increasing vessel draft and operational transit windows in Tangier Med using physics-based system*
- David Tidy, Trelleborg: *Snapback! Management of mooring line safety through the application of dynamic line-tensioning systems*
- Matthew Turner, OMC: *Improving port planning and risk management using AIS and PPU data*
- Wim van der Molen, Baird: *Implementation of Vertical ShoreTension® dynamic mooring system at Peru LNG*

The published papers of all presentations will be available soon at www.pianc.org.

*Tim Gourlay*


Tim Gourlay presenting at the PIANC Congress 2024 in Cape Town
(Photo courtesy Erik Broos, Port of Rotterdam)

## WSR Spirit 2

On 8 October 1978, 46 years ago, Ken Warby blasted across Blowering Dam to set his second (and current) Unlimited World Water Speed Record of 317.6 mph (511.1 km/h).

Dave Warby of Warby Motorsport is attempting to break his father Ken's Water Speed Record in their latest vessel, *Spirit of Australia 2*.

The Warby Motorsport team was back on the water at Blowering Dam on the weekend of 11–12 May to continue testing and ramping up the speed towards the record. However, with winds peaking at 37–39 km/h across the water from the east-coast low hanging around NSW, it only allowed one run on Saturday which was aborted as it was just too dangerous. The team books and arranges with the authorities ten weeks before the runs, and then they turn up to see how it is, hoping for good weather....which they can't control!

*Spirit of Australia 2* on the aborted run on 11 May
(Photo from the Warby Motorsport Facebook page)

The team was then back on the water at Blowering Dam on the weekend of 3–4 August to continue testing. Over the weekend *Spirit of Australia 2* achieved 275 mph (443 km/h), a new fastest speed. The team had varied water conditions—mostly very good weather—and found minor gremlins, all of which can be sorted.

*Spirit of Australia 2* rolling out of Newcastle, southbound for Blowering Dam on 1 August
(Photo from Warby Motorsport Facebook page)

*Spirit of Australia 2* at Speed on Blowering Dam on 4 August
(Photo by Jeff Barnett from Warby Motorsport Facebook page)

## WSR *Longbow*

Britain has re-entered the contest for the Water Speed Record with a new vessel, *Longbow*, having commenced construction in April 2018.

Progress has been held somewhat in abeyance while they consider the design of the driver's cockpit. Options for the cockpit really fall into two camps: either you retain the cockpit as an integral part of the hull, or you design the cockpit in such a way that it is ejected from the main hull in the event of an accident. Considering the speeds at which *Longbow,* if successful, would have the potential to run at, they have decided to have the cockpit/capsule detach from the hull in the event of an accident. The calculations involved with that scenario have been undertaken to ensure that the driver's capsule is able to withstand those loads and remain intact and floating on the water surface. The calculations and analysis of the roll-cage element of the driver's cockpit/capsule has been completed and that has been sent to the UIM Cockpit Safety Committee for confidential peer review.

Elements such as steering, fuel tanks and air intakes for *Longbow*'s engines are all built around her cockpit, and so all they can do is remain on hold with the build of the boat until the critical design of the cockpit is agreed with the UIM Cockpit Safety Committee.

## *SP80* Aims for World Sailing Speed Record

The world sailing speed record is currently held by Australian Paul Larsen in *Vestas Sailrocket 2* at an average speed of 65.45 kn (121.1 km/h) over the 500 m track.

*SP80* is the vessel being designed and built by engineering students from the Swiss engineering school École Polytechnique Fédérale de Lausanne (EPFL) to attempt the world sailing speed record and take it back to Europe. They are aiming for a speed of 80 kn (148 km/h) using a boat with shaped hulls, propelled by the usual kite wing, while the overall stability is achieved via super-ventilating hydrofoils.

Over the winter break, the team has changed many things: new—larger—kites have joined the party, a new take-off procedure has been implemented, the onboard electronics were overhauled, the shape of the main hull was updated and the roles of team members on the water changed. It was crucial to ensure that the team adapted to these new elements during the first runs back on the water in Leucate, France.

After a couple of trials, they managed to launch the boat on her first run with our their newest 40 $m^2$ kite. Sailing with a 40 $m^2$ kite in 30+ kn of wind is close to what they would need on a potential record day. The goal is now to fine-tune their take-off procedure so that they can launch this kite as easily as their "small" 25 $m^2$ kite. Planing is achieved at more than 10 kn, and they have now had the boat up to 18 kn.

For more details, visit the SP80 website at https://sp80.ch/

## Sail GP

The Australia SailGP Team has won the coveted SailGP Trophy three times, winning it in Seasons 1, 2 and 3.

Season 4 kicked off in Los Angeles, USA, on 22–23 July 2023, with Australia, Great Britain, Canada, Denmark, France, Germany (a newcomer), New Zealand, Spain, Switzerland and USA all competing.

Subsequent events have been held in Saint Tropez (France) 9–10 September, Taranto (Italy) 23–24September and Andalucia-Cadiz (Spain) 14–15 October, Dubai (UAE) 9–10 December, Abu Dhabi (UAE) 13–14 January, Sydney 24–25 February, Christchurch 23–24 March, Bermuda 4–5 May, Halifax 1–2 June, New York 22–23 June, and San Francisco 13–14 July.

Australia lost the season lead in Christchurch after hitting a race mark and being handed a devastating eight-point penalty to its season total.

Australia (Tom Slingsby) came second in San Francisco's three-boat Grand Final race, losing out to Spain (Diego Botin) and beating New Zealand (Peter Burling). Final standings show Spain with the gold medal, Australia silver, and New Zealand bronze. After the final race, Australia's Tom Slingsby said "Losing the Season 4 Championship title

*SP80* back on the water in Laucate, France
(Photo from SP80 website)

to Spain will ‘only make us hungrier’.”

Season 5 features new events in Brazil, Germany, Switzerland and Auckland, as well as a return to Great Britain and New York. Unfolding over a 12-month period, beginning and ending in November (2024–25), the season will be the league’s most expansive to date, with 14 events across an increased five continents. Season 5 starts in Dubai, UAE, on 23–24 November 2024.

For more details, visit the Sail GP website at https://sailgp.com.

*Phil Helmore*


Season 4 of SailGP ended in San Francisco with two days of action-packed sailing in July. France’s Season 4 hopes came to an end with a dramatic collision between the French and Danish F50s at the final mark in the fourth fleet race. This meant that Australia, New Zealand and Spain proceeded into the winner-takes-all, $US2 million Grand Final
(Photo courtesy SailGP)


New Zealand, Australia and Spain in the Grand Final shootout in San Francisco
(Photo courtesy SailGP)

## Agreement to Strengthen AUKUS Submarine Partnership

Australia, the United Kingdom and the United States have together reached another significant AUKUS milestone, with the signing of an agreement to enable cooperation which is essential to Australia's capacity to safely build, operate and maintain a conventionally-armed, nuclear-powered submarine capability.

The *Agreement among the Government of Australia, the Government of the United Kingdom of Great Britain and Northern Ireland, and the Government of the United States of America for Cooperation Related to Naval Nuclear Propulsion* was tabled in the Australian Parliament on 12 August.

The agreement will enable the UK and the USA to transfer submarine-specific material and equipment for Australia's future nuclear-powered submarines.

It will also allow the continued communication and exchange of information related to nuclear-powered submarines among AUKUS partners.

The agreement will be central to Australia's acquisition of a sovereign nuclear-powered submarine capability from the 2030s, with the transfer of Virginia-class submarines from the US to Australia, and the transfer of equipment from the UK for use in Australia's SSN-AUKUS submarines.

It will also enable Australia to prepare for Submarine Rotational Force-West at HMAS *Stirling* from 2027, supporting the rotational presence of up to four Virginia-class submarines from the USA and one Astute-class submarine from the UK.

Consistent with the commitment of AUKUS partners, the agreement will see Australia uphold the highest standards for safety, security and non-proliferation.

Future SSN-AUKUS submarines will be built at Osborne in South Australia, using sealed, welded power units which will not require refuelling over the life cycle of the submarine.

Australia is committed to the global nuclear non-proliferation regime. The agreement expressly rules out enriching uranium or reprocessing spent nuclear fuel in Australia as part of AUKUS and prevents AUKUS partners undertaking any activity which would contravene international non-proliferation obligations.

Importantly, the agreement re-affirms, and is consistent with, Australia's international non-proliferation obligations, including under the Treaty on the Non-Proliferation of Nuclear Weapons, the South Pacific Nuclear Free Zone Treaty and our safeguards agreements with the International Atomic Energy Agency.

As a responsible nuclear steward, Australia will manage all waste generated by its own Virginia-class and SSN-AUKUS submarines. Australia will not process spent nuclear fuel or reactors from the USA, UK or other countries.

The agreement replaces the Exchange of Naval Nuclear Propulsion Information Agreement, which entered into force in 2022.

The Deputy Prime Minister and Minister for Defence, the Hon. Richard Marles MP, the British Ambassador to the USA, Dame Karen Pierce and US Deputy Secretary of State, Kurt Campbell, sign the AUKUS Agreement for Cooperation Related to Naval Nuclear Propulsion in Washington DC on 5 August 2024
(Photo courtesy Department of Defence)

## Concept Design Partners announced for South Australia's new Nuclear-powered Submarine Construction Yard

On 28 May the Government announced the concept design partners for South Australia's new Nuclear-Powered Submarine Construction Yard (NPSCY).

Kellogg, Brown and Root (KBR) and an AECOM and Aurecon Joint Venture have been announced as the design partners for the NPSCY.

KBR has extensive experience in supporting design and project management for defence infrastructure facilities across the nation and will design the area of the NPSCY which will be used for steel processing and fabrication facilities.

The AECOM and Aurecon Joint Venture will deliver the concept design for the rest of the NPSCY site which will support outfitting, consolidation and commissioning of Australia's conventionally-armed nuclear-powered submarines.

The design teams collectively bring together nuclear infrastructure specialists and experienced personnel from previous shipyard infrastructure projects at Osborne, Henderson and in AUKUS partner nations.

The NPSCY development will be in excess of 75 ha and will be built to the highest security and safety standards.

The project alone is set to create up to 4000 direct jobs at the peak of construction, with a further 4000–5500 direct jobs expected to build Australia's nuclear-powered submarines in South Australia.

Preliminary enabling works required to support the future construction of the NPSCY at Osborne commenced in December 2023 with site mobilisations and early works for a new carpark.

Constructing the infrastructure at the NPSCY will rely on highly-skilled Australian engineering and design consultants, project controls specialists, project managers, tradespeople and construction workers.

In partnership with the South Australian Government, the Commonwealth Government is also designing and building the new Skills and Training Academy at Osborne to educate and train the elite naval shipbuilding workforce.

## Accelerated Littoral Fleet Build

On 23 July the Government announced that the construction of 18 medium landing craft for the Army's new littoral fleet is being accelerated.

The $2 billion project—part of the Government's record investment in Defence—is expected to create 1100 direct jobs and more than 2000 indirect jobs under a program which will also deliver heavy landing craft as well as amphibious vehicles.

The first of the medium landing craft, designed by Birdon and to be built by Austal at the Henderson Shipyard in Western Australia, is expected to be delivered in 2026.

The local construction of the medium landing craft is in addition to up to eight heavy landing craft which will also be built by Austal at Henderson.

These vessels are an essential component of Army's transformation and optimisation for littoral manoeuvre. They will support a strategy of denial which includes deploying and sustaining modernised land forces with long-range land and maritime strike capabilities across our region.

The Government is investing $7 billion towards littoral manoeuvre vessels, an investment which continues to grow the Australian industrial base and supply chains, and create highly-skilled well-paid jobs.

With a range of up to 2000 n miles when operating with the Landing Craft Heavy, the Landing Craft Medium are capable of transporting up to 90 t, equivalent to four High Mobility Artillery Rocket Systems (HIMARS), or one main battle tank, or one infantry fighting vehicle and two Bushmasters. This is similar to the capacity of large aircraft such as a C-17 Globemaster. These landing craft will be supported by the Amphibious Vehicle Logistics which can navigate over beaches and through waterways which may be clogged with obstacles and debris.

## First Australian Submarine Workers to Pearl Harbor for AUKUS Ttraining

In June around 30 skilled ASC workers were the first to deploy to the Pearl Harbor Naval Shipyard to directly participate in training in the maintenance of US Virginia-class nuclear-powered submarines alongside their US counterparts.

These ASC workers from South Australia and Western Australia comprise mechanical fitters and electricians as well as electrical, mechanical and safety engineers, and submarine maintenance and battery crew.

This is another important step towards Australian workers acquiring the knowledge and knowhow that will be essential to build, operate and sustain our future nuclear-powered submarines.

The international placements reflect the strength of the AUKUS partnership and follow the Government's announcement in March that it had selected ASC as a strategic partner in the sustainment and joint build of conventionally-armed nuclear-powered submarines in Australia, starting with the sustainment of the Virginia class and followed by the build and sustainment of Australia's SSN-AUKUS submarines.

In total, more than 100 Australian shipyard workers at ASC are expected to depart by mid-2025 for naval propulsion skilling at Pearl Harbor.

Once they have completed their overseas training—a mix of classroom and on-the-job learning—they will take up key roles in Western Australia as part of Submarine Rotational Force-West, where they will lead the sustainment of rotating USA and UK nuclear-powered submarines. They will also pass on their skills and train other ASC workers through their lead roles.

One UK Astute class submarine and up to four US Virginia-class submarines will be involved in a rotational presence through Submarine Rotational Force-West.

ASC employees already have decades of combined experience maintaining Australia's Collins-class submarines, which will continue operating as Australia transitions to its future nuclear-powered submarine capability.

All work by Australian personnel in the US or the UK will remain consistent with Australia's domestic and international legal obligations, including its non-proliferation obligations and commitments.

## Next Phase of Collins-class Life-of-type Extension Approved

HMAS *Farncomb* will be the first of Australia's six Collins-class submarines to undergo sustainment and capability enhancement under a life-of-type extension program being implemented by the Australian Government.

The life-of-type extension program is part of the Government's commitment to invest $4 to $5 billion to ensure the Collins-class submarines continue be provide a potent strike and deterrence capability.

The life-of-type extension of HMAS *Farncomb* will be undertaken by the highly-skilled workers at ASC and commence in 2026 at Osborne in South Australia.

An optronics upgrade for the Collins-class submarines, announced by the former Coalition government, will not proceed following advice that it would have added complexity and risk to the life-of-type extension program. The SSN AUKUS nuclear-powered conventionally-armed submarines will likewise not be fitted with this particular design.

The Government has also received advice from Defence, in consultation with the United States, that adding Tomahawk cruise missile capability to the Collins-class submarines is not viable and does not represent value for money.

The Virginia-class nuclear-powered submarines Australia will receive in the early 2030s will come with the Tomahawk as standard equipment. Tomahawk cruise missiles will also be used by Navy's Hobart-class destroyers and the Government has agreed in-principle to fit the Hunter-class frigates with Tomahawks, subject to a feasibility study.

## First Steel Cut for Hunter-class

The Commonwealth of Australia has awarded BAE Systems Maritime Australia a contract to build the first three Hunter-class frigates as the program celebrates its transition into formal construction phase.

Deputy Prime Minister, the Hon. Richard Marles MP and the Premier of South Australia, the Hon. Peter Malinauskas, officially cut steel on the first ship at a ceremony at the Osborne Naval Shipyard in Adelaide in June.

The event was attended by representatives from Federal and State Governments and the Royal Australian Navy, as well as BAE Systems Australia industry partners, suppliers and employees.

The piece of steel cut forms part of the under structure support for the port-side propeller-shaft brake system.

Based on the Type 26 Global Combat Ship, the first four of which are under construction at BAE Systems' site in Glasgow, UK, *Hunter* is one of the world's most advanced anti-submarine warfare frigates and will provide the Royal Australian Navy with next-generation capability.

Ben Hudson, Chief Executive Officer, BAE Systems Australia, said "This is a proud moment for all of us at BAE Systems Australia and it comes at a time when the capability of *Hunter* has never been more important.


The Deputy Prime Minister and the Premier of South Australia at the steel-cutting ceremony for the first Hunter-class frigate (Photo courtesy SA Government)

"*Hunter* will be one of the most technologically advanced, stealth-capable anti-submarine warfare vessels in the world and its modular mission bay allows it to undertake a wide-range of missions from warfare to humanitarian and disaster relief.

"Over the coming years we will build and deliver the first three Hunter-class frigates to the Royal Australian Navy."

Craig Lockhart, Managing Director, BAE Systems Australia – Maritime, said "We already have a head-start on the construction of the first Hunter-class frigate, with six schedule protection blocks already in production approved under the design and productionisation phase as part of the risk mitigation strategy.

"This program has always been more than just building ships. We have created world-leading facilities, a vibrant supply chain ready to step up to full rate of production and a workforce which is proving that it can produce the highest quality shipbuilding products that can compete anywhere.

"This moment has been a long time in the making and it has been a tremendous journey so far, but we have demonstrated that together with our partners, suppliers and the great team both here at Osborne and in the UK, we are up to the task and raring to go."

## Two More Guardian-class Patrol Boats

On 24 June 2024 Austal announced that the Australian Government had ordered two additional Guardian-class Patrol Boats from Austal Australia, valued at approximately $39 million.

The 39.5 m, steel-hull patrol boats, to be constructed at Henderson in Western Australia and scheduled for delivery in 2026, are in addition to the 22 Guardian-class patrol boats previously ordered by the Australian Government under the Pacific Patrol Boat Replacement Project (SEA3036-1) since 2016.

Nineteen of the 22 vessels have been delivered to 12 Pacific Island nations under the Australian Government's Pacific Maritime Security Program since 2018.

Austal's Chief Executive Officer, Paddy Gregg, said that the additional Guardian-class patrol boats will extend the production of the proven vessel platform, designed and constructed by Austal in Henderson and serviced by Austal in Cairns, Queensland.

## Austal to Construct a Sailing Cargo Trimaran

On 29 July Austal announced that Austal Australia has been awarded a contract to design and construct a wind-powered, aluminium cargo trimaran for Vela Transport of Bayonne, France. The exact purchase price for the vessel cannot be disclosed for commercial reasons; however, it is in the range of $40–45 million.

The first-of-class, 66.8 m high-value cargo vessel, based on a concept by VPLP of Paris and featuring a sailing system by MerConcept, will be constructed by Austal Philippines, in Balamban, Cebu, and is scheduled for delivery in mid 2026.

Austal's Chief Executive Officer, Paddy Gregg, said that the new contract confirmed Austal's position as a shipbuilder of choice; as a leader in trimaran design and construction; and with capabilities to deliver a diverse range of environmentally-friendly maritime solutions, worldwide.

"Austal is delighted to be partnering with Vela to deliver this unique, sailing cargo trimaran—a striking looking vessel which will transport high-value goods across the Atlantic Ocean using 100% wind power," Mr Gregg said.

"Austal's proven experience in trimaran design offers Vela a large cargo space and greater flexibility while delivering superior seakeeping, efficiency, and performance. The shallow draft of the trimaran also allows greater access to secondary ports, facilitating access to Vela's customers' factories and warehouses.

"The use of sails for main propulsion, rather than conventional diesel-powered engines, is also expected to deliver a 99% reduction in greenhouse gas emissions, compared with conventional container ships.

An impression of the wind-powered cargo trimaran to be built by Austal
(Image courtesy Austal)

"Having designed and constructed 25 large trimarans for commercial and defence operators around the world since 2007, no other shipbuilder is better placed to deliver this impressive new ship for Vela, and the Austal Philippines team can't wait to get started.

"Our thanks to the Vela team for their trust in Austal to deliver their first-ever sailing cargo trimaran, a vessel which will undoubtedly play a leading role in promoting the decarbonisation and sustainability of the international maritime transport industry."

Vela Transport's Chief Executive Officer, Pierre-Arnaud Vallon, said "We are not just constructing a ship with Austal, we are helping to shape the future of international maritime transport. With our strategic shipbuilding partner Austal, we are pioneering the way for an era where ships harness clean and inexhaustible energy. This sailing cargo trimaran, the first and largest of its kind, symbolises our vision of a world where sustainability and innovation go hand in hand."


*Spirit of Tasmania IV*, the first of two new ferries for the Melbourne-to-Tasmania service on trials recently. Her sister ship, *Spirit of Tasmania V*, was launched on 19 July by Rauma Marine Constructions in Finland
(Photo courtesy TT Line)

Vela Transport's Chief Operating Officer, Pascal Galacteros, added "The construction of this unique vessel represents an unprecedented technical challenge. We are tackling it with pride and determination, relying on Austal's globally recognised expertise in multihulls and aluminium shipbuilding, and integrating the wind sailing expertise from our partners, VPLP and MerConcept.

"Austal was selected after a global tender process lasting over nine months. The trust that emerged from our interactions with the Austal teams in Australia and the Philippines convinced us that we had the best strategic shipbuilding partner for our project."

## Austal Australia Delivers 20th Guardian-class Patrol Boat

Austal Australia has delivered the 20th Guardian-class Patrol Boat (GCPB) to the Australian Department of Defence.

The vessel, *Tobwaan Mainiku*, for the Republic of Kiribati, was accepted by representatives of the Department of Defence at the Austal shipyard in Henderson, Western Australia on 12 July 2024.

Austal's Chief Executive Officer, Paddy Gregg, said that the delivery of the 20th Guardian-class patrol boat highlighted the industry-leading productivity of the Pacific Patrol Boat Replacement Project, now comprising 24 vessels.

"The Austal Australia team, together with our valued supply chain and defence industry partners, including the Department of Defence and the Royal Australian Navy, have now delivered 20 Guardian-class patrol boats to the Australian Government since December 2018," Mr Gregg said.

"Effectively, we've delivered one new Guardian-class Patrol Boat every four months (on average) over the past five years, highlighting Western Australia's industry-leading naval shipbuilding capability and productivity. It's even more impressive when you consider that the Austal Australia team has also delivered two Cape-class Patrol Boats, six Evolved Cape-class Patrol Boats and three large high-speed ferries to commercial operators around the world, during the same period.

## Austal Australia Delivers 7th Evolved Cape-class Patrol Boat to Royal Australian Navy

Austal Australia has delivered the seventh of ten Evolved Cape-class Patrol Boats (ECCPB's) under contract to the Royal Australian Navy.

The vessel, ADV *Cape Solander*, was officially accepted by the Commonwealth of Australia at Austal's Henderson, Western Australia, shipyard.

Austal's Chief Executive Officer, Paddy Gregg, said that *Cape Solander* was the first of two Evolved Cape-class Patrol Boats scheduled for delivery to the RAN in 2024.

"The Austal Australia team is continuing to demonstrate outstanding capability, productivity and efficiency with the Evolved Cape-class Patrol Boat Project, which now comprises ten vessels for the Royal Australian Navy," Mr Gregg said.

The SEA1445-1 Evolved Cape-class Patrol Boat (ECCPB) project, initially to construct six 58 m aluminium monohull


Austal Australia has delivered the seventh Evolved Cape-class Patrol Boat, ADV *Cape Solander*, to the Royal Australian Navy. (Photo courtesy Austal)

patrol boats for the Royal Australian Navy from May 2020, was extended by two vessels in April 2022 and a further two vessels in February 2024, bringing the total to ten vessels. ADV *Cape Schanck*, the 8th ECCPB, is scheduled for delivery in the second half of 2024 and two further vessels remain under construction at Austal's Henderson shipyard.

## Dongara Marine Contract

Having completed their first new boat for Western Australia's Department of Transport in December 2022, Dongara Marine was awarded a contract in June to build another two new boats, as well as some refits of existing vessels.

The new 8.3 m cabin RIB will be nearly identical to 2022s PV21, while the 7.0 m cuddy-cabin vessel is very similar to the Marine Rescue vessels *Dampier Angel* and *Bay Watch*.

Both designs come from Port Denison-based naval architects Southerly Designs, and a number of local suppliers and subcontractors will also work on the project, making it very much a Mid-West industry effort.

The craft built under the $1.3 million contract will boost the WA Department of Transport's safety compliance and education fleet.

The 8.3 m and 7 m high-performance patrol vessels will be able to be transported by trailer and will be powered by twin outboard engines and capable of travelling at more than 40 kn.

The vessels are designed to meet the construction, stability and safety standards for operations up to 30 n miles off the


An impression of the 8.3 m RIB to be built by Dongara Marine (Image courtesy Dongara Marine)

coast and to be utilised for different purposes across DoT—including emergency environmental response.

Thermal imaging technology will be part of the navigation system for one of two new state-of- the-art vessels, providing improved search-and-rescue ability when supporting WA Police.

The new navigation technology is also being introduced to an existing patrol vessel currently being upgraded by the company, following the award of a $1.8 million contract last year for refurbishment of a number of vessels.

It's expected that the upgraded vessel will re-join the DoT fleet in October this year, while the two new vessels are due for delivery by May next year, replacing craft about to be decommissioned.

## *Sea Eagle* from Alan Muir & Associates

*Sea Eagle,* a 20 m lobster vessel for Galifrae Fishing Pty Ltd, designed by Alan Muir and Associates and built by Peter Shedden of Spectrum Engineering at Margate, Tasmania, was launched on 20 May. The controlled launch, while definitely not as exciting as a side launch or even a "release the winch brake" launch, the outcome was still the same, the successful entry of an immaculately-finished vessel into the water. From launching, the vessel immediately steamed from the Margate building yard to Prince of Wales Bay, Hobart.

Fit out was completed by Dean Marks of Dean Marks Boatbuilding, Royce Salter of Salter Marine Services and Jon Minnebo of Tasmanian Shipwrights. The level of fit-out, using Tasmanian Oak and quality fixtures and fittings, is a credit to them and matches the high quality of the fabrication finish, including the extensive use of stainless steel in areas likely to suffer wear and tear. With a slight adjustment to the internal layout this vessel could quite comfortably be used as a holiday get-away type cruising boat.


Sea Eagle being launched at Spectrum Engineering
(Photo courtesy Alan Muir)

As a 3B, 3C and 2D NSCV vessel, *Sea Eagle* will be harassing the crayfish around Tasmanian waters for quite some time, keeping the live catch in the compartmentalised sea water circulating tank. Additionally, structural arrangements have been made to allow for a transition to scallop fishing should the need arise.

Principal particulars of *Sea Eagle* are

| | |
|---|---|
| Length OA | 19.5 m |
| Beam | 6.0 m |
| Depth | 2.4 m |
| Displacement DWL | 94 t |
| Fuel oil | 9450 L |
| Fresh water | 8030 L |
| Main engine | Mitsubishi S6B3-Y3MPTAW<br>327 kW @1950 rpm |
| Gearbox | Twin Disc 5114DC |
| Reduction ratio | 4.59:1 |
| Propeller | 1372 mm diameter × 1080 mm pitch with 4 skewed blades |
| Speed | 10.5 kn @ 1800 rpm |
| Bow thruster | Twin Disc BP400 |
| Generators | 1×Isuzu 20 kVA<br>1×Isuzu 30 kVA |
| Steering system | Power-assisted hydraulic with articulated rudder |
| Anchor windlass | Spectrum Engineering |
| Refrigeration | Shaun Synnott, Kurowski |
| Holding freezer | 5 t Holding freezer -18$^{O}$ C |
| Circulating tank | 30 t SW to main deck |
| Circulating pumps | 2×Forani 125 mm bronze |
| VHF Radio | ICOM IC-M510 |
| HF Radio | ICOM IC-M8OIE + antenna 29 W |
| Radars | 1×Furuno 1835 4 kW<br>1×Furuno DRS-6ANXT 6 kW |
| Sat Compasses | 1×Furuno SC70<br>1×Furuno SCX-21 |
| Echo sounder | Furuno 1150<br>200B-8B 2 kW transducer<br>50BL-24HR 2 kW transducer |
| Auto Pilot | Furuno Nav Pilot 711C |
| GPS | GP39 Navigator |
| Sonar | WASSP Multibeam F3 |
| Survey: | AMSA class 3B, 3C and 2D |

*Richard Boult*

## Austal USA Launches Final Littoral Combat Ship

In August Austal USA has launched the future USS *Pierre* (LCS 38), the last ship of the US Navy's Independence-variant Littoral Combat Ship (LCS) program. Austal USA's test and activation team will spend the next several months preparing her for sea trials later this year.

This is the 23rd LCS launched by Austal USA using the modern, safe and efficient multi-step method of rolling the ship onto a moored deck barge and then transferring the


The future USS *Pierre* (LCS 38) is the final LCS to be built by Austal USA
(Photo courtesy Austal)

ship from the barge to a floating dry dock. The dry dock is submerged enabling the ship to float for the first time, and then removed from the dry dock and moored pier-side to get ready for engine light-off and trials.

*Pierre*, christened in May, is the US Navy's 19th and final Independence-variant LCS, and will be deployed to the Pacific fleet area of responsibility supporting forward presence, maritime security, sea control, and deterrence. She is the second US Navy ship launched at Austal USA this year.

## Glosten Design for South Australia

Glosten, the US naval architecture and marine engineering consultancy, has announced the completion of their latest concept design—a 37.7 m coastal research vessel for the South Australian Research and Development Institute (SARDI). Funded by the Australian National Collaborative Research Infrastructure Strategy, this project has the potential to provide the marine research community in southern Australia with a state-of-the-art asset which would aid SARDI in the protection and management of local marine ecosystems.

Glosten's goal was to help guide SARDI through the initial stages of a build and design process. Their vision was a vessel which could operate cleanly and quietly, so Glosten selected a diesel-electric power plant which allows for hybrid and battery-only operations. Glosten worked closely with stakeholders to develop a preliminary vessel specification and general arrangement which would satisfy the needs of both crew and scientists, and provided SARDI with capital and operating cost estimates to help them prepare a business case in pursuit of their mission.


An impression of Glosten's concept design for the SA Research and Development Institute
(Image courtesy Glosten)

## Incat TasmaniaPartners with Brittany Ferries and Wärtsilä for Zero-emission Ferry Project

Incat Tasmania announced in May a new partnership with European shipping company Brittany Ferries and technology company Wärtsilä to explore design and technical requirements for a 137 m zero-emission ferry.

Incat CEO, Stephen Casey, said that he is excited to be involved in the project as Incat pursues ambitions to build more zero-emission ferries for the global market.

"Incat has long-standing and successful relationships with Brittany Ferries and Wärtsilä, built upon shared values and a vision for innovation and environmental sustainability," Mr Casey said.

"We know that battery-electric propulsion coupled with lightweight aluminium vessels is the ideal choice to eliminate emissions, and we are thrilled to be continuing our relationship with both Brittany Ferries and Wärtsilä as we collectively lead the next evolution of sustainable maritime transport throughout Europe."

Brittany Ferries Chief Executive, Christophe Mathieu, highlighted Incat as the logical choice for the project.

"This is an important project as we look at different ways to reach net zero by 2050. All-electric power is a potential solution, best suited to shorter ferry routes. Brittany Ferries has a track record of walking the talk when it comes to

leading the industry on sustainable ferry travel, as our investment in LNG and hybrid ships shows," Mr Mathieu said.

Wärtsilä, which will power Incat Hull 096—the world's largest battery electric ferry—with its battery electric propulsion system and waterjets, sees ferries as vital in meeting the demand for environmentally-sustainable transport solutions.

## Historic Moment for Incat as Hull 096 Takes Shape

Incat Tasmania has celebrated a significant construction milestone with the completion of the rollback and the placement of the superstructures on Incat Hull 096, under construction for Buquebus of South America.

Incat Chairman, Robert Clifford, expressed his pride in the company's achievement.

"At 130 m long, this is the largest vessel we have ever rolled back, and our crews did an exceptional job," Mr Clifford said.

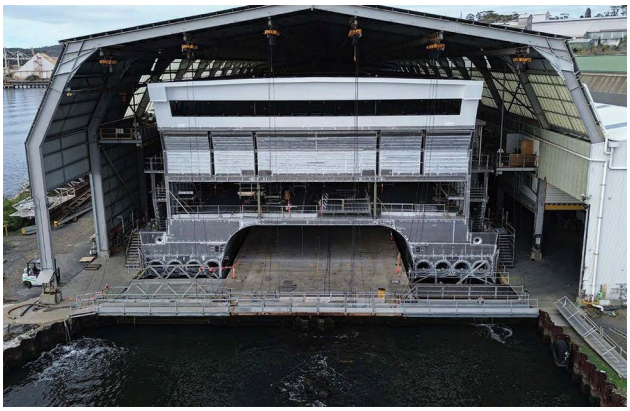
"Hull 096 is a monumental project for Incat, and to see another construction milestone completed is very special, not only for me personally but for the entire workforce."

Incat CEO, Stephen Casey, said that the vessel is progressing well and remains firmly on schedule.

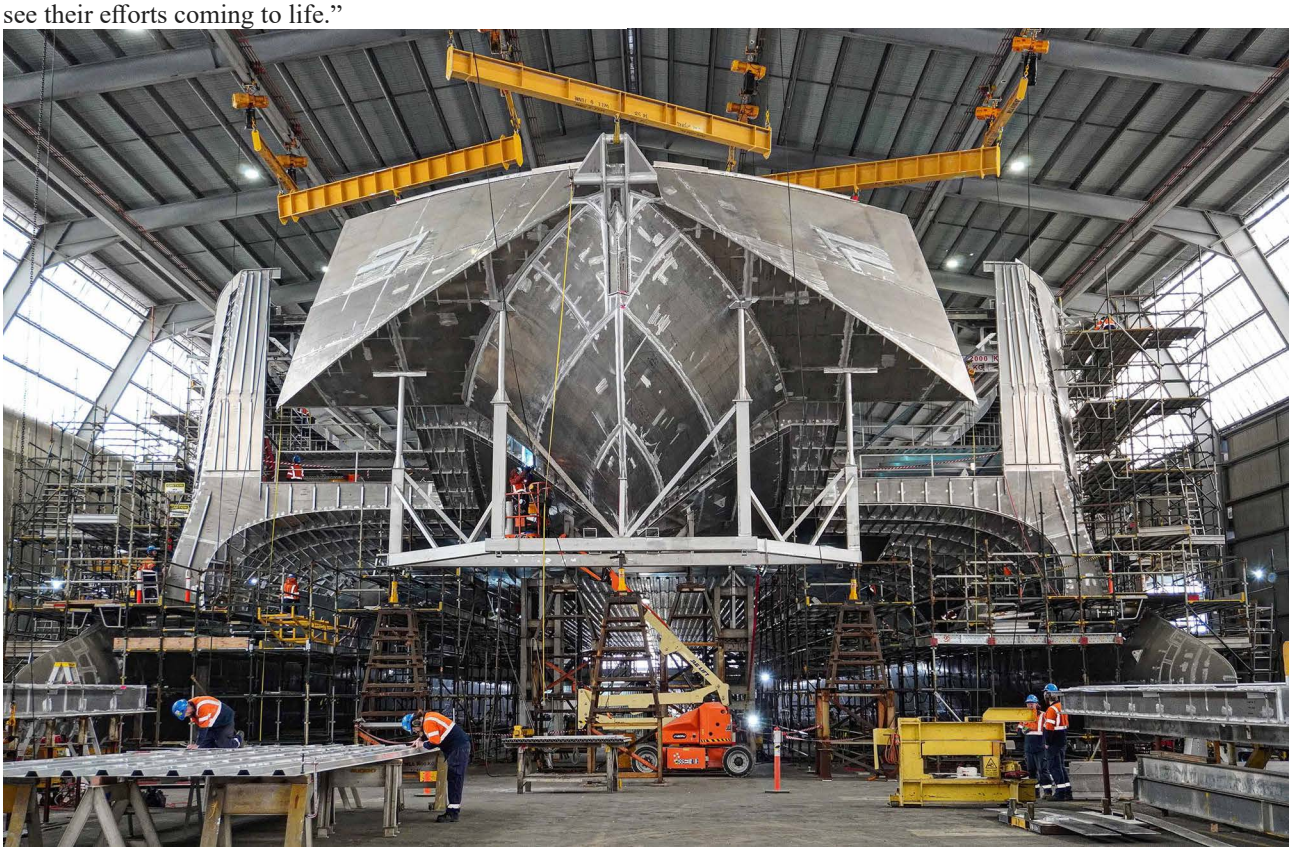
"Now that most of the structural work is complete, it allows our fit-out crews to begin their work on the interior of the vessel, this is a really exciting time in the build process," Mr Casey said

"With the superstructures in place, the world's largest electric ferry is really taking shape and the workforce can see their efforts coming to life."

A stern view of Incat Hull 096 under construction
(Photo courtesy Incat Tasmania)



Incat Hull 096 poking her stern out of the building hall
(Photo courtesy Incat Tsamania)



An impressive view of the bow of Incat Hull 096 taking shape
(Photo courtesy Incat Tasmania)


The US Navy submarine tender USS *Emory S. Land* arriving at Port Melbourne on her way to Western Australia
(RAN photograph)

## US Submarine Tender Visits Australia

The US Navy's submarine tender, USS *Emory S. Land,* began a visit to Australia in Darwin in May. Darwin was the first port visit of *Emory S. Land's* current deployment, which began on 17 May.

Since January 2024, *Emory S. Land* has been home to more than 30 Royal Australian Navy officers and sailors who travelled to Guam to embed on board the submarine tender.

These officers and sailors spent five months in the tender, integrating with US sailors and building unique knowledge, skills and experience in how the US Navy conducts nuclear-powered submarine maintenance.

The personnel involved range in rank from seaman to lieutenant and include electrical technicians, marine technicians and boatswain's mates.

A number of Australian personnel travelled in the tender to Australia, deepening their experience of tender-based maintenance at sea. The ship visited Cairns, Sydney and Melbourne on her way to HMAS *Stirling* in Western Australia.

## *Teranga I* from Incat Crowther

Incat Crowther and Penguin International have been commissioned to design and construct a new 36 m fast supply vessel (FSV) for O3S, Oil Senegal Support Services, a homegrown Senegalese operator servicing the country's fledgling offshore energy sector. The new state-of-the-art vessel will be capable of transporting 28 service personnel as well as 20 t of cargo at speeds of up to 33.5 kn. The vessel's design represents a unique blend of features from the offshore wind and offshore oil-and-gas sectors. The underlying catamaran hullform is derived from Penguin's proven WindFlex-32 crew transfer vessel (CTV), which was co-developed with Incat Crowther.

The vessel's air-conditioned cabin on the main deck will feature spacious and comfortable seating as well as a medical suite, two toilets and dedicated luggage holds. The main cabin will also contain a refreshment kiosk and large TVs for safety briefings. Each demihull features two berths for the vessel's crew in addition to bathrooms complete with shower facilities.

The large 62 $m^2$ foredeck optimises operational flexibility with a dedicated, enclosed cargo area and a FROG crew-transfer crane which enables the safe transfer of personnel from the vessel to offshore infrastructure. The vessel has also been fitted with an ultra-high performance bow fender to optimise safety when transferring personnel to the platform in open ocean conditions.

The vessel's elevated wheelhouse provides an excellent line of sight for the captain, while the upper deck also features a spacious, dedicated mess area and toilet for service personnel and the vessel's four crew.

Designed with operational efficiency in mind, the new vessel will also be fitted with the latest emissions-reduction technology to ensure that it is IMO Tier III compliant—offering emissions compliance significantly beyond other vessels operating in the region.

Commenting on the project, Incat Crowther's Technical Manager, Sam Mackay, said "We're excited to be working with our partners at Penguin International on this project."

Starboard bow view of *Teranga I*
(Image courtesy Incat Crowther)

"Incat Crowther and Penguin International have a track record of delivering for offshore energy operators seeking bespoke operationally-efficient state-of-the-art vessels. This project will add to the growing number of workboats and CTVs servicing the global offshore energy sector which have been designed and delivered by Incat Crowther and Penguin International," said Mr Mackay.

Construction on the new FSV is expected to start later this year, with delivery of the new vessel expected to take place in 2025.

Principal particulars of the new vessel are

| | |
|---|---|
| Length OA | 36.4 m |
| Length WL | 32.4 m |
| Beam OA | 10.0 m |
| Depth | 4.05 m |
| Draft (hull) | 1.40 m |
| Personnel | 28 |
| Crew | 4 |
| Cargo deck capacity | 20 t |
| Fuel oil | 52 500 L |
| Fresh water | 3750 L |
| Sullage | 3750 L |
| Urea | 3162 L |
| Main engines | 4×Caterpillar C32<br>each 1081 kW @ 2150 rpm |
| Propulsion | 4×Hamilton HTX52 waterjets |
| Generators | 2×Caterpillar C4.4 |
| Emissions | IMO Tier III compliant |
| Speed (service) | 31.0 kn |
| (maximum) | 33.5 kn |
| Construction | Marine-grade aluminium |
| Flag | Senegal |
| Class/Survey | BV ✠Hull ●Machinery, Fast Supply Vessel, Sea Area 3 |

## Next-generation Parramatta River Ferries from Incat Crowther

The NSW Government has announced that the first of seven new Parramatta-class ferries, which have been designed by Incat Crowther, is now in service in Sydney. The fleet of cutting-edge new ferries, which will service the busy Parramatta River commuter route, are being constructed in Tasmania by Richardson Devine Marine. A second vessel has begun sea trials and three more are already under construction, with the full fleet expected to enter passenger service over the next 18 months.

Incat Crowther worked closely with Transport for NSW and operator Transdev on the digital design of the new commuter ferries, including utilising augmented-reality headset technology to enable stakeholders to engage with the digital model of the ship throughout the process.

While aesthetically similar to the previous River-class vessels, the new Parramatta-class vessels are fully air-conditioned with no upper deck seating and feature floor-to-ceiling views, providing commuters with a smooth and enjoyable ride. The vessels have a 200 person capacity, and will predominantly run on the busy Parramatta-to-Circular Quay route. They have been future-proofed for conversion to electric propulsion when network infrastructure is ready. The innovative, future-focussed design means that the new ferries are expected to have a 25–30 year working life.

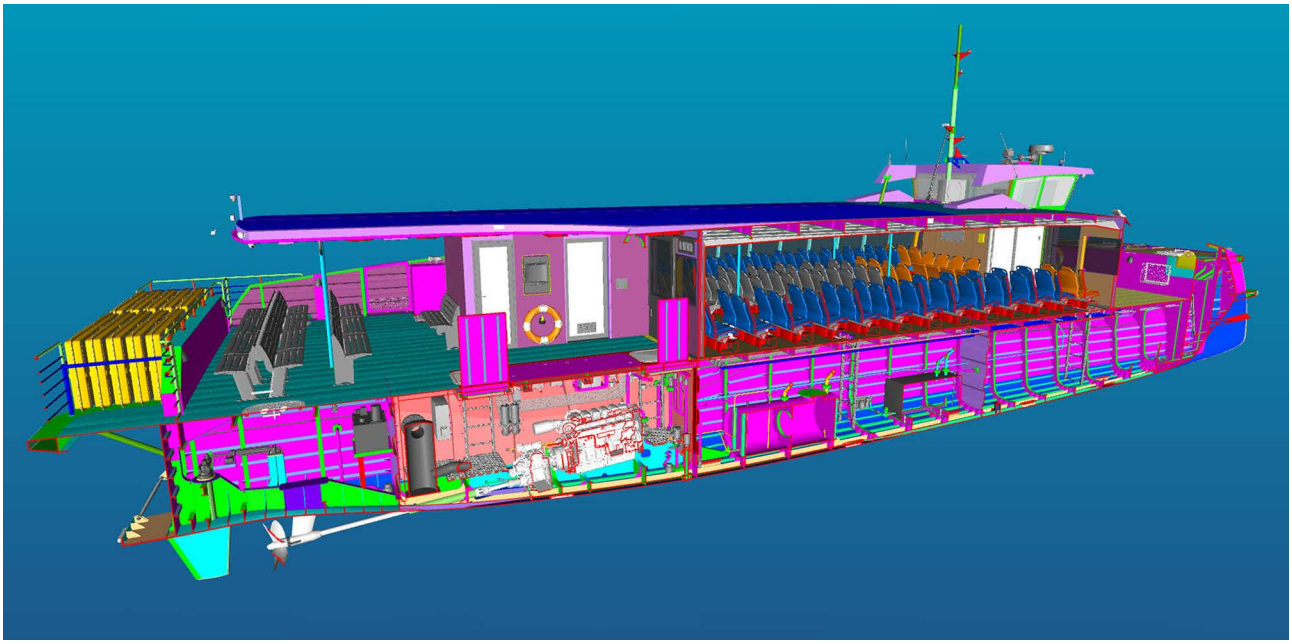
CEO of Incat Crowther, Brett Crowther, said that the digital shipbuilder's innovative approach and expertise in city networks have been central to the project: "Incat Crowther is an expert in designing solutions for city networks and has a proven track record of partnering with governments to deliver tailored passenger ferries for mass-transit systems across the globe."

"We design safe, efficient and future-focussed passenger ferries which are tailored to the needs of passengers, governments and their operators. This includes thirty-eight vessels for New York City Ferry, twelve for Italian operator Liberty Lines, as well as bespoke passenger ferries for operators throughout Asia, North America, Europe, the Middle East, Africa, Australia and New Zealand," said Mr Crowther.

"Our digital ship has been the heart of this project for Transport for NSW and Transdev, allowing us to keep a multitude of stakeholders closely involved, and creating trust and confidence before construction commenced. We're also pleased to be working closely again with Richardson Devine Marine. This has included one of our naval architects being stationed on site, providing assurance and construction oversight support throughout the process, and spearheading the use of augmented-reality technology which allows stakeholders to engage with the digital model of the ship. We are thrilled with the results and are proud to see the first vessel in this innovative fleet of next-generation ferries in Sydney ready for service," said Mr Crowther.

The seven new vessels in the fleet have all been named in honour of Australians who have made significant

Port bow of *Frances Bodkin*
(Photo courtesy Incat Crowther)

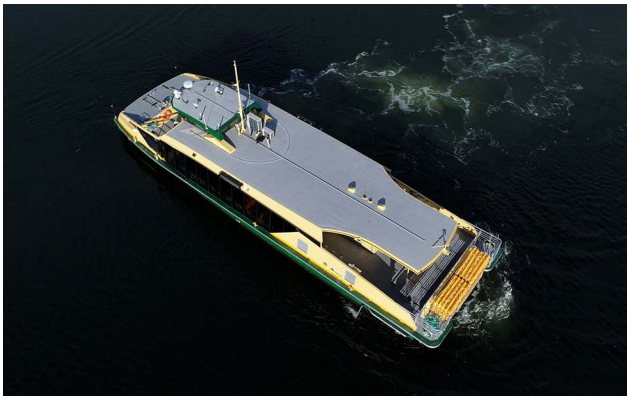


Cutaway view of *Frances Bodkin*
(Image courtesy Incat Crowther)

achievements in science, environment and innovation. The first vessel, *Frances Bodkin*, is named after a D'harawal elder who has dedicated her life to cataloguing plants native to western Sydney.

Principal particulars of the new vessels are

| | | |
|---|---|---|
| Length overall | | 26.40 m |
| Length waterline | | 24.95 m |
| Length measured | | 23.98 m |
| Beam overall | | 7.2m |
| Draft | (SDL) | 1.55 m |
| | (departure) | 1.48 m |
| Passengers | | 200 |
| Crew | | 3 |
| Fuel oil | | 2600 L |
| Fresh water | | 780 L |
| Black water | | 780 L |
| Main engines | | 2×Scania DI 13 070M each 405 kW @ 1800 rpm |
| Propulsion | | 2×propellers |
| Generators | | 1×Cummins Onan QD 8 kW |
| Speed | (service) | 23 kn |
| | (maximum) | 26 kn |
| Construction | | Marine-grade aluminium |
| Class/Survey | | NSCV Class 1D |



Bird's-eye view of *Frances Bodkin*
(Photo courtesy Incat Crowther)

## *Vittorio Morace* and *HSC Cristina M* from Incat Crowther

The first of twelve new hybrid high-speed ferries designed by Incat Crowther for Italian ferry operator Liberty Lines have exceeded performance expectations during sea trials and will soon begin servicing Liberty Lines' routes between Sicily and nearby islands. Named *Vittorio Morace* and *HSC Cristina M*, the new 38 m hybrid propulsion vessels have proven their ability to operate at speeds of up to 30 kn when carrying a full load, with a sprint speed of 33 kn.

The successful launches of *Vittorio Morace* and *HSC Cristina M* come after the Sicily-based operator and the shipyard Astilleros Armon worked closely with Incat Crowther to design a state-of-the-art high-speed low-emissions and customised hybrid-propulsion fleet.

Each vessel in the new fleet, being built by Spanish shipyard Astilleros Armon, is equipped with an integrated hybrid propulsion system which includes MTU 16V4000M65L engines providing both conventional and electric propulsion. In addition, each vessel features two e-motors, two variable-speed gensets, a battery system, electrical power management system and an MTU hybrid automation system.

This integrated system allows the fleet to enter and exit port in a zero-emissions mode at speeds of up to 8 kn, with the ability to recharge each vessel via shoreside infrastructure during longer stops. The vessels can also operate in a hybrid propulsion mode, reaching high speeds while recharging their batteries via the two main engines. In a further future-focused design element, the vessels are also ready for conversion to hydrogen consumption in the future.

The new vessels are designed to transport up to 251 passengers in safety and comfort, with the main deck featuring seating for 166 passengers, five bathrooms and a kiosk/bar amidships. The upper deck seats a further 85 passengers with an additional two toilets. Large luggage racks are available in both passenger cabins, in addition to overhead luggage bins.

Commenting on the new fleet, Chief Executive Officer at Liberty Lines, Gennaro Carlo Cotella, said "With this project, we are making a sustainable investment in the renewal of our fleet, with the purpose of continuing to offer high-quality services to our stakeholders and minimise environmental impact in order to achieve an emission-free future."

Incat Crowther's CEO, Brett Crowther, said "The launches of *Vittorio Morace* and *HSC Cristina M* provide a glimpse into the future of low-emission public transport. These vessels are a smart long-term investment by Liberty Lines, as not only do they help the company sustainably expand its fleet today, but they are also future-proofed for an operationally-efficient zero-emissions future as alternative fuels become more economically viable for operators".

The ten remaining vessels in the fleet are expected to follow *Vittorio Morace* and *HSC Cristina M* into service between 2024 and 2029.

Principal particulars of the new vessels are

| | |
|---|---|
| Length overall | 39.71 m |
| Length waterline | 38.41 m |
| Beam overall | 8.25 m |
| Depth | 4.00 m |
| Draft (hull) | 1.84 m |
| Passengers | 251 |
| Crew | 7 |
| Fuel oil | 20 000 L |
| Fresh water | 1500 L |
| Sullage | 2000 L |
| Main engines | 2×MTU 16V4000 M65L each 2560 kW @ 1800 rpm |
| Propulsion | 2×fixed-pitch propellers |
| Speed (service) | 28 kn |
| (maximum) | 30 kn |
| Construction | Marine-grade aluminium |
| Flag | Italy |
| Class/Survey | RINa C✠HSC A MON, PASSENGER SHIP, ✠AUT-CCS, PMR-ITA |


*Vittorio Morace* on trials
(Photos courtesy Incat Crowther)

## 22 m Tourism Vessel from Incat Crowther

Incat Crowther has been commissioned by The Tour Collective, a leading eco-tourism operator in Australia's southeast Queensland region, to develop a new custom-designed tourism vessel to support the company's award-winning operations in the Moreton Bay Marine Park. The Tour Collective chose to work with Incat Crowther following the success of *Spirit of Migaloo II*, an Incat Crowther-designed catamaran which has been in operation for The Tour Collective's Seaworld Cruises brand since 2019. The new highly-customised 22 m vessel, which will support The Tour Collective's See Moreton brand, has been designed to support the unique schedule and operational requirements of See Moreton while elevating the on-board experience for customers.


Starboard bow of 22 m tour vessel
(Image courtesy Incat Crowther)

The new vessel will incorporate Incat Crowther's proven stern swimming-platform design which offers an unparalleled passenger experience for vessel-based snorkelling and recreation. The low-draft vessel is also fitted with a bespoke bow gangway to allow for beach landing on the many islands within the Moreton Bay Marine Park area.

The main deck features comfortable seating for 105 passengers, a large central bar, two large refreshment refrigeration units, three toilets and large ceiling windows to maximise opportunities for passengers to enjoy the iconic views while on board.

The mid deck features lounge-based seating for 42 passengers, with the layout tailored to ensure that every passenger can enjoy the views from their seat. The mid deck also boasts a second bar, two additional toilets, outdoor front-of-vessel seating for 49 passengers, the wheelhouse and a multifunctional platform which can act as a lifeguard station during snorkelling tours, as well as a DJ booth on dinner cruises.

The open-air roof deck, which can be accessed via dual stairways, offers spacious and secure outdoor seating for 20 passengers in addition to standing room.

Anthony Ardern, General Manager of The Tour Collective, said that the company is excited to be partnering with Incat Crowther to deliver another outstanding tourism experience for their customers.

"Since commencing operation in 2019, *Spirit of Migaloo II* has provided thousands of visitors to southeast Queensland with amazing whale-watching trips and memories which will

last a lifetime. We have been impressed by the performance and reliability of *Spirit of Migaloo II* and we are excited about our new custom-designed See Moreton branded vessel," said Mr Ardern. "In designing this new vessel, we have worked closely with Incat Crowther's team of naval architects to create a vessel tailored to our tours which will enable our customers to enjoy the beautiful Moreton Bay Marine Park in safety and comfort. We can't wait to get it on the water," Mr Ardern said.

Principal particulars of the new vessel are

| | |
|---|---|
| Length Measured | 21.99 m |
| Length WL | 21.99 m |
| Beam OA | 9.00 m |
| Depth | 2.75 m |
| Draft (hull) | 1.20 m |
| Passengers | 190 |
| Crew | 5 |
| Fuel oil | 7000 L |
| Fresh water | 3000 L |
| Black water | 2000 L |
| Main engines | 2×MAN D2862 LE425<br>each 749 kW @ 2100 rpm |
| Propulsion | 2×propellers |
| Generators | 2×Zenith Isuzu |
| Speed (service) | 25 kn |
| (maximum) | 28 kn |
| Construction | Marine-grade aluminium |
| Flag | Australia |
| Class/Survey | NSCV Class1C |

## *Margarita Salas* from Incat Crowther

*Margarita Salas*, an innovative ro-pax fast ferry with dual-fuel LNG engines designed by Incat Crowther for Spanish operator Baleària, has successfully completed sea trials. The new vessel has been delivered to Baleària and entered service in late July, providing a daily service between Barcelona and the Balearic Islands of Mallorca and Menorca, a vital link for passengers and vehicles.

Named after pioneering biochemist Margarita Salas, the vessel is the second fast ferry with dual-fuel gas engines designed by Incat Crowther and built by Astilleros Armon Gijon SA for Baleària. *Margarita Salas* builds on the innovation and sustainability of her counterpart, *Eleanor Roosevelt*.

Like her predecessor which has been in operation since 2021, *Margarita* Salas is 123 m long and 28 m wide, with capacity for 1200 passengers and 450 vehicles. However, the new vessel features an additional passenger deck with a spacious lounge area in the bow and an expanded aft terrace with an outdoor bar service, enhancing the onboard experience.

*Margarita Salas* has been designed to maximise sustainability and to deliver excellent onboard comfort and amenities. The design prioritises passenger comfort with spacious seating areas, a ride-control system to minimise vessel motions, and careful design including a resiliently-mounted superstructure for low vibrations and noise. Passengers will also benefit from several innovative technologies, including broadband internet and the ability to access their accommodation via a QR code. They will also have an on-demand digital entertainment platform, while those travelling with pets will be able to monitor them via a video surveillance system.

Powered by four 9600 kW Wärtsilä dual-fuel LNG engines, *Margarita Salas* will cruise at a service speed of 35 kn at 85% MCR. The propulsion system includes four waterjets and two azimuthing bow thrusters, ensuring excellent manoeuvrability when berthing in port. The vessel's dual-fuel LNG engines provide the ability to operate for approximately 470 n miles (approximately 756 km) on gas. It can also consume 100% biomethane and mixtures of up to 25% green hydrogen, making it a versatile and sustainable addition to Baleària's fleet.

Brett Crowther, CEO of Incat Crowther, said "The successful completion of sea trials means that this state-of-the-art vessel can now join the Baleària fleet beside her sister ship, *Eleanor Roosevelt*. This project has been a true collaboration between Incat Crowther, operator Baleària, and shipbuilder Astilleros Armon, and is the second very large aluminium ro-pax vessel built locally in Europe, close to its operating region."

Principal particulars of *Margarita Salas* are

| | |
|---|---|
| Length OA | 123.3 m |
| Length WL | 118.8 m |
| Beam OA | 28.0 m |
| Depth | 7.80 m |
| Draft (hull) | 3.30 m |
| Passengers | 1200 |
| Crew | 21 |
| Cars | 450 |
| Fuel oil | 313 400 L |
| LNG | 190 $m^3$ |
| Fresh water | 10 000 L |
| Sullage | 6500 L |
| Main engines | 4×Wärtsilä 16V31DF<br>each 9600 kW @ 780 rpm |
| Propulsion | 4×Wärtsilä WXJ 1500 waterjets |
| Speed (service) | 35 kn |
| Construction | Marine-grade aluminium |
| Flag | Cyprus |
| Class/Survey | Bureau Veritas |

*Stewart Marler*


Starboard bow of *Margarita Salas*
(Photo courtesy Incat Crowther)

# FRIGATES FOR THE RAN 1941 TO 1971

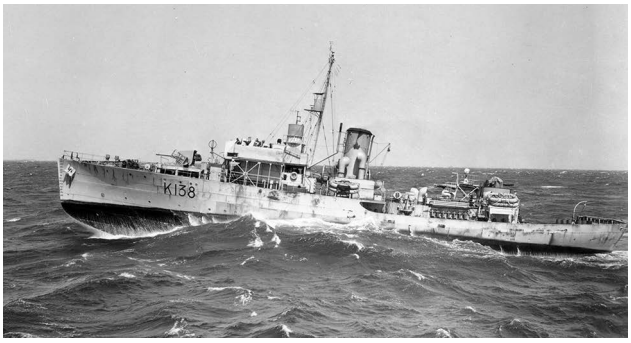
John Jeremy

Before we delve into history, we might ask: What is a frigate? With nautical terms Admiral W H Smith is a good place to start. His book, first published in 1867, lists some 14 000 nautical terms, and 'frigate' is amongst them. Ignoring the use of the word for the membranous zoophyte also known as the Portuguese man-of-war, we are informed that, in the Royal Navy, a frigate is "the next class of vessel to a ship of the line; formerly a light nimble ship built for the purpose of sailing swiftly."

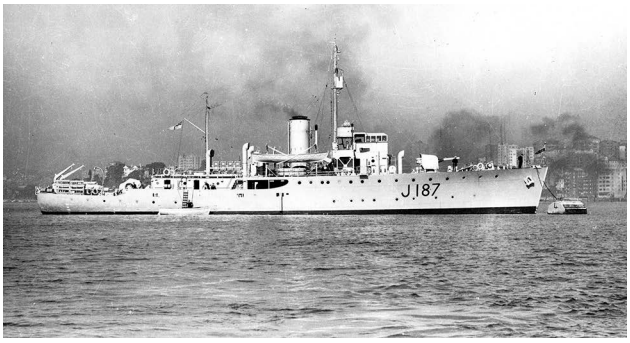
For our purposes that is not entirely helpful. Perhaps the Oxford English Dictionary could provide a more modern interpretation. It defines 'frigate' as "A war-vessel. In the Royal Navy, formerly a vessel of the class next in size and equipment to ships of the line". Admiral Smith's definition survives but, helpfully, the OED adds "Since 1943, a naval escort vessel, a large corvette." That will, indeed, be our starting point although, today, the class of ship includes vessels larger than the light cruisers of World War II and which are equipped with weapons capable of destroying such a ship before the cruiser even realised that they had been detected.

As World War II approached Britain, had a need for a large number of inexpensive escorts for anti-submarine duties which could be built in large numbers by shipbuilders not used to warship work. A corvette design by Smiths Dock based on the whale catcher *Southern Pride* was selected and the first were ordered in 1939. The first ships were available in July and August 1940. Ultimately nearly 300 Flower-class corvettes were built in Britain and Canada.

In Australia a program was begun in 1938 to build small vessels for local defence. The design was largely completed by February 1939 and the first Local Defence Vessel was ordered in December 1939 from Cockatoo Dockyard in Sydney. Other shipyards soon received orders and the construction of these small ships helped rebuild the Australian shipbuilding industry which had declined during the previous decade. They were reclassified Australian Minesweepers (AMS Bathurst-class) in 1940, not least because the Admiralty considered the designation Local Defence Vessel confusing. Ultimately 60 of these little ships, which became commonly known as corvettes, were built, including twenty to Admiralty account (although commissioned as RAN ships) and four for the Indian Navy.




The Canadian-built Flower-class corvette HMCS *Barrie* demonstrating her seakeeping in the North Atlantic (RCN photograph)




HMAS *Bendigo*, LDV No 6, was built to Admiralty account and was completed on 10 May 1941 (RAN Historical Collection)

The British Flower-class corvettes earned their place in history, particularly in the North Atlantic. They were, however, rather too small for the demanding convoy work, being over crowded, uncomfortable and too slow for their anti-submarine duties. In November 1940 plans were considered for a larger and faster escort vessel, about 300 feet (90.91 m) long with much better seakeeping qualities. A speed of 22 kn was desirable, but it would have required turbine propulsion when turbine production was dedicated to larger warships. Instead, two corvette engines were to be fitted with a speed drop to about 20 kn. Whilst commercial construction practices were adopted as far as practicable, the new twin-screw corvette design was much more a warship than the Flower-class corvette. The 1865 ton (1895 t) frigates were designed for rivetted construction although the design was later successfully adapted for welded construction for the 75 ships built in the United States between 1942 and 1945.

The first orders for these new River-class ships were placed in February 1941.

The designation 'twin-screw corvette' was clumsy, and it was the Royal Canadian Navy which began to refer to its own ships of the class as frigates in March 1942. The change met resistance in Britain, with the First Sea Lord telling the Canadians that 'there was insufficient justification for the use of the term frigate, and it is therefore intended that all ships of the class should be designated corvettes'. Despite this resistance, on 23 February 1943, the Admiralty reclassified the new ships as frigates, reviving a proud historic designation which continues today.

### Frigates for Australia

In Australia, in April 1941, the then acting Prime Minister requested the Naval Board to consider options for a more capable warship for Australian trade defence. Prime Minister Menzies, then in England, sought advice from the Admiralty and the River-class design was recommended. The Naval Board concurred and recommended an initial order of six ships which was approved.

On 5 July the Director of Engineering (Naval) wrote to Cockatoo Dockyard advising that the tentative programme for shipbuilding for 1941–42 included the construction at Cockatoo of two twin-screw corvettes complete with engines and asking that this work be borne in mind when planning the dockyard's work programme. RAN River-class frigates No. 1 and 2 were ordered from Cockatoo Dockyard on 16 August 1941, but it was not until 8 June 1942 that the company forwarded an 'approximate estimate of the cost of constructing a new corvette' of £360 000 (about $34.6 million today). The cost excluded, as usual, a wide range of Naval Board supply items, including the boilers which were ordered from Cockatoo separately. The dockyard ultimately built 26 River-class frigate boilers, including a number for ships subsequently cancelled.

Construction of the River-class frigates at Cockatoo was delayed by more-urgent ship-repair work and the first of the class to complete was HMAS *Gascoyne*, Frigate No. 5, built by Mort's Dock in Balmain. Frigate No. 1 was laid down on 21 October 1942 and was named *Barcoo* and launched on 26 August 1943. Reflecting war experience, several changes were incorporated into *Barcoo* during construction and, only five weeks before completion, the guns were changed, bullet-proof shelters and protective bulwarks were removed to save top weight, and the main mast was removed and replaced by a goal-post mast. She was completed and handed over on 10 February 1944. Changes made to Frigate No. 2, *Barwon,* were far more extensive and included improved armament, modified magazines, and changes to the bridge structure.

The River-class frigate programme was ultimately increased to 22 ships, although only 12 were completed—by Cockatoo and Morts Dock in Sydney, the State Dockyard in Newcastle, Walkers in Maryborough and Williamstown Dockyard in Victoria. The first eight ships were very similar to the many ships of the class built in Britain, Canada and the United States, but the final 14 were altered significantly to improve anti-aircraft capability. This was done by modifying the bridge structure to enable two twin 4-inch QF gun mountings to be fitted together with one twin 40 mm Bofors mounting and much-improved fire-control arrangements.

The four ships completed to this Modified River-class design, HMA Ships *Condamine*, *Culgoa*, *Murchison* and *Shoalhaven*, were propelled by the same machinery as the first eight ships. Four more modified River-class frigates were ordered on 10 December 1942 from Cockatoo Dockyard but these were intended to be fitted with steam turbines. These ships, Frigate No. 16 (*Wollondilly*), Frigate No. 17 (*Namoi*), Frigate No. 18 (*Wimmera*) and Frigate No. 19 (*Campaspe*) were all cancelled in 1943–44 as were those to be built by other shipyards.

HMAS *Gascoyne* was the first RAN River-class frigate to be completed, on 18 November 1943
(RAN Historical Collection)


HMAS *Shoalhaven* was one of four modified River-class frigates completed for the RAN in 1944–46
(RAN Historical Collection)

With the war drawing to a conclusion as the Australian River-class frigates were completed, many saw very little service. For example, after HMAS *Barwon* was commissioned she carried out patrol duties in New Guinea before returning to Australia to pay off in March 1947 after only 14 months in commission. The modified River-class ships saw more service than most of the earlier ships—in Japanese waters and Korea. Of the earlier ships, *Barcoo*, *Gascoyne* and *Diamantina* saw further service as survey ships and *Diamantina* is today at the Queensland Maritime Museum, possibly the last survivor of the class.

The River-class frigates had been designed as anti-submarine escorts. In the years after the war the early RAN ships were modernised by the installation of Squid anti-submarine mortars forward of the bridge but, like so many of their contemporary World War II-conceived ships, they were hampered by their lack of speed which limited their effectiveness against the modern high-speed submarine. Many of the large numbers of frigates were decommissioned, sold for on-going service with some 16 navies or ultimately scrapped, although the Canadians completed an interesting modernisation of 21 ships with the forecastle deck extended right aft, Squid mortars in a well aft and much improved crew accommodation.

After the end of World War II the commercial shipyards in Australia, which had been revived by the naval program and the program for construction of commercial vessels, concentrated on the latter and naval construction was concentrated at the two Commonwealth-owned yards, Cockatoo Dockyard in Sydney and Williamstown Naval Dockyard in Victoria. These two yards had orders for Battle-class destroyers (*Anzac* and *Tobruk*). In December 1946, the Commonwealth ordered four more destroyers of the British Daring class, two from each yard—all welded ships of advanced design which were to introduce new construction practices to the yards. Whilst the RAN needed the ships to maintain its destroyer force, government approval was given on the basis that the work would help avoid the situation which had existed in 1939 when Australia barely had a shipbuilding industry. The construction of the destroyers would help establish a continuous program of naval construction and maintain the necessary skills.

The construction of all these destroyers was ultimately delayed by several factors, not least being restrictions on the rate of expenditure imposed by the Treasury in those financially difficult times.

### The Type 15 Conversions

Dominating naval planning in the early years after the war was the need to provide anti-submarine ships capable of dealing with the high-speed submarines which had been developed during the war. Existing frigates were too slow. Whilst the destroyers would add considerable capability, in 1950 the Navy recommended the modernisation of the three Tribal-class destroyers, conversion of the five Q-class destroyers on loan from the RN to fast anti-submarine frigates along the lines of an Admiralty design designated Type 15, and the construction of six anti-submarine frigates to follow the six destroyers already on order. The program was implemented but the projected timescale and cost estimate were to prove wildly inaccurate.

Ultimately only two of the Tribals were modernised, *Arunta* and *Warramunga*, but their pre-war design limited what could be achieved and both ships only had a limited life. *Bataan* was not modernised. The frigate conversion and construction projects were much more effective, if protracted and more costly than anticipated.

In late 1938, the Admiralty had begun design studies for new classes of intermediate destroyer which could be built in large numbers relatively quickly. Sketch designs were completed in May 1939 and the first flotilla of Emergency Programme destroyers, the O-Class, was ordered on 3 September 1939. Further orders followed, including for the Q-class flotilla, which was ordered at the end of March 1940. The Admiralty proposed that three of the Q-class, *Quiberon*, *Quickmatch* and *Quality,* be manned by the RAN, but only the first two were commissioned as RAN ships on 6 July 1942. On 4 October 1945 the Australian War Cabinet approved an Admiralty proposal that five Q-class destroyers (including *Quiberon* and *Queenborough*) serving with the British Pacific Fleet be transferred to the RAN on loan.

The crews of three remaining RN-manned Q-class destroyers, *Quadrant*, *Queenborough* and *Quality* returned to the UK and HMAS *Quadrant* commissioned in October 1945 and paid off into reserve on 20 June 1947. HMAS *Queenborough* was commissioned on 29 October 1945 and served until 20 May 1946 when she joined the reserve fleet in Sydney. HMAS *Quality* was transferred in November 1945 but served as an RAN ship for only fifty-nine days, paying off to reserve on 25 January 1946.

Following the RAN's proposal in January 1950 to convert the five Q-class destroyers to antisubmarine frigates, in May 1950 Prime Minister Menzies sought British agreement for the conversions on the basis that Australia would pay the full cost, then estimated at £400 000 per ship. In response, the ships were given to Australia with all their stores and they were permanently transferred on 1 June 1950

The conversion of the ships was to be shared between Cockatoo Dockyard (*Queenborough*, *Quiberon* and *Quality*) and Williamstown Dockyard (*Quadrant* and *Quickmatch*). At early meetings held at Navy Office on 13 and 14 April 1950 and at Cockatoo Island on 23 May 1950, despite a lack of information on the nature of the conversion, decisions were made about the sharing of drawing office work between the two dockyards, with Cockatoo Dockyard to prepare most of the working drawings for the structure and piping systems, and Williamstown preparing some of the drawings for structure forward of the machinery spaces and the ventilation drawings. Navy office was to prepare all drawings for weapons systems and spaces. When the extent of the structural work involved in the conversion became known around August 1950 it was also agreed that Cockatoo would supply a full set of loft templates for all new structure above the weather decks for Williamstown.

As guidance for the conversion of the Australian ships, Navy Office acquired the drawings of the prototype ships *Rocket* and *Relentless* which had begun conversion in 1949 at Portsmouth and Devonport Dockyards. The conversion of the Type 15 frigates was very extensive—all the superstructure was removed above the weather decks and internal minor bulkheads stripped. The forecastle deck was extended almost to the stern with one of the biggest aluminium structures used in a ship at that time. Forward of the funnel a low bridge structure, housing the operations room and electronic spaces was built on the forecastle deck (No. 1 deck), also in aluminium. In most of the British conversions, a small wheelhouse with windows was built in the forward end of this structure, with a small bridge above the operations room. This arrangement ultimately proved impracticable and the Australian ships were fitted with an enclosed bridge on 01 deck.

The armament of the Australian ships was planned to include a twin 4-inch gun mounting on No. 1 deck aft, a twin 40-mm Bofors Mk V mounting on the forward superstructure with the main armament being two Mk 10 (Limbo) anti-submarine mortars in wells aft. Production difficulties with the Mk 10 mortar meant that the first of the RAN conversions was completed with two Squid mortars as an interim measure.


The first RAN Type 15 conversion, HMAS *Quadrant*, during trials in April 1953
(RAN Historical Collection)

In Australia, the first ship to complete conversion was *Quadrant*, at Williamstown. She had been taken in hand in January 1950, began sea trials in April 1953 and was commissioned on 16 July 1953. At Cockatoo Island, *Queenborough* and *Quiberon* were taken in hand in May 1950. In addition to the conversion work, the machinery in both ships was thoroughly overhauled and, in *Queenborough*, a gear wheel had to be removed from the starboard gearbox for machining of the trunnions. In addition to the new anti-submarine armament, the ships were fitted with new radar

and communications, greatly improved accommodation, enlarged galley and laundry facilities and extensive air-conditioning.

All the ships were delayed by the need to adapt the British design to suit Australian requirements and delays in the supply of equipment—work in the ships was stopped on occasions to allow the drawing offices in Navy Office, Williamstown and Cockatoo to catch up. At Cockatoo Dockyard progress was also hindered by a lack of skilled labour, particularly in the outfitting trades. *Queenborough* was handed back to the RAN on 1 December 1954 and was commissioned on 7 December 1954.

The lack of labour and the workload on the construction of the Daring-class destroyers *Voyager* and *Vampire* meant that Cockatoo Dockyard had few resources available for *Quiberon* and, at the end of 1954, structurally virtually complete, she was moved to Garden Island with barge loads of equipment for completion by that dockyard. She was eventually completed and commissioned on 18 December 1957.

Some material was purchased for the fifth ship, *Quality*, but she was never taken in hand and her conversion was cancelled. She had been given short refits in reserve in 1948 and 1950, but by 1954 her structure had severely deteriorated and her hull was patched in places. In August 1956 she was seen to be taking water. Corroded through at the waterline, she was swiftly docked in the Captain Cook Dock at Garden Island. All her superstructure above the weather deck was cut off and scrapped to reduce her draught and she was refloated to await her fate. *Quality* was finally sold on 10 April 1958 and scrapped in Japan.

*Quadrant* served for only four years, being decommissioned in August 1957. *Quickmatch* served from September 1955 to April 1963 and *Quiberon* from December 1957 to June 1964. *Queenborough* served as an anti-submarine frigate for nearly ten years before decommissioning in July 1963. She was recommissioned in July 1966 as a training ship, a role she continued until 1972—the last of the RAN Type 15 frigates.

### Six New Frigates for the RAN—no, make that four

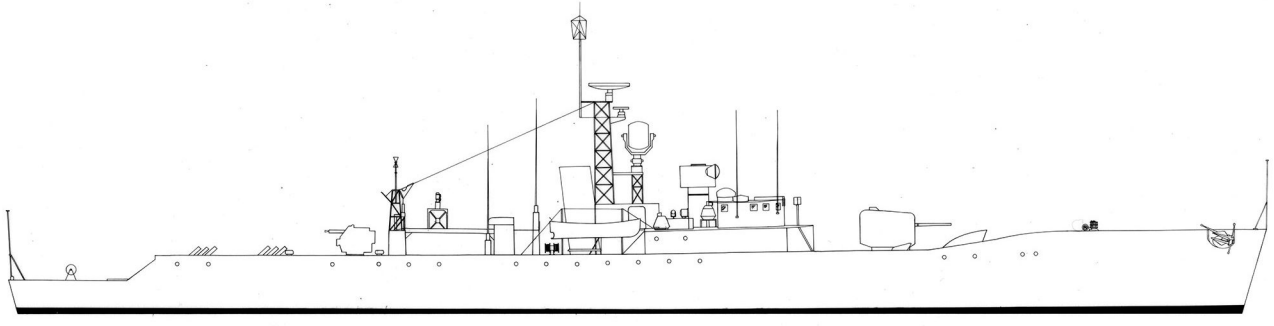
The third component of the Navy's plan to modernise and enlarge the RAN's anti-submarine force began in August 1950 when Cabinet approved the construction of six modern anti-submarine frigates at a total estimated cost of £14 million. The ships took the place of further destroyers which would otherwise have been necessary to maintain the continuity of naval construction at Cockatoo and Williamstown, for at that time it was still expected that all the Daring-class destroyers would be completed by the mid-1950s. The number of ships was reduced from the planned six to four in April 1953 when one of the Darings, *Waterhen*, was also cancelled and the modernisation of the destroyer *Bataan* and the conversion of *Quality* deferred indefinitely.

The ship selected was the British Type 12 anti-submarine frigate which was still in the early stages of design.

The need for a new generation of anti-submarine ship with a speed of at least 25 knots emerged in Britain in 1944 and initially thoughts were for two of the new ships to be ordered as part of the 1945 programme. Constructor M. K. Purvis was given the task of developing the new design which was initially based on a more powerful version of the Black Swan-class sloop. Studies continued through 1945 and the parallel need for ships with specialised anti-aircraft escorts directed work towards the concept of a common hull and machinery which could be fitted out for the different roles.

The high speed required by the anti-submarine version of the new frigate could only be achieved then by using steam turbine machinery. As work continued after the end of the war, concern about the capacity of industry to produce sufficient turbines in an emergency meant that two types of ship were developed, a common hull powered by eight ASR-1 diesel engines with a top speed of 23 kn for anti-aircraft and aircraft direction duties which became the Type 41 and Type 61 frigates, and a more powerful steam-turbine-powered ship capable of 27 kn which became the Type 12. As the rapid advances in weapons and electronics made these ships rather expensive, a cheaper single-screw anti-submarine frigate was also designed, which became the Type 14 utility frigate, intended to be capable of rapid production in numbers.

The primary task of the Type 12 frigate was the protection of convoys from submarine attack. Several versions of the design were considered before a ship 360 feet (109 m) long and 41 feet (12.4 m) beam (Design Y) powered by steam turbines developing 30 000 SHP was chosen in February 1950. The machinery was of a new design, known as Y100, which had been ordered from English Electric in 1948. Construction of the first ship had been authorised in the 1949 programme and, after Admiralty approval of the design in December 1950, the first ship was ordered in February 1951.



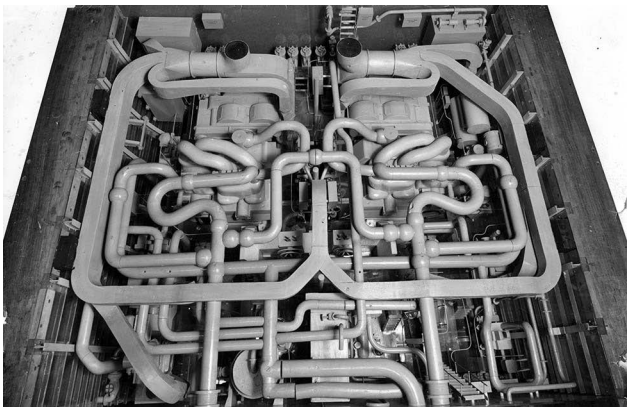
The Type 12 frigate Design Y
(Based on Admiralty drawing DNC 38/476)

The Type 12 frigate was to prove to be one of the most successful post-war warship designs with several variants of the design developed and some 70 ships built for seven navies over the following three decades.

The original concept for the family of new frigate designs was for a range of ships which could be built rapidly and in large numbers with parts prefabricated away from shipyards and brought together for assembly. Following post-war experiments with modern all-welded ex-German destroyers which proved the resistance to damage of a hull constructed with widely-spaced frames and closely-spaced longitudinals, this method of construction was adopted for the new frigates. The construction of the Type 41 and Type 61 frigates in this way proved to be difficult and a slightly wider spacing of longitudinals was adopted for the Type 12. Nevertheless, the ships had 31 longitudinals (more forward) which were continuous through the tapered frames and bulkheads compared to the 19 longitudinals in the Daring-class destroyers presenting quite a challenge for the shipbuilders although it proved to be very effective in service.

The outfit of the Type 12 was also more complex than any previous ships and they were quite cramped. Despite plans that electronic spaces might be constructed and fitted out away from the shipbuilders, this form of modular construction proved to be overly ambitious (for the time) and the construction of Type 12 frigates was definitely a job for a specialised warship builder and they were quite expensive.

A shell panel for a Type 12 frigate showing the closely-spaced longitudinals (RAN photograph)



A model of a Y100 engine room. Later variants (Y136 and Y160) were less complex (RAN photograph)

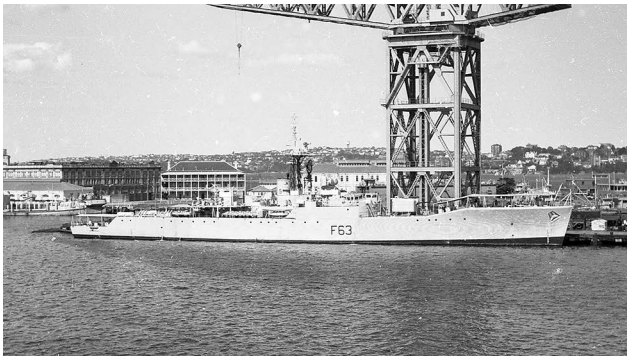
The hullform of the Type 12 was unusual. One of the requirements for the ship had been the ability to maintain high speed in rough conditions. This led to a very fine hull-form forward. The 4.5-inch Mk VI twin mounting forced the bridge well aft and the turret was set as low as possible to provide visibility forward from the bridge. To provide sufficient freeboard forward to keep the decks as dry as possible in rough conditions the forecastle deck was raised, resulting in the distinctive Type 12 hump in the sheer line. The extra space this hump provided in the hull enabled two diesel alternators to be positioned under the forecastle, well separated from the other machinery spaces.

The Y100 steam plant was located well aft. The machinery comprised a cruising turbine and a main turbine with a reduction gearbox supplied by two Babcock & Wilcox water-tube boilers in a single boiler room. The cruising turbine was later removed. To reduce radiated noise which could interfere with anti-submarine operations, the frigates were fitted with five-bladed propellers of new design which were slow running at a designed 220 rpm at full power, compared with 300 rpm in the Daring-class destroyers. The propellers were fitted with air injection on the leading edge of the blades (the Agouti system) to reduce cavitation noise.

With two ahead-throwing mortars and a comprehensive sonar installation the Type 12s were a formidable anti-submarine ship and, with their easily-driven hull and high freeboard, they developed a reputation for outstanding sea keeping. They were also originally to be fitted with an array of anti-submarine torpedo tubes but the weapon was not a success and was soon removed.

The Royal Navy built six ships to the original design, the Whitby class. The lead ship of the class, HMS *Whitby*, was commissioned on 10 July 1956, and one of the class, HMS *Scarborough*, visited Australia in October 1958 to give the RAN, and the shipbuilders, some idea of what lay ahead.

In 1955 the design was updated with a new aft deckhouse to accommodate the Seacat guided missile then being developed, together with partial bunk sleeping in some messes and modified central messing. This became the Rothesay class and nine ships of this type were built for the RN. Some of the later ships were also partially air conditioned with self-contained air-conditioning units.




The Whitby-class frigate HMS *Scarborough* in Sydney in October 1958 (Photo John Jeremy)

Preliminary information had been provided to the Australian builders in October 1950, based on Design Y. By the time the orders were placed for the first four ships (designated FSA RAN 01 and 02 at Cockatoo and FSA RAN 04 and 05 at Williamstown) in February 1952 the design was substantially more advanced. Completion of the four ships was then planned for 1957.

The delays to the Daring-class destroyers and the heavy workload in both dockyards meant that little progress was made with the frigates for some time, although the manufacture of the turbines and boilers at Cockatoo proceeded ahead of ship construction. At Cockatoo Island work began in the mould loft on 8 May 1952 but the processing of steel for the hull of the first ship was not started until December 1955. FSA RAN 01 was laid down on No 1 slipway on 3 January 1957 and she was launched as *Parramatta* by Lady Dowling, wife of the Chief of Naval Staff, Vice Admiral Sir Roy Dowling, on 31 January 1959. Contractor's sea trials were carried out in December 1961 and HMAS *Parramatta* was handed over and commissioned on 4 July 1961. Her sister ship HMAS *Yarra* was completed by Williamstown on 27 July 1961.

HMAS *Yarra* as completed
(RAN Historical Collection)

The four RAN Type 12s are frequently referred to as Rothesay class. The first two ships bore a resemblance to that class but, during their construction, every opportunity was taken to modernise them to incorporate improvements in the class from Britain and unique Australian characteristics. All the necessary design work for these changes was done in Australia. Compared to the Rothesay class *Parramatta* and *Yarra* had increased fuel and fresh water capacity, full air-conditioning of all operational and accommodation spaces with a centralised plant, cafeteria messing and bunk accommodation for all senior and junior sailors to RAN standards.

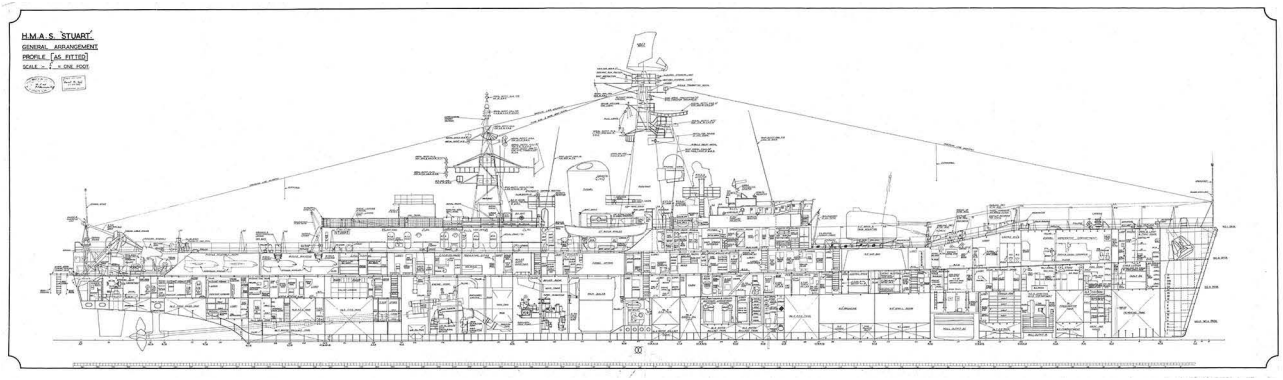
In the machinery spaces the cruising turbines were deleted (they were removed before completion) and a fully-enclosed and air-conditioned machinery control room was fitted in the engine room, a feature that did not appear in the RN until the later Leander-class Improved Type 12.

The armament was also different. The torpedo tubes were not fitted (removed before completion) and the MRS3 gun fire control (also a Leander-class improvement) replaced the Mk VI director. The British Type 277 radar was replaced by the Dutch HSA LWO2 on top of a fully-enclosed foremast (which didn't help the ships' stability) and the ships were fitted with US-sourced electronic warfare equipment and improved communications. *Parramatta* and *Yarra* were fitted for-but-not-with Seacat when they commissioned and mounted a 40-mm Bofors Mk V mounting until the missile system was fitted at a later date.

The second Cockatoo-built ship, *Stuart*—FSA RAN 02, was laid down on 20 March 1959. At the time she was intended to be identical to *Parramatta* but shortly before her launching by Mrs J. G. Gorton, wife of the Minister for the Navy, on 8 April 1961, everything changed. In early 1961 the dockyards were advised that it was intended that the second two ships would be modified to accommodate the Australian-designed Ikara anti-submarine weapon system. Ikara had been under development since the late 1950s as a cruise missile which carried a homing torpedo for delivery close to the target at a maximum range of about 11 n miles. Ikara greatly extended the effective range of the anti-submarine warship and filled an important gap in capability until ship-borne helicopters became available to the fleet.

The installation of Ikara in the two Australian Type 12s, *Stuart* and *Derwent*, resulted in extensive changes to the ships. Space for the missile magazine and assembly room was created by removing one Mk 10 mortar but other consequential changes resulted in most of the arrangement of the ships above No. 2 deck (the upper deck) being altered. Hence when *Stuart* was launched, everything above No 2 deck was in abeyance pending the redesign.

Whilst both *Stuart* and *Derwent* were modified, *Stuart* was intended to be the trial ship for Ikara and *Derwent* was to be the first RAN ship with Seacat. Both ships respectively received the missing system later.




HMAS *Stuart* completed as Ikara trials ship
(NAA: M2879, 1)

As the Ikara handling system was still being developed, the fitting out of *Stuart* proceeded in a rather ad hoc manner. Amongst the changes was the fitting of a variable-depth sonar, the Canadian AN/SQS 504, which was installed on the quarterdeck. The electronic warfare installation was also modified.

Contractor's sea trials for *Stuart* were carried out in October 1962. Early in 1963 the first Ikara launcher was delivered to the island and fitted to the ship. In February/March *Stuart* went to sea again for a series of test firings of the missile. The installation of the handling equipment was not complete when she was handed over to the RAN on 27 June 1963 and commissioned as the trials ship for the Ikara system. HMAS *Stuart* returned to the dockyard on several occasions over the following year to complete that work and fit other equipment not installed for her trials ship role.

Whilst they entered service much later than originally intended, the Type 12 frigates came with improved capability and served Australia well for many years.

All four ships were modernised in the late 1970s and 1980s although that for HMAS *Yarra*, which was carried out at Cockatoo Island, was much reduced in scope as her structure was the most Whitby-like of the four ships and a shorter life was expected. She became the trials ship for the Australian-developed sonar Mulloka. HMAS *Parramatta*, HMAS *Stuart* and HMAS *Derwent* were all modernised at the Williamstown Naval Dockyard in Victoria. *Parramatta* began her refit in June 1977 and was recommissioned on 26 August 1981. The modernisations were protracted and expensive, a common experience for Type 12s.


HMAS *Stuart* as modernised
(Photo John Jeremy)

## Two More Frigates—by accident

The remaining ships, FSA RAN 03 and 06 which had been dropped from the program in 1953, resurfaced in 1958, but in June 1964 they were finally approved to replace HMAS *Voyager* which had been lost earlier that year. On 23 June 1964 the Minister for the Navy, the Hon. F. C. Chaney MP, announced that the two ships would be built by the dockyards at Williamstown and Cockatoo Island, 'the only yards outside Britain which had experience in building the Admiralty-designed Type 12 frigates'.

The intention was for the frigates (later reclassified destroyer escorts, becoming DE RAN 03 and 06) to be built within four years to replace *Duchess* (on loan from the Royal Navy) in 1968. Accordingly they were intended to be identical to *Stuart* and *Derwent* and the dockyards were asked to order all the material for the hulls immediately.

By the time DE RAN 03 and 06 were ordered, the design development of the Type 12 frigate had moved on considerably from the Rothesay-class design on which *Stuart* and *Derwent* had been based. The Admiralty began development of the Rothesay class to produce a frigate of a general-purpose type in mid-1958. This new design became the very successful Leander-class frigate. In the first ten British Leander-class frigates the Y100 machinery was installed, but the next six had a modified Y136 power plant, and the last ten had the Y160 machinery installation which included the fully-enclosed machinery control room which the RAN had adopted much earlier. The installed generating capacity was also progressively increased and the last ten ships also had an extra two feet (0.61 m) of beam to improve stability.

Following a joint dockyard/Navy technical mission to Britain in late 1964, the RAN decided to incorporate as many of the Leander-class improvements as possible in 03 and 06, together with a range of other uniquely-RAN changes. The revised general arrangement was issued to the shipbuilders in March 1965, and the ships were then, effectively, a new purely-Australian, design.

The extent of change was to a degree constrained by the already-ordered material, so the narrow-beam Rothesay-class hull was retained. Otherwise, apart from the armament which remained the same as *Stuart* and *Derwent*, the ships were completely different.

The forecastle deck was fully extended to the stern, increasing the ship's length to 372 feet (112.7 m). The VDS (not a success in RAN service) was dropped, and the Ikara launcher fitted in a well on the starboard quarter. The 4.5-inch Mk VI gun mounting was updated from Mod 1 to Mod 3, and the MRS3 fire-control system was replaced with the Dutch M22, and the GWS20 fire-control for Seacat replaced with the Dutch M44. Internal and external communications and electronic warfare equipment were updated.

Internally the forward diesels were moved aft to the hold and the installed power increased. Heads and bathrooms were modernised and crew accommodation improved as far as possible in the limited space available.

A Leander-like superstructure was designed with a wider bridge for improved visibility aft. To reduce top weight, the superstructure above 01 deck including masts and funnel was constructed of welded aluminium and internal minor bulkheads throughout the ship were also made of welded aluminium, special extrusions being developed for the purpose.

Machinery changes were extensive. Stabilisers were fitted and generating capacity increased by two thirds. The Y136 machinery was adopted, with some features of Y160, including automatic remote control of main and auxiliary machinery. Electric telegraphs, capstans and steering control were also fitted.

To incorporate all these changes, virtually a complete redesign of the ship was needed, a task shared by Navy Office (which set up an annex in Sydney to house extra staff), Cockatoo and Williamstown, which was designated as lead yard. Construction of the ships continued to be a high priority, so design and construction continued in parallel with, on occasions, drawings being prepared after work had been started at the ship.

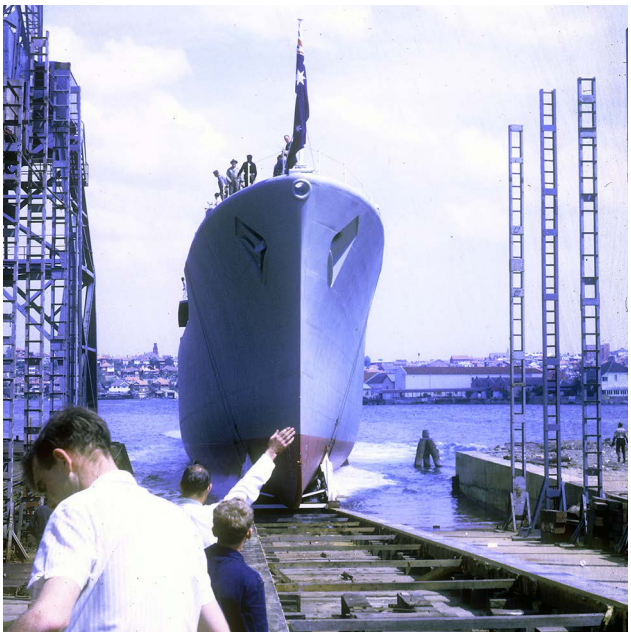
The turbines for both ships were made at Cockatoo Dockyard as before. The boilers, which were of an improved design, were ordered from Britain to save time. Similarly, the gearing was ordered overseas. The anti-submarine mortars and handling equipment removed from *Parramatta* and *Yarra* when Ikara was fitted in those ships was refitted and modernised for 03 and 06. Two new gun turrets were imported from overseas to save time.

With political pressure for progress with the *Voyager* replacements, both ships were laid down on 18 August 1965, much too soon. HMAS *Torrens* was launched on 28 September 1968 by Dame Zara Holt, widow of the late Prime Minister, Harold Holt.

The lead ship, HMAS *Swan*, was commissioned at Williamstown in January 1970 although she was not actually completed until 17 April. The political imperative was still present. *Torrens* went to sea for contractor's sea trials in May 1970 and was handed over on 18 January 1971.

The two ships were completed years later than planned and the project cost rose from an estimated $44 million to over $60 million by mid-1970 (equivalent to about $831 million today).

Despite the challenges and difficulties with the construction programme, the two new RAN Type 12s were outstandingly successful, unique representatives of one of the most prolific post-World War II British warship designs. They were a tribute to the Naval Staff who decided to modernise the



HMAS *Torrens* entering the water on 28 September 1968
(Photo John Jeremy)


HMAS *Swan* was completed on 17 April 1970
(RAN Historical Collection)

design, the technical staff in Navy Office and the dockyards who implemented the changes. It demonstrated a capability built up over many years of steady warship construction and gave confidence for the future development of a warship design capability in Australia, notably for the coming light destroyer (DDL) project to design and build six combat ships in Australia. Unfortunately, circumstances would lead in another direction. Two more Type 12s, DE RAN 07 and 08, were considered around 1970, but as most of the necessary equipment was no longer in production and the DDL was just around the corner, the idea was abandoned.

*Swan* and *Torrens* served the RAN well for many years. *Swan* was decommissioned in September 1996 and sunk as a dive site on 14 December 1997 off the coast of Western Australia. *Torrens* was decommissioned on 11 September 1998 and was sunk in the Indian Ocean by a Mk 48 torpedo fired by the Collins-class submarine HMAS *Farncomb* on 14 June 1999.

HMAS *Torrens* was to be the last Australian-built combat ship completed for the RAN for 21 years, until the guided missile frigate HMAS *Melbourne*, built at Williamstown in Victoria, was commissioned on 15 February 1992—but that is another story.


The guided missile frigate (FFG) HMAS *Melbourne* entering the water at her launching at Williamstown on 5 May 1989
(Photo John Jeremy)

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HMAS *Sydney* fires the Royal Australian Navy's first Naval Strike Missile during a SINKEX off the coast of Oahu, Hawaii, as a part of Exercise Rim of the Pacific (RIMPAC) 2024
(RAN photograph)

## Babcock and HII form company H&B Defence

Defence giants HII and Babcock have formed a ground-breaking new joint venture and entity—H&B Defence—to accelerate the development of critical sovereign capability for the once-in-a-generation AUKUS conventional armed, nuclear-powered submarine program.

H&B Defence combines world-leading nuclear submarine and shipbuilding experience from Australia, the United Kingdom and the United States to support the nation's inaugural nuclear-powered submarine program under AUKUS.

Together, HII and Babcock bring comprehensive expertise in every aspect of nuclear-powered submarine activities to support the development of Australia's sovereign capability. H&B Defence has been established to support all steps of Australia's optimal pathway to sovereign nuclear-powered submarines under AUKUS Pillar 1—including workforce, nuclear infrastructure design and build, submarine defueling and decommissioning, nuclear waste and future sustainment.

The company, headquartered in Canberra, Australia, will work with government and key stakeholders from industry and academic sectors to develop a comprehensive program to promote and grow a skilled sovereign nuclear workforce in Australia.

Tim Brown AM has been appointed H&B Defence Managing Director.

Brown, of Brisbane and a 33-year veteran of the Royal Australian Navy, has extensive knowledge and experience of Australia's submarine programme and Defence and Industry strategy. He is a mechanical engineer who primarily served as a submarine officer and commanded both a Collins-class submarine and an Anzac-class frigate. As the Director General Submarines and Head of the Submarine Profession, he led the submarine capability enterprise through a period of unheralded submarine availability and high levels of workforce growth, and he played an early and instrumental role in the AUKUS security partnership. Brown brings significant insight and leadership experience to drive the transformation and uplift of Australian industry to support the operation of nuclear-powered submarines.

The company board is chaired by HII's President of the Nuclear and Environmental Services and HII Australia Business Lead, Michael Lempke, and includes Babcock Australasia CEO, Andrew Cridland.

## Joint Venture to Support Australian Army Landing Craft Project

It was announced in July that Austal Australia and Civmec have executed a memorandum of understanding (MoU) to form a joint venture (JV) to submit a proposal to the Australian government to support the LAND8710 Phase 2, Landing Craft Heavy (LC-H) project. LAND8710 Phase 2 (LC-H) will deliver enhanced transport and littoral manoeuvre capability to the Australian Army to enable greater capacity and reach over the Indo-Pacific region.

Under the MoU, Austal and Civmec will develop the structure, delivery process, and detailed scope of the JV in preparation to submit tenders to the government for LAND8710 Phase 2 (LC-H). It is intended for the JV to contract directly to the government to undertake shipbuilding tasks for the LC-H project within the assembly hall at Civmec's facility in Henderson, Western Australia.

The Australian government plans to acquire eight LC-H vessels of 3000 to 5000 t each and 18 smaller landing craft medium (LC-M) vessels of 500 t each. The government recently approved the first stage of the project to build 18 LC-Ms at Austal using a design by local engineering company Birdon.

## LR and CORE POWER to Conduct Next-generation Nuclear Container Ship Regulatory Study

Lloyd's Register (LR) and CORE POWER have launched a joint regulatory assessment study to conduct research on the regulatory feasibility and frameworks which would need to be established for a nuclear-powewred container ship using a fourth-generation reactor, noted for its high inherent safety, to undertake cargo operations at a port in Europe. Following initial planning, the industry leaders, who are joined by A.P. Moller–Maersk (Maersk), have formalised their collaboration through the signing of a joint development project agreement to undertake the study.

The joint study will investigate the requirements for updated safety rules along with the improved operational and regulatory understanding that is needed for the application of nuclear power in container shipping. In addition, this study will provide insight for members of the maritime value chain who are exploring the business case for nuclear power to help shape their fleet strategy towards achieving net zero greenhouse gas emissions.

The study will bring together the expertise of LR as a trusted adviser to the maritime industry, CORE POWER's experience of developing advanced nuclear energy technology for maritime applications, a leading port authority and Maersk's extensive experience in shipping and logistics.

Nick Brown, CEO, Lloyd's Register, said "The initiation of this joint study marks the beginning of an exciting journey towards unlocking the potential of nuclear power in the maritime industry, paving the way for emissions-free operations, more-agile service networks and greater efficiency through the supply chain. A multi-fuel pathway to decarbonising the maritime industry is crucial to ensuring that we as an industry meet the IMO's emission reduction targets and nuclear propulsion shows signs of playing a key role in this energy transition."

Mikal Bøe, CEO, CORE POWER, said "There's no net zero without nuclear. A critical key to unlocking the vast potential for nuclear energy to transform how the maritime sector is powered is the standards framework for commercial insurability of floating nuclear power plants and nuclear-powered ships which would operate in nearshore environments, ports, and waterways. We're immensely pleased to be working with some of Europe's most respected industry participants to set out the conditions for how this can be achieved."

Ole Graa Jakobsen, Head of Fleet Technology, A.P. Moller – Maersk, said "Since Maersk launched its energy transition strategy in 2018, we have continuously explored diverse low-emission energy options for our assets. Nuclear power holds a number of challenges related to, for example, safety, waste management, and regulatory acceptance across regions, and so far, the downsides have clearly outweighed the benefits of the technology. If these challenges can be addressed by development of the new so-called fourth-generation reactor designs, nuclear power could potentially mature into another possible decarbonisation pathway for the logistics industry 10 to 15 years in the future. Therefore, we continue to monitor and assess this technology, along with all other low-emission solutions."

## Export Reforms to Boost AUKUS Trade and Collaboration

It was announced on16 August 2024 that Australia, the United Kingdom (UK) and the United States (USA) have finalised the establishment of an export licence-free environment, unlocking billions of dollars of investment and cutting red tape for Australian industry and our AUKUS partners.

Delivering on the collective commitment just over a year ago to streamline defence trade, AUKUS partners have implemented generational legislative reforms which provide reciprocal national exemptions from our respective export control frameworks.

Together, our respective national exemptions remove the licencing requirements for most controlled goods, technologies and services exported, re-exported or transferred to, or within, AUKUS nations.

This will be critical in driving scientific and technological collaboration, including under AUKUS Pillar II Advanced Capabilities.

From 1 September 2024, AUKUS partners will operate in this new export licence-free environment, significantly boosting defence trade and innovation.

It will support unprecedented levels of advanced scientific, technological and industrial cooperation, fast-tracking the delivery of high-end capabilities to the Australian Defence Force.

Importantly, the new licence-free environment removes barriers to trade and collaboration and reduces costs to local businesses, supporting industry, higher education and research sectors in all three nations. This milestone delivers key reforms which defence industry has been calling on for years.

The changes to our export control mechanisms will enable:

- Licence-free trade for over 70 per cent of defence exports from the US to Australia which are subject to International Traffic in Arms Regulations.
- Licence-free trade for over 80 per cent of defence trade from the US to Australia which are subject to Export Administration Regulations.
- The elimination of around 900 export permits required under the previous export controls from Australia to the US and UK valued at $5 billion per year.
- The removal of approximately 200 export permits required for defence exports from the UK to Australia valued at over $129 million per year.

Australia has implemented national exemptions for the UK and the US through the *Defence Trade Controls Amendment Act 2024* and associated regulations. The US provided national exemptions through amendments to its International Traffic in Arms Regulations and Export Administration Regulations, and the UK provided national exemptions through an AUKUS-specific Open General Export Licence.

The Australian Government committed $28 million in the 2024–25 Budget to implement reforms under the *Defence Trade Controls Amendment Act 2024*, including to support industry engagement and accelerate trade between AUKUS partners.


The RAN tugs *Waree* and *Elwing* attending a naval vessel on Sydney Harbour. The tugs are operated by Svitzer Australia. Svitzer also serves the RAN in other ports around Australia including Darwin and Fremantle
(RAN photograph)

## New Chairman For Austal

On 27 June 2024 Austal announced that its inaugural chairman, John Rothwell, was retiring from his position of Chairman of the Company to serve on the Austal Board as a non-executive director.

Former US Secretary of Navy, Richard Spencer, will replace Mr Rothwell as Chairman, and will also join the Board of Austal USA, providing important linkages between the two boards.

Mr Rothwell's retirement as Chairman marks a significant milestone in the history of Austal, having served in the position for 37 years since he founded the company in 1987. During that time Austal has grown from a small, privately-owned West Australian commercial shipbuilder to an ASX-listed international defence prime contractor with a multibillion-dollar orderbook, over 4000 employees and substantial shipbuilding operations in Australia, the United States and South East Asia.

Mr Rothwell said that Austal set out four important criteria to select its new chair—excellent character, strong business acumen, in-depth knowledge of the US defence industrial base and enduring relationships with the Australian and/or US defence sector.

"Those criteria narrowed the field of candidates considerably," he said. "Richard was at the top of the list, and I'm pleased that he was receptive to our approach."

Mr Spencer served five years with the US Marine Corps as a Naval Aviator. After leaving the defence force, he worked at several investment banks including Goldman Sachs, Donaldson, Lufkin and Jenrette, and Bear Stearns. He also served on the Pentagon Defence Business Board Advisory Panel and the Chief of Naval Operations Executive Panel. He was appointed and confirmed as Secretary of Navy from August 2017 through to November 2019.

Mr Spencer said that he was looking forward to the Chairman role, which commenced on 1 July 2024.

"The position that Austal has forged in the US and Australian defence sectors in such a short period of time is incredible," he said.

"I have kept a close watch on the Company's progress in the USA. Its expansion from a two-shipyard to a multi-program provider, including command deck modules for the United States' nuclear submarines, has been impressive.

"Austal's position in the US and Australian defence industry landscape has been built on a foundation of innovation and commitment to delivering a quality product to the men and women in the US and Australian navies. These organisational traits have been driven from the top-down by John Rothwell's leadership and strength of character, and he should be incredibly proud of the company which he has built.

"I look forward to building on that platform alongside him to drive shareholder value, though I will save the valedictory for later as he will continue to be actively involved in Austal for at least the near future."

Mr Rothwell said: "I'm incredibly proud of what Austal has achieved during my time as Chairman. I have been considering stepping back from the Chair role for a few years now, and having just turned 80 and with an excellent replacement in Richard, the time is right. The company is on a very strong footing, but it is entering its next phase of growth as a strategic defence shipbuilder, so I remain actively involved with Austal as an ordinary board member until the transition is complete."

## Contract for Windows for Hunter-class Frigates

Queensland manufacturer Craig International Ballistics will supply ballistic protection windows for the first three Hunter-class frigates under an agreement with BAE Systems Australia–Maritime.

The Gold Coast-based company has secured a contract to provide transparent armour on each of the anti-submarine warfare warships being built for the Royal Australian Navy as part of the Hunter-class frigate program.

A leading supplier of ballistic protection to the Australian Defence Force and police forces, Craig International Ballistics will manufacture dozens of windows for each vessel, as well as the frames for the windows and the wiper systems. Each of the six window types will have unique protective qualities, including ballistic protection, fire retardant properties and noise reduction.

Craig International Ballistics is one of the latest Australian companies to be awarded a contract to supply products and services for the Hunter-class frigate program. This is another example of BAE Systems working with Australian suppliers, which now amounts to over 60% Australian contract expenditure contribution in only the early design and prototyping phase of the contract.

BAE Systems Maritime Australia is working to increase the resilience, capability and capacity of the nation's defence industry by partnering with small and medium enterprises, in line with the Commonwealth's Defence Industry Development Strategy.

Craig Lockhart, Managing Director, BAE Systems Australia – Maritime, said "We're committed to maximising Australian industry participation in this truly national shipbuilding endeavour.

"The Hunter-class frigates will be among the most advanced and capable warships in the world, and companies such as Craig International Ballistics will deliver cutting-edge equipment to these warships which maintains its stealth capabilities and well as significantly improving its survivability.

"The Hunter program has embedded a truly sovereign continuous naval shipbuilding capability across Australia, ensuring we have the know-how to design, build and sustain our own warships."

James Craig, Chief Executive Officer, Craig International Ballistics, said "Craig International Ballistics is delighted to supply transparent armour and wiper systems for the Hunter-class frigates currently being built in Australia.

"As an Australian manufacturer of ballistic protection solutions, we take great pride in providing BAE Systems Australia–Maritime and Navy with high-quality products which are specifically designed to safeguard our Navy personnel.

"Our whole team is very proud of the work we do here on the Gold Coast, and we look forward to continuing our partnership with BAE Systems and the ADF."

# EDUCATION NEWS

**UNSW Canberra**

As the calendar rolls on, so do we into a new semester, with hydrodynamics, structures and design courses for our Year 3 students holding their attention and keeping them focussed. The final-year students are similarly fully engaged, being deep into the development of their individual design and thesis projects. The prize to be grasped, embodied by their graduation, is only a few months away. Thus, with the finish line in sight and drawing on this being an Olympic year, we are all working hard and with purpose.

Since our last report we have been to sea with our Year 4 students conducting our "Training Cruise" on MV *Sycamore*. The crew and support agency for MV *Sycamore* are gratefully thanked for accommodating us and aiding in building our knowledge and experience base. We joined the ship via launch transfer from HMAS *Creswell* in Jervis Bay, with a group of Navy gap-year midshipmen. The gap-years were sea riding for the week and would disembark in Sydney. They were on a tour around the country visiting key Navy establishments and facilities. Some of them expressed interest in coming to ADFA and studying naval architecture.

After finding our cabins, introductions, inductions, and safety briefs we—SBLTs Scotson, Morrison and Lockyer with lecturers Sean McCracken and myself—were given a tour of the machinery spaces by the Chief Engineer. This subsequently led to us having reasonable freedom to move generally around the ship, making our own observations and conducting our own "tutorials". The ship's CO also gave us plenty of his time, discussing the design and operation of the vessel. He also gave us freedom to explore the ship and the opportunity to "take control". Captured in the accompanying photos is the group: on the bridge where activities included our conduct of manoeuvring trials (e.g. zig-zag, tactical diameter and crash stop), in the Machinery Contril Room cross-checking fuel-consumption figures and discussing and tracing ship systems in the Auxiliary Machinery Room. A primary tasking of the vessel while onboard was the conduct of helicopter operations training. It was fascinating to observe day and night landings from both the Helicopter Control Station and the Bridge, as the ship was put on the edge of the helicopter operating envelope in terms of pitch, heave, and roll. With approximately 48 hours onboard (three days and two nights), we left via the ship's boat, being ferried at speed back to HMAS *Creswell*. The observation and firsthand experience of boat operations provided us all with valuable insights for both the engineering and safety of operation aspects.

On the Bridge—MV *Sycamore* Training Cruise
(Photo courtesy Warren Smith)

In the Machinery Control Room—MV *Sycamore* Training Cruise
(Photo courtesy Warren Smith)

In the Auxiliary Machinery Room—MV *Sycamore* Training Cruise
(Photo courtesy Warren Smith)

As we seek to grow student numbers, I again wish to emphasise the 2 + 2 nature of our degree—one that facilitates students transferring to UNSW Canberra to pursue naval architecture, having undertaken the first two years of an accredited mechanical or aeronautical engineering four-year degree program at another Australian or New Zealand tertiary institution. I encourage organisations to consider growing naval architects to meet their future needs through the provision of support for a scholar transferring to UNSW Canberra to undertake their naval architecture studies. The supply-and-demand system is not in equilibrium, and assistance is required to provide the feedstock that will develop the workforce for sovereignty, continuous naval shipbuilding and AUKUS.

*A/Prof. Warren Smith*
Naval Architecture Program Coordinator
School of Engineering and Technology
UNSW Canberra at ADFA

## AMSA Survey Matters

*Survey Matters* is AMSA's e-Newsletter relating to domestic commercial vessel (DCV) survey and is published approximately six times per year. You can request placement on the mailing list by emailing DCV Survey <dcvsurvey@amsa.gov.au>. The e-Newsletters are now also available online at

https://www.amsa.gov.au/news-community/newsletters#collapseArea612

and scroll down to the fourth newsletter which is *Survey Matters*.

Items included in the June 2024 *Survey Matters* included:

- Surveyor Accreditation Guidance Manual 2 consultation closed
- Shaft surveys explained
- Frequently asked questions related to AMS Audits
- Focused Certification Campaigns
- Monitoring Conditions
- Lithium-ion batteries.
- Surveyor workshop feedback
- Supporting AMSA's 'be electrically safe' education campaign
- Invisible gases, real risks
- Survey Matters suggestions

The articles on *Lithium-ion batteries* and S*urvey Matters suggestions* are reproduced below.

*Phil Helmore*

## Lithium-ion Batteries

The use of Lithium-ion batteries in the marine environment is increasing as the battery chemistry has numerous advantages, but these advantages also come with higher risks. Lithium batteries are not a direct drop-in replacement for lead-acid batteries. They must be treated as a system as they have a communication link, different charging requirements, higher fault currents, different venting hazards and may require additional fire protection and detection systems.

The term 'drop-in replacement' is not an accurate term due to the points raised below. The drop-in replacement term is being used in the market referring to the *physical size* of the battery occupying the same area as a lead-acid battery but does not refer to the compatibility with the vessel's electrical system.

*Regulatory Compliance*

Standards and Certifications: In Australia, lithium batteries must be installed in accordance with AS/NZS 3004.2 – 2.9.3 – Additional requirements for Lithium-Ion batteries.

*Safety Concerns*

1. Fire and Explosion Risks: Lithium batteries have the ability to enter a state known as thermal runaway, which can lead to fires or explosions. Once thermal runaway of a battery is reached there is no easy way to extinguish the ensuing fire. Batteries can enter thermal runaway due to internal failures such as internal short circuits caused by manufacturing faults or external failure caused by operating the battery outside of its operating envelope, e.g. over/under voltage, extreme temperatures. The marine environment can also expose the batteries to vibration, moisture, and temperature variations which may fall outside of the battery operating envelope.

2. Installation and Maintenance: Proper installation and maintenance are crucial to avoid safety risks. Lithium batteries must be installed with appropriate ventilation, must use suitable chargers, and undertake regular inspections of battery health.

*Compatibility*

1. System Integration: Lithium batteries must be compatible with existing marine electrical systems. This includes ensuring that the battery-management system (BMS) integrates seamlessly with the boat's power-management system.

2. Charger Compatibility: Not all chargers are suitable for lithium batteries. Using an incompatible charger can lead to overcharging or undercharging, which can damage the battery and pose safety risks.

3. Additional passive and active fire safety requirements may be required.

*Environmental Factors*

Marine Environment Challenges: The harsh marine environment, characterised by high humidity, saltwater exposure, and varying temperatures, can affect the performance and longevity of lithium batteries. Batteries must be designed to withstand these conditions.

*Conclusion*

While drop-in lithium batteries offer significant advantages for marine applications, including higher energy density, longer life-span, and better performance, they also present hazards. Ensuring regulatory compliance, addressing safety concerns and ensuring compatibility with existing systems are all critical for their use on domestic commercial vessels.

## Survey Matters Suggestions

AMSA wants to make sure that *Survey Matters* is relevant and useful for accredited marine surveyors, boat builders, class societies, and others involved in the survey of domestic commercial vessels.

We encourage our readers to submit subject requests or ideas to <dcvsurvey@amsa.gov.au> for articles which would be of assistance to industry in future publications.

*Survey Matters*, June 2024

## Digitalisation in the Maritime Industry

AMSA supports digital transformation for a safer, more efficient and sustainable maritime industry and is collaborating on initiatives to help industry adopt new technology and transform business.

Key initiatives include:

- High-speed connectivity for communication channels which improve bandwidth, reliability, and range.
- Harmonised and seamless data exchange for improved data access and transmission services across the maritime industry.
- Cyber security to protect the confidentiality, integrity,

and availability of data and communications.

- Integration of Maritime Autonomous Surface Ships (MASS) for digital services which support autonomous and uncrewed systems to improve efficiency, safety, and sustainability in maritime operations.

AMSA also supports the Department of Infrastructure, Transport, Regional Development, Communications and the Arts (DITRDC) on other digitalisation programs. This includes the Maritime Single Window, a program to simplify information exchange for regulatory requirements.

Exciting times are ahead.

*AMSA News,* 13 May 2024

### New Marine Order 55: Requirements for the Carriage of Industrial Personnel

The new *Marine Order 55 (Vessels Carrying Industrial Personnel) 2024* will commence on 1 July 2024. It contains mandatory requirements to ensure the safe carriage of more than 12 industrial personnel (IP) on cargo vessels and high-speed cargo craft in Australian waters.

Issued under the Navigation Act 2012, MO55 gives effect to the new SOLAS Chapter XV and the associated *International Code of Safety for Ships Carrying Industrial Personnel* (the IP Code).

It addresses aspects of safety including stability, machinery and electrical installations, fire safety, life-saving appliances and arrangements, carriage of dangerous goods, training of industrial personnel and their transfer arrangements.

Between 19 February and 14 April 2024, AMSA consulted on the proposed new Marine Order 55. The consultation feedback report is now available at

https://www.amsa.gov.au/marine-order-55-consultation-report-2024

Read the new Marine Order 55 at

https://www.amsa.gov.au/marine-order-55-vessel-carrying-industrial-personnel

*AMSA News*, 28 June 2024

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# THE AUSTRALIAN NAVAL ARCHITECT

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

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

*Photographs and figures should be sent as separate files (not embedded) with a minimum resolution of 200 dpi. A resolution of 300 dpi is preferred.*

## Australian Division Council

The Council of the Australian Division of RINA met on the afternoon of Tuesday 11 March 2024 by Zoom conference under the chairmanship of our new President, Prof. Jonathan Binns in Perth with links to Sydney, Canberra, Melbourne, Hobart, Launceston, Adelaide and Perth. In opening the meeting the President welcomed members attending for the first time, namely Peter Blackwood, Tamasin Welch, Tim Speer and Bruce McRae, while Martin Grimm remained on Council as an elected member having made way for Ms Welch as ACT Section nominee. The President expressed appreciation for the contributions of those members who retired at the AGM in March, namely Past President Gordon MacDonald, Adrian Broadbent and Emma Tongue. Prof. Martin Renilson, a member of the Institution's Council and nominee to become Pacific Region Vice-President attended as an observer.

Among the items discussed were:

**Election of Vice President and Filling Council Vacancies**

Council welcomed the inter-sessional election of Sammar Abbas as Vice President and Bruce McRae and Martin Grimm as elected Council members.

**Improvement Committee**

Council received a report from the Committee on progress towards conducting a workshop to discuss and refine services to Division members.

**WARSHIP 2024 Conference**

Council noted a report indicating the expected success of this annual conference organised by RINA HQ and being staged outside the UK for the first time in Adelaide the following week. More information on the conference is reported elsewhere in this issue.

**Australian Division Handbook and Alignment of Section Rules**

Council noted that RINA HQ had issued an initial draft handbook as a plain-English how-to guide to its Branches but that substantial change was necessary to make it applicable to the Division and Sections. Sections were requested to provide comments on a draft Australian Handbook and the amendments to Section Rules which would be necessary to achieve alignment with the arrangements applicable to the rest of the Institution.

**Meeting with Defence (CASG)**

Council received a report on a recent meeting that may, through further work, result in bulk membership and chartership arrangements with RINA in accordance with the DEFGRAM specifying equivalence of RINA, IMarEST and Engineers Australia.

**Naval Shipbuilding Program**

Council considered the potential conflict between the Australian content provisions applying to general-purpose Frigates and the Government decision that those GPFs built in Australia would have no design changes from the initial vessels built overseas. Further consideration is to be given to this matter.

**Victorian Engineer Registration**

A report was received indicating no progress in response to our application.

(Interested readers should note that a response has since been received indicating that approval as an assessment entity is still some way off and that the Division's previous advice for affected members to register in Queensland therefore remains current).

The draft minutes of the meeting have been circulated to Council members and are available to other members by request.

*Rob Gehling AO*
Secretary
rinaaustraliandivision@gmail.com
0403 221 631

## 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 | Jonathan Binns |
| Vice-president | Sammar Abbas |
| Immediate Past-pres | Jim Black |
| Secretary | Rob Gehling |
| Treasurer | Craig Boulton |
| Members nominated by Sections | |
| | Tamasin Welch (ACT) |
| | Nick Bentley (Qld) |
| | Peter Blackwood (NSW) |
| | Tim Speer (WA) |
| | Nathan Wallace (Vic) |
| | Phil Bevan (SA&NT) |
| | Chris Davies (Tas) |
| Members elected or appointed by Council | |
| | Sammar Abbas |
| | John Butler |
| | Ken Goh |
| | Martin Grimm |
| | Andrew Harris |
| | Omar Hostia Sotil |
| | Bruce McRae |

Improvement Working Group of AD Council

| | |
|---|---|
| Chair | Jonathan Binns |
| Members | Sammar Abbas |
| | Andy Harris |
| | Karl Slater |
| | Belinda Tayler |
| | Michael Woodward |

Investment Committee of AD Council

| | |
|---|---|
| Joint Chairs | Craig Boulton&Rob Gehling |
| Members | Nick Bentley |
| | Nathan Wallace |

**AMSA DCV Liaison Working Group**

| | |
|---|---|
| Chair | Rob Gehling |
| Members | 10 (names confidential) |

**ACT Section**

| | |
|---|---|
| Chair | Warren Smith |
| Deputy Chair | Cameron Whitten |
| Secretary | Jeremy Nolan |
| Assistant Secretary | Lily Webster |
| Treasurer | Lachlan Clarke |
| Nominee to ADC | Tamasin Welch |
| Members | Ray Duggan |
| | Martin Grimm |
| | James Loram |
| | David Lyons |

**NSW Section**

| | |
|---|---|
| Chair | Belinda Tayler |
| Secretary | Lauren Stotz |
| Assistant Secretary | Phil Helmore |
| Treasurer | Adrian Broadbent |
| Nominee to ADC | Peter Blackwood |
| TM Coordinator | Ehsan Khaled |
| Auditor | David Wong |
| Members | Craig Boulton |
| | John Butler |
| | Valerio Corniani |
| | Elettra Ganoulis |
| | Molly McManus |

**Queensland Section**

| | |
|---|---|
| Chair | Jalal Rafieshahraki |
| Deputy Chair | Hamish Lyons |
| Secretary | Tom Ryan |
| Treasurer | James Stephen |
| Nominee to ADC | Nick Bentley |
| Members | Gerard Anton |
| | Mark Devereaux |
| | Reza Dolat |
| | Tommy Ericson |
| | Daniel King |

**South Australia and Northern Territory Section**

| | |
|---|---|
| Chair | Phil Bevan |
| Secretary | Andrew Harris |
| Treasurer | Donald Gallagher |
| Nominee to ADC | Phil Bevan |
| Members | John French |
| | Steven Holland |
| | Frieda Lay |
| | Alistair Mitchell |
| | Alec Rusanoff |

**Tasmania Section**

| | |
|---|---|
| Chair | Martin Renilson |
| Deputy Chair | TBA |
| Secretary | Richard Boult |
| Treasurer | Chris Davies |
| Nominee to ADC | Chris Davies |
| Members | Jack McLaren |
| | Doupadi Herath Mudiyanselage |
| | Alan Muir |
| | Michael O'Connor |
| | Napuna Rajapaksha |
| | Nathan Smith |
| | Michael Woodward |

**Victoria Section**

| | |
|---|---|
| Chair | Tom Dearling |
| Secretary | Luke Shields |
| Treasurer | Alex Conway |
| Nominee to ADC | Nathan Wallace |
| Members | TBA |

**Western Australia Section**

| | |
|---|---|
| Chair | Piotr Sujkowski |
| Deputy Chair | Ken Goh |
| Secretary | Ken Goh |
| Treasurer | Hadiqa Khan |
| Nominee to ADC | Tim Speer |
| Members | Sammar Abbas |
| | Nathan Chappell |
| | Yuriy Drobyshevski |
| | Bertrand Gorjux |
| | Suzanne Hutchinson |
| | Evgenia Koutsoukou |
| | Anuj Sharma |
| | Emma Tongue |

***The Australian Naval Architect***

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

**Walter Atkinson Award Panel**

| | |
|---|---|
| Chair | Michael Squires |
| Members | Jonathan Binns |
| | Dan Curtis |
| | Alan Muir |
| | Lily Webster |

**Bob Campbell Award Panel**

| | |
|---|---|
| Convenor | Rob Gehling |
| Members | Volunteers from the WAA Panel and others |

**RINA London**

| | |
|---|---|
| Vice President Pacific Region | Martin Renilson |
| Council Members | Jonathan Binns (*ex officio*) |
| | Jim Black |
| | Martin Renilson |
| Maritime Safety Committee | Rob Gehling |
| | Doug Matchett |
| IMO Committee | John Manning |
| Professional Affairs Committee | Jim Black |
| Early Careers Committee | Emma Tongue |
| Membership Committee | Danielle Hodge |

**RINA/Engineers Australia Joint Board of Naval Architecture**

| | |
|---|---|
| Members | Jim Black |
| | Rob Gehling |

**Standards Australia Committee CS114 (Small Craft)**

| | |
|---|---|
| Member | Peter Holmes |
| | David Lyons |

**Standards Australia Committee ME059 (Shipbuilding)**

| | |
|---|---|
| Member | Adrian Macmillan |

**International Standards Organisation (ISO)**

| | |
|---|---|
| Chair Working Group 35 reviewing ISO12215 Small Craft—Hull Construction and Scantlings | David Lyons |
| Project Leader reviewing ISO12215 Part 9 Sailing Craft Appendages | David Lyons |

**Offshore Racing Congress**

| | |
|---|---|
| International Technical Committee Member | David Lyons |

**Sailing Yacht Research Foundation (USA)**

| | |
|---|---|
| Advisory Member | David Lyons |

**Indo-Pacific IMC2025 Organising Committee**

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

**Indo-Pacific IMC2025 Papers Committee**

| | | |
|---|---|---|
| Chair | Adrian Broadbent | RINA |
| Members | Craig Boulton | ASO Marine |
| | Giuseppina Dall'Armi-Stoks | DSTG |
| | Geoffrey Fawcett | IMarEST |
| | Rob Gehling | RINA |
| | Gregor Macfarlane | AMC/UTas |
| | Tauhid Rahman | DNV |
| | Karl Slater | DSTG |
| | Warren Smith | UNSW Canberra |

## 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 Div | rinaaustraliandivision@gmail.com |
| Section | |
| ACT | rinaact@gmail.com |
| NSW | rinansw@gmail.com |
| Qld | rinaqlddiv@gmail.com |
| SA/NT | rinasantdiv@gmail.com |
| Tas | tassec@rina.org.uk |
| Vic | vicsec@rina.org.uk |
| WA | wa@rina.org.uk |

*Phil Helmore*


# ACKNOWLEDGEMENT

The Australian Division of the Royal Institution of Naval Architects gratefully acknowledges the generous support of AMDA Foundation Limited for the conduct of the International Maritime Conferences organised by RINA, the Institute of Marine Engineering, Science and Technology and Engineers Australia in conjunction with AMDA's Indo Pacific Maritime Expositions.

Without such support the International Maritime Conferences and the publication of *The Australian Naval Architect* would not be possible.

# NAVAL ARCHITECTS ON THE MOVE

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

**Chris da Roza** has moved on from Atlantic & Peninsula Australia and is now evaluating opportunities.

**Jonathan Duffy** has moved on within the Australian Maritime College and is now an Associate Professor and Research Engineer in Launceston.

**Paul Duncan** has moved on from INCITIAS and has taken up the position of FSRU Manager with Vopak on the Victoria Energy Project in Melbourne.

**Bex Dunn** has moved on within Geoscience Australia and has now taken up the position of Assistant Director, Science Engagement and Innovation, Digital Earth, in Canberra.

**Dylan Dwyer** has moved on from the Defence Science and Technology Group and has taken up the position of Senior Naval Architect with Navantia Australia in Melbourne.

**Gooitzen Eggink** has moved on from Medisch Centrum Leeuwarden and, after some time at Cooperatie Sinnich Langwar, has taken up the position of Medical Specialist in Clinical Geriatrics with Ziekenhuis Tjongerschans in Heerenveen, The Netherlands.

**Ahmed Elhanafi** has moved on from Delmar & Vryhof and has taken up the position of Structural Engineering Manager/ Team Lead with BAE Systems Australia in Sydney.

**Jon Emonson** has moved on within BAE Systems Australia and has taken up the position of Engineering Assessment Lead in Rockingham, WA.

**Samuel Free** has moved on from Austal and has taken up a position as a naval architect with One2three Naval Architects in Sydney.

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

*Phil Helmore*

# THE INTERNET

## RINA Webcasts

RINA has set up a YouTube channel and RINA webcasts can be viewed there. The RINA YouTube channel is at

https://www.youtube.com/channel/UChb1sfHbWfQmG-iwpp_QGJg

Bookmark this website and keep your eye on it!

Video recordings of Australian section presentations should be sent to Abigail Forbes and Klaudia Rogala-Haracz <marketing@rina.org.uk> at RINA HQ for uploading.

To find a recording of an Australian section presentation, click on Playlists in the menu bar. Scroll down and across, and click on *View full playlist* under Branch and Section Presentations.

If you know the name of the presentation, then click in the search box at the top, type the title of the presentation you are looking for (or at least the first few words thereof) and press Enter.

## NSW Section Webcasts

The NSW Section webcasts recorded and uploaded within the last three months are:

- *Inadequate Knowledge Transfer Causes Maintenance Issues on Imported Ships* presented by Dauson Swied, Senior Engineer, Baker & Provan, to a joint meeting with the IMarEST on 3 April in the Henry Carmichael Theatre at the Sydney Mechanics School of Arts in the Sydney CBD and streamed live.
- *Towards Zero Carbon Shipping* presented by Jan de Kat, Regulatory Affairs Manager, Mærsk McKinney Møller Centre for Zero Carbon Shipping, Copenhagen, as a webinar (i.e. streamed live only).
- *Pollution Prevention in a Defence Context: Could an International Naval Ship Pollution Prevention Code be Feasible?* presented by Jonathan Branch, Principal Consultant and Director, Invicta Maritime Solutions, to a joint meeting with the IMarEST on 1 May in the Henry Carmichael Theatre at the Sydney Mechanics School of Arts in the Sydney CBD and streamed live.
- *IT Earthing Systems and the Evolution of Insulation Monitoring Devices* presented by Thomas Frank, Principal Engineer, Ausbright Electrical Solutions, to a joint meeting with the IMarEST on 5 June in the Henry Carmichael Theatre at the Sydney Mechanics School of Arts in the Sydney CBD and streamed live.

*Phil Helmore*

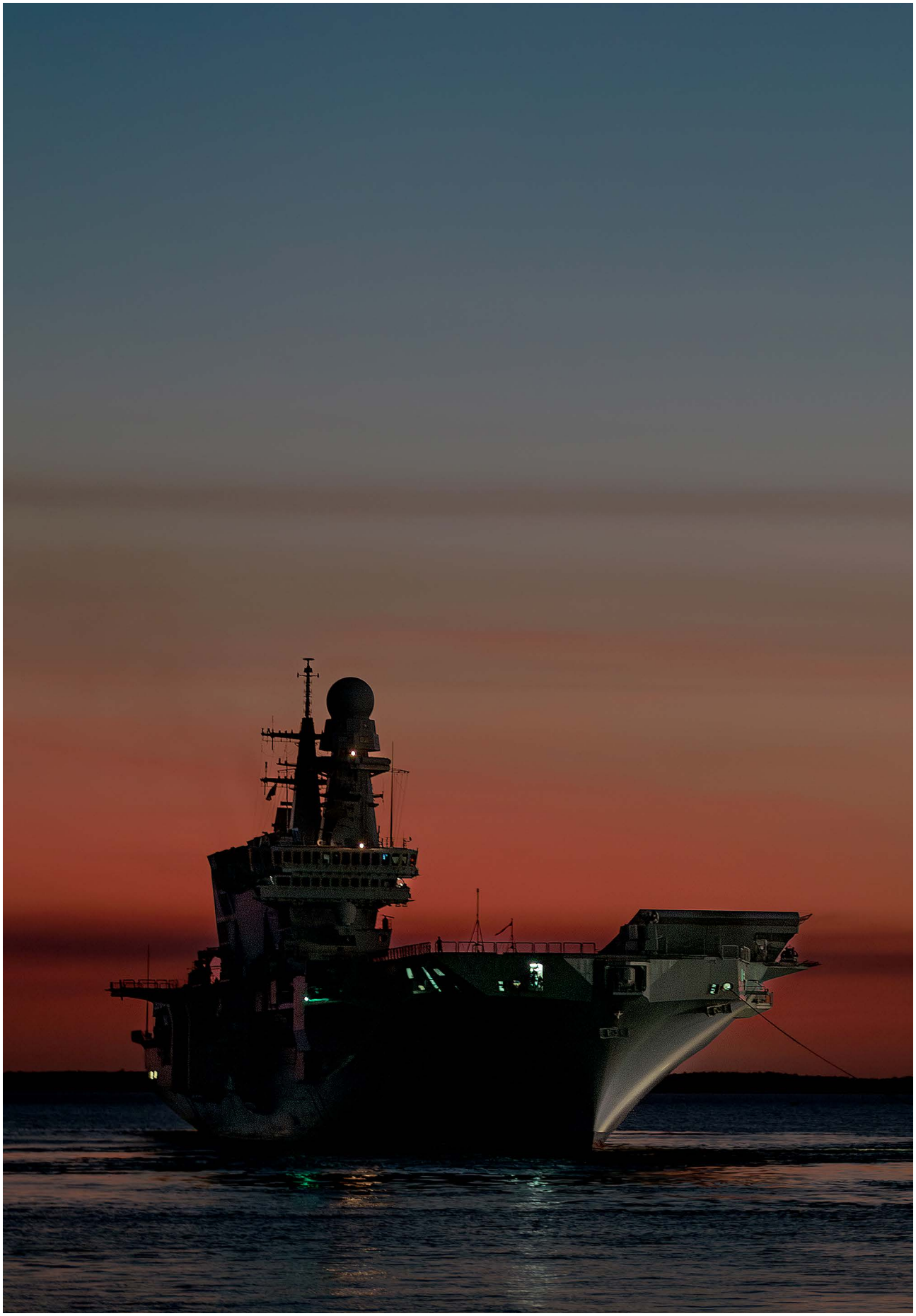
## Tasmania Section Webcasts

The Tasmania Section webcasts recorded and uploaded within the last three months are:

- *A Code of Practice for Aquaculture Vessels* presented by Andrew Harris of BMT to a meeting at the Australian Maritime College in Launceston, Zoomed to the Royal Yacht Club of Tasmania in Hobart, and streamed live to the wider fraternity on 13 March.
- *The Feasibility of Utilising Hydrogen as a Fuel for Australian Vessels* presented by Hongjun Fan, Postdoctoral Research Fellow at the Australian Maritime College, to a meeting at the Australian Maritime College in Launceston, Zoomed to the Royal Yacht Club of Tasmania in Hobart, and streamed live to the wider fraternity on 13 March.

*Richard Boult*

Further recordings will be added to the RINA YouTube channel as they occur.



A long way from home, the Italian Navy aircraft carrier ITS *Cavour* pulls alongside East Arm Wharf, Darwin, on 8 July to participate in Exercise Pitch Black 24
(RAAF photograph)

The three-masted clipper *Stad Amsterdam* in Darling Harbour on a grey day during a visit to Sydney in August. Designed by Gerard Dijkstra, she was built by Damen and completed in 2000. *Stad Amsterdam* is used for training and cruising
(Photo John Jeremy)