THE AUSTRALIAN NAVAL ARCHITECT

Volume 27 Number 3
August 2023

The Noakes Sydney Gold Coast Race started on Sydney Harbour on 29 July.
Andoo Comanche (CAY007) took line honours in 1 day 15 hours 34 minutes and 33 seconds.
Whisper (AUS13) was third to finish. The IRC winner was *URMGroup*
(Photo John Jeremy)

Back Cover:
HMAS *Canberra* escorts USS *Canberra* (LCS30) into Sydney Harbour prior to her commissioning at Fleet Base East (Garden Island) on 22 July 23
(RAN photograph)

THE AUSTRALIAN NAVAL ARCHITECT

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

Volume 27 Number 3
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Cover Photo:

The 76 m high-speed passenger catamaran *El Dorado Express* recently completed by Incat Tasmania for Daezer Ferry of South Korea
(Photo courtesy Incat Tasmania)

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RINA Australian Division
on the
World Wide Web
www.rina.org.uk/aust

From the Division President

I am writing this column as we pass from July in to August and am trying to sort out the positives from the negatives for naval architects in Australia at this somewhat confusing time.

We certainly have several current clouds over our heads, including:

- Still not knowing the direction of the Naval Shipbuilding Plan.
- Still awaiting confirmation from Victoria and Queensland on our application re-application for assessment entity for professional engineers.
- Engineers Australia looking to downgrade Naval Architecture from an Area of Practice to a Specialisation under Maritime Engineering.
- RINA's recently-launched new website currently assisting us in Australia much less than the old website did.

But then I look at some of the positives achieved over the past few months:

- Jonathan Binns has taken on the position of Division Vice President.
- IMC 2023 is forging ahead and a most impressive program of speakers has just been issued.
- Our WA Section has agreed to increase the frequency of our participation in AOG Energy from biennially to annually.
- Andy Harris is playing a lead part in the plan to bring RINA's Warship 2024 Conference to Australia.
- Emma Tongue has joined RINA's Developing Careers Working Group.
- Several Division members have provided significant input for our submission to the current Senate FADT enquiry into the performance of the Department of Defence in supporting the capability and capacity of Australia's defence industry

Jim Black

Taking in to account all of the above, and all of the great work being done behind the scenes by Division Council and Section Committees, I think we can be proud to say that the positives far outweigh the negatives. And you can be sure that we are not just letting the negatives lie; where we can we are actively working to resolve them to the benefit of all of us and our profession—hopefully most of them will be ticked off by the time of my next column!

As always, please feel free to contact me at any time with your comments, thoughts, recommendations, or criticisms—anything that can help us move forward as the premier international maritime professional institution.

Jim Black
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jimblack.marine@iinet.net.au

Editorial

This edition of *The Australian Naval Architect*, as is usual in the August edition, contains a list of those members of the Institution who contribute to the life of our Institution in Australia by participating on Section committees and contributing their time and experience in other ways. This year's list, on pages 48–50, includes nearly 150 roles filled by volunteers from the membership. Some of the listed names appear several times but the number of members volunteering their time is a significant proportion of the Institution's membership in Australia. Voluntary effort like this is vital for the success of bodies like our Australian Division. Not only does it help the Division survive, it can be a rewarding experience for the volunteers, who will most likely find proof of the maxim 'what you get out is proportional to the effort you put in.'

One of the major events of the Institution in Australia is the International Maritime Conference held in Sydney every two years (pandemics permitting) in conjunction with the International Maritime Exposition organised by AMDA Foundation Limited. Over the last 20 years, the Exposition has grown enormously. This year, Indo Pacific 2023 will be the biggest ever—12% bigger than the previous record set only last year with Indo Pacific 2022 (which was the 2021 event delayed by the pandemic). The Exposition is fully booked with 750 participating companies exhibiting and five country pavilions.

Our International Maritime Conference (IMC2023) is organised by the RINA, the Institute of Marine Engineering, Science and Technology and Engineers Australia in a partnership which has been in place for over 20 years. The conference could not take place without the generous support of AMDA Foundation and the efforts of the all-volunteer members of the Organising and Program Committees and those who give their time to review the refereed papers presented at the conference.

This year, the response to the call for abstracts was exceptional, with about twice as many papers offered as could be accepted. The program will be busy and informative. Registrations are open now.

John Jeremy

HMAS *Canberra* (L02) leads USS *Canberra* (LCS30) into Sydney Harbour on 18 July 2023 for a very rare event, the commissioning of a US Navy warship outside the United States.
USS *Canberra* is an Independence-variant Littoral Combat Ship built by Austal USA
(RAN photograph)

COMING EVENTS

NSW Section Technical Presentations

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 2023 (with exceptions noted) is as follows:

6 Sep CDRE Colin Dagg RAN (Retd), Assistant Secretary, Australian Naval Classification Authority
Australian Naval Classification

4 Oct David Firth, Principal Engineer SEA1788, Naval Shipbuilding & Sustainment Group, Department of Defence
STS Young Endeavour *Replacement*
Royal Prince Edward Yacht Club, 160 Wolseley Rd, Point Piper

7 Dec SMIX Bash 2023

Tasmanian Section Technical Presentations

Technical presentations are generally held on the second Thursday the month (February through August) in a room-and-zoom format, alternating between the Derwent Sailing Squadron, 23 Marieville Esplanade, Sandy Bay, and the Auditorium at the Australian Maritime College, Launceston, and streamed live, starting at 17:30 for 18:00 and finishing by 19:30. Guests are welcome.

The program of meetings remaining for 2023 is as follows:

14 Sep Launceston
Michael Woodward, Director, National Centre for Maritime Engineering and Hydrodynamics, Australian Maritime College
Greenwashing in the Big Blue Sea

Interferry 2023

The 47th annual Interferry Conference, hosted by Spirit of Tasmania, will be held in Hobart on 4–8 November 2023. The formal conference program will take place on 6–7 November at the Grand Chancellor Hotel, and Interferry will conclude with a Technical Tour on 8 November.

Speakers are now invited to submit their proposal to speak at the 2023 Interferry Conference on the theme of *The Leading Edge—Elevating the Customer Experience and Sustainability*. This year's event will focus on presentations which highlight innovations that have already been successfully implemented—or were submitted through the web portal by the due date. Selected speakers have been notified. The web portal is at https://interferryconference.com/.

Registration for the conference is available, with early-bird pricing until 15 September, at https://interferryconference.com/registration-information/.

Indo Pacific 2023

Indo Pacific 2023 will be held on 7–9 November 2023 at the International Convention Centre Sydney. 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.

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, symposia from leading maritime institutions, and networking opportunities.

The Indo Pacific International Maritime Conference (IMC2023) is organised by the Royal Institution of Naval Architects, the Institute of Marine Engineering, Science and Technology and Engineers Australia, and coincides with the Royal Australian Navy's Sea Power Conference and the International Maritime Exposition which is organised by AMDA Foundation Limited.

The IMC 2023 program includes presentations concentrating on the following topics:

- Commercial ship technology
- Naval ship technology
- Submarine technology
- Autonomous vehicle technology
- Shipbuilding and sustainment
- Maritime safety
- Maritime environment protection
- Maritime cyber security

The full conference program is available, and registrations are open with early-bird pricing until 8 September, for the IMC 2023 on the website https://www.indopacificexpo.com.au/IMC2023/.

For further information regarding the IMC 2023 International Maritime Conference contact the Conference Secretariat via email at imc@amda.com.au.

SMIX Bash 2023

The 23rd SMIX (Sydney Marine Industry Christmas) Bash will be held on Thursday 7 December aboard Sydney Heritage Fleet's beautifully-restored barque, *James Craig*, alongside Wharf 7, Darling Harbour, from 1730 to 2200. This party for the marine industry is organised jointly by RINA (NSW Section) and IMarEST (ACT & NSW Branch). Join your colleagues in the marine industry and their partners for drinks and a delicious buffet meal on board this unique vessel. Dress is smart casual, but no stiletto heels!

Bookings are now open for sponsors, members of RINA and IMarEST, and non-members on the Trybooking website https://www.trybooking.com/events/landing/1050495 at $60 per head for members and $75 for non-members. Payment may be made by Visa or Mastercard.

CONFERENCE PROGRAM LIVE

imc 2023

INTERNATIONAL MARITIME CONFERENCE

7–9 NOVEMBER 2023

INTERNATIONAL CONVENTION CENTRE
SYDNEY, AUSTRALIA

Are you interested in the latest developments in naval architecture or marine engineering and technology within defence and commercial shipping?

Don't miss three days of expert speakers discussing these topics and more from 7-9 November!

WITH KEYNOTE SPEAKERS:

Gwynne Lewis
Chief Executive
The Institute of Marine Engineering, Science & Technology (IMarEST)

Dr Todd Mansell
First Assistant Director General, Technical
Australian Submarine Agency (ASA)

Associate Professor Warren Smith, PhD, FRINA, MSNAME
Naval Architecture Coordinator
UNSW Canberra at the Australian Defence Force Academy

Tim Speer
Design Development Manager
Austal

International Maritime Conference (IMC) 2023 is organised by The Royal Institution of Naval Architects, The Institute of Marine Engineering, Science and Technology and Engineers Australia.

SCAN TO REGISTER
FOR IMC 2023

IMC 2023 is held in conjunction with INDO PACIFIC 2023

For more information: **www.indopacificexpo.com.au/IMC2023**

Contact the IMC Secretariat: **imc@amda.com.au**

INDO PACIFIC 2023
7 - 9 NOVEMBER
INTERNATIONAL MARITIME EXPOSITION
INTERNATIONAL CONVENTION CENTRE, SYDNEY, AUSTRALIA

NEWS FROM THE SECTIONS

ACT

ACT Section AGM

The ACT Section held its Annual General Meeting on the evening of 9 May 2023 via Zoom. The meeting included a Chair's Report and Treasurer's Report, and the following Section Committee was appointed for 2023:

Chair	Warren Smith
Deputy Chair	Trevor Dove
Secretary	Jordan Rayson
Assistant Secretary	Lily Webster
Nominee to AD Council	Martin Grimm
Members	Ray Duggan
	James Loram
	Jeremy Nolan
	Alistair Smith
	Tamasin Welsh
	Cameron Whitten

The ACT Section has one further technical meeting scheduled for this year, and options for the presentation were canvassed.

Shipbuilding at Whyalla

Rob Gehling AO, Royal Institution of Naval Architects, gave a presentation on *Shipbuilding at Whyalla* to a meeting at the Australian Defence Force Academy in Canberra with the Chair of the ACT Section, Warren Smith, as MC, and streamed live via Zoom on 30 May. This presentation attracted 7 attendees and 7 participating online on the evening. Rob's presentation was based on one he previously delivered to the SA&NT Section in October 2022 with some updating.

Arguably Australia's leading commercial shipyard was established by BHP at Whyalla near the start of World War II and continued in operation for about 40 years. In this time the shipyard constructed by far the largest ships built in Australia and a number of highly innovative ships.

Rob introduced his connection with the upper Spencer Gulf area, Whyalla, and the shipyard itself. The main part of the presentation included the shipyard's wartime genesis; developments in the life of the shipyard; factors in the industry environment in which the shipyard operated; descriptions of some of the significant ships built; the work of some significant figures in shipyard management; industry factors which led to the yard's closure; and some star-gazing into the future.

The presentation was not recorded.

The Presenter

Rob Gehling was the last naval architect trained by Whyalla Shipbuilding and Engineering Works, having started his degree in mechanical engineering at the University of Adelaide and completed it at the University of NSW in Sydney. While studying he worked as a vacation student at the shipyard. Post-university he started work as a shipyard employee in December 1972 and worked in the drawing and design offices until he left Whyalla in August 1977 following BHP's decision to close the yard.

In 1978 he joined the Department of Transport in Melbourne, with one of his first tasks being assessment and approval of the stability data for *Iron Carpentaria* and *Iron Curtis*, the last two large ships built at Whyalla. His career with the Department of Transport morphed into one with the Australian Maritime Safety Authority following the formation of that authority, extending to development and implementation of national and international ship safety standards.

He was President of the Australian Division of RINA from 2003 to 2007 and has been a member of Division Council since 1998. Currently he is a member of the Institution's Council and Board of Trustees, Vice President Pacific Region and has been Secretary of the Australian Division since 2009.

Martin Grimm

Victoria

Energising the Maritime Industry with Offshore Wind

Jordan Glanville, Infrastructure Manager, Oceanex Energy, gave a presentation on *Energising the Maritime Industry with Offshore Wind* to a meeting at the Mission to Seafarers in Docklands and streamed live via Zoom on 24 May. This presentation attracted 12 attendees and a further 9 participating online on the evening.

Offshore wind is booming both globally and locally. Oceanex Energy is progressing a portfolio of projects in Australia and New Zealand, with a key focus on floating offshore wind for New South Wales. Jordan provided an update on the status of the offshore wind industry, an overview of Oceanex's projects, and insight into the technology development pathway for floating offshore wind as well as the challenges and opportunities for the Australian maritime industry.

The Presenter

Jordan is a naval architect with over 16 years' experience in maritime, port and offshore construction operations from both client and service company perspectives. He has an in-depth understanding of what it takes to plan and execute marine and offshore projects within Australia, spanning shipbuilding to port operations to major offshore construction projects. Jordan has been closely involved with the development of the offshore wind industry in Australia since its inception and is deeply motivated to ensure that it is a success. He is responsible for delivering the port infrastructure, marine operations, fabrication and vessels strategy for Oceanex projects.

Jordan's presentation was recorded and is now available on the RINA YouTube channel, see *The Internet* column.

Samuel Smith

Tasmania

Maritime Art

Leisha Owen, Curator, Allport Library and Museum of Fine Arts, gave a presentation on *Maritime Art* at an in-person meeting of members of the Tasmanian Section and friends at the Allport Library and Museum of Fine Arts in Hobart

on 28 April, with 14 in attendance. The meeting was MCed by the Chair of the Tasmanian Section, Chris Davies, who thanked the presenter and proposed the vote of thanks.

The presentation focussed on artworks, from the collections of both the Allport Library and Museum of Fine Arts and the State Library of Tasmania, of historic vessels associated with Tasmania's early European settlement, exploration and trade.

The presentation was not recorded.

Chris Davies thanking Leisha Own for her presentation
(Photo courtesy Richard Boult)

Evolution of Timber Boat Construction at Norman R. Wright and Sons

Bill Wright, Director, Norman R. Wright and Sons, gave a presentation on *Evolution of Timber Boat Construction at Norman R. Wright and Sons* at a room-and-zoom meeting (in person at the Australian Maritime College in Launceston, Zoomed to the Derwent Sailing Squadron in Hobart, and streamed live via Zoom to the wider fraternity) on 11 May. This presentation attracted 5 attendees in Launceston, 4 in Hobart, and 5 participating online.

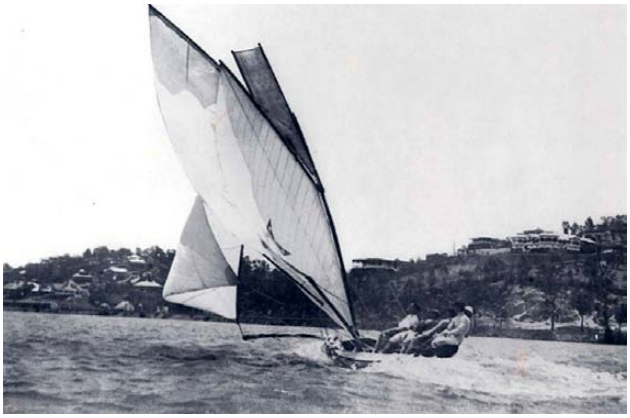
Bill gave a number of examples of vessels designed and built by NRW.

One of these was *Commonwealth*, a 10 ft gaff-rigged skiff. Norman first built a half model of the boat he wished to build—this model still lives in Bill's office at NRW. When happy with the shape, he took the lines off the model and lofted the boat on the attic floor of their family home. She was built and then launched in 1906 on a Saturday morning and, according to a press clipping from the *Courier Mail*, raced later that afternoon and won the Australian 10 ft skiff title! She was a magnificent sight when running with all of the gear up with a spinnaker, along with her mainsail, topsail, ringtail, watersail and balloon jib. She measured over 40 ft from the tip of the spinnaker pole to the end of ringtail boom. *Commonwealth* was Australian 10 ft Skiff Champion in 1907, 1908, 1909 and 1910.

Another, more recent, NRW vessel was *Aura*, a 63 ft 40 kn composite game boat launched in 2019.

In his presentation, Bill emphasised how the adoption of new materials and techniques in both design and construction had evolved over the 110 year history of the company.

The presentation was not recorded.



Commonwealth powering along
(Photo courtesy Bill Wright)

Aura at anchor
(Photo courtesy Bill Wright)

Annual General Meeting

The Tasmanian Section held its Annual General Meeting on the evening of 11 May, immediately following the May technical presentation by Bill Wright.

Oscar Kennedy resigned from the Committee due to the pressure of other things, and Jack McLaren was elected to the Committee to take on his role.

The Committee for 2023 therefore comprises

Chair	Chris Davies
Deputy Chair	Martin Renilson
Secretary	Richard Boult
Treasurer	Michael O'Connor
Advertising/Sponsorship Coordinator	Michael Woodward
AD Council Representative	Chris Davies
Junior Representative	Doupadi Bandara
Undergraduate Representative	Jack McLaren
Member	Alan Muir

ROV Fundamental Design, Build and Operation

Kelsey Treloar, Director, Southern Ocean Subsea, gave a presentation on *ROV Fundamental Design, Build and Operation* and a workshop tour at Sosub's premises in Kingston, Tasmania, and streamed live via MS Teams to the Australian Maritime College in Launceston and to the wider fraternity on 8 June. This presentation and tour

attracted 6 attendees in Kingston, 7 in Launceston, and 7 participating online.

Southern Ocean Subsea started in 2017 by repairing ROVs for the local aquaculture industry, and then embarked on designing and building their own ROVs. One of their early commissions was for the Australian Antarctic Division for a machine which had six degrees of freedom and was compact enough to dive vertically down through a 40 cm diameter hole cut in the sea ice. Sosub have also developed an ROV which can repair (stitch) aquaculture pen netting.

A very interesting presentation, highlighting local innovative design and manufacturing.

The presentation was not recorded.

Some of the ROV attendees (L to R): Kelsey Treloar, Chris Davies, Andrew Ford and Andrew Brocklesby
Note the AMC venue showing on the large screen
(Photo courtesy Richard Boult)

Kelsey Treloar demonstrating the evolution of ROVs from oldest to newest (L to R)
(Photo courtesy Richard Boult)

Active Heave Compensated Winch—Offshore Operation

Carl Morley, General Manager, Operations, Thrust Maritime, gave a presentation on *Active Heave Compensated Winch—Offshore Operation* at a room-and-zoom meeting (in person at the at the Australian Maritime College in Launceston, and streamed live via Zoom to the wider fraternity) on 13 July. This presentation attracted 12 attendees in Launceston, and 1 participating online.

Thrust Maritime completed the development of a novel and highly-portable fully-electric active heave compensated (AHC) winch system in 2021. The system has been developed by the multidisciplinary team at Thrust Maritime (www.thrustm.com). Thrust Maritime is an Australian, yet globally-niche, business with a focus on high-integrity offshore lifting solutions, typically involving challenging situations like hyperbaric and submarine rescue.

The development of the portable AHC system included design, manufacture and testing, all of which were conducted in-house. The system greatly increases the ability to launch and recover in high sea states, in essence nullifying vessel motions at the hook. This provides unique capability for subsea operations, including activities like subsea installation and construction, repair and specialist operations in support of defence.

Th presentation gave some highlights of the development journey, with a focus on naval architecture.

The presentation was not recorded.

Active heave compensation winch in operation
(Photo courtesy Thrust Maritime)

Design and Construction of the New AIMS Research Vessel

Peter Thurling, Project Manager AIMS Research Vessel, gave a presentation on *Design and Construction of the New AIMS Research Vessel* at a room-and-zoom meeting (in person at the at the Royal Yacht Club if Tasmania in Hobart and streamed live to the Australian Maritime College in Launceston and to the wider fraternity) on 10 August 2023. This presentation attracted 6 attendees in Hobart,12 in Launceston, and 19 participating online.

The presentation was not recorded.

Richard Boult

New South Wales
Committee Meetings

The NSW Section Committee met on 23 May and, other than routine matters, discussed:

- SMIX Bash: Accounts for 2022 finalised; sponsor letter and contact list for 2023 set up and sponsorships being sought; booking for *James Craig* has been confirmed.
- TM Program: Presentation for Wednesday 7 June moved to Monday 5 June at presenter's request; presentation for October deleted due to subsequent booking in September, and another presentation needed.
- Walter Atkinson Award 2023: NSW Section nomination forwarded to AD Council.
- Minutes of NSW Section Committee Meetings: Hard copies of minutes 2012–present sent for recycling, as we have digital copies from2001–present.

The NSW Section Committee also met on 23 May and, other than routine matters, discussed:

- SMIX Bash: Sponsors have been contacted and replies are arriving, some have already paid; deposits have been paid; Trybooking website is up and running and bookings are now open.
- TM Program: Presentation for August moved to October at presenter's request; presentation for August secured.
- Correspondence: RINA's new website is now live and Australian content is being graually added (see the Branch Finder page), recordings of previous Branch and Section presentations are also gradually being uploaded to the RINA YouTube channel.

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

The Australian Future Submarine Multiverse

Eric Fusil, Program Director Marine Engineering, The University of Adelaide, gave a presentation on *The Australian Future Submarine Multiverse: Between Myths and Realities*, to a joint meeting of the NSW and SA&NT Sections and IMarEST ACT & NSW Branch in Room S112, Engineering South Building, the University of Adelaide, with the Chair of the SA&NT Section, Peter Bevan as MC, and streamed live on 5 June. The presentation was attended by seven with an additional 17 online.

It is expected that this presentation will be written up in the November issue of *The ANA*.

The presentation was recorded and is expected to be available soon on the RINA YouTube channel.

The vote of thanks was proposed by Peter Bevan, and the "thank you" bottle of wine subsequently delivered to Eric via an eGift card.

HMAS *Choules* SEA3030 Mid-Life Upgrade

Lachlan Rowley, Engineering Manager, Atlantic & Peninsula Australia, gave a presentation on *HMAS* Choules *SEA3030 Mid-Life Upgrade*, to a joint meeting of the NSW Section and IMarEST ACT & NSW Branch in the Henry Carmichael Theatre, Sydney Mechanics School of Arts in the Sydney CBD, with IMarEST Committee Member, Steve Morant as MC, and streamed live on 5 July. The presentation was attended by 36 with an additional 17 online.

Introduction

HMAS *Choules* (ex RFA *Largs Bay)* is one of four Bay-class landing ships which the Australian Defence Force purchased from the Royal Fleet Auxiliary in the UK. She underwent a major refit to make her suitable for RAN service, arrived in Western Australia in December 2011, and was commissioned into the Royal Australian Navy as HMAS *Choules* on 13 December 2011.

Principal particulars of HMAS *Choules* are

Length	176.6 m
Beam	26.4 m
Draft	5.80 m
Displacement	16 190 t
Crew	158 officers and sailors
Capacity	356 troops (standard) 700 (overload) 32 Abrams tanks 150 light trucks 2 LCVP (landing craft, vehicle and personnel) 1 LCM8 2 mexeflotes (powered landing rafts) 2 helicopters
Main engines	2×Wärtsilä 8L26 engines each 2240 kW each 2×Wärtsilä 12V26 each 3360 kW
Auxiliary	1Wärtsilä genset
Propulsion	2×azimuthing thrusters
Manoeuvring	Bow thruster
Speed	18 kn
Range	8000 n miles at 15 kn

HMAS *Choules* departing Sydney on sea trials after Refit Period 2021–22
(Photo courtesy A&P Australia)

Lachlan began his presentation with an overview of the SEA3030 Project, and the Refit Period 2021–22.

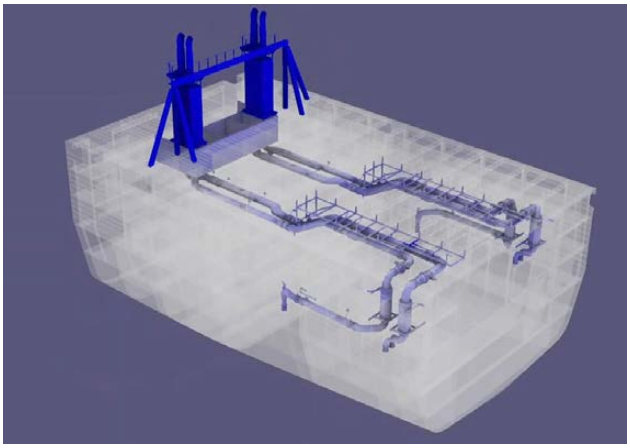
The major goal of the SEA3030 Project was a capability assurance programme—there were originally 44 discrete engineering changes but, over the course of the project, this was increased to 57. They included a HVAC upgrade (five new chillers, renewal of air-handling units and fan-coil units, new chilled-water pipework and flow philosophy), dry exhaust upgrades, ballast-water treatment facilities, galley upgrades, RHIB davit upgrades, new reverse-osmosis fresh water plants, new sewage treatment, stability upgrades, propulsion converter upgrades, diesel generator crankcase breather system upgrade, working air upgrades, fixed fire-fighting system upgrades, radar upgrades, and IPMS (Integrated Platform Management System) refresh. Also included were some capability additions to HMAS *Choules*: Close-in Weapons System (CIWS), Nixie decoy system, and Personnel and Magazine Ballistic Protection.

Some numbers from the Refit Period 2021–22 give an idea of the scope of the work done. This was the largest refit delivered on Garden Island in 15 years, with a budget of $180 million for the upgrade program, and $53 million for the maintenance work done in parallel: 1545 planned maintenance tasks, 476 corrective work orders, and $11 million in general support activities (scaffolding, painting, tank cleaning, etc.) There were 35 weeks of production, including 18 weeks in dry dock, and 17 weeks alongside.

There were 675 000 man-hours of production, utilising 2500 individuals. The good news was that there were no major safety incidents, only 28 minor safety incidents and eight man-hours lost due to injury.

Exhaust System Upgrade

The upgrade to the exhaust system was considered necessary for a number of reasons. Personnel safety was principal among them, as the exhaust stacks exiting the hull at the aft end of the flight deck above the transom created plumes across the decks during mooring. The installed wet exhausts inherited issues, with the water feed pipes being thick-walled mild steel and having corrosion problems after 12 years in service. The system was also prone to flooding the main engines by soot blocking drain pipes or valves incorrectly aligned. This occurred during ship build, and then again whilst in operation. Then there were the environmental optics with soot flowing into the sea on engine startup which wasn't a good look in Sydney Harbour.



Exhaust design from engines to new exhaust stacks (midships)
(Diagram courtesy A&P Australia)

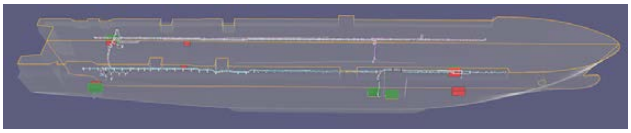
Exhaust in production standing on scaffold in vehicle deck
(Photo courtesy A&P Australia)

The wet exhaust system leading aft and exiting the hull at the aft end of the flight deck above the transom was removed, and replaced with new dry exhaust stacks exiting vertically at midships. In the process there was much collaboration with Australian industry, and the solution provided safety and reliability with decreased maintenance costs, and the bonus of making additional compartments available for new machinery and storage spaces.

HVAC Upgrades

Upgrades to the heating, ventilation and air-conditioning systems were considered necessary as they had been designed for UK conditions, and were seriously under capacity for Australian conditions. The system had limited redundancy built in and the ageing chillers were becoming less reliable and more expensive to maintain.

This upgrade was the largest change during the refit, with the removal of the old individually-looped chillers (2×1350 kW main chillers, and 2×450 kW and 2×70 kW chillers) and installation of new chillers on a constant-flow circuit (5×1000 kW chillers and a DG fresh-water cooling modification). The upgrade increased the overall cooling capacity by 35%.



Chillers in HMAS *Choules*
(old chillers in red, new chillers in green)
(Drawing courtesy A&P Australia)

The production required 1.4 km of new copper-nickel and mild-steel pipework with bores in excess of 150 mm, 3.5 km of electrical cable, the overhaul of more than 50 fan-coil units and 20 air-handling units for air conditioning. This change affected approximately 60 compartments across the ship.

During set-to-work, the chilled water system was filled which led to a very strong "team bonding session", as the team was stationed around the ship with radios to identify and rectify inevitable leaks.

The supply chain in Europe was also severely hampered by the pandemic which led to late delivery of components, and the new chillers required to be flown to Australia to meet the schedule. The HVAC upgrades were a massive undertaking, required the use of many different installation partners, and boasted a huge AIC (Australian Industry Content) with the system being wholly designed and installed using Australian engineers and labour force.

Ballast Water Treatment System

The Ballast Water Treatment System (BWTS) required an upgrade to bring the ship into line with IMO's 2017 requirements for treating ballast water.

This required major rework in Auxiliary Machinery Room No. 1 for the forward ballasting system (two ballast pumps and one new modular BWTS), and in the Ballast Pump Room for the after system (four ballast pumps and one new modular BWTS).

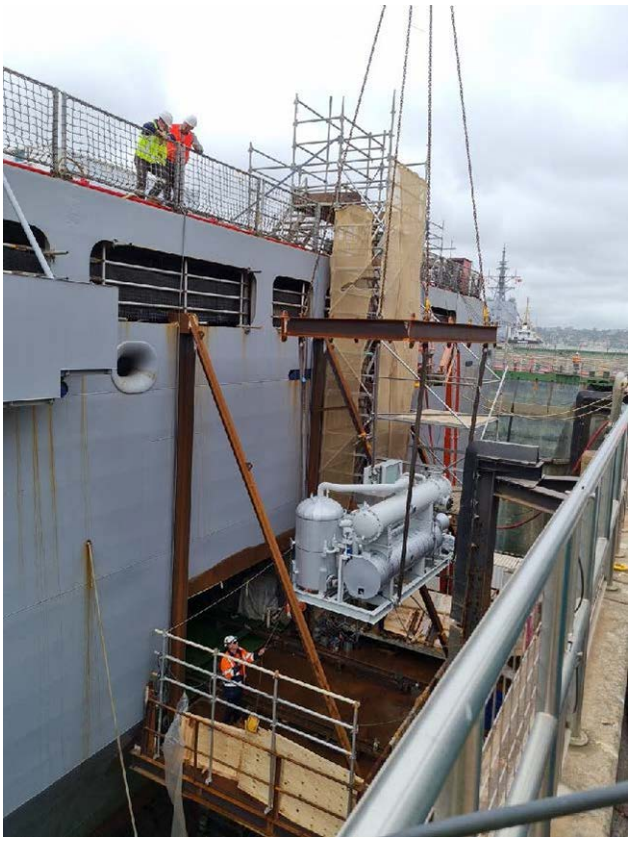
Forward ballast water treatment system installation
(Photo courtesy A&P Australia)

The inherented tight confines presented a challenge to fit the new equipment in these locations, along with other engineering changes in concurrence. These challenges were overcome with the use of the "PureBallast" modular system, 3D scanning and modelling of the compartments, pre-assembly in the workshop and then final installation on the ship.

Removal and Insertion Routes

The removal and insertion of items of equipment required six major inserts in the hull of HMAS *Choules*, each spanning approximately 3 m×5 m. Locations included:

- Auxiliary Machinery Room No. 1 (Fwd) — Support for the BWTS, sewage treatment plants (×2) and a chiller
- Auxiliary Machinery Room No. 2 (Midships) — Support for chillers (×2), reverse-osmosis plant (×2) and water-mist equipment
- Technical Equipment Rooms (Port and Starboard) — Out with old chillers, in with new
- Propulsion Converter Rooms (Port and Starboard) — Out with old converters, in with new
- Many more smaller inserts (in bottom side tanks, and for the topside exhaust) were required



Hanging platform welded to ship's side for aft chiller installation
(Photo courtesy A&P Australia)

To support these major removals and inserts, a set of jigs, platforms and fixtures were also required. Three of the original platforms, originally fabricated for the FFG upgrade programme were modified and repurposed for the work on HMAS *Choules.* The fourth "hanging" platform was purpose designed, built, and load tested for use on the port technical equipment compartment.

FFG platform in use on an FFG
(Photo courtesy Thales Australia)

FFG platform in use on HMAS *Choules*
(Photo courtesy A&P Australia)

Underwater Hull Coating

It had been noted that the hull was extremely fouled at previous dockings and on the current docking, so a change in coating was considered late in the programme. Hempel X7 was applied to the hull, a silicone-based coating with integral biocide designed to minimise hull-growth drag through water.

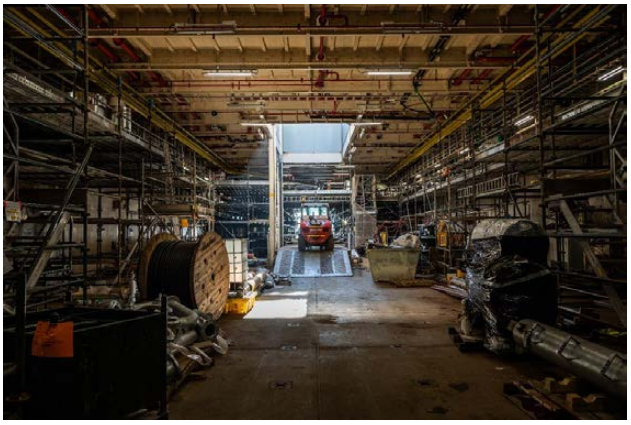
This has led to considerable fuel savings and propeller RPM at high lever settings. Recent diving inspections, 15 months after leaving dock, showed minimal growth on the hull.

Challenges

There were a number of challenges during the Refit Period 2021–22, many due to the sheer volume of work undertaken:

- there were workforce shortages due to the pandemic;
- permits for hot work—an average of 45 per day—needed additional ship's staff and safety staff;
- cranage was in short supply—they had four cranes at times to support more than 12 000 lifts through the period;
- work in confined spaces required rescue teams to be on standby;
- deconfliction between contractors working in the same compartments;
- lost time due to the pandemic totalled ~20,000 man-hours;
- there were rain delays as it was the wettest year in history; and
- there were supply-chain issues with the pandemic and European unrest.

HMAS *Choules* with new antifouling applied
(Photo courtesy A&P Australia)



Vehicle deck looking aft showing volume of work and scaffolding
(Photo courtesy A&P Australia)

Results

With the changes made to the propulsion converters, the streamlined underwater hull coating, the upgrades to cooling and general in-service pod maintenance, for the first time in the past six years the ship has been able to maintain maximum power output through the pods!

In addition, the ship's sea trials went through the whole programme without major issue and successful set-to-work of all systems, a huge achievement for many systems to be upgraded and successfully set to work without a defect rectification period.

As a matter of interest, the UK MoD is having some similar problems with their remaining three Bay-class LHDs, especially with the HVAC system, and have not been able to solve them, so they are now particularly interested in the upgrades which Australia has made.

"Delivering Success Together"—Atlantic and Peninsular Australia's ethos was reflected in the presentation as credits were noted for the wide array of design and installation partners who helped deliver a successful refit.

Conclusion

Atlantic and Peninsula Australia and their design and installation partners have completed a successful refit and upgrade to HMAS *Choules,* despite significant challenges along the way. A&P continues to deliver HMAS *Choules* in-service maintenance and engineering support, and looks to continue naval engineering support.

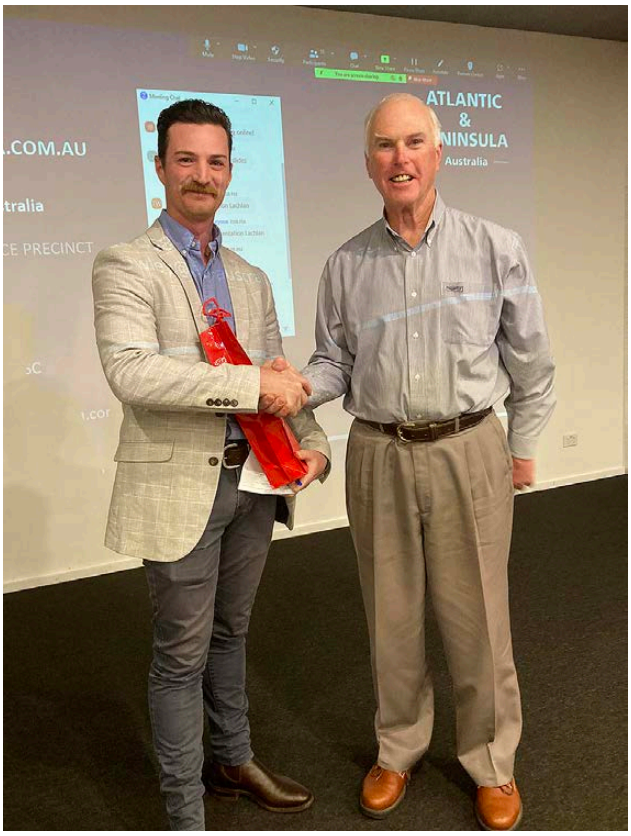
HMAS *Choules* continues to be ready and available to the Royal Australian Navy for amphibious operations.

Questions

Question time was lengthy and elicited some further interesting points.

The presentation was recorded and is expected to be available soon on the RINA YouTube channel.

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



Lachlan Rowley (L) and Greg Hellessey
(Photo Phil Helmore)

IMO Navigates the Age of Alternative Marine Fuels

Robert McMahon, Marine Engineer and Energy Consultant/ Auditor, gave a presentation on *IMO Navigates the Age of Alternative Marine Fuels* to a joint meeting of the NSW Section and IMarEST ACT & NSW Branch in the Henry Carmichael Theatre, Sydney Mechanics School of Arts in the Sydney CBD, with the IMarEST Secretary, Geoffrey Fawcett, as MC and streamed live on 5 July. The presentation was attended by 26 with an additional 31 online.

IMO has turned up the heat on ship owners, managers, and seagoing personnel by strengthening mandatory regulations and telegraphing full speed ahead to ships' decarbonisation and net zero GHG emissions targets.

Ship owners are demonstrating a surge of interest in energy-efficient improvements in vessels, reducing energy consumption in existing ships, effective supply-chain planning, and in building highly-efficient IMO-compliant, safe and profitable new vessels.

This presentation looked at current IMO regulations and showed a selection of information on owner approaches to different vessel types, and from present to future compliance with statutory safety rules, emissions regulations and crew-training requirements.

Included in the discussion were the pros and cons of the chemical and physical properties of different marine fuels, from diesel through alternate drop-in biofuels, LNG and methanol, to high-fire-risk hydrogen and highly-toxic-to-humans ammonia, electric systems and nuclear power, plus sail assist, AI assist and digital monitoring.

In conclusion, many known problems and side-effect issues still require resolution to reach a safe IMO green-energy nirvana with net zero ships' emissions from well to wake.

The presentation was recorded and is expected to be available soon on the RINA YouTube channel.

The vote of thanks was proposed by Steve Morant, and the "thank you" bottle of wine subsequently delivered to Robert via an eGift card.

Phil Helmore

CLASSIFICATION SOCIETY NEWS

ABS Classes World's First Green Methanol-powered Vessel

The first containership ever to sail on green methanol, an A.P. Moller-Maersk 2100 TEU feeder vessel built to ABS class, has been delivered from builder Hyundai Mipo Dockyard Co. in Ulsan, South Korea, to Copenhagen, Denmark.

"The development of this first-of-kind vessel represents a genuine landmark for our industry and is the result of significant teamwork that we are proud to have played a role in. This vessel represents a paradigm shift and requires new thinking in every area from design and operation, to skills and training, to bunkering and shoreside engagement," said Christopher Wiernicki, ABS Chairman and CEO. "Green methanol holds significant promise to contribute to the decarbonisation of our industry and ABS has been leading the way by supporting its adoption. This vessel and her successors now on order are a vital step in creating more sustainable global supply chains."

This feeder vessel is the first of 19 dual-fuel-engined vessels which can sail on green methanol on order from Maersk to ABS class. When all 19 vessels on order are deployed and have replaced older vessels they will, when operating on green methanol, generate annual CO_2 emissions savings of around 2.3 million tonnes.

ABS has published guidance on methanol as a marine fuel, evaluating the challenges in the design and operation of methanol-fuelled vessels. Copies of the sustainability whitepaper *Methanol as Marine Fuel* may be downloaded at https://absinfo.eagle.org/acton/media/16130/sustainability-whitepaper-methanol-as-marine-fuel. More information on ABS sustainability services and guidance on a range of alternative fuels is available at https://ww2.eagle.org/en/Products-and-Services/sustainability/alternative-fuel-options.html.

ABS News, 19 July 2023

DNV, Damen and NAPA use 3D Model-based Approval

Damen, DNV and NAPA are taking a major step forward in ship design processes by using the new Open Class 3D Exchange (OCX) standard to streamline classification involvement in the early phase of a project.

With increasing pressure to deliver vessel designs quickly, the early engagement of classification societies can increase designer and owner confidence in the concept design and ensure a smooth project execution. Responding to market expectations, Damen Engineering decided to involve DNV classification experts in the first review of its new design of a Commissioning Service Operation "Walk to Work" Vessel (CSOV 9020). Collaboration started during work on the design proposal, the very first stage of the project, using new cutting-edge technology based on 3D model exchange and approval through the OCX file format.

The new CSOV design was developed by Damen engineers using NAPA's 3D design tools, which enable the export of 3D models in the OCX format. This functionality allowed Damen and DNV to work in parallel on the same 3D model, saving the time and effort needed to agree and prepare 2D documentation.

Katarzyna Romantowska-Jaskólska, Managing Director at Damen Engineering, said "Environmental, safety, regulatory and other external pressures, combined with the competitive need to create ever-better designs, mean that doing things the way we always did them is no longer sufficient. The OCX format allows us to take a new approach which is beneficial to everyone involved in the development of a vessel design and the project execution process. In collaboration with DNV and NAPA, we arrived at a solution which connects disciplines and facilitates quick decision-making while reducing risks in the early stages of a design."

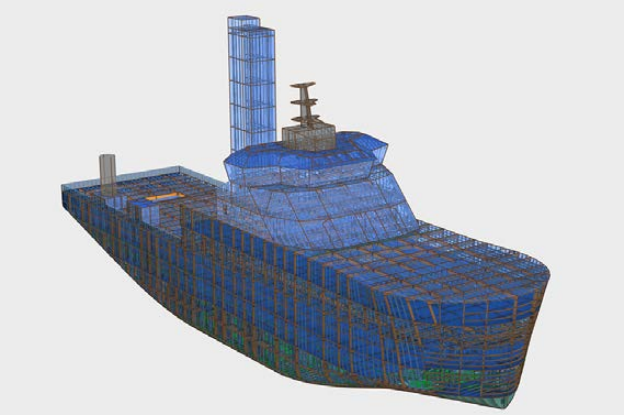
Mikko Forss, Executive Vice President for Design Solutions at NAPA, added "At NAPA, streamlining the hull structure approval process through efficient collaboration and swift feedback loops among stakeholders is one of our top priorities. As a result of several joint industry development projects, NAPA's 3D design solutions can support efficient information exchange between ship designers and classification societies, enabling quicker and more accurate approvals. Our support for the OCX format is a key part of this effort, as it enables the standardized exchange of 3D model data and reduces the time and effort required for efficient communication."

Ivar Håberg, Director of Approval at DNV, concluded "The earlier class starts the design-approval process, the easier it is to find good rule-compliant design solutions in cooperation with the yards. By using the OCX file format to exchange information on 3D design models, DNV can more efficiently interact and cooperate with the designers and yards already in the early design development phase."

OCX is a new standard for 3D model-based class approval, aimed at breaking down the barriers between different design and classification software platforms to enable the seamless exchange of idealised geometry and metadata between them. The OCX 3D model can also replace the traditional 2D structure drawings for classification purposes, thereby saving time for the yards, and allowing class to respond more quickly to designers' needs.

The OCX standard is the result of the joint industry project 'Approved (2016-2020)' headed by DNV. The standard is now jointly owned and managed by the OCX Consortium established in 2021 (https://3docx.org). This consortium has brought together more than 30 industry leaders to jointly promote and maintain the standard. The consortium members consist of all the major classification societies, leading CAD providers and several designers and yards.

DNV News, 26 June 2023



Damen's NAPA model of CSOV 9020
(Image from DNV website)

LR Report on Carbon Intensity of Sustainable Marine Fuels

New methods for well-to-wake assurance of shipping's new fuel-supply chain will be essential to achieving zero carbon emissions. A new report from the LR Maritime Decarbonisation Hub and Safetytech Accelerator, *Tracing True Carbon Intensity of Sustainable Marine* Fuels, highlights the role of technology in enabling the shipping industry to develop specific mechanisms to track, verify and assure the true carbon intensity of sustainable marine fuels.

Shipping's decarbonisation is focused on delivering alternative fuels which significantly reduce greenhouse gas (GHG) emissions. However, to be sure that alternative fuels can achieve the GHG reductions needed, emissions from the end-to-end supply chain of these fuels must also be measured, from the resource used to produce the fuels, to their consumption onboard the ship.

The key challenge facing the industry is that ship operators can lack visibility over the supply chain responsible for producing, delivering and bunkering a fuel used on their ships. A marine fuel can be presented as carbon-neutral, but could release substantial emissions when measured on a life-cycle assessment or well-to-wake basis.

Furthermore, alternative fuels may take diverse grey or blue production routes, thus delivering fuels which are often blended, mixed or re-labelled during transportation and distribution before they reach their final users. Consequently, there is no guarantee that the fuel bunkered retains the same carbon footprint as the fuel which left the production facility.

For this reason, the LR Maritime Decarbonisation Hub and Safetytech Accelerator have explored technologies which can track the true carbon intensity of hydrogen and ammonia, two of the most promising long-term alternative fuel candidates for shipping's energy transition.

Working with two technology vendors, Tymlez and Authentix, the collaboration resulted in a joint report, *Tracing the True Carbon Intensity of Sustainable Marine Fuels*, which examines new methods of tracing information on how a fuel is being produced, from the source of the electricity used in the production process, to the delivery of an un-altered final product.

The first method is through the Tymlez solution, which utilises a 'guarantee of origin' (GO) scheme where each unit of hydrogen or ammonia is certified through a live-facility data platform which can capture emissions data during the production process, such as water and fuel usage and grid electricity consumption. Blockchain technology is deployed for green hydrogen and green ammonia tracking systems.

Following the production and supply of the fuel which is accompanied with a GO certificate, the second method is applied through the Authentix approach, which offers downstream assurance. The Authentix solution can account for any blending or mis-labelling of the fuel through the use of a synthetic marker system, where the fuel is evaluated via chemical detection of the origin of the fuel, as well as any occurred dilution.

Given the varied production routes of sustainable marine fuels, it is essential to develop new carbon-tracing authentication methods to ensure that the new fuels purchased are being produced, transported and stored in ways which will deliver emissions performance expectations.

Charles Haskell, LR Maritime Decarbonisation Hub Director, said "The complexity of the marine fuel supply chain, with its diverse production methods, presents significant challenges to the shipping industry as the definition of sustainability is extended to include all stages of well-to-wake emissions. We hope that this joint study can serve as the basis for synergies and pilot projects to emerge and further contribute to the discussions for the development of new industry standards which can authentically validate the environmental and commercial impact of these new fuels."

Dr. Maurizio Pilu, Safetytech Accelerator Managing Director, said "The assurance of new green fuels, whether in terms of safety, origin or carbon footprint, is going to be a key component of the journey towards maritime decarbonisation. The right technologies could make the assurance process cost-effective, reliable and scalable. I am pleased that Safetytech Accelerator had the opportunity to collaborate

with the Lloyd's Register Maritime Decarbonisation Hub, and Authentix and Tymlez to understand how technologies such as theirs, could be used in future assurance processes."

Daniel O'Halloran, Executive Chairman of Tymlez, said "We are extremely excited by the release of this report as it showcases the role of technologies such as the Tymlez platform in the decarbonisation of the maritime industry. The guarantee of origin of sustainable fuels such as green hydrogen and green ammonia will be paramount for proving decarbonisation efforts across the industry. It is therefore vital that technologies which can verify the origin and green credentials of these fuels with total trust and transparency be utilised. The Tymlez Guarantee of Origin solution detailed in this report provides shipowners and operators with total assurance over the sustainability credentials of the fuels they are using to power their vessels."

Jim Seely, Vice President of Solutions for Authentix, said "We have been a pioneer in fuel quality and authentication since our beginnings 27 years ago, and this continues today. We are excited to be involved in this innovative project to provide the most advanced technology available for the assurance and verification of green fuels required by the maritime industry in its long-term goal toward decarbonisation."

A copy of the report may be downloaded from https://www.lr.org/en/knowledge/research-reports/report-tracing-the-true-carbon-intensity-of-sustainable-marine-fuels/

LR Report, January 2023

FROM THE CROWS NEST

WSR Spirit 2

On 8 October 1978, 45 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 returned to Blowering Dam for the weekend of 27–28 May to try their recent modifications to the rear ski under the boat and, despite the wind and rain, managed to get some runs in each day.

On Saturday the wind was coming across the dam at 20–25 km/h, and each run was unfortunately shut down with the boat being blown off course. On Sunday morning the wind was coming down the dam but lighter than on Saturday, and the team got in three runs, with a couple over 200 mph, before being blown off course and then rain ended the weekend.

The recent modifications appear to have settled the rear end of the boat down, and the team is now looking forward to some runs in light winds and good weather.

The next set of trials are scheduled for 9 and 10 September at Blowering Dam.

Martin Grimm
Phil Helmore

Spirit of Australia 2 at speed on Blowering Dam on 28 May 2023
(Photo 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.

The mounting cradle for the twin Rolls-Royce Viper jet engines has been set in the hull, the mounting brackets sized, shaped and welded, and the cradle itself bolted into position. Then it was time for a test fitting of the port engine in the vessel in Dave Aldred's driveway, which was successfully completed, including measuring up for the pipes which carry the jet thrust to the transom.

Test fitting of port jet engine in *Longbow*
(Photo from Longbow website)

Following the test fitting, it was time to spray paint the engine cradle and construct the pipes to carry the thrust from the jets to the transom. These are built in sections which had to be welded accurately together, no simple job when the wall thickness is only 1 mm and the metal wants to distort when it even looks at heat!

Port tail pipe for *Longbow*
(Photo from Longbow website)

Then it was on to setting up the battens for the top of the sponsons, the battens having to be steam bent and then fastened n place.

Longbow website

Starboard sponson battens in place on *Longbow*
(Photo from Longbow website)

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.

After two years of construction, the boat is finally complete and will make its first foray on the water this summer [*European* — Ed.] at Leucate in the south of France. The team opened their doors on Saturday 10 June for those interested to meet the team and ask questions about the challenge, discover SP80's history thanks to a filterless photo exhibition, discover how they built the boat from the prototype to the hundreds of production files sent to the shipyard, learn more about kite sailing, foils and mechanical parts thanks to booths tailored to explain everything, how they integrated all these parts inside the hulls, discover the work done by the integration team, get a feel of what the pilots will experience during a run thanks to the virtual-reality booth, and get closer to the world record boat for the first time!

The first trials at Leucate will be focussed on optimising the boat. Before reaching 80 knots (148 km/h), they will have to learn the boat's behaviour and to coordinate between pilots. The goal is to accelerate step by step until December 2023 before working on the boat during the winter break. They will then come back to Leucate by spring 2024 with a sharpened boat for a first world sailing speed record attempt" said Benoit Gaudiot, the pilot on the boat.

SP80 website

Sail GP Series 4

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

Series 4 kicked off in Los Angeles, USA, on 22–23 July, with Australia, Great Britain, Canada, Denmark, France, Germany, New Zealand, Spain, Switzerland and USA, all competing. Results show Australia at the top of the table with 17 points., Spain 2 with 16 and Denmark 3 also with 16.

Subsequent events will be held as follows:

Saint Tropez	9–10 September
Taranto	23–24 September
Andalucia-Cadiz	14–15 October
UAE	13–14 January
Sydney	24–25 February
Auckland	23–24 March
Bermuda	4–5 May
Canada	1–2 June
New York	22–23 June
San Francisco	13–14 July

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

Phil Helmore

Sail GP action on Sydney Harbour
(Photo John Jeremy)

GENERAL NEWS

New Ferries for Sydney's Parramatta River Service

On 26 June the NSW Government announced that seven new Australian-made ferries will take to Parramatta River after the Government awarded the construction contract to Richardson Devine Marine Constructions in Hobart.

The new Parramatta-class ferries have been designed by Incat Crowther, leading naval architects based in Belrose, Sydney.

The Parramatta-class ferry design will be a vast improvement on the 10 overseas-made River-class vessels which entered service in October 2021. Transport for NSW has worked closely with the naval architects, operator Transdev and union representatives to ensure that the faults which plagued the River-class ferries are not repeated.

While aesthetically similar, the new Parramatta-class vessels will not include upper-deck seating which was deemed too dangerous to be used when passing under Camellia Railway Bridge and Gasworks Bridge.

An impression of Sydney's new ferries
(Image courtesy Incat Crowther)

The new ferries will also be future-proofed, allowing for future conversion to electric propulsion as battery, charging and engine technologies improve.

Ferry engines are usually replaced after five years of service, providing a number of opportunities to make these upgrades during the 25–30 year working life of the Parramatta-class ferries.

The seven new vessels will replace seven Cairns-built RiverCat ferries, which are ready to retire after 30 years of faithful service. The RiverCat vessels were the first passenger ferries to chart a course all the way to Parramatta wharf in 1993.

Construction of the new ferries was to begin in July.

A spokesperson for Richardson Devine Marine said "We thank the NSW Government, Transport for NSW and Sydney Ferries for choosing to work with us to deliver all seven new Parramatta River ferries.

"Since RDM was founded in 1989, we have built a strong reputation for building high-quality aluminium passenger and cruise/charter vessels for commercial operators worldwide.

"You will find our Aussie-built vessels hard at work around the globe from Tasmania to Tanzania.

"We're excited to start building the new vessels for the people of NSW and can't wait to see them on the beautiful Parramatta River."

Incat Tasmania Completes High-speed Catamaran for South Korea

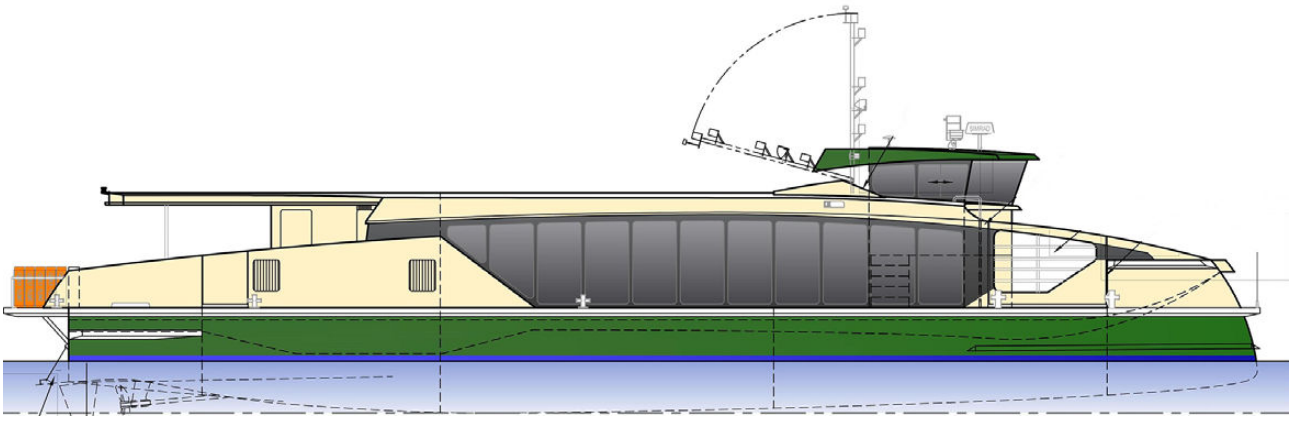
Australia's Incat Tasmania has handed over its latest building project, the 76 m high-speed passenger catamaran *El Dorado Express* to her new owner, Daezer Ferry of South Korea.

Reflecting the exacting requirements of her owners the bespoke new ferry, Incat Hull 099, is predominately a passenger craft with ramp and cargo space forward.

She will operate for Daezer Ferry on the crossing between Pohang and Ulleung, an island 117 n miles off the eastern coast of South Korea supporting the needs of local residents and providing a service for tourists to the island.

Incat Tasmania Chairman, Robert Clifford, said that Incat is no stranger to Korean waters, having delivered its first vessel to the region in 1995, the still highly-regarded *Sunflower*. "*Sunflower* served Ulleung island for 25 years and was only recently retired by Daezer in compliance with Korean ship age limits," he said.

Mr Kim, CEO of Daezer Ferry, said "We are thrilled to introduce *El Dorado Express*, a remarkable vessel which will navigate the challenging waters of the East Sea of



The outboard profile of the Parramatta-class ferries to be built for the NSW Government by Richardson Devine Marine in Hobart
(Incat Crowther drawing courtesy NSW Dept. of Transport)

The high-speed catamaran ferry *El Dorado Express* was recently delivered by Incat Tasmania to Daezer Ferry for service in South Korea
(Photo courtesy Incat Tasmania)

Korea with unparalleled speed. In our quest to deliver the fastest ferry, we chose Incat as our partner, confident in their ability to provide the highest-quality craftsmanship. We eagerly anticipate showcasing this extraordinary vessel to the people of Korea, and we are certain that it will exceed their expectations."

El Dorado Express will provide passengers with a smooth ride and enhanced onboard experience thanks to Incat's tried-and-proven evolved wave-piercing hullform and centre-bow arrangement.

Designed by Revolution Design, *El Dorado Express* is a truly fast vessel, reaching an impressive speed of 50.2 kn on sea trials with 100 t deadweight.

On board *El Dorado Express* passengers can enjoy an abundance of natural light in a high-quality interior featuring comfortable seating, durable timber-look walkways and tasteful bulkhead panelling. The stylish accommodation is situated across two decks: Tier 1 with seating for Tourist passengers and Tier 2 for both Business and VIP classes.

The aft end of Tier 2 boasts 92 luxurious Eknes Pacific Sleeper-1400 VIP seats affording every comfort at sea. Dividing the VIP area from the forward-facing Business lounge is a bar serving food and snacks. A services block houses male and female toilets as well as the lower wheelhouse electronics room. In this lounge Eknes has also supplied the 352 reclining seats from its Supa Nova range.

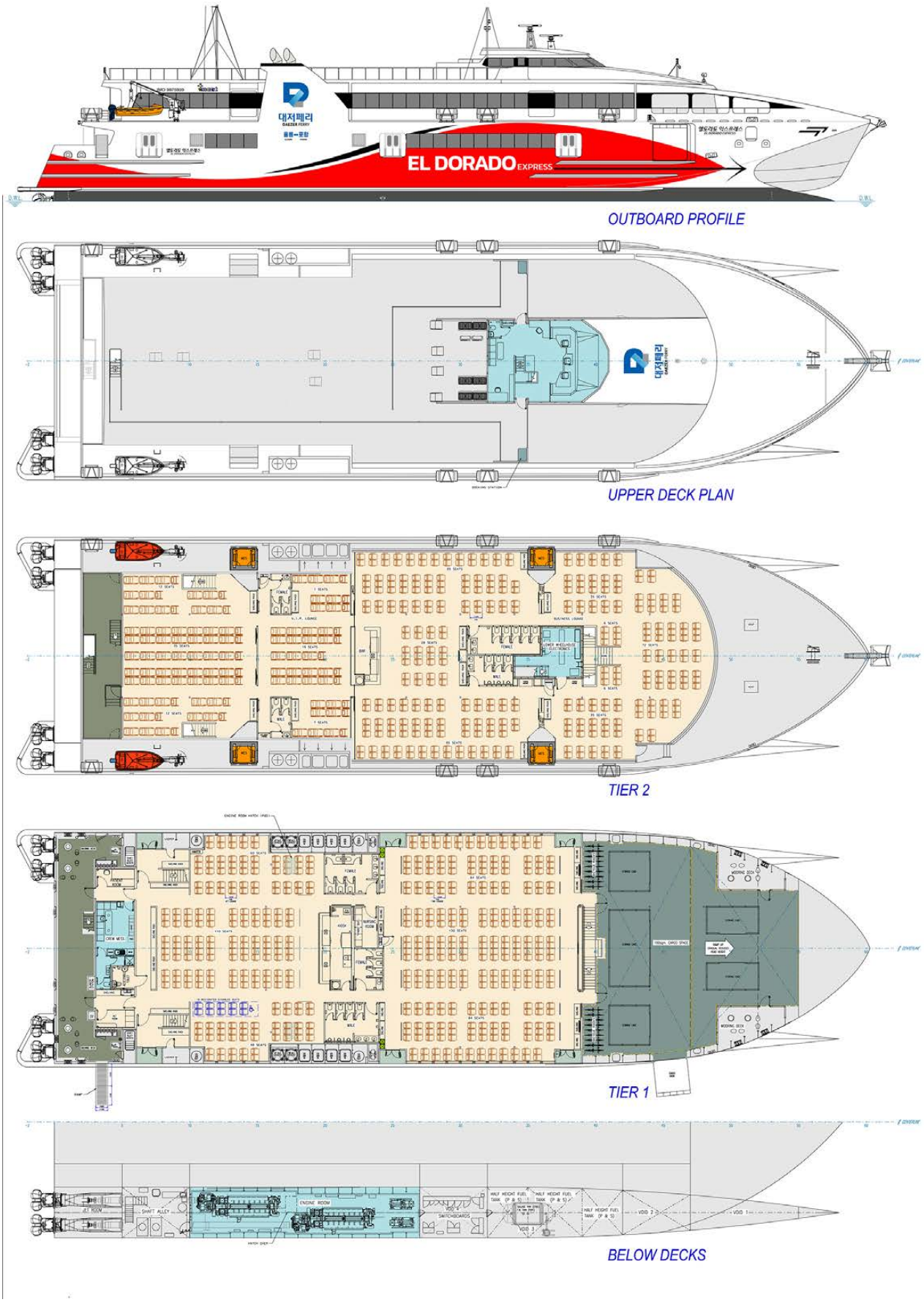
The remainder of the vessel's seating is found on the lower deck. The space is divided by a centrally-located kiosk, food preparation area and bar with wide counter area allowing customers easy viewing and access, while preventing crowding and long lines. At the aft end of Tier 1, a room is provided for passengers wishing to travel with their pets. A well-appointed crew mess divides the pet room from a patient room, provided for the benefit of patient transfer from the island to the mainland.

The wheelhouse in *El Dorado Express*
(Justin Merrigan photo courtesy Incat Tasmania)

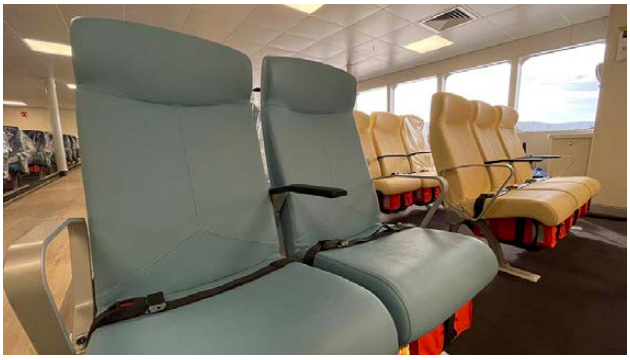
VIP seating in *El Dorado Express*
(Justin Merrigan photo courtesy Incat Tasmania)

Evacuation facilities for passengers and crew on board *El Dorado Express* comprise four Liferaft Systems Australia Marine Evacuation Stations, two port and two starboard.

As with all large Incat vessels the superstructure, Tier 2 and above, is an independent structure, connected to the hull via rubber isolation mounts, for optimum noise and vibration performance.



The General Arrangement of *El Dorado Express*
(Drawing courtesy Incat Tasmania)



Tier 1 seating in *El Dorado Express*
(Justin Merrigan photo courtesy Incat Tasmania)

Bridge wing controls in *El Dorado Express*
(Justin Merrigan photo courtesy Incat Tasmania)

Forward of the Tourist cabin on Tier 1 is the 190 m^2 cargo space with wide side-loading access for palletised goods. For cyclists there is ample bicycle rack storage.

Situated atop the passenger deck, *El Dorado Express's* wheelhouse features the latest navigation, monitoring, and control equipment. The vessel offers views from raised helm seating, with all instruments fitted in dark grey and black consoles to aid night vision and minimise distraction. For docking, wing station controls are provided. A separate ship's office and lounge is located aft of the bridge where crew can layout charts, plan voyages or relax from day-to-day activities.

High levels of operability are key and nowhere is this more evident than in *El Dorado Express's* spacious machinery rooms. The craft is equipped with four Caterpillar C280-16 engines which each deliver 6000 kW at 100% MCR. Each engine drives a steerable Kongsberg Kamewa S90-4 waterjet via a Reintjes VLJ 4431 gearbox.

Supplying electrical power are two Caterpillar C7.1 generators rated at 200 ekW each at 380 V 60 Hz.

The ship left Hobart in the afternoon of 22 May on delivery voyage from Hobart to Pohang under the control of her new Korean crew, with an Incat electronics technician and mechanical engineer on board.

Principal Particulars

Design	Revolution Design
Length OA	76.7 m
Breadth OA	20.6 m
Draft	3.02 m
Gross Tonnage	3158 GT
Deadweight	167 t
Passengers & crew	990
Cargo	25 t
Main engines	4×Caterpillar C280-16
Speed	50.2 kn @ 100% MCR and 100 t deadweight
Class:	DNV ✠1A1 HSLC R1 Ferry EO

The acquisition for the RAN of new fast-craft training simulators represents an important step towards Ship-Zero simulated training capability. Acquired through Luerssen Australia, the training simulators use the latest technology to readily and safely train coxswains for challenging scenarios without having to take assets and personnel to sea
(RAN photograph)

USS *Canberra* arriving at Fleet Base East, Garden Island, on 18 July ahead of her formal commissioning ceremony on 22 July (Photo John Jeremy)

USS *Canberra* is Commissioned in Sydney

The Independence-variant littoral combat ship USS *Canberra* (LCS 30) was commissioned at the Royal Australian Navy's Fleet Base East in Sydney on Saturday 22 July.

During the ceremony, leaders and distinguished guests from the US and Australia wished the crew of *Canberra* fair winds and following seas as they brought the ship to life and began its commissioned service.

US Secretary of the Navy, the Hon. Carlos Del Toro, delivered the commissioning ceremony's principal address. The ceremony also featured remarks from His Excellency General the Hon. David Hurley AC, DSC, Governor-General of the Commonwealth of Australia, the Hon. Caroline Kennedy, US Ambassador to Australia, the Hon. Richard Marles, Australian Deputy Prime Minister and Minister of Defence, ADM Michael Gilday, US Chief of Naval Operations, VADM Mark Hammond, RAN Chief of Navy, and Mr Larry Ryder, Vice President of Business Development and Government Affairs, Austal USA. The commissioning capped a week-long series of events celebrating the ship and her namesake city. During the ceremony, *Canberra's* commanding officer CMDR Will Ashley, reported the ship ready, and ship's sponsor, the Hon. Marise Payne, the former Australian Minister of Foreign Affairs, gave the traditional order to "Man our ship and bring her to life!"

"This truly is a special occasion for our fleet and our nation to be here with you in Australia, one of our closest allies, to celebrate the commissioning of our Navy's newest warship which is destined to serve throughout the Indo-Pacific region," said Secretary Del Toro. "I am confident that wherever USS *Canberra* is sailing, and whatever challenges her crew may face, they are ready, as reinforced by this warship's motto — 'Can Do!'"

Canberra departed her homeport of Naval Base San Diego for the first US Navy ceremonial commissioning in Australia on 13 June, visiting American Samoa and the Pacific Island Nation of Fiji prior to her arrival in Sydney for commissioning. Independence-variant littoral combat ships USS *Jackson* (LCS 6), USS *Manchester* (LCS 14), USS *Oakland* (LCS 24), and USS *Mobile* (LCS 26) are also operating in the Indo-Pacific.

The US Navy colour-party parades the colours at the commissioning of USS *Canberra* (RAN photograph)

"Today marks a proud moment which our Royal Australian Navy is privileged to share alongside our allies and friends in the United States Navy," said VADM Mark Hammond. "The connection between our navies, forged in battle during the Second World War, is reflected in the name USS *Canberra*." VADM Hammond also stated that, whilst USS *Canberra* is in commission, there will always be a RAN officer or sailor in her ship's company.

USS *Canberra* is the second US Navy ship named for Australia's capital. The first, a Baltimore-class heavy cruiser, was renamed from *Pittsburgh* to *Canberra* on16 October 1942, and was commissioned on 14 October 1943. She was named in honour of the Australian heavy cruiser HMAS *Canberra*, which was lost at the Battle of Savo Island in World War II. The ship was decommissioned on 2 February 1970, and was stricken from the Naval Vessel Register on 31 July 1978. Her bell, now in the custody of the Australian National Maritime Museum, was on display at the commissioning ceremony.

The official party at the keel-laying ceremony for *Young Endeavour II*
(Photo courtesy Birdon)

Ceremonial Keel Laying for *Young Endeavour II*

Construction of *Young Endeavour II* has commenced officially at the Birdon shipyard in Port Macquarie. The keel-laying ceremony on 26 July celebrated this critical milestone in the Commonwealth Government's acquisition of a unique vessel to replace the brigantine Sail Training Ship (STS) *Young Endeavour*.

CDRE Ashley Papp CSC, RAN, on behalf of the Chief of Navy, VADM Mark Hammond AO, and Tammy Bugler, Co-owner and Chief Financial Officer at Birdon, each laid coins on the keel, preserving Naval tradition to bestow good fortune upon the vessel's construction and all who sail onboard.

CDRE Ashley Papp CSC, RAN shared the motto inscribed on the special coin surrounding the Chief of Navy crest, "Service before Self", explaining that "these three words epitomise what we in the Navy look to. That is, each of us through our knowledge, skill and experience can contribute to the efforts of the whole organisation".

Over eighty distinguished guests, industry leaders, and Commonwealth representatives gathered to witness the ceremony, affirming its significance for Birdon and Australia's shipbuilding capability.

Joe Smith, Birdon's General Manager Defence, said "The keel-laying ceremony is a proud moment in the evolution of the project and is a testament to the dedication of the hard-working teams at Birdon, our subcontractors, suppliers, and the Department of Defence."

Austal USA Delivers the Future USS *Augusta*

In May the future USS *Augusta* (LCS 34) was delivered to the United States Navy. LCS 34 is the 17th Independence-variant Littoral Combat Ship (LCS) built by Austal USA in Mobile, Alabama.

Austal's Chief Executive Officer, Paddy Gregg, said that the delivery of *Augusta,* just five months after the vessel was christened in December 2022, highlights Austal USA's productivity and efficiency in delivering multiple naval shipbuilding programs.

"The speed with which the Austal USA team are managing the completion and delivery of multiple, complex naval assets is truly impressive," Mr Gregg said

"Already in 2023, Austal USA has delivered EPF-13, the autonomous-capable USNS *Apalachicola* and opened a huge new service facility in San Diego."

Independence-class Littoral Combat Ship, the future USS *Augusta* (LCS 34) has been delivered by Austal USA
(Photo courtesy Austal USA)

The future USS *Augusta* will be homeported at Naval Base San Diego, adjacent to Austal USA's new waterfront repair and maintenance facility, which features a floating dry dock capable of servicing littoral combat ships, frigates and other similar-sized surface combatants and auxiliary ships.

Austal USA's Independence-variant LCS program is nearing completion, with only two ships of a total 19 to be delivered remaining under construction — the future USS *Kingsville* (LCS 36) and USS *Pierre* (LCS 38).

Austal USA is also delivering the Spearhead-class Expeditionary Fast Transport (T-EPF) program for the United States Navy and has delivered 13 of a total 16 vessels ordered to date. The last EPF, the USNS *Apalachicola* was the first EPF (and the largest surface vessel in the US Navy fleet) to have autonomous capability for unmanned missions.

In addition to the LCS and EPF programs, Austal USA is contracted to deliver four Towing, Salvage and Rescue (T-ATS) steel-hulled ships for the US Navy and has a US$3.3 billion contract for up to 11 Offshore Patrol Cutters for the United States Coast Guard.

Austal Delivers Fifth Cape-class Patrol Boat for the RAN

In June Austal Australia delivered the fifth of eight Evolved Cape-class Patrol Boats (ECCPBs) to the Royal Australian Navy.

The vessel, ADV *Cape Woolamai*, was officially accepted by the Commonwealth of Australia on 22 June 2023.

Austal's Chief Executive Officer, Paddy Gregg, said that

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

the delivery of the fifth Evolved Cape-class Patrol Boat again highlights Austal's proven shipbuilding capabilities, efficiency and productivity from the Henderson, Western Australia shipyard.

"With the delivery of every Evolved Cape-class Patrol Boat, Austal is demonstrating the capacity, capability, and expertise to construct naval vessels for Australia to the highest quality, efficiently.

"This latest vessel, ADV *Cape Woolamai*, is the fifth we have delivered in just 15 months. We're launching and delivering a new patrol boat every three months, following approximately 12 months' construction.

"We remain on track to deliver all eight Evolved Cape-class Patrol Boats on schedule, in mid-2024 and thank the

The Evolved Cape-class Patrol Boat *Cape Pillar* entering the water for the first time at Austal's slipway at Henderson, WA, on 5 June 2023
(Photo courtesy Austal Australia)

Commonwealth again for their trust in our team to deliver this great capability for Australia," Mr Gregg added.

The 58 m aluminium monohull patrol boat is the fifth of eight to be delivered to the Royal Australian Navy since the project commenced in May 2020. The first four Evolved Cape-class Patrol Boats, *Cape Otway*, *Cape Peron*, *Cape Naturaliste*, and *Cape Capricorn* were delivered within a twelve-month period, from March 2022.

Austal Australia continues to employ approximately 400 people (directly) in Western Australia and is engaging more than 300 supply chain-partners across Australia, to deliver the Evolved Cape-class Patrol Boat Project (SEA1445-1) for the Royal Australian Navy. In-service support for the Cape, Evolved Cape and Guardian-class patrol boat fleets operated by the Australian Border Force, Royal Australian Navy and Pacific Island nations is provided by Austal Australia through dedicated service centres located in Henderson, Western Australia; Cairns, Queensland; and Darwin, Northern Territory.

Austal Vietnam Delivers High-speed Catamaran to French Polynesia

In June Austal Vietnam successfully delivered a new high-speed catamaran to the Degage Group of French Polynesia.

The 66 m *Apetahi Express* completed a series of sea trials off the coast of Vung Tau in May 2023.

Austal's Chief Executive Officer, Paddy Gregg, congratulated The Degage Group on the delivery of their latest catamaran, the sixth commercial ferry designed and constructed for them by Austal.

"Our warmest congratulations to the Degage Group on the delivery of this latest addition to their growing fleet. Austal has now designed and constructed six commercial ferries for The Degage Group, operating throughout French Polynesia and we're thankful for their continued business and support," Mr Gregg said

"*Apetahi Express* was customised by Austal's Australian and Vietnamese design and engineering teams to meet the exacting demands of inter-island transport, and this new catamaran delivers outstanding new capability; with multiple indoor and outdoor decks for passengers and a large cargo space.

Austal Vietnam's President, Mark Dummett, thanked the Austal teams for their efforts over the past two years, delivering the third vessel constructed by the Vung Tau shipyard since opening in 2018.

"This has been a fantastic collaboration between Austal and the team from the Degage Group which has resulted in a superb vessel that has exceeded speed performance targets."

The new Austal 'Passenger Express 66' catamaran features a length overall of 66.4 m, a beam of 15.2 m and draft of 1.8 m. Over two passenger decks, the vessel can accommodate 574 passengers, with an additional 80 seats available on an external sun deck. Crew accommodation includes seven two-berth cabins and two single-berth cabins. The vessel has four passenger access ramps and can carry up to 16 t of cargo loaded via two cranes.

Fitted with four diesel engines and four waterjets, as well as Austal's renowned Motion Control System (including active interceptors and T-foils) and the latest MARINELINK-Essentials program, the new ferry achieved a speed of 38 kn during sea trials.

During the design of *Apetahi Express*, the Degage Group placed an emphasis on reducing CO_2 emissions and improving fuel efficiency. By optimising the aluminium hull design, Austal has achieved a significant reduction in resistance which not only lowers fuel consumption but also improves seakeeping and delivers a more comfortable ride for passengers.

Austal Vietnam has delivered *Apetahi Express* to the Degage Group of French Polynesia
(Photo courtesy Austal Vietnam)

Austal USA Awarded Contract for up to seven T-AGOS Surveillance Ships

Austal USA has been awarded a US$113 906 029 fixed-price incentive (firm target) and firm-fixed-price contract for detail design of the Auxiliary General Ocean Surveillance Ship T-AGOS 25 Class for the United States Navy. The contract includes options for detail design and construction of up to seven T-AGOS 25 class ships which, if exercised, would bring the cumulative value of the contract to US$3 195 396 097.

T-AGOS ships, operated by United States Military Sealift Command (MSC), support the anti-submarine warfare (ASW) mission of the commanders of the Atlantic and Pacific Fleets by providing a platform capable of passive and active anti-submarine acoustic surveillance. The 110 m, steel 'small waterplane area twin hull' (SWATH) vessels support the US Navy's Integrated Undersea Surveillance System (IUSS) by gathering underwater acoustical data using Surveillance Towed-Array Sensor System (SURTASS) equipment.

Austal USA has been awarded a contract for the detail design and construction of up to seven T-AGOS 25 Ocean Surveillance Ships for the United States Navy
(US Navy image)

Austal's Chief Executive Officer, Paddy Gregg, said that the T-AGOS contract adds to Austal USA's growing portfolio of steel shipbuilding programs and is a further demonstration of the US Government's trust in Austal USA's capabilities.

"T-AGOS is a unique auxiliary naval platform which plays an integral role in supporting the US Navy's anti-submarine warfare mission. Austal USA is honoured to be selected to deliver this critical capability for the Navy, utilising our advanced manufacturing processes, state-of-the-art steel shipbuilding facilities and our growing team of shipbuilders.

"The T-AGOS contract is a clear acknowledgment of Austal's capabilities in steel naval shipbuilding, which includes the Navy's Towing, Salvage and Rescue (T-ATS) ships, an Auxiliary Floating Drydock Medium (AFDM), and the US Coast Guards' Offshore Patrol Cutters."

25 m Cruise Tenders from Incat Crowther

Three new 25 m cruise tenders designed by Incat Crowther are now in operation in the Caribbean for Norwegian Cruise Lines (NCL). Stationed at NCL's base at Great Stirrup Cay in the Bahamas, the tenders are designed to efficiently transport 354 passengers in comfort and safety from NCL's cruise ships to NCL's private island resort.

Accessibility is a key design feature of each vessel, with two wheelchair-accessible spaces on the main deck as well as three toilets, one of which is wheelchair accessible. The vessels, built by Singapore's Penguin Shipyard International, also include a wheelchair lift to provide access to the upper deck. The upper deck of each vessel seats 188 people and offers covered outdoor seating for guests. The main deck seats 164 passengers in air-conditioned comfort.

The design of each vessel has optimised disembarkation and boarding via bespoke main-deck bow ramps which interface with the existing tender docks at NCL's Great Stirrup Cay resort. Disembarkation and boarding are also possible from two access points on the upper deck. The vessels also feature elements of Incat Crowther's trademark catamaran design expertise including deep hulls for maximum comfort.

25 m cruise tender under way
(Photo courtesy Incat Crowther)

Incat Crowther's Managing Director for Europe, Ed Dudson, said that the project was the latest in a long line of tailored design projects for clients around the world. "This project required Incat Crowther to work closely with Norwegian Cruise Lines to ensure that the tenders were designed specifically for pre-existing infrastructure," said Mr Dudson. "Our digital shipbuilding process helped to ensure that these tenders were operationally efficient, as well as providing guests with the luxury experience you would expect while on a Caribbean holiday with Norwegian Cruise Lines. The project also proves that our world-leading catamaran hull designs can be applied across multiple sectors and in almost any environment—from the open ocean to tourist transportation routes such as this one in the Bahamas," said Mr Dudson.

25 m cruise tender boarding passengers
(Photo courtesy Incat Crowther)

25 m cruise tender outbound
(Photo courtesy Incat Crowther)

Principal particulars of the new tenders are

Length OA	24.3 m
Length WL	24.3 m
Beam OA	8.00 m
Depth	3.20 m
Draft (hull)	1.80 m
Passengers	354
Crew	3
Fuel oil	2000 L
Fresh water	2000 L
Sullage	2000 L
Main engines	2×CAT C12 each 339 kW @ 2100 rpm
Propulsion	2× fixed-pitch propellers
Generator	1×18 kW
Speed (service)	10 kn
(maximum)	13 kn
Construction	Marine-grade aluminium
Flag	Bahamas
Class/Survey	ABS ✠A1, (E), 1 m Sig Wave Height, AMS

Mar de Ons from Incat Crowther

Incat Crowther has announced that a second Incat Crowther 32 has been delivered to Spanish ferry operator Mar de Ons. The new self-titled vessel, *Mar de Ons*, was constructed at Astilleros Armon's Burella yard in Spain and is nearly identical to the successful *Mar de Cies*. *Mar de Cies* was also designed by Incat Crowther and has been in operation since 2019.

In developing *Mar de Cies*, Mar de Ons worked closely with Incat Crowther to create a vessel which could transport a large number of passengers anywhere within Mar de Ons' network. The result is an efficient, yet robust vessel which requires low maintenance.

The final design of *Mar de Ons* is almost identical to that of *Mar de Cies*. The vessels share common structural components and design elements, with some optimisation to the customer experience on board *Mar de Ons*. The most significant change to the design of *Mar de Ons* is a reconfiguration of the upper deck, allowing for additional seats, including forward seats overlooking the bow. The additional upper-deck capacity allows for the addition of wheelchair spaces on the main deck without an overall reduction in capacity, with *Mar de Ons* capable of transporting 394 passengers.

The new vessel again demonstrates Astilleros Armon's ability to deliver high-standard interior fitouts, with high-quality passenger amenities throughout. The outlook from the main deck has also been improved with the installation of full-depth windows for the entire length of the cabin. The main deck features a large kiosk, whilst seating at tables has also been provided.

Passenger flow to help increase operational efficiency on Mar de Ons' busy routes has been facilitated by multiple wide staircases and access options to both decks of the vessel. The design also accounts for the varied dockside infrastructure which Mar De Ons encounters on their network around the Bays of Vigo and Pontevedra. Boarding is by multiple locations, at a range of heights, including aft platforms, main-deck gates (aft, mid and forward) as well as

Port side of *Mar de Ons*
(Photo courtesy Incat Crowther)

bow loading over the foredeck. The extremities of the vessel are tailored to facilitate regular berthing manoeuvres, whilst custom fendering has also been installed.

The design features a low propeller draft to allow access to shallow docks as well as an aluminium hull which is not only efficient but has proven itself to be robust and low maintenance in operation. Both vessels are capable of a top speed of 29 kn, while *Mar de Cies* has reliably operated at 25 kn at a modest engine load, resulting in a very low fuel burn.

Safety compliance is provided in accordance with the latest EU regulations, a process which involved collaboration with Spanish flag authorities to achieve an optimal outcome.

With the success of *Mar de Cie*s, the operator naturally chose to work with Incat Crowther and Astilleros Armon on the follow-up. The result is a fully-customised design solution which reaps rewards in functionality, operational efficiency, and low fuel usage.

Principal particulars of *Mar de Ons* are

Length OA		32.5 m
Length WL		31.2 m
Beam OA		10.0 m
Depth		3.10 m
Draft	(hull)	1.10 m
	(propellers)	1.70 m
Passengers		394
Crew		5
Fuel oil		9000 L
Fresh water		2000 L
Sullage		1000 L

Starboard bow of *Mar de Ons*
(Photo courtesy Incat Crowther)

Main engines		2×MAN D2862 LE463 each 1029 kW @ 2100 rpm
Propulsion		2×propellers
Generator		1×Kohler 30 kVA
Speed	(service)	25 kn
	(maximum)	29 kn
Construction		Marine-grade aluminium
Flag		Spain
Class/Survey		BV I ✠HULL ✠MACH HSC Passenger Sea Area 2

Windea One from Incat Crowther

The first 32 m parallel hybrid crew transfer vessel (CTV) designed by Incat Crowther for Emden-based EMS Maritime Offshore (EMO) has been successfully delivered, with the vessel already servicing Germany's offshore wind industry. *Windea One* is the world's first CTV to utilise Volvo Penta's new parallel hybrid system together with IPS [*Inboard Propulsion System—forward-facing propellers on rotatable pods*—Ed.] propulsion and can be operated in an all-electric mode for up to six hours.

Starboard side of *Windea One*
(Photo courtesy Incat Crowther)

Built by Singapore's Penguin Shipyard International under the designation WindFlex-32, *Windea One* is based on Incat Crowther's proven 32 m CTV model. The hybrid vessel is IMO Tier III compliant and represents a step change in the sustainability of the offshore wind-support industry. Following an inauguration ceremony in Germany in June, *Windea One* will now be deployed by Orsted to service its wind farms in the North Sea.

Capable of speeds of up to 28 kn, *Windea One* will be serviced by up to six crew and will transport up to 24 service personnel in safety and comfort between the European mainland and the North Sea.

The vessel's upper deck has two single office cabins, a bathroom, a crew mess and galley along with an office/meeting room.

The main deck features a client cabin and first-aid room, along with two separate spacious accommodation areas for technicians, a technician change area and two bathrooms. The hull features four additional crew cabins.

Windea One has also been fitted with a hydraulic knuckle-boom crane, capable of carrying loads of up to 50 t.

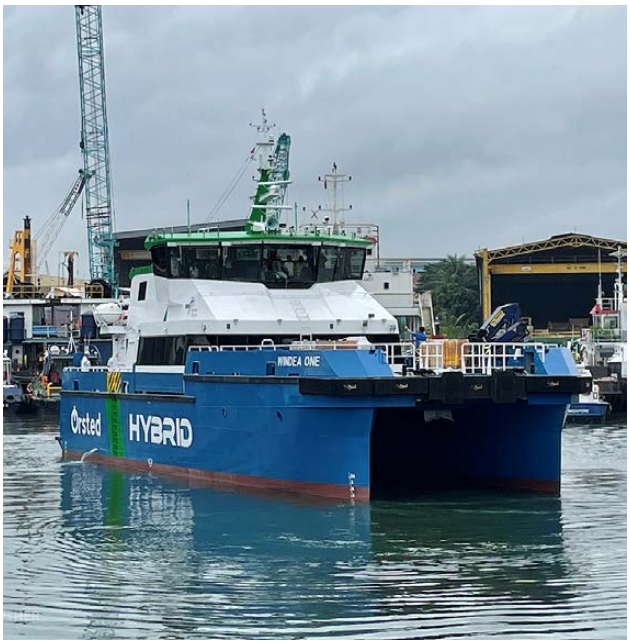
The vessel incorporates Incat Crowther's patented Resilient Bow Technology minimising boat landing impact forces.

Ed Dudson, Managing Director of Incat Crowther Europe, said the *Windea One* project saw Incat Crowther incorporate leading-edge technology into the design. "The inclusion of Volvo's new parallel hybrid propulsion system in this vessel places EMO at the cutting edge of the industry. Not only can the vessel be operated in a fully-electric mode, but there are also options to switch to biofuel, helping to further reduce emissions and the vessel's impact on the environment," said Mr Dudson.

"It's been fantastic working closely with EMO and our strategic partner Penguin to deliver *Windea One*. With the vessel now in the water, we are confident that it will be the first of many to incorporate hybrid propulsion systems as operators look to maximise efficiency and reduce emissions," said Mr. Dudson.

Principal particulars of *Windea One* are

Length OA	31.8 m
Length WL	29.7 m
Beam OA	10.0 m
Depth	4.35 m
Draft (hull)	1.50m
Passengers	24
Crew	6
Fuel oil	35 500 L
Fresh water	3500 L
Black water	2500 L
Main engines	4×Volvo DI13 each 515 kW @ 2250 rpm
Propulsion	4Volvo IPS 30
Generators	2×Kohler 44 ekW
Speed (service)	25 kn
(maximum)	28 kn
Construction	Marine-grade aluminium
Flag	Germany
Class/Survey	Bureau Veritas



Starboard bow of *Windea One*
(Photo courtesy Incat Crowther)

32 m Hybrid Fast Ferry from Incat Crowther

Auckland Transport has announced that Incat Crowther has been commissioned to deliver the design for a second 300 passenger electric hybrid fast ferry. The project will see Incat Crowther work closely with Q-West Boat Builders, Hamilton Jet and Fullers360 on the design, construction and delivery of the 32 m vessel.

The new hybrid ferry gives the operator an excellent combination of efficiency and flexibility. Designed specifically for the route, the vessel will provide an efficient low-emission quiet service between Auckland and Devonport. The vessel cabin is modular, with the main deck configured for metro operations and overflow capacity to the upper deck.

Auckland Transport's Programme Director for the Low Emission Ferry Programme, Nathan Cammock, said that it is incredibly exciting to see Auckland and New Zealand continuing to invest in modern, low-emission public transport. "As part of Auckland Transport's Mission Electric, we are investing in low-emission public transport right across our network. Our trains are electric, all new bus purchases will be electric, and now ferries will be too. Our new low-emission ferries have greater passenger capacity, improved accessibility, and a more-consistent customer experience compared to our current fleet. With significantly more space for bikes, it will make it easier for people to cycle at either end of their ferry trip," said Mr Cammock.

Q-West Chief Executive, Colin Mitchell, is delighted that Q-West has been selected to construct the new 32 m hybrid ferry. "This new vessel will likely be completed in Q-West's new facility at the Whanganui Port where we will be able to maintain and repair ferries and other commercial craft. We look forward to continuing our relationship with Auckland Transport and Fullers360," said Mr Mitchell.

Fullers360 CEO, Mike Horne, said that Fullers360 has made substantial investments over the last five years in research and development of the green technology, which will power these ferries. "As a key partner in the project, as well as initiating and project managing the build, we can't wait to see these low-emission vessels out on the Waitemata," said Mr Horne.

Incat Crowther Technical Manager, Dan Mace, said that the solution developed and delivered by Fullers360, Incat

Starboard bow of 32 m hybrid fast ferry for Auckland Transport
(Image courtesy Incat Crowther)

Crowther, Q-West and Hamilton Jet has been further validated by this announcement from Auckland Transport. "The Incat Crowther 32 design is customer-focused and offers operational flexibility and efficiency. Digital shipbuilding technology has been utilised to accurately and reliably integrate the electric drive system into the vessel. This solution is fully tailored for the operation. With another Incat Crowther-designed electric hybrid ferry, Auckland Council will continue to reduce its emissions whilst offering safe, comfortable and reliable public transport" said Mr Mace.

Principal particulars of the new 32 m vessel are

Length OA	34.6 m
Length WL	32.2 m
Beam OA	9.50 m
Depth	3.15 m
Draft (hull)	1.50 m
Passengers	299
Crew	3
Fuel oil	5104 L
Fresh water	1000 L
Black water	1000 L
Electric Drive	4 × Danfoss EM-PMI540-T4000 motors
Battery	1944 kWh
Propulsion	4×Hamilton HTX42 waterjets
Generators	2 × Danfoss EM-PMI540-T3000
Speed (service)	12 kn
(maximum)	28 kn
Construction	Marine-grade aluminium
Flag	New Zealand
Class/Survey	MNZ

Talwurrapin from Incat Crowther

Talwurrapin, a new 24 m passenger ferry designed by Incat Crowther, has begun servicing a busy passenger route for commuter and tourism ferry operator SeaLink South-East Queensland. The new Incat Crowther 24 began operating on the Redland Bay to Russell Island route in the Moreton Bay region in late January 2023, providing a vital connection between the mainland and Russell Island.

The vessel is the result of close collaboration between SeaLink South-East Queensland and Incat Crowther with a number of design elements tailored specifically for SeaLink's requirements and operations.

Featuring a low draft for a vessel of its size, *Talwurrapin* is capable of transporting up to 200 passengers at speeds of up to 25 kn. The vessel's main cabin seats 108 passengers with a further 32 passengers seated in an outdoor area, and safe space for 60 standing passengers throughout the vessel.

Designed with accessibility in mind, *Talwurrapin* includes six wheelchair spaces, and ceiling grab rails to maximise safety while on board. The main deck also features a large luggage rack in the centre of the air-conditioned main cabin, and storage for bicycles on the bow.

Talwurrapin has been specifically designed to maximise operational efficiency with safe and streamlined boarding. The vessel's wheelhouse has been positioned to provide maximum visibility, while boarding has been optimised by tailoring the vessel's design to integrate with existing infrastructure at the ports which the ferry will service.

Incat Crowther's Technical Manager, Andrew Tuite, said that *Talwurrapin* was the latest in a long line of successful projects between The Kelsian Group, its subsidiary brands, and Incat Crowther. "From passenger ferries in Queensland and Tasmania, to tourism cruise vessels in NSW, Incat Crowther has a long and proud history of working closely with SeaLink and The Kelsian Group to deliver high-quality vessels which are tailored specifically to their operational requirements," said Mr Tuite. "*Talwurrapin* will provide a safe, efficient, and vital community connection for people in the Moreton Bay region of Queensland, and further cements SeaLink South-East Queensland's position as the leading commuter and tourism ferry operator in the region".

SeaLink Marine & Tourism Chief Executive Officer, Donna Gauci, said that the company was proud to add *Talwurrapin* to its growing commuter fleet. "We are incredibly proud of both the name, which is Quandamooka Jandai Language for "Redland Bay", and that it was built, right here, in Redlands by Norman R. Wright & Sons," said Ms Gauci. "We proudly work with local shipbuilders to deliver innovative state-of-the-art vessels, and the *Talwurrapin* jet boat is another example of an exceptional ferry designed and built here in Australia."

Principal particulars of *Talwurrapin* are

Length OA	23.9 m
Length WL	22.7 m
Beam OA	6.50 m
Depth	1.95 m
Draft (hull)	1.00 m
Passengers	200
Crew	2
Fuel oil	2000 L
Fresh water	500 L
Black water	500 L
Main engines	2×Scania DI13 071M each 368 kW @ 1800 rpm
Propulsion	2×Hamilton HJ364 Waterjets
Generators	Sea Wasp 30 kVa
Speed (service)	22 kn
(maximum)	25 kn
Construction	Marine-grade aluminium
Flag	Australia
Class/Survey	NSCV Class 1E

Starboard side of *Talwurrapin*
(Image courtesy Incat Crowther)

WattnExpress, Inselexpress I and *Watt Sprinter* from Incat Crowther

The residents of Germany's North Sea Island communities are set to enjoy a reliable, safe, and efficient new commuter ferry service to the mainland with the delivery of three new Incat Crowther-designed fast ferries. The new ferries will service three busy routes between the North Frisian Islands and Neuharlingersiel, located on the north coast of Germany's mainland. The three vessels, named *WattnExpress, Inselexpress I* and *Watt Sprinter*, have been constructed by Penguin Shipyard International, based in Singapore.

The ferries, all of which are now in service, have been tailored to the unique local conditions in the inter-tidal Wadden Sea zone which separates the German mainland from the North Frisian Islands and the North Sea. Each vessel has a draft of less than 0.7 m, making the ferries' operation independent of tidal conditions which can reach very low levels.

The IMO Tier III-compliant vessels can transport up to 54 passengers at speeds of up to 19 kn. The vessels have also been customised to cater for the local community with space for wheelchair access and large indoor and outdoor luggage storage areas on the main deck.

Ed Dudson, Incat Crowther's Managing Director for Europe, said that the delivery of the new commuter fast ferries was the latest successful project in a long partnership with clients EMS Maritime Offshore (EMO). "Incat Crowther has collaborated closely with EMS Maritime Offshore on these new vessels and their delivery marks an important milestone for the communities which rely on EMO's service to commute to and from the German mainland," said Mr Dudson. "The design of each vessel relied on Incat Crowther's proven digital shipbuilding process. This process saw our team of designers sit down with the team at EMO and ensure that the design of each ferry was tailored to local conditions and requirements. The result of this process is a trio of safe, reliable, and efficient bespoke ferries."

The delivery of the three new Frisian Island ferries comes after Incat Crowther also delivered a 46 m passenger ferry which services the Emden–Borkum route for AG EMS, the parent company of EMO, and the delivery of a new 32 m crew transfer vessel for EMO.

Principal particulars of the new vessels are

Length OA	19.7 m
Length WL	17.5 m
Beam OA	5.40 m
Depth	1.90 m
Draft (hull)	0.70 m
Passengers	54
Crew	3
Fuel oil	1500 L
Fresh water	250 L
Sullage	250 L
Main engines	2×Volvo D8-MH R2 IMO Tier III each 313 kW @ 2200 rpm
Propulsion	2×Hamilton HTX30 waterjets
Speed (service)	17 kn
(maximum)	19 kn
Generator	Cummins Onan
Construction	Marine-grade aluminium
Flag	Germany
Class/Survey	Bureau Veritas

Stewart Marler

WattnExress on trials
(Photo courtesy Incat Crowther)

Model Test Predictions and Full-scale Measurements: Beware!

Dr Kim Klaka
Royal Institution of Naval Architects

Summary

This is a tale of caution: when it comes to scale-model tests and full-scale measurements, make sure that you are comparing apples with apples.

The replica of *Jewel of Muscat*, a 9th century 55 t ship, was successfully sailed from Oman to Singapore, travelling approximately 3600 n miles. Performance predictions based on towing-tank tests of a scale model did not correspond even closely with performance on the voyage. Several possible reasons are investigated.

Nomenclature

AWA	Apparent wind angle (degrees)
AWS	Apparent wind speed (kn)
CoG	Course over ground
JoM	*Jewel of Muscat*
TWA	True wind angle (degrees)
TWS	True wind speed (kn)
kn	knots
kN	kilonewtons (force)
Rt	Total resistance (kN)
Vb	Vessel speed (kn)
VPP	Velocity Prediction Program

1. Introduction

The 9th-century shipwreck of *Jewel of Muscat*, discovered in 1998 off the island of Belitung, Indonesia, was the first sewn-plank vessel discovered in the greater Indian Ocean and provided the opportunity to recreate a vessel based on the remains of the shipwreck.

A design was created, a scale model of which was tested in a towing tank by the University of Southampton (Wolfson Unit for Marine Technology and Industrial Aerodynamics, 2008). Some modifications in hullform and rig were made as a result. The replica 18 m 55 t vessel was built on a beach in Oman, using (in most cases) 9th-century methods. The ship, which took a year to build, successfully sailed from Oman to Singapore, over a period of four months, with 66 days at sea, traveling approximately 3600 n miles. There were several stopovers, including a vessel haul-out at Cochin [*now Cochi, India*—Ed.].

Comparison of performance predictions made from the model tests and the ship's log revealed significant discrepancies. The measured vessel speeds were much lower than predicted, and the leeway angles were an order of magnitude higher. Unravelling the likely causes of these discrepancies followed the T-shirt definition of engineering: precision guesswork based on unreliable data using inadequate tools!

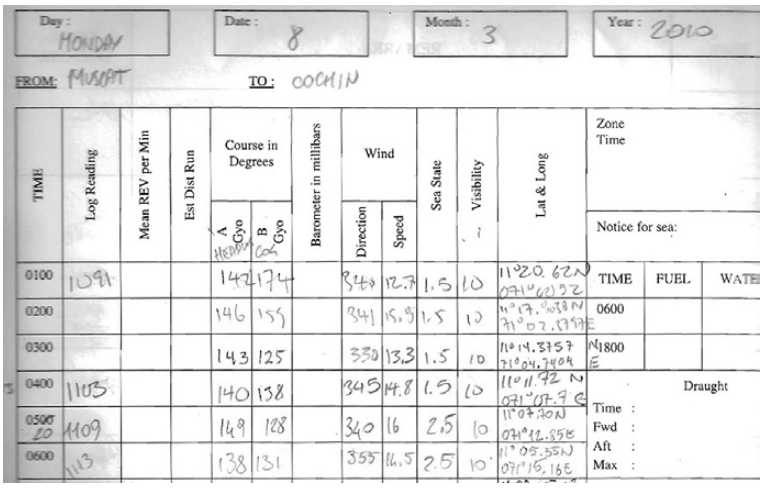
Figure 1: *Jewel of Muscat* under sail
(Photo courtesy A. Ghidoni)

Figure 2: Weather encountered during the voyage
(Photo courtesy A. Ghidoni)

2. Analysis of Ship's Log

2.1 Ship's Log

The ship's log for the voyage from Muscat to Singapore contains entries (typically hourly) of position, distance run, course, heading, wind speed and direction, sea state and visibility. There are also intermittent comments. A sample is shown in Figure 3.


Day : MONDAY Date : 8 Month : 3 Year : 2010

FROM: MUSCAT TO : COCHIN

TIME	Log Reading	Mean REV per Min	Est Dist Run	Course in Degrees A Gyo	Course in Degrees B Gyo	Barometer in millibars	Wind Direction	Wind Speed	Sea State	Visibility	Lat & Long	Zone Time / Notice for sea:
0100	1091			142	174		340	12.7	1.5	10	11°20.62N 071°00.32E	TIME FUEL WATE
0200				146	155		341	15.9	1.5	10	11°17.938N 71°02.1978E	0600
0300				143	125		330	13.3	1.5	10	11°14.3757 71°04.7404 E	1800
0400	1103			140	138		345	14.8	1.5	10	11°11.72 N 071°07.7 E	Draught
0500	1109			149	128		340	16	2.5	10	11°07.20N 071°12.85E	Time : Fwd : Aft : Max :
0600	1113			138	131		355	14.5	2.5	10	11°05.55N 071°15.16E	

Figure 3: Sample of ship's log
(Image courtesy A. Ghidoni)

The definitions, conventions and datums used for these measurements are unclear; e.g. are distances through the water or over the ground? The following assumptions and clarifications were made:

2.2 Vessel Speed/Log Reading

The log reading was assumed to be in units of nautical miles. The project documentation manager, Dr Eric Staples, who sailed on the voyages, advised that the log readings were from GPS, i.e. distance over the ground.

2.3 Heading

It was assumed that this was the angle of the ship's head relative to true north. For the purposes of this analysis it does not matter whether the datum is true, magnetic or compass north, provided that the same assumption is made for all direction data.

2.4 Course over Ground (CoG)

This is self-evident, with the same proviso about which reference datum for north is used.

2.5 Wind Direction and Speed

Wind direction was relative to north, with the same proviso about which reference datum for north is used. Wind speed was assumed to be measured in knots. It is not clear whether the log entries refer to true wind or apparent wind. Given that apparent wind is the quantity measured directly from the wind sensor, and true wind direction requires input from other sensors, it was initially assumed that the readings were for apparent wind. However, the documentation manager had notes referring to true wind. This ambiguity could not be resolved satisfactorily, but it is not very significant in terms of interpreting the results because the vessel speed is low relative to the wind speed and the wind direction was usually on the quarter, where the difference between true and apparent direction is low.

2.6 Sea State

The values recorded were assumed to be significant wave height in metres, this being close to that which an experienced sailor would estimate visually (Lloyd, 1989).

In order to compare the ship's log readings with model-test predictions, the log entries had to be filtered to avoid poor-quality data. This was conducted manually by identifying those entries which showed consistent values over periods of a few hours, then listing them in a spreadsheet. The entries were then sorted by wind angle (secondarily by wind speed), see Figure 4.

date	time	SOG	hdg	COG	drift angle	drift angle	app wind dir	AWS	AWA	AWA	TWA	TWS	wave ht
		kn			=+ is to stbd	abs		kn	+ from stbd	abs		kn	m
22/5/2010	4:00:00 AM	3.1	98	117	19	19	217	10	119	119	132	12	2
24/5/2010	4:00:00 AM	3.0	84	90	6	6	207	12.6	123	123	133	14	1
9/3/2010	2:00:00 AM	4.0	103	113	10	10	341	14.2	238	122	134	17	2
12/4/2010	5:00:00 AM	3.5	185	190	5	5	301	8.2	116	116	134	10	0.5
11/4/2010	8:00:00 AM	3.8	215	222	7	7	337	12	122	122	135	14	0.5
	7:10:00 PM	3.4	147	150	3	3	25	10.2	-122	122	135	12	0.5

Figure 4: Log data sorted by wind angle
(Image courtesy A. Ghidoni)

3. Comparison of Ship's Log with Model Tests

Towing-tank tests had been conducted on a 1:9 scale model by the Wolfson Unit at the University of Southampton (Wolfson Unit, 2008). Amongst the reported data were a resistance curve for the full-sized vessel, and the output of a velocity prediction program (VPP) using sail-force coefficients derived from wind tunnel tests of other sailing vessels. The tank tests were conducted for three different rudder configurations: an aft rudder on the centerline, a rudder on the aft quarter, and a modified rudder on the aft quarter. The full-sized vessel was fitted with both an aft rudder and a modified rudder on both port and starboard quarters.

Detailed VPP results are presented in the Wolfson report only for the centreline rudder configuration. However, the report includes a table of predicted time differences per mile between the two rudder configurations, from which a set of VPP results was derived for the quarter-rudder configuration. This is not an accurate representation of the full-sized vessel as it does not include the additional resistance of the centreline rudder. This matter is discussed in Section 4.4.

A comparison was made between the predicted and recorded vessel speeds for various wind speeds and wind angles. The log readings were sorted by TWA, then entries which lay within a range of about 5° TWA and 5 kn TWS (e.g. the beige cells in Figure 4) were then grouped; then the vessel speed, drift angle and wind angle in each group were averaged.

These average values were plotted against the equivalent values from the VPP predictions. The results are shown in Figure 5.

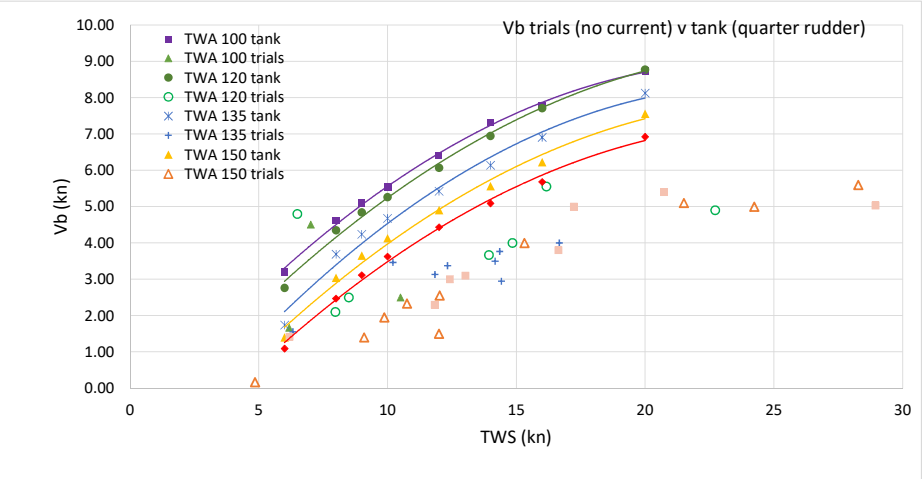


Figure 5: Comparison of vessel speeds from trials and VPP ("tank")
(Graph courtesy K. Klaka)

The graph is very busy, but it can be seen that, at any chosen wind speed, none of the vessel speeds recorded in the log are as high as the predictions (except for one outlier). A clearer view is obtained by plotting just one wind angle, as shown in Figure 6. It reveals that the vessel speeds recorded in the log are barely half those given in the predictions.

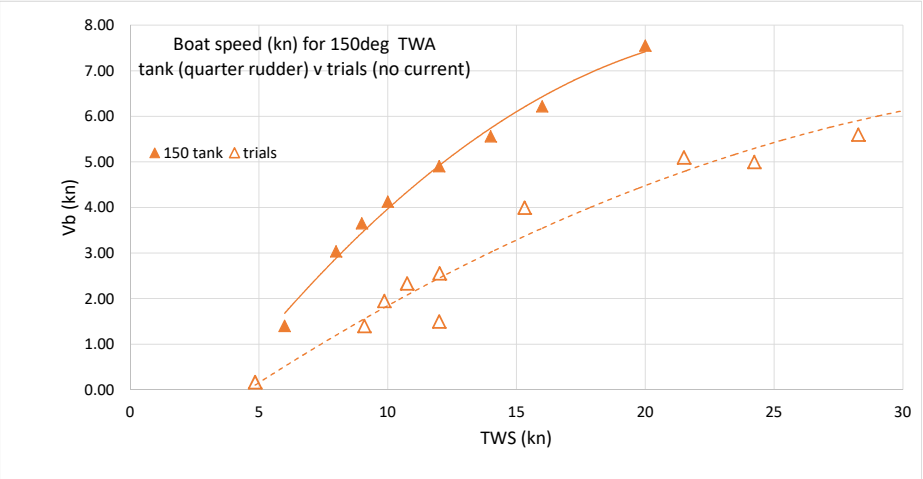


Figure 6: Vessel speed comparison log vs VPP at 150 deg TWA
(Graph courtesy K. Klaka)

The leeway angles in the ship's log, defined here as the difference between heading and course over ground, were plotted against the leeway angles predicted by the VPP, as a function of true wind angle. True wind angle was chosen as the variable because the VPP showed it to be much more influential on leeway than was vessel speed or true wind speed. The results are shown in Figure 7.

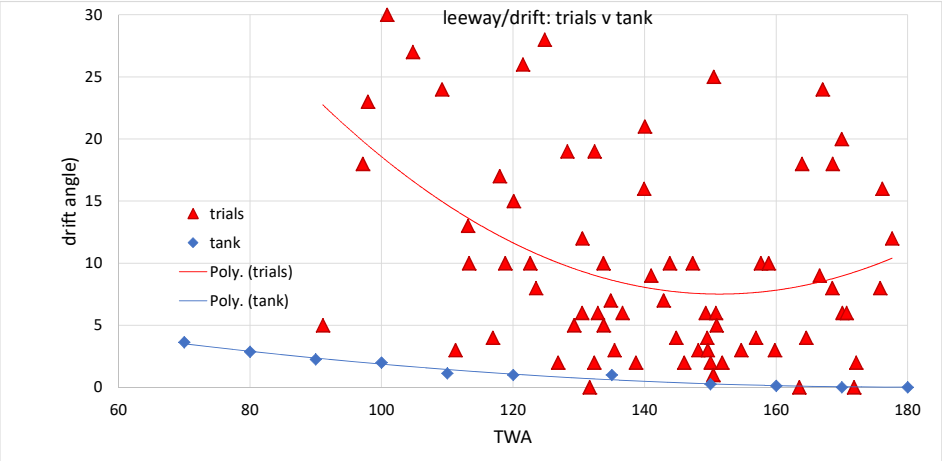


Figure 7: Leeway angle comparison log vs VPP
(Graph courtesy K. Klaka)

It is evident that the leeway angles determined from the ship's log are consistently between 5 and 10 times higher than the VPP values. It should be borne in mind that there are large uncertainties in the log leeway estimates.

The possible causes of these large vessel speed and leeway angle discrepancies are explored below.

4. Reasons for Discrepancies

Before investigating the possible causes of these large discrepancies between predicted and measured performance, it is important to acknowledge the large scatter in the ship's log data. A full error analysis has not been conducted, but 90% confidence limits are likely to be at least ±10%, probably more.

4.1 Ocean Current

The distance run recorded in the ship's log is over the ground, not through the water, so it includes any ocean current effects.

Morgan & Davies (1995) show a weak clockwise current in the north Indian Ocean for the voyage period, with a maximum value of 0.6 kn. Their estimate is based on data averaged over many years. The direction is such that the current would be assisting as much as it is opposing, resulting in a degree of averaging out of current effect on vessel speed over this leg of the voyage. Yet the recorded vessel speeds are always much less than the predicted speed.

There is evidence that currents during the voyage were mostly negligible, shown by the periods in the log when the weather was calm for several hours and the vessel was almost stationary in the water, and its geographical position was also almost stationary. On the rare occasions where there was specific reference to current in the ship's log, those entries were excluded from analysis.

The measured leeway angles are very approximate, and they would be very sensitive to any cross-current that might be present. The maximum current speed predicted from Morgan & Davies (1995) is 0.6 kn. The worst-case scenario for leeway error is if this maximum current were directly across the path of the vessel. The average vessel speed over the voyage from Muscat to Cochin was 2.5 kn so, if the vessel were travelling at this speed with a 0.6 kn cross-current, then this would result in a current-induced drift angle of 14°. This worst-case scenario could account for the discrepancies in about half the data points of Figure 7. Given that it is a worst-case scenario, it is tentatively concluded that current effects could account for at most a quarter of the leeway discrepancy.

4.2 Ocean Waves

Ocean waves slow a boat down when travelling to windward but slightly increase average speed when surging downwind. It is not known whether wave effects were included in the Wolfson Unit predictions. If they are, then wave effects are not a significant cause of the discrepancies. If wave effects are *not* included in the predictions, then the recorded vessel speeds should be greater than the predictions when sailing downwind. They are not.

4.3 Hull Fouling

The VPP predictions are for the hull surface with a friction allowance for the roughness of the sewn seams and the hull coating, whereas the hull will gradually foul more as time in the water progresses, thus slowing the boat down. The effect of seam roughness was calculated by the Wolfson Unit from data in Hoerner (1965) which showed that the frictional resistance of longitudinal protuberances was equivalent to twice that on a flat surface. They calculated the combined effect of the seam protuberances and the hull antifouling/sealing compound roughness, which increased the friction resistance by 34% in total.

Figure 8: Seam roughness and hull fouling 10 March 2010
(Photo courtesy E. Staples)

Figure 9: Haul-out at Cochin late March/early April 2010
(Photo courtesy A. Ghidoni)

The vessel was launched on 5 December 2009 with the hull coated in a mixture of rendered goat fat and hydrated lime. This mixture is ineffective at preventing the growth attaching to the hull compared with modern formulations, but it makes it easier to clean off (Vosmer et al., 2011). The voyage from Muscat to Cochin was from 16 February 2010 to 15 March 2010, a period of 27 days at sea. Therefore the mid-point of this voyage occurred 86 days after launching. The vessel was hauled out and cleaned at Cochin. The voyage from Cochin to Penang was from 10 April to 2 May, a period of 22 days including a stopover at Galle, Sri Lanka.

The state of fouling on arrival at Cochin can be seen in Figure 9 and there remained significant fouling even after cleaning. In the absence of further information, it was assumed that the average amount of fouling for the voyage from Cochin to Penang was the same as for the voyage from Muscat to Cochin.

Estimates of the daily rate of increase in total resistance for an un-antifouled vessel were taken from Comstock (1967) and Hoerner (1965). Both references contain estimates based on the famous *Lucy Ashton* trials of 1951, the latter reference also providing the results for a fouled flat plate towed in a tank. The estimates ranged from 0.8% to 2.3% resistance increase per day afloat.

Using the average of those fouling estimates , there was a 62% increase in resistance at the mid-point of each voyage, as compared with the Wolfson Unit prediction of resistance. The results are plotted in Figure 10.

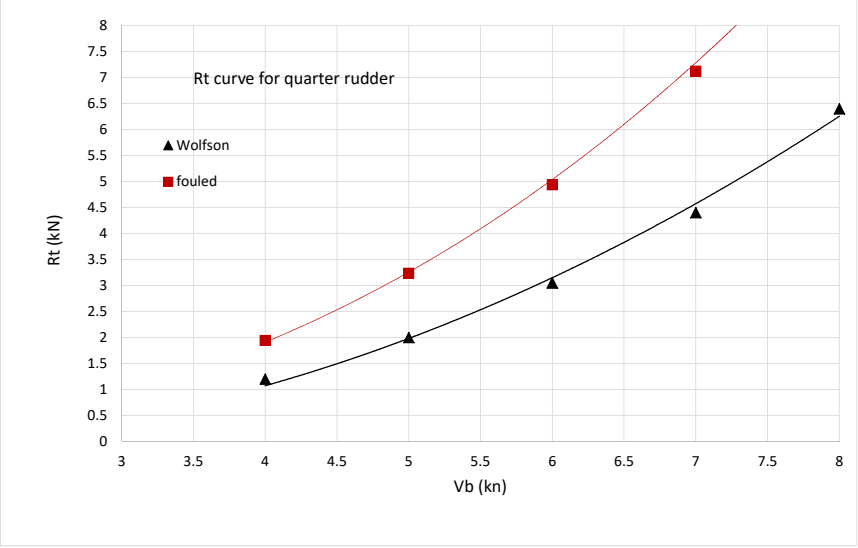


Figure 10: Resistance curve for fully-fouled and lightly-fouled vessel
(Graph courtesy K. Klaka)

The measurements used for the fouling rate estimates were for fouling in water temperature of less than 16°C, whereas the *Jewel of Muscat* voyage was in much warmer waters of 20–30°C. It is reasonable to expect that the fouling during the voyage would be greater than the rate estimated from the references above.

The effect of fouling on vessel speed can be determined by comparing intersects of each curve in Figure 10 for a chosen total resistance value (the sail thrust is equal to the ship resistance regardless of the amount of fouling). For example, for a sail thrust of 2.5 kN, the speed of the fouled vessel is 4.5 kn, whereas for the unfouled vessel the prediction is 5.5 kn, i.e. a difference of 1 kn. Figure 6 shows that, when the predicted speed of the vessel is 5.5 kn the speed from the ship's log was 3 kn i.e. a difference of 2.5 kn. So, on average, about 40% of the speed discrepancy could be due to hull fouling.

The effect of hull fouling on leeway angle is discussed in Section 4.7.

4.4 Rudder System

All the tank tests were conducted with a single rudder, either the centreline one or a quarter rudder. The vessel was equipped with a centreline rudder and two quarter rudders. Early on in the voyage it was found that the central rudder did not steer the boat effectively, so it was lashed on the centreline for most of the time. Only one quarter rudder was used at a time. The presence of the lashed centreline rudder is estimated to increase resistance by less than 1%, which corresponds to a decrease in vessel speed of less than 0.5%.

The effect of the lashed centerline rudder would be to decrease leeway angle slightly compared with the VPP predictions.

4.5 Rig Efficiency

The Wolfson VPP predictions used rig forces from wind-tunnel tests for "two-masted square rigs with similar aspect ratio". It is likely that those rigs are for 19th or 20th century vessels, which are quite probably more efficient than the unusual rig of *Jewel of Muscat*, thereby yielding over-prediction of vessel speed and under-prediction of leeway angle. Furthermore, the wind tunnel tests would most likely have been conducted by trimming the model sails for maximum efficiency before recording measurements, whereas the crew on the full-sized vessel were learning about sail setting as the voyage progressed.

4.6 Reduced Sail Area

It is not known whether the Wolfson Unit predictions included any assumptions about reducing sail area in higher wind speeds, or whether those assumptions matched the sail reductions used during the voyage. The Wolfson Unit predictions are for wind speeds up to 20 kn, so it is a reasonable assumption that full sail would be used for those predictions.

The crew of *Jewel of Muscat* were understandably cautious about the amount of sail they carried. They used a small storm sail a few times when the wind was very strong, and they also experimented with a smaller mizzen sail in the latter parts of the voyage. However, in wind speeds below 20 kn, the sails for most of the voyage were as per the original configuration.

4.7 Effect of Leeway on Vessel Speed

The leeway angles are underpredicted by between 5° and 25°. The influence of leeway on the vessel speed is an iterative effect—the slower a vessel travels (e.g. due to hull fouling), the more leeway it will make, and the more leeway it makes, the more drag will be created, slowing the boat down further, increasing the leeway, etc. This could explain a lot of the vessel speed difference when the wind is at or forward of the beam. However, inspection of Figure 6 for the specific case of 150° wind angle (i.e. wind from the aft quarter) when there should be almost no leeway, shows that the recorded vessel speeds are still very much lower than the predictions. So the high measured leeway angles do not appear to have contributed to the vessel speed discrepancies.

5. Conclusions

The vessel speeds recorded on the voyage were about half of those predicted using the VPP. About 40% of the vessel speed discrepancy can be attributed to hull fouling. The effect of ocean current on the vessel speed discrepancies is much less than the effect of hull fouling. The remaining vessel speed discrepancy deficit might be due to the very steep learning curve of the crew for trimming the sails of this novel rig.

The leeway angles recorded on the voyage were often an order of magnitude greater than those predicted by the VPP. The possible presence of ocean currents would account for at most half the leeway angle discrepancy. Differences in rig efficiency could also be a contributing factor.

These considerations, when combined, highlight some of the pitfalls in comparing model scale predictions with full scale measurements.

6. Acknowledgements

I am indebted to a triad of eminent maritime archaeologists: Doctors Tom Vosmer, Eric Staples and Alessandro Ghidoni, for providing detailed information about the voyage including the ship's logs, the instrumentation data and their personal observations from building and sailing the vessel.

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Calculation of Lackenby's Time and Space Factors for the Acceleration of Ships

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Introduction

There are few methods available for the prediction of the time and distance required to accelerate a ship from rest to a given fraction of the maximum speed at an early design stage or, for that matter, a quick estimate later on. Lackenby presented such a method, and it is one of the only two known to the author.

At the detailed design stage, a good estimate may be obtained using the propeller performance data and the resistance data, but these are not available at the early design stage.

Lackenby's method relies on a series of four graphs which he provided and, of course, these are time-consuming and laborious to read. In search of a better way, the author ended up writing a Fortran program to evaluate the data contained in Lackenby's graphs.

Lackenby's Method

Lackenby (1952) presented a method for the estimation of the time and distance taken for a ship to accelerate from rest to a given fraction of the maximum speed.

The method relies on two assumptions:

(a) that the total resistance curve of the vessel can be assumed to vary as a constant power of speed throughout the whole speed range, provided that the exponent is chosen so that the resistance curve in the neighbourhood of full speed is well approximated; this is because the greater proportion of time or distance required for acceleration is taken up in this period when acceleration is low; and

(b) that the thrust of a propeller accelerating a vessel from rest to full speed can be assumed to vary linearly from that at rest to that at full speed, and gave equations for this variation for both constant torque (e.g. diesel or reciprocating steam engines) and constant power.

Lackenby showed that the time to accelerate from rest to a given fraction of the maximum speed is given by

$$t = \frac{MV}{H}\int_0^x \frac{dx}{z-y} = \frac{MV}{H}F_t$$

and the distance to accelerate from rest to a given fraction of the maximum speed is given by

$$s = \frac{MV^2}{H}\int_0^x \frac{x\,dx}{z-y} = \frac{MV^2}{H}F_s$$

where M = mass of ship and axially-entrained water
V = maximum ship speed
H = thrust of propeller(s) at speed V
x = fractional speed v/V
y = fractional thrust h/H at speed v
z = fractional resistance r/R at speed v
F_t = time factor
F_s = space factor
$\frac{MV}{H}$ = time product
$\frac{MV^2}{H}$ = space product

Lackenby gave these integrals as

$$F_t = \int_0^x \frac{dx}{z-y} = \int_0^x \frac{dx}{1.31-0.31x-x^n} \quad \text{at constant torque}$$

$$F_t = \int_0^x \frac{dx}{z-y} = \int_0^x \frac{dx}{1.73-0.73x-x^n} \quad \text{at constant power}$$

and

$$F_s = \int_0^x \frac{x\,dx}{z-y} = \int_0^x \frac{x\,dx}{1.31-0.31x-x^n} \quad \text{at constant torque}$$

$$F_s = \int_0^x \frac{x\,dx}{z-y} = \int_0^x \frac{x\,dx}{1.73-0.73x-x^n} \quad \text{at constant power}$$

It is not possible to evaluate these integrals right up to full speed (x = 1) because as x approaches unity the integrands become infinitely large. This means that, theoretically at least, the maximum speed is approached infinitely slowly as the accelerating force (the difference between the thrust and the resistance) decreases.

Lackenby assumed that the resistance curve of the vessel in the neighbourhood of the full speed can be approximated by

$$R_T = kv^n$$

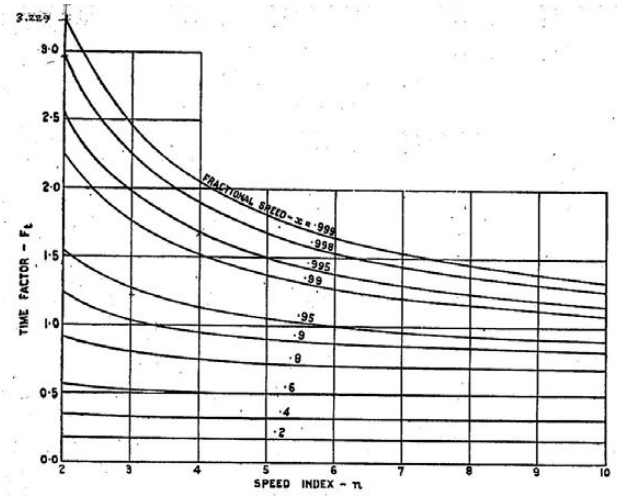
where R_T = total resistance
k = constant
v = ship speed
n = constant

The exponent n is then given by

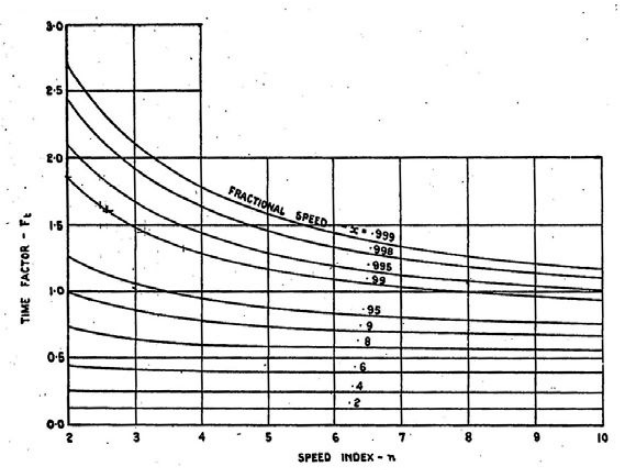
$$n = \frac{\log(P_{E1}/P_{E2})}{\log(V_1/V_2)} - 1$$

where V_1 = full speed
V_2 = say, $0.85V_1$
P_{E1} = effective power at speed V_1
P_{E2} = effective power at speed V_2

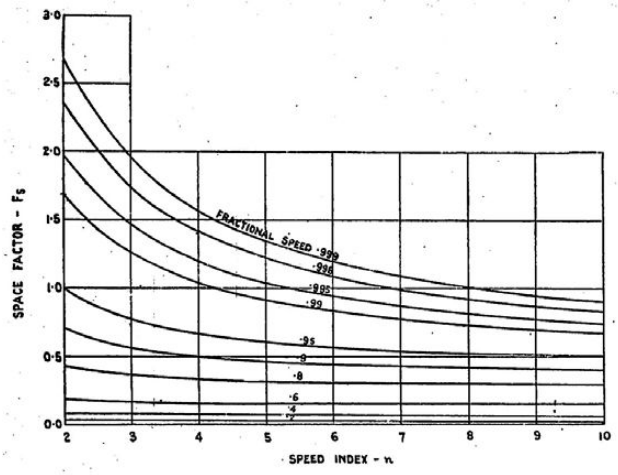
Lackenby then proceeded to evaluate the time and space factors for a range of values of exponent n from 2 to 10 and final fractional speeds x from 0.2 to 0.999. He gave graphs of the time and space factors for those ranges of n and x and for both constant torque and constant power.



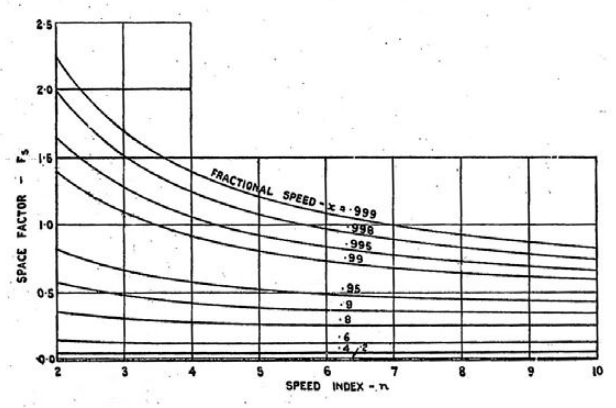
Time factor for constant torque
(Figure 7 from Lackenby 1952)



Time factor for constant power
(Figure 8 from Lackenby 1952)



Space factor for constant torque
(Figure 9 from Lackenby 1952)



Space factor for constant power
(Figure 10 from Lackenby 1952)

Lackenby used imperial units, but his time and space factors can be used with SI units by suitable conversions, as follows

$$t = \frac{MV}{H} F_t = \frac{(\Delta + a)V^2(1-t)}{222.6P_E} F_t$$

$$s = \frac{MV^2}{H} F_s = \frac{(\Delta + a)V^3(1-t)}{13590P_E} F_s$$

where t = time to accelerate, min
s = distance to accelerate, n mile
F_t = time factor, from Lackenby's Figure 7 (constant torque) or Figure 8 (constant power)
F_s = space factor, from Lackenby's Figure 9 (constant torque) or Figure 10 (constant power)
Δ = displacement, t
a = mass of axially-entrained water, t
V = maximum speed V, kn
t = thrust deduction fraction
P_E = effective power at speed V, kW

The Method in Use

In setting an assignment for naval architecture students to use this method at UNSW Sydney, the author was concerned at the wide range of values of time and space factors read from the graphs by students all using the same input data.

On reflection, one reason for this variation may be that much design data is now available in digital or equation form, and students now have need to refer to graphical data far less than a generation or so ago. They are, therefore, probably less proficient at doing so.

The Problem

The mathematicians out there will immediately realise, on inspection of Lackenby's equations for the time and space factors for constant torque and constant power, that there are definite integrals for these equations for integer values of n, but not for non-integer values. Lackenby may well have had an undergraduate or a postgraduate student doing integrals for their thesis project to produce the graphs, as he certainly didn't have computers back then.

However, the integrals can be integrated numerically for *all* values of n, as the integrands are continuous for all $x < 1$, using, for example, Simpson's First Rule.

Fortran Program

A Fortran program was therefore written to evaluate the integrals for speed index n between 2 and 10, and for fractional speeds x between 0.2 and 0.999, the same ranges as Lackenby. The high end of the range of x, 0.999, means that the vessel accelerates to within 0.1% of its maximum speed, which is probably more accurate than necessary for most applications, and 0.995 (i.e. to within 0.5%) is probably more realistic.

The result is an executable program which takes input from the keyboard and prints results to the screen to four decimal places, which is better than can be read from Lackenby's graphs and should cover most cases.

It was found during testing that the number of steps in the integration had to be varied to maintain accuracy, requiring more steps at high values of x. This has been included in the program with step-size changes when x exceeds 0.7, 0.95 or 0.995.

The program was compiled using Lahey Fortran and the executable file works on most PCs. However, if compiled using g77 Fortan, the input data appears on the line following the prompt rather than on the same line, for some unexplained reason. A copy of the Lahey Fortran executable file and the source code are available from the author on request.

Examples

An example calculation for HMAS *Brisbane* (D41) using Lackenby's method and the graphical format was published by Helmore (2001).

A further example for a 34 m fishing vessel using Lackenby's method and the Fortran program is shown in the Appendix.

Discussion

Lackenby said that constant power is likely to be of little practical value, as the thrust of a propeller driven by turbines (steam or gas) is likely to be much closer to those of constant torque than constant power. A reasonable assumption for turbines would therefore be to interpolate between the time and space factors for constant torque and constant power, say 80% constant torque and 20% constant power.

Conclusion

A simple method of determining Lackenby's time and space factors for the acceleration of a ship is to calculate the integrals numerically. A Fortran program has been written to perform the evaluations, and an executable file and the source code are available from the author on request.

References

Lackenby, H. (1951–52) On the Acceleration of Ships, *Trans. Institution of Engineers and Shipbuilders in Scotland,* v.95.

Helmore, P.J. (2001) On the Acceleration of a Naval Ship, *The Australian Naval Architect*, v.5, n.3, August.

APPENDIX

34 m Fishing Vessel

Length WL	34.0 m
Displacement Δ	734 t
Mass of axially-entrained water	0.08Δ
Thrust deduction fraction t	0.20
Main engine	Diesel
Propeller	MARIN B Seies
Maximum speed V	13 kn
P_E at V	745 kW
$0.85V$	11.05 kn
P_E at $0.85V$	330 kW

Using Lackenby's method, we have for the exponent n for $R_T = kv^n$ in the region of V:

$$n = \frac{\log(P_{E1}/P_{E2})}{\log(V_1/V_2)} - 1$$

$$= \frac{\log(745/330)}{\log(13/11.05)} - 1 = 4.01$$

Also, in Lackeby's notation:

Time product

$$\frac{MV}{H} = \frac{(\Delta + a)V^2(1-t)}{222.6P_E}$$

$$= \frac{(1.08\times734)\times13^2\times(1-0.20)}{222.6\times745} = 0.635 \text{ min}$$

Space product

$$\frac{MV^2}{H} = \frac{(\Delta + a)V^3(1-t)}{13590P_E}$$

$$= \frac{(1.08\times734)\times13^3\times(1-0.20)}{13590\times745} = 0.138 \text{ n mile}$$

To accelerate to within 0.5% of the maximum speed of 13 kn, we set x = 0.995 and use our exponent n = 4.01 to find Lackenby's time and space factors at constant torque for a diesel engine using the Fortran program:

```
LACKENBY'S TIME AND SPACE FACTORS FOR ACCELERATION OF SHIPS

Enter speed exponent (2.0-10.0),    n = 4.01

Enter fractional speed (0.2-0.999), x = 0.995

                    Time factor,  Ft =  1.669 at constant torque
                                  =  1.452 at constant power

                    Space factor, Fs =  1.198 at constant torque
                                  =  1.066 at constant power
Program Completed
Press Enter to Continue.
```

Lackenby Fortran program output
(Screenshot courtesy Phil Helmore)

Time to accelerate to $0.995V$

$$t = \frac{MV}{H}F_t = 0.635\times1.669 = 1.06 \text{ min}$$

Distance to accelerate to $0.995V$

$$s = \frac{MV^2}{H}F_s = 0.138\times1.198 = 0.17 \text{ n mile}$$

INDUSTRY NEWS

AUKUS Design Contract

The UK government has awarded a design contract to BAE Systems which represents the first stages of work on the AUKUS nuclear submarine, the future class of attack submarines which will replace the Royal Navy's Astute-class boats and be built for the Royal Australian Navy.

Details of the contract were shared in a Ministry of Defence minute to the UK Parliament.

It said: "The purpose of this Minute is to notify Parliament of reportable contingent liabilities which the Ministry of Defence (MOD) intends to incur as a result of placing the Detailed Design and Long Lead Items contract with BAE Systems for the Ship Submersible Nuclear AUKUS (known as "SSN-A"), the future class of attack submarines to replace the Astute class.

"Negotiations are ongoing and the contingent liabilities will come into force on signature of the contract."

The first phase of the work includes fabrication of steel in Barrow.

As part of the AUKUS pact, the UK's submarines will primarily be constructed in Barrow, while Australia will work on developing its submarine industrial base over the next decade.

Australian submarines are due to be built in South Australia, with some components produced in the UK.

BAE will play a key role in the programme and is expanding its workforce by 6 000 staff.

Luerssen Australia Expands Footprint

Luerssen Australia has expanded its footprint to Canberra and has established a base in the nation's capital.

Over the last five years, Luerssen Australia has continued to expand its teams in Perth, Melbourne and Adelaide as it delivers twelve Arafura-class offshore patrol vessels (OPV) for the Royal Australian Navy.

Establishing an office in Canberra allows the Luerssen Australia team to work even more closely with Defence and the Federal Government, and continue to strengthen collaborative relationships.

Luerssen Australia's Chief Executive Officer, Jens Nielsen, said that this is an exciting time for the company.

"As our employee numbers continued to grow, it was clear we needed to expand our footprint to provide greater support for our team and our customer," Mr Nielsen said.

"We are extremely proud to be continually growing our workforce, and creating job opportunities for Australians."

"As we build strong foundations across Australia, we are demonstrating our commitment to being here for the long term."

"Luerssen Australia is passionate about helping create a sovereign shipbuilding capability in Australia."

Incat Crowther opens new Europe Office in UK

In May Incat Crowther officially opened its new Europe office in the United Kingdom county of Hampshire. The new office, located near the historic maritime city of Southampton and in close proximity to major airports, will position Incat Crowther perfectly to service its growing client base in Europe and the Middle East.

With a track record of delivering bespoke customer-focused solutions, the move to a larger office with connections to major transport hubs will ensure that Incat Crowther can continue to grow its team of marine designers and digital shipbuilding experts.

Commenting on the new office, Incat Crowther's Europe Managing Director, Ed Dudson, said that it was the right time to move to a larger premises to help meet growing demand for Incat Crowther's services.

"This is an exciting milestone for Incat Crowther in Europe with the move to a new, larger office signifying the next step in our company's growth," said Mr Dudson.

"Over the last five years, we have seen demand for our services increase significantly. In that time, we have earned a reputation for delivering best-in-class, bespoke digital designs for our growing client base of passenger ferry operators and offshore wind-energy operators around the globe.

"This growth has meant that our team of expert designers has also grown and it continues to grow," said Mr Dudson.

The new European office is located at The Rectory within the newly renovated Stoneham Park Business centre, in Eastleigh.

Incat Crowther's new Europe office
(Photo courtesy Incat Crowther)

WinGD on Track to Deliver Ammonia Engines in 2025

Swiss marine power company WinGD is on track to deliver its first X-DF-A dual-fuel ammonia engines by the first quarter of 2025, with the first X-DF-A powered vessels in service from 2026. The confirmation, which follows combustion tests at WinGD research facilities in December 2022, is backed by concrete orders and recent rapid progress in developing an engine concept capable of using the zero-carbon fuel efficiently, safely and reliably.

WinGD has disclosed ammonia fuel technology developments involving two shipowners. Last month it signed an agreement with AET Tankers and sister company Akademi Laut Malaysia to develop crew training on ammonia engines. In January 2023 it announced a partnership with CMB Tech, a sister company of Belgian shipowner CMB, to develop ammonia-fuelled engines for ten 210 000 DWT bulk carriers.

The developments are supported by strong collaborations with engine and ship builders in China, Japan and Korea, as well as by WinGD's own extensive investment in research. Most recently, in June WinGD signed a memorandum of understanding with Mitsubishi Shipbuilding Co. Ltd to prepare X-DF-A for application across a range of vessel sizes and for integration with the engine builder's ammonia fuel supply system. This follows a development project with Hyundai Heavy Industries initiated in June 2022.

WinGD recently reported how a unique validation platform housed in its Engine Research & Innovation Centre (ERIC) in Winterthur, the Spray Combustion Chamber (SCC), had enabled rapid development of two-stroke combustion concepts and emission models. Since first ignition in 2022, the team has gained a wealth of insights into the combustion and emission characteristics which form the basis for a rapid deployment of the technology to the portfolio. WinGD can now provide accurate figures for ammonia consumption and relevant emissions.

Tests on the unique purpose-built single-cylinder engine located at ERIC Winterthur and a multi-cylinder test engine at WinGD's Global Test Centre in Shanghai will commence, in collaboration with China Shipbuilding Power Engineering Institute Co. Ltd (CSPI).

Across the multiple collaborations and further work with class societies, ammonia fuel-supply-system suppliers and shipyards, WinGD has focused on defining safety aspects related to the engine installation and ammonia supply system. WinGD has recently published the guidance and installation documentation for its X-DF-A engines across a range of bore sizes.

WinGD CEO, Dominik Schneiter, said "For the industry to be truly ready for alternative fuels, the engine concepts that use them—and the vessel designs, auxiliary systems, crew training and field support network—need to be ready before the fuels become widely available. Our development timeframe, as evidenced by these milestones in research and collaboration, shows that we are on track to give shipowners and operators the time they need to prepare for decarbonised ship power using ammonia as fuel."

HydroComp NavCad® 2023 Released

Development in 2023 for HydroComp NavCad offers new features across the range of applications.

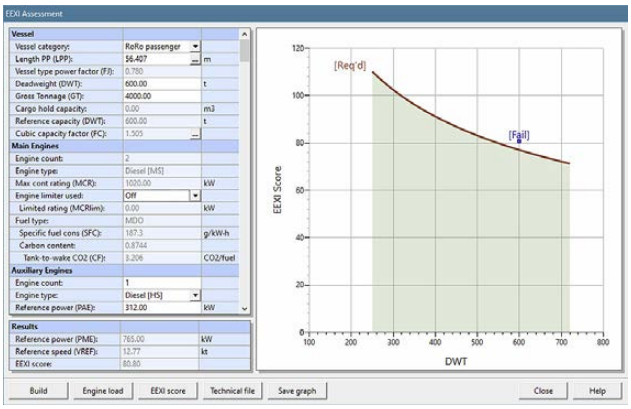
Miscellaneous updates

Every version year allows us to develop features requested by our user community, and this year is no exception. The first user-requested feature to be added for 2023 is a new **add/delete speed** capability using toolbar buttons in the results grid. For columns that have been manually entered, a new speed will have a spline-fit value determined for that column.

EEXI Assessment utility (Premium Edition)

The *EEXI Assessment* utility provides the means to calculate an EEXI Score for a current NavCad project, to investigate how design options affect the score, and to prepare an EEXI "Technical File" document for review and benchmarking of compliance calculations.

Following published IMO MEPC calculation guidelines, the performance basis for the EEXI score calculation is found from a "Speed Power Curve". While current regulations dictate computation requirements for submission of compliance, design-stage investigations of EEXI compliance can be made very efficient using the *EEXI Assessment* tool.



A screen shot of the EEXI assessment utility
(Image courtesy HydroComp)

For the highest fidelity speed-power curve, NavCad can employ calibration of predictions to comparable reference ships and propellers via "Aligned Prediction" (for resistance and hull-propulsor interaction) and "Aligned Series" (for propeller performance). Reference ships and propellers are typically empirical model tests, but they could also be from validated computational sources. For example, a suitable reference propeller K_T–K_Q curve for an Aligned Series could be prepared using HydroComp *PropElements* wake-adapted propeller design and analysis tool.

Suitable for virtually all ships under EEXI restriction, the *EEXI Assessment* utility in NavCad Premium provides quick and resource-friendly design guidance when the need comes to investigate where a ship stands regarding EEXI compliance. At the conclusion of the evaluation, the generated report can be used as reference documentation for quality assurance and benchmarking of future EEXI compliance calculations. For additional information visit www.hydrocompinc.com/solutions/navcad.

HydroComp PropCad®2023Released

Released in May, HydroComp PropCad 2023 is the most advanced propeller design framework to date. With the 2023 release, PropCad users now have more control and feedback for their designs than ever before.

Blade Layout Group

A new group documenting the geometric position of the blade's outline in both expanded and projected views is now available in the main Section table of PropCad. This provides users with better tools for physical blade layouts and gives feedback to users transferring legacy designs to the PropCad environment.

Regression and Smoothing tools for 2D Offsets

PropCad 2023 enables new tools for manipulating and smoothing 2D offset data, including a multiple-fit point regression. These tools are available from the Offset Toolbar Edit button to the left of the 2D Offset table. These new tools provide users with a fast and efficient way to eliminate unfair regions from their designs.

Update to DNV Rules for Blade Thickness

With the 2023 edition, PropCad's propeller blade thickness rules for DNV now include explicit entry of propeller design thrust. This is an alternative to the simplified rule for estimating the propeller thrust, allowing users of PropCad 2023 to leverage their CFD analysis, model tests, lifting line codes, and other forms of calculation for use with PropCad's DNV ruleset calculations.

Improved data extractions from CAD

One of PropCad's most popular features has been updated with more options for users to isolate the design data from existing 3D models of propeller blades. In addition to new menu items for removing leading and trailing edge data, the utility now offers automatic extrapolation of tip data via the PropCad 2D offsets distribution file (*.sect). These improvements offer an unprecedented level of reliability and control when extracting design data from 3D models of existing propellers. For additional information visit www.hydrocompinc.com/solutions/propcad

HydroComp PropExpert®2023 Released

Used by over 500 companies to size propellers, engines and gears for vessels large and small, PropExpert 2023 (released in June) features the most up-to-date techniques presented in an easy-to-use and powerful package.

Improved propeller codes for accurate sizings

HydroComp PropExpert 2023 includes updates for improved propeller sizings. This includes more stable solution convergence for very low thrust conditions, as well as a new update for the effect of shaft angle on cavitation and required blade area.

New reporting feature—Copy

PropExpert's reports document your calculations in a professional manner and are a valuable asset to provide to the vessel owner. PropExpert 2023 introduces a new shortcut button to copy the report file to the Windows clipboard. This allows users to quickly get the report performance results to the customer by email or file transfer.

Improvements for Windows 11

The latest version resolves directory permission issues on Windows 11, ensuring a seamless PropExpert experience from first installation to daily use.

About HydroComp PropExpert

For additional information, visit www.hydrocompinc.com/solutions/propexpert.

Wärtsilä Ammonia Release Mitigation System receives Approval in Principle from DNV

Wärtsilä announced in June that its new patented and proprietary technology Wärtsilä Ammonia Release Mitigation Systems (WARMS) has received Approval in Principle from classification society DNV. The approval in principle covers its use on ships fuelled by ammonia with the DNV Class notation Gas Fuelled Ammonia or on gas tankers fuelled by ammonia with the DNV Class notation GF NH3.

This innovative system mitigates the risks associated with future fuels, such as ammonia, which can be hazardous to both health and the environment unless handled and stored with great care. With WARMS, typical emissions comprise nitrogen (N_2) and water (H_2O), with ammonia (NH_3) emissions less than 30 ppm. In fact, in most cases NH_3 emissions are close to 0 ppm.

A combustion test at the Wärtsilä Moss facility
(Photo ourtesy Wärtsilä)

"Ammonia can be an important part of the future maritime fuel mix, but we need to ensure that with every step forward, safety is at the top of our list of considerations. That is why DNV is so pleased to be able to award this AiP to Wärtsilä for their innovative new Ammonia Release Mitigation Systems (WARMS). With the Gas Fuelled Ammonia notation, we set out to offer a practical path for realising ammonia as a zero-carbon fuel option. And we are delighted that Wärtsilä is working with us to demonstrate to their customers that this solution is being developed in line with the most technically-advanced rule set in the maritime industry," said Dalibor Bukarica, Head of Section, Piping Systems & Alternative Fuels at DNV.

In announcing the launch of WARMS, Ole Fjeld, Product Line Manager, Inert Gas Systems Offshore, Wärtsilä Gas Solutions, said "We can assume that regulations will become even more stringent as 'best available technologies' are developed to enable the global acceptance of future fuels. WARMS is designed to comply with both existing and anticipated legislation, and is an important element within Wärtsilä's decarbonisation journey."

WARMS is designed for accurate and continuous monitoring of emissions. It features staged and controlled combustion, minimal energy consumption and waste, and a compact footprint. WARMS offers a green and safe alternative to venting pure ammonia, diluting it with air, or bubbling it in hazardous dirty water tanks.

Wärtsilä has been developing solutions for protecting ships, their crews, cargoes, and the environment through inert gas systems for more than 60 years.

Wärtsilä to accelerate Stena Line's Decarbonisation Journey through Methanol Conversions

Wärtsilä has been contracted by Swedish ferry operator Stena Line to carry out and convert some of its vessels to operate with methanol fuel. As methanol is one of the key components of decarbonisation in the maritime industry, this contract will equip the vessels with unmatched fuel flexibility, thus marking an important milestone in Stena Line's journey towards becoming a leader in sustainable shipping. The conversions will include the fuel supply system and engine modifications, as well as integrating the new installations with the ships' existing systems. The contracts were booked as order intake by Wärtsilä in June 2023.

Converting ferries for methanol fuel will enable them to be compliant with various existing and upcoming regulations, including the Carbon Intensity Indicator (CII), FuelEU Maritime, and IMO 2050 GHG reduction target.

"As we continue to implement our strategy to decarbonise all our operations, we see methanol as a viable alternative fuel which will help us achieve this ambition. Wärtsilä has proven its capabilities to carry out the necessary conversions. This was shown eight years ago when they converted *Stena Germanica* to operate with methanol, and our experience from this ground-breaking innovation has been very positive," said Ian Hampton of Stena Line.

"We have had close cooperation with Stena Line for many years and we are pleased to be supporting them again in this important conversion project. Like Stena Line, Wärtsilä is committed to making decarbonised shipping operations a reality, and we have invested heavily in developing our engine portfolio to be capable of utilising carbon-neutral and zero-carbon fuels," commented Roger Holm, President of Wärtsilä's Marine Power business.

The full scope of Wärtsilä's supply package will include fuel tank instrumentation and valves, transfer pumps, low pressure pump skid, fuel valve trains, methanol fuel pump units and the automation of the system, engine conversions, and automation upgrade for the engine control room.

The conversions are scheduled to take place in 2025.

On 11 August Austal Australia delivered the 16th Guardian-class patrol boat to the Australian Department of Defence. The vessel was then gifted by the Australian Government to the Federated States of Micronesia at a certificate signing ceremony at Austal's shipyard in Henderson, Western Australia. The new Guardian-class patrol boat is the second to be gifted to the Federated States of Micronesia under the Pacific Patrol Boat Replacement Project, part of the Australian Government's Pacific Maritime Security Program, the first being FSS Tosiwo Makayama delivered in March 2022
(Photo courtesy Austal)

UNSW Canberra

Semester 2 has begun, and the consequence is that the full set of courses forming our undergraduate degree have now been activated at least once, and our first potential graduand in SBLT Cooper Woods has his prize in sight as we anticipate the joy of his walking across the stage to receive his degree in December.

The field trips completed in April and May were some of the highlights of Semester 1 activities.

A three-day training cruise from HMAS *Creswell* was conducted very successfully on board MV *Sycamore* on 17–19 April. Unfortunately, due to illness, the intended party shrank from four to two, with only SBLT Cooper Woods (student) and Sean McCracken (marine engineering staff) participating. The primary purpose was to provide sea-going experience to students in the naval architecture stream. The secondary purpose in 2023 was to use this inaugural cruise to explore potential activities to further enrich the cruise in future years.

Walking through a vessel at sea as it encounters waves and swells, experiencing the challenges which the environment adds to the crew's jobs, and understanding the effect which the design of the vessel has on the ability of the crew to successfully complete their mission were the main experiences gained through observation. There is no other work platform like a ship, and this is what makes naval architecture such a unique discipline. We consider that it is essential for the students to experience and appreciate time at sea. It is not a certainty that a civilian naval architecture graduate in their profession will gain opportunities on a ship at sea again. Listening to the crew was a highlight of the visit and many years of quality experience were shared.

Exploring the handling of the ship through the conduct of manoeuvring trials (Figure 1) had learning benefit, as well as to the bridge crew who were very accommodating

Figure 1: Aboard MV *Sycamore*
turning trials plotted
(Image courtesy Cooper Woods)

in participating and driving the ship to our requests. It is always impressive to see the discipline of a bridge crew in action, and it makes an impression on the students. A tour of the machinery spaces was very insightful. The opportunity for Sean as the "Inducted Supervisor" to guide the tour, provided more direct inspection and understanding of the various equipment and machinery with strong connections back to the classroom. Observing helicopter landings and boat launches and recoveries were extremely important in appreciating the high-risk work environment at sea (Figures 3 and 4). MV *Sycamore*, being a multi-role vessel, is an ideal platform to provide so many different seaborne evolutions.

Gracious thanks are extended to the Master, Chief Engineer, Crew, Sustainment Officer and Liaison Officer of MV *Sycamore*. We look forward with anticipation to this cruise being conducted annually, providing fantastic insights and first-hand experiences.

Figure 2: Aboard MV *Sycamore*
Observing Helicopter Landing practice—a primary vessel function
(Photo courtesy Sean McCracken)

Figure 3: Aboard MV *Sycamore*
Observing seaboat launch at night
(Photo courtesy Sean McCracken)

In early May, a trip with our Year 3 students took us to Sydney for the second time, for an inclining experiment and other industry visits to Garden Island Dockyard, Lloyd's Register and One2three Naval Architects. All hosts, principally Rob Tulk, Mike Hodgkinson and Cam Baird, are thanked for the time they spent with us, and the invaluable investments provided.

At the Sydney Heritage Fleet, as well as inclining HTS502 *Currawong* (Figure 4), we stepped back into history with a tour of SS *John Oxley*. The visit to One2three Naval Architects was greatly enjoyed by the students as they

gained an appreciation for a small but thriving consultancy (Figure 5). Each student, on returning to Canberra, made a presentation on the experience with reflections on their key learning moments. Most chose to highlight One2three. Interestingly, while four out of five students are in uniform and our program is grey-ship focussed, the breadth of activity being undertaken by One2three and the engagement demonstrated in a couple of hours by all staff caught their attention, opening their eyes to a tight and lean working environment and an exciting range of projects.

Figure 4: Aboard HTS502 *Currawong* for the 2023 Inclining with the guidance of Phil Helmore
(Photo courtesy Warren Smith)

As always, we welcome enquiry and comment. Please do not hesitate to contact me (w.smith@unsw.edu.au) or David Lyons (david.lyons@unsw.edu.au) or Sean McCracken (sean.mccracken@adfa.edu.au) via email, or by other channels, if you have any questions or would like to contribute to or join our enterprise. We would welcome talking to prospective students, both undergraduate and postgraduate, and those who may be interested in exploring career opportunities in academia.

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

[*Those with eagle eyes will have noticed that the name of the school has recently changed from School of Engineering and IT to School of Engineering and Technology, due to re-organisation*—Ed.]

Partnership between Babcock and the University of Adelaide

A new partnership between the University of Adelaide and Babcock Australasia (Babcock) was announced on 4 August which is set to accelerate Australia's critical defence industry workforce to support the biggest and most ambitious defence agenda in the nation's history.

Babcock's Managing Director AUKUS & International, Sir Nick Hine KCB, Babcock's CEO, Andrew Cridland, University of Adelaide's Vice-Chancellor and President, Prof. Peter Høj AC, and Deputy Vice Chancellor (External Engagement), Dr Jessica Gallagher, have signed a Memorandum of Understanding (MoU) in a commitment to work closely together.

Babcock Australasia CEO, Andrew Cridland and University of Adelaide Vice-Chancellor and President, Prof. Peter Høj AC, signing the MoU
(Photo courtesy Babcock)

Babcock and the University of Adelaide will work together on developing Australia's defence workforce and skills through new initiatives and projects to support current defence programs and the AUKUS program, including the delivery of the nation's first nuclear-powered submarines.

Under the AUKUS trilateral security pact the US and the UK will assist Australia in building nuclear-powered submarines in South Australia. It will be one of the most transformative industrial endeavours in Australia's history.

Figure 5: Group in the foyer at One2three Naval Architects
(L to R) Rob Tulk, David Lyons, Warren Smith, Lauren Kemp, Thandi Murada, Scarlett Lockyer, Sasha Apelt, James Scotson and Mike Hodgkinson
(Photo courtesy Warren Smith

Job creation and building the advanced skills needed to support South Australia's position will be critical to the program.

The MoU will serve as the guiding framework, between the University of Adelaide and Babcock, to work together on new talent attraction and development to support defence and national security and realise the potential presented by AUKUS.

The University of Adelaide is in the top 100 universities world-wide and has an outstanding global reputation for teaching and research across all major engineering disciplines as well as a strong track record of working closely with industry and government.

Babcock is the number one navy ship sustainer in Australia and NZ, employing more than 1800 people. Globally, Babcock is a proven, trusted leader in sustainment, nuclear safety and stewardship, playing a crucial role in the UK, US, and Australian submarine programs today.

Growing the Workforce of Tomorrow

More than 70 young Australians will start their nuclear-powered submarine careers this year; thanks to a new program announced on 7 July.

The Commonwealth Government is establishing an Early Careers Program in South Australia and Western Australia to develop the skills and experience needed to build and maintain the nation's nuclear-powered submarines.

Under the program, ASC Pty Ltd will employ more apprentices, graduates and undergraduates, giving them hands-on experience in designing, building and maintaining submarines.

The Defence Industry Minister, the Hon. Pat Conroy MP, said that the program presents an unparalleled opportunity for the nation, defence industry and the supply chain.

"ASC is a key industry partner for the Australian Government in developing the skills and experience needed in our transition from conventional submarines to nuclear-powered capability," Mr Conroy said.

More young Australians will benefit from the same opportunity in the future with plans to increase the number of positions on offer each year.

Participants will have access to cutting-edge technology and training, while working alongside and learning from experienced professionals in the field.

The Defence Minister, the Hon. Richard Marles MP, said that the program was another step towards growing the workforce needed for a sovereign submarine industry.

"The establishment of a nuclear-powered submarine capability in Australia will support around 20 000 direct jobs over the next 30 years. Developing the workforce to deliver the capability is vital to the success of the program," Mr Marles said.

"The scale of work will be unlike any previous shipbuilding program in our history, and will deliver career and job opportunities for generations."

Pathway to Keep the Talent Coming

A steady pipeline of talent will continue to flow into the essential naval shipbuilding and sustainment industry thanks to an Australian Government commitment to extend the Defence Industry Pathways Program (DIPP) for three years in Western Australia.

The DIPP is a 12-month skills development program in which participants gain an understanding of the defence industry and obtain a nationally-recognised Certificate III in Defence Industry Pathways.

The $11.4 million extension directly supports the initiatives to improve the growth and retention of a highly-skilled Defence workforce outlined in the Defence Strategic Review by providing another 150 positions in the program over the coming three years.

Acting Deputy Secretary Naval Shipbuilding and Sustainment, RADM Wendy Malcolm, said that the extension would "provide more participants with knowledge and experience, and a pathway to gain essential skills which will be required by Australia's defence industry well into the future".

The program is supported by large defence companies and small-to-medium enterprises, which ensures that graduates are employment-ready through practical experience and wide exposure to the maritime defence industry.

"As we face the most challenging strategic circumstances since the Second World War, the acceleration of important capabilities and activities is vital," RADM Malcolm said.

"Further investment in Defence and its workforce will ensure that we can deliver a robust, sovereign naval shipbuilding and sustainment industry."

More than 70 per cent of graduates have secured employment in the maritime defence industry so far, taking on roles from apprenticeships and follow-on traineeships to logistics, scheduling, administration, project administration and technician jobs.

The seventh intake of the Defence Industry Pathways Program commenced in late June 2023.

THE PROFESSION

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

The latest issue is April 2023, and that was reviewed in the May issue of *The ANA.*

Phil Helmore

MEMBERSHIP

Australian Division Council

The Council of the Australian Division of RINA met on the afternoon of Tuesday 20 June 2023 by Zoom-conference under the chairmanship of our President, Jim Black in Canberra with links to Sydney, Melbourne, Adelaide and Perth.

In opening the meeting, the President congratulated Prof. Jonathan Binns on his election as Vice President since the previous meeting and welcomed new Council members Martin Grimm and Karl Slater.

Among the items discussed were:

Lower Secondary Brochure

Council considered a draft of the brochure and authorised its use by Sections as self-printed documents. The draft is to be further refined with a view to printing a stock of hard copies as soon as possible.

Council Vacancy

Council is seeking a volunteer member to be appointed to a vacancy.

Walter Atkinson Award 2023

Council noted that nominations for this award for the best written paper presented within the Division in the 12 months to 30 June would close on 20 July and confirmed the selection procedures for this year's award.

Government Initiatives

Council noted that the forthcoming report by US VADM Halrides into the future structure of the Navy fleet following the Defence Strategic Review is likely to impact on the naval shipbuilding program and that Council may need to publicly respond.

Improvement Committee

The Committee continues its work, now under the leadership of our new Vice President, Prof. Binns.

Indo-Pacific 2023 IMC

Council received a report indicating that preparations for the Conference are proceeding apace.

Engineer Registration in Queensland and Victoria

The Institution is waiting for responses to our applications for approval as an assessment entity under the respective state legislations lodged earlier this year. Members should note that positive responses were received as this issue of *The ANA* goes to press.

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

In response to an invitation received after the Council meeting, the Division has made a submission to the Senate Foreign Affairs Defence and Trade Legislation Committee inquiry into support provided by Defence into the defence support industry. The submission, which relates particularly to naval shipbuilding, can be viewed at https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Foreign_Affairs_Defence_and_Trade/PerformanceofDefence47/Submissions.

The next meeting of the Australian Division Council is tentatively scheduled for Tuesday 19 September 2023.

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	Jim Black
Vice President	Jonathan Binns
Secretary	Rob Gehling
Treasurer	Craig Boulton

Members nominated by Sections	
	Nick Bentley (Qld)
	Phil Bevan (SA&NT)
	Adrian Broadbent (NSW)
	Chris Davies (Tas)
	Emma Tongue (WA)
	Nathan Wallace (Vic)
	Martin Grimm (ACT)
Members elected or appointed by Council	
	Sammar Abbas
	Walid Amin
	Jonathan Binns
	John Butler
	Ken Goh
	Andrew Harris

ACT Section

Chair	Warren Smith
Deputy Chair	Trevor Dove
Secretary	Jordan Rayson
Assistant Secretary	Lily Webster
Treasurer	Lauchlan Clarke
Nominee to ADC	Martin Grimm
Members	Ray Duggan
	James Loram
	Jeremy Nolan
	Alistair Smith
	Tamasin Welch
	Cameron Whitten

NSW Section

Chair	Belinda Tayler
Deputy Chair	Phil Helmore
Secretary	Lauren Stotz
Treasurer	Adrian Broadbent
Nominee to ADC	Adrian Broadbent
Auditor	David Wong
TM Coordinator	Phil Helmore
Members	Craig Boulton
	John Butler
	Valerio Corniani
	Ehsan Khaled
	Molly McManus
	Alan Taylor

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
	Timothy Vaughan
	Ashley Weir

South Australia and Northern Territory Section

Chair	Phillip Bevan
Deputy Chair	Peter Samarzia
Secretary	Cameron Wilkinson
Treasurer	Donal Gallagher
Nominee to ADC	Phillip Bevan
Members	Omar Hostia
	Alistair Mitchell

Tasmanian Section

Chair	Chris Davies
Deputy Chair	Martin Renilson
Secretary	Richard Boult
Treasurer	Michael O'Connor
Nominee to ADC	Chris Davies
Members	Doupadi Bandera
	Jack McLaren
	Alan Muir
	Michael Woodward

Victorian Section

Chair	Tom Dearling
Secretary	Samuel Smith
Assistant Secretary	Luke Shields
Treasurer	Alex Conway
Nominee to ADC	Nathan Wallace
Social Media Manager	Nathan Wallace
Members	Jonathan Binns
	Mihael De Rosa
	Martin Krygsman
	Ola Olubowale
	Karl Slater

Western Australian Section

Chair	Vesna Moretti
Deputy Chair	Ken Goh
Secretary	Ken Goh
Treasurer	Hadiqa Khan
Nominee to ADC	Emma Tongue
Members	Nathan Chappell
	Yuriy Drobyshevski
	Bertrand Gorjux
	Evgenia Koutsoukou
	Anuj Sharma

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
	Karl Slater
	Lily Webster

Bob Campbell Award Panel

Convenor	Rob Gehling
Members	Volunteers from the WAA Panel and others

RINA London

Vice President Pacific Region	
	Rob Gehling
Board of Trustees	Rob Gehling
Council Members	Jim Black (*ex officio*)
	Rob Gehling
	Martin Renilson
Maritime Safety Committee	
	Rob Gehling

	Doug Matchett
IMO Committee	John Manning
Professional Affairs Committee	
	Jim Black

RINA/Engineers Australia Joint Board of Naval Architecture

Members	Jim Black
	Rob Gehling

Improvement Committee 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)

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 2023 IMC Organising Committee

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

Indo Pacific 2023 IMC Papers Committee

Chair	Adrian Broadbent	RINA
Members		
	Craig Boulton	ASO Marine Consultants
	Giuseppina Dall'Armi-Stoks	DST Group
	Rob Gehling	RINA
	Gregor Macfarlane	AMC/UTas
	Tauhid Rahman	DNV and IMarEST
	Karl Slater	DST Goup
	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 Division	
	rinaaustraliandivision@gmail.com
Sections	
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

STOP PRESS—ADVANCE NOTICE

The Institution is pleased to announce that its world-renowned ***WARSHIP 2024*** Conference (sponsored by BMT) will be conducted at the Adelaide Convention Centre on 18–19 June 2024 with the theme *Design, Construction and Support of Surface Ships*. The Call for Papers will be issued shortly with an abstract submission deadline of 1 November. Topics to be covered include:

- Future Navy Surface Fleet Mix
- Design for constructability and supportability
- Facilities and Shipbuilding
- Automation in Ship Design and Construction
- Digital Engineering
- Use of Offboard Autonomy – Partially or Fully Autonomous Ships
- Disruptive Technologies

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 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. Branch and Section presentations are shown fourth from the left in the top line. Click on View full Playlist to see the list which is in approximate date order, with the most-recent first. For an older presentation you may scroll down through the list; however, 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 three words thereof) and press Enter.

NSW Section Webcast

The NSW Section webcast recorded and uploaded within the last three months is:

- *Remediation of the LHD Propulsion Issues,* presented by Philip Baldwin, Independent Contractor to Defence, Maritime Sustainment Division, to a joint meeting of the NSW Section and IMarEST ACT & NSW Branch at the Sydney Mechanics School of Arts in the Sydney CBD and streamed live on 1 March 2023.

Phil Helmore

Victorian Section Webcasts

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

- *Challenges in Developing Offshore Wind in Australia,* presented by Chris Carra, Director of Offshore Energy at AMOG Consulting, and Ralf Skowronnek of Skowronnek & Bechnak GmbH (leading risk advisors to the offshore wind sector), to a meeting at the Mission to Seafarers in Docklands and streamed live via Zoom on 2 March 2023.
- *Adventures in Antarctica,* presented by Captain Jorgen Berg to a meeting at the Mission to Seafarers in Docklands and streamed live on 16 March 2023.
- *Energising the Maritime Industry with Offshore Wind*, presented by Jordan Glanville, Infrastructure Manager, Oceanex Energy, to a meeting at the Mission to Seafarers in Docklands and streamed live via Zoom on 24 May 2023.

Samuel Smith

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

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.

NAVAL ARCHITECTS ON THE MOVE

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

Sam Baghurst has moved on within ASC and has taken up the position of Senior Naval Architect in Adelaide.

Nick Barratt has moved on from Hanseatic Marine and, after a year at Fugro-TSM, has taken up the position of Senior Decommissioning Project Engineer with Santos in Perth.

James Barton has moved on within Woodside Energy and has taken up the position of FPU Hull Construction Site Manager on the Scarborough Project in Qidong, Jiangsu, China.

Warwick Benn has moved on within Austal and has taken up the position of Senior Naval Architect Warranty in Fremantle.

Roger Best has moved on within Woodside Energy and has taken up the position of FPSO Hull and Marine Lead in Perth.

Nick Billett has moved on from Naval Architects Australia and, after some time at CNC Marine, has taken up the position of Senior Naval Architect with Formosa Marine in Brisbane.

Alex Bishop has moved on from Taylor Bros Marine and, after some time at Laurent Giles Naval Architects, BMT, and Lateral Naval Architects, has taken up the position of Naval Architect and Marine Engineer with QinetiQ in Farnborough, UK.

David Dinardo has moved on from Briar Maritime Service and, after a year at Incat Crowther, has taken up the position of Naval Architect with John Butler Design in Sydney.

John Donovan has moved on from London Marine Consultants and, after some time at Austal, moved to Orwell Offshore, where he has now taken up the position of Technical Authority—Structural in Ipswich, UK.

Gerard Engel has moved on from Silver Yachts and has taken up the position of OPV Project Manager with Shadbolt Group in Perth.

Jordan Glanville has moved on from TEK-Ocean Energy Services and has taken up the position of Infrastructure Manager with Oceanex Energy in Melbourne.

Alex Law has moved on from BMT Defence & Security Australia and has taken up the position of Director/Naval Architect in his own consultancy, Equilibrium Naval Architecture, in Sydney.

Brocque Preece has moved on from Aqualis Braemar London Group and has taken up the position of Principal Consultant with NASH Maritime in London, UK.

Matthew Stevens has moved on from ASC and moved to Gibbs & Cox Australia where he has now taken up the position of Director Programs, Sustainment & Shipbuilding Operations in Newcastle.

Amit Trivedi moved on from Queensland Rail in 2006 and moved to the Department of Transport and Main Roads, where he has now taken up the position of Connected and Automated Vehicle Pilot Lead in Brisbane.

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

FROM THE ARCHIVES

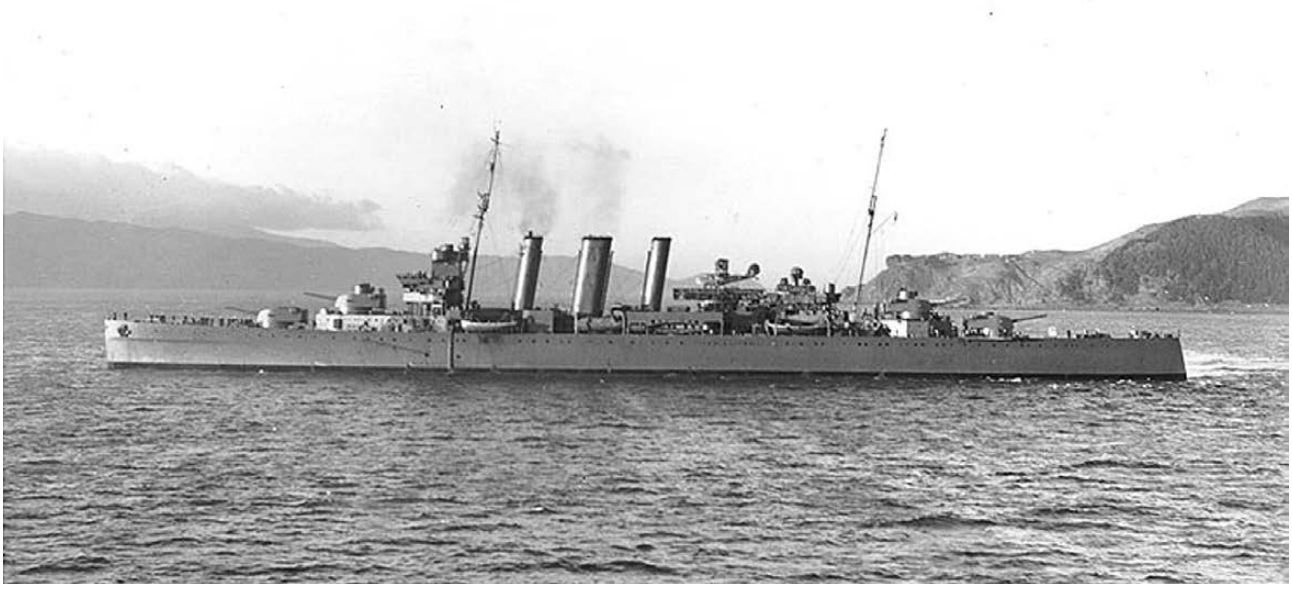
A TALE OF TWO CANBERRAS

The recently-commissioned USS *Canberra* (LCS30) is the fifth warship to bear the name of Australia's capital city, and the second to be commissioned into the United States Navy. The first *Canberra* was a heavy cruiser of the Kent class; one of two built in Scotland for the Royal Australian Navy during the 1920s, the other being her sister ship, HMAS *Australia*. HMAS *Canberra* was completed on 9 July 1928.

The British County-class cruisers were designed within the limits imposed by the Washington Naval Treaty of 1922—the Kent class comprised the first of three sub-classes of the type. The ships were spacious and fast. Their full-load displacement was about 13 878 t, overall length 192.02 m, beam 20.82 m and the deep draft was 6.8 m. The main armament was eight 8-inch (203 mm) guns in twin turrets—the secondary armament was modest and comprised mainly four single 4-inch (102 mm) guns.

As World War II approached, plans for the modernisation of the two cruisers were prepared, to increase the secondary armament and provide additional armour protection. HMAS *Australia* was modernised at Cockatoo Island in Sydney between April 1938 and September 1939. *Canberra* was to have followed into dockyard hands but, with the outbreak of war, her modernisation was deferred indefinitely. During 1941 plans were prepared for a modest modernisation and much of this work was completed during her last refit at Cockatoo Island between 9 March and 22 April 1942.

HMAS *Canberra* joined Task Force 44 in June 1942 and began working up for Operation Watchtower, the invasion of Guadalcanal. On Sunday 9 August, in company with USS *Chicago*, she was patrolling off Savo Island. The ships were suddenly attacked by a force of Japanese cruisers and *Canberra* was crippled before she could fire an effective shot—on fire with all power lost. Recovery of the ship proved impracticable and at 8 am that morning, after her survivors had been removed, her end was hastened by gunfire



One of the last photos taken of HMAS *Canberra*—departing Wellington, New Zealand on 22 July 1942 for Guadalcanal
(US Navy photograph)

and torpedoes from the destroyers USS *Selfridge* and *Ellet*. Her casualties totalled 193 men killed, missing or wounded, including her Captain.

On the initiative of the US President Roosevelt, a heavy cruiser was selected to be renamed in honour of HMAS *Canberra*. USS *Pittsburgh* had been laid down in Quincy, Massachusetts, on 3 September 1941. Renamed *Canberra*, she was launched on 19 April 1943 by Lady Dixon, the wife of Sir Owen Dixon, Australia's ambassador to the United States. USS *Canberra* was commissioned on 14 October 1943, then the only US warship ever to be named after a foreign capital city.

USS *Canberra* had a full load displacement of 13 600 t, an overall length of 205.26 m, beam of 21.59 m and her deep draft was 6.25 m. Her armament included nine 8-inch (203 mm) and twelve 5-inch (127 mm) guns.

After her war service in the Pacific, USS *Canberra* was decommissioned on 7 March 1947 and remained in reserve until she was selected for conversion in 1952 into a guided missile cruiser. She was recommissioned 15 June 1956 with her after gun turrets replaced by two twin Terrier guided missile launchers.

USS *Canberra's* subsequent service included deployments during the Cuban Missile Crisis and the Vietnam War. She visited the site of her namesake's sinking in 1960 and Melbourne in May 1967. *Canberra* was decommissioned in February 1970 and scrapped in 1980. Her bell was presented to Australia by President George W. Bush on 10 September 2001 and is displayed in the US Gallery at the Australian National Maritime Museum in Sydney.

John Jeremy

USS *Canberra* underway in the Pacific on 10 November 1944
(US Navy photograph)