THE AUSTRALIAN NAVAL ARCHITECT

Volume 15 Number 1
February 2011

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THE AUSTRALIAN NAVAL ARCHITECT

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

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Cover Photo:

The Sydney Heritage Fleet's barque *James Craig* underway on Sydney Harbour on Australia Day 2011 (Photo John Jeremy)

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From the Division President

This column in the February edition of *The Australian Naval Architect* usually contains the President's report to the Annual General Meeting. I see no reason to change this tradition and will once again present my report. This year's AGM will be held in Sydney on 30 March 2011. This is also my last report as the President of the Australian Division and I would therefore like to reflect on the highlights of my term before reporting on the outcomes of the last twelve months.

In my first column in *The ANA* I stated that I wished the RINA to be the institution of choice for people working in the maritime domain. To achieve this objective every member in Australia should be able to identify themselves with a section. To this end it was very important to me that the Division formed a section which covered South Australia and the Northern Territory. Many thanks to Peter Crosby and his team for helping to form this section and it has gone from strength to strength during my term.

The second highlight for me was the significant input which several members gave to assist with the work to support the Commission of Inquiry into the circumstances leading to the loss of HMAS *Sydney*. The major outcome of the work was that the technical aspects relating to the demise of the ship are well known now but, from the Institution's perspective, this activity really did raise our profile in Australia. Our Institution was named in many of the press articles and was acknowledged by the Chief of the Defence Force with a Commendation for the members who assisted. A further Certificate of Commendation was presented by the RINA Council to acknowledge our efforts in supporting this activity and raising and raising the profile and standing of the Institution, in Australia and internationally.

Further certificates of appreciation were also presented to members of the Australian Division over my term of office. Firstly, during the IMC cocktail party at the Pacific 2008 IMC John Jeremy was presented with a certificate acknowledging all his endeavours for our organisation over the years. In my report in the February 2009 edition of *The ANA* I also expressed the hope that his support would continue, and he certainly has not let us down. Other Certificates of Appreciation were awarded to members who have given significant service and for various reasons needed to step down to a lesser role. These included Keith Adams following his retirement as Secretary, and Allan Soars following his retirement as the Treasurer. Both these members gave me excellent support during their terms of office and presented me with real problems finding their replacements. However when somebody steps down this creates an opportunity for somebody to step up. It was pleasing for me that members volunteered to carry out these roles and the level of support appeared seamless. My thanks must go to Rob Gehling and Craig Boulton for accepting these demanding tasks. The fact that I have highlighted these two members certainly does not mean that I did not appreciate the efforts of other Council members who came and went during my term.

Now I shall move on to the report for 2010, the year in which we celebrated 150 years of the RINA. The "even" years always start with the Pacific IMC series. Once again this was a tremendous success, and I need to acknowledge the support of John Jeremy, Keith Adams, Adrian Broadbent and Tauhid Rahman who are all on the organising committee — Tauhid representing IMarEST. Adrian also acted as the chair of the program committee for the IMC and his team certainly produced an excellent program. I'm aware that there is not much down time for these members and they are already in full swing with preparations for the 2012 event.

During the year I have continued to attend the RINA Council meetings as an ex-officio member. John Jeremy has also continued to serve as a member of this Council. John seemed to find even more time and provided a summary of the Division's history for inclusion in *The Royal Institution of Naval Architects 1860–2010*, the book to mark 150 years of the RINA. This was the only contribution highlighting a Division. Our sincere thanks go to John for this contribution. Other members of the Division have also continued their support via Headquarters. These include Martin Renilson as Editor of the *International Journal of Small Craft Technology* and Rob Gehling and Tony Armstrong who have continued to support the Safety Committee and the High-speed Vessels Committee respectively. A variety of committees and advisory bodies within Australia are also supported by members. These are all listed in the August 2010 edition of *The ANA*. All of the members have provided well-thought-out contributions and need to be acknowledged for their support.

The Australia Naval Architect has continued to be a great success and we must thank our major sponsors Wärtsilä and the AWD Alliance for their continued support. It goes without saying that, without their support, the production of the journal would be a little challenging. Similarly it would be just as much a challenge without the contributions from all advertisers, section contributors and in particular those of the editorial team, John Jeremy and Phil Helmore. All these efforts are commended and I certainly hope this will continue for years to come so that we can all continue to be informed by this excellent production.

The Division has encouraged the future members of our institution through its generous support for awards and prizes for students at the Australian Maritime College (University of Tasmania) and the University of New South Wales. I congratulate all those students who have received awards and we are indebted to Austal for their continued support for those awards made through headquarters in London.

Much of the progress made by the Division over the year is due to the collective efforts of those members who have elected to serve on Council and on the Section committees. Examples of this are the discussion and feedback which various members gave to recent discussions on structural standards specified in the NSCV and of the interest taken by a number of Council members in developments towards the single national maritime safety jurisdiction. I would like to take this opportunity to thank all members of Council, both present and past, for their support. All of their names were listed in the August 2010 edition of *The ANA* and therefore I will not repeat them here. Some members of Council have completed their terms of office this year and cannot be re-elected. These are Peter Crosby, John Jeremy and Graham Taylor. I'm indebted to them for their support over the years and wish them all the best for the future.

So what of the future? At the last Council meeting Prof.

Martin Renilson was elected as my successor as the President of the Australian Division of RINA. Martin brings with him extensive knowledge of the Australian seascape as well as detailed knowledge of the operations of the RINA in London. Martin has previously served not only on both the Australian Division Council and the (London) Council but also on the Executive Committee in London. I hope that you will support him as you did me and I look forward to his leadership. He has supported me well in the last two years as Vice-President and will surely step up to the future challenges.

Before I sign off, I would also like to acknowledge the continued support of my employer, the Defence Science and Technology Organisation. It certainly was a highlight for me to bring these two organisations together for the HMAS *Sydney* inquiry.

Stuart Cannon

Editorial

Congratulations to Austal on their recent contract for a follow-on littoral combat ship for the US Navy with an option for nine more to be ordered over the next five years. Whilst these ships will be built in the United States, the design origin is Australia and this success in supplying the US Navy with a major warship is a notable milestone for our industry in Australia.

At our Australian Division Annual General Meeting at the end of March I will be leaving the Division Council in accordance with our rules, forty years after I first became a member of the RINA Australian Branch Council. Four decades (with a short two-year break) is a long time and it included seven years as President. I would not have done it if I had not found it a most satisfying and rewarding experience and felt that I was making a useful contribution to the profession in Australia. I have had the privilege of working with fine colleagues and I hope to continue to do so in the years to come in the various roles to which I have been, for some reason, unable to say no.

Our industry has changed enormously in the last forty years. In 1971 we were starting to design a warship for Australia in Australia (the light destroyer, cancelled in 1973) and the commercial shipbuilding industry was heavily subsidised. There was innovation in Australian ship design with the development of cellular container ships and the application of industrial gas turbines to merchant ship propulsion (for example) but any suggestion that Australia might design a warship for someone else would have been dismissed as impossible. In many ways it was—whilst we were very good then at adapting overseas designs for local conditions the RAN traditionally adopted British designs for its combat warships and had only recently, in the early 1960s, taken the bold step of going American with the order for the guided missile destroyers. Certainly, we designed our own naval auxiliaries and patrol boats, but we had a lot to learn about designing combat ships. Moreover, our naval shipbuilding industry of that time was either government owned and operated or privately operated by a subsidiary of a major overseas company, and I worked in the latter. We certainly believed that, in time, we could do anything — but I can't say we were encouraged by our owners to become too interested in working outside our Australia territory.

In the following decades, industry generally in Australia changed greatly. The removal of tariff barriers and dramatic changes to work practices resulted in many changes in practices and attitudes. Shipbuilding was one of the industries which underwent complete change, but the opportunities were there for those with bright ideas and the courage to try. We developed a completely different industry — much smaller, but with many more professionals at all levels, and an outward look to the world rather than an inward concentration on an Australian market.

Today the products of the work of Australian naval architects can be found in many parts of the world and we even have the confidence to contemplate designing a uniquely Australian submarine. That, certainly, would have been inconceivable in 1971. This new century has many opportunities and challenges for our young professionals.

John Jeremy

A recent photograph of the Anzac-class frigate HMAS *Perth* after the anti-ship missile defence upgrade. The new mast carries the CEA phased-array radar and the quarter deck has been enclosed
(Photo courtesy Hugh Hyland)

NEWS FROM THE SECTIONS

New South Wales

Committee Meeting

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

- SMIX Bash 2010: Final arrangements now well in hand, and all in order for Thursday.
- PI Insurance: To be referred to Australian Division Council for discussion.
- TM Program for 2011 and Webcast: Arrangements for RINA presentations under way, and presentation for March decided; arrangements to be made with Engineers Australia to record this presentation and place it as a webcast to be viewed subsequently far and wide.

The NSW Section Committee also met on 8 February and, other than routine matters, discussed:

- SMIX Bash: The 11th SMIX Bash was generally regarded as successful (see report below). Accounts have yet to be finalised, with sponsors to resolve and payments still to be made.
- Technical Meeting Program 2011 and Webcast Arrangements: Presentations organised by RINA have been arranged for March, June and August, and feelers are out for the meeting in October; presentations organised by IMarEST have not yet been advised. Arrangements have been made with Engineers Australia to record the March presentation and place as a webcast.
- PI Insurance: An article on professional indemnity insurance has been prepared by the Australian Division and appears on page 55 in this issue of *The ANA*.
- Emailing Notices: It was agreed that two committee members should have copies of the NSW database of member contacts, so that email notices can be sent if one committee member is unavailable.

The next meeting of the NSW Section committee is scheduled for 21 March 2011.

SMIX Bash

The eleventh SMIX (Sydney Marine Industry Christmas) Bash was held on Thursday 2 December aboard the beautifully-restored *James Craig* alongside Wharf 7, Darling Harbour, from 1730 to 2130. The Bash was organised jointly by the IMarEST (Sydney Branch) and RINA (NSW Section). About 200 guests came from the full spectrum of the marine industry, including naval architects, marine engineers, drafters, boatbuilders, machinery and equipment suppliers, regulators, classifiers, surveyors, operators, managers, pilots, navigators, researchers, and educators. Equally importantly, the full spectrum of age groups was represented, from present students to the elders of the marine community.

It was also great to see intrastate, interstate and international visitors in the throng, including Martin Renilson, Gregor Macfarlane, Jonathan Duffy, Mark Symes and Ramiro Infazon from AMC Search in Launceston, Phil Christiansen from Formation Design Systems in Perth, Peter Iredale and Neil Rodger from Hamilton Jets in New Zealand, and Michael Fletcher from Det Norske Veritas in Korea.

Rain on previous days and on the morning of the Bash cleared away and Sydney turned on a beautiful evening, and many partners in attendance enjoyed the view from the decks of *James Craig*, especially the city lights after dark. Drinks (beer, champagne, wine and soft drinks) and finger food (quiches and chicken skewers) were provided. A delicious buffet dinner was served in the 'tween decks, and many tall tales and true were told.

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

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

Formalities were limited to one speech from the Chair of the NSW Section of RINA, Graham Taylor, who welcomed the guests and thanked the industry sponsors.

The lucky-door prize and raffle were drawn by Ms Karen McDowell. The winner of the lucky-door prize was Chris de Jong and scored a $50 gift voucher to the Australian National Maritime Museum's shop. The raffle winners (gift vouchers to the ANMM shop) were:

First	Mary Wilson, Sydney Heritage Fleet — $150
Second	Fraser Johnson (Ocean Linx) — $75
Third	Mark Symes (Australian Maritime College) — $50

Bill Bollard had built a magnificent half-block waterline model of the Australian National Maritime Museum's yacht, *Akarana*, which was built by Robert Logan in New Zealand in 1888 to represent that country in the centennial International Regatta held on Hobson's Bay, Victoria, that year. One hundred years after racing to some celebrated victories in these events, and after a number of configuration changes, the yacht was located in Sydney and restored in New Zealand to become the New Zealand Bicentennial gift to Australia. She has subsequently been restored by the ANMM as closely as possible to the original condition.

Bill Bollard's beautiful model of *Akarana*
(Photo courtesy Bill Bollard)

The model was put up for silent auction. Adrian Broadbent submitted the winning bid and the model was presented to him by Ms Ellie McKillop. Our thanks to Bill for his expertise in building and generosity in donating this model.

Ellie McKillop (R) presenting the model of *Akarana* to Adrian Broadbent (L) with SMIX Committee Chair, Graham Taylor (Photo Chris Hughes)

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

Platinum
- Teekay Shipping
- Wartsila Australia

Gold+
- Svitzer Australasia

Gold
- ABS Pacific
- AMC Search
- Ausbarge Marine Services
- Det Norske Veritas
- Electrotech Australia
- Energy Power Systems (Caterpillar)
- International Paints
- KBR (Kellogg Brown and Root)
- Lloyd's Register Asia
- MTU Detroit Diesel Australia
- PB Towage
- Rolls-Royce Marine Australia
- Thales Australia

Silver
- Ayres Composite Panels
- ASO Marine Consultants
- Burness Corlett Three Quays Australia
- Cummins South Pacific
- CWF Hamilton and Co.
- Germanischer Lloyd AG
- Hanson Construction
- Inco Ships
- Jotun Australia
- MAN Diesel Australia
- ZF Australia

Bronze
- Botany Bay Shipping Group
- Composite Consulting Group (DIAB Australia)
- EMP Composites
- Formation Design Systems (ShipConstructor)
- G. James Extrusion Co.
- One2three Naval Architects
- Shearforce Maritime Services
- Sydney City Marine
- Twin Disc (Pacific)

Our thanks to them for their generosity and support of SMIX Bash 2010, without which it could not happen.

Many thanks also to the organising committee of Graham Taylor (Chair), Bill Bixley, Craig Boulton, Adrian Broadbent, Ben Hercus and Len Michaels, and to Sybil Edwards of the Sydney Heritage Fleet, for their sterling efforts.

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

Application of New Standards to Existing Vessels

Mori Flapan, Principal Technical Adviser to the National Marine Safety Committee, gave a presentation on *What Should be Done with Grandad?: The Application of New Standards to the Existing Fleet* to a joint meeting with the IMarEST attended by 18 on 2 February in the Harricks Auditorium at Engineers Australia, Chatswood.

Presentation

Mori's paper is published elsewhere in this issue of *The ANA*.

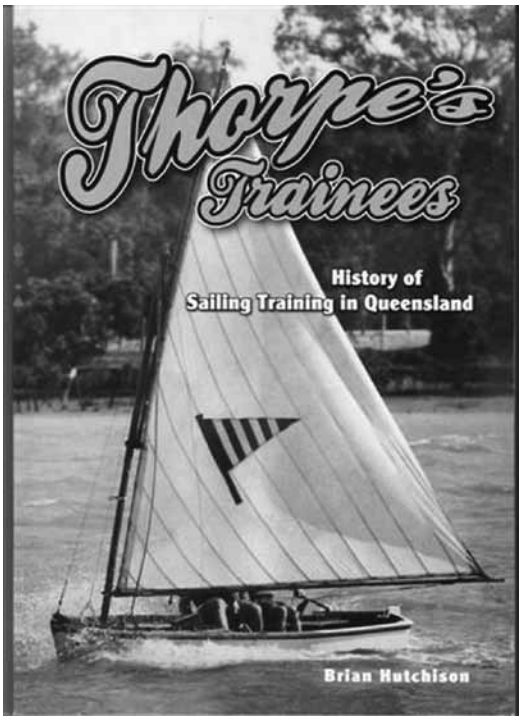
Vote of Thanks

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

Phil Helmore

Queensland

Queensland member Brian Hutchison's new book *Thorpe's Trainees: History of Sailing Training in Queensland* was launched by John Cuneo, Gold Medallist in the International Dragon Class at the Munich Olympic Games, on Sunday 21 November 2010.



The cover of Brian Hutchison's book

More than 350 sailors attended the launch at the Sandgate Yacht Club on the shore of Brisbane's Bramble Bay. Some recalled their sailing days before or during World War II in the Nip Thorpe Trainee leading up to the Thorpe 12 in 1960. Trainees *Eileen Too*, built in 1939, and *Black Swan*, built in 1953, were back in the water demonstrating gaff-rigged sailing on the waters of Cabbage Tree Creek.

*Thorpe's Trainees***,** the product of five years' research**,** traverses the period from the establishment of the Nip Thorpe Trainee Class on the Brisbane River in 1934, its reinvention as the Thorpe 12, its adoption by 26 Clubs at Queensland coastal centres and one in Sydney, to the demise of the Class in the early 1990s. About 900 of these boats were built.

The A4-sized 112-page *Thorpe's Trainees: History of Sailing Training in Queensland* includes specifications, lines plans, a 126 colour photograph chronology, logbook and championship, open and special-event sailing results. It also lists the sailing biographies of more than 350 sailors, including John Cuneo who learned to sail in the class and was its Queensland Champion in 1947–48, other Olympic Gold Medallists, Olympians, and Australian and International Champions in senior classes.

For further information contact Brian Hutchison — phone/fax (07) 3269 4913, email hutchi@bigpond,net.au.

Brian Hutchison

Eileen Too under sail
(Photo courtesy Brian Hutchison)

COMING EVENTS

Australian Division AGM

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

NSW Section AGM

The Annual General Meeting of the NSW Section of RINA will be held on Wednesday 2 March immediately following the scheduled technical meeting of RINA (NSW Section) and IMarEST (Sydney Branch) at 6:00 for 6:30 pm at Engineers Australia, 8 Thomas St, Chatswood; see notice enclosed with this issue for NSW members.

NSW Section Technical Meetings

Technical meetings are generally combined with the Sydney Branch of the IMarEST and held on the first Wednesday of each month at Engineers Australia, 8 Thomas St, Chatswood, starting at 6:00 pm for 6:30 pm and finishing by 8:00 pm. The program of meetings remaining for 2011 (with exceptions noted) is as follows:

2 Mar Tim Holt, Det Norske Veritas
DNV's Quantum *Containership Concept for the Future*
RINA NSW Section AGM

30 Mar NB 30 Mar in lieu of 6 Apr
John Jeremy, Royal Institution of Naval Architects
One hundred Years of Destroyers in the RAN
RINA Australian Division AGM

4 May IMarEST TBA

1 Jun David Firth, SP-High Modulus
Design and Construction of Composite Patrol Boats

6 Jul IMarEST TBA

3 Aug David Lyons, EMP Composites
Delamination Characteristics in Curved Composite Structures

7 Sep IMarEST TBA

5 Oct RINA TBA

1 Dec SMIX Bash 2011

South Australia and Northern Territory

The program for 2011 technical meetings, held jointly with the SA Section of IMarEST, has been scheduled and topics are being planned. The following is the preliminary scheme with confirmed topics and locations to be added to the RINA website and advised via member emails.

16 Feb Adam Brancher, Dept. of Transport, Energy and Infrastructure
Commercial Vessel and Seafarer Regulation in Australia — The Move to a Single National Jurisdiction

16 Mar TBA

13 Apr TBA

18 May TBA

15 Jun Malcolm Morrison, AMC
Claim Argument Evidence Safety Cases for Maritime Industry

17 Aug TBA (tentative site tour)

Sept Andrew Scardino, DSTO
Marine Biofouling — Current Challenges and Potential Solutions

19 Oct TBA

The program will include a mixture of science and engineering topics and, hopefully, a site tour.

Suggestions and volunteers for additional topics would be appreciated, please contact Danielle Hodge at danielle.hodge@defence.gov.au

Second International Conference on IHSMV

The second International Conference on Innovation in High Speed Marine Vessels will be held at the Fremantle Sailing club, 151 Marine Terrace, Fremantle, WA on 2–3 March 2011. The conference is being organised by the RINA in association with Curtin University of Technology and supported by Austal Ships.

Few sectors of the maritime industry have embraced innovation as readily and successfully as the high-speed marine vessels sector, in seeking to extend operating envelopes, reduce downtime and increase reliability, safety and comfort, and reduce costs. Advanced design, the use of new materials and more-efficient production methods—and other means—have been and are being explored to achieve these aims for commercial, military and recreational vessels.

Building on the success of the inaugural 2009 conference, the 2011 International Conference on Innovation in High Speed Marine Vessels will again provide an opportunity for all those involved with this sector of the maritime industry to present and discuss recent and future developments in all these aspects of commercial, military and recreational high-speed vessels.

Technical papers in the program contain new and original ideas, innovative applications and practical achievements in various aspects of high-speed marine vessels, including but not limited to the following topics:

- Design and construction: Including monohulls, multihulls, and special craft such as SWATH and hydrofoils.
- Coatings, materials and manufacturing processes, including nanotechnology.
- Research and development: Including model testing, hydrodynamics and structural response.
- Operations: Including wake and wash implications, propulsion machinery, motion control, seakeeping and human factors.
- Safety, regulation and classification
- Equipment.

The full program of papers may be viewed online at www.rina.org.uk/c2/uploads/hsmv 2011 brochure web.pdf.

Following the end of the conference on day one, delegates are invited to take a tour of the Austal Shipyard. This visit will be followed by an evening dinner, held at the sailing club and also kindly sponsored by Austal.

Further details may be obtained from the conference

website at www.rina.org.uk/highspeedmarinevessels2011. Registration for the conference may also be completed on the website, or with the conference secretariat at RINA by fax to +44-20-7259 5912, email to conference@rina.org.uk.

Maritime Matrix 2011

The Institute of Marine Engineering, Science and Technology (IMarEST), Australia, New Zealand and South Pacific Division (ANZSPAC) and the South East Asia Division (SEAD) will host a conference and exhibition from 23 to 25 August 2011. Maritime Matrix 2011 will be held at the Cairns Convention Centre, Cnr Wharf and Sheridan Sts, Cairns. This conference is a major bi-annual event for IMarEST, attracting more than 350 national and international marine engineers, scientists and technologists from diverse fields. The conference represents a unique opportunity for Australian and South East Asian maritime practitioners to address challenges and opportunities.

The theme will be *Technology's Impact on the Maritime Environment and Future Challenges*. Areas covered will include academia and regulatory, environment, and solutions.

Expressions of interest are now being sought for the following:

- Submission of Technical Papers
- Sponsorship
- Exhibition

For further details, visit the website www.icebergevents.com/IMarEST2011, or contact Greg Bondar on (0411) 854 115 or email execdirector.anzspac@imarest.net.

Basic Dry Dock Training Course

Following on from the success of the courses held in Melbourne in 2008 and Brisbane in 2009, the Royal Institution of Naval Architects has announced its intention to hold the Basic Dry Dock training course again in Australia. However, no dates have yet been arranged.

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

Presented through classroom lectures, student participation in projects and practical application exercises, the course addresses the deck-plate level of practical operation needed by the dock operator and the universally-accepted mathematical calculations required to carry out operations in accordance with established sound engineering practices.

To view details of the last course held at Forgacs Cairncross dockyard, Brisbane, in 2009, visit www.rina.org.uk/basicdrydockaustralia2009.

To register your interest in this event or for more information, visit www.rina.org.uk/drydockaustralia.html or email awilliams@rina.org.uk

Pacific 2012

The Pacific 2012 International Maritime Exposition and Congress will be held at the Sydney Convention and Exhibition Centre, Darling Harbour, Sydney, from Tuesday 31 January to Friday 3 February 2012. It will include:

The International Maritime and Naval Exposition, organised by Maritime Australia Ltd, to be held from Tuesday 31 January to Friday 3 February. Further information on the exposition can be obtained from the exposition website www.pacific2012.com.au/content-exposition or by contacting the exposition organisers, Maritime Australia Ltd, PO Box 4095, Geelong Vic 3220, phone (03) 5282 0500, fax (03) 5282 4455 or email expo@amda.com.au.

The Royal Australian Navy Sea Power Conference 2012, on the theme of *The Naval Contribution to National Security and Prosperity*, organised by the Royal Australian Navy and the Sea Power Centre Australia, to be held from Tuesday 31 January to Thursday 2 February.

The deadline for submission of abstracts for proposed papers, 31 January 2011, has already passed. For any queries on submission of papers, contact the Chair of the SPC Papers Committee, Andrew Forbes, at andrew.forbes1@defence.gov.au.

Further information on the conference can be obtained from the conference website www.seapower2012.com (when it appears) or by contacting the conference organisers, Arinex Pty Ltd, GPO Box 128, Sydney, NSW 2001, phone (02) 9265 0700, fax (02) 9267 5443 or email seapower2012@arinex.com.au.

The International Maritime Conference, organised by the Royal Institution of Naval Architects, the Institute of Marine Engineering, Science and Technology, and Engineers Australia, to be held from Tuesday 31 January to Thursday 2 February.

The call for papers is out, and the timescale is as follows:

Deadline for submission of abstracts	7 July 2011
Authors notified of acceptance	29 July
Deadline for submission of refereed papers	27 September
Deadline for submission of full papers	14 November
Deadline for presenter registration	15 November

For any queries on submission of papers, contact the Chair of the IMC Papers Committee, Adrian Broadbent, at adrian.broadbent@lr.org.

Further information on the conference, including the conference and social programs, can be obtained from the conference website www.pacific2012imc.com (when more information appears) or by contacting the conference organisers, Arinex Pty Ltd GPO Box 128, Sydney, NSW 2001, phone (02) 9265 0700, fax (02) 9267 5443 or email pacific2012imc@arinex.com.au.

CLASSIFICATION SOCIETY NEWS

Free Downloads of LR Rules

Lloyd's Register has now made the following rules available for free download from the web:

- Rules for Special Service Craft (SSC)
- Rules for Ships (including CSR)
- Rules for Naval Ships (NSR)

To obtain a copy of any of these rules, go to www.webstore.lr.org and follow the instructions under "Marine Downloads".

Note that, in order to obtain the rules, you must first register on webstore — this only takes a moment and will ensure that you receive automatic email notification of any updates to the Rules.

New LR Surveyors in Queensland

Lloyd's Register is pleased to welcome Dean Biskupovich and David McDonough to the Australian survey team.

Dean, a Senior Surveyor most recently with LR in Dubai, has joined the Brisbane office, whilst David, already a Cairns local, has recently taken over as Senior Surveyor in Charge of the Cairns office.

LR Training Courses in 2011

Dates in 2011 for LR's two most-popular training course have now been released:

- Hull Inspection — Damage and Repair
  - Melbourne 14–16 February
  - Sydney 15–17 August
- Classification and Statutory Surveys:
  - Sydney 11–13 April
  - Melbourne 26–28 September

Additional dates and venues in Australia may be available on request, as too are courses covering (among others) Naval Classification; Naval Ship Surveys; ISM Code, and Port State Control.

To register interest in any of these, or to find out more about training options, please contact Lloyd's Register's Sydney office by email at sydney@lr.org, or visit the website www.lr.org/sectors/marine/Services/training/Courses/

Chris Hughes

DNV Issues World's First Class Rules for Wind-farm Service Vessels

DNV has developed the world's first class rules for wind-farm service vessels in order to improve safety and promote uniform standards.

The rules were published on 1 January 2011, and DNV has already secured a contract for the first two vessels. The very first vessel built to the new class rules is expected to sail away from South Boats Medina Shipyard on the UK's Isle of Wight in March next year.

Offshore wind turbines arranged in large wind farms are becoming increasingly common worldwide as governments seek to meet their obligation to provide more renewable energy. The construction and maintenance of these wind turbines will require frequent visits by specialist technicians, and high-speed light craft have shown to be effective in transporting personnel.

These vessels, typically less than 24 metres in length and capable of carrying up to 12 technicians, have traditionally been constructed to domestic standards which vary from country to country. This has created difficulties for operators seeking to employ their vessels in different jurisdictions across Europe.

Stakeholders within the offshore wind industry, including the flag states, have thus asked for more transparent and uniform regulation of this segment. Some flag states have also indicated that class will become a mandatory requirement for wind-farm service vessels in the near future.

"There has been strong demand for such class notations in the market," explains Tor Svensen, the President of DNV. "Representatives of the following flag states, the Netherlands, Denmark, Norway, Germany and the UK, have been consulted to ensure safe, uniform and useful notations, and we have managed to meet this demand within a restricted time."

DNV Class for First LNG-fuelled High-speed Light Craft

Incat has secured a contract to build the world's first high-speed passenger ro-ro vessel powered by environmentally-friendly LNG at its yard in Tasmania. The 99 m wave-piercing catamaran is the first LNG-fuelled commercial vessel to be built in Australia. She will carry more than 1000 passengers and 150 cars and be built to DNV class.

This is a significant step forward as the use of natural gas powered vessels must gradually replace vessels with less environmentally-friendly engines. This first LNG powered high-speed light craft is expected to set the scene for the future. The LNG-fuelled high-speed passenger ro-ro is to be built at the Incat Tasmania shipyard at Prince of Wales Bay in Hobart for delivery in 2012.

The vessel will be delivered with DNV notation 1A1 HSLC R4 Car Ferry B Gas Fuelled E0. She will be powered by two aviation-derived GE Energy LM2500 gas turbines which will burn either LNG or marine distillate and each drive a Wartsila LJX 1720 water jet. As part of the new concept, GE has modified the fuel-delivery system to accommodate liquefied natural gas (LNG), which will allow commercial fast ferries to have lower emissions and operating costs.

Combination of Technologies

"Even though this is the first LNG-powered high-speed vessel ever to be built, I don't see anything disturbing about this project," says Incat Chairman, Robert Clifford. "We at Incat have a reputation for being first. What is unusual about this project is the combination of technologies. Each of them has been used before. That goes for turbines and it goes for gas. But, together with partners like GE and DNV, we are using the technologies in a new context.

"Even though this is the first actual contract for a new build, I see more than half-a-dozen vessels in the pipeline globally. I am talking to several shipping companies in Europe. They want to see the LNG supply infrastructure in place before they become really serious. To me this is about the chicken and the egg. Little will happen to the supply of LNG until shipping companies demonstrate willingness to go for LNG-fuelled vessels.

"Government involvement and incentives are expected and needed to get this moving," says Robert Clifford. "Shipping companies are concerned about the environmental impact of their operations, but any new project has to be financially sound as well. This also goes for the HSLC projects I see in the pipeline."

Within DNV, this project will generate substantial work in the US on the gas turbine and LNG fuel side, in Norway for approval, and in Australia for the follow-up with the yard and hull approval.

DNV Hobart Station Manager, Tony Allwood, says this contract is an example of DNV resources and expertise in the US, Norway and Australia working together. "Together with the team at Incat, we are working towards the goal of making this the fastest, most efficient and most environmentally-friendly high-speed ferry in the world," he says.

Rodney Humphrey

Chevron Shipping Relies on GL's Condition-Based Monitoring

At the Fourth Optimising Ship Maintenance Conference held in Rotterdam on 27 January 2010, GL Noble Denton discussed the implementation of a condition-based monitoring (CBM) system for Chevron Shipping Company. Several Chevron vessels successfully used this system on various equipment, including pumps, purifiers and steering gear.

The goal of a CBM system is to increase equipment reliability and streamline maintenance techniques, by providing early warning of developing problems, extending the life of machinery, and decreasing the number of unpredictable breakdowns. Chevron decided to pick GL because of the ability to provide bespoke solutions to specific problems. "The main component of any CBM program is a condition-monitoring strategy which is fit for purpose," explained Paul Shrieve, Vice President, Technical Assurance at GL Noble Denton. "This involves the identification of available fault-sensitive parameters and then monitoring the changes in baseline values to determine the onset of progressive failure modes."

Chevron Shipping Company (CSC) began to look for a new maintenance system when their previous time-based maintenance system—a system which replaced machine parts at predetermined intervals—led to equipment failures, mis-installed parts and generally-diminished program credibility. While this system may work for machines which run infrequently and have low repair costs, it is less beneficial for a company like CSC, which manages 28 owned and operated vessels around the world, transports 365 million barrels of oil per year, and imports more than 600 000 barrels of crude oil per day into the United States.

The system model follows a structured and auditable process for implementation. The CBM program begins with the gradual roll-out of analytical technologies, such as vibration analysis and thermal imaging, in order to detect both patent and latent defects. The next step involves applying the program's five implementation phases—performance review, strategy development, planning, implementation of improvement initiatives, and management and operation—in order to allow clients like CSC to maintain not only machines and equipment, but also satisfy business objectives.

These solutions and systems are easily adaptable in order to react quickly to both anticipated and unanticipated events. "This program is a detailed flexible mechanism developed to capture the requirements of implementing CBM programs on vessels—beginning from initial definition of the process

to continuous periodic assessment of machine condition to ensure operational functionality", explained Mr Shrieve.

GL Container Ship Optimisation Yields Significant Fuel Savings

The lines of a 9000 TEU container ship series were significantly improved in a joint venture of the Chinese design office, Maric, and Germanischer Lloyd's subsidiary, FutureShip. Shipowners Schulte Group (Germany) and Costamare Inc. (Greece) had requested the design review in order to optimise the vessel's efficiency. As a result of the optimisation, a smaller main engine than originally anticipated could be installed. The fuel consumption was reduced by more than 10% and CO_2 emissions were cut by more than 90 t/day.

FutureShip's optimization procedure generated 15 000 different hull designs and evaluated them numerically. The evaluation was based on computational fluid dynamics, where the flow around the ship was simulated in the computer to determine the actually-required propulsion power.

The most-efficient design was compared to the base design in model tests, which were performed in December at the Hamburg Ship Model Basin (HSVA). The optimised model had a significantly-lower total resistance than the base design. For the real ship this corresponds to substantial fuel and cost savings per day. The optimisation expenses are amortised within a few days of operation for the series of six ships.

FutureShip is specialised in developing and fine-tuning ship hullforms. The consulting and engineering company, a subsidiary of Germanischer Lloyd (GL), systematically models, varies and analyses many hundreds or thousands of ship designs in an automated process based on a unique parametric approach. Together with the shipowner's team, key objectives and constraints are identified. FutureShip sets up formal optimisations to explore the design space and to exploit promising options. Finally, FutureShip advises in choosing the best hullform and follows or carries out the associated tank testing. The company offers systematic and formal hydrodynamic optimisation of the hull, systematic and formal hydrodynamic optimisation of appendages, and surface and skin-friction reduction.

The 9000 TEU container ship series will be built in China, and delivery of the first ship is scheduled for 2013.

Mike Mechanicos

FROM THE CROW'S NEST

More World Speed Sailing Records

Following the report of kitesurfer Alexandre Caizergues regaining the outright world speed record under sail at Luderitz in the November 2010 issue of *The ANA*, the record was subsequently raised several times during the 2010 Luderitz Speed Challenge in Namibia.

Each year the Luderitz Speed Challenge attracts the World's top kite and wind surfers for a month-long event. Initially, Alexandre Caizergues regained his record from the French hydrofoil trimaran *l'Hyrdroptère* by achieving an average speed of 54.1 knots (100.19 km/h) over 500 metres on 12 October 2010 with his kite and board.

On 28 October 2010 the wind again blew up to 45 kn and the organisers decided to build a retaining wall at the end of the channel to keep the water in at low tide. This paid huge dividends and many records were smashed.

Final places posted on the Luderitz Speed Challenge website (www.luderitz-speed.com) indicate that the speed was subsequently increased several times over the duration of the challenge:

Rank	Name	Country	Speed (kn)
1	Rob Douglas	USA	55.65
2	Sebastien Cattelan	France	55.49
3	Alex Caizergues	France	54.93
4	Sebastien Salerno	France	54.28

Rob Douglas is therefore the new outright sailing record holder over 500 m, achieving 55.65 kn. These new records are all awaiting ratification by the World Sailing Speed Record Council, with WSSRC observers on site during the runs.

Martin Grimm

THE AUSTRALIAN NAVAL ARCHITECT

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

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

Photographs and figures should be sent as separate files (not embedded) with a minimum resolution of 150 dpi. A resolution of 300 dpi is preferred.

GENERAL NEWS

USN LCS Contract Award Announced

It was announced on 29 December 2010 that the US Navy has awarded Lockheed Martin Corp. and Austal USA each a fixed-price incentive contract for the design and construction of a 10 ship block-buy, for a total of 20 littoral combat ships (LCS) from financial year 2010 through financial year 2015.

The amount awarded to Lockheed Martin Corp. for F/Y 2010 littoral combat ships is $US436 852 639. The amount awarded to Austal USA for the F/Y 2010 littoral combat ships is $US432 069 883.

Both contracts also include long-lead items for nine additional ships, subject to Congressional appropriation of each year's Littoral Combat Ship Program requirements. When all 10 ships of each block buy are awarded, the value of the ship construction portion of the two contracts would be $US3 620 625 192 for Lockheed Martin Corp., and $US3 518 156 851 for Austal USA. The average cost of both variants including government-furnished equipment and margin for potential cost growth across the five-year period is $US440 million per ship. The pricing for these ships falls well below the escalated average Congressional cost cap of $US538 million.

"The awards represent a unique and valuable opportunity to lock in the benefits of competition and provide needed ships to our fleet in a timely and extraordinarily cost effective manner," said Secretary of the Navy, Ray Mabus.

Austal's first LCS — USS *Independence*
(Photo courtesy Austal)

The US Navy regards this award as a unique opportunity to maximise the buying power on the LCS Program by leveraging the highly-effective competition between the bidders. Each contractor's 10-ship bid reflects mature designs, investments made to improve performance, stable production, and continuous labour learning at their respective shipyards. The award was based on limited competition between teams led by Lockheed Martin and Austal USA. Under these contracts, both shipbuilders will also deliver a technical data package as part of the dual award, allowing the government a wide range of viable alternatives for effective future competition.

This approach, which is self-financed within the program by adding a year to the procurement and utilising a portion of the greater than $US2 billion total savings (throughout the Future Years Defense Program), enables the US Navy to efficiently produce these ships at an increased rate and meet operational requirements sooner.

US Chief of Naval Operations Admiral Gary Roughead praised the Navy's plan to add both ship designs to the fleet: "The LCS is uniquely designed to win against 21st century threats in coastal waters posed by increasingly-capable submarines, mines and swarming small craft. Both designs provide the capabilities our Navy needs, and each offers unique features which will provide fleet commanders with a high level of flexibility in employing these ships."

The US Navy remains committed to a 55-ship program to establish and maintain US Navy dominance in the littorals and sea lanes of communication choke points around the world. The LCS Program operational requirements have been virtually unchanged since the program's inception in 2002 and the both hullforms will meet the US Navy's operational warfighting requirements.

New Research Ship for Australia

Australian marine services company Teekay is set to deliver a world-class research ship which will help us better understand our oceans, climate change and weather.

Given the name RV *Investigator* after a national naming competition, the 89 m ship will accommodate 40 scientists and cover 10 000 n miles in each voyage. Scientists from around the world will use the ship to undertake vital marine research which will inform our sustainable ocean management practices.

Celebrating the signing on 17 January 2011 of a contract between Teekay and the Australian Government for the design and construction of *Investigator*, Innovation Minister, Senator Kim Carr, said the commissioning of the ship represents the Government's commitment to provide our scientists with the best kit possible.

"Australia has the world's third-largest ocean territory. It is rich in unique biodiversity and valuable resources, but only 12 per cent of the area is mapped," Senator Carr said.

"The long-range research ability of *Investigator* will allow scientists to understand our entire oceans — from the tropical north to the Antarctic ice-edge.

"I am pleased that Teekay will be delivering the project. They have an impeccable track record in marine services, and I believe they are well placed to deliver this important national research tool."

Teekay Holdings Australia Pty Ltd was selected following a rigorous procurement process undertaken by the CSIRO. During the process, Teekay showed that they could design and build RV *Investigator* while delivering value for money based on their extensive ability.

Investigator will be built in Singapore by Teekay's partners, Sembawang Shipyard Pte Ltd. As a condition of their approved Australian Industry Participation Plan, Teekay will ensure Australian suppliers and expertise are used where possible.

The CSIRO will own and operate *Investigator* on behalf of the Australian research community. The ship is scheduled to begin operating by mid 2013 and will be used by Australian

universities, research organisations and their international collaborators.

Research capabilities planned for the new vessel will include:

- deeper swath-mapping to determine seafloor bathymetry, influences on ocean currents, ecosystem structures and sub-sea resources;
- higher-resolution shallow water mapping for ecosystem structure;
- deeper and more efficient biological sampling through improved winches and the use of fibre-optic cables;
- deploying coring systems at greater lengths and depths allowing scientists to venture further back into the climate record; and
- improved ship-to-shore communication bandwidth that will enable virtual voyages where scientists can participate in a voyage from ashore.

The new vessel will be capable of operating continuously for 55 days at sea, cruising at 12 kn over a range of 10 000 n miles.

She will be engineered to adapt to support a broad range of sophisticated scientific activities by multi-disciplinary teams.

Investigator is expected to accommodate 30 to 45 scientists and support staff and will provide a safe working environment in the world's most challenging oceans, from the Roaring Forties of the Southern Ocean and Antarctica's ice edge, to the cyclones of Australia's tropical north.

Research teams will be able to add purpose-built systems to support their own investigations, such as:

- radiation and trace metal laboratories;
- deep-water dredging, coring and drilling devices;
- fishing nets;
- towed camera systems; and
- remotely-operated vehicles.

Researchers will also be able to integrate vessel-acquired data with data from satellite sensors, autonomous vehicles and shore-based models in real time.

Investigator will replace *Southern Surveyor*, which is operated by Australia's Marine National Facility.

New AWD HQ opened in South Australia

The largest Defence project in South Australia, the construction Australia's three air-warfare destroyers, took another step forward on 20 December 2010 with the official opening of the project's new headquarters.

Minister for Defence Materiel, Jason Clare, was joined by the Premier of South Australia, Mike Rann, to open the Air-warfare Destroyer Systems Centre at Techport Australia — South Australia's world-class naval shipbuilding precinct.

Mr Clare said the construction of the three new air-warfare destroyers was one of the largest naval shipbuilding projects ever undertaken in Australia.

"These will be the most-powerful and advanced warships Australia has ever had. They will be built here in Australia, creating about 3000 jobs," Mr Clare said.

"The opening of the Systems Centre marks an important milestone in the project. It brings together 300 expert naval architects, project managers and combat-systems engineers under one roof to get on with the job of delivering Australia's new warships."

Mr Clare said it was a significant investment in skills and jobs for South Australia.

"The project will see an investment of about $2 billion here in South Australia, and that means jobs," Mr Clare said.

"Today more than 800 people are working on the new destroyers here at the Techport precinct, and that number will reach more than 1000 in 2012.

"There are 130 people working on building the ships at the ASC shipyard, like boilermakers and welders including twenty apprentices.

"We've worked closely with the South Australian Government and I want to thank the Premier for the work he has done to develop this state-of-the-art facility."

Mr Rann said that South Australian companies were already benefiting from the construction of the ships and the new facility.

"This facility delivers on the South Australian Government's vision to make this Australia's premier naval shipbuilding hub," Mr Rann said.

"We're very proud of the facility and of the exciting work South Australian companies are doing here. This facility presents a fantastic opportunity for South Australia to become Australia's premier naval shipbuilding State.

"That means Defence jobs and the flow-on opportunities which come with them. For example, a local South Australian company, Tagara Builders, built the Systems Centre, providing jobs for more than 150 people during construction.

"Our State has developed, and proudly maintains, a reputation for delivering world-class defence projects, and is now home to more than a quarter of the nation's defence industry.

"We are focussed on growing our defence presence, and on building a sustainable defence industry, including delivering the $300 million State-owned, world-class infrastructure here at Techport Australia.

"South Australia's defence sector now employs around 25 000 people directly and indirectly, with the strongest jobs growth taking place in shipbuilding and repair, led by the AWD project."

Mr Clare also announced that the contract to blast and paint Australia's three new destroyers had been awarded to Transfield Services (Australia) Pty Ltd.

"The contract with Transfield Services is worth more than $35 million and will create jobs for more than 60 people over the next six years, Mr Clare said.

"Transfield will do paintwork on the blocks of the ship built by the ASC shipyard, and then will blast and paint the complete ships when they are assembled on the Government of South Australia's Common User Facility."

Parallel Negotiations for Pacific Patrol Boat Support and Third Refit Tender Contract

It was announced on 3 February that the Defence Materiel Organisation (DMO) had commenced parallel negotiations with two tenderers for the refit and support of the Pacific Patrol Boats.

This decision was made following an independent internal review conducted as a result of a tenderer complaint regarding the initial tender process.

This is normal practice in accordance with the Defence Procurement Policy guidelines.

DMO has now agreed, and commenced a parallel negotiation process with Birdon Pty Ltd and DMS Maritime Pty Ltd.

On 1 October 2010, Defence announced that the DMO had selected DMS Maritime Pty Ltd as the preferred tenderer for the provision of the Pacific Patrol Boat Support and Third Refit services.

The tender is for support for 19 Pacific Patrol Boats which were built and given to Pacific Island countries, and are sponsored and funded by the Defence Cooperation Program.

These vessels are used by the Pacific Island countries to patrol their Exclusive Economic Zones, conduct search- and rescue-operations and for disaster relief.

In the interim, the Pacific Patrol Boats remain supported by the current contractor, BAE Systems.

Transition Plan to LHD Service

On 1 February the Minister for Defence, Stephen Smith, and the Minister for Defence Materiel, Jason Clare, announced that HMAS *Manoora* would be decommissioned and that Defence would develop a new comprehensive plan to transition to the new Landing Helicopter Dock (LHD) Ships.

HMAS *Manoora*

HMAS *Manoora* will be decommissioned on the advice of Chief of Navy. *Manoora* was placed on operational pause by the Seaworthiness Board in September last year. An examination of the over-40-year-old ship has revealed that it requires remediation of significant hull corrosion and the replacement of both gear boxes.

This work would cost over $20 million and would take until April 2012 to complete.

Manoora was scheduled to be decommissioned at the end of next year.

"That is not value for money for another nine months of service," Mr Smith and Mr Clare said.

Landing Helicopter Dock (LHD)

HMAS *Manoora* and the Royal Australian Navy's other amphibious support ships (HMAS *Kanimbla* and HMAS *Tobruk*) will be replaced by two Canberra-class LHDs, the largest ships ever operated by the Royal Australian Navy.

The hull of the first LHD, *Canberra*, will be launched in Spain, where it has been constructed by Navantia, on 18 February.

The hull will arrive in Melbourne next year for further work to be completed at the Williamstown Shipyard before *Canberra* becomes operational in 2014. Australia's second LHD, *Adelaide*, will become operational the following year.

The LHDs are bigger than Australia's last aircraft carrier HMAS *Melbourne*. Each is 230 m long and can carry a combined armed battlegroup of more than 1000 personnel, 100 armoured vehicles and 12 helicopters. Each also includes a 40-bed hospital.

"Stepping up to this new capability is going to require a lot of work by the Navy," Mr Smith said.

"It is very different to the ships which we currently operate. One LHD will effectively replace the entire amphibious force we have today. It also has a number of capabilities, such as a floating dock which the Royal Australian Navy does not currently operate. Because of the decommissioning of *Manoora* and the age of our other amphibious ships, I have asked Defence to present a new comprehensive plan for the transition to the new LHDs."

Transition plan

"I have asked Defence to present me with options and recommendations to ensure the smooth transition to the LHDs," Mr Smith said.

This could include the lease or purchase of ships which would provide a platform to train and prepare for the LHDs, such as a Bay-class ship from the UK Government.

If this option is taken up, then it could provide for the decommissioning of HMAS *Kanimbla* or HMAS *Tobruk* to be brought forward.

HMAS *Kanimbla* was also placed on operational pause by the Seaworthiness Board last year. *Kanimbla* is not now expected to be available for operations until mid-2012 and is currently scheduled to be decommissioned at the end of 2014.

HMAS *Tobruk* is currently being maintained at a 48 hours readiness posture in order to meet Australian Defence Force preparedness requirements.

Tobruk will be required to dock this year to replace worn-out propeller shaft bearings. She is due to be decommissioned at the end of 2012.

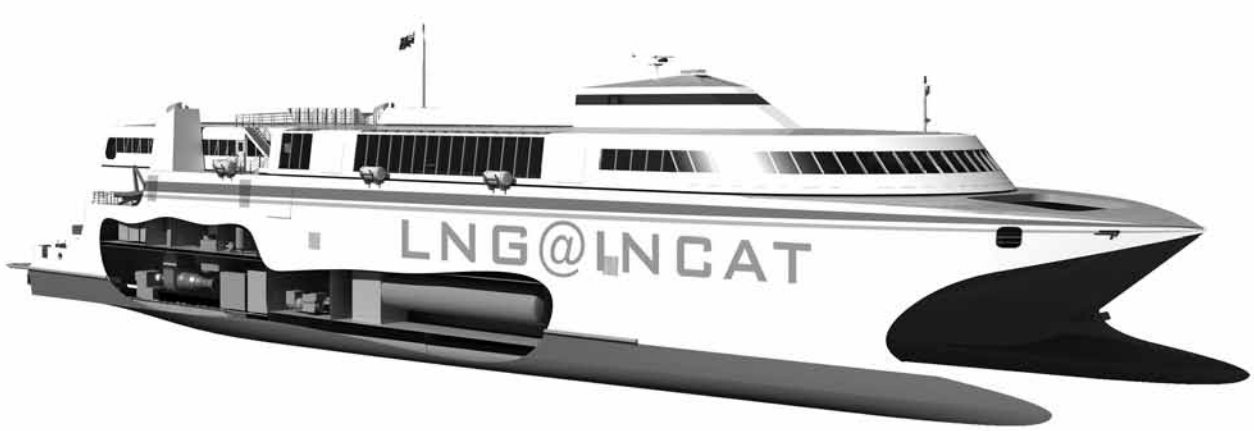
LCM 2000 Watercraft Cancelled

On 1 February Minister for Defence, Stephen Smith, and Minister for Defence Materiel, Jason Clare, announced the cancellation of the LCM2000 Watercraft project.

This project was approved by the previous Government in 1997 and involved the construction of six watercraft for HMA Ships *Kanimbla* and *Manoora*.

The project has suffered a number of problems. Most critically, the dimensions and weight of the watercraft meant that they were unsuitable for launching from these ships and are not fit for alternative Australian Defence Force use.

Accordingly, the project has been cancelled and Defence will now begin plans to dispose of the vessels.



An impression of Incat's LNG-powered catamaran
(Image courtesy Incat)

LNG Power for Incat Ship

Incat has secured a contract to build the world's first high-speed passenger ro-ro ship powered by environmentally-friendly liquified natural gas (LNG).

Incat Chairman, Robert Clifford, said "This is a significant step forward, as the use of natural gas powered ships must replace ships with less environmentally-friendly engines. This first LNG powered fast ship is expected to set the scene for the future".

The 99 m high-speed ferry, with capacity for over 1000 passengers and 153 cars, is being built at the Incat Tasmania shipyard at Prince of Wales Bay in Hobart for delivery in 2012 to a customer who has, for now, requested the commercial arrangements and route remain under wraps.

Incat and Revolution Design engineers are working closely with technical personnel from GE in Europe and the United States to progress this exciting project which will be the first installation of LNG-powered dual-fuel engines in an Incat high-speed ferry, and the first high-speed craft built under the HSC code to be powered by gas turbines using LNG as the primary fuel and marine distillate for standby and ancillary use.

In each catamaran hull a GE Energy LM2500 gas turbine will drive a Wärtsilä LJX 1720 waterjet, a departure from the usual use of two engines and two jets per hull as used in the diesel-powered Incat vessels.

The GE Energy LM2500 gas turbines are to be modified to meet class requirements so that either LNG or marine distillate can be burned. The LM2500 gas turbine is derived from the CF6 family of wide-body aircraft engines. It powers many industrial and electrical-generation applications around the world, using a large variety of gaseous and liquid fuels

Many warships in navies worldwide, as well as commercial ferries and cruise ships use the LM2500 for their marine propulsion needs. While these applications have utilised liquid fuel, GE has now modified the fuel-delivery system to accommodate liquified natural gas. This will allow lower emissions and operating costs for commercial fast ferries.

The fuel tanks for the LNG will be installed in a compartment above the double-bottom marine-distillate tanks. The change-over between the two fuels will be automatically controlled and seamless.

Consortium Mulls Future of Nuclear Powered Commercial Ships

Members of new research consortium, which includes Lloyd's Register, Enterprises Shipping and Trading, Hyperion Power Generation and BMT, to examine the marine applications for small modular reactors (SMRs). A consortium of British, American and Greek interests have agreed to investigate the practical maritime applications for small modular reactors as commercial tanker-owners search for new designs which could deliver safer, cleaner and commercially-viable forms of propulsion for the global fleet.

The Strategic Research Group at Lloyd's Register, Hyperion Power Generation Inc., British designer, BMT Nigel Gee and Greek ship operator, Enterprises Shipping and Trading SA, are to lead the research into nuclear propulsion, which they believe is technically feasible and has the potential to drastically reduce the CO_2 emissions caused by commercial shipping.

"This a very exciting project," said Lloyd's Register CEO, Richard Sadler. "We believe that, as society recognises the limited choices available in the low-carbon, oil-scarce economy -- and as land-based nuclear plants become common place -- we will see nuclear ships on specific trade routes sooner than many people currently anticipate."

The agreement for the joint industry project was signed today at the offices of Enterprises Shipping and Trading in Athens, Greece.

Enterprises' Victor Restis said: "Despite the fact that shipping contributes much less to the world's atmospheric pollution than other shore-based industries, we believe that no effort is too great when it comes to safeguarding a better world for future generations. We are extremely honoured and proud to be part of this consortium at this historic event, as we strongly believe that alternative power generation is the answer for shipping transportation."

The consortium believes that SMRs, with a thermal power output of more than 68 MW, have the potential to be used as a plug-in nuclear 'battery'.

The research is intended to produce a concept tanker design based on conventional and 'modular' concepts. Special attention will be paid to analysis of the vessel's lifecycle cost as well as to hullform designs and structural layout, including grounding and collision protection.

"We are enthusiastic about participating in the historic opportunity presented by this truly groundbreaking consortium," said John 'Grizz' Deal, the CEO of Hyperion Power. "In addition to fitting the basic requirements as the model for studying the application of SMRs in commercial naval propulsion, the Hyperion Power Module (HPM) can also help to set new nuclear maritime standards. The HPM's design includes a non-pressurised vessel, and non-reactive coolant. These features, among others in the HPM, should encourage the industry to strive for even higher levels of inherent safety in their models."

International shipping has been identified as a significant global contributor to greenhouse gas emissions, and it is under mounting pressure to contribute to overall emission reductions. There is an ongoing debate about how much the sector will be able to reduce those emissions, while continuing to support the forecast expansion in world trade which it enables.

"Nuclear propulsion offers the opportunity for an emissions-free alternative to fossil fuel, whist delivering ancillary benefits and security to the maritime industry," said Dr Phil Thompson, Sector Director—Transport, for the BMT Group. "We look forward to using our wide range of maritime skills and expertise to identify the through-life implications, risks and potential for developing and using SMRs in the civilian maritime environment and to provide a framework for its safe and reliable introduction and utilisation."

Austal Launches Largest Catamaran

The final stages of construction of Austal's largest catamaran to date were celebrated in January with a traditional 'coin ceremony', followed by the vessel's successful launch.

Placing a coin at the foot of the mast of a newly-constructed ship is an ancient maritime tradition which is believed to bring good luck to the vessel and its crew.

Senior Captain Soren Schow travelled from Denmark with a coin from the year 1660. This coin holds significance as it is from the same era as the ship's namesake, Danish historical icon, Leonora Christina.

An Australian two dollar coin was placed alongside the Danish two penny coin in a small box which was fixed below the foot of the mast.

Erecting the superstructure of *Leonora Christina*
(Photo courtesy Austal)

Leonora Christina will join the 86 m Austal-built catamaran, *Villum Clausen*, which has been operating the route between Rønne on the Danish island of Bornholm and Ystad in south-east Sweden for over ten years.

"We look forward to welcoming Bornholmer Faergen's newest ferry, *Leonora Christina,* to Denmark and are confident that this ship will exceed expectations," said Senior Captain Schow.

The vessel is owned by Danish company Faergen (formerly Nordic Ferry Services), and will be operated by Bornholmer Faergen, a subsidiary of Faergen. Bornholmer Faergen currently operates a fleet of three ships (one of which is *Villum Clausen*), and has been transporting passengers to the Danish island of Bornholm since 1866.

Austal Chief Operating Officer, Andrew Bellamy, commented that Austal greatly values its customer relationships, and is proud to continue its relationship with the Danish company.

"Austal has worked closely with Faergen and Bornholmer Faergen throughout the design and construction of *Leonora Christina*, and is honoured to be part of this ancient maritime tradition, celebrating the final stages of construction of the vehicle-passenger ferry," said Mr Bellamy.

The 113 m ferry was designed and built in Austal's Western Australian shipyard, and, once completed, will be able to hold up to 1400 passengers and 357 cars, and travel at speeds of up to 40 knots.

Leonora Christina ready for launching
(Photo courtesy Austal)

Austal was awarded the contract in April 2009 following a competitive international tender process which saw Austal utilise its in-house design team and experience to develop a highly-customised vessel design which met all Faergen's requirements for the route.

The vessel has been built in accordance with the requirements and under the survey of Det Norske Veritas, conforming to the International Maritime Organisation's HSC Code and Danish regulations. Registration will be under the Denmark Flag.

With Danish environmental regulations for fast ferries among some of the most stringent in the world, Austal's design is required to comply with legislation covering environmental noise, wave-wash and exhaust emissions.

The vessel is on track to commence sea trials in March, with delivery scheduled to take place in May 2011.

Principal Particulars

Dimensions	
Length OA	112.6 m
Length WL	101.3 m
Beam moulded	26.20 m
Depth	8.50 m
Capacity	
Passengers	1400
Crew	30 – 35
Vehicles	357 cars
Maximum deadweight	1000 t
Fuel	160 000 L
Propulsion and Performance	
Main engines	4 × MAN 20V28/33D each 9100 kW
Speed	Up to 40 knots
Classification	DNV ✠1A1 HSLC R2 Passenger Car Ferry A

One2three Designs on Manly Route

In 2009 the NSW Government announced that they were withdrawing the 35 m NQEA-built JetCats from the Manly route, citing financial and technical challenges which made the fast-ferry service unviable. An interim ferry-service tender ensued which was won by the Ford family operation, Manly Fast Ferries.

Thus commenced the introduction of a privately-owned and -operated service utilising two 30 m One2three-designed catamarans. *Ocean Dreaming II* and *Sun Cat* were operated on the busy Circular Quay–Manly route in the morning and evening commuter peaks, with *Ocean Dreaming II* operating whale-watching cruises outside Sydney Harbour in the middle of the day. Together the two vessels were operating 15 loaded services per day, carrying in excess of 3000 commuters daily. The introduction of new, fuel-efficient and reliable ferries on the route was warmly received by the Manly commuters who have shown a significant level of political activism in relation to the Circular Quay service.

The success of the privately-operated Manly Fast Ferry service and the overwhelming support of the travelling public for the fast service resulted in the NSW Government announcing a tender for a five-year operation on the route. The second five-year tender to operate the commuter service was won by a local consortium, Sydney Fast Ferries, which also included Townsville-based Sunferries.

Fantome Cat from One2three

Sunferries have recently taken delivery of their fourth One2three-designed 30 m catamaran, *Fantome Cat*, built by Aluminium Boats Australia in Brisbane, for use on the longer 40 n mile Palm Island route and alongside their existing One2three-designed Magnetic Island ferries. On award of the Manly tender, the One2three-designed/ABA-built *Palm Cat* and the One2three-designed/BSC-built *Maggie Cat* were redeployed to Sydney where they have been operating the morning and evening commuter service.

After 12 months of tracking fuel usage of the new vessels on the Magnetic Island routes, Terry Dodd, Managing Director of Sunferries, reported that *Maggie Cat* and *Palm Cat*, in addition to reducing travel time from 25 to 18 min, have produced significant fuel savings over their existing fleet of vessels, thus making this class of boat ideal for use on the highly-competitive Manly route.

Fantome Cat
(Photo courtesy One2three Naval Architects)

Manly fast ferries *Ocean Dreaming II* and *Sun Cat*
(Photo courtesy One2three Naval Architects)

Whilst the existing Sunferries 30 m hull was suitable, One2three have optimised the hull to suit the additional deck cargo and increased route length. The new vessel has a modified hull shape to suit the offshore nature of the route, and is slightly longer in order to deliver the highest fuel savings possible. It has also been fitted with a Humphree interceptor ride-control system to provide a greater level of ride comfort.

Principal particulars of *Fantome Cat* are

Length OA	30.0 m
Length WL	29.0 m
Beam moulded	8.0 m
Passengers	
Total seats	222
Total certified	300
Fuel oil	2×2500 L
Fresh water	1×1200 L
Sullage	1×1200 L
Main engines	2×Cat C32
	each 820 kW at 2100 rpm
Service speed	28 kn @ full load 85% MCR

Sandfly 1 from One2three for Bay Island Transit System

Aluminium Boats Australia has recently launched their third 24 m One2three-designed low-wash commuter ferry for operations in Brisbane. *Sandfly 1* joins her sister vessels *Kurrowera 1* and *A.L. Robb*. The boats are required to exhibit an extremely low-wash profile at service speeds up to 24 kn.

The boats operate daily in environmentally-sensitive areas, including operations in the vicinity of marine mammals, primarily dugong feeding grounds. Accordingly, the boats are waterjet powered to remove any possibility of open-water propellers damaging marine life. In addition, after a series of tank tests, the bows have been custom-designed to include a shallow forefoot with a blunt, rounded entry to minimise the possibility of injury to dugongs at or close to the water surface. Fernstrum grid coolers permit operation in shallow, sandy waters, and are recessed into the hull sides to remove any protrusions from the hull which may also result in injury to marine life.

Sandfly 1
(Photo courtesy One2three Naval Architects)

The new vessel, christened *Sandfly 1,* is powered by two Scania DI 1259M engines producing 331 kW each, driving a pair of Hamilton HJ403 waterjets with inlet grids.

The vessel's configuration allows for 200 passengers, of which 150 can be seated. The new vessels form the main transportation system to and from the island communities in Moreton Bay and, as such, are required to carry all sorts of luggage and cargo, ranging from lawn mowers to shopping trolleys to the odd goat and other family pets. Extensive luggage racks and storage areas are provided both internally in the cabin and externally on the foredeck.

A lightweight and durable fitout was selected to handle the rigours of the service, and the vessel's superstructure is fabricated from composite cored structure utilising resin-infusion to One2three's design, fixed to the alloy hulls and cross structure.

18 m Patrol Catamarans from One2three

Last year, three 23 m One2three-designed patrol catamarans were delivered to the Queensland Police Service following construction by Austal Ships in Tasmania. The three vessels form the Class 1 Fleet for the QPS, and are stationed at Yeppoon, Cairns and Brisbane.

Based on the operational success of the three lead vessels and the extended operational capabilities which their new vessels have provided, the Queensland Police Service has commissioned the design of a smaller 18 m sistership version for operation in the Whitsundays area.The vessels are similarly configured, with four two-berth cabins in the hulls and can accommodate up to 24 personnel on shorter-

18 m patrol catamarans for Queensland Police Service
(Photo courtesy One2three Naval Architects)

duration voyages. Each vessel is equipped with a fresh-water maker, a sewage treatment plant and WC and shower facilities on each deck.

The catamarans are similarly fitted with two MTU Series 60 diesels rated at 499 kW each, giving the vessels a cruising speed of 20 kn at approximately 80% power with a 700 n mile range. Sprint speed is in excess of 26 kn.

A feature of the vessel is the ability to launch and retrieve a 6 m RHIB at speed under a range of sea conditions, and which is housed on the aft deck between the hulls. See the video at www.one2three.com.au/c23-video.htm

Carrie from One2three

Aluminium Boats Australia has delivered a One2three-designed 17 m catamaran to Papua New Guinea for the Ramu Nico Nickel mine operations.

Carrie is configured for 52 passengers and 2 crew, and has been designed to patrol notation to provide a robust platform given the remoteness of the operation.

Cat C18 engines were selected, on a continuous A rating for longevity. In addition, the propellers were specified under-pitched to ensure that no more than 95% power could be drawn when running.

Principal particulars of *Carrie* are

Length OA	20.1 m
Length WL	18.4 m
Beam moulded	6.4 m
Passengers	
Total seats	52
Total certified	54
Fuel oil	2×3400 L
Fresh water	1×500 L
Sullage	1×500 L
Main engines	2×Cat C18 each 500 kW at 2100 rpm
Service speed	25 kn @ full load 95% MCR

Carrie
(Photo courtesy One2three Naval Architects)

Sea Lift 3 Jack-up Barge from One2three

Australian Barge Hire contracted One2three Naval Architects to convert a series of under-utilised surplus barge modules into an 18 m×13 m jack-up barge. Conversion works included installation of four jacking collars, moon pools, a deck-mounted crane and a connecting system to bind the modules together and make de-mounting for transport quick and easy.

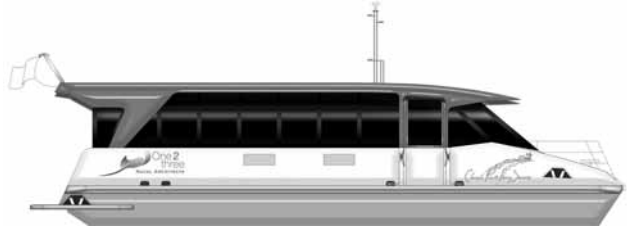
The final configuration involves seven individual barges and four spud legs, all of which can be disassembled for road transportation via conventional prime-mover/trailer. The spuds themselves are formed from 18 m and 12 m sections, to provide for a total jacking length of 30 m. The stability achieved with the seven modules enables the barge to be towed with the legs extending 26 m above the deck.

The jacking towers were designed by One2three and include hydraulic interlocks to prevent inadvertent release. A number of load cases were used in the analysis, including the weight of the barge and 30 t of deck cargo supported on two spud legs. Interestingly, the worst load case is when the spuds become 'stuck' in the mud, as the jacking towers have the capability to jack the barge completely under water. High-pressure water injection is provided inside each spud leg to assist in breaking free in these cases.

Sea Lift 3 jack-up barge
(Photo courtesy One2three Naval Architects)

12 m Catamaran from One2three for Church Point Ferry Services

One2three have custom-designed a new 12 m catamaran vessel for the iconic Church Point Ferry Services on Sydney's picturesque Pittwater. The new vessel, currently under construction at Aluminium Boats Australia, will replace their ageing fleet to service the communities on Church Point, Scotland Island and the western foreshores. The service is the only commercial means of transport off the island, which has grown from a community largely based on holiday shacks to a large cross-section of dwellings, ranging from luxurious residences to small artists retreats.



12 m ferry for Church point Ferry Services
(Image courtesy One2three Naval Architects)

Boarding doors are incorporated in the cabin side behind the helm station to enable operation by a single crew, and embarkation from the existing floating pontoons and wharves on the route.

Powered by twin John Deere 63 kW engines, the vessel will achieve a loaded speed of 10 kn.

Principal particulars of the new vessel are

Length OA	12.0 m
Beam moulded	5.5 m
Passengers	80
Fuel oil	2000 L

Fresh water	500 L
Sullage	300 L
Main engines	2×John Deere each 635 kW @ 3500 rpm
Service speed	10 kn fully loaded

12 m Catamaran Workboats from One2three

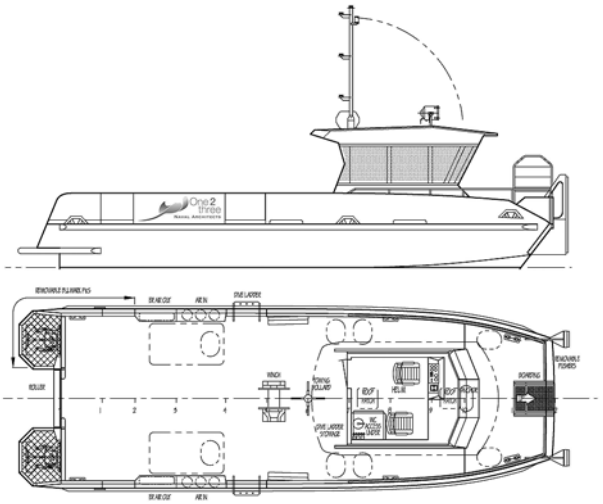
One2three Naval Architects have custom-designed a fleet of new 12 m catamaran multi-purpose workboats for use in servicing the offshore supply and maintenance industry. The new vessels, currently under construction for an unnamed operator, will complement their existing fleet to service the significant projects currently underway in coastal areas around Australia in the offshore oil and gas industry.

The vessels feature a large open aft deck, towing winch with stern roller, removable bow fenders for pushing and safe transfer of crew, and waterjet propulsion for shallow-water operation.

Boarding doors and dive ladders are incorporated into the vessel's side to support dive operations and making the boat a true multi-purpose high-speed support vessel.

Principal particulars of the new vessels are

Length OA		12.0 m
Beam moulded		4.5 m
Deck load capacity		5 t
Fuel oil		2000 L
Fresh water		500 L
Sullage		300 L
Main engines		2×Yanmar each 213 kW @ 3500 rpm
Waterjets		Hamilton
Speed	cruising	32 kn light load
	service	25 kn loaded



General arrangement of 12 m catamaran workboats
(Drawing courtesy One2three Naval Architects)

16 m Harbour-cleaning Catamaran Work Boat from One2three

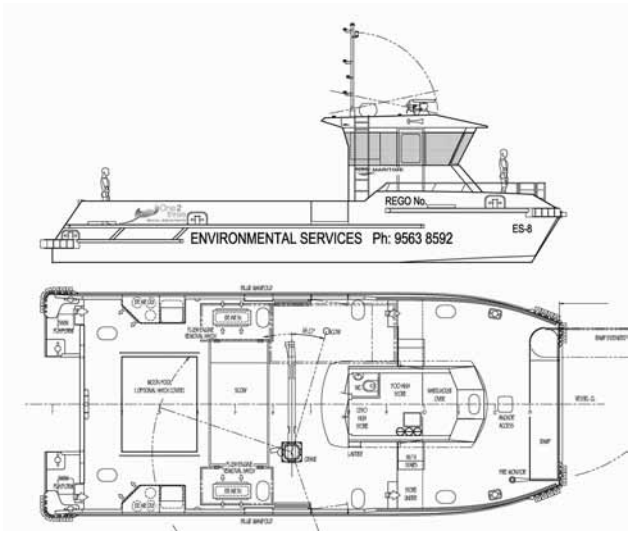
Q-West New Zealand recently won the tender to deliver a 16 m workboat to the NSW Maritime Authority. Designed by One2three Naval Architects, the vessel is to be deployed primarily on Sydney Harbour for cleaning operations.

Following on from the 12 m Bill Bollard-designed *ES-7*, the 16 m catamaran *ES-8* is due for delivery in June 2011 and is configured for a range of workboat duties with a large aft working deck and crane. However, her primary usage is as a cleaning vessel, and she is equipped with a waterjet spray system to draw rubbish between the hulls and place it in a submersible cage which is retrieved via a large moon pool and emptied into a scow located on main deck.

A bow ramp permits rubbish collection via powered wheelbarrows from harbour beaches and foreshores. *ES-8* is surveyed for offshore service to enable re-deployment to Newcastle or Botany Bay as required.

Principal particulars of *ES-8* are

Length OA		16.3 m
Beam moulded		7.0 m
Deadweight		11.6 t
Fuel oil		1000 L
Fresh water		400 L
Sullage		400 L
Main engines		2×Cat C12 339 kW @ 2100 rpm
Speed	cruising	18 kn light load
	service	15 kn loaded



General arrangement of 12 m harbour-cleaning catamaran workboat *ES-8*
(Drawing courtesy One2three Naval Architects)

12 m harbour-cleaning catamaran workboat *ES-8* under construction
(Photo courtesy One2three Naval Architects)

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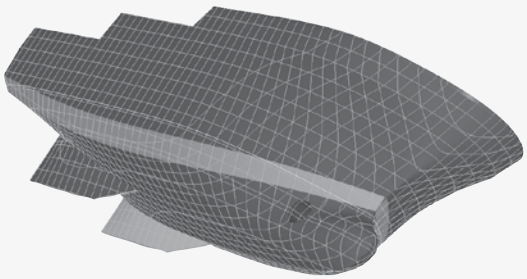

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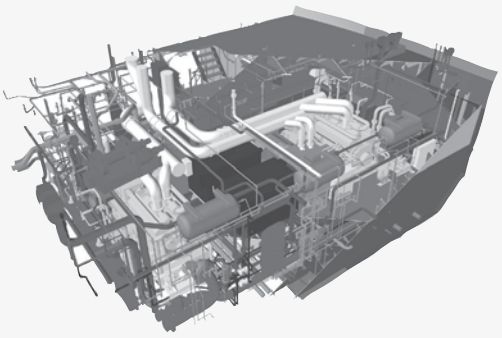

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Four Catamaran Ferries from Grahame Parker Design

Grahame Parker Design has designed four catamaran ferries which were built in Zhuhai, China, for operation in Honk Kong. The last of these was also fitted with sails and solar panels.

Grahame Parker

Port bow of solar-powered catamaran ferry for Hong Kong
(Photo courtesy Grahame Parker Design)

Port side of solar-powered catamaran ferry for Hong Kong
(Photo courtesy Grahame Parker Design)

19.9 m Catamaran from Kamira Launched

After sitting on the hard for more than one year after completion, The 19.9 m catamaran designed by Kamira holdings and built by Marlin Marine in Malaysia was finally launched in January 2011. This vessel was described in the February 2009 issue of *The ANA*.

Originally destined for a re-developed resort on Sibu Island on the East Coast of Johor, Malaysia, the ferry became "excess to requirements" after the resort failed to reach expected occupancy. She was finally sold by the original owner to an Indonesian company and will be used in the oil industry as a ferry between islands. The existing Daewoo main engines were removed prior to launch and will be replaced with MAN engines (similar size and design pedigree). The vessel was towed to Singapore after launch for modifications.

Port quarter of 19.9 m catamaran built by Marlin Marine
(Photo courtesy Greg Cox)

16 m Cargo Boat *Sri Perkasa* from Kamira

Marlin Marine's first aluminium cargo boat, designed by Kamira holdings, was launched in November 2010 and will operate around PTP (Tanjung Pelepas Port) in southern Johor, Malaysia. The design resembles a crayboat hull with sufficient cabin space to seat 12 passengers. The aft deck is reinforced to carry up to 10 t of deck cargo and has both an open aft bulwark and a diving platform.

Principal particulars of *Sri Perkasa* are

Length OA	16.00 m
Length WL	15.30 m
Beam OA	4.50 m
Draft (full load)	1.40 m
Displacement light	12 t
Passengers	12
Crew	2
Deadweight (max.)	10 t
Fuel oil	2800 L
Fresh water	500 L
Main engines	2×Volvo D7C-TA each 195 kW at 2300 rpm
Gearboxes	2×ZF 280-A reduction ratio 2.44:1
Speed	20 kn without cargo
Capacity	2 crew and 12 passengers

Greg Cox

Sri Perkasa built by Marlin Marine
(Photo courtesy Greg Cox)

24 m Research Vessel from Incat Crowther

Incat Crowther has announced the design of a 24 m catamaran scientific research vessel which marks the start of a new relationship between Incat Crowther and growing Estonian boatbuilder, Baltic Workboats. The vessel will be operated by Lithuania's Ministry of Environment in the near-shore areas of the Baltic Sea. Developed to meet comprehensive design guidelines, the vessel is practical, efficient and rugged.

The aft deck features lower platform access, hydraulic A-frame, 5.7 t-m Guerra deck crane and moon pool.

The main-deck cabin features two work spaces; to port is a hydrological laboratory with three workstations and bathroom and, to starboard, a chemical-biological laboratory with sinks, four workstations and an 8 m^2 storage room. At the forward end of the cabin is a crew mess and galley, as well as laundry facilities.

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

To address the vessel's diverse operation, oversized wireway paths have been provided. This allows for easy installation and reconfiguration of seismic survey and data-acquisition equipment.

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

The vessel will be powered by a pair of Volvo Penta D9 main engines, each producing 425 kW at 2200 rpm. The engines drive through a pair of ZF 325-1 reversing reduction gears to five-bladed fixed-pitch propellers, giving a service speed of 12 kn, and a top speed of 14 kn. At a cruising speed of 10 kn, the vessel will provide an economical fuel consumption of just 3.75 L/n mile, providing a range of over 1000 n miles.

Incat Crowther is proud to have secured this project and looks forward to designing further vessels for Baltic Workboats. The project again demonstrates Incat Crowther's service to clients—new and existing—and their ability to develop designs which meet detailed requirements.

Length OA		23.9 m
Length WL		23.3 m
Beam OA		8.0 m
Depth		3.4 m
Draft	hull	1.1 m
	propeller	1.5 m
Crew		4
Special personnel		6
Fuel oil		9000 L
Fresh water		1500 L
Sullage		1500 L
Main Engines		2×Volvo Penta D9I each 425 kW @ 2200 rpm
Gearboxes		ZF 325-1
Propulsion		2×propellers
Generators		2×Cummins Onan 50MDDCG each 50 kW
Bow thrusters		2×Side Power SP550, 33 kW
Speed	service	12 kn
	max.	14 kn
Construction		Marine-grade aluminium
Class/Survey		DNV ✠1A1 LC R3 Cargo
Flag		Lithuania

24 m catamaran scientific research vessel
(Image courtesy Incat Crowther)

24 m Catamaran Ferry from Incat Crowther

Incat Crowther has been awarded a contract to design a 24 m catamaran ferry for Real Journeys, for operation in the wilderness areas of New Zealand's South Island. The vessel will be the fourth Incat Crowther vessel for the operator, following the success of *Fiordland Flyer*, *Patea Explorer* and *Luminosa*. The vessel will be built by Q-west Boatbuilders in Wanganui, New Zealand.

The vessel is being designed with three main objectives. The first is to allow passengers to have a greater experience of the outside environment. Incat Crowther has implemented design features such as low window sills, large forward windows and a polycarbonate roof on the upper exterior deck. All windows are double glazed to minimise fogging, whilst the main-deck windows also feature gutters above to keep them clear of rainwater.

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

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

The vessel will be fitted with a pair of MTU 12V 2000 main engines, each producing 787 kW. The vessel will have a service speed of 25 kn, and a top speed of 30 kn. The main engines are removable via soft patches in both the main and upper decks.

Incat Crowther is proud of its partnership with Real Journeys. Incat Crowther will continue to offer this service, and hopes for the association to continue well into the future.

Principal particulars of the new vessel are

Length OA		24.0 m
Length WL		22.0 m
Beam OA		7.5 m
Depth		2.4 m
Draft	hull	1.0 m
	propeller	1.8 m
Passengers		146
Crew		3
Fuel oil		6000 L
Sullage		1500 L
Main Engines		2×MTU 12V 2000 each 787kW@ 2100 rpm
Propulsion		2×Fixed-pitch propellers
Generators		1×Caterpillar C4.4, 51 ekW 1×Caterpillar C4.4, 38 ekW
Speed	service	25 kn
	max.	30 kn
Construction		Marine-grade aluminium
Class/survey		New Zealand MSA Part 40A
Flag		New Zealand

24 m catamaran ferry for Real Journeys
(Image courtesy Incat Crowther)

Yankee Freedom III from Incat Crowther

Incat Crowther has announced a contract to design a 34 m catamaran ferry for operation in Florida, USA. The vessel will be built by Gladding-Hearn for Yankee Fleet. To be named *Yankee Freedom III*, the vessel will replace *Yankee Freedom II*, designed and built by the same partnership in 1999. She will operate on the company's daily run from Key West to Dry Tortugas National Park and Fort Jefferson.

Whilst Incat Crowther has expanded into new marine sectors of late, this project demonstrates Incat Crowther's commitment to servicing its long-term clients in North America. It also shows a welcome return to activity in the North American passenger ferry market, which has been subdued of late due to the economic downturn. *Yankee Freedom III* will be the 37th ferry built by Gladding-Hearn to Incat Crowther's designs.

The vessel will feature an isolated superstructure, reducing the transmission of noise and vibration to the passenger spaces, as well as offering construction efficiency.

The fully-ADA-compliant main deck features 142 seats and four wheelchair spaces, all with tables. There is a large bar and shop aft, with an additional serving counter. Aft of the bar are four toilets, one of which is wheelchair accessible. There are some exterior seats on the aft main deck, allowing passengers to enjoy the sunset on return journeys. The main-deck cabin features forward doors with direct access to the foredeck, which is optimised for aquatic wildlife viewing. The upper deck features 52 exterior seats. Inside there are 56 seats, some with tables, and a small additional bar.

Yankee Freedom III will be powered by a pair of Caterpillar 3512C engines, which are Tier 2 emissions compliant. These engines each produce 1230 kW at 1800 rpm. The vessel will have a service speed of 28 knots.

Principal particulars of *Yankee Freedom III* are

Length WL		32.5 m
Beam OA		9.1 m
Depth		3.6 m
Draft	hull	1.6 m
	propeller	2.0 m
Passengers		250
Crew		5
Fuel oil		7570 L
Fresh water		1515 L
Grey water		1515 L
Sullage		3030 L
Main engines		2×Caterpillar 3512C EPA Tier 2 each 1230 kW @ 1800 rpm
Propulsion		2×fixed-pitch propellers
Generators		2×Caterpillar C4.4 58 kW EPA Tier 2
Speed	service	28 kn
	maximum	30 kn
Construction		Marine-grade aluminium
Class/survey		USCG Subchapter K
Flag		USA

34 m catamaran ferry *Yankee Freedom III* for Yankee Fleet
(Image courtesy Incat Crowther)

Straight Shooter from Incat Crowther

The 28 m utility catamaran, *Straight Shooter*, has recently been launched by Richardson Devine Marine Constructions in Tasmania. Built for Carpentaria Contracting, *Strait Shooter* is an evolution of *Limitless*, launched in 2009, which has been a great success for her operator. *Strait Shooter* builds on the design features of *Limitless*, and adds some more features specifically developed for Carpentaria Contracting.

The greatest change has been to implement a large propeller tunnel to reduce the draft of the vessel. Aggressive propeller tunnels can be hugely detrimental if executed poorly; however, Incat Crowther's team of naval architects has developed a propeller-tunnel shape which significantly reduced the draft of the vessel without effecting its speed or efficiency.

Stairs have been added at the forward end of the upper deck, allowing quick and safe access from the wheelhouse to the foredeck for mooring activities.

Fendering has been increased, with tyres forward as well as extended diagonal rubber fenders on the hull. An extra run of rubber fendering has been added to the aft end of the upper deck to give it extra protection when loading items onto the cargo deck.

The upper deck aft has been extended aft and integrated with the air trunks under, providing control areas for the vessel and crane, each with an excellent view over the cargo deck.

A large stern roller has been fitted to the transom, whilst structure and rails have also been added for a movable aft lifting platform.

As with *Limitless*, *Strait Shooter* is fitted with a pair of Caterpillar C32 ACERT main engines, and achieved a speed of over 30 kn on recent performance trials.

Principal particulars of *Straight Shooter* are

Length OA	28.0 m
Length WL	27.5 m
Beam OA	8.5 m
Depth	3.45 m
Passengers	50
Work deck area	80 m^2
Work deck cargo	20 t
Max. deadweight	50 t
Deck crane	Heila HLM 20-4S 20 t/m
Fuel oil	30 000 L
Fresh water	1500 L
Sullage	1500 L
Main engines	2×Caterpillar C32 ACERT each 1081 kW @ 2300 rpm
Gearboxes	2×Twin Disc MGX6599SC
Propulsion	2×5-bladed propellers
Generators	2×CAT C404 each 86kW 50 Hz
Speed maximum	30 kn
service	27 kn
Bollard pull (static)	15 t
Construction	Marine-grade aluminium
Class/Survey	USL Code/NSCV 2A (12 pax) and 1B (50 pax)
Flag	Australia

Straight Shooter on trials
(Photo courtesy Richardson Devine Marine Constructions)

Port bow of *Straight Shooter*
(Photo courtesy Richardson Devine Marine Constructions)

Port Quarter of *Straight Shooter*
(Photo courtesy Richardson Devine Marine Constructions)

35 m Catamaran Ferries from Incat Crowther

Incat Crowther has recently won two separate multi-vessel design contracts with AFAI Shipyard in China.

The first of these projects is a design contract for two 35 m catamaran ferries for Zhuhai High Speed Ferry Co. The contract for these ferries was a competitive tender which placed great emphasis on performance and technical quality. Incat Crowther is proud of being able to assist AFAI to win the two-vessel contract with world-leading catamaran technology developed from a foundation of robust proven designs.

35 m catamaran ferries for Zhuhai High Speed Ferry Co. in China
(Image courtesy Incat Crowther)

The vessels will accommodate 198 passengers, all on the main deck. A large bar is situated amidships, and there are two VIP rooms. Crew accommodation, pantry and electrical rooms are located aft on the main deck.

The vessels will be powered by a pair of MTU 16V2000 M70 main engines.

Principal particulars of the new vessels are

Length OA	34.9 m
Length WL	33.0 m
Beam OA	9.0 m
Depth	3.5 m
Passengers	198
Crew	9
Fuel oil	5000 L
Fresh water	1000 L
Sullage	1000 L
Main engines	2×MTU 16V 2000 M70 each 1050 kW @ 2100 rpm
Gearboxes	2×ZF 4650
Propulsion	2×fixed-pitch copper-alloy propellers
Generators	2×Cummins Genset CCFJ-75JYA each 75 kW 50 Hz
Speed (service)	27 kn
Construction	Marine-grade aluminium
Class/Survey	CCS ✠ CSAD Catamaran HSC Passenger A Coastal Service Restriction
Flag	China MSA

34 m Catamaran Ferries from Incat Crowther

The second design project for AFAI Shipyard is for two 34 m catamaran ferries for Shenzen Xunlong Passenger Ferries.

These vessels will carry 188 passengers. They will feature 152 economy class seats on the main deck with a kiosk forward. The spacious upper deck will have 20 seats located at tables, a 10-passenger lounge and a 6-passenger VIP lounge.

As with the 35 m ferries, these vessels will be powered by a pair of MTU 16V2000 M70 main engines. The vessels will be fitted with a pair of MJP 550DD water jets.

34 m catamaran ferries for Shenzen Xunlong Passenger Ferries in China
(Image courtesy Incat Crowther)

Principal particulars of the new vessels are

Length OA	34.0 m
Length WL	30.9 m
Beam OA	8.5 m
Depth	3.05 m
Passengers	188
Crew	8
Fuel oil	6000 L
Fresh water	1000 L
Sullage	2000 L
Main engines	2×MTU 16V 2000 M70 each 1050 kW @ 2100 rpm
Gearboxes	2×ZF 4540
Propulsion	2×MJP 550DD Waterjets
Generators	2×Caterpillar C4.4 each 86 kW 50Hz
Speed (service)	28 kn
Construction	Marine-grade aluminium
Class/survey	CCS ✠ CSA Catamaran HSC Passenger A Coastal Service Restriction ✠CSM
Flag	China MSA

32 m Composite Catamaran Ferries from Incat Crowther

Incat Crowther has announced the launch of two 28 m composite catamaran ferries by Cheoy Lee Shipyards in Doumen, China.

Sea Serene and *Sea Superb* are the fourth and fifth Incat Crowther catamarans for the operator, Hong Kong and Kowloon Ferry Holdings. The vessels were made in a female mould which has an interchangeable centre module. This allows a range of lengths for the design from 24 to 32 metres.

Sea Serene and *Sea Superb* are configured to carry 425 passengers at a service speed of 25 knots.

Incat Crowther also has a 28 m version of this design under construction in Russia, proving the versatility of the design.

Incat Crowther is looking forward to a number of launchings in 2011, having expanded the business into new markets, and having over 40 vessels under construction.

Principal particulars of *Sea Serene* and *Sea Superb* are

Length OA	32.0 m
Length WL	30.0 m
Beam OA	8.1 m
Depth	3.1 m
Passengers	425
Fuel oil	3700 L
Fresh water	650 L
Main engines	2×Cummins KTA 38-M2 each 1007 kW @ 1900 rpm
Gearboxes	2×ZF 4540
Propulsion	2×4-bladed propellers
Generators	2×Perkins 67 kW
Speed (service)	25 kn
Construction	Composite
Flag	Hong Kong Marine Department

Sea Serene and *Sea Superb* built by Cheoy Lee for Hong Kong and Kowloon Ferry Holdings (Photo courtesy Incat Crowther)

28 m Wave-piercing Catamaran from Incat Crowther

Incat Crowther is designing a second 28 m wave-piercing catamaran crewboat to support offshore oil and gas operations. Incat Crowther has again worked with Topaz to develop a 24 hour version of the innovative crew boat. The new vessel shares the same hull configuration, as well as the aft cargo deck and forward loading arrangement.

The vessel differs from the earlier design by having a full-width superstructure allowing greater accommodation space. Together with increased fuel capacity, this allows the vessel to operate uninterrupted over a 24 h service pattern.

The accommodation-friendly vessel adds a bathroom to each of the two hull crew cabins. There is also an additional officer's cabin on the main deck. The entire wheelhouse module, including aft control stations, is common to both designs.

As with the earlier vessel, the 24 h vessel will be fitted with a FFS 250x350HD FiFi and foredeck-mounted fire monitor as well as a Sormec M18/FB/4S deck crane. The aft deck has over 50 m^2 of usable deck space, forward of which is a protected passenger-boarding area.

The new vessel will also be powered by a pair of Caterpillar C32 ACERT engines, each producing 1193 kW brake power at 2100rpm. This will give the operator commonality between the two different vessels, streamlining maintenance operations and parts inventory.

Starboard quarter of 28 m wave-piercing catamaran (Image courtesy Incat Crowther)

Starboard bow of 28 m wave-piercing catamaran (Image courtesy Incat Crowther)

Incat Crowther has forged a strong relationship with Topaz Marine which, in addition to these wave-piercing crewboats, has seen the launch of five 35 m monohull crewboats. Incat Crowther's attention to servicing its client's needs ensures a continual evolution and improvement of its designs, whilst maintaining a sound naval architectural basis.

Principal particulars of the new vessel are

Length OA	27.6 m
Length WL	23.0 m
Beam OA	7.5 m
Depth	3.2 m
Draft (hull)	1.4 m
Passengers	39
Crew	8
Fuel oil	13 930 L
Fresh water	5000 L
Sullage	500 L
Main engines	2×Caterpillar C32 ACERT D Rating each 1193 kW @ 2100rpm
Propulsion	2×Hamilton HM651 waterjets
Generators	2×Caterpillar C4.4
Speed service	28 kn
maximum	32 kn
Construction	Marine-grade aluminium
Class/Survey	DNV ✠1A1 HSLC R3 Crew
Flag	UAE

Stewart Marler

Austal Order from Noumea

Tourism operator, Mary D Enterprises, has selected Austal to design and construct a 35 m high-speed monohull passenger ferry, the second Austal-built vessel for the Noumea-based company.

The ferry is principally intended for operation between Noumea and Amadee Island, but will also service other locations on New Caledonia's south and west coasts. The new vessel will be joining the Austal-built *Mary D. Dolphin*, which has transported more than 300 000 passengers on the Amadee Island route since its delivery in 1998, and will carry 138 passengers on two decks. The new vessel will be one of only a small number of monohull ferries which are fully compliant with the International Maritime Organisation's

High Speed Craft (HSC) Code 2000. This is a significant step for Mary D. Enterprises in modernising its fleet and in maintaining compliance with French regulations which now require adoption of the full HSC Code on all high-speed vessels flying the French Flag.

Sylvie Helmy, General Manager of Mary D. Enterprises, said Austal's experience was instrumental in their choice of shipbuilder.

"We have always had great service and know the level of knowledge Austal has acquired over the years, so the choice was easy.

"Austal has proven experience not only in shipbuilding in general, but also in building vessels to French-flag requirements, which can be challenging at times," said Ms Helmy.

The ferry will be powered by three MTU 12V2000 engines coupled to Hamilton waterjets giving a speed of 34 knots. It will be built at Austal's Western Australian facility and is scheduled for delivery in November 2011.

Principal Particulars of the new vessel are

Length OA	35.20 m
Length WL	30.70 m
Beam (moulded)	7.00 m
Depth (moulded)	2.70 m
Hull draft (approx)	1.30 metres
Passengers	138
Crew	12
Main engines	3 × MTU 12V2000M72 (IMO Tier 2 compliant)
Propulsion	3 × Hamilton HM 521
Speed	34 kn
Classification	Lloyds Register ✠100A1 SSC Passenger (A), Mono HSC, LDC, G3, LMC
Flag	French

Austal's new ferry for Noumea
(Image courtesy Austal)

John Oxley Restoration

Sydney Heritage Fleet has released a new book, *S.S.* John Oxley *Restoration Underway,* by Hette Mollema. The book is the story of the history and restoration of *John Oxley* so far, of what is destined to be the last seagoing coastal steamer in the world. The book is available for viewing on the web; visit www.shf.org.au/JO-history/JO-home.html.

Re-plating of the hull is complete up to the waterline, and the stern plating, bulwarks, rudder trunk, steering gear and machinery are now being worked on.

As the project approaches refloat, there is the need to accelerate progress. The work will become more complex, more work teams will be needed and more materials must be sourced.

On-site the project needs

- Carpenters and shipwrights—on deck
- Fitters/machinists/engineers/machinery restorers
- Fabricators/riveters/iron workers—in the workshop and on board
- Painters—everywhere!

Off-site the project also needs people who are good at

- Publicity/promotions—volunteers to help with the website, email and reports
- Events—planners and promoters—events for members and sponsors
- Merchandising—apparel, souvenirs and publications—shop counter and on-line
- Fundraising

If you are good at any of these, then the SHF will be delighted to hear from you.

Cruising

The summer cruise season has moved into high gear, with visits to Sydney in December by *Rhapsody of the Seas, Sun Princess, Pacific Sun, Pacific Jewel, Volendam, Silver Shadow,* and *Diamond Princess*.

In addition to returns by many of these vessels, January added a visit by *Astor* and early February added visits by *Seabourn Sojourn, Pacific Pearl* and *Arcadia.*

Some cruise vessels have continued their practice of calling at Twofold Bay on the south coast of NSW for passengers to go ashore in Eden.

Phil Helmore

Astor in Athol Bight during her visit to Sydney
(Photo John Jeremy)

Volendam departing Eden on 18 December for New Zealand and return to Sydney
(Photo courtesy Robert Whiter)

Current Research on Linear Hydrodynamic Theory for Ship Resistance

Lawrence J. Doctors
University of New South Wales

1. Introduction

Readers of *The Australian Naval Architect* will be interested in some new results of research during the last few years regarding the application of linear hydrodynamic theory to the prediction of the performance of marine vessels.

2. Monohulls

A fundamental interest is the accurate prediction of the steady-state resistance of craft such as monohulls and catamarans. The background to this work can be traced to Michell (1898), who was the first to develop the theory in the case of deep water and laterally unrestricted water (such as in the open sea).

However, most ship-model tests are conducted in tanks of finite width and finite depth, where these additional constraints can have a significant influence on the resistance. The influence of tank walls was first considered by Sretensky (1936) and finite depth by Lunde (1951). Further enhancements to include the effects of a transom stern were described by Doctors and Day (1997).

The effect of a transom stern is twofold: Firstly, the partly unwetted (ventilated) transom gives rise to an additional component of resistance, namely the hydrostatic resistance. Secondly, because of the separation of the flow past the transom, one can argue that an imaginary appendage has been added to the hull, thus creating an effectively longer wavemaking vessel. These points were further enhanced by Doctors (2006), where tables of coefficients were provided for estimating the level of the unwetting and the imaginary added length.

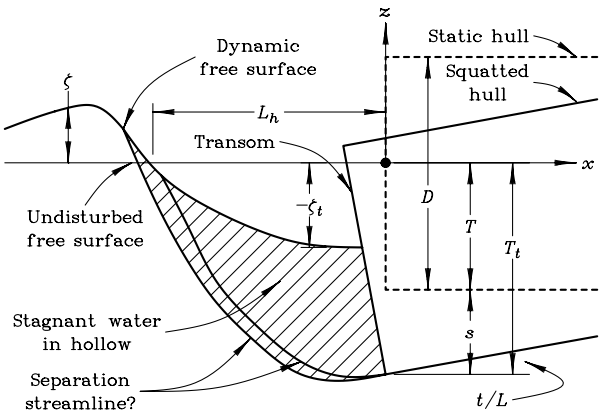

Figure 1 (a) Monohull Resistance
Transom Flow

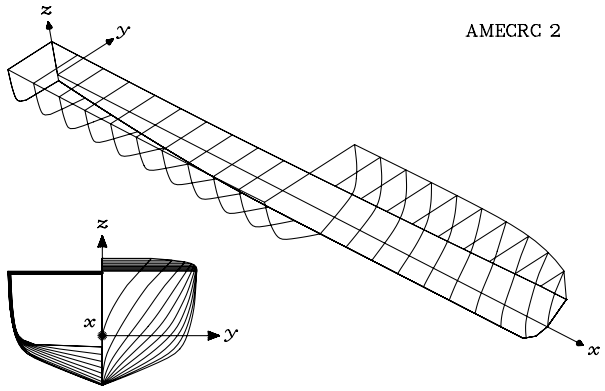

Figure 1 (b) Monohull Resistance
AMECRC Model 2

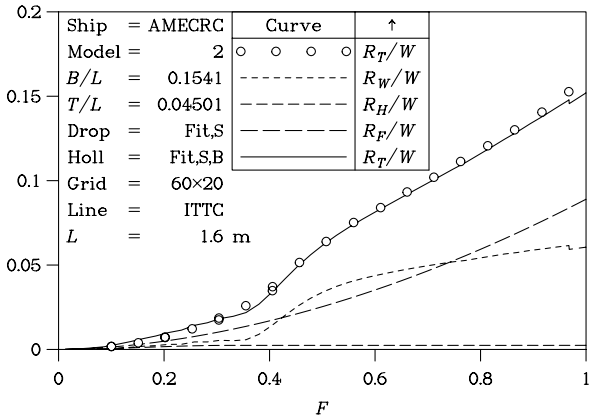

Figure 1 (c) Monohull Resistance
Resistance components

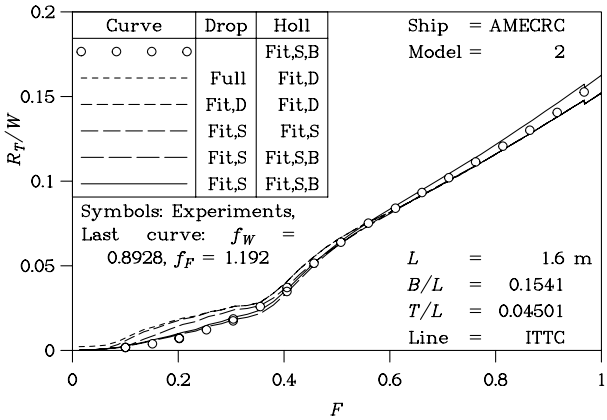

Figure 1 (d) Monohull Resistance
Transom-stern Flow Model

Figure 1(a) taken from Doctors (2006) depicts the nature of the water flow which is assumed to occur behind a partly ventilated transom stern. Figure 1(b) shows a pictorial view of AMECRC Model 2.

Figure 1(c) presents a set of theoretical calculations for the resistance components of Model 2 as follows: R_W is the wave resistance, R_H is the hydrostatic resistance, R_F is the frictional resistance computed according to the 1957 ITTC correlation line, and R_T is the total resistance obtained by simply summing these components. These components of resistance are non-dimensionalised with respect to the weight W of the model and they are plotted as a function of the length-based Froude number. Rather excellent agreement for the total resistance, over the entire Froude-number range, is demonstrated with the towing-tank data, which is represented as a set of symbols.

The beam-to-length ratio *B/L* and the draft-to-length ratio *T/L* are indicated on Figure 1(c), as is the computer grid used to model the hull. In fact, one can obtain almost identical numerical predictions for the resistance by employing one half of the number of panels in the longitudinal and in the transverse direction.

Some computer experiments on the manner in which the transom-stern flow is modelled are presented in Figure 1(d). The first set of data, the circular symbols, represent the towing-tank data. The first (short-dashed) curve is a calculation in which the transom is unrealistically assumed to fully ventilate, even at very low speeds. Also, the hollow length is estimated using the dynamic draft of the model (this is the meaning of the "D" subscript.) The second curve was derived using a similar approach for estimating the transom unwetting. This shows a slight improvement at low speed. The third curve is based on simpler calculations, wherein the static draft was used (this is the meaning of the "S" subscript.)

The fourth curve is considered to be the best one. Here, the static draft is used in the analysis as in the case of the third curve, but account is also taken of the fact that the bottom of this hull possesses an upward slope near the stern, and a correction to the hollow length is adjusted for this geometric fact (this is the meaning of the "B" subscript.) In this case, very good agreement between the theory and the experiment occurs over the entire speed range. Finally, the last (fifth) curve was generated in a manner similar to that for the previous curve — but a form factor $f_W = 0.8928$ was applied to the wave resistance and a form factor $f_F = 1.192$ was applied to the frictional resistance. In this example, there is little improvement, because the agreement of the uncorrected theory with experiment is already excellent.

3. Finite Water Depth

Many high-speed vessels operate in relatively shallow water and, of course by their nature, all towing-tank studies are executed in a constrained situation where potential problems can arise as a consequence. The effects are particularly acute when there is also a lateral restriction (finite width) — as in a river or in the towing tank. One example of a study of this phenomenon was by Sahoo and Doctors (2003). Figure 2(a) shows AMECRC Model 6 which was one of the subjects of the study.

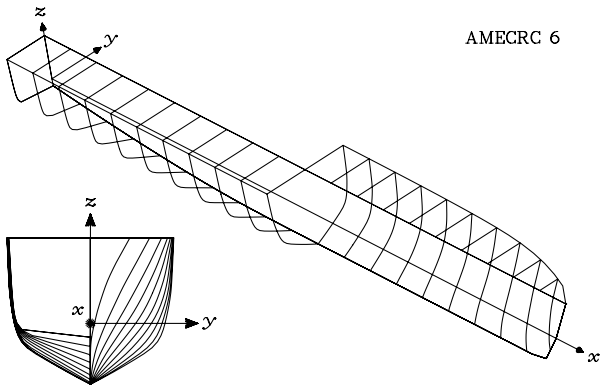

Figure 2 (a) Finite Water Depth
AMECRC Model 6

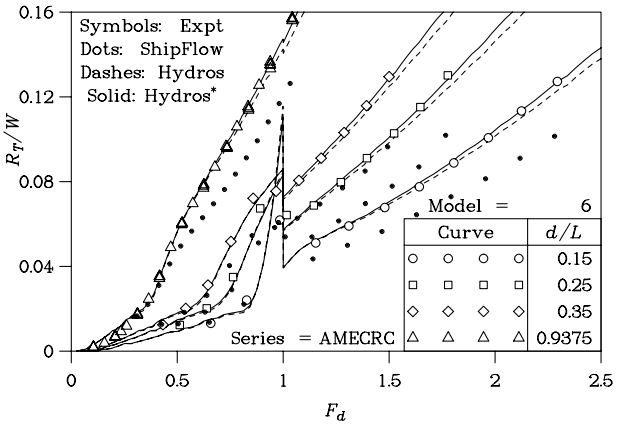

Figure 2 (b) Finite Water Depth
Specific Resistance

Figure 2(b) presents a comparison between experiments (the symbols) and the finite-depth finite-width linearised theory (the curves) for this model. In this example, the specific total resistance R_T/W is plotted as a function of the depth Froude number F_d. A number of depths is considered. Four different water-depth-to-model-length ratios *d/L* are considered. These vary between 0.15 (very shallow water) and 0.9375 (essentially deep water). In each case, the theory indicates a sudden drop in the wave resistance and a corresponding drop in the total resistance at the critical condition, when the depth Froude number passes through unity. This sudden drop in resistance results from the loss of the transverse wave at this speed. The sudden drop is given by the formula:

$$\Delta R_W = 3W^2/2\rho g w d^2$$

where ρ is the water density, *g* is the acceleration due to gravity, *w* is the width of the channel, and *d* is the water depth.

Two versions of the theory are tested here. The dashed lines represent the total resistance obtained by a simple sum of the relevant components. The continuous curves were obtained by utilising a wave-resistance form factor of 0.930 and a frictional form factor of 1.100, where the agreement between theory and experiment is excellent, except in the neighbourhood of the critical speed.

It is important, however, to note that the sudden (sharp) drop in theoretical resistance is confirmed in practice only as a rapid (rounded) drop. This point will be referred to in more detail in the next section.

The phenomenon of this drop was (to this writer's knowledge) first pointed out by Newman and Poole (1962), for the case of a hovercraft. The same phenomenon occurs for any marine craft operating in this condition.

Also shown on the plot is a set of dotted lines. These dotted lines are the output of the computer software ShipFlow, a computational fluid dynamics (CFD) ship-performance program. It is well known that, while CFD has the potential to

add greatly to our understanding of the hydrodynamics of steady-state resistance of ships, there are still inherently many difficulties in obtaining accurate results, in comparison to the simpler linearised theory.

4. Unsteady Theory

The impressive sharp theoretical drop in resistance at the critical speed is a result of the assumption of steady-state motion. In fact, there is no such thing as a steady-state towing-tank test, because (of necessity) all such tests start with the model at rest. In many cases (essentially deep water), this is of little consequence. However, in other situations the effects can be dramatic. Day, Clelland and Doctors (2009) have performed some careful experiments in which the true temporal total resistance in the towing tank was measured. This resistance was compared with the unsteady theory, first developed by Lunde (1951).

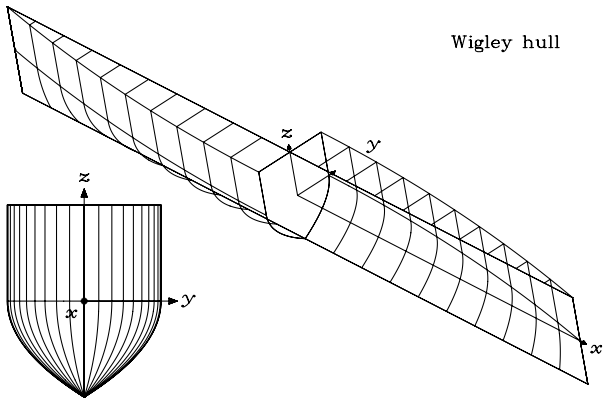

Figure 3 (a) Unsteady Theory
Wigley Model

Figure 3 (b) Unsteady Theory
Model undergoing a test

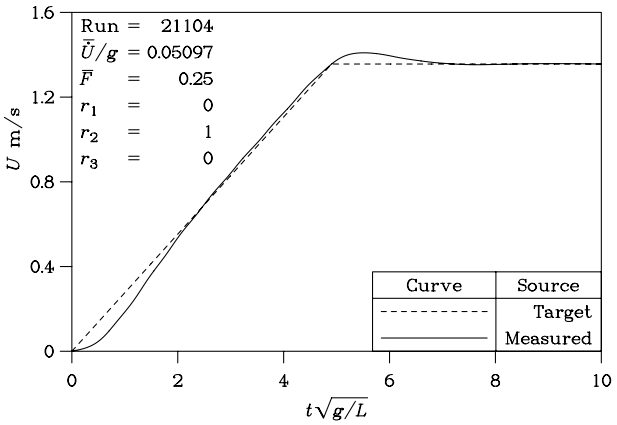

Figure 3 (c) Unsteady Theory
Sample run in towing tank

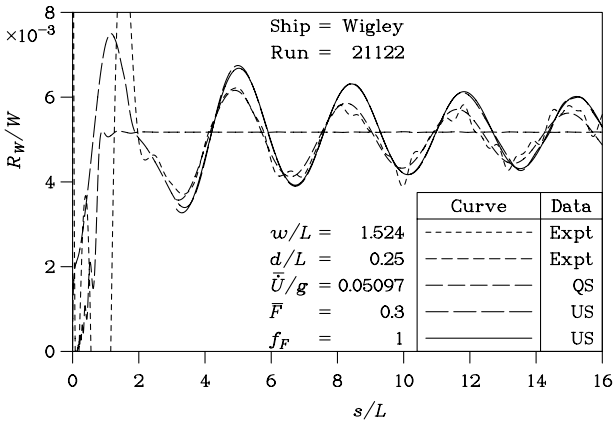

Figure 3 (d) Unsteady Theory
Resistance at Froude Number of 0.30

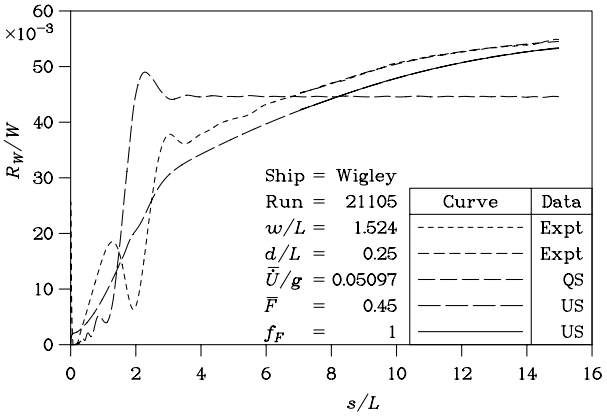

Figure 3 (e) Unsteady Theory
Resistance at Froude Number of 0.45

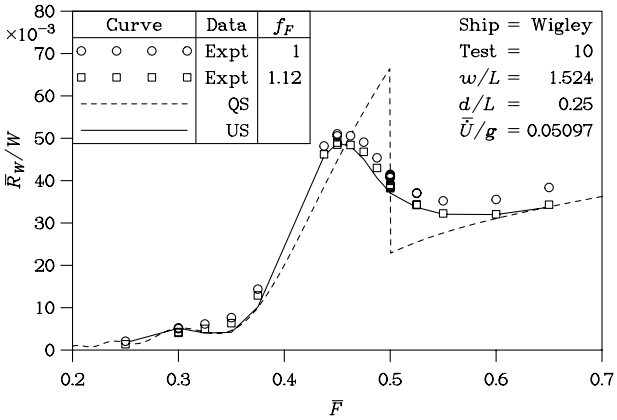

Figure 3 (f) Unsteady Theory
Deduced Curves of Wave resistance

Figure 3(a) shows the Wigley hull which was used in these tests. Figure 3(b) is a photograph of the model under test in the Towing Tank at the University of Strathclyde in Strathclyde, Scotland. Figure 3(c) relates to the motion history of the towing carriage for a typical run. The dashed curve is the target (intended) speed U of the computer-controlled carriage as a

function of the dimensional time—that is, a constant acceleration of 0.05097g followed by a constant speed, corresponding to a Froude number of 0.25. The continuous line is the measured speed.

Figure 3(d) shows five curves for the specific wave resistance R_W/W, plotted as a function of the distance travelled by the model, expressed in model lengths, namely s/L. The data is for a case of d/L of 0.25 and a Froude number of 0.3. The first curve is the experimental wave resistance. Strictly speaking, it is the experimental total resistance with the frictional resistance subtracted, assuming a frictional form factor of 1.000. The second curve is a regression fit of an analytic function to the first curve. The third curve is a quasi-steady calculation, which naturally fails to capture the oscillatory nature of the resistance curve. The fourth curve is the theoretical unsteady wave resistance, based on the Lunde (1951) paper. The fifth curve is a regression fit of the same analytic function to the fourth curve. This plot shows that the unsteady theory (fourth curve) captures the phasing of oscillations in the experimental wave resistance (first curve) very well. The theory predicts the amplitude of the oscillations reasonably well.

Figure 3(e) is similar to Figure 3(d); it applies to a higher Froude number of 0.45, which corresponds to a slightly subcritical speed, that is, a depth Froude number F_d of 0.9. The loss of the oscillatory nature of the curves can be observed. Once again, the theory captures the behaviour of the experiment. We point out here, also, that selecting a larger (and more realistic) frictional form factor, will bring the theory and experiment into very close agreement.

Finally, in Figure 3(f), we present a wave-resistance curve, analogous to some extent to the traditional supposedly steady-state curve. To be precise, the wave resistance is its time-average value (averaged from one model length after steady speed is achieved until the end of the run, namely 16 model lengths). It is plotted as a function of the achieved steady Froude number, after the end of the acceleration phase of the test. Four sets of data are presented in the plot. The first curve, the circular symbols, represent the experimentally-derived wave resistance, assuming a frictional form factor of 1.000. The second curve is similar, but it assumes a frictional form factor of 1.120—this reduces the value of the wave resistance deduced from the measured total resistance. The third curve is the theoretical finite-width finite-depth steady-state linearised theory, which exhibits the previously-discussed dramatic drop in resistance at the critical speed. Finally, the fourth curve is obtained from the unsteady Lunde (1951) theory. The near-perfect agreement between unsteady theory and unsteady experiment is indeed satisfying.

5. Catamaran Resistance

Modifications to the theory to permit the analysis of multihulls, such as catamarans, were described by Doctors, Renilson, Parker, and Hornsby (1991).

As a further example of the power of the linearised hydrodynamic theory, resistance predictions for a catamaran comprising a pair of Modified Series 64 demihulls, are now reproduced. A pictorial view of the demihull is shown in shown in Figure 4(a). This hull is based on the original Series 64, developed and tested by Yeh (1965). It was altered at the Australian Maritime College by removing the above-water tumblehome.

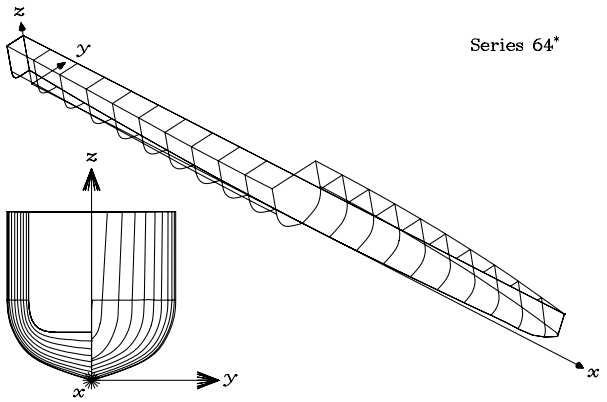

Figure 4 (a) Catamaran Resistance
Modified Series 64 Demihull

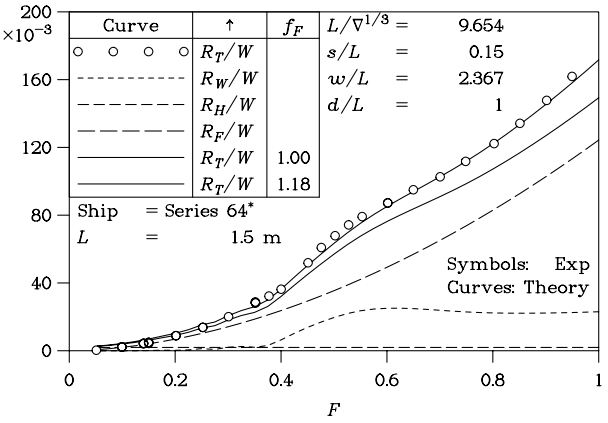

Figure 4 (b) Catamaran Resistance
Resistance Components

Figure 4(b), extracted from the publication by Doctors, Tregde, Jiang, and McKesson (2005), displays the traditional components of resistance. This particular plot applies to a demihull spacing-to-length ratio of 0.15. This is a very small spacing by naval architecture tradition and, therefore, the figure exaggerates the wave-interference effects between the demihulls, which are fully accounted for in the theory.

The second-last curve represents the total drag according to a simple summation of the individual resistance components (that is, using a frictional form factor of 1.000). Essentially perfect agreement between the theory and the experiment is achieved, as in the case of the last curve, if one selects a frictional form factor of 1.180.

6. Conclusions

The purpose of this survey paper was to illustrate that the traditional ship wave-resistance theory, developed by Michell (1898) provides a highly-accurate basis for the practical day-to-day prediction of the resistance of modern high-speed marine vessels. Simple engineering modifications to the theory, to account for the two effects of the transom stern are easily incorporated.

In general, the total drag obtained by a straightforward summation of the recognised components of resistance yields a small under-prediction of the total resistance. The use of a reasonable frictional form factor of around 1.150 will usually reduce the error in the resistance prediction to within a few percent.

This paper has also served as a warning to persons attempting to perform towing-tank experiments in critical conditions where the depth Froude number is close to unity. In such circumstances, the unsteady linearised theory fully explains the interesting observed phenomena with respect to the resistance of the ship model.

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What Should be Done with Grandad?
Discussing the Application of New Standards to the Existing Fleet

Mori Flapan
National Marine Safety Committee

1. INTRODUCTION

On 22 January 1984, the 71 year-old Sydney ferry *Karrabee* sank at Circular Quay just seconds after some 390 passengers disembarked hurriedly when the vessel started taking water during the Great Ferry Race. The ensuing Court of Marine Inquiry [1] recommended that for vessels of that type and age "*proper practices should be introduced based on up-to-date knowledge, technology and techniques to ensure that the intention of the Navigation Act is achieved*". The recommendation had partially been made in the context of verifying subdivision on existing older passenger vessels. It was never followed through for fear that the cost, both to industry and to the agency of undertaking such a review and addressing deficiencies that might arise from the results would have been prohibitive. There had been no loss of life, and within a few years, *Karrabee* and her immediate contemporaries, five other similar 70 year-old vessels, had all been retired.

Those on the *Karrabee* were lucky. Just two years later, on the other side of the world, the 61 year-old passenger ship *Amiral Nakhimov* collided with the bulk carrier *Pyotr Vasev* in Tsemes Bay, Novorossiysk, with the loss of 423 lives [2]. No inquiry is readily available to the author, but it begs the question to what extent would the death toll have been mitigated had the ship met modern standards?

1987 and 1994 were to see the sudden and catastrophic capsizing of the ro-ro ferries *Herald of Free Enterprise* with the loss of 193 persons, and *Estonia* with the loss of 852 persons respectively [3]. The IMO regulations were amended to overcome what was identified as a latent defect in existing standards of the day. The issue was seen to be so serious that, not only were the new standards applicable to new vessels, but they were also progressively phased in to existing vessels over a period of years resulting in a number of vessels being withdrawn from service [4].

These events illustrate the range of responses applicable to existing vessels when new safety standards have been implemented.

So-called "grandfathering" is the practice of permitting existing vessels to operate to standards that predate current minimum standards. Grandfathering is widely practiced in the Australian domestic fleet. The extent to which new standards should be applied to existing vessels has been a vexed question for decades, not only for vessels locally in Australia, but also across the entire maritime industry. This paper explores some of the issues in the context of work done in developing standards over the last decade, and explains the background to the Administrative Protocol for Assessing the Application of the NSCV to Existing Vessels [5].

2. THE CURRENT SITUATION IN AUSTRALIA

An indication of the age of commercial vessels in the Australian domestic fleet can be ascertained from Figure 1 [6]. Of the total, approximately 34 per cent were constructed 19 years or more before 2008. Over a third of these (13% of the total) could predate the Uniform Shipping Laws Code which was first published in 1979 but took some years to be picked up by enabling legislation. Figure 1 also illustrates that the average working life of vessels smaller than 7.5 m is considerably less than that for larger vessels.

The current situation regarding the application of new standards to existing domestic commercial vessels in Australia is ambiguous.

The previous USL Code Section 1 [7] Clause 2 stated:

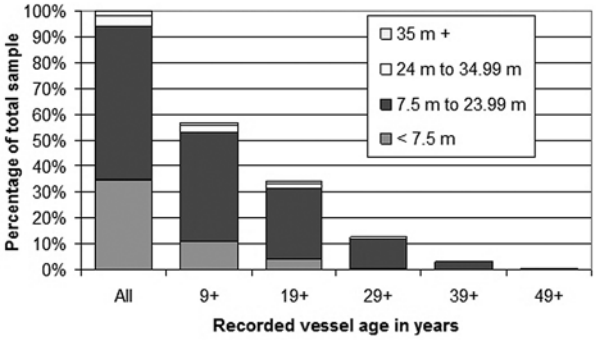

Figure 1— Indicative cumulative distribution of Australian domestic commercial vessels built up to 2008 by vessel age and vessel length (Sample n=5372)

Unless expressly provided otherwise, the provisions of this Code apply to new vessels. For vessels the keels of which were laid or reached a similar stage of construction on or before 31 December 1991, the Authority may determine the extent to which the Code provisions in force on that date are required to be met.

The scope and nature of the discretion granted under this Clause has never been systematically defined and the objectives have to be implied. The ambiguity is further highlighted by references to application in individual sections of the old USL Code:

For example, USL Code Subsection 5A Clause A.5 stated:

This Section applies to every new vessel the keel of which is laid after the date of coming into force of this Section and which is to be constructed to the survey of an Authority.

Where alterations are made to an existing vessel this Section shall apply as far as is reasonable and practicable to the alterations as if the parts of the vessel so altered were parts of a new vessel.

But USL Code Subsection 8A Clause A.2.1 states:

This Section applies to every vessel subject to the survey of an Authority. Where difficulty is experienced in respect of a particular vessel's meeting these Requirements, the matter should be referred to the Authority for decision. Where alterations are made to an existing vessel, such as materially to affect the stability of the vessel, the Authority may require the vessel to be re-inclined and a re-assessment made as to the ability of the vessel to meet the applicable criteria.

The subsection 8A clause seems to apply to every vessel including existing vessels, while the subsection 5A clause only applies to new vessels and alterations to existing vessels.

The lack of clarity as to the application of new standards to existing vessels becomes even more manifest when items such as fire and/or safety equipment are considered. Most jurisdictions have regulations which set requirements. A number of these have been frozen in time, being based on the 1981 or 1984 USL Code, with or without modifications. However, in the field, jurisdictions have often been applying current standards for some items of equipment and exemptions from compliance with others.

3. DEVELOPMENT OF THE NATIONAL STANDARD FOR COMMERCIAL VESSELS

The Uniform Shipping Laws Code is being progressively replaced by a new standard, the National Standard for Commercial Vessels (NSCV). The question of application of the NSCV to existing vessels was considered during the development of Part B of the standard which was to replace Section 1 of the USL Code. Early drafts included the application of the new standards to existing vessels in the application clause. However, it became clear that the clause was quasi-legislative and more reflective of policy than a technical standard. Application of new standards to existing vessels requires a policy decision on the balance between available government resources and public expectations as to safety. Furthermore, retrospective application of standards is a sensitive issue which can have political implications and so should not be dealt with lightly. It had been recognised that the inclusion of quasi-legislative clauses had been one of the failings of the USL Code [8], so the clause was amended to apply just to new vessels, existing vessels entering survey for the first time and existing vessels upgrading service. Specifying what happens to existing vessels that have been modified and existing vessels without change was left to be specified in the enabling legislation.

This decision had important implications for the development of the NSCV. It allowed drafters to focus on the vision of the fleet in the future, rather than being constrained by potential impacts on the current fleet. In accordance with COAG Guidelines [9], each new Part, Section or Subsection of the NSCV was supported by a Regulatory Impact Statement (RIS) which considered the cost/benefit of reforms contained within the new standard. It is important to note that the cost/benefit analysis in the RIS was based on the application of the standards being limited to new vessels, see Figure 2.

4. WHY NOT JUST APPLY NEW STANDARDS TO EVERYTHING?

Because of the different costs associated with applying the new standards to existing vessels, the conclusions which justify the new provisions for new vessels are invalid when applied to the existing fleet, see Figure 3. While the benefits of the new standard stay the same, the costs of applying the new standard to existing vessels are frequently considerably more.

- In addition to the cost of supplying, building or otherwise providing for the thing required by a specific provision in the new standard, an existing vessel faces additional cost through the cost of removing any existing arrangements.
- The loss of any residual capital value inherent in the existing arrangements.
- The cost of alterations to structure needed to accommodate the new arrangement.
- The cost of fitting or modifying ship systems required to supply the new arrangements.
- Loss of earnings during alterations while the vessel is out of service.
- Adverse changes in the vessel's earning capabilities which might come about due to the impact of the new regulations or the arrangements put in place to accommodate them.

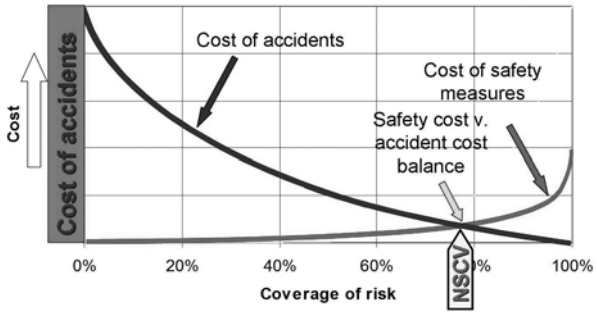

Figure 2—Indicative cost-benefit balance for a standard applicable to new vessels

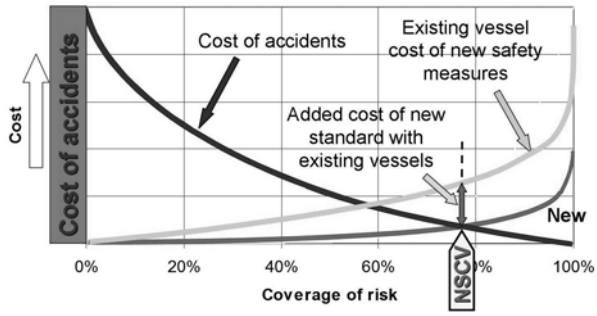

Figure 3—Indicative effect on the cost-benefit relationship when standards intended for new vessels are applied in full to existing vessels

Policies which apply new standards to existing vessels need to take these differences into account. As can be seen in Figure 3, the cost/benefit balance lies well to the left of the point where the NSCV lies. Except where there is an urgent safety concern that needs to be addressed, existing standards should be recognised as remaining appropriate and relevant to the existing fleet when new standards are introduced. This continues at least for the short to medium term. However, there are factors that change over time which will affect the assumptions behind this stance in the medium to long term.

5. ISSUES ASSOCIATED WITH GRANDFATHERING

There is a perception that grandfathered vessels are substandard; i.e. below an acceptable standard, because grandfathered vessels do not meet the latest standard. This is particularly so when such vessels are involved in serious incidents, such as illustrated by the *Karrabee* and *Amiral Nakimov* above.

However, is it reasonable to say that a vessel that was acceptable today should suddenly and automatically become unacceptable tomorrow because of the introduction of a new standard? Surely it depends upon the particular content of the changes. A new standard which applies to new vessels takes time to impact on the fleet as a whole. Assuming the average commercial life of a vessel is 20 to 25 years, the new standard might be better viewed as a vision of the fleet

in 15 to 20 years as new vessels progressively enter the fleet.

The reality is that most jurisdictions apply at least some parts of new standards to the existing fleet. Frequently, it is the new safety equipment requirements which are applied but construction is not. Between these two extremes lie less well-defined topics such as stability, fire safety, electrical installations, subdivision and so on. The extent to which new standards are applied to the existing fleet is not consistent between jurisdictions and even within jurisdictions. This leads to uncertainty and barriers to mutual recognition.

There is a real risk with grandfathering that vessels can be frozen in time, notwithstanding that public expectations regarding safety are continually evolving. While a vessel meeting standards of twenty years ago may be acceptable, chances are that a vessel meeting safety standards of one hundred years ago will not. A vessel grandfathered today should not be seen as having been grandfathered forever.

The lack of a consistent policy on existing vessels has arguably led to interstate transfer being used as a de-facto standard, as it has provided the receiving jurisdiction with a rare opportunity to review the newly-arrived existing vessel against current standards.

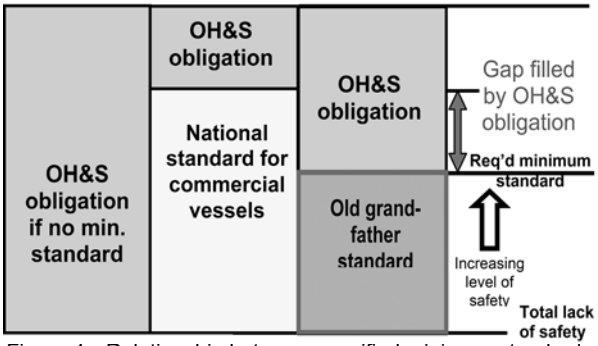

Figure 4—Relationship between specified minimum standards for survey and safety obligations under OH&S legislation

6. GRANDFATHERING AND BROADER SAFETY OBLIGATIONS

Grandfathering does not provide immunity from having to fulfil broader safety obligations. Occupational Health and Safety Legislation (OH&S) and the general law of negligence have no provision for grandfathering [10]. For example, OH&S legislation does not differentiate whether the workplace is old or new. It can be concluded that any shortfall in safety arising from applying old required minimum standards must still be compensated for by safety obligations under Occupational Health and Safety, see Figure 4. This discussion on grandfathering is therefore limited to the context of prescribed minimum standards for the purposes of a proactive survey licensing regime. Arguably, the greater the gap between current survey standards and previous survey standards, the greater the likelihood that the onus will be on the operator to identify and address any residual risks that may be unacceptable in terms of broader safety obligations.

Looking at Figure 4, the question may be asked: Why is the threshold of safety of the NSCV not the same as that needed to satisfy all OH&S objectives? Quite apart from considerable practical hurdles of a third party proactively certifying "adequate" safety, the test for an acceptable regulatory intervention under the NSCV is very different to the test for fulfilling safety obligations under OH&S.

COAG Guidelines [11] which underpin the NSCV apply a cost-benefit rule "government action is only justified where there are positive net social benefits…"; i.e. benefit is at least greater (or proportionate) to costs. OH&S requires reasonably practicable steps be undertaken to eliminate or minimise risks. Discussions with the relevant agency have indicated that this is something more than a bare comparison of whether benefit exceeds costs, though what that might be they were not prepared to say. Case law on the subject has given rise to the ALARP principle which states: "as low as reasonably practicable" and suggests that steps (to reduce risk) are reasonable unless there is a "gross disproportion between benefit and cost — the risk being insignificant in relation to the sacrifice" [12]. Clearly the term "gross disproportion" means something different to "positive net social benefits". The test for OH&S provisions would appear to be much more onerous than would be considered acceptable under the COAG Guidelines.

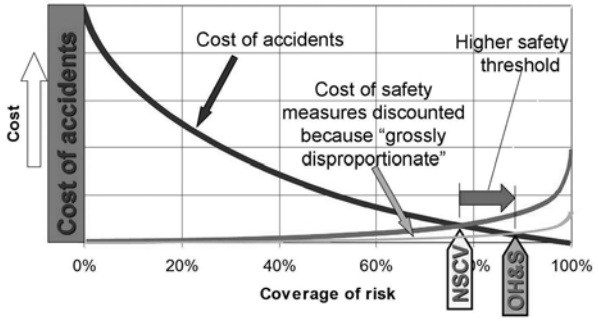

Figure 5—Indicative effect of the different thresholds for acceptability under OH&S and COAG Guidelines as reflected in the NSCV

Figure 5 illustrates the rationale behind Figure 4 in terms of cost/benefit. The OH&S threshold of "gross disproportion" effectively discounts the cost of safety measures relative to the benefits, shifting the balance point of acceptability far to the right.

7. TIME CHANGES EVERYTHING

1. The discussions so far have been mainly focused on the immediate effects of applying a new standard to the existing fleet. However, the factors which supported the continuance of previous standards under the new regime in the short term will, in themselves, change over time. These changes affect both the cost and benefit aspects in such a way that retrospective application of provisions that could not be justified in the short term may become essential, and at the same time more viable in the long term. Referring to the list of additional costs associated with existing vessels which was provided under Item 4 above, these costs will gradually reduce with time because time allows the vessel to work and provide a return on existing capital investment.
2. Time permits full application of any capital depreciation allowance [13].
3. Many items of equipment will, in any case, expire or become outdated or unserviceable over time.
4. The likelihood of ongoing repairs, refits, upgrades and refurbishments, for reasons other than safety, increases with time. The reasons include changes in operation, competitive advantage, economy of operation,

reliability and ease of maintenance. These can offset some or all of the cost of the safety upgrade.

5. Time permits the owner to schedule downtime and expenditure to best fit in with business needs and opportunities, reducing the cash flow burden, business disruption and, ultimately, the cost of the upgrade.
6. Time gives the owner the opportunity to factor future safety expenditure into the broader strategic decisions which determine the economic service life of the vessel, and whether to scrap and replace.

The effect on the cost/benefit balance is illustrated in Figure 6. As an example, consider the fire safety aspects of a passenger vessel built just before introduction of new standards in Part C Section 4. To immediately upgrade the vessel to changes in the standard may be impractical and unwarranted. However, after 10 or 15 years of operation, the interior décor and service areas would likely be due for refurbishment. This might provide an appropriate opportunity to upgrade the fire rating of linings and furnishings, fit smoke detectors, smoke barriers, and so on. The comparative costs of retrospectively meeting relevant fire provisions would at this juncture be much reduced.

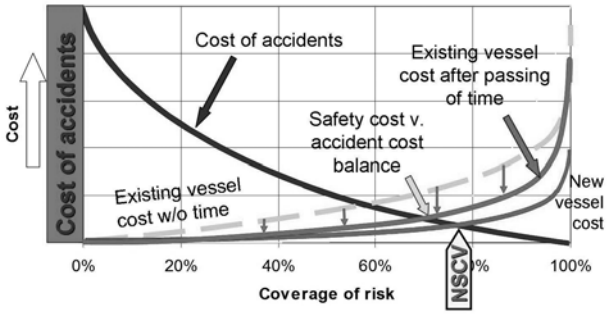

Figure 6—Indicative effect of the passing of time on the relative cost of applying new standards to existing vessels (balance point shifts to the right)

The relative benefit of safety measures is also likely to change with time. The long-term trend is for society to become more risk averse; i.e., to place a higher value on the benefit. Community expectations will also be changed by the incremental improvements which arise from the gradual take-up of new standards into the fleet as new vessels are built. Our society in the future will likely gradually increase the value placed on avoiding death or injury relative to today's levels. Referring to Figure 7, a long-term increase in the benefit of the new safety measures relative to today's values takes the cost-benefit balance point from the intersection of the dark blue curve with the green curve to the intersection of the light blue curve with the green curve.

8. GUIDELINES FOR ASSESSING THE APPLICATION OF THE NSCV TO EXISTING VESSELS

Figure 7 confirms that full implementation of the NSCV to existing vessels may not be viable, even in the long term. However, it does show that, over time, there is capacity for upgrades in safety if warranted by risk. The NSMC has published the Administrative Protocol for Assessing the Application of the NSCV to Existing Vessels [14] to provide a systematic approach to determining what upgrades are needed and how they should be applied. The Protocol is not mandatory in itself. The Protocol is intended to provide principles for developing relevant legislation and modifying the application of new standards for existing vessels.

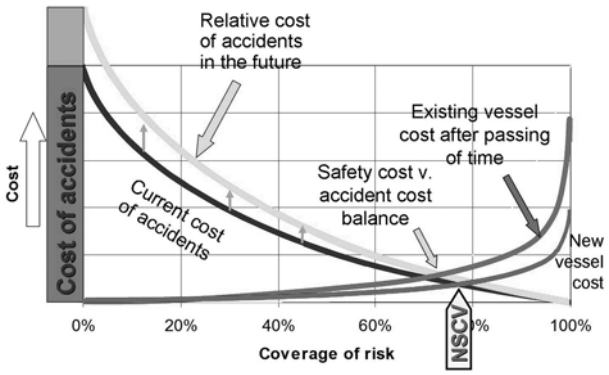

Figure 7—Indicative effect of the passing of time on the relative benefit of applying new standards to existing vessels (balance point shifts further to the right)

The principles operate by reviewing each provision in the NSCV standard for new vessels to establish its relevance and priority in terms of the safety of existing vessels.

8.1 Assigning a status to provisions

The process starts by identifying which provisions have been changed between the old and new standards.

Each provision of the new standard which differs from the old should be assessed as to the rationale for the change and the benefits of its effects. Depending upon the outcome, each provision is classified as being one of three types: Urgent, Benign or Progressive.

Provisions are given urgent status where the matter has an immediate and significant impact on safety, or there is a manifest deficiency in the safety standard of the existing fleet which has been highlighted by an incident, product recall or similar event. The risks which arise if the new provision were not applied would be considered to be intolerable [15]. Typically, the difference in risk between new and old provisions which determines whether it is urgent is in the order of 100 times greater risk.

An example of provisions which were given the equivalent of urgent status in the IMO was those pertaining to ro-ro passenger vessels which arose from the losses of *Herald of Free Enterprise* and *Estonia*.

A provision is given benign status where either the change has been for largely administrative, industry efficiency, or other non-safety related reasons, or the benefits would be grossly disproportionate to the costs. The risks associated with not applying the new provision to a vessel complying with the old provision would be considered to be negligible. Typically the difference in risk between new and old provisions associated with benign provisions is less than a factor of 2.

An example of a new provision having benign status might be application of Lloyds Rules for the structure of vessels in NSCV Section 3. The provision was changed largely for administrative and industry efficiency reasons. The application of Lloyds Rules will almost certainly result in different scantlings to those which came from the old Section 5 of the USL Code. However, for the majority of vessels, the scantlings derived under the USL Code should suffice. Hence this might be a provision which would be assigned benign status.

The third level of status, progressive status, is assigned where the issue is not considered urgent, but where there

is likely to be a significant deficiency relative to safety expectations over the long term. The difference between the old and new standards can be considered a tolerable risk. Over time, a tolerable risk which was initially considered acceptable becomes unacceptable because of the change in the cost/benefit balance.

Examples of provisions with progressive status might be the upgrading of fire safety measures, safety equipment, or subdivision standards.

Table 1 — Indicative transition times for various levels of provision status

Provision status	Typical example	Typical transition time
Urgent	Ro-Ro vessel bow door integrity	1 to 3 years
Benign	Hull scantlings on conventional vessels	Never required
Progressive	Quantity of life-saving equipment	1 to 2 years
	Build standard of life-saving equipment	5 to 10 years
	Mass of persons for stability	10 years
	Subdivision	20 years

8.2 Assigning transition periods

As already indicated, the passage of time is the key parameter for creating a viable framework for the application of new standards to existing vessels. Once provisions have been sorted by status, transition periods are assigned which are intended to minimise the impact on business while achieving short and long term safety goals. Factors which should be used to determine transition periods include:

1. The need to resolve any identified intolerable risks as soon as practicable.

2. Manufacturer's periods of expiry for equipment.

3. Typical service life of equipment, components and systems from wear and tear.

4. Dates at which parts, infrastructure or maintenance support will no longer be available.

5. Typical service life of the vessel between major refits or replacement.

6. Periods assigned for effective life of depreciating assets.

Regulators are sometimes tempted to accelerate implementation for administrative convenience or consistency. Unrealistically-short transition dates will spark political resistance which could easily undermine the long term benefit of the proposal. Table 1 illustrates indicative transition times which might be assigned against provisions of varying status.

8.3 Flexible approaches to compliance

As for new vessels under the NSCV, the Protocol provides that an existing vessel has options as to how it is to achieve the safety outcomes [16]. Prior to the expiry of the specified transition period, the existing vessel can either apply the deemed-to-satisfy solution specified for the particular provision, or it can apply an equivalent solution as specified in Part B of the NSCV. A third option has been devised for existing vessels which is not available for new vessels; a so-called Remedial Solution. Remedial solutions are solutions which are not fully equivalent, but can deliver most of the safety gains of the deemed-to-satisfy solution at a more practicable cost. These are particularly suited to 'construction' type issues where major structural changes might otherwise be required. The inclusion of remedial solutions is a pragmatic solution to avoid the inevitable resistance which arises when trying to make a square peg fit in a round hole.

9. COMPARISON WITH RELEVANT INTERNATIONAL STANDARDS

9.1 Application of SOLAS standards to existing vessels

One would expect that the principles of application of new standards to existing vessels would be well established at an international level. However, understanding the application of SOLAS regulations to any vessel, let alone existing vessels, can provide significant challenges. One frequently hears reference to "SOLAS ships" being used to indicate passenger ships and cargo ships over 500GT limited to those engaged in international trade. This is a misnomer because there are provisions in SOLAS applicable to "All vessels" (Chapter V Safety of Navigation for example). These include vessels engaged in domestic trade, vessels engaged in fishing, existing vessels, pleasure vessels, and so on. In theory, *any* vessel is potentially a SOLAS vessel. The structure of the document is such as to require the user to read large portions of the Convention to establish whether, and the extent to which, it does or does not apply. Furthermore, the wording used in the various application clauses requires considerable skill of legal interpretation in order to appreciate the full impact of what is being said. For example:

SOLAS Article VIII Amendments states

(e). Unless expressly provided otherwise, any amendment to the present Convention made under this article, which relates to the structure of a ship, shall apply only to ships the keels of which are laid or which are at a similar stage of construction, on or after the date on which the amendment enters into force.

This grandfather clause, applicable to vessels which predate the date the amendment enters force, is apparently intended to provide the shipping industry with some certainty when making investments.

However, there are a lot of implications that can be read into the wording of this Clause.

1. Amendments that do not relate to the structure are applicable to existing vessels.

2. There are amendments specified within the Convention relating to the structure that are applicable to an existing vessel, you just have to find them.

3. A key factor will be what is meant by the term "relating to the structure".

4. The clause is limited to amendments to the "present" (SOLAS 1974) convention which first came into force on 25 May 1980.

Focussing on the last point, for the ordinary user, a clear determination of the applicable standard to be applied to an existing vessel prior to 1980 from the face of the Convention can be quite problematic. The grandfather clause in Article VIII does not help as it apparently just applies to new vessels since 1980, and any retrospective provisions applicable to existing vessels contained within the present convention.

Article VI of the SOLAS Convention states:

(a). As between the Contracting Governments, the present Convention replaces and abrogates the International Convention for the Safety of Life at Sea which was signed in London on 17 June 1960.

By use of the terms "replaces and abrogates", this effectively terminates SOLAS '60. The result could be construed as indicating that the 1974 Convention is now the minimum required standard for existing vessels. However, the Administrations in both Australia and the USA have indicated that their approach has been to continue to apply under their National Law the relevant provisions of SOLAS '60 (or even SOLAS '48) where the corresponding chapter or regulation of SOLAS '74 is not expressed to apply to 'existing ships' or 'all ships'. This approach relies on Article VI (d) which states:

(d). All matters which are not expressly provided for in the present Convention remain subject to the legislation of the Contracting Governments.

However, as a solution, even this raises problems for the user. Where can one acquire a copy of SOLAS '60 or SOLAS '48 to establish and/or verify what is the standard? These documents are no longer published by IMO and, of course, they too will have been subject to amendments over the years. Unravelling the trail to establish a definitive answer for existing vessels is probably beyond the resources, competencies and ken of the ordinary person.

The concept of "relating to the structure" appears to be a fundamental driver as to whether provisions should be retrospective. The Convention does not define what this means; it provides clues, but is not definitive. Table 2 indicates that the application of Chapters II-1 Construction – Structure, subdivision and stability, machinery and electrical installations and II-2 Construction – Fire protection, fire detection and fire extinction, are largely excluded from retrospective application; however, each contains a number of provisions which are retrospectively applied that can have significant structural implications. Similarly, Chapters III and V, which are largely concerned with what are considered to be non-structural aspects, have caveats on their retrospective application for specific clauses pertaining to survival craft launching arrangements, navigating bridge visibility and navigational equipment carriage requirements.

Individual clauses relevant to the application of new standards to existing vessels contained in SOLAS become clearer when viewed in the context of the NMSC's Protocol on transition principles. IMO has effectively carried out assessments as to the status of changes, some being given urgent status while others are considered benign. However, the position of changes lying between the extremes remains uncertain under SOLAS, especially the issue of standards on vessels predating 1980.

The simplistic exclusion of retrospective application because of structural implications is not in itself enough. In recent times, IMO itself has questioned the acceptability of the grandfather clauses. The Preamble to the IMO Interim Guidelines for the Systematic Application of the Grandfather Clauses [17] states:

2. With each constructional improvement of new ships, the gap in standards, i.e. safety and pollution prevention standards, between new and existing ships increases. Recognizing that it is often the record of existing ships that demonstrates the compelling need to improve on certain aspects of their standards, it seems quite unjustifiable that existing ships should be deliberately exempted from improvements of their standards. So, on the one hand, extensive and costly constructional modifications should be avoided on existing ships, while on the other hand, the standards of existing ships may become unacceptable when compared to requirements adopted for new ships only.

3. The Interim guidelines for the systematic application of the grandfather clauses, hereafter "the guidelines", provide a strategy for avoiding undue gaps in standards between new and existing ships. The strategy aims to ensure that when such gaps could increase through the adoption of more stringent constructional requirements for new ships, the standards of existing ships would be likewise improved to an acceptable extent, although the measures to be taken may differ in nature from those agreed for new ships. Ideally, this would in the long run result in equivalent standards for new and existing ships.

Advice received has indicated that the IMO guidelines themselves have not been widely applied, largely because of difficulties in finding consensus. The last sentence in Paragraph 3 above could give an insight into one reason for this: the suggestion that the process might in the long run result in equivalent standards for new and existing ships.

The NMSC Protocol differs from the IMO guidelines in that the former has been formulated on the basis that alignment of existing vessels to the same standard of new vessels is not achievable nor, in fact, appropriate on cost/benefit grounds ,as illustrated in Figure 7. This means that decision makers need no longer fear the repercussions of being charged with a responsibility to achieve the impossible by placing a burden on industry which they know would be untenable.

9.2 The European Union

The European Union has addressed the issue of existing ships in their Council Directive 98/18/CE on safety rules and standards for passenger ships [18]. The scope includes existing passenger ships of 24 m in length and above. The directive states:

(12) Whereas the various classes of both new and existing passenger ships require a different approach for establishing safety requirements guaranteeing an equivalent safety level in view of the specific needs and limitations of these various classes; whereas it is appropriate to make distinctions in the safety requirements to be respected between new and existing ships since imposing the rules for new ships on existing ships would imply such extensive structural changes as to make them economically unviable;

The Clause specifies an objective of "*establishing safety requirements guaranteeing an equivalent safety level"* but at the same time acknowledges that distinctions need to be made in the safety requirements to be applied. Within the Directive there are clauses which highlight the importance of time on the viability of applying new standards to existing vessels, in particular the following clause:

(13) Whereas the financial and technical implications arising from the upgrading of existing ships to the standards provided for by the Directive justify certain transitional periods; whereas in the light of the very significant number

of islands in Greece, and the need to maintain constant frequent maritime connections between them and the serious effect on such transport operations and related employment which would arise by immediate application of major upgrading requirements to existing ships of more than 27 years of age on 1 October 2000, it is appropriate to provide for derogations from these requirements for such vessels operating exclusively between ports in Greece, the operation of which will cease on all domestic voyages in the Community not later than on the date on which they reach the age of 35 years;

Article 6 Clause 3 of the Directive focuses on existing vessels. Clause 3 specifies standards that apply to existing vessels which are graded to the EU equivalent of NSCV operational areas, with the most stringent requirements applying to passenger ships operating the equivalent of Operational Area A. Clause 3 refers to standards contained in Annex 1 of the Directive. Annex 1 clearly specifies the application of each provision, whether to new or existing vessels, and also to which operational area. The grading of operational area allows a vessel to downgrade service as an alternative to having to upgrade arrangements to remain in the same service. Clause 3 specifies a transition period for application to existing vessels depending upon the year of build of the vessel, the minimum being about 9 years after the date of the Directive, the maximum being 12 years.

The EU Passenger Ship directive is much clearer than SOLAS in respect of what applies to an existing vessel. It provides a good example of an attempt to address the issues of existing vessels and incorporates a graded response to risk and transition periods. But the basis of the decision making behind the provisions as applied to existing vessels is not readily ascertainable. Whether the cost of applying provisions to existing vessels is matched by the benefit is not discussed.

10. MUSEUM VESSELS

A particular issue which is raised from time to time is the status of museum vessels. For these vessels, there is an additional 'cost' to updating; that is the loss of authenticity and/or originality. For such vessels, the option of applying a 'remedial solution' may be of special importance. Remedial solutions provide more flexibility to adopt operational measures which help reduce risk. Notwithstanding the flexibility provided by the Protocol, the status of museum vessels may need to be specially considered on public policy grounds, remembering though that they are still subject to broader safety obligations discussed under Item 6, Grandfathering and Broader Safety Obligations [19].

11. CONCLUSIONS

The transition principles and, where necessary, the option of a remedial solution provides the means to apply a "modified NSCV solution" suited to the point of safety cost versus accident cost balance in Figure 7. The process requires a fresh look at the standards for new vessels to determine whether and how they might apply to existing vessels, taking into account risks, safety expectations, cost implications and time.

The Protocol is seeking to find a middle ground between two extremes. On one hand it does not accept the creation of vessels that are grandfathered in perpetuity. At the same time, it does not purport to ensure that existing vessels have safety equivalent to that of new vessels. Instead, the objective is to incrementally improve safety on existing vessels as and when the opportunity arises, so that they can keep pace with changing community expectations. It is hoped that this pragmatic approach will lead to requirements that are much more likely to be actually implemented.

The NMSC is currently trialling the application of the Protocol for Transition to Section 7A – Life-saving equipment. A reference group comprising both industry and government representatives has been looking at the provisions one by one, considering their urgency, and whether they should be given progressive or benign status. Where appropriate, transition periods are being assigned. The outcome of this work will be a draft proposal for application of the standard to existing vessels. The NMSC will prepare a regulatory impact statement which will consider the cost benefit of the proposals that will apply to existing vessels. The draft Protocal and draft RIS will go out so you will have the opportunity to comment. The responses should provide good feedback on the effectiveness of the principles in the Protocol.

12. ACKNOWLEDGEMENTS

The author gratefully acknowledges the other members of the Transition Principles reference group whose contributions were instrumental in developing the Protocol, and also the Project Manager, Terry Ehret, for his help reviewing this paper.

Table 2 — Summary of application, exclusions, additions and discretions by Chapter in SOLAS 1974

Chapter	Application	Exclusions	Additions	Discretions
Articles of the Convention	Ships entitled to fly the flag of contracting governments			
I. General Provisions	Apply only to ships engaged on international voyages subject to exclusions	Ship of war Cargo < 500 GT Dumb Wood + primitive Pleasure yachts Fishing vessels Great Lakes	Plus where expressly provided otherwise (also applies to exclusions except Great Lakes)	
II-1. Construction – Structure, subdivision and stability, machinery and electrical installations	Ships as per I. General provisions, excepting exclusions and limited further to: Ships the keels of which are laid on or after 2009/01/01 Cargo ship converted to passenger ship on or after 2009/01/01	Ships as per I. General provisions plus: Ships the keels of which are laid before 2009/01/01 subject SOLAS '74 and additions	Plus where expressly provided otherwise	Ships operating 20 miles or less from land Special trade passenger vessels such as pilgrim trade
II-2. Construction – Fire protection, fire detection and fire extinction	Ships as per I. General provisions, excepting exclusions and limited further to: Ships the keels of which are laid on or after 2002/07/01 Cargo ship converted to passenger ship on or after 2002/07/01	Ships as per I. General provisions plus: Ships the keels of which are laid before 2002/07/01, but subject to SOLAS '74 and additions	Ships the keels of which are laid before 2002/07/01	Ships operating 20 miles or less from land Special trade passenger vessels such as pilgrim trade
III. Life-saving appliances and arrangements	Ships as per I. General provisions, excepting exclusions and limited further to: Ships the keels of which are laid on or after 1998/07/01 Cargo ship converted to passenger ship on or after 1998/07/01	Ships as per I. General provisions plus: Ships the keels of which are laid before 1998/07/01, but subject to SOLAS '74 and additions Existing survival craft with dedicated launching appliance other than inflatable life raft	LSA replacements, additions, major repairs subject to exclusions	Ships operating 20 miles or less from land Special trade passenger vessels such as pilgrim trade
IV. Radio-communications	Ships as per I. General provisions, excepting exclusions plus additions	Ships as per I. General provisions plus: Ships as per application while being navigated in Great Lakes	Cargo ships between 300GT and 500GT	Regulations 7 to 11 if single voyage or otherwise unreasonable subject to conditions.
V. Safety of Navigation	All ships on all voyages subject to exclusions but limited: for Regs.19, 20, 22 ships the keels of which are laid on or after 2002/07/01; and for Reg.18 to equipment installed on or after 2002/07/01	Warships Govt ships in non-commercial service Great Lakes		Ships operating solely in waters landward of the baselines established with international law Ships > 150GT on international voyages Ships > 500GT on domestic voyages Fishing vessels Limited low risk voyages

Chapter	Application	Exclusions	Additions	Discretions
VI. Carriage of cargoes	Ships as per I. General provisions, excepting exclusions plus additions	Ships as per I. General provisions, plus for ships within application: Liquids in bulk Gases in bulk Cargoes that do not present a particular hazard	Cargo ships < 500GT with discretion	Cargo ships < 500GT subject to nature and conditions of voyage
VII. Carriage of dangerous goods	Ships as per I. General provisions, excepting exclusions plus additions	Ships as per I. General provisions, plus for ships within application: Ships' stores and equipment	Cargo ships < 500GT	
VIII. Nuclear ships	All nuclear ships excepting exclusions	Ships of war		
IX. Management for the safe operation of ships	Ships as per I. General provisions, excepting exclusions	Ships as per I. General provisions, plus for ships within application: Government operated for non-commercial		
X. Safety measures for high speed craft	HSC as per Ships in I. General provisions as an alternative to Chapters I to IV and specified clauses in Chapter V, excepting exclusions	HSC as per Ships in I. General provisions, plus for HSC within application: Passenger craft voyage > 4 hrs. Cargo craft voyage > 8 hrs HSC constructed between 1996/01/01 and 2002/07/01, but subject to HSC 1994.		What happens to HSC built before 1996/01/01?
XI-1 Special measures to enhance maritime safety	Ships as per I. General provisions, excepting exclusions plus additions	Ships as per I. General provisions	Cargo ships between 300GT and 500GT	
XI-2 Special measures to enhance maritime security	Ships as per I. General provisions, excepting exclusions	Ships as per I. General provisions	Mobile offshore drilling units	
XII. Additional safety measures for bulk carriers	Ships as per I. General provisions, excepting exclusions and further limited to bulk carriers	Ships as per I. General provisions, plus ships not being bulk carriers		

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This paper was first presented at the Marine Safety Conference 2010, held in Perth on 22–24 August and is reproduced here by kind permission of the National Marine Safety Committee.

EDUCATION NEWS

University of New South Wales

Vice-Chancellor's Award for Teaching Excellence

A/Prof. Gangadhara Prusty is the recipient of a 2010 Vice-Chancellor's Award for Teaching Excellence. This award follows closely on the heels of his recent Australian Learning and Teaching Council (ALTC) Citation for Outstanding Contributions to Student Learning, as well as Lecturer of the Year for 2010 awarded by the School's Year 4 students.

Ganga is a keen and dedicated lecturer. He uses a number of teaching modes to get the message across to his students, including lectures, tutorials, adaptive tutorials which he has created, as well as laboratory classes.

He will be presented with the award and medal at the School's graduation ceremony in March.

Thesis Projects

Among the interesting undergraduate thesis projects under way are the following:

Probabilistic Subdivision of Ships

Probabilistic damaged stability for ships has become mandatory for many large commercial vessels. While allowing a large amount of flexibility in layout, it also means a large amount of work for the consulting naval architect. The latest version of Maxsurf, Version 15, includes probabilistic damage stability. Malinda Wickramaarachchilage is investigating the damaged stability of an existing vessel, which was analysed using the probabilistic method some years ago, providing a basis for comparison of Maxsurf results.

Air and Wind Resistance of Ships

The prediction of air and wind resistance for small vessels is much less well known than that for large vessels, particularly when the vessel is proceeding at an angle to the prevailing wind. The prevailing wind itself has a velocity gradient above the sea, while that due to ship motion has no gradient. Ning Wu is conducting an investigation of the air and wind resistance of a high-speed catamaran in the wind tunnel. This will enable the determination of wind resistance coefficients at angles of attack. The experimental results could then be compared with the results of a computational fluid dynamics analysis, and with the direct profile method.

Post-graduate and Other News

Engineering Annual Dinner

The year of graduation is taken as the year in which your testamur was awarded. For most graduates, this is usually in the year following that in which their last coursework requirements were completed. For example, if you completed your coursework requirements at the final exams in November 2010, then you would expect to graduate in April 2011, and 2011 would be the year of your graduation.

The Engineering Annual Dinner for 2011 will be held on Friday 5 August 2011 at 1900 in Leighton Hall, Scientia Building, for the graduates of 1961, 1971, 1981, 1991 and 2001. So, if you graduated with Sean Ilbery (2001), Tony Armstrong (the younger) (1991), Simo Jaatinen (1981), or Mark Gairey (1971), then you should be dusting off the tux or cocktail dess, polishing your shoes and asking your partner to keep the evening of Friday 5 August free.

The 1971 class is distinguished by being UNSW's sixth graduating class of naval architects, the first having been Brian Robson in 1963.

For further information, please contact Tisha Dejmanee on (02) 9385 7324, email invitations@eng.unsw.edu.au, or check the website www.eng.unsw.edu.au/news-and-events, and click on Dates for the Diary/August 2011 and then select Alumni as the audience.

Industrial Action at UNSW

The enterprise bargaining agreement (EBA) for academic staff at UNSW is now more than two years out of date. A new agreement has not been signed because the Vice Chancellor, Prof. Fred Hilmer, has refused to negotiate with the National Tertiary Education Union (NTEU) on the critical issue of casual and fixed-term appointments.

Under John Howard's Higher Education Workplace Relations Requirements (HEWRRS) legislation, casual and fixed-term appointments grew from about 25% of academic staff to 42% at UNSW and over 50% Australia-wide. Since the demise of HEWRRS, 32 of Australia's 47 universities have now signed EBAs which reinstate the pre-HEWRRS caps on casual and fixed-term appointments for academic staff. UNSW, Macquarie and Wollongong are lone wolves, wanting no caps, because it is cheaper to employ casual staff and there is no security of their positions.

At UNSW, some academic staff withheld course results in order to place pressure on management to negotiate. Following pressure from students for results, management then began manufacturing course results for some students, without reference to the academics in charge of the courses for which results were being withheld. This is not acceptable, and the NTEU decided that, in order to maintain UNSW's reputation, course results should be submitted, and this was done in mid-January.

However, the dispute is far from over, and industrial action is continuing.

Phil Helmore

Curtin University

OpenFoam Student Projects

This year, we will be using OpenFoam for several of our undergraduate research projects. OpenFoam is an open-source CFD software package which can be used freely for research or commercial work. The projects will be supervised by Dr Tim Gourlay from CMST and Dr Andrew King from Curtin's Mechanical Engineering department (also part of the Fluid Dynamics Research Group). Andrew has experience with using OpenFoam in industrial applications, and we will now be applying this tool to marine projects.

The OpenFoam student projects planned for 2011 include:

2D and 3D Foil Analysis for Sailing Dinghies

This work will analyse flow around symmetric foils (keels, rudders and fins) and asymmetric foils (sails).

Flow beneath Ships at Small Under-keel Clearances

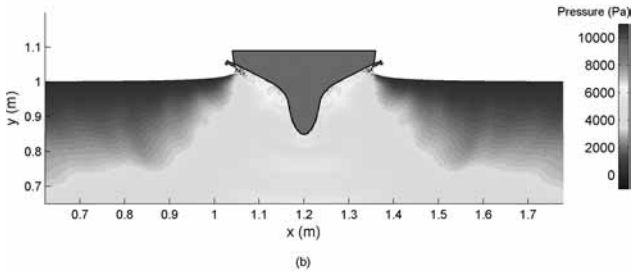
Pressure, forces and squat will be analysed for ships

travelling in shallow water, and the results compared with standard slender-body methods.

PhD thesis submitted

Daniel Veen has recently submitted his PhD thesis, entitled *A Smoothed Particle Hydrodynamics Study of Ship Slamming in Ocean Waves*. His project focused on developing a two-dimensional Smoothed Particle Hydrodynamics (SPH) code to model impact loads of ship hull sections in waves. The code was validated using a variety of experimental and analytical test cases, including the classic dam-break problem and a simple wedge impacting a free surface. An important output of Daniel's research was a generalised boundary method using "ghost particles", which enabled slamming pressures to be accurately calculated on solid boundaries. The 2D method was finally developed into a 2D + t strip theory for analysing the slam impact of a ship in head seas, including jet formation, impact pressures and slamming loads. Daniel's work will be presented at the RINA Conference *Innovation in High Speed Marine Vehicles* at Fremantle in March 2011.

Kim Klaka



Output from Daniel Veen's work
(Image courtesy Curtin University)

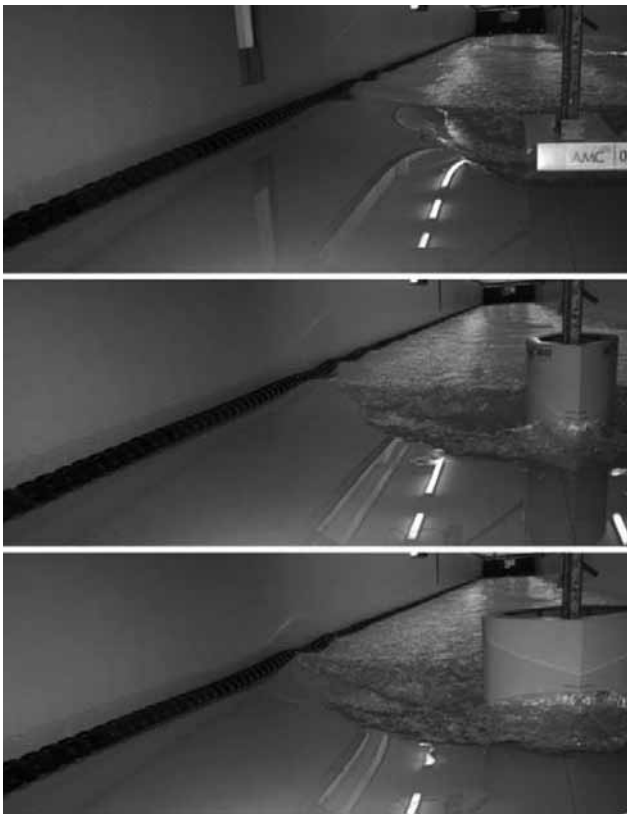
Australian Maritime College

Making the Perfect Wave

As reported in the August 2009 edition of *The ANA,* the AMC with industry participant Liquid Time, was successful in obtaining an ARC Linkage Project in the second round of 2008. The contracts have been signed and work has now commenced in earnest; we will be looking for an additional PhD candidate within the next month.

Many surfers do not have the luxury of living near surf breaks, and must travel long distances in order to surf. Then, as local populations increase and surfing becomes more popular, existing surf breaks become overcrowded — even dysfunctional. Surfers have responded by travelling to more distant and remote locations to chase uncrowded and better waves, though this increases the cost of surfing and does nothing to reduce crowding at their home breaks. Another solution has been to build artificial reefs in the ocean; however, these still rely on the natural wave conditions. A third solution is to develop new breaks and generate one's own waves in a controlled environment — the wave pool. Liquid Time has patented a unique solution in the circular wave pool. The research we are conducting is focussed on producing the perfect surfing wave with the minimum of wave energy.

Our present PhD candidate, Steven Schmied, conducted a series of experiments over the Christmas break on simple boat shapes to create that perfect wave. Two Wigley hulls and a wave-dozer were tested at various speeds, water depths and draughts whilst measuring the wave profile. The figure below shows the three different hulls being tested at a depth Froude number of 0.66 and draught-to-depth ratio of 0.25. From preliminary results it seems easy to make big waves, but hard to make the perfect wave. A second PhD scholarship will be advertised shortly; for more information contact Dr Jonathan Binns, telephone (03) 6335 4847 or email J.Binns@amc.edu.au.



Three wave producing hulls being tested for the surfability of the waves created, at a depth based Froude number of 0.66 and a draught to depth ratio of 0.25
(Photos courtesy AMC)

French Intern Students Keep Coming

Since the August 2008 edition of *The ANA* we've been reporting on a steady flow of French intern students to the AMC. These students are required to conduct internships, similar to our work-experience requirement, and relish the challenge of completing their tasks on the opposite side of the world in a foreign language. The exchange works both ways, our students discover the rigours of the French education system and the intern students find out what it takes to actually do experiments. The demand for placements is quite high, and this year we've turned back a few.

Presently, we have two intern students, Youri Guedj and Arnaud Duquesnal, both from ENSIETA. Youri is working on numerical modelling of underwater vehicles and Arnaud is working on numerical modeling of diesel sprays. Lucky for Youri and Arnaud, they are visiting throughout what's been a fabulous Tasmanian summer, travelling the coast looking for perfect waves and perfect fishing.

Postgraduate Enrolments and Completions at the AMC

After many years of hard work by students and supervisors, we are seeing a rapid growth in engineering postgraduate students at the AMC. Presently we have 19 active postgraduate students enrolled in engineering under the AMC

Youri and Arnaud enjoying some relax time over Christmas holidays during their Tassie internship
(Photo courtesy AMC)

and 16 registered supervisors. For more information on present postgraduates or postgraduate opportunities, please contact Dr Jonathan Binns, telephone (03) 6335 4847 or email j.binns@amc.edu.au.

Most pleasing of all, though, are the four thesis submissions we've had in the last 12 months. We've pulled together the titles and a short summary from their abstracts for each and take this opportunity to say congratulations on completing years of work.

John Wakeford — *Improving Sink-rate of Demersal Longlines: Focus on Reduction of Seabird Bycatch*

The sink-rate of demersal longlines is recognised as an important performance parameter nowadays because it is well demonstrated and widely accepted that hooks on faster sinking lines catch fewer seabirds during the line-setting stage, especially if an effective bird-scaring line is used as well. Auto-longliners in the Southern Ocean toothfish fishery are leading the way in many respects, since these vessels have been abiding by a minimum sink-rate regulation for several years now and, in the process, have reduced seabird bycatch to a level which is acceptable to the controlling body, namely the Commission for the Conservation of Antarctic Living Marine Resources (CCAMLR). To achieve the required sink-rate these autoliners have resorted to using heavier swivel-lines with lead-ballast inside one or more of the mainline strands. Currently, compliance with this sink-rate regulation is verified using one of two CCAMLR approved in-situ measurement methods and neither is without its challenges or shortcomings. In this study a third method was developed, one which used prediction equations based on a terminal velocity principle.

David Clarke — *Experimental and Computational Investigation of Flow about Low-aspect-ratio Ellipsoids at Transcritical Reynolds Numbers*

As the role of unmanned underwater vehicles expands, it becomes increasingly important to understand the nature of the fluid flow around them. This research examined the flow around two ellipsoids with generic shapes representative of streamlined unmanned underwater vehicles. Although a significant body of work, both experimental and computational, exists for flow about spheroids, the majority of this is for prolate spheroids with finer aspect ratio.

Ideally computational fluid dynamics could be used to examine the flow about these shapes during the design process. However, before this process is useful there needs to be an understanding of the strengths and weaknesses of the techniques being applied. Calculation of the three-dimensional flow around these vehicles presents a number of significant challenges including boundary-layer transition and boundary-layer separation off smooth doubly-curved surfaces.

A number of experimental techniques were refined during this work. These include a quick and accurate method of applying discrete-element boundary-layer trip strips, which is particularly suited to three-dimensional shapes; improvements to a fast-response total-pressure probe, and an oil-flow visualisation technique using a mixture which is close to neutrally buoyant and may be formulated to alter the viscosity over a large range.

Vikrambhai Garaniya — *Modelling of Heavy Fuel Oil Spray Combustion Using Continuous Thermodynamics*

Commercial liquid petroleum fuels are complex mixtures of various hydrocarbons. In multi-component fuel modelling, these liquid fuels are represented typically with two components or up to ten discrete components. Even with ten components, there are limitations on the representation of real commercial fuels such as heavy fuel oil (HFO), which contains large numbers of hydrocarbons with a wide range of molecular weights and dissimilar structures. Continuous thermodynamics and pyrolysis chemical kinetics are used to model the behaviour of HFO in diesel-spray combustion.

In the present study, HFO is represented by four fuel fractions — n-paraffins, aromatics, naphthenes and heavy residue. Each of these fractions is assigned a separate distribution function. In the evaporation model, both low-pressure and high-pressure formulations for the calculation of vapour-liquid equilibrium (VLE) at the droplet surface are provided. The formulations for high-pressure VLE are developed for a semicontinuous mixture and a generic approach to the equation of state is used.

A sample of HFO is characterised in the laboratory using chemical characterisation procedures such as sequential elution solvent chromatography, gas-chromatography, mass spectrometry and elemental analysis, to obtain the composition and mean molecular weights of HFO fractions required for continuous thermodynamics modelling. A CFD simulation of the characterised HFO was performed using the developed evaporation and pyrolysis models.

Andrew Mason — *Stochastic Optimisation of America's Cup Class Yachts*

Past efforts to automate the design optimisation of America's Cup Class yachts have typically used an objective function which evaluated the performance of an individual boat using direct computational fluid dynamic analysis of the hull design. This approach suffers from the use of an inappropriate measure of merit, as well as having extremely long execution times. A superior method is the use of an objective function incorporating a match-racing tournament amongst a population of candidate designs. The resulting need to maintain a population of designs makes the problem well suited to population-based optimisation methods, such as genetic algorithms. Performance issues have been addressed through the use of a neural-network-based metamodel, trained using parameters sampled from the design space and calculated using the SPLASH potential flow code. This has resulted in an optimisation system which gives good results while retaining reasonable execution times.

Mark Symes

New NSCV Generic Equivalent Solutions and Guidance Circulars

The Peer Advisory Network (PAN) of the National Marine Safety Committee (NMSC) is a body made up of senior surveyors from each of the Marine Safety Agencies around Australia. Its role is to review proposals in accordance with National Marine Guidance Manual 10 *Administrative Protocol for Assessing Generic Equivalent Solutions under the NSCV*. At its November 2010 meeting, the PAN approved four new generic equivalent solutions and commissioned three new National Guidance Circulars, as follows:

- GES 2010-02 Application of AS 4132
- GES 2010-03 Fabricated HDPE construction
- GES 2010-04 Thermoplastic fuel tanks
- GES 2010-05 Compass adjustment

and

- NMSC Guidance Circular 10-1 Construction of vessels using welded polyethylene
- NMSC Guidance Circular 10-2 Procedure for ultrasonic propeller shaft inspection
- NMSC Guidance Circular 10-3 Thermoplastic fuel tanks

The Guidance Circulars provide technical details to support some of the more-complex equivalent solutions or, in the case of Guidance Circular 10-1, to identify an optional method for use in periodic surveys.

All of the approved generic equivalent solutions approved to date can be found at

www.nmsc.gov.au/commercial_vessels/index.php?MID=17&COMID=1&CID=17

NSCV Correction Amendments and Interpretations

The National Marine Safety Committee (NMSC) Secretariat is currently working on a second tranche of correction amendments to the National Standard for Commercial Vessels (NSCV), in many cases to assist in the interpretation of specific clauses but, in other cases, to make minor changes which do not add to the cost of compliance; e.g. to update references to technical standards. It is anticipated that these amendments will be released following the March meeting of the NMSC.

Tech e-News, Edition 17, 31 January 2011

National System for Commercial Vessel Safety

The following is reproduced from the National System pages of the AMSA website, www.amsa.gov.au/national system.

Australia currently has eight different jurisdictions regulating commercial vessel safety. In 2009 the Council for Australian Governments (COAG) decided to make the Australian Maritime Safety Authority (AMSA) the national regulator and standard setter for all commercial vessels operating in Australia from 2013.

The National System will focus on maintaining and improving maritime safety. It will allow seafarers and their vessels to work and move throughout Australia. It will also ensure that nationally-agreed standards are uniform and are applied consistently. The National System will also include a modern Maritime Safety Act which will replace the existing Navigation Act 1912.

The Regulatory Affairs and Reform Group within AMSA is responsible for establishing the National System in collaboration with the Commonwealth Department of Infrastructure and Transport, State/Northern Territory maritime agencies and the National Marine Safety Committee (NMSC).

What is the National System?

The National System for Commercial Vessel Safety will be a nationally-uniform approach for regulating commercial vessels in Australian waters. It will be a merger of the eight systems which currently operate in Australia. The National System will establish and maintain national requirements for commercial vessels, vessel operators, and crew standards. The administration of the National System will involve existing maritime authorities working together with AMSA to promote an efficient and safe commercial maritime market.

Council of Australian Governments

COAG is the peak inter-governmental forum in Australia, comprising the Prime Minister, State Premiers, Territory Chief Ministers and the President of the Australian Local Government Association (ALGA). It is the forum where reform activity involving all levels of Government in Australia is considered and agreed.

In July 2009 COAG agreed that AMSA would become the national regulator of all commercial vessels in Australian waters. The COAG communiqué which announced this decision is available on the website.

Australian Transport Council

The Australian Transport Council (ATC), comprising Transport Ministers from the States, Territories and the Commonwealth, is working to implement COAG's decision to develop a single National System for the regulation of all marine commercial vessels.

On 24 September 2010 ATC received a progress report from AMSA and the Commonwealth Department of Infrastructure and Transport and agreed on the preferred approach for legislative, governance and administrative frameworks for the National System.

The ATC endorsement of the National System sets the foundations for a new national arrangement that is set to deliver national consistency and certainty for all commercial vessel operators across the country.

More information on the ATC can be found on the website.

Department of Infrastructure and Transport

The Department of Infrastructure and Transport contributes to the wellbeing of all Australians by assisting the Government to promote, evaluate, plan and invest in infrastructure and by fostering an efficient, sustainable, competitive, safe and secure transport system.

The Department works closely with AMSA on maritime

safety reform, and its role in the reform is to deal with the major policy questions associated with the reform. These include settling the arrangements between the Australian Government and the jurisdictions, including the negotiation of a National Partnership Agreement (NPA). The purpose of the NPA is to formalise the agreement of all Australian governments to the operating arrangements under which the National System will operate.

More information about the Department's involvement with the National System can be found on the website.

What is happening now?

National System for Commercial Vessel Safety

Commonwealth, State and Territory governments have agreed to work together on a model to deliver the National System. The model has the following steps:

- the rewrite of the Navigation Act 1912 which will result in a new statute: the Maritime Safety Act covering those vessels which are regulated at the moment by the present Commonwealth arrangements;
- the development of a Maritime Safety (National Law) Act which will provide the framework for the new commercial vessel national system;
- development of State and Northern Territory legislation to apply the new Commonwealth national law statute in each State and the Northern Territory; and
- formal delegations between the Commonwealth and each State and the Northern Territory under the new Commonwealth national law statute and the new state and territory legislation.

This model will create a new National System for all commercial vessel operations. However, it will involve local implementation to minimise costs and disruption. These arrangements will be formalised in a National Partnership Agreement which is expected to be signed in 2011.

A fact sheet on the National System for Commercial Vessel Safety can be found on the website.

Tinny to Tanker (MO3)

AMSA is rewriting Marine Orders Part 3 (MO3) to include what has become known as Tinny to Tanker (T2T). The most significant change will be to broaden the AMSA suite of Standards of Training, Certification and Watchkeeping (STCW) certificates into the near-coastal area of operation—within Australia's Exclusive Economic Zone. These proposed new STCW near-coastal certificates will include, for the smaller vessels, combined trading and fishing certificates. It is intended that all AMSA certificates issued under the new MO3 will be readily acceptable in all Australian States and Territories, as is required by the Council of Australian Governments (COAG).

T2T is being developed separately from, but in parallel with, the National System and will form a key element of the future regulatory framework. It is planned that T2T will commence prior to the 2013 National System; stakeholders are encouraged to offer comments during the T2T public consultation stage.

AMSA welcomes your questions and feedback which can be emailed to T2T@amsa.gov.au.

A fact sheet on *Tinny to Tanker* can be found on the website.

Navigation Act 1912 Rewrite

In June 2009 the Hon. Anthony Albanese MP, Minister for Infrastructure, Transport, Regional Development and Local Government announced the Government's plan to undertake a major rewrite of the Navigation Act 1912.

The objectives of the rewrite are to

- recast the Act in modern plain language;
- reflect contemporary conditions and practices of the shipping industry;
- remove unnecessary and out-dated provisions;
- enhance ship safety and protection of the marine environment;
- introduce greater flexibility to allow amendments to international treaties to be readily adopted; and
- provide confidence and certainty for industry.

The rewrite of the Navigation Act 1912 will proceed in parallel with the development of the necessary legislative amendments to implement national maritime safety reforms culminating in the National System for Commercial Vessel Safety.

A fact sheet on the Navigation Act rewrite can be found on the website.

Maritime Labour Convention

The Maritime Labour Convention (MLC) was adopted by the International Labour Organization (ILO) in February 2006 and replaces more than 60 existing ILO maritime labour instruments.

The MLC sets out the minimum requirements for seafarers to work on a ship. It establishes a strong compliance and enforcement mechanism based on flag State inspection and certification of seafarers' working and living conditions. This is supported by port Sate inspection of these ships to ensure ongoing compliance.

The MLC also contains provisions allowing it to keep step with the needs of the industry and help secure universal application and enforcement. It sets minimum requirements for seafarers to work on a ship and contains provisions on condition of employment, hours of work and rest, accommodation, recreational facilities, food and catering, health protection, medical care, welfare and social security protection.

It is anticipated that the MLC will enter into force internationally in 2012 and it is critical for Australia to ratify the MLC by this time because the MLC requires ratifying countries to apply the terms of the MLC to all foreign ships coming into their ports.

The MLC is being implemented domestically through amendments to the Navigation Act 1912 and Marine Orders. An exposure draft of the Bill will be sent out to key stakeholders and it is expected that the Bill will be introduced in and passed by Parliament within the first half of of 2011.

National Marine Safety Committee

Over the coming months, many of the National Marine Safety Committee's (NMSC) functions will be progressively handed over to AMSA; in particular, the responsibility for providing the Secretariat for the NMSC. The remainder of the NMSC's function of developing the National Standard

for Commercial Vessels (NSCV) will devolve to AMSA once the national regulator is established. This handover is in keeping with COAG's decision to implement a National System for Commercial Vessel Safety and reflects the fact that, by mid-2011, the NMSC will have effectively completed all the tasks originally assigned to it, including developing the remaining Sections of the initial NSCV. The NSCV will require continual development beyond this date to reflect industry developments and changes in technology and practices over time.

At a practical level, the NMSC office in Sydney will continue to operate as usual and it will be staffed by AMSA officers working on the NSCV. It will be redesignated as an AMSA office, once the handover is completed upon the establishment of the national regulator, at which time some contact details will change. However, its role in developing and updating national standards for commercial vessels in close consultation with industry and maritime jurisdictions will not change.

More information on the NMSC can be found on the website.

State and Territory Partners

AMSA Working with State and Territory Maritime Authorities to Implement the National System

AMSA will be responsible for developing, implementing and monitoring the National System from 2013. Until then, commercial vessel operators will need to continue to comply with the relevant State and Northern Territory laws.

When the National System is implemented, the new national law will be applied in each State and the Northern Territory to all commercial vessels. AMSA, with all state and territory maritime safety authorities acting under AMSA delegation, will monitor compliance with the national regulations.

In effect, this means that State and Northern Territory regulatory bodies will be given powers under the National System to run the National System and commercial vessel operators will continue to work with their State/NT maritime safety authorities on day-to-day matters.

www.amsa.gov.au/nationalsystem

VALE TED BELL

It is with sadness that *The ANA* reports the passing of Edward Thomas (Ted) Bell MRINA on 4 December 2010, at the age of 87.

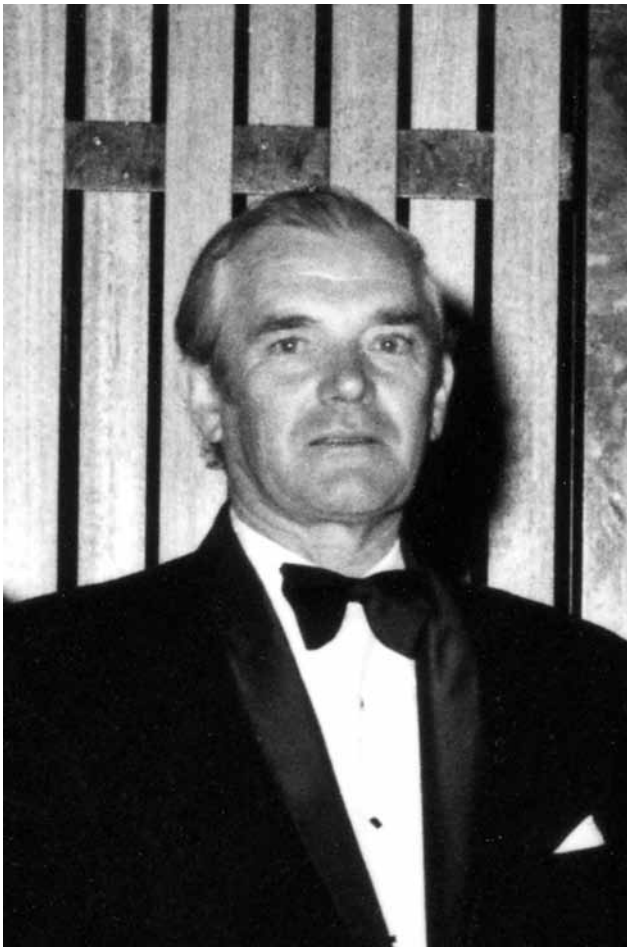
Ted started work as a trainee draughtsman at Navy Office in Melbourne in 1942. In 1945 he moved to Sydney and worked in the drawing office at Garden Island whilst undertaking the naval architecture diploma course at the Sydney Technical College. After graduating, Ted moved back to Navy Office in Melbourne where he worked on the design of HMAS *Kimbla*.

Ted was posted to the United Kingdom in 1954 for three years as the Australian Navy Constructor Liaison Officer. During this time he married his wife Dorothy.

Ted returned to Navy Office, first in Melbourne and later in Canberra, where he worked on the adaptation of the Type 12 frigates to accommodate the Australian-designed anti-submarine guided missile *Ikara,* the design of the Attack-class patrol boats and the destroyer tender HMAS *Stalwart*. In 1965 he was transferred to the staff of the General Overseer and Superintendent of Inspection, East Australia Area (GOSIEAA) based in Sydney and continued his work on *Ikara* during ship installation and with the patrol boats during their construction.

Ted then transferred to the Garden Island Naval Dockyard as Superintending Naval Architect with responsibility for the drawing office and quality assurance. He took a great interest in the training of future naval architects during his time at the dockyard. He was also involved in the activities of the Institution and was a member of the RINA Australian Branch/Division Council for some years, including as Vice-President.

Ted retired in 1986 and the following year found a new challenge as a volunteer with the Sydney Heritage Fleet working on the Museum's ships, especially the restoration of the launch *Berrima*. He was also an active member of the Probus Club of Sydney of which he was President in 1993.



Ted Bell at the dinner celebrating the formation of the Australian Division in 1978

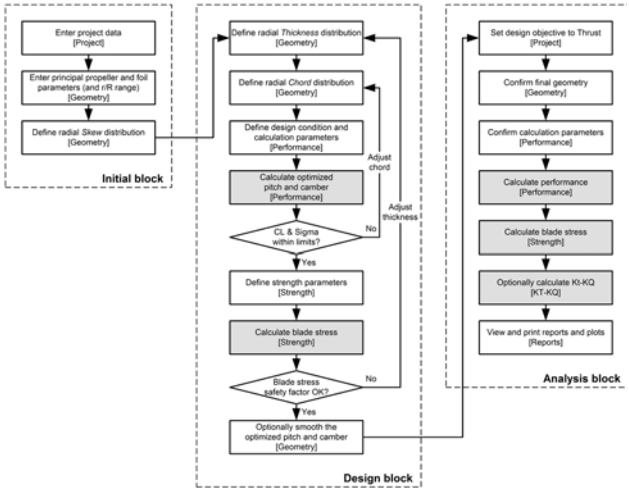
Ted's funeral at the Macquarie Park Crematorium, North Ryde, on Monday 13 December was well attended by a large number of friends and colleagues. Ted is survived by Dorothy, to whom we extend our sympathy.

Bob Grant
John Jeremy

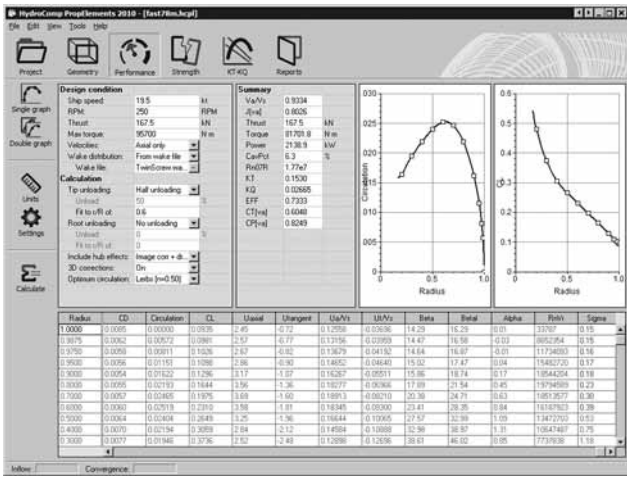
New Software from HydroComp

The propeller is the link between the engine and the hull. A well-designed propeller ensures that a motor yacht makes speed as efficiently as possible, is properly matched to the engine and transmission, and is free from noise and vibration. Today's high-value motor yachts have pushed the limit of stock propellers, and custom or semi-custom propellers are commonplace. However, proper evaluation of custom or semi-custom propellers requires calculations which may not be part of the typical naval architect's "toolbox".

HydroComp PropElements is a new propeller design and analysis tool from HydroComp, Inc. which provides serious yacht designers with a measure of technical scrutiny which has been absent. Naval architects can now work in partnership with propeller manufacturers to ensure that a proposed propeller design will perform as specified. PropElements allows even novice naval architects the ability to evaluate propeller designs and investigate alternatives which may better achieve speed, be more-suitably matched to the propulsion equipment, and do so with fewer noise and vibration problems.



A flow chart showing the PropElements process
(Chart courtesy HydroComp)



The propeller performance output of PropElements
(Image courtesy HydroComp)

Celebrating 27 years of operation in 2011, HydroComp Inc. provides software products and consultancy services for the performance analysis and design of marine vehicles to industry, research and government clients. Currently more than 600 marine professionals in over 60 countries are using HydroComp's award-winning marine propulsion software. PropElements was nominated for a DAME Award (Design and Excellence) at the Marine Equipment Trade show (METS) in Amsterdam last November.

For more information, please contact Jill Aaron, Managing Director, email info@hydrocompinc.com.

Wärtsilä to Power Advanced UK Research Vessel

In December Wärtsilä was awarded the contract to supply the propulsion equipment for a new state-of-the-art research vessel. The vessel will be operated by the UK's Natural Environment Research Council (NERC), and is to be built at the CNP Freire S.A. shipyard in Spain. The NERC is the UK's main agency for funding and managing world-class research, training and knowledge exchange in the environmental sciences.

The contract calls for Wärtsilä to supply four of its 8-cylinder in-line Wärtsilä 20 main diesel-electric generating sets, two main propulsion steerable thrusters, one bow retractable thruster, and a complete Low Loss Concept diesel-electric system. The majority of the Wärtsilä equipment will be delivered by the end of 2011, and the ship is scheduled to be launched before the end of 2012.

Wärtsilä has considerable experience in meeting the demanding needs of specialty vessels, and is considered to be the market leader in supplying propulsion systems for research and naval ships with low underwater radiated noise requirements.

Edward Cooper, the NERC's Project Officer, commented: "It is vital that the ship's systems be designed in such a way that the research activities, for which this ship is intended, can be carried out in the most-effective way possible. For this reason, we are delighted to cooperate with Wärtsilä, whose technology in this field is clearly very advanced. In particular, Wärtsilä's underwater noise abatement measures are critical to the research work."

The NERC co-ordinates some of the world's most-exciting research projects, tackling major issues such as climate change, environmental influences on human health, the genetic make-up of life on earth, and much more. NERC receives around €475 million a year from the UK government's science budget, which is used to fund independent research and training.

The new research ship will provide a state-of-the-art platform for researchers to address some of the world's most-pressing environmental issues. It will enable them to take measurements from the oceans which could lead to critical information regarding climate change, marine ecosystems, and underwater seismic activity. This, in turn, could deliver significant economic and societal benefits for the people of the world.

Special attention is to be paid to noise-related issues on the main steerable thrusters in order to comply with low underwater radiated noise requirements. These include the modification of the shank and pod to give a more

Wärtsilä will supply the propulsion solution for the UK's new research vessel *Discovery* to be operated by the NERC (Image by Skipsteknisk AS, courtesy Wärtsilä)

hydrodynamic shape, and a special fixed-pitch propeller design adapted to the specific wake field of the vessel. In addition, the generator sets will be double elastically mounted to ensure that the lowest-possible vibration is transmitted to the ship's structure. The Wärtsilä Low Loss Concept diesel-electric system will reduce electrical losses, which in turn reduces the power requirement, and hence CO_2 emissions. The main steerable thrusters are to be Ice Class 1D compliant.

The NERC vessel, RRS *James Cook*, delivered in 2006, is also fitted with Wärtsilä propulsion equipment, and the ship's silent propellers were supplied by Wärtsilä in France. The successful performance of this equipment was considered a key factor in the award of this latest contract.

"Our proven experience in meeting the specific needs of research ships has been an essential element of our negotiations with the NERC. Not only is there commonality of parts with the existing main engines on the RRS *James Cook*, but we also have a strong reference installation of steerable thrusters on the American T-AGS 60 oceanographic survey ships. Furthermore, we are able to provide local support from our Wärtsilä Service facilities in UK," noted Paul Bennett, Sales Manager, Wärtsilä UK Ltd.

Wärtsilä order for LNG-powered Platform Supply Vessel

Wärtsilä has strengthened its position as the global leader in supplying design and propulsion solutions for Liquefied Natural Gas (LNG) Platform Supply Vessels (PSVs) with yet another important order.

Norwegian operator, Eidesvik Offshore, placed an order for its fifth gas PSV in December. This latest order further demonstrates Eidesvik's position as the world leader in environmentally-friendly gas-powered PSVs. All Eidesvik's gas PSVs, including this latest order, are designed by Wärtsilä and utilise Wärtsilä's unique dual-fuel technology. In addition to the complete design of the vessel, Wärtsilä's scope of supply for the new PSV includes the dual-fuel main engines and generating sets, the electrical power and propulsion system, integrated automation, and the power-management system. The vessel will be fitted for use in arctic waters with 'winterisation' and de-icing solutions, and is to be built at Kleven Verft in Norway.

The new Wärtsilä VS 489 Gas PSV design is a state-of-the-art vessel. It features outstanding energy efficiency, a unique hull form, fuel flexibility, and outstanding vessel performance in areas such as fuel economy and cargo capacity. The Eidesvik orders include a unique configuration of the gas-electric propulsion system. This is based on a combination comprising the Low Loss Concept for electric propulsion, the Wärtsilä 34DF main engines, and the recently introduced Wärtsilä 20DF engine. The dual-fuel units enable, in addition to heavy fuel oil (HFO) and marine diesel oil (MDO), the use of gas as a main fuel for marine applications. Wärtsilä's ability to offer total concept solutions which include the design of the vessel, the propulsion plant, electrics and automation, and a host of fuel-saving and environmentally-sustainable options, has given the company a notable competitive edge — particularly in the area of specialty vessels such as Gas PSVs.

The Wärtsilä 20DF Completes a Wide Portfolio of Dual-fuel Engines

The Wärtsilä 20DF engine is the latest addition to the company's complete portfolio of dual-fuel engines. This industry-leading technology offers the marine sector numerous benefits, including the primary advantage of having the flexibility to utilise different fuels. At a time of uncertainty in the cost of liquid fuels, and as environmental legislation becomes increasingly stringent, this flexibility enables the use of cost-efficient and environmentally-friendly LNG as the main fuel. In case of interruption to the gas supply, Wärtsilä DF engines automatically switch to diesel-mode operation without any loss in speed or power output. Single-fuel installations obviously lack this additional level of operational safety.

"The combination of our unique design capabilities, and the introduction of the Wärtsilä 20DF dual-fuel engine, means that the customer will have a highly-efficient vessel to operate in all conditions. The energy efficiency, cargo capacity and overall performance are all outstanding," commented Tor Henning Vestbøstad, Sales Manager, Wärtsilä Ship Design. Vestböstad also emphasises the company's excellent collaboration with both Eidesvik and Kleven, which has been an important factor in the success of this project.

The new platform supply vessels for Eidesvik Offshore will include an integrated Wärtsilä gas power solution featuring the recently-launched Wärtsilä 20DF engine (Image courtesy Wärtsilä)

LCS Dual Buy a Double Win for ShipConstructor

Congressional approval to purchase ten each of both Lockheed Martin's and Austal's competing designs for the US Navy's Littoral Combat Ship (LCS) program is a double win for ShipConstructor Software Inc.

As with previously-built Littoral Combat Ships, future vessels in both the Freedom and Independence classes are being 3D modelled and constructed by companies using ShipConstructor's AutoCAD-based CAD/CAM application.

"ShipConstructor dominates the market for US naval construction," noted Justin Paquin, ShipConstructor's Product Manager. "The majority of the US Navy's future fleet will be built using ShipConstructor software."

ShipConstructor is a CAD/CAM software suite which provides tools for production engineering of marine structures. ShipConstructor captures all information relevant to the 3D design, manufacturing, maintenance, repair and refit of complex marine projects inside of a Marine Information Model (MIM). At the heart of the model is a single relational database residing on a Microsoft SQL Server which can be integrated with related business processes and applications.

Wärtsilä joins Global Sustainable Shipping Initiative

Wärtsilä has joined the Sustainable Shipping Initiative (SSI), a programme initiated by Forum for the Future. The initiative brings together the industry's leading organisations to show what can — and must — be done for shipping to contribute to, and benefit from, a sustainable future.

This global taskforce gives leading industry players, and their supply-chain stakeholders, a framework for assessing the extent of their sustainability challenges. By understanding their role in a sustainable future, companies can gain a competitive advantage and support the development of good policy in the process. SSI was founded earlier this year by Forum for the Future in collaboration with WWF, Maersk Line, BP Shipping, Lloyd's Register, Gearbulk, and ABN Amro. Forum for the Future is the UK's leading sustainable-development NGO. It works internationally with government, business and public-service providers, helping them to develop strategies to achieve success through sustainability, to deliver products and services which enhance people's lives and are better for the environment, and to lead the way to a better world.

The shipping industry will be profoundly affected by strategic megatrends, notably climate change and new weather patterns, oil shortages and carbon taxes, changing markets and cargoes—particularly in Asia, piracy and marine governance, new ship designs, as well as other technological developments. The SSI will help participants to prepare for, influence, and take advantage of these trends, and play a leading role in shaping the future of the industry.

Members, drawn from throughout the industry, will explore how best to react to these megatrends, and prepare a case for action as a resource for the entire industry. This will set the agenda for creating a vision of a sustainable shipping industry and a plan to create a step change in the social, environmental and economic sustainability of the shipping industry.

Today, Wärtsilä joins the initiative along with other new members: Cargill, a charter fleet operator with more than 300 vessels; South Korea's Daewoo Shipbuilding & Marine Engineering, one of the world's biggest shipbuilders; Rio Tinto Marine, the shipping arm of the mining giant; RSA, one of the world's top four marine insurers; and the high-profile Greek tanker operator, Tsakos Energy Navigation.

"The Sustainable Shipping Initiative has set out to transform an industry which plays an essential role in global trade and affects the lives of billions of people," said Jonathon Porritt, founding director of Forum for the Future. "The growing number of elite international companies coming on board shows that industry leaders understand that sustainability is crucial to their future success."

"The quality of these new members is a testimonial to the growing importance of promoting sustainable shipping, both to the industry and to society at large," said Tom Boardley, Marine Director, Lloyd's Register. "Their addition will deepen the expertise of the group as we look for solutions which will help the industry to improve its business performance while, at the same time, lessening our collective carbon footprint."

CEOs and board-level representatives will launch the case for action at a members' summit in 2011. The ultimate goal is to mobilise support across the industry for an action plan, which may include technical and engineering initiatives, policy proposals, development programmes for industry leaders, and marketing and communications plans.

"Wärtsilä powers every third ship, and services every second ship sailing the world's seas. Providing sustainable solutions is the cornerstone of Wärtsilä's commitment to the shipping industry," said Jaakko Eskola, Group Vice President, Wärtsilä Ship Power. "This initiative is an excellent opportunity for Wärtsilä to contribute towards ensuring that shipping remains in the future as the most-sustainable way of transporting goods over long distances."

AUSTRALIAN NAVAL MINE WARFARE

Low-technology mines are one of the most cost-effective weapons in existence.

Vice Admiral Stanley Arthur, USN, 1991 [1]

The sea mine is a sea-denial weapon. The laying of even a limited minefield in port approaches, in focal areas, or in choke points can deny an adversary free access. A known or suspected minefield will compel an adversary to either accept the loss of access and associated costs, or commit resources to lengthy and costly mine countermeasures (MCM) operations. Minefields can be used protectively in support of allied shipping or aggressively against an adversary. A mining threat will affect an adversary through disruption of plans, hindrance of maritime activity, lowering of morale, and disruption of national economy.

Australia is dependent on maritime trade, and mining an Australian port or its approaches would effectively close that port to shipping. Effective MCM assets provide the only practical means to reopen it. The defence of Australia requires an effective and balanced mine-warfare force incorporating a combination of minehunting, minesweeping and clearance diving. The ideal should be to acquire a mine-warfare force capable of deployment as required to support Australia's strategic interests and objectives.

MCM SHIPS AND UNITS

The RAN currently employs the following ships and units in the conduct of defensive MCM.

The deployable Commander Mine Warfare and Clearance Diving (MCD) task group, including the Mine Warfare Command Support System — This is a deployable headquarters capable of planning and executing MCM operations from either a sea- or shore-based headquarters. Small components of the headquarters may be deployed as part of a multinational headquarters. The task group regularly conducts exercises with Five Power Defence Arrangement (FPDA) nations, the Royal Navy (RN), Canadian Navy (CN) and the United States Navy (USN), both in Australia and abroad.

Huon-class Coastal Minehunters (MHC) — The six Huon-class vessels (two maintained in extended readiness) are capable of conducting minehunting to a maximum depth of 200 m and performing both mechanical and influence minesweeping operations. The MHCs carry clearance divers to provide an identification and disposal capability.

Minesweepers —Three remotely-controlled minesweeping drone units (MSDU) capable of conducting precursor operations to sweep mines targeting minehunters and minesweepers using mini dyads and the Australian Acoustic Generator.

Clearance Diving Teams (CDT) — The two permanent RAN CDTs have the ability to locate, identify, dispose of and exploit mines in the shallow and very-shallow water regions. A third RAN CDT is formed and deployed for specific military operations. All CDTs may be employed in advance force operations, port and wharf clearances, and in support of MHC operations. They also possess unique specialist diving, salvage, demolition, explosive ordnance disposal (EOD) and improvised explosive device disposal (IEDD) skills which can be used in other operations such as:

- underwater and land-based EOD and improvised explosive device disposal;
- support to amphibious operations by undertaking;
- landing site reconnaissance and survey;
- landing site sea mine and obstacle survey and clearance in very shallow water;
- other maritime tactical operations as required;
- contributing to advanced force operations such as Rapid Environmental Assessment (REA);
- undertaking other specialist diving operations assigned (eg. placing and recovery of underwater sensors, offshore maritime counter-terrorist); and
- limited underwater battle damage patching, repair and salvage capability to assist a damaged ship to return to a support facility for more comprehensive repairs.

Naval Reserve Diving Teams

The seven naval reserve dive teams have a limited diving and salvage capability which, assuming training and currency requirements are met, can be used to supplement the CDTs or to backfill CDT roles when the CDTs are deployed.

Maritime Geospatial Deployable Support Team

The MGDST unit provides technical and performance analysis of MCM operations, evaluation of MCM effort, intelligence and forward-based logistics support to deployed MCM forces. MGDST operates MDSU and Autonomous Underwater Vehicles (AUV) for support of MCM operations.

Naval Reserve Mine Warfare Groups

Among other tasks, the two groups have the ability to supplement headquarters staff and provide additional personnel to the MGDST.

MILITARY TASKS

The advantages of employing the sea mine include engaging an adversary at minimal risk to one's own units; providing the possibility of delivering a pre-emptive defensive attack; engaging an adversary with a covert weapon which maintains a continuous threat; forcing an adversary to operate both military and commercial shipping in areas which make them more vulnerable to other weapons; forcing an adversary to maintain an MCM capability; and presenting an adversary with a significant psychological threat.

The sea-mine threat may be described under two main categories. Moored mines are positively buoyant, attached to the seabed, floating at a pre-determined depth below the sea surface, and may be laid in depths down to 300 m or greater. Ground mines are negatively buoyant, resting on the seabed, and are laid in water depths in excess of 200 m. The diversity of sea mine types available to an adversary means that the planners of MCM operations need to consider a number of different approaches. MCM operations may be divided into offensive and defensive. Offensive MCM operations are carried out to prevent an

adversary from successfully laying sea mines and may include:

- strategic strike against an adversary's mine warfare infrastructure;
- maritime strike against an adversary's seaborne minelayers enroute to the mine laying areas; and
- air attack against an adversary's airborne minelayers enroute to the mine laying areas.

The ADF does not possess an offensive mining capability and, for the majority of ADF military operations, some form of defensive MCM will be required. For example, defensive MCM operations are needed to protect expeditionary forces used for maritime power projection, to defend sea-control forces operating in the littorals, and to counter an enemy's efforts to deny Australia the use of the sea. Defensive MCM operations are carried out to remove or reduce the threat after sea mines have been laid and include:

- passive measures, such as the localisation, identification and avoidance of the threat through intelligence, mine- and obstacle-avoidance sonar, peacetime route survey operations, route selection and publication of mine danger areas
- active measures, such as the use of MCM assets to remove, destroy or neutralise the mines or delineate the probable limits of the minefield.

The two main measures are minesweeping and minehunting. Minesweeping techniques use either influence or mechanical sweeps towed behind the minesweeper. Influence sweeps are designed to emulate the magnetic and/or acoustic signatures of a surface or sub-surface target and explode the mine. Mechanical sweeps are designed to cut the mooring cables of buoyant mines, using explosive cutters attached to the sweep wire, allowing the mine to float to the surface for subsequent disposal. Influence minesweeping is conducted by towing a specially-designed rig astern of a minesweeper. These can be used in any combination to precisely emulate the magnetic and acoustic signature of the target vessel to these types of mines.

Minehunting involves detecting and classifying sea mines using high-definition sonar. Once classified as a 'possible' mine, remotely-controlled underwater mine-disposal vehicles or clearance divers can be deployed to identify and destroy or neutralise the mine. The principal advantage of minehunting over minesweeping is that minehunters use forward-looking sonar, which enables the vessel to avoid passing over a mine while searching. It is currently the only practical MCM technique to counter the pressure mine.

The effectiveness of the MCM effort is expressed in terms of risk to the transitor and/or levels of confidence. For example, the outcome of a clearance operation may result in a 90% confidence level that the first transitor would not interact with a mine. Therefore a mixture of the risk which is acceptable to supported commanders, the clearance required to reduce that risk and the time taken to achieve that clearance, determines the end state of operations. In some cases the required level of clearance may not be achievable in the time required and the supported commander will have to make the decision to either accept the higher risk or extend the time allowed for the operation.

CONSTABULARY AND DIPLOMATIC TASKS

In addition to their primary military functions, RAN MCM ships and units can contribute a wide range of constabulary tasks, such as search-and-rescue, Defence Force aid to civilian authorities, environmental and resource protection and peace operations. The CDTs possess specialist underwater-search and deep-water diving support capabilities, which also makes them well suited to performing search and rescue operations or assisting police divers in this task. The RAN also provides clearance divers to the Australian Army Tactical Assault Group East for the conduct of maritime counter-terrorism operations, support to major fleet unit operations for an enhanced boarding capability and for EOD/IEDD support to operations in Afghanistan. MCM units also provide an underwater or land-based EOD and IEDD device-disposal capability to assist police. MCM ships can contribute to fisheries protection and the prevention of illegal immigration, by supplementing patrol-combatant and surface-combatant patrol operations. In addition MCM ships have contributed in recent years to ADF and coalition peace-keeping and peace building operations in Bougainville, East Timor and Solomon Islands, by providing a stabilising presence and contributing to patrols intended to monitor ceasefires.

The RAN's MCM ships and units also contribute to a range of diplomatic tasks, including assistance to allied and friendly nations, evacuation operations and humanitarian assistance and disaster relief. MCM ships and units can conduct preliminary reconnaissance, survey and, if necessary, clearance of approaches to beach-landing sites used in operations undertaken to protect or evacuate Australian nationals during regional crises. Since 1945 RAN MCM units have also cleared enormous quantities of mines and unexploded ordnance from South East Asia, Papua New Guinea, and the islands of the South West Pacific. Each year RAN CDTs respond to a variety of EOD taskings in Australia involving the discovery of mines laid during World War II (WWII). They also provide EOD assistance to other nations within the region to deal with discarded Allied and Japanese WWII ordnance. Additionally, they have contributed to regional disaster relief operations and the clearing of passages through reefs.

AN EYE ON THE FUTURE

The future direction and concepts for MCM will be shaped by an understanding of the expeditionary capabilities currently being delivered to the ADF. Certainly, mine warfare will not be less important in future. The opposite is the case, since mine warfare will permeate across all activities which the ADF undertakes at sea. The RAN does not just rely upon a few specialist personnel operating a small number of MCM vessels but, rather, deploys mine warfare specialists across the fleet to undertake passive and active countermeasures at home and abroad. The current mine warfare force is evolving and navy people are currently working hard re-examining mine-warfare concepts and doctrine in an effort to guide the future capability.

1. Vice Admiral Stanley Arthur, US Naval Commander in the 1991 Gulf War, quoted in 'Desert Storm at Sea' in *US Naval Institute Proceedings*, Naval Review Issue 1991, p. 86.

Reproduced from Semaphore*, Issue 10 November 2010, published by the Sea Power Centre – Australia*

DIAMANTINA AFLOAT AGAIN

The recent brisbane floods refloated the WWII frigate *Diamantina* in the South Brisbane graving dock at the Queensland Maritime Museum. *Diamantina* floated up satisfactorily, but the lightship CSL2 (astern of *Diamantina*, was not so lucky. With some plating missing from her hull, CLS 2 began to float but then sank in the dock
(Photo courtesy Brett Smith)

Diamantina with the water in the dock restored to a more usual level. She cannot be docked down again until CLS 2 is salvaged
(Photo Hugh Hyland)

MEMBERSHIP

Australian Division Council

The Council of the Australian Division of RINA met on Thursday 2 December 2009. In the absence of the President, the Vice-President, Prof. Renilson, chaired the meeting.

Some of the matters raised during the meeting were as follows:

Divisional Officers

As the term of Dr Cannon will end in March 2011, Council elected Prof. Martin Renilson as the Division's President for 2011 to 2013. The March meeting of Council will consider who will replace Prof. Renilson as Vice-President for that two-year period. In the meantime, nominations were being called for elected Council members for a similar term. Mr Antony Krokowski was elected as a member of the Division's Executive Committee.

NMSC/NSCV Concerns

In response to concerns raised by Sections regarding the omission from NSCV of AS.4132 as a deemed-to-satisfy solution for structure, Council has pursued this matter with NMSC with the result that AS.4132 has been declared a generic equivalent solution valid until 2016, subject to a number of qualifications.

Commercial Vessels Single National Jurisdiction

Council has been monitoring developments in this area. In particular, it viewed with some concern the apparent delay in completing transition to the single jurisdiction, especially in relation to the uncertainty which practitioners would face over the intervening period, and undertook to communicate with AMSA to achieve some clarity and offer cooperation to facilitate a smooth transition.

Next Meeting and Annual General Meeting

The next meeting of Council of the Australian Division will be held on Wednesday 30 March 2011 by teleconference originating in Sydney. The Division's Annual General Meeting, for which the formal notice appears in this edition, will be held later that day.

Rob Gehling
Secretary

THE ROYAL INSTITUTION OF NAVAL ARCHITECTS

AUSTRALIAN DIVISION

NOTICE OF ANNUAL GENERAL MEETING

WEDNESDAY 30 MARCH 2011

Notice is hereby given that the Annual General Meeting of the Australian Division of the Royal Institution of Naval Architects will be held at the offices of Engineers Australia, 8 Thomas Street, Chatswood, NSW 2067 on Wednesday 30th March 2011 immediately following the conclusion of the joint Technical Meeting of the New South Wales Section of RINA commencing at 6.00 pm for 6.30 pm Eastern Standard Time.

AGENDA

1. Opening
2. Apologies
3. To confirm the Minutes of the AGM held in Sydney on Tuesday 23 March 2010
4. To receive the President's Report
5. To receive, consider, and adopt the Financial Statements and Auditor's Report for the year ending 31 December 2010
6. Announcement of appointments to the Australian Division Council
7. Other Business

R C Gehling
Secretary
7 February 2011

Professional Indemnity Insurance

A number of members in private practice have recently inquired about the need for, and availability of, professional indemnity (PI) insurance.

It should be pointed out from the outset that Paragraph 23 of the Institution's *Code of Professional Conduct*, with regard to *Risk Assessment* states:

> *Every member undertaking a professional assignment should assess his/her potential liability for the accuracy and consequences of the work, and where appropriate, hold professional indemnity insurance.*

Additionally, a specified level of PI insurance may be mandated in some states and some clients may themselves require practitioners to hold as a pre-condition of allocating work.

Professional indemnity coverage is generally provided by an employer. However, self-employed naval architects who have attempted to secure PI insurance have often found that it is not necessarily easy to secure and that it is invariably quite expensive.

As a service to members, the "members only" section of the RINA web-site names a number of PI insurance providers, at least some of whom have arranged representation in Australia. Also, at least one Australian broker offering PI insurance has from time to time advertised in this journal.

Obviously, the risk associated with individual circumstances is variable, so the website listings do not necessarily indicate a particular level of premiums or discounts, but these organisations are understood to take appropriate account of RINA membership in their assessment of risk and therefore in their premiums.

Members requiring additional information should feel free to contact the Australian Division Secretary at rina.austdiv@optusnet.com.au or phone 0403 221 631.

Rob Gehling

NAVAL ARCHITECTS ON THE MOVE

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

Tom Bromhead, a graduand of the University of New South Wales, has taken up a position with Mannum Boat Haven and Slipway in Mannum, South Australia.

Greg Byrne has moved on from Forgacs and has taken up the position of Customer Sales Manager Commercial with Sydney City Marine at Rozelle Bay in Sydney.

Mike Fitzpatrick has moved on and is now one of the eleven partners owning Robert Allan Limited, the leading tug-design company in Vancouver, Canada, which still employs Robert Allan himself. Mike has taken over much of the commercial management.

Matthew Fox, a recent graduate of the University of New South Wales, has completed his European sojourn and has taken up a position as a naval architect with the Defence Materiel Organisation in Sydney.

Annette Hill, a graduand of the University of New South Wales, has taken up a position as a naval architect with One2three naval Architects in Sydney.

Claire Johnson, a graduand of the University of New South Wales, has taken up a position as a naval architect in the Stability Technology Branch of the Directorate of Navy Platform Systems in the Department of Defence in Canberra.

John Lembke has moved on from Halcyon International and has taken up a position with Dof Subsea Australia in Perth.

Jonathan Ling, a graduand of the University of New South Wales, has taken up a position as a naval architect with the Berjaya Dockyard, Sarawak, Malaysia.

Anthony Livanos, a graduand of the University of New South Wales, has taken up a position as a naval architect with Austal Image in Fremantle.

Campbell McLaren, a graduand of the University of New South Wales, has taken up a position with the School of Physics at the University of New South Wales.

Henry Morgan has moved on from Camarc in the UK and has taken up a position as a naval architect with Incat Crowther in Sydney.

Daniel Oliver, a graduand of the University of New South Wales, has taken up a position as a naval architect with the Defence Materiel Organisation in Sydney.

John van Pham, a graduand of the University of New South Wales, has taken up a position as a naval architect with Incat Crowther in Sydney.

Kevin Porter has moved on from Lloyd's Register and has taken up a position with the Australian Maritime Safety Authority in Canberra.

Tony Sammell moved on from Booz Allen Hamilton many moons ago and spent a year in Hong Kong worked for BMT. He then returned to Sydney and, for a sea change, completed his degree in medicine at the University of Sydney late last year, and has now taken up a position as an intern at the Prince of Wales Hospital in Sydney.

Jonathan Toomey has moved on from Sydney City Marine and has taken up the position of General Manager of Defence Maritime Services in Sydney.

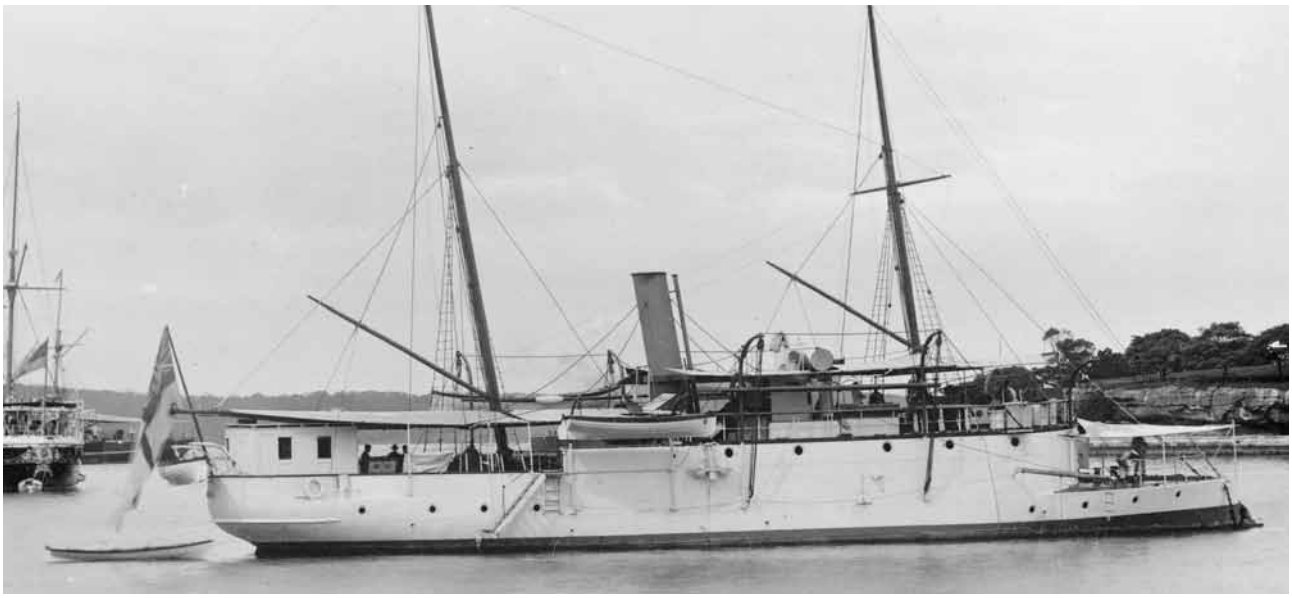
Cameron Whitten has moved on from BAE Systems (Maritime) and has taken up a position as a naval architect with Sea Transport Solutions at Runaway Bay, Qld.

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 Rob Gehling when your mailing address changes to reduce the number of copies of *The Australian Naval Architect* emulating boomerangs.

Phil Helmore

FROM THE ARCHIVES

THE BRISBANE FLOODS OF 1893



The Queensland gunboat Paluma
(Photo Naval Historical Collection)

The recent tragic floods in southern Queensland and the dramatic flooding of parts of Brisbane recalled the similar flood which occurred in 1893. On 2 February 1893 the city of Brisbane was cut off by a major flood with the river running at some 10 knots. The colonial Queensland Navy had a naval depot opposite the city near where the two gunboats *Gayundah* and *Paluma* were based. These 360 ton ships had been completed in 1884 and were armed with one 8 in gun, one 6 in gun two 9 pdr guns and two 3 pdr guns. They had twin screws with steam engines providing 400 ihp for a speed of 10.6 knots.

On 2 February 1894 *Gayundah* managed to escape the swollen river and found refuge in Moreton Bay, but *Paluma* was not so lucky. Alongside for a refit, she could not escape and was towed across to the Botanic Gardens and secured to trees. Even so, she nearly broke free but, when the water dropped, she was left high and dry in the gardens, along with the coal hulk *Mary Evans* and the freighter *Elamang*.

The Queensland Government placed an order with a contractor to refloat the ship but, before he could complete his preparations, a further major flood on 19 February substantially refloated *Paluma*. The tug *Advance* managed to drag her free after 24 hours and she was delivered alongside the depot by the contractor in accordance with his contract, albeit completed with considerable help from nature.

Paluma in the Botanic Gardens with *Elamang* and *Mary Evans*
(Photo John Oxley Library, University of Queensland)

Picture courtesy of BAE Systems Marine Ltd.

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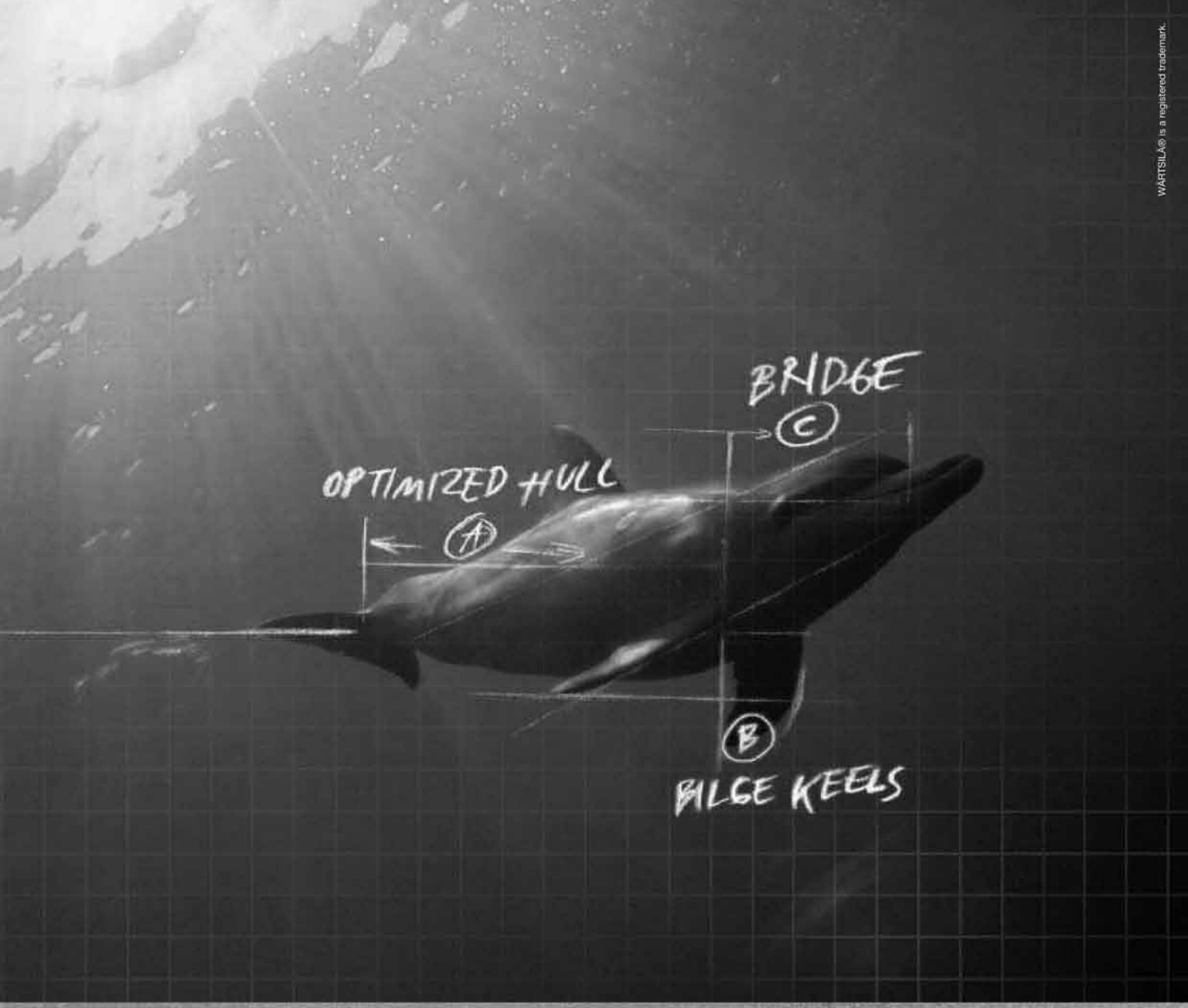

NOTICE HOW ALL THE PARTS FIT TOGETHER.

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