

# THE AUSTRALIAN NAVAL ARCHITECT



Volume 15   Number 3  
August 2011



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# THE AUSTRALIAN NAVAL ARCHITECT

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

Volume 15 Number 3  
August 2011

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Cover Photo:

Recently handed over to her Danish owners,  
*Leonora Christina* is the largest catamaran built  
by Austal so far (Photo courtesy Austal)

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on the

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## From the Division President

As members may recall, the Division Council agreed to propose a change to the Division by-laws to permit Associate Members to serve on Council. This was approved at the Special General meeting held on Thursday 19 May. We see this as a very important change which will permit younger members to take an active part in the running of the Division and we are now able to welcome Associate Members to the Council. I know that there are one or two enthusiastic Associate Members who would like to be able to contribute, and look forward to their input.

I'm pleased to report that progress towards the Single National Jurisdiction is continuing, with AMSA now in the consultative phase. A number of meetings have been held around the country and, if you didn't make it to one of these, then please contact AMSA for more details. Information provided by AMSA on progress is included in this edition on Pages 47 and 48. Whilst in general this is supported by RINA, there are a number of points of detail where more consideration is required. The Institution is in effective dialogue with AMSA regarding these issues and, if members would like more information or would like to raise any further aspects of concern, then please contact either myself or the Secretary.

Other proposed changes to the Navigation Act are also of importance to the industry. These are designed to result in an increase in the number of Australian-flagged ships, and, hence, to increase the size of the Australian maritime sector. The Council is monitoring these developments but, at this stage, we have decided not to make a formal submission to the process. If any members have any thoughts on this please then contact either the Secretary or me.

In the last edition I mentioned that we had recently made a submission to the Inquiry into Defence Procurement, which is being undertaken by the Senate's Standing Committee on Foreign Affairs, Defence and Trade. The Institution has been asked to attend a hearing in Canberra to discuss this further and I will be attending the hearing with the Secretary. The main points we made in this submission were the vital importance of Department of Defence being an intelligent customer; the need to maintain a continuous stream of work to the industry, and the importance of taking Australian conditions into account during the design of warships. A copy of our submission can be obtained from the Committee at [http://www.aph.gov.au/senate/committee/fadt\\_ctte/procurement/submissions.htm](http://www.aph.gov.au/senate/committee/fadt_ctte/procurement/submissions.htm).

If you have not already had a chance to look at our submission or those from other organisations, then I encourage you to do so. This is important for the future of the profession in Australia, as there are some who are arguing that future warships ought to be 'bought off the shelf' from overseas.

The submission date for abstracts for the forthcoming Pacific 2012 International Maritime Conference has now passed. We have a good number of excellent offerings and the program committee is currently assessing these. As in past years there is a number who have requested that they be refereed, and we have agreed to do this provided that they are submitted by 3 October. There is then only a very short time after that to referee them and for the authors to take these comments into account so, if you are asked by a

member of the program committee to assist in this manner, then we would appreciate it if you can do so promptly. I'm looking forward to this conference, as these are always very well attended, with interesting papers and I have enjoyed them in the past.

A development which is being introduced is for sections to record the lectures given at some of their section meetings. These recordings include a view of the presenter and the slides, along with the sound. It is still a bit experimental, but I'm sure that it will become more common in the future. I know that this has been done by both the NSW and the Tasmanian sections. The former can be accessed at [http://www.mediavisionz.com.au/ea\\_flash/syd/2011/110302-easyd/index.htm](http://www.mediavisionz.com.au/ea_flash/syd/2011/110302-easyd/index.htm), whilst the Tasmanian section has still to upload its recordings.

The RINA Council in London is also considering something similar, but using a different system modelled along the lines of that used by the Society for Petroleum Engineering. Presentations are also broadcast live, with the virtual audience being able to ask questions by email which are answered by the presenter at the end of the lecture. The presentations are also recorded and can be viewed after the occasion — although without the opportunity to ask questions.

I think that these developments are very important, particularly for those Australian members who are not able to attend many technical meetings in person so, if you have any thoughts on these developments, then please contact a Council member or me.

*Martin Renilson*

President

[martin@renilson-marine.com](mailto:martin@renilson-marine.com)



Martin Renilson  
President, RINA Australian Division

# Editorial

The recent announcement by the Minister for Defence that the Government is to undertake an Australian Defence Force posture review has prompted considerable speculation about the possibility of a new base for major ships of the RAN in the north of Australia, with speculative images of air-warfare destroyers alongside in well-known northern ports.

When it recently called for public submissions on the review, the Department of Defence made it clear that the review will focus at a strategic level, rather than focussing on individual bases, etc., but that is unlikely to quell calls for a new 'Fleet Base North' for the RAN to complement or replace the present Fleet Base East and Fleet Base West.

In his report on future Australian defence submitted to the young Commonwealth government just over 100 years ago on 1 March 1911, Admiral Sir Reginald Henderson proposed that primary naval bases be located in Sydney in the east and at Cockburn Sound in the west, with secondary bases around the coast of Australia and Tasmania — at the River Tamar, Hobart, Westernport, Port Lincoln, Albany, King Sound, Darwin, Thursday Island, Townsville, Brisbane and Port Stephens. The government acquired land in some of these sites and construction of new bases began at Cockburn Sound and Port Stephens. The advent of the First World War and the decline in defence spending which followed saw the end of work at these new locations, and it was not until that 1970s that Admiral Henderson's vision for a fleet base at Cockburn Sound was realised. Meanwhile, much of the land acquired for the other bases was sold and could never now be used for the then-intended purpose.

Admiral Henderson's recommendations were largely driven by the short range of the ships contemplated for the new Australian Navy. Today, the vast distances facing RAN ships and submarines transiting to areas of operations continue to suggest the need for bases closer to these operational areas and indeed such bases have been established, in Cairns

and Darwin, for the Navy's smaller ships like patrol boats. Locating and constructing a base for major fleet units is not, however, a trivial task.

A major fleet base needs to be located where people want to live. Partners need to be able to find suitable and satisfying employment, and there must be educational facilities for families, including universities. The port in which the base is located needs to have defendable, all-weather deep-water access with a manageable tide range. The base would need a sizeable area of land within the port for the necessary facilities and cyclone-proof berths for the ships. In addition to having the usual services required by a major fleet base, access to comprehensive industrial infrastructure would be essential.

Despite the enormous size of Australia, the geography and demography of the country suggest that the options for locating such a base are very limited and the likely cost very high. Will we have a 'Fleet Base North' in the foreseeable future? I think not — but additional forward-operating bases are another matter. Such bases, where major fleet units can safely berth for refuelling, restoring, rest, recreation and rectification of minor defects, have long been recognised as a requirement for the RAN. The destroyer tender HMAS *Stalwart* was designed and built in the mid 1960s to meet just such a need. In this century a base which could, for example, be used as a forward-operating base for the RAN's submarines would usefully extend their range and reduce transit times. Such forward-operating bases could well be co-located with the bases serving the present and future RAN offshore patrol vessels which maintain our northern barrier.

The Force Posture Review will no doubt flush out a wide range of proposals and ideas, but future plans will have to be tempered with large doses of practicality and affordability. It will be interesting to see what emerges from the review, which is intended to inform the planning for the next Defence White Paper.

*John Jeremy*



HMAS *Parramatta* in the outer Cook Dock with HMAS *Melbourne* (facing left) next to HMAS *Anzac* in the inner dock in 2009.

Thales was faced with another challenging multiple docking of RAN ships recently — see the report on Page 34

(Photo courtesy Thales Australia)

# NEWS FROM THE SECTIONS

## Australian Capital Territory

On 13 July 2011 Claire Johnson, a graduate naval architect working with the Stability Group within the Directorate of Navy Platform Systems of the Department of Defence, gave a presentation on *Determination of Discharge Coefficients for Damage Openings in Ships*. This presentation was based on the undergraduate engineering thesis project undertaken by Claire in which she experimentally determined discharge coefficients for a range of opening geometries covering circular, rectangular and star-shaped openings of various scales and aspect ratios. The study was prompted by Claire's earlier involvement in examining time-to-flood for damaged ship scenarios, during a placement with the Navy Platform Systems section of the Department of Defence during her studies. Discharge coefficients are not well documented for non-circular orifices. It was found that, despite the broad range of opening geometries tested by Claire, the discharge coefficients remained relatively similar to those of circular orifices. Both discharge into air and into water on the downstream side of the opening were considered; however, all cases consisted of openings with relatively sharp edges. Claire suggested that future work in this area should possibly consider curvature of the sides of any opening representing bent shell plating in way of the damaged opening. That said, aside from understanding the influence of opening geometry, there is also a need to be able to better predict the overall size of damage as a result of any incident, whether accidental or due to conflict. This can naturally be quite variable.

Martin Grimm

## Tasmania

The Tasmanian Section has held a number of technical meetings during 2011. A brief report on each follows.

### LNG — the New Fuel for Fast Ferries

In March, Gary Davidson from Revolution Design was at the AMC for the careers fair. The night before the fair we asked him to present his ideas on the latest Incat design which incorporates an LNG powering system. The challenges of getting such a large-volume system into a fast/light/narrow craft with fast port turnarounds creates a whole new design space into which some innovative designs are venturing.

In Gary's words "As worldwide environmental concerns increase and the IMO legislative processes create greater restrictions on emissions, liquefied natural gas (LNG) will become a very important new fuel in the economics of efficient, cost-effective and environmentally-sustainable shipping. Meeting future Tier II environmental guidelines in certain coastal areas may only be practical with LNG.

"Current predictions are that the price of distillate fuel will increase as the world economy picks up and demand exceeds supply during the early part of this current decade, but it is expected that the price of LNG will not. This is due to high world reserves and worldwide efforts to develop natural gas infrastructure and markets which will ensure that supply will exceed demand for the foreseeable future.

The latest Revolution Design/Incat wave-piercing catamaran is a gas turbine powered, LNG fuelled, 99 m vessel capable of speeds of 50 kn or more."

## The Australian Naval Architect

The talk explained the mechanism of operating with LNG, its advantages and disadvantages as well as future applications.

### A Novel Method of Generating Continuously Surfable Waves

On 19 May both the CEO of Liquid Time Pty Ltd (Greg Webber of Webber Surfboards fame) and the Principal Engineer (Steven Schmied) were in Launceston wrapping up their experiments on the next generation of wave pools in the AMC's Model Test Basin.

Steven gave an historical perspective on the project's beginnings at a chance meeting of himself and Greg. The wave-pool concept is quite exciting but does require significant and careful design to get right. To help LT in their design they have been collaborating with TU Delft and AMC, resulting in a number of internships, Master's and PhD projects.

A further PhD scholarship is in the process of being advertised — contact Jonathan Binns by email at [jrbinn@amc.edu.au](mailto:jrbinn@amc.edu.au) for further information.

### Xplore Expeditions — Life in the Southern Oceans

The 20.3 m sailing vessel *Xplore* pulled into Beauty Point in July after a slightly longer than expected crossing of the Pacific Ocean (she's normally based in Chile). She's currently wintering in Tassie for a well-earned break.

On 20 July skipper Stephen Wilkins and first mate Audrey Daumale were talking about the expeditions they've made in the Southern Oceans and life onboard *Xplore* to a larger-than-usual RINA crowd.

*Xplore* is a sailing vessel specifically designed and built for the extreme conditions of the Southern Ocean, as proven in Antarctic waters and two circumnavigations. A fast, heavy-weather sailing yacht, *Xplore* has strong motoring capabilities for when time and conditions demand.

The destinations which *Xplore* visits are among the world's wildest and most biologically rewarding. From Antarctica to the coast of Patagonia — icy fjords to the supreme diversity of the tropics, isolated from the rest of the world's temperate zones — *Xplore's* scope provides a unique assemblage of wildlife including sea birds, seals, whales, penguin colonies, and more.

The Antarctic voyage talks always fascinate our audience and this was no exception.

### HMAS Sydney II

Dr Stuart Cannon was in Launceston on 27 July to chair the Industry Advisory Committee for the AMC National Centre of Maritime Engineering and Hydrodynamics, so we asked if he could give his talk on the discovery and forensic analysis of the wreck of the RAN cruiser HMAS *Sydney*.

On 19 November 1941, the Royal Australian Navy's Modified Leander-class light cruiser *Sydney*, en route to Fremantle, intercepted the disguised German raider *Kormoran* about 100 nautical miles west of Steep Point off the coast of Western Australia. In the ensuing battle, *Sydney* was sunk with the loss of the entire crew of 645 men. *Kormoran* was subsequently scuttled with the loss of 81 of her crew.

Following the discovery of the wrecks of *Sydney* and *Kormoran* in March 2008, the Defence Science and Technol-

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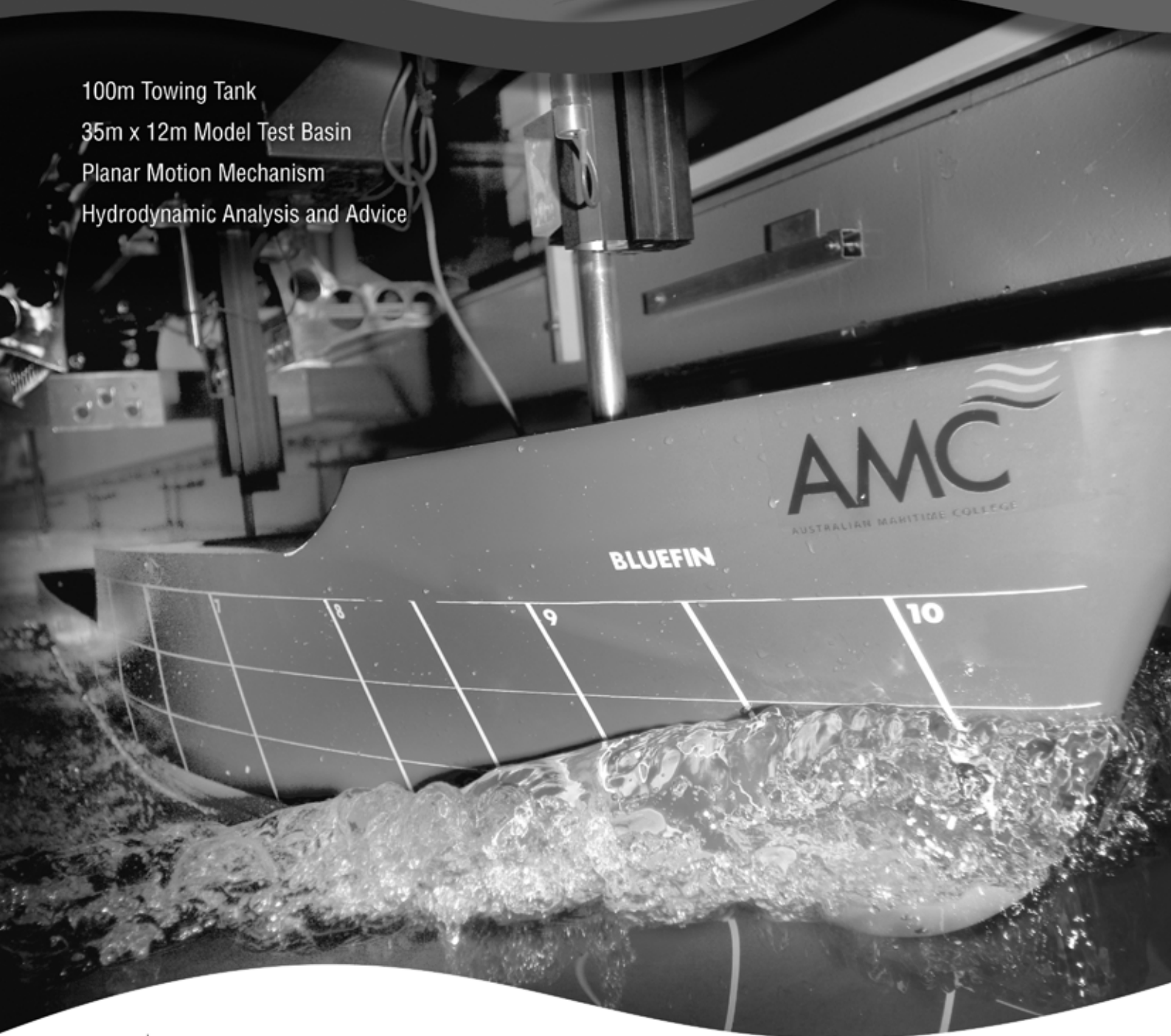


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ogy Organisation (DSTO) in collaboration with the Royal Institution of Naval Architects (RINA) were appointed to provide expert advice and opinion on the sinking of *Sydney*. The presentation discussed the evidence of the weapons damage to *Sydney* and presented the interpretation of that evidence. How and why *Sydney* sank with no survivors was explained and a visualisation of the engagement was presented.

The amount of detail discovered and extrapolated from the data for this project was quite astounding.

### The 2011 Season

With only one more talk to go in the 2011 season, the Tasmanian Section is pleased to report that talks for this year have been recorded. We are in the process of uploading the video files to the internet for public viewing and will advise how they can be viewed in the next issue of *The ANA*.

Jonathan Binns

### South Australia and Northern Territory

At a combined RINA/IMarEST technical meeting on 16 February, Adam Brancher of the Department for Transport, Energy and Infrastructure gave a presentation entitled *National Reform, Local Impact — The National System for Commercial Vessel Safety*. He described the work being undertaken by AMSA and the state maritime bodies towards the introduction of a single jurisdiction. The meeting was attended by approximately 25 people, all of whom provided Adam with a barrage of questions. RINA and IMarEST are grateful to Adam for providing the first presentation of the year.

A combined technical meeting was held on 16 March on the development work being undertaken towards the introduction of sanctuary zones within SA waters. The speaker was Alison Wright of the Department of Environment and Natural Resources. Her presentation, *Development of South Australia's Preliminary Sanctuary Zones*, was well received by members and provided information on the science and methodology used to develop the proposal which was out for community comments.

In addition, Hannah Flint from IMarEST in London was introduced to SA members ahead of a six-month placement with IMarEST's Australian Division.

Gary Whittle from International Paints gave a presentation entitled *IMO PSPC for Ballast Water Tank Coatings* to the members of RINA and IMarEST in April. Gary introduced the IMO's *Performance Standard for Protective Coatings* by explaining the context for the standard's introduction, the development of its requirements, the gains for the ship owner and the practicalities for the shipyard. The presentation was attended by approximately 15 members and 30 guests, all of whom thoroughly enjoyed the presentation. The committee thanked International Paints and Gary for their support of this year's technical program.

On 15 June a joint technical meeting was held at ASC Submarines when local RINA member Malcolm Morrison of ASC gave a presentation entitled *Claim Argument Evidence Safety Cases for the Maritime Industry*. Malcolm's presentation introduced the ability to customise the claim argument framework to suit the vessel, owner and operational profile. This meeting was attended by 30 people

and each left with many thoughts for future safety arguments. All attendees thanked Malcolm for his presentation and ASC for the use of their auditorium.

It was cold and wet on 6 July when members attended a site tour of MTU Detroit Diesel's Adelaide facility. Greg Gilkes showed members around the custom-built facility, including 10 truck service bays, a truck wash bay and three fully-functional engine-test beds. Members were lucky to see, hear and feel an engine run in one of the test beds. The committee members thanked Greg and MTU for their support of members and Greg and his helpers were invited as guests to the AWD site tour in August.

On 17 August the combined RINA/IMarEST technical meeting comprised a site tour of ASC's new yard in Osborne. ASC is the prime contractor for the RAN's new air-warfare destroyers. The AWDs will be constructed using a block-build method with three shipyards building modules (including ASC) and consolidation by ASC. ASC provided a guided tour of the shipyard where guests were able to view the first AWD under construction.

Danielle Hodge

### New South Wales

#### Committee Meetings

The NSW Section Committee met on 11 May and, other than routine matters, discussed:

- SMIX Bash: All sponsorship payments for SMIX Bash 2010 have now been received, and a small surplus has resulted, enabling donation of the proceeds of the raffle to be donated to the Sydney Heritage Fleet, and planning for 2011 to proceed. A booking has been made for *James Craig* for 1 December 2011, the invoice has been received and will be paid shortly.
- Technical Meeting Program: Presentations have been arranged up to September, and a final presentation for October is being sought.
- Register of Naval Architects in NSW: The NSW Maritime Authority has asked if RINA NSW would be interested in maintaining a list of consultant naval architects in NSW to which they could refer potential clients. This way the consultants are recognised by an international body, they are bound by a code of ethics, and it may sway some recalcitrant colleagues to apply for—or renew—their memberships!

The NSW Section Committee also met on 22 June and, other than routine matters, discussed:

- SMIX Bash: The hire of *James Craig* for 1 December 2011 has been paid; for the payment of registrations, credit-card facilities will continue and direct-deposit facilities are being investigated.
- Technical Meeting Program: A presentation for October has been arranged, and another being sought quickly for July due to changed commitments of the scheduled presenter.
- Register of Naval Architects: There is a register of consultants on the main RINA website which lists RINA members and organisations worldwide. This is being investigated with a view to filtering to areas, rather than being worldwide.

The NSW Section Committee also met on 27 July and, other than routine matters, discussed:

- SMIX Bash: The use of credit-card facilities has been arranged, but direct-deposit will not be used due to the difficulty of identifying depositors. A draft budget has been prepared, and ticket pricing will be considered at the next meeting of the organising committee tomorrow.
- Register of Naval Architects: RINA is in the process of providing a filter by country, and this will be investigated for suitability when implemented.
- Technical Meeting Program for 2012: Suggestions were made for technical meetings for next year.
- National System for Commercial Vessel Safety: Reports were received of the two stakeholder meetings, which have not been well attended, but where there were presentations on the proposed regulatory system, which vessels would be regulated, manning, crew competencies, etc. The ideal of a central approving authority (for consistency) with state survey to ensure compliance of construction with approved drawings does not seem achievable.

The next meeting of the NSW Section Committee is scheduled for 21 September 2011.

### Counter-piracy Operations

John Willy, Commander, Royal Australian Naval Reserve and Regional Operations Manager Australia, Orient Overseas Container Line, gave a presentation on *Counter-piracy Operations in the Gulf of Aden, Arabian Sea and Somali Basin* to a joint meeting with the IMarEST attended by twenty-nine on 4 May in the Harricks Auditorium at Engineers Australia, Chatswood.

#### Introduction

John began his presentation by saying that he has previously spoken about marine salvage [*The Salvage of Jodie F. Millennium at Gisborne, NZ*, see *The ANA*, November 2006 —Ed.]; this presentation is similar, but of a completely different aspect! John has recently returned from a three-month deployment with the United Kingdom Maritime Trade Operations (UKMTO) which is a Royal Navy operation based in the United Arab Emirates, and working in their counter-piracy operations.

He then showed a video, which had been downloaded from YouTube, showing pirates firing rocket-propelled grenades

at the superstructure of a tanker, with devastating effects. He thinks that the results have been doctored, but the video strikes fear into the hearts of those mariners running the gauntlet of the area. The reality is not quite like that.

#### Recent History of Piracy in the Area

Since 2003 the pirate operating area around the Horn of Africa and the Somali Basin has expanded in all directions, aided by the use of mother-ships. Pirates are targeting merchant vessels where warships do not patrol and merchant vessels are less vigilant. Their operations have expanded to 78°E and 10°S:

| Year    | Distance off coast<br>n miles |
|---------|-------------------------------|
| 2005    | 165                           |
| 2006    | 200                           |
| 2007    | 200                           |
| 2008    | 445                           |
| 2009    | 1000                          |
| 2010–11 | 100 n miles off India         |
| 2011    | Widespread                    |

He then showed a nautical chart of the area, indicating that the whole area from the horn of Africa to India to 78°E and 10°S, the Arabian Sea, Gulf of Aden and all of the Red Sea are high-risk areas. A lot happens in the Gulf of Aden because it is a narrow neck, concentrating the maritime traffic. The navies have responded by locating plenty of naval vessels in the area, but this has pushed the pirate operations into deeper waters in the Arabian Sea. Ship protection through the area is by two means;

- Group transits, which is a western-nation initiative because of insufficient assets. Groups are monitored and, if attacked, a warship from one of the navies can be alongside within 15 minutes.
- Convoys with escorts; this is provided by China, Russia, India, Korea and Japan who offer protection for their own ships and to any who care to tag along with the convoy.

The next chart showed the status of piracy operations in January/February this year. Incidents were marked on the chart and colour-coded as approached, attacked, hijacked, etc. and showing the UKMTO corridor through the Gulf of Aden and OOCL's own-vessel service lanes. The lane close to India heading for the Gulf of Oman is generally considered safe.

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A boarding party from HMAS *Stuart* approaches the pirated dhow, *Al Shahar 75* in April. The three crew, held hostage by Somali pirates, were rescued (RAN photograph)

### Operations

HMAS *Stuart* is in the area now. Under the US-led coalition forces, Combined Task Force (CTF) 150 is for the Persian Gulf (currently under Australian command), CTF 151 is for counter-piracy operations (currently under Singaporean command), and CTF 152 is for security operations (contraband and maritime threats).

There is also the EU Naval Force (EUNavFor), currently operated by The Netherlands and Denmark, and NATO Forces. Some are members of all three. Each navy has its own rules about what it can do in various situations, e.g. about the order of shooting and asking questions.

Here John showed a graph of pirate activity and trends. This showed the number of yearly attacks by Somali pirates; less than 50 up to 2007, but increasing to 153 in 2008, 194 in 2009, and 262 in 2010.

Where do the pirates hide? A map of the Somali coast showed that the main strongholds are Eyl, Hobyo and Harardhere (all between Mogadishu and the horn of Africa). Typically the pirates commandeer a vessel, go to the Somali coast, and then negotiate with the shipowner to release the vessel for a payment which may be of the order of \$2–10 million. Negotiations typically take 3–6 months, but the longest has been over 12 months (*Iceberg 1* was hijacked on 29 March last year, and is still being held with the crew captive, and *Leopard* has been released, but the crew are still held hostage!)

An aerial photo of the camp at Hobyo South showed that it is set up for organised crime: the chase boats on the beach, with drums of fuel, giving them a range of, say, up to 50 n miles off the coast. However, the use of mother-ships gives them effectively unlimited range!

### Vessels held by Pirates

John then showed photos of 19 merchant vessels currently held for ransom by the pirates (in May 2011), eight vessels being used as mother-ships with the crews still held captive, and nine vessels released recently after ransoms had been paid.

In general, the pirates target tankers and bulk carriers, because they are slow and have low freeboard and so are easier to board than fast container vessels with high freeboard.

The pirates need the crew alive to drive the ships at gunpoint.

### The Australian Naval Architect

### The UKMTO Mission

Royal Navy Reserve capability is manned by reservist (ten British subjects plus an International Augmentation Officer) and is based in Dubai, UAE. The mission is to support the maritime industry and the military in an anti-piracy role. They monitor merchant ship movements in the area 24/7, based on voluntary reporting from vessels. They co-ordinate military assistance to the industry, provide briefs to industry (ships in port and industry CSO and management), and build confidence through the shipping industry liaison (i.e. MIEVOM)

The focus is changing. UKMTO was established after 9/11 to counter terrorism and for the protection of UK interests (UK flagged ships and UK persons), the protection and observation of Iraqi offshore oil facilities, to support maritime interdiction operations (oil smuggling, arms smuggling, drug trafficking and people trafficking), anti-piracy advice and coordination of military assistance, and confidence-building and reassurance to industry. However, 99% of the focus is now on counter-piracy operations.

The UKMTO team comprises an OIC, 2IC, an Operations Room Supervisor, six ratings on 24/7 watchkeeping, a Merchant Navy Liaison Officer, and an International Augmentation Officer (on 3–6 month duration). The UKMTO Operations Room is situated in a small room in the British Embassy in Dubai. The UKMTO is manned by RN reservists; all are volunteers, and not all have a maritime background, so the Merchant Navy Liaison Officer is a brilliant innovation. The Ops Room is crewed by five people during the day, but only one after 2000, because most attacks occur between sunrise and sunset.

### NAMESIS Vessel Tracking System

The NAMESIS vessel tracking system shows the tracks of vessels which have reported in coloured yellow, those with a UK interest coloured pink, and those which have been attacked in purple. However, NAMESIS requires manual input of data, while a newer program, Polestar, does this automatically.

The navies cannot tell merchant ships what to do; they can only give advice, and only about 60% of ships call in to the navy.

Most merchant vessels now have AIS (the automatic identification system, which shows a vessel's identification and current location). However, some vessels choose to switch this off while transiting the area, so that the *pirates* do not know where they are. However, if the vessel is attacked, then they must switch back on so that they can be located by the UKMTO.

The IRTC is the International Recommended Transit Corridor through the Gulf of Aden, and provides a naval presence over a corridor of about 550 n miles in length.

### Warnings

When a vessel is attacked, a warning email is transmitted to ships and coastal stations in the area, indicating the details of the attacking vessel(s), the location, etc., and advising that vessels should exercise caution within 100 n miles of the area.

### Pirate Skiffs

Pirate skiffs used in attacking ships have the following



A small boat being towed by a suspected pirate mothership being destroyed by weapons fire from the guided-missile destroyer USS *Momsen* after *Momsen* disrupted an attack on a commercial oil tanker in the Arabian Sea  
(US Navy photograph)

typical characteristics: a fibreglass hull of 6–8 m in length, one or two outboard motors and a speed of 18–25 kn, operated by 4–8 pirates of east-African appearance (Somali) who sometimes pose as fishermen. Equipment includes AK47 rifles and RPG launchers as weapons, a ladder of 6–8 m in length, grappling hooks, radio equipment, and extra fuel tanks for long range.

If a vessel is approached and is in doubt, the UKMTO asks to check whether all of these items are visible and, if so, then piracy is likely—a ladder is a real give-away.

99% of RPG attacks are duds—the pirates do not want to destroy the ship, but to get on board and to hold the ship for ransom. They don't want to kill the crew either (except in retaliation for pirates killed), as they need them to operate the ship.

### Pirate Attacks

Attacks are most common between sunrise and sunset. Logistics and support are supplied using mother-ships (dhows or fishing vessels). Pirates can loiter in the shipping lanes for up to two weeks. A typical attack uses a high-speed approach from astern, with an element of surprise. Two chase boats are often used, one on either side, so that no matter which way a vessel turns in trying to escape, her path is brought closer to one chase boat or the other. The vessel is signalled to stop, with weapons possibly being fired at the bridge to intimidate the master and OOW into doing so. The ship is boarded by ladder or grappling hook and line, and the crew and vessel captured. The skiffs are taken under tow, and the crew subdued and forced to navigate the vessel (at gunpoint) to an anchorage and held for ransom. Captured ships are now also being used for logistic support and firing platforms. Attacks are becoming more daring and aggressive.

The UKMTO's advice to masters is to get people away from windows, and to proceed at full speed, zig-zagging if the pirates try to board to make boarding as difficult as possible in the wash, as it is difficult to board even at 12–13 kn. The pirates will usually make two or three attempts and, if unsuccessful, back off and wait for an easier target.

John then showed photos taken from a vessel of pirates approaching, their attempts to board while the vessel zig-zagged as advised, and the pirates eventually backing off from the attempt.

Pirate attack teams are not mariners, with photos showing many indications of poor seamanship (ropes dangling over the side, items on board unsecured, etc.)

Photos of one vessel showed the pirates ditching their piratical equipment (ladder, grappling hooks, extra fuel

drums, etc.) over the side so that they could claim that they were a fishing vessel!

### Advice to Crews

UKMTO advice to ship's crew is that they must implement their anti-piracy drills early and have all hoses and other counter measures deployed *before* entering the area. Fire hoses can be rigged and lashed with hydrants open so that all the Officer-of-the-Watch has to do is start the fire pump. Masters must be very aggressive in their ship handling, hard-over to hard-over when zig-zagging. If possible, start thrusters to create thruster wash. Keep the skiffs in the ship's positive-pressure zones and away from the midship negative-pressure wave. If sailing on tugs with fire cannons, have the cannons primed and running before entering the area. This will not only aid speed but will be an effective weapon against small open skiffs. LRAD is another effective non-lethal weapon and has been demonstrated to work effectively (even outside its technical effective range!)

Keep crew inside and close to the centreline of the vessel to minimise the chance of injury from bullets and shrapnel. Obviously, the bridge needs to be kept manned and crew need to be keeping an eye on the pirates' movements at all times. The provision of ballastic curtains around conning positions and other important stations will provide protection for the crew against the possibility of stray bullets and shrapnel.

However, should the pirates board, then the ship's crew must shift from aggressive to passive. They must not put up any resistance once the pirates are onboard. The crew must maintain navigational control of the vessel if possible. These pirates run a business. They are not interested in hurting the crew. In fact, the safe treatment of the crew is part of the negotiations for their money. The only casualties to crew recently recorded are two sailors, both of whom fought back, and a crew member was wounded by a ricochet bullet. Unfortunately the wounded seaman died of his wounds.

### Damage

Here John showed a series of slides of damage to vessels inflicted by pirates, the first one being a dent in the bridge-wing plating from an RPG. RPG damage may be very frightening but is, in fact, not as dangerous as an AK47 round which will *penetrate* the steel plating of a vessel.

Other photos showed damage in a master's cabin, a hole in a deck-stowed container, a hole in a magnetic compass repeater, and a shattered window.

### Cases of Opening Fire

The number of cases where the pirates have opened fire is increasing.

In 2009, there were 92 attacks, 42 hijacks, 60 cases of open fire, more than 750 crew captured, 48 injuries and 6 fatalities. By way of comparison, in 2010 there were 111 attacks, 64 hijacks, 87 cases of open fire, more than 1180 crew captured, 12 injuries and 1 fatality.

#### **Don't Let Them Get on Board**

The best protection is not to let the pirates get on board by first taking evasive manoeuvres. Other methods of prevention include (and John showed photos of all of these) having water-spray hoses rigged over the side to make it hard for the pirates to see what they are doing (and get wet while they are doing it!), having razor wire rigged at the sides of the vessel, having baulks of timber or logs suspended over the sides of the vessel, and these can be released to intimidate the pirate vessel and crew, and sandbags at the side of the vessel to take the impact of shots.

If they do get on board, then don't let them inside the accommodation. Methods of prevention can include locking bars on watertight/weathertight doors and portholes, grilles over accommodation stairways, and the like.

Don't let them get on the bridge. Methods of prevention include razor wire coiled over stairways to the bridge, locking bars, etc. Fire axes and tools should be removed so that, if the pirates do get in, then they do not have assault equipment laid on.

If they get into the accommodation, then the only chance is for the crew to retreat to a safe room or citadel, such as the engine room or steering flat, which is hard for the pirates to find and/or get into. The citadel needs to have been prepared, with food supply, torches, and communications. From there the crew can tell the world that they are safe and request help using a portable Inmarsat phone or similar. There have been cases where pirates got on board, but could not get to the crew, who they need to operate the vessel. In one such case, the crew waited in the citadel overnight and came out

to find the pirates gone. However, in another case, the crew waited only till they heard no more sounds, and came out to find themselves staring into the barrels of the pirates' guns!

#### **Best Management Practices**

The guide *Best Management Practices 3: Piracy off the Coast of Somalia and Arabian Sea Area* was written by a group of authorities, including Intertanko, SigTTO, BIMCO, IPTA, etc. from interviews with masters of vessels, both those who had been captured, and those who had avoided capture.

[The guide is available on the web on many websites; high- and low-resolution versions are available on the Intertanko website at [www.intertanko.com/templates/intertanko/issue.aspx?id=46363](http://www.intertanko.com/templates/intertanko/issue.aspx?id=46363)—Ed.]

#### **The Monsoon Seasons**

Piracy operations are strongly affected by the monsoon seasons.

From mid-December through March is the north-east monsoon season, and from June through September is the south-west monsoon season. The monsoons are characterised by strong winds and rough seas, which are not conducive to piracy in the Somali basin. In between these seasons, from April through May, and October through mid-December, are the transition seasons, characterised by calm seas conducive to piracy.

#### **Counter-piracy Operations**

What are the various naval forces doing about fighting piracy?

There is international resolve to interdict piracy, involving three separate forces the CMF (coalition), EUNAVFOR and NATO, a total of fifty countries. In addition UKMTO cooperates with Russian and Chinese forces operating independently but in close cooperation.

## AMD Marine Consulting



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In the Gulf of Aden, the CMF has divided the traffic corridor into ten segments and a warship from a different country of the coalition is stationed in each. Response time to piracy attack reports is typically 15–20 mins if the vessel can hold off an attack, and very few vessels operating in group transits or convoys are taken.

In the Somali Basin, there is coordination between the EU, NATO and the CMF. They each have assets (i.e. warships) in the area and are coordinating efforts to try to ensure reasonable cover, but ship protection measures must be in place. Due to the enormous size of the area (now extending almost to the Indian coastline), no-one can rely on the navy to provide close cover.

### Conclusion

Piracy continues to remain “a clear and present danger” in the Gulf of Aden and the Somali Basin. Military action alone will not solve the problem. It is imperative for multi-national forces to come together to conduct counter-piracy effort and patrol, and there is a need for continuous efforts by the shipping industry to ensure that best management practices are followed — self protection is the best form of defence!

### Questions

Question time was lengthy and elicited some further interesting points.

Cattle ships are not usually targeted, mainly because the cattle die if held, and become a problem for the pirates, rather than an asset.

There are few fires as a result of pirate operations; damage to the vessel is not the object of the game.

The pirate bases are not being shot up because of the possibility of “collateral damage”, i.e. the danger to innocent people like wives and children.

This is organised crime; it is a multi-million dollar industry, and Interpol is also working on it.

The vote of thanks was proposed, and the “thank you” bottle of wine presented, by Hannah Flint, the Membership Manager for IMarEST in the UK. The vote was carried with acclamation.

### Composite Patrol Boats

David Firth, Senior Design Engineer with SP-High Modulus, gave a presentation on *Design and Build of Composite Patrol Boats* to a joint meeting with the IMarEST attended by 26 on 1 June in the Harricks Auditorium at Engineers Australia, Chatswood.

David’s presentation was first presented at the Pacific 2010 IMC. It is expected that it will be reproduced in the November edition of *The ANA*.

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

### Solar Sails™

John Lord, who is Chief Operating Officer at Solar Sailor Holdings Limited, gave a presentation on *SolarSails™ Applied to Catamarans, Ships and Unmanned Ocean Vessels* to a joint meeting with the IMarEST attended by thirty-two on 6 July in the Harricks Auditorium at Engineers Australia, Chatswood. This was the highest attendance so far this year, and in the top 20% since Engineers Australia moved from North Sydney to Chatswood in mid-2006.

**August 2011**

### Introduction

John began his presentation by saying that his background was in engineering. This commenced with a Mechanical Engineering Cadetship with G.H. Olding and Sons at Thornleigh, who manufactured truck and motor bodies and associated equipment, and where he was fortunate to have been educated in all practical facets of engineering and design drafting. He then formed his own company, undertaking contract design drafting services for several years. Next came a 16 year period in the oil, gas and process plant industries with pipeline equipment in a family business throughout Australia and New Zealand. After selling that company, he acquired a run-down boatbuilding and repair business, hoping to enjoy it as a new “lifestyle” business. He never worked harder than here, but in 1998 had the good fortune to meet Robert Dane, and became an initial shareholder of Solar Sailor Holdings in 1999. He ended up selling the boatbuilding and repair business to Ralph Sarich (of orbital engine fame) and retired in 2007 at age 57. However, in 2010 Robert Dane asked if he would project manage the SolarSailor™ project in Hong Kong, building four 100 passenger ferries. Since then, and after the fourth SolarSailor™ vessel was delivered to the client (The Hong Kong Jockey Club’s island golf club) in early 2011, he has gone on to broader marketing and management within the company.



Sydney Solar Sailor passing under the Sydney Harbour Bridge with port panels stowed flat and starboard panels sailing  
(Photo courtesy Robert Dane)

### Early Solar Sailors

Robert Dane attended the inaugural solar boat race on Lake Burley Griffin in Canberra. He was intrigued by the notion of powering boats with sunlight but, as an experienced amateur sailor, he thought he saw a way he could combine

his passion for sailing with solar boat racing. Between the 1996 event and the second race in 1997, he designed what became the prototype solar sailor, *Marjorie K*, which was a Hobie-cat with a pair of sail wings instead of the traditional sail and mast. Bonded to the upper surface of each wing were photovoltaic cells which turned sunlight into electricity. Dane used this electricity to power the catamaran's electric motor. By combining both wind and solar power, *Marjorie K* easily won the competition and thereby set in motion a chain of events which would lead to the construction of variations of solar and wind powered vessels.

*Sydney Solar Sailor* was next, first gracing the waters of Sydney Harbour in 2000 in conjunction with the Sydney Olympic Games (see *The ANA*, February 2000). She can use the sun and wind together, powered by eight separate SolarSails™ and the solar/battery-powered electric motors. The apparent wind (which the sails see) is the vector sum of the true wind and the vessel speed, and the energy sources are computer-optimised for the best result.

Here John showed a solar radiation map of the world, which indicated that the use of solar power is highly feasible between latitudes of 60° north and south of the equator.

A 31.5 m vessel, *Suntech-Guosheng Solar Sailor*, was launched in Shanghai in 2010 with SolarSails™, and cruised the Huangpu River for the Shanghai World Expo. The vessel was designed in aluminium but unfortunately built in steel and, unsurprisingly, does not perform quite to design expectations. However, she is a good advertisement for SolarSails™.

The latest vessel, *Solar Albatross*, a 24 m 100 passenger catamaran ferry, underwent sea trials and delivery took place in March and April 2011 in Hong Kong. The vessel has now entered service with the Hong Kong Jockey Club's Kau Sai Chau Golf Club, ferrying golf-club patrons to and from their three island-based 18-hole courses off Hong Kong Island. The SolarSails™ stow flat on the roof when not in use, although they then continue to collect solar energy and store it in batteries in the hulls. The SolarSails™ are engineered and approved by DNV for 44 kn of apparent wind with a 100% safety factor. The sails can be feathered or lowered into a headwind. In early trials, "sailing" in a 15 kn true wind at 45 degrees off the bow gave a 1.8 kn increase in boat speed from 14.2 to 16 kn with no increase in engine rpm. Alternatively, engine speed can be reduced and substantial fuel savings achieved while maintaining the same speed. These vessels are on fixed runs every 20 mins, and need to maintain their schedule. Using these vessels has saved the HKJC about 50% of their previous fuel costs!

#### SSUOV™

Here John showed images of their self-sustaining SolarSailor™ Unmanned Ocean Vessel (SSUOV™) with a single SolarSail™. The development of this vessel has been a four-and-a-half year project, with the resulting vessel being just less than 6 m (20 ft) long so that it can be shipped around the world in a 20 ft container.

The idea was catalysed in the USA, when Robert Dane was summoned to military HQ in Washington and asked if he could build a vessel which would be self-sustaining, able to carry communications equipment, remain at sea for extended periods and power itself? Many UOV variants have



*Solar Albatross* on trials  
(Photo courtesy Robert Dane)



*Solar Albatross* with sails lowered  
(Photo courtesy Robert Dane)

been built over the last 50 years, but all others are limited in their ability to stay at sea by the limited amount of fuel which they can carry for propulsion. The SSUOV™ uses inexhaustible wind power for propulsion, and solar electric power stored in lithium-ion batteries for its onboard control and communications systems, and other payloads.

SolarSailor™ have three main areas of expertise and know-how which could make this possible: their pivoting sail rig — the SolarSails™ (patented); hybrid solar/electric systems (HMP™ — Hybrid Marine Power); and Unmanned Ocean Vessels (the SSUOV™ is also patented).

The SSUOV™ has a number of advantages, including:

- low capital cost;
- low running costs (no crew or stored fossil fuel is required);
- low maintenance;
- long endurance;
- fleet/network/swam capable;
- self-deploying;
- all weather;
- green—zero emissions/carbon credits;
- solar power generates electricity;
- wind is used for direct propulsion and generates energy from a rotating propeller while sailing; the propeller is used for low-wind conditions, manoeuvring and collision avoidance;
- wave energy generates electricity; and
- large payload capacity.

They have estimated that one of these vessels could go to sea for up to 2 years.

# Pacific 2012 Maritime Congress comprising: **Pacific 2012 International Maritime Conference** **Royal Australian Navy Sea Power Conference 2012**

31 January – 2 February 2012  
Sydney Convention & Exhibition Centre,  
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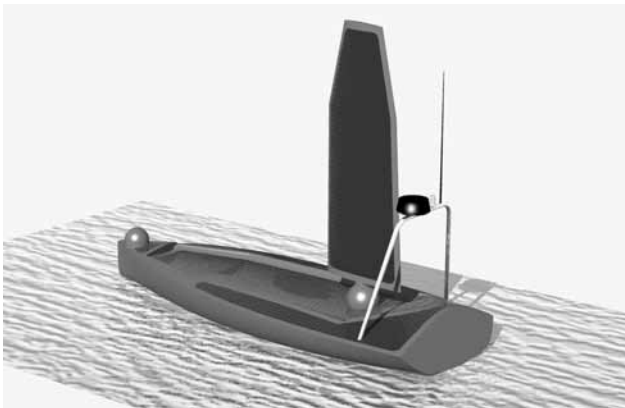
Image courtesy of Austal, Australia 2011.

Principal particulars of the proposed SSUOV™ are

|                 |                                |
|-----------------|--------------------------------|
| Length OA       | 6.5 m                          |
| Beam            | 3.5 m                          |
| Draft           | 1.75 m                         |
| Freeboard       | 2 m below SolarSail™           |
| SolarSail™ area | 3.5×2 m                        |
| Payload         | 4.5×1.5×0.6 = 4 m <sup>3</sup> |

A stealth version of the SSUOV™ would have a low profile above the water for stealthy appearance; e.g. not more than 750 mm hull freeboard. Black/grey paint helps to minimise visual impact. The vessel would be fitted with radar and camera dome and sensors.

A possible application is that a fleet of these vessels could provide a detection line barrier across the top of Australia to detect boats heading for the coast. Such a line would need to be, say, 1500 n miles long, and could be provided by 300 vessels spaced, say, 5 n miles apart. These vessels can sail 99% of the time, where other vessels will run out of fossil fuels. There is an onboard electric motor, but this would only be used for speed to escape from pirates and the like. The vessels would all be controlled from a communications command centre, and could be programmed to self-destruct at the push of a button in the centre. One proposal is for the vessels to be deployed from Darwin, sail to Geraldton, and then return to Darwin by truck.



Prototype 6.5 m version of SSUOV™  
(Image courtesy Robert Dane)

### Other SSUOV™ Applications

Some of the maritime zones which require patrolling include territorial seas, contiguous zones, exclusive economic zones (EEZ) and continental-shelf areas. Illegal activities are being fuelled by rising fish prices, overfishing elsewhere in the world, etc. Patrolling such areas can use swarms of SSUOVs™.

The navy and coast-guard could use such vessels to provide cost-effective support for border protection, homeland defence, and fisheries protection, the global war on terror, irregular warfare or conventional campaigns. Such a vessel may cost of the order of \$0.25 million, whereas the high-resolution camera to go with it may cost of the order of \$1.25 million! Satellites have the ability to cover large areas in one pass, but their cameras lack the ability to collect high-resolution fine-grain images if required.

Such vessels could be deployed for shipping lane security, such as the grid system used in the Arabian Gulf, or sea surveillance of a DMZ (such as between North and South Korea), or ASW surveillance (Taiwan/China).

## The Australian Naval Architect

Basic ocean research, such as survey and mapping of the seabed, can be undertaken by SSUOVs™. One application would be the Marshall Islands, 1500 n miles north-east of Papua New Guinea, where it is estimated that it would take about one month for a vessel to survey an area 300×150 n miles using north-south tracks at 5 n mile intervals.

The SSUOV™ offers a game-changing option for many applications.

### Commercial Vessels

John then indicated some of the emerging trends, which include

- the amount of trade carried by ships is increasing;
- the cost of oil is increasing;
- the price of carbon is increasing;
- the amount of regulation is increasing; and
- the cost of technology is increasing.

Taking all of these into account, it is estimated that SolarSails™ on large commercial ships can save approximately 20 to 40% of fuel costs.

John then showed a slide indicating a proposed application of SolarSails™ to a bulk carrier, which could just as easily apply to a tanker. They can be fitted as retro-fits, or applied to new-buildings. Garages for the sails can be fitted between hatch-covers on bulk carriers, or possibly in the double-hull spaces on tankers. There are currently 440 iron-ore carriers being built world-wide, and this could be of significant benefit to them.

He also showed a concept for a private yacht.

### Conclusion

SolarSailor™ is a leader in a fast-developing field. They were the first to harness solar and wind power together in a marine application. They have invested nearly \$20 million in developing their knowledge and capability, and the technology has now been proven on several commercially operating vessels.

### Questions

Question time was lengthy and elicited some further interesting points.

The SSUOV™ can remain at sea for lengthy periods, including during bad weather. In such an event, the sails fold down flush with the deck, yet still with the solar panels charging batteries, and the vessel is headed on the best course in relation to the sea state. It can withstand storm conditions by becoming a “cork-in-a-bottle” and, as with any monohull yacht, it is self-righting.

The vessels can go for up to ten days without recharging the batteries by solar or regenerative-sailing-produced electrical power. Current batteries are of the lead-acid type. However, there have been great strides made in lithium-ion technology over the last 5–10 years and, based on cost and efficiency, they are going to move to lithium-ion batteries.

They use both brushless and induction motors, depending on the application.

All sail controls can be done automatically with software developed over ten years within the company, because the master does not have the time to be continually adjusting them while navigating the vessel on crowded waterways.

*Sydney Solar Sailor* is on her third set of solar panels, mainly

due to the resins and adhesives, which are getting better all the time.

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

### Keep Your Keel on!

David Lyons, Principal of Seaflyer Pty Ltd, gave a presentation on *Keep your Keel On! Delamination Characterisation of Curved Composites Using Acoustic Emission and Fibre Bragg Gratings* to a joint meeting with the IMarEST attended by 26 on 3 August in the Harricks Auditorium at Engineers Australia, Chatswood.

#### Introduction

David’s title slide showed the yacht *Hooooligan V* upside down at sea after losing her keel in 2007, and began his presentation by saying that this project started when Raju, a PhD candidate at the University of New South Wales, asked for a project in which the industry was interested.

By way of background, a number of people had spent too much time in the Coroner’s Court in Sydney in the early 2000s giving evidence in the cases of the yachts *Rising Fast* and *Excalibur* losing their keels and, even before that, the enquiry into the losses in the disastrous 1998 Sydney–Hobart Yacht Race.

David was therefore interested in the failure of composite structures in way of the keel-bolt connections to the hull, and proposed the topic, firstly as an undergraduate thesis topic, and then as a doctoral thesis topic. He was interested particularly in the *useful* strength of composite laminates, as it is not good enough to look up the interlaminar shear strength in a textbook and use that value for design, as the textbook value is not often the useful strength.

Supervisors Prof. Don Kelly and A/Prof. Ganga Prusty were extremely helpful in defining the topic and the scope of the project. David was keen to have a significant experimental component to validate the theoretical work, so that the results could then be applied in the design office. David helped Raju with laying up the laminates in the workshop, and in setting up the sensors which provided real-time load information. Raju did the testing of laminates on the Instron machine in the Solid Mechanics Laboratory in the School of Mechanical and Manufacturing Engineering at the University of New South Wales, and carried out extensive non-linear finite-element analysis of the laminates, and achieved good agreement with the experimental results.

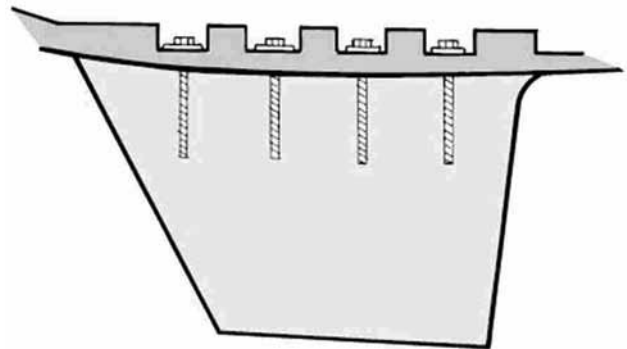
#### Consequences

Here David showed a slide of *Excalibur*, upside down at sea after losing her keel in 2000, and said that this is often one of the consequences of losing a keel. In fortunate cases there will be no loss of life but, all too frequently, there are also accompanying fatalities.

#### The Problem

David then showed several diagrams and photos of the typical arrangements of the bolts connecting the keel to the hull of composite yachts. The bolts usually connect the keel direct to the hull laminate in pockets between the transverse floors and longitudinals, relying on the high compressive strength of the laminate. They do not, as in timber construction, go up through the floors because the

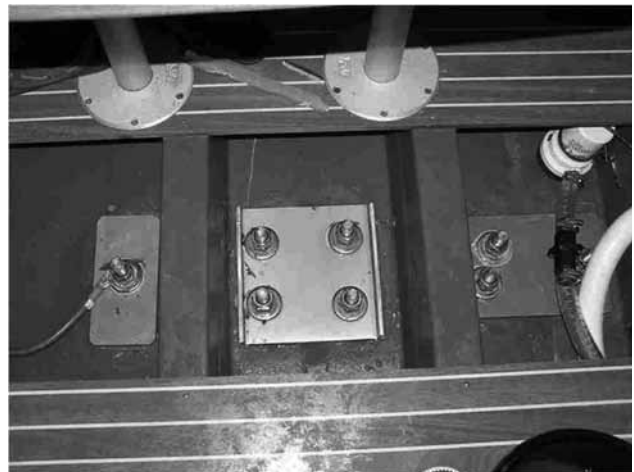
core of the floors is not sufficiently strong in compression to take the imposed loads. Compression tubes are not used through floors either, because they would interfere with the pre-tension loads in the bolts.



Typical arrangement of keel bolts on a composite yacht  
(Diagram courtesy David Lyons)



Keel bolts on a composite yacht  
between transverse floors and longitudinals  
(Photo courtesy David Lyons)



Keel bolts on a composite yacht  
between transverse floors  
(Photo courtesy David Lyons)

The laminate typically fails by inter-laminar shear at the junction between the floor or longitudinal and the bottom laminate, often at or close to the load-bearing steel plate.

### Test Laminate Schedules

Three separate layups were tested to determine the effect of fibre orientation on the strength of the curves composite structure, as shown in the following table:

| Layer                      | Layup 1<br>gsm | Layup2<br>gsm | Layup3<br>gsm |
|----------------------------|----------------|---------------|---------------|
| 1                          | CSM 450        | CSM 450       | DB 611        |
| 2                          | CSM 450        | DB 611        | CSM 450       |
| 3                          | CSM 450        | CSM 450       | UD 451        |
| 4                          | CSM 450        | DB 611        | DB 611        |
| 5                          | CSM 450        | CSM 450       | CSM 450       |
| 6                          | CSM 450        | DB 611        | UD 451        |
| 7                          | CSM 450        | CSM 450       | DB 611        |
| Normalised<br>fibre weight | 1              | 1.15          | 1.1           |

Each layup was 4.62 mm thick and all used commonly-used reinforcements and were infused with polyester resin. Layup 1 used all chopped-strand mat; Layup 2 introduced double-bias mat in alternate layers; and Layup 3 used two layers of uni-directional fibres in addition to the double-bias mat.

### Mechanical Properties

Mechanical properties of the layups were as shown in the following table:

| Property                         | Unit              | CSM   | DB    | UD    |
|----------------------------------|-------------------|-------|-------|-------|
| E <sub>11</sub>                  | MPa               | 9600  | 7850  | 23500 |
| E <sub>22</sub>                  | MPa               | 9600  | 7850  | 6560  |
| E <sub>33</sub>                  | MPa               | 6062  | 6673  | 6560  |
| i <sub>12</sub>                  | MPa               | 0.347 | 0.62  | 0.369 |
| i <sub>23</sub>                  | MPa               | 0.139 | 0.146 | 0.249 |
| i <sub>31</sub>                  | MPa               | 0.108 | 0.133 | 0.087 |
| G <sub>12</sub>                  | MPa               | 2602  | 7157  | 2265  |
| G <sub>23</sub>                  | MPa               | 1847  | 2050  | 1847  |
| G <sub>31</sub>                  | MPa               | 1847  | 2050  | 2265  |
| ILTS                             | MPa               | 9.5   | 10.5  | 10.5  |
| ILSS                             | MPa               | 28    | 30    | 28    |
| Flexure modulus                  | MPa               | 1693  | 1158  | 4196  |
| Flexure strength                 | MPa               | 214   | 76    | 433   |
| Fracture toughness               |                   |       |       |       |
| G <sub>C</sub>                   | kJ/m <sup>2</sup> | 0.68  | 1.04  | 0.84  |
| Critical opening<br>displacement | mm                | 0.05  | 0.05  | 0.05  |

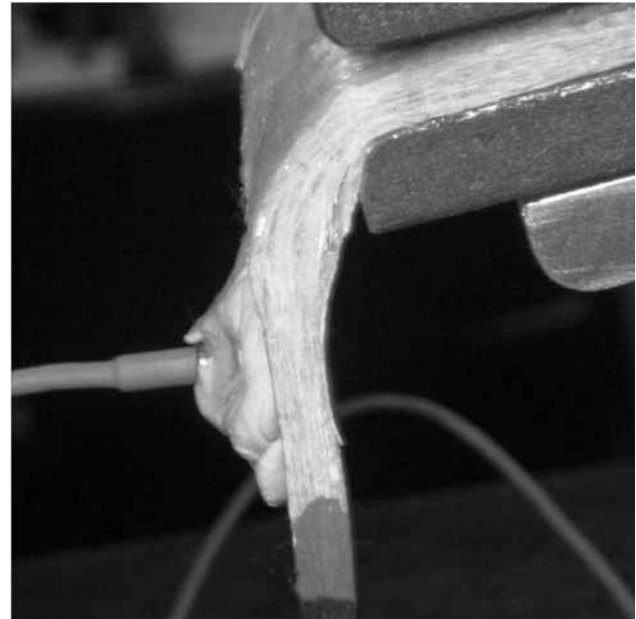
### First Test Setup

The initial test load setup was for a typical cross section of a laminate with the steel plate and bolt connecting the keel, mounted upside down in the test rig.



Layup 3 in the first test setup  
(Photo courtesy Raju)

The wires are attached to sensors for acoustic emissions and, when amplified, gave indications of when the resin started to let go of the fibres. These signals turned out to correlate extremely well with various stages of failure.

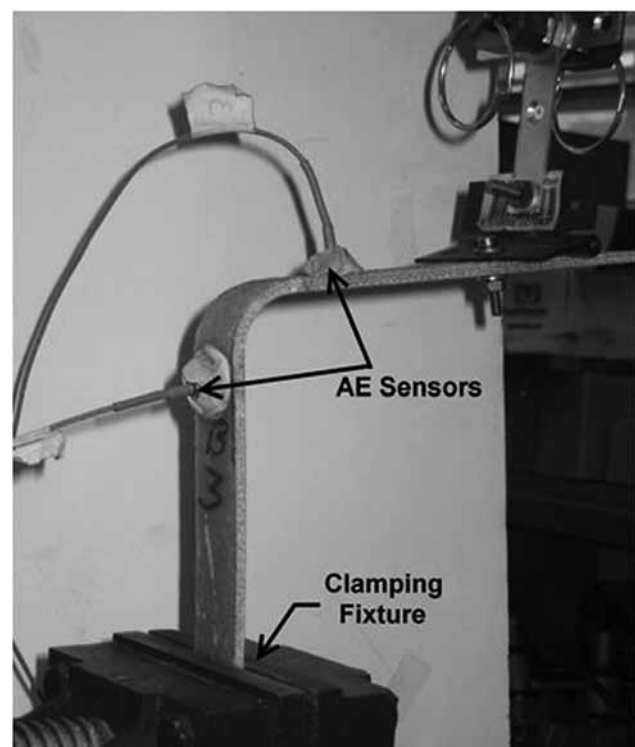


Failure of Layup 3 in the first test setup  
(Photo courtesy Raju)

What is considered to be failure? Clearly, the keel falling would be total failure, but a few fibres failing could be tolerated over the life of the vessel. There is a whole spectrum in between.

### Second Test Setup

The second test load setup was for an L-shaped cross section of a laminate, held at one end of the L-shape and loaded at the other end, to place the L-shape in bending with both inter-laminar tensile and shear forces at the corner.



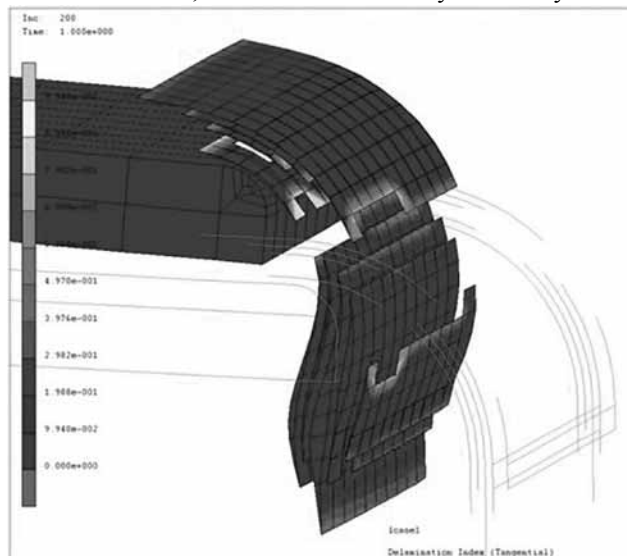
Layup 3 in the second test setup  
(Photo courtesy Raju)



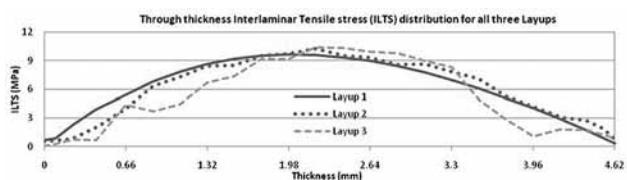
Progressive failure of Layup 3 in the second test setup  
(Photo courtesy Raju)

### Finite-Element Analysis

Raju carried out a non-linear finite-element analysis of each laminate in each test load setup using the ANSYS software. The steel plates representing the keel and load-bearing plate, and the laminates, were all modelled very accurately.

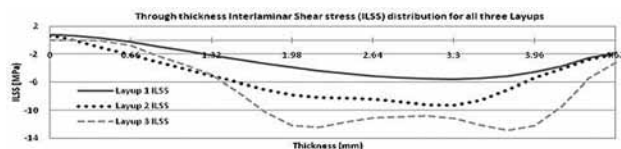


Finite-element modelling of the second test setup  
(image courtesy Raju)



Inter-laminar tensile stress in the second test setup  
(image courtesy Raju)

The results of the experiments and the finite-element analysis showed that the introduction of directional material, by way of the double-bias mat and/or unidirectional fibres, did



Inter-laminar shear stress in the second test setup  
(image courtesy Raju)

not improve the inter-laminar tensile stress performance significantly. However, it did improve the inter-laminar shear stress performance markedly, and was considered to be worthwhile and can be applied directly from here on. The values for tensile and shear stress failures came out to be close to what you would find in textbooks, but all the values for chopped-strand mat were low.

### Conclusions

Three layups of L-bend composite specimens were tested under displacement control up to 100 mm displacement. The failure of the specimens was monitored using acoustic emission techniques. Failure prediction around the bend was performed using nonlinear finite element analysis. Load-carrying capacity, failure initiation and progression were studied for each laminate. The bending load in this study generated more interlaminar tensile stress compared to interlaminar shear stress.

The performance of Layup 3 (CSM/DB/UD) was better than that of the other two layups. The secondary reserve strength of Layup 3 after initial failure (due to the presence of unidirectional fibres), helped in carrying more load up to 1800 N.

The load-carrying capacity of Layup 1 (CSM) was higher than that of Layup 2 (CSM/DB), but suffered catastrophic brittle failure.

Layups 2 and 3 had DB layers which hold the structure in place, and helped in avoiding the catastrophic brittle failure of Layup 1.

The damage mechanism, failure initiation and progression were assessed using acoustic emission techniques. Considering that the fibre composite systems used are fibre mats and fabrics, and that the specimens were subjected to an out-of-plane bending load, the proposed failure mechanisms are "reasonable", i.e. not of a surprising type.

The residual strength of the structure was identified so as



# ASO

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Naval Architecture  
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Finite Element Analysis  
Classification Submission

Loadouts  
Full Production Drawings  
Plan Approval  
Design Verification

**ASO Marine Consultants Pty Ltd** 79 Victoria Ave, Chatswood NSW 2067 **ph: +612 9882 3844 fax: +612 9882 3284**  
[www.asomarine.com.au](http://www.asomarine.com.au)

to assist boatbuilders in designing these specific curved structures.

The improved knowledge of the *low* ratio of de-lamination strength to ultimate tensile strength for the laminates tested (particularly the mixed laminates of Layups 2 and 3) is of significant importance for designers. The resin (matrix) used is also critical because of the importance of inter-laminar shear strength, i.e. it is just as important to use good-quality resin as it is to use high-strength (e.g. carbon) fibres.

With hindsight, this investigation can be considered to have been a simple first step, and there is enormous scope for further work to be done on how various factors affect the performance of the laminates under differing loading

conditions. There are many more PhD topics available!

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

*David's presentation was first published as Raju, R., Kelly, D.W., Lyons, D., Peng, G.D. and Prusty, B.G. (2010), Delamination Characterisation of Curved Composites Using Acoustic Emission and Fibre Bragg Gratings, Proceedings Pacific 2010 International Maritime Conference, Sydney, and has subsequently been published in the RINA Transactions 2010, and you are referred to this paper for further details.*

*Phil Helmore*

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## COMING EVENTS

### 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:

- 7 Sep Fraser Johnson, Oceanlinx Ltd  
*Marine Renewables — Mooring Design for Wave-energy Systems*
- 5 Oct Noel Riley, Commercial Marine Design  
*Developing Hullforms of Yesterday's Timber Vessels*
- 1 Dec SMIX Bash 2011

### South Australia and Northern Territory Technical Meetings

At the September meeting a presentation will be given by Dr Andrew Scardine from DSTO entitled *Marine Biofouling — Current Challenges and Potential Solutions*. This presentation will continue the recent presentations on marine pests and coating developments. The focus will be the research currently being undertaken by DSTO in support of RAN ships and submarines.

The October meeting (the last of the year's program) will be on the topic *Modern Developments in Submarine Escape and Rescue*. Members will be introduced to the platforms and methodologies in use around the world for submarine escape and rescue. Lessons learnt through recent Australian and NATO exercises will be discussed.

Details of these meetings will be provided directly to members of the SA and NT Section.

### Basic Dry Dock Training Course

Following the success of the courses held in Melbourne in 2008 and Brisbane in 2009, the Royal Institution of Naval Architects has announced that this course will again be held in Australia, in Melbourne on 11–14 October 2011.

DM Consulting's Basic Dry Dock Training is a four-day course which 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, and undocking. The course ends with a discussion of Accidents and Incidents.

The course is designed to be relevant to Dock Masters, Docking Officers, Engineers, Naval Architects, Port Engineers and others involved in the dry docking of ships and vessels. The course is presented through classroom lectures, student participation in projects and practical application exercises. The course addresses the deck-plate level of practical operation needed by the dock operator and the universally-accepted mathematical calculations required to carry out operations in accordance with established sound engineering practices.

Topics to be covered include:

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

The course leader, Joe Stiglich, is a retired Naval Officer, qualified NAVSEA Docking Officer and holds a Masters Degree from MIT in Naval Architecture and Marine Engineering. Responsible for over 250 safe docking and undocking operations, he currently runs a series of conference and training courses for personnel involved in all phases of the drydocking industry and acts as a consultant for ship-repair companies.

Places for this course are limited and early-bird pricing applies, so early booking is recommended.

For more information about this course see [www.rina.org.uk/drydockaustralia2011.html](http://www.rina.org.uk/drydockaustralia2011.html) or contact the conference department, phone +44-20-7235 4622, fax +44-20-7259 5912 or email: [conference@rina.org.uk](mailto:conference@rina.org.uk).

To register, go direct to [www.drydocktraining.com/train\\_sched.html](http://www.drydocktraining.com/train_sched.html).

### SMIX Bash 2011

The twelfth SMIX (Sydney Marine Industry Christmas) Bash will be held on Thursday 1 December aboard the beautifully-restored *James Craig* alongside Wharf 7, Darling Harbour, from 1730 to 2130. This party for the whole marine industry is organised jointly by RINA (NSW Section) and



Australian Government

Australian Maritime Safety Authority

Department of Infrastructure and Transport

NATIONAL SYSTEM  
FOR COMMERCIAL VESSEL SAFETY

# We invite you to help shape a safe maritime industry for Australia.

From January 2013 it's proposed the Australian Maritime Safety Authority (AMSA) will become the National Regulator for commercial vessel safety in Australian waters.

A new National System, currently under development, will streamline maritime safety laws and make it easier for seafarers and their vessels to work around Australia without barriers.

The Australian Government, in partnership with State and Territory Governments, invites you to attend a consultation open day to:

- obtain further information on the proposed new National System;
- share your ideas and comments.

For further information on dates and locations of the open days please contact your local maritime safety authority or go to **[www.amsa.gov.au](http://www.amsa.gov.au)** and follow the link to the National System for Commercial Vessel Safety or call (02) 6279 5000.



Government of South Australia

Department for Transport,  
Energy and Infrastructure



NSW | Maritime



Queensland  
Government



Government of Western Australia  
Department of Transport



Northern Territory  
Government



Department  
of Transport

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IMarEST (Sydney Branch).

Tickets are available from Adrian Broadbent of Lloyd's Register Asia on (02) 9262 1424, fax 9290 1445. Cost is \$40 per head till 4 November and payments by credit card are acceptable till then. After 4 November, the cost will be \$50 per head and credit card payments will no longer be acceptable; cash or cheque (payable to RINA NSW Section) only. There is a limit of 225 guests on board James Craig, so it would be wise to book early.

For further details and booking form, see the flyer mailed with this issue.

### **SIA Technology Conference 2011**

The Submarine Institute of Australia, supported by the Australian Society for Defence Engineering, will conduct its inaugural Technology Conference at the Crowne Plaza Hotel, Adelaide, between 8 and 10 November 2011.

The theme for the conference is *The Future Submarine — Australia's Science, Technology and Engineering Challenge of the 21st Century*.

More information can be found under 'Conferences' at the Submarine Institute's website, [www.submarineinstitute.com](http://www.submarineinstitute.com).

### **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 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](http://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](mailto: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.

For any queries on submission of papers, contact the Chair of the SPC Papers Committee, Andrew Forbes, at [andrew.forbes1@defence.gov.au](mailto:andrew.forbes1@defence.gov.au).

Further information on the conference can be obtained from the conference website [www.seapowerconference.com.au](http://www.seapowerconference.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 timescale is now as follows:

Registration

Opened July

Refereed papers submission deadline 3 October

Full paper submission deadline 14 November

Presenter registration deadline 15 November

Abstracts were submitted on the following major topics:

- Commercial Ship Technology
- Naval Ship Technology
- Submarine Technology
- Commercial Ship Operations
- Maritime Safety

For any queries on submission of papers, contact the Chair of the IMC Papers Committee, Adrian Broadbent, at [adrian.broadbent@lr.org](mailto:adrian.broadbent@lr.org).

The Pacific 2012 IMC Welcome Cocktail Party will be held at the Australian National Maritime Museum on Wednesday 1 February 2012. This relaxed evening will give delegates a chance to catch up with old friends and meet new ones.

Further information on the conference, including the conference and social programs, can be obtained from the conference website [www.pacific2012imc.com](http://www.pacific2012imc.com) 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](mailto:pacific2012imc@arinex.com.au).

### **Fourth High Performance Yacht Design Conference**

The fourth High Performance Yacht Design Conference (HPYD4) will be hosted by the Royal Institution of Naval Architects and the University of Auckland in Auckland, New Zealand. It will take place on 12–14 March 2012, during the Auckland stopover of the Volvo Ocean Race. The boats are scheduled to arrive on 8 March, with in-port racing on 16–17 March and race re-start on 18 March.

The conference venue will be in the heart of the Viaduct Basin in the purpose-built Marine Events centre. The HPYD conference will be a fully-refereed technical conference of the highest standard. A full social program will be provided. Meet the sailors, see the yachts and attend this highly-acclaimed, world-class technical conference. The focus is on the design, analysis, testing and performance of cutting-edge racing and super yachts. Abstracts were invited on a range of topics, including:

- Performance prediction and measurement
- Computational methods
- Wind tunnel and towing tank technology
- Materials and structural analysis
- Regulations and rating rules
- Hull and appendage design

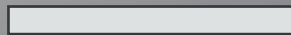
The conference now has a group on LinkedIn which you can join at

[www.linkedin.com/groups?home=&gid=3918059&trk=anet Ug\\_hm](http://www.linkedin.com/groups?home=&gid=3918059&trk=anet Ug_hm). The organisers expect that this will become a resource where delegates can find out what's being presented, swap contact details and share information about accommodation, travel, etc.

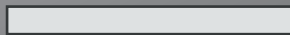
For further details please see [www.hpyd.org.nz](http://www.hpyd.org.nz) or email the conference Chair, David Le Pelley, at [info@hpyd.org.nz](mailto:info@hpyd.org.nz).

# The Complete Shipbuilding Software Solution

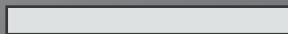
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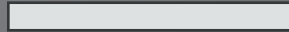
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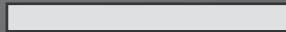
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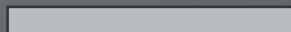
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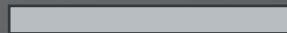
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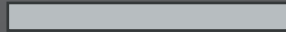
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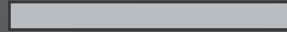
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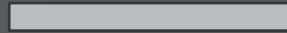
HVAC



EQUIPMENT



NESTING



CUTTING



**MAXSURF**

**ShipConstructor**

Maxsurf is an integrated suite of design, analysis and construction software suitable for all types of vessels. All modules feature a consistent, graphical Windows interface, work from a common database, and provide data exchange with AutoCAD, ShipConstructor and Microsoft Office.

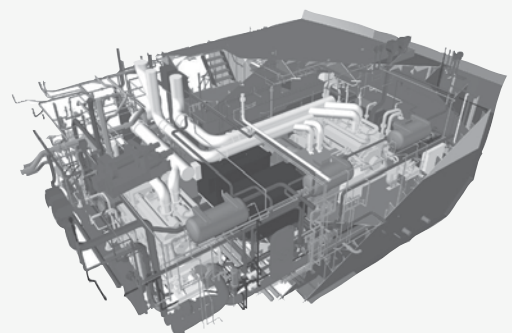
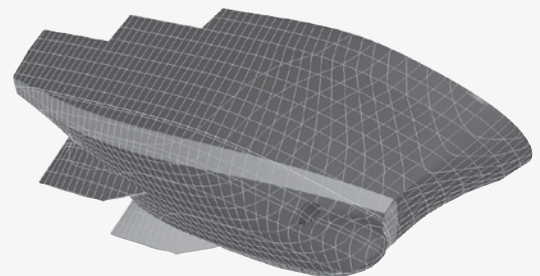
ShipConstructor offers shipbuilders a complete detailing and production solution for all zones and systems within a ship including structure, equipment layout, piping, and HVAC. The 3D product model is tightly coupled to production output which reduces re-work and most importantly, reduces man-hours in the yard.

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# CLASSIFICATION SOCIETY NEWS

## ABS Provides Guidance for Gas-fuelled Ships

With rising fuel costs and today's global interest on emission reduction, liquefied natural gas (LNG) is considered a promising alternative fuel for all types of ships. In response to industry's need for technical guidance for new construction and existing vessel conversion, classification society ABS recently announced the release of its *Guide for Propulsion and Auxiliary Systems for Gas Fuelled Ships*.

The new ABS *Guide*, considered to be the most comprehensive available to the industry, provides criteria for the arrangements, construction, installation and operation of machinery components and systems for vessels fuelled by natural gas. The objective of the guidance is to minimise operating risks and promote the protection of the vessel, its crew and the environment.

Christopher Wiernicki, CEO and President of ABS, says that the shipping industry needs to examine the issues surrounding the transition from traditional fuels to LNG, to verify that solutions provide an equivalent level of safety and reliability to those established for LNG storage and transportation. "With ship operators facing economic pressures from fuel costs, combined with impending regulations aimed at reducing exhaust gas emissions, particularly for sulfur oxide (SOx), LNG-fuelled propulsion systems could be a practical and beneficial solution. It is a matter of when, not if, LNG will be a commonly-selected fuel source and we need a sound basis for ship designs," says Wiernicki.

More than 50 years of ABS' experience with the handling and storage of LNG on board ships, many with dual-fuel diesel propulsion plants, was incorporated into the *Guide*. Consideration was also given to industry standards including the IMO Resolution MSC.285(86) *Interim Guidelines on Safety for Natural Gas-Fuelled Engine Installations in Ships*, the *International Gas Carrier Code* and the *IMO International Code of Safety for Gas-Fuelled Ships*, currently under development.

Significant contributions to the *Guide* also came from a joint research project with DSME and A.P. Moller-Maersk to develop an LNG-fuelled containership. Concluded earlier this year, the project addressed the design and technical issues surrounding the use of a 7000 TEU containership burning LNG as fuel for both propulsion and power generation, with ABS providing approval-in-principle for the resulting design. The study also assessed operational, economic and regulatory impacts from the use of LNG as a fuel source.

Results from the study were presented by DSME in March during industry's premier gas conference, Gastech, in Amsterdam. Found to be of particular interest were the considerations given to the type and arrangement of fuel tanks used to provide the utmost safety for the crew and to minimise capacity reductions. The study found that the initial costs for LNG-fuelled propulsion could be recouped within a three-to-ten-year period, depending upon the applied LNG prices.

"Natural gas has been used as a fuel for small regional non-LNG carriers working in environmentally-sensitive areas,"

says Director, Environmental Technology, for ABS, Yoshi Ozaki, who led ABS' involvement in the project. "This study further supports technical feasibility of LNG fuel and suggests promise for a viable extended business line for LNG suppliers."

The ABS *Guide for Propulsion and Auxiliary Systems for Gas Fuelled Ships* (Publication # 181) is available for download from the ABS website; navigate to Resources, Rules & Guides, Downloads.

## ABS Says the Time is Now for Floating LNG Concept

Speaking at Gastech 2011, where he chaired the technical session on Floating LNG, Vice President of Global Gas for ABS, William Sember, says the classification society is in advanced stages of design review for a number of concepts, as this technology moves ever-closer to reality.

"The advances and level of sophistication in all these subjects are evident. The time for commercialisation and the first project is now. From a classification-society perspective there are no technology showstoppers for FLNG. Liquefaction plants have been suitably optimised in order to efficiently use deck space while taking into account the safe and efficient operation of process equipment," said Sember.

As recently as five years ago, floating solutions for the import and export of LNG were still considered new and novel concepts.

Craig Hughes

## GL at H<sub>2</sub> Expo: Fuel Cells for Shipping—Clean, Quiet and on the Horizon

Hydrogen and fuel-cell technology have long promised an alternative to traditional propulsion and energy systems. The H<sub>2</sub> Expo held in the Hamburg Messe over 8–9 June 2011 looked at the latest trends in the industry, identified the most market-ready products, and examined the application of these technologies over a wide range of industries. Germanischer Lloyd (GL) has a long involvement in the research of fuel cells and the use of hydrogen in shipping, so the involvement of GL experts at the Expo was no surprise.

GL's Dr Gerd Würsig chaired the H<sub>2</sub> panel which looked at developments in fuel-cell and hydrogen technology in the maritime and shipping industries. Several papers were presented at the session. The presentations were then followed by a panel discussion.

In a paper entitled *Fuel Cell Systems for Shipping — Technical Potential and Economical Limit*, GL expert Finn Vogler looked at the overall state of fuel-cell development in the maritime field. Mr. Vogler's paper looked at the possible use of different types of fuel cells in shipping, designed to operate at low as well as high temperatures. Fuel-cell systems hold great potential in shipping due to their low noise, no or very-low emissions depending on the type of fuel used, and high efficiency in low-power usage. The modular nature of fuel cells also means they can be relatively easily integrated into existing systems.

High-temperature fuel cells, MCFC (Molten Carbonate Fuel Cell) and SOFC (Solid Oxide Fuel Cell), normally operate

with an upstream reformer system to create a hydrogen-rich gas mixture out of hydrocarbons. The high efficiency and the use of combined heat and power make them suitable for use in shipping.

A prime driver for the introduction of fuel cells is the increasingly-stringent regulatory climate. Environmental regulations which set ambitious targets for CO<sub>2</sub> reductions and the stringent control of SO<sub>x</sub> and NO<sub>x</sub> emissions mean that shipowners are under continuing pressure to operate more efficient and environmental ships. Tightening targets and cost pressures may see conventional systems and fuels unable to meet the demands of these targets in the near future, creating a greater opening for fuel-cell systems.

While the technical potential of fuel cell use in shipping was apparent now, economically such systems were only likely to become competitive with traditional engines around 2020, Mr. Vogler's paper suggested. Assuming rising fuel costs and the potential for the introduction of a carbon tax, the marginal costs at which FC systems would have to be offered to achieve profitability at competitive prices amount to 1,900 €/kW for 500 kW modules. Taking the present capital expenditure of about 4000 €/kW, the investment costs would have to be reduced by at least another 60%, but they could still lie considerably above the investment costs of today's diesel-generator sets. Reductions are probable, however, the paper noted, as investment costs have come down by approximately 40% since 2006 (about 6700 €/kW).

Maritime FC systems also had to be proven over the long term as fuel-cell maintenance costs particularly depend on the lifetime of the cells themselves. To compete with traditional systems, service times of at least 30 000 working hours without degradation under nominal operating conditions would be needed.

A further two papers presented projects where GL has been involved in the certification and development of safety standards and procedures. One looked at the Pa-X-cell project, a demonstration project which is working on the integration of a high-temperature proton-exchange-membrane fuel cell (HT-PEM), fuelled by LNG, in a cruise ship. Long term, this system could be used to provide auxiliary power for ro-pax ferries and cruise ships. A paper on the SchIBZ project presented the development of a 500 kW power generation set, based on a SOFC, intended to serve as the power network of a vessel, either solely or in combination with a diesel generator.

GL has long been involved in the development of ships, storage and transfer facilities for the maritime use of hydrogen. GL was the first classification society to develop guidelines for the use of fuel cells in watercraft in 2003. These guidelines cover not only fuel cells and fuel systems, but also standards for the materials used, ventilation systems, fire-fighting equipment, explosion protection and other safety systems. They also give guidance on testing fuel-cell systems. The most experienced classification society in fuel-cell ships, GL has certified vessels like *FCS Alsterwasser* and *Nemo H<sub>2</sub>* in Amsterdam.

Hosting the H<sub>2</sub> Expo fits seamlessly with Hamburg's role as the European Green Capital 2011. The European Commission named Hamburg the Green Capital in recognition of the many sustainable technology projects

taking place and under development in the city. The H<sub>2</sub> Expo was not only an international conference but an attached trade fair, work shops and an electric-vehicle test track.

## Condition Monitoring Key to Hull Life-cycle Management

Condition monitoring for hull and machinery can generate great advantages for shipping lines. Switching to need-based maintenance schedules can reduce downtime and increase vessel profitability by preventing unnecessary maintenance, offering early warning of equipment failure and avoiding misguided maintenance.

A well-chosen and effectively-implemented hull-maintenance strategy not only reduces the risk of incidents but insures hull integrity and safeguards the environment. Ship owners, managers and operators need to monitor their vessels' structural condition continuously, in order to detect deficiencies in the hull structure as early as possible and initiate the necessary maintenance.

Typically, monitoring is done by appointed crew members through periodic visual inspections. The location and extent of coating breakdown, defects or corrosion are documented, using only text descriptions and photos. Because of the size and complexity of the tanks and cargo holds, however, expressing the location of breakdowns reliably and with sufficient accuracy can be challenging.

Planning, preparing, executing, reporting on, and assessing hull structure inspections are crucial processes which require the utmost diligence. The latest hull integrity software systems use 3-D models of the vessel to visualise the shortcomings within the structure. The ability to present findings visually is particularly helpful when shipping companies need to prove to charterers that their ships are maintained to high standards.

3-D imaging with integrated reporting results in greater levels of accuracy in examining the integrity of a vessel's structure. GL HullManager uses a 3-D computer model of the particular vessel to support the complete hull condition inspection and assessment process. This model can be used throughout the entire hull integrity process, from inspections, to reporting and assessment of the conditions of tanks, cargo holds and coatings, as well as visualisation and assessment of the hull's structural condition. A dashboard overview of the entire ship helps crew or third-party inspectors to pinpoint any critical findings.

Systematic and comprehensive data collection is supported and information on the condition of hull structures can be made available to any company employee once the inspection results have been approved and synchronised. Once stored in a life-cycle database, the hull condition data for each individual vessel can then be traced over time. Sister vessels from the same fleet can also easily be compared.

*Mike Mechanicos*

## Lloyd's Register Provides Home for the Historic IMarEST library

Lloyd's Register has taken delivery of the Institute of Marine Engineering, Science and Technology's (IMarEST) library, giving the collection a secure new home and assuring its preservation for the future.

The historically-important IMarEST collection—which comprises more than 390 linear metres of material—now resides at Lloyd’s Register’s offices in Fenchurch Street in London.

“Like our own collection, the IMarEST library is one the great resources still available for current and historic information concerning maritime history, marine engineering, naval architecture, offshore engineering and ocean technology. It was absolutely vital that this collection be preserved to continue to provide the public with a rich sense of one of our traditional industries”, said Richard Sadler, Chief Executive Officer, Lloyd’s Register. “Part of our mission as a UK-registered charity is to advance public education within the engineering and technological disciplines. It is through acts like this that we continue to fulfill that mission.”

The IMarEST was established in 1889 and is the largest international membership body and learned society for marine professionals with over 15 000 members worldwide. The move was made necessary by IMarEST’s relocation this summer to smaller premises, which would not have had room to house the collection. By offering the library a new home at the Lloyd’s Register Information Centre, the organisation is ensuring that this important resource remains available to the public and to the Institute’s members.

Against a backdrop of widespread library closures in London and with many specialist collections under threat, hosting such an important resource ensures that this unique part of IMarEST’s heritage remains available to provide researchers with marine engineering, technical and scientific knowledge.

“The Institute is delighted that our incomparable collection will be housed in such ideal surroundings, remaining in the City of London, and open to all our members and to a wider audience interested in marine affairs,” says IMarEST’s Interim CEO, Fiona Morris.

“In addition to thanking Lloyd’s Register on behalf of the Institute, I would like to pay particular tribute to the hard work of James McRae, the Institute’s Information and Knowledge Manager. He has worked with Lloyd’s Register to ensure the smooth transfer of our vast collection from Coleman Street to Fenchurch Street, harnessing online tools to ensure that all members are kept fully informed, and is now driving forward the Institute’s plans for future online services. He has done a magnificent and highly-professional job.

“We are extremely proud of our collection in its new and very permanent home, and look forward to making use of it on a regular basis and meeting many of our Members when they visit the Lloyd’s Register library.”

The IMarEST will continue to provide its members with information and knowledge services and a virtual library online providing e-books. It will also continue to hold the Institute’s publications and some current specialist books.

Lloyd’s Register’s historic archive and library was founded in 1852 at the bequest of Principal Shipwright Surveyor, Augustin Francis Bullock Creuze, FRS, and a founding member of the first Royal School of Naval Architecture. Nestled in the heart of the City of London, the organisation’s information centre provides access to its historic archive, plus a full collection of the Lloyd’s Register of Ships—dating back to 1764—and associated publications and material.

**The Australian Naval Architect**

“This is a great opportunity to combine our collections, each complementing the other, and to build upon the good work undertaken by the information staff of both IMarEST and Lloyd’s Register”, Information Centre Manager, Barbara Jones, said. “There is a significant amount of work involved in maintaining an active archive and library, so we are ensuring that further resources are made available to ensure a successful amalgamation of our two collections.”

The collections are open to the public Monday to Friday between 0930–1200 and 1300–1630. Further information can be found on the website:

[www.lr.org/about\\_us/shipping\\_information/IMarEST\\_Collection\\_at\\_LR.aspx](http://www.lr.org/about_us/shipping_information/IMarEST_Collection_at_LR.aspx)

## **Statutory alert: Entry into force of Energy Efficiency Design Index**

The 62nd meeting of the Marine Environmental Protection Committee (MEPC) took place from 11 to 15 July at the IMO headquarters in London. The meeting largely focussed on reduction of Greenhouse Gases (GHG) from ships which led to the adoption of Energy Efficiency Regulations as part of a new Chapter 4 of MARPOL Annex VI. These include the Energy Efficiency Design Index (EEDI) and Ship Energy Efficiency Management Plan (SEEMP).

EEDI reflects the amount of CO<sub>2</sub> generated per tonne-mile (cargo carrying capacity). It constitutes a uniform approach to calculation of a ship’s energy efficiency during the design and build of new ships, and will be used to control CO<sub>2</sub> levels emitted for future new ships by encouraging improvements in ship design.

SEEMP establishes a mechanism for operators to improve the energy efficiency of ships through the management of individual efficiency measures.

### **Application**

The date of entry into force will be 1 January 2013. The SEEMP will be applicable to all ships greater than 400 GT whilst the EEDI will only apply to new ships, excluding those with diesel-electric, steam turbine or hybrid propulsion systems, as follows:

- Ship for which the building contract is placed on or after 1 January 2013;
- In the absence of a building contract, the keel is either laid or which is at a similar stage of construction, on or after 1 July 2013;
- The delivery of the ship is on or after 1 July 2015.

Additionally, an Administration may choose to waive the requirement for EEDI for up to four years after each of the above dates.

The regulation pertaining to the reduction of EEDI is currently prepared to be applicable for new ships as given in the table. These ships will be required to have an Attained EEDI (i.e. actual verifiable values) equal to or less than the required EEDI values (i.e. determined using Reference Lines). The required EEDI is drawn up based on the EEDI reference line related to ships construction as shown in the table below. The EEDI Reference Line is the average energy efficiency for different classes of vessels and this is yet to be finalised by IMO.

The regulation will only apply to other ship types and sizes

when the technical methods for calculation of EEDI which relate to them have been developed.

Table Reduction rate (percent) for Required EEDI versus EEDI Reference line

| Ship type                  | Size (DWT)    | Phase 0<br>1 Jan 2013 | Phase 1<br>1 Jan 2015 | Phase 2<br>1 Jan 2020 | Phase 3<br>>1 Jan 2025 |
|----------------------------|---------------|-----------------------|-----------------------|-----------------------|------------------------|
| Bulk carrier               | >20 000       | 0                     | 10                    | 20                    | 30                     |
|                            | 10 000–20 000 | n/a                   | 0–10*                 | 0–20*                 | 0–30*                  |
| Gas tanker                 | ≥10 000       | 0                     | 10                    | 20                    | 30                     |
|                            | 2000–10 000   | n/a                   | 0–10*                 | 0–20*                 | 0–30*                  |
| Tanker                     | ≥20 000       | 0                     | 10                    | 20                    | 30                     |
|                            | 4000–20 000   | n/a                   | 0–10*                 | 0–20*                 | 0–30*                  |
| Container ship             | ≥15 000       | 0                     | 10                    | 20                    | 30                     |
|                            | 3000–15 000   | n/a                   | 0–10*                 | 0–20*                 | 0–30*                  |
| General cargo ship         | ≥15 000       | 0                     | 10                    | 15                    | 30                     |
|                            | 3000–15 000   | n/a                   | 0–10*                 | 0–15*                 | 0–30*                  |
| Refrigerated cargo carrier | ≥5000         | 0                     | 10                    | 15                    | 30                     |
|                            | 3000–5000     | n/a                   | 0–10*                 | 0–15*                 | 0–30*                  |
| Combination carrier        | ≥20 000       | 0                     | 10                    | 20                    | 30                     |
|                            | 4000–20 000   | n/a                   | 0–10*                 | 0–20*                 | 0–30*                  |

### Calculation and Verification

Each applicable new ship will be required to submit information in the form of a Technical File which contains data to support the calculation of the EEDI value. Supporting information may be required as appropriate, including model test results and machinery and equipment certificates.

The EEDI will require that verification takes place at both the design stage (pre-verification) and during ship construction and sea trials (final verification) by an authorised Recognised Organisation (RO). Following verification, an International

Energy Efficiency Certificate (IEEC) covering both EEDI and SEEMP will be issued by the RO on behalf of the Flag State and will be required to be maintained onboard the ship throughout its life. The certificate is valid for the life of the ship unless the ship undergoes major conversion.

### EEDI Development Work

In the interim period prior to entry into force, there will be continued work by the relevant working groups to finalise the technical aspects of the EEDI in time for MEPC 63.

### Lloyd's Register Services

For clients wishing to apply for EEDI on a voluntary basis prior to entry into force, a request for marine services should be made through the Lloyd's Register Group offices in Busan, Yokohama, Piraeus or Copenhagen. Verification will be coordinated appropriately through Lloyd's Register's authorised Design Support Offices who will advise of the requirements.

Lloyd's Register's *Classification News*, No. 15/2011, 18 July 2011

## GENERAL NEWS

### Austal's Largest Catamaran Delivered

Austal's largest catamaran built to date, the 113 m *Leonora Christina*, was recently handed over to her owners, marking completion of construction of the high-speed vehicle-passenger ferry at Austal's Henderson shipyard.

*Leonora Christina* was constructed for Danish company Færøen (formerly Nordic Ferry Services) and sailed in May from Austal's Henderson shipyard for Denmark, where she will be operated by Bornholmer Færøen, a subsidiary of Færøen.

*Leonora Christina* will join the 86 m Austal-built catamaran *Villum Clausen* which has been transporting vehicles and passengers between Ronne on the Danish island of Bornholm and Ystad in south-east Sweden since 2000.

Senior Captain Søren Schow, of Bornholmer Færøen, commanded the 22 day voyage from Western Australia to Denmark along with a crew of 12 and commented that he looked forward to *Leonora Christina* commencing operations in mid-June 2011.

"Having spent a significant amount of time at Austal during the construction of *Leonora Christina*, I am confident that this vessel will perform well and exceed the expectations of the Bornholm public.

"After participating in recent sea trials, I am satisfied that *Leonora Christina* has fulfilled her speed requirements, while her proven seakeeping capabilities will ensure maximum passenger comfort throughout the 90 minute journey from Bornholm to Ystad," said Senior Captain Schow.

Austal's Chief Executive Officer, Andrew Bellamy, congratulated employees at Austal's Henderson shipyard on the completion of *Leonora Christina*, commenting that the vessel will soon be the pride of Bornholmer Færøen's fleet.



A starboard quarter view of *Leonora Christina* on trials  
(Photo courtesy Austal)

### Vessel Review

Austal was awarded the contract to build *Leonora Christina* 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 of Færøen's requirements for the route. *Leonora Christina* has also been built to comply with stringent Danish regulations, covering environmental noise, wave-wash and exhaust emissions, as well as ergonomic working arrangements for the crew and strict fire and safety standards.

Austal's proven design experience enabled the 113 m *Leonora Christina* to be customised to fit Bornholmer Færøen's existing high-speed ferry berths, which she will share with the smaller *Villum Clausen*. This resulted in significant savings for the operator as only minimal modifications were needed to be made to the ports of Ronne and Ystad.

*Leonora Christina* maintains the tradition for high-standard ferry services offered by Scandinavian operators in general



*Leonora Christina*  
(Photo courtesy Austal)

and Bornholmer Færge in particular, not only in terms of performance, but also with regard to safety, comfort and quality of finish.

Seating for the vessel's 1400 passengers is spread over the upper and bridge decks. Ample room and luxury fittings are evident throughout the vessel's refined, high-quality interior, which reflects contemporary Scandinavian design aesthetics. Natural lighting and timber finishing deliver a feeling of light and space throughout the vessel, with large skylights located in the vessel's atrium completing the look.

High levels of passenger comfort are ensured with a range of fixed and adjustable Beurteaux seating throughout the vessel in a variety of complementary colours. The main passenger facilities on board *Leonora Christina* are located on the upper deck which is split into several distinctive lounge areas along its length, each featuring its own style of seating, colour scheme and facilities as well as extensive use of glass to ensure a sea view for all. LCD TV screens are located throughout all passenger areas, with a screen visible from every seat in the interior of the vessel.

Bornholmer Færge is particularly renowned for its high-quality food and beverage service, and the facilities on *Leonora Christina* will assist the crew to exceed expectations not only in food quality but in efficiency of delivery. The large galley features ergonomically-adjustable bench heights and extensive food storage and preparation services, along with a raft of features to enable rapid replenishment during the vessel's short time in port.

The design and layout of the food servery is unique to Bornholmer Færge, with Austal's design team working to ensure maximum efficiency and flow of people through food-service areas. Adjacent to the servery is the shop which features the same high-quality finishes found throughout the vessel. Tables and chairs border both sides of the servery, allowing passengers to enjoy their meals whilst taking in the panoramic ocean views. A separate bar and café facility towards the bow of the vessel is also available to serve drinks and snacks throughout the duration of the voyage.

A must on every ferry is a children's play area and *Leonora Christina* is no exception. Located on the upper passenger deck near the atrium, the playroom is one of the brightest areas of the vessel and features a 107 cm flat-screen TV with DVD and surround-sound capabilities.

*Leonora Christina* has also been designed to allow maximum wheelchair accessibility, with two lifts allowing disabled access from the vehicle to the passenger decks, together with designated wheelchair seating locations in the forward lounge in close proximity to the cafe.

The vessel's wheelhouse contains ergonomically-designed navigation and control stations for the Captain and Navigator as well as a fully-integrated monitoring and control system featuring Austal's Marine Link system which provides the ship's engineers with the ability to monitor and control the vessel's safety, propulsion, generating and other operationally-critical systems. The wheelhouse extends across the full width of the vessel and provides the crew with maximum visibility, while fully-equipped bridge wings on both the port and starboard sides enable safe docking of the vessel in the confined ports of Ronne and Ystad, especially in winter fog, snow and other adverse conditions. A fully-equipped crew mess and multiple crew storage areas add to the comfort and functionality of the vessel.

The vessel's three vehicle decks offer a total capacity of 300 truck lane metres, or a maximum of 357 cars, which are accessible via both bow and stern ramps, ensuring efficient 'drive through' loading and unloading of the vessel, thereby keeping turnaround times to a minimum. The fitting of hoistable vehicle decks provides Bornholmer Færge with the flexibility to carry a mix of cars and freight. Lightweight structural fire protection, zoned sprinkler systems and hydrants ensure optimal fire safety during vehicle transport.

With the ability to operate at speeds of up to 40 kn, *Leonora Christina* is powered by four MAN 20V28/33D engines, each capable of producing a maximum continuous output of 9100 kW and driving Rolls Royce KaMeWa 125 SIII waterjets.

## HMAS Manoora Decommissioned

After 17 years of dedicated service, the Royal Australian Navy's amphibious transport ship, HMAS *Manoora*, was decommissioned at her homeport of Garden Island, in Sydney, on 27 May.

Following a time-honoured tradition, the Australian White Ensign was lowered for the last time and handed to Commanding Officer, Commander Stephen Dryden, RAN.

Commander Dryden said decommissioning the vessel was a bitter-sweet moment.

"It is always sad to farewell a ship like *Manoora*, which has provided significant amphibious capability to the Australian Defence Force over her many years of service," said Commander Dryden.

"*Manoora* has proven herself to be versatile and resilient, supporting humanitarian aid and disaster missions in Solomon Islands and East Timor and undertaking active service in the Middle East as part of Operations Slipper and Falconer."

"Her hard work has paved the way for the future of the Navy by providing an understanding of how to carry out amphibious and expeditionary warfare," said Commander Dryden.

"Today it is also important to acknowledge the hard work of the current and former crews who have called *Manoora* home. Their dedication has enabled the ship to respond to situations in war and peace, whenever tasked by Government to do so."



The ship's company of HMAS *Manoora* march off their ship during her decommissioning ceremony on 27 May (RAN photograph)

## Rizzo Report Released

On 18 July the Minister for Defence, Stephen Smith, and the Minister for Defence Materiel, Jason Clare, released the Rizzo report — Plan to Reform Support Ship Repair and Management Practices. Speaking at the release of the report at Fleet Base East, the Minister for Defence said:

"Firstly I thank Mr Rizzo for his report, and also thank Neil Smith and Brian Adams, who helped in the preparation of the report.

"The report is a damning report of what has occurred in the past. But, importantly, it provides us a very clear pathway for the future, and a very clear pathway for reform. Mr Rizzo's report draws attention to longstanding, systemic and institutional difficulties, but his report provides us with a path for the future which is consistent with the reform that Minister Clare and I have been progressing since we became

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Ministers for Defence and Defence Materiel respectively. All 24 recommendations of Mr Rizzo's report are accepted and will be implemented by Defence and by the government. One of the recommendations is for Mr Rizzo to chair an implementation committee. We accept that recommendation. "Amongst the important recommendations is the appointment of a two-star navy head of engineering. Commodore Michael Uzzell will be promoted to fill that position. It's clear from Mr Rizzo's report that navy's engineering capacity has in recent times not been up to the mark. It's also clear that navy and the Defence Materiel Organisation's engineering capacity have nowhere near the resources to do the job required of keeping modern ships at sea.

"At the same time the Defence Materiel Organisation will add to its resources in its systems program office dealing with maintenance and the amphibious fleet. Over 20 new positions will be created, and the first of the new appointments will occur shortly.

"It's also clear from Mr Rizzo's report that, over the period of the report, there has not been sufficient cooperation and coordination between the Defence Materiel Organisation and the navy. The new Chief of Navy and the acting CEO of the Defence Materiel Organisation have been charged with the responsibility of ensuring that, into the future, there is sufficient and appropriate coordination, integration, and cooperation between the Defence Materiel Organisation and the navy.

"As I said, the report makes clear that there are long-term, systemic longstanding issues of difficulty. In very many respects this comes as no surprise. The amphibious ships are now 30 to 40 years old, but when in February the problems associated with their maintenance confronted the Government, there were a number of issues which I wanted to ensure that the government addressed. Firstly, that there was an independent review so that we could put in to place reforms to ensure that a similar gap in capability did not occur into the future. Secondly, I wanted to ensure that we had a cover for the capability gap which had emerged. The government's purchase of *Largs Bay*, our agreement with New Zealand for cooperative use of HMNZS *Canterbury*, and our leasing of *Aurora Australis* has ensured that we have had capability requirements which will suit the demands whilst HMAS *Tobruk*, in particular, is in maintenance.

"Finally I wanted to ensure that these difficulties would not be presented to our successors. One of the difficulties with *Manoora* and *Kanimbla* is old ships with a lack of documentation. We have not made this mistake with the recent purchase of *Largs Bay*.

The full report can be downloaded from [www.defence.gov.au/rizzo-review/Review.pdf](http://www.defence.gov.au/rizzo-review/Review.pdf).

## ADF Force Posture Review

On 22 June the Minister for Defence, Stephen Smith, announced that the Government will undertake a Force Posture Review to assess whether the Australian Defence Force (ADF) is correctly geographically positioned to meet Australia's modern and future strategic and security challenges.

The Force Posture Review will be undertaken by the

Department of Defence and overseen by an expert panel made up of two renowned Australian national security specialists — Dr Allan Hawke and Mr Ric Smith.

The results of the Review and the views of the expert panel will help provide a strategic context for the next scheduled Defence White Paper in the first quarter of 2014.

The Review will address the range of present and emerging global, regional and national strategic and security factors which require careful consideration for the future, including:

- the rise of the Asia-Pacific as a region of global strategic significance;
- the rise of the Indian Ocean rim as a region of global strategic significance;
- the growth of military power-projection capabilities of countries in the Asia Pacific;
- the growing need for the provision of humanitarian assistance and disaster relief following extreme events in the Asia Pacific region; and
- energy security and security issues associated with expanding offshore resource exploitation in our north-west and northern approaches.

It is essential that, into the future, Defence and the Australian Defence Force is appropriately positioned to respond in a timely way to Australia's strategic and security demands.

The Review will build on the strategic and capability judgements contained in the Defence White Paper 2009 *Defending Australia in the Asia Pacific Century: Force 2030*, and consider the implications for Force Posture from the array of emerging strategic and security influences.

The Review will be informed by the work currently underway in relation to base consolidation, through which Defence is assessing basing requirements and developing options for changes to Defence's estate over the next 25 year period.

The Force Posture Review will:

- as its starting point draw on the security, strategic and capability judgements outlined in the Defence White Paper 2009 *Defending Australia in the Asia Pacific Century: Force 2030*;
- draw on work currently underway in Defence through the 2011 Annual Defence Planning Guidance;
- outline the future security and strategic environment and challenges which Australia needs to be positioned to respond to up to 2030;
- consider the potential strategic and security role of Australia's offshore territories, particularly Cocos and Christmas Islands, for Force Posture requirements;
- consider the implications for ADF Force Posture of the need for energy security, including security issues associated with expanding offshore resource exploitation in our north-west and northern approaches;
- consider how the future ADF Force Posture will

support Australia's ability to respond to a range of activities including:

- deployments on missions and operations overseas;
  - support of operations in our wider region; and
  - practical engagement with the countries of the Asia-Pacific and Indian Ocean rim in ways that help to shape security and strategic circumstances in Australia's interest;
- assess the impact on the ADF's Force Posture of a range of domestic, demographic and economic issues including:
    - more-intense minerals and petroleum resource activities around Defence training and exercise ranges;
    - urban encroachment on existing Defence facilities;
    - community attitudes to living standards and residential locations; and
    - the need for a more cost-effective approach to basing;
  - make recommendations in relation to the basing options for Force 2030 across Australia including in relation to:
    - Navy platforms (including the air-warfare destroyers, landing helicopter docks, future submarines, the Anzac-class frigate and its replacements and offshore patrol vessels);

- Army's additional northern basing requirements; and
  - Air Force's plans to introduce a range of new aircraft and associated support systems into service; and
- consider other relevant issues including population and population spread.

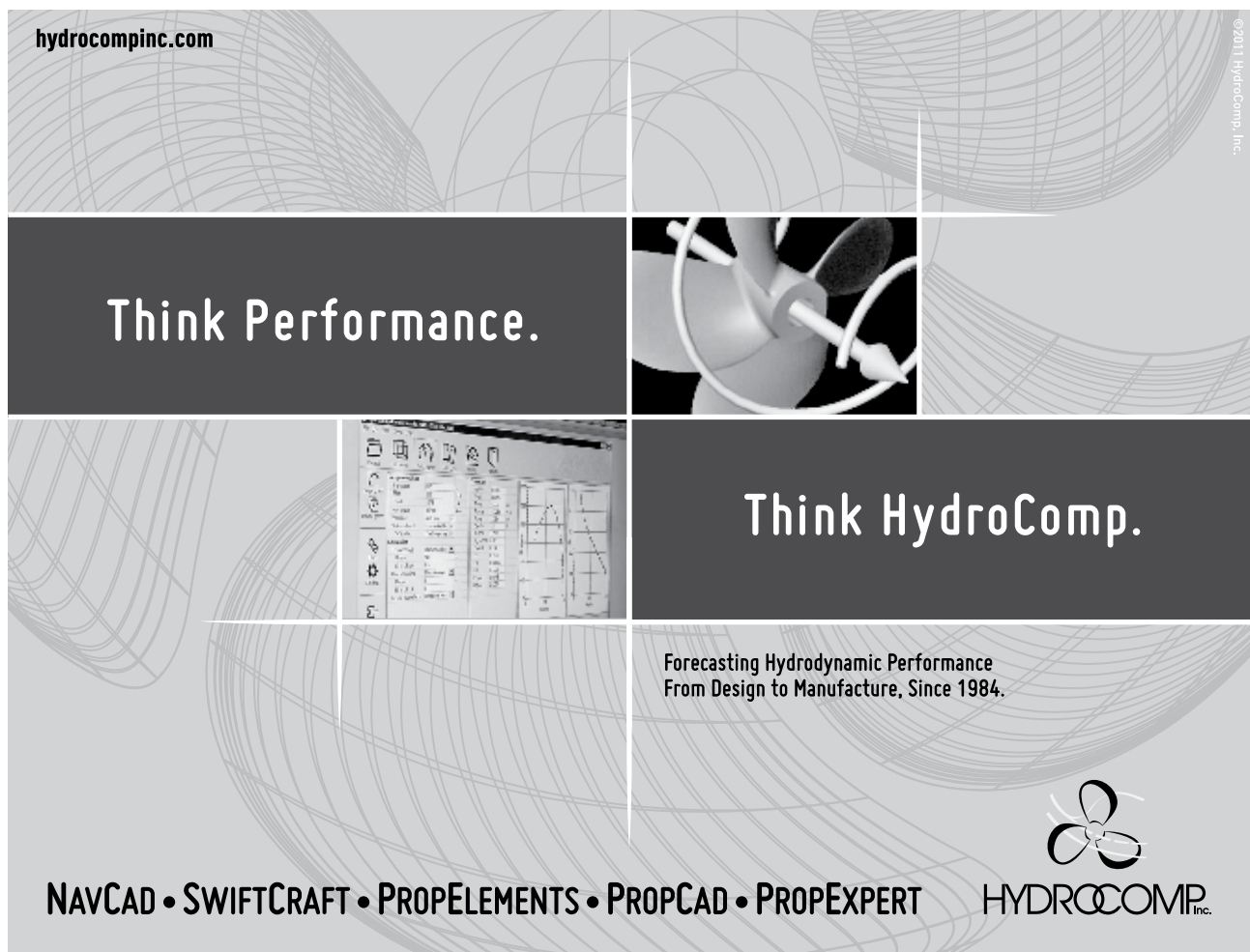
The Review will complement the work currently underway with the United States on the ongoing United States Global Force Posture Review by the joint Australian-United States working group.

The Review will be developed by the Department of Defence. The expert panel of Dr Hawke and Mr Smith will provide overall guidance to the Defence Force Posture Review.

Dr Hawke is a former Secretary of the Department of Defence. Mr Smith is Australia's Special Envoy for Afghanistan and Pakistan, and a former Secretary of the Department of Defence.

On Dr Hawke's and Mr Smith's recommendation, the Expert Panel may be augmented with additional expertise during the course of the Review.

The panel will provide a progress report before the end of 2011, with its Report provided to Government during the first quarter of 2012.



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## Austal Contract for Extra JHSV

In July the US Navy exercised contract options with Austal for the construction of the sixth and seventh Joint High Speed Vessels (JHSV), as part of a ten-vessel program potentially worth over \$US1.6 billion. The construction contract for both vessels is valued at approximately \$US313 million.

Austal's Chief Executive Officer, Andrew Bellamy, noted that this contract demonstrates the US Navy's confidence in Austal as a leading defence prime contractor.

"With options remaining for a further three vessels, the JHSV program is expected to deliver a predictable revenue stream of \$A330 million per annum from 2012 to 2015, which is approximately 60 per cent of Austal's historical revenue."

As prime contractor, Austal was awarded the construction contract for the first 103 m JHSV in November 2008, with options for nine additional vessels between FY09 and FY13. The Austal JHSV team includes platform systems engineering agent General Dynamics Advanced Information Systems which is responsible for the design, integration and testing of the ship's mission systems, including internal and external communications, electronic navigation, and aviation and armament systems.

Austal received authorisation from the US Navy to start construction on the first vessel of the contract, *Spearhead* (JHSV 1), in December 2009 after completing the rigorous design over a 12-month period. *Spearhead* is scheduled for launching in August 2011 and delivery in December 2011. Construction on *Vigilant* (JHSV 2) began at Austal's Mobile, Alabama, USA shipyard on 13 September 2010.

Austal USA's President and Chief Operating Officer, Joe Rella, remarked, "This award facilitates the continued development and growth of our US operations, as well as the expansion of our Alabama workforce from over 2000 to nearly 4000."

Austal is also currently building a second Independence-variant 127 m Littoral Combat Ship (LCS) for the US Navy, *Coronado* (LCS 4), which is scheduled for launch in September 2011. As prime contractor, Austal recently received a US Navy contract for construction of up to an additional 10 Littoral Combat Ships, including *Jackson* (LCS 6) and *Montgomery* (LCS 8), to be appropriated in the following five years, with a total value in excess of \$US3.5 billion. Once commissioned, these 10 vessels will join the Austal-built USS *Independence* (LCS 2) which was commissioned in January 2010.

## Changes to AWD Construction Program

At the end of May the Minister for Defence, Stephen Smith, and the Minister for Defence Materiel, Jason Clare, announced the reallocation of construction work for the \$8 billion air-warfare destroyer (AWD) Project.

Australia is constructing three AWDs based on a proven design from the Spanish Navy. The ships are due to be delivered from December 2014.

The AWD Project is an important element of Force 2030. The Government and Defence have been actively working with Defence Industry and the AWD Alliance, which is managing the AWD project, to deliver the project. The AWD Alliance consists of ASC, the Defence Materiel Organisation (DMO) and Raytheon.

## The Australian Naval Architect

Construction of the AWDs involves 90 separate steel blocks being built at three shipyards in Adelaide (ASC), Melbourne (BAE Systems) and Newcastle (Forgacs). Three additional sonar block assemblies are being built in Spain and the United Kingdom.

The Melbourne BAE Systems shipyard is also building 14 steel blocks for the superstructure of two new 27 500 t Landing Helicopter Dock ships (LHDs) — *Canberra* and *Adelaide* — due for delivery in 2014 and 2015.

Last year the project encountered difficulties in relation to engineering and construction of some of the first AWD hull blocks. To assist the AWD project schedule, earlier this year the AWD Alliance reallocated construction of nine steel blocks from BAE Systems in Melbourne to the Forgacs shipyard in Newcastle.

The Melbourne BAE Systems shipyard remains stretched, working on two major projects at the same time — steel blocks for the AWDs and the superstructure and integration of the LHDs.

The Government, the AWD Alliance and BAE Systems take the schedule for both these important projects extremely seriously.

In February 2011, BAE Systems advised the AWD Alliance of potential schedule delays. In recent months, the AWD Alliance and BAE Systems have been working closely to develop options to improve the production program.

In March, the Minister for Defence met with Guy Griffiths, the Group Managing Director—International of BAE Systems UK, in London to discuss this project.

The Minister for Defence Materiel has also met with the CEO of BAE Australia, Jim McDowell, on a number of occasions about this project.

Earlier this month BAE Systems presented the AWD Alliance with a plan to adjust its workload on the AWD Project.

The advice of the AWD Alliance is that, if no action is taken to relieve the pressure on the Melbourne BAE Systems shipyard, the first ship would be two years late, approximately 25% over schedule.

The AWD Alliance (with the support of BAE Systems) therefore plans to take the following action:

- up to 13 steel blocks will be reallocated among the three Australian shipyards in Adelaide, Melbourne and Newcastle — seven for advanced fit-out and six for construction; and
- up to five steel blocks will be reallocated to Navantia in Ferrol, Spain.

These changes involve the reallocation of blocks for the first two ships only, and are subject in the usual way to satisfactory commercial arrangements with the shipyards.

BAE will complete the structural steel and initial outfitting work on the seven steel blocks on which it is currently working, as well as all its work on the 14 blocks for the superstructure of the LHDs and the integration work.

A decision on the reallocation of blocks, if any, on the third AWD will be made later in the project. This action will reduce the schedule risk to both this project and to the LHD project and is expected to reduce the delay in the completion

of the first AWD by up to 12 months, and of all three AWDs by up to 12 months.

It will also reduce the pressure on BAE Systems to complete the construction of the superstructure and the integration of the LHDs.

## Austal Awarded Cape-class Patrol Boat Contract

At a ceremony held on board Austal's next generation 102 m trimaran on 12 August, Austal was awarded a contract for the design, construction and through-life support of eight new patrol boats for the Australian Customs and Border Protection Service.

This contract is Austal's second significant contract with the Australian Customs and Border Protection Service, having designed and constructed Customs' current fleet of eight Bay-class vessels, which have been in operation for over 10 years.

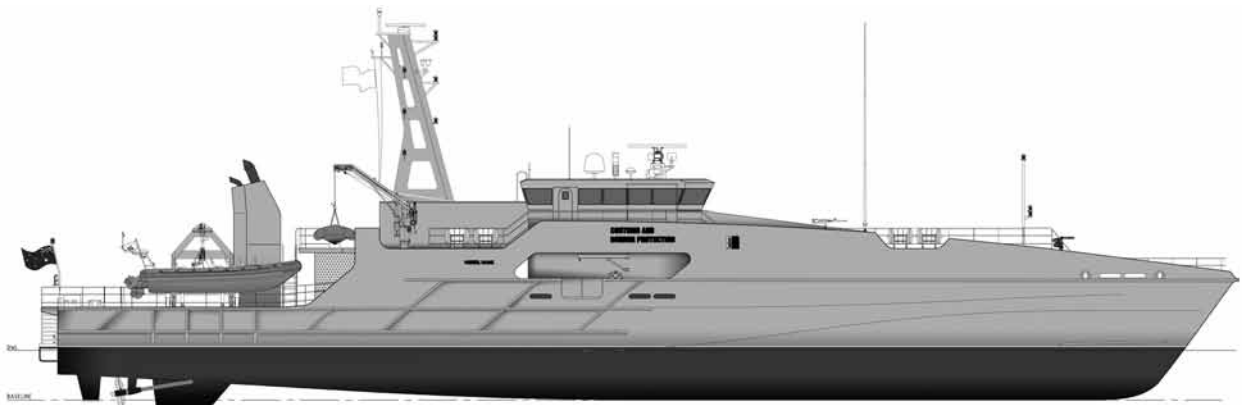
Austal will build the fleet of Cape-class patrol boats at its shipyard in Henderson, Western Australia. Construction of the first vessel is expected to commence in February 2012, with all eight due to be delivered between March 2013 and August 2015.

The in-service support contract extends for a minimum period of eight years and encompasses a full range of intermediate and depot level maintenance activities. Further options can be exercised by the Australian Customs and Border Protection Service for in-service support for the life of the Cape-class patrol boat fleet.

The eight 57.8 m Cape-class patrol boats will play a significant role in protecting Australia's borders from multiple maritime threats, and have been designed to have greater range, endurance and flexibility, as well as enhanced capability to operate in more severe sea conditions than the current Customs' fleet.

Austal's Chief Executive Officer, Andrew Bellamy, commented that Austal is proud to have been selected to work with the Australian Customs and Border Protection Service once again, and that the contract is strategically important for the Western Australian company.

"The Cape-class contract cements Austal's position as the sole provider of Australia's Border Protection Command patrol vessels, and as a leading supplier of Australia's front line border security and surveillance capabilities. It also provides us with the opportunity to continue to work with our long standing partner, DMS Maritime, to provide in-service support for the new Cape-class fleet."



The profile of Austal's Cape-class Customs patrol boat  
(Drawing courtesy Austal)

|                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
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|  | <h3>Submarine Design &amp; Engineering Course</h3> <p>Melbourne, November 14-18, 2011<br/>An all-encompassing technical acquaint course based primarily on conventional submarine technology whilst targeting the underlying principles of Naval Architecture, Marine, Electrical and Weapon Systems Engineering.</p> <h3>Technical Management of Warship Projects</h3> <p>An overview of the process, technical issues and risks associated with the design activity of warship acquisition. In addition to the overall design and integration process, the course will consider the hull, mechanical and electrical systems.</p> <h3>Defence Maritime System Safety</h3> <p>Introductory, Intermediate, Advanced or tailored training covering System Safety in the Defence maritime environment for all personnel involved in the Navy Safety Case at any stage of the system life cycle. The courses provide an overview of the philosophy, tools, techniques, and the skills required to properly manage a DMO Safety Program or build and maintain a Safety Case in RAN environment.</p> <p>Contact: Karyn Agius<br/>Phone: +61 3 8620 6171<br/>kagius@bmttdt.com.au<br/>www.bmttdt.com.au</p>  |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Australia and United Kingdom to share Defence Research Facilities

Australia and the United Kingdom will share defence research facilities to enhance cooperation in science and technology and reduce operating costs, the Minister for Defence Science and Personnel, Warren Snowdon, announced on 22 July.

Australia's Defence Science and Technology Organisation (DSTO) and the UK Defence Science and Technology Laboratory (DSTL) have signed a Memorandum of Understanding for reciprocal access to each other's science facilities and equipment.

"The new arrangement will benefit both Australia and the UK by making better use of specialist facilities and spare capacity without the need to invest in new infrastructure," Mr Snowdon said during a visit to DSTL headquarters at Porton Down.

"I have visited some of the facilities in the UK and recognise that both DSTL and DSTO have laboratories which undertake scientific inquiry within complex areas of research.

"Joint use of these facilities will be cost-effective for both countries."

Mr Snowdon said that Australia and the UK had a long history of collaboration in defence science, and the use of shared facilities opens up new opportunities for increased bilateral cooperation and a more strategic partnership between the two countries.

## Submarine Escape and Rescue Capability Exercised

The Royal Australian Navy (RAN) has successfully demonstrated its submarine rescue capability as part of Exercise Black Carillon 2011-1, which concluded off the West Australian coast in early June.

The exercise, which commenced in mid-May, was designed to test and demonstrate the RAN's submarine escape and rescue capability in a realistic scenario and is a requirement of the RAN's submarine safety program.

The method of submarine escape exercised as part of Black



The LR5 submersible deployed from *Seahorse Standard* (RAN photograph)

Carillon 2011-1 involved personnel transferring from a bottomed submarine into the James Fisher Submarine Rescue Service (JFSRS) rescue vehicle, the LR5 submersible, for transportation to a vessel at the surface. At depth, the mating of the LR5 rescue vehicle to the submarine requires a high level of expertise and proven technology.

Upon being recovered to the surface, the rescued submariners were tended to onboard the rescue mothership, in this instance the 'vessel of opportunity' *Seahorse Standard*, with specialised RAN medical teams and equipment embarked. The submarine rescue capability proven during Exercise Black Carillon 2011-1 involved simulated medical scenarios both in the 'disabled submarine' and on the surface.

The Commander Submarine Force, Captain Brett Sampson, said that the completion of a complex submarine rescue scenario proves that submariners should be confident in the submarine rescue capability provided by the RAN.

"Black Carillon is an extraordinarily valuable opportunity to exercise our submarine escape and rescue capability," said Captain Brett Sampson.

"The successful completion of the submarine escape as part of Exercise Black Carillon 2011-1 proves that the RAN is well equipped to take action to rescue submariners in the unlikely event of a submarine incident."



*Seahorse Standard* and HMAS *Waller* during Exercise Black Carillon 2011-1 (RAN photograph)

Black Carillon 2011-1 is the thirteenth in a series of RAN submarine escape and rescue exercises designed to test and demonstrate RAN submarine rescue capability.

## New Ship Maintenance Contracts for Navy

On 20 June the Minister for Defence Materiel, Jason Clare, announced that the tender had been released for a five-year contract for the repair and maintenance of the Navy's eight Anzac-class frigates. The contract is worth approximately \$300 million.

Four companies or joint ventures have been short-listed to compete for the work — BAE Systems, Babcock/UGL Infrastructure, Thales Australia, and DMS Maritime/Transfield Services. They were short-listed following an open tender process.

This is the first of the new group maintenance contracts to be released for tender. Currently, each maintenance activity is contracted individually to a panel of companies who compete for the work. This reform will end that system and create five-year performance-based contracts for the maintenance and repair of Navy ships.

Mr Clare said that reforming the way this work is contracted will provide the Navy and local industry with more certainty.

"This reform provides more security for Australian businesses and more job security for their workforce," Mr Clare said.

"It's a significant change — ending the burden for industry of bidding for every job."

## HMAS Perth Upgrade Trials Successful

A major milestone in the delivery of an upgraded anti-ship missile defence for the Royal Australian Navy's Anzac-class frigates has been achieved with the completion of a successful trial of the system in HMAS Perth.

The project involved a comprehensive upgrade of HMAS Perth's anti-ship missile defence systems including a new phased-array radar which was designed and developed in Australia by CEA Technologies.

The new radar, which is mounted on a new and prominent enclosed mast, improves the ability of the ship to detect and track multiple targets.

Recent trials included successful firing of an Evolved Sea Sparrow missile using the phased-array radar system.

HMAS Perth recently accompanied HMAS Sydney to the Pacific Missile Range Facility in Hawaii for operational testing of the system.

HMAS Perth is the lead ship in this project. Defence will now prepare a business case for Government to upgrade the other seven Anzac-class frigates.

During her refit to install the new radar, HMAS Perth was upgraded in other ways as well. Her combat-management system was updated and the operations-room layout modernised to accommodate the new equipment. Two new navigation radars were fitted on a new foremast, positioned so as to avoid the usual 'blind spots'. An infrared search and tracking system was also fitted. To improve reserve buoyancy and therefore the ship's ability to withstand damage, the quarterdeck was enclosed, providing additional air-conditioned recreation space. The Senior Sailors' Mess



HMAS Perth at anchor in Jervis Bay  
(RAN photograph)



Operators at new multi-function consoles in Perth's  
modernised operations room  
(RAN photograph)



An Evolved Sea Sparrow Missile being fired from HMAS Perth  
(RAN photograph)

was rebuilt to accommodate both Chief Petty Officers and Petty Officers, and a new garbage management system was installed.

The modifications to HMAS Perth were carried out in Western Australia. Subject to Government approval of ongoing phases of this project, the RAN's other Anzac-class frigates will be similarly modernised in coming years.

## BCTQ Busy

Burness Corlett Three Quays recently completed a lightship survey in Noumea, New Caledonia. The survey was conducted on Carnival Cruises' vessel *Pacific Pearl*. The program included a ship check to determine all weights off/on and liquid state conditions to verify the vessel's current lightship parameters and growth since its last inclining. The associated reports were prepared to the satisfaction of the British Maritime Coastguard.

Manufacturing and installation of the BCTQ-designed rudder stock, pintle and bearings for HMAS *Success* has been completed during her recent refit by Singapore Technologies Marine in Singapore. The entire installation package, including ripout and installation drawings, casting and machining drawings, design finite-element analysis and detailed design report documents which were developed in house. No deviations from the original design were necessary. The ship tests and trials were conducted in accordance with BCTQ procedures, and the ship returned to Sydney in late June.

BCTQ recently completed an inclining experiment in Port Moresby, Papua New Guinea. The experiment was conducted on Pacific Towing's tug *Vulcan*. The program included a ship check to determine all weights off/on and liquid state conditions to verify its current lightship parameters and growth since its last inclining. The inclining was conducted and the associated reports were prepared to the satisfaction of the PNG NMSA. The inclining experiment was commissioned after the completion of an earlier BCTQ design project to fit a new 150 t brake load winch foundation to the vessel. This involved 2D/3D CAD modelling and finite-element analysis.

BCTQ is continuing to provide production support for the \$8 billion air-warfare destroyer project for the Royal Australian Navy. The AWDs are being constructed using a block-build method. Details for lifting and manoeuvring of four of those blocks were delivered on time in 2010. The BCTQ production support involved 3D modelling, finite-element calculations and detail design drawings.

In early 2011, BCTQ assisted one of its South Australian clients with structural modification, design and stability calculations to allow a 42 t crane to operate on a system of eight interconnected barges. Additional structure was required to support the weight of the crane, incorporating bolted connections to maintain the ability of the barges to be disconnected for road transport.

BCTQ recently assisted the Royal Australian Navy with the design of additional structure to secure the bow doors on HMAS *Tobruk*. The modifications were required to meet current Lloyd's Register classification requirements. The design package included detailed design drawings, design finite-element analysis and engineering advice documentation for isolation of the bow door and ramp

*BCTQ News Update*, July 2011

## Triple Dockings at Thales Australia

Following the successful simultaneous triple dockings of three Royal Australian Navy (RAN) frigates in 2009, and the docking of three Minehunter Coastal (MHC) vessels in August 2010, Thales Australia has recently undertaken its

most complicated simultaneous triple docking in the Captain Cook Dock at Garden Island, Sydney.

The RAN ships HMAS *Melbourne* and HMAS *Kanimbla* were initially docked together in April with the Navy identifying the possibility that a third ship may require docking during this availability. In mid-May both ships were refloated and HMAS *Tobruk* entered the dock, requiring all three ships to be docked simultaneously.



HMAS *Tobruk* with HMAS *Melbourne* and HMAS *Kanimbla* side-by-side in the Captain Cook Dock; the distance between the two ships was less than two metres (Photo courtesy Thales Australia)

To allow HMAS *Tobruk* to dock, the detailed planning schedules for both HMAS *Melbourne* and HMAS *Kanimbla* were devised to allow the third docking to occur. The dock setup was designed to ensure that all three ships could be fitted into the dock in a configuration which would allow all likely activities, such as shaft work, hull repairs and underwater hull painting, to be done on each ship if needed following survey works.

In addition, all underwater work on both HMAS *Melbourne* and HMAS *Kanimbla* had to be brought to a stage of watertight completion such that they were capable of being re-floated to permit the dock to be flooded to bring in the third ship.

11 May 2011 was a very long day for the dock squad, but all three ships were settled safely down onto the dock blocks within the day and all services reconnected for the project teams to swiftly resume work on 12 May.

To make this availability a success, three separate project teams worked closely with the Commonwealth's team for

each ship. Co-ordination for planning, scheduling, materials, and labour resourcing between the central Projects Group, the three individual project teams, and production was a real test of Thales Australia's abilities. More than 400 people were involved in this triple docking endeavour which completed all of the key milestones on time. All three ships were refloated together on 15 July.

*Peter Swain*

### 35 m Catamarans from One2three Naval Architects

Aluminium Boats Australia has recently commenced construction of two 35 m One2three-designed low-wash commuter ferries for Transit Systems. The first two 35 m catamarans are nearing structural completion with launch and delivery due before Christmas.

These boats are in addition to the two sister vessels under construction at ABA as reported in the May issue of *The ANA*, where further details of the vessels may be found.



35 m low-wash catamaran under construction for Transit Systems  
(Photo courtesy One2three Naval Architects)

### 14 m Catamarans for the America's Cup from One2three

One2three Naval Architects have custom-designed a fleet of six new 14 m catamarans for use as corporate entertaining and multi-purpose workboats by the America's Cup Race Management Authority in the running of the 23rd America's Cup due to be held in San Francisco in 2013.

The first two vessels are significantly advanced in construction with delivery due in October 2011 and each subsequent boat being delivered at four-week intervals.

Further details of the vessels were reported in the May issue of *The ANA*.



14 m catamaran under construction for America's Cup Race Management Authority  
(Photo courtesy One2three Naval Architects)



14 m catamaran under construction for America's Cup Race Management Authority  
(Photo courtesy One2three Naval Architects)

### 15 m Catamaran Fish-farm Workboats from One2three

One2three Naval Architects have custom-designed a fleet of new 15 m catamaran multi-purpose workboats for servicing the offshore fish-farming industry. The new boats have been commissioned by Hobart-based Plastic Fabrications and are currently under construction at Incat Tasmania for a

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Scandinavian operator. The new boats will complement their existing fleet to service the significant aquaculture industry in the coastal areas around Scandinavia.

Further details of the vessels were reported in the May issue of *The ANA*.

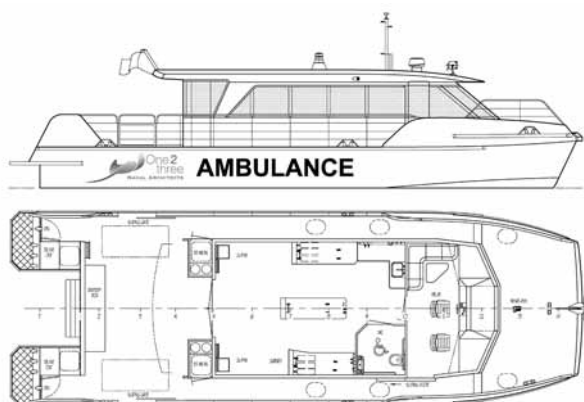


15 m catamaran fish-farm workboat under construction at Plastic Fabrications in Hobart

(Photo courtesy One2three Naval Architects)

### 17 m Ambulance Catamaran from One2three Naval Architects

Aluminium Boats Australia has recently commenced construction of a 17 m One2three-designed high-speed low-wash ambulance vessel. The boats are required to exhibit a low-wash profile and operate at service speeds up to 35 kn. The vessels are required to provide emergency support and medical evacuation to an offshore work platform and forms part of Australia's expanding offshore service industry.



General arrangement of 17 m ambulance catamaran  
(Drawing courtesy One2three Naval Architects)

The new boats are powered by two Scania DI1269M engines producing 515 kW brake power each, driving Hamilton 364 waterjets.

The vessel's configuration allows for three stretcher-based passengers and accompanying medical staff.

Principal particulars of the new vessels are

|              |                                 |
|--------------|---------------------------------|
| Length OA    | 17.0 m                          |
| Beam moulded | 6.0 m                           |
| Fuel oil     | 2000 L                          |
| Fresh Water  | 250 L                           |
| Sullage      | 250 L                           |
| Main Engines | 2×Scania DI1269M<br>each 515 kW |

|                  |                |
|------------------|----------------|
| Waterjets        | 2×Hamilton 364 |
| Speed (cruising) | 32 kn          |
| (maximum)        | 35 kn          |

### Cat Cocos Isle of la Digue from Incat Crowther

Incat Crowther has announced the launch of the 26 m catamaran, *Cat Cocos Isle of La Digue*, at Richardson Devine Marine in Hobart. The vessel has successfully completed seas trials, where it proved the efficiency of Incat Crowther's hull form by exceeding fuel consumption predictions. The 227 passenger vessel is the third Incat Crowther-designed vessel for the operator, and was designed with the specific goal of reduced capital expenditure and operating costs.

The main passenger deck seats 163 passengers in mostly forward-facing seats, with tables located in booth arrangements for those seats near the bar aft. There is a forward door with access to the foredeck which features bench seats for passengers. There are three toilets aft, as well as a large luggage room immediately adjacent to a crew gate, allowing quick and easy loading.

An external stair aft leads to the upper deck where there are 48 outdoor seats and an upper-deck cabin featuring 16 first class seats. This cabin also houses a mini-bar.

The vessel is powered by two MTU 12V2000 M70 engines, each producing 787 kW @ 2100 rpm. Propulsion is via ZF gearboxes through to five-bladed propellers. Whilst the vessel reached a top speed in excess of 30 kn on recent sea trials, its fully-loaded operational speed of 26 kn is achieved at only 70% MCR, resulting in an extremely fuel-efficient solution to the client's operational demands.

Incat Crowther is pleased to have worked closely with RDM to deliver such a cost-effective efficient vessel.

*Cat Cocos Isle of La Digue* proves the long term reward of Incat Crowther's attention to its clients.

Principal particulars of the new vessel are

|                   |                                            |
|-------------------|--------------------------------------------|
| Length OA         | 26.6 m                                     |
| Length WL         | 24.9 m                                     |
| Beam OA           | 8.0 m                                      |
| Depth             | 2.8 m                                      |
| Draft (propeller) | 1.7 m                                      |
| Passengers        | 227                                        |
| Fuel (main tanks) | 6000 L                                     |
| (day tanks)       | 2000 L                                     |
| Fresh water       | 500 L                                      |
| Sullage           | 500 L                                      |
| Main engines      | 2×MTU 12V2000 M70<br>each 787 kW @ 2100rpm |
| Gearboxes         | 2×ZF                                       |
| Propulsors        | 2×five-bladed propellers                   |
| Generators        | 2×Kohler 40EFO7D<br>50 kVA 40 kW 50Hz      |
| Speed (maximum)   | 30 kn                                      |
| (service)         | 26 kn                                      |
| Construction      | Marine-grade aluminium                     |
| Flag              | Seychelles                                 |
| Class/Survey      | Australian USL Code 1C                     |



*Cat Cocos Isle of La Digue on trials*  
(Photo courtesy Incat Crowther)



Main cabin on *Cat Cocos Isle of La Digue*  
(Photo courtesy Incat Crowther)



Bridge on *Cat Cocos Isle of La Digue*  
(Photo courtesy Incat Crowther)



*Cat Cocos Isle of La Digue* being hoisted aboard  
*Egelantiersgracht* in Hobart for shipping to the Seychelles  
(Photo courtesy Incat Crowther)

## Incat Crowther Motor Yacht Project

Incat Crowther is involved in an exciting new motor yacht project. The Curvelle 33 m catamaran yacht *Quaranta* is currently under construction and has brought together a team of world-leading design and engineering firms to create a modern, flexible and efficient yacht concept.



Port side of the Curvelle 33 *Quaranta*  
(Image courtesy Curvelle Yachts)

Logos Marine is managing and coordinating all aspects of the build at the Istanbul, Turkey, yard whilst Lila-Lou of London is responsible for exterior styling and interior design. Composite engineering will be performed by SP-High Modulus.

The vessel will offer the owners a new level of functionality, with six large cabin spaces located on the main deck. Each of these spaces can be configured as twin or double staterooms, or combined with the adjacent spaces to create three large suites. Crew accommodation and service spaces are provided in the hull, whilst a large lounge and dining space occupies the upper deck aft of the wheelhouse.

Incat Crowther brings their wealth of experience to the project by providing a full naval architecture package.

The vessel will be powered by a pair of Caterpillar C32 ACERT main engines, each producing 1417 kW at 2300 rpm. The shaftline will consist of ZF3050 gearboxes and a pair of fixed-pitch propellers. The vessel will have a maximum speed of 25 kn, and will cruise at 23 kn. Incat Crowther has used its extensive experience to engineer a vessel which is optimised for efficient cruising and optimum range, with a stated aim of trans-Atlantic cruising.



Eagle's view of *Quaranta*  
(Image courtesy Curvelle Yachts)

Incat Crowther is pleased to be a part of this project team, bringing a wealth of experience and knowledge to the project which, in turn, will deliver a highly-efficient and comfortable yacht that will carry the Curvelle brand.

[This vessel won the award for the Best Concept Under 50 m at the International Yacht Awards 2011 — Ed.]

Principal particulars of *Quaranta* are

|                   |                                                    |
|-------------------|----------------------------------------------------|
| Length OA         | 33.7 m                                             |
| Length WL         | 32.3 m                                             |
| Beam OA           | 9.0 m                                              |
| Depth             | 3.6 m                                              |
| Draft (hull)      | 2.0 m                                              |
| (propellers)      | 2.4 m                                              |
| Guests            | 12                                                 |
| Crew              | 5                                                  |
| Fuel (main tanks) | 16 500 L                                           |
| Fresh water       | 4000 L                                             |
| Sullage           | 4000 L                                             |
| Main Engines      | 2×Caterpillar C32 ACERT<br>each 1417 kW @ 2300 rpm |
| Propulsion        | 2×five-bladed propellers                           |
| Speed (maximum)   | 25 kn                                              |
| (service)         | 23 kn                                              |
| Construction      | Composite                                          |



Upper deck lounge and dining area on *Quaranta*  
(Image courtesy Curvelle Yachts)



Main cabin on *Quaranta*  
(Image courtesy Curvelle Yachts)

## 45 m Monohull Crewboat from Incat Crowther

Incat Crowther has secured a contract to design a 45 m monohull crewboat. The vessel will be built by Arpoador Engenharia Ltda and owned and operated by BSCO

The Australian Naval Architect



Stateroom on *Quaranta*  
(Image courtesy Curvelle Yachts)

Navigation, a subsidiary of Brasil Supply. Incat Crowther's USA office has worked hard to develop the new design, which will meet the specifications of the Petrobras P3-type crew boat for service in the Brazilian offshore oil fields.

The vessel's design features a large aft main cargo deck optimized for cargo and crew transfers. The 78 m<sup>2</sup> cargo space will have a cargo capacity of 150 t. The main cabin features seating for 60 passengers, two toilets, a beverage counter and large luggage racks. Below-deck accommodation includes sleeping quarters for 10 crew, a galley, mess, and a large wet room including showers, toilets and laundry facilities.

Below-deck tankage includes fuel oil and fresh water for both the ship's use and cargo. Ship's fuel will exceed 30 000 L, whilst cargo fuel capacity will exceed 100 000 L. There are also large grey- and black-water tanks, as well as large lube-oil and waste-oil tanks.

The vessel will be powered by four Caterpillar C32 main engines. These will turn a brace of ZF 3050 gearboxes, with main propulsion from Doen waterjets. Station will be maintained by a 149 kW tunnel bow thruster. Electric power will be provided by a pair of 60 kW generators.

Incat Crowther is proud to be servicing the growing South American market with this vessel, with their USA office offering a wealth of experience in the offshore sector and being well placed to provide ongoing support to South American clients.

Principal particulars of the new vessel are

|                     |                      |
|---------------------|----------------------|
| Length OA           | 45.0 m               |
| Length WL           | 42.0 m               |
| Beam OA             | 8.25 m               |
| Depth               | 3.75 m               |
| Draft (hull)        | 1.70 m               |
| Passengers          | 60                   |
| Crew                | 10                   |
| Cargo deck area     | 78 m <sup>2</sup>    |
| Cargo deck capacity | 150 t                |
| Cargo deck strength | 2.5 t/m <sup>2</sup> |
| Max. deadweight     | 250 t                |
| Ship's fuel oil     | 34 000 L             |
| Ship's fresh water  | 6200 L               |
| Cargo fuel oil      | 102 000 L            |
| Cargo fresh water   | 34 000 L             |
| Grey water          | 4400 L               |
| Sullage             | 2200 L               |

|                 |                        |
|-----------------|------------------------|
| Main Engines    | 4Caterpillar C32 ACERT |
| Gearboxes       | 4× ZF 3050             |
| Waterjets       | 4×Doen                 |
| Generators      | 2×60 ekW               |
| Speed (service) | 24 kn                  |
| (maximum)       | 31 kn                  |
| Construction    | Marine-grade aluminium |
| Flag            | Brazil                 |
| Class/survey    | Det Norske Veritas     |



Profile of 45 m crewboat  
(Image courtesy Incat Crowther)

## Incat Crowther Supports Successful Engine-replacement Project

In addition to new vessel design, Incat Crowther offers support for refurbishment work on its existing fleet. With a large portfolio of well-built vessels with efficient hullforms, many vessels are proving sensible to repower and refit.

A recent example of this support is the refitting and repowering of *Klondike Express*. Originally launched by Nichols Brothers Boat Builders in 1999, *Klondike Express* is a 342 passenger 40 m catamaran ferry operated by 26 Glacier Tours in Alaska. The vessel was designed by Incat Crowther to be a comfortable, fast tour boat, featuring a pair of MTU 16V2000 engines and waterjet propulsion. Over the years, the engines and gearboxes became tired, leading to increased running maintenance costs.

Incat Crowther was approached to investigate a series of renewal options, ranging from low-level refurbishment of the existing engines through to the replacement of the engines with alternative brands. Replacement of the shaftline and propulsion system was also considered. Included in the analysis of each option were performance, capital cost, fuel burn, local parts and service availability, and ongoing maintenance costs.

Following a comprehensive study, Incat Crowther recommended that the vessel be re-engined with the latest-specification MTU 16V2000 M63L engines. As well as offering optimum performance and efficiency, there was the additional cost benefit of allowing the existing engine foundation and waterjet structure to be retained. This, in turn, allowed 26 Glacier Tours to have the vessel out of service for the shortest amount of time.

Part of Incat Crowther's recommendation was to replace the gearboxes with new units consisting of a revised reduction ratio. The original ZF BU755 boxes were replaced with current model ZF 7650NR units with a custom ratio. Whilst typically avoided from a financial standpoint, the custom ratio was beneficial in that it allowed better matching of the waterjet to the engine output without the need for propulsion

changes or major structural work. The new gearboxes were also fitted with custom mounting feet, replicating the previous foundations.

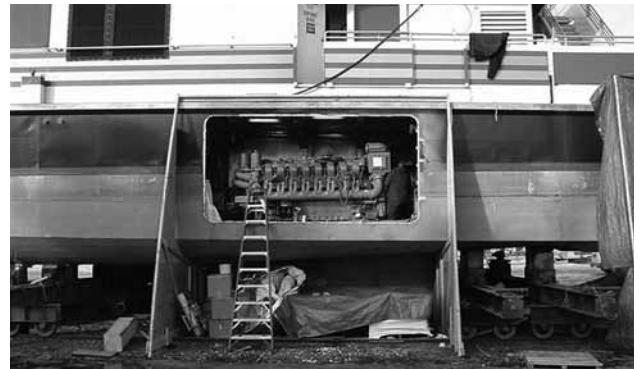
Following engine fitting, calibration and trouble shooting, the new engines were fired up and the vessel was cast off for some trial runs. It was immediately apparent to all on board the vast improvement which the new engines had made. 26 Glaciers Manager of Marine Operations, Gary Sommerfeld, reports "She ran flawlessly! Everything came out exactly as was predicted on paper."

Further benefits of the work came in the noise and vibration area. Ambient noise on the vessel is reported as being halved whilst, according to Sommerfeld, the vessel is "absolutely vibration free". This demonstrates that, after 12 years of solid service in icy waters, the vessel's structure remains as strong as ever.

A further endorsement of the success of the project comes from vessel owner, Bob Neuman, who calls himself "a renewed proud owner". Referring to the vessel's maintenance history, Neuman said "I know that we now have a new ship with many years of low maintenance costs and reliable service", adding "I look forward to one of our best seasons ever on board the brand new, clean, green and mean *Klondike Express*."

Incat Crowther remains busy with similar support and refit work. Among these is a program underway to replace the engines on the 45 m ferry, *Mendocino*, owned and operated by Golden Gate Ferries.

Incat Crowther-designed ferries are highly desirable in the used-vessel marketplace, as they are designed and built to last. Despite the constant evolution and improvement to designs, there can be significant life in these earlier vessels meaning that, with some thought, these vessels can be rejuvenated and ready to face the next decade of service.



New MTU engine in place on *Klondike Express*  
(Photo courtesy 26 Glacier Tours)



*Klondike Express* buttoned up after engine and gearbox replacement prior to hull painting  
(Photo courtesy 26 Glacier Tours)

## 24 m Catamaran Ferry from Incat Crowther

As construction of a 24 m catamaran ferry nears completion in Brisbane, Incat Crowther and Aluminium Marine are pleased to confirm the sale of the vessel. The sleek, versatile vessel has been sold to the prominent Great Barrier Reef operator, Fantasea Cruises, who will take delivery of the vessel immediately upon completion of sea trials.

Construction of the vessel was started in September 2010, with both designer and builder developing a vessel which was flexible in its configuration. It was anticipated that the vessel could be utilised for either commuter or tour operations, maximising its market appeal. As structural work proceeded, Aluminium Marine and Incat Crowther were approached by Fantasea Cruises to develop a layout for the vessel which suited their reef tour operation.

Whilst structural elements remained unchanged through the process, modifications were made to the interior fit out. A bar/kiosk was added to the main deck aft, utilising the space under the stairs for storage. Main-deck seating was revised to incorporate a mix of forward-facing seats and booths with tables. The upper-deck cabin has been fitted out with stylish lounges with occasional tables. The customisation of the vessel will be topped off with an eye-catching paint job, bringing the vessel in to line with the Fantasea fleet.

The vessel is to be powered by a pair of Yanmar 6AYM-GTE main engines. She will have a service speed of 26 kn, with a top speed of 28 kn. The vessel will set new standards for fuel efficiency, providing good cruising speed with low capital and running expenditure.

The vessel ushers in a new generation of style, giving a contemporary, sophisticated look. Further vessels in the same style are also under construction, with announcements due in coming months.

Principal particulars of the new vessel are

|                 |                                             |
|-----------------|---------------------------------------------|
| Length OA       | 24.0 m                                      |
| Length WL       | 23.8 m                                      |
| Beam OA         | 8.50 m                                      |
| Depth           | 2.75 m                                      |
| Draft (hull)    | 1.10 m                                      |
| (propeller)     | 1.70 m                                      |
| Passengers      | 195                                         |
| Crew            | 5                                           |
| Fuel oil        | 4000 L                                      |
| Fresh water     | 1000 L                                      |
| Sullage         | 1000 L                                      |
| Main engines    | 2×Yanmar 6AYM-GTE<br>each 618 kW @ 1900 rpm |
| Propulsion      | Propellers                                  |
| Generators      | 2×TBD                                       |
| Speed (service) | 25 kn                                       |
| (maximum)       | 26 kn                                       |
| Construction    | Marine-grade aluminium                      |
| Flag            | Australia                                   |
| Class/Survey    | NSCV/USL 1C                                 |



Bow of 24 m catamaran ferry for Fantasea Cruises  
(Photo courtesy Incat Crowther)

## Topaz Zenith from Incat Crowther

Incat Crowther has announced the launch of *Topaz Zenith*. Launched by Topaz Shipbuilding, this innovative 27.6 m wave-piercing catamaran crew boat has been designed to support offshore energy installations.

Part of the development of the vessel focussed on the development of an unusual platform for the application. Following the evaluation of a series of criteria, a wave-piercing catamaran platform was chosen. The bow of the vessel is configured to interface cleanly with the rig structure, whilst being well clear in all other areas to avoid the risk of collisions and injuries. To eliminate the risk of damage to the forepeaks or having the hull hang up on the rig structure, the vessel's bows have been configured so that they do not extend beyond the outline of the foredeck. The vessel offers excellent functionality and enhanced safety, whilst retaining the wave piercer's offshore capabilities.

The vessel features a large aft-deck with container mounts and a Sormec M18FB/4S 23.5 t/m deck crane. With a load-bearing capacity of 3 t/m<sup>2</sup>, the vessel has over 50 m<sup>2</sup> of usable deck space, giving the vessel-capacity to carry a 20 ft oil-spill-recovery container transversely on the aft deck.

In addition to the bow transfer system, passenger access is provided via side gates at the forward end of the cargo deck. This transverse passenger thoroughfare is protected from the cargo space by large cargo barriers, allowing passengers and cargo to be loaded concurrently in a safe and efficient manner.

The vessel is powered by a pair of 1193kW Caterpillar C32 ACERT engines, driving Hamilton HM651 waterjets. Speed performance on sea trials confirmed the design predictions with the vessel achieving 32 kn sprint speed, and 28 kn service speed at 85% MCR. The propulsion system exploits the WOSR (Wide Operating Speed Range) of the Caterpillar engines, allowing full power from 2000 rpm. This allowed a cost and weight saving by minimising the rotation speed of the FiFi clutch equipment. The port main engine is mated to a hydraulic clutch turning an FFS 250x350HD FiFi pump which feeds a foredeck-mounted fire monitor, with a rating of 600 m<sup>3</sup>/h.

Incat Crowther is proud of the development process of this vessel, which has led to a unique and capable vessel being created to its client's specific requirements. A similar vessel is also nearing completion at Topaz Shipbuilding which will incorporate a slightly larger cabin and additional fluid capacities, and will provide 24 h support in the wind farm sector.

Principal particulars of *Topaz Zenith* 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      | 36                        |
| Crew            | 5                         |
| Fuel oil        | 12 000 L                  |
| Fresh water     | 5200 L                    |
| Sullage         | 1300 L                    |
| Main engines    | 2×Caterpillar C32 ACERT D |
| Rating          | each 1193 kW @ 2100 rpm   |
| Waterjets       | 2×Hamilton HM651          |
| Generators      | 2×Caterpillar C4.4        |
| Speed (service) | 28 kn                     |
| (maximum)       | 32 kn                     |
| Construction    | Marine-grade aluminium    |
| Flag            | UAE                       |
| Class/survey    | DNV ✱1A1 HSLC R3 Crew     |



*Topaz Zenith* on trials  
(Photo courtesy Incat Crowther)

### 35 m Catamaran Utility Vessel from Incat Crowther

Incat Crowther is designing a 35 m catamaran work boat for Offshore Unlimited. The vessel will be the third vessel resulting from the three-way partnership between builder, Richardson Devine Marine, Incat Crowther and the operator.

The 24 m catamaran *Unlimited* was developed in 2008, capitalising on the unique skills of the three parties and resulting in a practical, capable workhorse which found itself in immediate demand for charter operations. The concept was further improved with the 28 m *Limitless*, launched in 2010. This third vessel will benefit from the experience gained by the operator, designer and builder from these earlier vessels.

The vessel will be able to carry 125 t of deadweight, with capacity for up to 50 passengers on day operations and 32 berths for overnight operations. Work spaces will abound, with desks in every cabin and an upper deck workspace with 14 seats. This workspace will be fitted with direct wireways to the aft deck to allow for quick installation and configuration of deck-mounted equipment, whilst an adjacent bathroom improves functionality.

Two large cabins on the upper deck will feature half-height glass bulkheads with blinds to allow interaction between the

workspace and the helm.

The main deck cabin will house a wet room with lockers and bathroom, lounge, galley, mess, medical room and six cabins. A pair of these cabins will be able to be joined by retracting a dividing wall, creating a large four-berth cabin.

The vessel's hulls will house a further six cabins, four of which will also feature a sliding joining partition. In addition to these cabins, the hulls will house refrigerator and freezer rooms, service and storage spaces.

The aft working deck will feature over 160 m<sup>2</sup> of work space — enough to accommodate a quartet of 20 ft containers. A Heila HLM 35-4S deck crane will be fitted with remote control. A moon pool will also be fitted and there are mounts for a removable luffing A-Frame with 20 t capacity.

The vessel will be powered by a pair of Caterpillar C32 ACERT main engines, each producing 1234 kW. Propulsion will be by a pair of five-bladed propellers. Service speed will be 20 knots and the range will be 1800 n miles. Manoeuvring will be enhanced by a pair of Westmar bow thrusters.

Incat Crowther is pleased to have worked in collaboration with RDM and Offshore Unlimited to develop this new generation of work boat.

Principal particulars of the new vessel are

|                      |                                                   |
|----------------------|---------------------------------------------------|
| Length OA            | 34.95 m                                           |
| Length WL            | 34.40 m                                           |
| Beam OA              | 11.5 m                                            |
| Depth                | 3.90 m                                            |
| Draft (prop tip)     | 2.10 m                                            |
| Passengers (day)     | 50                                                |
| Passengers (berthed) | 32                                                |
| Aft Deck Area        | 130 m <sup>2</sup>                                |
| Deadweight           | 150 t                                             |
| Fuel (main tanks)    | 37 000 L                                          |
| Fresh water          | 12 000 L                                          |
| Sullage              | 6000 L                                            |
| Main engines         | 2×Caterpillar C32 ACERT<br>each 1234 kW @ 2300rpm |
| Propulsors           | 2×five-bladed propellers                          |
| Generators           | 2×Caterpillar C9<br>each 200 kW                   |
| Speed (maximum)      | 22 kn                                             |
| (service)            | 19 kn                                             |
| Construction         | Marine-grade aluminium                            |
| Flag                 | Australia                                         |
| Class/Survey         | NSCV 2A/1B                                        |

*Stewart Marler*



Port bow of 35 m utility vessel for Offshore Unlimited  
(Image courtesy Incat Crowther)

# FROM THE CROW'S NEST

## Austal Ship in *Cars 2* Movie

USS *Independence* (LCS-2) was designed by Austal Ships and built in Mobile, USA by Austal USA. A character based on this vessel plays a role in the new Disney movie, *Cars 2*. Officials from Austal and the US Navy said that they didn't approach Pixar or Disney about using the ship in the movie, but they're happy that it happened.

In *Cars 2*, the unnamed ship character has just a few scenes, but it makes an intimidating impression. Early on it is seen guarding the villain's offshore oil platform lair and then chasing after one of the movie's heroes, spy car Finn McMissile. The ship pops up again at the end of the movie.

For the full story and a video clip, visit

[http://blog.al.com/press-register-business/2011/07/austal\\_ship\\_shines\\_on\\_silver\\_s.html](http://blog.al.com/press-register-business/2011/07/austal_ship_shines_on_silver_s.html).

Graham Taylor

## Distance and Latitude/Longitude Tools in Google maps

You may have been wondering where the distance-measuring and latitude/longitude tools in Google maps have disappeared to (see *The ANA*, November 2010). They have not disappeared; they have simply been re-located.

Click on the gear-wheel icon at the top right corner of the screen, and then on Maps Labs, and all the usual tools will show up.

Click on the radio button to enable Distance Measurement Tool, and then click on Save Changes. A ruler icon will have appeared to the left of the scale in the bottom left of the map. Now click on the ruler icon, then click at the start of the path you wish to trace, and a start will appear. Click on any number of waypoints, and the distance along the path to the last waypoint appears. If you don't like the default distance of kilometres, then click on I'm Feeling Geeky, and a host of distance units will show up in a menu, including several types of cubits, fathoms, furlongs, nautical miles, TeX points and light years! Select your choice, and the distances will show up in those units.

For latitude and longitude, scroll down to LatLng Tooltip, or LatLng Marker, click on the radio button to enable your choice, and then click on Save Changes. The LatLng Tooltip will continuously show the latitude and longitude at the point of the cursor. Enabling the LatLng Marker will allow you to right click with the mouse button on any point, and select Drop LatLng Marker to show the latitude and longitude just at the point of the cursor when you clicked.

Anthony Livanos

## Marker Set for Wreck of Steam Tug

An unusual heritage recognition ceremony was held on 23 May at the Tomato Island boat ramp on the south bank of the Roper River, about seven kilometres upstream from the Aboriginal Community of Ngukurr, 600 km south-east of Darwin.

The official party, there to unveil the heritage marker, first selected a site, dug post holes, mixed concrete, erected the interpretation panel, placed the concrete and levelled the

structure. Once the concrete had set, the party then proceeded to officially unveil the marker, with Kezia Purick, member for Goyder in the Northern Territory Legislative Assembly, and Owen Peake, chair of Engineering Heritage Australia, doing the honours.

The marker commemorates the steam tug, *Young Australian*, which was wrecked in the river while engaged on the construction of the Overland Telegraph line in 1872.

Peake explained that the tug was purchased by Charles Todd in Adelaide to be used on the Roper River in the Northern Territory. Todd had experienced considerable difficulties in construction of the Overland Telegraph line during the Top End wet season and the project had fallen seriously behind schedule. He decided to establish a port at the Telegraph Depot near Roper Bar, 100 km up the Roper River from the sea.

This was successful and materials were transported from the depot to the telegraph line. The large and unwieldy cargo ships of the era had great difficulties in negotiating the winding tidal river without assistance, and the tug overcame this problem, Peake said.

After completion of the telegraph, *Young Australian* was grounded during a towing mishap and could not be refloated. The wreck still lies where it grounded.

The Adelaide-to-Darwin section of the Overland Telegraph was completed on 22 August 1872.

"The *Young Australian* story is a testament to the ingenuity and determination of the builders of the Overland Telegraph which broke down the time for communications between Europe and Australia from months to hours", Peake said.

In attendance at the ceremony were Bronwyn Russell, Executive Director of the Northern Division; Trevor Horman, Chair of the Northern Division Heritage Group; Eddie Webber from Parks and Wildlife Service NT; and Gordon Atkinson from the NT Department of Construction and Infrastructure.

*Engineers Australia*, July 2011

[For further details of the Overland Telegraph line, Doris Blackwell and Douglas Lockwood's book *Alice on the Line is a cracking good yarn* — Ed.]

## World's Largest Ship

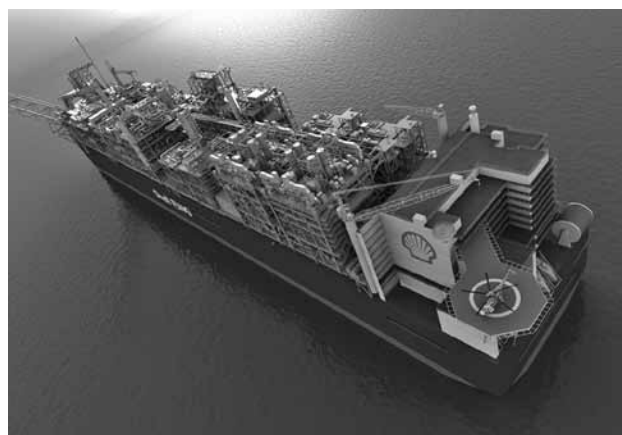
Shell has unveiled plans to build the world's first floating liquefied natural gas (FLNG) platform. The 600 000 t behemoth — the world's biggest ship — will be sited off the north-west coast of Australia.

At Samsung Heavy Industries' shipyard on Geoje Island in South Korea, work is about to start on the ship that, when finished and fully loaded, will displace 600 000 t, six times as much as that of the largest US aircraft carrier and exceeding that of the largest ULCC ever built [Knock Nevis, *ex Service Giant, displacement 657 019 t loaded* — Ed.].

By 2017 the vessel should be anchored off the north coast of Australia, where it will be used to harvest natural gas from Shell's Prelude field. Once the gas is on board, it will be cooled it until it liquefies, and stored in vast tanks at -161°C. Every six or seven days, a huge tanker will dock

beside the platform and load up enough fuel to heat a city the size of London for a week. The tankers will then sail to Japan, China, Korea or Thailand to offload their cargo. "The traditional way of producing gas offshore was through pipelines. You brought gas up to a platform and piped it to the 'beach'. That is the way it's done in the North Sea," said Scotsman Neil Gilmour, Shell's General Manager for FLNG. But the Prelude gas field is 200 km from Western Australia's Kimberley Coast and there are no pipelines there to be used. Johan Hedstrom, an energy analyst in Australia with Southern Cross Equities, said "The FLNG concept is an elegant solution because you don't need so much fixed infrastructure. "You don't need the pipeline or the onshore refinery and, when you run out of gas, you can just pull up stumps and go to the next field."

Mr Gilmour said that Shell had to overcome a "raft of technical challenges" ensuring, for example, that the vast amount of equipment on board would work in choppy seas. The Prelude field is in the middle of what is known as "cyclone alley", an area prone to extremely stormy weather. However, Mr Gilmour said that the vessel had been built to



An impression of Shell's enormous FLNG platform  
(Image courtesy Shell)

withstand category-five cyclones and even a "one-in-10 000-year storm" producing 300 km/h gusts and 20 m high waves. For the full story, visit [www.bbc.co.uk/news/science-environment-13709293](http://www.bbc.co.uk/news/science-environment-13709293).

## EDUCATION NEWS

### Western Australian Universities

A one-day course for ship pilots, harbourmasters and others interested in ship under-keel clearance will be held in Fremantle on Saturday 1 October 2011. The timing links with the Coastal and Ports Conference held in Perth between 28 and 30 September. The course, run jointly by Curtin University and the Australian Maritime College, will describe the knowledge which has been gained over the past decade through full-scale squat measurements, model testing and computational advancements.

To register for this event, please visit [www.cmst.curtin.edu.au/shipukc.html](http://www.cmst.curtin.edu.au/shipukc.html). For further enquiries, please contact [admin@cmst.curtin.edu.au](mailto:admin@cmst.curtin.edu.au) or telephone (08) 9266 7380.

Curtin University PhD student, Daniel Veen, graduated in August and has taken up a position with a fluid dynamics consultancy in the UK, working on Rolls Royce engines.

Edith Cowan University is offering a BEng in naval architecture from 2012 in collaboration with the Australian Maritime College. Students will do their first two years at ECU then transfer to AMC for their final two years.

*Kim Klaka*

### Australian Maritime College

#### Vale John Foster, CEO AMC Search Ltd

It is with deep regret that the Australian Maritime College records the death of AMC Search Chief Executive Officer, John Foster, on Monday 13 June 2011. Mr Foster died suddenly in Fort Worth, Texas, while holidaying in the United States. He is survived by his wife, Tamara, and an extended family.

AMC Principal, Professor Malek Pourzanjani, paid tribute to an astute businessman, valued colleague and dear friend. "John joined the organisation in 1987 and, under his professional leadership, AMC Search developed into a very successful business enterprise," Professor Pourzanjani said. "He played an instrumental role in identifying new

international markets and utilising AMC's expertise to provide consultancy and training opportunities for the global maritime industry.

"Some of John's outstanding projects include overseeing AMC's move into Western Australia with the opening of a Dynamic Positioning Unit, negotiating the Defence Force contract to provide technical and managerial training for Pacific Patrol Boat personnel, training the Kuwait Coastguard, collaborative projects with the Royal Australian Navy and simulation projects involving ports around Australia and overseas.

"John will be remembered for his personal commitment, quality service and expert leadership. He will be sadly missed by friends and colleagues at AMC and AMC Search."

#### Rohan Langford Sails into World Championship Challenge

Australian Maritime College student Rohan Langford's love of yachting has developed into a lifelong passion, and he is gearing up for his biggest challenge yet when he represents Australia at the International Sailing Federation (ISAF) World Team Racing Championships in Ireland this August.

Rohan, 20, a second-year naval architecture student, will be part of a team of six young Tasmanian sailors set to pit their skills against 18 teams from around the world. The six are members of the Royal Yacht Club of Tasmania and their selection follows on from success at the Australian Open Teams Racing Championship in Sydney in May.

In addition to the hours he spends training on the water, Rohan plans to pursue a career designing boats upon completion of his maritime engineering degree.

Team racing is a specialised part of the sport of sailing, combining a high level of sailing ability, tactics, knowledge of the rules and teamwork.

"Team racing is similar to match racing, where two teams using three identical boats race against each other," Rohan said. "The races are about six to ten minutes in duration and

are umpired on the water where the action is fast and frenetic. Several fleets sail at once, using distinctively coloured sails and hulls to identify the teams. It is not uncommon for 100 races a day to be completed.”

Rohan and his team mates have a wealth of experience in top-level racing at both national and international levels and, if successful, will be the first Australian team to win the ISAF World Team Racing Championship.

The Australian Maritime College is proud to support the team’s endeavours by coming on board as naming-rights sponsor. “On behalf of the team I’d like to thank our sponsor, the Australian Maritime College, for their support which helps us out with the travel and accommodation expenses associated with competing at the titles,” Rohan said. The team competing at the world championships is Rohan Langford, Elliott Noye, Christopher Jones, Amelia Catt, Lucy Shephard and Anna Vaughan.

The ISAF World Team Racing Championships will be held in Schull, Ireland, from 27 August to 4 September. For more information visit [www.sailing.org/teamworlds.php](http://www.sailing.org/teamworlds.php).



The AMC racing team  
(Photo courtesy AMC)

### Engineering Students put Design Skills to the Test

First- and second-year Australian Maritime College engineering students put their design and project management skills to the test for two of their most anticipated and challenging assignments.

The rat-trap boat race and pasta-bridge competitions were held on Friday 13 May, representing the culmination of weeks of hard work and last-minute design tweaks.

The day started in the Model Test Basin with the rat-trap race, where first-year students competed for the title of fastest rat-trap powered vessel over a distance of 10 m. Chris Coppard’s team D:One took line honours with a time of 18.40 seconds.

Chris said that the team’s model, *Red Rocket*, was built using balsa wood and finished with solar film.

“We went for the lightest possible construction that we could. It comes in at 380 g, so it’s nice and light, with a streamlined appearance which reduces friction and drag,” he said.

“I think we harnessed the power of the rat trap quite well. The use of the gearing pulley coming off the rat trap to the rear axle pretty much gave us a pull of just over 10 m which worked to our advantage.”

The race was followed by the pasta-bridge competition, which saw second-year students vie for the title of the

### The Australian Naval Architect



A rat-trap boat  
(Photo courtesy AMC)

strongest bridge made from dried pasta. The competition rules state that the bridge must have a one-metre span, weigh less than 1 kg and be made from commercially-available pasta and glue.

This year’s winning team, Lord of the Bridges, smashed last year’s record of 134 kg with an astounding weight-bearing effort of 174 kg. Congratulations to team members Aaron Nash, Michael Farmakis, Ellen Redden and Yuting Jin.

Two other teams also broke last year’s record, with Dodgy, Dodgy Fabrications Inc and San Remo Structures recording an impressive 161 kg and 156 kg respectively.

While the 009 teams averaged 46 kg, this year’s field almost doubled the effort with an average supported weight of 90 kg. The pasta bridge competition has been running for four years.



At work on a pasta bridge  
(Photo courtesy AMC)

## Further Research into Marine Renewable Energy at AMC

The Australian Research Council, through its Industry Linkage Project Program, has awarded a team of researchers at AMC and Oceanlinx Limited \$342 000 over a three-year period to undertake research into the performance and design optimisation of Oscillating Water Column (OWC) ocean-wave energy converters. The researchers at AMC include Professor Neil Bose, Dr Gregor Macfarlane, Dr Laurie Goldsworthy and Dr Irene Penesis, who will work closely with Dr Tom Denniss, Scott Hunter, Fraser Johnson and other employees at Oceanlinx.

This project will develop new ocean-wave energy technologies for electricity generation and desalination. Use of this renewable-energy technology will significantly reduce greenhouse gas emissions. The aim is to optimise the next generation of near-shore OWC ocean wave-energy conversion systems for utility-scale electricity and desalinated water production. Physical experiments will be used to visualise and quantify the particle flow in and around the systems to identify and minimise energy losses. The results will ensure that Oceanlinx, recipients of multiple international renewable energy awards, continues to lead the development of the most effective and economically attractive wave-energy conversion systems in the world.

AMC and Oceanlinx have established an active collaboration over the past 8 years, during which time numerous series of physical model experiments have been conducted within the AMC's Model Test Basin and Towing Tank. The majority of physical experiments conducted within Australia and around the world have generally treated the various OWC geometries simply as a 'black box', where the input energy (incident waves) is known and the available output energy is predicted (usually through the measurement of quantities such as air pressure, air velocity and water level within the chamber). One of the primary aims of this project is to use Particle Image Velocimetry (PIV) to quantify the flow fields within the OWC (black box). AMC has recently gained valuable experience by developing a PIV application to the challenging task of measuring inside an OWC in the towing tank environment. Results from these initial experiments were recently presented at the 30th International Conference on Ocean, Offshore and Arctic Engineering (OMAE2011) held in Rotterdam, The Netherlands.

Research into marine renewable-energy concepts is growing at AMC with two PhD candidates currently studying in this field and another about to commence. This new project, funded by the ARC and Oceanlinx, will support one or more additional PhD scholarships. Applications for these scholarships are now open (closing 16 September 2011) and anyone interested is encouraged to contact any of the team members listed above for more information.

Mark Symes

## University of New South Wales

### Undergraduate News

#### Re-accreditation of Degree Programs by Engineers Australia

All the degree programs in the Faculty of Engineering came up for re-accreditation by Engineers Australia this year. Documentation was submitted to EA in late March, with the visit to the university by the Accreditation Panel on 24 and 25 May. The Accreditation Panel for the School of Mechanical and Manufacturing Engineering comprised Prof. Tony Lucey, Mr Dom Lombardo, and Dr Stuart Cannon (immediate Past-President of RINA Australian Division). The full report on re-accreditation is expected from EA later in the year.

#### Thesis Topics

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

##### *Extending the Life of Heritage Vessels*

The Australian National Maritime Museum's static display vessels, HMAS *Vampire* and HMAS *Onslow*, were originally intended to have a relatively short life as museum vessels, i.e. as each new class of warship reached its end of life, one would be selected to replace the current museum vessel. This has not happened for a variety of reasons, the main one being that the two vessels which the museum currently has on display are not replaceable because they have significant heritage values above and beyond those associated with a recent warship. The problem for the museum is what and how do they conserve, i.e. preserve, maintain, replace and upgrade these vessels for an extended life?

Kathryn Dawes is researching the expected life of these vessels as static display vessels, and investigating how best to extend their life for the minimum cost. This research is expected to be of potential benefit to a number of other owners and operators of heritage vessels.

##### *The Feasibility of a Flying Submarine*

A recent article in *New Scientist* indicated an interest by the US Defence Advanced Projects Research Agency (DARPA) in the concept of a flying submarine/submersible plane. The strategic advantages of such a craft are numerous. There have been previous attempts, and some have come close to success, and it appears that most of the design issues can be overcome.

Nathan Gale is investigating the feasibility of the concept, putting numbers to the ideas for carrying small numbers of highly-trained personnel for covert insertion operations, and is designing a prototype craft to meet the DARPA requirements.

Interestingly, one of the aerospace engineering design projects this year is investigating another type of flying submarine, but not to the DARPA requirements for which they see a limited market. Theirs is designed for bathymetric sampling of mid-ocean water columns, and the design is very different.

### Post-graduate and Other News

#### Engineering Annual Dinner

The Engineering Annual Dinner for 2011 was held on Friday 5 August 2011 at 1900 in Leighton Hall, Scientia Building,

for the graduates of 1961, 1971, 1981, 1991 and 2001.

Naval architects who rocked up were Jennifer Knox (graduated 1991) and Hans Stevelt, and Tony Armstrong (the younger; graduated 1991) and Therese Armstrong, and Naval Architecture Plan Coordinator, Phil Helmore, and Helen Wortham.

Other VIPs at the dinner included The President and Vice-Chancellor, Prof. Fred Hilmer, Dean of Engineering, Prof. Graham Davies, past Deans of Engineering, Prof. Brendon Parker, Prof. Mark Wainwright, and Prof. Al Willis, Head of School of Mechanical and Manufacturing Engineering, A/Prof. Philip Mathew, and past Head of School, Em/Prof. Brian Milton.

Pre-dinner drinks warmed up proceedings, followed by a great three-course dinner, and the launch of the book *The History of the School of Electrical and Telecommunications Engineering 1961–2001*, and many tall tales and true were told.



Naval Architects at the Engineering Annual Dinner  
Hans Stevelt, Therese Armstrong, Tony Armstrong (the younger),  
Jennifer Knox, Phil Helmore and Helen Wortham  
(Photo courtesy Susan Trent—Gasbag Studios)

### Influential Engineers

The latest edition of *Engineers Australia* (June 2011) lists the 100 most-influential engineers in Australia, chosen by a panel of five engineers. As a matter of interest, 22 of these are graduates of the University of New South Wales, ten are graduates of the University of Sydney, ten are graduates of the University of Melbourne, five are graduates of the University of Queensland, five are graduates of the University of Western Australia, four are graduates of Monash University, and two are graduates of the University of Adelaide.

*Phil Helmore*

### Seminars at INSEAN

Emeritus Professor Lawrence Doctors was invited to present a series of three lectures to the Department of Computational Hydrodynamics, at INSEAN, the Italian Ship Model Basin, in Rome, Italy. He also took the opportunity to discuss current research on high-speed marine vessels.

On 4 July Lawry gave a presentation on the subject *The Australian High-Speed Ferry Design and Construction Industry*. He related the history of our successes in this field in some detail, concentrating on the different types of vessels that have been constructed over the last few decades.

On 5 July 5 he presented the seminar *Resistance Prediction The Australian Naval Architect*

*of High-Performance Marine Vessels*. In this seminar, he discussed the various components of resistance. These are wave, hydrostatic, frictional, and aerodynamic. He referred to various approaches to analysing the flow past the (typical) transom stern, as well as appropriate methods for computing the wave resistance and accounting for effects due to the finite depth of the water.

He presented his third talk on 6 July on the topic *Waves Generated by Marine Vessels*. Lawry demonstrated how the linearised theory could provide an accurate prediction of the elevation of the wave system generated by a typical vessel. The theories he discussed took account of the finite water depth and lateral restriction of the waterway (as in a river or in a towing tank). Additionally, he pointed out how one could also account for viscous and other real-fluid effects on the wave system, thus improving the accuracy of the theoretical prediction. Finally, he dwelt on the matter of unsteady phenomena, which dominate near the critical speed which occurs at a depth Froude number of unity. In this case, model-basin and towing-tank tests at a steady speed cannot be performed in a satisfactory manner. However, the unsteady theory may be used to accurately predict the rate of growth of the wave system in this condition.

*Lawrence Doctors*



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A Pacific Basin Group Company

# THE PROFESSION

## **New Edition of Australian Builders Plate Standard Published**

A new edition of the National Standard for the Australian Builders Plate for Recreational Boats was recently approved by Transport Ministers and published on 23 May 2011. It supersedes Edition 3 which has been in place since November 2005.

All national standards published by NMSC are subject to periodic review. In this case, the changes flowing from the review were limited to clarification of the existing requirements and ensuring a single reference point for additional information published in a number of supporting documents since 2005.

Edition 4 of the ABP standard includes a description of the treatment of inflatable boats and personal watercraft which was previously only contained in the Implementation Package. As well, it deals with some of the idiosyncrasies of the referenced technical standards which have come to light through implementation of the ABP standard. For example, the fact that a single air chamber is not acceptable as the source for buoyancy for boats of under six metres in length, even though this is not explicitly stated in some technical standards. Also, the calculation of persons capacity used in the ABYC standards (which come from the USA) assumes an equal mix of adults and children will be on board, whereas other technical standards base the capacity on the maximum number of adults which can safely be carried.

A number of editorial inconsistencies have also been addressed in the standard.

Edition 4 of the standard can be downloaded from [www.nmsc.gov.au/nmsc\\_and\\_you/...COMID=1&CID=70](http://www.nmsc.gov.au/nmsc_and_you/...COMID=1&CID=70).

*Tech e-News*, 30 May 2011

## **New National Standard for Commercial Vessels Not Required to be in Survey**

The National Marine Safety Committee (NMSC) in June released for public comment a draft standard on General Safety Requirements for Vessels which is aimed at vessels not required to be in survey under the proposed National System of Commercial Vessel Regulation.

A parallel consultation is currently underway on the new National System of Commercial Vessel Regulation planned to come into place in 2013; see the AMSA website [www.amsa.gov.au](http://www.amsa.gov.au) for details. Under the new National System, interstate differences in commercial vessel regulatory requirements would be addressed by introducing a single piece of maritime safety legislation applicable throughout Australia, based on the application of national standards.

One element of the National System proposal is that certain smaller lower-risk vessels would continue to be regulated, but would not be required to undergo commercial vessel survey. This mainly affects vessels less than 7.5 m in length operating in sheltered waters and not carrying passengers. Certain vessels used for training people to achieve recreational qualifications would also be covered.

An approach based on applying different standards to lower-risk commercial vessels is already in place in some states, but

there has traditionally been a range of different requirements applied in lieu of compliance with the National Standard for Commercial Vessels (NSCV).

The new national standard issued in June in draft form by the NMSC details common national requirements for vessel design and safety equipment proposed to be applied to those lower-risk commercial vessels not required to comply with the NSCV or be surveyed under the National System. It is intended to become a companion standard to the NSCV.

NMSC's Standards Team Leader, John Henry, said "In many ways the requirements proposed are similar to those contained in the national standards for recreational vessels. However, some of the options available for recreational boats have not been deemed to be adequate for a commercial vessel application and have not been included. The requirements in the draft standard for vessel design only apply to new vessels coming into the fleet from the start of 2013. They include a requirement for level flotation, as well as setting capacity limits and ensuring that fuel systems are safely installed."

Mr Henry stated "The requirements for equipment carried on board are intended to apply to both new and existing vessels and would be phased in over the period between 2013 and 2016. The requirements proposed are similar to those for recreational vessels in each state but, in establishing a common set of requirements to be applied across Australia, there were always going to be a few changes from the requirements currently applying in any given state."

In developing the draft requirements, the NMSC took account of its report on Commercial Vessel Incidents in Australia, published in 2009. That report showed that vessels under 7.5 m in length made up about half of the commercial vessel fleet, but accounted for only 20.5% of incidents involving a serious injury, and 12% involving a fatality.

Mr Henry commented "The report showed that smaller vessels have a much better safety record than larger vessels. However, there are still risks to life should a serious incident occur, and the focus of standards for these vessels should be on measures that facilitate the rescue of the crew." Mr Henry added "Overall, the new standard will deliver a common national set of requirements for smaller low-risk commercial vessels operating on sheltered waters, aligned to actual risks."

Copies of the document can be obtained by phoning the NMSC Secretariat on (02) 9247 2124 or downloaded from [www.nmsc.gov.au](http://www.nmsc.gov.au); click on 'Have Your Say'.

The period for public comment closed on 19 August 2011.

## **National System for Commercial Vessel Safety**

AMSA is well known as the national regulator of SOLAS or 'big ship' safety. During August and September, AMSA is conducting the initial round of nationwide consultations on the proposed National System for Commercial Vessel Safety (National System). This is a regulatory plan for small commercial vessels which are currently regulated by the states and the Northern Territory, and encompassing all commercial vessels, their operations and their crew, under a new Commonwealth Maritime Safety National Law from 2013.

The consultation process is divided into two sessions per city/regional centre which are jointly hosted by AMSA and state maritime authorities. The morning session is a more formal, invitational briefing to industry representatives and major stakeholders. The afternoon session is open to all interested members of the public and is held in an informal setting to encourage individuals to approach AMSA representatives with specific questions and feedback.

The afternoon sessions attract a wide range of people with interests in the commercial 'small ship' industry. Most numerous are individual seafarers with questions regarding the new national arrangements for seafarer qualifications. The National System envisages new National Seafarer Certificates for near-coastal qualifications acceptable in all Australian jurisdictions. These will be developed as a standard within the National Standard for Commercial Vessels by the National Marine Safety Committee. The system of 'blue water' certificates will continue on under the existing AMSA framework of Marine Orders Part 3.

An important principle in the development of the proposed new National System for near-coastal certificates is input by Industry.

Comments received so far by AMSA indicate:

- A high level of support from industry regarding the concept of a National System. The idea is regarded by participants as common sense.
- Stakeholders have said that the effectiveness of the reform will depend on its practical and simple delivery. Stakeholders are pleased with the changes to the proposal that have been made since the 2009 consultations. They look forward to more consultation as the National System is further developed.
- Many owners of trading vessels operate across several states with, at present, different safety standards. They look forward to a single National System which will allow them to move vessels between states more easily.
- Similarly, many seafarers look forward to a single National System which will allow them to work in

different states more easily under a National Seafarer Certificate structure.

Additional consultation will be held later in the year on the text of the Maritime Safety National Law bill, which is the legal instrument to implement the reform. In addition, the National Marine Safety Committee will be consulting on the new near-coastal seafarer qualifications system by the end of 2011.

For further information about the new National System, visit the AMSA website [www.amsa.gov.au](http://www.amsa.gov.au) and click on National System for Commercial Vessel Safety, and then on What is it All About?

### NMSC in Transition

Over the course of 2011, many of National Marine Safety Committee's (NMSC) functions will be progressively handed over to the Commonwealth's Australian Maritime Safety Authority (AMSA). In particular, the on-going oversight of the National Standard for Commercial Vessels (NSCV) will be managed by AMSA staff. As a result, the NMSC Secretariat office in Sydney will be closing in October 2011, with its functions transferring to the AMSA office in Canberra. The handover is in keeping with COAG's new directions to achieve a National System for commercial vessel regulation. This also reflects the fact that the NSCV is now largely complete and the focus is turning to maintaining the standards and assisting with their implementation.

The details of the new National System are still evolving and more information is available at <https://www.nationalsystem.amsa.gov.au/>.

The NMSC is confident that these reforms will deliver a more efficient national approach to commercial vessel safety.

As a complementary reform, a new body, the Australian Recreational Boating Safety Committee (ARBSC) has taken over the role of NMSC in that sector. The details of the arrangements for recreational boating safety are available from [www.safeboating.org.au](http://www.safeboating.org.au)

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## LATE NEWS

### Decommissioning of HMAS *Kanimbla*

The Minister for Defence, Stephen Smith, and Minister for Defence Materiel, Jason Clare, announced on 18 August that the amphibious ship HMAS *Kanimbla* would be decommissioned.

A detailed assessment of the ship's material state and the estimated cost of remedial work of up to \$35 million has revealed that the most cost effective and lowest risk option is to decommission HMAS *Kanimbla*.

Accordingly, on the basis of advice and recommendations from the Chief of Navy and the Chief Executive Officer of the Defence Materiel Organisation, the Government has agreed to decommission the ship.

In April the Government announced that it had successfully acquired RFA *Largs Bay* for £65 million (approximately \$100 million). *Largs Bay* will be commissioned into Navy service as HMAS *Choules* in honour of Mr Claude Choules,

the last-known veteran to have served on active service in the First World War. HMAS *Choules* is expected to arrive in Australia for a commissioning ceremony in Fremantle in December 2011.

Meanwhile HMAS *Tobruk* is currently in the final phase of her scheduled maintenance period and is expected to be available for sea for a short period of time from end August to early September before she undergoes further scheduled work.

To provide an amphibious-transport capability while HMAS *Tobruk* is prepared for cyclone season, Defence has negotiated the availability of the Australian Customs Vessel *Ocean Protector* to provide a humanitarian-assistance and disaster-relief sealift-response vessel from 12 August until 14 October 2011.

Defence had previously chartered the P&O vessel *Aurora Australis* from May to 12 August to provide a humanitarian-assistance and disaster-relief sealift-response vessel.

# INDUSTRY NEWS

## ShipConstructor 2012 Released

ShipConstructor Software Inc. (SSI) has released a new version of its AutoCAD-based CAD/CAM software.

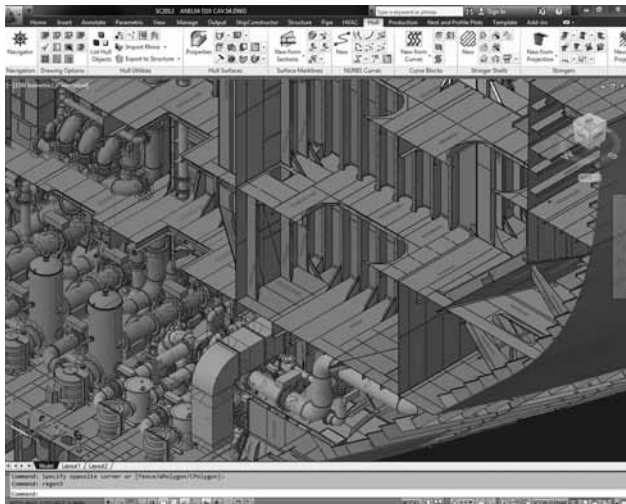
ShipConstructor 2012 enables users to work in the most advanced CAD environment by adding AutoCAD 2012 compatibility. AutoCAD 2010 and 2011 are still supported, but the latest version of ShipConstructor empowers users to take advantage of several new tools and improvements such as enhanced surface modelling, enhanced point cloud support for laser scanning, direct access to AutoCAD WS, and in-application access to Autodesk Exchange.

The speed of ShipConstructor has been increased yet again. The load times for distributed-system model drawings have been reduced by up to 10% and the load time for viewing distributed system part property data has been cut in half. Several new features and tweaks to the interface also enable increased productivity.

“No other shipbuilding CAD/CAM application is enhanced as frequently as ShipConstructor,” said SSI CEO, Darren Larkins. “No other shipbuilding software is as easy to learn and use.”

### ShipConstructor 2012 New Features:

- **AutoCAD 2012 Support** – Support for the latest version of AutoCAD tools for enhanced 3D design, model documentation and collaboration.
- **Enhanced Offset Construction Lines** – Addition of geometrical constraints to individual offset construction lines without losing parametric associativity with source geometry.
- **Enhanced End Cuts** – Reduced number of end-cut definitions required to populate a catalogue with industry standard end cuts.
- **One-Step Package and Deploy Project** – Quickly create isolated versions of the entire ShipConstructor project for archiving or transferring.
- **Side-by-side Installation** – Now supported with ShipConstructor 2008, 2009, and 2011.
- **Increased Speed** – Load times of distributed-system drawings have been significantly reduced.



A view of ShipConstructor 12  
(Image courtesy ShipConstructor)

## Wärtsilä to Supply the Ship Design and Equipment for Next Generation Platform Supply Vessel

Wärtsilä, the marine industry's leading solutions provider and system integrator, has been awarded the contract to supply the design and equipment for a new platform supply vessel (PSV) for offshore operations. The order has been placed by Hellesøy Verft AS, the Norwegian shipyard that will build the vessel, which is to be owned and operated by Norwegian ship owner, Vestland Offshore. The vessel is scheduled to be delivered towards the end of 2012.



The new VS 485 Mk III has outstanding performance in the areas of fuel-efficiency and safety  
(Image courtesy Wärtsilä)

In response to the customer's demand for a modern high-quality and fuel-efficient PSV, Wärtsilä Ship Design has developed a highly energy and environmentally efficient vessel solution. Based on the well-proven VS 485 design, the new vessel has an optimised hull design for greater efficiency, with corresponding reduced emission to air. The Vessel will be fitted with Wärtsilä medium speed engines and Wärtsilä NOx Reducer.

In addition to the design package, Wärtsilä's scope of supply includes four Wärtsilä 9L20 diesel generator sets, the electric propulsion system, the power management system, and an integrated automation system.

“Vestland Offshore is building a fleet of vessels which emphasises energy efficiency, safety, reliability, and environmental sustainability. These are all major focus areas for today's oil industry, and Wärtsilä's designs are at the forefront of achieving these aims,” said Tor Østervold, Chairman of the Board of Vestland Offshore.

The VS 485 Mk III fulfils the highest possible Environmental Rating Number (ERN) 99.99.99.99, which represents the vessel's capability for maintaining its position and normal operations under certain weather conditions. The new Wärtsilä PSV design includes a unique power and propulsion system based on the company's patented Low Loss Concept. This provides both additional safety and extra reliability for continuous operation, in various failure modes.

“Over the years, Wärtsilä has gained considerable experience in the development of energy efficient vessels. In particular, the optimisation of hull lines has been a major focus area of this development work. By combining this know-how with our overall expertise and experience, new design optimisation tools, and state-of-the-art power and propulsion solutions, we have been able to produce a highly efficient

portfolio of offshore service vessel designs,” says Johannes Eldøy, Director Project Development for Wärtsilä Ship Design.

Wärtsilä has had a long and successful relationship with the Helleøy Verft yard, and this will be the seventh VS 485 vessel which they have built. However, this is the first ship of the new Mk III design that they have ordered. The new ship will be one of the most cost- and fuel-efficient supply vessels ever launched. It is designed to be suitable for world-wide operations.

The vessel is 85.6 m long, has a breadth of 20 m, a cargo deck area of approximately 1000 m<sup>2</sup>, and has a deadweight at 7 m draft of 5000 t.

### **Wärtsilä receives Propulsion Package orders for New Dredgers**

Wärtsilä has recently been awarded a series of orders to supply propulsion solutions for dredgers to be built in China and the Netherlands. Since dredging applications are typically very demanding, the high reliability of the Wärtsilä solutions was a key element in the award of all three project orders.

Wärtsilä, the marine industry’s leading systems integrator, will provide the engines and fixed pitch propellers (FPP) to Van Oord, the Netherlands-based dredging and marine contractor with global operations. The equipment installation is for *Artemis*, the second of two large self-propelled cutter-suction dredgers being built for the company at the IHC Dredgers shipyard in Kinderdijk, The Netherlands. The equipment order for the first vessel, *Athena*, was placed earlier in 2008. Both vessels will be powered by three

Wärtsilä 6L46F engines, and will feature Wärtsilä FPPs. *Artemis* is due to be in operation by the second quarter of 2013. The customer’s need was for light and very powerful engines, with quick response and high reliability, a requirement that the Wärtsilä products meet in full. Additionally, Wärtsilä is currently negotiating a Dynamic Maintenance agreement with Van Oord.

Two further orders have been received from Chinese companies. The Nantong Gangzha Shipping Manufacturing Co., Ltd shipyard has placed an order for two Wärtsilä 16V32 engines, propulsion equipment and systems for a hopper dredger currently under construction. The ship is scheduled to be fully operational by the third quarter of 2012.

The Tianjin Dredging Company, part of the state-owned CCCC Group, has placed a propulsion package order with Wärtsilä for two dredgers being built at yards in China. The ships are due to be in operation during the beginning of 2012.



Self propelled cutter suction dredger, *Athena*  
(Photo courtesy Wärtsilä)



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- Finite Element / Shock Analysis
- Conduct Inclining Experiments
- Stability Assessments
- Noise and Vibration
- Motions and Seakeeping
- Structural Design
- Risk Analysis

## Austal Awarded First Wind Express Contract

Following the launch of Austal's Wind Express series in mid 2010, Austal announced in July the award of a contract for the design and construction of three purpose-built 21 m offshore support vessels (OSVs) for Turbine Transfers Limited, based in Holyhead, United Kingdom.

The Austal built OSV catamarans will be used to transport service crews and equipment to the many offshore windfarms which are located off the coastlines of several European countries. Turbine Transfers is a well-established fleet owner which has been supporting windfarm owners and operators for a number of years. The company currently owns and operates a fleet of 18 vessels. The Austal built OSVs will be the first that Turbine Transfers has commissioned outside the United Kingdom.



Starboard bow view of Austal's 21 m OSV  
(Image courtesy Austal)

Managing Director of Turbine Transfers, Captain Mark Meade, commented that Austal was selected based on the Western Australian company's extensive experience in the design and construction of innovative aluminium vessels.

"We look forward to taking delivery of these three vessels, which were designed to provide comfortable transits and safe turbine step-offs, whilst capably servicing Europe's growing windfarm industry," said Captain Meade.

Austal Chief Executive Officer, Andrew Bellamy, noted that the contract award is an important first step for Austal in becoming a supplier to the growing European renewable-energy market.

"Supporting the currently-installed offshore generating capacity is today an attractive market opportunity, but the projected growth in new wind farms and wave-generator capacity over coming years makes this market sector a strategic component of the Austal Group's commercial vessel business," said Mr Bellamy.

Mr Bellamy added that Austal brings a wealth of intellectual property to the needs of this new market and has already



Starboard quarter view of Austal's 21 m OSV  
(Image courtesy Austal)

demonstrated this to Turbine Transfers by designing highly-efficient vessels that will achieve greater speeds with a level of fuel efficiency which is superior to that of similar-sized vessels in the Turbine Transfers fleet.

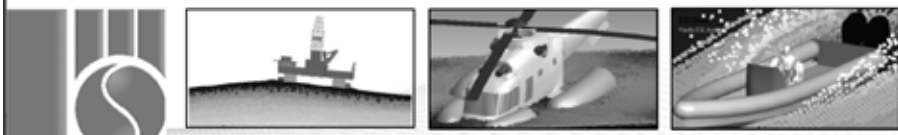
Austal has adopted an advanced fine-entry chine hull form which in association with a high tunnel height, will enable the vessels to operate at speeds of up to 30 kn with targeted seakeeping ability in up to 2 m significant wave height.

Due for delivery in May 2012, the vessels will be built at Austal's Henderson shipyard.

### Principal Particulars

|                     |                                 |
|---------------------|---------------------------------|
| Length OA           | 21.3 m                          |
| Length WL           | 18.4 m                          |
| Beam (mld)          | 7.3 m                           |
| Hull depth (mld)    | 3.5 m                           |
| Hull draft (approx) | 1.4 m                           |
| Crew                | 3                               |
| Wind Farm Personnel | 12                              |
| Maximum deadweight  | 12.5 t                          |
| Main engines        | 2 × MTU 10V 2000 M72            |
| Propulsion          | 2 × Waterjets Rolls Royce 45 A3 |
| Speed               | 30 kn at 100% MCR               |
| Survey              | DNV ✕1A1 HSLC                   |
|                     | Windfarm Service 1 R2 E         |

## Pacific E S I



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# MEMBERSHIP

## Australian Division Council

The Council of the Australian Division of RINA met on Wednesday 8 June 2011 by teleconference, with the President, Prof. Martin Renilson, in the chair

Significant matters raised or discussed during the meeting were as follows:

### Amendment of Division's By-Laws

Council noted that the proposed amendments to the by-laws had been passed by a Special General Meeting in Launceston on Thursday 19 May, aided in part by a strong proxy vote by members.

The amended by-laws had therefore taken effect. Council welcomed the new Council members whose appointment was facilitated by the amended by-laws.

### Single National Maritime Safety Jurisdiction

Council was briefed on developments in this area by Clinton McKenzie of AMSA. This briefing was a prelude to a further national consultation "road show" due to commence later in June.

Most of the information provided has subsequently been promulgated in "fact sheets" on AMSA's web-site.

One factor that received prominence under this and other topics on the agenda was the phased integration of the NMSC Secretariat into AMSA in Canberra.

Comments and queries directed to Mr McKenzie by Council members in response to this briefing included:

- concerns about fees and competition issues;
- achieving uniform outcomes on a national basis;
- national record system for surveys, certificates and seafarer qualifications; and
- the different role required of AMSA under the national system compared with the larger vessels currently under its jurisdiction.

It should be noted that I subsequently attended the National Stakeholder Meeting on 14 July.

Despite the fact that the current round of industry open days has been largely completed, with sessions in Queensland and Victoria all that remain as we go to print, interested RINA members are urged to consider making written submissions by the deadline of 30 September.

### Cabotage under the Navigation Act

Council was informed of developments through the public consultation stage of this initiative and will maintain a watching brief on further steps.

### Advertising in *The Australian Naval Architect*

Progress in attracting advertising was noted, but all members are urged to be aware of the need to secure further advertising before the future of this publication becomes more secure. The Secretary is coordinating approaches to companies in this regard.

### Senate Committee Inquiry into Defence Procurement

Council was updated on the Division's submission to this inquiry, as mentioned in the President's column.

## The Australian Naval Architect

The President and I have since been called to give evidence to the inquiry on 12 August.

### Next Council Meeting

The next meeting is scheduled for 14 September 2011, by teleconference.

*Rob Gehling*  
Secretary

## Directory of Consultants

From time to time the state survey authorities, the RINA Sections and the Australian Division receive requests for the names of consultants who can perform various naval architectural services.

Members should be aware that there is a directory of consultants on the RINA website ([www.rina.org.uk/maritime\\_services\\_directory.html](http://www.rina.org.uk/maritime_services_directory.html)) which provides free listing to members. Members or companies may be listed, but all applications for a company listing must be submitted by a member of the Institution who is employed by the company. Different services can be listed, e.g. design, construction, surveying, project management, and the like, and there is space for a description of the consultancy and the services provided.

There is a number of advantages to such a listing: it provides assurance that the consultant is professionally qualified, that they are bound by a code of ethics, and that they have

## Marine Professional Indemnity

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professional indemnity insurance (as required by the by-laws).

The directory is currently a worldwide directory, and used by a limited number of Australian consultants. However, RINA has agreed to make the directory searchable by country, and this should be in operation by the time we go to press.

It has been proposed that the state survey authorities, the RINA Sections and the Australian Division should simply direct all such enquiries for services to the RINA Maritime Services directory. If you are consulting, then it would be in your own best interests to list your consultancy for free on the RINA website.

## Continuing Professional Development

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

Continuing Professional Development will therefore enable the member to:

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

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

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

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

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

## RINA Council and Committee Members

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

### Australian Division

|                               |                                                                                                                                                                 |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| President                     | Martin Renilson                                                                                                                                                 |
| Vice-president                | Tony Armstrong                                                                                                                                                  |
| Secretary                     | Robin Gehling                                                                                                                                                   |
| Treasurer                     | Craig Boulton                                                                                                                                                   |
| Members nominated by Sections | Adrian Broadbent (NSW)<br>Antony Krokowski (Qld)<br>Ian Laverock (ACT)<br>Ken McAlpine (WA)<br>Lance Marshall (Vic)<br>Alan Muir (Tas)<br>Graham Watson (SA&NT) |

|                                         |                                                                                                        |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------|
| Members elected or appointed by Council | Sam Abbott<br>Tony Armstrong<br>Danielle Hodge<br>Craig Hughes<br>Tim Lyon<br>Jon Pattie<br>Mark Symes |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------|

### Executive Committee

|                                          |  |
|------------------------------------------|--|
| President                                |  |
| Secretary                                |  |
| Treasurer                                |  |
| TBA (representing appointees)            |  |
| Antony Krokowski (representing nominees) |  |

### ACT Section

|                     |                                              |
|---------------------|----------------------------------------------|
| Chair               | Martin Grimm                                 |
| Deputy Chair        | Peter Hayes                                  |
| Secretary           | Richard Milne                                |
| Assistant Secretary | Kerry Johnson                                |
| Treasurer           | Tim Lyon                                     |
| Nominee to ADC      | Ian Laverock                                 |
| Members             | John Colquhoun<br>John Lord<br>Bruce McNeice |

### NSW Section

|                     |                                     |
|---------------------|-------------------------------------|
| Chair               | Graham Taylor                       |
| Deputy Chair        | Craig Hughes                        |
| Secretary           | Craig Boulton                       |
| Assistant Secretary | Rozetta Payne                       |
| Treasurer           | Adrian Broadbent                    |
| Nominee to ADC      | Adrian Broadbent                    |
| Auditor             | Anne Simpson                        |
| TM Coordinator      | Phil Helmore                        |
| Members             | Valerio Corniani<br>Matthew Stevens |

### Queensland Section

|                |                                              |
|----------------|----------------------------------------------|
| Chair          | Doug Matchett                                |
| Deputy Chair   | Mark Devereaux                               |
| Secretary      | Peter Holmes                                 |
| Treasurer      | Doug Matchett                                |
| Nominee to ADC | Antony Krokowski                             |
| Members        | Tommy Ericson<br>Jon Pattie<br>James Stephen |

### **South Australia and Northern Territory Section**

|                |                                                              |
|----------------|--------------------------------------------------------------|
| Chair          | Graham Watson                                                |
| Deputy Chair   | Malcolm Morrison                                             |
| Secretary      | Danielle Hodge                                               |
| Treasurer      | Danielle Hodge                                               |
| Nominee to ADC | Danielle Hodge                                               |
| Members        | Sam Baghurst<br>Peter Dandy<br>Nik Parker<br>Jan Verdaasdonk |

### **Tasmanian Section**

|                |                                                       |
|----------------|-------------------------------------------------------|
| Chair          | Jonathan Binns                                        |
| Secretary      | Mark Symes                                            |
| Treasurer      | Jonathan Duffy                                        |
| Nominee to ADC | Alan Muir                                             |
| Members        | Stuart McDonnell<br>Gregor Macfarlane<br>Giles Thomas |

### **Victorian Section**

|                |                                               |
|----------------|-----------------------------------------------|
| Chair          | Karl Slater                                   |
| Secretary      | Simon Kelly                                   |
| Treasurer      | Sam Tait                                      |
| Nominee to ADC | Lance Marshall                                |
| Members        | Stuart Cannon<br>Sean Johnson<br>Allan Taylor |

### **Western Australian Section**

|                |                  |
|----------------|------------------|
| Chair          | Kristofer Rettke |
| Deputy Chair   | Ken McAlpine     |
| Secretary      | TBA              |
| Treasurer      | TBA              |
| Nominee to ADC | Ken McAlpine     |
| Member         | TBA              |

### ***The Australian Naval Architect***

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

### ***International Journal of Small Craft Technology***

|        |                 |
|--------|-----------------|
| Editor | Martin Renilson |
|--------|-----------------|

### **Safety Group**

In recess

### **Walter Atkinson Award Committee**

In recess

### **RINA London**

|                 |                                                      |
|-----------------|------------------------------------------------------|
| Council Members | Martin Renilson ( <i>ex officio</i> )<br>John Jeremy |
|-----------------|------------------------------------------------------|

|                    |                |
|--------------------|----------------|
| Safety Committee   | Robin Gehling  |
| High-speed Vessels | Tony Armstrong |

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

|         |                                |
|---------|--------------------------------|
| Members | Stuart Cannon<br>Robin Gehling |
|---------|--------------------------------|

### **National Professional Engineers Register Naval Architecture Competency Panel**

In recess

### **Pacific 2012 IMC Organising Committee**

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

### **Standards Australia Committee AS1799 Small Pleasure Boats Review**

|        |                                  |
|--------|----------------------------------|
| Member | Doug Matchett<br>Steven McCoombe |
|--------|----------------------------------|

### **Standards Australia Committee CS051 Yachting Harnesses and Lines**

|        |             |
|--------|-------------|
| Member | Bruce McRae |
|--------|-------------|

*Phil Helmore*

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# **THE AUSTRALIAN NAVAL ARCHITECT**

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

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

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

# NAVAL ARCHITECTS ON THE MOVE

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

Tony Armstrong (the younger) has recently returned from eight years overseas, working with Teekay and Hoegh LNG. His last position was as owner's project manager for two shuttle and regasification vessels built at Samsung Heavy Industries (see *The Naval Architect*, January 2011, pp.64–65). He is now taking some time out from naval architecture and shipbuilding and is enjoying the NSW south-coast lifestyle, living in Mossy Point, and has taken up a position with the Eurobodalla Shire Council.

William Birdsall, a student in naval architecture at the University of New South Wales, has taken up a position with Halliday Engineering in Sydney while he completes the requirements for his degree.

Anthony Brann has moved on from EMP Composites and has taken up a position as a naval architect with the Centre for Maritime Engineering of the Defence Materiel Organisation in Sydney.

Dan Curtis has moved on from the position of Director Hull, Mechanical and Electrical within Navy Platform Systems of the Department of Defence and is now undertaking a 12 month Executive Masters in Complex Project Management with the Defence Materiel Organisation. The program is delivered by Queensland University of Technology in Canberra for the DMO.

Brenden Egan has moved on from EMP Composites and has taken up a position as an engineer with Composites Consulting Group, an independent company within the Diab Group, telecommuting from Pearce's Creek. Friends can find out more about CCG Asia-Pacific at [www.diabgroup.com/aao/a\\_opening/a\\_home.html](http://www.diabgroup.com/aao/a_opening/a_home.html).

Tommy Ericson has moved on from Marine Safety Queensland and has taken up the position of Assistant General Manager with Aluminium Boats Australia in Brisbane.

Dane Fowler, a student in naval architecture at the University of New South Wales, has taken up a position with the NSW Maritime Authority in Sydney while he completes the requirements for his degree.

Matthew Fox has moved on within the Defence Materiel Organisation, and has now taken up a position as a naval architect in the Centre for Maritime Engineering in Sydney.

Nathan Gale, a student at the University of New South Wales, has taken up a part-time position with the Mine Hunter Coastal Systems Program Office (MHCSPO) of the Defence Materiel Organisation at HMAS *Waterhen* in Sydney while he completes the requirements for his degree.

Martin Grimm has moved on within the Navy Platform Systems section of Navy Engineering Division of the Department of Defence and has taken up the position of Principal Naval Architect in Canberra, having previously acted in this role for some time.

Peter Henry has moved on from Leatherhead, UK, within the Kellogg, Brown and Root organisation and has taken up a position with KBR/Granherne in Houston, Texas, in the offshore industry.

Peter Holmes has moved on from consulting and has taken

up a position as a naval architect with Riviera Marine in Coomera, Qld.

Jamie Howden moved to the USA with Austal Ships on the Littoral Combat Ships project many moons ago and was on hand for the sea trials of *Independence*, then went travelling through western Europe, recently returned to Australia and is now evaluating opportunities.

Martin Jaggs has moved on from Marine Safety Victoria (which has now been incorporated into Transport Safety Victoria) and has taken up the position of Senior Advisor Policy and Deputy Project Manager Marine in the Transport Regulation and Review Unit of the Regulatory Policy and Legislation Branch in the Department of Transport in Melbourne.

Ruth Jago has moved on from Orwell Offshore, and has taken up a contract position as Facilities Team Leader with Petrofac working on the Berantai Field development at Kuala Lumpur, Malaysia.

Sue-Ellen Jahshan, a recent graduate of the University of New South Wales, has taken up a position as a naval architect with Incat Crowther in Sydney.

Claire Johnson has moved on from the Stability Technology Branch of the Department of Defence and is now undertaking a rotation with Defence Materiel Organisation's Project Air 9000 Phase 8 in Canberra. This project is concerned with the acquisition of the new naval helicopters to replace the current Seahawk fleet, and Claire is working on ship-helicopter interface aspects.

Chia How Khoo has moved on from Orwell Offshore and has taken up a position as a trainee surveyor with Det Norske Veritas in Singapore.

David Lyons has moved on from EMP Composites and is now consulting as Seaflyer in Yaroomba, Qld.

Scott McErlane has moved on from the vessel *Mine Games* and has taken up the position of Chief Engineer on MY *Obsession*, currently based in the Mediterranean. *Obsession* is a 55 m motor yacht built by Oceanfast in 1991 and friends can check out Scott's latest home away from home at [www.superyachtimes.com/yachts/details/346](http://www.superyachtimes.com/yachts/details/346).

Bruce McRae moved on from Incat Crowther last year and took up a position with Palm Beach Motor Yachts in Sydney before moving on and doing some sailing and travelling. He has now re-joined Incat Crowther and is currently working on a project just outside Stockholm, Sweden.

Adrian Mnew has moved on with Marine Safety Victoria which has now been incorporated into Transport Safety Victoria as the Maritime Safety Branch, so that there is now one organisation in Victoria regulating bus, rail, tram and maritime transport. Adrian has taken up the position of Manager Commercial Operations in the Maritime Safety Branch of Transport Safety Victoria in Melbourne.

Joanna Mycroft has moved on from Tony Castro Naval Architects and Yacht Designers in Southampton, UK, and is now evaluating opportunities. However, while doing so she is not letting any barnacles grow on her hull and has subsequently sailed in JOG week, Cowes week and this year's Fastnet Race!

Daniel Oliver has moved on within the Defence Materiel Organisation and has taken up a position as a naval architect with the Directorate of Submarine Engineering at ASC in Adelaide.

Michael Stuart, a recent graduate of the University of New South Wales, has taken up a position with Fitzroy Yachts in New Plymouth, New Zealand.

Cengizhan Uluduz moved on within the Diab Group two years ago when he went to Dubai, UAE, set up their office there and took up the position of Middle-east Sales Manager. Being the only one in the office, he also does everything else, including technical support, customer training for production, handling claims, making up laminate schedules according to class rules, and helping them to obtain class approvals.

Drew van Ryn has moved on from Barracouta Sails and has taken up a position as a naval architect with One2three Naval Architects in Sydney.

Carl Vlazny moved on from Austal Ships a year ago, finished his MBA degree, and has now taken up a position as Operations Manager with Linch Pin, an offshore management services consultancy, in Perth. Friends can check out the company at [www.linch-pin.com.au](http://www.linch-pin.com.au).

Ahamed Wajeed has moved on from both the government boatyard at Alifushi and the Ministry of Transport in Malé, Maldivian Islands, and is now consulting as Optimum Solutions in Malé. Friends can find out more about his company at [www.op-sol.com](http://www.op-sol.com).

Ramesh Watson has moved on within the Diab Group and has taken up a position as an engineer with Composites Consulting Group in Sydney.

Delwyn Wee moved on from the Republic of Singapore Navy many moons ago and, after a short stint with a marine warranty company, has taken up a position as marine

surveyor with Bureau Veritas in Singapore, surveying new construction of aluminium fast craft, catamaran passenger vessels, and crew boats for the offshore oil and gas industry.

Jonathan Windsor has moved on from his rotation with the Directorate of Submarine Engineering in Adelaide and has taken up a position with the Navy Platform Systems section of Navy Engineering Division of the Department of Defence in Canberra to undertake concept development work.

Gabriel Wong, a recent graduate of the University of New South Wales, has taken up a position with Pape Engineering, a subsidiary of Swiber Holdings, in Singapore.

Ning Wu, a graduand of the University of New South Wales, has taken up a position as a naval architect with ASO Marine Consultants in Sydney.

Ivy Zhang, a student in naval architecture at the University of New South Wales, has taken up a part-time position with ASO Marine Consultants in Sydney while she completes the requirements for her degree.

Konny Zurcher has moved on from Digital Wranglers and has taken up a scholarship to work on his Doctor of Philosophy degree at the Australian Maritime College in Launceston.

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*

*Martin Grimm*



With a full-load displacement of 8100 t, the new Daring-class destroyers are the Royal Navy's largest and most-powerful destroyers yet built. HMS *Daring* (completed in July 2009) and HMS *Diamond* (completed in May 2011) reveal the chunky lines of these new warships — clearly built for stealth, not beauty. Six ships of the class are in commission or under construction

(Photograph by Roger D. Smith, ABIPP, Gosport)

# FROM THE ARCHIVES

## THE START OF THE MISSILE AGE FOR THE RAN

John Jeremy

A little over fifty years ago, two ships were launched in Australia which were to bring the Royal Australian Navy into the missile age even before the first of the RAN's new US-built guided-missile destroyers arrived in Australia in 1966. On 8 April 1961 HMAS *Stuart* entered the water at Cockatoo Island in Sydney. She was followed by her sister ship HMAS *Derwent* on 17 April from HMA Naval Dockyard, Williamstown.

Both these Type 12 frigates began construction as identical sister ships of the first two of the class, HMA Ships *Parramatta* and *Yarra*, which were completed in 1961. However, before launching, the design of both ships was changed to include the fitting of the Australian-designed and developed Ikara anti-submarine guided missile. When they entered the water, most of the internal arrangement of the ships was in abeyance. The rearrangement affected about 25% of No. 3 deck, 70% of No. 2 deck and almost 100% of No. 1 deck and above. The new general arrangement was issued to the shipbuilders in July 1961, enabling the preparation of working drawings and construction to proceed.

HMAS *Stuart* was to be the trials ship for Ikara, the development of which began in 1958. The first test firing of the missile at sea was from *Stuart* in March 1963 while she was still in her builder's hands. She was completed on 28 June 1963 fitted out as a trials ship. Intended also to carry the Seacat surface-to-air guided missile (*Yarra* and *Parramatta* had also been 'fitted for but not with' Seacat), the honour of taking Seacat to sea for the first time in the RAN went to HMAS *Derwent*, which was completed in April 1964, although she was then without Ikara. Both ships were completed to their intended configuration after the trials in HMAS *Stuart* were completed.

The installation of Ikara in these quite small ships was tricky, with very tight tolerances on the flatness of the mounting structure for the handling gear and height at the transfer position between the overhead rails in the magazine and deck-mounted gear in the handling room. The overhead structure in the magazine was built up in *Stuart* after launching and the mounting plane established by fitting some 360 individually-machined steel pads. Because the heat of



HMAS *Stuart* entering the water on 8 April 1961  
(Photo John Jeremy Collection)

the day caused the ship to move and twist, measurements for the pads were made at night using a theodolite and an optical micrometer. After fitting, the pads were hand dressed to the designed tolerance. The tight tolerances in a moving structure caused some to doubt that the handling gear would actually work, but it did. The installation in later ships was simplified somewhat by pre-machining the supporting structure before erection at the ship.



HMAS *Stuart* at sea showing the Ikara (on the quarterdeck) and Seacat missile launchers. The variable-depth sonar which was also fitted in *Stuart* and *Derwent* had been removed by the time this photo was taken in 1972  
(Photo Naval Historical Collection)



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