THE AUSTRALIAN NAVAL ARCHITECT

Volume 14 Number 4
November 2010

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THE AUSTRALIAN NAVAL ARCHITECT

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Cover Photo:

Four hundred years of ship design evolution on show as a modern ferry passes the replica ship *Duyfken* at the Queensland Maritime Museum on the Brisbane River (Photo John Jeremy)

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The Editor
The Australian Naval Architect
c/o RINA
PO Box No. 462
Jamison Centre, ACT 2614
AUSTRALIA
email: jcjeremy@ozemail.com.au

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RINA Australian Division
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From the Division President

That Was the Year that Was is the title of a live album which contains performances by Tom Lehrer for the television program *That Was the Week that Was*. All songs in the album relate to events current in the news in 1964–65. This phrase is often heard when the events of the past year are being revisited. For us, the past year has been about celebrating 150 years of the Royal Institution of Naval Architects. For me, the most significant outcome during the year was the publication of the commemorative book which describes and outlines the history of our profession. In his introductory foreword the Chief Executive of RINA, Trevor Blakeley, asks what the original founders of the Institution would say if they could see how the industry and profession had changed over the 150 years. Many of the chapters inside describe, in some detail, the key events and designs for which those members were responsible and which led us to where we are today. The authors of these chapters need to be commended for their efforts.

The most interesting parts of the book for me are the insights into the future of our profession and the challenges which the newer members in our industry will face during their careers. Some of the themes are common across the work of many of the authors. The impact of the increasing use of computing techniques and computing power is a common theme for all authors who discussed theoretical advances as well as those who wrote about general ship design. After reading these chapters, it really does leave me wondering whether or not the gap between those naval architects who specialise in one of the fundamental sciences and those who specialise in ship design will diverge to a greater extent than they have so far. Different skill sets are needed to be able to understand the finer details of a particular hydrodynamic theory, compared to understanding the most efficient tool for a particular design task.

A second theme which emerges is the need for improvement in the cost of ownership of the ships and platforms (including oil and gas rigs) which we design. With the ever-increasing costs of fossil fuels and the need to ensure environmental compliance, it is easy to see that future designers will need to take this seriously. Some of the chapters suggest that it will be due to improvements in hullforms, whereas others suggest that it might be due to advances in associated technologies. The use of hydrophobic coatings to reduce drag is one which comes to mind. The use of automation and other methods to reduce crew sizes is also important as crewing is a large component of operating costs.

It is also clear from the book that the system of which ships are a part will become more and more important. In the total transport system to get cargoes from A to B, the ship will only be one small link in the chain. Similarly, the role of a single warship is diminished as it becomes an integral part of a task force. In cases like these I wonder whether the naval architect will lead the design of the system or simply be responsible for his or her niche area.

Advances in communication and the globalisation of the industry are also a common theme throughout the book. Many will be more aware of the activities of others and follow suit. The US Navy originally operated 51 guided missile frigates (FFG). Many of these have been decommissioned or disposed of, and there is no replacement frigate program currently on the US agenda. This begs the simple question: are we now approaching the time when the frigate will follow in the footsteps of the dreadnoughts and disappear — and simply become something written about in text or history books? One might also speculate where the advances in technology which are producing ships such as the littoral combat ship (LCS) ultimately lead. Will this type of ship eventually become the workhorse of the world's navies? This trend of globalisation is also illustrated by the list of exhibitors at the forthcoming Ausmarine conference. It has been reported that in 2003 there were no foreign-domiciled shipbuilders present at the conference but, this year, it is expected that more than half will be foreign.

After reading the RINA commemorative book I certainly felt more knowledgeable about the past, but was even more intrigued about the prospects for our future naval architects and the challenges which will face them over the next 150 years. Unfortunately I (along with all of the readership of *The ANA*) will not be around to read about it when the RINA's 300 years are commemorated but, judging by the changing pace of technology, we are certainly in for some big advances in the near future. It is a challenging and exciting time.

Stuart Cannon

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.

Editorial

The RAN's air-warfare destroyer project received some unfortunate publicity recently when it was revealed that problems of distortion with a major 200-t lower hull block which is being fabricated in Victoria for the first ship had potentially-significant cost and time implications for the project. Headlines like *We can't afford another Collins-class debacle* are not helpful and can be very misleading to the mass of readers who have little understanding of shipbuilding, let alone the construction of modern warships.

It irritates me when I hear people say 'Obviously we shouldn't try to build naval ships in Australia' — it is an uninformed and incorrect conclusion which can too easily take hold in a society where attention spans are short and in which the Great Australian Inferiority Complex re-emerges from time to time.

Without commenting on what may have happened with this particular hull block, it is well known that problems with distortion and maintenance of form during prefabrication of hull units can result from a lack of experience amongst the fabricators, a situation which can easily arise when there is a lack of continuity of this type of work. There are plenty of examples, most of which get no publicity.

For as long as I can remember (i.e. about half a century) Australian naval shipbuilders have stressed the need for continuity, as have their overseas counterparts. It is simply not possible to keep skilled workers sitting around twiddling their thumbs while waiting for the next project to emerge from tortuous procurement processes — skilled people are in demand and experienced shipbuilders are very skilled people. Navies and Governments often recognise the problem and try to smooth the flow of work, but seldom with real success.

The potential workload for Australian naval shipbuilders over the next couple of decades is considerable. We shouldn't baulk at restart problems, because we need to build more naval ships in Australia, not fewer. Let's get on with it, learn from the problems, and hope that our messages about the need for continuity get heard in the right places.

John Jeremy

NEWS FROM THE SECTIONS

Tasmania

Are Regional Wave Climates Changing?

The August technical meeting of the Tasmanian Section of RINA was held on 18 August when Prof. Tarmo Soomere gave a presentation titled *Are Regional Wave Climates Changing?* Tarmo currently works for the Institute of Cybernetics at Tallinn University of Technology, Estonia, as the Head of the Laboratory of Wave Engineering. Tarmo was visiting the University of Tasmania on a sabbatical sponsored by the Australian National Network in Marine Science, so we arranged for him to come to Launceston to talk about his research into wave fields in the Baltic Sea (and to chat about the wave-generation projects running at the Australian Maritime College).

In Tarmo's words, "The patterns of change to the regional wave climate on the open-ocean coasts are usually masked by remote swells. Such changes can be identified for relatively large semi-sheltered basins where the contribution of remote wave fields is insignificant. Prof. Soomere will present an overview of recently-discovered drastic changes to key properties of wave fields in the Baltic Sea, an almost-closed sub-basin of the North Atlantic. According to both visual observations and instrumental measurements, the annual mean wave height increased by a factor of two within a ten-year period 1985–95 and decreased substantially afterwards. At the same time, the annual mean wind speed over this basin gradually increased. At selected observation sites, the predominant wave-approach direction has turned up to 90 degrees since about 1970. The described variations serve as one of the most drastic evidences of changes to wave climate. It is highly intriguing that even the best existing wind and wave models are not able to replicate the described features, evidently owing to the extreme complexity of the geometry of the Baltic Sea."

As can be gathered from this explanation, the combined effects of changing wind patterns and complex coastline interactions resulted in significant increases in wave fields. Tarmo showed that simplified statistically-based isotropic models are not sufficient to account for these increases, a theme he carried forward into an undergraduate talk he gave after the RINA technical session.

Using a High-endurance AUV to Map the Deep Sea Floor in the Canadian Arctic and Generalized Benthic Species Recognition

As reported in the last edition of *The ANA,* the plan was to have Prof. Lenny Imas come and give us a talk on CFD in the America's Cup. Unfortunately, Lenny couldn't make it due to commitments in the US. With a little help from the Society for Underwater Technology, we were able to fill the gap with some very interesting talks on undersea automated exploration.

The first was held on 28 September, delivered by Dr Gary Heard, Group Leader from the Network Autonomous Littoral Surveillance Defence R&D, Canada-Atlantic. Gary's description of the talk is below, but I was fascinated by this expedition in which an entirely autonomous vehicle was sent out for a 620 km surveying trip under the Arctic ice. Its mission was to map out the sea floor, producing hydrographic maps of latitudes in excess of 79 N. This first mission was the largest Arctic expedition ever mounted, and it's all due to return in the 2011 season.

In Gary's words, "As part of a collaboration with Natural Resources Canada (NRCan), Canadian Hydrographic Services (CHS), and the Department of Fisheries and Oceans (DFO), DRDC is working with International Submarine Engineering to provide a pair of autonomous underwater vehicles (AUV) capable of missions up to 400 km in length at depths up to 5000 m. The AUVs will be used to map the depth of the sea under ice cover in the high Arctic. Data collected by these vehicles will be used to support the Canadian submission to the United Nations Convention on the Law of the Sea (UNCLOS).

In addition to the 3D navigation requirements during launch and recovery, there is the issue that the recovery location drifts randomly during each AUV mission, which can last for three days. Erratic ice motion has been observed in the Arctic, with drift rates of up to 24 km/day. The DRDC Long-Range Acoustic Bearing (LRAB) homing system lets the AUV locate the drifting recovery camp at ranges up to 100 km.

This presentation described the Explorer AUVs and the homing and navigation systems. It also describeb the logistics and process for a successful mission which has set new limits on AUV capabilities.

The sixth and final technical session for 2010 was delivered on 25 October by Adam Gobi, one of Prof. Bose's PhD students from Memorial University, Newfoundland. In Adam's words, "Seabed resource exploitation and conservation efforts are extending to offshore areas where the distribution of benthic epifauna (animals living on the seafloor) is unknown. There is a need to survey these areas to determine how biodiversity is distributed spatially and to evaluate and monitor ecosystem states. Seafloor imagery, collected by underwater vehicles, offers a means for large-scale characterisation of benthic communities. A single submersible dive can image thousands of square metres of seabed using video and digital still cameras. As manual, human-based analysis lacks large-scale feasibility, there is a need to develop efficient and rapid techniques for automatically extracting biological information from this raw imagery. To meet this need, underwater computer-vision algorithms are being developed for the automatic recognition and quantification of benthic organisms. Focussing on intelligent analysis of distinct local image features, the work has the potential to overcome the unique challenges associated with visually interpreting benthic communities. The current incarnation of the system is a significant step towards generalized benthic species mapping, and its feature-based nature offers several advantages over existing technology."

The 2010 Season

On behalf of the Tasmanian Division of RINA I would like to take this chance to publicly thank all our speakers for 2010. It has revealed a fascinating cross section of the maritime industry, truly showing what incredible work can be achieved with a truly open mind and multi-disciplinary approach. From record-breaking fast ferries, to Antarctic regulation, to Antarctic marine sciences, to Baltic wave fields, to Arctic AUVs, to benthic vision-recognition systems. It has been a very interesting year of technical meetings.

Jonathan Binns

South Australia and Northern Territory

RINA/IMarEST Annual Dinner

The annual dinner jointly held by RINA and IMarEST was held on 10 September at the Cruising Yacht Club at North Haven. The dinner celebrated the 150th Anniversary of RINA and The Year of the Seafarer. The two guest speakers were CMDR Brian Mateer, RAN, and Janet Giles, SA Unions. The night was a successful event, enjoyed by all and with a total of 75 people attending.

Site Tour of Babcock Integrated Technology Australia's Osborne facility.

The combined RINA/IMarEST technical meeting for October was a site tour of Babcock Integrated Technology Australia's new facility at Osborne. Babcock was established in 1989 to support the design and build of the weapons-handling and launch systems on the Collins-class submarines. A support partner to the Australian Government, Babcock has over 20 years' experience in the Australian defence industry and is a market leader in naval systems design and supply, offering engineering support services, information and knowledge management, in-service support and specialist analysis. Babcock delivers state-of-the-art torpedo-discharge systems and weapons-handling and launch systems for Australian platforms.

The site tour was found interesting and enjoyable by all who attended, and the success of the night was thanks to Babcock and their Engineering Manager for their planning and hosting of the event.

Social Dinner with Visiting AMC Students

A social dinner was held by the RINA and IMarEST sections with visiting students from the Australian Maritime College. A number of currently working and retired naval architects and marine engineers shared a meal with the students and provided insight and experience for the students. A good night and meal was had by all who attended.

Danielle Hodge

RINA/IMarEST social dinner with visiting AMC students
(Photo courtesy Danielle Hodge)

RINA/IMarEST social dinner with visiting AMC students
(Photo courtesy Danielle Hodge)

New South Wales

Committee Meetings

The NSW Section Committee met on 14 September and, other than routine matters, discussed:

- SMIX Bash: The organising committee is due to meet, and arrangements are proceeding; sponsorships are coming in and more are being sought, as these will determine ticket pricing for this year. The hire of *James Craig* has been paid, and Bill Bollard is constructing a model for the silent auction.
- National Approach to Maritime Safety Reform: Arrangements for the NAMSR have been held up because of the widening of the scope to include the re-writing of the Commonwealth *Navigation Act*, and the intent to also include the ILO Maritime Labour Convention (MLC 2006).
- TM Weblink: The possibility of recording technical presentations and placing on the web for the benefit of distant members is to be trialled by the NSW Section early in 2011.
- Professional Indemnity Insurance: This was discussed, with the intention being to have an article prepared for a forthcoming issue of *The ANA*.
- TM Program 2011: Ideas were canvassed for the program of technical meetings in 2011, with initial moves to be made to secure our venue for the meetings.
- Committee Membership: Valerio Corniani has accepted an invitation to join the committee, and was welcomed to his first meeting by the Chair.

The NSW Section Committee also met on 19 October and, other than routine matters, discussed:

- SMIX Bash: Sponsorships are coming in and ticket prices have been set at $37 for early-bird and $45 thereafter; catering is being arranged.
- Professional Indemnity Insurance: RINA has an arrangement with Beazley in the UK regarding professional indemnity insurance, and is proposing a similar arrangement in Australia; this is to be referred to the Australian Division.
- TM Venue Bookings for 2011: The Harricks Auditorium at Engineers Australia has been secured for the requested dates on the first Wednesdays of the month in 2011.
- TM Program 2011: One presentation has been secured for 2011, and further ideas were canvassed, with requests to be made.

The next meeting of the NSW Section Committee is scheduled for 30 November.

The Panamax Ketch

Alan Goddard of SP-High Modulus, the Marine Business of Gurit, gave a presentation on *A Brief Overview of the Panamax Ketch* to a joint meeting with the IMarEST attended by thirty-six on 1 September in the Harricks Auditorium at the Engineers Australia, Chatswood. This was the third-highest attendance since EA moved from North Sydney to Chatswood in mid-2005.

Introduction

Alan began his presentation by saying that he had graduated from the Australian Maritime College in 2005, and has now been with Gurit/SP-High Modulus for five years, moving from his initial employment as a drafter to design engineer, and then site engineer. Gurit has been working with Baltic Yachts for over three years on the structural design of the Panamax ketch. The vessel is termed "Panamax" not because of limitations on length, beam or draft, but because of a limitation on air draft of 190 ft (57.91 m), measured from the waterline to the vessel's highest point, to enable passing under the Bridge of the Americas which crosses the Pacific approach to the Panama Canal at Balboa, near Panama City.

The Gurit Group

Gurit employs more than 1500 personnel worldwide, including the UK, France, Spain, Germany, Switzerland, Australia, New Zealand, India, China and North America. They have composite materials manufacturing facilities in The UK, Spain, Germany, Switzerland, China and North America, with engineering and technical services located in the UK, France, Australia, New Zealand and North America.

They are capable of providing an integrated solution, incorporating the engineering design, materials and process development, materials production and supply, and prototyping. This ability is unique in the composites industry.

On the structural engineering side, they are a composite-engineering design consultancy, having 40 personnel in the UK, France, Australia, New Zealand and the USA. They have engineers on the design team who have come from aerospace, marine, automotive and mechanical engineering backgrounds.

Here Alan showed slides of some of their previous projects in composite engineering, which have included a 50 m wind wand (a big, bendy stick, which some people call art!), and a carbon-fibre shell for a car (including door panels, bonnet and boot lid).

Baltic Yachts

The motto of Baltic Yachts is to "Build high-performance sailing yachts faster, stronger and lighter".

The company has two main facilities, one in Bosund, and one in Jakobstad, Finland. The original site at Bosund has eight or nine sheds but is 25 km from the water, so any vessels had to be trucked to the sea. They have recently opened a new facility with a big shed which is on the harbour in Jakobstad, on the west coast, and Alan attended the opening of the new facility.

Baltic Yachts build custom yachts of high-quality finish, with typically timber veneer interiors over high-tech, lightweight carbon-fibre construction, sandwich panels, etc. The emphasis is on meeting the customer's requirements, with high design flexibility. Baltic Yachts keeps close relationships with their designers.

Alan then showed slides of some previous vessels constructed by Baltic Yachts, including *Nilaya*, a 112 ft (24.14 m) vessel; *Pink Gin*, a 152 ft (46.33 m) sloop to a design by Judel/Vrolijk in Germany; *Visione*, a 147 m (44.81 m) vessel designed by Reichel Pugh; and *Canica*, a 141 ft (42.98 m) vessel launched in 2003. [*Most of these vessels can be found either on the Baltic Yachts website or*

elsewhere on the web for those interested—Ed.]

Principal Particulars

Principal particulars of the Panamax ketch are

Length OA	59.92 m
Length WL	49.76 m
Beam	10.54 m
Draft	3.50 m/6.00 m/9.00 m
Displacement	220 t
Ballast	83 t

The vessel has a lifting keel, and so the draft depends on the position of the keel.

The design is of a high-performance cruiser/racer, using carbon-fibre construction, with corecell for durability of the hull and nomex for the deck and internals.

The interior has aimed for a classical view, with white-painted panel surfaces. There is an owner's suite aft with a saloon and cabin, and then the main saloon between the main and mizzen masts, and a forward cabin. There are four guest cabins, a captain's cabin and four crew cabins.

The Design Team

The design and construction of the Panamax ketch is the result of a collaboration of a number of contributors, including Dykstra and Partners, Rhoades Young, SP-High Modulus (SP-HM), R&J Design and Engineering, and Baltic Yachts (BY).

Gerard Dykstra in The Netherlands was responsible for the deck layout, general arrangement and running of the vessel, with some parts done in concert with Reichel Pugh, including the hull lines, rudder and keel.

Rhoades Young are interior designers in the UK, and were responsible for the interior design.

SP-HM were responsible for the design of the composite structure and supplied all the composite materials. The first materials order was for about £2 million, and there have been many orders since!

R&J Design and Engineering are a part of Baltic yachts, but not; they do the in-house design work for BY. They take all information from other sources and put it all together in a 3D model, making sure that it all fits together and that separate parts don't hit or foul each other. They also produce construction drawings; some of SP-HM's drawings could be used for construction, but not all, and R&JDE filled the gaps.

Structural Design

SP-HM completed a preliminary design in order to determine the materials required. In fact, the design was only just ahead of construction! There was a high resource allocation, using—at times—up to ten structural engineers on the project. The 3D modelling proved to be crucial to the design. In total, over 13 person-years have been expended on just the design of the structure for the vessel!

Hull Laminate

There is over 700 m^2 of laminate in the hull, and here Alan handed around a sample of the forward single-skin region where 4.5 mm carbon skins 'sandwich' an 8.5 mm aramid 'core', giving a total thickness of 16–17 mm. A core thickness to take the high slamming loads would have taken up too much room, and so they went for a single-skin layup, very light and very hard. Each layer is about 0.45 mm thick, so there are 32–34 layers.

The layup was done using prepregs. The resin cures at 80°C, so they had to heat to this temperature. However, if it is left too long, it cures by itself, so they had a distinct time-frame within which to work. To prevent problems, the specification needed to cover the cure cycle time as well.

To avoid problems with thermal distortion, a balanced laminate was designed for each cure of the hull. If cured too fast or incorrectly, it might pop off the mould. To verify the design, they utilised the finite-element thermal-analysis capability of Patran, and mechanical testing in laboratories in the UK.

Global Stiffness

The vessel acts as a beam, with the mast providing a vertically-downward load in the middle. If it deflects too much, it changes the hull shape and, hence, the hydrodynamics and the rig performance.

SP-HM have their own in-house rule for the stiffness level for sailing vessels. Here Alan showed a graph of bending moment vs length overall, and lines for sloops and ketches. The lines coincided from 15 up to 30 m, but diverged for lengths greater than 30 m, with the line for sloops rising faster to top out at about 7500 kN-m for a length of 45 m. However, the Panamax ketch took the cake at 15 000 kN-m for a length of 60 m!

Det Norske Veritas asked for more stiffness than had been proposed by SP-HM. So, to comply, they added unidirectional tapes—longitudinally—to the underside of the deck, the inside of the side shell below the deck, and the inside of the bottom shell on either side of the keel (so that they would not be cut by the keel, the propeller shaft, etc.)

Deck Laminate

The flat decks were built in two pieces, including the thick unidirectional planks for global stiffness. The three deckhouses were built separately. There was an ever-increasing number of deck hatches. The join in the deck between the two halves was highly loaded due to global bending, and they had beams representing the lap joint made and tested to ensure that the join could take the expected loads.

Main Deckhouse

The demanding interior of the main deckhouse is 10 m long by 6 m wide, and called for a large open space with no pillars or other supporting structure. In addition, the sailing requirements called for high loads on the attachment fittings, many of which were sited on the top of the main deckhouse. There is a 40 t mainsheet vertical load, a 21.6 t mainsheet side load, and a 175 t mizzen forestay breaking load, all landing on top of the main deckhouse!

They were not initially worried about the 40 t vertical mainsheet load, but more about the 21.6 t side load. They thought that they could transfer this through the aft deckhouse bulkhead panel. However, once detailed design began, the owner informed them that this was not to be a solid panel, but a drop-down panel for a servery, taking away the load path! So they made the mullions stiffer, using high-modulus carbon and increasing the depth to 300 mm. Strength was not really an issue, but stiffness was.

They expected 3 mm sideways movement of the deckhouse

under the sailing loads, but they had a factor of safety of 5 or 6 on the strength of the structure. To carry the vertical loads, tie rods were utilised which ran through the interior space. Much to the surprise of the structural engineers, the interior designers were not averse to the idea, and even decided to make a feature out of the 100 mm×100 mm carbon-fibre pillar for the mainsheet load. The mizzen forestay ended up passing through the saloon and connecting to the centreline bulkhead below. So there are now two rods going through the main saloon.

The design of this area took a long time to evolve, and was a major challenge.

Keel

The owner's requirement was for a lifting keel, to enable sailing to continue in shallow water, and for the vessel to enter shallow ports. Lifting keels are common, but this one was a whole project by itself due to the size and loads. There are three positions for the keel; fully extended, shallow-water sailing, and port entry. The owner's requirement was also that the keel should be able to be lifted from the fully-extended position to the shallow-water sailing position while sailing—this presented a real challenge. However, the port-entry condition was also a challenge, because the fin did not fit inside the hull!

Loads on the keel in the transverse direction are provided by hydrodynamic forces when sailing and require both stiffness and strength; vertical loads are experienced due to self weight (the ballast bulb at the bottom of the fin is 1.5 m in diameter and has a mass of 83 t!) and in the fore-and-aft direction due to grounding, pounding and pitching. The grounding load was taken, at a speed of 36 kn, to be 470 t. However, due to the lever arm of 9 m below the hull and 1 m inside the hull in the fully-extended position, the load transmitted to the hull ends up being 2200 t!

Loads due to inertia, side pitching and self weight were applied at the centre of gravity of the combined bulb/fin, whereas grounding and pounding loads were applied at the point of contact. Load offsets also induce a moment as well as a direct force, and all of these had to be considered.

The transverse loads in the sailing positions are taken by the hull laminate and the keel shelf. Rams engage in the down position, and locking pins take the vertical loads. The keel can be lifted to the shallow-water sailing position at up to 15° of heel—it has not been designed for more due to the frictional loads. The design of this keel and housing trunk is much more complex than other trunks due to this requirement.

Similar load paths are utilised for the shallow-water draft. However, in the port-entry position, the fin sticks above the deck, and the mainsail boom needs to go to one side. There are two vertical rams, the full length of the keel trunk, which are out-of-sight out-of-mind while the keel is down, but come into play for the port-entry condition to raise the keel above the shallow-water sailing position.

Alan then showed a slide of the keel trunk being lifted into position in the vessel. The hull laminate is locally up to 150 mm thick solid carbon laminate in way of the keel trunk. SP-HM issued over 20 drawings for the structure, many with multiple sheets. The trunk took 3–6 men 10 months to build, and had a mass (as lifted into the vessel) of 3.6 t.

Rudder

The rudder also has a lifting arrangement; it is fully extended for the two sailing positions, but needs to be lifted for the port-entry condition so that it does not project more deeply than the keel. It retracts into a trunk, and a section of the hull also lifts to allow the rudder to pivot while lifted. There are complex load paths due to the interior requirements—the rudder is at the forward end of the owner's saloon, with stairs to the owner's cabin passing on the port side, meaning that there is an asymmetric load path. The rudder trunk was built first, and then designed to work later! In fact, Alan designed the lifting lower bearing while onsite. The upper bearing feeds load through two 80 mm wide side plates which extend either side to clear the skylights in the deck. There was a lot of work involved in the design of the rudder lifting arrangements.

On-site Engineering

The job of the on-site engineer included information transfer, clarification of the intent of drawings, initial concept solutions, hand sketches for repairs, and an additional design resource.

Alan was able to login to the Gurit computers in the UK, and see where drawings were up to and when they would be issued, and supply clarifications and even advance information—which BY really liked! He could also, as an engineer, interpret the drawings if there were queries, or go back to the engineers in the UK.

Another useful function was as eyes on the ground, as he could see if things were out of place or not being installed correctly, or Gurit in the UK could ask him for advice on what was on the ground.

At one stage, BY asked him if they could cut an additional hole in the deck for another hatch, to which he replied "No; that takes away a load path". "What if we have already cut the hole?" They went and inspected and, sure enough, the hole had already been cut! He therefore had to get busy and come up with an on-site solution for an alternative load path. Fortunately, that was an isolated case, and BY usually asked before cutting holes anywhere.

In the long run, there were lots of hand sketches. These were then passed back to the design team for verification and, quite often, drawn up as is and then passed to the builder.

BY liked having Alan on site and working as a design engineer, because then they could push him hard.

Conclusion

The Panamax ketch is the result of collaboration of a number of companies. The design and engineering of the composite structure was challenging, to say the least, but has resulted in what will be one of the best-engineered super-yachts in the world. Working on site in cold conditions (on the latitude of Iceland, a few degrees short of the Arctic Circle) was also challenging, but a great experience.

Questions

Question time was, unfortunately, curtailed due to the time limit in the Harricks Auditorium, but elicited some further interesting points.

The laminating process used prepreg materials, and the inside carbon layups were applied over a male plug, followed

by the core materials. The core was then boarded to fair it, and then the outside carbon layups applied. Each was vacuum bagged, and cured at 80°C.

BY managed the weights going into the vessel. The original estimate was for 38 t of structure, but there have been many subsequent changes, including the sliding aft wall of the main deckhouse, lifting the keel while sailing, and a gazillion deck hatches. The latest estimate is for 42 t of structure.

The vessel carries 10 t of water ballast on each side. After an adjustment to the powering requirements, the engine room had to be re-configured and some of the ballast capacity was lost. At one stage the owner suggested putting extra mass into the keel to account for this loss, but SP-HM said "No!".

The vote of thanks was proposed, and the "thank you" bottle of wine presented, by Rozetta Payne, who said that she had been working for SP-HM at the time and was aware of the Panamax ketch, but had no idea of the extent of the design challenges being faced. The vote was carried with acclamation.

Marine Biofouling

Andrew Scardino of the Defence Science and Technology Organisation, gave a presentation on *Marine biofouling: Current Challenges and Potential Solutions* to a joint meeting with the IMarEST attended by nineteen on 6 October in the Harricks Auditorium at the Engineers Australia, Chatswood.

Introduction

Andrew began his presentation by outlining some of the biofouling issues for the Royal Australian Navy. These include the facts that the fleet comprises diverse ship types and hullforms, constructed from different materials, and operate at variable speeds. The vessels also operate over a wide range of environments and spend extended periods alongside. The Navy is expected to protect niches and prevent the spread of pests, which becomes a challenge as in-water cleaning is currently not allowed in Australia. What this means is that there is no single solution which is applicable to the whole fleet over the whole range of environments.

In the future, there may be biocidal regulations, for example on copper-based biocides, and this may mean the phasing out of the main current biocides. Volatile organic compounds (VOCs) have been restricted overseas and, while still allowed in Australia, it is reasonable to expect that they will be restricted here too. There is a move towards non-toxic foul-release coatings (FRCs) away from biocides, and the FRCs are getting better at lower speeds. There is also a move towards painting propellers fleet-wide. The Code of Practice on cleaning in-water is currently being reviewed, and may result in changes to how biofouling is managed on ship hulls.

Problems with Existing Coatings

Andrew showed some slides illustrating problems with existing coating systems.

For copper-based coatings, problems include failure of the paint system, delamination of the anti-fouling system (especially if the vessel is alternately wet and dry), algal growth at the waterline (if species become tolerant to copper), paint cracking, variations in paint film thickness, and the cuprous-oxide pigment size.

For foul-release coatings, problems include the fact that, in tropical waters, heavy fouling occurs, particularly when stationary. Also, some organisms are not released under operating conditions, and areas of a vessel not experiencing in-water shear are often prone to heavy fouling.

DSTO Anti-fouling Research

DSTO's research into anti-fouling includes static immersion trials in southern and northern Australia, paint patch trials on RAN vessels, a specialised rotor facility to evaluate coating durability, and a flow chamber to evaluate adhesion strength and foul-release capabilities.

Research into biofouling control is driven by the need to find fuel savings. The current program includes:

- Development of a fouling-rating tool for Australian conditions to assist with quantifying cost of fouling.
- Torque-meter installations on propeller shafts to measure the effect of fouling.
- Trials of new-generation foul-release coatings.
- Trial of new low-VOC traditional anti-fouling paint due to international controls on VOC paints.
- Coating propellers with foul-release coatings.
- Trial of a hull-treatment system based on hot water for removal of slimes.
- Research into biomimetic non-toxic coatings.
- Investigation of bubbles to reduce biofouling settlement on stationary hulls.

There is a current fouling-rating tool used by the USN and the RAN, but DSTO's Environment Group have modified the tool due to the prevalence of bryozoans observed in Australia on FRCs. The tool is used for ship trials and is being evaluated by the Navy's Fleet Environment Group for possible inclusion in pre- and post-dive inspections.

Hull Fouling and Fuel Economy FFG Class

Here Andrew showed a slide indicating the effect of hull-surface roughness on the percentage increase in shaft power and percentage increase in fuel consumption for an FFG-7 operating at 15 kn. A hull-surface roughness of 150 μm is equivalent to freshly-painted new steel/aluminium.

Condition	%Roughness (μm) (Shultz 2007)	% ΔSP at 15 knots (Shultz 2007)	%Increase fuel Consumption (Walker & Atkins 2007)
Newly applied coating	150	2%	-
Deteriorated coating or light slime	300	11%	~6%
Heavy slime	600	21%	12%
Small calcareous fouling	1000	35%	18-24%
Medium calcareous fouling	3000	54%	61%
Heavy calcareous fouling	10,000	86%	92%

There has been increasing literature on the effects of hull fouling, especially since 2004, including publications by the US Office of Naval Research and Naval Surface Warfare Centre, the UK Ministry of Defence and the Royal Navy, CRC Econships, consultants, and paint companies.

Hull Surface Treatment

Hull Surface Treatment™ (HST) was developed by an Australian dive company based on NZ research into hot water treatment for soft biofouling. Thermal shock (70ºC) using heated sea water is applied to the hull and this kills algal growth immediately. The company claims that dead marine growth remains attached to the hull whilst the ship is alongside and is released during the first 2–4 weeks of sailing. The HST system has been permitted in various harbours and coastal regions by the port authorities. The effectiveness of the treatment is claimed to be long lasting because the treatment kills not only the algae but also the spores, which delays the process of regrowth. Biofouling will start at some stage afterwards, and so it is important to repeat the HST treatment at regular intervals. The HST developer claims that a commercial ship will require, on average, one HST treatment every four–six months.

DSTO commenced trials of HST on April 2010 on HMA Ships *Newcastle* (FFG) and *Kanimbla* (LPA). The trials tested the efficacy of hot water treatment using HST to provide an immediate effect on algae mortality and a sustained reduction in soft biofouling on a RAN ship. The aims of the trials were to assess and note any potential deleterious effect on hull coatings, to assess and evaluate the practicality of the technique, and to assess and note any impact during treatment on ships' operations. One side of the hull was treated on each vessel, with regular diver inspections following the treatment. A final report on the trial is being compiled which will help to determine the suitability of this technology for the RAN.

Shaft Power Monitoring

Changes in shaft power are a measure of hydrodynamic drag from hull fouling and is related to fuel efficiency. A fundamental element of DSTO's program is to evaluate and measure the actual penalty of fouling, and they took the opportunity to automate shaft power monitoring on an Armidale-class patrol boat (ACPB) painted with a FRC which operates in our high-fouling-pressure northern waters.

In previous trials in the UK, the RN determined their trigger value so that the cost of hull cleaning is recouped within 3 months from fuel savings. ACPBs with FRCs have much greater rates fouling than in the UK, and therefore potential for much greater savings and the ability to automate and evaluate shaft power over a number of operational and environmental conditions. A torque meter, based on the RN system, was installed on HMAS *Glenelg* in April 2010, and the baseline ship trial commenced.

The aims of the trial included:

- Developing an accurate fuel-efficiency curve for the vessel.
- Accurately measuring the penalty of fouling in Australian conditions for hulls painted with foul-release coatings.
- Measuring the effectiveness of high-speed transits on reducing fouling build up.
- Identifying the rate at which hull fouling in tropical conditions develops, and whether alternate hull management options could be cost effective.
- Identifying the optimum timings for hull cleaning (note the Australian ban on in-water cleaning).
- Measuring improvements in performance from propeller cleaning and painting.
- In the medium term, investigating the potential of the system to provide smart control for propulsion systems.

RAN Antifouling Paint Trials

The Royal Australian Navy is conducting paint trials on various vessels.

HMAS *Shepparton*, a survey motor launch operating at slow speed in a tropical environment, commenced a patch trial comparison in August 2010 between her existing low-solid Intersmooth 360, high-solids low-VOC copper-based anti-fouling paints, and foul-release coatings. HMAS *Shepparton* was the first RAN surface vessel to have its propellers and rudders painted with a FRC.

HMA Ships *Larrakia* and *Bathurst* commenced trials of hull and propeller painting with new-generation foul-release coatings. HMAS *Larrakia* was painted in September 2010 with Interseek 900, and HMAS *Bathurst* in October 2010 with Hempel X3.

Air Bubble Curtains

The air-bubble curtain technique is used as a complementary strategy for FRCs when a vessel is stationary. Fouling settles when stationary and, if we can avoid this, then it may be possible to get the benefits of FRCs for fuel saving and performance.

Air is supplied through aerators to the hull of vessels at 3–8 L/min/m. Simple commercial blowers or air pumps supply the required air pressure and volume, and silicon-sleeve aerators have been shown to be the most effective in field trials. They used a variety of coatings, and used aeration intermittently. The aeration is not sufficient to protect an unpainted hull. The biggest issue in high-silt areas is cleaning the sparges which deliver the air.

Hull Roughness and Fuel Economy

The RAN's marine fuel consumption is of the order of 100 million L/a. The increase in fuel consumption (due to fouling) is equal to or slightly less than the increase in shaft power for the usual levels of fouling. Substantial reductions in fuel consumption and greenhouse gas emissions can be achieved through reducing hull roughness.

Fouling Control using Vibration

PZT embedded panels were tested in static immersion trials over several fouling seasons. A range of frequencies (100–2000 Hz) and amplitudes (10–50 V) were examined.

Barnacle deterrence was found in repeat experiments with frequencies of 430 Hz or more and the effect of amplitude, velocity and acceleration of vibration may be a contributing factor. However, there were no effects on other fouling organisms.

Biomimetic/Bioinspired Fouling Control—Nature's Way

Means of fouling control by mimicking nature include surface topography, wettability, roughness, mucous secretion, sloughing, filtration, grooming, and chemical deterrence.

As an example of biomimickry, mussel shells were replicated to asses the effects of the surface topography. Selected bivalve surfaces were mimicked, creating high-resolution

replicas, e.g. *Amusium balotti* (smooth), *Tellina plicata* (micro-projections), and *M. galloprovincialis* (micro-ripples). They found a loss of effect with time relative to true surface, and that there was an effect of surface properties of the periostracum (the outermost layer of shell).

Biomimetic anti-fouling coatings have also been tried, mimicking the micro-textured surfaces on shellfish to create fouling-resistant films. They discovered that if surface striations are pitched correctly, then organisms cannot get a grip. However, the organisms are of different sizes, and so one pitch does not prevent all organisms!

Biofouling Control Research for Internal Systems

Research of biofouling control for shipboard internal systems is being driven by the Australian codes for controlling invasive aquatic species through biofouling. The current program inlcudes:

- Assessing niches on RAN vessels for identification of high-risk areas for potential transportation of quarantine trigger-list species.
- Investigation of novel techniques and design modification to control or reduce fouling settlement in important niches (such as sea chests).
- Risk assessment of in-water cleaning of ship hulls and niches.
- Assessment of alternative marine-growth protection systems (MGPS) for Australian conditions.
- Underwater diver inspection techniques for assessing niche areas before and after deployment.

Here Andrew showed slides of fouling and/or clogging of various sea-inlet openings and chests on RAN vessels.

Regular hull and niche inspections are necessary. Diver aids are required to detect high-risk species, and reliable footage is needed for timely identification.

Sea Chests and Sea-water Cooling Systems

Current marine-growth protection systems include copper-nickel pipes, copper anodes, and chlorination.

The AWD program has a work package to address the outstanding question regarding copper-nickel and chlorine compatibility. In general, RAN sea chests are smaller, with systems more critical in terms of temperature tolerance. DSTO is currently establishing a laboratory test system to test chlorine and copper-nickel compatibility with the corrosion group. They are reviewing emerging treatment options for possible future test, particularly new developments for ballast treatment and applicability to seawater cooling systems, and undertaking static tests for coating options.

Sea chests are a significant vector for the translocation of marine pests. New foul-release coatings are being trialled to reduce fouling in sea chests. To date, encouraging results have been found at the Williamstown deployment. New FRCs combined with design modifications to ensure high flow throughout the chest could minimise fouling settlement.

Conclusion

The Royal Australian Navy faces significant issues in the control of marine biofouling, and DSTO is engaged in a wide range of research to combat these, and to provide fuel savings on a sustainable basis.

Questions

Question time was lengthy and elicited some further interesting points.

Air bubble curtains are only applied when a vessel is alongside a berth, not while under way.

Painting of propellers is becoming a common practice. Inco Ships and Svitzer Australasia, as well as some private yacht owners, are known to be painting their propellers. One of the issues is that the anti-fouling cannot be applied directly to the propeller, or it will wash off very quickly. The propeller needs proper preparation, usually grit blasting with garnet, followed by the application of an anti-corrosive, then a tie coat, and the anti-fouling or fouling-release topcoat. Painting propellers is usually beneficial if the vessel spends much time alongside or at anchor. A polished propeller is more efficient than a painted one, but a painted propeller is much more efficient than a heavily-fouled one.

In New Zealand, encapsulation of a vessel in a plastic bag has been used successfully to keep problem species at bay.

In Darwin, the whole harbour was once dosed with biocide in order to remove an infestation of the Zebra mussel.

Waterjet impellers are often made of stainless steel, and do not suffer from fouling. An application of grease or lanoline to propellers can also prevent growth of fouling on the propeller.

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

LHD Progress Report

Captain Craig Bourke RAN, the LHD Project Director, and Jeremy Redmond, the LHD Engineering Director, gave a presentation on *A Progress Report of the RAN's Landing Helicopter Dock Project* to a meeting of the NSW Chapter of the Australian Society for Defence Engineering on 25 October in the Harricks Auditorium at the Engineers Australia, Chatswood.

The Australian Department of Defence is acquiring two Landing Helicopter Dock (LHD) vessels to replace and enhance the current amphibious capability for the ADF. The ships are being built as a collaboration between Navantia and BAE Systems, and their roles will be to embark, transport and deploy a force (Army in the case of the ADF, but could equally be an allied Army or Marines), along with their equipment and aviation units, and to carry out and support humanitarian missions.

The construction is being done using the modular approach whereby the ship is divided into modules, which are built and fitted out as discrete units, before being welded together to form the completed ship. Construction of the hull to the level of the flight deck, including the majority of fitting out will be undertaken at Navantia's Ferrol-Fene shipyard in north-west Spain. The hull will then be shipped to BAE's Williamstown shipyard in Victoria for the installation of the island structure. The island modules will be constructed at a number of sites around Australian before being moved to Williamstown for final installation on the flight deck. The combat systems are to be installed by SAAB Systems Australia.

The presentation specifically addressed the challenges of designing and building platforms offshore, and the "Australianisation" of European ships.

Phil Helmore

LHD 01 construction progress in August 2010. The ship, to be named *Canberra*, will be launched next year
(Photograph by Foto Lugris)

COMING EVENTS

NSW Section

SMIX Bash 2009

The eleventh SMIX (Sydney Marine Industry Christmas) Bash will be held on Thursday 2 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 IMarEST (Sydney Branch).

Tickets are available from Adrian Broadbent of Lloyd's Register Asia on (02) 9262 1424, fax 9290 1445 at $45 per head; 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 now.

For further details and booking form, see the advertisement elsewhere in this issue.

Second International Conference on IHSMV

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

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

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

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

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

Submission of abstracts closed on 8 October.

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

Further details may be obtained from, and interest registered with, the conference secretariat at RINA by fax to +44-20-7259 5912, email to conference@rina.org.uk, or on the conference website at www.rina.org.uk/highspeedmarinevessels2011.

Basic Dry Dock Training Course

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

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

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

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

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

FROM THE CROW'S NEST

New World Speed Sailing Record

Kitesurfer Alexandre Caizergues on 12 October 2010 beat the outright world speed record under sail with an average of 54.10 kn (100.19 km/h) over 500 m of the Luderitz channel, Namibia. The young Frenchman is the new sailing outright speed record holder, taking back his own record from that set by *l'Hydroptère* of 51.36 kn on 4 September 2009. This is the first sailing record to exceed 100 km/h.

There are three main speed sailing records: over 500 m, over one nautical mile, and over 24 h. *l'Hydroptère*, skippered by Frenchman Alain Thébault, still holds the record for one nautical mile at 51.36 kn, and *Banque Populaire V*, skippered by Frenchman Pascal Bidégorry, holds the 24 h record at 37.84 kn.

Further details and photographs of Caizergues in action may be found on a number of websites; see, for example, http://yachtpals.com/speed-sailing-9159, or www.sail-world.com/Australia/New-World-Speed-record---Alexandre-Caizergues,-kitesurfer-hits-54.10-k/75791

Phil Helmore

RINA
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NEW SOUTH WALES SECTION

SMIX Bash 2010...

IMAREST
The Institute of Marine Engineering, Science and Technology
Sydney Branch

THE SYDNEY MARITIME INDUSTRY CHRISTMAS PARTY

for people in the Maritime Industry and their partners will be held onboard the unique 19th century iron barque "James Craig" berthed at No. 7 Wharf, Darling Harbour on Thursday, 2 December 2010 - 5:30 pm for 6:00 pm

Tickets are $45 per person which includes a delicious buffet meal and all your drinks.

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Those wishing to attend this Sydney Maritime Industry Christmas Party should complete this form and return it, together with your remittance, to the RINA (NSW) Treasurer, Adrian Broadbent, c/o Lloyd's Register Asia, PO Box Q385, Sydney NSW 1230, Fax (02) 9290 1445. There is a maximum limit of 225 attendees on the James Craig and we have had to turn away members and friends in previous years; so you are urged to please book early.

Price: $45-00 per head. No refunds will be granted. Dress: Casual (no stiletto heels!)

Name: (Block Letters) _____
Guests: _____
_____
_____

Cheque payable to "Royal Institution of Naval Architects (NSW Section)" for _____ is enclosed (our account name in full please)
Email address for confirmation:_____Please note that no tickets are issued.

Attention: Adrian Broadbent, Lloyd's Register Asia, PO Box Q385 Sydney NSW 1230
Email: adrian.broadbent@lr.org Fax: (02) 9290 1445

CLASSIFICATION SOCIETY NEWS

LR Appoints Client Support Manager in Sydney Design Support Office

As reported in the August issue of *The ANA,* following a global review of LR's Design Support functions, the decision has recently been taken to restructure the Sydney Design Support Office in order to align with the corporate strategy of consolidating the plan review of design support activities into fewer centres.

Paul O'Connor has been appointed to the position of Client Support Manager in the Sydney Design Support Office. This role will allow greater flexibility to provide a wider level of support to local clients, whilst at the same time achieving greater control of design support work within the system. Paul is now the initial point of contact for plan approval and design support matters in Australia and New Zealand.

Tim Hall

Meeting of LR's Australian Technical Committee

The Australian Technical Committee of Lloyd's Register met on 9 September to consider proposed changes to Lloyd's Rules for Ships and Lloyd's Rules for Special Service Craft. Comments from the Australian Technical Committee will be considered, along with comments from other LR Technical Committees around the world, by Lloyd's Technical Committee in London in November, and the changes will be promulgated in 2011.

LR Celebrates 250 Years of Operation

Lloyd's Register held a cocktail evening at the Australian National Maritime Museum on the evening of 9 September to celebrate 250 years of operation. Champagne, wine and soft drinks were served, together with hors d'oeuvres, and many tall tales and true were told.

Mary-Louise Williams, the Director of the ANMM, welcomed guests to the museum and declared open a display of LR artifacts which had been set up commemorate the 250 years.

Richard Hein, Chair of the Australian Committee of Lloyd's Register, also welcomed guests to the museum and the LR display.

Alan Williams, Marine and Area Manager, Lloyd's Register Asia, gave a brief overview of the development of LR. The Society for the Registry of Shipping was first established in Edward Lloyd's coffee house at 16 Lombard St in London, UK, in 1760. The company grew from there to become the diversified world-wide organisation which it is today, with headquarters at 71 Fenchurch St, London. LR now employs some 7700 people of over 90 nationalities, in 238 offices in 227 countries and other territories, serving more than 55 000 clients. They survey ships, inspect offshore platforms and refineries, audit rail networks, and certify production plants. They work in the oil fields of Kazakhstan, at the world's major ports (such as Rotterdam, Singapore and Shanghai), and at the world's largest nuclear power station in Japan.

As a matter of interest, Alan said, the first vessel in the world to be fully classed to LR's *Naval Ship Rules* was classed here in Australia, as was the first wing-in-ground-effect (WIG) craft to be classed to LR's *Wing-in-ground-effect Craft Rules.*

The LR display was then inspected, and items now on show include a full model of the steamship *Westralia*, copies of and extracts from early *Lloyd's Registers*, a boiler certificate, a pressure test gauge, and (of interest to the elders of the tribe), Frank Last's 500 mm slide rule! Frank Last was, for many years, LR's principal naval architect in the Sydney office, and was able to derive—from first principles—all of the formulae in the rules, something it would be impossible to do in the current rules!

Phil Helmore

New Chairman for LR

Lloyd's Register's Board of Trustees has selected Thomas Andersen as the Chairman-elect of the Lloyd's Register Group, a leading provider of independent assurance and expert advice to the marine, energy, transport and management-systems sectors around the world. Andersen, who was appointed as a Trustee by the General Committee in June, will succeed Chairman David Moorhouse CBE, who is due to retire at the end of the year after serving eleven-and-a-half years as the Chairman of the Group.

Moorhouse commented "It is a great pleasure for me to welcome my successor, Thomas Andersen. I have every confidence that he, together with the Chief Executive, Richard Sadler, and his management team, will lead this organisation to even greater success in the future. The Lloyd's Register Group has a significantly more-diversified range of activities today than at any time in its history. That diversity has helped us to weather the current economic storm and has given us great confidence as we look to the short- and long-term future of the Group."

Andersen, a former Member of the Board for the A.P. Moller-Maersk Group, will take over at the non-executive helm of Lloyd's Register after almost 25 years in the maritime and energy sectors.

Thomas is currently a Board Director of Scottish and Southern Energy, Petrofac and VKR Holdings, the parent group of Velux. He has had a long career with A.P. Moller-Maersk, starting as a shipping trainee in 1977, and has held senior positions throughout the Group, latterly as a partner and member of its executive board and Chief Executive Officer of Maersk Oil.

Andersen's previous positions include President and CEO of Maersk Inc., based in New Jersey, USA, Managing Director for Maersk Company Ltd, Executive Vice-President of A.P. Moller-Maersk and President of Maersk Contractors. With a Graduate Diploma in Foreign Relations (HD) from Copenhagen Business School, Thomas has also studied at Columbia and Harvard universities and is a Freeman of the City of London. He is also Chairman of the British Chamber of Commerce in Denmark.

"It is an honour and a privilege to join the Lloyd's Register team. One can't help but be impressed by how the organisation, over its past 250 years—and not least under the Chairmanship of David Moorhouse—has consistently supported the industry by setting new standards for technical innovation and expertise," Andersen said. "I have been very

fortunate over my long career in the shipping, infrastructure and energy sectors to have worked closely with Lloyd's Register as a customer, bearing personal witness to the huge value of this organisation. This experience reflected very positively on the commitment of the Lloyd's Register team worldwide. Our history is unique, our achievements are impressive and, while our future will be challenging, the opportunities are certainly great."

The Lloyd's Register Group recently reported its annual results to its General Committee, revealing that all business streams—Marine, Management Systems, Energy and Transportation—made strong contributions last year despite the adverse market conditions created by the global economic downturn.

Group income for the fiscal year to 30June 2010 dipped slightly to £806 million, against £820 million last year, as all divisions weathered the global financial downturn which had a significant impact on the amount of financing available for large-scale infrastructure projects. Group operating surplus, buoyed by significant one-off gains, reached £127.8 million.

Moorhouse said that the strong result allowed the Group to increase its donation to the Lloyd's Register Educational Trust (LRET), a wholly-independent charity whose sole benefactor is the Group, to £10 million for the 2010–11 fiscal year.

"The Group's constitution requires us to secure, for the benefit of others, 'the advancement of education' within the industries we serve and other engineering and science-led disciplines," he said. "The LRET has grown in scale and stature to establish itself, not only as a giver, but as a participating charity and, with our strong support, we expect it to continue to help shape and improve the world's engineering and science-based academic communities to the benefit of all."

LR Guidance on Ballast-water Management Systems

Lloyd's Register has issued new guidance notes to help shipowners and operators who are preparing to install ballast-water treatment systems on their ships. The new guidance, developed to complement the Lloyd's Register *Ballast Water Treatment Technology Guide*, reflects the current status of regulations proposed by the International Maritime Organization (IMO) and provides owners with recommendations which will help them to prepare their ships, ensuring they remain compliant.

"The need to reduce the international merchant fleet's carbon emissions may have captured all the headlines recently, but the shipping community knows that finding effective solutions for ballast-water management is just as big an environmental challenge for the industry," said Dr Anne Marie Warris, Environmental Advisor to the Lloyd's Register Group. "With the ballast-water convention awaiting ratification, shipowners and managers are working hard to determine the consequences for their ships—including the associated costs—and whether the skills of their crews will need to be upgraded to effectively and safely operate any new equipment and technology."

The IMO in 2004 presented the International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention) to regulate the discharges of ballast water and reduce the risk of introducing non-native species to the world's waterways. Once ratified by the required number of states, which represent a predetermined proportion of the merchant fleet, the convention will require ballast-water treatment to be used instead of ballast-water exchanges. This requirement will be phased in.

The BWM Convention will apply to all ships trading internationally and which carry ballast water, with a few exceptions and in accordance with specific territorial requirements. These exceptions and conditions are detailed in Lloyd's Register's National Ballast Water Management Requirements guide, which can be found at: http://www.lr.org/sectors/marine/documents/175149-national-ballast-water-management-requirements.aspx.

The BWM Convention will come into force 12 months after at least 30 states (the combined merchant fleet of which must constitute at least 35% of the gross tonnage of the world's merchant shipping fleet) have ratified it. To date, it has been ratified by 26 states constituting 24% of the merchant fleet.

The new guidance notes can be found at: http://www.lr.org/sectors/marine/documents/202264-ballast-water-treatment-systems-guidance-for-ship-operators-on-procurement-installation-and-operation.aspx.

For a full overview of ballast water treatment management go to: www.lr.org/bwm.

First LNG -powered Vessel with GL Class

The 25 000 DWT product tanker, *Bit Viking*, will be converted to run on LNG. It will then be the first ship with Germanischer Lloyd (GL) class using gas as fuel. The ship will be retro-fitted with a dual-fuel Wärtsilä engine. Sea trials are planned for May 2011.

With two 500 m³ tanks, the vessel will have a range of 12 days. It is owned by Tarbit Shipping and operated by Statoil along the Norwegian coastline. The conversion will enable the vessel to qualify for lower NOx emission taxes under the Norwegian government's NOx fund scheme.

Bit Viking has twin-screw propulsion, with each screw currently powered by a 6-cylinder in-line Wärtsilä 46 engine running on heavy fuel oil. The conversion involves changing these to 6-cylinder in-line Wärtsilä 50DF dual-fuel engines which will operate on LNG. The ship was built with double engine rooms, propellers, steering gears, rudders and control systems. After conversion, for which Tarbit Shipping chose Wärtsilä, *Bit Viking* will be one of the safest and most environmental-friendly 25 000 DWT product tankers in the world.

"The use of LNG could reduce carbon emissions by 23%, with even bigger reductions of 80% in NOx and 92% in SOx emissions", said Dr Pierre Sames at GL's press conference during the recently held SMM. "Using gas as a fuel can be one of the major contributors to meeting emissions targets."

GL has issued guidelines for gas as ship fuel on the application of the IMO regulations. These guidelines have been in force since 1 May and apply to all ships excluding liquefied gas tankers. The internal combustion engine installations subject to the IMO interim guidelines may be single-fuel (i.e. natural gas) or dual-fuel (gas and fuel oil) machines, and the natural gas may be stored in gaseous or

liquid state. The guidelines are to be applied in conjunction with the relevant provisions of the International Convention for the Safety of Life at Sea 1974, and the Protocol of 1988 relating thereto, as amended.

Fuel-cell Systems can Substitute 160 GW of Auxiliary Engines Worldwide

The installed auxiliary power onboard seagoing vessels has a market potential of approximately 160 GW worldwide and can, in principle, be substituted by fuel cells in order to reduce emissions to air. This is one of the conclusions of a market study for fuel cell systems carried out by Germanischer Lloyd (GL) and the Hamburg City Administration for Urban Development and Environment.

GL experts examined the technical possibilities, the currently-available technology, integration concepts and the legal background for the use of fuel cells onboard ships. The target prices for fuel-cell systems have been analysed, as well as the market size onboard seagoing vessels. For the study, approximately 53 % of the world merchant fleet has been analysed.

The study also shows that five years after the finalisation of the development of first systems for commercial shipping, fuel-cell systems can be competitive in comparison with traditional diesel engines from an economic point of view—even if the prices for fuel-cell systems become higher at this time.

The first identified markets for fuel-cell application are cruise vessels, ro-pax vessels and mega yachts. With fuel-cell systems reaching economic competitiveness, a much larger market for ship types like container feeders will be open.

Dr Gerd-Michael Würsig, GL's expert for fuel-cell technology and one of the authors of the study, states "The study concludes that fuel-cell systems have a high market potential in shipping in the future. Today, some technical challenges have still to be overcome. However, current and ongoing projects already demonstrate the suitability of fuel-cell systems for power generation onboard ships. Fuel cells will be one technology of the future for environmentally-friendly power generation on board!"

Environmental concerns, environmental regulations and high energy prices are forcing the shipping industry towards more-efficient and greener vessels. One solution to achieve this goal is the use of fuel-cell systems for power generation on board.

Apart from the high efficiency of the fuel-cell system of more than 50%, the very-low or no emissions (depending on the fuel type) are a big argument for the use of fuel-cell systems onboard ships. Furthermore, the modular design and the negligible noises and vibrations give the fuel-cell system a big advantage compared to traditional power generation onboard ships.

GL has been involved in developing ships, storage and transfer facilities for hydrogen, and has developed its own guidelines for the use of fuel cells in watercraft. These 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 the fuel-cell system.

Michael Mechanicos

DNV Expands Presence in Australia

2010 has seen DNV expanding its presence in Australia with the establishment of a DNV Energy office based in Perth. The new office is managed by Hans-Kristian Danielsen. This second Perth office is located on St George's Terrace and will have its official opening in the last week of November.

DNV to Investigate the Deepwater Horizon Blowout Preventer

DNV has been contracted by the Joint Investigation Team (JIT) of the Departments of the Interior and Homeland Security for the forensic examination of the blowout preventer (BOP) and lower marine-riser package which was fitted to the Macondo well in the Gulf of Mexico, the site of the Deepwater Horizon disaster and oil spill.

The BOP, a 50 ft 300 ton (15.24 m 304.8 t) assembly has been raised and taken to NASA's secure facility in Michoud, Louisiana, where it is in the custody of the JIT. Chain-of-custody and evidence-preservation protocols to ensure the proper handling of all evidentiary material have been in effect since the BOP was first retrieved in August.

The final forensic testing protocol will be developed by DNV, in consultation with various commercial, academic, and governmental organizations, and will be approved by the JIT prior to the start of testing.

DNV is utilizing its forensic investigation expertise from the Columbus, Ohio, office and its subsea equipment (BOP) expertise from the Houston, Texas, office in the project.

DNV Benchmark: Improving Vessel Performance

Building on DNV's vast vessel database (NPS) the organization has launched DNV Benchmark, an advanced benchmarking tool to allow shipowners and managers access to valuable performance data to reduce operational costs and improve vessel safety.

DNV Benchmark is a decision-support tool, allowing shipowners and managers to identify underperforming vessels in their fleet across a broad range of criteria including safety, pollution, machinery, hull and safety management. By benchmarking fleet performance against other similar vessels of similar age, owners and managers can make better decisions specifically targeted to improve the performance of individual vessels which do not meet performance expectations.

According to Michael Aasland, Segment Director in DNV, the project grew out of DNV's survey-reporting system, NPS, a comprehensive vessel database covering all DNV-classed ships. "The industry has become increasingly focused on reducing costs and improving safety, creating a demand for better, more-specific information about vessel performance," he said. "We recognised that DNV's vessel database represented a valuable source of information which could be used by customers to make better decisions. We therefore developed the benchmarking service, and we are offering the Initial Benchmark report free of charge as an advantage of having DNV class."

Gjermund Våge, Service Director in DNV, notes that DNV's database includes hundreds of thousands of findings from surveys all over the world, detailing a broad range of

issues impacting vessel performance. "Our challenge was to organise this information and develop a tool optimised for customer use," he said. "We have tested the concept with several shipowners, and the results have exceeded our expectations."

Våge explained that DNV's product model structure enables extraction of survey findings which indicate the performance of a vessel within five main areas: safety, pollution, machinery, hull and safety management. The performance of a vessel is then compared with the benchmark performance of similar ships of similar age from the shipowners fleet, or all vessels classed by DNV. No information of any particular vessels is, of course, shared with others than the owner—it is only used for benchmarking purposes. In addition, DNV Benchmark allows owners to monitor vessel performance over time.

Michael Aasland went on to say that, while DNV offers the benchmarking service free-of-charge to customers, DNV also provides more-specialised services based on the benchmarking data to help owners achieve better results, faster. "We have the expertise to provide in-depth statistical analysis of survey findings on selected vessels, detailed benchmarking reports, and offer recommendations verified by DNV experts specializing in safety management, pollution, machinery and hull," he says. "We believe that by making this information available to DNV customers, we can help the industry reduce cost and improve safety."

DNV Publications

Almost all DNV service documents (rules, standards, guidelines, offshore codes, etc.) are now available to DNV customers for free online. While this service used to be paid for, customers are now able to access them through www.dnv.com.

In addition, the electronic readability of the service documents is currently being improved. The new format will be a one-column version, as opposed to the two-column format previously used. The service documents will be transferred to one-column versions as they are revised.

From now on, the electronic PDF version of the service document is the officially-binding document. Additionally, printing has been stopped for all documents except the rules to encourage environmentally-friendly use. A cost-efficient print-on-demand solution will be considered for the future, should there be requests from customers.

Rodney Humphrey

GENERAL NEWS

Pacific Patrol Boat Support and Third Refit Contract

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

DMS Maritime has been selected after a thorough tender evaluation process which included the evaluation of a number of responses to the Request for Tender, which closed 20 January 2010.

The proposed contract will be valued at approximately $49.5 million and will be primarily delivered from Cairns in Queensland, commencing in early 2011.

The contract will operate for five years and has options to extend for a further 12 years.

It is expected to generate up to 15 jobs directly, and up to 20 jobs indirectly, while refit activities are completed.

The proposed contract will support the 19 Pacific patrol boats, which were built and given to 12 Pacific Island countries by Australia from 1987 to 1995, and are sponsored and funded by Defence Cooperation Program.

These vessels are used by the Pacific island countries to patrol their exclusive economic zones, conduct search-and-rescue operations and disaster relief.

DMS Maritime will provide through-life technical support, advice, assistance, and third-refit services to countries operating Pacific patrol boats, as part of the Defence Cooperation Program.

Recruiting Drive for AWD Construction

A national recruitment drive is underway to fill up to 60 vacancies in skilled positions within the air-warfare destroyer project.

The $8 billion AWD project is the largest Defence procurement project ever undertaken in Australia. It is is expected to create 3000 jobs, benefiting thousands of businesses and families in Australia.

The AWD project is being delivered under an Alliance arrangement between Raytheon Australia, ASC and the Commonwealth, represented by the Defence Materiel Organisation.

AWD Alliance CEO, Rod Equid, said the AWD Alliance workforce is growing and will peak during full production in 2012.

"The project is driving a rapid expansion in shipbuilding skills, technical expertise and capability throughout the country," Mr Equid said.

"The AWD Alliance has instigated a national recruitment drive to fill skilled positions in key areas in the program including welders, data analysts, marine engineers and naval architects.

"Full block production is underway in three shipyards, ASC in Adelaide, BAE Systems in Melbourne and Forgacs in Newcastle. Contracts have been signed by the AWD Alliance for almost all major equipment and material.

"At this stage in the project, there is a focus on hull fabrication which is leading to a demand for more welders at all three shipyards. There is also a demand for stores and warehouse positions, schedulers, procurement specialists, pipe fitters and boilermakers.

"The combat system team is moving from the procurement

phase to the management and test phase of the project and is recruiting in areas of production support such as production engineers, integrated logistics support, systems engineers and operations managers.

"There are a number of vacancies within the Combat System team at Raytheon's Macquarie Park offices in Sydney as well as other opportunities in Adelaide," Mr Equid said.

Approximately 200 AWD Alliance members are now located at Techport Australia, Osborne, after relocating from Felixstow in August. The AWD workforce is made up of representatives from the Commonwealth Government, Royal Australian Navy, ASC, Raytheon Australia, Navantia, Bath Iron Works, Lockheed Martin and the US Navy.

In total, the three shipyards will employ about 200 apprentices which will build an important foundation for the industry. There are 18 graduates who work on the AWD project, with plans to expand the number of graduates over time.

South Australia wins bid for World's Oldest Clipper Ship

The historic 1864 clipper ship, *City of Adelaide* has been saved and will be moved from Scotland to Adelaide, South Australia.

Scottish Government Minister for Culture and External Affairs, Fiona Hyslop, announced on 28 August that Adelaide had been identified as the only "viable alternative to deconstruction".

City of Adelaide Preservation Trust Chairman, Creagh O'Connor, said he was "thrilled and delighted" with the news and elated that the decade-long campaign to bring the clipper to Adelaide had succeeded.

The Preservation Trust proposes to preserve *City of Adelaide* on a land-based maritime precinct at Port Adelaide, and provide for the co-location of other historic vessels at the same site.

The South Australian Government has agreed to provide land for the maritime precinct.

The objective is for the ship to be moved in time to celebrate South Australia's 175th anniversary of settlement in 2011.

Trust Director and Naval Architect, Peter Roberts, said *City of Adelaide* was in "quite sound condition" for a ship built in 1864, and that the massive size (55 m length) of her hull will make an exceptional display. "Until only 20 years ago the ship was in use as naval club rooms and a restaurant," he said.

City of Adelaide as she is today
(Photo David Cook)

The South Australian campaign, with extensive community support, had succeeded against bids to demolish the ship and the passionate campaign to relocate it to the English city of Sunderland where she was built.

Ongoing discussions will occur to further develop educational and cultural links between Scotland and South Australia.

City of Adelaide undertook 23 return trips between the UK and Adelaide, carrying thousands of passengers and significant amounts of cargo between the two countries.

Genealogists have calculated that almost a quarter of a million Australians can trace their heritage to passengers and crew of the historic ship.

While much funding has already been secured, community support and further donations are being encouraged through the Trust's web site www.cityofadelaide.org.au.

Austal Starts Construction of JHSV 2

Less than one year after beginning fabrication of *Spearhead* (JHSV 1), Austal began construction of *Vigilant* (JHSV 2), the second of up to ten 103 m Joint High Speed Vessels (JHSV) on 13 September.

On 22 July 2010, the official keel-laying ceremony was held at Austal's shipyard in the USA for *Spearhead* (JHSV 1) which is on schedule for launch in June 2011 and delivery in December 2011. Austal was selected as prime contractor in November 2008 to design and build the first JHSV, with options for nine additional vessels expected to be exercised between FY09 and FY13. Since then, Austal has received construction contracts for JHSV 1, JHSV 2, and JHSV 3.

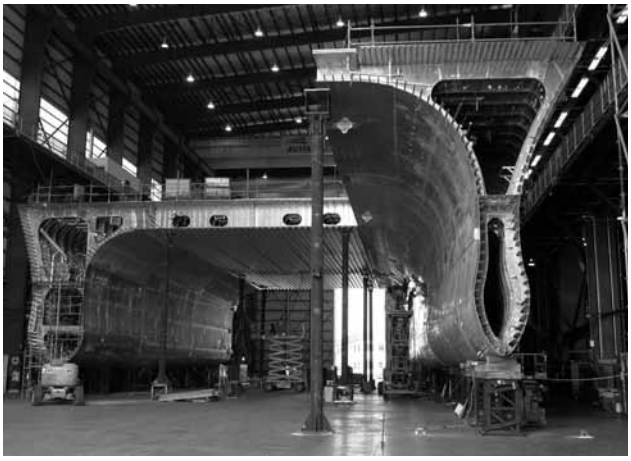
As the US Department of Defence's next-generation multi-use platform, the 103 m JHSV will provide rapid intra-theatre deployment/transportation of personnel, equipment and supplies. The vessel will support military logistics, sustainment and humanitarian-relief operations and will be capable of speeds up to 43 knots. Proof of the value of this program for humanitarian efforts was evidenced in January 2010 when the Austal-built 113 m aluminum catamaran, *Huakai*, was successfully deployed to transport members of the US Army's Transportation Corps from Ft Eustis, Virginia, along with their equipment, to Haiti following the earthquake which devastated that region less than two weeks prior to *Huakai's* arrival.

US Navy Program Manager, Capt. George Sutton, said "The start of JHSV 2 represents the first Navy/MSC ship and the start of serial production. Serial production is the key to program stability, affordability and efficiency for the shipbuilder and the taxpayer."

Spearhead is the first Austal design to be constructed using the new procedures and processes developed in conjunction with cost savings and reduced lead times.

Austal USA President and Chief Operating Officer, Joe Rella, commented "Since the beginning of the year, Austal has added over 800 employees to our staff of shipbuilding professionals. Our workforce is well positioned to start construction on this second JHSV."

The Austal JHSV will transport medium-size operational units with their vehicles, or reconfigure to provide troop



Spearhead (JHSV 1) under construction at Austal's US shipyard
(Photo courtesy Austal)

transport for an infantry battalion, allowing units to transit long distances while maintaining unit integrity. The vessel also supports helicopter operations and has a slewing vehicle ramp on the starboard quarter which enables the use of austere piers and quay walls, common in developing countries. A shallow draft (under 4 m) will further enhance theatre port access.

The Austal JHSV team includes platform systems engineering agent, General Dynamics Advanced Information Systems, who 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 USA is also currently building a second Independence-class 127 m Littoral Combat Ship (LCS) for the US Navy, *Coronado* (LCS 4). *USS Independence* (LCS 2) is currently being put through trials by her crew after the US Navy officially took delivery in December 2009 and she was commissioned earlier this year in January 2010. As prime contractor, Austal is in the process of completing final proposal revisions for the next LCS 10-ship contract which should be competitively awarded by the US Navy before the end of the year.

Austal's Contract for JHSV 4 and 5

Austal announced on 13 October that the US Navy was exercising its contract option to order the fourth and fifth vessels of the U.S. Department of Defense's next-generation multi-use ship, the Joint High Speed Vessel (JHSV), as part of a program potentially worth over $US1.6 billion. Austal received funding previously from the Navy, valued at $US99 557 548, to acquire long lead-time material, to include diesel engines, waterjets and reduction gears, for these two vessels in June 2010. The additional work is valued at approximately $US204.6 million.

Austal USA's President and Chief Operating Officer, Joe Rella, remarked "The full award for the fourth and fifth JHSVs further demonstrates the Navy's commitment to the program and their confidence in our performance. I am proud of our shipbuilding team and look forward to the continued success of this program."

As prime contractor, Austal was awarded the construction contract for the first 103 m JHSV in November 2008, with options for nine additional vessels expected to be exercised between FY09 and FY13.

HMA Ships *Manoora* and *Kanimbla* 'grounded'

Information provided to the Chief of Navy by the Landing Platform Amphibious (LPA) Seaworthiness Board, an independent body which provides robust governance advice to the Chief of Navy, about platform seaworthiness and potential risks associated with operating the two ships has resulted in an "operational pause" being initiated for the Navy's two LPAs, HMA Ships *Manoora* and *Kanimbla*, from the end of September.

The Chief of Navy, Vice-Admiral Russ Crane AO, CSM, RAN, said that while the decision to keep both ships alongside is precautionary, the safety of those on board must come first.

"Our LPAs are a key element of Navy capability but, if their operation has potential to impact on safety, then this must be

HMAS *Manoora*
(Photo John Jeremy)

HMAS *Success*
(Photo John Jeremy)

addressed quickly and openly," VADM Crane said.

Specialist engineers and the Navy's Sea Training Group will now carry out a closer inspection of each ship's engineering systems, maintenance arrangements and general condition, to ensure that they can be operated safely and effectively to meet national requirements.

"We will make every effort to get both ships back to sea as soon as possible," Vice-Admiral Crane said. "But we won't be cutting corners. While I acknowledge the significant effort to improve the state of the LPAs during 2010, the ships will now remain alongside until I am convinced that potential problems highlighted by the LPA Seaworthiness Board have been addressed."

HMA Ships *Manoora* and *Kanimbla* will remain alongside in Sydney until given the all clear.

HMAS *Success* Conversion to Double-hull Configuration

It was announced on 8 October that the Department of Defence had selected ST Marine as the preferred tenderer to convert the Royal Australian Navy tanker, HMAS *Success,* to be double hulled.

ST Marine represented the best value for money and the shortest time out of service. The work will be carried out in Singapore, where the ship has a scheduled visit while on deployment in Asia, and involves the double hulling of HMAS *Success* to meet International Maritime Organisation standards for environmental protection against oil spills.

ST Marine's tender came in under budget. As a result, funds saved on this project will be re-directed towards the priority repair and maintenance work required on HMAS *Kanimbla* and HMAS *Manoora*, for which a precautionary operational pause was recently initiated by the Chief of Navy. This work will occur concurrently at Garden Island, Sydney.

Overseas companies were allowed to bid for the work in HMAS *Success* as:

- this is a one-off project — work of this type will never again be carried out in Australia; and
- no Australian company had ever undertaken work of this type.

The on-going repair and maintenance of Navy ships happens in Australia and will stay in Australia. This includes the regular and on-going repair and maintenance of HMAS *Success*.

This year Defence will spend approximately $79 million on ship repair and maintenance in the Sydney region. Next year Defence has budgeted to spend $81 million on ship repair and maintenance in the Sydney region. Next year Defence will also issue tenders for five-year contracts for the repair and maintenance of Navy ships at Garden Island. This work will all occur in Australia and is worth about half a billion dollars over the five years.

These long-term contracts will provide more security for Australian businesses and more job security for their workforce.

HMAS *Newcastle* Maintenance Contract

The Defence Materiel Organisation announced on 14 October that it had signed a multi-million dollar contract with Thales Australia for the scheduled repair and maintenance of HMAS *Newcastle*.

The contract is worth approximately $8.7 million and is anticipated to engage of the order of 100 Thales personnel, with further support from subcontractors.

Austal Purchases Systems Integrator, ATI

Austal announced on 8 November that agreement had been reached to acquire the Canberra-based company, Australian Technology Information Pty Ltd (ATI).

ATI is an Australian company which provides specialised services to the Australian Defence Forces including systems engineering and integration, information technology, verification and validation systems and deployable tactical command centres. In financial year 2010, ATI turnover totalled A$ 6.1 million.

Commenting upon the acquisition, Austal Chief Operating Officer, Andrew Bellamy, said "ATI has developed a very successful business in providing state-of-the-art systems engineering and associated technologies to the Australian Defence Forces."

"These technologies are an ideal complement to Austal's existing design and production capability in the defence sector and will allow Austal to expand the range of services and products that it can deliver to defence customers worldwide".

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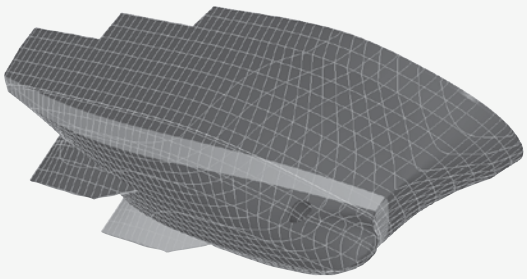
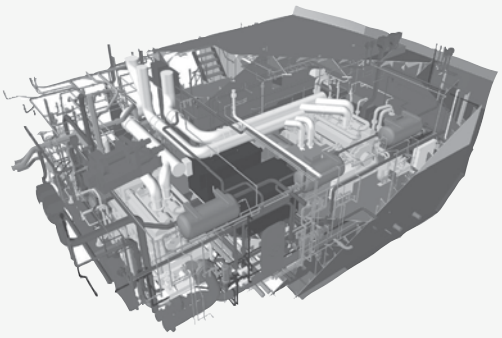


ShipConstructor offers shipbuilders a complete detailing and production solution for all zones and systems within a ship including structure, equipment layout, piping, and HVAC. The 3D product model is tightly coupled to production output which reduces re-work and most importantly, reduces man-hours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



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Boatspeed Takes another World Record

On 24 August, Sidney Gavignet onboard *Oman Air Majan* crossed the finish line off Lizard Point, Cornwall, UK, to smash the single-handed Round Britain and Ireland record. The A100 trimaran, built by Boatspeed at Gosford, NSW (see *The ANA*, May 2010), set the new record at 4 days 15 h 9 min 47 s, breaking the existing record held by Thomas Coville on board *Sodeb'O*, also built by Boatspeed, by a massive 1 day 15 h 30 min 44 s.

Skipper, solo Frenchman Sidney Gavignet, needed to maintain an average speed of over 11.86 kn in order to break *Sodeb'O*'s record. However, he maintained an amazing average speed of 16.08 kn for the 1787 n mile course, also beating the existing fully-crewed record time set by Steve Fosset onboard *PlayStation* of 4 days 16 h 9 min 54 s, by 1 h 7 s.

In his circumnavigation, Sidney tackled huge low-pressure systems and *Oman Air Majan* saw squalls of over 40 kn. This is the first major test for *Oman Air Majan* ahead of the Route du Rhum race in November. For the first time, the Route du Rhum will be open to G-class multihulls—the G stands for giant (30-plus metres in length)—and the race is single-handed across 3500 n miles of Atlantic Ocean from Saint Malo, France, to Pointe à Pitre, Guadeloupe.

Principal particulars of *Oman Air Majan*, designed by Nigel Irens/Benoit Cabaret (Nigel Irens Design, UK) are

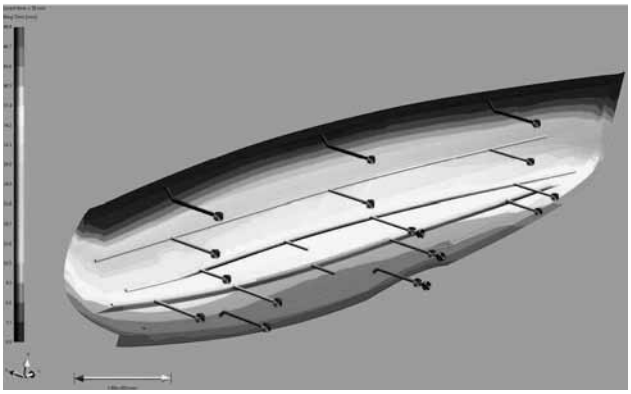
Length	32.00 m
Beam	16.50 m
Largest Sail	550 m²

Oman Air Majan built by Boatspeed
and single helmed by Sidney Gavignet
(Photo courtesy Lloyd Images/Oman Sail)

Buizen 52 Hull Infusion

Mastercraft Marine Pty in Sydney builds the well-respected Buizen Pilot House yachts. The established 48 model has now been joined by a new and exciting 52, and there is also a plan to extend the range to encompass a 60. Peter Lowe Design has come up with a modern but evolutionary design for this new sailboat.

EMP Composites (composite design and processing consultants) assisted the naval architects to optimize the structural laminates of the hull and deck in response to Buizen's desire to get into closed moulding for the first time. While meeting the requirements of the European Recreational Craft Directive and its CE mark to Category A under International Standard ISO12215, the composite laminates also needed to be optimized for EMP's processing specialty, vacuum resin infusion.



RTM-Worx resin flow simulation
(Image courtesy EMP Composites)

Lachlan Welch managing the array of infusion lines
feeding resin through the balsa core and fabric.
(Photo courtesy EMP Composites)

EMP undertook flow simulations using its in-house RTM-Worx software from Polyworx, backed up by permeability trials of test panels reproducing the actual production laminates in its Sydney workshop. Concurrently Lachlan Welch, EMP's Senior Applications Engineer, ran a training program with Buizen's shipwrights, setting up the hull mould for the first infusion and advising on correct handling of the FGI materials which were used throughout the construction.

The infusion of the two hull shell halves was a success. The Saertex stitched fabrics consolidated very well with excellent wet-out from less than 300 kg of tailored FGI SPV infusion vinylester resin over DIAB end-grain balsa core material in each hull half-shell. Low-shrink SPV tie-coat resin also ensured very good surface cosmetics.

Buizen's Steve Howe was very pleased with the results, endorsing the systematic approach taken by EMP's engineers while working alongside the builder's workforce to clearly define the overall combination of composite design, materials selection and process optimization.

Starboard side of hull infusion completed
(Photo courtesy EMP Composites)

Hull out of the mould
(Photo courtesy EMP Composites)

Rendering of the completed Buizen 52
(Image courtesy Buizen Yachts)

Research on Keel Loads

EMP Composites is an active ongoing partner with the University of New South Wales conducting various research projects in composites. Raju Raju is a PhD Student at the University of New South Wales in the School of Mechanical and Manufacturing Engineering. He is presently writing up his thesis on his findings from his research project being conducted at the university and at EMP.

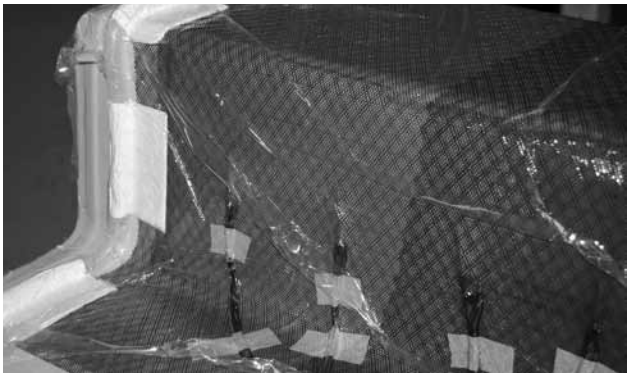
Since ballast keel stresses on sailing yachts have always been a topic of much concern, EMP has continued their support of an extensive research project to investigate the failure mechanisms of marine composite joints, specifically top-hat stiffeners for keel structural attachments.

One of the aspects being researched is the out-of-plane load transfer mechanism for which a secondary reserve strength has been identified. State-of-the-art non-destructive evaluation techniques are being incorporated to assess the failure initiation and progression using acoustic emission and embedded fibre-optic sensors in the laminate.

Industry-standard specimens were manufactured at EMP where a novel technique to embed the optical-fibre strain gauges in curved composite joints is being developed by Raju. Coupons with different layup configurations have been manufactured using both hand layup and the vacuum resin-infusion process to obtain the mechanical properties of the materials.

When the curved composites were subjected to flexure load, they suffered delamination failure due to critical interlaminar stress. Non-linear finite-element analysis was used to conduct the progressive failure analysis using interface elements. This resulted in the optimisation of the stiffener design and laminate layup configuration. A number of research papers have been published from this work.

Lachlan Welch and Raju Raju infusing the test prototype
(Image courtesy EMP Composites)



Infused fibre-optic sensors positioned in strategic
potential stress areas
(Image courtesy EMP Composites)

Kilimanjaro III from Incat Crowther

Incat Crowther have been contracted to design a third 37 m catamaran passenger ferry for Coastal Fast Ferries of Tanzania, Africa. To be built by Richardson Devine Marine (RDM) in Hobart, *Kilimanjaro III* will build on the experienced gained in the successful operation of sisterships *Kilimanjaro I* and *Kilimanjaro II*, previously designed by Incat Crowther for Coastal Fast Ferries.

Kilimanjaro I and *II* are significantly larger vessels than any fast ferries which have been deployed on the Zanzibar–Dar Es Salaam route, yet the vessels are nearly always running at full capacity. Needless to say, the operator is extremely happy with the success of these vessels and has been working with Incat Crowther and RDM to develop a vessel which can take further advantage of the operation's revenue-making potential.

Kilimanjaro III's two significant enhancements are increased passenger capacity and new-generation hullform which offers increased efficiency and improved seakeeping. The result is a vessel which will carry more passengers at less cost per passenger to the operator. As well as supplementing the operational capacity on the Zanzibar–Dar Es Salaam run at a higher service speed, Coastal Fast Ferries plans to use the vessel to expand their operation by extending the route to the island of Pemba. *Kilimanjaro III* is specifically suited for this added offshore work.

Taking advantage of its increased beam, *Kilimanjaro III* will carry 558 passengers in a mix of seating levels and styles. The main passenger deck features 249 economy-class seats, with those nearest the aft kiosk equipped with tables. The aft end of the main deck has been reconfigured with a larger luggage room, located directly adjacent to the side crew ramps to speed up turnaround.

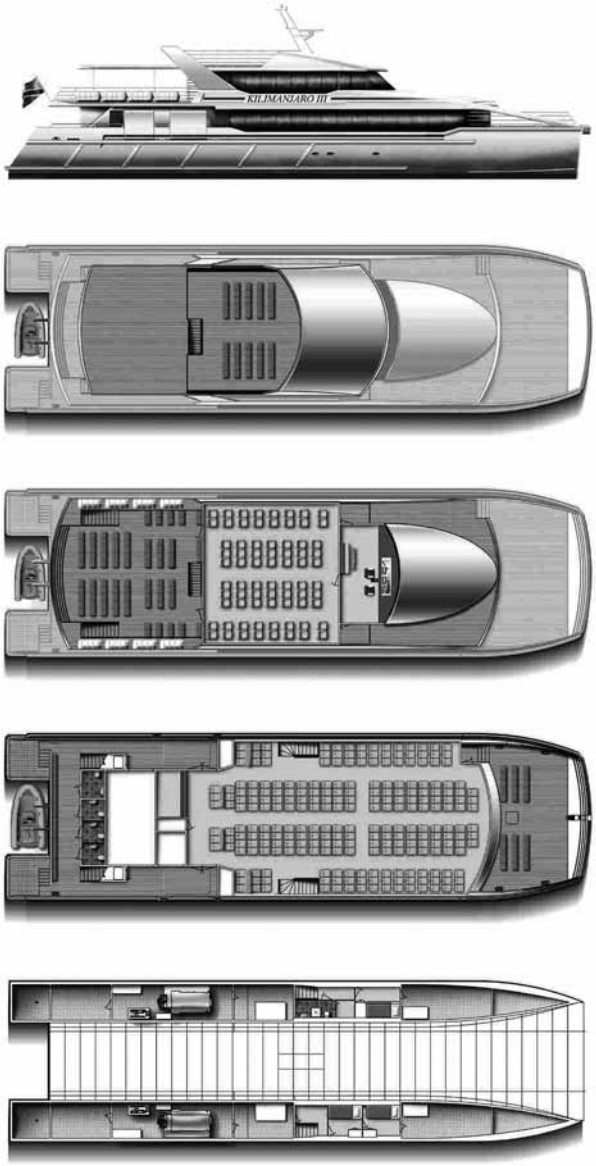
The upper deck has outdoor seats for 107 passengers. Amidships there is a first-class cabin with 74 seats. The sundeck has seats for a further 60 passengers.

Kilimanjaro III will be powered by a pair of Cummins KTA50 engines, each producing 1340 kW, and will have a service speed of 30 kn.

Incat Crowther is pleased to continue its relationship with Coastal Fast Ferries and believes that the growth in business is a result of the company's attention to client service and adding value to the client's operation.

Principal particulars of *Kilimanjaro III* are

Length OA	38.1 m
Length WL	37.3 m
Beam OA	10.5 m
Depth	3.65 m
Draft (hull)	1.1 m
Draft (prop)	1.8 m
Passengers	558
Fuel oil	6000 L
Fresh Water	1500 L
Sullage	1500 L
Main Engines	2×Cummins KTA50 each 1340 kW @ 1900 rpm
Propulsion	2×propellers
Generators	2×Cummins 170 kVA 50 Hz 1×Cummins 17 kVA 50 Hz
Speed (service)	30 kn
Construction	Marine-grade aluminium
Survey	USL Code/NSCV Class 1C
Flag	Tanzania



General arrangement of *Kilimanjaro III*
(Drawing courtesy Incat Crowther)

38 m Catamaran Motor Yacht from Incat Crowther

Incat Crowther was contracted for the design of a 38m catamaran motor yacht (see *The ANA*, November 2008), which is now under construction at Sabre Catamaran's shipyard in Perth, WA. The vessel's sleek lines, which are the result of collaboration with Waterline Yacht Design, feature a stylish mix of modern and motor-yacht styling cues.

All major aluminium work has been completed, as has hull fairing. Fit out of the vessel's interior is well underway, with an anticipated launch early in 2011.

When complete, the vessel will be an impressive motor yacht which makes great use of the catamaran platform to create a spacious and comfortable long-range cruiser.

The vessel will be powered by a pair of MTU 12V4000 engines and will cruise at 25 kn, with long-range capabilities

in excess of 3500 n miles at lower speeds. Inside, it will feature luxuries such as a large central entrance foyer, king-sized guest staterooms and a gymnasium.

Principal particulars of the new vessel are

Length OA	37.5 m
Length WL	35.5 m
Beam OA	10.3m
Depth	3.6m
Draft (max)	1.5m
Guests	10
Crew	4
Fuel oil	50 000 L
Fresh water	4 000 L
Sullage	900 L
Main Engines	2×MTU 12V4000 M71 each 1850 kW @ 2000rpm
Propulsion	2×propellers
Speed (cruise)	25 kn
Speed (max.)	29 kn
Construction	Marine-grade aluminium
Flag	Cayman Islands
Class/Survey	Lloyd's Register/MCA LY2

Aft end of Incat Crowther's 38 m motor yacht under construction at Sabre Catamarans (Photo courtesy Incat Crowther)

Forward end of Incat Crowther's 38 m motor yacht under construction at Sabre Catamarans (Photo courtesy Incat Crowther)

30 m Catamaran Ro-Pax Ferry from Incat Crowther

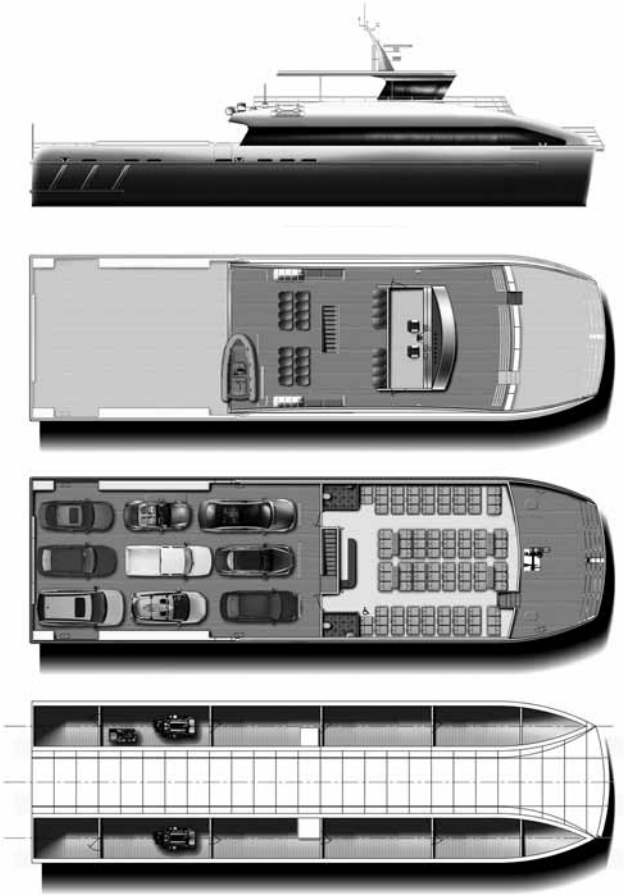
Incat Crowther has been contracted by Bodrum Express for the design of a 30 m catamaran ro-pax ferry which will carry 100 passengers and 9 vehicles for operation in Turkey. The vessel has been designed in response to a growing trend towards efficiency at modest speed, and represents a new generation of ro-pax ferry which is simple and cost-effective in both construction and operation.

The vessel features an aft vehicle deck with stern ramp. The main passenger cabin features 100 seats, two bathrooms and a bar. There is also luggage storage under the stairs to the upper deck. The upper deck features a walk-around wheelhouse with direct foredeck access, a rescue tender and 24 outdoor seats.

The vessel will also feature Incat Crowther's new-generation hullform, as proven on Incat Crowther's latest workboats and now filtering through into Incat Crowther's ferry range. The result of the development work on this hullform speaks for itself, with recent launchings like *Limitless* and *James Grant* setting new benchmarks for speed and efficiency.

Twin Doosan 4V222TI main engines, each producing 647 kW, were chosen for their low capital outlay and efficiency. The vessel will have a service speed of 23 kn @ 85% MCR. Top speed will be 25 kn. The vessel will be classed by Registro Italiano Navale.

Further enhancing Incat Crowther's contribution to the value of the project, the vessel has been designed with a dual-purpose platform. The vessel has been optimised to have commonality with future passenger-only vessels. The passenger-only vessels will be identical in many areas, including machinery, ventilation, wheelhouse and electronics configuration and performance. This approach will reap benefits, initially in construction costs, and then in operation with reduced maintenance and inventory complexity. This project demonstrates Incat Crowther's



General arrangement of 30 m catamaran ro-pax ferry for operation in Turkey (Image courtesy Incat Crowther)

continued evolution and improvement of their products and services.

Principal particulars of the new vessel are

Length OA	30.5 m
Length WL	29.9 m
Beam OA	8.75 m
Depth	3.45 m
Draft (hull)	1.10 m
Draft (prop)	1.70 m
Passengers	100
Cars	9
Fuel oil	3000 L
Fresh water	1000 L
Sullage	1000 L
Main engines	2×Doosan 4V222TI each 647 kW @ 2100 rpm
Propulsion	2×propellers
Generators	1×Caterpillar C4.4
Speed (service)	23 kn
(max.)	25 kn
Construction	Marine-grade aluminium
Flag	Turkey
Class/Survey	RINa/C + Ro-Ro Passenger Ship

30 m Monohull Crewboats from Incat Crowther

Incat Crowther have been awarded a contract to design two 30 m aluminium monohull crewboats for service in Nigeria. Incat Crowther's brief is to design vessels which are easy to construct and robust in operation with simple systems, in line with the demands of the region.

To be built by Cape Town-based Veecraft Marine, the project represents the start of a new collaboration between Incat Crowther and the South African shipyard.

Each vessel will feature a large working deck with guard rails. Available cargo space will be nearly 80 m^2. The main passenger cabin features doors forward and aft. There is a toilet and luggage rack aft, and comfortable seats for 30 passengers. The forward cabin doors lead directly to the bow transfer station, protected by handrails, which allows safe, direct transfer to oil rigs. The wheelhouse features both forward and aft control stations with excellent visibility.

Profile of 30 m monohull crewboats for operation in Nigeria
(Image courtesy Incat Crowther)

The vessels will each be powered by three Caterpillar C32s, each producing 1080 kW. Propulsion will be by three fixed-pitched propellers. Loaded service speed will be 25 knots.

Principal particulars of the new vessels are

Length OA	30.0 m
Length WL	29.0 m
Beam OA	7.0 m
Depth	3.5 m
Draft hull	1.5 m
propeller	2.1 m
Deck cargo capacity	10 t
Crew	6
Special personnel	30
Fuel oil	20 000 L
Fresh water	10 000 L
Sullage	3000 L
Main Engines	3×Caterpillar C32 (C rating) each 1080 kW @ 2300rpm
Propulsion	3×propellers
Generators	2×Caterpillar C4.4 86 kVA
Speed (service)	25 kn
(max.)	30 kn
Construction	Marine-grade aluminium
Flag	Nigeria
Survey	Bureau Veritas
Notation	✠ HULL MACH Crew Boat Coastal Area

20 m Crewboat from Incat Crowther

Incat Crowther have been awarded the contract to design a 20 m monohull crewboat to be built by VeeCraft Marine in South Africa. The new design will bolster Incat Crowther's range in this exciting new sector of the marine industry.

The vessel is characterised by a large foredeck, which has 27 m^2 of cargo space. The bow features a passenger-boarding area for safe and efficient transfers to offshore factilites. A dedicated passageway is located on the port side, directly accessing the main passenger cabin. This cabin has comfortable seating for 25 passengers and a bathroom. There is a rescue zone situated over the large aft platform. Below decks, the vessel has four crew berths, a galley, mess and a bathroom.

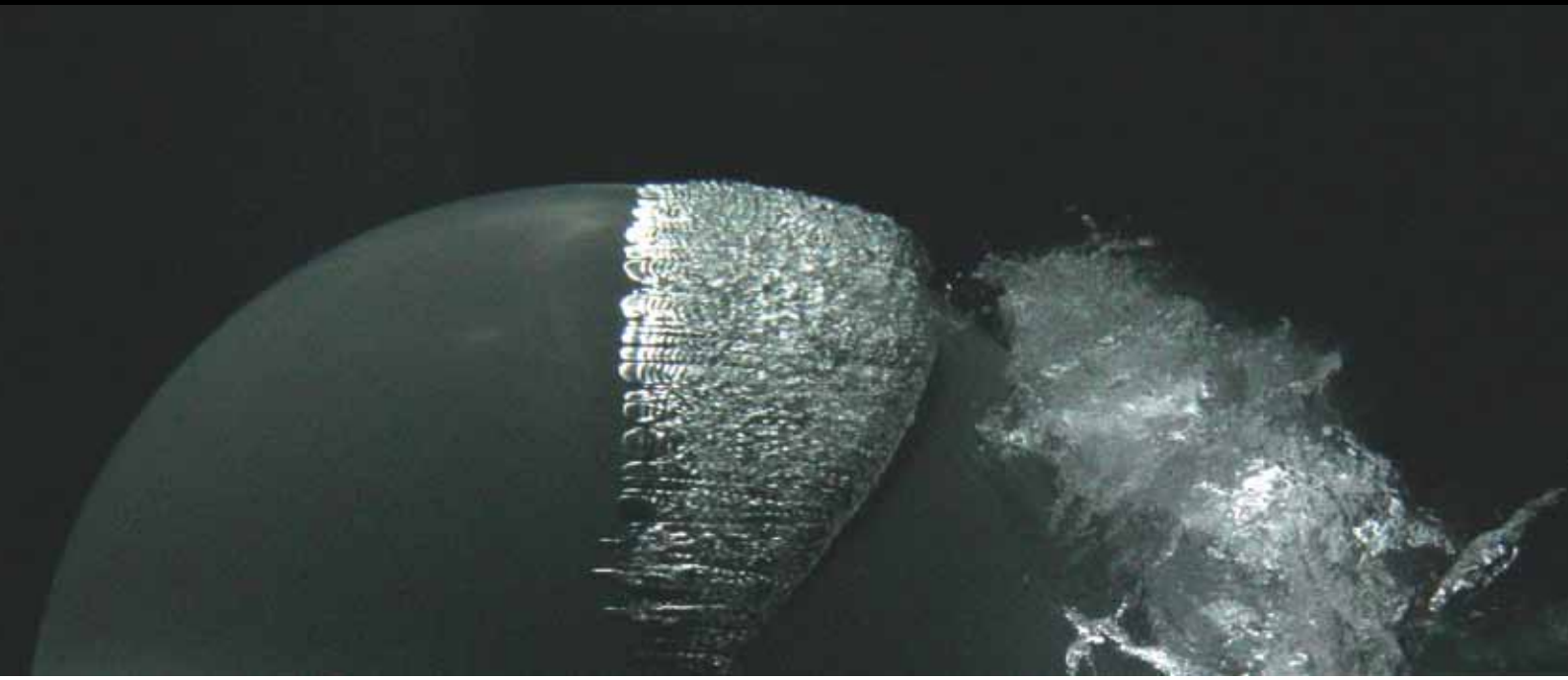
The vessel will be powered by a pair of MAN 284 LE 413 main engines, each producing 746 kW @ 2100 rpm. The vessel will have a loaded service speed of 25 kn and a maximum speed in excess of 30 kn.

Principal particulars of the new vessel are

Length OA	19.2 m
Length WL	18.5 m
Beam OA	5.5 m
Depth	3.0 m
Draft hull	1.1m
Passengers	25
Crew	4
Fuel oil	5200 L
Fresh water	1300 L
Sullage	300 L
Main Engines	2×MAN 284 LE 413 each 746 kW @ 2100 rpm
Propulsion	2×Hamilton HM521 Waterjets
Generator	1×Perkins 4.4gM 48 kVA
Speed (service)	25 kn
(max.)	30 kn
Construction	Marine-grade aluminium

AUSTRALIAN MARITIME COLLEGE

NATIONAL CENTRE FOR MARITIME ENGINEERING AND HYDRODYNAMICS



Postgraduate Opportunities in Cavitation Research

AMC is seeking applications from engineering, science and mathematics graduates for postgraduate programs from 2011 within the newly developed Cavitation Research Laboratory (CRL). Research within the CRL ranges from basic cavitation physics through to applied work involving naval platforms and high-speed ships. Several PhD programs are available in leading areas of cavitation research supported by industry, government or AMC sponsorship with annual scholarships from $32,500.

Cavitation Research Laboratory

The CRL has been developed to provide new insights and opportunities in cavitation research making use of the latest experimental capabilities combined with modern instrumentation including high-speed photography and laser based diagnostics. The CRL has two experimental facilities; the Cavitation Tunnel (CT) and the Bubble Dynamics Chamber (BDC). The CT is a variable pressure water tunnel for the study of cavitating and bubbly viscous flows and is the major CRL facility. The BDC is a pressure vessel for the study of small scale bubble dynamics in a non-flowing liquid volume. The CRL has been developed in collaboration with the Australian Department of Defence, Defence Science and Technology Organisation as a key strategic research provider in subsea and surface platform performance.

Programs on offer include:

- Super-cavitating hydrofoils for motion control of high-speed ships
- Hydro-elastic behaviour of hydrofoils
- Cavity-boundary layer Interaction
- Propeller cavitation inception

For more information visit

www.amc.edu.au/news/postgraduate-opportunities-cavitation-research or contact Professor Paul Brandner on (03) 6324 9832.

1226

Flag	Nigeria
Class	Bureau Veritas ✠ HULL MACH Crew Boat Sea Area 2

In total, Incat Crowther currently has over 30 vessels under construction across a wide range of uses, including 10 offshore energy service vessels. The diversity of these products is proof of Incat Crowther's attention to its clients. These clients all have varying operational requirements, budgets and business structures, and Incat Crowther has worked closely in all cases to provide the optimum solution for each client's requirements.

Stewart Marler

BCTQ Activity

AWD Support

BCTQ are providing production support for the $8 billion air-warfare destroyer project for the Royal Australian Navy. The construction of the Hobart-class air-warfare destroyers (AWDs) is one of the most significant shipbuilding projects undertaken in Australia. The AWDs will be constructed using a block build method, and BCTQ production support will involve 3D modelling, finite-element calculations and detail design drawings for lifting and manoeuvring of the blocks.

Jack-up Barge

Manufacturing has been completed on BCTQ's most recent jack-up barge. BCTQ prepared the designs and specifications for this jack-up barge, including survey authority drawings, machinery and jacking arrangements. BCTQ developed a new spud jacking system for this project using 3D modelling and FEA analysis. The hydraulically-controlled jacking system will allow the barge to operate as both a floating and elevated work platform. It is to be used for pile driving and marine excavations around the Australian coast and inland waterways.

Movie Screen for *Pacific Jewel*

Carnival Cruise Lines Australia approached BCTQ with plans to install a large movie screen on the top deck of their cruise liner, *Pacific Jewel*. BCTQ assisted with the design by constructing a 3D model and conducting a finite-element analysis on both the existing structure and the new support structure. As the screen will be a permanent structure, the structural integrity was assessed under loads due to ship motions and wind loads in accordance with Lloyds Rules. Construction drawings were prepared to assist with production, and for submission to class for approval. The influence on ship stability due to the addition of the screen has also been assessed and a report prepared.

HMAS *Success* Rudder Stock

BCTQ has provided the design of a classification-society-approved approved rudder stock, pintle, bearings and housing. The rudder design is for the fleet underway replenishment ship, HMAS *Success,* and is to Bureau Veritas classification. The BCTQ design is currently being manufactured and installation will begin later this year. The entire design package for installation was developed in-house and included:

- Detail ripout and installation drawings
- Casting and machining drawings
- Detailed design report
- Installation specification
- Test and trials procedure
- Finite-element analysis of the new design

Licensee for Mariner Software

BCTQ are now the licensee for Mariner 4.2, an onboard software program designed to assist in routine loading calculations. Mariner 4.2 is approved by Lloyd's Register as a loading instrument. Once installed, the operator can quickly assess intact stability and longitudinal stress based on any tank condition and cargo configuration. Mariner 4.2 is currently installed on several vessels, including P&O research vessels *Southern Surveyor* and *Southern Supporter*. Mariner is also the preferred loading instrument for the Royal Australian Navy.

BCTQ News Update, October 2010

Cruising in NSW

After the winter quiet, with only *Pacific Jewel* and *Pacific Sun* working out of Sydney, the summer season got under way in October with additional visits to Sydney by *Dawn Princess, Rhapsody of the Seas*, *Sun Princess,* and *Sapphire Princess*. November moved into a higher gear, with visits by these vessels plus *Volendam, Orion*, *Christmas Decorations, Amsterdam, Seven Seas Navigator,* and *Pacific Venus*. Vessels berthing regularly at the Overseas Passenger Terminal at Circular Quay are a sure sign that the summer cruise season is under way.

Phil Helmore

Changes Ahead for the Royal Navy

The British Government recently announced a series of cuts to defence spending which will have a considerable effect on the future shape of the Royal Navy.

Britain's nuclear deterrent, the Trident Force, based around the four Vanguard-class submarines, one of which is always on patrol, will continue.

Construction of the two Queen Elizabeth-class aircraft carriers is continuing to give the UK political and military flexibility in responding to crises. The ships will routinely have 12 Joint Strike Fighters (F35), plus helicopters embarked for operations. The aircraft's 594 n mile range over land and sea will enable it to carry out a broad range of missions.

The Royal Navy will be equipped with 19 frigates and destroyers to protect a naval task group and meet the UK's standing commitments at home and overseas. These will include six new Type 45 destroyers and new Type 26 frigates. This force, though smaller than currently, will provide military flexibility and choice across a variety of operations from full-scale warfare, through coercion and reassurance, to presence and maritime security (in particular protecting trade and energy supplies).

Seven new Astute-class nuclear submarines will contribute to the protection of the nuclear deterrent and naval task groups.

The Royal Marines will be able to land and sustain a commando group by helicopter, and with protective vehicles, logistics, and command and control support from a specialist landing and command ship.

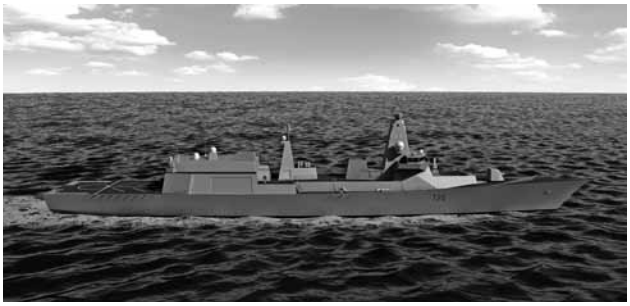
In order to meet this new structure the Royal Navy will:

The two new aircraft carriers, HMS *Queen Elizabeth* and HMS *Prince of Wales*, under construction for the Royal Navy have survived recent defence cuts
(Image courtesy BAE Systems)

- reduce Royal Navy Service personnel by around 5000 to a total of about 30 000 by 2015, and with an assumption, for now, of a requirement of about 29 000 by 2020;
- decommission the aircraft carrier HMS *Ark Royal* immediately;
- decommission either the helicopter landing ship HMS *Ocean* or the aircraft carrier HMS *Illustrious* following a short study of which would provide the most-effective helicopter-platform capability, and place one landing and command ship at extended readiness;
- decommission four frigates and a Bay-class amphibious support ship, and
- rationalise the Royal Navy estate.

The third Type 45 destroyer, HMS *Diamond*, sailing from the Clyde in September for handover to the RN
(Photo courtesy BAE Systems)

Construction progress on Lower Block 03 of the future *Queen Elizabeth* at Govan in October
(Photo courtesy BAE Systems)



An impression of the future Type 26 frigate
(Image courtesy BAE Systems)

EDUCATION NEWS

Australian Maritime College

First Year Rat-trap Boat Race

Just when you thought a rat-trap boat couldn't get any faster the 2009 race record has been smashed. AMC's Rat-trap Boat Race is an annual event for first-year engineering students enrolled in Dynamics. Teams of students are asked to design their own boat powered by a rat trap using any material but which must fit within a 1 m × 1 m × 0.5 m rule. The models have continued to improve each year, with this year's winning design achieving a time of 10.38 seconds over 10 m, eclipsing last year's time by 7.74 seconds. The winning team received RINA wall clocks, donated to the event by the Tasmanian Section of RINA.

A rat-trap boat being prepared
(Photo courtesy AMC)

The winning team
(Photo courtesy AMC)

AMC Accreditation

The National Centre for Maritime Engineering and Hydrodynamics underwent an external accreditation review by Engineers Australia of its three maritime engineering programmes. A site visit was made by the panel in April 2010 and the draft recommendation was confirmed by the Australian Engineering Accreditation Centre at its Board Meeting in August 2010. Continuing full accreditation was accorded through to the intake of students in the first semester of 2016 for the Bachelor of Engineering programmes in Naval Architecture, Ocean Engineering, and Marine and Offshore Systems. This accreditation includes ongoing programme development over the accreditation period.

Research

A flavour of the research in the National Centre is given by the following recent project descriptions:

Funded by an ARC Linkage Project with the industry partner Liquid Time Ltd., a patented circular wave pool is being tested as an innovative "perpetual" wave-surfing pool. The picture shows a view of the model set up in AMC's Model Test Basin. The tests are aimed at assessing the effectiveness of the pool as a perpetual wave surfing site.

A model of the wave surfing pool under test in the model test basin at AMC
(Photo courtesy AMC)

A final-year project student, David Harte, worked with Incat Tasmania owner, Robert Clifford, and Revolution Design engineers on a high-speed paddle-propulsion system. The 8 m long test vehicle reached speeds of 30 knots.

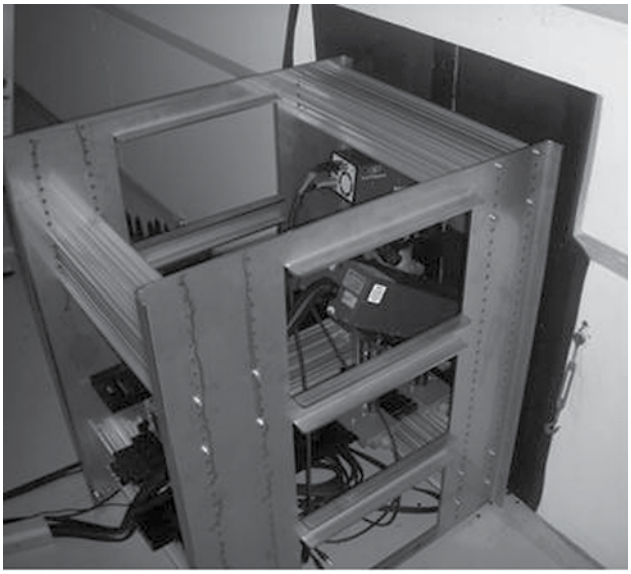
Incat Tasmania's paddle test boat
(Photo courtesy AMC)

PhD student Alan Fleming is working with industry partner OceanLinx on characterising the flows inside a design of their oscillating water column wave energy system. The aim is to reduce energy losses within the water column.

Bluefin's First Trip to the Wild South West

Bluefin has seen a lot of Australia but, recently, AMC's training vessel finally accomplished her first voyage to the world-famous natural heritage areas of Port Davey and Bathurst Harbour on Tasmania's wild south west coast.

During a series of trips for third-year maritime engineering students, *Bluefin* braved three-to-four metre swells to visit



Laser based PIV system at the AMC Towing Tank
during oscillating water column tests
(Photo courtesy AMC)

this pristine area of mountains and sheltered waterways. Whilst the 35 m long *Bluefin*, which will soon be entering her 30th year, has previously voyaged widely, including the Bass Strait islands, Pedra Blanca, and Victoria, she has never managed a trip to the south west.

On the *Bluefin* voyages, students conducted a range of activities, including mooring design and deployment, speed and manoeuvring trials, noise and vibration surveys, fish trawling and longlining, and vessel redesign. These voyages provide students with invaluable practical experience on living and working aboard a vessel.

Whilst in Port Davey the students managed some R&R, climbing to the top of Mt Beattie. They were rewarded by spectacular views over Bathurst Harbour, Mt Rugby and the Bathurst Channel.

The return leg of the voyage back to the home port of Beauty Point saw the *Bluefin* visit Port Arthur, Wineglass Bay and Eddystone Point.

Giles Thomas

Students descending Mt Beattie
(Photo Giles Thomas)

Bluefin under Mt Rugby at Bathurst Harbour
(Photo Giles Thomas)

Maritime Engineering Technical Forum and Reunion Dinner

The National Centre for Maritime Engineering and Hydrodynamics held a very successful technical forum and reunion dinner on Friday 5 November 2010. More than 80 delegates attended the conference, which was held in the AMC Auditorium, with over 30 representatives from industry making the trip to AMC for these events. The technical forum commenced with a formal welcome by AMC Principal, Prof. Malek Pourzanjani. The Technical Chair for the proceedings was Mr John Seaton. The list of speakers included Dr Hayden Marcollo of AMOG, Dr Yuriy

Drobyshevski of Intecsea, Dr Paulo de Souza of CSIRO ICT Centre, Dr Jane Sargison of the University of Tasmania, Mr Glen Seeley of AMSA and Mr Stuart Ballantyne of Sea Transport Solutions.

The Reunion Dinner was held in the Tailrace Function Centre in Launceston and was attended by approximately 100 people. A very informative and interesting speech on the history of the AMC Bachelor of Engineering degree was delivered by Dr Stan Gottschalk, who was instrumental in its development. The success of those graduates in attendance in their respective careers was clear evidence of how far this degree has come in a relatively short timeframe. Those in attendance were also able to view an amusing slide show of more than 650 photographs of AMC students, and past and present staff, covering the past 25 years.

Both events were organised by the National Centre for Maritime Engineering and Hydrodynamics to celebrate the 30th anniversary of AMC and the 25th year since the commencement of the AMC Bachelor of Engineering degrees in maritime engineering and naval architecture.

A brief summary of the papers presented at the conference follows:

***Innovation in Ultra-deep Water* — Dr Hayden Marcollo, AMOG Consulting**

Hayden's presentation discussed the three main drivers of innovation in ultra-deep water, these being, basic science, enabling technology and enhancing technology. These drivers come primarily from large oil and gas companies, companies selling facilities to oil and gas companies as well as government co-operative joint ventures both here in Australia and overseas in such countries as the USA, Brazil, Norway and France.

One of the present innovations being driven by industry is the effect of vortex-induced vibration in ultra-deep water. Industry is presently trying to understand the basic science of what is occurring with deep-water drilling risers. The current understanding of these effects is based on responses of risers in shallow water. As a lot is still not known of the true effects of vortex-induced vibration in deep water, so a large amount of conservatism has been placed on designs to account for these unknowns.

Hayden went on to explain his involvement in research in the USA, where model experiment response results were compared against known results of vortex-induced vibration on shallow-water risers. This resulted in a fundamental change in assumptions which industry were making on what was happening with deep-water risers, with results showing that deep-water risers were experiencing the effects of travelling-wave response.

Under the driver of enabling technology, Hayden highlighted deep-water well testing as an area waiting for technology to come along. Current restrictions placed on industry by authorities limit the use of present technology in deep-water well testing, resulting in a hit-or-miss approach to the discovery of total well reserves. Enabling technology will allow the industry to flow test the well, allowing them to understand the well and therefore more accurately predict the reserve.

In the area of enhancing technology, the investigation into developing larger and more-economic steel and flexible risers was given, showing that a large number of small steps reduces associated risks and enhances technology and the overall value of the end product.

In summary, Hayden stated that easier oil is disappearing and most of the new innovation seen today is focused on deep water. It is predicted that approximately $20 billion will be invested over the next decade on new facilities and, as such, deep-water development will be a fertile area for innovation.

***Hydrodynamic Challenges in FPSO Design* — Dr Yuriy Drobyshevski, Floating Systems Group, INTECSEA**

Yuriy's paper looked at existing industry trends relating to the use of FPSOs offshore and the methods, shortcomings and challenges for a designer which lie ahead. At present (2010) there are 134 FPSOs operating worldwide with 33 under construction. Some 80 new FPSOs will be deployed in 2010–2014. In future there will be more FPSOs permanently moored in cyclonic environments. There will be FPSOs in Arctic regions and in shallow waters, e.g. SE Asia. Gas fields will call for large permanently-moored FPSs which are larger than conventional tankers — these will be purpose-built vessels (approximately 500 m × 80 m).

Some particular challenges lie in the areas of seakeeping, station keeping and compatibility with riser systems. FPSOs experience roll in ambient conditions and pitch is highest in beam seas – this impacts on riser performance, fatigue in the mooring, and causes operational accidents. Green water on deck occurs in conditions less than the design extremes and causes damage to deck structures. The mooring cost is pretty much the same as the hull cost; even so, the mooring failure rate in the North Sea is 1 in every 8.8 years. Lastly, riser compatibility – they are expensive and delicate equipment, and it is difficult to match the motions of the hull, mooring and riser in harsh environments. Both rigid and flexible risers have been used in the past.

In dealing with the challenges and summing up, Yuriy stated that hydrodynamic methods are playing an increasing role. The hull, mooring and riser have to be considered as an integrated system. Hybrid material risers and novel mooring configurations must be utilized. Finally CFD (computational fluid dynamics) is proving useful for specific problems, but not the main design tool — physical model tests continue to be used for verification and calibration.

***Smart Robots: The future of Underwater Exploration* — Dr Paulo de Souza, CSIRO, Tasmanian ICT Centre**

Paulo de Souza started his talk on underwater robotics with a video of a simulation of the Mars Rover mission. Communication from Mars to Earth takes 12–20 minutes, depending on atmospheric conditions, but even that is better than can be achieved between a ship and an underwater vehicle. True autonomy, the ability of an autonomous underwater vehicle to make intelligent decisions, is therefore highly important and this was the focus of the presentation. An explanation was also given of the types of data analysis which can be done on-the-fly to analyse what the vehicle "sees" in its underwater images.

Paulo outlined the current research focus for the CSIRO "starbug" autonomous underwater vehicle (AUV), including the following aspects: vision-based navigation and control, autonomy, human–robot interface, 3D visualisation and robot sensor network interaction.

***Teaching, Leading, Doing: The Role of the Modern Academic in Maritime Engineering* — Dr Jane Sargison, School of Engineering, University of Tasmania**

Dr Jane Sargison from the School of Engineering, University of Tasmania, presented a thought-provoking talk on what it means to be an academic educating, researching and engaging the wider university and non-university community in maritime engineering or, indeed, any branch of engineering. Jane explained that her job description right now encompasses teaching into three undergraduate units, research into Rolls Royce engines and renewable energy, and chairing the School's Teaching and Learning Committee.

From the point of view of teaching, universities are constantly changing. The biggest shift of all is in demand. This is most apparent in Tasmania where, traditionally, the university participation rate has sat at well under 10% of the general population. Due to increases in demand and a mandate from government, the goal for this figure is 40%. This equates to a ten-fold increase in undergraduate enrolments for some courses. Linked to this is the increased focus on catering for the needs of this increased demand, for example "Gen Y" expectations cannot be ignored in relation to putting everything into a "why?" perspective. Finally, the reliance on overseas full-fee-paying students is rapidly changing. UTas Engineering has traditionally had around 50% of its student body from overseas students, but with changing economic and social conditions this reliance will have to change.

When discussing research, the ideas out there are ever increasing in number and degree of excitement. The challenges are to keep up with the metrics (assessing what is good research) and also the changing role of research training. Supervising PhDs now is not about making the next generation of lecturers, but is more about making the next generation of highly-qualified R&D engineers. Finally, the culture of the university system requires academics to be actively involved in administration and community engagement.

In conclusion, Jane highlighted the challenges and opportunities for the modern academic, key areas as always are to attract and retain good students and good staff. Adjusting to demand is therefore always important.

***Professional Development and Working with the Three Other Maritime Professions* — Glen Seeley, AMSA**

Professional development was the theme for the presentation by Glen Seeley from AMSA, with a particular focus on the four major maritime professions: naval architects, master mariners, chief marine engineers, and maritime engineers. Glen commenced by outlining the global nature of the shipbuilding industry, with over 90% of new SOLAS-class ships being constructed in Asia, whilst regulators and professional organisations are largely based in the UK.

Glen then described some of the current developments in the maritime industry, including the move towards goal-based systems from prescriptive regulations and the changes to domestic-flag administration. He then outlined some of the main features of the maritime professions, for example that master mariners have had "superior responsibility" for many years but, that whilst their technical competence is lower than that of the three other engineering professions, their

Delegates at the AMC Maritime Engineering Technical Forum and Reunion Dinner, from left: Nick Browne (Lloyds Register), Greg Hansen (AMSA) and Glen Seeley (AMSA)
(Photo courtesy AMC)

Delegates at the AMC Maritime Engineering Technical Forum and Reunion Dinner, from left: Sean van Steel (AMC 4th year naval architecture student), Hayden Marcollo (AMOG) and Ashley Jones (AMC 4th year ocean engineering student)
(Photo courtesy AMC)

ultimate responsibility for the ship and its crew is very high. Glen then raised the question: In what context are the four maritime professions "equivalent"? This is particularly relevant for ship surveyors who may hail originally from any of the main four maritime professions. Glen pointed out that not all of the four maritime professions are considered equivalent by the IMO, IACS and the various Port State Control MOUs.

***Wake Up Australia* — Stuart Ballantyne, Sea Transport Corporation**

Stuart Ballantyne, from Sea Transport Corporation, gave a very interesting and thought-provoking presentation entitled *Wake Up Australia*. He said that Australian coastal shipping is in a coma, due to the unions, tax policies, the greenies, and poor port facilities. There are too many regulations for too few ships, and investors regard the Australian industry as high risk.

In Queensland the Government spends $3.1 billion on road transport, $1.2 billion on rail transport and only $365 million on ports. Stuart suggested that this ratio would be somewhat similar across the other states. However, sea transport is cheaper, and the sea doesn't need repairing, unlike roads and rail. Rail is a pipeline, and can't grow, so Stuart questioned why the governments are supporting this so strongly, rather than coastal sea transport. If a railway is blocked then the whole system becomes clogged.

Shipping is a strategically-important industry, and should be supported. Shipowners should be given subsidies if their ships could be fitted out for a second role as paramilitary vessels.

Stuart discussed the difficulties caused by environmental constraints on dredging, and suggested that these should be reduced substantially. This will have a net benefit to the environment, as seaborne transport is much more environmentally friendly than land transport, and ships can be powered by wind, whereas trucks and trains cannot.

A second registry is necessary, together with tax exemptions for seafarers working overseas. This will put the Australian industry on a level playing field with the rest of the world.

Stuart also extolled the advantages of nuclear-powered ships, and said that, at the very least, we should be discussing this. Submarines have been using nuclear power for many years without any radiation leak. He stated that the Chinese are investigating nuclear-powered containerships, and that it wouldn't be long before they do this.

Finally, Stuart gave a number of examples of projects in which his company is involved, where 'thinking outside the box' enabled him to come up with a solution which was much more economical than the traditional approaches. These included cases where he had conducted tank testing at AMC to improve seakeeping.

University of New South Wales

Undergraduate News

Graduation

At the graduation ceremony on 30 August, the following graduated with degrees in naval architecture:

Yew Jinn Chieng	H1
Tibor Corbett	H2/2
Gordon Danton	H2/2
Liam Finegan	H2/1
Matthew Fox	
Bryan Kent	
Drew van Ryn	H2/1
Konrad Zurcher	H2/1

H1	Honours Class 1
H2/1	Honours Class 2 Division 1
H2/2	Honours Class 2 Division 2

They are now employed as follows:

Yew Jinn Chieng	ASO Marine Consultants
Tibor Corbett	Evaluating opportunities
Gordon Danton	Wood & Grieve Engineers, Sydney
Liam Finegan	Evaluating opportunities
Matthew Fox	Travelling Europe/UK
Bryan Kent	Incat Crowther, Sydney
Drew van Ryn	Barracouta Sails, Sydney
Konrad Zurcher	Digital Wranglers, Sydney

Congratulations, all!

Thesis Conference

The School's annual undergraduate thesis conference was held on 23 and 24 September, and 237 Year 4 students made presentations on their thesis projects. The following presentations were made by naval architecture students:

Tom Bromhead	*Investigation of Paddle Steamer* Decoy
Annette Hill	*Development of a Simplified Method to Assess Trawler Stability*

UNSW Naval Architecture graduates Gordon Danton, Drew van Ryn, Konny Zurcher, Yew Jinn Chieng, Liam Finegan, Bryan Kent and Tibor Corbett at the UNSW Graduation Ceremony on 30 August
(Photo Phil Helmore)

Sue-Ellen Jahshan	*Experimental Study of Superhydrophobic Surfaces for Ship Resistance Reduction*
Claire Johnson	*Discharge Coefficients of Non-circular Orifices for the Progressive Flooding of Ships*
Chia How Khee	*Variation of Wind Heeling Moment with Angle of Heel for Ships*
Anthony Livanos	*CFD Investigation of Ship Hydrodynamic Flow*
Daniel Oliver	*Strength and Stability of the Fitzroy Dock Caisson*
Gayoung Suh	*Air and Wind Resistance of Monohull Vessels*
John van Pham	*Structural Design and Analysis of a Monohull Fast Ferry using Aluminium and Composites*
Michael Stuart	*Bonded Composite Patch Repair for Ship Plating*
Malinda Wickremaarachchilage	*Probabilistic Subdivision and Damaged Stability of Ships*
Gabriel Wong	*Extension of the Gabrielli-von Karman Limit Line for Marine Vehicles*
Ning Wu	*Air and Wind Resistance of Catamarans*

Thesis Conference Dinner

The School's annual thesis conference dinner was held on the evening of the last day of the conference, Friday 24 September, at the South Sydney Junior Rugby Leagues Club. The dinner was attended by 250 students, partners and staff members, including most of the naval architects.

RINA–Austal Ships Award

RINA and Austal Ships jointly offered an award of $500 and a certificate for the best presentation at the conference by a student member on a naval architectural project. Assessment was made on the basis of marks awarded by School staff, with marks being standardised to remove the effects of marker variability. The award went to Annette Hill for her presentation on *Development of a Simplified Method to Assess Trawler Stability*. The award was announced by the Head of School, A/Prof. Philip Mathew and presented by the Naval Architecture Plan Coordinator, Mr Phil Helmore, at the thesis conference dinner. The cheque has subsequently arrived and was presented by Phil Helmore. Congratulations, Annette!

Naval architects at the thesis conference dinner on 24 September Chia How Khee, Annette Hill, Tom Bromhead, Claire Johnson, Phil Helmore, Gayoung Suh, Michael Stuart, John van Pham and Gabriel Wong
(Photo courtesy Gayoung Suh)

Annette Hill and the RINA–Austal Ships Award presented by Phil Helmore
(Photo courtesy Jackie Chan and Minh Le)

Thesis Poster prize

At the thesis conference dinner, the annual awards for the thesis posters (which adorn the walls of the laboratory building and are updated annually) were made. The 2010 prize for the second-best thesis poster went to naval

architecture student Tom Bromhead for his poster on *Investigation of Paddle Steamer* Decoy, which was operated on the Murray River, in South Australia and in Western Australia at various stages of her career, but is now on the bank of the Murray River at Mannum, awaiting restoration.

Lecturer of the Year and Other Awards

Also at the thesis conference dinner, the School's final-year students made their annual award for Lecturer of the Year, inaugurated in 1995. This year the Lecturer of the Year award went to Dr Gangadhara Prusty.

A number of light-hearted awards were also made:

For the lecturer making the best imitation of a GPS unit in class to Dr Jose Guivant.

For the academic with the most unpronounceable name to Dr Sangarapillai Kanapathipillai who, in accepting the award, deftly pronounced it for the benefit of the audience!

The Julia Gillard Award for the most efficient leadership change to Dr Garth Pearce.

For the lecturer most likely to be a CIA spy to Dr Nathan Kinkaid.

For the lecturer with the best foreign accent to Dr Zoran Vulovic who, in accepting the award, said that "You all have an accent, but I speak normal English!

Visit to AMC

On 30 September and 1 October the Year 3 students studying NAVL3620 Ship Hydrodynamics visited the Australian Maritime College accompanied by lecturer, Dr Rozetta Payne. The visit was organised by Dr Gregor Macfarlane, and UNSW is grateful for AMC's hospitality. The group were introduced to the towing tank for experiments by Dr Tim Lilienthal and then, after lunch, to the Integrated Marine Simulator for ship manoeuvring by Capt. Wayne Schwartz and the model test basin by Dr Gregor Macfarlane before adjourning to The Royal Oak for a counter meal.

Next day, the students sat in on a lecture on cavitation by A/Prof. Paul Brandner, which they enjoyed, were shown over the new cavitation tunnel, and were then introduced to research activities and opportunities at AMC by Prof. Neil Bose and Dr Jonathan Binns, and then seakeeping tests in the towing tank under the guidance of Dr Lilienthal.

Lecturer Rozetta Payne with UNSW students Nathan Gale, Alex Conway, Geordie grant, Yasuhiro Hayashi and Dane Fowler at the AMC Towing Tank
(Photo courtesy Geordie Grant)

The students all came away with a better understanding of ship model testing and how it is done in practice. It certainly helped to have naval architects talk about the various aspects of testing and research, and their explanations of the processes brought out the realities and practicalities which you don't get in the theory.

UNSW students Yasuhiro Hayashi and Geordie Grant Checking the carriage prior to the start of a run
(Photo courtesy Geordie Grant)

UNSW students Alex Conway and Geordie Grant calibrating the towing rig on the carriage
(Photo courtesy Geordie Grant)

Visit to Richardson Devine Marine Constructions

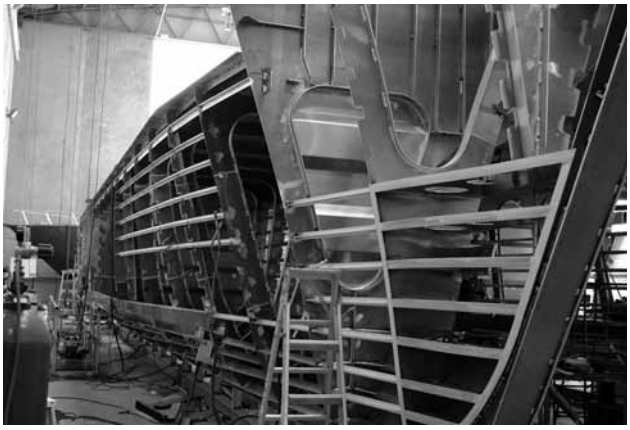
The students took the opportunity, while in Tasmania, to visit Hobart, where they were shown over the Richardson Devine Marine Constructions facility at Goodwood by Toby Richardson. RDMC had two vessels under construction, a 26 m high-speed ferry in the early stages of construction (frames set and hull plating half-completed) and a 35 m workboat nearing completion, with a smaller pleasure craft in the process of being lengthened. It was instructive to be able to see, at first hand, the details of construction, and to discuss simplicity of application rather than complexity of design, and the impact which building to the rules of a classification society has on the construction time, cost and weight of a given vessel in comparison to those that are built to the USL Code/NSCV. The theory is interesting, but seeing construction under way really brings it alive! UNSW is grateful to RDMC for their hospitality.

UNSW student Yasuhiro Hayashi
tries out as master in the shiphandling simulator at AMC
(Photo courtesy Geordie Grant)

UNSW students being shown around 35 m workboat
by Toby Richardson at RDMC in Hobart
(Photo courtesy Geordie Grant)

Aurora Australis

While in Hobart, the students also saw Australia's Antarctic flagship, *Aurora Australis*, alongside. Designed as a multi-purpose research and resupply ship by M.J. Doherty and Co., the vessel was built by Carrington Slipways in Newcastle for P&O Polar and launched in September 1989. She has a length of 94 m and a displacement of 3911 t, accommodates 116 passengers and is capable of breaking ice up to 1.5 metres thick. She is well equipped with a trawl deck, purpose designed for marine science and oceanographic work, and is fitted with a helipad and hangar facilities for three helicopters. She is chartered by the Australian Antarctic Division over the southern summer.



26 m ferry under construction at RDMC in Hobart
(Photo courtesy Geordie Grant)

Aurora Australis alongside in Hobart
(Photo courtesy Geordie Grant)

Thesis Topics

Among the interesting undergraduate thesis projects recently completed are the following:

Variation of Wind Heeling Moment with Angle of Heel

The variation of wind heeling moment on a ship with angle of heel is not well understood. AMSA considers it to be constant with angle of heel, but the USL Code and the NSCV both allow a cosine variation from that at the upright position.

Chia How Khee has conducted an investigation of the variation of wind heeling arm for the Armidale-class patrol boats. A model was made by Richard Dunworth, together with five bases which allow the one model to be used at different angles of heel. These have been tested in the wind tunnel, and the results were correlated with both CFD analysis and the results of a strip-theory approach.

CFD Analysis of Ship hydrodynamic Flow

It has been proposed that ducts from the bow of a large commercial vessel to the sides of the ship could provide a reduction in resistance due to reduction in pressure.

Anthony Livanos has conducted a CFD investigation of the phenomenon to evaluate the merits of the proposal. He has modelled a commercial-vessel hullform in Maxsurf, and imported that to ANSYS, and determined the resistance of the vessel without ducts. He then modelled an initial set of ducts and ran trials. A number of variations were tried to attempt to minimise the resistance, e.g. the size and shape of the ducts, their position, etc.

Investigation of the Fitzroy Dock Caisson

The caisson of the Fitzroy Dock on Cockatoo Island is in a

poor state of repair, and there is not a lot of data extant on the vessel, which is very ship shaped. The Sydney Harbour Federation Trust is proposing to restore the vessel and to have it on display at Cockatoo Island, with a new gate-type caisson being used in the dock entrance.

Daniel Oliver has conducted an investigation of the caisson, and has modelled up the hull in Maxsurf and run out hydrostatic and KN data. He has also done a mass estimate which has been validated by the drafts at a recent docking at Garden Island, and worked up stability data and an estimate of the strength of the caisson.

Air and Wind Resistance of Monohull Vessels

The prediction of air and wind resistance for small vessels is much less well known than that for large vessels, particularly when the vessel is proceeding at an angle to the prevailing wind. The prevailing wind itself has a velocity gradient above the sea, while that due to ship motion has no gradient.

Gayoung Suh has conducted an investigation of the wind resistance of a typical motor yacht hullform. She has tested a model in the wind tunnel, and the results were correlated with both CFD analysis and the results of a strip-theory approach.

Extension of the Gabrielli-von Karman Limit Lines for Marine Vehicles

Gabrielli and von Karman published their landmark paper on the specific resistance (resistance per unit mass) for a whole range of land, sea and air transport vehicles in 1950. Jewell of the DTMB updated this for marine vehicles in 1980 for marine vehicles, and provided some new graphs and insights.

Gabriel Wong has conducted an investigation of the latest marine vehicles, including modern modes of transport, to see if the limit lines have moved or remained static in comparison to those of the best performance of vehicles of sixty years ago.

Post-graduate and Other News

School History

The History of the UNSW School of Mechanical and Manufacturing Engineering 1949-2009, the recently-published book covering the School's 60-year history, was officially launched on 6 August 2010 at the Faculty of Engineering Annual Dinner.

Writing involved many contributors who gave their time and effort generously. The authoring team of Blanche Hampton and Ben Allen was supplemented by the collective memories of the School's editorial committee comprising Brian Milton, Lawry Doctors, Eric Hahn and Kelvin Hundt. Many interviews of past and present staff members, students and alumni took place and archival material was retrieved from all over.

As a matter of interest, this book contains the famous photo of the graduating class of 1983 (Mark Smallwood, Malcolm Rowe, Steve Quigley and Rob Dunbar — John Donovan and Kim Bond missed the photo shoot), holding the Type 12 frigate model in front of themselves for modesty's sake and predating *The Full Monty* by 14 years! The model is from Brian Robson's thesis project on the launching of the Type 12 frigates at Cockatoo Island and is still there, complete with the launching cradle.

The History of the UNSW School of Mechanical and Manufacturing Engineering 1949-2009 may be ordered and paid for on-line. Visit www.mech.unsw.edu.au/content/about_us/History-Book.cfm?ss=1 and click on the link for Domestic or International and follow the directions.

Domestic customers (Australia only) Cost $88 including GST, postage and handling

International customers Cost $118 including postage and handling

Faculty History

The History of the Faculty of Engineering 1949–2009, the recently-published book covering the Faculty's 60-year history, was officially launched on 21 August 2009 at the Faculty of Engineering Annual Dinner.

The authoring team of Blanche Hampton, Ben Allen and Robert Loeffel was supplemented by an editorial committee (with representatives from most schools in the faculty) which was convened to work actively with the authors. Graduates and current and former staff contributed greatly to the development of the book by responding to surveys and providing photographs and other materials. The book traces the Faculty's origins from Sydney Technical College to the internationally-recognised education and research institution it is today.

The History of the Faculty of Engineering 1949–2009 is available for purchase through the UNSW Press website, www.unswpress.com.au, or by calling UNSW Press direct on (02) 8778 9999.

Phil Helmore

EMSHIP Scholar

Dr Gangadhara Prusty has been invited as a Visiting Professor and EMShip scholar to participate in the European Master's Course in Integrated Advanced Ship Design teaching missions in academic year 2010–11 at the University of Liege in Belgium and the West Pomeranian University of Technology in Poland.

The objective of the EMShip Erasmus Mundus master's program is to provide a high-level education in naval architecture, ship design and shipbuilding through a 1.5 year 90 ECTS credit s master's course. This program is supported by the European Commission under the Erasmus Mundus funding scheme. EMship directly relates to the future needs of the European and international marine industries.

Details of the EMShip program may be found at www.emship.eu.

ALTC Grant

Dr Gangadhara Prusty of the School of Mechanical and Manufacturing Engineering has been awarded Australian Learning and Teaching Council competitive-grant funding of $211 000 to develop and share use of adaptive tutorials in mechanics courses in engineering. Led by Dr Prusty, the project team involves engineering educators in UNSW and three other universities:

Dr Zora Vrcelj, UNSW School of Civil and Environmental Engineering

Professor Tim McCarthy, University of Wollongong

Ms Anne Gardner, University of Technology Sydney

Mr Roberto Ojeda, University of Tasmania, Australian Maritime College

Adaptive tutorials provide a way of dealing with common sticking points, or 'threshold concepts' which prevent students progressing in the study of mechanics. These can sometimes be picked up by skilled one-to-one coaching but are usually missed by traditional 'book and board' teaching in large classes. The adaptive tutorials use artificial intelligence (AI) principles along with online interactive virtual laboratory activities (simulations), to:

- track each student's interaction with the simulation, and provide tailored feedback;
- generate data which teachers can use to identify common conceptual sticking points in large classes; and
- provide information for adjusting the simulation, feedback and other learning activities in a course to help students through threshold concepts.

Pilots by Dr Prusty in mechanical engineering courses at UNSW have established the effectiveness of the tools and method. The ALTC-funded project is entitled 'An adaptive eLearning community of practice for mechanics courses in engineering' and aims to extend the use of this technology through the development, use and dissemination of a set of adaptive eLearning tutorials which target identified threshold concepts in the field. Furthermore, this project will foster a community of practice revolving around the use of such technology through a strong focus on staff training and cross-institutional cross-disciplinary collaboration and related staff-development events.

ALTC National Citation Award

Dr Gangadhara Prusty has been awarded a National Citation Award for 2010 by the Australian Learning and Teaching Council for outstanding contributions to student learning.

The citation reads: "For innovative teaching and assessment of mechanics courses in engineering, which encourage and motivate students to learn threshold concepts effectively".

Dr Prusty, an engineering educator with over 20 years of teaching experience, has contributed significantly to the enhancement of student learning, making his courses engaging, stimulating and highly innovative. Using a blend of traditional and contemporary teaching methods, he has helped students understand the key threshold concepts of the mechanics courses effectively. Adding these vital ingredients, he has created a smooth and enjoyable learning process enabling the students to unlock their maximum potential in their engineering careers.

Gangadhara Prusty

Twenty-Eighth Symposium on Naval Hydrodynamics

The Symposia on Naval Hydrodynamics are run under the auspices of the Office of Naval Research (ONR) in Washington, USA, and take place every two years. On this occasion, the symposium was held in Pasadena, California, on 12–17 September 2010. The standard five-day format was followed again. In addition to the ONR, the California Institute of Technology (CalTech) was a sponsor. The local organising committee consisted of a number of researchers from CalTech in Pasadena.

A total of 82 papers on all aspects of ship hydrodynamics was presented. This total included four keynote lectures and the Weinblum Lecture. On this occasion, there were just two Australian contributions.

Em/Prof. Lawrence Doctors (UNSW) and Dr Steven Zalek from the University of Michigan (USA) presented their work on *Experimental Study of the Resistance of Surface-Effect-Ship Seals*. The work covered in their paper, in particular, covers the prediction and measurement of the drag of the seals of a surface-effect ship (SES). A set of measurements on the distorted seal shape, the rise of the water ahead of the seal, and the resistance itself, was made. This experimental data exhibits excellent correlation with the theory previously developed to characterise the behaviour of SES seals. This theory was shown to provide excellent and considerably-improved predictions of the total drag experienced by these vehicles in the all-important low-speed range.

Dr Jason Lavroff, Professor Michael Davis, Dr Damien Holloway and Dr Giles Thomas described their work on *Slamming of High-Speed Catamarans in Severe Sea Conditions Investigated by Hydroelastic Segmented Model Experiments*. A model was developed based on the 112 m Incat wavepiercer catamaran to establish the dynamic wave-slam forces and whipping vibration responses during operation in severe sea conditions. Towing tank tests were performed in regular seas to investigate the dynamic wave-slam forces acting on the centre bow and slam-induced bending moments acting in the demihull. From model tests and full-scale trials it was found that slams of up to 2148 tonnes force can occur when the wetdeck arches between the main hulls and centre bow fill. The slams can impart impulses to the bow of up to 938 tonne-force seconds and impart up to 3.5 MJ of strain energy to the ship structure.

The next conference in the series, i.e. the Twenty-Ninth Symposium on Naval Hydrodynamics, will be organized by Chalmers University of Technology and SSPA Sweden AB, and will take place in Gothenburg, Sweden, on 26–31 August 2012. Further information can be obtained on the last conference (as well as the next one) from Em/Prof. Doctors at l.doctors@unsw.edu.au.

Lawrence Doctors

THE INTERNET

Distances and Latitude/Longitude

Ever wanted to know how far it is by sea from Port Lincoln to Adelaide?

Google Maps has provided an answer. Open Google Maps (www.google.com/maps) and find the area you are interested in. Click on the Link to New! at the top right of the screen, 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 kilometers, 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.

There are other tools in Google Maps, but another good one is for latitude and longitude, enabling you to determine the exact location of your house, or that place you have decided on for your summer holidays. Click on the Link to New! at the top right of the screen, and 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.

Phil Helmore

Ship Drawings on the Web

Model makers or those just interested in studying warship design in detail are often looking for drawings of past warships. In Australia, the National Archives holds a valuable collection of RAN ship plans, including 'As Fitted' drawings, but only a small number can be found on the web at www.naa.gov.au in series MP551/1. No doubt the selection will grow in time, but it will take a long while to equal the excellent collection available from the French Navy historical collection. Many excellently-scanned plans of ships from the 1880s to the 1960s are available — including general arrangement drawings, lines plans, docking plans, selected structural drawings and some machinery plans. The site is a paradise for those people known in the publishing business as 'rivet counters'. Have a look at http://www.servicehistorique.sga.defense.gouv.fr/02fonds-collections/banquedocuments/planbato/planbato/listebato/listebato.php.

For US warships there is an excellent non-government source of copies of Booklets of General Plans on the Historic Naval Ships Association website at http://www.hnsa.org/doc/plans/index.htm.

Cheonan Report Released

The final report of the Civilian-military Joint Investigation Group into the loss of ROKS *Cheonan* is now freely available can be downloaded from http://www.nautilus.org/publications/essays/napsnet/sr/Cheonan.pdf.

John Jeremy

THE PROFESSION

Australia's First Boating-usage Study Reports Published

The National Marine Safety Committee (NMSC) recently released two final reports on the first study of its kind in Australia—the 18-month-long National Boating Usage Study (NBUS)—at their National Marine Safety Conference 2010 in Perth.

NMSC CEO, Ms Margie O'Tarpey, explained that the NBUS statistics will better inform marine agencies when delivering policy and education programs for recreational boating. "We now have concrete information on how boaters use their boats, how long they are on the water, and the types of waterways that are most popular," she said. "With almost one million recreational craft being used throughout Australia, and 12 816 boating incidents in the last nine years, it is vital that we develop informed policy and educational programs to ensure that the potential for boating accidents is minimised."

The *NBUS Trip Analysis Report* analyses the data from trip diaries which 2035 volunteers from across Australia filled in during the study, from October 2008 to March 2010. These boaters logged 32 100 trips and 300 000 hours on the water.

The *Executive Summary Report* summarises the Trip Analysis Report and the NBUS Preliminary Survey Report, which was released last year, and asked volunteers about their boating usage habits in the 12 months prior to the study.

Whilst the *NBUS Preliminary Survey Report* indicated that approximately 1 in 10 participants use their boats for 100 days a year, the statistics from the trip diaries concluded that 3 out of 5 boaters use their boats only between 12 and 36 times each year. The report's research manager, Dr John Bentley, estimated that employed Australians have the opportunity to use their boats for 124 days per year but the average boater only uses their boat for between 10 and 30 per cent of this time. "Issues related to under utilisation of boats from a safety perspective include not inadequately maintaining their boats, safety equipment and boating skill, and this may have an impact on marine safety," Dr Bentley said.

The *NBUS Trip Analysis Report* found that:

Boating Usage

- Weekends were the most popular time for boating, with Saturday recording 25% of trips and Sunday accounting for 22% of trips.
- Boat ramps were the most-common access point for boat trips (59%), followed by private jetty or marinas (23%).

- The most popular time for boating was between 6 a.m. and 10 a.m., which accounted for 47% of boating trips. This was followed by the 10 a.m.–2 p.m. time period which accounted for 26% of trips.
- Boaters most commonly used their craft for between 3 and 5 hours (43% of trips) followed by 0–2 hours (16% of trips).
- The majority of trips occurred in inlets, estuaries, bays and sheltered waters, which accounted for 43% of trips. More than one-third of trips (35%) occurred in open waters.

Boats

- The most common boat used was the cuddy/half-cabin cruiser, which accounted for 24% of trips. This was followed by open runabouts which accounted for 22% of trips.
- The most popular size of boat used on trips was between 5 and 9.9 metres in length (55%). This was followed by boats of less than 5 metres in length (29%).
- Fishing was the primary activity on 54% of trips, with cruising the primary activity on 24% of trips.

Incidents

- During the 18 months of data collection, 343 incidents occurred, representing 1% of boating trips.
- Almost two-thirds (61%) of incidents had occurred within the first two hours.

The *Trip Analysis Report* found that 'under reporting' of boating incidents may need to be addressed by marine agencies. The study found that only 14% of the 343 incidents which occurred during the study were reported, despite the fact that 45% of incidents were reportable.

Boat ramps accounted for almost two-thirds of boating access, and the report found that if demand for boat ramps continues to grow, this may lead to further problems with congestion, pollution, parking, amenities and access.

Another trend was the high usage of canoes and kayaks, houseboats, party pontoons, and converted commercial craft. Even though these craft represented only 2% of the survey sample, they were used in 11% of trips logged in the boating diaries.

Ms O'Tarpey said the NBUS study results indicate that there is also more to be done in the area of boating education. For example, the responses in the *Preliminary Survey Report* indicated that 98% of participants carry personal flotation devices (PFDs) on board their boats; however, only 16% of those surveyed wore them on a regular basis. "This is cause for concern, because drowning is the cause of death in approximately 80 per cent of boating fatalities and the wearing of PFDs could significantly reduce this figure," she said.

"I would like to take this opportunity to thank the thousands of volunteers who gave up their time to fill in the preliminary survey and the trip diaries, because without them we would not have been able to gain such a valuable insight into boating behaviour".

All reports are now available for download from NMSC's website, www.nmsc.gov.au; click on Research and Policy/ Manual and Reports. To order hard copies, contact the NMSC Secretariat on (02) 9247 2124 or email secretariat@nmsc.gov.au.

ATC Approves New Commercial Vessel Standards

The Australian Transport Council (ATC) has endorsed new national standards for commercial vessels including leisure craft (previously known as "hire and drive" craft) and some updates to the existing standard for safety equipment.

The national commercial vessels safety standards-setting body, the National Marine Safety Committee (NMSC), reminds stakeholders these standards generally came into force under the law when Amendment List 8 to the USL Code took effect on 1 October.

NMSC's CEO, Margie O'Tarpey, said that Amendment List 8 also introduces the National Standard for Commercial Vessels (NSCV) C6B—Buoyancy and Stability after Flooding, completing the important trio of stability standards for commercial vessel design. Ms O'Tarpey welcomed the finalisation of NSCV F2—Leisure Craft. "The industry is excited about accessing the national leisure-craft standard, especially as the standard now covers the newer types of "hire and drive" activity, including PWCs and craft hired on a trailer," she said. "More challenging activities are now

covered under a philosophy of seeing safety management as a shared responsibility between the user and the provider".

Standards reference group member and Director of BOAB Boat Hire, Anthony Gelfius, welcomed the leisure craft standard from an industry point of view. "This new standard will save some administrative costs, and I think it's fantastic that we can now have the same set of rules for every state," Mr Gelfius said. "This will make it much easier in future to certify and move our craft between states for seasonal or other reasons".

Ms O'Tarpey indicated that there were still two more critical standards to be completed before the NMSC can be said to have completed the task of revising the USL Code assigned to it by the ministerial council. These standards, covering Arrangement, Accommodation and Personal Safety, and Watertight and Weathertight Integrity, are due for completion and endorsement during the first half of 2011 and their finalisation will be undertaken through a partnership between NMSC and AMSA. It is intended that the final two standards will come into force as replacements for the equivalent USL Code requirements, six months after they are endorsed by ATC.

For further detail, see the NMSC website www.nmsc.gov.au.

***Note**: For those jurisdictions which currently allow vessels to comply with the USL Code, a new vessel which submitted an application prior to 1 October 2010 can be built to these existing requirements, provided that construction work begins within a three-year period. However, design approvals submitted after 1 October 2010 must comply with the new standards.

Rosemary Pryor

Amendments Issued for Eight Standards

With the published sections of the National Standard for Commercial Vessels (NSCV) now being applied around Australia, NMSC has turned its attention to facilitating the implementation of those standards. As one would expect with any new standards, a few issues have come to light during implementation, and there is now a process in place to deal with minor matters requiring correction. A series of correction amendments were approved at the NMSC meeting in October and have now been included in the following Sections of the NSCV, which are available on the NMSC website.

NSCV Part C3 Construction
NSCV Part C5A Machinery
NSCV Part C6A Intact Stability
NSCV Part C6B Buoyancy and Stability after Flooding
NSCV Part C6C Stability Tests and Stability Information
NSCV Part C7D Anchoring Systems
NSCV Part F1 B Category F1 - Fast Craft
NSCV Part F1 C Category F2 - Fast Craft

The details of the specific changes to each Section are available by clicking on *Amendment 1* in the right-hand column next to the relevant section on the NSCV summary page at http://www.nmsc.gov.au/index.php?MID=16&CID=97. Stakeholders who believe thta they have identified any further implementation issues with the NSCV are invited to raise them with a representative of their local Marine Safety Authority who can look into the question and potentially make a proposal to amend the particular standard.

Safety Lines to be discontinued

The NMSC publication, *Safety Lines* will no longer be issued and its content is to be rolled into the AMSA communications strategy. For the future there will be a single national point of contact for information about the proposed new national system for commercial vessel regulation currently under development — see http://www.amsa.gov.au/Maritime Reform/.

NMSC will continue to keep stakeholders informed of developments in relation to specific NMSC national standards through Tech e-News bulletins.

Heavy Oils Banned on Ships Operating in the Antarctic

Changes to MARPOL Annex I (new Chapter 9, Regulation 43) regarding the use and carriage of 'heavy' oils in the Antarctic area (defined as the sea area south of latitude 60°S) will come into effect on August 1, 2011. These requirements, which apply to both new and existing ships, prohibit the carriage in bulk as cargo, or carriage and use as fuel, of the following oils in the Antarctic area:

- crude oils having a density at 15°C higher than 900 kg/m^3;
- oils, other than crude oils, having a density at 15°C higher than 900 kg/m^3 or a kinematic viscosity at 50°C higher than 180 mm^2/s; or
- bitumen, tar and their emulsions.

The cleaning or flushing of tanks or pipelines is not required when prior operations have included the carriage or use of these oils.

Vessels engaged in securing the safety of ships or in a search-and-rescue operation are exempt from the requirements.

What will the new requirements mean?

These new requirements will have an impact on operators using heavy fuel oil, particularly those engaged in Antarctic cruise and 'eco-tourism' activities. Apart from having to change fuel, there will also be implications for shore-side fuel-storage arrangements, and the capability of ships to discharge fuel oil.

Ships which have been operating on or carrying heavy oil will need to pump it out before entering the Antarctic area. Changes may be required to machinery and fuel-system arrangements to enable ships to discharge this fuel oil and to use allowable fuels safely, particularly if they do not normally operate on heavy fuel oils and are not optimised to operate on alternative fuels. Classification societies are happy to provide further guidance and support in this area.

Background

The changes to Annex I of MARPOL were adopted in March 2010 at the 60th session of the Marine Environment Protection Committee (MEPC 60) and are detailed in Resolution MEPC 189(60). They have been adopted as a result of a number of accidents, including the sinking and grounding of ships in the Antarctic area, and concerns over the adverse impact which leakage of heavy oil would have in such a remote and environmentally-sensitive area.

Lloyd's Register, *Classification News No. 30/2010*

WHAT'S IN A NAME?

The Government will proceed with the acquisition of three Air Warfare Destroyers (AWD).

Defending Australia in the Asia Pacific Century: Force 2030

DDGH — Destroyer, Helo-capable, Guided Missile — Major surface combatant in range of about 95 to 140 m whole, general mission is to conduct operations with strike, ASW and amphibious forces, and to perform screening and convoy duties. Fitted with one or more force guided missile systems. Fitted with a flight deck with a primary mission of operating and maintaining helicopters.

STANAG 1166

The process for naming individual ships of the Royal Australian Navy (RAN) and the history behind some of our more famous ship names was described in *Semaphore* No. 4 of 2007. However, the more prosaic method of identifying ships, by designation and/or pennant number — HMAS *Sydney* (IV) can be identified as F03 and HMAS *Balikpapan* as L126 — is explained below.

A Short History of Ship Designators

The system of pennant numbers in the Royal Navy (RN) began before World War I to distinguish ships of a similar class and thereby improve rapid recognition and visual communications. Initially a ship was distinguished by a single letter pennant signifying a flotilla or a particular type of vessel such as a red burgee for torpedo boats and the pennant 'H' for torpedo-boat destroyers. Beneath each pennant was a unique number identifying the individual vessel. The allocation of pennant numbers was prepared within each fleet until the *Navy Pennant List* in 1910 standardised numbers across the RN. After World War II the RN further rationalised the system's letter designators resulting in R for aircraft carrier, D for destroyer, F for frigate, L for amphibious vessels, and M for mine warfare vessels, etc.

The US Navy (USN) had, in the meantime, been developing its own system. In the 1890s, the USN began using a ship type and a one-up numbering system. Hence USS *Indiana* was referred to as Battleship No. 1 which was soon shortened to B-1. In 1920 the USN standardised its system and expanded it to include all US Coast Guard cutters. This system allocated two or three-letter class designators to each ship type, and retained the one-up numbering system. The first aircraft carrier, USS *Langley*, thus became CV1, while USS *Bainbridge*, the first USN destroyer, became DD1 and the first submarine, USS *Holland*, received the designation SS1.

The system endures, but the designations have evolved over time as new ship types incorporating advanced technologies have been commissioned. USS *George H W Bush*, for example, is designated CVN77, as she is both the 76th carrier planned since *Langley* and uses nuclear propulsion. Inconsistencies nevertheless arise due to changing roles and capabilities. Thus USS *Mitscher*, although planned as DD927, commissioned in 1953 as DL (destroyer leader) 2, then was finally redesignated DDG (guided missile destroyer) 35 in 1968. Further gaps in the numbering system have occurred due to construction cancellations and building programs for other navies. Hence, having allocated DDG25–27 to the three RAN *Perth* class DDGs, the USN did not use these designations in its own fleet. *The Classifications of Naval Ships and Craft* (SECNAVINST 5030.8) provides the latest iteration of all USN definitions [1].

Ship Type Designators

Today, the RAN, like most Western navies, employs the NATO standard for describing and comparing the broad roles and capabilities of naval vessels. This system is contained in the NATO Standardisation Agency publication *STANAG 1166 MAROPS (Edition 7) — Standard Ship Designator System*. *STANAG 1166* is not publicly available, but reference publications such as *Jane's Fighting Ships* routinely adopt the NATO standard and provide similar information.

STANAG 1166 broadly groups both naval and non-naval vessels as either combatants or non-combatants. Combatants are vessels which possess some sort of inherent armed or combat capability primarily intended for offensive use. They are further defined as submarines, principal surface combatants, patrol vessels, river/roadstead patrol vessels, mine-warfare vessels, amphibious warfare vessels or coast guard. Non-combatants tend to be role-specific vessels, and may possess an armed or combat capability intended primarily for self-defence. They are further grouped as auxiliary, service and support, government-owned, merchant or recreational [2].

For each of these groups a system of two, three or four-letter designators exists which defines a ship's or submarine's category and principal role. In addition to the letter N which, as already noted, signifies nuclear propulsion, other common suffixes include G — a unit equipped with one or more force guided missile systems, and H — a unit equipped with a helicopter, or capable of operating a helicopter or vertical or short take-off and landing aircraft.

A conventional submarine fitted with underwater-to-surface or surface-to-surface missiles is therefore designated SSG, which is consequently the designation used for the RAN's *Collins* class submarines. The USN's submarine fleet on the other hand, consists not only of SSGNs (nuclear-powered guided-missile capable attack submarines) but also SSBNs (nuclear-powered, ballistic-missile submarines).

The surface-combatant designator which currently best applies to RAN vessels is FFGH, which is defined as:

"A surface combatant in size range of about 75–150 m. Generally has lighter armament than a DD. Fitted with one or more force guided-missile systems. Fitted with a flight deck with a primary mission of operating and maintaining helicopters."

With their current and planned equipment fits, both the Anzac and Adelaide classes should therefore be included within this definition, notwithstanding their more

commonly used simplified designators as FFH and FFG respectively.

Under the STANAG, support craft and non-commissioned single purpose vessels within naval bases are also allocated designators. For example, Defence Maritime Service Wattle-class stores lighters based in Sydney and Darwin are designated YE (lighter, ammunition), and the sail training vessel *Young Endeavour* is designated as AXS for training ship sail (naval).

In addition to the standard designators, the prefix and suffix system further delineates the role, ownership or characteristics of a vessel. The prefix Z is most applicable to Australia and denotes a non-Defence but Government-owned vessel. The Australian Customs and Border Protection Service Bay-class patrol vessels would be designated as ZPB and defined as a:

"Government owned coastal patrol unit intended for basically coastal guarding function. Includes any coastal patrol ship under 45 m which cannot qualify as a PG in armament. May be unarmed."

Australian Pennant Numbers

Pennant numbers are identification numbers painted prominently on most naval vessels. The RAN largely followed the RN system until 1964, and then fully adopted USN style pennant numbers in 1969. The RAN draws these numbers from a block allocation made in Annex B of the *Call Sign Book for Ships* (ACP113, Edition AH) [3]. These blocks of numbers are allocated by ship type and country. For example, the Anzac-class frigates are numbered 150–157 because the frigate hull numbers from 150 to 168 are allocated to Australia, as are 01–07, 20–23, 442–449 and 531–539. Similarly, the three new Hobart-class destroyers have been allocated numbers from within Australia's destroyer block 38–42. The process is not entirely random, however, and to maintain a tangible connection with the previous DDGs HMAS *Hobart* (II) and HMAS *Brisbane* (II), the decision has been made to again use 39 for *Hobart* (III), and 41 for *Brisbane* (III). HMAS *Sydney* (V) has been allocated 42.

The allocation by both type and country explains why there can be duplication in hull numbers. Australia currently has patrol combatant 83 (HMAS *Armidale*) and mine hunter 83 (HMAS *Hawkesbury*) in commission simultaneously. There are a number of similar examples in our recent past including HMAS *Jervis Bay* (I) and HMAS *Fremantle* (II) which both wore 203, and HMAS *Tobruk* (II) and HMAS *Swan* (II) which both wore 50.

With the notable absence of the US and Canada, other navies which use the ACP113 allocation include Belgium, Germany, Denmark, France, United Kingdom, Greece, Italy, Kenya, Malaysia, Netherlands, Norway, New Zealand, Poland, Portugal, Spain and Turkey. Each nation is responsible for the avoidance of visual call-sign duplication, but such overlaps do still occur. Thus HMAS *Benalla*, HMNZS *Kahua* and the Spanish ship *Martin Posadillo* all carry the pennant number A04.

AWD, MFU and other TLA (Three Letter Acronyms)

The armed forces have always favoured acronyms as a form of linguistic shorthand, jargon which is often indecipherable to outsiders. This has led to a range of classifications for ships which are not covered by the STANAG, but which have found their way into common usage.

In the early stages of a defence project when the exact form of a ship is yet to be determined, a generic descriptor of its purpose suffices. The AWD was accordingly a ship highly capable in air warfare, while the 'modular, multi-role class' included in the 2009 Defence White Paper is currently known as the Offshore Combatant Vessel (OCV). The AWD project is set to deliver the Hobart-class DDGH from 2014 and the OCV designator will become clearer as the project progresses.

For many years, commissioned RAN ships have been defined as either MFU (major fleet units) 'a vessel such as an aircraft carrier, fleet replenishment vessel, destroyer tender, guided missile destroyer, guided missile frigate, destroyer escort, designated training ship, landing ship heavy, or hydrographic and oceanographic research vessel' or MWV (minor war vessel), 'a vessel such as mine countermeasures vessel, patrol boat, landing craft heavy, survey motor launch, or craft of opportunity'[4].

The terms MFU and MWV are of largely administrative significance. They allow for categorising levels of command, remuneration and career progression, structuring training continuums for both individual and collective training, and delegating financial responsibilities. The words minor and major are not intended to imply a hierarchy of operational 'usefulness' — all RAN units contribute to a balanced force which is able to undertake the full spectrum of operations in the maritime domain.

Conclusion

Warships are among the most complex machines ever created by humans. Any sailor will know that individually they are quite distinct, yet commonalities of role, equipment and size lend themselves to myriad systems of taxonomy and classification. While attempts will always be made to impose order through a standard method of designation, class and hull number, the inherent complexity of the task will continue to impose limitations. In truth, mariners will always feel compelled to invent their own systems for their own purposes, and give their ship its own particular place in the wider scheme of things.

1. Navy Department, *Classifications of Naval Ships and Craft, SECNAVINST 5030.8*, Washington DC, 2006, <www.history.navy.mil/danfs/secnav_2006.htm> (30 July 2010).

2. NATO, *Standard Ship Designator System (STANAG 1166)*, 7th ed., 2007, pp A-1, A-2

3. http://jcs.dtic.mil/j6/cceb/acps/acp113/

4. Department of Defence, *Australian Defence Glossary*, version 5.1.7.3, Canberra, 2010.

Reproduced from Semaphore *No. 7, September 2010, published by the Sea Power Centre — Australia.*

VALE DON GILLIES

It is with sadness that *The ANA* records the passing of Donald Alexander Gillies AM on 26 August 2010, aged 87.

Don was born on 26 September 1922 at Coonamble, NSW, the only child of Duncan McKillop Gillies and Olive Angie McGregor. His father had arrived in Australia from Islay, Scotland in 1907 and, although he died when young Don was only 9, he instilled in his son a lifelong love for the highlands and west coast islands, with a fondness for the mail ferries operated by David MacBrayne Ltd and the "puffers", small bulk-cargo vessels capable of landing at simple piers or on the beach to discharge coal, lime etc.

The name "Gillies" means "servant of Jesus" in Gaelic. It is a common family name in the Hebrides Islands. To get away to sea and to regain his rightful clanship, Don commenced a five-year apprenticeship in engineering in 1939, with some time allocated to mechanical draughting. As soon as possible, he proceeded to sea as a junior engineer in ships of McIlwraith McEacharn's fleet, also known as The Scottish Company, and significant in developing the frozen meat trade. Don served in the merchant navy during WWII and by 1948 had gained his First-class Certificate of Competency, continuing as Senior Engineer Officer. His excellence was recognised and promotions followed. In 1950 he was taken into McIlwraith McEacharn's head office in Melbourne as Assistant Superintendent Engineer, and then transferred to Sydney in 1956 with responsibility for all of the fleet's docking and survey work, with duties expanding to cover the design, development and construction of new containerships for use in projected Australia-wide container operations.

On 1 January 1964, McIlwraith McEacharn's interstate fleet was merged with that of the Adelaide Steamship Company in a new company, Associated Steamships Pty Ltd. Don was the newly-merged company's first Superintendent Engineer, and was responsible for the design and construction of MV *Kooringa*, the first purpose-built fully containerised vessel in the world and which was built by State Dockyard in Newcastle.

Don then went on with the design, specification and building of two specialised and larger containerships, *Kanimbla* and *Manoora,* which were built by BHP at Whyalla, having compatibility with an international system of shore cranes and handling equipment. By1968 he had his own staff of naval architects, design engineers and draftsmen.

In 1971 Don was engaged as Technical Manager by Y-ARD (Australia) Pty Ltd, consultants working on special ship designs for shipowners and the Australian Government. That office was closed due to a change in the Government's shipbuilding policies.

In 1973 Don spent a year as Chief Engineer of Sydney Hospital, with responsibility for overall Engineering functioning of all services, construction and modifications, assisted by an engineering staff of 44.

Don was enticed back into shipping by the CSIRO Division of Fisheries and Oceanography to design a replacement research ship, and to care for other vessels of their fisheries inspection fleet.

In 1983 Don joined forces with Fred Ellis (originally of the Adelaide Steamship Company) and Associates to form

Don Gillies AM
(Photo John Jeremy)

Advance Ship Design Pty Ltd, with Don Gillies as Vice-President, to provide marine engineering and naval architecture consulting services. Among their many achievements was the design of the world's first hatchcoverless container ship, *Bell Pioneer.* At least 40 of these vessels have now been built around the world, and they are revolutionising the container-shipping business by reducing terminal turnaround times by about 27%. The design won the prestigious annual Seatrade Award in 1992 for excellence in the category of innovation. ASD also developed the twin-lift container-crane concept, for lifting two twenty-foot containers simultaneously and which was subsequently adopted by Paeco of the USA, and a special frame to hold eight cars and lift them on and off the ship.

He worked long and diligently for the benefit of the Institute of Marine Engineering, Science and Technology and its members, serving in various capacities on the committee of the Sydney Branch for many years. He was also a member of the founding committee of the NSW Section of the Royal Institution of Naval Architects in 1998, and served on that Committee until 2006. He was a member of the Australian Technical Committee of Lloyd's Register, and lectured on marine engineering to the naval architecture students at the University of New South Wales for 18 years. He could reach easily into the most senior levels of the marine learned societies, the Royal Australian Navy and Department of Defence.

In addition to his commitment to the marine industry, Don was also involved with Diabetes Australia, with Technical Aid for the Disabled, and with North Sydney Rotary.

Don was one of those men who had the rare ability to study a technical problem to the very depths of the known technology, and arrive with a good solution to the problem. He was therefore a valuable asset to all of his employers. Above all, he was always a sincere, polite and gentle man in all his dealings. He always had a good sense of humour and quickly gained the respect of all those who worked with him. His manner was unfailingly warm, friendly, and always of the highest ethical principles.

Don's services to marine engineering, naval architecture and

the community culminated in his investiture as a Member of the Order of Australia on Australia Day this year.

The funeral service was held in the Palm Chapel at Macquarie Park Crematorium, North Ryde, on Thursday 2 September 2010, and was attended by an impressively-large crowd. Don has been an inspiration to many and is a perfect example of a true gentleman, a technical innovator, a community-minded citizen, and loving family man. Don is survived by his wife Joy, children Heather and David, and eight grandchildren.

Tony Smith
Ed Ironside
Graham Taylor
David Gillies

INDUSTRY NEWS

Wärtsilä and Deltamarin introduce Innovative Ferry Family

Wärtsilä, the marine industry's leading solution provider and Deltamarin, the foremost design company in the cruise and ferry market, announced the introduction of an innovative series of ferry designs during the 35th Interferry Conference in New York in October.

By working in partnership, the two companies have identified the need for a rational approach to ferry design, and to the entire newbuilding process. Ferries are a niche market and represent less than 1% of the world's shipping fleet.

Most ferries have a unique design, which is produced according to the special characteristics of each route, highly diverse passenger and freight requirements, and the owner's own business model. This diversity results in very high prototype costs for each vessel, to the extent that ferries may be hard to trade and finance. However, standardisation has seldom been the answer, and has usually led to sub-optimal ships with low profitability.

Parametric Design Method

From an environmental point of view, in the future ferries will have to operate using less fuel and creating lower emission levels. This can be achieved by benefitting from state-of-the-art design improvements, through optimising machinery and systems, and by implementing the latest innovations in propulsion technology. These innovations are costly and must be standardised wherever possible.

The break-through achieved by Wärtsilä and Deltamarin is the development of the so-called Parametric Design Method. Using this method, designers can make a clear distinction between the marketable and non-marketable features of a vessel. For example, the size and architecture of the passenger accommodation and recreation areas are marketable features of a ship, and can be tailored to each customer's particular needs. On the other hand, the construction of the ship — the engine room layout, piping and ventilation, power, navigation and automation systems — can be designed using a more industrial method. By modularising and parameterising these elements within the ship, the same benefits can be utilised in subsequent ships without them becoming duplicates.

The savings resulting from use of the parametric approach will be considerable, both in the initial investment as well as in operational costs. The industrial engineering of ship systems, and the serial effect created from pre-designed modules, are estimated to result in cost savings of approximately 15%. The fuel economy of these ferries, compared with ferries built 10–15 years ago, will also improve by 15%, not least as a result of developments in Wärtsilä's technology and Deltamarin's advances in ship design.

Evolving emission regulations will inevitably require the re-design of many vessel types. This is especially true for ferries operating in (future) ECA, (Emission Control Areas), and having passengers as their most important "cargo".

Environmentally-sustainable strategy

An important aim of this project is to introduce advanced, environmentally-sound solutions, applied in a modular way and that are prepared for any future requirements.

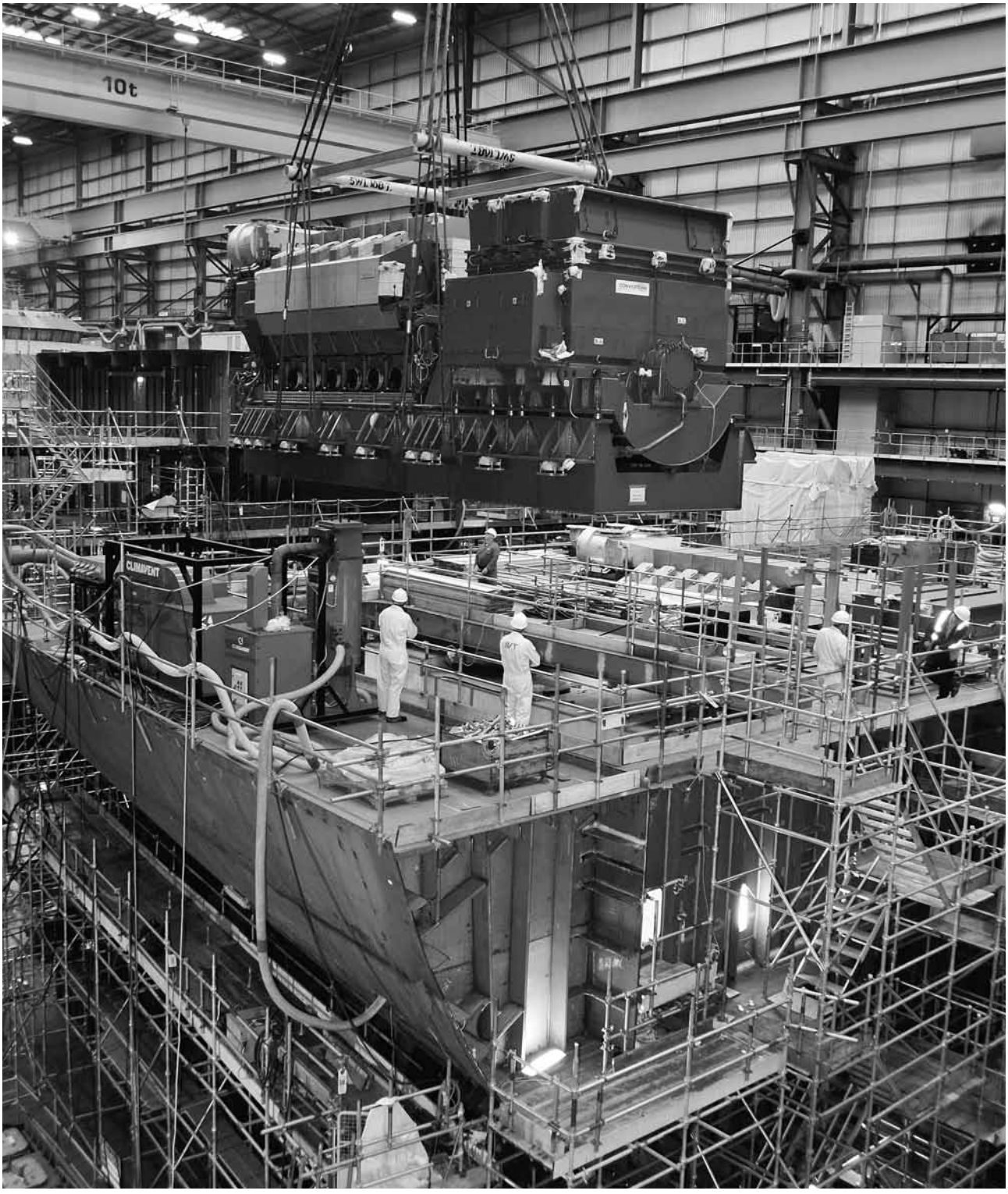
Deltamarin and Wärtsilä are continuously developing these solutions, and will continue to do so with this aim as a vital element of the sustainability strategy in both companies. Examples of this joint commitment include Deltamarin's highly-efficient ferry designs which are setting new standards in the market, and Wärtsilä's propulsion arrangements, exhaust gas cleaning systems and, in particular, its base of installed LNG dual-fuel marine engines, which is the largest in the market.

The Wärtsilä and Deltamarin partnership will produce sleek, modern ferry design concepts incorporating both operational and environmental considerations
(Image courtesy Wärtsilä)

Another unique aspect of this co-operation is that Wärtsilä and Deltamarin will be able to generate, quickly and reliably, customised ferry concept designs for the owner's feasibility and budgeting purposes. This will shorten time-to-market considerations notably. The subsequent basic design can be generated rapidly, thanks to the combination of parametrically pre-designed elements and pre-engineered ship machinery and systems.

"The economic viability of advanced technical solutions can only come about through an integrated approach. By combining our companies' complementary expertise in ship design and integrated technologies, we believe that such viable solutions can be attained", said Mr Wilco van der Linden, Director Business Development, Cruise and Ferry, Wärtsilä Ship Power.

"Deltamarin will provide their vast design expertise in ferries and, in particular, the development of advanced, high-performance hull forms for new designs. These complementary capabilities will provide a valuable service to the international ferry industry", said Mr Markku Kanerva, Deltamarin's Sales Director for Contracting Services.



The first set of Wärtsilä diesel generators being lifted into position in Lower Block 2 of the future aircraft carrier HMS *Queen Elizabeth* in Portsmouth recently
(Photo courtesy BAE Systems)

Wärtsilä Launches the Wärtsilä 3C

Wärtsilä launched its Wärtsilä Communication and Control Centre (Wärtsilä 3C) solution in Hamburg, Germany in September.

Wärtsilä 3C is a new way of thinking and it will be the first system to integrate the entire vessel's control into one solution. With the introduction of Wärtsilä 3C, Wärtsilä's expertise in integrating its own products and systems, such as automation, propulsion and engines, with other operationally-relevant equipment and systems to obtain a truly fully-integrated solution, is again highlighted. In this case, all the needed ship's controls and alarms are integrated with a common interface for the highest efficiency and best-possible situational awareness. The Wärtsilä 3C has been designed in co-operation with experienced maritime professionals to ensure fluent control of the vessel, and to make ship operation easier and safer than ever before.

The innovative Wärtsilä 3C system is a key enabler for the leveraging of energy management and integrated navigation solutions, and offers efficiency optimisation and emissions-reduction benefits. Route planning, optimal engine configuration and decision support will increase the vessel's fuel economy and reduce the maintenance requirements of the ship's systems. In optimising engine performance and ensuring maximum power availability with high efficiency, fuel consumption is reduced as is, therefore, the volume of harmful emissions.

With the Wärtsilä 3C, owners can remotely optimise their assets and achieve real-time fleet management. The system is supported by Wärtsilä's global service capabilities to maximize the availability and efficiency of a ship's crucial operating equipment throughout its lifecycle. This global network is enhanced by the Wärtsilä Land and Sea Academy's training facilities, to provide comprehensive instruction on all ship operating systems.

The Wärtsilä 3C will comply with all major classification societies and notations, and is designed to meet the highest standards — even when being used in the most difficult operating environments. The modularised components and customized design make the Wärtsilä 3C suitable for all types of vessels. Furthermore, regardless of the ship's level of redundancy, it will maintain the same high system design and component quality. The navigation technology used in the Wärtsilä 3C is supplied by Raytheon Anschütz, a proven provider of advanced maritime navigational systems.

By being able to offer a totally-integrated solution, Wärtsilä offers cost saving benefits to both shipyards and owners. The Wärtsilä 3C is seen as being an important step in the company's strategy of providing a full range of efficient and environmentally-sustainable ship-power systems from a single source. It will hasten the development of future solutions, such as economical autopilots and other innovations.

"With Wärtsilä 3C, Wärtsilä can now provide, manage and guarantee maintenance for the full scope of all ship operating systems, which further strengthens our position as the industry's leading systems integrator and solution provider," commented Mr Aaron Bresnahan, Vice President, Special Vessels, Wärtsilä Ship Power. "It is important to note that we are not merely the integrator for the ship's controls, but we also have the most innovative technological know-how on the market, together with a wide range of services. The Wärtsilä 3C is the nerve centre for the vessel, and will definitely simplify operations. It also adds features, maximizes the ship's power efficiency, and extends its lifecycle."

Wärtsilä's Technology powers Royal Caribbean's *Allure of the Seas*

Like those in her sister ship, *Oasis of the Seas*, the Wärtsilä engines installed in *Allure of the Seas* have common-rail systems, ensuring lower fuel consumption and reduced emissions, giving smokeless operation at various engine loads.

Allure of the Seas, the sister ship of *Oasis of the Seas*, was handed over to Royal Caribbean Cruises Ltd (RCCL) by STX Europe's shipyard in Turku, Finland, on 28 October. The 361 m long ultra-modern vessel is powered by six Wärtsilä 46 engines, including three 12-cylinder and three 16-cylinder Wärtsilä 46 engines in V-configuration, and Wärtsilä 5593 kW bow thrusters with a combined power output of some 20 MW that make the vessel easy to manoeuvre.

Over the decades, Royal Caribbean International has had several of the world's most-innovative ships in its fleet and, as its partnership with Wärtsilä stretches back 40 years, most of them have been powered by Wärtsilä engines. *Oasis of the Seas*, the world's most-innovative cruise ship at the time, was delivered just 12 months ago. "*Allure of the Seas* is *Oasis'* sister ship, with the same propulsion setup, the same thrusters, and the same specifications," said Fred Danska, Director, Cruise Business at Wärtsilä.

Allure of the Seas is 361 m long, has a gross tonnage of 225 000, 2700 staterooms, 16 decks and can accommodate about 6400 guests and a crew of 2200. She has 21 swimming pools and whirlpools, 24 restaurants, a floating park with 12 000 plants and more than 2600 theatre seats.

Like *Oasis*, the Wärtsilä engines installed in *Allure* also have common-rail injection. Combined with electronic control, this means that the fuel injection's timing, profile and duration can all be controlled accurately and even take place in stages, to provide improved low-speed operation, better load control and longer periods between overhauls.

Wärtsilä common-rail systems also ensure better combustion at all operating speeds and loads, lower fuel consumption, reduced NOx emissions and a reduction in exhaust emissions — giving smokeless operation at various engine loads. In engines of older design, it is practically impossible to optimise the fuel-injection characteristics for different loads and different fuels.

Solid and long partnership

Wärtsilä has long and extensive experience in providing propulsion solutions for the world's most-innovative cruise ships.

"What is truly remarkable is the long partnership between Wärtsilä and Royal Caribbean International," said Danska. "We've worked together since *Song of Norway* days." The cruise ship referred to was built at what was then the Wärtsilä shipyard in Helsinki, and delivered to Royal Caribbean in October 1970. Cooperation evolved into an agreement signed between the two companies in 2000.

Allure of the Seas
(Photo courtesy Wärtsilä)

"Our relationship is built on a solid foundation of trust and transparency, the essential prerequisite for a long-term partnership," said Danska. "We work very hard to truly understand both our customers' businesses and the needs of their customers. We've always done what is needed to be the forerunner in technological development: we were the first to implement common-rail technology in ships, and we are also at the cutting edge with emission-reduction technologies."
As they are sister ships, the good news about *Allure of the Seas* is that changes to the specifications of the equipment installed on *Oasis* have not been required. The feedback which Wärtsilä has received about *Oasis'* first 12 months in operation has been good.

"The experience we have gained from *Oasis* has been really good, everything has worked fine and the loadings have been optimal for the engines installed on the vessel," says Danska. Getting it right first time is good news because, with only a year between the deliveries of these two gigantic ships, making changes to the installed technologies would have been less than welcome.

The main engine room in *Allure of the Seas*
(Photo courtesy Wärtsilä)

MEMBERSHIP

Australian Division Council Meeting

The Council of the Division met on Wednesday 15 September, chaired by the President, Dr Stuart Cannon. Matters discussed at the meeting included:

Structural Standards Specified in the NSCV

Following the discussion on this subject at the June meeting, the Division has written to NMSC seeking reinstatement of AS4132 as a deemed-to-satisfy solution.

Tele/Video Recording of Technical Meetings

Council agreed to conduct a trial recording of a selected presentation to NSW Section to test the viability of this technology to facilitate transmission to other sections.

Division Council Elections and 2011 AGM

Council was advised that Council members who had been directly elected would reach the end of their terms at the 2011 AGM and that a number of members would not be eligible for re-election as they had reached their maximum uninterrupted term. A notice is therefore included in this issue of *The ANA* calling for nominations for Council members for the period 2011–2013. The Division's AGM is scheduled to be held in Sydney on Wednesday 30 March 2011.

NSCV Structural Standards

Following the letter to NMSC mentioned above, Council members Krokowski and McAlpine together with the Secretary met with NMSC staff on 24 October. The Division is likely to make further submissions to NMSC on continued acceptance of AS4132.

Rob Gehling
Secretary

Two ships of the Chinese Navy visited Sydney and Darwin in September and October as part of a goodwill voyage throughout the Asia-Pacific region. The training ship *Zhenghe* (above) and frigate *Mianyang* (below) left Sydney for Darwin on 24 September

(Photos John Jeremy)

NAVAL ARCHITECTS ON THE MOVE

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

Trevor Allan has resigned from ASC and has moved to Sao Paulo, Brazil, where he is evaluating opportunities.

Gordon Danton, a recent graduate of the University of New South Wales, moved on from Thales Australia and took up a position with Wood & Grieve Engineers, building services consultants, in Sydney. However, he has now moved on from there and has taken up a position as a manufacturing engineer with ResMed, a leading developer, manufacturer, and marketer of products for the diagnosis and treatment of sleep-disordered breathing, in Sydney.

Roger Duffield moved on from the Directorate of Navy Platform Systems many moons ago and joined the air-warfare destroyer project. He has recently changed roles and has taken up the position of Platform System Construction, Design Acceptance Representative with the AWD Alliance in Adelaide.

Matthew Fox, a recent graduate of the University of New South Wales, has been travelling in Europe and the UK and expects to be back in Australia in December.

Rohan Frost, a graduate of the Australian Maritime College, has taken up the position of Research Engineer at the AMC's National Centre for Maritime Engineering and Hydrodynamics in Launceston.

Mark Hughes moved on from Gibbs & Cox many moons ago, and took up a position consulting in civil engineering in Melbourne, with clients including TransUrban and Thiess. He has now moved to Jeddah, Saudi Arabia, and continues consulting with clients including Saudi Aramco, the Royal Saudi Navy and the Saudi Arabian National Guard.

Jun Ikeda has moved on from Clough, and has taken up a position with Dof Subsea Asia Pacific in Perth.

Jude Kennedy has returned from Navantia, Spain, on the air-warfare destroyer project and has taken up the position of Operations Manager, Platform System Design Cross-Product Team with the AWD Alliance in Adelaide.

Bryan Kent, a recent graduate of the University of New South Wales, has taken up a position as a trainee naval architect with Incat Crowther in Sydney.

Henry Morgan, after graduating from the University of New South Wales, moved on from the NSW Maritime Authority and headed overseas, taking up a position for nine months with Camarc Ltd in Shoreham, UK, a company which designs workboats, primarily pilot boats and patrol boats. He has now returned to Australia and is evaluating opportunities.

Paul O'Connor has moved on within Lloyd's Register, and has taken up the position of Client Support Manager in their Sydney Design Support Office.

Kalevi Savolainen has moved on from Strategic Marine and has taken up a position with the Caterpillar Governmental Marine Excellence Centre (CAT GMEC) in Perth, a group exclusively focussed on the delivery of governmental and military marine propulsion and power-generation solutions for the world's navies, coastguards, customs and fisheries.

Tim Sexton has moved on and has taken up a position as a surveyor with the WA Department of Department of Planning and Infrastructure in Fremantle.

Rob Thompson, a graduate of the Australian Maritime College, has taken up the position of Investigator with the New Zealand Transport Investigation Commission in Wellington, New Zealand.

Peter Tomic has moved on from Strategic Marine in Vietnam and has taken up the position of Engineer at AMC's Towing Tank and Model Test Basin in Launceston.

Drew van Ryn, a recent graduate of the University of New South Wales, has converted his part-time position to full-time at Barracouta Sails in Sydney.

Sam Wilson-Heffenden has moved on from BMT Design & Technology and has taken up a position as a naval architect with Incat Crowther in Sydney.

Konny Zurcher, a recent graduate of the University of New South Wales, has converted his part-time position to full-time at Digital Wranglers, an IT company, in Sydney

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

Phil Helmore
Mark Symes

NOTICE
NOMINATIONS FOR ELECTION TO DIVISION COUNCIL

In accordance with the By-Laws of the Division, Corporate members are invited to nominate for the seven directly-elected positions as members of Division Council, for a term or two years commencing after the Division's 2011 Annual General Meeting. Written nominations, duly proposed, seconded, and endorsed by the nominee, must reach the undersigned no later than Friday 17 December at the address listed on Page 1 of this issue or email rina.austdiv@optusnet.com.au.

Rob Gehling
Secretary

FROM THE ARCHIVES

MV *Kooringa*

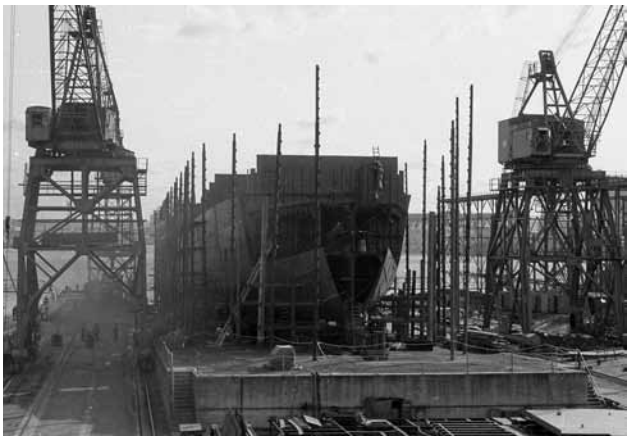
In this edition of *The ANA* we record the late Don Gillies' responsibility for the design and construction of the world's first purpose-built fully-containerised container ship, MV *Kooringa*, during his time as Superintendent Engineer of Associated Steamships Pty Ltd.

The development of containers for the carriage of cargo by sea during the 1950s revolutionised international trade as containers were standardised and adopted throughout the world. The early container ships were conversions of existing ships. By the late 1950s containers were being used for some interstate trade in Australia but their use was hampered by the lack of handling facilities in ports and the limited capacity of ship-fitted lifting gear. Moreover, the stowage of containers in existing ships with hulls not designed for cargo in large boxes was inefficient.

McIlwraith McEacharn's *Kooringa* was designed specifically for containers and was fitted with two mobile gantry cranes, with outriggers both port and starboard, which could lift containers to and from the ship's stowage cells. When fully loaded, *Kooringa* could carry one hundred and seventy-six 3 ton containers, seventy-eight of 17 tons and twenty of an intermediate size. She had a speed of 16 knots.

Kooringa was built at the State Dockyard in Newcastle, NSW, and was launched on 29 February 1964. She entered service on the Melbourne–Fremantle route in June that year.

In 1976 *Kooringa* was sold overseas and renamed *Island Container*, registered in Panama. She changed hands twice more, becoming *Fair Union* in 1989 and *United Way* later the same year. She was broken up in China in 1992.



Kooringa under construction at the State Dockyard, Newcastle NSW
(Photo John Jeremy)

Launching day — 29 February 1964
(Photo John Jeremy)

Kooringa on trials
(State Dockyard photo)

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Picture courtesy of BAE Systems Marine Ltd.

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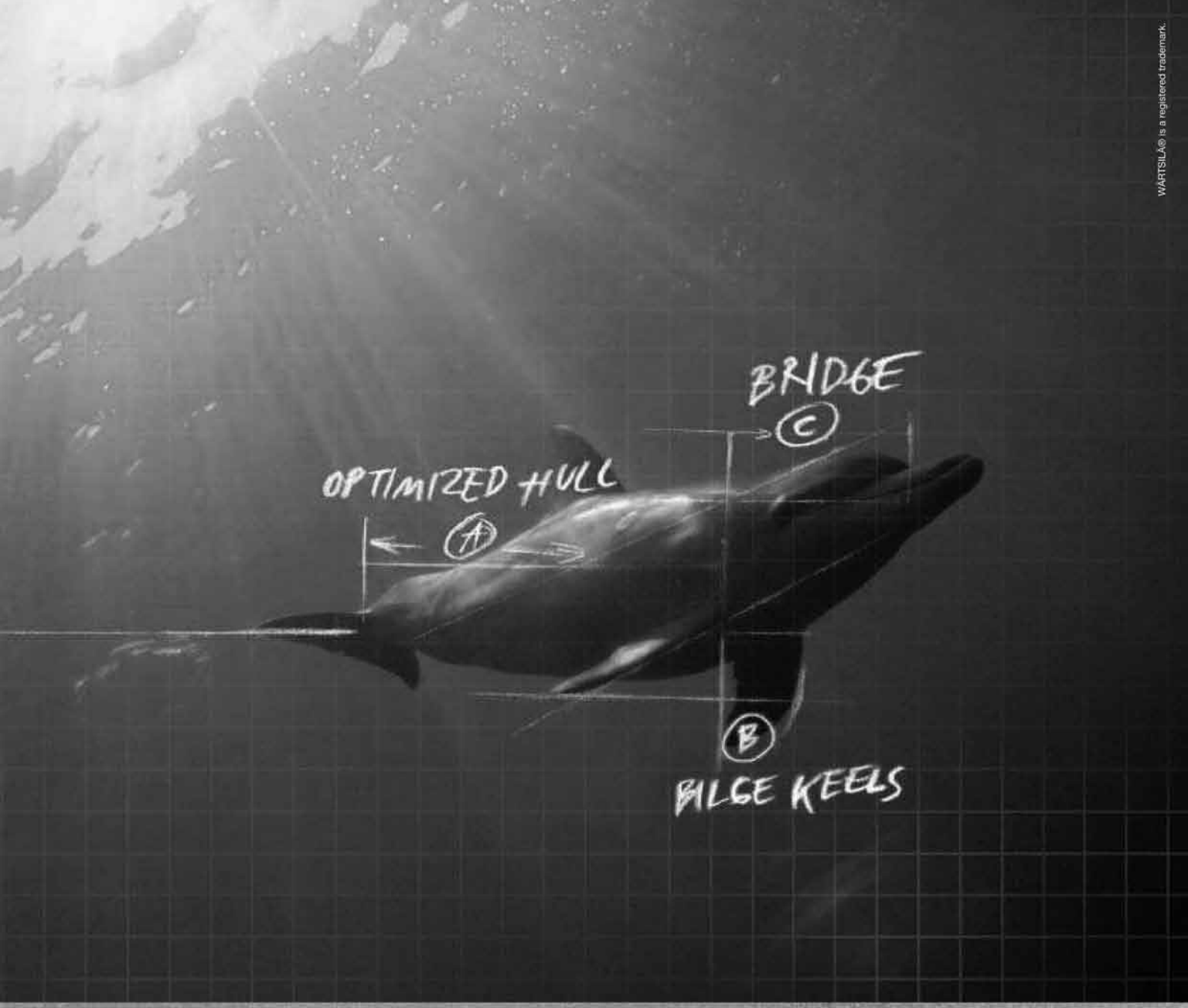
Wärtsilä in Australia:
Adelaide, 283–287 Sir Donald Bradman Drive, Brooklyn Park, SA, 5032. Tel: +61 8 8238 3473
Sydney, 48 Huntingwood Drive, Huntingwood, NSW, 2148. Tel: +61 2 9672 8200
Perth, 19 Alacrity Place, Henderson, WA, 6166. Tel: +61 9 9410 1300



NOTICE HOW ALL THE PARTS FIT TOGETHER.

Wärtsilä now offers the marine industry total solutions that cover everything from design to lifecycle service. This makes our solutions uniquely efficient and environmentally sound. Read more about what we can do for you, wherever you are: wartsila.com.

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Wärtsilä in Australia:
Adelaide, 283–287 Sir Donald Bradman Drive, Brooklyn Park, SA, 5032. Tel: +61 8 8238 3473
Sydney, 48 Huntingwood Drive, Huntingwood, NSW, 2148. Tel: +61 2 9672 8200
Perth, 19 Alacrity Place, Henderson, WA, 6166. Tel: +61 9 9410 1300
Main Contact: Chris Field, Senior Sales Manager — Ship Power and Navy, email: chris.field@wartsila.com