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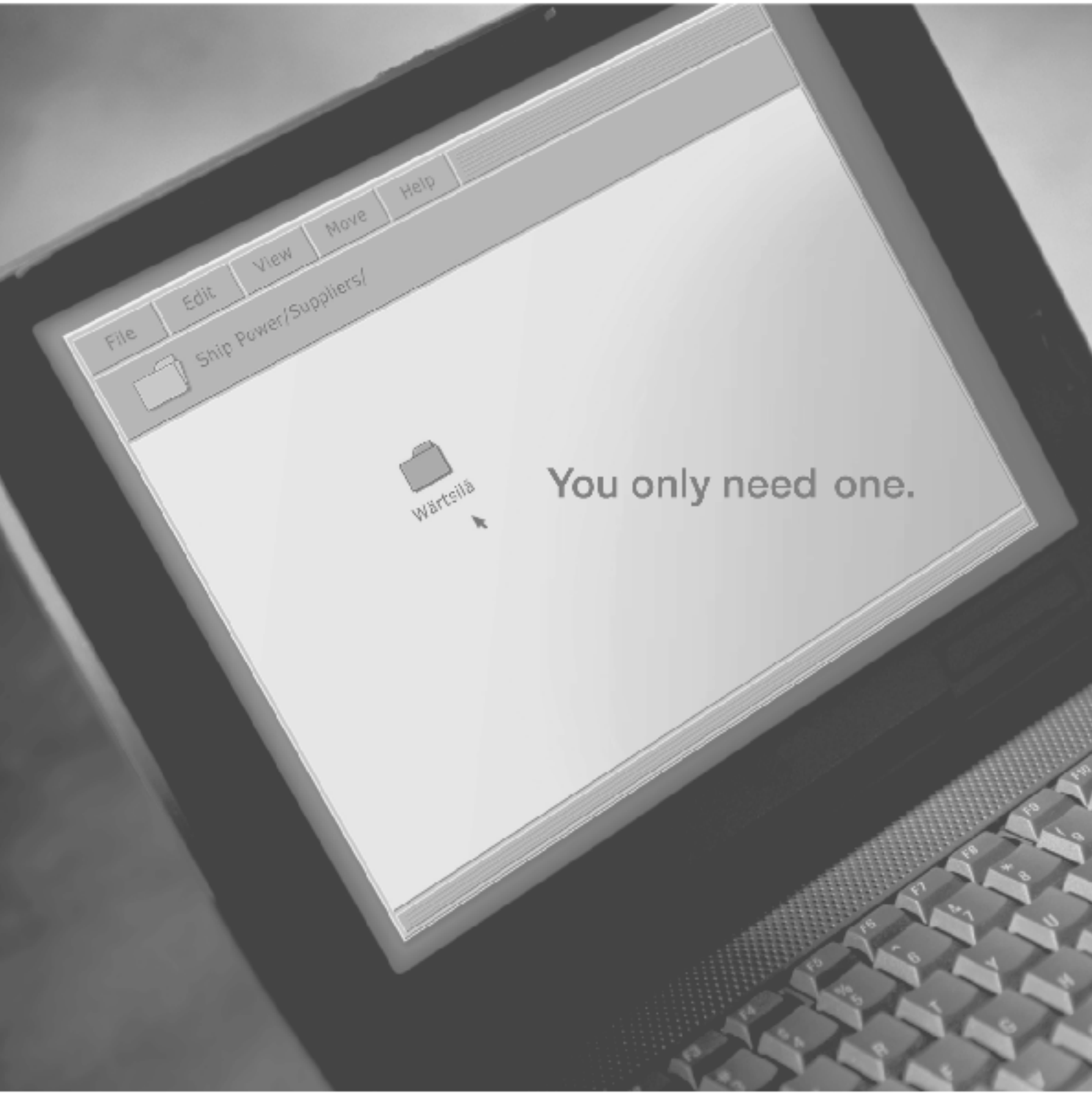

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Cover Photo:

Designed by Crowther Designs in Sydney and built by NQEA Australia in Cairns, *Pvt Sorensen* is the first of two 22 m catamarans to be operated by Kwajalein Range Services for the US Army base in the Marshall Islands (Photo courtesy NQEA)

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RINA Australian Division
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From the Division President

As you may recall, this column in the August issue of *The ANA* included mention of the Division's proposed submissions in response to the request for public comment regarding two documents issued by the National Marine Safety Committee (NMSC) as part of the development of the National Standard for Commercial Vessels (NSCV). These were the draft Fire Safety Section of NSCV and the Issues Paper on Construction requirements of NSCV.

For those of you who are not familiar with NSCV, it is the document intended to update and replace the Uniform Shipping Laws (USL) Code as *the* standard for design, construction and equipment of un-classed commercial vessels operating within Australian waters. Accordingly, with the increased usage of commercial standards for naval support vessels, the contents of the NSCV will most likely impact on virtually all naval architects working in Australia.

I should acknowledge at the outset that every naval architect will have his or her own philosophical and/or experience-based approach to the subject of the form standards such as these should take. It is therefore impossible for each and every one of these individual views to be formed into a position that could be put forward as representing the Division, let alone the Institution as a whole.

So, in considering the shape of any submissions made in response to calls for comment such as by NMSC, the Division needs to consider the fact that, as the pre-eminent professional body in Australia for naval architects, it is in a unique position to provide broad-based advice to public bodies on naval architectural standards. Such advice should be aimed at providing the community with appropriately-high levels of safety that can be implemented in practice. The Division Council has agreed that such submissions are central to the Division's role in the community.

Before discussing the submission made in relation to the Construction issues paper, I should point out that the Division has made submissions with regard to the issues paper on NSCV Fire Safety and the draft Fire Safety requirements. These submissions, for which I must thank Bob Herd, Mike Seward and Graham Taylor for their contributions in various forms, have resulted in a set of requirements that should provide an appropriately-high level of public safety.

In the case of the development of the NSCV Construction requirements, the issues paper declared that everything was up for grabs, including the standards themselves and the mechanism for their implementation. In common with all NMSC standards, the situation is complicated by adoption of the performance-based approach, but this is something of a side issue.

Rightly or wrongly, assembly of the Division's submission became my responsibility in the days leading up to the 31 August deadline for submissions. I attempted to contact not only members of the Division's Safety Group, but also other members who had indicated to me that they had views on the subject. Lina Diaz was instrumental in promoting awareness of this public comment process through her emails to members in NSW and these were also forwarded to Section secretaries in other states. This consultation resulted in a submission which I consider to be worthy of the Institution's name as it provides appropriate weight to satisfactory experience with the existing requirements of the USL Code and to measures that would assure public safety. The main points of the submission are:

- Delete the present USL Code coverage of copper-nickel and ferro-cement construction.
- Retain USL Code Section 5L for steel vessels <60 m.
- Use AS 4132 or similar for aluminium and FRP vessels <35 m, updated as required, and possibly develop similar requirements for other materials.
- ISO 12215 is too restricted in its intended application to use as USL replacement.
- Conventional steel vessels >=60 m and others >=35 m to be built and maintained in class.
- Reject term-contract and "open market" class options as unworkable.

As mentioned above, achievement of a consensus view across the membership was never going to be possible and so it proved to be. Some members were critical of various aspects of the submission. Phil Helmore subsequently suggested that, in view of the interest raised by the submission, members views could be further fleshed-out through the NSW Section convening a forum in Sydney on the subject. With assistance from NMSC in making the necessary arrangements, this idea was turned into reality and extended to include a similar forum in arranged in Fremantle by the WA Section. Both forums, held in the second half of October, were structured to discuss not only the Issues Paper and the RINA submission, but also an expanded list of options involving the use of classification society rules and resources.

The forums, attended by a total of 47 members and guests representing a wide cross-section of those potentially impacted by the NSCV Construction section, covered this subject matter broadly and comprehensively through well-informed and sometimes spirited discussion. Attendees were encouraged to make individual submissions, although a summary of points made was subsequently submitted to NMSC.

I'm not sure if the forums produced sufficiently conclusive outcomes to assist in determining a direction for the NSCV Construction section from an NMSC perspective. This will no doubt be firmed-up at a workshop to be held by NMSC in late November, where all public comment will be assessed. I hope to attend and, no doubt, will have more to report to you on the subject.

Some would say that I'm biased, but from a RINA perspective I would suggest that this exercise illustrates not only the important role of RINA in the community but also the fact that our Division's worth to the community at large is much greater than the sum of its constituent individuals.

On that note, I'd like to extend Seasons Greetings to you and your families and would urge those of you who can to celebrate with me at the SMIX Bash in Sydney on 2 December.

Rob Gehling

Letters to the Editor

Dear Sir,

Following up our recent earnest debate on the use of U-tubes or pendulums for inclining experiments, I would like to take the opportunity to recommend an instrument to take the place of the calibrated hydrometer. The instrument I am using is a hand-held Automatic Temperature Compensated Salinity Refractometer, Model No. SA-5ATC, purchased from ISSCO, Sydney.

This instrument is a portable (125 mm long by 25 mm diameter) laboratory instrument, widely used in the aquaculture industry. It can be self-calibrated using distilled water at 20° C and, if the attending surveyor wishes, can be witness calibrated on the day. Readings are through an eyepiece with accuracy quite readily to half points. This may sound like an advertisement but, having peered over the top of a bucket and attempted to get an accurate reading on a hydrometer quite a number of times, once you have used the refractometer, you'll never return to the 'old ways'. With one or two drops of water (still from a bucket) readings are quick and very accurate.

Alan Muir

Dear Sir,

I have recently transferred to the naval architecture degree plan at The University of New South Wales following the completion of my initial years of a mechanical engineering degree at the University of Melbourne.

I am really enjoying the new course and have found it to be a big improvement over the degree offered at Melbourne. The standard of teaching is far higher, class sizes are smaller, there are better resources, and a there is much closer interaction with industry.

What surprises me, however, is how poorly known the existence of UNSW's naval architecture degree is in other tertiary institutions, and how little it is publicised in schools and universities around the country. I only became aware of the degree through contact with previous students, and I would imagine that the vast majority of tertiary engineering students (especially those outside NSW) have no idea that the plan exists.

With mechanical engineering degrees having one of the highest non-completion rates of any degree in Australia, it seems that there is a great opportunity to further publicise the existence of the plan. This would attract some of the large number of disaffected mechanical engineering students who have started their course, but are desperate to transfer to something more interesting without sacrificing their initial years of study.

Increased publicity to the mechanical engineering departments of universities across Australia, as well as into school classrooms, could help increase the currently-low number of naval architecture students at UNSW.

Campbell Baird
UNSW Student

[*Naval architecture has only ever been a low-demand plan, and is likely to remain so in comparison with other plans. However, there are currently more students enrolled in naval architecture at UNSW than ever before* — Ed.]

Dear Sir,

I am currently studying for my Bachelor of Engineering degree in naval architecture at The University of New South Wales. During the first session of this academic year, the third-year naval architecture students undertook a course, Ship Practice, which involved visits to industry. One of these visits involved a trip to International Catamaran Design Pty Ltd, the purpose of the visit being to introduce us to a large naval architecture consultancy.

After visiting Incat, I was somewhat disappointed as I had expected 'large' to mean a business employing thirty or more people, whereas Incat had about fourteen. While I was not disappointed with Incat (they design marvellous fast ferries), I was quite disheartened about what my prospective job opportunities would be once I graduate.

With twelve students in my class, it seems to me highly improbable that we will all be able to secure jobs in the local industry once we graduate, and many of us may have to look overseas or even change industries. This is a great shame as, after four years of being educated locally, most of us may never work in the local industry.

It is therefore my view that more must be done to encourage the growth of the local industry. While our high labour costs prohibit the construction of large ships, our design firms should be looking to establish a reputation as world leaders by specialising in certain types of vessels.

Australia needs firms large enough to train and develop graduates as, at present, most firms don't have the resources or time to train fresh recruits.

Robert McConachie
UNSW Student

[*Your job prospects are much better than you think; in fact, the only UNSW graduates who do not find jobs in naval architecture at the moment are ones who go into other areas for other reasons (such as travel)* — Ed.]

Dear Sir,

As a second-year student in the School of Mechanical and Manufacturing Engineering at The University of New South Wales, about to narrow one's studies to naval architecture in the third year, the outlook can be rather daunting. We've all experienced the quizzical looks that are given when your field of interest is discovered: "Oh! So you're going to join the Navy!"

Worries quickly evaporate, however, once you begin your third year and begin the naval architecture courses. "Great minds think alike" is definitely to be applied here and, with small classes and teaching material this esoteric in nature, you soon feel part of the family of naval architects.

The necessary industry visits, and the wealth of first-hand knowledge and experience brought to class by the lecturers, provides welcome relief from the tedium of two years' groundwork study of maths and mechanics.

I can only hope that, once the degree is completed and the job applications sent, the broader industry is just as accepting. From first impressions, I don't think there will be any trouble.

Simon Orr
UNSW Student

NEWS FROM THE SECTIONS

Tasmania

Section Meetings

The Tasmanian Section Committee has met twice in recent months. Topics discussed included a review of the 2004 seminar series and plans for the 2005 seminars, input for *The Australian Naval Architect*, student membership and social events.

Small Boat Drawers Club Meetings

At a recent Section Committee meeting there was strong support for the re-introduction of the once-popular local RINA social events known as the Small Boat Drawers Club Meetings — which roughly translates to a number of local naval architects, students and anyone else interested in talking any aspects of boats, meeting for a counter meal and drinks. The first of these events, held in August, was a pleasing success and another event is planned for early December.

Gregor Macfarlane

Queensland

The Queensland Section held a technical meeting followed by a Section committee meeting on 14 September at Forgacs Cairncross Dockyard at Morningside in Brisbane. The technical meeting began with a guided tour of the dockyard and the graving dock by Ross Mierendorff, the Dockyard General Manager.

The French Navy auxiliary vessel *Jacques Cartier* was in dock for maintenance and the decommissioned destroyer *Brisbane* was berthed alongside. *Jacques Cartier* is an 80 m light transport and landing ship with a bow door for loading vehicles as well as a helipad at the stern. HMAS *Westralia* was recently docked and HMAS *Success* is expected to be docked next February. Asbestos and zinc chromate is to be removed from *Brisbane* and her fuel tanks cleaned before she is sunk as a dive wreck off the Sunshine Coast.

The graving dock, which can be emptied in five hours, is 236 m long with a single caisson. A very high-pressure water cleaning system with a mechanical arm supported on either side of the dock is used for hull cleaning and an abrasive blasting system using recycled glass is also available.

Forgacs anticipates that its main clients in future will be the Australian Department of Defence and emergency commercial repairs, as competing dockyards in China, Singapore and Vietnam have cheaper pricing structures.

After the workplace visit, Ross Mierendorff gave a talk on Cairncross' capacity and capability and answered many questions for the meeting. Forgacs are planning to tender for the construction of two large amphibious vessels for the Royal Australian Navy. These would be fabricated in sections in their Newcastle facility, barged up the coast and assembled at Cairncross. The contract is estimated at $2.5 billion, and the cost of tendering will be $5 to $6 million. The construction will extend over ten years and the current work-force of sixty-five would expand to over four hundred if the tender were successful. Forgacs is experiencing a skill shortage and expects that an increase in apprentices will also be required.

Items raised at the Section committee meeting held after the technical meeting included discussions on the development and introduction of the Queensland TAFE Ship and Boat Design Courses. Further information on this subject can be found in the minutes of the committee meeting, which can be obtained from the Section secretary.

Brian Robson

Victoria

Our Victorian Chair has taken a Defence Scholarship to work with the Canadian Department of Defence in Nova Scotia. This has left his position free if anybody is interested in this role.

The last technical presentation was held on Monday 18 October at Engineers Australia. Dr Geoff Goodwin from DSTO presented a paper on his recent activities modelling hydraulic flow. Unfortunately I was unable to attend since I was in Launceston assisting with the assessments of the final year projects. I will take this opportunity to report that the quality of the projects, which cover a diverse range of topics, was excellent.

The dates for next year's technical presentations have been set although the topics have not yet been finalised. The venue is Engineers Australia, 21 Bedford St, North Melbourne, starting at 5:30 for 6:00 pm and finishing by 7:30 pm. The following dates (all Thursdays) have been booked and should be entered into your diaries: 10 February, 14 April, 9 June, 11 August, 13 October and 8 December.

Stuart Cannon

New South Wales

The NSW Section Committee met on 7 September and, other than routine matters, discussed:

- SMIX Bash: The flyer has been updated and will be circulated by email soon; the sponsorship target of $10 700 has been pledged and some have already paid; Bill Bollard has the raffle model under construction, and some further raffle prizes were suggested and will be followed up; deposits for catering and hire of *James Craig* have been paid.
- Technical Meeting Program for 2005: Possible topics include: Conversion of a Train Ferry to a Hospital Ship, Design and Construction of the Army Watercraft, Reflagging of *Westpac Express*, the Air-warfare Destroyer Project, Wave Loads on Ships, and Conversion of *Delos* for the RAN. Possible visits to new-generation cruise vessels visiting Sydney also to be investigated.
- Finance: The Section account at 31 August was $166 in the red (i.e. being supported by the Social account), but we have payments for several venue hires due which will put the Section account back into the black.
- Comment on the Fire Safety and Construction Sections of the NSCV: The Safety Committee of RINA had made

a submission to the NMSC on these two sections, and some committee members had differing views. It was decided that all members should be encouraged to comment individually, and would be asked so to do by a circular email message.

Automation in Container-handling Operations

Prof. Hugh Durrant-Whyte of the ARC Centre of Excellence for Autonomous Systems gave a presentation on *Automation in Container-handling Operations* to a joint meeting with the IMarEST attended by twenty-five on 4 August in the Harricks Auditorium at Engineers Australia, Milsons Point. The ARC Centre of Excellence for Autonomous Systems, while based at the University of Sydney, is a joint venture of the School of Aerospace, Mechanical and Mechatronic Engineering at the University of Sydney, the School of Computer Science and Engineering and the Mechatronic Engineering Plan (in the School of Mechanical and Manufacturing Engineering) at The University of New South Wales, and the Mechatronic Engineering Department at the University of Technology, Sydney. There are eight such ARC (Australian Research Council) centres of excellence, but this is the only one in engineering, and it links three Sydney-based universities. They receive a six-year block grant from the Federal Government, currently employ about 120 staff and research students (expected to grow to 200), conduct research and, equally importantly, also develop and apply the results.

Hugh then showed photographs and videos of some typical applications of automation to transport and materials handling, especially in the field of unmanned outdoor vehicles.

In mining, the haulpaks cost $3 million each, carry 200 t of ore at a time, and are being automated so that they operate without a driver. This is not to save labour, but so that the vehicles are driven more smoothly, have longer periods between maintenance, and last longer. Similarly with underground equipment.

In the defence area, the US Office of naval Research, the US Army, the US Air Force and British Aerospace are all interested in unmanned aircraft. Singapore is interested in unmanned tanks and jungle-able vehicles, and Australia and the USA (in particular) are interested in unmanned bushfire-fighting equipment.

In the subsea area, the interest is in unmanned vehicles which need the ability to navigate without GPS or a terrain model, and they must build their own terrain model from sonar.

Automated Container Handling

This is one of the simplest outdoor operations for automation. It is a highly-structured environment, and the tasks are well defined. The payoffs in automation come from high equipment utilisation, productivity levels at least equal to manned vehicles, a safe and efficient interface with port personnel and equipment, and there is no increase in maintenance skills and equipment required.

The technical challenges come from the large, high-speed vehicles moving around the terminal, which are free ranging and therefore need accurate sensing of position over a long range and precision control of complex drives. They need high reliability, and anytime operation, and each has to operate as a subset of a larger system.

The Frait Project at ThamesPort

This was Hugh's introduction to container automation in 1990–93, when he was called in to advise on the ThamesPort operation in London. This was designed from the outset to be automated, and operated with rail-mounted gantry cranes and flatbed movers. The vehicles were manufactured by Terberg, and were diesel-hydraulic flatbeds, using 3 mm wavelength radar for navigation and collision detection. These worked successfully, as Hugh showed in a video of the operation.

The lessons learned from this venture were that the support and involvement of the end user was essential at all stages, they needed a longer time-scale than envisaged so as to allow for mistakes, and that the start-up approach was not viable. The systems engineering had to be integrated with the operation, and was crucial for success. The whole project failed for technical, not academic, reasons.

The Enhanced Straddle Carrier Project

In 1996, Corrigan had taken over at Patricks, and wanted to improve the flexibility on the waterfront. This was a second chance at automating the container-handling operation, and to use the lessons learned from the first attempt. The straddle carriers have a mass of 65 t, are 30 m high, and roar around the terminal at 35–40 km/h. In the development of the enhanced straddle carrier, they worked on the systems engineering, making sure that they had the components in place which would ensure the successful operation of the whole system. They worked hard on the integrity of the navigation architecture and the safety systems, and retained the intellectual property rights. They let out the development of the machine controller to the carrier company, Kalmar, which supplied the straddle carriers, and this company now incorporates much of the controller hardware in its standard (manually-operated) products.

Before moving, a straddle carrier must compute possible vehicle routes, define the events required for the move, and test the trajectories for correctness. During a move, it must monitor the sequence, check for errors, and integrate with traffic-control directions from above. Task control is at the heart of the vehicle operation, and uses the vehicle model to generate velocity and steering trajectories, and execute the computed trajectories.

The vehicle model is a key part of the high-value intellectual property. It takes account of wheel radius changes, slipping and skidding, rolling and pitching, and steering mis-alignment.

The Navigation System

The navigation system incorporates a lot of ideas learned from previous experience. There are two separate navigation systems; a GPS inertial system and a radar encoder, with fault regimes for each. The results of the two systems are compared and, if they agree, a composite result is used; if they do not agree, then which is in error is worked out so that the operation can proceed. This is also a very successful part of the intellectual property.

The radar is based on 3 mm wavelength, having a narrow (one degree) beam, giving very high accuracy. The benefits

are that it can see through rain, dust, and darkness, making the operation independent of conditions. The radar detects range and bearing to a set of beacons around the terminal, checking each at 20 Hz (i.e. 20 times per second). The GPS system has 2 cm precision and updates position at 10 Hz.

Safety

There is continuous monitoring of the vehicle's health, and the machinery is shut down immediately on the failure of any major component. Likewise, there is continuous monitoring of the integrity of the software.

Barriers are placed to keep personnel away from the operation; there is a fence around the whole terminal, and breaking of the optical barriers at the gates causes an immediate shut down of the terminal.

Collision-detection equipment is the last line of defence, and each vehicle is provided with laser scanners to check for anything unexpected. Bumper bars on the four vehicle corners are psychological protection only, as 65 t travelling at 40 km/h kills!

Kalmar also developed the pick-and-place system, with optical barriers on approach, and the sonar/infra-red sensors for spreader docking with the container.

Research and Development

Hugh showed a video of their initial experimental operation in the research phase at Port Botany. Here they concentrated on the systems engineering, design and testing of the control algorithm, incorporation of the navigation sensors, and integration of the pilot.

In the first development phase, they were able to leave the systems engineering largely unchanged, having got most of it right the first time. There was some new hardware design to be done, and integration with the Kalmar systems, port management and Patricks. This then had to be expanded for multi-vehicle operations.

In the second development phase, they concentrated on the tele-operations, the handler interface, the crane interface, and development of operational procedures.

Implementation

The system has been implemented at Berth 7, Fishermen's Island in the Port of Brisbane. The terminal is in Brisbane, but the controller is in the Patricks terminal in Sydney! Berth 8 at Fishemen's Island is scheduled for implementation next. Hugh showed a video of Berth 7 in operation.

Efficiency at Patricks has improved dramatically, and Berth 7 is now one of the most technically-advanced container terminals in the world. Patricks Technology, a new start-up company, will be busy exporting the technology to other terminals around the world.

Conclusion

Strong collaboration has been essential to the success of this project. They received strong support from Corrigan all the way through, and this helped enormously.

Current work includes support for Patricks in the key technical areas of navigation and vehicle control, and in expanding to control of other equipment, such as quay cranes. The challenge lies in the automation of whole logistics networks, from ship to shore, at rail heads, etc.

Successful technical development relies on a few key ideas in navigation and control. There has been a common focus for the centre staff and the industry partner, and dedicated work by both over a long period.

Questions

Question time was lengthy and drew out some further interesting points.

The big development areas for automation are in mining, agriculture (fruit picking, etc.), bushfire fighting and defence vehicles. All of these present challenges. The container terminal is a very constrained environment, but public roads aren't. With cars there are legal issues, personnel issues, and automated control will not happen in the foreseeable future.

In the mining industry, 50-70% of the cost is in the haulage. However, lots of smaller trucks would usually involve lower cost and, in fact, CRA are now re-thinking the operation. Automated trucks are coming, and have already been demonstrated by Caterpillar and Komatsu. There is also a lot of work being done on long-haul routes, such as at Weipa, where the drivers tend to fall asleep.

For rural fire services, this is a brilliant challenge, as it is a very unstructured environment, and you need to know not only where the fire is, but what it is best to deploy, and where to put machinery that you can't put a person, etc. However, unlike the mining industry, there is no money for research in this area. Politicians are more interested *showing* that they are trying to do the right thing, as opposed to actually doing it.

The terminal in Brisbane has been set in operation with the cooperation of the unions. Brisbane was chosen deliberately, not Sydney or Melbourne. However, having operated successfully in Brisbane, it will not be long before Sydney and Melbourne both start.

Straddle carriers use a map provided by the terminal. However, in underwater operations, in mining, and in the jungle, the map of the terrain changes daily, and must be updated on site, so both optics and radar are necessary.

The Delta terminal at the Port of Rotterdam has been automated for at least ten years. However, they use magnetic transponders buried in the tarmac, and speeds are limited to 3 m/s (10.8 km/h) which is regarded as slow these days. They use flatbed carriers, and they queue up like a conveyor belt. They are not worried about productivity levels, and have only one route, which is why they were not used here. The Port of Singapore Authority used the Rotterdam model, and Australia can now easily out-perform it with, typically, 40 movements per hour.

The movement of containers on and off the ships with portainer cranes can also be automated, but it needs the political will, as quay cranes require enormous investment.

The vote of thanks was proposed by Don Gillies, who expressed surprise that the NSW Premier, Bob Carr, had not already employed Hugh to begin automation of NSW's State Rail! The vote was carried with acclamation. If you missed this one, then you missed a cracker of a presentation.

What If? A Desktop Emergency Response Exercise

The Hon. Justice Greg James presided over a panel

comprising port personnel, emergency service personnel and shipboard personnel to simulate a "hypothetical" situation, involving a tanker at the bulk liquids berth in Port Botany, *What If? A Desktop Emergency Response Exercise*, held at Blake Dawson Waldron in Grosvenor Place, Sydney, and attended by sixty-one on 25 August. The meeting was sponsored by Sydney Ports Corporation (Marine Operations), The Company of Master Mariners of Australia (Sydney Branch) and the Nautical Institute (South East Australia Branch).

The Players

The panel was formed by representatives of the following services:

Sydney Ports Corporation	General Manager (Operations) and Harbourmaster
BP Gas Tanker	Master
NSW Fire Brigade	Inspector and two Superintendents
NSW Police	Inspector and Sergeant
Adsteam Tugs	General Manager and Tug Master
Australian Maritime Services	Operations Manager
Elgas	Cabin Manager

The evening was based loosely on Geoffrey Robertson's *Hypotheticals*, with 120 questions being posed to the various members of the panel by the Hon. Justice Greg James.

The Scenario

The scene was set by Peter McQueen of Blake Dawson Waldron, showing (with the aid of slides) the bulk liquids berth in the north-west corner of Botany Bay, with a 50 000 dwt tanker at the berth about to depart and another tanker due to berth at midday, with a southerly buster forecast.

The first questions elicited the requirements or berthing at the bulk liquids berth, by way of tides, under-keel clearance, number of tugs, time taken, radio reporting, etc.

The scene developed with a crankcase explosion on board the tanker at the berth, and the questions elicited what would be happening on the ship, notifying authorities, etc. The explosion then developed into a fire which spread, and quickly involved the Fire Brigade, Police, Adsteam (for towage of the due tanker and, subsequently, for the removal of the flaming vessel) and Elgas (for the safety of gas storage at the berth). The arrival of the southerly buster pushed the scenario along, with the wind fanning the flames, and a smoke pall drifting over to the airport and affecting operations there. The safety of the bulk liquids berth itself was eventually on the line, and at that stage, the Sydney Ports Corporation have the statutory powers to order the dangerous vessel to leave port.

Conclusion

The evening was interesting for many involved in the marine industry, and it was good to see naval architects Graham Taylor, Barry Cleary, Laurie Prandolini, and visiting Prof. Tom Lamb from the University of Michigan in the USA there. The vote of thanks was proposed by the Hon. Justice Greg James.

Design for Production

Prof. Thomas Lamb of the Department of Naval Architecture and Marine Engineering at the University of Michigan, and editor of SNAME's new two-volume edition of *Ship Design and Construction*, gave a presentation on *Design for Production* to a lunch-time meeting of students, staff and industry in the School of Mechanical and Manufacturing Engineering at The University of New South Wales attended by twenty-eight on 26 August.

Prof. Lamb began his presentation with some background on the Department of Naval Architecture and Marine Engineering at the University of Michigan. The university itself is situated in Ann Arbor, Michigan, which is cold in winter and too hot in summer. The program in naval architecture and marine engineering was the first of its kind in the USA, 35–40% of graduates in the USA come from UM, and each graduate receives four or five job offers. They have fifteen faculty and research staff, about 110 undergraduate and 70 postgraduate students in naval architecture and marine engineering, with world-class facilities including a towing tank.

What is Design for Production?

Design for production might just as well be labelled "Design for X" (DFX) where X may represent one or many of a whole host of items. It has been necessary to develop the DFX approach because designers have not stepped up to the responsibility to prepare their designs to meet all these requirements, not only in the shipbuilding industry but in many others as well.

DFX covers many areas: design for manufacturing, design for assembly (recently called lean design), design for production, design for operation, design for maintenance and design for disposal.

Design for Production is the deliberate act of designing a product to meet its specified technical and operational requirements and quality so that the production costs will be minimal through low work content and ease of construction. All designs should be prepared to suit a shipyard's facilities and preferred production methods.

Why has it been necessary to develop a specific discipline to achieve what should have been obvious? Engineering designs should be prepared and transmitted to the users in a way that best suits the way they build their ships. DFP takes into account production methods and techniques that reduce the product work content, but still meet the specified design requirements and quality. DFP must be incorporated into a design from the start. Traditional engineering leaves it up to another department, such as Production or Manufacturing Engineering, to develop the technical documentation required by the production workers. This is an un-necessary duplication of effort and is a non-value-added task that takes time.

The basic goal of DFP is to reduce work content, and structural-detail decisions should be based on this. Minimum considerations include block breakdown/size/weight, the number of parts, joint weld length, type and position, and completion of spaces/tanks within blocks. The design and production departments must work together interactively.
DFP is not improvements in facilities, improvements in

materials, or alternative shipboard equipment *unless* DFP was the major driver in bringing about the change.

Hullform DFX

The design of the hullform should consider the material of construction. Prof. Lamb showed a series of slides comparing wooden barrels to carvel/clinker timber construction, steel drums to developable-surface hulls, and pointed out that many shapes are difficult to build with steel or aluminium plates. A sphere, for example, is not developable (you can't lie the peel of an orange down flat). Developable surfaces can be cut out from paper (or steel or aluminium) and formed into 3D surfaces. Most bodies, however, are not developable, and here he showed a bulbous bow comprising developable surfaces.

Some of the things which can be done to maximise the producibility of hullforms are to maximize the extent of parallel body, maximize the flat of bottom and flat of side, use a straight-line stem profile, use a flat vertical transom, make sure the forefoot shape has fair frame lines, select a bilge radius so that one plate width can handle the bilge strake, and to eliminate shape that forces a decision to use castings in the stem and stern. On the other hand, castings for the forefoot and heelpiece may be more economical than fabrications if they are to be supplied for a production run of 70 DDGs!

Research in DFX

World War I drove the first research into ship producibility by the war need for ship capacity. Early researchers included McEntee (1917), Sadler (1918) and, in 1918, the "N" (National)-type standard ship in UK. In the post-war era there was less interest in simple hulls, and follow-up publications were based on WW I research.

In 1923, Robb in the UK proposed straight-framed ships, and World War II revived interest in simple hulls. In 1940 Burgess in the USA proposes simplified hulls, and these were built in 1943–44 as the C1-S-D1 concrete steamer. Again, in the immediate post-war era there was less interest in simple hulls.

In 1958, Stich in Germany described a motorship for Niger built exclusively from single-curvature plates. In 1964, Johnson in the UK conducted systematic model tests on a family of four hulls with successive simplifications to the shape. He concluded that moderate simplification may reduce power requirements, but that extreme simplification yields unacceptable power increases. In 1967 Blohm & Voss built their "Pioneer" ship, which only used flat plates except at the ends of the vessel. However, there was a multitude of knuckles introduced and problems with fatigue strength. The power increase due to the shape was not offset by production cost savings, and the whole project was considered a flop due to the availability of cheap fuel and the unexpected problems encountered.

In modern times there have been several projects. In 1991, Schenzle of HSVA developed a hullform for Indosail using only developable surfaces and decent hydrodynamics. In 1992, Burmeister & Wain in Denmark developed a simplified hullform for OBO vessels, and in 1996 Wilkins in the USA re-engineered an assault ship by reducing curvature and introducing some knuckles so that there were many flat and developable plates, with extensive simplification above waterline. In 1999, the EconoForm hullform was advertised on the web as a patented hullform using entirely flat and conical surfaces.

CAD Modelling

Developable surfaces are popular for small vessels, and AutoShip (for example) has an option for converting surfaces to be developable automatically. In CAD, the curvature of a surface can be shown either as a colour map, or as a porcupine plot, and this can be shown in red for anything which the shipyard is not able to handle.

There are criteria for the acceptability of compound curves and, again, these can be geared to what the shipyard can produce.

Shell Plating

Even if the hull form has been designed to minimize curvature and simplify known problem details, it is still possible to design shell plates that are unacceptable from the point of view of shell development and forming. Shell plates should be developed to use the maximum plate length and width that can be handled by the shipyard, provided they meet backset and twist constraints. Block construction has resulted in the desire for transverse and vertical butts and horizontal seams at the block edges. This can result in plates with excessive curvature and twist in the shell plates.

Incorporating producibility in the design requires knowledge of the production processes used in building the ship. These depend, to some extent, on the facilities and capabilities of the specific shipyard. However, some general guidelines are applicable everywhere. Aspects of producibility can be classified into global (main dimensions), and local (local hull shape) aspects.

Global aspects for hull producibility are well known: the vessel should have small L/B (to reduce the number of frames and steel weight), long parallel section amidships (for more flat plates and repeated parts), a large block coefficient (for more flat plates), and a small bilge radius (to reduce the amount of bending for frames and plates).

Local aspects for hull producibility are less well known : double curvature should be avoided, chines should be appropriately placed, unit breaks should be placed appropriately, inner structure should be kept straight, and everything not required should be removed from the design.

Flare, for example, can be put into a design with straight lines and knuckles, and bulbous bows can be constructed entirely of developable surfaces. It is easier to set up flat, horizontal keel blocks for docking, so if the ship bottom can be kept flat, the sides can be sloped and provide a slightly wider deck, maximising the usable space. This has been done by the best ro-ro builder in the world, Flensburg.

Prof. Lamb then showed a series of slides illustrating the use of developable surfaces in various locations to simplify construction.

Modular Construction

The basic goal of DFP is to reduce the work content, and structural detail decisions should be based on this. The minimum considerations include the block breakdown/size/weight, the number of parts, and the weld length, type and position.

Some of the benefits of modular accommodation units include relocation of work from ship to shop, resulting in easier, safer, and cleaner access and environment, the possibility of assembly-line techniques for multiple units, the elimination of transporting many small parts to the ship, simpler material control, reduction in material scrap, and shorter installation time on board the ship.

Vote of Thanks

The vote of thanks was proposed by Prof. Lawry Doctors and carried with acclamation.

[*Prof. Lamb's presentation, including all diagrams, is available in PDF format (1.27 MB) on the web at www.mech.unsw.edu.au/notes/navl3100* — Ed.]

Ship Design Methods

Prof. Thomas Lamb of the Department of Naval Architecture and Marine Engineering at the University of Michigan, and editor of SNAME's new two-volume edition of *Ship Design and* Construction, gave a presentation on *Ship Design Methods* to an evening joint meeting of RINA and IMarEST in the School of Mechanical and Manufacturing Engineering at The University of New South Wales attended by thirty on 26 August.

Prof. Lamb began his presentation by saying that most practising ship designers probably do not think too much about why they prepare their ship designs the way they do. They probably learned it by following a mentor early in their careers. Academics who teach ship design need to document the different approaches, and even give their students an opinion on which is better. Fortunately, there has been considerable research into design in all disciplines over the past few decades, and they can be examined and tested in the context of ship design. His presentation would try to frame some of them again in the context of ship design by addressing specific aspects of design.

What is Design?

Today there is still a general lack of understanding of the essence of design. Design is the arrangement of elements that go into human productions. Design is not a body of knowledge; it is the activity that integrates the existing bodies of knowledge to achieve a given outcome. Design is a highly manipulative activity in which the designer has to continuously and simultaneously pay attention to, and balance, several factors that influence the design outcome. To design is to invent. To design is to make decisions.

Because of the incompleteness of knowledge at the different design stages when decisions are being made, it is traditional to re-examine them at subsequent points in time when more knowledge is developed. This process of re-examination is the traditional iterative nature of design and is recognized as an integral part of the process. However, there are ways to design that eliminate the need for iteration and thus save design time and effort.

Theory versus Practice

Prof. Lamb then gave us a quote to consider:

A debate currently rages in the engineering design community as to whether design should be taught primarily by establishing a foundation of theory or by engaging students in loosely supervised practice. For the broader activity of product design and development, we reject both approaches when taken to their extremes. Theory, without practice is ineffective because there are many nuances, exceptions and subtleties to be learned in practical settings, and because some necessary tasks simply lack any theoretical underpinnings. Practice without guidance can too easily result in frustration and fails to exploit the knowledge that successful product-development professionals and researchers have accumulated over time.

Today there are still strong defenders of both extremes. However, it is likely that, over time, the theory approach will prevail. This will be aided by the needs of computer applications in design, in that computers are still dumb machines, and require process classification and principles in order for them to be programmed. One reason that the theory of design has developed so slowly (it was first proposed in the late 1950s) is that most engineers do not receive formal education in design.

That this is so is validated by the fact that the NAS Engineering Education Report (NAS, 1995) states many times that design theory and practice are lacking in current curriculums and need to be an integral part of all future engineering undergraduate education.

Another reason is that the very wide range of products and services provided by engineers prevents the agreement of a universal theory of design and it will, in all probability, never happen. Rather, each branch of engineering will develop its own specific theory of design. We are close, today, to reaching a theory of ship design that will be acceptable to most ship designers.

The Difference between Design and Engineering

Engineering is a very misused word. It can be used to describe a whole profession, the process of developing a design into working instructions, or a type of manufacturing. Here we will consider the second case only.

One of the earliest definitions of Engineering, from the Charter of the Institution of Civil Engineers, is "the art of directing the great sources of power in nature for the use and convenience of man." In architecture, architects design the building but engineers do the analysis and construction details. Another idea was offered by Erichsen: "Designers create and engineers analyse."

Some people see design as a part of engineering. In this sense, they see some engineers design and some analyse the designs of others. Prof. Lamb indicated that he prefers to separate them because they use different approaches and have different goals. So, for the remainder of his presentation, he would use them as follows: Design decides all technical matters; Engineering develops and documents the design to enable its manufacture.

What do we Mean by Design Process?

By "process" we refer to a series of actions or operations conducing to an end. With reference to "design process" it is interchangeable with "methodology". Both process and methodology thus are procedures for completing activities. The procedures are structured, that is a step-by-step description and a framework or template for the key information and decision making. Some people think that

such structuring constrains innovation and creativity. In actual fact, it saves time which, in turn, can be used to develop innovative and creative solutions.

Documented design processes provide the following advantages:

- The process is made explicit. It is known to everyone, allowing an understanding of the design rationale and reducing the possibility of proceeding with unsupported decisions.
- It ensures that important design issues are considered.
- Structured processes are largely self-documenting as, in the process of executing the process, a record of the decisions is created for future reference and for educating new designers.
- It provides standardisation within companies and even industries.

All design has a process, either by desire or by accident. A good process, if followed, will produce an effective design for the minimum of effort and in the shortest time. Practitioners of ship design have developed design processes over many years. The process can be a learning tool, thus saving new designers time. When performed on a computer, this process is blurred by speed, but the process is still there, embedded in the program.

Documented design processes have usually developed over time by trial and error, and the best (most efficient in effort and duration) are reached by evolution. Some developers of such processes for ship design have presented their processes in technical books and papers. There are exceptions to the gradual evolution approach by developers who applied systems engineering approaches to develop requirements for, and a solution for, the ship design process.

Generic Design Approaches

Prof. Lamb then showed a series of slides, documenting different generic approaches to the design process:

- Cross's model: This model comprises seven stages purposefully positioned within the symmetrical problem-solution model. The model integrates the procedural aspects of design with the structural aspects of design problems. The procedural aspects are represented by the sequence of methods, while the structural aspects are represented by the larger arrows showing the commutative relationship between problem and solution, and the interactional relationships between problem and sub-problem and between sub-solution and solution.
- Pahl and Beitz model: Here the process comprises a number of steps wherein the main phases include clarifying the task, conceptual design, embodiment design and detailed design. At every step a decision must be made as to whether the next step can be taken or whether previous steps need to be repeated.
- March's model: This model recognizes the solution-focussed nature of design thinking. The phase of productive reasoning draws on a preliminary statement of requirements, and some presuppositions about solution types, in order to conceive a potential design proposal. From this proposal it is possible to analyse deductively the performance of the candidate solution. Finally, from the predicted performance characteristics of the design, it is possible to evaluate inductively further alternatives.
- Pugh's total design activity model.
- Set-based Design: This is a term describing a process in which "designers…must draw inferences about sets of artefacts (physical objects) under sets of operating conditions; they cannot simply simulate or analyse single, completely-specified designs." This contrasts with iterative, or point-to-point, approaches which synthesise a single solution and then evolve the design through a series of analyses, evaluations and modifications.

Ship Design Approaches

For over three decades, the design spiral has been used by many designers to describe and develop a process. It is inherently iterative in concept, with the goal of zeroing-in on a single solution as quickly as possible. Prof. Lamb prefers, and has used all his design life, the design-bounding approach. In the last decade, the set-based design approach, accredited to Toyota, has been offered as the best approach.

Prof. Lamb then showed a series of slides illustrating the various approaches and the iterative nature of the process; two-dimensional spirals, three-dimensional spirals, ship design dependencies, logic design, design bounding, the sizing process, the contract process, and the like.

Impact of Computers on Design

Some people claim that computers have eliminated the need for a design process. In actual fact, where there was no process documentation, it was necessary that processes be developed as a way to define the flow of information.

While a user of a design-synthesis program may not see or understand the process used by the program, it is there. Because of the speed of computations, the computer can perform in a millisecond what took days and even weeks manually. This does not eliminate the need for a process that is efficient in operation.

Systems Engineering

In recent years, some proponents of systems engineering have proposed its use almost as if it was a design approach. While total design has always considered both the design of individual systems and the integration of the systems, systems engineering does not include the design, only the organization and management of the design.

Systems engineering (SE) developed for two reasons. The first was that engineers in the USA had become so specialised that someone needed to take the responsibility for the total system, i.e. the completed product. In the case of ships, the naval architect always had this responsibility and still maintains it in most shipbuilding countries. However, in the USA, the naval architects allowed this responsibility to be taken away from them. The second reason was that some systems have become so complex that a better way to design and manage the design has become essential.

SE is a process, not an engineering discipline. Design is a decision-making process and the selection of design

parameters represents decisions. Therefore, SE is a design-management process. It should be obvious that, as SE is a structured approach, its successful implementation is even more dependent than less structured approaches on a structured approach to its management being available and used.

SE has received its impetus from the defence industries in a number of countries. The US Navy has focused on it as a primary need for future design teams. So much so, that it is now a specific program at the Naval Postgraduate School in Monterey, California, and a new program is being offered at UNO.

SE is a recently-labelled approach to the design, analysis and management of complex products. However, it is not new. Most writers on the subject trace its origins back to World War II but, in actual fact, it goes way back before then. Most of the publications on the subject have been developed very recently, but some of the earlier books go back to 1959 and 1967. A draft MIL-STD (499) was prepared in 1974 and it formed the foundation for EIA 632 Standard, Process for Engineering a System (1994).

Some proponents of SE see it as a panacea for handling complex products. However, for a long time the marine industry has produced some of the most complex and largest products in the world. Van Griethuysen stated that:

In many ways systems engineering is no more than a generalized model of, and framework for thinking about, the engineering process, which needs tailoring to be applicable to a particular product and project. It is therefore self-evident that marine products have always been designed and produced using a form of systems engineering, *even if those particular words were rarely used. It is also true that much of naval architecture and marine engineering concerned with design and management is undoubtedly an example of systems engineering.*

Current trends indicate that, in general, the complexity of systems is increasing with the introduction of new technologies. In today's environment, there is an ever-increasing need to develop and produce systems that meet the customer's requirements, are robust in nature, reliable and of high quality, supportable and cost effective. SE is an orderly way of bringing systems into being and achieving this. SE is the effective application of engineering effort to transform an operational need into a defined system configuration through the top-down iterative process of requirements analysis, functional analysis and allocation, synthesis, design optimisation, test and evaluation, and validation. SE is intended to ensure the development of affordable systems that completely meet the customer's requirements.

SE is good engineering with certain designated areas of emphasis — a top-down approach, life-cycle orientation, better initial design requirement definition, and a team approach. A ship is composed of many systems, often with conflicting requirements. Some people look at it as a system of systems. SE focuses on managing the design of systems and on systems analysis. Managing the design of systems covers the process of developing systems into new products. Systems analysis covers the improvement of existing systems.

Naval vs Commercial and US vs World Ship Design

The number of designers and man-hours is significantly different between naval and commercial ship design — at least by a factor of 10. Naval and commercial ships have significantly different scopes at early stages, such as concept design and preliminary design. A naval ship concept design is more like a commercial ship preliminary design.

Commercial shipowners do not pay for pre-award design effort except where, for some reason, they go to a design agent).

US ship designers, generally, prepare many more documents for contract design than most other shipbuilding countries. A typical US contract design for a commercial ship would consist of up to 40 drawings and an 800 page specification. The rest of the world would have 3 to 6 drawings and a 10 to 100 page specification. This is a hang over from the MarAd days when they were the contractors and administrators of the US commercial shipbuilding program as well as the focus on naval ship design.

Tools to Assist Ship Design

Early computer-based tools were for calculations, such as hydrostatics and stability. Today we have computer programs for design synthesis (ASSET and Michigan SDS), analysis (FEM, CFD, Safehull, Maestro), surface modelling (Rhinoceros), CAD (AutoCad, FastShip, Maxsurf, Tribon) and CAE (CALMA).

Many design tools now have a link to design management and production tools.

The problem is how to teach the latest design tools to students, as there is not enough time within current programs, or interest by academics. The Student-Friendly Software Project at UM will have a beneficial impact on this problem.

Conclusion

You would think that, after all these years, we would have great ship-design tools. However, we are mostly dissatisfied with what we have and are seeking better. The US Navy has identified many inadequacies. For example, an ONR project to integrate stand-alone tools with a multivariate optimization tool has shown that we do not have the tools we need yet. We need a good naval-ship mission-analyses/effectiveness tool, a better cost-estimating tool, and a life-cycle design tool.

The vote of thanks was proposed by John Jeremy and carried with acclamation.

[*Prof. Lamb's presentation, including all diagrams, is available in PDF format (0.35 MB) on the web at www.mech.unsw.edu.au/notes/navl3100* — Ed.]

Trimarans: the Ships of the Future?

Robert Tulk and Stephen Quigley of North West Bay Ships gave a presentation on on *Trimarans: the Ships of the Future?* to a joint meeting with the IMarEST attended by fifty on 2 September in the Harricks Auditorium at Engineers Australia, Milsons Point.

This presentation was based on the paper which they presented at the RINA Conference on Trimarans in London in April, and which is reproduced elsewhere in this issue.

In answer to the query in the title of the presentation, the answer from the audience was a resounding "yes".

The vote of thanks was proposed by David Gosling and carried with acclamation.

Business and Engineering Process Management

Peter Lucey, Director of Business and Systems Improvement for the Department of Defence, was scheduled to give a presentation on *Business and Engineering Process Management* to a joint meeting with the IMarEST. However, the author did not show up, disappointing the twenty-one who enjoyed coffee and biscuits anyway on 6 October in the Harricks Auditorium at Engineers Australia, Milsons Point.

This is the first time that I can recall this happening at a RINA/IMarEST technical presentation; can anyone recall another instance?

Phil Helmore

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. Many people use Microsoft Word, but illustrations should not be incorporated in the document. Photographs and figures should be sent as separate files with a minimum resolution of 150 dpi. A resolution of 200–300 dpi is preferred.

HMAS *Adelaide* patrols the waters around the oil terminals in the North Persian Gulf during Operation Catalyst. *Adelaide's* mission is to conduct operations, initially in the North Persian Gulf, as part of the Maritime Interception Force in support of measures to contribute to the maintenance of the security and stability of Iraq.

HMAS *Adelaide* has been there since August 2004 and will return to Australia in January 2005 when HMAS *Darwin* will take her place (RAN photograph)

COMING EVENTS

New South Wales

SMIX Bash 2004

The fifth 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 2230. This party for the whole marine industry is organised jointly by RINA (NSW Section) and IMarEST (Sydney Branch).

Tickets are available from Adrian Broadbent on (02) 9262 1424 at $25 per head (cash or cheque payable to RINA NSW Section).

Queensland

A Christmas Bash will be held at 6.30 pm on Tuesday 14 December 2004 at the Boardwalk Tavern (adjacent to the Marine Village Shopping Centre), Hope Island Road, Hope Island, The Gold Coast. Interstate members would be most welcome.

HoverWorld Expo 2004 and CACTS Symposium on Air-cushion Technology

With great regret, we must inform you that the National Capital Authority in Canberra has recently declined the opportunity to stage HoverWorld Expo 2004. The CACTS Symposium on Air-cushion Technology will, as a result, also not be held.

Despite the wholehearted best efforts of the entire HoverWorld Expo organising team, we have received notification that the National Capital Authority has "withdrawn its support for the HoverWorld Expo 2004 event on Lake Burley Griffin." In addition, Australian Capital Tourism has informed us that the tourism benefits of HoverWorld Expo 2004 will not be significant enough for it to receive support through their Events Assistance Program.

After four years of planning — and a massive investment of man-hours and funds –– we certainly share in your disappointment. As Australian citizens, we are sincerely aggrieved at the loss of this opportunity for Canberra and all Australians to celebrate the 40th anniversary of a genuine historic first: the World's First Hovercraft Race, staged in Canberra in 1964.

Sadly, many nations will share this disappointment. Groups from throughout the world have registered to attend HoverWorld Expo 2004, including Australian Hovercraft Federation members from throughout Australia, as well as teams from New Zealand, Malaysia, Sweden, Nigeria, Canada, the United States and the United Kingdom.

Although Canberra officials were responsive to bringing HoverWorld Expo to their city, and provided much assistance in the planning process, the extensive regulatory process in Canberra ultimately proved to be insurmountable and cost-prohibitive for the not-for-profit Australian Hovercraft Federation and the World Hovercraft Organization.

As disheartening as it may be to all of us that the event has been cancelled, it is perhaps the best alternative, given that the enormous number of ever-increasing regulations with which we were expected to comply would, at best, severely limit the scope of activities offered to participants and, at worst, subject HoverWorld Expo 2004 to the possibility of being closed at any time during the event.

So that the cancellation of HoverWorld Expo 2004 does not leave you entirely without an opportunity to celebrate the 40th Anniversary of the World's First Hovercraft Race, the Australian Hovercraft Federation is working to organize a cruise on the Murray River downstream from Albury–Wodonga, starting around 3 January 2005. Details will be available to you soon on www.worldhovercraft.org.

Please be assured that the World Hovercraft Organization will stage events in the future, in locations that will allow for us to create events as enjoyable as World Hovercraft Week 2002 in Terre Haute, Indiana. In addition, you can anticipate a new venue of events surrounding DiscoverHover, our increasingly-successful international school hovercraft program.

Chris Fitzgerald
Chairman, Hoverworld Expo 2004
Ken Osmond
President, Australian Hovercraft Federation

Marine Safety 2005

The National Marine Safety Committee will host Australia's premier marine safety event, the Marine Safety 2005 conference, at Wrest Point, Hobart, on 11–13 April 2005. This conference follows the successes of the Marine Safety conferences in Brisbane in 2002 and Sydney in 2003. As with past conferences, NMSC is inviting all sectors of Australia's marine industries to participate. For further information, contact NMSC on (02) 9247 2124, email secretariat@nmsc.gov.au, or visit the website www.nmsc.gov.au.

Pacific 2006 International Maritime Conference

The Pacific 2006 International Maritime Conference (organized by the Royal Institution of Naval Architects, the Institute of Marine Engineering, Science and Technology and Engineers Australia) will be held at the Darling Harbour Convention and Exhibition Centre in Sydney from 31 January to 3 February 2006.

HIPER 06 at AMC

The fifth International Conference on High Performance Marine Vehicles (HIPER) will be held between 8 and 10 November 2006 at the Australian Maritime College in Launceston. HIPER Conferences are held once every two years. The inaugural conference was held in South Africa in 1999; subsequent ones have been held in Hamburg in 2001 and Bergen in 2002, and the fourth was held in Rome in September 2004. Dr Prasanta Sahoo is the Convenor of the fifth HIPER conference which will be held in late 2006. Watch this space for forthcoming details. In the meantime, for further information contact Dr Sahoo on (03) 6335 4822 or email p.sahoo@mte.amc.edu.au or visit the conference website www.amc.edu.au/hiper06.

THE SYDNEY MARITIME INDUSTRY CHRISTMAS PARTY
(SMIX Bash)

All involved with the Maritime Industry, their partners and friends are welcome to join the
Institute of Marine Engineering, Science and Technology
and the
Royal Institution of Naval Architects
on board the unique 19th century iron barque

"James Craig"

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On Thursday, 2 December 2004

At 5:30pm for 6:00pm

$25.00 per head

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Tenders Called To Build Air-Warfare Destroyers

On 16 October the Federal Government advertised for Australian shipbuilders to bid for one of Australia's largest and most complex Defence projects, the Navy's air-warfare destroyers (AWDs).

Defence Minister Robert Hill said: "The proposal will be for the construction of three AWDs in Australia. The RFP will be available to qualified shipbuilding organisations that have entered into agreements with the Commonwealth in relation to confidentiality and related matters."

Senator Hill said that tender documents for the $4.5–6 billion project have been developed by Defence in consultation with independent commercial adviser Carnegie Wylie and Company.

The tender for the construction of the AWDs will remain open for approximately nine weeks. Defence will then evaluate tender responses, with Government to receive a recommendation on the preferred shipbuilder in March 2005.

Once appointed, the preferred shipbuilder will be in a position to assist the Commonwealth select the preferred design for the AWD in mid 2005.

Senator Hill said that tenders will be sought on an alliance-style contract basis, with the vessels to be built in Australia. The successful shipbuilder will be majority Australian-owned and be required to satisfy a range of price and non-price criteria, including:

- Commitment to the principles of a long-term risk-sharing arrangement with the Commonwealth and other industry partners for the construction of the AWDs.
- A cost, overhead and pricing structure that will enable the cost-effective delivery of the AWDs, including the ability to build designs considering 'whole of life' costs.
- A sound record of past performance in building naval vessels.
- Commercial viability and financial backing.
- Access to the skilled workforce required to produce ships to the Commonwealth's requirements.
- Willingness to provide open financial accounting data — including visibility through to the sub-contractor level — to the Commonwealth.
- Capacity to provide the Commonwealth with transparency and contractual influence over major sub-contractors.
- Capacity to access sensitive technology required for the AWD project.

Companies bidding for the AWDs will be required to include Australian skills and training programs in their tenders, with Defence to fund companies for extra skills generation and training benefits in the programs.

The AWDs represent a quantum leap in the air-warfare capabilities of the Royal Australian Navy. The vessels, which are to be introduced into service from 2013, will be equipped with the world-class Aegis radar that is capable of detecting and defeating multiple hostile aircraft and missiles at ranges in excess of 150 kilometres.

The AWDs will also have an anti-submarine and anti-shipping capability, together with the potential for the ships' sensors to be used to detect ballistic missiles in flight. They will provide significantly increased protection from air attack for troops being transported and deployed, and long-range air-warfare defence for a Navy task group.

As outlined earlier this year, the Government has asked the international design houses Blohm & Voss of Germany; Gibbs & Cox of the United States and Izar of Spain to produce evolved-concept designs based on their existing ship classes, the Saschen-class F124 frigate, the Arleigh Burke-class guided missile destroyer, and the Alvaro de Bazan-class F100 frigate respectively.

The Spanish Navy frigate *Almirante Juan de Borbon* (F 102) during Combat Systems Ship Qualifications Trials off the coast of California. *Almirante Juan de Borbon* is equipped with a Lockheed Martin Aegis-derived combat system and is the second ship in the Spanish F100 frigate class
(US Navy photograph)

Systems Engineering Support Sought For Air-warfare Destroyer Project

On 23 October the Federal Government advertised for an Australian-based combat-system engineering company to support the air-warfare destroyer (AWD) program.

Defence Minister Robert Hill said that the combat system tender followed the release of a Request for Proposal (RFP) for Australian shipbuilders to bid for the contract to build the Navy's air-warfare destroyers — one of Australia's largest and most-complex Defence projects.

"The Government has now moved quickly to engage Australian industry in the additional major work needed for the AWD program," Senator Hill said.

The role of the AWD Combat System – Systems Engineer (AWDCSSE) is to provide system-level design and integration of non-Aegis elements of the AWD combat system.

The engagement of combat-system integration expertise from within Australia is in line with the Government's Skilling Australia's Defence Industry policy and the Defence Electronic Systems Sector Strategic Plan.

The RFP will remain open for approximately eight weeks. It is expected that the company selected for the AWDCSSE role will be appointed by March 2005.

Benchijigua Express ready for launching at the Austal Ships yard in Western Australia
(Photo courtesy Austal Ships)

Benchijigua Express Launched

Austal Ships launched the largest aluminium ship ever built, the 127 m trimaran ferry *Benchijigua Express*, taking to the water for the first time early on 25 September 2004.

Construction of the ferry began at the Austal shipyard in Western Australia in September 2003. At the height of construction approximately 430 of the company's 1200 staff were working on the project.

When Austal signed the contract to build a second high-speed vehicle–passenger ferry for European ferry operator, Fred. Olsen, S.A. in June last year, it signalled the start of not just another ferry, but the creation of a new hullform that is set to revolutionise fast sea transportation.

Benchijigua Express is the outcome of collaboration between Fred. Olsen, S.A. and Austal involving more than three years of research and development to produce a new design which will not only enable operators to offer better service on existing routes, but also begin operations on new routes where sea conditions are too challenging for existing fast ferries.

With power provided by four 8 200 kW diesel engines driving three waterjets, the Auto Express 127 trimaran will be able to maintain Fred. Olsen, S.A.'s projected service speed in excess of 40 kn and carry 1350 passengers, over 340 cars and a substantial number of trucks.

Seeing the vessel afloat for the first time Austal's Chairman, Mr. John Rothwell, spoke of his deep sense of pride.

"The sight of this gigantic ship, the largest aluminium vessel to ever be built in the world, illustrates just how far Austal has come since it delivered its first vessel back in 1988," Mr. Rothwell said.

"At 127 m this huge vessel is 4¼ times longer than the first Austal-built live-aboard dive catamaran of just 30 m which was built in approximately six months with just 30 people. Now we employ 1200 people," he said.

Benchijigua Express was christened in a ceremony at the yard on 5 November. Godmother of the vessel, Mrs Juana Hernández Cabrera, wife of Fred. Olsen, S.A's Managing Director, Mr Guillermo Van de Waal, cut the ribbon to christen the trimaran with a magnum of champagne across her bow. Also in attendance from Fred. Olsen, S.A. were Mr Fred Olsen Jnr, Chairman, the vessel's senior officers and management from the company's European offices.

Benchijigua Express will complete final sea trials before departing Fremantle at the end of November on her 9 500 n mile delivery voyage to the Canary Islands.

Tasmanian Industry News

There are several vessels designed by Alan Muir and Associates under construction locally, including *Diana*, a 22 m steel-hulled aluminium-topsides longline fishing vessel for Mures Fishing Co. in Hobart, and *Brid Voyager*, a 17 m all-steel scallop and cray fishing vessel for Alan Barnett Fishing Co. in Bridport. The latter is a sister ship to *Brid Venture*, launched in 2003. Construction has also begun in Launceston of a 38 m steel-hulled aluminium-topsides luxury motor yacht for a Melbourne client.

Gregor Macfarlane

Benchijigua Express dwarfs tthe construction facilities at Austal Ships as she emerges from the building hall
(Photo courtesy Austal Ships)

The launching party for *Benchijigua Express*
(Photo courtesy Austal Ships)

Austal and Raytheon Team for LHD Project

Austal Limited announced on 30 August that it had teamed with Raytheon Australia to bid for the upcoming Australian Government tender to build two amphibious ships (LHD), which is due to be issued in early 2005.

"By combining Austal's impressive track record of on-time, on-budget shipbuilding with Raytheon's expertise in electronic systems, we have created a powerful team to build and support the new amphibious vessels, along with considerable potential to bid for other naval contracts in the future," said Austal's Managing Director, Mr Bob McKinnon.

The amphibious vessel project has an indicative cost of $1.5 to $2 billion. The preferred tenderer is likely to be identified by late 2005, with in-service delivery planned between 2010 and 2014.

Raytheon Australia is a wholly-owned subsidiary of Raytheon Company. With 2003 sales of $US18.1 billion, Raytheon is an industry leader in defence and government electronics, space, information technology, technical services, and business and special-mission aircraft. With headquarters in Waltham, Mass., Raytheon employs 78 000 people worldwide.

HMAS *Farncomb* Refit Completed

The first Collins-class submarine Full-cycle Docking (FCD) was completed in September by ASC Pty Ltd at Osborne in South Australia. HMAS *Farncomb* returned to operational service on completion of the extensive refit. *Farncomb* is the first submarine to complete a full-cycle docking and will complete sea trials to test and calibrate refurbished equipment and systems prior to returning to duty.

The FCD has taken approximately two years and cost about $100 million. The work has included capability improvements to the submarine.

The Commonwealth and ASC signed a contract last year worth up to $3.5 billion over 25 years to refit the Collins-class submarines.

Catamaran from Aluminium Marine

Aluminium Marine of Brisbane have recently launched a new multi-purpose high-speed catamaran designed by Stephen and Gravlev Pty Ltd, based at Manly in Brisbane.

Named *Marjorie B*, this multi purpose vessel can be operated as

- a cruise vessel, with five cabins for overnight accommodation for ten passengers — additional cabins can be arranged to increase the overnight accommodation;
- a dive boat, with excellent access to the water at the aft end, by means of a lowering dive platform and a large open deck area aft; or
- a passenger vessel to ferry passengers to the reef.

The accommodation comprises five cabins for passengers, four below deck and one above deck. Each cabin has an ensuite shower and toilet and queen-size bed.

On the main deck there is a large air-conditioned saloon which can be outfitted to suit the owners requirements. Windows all round give excellent light and views. The open galley and bar area is situated on the aft deck. A large undercover deck area aft is fitted with a shower and toilet.

The upper deck saloon is integral with the open-plan wheelhouse. On the upper deck aft there is a separate toilet and a large open area for seating.

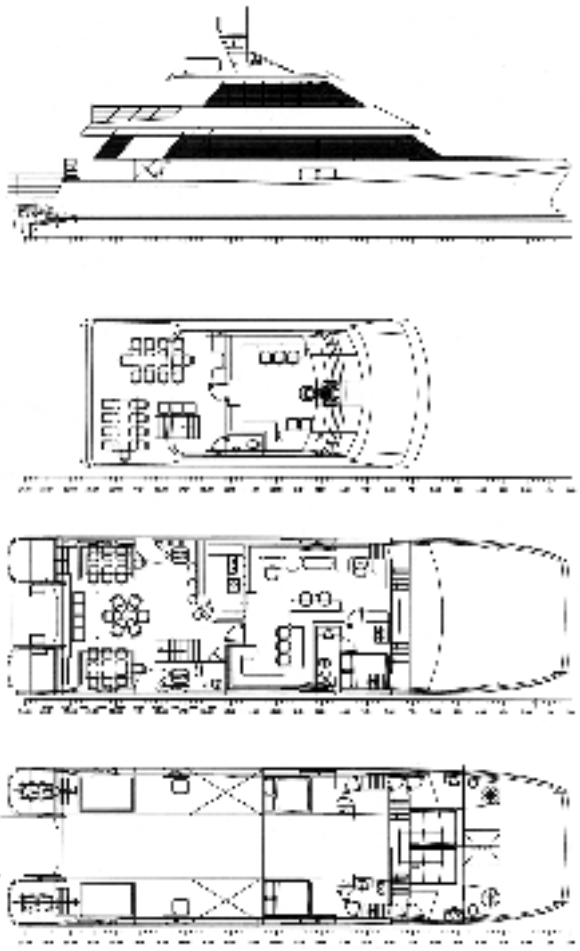
Marjorie B as completed
(Photo courtesy Stephen and Gravlev)

The vessel is fitted with twin MTU 12V 183 engines, driving Seafury surface-piercing propellers, giving improved performance compared with traditional propulsion systems at high speeds. The vessel achieved 33 kn on trials before any fine tuning of the propellers. The vessel has a very shallow draft of around 0.8 m, allowing access to shallow anchorages and the ability to cross shallow bars.

Principal Particulars

Length OA	25.3 m
Length WL	22.3 m
Beam	7.0 m
Depth	2.5 m
Draft	0.8 m
Displacement, light	40 t (approx)
Passengers	100
Fuel	4500 L
Fresh water	1200 L
Sullage Capacity	1000 L
Engines	2 x MTU 12V 183
Power	730 kw at 2300 rpm
Propulsion	Seafury 36 surface-piercing propellers
Speed	32 kn maximum 27 kn cruising
Survey	USL Code Class 1C

James Stephen



General Arrangement of *Marjorie B*
(Drawing courtesy Stephen and Gravlev)

Queensland Industry News

The Gold Coast City Marine Precinct recently saw the official opening of another major boat-building factory, the new $4.5 million factory for custom boatbuilder, Azzura Yachts. Queensland Premier, Peter Beattie, opened the facility with notable local identities present. The new factory will help consolidate future work and will assist in the building of larger luxury boats.

Perry Catamarans are currently celebrating the launch of their new 17.4 m yacht. With a beam of 8.5 m, this world-class vessel features three double cabins all with ensuites, a spacious saloon and a gourmet kitchen. Orders for this vessel have been taken from both local customers and internationally from as far away as Hawaii.

Toowoomba-based manufacturer, Buchanan Advanced Composites, have numerous marine jobs on the go — a 17 m motor-sailer catamaran for Crusader Marine and a 12.8 m high-performance sailing yacht. They also recently completed an all-composite roll stabiliser that was constructed for Western Australia shipbuilder, Austal Ships, to be fitted to one of their ferries. The fibreglass structure was chosen over traditional metal construction due to the large weight savings — up to one third.

Riviera Marine released two new models at the Sydney Boat Show in August.. The new M400 sports cruiser can sleep five people in comfort and is powered by twin 280 kW Mercruiser engines. The Riviera 33 flybridge features newly-designed underwater exhausts and propeller tunnels to assist in overall efficiency and performance.

The Gold Coast City Marina is keeping busy with major and minor refit work.

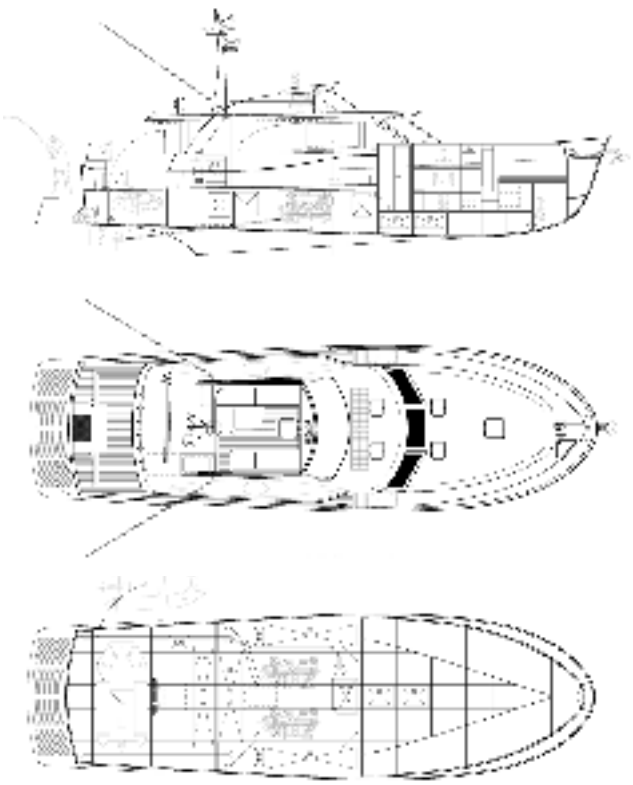
Of notable interest in Brisbane is the refit of a 57 m motor yacht with a number of local Gold Coast boatbuilding companies involved. Also in Brisbane, Norman Wright and Son is progressing the construction of a 15.8 m Express Classic Cruiser. She will be timber-cored composite with teak deckhouse and transom. The hull is semi-displacement with full-depth skeg to protect the propellers. Two Caterpillar C7 336 kW engines will power her and the maximum speed is expected to be 22 kn. Fuel is 2 800 L and fresh water is 1 200 L. She is a private vessel for a NSW client and will be used on Sydney Harbour and the East Coast of Australia. Completion is expected in September 2005.

New Wave Catamarans have delivered a 19.4 m catamaran for operation as a whale-watching vessel in Hervey Bay. The vessel is registered for 120 passengers.

South Pacific Marine will shortly be launching a 30 m car ferry, which will be running to Fraser Island. The vessel design is another steel hull and alloy superstructure catamaran by Sea Transport Solutions.

In Cairns, as well as completing *Pvt Sorenson* (described separately), NQEA Australia is currently working on a 14 m private catamaran motor yacht, a 22 m catamaran ferry (the sister vessel to *Pvt Sorenson*), a 35 m luxury private monohull motor yacht and a 63 m monohull passenger ship.

Brian Robson



The general arrangement of the 15.8 m express cruiser under construction by Norman Wright and Son
(Drawing courtesy Norman Wright and Son)

Kwajalein Catamaran Completed by NQEA

Designed by Crowther Designs in Sydney and built by NQEA Australia in Cairns, *Pvt Sorensen* is the first of two 22 m catamarans to be operated by Kwajalein Range Services for the US Army base in the Marshall Islands. The vessels will carry up to 149 contractors and support staff between the various islands fringing the very large Kwajalein Atoll.

NQEA Australia bid against several Australian and American ferry builders to win the project. The vessels will replace two Incat-designed catamarans built in the US by Nichols Brothers in 1988. Both vessels are named after World War II heroes who fought in the Marshall Islands. The second vessel, *Pvt Anderson*, will be completed in early December and is identical to the first vessel except for the addition of an hydraulically-raised stern platform for divers or a tender, and a Muir anchor winch.

Powered by four Series 60 MTU Detroit Diesels driving Hamilton HJ 362 water jets, *Pvt Sorenson* achieved 27.3 kn fully loaded at MCR on sea trials; however, the ship will be operated at 1950 RPM for a 24 kn cruising speed. In the light condition the vessel achieved over 29 kn.

With two main engines in each hull, the Detroit Series 60s are staggered both fore and aft and athwartships. Centa-Series-A flexible couplings arranged with bobbin intermediate shafts drive the waterjets located in the aft jet room. Fuel, sullage and water tanks are all independently mounted in the hull. The Colpro-designed exhaust system has oval-shaped low-profile mufflers and Rainmaker water-injected diffusers discharging through the outboard shell to stainless steel shell-mounted removable elbows connected

to heavy-wall aluminium channels also acting as lower sponsons.

Two Northern Lights Model M1064 T1 marine generator sets producing 55 kW 3 phase 60 Hz power can each supply the vessel's electrical system with reserve for any future growth.

A Hamilton MECS system controls the engine RPM and all functions of the waterjet operations. The bridge console features a central control for master and engineer and fully-functional bridge wing controls.

Other equipment includes Praxis alarms, Autronica fire-detection system and a full array of Furuno integrated navigation equipment including 1933c and 1732c radars, FM3000 VHF and FS1503 HF radios, Navplot autopilot, GP320B GPS and 50/200IT depth sounder. A Perko searchlight, Silva magnetic compass and Niki horn complete the navigation equipment. Crew call is Stento equipment, including voice activated headsets for the engine rooms.

Although never to carry any ticketed passengers, the vessels are fitted out as passenger ferries.

The seating accommodation is of fairly standard ferry configuration using Beurteaux rail mounted seats and tables, Dampa ceiling and Altro flooring on the main deck and wool blended carpet on the upper deck.

Carrier DX split-system air conditioners featuring flush-mounted ceiling cassettes and a cabin-top air-cooled condensing unit inside a meshed box provide climate control. As with much of the other electrical equipment, the air-conditioning units are for 60 Hz operation and so had to be imported from the USA.

A small crew mess fitted out in kiosk style is separately arranged at the rear of the main cabin and is fitted out with benches, a sink, a microwave oven and a Norcold refrigerator. The main electrical switchboard is also located in the crew mess.

External seating is also provided on the aft upper deck.

Pvt Sorensen on trials
(Photo courtesy NQEA)

Apex and Sharp Aquos LCD television monitors, a GME GR968 radio/CD player, a Panasonic DVD and a TOA amplifier provide entertainment for the personnel onboard.

Due to the remoteness of the Marshall Islands, the US Army required the vessels to be of robust construction and fitted with propulsion, electrical and piping back-up systems to allow continued operations should there by any equipment problems.

NQEA Australia also provided extensive technical-support manuals and parts manuals listing original supplier, agents, and parts suppliers for all equipment and fitting right down to rubber seals.

Principal Particulars

Length OA	22.6 m
Length WL	19.7 m
Beam (moulded)	8.4 m
Hull depth (moulded)	2.9 m
Hull draft (maximum)	1.26 m
Crew	2 operational, 6 maximum
Passengers (personnel)	149
Fuel (maximum)	5 500 L
Fresh water	700 L
Range (with 10% reserve)	310 n miles at 24.5 kn
Propulsion	
Engines	4 x MTU Detroit Series 60 each 448 kW at 2100 RPM
Propulsors	4 x Hamilton HJ362 waterjets
Speed (full load) cruising	24.5 kn at 1950 RPM
Speed (mid load) MCR	29.4 kn
Survey	
Classification	American Bureau of Shipping ✠A1 HSC Government Services, AMS
Flag Authority	US Army

Marc Richards

New Man at Helm of Tenix Defence Marine Division

Former US Navy Officer, David Miller, has been appointed Executive General Manager of Tenix Defence's Marine Division.

Tenix Defence Chief Executive Officer, Robert Salteri, said that Mr Miller was a widely-respected industry specialist with 11 years experience in the defence sector, following on from more than 20 years in the US Navy.

"David's extensive naval knowledge and strong background in program and project management will prove an invaluable asset in the development and delivery of innovative defence solutions," Mr Salteri said.

Mr Miller comes to Tenix after five years at Lockheed Martin in Syracuse, New York, most recently as Director of Airborne Radar Programs.

He has held management positions on programs commissioned by the US Department of Defence including the Tomahawk Cruise Missile, the Joint Stand-off Weapon, the Extended Range Guided Munition, the F-22 Phased-array Radar and the Advanced Hawkeye Radar.

Mr Miller worked in Australia throughout 2002 and 2003 as

Director of the successful Jindalee Operational Radar Network (JORN) Project at RLM Systems Pty Ltd, a Tenix/Lockheed Martin joint venture.

Before joining Lockheed Martin, Mr Miller worked at Texas Instruments, which was later acquired by Raytheon.

During his naval service he gained substantial experience as a line officer at sea, serving on minesweepers, frigates, destroyers, cruisers and aircraft carriers. He was also involved in the management of material-acquisition programs in Washington D.C.

Mr Miller succeeds Jerry Trammel, who has completed his contract and returned to the United States.

Mr Salteri praised Mr Trammel's performance as Executive General Manager of Marine Division and Anzac Ship Project Director.

"Jerry steered the Marine Division through many challenges of the largest and arguably most-successful defence contract ever awarded in Australia," Mr Salteri said.

"We thank him for his commitment to Tenix and Australian industry."

Mr Miller holds a Bachelor of Science in Mathematics and a Master of Science in Electrical Engineering. He has also completed a course in Finance at Harvard Business School.

Austal Vehicle Ferry Order

On 29 September Austal Ships announced a contract for a 67 m high-speed vehicle-passenger catamaran for Virtu Ferries of Malta, adding to an already-healthy order book for the West Australian shipbuilder.

The new vessel is scheduled for delivery to Virtu Ferries in time for the European 2005 summer season and will have the capacity to carry 600 passengers and 65 cars, or 95 lane metres of trucks plus 35 cars.

Commenting on the contract Austal's Managing Director, Mr Bob McKinnon, said "This latest order for a mid-sized car ferry is particularly pleasing in that it adds another important customer to our extensive list of clients.

"We already have a strong forward-order position and this contract obviously enhances that."

Established in 1988, Virtu Ferries operates fast ferry services between Malta and Sicily. This new vessel will operate on routes from Valletta to Catania, Licata and Pozzallo. Designed specifically for this route, with aft and side ramps for rapid turnaround, the ferry will greatly expand the service to mainland Italy.

The ferry will be powered by six MTU 16-cylinder diesel engines driving a KaMeWa propulsion system through six ZF gearboxes. Austal Sales Manager, Glenn Williams, said that this arrangement was developed to provide the optimum solution to meet the operator's preferred engine manufacturer, speed and deadweight requirements.

The vessel has a maximum deadweight of 260 t and will operate loaded at a speed of 35 kn providing a year-round schedule catering for car traffic and the import/export of cargo.

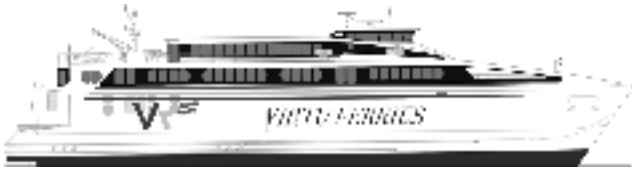
The vehicle deck on the new ferry will offer a clear height of 4.6 m, allowing for shipment of campers and coaches, a niche market hitherto untapped by Malta. Europe is experiencing an unprecedented increase in coach travel, with hundreds of thousands of coach tourists across the continent each year, and increasing numbers taking advantage of reduced rates in the shoulder months in Southern Europe. The new vessel will ensure that Malta is seen as an extension of mainland Europe following its accession to the EU on 1 May 2004.

Passenger accommodation will be located on two decks: the tourist class upper deck for 508 passengers also provides two catering outlets, two shops and recreational facilities. The bridge deck will accommodate 92 club-class passengers, with outside seats also available. The spacious seating configuration on both decks has been designed to allow for ease of circulation of passengers.

The vessel is being built in accordance with the requirements, and under the survey, of Det Norske Veritas, conforming to International Maritime Organisation codes and Malta Flag State and Italian Port State regulations. Registration will be under the Malta Flag.

Principal particulars

LengthOA	67.5 m
Length WL	58.8 m
Beam moulded	18.2 m
Hull depth moulded	6.3 m
Draft maximum	2.6 m
Deadweight	260 t
Passengers	600
Cars	65 cars
Heavy vehicles	95 truck lane-metres plus 35 cars
Main engines	6 x MTU 16V 4000 M71
Gearboxes	4 x ZF 7550 NRH and 2 x ZF 7550 NRB2
Waterjets	4 x Kamewa 80SII and 2 x Kamewa 90SII
Speed	35 kn



Profile drawing of the new ferries for Virtu Ferries of Malta
(Image courtesy Austal Ships)

Another Ferry Contract for Austal

On 5 November Austal announced a further strengthening of its already-substantial order book through the signing of a new contract for two fast ferries.

The 45 m catamarans are to be built for L'Express des Iles SA, a company that operates both domestic and international services from Guadeloupe. Its existing fleet of four fast ferries includes two catamarans built by Austal in 1998 — the 40 m, 300 passenger *Opale Express*, and the 47.6 m *Jade Express* which has capacity for 329 passengers and 10 cars.

Due for delivery in October 2005, the new vessels are intended to replace the two non-Austal catamarans in the L'Express des Iles fleet. One will carry 360 passengers and 10 cars and the other 446 passengers, but they will have

identical four-engine propulsion arrangements providing a speed of 38 kn fully loaded.

Austal's Managing Director, Mr Bob McKinnon, said that the company was extremely proud of its track record of securing repeat business. He attributes customer loyalty to the emphasis that the company places on working closely with clients to ensure that they are provided with vessels and follow-up service which completely meets their needs.

"While there are numerous instances of operators turning to us after initially operating fast ferries built by other shipyards, the reverse situation is virtually unheard of. This reflects the extremely high level of satisfaction with both the vessels we build and the service we provide our customers," he said.

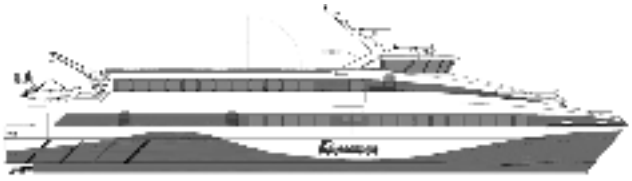
Mr McKinnon said it was pleasing to add further commercial vessel contracts to the existing strong forward-order position which is underpinned by longer-term defence contracts.

"As well as augmenting the current year, we are now beginning to build on the solid revenue base which the Royal Australian Navy patrol-boat project provides for 2006," he said.

Demonstrating the diversity of its capabilities, Austal now has unconditional contracts for 30 vessels ranging from 31 to 127 m in length. Included in the order book are 22 patrol boats, five fast ferries, an adventure-cruise vessel, an underwater research boat and a high-speed vessel technology demonstrator.

Principal Particulars

	Pax-only	Vehicle/pax
Length OA	45.24 m	45.24 m
Length WL	40.20 m	40.20 m
Beam moulded	12.30 m	12.30 m
Hull depth moulded	4.00 m	4.00 m
Draft (maximum)	1.80 m	1.80 m
Crew	6	6
Passengers	446	360
Vehicles	0	10 cars
Cargo/luggage	4.5 t	4.5 t
Propulsion		
Main engines	4 x MTU 16V 396 TE74L	
Gearboxes	4 x ZF 7550	
Waterjets	4 x Kamewa 63 SII	
Speed	38 kn	
Survey		
Classification	Bureau Veritas	



Profile of the new ferries for L'Express des Iles SA
(Image courtesy Austal Ships)

Austal Hong Kong Delivery

Austal has delivered its latest high-speed passenger catamarans to a market that did much to establish the Australian shipbuilder as a world leader in the design and construction of high-speed ferries. Hong Kong based New World First Ferry Services (Macau) Limited accepted delivery of two 47.5 m passenger catamarans at the beginning of September, taking the total number of Austal-built vessels in its fleet to seven.

Officiating at the colourful launching ceremony at Hong Kong's Dragon Cruise Pier and at Macau Ferry Terminal were Mr R. C. L. Footman JP, Commissioner for Transport of Hong Kong SAR Government, and Mr Ao Man Long, Secretary for Transport and Public Works of Macau SAR Government. The launching ceremony was also attended by Dr Henry Cheng Kar Shun, Chairman of NWS Holdings, Mr Tsang Yam Pui, Executive Director of NWS Holdings, Mr John Hui, Director and General Manager of First Ferry (Macau) and Austal Sales Manager, Mr Mark Stothard.

Speaking at the ceremony Dr Cheng said the arrival of the new ferries marked the culmination of First Ferry (Macau)'s investment of over $HK250 million to acquire five high-speed catamarans in the past four years.

"With the dedicated service coupled with enhanced frequency, First Ferry (Macau) is well received by the market with encouraging patronage figures. Besides, the market share of First Ferry (Macau) has been on a rising trend, from a single-digit figure up to the current 25%. The two new catamarans strengthen the existing fleet and help increase sailings by nearly 20% to over 52 departures a day," Dr Cheng said.

Part of the lounge in one of the Hong Kong Ferries
(Photo courtesy Austal Ships)

"First Ferry (Macau) is optimistic for the future and our further investment in the industry demonstrates our long-term commitment to the development of Hong Kong and Macau."

New World First Ferry, regarded as being one of the Asia-Pacific region's foremost ferry companies, operates 12 routes within Hong Kong Harbour and to outlying islands. This includes the services between Hong Kong and Macau on which the new Austal catamarans now operate.

Reflecting a high degree of satisfaction with its existing Austal catamarans, the two new high-speed ferries are almost identical to the trio delivered to New World First Ferry in October 2002. Austal also delivered two 41 m harbour cruise

New Ferry LXXXV and *New Ferry LXXXVI* on trials
(Photo courtesy Austal Ships)

vessels to sister company New World First Travel Services Limited in October 2003.

Confirming Austal's status as the leading supplier of fast ferries to this internationally-significant market, the arrival of *New Ferry LXXXV* and *New Ferry LXXXVI*, yard number 148 and 150 respectively, takes the total number of Austal-built vessels delivered to Hong Kong in the last 14 years to 36.

Mr John Hui, Director and General Manager of First Ferry (Macau) said each of the seven Austal-built vessels now employed in the New World group is operating well and contributing to the success of the company.

"In selecting the world's largest builder of high-speed aluminium vessels, we took great comfort in the knowledge that our new vessels would not only be of first-class construction, but be delivered on time and on budget," said Mr Hui.

"At an early stage in the construction of our first three ferries, New World and Austal developed a very positive and cooperative working environment. Despite its meteoric growth and global successes, Austal retains the small company ethos that was the driving force behind its early achievements. The Austal team has placed great emphasis on providing a very high degree of personal service and responsiveness to client needs, irrespective of whether the order is for a 48 m ferry or a giant seagoing trimaran."

The new catamarans are equipped with the latest navigational aids, ensuring the optimal performance of the vessels. The cabin is well-appointed with a strong focus on passenger comfort, featuring audio-visual equipment and luxurious seating throughout, and the owner's striking livery which makes the modern fleet instantly recognizable. As was the case on all previous vessels, Austal has worked closely with New World First Ferry to ensure that their corporate branding was maintained throughout.

Passengers enter the vessel via hydraulically-operated gangways located on the port and starboard sides of both decks amidships. Each gangway measures 1.5 m in width and 2 m in length. The gangways, painted with purple non-slip paint, are locally controlled with manual back-up in case of mechanical failure.

New Ferry LXXXV and *New Ferry LXXXVI* can each accommodate 430 passengers, a slight increase compared to the earlier trio. Of these, 100 are carried on the upper deck, including 12 passengers in two private VIP lounges. The latter are fitted with a call button for cabin-attendant service.

Comfortable Beurteaux airline-style seats are fitted throughout the passenger areas, which feature First Bus colour-scheme vinyl flooring for long life and ease of maintenance. For passenger comfort and safety, deck-mounted baggage racks are also installed in the main and upper passenger saloons.

Colour plasma monitors allow main-deck passengers to view either local television or video/DVD entertainment. Another large plasma screen and four smaller LCD monitors are fitted on the upper deck. The monitors can be linked to a camera on the wheelhouse roof, showing all passengers the view ahead of the vessel.

Other onboard facilities include a main-deck kiosk and toilets on both decks. One toilet on the main deck is arranged for disabled use and is fitted with a call button which is monitored at the main-deck kiosk. A flip-over baby change table is also provided.

The wheelhouse
(Photo courtesy Austal Ships)

Each ferry operates with a crew of eight, including five on the bridge which features maximum vision and an electronics package incorporating two X-band radars, electronic charting, night vision and a day-and-night sailing recording system.

Four MTU 16V 4000 diesels driving KaMeWa waterjets provide a service speed of 42 kn, allowing the crossing from Hong Kong to Macau to be completed in approximately 55 minutes. First Ferry (Macau)'s operational experience has proved the excellent seakeeping performance of the Austal hull design and led to its decision not to fit the retractable ride-control fins that feature on the earlier vessels.

The two catamarans commenced service on 10 September 2004 and, to celebrate their arrival, First Ferry (Macau) treated 86 sets of twins in Hong Kong and Macau to a memorable ride to Macau on board one of the new vessels.

Principal Particulars

Length OA	47.5 m
Length WL	44.0 m
Beam moulded	11.8 m
Hull depth moulded	3.8 m
Draft (maximum)	1.6 m
Deadweight	55.8 t
Passengers	430
Crew	8
Fuel	20 000 L

Propulsion

Engines	4 x MTU 16V 4000 M70 each 2320 kW at 2000 rpm
Gearboxes	4 x Reintjes VLJ 930 HL
Waterjets	4 x Kamewa 63 SII
Speed	43 knots @ 95% MCR and 45.2 t dwt
Generators	2 x Cummins MXDGFA - 6CTA 8.3G, Newage Stamford UCM 274H alternators each 135 kW at 1500 rpm

Survey

Classification	Det Norske Veritas ✠1A1 HSLC Passenger R2 EO

Trials for New Army Watercraft

The first of six amphibious watercraft being built by ADI during beaching trials
(Photo courtesy Martin Grimm)

New South Wales Industry News

Lightning Completes Work on *Arahura*

Lightning Naval Architecture has just completed an $A4.2 million refit of the diesel-electric passenger ferry *Arahura* for The InterIsland Line, now part of Toll NZ. *Arahura* is a passenger-rail ferry, built in 1983, which operates between Wellington and Picton. Part of the crossing is on the notorious Cook Strait, where conditions can get extremely rough, and part is through the beautiful Marlborough Sounds, which are one of the most scenic of ferry routes. *Arahura* is a great favourite with tourists, as she departs Wellington at 0930 for the three-hour crossing, is the most comfortable of all the ferries, and has large viewing lounges.

Lightning provided architectural design and project-supervision services and, due to the short time frame, purchased of all major materials for the project.

The goals of the project included maximising viewing opportunities with increased window seating and smaller seating groups; creating through-ship views across lounges and along the ship; increasing the numbers of inside seats and seating in covered promenades; and creating a more-open passenger flow.

The scope of work included:

- relocating the theatre to create a full width lounge aft on Deck 8;
- making a new open food court;
- making a new Club Class (business) Lounge on Deck 8 with new large windows;
- extending the Queen Charlotte Observation Lounge forward on Deck 8 into existing crew accommodation;
- a new extended main lobby;
- a complete refurbishment of all passenger spaces, including replacing all furniture, ceilings, carpets and floor coverings and some bulkheads;
- covering in part of the open boat deck to make an enclosed promenade;
- changes to the crew accommodation; and
- a complete refurbishment of the passenger galley and pantry.

This work was carried out partly while the ship was in dock at Cairncross Dockyard, Brisbane, for her two-yearly docking and then during a twenty-six day stay in Hobart. The principal contractor was Taylor Bros of Hobart, with whom Lightning most recently worked on the *Spirit of Tasmania III* conversion.

AMD Marine Consulting's Middle East Projects

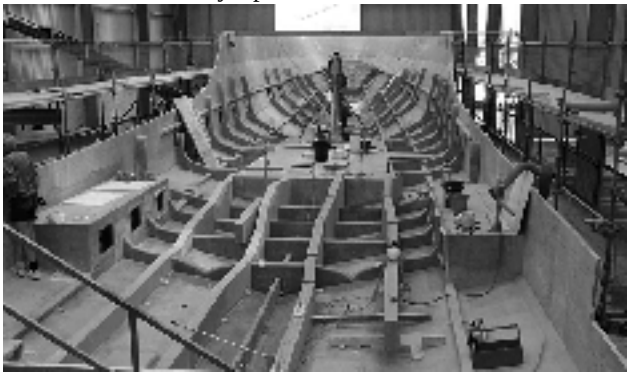
AMD has been contracted by Combined Shipping Co. KSCC to design a 44 m high-speed catamaran ferry for their Persian Gulf operation. Combined Shipping is the marine arm of Kuwait and Gulf Link Transport Co. The vessel will carry 10 vehicles and 300 passengers at a speed of 34 kn. The vessel will be designed over the next couple of months, after which a number of pre-selected shipyards will be invited to tender for the construction of the vessel. The intention is to order two more vessels on successful operation of the first.

AMD has also been engaged by one of the more progressive Middle East governments to help them prepare the specifications for a five-vessel project, and then to assist them to choose shipyards to build the vessels. The vessels are two 60 m and one 50 m high-speed car-carrying fast ferries and two 50 m, 45 kn patrol boats with rescue and firefighting capability. The two 60 m fast car ferries will have a speed of 50 kn, and the 50 m ferry will have a speed of about 40 kn. The patrol boats will use the same hull platform as the 50 m ferries. Once defined, a number of pre-selected yards will also be invited to tender for these vessels, either as a five-boat package or as two separate tenders, one being for the two 60 m vessels and the other for the three 50 m vessels. AMD expects to begin the pre-selection process very soon.

Peter Lowe Design Busy

Peter Lowe Design is currently busy with the design of several large motor yachts which are being constructed at various locations around the world.

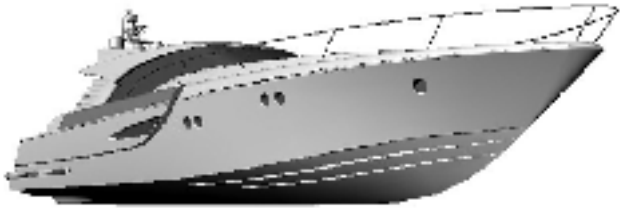
The Evolution 110, under construction at Evolution Yachts in Henderson, WA, is nearing completion with the hull and superstructure now assembled. Styled by Sam Sorgiovanni Designs (who is also in charge of interior design), the 33.5 m vessel has a radical and very curvaceous superstructure. Construction is epoxy foam-cored GRP to DNV requirements, assembled using a combination of resin infusion and hand lay-up. This has resulted in a laminate of consistently high quality. The hull, superstructure and wheelhouse were all laid up inside one-off female moulds. The vessel will be powered by twin MTU 16V2000 engines rated at 1300 kW to give a cruising speed of 26 knots.



The Evolution 110 under construction
(Photo courtesy Peter Lowe Design)

Peter Lowe Design's Evolution 110
(Image courtesy Peter Lowe Design)

Soon to commence construction is the Evolution 80, to be built at the same yard. It is a sleek 24.3 m planing sports yacht, with an estimated top speed of 32 knots from twin MTU 10V2000 engines. Peter Lowe Design has once again teamed up with Sam Sorgiovanni Designs, who are responsible for the interior design and styling. The boat will be constructed to USL Code Class 2B requirements using a more conventional layup of vinylester resin with a solid-hull bottom and foam-cored topsides and superstructure.



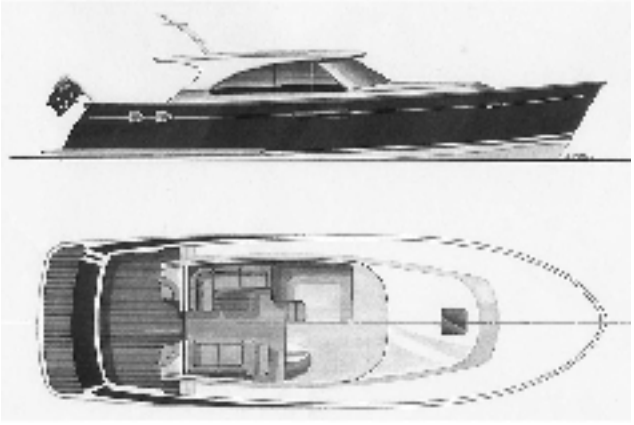
Peter Lowe Design's Evolution 80
(Image courtesy Peter Lowe Design)

At the smaller end of the scale, a very elegant 10 m "lunch launch" is nearing completion in Victoria. The strip-planked vessel will be capable of speeds of up to 25 knots from its single 237 kW diesel and will be used for a combination of fishing and cruising around Port Phillip Bay. She will provide for the owner a classic, lobster-boat style launch, with a very practical workmanlike layout.

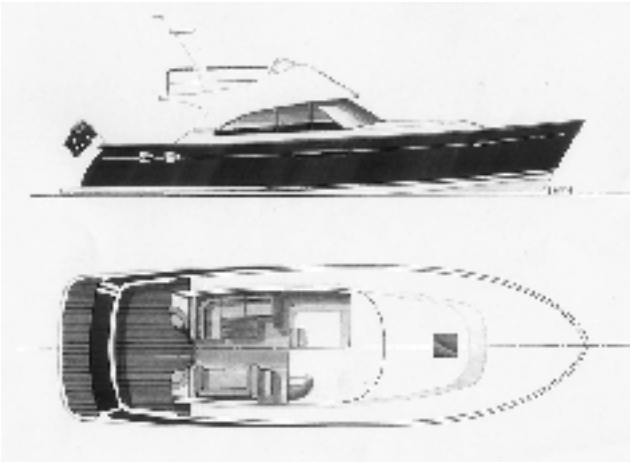
In Dubai, construction is about to commence on the superstructure for a 38 m motor yacht, developed in conjunction with Sam Sorgiovanni Designs. The boat incorporates three decks and will be constructed out of GRP foam sandwich to RINa classification requirements.

Work is also continuing on a "retro-style" 42 ft (12.8 m) launch, which will be available in either hardtop or flybridge configurations. It will provide luxurious accommodation for up to four people and a top speed of 30 knots. The svelte, almost classic, design will be a far more individual and distinctive alternative to the myriad Hinckley-style "lobster launches" available on the market today.

Peter Lowe Design is a small design/consulting firm managed by Peter Lowe, with four employees, including two naval architects and a drafter, and located in Avalon on Sydney's northern beaches. Recent designs of note are the 75–85 ft (23–26 m) Supernova/Stealth sports cruisers built by Warren Yachts, the Australian Design Award-winning Mustang 46,



Peter Lowe Design's PLD42 Hardtop Version
(Image courtesy Peter Lowe Design)



Peter Lowe Design's PLD42 Flybridge Version
(Image courtesy Peter Lowe Design)

the Divine 29 retro-classic production launch, the 34 m *Crystal Lady* and the Southwind (now Southern Start Marine) production powerboats. More information can be found on their website www.peterlowedesign.com or by email to info@peterlowedesign.com.

Crowther Designs' 32 m Catamaran

A 32 m catamaran to a design by Crowther Designs is due to be delivered in mid December to operator World Heritage Cruises for operation as an overnight cruise vessel on the magnificent Gordon River. This is the fifth Crowther vessel designed for the operators at World Heritage Cruises, and previous vessels have all been passenger vessels to run on the Gordon River. The vessel is under construction at Richardson Devine Marine in Hobart.

The vessel is fitted with two Detroit S60 diesel engines, each producing a maximum of 552 kW. The five-bladed NiAlBr propellers are driven via ZF 550 electronically-actuated gearboxes, giving a laden top speed of 21 kn.

This unique vessel has passenger accommodation for 24 on the main deck in twelve twin cabins. Each cabin includes a double bed and a prefabricated modular bathroom that has a large shower basin and toilet. Crew accommodation can be found in the hulls with the captain's cabin aft of the wheelhouse. Incorporated into the stern is an hydraulic platform for the launching of two 7.4 m tenders. These tenders will be used to run the guests to the shoreline for day excursions.

The mid-deck cabin is open and spacious for dining and relaxing. A series of tables on the starboard side of the vessel are to be used for meals, whilst a large couch at the front of the cabin will be utilised as a passenger lounge. A large galley including a cool room is located on the port side to facilitate food preparation for the overnight guests. An added feature of the mid-deck cabin is the spa that has been recessed into the front bonnet for the guests to unwind in after a day on the river. The mid deck can be accessed by a set of external stairs from the aft deck as well as a set of internal stairs just forward of midships.

The upper deck is to be used as a viewing deck whilst cruising the magnificent Gordon River. The wheelhouse is stepped in to allow full 360 degree access for the guests. The captain's cabin is located aft of the wheelhouse, complete with double bed and toilet facilities. The upper deck is accessed via an external set of stairs from the aft mid deck.

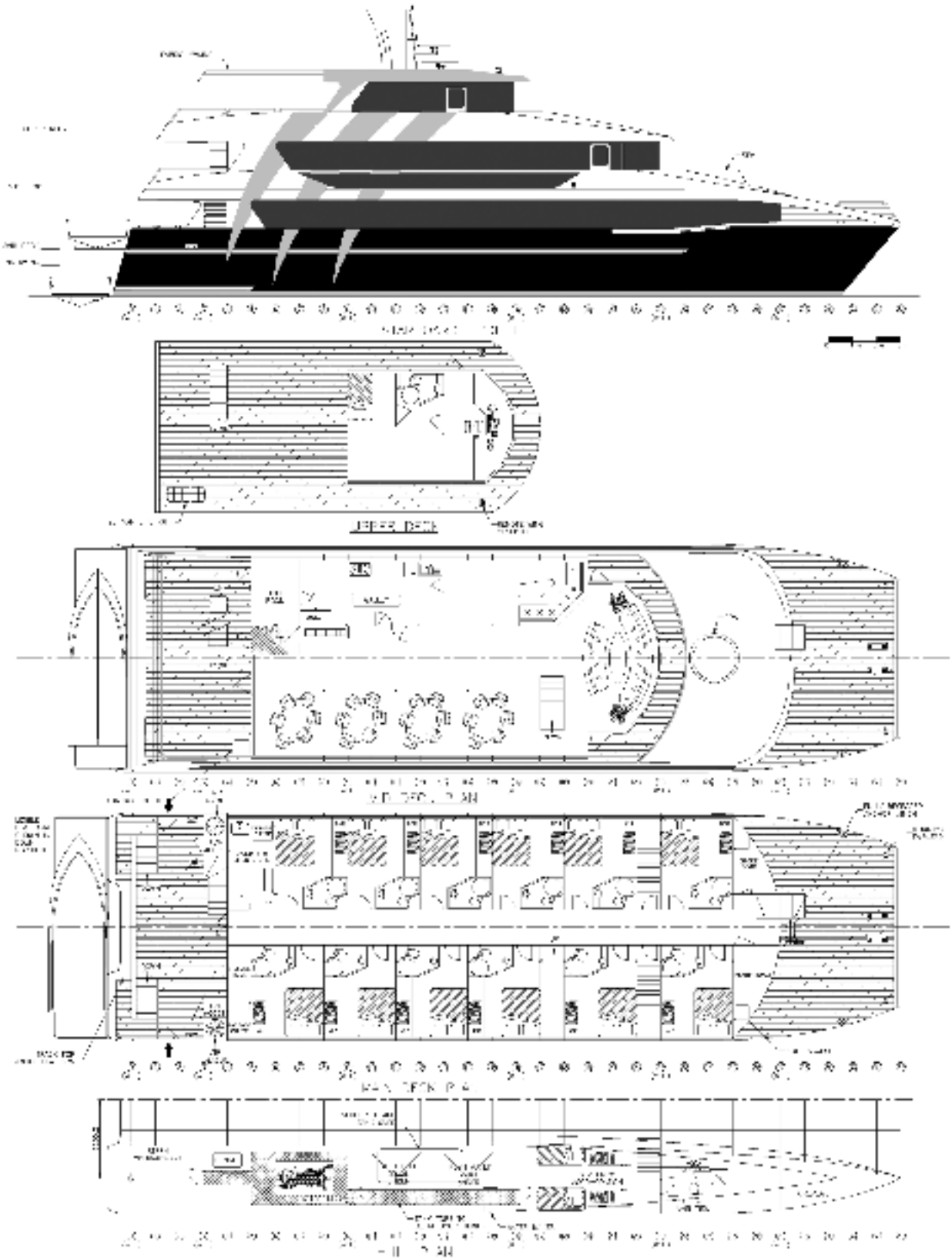
Principal particulars of the vessel are:

Length OA	32.00 m
Length WL	30.30 m
Beam OA	9.50 m
Draft (prop)	1.93 m
Draft (hull)	1.20 m
Pax accommodation	24 pax in 12 cabins
Crew	6
Fuel	7000 L
Fresh water	7000 L
Deadweight	16.72 t
Engines	Two Detroit S60 Each 552 kW @ 2300 rpm
Gearboxes	2 x ZF 550 reduction ratio 3.042:1 electronically actuated
Gensets	Primary Sabre 6TG2AM 104 kVA Secondary Sabre 4TGM 77 kVA
Speed	21 kn
Construction	Aluminium

Crowther Designs' 32 m Catamaran
(Image courtesy Crowther Designs)

Crowther Designs *Peppermint Bay II*

The 22 m catamaran *Peppermint Bay II* is due to be delivered mid December to operator Peppermint Bay Cruises for operating a combined commuter and cruise service around Peppermint Bay and the surrounding area. This is the second Crowther vessel designed for the operators at Peppermint Bay. The previous vessel was a 24 m catamaran with similiar layout and operating parameters.



General Arrangement of Crowther Designs' 32 m Catamaran
(Drawing courtesy Crowther Designs)

The vessel is currently under construction at Richardson Devine Marine in Hobart. The structure has been designed as a two-beam vessel to reduce weight and increase underwing clearance to cope with the expected weather conditions on the run.

The vessel is fitted with two Caterpillar 3406E diesel engines, each producing a maximum of 520 kW at 2200 RPM. The five-bladed NiAlBr propellers are driven via Twin Disc MG5114 reduction gears giving a laden top speed of over 20 kn.

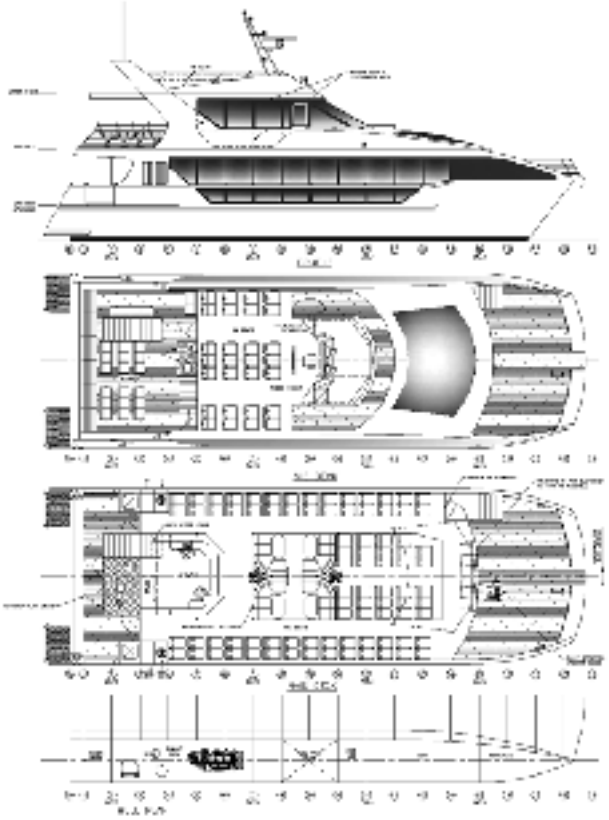
The vessel has seating for a full passenger complement of 135 internally and a further 38 seats outside. This vessel features large floor-to-ceiling windows on the main and upper decks, which allow the passengers to fully appreciate their surroundings. A bow atrium has also been incorporated into the forward bonnet to create an open feel to the main cabin of the vessel. The kiosk is located on the centreline of the vessel at the aft end of the main saloon, incorporating a fridge and freezer, and providing light meals and refreshments.

Principal particulars of the vessel are:

Length OA		22.00 m
Length WL		19.57 m
Beam OA		7.50 m
Draft (prop)		1.50 m
Draft (hull)		0.85 m
Pax seating		
	Internal	107 main deck
		28 upper deck
	External	38
	Total	173
Fuel		4800 L
Fresh water		1840 L
Deadweight		16.72 t
Engines		2 x Caterpillar 3406E
		Each 520 kW @ 2200 rpm
Gearboxes		2 x Twin Disc MG 5114
Gensets		2 x Perkins/Stamford 40 kVA
Speed		> 20 kn
Construction		Aluminium
Survey		USL Code Class 1D

Phil Helmore

Crowther Designs' *Peppermint Bay II*
(Image courtesy Crowther Designs)



General Arrangement of *Peppermint Bay II*
(Drawing courtesy Crowther Designs)

ANMM Seeks Floating Dock

The Australian National Maritime Museum (ANMM) is planning to acquire a floating dock to help with vessel maintenance activities within a new protected mooring basin in Darling Harbour, Sydney. The ANMM recently invited interest in the design and supply of the dock.

The dock is intended to lift vessels up to 16 m in length, 5 m in beam and 35 t gross displacement. It is intended to operate and support maintenance operations upon itself independently from shore power and be capable of fully containing all solid and liquid waste generated by maintenance activities for periodic collection and disposal by authorised third parties, and to not allow any of these pollutants to escape during docking/undocking operations.

The dock is to be easily operated (preferably by no more than two persons) and maintained capable of obtaining certification with a classification society.

Expressions of interest were sought from individuals and organisations with the expertise and experience to design and manufacture such a dock, noting that the ANMM is looking for a 'turn key' solution via a single contract.

Expressions of interest closed on 12 November.

Canadian Submarine Fire

On the afternoon of 5 October 2004 the Canadian submarine HMCS *Chicoutimi* was on passage from Faslane, Scotland, to Canada when two fires broke out. The fires were in electrical circuits and caused extensive damage, with the loss of all electrical power in the submarine.

The submarine, formerly HMS *Upholder*, is one of four diesel-electric submarines sold to the Canada after short service in the Royal Navy. The submarine was on her delivery voyage after a refit in Britain. At the time of the incident, *Chicoutimi* was on the surface 60 n miles off the northwest coast of Ireland, in difficult conditions with strong winds and wave heights of some 5 m. The RN frigate, HMS *Montrose*, rendezvoused with the submarine on 6 October, and another frigate, HMS *Marlborough*, RFA *Wave Knight* and two salvage tugs were despatched to the scene. Three RAF and RN Sea King and Merlin helicopters were deployed to Northern Ireland as a precaution and, on the evening of 6 October, three injured crew members were evacuated from the submarine to hospital in the Irish Republic. One subsequently died of his injuries.

Crew members from the Royal Navy frigates HMS *Montrose* and HMS *Marlborough* prepare line hawsers for the tow of HMCS Chicoutimi back to Scotland.
(Photograph DND Canada)

The tug *Anglian Prince* moves in to take the stricken submarine HMCS *Chicoutimi* in tow
(Photograph DND Canada)

RFA *Argus*, capable of supporting helicopters for extended periods, the specialist tug *Anglian Prince* and the US submarine support vessel *Carolyn Chouest,* were also diverted to the area. The Irish coastguard ship *Le Aoife* acted as on-scene coordinator and the Canadian frigate *St Johns* sailed from Canada to provide further support.

As conditions began to moderate, power was restored to some systems in the submarine. Restoration of hydraulic power enabled the steering gear to function and high-pressure air was restored, allowing three ballast tanks to be fully blown to safeguard buoyancy — a fourth was flooded for trim. HMS *Montrose* provided hot meals and showers for the submarine's crew. The decision was made to tow the submarine to safety as it was unclear if the propulsion system could be restored at sea. Work restoring systems in the boat was done with the aid of secondary lighting and torches only.

A tow was attached between the submarine and the tug *Anglian Prince* late on 7 October, and progress was commenced on the 170 n mile tow to Faslane at 3 to 4 kn, increasing to 5 kn as the weather moderated. HMCS *Chicoutimi* arrived safely at Faslane on 10 October from where her crew were repatriated to Canada, being relieved by technical personnel from her sister submarine HMCS *Windsor*.

On 12 October Vice-Admiral Bruce MacLean, Canadian Chief of Maritime Staff, announced that a military Board of Inquiry chaired by Commodore Dan Murphy would investigate the incident.

HMCS *Chicoutimi* is helped to the jetty by two British Royal Navy tugs in Faslane, Scotland on 10 October
(Photo DND Canada)

Fire damage to the Commanding Officer's cabin in HMCS *Chicoutimi*
(Photo DND Canada)

Award for Incat Designs at Monaco Yacht Show

Incat Designs — Sydney has long been an innovator in the catamaran design field. The company has now taken this pioneering tradition to the next level, instituting an arm of the company to be known simply as **iD**. The role of **iD** is to showcase the renowned company's abilities in finding creative new approaches to vessel design, particularly in the areas of styling, packaging, and powering.

The new entity has met with immediate success, having become a category winner in Boat International's "New Design Concept" awards. The awards were handed out for the first time this year at the Monaco Yacht show. For their entry, **iD** developed a 35 m wave-piercing catamaran motor yacht. With the emphasis on world cruising ability, **iD**'s 35m WPC took out the 30–45 m power category.

In developing the interior, **iD**'s staff threw out much of the accepted norm by adopting an environmentally-conscious approach. This doesn't so much refer to traditional elements of environmental design, such as low emissions and low wash, but instead refers to the situation of the elements of the vessel in the locations most appropriate for the surrounding environment. For instance, the owner's suite is on the main deck just aft of amidships, where the vessel's motion is at its least. Whilst this is commonplace theory on monohull motor yachts, it has been forsaken on most catamaran motor yachts, with the owner's suite tending to end up either forward on the main deck or aft on the upper deck. Similarly, the main saloon has been raised to the upper deck, where it is free of the clutter of deck hardware, and is afforded better visibility of the surrounds.

Performance wise, the vessel takes full advantage of Incat Designs' proven wave-piercing hullform. The vessel offers a smooth ride whilst the isolated superstructure reduces the transmission of noise and vibration to the cabin. Equipped with two 1640 kW main engines, the vessel achieves a maximum speed of 31 knots, and is able to cruise at 25 knots. At this speed, the vessel has a range of 1200 n miles; however, at a long-range cruise speed of 13 knots, this jumps to an impressive 3750 n mile range. This is comparable to many established yachts on the market, but with the added advantage of being able to achieve higher speed if necessary. It is with this range that **iD** confidently offers the design as a true "world cruiser", the given criteria of the Boat International Competition. For customers with different priorities, the vessel can be configured for a higher top speed, with waterjet propulsion being an option.

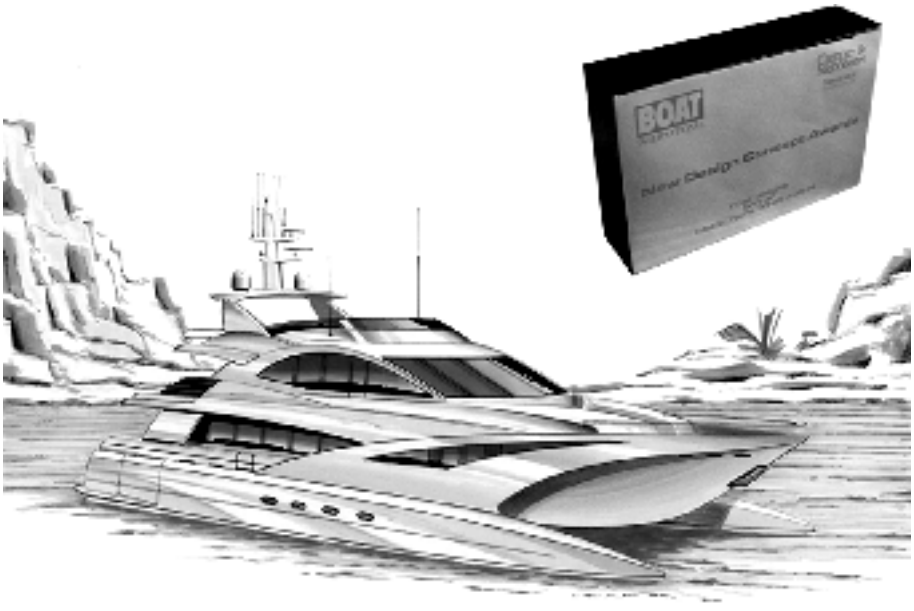
Externally, the vessel is endowed with a modern appearance, a look that would not be out of place in the world's greatest harbours. To create this stylish exterior, the **iD** staff worked in conjunction with internationally recognised stylist, David Bentley. The vessel features Incat Designs –– Sydney's commercially-proven wave-piercing hullform, excellent performance in the areas of efficiency, range and ride, isolated superstructure for reduced noise and vibration levels, and a large multifunctional lifting platform on the stern.

Further information on this vessel, and the rest of the Incat Designs fleet, can be found at mycat.incatdesigns.com.au

The success of this concept shows that there is always room for a design company to free themselves of apparent constraints and demonstrate their talents. Already, **iD** has been charged with a growing list of customer-specific tasks in many of Incat Designs' current projects, with more of their work expected to come to light as these projects proceed.

Principal Particulars

Length OA	35.50 m
Length WL	33.00 m
Beam OA	11.00 m
Beam demihull	3.00 m
Fuel (standard)	5750 L
Fuel (long range)	17 250 L
Fresh Water (standard)	5000 L
Fresh Water (additional)	5000 L
Power	2 x 1490 kW
Propulsion	2 x propellers
Speed	31 kn (max) 25 kn (cruise) 13 kn (long-range cruise)
Range	1200 n miles (at cruise speed) 3750 n miles (at long-range cruise speed)



Incat Designs' Award-winning 35 m Design
(Image courtesy Incat Designs)

DEVELOPMENT OF THE NORTH WEST BAY SHIPS TRIMARAN

R. J. Tulk and S. G. Quigley
North West Bay Ships

North West Bay Ships, located in Hobart, Australia, commenced construction in 1999 of its first build, a 55 m trimaran passenger ferry. Launched in March 2001, MV *Triumphant* proved to be highly efficient, achieving 40 knots fully loaded with 75% of the installed power of equivalent vessels in the marketplace.

Heavy-weather trials demonstrated the impressive handling characteristics of the trimaran platform, with MV *Triumphant* maintaining 36 knots in a head sea of 4.8 m significant wave height. The vessel is currently operating a passenger service between Japan and Korea.

This paper looks at the design processes applied by NWBS, and describes the unique characteristics of this vessel. A description of the vessel's construction is included, and the paper concludes with a preview of the world's largest trimaran luxury motor yacht, a 60 m vessel currently under construction by NWBS and due for delivery in December 2004.

1. INTRODUCTION

North West Bay Ships (NWBS) began as a green-field shipyard in 1999. Recognising that it would be difficult to attract customers to a new yard with no track record, and not wishing to complete solely on price, NWBS investigated alternative hull concepts, with the aim of producing a fuel saving of the order of 5% – 10%. NWBS made a strategic commercial decision that such a fuel saving would entice customers and allow the yard to become established in a competitive and mature high-speed ferry market.

A trimaran platform was initially selected for further study. The perceived advantages of the trimaran at this early stage included scope to improve performance through the use of long slender monohull technology, and the retention of large deck areas evident on many successful catamaran fast ferries. The seakeeping performance was intuitively encouraging but largely unknown.

2. INITIAL INVESTIGATIONS

2.1 Numerical Computation

NWBS made use of a suite of software developed by Professor L.J. Doctors [1] through a commercial contract to undertake a preliminary analysis of a number of hull shapes. Using Doctors' programme, six centre hulls and six side hulls were tested, and the most promising was then systematically scaled to produce a total matrix of 82 different trimaran hull shape configurations. Almost 4000 resistance points were determined (a number not practically attainable in a towing tank). The conclusions from this testing were:

A slender monohull has the lowest resistance, if it could be artificially stabilised. Stable monohulls, due to their beam, exhibit the highest resistance (in the current size interest).

- The catamaran lies between the two extremes, and, as such, is a viable alternative that is both stable and has low resistance.
- The trimarans show less resistance than the catamarans, and are almost as efficient as the unstable monohulls.
- Skin-friction drag was found to contribute the majority of the drag from the trimaran side hull; the wave-making resistance component was almost negligible.
- These statements were valid over the majority of the speed range; in particular around 15 m/s to 25 m/s, which was the area of most interest.

2.2 Scale-model Testing

Scale models at 1:35 were made of the most-promising two centre hull forms and three pairs of side hulls. Tests were conducted at the Australian Maritime College (AMC), and the best-performing centre and side hulls were quickly identified. The NWBS centre hull was artificially turned into a catamaran by doubling the resistance, and adding a percentage for hull interference in a similar manner to the work by Insel and Molland [2]. Non-dimensional comparison against all other tested catamarans at AMC indicated the resistance was in the lower 10th percentile.

In excess of 200 runs were then conducted on the trimaran hull form, looking at various transverse, longitudinal and vertical positions of the side hulls with respect to the centre hull over a range of displacements.

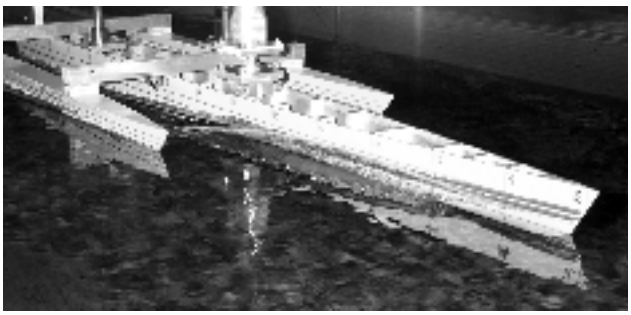


Figure 1: 1:35 Tank-test model

The tank-test results were compared to the numerical predictions and excellent agreement was found. More importantly, the predicted resistance of a 55 m trimaran was less than that of catamarans with similar capacity delivered at the time.

All of the testing and calculations to this stage highlighted that the side hulls had a disproportionate amount of drag compared to the volume they carried. Subject to stability performance, the results indicated that the side hulls needed to be as small as possible from a resistance perspective.

2.3 1:5 Scale Model

NWBS were sufficiently encouraged at that stage to construct and test an 11 m crewed model.

The model was constructed to allow full flexibility with the side hull location. The first series of testing (of a comparative nature) enabled investigation of the side hull beam-to-depth ratio and analysis of the longitudinal location of the side hulls. The testing correlated with the 1:35 tank-test results.

Figure 2: 11.0 m x 3.5 m crewed model

Once the arrangement of the side hulls was determined, NWBS wished to benchmark the full-scale resistance of the trimaran concept developed to date. Given the nature of the shallow-draft side hulls, NWBS, in conjunction with AMC, elected to test the larger 11 m model and accept the difficulties of testing in a non-sterile environment rather than test at small scale in the towing tank. Open-water towed tests were conducted over a two-mile course in Tasmania.

In addition to resistance testing, rough-water validation trials of the 11 m model were conducted in 3 m waves (equivlent to 15 m at full size) to ensure that no aberrant behaviour was hidden in such a novel vessel. The 11 m crewed model logged over 720 nautical miles in testing over an eighteen month period.

Of all the testing undertaken by NWBS, the most interesting aspects investigated with the 11 m crewed model were side-hull treatments and the addition of foils.

2.3.1 Side-hull Treatments

The initial design of the side hulls had a length of approximately 25% of the centre-hull waterline length. Stability requirements meant that these hulls were relatively wide at the waterline.

Increasing the length of the side hulls had a number of advantages:

- reduction in residuary resistance;
- increased waterplane area and hence better dynamic buoyancy as the vessel heeled; and
- increased deck area for passenger use.

However, the length increase added significantly to the skin-friction drag.

In order to negate the added skin friction, NWBS considered possibilities for adding air lubrication to the side hulls. Previous attempts on multihulled vessels with air lubrication had generated mixed results; a major challenge being air ingestion into the propulsion system. Again, an inherent advantage of the NWBS trimaran was that the waterjets are contained within the centre hull; hence air lubrication to the side hull was a possibility.

Forced ventilation of the side hulls was considered undesirable, due to the added complexity and weight of the ventilation system. With the side hulls running close to the water surface, NWBS looked at adding steps into the side hulls to achieve natural ventilation.

Such steps are not new; in fact, *Maple Leaf IV* (built in 1912 and credited as the first vessel to attain a speed of 50 knots) utilised 5 bottom steps [3], see Figure 3.

NWBS determined through further testing that increasing the side-hull length, combined with using both bottom and side steps, resulted in no appreciable increase in resistance when the stepped side hull was running close to the water surface. Steps were fitted in the after part of the side hulls – there are no steps forward of the lifting foil.

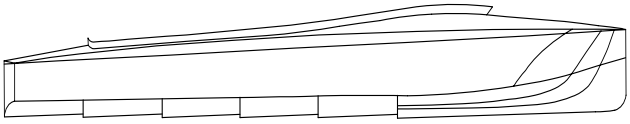


Figure 3: *Maple Leaf IV* hull showing steps

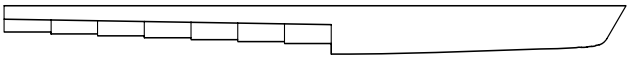


Figure 4: NWBS Side Hull Steps

2.3.2 Lifting Foils

The concept of lifting foils is not new in the fast ferry industry and large numbers of vessels utilising lifting foils are in operation today.

Unlike many vessels where the foil lift approaches 100% of the vessel's displacement, NWBS elected to use foils that only supported part of the displacement for the following reasons:

- Commercially, NWBS wished to stay with the trimaran technology developed so far, and did not want to stray towards the development of a triple-hulled hydrofoil.
- Partial foil support allows the centre hull and the vessel's propulsion system to stay in contact with the water, thereby keeping the water-jet system simple, commercially available and, importantly, light in weight.
- Foils are only successful when the lift-to-drag ratio of the foil is higher than the lift-to-drag ratio of the vessel itself. With a highly-efficient hull (NWBS trimaran lift-to-drag ratio = 9.4 without foils) travelling at speeds over 40 knots, it becomes more difficult to build an efficient foil and avoid cavitation inception. Given the risk exposure already present in the trimaran project at the time, NWBS, in conjunction with Maritime Dynamics Inc. (MDI), took a more-conservative approach and reduced foil lift to approximately 30% of the vessel's full-load displacement.
- By limiting the foil lift used to dynamically lift the vessel, a portion of the total foil lift was retained for use as a ride-control surface. By utilising the lifting foils as a ride-control system, NWBS and MDI were able to avoid the parasitic drag of additional ride-control surfaces.

Initial resistance testing with the foils showed a significant decrease in total resistance as speed increased above 25 kn at full scale.

Extensive tests with the 11 m crewed model were undertaken with the model self-propelled with a 41 kW outboard motor. A wide range of foil configurations were investigated, covering varying angles of attack and a range of anhedral and dihedral angles. A trap to be avoided with scaled foil-borne models is that the foil does not scale with the vessel. At slower model speeds, cavitation is less of an issue, allowing higher angles of attack and spectacular results to be achieved; these are generally not able to be realised at full scale.

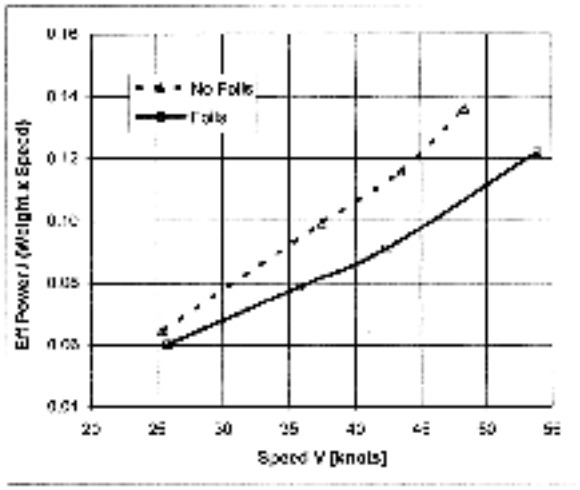


Figure 5: Power vs Speed at full scale, showing effect of foil assistance.

During this testing, a number of inherent advantages of the trimaran became apparent:

- The aspect ratio of the foil can be high on a trimaran, with the foil spanning almost the full beam of the vessel. A simple illustration of the benefit of high aspect ratio is found in nature — compare the flying abilities of the humble chicken (wing aspect ratio approximately 2) to the mighty albatross (aspect ratio approximating 11) — see Figure 6.
- A foil that can be kept within the boundaries of the hull is much less prone to damage. A typical surface-piercing hydrofoil on a monohull has the foils exposed both beneath the hull and in some cases out beyond the vessel's beam — see Figure 7.
- The foil can be kept parallel to the water surface, creating maximum lifting area (witness, again, the near-horizontal wing spread of the albatross). Typically a surface-piercing foil system on a monohull has foils inclined at angles up to 30 degrees.

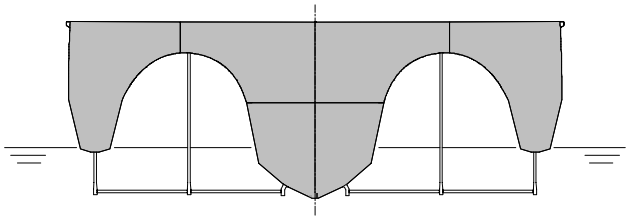


Figure 6: Foil arrangement on NWBS trimaran

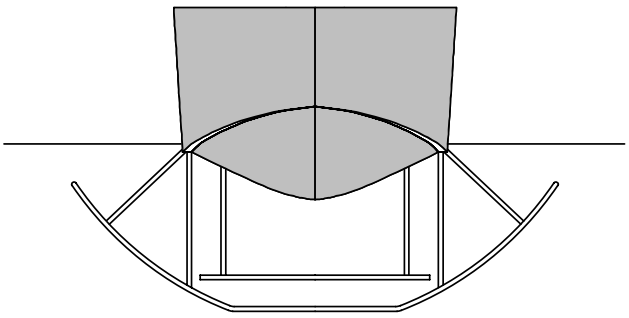


Figure 7: Foil arrangement on typical monohull

After two years of research, NWBS had sufficient confidence in the trimaran concept to start design and construction of MV *Triumphant*, a 55 m, 40-kn vessel.

3. DESIGN CONSIDERATIONS

The primary design considerations for MV *Triumphant* covered four main areas; structure, hydrodynamic performance, stability and a ride-control system.

Each of these areas is significantly different from the previous high-speed catamaran experience of the design team. Whilst some classification society design guidelines were available from early investigations with the Triton project (also under construction at the same time), most of the information was not relevant to a smaller high-speed trimaran version constructed from aluminium.

In addition, the design team faced a new challenge — the vessel did not have a client and, hence, could not be designed around any one particular route, rule package, or even a given country. To preserve an international-client base, it was necessary to design the vessel to the highest standards.

Det Norske Veritas (DNV) was selected as the Classification Society, given their status in the high-speed industry and their involvement with the structural design of RV Triton. The vessel was designed with Class Notation DnV ✠1A1 HSLC Passenger R1 EO Cat B. The underlying High Speed Craft (HSC) Code in the DNV rules is internationally recognised, R1 allows for open-ocean operation and is the most severe rating permitted for passenger vessels, EO permits an unmanned machinery space and Cat B was chosen to allow the vessel to operate with more than 450 passengers and potentially in areas not well serviced by rescue facilities.

The vessel's principal particulars are as follows:

Length OA	54.5 m
Length WL centre hull	52.1 m
Length WL side hull	31.1 m
Beam OA	15.2 m
Beam centre hull	4.0 m
Beam side hull	1.3 m
Depth	5.50 m
Draft	2.12 m
Passenger capacity	450
Speed (full load)	40 kn
Range at 40 kn	330 n miles
Machinery	3 x MTU 16V4000 engines each 2320 bkW @ 2000 rpm
Waterjets	3 x KaMeWa 63, 2 steering, 1 boost

3.1 Structure

The vessel's structure was designed to the DNV High Speed and Light-Craft Rules. The number of load cases investigated is approximately double that of a conventional catamaran, with additional cases looking at loads transferred through the cross structure due to various interactions of the side hulls.

The vessel's structure was rigorously analysed to ensure that the vessel was as light as possible, whilst still retaining sufficient margins on strength appropriate to such a high-speed and novel craft. Aluminium extrusions were extensively used throughout the structure, including a number of extrusions specifically developed for this project, in an effort to reduce the weight of the structure and retain ease of fabrication.

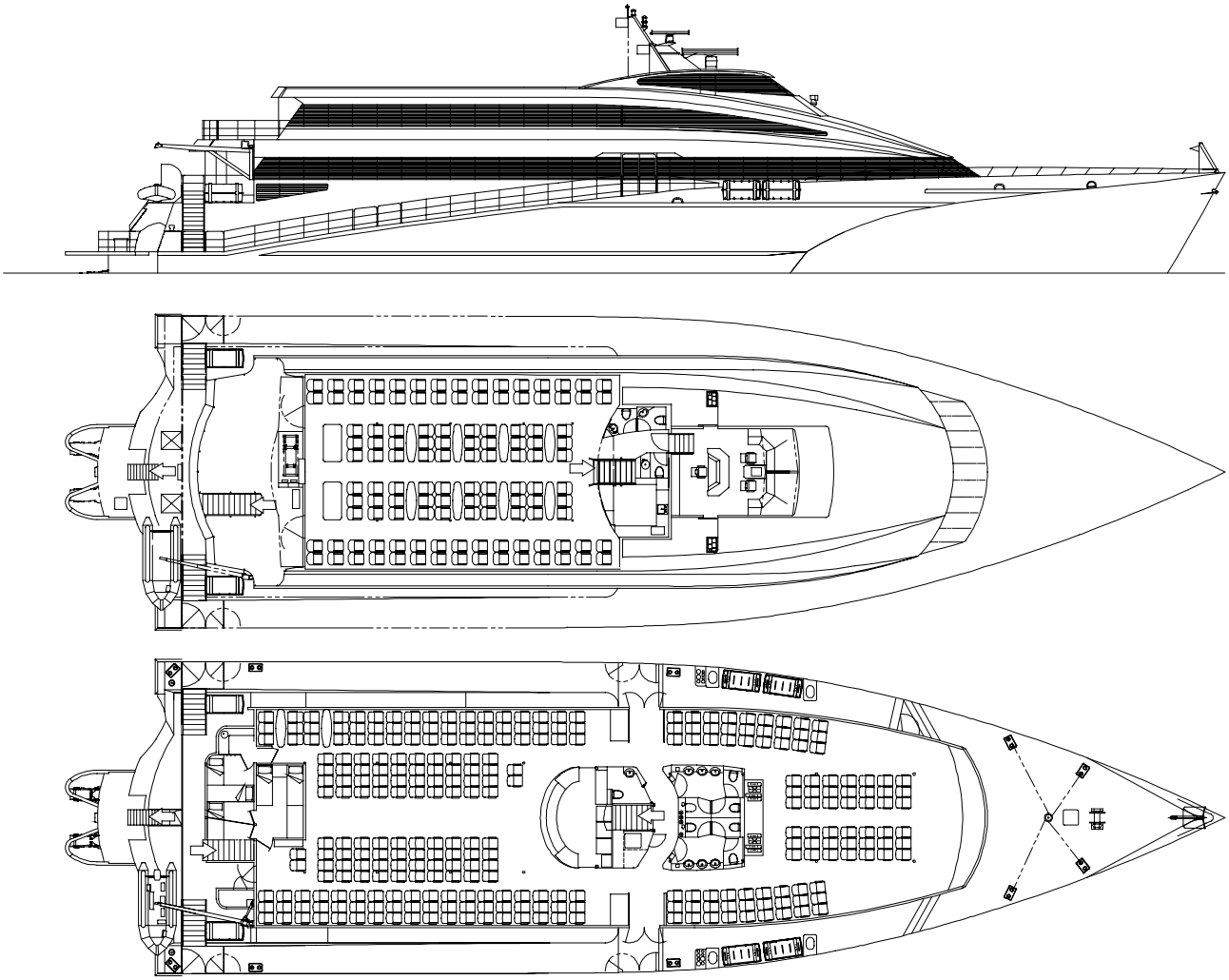


Figure 8: Arrangement of NWBS 55 m Trimaran.

Finite-element analysis was used as a final check on the structure, in particular looking at bending loads transferred from the side hulls to the transverse bulkheads.

The vessel was designed for a significant wave height of 2.0 m at full speed of 40 kn, rising to 3.0 m at 30 kn and 3.5 m at a vessel speed of 20 kn. Permitted wave heights are approximately 30% higher than an equivalent-capacity catamaran or monohull, due to the reduced accelerations on the trimaran in a seaway.

In addition, an acceleration alarm monitoring system has been installed on the vessel, with accelerometers installed at various locations. The trigger points for an alarm are set well beneath the design maximum acceleration for the vessel. This equates to the statistical likelihood that, should the vessel continue running in the same conditions that triggered the alarm, the vessel would eventually encounter a wave that would result in the maximum design acceleration being exceeded. The alarm system has indicated that MV *Triumphant* can operate well beyond its design significant waveheight without causing undue loading on the structure.

The superstructure is structurally independent of the hull. Rubber mounts, located at each frame, raise the superstructure cabin 120 mm above the main hull deck. These mounts act to reduce transmission of noise and structure-borne vibration from the hull to the passenger cabin. The mounts also act to limit the transfer of global hull loads to the cabin, allowing very light construction techniques to be applied to the superstructure. The majority of the cabin plating is 1.9 to 2.5 mm aluminium plate and extrusion.

3.2 Hydrodynamic Performance

The NWBS trimaran has been designed to minimise resistance. The forebody has a very fine entrance and has a large freeboard to provide high levels of reserve buoyancy. A length-to-beam (L/B) ratio of 13 has been used for the centre hull, with the beam being determined by the machinery installation.

Spray chines are fitted on all three hulls to reduce wetted surface when running. Freeboard to the foredeck has been kept relatively high at almost 5 m in the static condition, ensuring plenty of reserve buoyancy forward and a lower incidence of slamming in a seaway.

The side hulls extend for 60% of the centre-hull waterline length, and are exceptionally narrow with a L/B ratio of 24. Seven steps were added in the side-hull bottom, with the steps extending up the sides of the hulls for natural air ventilation.

The location of the side hulls was examined with great interest. Several papers have been presented on the theoretical position of the side hulls relative to the centre hull, in particular looking at optimised positions for wave cancellation in order to reduce resistance [4], [5]. It should

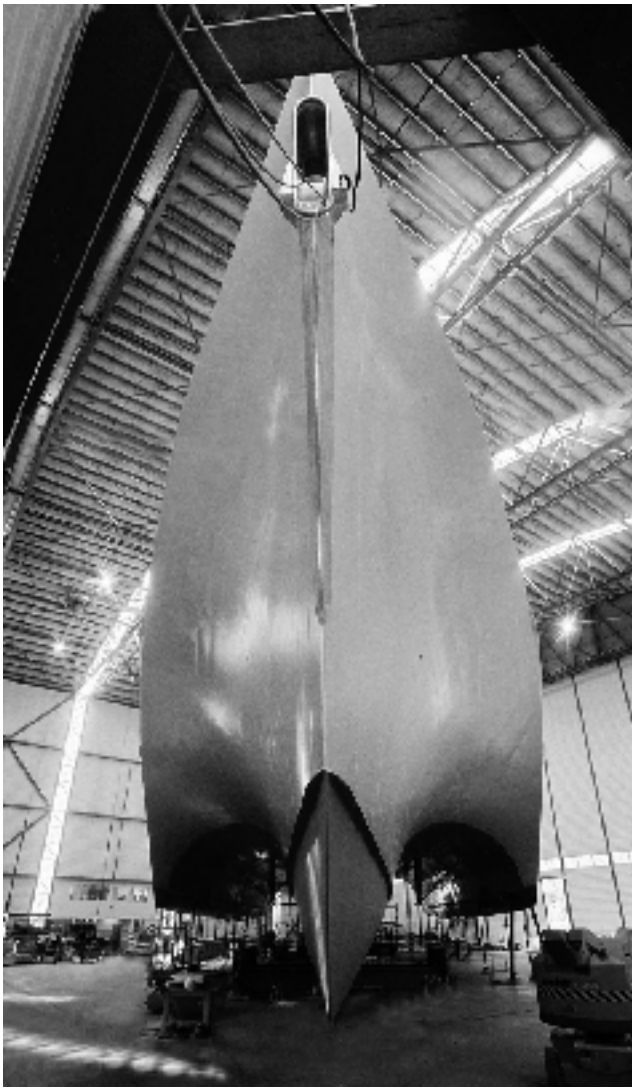


Figure 9: Bow-on photo of NWBS Trimaran

be noted that these papers refer to vessels with Froude numbers between 0.2 and 0.6. However, NWBS, with a Froude number of 0.9–1.0, chose not to follow this path. Instead, the side hulls were positioned with consideration given to the following:

- Optimal wave cancellation was considered too route and speed specific.
- With the side hulls running close to the surface, and with steps to reduce frictional drag, the location from a resistance viewpoint was less important.
- Small side hulls at midships (of the RV *Triton* form) are not the best-suited arrangement for passenger ferry operations, where maximum deck area is always an advantage.
- Long side hulls were advantageous, in that a full-length boarding ramp offering multiple boarding heights could be achieved down each side of the vessel. Without a final client/route and dedicated embarkation arrangements, NWBS accepted a design compromise in order to retain flexibility over a range of boarding heights and locations.
- Sufficient side-hull buoyancy was required to enable the vessel to operate and be viable in the event that the ride-control system was not operational — a fundamental difference when compared to fully-lifting hydrofoils.

3.3 Stability

The vessel's intact and damaged stability was designed to comply with the HSC Code 1994, Annex 7, Stability of Multihull Craft. This required the ability to survive a two-compartment damage case. The centre hull is separated from the side hulls by a continuous watertight longitudinal bulkhead port and starboard, with the centre hull being subdivided into seven compartments. The most critical flooding case involves asymmetric flooding of the side hulls, requiring each side hull to be sub-divided into eight watertight compartments.

3.4 Ride Control System

At the time when MV *Triumphant* was being designed, the majority of new ferries of comparable size and speed were being fitted with ride-control systems. Typically, these systems comprise a forward control surface on each hull and a trim tab at the stern. Such systems have a drag penalty resulting in a speed loss of approximately 1 to 2 kn.

The MDI-designed lifting foils operate as a ride control system in conjunction with an active trim tab. The foil system comprises an inner and outer foil on each side of the centre hull. The total area is approximately 12 m^2, compared to 4 m^2 for a standard catamaran-style pair of T-foils. To avoid the use of exotic materials, the foils are machined from stainless steel and are supported by a central strut. This permits both inner and outer foils to be independently controlled, allowing the outer foils to be biased for roll control and the inner foils biased for pitch. All foils contribute to lifting the vessel at speed.

The system is effective, both as a passive surface when the vessel is stationary or moving slowly, and as an active surface at speed. Combined with their lifting function, it could be argued that the foils are a "drag-positive" ride-control system, increasing the speed of the vessel by 3–4 kn.

4. MACHINERY INSTALLATION

Possibly the biggest disadvantage of the trimaran platform is the constraint placed on the machinery installation. The centre hull, whilst slightly wider than a comparable catamaran demi-hull, has to accommodate an additional 50% propulsive power. In addition, as a Category B craft, the vessel must maintain two independent sources of propulsion, thus providing a get-home function should one engine room become unserviceable.

The machinery arrangement on MV *Triumphant* consists of an aft waterjet space, an aft engine room containing two MTU 16V4000 engines, and a forward engine room containing a third 16V4000 main engine. Two KaMeWa Series 63 waterjets are fitted for steering, one connected to an engine in each engine room, with a third boost waterjet connected to the extra engine in the aft engine room. This arrangement permits steering control of the vessel in the event of either engine room being compromised.

The two forward engines are connected to the waterjets via Geislinger hollow carbon-fibre shafts, which provide substantial weight savings to the system. The shaft from the forward engine room is protected by a water deluge system as it passes through the aft engine room — again to provide redundancy should the aft engine room catch fire.

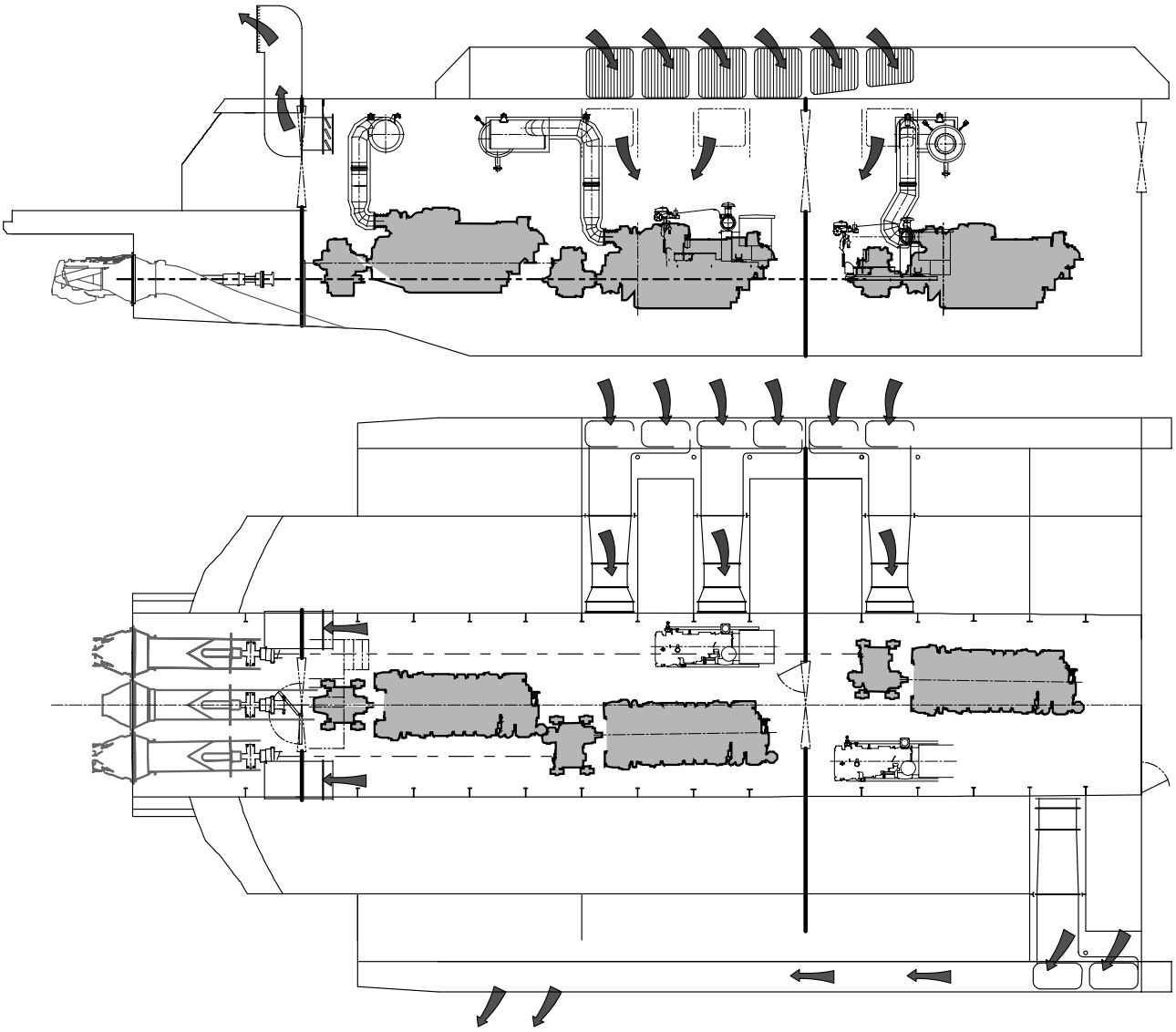


Figure 10: Machinery Arrangement

The other disadvantage of main machinery all located in the centre hull is the difficulty in meeting ventilation requirements. Whilst it would be possible to simply vent vertically, this imposes a large structure in the centre of an otherwise spacious passenger cabin. This is unacceptable from both an aesthetic and noise-transmission viewpoint.

NWBS overcame this by supplying air in through a vent running along the port side beneath the cabin-side windows. Air out for the forward engine room exhausts through the starboard side, whilst the aft engine room exhausts through outlets on the aft deck. This system, whilst slightly complex, preserved the desirable cabin arrangement which is considered fundamental to the vessel's commercial success.

5. SEA TRIALS ANALYSIS

MV *Triumphant* was launched in March 2001 and NWBS proceeded to undertake an exhaustive set of trials to determine whether the vessel would live up to her design expectations.

5.1 Speed Trials

Initial trials were positive in all areas, with the exception of the vessel's speed which was approximately 1 knot less than expected. Modifications were made to the side hull steps, and the bow thrusters, and on re-trialling the vessel achieved 40.5 kn in the fully loaded condition, 0.5 knots above predictions. Comparable 40-kn catamarans with ride control in the market place required four 16V4000 MTU engines, so NWBS had achieved a 25% fuel saving.

Figure 11: MV *Triumphant* at 40 knots — note the effectiveness of the bow spray chines in keeping the vessel dry.

5.2 Step Effectiveness

One area that was examined post trials was the effectiveness of the stepped side hulls. The major unknown was the extent of ventilation of the side hull provided by the steps. A 55 m vessel at 40 kn does not allow for underwater observations.

A novel solution to the problem was found. MV *Triumphant* has a Wattyl Sigma-Glide underwater paint system, which is non-biocidal – the smooth silicon-based surface relies on the speed of the water to wash off barnacles and bottom growth. By allowing the vessel to sit for several weeks until this growth was established, and then running the vessel at 40 kn for 10 minutes, NWBS were able to accurately measure the surface area that was not exposed to water flow and hence was experiencing ventilation.

Using this method, it was confirmed that 60% of the stepped section of the side hulls were ventilated. This equated to a reduction in wetted surface area of the vessel when foil borne of 10%, which, in turn, produces a resistance saving of approximately 6% — a good result when one considers this saving comes at very little capital and maintenance cost (no powered ventilation).

5.3 Seakeeping

NWBS had always targeted speed performance as the primary goal in the design. Seakeeping, whilst important, was initially a lower-order priority in that, unlike military applications, most ferries typically run on short-duration routes (less than 2 hours) in semi-protected waters.

Nonetheless, a series of heavy-weather trials were conducted independently by the Australian Defence Science and Technology Organisation (DSTO), primarily aimed at assessing the vessel's suitability as a military platform. Accelerometers were fitted at various locations around the vessel. The vessel was run in various seastates through a range of headings, and vessel responses were logged for 20 minutes for each speed in each direction. The results of these trials were staggering.

MV *Triumphant* maintained a speed of 36 knots into a 4.8 m significant head sea (simply not achievable with a comparable catamaran due to bow slamming). At no stage did the vessel slam, and no water was taken across the foredeck. Accelerations at the centre of the passenger cabin were less than 0.14g (measured to one standard deviation).

In beam seas of 2.5 m significant waveheight, at a vessel speed of 40 kn, the vessel's angle of roll did not exceed 3 degrees (measured to one standard deviation).

In their conclusions, DSTO noted "It was observed that the vessel displayed very low wake/wash behind, low roll and no slamming and/or deck wetness occurred. This performance was considered remarkable given that the sea conditions on the day of the trial were quite rough (approaching top of Sea State 5)" [6].

Comparisons of vomit incidence (a measure of the percentage of personnel likely to become seasick) during a two-hour exposure time were made with DSTO results from trials on an 86 m high-speed catamaran with ride control as follows:

- The 86 m vessel, in a 2.0 m significant wave height, experienced accelerations in the passenger cabin giving a vomit incidence of 25%.
- The NWBS 55 m Trimaran, in a 4.7 m significant sea, had a vomit incidence of only 15%, despite the much greater sea state and comparatively much smaller vessel.

5.4 Wash

As shown in Figure 12, MV *Triumphant*, when running at 40 kn, produces a wash height of less than 400 mm.

Figure 12: MV *Triumphant* at 40 knots

The reasons behind such a low wash signature are as follows:

- The NWBS hull shape is specifically designed to prevent sinkage and maintain a relatively small transom immersion.
- The foil lift generates 300–400 mm of lift, reducing the underwater envelope.
- The long slender centre hull of the trimaran platform is inherently a low-wash solution.
- The narrow side hulls, running close to the surface and vented with the steps, contribute almost nothing to the wash signature.

MV *Triumphant* has for the last two years operated a return passenger service between Korea and Japan. The route is very exposed, with significant wave heights up to 3.5 m commonly occurring at various times of the year. Trip duration is 4 hours each way.

6. YACHT APPLICATION

Following the success of MV *Triumphant* in a ferry application, NWBS has transferred this technology to the luxury-yacht market. A 60 m trimaran superyacht is currently under construction at NWBS, with launch scheduled for December 2004. Configured purely as a private blue-water motoryacht, the vessel caters for 18 guests and a crew of 13.

Figure 13: March 2004 — NWBS Trimaran Superyacht

This vessel, whilst of comparable size at 60 m, is a significant departure from the *Triumphant* design. Major differences include:

- The superyacht is approximately double the displacement of MV *Triumphant*, and operates at a reduced Froude number of 0.44 (compared with 0.91 for MV *Triumphant*), resulting in significantly different centre-hull and side hull shapes.
- The side hulls do not contain steps; at 20 knots these would be ineffective.
- Commercial efficiency is not the primary aim; rather, the vessel has been optimised for seakeeping, and is designed to DNV Light Craft Rules for a 6 m significant waveheight.
- A MDI ride-control system is fitted, and comprises not one, but two, full-span foils, located at 20% and 60% of the waterline length. The foils are dedicated solely to ride control. Due to the modest speed of the vessel, no significant vertical dynamic support is taken from the foil. The 20 kn design speed has allowed MDI to specify aluminium foils rather than stainless, and the centre strut has been removed, giving the trimaran motoryacht aesthetically-clean lines down through the tunnels.
- With the additional foils able to control pitching motions, the aft trim tab has been removed.

Figure 14: Rendering of NWBS 60 m Superyacht

The trimaran platform offers a number of advantages as a motoryacht compared to the traditional monohull:

- Large deck areas are achievable; the 15.2 m beam of the NWBS 60m motoryacht gives deck areas equivalent to those found on 75 m monohulls.
- The relative dryness of the foredeck allows stowage of watercraft forward, freeing up aft deck space. In the NWBS motoryacht, a 28 ft (8.5 m) Boston Whaler tender is stored on the foredeck, along with 3 jet skis.
- Vertical accelerations are significantly reduced; in a 2 m head sea, independent simulations have shown the NWBS motoryacht accelerations in the forward cabins to be 50% less than those on a typical 60 m monohull.
- Foils with large ride-control surface areas can be achieved, located within the physical bounds of the hulls, reducing the possibility of damage. The NWBS motoryacht has approximately 28 m^2 of active control surfaces.

7. THE FUTURE

NWBS sees a bright future for the trimaran platform. With additional trimarans going into service this year (NWBS 60 m motoryacht, Austal Ships 127 m car ferry), NWBS anticipates that the trimaran will become an increasingly-accepted design in the marine market.

Strong advantages of the trimaran platform include:

- Large deck areas.
- Low resistance.
- Excellent seakeeping performance.
- Ability to fit large ride-control surfaces within the boundaries of the hull platform.
- Ability to operate and maintain service speed in higher seastates.
- Scope for further improvements in an emerging technology

Disadvantages inherent in trimarans designed to date include:

- Increased capital cost compared with a catamaran.
- Constricted machinery spaces.

Whilst NWBS recognises that there will always be a marketplace for monohulls and catamarans, it is perceived that the trimaran platform offers specific advantages associated with efficiency and ability to operate in higher seastates. NWBS believe this emerging technology will result in an increasing demand for trimaran vessels. NWBS are strategically placing themselves to be able to participate in this exciting growth market.

8. ACKNOWLEDGEMENTS

NWBS would like to acknowledge the dedication and work of the following; without their support the 55 m trimaran would not have been successful:

- Australian Maritime College.
- Det Norske Veritas.
- Maritime Dynamics Inc.
- Professor Lawry Doctors, UNSW.
- The Staff at NWBS.

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10. AUTHOR'S BIOGRAPHIES

Robert Tulk is the Senior Naval Architect at NWBS. He has 12 years of design experience in the high-speed ferry industry.

Stephen Quigley is the Managing Director of NWBS. His background includes 20 years of design and construction of high-speed aluminium vessels.

This paper was presented at the RINA Conference *Design and Operation of Trimaran Ships* in London in April 2004.

Copies of all the papers from this conference are available from the RINA Publications Department (email publications@rina.org.uk) for £95 (members) or £115 (non-members). The reference number is TR104 or, if the CD version is required, TR104CD.

EDUCATION NEWS

Australian Maritime College

Final Year BEng Research Thesis Presentations

The current final year students studying the undergraduate engineering degrees of naval architecture, ocean engineering and marine and offshore systems made presentations of their research theses on Monday 18 and Tuesday 20 October 2004. As usual a number of external moderators from industry were present, including Mr Derek Gill (Austal Ships), Dr Stuart Cannon (DSTO) and Mr Andrew Mason (Formation Design Systems).

The students and the titles of their projects were:

Dane McNally — *Design of a Semi-Submersible and its Mooring System for the Bass Basin*

Oliver Mills — *Time Domain Simulation of Ship Based Crane Motions*

Oscar Palos — *Stability of Canting Keel Yachts in Large Breaking Waves*

Nick Billett — *An Investigation into the Effects of a Yaw Moment Balance on a Sailing Dinghy VPP*

Tom Ryan — *Motion Reduction of Prawn Trawlers using Passive Bow Fins*

Kyle Dick — *Development of Software for the Analysis of Experimental Data for Hydrodynamic Applications*

Jesse Millar — *Theoretical Resistance Prediction of Modern High Speed Vessels*

Colin Johnson — *Preliminary Motion Predictions of Catamarans in Waves*

Ben Healy — *Wave Wake Generation of Trimaran Hulls*

Luke Pretlove — *An Investigation into the Generated Waves of a Staggered Catamaran*

Noel Dunstan — *Finite Element Investigation of Ice Vessel Structures Subjected to Ice Loads*

Alan Goddard — *Finite Element Analysis of FRP Moth-class Sailing Dinghies*

Sergy Kamkin — *Structural Performance of Composite Laminate Panels in Fatigue*

Jonathon Schulz — *Retrofication of Reinforced Concrete Beams using CFRP Panels in the Splash Zone*

Iain Lund — *Wave Drift Force Effects on Ship Manoeuvring*

Holley Lees — *An Investigation into the Hydrodynamic Efficiency of the Energetech Wave Energy Converter*

Suzanne Hayne — *Investigation of Cantilevered Float-over Installations*

Bill Edwards — *Instantaneous Diesel Injector Fuel Flow Measuremen*t

Jeremy White — *Investigation of Soot Formation trends for the Combustion of Heavy Fuel Oil using CFD*

Todd Tippett — *An Investigation into the Strainer Failures within the Electronic Container Seawater Cooling System Onboard Anzac-class Frigates*

Mark Hughes — *Application of Artificial Neural Networks to Ship Resistance Prediction*

Anton Schiemann — *Added Resistance of Catamarans in Waves*

Kay Myers — *Investigation of the Motion of an Underwater Towed Vehicle*

Ben Gilkes — *Design and Modelling of a Steep Wave Flexible Production Riser for Deep Water*

Cameron Nilsson Linne — *Development of an Optimal Control Algorithm for Ship Manoeuvring*

Papers Presented at International Conferences

Dr Prasanta Sahoo attended the 9th International Conference on Practical Design of Ships and Other Floating Structures (PRADS 2004) in Lubeck, Germany between 12 and 15 September. Prasanta presented a paper titled *Theoretical and Experimental Study of Motion Characteristics of High-speed Catamaran Hull Forms*.

Dr Giles Thomas and Dr Prasanta Sahoo recently attended the 4th International Conference on High-Performance Marine Vehicles (HIPER 04) held in Rome on 27 to 29 September. Giles presented a paper titled *An Investigation into the Whipping of Large High-speed Catamarans* while Prasanta presented two papers *Experimental and CFD Study of Wave Resistance of High-speed Round-bilge Catamaran Hull Forms* and *Experimental* and *CFD Resistance Calculation of a Small Fast Catamaran*. The conference was held at INSEAN, the Italian national hydrodynamic research centre (www.insean.it) — home of Italy's largest towing tank, model test basin and cavitation tunnel facilities. The conference delegates were drawn from universities, research centres, classification societies and industry. They were predominantly from European countries, but Australia, Japan, South Africa, Iraq and the United States were also represented. The presented papers focussed on the design, research and development of high-speed marine vehicles. A broad range of topics was covered, and papers were presented on optimisation in design, slamming impacts, stability criteria and vessel subdivision, resistance and ship motion prediction, among others. It should be noted that HIPER 06 will be

held at the Australian Maritime College from 8 to 10 November 2006 (www.amc.edu.au/hiper06).

Students Site Visit to North West Bay Ships and Incat Tasmania Shipyards

In October the first year BEng (Naval Architecture) students visited the Hobart shipyards of Incat and North West Bay Ships. Thirty-seven students made the trip, accompanied by Dr Norman Lawrence. At Incat they saw a 112 m catamaran in the preliminary stages of construction and a 94 m catamaran with both hulls nearly complete. The visit to North West Bay Ships enabled them to see a 60 m superyacht trimaran in the outfit stage. The following excerpts, taken from students' journals, give an indication of their impressions:

- 'We saw two fuel tanks being welded up, which were twice as big as our house.'
- 'A 94 m US Military vessel was in for maintenance, a pretty impressive-looking craft.'
- 'Probably the coolest thing I saw was the retractable T-foil — apparently they had a few problems in the past with whales destroying the foils.'
- 'A huge aluminium trimaran, by far the best and coolest looking shape I've ever seen.'
- 'Both yards, boats and workplace set-ups were amazing.'
- 'It's interesting — the master bedroom had *two* double beds!'

[*Do we have a definition of 'cool' in the naval architectural sense yet?* — Ed.]

Full Scale Wave Wake Studies

Gregor Macfarlane and Jonathan Duffy recently spent a week conducting full-scale wave-wake trials on the Gordon River on Tasmania's West coast. This work is part of a joint research project between AMC, the Nature Conservation Branch of the Tasmanian Department of Primary Industry, Water and Environment, the Tasmanian Parks and Wildlife Service and World Heritage Cruises (who provided their cruise vessel *Adventurer* and crew for the experiments). The primary aim was to examine the relationship between model scale and full scale wave-wake characteristics to determine if any correlation factor should be applied to results of model testing to accurately predict full-scale wave-wake characteristics, with particular emphasis on the slow speed range of 4–8 kn.

Another wave-wake study was undertaken by Gregor Macfarlane and Greg Cox of Kamira Holdings which required the conduct of a series of full-scale wave-wake experiments on the Maroochy River in Queensland. This work forms part of the third stage of AMC's involvement in a study into vessel wash impacts on bank erosion for the Moreton Bay Waterways and Catchments Partnership. This study was instigated by Maritime Safety Queensland and is now into its 5th consecutive year.

Annual UNSW Naval Architecture Student Visit to AMC

On 20 and 21 September the AMC was host to the third-year naval architecture students from The University of New South Wales for a series of laboratory sessions in the towing tank, cavitation tunnel, model test basin, ship-handling simulator and circulating-water channel. The twelve UNSW students also had a brief tour of AMC's vessels. As is usual during these visits, the naval architecture program co-ordinator, Professor Lawry Doctors, gave a presentation to AMC students and staff. This year the presentation was on *Wave Generation of High-speed Marine Vessels*. The talk was followed by a counter meal which provided an opportunity for students studying naval architecture from both UNSW and AMC to compare notes.

Naval Architecture Degree — Industry Liaison Committee

The naval architecture degree held one of its regular Industry Liaison Committee meetings at AMC earlier this year to conduct a thorough review of the course content. The Industry representatives, all of whom provided excellent input throughout the meeting, included Mr Noel Riley (Commercial Marine Design), Mr Gordon MacDonald (Department of Defence), Mr Derek Gill (Austal Ships) and Mr Steve Quigley (North West Bay Ships).

New Practical Laboratory Sessions Introduced

Third-year students studying the subject *Hydrodynamics of Offshore Structures* recently conducted a newly-developed practical laboratory session within the AMC's model test basin. The particular scenario modelled in this investigation was one aspect of the installation process for a floating coastal structure. The scale model was held in place by accurately-modelled mooring lines connected at each of the two forward corners and a single line pulling aft with constant tension (simulating a tug). The floating structure was then exposed to a series of regular waves of nominal wave height and a wide range of wave periods. The primary aims of the exercise were (1) to measure the vertical and lateral motions of a model of a floating offshore structure; (2) to measure the loads experienced within the mooring lines, and (3) to learn about the primary factors to be considered when undertaking scale-model physical experiments, such as model scaling laws for length, mass, time and mooring-line stiffness. Groups were limited to a maximum of three students in order to allow each student to be actively involved in all aspects of the experiments.

Towing Tank Upgrade Update

The major upgrade of the AMC towing tank will soon be underway following the close of the tender period on 22 October and engagement with the preferred tenderer. ARTAS (Architects) and their engineering partners in this project have completed the detailed design for all major civil tasks. Ship Hydrodynamics Centre staff have been working through some of the more technical aspects of the project, including the accurate machining and alignment of the new rails and tolerances on the tank floor and walls.

It is envisaged that the civil works will begin in mid-late November 2004 and the new 100 m tank should be up and running in early April 2005. During the downtime, facility staff will be taking the opportunity to upgrade a number of other aspects including major modifications to the carriage, such as improving the quality of carriage ride through upgrading of the rail guide system, reconfiguring the working platform and incorporation of the latest OH&S requirements.

As well as the upgrades outlined, it is also planned to take this opportunity to implement a new data acquisition and analysis system and wavemaker-control system.

In addition to the extension to the towing tank, a number of additional classrooms, computer laboratories, staff offices and a new centre for postgraduate students will be provided within the upper floors of this building.

Gregor Macfarlane

Curtin University

Education and Research

Curtin University has recently signed a Memorandum of Understanding with the Australian Maritime College, formalising and strengthening the existing ties between the two institutions. Two immediate outcomes have been:

Green Ship Research

Both institutions are offering a range of undergraduate research projects aimed at reducing the impact of ship construction and ship operations on the environment. The initiative is expected to extend to postgraduate research collaboration in future.

Naval Architecture Degree

Arrangements are now in place for students to study naval architecture by completing their first two years at Curtin University and their second two years at the Australian Maritime College. AMC will be running some of their second year units remotely for the Curtin students in order to ensure smooth articulation. This arrangement, on offer from January 2005, will increase the opportunity for Western Australians to become fully-qualified naval architects. For further information contact the Department of Mechanical Engineering at Curtin University on (08) 9266 7047 or AMC on 1800 030 277

DSTO Alliance

Curtin University has signed a Memorandum of Understanding with DSTO built on the collaboration between the two organisations over two decades, principally through contract research with Curtin's Centre for Marine Science and Technology. Staff exchanges are under discussion and a DSTO staff member has already enrolled at Curtin in a PhD programme.

Visit by NRL

Staff from the United States Naval Research Laboratory Ocean and Atmospheric Science and Technology Directorate visited Curtin University to discuss research collaboration on several topics including ocean-wave propagation and ship-wake modelling. A visit by CMST staff to NRL is planned for 2005.

Virtual Hydrodynamic Testing Facility

A new project has just started to explore the feasibility of using high-performance computing to provide solutions to hydrodynamic problems faced by Australian marine industries and to demonstrate the capability of the ISA Technologies IBM HPC facility recently installed at Technology Park next to Curtin University. The project is managed by ISA Technologies Pty Ltd with contributions from Curtin's Centre for Marine Science and Technology, WBM Pty Ltd and the WA Department of Industry and Resources, with funding support from the Western Australian Interactive Virtual Environments Centre (IVEC).

People

Kim Klaka has been appointed Director of the Centre for Marine Science and Technology at Curtin University.

Kim Klaka

The University of New South Wales

Undergraduate News

Visit to AMC

Once again this year, the third-year students in ship hydrodynamics at NSW were guests at the Australian Maritime College, on 20 and 21 September 2004. As was the custom in previous years, the visit lasted two days and was most ably organized by Mr Gregor Macfarlane and Mr Richard Young of the AMC. UNSW is very grateful to them for their hospitality. In addition, Dr Paul Brandner, Mr John Wakeford, Mr Liam Honeychurch, Mr David Clarke (of the DSTO), Mr Jamie McDougall, and Mr Ian Smith assisted with the tour itself.

The experience they gained by using the towing tank for resistance and motion tests together with the inspection of the other experimental facilities (the ship-handling simulator, the cavitation tunnel, the circulating-water tunnel, the ship-model basin, and the vessels at Beauty Point) was most valuable and was a great addition to their theoretical studies at UNSW. The students also witnessed a ship model being milled by a numerically-controlled machine.

In return, Professor Lawrence Doctors gave an evening presentation on the subject *Environmental Wave Generation of High-Speed Marine Vessels* on 20 September. This was an official activity of the Tasmanian Section of RINA. In his presentation he emphasized the importance of surface tension on the waves generated by small ship models, particularly at low speeds. The talk was delivered in the main auditorium of the AMC and was attended by a large number of students and staff from the AMC, as well as the UNSW students.

Lawry Doctors

Graduation

At the graduation ceremony on 19 October, Gerard Engel graduated with his degree in naval architecture with Honours Class 2, Division 1. Congratulations, Gerard!

Gerard is now employed by Austal Ships in Fremantle. He has recently completed the first part of Austal's training scheme, with six months on the workshop floor, and has now moved into the drawing office.

Thesis Conference and Dinner

At the School's annual undergraduate thesis conference on Thursday 4 and Friday 5 October the following presentations on naval architecture student projects were made:

Anthony Bran — *CFD Prediction of Air and Wind Resistance of Ships*

Sean Cribb — *The Accuracy of U-Tubes in Inclining Experiments*

John Hayes* — *Project Management for Restoration of* John Oxley

Jamie Howden — *Analysis of Wash Generated by Wakeboard Vessels*

Ruth Jago* — *Applications of Composites to Marine Propellers*

Mervyn Lepper — *Probabilistic Assessment of Hull Girder Geometric Properties for Aged Ships*

Felix Scott — *Regression Analysis of Resistance for Round-Bilge Catamarans*

* = Mid-2004 start

The Conference Dinner was held on the evening of Friday 5 October at the Randwick Labor Club. A group of the final-year naval architects attended and made up a congenial table with lecturer Phil Helmore and Helen Wortham.

Naval Architects at the Thesis Conference Dinner
(Photo courtesy Mervyn Lepper)

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 Sean Cribb for his presentation on *The Accuracy of U-Tubes in Inclining Experiments*, and was announced by Mr Phil Helmore at the thesis conference dinner. His prize cheque has subsequently arrived, but he is still waiting on the certificate from London. Congratulations, Sean!

Sean Cribb and Phil Helmore at the Announcement of the RINA–Austal Ships Award
(Photo courtesy Mervyn Lepper)

Lecturer of the Year

Also at the thesis conference dinner, the School's 154 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 Zoran Vulovic, who also won the award in 2002.

A number of light-hearted awards were also presented by the students:

The Communications for Professional Engineers Lecturer: Dr Tracie Barber.

The Departing Numerical Methods Lecturer: Dr Ian Maclaine-cross.

The Free-body Diagram Award: A/Prof. Robin Ford.

The Missing Link: Prof. Eddie Leonardi.

The Being a Dude Lecturer: Prof. Bob Randall.

The Longest Degree (ten years): Duncan Stewart.

The Ice Queen: Karen Winfield.

The Most Likely to Come Back as a Lecturer: Alicia Kidson.

The Smartest Rugby League Player Ever to Earn a Degree: Anthony Brann (naval architect).

The Most Likely Contender for a Fat-free Makeover: Leigh Glasgow.

The Most Likely to Blow up a Government Building: Robert Evans.

The Most Creative Hair Design: David Lindartono.

The "He Took off His Cap and has Beautiful Hair" Award: Bourhan Chmeisse.

The Best Expert Witness: Michael Allan.

The Loudest Black Man on Campus: Faisal Ghani.

The Geek Award: Galen Needham.

The Lovely Person Award (having never put a foot wrong): Denise Lin.

The Table 13 Lucky-dip Award: Arash Karpour.

The Lab Rat Award: Tim Anderson.

Congratulations to all!

Phil Helmore

Naval Architects at Play

Naval architecture students Rozetta Payne (postgraduate) and Rebecca Dunn crewed on the CYCA entry in the Australian Women's Match Racing Championships which were held at the Royal Perth Yacht Club in Western Australia from 23–27 September. A total of eight teams attended, representing Sydney, Perth, Fremantle, Hobart and Auckland. The event consisted of two round-robin series, followed by match-racing semi-finals and finals (best of three).

The series was sailed in J24 yachts which are 7.3 m (24 ft) long and sloop-rigged with a crew of five. Sydney was represented by teams from Royal Prince Alfred Yacht Club and the Cruising Yacht Club of Australia.

The CYCA team were top of the league after the round-robin series, and were one-all with Auckland in the major semi-final best-of-three races, but lost the decider with a jib over-ride problem. The event was won by the team from RPAYC, with second place going to the team from Auckland, third to the Royal Perth Yacht Club team and fourth to the CYCA team.

It was a fun regatta with a great mix of people and was enjoyed by all who participated. Thanks to Royal Perth Yacht Club for putting on the regatta and billeting interstate and overseas teams. The next Women's Match-racing event on the calendar is to be held at the CYCA in March 2005, with the next Australian Women's Championships to be held in Sydney in September 2005.

Rozetta Payne

Post-graduate and Other News

Alumni Dinner

The Faculty of Engineering began holding annual Alumni Anniversary Dinners in 2002 and, each year, targets the students who graduated 10, 20, 30, and 40 years ago. In 2004, that means those who graduated in 1954, 1964, 1974, 1984 and 1994.

This year's dinner was held in the Roundhouse, and attracted a number of graduates from the School of Mechanical and Manufacturing Engineering, including naval architect Rear-Admiral Trevor Ruting. Staff from the School of Mechanical and Manufacturing Engineering who attended included the Head of School, Prof. Hartmut Kaebernick, Deputy Head

of School, Prof. Eddie Leonardi, Executive Assistant to Head of School, A/Prof. Philip Mathew, Director of Undergraduate Teaching, Mr Phil Helmore, Emeritus Prof. Kerry Byrne, Visiting Prof. John Reizes, and former Deans, Emeritus Profs Al Willis and Chris Fell. The Dean of the Faculty, Prof. Brendon Parker, presided.

The first after-dinner speaker was the CEO of Australian Defence Industries, Lucio di Bartolomeo, who graduated in civil engineering in 1984. Perspectives from alumni of 1964, 1974 and 1984 provided light entertainment, recalling Bacchus Balls and Engineering Balls in particular. Trevor Ruting gave the 1974 perspective, and his account of three-hour hydrodynamics lectures on Wednesday mornings with Prof. Tom Fink, followed by three lecturers and six students piling into two cars and then onto one yacht for Wednesday afternoon practical experiments in hydrodynamics and aerodynamics on Sydney Harbour left the Dean envious that he had not yet been invited! A good time was had by all.

Rear-Admiral Trevor Ruting, Visiting Professor John Reizes and Mr Phil Helmore
at the Engineering Alumni Anniversary Dinner 2004
(Photo courtesy Faculty of Engineering)

Next year's Engineering Alumni Anniversary Dinner will be special for those naval architects who graduated in 1965, 1975, 1985 and 1995.

If you do not currently receive the twice-yearly *UNSW Engineers* (with news of just this sort of thing) which is mailed by the faculty to all graduates, or the new twice-yearly *Alumni News* which is mailed by the university to all graduates, then it will be because the university does not have your current contact details. You may correct the oversight by email to alumni@unsw.edu.au, or directly on the web at www.unsw.edu.au/alumni/adv/updateform.html.

Lifelong Email Addresses for Alumni

All alumni of UNSW are now offered a lifelong email address of the form j.bloggs@alumni.unsw.edu.au. The service was launched in September, and offers a number of benefits, including having your *alma mater* in your email address, being identified as a alumnus, helping to maintain better contact with UNSW friends, and receiving quarterly news on University activities, events and professional development.

The high-capacity (40 MB each) email service was rolled out with an offer to all alumni to take up an email address, and is as easy to use as Hotmail or Yahoo. Starting in 2004, all graduating students will be offered the automatic upgrade from their student email address to an alumnus address as soon as they graduate. It will have an on-line directory, accessed via a website.

If you are an alumnus and the university has your current contact details, then you should receive a letter with this offer through the mail soon. If you don't, then it will be because the university does not have your current contact details. You may correct the oversight by email to alumni@unsw.edu.au, or directly on the web at www.unsw.edu.au/alumni/adv/updateform.html.

If you would like to sign up immediately or would like further information, then email alumni@unsw.edu.au.

Phil Helmore

Twenty-Fifth Symposium on Naval Hydrodynamics

This conference is run under the auspices of the Office of Naval Research (ONR) in Washington and takes place every two years. On this occasion, the symposium was held in St John's, Newfoundland and Labrador, Canada, on 8–13 August 2004, with the standard five-day format being followed. In addition to the ONR, The National Academy of Sciences (Washington), the National Research Council (Canada), and Memorial University of Newfoundland (St John's) were co-sponsors. The local organising committee consisted of a number of academics from the National Research Council and Memorial University of Newfoundland.

A total of 77 papers on all aspects of ship hydrodynamics was presented. There were 166 attendees from 22 countries. On this occasion, there were two Australian contributions.

Associate Professor Krish Thiagarajan (University of Western Australia) presented his work on *An Effective Scaling Device for Model Tests of Air Cushion Vehicles in a Laboratory*. The work related to the use of air cushions for support of floating platforms, such as large-volume concrete structures, during tow-outs. For the latter case, the purpose is to provide sufficient clearance above the seabed when the water is shallow. The research relates to the fact that the atmosphere in the laboratory ideally should be scaled down. This can be achieved artificially using an air reservoir made of an elastic material to correct the dynamics of the model.

Professor Lawrence Doctors (UNSW) and Dr Gregory Zilman (Tel-Aviv University) discussed their work on *Environmental Wave Generation of High-speed Marine Vessels*. The work described in their paper covered the wavemaking characteristics of three types of advanced high-speed marine vessels: catamarans, trimarans, and air-cushion-assisted catamarans. The theory developed now includes the effects of viscosity, surface tension and surface elasticity (contaminants) on the wave generation. This theory was shown to provide excellent predictions of the wave patterns created by these vehicles.

Lawry Doctors

FROM THE CROW'S NEST

The Technology Race

National Engineering Week 2004 was officially launched in Sydney on Sunday 29 August with a special race between 19th century and 21st century technologies. The restored 19th century barque *James Craig* and the 21st century *Solar Sailor* raced each other from Fort Denison to Sydney Harbour Bridge, with both vessels carrying a total of nearly 180 passengers for the race.

James Craig is the only 19th century iron barque which carries public passengers, and *Solar Sailor* is the first sun-and-wind-powered passenger vessel in commercial use. Solar panels on the deck and sails capture sunlight, and the wings function as sails when raised.

The race was organised to display the magnificent engineering in both vessels. The race was narrowly won by *Solar Sailor*, with *James Craig* crossing the finish line about a minute later, and the race featured on the evening TV news.

Now, if there had been a bit more wind and a little less sun … square-rig aficionados are awaiting a re-match.

Lloyd's Register Asia Wins Royal Australian Navy Classification Contract

Lloyd's Register Asia has signed a contract to provide classification services for the design-study phase of the Royal Australian Navy's air-warfare destroyer (AWD) project.

This project will deliver a new class of at least three ships capable of air defence, with entry into service expected to take place in 2013. The ships will provide a significant enhancement to the Royal Australian Navy's air-defence capability and will include the AEGIS combat system with helicopter, gun and vertically-launched-missile weapon systems. They will be the first combat ships for the Royal Australian Navy to be designed and constructed to a classification society's Rules.

The contract represents the beginning of Lloyd's Register Asia's formal participation in the AWD project and will enable the establishment of a key technical partnership during the early stages of the project, providing significant benefits to the Royal Australian Navy. Jim Gledhill, Director of the AWD project, says: "Lloyd's Register will provide important technical services at this early stage of the project."

Lloyd's Register Asia's involvement is expected to extend through the design, construction and in-service phases of the project.

"This contract is an important one for Lloyd's Register Asia, as it extends the work done by Lloyd's Register in the UK on the Royal Navy's Type 45 destroyers and the 'future aircraft carrier' project," says Adrian Broadbent, Lloyd's Register Asia's Naval Business Manager in Australia. "The AWD project team has engaged us at an early stage of the project, which will enable us to provide a much wider and comprehensive range of services than is usually possible. This reflects our mutual desire to work closely with the project team and thereby maximise the possible benefits available to the Royal Australian Navy throughout the service life of these vessels.

"The classification of these ships will encompass hull, machinery, electrical, control and military-system aspects. This will be one of the most significant naval classification tasks Lloyd's Register has ever undertaken."

Lloyd's Register Asia has worked closely with the Australian Department of Defence over the past four years to bring a number of Royal Australian Navy ships into Lloyd's Register class. A total of fifteen Royal Australian Navy ships are currently classed by Lloyd's Register.

Qinetiq Short Course on Performance of Warships in Rough Weather

Qinetiq at Haslar in the UK runs a three-day short course on the performance of warships in rough weather.

The seakeeping performance of a ship is a major determinant of its overall operational effectiveness. Ships with good seakeeping qualities are able to go to sea and successfully execute their missions despite adverse weather conditions. Monetary constraints together with the desire to maximise operational effectiveness demand that naval ships, with their ever-increasingly sophisticated systems, are designed with known operational capabilities.

The aim of this course is to provide a methodology for the naval architects from both the project teams and industry to understand and set seakeeping requirements, and to be able to assess designs throughout the procurement process. The course is aimed to complement the seakeeping methodology outlined in the latest version of the *SSP97 — Hydrodynamics Design Guide*.

QinetiQ Haslar has been involved with the hydrodynamic assessment of most Royal Navy surface combatants and continues to work with the UK Ministry of Defence and commercial organisations to improve the hydrodynamic capability of surface ships and ensure that design guidance is available to designers and operators.

The course fee is £950 excluding VAT and includes course notes, refreshments and course dinner.

For further information and dates of the next course, visit the website www.qinetiq.com or contact Martin Renilson at mrrenilson@qinetiq.com.

Qinetiq Short Course in Submarine Hydrodynamics

Qinetiq at Haslar in the UK also runs a three-day short course on submarine hydrodynamics.

The design and operation of submarines requires skills that are specific to the problems associated with these vessels. QinetiQ Haslar has been involved with the hydrodynamic assessment of every Royal Navy Submarine and continues to work with the UK Ministry of Defence (MoD) and commercial organisations to provide design capability, improve submarine hydrodynamic capability and ensure that safety guidance is available to the MoD, constructors and operators.

This course will allow delegates to expand and develop their understanding of the design criteria which affect submarine performance –– including static control, resistance, propulsion, dynamic control and safety guidance. Details will be provided on the model experimentation required to allow manoeuvring predictions to be performed and a tour of the facilities at Haslar will familiarise delegates with the physical models and equipment required. Propulsor concept design, control and autopilot criteria, increased use of CFD and safety guidance will be discussed, allowing all delegates to participate and share knowledge.

The course complements the information contained in the Ministry of Defence Sea Technology Group's *Publication No. 73, Submarine Hydromechanics*, which is provided as part of the course notes.

The course fee is £950 excluding VAT and includes course notes, refreshments and course dinner.

For further information and dates of the next course, visit the website www.qinetiq.com or contact Martin Renilson at mrrenilson@qinetiq.com.

Plating Thicknesses

No doubt you have read, marked, learned and inwardly digested the article on *Developing the Next Generation of Class Rules for Oil Tankers* in the September 2004 issue of *The Naval Architect.*

However, your attention is drawn to the section on *Net Thickness Approach and Wastage Allowance*, and particularly to the explanatory diagram, Fig. 4 on page 134. This section shows clearly how the gross thickness required for new construction is obtained from the net thickness required for the structure to survive plus a corrosion allowance. Further, how the thickness at which plating renewal is required in service is obtained from the net thickness plus the estimated amount of corrosion during a 2½ year docking cycle. This is the clearest explanation of how the various thicknesses are related that I have seen. Highly recommended.

Little America's Cup

The races for the Little America's Cup, sailed in C-class catamarans, were recently held out of Bristol, Rhode Island, USA. The Australian challenger, *Ronstan*, was designed and crewed by Damien Smith, and skippered by former Hobie 16 world champion, Gavin Colby.

The races were hard fought, and ended with *Cogito* (USA) first and retaining the trophy, *Ronstan* (Australia) second, and *Invictus* (UK) third. This is Damien's first challenge for the Little America's Cup, and he was up against the world's best. Congratulations on your second place, Damien!

The ANA expects to publish a paper on the design, construction and sailing of *Ronstan* in the near future.

Phil Helmore

Spyware Eradication

I was listening to the radio recently when they recommended the use of the NoAdware software to remove the various spyware programs that could be on your computer. I tried it and found that I had *eight* different spyware programs on my computer, none of which were detected by my virus checker.

My computer is now running much faster, so I can recommend trying the free detection scan that can be found at www.noadware.net.

Andrew Baker

More Spyware Eradication

Your scribe can verify the pervasiveness of spyware. Only days after learning of the existence of spyware from Andrew Baker's message above (and having done nothing about it), I successfully installed the Windows XP Service Pack 2 upgrade on my laptop, but it would not then re-boot! When trying to find the cause, my computer guru checked the desktop computer alongside, and found *fifty* spyware items present, none of which had been detected by my up-to-date anti-virus software. The laptop spends less time connected to the 'net, but would certainly have picked up some of the fifty spyware items. The end result was a complete reload of operating system, software and data on the laptop!

At almost the same time, the desktop computer at home became painfully slow, and neither of the browsers (Opera and IE) would work. Already wise from the laptop incident, anti-spyware found and eradicated *one hundred and seventy-three* spyware items. This has restored the speed, but not the browser operation. A complete operating system reload may be the only way!

My computer guru says that you should download and install both Spybot and Spyware Blaster (they are free), update both weekly from their websites, and run Spybot weekly (it takes a few minutes) to clean out any spyware found; Spyware Blaster runs in the background and prevents installation of some spyware. They check different things, and so you need both. You can find Spybot at www.spybot.info/en/index.html and Spyware Blaster at www.javacoolsoftware.com/spywareblaster.html.

"Eternal vigilance" is the watchword for spyware and viruses. A couple of further pointers follow.

Malware

Spyware, adware, trojans, and key-loggers are all encompassed by the generic term malware.

The following definitions are quoted *verbatim* from the Dictionary in the Spybot program:

What is spyware? In easy terms, spyware is software that transmits personally-identifiable information from your computer to some place in the internet without your special knowledge. Spyware is typically not the product you install itself, but small add-ons, that you may or may not disable during install. In most cases, the EULA [*End User Licence Agreement* — Ed.] somewhere has a few lines telling you about privacy matters, but typically most users don't read the complete EULA and never know they landed spyware on their system.

A less threatening sort is adware. Adware is similar to spyware, but does not transmit personally-identifiable information, or at least the collector promises not to sell it. Instead, aggregated usage information is collected. Adware is also often a side-effect of spyware, as both monitor you for a sole purpose — delivering you advertisement that is especially tailored to your habits.

Another kind that is detected under the spyware category are tracking cookies. Cookies are used all over the Internet in useful and less-useful places. Advertisement companies often set cookies whenever your browser loads a banner from them. In that case, and if that cookie contains a GUID [*Globally Unique Identifier* — Ed.], the company gets notice about every site you visit which contains their ads.

Trojans give hackers easy entry into other computers, and key-loggers surreptitiously capture keystrokes and, hence, passwords and other details. It might not be a serious problem if someone found out your email password, but it could be a real pain if they found out your bank account details from a key-logger!

Malware Targets

Microsoft's Internet Explorer for browsing and Outlook/Outlook Express for email are targetted by malware mongers because of their widespread usage. Just visiting a particular website or even looking at an image with Internet Explorer can infect your computer with a "drive-by download", software which invites itself onto your system.

Free alternatives to Internet Explorer include Opera, downloadable from www.opera.com, and Firefox, downloadable from www.mozilla.org/products/firefox. Both can import your Internet Explorer or Netscape favourites and browser history, so you won't lose anything, but are vastly more secure, and have good features of their own, like blocking of pop-ups and tabbed browsing (i.e. tabbing between open web pages). Opera also has the best selection of different ways to present your bookmarks.

Free alternatives to Outlook/Outlook Express include Eudora, downloadable from www.eudora.com, and Thunderbird, downloadable from www.mozilla.org/products/thunderbird. Both can import all your mail, address book and settings from Outlook/Outlook Express so, once again, you won't lose anything. Eudora in sponsored mode (free) has all the features of the paid mode, like filtering and the ability to send and receive from multiple email addresses, which is a boon if you need it.

Firewalls

A firewall stops remote computers connecting to your computer and doing things you don't want or expect, and stops programs/spyware/trojans/keystroke-loggers that have already infected your computer from connecting to the web. Firewalls may be hardware or software based, and you should use one if you connect to the Internet, but *especially* if you are using broadband because of the extended time spent online.

A free software firewall which you could use is ZoneAlarm, downloadable from www.zonelabs.com/store/content/catalog/products/sku_list_za.jsp.

After installing, ZoneAlarm will show you pop-ups when programs on your computer try to access the web. A pop-up may look something like "Opera.exe is trying to access the web, do you want to give it permission?" At the start, it might be annoying to have lots of pop-ups asking if you want to give each program permission to access the web. However, don't just click "Yes" to every pop-up; if you do so, then you might as well not have a firewall. If you're unsure what the referred program does, or why it's trying to access the web, then use Dogpile or Google to search the web for it. If most of the results tell you that it is spyware or a virus, then deny permission. If it's a program that you trust (Opera, Eudora, etc.), then you can permit access to the web and check the box to always perform this action. If you're unsure what to do, then deny permission; if the program/website you're trying to use doesn't work, then allow permission next time it pops up.

Computer Acronyms

Are you mystified by the computer term GUID and what it means? This is short for Globally Unique Identifier, a unique 128-bit number that is produced by the Windows OS (operating system) or by some Windows applications to identify a particular component, application, file, database entry, and/or user. For instance, a website may generate a GUID and assign it to a user's browser to record and track the session. A GUID is also used in a Windows registry to identify COM DLLs (dynamic link libraries). Knowing where to look in the registry and having the correct GUID yields a lot information about a COM object (i.e., information in the type library, its physical location, etc.). Windows also identifies user accounts by a username (computer/domain and username) and assigns it a GUID. Some database administrators will even use GUIDs as primary key values in databases.

You may like to try www.webopedia.com for other acronyms, and it is all demystified.

Marine Acronyms

Are you mystified by the maritime terms COGAG, GMDSS, ISGOTT, OPA'90, ROV and VDR? Are you confused by the abbreviations Glonass, Intertanko, and Unclos? Well, you needn't be. The Nautical Institute has a listing of many maritime abbreviations and acronyms (including all of the above) on their website at www.nautinst.org/acronyms.htm. A few clicks of the mouse to get there, and it is all demystified.

SI Prefixes

If you habitually deal with very small or very large numbers, then you are probably aware that the prefixes for use with the SI system now extend from 10^{-24} through to 10^{24}. However, most reference books (on my bookshelves, at least) only give the prefixes from 10^{-18} through to 10^{18}, and you sometimes have to search for the upper echelons.

The Conference Generale des Poids et Measures (CGPM) in 1960 adopted a series of prefixes and symbols of the decimal multiples and submultiples of SI units ranging from 10^{-12} to 10^{12}. Prefixes and symbols were added for 10^{-15} and 10^{-18} in 1964, for 10^{15} and 10^{18} in 1975 and for 10^{-21}, 10^{-24}, 10^{21} and 10^{24} in 1991.

The complete list is given on the Bureau International des Poids et Measures (BIPM) website www1.bipm.org/en/si/prefixes.html, and is enshrined in Australia's National Measurement Regulations 1999 (Schedule 3) and shown on the Australian government legislation website, http://scaleplus.law.gov.au/html/pastereg/3/1519/0/pr001320.htm.

The twenty SI prefixes used to form decimal multiples and submultiples of SI units are:

Factor	Name	Symbol	Factor	Name	Symbol
10^{24}	yotta	Y	10^{-1}	deci	d
10^{21}	zetta	Z	10^{-2}	centi	c
10^{18}	exa	E	10^{-3}	milli	m
10^{15}	peta	P	10^{-6}	micro	μ
10^{12}	tera	T	10^{-9}	nano	n
10^{9}	giga	G	10^{-12}	pico	p
10^{6}	mega	M	10^{-15}	femto	f
10^{3}	kilo	k	10^{-18}	atto	a
10^{2}	hecto	h	10^{-21}	zepto	z
10^{1}	deka	da	10^{-24}	yocto	y

My ten-year-old son, Declan, is agog that there are a million million million million yoctoseconds in the time that it takes you to snap your fingers!

Ellen MacArthur Readies for Round-the-world Record

Ellen MacArthur's 23 m trimaran, *B&Q*, which was built by Boatspeed at Gosford, NSW, is currently in Lorient, France, being prepared for an attempt on the solo non-stop around-the-world sailing record. The record is currently held by Francis Joyon on board *IDEC*, who finished on 3 February this year in 72 d 22 h 54 min 22 s, making that the new time to beat.

Ellen expects to be in Falmouth, UK, with the boat from about mid-November, waiting for a weather window to start the attempt on the chosen start line between The Lizard, UK, and Ushant, France.

Check out the details and progress at www.teamellen.com.

James Craig Sails Sydney to Hobart

The Australian Heritage Fleet's tall ship, *James Craig*, will be sailing from Sydney to Hobart and returning to Sydney in February, with a crew of fifty plus twelve passengers. The passengers are offered hardships, thrills and adventure in the experience of a lifetime, three levels of 1874-style accommodation (officer, immigrant and crew), and meals rostered with the officers and crew. Prospective passengers may submit bids for places, with the top twelve (four in each class of accommodation) being accepted — bids at the start of November were around the $2000 mark.

Outward bound, she will clear Sydney on Tuesday 1 February and arrive in Hobart on Friday 11 February. Homeward bound, she will clear Hobart on Tuesday 22 February and arrive in Sydney on Tuesday 1 March.

For further information, or to place your bid for the voyage of a lifetime, visit www.australianheritagefleet.com.au/specev/tendays.html

Phil Helmore

THE PROFESSION

Australian Standards

Standards Australia is a not-for-profit organization and is an internationally-recognised leader in the facilitation of standardisation solutions. Through the collective expertise of stakeholders it works to meet the community's expectations for a safe and sustainable environment and to enhance Australia's economic efficiency and international competitiveness.

Through its consensus-based standards development process, which sees agreement reached between more than 9000 technical committee representatives from industry bodies, trade associations, government and consumer groups, the national standards body continues to provide high-level technical and business knowledge to the Australian community.

For further information, visit Standards Australia's website at www. standards.org.au.

However, the commercial activities of Standards Australia have been spun off to a new company, SAI Global Limited, and that company is now listed on the Australian Stock Exchange. Standards Australia had developed a collection of over 7000 Australian Standards and associated publications, all available in a variety of formats — from the traditional printed book, through to advanced on-line subscription services. Australian Standards are now sold and distributed worldwide by SAI Global:

Catalogue and web store	www.standards.com.au
Phone	1300 654 646
Fax	1300 654 949
Email	sales@sai-global.com
Mail	SAI Global Limited GPO Box 5420 Sydney NSW 2001

Shops are located in each capital city as follows:

- 286 Sussex Street, Sydney, NSW
- 19-25 Raglan Street, South Melbourne, Vic
- 165 Adelaide Terrace, East Perth, WA
- Standards and Technical Publications, 45D Sussex Terrace, Hawthorn SA
- Goprint, 371 Vulture St, Woolloongabba, Qld
- 10 Barrack Street, Hobart, Tas
- Territory Construction Association, Lot 1450 Winnellie Road, Winnellie, NT

However, not all is sweetness and light. The October 2004 issue of *Engineers Australia* carries a letter to the editor from an engineer who had helped draft and review a number of Australian Standards. He points out that SAI Global is a publicly-listed company, and the fact that it is 40% (i.e. less than 50%) owned by Standards Australia is irrelevant. As a publicly-listed company, SAI Global has a duty to maximise the return to its shareholders. Many scions of industry, who gave freely of their time to participate in the drafting and review of standards for the not-for-profit Standards Australia, will not give so freely to generate profit for SAI Global shareholders! We live in interesting times, and wait to see what happens.

Forum on the Construction Section of the NSCV

RINA NSW Section and the National Marine Safety Committee jointly organised a forum to discuss the *Issues Paper* on the possible ways forward for the drafting of the new Construction Section of the National Standard for Commercial Vessels.

The *Issues Paper* had been circulated by email, and the NMSC had received a number of written submissions. One of the submissions had been prepared by RINA AD's Safety Committee, and the RINA submission was circulated by email to members. However, there were a number of diverse views, even within RINA, and it was known (and pointed out in the preamble) that the RINA submission would not represent the views of all members.

The forum was therefore organised to discuss the issues fully, with the hope of attracting further written submissions to the NMSC, and was attended by thirty-one at the Kirribilli Club, Lavender Bay, on the evening of 21 October.

Welcome

The forum was chaired by Graham Taylor, who welcomed the guests and outlined the reasons for holding the forum. These included the desire for the widest possible range of input, the forum not being limited to RINA members, the fact that the forum was not an official NMSC function (although supported and watched with interest by NMSC), the consideration and discussion by those present to be free and frank, and the way forward for the process.

Three twenty-minute presentations were made, with each being immediately followed by a thirty-minute discussion period.

The Issues

Mark Devereaux, of Maritime Safety Queensland, who is looking after the new Construction Section of the NSCV on behalf of the NMSC, made the first presentation on the *Issues Paper*, covering the background and some of the options. The Construction Section of the NSCV will replace (or at least update) most of Section 5, Construction, of the current USL Code, and the guiding principles include incorporation of relevant national and international standards, incorporation of a performance-based approach, facilitation of the approval of new technologies, incorporation of OH&S principles, and encouragement of the recognition of duty of care.

The NSCV is a performance-based standard, i.e. it specifies required outcomes regarding essential safety requirements. It provides a prescriptive, deemed-to-satisfy solution (similar to the USL Code) which meets the required outcomes, but also provides for equivalent solutions which meet the requirements. With a deemed-to-satisfy solution, compliance is guaranteed, but at the price of a lack of flexibility. With an equivalent solution, alternative standards may be used and flexibility is provided, but it is up to the user (i.e. the owner/naval architect) to prove that the standard meets the required outcomes at least as well as the deemed-to-satisfy solution.

The Construction Section of the NSCV will be applied to all domestic vessels other than special vessels in Part F (fast craft, hire-and-drive and novel vessels). For comparison, the USL Code applies all vessels up to 35 m in measured length (there is no limit stated for steel construction, but the steel rules are based on the ABS rules for vessels of up to 60 m in length).

The standard covers a range of construction materials, including steel, timber, aluminium, composites and polyethylene; a range of environments, from unlimited seagoing to smooth waters; a range of sizes, from 3 m tinnies to 400 passenger ferries; and a range of services, from robust (ferries, trawlers, tugs, etc.) to light (charter yachts, game-fishing vessels, hire-and-drive vessels, etc.)

For vessels of 35 m or more in length, the deemed-to-satisfy solution is classification with one of the recognised classification societies.

For vessels of less than 35 m in length, the deemed-to-satisfy solution is the focus of the issues paper, as it is what the Construction Section is all about. Classification is also deemed to satisfy.

Equivalent solutions may consider vessels designed to class but not maintained in class, for example. Equivalent solutions, while requiring the onus of proof, provide flexibility by allowing for innovation and technological advances.

The options for approaches to the new Construction Section include:

- revise and update the USL Code and AS4132 (aluminium and composites);
- adopt ISO12215 Small Craft — Hull Construction and Scantlings;
- use classification society rules and/or services;
- a combination of the above; or
- change nothing (probably not a very good option).

Updating the USL Code and AS4132 could resolve existing issues, redraft in the style of the NSCV, provide the option of combining the different construction materials under the one set of design load formulae, and combine the two into one document.

Adopting ISO12215 is an option because Standards Australia is likely to adopt it in place of AS1799 and not provide further support. However, ISO12215 is primarily intended for recreational craft up to 24 m in length, rather than commercial vessels, and could not be expected to cover commercial vessels. Further, the standard is not complete, and is not expected to be complete for another couple of years. And, finally, there is still a gap between the 24 m length limit of ISO12215 and the NSCV's 35 m.

A tendering process could be used to select a particular classification society's design rules, with these rules being used for a set period of time and then reviewed or put out to tender again. Technical advice would be provided by the classification society, and the independence of the society would provide consistent interpretations (i.e. less inter-state differences).

Mark then showed a matrix-style combination of all of the above options, for length ranges of 35 m or more, 24–35 m, 7.5–24 m and less than 7.5 m; and types full commercial, light commercial and hire-and-drive.

Other issues which need to be considered include the fact that it would be preferable to have one set of design-load calculations, a standard covering the various timber/epoxy composite methods, the need for a better method than AS4132 for designing FRP laminates, and the need to remove the possibility of ambiguity interpretations.

Mark then outlined the approaches taken in the USA, Europe and in the UK, which appear to be adopting national and international standards. The UK, however, appears to have an escape clause:

"4.2.2.5 A vessel which has not been built under the survey of a UK load line assigning authority will be considered to be of adequate strength after a satisfactory examination by an authorised person and if it has been built:

.2 in general accord with the standard of a vessel which has a record of at least five years' history of safe operation in an area where the sea and weather conditions are no less severe than those likely to be encountered in the intended area of operation."

The RINA Submission

Rob Gehling, the President of the Australian Division of RINA and Chair of the Safety Group which prepared the RINA submission to the NMSC, made the second presentation on the RINA submission and the thinking behind it. The RINA submission was circulated to members of the Australian Division by email, and so the submission will be summarised briefly here for completeness. If you did not receive a copy by email, or do not have access to email, then contact your section secretary.

- There is little demand from industry for copper-nickel or ferro-cement materials of construction, and therefore no need to expend effort on retaining or replacing these sections.
- USL Code Section 5L (steel) and AS4132 (aluminium and composites) have generally proven satisfactory, and provide an appropriate base on which to develop improved standards. They could usefully be integrated and expanded to cover other materials. Development of full strength of materials is dependent on quality of fabrication work and clean environment, and these issues are inadequately addressed.
- ISO12215 does not appear suitable, due to its restrictions on length and to light duty, except for hire-and-drive craft.
- The options of an open market for the use of classification society rules, or the contracting of a classification society to supply rules and technical support should be rejected.
- Vessels other than those to which USL Code Section 5L or AS4132 apply should be required to be in class with an approved classification society, to ensure adequate approval of larger, complex structures.
- Care should be exercised in developing available deemed-to-satisfy solutions to ensure maintenance of the safety standards. In particular, "rule shopping" should not be allowed.

Further Class Society Options

Mark Devereaux, of Maritime Safety Queensland, made the final presentation on futher possible options for using the rules of classification societies in various ways. The NMSC is already having discussions with the classification societies to gauge their interest.

Possible sub-options include:

- Direct use of the a classification society's rules without input from, nor the specific agreement of, the classification society.
- A single classification society selected by tender to draft the Construction Section of the NSCV, with the jurisdictions doing approvals and survey, and the classification society updating the rules.
- Direct use of a classification society's rules, with the classification society selected by tender, and providing training and technical support.
- Direct use of several classification societies' rules, with the classification societies selected by tender, and providing training and support.
- Direct use of a classification society's rules, with plan approval done by the classification society; initial and periodic surveys to be done by the jurisdictions.
- Direct use of a classification society's rules, with plan approval and initial survey done by the classification society; periodic surveys to be done by the jurisdictions.
- Vessels required to be in class with a classification society as the deemed-to-satisfy solution.

These options obviously raise a number of issues. For example: what are the limitations on competence of users without classification society support? What are the costs/benefits of classification society participation? What are the benefits of adopting classification society rules as a recognised international standard? Should deemed-to-satisfy solutions be limited to one or two classification societies? Do classification society rules provide good solutions for the range of vessels under the NSCV? and To what extent should classification society rules be followed, e.g. material surveys during construction?

Discussion

Discussion following each of the presentations lasted for the full allotted time, and some interesting views came out which had not been canvassed in the *Issues Paper*. At least one further written comment was received by NMSC on the morning after the forum, and a further submission will be made to the NMSC by the RINA Safety Committee, summarising reactions to this forum and the similar one held by the WA Section. The forum certainly promoted a wider discussion and understanding of the issues and, taken with the further submissions to NMSC, can be judged to have been a success.

The vote of thanks was proposed by Phil Helmore, and included the following:

Graham Taylor — Chairing and setting the scene.
Maurene Horder and NMSC — Support, and finding and funding the venue.
Mark Devereaux — Presentations and wisdom.
Rob Gehling — Presentation, wisdom and RINA AD submission.
Mori Flapan — Attendance and wisdom.
All — Attendance and possible further submissions!

The vote was carried with acclamation.

Phil Helmore

MEMBERSHIP NOTES

Australian Division Council Meeting

The Australian Division Council met on 29 September, with teleconference links to all members, and the President, Rob Gehling in the chair. The meeting was lengthy and matters, other than routine, which were discussed included:

- National Professional Engineers' Register: As foreshadowed in the last report of Council, the original document submitted to the Registration Board was revised and presented to Council who approved the revised document for lodging. The Registration Board would, it was expected, meet before the end of October and its decision be made known fairly promptly. If approved, there would then be a need to set up Assessment and Accreditation Panels as soon as possible.
- Ausmarine West: Council was advised by Mr Neil Baird, Managing Director of Baird Publications, that it had been necessary to cancel this event which had been scheduled to be held on 26–28 October in Fremantle, Western Australia. Mr Shaun Ritson, Chair of the WA Section and a member of Council, indicated that it might still be possible for the WA Section to hold a mini-conference within a short time.
- RINA London Council Meeting: It was reported that the RINA Council met on 14 July, and Australia's concern in relation to the Corporate Partnership Scheme was presented. The Chief Executive had advised that the Mentoring Scheme would be formally introduced in a forthcoming issue of *RINA Affairs*, and this had occurred in the September issue.
- Proposed Course in Offshore Engineering and Naval Architecture: Advice had been received that the University of Western Australia was proposing to offer a new course in this field in 2005 and an outline and study guide was available on the UWA website, www.ecm.uwa.edu.au/for/prosp/courses/offshore_and_naval_architecture. The President offered to discuss this proposal with the relevant university authorities.

The next meeting of the Australian Division Council is scheduled for 2 December.

Keith Adams
Secretary

A NOTABLE CAREER

Many members of the Australian Division will be unaware of the contributions made by the older members of the Division to the profession and our industry in Australia. This article is planned to be the first in a series outlining the careers of notable senior members of the Australian Division.

James Hillier Mayson FRINA

Jim Mayson is one of our Division's founding members and the Queensland Section's most senior member. Most of our older members will remember Jim and his long and distinguished career with the Australian Department of Defence (Navy).

The following outline of Jim's career was prepared by the author from a very detailed set of notes and comments provided by Jim himself. The author also had the privilege of both working for and befriending Jim for a period of over forty years, which adds a further dimension.

Jim began his career during the depression in February 1936 with the then Department of Navy at HMA Naval Dockyard Garden Island as an apprentice shipwright and boatbuilder. A trade was a starting point in those days if you wanted to become a naval architect, although this was probably not one of Jim's most immediate goals at the time.

As part of the trade training, it was necessary for Jim to undertake the appropriate trade course at Sydney Technical College. This course was attended after work for two or three nights a week for a period of five years. Jim duly completed his apprenticeship and trade studies in 1941. In those days it was normal for the smarter apprentices to serve some time in the drawing office, which Jim did. He must have enjoyed the drawing office work because he never went back to his trade.

Of course, to remain in the drawing office, Jim had to go back to night school to matriculate and undertake studies for the Diploma in Naval Architecture at Sydney Technical College. This took eight years of hard study. These studies were completed in 1950. I wonder how many would be prepared to take on this task today with a wife, family and working during the day.

Jim comments "All of the diploma subjects were undertaken during the evening after a full day's work. All classes were about three hours duration and were attended three or four evenings a week. Some printed notes and references were made available, particularly for laboratory experiments. In the main, notes were hand written and later interpretation depended upon the clarity and definition of the lecturer and one's ability to comprehend and write at the same time. Our naval architecture lecturers (David Carment for the trade course and Cecil Boden for the diploma course) were far better lecturers than most, as students had a better rapport with them due to their common interests.

"Subjects for the diploma included mathematics, physics, materials and structures, heat engines, fluid mechanics, applied electrical mechanics, and industrial engineering. The five years of the naval architecture subjects covered a full spectrum from inception to a finished design. It was also necessary for each student to complete a self-researched ship design and thesis of your own choosing. My particular design was for an ocean-going tug and my thesis was *Some aspects of the Design and Construction of Whaling Ships and Whaling Chasers*. These two projects were undertaken over the last two years of the diploma and mostly outside the lecture class periods. Of course the mathematics used in research and applied calculations was aided by logarithm tables, slide rule, and barrel calculators plus standard graphs derived from experiment results. Electronic calculators and computers had not yet been developed for personal use at that time".

Jim Mayson

Jim worked at Garden Island until 1952, progressing through the various grades of ship draughtsman and with periods as a naval overseer at Cockatoo Island, Sydney. During this time he became eligible for and was granted membership of the Royal Institution of Naval Architects and the then Institution of Engineers, Australia, later progressing to Fellow in both of these institutions.

From late 1952 to August 1954 Jim served overseas in the UK with the British Ministry of Defence (Navy) as the Australian Naval Construction Liaison Officer. This job was related to the obtaining and processing of drawings and techniques to assist the RAN program for the Q-class frigate modernisation, the construction of the Daring-class destroyers and the Type 12 destroyer escorts. An interesting aspect of an overseas job in the fifties was that if you wanted to take your family with you (as Jim did) it was at one's own expense. Under these conditions Jim and his family found it very difficult to reciprocate the hospitality extended to them by his many UK colleagues. Jim subsequently made sure that those that followed in this overseas posting did not have to also experience these unfair conditions.

On his return to Australia, Jim was appointed Assistant Naval Architect in charge of that part of the drawing office at Navy Office Melbourne where he was responsible for design concepts and standards and maintained a watching brief on

the stability of all HMA Ships and support vessels.

From 1957 to 1962 Jim served first as the Assistant Naval Architect and then Senior Naval Architect at the Williamstown Naval Dockyard in Melbourne. These positions involved responsibility for all aspects of the shipyard section for the fitting out and sea trials for new-construction ships *Vendetta* and *Yarra*, and the early stages of *Derwent*. During this time Jim was also responsible for the repair, conversion and docking of ships at the dockyard and also for cost and resource estimating and for planning and progress reporting.

From 1962 to 1970 Jim served as a Supervising Naval Architect, initially at Navy Office in Melbourne, serving under Frank Day who was the Principal Naval Architect at the time. He then moved to Canberra in early 1963 and served under John Follan, then the newly-appointed Principal Naval Architect. During the time in Canberra, Jim's duties included the control and coordination of the Ship Design Branch activities involving planning, cost estimating and design development for new-construction ships and support craft, specialised equipment and the modernisation of existing HMA ships. Some of the more important tasks undertaken during this period included the redesign of the British destroyer escorts for the construction of *Swan* and *Torrens*, the design of the Attack-class patrol boats, the design of the destroyer tender *Stalwart*, the early design development for the light destroyer programme, a fast combat support ship, an oceanographic ship and numerous small craft. During this time Jim was also involved with two overseas missions, one involved with the operation and ship interface of helicopters from light destroyers and the other for the selection of a weapon system for the proposed RAN light destroyer project.

In 1970 Jim was the first appointee to the position of Director of Naval Ship Production. In this position he initiated the preparation of many standards and procedures that were subsequently introduced for future ship construction projects. In this position he led two overseas missions to the UK. One was to examine the tenders which led to the construction of last two Oberon-class submarines *Orion* and *Otama*. The second was to negotiate with the UK Board of Trade and shipbuilders for the acquisition of design and working drawings and specifications for the construction in Australia of the amphibious heavy lift ship *Tobruk* which was built at Carrington Slipways in Newcastle, NSW. Jim was Director of Naval Ship Production for five years.

From 1976 to 1978 Jim occupied the position of Director General of Naval Production, firstly on a continuous acting basis and then on a substantive basis after an Australia-wide interview process. On his promotion Jim became the first and only civilian naval architect to be appointed to this position and thus became the first Australian naval architect to be appointed to the Senior Executive Service of the Department of Defence. In this position Jim was responsible for the construction concepts, the acquisition strategies and the management of all ship, submarine and support-craft acquisitions, modernisations and conversions.

In October1978 Jim was provisionally appointed to the position of Director General of Naval Ship Design. The appointment was made permanent six months later. Again Jim was the first Australian civilian appointee to the position following two previous appointees from the UK Royal Corps of Naval Constructors. Jim occupied this position with distinction until his retirement in October 1981. As the Director General of Naval Design, Jim became the senior civilian naval engineer with the Australian Department of Defence. The Naval Ship Design Branch then comprised 350–400 staff responsible for ship design, communications design, weapon design, mechanical engineering design, electrical engineering design, forward design (ships) and combat data systems design. Some of the projects current at that time were the FFG acquisition and the planned new aircraft carrier. The aircraft carrier project was cancelled at a late stage of its development.

Jim Mayson was elected a Member of the Institution of Naval Architects (now RINA) on 1 January 1952 and was one of the founding members of the Association of Naval Architects, Sydney Technical College that later became the first international branch of the Royal Institution of Naval Architects in 1954. The February 2004 issue of *The Australian Naval Architect*, pages 56-58, provides an excellent overview of the early days of our Institution. Jim has now been a continuous member of the Institution for 52 years with 45 Year and 50 Year membership certificates awarded by the Institution.

Jim became a Fellow of the Institution of Engineers, Australia in 1976 and remained an active member of this institution for the next 21 years before resigning in 1997. He also became an Associate Member of the Australian Naval Institute in 1978, and was probably its first civilian member. Jim has now been retired for 23 years.

Immediately after his retirement from the Department of Defence, Jim took to the farm and successfully raised sheep near Dalton, New South Wales. He now enjoys moderately good health and lives with his wife Betty at Runaway Bay on the Gold Coast, spending a lot of time with his family genealogy research. To his surprise, during this research he discovered that he was a descendant of a 'First Fleeter' who had a free passage aboard *Scarborough* arriving at Sydney Cove on 26 January 1788.

Brian Robson

ARE YOU MOVING?

Moving house can be…well, not one of life's greatest pleasures. It is easy to overlook telling those who would like to know where you are. If you are about to change your address, then please add an item to your check list to tell Keith Adams, so he can ensure that *The ANA* and other important communications from RINA continue to arrive.

Wärtsilä Power for Offshore Construction Vessel

Wärtsilä was awarded a contract in September by Ulstein Verft AS in Norway for a 23 MW power plant to be installed in a new offshore construction vessel being built by Ulstein for the Norwegian offshore company Solstad Offshore ASA and the Swiss-based company Single Buoy Moorings Inc (SBM). The 124 m-long vessel, to be named *Normand Installer*, was designed by Vik-Sandvik AS, Norway.

The vessel will be equipped with a diesel-electric power plant incorporating two Wärtsilä 16V32 diesel generating sets and two Wärtsilä 8L32 diesel generating sets. The Wärtsilä 16V32 engines each develop 7 680 kW, and the Wärtsilä 8L32 engines each 3 840 kW, both at 720 rpm. Electric propulsion motors will drive through twin Wärtsilä SV105 reduction gears to twin Lips CPS115 controllable-pitch propellers running in Lips HR nozzles.

Wärtsilä, as the ship power supplier, is thus delivering the four diesel generating sets, two reduction gears, two Lips CP propellers, Lips HR nozzles, and the Lipstronic C7000 advanced remote-control system. In addition, Wärtsilä will deliver four Lips CT250M-D tunnel thrusters and a Lips FS225-240/MNR retractable thruster.

The vessel is due for delivery in January 2006. It will be operated by Solstad Offshore and has been chartered for a period of eight years to SBM, which has an option to employ the vessel for a further 12 years after the initial period.

Founded in 1969, SBM is the world leader in the design, fabrication, installation and servicing of offshore loading and offloading terminals, as well as tanker-based floating production, storage and offloading (FPSO) vessels for the offshore oil and gas industry.

The vessel will thus be employed by SBM in the installation and maintenance of its floating production systems and single-point mooring (SPM) systems around the world. It will be required to undertake a great variety of tasks in deep water.

The vessel is thus designed to be extremely versatile in its capabilities, based upon the experience of both Solstad Offshore and SBM, and upon anticipated future demands. It has a large working deck aft, with a working area of about 2 500 m^2 on two decks, together with a moon-pool. There is a 500 t winch, a 250 t subsea crane and a 250 t capacity A-frame over the stern.

Solstad Offshore is a long-established customer of Wärtsilä, having taken delivery of some 49 Wärtsilä engines in 16 vessels. Another ship is currently under construction in Norway for Solstad Offshore with four further engines. The first Solstad vessels with Wärtsilä engines were two anchor-handling tug/supply vessels, *Normand Drott* and *Normand Jarl*, delivered in 1984 and 1985 respectively.

The offshore construction vessel *Normand Installer* will be equipped with a complete Wärtsilä ship power plant. (Image courtesy Wärtsilä)

Wärtsilä Power for Spliethoff's New Sto-Ro Freighters

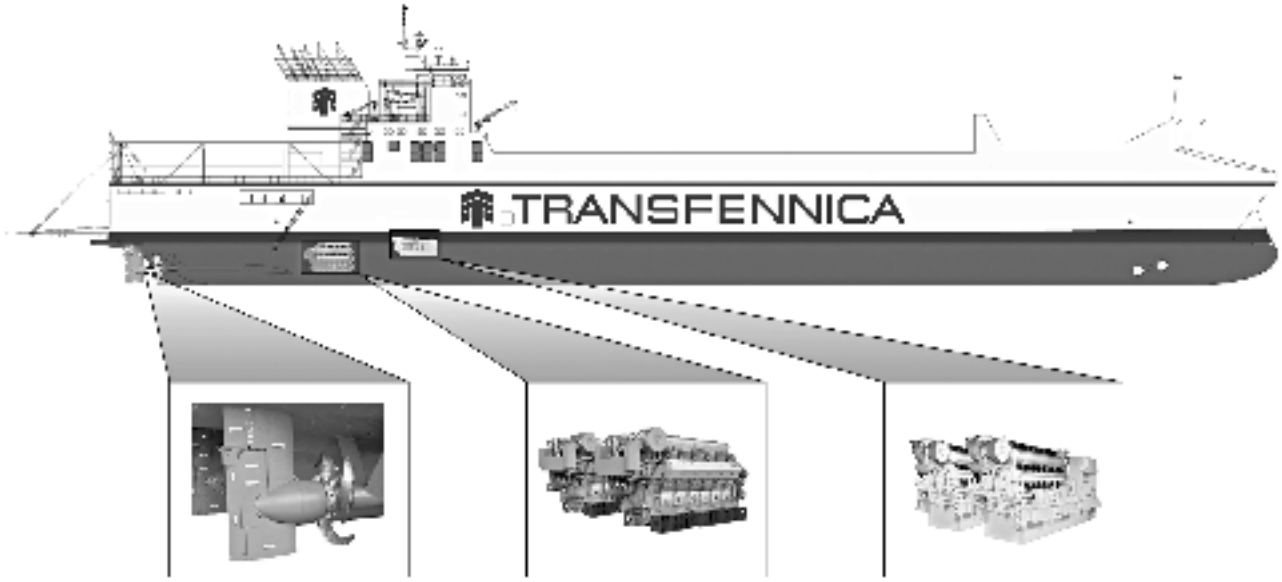
Wärtsilä received orders in September from the Polish shipbuilder Stocznia Szczecinska Nowa for the ship power plants for four new 12 800 dwt multi-purpose sto-ro cargo vessels contracted by the Dutch owner Spliethoff's Bevrachtingskantoor BV.

For each of the four vessels, Wärtsilä will deliver two Wärtsilä 12V46 main engines, two Lips controllable-pitch propellers including Unnet aft seal protection system, two Lips Efficiency Rudders and two Wärtsilä 8L20 diesel generating sets. The Wärtsilä 12V46 main engines have a combined output of 25 200 kW, and the generating sets a combined electrical output of 2 720 kW.

When delivered in 2006, the vessels will enter Transfennica services which operates ro-ro services between Finland and Estonia, Sweden, Germany, Belgium and the UK.

Although designed primarily for carrying forest products and paper, the vessels will be very flexible in their cargo-carrying capacity. Within an overall length of about 205 m, they will have a roll-on/roll-off (ro-ro) capacity of 2 800 lane-metres and a container capacity of 660 TEU. They will be able to carry a diverse mixture of road trailers, commercial vehicles, MAFI trailers, paper cassettes and 20- to 45-foot containers. Access to the ships' four decks will be through a wide stern door, with fixed ramps leading to the upper decks and the hold. They will also have provision for IMO Classes 1 to 8 dangerous cargoes. The vessels will be built to Finnish Ice Class 1A Super.

The Wärtsilä ship power plant will give the vessels a service speed of 22 kn. It is designed both for high power to achieve the desired ship speed and for fuel economy. An important contribution to fuel economy will come from the choice of Lips Efficiency Rudders. The improved hydrodynamic performance of Efficiency Rudders not only gives better propulsive efficiency, but also allows greater freedom in ship design for lower noise transmission into the hull and greater strength in the rudder assembly.



The sto-ro cargo vessels of Spliethoff's will be equipped with Wärtsilä main engines and generating sets, Lips CP propellers and Efficiency Rudders.
(Image courtesy Wärtsilä)

Wärtsilä Auxpac generating sets from 60 to 2850 kWe

In September Wärtsilä announced the introduction of a new comprehensive range of Wärtsilä Auxpac medium- and high-speed standard marine generating sets.

The Wärtsilä Auxpac generating sets are supplied as pre-commissioned standard packages that ensure the availability of electrical power in sufficient quantity as and when needed. Through modularisation, the new generating sets can be built to a high, comprehensive specification for a market-competitive price. Wärtsilä Auxpac generating sets provide easy installation, easy operation and low operating costs and thus bring superlative benefits for both shipbuilders and shipowners.

Wärtsilä Auxpac generating sets cover an electrical power output of 60 to 2850 kWe for either 50 or 60 Hz operation. The high-speed range covers an output range from 60 to 1630 kWe, while the medium-speed range covers an output range from 520 to 2850 kWe.

The medium-speed generating set range running on heavy fuel is based on Wärtsilä 20 and 26 engines which are well proven in shipboard auxiliary service, and are supplied for operation on the same heavy fuel oil as the ship's main engines. The high-speed Auxpac range running on MGO is based on the cooperation with Volvo Penta through which Wärtsilä will sell and service large Volvo Penta engines for commercial shipping applications.

The Wärtsilä Auxpac generating sets are well outfitted, being self supporting for ancillary systems. The generating sets are supplied complete, ready for installation. The fully-assembled sets are put through a rigorous factory-acceptance test which includes full parallel running when multiple sets are being supplied.

The Wärtsilä Auxpac generating sets include more than hardware. Easy-to-use documentation is provided for all commercial and technical aspects, and it is tailored for each individual delivery. The documentation, including all related drawings, can be supplied in either digital or printed form, while digital drawings can be in various formats, such as DXF or Tribon. Operating and maintenance manuals can also be supplied in a choice of formats, conventional paper copies, in interactive electronic versions and as on-line service.

Wärtsilä provides project management and experienced marine engineering to support the design and installation. Installation and commissioning procedures are standardised and well documented, which allows shipyard staff to build up their proficiency and ensure a trouble-free start to shipboard service.

Wärtsilä also provides full service support for the Wärtsilä Auxpac generating set range, including commissioning, maintenance and spare parts. Complete kits of original spare parts ease service and maintenance onboard. The Wärtsilä service organization with more than 6 000 professionals worldwide enables the best support for Wärtsilä Auxpac generating sets anywhere at any time.

Wärtsilä Auxpac generating sets have already attracted considerable interest worldwide from shipbuilders and shipowners alike. Wärtsilä has received the first orders for Wärtsilä Auxpac generating sets.

A Wärtsilä Auxpac high-speed generating set
(Image courtesy Wärtsilä)

NAVAL ARCHITECTS ON THE MOVE

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

Matthew Allen has moved on from Clough Offshore and has taken up a position with Technip Oceania in Perth, working on the Otway platform installation for Woodside Energy Ltd.

Roger Duffield has moved on within the Directorate of Navy Platform Systems in Canberra, and has taken up a position in the Ship Survivability Group.

Craig Hughes has moved on within the Det Norske Veritas organization, and has returned to Australia after a five-year spell in Asia; the first nine months in Pusan, Korea, and the remainder in Shanghai, PRC. Much of the last year was taken up with business development and implementation of security for compliance with the ISPS Code. He has now taken up a position in the plan approval office in Sydney.

David Lyons has moved on from Diab Australia. He continues consulting as Lyons Yacht Designers, and doing work for (among others) Vanguard Marine Industries, who have recently launched a new carbon 60 raceboat, *Vanguard*, (see photos on website www.vanguardmarine.com.au). In addition, he has started a new composite engineering business, emp Composites, in the Austlink corporate park at Belrose (in the same building as Crowther Designs).

Steve McCoombe has recently returned to Australia after having worked in Spain for around seven years, four in design studios and three as the in-house naval architect at a boatyard building GRP luxury sailboats. He has taken up a position as an associate with Michael Rikard-Bell in Melbourne, mainly involved in the design of steel vessels such as bunkering barges, dredges, and ocean-going tugs, etc.

Teresa Michell moved on from Incat Designs some time ago and moved to Coffs Harbour with John and the boys to care for her father. She is now finishing off a graduate diploma in secondary-school mathematics education, and has a teaching job lined up at Yanco Agricultural High School, in the Riverina between Wagga Wagga and Griffith, for next year. They will move to Yanco in mid January.

Peter Öman moved on from Kockums in Sweden and joined the Australian Submarine Corporation in Adelaide about a year ago. Peter graduated in mechanical engineering, has been subsequently absorbing naval architecture, and he is now one of the experts in submarine stability.

James Rintoul has moved on within @www and is now the Technical Director, and so is involved with the information technology side of the operation rather than website design, where he started. He moved to London in 2000 to set up their London office and, coincidentally, arrived on the same day as the Nasdaq crash! Friends can find out more about the company from the website www.atwww.com.

Trevor Ruting has moved on within the Royal Australian Navy with a recent promotion to the rank of Rear Admiral. He has taken up the position of Head of Maritime Systems in the Defence Materiel Organisation in Canberra. Congratulations, Trevor!

Craig Singleton, a student in naval architecture at The University of New South Wales, who already holds a degree in mechanical engineering, has taken up a part-time position with emp Composites at Belrose.

Ben Smith has moved on within the Austal Ships organisation in Fremantle and, from marketing support, has joined the structural analysis team. He has been working on the Hawaiian superferry and, as well as seeing the company from another perspective, says that he has been learning heaps.

Carl Vlazny has moved on from Seawind Catamarans and is now consulting as Carl Vlazny. He now includes Predator Boats among his clients, and has been developing a line of tournament barra and bass boats to market. He says that he is having fun, and enjoying working his own hours.

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

Phil Helmore

Vale Winifred Davenport

Marjorie Winifred Davenport AM MRINA passed away in Brisbane on 13 May 2004 at the age of 80. A passionate marine engineer (the first female engineer in Queensland and possibly Australia) she always went by her middle name, Winifred, and enjoyed a 47-year career working with ships and boats in the Brisbane region. Following in her father footsteps, she started her career working as a cadet draughtsperson at the Evans Deakin Shipyard at Kangaroo Point while studying civil engineering at night. She eventually became an executive with the Queensland Harbours and Marine Department.

An only child, Winifred was born in Brisbane in 1924 and lived with her parents at Moorooka for most of her life until they died. She then moved to Manly where she could overlook Morton Bay and the Manly Boat Harbour.

In 1950 Winifred joined the Queensland Harbours and Marine Department as an associate engineer, working there until she retired in 1989. She joined the Institute of Engineers, Australia in 1951 and the Royal Institution of Naval Architects in 1958, and only just before her death received a 45 years membership certificate from the RINA.

Later in her retirement, Winifred wrote the *History of the Harbours and Marine Department.* This book traces the movement of shipping into Brisbane from 1845 and the passengers who travelled in these ships. It has become an invaluable reference to family historians.

In 1990 she was honoured for her services to engineering, becoming a Member of the Order of Australia.

Brian Robson

FROM THE ARCHIVES

CALLED TO ANOTHER DUTY

Part 1

John Jeremy

Images of the Incat-built catamaran HMAS Jervis Bay *supporting Australian forces in East Timor a few years ago will be familiar to many.* Jervis Bay *is one recent example of a commercial vessel taken up from trade to provide transport or support for military forces in times of need. Such ships have frequently had a role in the development or defence of Australia, from the days when Lt James Cook RN commanded the converted Whitby collier* Endeavour *in his exploration of Australia's east coast.*

In the early 19th Century the Royal Navy was well endowed with ships and had little need to employ commercial ships in military tasks. After the end of the war with France, the navy was greatly reduced in size, and by the time the Crimean war began in 1856 it was ill equipped to move the British army to the battlefields of the Crimea. That task fell largely to the ships of the P&O line, which had been carrying troops from time to time since 1840. By 1855 about one third of P&O's ships were working in the Black Sea and, during the war, they carried some 2 000 officers, 60 000 men and 15 000 horses together with guns, ammunition and stores [1].

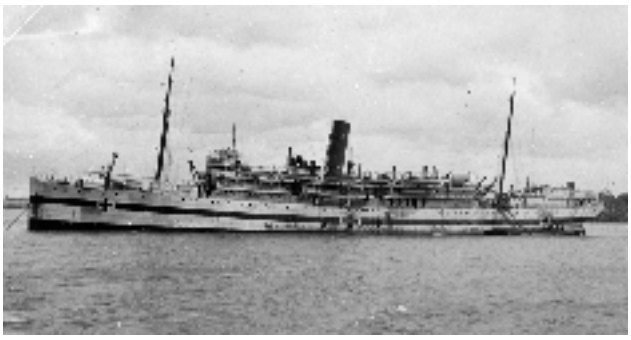
The use of P&O ships in this way had a considerable effect on the line's services, and a few, including their new Australian service, were suspended for the duration. The Government contracts were, however, lucrative and the line sold the liner *Himalaya* to the Government for permanent service as a transport in July 1854 for a sum around her original cost. This sale was fortuitous, because *Himalaya* had not been a success when completed the previous year, as she was very expensive to run. Slightly larger than Brunel's *Great Britain*, *Himalaya* was, at 3 500 t and 103 m long, about twice the size of any previous ship the line had built. It may have been a case of ambition outstripping technology, but *Himalaya* proved a great success as a troopship, remaining in service for several decades, and she might still be around today had she not been sunk during World War II by a German bomb when she was a coal hulk in Weymouth Harbour [2].

HM Transport *Himalaya* in Sydney Harbour
(John Jeremy Collection)

Another P&O ship was to become one of the first ships to take Australian troops overseas. In March 1885, New South Wales raised a small contingent to assist the British army in the Sudan, and to transport the 734 men and 196 horses, two passenger vessels then in Sydney were requisitioned. The larger of the two was the P&O *Iberia*, built in 1874. The other was the new Aberdeen liner, *Australasian*. Both were iron steamships, and *Australasian* was one of the first ships in the world fitted with triple-expansion machinery [3].

Many more ships were involved in the transport of Australian soldiers to and from South Africa for the Boer War, including the Orient liner *Orient*, built in 1874 and one of the first ships requisitioned by the British Government for the task. Another ship that helped to bring the troops home was the White Star liner, *Britannic*, which had been (at 5 004 grt) the largest ship in the world when completed in 1874. After the war service, *Britannic* was sold to the breakers in 1903, but *Orient* returned to the Australian trade until sold in 1909.

The outbreak of World War I on 4 August 1914 resulted in many ships being taken up from trade to transport Australian troops overseas. Australia's first departing troops left Townsville on 8 August for Rabaul in German New Guinea in the requisitioned AUSN passenger ship *Kanowna*. *Kanowna* was returned to her owners on 13 October 1914, but was requisitioned a second time on 1 June 1915 for service as a troop transport, with the pennant number A61. She sailed from Sydney on 19 June 1915 for Port Said, continuing on for London. After arrival in Britain, she was converted into a hospital ship with accommodation for 452 patients and crew. This remained her task for the rest of the war until her final task repatriating prisoners of war [4].



The hospital ship *Kanowna* during World War I. After a refit in Sydney, *Kanowna* was returned to her owners on 29 July 1920. On a voyage from Sydney to Fremantle in 1929 she struck a rock near Wilson's Promontory and sank in Bass Strait on 18 February
(Don Dinnie Collection)

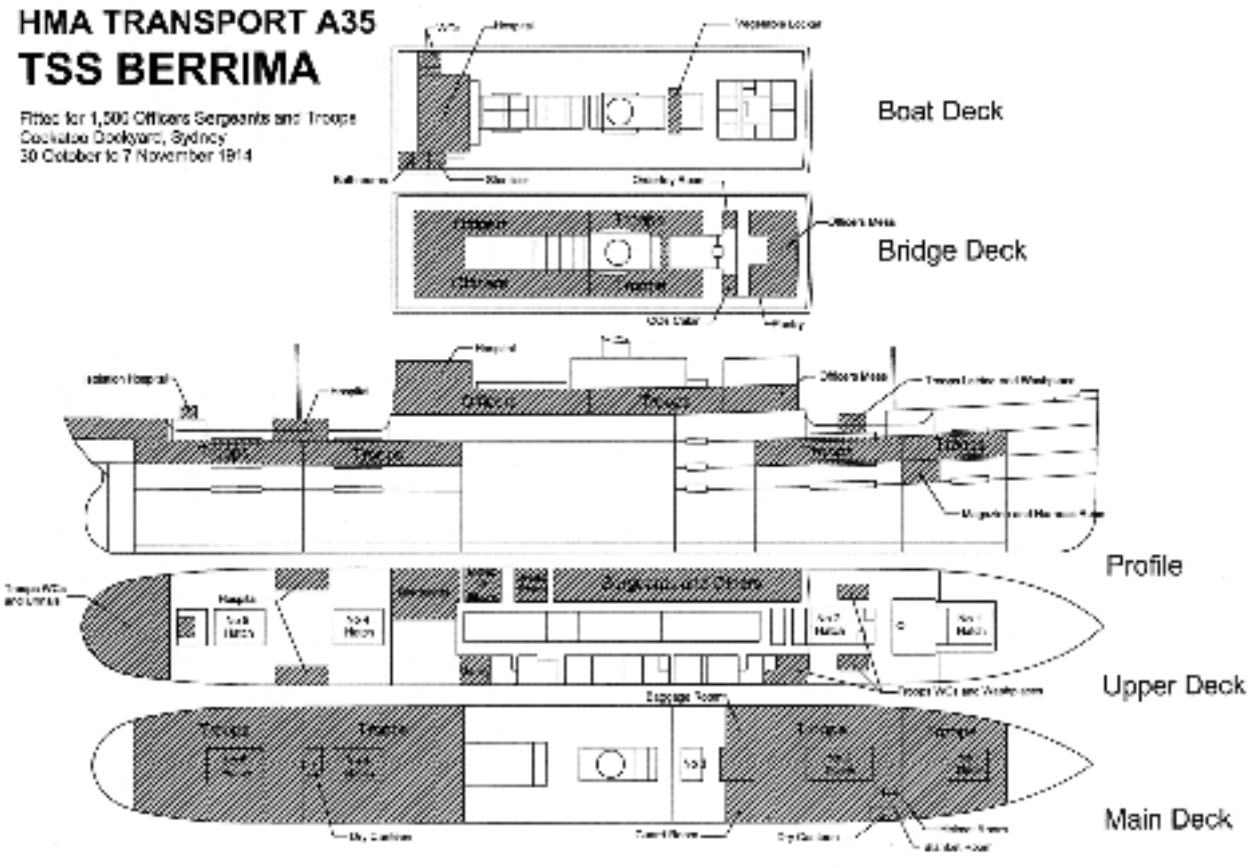
On 12 August 1914 the P&O liner *Berrima* was taken over by the Australian Government in Sydney and sent to Cockatoo Island for conversion into an expeditionary ship. The work was completed in six days, and included basic accommodation arranged in the holds for 1 500 officers and men, with latrines and washplaces on the upper deck under the poop deck. Cabins were dismantled to provide guard rooms and baggage rooms, and a hospital was fitted out on the upper deck. She was also fitted with four 4.7 inch guns,

The auxiliary cruiser *Berrima* about to undock on 18 August 1914 after her six-day conversion to become Australia's first armed merchant cruiser. *Berrima* was torpedoed in the English Channel on 18 February 1917
(John Jeremy Collection)

two on the forecastle and two on the poop deck, with magazines fitted out on the lower deck. She was commissioned on 18 August as the Auxiliary Cruiser HMAS *Berrima* and sailed from Sydney on 19 August carrying the Australian Naval and Military Expeditionary Force for New Guinea. *Berrima* returned to Sydney in October and decommissioned, reverting to her ongoing role as a troopship (A35). She returned to Cockatoo Dockyard on 30 October for further conversion work, including an enlarged hospital, improved accommodation for troops, NCOs and officers, extra galley facilities and additional latrines and washplaces on the upper deck forward. The work was completed on 7 November and *Berrima* sailed in December with the second convoy carrying Australian and New Zealand troops to the Middle East, with the RAN submarine *AE2* in tow. This particular task proved to be difficult, with the tow parting several times forcing the submarine to complete the passage under her own power. *AE2* was lost in the Sea of Marmara on 30 April 1915.

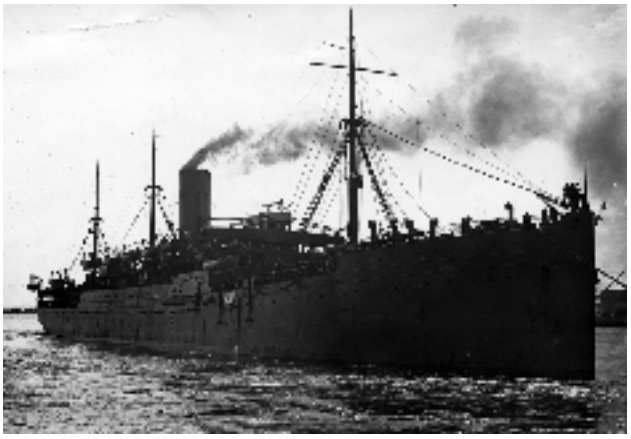
Many ships were needed to carry the troops to war. At Cockatoo Dockyard alone, 21 ships were converted to transports between August 1914 and October 1915. A further six ships were converted between October 1917 and February 1919. Typically, the work was completed in one or two weeks, and at Cockatoo, ships were fitted out to carry 4 459 officers, 5 900 non-commissioned officers, 112 500 other ranks, 1 800 munition workers and navvies and 17 100 horses [6].

The standard of the fitting out for the new role was very basic. Troop accommodation was fitted with hammocks



The general arrangement of HMA Transport *Berrima* (A35) after her second conversion in October–November 1914 [5]

slung from hooks on timber beams secured to the overhead structure, with timber mess tables and benches occupying the deck space. Additional structures on deck for galleys, canteens, latrines and washplaces were usually built of wood. Galleys were fitted with coal-fired ranges, latrines had long continuously-flushed steel WC troughs and urinals and washplaces had rows of basins and a very few showers. The ships' salt- and fresh-water services were extended to serve the new facilities, and soil and waste pipes were arranged to discharge directly over the side.

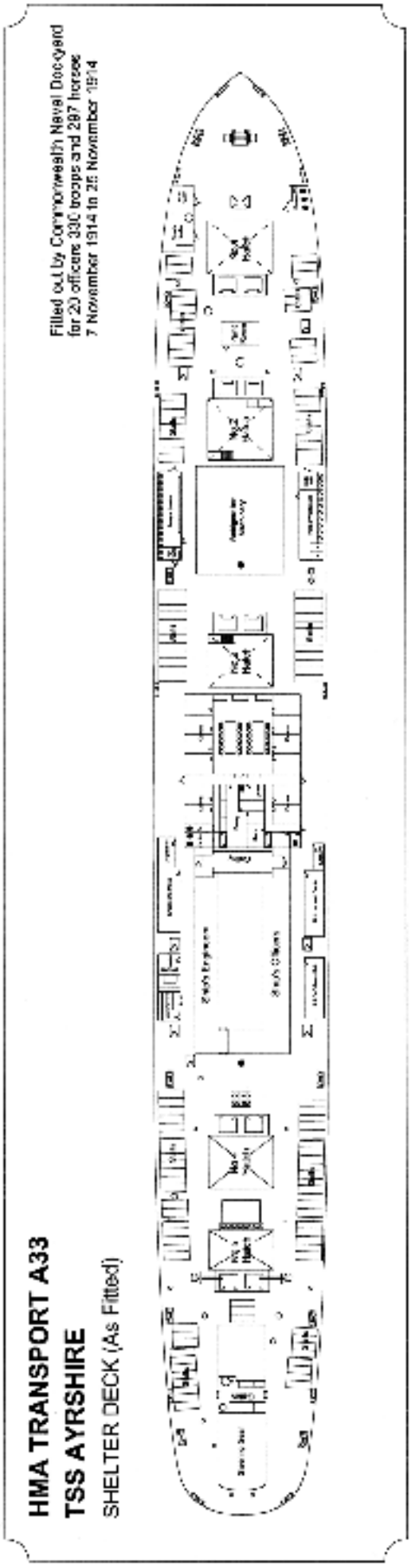


The New Zealand Shipping Company's *Hororata* (A20), a new ship completed in May 1914, was converted into a troopship in Brisbane
(John Jeremy Collection)

Seang Choon (A49) was typical of many ships requisitioned during World War I for transport service
(John Jeremy Collection)

Some ships were intended primarily to carry horses, like *Ayrshire* (7 463 grt, 139 m length OA) which was fitted out at Cockatoo Dockyard between 7 November 1914 and 25 November 1914 to carry 20 officers, 330 troops and 297 horses. Troops were accommodated in the 'tween decks forward, with latrines and washplaces on the upper deck. Horse stalls were built on the upper deck and 'tween decks aft. A hospital was fitted amidships and the usual canteens and stores arranged where convenient. *Ayrshire* (A33) sailed with *Berrima* in the second convoy, but was unable to maintain convoy speed and completed the voyage independently.

Many ships were needed for the transport task during the war and provided Australian dockyards with considerable work, both during the war and immediately afterwards. At Cockatoo Dockyard in Sydney, 214 refits of 112 transports were completed during the war, and after the war 75 transports (and two tugs) were fully or partially reconditioned for commercial service, including *Kanowna* (A61) which



The general arrangement of the upper deck of *Ayshire* (A33) after conversion in November 1914 [7]

was fully refitted between 1 March and 29 September 1920.

The World War I transport task finished by the end of 1919 and the conversion drawings were put away — only to be resurrected twenty years later when World War II demanded a similar response.

To be continued.

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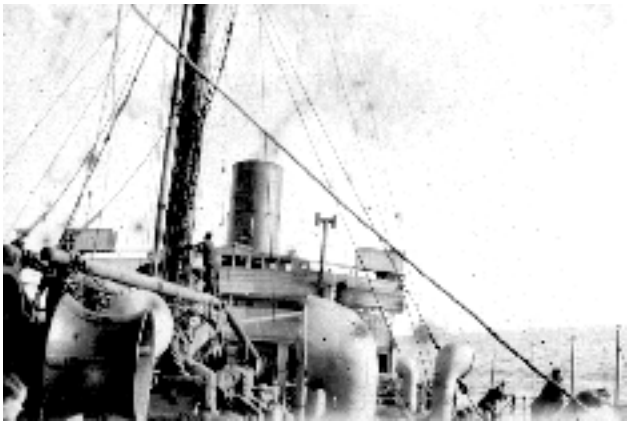
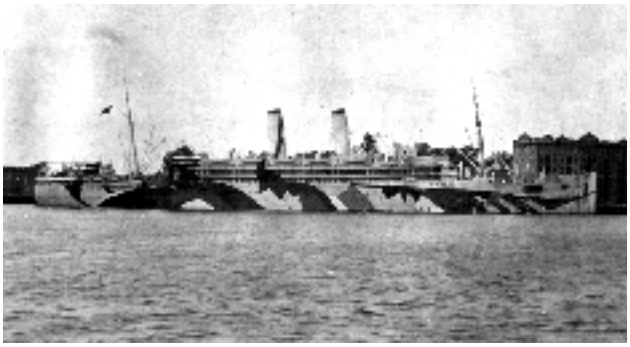
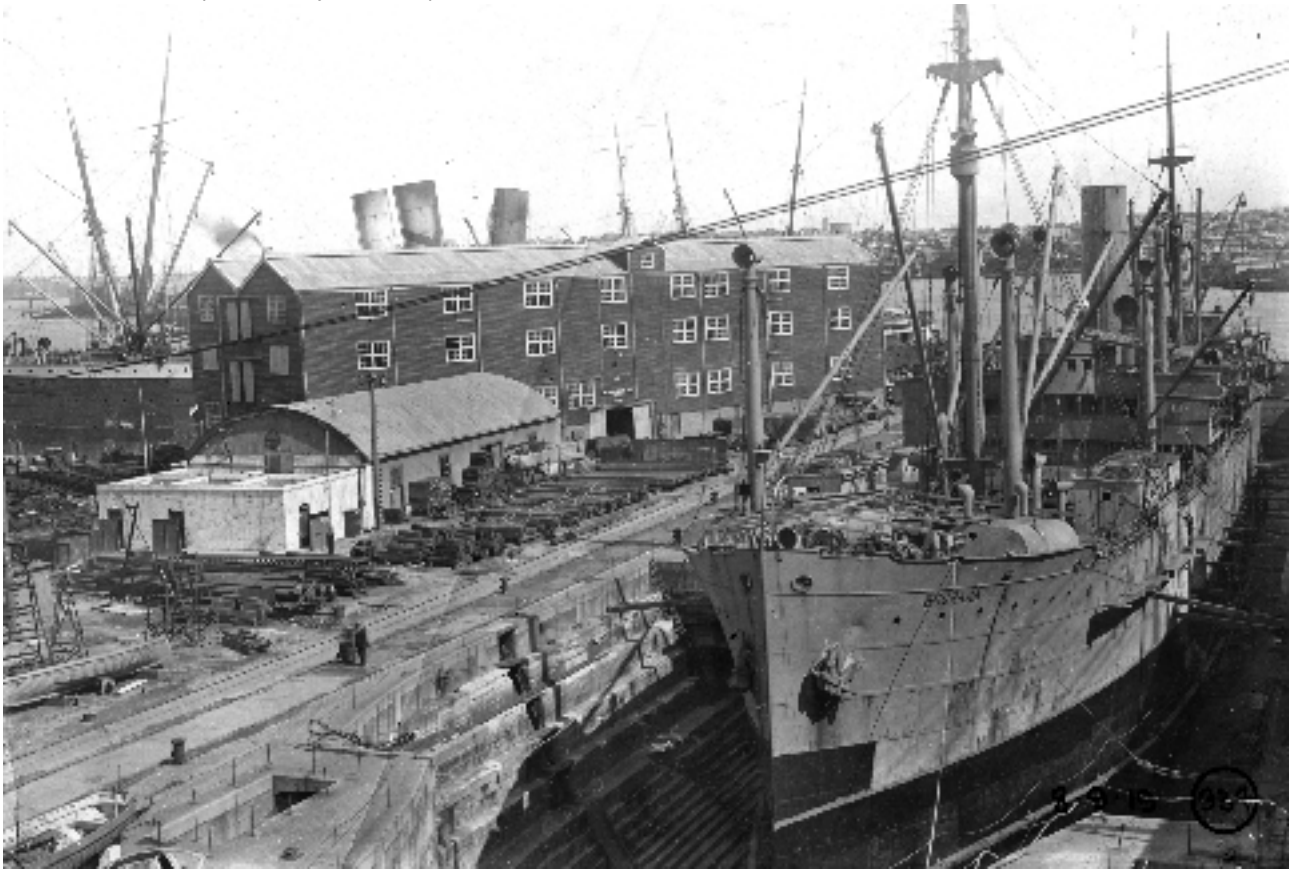


Rolling home — Australian troops returning home in HM Transport *Kashmir* in 1919
(John Jeremy Collection)



Some World War I transports became well known to Australians in later years, like the Orient Line's *Ormonde*, seen here in Sydney in 1918. Her construction was suspended on the outbreak of war, but resumed in 1917 for completion as a troopship in June 1918. After the war she was fitted out for commercial service and returned to Australia in November 1919. After further duties as a transport during World War II, she carried migrants to Australia. The first Orient liner to have a cruiser stern, she was broken up in Scotland in 1952
(Don Dinnie Collection)

The transport *Boorara* (A42) in dock at Cockatoo Island (below) in September 1919 with other ships awaiting refit for commercial service at the Sutherland Wharf. *Boorara* was originally the German *Pfalz* which had been stopped by gunfire from the Nepean Battery at the entrance of Port Philip Bay on 5 August 1914
(John Jeremy Collection)



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