THE AUSTRALIAN NAVAL ARCHITECT

Volume 7 Number 2
May 2003

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THE AUSTRALIAN NAVAL ARCHITECT

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(Australian Division)

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Cover Photo:

With HMAS *Anzac* less than four miles from the Iraqi coast, and for the first time for over 31 years, a RAN ship flies a battle ensign from her mast. For three days HMAS *Anzac* flew the battle ensign as she conducted seven missions of heavy gun fire on Iraq's southern Al Faw peninsula. (RAN Photograph)

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on the
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From the Division President

As this is my first message through these pages since becoming President of the Division, I would like to start by congratulating Bryan Chapman on his achievements as President since 1998.

There is no need for me to repeat those achievements he outlined in this column in the last edition of *The Australian Naval Architect*, but I think he might have undersold himself a little. To his list should be added the introduction of groups reporting to the Division Council on the specialised areas of membership, safety, *The ANA* and web-site, together with continued growth in the content and recognition of *The ANA* as a primary means of communicating with members and across the Australian shipping and shipbuilding industries.

Bryan has provided me with a firm basis from which to work in the further development of the Division, and I do not propose any major changes to the course that he has set.

I would like to express my appreciation for the confidence that members, through the Division Council, have expressed in electing me as President.

As ever, I see the main challenges facing the Division as proving our on-going relevance to society as a profession and to do so in a manner that is cost-effective to members.

In a move that appears aimed at addressing these issues, the April meeting of the RINA Council in London agreed to a definition of corporate membership as follows:

> Corporate Membership of the Institution is open to those whose education, professional development and experience meet the standards defined for their class of membership, and enable them to make a direct contribution to the process of designing, constructing and maintaining marine vessels and structures.

I should point out that this definition does not restrict corporate membership to professional engineers, let alone to *naval architects* within the terms of the Australian Concise Oxford definition "a designer of ships", but places greatest importance on the individual's ability to "make a direct contribution to the process…"

No doubt there will be a divergence of opinion on the desirability or otherwise of this decision, but the decision was made from the Council's view of what was best for RINA on a global basis.

Whereas the activities of members within the United Kingdom are governed by the rules of the Engineering Council, there is no such rigid relationship with Engineers Australia for Australian naval architects. While the new definition will for the first time permit corporate members of RINA who are not eligible for the CEng designation, many in Australia have until now viewed RINA corporate membership as being the primary recognition of a professional naval architect, whether with or without the corresponding handle from Engineers Australia.

I look forward to receiving members' feedback on this matter, either directly or through the pages of this journal.

Turning now to issues closer to our everyday professional lives, we face any number of challenges, including in no particular order but with particular relevance to my own work in marine safety:

- proving and improving maritime safety in the wake of incidents such as *Erika*, *Castor*, *Leader L*, *Christopher* and *Prestige*,
- the transition of the national regulatory framework from the USL Code to the NSCV,
- reducing the unacceptable incidence of accidents, injuries and fatalities at sea,
- advancing national industry and associated technology; and
- ensuring the sustainability of enterprises while attending to the above.

This is not intended to be anything like a complete list of the challenges we face, and I don't pretend to have all the relevant answers. But the Pacific 2004 International Maritime Conference in February next year presents an opportunity to get together and collectively address our challenges. I urge you to participate in any way you can, whether it is as a sponsor, exhibitor, by contributing a paper or by attending and participating in discussions. I look forward to seeing you there.

Rob Gehling

Editorial

In his first column in *The ANA*, Rob Gehling includes amongst our challenges the need to learn from a series of recent maritime incidents. I expect that many people know of the loss of *Erika* and *Prestige*, probably because of the intense press coverage of the potential environmental damage. How many know of *Christopher*? I suspect not many. *Christopher*, a 165 000 t bulk carrier, sank in a North Atlantic storm on 22 December 2001 with the loss of 27 lives. The loss was only one of the many that occur each year, with the loss of many lives.

When the space shuttle *Columbia* was lost, the whole world watched the disaster repeated endlessly on television and intense investigations were begun into the cause of the loss. We are still reminded of the progress of these inquiries in our nightly news. The *Columbia* incident was horrifying, and it is proper that it be subject to thorough forensic examination. We also apply rigorous standards of inquiry to the loss of passenger aircraft, yet many maritime disasters escape similar examination. Notable exceptions are the loss of *Titanic* and *Derbyshire*. It is, of course, much more difficult to examine wreckage scattered across the ocean floor, thousands of metres down, than scattered across the fields of Texas.

The sea highways still carry the bulk of the world's cargoes upon which our economies depend. Surely, the sailors in these ships deserve a similar standard of safety to that we expect in the air or space. I suspect, however, that without some aspect of public drama associated with the incidents, like the potential pollution of miles of pristine shoreline, that they will always remain hidden from the public generally.

Those of us who are involved in the regulation, design, construction, operation and maintenance of ships have a responsibility to ensure that the lessons of these many hidden tragedies are heeded to help our seafarers and their cargoes to safe landfalls on each voyage.

John Jeremy

Letters to the Editor

Dear Sir,

I am writing about the Bachelor of Engineering in Naval Architecture degree offered by The University of New South Wales. The first two years of this degree are common with Mechanical Engineering and the degree is structured to offer students maximum diversity in terms of which branch of engineering they wish to specialise in. I believe it would be in the interests of students to study some subjects from their area of interest, be it Naval Architecture or otherwise, if not in first year then in the second year of their degree.

Speaking from experience, I found it very hard to stay motivated in the first two years of study as there were no Naval Architecture subjects which I find very interesting. I think it would be good to introduce some Naval Architecture subjects into earlier years, not only to create interest and keep people motivated, but also to introduce students to lecturers and other Naval Architecture students earlier.

Robert Skerman
UNSW Student

Many people share your view. However, it is not likely to happen in the short term, as UNSW uses the common first two years as a marketing attraction — Ed.

Dear Sir,

During my studies in Naval Architecture at the UNSW I have been exposed to the history of shipbuilding in Australia and the industry's reaction to local and global economic factors. However, with increased globalisation through improved electronic information transfer technologies, it is difficult to see the role Australia will take in the future of reasonably large ship construction (i.e. larger than 10 000 t). With the closure of our larger yards, overseas operators employ our technical design knowledge, then award construction of the vessel to a region of decreased production costs. Is this a global occurrence made viable through electronic information transfer, or is it a result of our physical location and higher labour costs? If so, is the future role of the Australian large ship industry solely in consultancy or is a return to large ship construction viable and sustainable with government assistance?

Graeme Collins
UNSW Student

Dear Sir,

The Australian Naval Architect is getting better with each issue. I will start with the front cover of the February 2003 issue. What an excellent photograph! Note the bend in the mast of the windward boat. The re-vitalised 'couta boat is a credit to who ever put his heart and soul into her reconditioning. The cut of the mainsail is most interesting, with the cloths running parallel to the leech. The same applies to the mainsail and the headsail of *Britannia* on page 35. I have always understood that this was classified as Scots Cut. It is very good to see these 18s being rejuvenated.

It is a pity that something like that has not been done for our 'snub-nosed' 14 footers. The tale, as I heard it, was that the first such boat was designed and built by that master designer and builder, Charlie Peel [*The elder; i.e. father of the master designer and builder Charlie Peel who worked in Eden for many years, known to many of the elder-statesmen naval architects, and who died in Melbourne recently* — Ed.] It was in the early 1920s, and she was built 'under wraps' and came out into the light of day on an opening day of the Royal St Kilda Yacht Club. The boat was *John Nimmo*. As she was being rigged for the first time on the beach, it is said that all the armchair critics gathered around and roared with laughter. It was a case of laughing on the other side of their faces. *John Nimmo* was Australian Champion that year. Charlie Peel was also responsible for the design of the Jubilee Class, several 21 footers for the Forster Cup events, including *Gymea* and *Neran* (which boats he built), and the yacht *Acrosphire IV* in Melbourne. As for the 'couta boat, there appears to be no boom topping lift? Does the boom just come down into the boat when the mainsail is lowered? [*Most 'couta boats do not have topping lifts. Apparently you soon learn to be careful when dropping the main* — Ed.]

Another 'couta boat regularly sailing on Sydney Harbour with the Sydney Amateur Sailing Club is *Sylvia* (CB 80) owned by Phillip Kinsella (Photograph John Jeremy)

The letter from Noel Riley is most interesting and, in particular, his reference to the USL Code. However the USL Code does have some short-comings, viz., there is no requirement to present to the authority the hydrostatic curves extending from the baseline to above the load line. In my last employment as Ship Surveyor for the Department of Marine and Harbours, up until the time of my retirement that Department did not have access to computer facilities. Part of my duty was the checking of all stability data submitted. With hydrostatic curves extending to the baseline it was so easy to check the accuracy of the transverse curve of buoyancy, etc. Also the curve of the Longitudinal Centre of Buoyancy and Longitudinal Centre of Flotation can be easily checked at a glance — it can be mathematically proven that if the LCB curve crosses the LCF curve then they must be perpendicular. I have seen hydrostatic curves, and from a recognised shipyard, where it was not so. In that case the LCB curve lay almost at 45° to the intersection with the LCF curve. The calculations had obviously been 'fudged'.

Another shortcoming occurs in my copy of the USL on Page 14 of Section 13 re High-holding Power of Anchors'. To quote Clause 1.2: "anchors having a holding power at least double that of Admiralty Pattern Stockless Anchors". Admiralty Pattern Stockless anchors? Any sailor worth his

salt knows that there is "no such animal" as an Admiralty Stockless Anchor, which certainly raises the question of the seamanship capabilities of those who were responsible for this Section.

Noel also makes reference to the NMSC. What is it? I am afraid I am at a loss. [*The NMSC is the National Marine Safety Committee, who are responsible,* inter alia*, for the updating of the USL Code to become the new National Standard for Commercial Vessels (NSCV)* — Ed.]

Turning now to *Braeside* and *Burnside*. What a calamity! It is all recorded in *Build a Fleet, Lose a Fleet* by Captain R. McDonell. Are there any plans of these two vessels still extant? In particular the Lines Plan and the Construction Plan? Just what was the arrangement of the keel, keelson and sister keelson set-up? Perhaps there was not much rise of floor. A good rise of floor helps somewhat in longitudinal strength. I wonder too, if a good "shift of butts" was strictly adhered to? Evidently the fastenings were in question also. A great pity. They would have been the largest wooden ships ever built in Australia.

I reiterate that *The Australian Naval Architect* is an excellent publication and a credit to those responsible.

Neil Cormack

Ships of the Australian Heritage Fleet including *Boomerang* (left) and *John Oxley* (on the dock) at the Museum's base in Rozelle Bay in Sydney

(Photograph John Jeremy)

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.

NEWS FROM THE SECTIONS

New South Wales

Annual General Meeting

The NSW Section held its fifth AGM on the evening of 26 March, following the March technical presentation at the Institution of Engineers, Australia, Milsons Point, attended by thirteen with Bob Dummett in the chair.

Bob, in his Chair's Report, touched on some of the highlights of 2002, which included ten joint technical meetings with the IMarEST (Sydney Branch) and one RINA-only meeting at UNSW, with attendances varying between twenty-two, and forty-eight at Brett Crowther's presentation on *Design and Construction of Modern Multihulls*. RINA and IMarEST members have expressed satisfaction with the return to the IEAust venue (particularly the parking aspect) but, unfortunately, attendances have been down slightly on previous years.

SMIX Bash 2002 was successful, attended by our largest number ever, 217, and has now become established as an institution. For the first time, the Bash returned a small profit, made possible by the generosity of our sponsors, and Bill Bollard's donation of a half model of *James* Craig which was raffled. Our principal sponsor in 2002, Wärtsilä Australia, has also requested principal sponsorship for 2003. Bob thanked the other members of the SMIX Bash Committee, Don Gillies and Bill Bixley, for their help.

Bob, also holding the portfolio of Treasurer, presented the Treasurer's Report. The IEAust venue had, as usual, been our major cost for the year. However, with a close watch on the outgoings, we had managed to operate within the black all year and have the grand total of $572 in the bank at 31 December 2002, i.e. more than last year! SMIX Bash 2002 was funded entirely outside of Section finances, and made a profit of $767. This is shared with the IMarEST, and will start to defray the accumulated losses from the previous two years.

There are a number of changes to the NSW Committee for 2003. Bob Dummett, Rod Humphrey and Jennifer Knox have resigned due to pressure of other things, and Bob thanked the others for their significant contributions to the Committee over a number of years. Craig Boulton, Adrian Broadbent, Graeme Parker and Martin Williams have agreed to accept positions on the committee. Committee positions will be decided at the next Committee meeting.

Phil Helmore proposed a vote of thanks to the outgoing Committee members, Bob Dummett, Rod Humphrey and Jennifer Knox. Bob had done sterling service in the Chair for two years and it was largely due to his indefatigable chasing of sponsors, that SMIX Bash 2002 had returned a profit for the first time. Jennifer Knox had been a tower of strength in maintaining the email database and in sending out notices of meetings, and Rod Humphrey in arranging technical presentations. The vote was carried with acclamation.

Committee Meeting

The NSW Section Committee met on 16 April and, other than routine matters, discussed:

- Committee positions: The committee for 2003 was decided as follows:

Chair	Phil Helmore
Deputy Chair	Graham Taylor
Treasurer	Adrian Broadbent
Secretary	Lina Diaz
Assistant Secretary	Todd Maybury
AD Council Nominee	Martin Williams
Members	Craig Boulton
	Don Gillies
	Bruce McRae
	Graeme Parker
	Andrew Tuite

- Technical Meeting Program 2003: Most presentations are organised (see *Coming Events* elsewhere in this issue). Presentations still to be arranged for July and September, one by IMarEST and one joint. Hot ideas include carbon-fibre technology, and legal issues in marine design and construction.
- Ship Visit 2003: Visit to *Shirase* missed because of short notice; *Crystal Symphony* due to security on outbreak of war. Other possibilities to be canvassed, and the issue of insurance to be checked.
- The Walter Atkinson Award for 2002: Eight nominations were considered and the decision made to nominate Keith Murray's paper, *A History of Mort's Dock and Engineering Co. Ltd* which was published in *The ANA* in February 2002, for the award.
- Correspondence: With the change of address following our change of Secretary, it was noted that the web address of the NSW Section should be on our letterhead. However, the current address is lengthy and not intuitive, and it was decided to ask London if a link from a short-form address, such as www.rina.org.uk/nswsec, could be added to allow all divisions/branches/sections to have their web address on their letterhead.
- SMIX Bash: Organising Committee to comprise Don Gillies, Graham Taylor, Ben Hercus and Bill Bixley (IMarEST). Date of Thursday 4 December decided for this year's Bash, and booking to be made.

Technical Meetings

Main Engine Tie Bolts

Jude Fernandes of Australian Defence Industries, Garden Island, gave a presentation on *The Removal and Replacement of a Main Engine Tie Bolt* to a joint meeting with the IMarEST attended by twenty-five on 26 February in the Harricks Auditorium at the Institution of Engineers, Australia, Milsons Point. Jude's presentation included a written paper which is reproduced, with permission, elsewhere in this issue of *The ANA*.

Design of Offshore Yachts

Bruce McRae and Andy Dovell of Murray, Burns and Dovell, gave a presentation on *Design of Offshore Yachts for the New Millennium* to a joint meeting with the IMarEST attended by fifty-four on 26 March in the Harricks Auditorium at the Institution of Engineers, Australia, Milsons Point. Bruce, in his presentation, first explored the reasons

why we (i.e. sailors) do it; the reasons including adventure, technical aspects, challenging the elements and/or other competitors, and being mentally stimulating and physically draining.

On the safety side, it has always been the skipper's responsibility to decide whether to start or continue to race. The design challenge is to ensure that the yacht is structurally sound and able to maintain performance. Some recent incidents have highlighted the need for care (i.e. thorough maintenance) to be continued throughout the vessel's life. Lessons learned from the 1998 Sydney–Hobart include all yachts being susceptible to capsize, the solution is not simply maximising the limit of positive stability (LPOS) of equal importance is re-righting ability, structural integrity must be retained during rollover, and self righting increases under surfing conditions. Much research is currently being conducted on factors affecting self-righting ability. Other changes influencing safety include crew training, liferaft stowage on deck for new vessels, radio training, EPIRBS with vessel ID and GPS location inbuilt, and satellite tracking of competitors.

Design issues include the length, weight (probably the most important!), righting moment, strength of hull, rigs and sails (to take the loads imposed), hullform, ergonomics, and practical construction issues. Technological advances have been made in the areas of sails, keel systems, rigs, deck hardware, ropes and lines, and production techniques. Materials advances have been made with the use of carbon fibre, Kevlar, PBO/Dyneema/Spectra/Vectran, titanium (has high strength, but requires careful engineering because of grain structure), and cores of Nomex/Airex/Hirex/balsa.
Bruce then showed photos of some high-performance yachts and their equipment:

- Volvo 60 *Illbruck*, current world record holder for distance covered in 24 h of 484 n miles at 20.16 kn, set in June 2002;
- Catamaran *Maiden II* (ex *Club Med*), current world record holder for distance covered in 24 h of 695 n miles at 28.95 kn, set in June 2002;
- *Team Adventure* (sister to *Club Med)*, developed for The Race, a no-holds-barred, fastest-around-the-world passage;
- *Geronimo*, a 33 m trimaran which attempted the Jules Verne record currently held by *Orange* at 64 days;
- *Team Philips*, another catamaran developed for The Race, showing the broken bow in the first incident; this was repaired, and in the next incident she sank;
- a Harken winch for America's Cup yachts, having a carbon fibre housing and glued-in titanium gear ring (saves 20% of the weight on a 300 mm diameter winch);
- a titanium runner block;
- a carbon-fibre winch gearbox;
- a traveller block with cylindrical bearings to increase the bearing surface compared to ball bearings;
- lashed connections, which are returning to popularity to save the weight of hydraulics on boom vangs, and shackles elsewhere (new high-strength ropes make this possible, and repair is simple);
- Open 60 *Kingfisher* with her large asymmetric foresails requires carbon-fibre furlers;
- Volvo 60 *Assa Abloy* used female mould techniques and saved 100 kg in hull construction and did not require painting; and
- *Mirabella V*, the world's largest sloop, 75 m long, 700 t displacement and with a 150 t lifting keel, draws 10 m with the keel down, 4.3 m with it raised, and has 38 t jibsheet loads!!!

There has been much innovation and development in the America's Cup class yachts, such as rigs, bulbs and keels, sail technology, and meteorology. Many features of IACC yachts will trickle down to GP-level racing, but some is inhibited by details which are considered proprietary. The "millennium rig" used by *Team New Zealand* was developed by Tom Schnackenberg to change the angle of the rig elements, and the line of the rigging goes through the mast to the spreader above, requiring smaller wires and resulting in less weight aloft. The failure of her mast was not due to this rig, but to a poor end connection on a spreader.

The ballast bulbs on *Alinghi*, *Oracle* and *Team New Zealand* were all about 19 t (of a total displacement of 24 t!) but had widely-varying shapes and profiles. *TNZ* had a slender bulb with lower CG and horizontal winglets (because of the maximum draft restriction) which would have been about 50% longer than the others. *TNZ* also sported a "hula" or hull appendage which added waterline length and volume between the keel and the rudder, but they had to prove that it was, in fact, an appendage.

Canting-keel technology is the current rage. This is where the keel is pivoted about a longitudinal axis at the hull, and allows the keel to be swung to windward to maximise the righting moment and minimise the wave-induced and wetted-surface drags. The reduction in side force is then offset by the addition of a fixed or movable foil forward. One of the latest ideas is to have winglets on the canting keel so placed that, when the keel is canted, they eliminate the need for the forward foil. However, the technology is still in its infancy, and can be positively dangerous if not handled correctly.

How good the performance of each of the yachts is depends on the type of racing. Measurement handicapping rates the yacht according to directly measured or calculated parameters, and the data is fed into a VPP. Performance handicapping, on the other hand, rates the yacht according to previous results. The IMS rule was designed as a fully-transparent rule, allowing designers to probe the performance vs rating trade-offs. The IRC (IR2000 Club) rule was based on a "black box"; i.e. only a handful of people know the full formulation of the rule, there is no designer version of the VPP available, and was aimed at restricting optimisation analyses. This rating is gaining in popularity as competitors see that everyone has a chance, and older vessels are rated fairly in comparison to newer, high-tech vessels. One-design racing is a different approach as, for example, the Sydney 38. This type of racing is also increasing in popularity. It is usually short-course racing (e.g. Saturday afternoons) for those with a fast-food approach; first over the line wins and there is no waiting around to see who won. This is often regarded as a test of the best sailors, as opposed to the deepest pockets.

Questions from the floor, comprising our highest attendance for some time, came thick and fast, probing many aspects of high-tech yacht design, and kept Bruce and Andy on their toes for half an hour, instead of five minutes. The vote of

thanks was proposed by John Jeremy, and carried with acclamation.

High-speed Marine Diesels

Phil Canning, National Marine Manager of MTU Detroit Diesel Australia, gave a presentation on *Technical Update on High-speed Diesel Engine Technology for Marine Applications* to a joint meeting with the IMarEST attended by twenty-six on 23 April in the Harricks Auditorium at Engineers Australia, Milsons Point. Phil began his presentation with a brief summary of the development of the high-speed ferry market over the last twenty years. MTU played a significant part in that development, already having a 2000 kW engine with high power-to-weight ratio and low fuel consumption per unit power. This meant that engine and fuel weights were low, enabling vessels to be light and achieve target speeds. As the lengths of vessels grew from 40 m to 90 m, and then more recently to over 100 m, power requirements doubled and then tripled. The initial need was solved by installing more engines, but this led to an increase in maintenance costs.

The end result was that MTU did not have engines with enough power to meet the coming demands. They realised this in 1996, and set in motion a research and development effort on a new series of engines, the 8000 series. It was realised that there were three critical areas in engines for high-speed craft: high power-to-weight, low fuel consumption, and low maintenance costs.

The main development targets were that the new engines must have:

- the ability to meet the high power demands of the fast and high-payload commercial vessels, as well as the low-speed loitering demands of military vessels;
- high reliability, availability and maintainability;
- low fuel and lube oil consumption;
- environmentally-friendly design (for Europe and California in particular); and
- compact and complete systems with minimal interfaces.

The new engines were designed as marine engines from the outset, with no industrial use in mind. The engines are on a 48° vee configuration, with 17.37 L per cylinder on a 265×315 mm bore×stroke. The 16V engine is 7.4 m in length, and both are 1.9 m in width. The ratings of the sixteen- and twenty-cylinder versions are as shown:

Engine	MCR Power (kW)	Max Power (kW)	RPM
16V8000 M70	6560	7200	1150
20V8000 M70	8200	9000	1150

Having been alerted that 25% of his audience were naval architects, Phil continually pointed out features of the engines which were of interest to naval architects. One of these was that the engines have a service module on the front end, where all the peripherals are concentrated for maintenance. This means that the engines do not require side access, except for removal of the crankcase doors and removal of the power units, which makes for an engine requiring a minimum of space around the sides, especially desirable for placement in catamaran hullforms.

The "power units" are a new concept, where the head and cylinder liner are kept together in one unit, and the cylinder liner is dry except for a short section near the top. The firing pressure has been increased from 160 bar on previous engines to 210 bar on these engines, and this now requires 24 bolts to hold the power unit onto the cylinder. However, for maintenance purposes, the big advantage is that to change a power unit, you don't have to drain the block of cooling water, or the sump of lube oil; you simply disconnect the piston from the crankshaft, and withdraw the power unit complete with the piston and rod, and change the lot. One can be completely changed in three hours!

The crankcase is of nodular cast iron, better than grey but not as expensive as spheroidal to keep the cost down. This has resulted in a very rigid crankcase, and it has large access doors. Cylinder heads are also of nodular cast iron to sustain the high firing pressures. Pistons are composite, with a forged steel crown and steel skirt (they considered aluminium skirts but did not proceed). The crankshaft is an alloy-steel forged design with bolt-on counterweights, machined all over. Exhaust piping is dry, with an insulated exhaust manifold. Turbocharging is by four radial-type single-stage units.

Fuel is supplied through a common-rail system by two fuel pumps to an accumulator in each cylinder head. The injectors are about 450 mm long, and the only moving parts are the solenoid (for control) and the nozzle, leading to less expensive components and simple replacement. Control of the injection is such that fuel can be injected late at low speeds, so that it burns quickly and completely and results in lower emissions.

The coolant circuit uses a split system, so that engine components are in contact with fresh water only, and the heat exchanger can be bypassed if required. This provides optimal temperatures for the coolant, lube oil and intake air under all operating conditions. One beneficial result is that these engines can operate continuously at idle with no damage!

The lube oil system uses an automatic oil filter, with no replaceable cartridges, but a continuous back-flushing process via a centrifuge. The engines are fully electronically controlled, with data acquisition points built in, and records of operation can be relayed to shore if required. Sequential turbocharging is used, and the performance map indicates that these engines use 5% less fuel with sequential turbocharging for the same power.

Testing of the engines included 800 h on a single-cylinder engine where they perfected the combustion process, 600 h on a 16V engine for high-cycle fatigue (long periods at high power), and 1000 h on a 20V engine for low-cycle fatigue (start, heat up, stop, cool down, start, and repeat, etc.)

These engines have lower NOx emissions than the Marpol 7378 Annex VI limits. Black smoke emissions are the ones which usually cause complaints, and these often occur while the engines are idling and the passengers are embarking or debarking, with time to look around. However, the common-rail fuel system and the split cooling system for temperature control work well, and they have demonstrably low black-smoke emissions at idle (he showed photographs of the exhaust over the whole rev range), and confidently expect happier customers.

Another interesting feature of the design is that there is a flat spot of some 60 RPM at the top of the output power curve around the MCR. This means that there is considerably more scope than usual for the propeller/impeller pitch to be slightly off-target.

The whole R&D effort cost the company of the order of $100 million. The design, started in 1996, was complete and certified by eleven classification societies in 2000. The first engine was delivered in 2001; thirty-six were sold in 2002, and the first four are being installed in a catamaran in Western Australia. When launched later this year, this vessel will be the most powerful diesel-engined catamaran in the world.

In summary, MTU have achieved all the goals in their design brief, and the design has been verified by extensive testing. The vote of thanks was proposed by Phil Wickersen.

Phil Helmore

Queensland

The Queensland Section met for its 2003 Annual General Meeting at the Gateway Campus of the Brisbane and Northpoint Institute of TAFE on 4 March 2003. The Section Committee was elected for 2003 was:

Chair	Brian Robson
Deputy Chair	Bill Barlow
Secretary/Treasurer	Brian Hutchison
Members	Dion Alston
	James Stephen
	Milton Roberts
	Peter Murrell
	Ross Burchill
	Alan Prigg

The AGM was followed by a technical presentation, *An Update on Maritime Standards,* by Werner Bundschuh, Director of Marine Safety, Queensland Department of Transport. Werner informed the meeting of the achievements, and projections in updating the current maritime standards. He offered to provide electronic and hard copies of his presentation to members on request to theSecretary/ Treasurer. Werner's presentation was well received by members and Brian Robson thanked him on behalf of the Queensland Section for his thought and effort in preparing the material on a complex issue and for his user-friendly presentation.

Brian Robson

Tasmania

AMC Seminars

Jan Broekel, a visiting student from the University of Rostok, Germany, gave a presentation on *Experimental and Theoretical Investigations of Stiffened and Unstiffened Composite Panels under Uniform TransverseLloading* on 4 February.

On 7 February, Roberto Ojeda, the AMC Tom Fink Scholar for 2002, gave a presentation entitled *Static, Modal and Transient Analysis of a Composite Catamaran under Slamming Loads using the method of Finite Elements*. Roberto has since completed his twelve-month stint at AMC and returned to Chile to complete the final semester of his degree in naval architecture. Roberto then hopes to undertake a higher degree by research.

Greg Cox, a freelance naval architect based in Newcastle, NSW, gave a very detailed presentation on *The Design and Construction of High-speed Planing Monohulls* to a large number of students and staff. Greg was at AMC to undertake a series of model tests in the towing tank for a vessel he is designing for a Malaysian company. Greg is also an active participant in the AMC's IGS research project on vessel wash.

Bill Wright, managing director of Norman R. Wright & Sons of Brisbane, has presented two technical seminars to students and staff as part of the RINA/AMC Seminar Series over the past couple of months. The first presentation (in late February) was on *The Design and Construction of Long-range Motor Boats*. The second presentation, in early April, covered *The Design, Construction and Operation of Pilot Boats*. Both presentations provided a great deal of detail and were very well attended, including a number of visitors who travelled up from Hobart specifically for the occasion. On both occasions Bill was at AMC to undertake a series of model tests in the towing tank.

Any members (particularly those in the Tasmanian Section) who would like to receive email notification of upcoming presentations are asked to provide their email address to Gregor Macfarlane at g.macfarlane@mte.amc.edu.au.

Gregor Macfarlane

Western Australia

Annual General Meeting

The WA Section Annual General Meeting was held on 19 February, with several changes to the committee. John Wood retired after many valuable years of service, being responsible for the bulk of the hard work in getting the section library organised. Deputy Chair Steve Harler also completed his term, one of his many valuable roles being as initiator and administrator of the annual Beer Can Challenge. Kim Klaka completed his term as Chair, though he remains on the committee for one more year. Two new and relatively youthful members have joined the committee — Bronwyn Adamson and Marius Martens. With the new Chair being Shaun Ritson and new Deputy Chair Kalevi Savolainen, we have an invigorating mix of old and new to lead us onward. The average age of the new committee is now somewhere in the mid 30s, which not only augers well for the future of the section, but also says heaps for the dedication of the younger members at possibly the busiest time of their professional careers. All but one of the committee are employed full time in private industry.

The new committee is:

Chair	Shaun Ritson
Deputy Chair	Kalevi Savolainen
Secretary	Jim Black
Treasurer	Damien Smith
Members	Bronwyn Adamson
	Roger Best
	Kim Klaka
	Marius Martens

Beer Can Challenge

The third annual Beer Can Challenge was held in March, on the placid waters of the Swan River. Six teams competed, including three student teams.

Technical Meetings

The year started in February with the AGM followed by a technical quiz hosted by outgoing Chair Kim Klaka. In March, Brian Hardaker gave a presentation on air conditioning and refrigeration, and April saw a packed house for America's Cup designer Phil Kaiko's insight to the design process on an unlimited budget.

Kim Klaka

Victoria

The Victorian Section has held three technical meetings since the last edition of *The Australian Naval Architect*. Mr Ken Greig gave the first of these in February on *The SSP Podded Propulsion System*. He also spoke of other developments that his company had been involved in, such as platform electrical systems. The presentation included information relating to the SSP installation and the advantages of electric propulsion systems. Finally, a detailed comparison of vessels with and without the SPP podded propulsors was discussed in terms of hull lines, fuel consumption, cargo carrying capacity, etc.

In March the Victorian Section hosted the Australian Division AGM. This gave many of the local members a chance to meet with many council members to discuss issues of interest. Following the meeting, members joined the technical meeting at which Kaspar Wijsbeck discussed *Gas Turbine Applications*. His presentation briefly described the history of gas turbine applications in the aviation/maritime transport arena. This was done with the aid of extremely simple analogies with balloons. A particular application of gas turbines was presented which had little to do with ships but to our competitor industry — the Boeing 727 passenger or airfreight aircraft. This lead through to the propulsion of large Sea Land container vessels and to the recently completed 300 MW Peaker power plant located in the La Trobe Valley. This discussion was extremely detailed, especially since the entire class of engineering students at HMAS *Cerberus* attended.

April's monthly meeting allowed the membership to catch up with some of the issues that Alan Taylor has been involved with. Alan has made himself available on several occasions to present papers to the group. This time Alan chose to discuss the problems associated with ship's ballast water. Although the problems are well documented, and have stimulated much research into finding workable, cost effective solutions, the problems are still with us. Alan's presentation prompted an enthusiastic discussion amongst members which continued in the bar afterwards.

Alan Taylor wins the IMarEST President's Award

The winners of the IMarEST President's Award (formerly known as the Stanley Gray Award) are Mr Alan Taylor, Dr Geoff Rigby and Professor Gustaaf Hallegraeff for their extensive work leading to the development of acceptable solutions for the management and treatment of ships' ballast water to minimise the translocation and establishment of non-indigenous marine organisms. Introduced in 1997, this is the first time that this award, with its cash prize of up to £10,000, has been presented. The award is presented approximately every five years to the engineer, scientist, technologist or research and/or development team attaining the highest distinction in a maritime technology subject or subjects either by an outstanding achievement, the writing and presentation of a significant technical paper or the writing of a technical book. Congratulations Alan!

Stuart Cannon

COMING EVENTS

NSW Technical Meetings

Technical meetings are generally combined with the Sydney Branch of the IMarEST and held on the fourth Wednesday of each month in the Harricks Auditorium at the Institution of Engineers, Australia, 118 Alfred St, North Sydney, starting at 5:30 pm for 6:00 pm and finishing by 8:00 pm. The program of meetings remaining for 2002 (with exceptions noted) is as follows:

28 May	Kit Filor, Australian Transportation Safety Bureau, *There but for the Grace of … — a Review of Some Recent Shipping Accidents*
25 Jun	Michael Andrewartha, UNSW PhD student, *The Performance of Foil-assisted Catamarans*
23 Jul	TBA
27 Aug	TBA
24 Sep	Noel Riley, Commercial Marine Design, *The Evolution of Australian Tug Design*
22 Oct	David Gosling and Lina Diaz, Waterways Authority of NSW, *Stability Requirements for the New Millennium*
4 Dec	SMIX Bash 2003

Victorian Technical Meetings

The Victorian Section meetings are held in conjunction with the Institute of Marine Engineering, Science and Technology (IMarEST). The venue of the meetings has changed and they are now held in the Keepers Arms on the corner of Queensbury Street and Peel Street. We meet at around 5.30 pm for 6.00 pm start. The key advantage is that the pub sells a meal and a beer for $5 on Tuesday night. The Victorian Section AGM was held on 6 May. Forthcoming technical meetings are:

20 May	Robert Phillips, DSTO, *Refurbishment of FFG Superstructures*.
17 June	Geoff Goodwin, DSTO, *Failure Investigations of Marine Engines*.

Queensland Technical Meetings

The Queensland Section will hold its next technical meeting at 1830 on Tuesday 8 July 2003. Its location, subject and presenter will be advised on the Queensland Section Website when finalised.

Marine Safety 2003

The National Marine Safety Committee will host another major marine safety conference, Marine Safety 2003, at Stadium Australia at Sydney's Olympic Park from 22 to 24 September, and is calling for registrations of interest from potential presenters, exhibitors, delegates and sponsors. The NMSC expects the conference to equal the success of the inaugural Marine Safety 2002 conference, when around 400 marine industry leaders joined together in Brisbane. The aims of the conference are to accelerate the exchange of ideas and knowledge between people involved in Australia's coastal marine industries, promote national marine safety, and assess NMSC's work on the introduction of uniform national commercial and recreational marine safety standards. For further information, or to register interest, contact the secretariat on (02) 9555 2879, email mglenister@nmsc.gov.au, or visit their website www.nmsc.gov.au.

Ausmarine East

The two-yearly Ausmarine East Conference and Exhibition will be held in Brisbane, at the Brisbane Convention and Exhibition Centre, from 28 to 30 October 2003. Ausmarine is one of Australia's leading international commercial and government marine events. It is aimed at owners and operators of fishing boats, tugs, ferries, offshore support vessels, pilot and rescue craft, aquaculture vessels, cargo ships and naval craft. For further information contact Baird Publications on (03) 9645 0411, fax 9645 0475, email marinfo@baird.com.au, or visit their website www.baird.com.au.

RINA Conference at Ausmarine East

The Queensland Section of RINA will hold a conference of their own in association with Ausmarine East in October 2003 in Brisbane. Details will be forthcoming. For further information contact Brian Hutchison on telephone/fax (07) 3269 4913 or email brghutchison@hotmail.com.

Pacific 2004 International Maritime Conference

The Pacific 2004 International Maritime Conference will be held at the Sydney Convention and Exhibition Centre, Darling Harbour, Sydney, from 3 to 5 February 2004. It will be presented in association with the Pacific 2004 RAN Sea Power Conference as part of the Pacific 2004 Maritime Congress.

The conference, which is being organised by the Royal Institution of Naval Architects, The Institute of Marine Engineering, Science and Technology and the Institution of Engineers, Australia, follows the success of the Pacific 2002 event which was held in January 2002.

More information can be found on the website www.tourhosts.com.au/pacificmc2004, or by emailing pacificmc2004@tourhosts.com.au

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"Awesome" *Spearhead* Meets US Army's Needs

"Awesome" is the word used by CW3 Patrick S. May, Commander of USAV *Spearhead*, when describing the US Army's Theatre Support Vessel sustaining 48.7 kn running down the coast of Qatar during Operation Iraqi Freedom.

As the US Army's first Theatre Support vessel, TSV-1X USAV *Spearhead* was planned to be utilised on missions to maximise its speed and flexibility, required for both sustainment deliveries and the movement of Army prepositioned stocks, and troop units.

Laid down at Incat's Hobart, Tasmania shipyard as a commercial passenger and vehicle ferry the ship was modified to meet US Army requirements and was promptly delivered to Bollinger/Incat USA for hand over to the military in an impressive 53 days after contract award.

Leaving Hobart soon after hand over, TSV-1X *Spearhead* headed directly to the Persian Gulf to be part of the major military build-up in the region. En route, her crew began training, conducted extensive sea trials and outfitted *Spearhead* for logistics operations worldwide.

Both *Spearhead* and the earlier Incat-built 96 m craft HSV-X1 *Joint Venture* were deployed within the central command area of responsibility in support of Operation Enduring Freedom and Operation Iraqi Freedom.

CW3 Patrick S. May, Commander USAV *Spearhead*, commented "The reception of the TSV is amazing, and all eyes are on the *Spearhead* in every port. We've given hundreds of tours to everyone from the casual observer to generals."

"We have sailed a total of 29 305 n miles and our operations to date have covered most of the western part of the CENTCOM Theatre from Jordan to Kuwait. We have carried 751 troops and hauled over 1320 pieces of military cargo, just about everything in the inventory except for tracks, all of which were already on the battlefield when we arrived."

Speaking of his role as commander of such a high-profile craft as *Spearhead*, CW3 May says, "I can tell you that Incat has hit a home run with this ship! What an awesome piece of equipment. We have had minimal problems during a higher-than-designed or intended operation tempo."

"The vessel is near perfect for the intended US Army mission, and in 18-plus years of driving and working about boats, I've never had so much fun."

"We hit and sustained 48.7 kn running down the coast of Qatar a few weeks ago, unbelievable" he said.

While HSV-X1 *Joint Venture* is shared by components of the Joint Forces Command, TSV-1X *Spearhead* is a pure Army craft. The Army has used performance and engineering data gathered through their involvement with *Joint Venture* and used this to fine-tune the requirements for *Spearhead*.

In the meantime, Incat is currently constructing another 98 m craft, HSV 2 *Swift*, for the US Navy. The ship is on target for a mid-2003 delivery.

Incat out of receivership

Incat's $70 million debt to the National Australia Bank was paid in full in mid-February, releasing the shipbuilder from receivership. At that time, $30 million remained owing to the Tasmanian Government.

The US Navy's *Joint Venture* (HSV-X1) and the US Army's *Spearhead* (TSV-1X) together in Kuwait during the Iraq war. The high-speed catamarans were designed and built by Incat in Tasmania. Operation Enduring Freedom was the first time the craft have been deployed together in support of military operations.
(U.S. Navy photograph)

Collins class construction complete

HMAS *Rankin* — the sixth and final Collins-class submarine — was commissioned in Western Australia on 29 March.

Attorney-General Daryl Williams represented Defence Minister Robert Hill at the ceremony, held at HMAS *Stirling*, home base of the Collins-class submarines.

The Australian-built Collins-class submarines are now competing with the world's best — they have performed superbly against US nuclear submarines in recent exercises, and in operational work over the last year they have been exceptionally capable.

Recently the Government has announced several initiatives aimed at addressing the remaining challenges with the submarine fleet, and guaranteeing their future capability advantage. The submarines will be equipped with the most capable torpedo of its type — the Mk 48 Mod 7 advanced capability torpedo. This will lead to a significant capability upgrade when they enter service from 2006.

Earlier the Government announced its intention to purchase a replacement combat system for the Collins class. Enhancements to the tactical command and control component, and the sonar processing elements of the combat system, represent a significant capability enhancement over the existing system, which was identified in 1999 as the principal technical challenge for the Collins class.

Last year, the Government announced that it would sign a capability agreement with Electric Boat Corporation, under which Electric Boat will provide technical and commercial support to Australian Submarine Corporation as the company makes the transition from being a builder of submarines to one that maintains them.

Contract Signed for New Bridging Capability

Minister for Defence Robert Hill announced on 8 April that Birdon Marine Pty Ltd of Port Macquarie has won the contract to provide the Australian Army with a new bridging capability with 24 new bridging boats.

Senator Hill said the $13.95 million contract will deliver a much-needed capability boost, supplying fixed modular bridging for the Army.

"The new boats will replace the current ageing fleet of bridging boats, which have been in service for over 30 years, and will provide a capability that has not been available since the retirement of the Bailey Bridge in the mid-1980s," Senator Hill said.

"The boats will work in conjunction with the Army's Floating Support Bridge system and will be operated by soldiers from the Royal Australian Engineers who have a primary task of constructing various bridging systems.

"The new boats are designed to assist the engineers in crossing wet gaps of all sizes and in providing improved mobility for the Army."

Senator Hill said the contract will meet another of the Government's White Paper commitments.

The boats will be operated by 'sappers' from the Combat Engineer Regiments located at Darwin, Townsville and Brisbane. Additionally, some boats will be located at the School of Military Engineering for training purposes.

Proposed Merger of Tenix and ADI Shipbuilding Capabilities

Defence contractor Thales, joint venture owner of ADI Limited, and Tenix announced on 20 February that they have agreed in principle on a proposal to merge the shipbuilding and ship repair capabilities of Tenix and ADI.

The move follows the release of the Defence Naval Shipbuilding and Repair Sector plan last year, and extensive discussion over the last three years of the need to rationalise the Australian naval shipbuilding industry in the face of reduced demand.

The proposal would bring together all current naval shipbuilding, upgrade and repair businesses of both companies. The proposed new company formed from the merger would be majority owned by Tenix. Full details remain confidential, pending talks with the Commonwealth Government and Defence Department.

If the merger proceeds, ADI Limited's other joint venture owner, Transfield Holdings, would retain its joint venture ownership in the ongoing business operations of ADI.

Once established, the new company would be a potential bidder for the Australian Submarine Corporation, subject to the requirements of the Commonwealth.

The initiative is the first step in creating a long-term and sustainable naval shipbuilding industry, bringing together and enhancing Australia's significant capability in this strategic industry sector.

It would assist the long-term restructuring of the industry, ensure vital support capabilities are maintained and lead to new investment in capability.

It would bring together the financial, technical and prime contracting strengths the Defence Department requires, in a company with unique experience in understanding and working with Defence and the Royal Australian Navy.

Large Ship Docks in Sydney

The biggest vessel to use ADI Limited's Garden Island dry dock since it was opened 58 years ago was docked on 23 April 2003.

The 255 m long, 35m wide bauxite carrier *Endeavour River* spent three days in the dock for routine maintenance. It was the first time the 20-year-old ship has used an Australian dry dock with all previous work undertaken at overseas facilities. *Endeavour River*, a steam-driven vessel, transports bauxite along the northern Australian coastline.

The previous biggest visitor to the dry dock was the tanker, *Arthur Phillip*, in 1981. The dock's first customer was the British aircraft carrier HMS *Illustrious* in March 1945, shortly before the end of the Second World War.

WA Industry News

Current work in progress at Strategic Marine includes the construction of three 23-passenger crew boats for Indonesia. They are also building two 20 m patrol boats in Malaysia in collaboration with a local builder and are refitting a 12-passenger utility catamaran for Indonesia.

Kim Klaka

United States to Sail Again!

Norwegian Cruise Line has purchased two veteran US liners for further service, SS *United States* and the former American Classic Voyages' *Independence*.

Completed in 1952, *United States* was the fastest of the great trans-Atlantic liners, with a trial speed around 38 knots. Her maximum performance was classified for many years. Designed by the New York firm Gibbs & Cox, *United States* challenged the supremacy of Cunard's *Queen Mary* and *Queen Elizabeth* on the North Atlantic, but could not compete with the Boeing 707.

Now out of service for decades, *United States* has been subject to many proposals for reconstruction, but has remained stripped and laid up with her aluminium superstructure rotting.

Norwegian Cruise Line intends to rebuild the ship for cruises from US ports.

New Daring Class Underway

UK Defence Procurement Minister Lord Bach has officially launched production of HMS *Daring*, first of the new Type 45 class of anti-air warfare destroyer, at BAE Systems' shipyard at Govan in Glasgow.

At around 7 350 t displacement and over 150 m long, the Type 45s will be the biggest and most powerful air defence destroyers ever built for the Royal Navy. The current contract, with BAE Systems as the prime contractor, is for six ships with orders for further ships expected later in the decade. The ships will be built by BAE Systems on the Clyde and by Vosper Thornycroft at Portsmouth.

Equipped with the world-leading Principal Anti-Air Missile System (PAAMS), the Type 45 will provide a quantum leap in technology when it is introduced later in the decade.

Lord Bach said: "When HMS *Daring* enters service, she will set new standards in anti-air warfare. The Type 45 represents a 21st Century response to the most sophisticated threats that might face UK or allied ships in the years to come.

"When allied to the new aircraft carriers, our new attack submarines, and to a range of other new amphibious and support vessels currently under construction, this demonstrates our firm commitment to maintaining and enhancing our maritime capabilities. This programme of new warship construction is the largest in the country for years and is creating and sustaining large numbers of jobs at shipyards across the UK.

"The design phase of this project, which is now reaching its conclusion, has been a tremendous success for all involved. The Type 45 moves into production with a level of design maturity that far exceeds what has been possible on previous warship programmes. While building a warship remains an extremely complex business, the progress made on design will bring real benefits during the construction process." The cost of the first six ships is expected to be about £4.3 billion (about $A11.3 billion) and their construction is expected to sustain over 2 000 jobs on the Clyde and around 650 at Vosper Thornycroft in Portsmouth. In addition, many other UK companies are benefiting from work on the programme, including over 30 who are sub-contracted to the prime contractor. The in-service date for HMS *Daring* is 2007.

Austal Ship for Fred. Olsen SA

Austal Ships and leading European ferry operator Fred. Olsen SA have confirmed that the Canary Islands-based company is the owner of the 66 m high-speed vehicle-passenger catamaran (Hull 196) contracted in December 2002 and currently under construction at Austal's shipyard in Western Australia.

Austal managing director, Mr Bob McKinnon, said establishing a business relationship with such a high profile and highly professional organization was a coup for the company and enhanced Austal's reputation as a leader in the world ferry market.

To be named *Bocayna Express*, the Auto Express 66 will operate at a speed in excess of 30 kn and will have the capacity to carry 450 passengers and 69 cars or 110 lane-metres of trucks plus 37 cars. Construction of the all aluminium catamaran is progressing according to schedule for delivery in the second half of 2003.

RAN Refutes Submarine Allegations

On 26 February, Vice-Admiral Chris Ritchie RAN, Chief of Navy, rejected claims that there is doubt over the serviceability of two of Australia's Collins-class submarines.

Vice Admiral Ritchie said that while weld repairs are under way in two sections of HMAS *Collins*, Australia's foremost welding experts have confirmed that *Collins* will be fully capable of returning to full operational service once the repairs are complete.

"Other submarines have been examined by independent experts and they have confirmed that similar problems do not exist elsewhere in the fleet."

The nature and number of weld defects in the two sections of *Collins* were revealed during her current refit being undertaken by the ASC at Osborne, SA. An independent review of welds in other sections of *Collins* has confirmed that the problems are isolated to the two sections in HMAS *Collins*.

"While we had taken the precautionary measure of restricting the activities of the submarine fleet, these were lifted in December 2002 once this was confirmed.

"The burst hose incident in HMAS *Dechaineux* was totally unrelated to HMAS *Collins* weld repairs," Admiral Ritchie said.

"Navy has not played down the severity nor significance of the *Dechaineux* flooding incident. Navy's duty of care to its submariners was a major consideration in deciding to keep submarines alongside pending technical and safety investigations and minor modifications to pipe work.

"The safeguards and emergency operating procedures in all our submarines are extremely stringent, and cover many worst-case contingencies. These worked well in the Dechaineux case. The boat surfaced quickly, in well under five minutes, and the emergency systems had operated as designed."

Four submarines including *Dechaineux* are in the water, capable of going to sea. Two are in refit.

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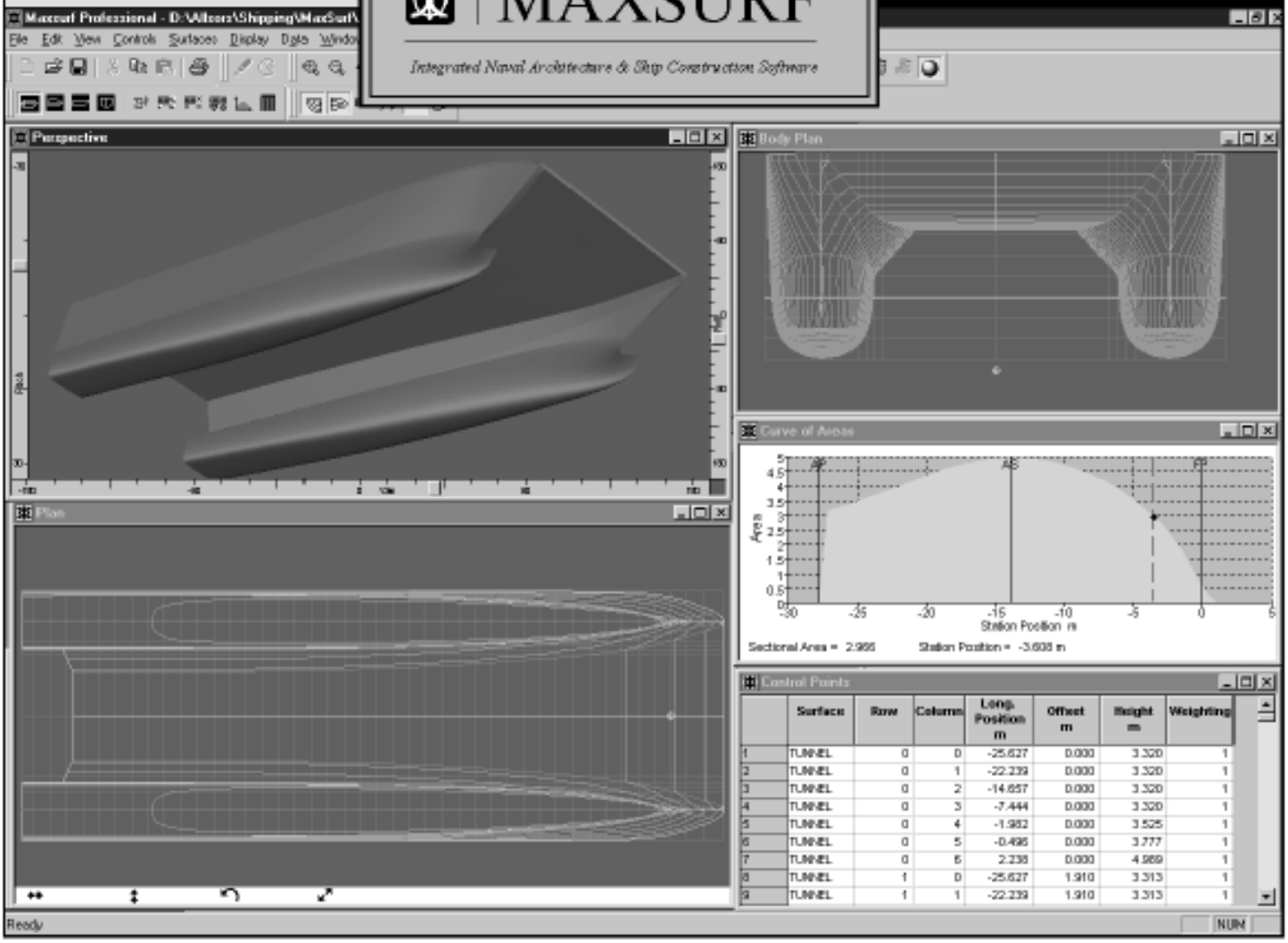


Tenix to enter Large Luxury Yacht Market

Tenix announced on 7 March that they have decided to enter the luxury yacht market, focussing on steel hulls for the large end of the market.

Tenix Shipbuilding New Zealand will be responsible for developing the business, under the guidance of experienced NZ industry leader Mr Dennis Maconaghie.

Tenix Defence Chief Executive Officer, Robert Salteri, announced the move at a function at the company's Whangarei shipyard.

"Tenix has developed strong alliances with suppliers and subcontractors, and forged a strong and highly expert team during the 15-year programme building the ten Anzac frigates, which has resulted in direct financial benefits to New Zealand industry of more than $NZ800 million," Mr Salteri said.

"The ANZAC Ship Project saw most of the frigate superstructure modules built at Whangarei, which has developed into a world-class ship construction facility," he added.

"Our research of the large yacht market has identified a number of niches which fit well with our capabilities and where there is increasing demand.

"We chose Whangarei as the base for our entry into this market because New Zealand has a growing reputation for building world-class high-quality large yachts.

"Building large yachts, especially motor yachts, has much in common with what we already do in Whangarei.

"We already have world-class skills in structures and systems as well as project management in Whangarei.

"We can draw on these skills and our relationships with suppliers and subcontractors to deliver high quality product," Mr Salteri said.

The Tenix facility in Whangarei, New Zealand
(Tenix photograph)

Incat Ship Sold to European Customer

Incat Australia announced on 23 March that a contract has been exchanged for the sale of its 98 m catamaran, hull 058, to a well-established European customer. The purchaser is a long-term Incat customer, and intends 058 to join its two existing Incat vessels in operation for the northern European summer. The ship was expected to depart Hobart for Europe in late April.

The Evolution 10b design of hull 058 delivers proven technology in a vessel capable of carrying a mix of passengers and freight at speeds over 40 knots. The operator will have the flexibility to configure the wave-piercing catamaran to suit traffic fluctuations whilst maximising revenue. Deployed in a high-volume tourist mode, the operator can opt for the maximum 267-car capacity by utilising the optional mezzanine vehicle decks. To maximise flexibility during shoulder seasons or to provide a dedicated freight service, the mezzanine decks can be easily lifted to allow a high concentration of heavy highway vehicles, 24 road freight trailers with 85 cars.

The sale will provide funds to repay the existing Tasmanian State Government loan. On completion of the sale the loan will be repaid in full with interest.

The Incat group has acknowledged with appreciation the support shown by the Tasmanian Government, and their confidence in Incat's shipbuilding enterprises. Chairman of the Incat Group, Robert Clifford said "The loan assisted the company to retain our core workforce through a difficult period. We now look forward to a strong and long future".

The remaining funds received from the sale will go towards the completion of the 98 m high-speed craft, hull number 061, for the United States Navy, delivery of which is expected in July 2003.

Incat ship 058 *Millenium Dos* prior to delivery
(Photo by Justin Merrigan, courtesy Incat)

Superyachts in Newcastle

ADI Limited's Newcastle facility is currently refitting three Dutch-built superyachts as it awaits the Commonwealth Government's decision on the Royal Australian Navy's replacement patrol boat contract. ADI is one of three bidders for the patrol boat contract with a decision expected in the next few months.

The three superyacht refits are providing work for 55 people including contractors and are making use of some of the capabilities established at the facility for the recently-completed Huon-class minehunter project.

ADI's Newcastle facility is also producing six watercraft for the Royal Australian Navy and providing in-service support for the Huon-class minehunters.

Williamstown Launching

HMAS *Toowomba*, the ninth Anzac-class frigate to be laid down was launched on 16 May 2003. *Toowomba's* launching

displacement of 2058 t was approximately 74% of its final lightship weight. *Toowomba* was launched by Ms Judith Blight, the daughter of the late Howard Goodwin. Howard Goodwin was the last Commanding Officer of the first HMAS *Toowomba*, a Bathurst-class minesweeper that served in World War II.

Final-year students from AMC and UNSW were again given the opportunity to learn about the launch methodology prior to the launch and to view the launch.

Parramatta, the seventh Anzac-class frigate and the fifth Australian ship, is scheduled to be delivered to the Department of Defence at the end of June 2003.

Stricter Controls of Ship Effluent

The Commonwealth Government is strengthening measures aimed at protecting the marine environment from the disposal of effluent from ships.

Maritime legislation is being amended to implement controls over ships' waste disposal. These controls, which come into force internationally on 27 September 2003, will be introduced under Annex IV of the International Convention for the Prevention of Pollution from Ships (MARPOL).

The regulation of effluent discharge from vessels is one of the few areas of pollution from ships where there were no enforceable international standards.

The original MARPOL Convention in 1973 included these regulations but, until last year, there was insufficient international support to bring them into effect.

These days, some of the larger ships have the capacity to generate a significant amount of waste which, if discharged untreated into the environment, can harm Australia's unique marine life, particularly in sensitive areas such as the Great Barrier Reef.

Australia, as a signatory to MARPOL, has been working with the international community to bring into effect much tougher standards for the disposal of waste by ships on international voyages.

The Maritime Legislation Amendment (Prevention of Pollution from Ships) Bill 2003 will protect the marine environment by proclaiming Australian legislation implementing international standards for effluent disposal. This bill will update existing Australian legislation to reflect changes to Annex IV. The Annex will apply to international ships of 400 gross tonnes and over, or those certified to carry 15 or more persons. The Bill sets out the condition in which a ship is to be maintained to ensure that it does not present a threat to the marine environment. It also updates the provision specifying the distance from the nearest land that treated effluent can be released.

The existing penalties for reckless or negligent discharge of sewage are fines of up to 2000 penalty units ($220 000) for an individual and $1.1 million for a corporation.

Marine Anti-Fouling Paints

Details of an industry-government plan to phase out the use of tributyltin-based anti-fouling paints were announced in April. The plan — which will see tributyltin (TBT) paints phased-out by 31 July 2003 — was developed by Australian paint manufacturers and government agencies, including the Departments of Agriculture, Fisheries and Forestry, the Environment and Heritage (through Environment Australia) and Transport and Regional Services, the Australian Maritime Safety Authority, and the Australian Pesticides and Veterinary Medicines Authority (APVMA).

Scientific studies have shown that TBT, and other organotin compounds used as biocides in anti-fouling systems, adversely affect the marine environment by being highly toxic to shellfish, such as mussels, oysters and sea snails. Alternatives to harmful TBT-based antifouling paints are available.

The Government commended what it saw as an initiative of paint manufacturers in voluntarily seeking cancellation of registrations for TBT marine paints in a move to protect Australia's marine environment. Phase-out arrangements have been agreed between industry and government agencies to continue to allow supply, possession and use of TBT-based marine paints up to 31 July.

The phase-out period is designed to use up existing stocks and avoid the potential for subsequent adverse effects arising from long-term storage or inappropriate means of disposal.

The deregistration and phase-out of TBT products for marine use brought Australia in line with the *International Convention on the Control of Harmful Anti-fouling Systems on Ships 2001*. The Convention is designed to protect the marine environment and human health from the adverse effects of organotin anti-fouling systems on ships.

Australia made a significant contribution to the development of the Convention and is leading international efforts to test and introduce less harmful and effective alternatives to the harmful tin-based paints used throughout the world. Planning and consultation is now underway with a view to Australia ratifying the Convention and introducing new domestic legislation consistent with Australia's Oceans Policy.

Tahitian Order for Austal

On 21 March Western Australian shipbuilder Austal Ships announced that it had signed a contract with leading Tahitian ferry operator Aremiti Cruise.

The contract for the 56 m high-speed ferry will be the fourth vessel in the Aremiti fleet and brings the already solid Austal group order book to 20 vessels, including four vehicle-passenger ferries.

Due for delivery in January 2004, the new aluminium catamaran has capacity for 700 passengers and 30 cars and will provide transportation for both locals and tourists between the Tahitian islands of Papeete, Morea and Bora Bora. Fitted with ride control and powered by four MTU diesels, the Auto Express 56 will be capable of a service speed of 35 knots.

Over 500 passengers can be accommodated on the upper deck in a mixture of internal and external areas, and another 70 passengers can travel on the open bridge deck area. Cars will be carried aft on the main deck, which also has internal cabin seats for 122 passengers.

Specifically designed to meet the requirements of the Aremiti fleet, the vessel has both aft and side vehicle loading, to suit existing shore-side docking infrastructure in Tahiti.

Austal Managing Director, Mr Bob McKinnon said the interest in the medium-sized vehicle- passenger catamaran market had been encouraging in recent months.

Principal Particulars

Length OA	56.00 m
Length WL	49.80 m
Beam	14.00 m
Hull depth moulded	5.00 m
Hull draft	1.90 m
Passengers	700
Crew	10
Vehicles	30 cars
Maximum axle load	1.5 t
Deadweight (max)	117 t
Main engines	Four MTU 16V 4000 M70
Gearboxes	Four Reintjes/ZF
Waterjets	Four Kamewa 71 SII
Speed	35 kn (90% MCR, 95 t dwt)
Classification	Germanischer Lloyd

Queensland Industry News

There has been a significant turnaround in the shipbuilding/ boatbuilding industry in the north in recent months, with most builders busy once again. NQEA Australia Pty Ltd have secured the following three contracts. They are to complete a 43 m aluminium luxury motor yacht which had been built to an advanced stage by Australian Motor Yachts and was towed on a barge from South East Queensland to Cairns. They are also to build in aluminium a 35 m luxury motor yacht which was designed by G.A. Glanville and Co. to Lloyd's Registers Special Service Craft classification. A third order is for a 63 m steel monohull passenger ship for Coral Princess Cruises. This vessel is being built to ABS Classification and to full SOLAS standards and will be capable of carrying 78 passengers. Delivery is scheduled for July 2004.

G.A. Glanville and Co. have recently completed the design and construction support for the Birdon Marine 24 m export cutter-suction dredge They are also involved in partnering Birdon Marine for the Australian Army design-and-build tender for supply of 24 bridging erection boats.

Cairns Custom Craft is constructing a 24 m aluminium dive boat as well as numerous other smaller vessels.

In the Brisbane Region, the Brisbane Marine Industry Park is now serviced by a new 300 t travelift in addition to the existing 65 t travelift. Vessels with a beam of up to 13 m can now be lifted. The Brisbane Marine Industry Park covers an area of 30 ha on the Brisbane River, 10 minutes from the Port of Brisbane at Hemmant. Existing tenants include Brisbane Shipworks, and other builders and refit and repair specialists. Shed and hardstand areas from 2000 to 20 000 m^2 are available for tenants. For more details visit www.brisbanemarine.com.au.

Other activities in the Brisbane Region include the completion by Aluminium Marine of a 24 m passenger ferry for operation on Moreton Bay. This vessel was designed by Clubb Drafting Service and has a speed of 21 kn and can carry 134 seated passengers. Work has also started on a new design of a 22 m passenger ferry designed by Stephen & Gravlev Pty Ltd.

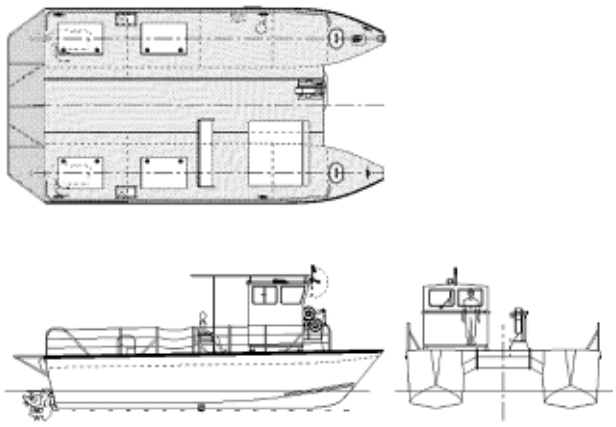
Brisbane Ship Constructions has delivered a 20 m Patrol Boat for the Department of Primary Industries and work has started on three 30 m river passenger ferries for export. These are high-speed and low-wash ferries designed in-house.

New Wave Catamarans has already delivered a second 24 m 190 passenger ferry for operation on Sydney Harbour, and a 17 m whale-watching catamaran and a 12 m catamaran passenger ferry for Sydney Harbour are under construction. Both of these vessels have been designed in-house.

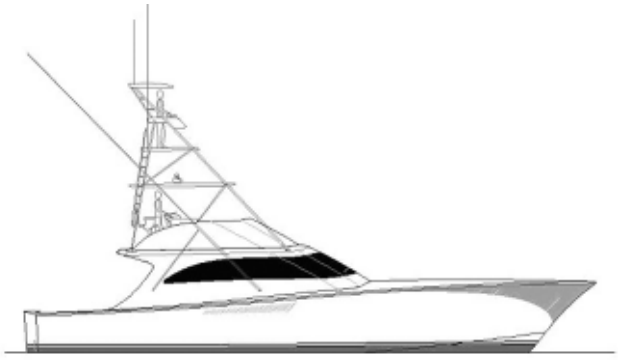
South Pacific Marine is busy building two 47 m car ferries. These vessels were designed by Sea Transport Solutions and have steel hulls and aluminium superstructures. Also under construction at South Pacific Marine is a 14 m fisheries research catamaran designed by Stanyon Marine for the Department of Primary Industries.

Southern Hemisphere Shipyards are building three 16 m oil-rig crew boats for Indonesia. These boats are jet powered with a top speed of over 30 kn and were designed by Crowther Multihulls. Also just commenced are two 12 m catamaran vessels designed by Stephen & Gravlev Pty Ltd.

Norman Wright & Sons will be launching a 17.7 m game fishing boat at the end of the month (see details below) and are building a 15.13 m long-range motor cruiser . They are building a 11.25 m catamaran workboat, which can be transported in three containers. They are also refitting the sailing yacht *Hurrica*, a Camper & Nicholson design built in 1924. The yacht has been stripped right back to the hull and frames and is being completely restored.



General arrangement of 11.25 m catamaran workboat
(Image courtesy Norman R. Wright & Sons)



Profile of 17.7 m game-fishing boat
(Image courtesy Norman R. Wright & Sons)

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If you're a commercial or military mariner you can't afford to miss AUSMARINE EAST 2003

In the Gold Coast region many local boat builders are extremely busy at the moment in the lead up to the Sanctuary Cove Boat Show to be held at the end of May. Local manufacturers to launch new boats at the show include Sunrunner Sport Cruisers' new 4700; Riviera with the new 12.7 m flybridge cruiser and Mustang Cruiser's 4200 sports cruiser. The Sea Transport Solutions-designed 47 m passenger/vehicle ferry was recently delivered to the Bahamas. This vessel was delivered under its own steam, averaging better-than-expected speeds in difficult sea states on the four-week voyage

Other projects of interest include the 13.9 m game boat for Southern Cross Yachts that Azzura Yachts has recently commissioned to build and the $4 million refit of the 24.2 m steel vessel *Gissie M* at the Gold Coast City Marina.

Brian Robson

Long-range Cruiser from Norman Wright

Norman R. Wright & Sons began construction in April of a long-range cruiser for an Australian client, a development of *Bandanna* and *Quandamooka*. She will be designed and built to cruise the oceans of the world. The vessel's particulars are as follows:

Length overall	15.13 m
Hull length moulded	14.31 m
Lenght waterline	12.96 m
Beam moulded	4.65 m
Beam maximum	4.85 m
Draught maximum	1.7 m
Height to top of mast	5.5 m
Displacement (lightship)	22 t
Displacement (full load)	27 t
Accommodation	
Owners	2 persons
Guests	2 persons
Main Engine	One Perkins Sabre M185C, 138 kW @ 2 100 rpm
Gearbox	One ZF 80 A
Auxiliary	One Diecon VT28 Kubota, 21 kW @ 3 000rpm
Fuel	4 500 L
Fresh Water	1 000 L
Bow thruster	One SP125 Side-Power 24V Electric
Stern thruster	One SP125 Side-Power 24V Electric
Stabilisers	Naiad 174 system with 0.55 m^2 fins

The hull has already been tank tested at the Australian Maritime College in Launceston. It is of full displacement form and of carvel section throughout the length. Performance was impressive with and without a bulb. The bulb resulted in less resistance and will provide better seakeeping so it has been decided to fit one to the hull.

Preliminary performance predictions from tank testing results are as follows:

Vessel condition	Half load with bulb
Engine Speed	1 400 rpm
Vessel Speed:	7.8 kn
Range	2 330 nm with 10% reserve including generator
Vessel condition	Half load with bulb
Engine Speed	1 600 rpm
Vessel Speed	8.7 kn
Range	1 880 nm with 10% reserve including generator
Vessel condition	Half load with bulb
Engine Speed	1 800 rpm
Vessel Speed	9.2 kn
Range	1 500 nm with 10% reserve including generator
Vessel condition	Half load with bulb
Engine Speed	2 000 rpm
Vessel Speed	9.5 knots
Range	1 150 nm with 10% reserve including generator
Vessel condition	Half load with bulb
Engine Speed	2 100 rpm
Vessel Speed	9.7 kn
Range:	1 020 nm with 10% reserve including generator

The vessel will feature a cherry-wood interior with painted walls in the accommodation areas. The floors will be either carpet or teak and holly. The aft deck will be finished in teak. This will be the only external timber work on the vessel to minimise maintenance.

The aim was to design a vessel with the helm as far aft as possible to allow for the most comfortable ride whilst at sea. Likewise, the vertical height was kept to a minimum so the centre of gravity was as low as possible, maximising the stability of the vessel and ride comfort.

The saloon is full width which will allow for maximum comfort in an area where the owner and guests will spend most of their time whilst at anchor and at sea.

Construction of the vessel will be timber/fibreglass composite.

Accommodation Deck

The accommodation deck is arranged into five watertight compartments. Watertight bulkheads are located at the aft engine room bulkhead, forward engine room bulkhead, forward cabin aft bulkhead and the stepped collision bulkhead. Bulkheads are watertight up to the foredeck forward and the saloon sole aft.

The lazarette houses the rudder stock, tiller and steering ram. The stern thruster motor is also accessed from this area. Outboard in the forward corners of the lazarette will be the water-lift mufflers for the main engine on one side and the generator/wing engine on the other side. The exhaust pipes will exit in the corners of the transom where it meets the hull sides.

The engine room will be accessed from the two deck hatches in the saloon sole and the watertight door located in the forward engine room bulkhead. The door will be fitted with a double-glazed inspection port.

The engine room deckhead and forward and aft bulkheads will be insulated against fire and sound. The main engine will be located on the centreline in the forward section of the engine room. The generator/wing engine will be located aft in the engine room close to the aft bulkhead. Outboard in

the engine room are the integral fuel tanks. These will use the hull and deckhead as their top and bottom faces. The aft engine room bulkhead will form the aft face. The forward face will stop short of the forward engine room bulkhead to allow room for fitting of the stabiliser actuators.

Shelves will be fitted above the stabiliser actuators forward of the front face of the fuel tanks to allow for the fitting of air conditioning condensers, pumps, etc. The area between the engine beds and the fuel tank inboard face will be fitted with the batteries for house systems. The engine and generator start batteries will be located above the waterline on the top shelves above the stabiliser actuators.

In the accommodation the guest cabin is located to port. The bathroom is on the starboard side and is fitted with a washing machine/dryer recessed in the aft bulkhead with exposed front face, toilet against the aft bulkhead and enclosed shower forward.

The owner's cabin is further forward. The bed is approximately queen size and located against the forward collision bulkhead. A flat-screen TV will be fitted to the starboard side of the aft cabin bulkhead.

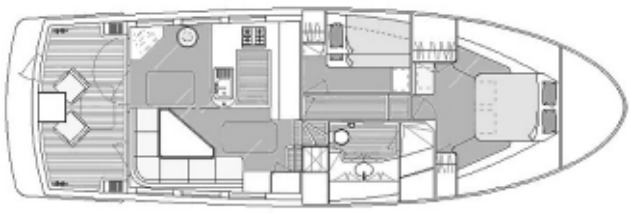
Main Deck

Located aft on the main deck is the swim platform which will extend aft from the transom by approximately 600 mm. This overhang protects the stern thruster

The cockpit will feature 3/4 depth sides with a stainless rail and the deck will be raw teak with black seams.

The aft saloon bulkhead will feature a built-in freezer. Inside the saloon, an entertainment unit will include TV, DVD player, AM/FM radio/CD player and storage. The saloon will have an L-shaped lounge with a table that can be lowered to form a bed. A U-shaped galley will be located in the forward port corner of the saloon.

Profile of 15 m long-range cruiser
(Image courtesy Norman R. Wright & Sons)



Accommodation deck layout
(Image courtesy Norman R. Wright & Sons)

Cruise Yachts for Tahiti

Almost a year after the contract was signed, progress was well advanced at Austal Ships in February on the pair of cruise yachts ordered by Bora Bora Cruises of Tahiti.

Tu Moana and *Tia Moana* (meaning 'strong on the ocean' and 'sure and stable on the ocean') each provides 74 passenger berths in 37 outside cabins. The two cruise yachts will feature a high degree of comfort and luxury with a modern design inspired by Tahitian traditional art and incorporating the European touch of Tillberg Designs.

Onboard features include a restaurant and galley catering for all passengers in a single sitting, gymnasium, library, indoor and outdoor lounges, two jacuzzis, an expansive sun deck and a host of water sports equipment, with easy access to the water.

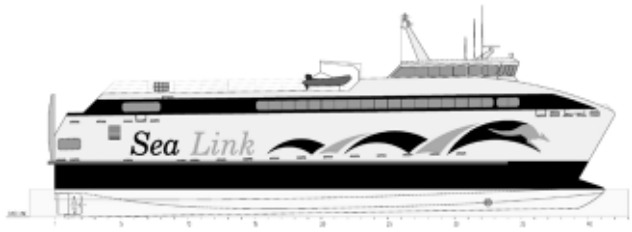
The 69 m monohulls were launched before Christmas and were planned to undergo final sea trials before leaving Western Australia in late March or early April in time to commence operations in mid-June. They will operate seven-day/six night cruises from Bora Bora, with extended cruising within the lagoons of leeward sister islands of Tahaa, Raiatea and Huahine.

Tia Moana and Tu Moana fitting out
(Photo courtesy Austal Ships)

Austal to build Kangaroo Island Ship

Austal Ships has signed a contract for a 49.9 m catamaran with established operator Kangaroo Island SeaLink. Signifying Austal's first sale of a vehicle-passenger ferry to its local market, the new contract increased the group's order book to 19 vessels.

Austal's ability to meet the necessity for a short build time to enable delivery in November 2003, and flexibility in adopting a client-specified external design were key factors in securing the order. The vessel's design is by AMD Marine Consulting of Sydney. Details of the new ship were given in the last edition of *The ANA* (page 12).



Profile of the new 49.9 m vehicle-passenger ferry for Kangaroo Island Sealink
(Image courtesy Austal Ships)

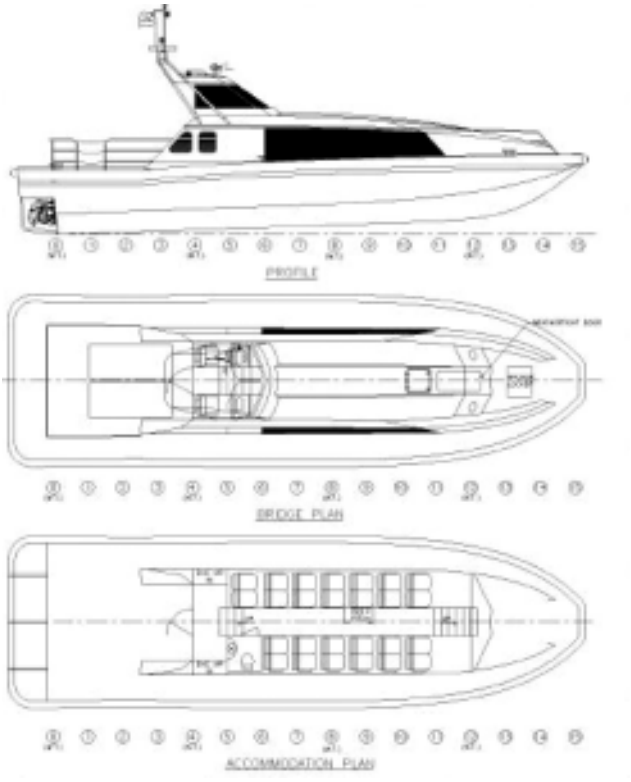
New Design

North West Bay Ships have secured an order for a 34 m sightseeing/dinner cruise vessel for Blue Line Cruises for operation on Sydney Harbour. The vessel is to be delivered in November 2003 and, accordingly, construction has already started, with approximately 2/3 of the hull under fabrication within three weeks of contract signing. The vessel is designed to the USL Code for 275 passengers, with 3 crew and 22 restaurant staff.

New Construction

Southern Hemisphere Ship Yards in Brisbane have recently launched three 16 m aluminium monohull crewboats, *Sarah Splash*, *Fredrick Waves* and *Indriani Swift*, to a design by Crowther Design in Sydney. The vessels are to operate from Balikpapan in East Kalimantan, Indonesia, to offshore Unocal Oil Rigs. Principal particulars are as follows:

Length OA	16.60 m
Length WL	13.17 m
Beam	3.50 m (average at chine)
Draft (hull)	1.00 m
Passengers	26 (main deck)
Crew	2 (wheelhouse)
Fuel capacity	1600 L
Fresh water capacity	350 L
Cargo	0.5 t
Deadweight	4.3 t
Engines	2 x Cat 3406E 447 kW @ 2 100 rpm
Gearbox	2 x Twin Disc MG5114A 1.03:1
Waterjet	Hamilton HJ 362
Survey	ABS



General Arrangement Drawing of Crowther Design's Crewboats
(Drawing courtesy Crowther Design)

Crowther Design's crewboats showing their paces
(Photo courtesy Crowther Design)

Lulalu has recently been launched by Proboat, Brazil, to a design by Crowther Designs. This is a 14 m catamaran sportsfisher of composite construction, with a deep-vee hull shape. The hull has been designed to suit a range of engines and propulsion via propellers or jet units. Indicative speeds are 25 kn with 2 x 224 kW, and 35 kn with 2 x 448 kW. Principal particulars are as follows:

Length OA	13.80 m
Beam	5.53 m
Depth	1.90 m
Draft (hull)	0.55 m
Passengers	4 (sleeping)
Fuel capacity	1800 L
Fresh water capacity	800 L

The photograph shows *Lulalu* on trials, and two more vessels are currently under construction at Proboat.

Crowther Design's *Lulalu*
(Photo courtesy Crowther Design)

Other vessels designed by Crowther Design and currently under construction include the following:

- An aluminium catamaran tourist ferry of length OA 32 m, beam 9.0 m, draft 1.20 m to carry 220 passengers, powered by two MTU16V2000M90 1044 kW@2100 rpm engines with propellers under construction at Richardson Devine Marine in Hobart.
- An aluminium cruise vessel of length 22 m, beam 7.75 m, draft 1.10 m to carry 150 passengers, powered by two Cummins QSL11 399 kW@2300rpm engines with propellers also under construction at Richardson Devine Marine in Hobart.
- An aluminium catamaran whale-watcher of length 37 m, beam 10.97 m, draft 1.37 m to carry 444 passengers, powered by four Cummins KTA-50 M2

1342 kW@1900 rpm engines with four Hamilton HJ651 jets under construction at Blount Barker.

- An aluminium catamaran passenger ferry of length 44 m, beam 10.36 m, draft 1.14 m to carry 310 passengers, powered by four Cummins KTA-50 M2 1342 kW@1900 rpm engines with four Hamilton HJ651 jets under construction at Gulf Craft.
- An aluminium catamaran harbour ferry of length 20 m, beam 7.32 m, draft 1.02 m to carry 149 passengers, powered by two Caterpillar 3412D 820 kW@2300 rpm engines with propellers under construction at Merryfield and Roberts.
- A composite FRP motor yacht of length 28 m, beam 7.50 m, draft 1.20 m with four cabins, powered by tow MTU16VM90 1417 kW@2300 rpm engines with KaMeWa A40 jets under construction at Proboat, Brazil.
- Two aluminium catamaran passenger ferries of length 26 m, beam 8.50 m, draft 1.10 m to carry 222 passengers, powered by two Caterpillar 3412E 895 kW@2300 rpm engines with propellers under construction at Cheoy Lee.
- An composite FRP catamaran commuter ferry of length 28 m, beam 8.10 m, draft 1.20 m to carry 600 passengers, powered by two Cummins KTA-38 1119 kW@2050 rpm engines with propellers under construction at Cheoy Lee.
- An aluminium catamaran patrol boat of length 20 m, beam 7.46 m, draft 0.90 m, powered by two 485 kW engines with propellers under construction at Kvichak.
- An aluminium catamaran tourist ferry of length 20 m, beam 7.46 m, draft 0.90 m to carry 149 passengers, powered by two 522 kW engines with propellers under construction at Kvichak.

Around and About

The autumn months have been busy for cruise ships visiting Sydney, as usual. Visitors to the port in February included *Pacific Princess, Seven Seas Mariner, Prinsendam, Saga Rose, Oriana* and *Regal Princess*. March saw *Regal Princess* and *Pacific Princess* again, along with *Pacific Sky, The World* (for the first time), *Maxim Gorkiy, Amsterdam* and *Delphin*. April saw things slowing down, with *Crystal Symphony, Pacific Princess, Pacific Sky* and *SuperStar Leo*; the latter two are the only scheduled regulars for the coming winter months.

Star Cruises' *SuperStar Leo*, with a length overall of 269 m and gross tonnage of 75 338, is the largest cruise vessel to visit Sydney, and arrived in Sydney for the first time on 30 April. She has been repositioned here from Hong Kong, due to the prevalence of SARS in south-east Asia. The luxury liner was welcomed with a spectacular water display by Sydney Ports Corporation's emergency response fire tug, *Shirley Smith*, as she made her way past Bradley's Head at 0740. She is, of course, not the largest passenger vessel to visit Sydney. *Queen Elizabeth*, with a length overall of 314 m and gross tonnage of 83 673, and her little sister *Queen Mary*, with a length overall of 311 m and gross tonnage of 81 237, probably take the cake.

Also gracing the Overseas Passenger Terminal at Circular Quay for a couple of days in mid March was *Amerigo Vespucci*, the Italian three-masted sail training barquentine of length OA 101 m, beam 15.6 m, and summer draft 7.5 m. Berthed astern of her for a couple of simultaneous days was *Shirase*, the Japanese ice-breaking polar research vessel of length OA 134 m, beam 28 m and summer draft 10.7 m.

SuperStar Leo in Darling Harbour, Sydney
(Photograph John Jeremy)

RMS *Queen Mary* at anchor in Athol Bay during her conversion to a troop transport in 1940
(Photo John Jeremy Collection)

RMS *Queen Elizabeth* in Sydney Harbour
(Photo John Jeremy Collection)

The Italian sail training ship *Amerigo Vespuci* in Sydney during her recent visit
(Photograph John Jeremy)

Work is proceeding on the restoration of *John Oxley*, the only remaining coastal steamship left in Australian waters, at the Australian Heritage Fleet (formerly the Sydney Heritage Fleet) in Rozelle Bay. All structure in the bottom of the main hold has been replaced and riveted together. John Oxley's service life involved hauling buoys and moorings from the sea and stowing them in the main hold. Salt water and steel are never a good combination and the main hold was the worst part. Full credit to the team of volunteers under team leader Barry Jones, who carried out work estimated at $140 000 for a little over $14 000 in steel, rivets and industrial gases! Work has now commenced in the forward hold. Repairs to the lower part of the bulkhead are almost complete, and the first frames are being removed for replication in the workshop. The restoration project has just received an anonymous donation of $115 000, which has already been earmarked for the forward hold structure and related safety requirements. This has provided a great boost to the project and has been a source of excitement for the volunteer workforce. Further details may be found on the website www.australianheritagefleet.com.au/jorest/jolatest.html.

America's Cup Presentation

Ian Burns of Murray, Burns and Dovell, gave a presentation on *America's Cup 2003 — Billionaires Only Need Apply* to a meeting of the Sydney Panel of the Centre for Engineering Learning and Management of the IEAust attended by a packed house of one hundred and two on 8 April at the Kirribilli Ex-services Club, Milsons Point. Ian has been involved in five America's Cup campaigns, having been navigator for Australia's 12 metre *Kookaburra*, the yacht which eliminated the *Australia II* syndicate in the 1987 America's Cup selection process. He joined the *Spirit of Australia* team in 1992, *One Australia* in 1995 and *Abracadabra 2000* in a navigation and design capacity. He has just competed as navigator on *OracleBMW* in the 2003challenge in New Zealand, as well as providing design liaison, and performance comparison and enhancement. Career highlights also include winning the 1998 Maxi World Yacht Race aboard *Sayonara*, five Admiral's Cup campaigns, seven Sydney–Hobart races, two Newport–Bermuda races, and much other blue-water experience.

Ian began his presentation by saying that Larry Ellison, when cruising down to the line to win the Newport–Bermuda race in June 2000, said "We should have a crack at the America's Cup!" The crew thought that he was on a high, and joking. But by October that year they had purchased two vessels to begin practice, and they were on the way. Ultimately, they were beaten by *Alinghi*, but they could have beaten *Team New Zealand*.

He then traced the development of the Cup rules, from open class to the Old Rule, the J class, the 12-metre class and, now, the IACC (International America's Cup Class). The IACC uses a VPP (velocity prediction program) to balance length, displacement and sail area, and the interesting thing is that all players end up in the same corner of the playing field. All are built of carbon fibre on a Nomex (honeycomb) core, about 24 m in length, 25 t displacement, 34 m to the tip of the carbon-fibre mast, 300 m^2 sail area upwind and 450 m^2 downwind. However, each iteration of the IACC Rule seems to be bringing these yachts closer to the 12 metres, which some regard as the pinnacle of yacht racing.

Under the rules, the current defender writes the protocol for the next event, regarding rules of engagement, nationality of crew, designers, etc. For example, New Zealand in their previous defence, wrote the protocol for 2003 to exclude cigarette advertising (on which one of the US syndicates had previously depended). However, Switzerland has now virtually eliminated the nationality requirements for the 2007 challenge, for obvious reasons.

An interesting aspect was that the 2003 rules stated that the vessels "must be assembled in their country of origin". *Alinghi* was constructed in Switzerland but, prior to arriving in New Zealand, the keel had never been mated with the hull! There was a protest on the grounds that she had therefore not been assembled in her country of origin, but it was not upheld.

Logistics is a big deal. Firstly, all those associated with the *OracleBMW* challenge had to have US residency established, which meant housing, cars, driver's licences, etc. There were 140 in the team, and these all then had to be housed and fed while in New Zealand. The *OracleBMW* team trained in *Ventura* in New Zealand for six months before the start of the Louis Vuitton Cup, so the taxi-meter for accommodation ticked over fast. Their dock in Auckland Harbour had sheds for two vessels, two travelifts (to save time when launching both yachts together) design office, dining facilities, etc.

One of the basic decisions which needs to be made very early is whether the design will be revolutionary (completely

different to anything previous) or evolutionary (improving on what worked before). In general, yachts are looking for a one second per mile improvement, or a 12 m advantage in a 10 min test alongside each other. *OracleBMW* was an evolutionary yacht, but the UK yacht had a tandem keel which, while this has been done before on other yachts, was revolutionary on an IACC yacht. *Team New Zealand* had a long, skinny bulb on the keel, which was revolutionary. An America's Cup yacht is complex, and the helmsman, crew, winches, sails, mast, hull, keel, drag (frictional, wavemaking and appendages) all contribute and must be balanced. The rules for 2003 did not allow anything from previous vessels to be used; either equipment or design information.

The "hula" or hull appendage used by *Team New Zealand* was also a revolutionary rule-bender to gain un-measured waterline length. However, the hull appendage could not touch the hull (it had to be 6 mm clear), and that gap provided additional drag, and the whole thing was of dubious benefit. Only two movable appendages are allowed, and conventional wisdom says that these should be the rudder and a trim tab on the aft end of the keel.

The rules state that the largest models which may be tank tested are 1/3 full size; any larger and the model is regarded as one of the two new vessels allowed to each team. Everyone therefore tests at 1/3 scale, irrespective of whether that is the best scale.

A typical sailing practice day starts at 0600 in the gym, doing weights and armwork for an hour-and-a-half, then down to the dock for breakfast, followed by a one-hour tow out to the sailing area, sailing till 1700, a tow back, and putting the yacht to bed in the shed (i.e. out of water and mostly under cover) before dark.

The average wind speed on the sailing course at Auckland was 15 kn. However, much of that is at low speeds, and much at high speeds; not much is at 15 kn.

Improvements of one second per mile are probably easier to obtain from the sail and rig than from the hull and appendages. In testing sails and rigs in the wind tunnel, you need very high speeds to get the Reynolds number correct. The *OracleBMW* team have built their own wind tunnel, which is successful, but suffers from scale effects as it can only test at 1/8 full size for IACC yachts. Carbon fibre sails are so stiff that there is no give, and all of the loads go straight into the rig, and it is common to break halyards after half an hour, for example. The mast is constrained by the rules in materials and moulding techniques, and all masts, except *Alinghi*'s, were made by one manufacturer. All use Nitronic (a high-strength stainless alloy) for rigging.

Team New Zealand used the "millennium rig" in which the mast stays pass through the mast from spreader tip to spreader tip, allowing lighter rigging and more control of the fore-and-aft bend in the mast. The failure was not due to the rig, *per se*, but due to the failure of an aluminium spreader tip, where other vessels were using titanium spreader tips.

In the spinnaker-pole department, *Team New Zealand* used a pole with a triangular cross section, *Prada*'s was square, and the others were circular. The triangular pole was an attempt to streamline while lying on the deck, and to ensure that when it hit the forestay it did so on the flat (and so cause less failures). *Alinghi* had her pole lying in a recess in the deck for streamlining.

The *OracleBMW* team had six weather boats and a trawler scattered around the course to sight the wind and weather and relay back to their weather mother ship and link to the yacht during practice. The rules state that at the five minute gun, all incoming communications must be severed; i.e. the yacht can send data, but may receive none during the race.

The first crossing after the start is always a big deal since, ninety percent of the time, the yacht ahead at the first crossing wins the race! This happened in Race 3, where *Team New Zealand* won the start, but *Alinghi* found a favourable wind shift soon after, crossed ahead, and won.

Most successful America's Cup teams have one person at the top with a vision of how he wants it to be, and everything flows from that. In a big company, the CEO does not often go onto the packing floor and tell the tradesman how to do his job, In an America's Cup team however, it is common for the CEO to go into the sail loft and ask why it is being sewn that way. The commitment by everyone is much greater in a Cup team than in a company.

The biggest problem faced by *Team New Zealand* was that Russell Cootes and Brad Butterworth were not given full control, and they left. The seconds-in-command were then catapulted into positions and, ultimately, they may not have had sufficient time in those positions.

There is lots of disrespect between sailors and designers. Sailors know how to sail, and little about the technology; designers know the technology but little about how to sail; and they don't communicate very well. In general, Australians and New Zealanders have a good track record of going out there themselves and getting the job done. The Americans, on the other hand, have a meeting, plan what to do, hire someone, and have them do it. The Anzacs have it done next day; the Americans have it done next week.

In summary, the America's Cup challenge in 2007 will be different to previous challenges, as there will be a new venue and a new set of protocols. It will be interesting, as some lessons have been learned, but the playing field has acquired a new tilt. It will be expensive, and only billionaires need apply, again.

Phil Helmore

Pacificats Sold for a Song

British Columbia's three mothballed Pacificat fast ferries were sold at auction on 24 March for $US13 million. Originally projected to cost $US210 million, the actual cost of the three Canadian-built aluminium hulled vessels was about $US450 million.The first two Pacificats were said to be plagued with mechanical and environmental problems and were withdrawn from service after months. The third ship was laid up on completion.Two vessels sold for $US4.5 million and one for $US4 million

The Pacificats were built to an Australian design, see *The ANA*, February 1999, pages 25-35.

The first of the Pacificats (Photo courtesy Incat Designs)

North West Bay Ships Delivery

North West Bay Ships has delivered a 39 m catamaran to Red Funnel Group UK for operation on the Southampton to Cowes route. Named *Red Jet 4*, the vessel was loaded onto the heavy-lift ship *Edmondgracht* in Hobart and transported via the Panama Canal to Southampton and is due to enter service in June.

NWBS won the tender against an international field of twelve respondents in May 2002, construction started in June and the vessel was launched in Hobart during February 2003.

NWBS reports that the vessel achieved the 35 knot contract speed when fully loaded at 80% power. At 100% power, the vessel exceeded contract speed by 3.1 knots, achieving 38.1 knots at full deadweight and 41.0 knots when lightly loaded.

In additional to speed, Red Funnel Group insisted on a low-wash contractual requirement of less than 400 mm, measured at 100 m from the trackline. The Australian Maritime College conducted independent wash measurements utilising advanced wave probes and radio telemetry gear. At full load displacement and 38 knots, the measured wash was 330 mm. At 41 knots lightly loaded, the measured wash was less than 280 mm.

An MDI adjustable interceptor is fitted at the transom of each hull, enabling the master to adjust the vessel's running trim for different loading conditions.

Passenger Saloon

Operating a 23-minute service on a half-hour schedule allows just 7 minutes to turn around 275 passengers. Accordingly, the main cabin is expressly designed to facilitate rapid passenger transfer. All passengers are accommodated on a single deck, with large access doors, on-board boarding ramp and generous aisles provided to reduce loading times. Large luggage racks are provided on entry, with additional luggage racks provided to cater for Cowes Week when crew bags and yacht spinnakers on the ferry are the norm.

Describing the interiors, NWBS says "We worked closely with Red Funnel to ensure that corporate branding was maintained throughout, right down to the specific fabric on the passenger seats to match the existing 3 vessel fleet."

The passenger cabin is supported on rubber mounts, minimising the transfer of noise and vibration. Noise levels in the passenger cabin at full power were 70 dB, and 62 dB in the wheelhouse.

Passenger Safety

Three LSA 128-person liferafts and a single RFD 65-person raft are installed on the upper deck. Egress from the cabin is through dual doors, port and starboard, and then via mini-slides down to the rafts. Two additional doors are provided at the forward quarter points, with single doors at the rear of the passenger cabin and in the aft wheelhouse bulkhead. Emergency windows are fitted port and starboard in the forward passenger cabin.

Wheelhouse

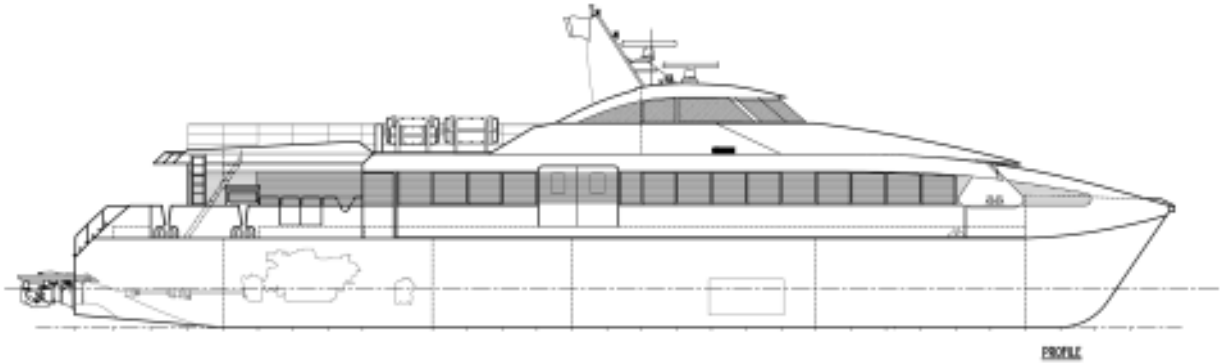
A full-width wheelhouse is installed on the upper deck, giving excellent visibility both forward and aft. The master's seat is offset to port to assist with berthing, while the mate's is on the vessel's centreline.

Principal Particulars

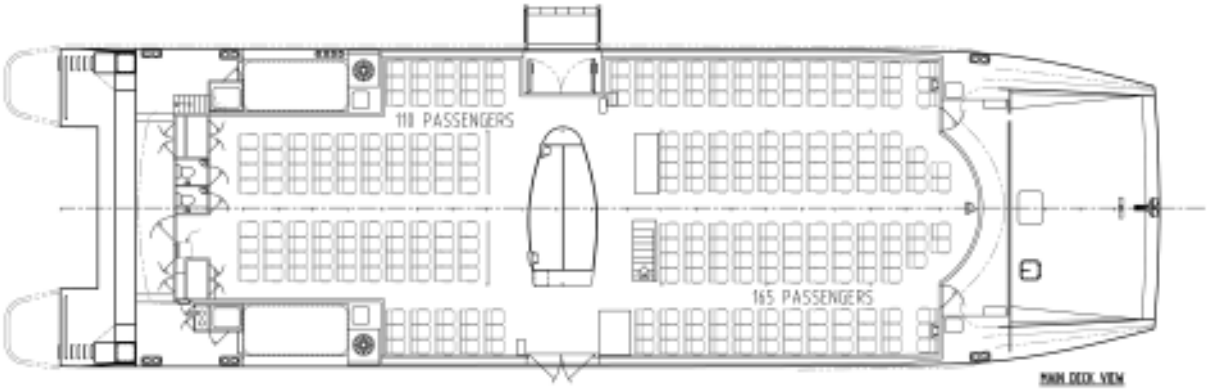
Length extreme	39.23 m
Length waterline	35.25 m
Beam moulded	10.82 m (excl. sponsons)
Depth	3.00 m
Draft	1.30 m
Deadweight	29.3 t
Total Fuel Oil	2 x 2 800 L
Fresh Water	1 x 500 L
Sullage	1 x 500 L
Lubricating oil	1 x 50 L
Passengers	275
Restaurant staff	22
Crew	3
Speed	
Full load	38.1 knots
Light	41.0 knots
Main engines	Two MTU 12V4000, 1740 kW at 2000 rpm
Aux Power	Two Perkins Sabre 4TGM, 62 kW at 1500 rpm
Waterjets	Two MJP 650 Composite Ducts
Classification	Det Norske Veritas +1A1 HSLC R4 passenger EO
Survey Authority	MCA, UK

Red Jet 4 Departing on Trials
(Photo courtesy North West Bay Ships)

Red Jet 4 alongside Heavy-lift Ship *Edmondgracht* in Hobart
(Photo courtesy North West Bay Ships)



Profile of NWBS's *Red Jet 4*
(Drawing courtesy North West Bay Ships)



Plan of NWBS's *Red Jet 4*
(Drawing courtesy North West Bay Ships)

The US Navy's new amphibious transport dock ship *San Antonio* (LPD 17) under construction at Northrop Grumman Ship Systems Avondale in New Orleans in February. *San Antonio* is scheduled for launching in July this year and should be commissioned in 2005.
(US Navy photograph)

No, That's Not What I Meant!
Or
Beware of Journalists and Complex Subjects!

At a doorstop interview on 26 February after the launch of *Defence Update 2003*, the Minister for Defence, Senator Robert Hill, was questioned by a journalist about recent reports of problems with the Collins-class submarines. This is how the interview proceeded. [*Emphasis added* — Ed.]

Senator Hill

Collins? *Collins* — I guess from my perspective from an exercise point of view, Collins [class] in this last year has performed superbly against the US nuclear submarines. And from an operational point of view this year they've also performed very well. So in terms of what we are wanting, in that way they're going well. But they are expensive in their ongoing difficulties and challenges. There's no secret in that and I understand it's always the case with a new type of submarine. There's been a recent incident in relation to a burst water hose. That hose was designed to far exceed the water pressures that it was under at the time. So DSTO is working on why it occurred and when they're confident of the answer to that it will be responded to. Similarly in the major refit of the first boat, *Collins*, certain welding issues were found in relation to the two sections of the boat that were imported. They are being repaired and the boat will return to the water and be an important part of the fleet.

Journalist

Are they under warranty, those welds, or does it cost taxpayers again and how much?

Senator Hill

Well, the issue of warranty, as you know is a highly complex one in the *Collins* because there's been changes in terms of the ownership of Kockums. There's been various agreements between ASC and Kockums and HDW and others over the year. And the cost issue in relation to fixing the welding problems is one that is currently unresolved and that we're still working on.

Journalist

How much is it?

Senator Hill

The full cost is still unsettled as well. But nothing in relation to submarines comes cheaply.

Journalist

So it's the Swedish welds that are dodgy and the Australian ones are all right?

Senator Hill

We haven't found the same problem in relation to the sections constructed in Australia.

Journalist

You found different ones?

Senator Hill

No. What do you mean?

Journalist

Well I'm not sure. You said you haven't found the same problem?

Senator Hill

The specific problem we haven't found, no.

Senator Hill went on to say that much was being learnt from the first refit of HMAS *Collins* that would be of considerable benefit for the conduct of later refits. [*With memories of the first refit of HMAS* Oxley *thirty years ago, I know just what he means* — Ed.]

An LCM8 landing craft from the Australian Army's 10th Force Support Battalion, 35th Water Transport Squadron alongside the US Army's Incat-built *Spearhead* in Kuwait. For two weeks the Australian crews of two LCM8s took advantage of the showers, laundry facilities and catering in *Spearhead* (US Army photograph)

At 0640 on 21 March HMAS *Anzac* commenced naval gunfire in direct support of the British-led Royal Marine Commando assault on the Al Faw Peninsular in Southern Iraq. The action on what has been called 'Five-inch Friday' was the first such RAN action for 31 years. *Anzac* was accompanied by HM Ships *Chatham*, *Richmond* and *Marlborough* during the action which continued for three days. *Anzac* approached to within 7 miles of the Iraqi-held territory and fired more than seventy 127 mm rounds in support of the Royal Marines

(RAN photograph)

HMAS *Kanimbla* escorting the Royal Fleet Auxiliary *Sir Galahad* on 30 March during the delivery of the first humanitarian aid to Iraq. *Sir Galahad* was bound for the Iraqi port of Umm Qasr which is the major port on the Khawr Abd Allah waterway and the port for most of Iraq's overseas trade.

(RAN Photograph)

Removal and Replacement of a Main Engine Tie Bolt

Jude Fernandes
ADI Limited, Garden Island

Tie Bolts

The tie bolts connect the frame box to the bedplate of a marine diesel engine, and are hydraulically tensioned with the use of jacks. They are normally available in one-piece units. However if the dismantling height above the engine is restricted, they can be made available in two parts as an option.

A Broken Bolt

I was the Chief Engineer on MT *Maersk Visual*, a 77 500 dwt product tanker with an engine-room complement of three engineers and a motorman, and a MAN B&W S70MCE main engine.

On completing a twelve-day voyage from Japan to the Persian Gulf, where the vessel was scheduled to load, routine main engine inspections were being carried out in accordance with a planned maintenance program. Tensioning of the tie bolts was part of the planned work, along with inspections and deflections. On this vessel the tie bolts were in two parts, the upper section being 2386 mm long and weighing 219 kg, and the lower section 6531 mm long and weighing 622 kg, with a diameter of 125 mm, and connected together by a sleeve nut (see the accompanying diagram).

When checking the tie bolts, one starts in the centre and moves outwards, checking the tension in the tie bolts in pairs. The second engineer had reached the last pair at the forward end of the engine. Whilst tensioning the tie bolt, when the hydraulic pressure reached 700 bar (aiming for 900 bar), the pressure suddenly fell and there was a loud sound in the engine room. The engineer's first reaction was to check the hydraulic hose for a leak, and the nut on the tie bolt to see if the seals had given way. To his surprise when checking the nut, the stud part also moved. At that time we also had the third engineer preparing to do a crank-case inspection and take crankshaft deflections. On inspection inside the crankcase, the stud, along with the nut, was found on the crank-case floor. That was when I was informed, and I went down to the engine room and confirmed my worst fears — *the tie bolt had broken!*

Decision Time

I now had the challenging task of organising the replacement and trying to maintain the loading schedule. At an emergency meeting between the Master, the Chief Officer, the Second Engineer and myself, we discussed engine operation, manoeuvrability and ship's speed, loading schedule, spares, resources, and the owner's and charterer's requirements. With a three-day turn around in the Persian Gulf, it was decided that we would attempt to remove the broken part during loading ports and fit the new bolt on leaving the gulf at Fujairah. This would provide Maersk with sufficient time for a new spare to be procured and delivered.

The company was informed, and advice on operating the engine sought from MAN B&W. In consultation with the technical management in Copenhagen and MAN B&W Diesel A/S, there was no objection to operating the engine as normal and at full capacity, provided that movement between the cylinder block and the A-frame was monitored. This was achieved by placing a couple of dial gauges between the two. It turned out that the engine had a rhythmic deflection of 0.3 to 0.5 mm. My guidance was that, provided it remained the same and there was no increase in the deflection readings, I could operate the main engine as normal. As a precaution, the engine room was manned and deflection readings were logged every half hour. This permitted the operation of the engine at full capacity in ballast and loaded conditions to meet schedules — in this case the waters were flat and weather conditions ideal. We tried out the engine full astern too and noted the deflections; there was no increase. It was agreed that we would make the schedule, instead of pushing the engine to make up the time we would lose in replacing the tie bolt. It turned out to be a wise move, as we got time between loadings to remove the broken tie bolt.

The Removal

It was essential at this stage that all involved in the repair took part in the plan for removal and gave feedback of their ideas and opinions in a brainstorming session. We now had the task of finding out at which section along its length the bolt had broken; a near-impossible task, as none of the entire length is visible. However, by moving the top or lower sections, one can get a fair idea of where the break has occurred. The approximate weight of the bolt sections can then be estimated knowing the diameter, specific weight and length to be lifted out. To prevent the engine from turning it should be secured and isolated against inadvertent operation. All lifting equipment should be carefully inspected for defects. The distance to which the nuts are threaded on the broken tie bolt should be measured and compared with the other tie bolts, which is a good reference when fitting the new tie bolt.

Since the upper section of the broken bolt could move, we fitted an eyebolt and lifted the top section out. This revealed that the break was at the root of the thread at the top of the lower section. The approximate weight of the lower section that had to be removed was then calculated and four 6 mm diameter wire ropes were threaded down between the lower section and the bore of the hole. A jack was placed between the nut and the crankcase floor, and the lower section jacked up sufficiently to fit an eyebolt at the lower end of the stud. The wire ropes were next wrapped round the threaded part, secured, and the weight of the stud transferred to the wire ropes. The jack was retracted, and the nut unscrewed and removed. The stud was then lowered and rested on the crankcase floor. The wire ropes were then repositioned through the eye bolt and clamped with band-aid straps for security — this was only used till the upper end came out of bore, and then a clamp was fitted to the top end and the lifting point transferred to the upper end. This enabled the lower section to be removed and lifted clear of the engine. The opening for the tie bolt was blanked and welded down using adjacent bolts and clamps as weld points, and the vessel was able to proceed to the next port.

In general, as the location of the break moves towards the upper section, the degree of difficulty in removal increases. It is recommended in all such cases that a new set of nuts be ordered and fitted along with new studs. The nuts should be tried out by hand to ensure that they fit freely. The stud threads should be protected from damage during transportation and whilst fitting.

The Replacement

We picked up the new tie bolt on arrival at Fujairah, three days later. A lifting clamp was fabricated and fitted to the upper part of the lower section. The height of clamp was calculated as the length of lower section, less the distance between the overhead crane hook and the opening for the tie bolt, plus 50 cm for the lifting sling arrangement. The clamps were provided with two sets of lifting slings to facilitate transfer of load from one hook to another. The replacement tie-bolt lower section was lifted, manoeuvred over the hole for the tie bolt and lowered into position so that the clamp rested on the entablature. The upper section of the tie bolt was next lifted by means of the clamp and manoeuvred on to the intermediate sleeve nut and screwed into the sleeve nut.

The lifting point was transferred to upper clamp; this enabled the tie bolt to be lifted and facilitated removal of the clamp on the lower section. The tie bolt was lowered into the entablature and rested on the clamp. The bottom nut was fitted to the lower end of the tie bolt and positioned to the distance measured during removal, and tightened with tommy bars. A hydraulic jack was placed between the bottom end of the tie bolt and the crank case floor. The weight was transferred to the jack, and the upper hydraulic nut positioned to the distance measured during removal. The tie bolt was finally hydraulically tensioned in accordance with the procedure detailed by the engine manufacturer.

Conclusion

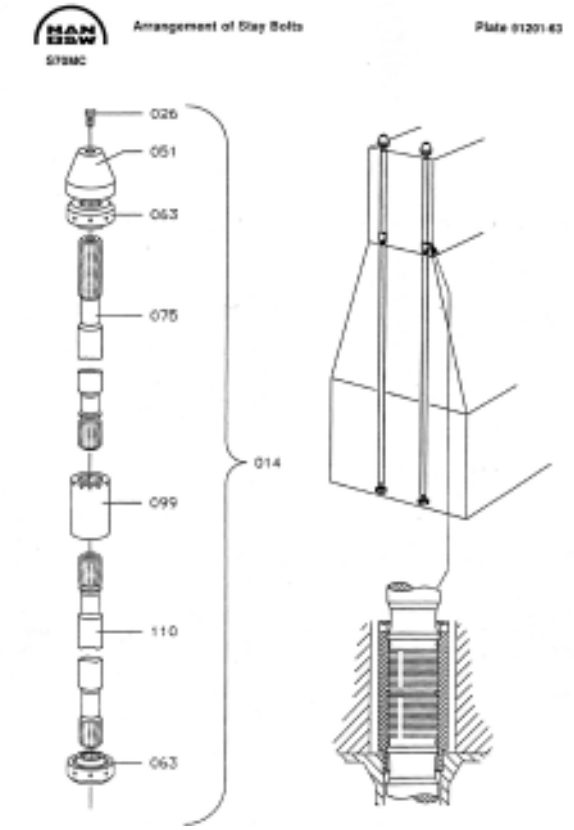
In conclusion, the renewal of a main engine tie bolt has hung over many a student preparing for certification. It is one repair where no two can be alike, nor can there be a fixed procedure due to the configuration of the engine room and the uncertainty of where the break could occur. The probability of a tie bolt breaking is extremely low but, if it does, it is very likely to be due to a fatigue failure initiated at a thread root. Removal and replacement needs a team effort, an understanding of capabilities, the ability to visualise what the outcome of the actions could lead to, and improvisation on the run.

It took me twelve hours to remove the broken section, and ten hours to fit the new tie bolt. It was done safely, without a change to the loading schedule, and the vessel was off-hire for only ten hours, the time for which was made up on the way to the discharge port in Japan.

Acknowledgements

- MAN B&W Diesel A/S
- KR Larsen from MAN B&W Diesel A/S, Denmark
- Neil Brennan from MAN B&W Diesel Australia Pty Ltd

This paper was presented by Jude Fernandes to a joint meeting of the Institute of Marine Engineeering, Science and Technology (Sydney Branch) and the Royal Institution of Naval Architects (NSW Section) in the Harricks Auditorium at the Institution of Engineers, Australia, Milsons Point, on 26 February 2003. It is reproduced here for its implications for naval architects to provide space for maintenance and repair operations, and to show what can be achieved in operation by a motivated team of marine engineers.



Arrangement of S70 MC Stay Bolts
(Diagram courtesy MAN B&W)

Whyalla Today

Martin Grimm
Department of Defence

During a recent trip to Western Australia, I detoured via Whyalla to see whether anything still remains of the former shipyard. I thought it may be worth reporting back on the Whyalla 'shipyard' today. I give this report as a relative 'youngster' who has never been at Whyalla before, let alone when it had an active shipbuilding industry.

Having stopped in at the information centre and adjoining maritime museum, I was advised that the former shipyard is now all part of the OneSteel Whyalla Steelworks site. As such, the only means of getting a closer view of what remains of the shipyard is to take a minibus tour of the steelworks, which is most worthwhile in its own right. Having noted my interest in the shipyard, the tour guides, Les Jones and Trish Lawrence, were good enough to take the minibus closer to the former shipyard while we waited for the steelworks coke ovens to open.

As for the shipyard, some of the major buildings still stand, the building berths are also still easy to identify though obviously run down, while the fitting out wharves also remain. At the time of my visit in early April, the hammerhead crane, looking much the same as the one at Garden Island Dockyard in Sydney (though undoubtedly with different specifications) was in the process of being dismantled with some of the equipment already removed. Thankfully, the hook for the crane has been handed over to the maritime museum at Whyalla where it is now on display as a reminder of the former industry in the city. Photographs of the hook and a view of the yard as seen from Hummock Hill lookout are shown below.

The information centre has a book on sale which documents the history of Whyalla and this book allocates a number of pages to the growth and decline of the shipbuilding industry in the city. This hard-bound book of 160 pages by Sue Scheiffers is titled *A Ribbon of Steel — Whyalla Surges Ahead* and also contains an annex with a list of major ships built at Whyalla and photos of each of the ship types built there. In summary, the first ship built was HMAS *Whyalla* in 1941, and the last was *Iron Curtis* built in 1978. The ship with the greatest deadweight built at the yard was *Clutha Capricorn* at 79 380 DWT, completed in 1972.

The guided tour of the steelworks is run by Cuttlefish Capital Tours and tours are conducted on Monday, Wednesday and Friday starting at 1330 and finishing at 1730. More information and bookings are available at the Whyalla visitors' centre or on the web at www.cuttlefishcapital.com.au.

The maritime museum display area is currently closed for refurbishment. However, the minesweeper HMAS *Whyalla* remains open for guided tours and it is interesting to contrast the basic living conditions that would have existed on that ship with the standard that is now available on RAN patrol boats and frigates.

[*Martin's report has inspired a review of the history of the Whyalla shipyard in* From the Archives — Ed.]

Hook from the Hammerhead Crane at Whyalla
(Photo courtesy Martin Grimm)

Whyalla Today
(Photo courtesy Martin Grimm)

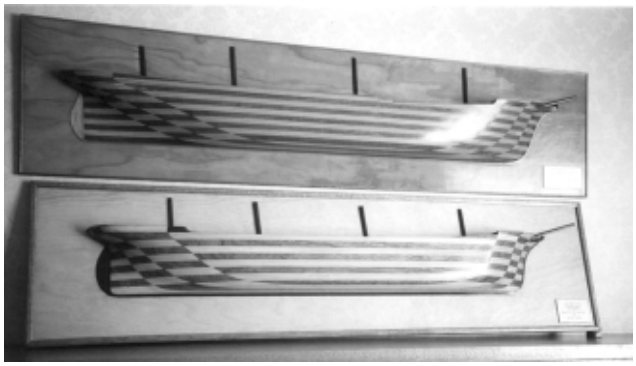
FROM THE CROW'S NEST

Half-block and Full Models

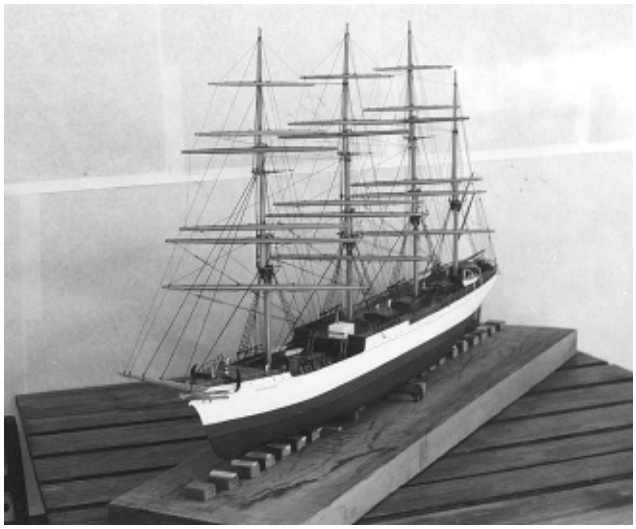
Anyone who knows Neil Cormack knows that ship models are one of his favourite topics. Inspired by Bill Bollard's half-block model of *James Craig*, built for SMIX Bash 2002, Neil has sent photographs of some of the models he has built over the years at a scale of 1/8 inch to the foot (1/96 for those who like it that way). These include *Herzogin Cecilie, Hougomont, Pommern,* and *Lawhill.* These were all made showing both the waterlines and the buttock lines, using alternating lifts of light and dark timber. He learned this method from his father who, in turn, was taught by the master tradesman, Bob Lambie, the foreman shipwright and senior loftsman at Poole and Steele's yard at Osborne, Port Adelaide. The models of *Herzogin Cecilie* and *Hougomont* live on Neil's sitting-room wall (as shown in the accompanying photograph), while *Pommern* was presented to the Åland Nautical Museum in Mariehamn, Finland, and *Lawhill* to Captain Ken Edwards, the present master of *James Craig* in Sydney.

Neil has also built a full model of *Herzogin Cecilie,* including rigging, also at a scale of 1/8 inch to the foot (as shown in the accompanying photograph), and this model was presented to the Paul McGuire Maritime Library, which is housed in the South Australian State Library in Adelaide.

Phil Helmore



Half-block Models of *Herzogin Cecilie(top)* and *Hougomont*
(Photo courtesy Neil Cormack)



Full Model of *Herzogin Cecilie* (right)
(Photo courtesy Neil Cormack)

THE INTERNET

Expats Online

Every Tuesday morning at 0540 on 774 ABC Melbourne breakfast radio, your ABC goes in search of expats, i.e. Australians who have packed their bags and are living and working overseas. Craig Hughes, was the expat on Tuesday morning, 29 April, and was interviewed live by Red Symons. Craig is currently living and working (for Det Norske Veritas) in Shanghai, where SARS is a real threat. You can listen to Craig's story online at www.abc.net.au/melbourne/expats, but you need to have RealPlayer installed (a basic version is downloadable from the site).

If you have a friend or relative living and working overseas and would like to hear them interviewed, then advise the ABC by email at 774@your.abc.net.au, including contact phone number for the expat, and the ABC does the rest so that they can tell their story.

MarTV

MarTV.com is a new marine web site specifically designed to provide the maritime professional with free up-to-date information and access to thousands of shipping web sites and organisations. Access is non conditional and there is no login or registration. The site provides instant access to online maritime resources, news, maritime experts, classification societies, consultants, surveyors, business risk assessment, marine equipment, ship building and repair yards, agents, ports, shipping consultants, technical papers, etc., a one-stop global portal. It also includes links to job vacancies (companies and employment agencies) worldwide, so you could start your search here for an overseas posting. Visit www.martv.com.

This site works happily with Netscape version 7 or 4.7 and that other *browser, but appears not to work with Netscape version 6* — Ed.

Sixth ISR

One- and two-person teams will participate in the sixth running of the International Human-Powered Submarine Races™ (ISR), a biennial engineering design competition, on 11 to 15 June 2003 at the Naval Surface Warfare Center's Carderock Division in Bethesda, Maryland.

This will be the third time that the design competition has been staged at the 3200 ft (975 m) David Taylor Model Basin test tank at NSWC. The submarine races are a challenge which began in 1989 and have grown to an event that has seen the participation of universities, colleges, corporations, research centres, high schools and privately-sponsored teams from the United States, Canada, Mexico and Europe. Typical teams consist of student athlete/engineers, wearing scuba gear, who provide propulsion and navigation as their subs

run against the clock along a fixed underwater course. The competition focuses upon the educational aspects of submarine team efforts, such as use of materials, efficiency of hydrodynamics, propulsion and underwater air-supply and life-support systems. Previous races saw the creation of world speed marks and the emergence of a new category of high-speed underwater performance from one-person designs.

Seventeen participating teams are: Texas A&M University, University of Washington, Lawrence Tech University (Southfield, MI), Virginia Tech University, University of Michigan, University of Maryland (two teams), University of Quebec, University of British Columbia, US Merchant Marine Academy, Millersville University (PA), University of California at Santa Barbara, Winston Churchill High School (Potomac, MD), Wheaton Submarine Works (Wheaton, MD), Bruce Plazyk (Wheaton, IL), Donald Burton (Frederick, MD), and Robert Golobic (Wellington, FL).

The ISR events, including technical seminars for aspiring teams, are part of an all-volunteer effort including senior Navy personnel, individuals from major corporations, research centres and other interested companies and organisations. Judging is based on a combination of a team's ratings in innovation, speed, design, and best use of composite materials.

For further details and photos visit www.isrsubrace.org/index.htm.

Panama Canal Widened

The Panama Canal Authority on April 17 announced trials of simultaneous, two-way transits of large commercial vessels through the Gaillard Cut, which is the narrowest passage in the Panama Canal. This cut was widened from 152 m to 192 m along straight stretches, and up to 222 m on curved areas. The trials will eventually lead to two Panamax-size vessels transiting simultaneously in opposite directions, thereby increasing the Canal's capacity. For photographs of the Gaillard Cut, and a generally interesting web site on the canal, visit www.pancanal.com.

Phil Helmore

EDUCATION NEWS

Curtin University

The Centre for Marine Science and Technology at Curtin University is currently running two short courses this semester — Design for Small Craft (taught by WA Section Chair Shaun Ritson) and Marine Acoustics.

Next semester the Centre will by running a course on Applied Hydrodynamics, taught by Dr Tim Gourlay. The course will run for two hours per week over 12 weeks starting in the last week of July, in late afternoon/early evening to make it easier for people with full-time jobs to attend. Further details from Mrs Ann Smith on a.smith@curtin.edu.au, phone (08) 9266 7380 or fax 9266 4799.

Dougal Harris has completed his PhD at Curtin University.
Kim Klaka

The University of New South Wales

Undergraduate News

The naval architecture students and staff held a get-together on Thursday 20 March. This was to enable the students in early years to meet and get to know the final-year and post-graduate students and the staff on a social level, and to discuss the program and matters of mutual interest. Pizza, chicken, beers and soft-drink were provided and, after a slow start, conversation was flowing pretty freely an hour later! This year we have nine students in the third year and about seven in fourth year (the uncertainty comes from the fact that some are doing courses from different years, and it depends on who you count where). These include two students from Norway and one from Germany on exchange programs, and full-time students from Singapore, Fiji, Tonga, and Hong Kong, most of whom attended. Three post-graduate students came along as well as the three full-time staff. A broad mix, and some wide-ranging discussions ensued.

The introductory course in computational fluid dynamics (CFD) for the final-year naval architecture students which started last year was expanded this year. It now involves eight hours of theory and six hours of hands-on work in the computer laboratory together with the aerospace students. The course was taught by Dr Tracie Barber (who did her PhD at UNSW using CFD analysis of the flow around ekranoplan wings). The practical work used a circular-foil model which the aero students ran in air and the naval students ran in water, using fine and coarse meshes, several turbulence models with the CFD package Fluent. This introductory course gets them up to the hands-on stage, and gives them a feel for some of the increasing uses of CFD in the marine field.

At the graduation ceremony on 27 May, the following graduated with degrees in naval architecture:

Tommy Ericson	H1
Scott Hunter	H2/2
Martin Johnson	
Nigel Lynch	H1 and University Medal
Katie Miller	H2/1
Giang Ngo	H2/1
Michael O'Connor	H2/2
Rozetta Payne	H1
Minh Pham	H1
Benjamin Smith	H2/1

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

The performances of Nigel Lynch and Minh Pham deserve special mention. The University Medal is awarded for the highest average mark for all courses in all years of the degree program (weighted more heavily towards the later years) of 85% or more. Both these students had a weighted average of more than 85%, with the medal going to Nigel. To put this in perspective, of our 263 graduates in naval architecture,

forty-nine have been awarded Honours Class 1 (for a weighted average of 75% or more), and five have been awarded the University Medal: Nigel Lynch (2003), Michael Andrewartha (2000), Steve Davies (1980), Brian Morley (1974) and Phil Helmore (1970).

At the prize-giving ceremony on the same day, the following prizes were awarded in naval architecture:

The Baird Publications Prize 1 for the best performance in Ship Hydromechanics A to Tony Sammel.

The Baird Publications Prize 2 for the best performance in Ship Structures 1 to Tony Sammel.

The Royal Institution of Naval Architects (Australian Division) Prize and Medal for the best ship design project by a student in the final year to Rozetta Payne.

The David Carment Memorial Prize and Medal for the best overall performance by a student in the final year to Nigel Lynch.

Congratulations to all on their fine performances.

Our 2003 graduates are now employed as follows:

Tommy Ericson	Brisbane Ship Construction, Brisbane
Scott Hunter	Energetec, Sydney
Martin Johnson	Bethwaite Design, Sydney
Nigel Lynch	North West Bay Ships, Sydney
Katie Miller	RAN, HMAS *Creswell.*
Giang Ngo	Geoff Glanville and Co., Cairns
Michael O'Connor	Department of Defence, Canberra
Rozetta Payne	Commercial Marine Design, Daley's Point
Minh Pham	Huyndai-Vinashin Shipyard, Viet Nam
Benjamin Smith	Austal Ships, Fremantle

Post-graduate and Other News

The prestigious Eighteenth annual International Workshop on Water Waves and Floating Bodies took place on this occasion in Le Croisic, France, on 6–9April 2003. A total of 47 papers was presented at the 18IWWWFB on all topics associated with water waves, with a good number of papers devoted to the matter of waves generated by ships and the impact of waves upon ships. The only Australian contribution was that by Professor Lawrence Doctors from UNSW, who presented his work on the topic, *The Influence of Viscosity on the Wavemaking of a Model Catamaran*. In his paper, Lawry reported on an extensive set of experiments conducted in the Model Basin at the AMC, in which the influences of catamaran demihull spacing, water depth and model speed were all studied. It was shown that excellent agreement for the wave profiles and the root-mean-square wave elevation, between the model experiments and the computer program, could be achieved. It was also demonstrated that the water viscosity, now incorporated in the computer program, plays a significant role in such tests, both at low and high Froude numbers.

Readers of *The Australian Naval Architect* will be interested to learn, also, that Le Croisic is the town where Professor Pierre Bouguer developed and published the well-known formula for the metacentric radius for a floating ship in 1746. It is claimed that this is the first major application of mathematics to a field of engineering. A statue was erected in his honour in the town square.

Phil Helmore
Lawry Doctors

Vice-Chancellor's Award for Teaching Excellence

At the graduation ceremony on 27 May, Phil Helmore was presented with the Vice-Chancellor's Award for Teaching Excellence 2002. It has always been known that Phil devoted extraordinary effort to his teaching duties at UNSW during his employment at the University for the last ten years. However, to receive the official recognition via this Award is a truly magnificent achievement.

The awards are competitive, with up to seven being awarded in any year for the full-time academic staff of about 1700. The honour is even more significant when one considers that UNSW, with its very high academic standards, frequently does not give the full number of available awards, and that it is even more difficult to make the case because of the relatively low number of students in naval architecture classes. Well done, Phil!

Lawry Doctors

Australian Maritime College

AMC Graduation Ceremony/Australian Division President Visit to AMC

Bryan Chapman, President of the Australian Division of the Royal Institution of Naval Architects, recently visited the AMC to meet with local RINA members and to tour AMC facilities. Mr Chapman was in Launceston to attend the AMC graduation and prizegiving ceremony which was held on Friday 21 March 2003. The following students received their Bachelor of Engineering (Naval Architecture) degree:

Drew Russel Bryant	Levi Catton
Joseph Hugh Cole	Steven James Cook
Andrew Tyson Forbes	James Francis Keegan
Wade Limpus	Simon Joseph McGoldrick
Michael Tiller	Byron Matthew Walpole

The following Students received their Bachelor of Engineering (Ocean Engineering) degree:

Cassandra Ellen Bird	Piers Robert Findlay
Jacob William Law	Kevin Lewis Morton
Sophia Elizabeth Pearce	Isikeli Waqa

Kevin Morton received the Connell Medal which is awarded to the best graduate in the College. Kevin was also awarded the Captain Thomas Swanson Prize for the best student over the duration of any engineering course in 2002 and the Institution of Engineers, Australia Award (Norman Selfe Prize) for the best achievement and attainment of professional skills in the final year of a Bachelor of Engineering course.

Andrew Forbes was awarded the RINA Prize for the best research project by a final year student in the Bachelor of Engineering (Naval Architecture).

The Baird Publications Prize for the best mark in Ocean Vehicle Design in the Bachelor of Engineering (Naval Architecture) was shared by Alistair Allen and Joseph Cole. The RINA/Austal Ships Systems Prize for the best achievement in design-related subjects in Year 2 was shared by Mark Hughes, Jared Mouldey, Cameron Nilsson-Linne and Gavin Sheperdson.

Gregor Macfarlane (finally) completed his Master of Philosophy degree by research. His thesis was titled *The Measurement and Assessment of Sub-Critical Vessel Generated Waves.*

New Staff at the AMC Department of Maritime Engineering

Dr Jinzhu Xia is a Senior/Principal Lecturer with the Department of Maritime Engineering. His research and teaching interests are in hydrodynamics, fluid-structure interaction, naval architecture and offshore engineering. Recent assignments have included project leader of the following research programs:

- Hydroelasticity of offshore structures (ARC funded)
- Non-linear ship motion simulation
- Tank wall effects on offshore hydrodynamic model testing
- Slamming on catamarans - postgraduate research project

Jinzhu is a Member of The Society of Naval Architects and Marine Engineers (SNAME), The International Ship and Offshore Structures Congress (ISSC) and the Editorial Committee for the Journal of Ship Mechanics.

Dr Irene Penesis obtained her Doctorate qualification from the Department of Mathematics and Statistics at RMIT University, Melbourne. Her research interests have been mainly in the field of hydrodynamics, in particular the determination of the pressure field and load-carrying capabilities of gas-lubricated bearings with non-smooth profiles. Irene has also undertaken quality research in the area of biological mathematics, in particular the modelling chemotactic cellular migration. Her current position at the AMC in the Department of Maritime Engineering is the Subject Co-ordinator of all engineering mathematics related disciplines for the Bachelor of Engineering degree courses. This includes preparing, coordinating and effectively delivering online teaching and learning programs to science and engineering students.

Allan Samways is a lecturer in marine electrical engineering. Allan was born in Scotland and has completed an trade apprenticeship in the England with the Associated Engineering Company Ltd, a Diploma of Education at Warwick University and a BSc (Electrical) degree in Industrial Electronics at Open University, London and Cambridge. Allan brings to AMC many years of practical experience in engineering, communications, instrumentation, education and computing in the UK, Zimbabwe, South Africa, the United Arab Emirates and Western Australia.

Dr Ju Fan, Associate Professor with the School of Naval Architecture and Ocean Engineering, Shanghai Jianotong University, China, is at the AMC on a 12 month sabbatical to undertake research into the motion response of moored floating structures in waves, (including moored tankers, floating towers, geospara, and FPDSOs).

New Post-Graduate Students at AMC

Jiangang Fei came from Dalian, a seaside city in north China. He graduated from Dalian Maritime University, majoring in navigation. He had been at sea as a deck officer for 8 years prior to arriving at AMC two years ago for his MBA study. He is now progressing into his PhD where he is researching *Strategic Human Resource Management in the Maritime Industry*.

Vinh Thai has come from Ho Chi Minh City, the economic capital of Vietnam. He graduated from Vietnam Maritime University in Transport Economics in 1997. He took his Master of Science degree in Maritime Affairs, specialising in Port Management at the World Maritime University in Sweden in 2001. His current Doctoral research with AMC is *Port and Terminal Safety*.

Other Recent Items of Interest at AMC

The training ship of the Tokyo University of Fisheries, *Umitaka Maru*, visited Beauty Point on the Tamar River after some AMC staff and students had joined the vessel in Hobart. Tours of both campuses were arranged for the 27 Japanese cadets and many of the crew.

North West Bay Ships in Margate, south of Hobart, recently conducted sea trials on their latest new-build vessel, *Red Jet 4* (see report in *General News*). Gregor Macfarlane attended the sea trials to measure the wash generated by the vessel, particularly at its design speed of 35 kn, and compare the results against strict limits set in the contract. Several representatives of the Red Funnel Line were present for the trials and appeared to be very pleased with the quality of the vessel and its performance. Noel Dunstan, a final-year naval architecture student, ably assisted Gregor with the conduct of the wash experiments in Norfolk Bay and also had the opportunity to experience manoeuvring trials at first hand.

Wake trials for Red Jet 4
(Photo courtesy Gregor Macfarlane)

AMC's 64 m navigation and seafarer training ship, *Wyuna*, recently spent some time on the Southern Marine SynchroLift in Launceston for her regular survey and routine maintenance. The 45 km trip up river from Beauty Point provided an opportunity for a number of AMC staff and students to enjoy a pleasant Sunday evening cruise.

Gregor Macfarlane

Sulzer RT-flex60C engines manufactured in Korea

A series of electronically-controlled Sulzer RT-flex low-speed marine diesel engines are in production under licence from Wärtsilä Corporation in the Ulsan works of Hyundai Heavy Industries Co Ltd in Korea.

The engines are a series of four Sulzer 7RT-flex60C engines for a series of four 30 000 tdw multi-purpose carriers contracted at Shanghai Shipyard in China by Chinese-Polish Joint Stock Shipping Co (Chipolbrok). The 7RT-flex60C has a maximum continuous power of 16 520 kW at 114 rpm.

The first of these engines successfully passed its official shop test in the Ulsan works on 27 January 2003. The second engine recently started its shop testing and was demonstrated to a large group of guests on 6 March. The guests were mainly from East Asia and include shipowners, ship operators and shipbuilders, together with representatives from classification societies and other interested organisations.

Series production of Sulzer RT-flex electronically-controlled engines has been underway for just over two years. The first engine, a Sulzer 6RT-flex58T-B, passed its official shop test in January 2001 and has been in service in the bulk carrier *Gypsum Centennial* since September 2001 with excellent results. This first Sulzer RT-flex engine was also built under Wärtsilä licence by Hyundai.

Two Sulzer 7RT-flex60C engines have already been completed in Wärtsilä's Trieste factory in Italy, with the first having successfully passed its official shop test on 14 October 2002. There are now 13 Sulzer RT-flex engines in service, completed or on order.

The Sulzer RT-flex60C is a forward-looking engine offering a new range of benefits to shipowners. Not only does it bring the new benefits of electronically-controlled common-rail fuel injection, such as low emissions and very slow running capability, but embodies stepwise improvements in basic diesel engine technology which will give shipowners better reliability and longer times between overhauls.

With cylinder dimensions of 600 mm bore by 2250 mm stroke, the Sulzer RT-flex60C has a maximum continuous output of 2360 kW/cylinder at 114 rpm. It is available with five to nine cylinders covering an overall power range of 8 250–21 240 kW at 91–114 rpm. It thus offers optimum powers and speeds for a wide range of 'faster' ships such as medium-sized container ships, car carriers, reefers, etc.

The new Sulzer RT-flex60C builds upon experience gained with the latest Sulzer RTA engine designs and incorporates the latest technological improvements. It thereby offers clear and substantial benefits in terms of reliability, three years between overhauls, low maintenance costs, and low exhaust emissions.

Additional benefits come from the Sulzer RT-flex system by which electronically-controlled common-rail systems replace the usual camshaft-based systems. The key feature of the RT-flex system is that it gives complete freedom in the timing and operation of fuel injection and exhaust valve actuation. This flexibility has been employed to provide smokeless operation at all ship speeds, and steady running of the engine at very low speeds, down to about 10–12 per cent nominal speed, also without smoke. The precise volumetric fuel injection control given by the RT-flex system reduces maintenance costs through extending times between overhauls. Engine availability is increased by both the integrated monitoring functions and by the redundancy in pumps, piping and electronics of the Sulzer RT-flex system.

New Sulzer common-rail marine engine

Wärtsilä Corporation has announced a new low-speed marine diesel engine which will be available in two versions, the Sulzer RT-flex50C and the Sulzer RTA50C. The Sulzer RTA50C is a joint development with Mitsubishi Heavy Industries Ltd in Japan, taking advantage of the strengths of both companies with this type of engine. The basis for this joint development is the agreement made between Wärtsilä and Mitsubishi in November 2002.

The first engines of the new type are expected to be completed towards the end of 2004. Both versions will be marketed and manufactured in the normal way by Wärtsilä and its licensees.

The Sulzer RT-flex50C is based on the Sulzer RTA50C. Instead of the traditional mechanically-driven camshaft with fuel injection pumps, exhaust valve actuator pumps and reversing servomotors, the Sulzer RT-flex50C has electronically-controlled common-rail systems for fuel injection and exhaust valve actuation.

The Sulzer RT-flex50C and Sulzer RTA50C have the same principal characteristics, with cylinder dimensions of 500 mm bore by 2 050 mm stroke. Their maximum continuous power is 1 620 kW/cylinder at 124 rpm. Both engines will be available with five to eight cylinders covering an overall power range of 5 650 to 12 960 kW at 99 to 124 rpm. They thus offer the right powers and speeds for a wide variety of ship types including the new generation of handymax and Panamax bulk carriers, large product tankers, container feeder vessels and medium-sized reefer ships.

The engines will meet the market needs for outstanding reliability, high efficiency, compactness, optimised industrialisation, and environmental requirements. As with all new marine engines nowadays, they will be fully compliant with the NOx emission regulation of Annexe VI of the MARPOL 1973/78 convention.

The Sulzer RT-flex version has the added benefit of no smoke emissions at all operating speeds, together with lower running speeds. The mechanical version, the Sulzer RTA50C, will be available for those shipowners preferring the traditional concept.

Both versions, RT-flex50C and Sulzer RTA50C, will benefit from the proven Sulzer TriboPack technology for best piston-running behaviour, providing low wear rates for three years between overhauls, and minimum cylinder lubrication oil consumption.

National Marine Safety Committee

Fire Safety

Revised standards for fire safety of commercial vessels are currently being progressed as a priority. Public submissions on an issues paper in 2002 have been incorporated into a preliminary draft. A reference group has been formed to review the draft prior to its going to the NMSC for approval to be released for public comment. Members of the reference group are:

Tony Armstrong	Australian Shipbuilders Association
Dennis Arnott	Adsteam Marine
Clinton Ayling	Dept of Planning & Infrastructure, WA
Russell Behan	Marine Matters Ltd (marine surveyors)
Bhu Dev	AMSA
Trevor Faust	Marine and Safety Tasmania
Rick Foster	Fire consultant
Patrick Harrington	Fire Protection Technologies (Fire Protection Association of Australia)
Bob Herd	Royal Institution of Naval Architects
Tony Pengilly	Waterways Authority (NSW)
Brett Staines	Chubb Fire Australia (Fire Protection Association of Australia)
Roger Thomas	Tyco
Barry Wilkinson	Marine Safety Victoria
John Woolmer	Maritime Safety Queensland

It is also hoped to have a representative from the Australian Seafood Industries Council.

The new fire standard will replace Section 11 and Subsection 5F of the Uniform Shipping Laws Code and will form Part C Section 4 of the new National Standard for Commercial Vessels. The revision will reflect current national and international fire safety standards. The fire safety standard will incorporate a performance-based approach while maintaining deemed-to-satisfy prescriptive solutions. Reference is being made to incident data and information on the nature of exemptions granted by jurisdictions to identify areas of possible concern. A more risk-based approach for deemed-to-satisfy solutions is being proposed to provide fire-safety solutions that are better tailored to the particular fire hazards pertaining to a vessel, taking into account the likelihood and consequences.

The draft standard will likely be released for public comment in July or August this year. In addition to Bob Herd's involvement on behalf of RINA in the reference group, participation by RINA members in the public comment phase is welcomed and encouraged.

Stability And Subdivision

Work is commencing on the review of stability and subdivision sections in the Uniform Shipping Laws Code. Issues papers are being developed for Intact Stability (Subsections 8A and 8B) and for Subdivision and Damaged Stability (Parts of Subsections 5C and 5D). Public submissions on issues pertaining to these sections are welcome, both for incorporation into the issues papers and in response to the release of the issues papers. If you have identified a problem or something that can improve these sections, please email the NMSC Secretariat at secretariat@nmsc.gov.au or write to The Director, National Marine Safety Committee Secretariat, PO Box 1773, Rozelle, NSW 2039.

Maurene Horder

The NSW Waterways Authority, on behalf of the NMSC, working with input from the state survey authorities and interested people, has already drafted the new Intact Stability and Subdivision sections. These have been passed to the NMSC Secretariat for preparation of the issues papers, and comments on the draft sections will be called for soon — Ed.

Australian Maritime Safety Authority

New and Amended Marine Orders

For ships to which the Commonwealth's Navigation Act applies, the Australian Maritime Safety Authority has issued the following new and amended parts of Marine Orders during the first quarter of 2003:

Part 62	(Commonwealth Ships) Issue 1 — Order No. 1 of 2003
Part 19	(Tonnage Measurement) Issue 4 — Order No. 2 of 2003

Copies of all current Marine Orders, including the above, can be viewed on www.amsa.gov.au/sd/mo/mo_index.htm (Note: ...mo *underscore* index.htm).

Additionally, work has been commenced on the following new and amended parts of Marine Orders:

Part 3	(Seagoing Qualifications), Issue 6
Part 21	(Safety of Navigation and Emergency Procedures), Amendment to Issue 4
Part 30	(Prevention of Collisions) Amendment to Issue 5
Part 41	(Carriage of Dangerous Goods) Amendment to Issue 5
Part 42	(Cargo Stowage and Securing) Amendment to Issue 1
Part 43	(Cargo and Cargo Handling — Livestock) Issue 6
Part 51	(Fishing Vessels), Issue 2
Part 55	(Publication of Inspection Data) Amendment to Issue 1
Part 96	(Marine Pollution Prevention — Sewage) Issue 1

When available, these amendments and new Parts will be available for viewing on www.amsa.gov.au/sd/mo/modrafts.htm. Queries on these changes should be directed to Abdul Hannan on (02) 6279 5944 or abdul.hannan@amsa.gov.au.

Robin Gehling

IEAust PI Insurance Survey Report

The IEAust conducted a survey of members regarding their experiences with and comments on professional indemnity insurance in January/February of this year. 569 completed questionnaires were returned for analysis, and a report of the findings has been published.

The Executive Summary says, in part:
"The research findings reveal that while the amount of PI insurance cover being taken out has not changed significantly over the last three years (up 7%), premiums have more than tripled (up 210%) and excesses have jumped 166%.

- Twenty-nine percent of engineers surveyed reported that they were not currently covered by PI insurance.
- The findings indicate that 71% of engineers are currently covered and that a minimum of an additional 2% are still seeking cover for 2003.
- Cost (46%) and exclusion clauses (28%) are the main barriers to taking out PI insurance. Ten percent of those without PI insurance had been refused cover.
- Only 9% of engineers have made a PI insurance claim in the last three years. The incidence of claiming was considerably higher among large firms. Very few sole practitioners had made a claim in the last three years (3%).
- 49% of engineers said that they had been refused cover in the last 12 months, or had some conditions or restrictions imposed on them. There was no correlation between the size of the firm, or the use of risk management strategies, and cover being refused."

Visit www.ieaust.org.au/policy/res/downloads/other/2003 pi survey report.doc for the full report.

Phil Helmore

Progress on Professional Indemnity

A meeting of [Victorian] state Insurance Ministers earlier this month has led to significant movement in approaches to Professional Indemnity issues. The Ministers have asked state officials to report back in June on:

(1) a nationally consistent model for proportionate liability for economic loss; and

(2) the implications and mechanisms for developing a nationally consistent approach to professional standards legislation.

Engineers Australia and other professional bodies have been lobbying for the implementation of the above measures. Professional Standards legislation currently in force in two states has been impeded by the availability of action under the Trade Practices Act, so amendments to the TPA will need to be considered as part of the implementation. Proportionate liability ends the 'deep pockets' syndrome whereby professionals with the best insurance cover may have to bear fully the cost of damage caused regardless of their degree of responsibility. Professional Standards legislation provides for mandatory insurance for professionals and comprehensive risk management schemes to protect the community, in return for ceilings on liability payouts by professionals. Until recently, the Victorian Government has not supported the concept of Professional Standards legislation, but there are signs that view is changing.

Victorian IEAust members who have been affected by the PI crisis to the extent they have had to give up practice or substantial areas of their practice, and who are willing to participate in a lobbying exercise, are asked contact Jane Stephens: jstephens@ieaust.org.au. For professional indemnity information please visit http://www.ieaust.org.au/policy/pi_insurance0.html

EngFlash, IEAust Victoria Division (Electronic Newsletter), Issue No. 5, April 2003

Change of Name for IEAust

The Council of the Institution of Engineers, Australia, has accepted the recommendation from Congress that the Institution adopt the "everyday" or common name of "Engineers Australia". The formal or legal name remains unchanged as the Institution of Engineers, Australia. The shortened form of the name change will be EA rather than IEAust.

Some things will not change. There is no plan to alter the postnominals MIEAust, etc. The Journal name will remain *Engineers Australia* although the trading name of the publishing company will change to Engineers Media.

Engineers Australia, April 2003

Vale Jack Coleman

The ANA regrets to record that Jack Coleman, a past Member of the Institution, Member of Council and Vice-President of the Australian Branch of RINA, passed away on 24 April 2003 at the age of 84.

Jack commenced work as an apprentice joiner at Cockatoo Dockyard in the 1930s. Moving to the ship drawing office at the start of World War II, he became the dockyard's Naval Architect in the 1950s, before moving into the yard as Works Manager in the early 1960s. He returned to the technical department in 1966 as Technical Services Manager.

Jack suffered a severe heart attack in his office in 1972. After a period of recuperation, he returned to the dockyard as Controller, Planning and Development. He was subsequently appointed General Manager (Production) before joining the board of Vickers Cockatoo Dockyard Pty Limited in 1976 as Production Director. Jack retired in 1978 and moved to the central coast.

We extend our sympathy to his wife June and their family.

John Jeremy

MEMBERSHIP NOTES

Australian Division Council Meeting

The Australian Division Council met on 5 March, with teleconference links to all members and the President, Bryan Chapman, in the chair in Sydney. Matters, other than routine, which were discussed included:

- RINA Input at IMO Meetings: There had been some discussion on the effectiveness of RINA participation in meetings of IMO and it was decided that the Australian members of the RINA Council would bring the matter up at the July RINA Council Meeting in London.
- Legal Matters: The President advised that Mr Peter Murrell, a solicitor practising in Brisbane and a member of the Queensland Section, had offered his services as Honorary Solicitor to the Division and would provide limited legal advice to members. Mr Murrell will also represent RINA at meetings of the IMO Legal Panel.
- ANA Advertising Rates: Council approved new advertising rates for the ANA. The new rates are, for casual advertising:

Full Page	$600
1/2 Page	$300
1/4 Page	$200

  Rates for advertising in 4 issues of the ANA are:

Full Page	$450
1/2 Page	$250
1/4 Page	$150

  Inserts will be charged at the Full Page rate.
- AMC Proposal For Change of Status: The President had written a letter of support forwarded to DEST for a change of status from College to University proposed by the AMC.
- Ausmarine East 2003: Council approved a request from Baird Publications for RINA support for this event to be staged in Brisbane later this year. The Queensland Section had indicated its willingness to provide support by hosting a mini conference during the event.
- Appointment of RINA Australian Division Vice-President: On a recommendation from the President-elect, Rob Gehling, Council approved the appointment of Stuart Cannon as Vice-President.
- Other Matters: Noel Riley reminded Council that he would not be attending, for the time being, any further meetings of Council as he would relinquish the position of Immediate Past President in favour of Bryan Chapman, whose term as President will cease following the next Annual General Meeting. He commended Bryan for his leadership and activity during his term of office and moved a vote of thanks to the President from Council. This was carried unanimously.

The President thanked outgoing members of Council for their support and assistance during his term and thanked John Jeremy particularly for his services to Council over many years and for his efforts as Editor in Chief of *The Australian Naval Architect*.

The next Meeting of Council is scheduled for Wednesday 18 June 2003.

Keith Adams

Australian Division Annual General Meeting

This year, the Annual General Meeting of the Australian Division was held on 25 March 2003 in Melbourne. The meeting was the first, for many years, to be held other than in Sydney. Arrangements for the meeting were made by the Victorian Section of the Division.

After opening the meeting and welcoming members and guests, the President, Bryan Chapman, spoke briefly to his Report. The Report had been circulated to all members of the Division as an enclosure to the February issue of *The ANA*. He acknowledged contributions made by John Jeremy and Phil Helmore in the production of *The ANA* and to the invaluable support given by Wärtsilä Australia. He noted that, although Noel Riley would no longer be a member of the Australian Division Council following the meeting, he (Noel), Bryan and Rob Gehling would sit as members of the RINA Council at Council meetings in London.

Bryan said he was confident that Rob Gehling, the incoming President of the Division, would make a noteworthy contribution to the Division and that he was looking forward to working with Rob in his new role as Immediate Past President.

Allan Soars, the Division Treasurer, presented the Financial Statement and Auditor's Report and was happy to report that the Division's finances were in a sound state.

The Secretary, Keith Adams, then announced the appointment of six Councillors to the Division who would commence their term of two years from the conclusion of the AGM. They are:

Jim Black
Werner Bundschuh
Mike Seward
Mark Smallwood
Andy Tait and
Mike Warren.

Bryan sincerely thanked all who had given him such support during his term of office and thanked those who would be retiring from Council at the conclusion of the AGM.

Allan Taylor, on behalf of all members, expressed thanks to Bryan for his leadership of, and contribution to, the Division.

Australian Division Council Membership

Following the recent elections and changes, the full composition of the Council of the Australian Division is therefore as follows:

President:	Mr R.C. Gehling
Immediate Past President	Mr B.V. Chapman
Vice-President	Dr S. Cannon

Elected Members of Council

Mr J.M. Black
Mr W. Bundschuh

Mr M. Seward
Mr M. Smallwood
Mr A.R.L. Tait
Mr M.R. Warren

Members Appointed by Sections
Dr S. Cannon (Vic.)
Mr M.J. Williams (NSW)
Mr B.R.G. Hutchison (Qld)
Mr G. MacFarlane (Tas.)
Mr S. Ritson (WA)
Mr N.P.Whyatt (ACT)

Secretary Mr K.M. Adams

Treasurer Mr A.J. Soars

Keith Adams

NAVAL ARCHITECTS ON THE MOVE

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

Gillian Carter has moved on from Brisbane Shipworks and has taken up a position with Dubois Naval Architects in Lymington, United Kingdom.

Tommy Ericson, a graduate of The University of New South Wales, after several months touring Japan, Canada and the USA, has taken up a position as a Project Manager with Brisbane Ship Constructions in Brisbane. Tommy says that he also expects to be doing design work when he has the time.

Dougal Harris has moved on from the Wolfson Unit at Southampton University and, after some arduous overseas travel, has taken up a position with Formation Design Systems in Fremantle.

Rod Humphrey has moved on within Det Norske Veritas and has taken up a position as Head of Section/Classification Coordinator in Bristol in the UK. This position is head of a new group called Maritime Solutions, which has been set up because the Royal Navy (along with many other navies around the world) is looking closely at the formal classification process and how it can benefit their operations. The others in the team deal mainly with risk management and safety management issues, and Rod provides the link with the core classification process.

Magnus Lindgren has succeeded Rod Humphrey in the position of Head of Approval Centre Sydney for Det Norske Veritas. Magnus has been group leader in the hydrodynamics and structures sections, and has vast experience in direct load calculations.

MIDN Katie Miller, a graduate of The University of New South Wales, is now at HMAS *Creswell* at Jervis Bay and expects to be there until the end of June, completing her New Entry Officer Course (NEOC) as a Marine Engineering Trainee, before being posted to her first vessel in November. Katie writes that she has completed some courses to qualify to go to sea, including Survival at Sea, where they stick you in a liferaft with twenty-four other people and you sit there for four hours; Basic Nuclear, Biological and Chemical Defence (NBCD), which is training for damage control, fire fighting and gassing, which was pretty cool but it was exhausting, especially the fire fighting. She has also been on her first sea training deployment, joining HMAS *Tobruk* in Townsville in March and sailing for Port Vila, Vanuatu, and back to Brisbane and Sydney. She says that she has learned a lot so far and has really enjoyed herself for the most part, and can't wait to get posted to sea.

Sophia Pearce, a recent graduate of the Australian Maritime College in Ocean Engineering, has taken up a position as a resourcer with Michael Page International in Perth, WA. Prior to taking up this post, Sophia undertook some part-time work on a project for the Co-operative Research Centre for Sustainable Tourism, which was tasked with developing minimum-impact guidelines regulating commercial shipping within Bathurst Channel, Port Davey, in the World Heritage region of South-West Tasmania. This work directly followed on from her final-year research project. Sophia and Anton Schmieman (a recent graduate of the Australian Maritime College who is currently employed by Austal Ships in Fremantle) were married in December 2002.

Sean Phelps, after five years of assorted jobs and travelling the world, has finally cracked into the naval architecture industry! He has taken up a position with Jutson Yacht Design in Seaforth. Sean said that after four weeks in the job, he had learned more about engineering than he had in the previous five years! He is currently working on the design of a 12 m powercat.

Pete Randhawa has moved on from Austal Ships and has shifted camp to Melbourne. He is currently enrolled in the APESMA MBA program by correspondence. He is reading for two units this session, and is facing exams for these units in June. He is also in the process of developing notes for the instructors/lecturers in naval architecture courses for the Malaysian Institute of Marine Technology which is to be built next to the Naval Dockyard in Lumut, Malaysia. This is a part time, project-based job through the Victoria University. He says that he is, however, still seeking further career opportunities.

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 (see *Missing in Action).*

Phil Helmore
Gregor Macfarlane

MISSING IN ACTION

The following members are Missing in Action.

M C Payze, formerly of P&O Ports, Sydney
T E Cocks, formerly of West Perth, WA and
A Rashid, formerly of Isabella Plains ACT.

If any member knows their current address please let Keith Adams know on (02) 9876 4140, fax (02) 9876 5421 or email kadams@zeta.org.au.

Queen Mary 2 Launched

Queen Mary 2 — the world's biggest cruise liner — moved out of dry dock into open waters for the first time late last month at the Alstom Chantiers de l'Atlantique shipyard in St Nazaire, on the River Loire in north-west France.

The 150 000 t British-flagged vessel, the latest in a class which marks the return of the glamorous super-liners, cost around $A1.5 billion and can carry 2 600 passengers and over 1 300 crew at a maximum speed of about 30 kn. *QM2* is due to be delivered to the Cunard line in mid-December 2003 prior to her naming ceremony at Southampton on 10 January 2004.

Queen Mary 2 has an overall length of 345.03 m and a beam of 40 m. The beam at the bridge wings is 45 m. The draft is only 9.95 m, but the height above LWL is 62.05 m. The overall height of the ship was limited by the clearance under the Verazano Narrows bridge in New Yark, which has a maximum clearance of 66 m. She will not be able to pass under the Sydney Harbour Bridge, which has a clearance of only 52 m.

The passengers will be accommodated in 1 310 staterooms, 944 of which have private balconies. Another 66 have ocean views. All cabins will have 144 kb/s internet access by satellite, so there will be no escape from the world!

The main dining room on the vessel spans the full width of the ship, seats 1 347 passengers and is nearly three decks high. The ship also has 14 bars, including a reproduction of an old English pub as well as a casino, cinema, broadcast studio, planetarium, an education centre, a garden complete with waterfall, night club, shopping centres and a theatre for complete West-End-style productions.

QM2 will be an all-electric ship powered by four Wärtsilä diesel alternators supplemented by two LM2500 gas turbines to provide 118 MW of power. She is fitted with four 20 MW Mermaid propulsion pods with AC motors driving fixed-pitch highly-skewed propellers, two fixed and two capable of being rotated through 360°.

QM2 will start sea trials in the (northern-hemisphere) autumn. Last month's float-out was delayed for five days because an extra-deep water basin had to be dredged for the giant ship to sit in.

Cunard is confident it will overcome a propulsion system problem which threatened to delay the December hand over. QM2 will take over the role as Cunard flagship from *Queen Elizabeth 2* on the Southampton to New York run. The two vessels will conduct a simultaneous crossing from New York on 25 April 2004.

QM2 has already been chartered by the Athens 2004 Olympic Games organisers to serve as a floating hotel for the 2004 Olympic Games.

Cunard's official artists impression of *Queen Mary 2*
(Image GB Marine Art, www.gbmarineart.com)

Cunard Names New Ship *Queen Victoria*

Cunard Line has announced that its new 85 000 t cruise ship, which is scheduled to enter service in 2005, will be named *Queen Victoria*. Dedicated to the British cruise market, *Queen Victoria* will be the second largest Cunarder ever built. Together with the current flagship, *Queen Elizabeth 2*, and *Queen Mary 2*, the biggest passenger liner ever, the Cunard fleet will include three Queens for the first time.

Queen Victoria will enter service in the company's 165th anniversary and will operate cruises from Southampton to the Mediterranean, the Canaries, Northern Europe and the Caribbean. She will join the world famous *Queen Elizabeth 2* and the elegant *Caronia*.

The 1 968-passenger vessel will feature a covered wraparound promenade deck, a forward-facing observation lounge, a large Lido pool with a retractable magrodome [*whatever that is* — Ed.], and ten of the twelve passenger decks will be served by exterior glass-walled lifts. Like *QE2* and *QM2*, the liner will have a Queens Grill, offering single-seating gourmet dining.

Queen Victoria will offer a wide range of accommodation — large standard outside cabins and a high percentage of balcony cabins (67%).

Queen Victoria will be built at Italy's Fincantieri shipyard near Venice with her keel scheduled to be laid in July 2003.

FROM THE ARCHIVES

Shipbuilding in Whyalla

John Jeremy

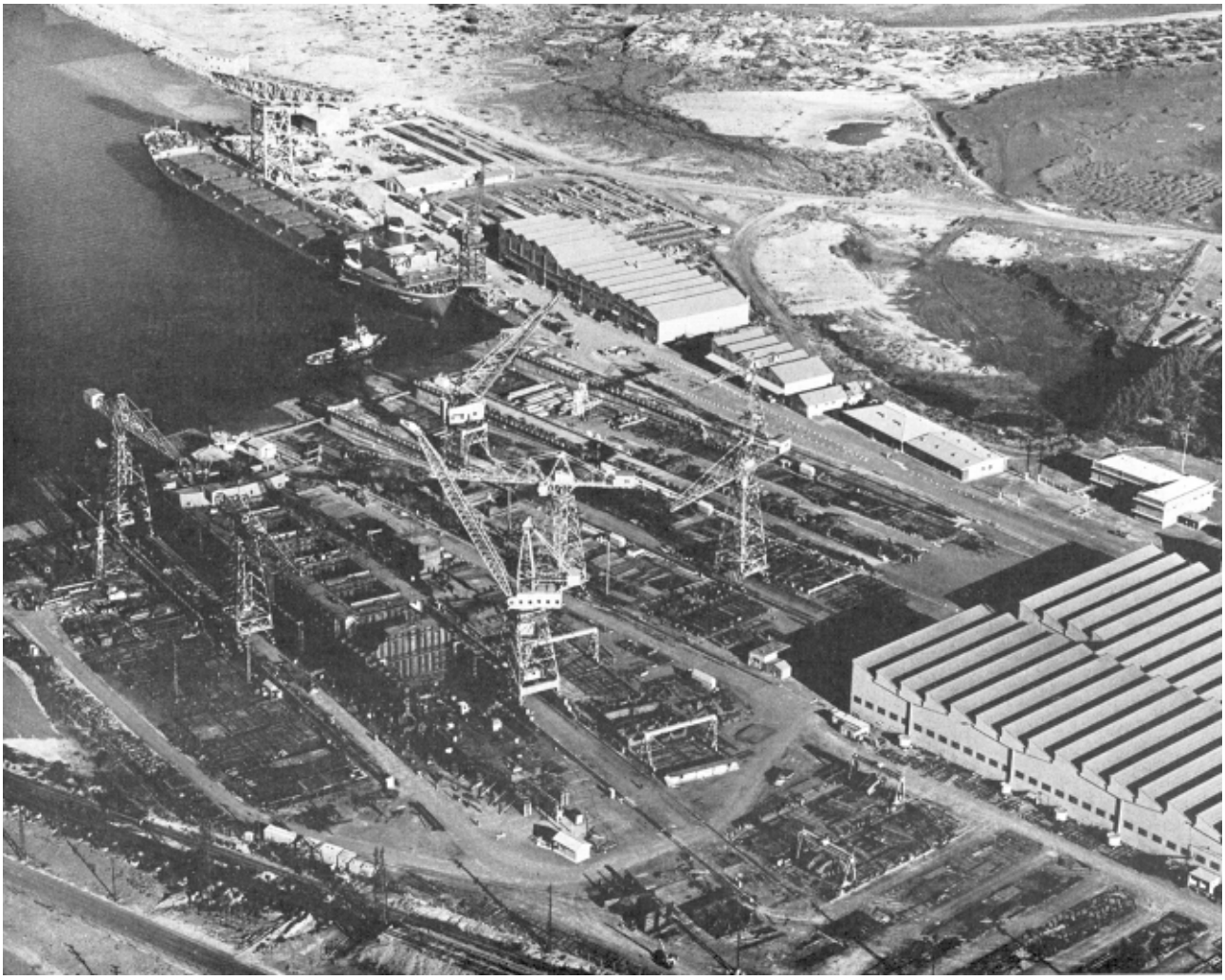
In 1900 the Broken Hill Proprietary Company Limited acquired the deposits of iron ore at Iron Knob in South Australia, near Port Augusta at the head of the Spencer Gulf. In 1913 large quantities of iron ore began to be smelted at the BHP steelworks at Newcastle in NSW. By the end of World War I, some 190 000 t of steel was being produced annually.

In 1938, BHP decided to construct a steelworks at Whyalla, and in December 1939 the Department of the Navy asked BHP to consider the establishment of a shipyard at Whyalla to build small escort vessels for the British Admiralty. The company agreed immediately and work began on the layout of the shipyard a little to the north of the town. An artificial harbour to be shared by the shipyard and the steelworks was built, and by mid 1940 work was sufficiently advanced for the first ship to be laid down.

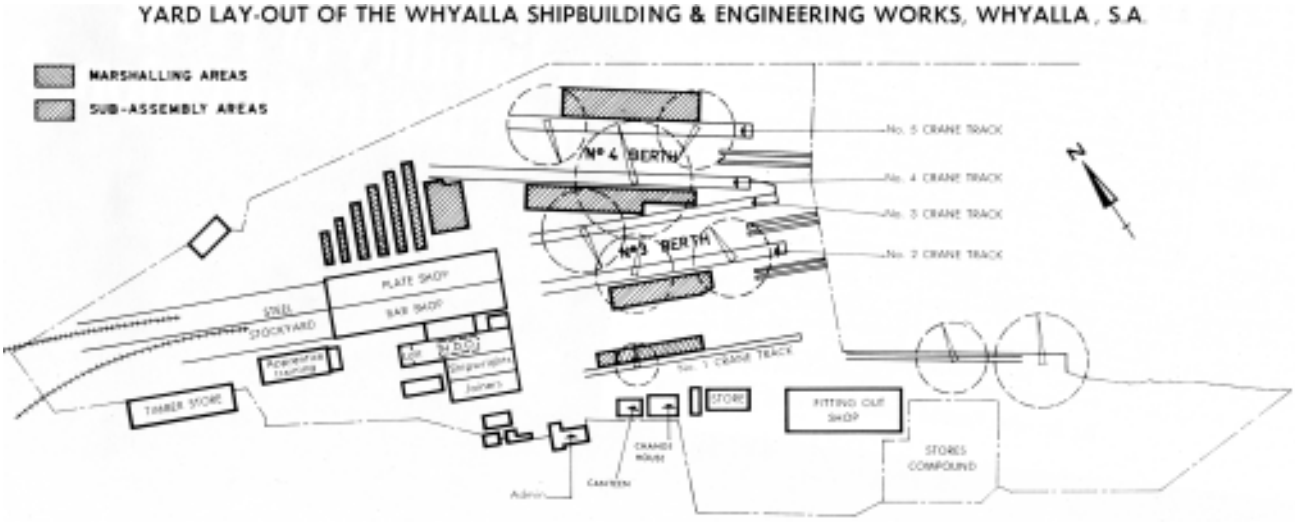
The shipyard was laid out with three slipways capable of building ships up to about 15 000 dwt. Within a year another two slipways were added. The workshops were very well equipped for the construction of the hulls, outfit and machinery. A 182 m long fitting-out wharf was built, served by a fixed 153 t tower crane and a 15 t travelling luffing crane.

The keel of the first naval ship, to become HMAS *Whyalla*, was laid on 12 July 1940. She was launched on 12 May 1941 and delivered on 8 January 1942. HMA Ships *Kalgoorlie*, *Gawler* and *Pirie* followed. They were to be the only warships built at Whyalla. In July and August 1941 the company also laid the keels of two Chieftain-class ore carriers for their own service. These 129 m long, 8 176 t dwt ships, *Iron Monarch* and *Iron Duke II*, were similar to others built for the company in Scotland.

In 1942, work began on the construction of the first of five River-class standard freighters for the Australian Shipbuilding Board as part of the war emergency shipbuilding programme. By the time the last of these ships, *River Murray*, was completed in 1945, the Whyalla shipyard was the largest and one of the best-equipped shipyards in



The Whyalla Shipbuilding and Engineering Works in 1966. The bulk carrier at the fitting-out wharf is the 49 375 t *Darling River*, while *Bogong* of 55 000 t is under construction on the slipway
(From *Shipbuilding in Australia*)



The layout of the Whyalla Shipyard in 1968
(From *Shipbuilding in Australia*)

Australia. The capability of the yard was enhanced by the considerable engineering capacity of the BHP group, particularly at the BHP Newcastle steelworks and the AIS Port Kembla steelworks.

By 1957 thirty ships had been completed at Whyalla, for the RAN, BHP and the Australian Shipbuilding Board. These ships had been predominantly riveted, but welding was becoming more common and it was decided to modernise the shipyard to construct all-welded ships more efficiently. New, larger cranes were bought and existing cranes relocated to construct ships on two slipways which were enlarged to take ships of 230 m x 31.5 m and 203 m x 27 m respectively. Steelworking facilities were improved and prefabrication areas established. Modern welding equipment was acquired and 1/10 scale lofting introduced with new plate-cutting equipment. Steel throughput was increased to about 10 000 t per annum, and the number of employees in the yard grew to 1 500.

From 1940 the shipyard had been part of the BHP Whyalla steelworks organisation. In 1964 the shipyard became a separate division as the Whyalla Shipbuilding and Engineering Works, with a manager reporting directly to the company's head office.

The Whyalla shipyard was supported by a considerable technical staff, and benefited from a technical aid agreement with Ishikawajima-Harima Heavy Industries Ltd of Japan. This ensured assistance with the preparation of design and working drawings and the shipyard was an early adopter of modern shipbuilding practices, including early outfit of structural units prior to erection on the slipway.

In addition to the construction of bulk carriers, tankers, container ships and specialised cargo ships, Whyalla also built a semi-submersible oil-drilling rig, *Ocean Digger*, the first of its kind to be built in Australia. Perhaps the most notable ships built in the yard were the specialised steel product carriers *Iron Monarch* and *Iron Duke*, completed in 1973 and 1974. These were the first ships in the world to be fitted with industrial gas turbines for propulsion. *Iron Duke* had a short life, but the (since re-engined) *Iron Monarch* is still in service today.

Further gas turbine powered ships followed — *Seaway Prince*, *Union Rotorua*, *Union Rotoiti*, *Seaway Princess* and the last two major ships built in Whyalla, the bulk carriers *Iron Carpentaria* and *Iron Curtis*, completed in 1977 and 1978. *Seaway Prince* was the first gas turbo-electric merchant ship to go to sea since the diesel-electric Shell tanker *Auris*, which was fitted with an experimental gas turbine driven generator in 1951.

The first ship completed at Whyalla — the Bathurst-class minesweeper HMAS *Whyalla*
(Photograph John Jeremy Collection)

The unit-load carrier GTV *Seaway Prince* under construction at Whyalla in May 1974
(Photograph John Jeremy)

Despite the modern management approach, innovative design and engineering, and the high-quality product typical of many Australian shipyards, the economic survival of the Whyalla shipyard depended on the continuation of the subsidy/bounty schemes and prohibition on the import of ships that had supported merchant ship construction in Australia in the decades following World War II.

The subsidy scheme was administered by the Australian Shipbuilding Board, which actually bought ships from the builders for resale to the ship owner at a reduced price. The subsidy was later replaced by a bounty which in the early 1970s was as high as 45% of the cost of the ship. This level of government support was largely justified on the grounds that the maintenance of the merchant shipbuilding industry was required for defence purposes. Many ships were built this way, but the industry suffered from constant reviews of the scheme by the Tariff Board (later the Industries Assistance Commission) with consequent uncertainty about the on-going level of government support.

In a 1976 review the Industries Assistance Commission concluded that the types of ships being built at Whyalla and by the State Dockyard in Newcastle were not of primary defence significance, and that production was uneconomical and should cease. In 1977 the government announced the abolition of restrictions on the import of ships over 6 000 t gross, a decision that led to the end of the construction of large merchant ships in Australia.

The shipyard in Whyalla closed in 1978, by which time sixty-six ships had been built there.

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The tanker *Arthur Philip*, built for the Botany Bay Tanker Company, at the fitting-out wharf at Whyalla in May 1974 (Photograph John Jeremy)

Vale David Baron

David Charles Baron died on 28 March 2003. A native of the United Kingdom, David migrated to Australia as a child. He graduated with a BE in naval architecture (with Honours Class 2, Division 1) from UNSW in 1974 and subsequently worked with the Whyalla Shipbuilding and Engineering Works, AMSA and ultimately, with Richard Dunworth, formed the company Baron and Dunworth. His career also included a period with Brooke Marine in the UK where he worked on HMAS *Fremantle*.

He is survived by his wife, Georgie, and three of their four children. A more complete obituary will be printed in the next issue of *The Australian Naval Architect*.

Bryan Chapman

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