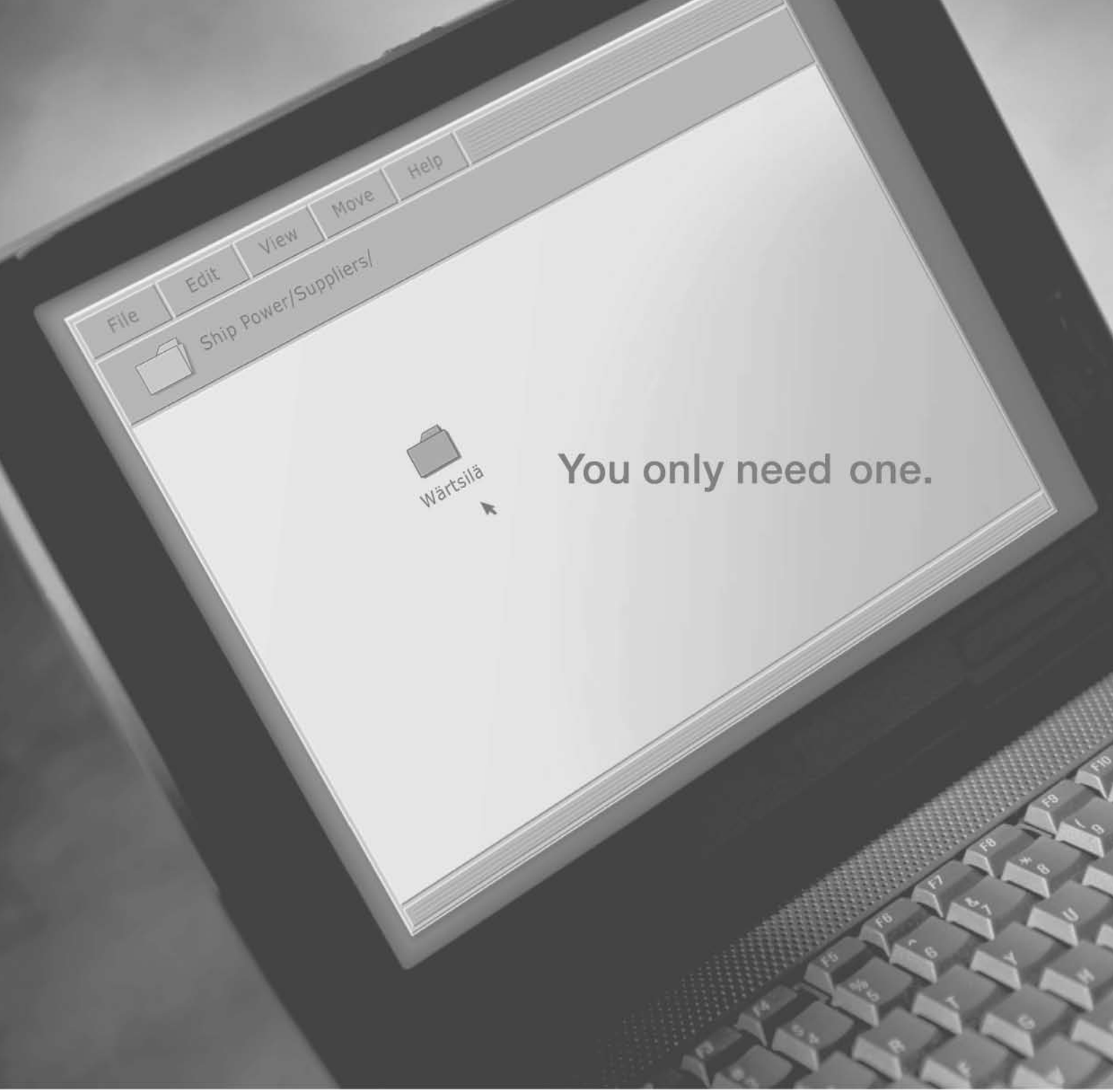
THE AUSTRALIAN NAVAL ARCHITECT

Volume 10 Number 1
February 2006



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THE AUSTRALIAN NAVAL ARCHITECT

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(Australian Division)

Volume 10 Number 1
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Cover Photo:

Three generations of RAN patrol boats together in Darling Harbour, Sydney. The ANMM's *Advance* outboard of HMAS *Townsville* and HMAS *Armidale* (Photo John Jeremy)

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From the Division President

In keeping with the practice which I began last year, this column constitutes my report on the calendar year 2005 to the Annual General Meeting scheduled for 14 March 2006.

After last year's 25th anniversary of the formation of the Australian Division, the year was one of further consolidation of our role within the engineering profession, within the Institution, and of our interaction with the Australian community.

A noticeable trend within the profession has been the increasing demand by employers for their engineers and naval architects in particular to be registered with "chartered engineer" status. In recognition of this trend and with the authority of RINA's (London) Council to sign on behalf of the Institution, on 5 September I completed a Memorandum of Understanding on the provision of "chartering" services with the Defence Materiel Organisation. It is expected that this MoU will be the first of a number of similar agreements with various employers. A further response to the recognition by Australian employers has been the increased number of interviews conducted by the Division as the final step in fulfilling the requirements for CEng registration.

These developments reinforce the Division's position, recognised in our Heads of Agreement with Engineers Australia, as the "paramount international learned society in the field of naval architecture".

This year has also seen the extension of that Heads of Agreement, with a view to extending it and bringing it into the same format as similar agreements between Engineers Australia and other societies. Revision of the agreement will comprise a significant task for the Division during 2006.

Revision of the Heads of Agreement will also add to the workload of the Joint Board, chaired by Bryan Chapman, which is tasked with administering the agreement. Its main task over the past year has been to obtain final sign-off by the National Engineers Registration Board on the competencies for creation of an "area of practice" in naval architecture. Another of the Board's tasks for 2006 will be to establish the competency panels through which this area of practice will be administered.

The Australian members of the Institution's Council have been active in the meetings of our governing body, encouraging it to take an outward focus and progress the tasks of not only directing the Institution but also making it more truly international in terms of organisation as well as membership. While I have participated in these Council meetings by teleconference, both Noel Riley and Bryan Chapman travelled to London at their own expense to more effectively promote progress in this area which is important to the future direction of the Institution. I would anticipate that the Chief Executive will report to members during 2006 on this work by Council. In closing on London Council matters, I would like to acknowledge the time, effort and expense that Noel Riley has put into his membership of that Council. Since Noel has reached the end of his maximum term, members of the Division have nominated John Jeremy to succeed him on Council.

Divisional nominees have also been active on the Headquarters specialist committees on Safety, Small Craft and High-speed Vessels. It is through these committees that the Institution seeks to improve national and international standards in these specialist areas.

The Division's own Safety Group was also active during the year, particularly in assessing the technical aspects of the Australian Builders Plate which is being introduced through the National Marine Safety Committee as a legislative requirement for most pleasure boats sold in Australia. As a result of the work, undertaken by Safety Group members on a voluntary basis, the Division wrote to NMSC providing its input on this subject. The Safety Group is likely to have a high workload again during 2006, providing comments on drafts of the various safety standards being developed by NMSC.

A major task continuing through the year was preparing for our major biennial event, the Pacific 2006 International Maritime Conference, held at the end of January. It was another highly successful conference reflecting great credit on John Jeremy (Chairman) and Keith Adams as our representatives with IMarEST and Engineers Australia on the organising committee.

At the end of the year, the Division received an invitation to make a submission to the Senate inquiry into naval shipbuilding. It appears that the Divisional Council will have a busy start to the year in responding to this invitation.

The Australian Naval Architect continued to be an important and effective part of the Division's activities. It continues to develop as a journal of high standard of which the Division is rightly proud and is well supported by the Division membership and a respectable international readership. Achievement of this support has been largely due to the efforts of the Editor-in-chief John Jeremy and the Technical Editor Phil Helmore. I also want to acknowledge the continuing and generous financial support given to the journal by Wärtsilä and other advertisers, which is very much appreciated. Thanks to this support, the journal continues to be produced at minimal net cost to the Division.

All Sections, including the South Australian Sub-committee, have active and enthusiastic committees. As ever, the activities of Sections are the result of the efforts of Section members and are reported in *The Australian Naval Architect*. Sections also have web pages that are accessible through the Institution's site, which they are encouraged to keep updated and use to the fullest practicable extent. In this regard, members should note that the RINA web site is to be upgraded during 2006 with the intention of making it more accessible and informative from a user's perspective and more readily updated by the Division and Sections.

The Division has continued to provide prizes for students in naval architecture at both the Australian Maritime College and the University of New South Wales. While congratulating the students who have been awarded these prizes, the Division is particularly indebted to Austal Ships for their continued support of the joint RINA/Austal prizes at both of these institutions.

In making this report, I have generally avoided naming individuals, as it would be remiss of me to avoid naming those who want to stay out of the limelight while naming others. But the progress made by the Division is due to

the collective efforts of its members and I would like to express my thanks to members for their continued support. Special thanks are due to those individuals and sponsors who have donated time and resources to the activities outlined above. I would also like to thank Brian Hutchison, who has reached the limit for continuous service on the Division Council, and others who are retiring at the 2006 AGM as Section nominees, and look forward to the participation of the new Council members. Particular thanks are due to our Treasurer, Allan Soars, for securing our financial stability and Secretary, Keith Adams, whose vigilance, energy and wise advice to both the Division Council and to me ensures that the Division continues to run smoothly.

Rob Gehling

Editorial

The outstandingly-successful Pacific 2006 International Maritime Exposition and Congress held in Sydney in early February provided a unique opportunity for three generations of RAN patrol boats to be photographed together in Darling Harbour. The Australian National Maritime Museum's *Advance* (Attack class) secured alongside HMAS *Townsville* (Fremantle class) and HMAS *Armidale*, the first of the new patrol boats being constructed by Austal Ships in Western Australia.

The Attack class were designed in Australia by Navy Office under the supervision of Principal Naval Architect, John Follan, for general patrol duties, search and rescue, and seaward and harbour defence. Built in Australia in the late 1960s, they were soon being used for tasks well beyond the original design brief and their successors, the larger Fremantle class, were intended to be able to be able to spend more time at sea and provide much more capability than the over-stretched Attacks.

Ordered in the risk-averse 1970s, the design of the Fremantle class was chosen after an international tendering process and a competitive project definition to choose between the proven designs offered by Lurssen of Germany and Brooke Marine of Britain. The Brooke Marine design won and most were built in Australia by NQEA in Cairns.

The Armidale class arises from a contract to provide patrol boat capability and availability, rather than simply a number of ships. Much larger than their predecessors, these Australian designed-and-built aluminium ships are also crewed by the RAN in a relatively novel way to maximise the available time that the ships can remain at sea.

The procurement of the Armidale class is in complete contrast to the conservative 'minimum technical risk' approach of the 1970s. That approach had resulted from the experience of designing a new 'light destroyer' for the RAN, which began as a relatively simple 2 750 t ship in 1968 but had grown to an unaffordable size of about 4 000 t when the project was abandoned in 1973. The 'proven design only' approach dominated RAN design selection for many years.

As we enter the new century with renewed confidence in our own abilities to get it right (recognising that increased risk can sometimes mean that we don't), we are again starting the design of a major warship for the RAN — the air-warfare destroyer. The project makes the DDL look relatively straightforward, but many lessons should have been learned in the intervening years which will help ensure the project's success. In particular, the AWD has a fall-back — the Australianised F100 — which the DDL did not. Of course, despite that the DDL successors, the US-designed guided missile frigates (FFG), have served Australia very well.

There will be many challenges ahead before the new HMAS *Hobart* sails into Sydney on the planned date of 4 October 2013 — just in time for Pacific 2014. Eight years may seem a long time but I expect that they will be busy ones.

John Jeremy

THE ROYAL INSTITUTION OF NAVAL ARCHITECTS
AUSTRALIAN DIVISION

NOTICE OF ANNUAL GENERAL MEETING

Notice is hereby given that the Annual General Meeting of the Australian Division of the Royal Institution of Naval Architects will be held in the Harricks Auditorium of Engineers Australia, Eagle House, 118 Alfred Street, Milsons Point NSW on Tuesday 14 March 2006.

The meeting will commence immediately following the combined RINA/IMarEst Technical Meeting commencing at 5.30 pm for 6.00 pm Sydney time.

AGENDA

1. Opening
2. Apologies
3. To confirm Minutes of the AGM held in Sydney on Tuesday 8 March 2005
4. To receive the President's report
5. To receive, consider and adopt the Financial Statements and Auditor's Report for the year ending 31 December 2005
6. Announcement of appointments to the Australian Division Council
7. Other business

Keith M. Adams
Secretary
February 2006

Letters to the Editor

Dear Sir,

I would like to add to the article on *Hull Infusion at Perry Catamarans* by Peter Holmes in the November 2005 issue of *The ANA*. It was great to see an article on advanced materials and processes.

The resin infusion process uses a pressure gradient to force resin to travel through sealed constituents. The process is regarded as "open technology", which means builders may embrace it without engineering consultation. Add to that the "all or nothing" nature of the process, and it is easy to see that expensive failures can happen.

In the majority of cases, that does not happen. In ten years of doing this within the DIAB group, not a single full scale structure had to be written off. Consider the case where the resin prematurely gels and the hull does not completely wet out with resin. Such cases can almost always be repaired by strategically relocating the resin and vacuum inlets to finish off the job.

Successful infusion is built upon intellectual investment. The first step is to understand how resin flows through laminates and cores under vacuum over different shapes. Once builders become skilled at this, the resin infusion process becomes very predictable. Moreover, careful planning of the infusion strategy will expose "trouble-making" variables, which may be resolved before resin is introduced into the part. From a production point of view, the resin infusion process offers a high degree of quality control.

Currently, in Australia, the technology is mostly used in medium-to-large productions of privately-operated vessels. For commercially-operated vessels, steel and aluminium remain the preferred choice as they are the most economical materials from a manufacturing point of view. However, studies have shown that, from a life-cycle perspective, composite vessels can be more profitable than steel and even aluminium vessels.

In the marine industry, there is an inherent resistance to the use of new materials and processes. The merits of the resin-infusion process are widespread and are best left to form a more detailed article. For now, I would like to encourage more composite-related articles to be submitted in order to overcome the resistance.

Ramesh Watson
Project Engineer
DIAB Australia Pty Ltd

Dear Sir,

I am currently studying naval architecture The University of New South Wales. The program is very thorough, especially on the technical aspects of ship design. However, I have yet to come across a course that informs me on the effects of vessel pollution on the marine environment.

The recent rise in petrol prices has focused my attention on whether the sustainability of oil as our prime energy source will last much longer. This is not only in terms of availability, but especially because pollution is on the rise and society is looking for means to try and reduce green house emissions (as we should, under the Kyoto Agreement).

Surely consumers will also want their cars and boats to be environmentally friendly. I am aware that the motor-vehicle industry has picked up on this, and we now see electric and hybrid cars on the road. I tried searching on the Internet for articles on environment-friendly vessels, but was disappointed by the lack of available information. It may be that I was not using the right keywords, or the search engine failed to find the articles, but it appears that there is indeed a lack of research and innovation into environmentally-safe vessels.

Should this not be a concern for us as naval architects, since the vessels which we design have the potential to pollute both the skies and the sea?

Regina Lee
UNSW Student

Dear Sir,

Being a student of naval architecture, my understanding of much of the material in some of the RINA publications is sometimes quite limited. I find myself struggling to follow some of the more technical articles. However, I find *The Australian Naval Architect* to be a far more enjoyable read because of its friendlier approach. The articles are informative, while being in a language more easily understood by the less-experienced readers.

The ability to have a look at the current state of the industry has been very useful, especially in keeping my interest in naval architecture alive during our first two years of pure science and mechanical engineering subjects.

Apart from the style of the writing, some of the sections within *The Australian Naval Architect* continue to stoke my interest in the subject. The *Education News* and the *From the Archives* columns, in particular, have always been very interesting. I enjoy the education column mainly because it allows me to gauge where I am in relation to the rest of the industry. The archives section is always a pleasure to read. The history of the profession and the industry is always fascinating, and I still remember my first issue and being enthralled by the evolution of Australian tugs over the years.

I would like to thank you for making this well-written and informative publication available to students like myself, as it has played an important role in our education, and is always a great read.

Jun Ikeda
UNSW Student

NEWS FROM THE SECTIONS

Western Australia

The new-look WA Section committee has started putting together what promises to be a good year of technical presentations and social events.

The first presentation was by the President of RINA, Mr Nigel Gee, who spoke on the X-Craft project. The Office of Naval Research in the United States commissioned the design and build of the X-Craft that will be used to demonstrate mission modularity and evaluate hydrodynamic performance and operational availability of the vessel for use in the littoral area. The vessel has been named *Sea Fighter* and is classed as a Fast Sea Frame, a new class of vessels in the US Navy. The X-Craft is required to carry up to 700 t of deadweight and be capable of operating at a maximum speed of up to 60 kn, and 45 kn in sea state 4. The X-Craft is also to be capable of self deployment over 4000 n miles at a speed of 20 knots.

Sea Fighter was built by Nichols Brothers Boat Builders in Washington State, USA, and launched in February 2005. Nigel Gee's presentation described in detail the design and development of the X-Craft hullform and the innovative technologies used onboard the ship.

The WA Section library has recently received a significant contribution of books and technical journals from Mr Phil Curran. The section would like to take this opportunity to thank Phil for his generosity.

The library gladly accepts any books, papers or journals from members who may no longer want them. All contributions are added to the register which is available for download from the RINA WA website. Members are then welcome to arrange to borrow items from the library on short-term loans. Unfortunately, loans can only be made to local members who are actually able to meet at the library to pick up or return items, although interstate members are welcome to access the library by arrangement should they happen to find themselves in the Fremantle area.

On the social side the now defunct beer-can challenge is soon to be replaced by an even bigger event. Details will soon be announced once the arrangements are finalised, but we can reveal that there is every likelihood that water will be involved.

Shaun Ritson

Queensland

The last three months have been very busy for the Queensland Section with most organisational work being done by our Hon. Secretary/Treasurer, Brian Hutchison. The quarterly section committee meeting was held on 25 October, there was a technical meeting held on 1 November, an end of year social river cruise on the Brisbane River on 13 December, and there was the visit of our RINA Chief Executive to Brisbane on 26 and 27 January 2006.

The section committee meeting was held by teleconferencing which has proven very convenient because of the vast statewide distances between participants. The prime agenda items discussed were the progress made with the implementation of the Queensland TAFE Certificate IV in Engineering, Diploma of Engineering and Advanced Diploma of Engineering (Ship and Boat Design) which, unfortunately, is at a stalemate despite the efforts made to get it up and running during 2006. The section committee will continue its efforts through the appropriate government authorities to get this course started in 2007. It was also agreed at the meeting that the State List of Naval Architects, Consultants, and Surveyors should continue to be supported and to encourage more members to register their details and expertise. The End-of-year Social was also addressed by the committee.

The technical meeting held on 1 November at the Brisbane North Institute of TAFE consisted of a follow-on presentation by John Lund on *The Design of a 4 500 DWT Self Loading Ore Barge,* originally given by John to the Queensland Section on 7 December 1999. John has recently sold his business, Commercial Naval Architects Pty Ltd (CNA) and is now acting as a consulting naval architect in South East Queensland.

After outlining the design of the barge for service in the north of Western Australia, John mentioned that CNA was contacted (and later contracted) by a mining company on the Black Sea coast of Turkey having similar requirements, but involved in the transfer of copper and zinc ore concentrates.

John related the design principles and experience gained in the Western Australia, contract with forecast cargo requirements, operational requirements and environmental safeguards, researching Black Sea tidal and sea conditions and other factors to determine feasibility of operation, design and construction options. Site inspections and negotiations led to a design contract for a vessel to transport cargoes of copper and zinc ore concentrates from a specially-built wharf complex to ship side to load the bulk carrier at a rate of about 600 t/h.

In addition to the design of the hullform for a self-propelled carrier having a top speed of 7.5 kn, the contract included the equipment for the discharging of the ore concentrates and safe storage in an asymmetrical weather-deck-mounted bin. John outlined the owners' and legislative requirements which included loading, unloading, and transport of the concentrate in up to 1.5 m seas with no spillage into the natural environment. This environmental protection and concern applied also to the washing down of the deck into collection tanks as no contaminants were to enter the Black Sea. A telescopic rain cover was also included in the design, as the concentrates had to be delivered with a specific moisture content.

John responded to questions with respect to construction options, protective surface coatings, and period to complete the contract from feasibility to approval of the design. He also provided information on his very favourable impression of the Turkish shipyards, their sophisticated operation and technological capacity, and their competitive prices.

The End-of-year Social proved to be most successful with thirty seven members and guests attending a cruise and barbecue on the Brisbane River. Many thanks must go to James Stephens and his team for organising the function and to the following sponsors:

Poly Flex Marine Products Australia
Electronic Marine Solutions Pty Ltd

Lloyd's Register Asia

Hopefully, a similar event can be organised for 2006.

The RINA Chief Executive, Trevor Blakeley, spent 26 and 27 January in Brisbane and its surrounds. On Australia Day, Trevor and his wife Pat, together with Brian and Roz Hutchison spent most of the day at Brian and Judy Robson's house at Noosa Waters on the Sunshine Coast, with good food and wine (and of course intelligent conversation) doing their little bit to celebrate the day. On this occasion Trevor took the opportunity to present Brian Robson with his RINA 40 years Continuous Membership Certificate which was very much appreciated by Brian.

Trevor Blakeley presenting Brian Robson with his 40 years Continuous Membership Certificate
(Photo courtesy Brian Robson)

On the morning of 27 January Trevor visited the Forgacs Cairncross Dockyard to meet with George Windram. Together with Brian Hutchison they had a quick inspection of the facilities and work in progress. This included the repair to the cruise vessel *Paul Gauguin*, construction of a steel-hulled workboat for the Port of Brisbane Corporation, the construction of a shiploader for Dalrymple Bay Coal Terminal, and the main engine repairs to the tanker *Moana C.*

Also on the morning of the 27 January, Trevor and Brian Hutchison visited the premises of Norman R. Wright and Sons Pty Ltd at Bulimba on the banks of the Brisbane River. An inspection was made of the facilities and a presentation was made to Ron Wright with a RINA 55 years Continuous Membership Certificate. Ron Wright also made a presentation to Trevor Blakeley of a publication on the construction in Australia and history of the WWII Fairmiles for inclusion in the RINA Library in London.

On the afternoon of 27 January, Trevor Blakeley and Brian Hutchison inspected the building facilities of Brisbane Ship Construction Pty Ltd and work in progress there. This included two 18 m catamarans due to be launched the following week, one 27 m catamaran due to be launched in four weeks, a 10 m high-speed monohull interceptor, one 8 m patrol catamaran and a 6.5 m patrol monohull. An inspection was also made of the industrial estate production facilities downstream of the Gateway Bridge over the Brisbane River.

In the early evening Trevor met with members, prospective

Trevor Blakeley presenting Ron Wright with his 55 years Continuous Membership Certificate
(Photo courtesy Brian Hutchinson)

members and industry supporters at the offices of Brisbane Ship Construction. The meeting was chaired by James Stephens, Deputy Chair of the Queensland Section.

Brian Robson

New South Wales

SMIX Bash 2005

The sixth SMIX (Sydney Marine Industry Christmas) Bash was held on Thursday 1 December aboard the beautifully-restored *James Craig* alongside Wharf 7, Darling Harbour, from 1730 to 2130. The Bash was organised jointly by RINA (NSW Section) and IMarEST (Sydney Branch).

203 guests came from the full spectrum of the marine industry, including naval architects, marine engineers, drafters, boatbuilders, machinery and equipment suppliers, regulators, classification societies, surveyors, operators, managers, pilots, navigators, researchers, and educators. Equally importantly, the full spectrum of age groups was represented, from present students to the elders of the marine community.

It was also great to see intrastate and interstate visitors in the throng, including Rob Gehling, President of the Australian Division, from Canberra, Martin Williams from ADI limited in Newcastle, Gregor Macfarlane, Giles Thomas and Jon Duffy from the AMC in Launceston, Jim Black from Austal Ships in Western Australia, and international visitors Phil Brodie and Dave Hopkins from Hamilton Jets in New Zealand.

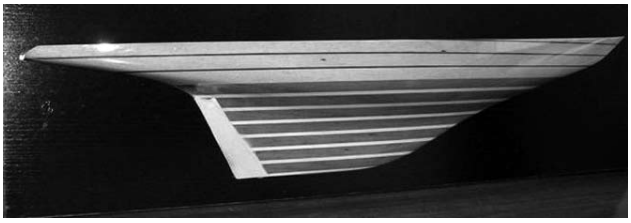
Sydney turned on a beautiful evening and many partners in attendance enjoyed the view of Darling Harbour and the city skyline from the decks of *James Craig.* Drinks (beer, champagne, wine and soft drinks) were provided, and a delicious buffet dinner was served in the 'tween decks.

This year we continued "early bird" pricing and credit-card facilities for "early bird" payments, and this turned out to be equally successful as last year, as all tickets were sold before the event.

Formalities were limited to a short speech by the Chair of the NSW Section, Phil Helmore, who welcomed the guests and thanked the organising committee and the industry sponsors.

Some of the crowd enjoying drinks on board *James Craig*
(Photo courtesy Adrian Broadbent)

The SMIX Bash Raffle was back, bigger and better than ever this year, with three prizes. Bill Bollard had built a magnificent half-block waterline model of Australia's first challenger for the America's Cup, *Gretel*. This was particularly appropriate for 2005, as *Gretel's* designer, Alan Payne, was inducted into the America's Cup Hall of Fame in September, in the presence of his wife, Wendy, and daughters Rozetta and Sarah. Our thanks to Bill for his expertise in building and generosity in donating this model. The University of New South Wales had donated a framed print of Operation Sail'88, the 1988 tall-ship visitors to Sydney, and Claude Gonzales, the director of the documentary of the Japanese submarine attack on Sydney Harbour during World War II, had donated a DVD of the documentary. The raffle was drawn on the evening of SMIX Bash by Mrs Ann O'Connor. Third prize of the DVD went to Shing Tong from Lloyd's Register Asia; second prize of the framed print went to Nick Flynn from ADI Limited, and the first prize of the *Gretel* model went to Phil Brodie from Hamilton Jets. Congratulations all!



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

RINA NSW would like to thank all our wonderful sponsors, without whom SMIX Bash could not happen:

Platinum Sponsor

- Wartsila Australia

Gold sponsors

- Akzo Nobel (International Paints)
- Adsteam Marine
- ABS Pacific
- ADI Limited
- AMC Search
- Cummins South Pacific
- Det Norske Veritas
- Electrotech Australia
- Energy Power Systems (Caterpillar)
- Germanischer Lloyd
- Lloyd's Register Asia
- MAN B&W Diesel
- Rolls Royce Marine Australia
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- ZF Australia

Silver sponsors

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- DIAB Australia
- EMP Composites
- Hamilton Jet
- Spear Green Design
- Twin Disc (Pacific)

Bronze sponsors

- JG Shipping Services (Joe Gaioli)
- Jotun Australia

Our thanks to them for their generosity and support of SMIX Bash 2005.

Committee Meetings

The NSW Section Committee met on 6 December 2005 and, other than routine matters, discussed:

- SMIX Bash: Aftermath of the 2005 event, and possible improvements for 2006. Not all sponsorships have been received, but projections are for a small profit.
- Venue for RINA Committee Meetings: ABS Pacific offices in North Sydney have been offered.
- TM Program for 2006: The draft program of meetings for 2006 had been circulated and was accepted (see the *Coming Events* column in this issue).
- Budget for 2006: The draft budget had been circulated and was accepted for forwarding to the AustralianDivision.
- Pacific 2006: A roster for crewing the RINA stand at the Pacific 2006 International Maritime Exhibition had been drawn up.
- Finance: We currently have $4303 in the bank, made up of $4484 in the Social Account (including SMIX Bash monies), and the Section Account $181 in the red; i.e. the social account is keeping the section account afloat. However, we are owed $382 by the AD for venue hire, and this will put the Section Account = $201 into the black.
- AD Council Report: A summary was given of the discussions at the Australian Division Council meeting held on Thursday 1 December.
- Membership: Some members are active in recommending membership of RINA. However, free student memberships are not translating into graduate memberships, and discussion of possibilities ensued.

The NSW Section Committee also met on 7 February 2006 and, other than routine matters, discussed:

- SMIX Bash: Possibilities for increasing numbers canvassed, including limits on *James Craig* and ANMM finger wharf. Some sponsorships still outstanding, and further possibilities discussed.
- Venue for RINA Committee Meetings: ABS Pacific offices in North Sydney voted a success.
- TM Program for 2006: Minor revision to schedule of

presentations for 2006 (see the *Coming Events* column in this issue).
- Committee Positions for 2006: Positions and portfolios on the NSW Section Committee for 2006 were canvassed.
- Fisher Maritime Course in Melbourne: Noted (see the *Coming Events* column in this issue).
- As of 31 December 2005 we had $4688 in the bank, made up of $4484 in the Social Account (including SMIX Bash monies), and $204 in the Section Account.
- Continuing Professional Development: The question of proof of attendance at technical meetings was raised; this is not usually necessary but, if required, then this could be attested by the Secretary of IMarEST who keeps the signed attendance records.

Pacific 2006

The Pacific 2006 International Maritime Conference was held at the Sydney Exhibition Centre, Darling Harbour, from 31 January to 2 February 2006, and the International Maritime Exhibition was held there from 31 January to 4 February 2006.

RINA had a stand at the exhibition, crewed continually (well … almost) by members of the NSW Section Committee and by the Chief Executive, Trevor Blakeley. Thanks to members of the NSW Section Committee, Craig Boulton, Adrian Broadbent, John Butler, Geoffrey Fawcett, Craig Hughes, Bruce Mcrae, and Graham Taylor for their effort and providing the benefit of their wisdom to interested customers.

CE Presentation to DMO and LR

The Chief Executive, Trevor Blakeley, made a presentation to employees of the Centre for Maritime Engineering of the Defence Materiel Organisation and Lloyd's Register on the Thursday evening following the Pacific 2006 program, regarding the benefits of corporate membership of RINA.

Many organisations are now finding that, in order to comply with professional indemnity requirements, they need to ensure the qualifications and continuing professional development of their employees. One way of doing so is via the professional societies in the industry, and for naval architects in Australia you need look no further than RINA. Also, RINA now has an agreement with Engineers Australia that corporate memberships are mutually recognised, and both have requirements for continuing professional development. [*How long since you last updated yours and checked compliance?* — Ed.]

Continuing this line of reasoning, some organisations are proposing that, if an employee attains corporate membership of their industry's professional society, then the organisation will pay the annual membership fee for that employee.

We live in interesting times.

Phil Helmore

THE INTERNET

Maritime Museums

A recent search for some historical data on the web came up with Robert Smith's Master Index of Maritime Museums. The website, www.maritimemuseums.net, provides links to hundreds of maritime museums around the world. You can search by location, e.g. USA (by state), Australia/New Zealand, Canada, South America, Africa, Asia, Europe, West Indies, or the UK.

If you are looking for a particular maritime museum, or just browsing, then this could provide a good start.

Phil Helmore

WALTER ATKINSON AWARD 2004

The Council of the Australian Division of RINA is pleased to announce that Dr Craig Gardiner of the Platform Sciences Laboratory, Defence Science and Technology Organisation and a member of the Victorian Section has been awarded the Walter Atkinson Award for 2004.

Dr Gardiner's paper, *Structural Analysis of the Huon-class Minehunter Coastal* was presented at the Pacific 2004 International Maritime Conference held in Sydney 3-5 February 2004.

A notice calling for nominations for the Walter Atkinson Award 2005 appears elsewhere in this edition of *The Australian Naval Architect*.

COMING EVENTS

Australian Division AGM

The Annual General Meeting of the Australian Division of RINA will be held on Tuesday 14 March immediately following the scheduled technical meeting of RINA (NSW Section) and IMarEST (Sydney Branch) at 5:30 for 6:00 pm in the Harricks Auditorium at Engineers Australia, 118 Alfred St, North Sydney; see separate notice mailed to members in February.

NSW Section AGM and Technical Meetings

The Annual General Meeting of the NSW Section of RINA will be held on Tuesday 14 March immediately following the AGM of the Australian Division of RINA which, in turn, follows the scheduled technical meeting of RINA (NSW Section) and IMarEST (Sydney Branch) at 5:30 for 6:00 pm in the Harricks Auditorium at Engineers, Australia, 118 Alfred St, North Sydney; see separate notice mailed to NSW members in February.

Technical meetings are generally combined with the Sydney Branch of the IMarEST and held on the second Tuesday of each month, starting at 5:30 pm for 6:00 pm and finishing by 8:00 pm.

The venue is Engineers Australia which, for the first quarter, will remain at 118 Alfred St, North Sydney. Engineers Australia will move during the second quarter to 8 Thomas St, Chatswood, and subsequent meetings will take place there. The date for the move has not been finalised, but will be advised on the Programme of Meetings page on the NSW Section website when known.

The program of meetings for 2006 (with exceptions noted) is as follows:

14 Feb	Jon Clemesha, Defence Maritime Services, Rafael Protector *Remote Control of Port Security Gunboat*
14 Mar	RINA AD AGM and RINA NSW AGM Mori Flapan, National Marine Safety Committee, *Vessel Survey Innovations in the New National Standard for the Administration of Marine Safety*
11 Apr	Richard George, MAN B&W, *The MAN B&W Two-stroke Electronically-controlled Engine*
9 May	Stefan Reuterlöv, Diab Australia, *Marine Applications of Composites*
13 Jun	Graeme Nelmes, Patrick Terminals, *The Robotic Container Terminal*
11 JuL	Bruce McRae, Murray Burns and Dovell, *High-performance Surfboard Fins*
8 Aug	John Willy, OOCL (Australia), *The Salvage of* Jodie F. Millennium *at Gisborne, NZ*
12 Sep	Peter Goodin, Australian Marine Technologies, *From* Delos *to HMAS* Sirius*: A Serious Design Challenge*
10 Oct	Stuart Cannon, Defence Science and Technology Organisation, *Post-damage Ship Structural Strength*
7 Dec	SMIX Bash 2006

Queensland Section Technical Meeting

The next meeting of the Queensland Section will be held on Tuesday 6 March at 6.30 pm at the Frazer/Eden Room, Level 22 Mineral House, 41 George Street, Brisbane.

This meeting will include the Section's Annual General Meeting and a technical presentation by Marc Devereaux, Maritime Safety Queensland, Department of Transport on *An Update on the Technical Sections of the National Standard for Commercial Vessels.*

Contract Management Training Program

The Fisher Maritime Consulting Group, headed by Dr Ken Fisher, is returning to Australia in 2006 with its well-known and widely-respected Contract Management training program. The program will be held over three days, 2–4 August 2006, in Melbourne.

Put the dates in your diary now, and full details and the registration form will be forthcoming with the May issue of *The ANA*.

Marine Safety 2006

The National Marine Safety Committee's (NMSC) safety conferences have established a reputation as the leading marine safety forum in Australia. The Marine Safety Conference 2006 will be held at the Gold Coast International Hotel, Surfers Paradise, from Tuesday 12 to Thursday 14 September 2006.

Call for Papers

As with previous conferences, the NMSC is seeking those who wish to take the lead on issues affecting Australia's marine activities and is inviting the submission of ideas and presentations for the conference. The committee welcomes original papers from professionals, voluntary groups and associations from across the industry.

Papers are invited on the theme Towards *2010* and will focus on these topics:

- Technological Developments in the Design of Boats and Ships
- Keeping the Recreational Boater Safe
- Radio Communications for Australia
- New Developments in Navigation and Safety Equipment
- Legislation for Marine Safety
- Research into Accidents and Incidents
- Meeting the Training Agenda for the Maritime Industry
- Improving Marine Safety Administration
- Growing the Maritime and Boating Sectors in Australia
- Exporting and the International Boating Market
- A National Approach to Survey
- Promotion of the Recreational Boating Industry
- The Role of Women in the Maritime Sector
- Resolving the Relationship between the Maritime Industry and the Environment
- Safety and the Fishing Industry
- Succession Planning for the Maritime Industry

The schedule is as follows:

Submission of abstracts	1 March 2006
Submission of final paper	30 June
Conference	12–14 September

For submission of papers contact Emma Farag on (02) 9247 2124 or email efarag@nmsc.gov.au.

Conference Program

The Marine Safety Conference 2006 brings together a wide range of representatives who work in and support Australia's vast maritime industry. The conference includes special segments on recreational boating and a Shipping Symposium covering large-ship issues.

Through a streamed approach to the conference, delegates will be able to choose to attend the forums that meet their needs. The conference will also provide valuable networking and social activities for participants and their partners.

Exhibitors and Sponsors

The Marine Safety Conference 2006 is an excellent opportunity to gain exposure to major decision makers within Australia's marine industry. NMSC can provide organisations with sponsorship packages and details of conference exhibition opportunities.

For further details contact Marlene Glenister on (02) 9247 2124 or email mglenister@nmsc.gov.au.

HIPER 06

The fifth International Conference on High Performance Marine Vehicles (HIPER) will be held between 8 and 10 November 2006 at the Australian Maritime College in Launceston. HIPER Conferences are held once every two years. The inaugural conference was held in South Africa in 1999; subsequent ones have been held in Hamburg in 2001, Bergen in 2002 and Rome in September 2004.

Dr Prasanta Sahoo is the Convenor of the fifth HIPER conference which will be held at the Australian Maritime College in Launceston. Papers are invited on the design and operation of high-performance marine vehicles, such as hydrodynamic or structural analysis, or economical, ecological or safety aspects, etc. There will be two parallel sessions and proceedings will be published in hardcover book format.

The schedule is as follows:

Submission of abstracts	31 March 2006
Acceptance of abstracts	30 April
Submission of papers for review	31 May
Acceptance of papers after review	30 June
Author registration	30 July
Submission of final paper	31 August
Conference	8–10 November 2006

Fees for the conference include attendance at all technical sessions, a copy of the proceedings, lunches, refreshments, conference dinner and barbecue, and are as follows:

Registration until 16 July 2006	$850
Registration after 16 July	$950
Student (including higher degree) discount	50%

For further information, check the conference website, www.amc.edu.au/hiper06, or contact the conference secretariat at hiper06.amc.edu.au, or Dr Sahoo on (03) 6335 4822 or email p.sahoo@mte.amc.edu.au.

THE WALTER ATKINSON AWARD 2005

The Award was established in 1971 to commemorate the life, work and service of a founder member of the Australian Branch, later Division, of RINA with the objective of stimulating increased interest in the preparation and to raise the standard of technical papers presented to the naval architecture community in Australia.

A nomination for the Award may be for a presentation which includes a written technical paper or for a technical published paper, and it must be more than a promotional presentation. The paper must be first presented at a maritime conference or RINA meeting within Australia, or first published in a maritime journal within Australia during the current year. All authors are eligible.

The following are considered in the assessment for the Award:

- Is there a stated or implied purpose?
- How important is that purpose in the context of the Australian industry?
- Does the paper have any new ideas to impart?
- How easy is the paper to understand?
- How rigorous is the paper?

The Award will comprise a monetary award of $250 for an individual author, or, where there are two or more authors, each author will receive $125. In addition, each author will receive, where practicable, a framed certificate.

Call for Nominations

Nominations for the Walter Atkinson Award for papers presented in **2005** are now called and should be made by members in writing to the Secretary of the local Section (or, for NT and SA residents, the Secretary of the Division). Nominations must include a hard copy of the paper for assessment, except for papers published in *The ANA*. It is the responsibility of the nominator to obtain the consent of the author/s of the paper to the nomination.

No member of a Section Committee or the Council of the Australian Division who is an author or contributor to a paper may be involved in the nomination or decision process at any stage.

Nominations close with the Secretary of you local Section (or, for NT and SA residents, the Secretary of the Australian Division) on **Friday, 31 March 2006.**

Keith M Adams
Secretary
RINA Australian Division

GENERAL NEWS

New Alliance Council for Air-warfare Destroyer Program

An Alliance Principals' Council has been established to build strong team partnerships between the key partners of the Air-warfare Destroyer (AWD) Program, Defence Minister Senator Hill announced on 8 December.

This represents another major step for the Air-warfare Destroyer Program following the announcement that the AWD System Centre will be established in South Australia.

Senator Hill said that the Principals' Council had a very important role to play over the next two years in shaping the course of the Program, leading up to formal consideration by the Government in mid 2007.

"I am pleased to announce the appointment of Vice Admiral Chris Ritchie, RAN (Rtd) as the Chairman and independent member of the Council. Admiral Ritchie brings a wealth of Navy experience to this key position in one of Australia's most important and complex Defence Programs," Senator Hill said.

"Members of the Principals' Council are Mr John Prescott, Chairman of ASC; Mr Dan Smith, Executive Vice President of Raytheon Integrated Defence Systems; Lieutenant-General David Hurley, Chief of Capability Development Group; and Dr Stephen Gumley, CEO of the Defence Materiel Organisation.

"The AWD Principals' Council rests above the Alliance Project Board and is designed to build strong team relationships between the project's alliance partners."

The construction of the AWDs will be one of the significant shipbuilding projects undertaken in Australia to date, and will provide enormous opportunities for the Australian shipbuilding industry with important flow-on benefits for key sub-contractors throughout Australia.

In November Senator Hill announced that South Australia will be home to the new headquarters of the Air-warfare Destroyer project creating up to 200 additional jobs in SA, as well as generating specialised design work for contractors throughout Australia.

The systems centre will include representatives from the Alliance Partners — the Commonwealth, the shipbuilder ASC, the systems integrator Raytheon and the ship designer.

Purchase of Aegis Combat System for Destroyers

Key components of the Aegis combat system for Australia's air-warfare destroyers (AWDs) are about to be purchased at a cost of $1 billion to reduce project risks and capital costs, Defence Minister Robert Hill announced on 9 December. Senator Hill said that the Government has approved the purchase of three Aegis weapon systems from the United States Navy that will form part of the Aegis combat system — the core capability of the AWDs. The procurement

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of the three systems is included as part of the $6 billion shipbuilding project.

"The Aegis weapon system comprises the core command and control system, phased-array radar and missile-launch system capability," Senator Hill said.

"Placing the order for the systems now allows the United States to continue manufacturing the systems for Australia without halting its production line, bringing about greater efficiency and achieving considerable savings.

"The purchase will also maximise opportunity for Australian industry to provide sub-systems such as communications, electronic warfare, sonar, electro-optical sensors and other equipment.

"Working closely with the US Navy on combat-system integration and risk-reduction studies will minimise the risk of any delay in the 2013 delivery date for the first air-warfare destroyer.

The Aegis system is the world's pre-eminent maritime air -warfare system, capable of detecting and defeating multiple hostile aircraft and missiles at ranges in excess of 150 kilometres. The AWDs will also have an anti-submarine and anti-surface warfare capability, as well as the ability to embark a helicopter at sea.

NSW Industry News

Lightning Naval Architecture –– Kalkavan Newbuilding Program

Lightning Naval Architecture currently advises Kalkavan Shipyard in Tuzla, Turkey on the design for a newbuilding series of six 1835 TEU container ships. Turkish company Kalkavan Holdings owns the shipyard and also the shipping company Turkon Line, who has ordered the ships. The shipyard uses local naval architect Delta Marine for the detail design work and construction plans.

The six 1835 TEU container ships are part of Turkon Line's commitment to build 24 new container vessels for its expanding operation.

Principal particulars of the 1835TEU ships are:

Length OA	182.85 m
Length BP	171.00 m
Breadth moulded	28.00 m
Depth moulded	16.10 m
Design draught	10.00 m
Scantling draught	11.00 m
Deadweight at design draught	22450 t
Main Engine	MAN B&W 8S50MC-C
	MCR 13280 kW @ 127 rpm
Service speed at 90% MCR	19.5 knots

The remaining 18 ships in the newbuilding program will be larger than the first six ships. LNA is therefore carrying out initial design studies on a number of alternatives for the remaining ships. Various combinations of main dimensions and block coefficients are examined together with lightweight estimates and selection of main engine power. There is at the moment a very long delivery time on large two-stroke main engines, so the shipyard has to order the main engines one to two years before the actual construction of the vessels start.

Container vessels carry a large portion of their payload as deck cargo, with a high centre of gravity and windage area, which means that stability is a key factor in the optimisation of the design. The challenge in selecting the main dimensions and designing the hullform for container vessels is therefore to strike the right balance between the speed and power performance and the payload.

LNA uses their in-house developed conceptual-design program in combination with their NAPA modelling software for this kind of work.

LNA has previously carried out similar design work for Jurong Shipyard in Singapore for a 2580 TEU design. One of the ships built to this design is the container vessel *Theodor Storm* which operates in Australian waters. The sister ship, *Thomas Mann*, is described in the RINA publication *Significant Ships of 2003*.

Jennifer Knox and Hans Stevelt

Keel Laying Ceremony for Littoral Combat Ship at Austal USA

Following the official opening of the new ship construction facility last November, Austal USA hosted a traditional US Navy keel-laying ceremony on 19 January to signify the start of construction on the Navy's new breed of surface combatant, the Littoral Combat Ship (LCS).

Austal, as the designer and builder of the LCS seaframe, is part of the General Dynamics/Bath Iron Works Team offering the unique trimaran solution for the US Navy's defence needs.

The ceremony was attended by in excess of 150 high-ranking officials from Government, Navy, the State of Alabama and the City of Mobile who joined the Austal workforce to mark this historic occasion in the changing nature of naval ship design and construction.

Representing Austal, Executive Chairman John Rothwell reflected on the significance to Austal of beginning work on the Littoral Combat Ship, when he spoke during the ceremony:

"From an initial workshop in 1997 at the naval facility in Carderock, Maryland, where Austal was invited to discuss potential military uses for high-speed vessels, to today's keel-laying ceremony for the first LCS, signifies a momentous occasion in the history of an Australian shipyard now designing and building the most revolutionary warship for the world's most powerful navy".

"Since 1997 some bold decisions and the incredible effort by many have enabled the establishment of the Austal USA shipyard in Mobile, Alabama, a new facility dedicated to high-speed aluminium ship construction, and the recruitment and training of 300 people in order to be prepared for this opportunity".

The design and construction of the LCS is the culmination of 17 years of continuous development of high-speed aluminium ship technology by Austal. The LCS is a clear indication of the benefits of Austal's successful involvement in commercial and defence markets — swiftly transitioning proven commercial technology to provide key defence capability".

Addressing the audience on behalf of the US Government, Senator Jeff Sessions commented:

The Austal USA shipyard
(Photo courtesy Austal Ships)

Visiting officials at the keel laying of LCS2 by Austal USA
(Photo courtesy Austal Ships)

"Today marks an important milestone as the US Navy embarks on the construction of a new vessel that will carry it to the littorals worldwide. The General Dynamics – Austal partnership returns to Alabama the finest elements of advanced shipbuilding, and I am immensely pleased that we in Alabama are part of this new endeavour."

LCS2, due for delivery in late 2007, has a flight deck larger than any other surface combatant that will support near-simultaneous operation of two large MH-60R/S helicopters or multiple unmanned vehicles. LCS2 will also provide one of the largest usable payload volumes of any US Navy surface combatant and deliver greater payload per unit displacement than any ship of comparable displacement.

FFG Upgrade Formal Acceptance Sea Trials Commence

It was announced on 2 February that ADI Limited has achieved significant progress in its FFG Upgrade Project, with the start of HMAS *Sydney's* formal acceptance sea trials and commencement of preparations for HMAS *Melbourne's* upgrade.

HMAS *Sydney's* formal acceptance sea trials, which began in early February and will take two months to complete, are a crucial test of the guided missile frigate's upgraded systems before ADI hands the ship back to the Royal Australian Navy.

Vice President Thales Naval Australia and ADI Naval Director, Mr Ali Baghaei, said that with the continued collaborative working relationship between ADI, HMAS *Sydney* and the Department of Defence, ADI will hand over *Sydney* at the end of April.

This final round of sea trials follows a very successful trials program late last year, during which the ADI-developed Australian Distributed Architecture Combat System (ADACS) performed beyond expectations.

Marking further progress in the project, the second guided missile frigate to be upgraded, HMAS *Melbourne*, entered dry dock at ADI's Garden Island facility at the beginning of February to commence preparations for the upgrade.

Mr Baghaei described these achievements as further indication of the company's progress in the $1 billion project.

'By reshaping our project team organisation early last year and instilling a sharper project management focus, ADI has made significant progress on the FFG Upgrade project,' Mr Baghaei said.

The FFG Upgrade project is the most sophisticated naval systems integration task undertaken by an Australian company involving both new technologies and legacy equipment. Central to the upgrade is the ADACS. ADI is the only Australian company to have designed, developed and installed a naval combat system.

HMAS *Melbourne* in the Captain Cook Dock at Garden Island at the start of her upgrade
(Photo courtesy ADI Limited)

Tasmanian Industry News

Good News from Incat

On 31 January 2006 Incat announced the signing of a letter of intent for the purchase of two 112 m Incat high-speed wave-piercing catamarans by a Japanese company. The letter of intent follows extensive discussions and negotiations over several months and includes an option for a third vessel.

A 112 m wave-piercing catamaran is currently under construction at the Incat shipyard in Hobart. It will have capacity for over 800 lane metres for trucks and other heavy vehicles plus 150 cars or, if trucks are not carried, for over 400 cars. Passenger capacity of up to 1000 persons includes restaurant and bar areas and other facilities.

With a 1 500 t carrying capacity, the first vessel to be delivered to Japan in mid 2007 will be the world's largest diesel-powered high-speed ship capable of over 40 knots, and the largest ever built by Incat.

Incat Group founder and chairman Robert Clifford AO, said

"The Australia Day letter of intent is the third in a series of good news that we've received over the past few weeks. Incat has also received an offer to purchase a 98 m vessel from a long-standing European client who already has Incat vessels in service, and last month we signed a contract for the sale of a vessel, which had previously been on charter, to Master Ferries, a new operator in Scandinavia."

On 9 January 2006 Incat announced the sale of a 91 m wave -piercing catamaran to a new European customer. Master Ferries will take delivery of the high-speed craft on 1 March 2006 for service on their new route between Kristiansand in Norway and Hanstholm in Denmark.

The CEO of Master Ferries, Svein Olaf Olsen, commented "Master Ferries is modelled on the highly successful low-cost airline concept, especially adapted to the ferry world. Master Ferries will be the first to bring this concept to Norway and we will do so with two fundamental differences. The first is that 50% of the passenger space will be allocated to Master Class, a first-class ferry experience which includes a high-quality buffet dining experience. The second is that there will be two huge duty-free shops on board and these will sell hundreds of items including perfumes, alcohol, foodstuffs, household goods and clothing."

Mr Olsen said "Master Ferries had the option to either purchase or charter *Master Cat*. We chose to purchase the vessel for two primary reasons — the Incat wave-piercing catamarans have the highest residual values in the fast-ferry industry and it will give us a much stronger EBITDA ratio,"

The Incat 91 m wave-piercing catamaran was built in 1998. Named *Cat-Link V,* she entered service between Århus and Kalundborg. The following year the charter transferred to Mols-Linien and, renamed *Mads Mols,* she served the Århus to Odden route. Now to be named *Master Cat* she will be the first high-speed craft to bear the Master Ferries livery.

Richardson Devine Marine Constructions, Hobart

The 31.6 m Crowther catamaran *Patea Explorer* was delivered to her owner, Fiordland Travel Ltd (NZ) in late November 2005. *Patea Explorer* will carry 200 tourist passengers on excursions in and around Doubtful Sound in New Zealand's Fiordland National Park.

Georges Bay Marine, St Helens

Current projects include the construction of three 13 m aluminium patrol craft for the Australian Federal Police.

Allan Barnett's shipyard, Bridport

Currently under construction is an 18 m steel-hulled expedition yacht. She is due for completion in time to attend the Sanctuary Cove Boat Show in August.

Australian Wooden Boat Festival, Hobart

Festival Director, Andy Gamlin, is very pleased with the response for his call for a new recreational rowing skiff design — the "Derwent Rowing Skiff". There have been fifteen expressions of interest so far. Approximately half of the responding designers are based in Tasmania (in this contingent I include the students at AMC) with the remainder being from the rest of Australia plus one designer from New Zealand. Drawings have been received from five designers, with a complete wooden model, a traditional half-model and two scale paper models having been supplied as well. The AWBF's skiff evaluation team were expected to meet in the first week of February to begin the task of selecting the most-favoured design.

Sabre Marine and General Engineering, Hobart

Currently under construction is a 12 m aluminium pilot boat. In early 2005 North West Bay Shipping and Towage commissioned Michael Hunn to conduct a thorough review of the world's pilot-boat designs with a view to creating a completely new design. The result is a twin water-jet powered monohull which complies with the latest pilot craft rules. Conventional semi-displacement pilot boats are typically massively built, have high displacement and need high installed power. As a result they tend to be expensive to run and are a very noisy workplace. Michael Hunn has designed an efficient high-strength hull structure and kept weight down to a minimum. As a result two 350 hp Cummins QSB engines will deliver a service speed of 25 knots.

Guy Anderson

Mistral sails for Toulon

Following the complete testing and qualification of her hull and propulsion systems, *Mistral*, the first of two BPC-type force-projection and command vessels for the French Navy, left DCN's Brest shipyard in Brittany in early February for Toulon on the Mediterranean. In Toulon, the ship's combat system will undergo further testing. The vessel will then proceed to full acceptance testing to the requirements of the defence procurement agency DGA prior to delivery to the French Navy.

As programme prime contractor to contracting principal DGA, DCN has overall responsibility for the design and construction of force projection vessels *Mistral* and *Tonnerre*. Construction of the more-military aft sections is the responsibility of DCN's Brest shipyard, while the forward sections, which are more like commercial ships, are the responsibility of Alstom Marine's Chantiers de l'Atlantique shipyard. As a result of these contracting arrangements, the BPC programme benefits from the expertise of two leading shipbuilders. Design/need optimisation, innovative engineering solutions and the decision to build the forward and aft sections concurrently cut construction times and reduced costs by some 30% when compared with the earlier Foudre and Sirocco classes.

The 199 m long Mistral class has a full-load displacement of 21 000 t, a maximum speed of 19 kn and sufficient endurance and range for force projection anywhere in the world. A typical payload might include 450 troops, 16 heavy helicopters plus two hovercraft, four LCM landing craft, or one-third of a mechanised regiment complete with armoured vehicles (1000 t). The design features electric propulsion using azimuthing pods and high-level automation compatible with a complement of just 160. The vessel also offers ample capacity for use as a hospital ship or for humanitarian evacuation missions. A high-performance communications suite allows the BPC to fulfil its role as a naval force command vessel.

Names for New RAN Ships

Australia's new large amphibious ships and air-warfare destroyers will be named after Australian cities having close links with Navy heritage.

On 20 January Defence Minister, Senator Hill, said that the Chief of Navy made the recommendation for the names after careful consideration and taking into account the considerable public interest in the naming process. The Government submitted the names to the Governor General for approval, which has now been granted.

Senator Hill said that is was a great honour to announce that the two large amphibious ships will be named HMAS *Canberra* and HMAS *Adelaide,* and the air-warfare destroyers will be named HMAS *Hobart*, HMAS *Brisbane* and HMAS *Sydney*.

"One of the principal aims of naming ships for our Navy has been to promote links between the Navy and the community," Senator Hill said.

"Naming of the ships after Australian cities will hopefully build on these links and gain wide acceptance from former Navy personnel. Ships of the Royal Australian Navy have previously carried these names and all have received battle honours in conflicts dating from the First World War."

The acquisition projects to acquire these new ships have received first-pass approval from the Government. Second-pass approval is planned for 2007.

Subject to these approvals, the two large amphibious ships are expected to enter service with the Royal Australian Navy from 2012, and the three air-warfare destroyers are expected to enter service from 2013.

HMS *Daring* Launched at Scotstoun

The first of the Royal Navy's Type 45 air-defence destroyers was launched by the Countess of Wessex at BAE System's Scotstoun yard in Glasgow on 1 February. The most powerful destroyer ever built in the UK, HMS *Daring* will be able to track and destroy a target the size of a cricket ball travelling at three times the speed of sound [*anything to keep the Ashes* — Ed.] Her overall length is 152.4 m, beam 21.2 m and full load displacement 7 350 t. She will have a maximum speed of 27 kn and a range of 7 000 n miles at 18 knots. The complement will be about 190 with space for 235 in accommodation of a very high standard. The ship will cost about £1 billion.

HMS *Daring* will enter service in 2009. A further five ships have been ordered and two more are anticipated. More information, photographs and a video of the launching can be found at www.type45.com.

HMS *Daring* entering the Clyde
(Royal Navy photograph)

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Lloyd's Register

Thales and DCN Announce Intention to Combine Naval Businesses

On 15 December Michèle Alliot-Marie, Minister of Defence, Thierry Breton, Minister for the Economy, Finance and Industry, Jean-Marie Poimboeuf, Chairman and Chief Executive Officer of DCN and Denis Ranque, Chairman and Chief Executive Officer of Thales, signed a joint declaration of intent with a view to combining the French naval businesses of Thales and DCN within DCN and the acquisition by Thales of a 25% interest in DCN.

Both industrial partners are strongly committed to developing closer ties through this operation, which has the full support of the French State. The combination represents a significant milestone in the construction of a European naval defence industry.

"Closer ties between European industry players are crucial to Europe's ability to sustain an independent industrial capability over the long term," said Defence Minister Michèle Alliot-Marie.

The project is the continuation of a process that has included the formation of Armaris in 2002 and successful cooperation between Thales and DCN on numerous French and export programmes.

Since enactment of the law of 31 December 2004 authorising the opening of DCN's share capital, the two partners have sought to move to a new level of cooperation in order to combine their R&D efforts, share their know-how and organise the complementary areas of expertise of their respective companies.

The project, which is expected to be finalised by the summer of 2006, involves transferring to DCN the non-equipment businesses of Thales Naval France, the activities of the partners' joint venture Armaris and its subsidiaries, and those of MOPA2, the joint company set up for France's second aircraft carrier. The scope of the agreement also includes Thales' interest in Eurotorp, the European lightweight torpedo consortium.

At the same time, Thales will become DCN's industry shareholder, owning 25% of the company alongside the French State which will retain 75%. Thales will have the voting rights needed to play an active role on the Board of Directors. After two years, under the terms of a new shareholders' agreement, Thales will have an option to increase its interest to 35%, in particular by contributing additional industrial assets to the company.

The operation strengthens DCN's position as an integrated naval defence contractor. DCN will generate revenues of approximately €3 billion, with an order book in excess of €8 billion and some 13 300 employees.

Thales is an international electronics and systems group operating in the defence, aerospace and security markets. The group employs 60 000 staff worldwide and generated

ADI and Thales-DCN Team for LHD

On 30 January ADI Limited announced that it will team with Europe's Thales-DCN joint venture company, Armaris, to offer the proven DCN Mistral design for the Commonwealth Government's amphibious ships project.

The first of class of the DCN-designed projection and command ship, *Mistral*, is set to enter service with the French Navy after an extensive sea trials program thoroughly tested the 21 500 t ship's capabilities. Her sister ship, *Tonnerre*, is also undergoing sea trials and is due to enter service in late 2006.

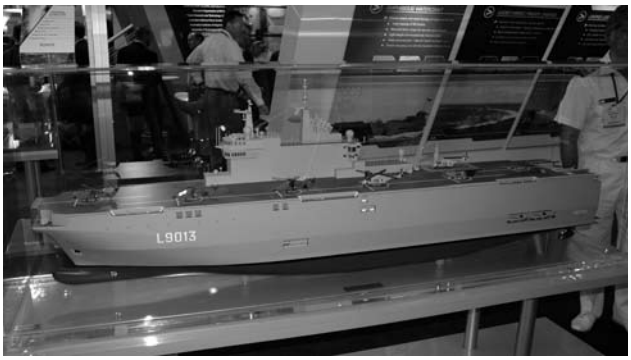
The teaming agreement, which will see ADI bid as prime contractor, brings together complementary strengths for this crucial defence program to build and support two landing ship helicopter/dock (LHD) amphibious ships for the Royal Australian Navy.

ADI will add to its proven Australian prime-contracting experience, Armaris' international expertise in complex project management, including the construction of 17 multi-mission frigates for the French Navy, and DCN's knowledge as design authority for the Mistral class.

ADI and Armaris are currently finalising plans for a low-risk, value for money ship-construction program which meets the Australian Defence Force's operational requirements and maximises economic benefits to Australia.

ADI and Armaris will have shared access to the extensive international resources of the Thales and DCN groups. Thales and DCN's support for the project was strengthened last month when the two companies agreed to merge their French naval businesses.

Each of Australia's LHDs will be capable of embarking large numbers of troops with their vehicles and equipment, lodging them ashore via helicopters and landing craft for combat or humanitarian missions, and supporting them with medical, command and logistics facilities.



A model of *Mistral* on display on the ADI stand at Pacific 2006 (Photo John Jeremy)

Tenix and Navantia Team for LHD

Spanish shipbuilder Navantia and Australian defence prime contractor Tenix Defence announced on 31 January that they will team to compete for the $A2b contract to construct two amphibious ships for the Royal Australian Navy.

In a joint statement, the two companies said their that team would submit a strong, comprehensive and very competitive bid for the important contract.

"We believe a Tenix/Navantia team will provide the greatest capability to the RAN at the lowest risk, and we look forward to working closely together on this exciting project," the companies said.

Australia is seeking two ships, each able to transport up to 1 000 personnel, which have six helicopter landing spots and provision for a mix of troop-lift and armed-reconnaissance helicopters.

They will also be able to transport up to 150 vehicles, including the new M1A1 Abrams tanks and armoured vehicles, and will also be equipped with medical facilities, including two operating theatres.

Navantia is one of Europe's leading naval and commercial shipbuilders, and is constructing a 27 000 t amphibious ship for the Spanish Navy which offers similar capabilities to those required by Australia.

The Tenix/Navantia bid for the Australian amphibious ships contract will be based on this design.

A model of the Navantia LHD design on the Tenix stand at Pacific 2006
(Photo John Jeremy)

Austal Confirms Order for Ferries for Turkey

Austal announced in December that a contract for two 88 m high-speed vehicle-passenger catamarans had been signed with the Istanbul Metropolitan Municipality. This follows the submission of a fully compliant proposal with the lowest price offer in an international tender that began earlier this year.

To be operated by Istanbul Deniz Otobusleri (IDO) the identical new ferries are scheduled for delivery in 2007 and have the capacity to carry 1 200 passengers and 225 cars or 126 lane metres of trucks plus 158 cars.

Commenting on the significant contract, Austal's Executive Chairman, Mr John Rothwell, said "This repeat order is particularly pleasing in the light of IDO being one of the world's most experienced fast-ferry operators that has again chosen Austal-designed-and-built vessels for their large, fast vehicle-passenger service."

Speaking on behalf of the Municipality, Mr Hüseyin Eren, Assistant Secretary General, commented, "Austal won the right to sign the contract with the Municipality following an international tender process and we look forward to these vessels entering service in Istanbul."

The origins of Turkey's large fast-ferry fleet can be traced to 1987 when the Istanbul Metropolitan Municipality founded IDO to develop sea transportation solutions and thus help ease growing traffic congestion. With Istanbul located on the sides of the Bosphorus and bordering the Mamara Sea this has proven to be a valuable addition to the domestic Turkish transport system.

The new Austal ferries are designated to operate on a 39 n mile reciprocal service across the Marmara Sea between Yenikapi (Istanbul) and a new port development in Mudanya servicing the city of Bursa.

IDO Project Manager, Mr Osman Aksoy, commented "Our current Austal fast ferry fleet has provided reliable service since 1995. We appreciate Austal's commitment to product support which assures that this important means of public transport can be maintained at the highest level and our passengers appreciate Austal's commitment to comfort and onboard amenity."

Each ferry is to be powered by four MTU 20 cylinder 8000 series diesel engines driving a Lips propulsion system through four Reintjes gearboxes. The vessels have an impressive maximum deadweight of 470 t and are designed to operate with this load at speeds in excess of 36 knots utilising only 90% of maximum engine power.

The vehicle deck on the new ferries offers a clear height of 4.0 m under the raised mezzanine decks, which are being installed for the first time on a Turkish fast ferry enabling greater flexibility in seasonal load handling.

Passenger accommodation will be located on two decks — the Tourist Class upper deck for 922 passengers also providing catering and shopping facilities and a children's recreational area. The bridge deck will accommodate 278 Business Class passengers.

Passenger loading is enhanced by specialised boarding ramps and entrances which enable safe, simultaneous movement of vehicle and passenger traffic. In addition, the main engines exhaust via dry stacks to keep fumes away from passengers during boarding and departure.

Photographed in Darwin just before their commissioning on 10 February, the second and third Armidale-class patrol boats for the RAN HMA Ships *Bathurst* and *Larrakia* (RAN photograph)

The vessels are being built in accordance with the requirements and under the survey of Germanisher Lloyd, conforming to International Maritime Organisation codes and Turkish Flag and Port State Regulations.

Principal Particulars

Length OA	87.8 m
Length WL	77.4 m
Beam moulded	24.0 m
Hull depth moulded	8.25 m
Hull draft (maximum)	3.7 m
Deadweight (maximum)	470 t
Passengers	1200
Crew	16
Vehicles	225 cars
	or 126 lane m with 158 cars
Axle loads	
centre lanes	9 t (single axle)
	12 t (dual axle)
outer lanes	3.5 t (single axle)
Vehicle deck clear height:	
mezzanines up	4.0 m
mezzanines down	2.2 m (below)
	2.0 m (above)
Fuel (approx)	160 000 L

Propulsion

Main engines	4 x MTU 20V 8000 M70R
	4 x 7 200 kW
Propulsion	4 x Lips 120E
Gearboxes	4 x Reintjes VLJ 6831
Service speed	36 kn at 90% MCR and 470 t

Queensland Industry News

The Gold Coast marine industry is getting back into the swing of things after the usual Christmas hibernation. All indicators are suggesting that 2006 will be another busy year for new construction and refit.

Oceanic Yacht Design has secured a contract for the design of a 35 m corporate entertainment vessel for Sydney Harbour. Designed to USL Code Class 1D, the twin-decked vessel features an all-glass lower superstructure and will carry up to 750 passengers.

Sea Transport Design have a number of projects on the go with the latest being the preliminary design of a dedicated ambulance vessel. The fully-customised 10 m catamaran is being designed to Class 1C requirements and will feature wheel-chair-friendly access.

Local Gold Coast production boat builders including Riviera, Maritimo and Sunrunner are also expecting a busy first half of the year with the rush to prepare new models for release at the annual Sanctuary Cove Boat Show.

In the Brisbane area, Aluminium Marine has won a contract for a 35 m passenger ferry for the Seychelles. Designed by Incat-Crowther Designs the 35 m vessel will be built to BV class and carry 350 passengers. Main engines will be MTU 12V each 970 kW for a speed of 38 kn and the vessel will be fitted with a Maritime Dynamics ride control system.

Aluminium Marine is also constructing a 24 m passenger catamaran, designed by Stephen and Gravlev Pty Ltd, for the same company.

An impression of the catamaran ferry for the Seychelles
(Image courtesy Aluminium Marine)

New Wave Catamarans is currently constructing four 18 m crew boats which will be operated on the Caspian Sea. Two of these are being built in Baku. Also under construction is a 24 m dive boat for Calypso Reef Charters at Port Douglas and a 16 m whale-watching catamaran for Eden, NSW.

Norman R. Wright and Sons has fitted a new retracting transducer to the survey vessel *Jim Peel*. Norman R. Wright and Sons built this survey vessel for the Port of Brisbane in 1995. The main transducer was updated in 2004 and was fitted in a conventional manner to the hull bottom. Due to the beam, the transducer needed to be mounted low down in order to miss the keel. The transducer has a glass scanning face which needs to be kept clean. In order to keep it clean, divers were sent down to scrub the face which ultimately was starting to damage it.

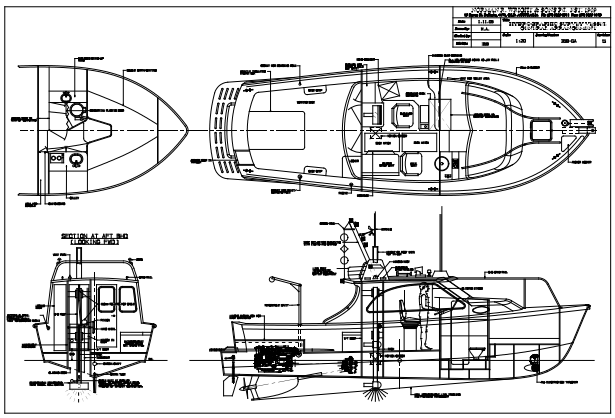
The Port of Brisbane requested that a design be investigated that allowed the transducer to sit above the waterline when not being used. This resulted in a custom-designed retracting mechanism which consisted of a watertight trunk that extended from the main deck to the hull bottom. The transducer was mounted on a shaft which allowed it to be retracted above the waterline when not in use. A watertight door with clear inspection panel was fitted in the trunk above the waterline which allowed the transducer to be inspected and cleaned when retracted. In this way the transducer could be kept clean and free of growth when not in use and would prolong the life of the transducer as well as allow for it to be removed without slipping the boat. A large fairing block needed to be fitted to the hull bottom which caused no adverse affects on the stability when the boat was at maximum speed. Maximum survey speed is approximately 12 knots with the maximum vessel speed being 15 knots.

The new transducer for *Jim Peel*
(Photo courtesy Norman R. Wright and Sons)

Norman R. Wright and Sons has signed a contract with POB to supply them with a custom survey vessel. The vessel will feature a retracting transducer similar to that fitted to *Jim Peel*. The system will also allow for the transducer to be mounted at an angle transversely for surveying rock walls, etc. The mounting system will allow for the same transducer from *Jim Peel* to be transferred to this vessel depending on the areas required to be surveyed.

Principal particulars of the vessel will be as follows:

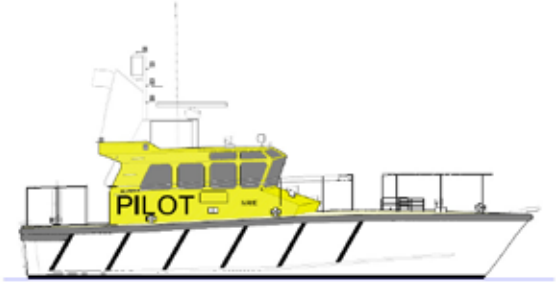
Length OA	9.7 m
Maximum speed	25 kn (approx)
Power	1 x 260 kW Yanmar V-drive
Displacement	5.8 t (full load)



The new survey vessel for the Port of Brisbane
(Drawing courtesy Norman R. Wright and Sons)

Norman R. Wright & Sons are soon to launch their latest pilot-boat design for the Bunbury Port Authority. It is the latest refinement of a design series that has spanned 15 years. The refined semi-displacement hull form was tank tested at the AMC. The vessel is due for launch in April 2006. Construction is GRP composite with the structure being DNV approved. Particulars are as follows:

Length OA	13.6 m
Power	2 x 302 kW Cummins QSL9
Speed	25 kn (approx)
Displacement	13.2 t lightship



The pilot boat for Bunbury Port Authority
(Drawing courtesy Norman R. Wright and Sons)

First Ship for New Zealand's Project Protector Launched

The multi-role vessel being built for the New Zealand Ministry of Defence by Tenix Defence was launched on 11 February 2006 at the Merwede Shipyard near Rotterdam in the Netherlands.

The multi-role vessel for New Zealand entering the water at her launching on 11 February
(Photo www.bendijkstra.nl)

Following the launch of the hull on Saturday the vessel was towed to Rotterdam, where the superstructure was lifted into place on Sunday. It will return to Merwede for fit-out.

Erecting the superstructure in Rotterdam on 12 February
(Photo www.bendijkstra.nl)

She is the first of a total of seven ships, including two off-shore patrol vessels and four inshore patrol vessels, to be launched under the $NZ500 million Project Protector, on schedule, 18 months after contract award. The ships will be operated by the Royal New Zealand Navy.

Tenix Defence sub-contracted construction of the MRV to Merwede. The OPVs are being consolidated at Tenix's yard at Williamstown in Victoria, and the IPVs are being constructed at Tenix's yard at Whangarei in New Zealand, which is also building OPV modules.

Merwede CEO, Ton Riedtijk, welcomed the NZ Secretary of Defence, Graham Fortune, the New Zealand Ambassador to The Hague, David Payton, Commodore Jack Steer RNZN, Deputy Chief of Navy, Gary Collier, MoD Project Director, Gordon Hall, MoD Project Manager, and the CEO of Tenix Defence, Robert Salteri, to the ceremony.

Mrs Bronwyn Barton of Melbourne, whose husband Blair is the MRV Ship Manager for Tenix Defence, launched the ship.

Robert Salteri congratulated Merwede on its achievement, saying that the MRV construction demonstrated Merwede's versatility and excellence, and maintained the leading record of the 100-year-old shipyard.

"The Project Protector team here in Rotterdam has set a cracking pace and a great example for the teams in Australia and New Zealand," he said.

The MRV will start sea trials in June, and is scheduled for delivery to Tenix Defence in the Netherlands in July. She will come to Williamstown in September for final fit-out, and will be delivered to the Ministry of Defence before the end of the year.

The 131 m MRV will displace approximately 9 000 t and will be able to carry up to 250 troops and their equipment, a Sea Sprite helicopter, up to four additional utility helicopters as cargo, and a crew of more than 60 as well as additional trainees and Government employees. She carries two landing craft to ferry personnel and cargo to shore where there is no wharf, and is ice-strengthened.

Austal Delivers Ferry for Operation in Malta

Mediterranean ferry passengers on the Malta-Italy route are soon to enjoy a stylish new delivery with the introduction of *Maria Dolores*, an Austal Auto Express 68 m vehicle-passenger ferry for Virtu Ferries.

Set to replace the existing 52 m ferry, *Maria Dolores* will have additional capacity to carry 600 passengers and 65 cars or 95 lane m of trucks plus 35 cars on a vehicle deck with an impressive clear height of 4.6 m.

This new vessel will operate on routes from Malta to Italy; Valetta to Catania in 3 hours, to Pozzallo in 90 minutes and Reggio Calabria (mainland Italy) in 4 hours. Designed specifically for these routes, with aft and side ramps for rapid turnaround and a moulded depth of 6.3 m (approximately 20% higher than comparable size Austal ferries), the ferry will greatly expand the service to mainland Italy and meet growing demand.

Passengers boarding the new ferry will instantly be impressed by the high-quality furnishings and décor which greets them when they first enter the ticketing foyer located for convenience on the main/vehicle deck level at midships on the port side. A wide staircase leads to the upper deck where 508 passengers in tourist class could easily be mistaken that they have entered a private luxury vessel rather than one dedicated to mass transport. The strategic use of full-height windows creates an immediate sense of

Part of the passenger accommodation in *Maria Dolores*
(Photo courtesy Austal Ships)

light and space which complements the spacious and highly stylish interior. Assisting the luxury theme is the extensive use of polished stainless steel features, particularly in the bar and staircase areas. In keeping with the existing Virtu Ferries fleet seating is Eknes Transit Super Nova finished in Svartdal fabric, and ceilings utilise the highly effective and lightweight Barrisol stretch material.

Additional features developed by Austal in collaboration with Virtu Ferries include the upgrading of display-area window mullions to be clad in emu leather and the installation of large planter boxes with frosted-glass back panels. The use of frosted-glass panels is also continued for certain smoke doors and in the bar areas where the Virtu Ferries logo is subtly imposed.

The interior theme is continued above on the Bridge Deck which has seating for a further 92 passengers in club class. Passengers in this area enjoy panoramic views, high-quality upgraded leather-clad Eknes seating and their own bar and casual seating area. An aft outdoor deck on this level provides room for 30 passengers to move about.

An almost imperceptible Mezzanine Deck provides space for a comfortable accommodation area with eight bunks, shower and toilet facilities for off-watch crew members.

Maria Dolores shows her paces
(Photo courtesy Austal Ships)

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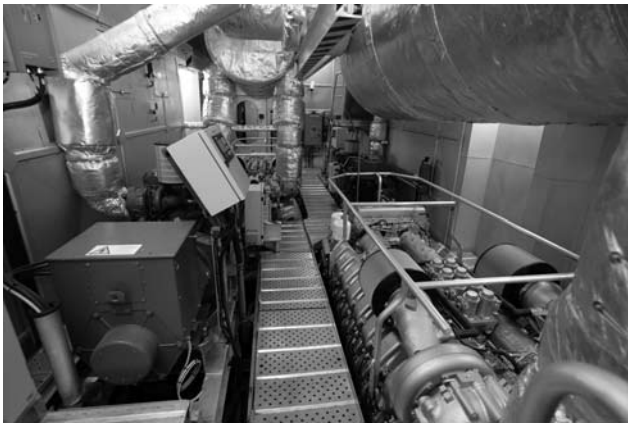
The bridge on *Maria Dolores*
(Photo courtesy Austal Ships)

The stern door and ramp
(Photo courtesy Austal Ships)

Design innovation is not limited to the passenger areas, as the engine rooms also contain a well-considered propulsion solution developed in close consultation with Virtu Ferries' operational needs. The customised dimensions and load-carrying capacity of the ferry dictated a total kilowatt requirement not easily catered for by a four-engine installation. As compatibility with Virtu Ferries' existing fleet was also an important consideration, the ferry was designed to incorporate six MTU 16 cylinder diesel engines driving six waterjets through six ZF gearboxes, making this the first ever sextuple waterjet installation on a fast ferry.

Two engine rooms per hull accommodate two engines in the forward compartment and one engine aft which is raised to enable the triangular arrangement of the waterjets on the transom. Unlike conventional installations, this places the centre waterjet above the waterline, meaning that initial propulsion is gained via the lower four steerable/reversible waterjets allowing the subsequent engagement of the two higher booster-only waterjets for full-power operations.



An engine room in *Maria Dolores*
(Photo courtesy Austal Ships)

Whilst the operation of this arrangement requires no increased effort on behalf of the crew the engineering of the waterjet tunnels incorporated the experience in inlet duct geometry of the supplier, Rolls Royce/KaMeWa.

Some interesting and highly useful benefits of this installation are the highest possible propulsive efficiency, added redundancy and ability, if desired, to operate on the four lower engines providing Virtu Ferries with the flexibility to offer different frequencies and rates for off-peak periods in order to optimise the ferry's utilisation.

Technical Manager, James Bennett, said "With the experience of more than 150 high-speed vessels, our design team is familiar with solving demanding engineering challenges and we enjoy a close working relationship with the suppliers who ensure that we deliver what we say we are going to achieve."

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

Principal Particulars

Length OA	68.4 m
Length WL	58.8 m
Beam moulded	18.2 m
Hull depth moulded	6.3 m
Hull draft (maximum)	2.6 m
Deadweight (maximum)	260 t
Passengers	600
Crew	16
Vehicles	65 cars or 95 lane m with 35 cars
Axle loads	
centre lanes	9 t (single wheel) 12 t (dual wheel)
outer lanes	2 t (single wheel) 3.5 t (dual wheel)
Vehicle deck clear height	
centre lanes	4.6 m
side lanes	4.2 m
Fuel (approx)	43 600 L

Propulsion

Main engines	6 x MTU 16V 4000 M71 each 2 465 kW
Propulsion	4 x KaMeWa 80SII and 2 x KaMeWa 80BII
Gearboxes	4 x ZF 7650 NR2H and 2 x ZF 7650 NR2B
Service Speed	35.9 kn at 90% MCR and 194 t
Ride Control	Austal SeaState T-Foils and Interceptors

Survey

Classification	Det Norske Veritas

Maria Dolores has a maximum deadweight of 260 t and operates at a loaded speed in excess of 35 knots.

To maximise the seakeeping potential of the high tunnel height, the vessel is fitted with dual SeaState T-Foils and interceptors providing maximum passenger comfort across the year-round spectrum of sea states.

High-quality outfit in *Maria Dolores*
(Photo courtesy Austal Ships)

Former RAN Captain wins Inaugural ANI Maritime Advancement Award

A former naval electrical engineering officer is the winner of the inaugural Maritime Advancement Award, sponsored by Booz Allen Hamilton in conjunction with the Centre for Maritime Policy at the University of Wollongong.

During the closing ceremony of the Pacific 2006 Congress on 2 February, President of the Australian Naval Institute, Commodore James Goldrick, presented the award to Mr Christopher Skinner, who had a distinguished career in the RAN from 1959 to 1989, including service in Vietnam aboard HMAS *Hobart*.

For his project to analyse the costs and benefits to Australia of the Collins-class submarine project, Mr Skinner has been awarded a two-year research or development grant worth $12 000.

The Maritime Advancement Award goes to the most promising research or development proposal from anyone working in the field of maritime endeavour including science, maritime law and policy, defence, commerce, shipbuilding or maritime industry.

The judges agreed that Mr Skinner's project would bring new understanding of the impact of the submarine project upon the Australian economy and highlight key lessons about the significance of such activities for national development as well as for the future.

REFIT FOR ENDEAVOUR

ADI Limited, in conjunction with the Australian National Maritime Museum, has finished a repair and refit of the replica bark *Endeavour*. The vessel is a replica of the ex-collier HMS *Endeavour*, which Lt James Cook sailed around the world leaving England in 1768.

Much research was carried out to create what is regarded as possibly the best 18th century replica afloat. Cloths used for the interior were even woven on an eighteenth-century loom. Any differences were due to modern safety standards and/or the desire to add longevity.

The bark *Endeavour* website, www.barkendeavour.com.au, states that "The main differences between the original and the replica are in the timber and the metal fittings used, and in the use of man-made materials for masts, ropes and sails. Instead of the traditional elm, oak or spruce, the replica was built mainly from jarrah, a native West Australian hardwood which will ensure a long life for the ship. Old-growth oregon (douglas fir), especially imported from the USA, was used for the masts, spars, topsides and decks".

Two hundred and thirty-five years and two months ago, Cook's vessel *Endeavour* struck the Great Barrier Reef in North Queensland. Cook had to use a sail to bandage the hole and then beach the vessel to repair the damage.

Coincidently, the modern-day *Endeavour* ran aground in Botany Bay in April 2005 and, in doing so, lodged a rock in the keel. Fortunately, the watertight integrity of the hull was not breached this time.

Keel damage showing the protruding rock
(Photo courtesy ADI)

The bottom planking of the keel had been torn away in some sections, making docking difficult. Divers were sent down to remove the rest of the keel section before docking. This enabled the vessel to be docked level on the caps.

The next issue was repair of the keel which would be difficult with the vessel sitting on keel blocks. ADI Dockmaster, Brad Lovegrove, decided to use sand boxes for the docking in order to enable lowering of successive keel-block caps to get at the keel. A fiddle is put around the cap and another cap placed on top. In this case the fiddle was made from plywood and care was taken to make it watertight so as to not let the garnet be washed away. The sand boxes were filled with garnet due to availability, but sand or something similar could have been used as well.

The fiddle can then be pulled away and the garnet hosed out to lower the caps. In this way four caps at a time could be effectively lowered and a section of the keel replaced. Once a section of keel had been replaced, wedges were knocked in to drive the caps up to re-support the keel.

The sand boxes fitted to the keel blocks to enable sections of the keel to be exposed for repair
(Photo courtesy ADI)

The keel planks were reinforced with extra galvanised plates to add strength as the keel was replaced in more sections than previously existed. Anodes were replaced and attached to the reinforcing plates.

The two propeller shafts were pulled and the shaft journals replaced due to excessive wear. The Cutless bearings were also replaced due to excessive wear. The port propeller blades were re-tipped because of a previous grounding. New seals were fitted to the controllable-pitch propeller inner shafts port and starboard and new bolts were fitted to the couplings.

Some of the planking had degraded and needed work. The planks were treated with a 20 684 kPa water wash and then sanded back to good wood and the whole hull repainted.

Endeavour entering the floating dock at Garden Island
(Photo courtesy ADI)

All the standing and running rigging was taken down. The standing rigging was treated to withstand the weather. It was first cleaned with a stiff brush and gum turps. This is a long and laborious process and mostly carried out by volunteers from the museum. It was then saturated in a mixture of gum turps and natural pine tar. The standing rigging was then pre-tensioned before being fitted. Upper masts and yards were removed, sanded back, repainted and reinstalled.

The interior of the ship was emptied and painted with all furniture removed and repainted. Most of the painting and rigging work was carried out by museum staff and volunteers. The museum employs some shipwrights and general hands to help keep *Endeavour* in service. Without the help and efforts of these people the project would not be possible.

The *Endeavour* repair and refit was a unique and interesting project which ADI was lucky to be involved with. ADI wishes *Endeavour* many more years of happy sailing!

Sean Cribb

CLASSIFICATION SOCIETY NEWS

ABS Rules Free on the Web

The classification society American Bureau of Shipping develops and verifies conformance with standards for design, construction and operational maintenance of marine-related facilities.

These standards are known as Rules and Guides. They are derived from principles of naval architecture, marine engineering and related disciplines. Currently, ABS has close to 100 Rules and Guides available.

These Rules and Guides are now available for free in PDF format on the ABS website, www.eagle.org/rules.html.

Any queries regarding the interpretation of the Rules and Guides can be directed to the ABS Sydney Office on (02) 9956 7322.

ABS Selected By Woodside For Asset Base Classification and Verification

ABS has been selected by Woodside Energy Ltd, Australia's largest publicly-traded oil and gas exploration and production company, to provide classification and verification services across the Pan-Woodside Energy Ltd asset base for the next five years. The multi-year, multi-million dollar contract covers core operational requirements of the company's activities off Australia, and existing and future emerging projects in Australia, the UK, the USA, Singapore and Korea.

Woodside's active exploration and production program includes such projects as the Enfield and Vincent developments offshore Western Australia, the Angel Gas Project and the Pluto LNG field about 180 km from the Burrup Peninsula, the Bonaparte Basin in the Timor Sea and projects off the US West and Gulf coasts. Woodside is also undertaking a major exploration program off Mauritania, West Africa.

The agreement covers the energy major's FPSO assets including production systems, equipment and safety systems. Classification will be to applicable ABS Rules. Verification will be to relevant international, national and state regulations, in particular Australia's Petroleum Submerged Lands Act (PSLA) as it applies to the management of safety on offshore facilities.

Woodside operates the North West Shelf Venture, Australia's largest resource project. It also operates more than 75 joint ventures on behalf of 39 participants in Australia, Africa and the United States. ABS will provide engineering design review, survey services and act as a liaison on behalf of government agencies to facilitate the reviews and surveys conducted to fulfill the regulatory requirements of these agencies.

ABS already classes the Woodside-operated FPSO *Cossack Pioneer* that has been on station on the North West Shelf for several years. This new agreement significantly expands the relationship with Woodside in terms of the number of units and geographic scope of the ABS activities.

ABS holds the leading market share in offshore classification worldwide, and has a well-established network of offices in Australia with exclusive surveyors in offices in Sydney, Cairns, Fremantle and Melbourne. The Woodside contract will be managed from the society's Fremantle, Western Australia, office with overall project responsibility taken by ABS' new Country Manager, Craig Hughes, in Sydney.

"The confidence Woodside has placed in ABS with this new agreement reflects the superior service and strong technical support we have given them on the *Cossack Pioneer* project," says ABS Vice-President of Energy Development, William J. Sember. "The expanded agreement will allow us to build on the effective asset-integrity management programs that we have developed specifically for FPSOs which utilize sophisticated risk methodologies to better protect these assets and maximize their production efficiencies."

Craig Hughes

Pacific 2006

It was good to see all the major classification societies represented at stands at the Pacific 2006 International Maritime Exhibition in Sydney. All were in prominent positions and had freebies available, like mugs, model vessels and free copies of rules on CD. There was much discussion, many friendships renewed and, no doubt, avenues for new business explored.

Phil Helmore

EDUCATION NEWS

Australian Maritime College

Parametric Roll in Head Seas

Work is continuing on an investigation into the parametric roll of container ships in collaboration with the Australian Maritime Safety Authority. Towing-tank experiments are currently being conducted in head seas to ascertain when the onset of parametric roll occurs and its influences. The work by the research team of Giles Thomas, Jonathan Duffy, Tim Lilienthal and Irene Penesis from AMC and Rob Gehling of AMSA will help develop a submission to IMO.

Replenishment at Sea

The Defence Science and Technology Organisation (DSTO) recently sponsored an Australian Maritime College naval architecture student, Tristan Andrewartha, to undertake a study of the interactions between vessels whilst travelling in close proximity for replenishment-at-sea operations. The program of work, supervised by Giles Thomas from AMC and Terry Turner from DSTO, includes both experiments and computational analysis. The experimental component of this research has been undertaken at the towing-tank facility at the Australian Maritime College.

This program of work has involved personnel, not only from DSTO and AMC, but also a Canadian Defence Scientist from Defence Research and Development Canada, Dr Kevin McTaggart, who is currently attached to DSTO as part of an international scientist-exchange program.

Professor Position

The Australian Maritime College is currently advertising a combined position of Professor of Maritime Hydrodynamics and Manager, Australian Hydrodynamics Research Centre. The appointee will have demonstrated expertise, substantial research experience and proven ability to obtain research funding in the field of maritime hydrodynamics. An international reputation for excellence is expected, with leadership experience pointing to success in senior management an advantage.

Giles Thomas

The University of New South Wales

Undergraduate News

Thesis Projects

Some of the undergraduate thesis topics recently completed include:

Analysis of a Twin-mast Catamaran

Conventional catamaran designs use a single mast, located on the forward crossbeam, usually at the most highly-stressed region. Craig Birdsall has extensively tested a structurally-advantageous design in the closed-circuit wind tunnel. This design has shown significantly increased thrust, with only a slight increase in drag.

The Application of Fracture Mechanics in Fatigue-life Analysis of Joints in High-speed Craft

Fatigue-life assessment methodologies are used with the final aim of comparing their validity. Constantine Ling analysed local finite-element models of various parts of the structure of a modern high-speed catamaran using MSC Patran/Nastran to identify locations of maximum stress. Results show that the fracture mechanics approach has an edge in the accuracy of lives predicted.

And, still in progress (due to complete in mid-2006):

Analysing the Stability of Rigid-inflatable Boats

The application of standard stability criteria to rigid-inflatable boats (RIBs) presents difficulties due to their unique hullform. Brett Morris is reviewing the stability-curve-based criteria and is analysing the stability data of several RIBs, and expects to propose a simplified heeling trial for assessing the stability of RIB craft.

Multiple-criteria Entry

The Faculty of Engineering at The University of New South Wales has introduced a new entry scheme which looks beyond just HSC exam results. Multiple-criteria entry involves potential students attending an interview to assess their suitability to the profession.

"Engineering is a professional discipline and, while academic performance is important, success in the field also depends on motivation, attitudes and commitment," said A/Prof. Tim Hesketh, Associate Dean in the Faculty of Engineering. "Through the multiple-criteria entry program's interview process, we can assess a student's attitude and their ability in certain areas not measured in high-school examination assessment."

Students who believe that their UAI may fall in the range of 75–85 are encouraged to apply for an interview or to phone the Faculty of Engineering to talk it over. The inaugural round of interviews for entry to UNSW in 2006 were held during the week commencing Monday 26 September 2005 at The University of New South Wales in Sydney, and in Canberra, Coffs Harbour and Dubbo. A second round of interviews was held during the week commencing Monday 2 January 2006, after UAI results had been released.

It will be interesting to see what effects the MCE scheme will have.

Plan Reviews

The degree plans in the Faculty of Engineering have all been reviewed, as a result of a number of drivers:

- new requirements of the Academic Board for elective material;
- new requirements of the Dean of Engineering that all courses be 6 units of credit and that there be a flexible entry to Year 1 (i.e. an almost-common Year 1 for all of the Faculty of Engineering) [*just like there was forty years ago!* — Ed.]; and
- the establishment of a UNSW campus in Singapore, and the requirement by the Academic Board that transfer between campuses be without penalty.

As a result of the review, students commencing Year 1 of aerospace engineering, manufacturing engineering, mechanical engineering, mechatronic engineering or naval architecture at UNSW in 2006 will study the following program:

Session 1

MATH1131	Mathematics 1A
PHYS1121	Physics 1A
ENGG1811	Computing for Engineers
ENGG1000	Engineering Design and Innovation

Session 2

MATH1231	Mathematics 1B
MATS1011	Engineering Materials and Chemistry
MMAN1130	Design for Manufacture
MMAN1300	Engineering Mechanics 1

The new plan structures and courses will roll in progressively over the next few years for those Year 1 students. Details of courses may be found on the UNSW website, www.handbook.unsw.edu.au/vbook/brCoursesByAtoZ.jsp?StudyLevel=Undergraduate&descr=A

Post-graduate and Other News

Staff Changes

Professor Graham Morrison retired from teaching in the School of Mechanical and Manufacturing Engineering in February. Many will remember him teaching in the areas of fluid mechanics and thermodynamics, his research interest in solar power, and recent post as Director of Laboratories. He continues at UNSW as a Visiting Professor.

Dr Gary Rosengarten, a recent PhD graduate of UNSW, commenced in February, and will take over some of the teaching in fluid mechanics and thermodynamics.

Pacific 2006 IMC

The Pacific 2006 International Maritime Conference was held at the Sydney Exhibition Centre, Darling Harbour, from 31 January to 2 February 2006. There were 354 registrations from all over the world, and a number from UNSW presented papers, including:

Chowdhury, M., *Probability of Strength Reduction of Aged Ship Structural Profiles Due to Corrosion Wear*

Doctors, L.J., *Investigation of the Free Surface and Resistance of Transom-Stern Vessels*

Helmore, P.J. and Swain, P., *Regression Analysis of the Ridgeley-Nevitt Trawler Series Data*

Prusty, G., *Buckling Behaviour of Eccentrically-stiffened Composite Panels*

The Conference Cocktail Party was held on the evening of Wednesday 1 February in the Terrace Room at the Australian National Maritime Museum. With tall walls of glass presenting sweeping views of Darling Harbour and the spectacular towering city skyline, the Terrace Room proved to be the perfect place to enjoy Australian wines and delicious canapés.

HPYD 2006

Jointly hosted by Royal Institution of Naval Architects, the University of Auckland and Massey University, and timed to coincide with the arrival of the Volvo Ocean Race fleet in New Zealand, the second international conference on high performance yacht design was attended by delegates from all over the world, and included the Chief Executive of RINA, Trevor Blakeley, continuing his peregrination from Pacific 2006 IMC.

It was pleasing to see a number of registrants from Australia, and the authors included the following:

Rozetta Payne and Don Kelly, *Knowledge-based Engineering and Innovative Yacht Design*

Giles Thomas, Dougal Harris, Yannick d'Armancourt and Iain Larkins, *The Performance and Controllability of Yachts Sailing Downwind in Waves*

Bruce Cartwright, Jinzhu Xia, Stuart Cannon, D. McGuckin and P. Groenenboom, *Motion Prediction of Ships and Yachts by Smoothed Particle Hydrodynamics*

The opening Cocktail Party was held at the Waterfront Bar and Café at Hobson's Wharf on the Waitemata, and the Conference Dinner at the Royal New Zealand Yacht Squadron at Westhaven Marina on the Manu Kau.

Following the conference, UNSW PhD student Rozetta Payne took some time to catch up with recent UNSW graduate, Felix Scott, who is now working at High Modulus in Auckland.

Phil Helmore

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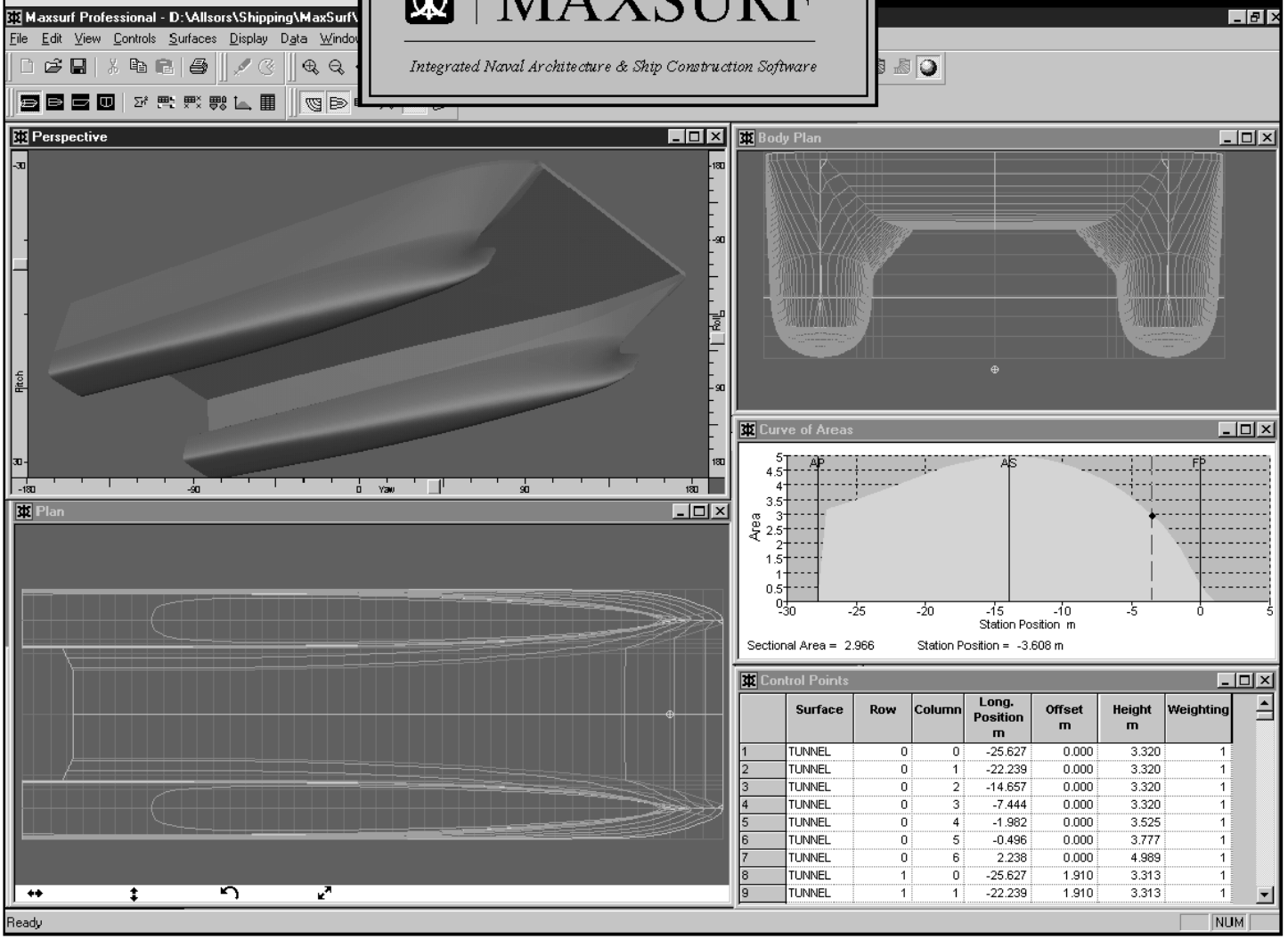


FROM THE CROW'S NEST

Yacht *Nirimba* Sails On

The steel yacht *Nirimba* was built by the naval artificer apprentices at the RAN Apprentice Training Establishment, HMAS *Nirimba,* at Quaker's Hill, NSW, over a period of four years and was launched in November 1966. She was designed by Alan Payne, and remains the only operational steel vessel ever built entirely by RAN personnel. She was used by the navy as a training vessel and competed in eight Sydney–Hobart Yacht Races, including completing stone-motherless-last in the 1977 classic which saw more than 50 yachts pull out due to the ferocious weather. HMAS *Nirimba*, where she was built, is no longer used for training navy apprentices, and is now the University of Western Sydney's Blacktown Campus, Nirimba Education Precinct.

When the ex-apprentices found that the yacht was up for sale in the middle of last year, they contacted the owner, Dirk Hunter. He had found the yacht after two post-navy owners, spent $80 000 restoring her, and had been happily sailing her for years. They began negotiations for the ex-apprentices to buy her, including removing her from the market for a time. This culminated in the formation of The MOBI Yacht *Nirimba* Association, and many months of fundraising efforts by the President, Rick Pengilly. Fundraising was successful, and included Bronze, Silver, Gold, Sapphire and Diamond "Strake Holder" contributions and donations through the www.MOBI-Yacht-Nirimba.org appeal website (you may still donate!), the raffle of a painting of the yacht, interest-free loans, and a short-term loan by the owner himself.

The result was that The MOBI Yacht *Nirimba* sailed back in through Sydney Heads on 4 December 2005, and berthed at the Royal Australian Naval Sailing Association in Ruschcutter's Bay for a grand home-coming reception.

The 50th Anniversary Reunion of HMAS *Nirimba* will take place in Canberra this year.

Nirimba aficionados can find more details on the website www.mobi-yacht-nirimba.org. Clicking on the signed photograph takes you to a pile of photographs on the RAN Skilled Hands website, www.ran-skilledhands.org/photogallery/index.php.

Nirimba dressed to impress on Australia Day 2006
(Photo John Jeremy)

Speed Sailing Record Falls … Again

The world record for distance covered in 24 h by a monohull sailing vessel has kept on falling.

It was captured in April 2005 by the Volvo Ocean 70 yacht *Telefonica MoviStar* (built by BoatSpeed in Somersby, NSW) while on her delivery voyage from Sydney to Galicia, Spain.

However, during the current Volvo 70 race, both Team ABN AMRO yachts have smashed the monohull 24-hour world speed record. The record was broken first by *ABN AMRO Two* and then *ABN AMRO One*, but speeds kept rising. It wasn't until day 17, on 28 November 2005, that the highest numbers were confirmed and the record was claimed by *ABN AMRO One* with a final tally of 546 n miles at an average speed of 22.75 kn throughout the 24 h period. Not to be outdone, *ABN AMRO Two* clocked in at 539 n miles, averaging 22.45 kn and also breaking *MoviStar*'s record.

Cruising

The summer cruise season is beginning to wind down after a busy time of operations out of Sydney.

Other than the summer regulars, *Pacific Princess* and *Pacific Sun,* Sydney Harbour saw visits by *Artemis, Silver Shadow,* and *Orion* in December; *Statendam, Orion, Diamond Princess, Silver Shadow, Christopher Columbus,* and *Seabourn Spirit* in January; and *Diamond Princess, Seven Seas Voyager, Statendam,* and *Aurora* in February, as well as *QE2* on her annual circumnavigation of the world.

Diamond Princess at the Sydney Cove Passenger Terminal making the 23 663 GRT *Spirit of Tasmania III* (inbound) look quite small
(Photograph John Jeremy)

Eden Busy

The closure of the Mobil and BP oil terminals at Eden has meant that tankers no longer call there to deliver fuels for on-delivery by road tanker to the Monaro region and Canberra, which are now supplied by road tanker direct from Sydney.

However, the completion of the multi-purpose wharf on the south side of Twofold Bay has given a boost to the number of shipping movements. Naval vessels call there for ammunitioning and de-ammunitioning, and log ships are becoming a familiar sight as they load pine logs from the Monaro for export to South America.

Coinciding with the completion of the multi-purpose wharf, some of the summer cruise vessels operating out of Sydney have begun calling at Eden. *Aurora, Orion, Pacific Princess, Artemis* and *Silver Shadow* have all called recently, one berthing at the multi-purpose wharf, one at the breakwater wharf, and the others anchoring in the bay and ferrying passengers ashore in the ship's boats.

Silver Shadow anchored in Twofold Bay, Eden with ship's boat at the breakwater wharf (extreme left) (Photo Phil Helmore)

Also coinciding with the completion of the multi-purpose wharf has been the advent of further work at the eastern end of the Bass Strait oil field. Rig tender vessels are now calling regularly at Eden for equipment and supplies, as it is closer to Eden from the site than to Barry Beach at Corner Inlet in Victoria.

All of this is providing heaps of work for Eden's new Harbourmaster, Captain Josephine Clarke, the first female harbourmaster in NSW (and one of two in Australia). She works hard, is thoroughly professional, and is respected and liked by all. Tug masters have been known to sign off an operation, saying "Nice one, Jo!"

James Craig Sails South

James Craig set sail from Sydney on 14 January, and headed south to be the flagship for the arrival of the Volvo round-the-world yachts at Geelong, and the annual Williamstown Maritime Festival.

On the way, she called at Eden, then Cowes in Westernport, Port Melbourne, and then Williamstown from where she spent several days sailing with passengers on Port Phillip Bay. When arriving at Geelong on Australia Day, the tugs did not show up, so Captain Ken Edwards put her alongside without.

During the time in Geelong and Williamstown, *James Craig* played host to a number of the elders of the tribe who had sailed in square-riggers such as *Passat*, *Lawhill* and *Cutty Sark.*

On the return trip to Sydney, *James Craig* rounded Gabo in a 35-knot sou'wester and logged 11.3 knots, the fastest she has been since her restoration! She arrived back in Sydney on 12 February.

For square-rig aficionados, the log of her recent trip, at www.australianheritagefleet.com.au/specev/sydmelblog.html, makes exhilarating reading.

James Craig departing Eden at 1615 on 16 January (Photo courtesy Helen Wortham)

RAN Heritage Centre

The RAN Heritage Centre on the end of Garden Island opened its doors late last year (see *The ANA*, November 2005). The centre consists of two National Estate-listed buildings, the Gun-mounting Workshop and the Boatshed, which provide the setting for the exhibition of the Naval Heritage Collection. The Centre itself is located within the new Garden Island Public Precinct, which covers most of the original island.

Your scribe's family made a day out of it in late January, and it is well worth a visit.

If you are interested in marine things painted grey, their equipment, operation, maintenance, logistics, and just what makes the navy tick, then the Heritage Centre will keep you interested for hours.

George Wortham, ex-Royal Navy, inspecting the whaler at the RAN Heritage Centre (Photo courtesy Helen Wortham)

If you are not so interested, then the gardens and the view will keep you occupied. The gardens include a heritage rose garden, beautiful old trees, grass lawns, picnic tables and seating, and views at least the equal of The Domain! The old signal building on the top of the island has had its roof converted to a viewing platform, and there are spectacular views of the harbour and the city. The gardens include the earliest known graffiti in Australia (January 1788) and the first grass tennis court in Australia.

The precinct and centre are open between 0930 and 1530 daily, except for Good Friday, Christmas Day, Boxing Day, New Year's Eve, New Year's Day and Australia Day. Entry is free to all areas of the precinct and centre, except for the Special Exhibition Gallery. Access is by ferry from Circular Quay, using the Watson's Bay route. Tour buses (but not private vehicles or pedestrians) may access the precinct via the ADI site.

Further details of the RAN Heritage Centre may be found on the website www.navy.gov.au/ranhc.

Well worth a visit, and a stunning, uncrowded spot for a picnic in the gardens.

Phil Helmore

Australia Day on Sydney Harbour

The celebrations of Australia Day in Sydney centre on the Harbour and, as in previous years, thousands turned out to view the on-water activities including the now-traditional 'ferrython' (it is not really a race as the speed of the ferries is strictly controlled for safety), the air displays by the RAAF Roulettes and Hawk fighters, and the Tall Ships race.

A highlight of the day was the 170th Australia Day Regatta — the oldest continuously-run regatta in the world. Unfortunately, the offshore race conducted by the Cruising Yacht Club had to be abandoned for lack of wind, but the sea breeze arrived just in time for the start of the harbour races which had the largest number of entries for many years. The regatta is also sailed on Lake Macquarie, Pittwater, Botany Bay and Lake Illawarra in all kinds of sailing craft including radio-controlled model yachts with some 750 boats taking part.

Passengers in the cruise liner *Silver Shadow* enjoyed a clear view of harbour activities from a mooring in Athol Bight. She moved to Darling Harbour in the afternoon for the evening events there. The replica 18-foot skiff *The Scot* is heading towards the Regatta start line
(Photo John Jeremy)

With *James Craig* in Melbourne for Australia Day this year, the Australian National Maritime Museum's *Endeavour* was the largest ship in the Tall Ships Race
(Photo John Jeremy)

The Historical Skiffs Division start in the Australia Day Regatta
(Photo John Jeremy)

Voyager returns to Cockatoo Island

Visitors to Cockatoo Island in Sydney can now see an outstanding model of the Daring-class destroyer HMAS *Voyager* which was built on the island and completed in 1957. On loan to the Sydney Harbour Federation Trust, the model was built by musician and guitar maker, Ken Taylor, who started building models as a hobby in the 1950s. Constructed at 1:24 scale, the model was begun in March 1992 and completed in June 2001. It contains 45 887 individual parts and took an estimated 54 500 hours to complete.

During construction Ken Taylor was assisted by many survivors from *Voyager* who helped ensure that the model accurately represents the ship as she was on the day she collided with the aircraft carrier HMAS *Melbourne* in February 1964.

The detail in the model is remarkable. Ken has selected materials that enabled accurate representation at model scale — for example, sheet lead rolled to accurate scale thickness has been used for 40 mm Mk 5 gun mountings. There is no fibreglass in the model. The hull is not solid, but timber framed and 'plated' with thin plywood. Woods used include maple, cedar, teak, spruce and MDF. Metal parts have been made from brass and copper sheet, brass and stainless steel rod, copper fuse wire, lead sheet, resin cored solder, aluminium sheet, rod and wire, brass chain, small brass fishing rings and swivels, small nails and copper tubing. Clear plastic, PVC pipe, plastic mesh and perspex

HMAS *Stuart* — Flagship of the 170th Australia Day Regatta
(Photo John Jeremy)

have also been used. The model was painted with acrylic lacquer and Humbrol model paint. Selleys donated 300 tubes of araldite for the project.

The Mosman Lions Club, led by their Chairman Hal Speigel, has taken on the future of the model as a project and is seeking sponsorship and donations to purchase the model and find it a permanent home. Hopefully, that will be on Cockatoo Island where it may become a major part of a permanent exhibition describing the 117 years of shipbuilding on the island.

John Jeremy

The detail in the model of HMAS *Voyager* is remarkable
(Photo John Jeremy)

The superb model of the RAN Daring-class destroyer HMAS *Voyager* built by Ken Taylor and now on display on Cockatoo Island in Sydney. *Voyager* was the first of two Daring-class destroyers built on Cockatoo Island. The second, HMAS *Vampire*, is now a popular exhibit at the Australian National Maritime Museum in Darling Harbour
(Photo John Jeremy)

PACIFIC 2006
INTERNATIONAL MARITIME CONFERENCE

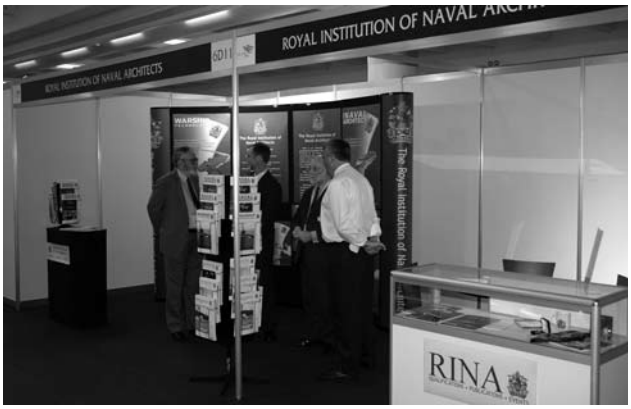
The Pacific 2006 International Maritime Conference was held at Darling Harbour in Sydney from 31 January to 2 February 2006. Held in conjunction with the RAN Sea Power Conference and the Pacific 2006 Maritime Exposition organised by Maritime Australia Limited, the conference was attended by some 345 delegates from 16 countries. Overall, an estimated 10 000 people attended the event which was the biggest of the four held at Darling Harbour since 2000. The Pacific 2006 IMC was organised by the Royal Institution of Naval Architects, the Institute of Marine Engineering, Science and Technology, and Engineers Australia. The Pacific series of expositions and conferences is the largest of its kind in the Southern Hemisphere and a major international event. The Pacific 2008 IMC will be held in Sydney between 29 January and 1 February 2008.

USS *Pinckney* (DDG 91) arriving in Sydney for Pacific 2006
(RAN Photograph)

RINA President Nigel Gee and his wife Susan during the Harbour cruise on 30 January
(Photo John Jeremy)

John Jeremy speaking at the Opening Ceremony for the Pacific 2006 Congress
(Photo Lysette Mavridis)

A technical session at the Pacific 2006 IMC
(Photo John Jeremy)



At the RINA stand in the exhibition — Keith Adams, Adrian Broadbent, Trevor Blakeley and Glenn Cobb
(Photo John Jeremy)

The Tenix stand was one of the many fine exhibits at the Pacific 2006 Maritime Exposition
(Photo John Jeremy)

Mr John Prescott, Chairman of ASC Pty Ltd, speaking at the Pacific 2006 IMC cocktail party
(Photo Sara Foda)

Some familiar faces at the Pacific 2006 IMC cocktail party
(Photo Sara Foda)

The RAN Guard about to fire a volley during the Ceremonial Sunset in Cockle Bay on 31 January. The ships in the bay were HMAS *Hawkesbury*, HMAS *Townsville* and HMAS *Armidale*
(Photo John Jeremy)

The Pacific 2006 IMC Organising Committee, Peter May (Engineers Australia), Keith Adams (RINA), John Jeremy (RINA — Chairman) and Laurie Prandolini (IMarEST) with Madeleine Smith and Sara Foda of Tour Hosts
(Photo Bob Campbell)

Do Safety and the 1969 Tonnage Measurement Convention go Together?

Rob Gehling

Australian Maritime Safety Authority, Canberra

Why Discuss Tonnage Measurement?

"What — tonnage measurement?" would seem to be the likely reaction of many to the title of this paper. Further reaction, if only subconscious, is likely to be along the lines of "gross and net tonnages are an artificial construct to simply ascribe a number to the size of a ship, so what's that got to do with safety?"

As it turns out, the use of gross tonnage and, to a lesser extent, net tonnage for the setting of various unavoidable fees associated with ship operations makes reduced tonnage values an attractive feature for shipowners, and therefore well worth the effort involved from the perspective of ship designers and builders. As will be apparent, the advent of the 1969 Tonnage Measurement Convention [1] or London Convention has, in closing-off some tonnage-reducing loopholes, introduced a pressure to alter ship designs in ways that also reduce safety.

Introduction — Principles and History of Tonnage Measurement

The 1969 Tonnage Measurement Convention was formulated in somewhat unusual circumstances. While the purpose of the convention was to formulate an internationally agreed formula for the measurement of gross and net tonnage, eliminating some of the tricks used by designers to artificially reduce the measured tonnages of their designs, the question on which this paper is titled needs to be asked. In short, "is the cure worse than the disease?"

As a young student, I was taught the origins of tonnage measurement. Initially it comprised determining the number of wine barrels or "tuns" that a ship could carry. The spelling of tuns changed and standardised on units of 100 cubic feet (2.83 cubic metres). Over the years the ebb and flow between tonnage rule-makers and ship designers resulted in "shelter deck" spaces above the "tonnage deck" being excluded from tonnage measurement as deck openings were deemed not to provide protection to the cargo from weather and sea, regardless of whether the "tonnage hatches" were in protected locations and the small area of those hatches relative to the decks in which they were located.

The rules for measurement of these tonnages evolved into two basic sets [2], namely the British (Moorsom) system adopted by most European countries and reflected in the Oslo Convention of 1947, and the American system which was also used by such flag States as Panama and Liberia. While basically similar, the main difference between them was that the American system often provided more generous deductions for some categories of spaces.

It is noteworthy that the 1947 Oslo Convention system is still in use by some countries, particularly in relation to fishing vessels, since the 1969 (London) Convention, as its international successor, does not apply to vessels of less than 24 m length.

The 1969 Convention

When a new multilateral treaty is foreshadowed, the arrangements for the adopting Diplomatic Conference have to be put in place well beforehand, often before many of the details of the resulting treaty (Convention) have been agreed. However, these arrangements are put in place in anticipation of outstanding problems and details of the proposed treaty being agreed in advance of the Conference, but it is not always possible.

In the case of the 1969 Tonnage Measurement Conference, many of the principles of the proposed new tonnage regime remained outstanding at the start of the scheduled conference. Indeed, the difficulty in developing a new internationally-agreed tonnage measurement system to replace the existing systems was such that agreement had not been achieved by the scheduled end of the conference, so the conference was extended as long as necessary to reach agreement. This involved analysis of the effect of various options on the world fleet, using the then-available databases and computing systems. The conference and the processes involved in bringing it to conclusion are now part of folklore, although I have had to rely on personal recollections [3] for the above background information as little of it has been committed to writing.

The resulting Convention is a system in which a ship's gross tonnage (intended to indicate the size of the ship) is based on the total enclosed volume modified by a logarithmic factor based on that volume, while the net tonnage (to reflect earning capacity) is similarly based on the volume of cargo spaces and a similar logarithmic factor.

But the reality of replacing existing "national" tonnage measurement systems (in practice only two, as outlined above) was that the commercial implications and political imperatives of the new Convention led to it not entering force until July 1982, despite its attraction as an internationally-accepted and uniform system.

It should be pointed out at the outset that the total enclosed volume concept provides a good basis for determining the size of a passenger ship and, indeed, the 1969 convention appears to have worked well in relation to such ships. So the discussion in the remainder of this paper excludes passenger ships and relates only to cargo ships.

One of the implications of the London Convention is that it has meant the end of the conventional "shelter-decker". Despite the same tonnage penalties applying to them, ro-ro ships have continued due to operational features that counter-act the tonnage penalties. Similarly, car carriers have developed since 1969 despite the tonnage penalties. On the other hand, conventional containerships have continued to develop and prosper, largely due to the space occupied by on-deck containers, whereas in the open-top type of containership almost all container slots are included in the total enclosed volume measured for gross tonnage.

Unsuccessful attempts have been made from time to time, including in Australia, to levy port charges on conventional containerships taking into account the on-deck spaces that are not measured for tonnage but are used for cargo.

The comparison between conventional and open-top containerships is an indication that there is a pressure on ship designers to minimise enclosed volume above the waterline in order to reduce gross tonnage, and thereby reduce tonnage-based fees. Accordingly, greater-than-minimum freeboard, increased reserve buoyancy and the resulting improved reserves of stability have become optional extras with an associated price tag that lasts throughout the ship's life in terms of increased tonnage-based fees. Additionally, a ship with greater than minimum freeboard probably carries an increased initial price. It seems that there is no incentive to provide improved safety.

In addition to the general incentive to reduce gross tonnage, the use of gross tonnage as a delimiter for various statutory and other requirements, such as the lower limit of 500 gross tons for the application of SOLAS to cargo ships, provides an incentive to keep gross tonnage below these specific values. Although the author has no direct experience of gross tonnage delimiters in other areas, manning and insurance have been mentioned to him as areas of international application.

The consequences of the 1969 Convention extend beyond efforts to minimize freeboard. These were perhaps best summarized in a presentation made during the session of IMO's SLF Sub-Committee last year, in which De Monie [4] asserted from research conducted on behalf of the Netherlands' Shipping Inspectorate that the quest to reduce gross tonnage "induces naval architects and shipbuilders to build ships without forecastle, with cut-off stern, small engine room, tight crew accommodation spaces" and "wide vessels with reduced freeboard, no forecastle and non-reinforced hatch covers on the forward holds".

Enter a free-thinking Dutch naval architect named Dr Ernst Vossnack. In May 1997 Vossnack presented a paper [5] in which he pointed to the "dangerous consequences" of measures taken by ship designers and builders to reduce total enclosed volume and therefore gross tonnage measured under the 1969 Convention. He proposed replacement of gross tonnage with another value to reflect the size of the vessel, namely:

Length overall x Breadth x (Length overall x Breadth)$^{0.3}$

However, in his verbal presentation, Vossnack is reported to have suggested using draft as the third term, although it would appear that he proposed using the actual draft rather than the ship's maximum (summer) draft, as he suggested that use of draft would be subject to manipulation by masters, possibly compromising ship safety.

Further to the measures listed by De Monie, Vossnack drew attention to a ship that had its hatch covers designed and constructed with stiffening on the upper side simply to reduce gross tonnage by shifting the weathertight boundary of the space downwards by a few centimetres. The author would like to think that the quest to achieve reduced gross tonnage values has not, in general, reached such extremes — but perhaps it has.

This Vossnack presentation is reported to have been poorly attended, but the referenced summary was given added importance by connections being made between 1969 Convention gross tonnage and subsequent loss or damage of deck-stowed containers on *APL China*, *President Adams*, *Alligator Strength* and *Ever Union* — and that's only from one single Pacific storm, possibly in October 1998. Another storm in February 2000 [6] was reported as having resulted in extensive container damage and losses on *OOCL America*, *Astoria Bridge*, *Sea-Land Hawaii* and *Sea-Land Pacific*. An associated comment piece [7] attributed such incidents to measures taken to reduce gross tonnage, with Dr Vossnack and his group of "influential Dutch marine people" featuring prominently.

Implications of the problem for containerships

It should be noted that the introduction of open-top containerships in the early 1990s, accompanied by special safety rules [8], brought attention to the previously-mentioned tonnage penalties associated with this ship type. Coinciding with the issue of those safety rules, IMO therefore issued a circular [9] authorising the application of a discount to such vessels when using their gross tonnage values for determination of tonnage-based fees. It is of interest that records of the presentation of the above-mentioned paper indicate that Vossnack was previously an employee of Nedlloyd, who were among the pioneers of open-top containerships. Perhaps commercial disadvantages concentrate the attention on safety advantages.

Nonetheless, a single incident with a C11 class containership in October 1998 [10] resulted in the loss overboard of about 400 containers, with a similar number collapsing or being crushed, out of a total of about 1300 deck-stowed containers.

The TT Club, in claiming to insure 15 of the top 20 container lines for their container losses, estimates [11] from 2001 container-fleet information that 0.005% or one in 17 500 containers shipped each year ends up in the ocean. The article quotes Vossnack and Dr Hans Payer of Germanischer Lloyd as supporters of changes to tonnage measurement rules in relation to this problem. As a comment on the article, this author notes that, while the loss rate of one in 17 500 may superficially appear to be very low, in risk management and formal safety assessment terms a loss probability of greater than one in a million [12] is regarded as unacceptable.

The TT Club's container claims specialist is also quoted in the article as saying that the potential for improvement of the safe working load of container lashing and securing systems is limited, implying that ship design is a better prospect for reduction of loss rates. Since the top layers of containers stowed on deck are more likely to be "empties", to reduce their effect upon ship's stability, their average insurance value is reduced compared with containers filled with cargo; this may explain the apparently relaxed approach of the insurance industry to the above-mentioned loss rate.

In discussing containerships, it should be noted that it seems highly probable that there is a connection between container losses and head seas; certainly the losses mentioned above by a C11 containership were reported to IMO as having arisen in a head seas parametric-rolling situation. However,

parametric rolling of this type is the subject of another paper to this Congress to which the author has contributed and, in any case, different ships mentioned above in relation to specific incidents in the North Pacific are reported as having been travelling in opposite directions, so head seas are unlikely to have been involved in every case.

Tonnage Measurement and "Maritime Real Estate"

In looking at the use of a tonnage value for setting fees, it is worthwhile considering what is being provided for the price of the fee.

Take, for example, port dues. For the price of the fee, the owner provides a berth of suitable length, breadth (which may be dredged) and draft to accommodate the ship. What is being provided is not directly related to the total enclosed volume of the ship, and certainly not to the above-waterline volume of the ship. So why use gross tonnage for setting fees when a parameter based on the volume of required length, breadth and draft of the ship (i.e. its indisputable physical dimensions that define the maritime real estate, or parking space, that it requires) is more appropriate?

If it is satisfactory to apply this maritime real estate principle to setting fees, then perhaps consideration should also be given to simply using full load displacement. The author would offer the view that it is up to the owner and the ship designer as to how they use the maritime real estate — if they see an advantage in having a ship with fine lines, then so be it, but the ship's maritime real estate requirements do not change because of its fine lines. In principle, the overall size of the ship above the waterline is limited by the underwater body; whatever appears above the waterline has to be supported by buoyancy from below that line.

In considering a change from gross tonnage to a maritime real estate parameter, the anticipated effect on individual ship types should be taken into account. Tonnage-based fees for ships having greater-than-minimum assigned freeboard, such as containerships and LNG carriers, or having large enclosed superstructures above the freeboard deck (ro-ro ships, car carriers and livestock ships) will no doubt be reduced, in some cases by a significant margin. On the other hand, ships with minimum freeboard and relatively small superstructures such as bulk carriers and tankers can be expected to have their tonnage-based fees increased by a small amount commensurate with the relative numbers of these types.

French ports are already using the maritime real estate principle in setting their port charges, according to both the De Monie presentation and a statement by France to SLF 48 at IMO.

Investigations in Australia

In 2004 AMSA applied the maritime real estate principle to determine a "register tonnage" for all ships calling in Australian ports over a 12 month period. A notional levy was then calculated using this tonnage value to give the same total revenue as a levy based on gross tonnage, with the relative difference in tonnage-based fees for each ship according to the two methods then compared. The outcome was that for 89% of the population of over 3000 ships the fees were within plus-or-minus 25% of those based on gross tonnage. Under a similar comparison, neither deadweight nor net tonnage performed as well as register tonnage as the alternatives to gross tonnage in terms of the plus-or-minus 25% criterion.

Based on this methodology and outcome, AMSA subsequently conducted a similar study comparing "register tonnage" and gross tonnage across the world fleet as defined in the Lloyd's Register Fairplay and using a finer mesh to grade the results which, as reported to IMO [13], are shown in Figures 1 and 2.

At first sight these graphs may appear lop-sided. However, they are both based on the ratio for each ship of fees determined according to "register tonnage" relative to fees based on 1969 Convention gross tonnage. Using this method, no weighting is applied to ship size, so the lop-sidedness is due to large ships being generally less adversely affected than smaller ships. Since the 1969 Convention's formulae for gross and net tonnages include a logarithmic coefficient which reduces the measured tonnages of smaller ships compared with larger ones, it is apparent from Figures 1 and 2 that such a weighting factor would reduce the number of ships adversely affected by a move to "register tonnage".

It will be seen from Figure 2 that the anticipated effects on ship types are not as pronounced as might have been expected from the above in-principle consideration of the issue.

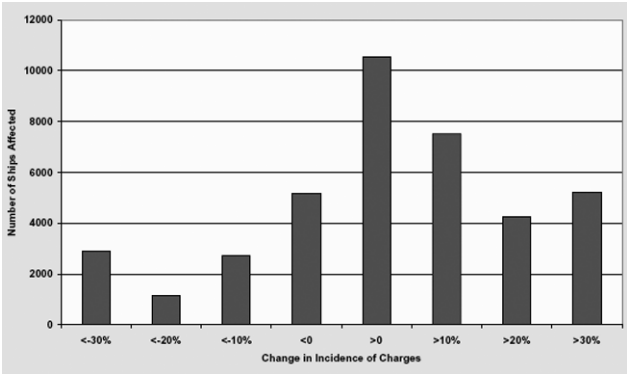


Figure 1 –Change from gross tonnage to "register tonnage" on world fleet

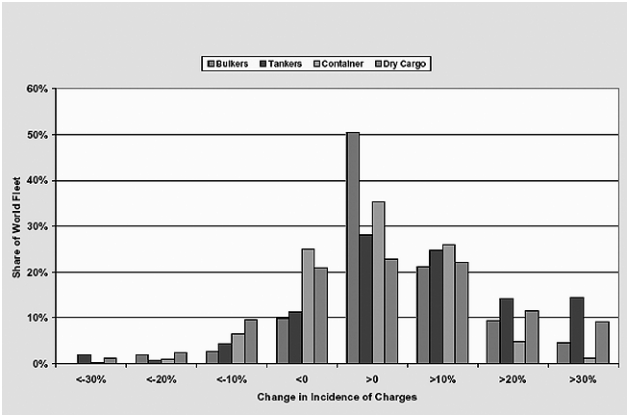


Figure 2 – Change from gross tonnage to "register tonnage" on world fleet according to ship type

The study was then extended to apply the same principles as used for the world fleet to consider the change in tonnage-based fees that a register tonnage would have on the populations of ships using three markedly-different Australian ports.

In Port A, shown in Figure 3, about two-thirds of the ships are dry bulk carriers, with oil tankers having the next highest number at about 13 per cent, which is about double the next largest category. The large number of ships having increased fees of 10 to 20 per cent are mostly smaller bulk carriers. A further counter-balancing factor is a small number of large LNG carriers for which fees would reduce substantially.

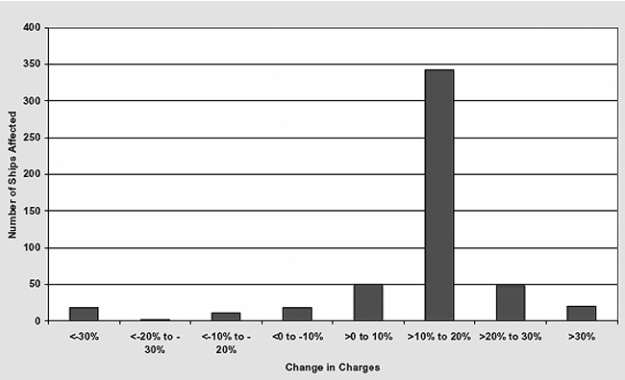


Figure 3 — Change from gross tonnage to "register tonnage" on ships visiting Port A

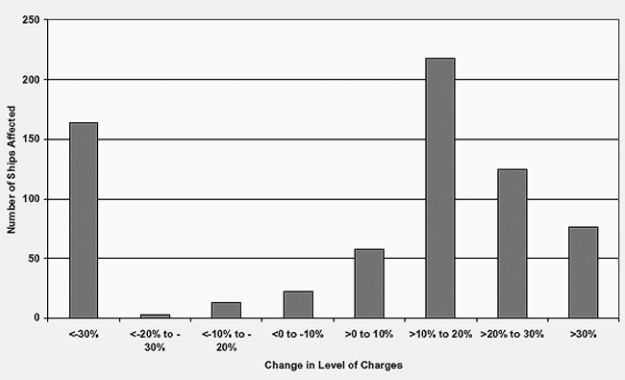


Figure 4 — Change from gross tonnage to "register tonnage" on ships visiting Port B

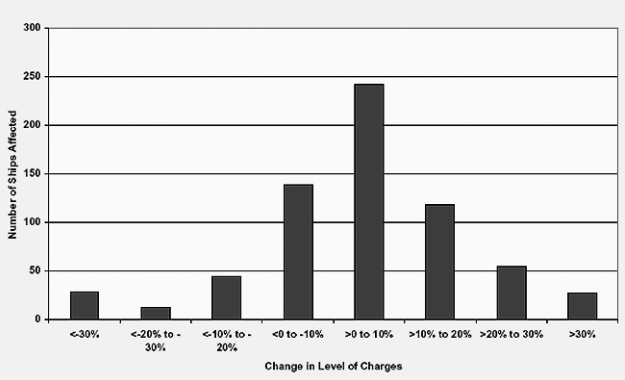


Figure 5 - Change from gross tonnage to "register tonnage" on ships visiting Port C

Figure 4 shows callers Port B which used by a much broader mixture of ship types, with no particular type predominating and ships being generally in the small-to-medium size range. In this case, as could be anticipated, the ships receiving greatest advantage from the change (fees reducing in excess of 30 per cent) are generally car carriers, ro-ro ships and passenger ships. These ships, of course, need to be counter-balanced by ships that are disadvantaged by use of "register tonnage". It is interesting, though, that the peak of those disadvantaged also occurs in the 10 to 20 percent disadvantage range.

Port (C) is represented by Figure 5. The main difference from Port B in the ship types using this port is that it is used by a much lower proportion of ro-ro ships and car carriers, hence the statistical distribution is much closer to that of Figure 1, and the peak number of disadvantaged ships moves to the 0 to 10 percent disadvantage range.

In examining these and later results, it must be borne in mind that such a fundamental change to the basis of fee-setting will never give a perfect result, where no ship is either advantaged or disadvantaged. So the extent of change to fees for an individual ship, as outlined in the preceding results, whether in relation to a global population of ships or on a port scale, should be sufficiently small as to not constitute an impediment to such a change.

How Could a Change to the "Maritime Real Estate" Concept be Engineered?

As indicated by the fact that this concept has already been implemented in French ports, there is no need for "maritime real estate" to be labelled as a "tonnage" measure before it can be used by who ever may wish to use it. However, it would be useful to have it incorporated into an international agreement such as the 1969 Convention, both to encourage its use as a measure of ship size and to ensure its internationally uniform implementation.

Earlier it was mentioned that the implications of the 1969 Convention were such that it did not gather sufficient international support to enter force any earlier than 1982. This is not particularly surprising, when it is borne in mind that change to tonnage measurement systems may impact upon "paragraph ships" which have been designed and constructed specifically to have gross tonnage less than a certain delimiter, such as below the 500 gross tonnage limit of application of the SOLAS Convention [14] to cargo ships.

In order to make the implementation of a "register tonnage" as simple as possible, when proposing the adoption of the maritime real estate concept to IMO's SLF Sub-Committee in September 2005 [15] Australia suggested that it should be as a "register tonnage" additional to the existing gross and net tonnages provided for under the 1969 Convention. There is nothing special about the name, except that it has been used before in Australian tonnage legislation. But the proposal was made with the specific purpose of addressing the "long-term effect with regard to safety" by running in parallel with the existing provisions of the 1969 Convention so as to pose no threat to existing "paragraph ships" or to the application of legislation such as IMO instruments.

The proposal was made with the intention of any amendments to the 1969 Convention being adopted at the same time as a resolution urging those using tonnage measured under the convention as the basis for fees to select "register tonnage" in preference to gross or net tonnage for this purpose. In this regard, it should be noted that in adopting the 1969 Convention the conference also adopted "Recommendation 2" on uses of gross and net tonnages which could form the pre-cursor of the proposed resolution.

But the 1969 Convention has a similar problem to other IMO Conventions of its era in that its amendment procedure requires "explicit" action by a given number of countries representing a predetermined proportion of the world fleet. In practice, this means that any amendments need to be sufficiently high on the legislative agenda of a large number of countries for them all to pass national legislation giving effect to the amendments before an entry into force date can be set. Effectively, the outcome is that such Conventions are for all practical purposes unamendable. For example, the 1975 amendments [16] to the 1966 Load Line Convention [17] have never entered force internationally, despite having been endorsed by 47 countries, but have instead had to be implemented through a separate legal instrument, the 1988 Load Line Protocol [18] which entered force in 2000 after explicit action by the required number of countries.

So, even if the 1969 Convention is amended through a protocol, the amendments are not likely to enter force for some years.

It is unsurprising, then, that some influential people at IMO have mentioned to the author that unnamed people are not keen to have the 1969 Convention re-opened, especially bearing in mind the difficult circumstances of its birth.

On the other hand, the safety implications of the 1969 Convention outlined above, despite having been foreseen at the time of the Convention's adoption, are such that early action will be necessary to minimize the time before the expected improvements to safety materialize in the world fleet.

Port State Control of Tonnage Measurement

The 1969 Convention states in Article 11 that "the certificate issued under the authority of a Contracting Government in accordance with the present Convention shall be accepted by other Contracting Governments and regarded for all purposes covered by the present Convention as having the same validity as certificates issued by them."

Article 12 of the 1969 Convention states that a ship of a 1969 Convention country will, when in the ports of another convention country, be subject to inspection by the port State provided that the inspection is limited to verifying that the ship has a valid tonnage certificate issued under the convention and that the main characteristics of the ship correspond to that certificate. This provision continues to state that "Should the inspection reveal that the main characteristics of the ship difer from those entered on the International Tonnage Certificate (1969) so as to lead to an increase in the gross tonnage or the net tonnage, the Government whose flag the ship is flying shall be informed without delay."

The effect of these provisions is that port state inspections are limited to checking that the ship has a valid tonnage certificate and any problems with that certificate can only be addressed long after the ship has departed.

While implementation of the 1969 Convention has generally been in accordance with the letter and the spirit of not only the convention itself but also the relevant interpretations issued by IMO [19], an example of where this does not appear to have occurred has recently been notified in a circular issued by IMO [20]. In this case, the ship is fitted

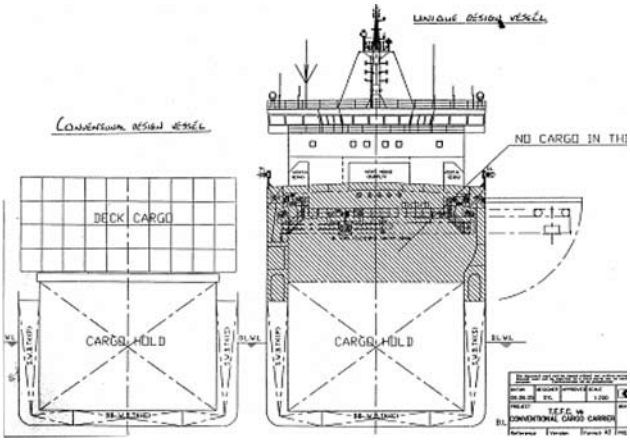


Figure 6a (left) and Figure 6b (right)

with deck-mounted gantry cranes for which protective superstructures are provided, with the volume of those superstructures purportedly not used for cargo and not measured for tonnage as shown by the shaded area in Figure 6b. For comparison, the midship section of a similar-sized conventional container ship (where cargo is carried in the corresponding space that is also not included in tonnage measurement) is shown in Figure 6a. The exclusion of this space from tonnage measurement has been made on the basis provided in the 1969 Convention in relation to "novel types of craft" for which the flag administration considers the application of the Convention provisions "unreasonable or impracticable".

It is the author's contention, held in common with many other national representatives at SLF 48 that the exempted space could readily be measured and should be included in the total enclosed volume of the ship and thus in gross tonnage in accordance with the Convention and its interpretations. Could this lead to other flag states applying a similar approach to the tonnage measurement of large enclosed superstructures or, indeed, flag and port states reconsidering their agreement to be bound by the provisions of the 1969 Convention?

The above example is perhaps another reason for introduction of a "maritime real estate" concept for use in assessing tonnage-based fees, by providing a more realistic parameter of ship size on which tonnage-based fees can be calculated. If the "register tonnage" were to be introduced and used for the main part in determining tonnage-based fees, then the commercial importance of reducing gross tonnage would reduce and its impact on reducing safety would be commensurately reduced.

This example certainly appears to provide reasons for amending the 1969 Convention to strengthen the powers of port states to respond to doubtful interpretations or use of the "novel types of craft" provisions without recourse to extreme measures. Such an amendment may then act as an incentive for more countries to become party to any protocol to the 1969 Convention and thereby help bring it into effect at the earliest possible date.

Conclusion

The answer to the question posed in the title of this paper has to be, on the basis of the arguments put forward, "not necessarily".

It is clear that tonnage measurement cannot continue to be treated as a bureaucratic process which results in tonnage values that provide an indication of a ship's size with no effect on safety — in a modern ship operations environment tonnage values can have a significant effect on the bottom line.

A case has been made for assignment of a new "tonnage measurement" parameter for ships, based on addressing the provisions of the 1969 Convention which act as disincentives to improved safety using the "maritime real estate" concept.

There are substantial reasons in favour of amendment of the 1969 Convention, either to include a new "register tonnage" value or simply to improve the robustness of the existing convention. Either way, the path towards adoption and implementation of such changes will no doubt be long and may be very rocky.

Acknowledgements

The author would like to thank his employer, the Australian Maritime Safety Authority, for making this paper possible and enabling the dissemination of the ideas contained therein. Any opinions expressed are those of the author and do not necessarily reflect AMSA's views. It should be noted, for example, that AMSA's levies on shipping using Australian ports are currently based on net tonnage and this is not likely to change in the foreseeable future. However, AMSA has supported the airing of these issues at IMO in view of their safety implications.

A significant part of the work underlying this paper was undertaken by Mr Chris Barnes of AMSA, to whom thanks are due for providing the assessment of the effect of replacing gross tonnage with "register tonnage" for various ship populations.

Thanks are also given to Mr Richard Akerboom of the Netherlands (Ministry of Transport, Public Works and Water Management), and Mr Gustaaf De Monie of Policy Research Corporation in Rotterdam for providing access to the information included in their presentation to SLF 48, which covered similar ground to that envisaged at the time the abstract for this paper was written.

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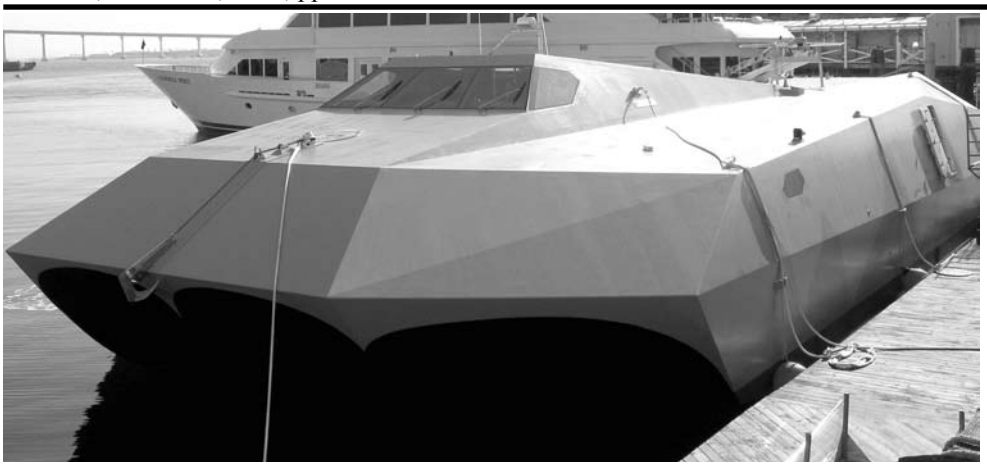

The experimental boat *Stiletto* moored in San Diego. *Stiletto* is more than 24 m in length and has a carbon-composite hull, which help the boat to travel at speeds more than 50 knots. The boat will be used to transport special operations forces to their mission quickly (US Dept. of Defence photo)

Call for Comment on Draft Standard and Regulatory Impact Statement NSAMS

The National Marine Safety Committee is responsible for the development of the National Standard for the Administration of Marine Safety (NSAMS).

Public comment is being sought on the draft NSAMS — Section 4, Surveys of Vessels, which will replace Section 14 of the Uniform Shipping Laws Code. Comment is also being sought on the Regulatory Impact Statement for the Standard, which discusses the major costs and benefits.

Both documents can be obtained in either hard-copy form from the NMSC Secretariat, or downloaded from the NMSC website.

Comment on the Standard or the RIS should be written, using the public comment form provided. This can printed from the NMSC website as a PDF, or downloaded from the web as a word document. Clearly mark on the form whether you are commenting on NSAMS — Section 4 of the Standard or the RIS. A separate form should be used for comment on each of the documents. Completed comment forms may be mailed, emailed or faxed to the NMSC Secretariat at the address below.

For further information or hard copies of the documents, contact the NMSC Secretariat at PO Box R1871 Royal Exchange NSW 1225, tel (02) 9247 2124, fax 9247 5203, email secretariat@nmsc.gov.au. Soft (electronic) copies may be obtained from the website www.nmsc.gov.au.

The public comment period commenced on 20 December 2005 and closes on 31 March 2006. So get your copies today and comment away!

The Latest on the Australian Builders Plate

Many boat manufacturers are already attaching Australian Builders Plates (ABPs) to their boats, even though it will not become mandatory until July next year. NMSC CEO Maurene Horder has welcomed this show of support and said that since there was little regulation of construction standards for recreational boats, she hoped that the plate would encourage minimum safety standards. The ABP, which applies to all new recreational boats including those imported into Australia, is being introduced to provide information to boat users on a boat's capacity and capability to encourage safer boating.

The NMSC has made some recent amendments to the ABP standard, endorsed by Ministers of the Australian Transport Council on 18 November 2005. They are included in Edition 3 of the ABP Standard and can be accessed from the NMSC website, www.nmsc.gov.au.

ABP Amendments

The name of the standard used to determine the information on the plate is now to be shown on the plate, for example "Information determined — AS 1799" or "Information determined — ISO 14945–2004".

Examples of further optional warning statements have been included in the standard. For example, for flybridge boats it is appropriate to include a warning regarding the maximum passenger numbers to be carried on the flybridge.

The maximum load definition has been clarified. It includes persons, maximum outboard engine weight (including auxiliary engines), as well as carry-on equipment such as personal equipment, personal safety equipment, spare parts, tools, dry provisions, fishing tackle, portable tanks and their contents. It does not include the mass of the contents of fixed fuel and water tanks when full.

The symbols for maximum load have also been clarified. On boats with an outboard engine, the person, suitcase symbol and engine symbol together represent the maximum load.

If displayed, the build date specifies details the year of production only. This will allow manufacturers to pre-purchase plates for the year, rather than month by month.

Model Legislation

There have also been changes to the model legislation (following submissions from industry groups). These changes include:

A penalty has now been introduced against anyone in the production and distribution chain who sells a new boat without an ABP. In most instances, this will ensure that the builder has attached the plate when it is first sold in the distribution chain.

Persons authorised to approve information on ABPs include the builder, importer, or a competent person who must be a resident or a registered corporation in Australia. A competent person is a person who has acquired through training, qualification and/or experience, the knowledge and skills to determine and approve information on an ABP.

Owner-built boats will be required to affix an ABP and will not be given any exemptions.

Further information and an electronic copy of the Australian Builders Plate can be downloaded from the NMSC web site www.nmsc.gov.au. The Australian Marine Industries Federation (AMIF) provides online facilities for ordering plates at www.amif.asn.au.

Ursula Bishop

Nationally-consistent Superyacht Policy

NMSC has established a nationally-consistent policy on commercially-operated superyachts following approaches from industry, federal and state government to facilitate their operation in Australia. Maurene Horder explained that superyachts were a significant contributor to the marine economy. Details and specifics of the comprehensive policy are on NMSC's website.

Superyachts when undertaking charters for clients are considered as commercial vessels under definitions used in state law and Part B of the National Standard for Commercial Vessels.

The new policy provides a nationally-consistent approach to govern the commercial operation of foreign-registered superyachts which do not carry more than 12 passengers on intrastate voyages. Superyachts not undertaking commercial operations are considered recreational vessels and are not subject to this policy. The policy also does not apply to

foreign-registered superyachts conducting an international voyage, even under charter, passing through Australian waters.

Under the policy, foreign-registered superyachts may be granted a temporary recognition as a commercial vessel for a designated period where they carry:

Certification — the list of certificates specified in the UK MSA publication and the Large Commercial Yacht Code (LY2), issued by an IACS classification society or by the UK or US governments.

Safety Equipment — a current valid certificate from an IACS classification Society or the UK or US Governments for lifesaving appliances for crew and 12 passengers in an unlimited operating area, or a certificate issued under the relevant state legislation by an Australian marine authority.

Crew — in accordance with UK or US requirements, NSCV qualifications or STCW95-compliant licence.

Safety Lines, December 2005

THE STRATEGIC IMPORTANCE OF AUSTRALIAN PORTS

Australia is fundamentally a maritime nation and its economy is absolutely dependent on shipping. Of its international trade, 99.9% by weight and 73.5% by value is carried by ship. Australia's ports are vital to this trade and their managers are constantly seeking to improve productivity and reduce overheads in the search for improved profitability.

Specific Australian ports are also crucial to Australia's defence. The geography of mainland Australia, and the proximity of our northern approaches to potential operations, necessitates that core naval infrastructure and major fleet support bases be located in the south, close to Australia's industrial centres, augmented by operating bases in the north from which operations are mounted by locally-based or forward-deployed elements.

Consequently, the RAN's major ships are located at Fleet Base East at Garden Island, Sydney and Fleet Base West at Garden Island, Rockingham, WA, which is also home to the submarine force. Smaller patrol, hydrographic and amphibious vessels are based in Darwin and Cairns. These locations are all close to important offshore training areas, and have dedicated naval fuel installations (NFI) which provide strategic fuel stockholdings to meet the varying operational demands of locally-based and visiting warships. Major naval ship and submarine construction, refit and repair tasks are conducted at commercial facilities located in the industrial centres of Brisbane, Newcastle, Sydney, Melbourne, Adelaide and Fremantle.

The relative importance of individual ports to the Australian Defence Force (ADF) will be determined by the location, nature and duration of each contingency, plus the nature and tempo of normal peacetime operations including activities supporting border protection in Australia's north. The RAN's strategic planning assumes continued access to those commercial ports which contain naval bases, and seeks to ensure access to other northern commercial port facilities needed to support forward-deployed assets. Most importantly, this includes Darwin, Cairns and Townsville which are key bases for maritime operations in Australia's northern approaches, plus Gladstone, close to Shoalwater Bay Training Area, Weipa and Gove in the Gulf of Carpentaria, and Broome, Dampier and Port Hedland on the north west coast.

The Department has already invested in Townsville and Darwin to meet specific Army amphibious load/offload requirements for the RAN's current major amphibious ships, [1] which require stern door roll-on roll-off (ro-ro) loading facilities, plus associated berth space and vehicle marshalling areas. In Townsville, these requirements are met under a Deed of Licence with the Port Authority for access to its ro-ro facility, which involved Defence-funded construction of an extension to the associated Berth 10. In Darwin, Defence has funded refurbishment of the ro-ro facility at Fort Hill Wharf under a Deed of Licence with the Port Corporation which also addresses access and berthing rights in the city wharf precinct. The requirement for Defence investment in port infrastructure in Cairns [2] and Dampier [3] is under active consideration.

Port infrastructure investment necessarily requires a long-term view, with trade projections and berth capacity uppermost in the minds of port and government planners. Planning lead times are typically in the 20 to 50 year scale. While investment in new infrastructure generally increases productivity and reduces ship turnaround times, the cost of these investments must be recovered. In addition, new infrastructure initially tends to have relatively low usage rates but, as trade increases, so too does port congestion. Port authorities are inevitably faced with striking a balance between the costs of infrastructure expansion and those of port congestion. Ultimately, ports aim to ensure their berths lie idle for as little time as possible. This means that spare berth capacity for naval use will diminish over time, particularly if redundant wharf areas are not replaced.

Under Section 70C of the Defence Act 1903, RAN ships are exempt from payment of berthing fees in Australian ports, although they do pay for received services such as water, power, and telephones. Therefore, while local communities benefit economically from RAN ship visits, port authorities themselves receive no direct revenue. This partly determines a commercial reality that naval ships do not enjoy the same priority for berthing as commercial shipping. Even so, Australian ports have generally been outstanding in their efforts to accommodate visiting warships around their busy commercial shipping schedules.

In looking to the future, the key question is whether existing arrangements will be sufficient to provide RAN and other ADF elements with the port access necessary to carry out assigned national security tasks. Arguably, a port system which is unable to respond to the support and surge demands of Defence during contingencies will quickly become a bottleneck and impede operations.

Present liaison links between the Navy and the chief executives of key ports certainly seem capable of dealing with future contingencies where the Department may require priority access to a port for a specific task attracting high

national priority. This liaison has occurred successfully in the past to accommodate various regional contingencies, under the principle that commercial shipping may be held off a berth while a higher-priority Defence task is undertaken. In most contingeny situations, Defence will need access to general cargo and ro-ro berths, plus refueling and intermodal links.

Short-term but high naval demands are also placed on ports during major exercises such as the recent Kakadu 7 off Darwin, and Talisman Sabre 05 off the Queensland coast. In the latter case, the Department established liaison cells in key ports to assist with the significant additional RAN and US Navy requests for alongside berth space, often at short notice.

Access to dedicated naval F76 diesel fuel supplies remains a key issue. Although some uncertainties exist over naval fuel offloading arrangements in Darwin beyond 2010, fuel storage capacity at that port's NFI remains adequate for the foreseeable future. Limitations on commercial fuel storage capacity and re-supply in Townsville, particularly during major Defence exercises, suggests the need to consider establishing a dedicated Navy fuel storage facility in that port, noting that access to the nearby NFI storage in Cairns may not be possible for larger ships due to channel limitations in that port.

Present and future Defence needs for access to Australian ports are best facilitated through an ongoing liaison and dialogue process. Prominent in this is the Australian Maritime Defence Council (AMDC), established in 1982 in recognition of the need to develop and maintain sound working relationships between the Department and key maritime industry players. Chaired by the Deputy Chief of Navy, the biannual AMDC meetings provide a valuable forum in which senior Defence and industry stakeholders can exchange information and keep each other informed of trends and key matters of national maritime interest.

The commercialisation and privatisation of Australian ports has seen a steady shift from Defence dealing with state governments as the owners and operators of ports, to dealing with port operators singularly and collectively. How Defence communicates and interacts with ports has a significant influence on its capability. To address this, Defence has established a close relationship with the Australian Association of Ports and Marine Authorities which represents the majority of ports. This relationship is further supported by the documented Guiding Principles for Defence Access to National Ports, which provide a clear and agreed understanding between the Department and the ports of their shared obligations for Defence access to, and use of, Australian ports.

A new factor in this strategic relationship has been Australia's enactment of the Maritime Transport and Offshore Facilities Security Act 2003 (MTOFSA). This legislation provides a framework for the deterrence and detection of acts which pose a threat to maritime transport and associated facilities, and applies to approximately 70 ports, 300 port facilities and 70 Australian ships involved in international and interstate trade, plus various offshore facilities. The MTOFSA does not apply to military vessels, ports, or parts of ports under the exclusive control of the ADF. However, the RAN has agreed to work closely with all ports to ensure that the force-protection measures adopted by its ships dovetail with the MTOFSA security levels and measures which ports are necessarily obliged to implement, and thus avoid compromise of port security arrangements [4].

The new focus on port security around Australia has also drawn attention to apparent inconsistencies between the ambitions of development planners who seek to place high-return residential accommodation at the waters' edge in working ports, versus port authorities who seek to protect the security of their waterfront from urban encroachment. RAN policy is to obtain a minimum of 50 metres and, ideally, at least 100 metres of clear space around any ship alongside a commercial berth. US Navy requirements for ships visiting Australian ports are comparable. As a consequence, the RAN has decided that its ships will no longer berth at the innermost berths in Port Adelaide, where new townhouses are now located close to the wharf edge — a situation which could well be replicated in other ports under similar circumstances.

In summary, despite the current modest levels of commercial port infrastructure investment by Defence under Deeds of Licence in key ports, and the good working relationship which the Department enjoys with ports and the maritime industry, these arrangements need constant attention to ensure that they continue to meet the operational support needs of visiting RAN and foreign warships. With anticipated trade growth in ports like Townsville and Darwin increasingly constraining berth availability, there is likely to be added pressure on Defence to invest in port infrastructure to meet its specific needs. Unless directed by their governments under community-service obligation provisions, ports will not invest in facilities from which they gain no revenue.

These issues are uppermost in present deliberations over future Defence refurbishment and retention of the Iron Ore Wharf in Darwin, and the adequacy of various port facilities — notably in Darwin, Townsville and Gladstone — to accommodate future RAN amphibious ships and their load/offload requirements [5]. Meanwhile, the RAN's access to the key Australian commercial ports will remain vital to conduct of operations and exercises in Australia's northern region, and will continue to be determined largely by the quality and effectiveness of its relations with individual ports and their representative national body.

1. HMA Ships *Kanimbla*, *Manoora* and *Tobruk*.

2. The planned redevelopment of HMAS *Cairns* from 2007-10 seeks to incorporate use of the Sugar Wharf to overcome berth shortfalls.

3. The Minister for Defence has announced that Dampier is the preferred operating port for Armidale-class patrol boats conducting patrols in the North West Shelf area.

4. RAN force protection policies and the regulations under the MTOFSA are not directly linked.

5. Current planning is to replace HMA Ships *Kanimbla*, *Manoora* and *Tobruk* with two larger amphibious ships and a sea-lift capability from 2010.

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INDUSTRY NEWS

Wärtsilä engines for 'Clean Design' Mothership

Wärtsilä Corporation was awarded a contract in February 2006, worth about €2.7 million in November 2005, by the Norwegian shipbuilder Aker Yards ASA to supply main engines for a new offshore support vessel contracted by the Norwegian subsea operations company Geo ASA.

The vessel will be constructed at Aker Yards' Søviknes shipyard in Norway, with delivery due in May 2007. Its main engines will be four six-cylinder Wärtsilä 32 diesel engines with a combined output of 11 520 kW at 720 rpm.

Of the Aker ROV 06 design, the vessel will be employed in subsea operations, primarily for the offshore oil and gas industry. She will be capable of worldwide operation, including the northern oceans. The vessel will principally serve as a mothership for unmanned remotely-operated subsea vehicles (ROV) which can be launched by crane over both sides of the vessel as well as through a moon pool.

Important requirements concerning the choice of engines included low fuel consumption and fulfilment of the Clean Design notation of DNV classification. The Clean Design notation sets high environmental standards for the control and limiting of all types of emissions and discharges. These standards involve not only the choice of equipment in a vessel and the design of its installation but also a vessel's operational procedures.

Geo ASA carries out subsea operations in three main fields: seabed mapping of topography and other levels of sediments; inspection, maintenance and repair of offshore installations; and offshore construction support with ROVs. Geo ASA is a subsidiary of DOF ASA, a major owner and operator of offshore vessels. DOF is a long-established customer for Wärtsilä engines, having built some 20 vessels powered by 70 Wärtsilä engines.

The new offshore support vessel of Aker ROV 06 design will be equipped with Wärtsilä main engines
(Image courtesy Wärtsilä)

Wärtsilä Acquires Business of Singaporean Total Automation Ltd

Wärtsilä Corporation is acquiring the entire business of Total Automation Ltd, a Singapore-based public marine automation company, and all Total Automation's shares in its subsidiaries at a price of approximately €61.6 million. Total Automation had sales of €38.5 million in 2004 and has consistently generated EBIT margins in excess of 15%. The company employs over 400 people and has facilities in Singapore, Dubai, France, the UK and China

"The transaction strongly supports Wärtsilä's strategy to expand our Ship Power and Service businesses by broadening our global service offering", says Ole Johansson, President and CEO. "It will bring substantial electrical and automation capabilities to Wärtsilä, an organisation with a very strong track record, and further strengthen our position, especially in the Far and the Middle East.

Commenting on the transaction, Mr Richard Willenbrock, Chairman of Total Automation Ltd, says "Our customers will continue to receive the same high level of service as before, but now with the backing of a leading global force in the marine industry and its broad product and service capability. For the company and our employees, Wärtsilä's market presence throughout the world and its strategy to grow will create new growth and development opportunities".

In addition to general marine automation, Total Automation has a strong foothold within the offshore and LNG sectors. The company focuses on refit projects and service work. The customers are multinational companies, shipyards and ship owners.

The transaction complements Wärtsilä's earlier electrical and automation acquisitions in Europe and North America. It enables Wärtsilä to provide a comprehensive automation and electrical offering, strengthening Wärtsilä's position as a total service provider.

Wärtsilä's New Low-speed Engines

Wärtsilä Corporation has introduced two new low-speed marine diesel engines, each of which will be available in two versions, namely the Wärtsilä RT-flex82C, RTA82C, RT-flex82T and RTA82T.

The two engines are designed for two different markets. The Wärtsilä RT-flex82C and RTA82C are intended to be ideal prime movers for the propulsion of Panamax containerships with capacities up to 4 500 TEU at a typical service speed of about 24 knots. With cylinder dimensions of 820 mm bore and 2646 mm stroke, the RT-flex82C and RTA82C will be available with six to twelve cylinders to cover a power range of 21 720 kW to 54 240 kW at 87 to 102 rpm.

The Wärtsilä RT-flex82T and RTA82T are designed to provide the right powers and shaft speeds for the propulsion of large tankers, VLCCs and ULCCs of 200 000 dwt to more than 350 000 dwt. With cylinder dimensions of 820 mm bore and 3375 mm stroke, they will be built with six to nine cylinders to cover a power range of 21 720 kW to 40 680 kW at 68 to 80 rpm.

The first engines of the new types are expected to be completed towards the end of 2007, in cooperation with Hyundai Heavy Industries Co. Ltd supporting in engine production design and testing by utilising their existing facilities and manpower.

A NOTABLE CAREER

In the November 2004 Edition of The ANA *we began an occasional series of articles outlining the careers of some of the notable senior members of the Australian Division. In this edition we feature John Bell FRINA, a past President of the Australian Branch of RINA.*

Captain John Frederick Bell RAN (Retd) CPEng FIEAust FRINA FAIM

John Bell was born on 24 October 1920 in Newcastle, NSW, to Frederick and May Bell. His father migrated to Australia in 1912 and was employed as Senior Mechanical Draughtsman at the Walsh Island Dockyard in Newcastle prior to enlisting as a sapper in the first Field Squadron of the Australian Engineers in 1914. He served with distinction with the Australian Light Horse in Sinai and Palestine and was awarded the DCM for sustained bravery in repeatedly swimming the Jordan River under Turkish rifle fire to carry the supporting cables for a pontoon bridge.

John's mother, who was born in Broken Hill in 1894, meanwhile trained as a kindergarten teacher in Sydney. They were married in Newcastle after Fred's return to Australia in 1919.

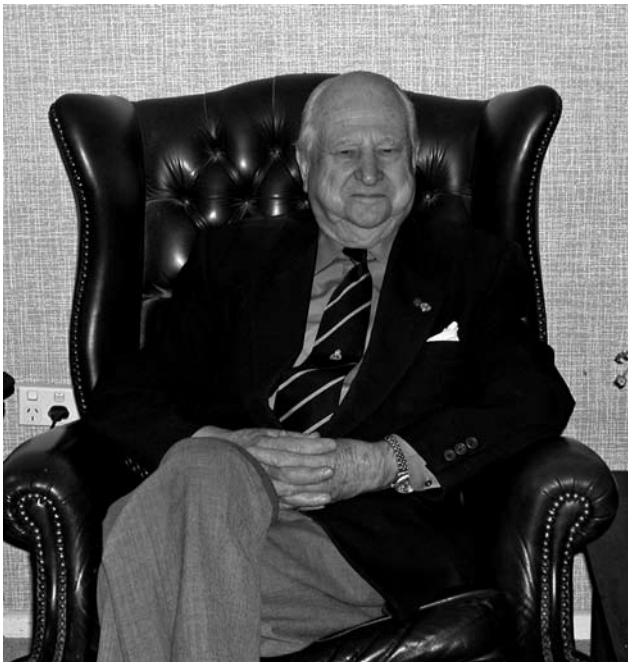
Unfortunately Fred's health deteriorated rapidly, and he was diagnosed with tuberculosis. He was unable to resume his prior employment and became a TPI pensioner. In those days whilst there was no cure for TB, it was recommended that mountain air offered best chances for extending life. Accordingly, the family purchased a cottage just off the Great Western Highway in Leura and moved there in 1922.

John's first recollections are of helping to round up the family pony and harnessing up the governor's cart for trips into Leura. He was enrolled in first class at Leura Public School in 1926. By 1927 the extreme winter climate was proving beyond his father's ability to tolerate and, on doctor's recommendations, the family moved to the Sydney suburb of Beecroft. In 1928 he was enrolled in 3rd class at Beecroft Public School. He completed 6th class in December 1931. His parents decided that he was too young to enter high School in 1932 and he was enrolled in 6th class at Eastwood Public School in1932.

Meanwhile his father's health continued to deteriorate and there were serious family discussions as to the career young John was to follow. He was an avid reader and greatly enjoyed stories of life at sea. It was agreed that in 1933 he would enrol in Fort Street High School provided that he achieved a sufficiently good pass at the end of 1932. He would also apply for entry to the Royal Australian Naval College in 1934.

This involved an examination in mid-1933 followed by a medical examination and then an interview by a selection panel. With these goals ahead he did well in 6th class at Eastwood and was selected for Fort Street High School in January 1933.

As an only child, he had a fairly lonely childhood but developed early a sense of independence and responsibility. This stood him in good stead as his father's health deteriorated during 1933, and the prospect of winning a fully-funded scholarship to the Royal Australian Naval College became important to the family. There were 576 applicants for this scholarship in 1933 and only 14 scholarships to be awarded.



John Bell

His father died on 13 October 1933 after receiving a letter from the Secretary of the Navy that John Frederick had been selected to enter the RAN as a Cadet Midshipman in January 1934.

Four years were spent at the RANC which was then accommodated within Flinders Naval Depot at Crib Point on the shores of Westernport Victoria.

John did well in his studies, became a Cadet Captain in 1937 and graduated with the prize for Seamanship and Engineering.

In those days, cadets were required to make a selection on graduating whether to specialise as seamen or engineers. Only 10 graduated and 4 volunteered for engineering. He recalls being counselled by the then Commander of the College not to volunteer for engineering, thereby sacrificing social status and prospects of high command. He has never regretted his decision to become an engineer.

He joined HMAS *Canberra* at No. 1 Buoy, Farm Cove, Sydney, on 26 January 1938 — the one hundred and fiftieth anniversary of Governor Phillip's landing.

HMAS *Canberra* was a County-class cruiser of 10 000 tons, 80 000 shp on 4 shafts and maximum speed of 31.5 kn, with a broadside of eight 8 inch guns in twin turrets. Although regarded as offering a high standard of accommodation for her day, the midshipmen were provided with hammocks slung in the midshipman's chest flat, and messed in the gunroom presided over by a sub-lieutenant with authority to administer corporal punishment with a sword scabbard applied to the backside. Not quite reflecting modern concepts of discipline, but quite acceptable pre-WW II.

The practice of the day was for all officers of the RAN to undergo further specialist training in the United Kingdom, and they all looked forward to passage to the UK by passenger liner, either P&O or Orient Line. However, in 1938 the RAN was to exchange our seaplane carrier HMAS *Albatross* in part payment for the cruiser HMS *Amphion* to be renamed HMAS *Hobart*. This enabled the two Australian midshipmen due to enter the Royal Naval Engineering College at Keyham, Devon, in September 1938 to take passage to the UK in *Albatross*. Although personally disappointed in missing a liner passage, it proved to be of great professional advantage as they were able to obtain watchkeeping certificates for operation of auxiliary machinery such as evaporators and diesel generators. This practical experience put them at a comparative advantage compared with their RN contemporaries during their subsequent studies.

The clouds of WWII were gathering. The Australian government adopted the Admiralty policy not to repeat the mistake of WWI, when war was declared, and all officers under training were immediately sent to sea. The courses became more intense but not reduced in content. The course at RNEC which would normally have extended to 1942 concluded in 1941. John's first real taste of WWII was when Plymouth was subjected to intense aerial bombing by Germany in 1941. Though the college buildings received comparatively superficial damage, the surrounding areas were badly damaged and he and fellow students were involved in fire fighting and rescue activities among the local residents.

The course at RNEC was the equivalent of a bachelor of mechanical engineering with particular emphasis on marine engineering. John did well and graduated in December 1941 with a first-class pass. He returned to Australia by sea, leaving Liverpool into the teeth of a North Atlantic gale. He recalls keeping watch on an antiaircraft gun on the bridge of a Port Line freighter as they sailed unescorted for Curacao. Fortunately the weather was too foul for Nazi aircraft. They traversed the Panama Canal and, since Japan was now an enemy, were routed to Sydney south of New Zealand.

His first appointment was to HMAS *Adelaide,* a cruiser of WWI design. It was quite an initiation for an engineer still to obtain an engine-room watchkeeping certificate. The design was so outdated (1906) that the direct-drive turbines delivered their thrust via a multi-collar thrust block, and there were separate condenser rooms adjacent to each engine room. She was originally coal fired, but had been modernised in 1938 to be oil burning. John quickly acquired experience in each of the engineering departments in turn and became the "senior engineer" within twelve months.

Adelaide was recognised as unfit for combat with any major unit of the Japanese navy, and accordingly allocated principally to convoy escort duties.

This was not entirely uneventful. He recalls one convoy from Fremantle to Melbourne where the speed of the convoy was 25 knots and, as the nominal full speed of *Adelaide* was 25 knots, this became effectively a full-power trial for the voyage. A demanding test for an ageing warship.

In 1943, whilst *Adelaide* was refitting in Williamstown Naval Dockyard, two significant events occurred. John married Mary Tellick, daughter of Fred and Margaret Tellick, in Melbourne. He was asked to call on Rear Admiral Doyle, then Third Naval Member of the Commonwealth Naval Board at Navy Office. Admiral Doyle congratulated John on his record at the Royal Naval Engineering College, and asked if he would like to take the course for naval architects at the Royal Naval College at Greenwich. He explained that the RAN had relied on civil officers of the Department of Navy for professional advice on naval architecture but, since these officers had no experience in warships under seagoing conditions, he felt that there was a role for appropriately-qualified naval officers to add to the advice being given to the Naval Board. John knew that the course at Greenwich was the qualification for entry to the Royal Corps of Naval Constructors who were responsible for all ship design for the Royal Navy, and jumped at this opportunity.

Since the qualification for entry to the naval architecture course was an honours degree from university, it was decided that John should undergo some additional preparation in Australia. This took some time to arrange and he remained as senior engineer in HMAS *Adelaide* until November 1943, when he was appointed Assistant to the Engineer Manager, Garden Island Dockyard, who was Captain G.I.D. Hutcheson. He allocated him as assistant naval overseer of Cockatoo Dockyard.

Meanwhile, he was enrolled in the part-time course for the Diploma in Naval Architecture at Sydney Technical College.

At that time the courses were supervised by David Carment and Cecil Boden, and John had special permission to attend lectures four nights each week to capture as much as possible before departure for England in July 1944. It was a very full week, doing five and a half working days at Cockatoo, and four nights from 6 to 9 pm. He needed a very understanding new bride.

By happy coincidence, on a pre-embarkation holiday at Katoomba, a fellow guest had a sister married to the Secretary to the President of the Royal Naval College at Greenwich, Clem Borrie.

Wartime secrecy was such that John knew nothing of his passage route to UK when leaving Sydney by rail for Brisbane. He was advised, just before departure, that as a consequence of a protest made by the Professional Officers Association, his enrolment in the naval architecture course had been deferred and, instead, he was to enrol in the Advanced Marine Engineering Design Course at the RNC Greenwich. This was known colloquially as the E Dagger course.

It is of some interest that the question of principle about whether serving naval officers should be trained in specialisations hitherto the prerogative of civil professional officers was regarded as of such importance that it was finally resolved by Prime Ministerial decision, in wartime. By the time a decision was made, John was well into his E Dagger course, and the navy agreed that he should complete it and, subject to satisfactory completion, should continue on at Greenwich with the second and third years of the course in naval architecture.

Life at the Royal Naval College in 1944 was frequently interrupted by the sound of V bombs which were regularly,

or more correctly, irregularly rained on London. John's cabin in the Queen Mary block of RNC had a tarpapered window and the inner wall was formed by a linen curtain on a cord to replace the wall which had been blown out by a near miss. Fortunately, there were no more near misses after this. Life was spartan as there was no fuel to heat buildings and dining took place in the "painted hall" wearing a greatcoat with the fog inside so dense that one could not see to the far end of the hall from the upper hall.

Studies were conducted by a panel of professors who were internationally-acknowledged leaders in their fields and, with only twelve students in each class, they had a very privileged education. In those days the Admiralty was regarded as being in the forefront of marine engineering design, led by former students of Greenwich.

The war was the constant background, yet studies continued and many recreational activities. John took the initiative in resurrecting the RNC dramatic society. VE Day was celebrated with some reservations, since war continued in the Pacific, and the real celebration came in August with VJ Day and the prospect that Mary might join him in UK. By this time it had been resolved that, if John satisfactorily completed the E Dagger course, he would be admitted to the course for members of the Royal Corps of Naval Constructors at the commencement of the second year. The course was of three years duration. Entry to the course required an honours level pass in a bachelor's degree.

Mary duly received approval to take passage to England by sea, since it would be probably be some two-and-a-half years before John would return to Australia. Mary arrived at Liverpool on 30 December 1945. John had agreed to lease the ground floor of a house on Blackheath from Jack Bullocke, the Professor of History and English at RNC; however, it had been bomb damaged and the War Damage Commission had not yet completed repairs. Clem Borrie, the Secretary of RNC, offered to have Mary as guest in his official residence in the Queen Anne building of the RNC. Her first night in London was spent in a room on the third floor overlooking the Thames.

In February they moved into 5 Dartmouth Grove, Blackheath. In July John successfully completed his E Dagger course, with first class honours.

In November Christopher was born and duly christened in the chapel of RNC in December 1946. By July 1948 John had completed the course in naval architecture with distinction and passage by sea back to Australia was arranged. The Professor of Naval Architecture during John's time was Alfred Sims RCNC, who subsequently became Sir Alfred Sims Director of Naval Construction at the Admiralty.

On return to Australia, John was appointed to HMAS *Australia*, the County-class cruiser which survived a kamikaze attack in Leyte Gulf and was by then the Fleet Flagship. He found himself whilst still a Lieutenant, and having been ashore for four years, the "Senior Engineer". It was a rapid descent into the realities of seagoing service, and an opportunity to experience, firsthand, some of the compromises which the naval architects of the 1920s had made in the design of the County class. In 1949 he was promoted Lieutenant Commander and continued in *Australia* until November, when he was appointed Assistant to the Engineer Manager of Garden Island.

Here he was given responsibility for the Captain Cook Graving Dock. This gave him the opportunity to investigate improvements in the underwater maintenance of hulls.

In March 1951 John and Mary had a daughter Virginia. Their residence in Sydney was short lived for, in October 1951, John was appointed to Navy Office Melbourne as Assistant Director of Naval Construction. This was his first opportunity to apply some of his naval architectural knowledge but it was again short lived for, on 30 June 1952, he was promoted Commander and appointed the Engineer Officer of HMAS *Sydney*. The highlight of his service in *Sydney* was her selection to carry the Australian and New Zealand Coronation contingents to the UK. Having reduced her ship's company by 25% to accommodate the troops, all aboard were somewhat disconcerted when halfway across the bight on the way to UK, a signal was received from the Naval Board announcing that upon return to Australia, *Sydney* was to join the naval forces in Korean waters and accordingly, should continue to operate aircraft throughout the Coronation cruise. This meant a formidable workload for the remaining 75% ship's company. This in no way diminished the pleasures of attendance at the Coronation Parade, the Spithead Review, or the entertainment on passage home via Newfoundland, Baltimore, Panama Canal, and Hawaii.

John was not too disappointed on arriving home to find an appointment to Navy Office as Director of Construction (N). It enabled him to enjoy family life in Melbourne and to pursue some special interests as member of a Working Party set up by the Naval Board to review the procedures for estimating and control of the costs of naval maintenance and repair in naval dockyards and by contractors. This took about a year, when carried out with his other responsibilities for naval architecture. It led directly to his next appointment in May 1956, as Deputy General Manager of Garden Island Dockyard with instructions to implement the recommendations he had helped to formulate. The family moved into Residence G on Garden Island.

He had barely settled when his General Manager, Captain John Bull, took leave to attend the 1956 Olympic Games in Melbourne. Whilst there he suffered a fatal heart attack and John became Acting GM until Roger Parker, then serving as GM of Williamstown Dockyard, could be relieved and transferred to GID. Roger was in poor health at this time and delegated to John a good deal of the responsibility for day-to-day management.

A new section was established to control the estimating and planning functions for the refitting programme. It was at this time that John established a good working relationship with Rear Admiral "Arch" Harrington, Flag Officer in Charge East Australian Area (FOICEA) to whom the GM was directly responsible. This was essential as the finance and personnel functions for the dockyard were provided by civil staff who answered directly to FOICEA, something of an administrative nightmare. The General Manager was not in direct control of the personnel upon whom he was critically dependent. In consequence, progress on implementing new programmes for estimating and planning was painfully slow.

In June 1959 John was promoted to Captain, at 38 the youngest Captain in the RAN, and appointed Fleet Engineer Officer on the staff of "Arch" Harrington who, by this time, was Flag Officer Commanding the Australian Fleet, in HMAS *Melbourne*. He served in this role for eighteen months, including visits to Indonesia, Taiwan, and Japan where the RAN received considerable credit for operating an aircraft carrier. At that time Chiang Kai-shek was still leader of the Chinese Nationalists in Taiwan and the "domino theory" of communist expansion into SE Asia was widely supported.

With Admiral Harrington he flew off Melbourne to Taipei as official guests of the Chinese Nationalist Commander-in-Chief, for some five days, to be shown their naval base in Tainan. They impressed him with their efficiency in maintaining and operating a small fleet of former USN ships. Taiwanese industry was being rapidly developed to become a significant exporter of quality manufactured products.

John's next appointment was as Naval Engineer Officer on the staff of the Australian High Commissioner in London. Essentially this appointment involved keeping the Chief of Naval Technical Services in Canberra informed on all matters of interest to the RAN occurring in the UK. In turn, it provided unrestricted access to Admiralty officers and to shipbuilding, ship repair and ship design organisations throughout the country. It was a unique opportunity to obtain an insight into the future of the maritime industry.

He was assisted by senior technical officers in mechanical engineering, electrical engineering, naval architecture and naval aviation. Faced with such a surfeit of information, it was a question of how best to allocate one's time, of which there was never enough. He also had responsibility for overseeing the refitting of the six coastal minesweepers which the RAN had purchased from the RN. Contracts had to be negotiated with small shipyards scattered around the coastline. There was also the refitting of HMAS *Supply* at Thornycroft in Southampton for service with the RAN. The two years 1961 and 1962 fled by and John was posted back to Australia to become General Manager of Garden Island Dockyard, Sydney, in February 1963.

He welcomed the opportunity to implement some of the ideas he had conceived whilst serving as Deputy GM. The major changes he sought could only be made with the approval of the Naval Board. To make his case he sought a review by an external firm of management consultants. This was eventually approved by the Defence Business Board, and W.D. Scott won the contract by competitive tender.

The subsequent review took a year to complete. It recommended that the General Manager be directly responsible to the Naval Board for the operation of the dockyard and be provided with the necessary staff to control both the personnel and financial functions. It also provided for continuous monitoring of performance, with progressive establishment of the measures and benchmarks for doing so.

Although John was very pleased with these changes, he was becoming increasingly concerned with what was achievable within the constraints of his naval service. He was very conscious that his education, training and experience had been provided by the navy, however he believed he had by this time repaid his debt to the navy, and if he were to resign and seek employment in industry he might be able to make a greater contribution to our country. He was conscious that, if he had not entered industry by age fifty, then he was unlikely to be appointed to any senior management position and in 1967 commenced negotiations with some management consultancies, which culminated in an offer of the position of Shipyard Manager with Evans Deakin Industries for their shipbuilding yard at Kangaroo Point in Brisbane.

John was attracted to Evans Deakin because their shipbuilding yard had been recently upgraded to incorporate optical marking-off and fully-automated flame cutting of plate for the prefabrication of welded units prior to assembly in the building dock adjacent. He was aware that the shipyard was well behind schedule for vessels currently on order and that the winning of new orders in the competitive market would be increasingly difficult. It was essential to generate a new image with the Australian Shipbuilding Board.

He was not prepared for the extent of the management reorganisation currently occurring within the company. A very rapid learning curve was involved. He became General Manager of the Shipbuilding Division of the company, answerable to a newly-appointed Managing Director. It took some time to acquire from the company's head office all the financial records relevant to the Shipbuilding Division. It was evident that extraordinary action was needed to establish additional positive cash flows to the new division. In conjunction with his management team, a project was conceived to utilise an area on the river frontage as an extra building berth suitable for side launching into the Brisbane River. A tender was lodged with the Australian Shipbuilding Board for an offshore derrick barge for Ingram Contractors of the USA. It carried a 600 ton fully-rotating Clyde crane and residential accommodation on board for 30 people. This project could utilise more fully the steel-fabrication capacity of the shipyard and help absorb some of the fixed overheads. The Australian Shipbuilding Board took a great deal of convincing that this additional project could be carried out without detriment to the already-late existing orders, but was eventually won on condition that an entirely new management team and separate labour force be employed. There was an incentive in the contract for early delivery and the price was competitive. This project successfully completed ahead of time and restored the shipbuilding division to profitability.

In 1968 all the other Australian shipbuilding yards had contracts with established overseas shipyards for technical support. After reviewing the industry world wide John proposed to his board that Evans Deakin explore an agreement with Litton Industries of USA. This was done and an early rapport with a Vice President of the Marine Division of Litton headquartered in Los Angeles was established. It soon emerged that there was an opportunity to utilise in Australia much of the expertise which Litton had built up in USA, and to apply it to new markets here. In the 1969 Tariff Board enquiry John gave evidence that Evans Deakin and Litton Industries planned to establish a joint company in Australia to improve the competitiveness of the Australian shipbuilding industry; however he had not convinced the Board of Evans Deakin of the benefits to the company. Indeed they became concerned at the prospect

of a takeover by an American conglomerate and called off further negotiations. This left John in a difficult situation and, when Litton told him that they intended to proceed with the establishment of an Australian subsidiary specifically to compete for the design of light destroyers for the RAN and to explore other applications in Australia of their total transport systems technology, and offered him the job of managing this subsidiary, he resigned from Evans Deakin and moved back to Sydney to set up Litton Marine Australia.

There were three companies selected by the RAN to tender for the design contract: YARD Australia, headed by E. B. Good, a retired engineer with whom John had been a fellow student at Greenwich in the forties, was a subsidiary of YARD UK; Vickers Cockatoo, headed by Dick Humbley, a retired Captain RAN, then serving as Managing Director of Cockatoo Docks and Engineering Company, a subsidiary of Vickers UK; and Litton Marine Australia, headed by John Bell. They all were personally acquainted but representative of very different design approaches. The tendering process was protracted as the RAN sought to extract the maximum of information from the tenderers. It became evident that, after some eighteen months and, in Litton's case, some $750,000 that the Australian government was not intending to place a contract for this design in Australia, and Litton withdrew from the contest.

A thorough review of the long-term prospects for Litton Marine Australia led to the conclusion that, whilst there were a number of potentially valuable projects none could be expected to become cash-flow positive in less than two years. The Litton parent company was at that time beginning to experience some turn-down in profitability in the USA, and decided to put its Australian subsidiary on hold. This meant closing the Sydney office.

At this time the RAN called for tenders for consultants to establish a DDL Management Project, and John was approached by several companies to be part of their team. He did so and was particularly involved in a proposal by W.D. Scott to establish a Canberra office of the company to manage this contract and pursue other consulting work in Canberra. The proposal involved John as the manager of this subsidiary. It was with some disappointment that he received a phone call from Dr Scott to say that the company had been told that they would be awarded the contract if they accepted that the Navy supplied from in house an officer in lieu of Captain Bell. They were unwilling to pay at contract rates for expertise they could provide. Dr Scott said they had refused the contract. John said that they should accept the condition, though he personally felt that it gave scant credit to the unique qualifications he possessed and to his commercial experience.

At this stage John decided that he would change career direction, and he has had no further involvement with the maritime industry.

He became involved with industrial real-estate development and in October 1973 accepted an offer by Wollongong University College to join their staff to prepare for autonomy on 1 January 1975. He became the Estate Manager with responsibility for the physical development of the new university. He served in this role for more than ten years retiring in December 1983. He then became a founding director of an architectural practice, Graham Bell and Bowman in Wollongong. He ceased active participation in 1984 and has since been actively involved in a variety of community organisations. These include the University of Wollongong Alumni (he was made a Fellow in 1988), Rotary and Probus. He was the founding Chair of Technical Aid to the Disabled in the Illawarra. He is a member of the management committee of The Old Court House, and of The Port Kembla Heritage Park Inc. He is a member of the Illawarra Sub-section of The Australian Naval Association, and of Futureworld.

The Cunard liner *Queen Elizabeth 2* departing Sydney on 17 February after her annual visit
(Photo John Jeremy)

NAVAL ARCHITECTS ON THE MOVE

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

Bill Backshell has moved on from ABS Pacific in Sydney, and has taken up a well-deserved position in retirement. Bill grew up in Fremantle and worked for Australian Offshore Services as a Chief Engineer before joining ABS, where he has been for seventeen years. He is returning to WA, to a waterfront in Mandurah, and looking forward to buying a cruiser, going fishing, playing golf and visiting Margaret River wineries on a regular basis.

Adrian Broadbent continues with Lloyd's Register Asia in Sydney as Naval Business Manager, and has added the responsibility of NSW Manager to his portfolio.

Anderson Chaplow, a graduand of The University of New South Wales, has taken up a position as a surveyor with Lloyd's Register Asia in Sydney.

Matt Duff moved on from Austal Ships many moons ago and took up a position as a naval architect with the London Offshore Consultancy in Perth. He subsequently moved on from there, and consulted directly to companies in the offshore oil and gas industry. He and his family have recently moved back to Sydney, and he is busy building a house.

Brendan Egan continues consulting, and now numbers Allyacht Spars Australia in Brisbane among his clients. AYA is Australia's leading manufacturer of masts and spars.

Tim Hall has moved on within Lloyd's Register Asia, and has taken up the position of New Construction Product Leader to oversee the development of rules, software, procedures and training for ship new construction in Pusan, Korea.

Peter Hatton, a graduand of The University of New South Wales, has taken up a position riding for Jittery Joe's Zero Gravity mountain-biking team in the USA. Peter says that he didn't quite make Australia's mountain-biking team for the Commonwealth Games (despite much dedicated effort), and will now be living in Athens, Georgia, USA, for the next seven months.

Chris Hughes has moved on within the BMT Seatech organisation in Southampton, UK, from the position of software development manager, and has taken up the position of manager for BMT Seatech's SMART range of structural and performance-monitoring products. Through this combination of roles, Chris has built up extensive experience in the mathematical modelling, design and development of ship-based software and systems. Recently he has been responsible for the development of their SMART stress system, and the methodology behind their vessel performance consultancy services.

Craig Hughes has moved on from Det Norske Veritas after seventeen years, and has taken up the position of Country Manager for Australia and New Zealand with ABS Pacific in Sydney.

Ruth Jago, a graduand of The University of New South Wales, has moved on from Quigley Marine Design in Sydney and has taken up a position as a naval architect with Donald L. Blount and Associates Inc. in Chesapeake, Virginia, USA. Friends can find out more about the company at www.dlba-inc.com; no doubt her photo will soon appear with the others on the staff page. She says that in the first week she was working on podded propulsors with forward-facing propellers, and that she had a drive of one of the vessels at the end of the week; the maneouvrability and controllability is unbelievable, which is great for the average weekend boating punter.

Scott McErlane has moved on from MV *Ladina*, and is now Chief Engineer on the 47 m luxury charter yacht MV *One More Toy,* currently cruising the British Virgin Islands in the West Indies. He says that he has learned a lot about what *not* to do in designing boats, such as loading up a semi-planing hull with lots of marble and fine timber! Friends can find out more about the vessel and luxury charters at www.sevenseascharters.com/mega-yacht-charters-over150-1.html and clicking on *One More Toy*.

LEUT Katie Miller recently passed her Marine Engineering Officer's Certificate of Competence. She then moved on from her position as AMEO on HMAS *Anzac* and took some leave before posting to HMAS *Stirling* for the Submarine Officer Course in January.

Simon Orr, a graduand of The University of New South Wales, has taken up a position as a naval architect with Australian Marine Technologies in Williamstown, Vic., and started work with a finite-element analysis.

Kevin Porter has moved up within Lloyd's Register Asia in Sydney and has taken over the position of Sydney Plan Approval Manager.

Alex Robbins has moved on from Nigel Gee and Associates, and has taken up a position with BMT Seatech in Haslar, UK, where he is working in hydrodynamics for Ian Dand of BMT Seatech and Martin Renilson of Qinetiq.

Dominic Worthington has moved on from the position as Second Engineer on the tanker *Juniper* in WA and has taken up a position at HMAS *Creswell* in NSW as SBLT Worthington. Six months of initial training at *Creswell* will be followed by six more of marine engineering at HMAS *Cerberus* in Victoria before joining the grey-funnel fleet.

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

MISSING IN ACTION

Two members are missing in action. They are Mr N.S. Chappel (last address Mosman Park, WA) and Mr E.K. Solomon (last address Newnham, TAS.).

If anyone knows their present location, please let Keith Adams know on (02) 9878 4140, fax (02) 9878 5421 or email kadams@zeta.org.au.

FROM THE ARCHIVES

THE CAPTAIN COOK DOCK

John Jeremy

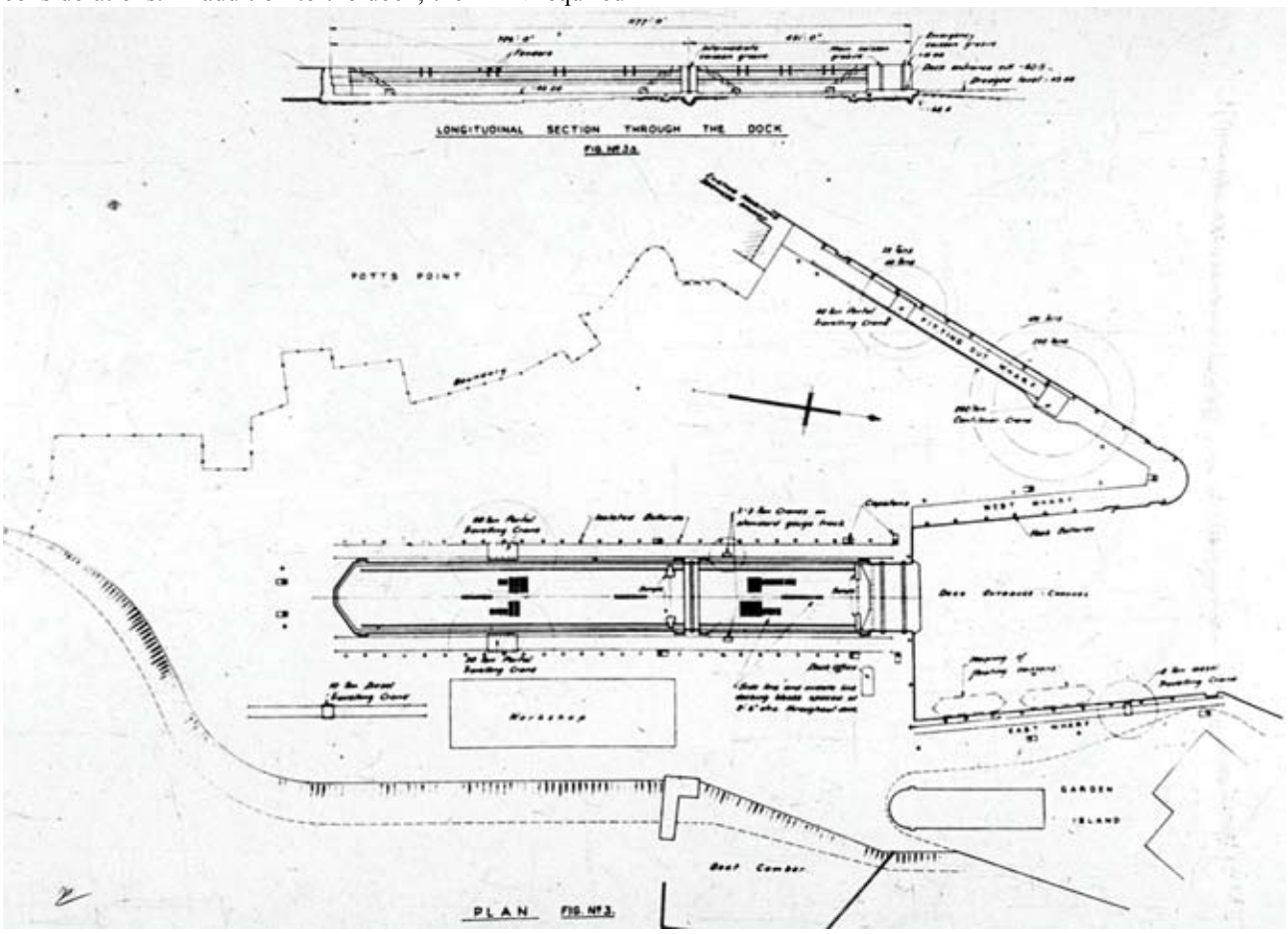
The Captain Cook Graving Dock in Sydney was sixty years old on 25 March 2005. Conceived in the 1930s as the world was moving inexorably towards war, Australia's largest dock was completed as World War II was drawing to a close, just in time to provide essential support for the British Pacific Fleet. In its first sixty years of operation, some 1722 dockings of ships ranging from battleships and aircraft carriers to bulk carriers and tugs were completed.

In 1937, when consideration was being given to stationing a British capital ship at Singapore for part-time service in Australian waters, the need for a suitable dock in Australia to avoid a round trip of some 8 000 n miles to the large dock in Singapore was highlighted. At that time there was no dock in Australia capable of docking a modern battleship, the largest docks then being the Morts Dock at Woolwich in Sydney and the Sutherland Dock at Cockatoo Island.

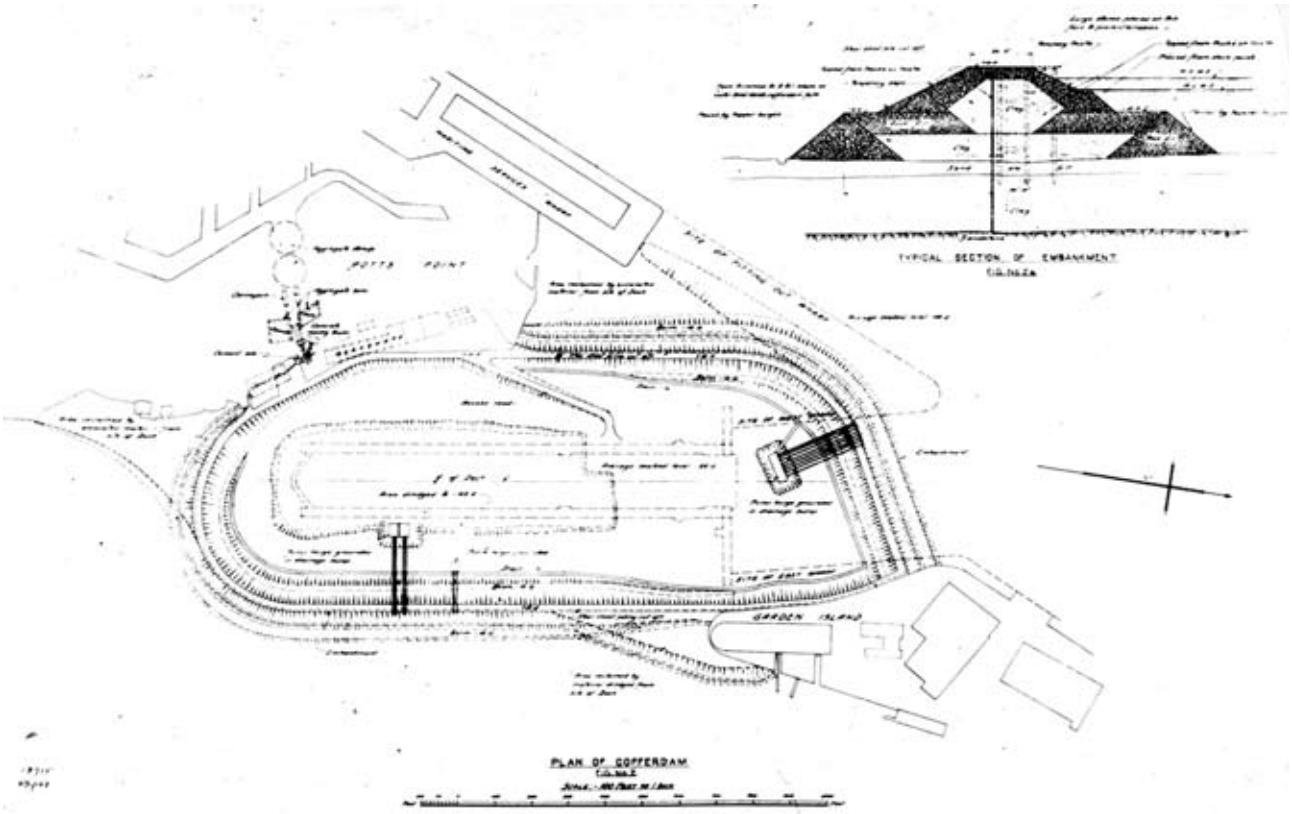
In 1938 Cabinet approved in principle the construction of an Australian naval graving dock, and sought the assistance of the British Admiralty for the design. A second-hand floating dock was considered but the Naval Board recommended a graving dock, despite the much greater cost. Initial concepts were increased in length by some 12 m and in beam by about 3 m on Admiralty advice.

In 1939 the principal of Sir Alexander Gibb and Partners, Sir Leopold Saville, was asked to recommend the most suitable site for the dock. He began his task in June 1939 and examined sixteen sites in eight ports in southern Australia, keeping in mind strategic as well as engineering considerations. In addition to the dock, the RAN required the provision of repair shops and a fitting-out wharf with appropriate cranes and other facilities, and proximity to skilled labour. Saville nominated three possible sites, one in Adelaide and two in Sydney Harbour, one of which was upstream of the harbour bridge. A dock between Garden Island and Potts Point (east of the bridge) was favoured at an estimated cost of £2 997 000, which was cheaper than the other possible sites. The government approved the construction of the dock on 1 May 1940.

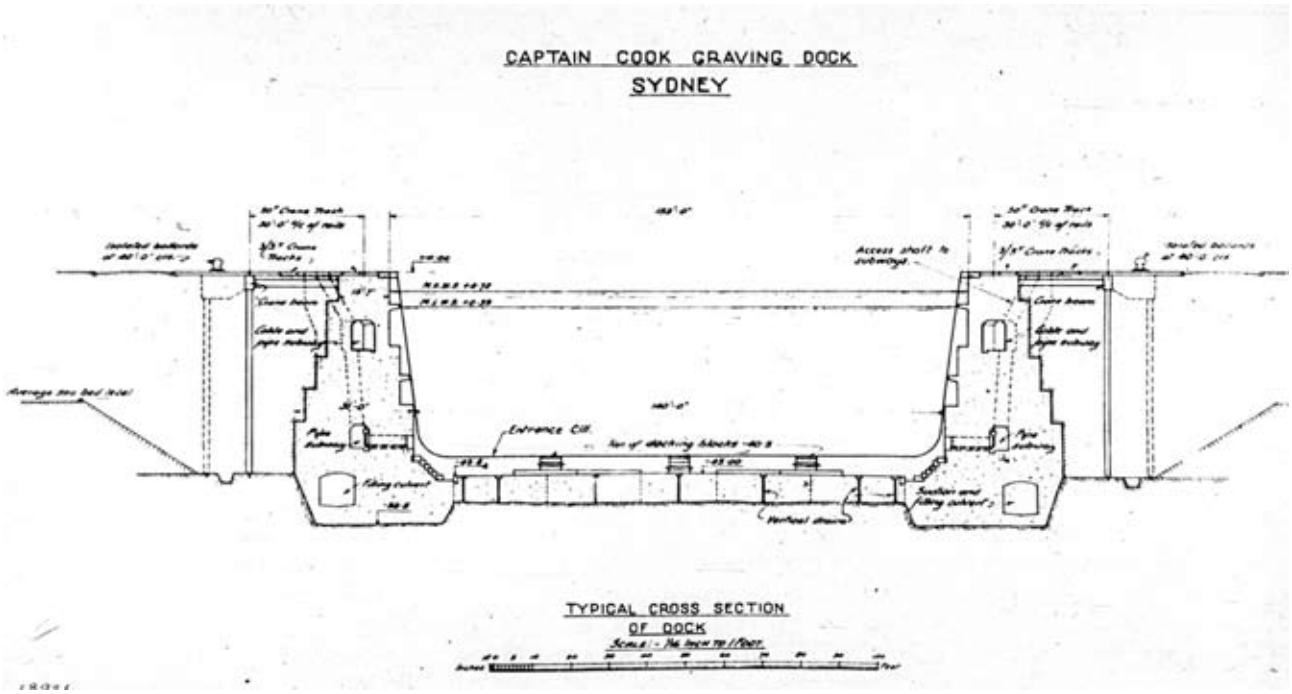
The construction of the new dock was the largest engineering project undertaken in Australia since the construction of the Sydney Harbour Bridge. It involved the reclamation of the harbour between Garden Island and Potts Point and would provide, in addition to the dock, some 14 hectares of land for workshops and the fitting-out wharf, which would be fitted with a 250-ton crane capable of lifting battleship gun turrets. Some excavation of the harbour floor was needed to accommodate the dock which was to be 345.3 m long, 44.73 m wide and with a draught of water over the sill at spring tides of 13.6 m.



General layout of the Captain Cook Graving Dock, Sydney
(Drawing J C Jeremy Collection)



General arrangement of the cofferdam and embankments for the dock construction
(Drawing J C Jeremy Collection)



Section through the dock
(Drawing J C Jeremy Collection)

All water mains, power and telephone cables between Garden Island and the mainland were relocated and between December 1940 and February 1942 some 612 000 cubic metres of sandstone and clay were used with some 52 000 m of sheet piling to build cofferdam (known as the 'Burma Road') around the site, enabling the sea water to be pumped out and creating a large basin in which the dock could be built. Sandstone for the dam walls came from a quarry at Balls Head, and the outer wall of the dam became sea wall of the reclaimed area. The fall of Singapore in February 1942 and the expansion of the war to the Pacific meant that the docks at Cockatoo Island were fully committed adding urgency to the project.

Pumping of water from the enclosed area was begun on 17 February 1942 and when finished it was found that leakage of sea water through the dam walls was only 1.7 cubic metres per minute, easily removed by pumps installed for the purpose. Work continued around the clock with the

The cofferdam almost completed in January 1942. The liner in the background (right) is *Queen Elizabeth* on her fourth visit to Sydney
(Photo J C Jeremy Collection)

average workforce rising from 1750 to a peak of 4125 in July 1943. Work continued under lights at night in contrast to the otherwise darkened city.

The dock was constructed of mass concrete with sections carefully sealed with a tough plastic bituminous compound to prevent leakage. Caisson grooves were built of granite securely anchored to the concrete by heavy steel ties. Two caisson fits were provided, enabling the dock to be used in two sections.

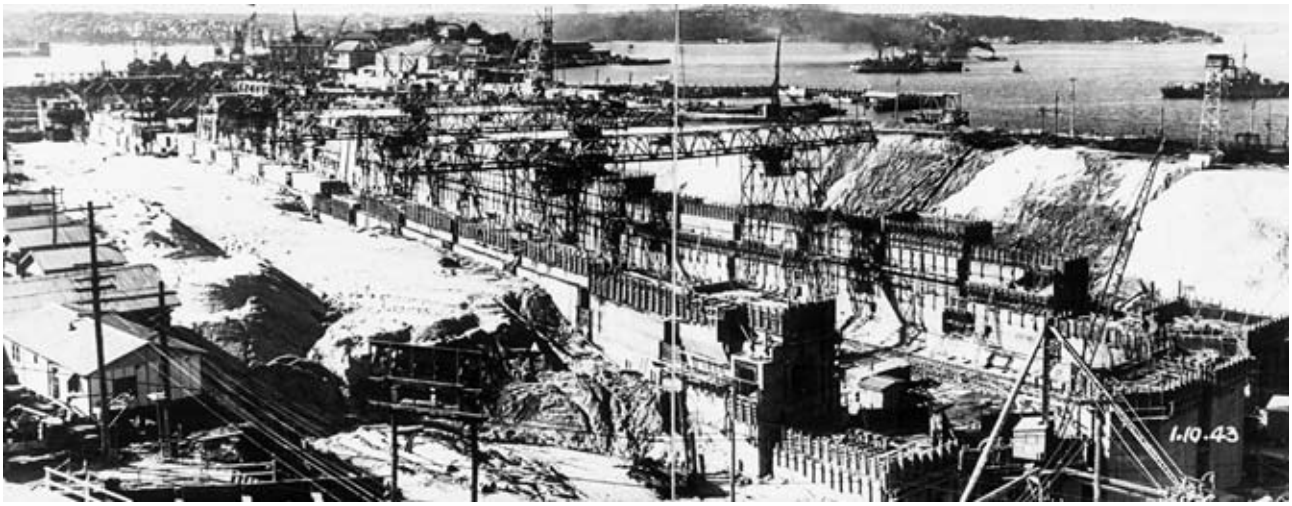
Two 1.8 m diameter filling culverts were built, one each side of the dock entrance. Either section of the dock can be flooded separately. Three pumps are used to empty the dock, discharging through culverts at the dock entrance. Most of the machinery and plant for the dock was built in Britain and shipped to Australia, a risky operation in time of war, but only two shipments were lost due to enemy action.

The pump house is a reinforced-concrete underground structure some 41 m long, 12 m wide and 10 m high. The three main dock pumps can dewater the dock completely (about 270 000 t of water) in four hours. The pumps are Gwynne centrifugal horizontal-spindle double-inlet type drawing from the main suction chamber immediately below the pump house. The pumps are made of nickel-alloy cast iron to resist corrosion and each can discharge 320 cubic metres per minute against a head of 15 m. The pumps can be isolated by electro-hydraulic valves on intake and discharge sides. Drainage and seepage pumps are also provided.

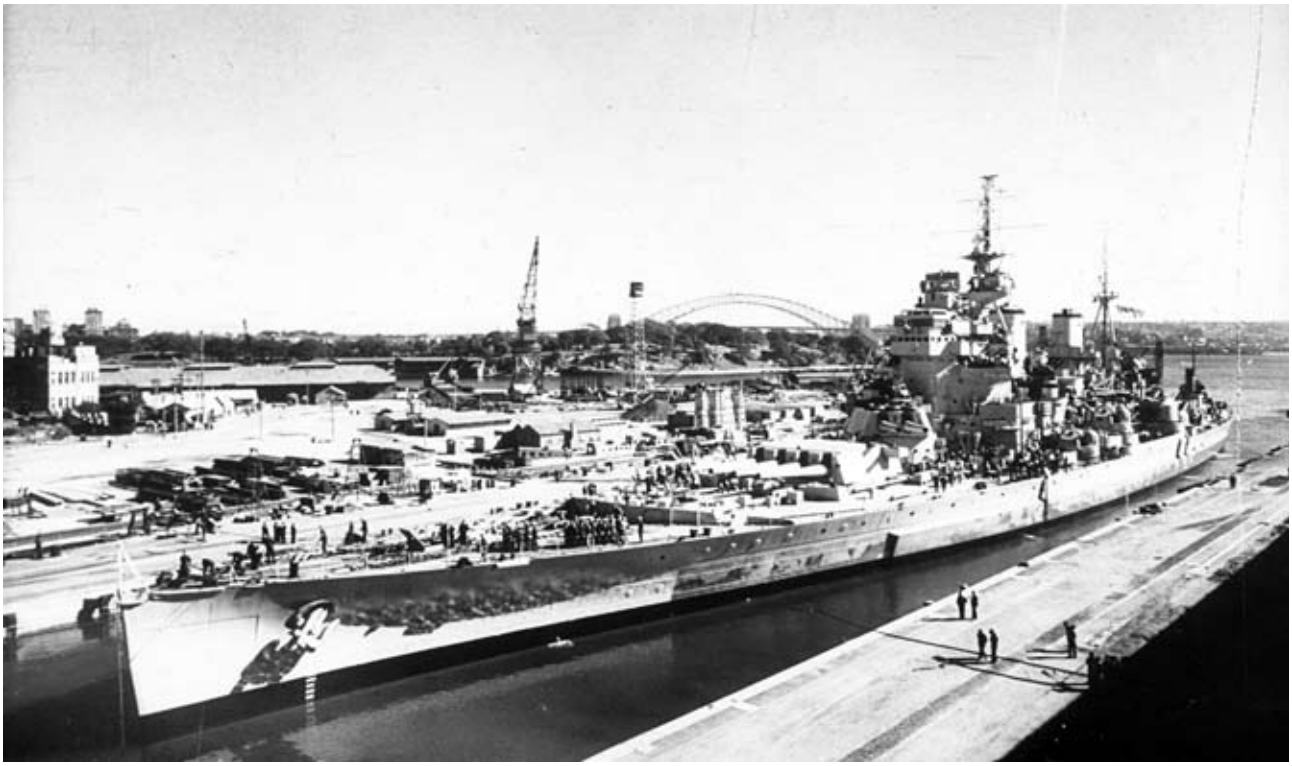
The caissons were designed by Vickers Armstrong at Barrow in Furness and built on site by the Sydney Steel Company. They are of all-welded construction and contain 4.8 m diameter water ballast tanks operated by compressed air with tidal water compartments. The caissons were the most complex welding task undertaken in Australia at the time, and are 45.75 m long, 11.2 m wide and 15.7 m high. They were built outside the dock entrance, inside the cofferdam.

In addition to the dock itself, works included 50 t dockside cranes, a well-equipped workshop building, east- and west-wall wharves and the fitting-out wharf. The fitting-out wharf was equipped with a 250 t cantilever crane designed by Sir William Arrol & Co., Glasgow and built by Sydney Steel. The supporting tower is about 46 m high and the latticed horizontal cantilever jib has unequal arms with a ballast box at the short end.

The total cost of the dock and associated works when finally completed in 1951 was about £10 558 349. The concreting of the dock was substantially complete by June 1944, and the dock was flooded for the first time on 7 September 1944. One caisson was put in place and the dock emptied by its own pumps for the first time on 13 September. By the end



The dock walls well advanced in October 1943
(Photo J C Jeremy Collection)



A King George V class battleship entering the Captain Cook Dock in 1945
(Photo J C Jeremy Collection)

of February 1945 the dock was sufficiently complete to allow the docking of the aircraft carrier HMS *Illustrious*. It was formally opened by HRH The Duke of Gloucester on 24 March 1945 and named the Captain Cook Dock by HRH The Duchess of Gloucester. After the war ended, the work of finishing the dock and associated works slowed considerably but, between February and September 1945, the dock was used by a number of major ships of the British Pacific Fleet including the carriers *Illustrious*, *Indomitable*, *Implacable*, *Formidable* and *Indefatigable* and the battleships *Duke of York* and *Anson*.

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The Captain Cook Dock in 1946
(Photo J C Jeremy Collection)

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