THE AUSTRALIAN NAVAL ARCHITECT

Volume 6 Number 4
November 2002

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From the Division President

A gathering storm as I write this is the case of *Prestige*, an 81 500 dwt Greek-owned Bahamas-registered tanker which sank recently off the Spanish coast with 70 000 t of crude oil on board. One of the Internet maritime news services, in an item headed *Waiting for the Knee Jerk* said:

"The tanker industry is now bracing itself for the inevitable regulatory and legislative reaction to a spill that could well have at least as big an impact as the *Exxon Valdez* accident"

Whether the measures implemented after *Exxon Valdez, Erika* and now *Prestige* make much difference is a moot point, and that won't really become clear for 10–15 years if not more. There is a reasonable case that the double-hull measure implemented after *Exxon Valdez* may in fact increase the likelihood of major pollution from incidents such as *Prestige*.

What has been disappointing has been the amount of finger-pointing and apportioning of blame over *Prestige*, even as the tragedy was still being played out. In this respect I was reminded of the *Castor* incident of last year. For those who may not remember, *Castor* was a Greek-owned Cypriot-flagged products tanker which developed a 20 m long deck crack while sailing off the coast of Morocco with 29 500 t of unleaded petrol on board.

The whole story makes interesting reading, but to summarise it *Castor* drifted off the European and north-African coasts for 35 days, posing a very serious threat to the environment, while salvors tried to find a safe haven to transfer her cargo and the various governments played NIMBYs. The most important thing seems to have been not to prevent pollution but to duck-shove it onto somebody else. This may placate domestic opinion and keep the voters on side, but it doesn't address the problem. Until governments show leadership rather than responding to public opinion in such crises they will continue to be a danger to the environment and to maritime economies.

Those who can remember back to the August issue of this journal may recall my appeal for comments on the future of RINA. The response to this and a parallel email missive was gratifying both in quantity and quality. A special sub-committee of the Division Council is currently sifting through the responses and will report to the December Division Council meeting. It is my intention that recommendations affecting the Division will be taken into account in planning for 2003 and recommendations of concern to the parent body will be forward to RINA headquarters in time for consideration at the January Council meeting.

On a final note, the saga of professional indemnity insurance continues and while progress isn't easy to come by, some is being made. One local broker who expressed interest in developing a scheme suitable for naval architects found that it was more difficult than expected and withdrew from the process, at least for the time being. However another broker recently informed me that he might have found underwriters interested in providing cover — so there may yet be hope!

Bryan Chapman

Editorial

In late August the Minister for Defence released the Department of Defence *Naval Shipbuilding and Repair Sector Strategic Plan*, the executive summary of which is reproduced in this edition of *The ANA*. It is one of the most thorough examinations of the realities of this market sector that has been made publicly available, and many of the plan's observations and conclusions will come as no surprise to those with experience in this industry. The plan is particularly notable for its emphasis on the importance of retaining a naval shipbuilding capability as well as that for ship refit and repair. It is the clearest statement of industry capability requirements that Defence has made for many years.

The main conclusion of the Strategic Plan is 'that future demand is sufficient to sustain only one shipbuilder, and that the single shipbuilding entity model provides the only feasible structural arrangement to meet Navy's new construction capability requirements.' Clearly, this conclusion will be a most controversial aspect of the plan.

Today, the naval shipbuilding and repair industry is in commercial hands (apart from ASC), and its ability to survive and prosper is largely dependent on sufficient workload to justify the necessary investment in facilities and people. No commercial organisation can retain special facilities and capabilities on the off chance that they might be needed — and the necessary investment in facilities and skills development and retention is considerable.

Ideally, continuing competition for the supply of ships and services to the navy is a desirable outcome. However, if the price of maintaining competition in a very small market (by international standards) is a loss of essential capability then that price is too high. The lead time for this essential capability is years — it cannot be turned on and off like a tap.

The Strategic Plan outlines a new way of managing business in a sole-source environment. The proposed strategic alliance will introduce interesting complexities to the relationship between Defence and the Alliance Entity (as it is called). The plan notes that Defence will need 'visibility of the Entity's operation and management without constraining day-to-day activities.' This can surely be done, but it would be essential for the relationship that the Alliance Entity be allowed to manage its business, to hire, fire, train, invest and innovate without interference by bureaucracy.

Perhaps the greatest challenge for the Government, if it decides to implement this plan, will be making it work in Australia's political environment. Each State will lobby for a piece of the action, and politicians will be pressed by firms in their electorates who believe they can do it faster and cheaper, even if they have never done it before. At least, in this case, there is only one customer, unlike the market for railway locomotives and rolling stock where political pressure has frequently resulted in work being spread amongst the States when a single source would have been more efficient.

Acceptance of the recommendations in the Strategic Plan will not be easy for the Government, but doing nothing may well produce a similar but more random and less satisfactory result.

John Jeremy

Letters to the Editor

Dear Sir,

I refer to the Letter to the Editor in your August edition from Noel Riley.

The National Marine Safety Committee (NMSC) has endeavoured to maintain a close dialogue with RINA and its members. Since 2000 *The Australian Naval Architect* has regularly published updates of NMSC activities. Members of the NMSC Secretariat have made presentations or addressed RINA meetings in three States and distributed information to those present. Representatives of the NMSC are willing to do the same for the other Sections.

The NMSC has adopted a collaborative approach to the development of the National Standard for Commercial Vessels (NSCV). RINA has been invited on several occasions to nominate representatives to the NMSC Reference Groups, which are charged with reviewing the Draft Standards prior to public comment, and to review the public comment. In a similar way, all State marine authorities are able to participate.

Our processes of consultation are open and transparent. Your members are invited to visit our website at http://www.nmsc.gov.au for details of the NMSC's current work. There are a number of sections of the NSCV now completed and agreed to by all Transport Ministers in Australia. These are available on CD to your members.

I would encourage and welcome Mr Riley to participate more actively with the NMSC and invite him and others to do so.

Maurene Horder
Director, NMSC

Dear Sir,

I would like to briefly respond to a few points raised by Professor Lawry Doctors in *Wave Generation of High-Speed Ships* (*The ANA*, August 2002). It goes without saying that the comprehensive response by Prof. Doctors was anticipated — I would have expected nothing less. I want to discuss five general points that highlight the differences between the empirical approach and the theoretical approach.

Prof. Doctors says "I find it is of particular concern to me that *The Australian Naval Architect* should be used to propagate these misconceptions." These are my thoughts exactly, which is what led me to write my initial contribution in May 2002.

There are often theoretical concepts which we all choose to gloss over in favour of more anecdotal explanations, or at least in an attempt to simplify the explanation. As an example, hydrodynamicists have consistently ignored viscous effects in their general theories, as their comprehensive treatment could result in unjustifiable complexity.

Similarly, we often simplify our explanation of the physical wash science so that it can be better understood, provided that the simplification does not significantly alter the outcome. The description of the deep-water Kelvin wave pattern is one such simplification. I am fully aware of the quarter cycle phase shift between the transverse and divergent waves along the so-called Kelvin wedge, but this in itself raises another myth. Along the Kelvin wedge, there are no wave cusps as we all describe, only points of wave superposition; the mathematical definition of a cusp being the point at which two curved lines both intersect *and* terminate. The quarter-phase shift means there is no termination, hence no cusp.

My use of the term 'cusp point', which I should have italicised, may seem like a tautology, but it was used to highlight only the cusp-like nature of the superposition. Both Prof. Doctors and I incorrectly use the term 'cusp' — I use it for its practical and descriptive simplicity.

Reinforcing my original message, we conduct deep-water, high-speed tests, we plot the results and we pick the trends. The $-1/3$ wave decay is not perfect, but it is reasonable. It does, of course, relate to the decay of the highest wave in a propagating wave packet, which is the measure many engineers in both the naval architecture and coastal engineering professions choose as being an apt descriptor of a wave packet in the physical world.

It has consistently been demonstrated that the total erosive potential of a wave wake can be described by only a small part of that packet, which is why the maximum wave is the best candidate. It is easy to define, relatively easy to measure and relatively consistent in its behaviour in deep water. It is also relatively consistent in its relation to erosion from the information we have at hand. However, not only does the height and period need to be recorded to be of any use, the maximum wave may not be sufficient in itself to fully explain the erosion process. Recent work has led us to use several criteria to define erosion potential, all with more emphasis on period and less on height.

After many years of Prof. Doctors proclaiming the clear wave wake superiority of the catamaran, there would appear to be some acquiescence (of sorts). The paper by Renilson and Macfarlane (2000), where the AMC's wave wake database results are demonstrated, is mentioned by Prof. Doctors in relation to maximum wave height and where catamarans are favoured. However, readers are also advised to look at the two accompanying graphs — those of wave period and wave energy (for the maximum wave). The monohulls have higher heights, but shorter wave periods. The generally-accepted erosion measure, wave energy, is essentially identical for all hull forms when compared by the wave wake database. It doesn't matter whether the vessel is a monohull, catamaran, trimaran or a felled tree with the branches still on — the maximum wave energy, and hence erosion potential, is not a function of hull form. The shallow-water case, from the limited results we have, is not expected to be much different. Indeed, recent studies in Europe have demonstrated that the operation of catamarans in restricted channels (canals) is potentially more damaging than that of monohulls (Husig et al. 2000).

Lastly, I participated in a seminar organised by the Maritime Panel of IEAust in Sydney in September, at the request of the Maritime Panel, at which I presented some very recent bank erosion work I've been involved with and some additional work that has been undertaken in Tasmania. This work clearly demonstrates two points — that wave height alone is an extremely poor indicator of erosion potential, and wave period (and period/height functions such as energy and power and others we've developed) are the better

indicators. Sadly, the reporting of wave period has hardly featured at all in much of Prof. Doctors' work over the past decade or more, so the relevance of his published papers on vessel wash may have been compromised.

I find myself drawn more towards, and drawn in by, the coastal engineers professionally and find greater synergy with their work. We create the problems — they attempt to mitigate them. The warm reception our bank erosion work received at the IE Aust presentation and the support from researchers like Assoc. Prof. Ron Cox only gives us greater confidence that we are on the right path, at last.

Our bank erosion work is planned for completion in 2004, with the development of a powerful prediction tool for planners and waterway regulators. More will be announced next year.

Greg Cox

Reference

Husig, A., Linke, T. and Zimmermann, C.: Effects from Supercritical Ship Operation on Inland Canals, *Journal of Waterway, Port, Coastal and Ocean Engineering*, ASCE, May/June, 2000, p103-135.

Dear Sir,

I draw to your attention the article *On Wave Decay* by Greg Cox (*The ANA*, May 2002) where the use of empirical versus numerical methods (CFD) for determining the decay of deep-water waves is debated.

The present design climate is frugal and, to stay competitive, there is heavy reliance on tools such as CFD and finite element modelling (FEM), which can reduce time and cost. The limitation of these methods is ensuring against "garbage-in, garbage-out" which is achieved by verification combined with the development of sound theoretical descriptions and numerical solution techniques.

Mr Cox says "My goal is not to verify anyone's theoretical work or try and juggle the real-world results to make them fit the theory, my goal is to produce an empirical measure …from physical modelling…"

Accepting that CFD and FEM methods are here to stay, the empiricist should be working *together* with the numericist. Providing feedback and information regarding the interdependencies of different parameters would aid in the *understanding* and progress towards mathematically defining the physical phenomenon. Sir Joshua Reynolds said "a true copier of nature can never produce anything great". I interpret this as the need for understanding. Empiricists devote lifetimes to understanding; combine this with co-operation with numericists and it may be possible to describe the decay of waves in the form of a theory as powerful as that of Newton's Laws of Motion.

Industry should embrace CFD as a tool and work together to broaden its accuracy and applicability, as it is here to stay. Australia is too full of cynicism and it is not surprising that many of Australia's brilliant minds head overseas for recognition and support.

Rozetta Payne
UNSW Student

Dear Sir,

I'm an exchange student from Sweden, studying naval architecture at UNSW. For the last three years I've been studying engineering physics at the Royal Institute of Technology in Stockholm. I'm writing to you because I'm concerned about the naval architecture courses and the naval architectural industry. The aspects regarding the naval architect program discussed in this letter are often valid in both Sweden and Australia.

My main concern is the lack of ongoing research in the industry and the academic community. It's striking that almost every large-scale research project was performed more than fifty years ago. Most of the data regarding propulsion, for example, descends from the mid-1900s. I think the fact that there is little or no further research within the area prevents the development of more effective ships. Who says that the solutions used today are the most efficient? I wonder how many design offices really try to see things from a different point of view. Is there another way to transfer the power into the water rather than the conventional propeller/water-jet propulsion? Should we use a submarine to transport cargo? Of course, some of the answers to these questions are, for more experienced naval architects, obvious but if you don't think this way then you won't come up with new inventions.

Another issue is the inexactness in the way we calculate some of the main properties of the ship, such as resistance and propulsion. Many of the equations are based on empirical data rather than the laws of physics. The equations will probably give you a good estimate of what you are calculating, but it seems that almost every time you ignore something important or assume something which in some cases can't be assumed. Of course, if you want to calculate the flow around a ship that's a very difficult task, but with today's rapid development of new computers I think that in the future it will be possible to calculate the flow, perhaps not exactly, but to a sufficient accuracy to use these results rather than the results from the semi-empirical equations used today. I'm not saying that the data is incorrect but they are certainly not valid for all ship types.

As a student searching for knowledge, I think there is a gap between the theories taught in the more theoretical courses and the way we are taught to calculate things in the more practical naval architecture courses. This means that the naval architect isn't able to see when these equations fail to predict a correct answer. This is very important when you try to develop something completely new and don't have reliable facts from other designs.

What I'm trying to say is that to improve ship designs and to reach more scientific breakthroughs, we have to do more research and gain more knowledge in how things are connected, and try to find more exact solutions rather than estimate everything and rely on experience. And with a more extensive use of computers in both the design-phase and the operational service of the ships there are certainly better and different ships to be built.

Niclas Backstrom
UNSW Student

Dear Sir,

I am a migrant from China. Before I arrived in Australia, I thought that Australia had such a long coastline that there should be a lot of people working as shipbuilders and other relevant jobs.

I was amazed to find, after I arrived in Sydney in 1998, that my imagination had gone too far. Here, no ships are being built and no ships are being repaired in Sydney. [*Tenix, ASC, NQEA, ADI and others may not share your views* — Ed.] As you may know, many shipbuilding contracts went to New Zealand in 1998.

I still think that in such a geographic situation, i.e. with long coastline and oceans surrounding this country, Australia should have the most advanced techniques of designing and building ships, as well as related engineering and material industry.

From my point of view, shipbuilding attracts a huge amount investment and, if managed well, it is also a most profitable industry. I know that the Americans are now building a sea-city on the ocean, and from your magazine I learnt that the Norwegians built the luxury apartment ship, *The World*.

Those projects need large financial foundations, but they create job positions and have, as a consequence, the maintenance of profit.

As a naval architect, to be involved in such great projects has always been my dream. I hope this dream can become true in Australia.

Lijie Henry Xu
UNSW Student

NEWS FROM THE SECTIONS

ACT

A joint meeting of RINA, IMarEST and the IEAust Society of Military Engineering was held on 22 August. The topic was *Wing-in-ground-effect Craft — Developments and Regulation*. The meeting was held at the AFP College. Presentations were given by Rob Gehling of AMSA and John Leslie, Managing Director of Flightship Ground Effect Pty Ltd. Rob first addressed the development of the legislative framework for these craft. A short video was then screened showing the range of WIGE craft that have seen service over the years from the small Airfish 2 through to the large KM, better known as the 'Caspian Sea Monster' with an all-up mass of around 500 t. John Leslie then gave an overview of developments at Flightship, a Cairns-based company. An enjoyable evening of presentations was finally wrapped up with footage of the Flightship FS8 eight-seater WIGE craft in service off the coast of far north Queensland.

On 11 September a panel discussion was arranged at the National Press Club by the IEAust Society of Military Engineering in conjunction with RINA and IMarEST to provide an overview of the Australian Strategic Policy Institute paper *Setting a Course for Australia's Naval Shipbuilding and Repair Industry* and discuss views on this subject. The August 2002 edition of *The ANA* contains the executive summary of that report and details for downloading it from the Internet. The chair, RADM Bill Rourke (RAN retd) provided an outline of the recently-released Naval Shipbuilding and Repair Sector Plan that had recently been released by DMO and the independently prepared ASPI paper. He identified areas where both these documents drew common recommendations and where there were contrasts. Mark Thompson of ASPI then provided a more detailed review of the ASPI paper. Peter Dechaineaux provided some further viewpoints from the perspective of a retired senior RAN officer before the floor was opened for discussion. Following a keen exchange of views the meeting was drawn to a close by Bill Rourke who stressed the need for more open discussion on plans for the industry before government makes a final decision on the way ahead.

Martin Grimm

New South Wales

The NSW Section Committee met on 25 September and, other than routine matters, discussed:

- SMIX Bash 2002: Pledged sponsorships seem to be on target for a beak-even budget, and logistical details of the evening were discussed.
- Financial Report: The new account with the Laboratories Credit Union is up and working satisfactorily. A financial statement for August was tabled, showing a bank balance in credit, but which includes deposits for SMIX Bash. We have recently settled accounts with the AD Council and IMarEST for venue hire.
- Technical Meeting Program for 2003: Booking of venue for 2003 to be checked. Consideration of the draft program was postponed till the next meeting due to low attendance.
- Report from Australian Division: The deliberations of the AD Council meeting the previous week were reported (see *Membership* column in this issue).
- Committee for 2003: Bob Dummett and Jennifer Knox have indicated that they will not be available for re-election to the Committee next year, and Phil Helmore has indicated that he wishes to scale down his involvement in the NSW Committee, as *The ANA* involves a significant commitment of time.

The NSW Section Committee also met on 6 November and, other than routine matters, discussed:

- SMIX Bash 2002: Sponsorship still on track; the eats and drinks menu was tabled and discussed, as well as a half-block waterline model of *James Craig* built by Bill Bollard for RINA to raffle, and tickets for the raffle, and helping on the evening.
- Technical Meeting Program for 2003: The IEAust venue has been booked for nine technical meetings in 2003. A ship visit and ten technical presentations were proposed and discussed, with companies and presenters to be contacted.
- Committee for 2003: Rod Humphrey indicated that he

would not be available for re-election to the committee next year. Andrew Tuite agreed to take on the responsibility of one of the website editors, and Lina Diaz has subsequently agreed to take on the responsibility of Assistant Secretary (for coordination, agenda and minutes of meetings).

- MARENSA Members and IEAust Assistance: It was agreed that we should take advantage of the offer by IEAust to promote RINA activities to their members and to ex-MARENSA members.

Geoff Hunter, Head of Marine, Rolls Royce Australia, gave a presentation on *The Electric Ship* to a joint meeting with the IMarEST attended by twenty-five on 28 August. During the 1980s the cruise ship industry started specifying electric propulsion systems, which have since been shown to significantly reduce running costs by using less fuel and requiring less maintenance than geared systems. Geoff's presentation addressed how the adoption of electric propulsion by naval forces is leading toward an all-electric warship, the necessary developments that have taken place along the way and those currently underway, and the involvement which Rolls-Royce has had throughout. The presentation was interesting for naval architects and marine engineers alike, as the incorporation of podded propulsion units can bring about changes in hull design and the operational requirements and machinery layout differs from conventional stern tube and shaft line configurations.

Following Geoff Hunter's presentation, a video about the Institute of Marine Engineering, Science and Technology was screened, detailing the formation of the new Institute, the objectives, and emphasising the international nature of the Institute.

Mori Flapan of the National Marine Safety Committee gave a presentation on *The Fast Craft Section of the new National Standard for Commercial Vessels* to a joint meeting with the IMarEST attended by thirty-two on 23 September. The National Marine Safety Committee is reviewing commercial standards in Australia. A new National Standard for Commercial Vessels will replace the Uniform Shipping Laws Code. Part F Section 1 of the National Standard is a new standard applicable to fast craft. A fast craft is defined as a vessel capable of a speed of 25 knots or more. Mori's presentation looked at the reasons for having a special standard for fast craft, and provided an overview of safety obligations of designers, builders, suppliers, owners and operators and how they fit in with the application of the standard. There was information on how performance-based approaches are to work in the new standard. Two categories of fast craft will be identified and the standards applicable to each were discussed. The standards for the other categories have been completed and were officially released in August. Standards for the second category of fast craft are currently under development. Aspects of the development process were discussed, including how members of the audience could participate in the development of the new standards. The vote of thanks was proposed by John Jeremy.

Following Mori Flapan's presentation, the video about the Institute of Marine Engineering, Science and Technology was re-screened (for the benefit of those who had missed it at the August technical meeting).

The RINA Australian Division prize for the best design project by a final-year student in naval architecture at The University of New South Wales has been around for a long time. However, the presentation of a certificate and medal in addition to the prize is an innovation commenced in 2001. Due to a combination of circumstances, the certificate and medal for 2001 did not coincide with the School's annual prize-giving ceremony on graduation day, 12 April 2002. As a result, attendees at the September technical meeting were treated to a one-off special: the certificate and prize being presented at a section technical meeting. The presentation was made by Australian Division Council member, Phil Helmore, to Hason Ho for his design of a 13 m pursuit craft for the Australian Customs Service. The award of the certificate and medal for subsequent years will take place at the School's annual prize-giving ceremony.

Presentation of the RINA AD Certificate and Medal for 2001 to Hason Ho by Phil Helmore
(Photo courtesy Don Gillies)

Lina Diaz of the Waterways Authority of NSW gave a presentation on *Submissions for Survey and Classification: Do Yours Make the Grade?* to a joint meeting with the IMarEST attended by thirty-one on 23 October. Lina has experience of working both for a classification society as well as her present role at the Waterways Authority, and the *safety* of vessels if of paramount importance. The Waterways Authority is responsible for maintaining the standard of safety in commercial vessels in the state of New South Wales. As such, commercial vessels are required to be in survey with the Authority. It is a requirement under USL Section 1 Part 5 *Submission of Information* that certain drawings and vessel particulars be submitted to the Authority for approval for any vessels wishing to operate commercially. The Authority has prepared a brochure which is forwarded when any enquiries regarding the requirements for commercial vessels are made. The purpose of this presentation was not discuss the Code, any other rules, or interpretations thereof, but rather to explain the reasons why it is important to provide the information as required by the Code and requested by the Authority. It has become apparent to the Authority that not everyone is aware of what the requirements are and why the requirements are there. A particularly interesting feature of Lina's presentation, in addition to examples of good submissions showing the information required, were some

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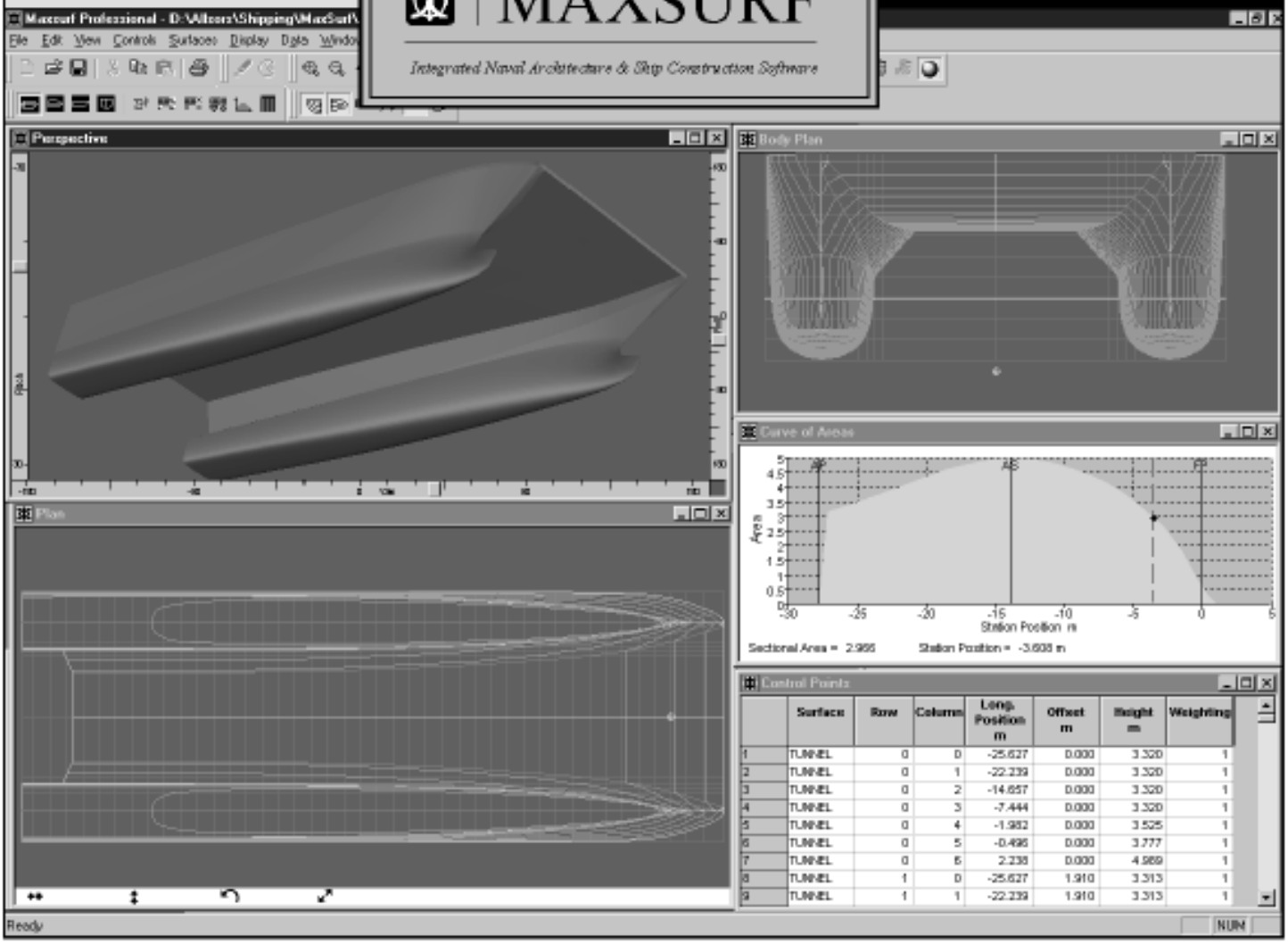


examples of *poor* submissions! The vote of thanks was proposed by Noel Riley.

Phil Helmore

Queensland

The Queensland Section Committee met on 6 August by teleconference between Yeronga Institute of TAFE, Cairns and Noosa. A technical meeting was held on 3 September at the premises of Norman R Wright and Sons, Bulimba, Brisbane. Mr Bill Wright, Managing Director of Norman R Wright and Sons, gave a presentation on the history of the most significant of the many boats designed and built by the Wright family over the last 100 years. The presentation was followed by a walk around the building sheds and an inspection of the boats under construction. With the enthusiasm shown by the eighteen attendees and the support of the section committee, it all augers well for the future of the Queensland Section.

A special thanks must go to Bill Wright for his continued support of the Queensland Section, this being his third presentation in as many years.

Brian Robson

Western Australia

Ausmarine West Exhibition

The Ausmarine West Exhibition was held from 29 to 31 October at Fremantle — this event runs on even-numbered years. Once again RINA had a stand, shared with IMarEST and staffed by local members of both organisations. Display material was supplied by Strategic Marine Design, Curtin University, University of Western Australia and RINA London. The stand attracted several visitors from different countries, and we can expect some membership applications as a consequence.

The RINA/IMarEST stand at Ausmarine West
(Photo courtesy Jim Black)

RINA Ausmarine Conference

As has become customary over the years, the WA Section of RINA organised a half-day conference on 31 October in conjunction with the Ausmarine exhibition. This year's topic was High-speed Craft Technology and Operation, covering the full range, from use of CFD to technical aspects of high-speed craft deliveries. The speakers were (in order of appearance) Kim Cleggett of International Maritime Services; Paul Crossland of QinetiQ; Jonathan Duffy from the Australian Maritime College; Kristoffer Grande from Curtin University and Patrick Couser from Formation Design Systems. The event was well attended with forty-five people from five countries participating. It could not have happened without our major sponsor, Rolls Royce Marine Australia, and support from Ausmarine organisers, Baird Publications.

Maxsurf Users Workshop

Formation Design Systems held a one-day users workshop at Fremantle on 1 November. These popular workshops have been held on just about every continent, but this was the first one to be conducted in Formation's home town. Coverage was given to new developments in the Maxsurf, Hydromax, Workshop, Multiframe and Seakeeper software modules. Some fifty people attended.

Museum visit

RINA members had a sneak preview of the new WA Maritime Museum which opens officially on 1 December. A behind-the-scenes tour was given by museum staff in October. The building is as impressive inside as it is outside; it is Western Australia's own version of the Opera House, right on the waterfront in the main harbour. Displays include the world record-breaking Western Australian yachts *Parry Endeavour*, which completed a triple solo non-stop circumnavigation, and *Australia II*, winner of America's Cup.

Kim Klaka

Victoria

At a technical meeting in August Mr Ray Cross, technical manager of Reeve BR Engineering's Pressure and Safety Systems, gave a presentation which reviewed the various types of safety valves currently available. He described the types of valves, the key terms relating to safety valves, their construction, correct sizing, applications and issues relating to safety valve repair. This presentation was supported by Ray's twenty years of experience in supplying safety valves to many industries including the marine, oil, gas production and processing, mining and other process users. Although little naval architecture was included, his presentation gave those who attended a fascinating insight into valve systems and how such items could affect classification and safety.

The annual *Night of Miscellany* was held in September. Several members described situations and shared memories of incidents and near misses at sea.

Finally, in October Gaspar Guzsvany gave a presentation entitled *Preliminary Determination of the Safe Maximum Vessel Size for Operation in a Port*. His presentation focused on his research work that has been recently accepted for the degree of Master of Science at the Australian Maritime College. Gaspar described how it is a common practice to use a full bridge ship-handling simulator, such as the one at the Australian Maritime College, to determine whether a ship

can enter a given port in a particular set of environmental conditions. After the port and the ship are accurately modelled, the tests are conducted in real time using pilots.

In order to reduce costs, the simulation model was transferred to a PC. In this way the simulation could be run faster than real time; enabling many simulations to be conducted quickly and cheaply. However it still required command inputs from pilots whose response time could not be speeded up.

In order to overcome this problem, Gaspar outlined a method he has developed for predicting the difficulty of manoeuvring in a port, using a PC-based simulator in fast track mode. It is based on preliminary correlation between basic calculation results and the pilot assessment results obtained on the ship-handling simulator. The new method uses random selection of the control parameters and tracking the success rate of ship paths along the port. It provides the critical port positions and the associated difficulty levels. It has been found that these local maximum-difficulty levels give better correlation with the judgements of the human pilots.

A further improvement developed as part of his master's research has been implemented: to narrow down the range of examined random control values around the most successful values that can be determined. It uses the best control sequence obtained, offset by a random error. In this way the overall difficulty level sensitivity can be determined.

The results calculated in this way have been compared with the acceptable level of difficulty as judged by experienced mariners, and it is shown that the method can be used to determine the maximum size of ship operating safely in a port.

Stuart Cannon

News from the Sections continues on page 47

COMING EVENTS

NSW Meeting

The third Sydney Marine Industry Christmas (SMIX) Bash will be held on Thursday 5 December on board *James Craig* alongside Wharf 7, Darling Harbour from 1730 to 2130. All in the marine industry are welcome, and partners are particularly welcome. There will be a nominal charge of $25 per head, and numbers are limited so early booking with payment by cheque (payable to RINA NSW Section) to Bob Dummett at 78 Hilltop Rd, Clareville 2106 is advisable to guarantee your place. Late bookings with Bob on (02) 9918 7062 and payment at the gangway will be subject to the numbers limit. So don't delay; post that cheque today!

ACT Technical Meetings

Early 2003 *Procurement for Government Organisations* — John Simmons.

Early 2003 *Submarine Stability Assessment* — Dave Magill and Nick Whyatt.

Queensland Technical Meeting

The Queensland Section will hold a combined Section Committee meeting and technical meeting on 3 December at the Institute of TAFE, Gateway Campus Brisbane, Boat and Shipbuilding Section. The Section Committee meeting will commence at 5.30 pm and the technical meeting that will consist of a tour of the ship and boat building facilities will commence at 6.30 pm.Watch the Queensland Section RINA web-site page for further details and changes. Potential attendees should advise the Section Secretary of their intentions.

Victorian Technical Meetings

Technical meetings are generally held in conjunction with the Victorian/Tasmanian branch of IMarEST and held on the second Tuesday of every month at the Institution of Engineers building, 21 Bedford Street, North Melbourne, starting at 5.30 pm for 6.00 pm and finishing by 7.30 pm. The program for the next calendar year is being finalised. If you have any suggestions or requests please contact Stuart Cannon via e-mail at stuart.cannon@dsto.defence.gov.au.

Western Australian Technical Meeting

The next technical meeting will be on Tuesday 10 December at 6.00 pm at the Flying Angel Club Fremantle. It is timed to coincide with a visit from London by our Chief Executive Trevor Blakeley. The talk will be *The Maximum Squat of a Ship through the Transcritical Speed Range* presented by Dr Tim Gourlay of Curtin University.

High-speed vessels are able to travel in shallow water at "supercritical" speeds, i.e. faster than the natural shallow water wave speed (the "critical speed"). Around this critical speed, the sinkage and trim of the ship reach a maximum, so that the vessel is in particular danger of grounding. A method will be presented, based on modified slender-body theory, for predicting this maximum sinkage and trim. This will be compared to some experimental results, and then applied to example hull shapes.

High-performance Yacht Design Conference

The University of Auckland, Massey University, and the Royal Institution of Naval Architects (New Zealand Division) will hold an international conference on High-performance Yacht Design on 4–6 December 2002. The conference is scheduled for the middle of the Louis Vuitton Challenger Series to be held in Auckland, New Zealand, in the lead up to the 2003 America's Cup, and shortly after the finish of the Volvo Ocean Race.

The conference will be held at the School of Engineering at The University of Auckland. There will be a welcoming evening function at the New Zealand National Maritime Museum, and a dinner at the Royal New Zealand Yacht Squadron. The conference will provide a forum where naval architects, engineers, designers and researchers can discuss technical aspects of the design and development of high-performance yachts and power craft.

Registration may be done directly on the website, or registration forms may be downloaded and posted. For further details visit the website www.hpyacht.org.nz, or contact B. Woods on +64-9-443 9799 ext. 9560 or email b.woods@massey.ac.nz.

US Army orders a Fast Vessel from Incat

In September the US Army announced a contract for a second Incat-built high-speed wave-piercing catamaran for evaluation in various mission scenarios.

The US Army Tank-Automotive and Armaments Command (TACOM) is leasing their first Theatre Support Vessel (TSV –1X) for the Army from Bollinger/Incat USA, LLC of Lockport, Louisana.

The vessel, Incat hull 060, was to be delivered to her owner, Bollinger/Incat USA, in mid-November after midification at the Incat shipyard in Hobart to meet US Army requirements.

The ship, to be named *Spearhead* (TSV-1X), is to demonstrate and evaluate its ability to perform during certain mission scenarios, assess its usefulness to the US military and refine the requirements for the next generation of army watercraft. The TSV will be evaluated in its intra-theatre role in support of Operation Enduring Freedom .

Spearhead is a 98 m craft from Incat's Evolution 10B range of wave-piercing catamarans.

In 2001 Incat formed a strategic alliance with an American shipyard to market and build innovative craft designs for the US military and commercial markets. Incat USA's alliance with Bollinger Shipyard Inc. of Louisiana, who have extensive experience with supplying patrol craft to the Military and Coast Guard, has combined the strengths of two world-class shipbuilders.

As a result, joint forces from the US Military chartered a catamaran from Bollinger / Incat USA to be used as an evaluation platform for various trials and demonstrations for the different forces involved. This craft, *Joint Venture* (HSV-X1), continues to excel and has recently completed a circumnavigation of the globe — the first high-speed craft flying a special purpose US Military flag to do so.

Spearhead (TSV-1X)
(Image courtesy Incat)

NZ Contract for WaveMaster

WaveMaster International has announced a multi-million-dollar deal with New Zealand's biggest tourism operator. WaveMaster is to design and build a 34 m luxury catamaran capable of carrying 400 passengers for NZ-listed Tourism Holdings, which plans to conduct sightseeing tours of New Zealand's Milford Sound. The contract could be worth tens of millions of dollars to WaveMaster should THL take up an option to order as many as four catamarans for its Red Boat Cruises division.

Managing director Chris Gerrard said the THL deal was a watershed for WaveMaster as it sought to build its standing in the lucrative tourist marine vessel market. "This deal with THL really is the start of something," he said. "Marine tourism is going to boom and there's going to be a lot more demand for the kind of product we can build for that market." The deal with THL comes just weeks after WaveMaster delivered the first of four offshore supply vessels for Singapore oil industry group Abeer Marine, which is now expected to order an additional and bigger vessel to bolster its deepwater fleet.

The company is also among the front runners for tour boat and ferry contracts in New South Wales and Queensland.

With "quite a lot of things coming up", Mr. Gerrard said WaveMaster was confident of trebling its annual turnover to $100 million within five years, despite fierce competition from Henderson neighbour Austal and other rivals.

The company, wholly-owned by listed Malaysian company Penang Shipbuilding and Construction, last year built eight vessels and expected to build 15 to 20 vessels over the next year, he said. Such expansion would require a significant upgrade of its manufacturing equipment and facilities at the Australian Marine Complex at Henderson.

Naval Ship of Gold

A partnering agreement was signed on Friday 27 September 2002 between the Ministry of Defence Disposal Services Agency (DSA) and Odyssey, a US Marine Exploration Company, to conduct further archaeological exploration on the wreck in the Western Mediterranean believed to be HMS *Sussex*.

Built a short distance from London at Chatham Dockyard in the reign of William III, HMS *Sussex* was escorting a large merchant fleet to the Mediterranean when she sank in a severe storm in 1694. She was carrying a payment for the Duke of Savoy to continue the war against the French. That payment, consisting of tons of (most likely) gold coins, was lost with the ship, and virtually all hands. The exclusive partnering agreement will cover all short-term and long-term aspects of the British Government–Odyssey relationship relating to the wreck of HMS *Sussex*. This relationship will extend to recording and observation of artefacts and their eventual conservation, publication, exhibition, marketing and all other facets relating to the management of this project. Discussions and detailed negotiations between DSA and Odyssey were supported by guidance from a multi-departmental Project Board which specified archaeological aspects as its primary consideration. It is envisaged that the work at the site will eventually provide educational and cultural material aimed at benefiting future generations of researchers, interest groups, and the general public worldwide.

Image Marine Delivers Dive Boat to SE Asia

Image Marine has recently delivered a 22 m aluminium catamaran destined for the waters of South East Asia to a private owner.

Image Marine's extensive experience in producing high-quality finishes using standard commercial materials is evidenced by live-aboard dive vessels like *True North*, *Aqua Cat* and the recently completed *Island Explorer*, and was a key factor in winning the contract to build *Haruku*. So, too,

was the proven ability to apply these skills in a private vessel, notably the stylish 36 metre *White Rabbit* delivered in 2000.

Although Sydney-based Incat Designs provided the wave-piercing catamaran design, Image Marine was still heavily involved in the detail of the vessel, working in conjunction with both the designer and owner on such areas as material and equipment selection, right down to the colour scheme and furnishings. This included working closely with the owner to develop engineering solutions that would be simple to operate, repair and maintain, taking into account the facilities and skills available in the operational area.

Outfitted to a similar standard to the Image live-aboard *True North*, *Haruku's* interior includes a combined lounge/dining area, galley, owner's cabin and two guest cabins on the main deck.

The main living area features a dining table and chairs to port, a five-seat lounge suite and an entertainment centre that includes an integrated stereo system. Lighting combines downlights including feature perimeter lighting. The Amtico floor and stretched vinyl deckhead both combine aesthetics with practicality.

Also on the port side is the galley, which has ample storage and bench space to allow the preparation of meals for ten or more guests. The servery counter doubles as a breakfast bar.

The owner's suite and two guest cabins are located forward. Each guest cabin sleeps two (one double cabin, one twin) and features wardrobe and drawer units providing ample storage. All cabins have low-voltage feature downlights.

The owner's suite has a queen-size bed and writing desk, as well as extensive wardrobe and drawer space. Whereas the guests share a central bathroom, the owner's cabin has a private en suite.

Aft on the main deck there is a fishing station, complete with stainless steel sink, and lighting under the bulwarks to provide indirect illumination when chasing the catch at night. Flood lights are fitted for occasions when more light is required.

Swimmers and divers are equally well provided for, with bench seating incorporating stowage for ten to twelve dive bottles, and stairs leading to transom swim platforms. These also provide access to a lifting dive platform that can be submerged to make divers' entry and exit from the water effortless. When raised, the dive platform is used to store the vessel's tender. Crew cabins in each hull are also reached via the swim platforms.

The central wheelhouse combines control and comfort, with an L-shaped lounge in the aft port corner allowing passengers to appreciate the vistas from the raised position. Wheel, engine controls, radar, depth sounder, GPS/plotter, autopilot and communications gear are all logically arranged in a single console, putting everything within easy reach of the helm chair. A second steering position is located in the covered flybridge. Reached directly from the wheelhouse, this features comfortable seating for up to six guests, and views of and access to the aft deck.

Powered by twin 522 kW Cummins KTA19 diesels driving fixed pitch propellers, *Haruku* achieved a speed of 25.5 kn during sea trials in August and, with up to 8 200 L of fuel, can steam for over 24 hours without refuelling.

Australian fast Ferry for Great Lakes

Austal Ships is to design and build the world's most powerful diesel-powered catamaran for Canadian American Transportation Systems (CATS). The contract represents a major milestone for the Austal Group in the North American market.

With a speed of 42 kn, the 86 m vehicle-passenger ferry will be the first of its type on the Great Lakes. It will operate on Lake Ontario between the cities of Rochester in New York state, USA, and Toronto in Canada, with a voyage time of 2 hours and 15 minutes.

Announcing the contract on 13 September, Austal's Managing Director, Mr Bob McKinnon, said the contract is a vital step forward in maintaining Austal's share of the fast ferry market.

"This order indicates that Austal is winning lucrative contracts for large fast ferries in very a competitive environment," Mr McKinnon said.

"We are delighted to be involved with CATS in this project and look forward to delivering our Auto Express product to this part of the world."

The order, the first Austal Ships has received from North America, is another key achievement for the Austal Group in this important market.

In 1999, Austal established a joint venture shipyard in Mobile, Alabama, with a view to making its world-leading aluminium shipbuilding expertise available to the US domestic markets for commercial and military vessels.

Austal USA has already made significant progress, including its first deliveries, two 45 m offshore crew/supply vessels completed earlier this year. A 26 m catamaran ferry will be delivered for operation in New York shortly, and the yard is also building two dinner cruise vessels.

In addition, the Theatre Support Vessel *WestPac Express* built by Austal Ships is on a three-year charter to the United States military. It has already completed a highly successful first year of operations with the Third Marine Expeditionary Force of the US Marine Corps based in Okinawa, Japan. The 101 m catamaran will be re-flagged to the United States within the next six months.

Scheduled to arrive in Rochester in late July 2003, the CATS ferry will have the capacity to carry 774 passengers in its luxurious dual-class interior and 238 cars or up to 10 trucks and fewer cars. The garage features Austal's highly efficient drive-through vehicle-deck design, with hoistable mezzanine decks to allow the carriage of trucks and other overheight vehicles, without sacrificing maximum car capacity.

Although it will be the seventh Auto Express 86 vehicle-passenger catamaran built by Austal Ships, the CATS vessel will be different in a number of ways. This includes structural and design changes in accordance with the latest IMO HSC Code 2000 requirements and to allow operation in limited ice conditions.

The ferry will also be the first of its type to be fitted with MTU's 20V 8000 M70 engines, each rated at 8 200 kW, making it the most powerful diesel-powered high-speed catamaran in the world. Each engine will drive a steerable waterjet via a ZF gearbox.

Principal particulars:

Overall length	86.6 m
Waterline length (approx)	74.15 m
Moulded beam	23.75 m
Hull depth (moulded)	7.6 m
Maximum draft	3.2 m
Passengers	774
Cars	238 (max)
Trucks	10 (max)
Engines	Four MTU 20V 8000 M70
Gearboxes	Four ZF53000
Waterjets	Four steerable
Speed	42 kn
Classification	Germanischer Lloyd

Australian Companies win Systems Contract for German Warship Design

Defence Minister Robert Hill and Industry Minister Ian Macfarlane have congratulated the Australian companies CEA Technologies and Saab Systems Australia for their selection in a new warship design announced by Blohm + Voss GmbH in Germany.

The CEA-Saab Naval Advanced Air Warfare System was unveiled in September at the MECON 2002 Conference in Hamburg which is attended by naval staff from over 40 countries.

The Australian system was specifically designed for the Blohm + Voss new-generation frigate design. The proposed 3 500 t frigate would be the first in the world to incorporate CEA's active phased array radar. This radar allows vessels to engage multiple targets at extended range and similar radars have previously only been fitted to ships of nearly twice the size.

The radar is integrated with the latest evolution of Saab Combat Management System that is based on commercial off-the-shelf technology, incorporates surface-to-surface and surface-to-air missile control systems and allows the vessel to operate with coalition and US forces.

"The Australian Navy plans to fit a production system on one of our frigates with a view to undertaking future sea trials," Senator Hill said. "If these trials are successful, there is the potential for Australia to use this system in the future."

Austal USA sells Third Vessel into New York Market

Representing the third contract signed for the New York market in six months, in September Austal USA secured an order for a 43.5 m passenger ferry from the well-established New York operator, Circle Line-Statue of Liberty Ferry, Inc. (Circle Line).

Circle Line transports thousands of passengers each day to the Statue of Liberty and Ellis Island. The new catamaran will be the company's first aluminium fast ferry, and is designed to meet Circle Line's requirements for a vessel capable of fulfilling a number of different roles.

Austal Managing Director, Mr Bob McKinnon, said the contract was another step in Austal becoming a major supplier of aluminium vessels to the US domestic market.

"This order is another significant achievement for Austal USA, indicating that our forecast demand for high-speed aluminium ferries in the US is being realised," Mr McKinnon said.

The success in securing orders to date has prompted Austal USA to substantially increase its sales capability to capitalise on the company's growing reputation in North America.

The planned expansion of shipbuilding facilities at Austal USA will enable the yard to build larger defence and commercial vessels such as the 86 m catamaran now under construction at Austal's WA facilities for the North American market.

"As well as being attractive contracts in their own right, each one of these orders further enables us to develop our US capabilities," Mr McKinnon added.

Capable of 29 kn and with the capacity for 600 passengers, the new vessel has been developed through close co-operation between Austal USA and Circle Line and will cater for harbour sightseeing cruises, evening dinner cruises and longer distance runs.

The catamaran's interior incorporates numerous features that will enable Circle Line to quickly change the configuration for these different operating modes. A large skylight area forward will provide outstanding views of the New York skyline from within the main deck passenger cabin. The vessel also has an open sun deck and an upper deck passenger lounge.

Also reflecting Austal's commitment to providing a vessel tailored to specific operational requirements, the catamaran's bow and freeboard have been designed to be compatible with existing and planned docks in Manhattan and will allow bow loading and side loading from three separate entranceways.

Circle Line expressed their appreciation of the responsiveness that Austal USA and the design team at Austal Ships demonstrated in bringing the new design to a contract definition stage in such a short time.

Commenting on the new contract, Circle Line's Chief Executive Officer, Mr Kevin Moran, said "This new vessel gives Circle Line the flexibility to provide an all-encompassing fleet to better serve the expansion of waterborne entertainment and transportation in the New York harbour."

Power for the vessel will be supplied by four Cummins KTA38M2 diesel engines, each coupled to a Hamilton 571 waterjet through a Reintjes WVS 440 reversing gearbox. This configuration allows the catamaran to be operated with either two or four engines, giving the vessel two distinct service speeds to match its varied operating profile.

The vessel is scheduled to enter service in early July 2003, and Circle Line has an option to purchase a second vessel.

Austal USA's current order book includes a 41 m dinner cruise monohull for Cloud Nine of New York and a 34 m dinner cruise catamaran for Island Queen Cruises of Miami. The Mobile, Alabama based shipyard has also recently completed a 26 metre catamaran ferry for Lighthouse Fast Ferry of New York.

Cabinet to Consider the Future of Australia's Naval Shipbuilding Industry

On 29 August the Defence Minister, Robert Hill, released the Department of Defence's *Naval Shipbuilding and Repair Sector Strategic Plan*, ahead of Cabinet's consideration in the near future.

The plan provides Government with expert advice, developed in consultation with industry, on safeguarding Australia's strategic maritime capabilities through building a sustainable future for the industry.

"The naval shipbuilding industry in Australia is at a crossroads," Senator Hill said.

"Defence's demand for warships over the next 15 years will be half that of the last 15. This will be insufficient to sustain industry in its current form.

"The Government announced its intention in October last year to adopt a more strategic industry approach by developing structured, long-term commercial relationships with a small number of Australian industry players rather than awarding all contracts on a project-by-project basis."

The shipbuilding sector plan links strategically-important industry skills and capabilities to expected Defence demand for acquisition and in-service support. The plan was developed in close cooperation with industry over the past six months and, I am advised, has the support of Australia's major naval shipbuilding companies.

However, the plan does not propose any particular company/companies as the shipbuilding entity/entities, nor does it make any assertions on the location of future naval construction work.

"The paper argues that future military demand is unlikely to support the current number of shipbuilders — that a natural monopoly will almost certainly emerge, either by consolidation, attrition or market collapse," Senator Hill said.

"But Australia needs to be able to build, maintain, modify, upgrade and repair our warships if we are to maintain our self-reliance in this important strategic area. With this reduced demand, there is real a risk that industry's critical skills and capabilities will be lost, or that Australia might lose access to the sensitive worldwide technology we need.

"The question for the Government is to decide how best to respond — to allow market forces to determine the naval shipbuilding sector's future, or to intervene and guide the industry to try to reduce the risks."

The Defence plan considers the merits of creating a "strategic alliance" between the Commonwealth and one or two shipbuilding entities as a means of achieving superior performance, value for money and flexibility.

"This plan is aimed at helping industry restructure for the longer term, and ensuring that the important skills base in the industry is built, sustained and developed over the long term, not allowed to fall away at the end of each project," Senator Hill said.

A sustainable, longer-term submarine capability is a key element of the shipbuilding sector plan.

The Executive Summary of the Plan is reproduced in this edition of *The Australian Naval Architect*.

US Military Leases a Third Ship from Incat

On 24 October the Australian shipbuilder Incat announced the lease of a third ship for service with the US Military. Military Sealift Command, Washington DC, is the contracting arm that will lease the craft from Bollinger/Incat USA LLC, Lockport, La., to support US Navy Mine Warfare Command.

The ship will be developed from a part-built commercial vessel (Incat Hull 061) currently under construction at the Hobart shipyard with delivery of the vessel to Ingleside, Texas in June 2003.

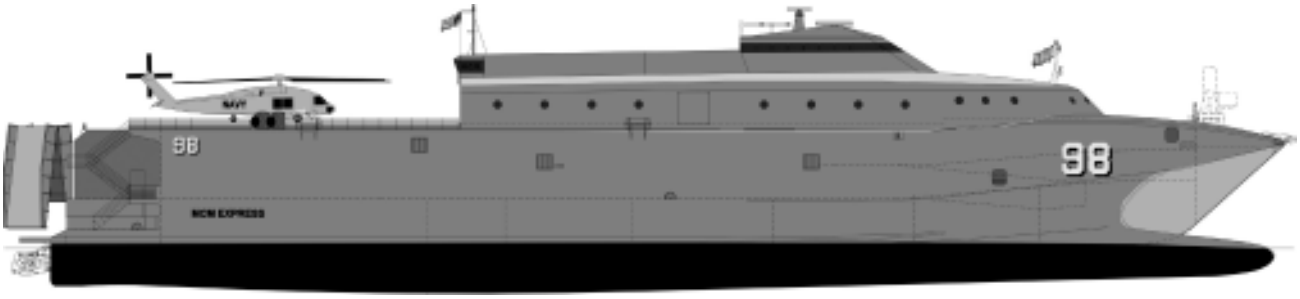
Incat's US Military Project Manager, Mr Nick Wells, commented: "Once commissioned, the vessel is expected to serve as an interim replacement for the US Navy mine countermeasure support ship *Inchon*. The craft will also serve as a platform to conduct a series of limited objective experiments, exercises, demonstrations and training events determined by the Navy Warfare Development Command and the Marine Corps Combat Development Command."

The ship will be capable of maintaining an average speed of 35 kn or greater, loaded with 500 t of payload comprising 350 personnel and military equipment. A minimum operating range of 1100 n miles at 35 kn is required by the contract, as is a minimum transit range of 4 000 n miles at an average speed of 20 kn. Furthermore, she must be capable of 24-hour operations at slow speeds (3-10 kn) for small boat and helicopter operations.

A stern ramp capable of on/off loading directly astern or to the starboard quarter will be fitted. The ramp will be capable of loading/unloading a multitude of military vehicles up to and including battle tanks of 32 t. The ramp will also be capable of launch and recovery of amphibious assault vehicles. To achieve this the ramp tip end will be submerged allowing the amphibious vehicles to drive on and off.

The ship will also be capable of launching and recovery of small boats and unmanned vehicles up to 10.5 t whilst underway.

The vessel will be fitted with a NAVAIR certified helicopter deck for operation of MH-60S, CH-46, UH-1 and AH-1 helicopters. An area protected from the weather for storage and maintenance of two MH-60S helicopters will be provided, as will a Carriage Stream Tow and Recovery System (CSTARS). The helicopter deck will have the capacity to transfer equipment up to 2.7 t to and from the vehicle deck.



An impression of Incat's latest ship for delivery to the armed forces of the United States
(Image courtesy incat)

Austal Ferries for Hong Kong

After an absence of five years, Austal Ships has returned to Hong Kong with the simultaneous delivery of three 47.5 m aluminium catamarans. They take the total number of Austal-built vessels delivered to Hong Kong to 32.

Delivered over a five-year period beginning in November 1990, the previous 29 Austal deliveries to Hong Kong were critical in establishing the company's reputation as a reliable supplier of high quality, high performance passenger ferries in the 40 m range.

"Based on this solid foundation, Austal has built up a product range that now also includes vehicle-passenger ferries, cruise yachts, patrol boats, offshore crewboats and large high-speed vessels for military applications," explained Austal's Managing Director, Mr Bob McKinnon.

"We are delighted to welcome New World First Ferry to the expanding group of leading operators that are taking advantage of Austal's expertise in high performance vessels. I am confident that the success of these vessels will be the start of a long-term relationship between our two companies," he added.

One of the Asia-Pacific region's foremost ferry companies, New World First Ferry (NWFF) operates twelve routes within Hong Kong Harbour and to outlying islands. This includes the services between Hong Kong and Macau operated by New World First Ferry Servicios Maritimos (Macau) on which the new Austal catamarans will run.

Mr Adolf Hsu, Managing Director of First Ferry (Macau), said "By bringing these three new high-speed catamarans alongside the existing fleet, First Ferry (Macau)'s capacity is nearly doubled. With their loaded speed of 41.8 kn, reclining seats, wide passageways, tinted windows and modern kiosk service, the new ferries represent our dedication to pursue a higher standard of passenger comfort and operational safety."

The acquisition of the three Austal ferries (with an option for up to four more) reflects New World First Ferry's confidence in the prospects for continued growth in passenger volumes on the Hong Kong to Macau route, which the new catamarans will complete in approximately 50 minutes. Seakeeping and thus passenger comfort is optimised by an active motion control system supplied by Seastate. This consists of interceptors aft and retractable T-foils forward.

Mr John Hui, Director and General Manager of First Ferry (Macau), said "The new catamarans are equipped with the latest navigational aids ensuring the optimal performance of the vessels. The cabin is well-appointed with a strong focus on passenger comfort, featuring audio-visual equipment and luxurious seating throughout and, of course, with the striking livery of our company logo."

New Ferry LXXXI, *New Ferry LXXXII* and *New Ferry LXXXIII* can each carry 414 passengers on two decks. Of these, 100 are carried on the upper deck, including 16 passengers in private VIP lounges.

Comfortable Beurteaux seats are fitted throughout the passenger areas, which feature hard-wearing vinyl-type flooring for long life and ease of maintenance. The purple floors are in keeping with New World First Ferry's corporate colour scheme which combines purple with bright orange and green, making the company's modern fleet instantly recognizable.

Austal worked closely with New World First Ferry to ensure that the corporate branding was maintained throughout, right down to details such as the colour of the toilet doors and including the pattern on the stairway capping in the passenger cabin.

Mr Hui said that working with the staff of Austal was a great pleasure. "They were very forthcoming and always prepared to discuss the pros and cons of various issues that arose over the course of the project. I was also impressed by the professionalism and zeal of the Austal staff. They went to great lengths to ensure that all three vessels were delivered before the contract date," he said.

Mark Stothard, who managed the successful contract bid for Austal, said the close contact and understanding between Austal and NWFF was a key to making the project so successful.

"The performance of the entire Austal team is typified by Project Manager John van Meekeren, who showed great dedication and drive to develop a close working relationship with the customer and thus ensure that we fully understood their needs," Mr Stothard said.

"On the customer side, New World First Ferry have a great asset in David Wong, who both wrote the tender and then followed the vessels through as the owner's representative. In fact, NWFF have been a great customer and the whole project has been very rewarding."

Impressive 107 cm colour plasma monitors allow main deck passengers to view either local television or video/DVD entertainment. Another large plasma screen and four smaller LCD monitors are fitted on the upper deck. The monitors can be linked to a camera on the wheelhouse roof, showing all passengers the view ahead of the vessel.

Other onboard facilities include a main deck kiosk, toilets and baggage racks on both decks.

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

Mr McKinnon said that although Austal is best known internationally for fast aluminium catamarans such as the Hong Kong vessels, the combined order book of Austal group companies reflects a far more varied product range.

"Austal group companies are currently building no fewer than 12 vessels, including cruise yachts, passenger and vehicle-passenger ferries, dinner cruise / sightseeing vessels and luxury motor yachts," Mr McKinnon said.

"These vessels are being built in both aluminium and steel, and include both monohulls and catamarans, which really serves to illustrate the success of our policy of diversifying our product range," he explained.

Principal Particulars

Length Overall	47.5 m
Length Waterline	44.0 m
Beam Moulded	11.8 m
Hull Depth Moulded	3.8 m
Maximum Draft	1.4 m
Maximum deadweight	55.8 t
Passengers	414
Crew	8
Fuel (maximum)	20 000 L

Propulsion

Engines	Four MTU 16V 4000 M70; 2 320 kW at 2 000 rpm
Gearboxes	Four Reintjes VLJ 930 HL
Waterjets	Four Kamewa 63 SII
Speed	41.8 kn at 95% MCR with 44.1 t deadweight

Survey

Classification	Det Norske Veritas X1A1 HSLC Passenger R2 EO

Two of the new Austal-built ferries for Hong Kong
(Photograph courtesy Austal)

Electric Boat Corporation signs as Capability Partner to Australian Submarine Corporation

The Commonwealth Government has formally engaged the major United States submarine builder Electric Boat Corporation as capability partner to the Australian Submarine Corporation, Defence Minister Robert Hill and Finance Minister Nick Minchin announced on 3 October.

A team of experts from Electric Boat's head office in Groton, USA, will be based in South Australia from mid-October under a service agreement with the Australian Submarine Corporation. Under the agreement, Electric Boat will provide technical and commercial support to the Australian Submarine Corporation as it transits from being a producer of submarines to an agency for through-life support.

Valued at $US20 million over three years, with up to four years of annual extensions, the partnership will see Electric Boat provide specialist management and technical advice on the maintenance and ongoing support of Australia's Collins-class submarines. Support will focus on the areas of modernised through-life support and capability upgrades. The capability partnership will be instrumental to ASC's work on future refits for Collins-class submarines which will be done at ASC.

It follows the Government's decision last month to purchase a replacement combat system for the Collins class and a commitment last year to closer cooperation with the United States Navy in maintaining fully capable, sustainable and interoperable submarine forces.

Austal in US Navy Study

Austal USA, the Mobile, Alabama, based subsidiary of aluminium shipbuilder, Austal Limited, will team with Bath Iron Works, a subsidiary of General Dynamics, to explore advanced concepts for a Focused Mission High-Speed Ship (FMHSS) for the United States Navy.

Austal USA will play an integral part in the study team as one of six consortia selected from eighteen proposals to receive a $US500 000 grant to develop the concept. Led by Bath Iron Works, the team will also include The Boeing Company, British Aerospace Corporation (BAE), Maritime Applied Physics Corporation, CAE Marine Systems and five other General Dynamics business units.

Austal's Managing Director, Mr Bob McKinnon acknowledged the study as a major development in the medium- and long-term prospects for United States military vessels.

"We are delighted to be part of such a strong team but are aware that there is quite a long way to go before a contract is awarded", Mr McKinnon said. He also confirmed that the large commercial vehicle-passenger ferry market remains subdued.

FMHSS is an integrated surface combatant capability envisaged to operate in littoral (coastal) areas against terrorist threats, high-speed swarm boats, mines and diesel submarines. It may also be called upon to carry logistics supplies or personnel and equipment for special operations forces and the US Marine Corps, acting in a role similar to the Austal built 101 m theatre support vessel, *WestPac Express*, currently contracted to the US Marine Corps in Okinawa, Japan.

The FMHSS will incorporate state-of-the-art materials, modular mission packages, and a multi-purpose platform design to provide the US Navy with a highly flexible concept for future littoral operations. The mission capability of the FMHSS will play a pivotal role in assuring the access for joint and coalition forces into contested coastal regions around the world.

The team has chosen to base its FMHSS hull design on Austal's advanced hullform technology, developed and designed by Austal's experienced design team located in Western Australia, to create a highly automated ship capable of speeds in excess of 50 kn.

Austal's design offers outstanding efficiency and performance in all sea conditions, endurance and reliability for sustained independent operations and a high degree of flexibility/adaptability to meet evolving military requirements through open architecture and modular configuration. The system will enable advanced operational concepts such as those employing high speed, enhanced manoeuvre, distributed forces and reduced signatures as well as the ability to efficiently embark from a broad array of aircraft, amphibious, land and marine vehicles.

The team will develop an integrated system which delivers significantly enhanced capabilities to naval, joint and coalition forces operating within the littorals. In defining system design characteristics, the team will address FMHSS integration with FORCEnet, the information network into which the US Navy will integrate sensors, decision aids and weapons, as well as other joint and coalition information networks.

The spectrum of technologies to be evaluated by the team will include all forms of remotely deployed and operated vehicles, distributed sensors, modular payloads, weapons, communications, command and control and automation systems as well as advanced propulsion technologies and hull construction materials.

The results of this study will assist the US Navy in defining requirements for the rapidly emerging Littoral Combat Ship (LCS) Program. Between thirty and sixty LCS ships are planned, with construction to commence in 2005. Earlier construction may be required by the US Navy in order to accelerate defence against growing worldwide threats and terrorist operations.

New Charges for Commercial Vessel Surveys in NSW

NSW recreational boaters will no longer subsidise the survey of commercial vessels by the Waterways Authority from 1 November 2002. On 11 October the Waterways Authority Chief Executive, Matthew Taylor, announced new charges for survey inspections of commercial vessels in NSW.

For some time the Waterways Authority, through recreational boating fees, has subsidised commercial vessel survey work. The Waterways Authority's new scalable system of survey fees is intended to achieve full cost recovery.

There will be three fee rates for commercial vessel periodic surveys to reflect the cost of safety and environmental management of vessels according to their size.

The fees will increase as follows:

- from $36 per metre to $40 for vessels up to and including 7.5 m in length
- from $47 per metre to $59 for vessels between 7.5 m and 15 m
- from $47 per metre to $71 for vessels more than 15 m.

Preferred Primary Weapon System for New Patrol Boats

A 25 mm stabilised weapon system, known as Typhoon Mk 25, has been selected as the preferred primary weapon system for the Navy's new patrol boats, Defence Minister Robert Hill announced in August.

Senator Hill said the Typhoon, proposed by Rafael, was chosen by Defence as offering the best value with additional operational features at a significantly reduced overall cost when compared to its competitor.

Under a partnering arrangement, General Motors Defence Australia (GMDA) will build all the weapon mounts under licence in Adelaide (with the exception of the lead unit). GMDA also proposes to support the system through-life at its repair and maintenance facility in Palmerston, Northern Territory.

The expected contract value for the acquisition and support of the gun systems over the first fifteen years of their operational life is about $50 million. This contract will be placed through the successful prime contractor for the Replacement Patrol Boats to be announced in the first half of 2003. At least 60% to 70% of the value of this contract will be spent in Australia.

The Typhoon will be fitted with a 25 mm (marinised) Bushmaster cannon supplied by Alliant Tech Systems (formerly produced by Boeing).

Senator Hill said the stabilised Typhoon system will greatly enhance the operational capability of the replacement patrol boats. “Its range and accuracy, which is vastly superior to that of the Bofors 40 mm non-stabilised gun on the current Fremantle Class boats, will add to Navy’s ability to protect Australia’s coastline.”

WA Industry News

Strategic Marine continues to be active with a 40 m 120 passenger crewboat for Asia due to be launched in December. They have three 13 m 20 passenger crewboats under construction for delivery to an Asian customer and two 20 m high-speed patrol boats are currently being assembled in Malaysia from kits supplied by Strategic Marine and with their supervision. A kit of parts for an 18 m crayboat is being plasma cut for Western Boat Builders.

Kim Klaka

Order for Oceanfast

Oceanfast announced in October that it has secured a contract to build a 58 m luxury motor yacht for a new client.

Demonstrating confidence in, and demand for, an Oceanfast product, this contract is a direct result of the new client’s tremendous impression after a visit to the 57 m motor yacht *Sagitta*, successfully delivered by Oceanfast in July last year and a finalist in this year’s Super Yacht Society Awards.

Oceanfast is undertaking the yacht design in-house, delivering extensive alfresco family entertaining areas throughout the yacht and featuring simple stylised interior design. An innovative storage arrangement for tenders enables maximum use of aft deck space and providing panoramic views off the main deck through large retractable clear sliding doors.

Oceanfast now has five yachts on order with deliveries extending to 2004.

The shipbuilder has made a significant investment in upgrading the existing slipway and jetty facilities. A unique feature of the new launching services is a transfer trolley designed in a wedge shape, enabling vessels to enter the water parallel with the waterline. Rail beams line the slipway from the front of the production sheds to the launch area extending over 130 m in length and easily accessible to the winching system.

These new facilities currently enable Oceanfast to launch yachts up to 80 m in length with expansion available for larger yachts.

General particulars of new motor yacht

Length Overall	58 m
Beam	10.55 m
Draft	2.65 m
Materials	Aluminium
Hull type	Semi-displacement
Accommodation	12 guests and 14 crew
Top speed	21 kn
Classification	Lloyds Register

Oceanfast’s purpose built construction sheds in which they can build yachts up to 120 m in length, along with the new slipway (Photo courtesy Oceanfast)

Tasmanian Industry News

Seward Maritime has had a low-profile year after moving to new premises in the beautiful Tamar Valley (with about a dozen wineries within 10 minutes drive). Work this year has focussed on CFD studies for clients and some in-house hull development projects as well as the usual consultancy mix. Present projects include a 24 m dive fishing mother ship just started and talks are continuing about a number of ferry projects.

***Adventurer* Launched**

To cater for the ever-increasing tourist interest in Gordon River cruises, the Grining family from Strahan, who run World Heritage Cruises, launched their latest catamaran *Adventurer* on Saturday 31 August. The family, which has been navigating the Gordon River since 1896, were proudly calling their newest vessel the largest, sleekest, most sophisticated craft ever to cruise the Gordon.

The vessel was designed by Crowther Multihulls and built in Hobart by Richardson Devine Marine. Scale model tests were conducted at the Australian Maritime College to assist in the licencing process for the vessel to commercially operate on the Gordon River, where strict criteria are applied to minimise bank erosion. About 300 people attended the launching of *Adventurer* at Hobart’s Macquarie Wharf, among them was the Tasmanian Premier, Jim Bacon, and representatives of AMC.

The general particulars of *Adventurer* are:

Length overall	28 m
Waterline length	26.7 m
Beam	8.5 m
Maximum Speed	30 kn
Propulsion	Two Detroit 16V92/820 kW
Generator set	47 kVA
Fuel	6 000 l
Passengers	214
Crew	6
Superstructure	Aluminium

Gregor Macfarlane

Oceanfast launches *Aussie Rules*

Western Australian shipbuilder Oceanfast has launched *Aussie Rules* — the largest private aluminium motor yacht in the world. The yacht was launched on 13 October 2002 with owners Greg and Laura Norman present to witness the event.

The launching was a very modest event for the launching with only the Normans, selected Oceanfast personnel, the 12-person crew, designer Sam Sorgiovanni and inquisitive dolphins in attendance. Laura Norman officially named the Norman Expedition Yacht *Aussie Rules*, with a magnum of champagne smashed on the bulbous bow before the yacht slid out into the Indian Ocean.

The 69.5 m *Aussie Rules* can cruise at a comfortable 12.5 knots, with 220 000 litres of fuel giving a range of 8 000 n miles. The yacht can comfortably accommodate a complement of up to sixteen guests in deluxe guest cabins with several opulently appointed dining and lounge saloons. A traditional theme is carried throughout the interior, incorporating finely-crafted timber details to carefully selected soft furnishings and accessories to complement this style.

Greg Norman's sporting and yachting experience has greatly influenced the design and concept of this unique motor yacht with entertaining and exploring elements evident in the design and outfit. Keen water-sport guests will be able to optimise surrounding aquatic playgrounds through the range of tenders carried on board. These include:

- a 12.8 m Gamefisher, launched from the main deck by double slings when the yacht is in port. Perfect for overnight outings, the boat includes four berths and a galley to cook the 'catch of the day';
- a 9.2 m SeaVee for smaller fishing excursions;
- a 7 m Novurania Equator for diving and providing guests with a dry ride ashore;
- two 5.5 m Hewes Bonefishers to manoeuvre over sand flats and estuaries in areas such as Key West, Florida;
- a 4 m Narwhal rescue boat; and
- four Yamaha Wave Runners (jet skis).

The dive equipment on board *Aussie Rules* will cater for up to 30 people and includes a decompression chamber and two dive compressors. For the fishing enthusiast there are also 200 fishing rods.

The sun deck features a spa/pool which is able to seat twelve people and boasts over 100 jet outlets arranged differently for each individual massage position. Greg Norman's well-known shark logo appears prominently emblazoned in polished stainless steel on the bottom of the pool.

The general particulars of *Aussie Rules* are:

Length Overall	69.5 m
Beam	11.6 m
Draft	3 m
Materials	Aluminium Hull/Composite superstructure
Accommodation	16 guests and 14 crew
Top Speed	17 kn
Range	8,000 n miles at 12 kn
Classification	Lloyds Register
Yacht Design	Oceanfast/Greg Norman
Interior Design	N I Design and Sam Sorgiovanni Design

Watched by her owners, *Aussie Rules* lies ready to take to the watersof the Indian Ocean
(Photo courtesy Oceanfast)

New South Wales Industry News

New Design

AMD Marine Consulting is designing a new vessel for Kangaroo Island Sealink. At 50 m overall, with a beam of 17.8 m, and a deadweight capacity of 350 t, the new vessel will be slightly larger than *Sealion*, the current flagship of the Sealink fleet.

AMD was commissioned to carry out a preliminary design last year in order to prepare tender documents, and Sealink formally announced the awarding of the construction contract just prior to *The ANA* going to print. The vessel will be built by NQEA in Cairns. More information will be published in the February edition of *The ANA*.

Crowther Multihulls are designing a 37 m high-speed passenger ferry for Billbo LLC in the USA. The vessel is designed to carry a total of 434 passengers at a speed of 38 knots, with propulsion being provided by four Cummins KTA50 engines delivering 1340 kW each and four Hamilton HM651 waterjet units. She will be run as a whale watcher out of Bar Harbour in Maine, with large viewing platforms for passenger vision, and Seastate ride control for passenger comfort. The vessel will be built by Blount Barker Shipyards, Rhode Island, under survey by the US Coast Guard, and delivery is scheduled for July 2003.

New Construction

Warren Yachts at Kincumber has under construction a 35 m motor yacht to a Sam Sorgiovanni/Phil Curran/Peter Lowe design. The vessel is of beam 7.4 m, draft 2.2 m fully loaded, fuel capacity 32 kL, water capacity 4 kL, is of composite construction and will be classed by ABS as ✠ A1 Yachting Service AMS. Propulsion is by two MTU 12 V 4000 M90 diesels with ZF reduction gearboxes driving fixed-pitch Teignbridge propellers in tunnels. The top speed is expected to be 28 knots and, at a cruising speed of 14 kn, the range is 2000 n miles. Auxiliary power is provided by two 65 kW Northern Lights generators, and the vessel is fitted with a 48 kW Naiad bowthruster and 1.1 m^2 Naiad roll-stabiliser fins. The owner's and three guest suites each have private bath and the upper deck includes a games room for children. The vessel is due for launch and completion in December 2002.

Warren Yachts also have under construction a Supernova 85 hardtop to a Sam Sorgiovanni/Peter Lowe design. The vessel is of length 26 m (85 ft), beam 5.8 m, draft 1.27 m maximum, fuel capacity 7 kL, and fresh water capacity 1.95 kL. Propulsion is by two MTU 12V183TE93 diesels of 860 kW with ZF gearboxes driving fixed-pitch Teignbridge propellers in tunnels. Top speed is expected to be 31 kn, and 28 kn cruising. Auxiliary power is provided by two 22.5 kW Onan gensets. The vessel is fitted with a Trac 28 kW hydraulic bowthruster. The Supernova 85 (85 ft) is an extended version of the 77, allowing some significant changes to the interior. On the main deck the additional length has allowed space for a dedicated dining area just aft of the main control area, and below the configuration has changed from two suites with private facilities and one guest which shared the day facilities, to four suites, each with private facilities.

BoatSpeed of Somersby have under construction a carbon/Nomex/foam/Custom Preg® 90 Plus water-ballasted race yacht designed by Hugh Welbourn. Photographs of construction in progress may be seen on their website at www.boatspeed.com.au.

Phil Helmore

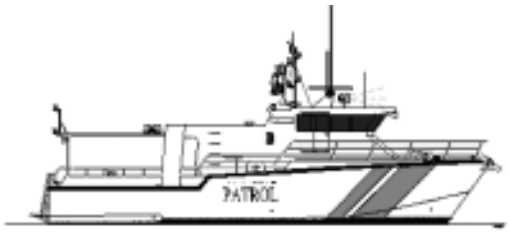
Queensland Industry News

Custom boat building and design is still progressing well in the Brisbane area. The larger boat builders are very busy while the smaller builders are short of work. Deep V Pty Ltd (formerly Queensland Ships/Pacific Boats that built the 'Boat of the Year' sports fishing boat) has gone into receivership. Unfortunately there seems to be very little activity in North Queensland and Gold Coast regions.

In the Brisbane area, Aluminium Marine has completed the construction of three 12 m Police patrol vessels. These boats will be deployed at Brisbane, Mooloolaba and Hervey Bay. They are powered by twin Mercury Mercruisers and have a top speed of 35 kn and a cruise speed of 26 kn fully loaded.

Aluminium Marine has also delivered a 12 m landing barge delivered to Queensland Parks and Wildlife. It has a top speed of 30 kn and can carry four tonnes of deck cargo. This vessel will replace the existing barge on Moreton Bay.

Brisbane Ship Constructions are soon to hand over a 20 m patrol boat for the Department of Primary Industries. *Flinders* was launched in September, and is built in aluminium for service in Queensland coastal waters. She has a crew of eight and a maximum speed of 23.3 kn.



Flinders, the new patrol boat for the Queensland Department of Primary Industries (Image courtesy BSC Marine Group)

Lightning Boats are constructing two 24 m passenger catamarans, one designed by Sea Speed Pty Ltd and one by Crowther Designs.

A new aluminium boat builder, New Wave Catamarans, has opened at Hemmant on the Brisbane River. The company has already delivered a 24 m 190 passenger ferry for operation on Sydney harbour. The owner has now ordered a second identical vessel. Also under construction is a 28 m passenger ferry for Hong Kong.

Norman Wright and Sons remain busy, with six projects current.

South Pacific Marine has completed a 29 m whale-watching catamaran designed by Crowther Designs. The yard is also further progressed the building of their 30 m steel landing barge.

Stingray Boats has delivered a 12 m dive/thrill boat, powered by three of the new 225 hp, 4 stroke, Yamaha outboard motors.

Brian Robson

HMS *Nottingham* Goes Home

The Royal Navy Type 42 destroyer HMS *Nottingham*, severely damaged off Lord Howe Island on 7 July, has left Australia for home. Following de-ammunitioning and de-storing in Newcastle, *Nottingham* was towed to Sydney in October to await the Dockwise Shipping BV heavy lift ship *Swan* for transport to the UK.

Swan is a semi-submersible heavy transport/product carrier which can carry deck cargo up to 25 000 t or 32 928 m^3 of clean product cargo in cargo tanks. The ship has an overall length of 180.5 m with available deck space 126.8 m x 31.6 m.

Nottingham was docked on *Swan* off Parsley Bay in Sydney Harbour on 22 October. The docking, which took about ten hours, revealed the extensive damage to the destroyer. *Nottingham* was a tight fit on deck with less than one metre clearance forward and aft. After further preparation alongside at Garden Island, the ships sailed for Southampton at 0200 on 29 October.

The docking was the largest 'collection' by a heavy-lift ship in Sydney since *Mighty Servant 3* docked the drilling rig *Sedco 600* in January 1989.

At 3 500 t *Nottingham* is a relatively light cargo for Dockwise who operate a fleet of 14 semi-submersible vessels serving the offshore oil and other industries. They recently announced that Hyundai Mipo Dockyard in Korea will jumboise their heavy transport vessel *Blue Marlin*. The ship will be widened by 21 m to create a stable platform of 63 m breadth. After modification, *Blue Marlin* will have a deadweight of 78 000 t, enabling the ship to carry heavy structures up to 73 000 t.

With the two tugs that moved *Nottingham* from Chowder Bay holding the ship in position fore and aft, lines from *Nottingham* to *Swan* were used to pull the destroyer sideways into position, at about 0630 on 22 October (above)

Nottingham was positioned across the deck of *Swan* at an angle to provide some clearance at bow and stern. Divers were used to monitor the position of the ship over the blocks as *Swan* was slowly raised. About 0830, 22 October (above)

HMS *Nottingham* safe on the deck of the Dockwise heavy-lift ship *Swan* in Watsons Bay, Sydney Harbour (below)
(All photographs by John Jeremy)

By mid afternoon, the damage to *Nottingham* became visible. The keel was set-up to about the gun mounting, and the starboard shell was crushed and split both forward and aft of the shore tower. About 1530, 22 October (above)

Safe onboard *Swan* at about 1600, 22 October (above)

Nottingham was docked on a low timber cradle. At Garden Island steel shoring was added to secure the ship for the passage to England (below)

NAVAL SHIPBUILDING AND REPAIR SECTOR STRATEGIC PLAN

As reported on page 15, the Department of Defence strategic plan for the naval shipbuilding and ship repair industry was released on 29 August 2002. It is currently being considered by the Government. The Executive Summary of the plan is reproduced below. The full document can be obtained from www.defence.gov.au/dmo.

INTRODUCTION

The Naval Shipbuilding and Repair (NSR) sector of the economy has key strategic importance to Australia. Our self-reliant defence cannot be assured unless the capabilities exist in Australian industry to maintain, modify, upgrade and repair our warships. And as the facilities, equipment and skills needed to build new warships could be vitally important if our strategic circumstances were to deteriorate, these are important long-term strategic assets.

The NSR sector, however, faces major challenges in the years ahead. Australia is emerging from a period of historically high naval shipbuilding activity, dominated by construction of vessels that have been substantially adapted to meet Australia's specific operating requirements. These high activity levels have been driven largely by the ANZAC frigate and Collins submarine projects — both of which have been atypically large, by Australian standards, in terms of value, numbers of vessels and complexity of technologies. These technologies are now embodied in a naval fleet, the bulk of which was built fairly recently.

However, the future looks very different. The average level of shipbuilding activity, even including major upgrades to the existing contingent of FFG-class vessels and future builds of air warfare destroyers and large amphibious and support vessels, is going to be well below that of the recent past.

The level of Defence's demand for warship construction during the next fifteen years will be only half that of the last fifteen years. Defence spending on major naval projects over the period will total only about $6 billion, compared to $12 billion in the last decade and a half. Industry restructuring and consolidation is inevitable.

This presents a major risk to Australia's defence self-reliance. The Plan argues that if restructuring is left solely to industry, either through purely commercial consolidation or simple attrition, the NSR sector is likely to lose technical skills and manufacturing capabilities that are strategically important. There is also a risk that Defence's access to important foreign technology might be diminished, and Navy's capability along with it.

How Defence responds to this challenge is critical. The response proposed in this Plan takes account of:

a. lessons learnt over the recent history of the Collins-class submarines, ANZAC frigates and other major vessel build programs;

b. a clear need to adapt to a future in which the nature and intensity of build programs will be very different from the recent pattern — to ensure that these programs remain consistent with budgets and that there is continued access to the key skills, knowledge and facilities that are a crucial part of Australia's naval capability;

c. an increasing emphasis in Defence planning and business processes on valuing — as an integral part of Australia's defence capability — flexibility for timely and cost effective adaptation of requirements to better match emerging threats or changes in available technologies;

d. the need to ensure that naval shipbuilding and repair needs over the next ten to fifteen years are achievable and affordable; and

e. the need to determine the future of the Australian Submarine Corporation in a manner that ensures the sustainment of Australia's submarine capability.

This is the context in which the Naval Shipbuilding and Repair Sector Strategic Plan has been prepared. The Plan is in three main parts:

a. **Section 1 ("Setting the Scene")** outlines the structure of the NSR sector, Navy's capability requirements in the years ahead, and the advantages and disadvantages of local versus overseas construction, upgrade and repair of Navy's warships.

b. **Section 2 ("Defining the Problems")** reviews the main problems associated with past procurement strategies, and defines the skill-sets that Defence needs. In particular, it analyses future supply and demand issues and their implications for the way in which the NSR sector might be restructured.

c. **Section 3 ("A New Way of Doing Business")** considers the benefits and costs of a solesource NSR environment, and the contracting and other management arrangements that might be made to protect Defence interests in those circumstances.

SECTION 1: SETTING THE SCENE

Three broad options exist for building Navy's surface ships and submarines – offshore procurement; offshore hull construction with local fit-out; and local construction. Local construction offers a number of capability and economic benefits over the alternatives. As well as being advantageous for shipbuilding, in-country construction also enhances industry's ability to conduct major upgrades and complex repair and maintenance tasks. There is a very strong strategic case for doing this work in Australia.

Projects SEA 4000 (Air Warfare Destroyers), JP 2027 and JP2048 (Amphibious Transport Ships) and SEA 1654 (Afloat Replenishment Ships) are the main naval construction projects scheduled in the Defence Capability Plan. Other planned

work consists of upgrades and modifications to Navy's major surface ships and routine repair and maintenance work. An experienced and capable workforce with specialised skills needs to be retained in industry to deliver this work.

As noted above, the level of expenditure over the next fifteen years will be only half that of the last fifteen years. In addition, there are some lengthy intervals between the various projects, so it will be particularly difficult for some firms in the NSR sector to survive in this period.

However, falling demand is only half of the picture. The other significant factor that will affect the sector's future is how demand was managed in the past.

The NSR sector is a monopsonistic market – Defence is the only customer to speak of. More than any other defence industry sector, therefore, the NSR sector exemplifies the problems that have arisen from the project-by-project approach that Defence has traditionally taken to major equipment acquisition, where little attempt has been made to use demand to strategically shape and sustain industry capabilities.

In October 2001, the legacy of these problems prompted the Government to endorse, in principle, a move to a more strategic approach to acquisition. The recent history of naval shipbuilding is a case in point. Over the last fifteen years, six major naval projects have been undertaken. The contracts were awarded to five different companies based in five separate locations.

Taken together, these two factors guarantee that the sector as it stands is unsustainable, and that its capabilities and skills are at risk of being lost. Some of these critical skill-sets, especially but not solely in relation to the submarines, are in short supply internationally. This makes skill retention without adequacy of workflow a major challenge that may not even be solvable through practically feasible levels of increase in remuneration; these skilled personnel commonly seek satisfying work that places demands on their capabilities.

The risk of skills loss is greatest in the Australian Submarine Corporation (ASC). ASC's future is crucially important because the company's facilities and many of the skills in its workforce are essential to provision of through- life support to the Collins submarines. The projected Defence workload for ASC is insufficient, however, to keep the workforce intact. This suggests that it might not be in the national interest to seek to maximise the return on the ASC investment in isolation from the rest of the sector. There may be greater value in integrating ASC into the sector to take advantage of these possible synergies. Ideally, the proposed privatisation of ASC would be the catalyst and focal point for the restructuring of the NSR sector.

SECTION 2: DEFINING THE PROBLEMS

This section draws together the key issues faced in the sector. These include the conclusions to be drawn from a detailed analysis of supply and demand, and consequences for risk and cost of project-by-project competition, particularly in the context of reduced demand.

Demand and Supply

The skill-sets that Defence wants to preserve in the NSR sector are of two main types. They are "high-end" shipbuilding activities, such as systems engineering and platform integration; and production activities like metal fabrication and equipment installation. The high-end skills are often naval-specific and are possessed by few firms in the NSR sector. The production skills are equally important to Navy, although most can be found elsewhere in the economy. A key concern for Defence, however, is that the two types of skill need to be collocated in order to mitigate the risks inherent in major naval projects.

Estimates have been made in the Plan of the numbers of people needed with each of the skill-sets in a restructured NSR sector. Two sets of estimates have therefore been made of the number of people with the skill-sets needed to sustain Navy's projected shipbuilding and repair activities. Predictably, the personnel numbers required in the two-shipbuilder entity scenario are much greater — and therefore more difficult to sustain — than in the single-entity model.

Estimates have also been made in the Plan of employment, infrastructure and other costs associated with meeting Defence demand in the next fifteen years, under a range of other industry models considered to be credible restructuring options for the NSR sector.

Detailed analyses have been made of industry supply and demand, under three different industry structural models which are considered credible by key industry and government stakeholders, and have been validated by ACIL Consulting. The three models are:

a. Model A. In this case, a single shipbuilding entity would be operating under a sole source arrangement managed jointly with Defence as customer.

b. Model B. This assumes two shipbuilding entities in the sector, with major naval projects being allocated between them.

c. Model C. This would be an industry structure that commenced with two shipbuilding entities competing for the first project, with others exiting the sector through attrition and the advantages that would accrue to the winner of the first major project.

The central conclusion is that future demand is sufficient to sustain only one shipbuilder, and that the single shipbuilding entity model provides the only feasible structural arrangement to meet Navy's new construction capability requirements.

This is not a fine judgement – the revenue gap is very substantially greater than the probable margin of error. Future demand levels will almost guarantee the emergence of a natural monopoly. This accords with the consistent view of industry. Assumptions that past practice will suffice, or that industry will continue substantially as is, are not borne out by an objective and rigorous quantitative analysis of projected project expenditure, which is dramatically lower than in recent history.

The analyses also indicate that there will be sufficient Defence demand to sustain only a single ship repairer on the East and West Coasts, with perhaps some possibility for a second repairer on the East Coast.

How to Respond?

They key question that then arises is, what should the response be? There are two alternatives — take a "hands off" approach and deal with what emerges, or influence the transition to reduce the risks and exploit the benefits as has been done by other national governments.

If the industry was allowed to consolidate itself, either commercially or by attrition, several major risks would arise. First, there would be a significant risk of loss of key skills and capabilities. Second, Defence would, in effect, be presented with a monopoly with which to then negotiate terms for future acquisitions. Finally, changes to ownership would risk prejudicing Defence's access to the sensitive worldwide technology it requires.

The alternative is for Defence to influence the market response by using its monopsony power. It would be open to Defence to exploit the leverage associated with offering future work on a long-term multi-project basis, in a structured and transparent process of engagement with industry, to drive the commercial, governance and ownership measures which would establish a viable, competent and cost-effective supplier.

This is the approach favoured in the Plan. Careful management of the transition process to a single shipbuilder will, however, be needed if Defence's requirements of the NSR sector are to be met, the benefits from industry rationalisation captured, and the risks and costs minimised.

Benefits and Risks

There are benefits inherent in a single supplier, particularly in the context of reduced demand. These include:

a. with fewer builds of smaller classes (two and three ships per class compared to six and eight in recent history), size economies and learning curve savings are available only across a multi-project build;

b. project-specific ramp-up, wind down and tendering costs are avoided;

c. increased ability to deliver common equipment, systems and processes across the builds thereby reducing through-life support costs;

d. infrastructure investment can be amortised over more units and longer time; and

e. more flexible contractual arrangements, with less inherent risk of cost and schedule overruns, can be employed (see below).

The key risk is that a single shipbuilding entity might have such market power that it refused to pass on to Defence the cost-reduction benefits that it should receive from the new industry structure. As a monopsonistic purchaser, however, Defence should be able to exercise adequate countervailing power, particularly if it is used up front to set the commercial framework for future work. In this context, it is important to note that 70% to 80% of the project cost would continue to be competitively subcontracted.

Tendering and Inflexible Contract Structures

Over the last decade it has become evident that the procurement strategy normally used by Defence has not always delivered the best value-for-money outcomes. In each project, a prime contractor has usually been selected through an open tendering process, and awarded a fixed-price contract to supply the capability.

This has encouraged tenderers to under-bid, downplay risk and offer unachievable schedules. Profit margins then tend to be recovered as detailed production specifications emerge as contract variations. This procurement strategy also tends to produce an adversarial relationship, rather than a close partnership between Defence and its contractors.

This carries through to variations that arise during the life of the contracts, reflecting changing Defence needs or new technologies. The result is a contract structure with strong penalties against the exercise of innovation and flexibility during the life of the contract — even though such flexibility is central to effective defence capability. It may also discriminate against bids that in fact offer greater through-life value.

A single shipbuilding supplier offers the opportunity for detailed specifications to be developed with the prime contractor and then contracted for delivery, rather than developed after contract award. This would enable informed cost/capability trade-offs in design and reduce the risk of cost and schedule overruns.

SECTION 3: A NEW WAY OF DOING BUSINESS

The Plan concludes that, in principle, a move to a sole-source environment could provide net benefits to Defence. But in order for Defence to derive maximum value from the opportunities that exist, it will be important for a strong alliance relationship to be formed between Defence and the sole-source supplier.

That relationship should be underpinned by a "strategic alliance" between the parties. The governing body of the strategic alliance would oversee "project alliances" and these in turn would manage the sub-contractors responsible for conducting

the various construction, upgrade, and repair and maintenance work.

The preferred model for this arrangement is one in which the shipbuilding entity would contract with Defence for the provision of all major shipbuilding programs and related through-life support. The facilities and capabilities of ASC would form part of the entity, but otherwise there would not be a high degree of vertical integration in it. The entity would therefore sub-contract with local and overseas suppliers to provide components for the procurement. New contractual arrangements would need to be established to achieve value for money during the life of the arrangement. As well as a strategic alliance contract between Defence and the alliance entity, separate contracts would be negotiated for each project. Effective mechanisms to drive performance and value for money at the project level will be important. These would include:

a. hard targets with incentives and penalties (similar to the UK's Target Cost Incentive Fee approach for the Type 45 destroyer);

b. benchmarking of costs against national and international experience;

c. maximising the work that is competitively subcontracted; and

d. providing the customer with greater influence over choice or retention of subcontractors.

The ownership, governance and operating arrangements for the alliance entity will also be key to its success. As for ownership, there are advantages in having diversity, so as to preclude any one group gaining a controlling interest. Defence is not envisaged as holding any interest, but its consent may be required for the issue and transfer of shares in the entity. This would assume that, among other things, ownership would not change so as to prejudice access to technology.

Operational arrangements need to enable Defence to have visibility of the entity's operation and management without constraining day to day activities. These arrangements should be simple to implement. Mechanisms to enforce the agreed ownership, governance and operating arrangements will also be necessary and can be made part of the contractual regime.

Ship Repair and Maintenance

A viable and efficient naval upgrade, repair and maintenance capability is an essential component of self-reliance as a defence force and nation. While ships may be able to be built overseas, there is no practical alternative to conducting repair and maintenance of the fleet in Australia.

There is a strong connection between the capabilities and skills required for naval shipbuilding and upgrade, repair and maintenance. For example the skills that have been built up during the construction of Collins and ANZAC vessels are essential to the whole-of-life support of those platforms and cannot be easily replaced.

The Naval upgrade, repair and maintenance sector is a monopsony with Defence the sole purchaser. Supply is spread across a number of companies predominantly located around the two fleet bases in New South Wales and Western Australia. Competition is one of the primary strategies used by Defence to achieve value for money and constrain the costs of repair and maintenance. Contracts for work are placed on a 'project by project' basis with price, as well as industry capability, a primary determinant of the successful tenderer. In this environment there has been a steady reduction in individual company capabilities and investment in the sector as greater competition has been introduced.

Analysis suggests that, like shipbuilding, revenue from repair work may be insufficient to support more than one cost-effective repairer on each coast, although there may be work for two on the east coast. The current arrangement of multiple repairers is not sustainable and is not likely, in any event, to be cost-effective.

A range of opportunities that may improve the current conduct of repair and maintenance has been identified. These centre around the possibility of a new business model to maximise the benefits of long-term contracting arrangements and provide the certainty for companies to reinvest in the sector and critical skills base. This approach could recognise and address under-utilisation of resources (especially where the fixed costs or overheads are already being paid for by Defence) and provide a sound basis for the value-for-money outcomes required by Defence for the long term.

There are imperatives to pursue these opportunities in the short term, independent of the Sector Plan. However, the future conduct of repair and maintenance should be integrated into the alliance framework as soon as practicable after establishment of the Naval Shipbuilding Alliance Entity.

Small to Medium Enterprises

Several other issues of importance to Defence arise from movement to an alliance entity framework in the NSR sector. These include the implications that it might have for small to medium enterprises (SMEs), which are often a significant source of technology, innovation and skills. On balance, the proposed new structure should be of benefit to the SMEs, by offering them the possibility of forming longer-term sub-alliance relationships, and because the incentive structure in the new contracting framework will favour use of efficient and capable SMEs over less efficient in-house alternatives.

Workforce

Advantages should also emerge for workforce skill-sets development and sustainment. The long-term business and investment horizon under the proposed arrangements will far better enable the alliance entity to invest in long-term training programs than most firms are able to afford at present.

Research and Development

Benefits should be obtained in research and development for the same reason. A long-term R&D investment plan will need to be prepared by the alliance entity as part of its strategic planning. This would be likely to embrace participation by SMEs, universities and cooperative research centres as well as support from DSTO. The benefits from this for innovation would add to the value-for-money gains derived from the new sector structure.

Exports

A further potential benefit from a rationalised NSR sector is the increased likelihood of higher levels of defence exports. While export activity would be essentially a commercial decision for the alliance entity to make, there would be advantages to defence and the broader economy if it occurs. The market power and low cost base of an Australian sole-source supplier would give it better prospects for overseas sales than NSR enterprises have had to date.

The Economic Life of Warships

The final part of the Plan notes that the quantum and timing of Defence's demand for naval shipbuilding and repair have significant implications for the sustainability of industry capabilities and skill-sets. The problems caused by the unevenness of the provisional build program were highlighted in Section1 of the NSR Sector Strategic Plan. Demand management issues will require close attention in future.

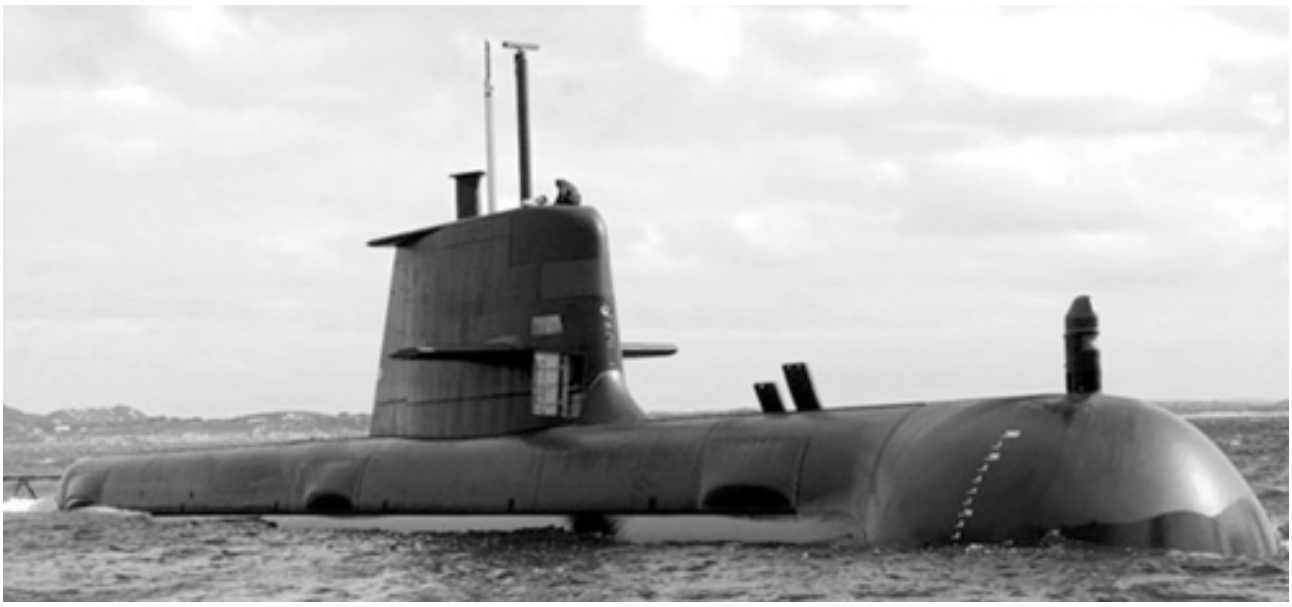
There may be substantial scope for reducing industry (and hence Defence's) costs through modest modification to its pattern of demand. Industry costs, and necessary levels of capability in key skill and infrastructure areas, are heavily influenced by peak demands. Were there scope for smoothing the demand profile to lower the peaks and raise some of the troughs, the benefits may be substantial, conceivably including increases in the value of the capability that is delivered. This could flow from changes as simple as modified timing of delivery schedules through to a more fundamental change to the age at which vessels are replaced.

Navy's future construction demand would ideally be managed in such a way that it contributes to a sustainable and efficient NSR sector. Changes could be made to capability planning processes, construction strategies and financing arrangements that would help to smooth out demand, and give the NSR sector improved prospects of sustaining its capabilities and skills.

Capability planning is not at present informed by awareness of shortfalls in industry demand. The fragmented industry base and the project-by-project approach that has been taken to acquisition have both contributed to this. A single entity in the NSR sector will be better placed to have practical considerations factored into the timing of acquisition decisions.

Varying the length of ships' in-service lives may also have effects on the sustainability of industry skills, and may have cost benefits for Defence. Recent Defence analysis indicates that the current strategy of replacing naval ships only after their designed hull lives have expired (about 30 years) delivers the worst annualised value, and that replacement after 20 years would achieve optimal annuity value — largely by dispensing with the need for expensive mid-life upgrades, and imposing a regime of more regular system upgrades. Theoretically, a shorter in-service life would allow for a more continuous build and replacement cycle, and a net cost/capability benefit for Defence. Innovative financing arrangements might achieve such outcomes.

Although Australia may not have the scale to implement a continuous-build strategy based on individual ship classes, the analysis suggests that if one considers the current mixed class combatant force of 14 ships as a whole, it may be feasible for Australia to adopt a rolling build program in relation to major naval surface combatants.



The sixth, and last, of the Collins-class submarines to be built in Adelaide, *Rankin*, recently arrived in Western Australia for a comprehensive programme of sea trials
(RAN Photograph)

Regulatory Reform in the Australian Domestic Industry

Mori Flapan
National Marine Safety Committee Secretariat

INTRODUCTION

Most people would say that Australia has a satisfactory record for maritime safety by world standards. However, there can be no room for complacency. Studies have shown that, in past years, the fishing industry has had one of the highest rates of fatal injury of any working group in Australia [1]. Also, though fortunately very infrequent, any incident involving large numbers of fatalities can have social, political and economic consequences that go far beyond the consequences of the event to those directly involved. Australia must maintain an effective system of safety regulation that can meet community expectations for safety.

Australia's system for the safety regulation of domestic commercial vessels presents special challenges not faced by other nations. Regulation is by a number of independent sovereign Governments. The strong commitment that each sovereign State, Territory or Federal body has to ensuring safety measured by its own legislation, standards, policies and processes can give rise to conflicts if there are differing philosophies, objectives and perceptions of appropriate risk control measures. These conflicts and the resultant lack of confidence that they bring create barriers to the movement of vessels and personnel giving rise to costs, frustrations and delays.

ONE NATION — EIGHT SYSTEMS

As already mentioned, the safety of commercial vessels in Australia is not the responsibility of a single Australian government. It is regulated by one of eight governments, depending upon whether the vessel operates internationally, interstate or intrastate and whether it is engaged in trading or fishing operations, see Table 1.

The reason for this split in jurisdiction goes back to Australia's colonial past when Australia was occupied by a number of separate British colonies. These colonies formed a federation of States and with it a Federal Government with specific powers granted to it by the Constitution [2]. The Australian Constitution makes the Federal Government responsible for international shipping and for interstate trading vessels. Residual powers for all shipping not specifically dealt with by the Constitution was retained by the individual State Governments.

The multi-jurisdictional arrangements that were instituted by the Australian Constitution in 1901 are still in place today, making Australia unique amongst nations in its arrangements for the safety regulation of shipping. The closest parallel is the European Union where separate sovereign nations have come together to gain the benefits of co-operative effort and standardization. But even here, the member nations have agreed to the establishment of a single European Maritime Safety Agency to oversee implimentation of European Community Legislation [3].

The multi-jurisdictional nature of marine safety regulation within Australia has brought with it challenges normally reserved for the international arena. At the international level, the boundaries between sovereign nations give rise to issues of mutual recognition and uniformity. Likewise, at the domestic level, the boundaries between sovereign Australian States and Territories have given rise to similar issues of mutual recognition and national uniformity.

Table 1 — Responsibility for Marine Safety

	Type of operation		
	International	Interstate	Intrastate
Trading vessels	Federal government	Federal government	State/Territory governments
Fishing vessels	Federal government	State/Territory governments	State/Territory governments

CHANGES IN SAFETY CONCEPTS AND REGIMES SINCE 1901

The 20th Century has seen major changes in safety standards applicable to vessels. Standards at the beginning of the last century were relatively simple and based on the UK Board of Trade requirements that were mainly applicable to larger vessels or passenger vessels. Since then, a number of significant events have impacted on standards applicable to vessels internationally and in Australia, see Table 2.

The 20th century also saw the introduction and then widespread use of liquid fuel and internal combustion engines, the introduction aluminium and fibre-reinforced plastics and the development of high speed craft as well as many other specialized vessel types.

Table 2 — Some 20th century events that have shaped marine safety regulation

1912 the loss of the Titanic
1914 the first Safety of Life at Sea (SOLAS) regulations
1929 revised SOLAS regulations
1934 the loss of the Coramba (mandatory carriage of radios)
1938 the capsize of the ferry Rodney
1960 revised SOLAS regulations
1966 Load-line convention
1972 the capsize of the cargo ship Blythe Star
1987 the capsize of the Herald of Free Enterprise
1993 the loss of the Estonia
1993 Adoption of ISM Code by SOLAS

Over the same period of time, public expectations of safety have also changed. The number of lives and vessels that were lost on the Australian coast at the turn of the 20th Century would be totally unacceptable today. Recent years have seen the development of holistic approaches to safety as characterised by Robens-style Occupational Health and Safety legislation [4].

All these factors have meant that the safety outcomes that were in place in 1901 when Australia became a federation are very different from those applicable today. Yet in many ways, the safety regimes that achieve these outcomes have not changed greatly.

As the scope and complexity of marine legislation and standards grew, issues of mutual recognition became more apparent. Each of the Australian jurisdictions developed legislation and standards applicable to domestic vessels in

relative isolation from that of the other jurisdictions.

THE UNIFORM SHIPPING LAWS CODE

By the late 1950s, it was apparent that the plethora of differing standards applicable to domestic commercial vessels in Australia was a barrier to the mutual recognition of vessels. A first attempt to address the problem in the late 1960s was the development of the 'Model Code' by the MSB of NSW. Standards were developed for structure and stability but they were not widely implemented, with apparently only one state (NSW) actually applying the Model Code.

In 1971 arrangements were put in place to develop the Uniform Shipping Laws Code [5]. Assisted by a secretariat, the Australian marine authorities contributed resources to develop a set of uniform marine safety standards over a nine-year period.

The USL Code was based on standards obtained from a wide range of sources including SOLAS, the US Federal Code of Regulations, classification society rules, the Model Code, standards previously used by individual states, and standards developed from original work contained in technical papers. These standards were adapted to the particular Australian context to reflect past experience and an assessment of the capacity of the domestic industry at that time to accommodate what was, in effect, a raising of standards in some jurisdictions.

When first published in 1979, the USL Code was a significant achievement. Not only did it represent a consensus between the many views of the various jurisdictions, but it also provided for what were then a number of important new technologies that were coming into the domestic commercial vessel industry. Standards were specified for aluminium, fibreglass and ferro-cement construction. Standards were provided that were applicable to small- to moderate-sized, high-capacity passenger-carrying charter vessels with or without sails. It has been said that the recognition of these new technologies within the USL Code may have played at least some small part in the subsequent establishment of Australia as an innovator in the design of commercial vessels including the development of catamarans and high speed craft.

However, the publishing of the USL Code did not mean its immediate adoption. Some States were quick to adopt the USL Code in their legislation. For others, it would be over a decade before the USL Code would be explicitly picked up by legislation. Notwithstanding these delays, the USL Code was hailed as a significant improvement in the mutual recognition of vessels.

THE THOMPSON CLARKE REPORT

In 1995, the Australian Transport Council commissioned the Thompson Clarke report [6] to review marine safety in Australia. The review noted in its terms of reference that current maritime safety regulatory and operational arrangements (including those for commercial vessel safety) lacked an overall national approach.

Given that the USL Code was intended to provide a uniform standard, why was such a review necessary? It would appear that the introduction of the USL Code seventeen years before had not been sufficient in itself to overcome the problems of uniformity and mutual recognition.

The Thompson Clarke report identified a number of reasons for this, including

(a) Different perceptions among regulators of their specific role. No uniform statement of the rationale for government involvement in commercial vessel safety.
(b) Differences in the manner and extent to which the USL Code had been picked up by the enabling legislation of the various states and the Northern Territory.
(c) Modifications of standards by jurisidictions to provide for perceived regional requirements to meet particular operational needs including geographical and climatic variations. Most jurisdictions selectively ignore some Code requirements and, in some cases, they impose requirements outside the Code.
(d) Differences in interpretation and application of the USL Code, not only between jurisdictions but in some cases within a jurisdiction.
(e) No mutually-accepted practice for assessing and approving proposed new technology or operations, in a manner which would lead directly to full acceptance and recognition of the outcomes in a timely manner.
(f) The USL Code has become out of date, at least for certain types of vessels or in specific aspects of vessel design. The review processes of the USL Code had failed to keep pace with modern technology and had not addressed perceived problems of application of the Code. The review processes were cumbersome, tended to be based on big-ship practice and failed to take into account industry views.
(g) Insufficient use of risk management techniques and a lack of agreement for mutual recognition of the outcomes when such techniques are applied.
(h) Insufficient resources in the regulatory administrations. There is an evident connection between the general resource levels and observed difficulties in addressing problems within the USL Code.
(i) No common approach to training and practice in the survey field.
(j) Partial lack of a sense of common purpose amoung the staff of the various marine authorities.

It should be noted that some of the reasons pertain directly to the USL Code itself, but many were beyond the scope of the Code. The report stated:

"Many in industry with fairly conventional operating requirements saw the USL Code itself as working reasonably well, despite gaps in coverage and implementation, and delays in updating requirements. These interests saw the Code filling a niche not adequately covered by Commonwealth Navigation Act standards, ship classification society rules, or any specific Australian or international standards."

Thus the USL Code went part of the way toward achieving its objectives, but could not deliver all that was needed.

THE MARINE SAFETY STRATEGY

In response to the Thompson Clarke report, the Australian Transport Council (ATC) drafted a Marine Safety Strategy. The National Marine Safety Committee (NMSC) was established under an Intergovernmental Agreement (IGA) [7] to promote a uniform national approach to marine safety in Australia.

The NMSC subsequently prepared a final version of the National Marine Safety Strategy [8], which was endorsed by ATC. The Strategy, as published in 1998, identified a number of strategic actions necessary to achieve and sustain a uniform national approach to marine safety. The Strategy and IGA set the framework for the reforms to achieve uniformity and mutual recognition.

The issues applicable to commercial vessel safety can be grouped as outcome-driven and process-driven. Outcome driven issues pertain to 'what is to be achieved'. Process-driven issues pertain to 'how to achieve the agreed outcomes'. There are three main elements that determine outcome and process: legislation, standards and administration. The interrelationship between these is illustrated in Figure 1. Legislation specifies the outcomes required, either directly or by calling up specific standards. Legislation also puts in place the processes to achieve those outcomes and specifies penalties for non-compliance.

The standard specifies safety outcomes, solutions to provide those safety outcomes and the methods for determining equivalent solutions. Administration sets in place a series of processes needed for achieving the required outcomes. If the standards are acceptable across all jurisdictions and the outcomes of the process meet the outcomes envisaged in the standards, then mutual recognition will be facilitated.

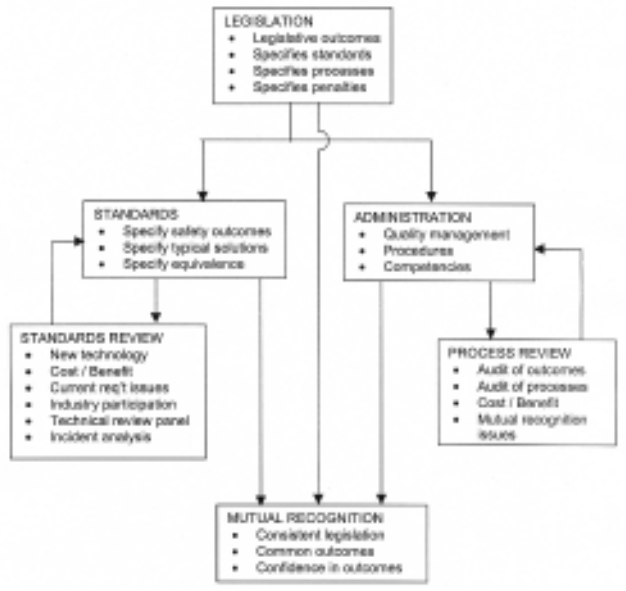


Figure 1—Flowchart of key elements for mutual recognition

Looking at the above model gives an insight as to why the USL Code failed to achieve the objective of uniformity and mutual recognition. It addressed only some aspects of the system. Legislation and administration were left largely unaddressed. While the USL Code did incorporate some quasi-legislative and process clauses in an attempt to fill the gap, these were frequently ignored when they came in conflict with enabling legislation or administrative policies. In fact, conflicts with legislation were sometimes cited as the very reason why the USL Code was not adopted in full by the enabling legislation.

LEGISLATIVE REFORM

The enabling legislation establishes both the applicable standards and the required processes. Legislation that is compatible in objectives and outputs amongst the various jurisdictions is fundamental to achieving uniformity and mutual recognition.

The Intergovernmental Agreement (IGA) between the States and Territories set out the following goals and guiding principles pertaining to legislation:

(a) Legislation is made and continues to be made in a timely and consistent or uniform manner throughout Australia.

(b) Legislation and marine safety standards comply with the "Principles and Guidelines for National Standards Setting Bodies and Regulatory Action by Ministerial Councils and Standards Setting Bodies" [9] endorsed by the Council of Australian Governments.

(c) Changes in the legislation are proposed for consideration by the Parties from time to time and amendments are promptly and consistently made as the need for reform arises.

The Marine Safety Strategy requires the NMSC to develop and implement model legislation in a timely and consistent manner that enables the adoption of common or uniform standards and enhances mutual recognition.

The Thompson Clarke report noted:

".. a divergence in legislative drafting practice exists which can only be described as difficult for administrators and baffling to many lay users."

An example of the barriers to uniformity and mutual recognition brought about through legislation is as follows: in some jurisdictions, the USL Code is adopted in full, in others it is adopted partially or as modified by the legislation, while in at least one jurisdiction, it is just one of a number of standards that could be applied.

Similarly, problems of mutual recognition are exacerbated by differences in the meaning of a Certificate of Survey within the legislative provisions of the different jurisdictions.

In NSW, the current Commercial Vessels Act [10] requires the surveyor to ascertain whether:

"...the vessel is, or will be, designed, constructed and equipped to the satisfaction of the Minister and in conformity with any law applicable to the vessel."

The new NSW Marine Safety Act [11] which is yet to be promulgated states:

"A survey certificate is not to be granted for a vessel unless the Minister is satisfied that the vessel complies with relevant requirements as to design, construction and equipment and that the vessel is safe to operate."

In Queensland, the Transport Operations Regulations [12] require that:

"A certificate of compliance for a ship, or part of a ship, must include the appropriate declaration stated in Schedule 1 about the seaworthiness of the ship or part."

The WA Marine Act Regulations [13] state:

"Upon receiving a satisfactory report from each surveyor performing the initial survey of a vessel, the Chief Executive Officer shall prepare a Certificate of Survey …"

What constitutes a satisfactory report is not expressly defined in the WA Act; however, compliance with the USL Code as modified by the regulations is implied.

As a first step in reforming the marine legislation applicable to commercial vessels, the NMSC published a protocol for mutual recognition [14] to serve as an interim measure while more substantive measures were being implemented. This protocol operates under the current legislative regimes. It is intended to streamline administrative process within the limits imposed by current legislative requirements. A pilot study on mutual recognition is currently underway to review the effectiveness of these arrangements and to determine the nature and extent of issues that need to be addressed in legislation and administrative process.

The NMSC commenced the review of legislation by considering five different approaches for achieving uniform legislation. These are;

1. Model Legislation

A model of the legislation is used for drafting the legislation in each jurisdiction. Each State and Territory Parliament and the Commonwealth Parliament, if applicable, then enacts the legislation. Amendments to the legislation are made in each Parliament in the normal way. This method is consistent with maintaining the sovereignty of each Parliament as the legislation only has effect in a jurisdiction if enacted by the Parliament of that jurisdiction. However it has the disadvantage that it is sometimes difficult to maintain uniformity under this method either because the "model" legislation is varied when originally enacted or amendments agreed to later may not be enacted.

2. Template Legislation

Template legislation is a law enacted as the law of one State or Territory and then adopted as the law by the Parliaments of all other States and Territories. A Ministerial Council may agree to amendments to the originally-enacted law, and an intergovernmental agreement may provide that the approval of a Ministerial Council is required before amendments can be made. An amendment to the originally-enacted law usually applies automatically in each other State and Territory. Its advantage is that it provides a tight system as the law in a State or Territory will remain the same as the enacted template legislation without any action required by their Parliaments. Its disadvantage is that, with the exception of the State or Territory that passed the legislation, this method does not allow the full Parliamentary process to operate as the substantive and any amending legislation is not before the Parliament. It is seen as a surrender of jurisdiction sovereignty to the Parliament of the home of the template legislation, or to the sponsoring Ministerial Council.

3. Reference of Power

Under the Australian Constitution, the States may refer their power to the Commonwealth. The Commonwealth Parliament then enacts a law that overrides inconsistent State laws. Amendments to the legislation can only be enacted by the Commonwealth Parliament subject to the referred power being wide enough to support the amendment. The advantage of this method is that it provides a tight model, as the Commonwealth becomes the only legislating body. However, it results in a significant surrender of jurisdiction sovereignty by the States and Territories. There is doubt as to whether powers, once referred, can be reclaimed. While the reference of power is in force, States are powerless to vary the Commonwealth law. All existing State law which is inconsistent with the Commonwealth law is inoperative, and States cannot enact new legislation that is inconsistent with the Commonwealth law.

4. Mirror Legislation

Mirror legislation is legislation enacted by the States and the Commonwealth in identical terms. It tends to be used where there is uncertainty on whether the law may be enacted by the States or the Commonwealth because of the questions of legislative power. The advantages and disadvantages are the same as those for "model legislation" except that it has the benefit of achieving greater uniformity initially than model legislation, and the disadvantage that the mirror legislation may not fit the specific conventions of legislative style and terminology used by each jurisdiction.

5. Model Provisions

This involves the development of a series of model clauses that would facilitate the consistent adoption of respective sections of the USL Code as they are progressively reviewed. The model provisions usually comprise a list of core model provisions that all jurisdictions must agree to pick up, and a list of non-core model provisions that jurisdictions may modify when they pick them up so long as the desired national outcome is still achieved. The advantage of model provisions is that a complete act or regulation does not need to be drafted. The model provisions allow for amendments to existing legislation, and are introduced by each jurisdiction using its own legislative processes. The disadvantage of the model provision approach is that the provisions could be varied by a jurisdiction when introduced. In addition, the provisions may not be enacted by all jurisdictions.

The NMSC has decided to apply the "Model Provisions" approach to its work in reforming marine legislation. A project is currently underway to prepare drafting instructions for drafting the model provisions that will incorporate the first sections of the revised standards for commercial vessels.

STANDARDS REFORM

The current safety standards for Australian domestic commercial vessels are embodied in the USL Code.

The Marine Safety Strategy identified a number of strategic actions applicable to standards reform that included:

(a) Develop and promulgate standards based on recognised and approved national and international standards for the design and construction of vessels.
(b) Encourage the development of professional

competence in vessel design, construction and survey.

(c) Introduce and support performance-based standards as an alternative to prescriptive standards.
(d) Establish practices for assessing new technologies or operations in a timely manner and facilitate rapid transfer into standards.
(e) Incorporate OH&S principles into design and construction standards.
(f) Establish standards for crew levels and qualifications.
(g) Encourage the incorporation of OH&S concepts and practices in marine training programs and in determining crew levels of fishing vessels.
(h) Encourage vessel operators to recognise their duty of care to employees and passengers.

The review of the USL Code has been given a high priority in the NMSC's work program. The above-listed strategic actions shape the review of the USL Code and will be reflected in the content and format of the new standards which have been given a new name: the National Standard for Commercial Vessels (NSCV). The NSCV will replace the USL Code as the common national standard for the design, construction, crewing and operation of domestic vessels in Australia.

Note that the Marine Safety Strategy does not give a general mandate to raise safety standards. Any changes to safety standards must be justified on a cost/benefit basis within a Regulatory Impact Statement.

Objectives of the Standard

Discussions with various stakeholders indicated that there were significant differences of opinion as to the actual function of the standards contained in the USL Code. Some felt that compliance with the USL Code provided for "adequate" levels of safety, others felt that it set "minimum required" levels of safety. Inspection of the standards contained in the USL Code clearly shows that they cannot be said to always provide for adequate safety even in normal circumstances, let alone abnormal circumstances. At best, the USL Code addresses certain major risks that tend to be generic across the industry, or at least a sector of the industry. Its clauses provide for "minimum required" levels of safety.

The NSCV will explicitly state that it does not cover every aspect of safety. Any "safety gap" between the standards specified within the NSCV and those required to provide for adequate safety under Occupational Health and Safety Legislation or the general law is the responsibility of the person who has control over the relevant aspect of safety; be they the designer, builder, supplier, owner or operator.

An innovation in the NSCV, relative to the USL Code, is that the key objectives of the document are explicitly stated in the document. These objectives are to:

- Protect the health and safety of persons from hazards arising from the operation of commercial vessels.
- Protect the environment from hazards arising from the operation of commercial vessels in the marine environment.
- Facilitate the transfer of vessels and the recognition of crew qualifications between Australian States and Territories.

The NSCV will promote a uniform national approach to the safety of commercial vessels and the protection of the environment by:

(a) Providing information on the safety obligations and responsibilities of people who design, build and otherwise exercise control over the safety of commercial vessels.
(b) Specifying nationally-agreed minimum-required standards for vessel design, construction and equipment.
(c) Specifying nationally-agreed minimum-required standards for the issue of certificates of competency and
(d) Specifying nationally-agreed minimum-required standards for the operation and crewing of vessels.

The NSCV will comprise six Parts. Table 3 lists the titles of each of these parts and the corresponding sections in the current USL Code. Five of these Parts contain requirements that are mandatory for compliance with the standard.

Table 3—Comparison between the NSCV and USL Code

National Standard for Commercial Vessels (NSCV)			Uniform Shipping Laws (USL) Code
Part A:	Safety Obligations	Informative	New
Part B:	General Requirements	Mandatory	Section 1
Part C:	Design and Construction	Mandatory	Sections 5, 6, 7, 8, 9, 10, 11, 12, 13, 16
Part D:	Crew Competencies	Mandatory	Sections 2, 3
Part E:	Operation	Mandatory	Section 15
Part F:	Special Craft	Mandatory	Section 18, new sections for Fast Craft and Unconventional Craft

Key differences between the USL Code and the NSCV include:

(a) clarification of safety obligations and safety outcomes sought;
(b) incorporation of performance-based approaches as an alternative to prescription;
(c) removal of clauses pertaining to process from the standard;
(d) replacement of Authority discretion by equivalent solutions;
(e) easier to read format, based on styles used for other modern standards; and
(f) updated content and deletion of outdated clauses.

These differences are best put into context by a description of the various Parts of the Standard

Part A

Part A aims to raise the awareness of all parties involved in the design, construction, supply, ownership and operation of commercial vessels to provide for the safety of persons and to work safely. These obligations currently exist under the various State and Territory OH&S Acts and in common law.

Part A does not establish or impose new safety obligations on the industry. It sets out, in general terms, information which describes these existing safety obligations in a form relevant to the commercial vessel industry. Part A is only for guidance and persons should still refer to applicable OH&S and other legislation for details of mandatory requirements.

Part A highlights to the user the wider responsibilities relating to the safety of a commercial vessel which should at all times be considered. It advises that compliance with Parts B to F of the NSCV by itself may not be sufficient to fully discharge these responsibilities, though such compliance should g

long way towards doing so. It reminds users that there is an onus on each party to identify hazards, analyse risks and control risks that are not adequately addressed by the NSCV, taking into account the particular circumstances of the vessel and its operation.

It is important to note that compliance with Part A is not required in order for a Certificate of Survey to be issued for a vessel or a Certificate of Competency to be issued to a person. However, it should discourage the "minimum is maximum" culture that is practiced by some in the industry.

Parts B, C, D and E

Parts B, C, D, E and F will specify minimum required standards for the design, construction, crewing and operation of domestic commercial vessels.

They will contain agreed required outcomes and technical solutions for the issue of certificates of compliance (e.g. Certificates of Survey and Certificates of Competency) by the various Commonwealth, State and Territory marine authorities. Compliance with Parts B, C, D, E and F will be mandatory for compliance with the NSCV and will be mandatory by law when made so by the applicable Commonwealth, State and Territory legislation.

The standards contained in Parts B, C, D, E are intended to control risks that are commonly found on most vessels. However, these standards will not be exhaustive, nor will they replace duty of care responsibilities described in Part A.

Part F

Parts B to E are intended for a wide range of so-called conventional commercial vessels that we see operating in domestic service around Australia. Part F will contain requirements for special craft, i.e. craft for which the conventional requirements in Parts B to E are not properly applicable, at least without some modification. Standards for so-called Fast Craft will be contained in Part F. Requirements for larger seagoing fast craft will be based upon the IMO HSC Code. Requirements for smaller seagoing fast craft and those that operate in sheltered waters are currently under development. A safety case approach will be specified for Novel Craft such as wing-in-ground effect craft (WIGs). Part F will also provide standards for Hire-and-Drive Vessels.

Use of the standard

The NSCV is being written to allow flexibility in application while maintaining consistency. It does this by specifying performance in the form of required outcomes. While the required outcomes are mandatory, the means of satisfying those required outcomes are not fixed. Solutions may be either "deemed to satisfy" prescriptive solutions that are specified within the NSCV or equivalent performance-based solutions that are proposed by the applicant.

Figure 2 illustrates the framework of the NSCV and the options available to users.

Required outcomes

Required outcomes describe the safety outcome that is sought, the "why" behind existing requirements. What is to be achieved? The current USL Code does not generally specify required outcomes. They have largely been reverse-engineered from the current provisions of the USL Code. Compliance with required outcomes is mandatory for compliance with the National Standard. However, the degree of compliance may not be absolute, but rather relative to certain criteria.

"Deemed-to-satisfy" solutions

Deemed-to-satisfy solutions are solutions for controlling risk that are prescribed within the standard. They are deemed to satisfy the required outcomes, i.e. proof of compliance with the required outcomes is not required. Deemed-to-satisfy solutions are largely based on the content of the current USL Code. In the absence of other criteria, the performance of a deemed-to-satisfy solution provides a benchmark for assessing equivalent solutions.

The benefit of adopting a deemed-to-satisfy solution is that there is no onus on the applicant to prove compliance with the corresponding performance standard. The convenience of this option comes at a cost in that flexibility in the solution is limited.

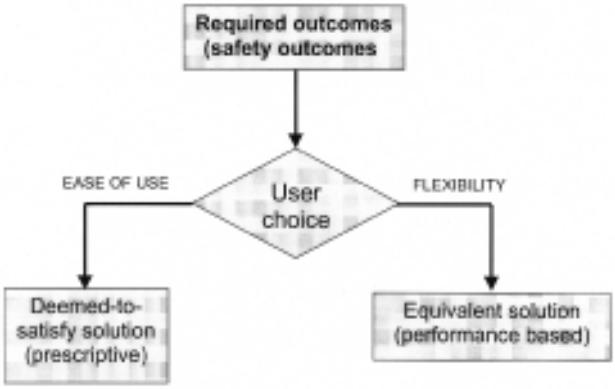


Figure 2—Flowchart for performance-based approach to vessel certification

Equivalent solutions

Equivalent solutions are solutions that achieve the required outcomes by means other than that which is deemed-to-satisfy. An equivalent solution must be proven-to-satisfy the required outcomes, either directly or by showing its performance is at least equivalent to that of the deemed-to-satisfy solution.

The benefit of using an equivalent solution is that it greatly increases the options available for achieving the required outcome, allowing for innovation and the adoption of new technology. However, in adopting an equivalent solution, the applicant must bear the onus *and cost* of proving that the equivalent solution meets the applicable required outcomes.

The deemed-to-satisfy solutions specified within the NSCV provide an integrated safety system that combines a vessel's technical characteristics, operator competencies and safety management procedures to control risk. When formulating an equivalent solution, elements of the safety system must not be altered without considering the potential impact on the effectiveness of the safety system as a whole.

Stakeholder involvement

A key aspect of the NSCV is that it is being developed with significant stakeholder involvement. An Industry Advisory Committee with representatives of major industry sectors provides advise to the NMSC on broad policy issues. Issues papers, workshops and reference groups provide forums for both industry and government to steer and participate in the

direction of the review and drafting of the individual Parts and Sections of the Standard.

A Regulatory Impact Statement (RIS) is prepared that explicitly states the rationale behind the review of each part or section, the changes that have been made, the anticipated effect on stakeholders and the cost/benefit of changes.

Both the draft and the RIS are then offered for public comment for a period of 2 to 3 months. Comments received are reviewed by a reference panel comprising both industry and government representatives, the panel making recommendations to the NMSC for approval. The draft standard and the RIS are then amended in accordance with the NMSC approval. The final draft and RIS then go through a series of approvals which eventually leads to the Council of Ministers (ATC).

Stakeholder involvement is a key element in the review process. The process by which stakeholders participate is not quick and consensus can sometimes be elusive. However, the benefits are that the end result should be documents that all can at least learn to live with, if not love. In order for the process to work, all stakeholders must be prepared to make some compromises, even if it requires an easing of position in the interests of the overall national benefit.

Effect of the new National Standard

The transformation of the USL Code into the NSCV does not signal a revolutionary change in the safety obligations and safety requirements in the commercial vessel industry. A close inspection of the new sections will reveal many familiar clauses, perhaps expressed in a different way and updated to reflect modern practices, but familiar just the same.

Likewise, the concept of performance-based approaches is nothing new. For many years, surveyors have been called upon to consider alternative arrangements under exemption clauses. The main difference will be the focus placed on objective analysis and auditable documentation of the decision to facilitate mutual recognition of a performance-based equivalent solution.

The review of the USL Code is more about changing the way that people think about, interpret and meet their existing safety obligations, rather than changing or adding to those obligations.

The NSCV will provide better opportunities for innovation by focusing on safety outcomes rather than specific prescriptive solutions. It will also provide the vehicle for identifying and achieving those outcomes in an objective and consistent manner to facilitate national consistency and mutual recognition.

Progress to date

The process of reviewing the current USL Code and drafting the NSCV has been the major focus of the NMSC's activities over the last 4 years. Considerable effort has been directed to developing the overall concepts, review processes and style, as well as the painstaking business of finding consensus between stakeholders having a wide range of views and needs.

Work is nearing completion on Part A—Safety obligations, Part B—General Requirements, Part C Section 5—Engineering and Part D—Crewing and Competencies. Work is well advanced on Part C Subsection 7A—Lifesaving equipment and Part F Section 1 Fast Craft. Work has also commenced on Part C Section 4—Fire safety, Part C Subsection 6B—Intact Stability and Part E—Operations.

The first Sections should be published in mid-2002.

ADMINISTRATIVE REFORM

The third leg of the reform process is administrative reform.

The Intergovernmental Agreement (IGA) between the States and Territories set out the following goals and guiding principles pertaining to administration:

(a) Legislation is administered consistently to achieve, at least, an agreed standard of marine safety.
(b) There is a minimum of procedural differences in marine safety administration throughout Australia.
(c) There is mutual recognition of each other's administration of marine safety.

The Marine Safety Strategy requires the NMSC to develop appropriate standards and arrangements (processes) which provide for consistent legislative and operational marine safety practices in all jurisdictions, including national verification and certification.

With regard to administration, the Thompson Clarke report observed:

There is evidence that the political will at government level in all jurisdictions to fully develop integrated administrative arrangements and mutual recognition of outcomes has not yet been absorbed into the maritime safety administrative field.

An important barrier to mutual recognition identified in the Thompson Clarke report, and subsequently acknowledged by the NMSC, is an underlying lack of confidence in the survey arrangements of each others' jurisdictions.

The report noted that the main gaps in uniform adoption of agreed standards relate to areas where there appear to be significant differences of opinion on administrative philosophy, objectives and desired outcomes.

The Thompson Clarke report further observed:

Mutual confidence at the administrative level in the concept of uniformity and mutual recognition has been eroded by a series of non-standard events. There are several recorded cases of technical decisions approved by all Ministers not subsequently being adopted in certain jurisdictions, upgrades of USL standard have in some instances not been applied after adoption, and all jurisdictions can point to significant areas where some others do not apply sections of the USL Code.

The USL Code contains provisions that were intended to reform administrative process. Administrative decisions that varied standards from thoses contained in the USL Code were supposed to be circulated through a Secretariat. This was never fulfilled.

The above indicates that administrative reform is an essential component of any attempt to improve uniformity and mutual recognition.

In particular, administrative functions often determine State or Territory policies (both generic and local), exemptions, local rules, quantity and competence of staff, financial resources and quality.

For example, despite being specified in Section 14 of the current USL Code, methods and approaches to the survey of vessels have varied widely between jurisdictions. Some require full compliance with Section 14, some partial complance with Section 14, some extend the dates for periodic inspections, and at least one permits a degree of self-certification.

The NMSC is considering the possibility of replacing Section 14 of the USL Code with a Standard for the Survey of Commercial Vessels applicable to the jurisdictions. Again, this would likely be outcome, rather than solution-driven, and would probably specify deemed-to-satisfy solutions. The focus would be more on whether the outcomes of the survey process are achieved rather than concentrating on the specific processes that are used (the latter possibly presented as a deemed-to-satisfy solution). Such a standard may include requirements for quality management and external auditing to establish confidence that the safety outcomes implied by the issue of a certificate of compliance are indeed being delivered.

Since the Thompson Clarke report was released, a number of marine authorities have implemented quality management systems to improve the quality of their operations. Western Australia has been accredited to ISO 9002 and the Waterways Authority (NSW) will be seeking accreditation in the near future. Other marine authorities have been actively investigating the possibility of adopting similar quality systems.

Administrative arrangements will be improved by clearer statements of objectives and required outcomes that are to be expressed both in the standards and enabling legislation. Such clarity should require less administrative interpretation.

The NMSC has commenced the publication of National Guidance material to assist both the administrators and those interacting with administrators. Guidelines have been published on the recognition of Australian defence force qualifications [15] as well as other topics pertaining to commercial vessels and recreational boats.

As already mentioned, the NMSC has instituted an administrative protocol for mutual recognition to improve processes as an interim measure while the legislative reform process is underway.

Another administrative reform has been the revamping of the national system for the registration of compliant equipment. The NMSC has instituted a system that incorporates modern requirements for conformity assessement and quality, as well as better addressing product liability issues. The register is now available for ready reference on the internet [16].

CONCLUSIONS

Regulatory reform in the Australian domestic commercial vessel industry requires a multi-pronged approach to achieve its objectives of uniformity and mutual recognition.

The NMSC, guided by the National Marine Safety Strategy, is working toward reform in the three key elements: legislation, standards and administration. In carrying out this work, the NMSC is actively seeking to confer and find consensus between the various stakeholders within the industry.

Significant progress has been made in the reform of applicable standards. Through the provisions of the NSCV, the NMSC seeks to promote a better understanding of existing safety obligations and the underlying safety rationale behind those familiar prescriptive solutions. In a world which is getting more sophisticated and complex, simple prescriptive solutions alone are not able to keep pace with changes in technology. The inclusion of required outcomes in the NSCV better allows for the development of alternative solutions that provide for equivalent safety.

The challenge that is faced in reviewing safety regulation in Australia is to devise a system that delivers appropriate levels of safety and is sufficiently reliable and transparent to promote confidence, uniform to avoid conflicts in safety outcomes, represents consensus between stakeholders to ensure commitment, efficient to be economically sustainable and, at the same time, is consistent with the sovereign power of the various governments involved.

The reform of legislation and administrative processes in particular, is a challenge to the marine authorities, requiring them to balance the issues of sovereignty with those of uniformity. Similarly, parochial issues and long-standing policies have to be balanced against national objectives. The Marine Safety Strategy and the IGA highlight the political will of Government to reform legislation and administrative process. The NMSC is now working to deliver these outcomes.

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Mori Flapan is Technical Advisor on the National Marine Safety Secretariat. This paper was presented at the Pacific 2002 International Maritime Conference in Sydney in February 2002.

Marine Safety 2002 Conference

Brisbane, 6 and 7 August 2002

Conference Report by Bob Dummett

INTRODUCTION

The conference was held in the Brisbane Convention and Exhibition Centre, on the South Bank, and was extremely well attended with over 300 registered delegates.

The conference was linked to the introduction and promotion of the new *National Standard for Commercial Vessels* which was 'launched' at the pre-conference cocktail party on Monday 5 August. The standard is partly drafted, and some sections have already been through the process of appraisal and comment by industry.

The tenor of the conference was set in the opening address by Senator the Hon. Ron Boswell, who called for 'national consistency' in the approach to marine safety, pointing out that the existing USL Code lacks uniformity and consistency, both in technical content and application.

Senator Boswell promoted the need for the combination of a prescriptive standard with an alternative performance-based standard, based on risk analysis. He further noted the problems of drafting standards that will keep pace with accelerating change in technology, and also referred to the problems resulting from mistrust, which is evident not only between Government and industry and vice versa, but also between the various relevant Government authorities.

SOME PRESENTATION HIGHLIGHTS

Keynote Address — Colin Finch, Chair NMSC

The speaker outlined the membership of the National Marine Safety Committee (NMSC), how the committee works, and its accomplishments — also what it means in terms of the new national marine safety standards now being readied for introduction around Australia.

He maintained that essentially it is a 'good news' story of achievement for both commercial and recreational boat owners, being developed through stakeholder consensus in a relatively short time and at minimal cost, to enhance safety that will benefit all Australians on the water.

He pointed out that currently Australia's recreational and commercial boating activities result in:

- more deaths and serious injuries than rail accidents and air crashes combined, at current costs of more than $400 million per year, and
- fishing industry fatality rates are up to 16 times higher than the national industry average.

He believes that the new safety standard will go a long way towards addressing these problems.

The speaker explained how the NMSC was formed after a consultant's study was prepared in response to industry concerns regarding difficulties experienced in moving commercial vessels from one state to another. Specifically, the study noted the reluctance by States to accept vessels constructed and operated in another State without a thorough survey. This often brought up contentious issues where the original construction of the vessel may suddenly be deemed not to comply with the USL Code.

He acknowledged that, unfortunately, the USL Code was neither adopted nor interpreted in a uniform way, but maintained that this was not entirely a result of the States being obstructive, reflecting also the size of Australia and the large differences in climate, sea conditions, industry, etc.

The speaker described how the NMSC has a detailed strategy that has been signed off by transport ministers, the core of which is the development of consistent national standards to ensure that all boats, commercial and recreational, are safely constructed and operated around Australia.

He pointed out that the Council of Australian Governments (COAG) guidelines advocate a risk-based approach, which he considered is eminently sensible in these times when liability issues are on everyone's mind, but also emphasise the need to incorporate a performance-based approach. The new standards being developed by NMSC offer designers, builders, owners and operators the opportunity to use a performance-based approach but also provide the alternative of using the best of a current prescriptive standard.

NMSC's charter also covers recreational boats and it has prepared guidelines for the licensing of recreational boat drivers, is finalising a standard for the carriage of safety equipment and has released the national compliance plate standard for public comment.

The speaker described how NMSC is working with industry and marine safety agencies as stakeholders in a common endeavour to develop relevant standards. The strategies being using to achieve this involve a close working relationship with stakeholder groups to ensure consensus in development and, ultimately, compliance when the standards are introduced.

Typically the first stage in developing a new standard is to convene a workshop to discuss the issue in question to determine the most important concerns and how these should be addressed.

The next step is to convene a reference group of officials and industry to develop a draft standard. At the same time a Regulatory Impact Statement (RIS) is drafted to explain the issue that NMSC is trying to address, consider the alternative regulatory options, and detail the costs and benefits. The RIS contains a statement of consultation which explains how industry has been consulted during the

development of the draft standard and how they will be consulted as part of the RIS process.

The draft standard and RIS are then released for public comment after the RIS has been approved by the Commonwealth Office of Regulation Review. Reference groups then consider the public comments and make recommendations to NMSC for incorporation.

The amended standard and RIS are then forwarded to transport ministers who, once they have a sign off from their marine safety agencies and from the Office of Regulation Review, determine whether the standards are to be approved.

The speaker made the point that it is one thing to put words on paper and quite another to get them accepted by industry and marine safety organisations. He explained that the Marine Safety 2002 Conference is part of a long-term communication plan by NMSC to get the message across about new safety standards and their implementation through consistent legislation.

He referred to the fact that there is often a level of mistrust between those in government who regulate safety and those in industry who must make a commercial return. Equally, there can be mistrust between marine agencies. It is important that the existence of this mistrust is recognised and confronted. It has already caused a great deal of difficulty in resolving issues of detail in particular sections of the NSCV, where protracted debate about a particular clause, or even a few words, can hold up the acceptance of a 100 page document.

This mistrust also manifests itself in a refusal to accept a drafted standard as final. There seems to be a concern that if a document is not absolutely perfect then it should not go forward, even if it represents a major improvement over current practice and would bring great benefits to both industry and the regulator. He made a plea that draft standards should be adopted, with any differences set aside for subsequent consideration and resolution through the reference groups.

The speaker went on to outline the significant achievements of the NMSC to date. Nationally consistent recreational and commercial marine safety standards are being readied for introduction to cover Australia's one million recreational boaters and the domestic commercial fleet. The standards are part of a national marine safety package NMSC is developing which includes the:

- National Recreational Boating Safety System,
- National Standard for Commercial Vessels, and
- National consistency in marine safety administration.

The National Recreational Boating Safety System will include:

- the National Compliance Plate (NCP) Program, covering capacity for new boats,
- new standards of operator competencies, and
- new on-board safety equipment standards.

The NCP Program has already received in-principle approval by transport ministers. The guidelines for recreational boat operators has been developed, and the boating safety equipment standard has been released for public comment.

Transport ministers have approved major planks of the new National Standard for Commercial Vessels (NSCV) — covering occupational health and safety, crew training and qualifications, engineering requirements, safety obligations and fast craft operations. In addition, NMSC has released a further major NSCV section, covering safety equipment, for public comment.

While NMSC has prioritised the work plan to achieve the most benefit from new standards as early as possible, there are still major areas of ship design such as load line and stability to tackle. There are also operational issues in management (in Part E) concerned with safe operation of vessels, and (in Part F) dealing with high-speed craft. Both of these standards are currently being developed.

The speaker maintained that the work of NMSC essentially is a 'good news' story of government and industry working together to answer safety needs in a sector embracing new technologies in commercial vessels and an expanding pleasure boat sector for export.

Fatal and Non-Fatal Injuries due to Boating in Australia — Peter O'Connor

The paper drew on and presented statistical information compiled from two sources:

1. Readily-available information from the Australian Bureau of Statistics and Australian hospitals, and

2. A detailed study of the causes of boating deaths, which is currently underway.

The paper showed that over the last twenty years, there has been an average of 80 deaths and nearly 1000 people admitted to hospital each year as a result of boating incidents in Australia. Those admitted to hospital consume more than 4 000 hospital bed-days each year.

It was found that over the last five years, boating activity, whether recreational or commercial in nature, caused more deaths and serious injuries than rail accidents and air crashes combined. However, boating deaths have decreased over recent years, with the number of deaths registered for 1998 (39) being the lowest recorded over the last twenty years. This decline has occurred while the population of Australia has been increasing.

The fact that fatalities appear to have fallen over the last twenty years is encouraging and provides support for the current control measures. Of concern, however, is the incidence of non-fatal injury, as measured by hospitalisations, which does not appear to have declined substantially over recent years.

More than two-thirds of those who died were occupants of small boats, defined as those with a passenger capacity of less than ten. Most of these were powered boats. Only three percent of those killed were water skiers; however, water skiers made up twenty three percent of those admitted to hospital due to a boating-related non-fatal injury. Deaths peaked in the age group 25–29 years and ninety three percent of those who died were male. A similar pattern was found among those admitted to hospital.

The information reported in the paper provides only a general overview of the problem that must be extended with a more detailed level of analysis in order to contribute to the assessment of risk factors and prevention measures, and the development of prevention policy. Coroner's data provides a rich source of detailed information on fatal boating

incidents that has not been tapped until now. Among the factors that can be assessed using Coroner's data are:

- the role of alcohol and drugs,
- the role of life jackets,
- environmental conditions,
- mechanical and other material factors,
- individual co-morbidities, and
- communication and rescue failures.

Every boating death in Australia is currently being investigated and a comprehensive database is being constructed. The compilation and analysis has already been completed in one State and is progressing in the other states. Some interesting results are already emerging:

- The purpose of the boating trip where a fatality occurred is shown to be primarily recreational fishing (over 60%).
- When all significant contributing factors were considered, it was found that human factors most often contributed to the incidents (53% versus 24% for material factors, and 22% for environmental factors).
- Alcohol contributed to 38% of incidents. This is similar to the contribution of alcohol to road deaths.
- In 12% of the incidents the person was known to be unable to swim.
- Speed and risk-taking behaviour were noted in 5% of cases. A number of fatal incidents involved high-speed racing vessels.
- The person at the helm did not have a valid licence in 20% of cases.
- Eighty-five percent of the vessels were for recreational purposes and 15% were commercial fishing vessels.
- Fifty eight percent were open motorboats. The hulls were mostly made from aluminium (38%) and fibreglass/GRP (27%).
- Average boat length was just under 5.5 m. Forty two percent of the vessels involved were dinghy's under 5.5 m in length.
- The sequence of events resulting in a boating death was initiated most often by capsize of the vessel (35%) or a person falling overboard (15%).

Although condition of the vessel was not found to be a primary cause of death, some vessels were clearly unseaworthy. While control of the manufacture of new vessels is possible to regulate, the author failed to see how the seaworthiness of existing vessels, some poorly maintained and dangerous, can be regulated except through compulsory inspection measures. Unfortunately, many vessels involved in fatalities were not even registered.

Drowning was the stated cause of death in 87% of the cases. However, there were significant contributing causes for 44% of the deaths, including cardiac arrest which precipitated death by drowning, head injuries and resulting loss of consciousness, and various conditions which may have played a role. These include asthma, chronic alcohol abuse, diabetes, arthritis, high blood pressure, obesity, heart disease, and viral infections.

Although most vessels involved in fatal incidents had sufficient lifejackets for all occupants, few occupants were wearing them. A lifejacket was not worn by 71% of those killed.

The Australian Boating Fatality Study will deliver, for the first time, a comprehensive national database for the prevention and control of boating deaths and for research studies. The database is being established so that it can be updated on an ongoing basis. An analytical and descriptive report based on the compiled data will be presented to the National Marine Safety Committee later this year.

The Lessons from the Sydney-Hobart Inquest for Marine Safety — Phil Jones

The author outlined the lessons that have been learnt from the 1998 Sydney-Hobart Race, and from the Coroner's Report.

One of the principal lessons learnt was that both sailors and race administrators need educating in a number of areas.

Sailors

- It is recognised that the majority of sailors, even those with over twenty Sydney - Hobart races to their credit, lacked some basic knowledge. Many had not seen the inside of a liferaft, did not know that wave height could be up to twice that forecast, and wind strengths in the gusts up to 40% stronger that the average forecast.
- The AYF has introduced a Safety and Sea Survival Course (SSSC). Fifty percent of each crew in the longer ocean races is now required to have participated in such a course. It is recommended that all crew members do likewise.

Race Administrators

- Much was learnt regarding race administration — from ensuring that all appropriate documentation was in place to finding out that one person with one radio on the radio relay vessel could not effectively operate when so many boats were calling on his assistance.
- Measures have been instigated to ensure that all boats now comply with all the requirements of the race.

Equipment

Major equipment concerns found as a result of the 1998 Sydney – Hobart race were:

- **Liferafts**
  Liferaft standards have now been improved and a draft has been prepared for ISO to adopt so as to create a world standard. However, some of the Coroner's recommendations have not been followed, such as:
  - Insulated floor — The evidence that hypothermia was a problem came from the crew that found the raft to be more stable with water in it. An insulated floor would therefore have had no impact in this case.
  - Secondary ceiling — SOLAS requires a secondary, more user friendly, internal canopy than the bright orange on the standard coastal raft. It was considered that as the race is relatively close to shore it was unlikely that occupants would be required to spend a long time in a raft.
- **EPIRBS and Personal Lights**
  - There were so many EPIRBS activated at the time that it was difficult to identify each one separately. It is now required that '406' EPIRBS be used so that actual identification can be recorded.
  - Personal EPIRBS are also now required to be worn by every person when on deck as are personal lights.

- **Hull and deck joints**
  - It was found that some of the boats that were capsized suffered a break in the hull / deck joint.
  - The International Sailing Federation has addressed this issue and is working with ISO to tighten up the construction standard.

Coroner's Recommendations

Of the twelve specific recommendations addressed to the Australian Yachting Federation, all have been carefully investigated and eleven adopted in full. The remaining one (liferafts) has been modified slightly after due investigation and consideration.

Shipboard Electrical Safety — Ian Ritchie

The author is a marine surveyor, and is associated with a Queensland firm of marine electrical contractors. His paper outlined some safety aspects of marine electrical installations, principally applying to small craft.

Matters covered included:

- the evolving history of on-board electrical systems,
- the increasing reliance on electrical services,
- the process of ensuring the safest electrical installations,
- the dangers associated with low and extra-low voltage electrical services,
- common faults encountered during electrical safety audits,
- the law and liability when carrying out electrical work, and
- the need to carry out ongoing inspections to ensure regulatory compliance and safety.

The principal theme of the paper was that lack of knowledge leads to unsafe practices, and unsafe practices can lead to electrocution.

Fire Protection — Roger Thomas

The author is the manager of a company supplying fire-protection systems, and the paper was essentially a promotion of two new systems as alternatives to other available gas and water-mist products, with a comparison of salient features.

The Future of Marine Liability Insurance vs An Improved Safety Culture — James Dowson

James Dowson is the CEO of Shipowners' Protection Ltd of London. He asked vessel operators if their 'safety culture' simply existed because government legislation and industry competition forced them to comply with the bare minimum standards or, because, as operators, they were endeavouring to:

- care for human life,
- protect the environment, and/or
- preserve their asset.

He suggested that from a purely commercial angle there are three very good reasons to establish a 'safety culture':

- A safe and attractive working environment will attract and maintain a staff of well-trained, qualified, motivated seafarers and shore staff. A business is only as good as the crew and staff it employs.
- Increased operational efficiency through safer and effective maintenance programmes — down time due to breakdowns can bring a business to its knees.
- Knowledge and understanding of current legislation and regulations.

As the operator is optimising his earning potential by implementing 'world's best practices' in crewing/ maintenance/education, he is also achieving a 'safety culture which cares for human life/protects the environment/ preserves his assets.

He asked the question "Where does insurance fit in?" Insurance is vital to the vessel owner/operator in 'preserving his asset' and also in protecting his liabilities. An insurer starts from the assumption that a vessel owner manages and operates a quality operation, has well-trained, qualified and motivated staff, and cares for the environment. The insurance underwriter should be one of the people 'on the team'.

The insurer is there to protect and indemnify the owner from the fortuitous accidents that happen. So what happens when a crewman or a passenger sues the operator for $1million because they were injured on his vessel? He will cry out "Insurance will pay!" And they do — but should they, if the accident was because of an unqualified stand-in skipper? Or the breakdown of a poorly maintained vessel?

A claim for $100 000 from an owner whose annual premium is $7 000 or $8 000 is a big claim. In rough terms, it is twenty years net premium, which is fine if there is no claim for the next twenty years. However, as reported on a daily basis, the value of claims is rising. It is no surprise to learn that in Australia, as in many other countries, the annual total quantum of claims decided by the courts exceeds the annual premiums collected.

The author asked: "Will premiums continue to rise?" He commented that 11 September has been blamed for premium rises, but claimed that the event itself was not the issue, but the shock, that it caused the insurance world had a knock-on effect. The cost to the insurance world and, ultimately, policyholders is roughly estimated at $A70 billion, i.e. roughly equivalent to the value of Australia's total exports for one year. This enormous sum has impacted heavily on insurers and reinsurers and caused both groups to:

- Realise that their assets are very finite.
- Watch accumulation of risk, e.g. brought some close to bankruptcy — St Paul exited certain lines of business which caused Copenhagen-Reinsurance to close. Fortress-Reinsurance caused Japanese insurer Taisai to close.
- Require higher levels of capital return — up to 25%.

The results now unfolding as a result of 11 September are:

1. Insurance and Reinsurance markets are still in shock.
2. The full effect of 11 September and other policies written over last 5–7 years are being evaluated.
3. Reinsurers of reinsurers (the RETRO market) are:
   - Increasing price, often by up to 100%; and
   - Restricting cover.
4. There has been a knock-on effect to reinsurers and then to actual insurers of specific risks in London, for example, and as a result:
   - Liability rates are up 40%.
   - Hull and Machinery rates are up 20%.
   - Energy rates are up as much as 1000%!

In the marine market, the message to vessel owners and

operators, is:

1. Cover is available in the market for risks which are clearly measurable and capable of being priced. Quality of information and transparency is the key to everything. Insurers need to believe that they have the full picture and can quantify their liabilities.

2. Develop long term relationships.

3. With the market being less secure, be careful with whom you insure.

Years ago Lloyds operated 400 marine syndicates. Today only 60 marine syndicates exist, and it is expected that these numbers will reduce to 50. Insurance is a commodity just like any other. The insurance product, although intangible, is a product all the same, and subject to the usual laws of supply and demand. We are in a market environment where supply is declining, so prices will rise.

What does this mean to those who operate in the marine market? Fewer insurers means less flexibility, and less flexibility means higher prices, policies more specific and less general, and a 'take-it-or-leave-it' attitude. This mood currently in the marine insurance market is likely to prevail for the foreseeable future. In contrast, the following are realities for the Australian marine market:

- More and more breaches of statutory legislation being subject to strict liability.
- New legislation imposing increased limits of liability, e.g. the Athens convention.
- Injury compensation expectations of crew and passengers.

The Author asked: "How do I perceive the future as an insurer?"

As a result of 11 September, the insurance world has had to stop and take measure. It has become very clear that insurers will be looking for upward of 25% profit in the future. We all now fully realise that an efficient, professional, and profitable insurance industry is essential to world economic recovery when international tragedies occur.

Insurers will be looking at risks that are capable of being evaluated.

- They will expect marine operators to practice internationally-accepted operational procedures.
- They will expect marine operators to be aware of statutory changes that expose the operators to liability risks.
- They will expect operators to maintain all hardware.
- They will expect operators to operate in an environment of 'safety culture'.

Marine liability insurance will be more expensive in the future for all the reasons discussed, and more. Marine operators are being forced, through consumerism, competition, statutory regulation, and higher insurance premiums, to focus on what they do and how they should do it.

The marine industry in Australia, although small, is a good industry. It can also become the best in the world.

A Hypothetical *Bad Hair Day in the Marine Industry — A View from the Salon*

Hume Campbell, managing director of Riverside Marine Ltd, was moderator of this very entertaining and informative session, setting the hypothetical scenario and putting questions to a panel comprising:

- A vessel operator (David Hutchen);
- A marine surveyor (Russell Behan);
- A hull insurer (Ian Ferns); and
- A protection and indemnity insurer (Charles Hume).

Delegates from the floor were also invited to participate, and came up with a number of intriguing 'twists' to the plot, and some searching questions.

The initial scenario involved a high-speed catamaran cruise vessel, (owned by the operator), en route to a destination on the Great Barrier Reef, with a full complement of tourists, which hits a partially submerged container. A number of passengers are injured as result of the impact, some badly, and the master has received a knock on the head and is unconscious. One hull is extensively damaged, and the vessel is listing alarmingly. There is another cruise vessel in the vicinity (5 n miles away) but it so happens that one of the passengers on this boat is Bill Clinton, who has just developed chest pains, and his 'minders' believe he is having a heart attack!

As can be imagined, the story unfolded in a somewhat convoluted and improbable manner, with rescue boats and helicopters having major difficulties, the Great Barrier Reef Marine Park Authority refusing to allow the vessel to beach for fear of pollution, and insurers apparently being more concerned with the fate of the vessel, the container, the owner of the cargo or the ship it fell from, than that of the injured passengers.

Various relevant bodies, authorities and interested parties were represented by delegates in the audience, particularly Police Search and Rescue, AMSA, Queensland Transport, the next-of-kin of passengers, local repair facilities etc., who all contributed in a highly imaginative and constructive way to the development of the story.

Delegates were left with the impression that many of those involved appeared to be seeing the situation primarily from a their individual point of view, and empathised with the passengers. No doubt those travelling with Bill Clinton may have felt more secure!

CONCLUSIONS

Not all papers presented have been reviewed in this report. Neither have I reported on speeches made at associated functions. Alan Murray was the guest speaker at the conference dinner, and described in some detail and with much humour, his long association with yachting, and in particular, the America's Cup.

In summary, I consider the fact that the conference was attended by so many representatives of all branches of the maritime industry was a healthy sign and, hopefully indicates a growing interest in reform of the Safety Culture.

As a result, I believe it achieved much in alerting the marine community to the need to treat the introduction of a genuinely uniform set of safety standards seriously, and as a matter of urgency. I trust that the individual State authorities will have heard the call, and only hope that the level of scepticism regarding the likelihood of real action that I noted among some delegates was not well founded.

The University of New South Wales

Undergraduate News

On 14 and 15 October A/Prof. Lawry Doctors visited the Australian Maritime College with the third-year naval architecture students from UNSW who are studying ship hydromechanics. The visit was paced over two days and was most ably organised by Mr Gregor Macfarlane. UNSW is very grateful to him for his hospitality. In addition, Mr Richard Young, Dr Paul Brandner, Mr John Wakeford, Mr Peter Guy, and Mr Ian Smith assisted with the tour itself.

The experience they gained by using the towing tank for resistance and motion tests together with the inspection of the other experimental facilities (the shiphandling simulator, the cavitation tunnel, the circulating-water tunnel, the ship-model basin, and the vessels at Beauty Point) was most valuable and was a beneficial complement to their theoretical studies at UNSW.

In return, Professor Lawrence Doctors gave an evening presentation of his theoretical work on the prediction of resistance of vessels with a transom stern to AMC staff and students. There was a pleasing attendance at this seminar.

At the graduation ceremony on 29 October, Greg Shannon graduated with an Honours Class 2, Division 2 degree in naval architecture. He is now employed by North West Bay Ships, Sydney. Congratulations, Greg!

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

Martin Johnson	*Analysis of Australian 16 ft Skiff Hull Structure*
Michael O'Connor	*The Impact of the HSC Code 2000 Amendments*
Tommy Ericson	*Trim Tabs vs Interceptors for Ride Control*
Katie Miller	*Restoration of* John Oxley
Minh Pham	*Computational Cavitation Analysis of Marine Propellers*
Nigel Lynch	*Wave Generation of High-speed Catamarans*
Benjamin Smith	*Aerodynamic Performance of an Ekranocat*
Scott Hunter	*CFD Analysis of IACC Yacht Keels*
Giang Ngo	*Viscous Roll Damping of High-speed Vessels*

RINA and Austal Ships jointly offered an award of $500 and a certificate for the best presentation at the conference by a student member on a naval architectural project. Assessment was made on the basis of marks awarded by School staff, with marks being standardised to remove the effects of marker variability. The award went to Nigel Lynch for his presentation on *Wave Generation of High-speed Catamarans*, and was announced by Mr Phil Helmore at the thesis conference dinner at the Easts Leagues Club on the evening of 11 October. The certificate and cheque have since arrived from London. Congratulations, Nigel!

Also at the thesis conference dinner, the School's 178 final-year students made their annual award for Lecturer of the Year, inaugurated in 1995. This year the Lecturer of the Year award went to Mr Zoran Vulovic.

Post-graduate and Other News

Professor Lawrence Doctors recently joined the four-person team to conduct the External Review of the Department of Naval Architecture and Marine Engineering at the University of Michigan in Ann Arbor, Michigan. This review is normally undertaken every five years. The other members of the team were drawn from the University of California, Massachusetts Institute of Technology, and the American Bureau of Shipping. The purpose of the review was to report on the activities of the Department with respect to its mission, organization, enrolments, and its future. The review was conducted on October 3 and 4. In addition to this process, the College of Engineering at the University of Michigan also conducts an Internal Review as well as the regular ABET accreditation of the undergraduate degree program (parallel to that performed by The Institution of Engineers, Australia, for Australian universities).

While visiting the Department, Professor Doctors also discussed his research and presented a seminar on the topic *Nonlinear Free-surface Effects on the Resistance and Squat of High-speed Vessels with a Transom Stern*.

Phil Helmore
Lawry Doctors

Curtin University

Dr Tim Gourlay has left his lecturing position at the Australian Maritime College to take up the post of Research Fellow with the Centre for Marine Science and Technology at Curtin University. With superb timing, Dr Jinzhu Xia is leaving Curtin CMST to take up a research position at AMC. CMST will be looking for another naval architect to fill the ranks.

Kristoffer Grande has submitted his Masters thesis on *Slamming of Sailing and Powered Catamarans* at Curtin, and has moved to Europe. At time of writing, he has not yet chosen his preferred employer.

Kim Klaka

Australian Maritime College

Final Year Naval Architecture Thesis Presentations

The Naval Architecture Program held their annual undergraduate research thesis conference on Saturday 19 October. The conference was opened by AMC Principal/CEO, Dr Neil Otway, and guests/invited moderators included Mr Doug Beck of the Australian Marine & Offshore Group (Melbourne), Mr Martin Grimm of the Department of Defence (Canberra), Mr Keith Wood of Sinclair Knight Merz (Melbourne), and Mr Nigel Winter of North West Bay Ships (Hobart).

The student research topics presented included:

Joseph Cole	*2D Numerical Foil Testing*
Simon McGoldrick	*Seakeeping Characteristics of Catamarans*
Steven Cook	*Investigation into Bore Produced by a High-speed Craft in a Channel*

Byron Walpole	*CFD Analysis of High-speed Craft in Shallow Water*
Wade Limpus	*Effect of Under-keel Clearance on Squat*
James Keegan	*Propeller Selection and Optimisation*
Levi Catton	*Fourier Analysis of Irregular Wave Seakeeping Data and Motion Sickness Incidence Assessment*
Andrew Forbes	*Wake Pattern behind a Ship Travelling at Supercritical Speed*
Drew Bryant	*Damage Stability of SWATH Hull Forms*
Michael Tiller	*Dynamic Stability of a Containership in Following Seas*

Updates on AMC Post Graduate Student Research

Kishore Kantimahanthi — *Use of Hydrofoils for the Dynamic Support of High-speed Catamarans*

The primary aim of this research is to study the function of hydrofoils when they are fixed to high-speed catamarans, commonly referred to as foilcats. These catamarans are known to behave differently from more typical catamarans in their performance. From previous observations, it was shown that the lift generated by the hydrofoil could reduce the resistance of the catamaran and increase its speed. It was also shown that the wake generated by the foil cats is less than the catamarans without foils. The present research aims to study the resistance and powering of foil-cats. The underlying principles are derived from aerodynamics, but with the added challenge of dealing with the free surface. Unlike an aircraft, a foil-cat is exposed to two fluids, water and air, and the different densities of these fluids introduce the phenomenon of free surface. For this reason, the research has also been directed to study the 'free-surface effect' upon the lift of a hydrofoil.

Crowther Multihulls are collaborating in the study and have provided a scale model of *Lady Jane Franklin* (currently operating on the Gordon River, Tasmania) for the initial phase of tank testing. These tests, conducted in the AMC Towing Tank, involve calm-water tests for the bare hull for various displacements and trims. At this stage of the research, AMC took a step further in collaborating with a PhD student at The University of New South Wales, Michael Andrewartha. Prof. Lawry Doctors is Michael's supervisor while AMC's Dr. Paul Brandner and Prasanta Sahoo are supervising Kishore. As a part of the agreement, AMC have designed and constructed a six-component force balance, which can measure the forces and moments along and about all the axes. This sensitive instrument is initially being used for this study but is also available for use in other studies involving hydrodynamic tests.

The next stage of the research involves the testing of the bare foils within the towing tank. Using the existing tank set up and the calibrated force balance, the preliminary bare foil tests were completed by Kishore in August. The results of the tests are optimistic if not conclusive. As expected from the theory and the experiments done by other researchers around the world, it was found that the lift decreases with the depth of submersion of the foil and the effect of the free surface therefore is more at shallow depths and is less or absent for greater depths. The bare foil tests are conducted by changing the angle of attack for different depths. A further series of bare foil tests are planned for November using a refined test rig in order to fine tune the operation.

Following the bare foil tests, a further series of tests are planned in which the foil(s) will be combined with the catamaran model. It is likely that a new model of the catamaran will be made of carbon fibre in an attempt to reduce the weight to allow a wider range of load conditions to be investigated.

Jon Binns — *Investigation into Re-righting Tendencies of Modern Sailing Yachts*

This project has been tied up primarily with the development of a new force balance. The force balance has now been commissioned and the design specifications have been verified. The balance is capable of measuring forces and moments in six degrees of freedom. With a full-scale load rating of around 200 kg and accuracy measured down to around 5 g it is capable of performing most measuring tasks. It is also possible to decrease the maximum load and consequently decrease the accuracy. Of greatest importance to this project is its natural frequency. Natural frequencies have been measured by impact tests at 79 Hz, 115 Hz and 188 Hz, which are far in excess of the 4 Hz maximum signal frequency expected. Preliminary tests in September identified a few minor problems with the setup, concerned primarily with model attachment. These problems are being addressed, and further tests are scheduled for mid-to-late November.

Jon Duffy — *An Investigation into Ship-bank Interaction and its Mathematical Modelling for a Ship-handling Simulator*

When operating in restricted water, the behaviour of a ship can be significantly influenced by the presence of nearby lateral banks. The restrictions due to the banks force the fluid flow around the ship to be asymmetrical. This creates a net sway force and yaw moment, which can lead to potentially dangerous situations. In order to optimise port design and predict the maximum size of ship that can be safely operated in a given port, it is necessary to understand the effect that lateral banks have on the manoeuvring characteristics of a ship.

A series of model tests has been conducted in the Australian Maritime College's towing tank with the model constrained in surge, sway and yaw to enable the measurement of the resultant bank-induced sway force and yaw moment. The effect of vessel draught, bank height, water depth, bank slope and ship-to-bank distance on sway force and yaw moment have been investigated.

Regression analyses have been performed on the experimental data in order to predict bank-induced sway force and yaw moment. The formulae can be used in ship handling simulators, greatly enhancing their use as a tool to evaluate dredging requirements, conduct channel design, harbour pilot training and nautical risk analysis.

Tim Lilienthal — *Dynamic Stability in Following Seas*

The basic concept of Tim's study is to ascertain where a time-domain motion program can be utilised to assess the stability of ships in a following sea. How valid is the GZ

curve analysis with respect to a vessel's actual motions and thus its stability, if the basic concept ignores waves and vessel velocity? The program involved can use either irregular or regular waves — Tim's procedure to simplify the analysis uses regular waves. This technique reduces the computational time required and a series of model experiments will be undertaken to verify the results. This project has been sponsored by the Department of Defence, who have also allowed the use of their time-domain motion program for the duration of this study.

A 1:100 scale model of the P&O *Nedlloyd Hoorn* containership, partly sponsored by P&O Maritime Services, has been constructed. This model has the dimensions LBP of 2470 mm, beam 322 mm and displacement (DWL) of 64 kg. The model has been constructed to undertake free-running experiments to test for capsize in following seas and is fitted with three fibre-optic gyros to record the three rotations (roll, pitch and yaw). The model is computer controlled from a laptop and the communication between the model and computer is by wireless ethernet. The model has a platform that can be raised to change the KG of the vessel. The platform has been designed to hold a number of lead weights which allow the displacement to be set from ballast condition (five weights) to fully laden condition (27

weights). The height of the platform can be set by the computer and thus the KG for capsize can be obtained. Mike Tiller, a fourth year naval architect student, and Tim have recently completed the first series of model tests at two displacements in the AMC model test basin. Further testing will include different speeds and comparison with outputs from a time-domain motion program.

Bryce Pearce — *An Investigation into the Application of Ventilated Supercavitating Hydrofoils for use in the Motion Control of High-speed Catamarans*

Bryce graduated from AMC in 2001 with a Bachelor of Engineering (Naval Architecture) and is now undertaking a post-graduate program at AMC. Current activity includes the design of several models of differing cross-sectional shape, the design of a dividing plate for the cavitation tunnel test section to enable 2-D testing and the preliminary design of a new force-measurement balance to enable more accurate drag measurement. The investigation is being conducted under the supervision of Dr Paul Brandner.

Gregor Macfarlane — *The Measurement and Assessment of Sub-critical Vessel Generated Waves*

This study has centred about the development of a database of wave wake measurements gathered from model tests on over 80 different hull forms. Gregor has recently submitted his thesis for examination.

Roberto Ojeda — *Static and Dynamic Response of a Composite Catamaran Under Slamming Loads*

Roberto is from Valdivia in Chile and is this year's recipient of the AMC Council Tom Fink Scholarship. Roberto's research project is aiming to present the static and dynamic response of the structure of a fast and relatively small catamaran made out of composite materials to slamming loads, using finite element analysis techniques. Roberto's supervisors are Dr Gangadhara Prusty (AMC) and Dr Marcos Salas (UACh).

The analysis has been carried out using ANSYS60 finite element software and the work has been divided in to the following modules:

- Modelling and discretisation of the vessel's structure,
- Study of the static response of the structure to static slamming according to DNV HSLC crest landing and hollow landing loads,
- Determination of the vessel's global dynamic characteristics, and
- Study of the dynamic response of the structure to a transient slamming load.

The first two modules of this project (modeling and static analysis) are complete and the second two are presently underway. A publication with the results of this project is expected to be ready in January next year.

Tom Fink Cavitation Tunnel

Research, development and design work on the upgrade of the cavitation tunnel, as part of the Australian Maritime Hydrodynamic Research Centre (AMHRC), is progressing well. Several consultants from within Australia and overseas have or will be engaged on specialist aspects of the tunnel upgrade. New and improved features include:

- low freestream turbulence intensity,
- highly uniform freestream velocity profile,
- low minimum cavitation number,
- low background noise,
- boundary layer control (thickness, velocity and turbulence profiles) on ceiling of test section,
- rapid degas equipment,
- nuclei injection system — controllable bubble population, and
- continuous separation of nuclei, residual gases and injected (non-condensable) gases.

In addition to specialist consulting, AMC, UTas and DSTO are carrying out numerical and experimental studies for the design of various components and a 1/4 scale physical model of the upgraded facility will be built and tested with air as the working fluid.

Dr Paul Brandner made a presentation on the AMHRC and the tunnel upgrade at the Science and Technology Workshop organised by the Office of Naval Research International Field Office (ONRIFO) recently established at the DSTO in Melbourne.

Ship Interaction Study Underway at AMC for the Port of Newcastle

The AMC Ship Hydrodynamics Centre, through AMC Search, is presently conducting a research program for the Port of Newcastle. The study is investigating the effect of a passing ship on the forces and motions on a berthed ship. The channel configuration is being studied in order to determine the maximum speed at which ships can pass without adversely affecting the motions of a berthed Cape-size ship. Two passing vessel configurations are being considered for the proposed situations, one Cape-size vessel and a Handymax vessel.

Model test configuration

Physical model tests have been conducted within the AMC Model Test Basin with a 4.2 m stationary model to simulate the berthed vessel, and a 4.2 m towed model to simulate the passing vessel (shown in the photograph above). The stationary model was constrained in surge, sway and yaw, enabling the forces and moments in these directions to be measured. The model was free to heave, pitch and roll. The near and far banks and the channel depth were modelled to a representative geometry. Obtaining the interactive forces and moments on the berthed ship using model experiments

is a proven method which allows many site-specific variables to be considered in detail.

Secondly, the forces and moments measured during the physical model tests will be used as input to a mathematical model. This model takes into account the dynamics of the vessel and the mooring line and fender forces, and will be used to predict the surge, sway and yaw motions in the time domain as the vessel passes the berthed vessel. These motions will be evaluated against acceptable limits in order to determine the optimum channel configuration and/or acceptable maximum speed for passing ships.

Ausmarine West 2002

Jon Duffy presented a paper co-written with Gregor Macfarlane on the work of the AMC Ship Hydrodynamics Centre (SHC). This included a general overview of the educational and research activities undertaken by the Centre, primarily utilising the conventional Towing Tank and Model Test Basin. Also described were the typical range of commercial consultancy services the Centre offers to the maritime industry.

Some of the research topics covered included: the effect of channel geometry on ship operation in a port, vessel interaction in restricted waterways, passing vessel-moored vessel interaction within a port, and the measurement and prediction of vessel-generated waves.

Jon also presented his paper *The Effects of Channel Geometry on Ship Operation in a Port* at the RINA WA Section mini-conference. This was the same paper that Jon presented at the 30th PIANC Conference held the previous month (reported below).

The AMC Dash

Early this year the AMC identified an opportunity to enhance its involvement with secondary schools in the local community by establishing an event that highlighted AMC and the industries it serves. The AMC Dash is a competition to determine which Tasmanian school can design and construct the fastest model sea-going vessel. It is open to teams of 4 students in years 10–12 from Physics, Mathematics and Technology related classes.

To facilitate awareness of the activity a comprehensive information campaign was carried out in the early months of the academic year. Two one-day basic naval architecture workshops were conducted, one in Launceston and one in Hobart. Schools were then provided with a standard kit to assist development of their project. The kit included a motor, propeller, shaft and design guideline. In addition, AMC provided a student 'mentor' who was available to share knowledge, experience and skills. These mentors were typically naval architecture students in their final year of study at AMC.

The schools had from April until 15 August to complete their models. On 15 August all 32 teams assembled at the AMC Model Test Basin to compete over a series of races to determine the fastest model vessel. The eventual winner was a team from Rosny College, Hobart.

The event was an innovative, practical and 'fun' project. It enabled students from a wide range of backgrounds to participate to achieve a tangible outcome, while raising awareness of alternative tertiary education and career opportunities. It also highlighted the facilities and services unique to AMC and gave naval architecture students an opportunity to develop their supervision skills. As a result of the success of this year's event, it is planned to run a similar event biennially.

UNSW Naval Architect Students Visit AMC

On October 14 and 15 the UNSW third-year naval architect students made their annual visit to AMC for laboratory sessions with AMC staff in the Towing Tank, Cavitation Tunnel, Model Test Basin, Ship Handling Simulator and Circulating Water Channel. The five UNSW students also had a brief tour of AMC's vessels. As is usual during these visits, Professor Lawry Doctors gave a presentation to AMC students and staff as part of the Royal Institution of Naval Architects (Tasmanian Section) Seminar Series. This year the presentation was on *Nonlinear Free-surface Effects on the Resistance and Squat of High-speed Vessels with a Transom Stern*. The talk was followed by a counter meal which provided an opportunity for students studying naval architecture from both UNSW and AMC to compare notes.

Other Items of Interest

Jon Duffy, Research Engineer with the Ship Hydrodynamics Centre, presented a paper titled *The Effects of Channel Geometry on Ship Operation in a Port* at the 30th Permanent International Association of Navigation Congresses (PIANC) Conference held in Sydney last week. The paper generated a lot of interest among delegates, particularly, with regards to the quality of the work being conducted at AMC in this field. This was the first time this congress, which meets every four years, has been held in the southern hemisphere and over 400 delegates attended (with approximately 100 from Australia).

Dr Laurie Goldsworthy presented a paper entitled *Development of the AMC PC-based Machinery Space Simulator*, at the Martech 2002 conference in Singapore. Laurie also met with DNV in Singapore to discuss cooperative research.

Stan Earl hosted a site visit by ten IEAust Professional Engineers to AMC's Cavitation Tunnel, Towing Tank and Model Test Basin. The visit was scheduled to last one hour; however, due to the level of interest and questions from the engineers, the visit lasted over two hours.

AMC Search has commissioned its new portable marine simulator called VOS (Vessel Operations Simulator), and it attracted much favourable attention at the Company's promotional stand at the PIANC Conference/Exhibition in Sydney recently.

Prasanta Sahoo presented a paper on *Wave Resistance of Semi-displacement High-speed Catamarans through CFD and Regression Analysis* at the 3rd International Conference on High-performance Marine Vehicles in Bergen, Norway.

Gregor Macfarlane

Wärtsilä and Haldor Topsøe start co-operation in fuel cell development

Wärtsilä has entered into a co-operation agreement with the Danish technology company Haldor Topsøe A/S to start a joint development programme within the area of fuel cell technology. The development programme aims to bring to the market highly efficient, clean and cost-competitive fuel cell products with power outputs above 200 kW for distributed power generation and marine applications.

The programme combines the competence of both companies. Wärtsilä will apply its know-how in decentralised power plant applications and marine propulsion systems. Haldor Topsøe has long experience and a leading position in catalyst development for the oil industry and in the development of planar solid oxide fuel cell (SOFC) technology.

The fuel cell development programme is part of Wärtsilä´s strategy to provide environmentally-friendly solutions for customers with various power generation needs. SOFC technology will provide products for cogeneration applications with ultra-low emission levels, high efficiency and outstanding reliability.

Wärtsilä is the leading global ship power supplier and a major provider of solutions for decentralised power generation and of supporting services with its head office in Helsinki, Finland. Wärtsilä supplies engine room solutions, integrated propulsion systems, main and auxiliary engines and maintenance for all types of vessels. For the power generation market Wärtsilä delivers power plant solutions from 1 to 300 MW.

Haldor Topsøe is a global technology and catalyst company focused on heavy chemical, petrochemical, refinery, environmental and energy-conversion related technologies, with its head office in Lyngby, Denmark. Haldor Topsøe has worked on the development of fuels cells and fuel processing systems for a number of fuel-cell technologies for years. In the past five years, development has concentrated on solid oxide fuel cell (SOFC) technology. Topsøe's position within SOFC technology is to a significant degree based on 10 years participation, also financially, in the Danish SOFC Fuel Cell programme led by the Danish National Laboratory at Risø and supported by the Danish government and the Danish energy sector.

Wärtsilä and Mitsubishi join forces in designing new marine engine

On 15 November Wärtsilä Corporation and Mitsubishi Heavy Industries Ltd of Japan announced a joint development agreement to design and develop a new low-speed marine diesel engine.

The two companies see a potential in pooling their resources and experience to produce a new engine of 500-600 mm cylinder bore. Such engines are suitable for a wide variety of ship types, including bulk carriers in the Handymax and Panamax sizes, large product tankers, container feeder vessels, and medium-sized reefer ships. The new engine will meet the market needs for high efficiency, compactness and environmental requirements.

Today, Wärtsilä has its own range of low-speed marine diesel engines, with the Sulzer low-speed engines covering the power range of 5 000 to 80 000 kW. Mitsubishi also has its own range of UE low-speed marine diesel engines covering the power range of 1 120 to 46 800 kW, and has long cooperated in the manufacture of Sulzer engines going back to an agreement signed in 1925. Over the years, Mitsubishi has notably been extensively involved in the building and testing of the first examples of newly-designed Sulzer low-speed engines. The new agreement takes this cooperation a step further to joint design and development.

The project is led by a joint working group of engineers from both companies with supervision by a steering committee including senior management of the two companies. It is envisaged that the new engine would be built in Japan by Mitsubishi, Mitsubishi´s licensees and Wärtsilä´s licensees. In Korea and China, the engine will be built by Wärtsilä´s and Mitsubishi's licensees.

SwiftCraft — speed and power software from HydroComp

HydroComp has introduced SwiftCraft — a new designer's tool for speed and power prediction of monohull vessels under 75 m. SwiftCraft has been developed specifically for designers and builders of motor yachts, patrol craft, small ships, supply vessels, ferries and other transit craft. Its easy-to-use interface is modelled on web navigation, so it is ideal for new users where a rapid learning curve is important and the time needed to complete a project must be minimised.

SwiftCraft is built upon nearly twenty years of technical development by the experts at HydroComp, employing many of the same capabilities and features found in the award-winning NavCad and PropExpert software. SwiftCraft contains the following speed and power analyses:

- Bare-hull drag for displacement, semi-displacement, sailboats and planing craft;
- Appendage and wind drag;
- Hull-propulsor coefficients;
- Propeller and gear ratio sizing;
- Thrust, torque, power, fuel rate analysis; and
- Cavitation evaluation.

HydroComp is anticipating that SwiftCraft will be particularly successful in serving the new or inexperienced user. "One of the key attributes of SwiftCraft is that it focuses on one frequently-used set of tasks", Donald MacPherson, HydroComp's Technical Director, said. "Our NavCad software, for example, contains an extremely broad feature set — from monohulls to catamarans, propellers to waterjets, free-running analysis to towing to acceleration. SwiftCraft narrows the focus to free-running monohulls using conventional propellers. Based on the success of the SwiftCraft model, we are planning to extend this strategy of smaller focused products to other design calculations."

SwiftCraft is to be the first product in a new collection of marine performance tools called SwiftWorks. A variety of SwiftWorks tools are planned or under development.

Repeat order for Sulzer RT-flex engines

Wärtsilä Corporation has received a repeat order for two more Sulzer RT-flex engines with electronically-controlled common-rail fuel injection. They will be installed in two 30 000 tdw multipurpose carriers contracted at Shanghai Shipyard in China by Chinese-Polish Joint Stock Shipping Co (Chipolbrok). Two similar engines were contracted in October 2001.

The engines are seven-cylinder Sulzer RT-flex60C engines, each with a maximum continuous output of 16 520 kW (22 470 bhp) at 114 rpm. The engines will be built under licence by Hyundai Heavy Industries Co Ltd.

For each vessel, Wärtsilä will also supply three Wärtsilä 6L20 auxiliary engines with a combined output of 3060 kW (4160 bhp) at 900 rpm.

Due for delivery in 2004, these vessels will be general cargo ships with movable tween-decks, fitted with heavy-lift cranes up to 640 tonnes capacity (SWL) and with a container capacity of about 2000 TEU. The vessels will operate around the world: China/Far East–North America–Europe–China/Far East. The vessel's principal dimensions are 199.8 m length overall, 27.8 m beam, and 10.3 m design draft. The service speed will be more than 19 knots.

Chipolbrok's expectations in operational economy and reaching the highest environmental standards created a clear preference for the innovative RT-flex technology. Sulzer RT-flex engines are the first low-speed engines to have electronically-controlled common-rail systems for fuel injection and valve actuation. This gives unrivalled flexibility in the way the engines operate, to deliver benefits such as lower exhaust emissions, lower fuel consumption at part load, and better manoeuvring ability.

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

There are now eight Sulzer RT-flex engines in service and on order. The first engine in service is the Sulzer 6RT-flex58T-B in the bulk carrier *Gypsum Centennial* which began operation in September 2001. The service experience with this engine has been very good, with currently more than 5000 hours' operation.

In addition to the four engines for Chipolbrok, two Sulzer 7RT-flex60C engines have been ordered for two 13 200 tdw containerised reefers being built for Agrexco, and a Sulzer 6RT-flex58T-B for an Aframax tanker to be built in Japan for Scinicariello Ship Management. The first Sulzer RT-flex60C engine is currently completing tests at Wärtsilä's Trieste factory in Italy.

NEWS FROM THE SECTIONS

Tasmania

The Tasmanian Section combined its Annual General Meeting with a social barbeque on a pleasant sunny evening in Willow Court at the Newnham campus of AMC on Thursday 17 October. The present chairman, Gregor Macfarlane, presented the annual report on the activities of the Section for the past twelve months. The committee members for 2003 were elected and are shown below. The chairman for 2003 will be elected at the next Section meeting:

Noel Dunstan
Misha Merzliakov (Secretary)
Giles Thomas MRINA
Mark Hughes
Oliver Mills
Ian Larkins
Ian Lund (Treasurer)
Alan Muir MRINA
Gregor Macfarlane MRINA
Kay Myers

Walter Atkinson Award

The Walter Atkinson Award for 2001 was awarded to Mr Jon Duffy and Dr Martin Renilson for their paper *The Effect of Channel Design on Ship Operation in a Port*. Jon is a research engineer and part-time PhD student with the AMC Ship Hydrodynamics Centre and Martin was Head of the Department of Naval Architecture and Ocean Engineering at AMC when they wrote the paper. Martin, now with Qineteq in the UK, was recently presented his certificate at the 23rd ITTC in Italy by Gregor Macfarlane.

Professor Lawry Doctors of UNSW presenting Jon Duffy with his Walter Atkinson Award certificate at a recent Tasmanian Section technical meeting

Tasmanian Section Seminars 2002

A very successful 2002 AMC/RINA Seminar Series has almost come to a close for the year. The AMC and the Tasmanian Section of RINA would like to take this opportunity to thank all presenters for their contributions in providing local members and students with a range of high-quality presentations covering a wide range of very interesting topics.

In recent presentations, Dr Tony Armstrong gave a very detailed and informative presentation on *The Design of Catamarans* which was based on a chapter he is writing for a new (revised) book. More than forty members and students

attended, including a few senior engineer 'spies' from Incat Tasmania. Lively discussions continued well into the night at the following counter meal.

Scott Jutson of JutsonYacht Design ran a very interesting open discussion around the theme of *Yacht Design in the Real World*. Topics discussed included the business of yacht design, covering all the issues from client management, marketing, rules and regulations, through to what JYD look for in a potential employee. This was an excellent opportunity for the students to ask the hard questions that may influence their careers — and a large number took good advantage of the opportunity.

Paul Birgan of Commercial Marine Consulting Services gave a very practical seminar titled *The Secrets of a Freelance Designer*. The presentation discussed in detail some general matters pertaining to the running of a small naval architecture consulting company — the do's and don'ts according to Paul Birgan. It was very clear that many AMC students gained a great deal from this open discussion. Paul also presented a brief overview of one of his deep-vee aluminium catamaran designs.

Rob Gehling of AMSA gave a presentation titled *International Maritime Regulations — An Insider's Perspective*. Rob reflected on the past 15 years in which he has represented Australia on IMO sub-committees, including the many changes that have been made to improve the international maritime safety regulatory system through those sub-committees, namely those on:

- Stability and Load Lines and on Fishing Vessel Safety,
- Ship Design and Equipment, and
- Bulk Liquids and Gases.

These developments include:

- guidelines for open-top containerships,
- development and refinement of the High-Speed Craft Code,
- introduction of MARPOL double-hull requirements for oil tankers,
- improvements to ro-ro passenger ship safety following the *Herald of Free Enterprise* and *Estonia* casualties,
- introduction of enhanced surveys for bulk carriers and oil tankers, including the condition assessment scheme for single-hull tankers,
- development of safety guidelines for wing-in-ground-effect (WIG) craft,
- application of MARPOL Annex I to FPSOs and FSUs, and
- prevention of lifeboat accidents.

Rob's presentation touched on each of these projects, but was centred on the process through which this work is launched and managed, namely identifying a compelling need for such requirements and then managing the fulfillment of that need. Rob also gave an outline on the development of safety guidelines for wing-in-ground-effect (WIG) craft, accompanied by a very interesting video presentation. Following the presentation there was a wide-ranging discussion on the work of IMO and specific statutory safety provisions that it has developed.

Professor Lawry Doctors gave a paper titled *Nonlinear Free-surface Effects on the Resistance and Squat of High-speed Vessels with a Transom Stern*. In this presentation Lawry discussed the inviscid linearized near-field solution for the flow past a vessel with a transom stern as developed within the framework of classical thin-ship theory. The hollow in the water behind the stern is represented here by a virtual extension to the usual hull-centerplane source distribution. The shape and length of this hollow are permitted to change in a realistic manner with increasing forward speed of the vessel, as well as with any consequent sinkage and trim that the vessel might suffer.

Developments reported in this presentation are the inclusion of nonlinear free-surface effects, by introducing a vertical straining or distortion of the hull, in order to account for the changing submerged wetted volume, resulting from the profile of the disturbed free surface. In addition, enhancements to the analysis, due to the influence of viscosity, and a partially-wetted transom at low speeds, are considered here.

Gregor Macfarlane

THE INTERNET

Poison-free Antifouling

Sealcoat has developed a poison-free antifouling which uses a coating on which hard biofouling will not settle. The coating, known as Sealcoat AF, comprises two layers. A layer of powerful adhesive, blended from solvent-free epoxies, is first applied. Millions of micro fibres are then sprayed onto the adhesive before it dries and, as they are sprayed, each is electrostatically charged so that it stands upright in the adhesive. Sealcoat AF is patented, is safe to apply, does no harm to the environment, and is now available worldwide. It can be applied to wood, aluminium, steel, concrete and FRP, and comes with a warranty depending on the application, but typically two to five years. Further details can be found on the main website www.sealcoats.com/fr_af.htm.

AIMEX

The Australian International Marine Export Group (AIMEX) is proving itself to be a valuable ally of the recreational and light commercial craft manufacturers as it strives to take them to a prominent position on the world stage. It has already had considerable success, with Australian-built boats and equipment making their presence felt at boat shows around the world. AIMEX membership has trebled to 65 over the last twelve months, and their website is worth a visit, not only for the details of AIMEX itself, but for the on-site links to Australian manufacturers, e.g. Muir Winches, Austral Propellers, Sabre Catamarans, Quintrex and Tasman Yachts. Visit www.aimex.asn.au, and click on Member Listings.

Phil Helmore

Sixth Phase of Focussed Inspection Campaign

The Australian Maritime Safety Authority (AMSA) is currently implementing an enhanced inspection campaign that focuses on specific areas of a vessel's operation. AMSA is carrying out inspections on selected areas, both as part of the existing programmed port state control inspections, as well as additional random visits. AMSA initiated the programme in December 2000, and anticipates that it will run for two years from this date, changing every four months to enable six different specific inspection areas to be addressed within the two-year period 1 August – 30 November 2002**.**

STCW compliance

New requirements for mandatory training and certification of officers and ratings came into force on February 1, 2002. However, a period of grace was applied until 31 July 2002.

IMO Circular STCW.7/Circ 12, issued on 25 January 2002 by the Sub-Committee on Standards of Training and Watchkeeping (STCW), noted delays to the full implementation of the STCW Convention. The IMO Circular recommended that until 1 August 1 2002, a letter of warning be issued to masters of vessels not able to comply fully with those STCW 95 requirements.

Since 1 August, the sixth focused inspection campaign has started to examine full compliance with the requirements of the STCW 95 Convention, with specific reference to the following:

- the originals of all certificates available on board;
- certificate endorsements are in the correct format;
- all persons performing GMDSS radio duties are appropriately qualified;
- tanker and passenger ship crew hold appropriate endorsements and/or documentary evidence of training; and
- the arrangements of watch schedules and rest periods.

These inspections will be carried out in addition to AMSA's normal port state control activities, and any deficiencies found will require appropriate rectification, as with normal PSC inspections.

Report on Shipbuilding Materials

The Defence Science and Technology Organisation (DSTO) has released a report on steel, aluminium and FRP as shipbuilding materials as they apply to the Royal Australian Navy's replacement patrol vessel program. The three builders on the short list have each chosen a different material, and the report is therefore a welcome summary of the state of the art.

The report, prepared by Seref Aksu, Stuart Cannon, Craig Gardiner and Matthew Gudze, presents a detailed analysis of the advantages and disadvantages of each of the materials, looking both at capital costs and through-life costs. The analysis is objective, and makes some interesting observations about all three materials. While the report is aimed at the replacement patrol boats, the DSTO assessment of the materials applies much more generally, and should be read by all naval architects.

The report is downloadable from the DSTO website www.dsto.defence.gov.au. Click on Search, enter "hull materials", click on the radio button for All Words, click on Search, and the report will be the first item which shows up. Click on the title to view with Acrobat Reader and save.

Multihull Rules for Royal Navy

Lloyd's Register has been contracted by the UK MoD Sea Technology Group to develop a set of technical rules which will cover the design and operation of multi-hull vessels including trimarans. The development will use data that has been collected from the two-year trials programme carried out by the UK MoD and the US DoD on RV *Triton*, the QinetiQ-owned research vessel.

The need to provide a set of rules that will significantly reduce the risks in the development of designs for such future projects as the UK's Future Surface Combatant or the US Focused-mission Ship is key to achieving the benefits that multi-hull warships offer. With the more complex hull response from torsional effects of side hulls, a method of designing this type of vessel, without the need to build complex finite element models, is one of the major challenges facing ship designers. By providing a simplified process that uses proven data embedded in empirical formulae, designers can obtain a robust design in a much shorter timeframe. Advanced tools can then be used to refine innovative designs, with confidence that the general design is sound.

The Trimaran Rules will complement the existing Lloyd's Register Rules for Naval Vessels that are now uniquely being applied to a range of new and in-service front-line naval vessels for maintenance in Lloyd's Register class.

With significant commercial interest in vessels with similar hullforms, including pentamarans, the embedding of military research findings in public-domain technical standards offers similar lower risks for other projects.

Vale Bill Porritt

The ANA sadly records the death of Bill Porritt, whom many will remember as the long-time ABS Area Representative for Australia, New Zealand and Oceania.

William Athol Porritt was born in Hamilton, New Zealand in 1925 and, after serving an apprenticeship of 5 years, went to sea with United Fruit Company of New York. In 1949 he joined Furness Withy, and rose in that company to the position of Chief Engineer. In 1952 he joined the American Bureau of Shipping as a Marine Surveyor in New York, and was then posted to the Caribbean as well as South America. In 1964 he was appointed to Sydney as the Area Representative for Australia, New Zealand and Oceania, where he remained until he retired in 1988.

Bill was a keen yachtsman and was a member of the Royal Motor Yacht Club. He was also a member of the United States Naval Institute and the American Chamber of Commerce in Australia. He is survived by his wife Anne, children, Stephen, Ruth and Richard as well as eight grandchildren.

The 23rd International Towing Tank Conference (ITTC)

8-14 September 2002

Conference Report by Gregor Macfarlane

The 23rd International Towing Tank Conference (ITTC) was hosted by the Italian Ship Model Basin (INSEAN) in Venice, Italy, between 8–14 September 2002. Gregor Macfarlane represented the Australian Maritime College at the conference and was the only delegate from Australia.

The primary task of the ITTC is to stimulate progress in solving technical problems that are of importance to institutions who are regularly responsible for giving advice and information regarding full-scale performance to designers, builders and operators of ships and marine installations based on the results of physical and numerical modelling.

The conference also aims to stimulate research in all fields in which a better knowledge of the hydrodynamics of ships and marine installations is needed to:

- improve methods of model experiments, numerical modelling and full-scale measurements,
- recommend procedures for general use in carrying out physical model experiments and numerical modelling of ships and marine installations,
- validate the accuracy of such full-scale predictions and measurements for quality assurance,
- formulate collective policy on matters of common interest, and
- provide an effective organisation for the interchange of information on such matters.

The aims of the Conference shall be pursued by:

- stimulating research into specific topics,
- organising and encouraging meetings to review progress in this research,
- making such recommendations and decisions on joint action and policy as seem desirable to the members of the Conference,
- establishing procedures and guidelines to help member organisations to maintain their institutional credibility with regard to quality assurance of products and services, such as, performance prediction and evaluation of designs by either experimental or computational means, and
- recording and publishing discussions taking place at ITTC meetings.

As usual, a number of technical committees reported on the significant work in their fields that had been conducted since the last full conference of the ITTC (September 1999) and made conclusions where appropriate and recommendations for future work where conclusions could not be made. The current committee structure is as follows:

Administrative

- Advisory Council (representatives from all large organisations)
- Executive Committee (one representative for each geographical region)

General Technical Committees

- Resistance
- Propulsion
- Manoeuvring
- Loads and responses

Specialist Technical Committees

- Speed and powering trials
- Procedures for propulsion and propeller open-water tests
- Validation of waterjet test procedures
- Cavitation induced pressures
- Water quality and cavitation
- Ice
- Waves
- Stationary floating systems
- Esso Osaka
- Prediction of extreme ship motions and capsizing

There is also a permanent group covering quality systems.

The specialist technical committees typically last 3–6 years and have specific tasks to accomplish. The specialist committee structure for the 24th ITTC period (2002–2005) is as follows:

- Stability in waves
- Assessment of ocean environmental issues
- Ice
- Validation of waterjet test procedures
- Cavitation erosion on propellers and appendages on high-powered high-speed ships
- Azimuthing podded propulsion
- Powering performance prediction

The membership of the general technical committees consists of one member from each geographical region, whereas the specialist technical committee comprises smaller groups of internationally recognised experts in their field.

During the course of the conference a number of technical workshops were also held, including new experimental techniques and facilities, accuracy of CFD predictions, and model manufacturing and accuracy.

The workshop on new experimental techniques and facilities included presentations on two new facilities for modelling deep-water conditions for offshore oil and gas projects. The first was the Brazilian Ocean Basin in Rio de Janeiro, Brazil, which is expected to commence operation in November 2002. This basin has dimensions of 40 m by 30 m and a depth of 15 m, making it the deepest of its type in the world. It also boasts a 5 m diameter pit providing an additional 10 m of depth and has the capability of modelling waves, wind and current. A presentation was also made on the new deep-sea basin at the National Maritime Research Institute in Tokyo, Japan. This facility consists of a round basin of 16 m diameter with a depth of 5 m and a central pit of 6 m diameter, providing an additional 30 m of depth and making it the deepest basin of any type in the world.

Considerable discussion was held throughout the conference regarding the accuracy and reliability of CFD predictions. There appeared to be repeated calls for serious attention to

be paid to the verification and validation of CFD applications and procedures in an effort to improve the accuracy of predictions, increase the number of appropriately trained users and reduce user variability.

During the past 3 years most of the 80+ ITTC Recommended Procedures were revised and updated, with the current procedures being accepted at the conference. These procedures cover many areas of the work undertaken by member organisations, including:

- Document and data control
- Model manufacture
- Control of inspection, measuring and test equipment
- Testing and extrapolation methods, including
    - Resistance
    - Propulsion
    - Propulsor
    - Cavitation
    - Ice testing
    - High speed marine vehicles
    - Manoeuvrability
    - Loads and responses
    - Environmental modelling
    - Seakeeping
    - Ocean engineering
    - Uncertainty analysis in EFD
    - Uncertainty analysis in CFD
    - Verification and Validation Methodology and Procedures in CFD
    - Full scale measurements
    - Speed and power trials

More information on the ITTC can be found at the permanent website, www.ittcdoc.org or at the website dedicated to the 23rd conference at www.ittc-2002.insean.it Alternatively, contact the Australian representative, Gregor Macfarlane at AMC. The AMC Library holds copies of the ITTC conference proceedings for the past 15 or so years.

ONR Science and Technology Workshop

19–20 September 2002

Conference Report by Lawry Doctors

The recent opening of the Office of Naval Research International Field Office (ONRIFO) in Melbourne (see *The ANA*, May 2002) was marked by the Science and Technology Workshop held at Monash University on September 19 and 20.

The workshop was opened by the triumvirate of Dr Peter Majumdar, Head, ONRIFO — Australia, Prof. Rhys Jones, Department of Mechanical Engineering, Monash University (host for the event), and Dr Graham Johnston, Acting Chief, Maritime Platforms Division, Defence Science and Technology Organisation.

There were 144 attendees at this workshop, and a total of 28 presentations, as follows:

Ship Hydrodynamics
Lawrence Doctors: *Practical Prediction of Resistance of High-speed Ships*
Michael Banner*: A New Perspective on Predicting Wave Breaking at Sea*
Paul Brandner: *Developments of Cavitation and Viscous Flow Investigation*
Len Koss: *Ship Evacuation Simulation*
Ernie Tuck: *Thin Ships, Pressure Distributions and Planing Surfaces*

Microsensors and Smart Structures
Jason Hayes: *Laser Micromachining*
John Dell: *Silicon Nitride Based MEMS Structures*
Stephen Collins: *Optical Fibre Sensors for Simultaneous Measurement of Strain and Temperature*
Wojtek Wlodarski: *SAW Sensors*
Christine Scala: *Smart Materials and Structures Initiative Nanotechnology*
Paul Mulvaney: *Building a Future from Nanocrystals*
Anne Ammala: *Nanoparticle Production and Functional Nanomaterials*
George Simon: *Nanocomposite Materials*
Barry Muddle: *Nanostructured Materials*

Advanced Materials
Jim Williams: *Electronic Materials*
Ian Polmear and Roger Lumley: *Light Alloys*
Richard Hannick: *Ceramics*
Michael Bannister: *Fibre-reinforced Polymers*

High-Performance Computing
Bill Applebee: *High-performance Computing*
Steve Quenette: *Geoscience and Visualization Cluster Initiatives*
Peter Dyson: *Simulations of Ionospheric Radar Propagation using High-Performance Computing*
Chris Seeling: *Oilplan Simulation/Virtual Engineering*
Pavel Trivailo: *Dynamics and Control of Smart Towed Systems*

Advances in Mechanics
Rhys Jones: *Meso- to Nano-mechanics*
Mike Xie: *Structural Optimization*
Don Kelly, R. Li and K. Wang: *Failure Prediction and Cost-Based Optimisation in Composite Structures*
W.K. Chiu: *Stress Waves and Sensors*
Liyong Tong: *Controlled Behaviour of Smart Structures — Some Recent Advances*

Dr Graham Johnston, Dr Peter Majumdar, and Prof. Rhys Jones (Photo courtesy Lawry Doctors)

Recent US Contracts

As we debate how Australia should structure the naval shipbuilding and repair industry in a very small market, it is interesting to observe developments in the largest market in the world.

Last June the United States Coast Guard awarded Integrated Coast Guard Systems (ICGS) a contract to carry out a far-reaching modernisation program for the agency's deepwater forces — the ships, aircraft, command and control, and logistics systems that fulfil the US Coast Guard's many missions.

ICGS — a 50/50 partnership of Northrop Grumman Corporation and Lockheed Martin Corporation — was awarded a contract valued at $US11 billion (about $A20 billion) to modernise the Coast Guard's deepwater assets over a twenty-year period. The program's total potential value over three decades is estimated at approximately $US17 billion (about $30 billion). Deepwater is the largest recapitalisation effort in the history of the Coast Guard and will involve the acquisition of up to 91 ships, 35 fixed-wing aircraft, 34 helicopters, 76 unmanned surveillance aircraft, and upgrade of 49 existing cutters and 93 helicopters, in addition to systems for communications, surveillance and command and control.

ICGS will manage over 100 companies from 32 states, as well as four international team members, to implement its comprehensive plan for the Coast Guard.

The cutter design and production work will be performed at Northrop Grumman's Ship Systems sector, headquartered in Pascagoula, MS. Ship Systems includes primary operations in Pascagoula and Gulfport, MS, and New Orleans and Tallulah, LA.

An impression of the proposed 3 686 t national security cutter for the US Coastguard

In October 2002 Naval Sea Systems Command's Supervisor of Shipbuilding, Conversion and Repair (SUPSHIP) Portsmouth, VA, awarded four multi-ship multi-option contracts for depot maintenance on ships home ported in the Hampton Roads area.

Two contracts valued at $70 million were awarded to Norfolk Shipbuilding and Drydock Corp. for maintenance on six amphibious dock-landing ships. Colanna's Shipyard was awarded a $52 million contract for maintenance on five guided-missile frigates. Metro Machine was awarded a $109 million contract for maintenance on four amphibious transport dock ships.

Announcing the contract, the US Navy said that multi-ship, multi-option contracts allow the navy and contractors to establish long-term relations between the ship and the contractor, reduce the learning curve, cut costs and improve responsiveness for emergent work and growth. The contracts also provide program stability and incentive for the contractor to plan for facilities investment and provide a level loading that results in improved contractor efficiency and cost savings.

Great Britain Celebration and Exhibition

The Australian National Maritime Museum this month celebrates the 150th anniversary of a key event in Australia's migration history: the grand entry of SS *Great Britain* into Sydney Harbour on her first voyage to Australia. The celebration will take the form of an open forum involving specialist speakers and descendants of migrants who arrived in Australia on the famous ship, and will include an opportunity to view the museum's standing display of *Great Britain* artefacts and illustrations.

Designed by Isambard Kingdom Brunel, and widely acclaimed as the world's first passenger liner, *Great Britain* was one of the most advanced ships of her time, driven by steam as well as sail, and with the newly-developed screw propeller instead of paddle wheels. She was noteworthy, naval architecturally, for a number of reasons. She was 322 ft (98.15 m long), 51 ft (15.54 m) bream, had a displacement of 3 400 tons (3 454 t), and was the largest vessel in the world at the time, the first all-iron vessel, and used a substantial amount of longitudinal framing.

She called at Melbourne on 12 November and Sydney on 25 November 1852, bringing British diggers to the recently-opened Australian goldfields. After that she made 31 return voyages over a span of 22 years, bringing more than 25 000 migrants to Australia, to become one of the most significant migrant ships in Australian history. Historian Vaughan Evans once estimated that one in twelve Australians could trace their origins in Australia directly to *Great Britain.*

Great Britain survives today, as one of the most celebrated museum ships in Europe. She rests in the Great Western Dock at Bristol, UK, where she was built and launched in 1843. The British Government recently announced a £7 million ($20 million) grant to fund her conservation.

One of the curators responsible for researching this wonderful ship's history and preparing a conservation plan for her future will be the keynote speaker at the *Great Britain* Open Forum at the Australian National Maritime Museum, Darling Harbour, on Sunday, 24 November. Mr Shane Casey, who is a maritime archaeologist as well as a curator on the *Great Britain* project, has travelled from Bristol to attend this forum and a similar sesqui-centenary celebration in Melbourne. The audience will include well over a hundred people descended from settlers who arrived on the great 19th century migrant ship.

The exhibition of drawings and artefacts will remain on display till about May 2003.

Phil Helmore

PROFESSIONAL NOTES

Engineers' Salaries and Contract Rates

The Association of Professional Engineers, Scientists and Managers (APESMA) has released the results of its latest professional engineers remuneration survey. The survey, conducted in March of this year, reported an average annual increase in professional engineer salaries of 4.5%. This compares to an average annual increase of 4.9% reported at the same time last year, and a rise in the ABS Consumer Price Index of 2.9% in the twelve months to the end of March 2002. Base salaries rose by an average of 5.1% in the private sector, and 3.8% in the public sector.

Graduate engineers commencing work during the last twelve months earned a median base salary of $38 000 on commencement, with lower and upper deciles of $32 000 and $48 000 respectively. Approximately 90% of graduates began on salaries higher than prescribed award minimums.

A trend in the employment of professional engineers is the increasing number opting to practice as contract engineers. Employers of professional engineers are making greater use of such arrangements as a means of meeting peak workloads or to engage contract professionals for specific projects or tasks. Professional engineer employees have access to the Australian Industrial Relations Commission and receive annual leave, sick leave, paid public holidays, long service leave, superannuation, jury leave, compassionate leave, family leave, professional development and retrenchment/ redundancy provisions. The contract engineer may be engaged on an hourly basis and generally does not have access to these provisions. The contract engineer must take such provisions into account when determining the hourly fee to be charged. The last page of the seven-page summary report on the APESMA website is required reading for anyone employing or employed on a contract basis.

Check it all out at www.apesma.asn.au, and follow the links to Surveys/Professional Engineers Remuneration/Summary Report.

NMSC Safety Equipment Section for Comment

The National Marine Safety Committee (NMSC) has released Part C Section 7A, Safety Equipment, of the new National Standard for Commercial Vessels (NSCV) and its Regulatory Impact Statement for public comment. Part C Subsection 7A replaces Section 10 and part of Section 13 of the Uniform Shipping Laws Code.

This section of the NSCV specifies the requirements for the design and manufacture of safety equipment, and for the installation, stowage, labelling, and use of the equipment. The equipment covered includes survival craft such as liferafts, dinghies and rescue boats,evacuation systems, lifejackets, flares, EPIRBs, immersion suits and medical supplies. Communication, navigation and deck equipment will be covered in other subsections of Part C Section 7.

Copies of the Draft Standard, Regulatory Impact Statement and Comment Forms are available on the website www.nmsc.gov.au, or from the secretariat on (02) 9555 2879. Submissions on Part C Subsection 7A will be accepted until 30 November 2002.

NSCV Completed Sections Available on CD

Some sections of the new National Standards for Commercial Vessels have been completed and approved by all governments, and are now available on CD-ROM. If you wish to obtain a copy of the completed sections, then contact the National Marine Safety Committee Secretariat on (02) 9555 2879 or email secretariat@nmsc.gov.au. You will need to advise the following details for mailing purposes: name, job title, organization, mailing address, phone number and email address.

Phil Helmore

Warning of Upcoming PI Crisis for Consultants

The Association of Consulting Engineers Australia (ACEA) has warned of a "December crisis" as consulting engineering firms try to renew their personal indemnity (PI) insurance over the next few weeks.

Two surveys of ACEA member firms has found that in the last six months the average increase in PI premiums has risen by more than four times from 50% to 205%, with the largest increase at 1000%. The average increase in PI excess has risen by six times from 50% to 300%, with the largest increase at 1000%. The number of firms experiencing major difficulties obtaining PI cover has risen from 7.1% to 11%.

The ACEA said if current trends continue, by December the average increase in premiums will be 400%, excesses will increase by 600%, and 15% of firms will be struggling to get PI insurance.

According to the Association, some consulting engineers have had to withdraw their services in uninsurable activities such as environmental, water treatment, costing, building inspections, noise monitoring and marine engineering to get insurance. Most propose to pass on the higher cost to their clients.

IEAust. eNews, 15 November 2002

NAVAL ARCHITECTS ON THE MOVE

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

Seref Aksu has moved on from his position as a Research Scientist at the Defence Science and Technology Organisation at Maribyrnong. He has taken up a position as a Senior Lecturer in the Naval Architecture Department of the Universities of Glasgow and Strathclyde, Scotland. His wife Serap, also a naval architect, has joined the department to complete a higher degree.

Fredrick Barrett of Mungral Yachts in Hobart is presently working at McConaghy's Yachts in Sydney.

Andrew Cooper has moved on from Mark Millman Marine in Geraldton and has taken up a position with Australian Maritime Technologies in Williamstown.

Dan Curtis has moved on from Navy Systems Branch and has taken up the position of Australian Naval Liaison Officer (ANLO) based at Bristol in the UK. He replaces mechanical engineer Ron Bebbington who has completed his three-year posting there.

Mike Fitzpatrick has been living in Prague, Czechoslovakia, for the last two years, with Kathy working and Mike looking after the children and consulting occasionally to Incat Designs. Mike writes that they have just spent the (northern) summer in Canada. They plan to stay in Prague for a few more months and then head off into the wide blue yonder again, possibly (but not definitely) back to Australia.

Tim Gourlay has moved on from his lecturing position at the Australian Maritime College and has taken up a position as a Research Fellow with the Centre for Marine Science and Technology at Curtin University in Perth.

Kristoffer Grande has submitted his master's thesis on *Slamming of Sailing and Powered Catamarans* at Curtin University, and has moved to Europe but has not yet chosen his employer.

Nick Hornsby retired from his position as Project Engineer on the SuperCat construction at Australian Defence Industires, Garden Island, about two years ago, and is now living at Toronto on the western shore of Lake Macquarie. He spends his time practising his golf and sailing with John McCarlie and, when he can fit it in to a busy schedule, consulting. You have to get your priorities right!

Andrew Jeffs has moved on from consulting and has taken up a position as Market Research Manager for the Austal Group of companies in Fremantle.

David Sherwood has moved on from Nigel Gee and Associates Ltd, and has taken up a position with Shipworks Superyachts (renamed from Shipworks Brisbane) in Brisbane. David writes that they have a 44 m motor yacht on the go, and a 56 m yacht due to commence construction in January next year. At this stage designs are not in-house, but they are setting up a design office with a view do doing all their own design work in future. If you want to check out Shipworks, have a look at www.shipworksbrisbane.com (which includes a webcam, updated every 30 s during working hours!)

Jinzhu Xia has moved on from the Centre for Marine Science and Technology at Curtin University and has taken up a research position at the Australian Maritime College in Launceston.

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

Phil Helmore
Gregor Macfarlane
Kim Klaka

MEMBERSHIP NOTES

AD Council Meeting

The Australian Division Council met on 18 September, with teleconference links to all members, and John Jeremy in the chair in Sydney. Matters, other than routine, which were discussed included:

- Marine Safety Conference 2002 in Brisbane: Bob Dummett had attended as RINA representative and produced a comprehensive report (see elsewhere in this issue of *The ANA*).
- Joint IMarEST/RINA conference in WA: This appears to be on hold at the moment and, if international, would be arranged via London.
- Professional Indemnity: There is much interest in this at the moment, but a hitch-hike being pursued with the Australian Institute of Marine Surveyors did not come to pass, due to differences in operations. Our numbers are small, so there is little interest from underwriters in us as a group, but they will (as usual) consider individual cases.
- Industry Liaison Committees: Noel Riley reported that the AMC/Industry liaison committee meets every two years. Phil Helmore undertook to start the ball rolling on a UNSW/Industry liaison committee meeting, the last one having been held in 1999, following which the program was significantly modified.
- Website: Mike Warren reported that notices of meetings on some web pages were long outdated, and indicated that all sections should be attending to the currency of their sites. In particular, when a meeting has been held, the notice of that meeting should be moved elsewhere, e.g. as done by WA, to a special Meeting Report part of the Section News page.
- Safety Committee (London): Robin Gehling reported that this committee works well as an international forum. However, the Marine Safety Agency (UK) feeds a lot of paperwork to it for vetting, and there seems to be a need for a separate UK safety group.
- Ausmarine West: Jim Black reported that all is on track for this event.
- NA Brochure: Brian Hutchison reported that the brochure detailing NA courses and prizes in Australia is now complete, and available on the website. The location needs to be improved, as you have to drill down through AD News to get to it but, at least, it is there.
- Yeronga NA Diploma: Brian Hutchison reported that Yeronga Institute of TAFE is developing a Diploma of Engineering and Naval Architecture course, to be web-based, and which will articulate to the universities.

The next AD Council meeting is scheduled for Wednesday 11 December.

Phil Helmore

Correction

In the last edition of The ANA we included an error in the list of members on the NPER Naval Architecture Competency Panel. The correct list of members is Werner Bundschuh, Jim Black, Stuart Cannon, Bryan Chapman, Lawry Doctors and Allan Taylor.

FROM THE ARCHIVES

AUSTRALIA'S FIRST ALL-WELDED WARSHIP

John Jeremy

A little over fifty years ago, on 1 March 1952, the first all-welded warship to be built in Australia was named Voyager *and launched by Mrs R. G. Menzies at Cockatoo Island in Sydney. The first of an intended four Daring-class destroyers,* Voyager *introduced cafeteria messing, air conditioning and alternating current to the fleet.*

DESIGN ORIGINS

The Daring-class destroyer design evolved from a Royal Navy staff requirement of 19 June 1943 for a fleet destroyer. Initial sketch designs forecast a ship with a standard displacement of 3 500 tons, a deep displacement of 4 500 tons and a waterline length of 420 feet (127.27 m). By the time the design was approved on 9 February 1945, the standard displacement had been reduced to 2 630 tons, and was further reduced to 2 610 tons by the decision to adopt all welded construction, aluminium alloy for minor bulkheads and braided instead of lead covered cables.

The new destroyers were to be armed with six 4.5 inch (114.3 mm) guns in twin Mk 6 RP 41 mountings, six 40 mm Bofors guns in two STAAG and one Mk V mounting, two sets Pentad torpedo tubes with ten torpedoes, and depth-charge throwers and rails for seventy depth charges. The depth charges were later replaced by one Squid Mk 4 ahead-throwing mortar.

A new design of propulsion machinery was approved to improve efficiency over the Battle-class destroyers' plant and to provide a speed of 32 kn with an endurance of 4 400 n miles at 20 kn.

A 1948 builder's model for the Daring class showing unit sub-division (J. S. White photograph)

Sixteen ships were planned, and orders were placed on 29 March 1945. Eight ships were subsequently cancelled. J. Samuel White and Company were given the task of preparing the working drawings for the class, which were to be built from about 100 prefabricated units although the builders of four ships were allowed to employ composite construction.

Construction of the Daring class was delayed by the priority given in the early post-war years to merchant ships and it was not until 1948 that approval was given to proceed with the construction of all eight ships.

The Royal Navy ships were completed between 1952 and 1954, and all exceeded their designed displacement by some 220 tons, mainly due to increases in the weight of machinery [1].

THE AUSTRALIAN DARING-CLASS DESTROYERS

In April 1946 the Australian Government gave approval to the RAN for the construction of four destroyers of the Daring class, in addition to the two Battle-class destroyers (*Anzac* and *Tobruk*) then under construction. The destroyers were to be built by Cockatoo Docks and Engineering Co. Pty Ltd in Sydney and HMA Naval Dockyard Williamstown, Victoria. Modernisation of the facilities in the two dockyards to enable them to build fully-welded ships was also approved.

Preliminary drawings for the new ships were provided to the shipbuilders in the following month and formal orders were placed in December 1946.

The Cockatoo Dockyard order was placed under the conditions of the Wartime Agreement between the company and the Commonwealth, which provided that the shipbuilder be paid the actual cost of construction. Under the terms of this agreement (terms that continued with only slight modification until 1972), the company received a management fee based on turnover as reward (or profit). The contract conditions were largely the same as those for the construction of the Tribal-class destroyers during World War II, and it was a condition of the order that the second destroyer not be laid down until the first was launched.

The shipbuilders were also advised of the conditions that applied to the building of these ships, as specified by the Department of Treasury:

'The approval in principle given by Cabinet to the building of four additional destroyers of an advanced type may be regarded as authority to proceed with the placement of orders to ensure the maintenance of shipbuilding capacity in Australia.

The main consideration involved in the maintenance of this shipbuilding capacity is its relation to:

(a) the ultimate strength and composition of the post-war Australian forces, and

(b) the balanced allocation between the Service and Supply Departments.

Until a decision is reached on these matters orders to be placed under the Cabinet approval should not exceed the essential minimum necessary to maintain production capacity from time to time. The necessity to continue the work of constructing the destroyers should also be reviewed at regular intervals.' [2]

These conditions were to have a significant impact on the pace of the project in coming years.

In addition to the order to build Daring class destroyers No. 1 and 2, Cockatoo Dockyard also manufactured the boilers, turbines and many other parts from kit lockers to watertight doors for all four ships. Working drawings were supplied by J. Samuel White for the RAN ships, with Australian modifications incorporated by the shipbuilders.

Much of the armament and equipment for the ships was also to be made in Australia and the guns and torpedo tubes were manufactured by the Department of Defence Production in Bendigo.

The forebody units for *Voyager* during assembly
(RAN Photograph)

PROGRESS ON CONSTRUCTION

In December 1946, it was intended that the first ship would be laid down at Cockatoo Island in July 1947 for completion in December 1949. Construction of the second would follow between July 1948 and July 1950. This programme was soon changed with the first ship to be laid down in March 1948, launched in March 1949 and completed in June 1950. Even this revised programme proved to be wildly optimistic, and progress was slow.

Work began in the mould loft at Cockatoo on 1 April 1947. By January 1948 there were delays due to the lead time required for the supply of turbine forgings, and although cutting of steel for the first ship began on 1 June 1948, by then the programme had already been extended for several reasons. These included the failure to obtain increased manpower in the numbers anticipated; the strike of Cockatoo Dockyard employees in February/March 1948 which involved all adult employees in a stoppage of one month and caused two months disruption; protracted deliveries of structural materials; delay in receiving working drawings from Britain, and extended deliveries of important forgings and castings for machinery.

By March 1950, further serious delays in the receipt of drawings, materials and equipment, together with more industrial disputes and manpower shortages in both shipyards extended the programme by a further year. Delays to the drawings were so bad that it was suggested at one time that the drawings being prepared by White's should be taken over and completed in Australia.

Assembling a flat panel with the aid of magnetic clamps
(RAN Photograph)

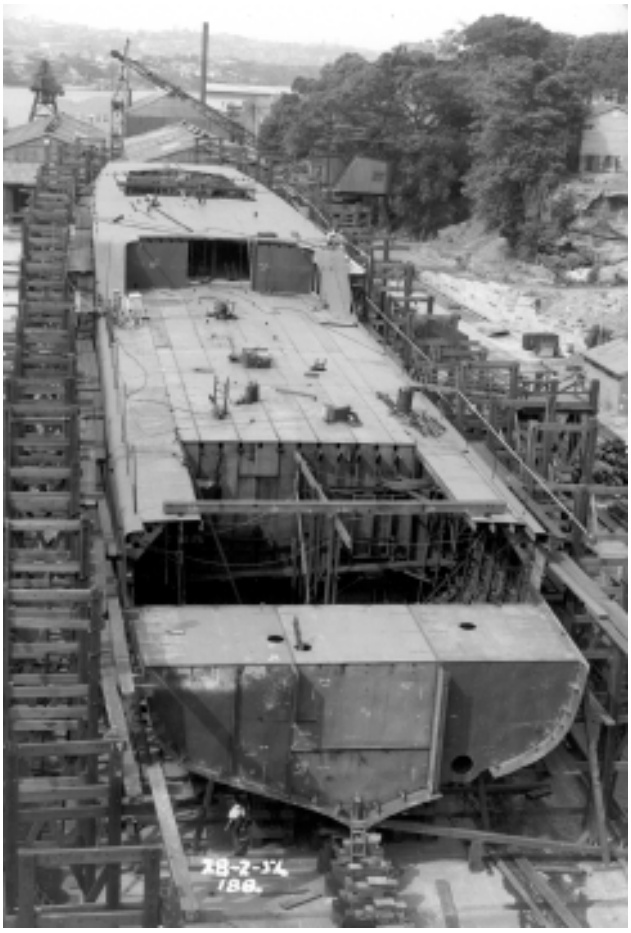
By January 1951 it was apparent that the delays would be felt for some time. Manpower was still a problem, and only one satisfactory steel casting, that for the HP turbine casing, had been received. At Cockatoo, priority for labour was given to the reconversion of *Kanimbla* for commercial service, the modernisation of the Tribal-class destroyer *Arunta* and the conversion of the destroyers *Queenborough* and *Quiberon* to Type 15 anti-submarine frigates.

By 1953 the financial limitations imposed by the Treasury were having a major influence on the speed of construction and the availability of funds was largely determining the rate of progress. It was not until the following year that recurrent shortages of labour were eased by the transfer of *Quiberon* to Garden Island for completion. The dates forecast then were close to those finally achieved, although there were still doubts that the armament being built at Bendigo would be ready to suit the outfit programme for the first ship.

CONSTRUCTION OF THE FIRST SHIP

Following the construction plans for the all-welded RN ships, the Australian Darings were constructed from three-dimensional prefabricated units. Lower hull units were constructed upside down, commencing with the forebody. After fabrication, the units were separated and turned right side up for erection on the slipway. More extensive use was made of panels for the upper shell and decks.

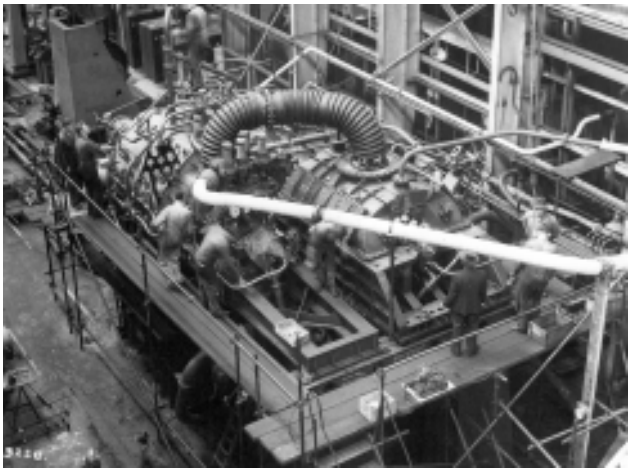
Turning the first unit to berth with the aid of
the floating crane *Titan*
(RAN Photograph)



Erection progress on the slipway in February 1951
(RAN Photograph)

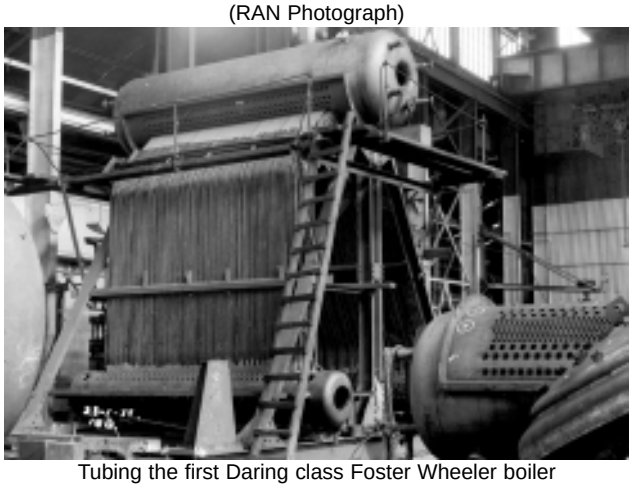
Extensive use of aluminium was made for minor bulkheads and for some external bulkheads in the superstructure. This aluminium was riveted. The rivets work-hardened and tended to be brittle, with broadsides producing many flying rivet heads in later years. Whilst faying surfaces between the aluminium and the steel curtain and coaming plates were insulated with barium chromate tape, corrosion between the dissimilar metals was also to become a major problem.

Daring-class destroyer No. 1 was laid down on the No. 1 slipway at Cockatoo Island on 10 October 1949. She was named *Voyager* and launched by Mrs R. G. Menzies, wife of the Prime Minister, on 1 March 1952.



Shop test of a turbine set for *Voyager*
(RAN Photograph)

A condenser fabrication (left) and a HP turbine casing in the welding jig in may 1950
(RAN Photograph)



Tubing the first Daring class Foster Wheeler boiler in January 1951
(RAN Photograph)

With the delays to the manufacture of equipment for the ships, *Voyager* was largely a shell, with a launch weight of 910 tons. Fitting out proceeded at a leisurely pace, with the ship finally completing contractor's sea trials in September 1956. She was handed over to the RAN on 11 February 1957 and HMAS *Voyager* was commissioned the following day.

Ship 188, *Voyager*, ready for launching from the No. 1 slipway at Cockatoo Island on 1 March 1952 by Mrs R. G. Menzies
(RAN Photograph)

HMAS *Voyager* had the following general particulars:

Dimensions

Length overall	390 ft (118.18 m)
Length bp	366 ft (110.9 m)
Breadth mld.	42 ft 10 in (13 m)
Breadth ext.	42 ft 11¾ in (13.03 m)
Depth mld.	22 ft 6 in (6.82 m)
Lightship	2 606 tons
Standard	2 840 tons
Full load	3 532 tons

Machinery

English Electric geared turbines and two Foster Wheeler boilers driving two shafts.

Steam conditions	650 psi, 850° F (4.48 MPa, 454° C)
Propellers	12 ft (3.64 m) dia, 14 ft 4 in (4.34 m) pitch, three blades.
Designed SHP	54 000 hp (40 270 kW)
Designed RPM	300
Designed max speed	33 kn

Armament

Main	Six 4.5 inch guns in three Mk 6 RP 41 Mod 1 turrets
Secondary	Six 40 mm guns in two STAAG mountings and one Mk V mounting
Torpedoes	Five in one Pentad mounting
Anti-sub	One Mk 10 mortar (Limbo)

On trials *Voyager* achieved 56 364 shp at 307.8 rpm for a maximum speed of 33.34 kn, an above average performance when compared to the RN ships. Fuel consumption at full power was 0.725 lbs/shp/hr, 18.05 tons per hour or 1.842 n miles per ton. She was built without the benefits of the accuracy of the computer-driven plate-cutting machinery available to shipbuilders today. Plates were cut from full-size templates with the aid of a Travograph burning machine, and knowledge of welding contraction was less extensive than today. As built, she was 3¾ inches (95 mm) short on length between perpendiculars, and ¾ inch (19 mm) narrow in beam, which is not a bad achievement for a first welded ship.

Voyager entering the water on 1 March 1952
(RAN Photograph)

Voyager was the first RAN ship with air-conditioned accommodation and the first with cafeteria messing, a considerable advance by the standards of the day. The second two ships in the class were further modified and improved, notably by the deletion of the two 40 mm STAAG mountings.

The STAAG (Stabilised Tachymetric Anti-Aircraft Gun) mounting was a remarkable weapon. The mounting was fully self-contained with its own radar and fire control. It weighed

Voyager fitting out alongside the Cruiser Wharf at Cockatoo Island on 27 March 1953
(RAN Photograph)

Shipping the boiler into No. 1 boiler room
(RAN Photograph)

17 tons, was a maintenance nightmare and was somewhat unreliable. *Vampire* (completed in June 1959) and *Vendetta* (completed in November 1958) mounted six 40 mm guns in two Mk V twin mountings and two Mk IX single mountings.

The fourth ship, *Waterhen*, was cancelled in March 1953.

The crew's cafeteria in HMAS *Voyager*
(RAN Photograph)

The three destroyers completed were expensive ships by the standards of the day. When the original sketch design was approved in 1945, the cost per ship was estimated to be £950 000 (sterling). The Royal Navy ships actually cost about £2 282 000. *Voyager* cost £A2 949 092 (excluding government-furnished equipment). The cost of preparatory work at Cockatoo for all ships (mainly working and as-fitted

HMAS *Voyager* at sea during trials
(J C Jeremy collection)

drawings, lofting, etc.) was £A439 085. *Vampire* cost £A3 309 856 (excluding GFE). The boilers and turbines (four ships) cost £A1 946 715. The high cost is not surprising in view of the construction history.

SERVICE LIFE

Voyager served with the Far East Strategic Reserve on six occasions and frequently escorted the aircraft carrier HMAS *Melbourne*, a role often undertaken by the RAN Daring-class destroyers. She was sunk in collision with *Melbourne* off Jervis Bay on the night of Monday 10 February 1964 with the loss of 82 lives.

Her sister ships had much longer and happier lives, and today *Vampire* remains a popular exhibit at the Australian National Maritime Museum, a fine example of the last British destroyer design of World War II.

REFERENCES

1. Edgar J. March, *British Destroyers, A History of Development 1892–1953*, Seeley Service and Co., 1966.

2. Navy Office letter No. 117353 dated 19 December 1946 to Cockatoo Docks and Engineering Co. Pty Ltd.

HMAS *Voyager* in Sydney Harbour on Australia Day 1964.
She was lost at sea on 10 February 1964
(J C Jeremy photograph)

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