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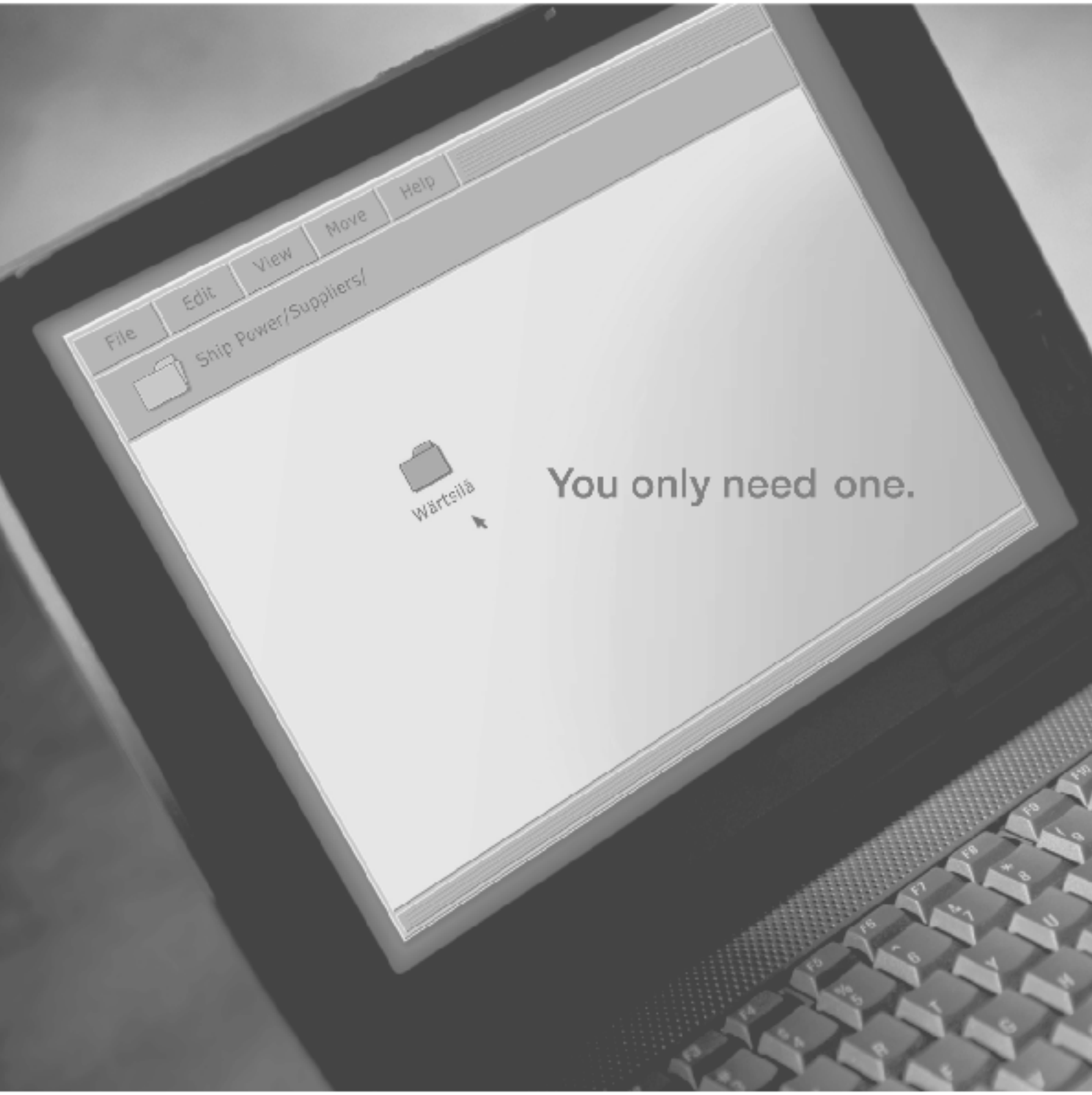

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THE AUSTRALIAN NAVAL ARCHITECT

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Cover Photo:

Three 22 m patrol boats built by Austal Ships for the Kuwait Coast Guard, *Kassir*, *Dastoor* and *Mahroos*, showing their paces during trials off Western Australia (Photo courtesy Austal Ships)

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RINA Australian Division
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From the Division President

The past three months have been extremely busy for the Division, and the action still has some way to run. There has been something happening to involve just about everyone, no matter whether your interests lie in yachting, commercial vessels, career progression, you name it!

I won't repeat the items of Council business covered by Keith Adams elsewhere in this issue, but there's plenty more!

Eminent Speaker Tour

During July we had a lecture tour by the eminent speaker Professor Peter Jackson. This was organized by Engineers Australia and supported by the Division. I attended his presentation in Canberra, on a subject that is a pleasure for most and work for a select few, which was well received despite the land-locked venue. For those like me not professionally involved in sailing, it seemed to provide a most enlightening "total engineering" perspective to high-performance yacht design and construction.

National Standard for Commercial Vessels (NSCV)

At about the time you receive this edition of our journal, the public comment period will close for two documents produced by the National Marine Safety Committee which will be of particular importance for those naval architects who now use the USL Code and will use its successor document, the NSCV. RINA, through the Divisional Council, is attempting to ensure that the outcomes in these documents provide a robust safety framework which can be readily implemented by naval architects. Details of these requests for public comment are given elsewhere in this issue.

The first of these documents for comment is the draft of the fire safety section, which is nearing completion following input from RINA in its earlier stages. Without prejudging what amendments might result through the public comment phase, this document appears to me to be reasonably robust and should not present too many problems to naval architects.

Somewhat more problematic is the second document, a discussion paper on the development of the construction requirements of the NSCV. This paper sets the scene for replacement of the present USL Code requirements and proposes a number of possible options for that replacement under the NSCV. As the passage of time has meant that it is no longer possible for such replacement to be like-with-like, these options are somewhat radical compared with the status quo. It may be possible to develop further options with which USL Code users are more comfortable, but this will not happen unless people in the industry, naval architects in particular, respond to the NMSC's invitation to have their say. Divisional Council, through its Safety Group, is attempting to provide coordinated input to these aspects of the NSCV.

Members should note that two developments during this year reflect recognition by the NMSC of the role that naval architects can and should play in the development of the content of the NSCV. First, Bryan Chapman was invited to join the NSCV's Industry Advisory Committee as RINA representative, and then I received an invitation to sit on the committee preparing the program for the NMSC's Marine Safety Conference in Hobart in April next year. Bryan and I are your representatives, so we cannot afford to let slip our opportunity as a professional organisation to contribute to the improvement of the national framework. If you have any views that you feel should be expressed to either of these NMSC forums, please don't hesitate to let Bryan or me know. In particular, if you have any subjects that you feel should be discussed at the NMSC Marine Safety Conference, now is the time to let me know.

Registration as Chartered Engineer

Divisional Council has been actively pursuing several aspects of the professional recognition of RINA members through the course of this year. While the establishment of an area of professional practice entitled "naval architecture" is looking positive and has been covered elsewhere in this edition, increasing pressure has been applied by some employers for their professional engineer employees to obtain Chartered registration. Members and Fellows facing this situation should be aware that all such employers contacted to date have indicated that the requirement can be met by registration as Chartered Engineer (CEng) obtained through the Australian Division of RINA. Details are set out in a letter dated 4 August which I sent to all members by email through the Secretaries of Sections.

I trust that you will see from the above that recent months have been challenging for the Divisional Council. The developments outlined above provide something of significant interest for practically all of our members. Nonetheless, it is not a time for reflection. Work on the NMSC/NSCV subjects and our professional status looks like continuing for a few months yet at least, and provides tangible evidence of the increasing value of membership of, and participation in, RINA as our professional body.

Finally, having known him since our university days, I would like to congratulate Rear Admiral Trevor Ruting RAN on his recent promotion. This promotion is an indication of not only his personal qualities, but also the quality of the profession to which he is proud to belong.

Rob Gehling

Editorial

It seems like only yesterday that we were swept up in the Olympic Games in Sydney — a memorable and once-in-a-lifetime event particularly for those of us who were lucky enough to be involved in some way. The last four years have passed by with the usual controversies but finally a colourful opening ceremony has heralded the start of the 2004 Games in Athens.

The watery opening may be one of the few maritime aspects of the games we see on television — as was the case in Sydney sailing is unlikely to attract much television time unless we look like winning a medal or two — but we can rejoice in the selection of the experienced sailor and Atlanta Bronze medal winner Colin Beashel to carry the Australian flag in the opening ceremony.

The Greek facilities appear to be magnificent and the location is, of course, unrivalled. We wish all involved in the 2004 Games success in their endeavours and an experience to savour for many years to come.

John Jeremy

Letters to the Editor

Dear Sir,

The correspondence regarding U-tubes for inclining experiments in the last issue of *The ANA* read well, and my friend (whose innocent question started it all) is pleased with the outcome so far.

However, no-one has yet answered my question. If you start with both tubes level, heel the ship and find that one tube has altered by six units, say, and the other tube has altered by four units, say, then what is the correct reading? No amount of simultaneous reading will be of any help. I don't know the answer. It was this type of problem which led me to reject U-tubes as the sole means of measuring heel.

Robert Herd

Dear Sir,

Perhaps I could attempt to answer Mr Herd's question. I am investigating the use of U-tubes for inclinings for my thesis project and, so far, have conducted six inclinings using both U-tubes and pendulums.

In the case quoted by Mr Herd, the total deflection of the fluid level would be four units plus six units, giving a total of ten units. The angle of heel would be found as the inverse tangent of the ratio of this ten units to the length between the standpipes of the U-tube. The value of *wd/a* would be the moment of the mass shift divided by this ten units.

Water is effectively incompressible, and you would expect that the rise of level on one side would equal the fall in level on the other. Why is there a difference between the deflections port and starboard? I think that it is just due to experimental error, and is allowed for by all values of *wd/a* being required within 5% of the average. The same applies to the pendulums, whereall values of *wd/a* must be within 5% of the average.

Having now arranged the simultaneous set-up of U-tubes and pendulums for a number of inclinings, it has become clear that pendulums have several practical advantages:

(a) Pendulums are light, compact, and easily portable. U-tubes, in comparison, are much more bulky and must be lugged around. The tube itself needs to be long enough to cater for most expected vessels, and the bulk of the tube can then be a problem on small vessels.

(b) Pendulums require only a location for an upper attachment point. A location where the batten can be simultaneously clamped to the vessel helps, but this can be obviated by thoughtful planning. One good system is to take along two stools or buckets (which can be filled with water) and to which the batten can be clamped over the (lower) pendulum bucket.

U-tubes, in comparison, require simultaneous locations for the two standpipes athwartships of each other.

(c) U-tubes require careful alignment to ensure that both standpipes are initially parallel and vertical, and careful attention that all air has been eliminated from the tube, all of which takes time. As a result, pendulums are much quicker to set up than U-tubes.

These factors mitigate against the use of U-tubes, quite apart from purely technical considerations.

Sean Cribb
UNSW Student

Dear Sir,

I am writing to express my appreciation for the recent presentation made by Professor Peter Jackson, *An Engineer Goes Sailing*, which was given at the combined technical meeting of the Sydney Mechanical Branch of Engineers Australia, the NSW Section of RINA and the Sydney Branch of IMarEST on 15 July 2004.

As a naval architecture student currently enrolled in the Design of Yachts course, I found that the material presented by Professor Jackson has served as a most valuable introduction to this complex engineering design problem. In his discourse, Professor Jackson summarised the major considerations in technical yacht design (from sail and hull dynamics to load considerations and highly-technical wind-tunnel testing), and presented them in a simple and erudite manner which was easy to follow and extremely informative.

Having completed a Bachelor of Engineering degree in mechanical engineering in 1994, I am returning to an engineering career after many years in supply-chain management. My ambition is to be a successful yacht designer in my own right. Professor Jackson's presentation served as a great motivator in my endeavour, revealing a highly-specialised world which, intuitively, I knew was out there but, until now, has been hidden from view.

Thank you, Professor Jackson, for your presentation and thank you, RINA, for making opportunities like this available.

Craig Singleton
UNSW Student

NEWS FROM THE SECTIONS

ACT

The ACT Section held its AGM at lunchtime on Tuesday 20 July, with Gordon MacDonald in the chair. Gordon noted that since the move interstate of the Section's Secretary, Michael O'Connor, the administration of the section had been affected. However, regular technical meetings have been sustained, thanks to the earlier work of the committee in establishing a schedule of presenters. In the past year the section has held eight technical meetings, which were reviewed, and poor attendance at some of the meetings was noted as a problem. Given this problem, the benefit of continuing to host joint evening meetings with IMarEST cannot be ignored.

The office bearers and committee members for the following year are:

Chair	Gordon MacDonald
Deputy Chair	Dave Magill
Secretary	Kate Linley
Treasurer	Nick Whyatt
Committee Members	
	Rob Gehling
	Alistair Allen
	Wade Limpus
	Martin Grimm
	Roger Duffield
Aust. Div. Council	Gordon MacDonald
	Rob Gehling (in his role as Division President)

Kate Linley

Victoria

Victorian Section activities have continued in recent months with an interesting and diverse range of presentations and activities in held conjunction with IMarEST.

Mr Ian Hollywood, Technical Manager for ASP Ship Management, spoke at the April meeting held at the EA Headquarters in North Melbourne on the two new *Spirit of Tasmania* ships now providing passenger and vehicle transport between Tasmania and Melbourne and Sydney. As a follow up to this presentation, Mr Hollywood hosted a ship visit for members on 28 May at Station Pier.

Mr Bryan Chapman provided an interesting presentation at the June Technical Meeting on *Modification of the Slab Carrier* Iron Monarch *to carry Steel Coils*. The vessel *Iron Monarch* (14 700 t dwt) was constructed by Whyalla Shipbuilding and Engineering Works as a roll-on/roll-off steel products carrier, entering service in 1973. Originally the vessel carried long products in bolsters, and was accompanied in this service by her sister ship, *Iron Duke*. After some years in service, *Iron Monarch* was modified to carry steel slabs instead of long products. She operates a shuttle service between Port Kembla (NSW) and Westernport (Vic) carrying slabs on the south-bound voyage and returning to Port Kembla empty. More recently, a need developed to carry a limited quantity of steel coils. The coils are generally of about 2 m diameter and 28 t mass. To minimise the stevedoring costs, steel cradles were designed to carry coils without lashing, the necessary securing forces being provided by the design of the cradle. In addition to cradles, special equipment also had to be developed so that the coils could be handled by the straddle carriers and magnet cranes normally used to handle slab. Mr Chapman discussed the various technical issues that had to be considered to develop a range of solutions.

On 16 July, on a chilly Melbourne winter night, members were treated to a presentation by Professor Peter Jackson, Pro-vice Chancellor for the College of Engineering at the University of Canterbury, NZ. The talk was held as part of Prof. Jackson's national lecture tour in conjunction with Engineers Australia. Prof. Jackson discussed a diverse background of enabling research undertaken for application to International America's Cup Class yachts on the aerodynamics of sails and flexible membranes.

Craig Gardiner

Queensland

The Queensland Section held a combined Section committee and technical meeting on 6 July 2004 at the Brisbane North Institute of TAFE, Hamilton, Brisbane, with a teleconference link to Cairns. As well as the normal business of finance, ($400 in the bank), and membership (now 55 members in the section), the Section committee reviewed the development status of the Diploma of Engineering (Ship and Boat Design) and discussed the Eligibility Criteria for the National Professional Engineers Register.

Afterwards, fifteen attendees enjoyed a technical presentation by Colin Lough (Performance Propellers Pty Ltd) on *Aspects of Propeller Design*. Brian Hutchison introduced Colin Lough and his wife Donna to the meeting. As a fitter and turner, Colin's passion for propellers led him to becoming head of the propeller division of Rogers and Lough and from there to own and run his own business, Performance Propellers Pty Ltd. In 1998 Colin's expertise led to his working with the United States Defence Department. He attended the Prop Scan propeller school, is a certified propeller technician, and has been using Prop Scan technology for around twenty years.

Using overhead transparencies, a Powerpoint presentation, and whiteboard sketches, Colin explained some of the principles of the operation of propellers and how to gain optimum efficiency from them. He stressed the importance for the uniform flow of water into the propeller. If the water flowing to the propeller is uniform, then there is little loss of efficiency that could otherwise be caused by inappropriate design or lack of streamlining of the keel, propeller aperture and external bearing brackets. Colin mentioned that, from his experience of seeing many propellers through Performance Propeller's workshop, he can understand why some boats do not achieve their design speeds and, in fact, when power, RPM and gearbox data is analysed by computer, these boats can be 2 – 3 knots off their designed speed. The two factors that most commonly contribute to this problem are poor keel design and non-optimum propeller design.

Colin explained that while a high-cost factor sometimes inhibits rectification of the keel or aperture configuration, the inefficiency can be addressed through a design change to the propeller. He identified factors that can be used in redesigning a propeller to help it work in a non-uniform flow. Rake can be used on the propeller if there is a diameter restriction and to help quieten the propeller — camber and skew and a non-uniform pitch distribution can also be used.

Using detailed graphics, Colin explained how propellers are measured on a minimum of 6 radii across the blade from 40% out to 90% of the diameter at 10% intervals — this data is used to machine the propeller, to set tolerances and, most importantly, to determine the design changes to maximise thrust.

Colin mentioned that a standard range of new propellers are available in either hand, in 2 3 4 and 5 blades, and blade area to suit cavitation needs. Also available are propellers that optimise sectional shape, skew and camber and have pitch set to a very high tolerance for increased efficiency and reduced vibration and noise.

All propellers supplied by Performance Propellers Pty Ltd have their pitch set to ISO 484/2 Standard, being either Class 1 or Class S. The four classes within this Standard that identify propeller quality and performance used in Prop Scan workshops are:

Class S – Very High Accuracy
Class 1 – High Accuracy
Class 2 – Medium Accuracy
Class 3 – Wide Tolerances

The Class 3 propeller is an economy-class propeller that does a basic good solid job. Colin pointed out that, understandably, a higher-class propeller of an optimised design will save fuel, reduce vibration and reduce erosion. Colin explained that Prop Scan EPS is a new Standard that builds on ISO 484 to satisfy the needs of sophisticated powerboats providing greater smoothness of operation, efficiency and speed.

Colin informed the meeting that the Prop Scan measuring system is used to check the pitch and section shape and is the only measuring system accredited with the United States and Canadian Defence Forces along with the Australian Defence Force. At dispatch, all propellers are accompanied by a Prop Scan Quality Certificate verifying the accuracy and tolerance to which the propeller has been designed and machined.

The interest generated by Colin's presentation was shown by the range of questions put to him by members and visitors. Colin responded and provided further information including his involvement in vessel design and powering, the classification of propellers, manufacture of identical propellers, use of the computer for fine tuning characteristics, return of propeller for maintenance, most efficient number of blades, most efficient blade shape and area, alloy composition of propellers, cupping of blades, casting, pressing and machining, and folding propellers for sailing yachts.

The meeting joined Acting Chair James Stephen in acclamation to thank Colin for his informative presentation and to Donna for her assistance to Colin. Colin may be contacted by telephone (07) 3899 1501, fax (07) 3899 9288 or email colin@pprops.com.au.

Brian Robson

New South Wales

Committee Meetings

The NSW Section Committee met on 26 May and, other than routine matters, discussed:

- SMIX Bash: The SMIX Bash committee has met, and is canvassing further sponsors.
- The Walter Atkinson Award for 2003: Nominations considered and decided; to be advised to the Australian Division by 31 May.
- Finance: After a lot of work, our Treasurer had divided up our finances into a Section account and a separate Social account, starting from the formation of the Section in October 1998. The Section account at 26 May is $167 in the black. Many thanks, Adrian, for your sterling effort.
- Technical Meeting Program: The technical meeting program for 2004 is complete, and so a presentation proposal for December may be held over to next year. The Nautical Institute has proposed a "hypothetical" case of an oil spill at the bulk liquids berth at Port Botany for 25 August, and we will help advertise this for them via our email lists.

The NSW Section Committee also met on 22 July and, other than routine matters, discussed:

- SMIX Bash: Many details sorted out, including "early bird" pricing and credit-card facilities available for tickets bought before 29 October; sponsorships about on track; bridging finance not required this year.
- Fisher Maritime Contract Change Management Courses: Arrangements are well in hand.
- Finance: The Australian Division is happy with our proposed division of finances back to the start of the Section, the audit of all years has been completed, and results forwarded. The Section account at 22 July was $140 in the red (i.e. being supported by the Social account), but we have payments for several venue hires due which will put the Section account back into the black.
- TM Program for 2005: We had received a proposal of a paper for 2005 about the movement of sand and waves at the southern end of the Collaroy beachfront, but this was felt to be more up the Maritime Panel's alley, and they have subsequently expressed their interest.
- RINA–LR Safer Ships Award: It was decided to propose a UNSW thesis from 2003 which had investigated free-fall lifeboats, and to canvass possible industry projects from the Australian Shipowners' association and from the Australian Shipbuilders' Association.
- Thomas Lamb, the editor of the new two-volume version of the SNAME publication, *Ship Design and Construction* will be in Australia in August, and has offered to make presentations to RINA. It was decided to accept his offer of a presentation on *Ship Design*

Methods on Thursday 26 August. He will also make a presentation to UNSW students and staff on *Design for Production* on Thursday 26 August, which all may attend.

Copyright, Patents and Trademarks in the Marine Industry

Hugh Hodgkinson of Hodgkinson and McInnes gave a presentation on *Copyright, Patents and Trademarks in the Marine Industry* to a joint meeting with the IMarEST attended by twenty-seven on 6 May in the Harricks Auditorium at Engineers Australia, Milsons Point. Hugh began his presentation by saying that there are many ways of protecting intellectual property (IP), including patents, registered designs, trade marks, and copyright; there are others, but these are the most important and most common. It may be that IP is your company's most valuable asset, and failure to protect it may put the future of the company at risk. IP is a balance-sheet asset, but is rarely shown that way.

Silverstream is the biggest patent filer in Australia; a start-up company which has many new ideas which they patent and then commercialise; they permanently employ a team of patent attorneys and spend about $½ million per year on filing patents!

Bishop Engineering, another Australian company, generates an annual revenue stream of more than $8 million from licensing. Arthur Bishop, many years ago now, developed a power-steering rack with gear teeth and a variable ratio, which everyone thought was impossible. It is now used in all GM, Ford, and Daimler-Benz vehicles. Bishops are vigilant about defending their rights, and this is the only way. Their royalty stream, 90% of which comes from overseas, provides a cash flow for further research and development.

In the IP field, patent attorneys are usually engineers or scientists who then become qualified in IP law. There are about 350 qualified patent attorneys in Australia.

The World IP Organisation (WIPO) is based in Geneva, Switzerland, and develops harmonised world-class IP laws between countries and regions.

Patents

A patent is a legally-enforceable monopoly right. It covers any device, substance, method or process which is new, inventive and useful. The term is for 20 years, provided that the renewal fee is paid annually after the first five-year period. Hugh then showed, as an example, the application for US Patent No. 5406091 for the open cellular (hatchcoverless) containership which was awarded to Australian company, Advance Ship Design. The filed patent contains the following:

- a description of the prior art;
- background (it is usually beneficial to have supporting diagrams);
- a description of related art;
- a summary of the invention;
- a description of the preferred embodiment; and
- a set of claims.

The set of claims is where patent attorneys earn their keep, drafting the claims correctly. If they are drafted too widely, then they stray into known technology; if drafted too narrowly, then they become easy to avoid.

The Patenting Process

There are four key steps in a patentable idea:

- conception of the idea and how it is to be achieved;
- a study of the prior art;
- a test for whether the idea is "new" or "novel"; and
- a test for whether there is an "inventive step".

Once satisfied that there is an inventive step, you should visit your patent attorney to lodge the application for a provisional patent and establish a "priority date", from which the patent will run and be enforceable. The specification, definition and drawings must be thorough, cover every aspect, and be clearly understood. The final application is filed after twelve months, and an international application may also be filed at then same time under the Patent Cooperation Treaty (PCT). The advantage of the PCT is that costs are spread over 2–3 years, but the priority date is the same as the Australian patent. After 30 months this reaches the national phase, and applications must be filed in each country in which you want protection; there is no such thing as a "world" patent.

Licensing and Infringement

A licensed patent remains the property of the licensee, and the licensing rights generate a revenue stream. Licensing involves confidentiality, royalty, terms, territories, time, etc. and can be exclusive, sole (where the owner can build too), or non-sole.

Infringement of a patent must fall within the scope of the claims. If infringed, you *must* enforce your rights, but it takes money to do this. Patent attorneys are trained to word claims so as to catch possible infringements. Most infringements which are pursued are actually settled out of court, as there is always the possibility that infringers will have to pay the court costs for the other side.

Registered Designs

Registered designs protect the appearance, not the functionality; i.e. patent protection is much stronger than registering the design. Protection is important if the item has a shape which is essential to the functioning of another product. A New Designs Act comes into force in Australia on 17 June this year and, under it, registered designs may be 2D or 3D.

Examples of registered designs include aluminium extrusions (approximately 10% of registered designs are extrusions), cars, and laptop computers.

Trade Marks

Trade marks are a way of identifying goods or services as being unique to your business. Forms can include words, names, slogans, logos, jingles, colours, sounds, letters, numbers, smells, shapes, and packaging. Examples of shape are the Coke logo and the Coke and Dimple whiskey bottles; of sound the MGM lion's roar; of names Solartint (written in a special way), and of smell the UK company which registered a dart smelling of beer! Marks which would *not* be registrable would include monograms, abbreviations and

acronyms, geographical names, family names and laudatory terms (e.g. supreme, classic, etc.)

Why should you register a trade mark? The public can readily identify the goods and services from a particular company. Brand recognition helps to guarantee the origin, quality and consistency of goods or services. It allows brand extension and helps build customer loyalty. It enables quick action against infringers and, if immediate action is taken, an infringer can be shut down within ten hours. Rights can be established before the mark is used, and they are enforceable.

Examples of trade marks now in common usage include hoover (vacuum cleaner), perspex (acrylic sheet), roller blades (in-line skates), and walkman (personal stereo).

The term of registration for a trade mark is usually ten years. However, if you have not used it after three years, then someone else may apply to have the registration expunged. The usual usage is to use the ® symbol after a registered trade mark, and the ™ symbol after a non-registered mark. Company or business names do not confer trade mark rights. Trade marks do not expire (patents do).

Copyright

Copyright confers rights on the owner, e.g. in literature, art, music, sound, films and broadcast. No registration is required. Use the © symbol with the name of the owner and year of first publication, e.g. © RINA 2004.

Other IP Rights

Other IP rights include plant-breeder's rights, know how, trade secrets (e.g. the Coke formula), and circuit layout rights. Owners can enforce these rights, but they are different because they are not registered.

Questions

Question time brought out some further interesting aspects of IP.

Registering a design is, ultimately, a weak form of protection, as a similar design does not have to be very different to avoid infringement.

Drafters own the copyright in their work but, if employed, then this is usually automatically assigned to the employer. If the drafter comes up with a genuinely new idea, then the copyright remains his/her property; however, if enforcement was attempted, then the employer could make life very difficult.

As far as copyright in drawings goes, it is usual for a naval architect to issue a set of drawings so that one ship may be built, and to state this on the drawings. If a shipbuilder uses the drawings to build further ships, then the naval architect must be prepared to prosecute.

The vote of thanks was proposed by Don Gillies.

Marine Styling and Interior Design

Jeremy Spear of Spear Green Design gave a presentation on *Marine Styling and Interior Design* to a joint meeting with the IMarEST attended by thirty-one on 2 June in the Harricks Auditorium at Engineers Australia, Milsons Point. Jeremy began his presentation by giving some background to Spear Green's operations. Their major areas of expertise are in naval architecture, marine interiors, external styling, project management and design documentation. Their clients include owners (both commercial and private), masters, managers, brokers, shipyards and shipbuilders, and naval architects who require their expertise and specialised skills. Most organizations "do" the styling and interiors. However, many schemes have been dictated by owners, or builders, or their partners, none of whom have any special skills in those areas. SGD have the special skills required, as these areas provide their core business.

Cruise Ships

The cruise ship market is rapidly expanding. There are 38 new vessels currently building, with 12 to be launched this year. *Queen Mary 2* is, of course, the largest, longest, widest and deepest so far. Kvaerner-Masa Yards has estimated that there is $1.2 billion being spent in cruise-ship refits, and that such refits could become a major sector. In the early 1990s, cruise lines began a massive newbuilding program and, currently, 60% of the USA fleet is less than ten years old. This pace fosters innovation, but it also brings attendant risks.

Locally, last year more than 135 000 Australians went on cruise-ship holidays. The Irish company Mivan is currently refurbishing P&O's *Oriana* and Carnival Cruises' *Jubilee* (which will be renamed *Pacific Sun* and operate out of Brisbane). *Orion*, currently undergoing refit in Bremen, Germany, is due to arrive in Australia in 2005.

Superyacht

Mirabella V has recently been launched in the UK for Joe Vittorio for the staggering sum of £35 million. The vessel may be chartered for the (also staggering) sum of £140 000 per week, for which you have access to a 600-bottle wine cellar, an outdoor cinema, a jacuzzi/dip pool, etc., and boasts the tallest mast. Further details may be found on the web.

SGD Operations

SGD have been involved in refurbishment of:

- cruise ships and ro-pax vessels, including *Horizon, Sovereign of the Seas, Fairstar, Fair Princess,* and *Spirit of Tasmania 1, 2* and *3*;
- commercial vessels, including *Magistic, Magisitic 2, Lady Jane Franklin, Aussie One, Matilda III, and Adventure Komodo*; and
- private vessels, including *Inca Rose, Maldive, Fudge, Ragamuffin,* and *AtlantiCat.*

However, commercial vessels provide their main customers, and especially newbuildings and refits of 15–50 m vessels. They spend a lot of time building their relationship with the client, because of its importance to the finished product. They work with all classification societies, state survey authorities and the NMSC; of them all, the US Coast Guard would be the most demanding. SGD are not curtain hangers or cushion scatterers; they provide technical input where it is needed. One area of special expertise is in modelling and using graphics to show the result. Jeremy showed several cases of the model on a computer screen, followed by photographs of the finished article, and you had to look closely to tell which was which!

Another area of special expertise is in audio-visual installations. They can specify and manage the installation of equipment to show where the vessel is in the world (as in aircraft) or, for example, to show the view of whales taken from a nearby helicopter on a big screen, which the passengers love.

Case Study 1: *Spirit of Tasmania 3*

SGD were contracted to do the design work and project management for the creation of a restaurant at the aft end of Deck 7, and an atrium on the aft end of Deck 8 of *SpoT 3*.

The previous owners of the vessel had placed great importance on the facilities for drivers and, at the aft end of Deck 7, had a disco, bar, cafeteria and drivers' lounge. However, for the Bass Strait operation, these were unnecessary, and a restaurant was needed because the fare includes dinner, bed and breakfast.

SGD re-designed the four spaces to create a contiguous, homogeneous restaurant to seat 250 passengers. They changed the method of food delivery, so that it is now prepared off-site in Tasmania, comes on and uses hi-tech methods for presentation. Diners are greeted by a waiter and escorted to a table. The restaurant now serves 317 000 meals per year, including smoked ocean trout, etc. On the first voyage, one passenger filled his plate with 15 oysters, and came back for two refills, making 45 the record for one meal!

Weight was an important consideration, and so the table tops and the fascias in the food servery are honeycomb, with digitally-laminated panels and these helped in the choice of colour scheme. New chairs with fireproof fabric and stainless-steel legs were fitted. They used curves wherever possible to improve safety and traffic flow.

They were working to a limited time and a limited budget, and employed Incat Tasmania as the major contractor for the refit, and used local suppliers wherever possible.

At the aft end of Deck 8, above the restaurant, there was a swimming pool which had previously been used by backpackers lounging around a bar and, for the Bass Strait operation, this was no longer required. A space for families was needed, and so SGD worked with Lightning Naval Architecture to re-design the space, removing the swimming pool and creating several proposals for the owners to consider. The space was to be partially enclosed (not totally, as it is a muster station), and it needed to be a fun place for both adults and children.

The final design for the atrium was enclosed with a stretched-membrane deckhead, with the structure tested to 110 kn of wind using finite-element analysis. The membrane is fire rated (this alone took a lot of time and effort). The space is attractive, and passengers can now watch dolphins and albatross over the stern, listen to music, play with their children, etc. There is computer-controlled audio-visual equipment, and A/V signals from anywhere in the ship can be patched through to the atrium. The lighting is also computer controlled, with lighting states following the eight music moods, typically slow and cruising in the afternoon, upbeat in the early evening; and classical music later.

SGD had worked with Richardson Devine Marine in Hobart before, and they had done good work on *Lady Jane Franklin* and *Lady Jane Franklin 2*. RDM were employed for the stripping out of the swimming pool and the construction of the atrium.

The vessel is now in the off-season, and there has been a recent hike in the price of oil fuel, but the three *SpoT* vessels together have already brought $650 million worth of tourism to Tasmania.

Case Study 2: *Lady Jane Franklin 2*

Lady Jane Franklin 2 is a 32 m catamaran designed by Crowther Design for the strongly-competitive Macquarie Harbour and Franklin River cruise market. She is a repeat order from the same designer and builder (as are a number of their jobs). She carries 238 passengers on two decks at 30 kn and is surveyed to Class 1D under the USL Code. Wake wash is a major consideration on the Franklin River.

The styling of the exterior and the level of finish of interior of this vessel are important. People typically arrive at Strahan in the evening for a river cruise the next day, and often go for a walk after dinner. The vessel has floor-to-ceiling windows, and all the seats face outboard with open armrests to minimise disruption of the view of those seated inboard. The lights on this vessel are deliberately left on at night, and people can see the styling and finish, and it all seems to pay off in ticket sales the next day.

Rendered models of the interior, in addition to choice of colour scheme, in this case also helped with joinery and the minimisation of interferences with cupboard doors, etc. The use of curves helped with traffic flow, comfort, safety and styling. This can all be done in aluminium with developable surfaces.

Conclusion

Marine styling and interiors are specialty areas, and are best left to the specialists. Good design does not have to cost more; good design is often in the detailing. SGD have vast industry resources by way of their knowledge of materials and products, and they have often helped suppliers to gain regulatory approval for their products and, hence, market penetration. They are experienced worldwide across many industry sectors, and have the tools to make designs a reality. They can operate anywhere and deliver work worldwide. Jeremy summed up with the quote "Experience makes the difference".

The vote of thanks was proposed by Mori Flapan, and was carried with acclamation.

The Armidale-class Patrol Vessel Project

Jon Clemensha of Defence Maritime Services gave a presentation on *The Armidale-class Patrol Vessel Project* to a joint meeting with the IMarEST and the Australian Society of Defence Engineering of Engineers Australia attended by fifty-five on 1 July in the Harricks Auditorium at Engineers Australia, Milsons Point. This was our largest attendance since Grahame Parker's presentation on *The Design and Construction of Sydney's SuperCats* in February 2001.

Jon began his presentation by giving an overview of the project, which is a joint venture between Defence Maritime

Services (responsible as principal contractor and for logisitic support) and Austal Ships (responsible for design and construction). The whole project represents a new approach to outsourcing of integrated logistic support, and reflects the major changes undertaken recently by Defence in procurement:

- the project is focussed on outcomes (e.g. the vessels will each be available for 300 days per year);
- commercial, off-the-shelf technology is used as far as possible;
- project management is focussed by having DMS as the prime contractor, and therefore a single point of contact for the RAN, responsible for the 15-year life of the project;
- ship and support-system specifications are integrated; and
- RAN personnel involved are integrated into the DMS organization.

Defence Maritime Services

DMS is a maritime service organisation, a joint venture between P&O Maritime Services and Serco, which started with the RAN's port services and support craft (PSSC) contract. However, DMS does other commercial work, apart from Defence contracts, such as delivery of vessels offshore, diving support, etc.

Jon then showed a video of the DMS—Austal Ships alliance to illustrate the variety of craft which Austal is capable of building and the complex nature of DMS activities.

DMS has established branches in every major port in Australia in order to service the PSSC contract. It provides target towing operations, and works closely with the RAN to enhance its ability to deliver requisite services. A recent review by the Department of Defence showed that, under the PSSC contract, they were receiving 125% of the previous RAN performance for 75% of the previous cost.

The SEA1444 Patrol Vessel Contract

The RAN's Fremantle-class patrol vessels are now 25 years old, and are starting to provide maintenance problems. The Department of Defence therefore initiated moves in 2000 to provide replacements. The selection process involved an innovative strategy linking through-life support to the vessel purchase, and a two-stage request-for-tender process.

Defence described its requirements in functional performance terms. Instead of stating a need for a given number of boats of particular length, displacement and construction, it asked for a patrol boat capability to provide 3 000 days of annual operational availability of specified performance. Performance requirements included, for example, the ability to conduct surveillance and response boarding operations at the top of sea state 4 (significant wave heights of 2.5 m) and surveillance at top of sea state 5 (significant wave heights of 4 m). Other requirements included a range of 3000 nautical miles, being able to conduct a 42-day mission without resupply, able to accommodate two sea-boats for boarding operations, and being equipped with a 25 mm gun. Tenderers had to provide support solutions that meant that the boats will be available to the Navy for 3000 patrol days per year, with up to 600 days surge per annum at 48 hours notice to meet operational contingencies over 15 years.

The contractor assumes full responsibility for providing the RAN with patrol boats available for operations, in return for the support fees, for 15 years for each patrol boat. Combining the construction and through-life support activities in a single contract with one prime contractor means the contractor must consider the long-term sustainability and supportability of the boats.

Seven serious tenders were received in response to the first request, and Defence first evaluated the tenders and examined private financing and direct purchase as potential acquisition methods. After evaluation, the list was shortened to three in June 2002 for the second stage: DMS/Austal Ships (offering aluminium and steel construction alternatives), Tenix (offering steel construction), and ADI (offering FRP construction). Detailed tenders were then called for from the three, closing in November 2002. The preferred tenderer was announced as DMS/Austal Ships in August 2003, and the contract was signed in December 2003. The first vessel is expected to be launched in January 2005 with delivery to the RAN in May 2005, and the remaining eleven vessels at intervals over two years with the last in May 2007.

The Armidale Class

The Armidale-class patrol vessels will provide the RAN with increased capability in comparison to the current Fremantle-class patrol vessels. The general patrol duties have not changed significantly, but the capability has been improved. The Armidale class is larger, is a more-capable seaboat, has more sophisticated communications equipment, has higher levels of crew comfort, thereby increasing endurance, and will be certified by Det Norske Veritas for unlimited operations.

Principal Particulars are as follows:

Length OA	56.8 m
Length WL	52.25 m
Beam OA	9.68 m
Draft	2.25 m (loaded)
Depth moulded	5.0 m
Displacement	343 t (loaded)
Main engines	Two MTU 16V 4000 M70 each 2320 kW @ 2000 rpm
Gearboxes	Two ZF 7550A 3.269:1
Propellers	Two 1.45 m 5 blade
Speed	> 25 kn maximum 4–10 kn loiter
Range	3000 n miles at 20 kn
Gensets	Two Caterpillar 3406 each 215 kVA @ 1500 rpm
Fuel	66.2 t
Crew	21 Navy requirement 8 boarding party 29 total
Armament	Raphael Typhoon 25 mm gun on foredeck Two 25 mm machine guns at bridge wings
Seaboats	Two Zodiac ZH 733 7.2 m Volvo Penta AD41P 6-cyl. diesel Hamilton HJ241 waterjet unit

Classification	DNV ✠1A1 HSLC Patrol EO NAUT NV Crane (aus)

The hulls are constructed in four modules, and the superstructure in two modules, with each reaching completion at close to the same time, ready for assembly.

Jon showed several slides of the first vessel under construction, with hull modules starting life upside down to facilitate welding, through fabrication processes, and using cranes to turn the modules over for assembly.

It is expected that, following launching and final fit-out in Fremantle, each vessel will undergo three weeks of sea training for the crew, followed by three weeks of mission trials, and then final delivery to and acceptance by the RAN in Darwin.

Integrated Logisitic Support

DMS is responsible for the integrated logistic support for the vessels over their life with the RAN. DMS have developed a logistics information management system and, via a communications link, can use shore-based computers to access the on-bard monitoring systems. This can be used, for example, to monitor the main engine in operation. They have also developed a configuration management system to ensure that all twelve vessels are the same or, if different, to document where and what the differences are. Supply support is made easier by using commercial off-the-shelf items wherever possible when installing equipment. DMS also has the responsibility for training personnel for the vessels, most of whom are expected to migrate from the Fremantle-class vessels to the Armidales, and will have new procedures to learn and new equipment to operate.

Support Development

Responsibility for design and construction has rested with Austal.

Responsibility for through-life maintenance planning has rested with DMS, and has been a major feature of the process. The vessels will operate mainly out of Darwin and Cairns, and most spares and twenty-one personnel will be based in Darwin. The development of support systems will be complete by the time the first vessel arrives in Darwin in early 2005.

This is a fixed-price contract. There are penalties in the contract for failure to deliver, based on a demerit points system for various items of failure. Points are cumulative and, ultimately, mean money taken off the payments to the contractor, so there is every incentive to perform!

Questions

Question time was lengthy, and brought out a number of other interesting points.

The condition of the vessels is constantly monitored by the crew, and defects are entered directly into the computer-based Asset Management Planning System. DMS is therefore immediately aware of defects, and can attend to them according to the severity. The crew are responsible for operating the vessel, and this includes repairs within their capability.

The contract caters for most eventualities, including cases where responsibility for damage is blurred, such as grounding due to a combination of navigational error and equipment fault.

The vessels will be in survey to DNV, and will also have ISM Code certification.

The life of the vessels is required to be fifteen years by Defence under the contract, but the real life may be much higher than that, possibly twenty or thirty years.

The cost of each vessel is of the order of $20 million, with a quarter of that wrapped up in communications equipment.

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

An Engineer Goes Sailing

Prof. Peter Jackson, Pro-vice Chancellor of the University of Canterbury, NZ, and professor of mechanical engineering, gave a presentation on *An Engineer Goes Sailing* to a joint meeting with the IMarEST and the Mechanical Branch of Engineers Australia attended by 60 on 15 July in the Harricks Auditorium at Engineers Australia, Milsons Point. Peter began his presentation by showing a slide of a cruising/racing ketch with a flat spinnaker set, hard on the wind, and saying that his dream would be to predict the flow around the complete set of sails. However, more generally, it is attractive to designers to be able to predict the overall performance of the yacht before it is built. It is especially useful for racing yachts, because they are constrained by rules, and they would like to know where in the design space is best. The key to this lies in being able to predict the external aerodynamic and hydrodynamic forces. Unfortunately, the external forces interact with the hull and sail size and shape in a complicated way, and we need to understand the overall interactions first.

Performance Prediction

Peter then showed some slides of various yachts, many pushing the envelope of speed, such as sailing on ice, and *Yellow Pages Endeavour.* All of these are governed by the balance of aerodynamic and hydrodynamic forces, from which there is no escape.

The combination of the true wind and boat speed give the apparent wind, which is what the sails react to. Fortunately, foils such as sails give a larger lift force than drag force, and this fact means that when these two are resolved, there is a component in the direction of motion of the yacht, and this is what drives the vessel ahead.

In the hydrodynamic department, keels are usually symmetric longitudinally to give the same performance on either tack. However, America's Cup and other vessels now have trim tabs to vary the camber from tack to tack and provide a side force at small, zero or negative leeway angles. One yacht had *two* keels, with no fin and connected by a web, and could generate negative leeway.

We then need to look at the balance of heeling moments, i.e. due to the wind on the sails, the hydrodynamic forces and the ballast.

If we can identify all the forces depending on speed and angle-of-attack, then we can write it all down and solve for

the unknowns. We end up with three equations (X- and Y-forces and the heeling moments) which we can then solve for boat speed, heel angle and leeway angle. In the general case, there are six equations in six unknowns, but we are mainly interested in these three. Peter then showed slides of a vessel pitch poling (unbalanced pitching moments) and broaching (unbalanced yawing moments).

A speed-polar diagram, on which vessel speed is plotted against apparent wind speed and angle, is useful for advice to the skipper for where to point the vessel to maximise the forward component of speed. The usual aim is to go upwind or downwind as fast as possible. The speed-polar information is stored in an on-board computer. The boat speed and apparent wind can be measured, resolved to find the true wind speed and angle and, in combination with the speed-polar information , can predict how fast the yacht should go and what the apparent wind should be, providing something for the skipper and navigator to debate!

The IACC Rule

The current International America's Cup Class rule is simple in principle, balancing the length and sail area (which make the yacht go fast) against the displacement (which doesn't):

$$\frac{L + 1.25\sqrt{S} - 9.8\Delta^{1/3}}{0.679} = 24$$

where L = length, S = sail area and Δ = displacement.

The coefficients were determined by analysis to try and give the same performance for all vessels. Longer usually means faster, as there is proportionally less wave resistance. If the sail area is increased, the vessel also goes faster but, in the formula, either length must be decreased or displacement must be increased to compensate. However, the IACC rule is now in its fourth iteration, and naval architects know that they should be up against maximum length and maximum displacement for best results.

Typical IACC yachts now have a length OA of about 23.8 m, beam 4.3 m, draft 4.0 m, sail area upwind 364 m^2, downwind 730 m^2 and displacement of about 24 000 kg.

Prediction of External Aerodynamic Forces

Application of Bernouilli's equation takes us a long way in the analysis of aerodynamic forces. However, then we need to take measurements at full size. This is complicated and expensive. A group at the Technical University of Berlin has now made a space frame to fit inside a cruising vessel, so that all forces from the sail, rig, keel and rudder are transferred into the frame and can be measured, as well as videoing the sail shape. Recordings are made 40 times per second, so lots of data is being generated, and will require lots of analysis.

Sail forces can be measured on physical models. However, small sails are hard to cut accurately and therefore the larger the sails the better. Fortunately, larger sails mean larger forces, and these are easier to measure. At the University of Auckland in New Zealand, they built a wind tunnel especially for measuring the forces on America's Cup yacht sails. The working section has a 7 m high by 3.5 m cross section, and the models are attached to a force balance under the floor of the working section.

Five of the seven most-recent Volvo round-the-world yachts tested in Auckland with the same running rigging as the full-sized vessels. The trimmer is able to control the sails by switches and winches to maximise the driving force. However, this is not the full story. The yacht should heel as the sails are trimmed. They have now connected the model to a computer, which works out the resulting hull speed and angle of heel, and heels the vessel to that angle. The sails can therefore be trimmed for maximum speed, rather than maximum driving force.

Aerodynamic forces can also be predicted using computational fluid dynamics. The equations of fluid motion are well known; they were propounded by Navier and Stokes many years ago. However, they cannot be solved for real fluid flow around yachts, cars, planes or any practical problem of value, due to turbulence. Turbulent eddies exist from millimetric scale right up to of the order of the size of the vessel. We therefore make models of the turbulence, and this makes the problem tractable and solvable, even on top-end personal computers these days.

CFD can help to visualise the flow. However, if the assumptions are changed (e.g. about the turbulence model), then the results are also changed! CFD is not good for getting concrete numbers to better than 10% accuracy. Peter showed that what is usually considered "dirty wind" astern and to leeward of a yacht is, in fact, a coherent, large-scale, stable vortex which is circulating slowly. This changes the angle of attack for a vessel astern and to leeward, and the result is that the vessel in such a situation should either bear away or tack to maintain boat speed. This was evident in a photo of the last Volvo race vessels soon after leaving Capetown, when they sailed into a fog bank. The photo, taken from above the bank, clearly showed the vortex patterns behind the yachts in the fog below.

Prediction of External Hydrodynamic Forces

In the testing of hydrodynamic models, we run into a scaling problem. In the equation for total resistance coefficient, we have

$$C_T = C_F(\mathrm{Rn}) + C_W(\mathrm{Fn})$$

where C_T is the total resistance coefficient, C_F is the frictional resistance coefficient (dependent on Reynolds number), and C_W is the wavemaking resistance coefficient (dependent on Froude number). In order to keep the Reynolds number the same for model and vessel, the model would have to be tested at a higher speed than the vessel, whereas to keep the Froude number the same, the model would have to be tested at a lower speed than the vessel. Clearly we cannot keep both the same. Froude said that we could treat C_F and C_W independently. This is not quite true, but close enough for most practical purposes. There is both art and science involved here, because of all the estimation!

The usual method of scaling model results to full size is:

At model scale $\quad C_W = C_T(\text{measured}) - C_F(\text{estimated})$
At full scale $\quad C_T = C_F(\text{estimated}) + C_W$

and C_W is assumed to be the same at model and full scales.

The towing tank at the University of Auckland has a cross section 12 m wide by 5 m deep, and is 280 m long. The carriage moves along the tank at constant speed, and it is so

important to maintain the vertical location of the carriage in relation to the water surface that most tanks have the tracks corrected to account for the curvature of the earth! The model is attached to the carriage by a force balance to measure the forces. The model is unrestrained in heave and pitch, and is tested at a given leeway angle and heel angle at various speeds. Tests are usually done on both tacks in case the model is asymmetric. Tests are first done in calm water, and can then be repeated for different wave lengths and frequencies.

Hull forces can also be predicted using computational fluid dynamics software, such as Splash and ShipFlow.

Peter then showed a graph of underwater resistance components of hull friction, appendage friction, wave and induced versus vessel speed. It was instructive to see that, for IACC yachts, hull and appendage friction were more important at low speeds (i.e. in light winds), and that wave and induced resistance were more important at high speeds (i.e. in strong winds). These therefore lead to very differently-shaped boats for the different conditions.

Induced drag is important for IACC yachts. Any kind of wing leaves behind a big swirling motion (which we discussed as the "dirty wind" left behind sails). The wind tries to go from the high-pressure to the low-pressure side of the wing/sail. However, the vessel is moving forward, and this leaves the movement behind as a large, slowly-rotating swirl, which translates into induced resistance. So we add fins to modify the effects. Due to the swirl in the water, the fins give a forward force upwind, but a resistance downwind. Composites could be used, to give different angles of attack upwind and downwind, but the measurers would regard this as two surfaces, and you are only allowed one.

Peter then showed photos of the bulbs and fins under *Team New Zealand* (long and thin, with wing fins horizontal at mid-length) and *Alinghi* (shorter, with wing fins angled and two-thirds aft). The bulb should have minimum resistance, and the USA solved this problem twenty-five years ago for torpedoes (having maximum speed for a given volume); the best shape is that of the dolphin. If that shape is slightly flattened to give a lower centre of gravity, it results in a larger wetted surface. Which is better? One is better upwind, the other better downwind.

Internal Forces and Yacht Structure

The righting moment on the yacht is provided partly by the crew (on the windward rail) and, mostly, by the ballast in the bulb keel which is, typically, 20 t of the total 25 t displacment! This bulb on the keel produces a bending moment in the fin, which must then be transmitted and diffused into the shell structure of the hull and to the side stays. The fin will actually bend and, hence, reduce the righting moment. In practice, the fin is subjected to low-cycle fatigue, and cannot be used for a whole America's Cup campaign!

In the transverse direction, the aerodynamic and hydrodynamic heeling forces have large separation, while the side-stay and mast-compression forces have small separation and are, correspondingly, large in magnitude.

In the longitudinal direction, the backstay and forestay forces are balanced by the mast compression which, typically, is of the order of 50 t (500 kN).

The mast section is, typically, 800 mm wide, hollow, and made of carbon fibre. This presents a significant design challenge. The two common types of failure are column (Euler) buckling (which is why they have cross bracing and spreaders), and local buckling (where one piece of the wall fails, and the lot goes). The difficulty is to work out what went wrong after the event. Mast failures are not new; they also happened in the days of the Sopwiths and Vanderbilts racing in their J-class yachts with hollow steel masts.

The rig loads must be transferred to the hull, which is also subject to hydrostatic loads. The hull bottom is in tension and the deck is in compression. Tension is easy to design for, and we can calculate how thick the deck has to be, and move any excess weight to the keel where it will be of use as ballast. However, we sometimes get it wrong, and Peter showed a politically-correct photo of a *European* America's Cup yacht which had broken in two and was sinking.

Internal forces can be calculated using finite element modelling, and this is now routinely used for America's Cup and other big-race yachts. This type of analysis provides the stresses, strains and deflections in each element. FEM programs are so well developed that they can now take into account each of the separate layers in composite construction.

Evolution of Materials

Strength-to-weight ratio is the key to success in high-performance yachting. If you can take weight out of the sails, equipment and hull, and place it in the keel, then this will help the boat stand up straighter and go faster.

Peter then showed two bar charts. The first showed the length of a material which would break under its own weight when held vertically, increasing from wood at 3 km through steel, aluminium, glass, and aramid fibres to carbon at about 350 km; i.e. carbon is the strongest per unit weight. The second showed a measure of stretchiness (or bungee length of 1 kg of material), increasing from wood at 15 m through steel to aluminium at 30 m, but then decreasing through glass and aramid fibres to carbon at about 5 m. The problem with carbon, being the strongest, is that it is brittle. Kevlar, on the other hand, is extremely tough. One solution is to place one (or more) layers of Kevlar on the outside of the usual carbon-core-carbon composite layup to give a measure of toughness to the exterior.

Sails are heavy and, to illustrate the point, Peter showed an IACC mainsail being carried to the yacht by a team of ten husky men. Mylar (the same material as used in slides for overhead projectors) is great for sails, but it has a fatal flaw. It has no resistance to tearing and, if nicked, it will tear right across; exit one sail. However, fibres can be added to give it resistance to tearing and, if doing so, then you might as well add them in the direction to take the known stresses. North Sails now adds fibres onto a layer of Mylar with the required sail shape set in, then add another layer of Mylar and heat to bond them all together. This is the ideal composite material for sails: it has the shape built in, and is smooth on both sides.

Questions

Question time brought out a number of other interesting points.

The factor of safety for high-performance yachts is approximately 1! Designers are always trying for the ultimate, and any excess is a penalty in terms of performance.

Interference resistance (i.e. that due to interaction of the hull and the keel) is important for high-performance yachts. Using the basic equations and ignoring interference will give a prediction good to about 5%. However, predicting to the last 0.5% is much more difficult, and interference drag become significant at this level.

Radio-controlled models are also looking for increases in performance, and velocity-prediction programs (VPP) also apply to models at this scale.

In tank testing of models, there are two items of concern when deciding how long to leave between runs. The first is the surface waves, and it is usually clear by inspection when these disappear. However, with yachts, there is always the large, slow swirl motion left behind the keel, and this may persist for a long time, and there is no easy way of detection.

The meeting was chaired by Jim Vickery from the Mechanical Branch of Engineers Australia, and the speaker was introduced by Phil Helmore of RINA. The vote of thanks was proposed by Laurie Prandolini of IMarEST, and carried with acclamation.

The New Fire Safety Standard

Mori Flapan, Technical Adviser to the National Marine Safety Committee, gave a presentation on *The New Fire Safety Standard for Australian Domestic Commercial Vessels* to a joint meeting with the IMarEST attended by 19 on 29 July in the Harricks Auditorium at Engineers Australia, Milsons Point. Mori introduced the topic by saying that the current fire safety standards for commercial vessels are in Sections 5F and 11 of the Uniform Shipping Laws Code. The USL Code is being progressively replaced by the National Standard for Commercial Vessels.

The Process

The strategic principles of the National Marine Safety Committee, who is developing the new standard, include encouraging professional competence, incorporating recognised relevant national and international standards, incorporating a performance-based approach, and facilitating the approval of new technologies. The process developed by the NMSC has three phases: to identify the issues associated with a standard, draft the new standard, and then to review the draft. Each phase has input from stakeholders as well as other input, and there are recognised outputs.

Progress to date on the fire safety standard has included the collection and analysis of fire incident data, a review of other fire safety standards, preparation of a discussion paper, preparation of a draft based on the reference group's recommendations, preparation of a regulatory impact statement, and the release of these for public comment.

The fire safety reference group includes the following industry personnel: Tony Armstrong (Australian Shipbuilders' Association), Russ Behan (Marine Matters), Bhu Dev (AMSA), Mark Devereaux (Maritime Safety Queensland), Trevor Foster (Consultant), Patrick Harrington (Fire Protection Technologies), Bob Herd (RINA), Frank Jarosek (Dept of Transport WA), Tony Pengilly (Waterways Authority NSW), Brett Staines (Chubb), Roger Thomas (Tyco), and Barry Wilkinson (Marine Safety Victoria).

The reference group will review the public comments received and make recommendations to the NMSC, who will then amend the draft standard and its RIS accordingly. These will then proceed through the approval process to become part of the NSCV.

Analysis of Fire Incidents

Mori then showed a number of slides which summarised his analysis of fire incidents over the last twenty years. The data indicates that fire hazards appear more likely on passenger vessels, and less likely on hire-and-drive vessels. The consequences of fire on fishing vessels tend to be more major or catastrophic than on other vessels. Machinery (43%) and electricity (22%) are the most common sources of fire. Fixed fire-extinguishing equipment in the machinery space dramatically reduces the incidence of major consequences of fire, as the absence of fixed fire-extinguishing equipment means that total loss is four times more likely!

The NSCV Part C Section 4

The new fire safety standard is contained in the NSCV Part C Section 4, which is divided into thirteen chapters. This is to be read in conjunction with Part B (General Requirements).

Chapters 1 and 2

These two chapters, *Preliminary* and *Fire Safety Outcomes and Solutions* set the scene for what is to follow.

Current fire-safety standards are solution driven rather than outcome driven, and the reasons for some requirements may not be clearly understood. The proposed solution is performance based, and includes clauses which explain objectives and rationale, a specification of required outcomes, and a prescribed solution which is deemed to satisfy the requirements. The overall objective is to control to acceptable levels or, where practicable, eliminate the risks to persons and the environment arising from fire and/or the fire control measures themselves.

The USL Code splits the structural fire protection and the fire safety equipment sections, and thus passive and active solutions are often applied independently of one another. These are combined in the NSCV, and this provides a more holistic approach to fire safety.

The current USL Code requirements are largely determined on the basis of length, but this is not a good indicator of the likelihood or consequence of fire. The NSCV approach is to determine the fire risk level based on the fire risk category of the vessel, and the categories of spaces on board the vessel. The fire risk categories of vessels, I (low) to IV (highest), are determined by the area of operation, the number of passengers on board, and the number of berthed passengers, by referring to a table.

Fire on fishing vessels tends to result in major or catastrophic

consequences, and standards in the USL Code are lower for fishing vessels than for trading vessels. The NSCV proposes removal of the differences between standards for fishing and trading vessels.

Categories of spaces are defined in the USL Code for the purposes of structural fire protection. The NSCV takes the concept of categories of spaces further, to provide the framework for the fire-safety solutions applicable to these spaces relative to adjacent spaces.

Required outcomes, which have been reverse-engineered from the USL Code, are the prevention of explosive combustion, control of risk of spillage of flammable liquids, control of risk of ignition from sources of heat or sparks, prevention of exposure of persons to smoke and heat from fire, prevention or delay of the spread of fire, and protection of essential systems.

Chapter 3

General requirements for passive fire protection systems include the prevention of fire from sources of fuel, heat and sparks, the separation of spaces, structural fire protection, structural integrity, and watertight integrity.

Chapter 4

General requirements for active fire protection systems include control of ventilation, fire detection and alarms, emergency escape breathing devices, fire hose appliances, fixed fire-extinguishing systems, portable and semi-portable fire appliances, fire-fighter's outfits, and fire buckets. Deemed-to-satisfy solutions are proposed which take account of the technological changes which have occurred in vessel design and fire safety systems, and so are better adapted to modern vessels.

Chapter 6

Fire-safety preparedness requires certain vessels to be provided with a fire-control plan, a training manual and a fire-safety operational booklet. Designers, builders, and fire-equipment suppliers have a duty to supply the information needed by the owner and operator to fulfil their Occupational Health and Safety obligations.

Standards on which the USL Code was based have since changed, and new standards have appeared. The NSCV has been written to specify standards which are up-to-date and products which are commercially available.

Chapters 6 to 11

These chapters cover categories of spaces, in order: spaces of high fire risk, spaces of moderate fire risk, accommodation spaces, spaces of minor fire risk, control spaces, and escape and evacuation.

Spaces with a high risk of fire include high-fire-risk machinery spaces, ro-ro spaces, dangerous-goods stores, helidecks, and combustible and flammable liquid stores. Spaces with a moderate risk of fire include moderate-fire-risk machinery spaces and galleys. Spaces with a minor risk of fire include cargo spaces. The fire safety of a machinery space is determined by the fire risk category of the vessel and the category of the space.

Mori then showed an example of a landing barge, having different risks of fire in the different spaces; high in the machinery and dangerous-goods spaces, moderate in steering gear compartment, the accommodation and control spaces, and minor in other areas.

The USL Code does not address the carriage of dangerous goods, but there are international standards around for these. The NSCV includes provision for the carriage of dangerous goods, based on SOLAS and the HSC Code requirements. Depending on the quantity of dangerous goods carried, additional equipment may be required.

In an attempt to reduce differences between jurisdictions (and, hence, facilitate interstate transfer of vessels), the standards are being revised to reflect what a competent surveyor would apply to a particular vessel. Placing the solution within the standard means that it is available to all and can be applied uniformly, rather than by interpretation and exemption.

Chapter 12

Materials, systems and equipment are specified here. The chapter refers to the relevant national and international standards wherever possible, and referenced standards specify performance, availability, reliability and quality. The reference standards have been chosen to harmonise NSCV requirements with the products available in the marketplace.

For assessment and verification, products must be either tested by a recognised testing authority in Australia, certified by a JAS–ANZ accredited certifier, type-approved by a ship classification society recognised by AMSA, or certified by an AMSA-recognised body in accordance with the EU Marine Equipment Directive. A register of compliant equipment is published by the NMSCat www.nmsc.gov.au.

In developing a standard, a balance has to be found between simplicity of use and effectiveness of the result. The draft NSCV is not as simple as the USL Code because it covers a wider range of fire risks and uses a more finely tuned risk-based approach.

Chapter 13

This chapter covers the periodic servicing of fire equipment.

Spreadsheet Tool for Compliance

Mori then demonstrated a spreadsheet which he has developed in MS Excel. The challenge for the NSCV is to provide a standard which is easy to use for simple vessels, but also of sufficient depth for the needs of complex vessels. The spreadsheet helps to identify which clauses in the standard are relevant for a particular vessel.

The first example was for a 70 m Manly ferry on Sydney harbour, carrying 1100 passengers in Class 1D operation. After the input of a dozen vessel particulars, the spreadsheet came up with the clauses applicable in this case. For a large vessel carrying a large number of passengers, the fire risk category is III, and most clauses were applicable. Various items could be fine-tuned by selecting/deselecting via radio buttons, and pages of the spreadsheet are arranged by Chapter of the NSCV. The table of structural fire protection separating various spaces is customised for the particular vessel.

The second example was for a 9.5 m fishing vessel operating inshore in Class 3D with two crew. After the input of the dozen vessel particulars, the spreadsheet came up with the clauses applicable in this case. For a small vessel with no passengers, the fire risk category is I, and many clauses did not apply. Structural fire protection is not required, and the active fire protection systems required are pretty basic.

The spreadsheet is in the course of development, and it is planned to have the NSCV fire-safety clauses incorporated so that they can be viewed at will. This was a powerful demonstration of the way in which the computer can be used as a tool to aid the designer in the office. The spreadsheet (and the fire-safety section) is available for download from the NMSC's website.

Questions

The audience proposed a couple of different vessels to run through the spreadsheet, and Mori obliged. First was a 75 m vessel carrying twelve passengers with sixteen crew in area A, but also carrying bulk liquid cargoes. This immediately put the vessel beyond the scope of the NSCV, and referred to Marine Orders.

The second vessel was a 34 m vessel, again carrying twelve passengers with six crew in area A, but also carrying dangerous goods. This gave an opportunity to show the inbuilt dangerous-goods calculator, which determined the category of dangerous goods to be DGV2. In that case, most clauses were applicable.

The vote of thanks for this most entertaining and informative presentation was proposed by Phil Helmore, and carried with acclamation.

Phil Helmore

COMING EVENTS

NSW Technical Meetings

Technical meetings are generally combined with the Sydney Branch of the IMarEST and held on alternating first Wednesdays and Thursdays of each month in the Harricks Auditorium at Engineers Australia, 118 Alfred St, Milsons Point, starting at 5:30 pm for 6:00 pm and finishing by 8:00 pm. The program of meetings remaining for 2004 (with exceptions noted) is as follows:

Thur 2 Sep	Stephen Quigley/Robert Tulk, North West Bay Ships *Trimarans: the Ships of the Future*
Wed 6 Oct	Colin Rudd, Sydney Ports Corporation *Port Botany Expansion*
Thur 2 Dec	SMIX Bash 2004

Queensland Technical Meetings

The next Queensland Section technical meeting will be at 6.30 pm on Tuesday 7 September 2004. The location and subject will be advised later on the Queensland Section website.

The Technology Race

National Engineering Week 2004 will be officially launched in Sydney on Sunday 29 August with a special race between 19th century and 21st century technologies. The restored 19th century barque *James Craig* and the 21st century *Solar Sailor* will race each other from Fort Denison to Sydney Harbour Bridge. Both vessels will take passengers for the race.

James Craig is the only 19th century iron barque which carries public passengers. The cost is $150, which includes the morning race and a full day's sailing plus lunch and morning and afternoon teas. The ship departs from Wharf 7, Pyrmont, at 0900.

Solar Sailor is the first sun-and-wind-powered passenger vessel in commercial use. Solar panels on the deck and sails capture sunlight, and the wings function as sails when raised. The vessel's creator, Dr Robert Dane, will be on board to describe the vessel's innovative engineering. The cost is $50, which includes morning tea. The vessel departs from Circular Quay at 0900.

Bookings should be made with Engineers Australia, phone (02) 8923 7118, or post to PO Box 138, Milsons Point NSW 1565 (cheques payable to Engineers Australia).

Fisher Maritime Training Programs

The Fisher Maritime Consulting Group, headed by Dr Ken Fisher, is returning to Australia in 2004 with its well-known and widely-respected Contract Management training programs. The programs will be held over three days, both in Sydney and Perth, as follows:

Sydney	Wed 27 to Fri 29 October
Perth	Mon 1 to Wed 3 November

Full details and a registration form are enclosed with this issue of *The ANA*, and are available online at www.fishermaritime.com.

Ausmarine 2004

For the sixth time, the commercial and government maritime worlds will come to Fremantle for this major conference and exhibition. However, Ausmarine will see some significant changes this year.

The conference and exhibition will be held on 26 to 28 October, adjacent to each other in the Fremantle Passenger Terminal, in the centre of the busy port. The conference component will be made more appropriate to current industry requirements.

David Wong, organiser of the event, says "We are changing the format and will not have a conference as such; rather, a series of product presentation seminars and highly-focussed forums. We have found that too few of the currently-employed people from the industry have the time or inclination to attend a full-on conference. In recent years, while the conferences have been useful and interesting, public servants, academics and retired people have largely dominated them.

"As we are aiming to reach those who are currently engaged full time in the industry, we have decided to take a different approach. What we have organized now is much more economical for them both in terms of time and money. We have decided to have a series of product presentation

seminars of up to an hour each, interspersed with three or four forums, each lasting two to two-and-a-half hours, where specific currently-important topics can be discussed by a panel of experts."

The exhibition arrangements will remain similar to those of previous events. As well as welcoming the return of most previous exhibitors, the organizers indicate that a number of new and interesting exhibitors have confirmed their participation. Attendance at the forums and product presentation seminars will be free of charge.

The social program includes the Ausmarine Cocktail Party on 26 October, and the Exhibitors' Happy Hour on 28 October.

For further information, see the advertisement elsewhere in this issue, contact Baird Publications on (03) 9645 0411, fax 9645 0475, email marinfo@baird.com.au, or visit their website www.baird.com.au.

RINA at Ausmarine

The Western Australian Section of RINA are, as usual, organising their own mini-conference in association with AusMarine 2004 in Fremantle, and this year the theme will be *The Use of Computers and Specialised Software in Marine Design*. The call for papers is out and so, if you have a paper which you would like to present, then contact Colin Spence on (08) 9336 6664 or at vortex@arach.net.au. Formation Design Systems have already signed up to present two papers. Full details of the program will be forthcoming closer to the conference.

SMIX Bash 2004

The fifth SMIX (Sydney Marine Industry Christmas) Bash will be held on Thursday 2 December aboard the beautifully-restored *James Craig* alongside Wharf 7, Darling Harbour, from 1730 to 2230. This party for the whole marine industry is organised jointly by RINA (NSW Section) and IMarEST (Sydney Branch).

This year sees the introduction of "early bird" pricing, and credit-card payments available for tickets bought *before* COB on Friday 29 October, but not after. Tickets are available now.

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

HoverWorld Expo 2004

In commemoration of the World's First Hovercraft Race held in Canberra in 1964, HoverWorld Expo 2004 will take place from 28 December 2004 to 3 January 2005 on Lake Burley Griffin's Black Mountain Peninsula, near the site of the 1964 race. HoverWorld Expo will be an all-inclusive air cushion vehicle event patterned after World Hovercraft Week 2002 in Terre Haute, Indiana USA in which 18 nations participated.

HoverWorld Expo 2004 will encompass the first World Championship Hovercraft Endurance Race; a Pioneer's Race among the original 1964 competitors; the Hovercraft World Speed Record Challenge; and a cruise on the Molonglo River; the Canadian Air Cushion Technology Society's 28th International Symposium on Air Cushion Technology and the second World Symposium on Hovercraft Rescue. In addition, Tech Talks by notables in the field of hovercraft technology will be given throughout the week, and an elaborate hovercraft exhibit will be on display at the National Science and Technology Centre.

Further details can be obtained from the article in the February 2004 issue of *The* ANA, as well as from the website www.hoverworldexpo.com or from Professor Lawrence Doctors on (02) 9385 4098 or email L.Doctors@UNSW.edu.au.

CACTS 28th International Symposium on Air Cushion Technology Call for Papers

As a part of HoverWorld Expo 2004, the Canadian Air Cushion Technology Society's (CACTS) 28th International Symposium on Air Cushion Technology will take place from 29 to 31 December 2004 at the Australian National University. Papers on all aspects of air cushion technology may be submitted; papers addressing sport- and racing-hovercraft design are particularly encouraged. Papers on any aspect of hovercraft rescue may also be submitted for presentation at the 28 December second World Symposium on Hovercraft Rescue.

The deadline for submission of abstracts is 28 June 2004. Further details can be obtained from the article in the February 2004 issue of *The ANA*, as well as from the website www.hoverworldexpo.com, where a list of suggested topics and submission instructions may be found at www.hoverworldexpo.com/callforpapers/callforpapers.htm. You may also contact Professor Lawrence Doctors, who is serving as Chairman of the Symposium, on (02) 9385 4098 or email L.Doctors@UNSW.edu.au.

Marine Safety 2005

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

Pacific 2006 International Maritime Conference

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

HIPER 06 at AMC

The fifth International Conference on High Performance Marine Vehicles (HIPER) will be held between 8 and 10 November 2006 at the Australian Maritime College in Launceston. HIPER Conferences are held once every two years. The inaugural conference was held in South Africa in

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1999; subsequent ones have been held in Hamburg in 2001 and Bergen in 2002, and the fourth will be held in Rome in September 2004. Dr Prasanta Sahoo is the Convenor of the fifth HIPER conference which will be held in late 2006. Watch this space for forthcoming details. In the meantime, for further information contact Dr Sahoo on (03) 6335 4822 or email p.sahoo@mte.amc.edu.au.

THE ROYAL INSTITUTION OF NAVAL ARCHITECTS
AUSTRALIAN DIVISION
MEMBERS OF COUNCIL

Nominations are called for Six (6) vacancies on Council to fill the positions on Council of members who must retire, in accordance with the By-Laws of the Australian Division, at the next Annual General Meeting to be held in 2005. Those retiring are:

James Black,
Werner Bundschuh,
Michael Seward,
Mark Smallwood,
Andrew Tait, and
Michael Warren.

All those retiring are eligible for nomination and re-election. Should more than six nominations be received, the positions will be filled following a national vote by all members of the Division. A nomination will be valid provided that the nominee is a Corporate Member that is either a Fellow, Member, Associate Member or Associate of the Australian Division, it is signed by the proposer and seconder who are each members of the Australian Division and countersigned by the person nominated stating that he/she consents to the nomination.

Nominations, in writing, are to be forwarded to reach the Secretary not later than 24 September 2004.

Keith Adams
Secretary
PO Box 976
Epping NSW 1710
3 September 2004

The third and final Seawolf-class nuclear attack submarine for the US Navy, *Jimmy Carter* (SSN 23) outdoors for the first time. The move of the 137.3 m, 12 360 t submarine preceded her launching on 5 June by former First Lady Rosalynn Carter. The new submarine honours the 39th president of the United States who is the only submarine-qualified man to become US president. Differentiating *Jimmy Carter* from all other undersea vessels is her Multi-Mission Platform which includes a 33 m hull extension that enhances payload capability, enabling the submarine to accommodate advanced technology required to develop and test a new generation of weapons, sensors and undersea vehicles (Photo courtesy General Dynamics Electric Boat)

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GENERAL NEWS

Naval Shipbuilding Policy Decisions

On 27 May Defence Minister Robert Hill and Finance Minister Nick Minchin announced a series of decisions relating to the future of the naval shipbuilding and repair (NSR) sector.

The key decisions, which flow from the Government's consideration of commercial advice provided by independent expert Mr John Wylie of Carnegie, Wylie & Company, are as follows:

- Given the significant increase in NSR sector expenditure resulting from the Defence Capability Review, a competitive model is the preferred approach for contracting in the NSR sector, with intervention by Government only in exceptional circumstances.
- The $4.5–$6 billion air-warfare destroyers (AWD) contract will be brought forward and let before the $1.5–$2 billion amphibious vessels contract while maintaining the in-service dates for these projects set out in the Defence Capability Plan.
- It is planned that tenders for the AWD build will be issued later this year with a preferred tenderer to be identified by early 2005. It is planned that tenders for the amphibious vessels build will be issued in early 2005 with a preferred tenderer to be identified by late 2005.
- Tenderers for the AWD contract will be asked to bid on the basis of an alliance relationship with the Commonwealth. An alliance contract will reflect all of the key commercial principles that will govern the relationship and will rely on providing incentives to the parties to minimise costs. Mr Wylie will assist Defence in the development of the detailed terms of the alliance relationship.
- The sale of the Australian Submarine Corporation (ASC) will be deferred until after the AWD and Amphibious vessels are in contract to allow the shipbuilding industry — including the ASC — to focus on tendering for these projects. As a result, it is unlikely that ASC will be sold until 2006.
- While ASC will be permitted to tender for major naval shipbuilding contracts, it must do so on an arm's-length basis from Government. To ensure that this occurs, ASC will be established as a Government Business Enterprise under the Commonwealth Authorities and Companies Act, which will require the company to operate efficiently, earn at least a commercial rate of return and observe a more standardised and transparent reporting framework. Strict procedures governing the relationship between ASC, Defence and Finance will also be put in place.

These decisions mark the commencement of what is perhaps the most challenging naval construction program in Australian history.

The tenders for the naval shipbuilding contracts will be conducted through competitive processes in a fair and open manner and it is the Government's stated preference that they are built in Australia.

With an estimated $6–$8 billion to be spent on the build of AWDs and amphibious vessels alone, these projects will provide massive opportunities for Australian industry to participate at both the prime and subcontractor level, create new Australian jobs and skills, and strengthen Australia's strategic industrial base.

Aegis Combat System for Air-warfare Destroyers

The Government has selected the Aegis air-warfare system as the core of the combat system for Australia's new air-warfare destroyers, Defence Minister Robert Hill announced on 11 August.

"The Aegis system is the world's pre-eminent maritime air-warfare system and forms the backbone of the United States Navy fleet," Senator Hill said.

"Also currently in-service with the Japanese and Spanish navies and soon to be introduced into the South Korean and Norwegian fleets, the Aegis is capable of detecting and defeating multiple hostile aircraft and missiles at ranges in excess of 150 km.

"This combat system will be a quantum leap in the air-warfare capabilities of the Royal Australian Navy. It will provide significantly increased protection from air attack for troops being transported and deployed, long-range area air warfare defence for a Navy task group and a coordinated air picture for the more effective deployment of fighter and surveillance aircraft."

The first of Australia's three new air-warfare destroyers will be delivered in 2013. Defence recommended the Aegis as the best system for its air-warfare combat needs based on cost, capability, risk and schedule following analysis by the Defence Science Technology Organisation and support from the US Navy.

Defence will now undertake a combat system integration and risk-reduction study to:

- refine detailed aspects of the version of the Aegis system to be acquired;
- explore the use of Australian-designed phased-array fire-control technology that has significant potential to enhance the air-warfare destroyers' capabilities; and
- examine options for integrating Australian components and sub-systems into the Aegis combat system.

Defence will recommend the detail of the total combined combat system and the preferred design for the air-warfare destroyers in mid-2005.

"The RAN and US Navy have been working closely on the air-warfare destroyer project since signing a Statement of Principles on Surface Warfare earlier this year. This cooperation means that the RAN will continue to benefit from the US Navy's wealth of technical and operational experience and knowledge of the Aegis system," Senator Hill said.

Amphibious Ship Options Study

French shipbuilding group Armaris and Spanish shipbuilding group IZAR will be asked to participate in a funded risk reduction and design study for the Navy's two new amphibious vessels, Defence Minister Robert Hill announced on 9 August.

Senator Hill said the study was a further step towards the selection of a new amphibious ship design to replace HMAS *Tobruk* and one of the Landing Platform Amphibious ships.

The $2 billion project will equip the Australian Defence Force with two new amphibious ships capable of performing a range of tasks, including regional disaster relief, delivering humanitarian aid, support for peace operations, and assistance to policing or military operations.

"Defence has conducted a preliminary design assessment in consultation with the Australian shipbuilding industry which confirmed that the basic designs of Armaris and IZAR broadly meet the ADF's capability requirements for the new amphibious ships," Senator Hill said.

"The study will assist Defence to further assess the suitability of the companies' amphibious ship designs for the ADF's capability requirements, including the capability, cost, schedule, technical risk and industry issues relating to the construction of amphibious ships in Australia."

As part of the study, Armaris will be asked to provide detailed information relating to three variants of its Mistral design: the military off-the-shelf design which is currently in production; a modified design providing for increased troop capacity; and an option based on the original extended Mistral design.

IZAR will be asked to provide detailed information relating to its Strategic Projection Ship design.

The decision to conduct the risk-reduction and design study is consistent with the Government's implementation of the Kinnaird Review's recommendation that increased planning and analysis is undertaken during the early stages of Defence projects.

Senator Hill said Defence was expected to issue invitations to contract to Armaris and IZAR for the conduct of the study by the end of the month, with the companies to respond to Defence's request for information in December.

It is anticipated that the outcomes of the study will enable the selection of a preferred designer for the amphibious ships in the first half of next year.

Submarine Commercial Settlement

Defence Minister Robert Hill and Finance Minister Nick Minchin announced on 28 June a settlement of all outstanding commercial issues relating to the Collins Class submarines between the Department of Defence, Australian Submarine Corporation and Kockums AB of Sweden.

The key features of the settlement are as follows:

- Defence and ASC have full access to Kockums' intellectual property for maintaining, supporting and upgrading the Collins Class submarines throughout the life of the class.
- Formal termination of the various contracts between the parties for the design and construction of the submarines, and subsequent settlement of all claims arising from these contracts.
- Provision of a contract under which Defence and ASC may have access to Kockums' design services for support of the Collins-class submarines as required.

The settlement provides full access for Defence, ASC and their subcontractors to Kockums' intellectual property for the Collins-class submarines within a framework that protects Kockums' proprietary information and also facilitates Australian access to United States submarine technology.

The Ministers said they were pleased with the outcome of the settlement, which will provides an effective and sustainable basis to increase Australia's in-country capability to support its submarine fleet.

The settlement marks the end of long and complex negotiations between Defence, ASC and Kockums, and the subsequent beginning of a new era for ASC as the company strengthens its role as designer of and provider of through-life support for the Collins-class submarines.

All future work by ASC in maintaining, supporting and upgrading the submarines will be carried out through a long-term strategic relationship with Defence under the $3.5 billion Through-Life Support Contract signed in December last year.

The Ministers noted that the settlement with Kockums brings to an end the ongoing legal negotiations and proceedings, and expressed their appreciation to Kockums for their assistance in resolving these issues.

Milestone for Anzac Missile Systems

The Royal Australian Navy has accepted Operational Release of its three Anzac-class frigates as equipped with the Evolved Sea Sparrow Missile system, Defence Minister Robert Hill announced on 1 June.

This important milestone acknowledges the ships' ability to achieve defined operational outcomes laid down in the Defence Preparedness documentation.

Senator Hill said the Navy was now confident in the ability of HMA Ships *Warramunga*, *Stuart* and *Parramatta* to undertake operational employment equipped with this new state-of-the-art weaponry.

The Chief of Navy, Vice Admiral Chris Ritchie, agreed to the Operational Release, recognising that the ships are now providing an important national defence capability and following outstanding results in exercises and real-world scenarios, and intensive testing and evaluation of the new system.

"Australia is the first of the ten nations involved in developing the Evolved Sea Sparrow missile system to formally reach operational release of the weapon," Senator Hill said.

"The ships' main line of defence is now their ESSM system. The missile is specifically designed to defeat anti-ship missile threats and subsequently increases significantly the ability of these three ships to defend themselves.

HMAS Ballarat Commissioned

The Royal Australian Navy's newest Anzac-class frigate, HMAS *Ballarat*, was commissioned at Waterfront City at New Quay, Victoria Harbour in Melbourne's Docklands on 26 June 2004.

The new HMAS *Ballarat* was built by Tenix at Williamstown in Victoria and was launched on 25 May 2002. The frigate is now based at Fleet Base East at Garden Island in Sydney. *Ballarat* is the second ship of the name to serve in the RAN, the first being completed in the Second World War as a Bathurst-class minesweeper.

HMAS *Ballarat* alongside at Fleet Base East
(John Jeremy photograph)

New South Wales Industry News

New Design

AMD Consulting's joint-venture design office in Guangzhou, China, called Sea Bus International (SBI), has recently won the design contract for a 50 m wave-piercing catamaran high-speed rescue vessel for the China Rescue and Salvage Bureau. Initially three vessels will be built, with an option for six more. The vessels will have a beam of 13.1 m, draft 1.6 m, 13 crew, and the capacity to pick up approximately 200 survivors.

Sea Bus International's high-speed rescue vessel
for the China Rescue and Salvage Bureau
(Image courtesy AMD Consulting)

New Construction

A 40 m catamaran to a design by AMD Consulting has recently been delivered by Dakota Creek Industries in the USA. The vessel is an AMD360C design, named *Solano*, and entered service in late June for Baylink Ferry's Vallejo route on San Francisco Bay. This is the third AMD-designed DCI-built AMD360 for Baylink. Golden Gate Ferry also has an AMD360B operating on San Francisco Bay. The vessel features a Siemens SINOx treatment system to reduce the level of nitrous oxide in the exhaust gas.

Principal particulars of the vessel are:

Length OA	41.3 m
Beam	12 m
Draft	1.5 m
Passengers	300
Main engines	Two Detroit/MTU 16V4000 each 2320 kW at 2000 rpm
Gearboxes	Two ZF 7550
Waterjets	Two Hamilton HM811
Speed	35 kn

AMD Consulting's *Solano* at speed
(Photo courtesy AMD Consulting)

Incat Designs – Sydney recently announced the delivery of *Provincetown III*, a 30 m 149 passenger catamaran which was launched at Gladding Hearn Shipbuilders' Massachussetts, USA, shipyard in time to enter service for the July 4 long weekend. The vessel is being operated by Bay State Cruise Company (BSC) of Boston, MA, on the 55 n mile run between Boston and Provincetown, replacing *Friendship IV*. The new vessel has a service speed of 30 knots while carrying 149 passengers. The vessel is powered by two Cummins KTA 38-M2 diesel engines providing 1007 kW @ 1950 rpm, driving two five-bladed fixed-pitch propellers through ZF reduction gearboxes.

Provincetown III also sports two of Incat Designs' cornerstone design features: an isolated superstructure and S-bow hull configuration. The isolated superstructure reduces the transfer of noise and vibration to the passenger areas. The S-bow is a further development of the company's hullform, providing superior seakeeping and performance. These two features combine to create a comfortable journey for BSC's customers.

Principal particulars of the vessel are:

Length OA (excl sponsons)		29.74 m
Length WL		28.80 m
Beam overall (excl sponsons)		9.10 m
Beam demihull		2.75 m
Draft		1.85 m approx.
Passengers		
	Tier 1 Internal	142
	Tier 2 External	20
	Total	162 seats for 149 passengers
Main Engines		Two Cummins KTA 38-M2 each 1007 kW @ 1950 rpm
Gearboxes		Two ZF 2550
Propellers		Two Bruntons 5 bladed
Speed (full load displacement)		30 kn

Incat Designs – Sydney's *Provincetown III* at speed
(Photo courtesy Incat Designs – Sydney)

Around and About

The importance of clear vision all around from the wheelhouse can hardly be over emphasised. However, some deck cargoes, by their nature, tend to restrict the vision from the helm. This photograph, of an unusual cargo in transit on Sydney Harbour, was taken from Bradley's Head recently. It is rare for a mariner to be unable to see the wood (well … water) for the trees, but it can happen!

Phil Helmore

Can't see the water for the trees?
(Photo courtesy Rozetta Payne)

New Navy Heritage Centre on Sydney Harbour

More than 500 000 items, representing a century of Australia's Naval heritage, will be displayed in a new Royal Australian Navy Heritage Centre on Sydney harbour, Defence Minister Robert Hill announced on 28 May.

The centre will be built in the public access area at the northern end of Garden Island at a cost of approximately $5 million. Work is expected to begin in January 2005.

It will consist of:

- two converted heritage-listed buildings used formerly as a gun-mounting workshop and a boat shed;
- a landscaped area for large external displays; and
- a café and conference facility.

"The RAN Heritage Centre will be an institution of national significance," Senator Hill said. "It is a major commitment by the Government to conserving and opening up Australia's rich heritage to the nation."

Senator Hill said that development of the centre was the culmination of the Navy's re-invigoration of its heritage management. The centre will exhibit, at museum standard, artefacts from the RAN Collection.

"The Naval collection is one of the largest of its kind in the world," he said. "It represents our Navy's physical history and illustrates its role in the defence and development of Australia since colonial times.

"The exhibits will acknowledge the sacrifice of all those men and women who have served Australia so well in the past. They will also enhance the Navy's internal ethos and further inform and educate the public on our Navy's history through more than 100 years of peace and war.

"The RAN Heritage Centre will complement the work of other institutions such as the Australian War Memorial, the Australian National Maritime Museum and the Sydney Harbour Federation Trust."

Senator Hill said the Navy planned to operate the centre seven days a week and the public will be able to travel by ferry from Circular Quay to Garden Island.

Tenix Defence Signs Contract for NZ Project Protector

Australian company Tenix Defence Pty Ltd has been awarded contracts for the provision of Project Protector, a NZ$500 million modernisation program for the Royal New Zealand Navy, Defence Minister Robert Hill announced on 6 August.

"Tenix's provision of a successful and innovative solution for the New Zealand Navy displays the capabilities and strengths of Australian shipbuilders to operate competitively in the international market, out-competing bids from the United Kingdom, Singapore and the Netherlands," Senator Hill said.

Project Protector is the acquisition of a multi-role vessel, and offshore and inshore patrol vessels, to be operated by the Royal New Zealand Navy to conduct tasks for and with the New Zealand Customs, the Department of Conservation, Ministry of Agriculture and Forestry, Ministry of Foreign Affairs and Trade, Ministry of Fisheries, Maritime Safety Authority of New Zealand and New Zealand Police.

The 2002 Maritime Forces Review, conducted by the New Zealand Ministry of Defence, detailed the need for sealift capability, inshore and offshore patrol matched to New Zealand's demanding maritime environments, and the ability to conduct at-sea naval training.

All of the vessels purchased under Project Protector will be designed and purpose built to meet these needs.

Tenix plans to build on its successful experiences of local industry participation in the Anzac Ship Project in both Australia and New Zealand, with the majority of Project Protector's vessels to be built, assembled, launched and fitted out in Australia and New Zealand. Modules for the offshore patrol vessels will be constructed in New Zealand, while the consolidation and launch of the ships will occur at Tenix's shipbuilding facilities at Williamstown in Victoria, where the Anzac frigates were constructed.

Restructured Maritime Authority for NSW

It was announced at the end of July that the NSW maritime regulator will be restructured and renamed NSW Maritime Authority to better reflect its core business. The Waterways Authority will become the NSW Maritime Authority from 1 September.

Waterways Authority GM Operations, Brett Moore, said the name change was just one of the recommendations of a far-reaching review of the Waterways Authority.

"NSW is Australia's leading boating and maritime state, with a proud maritime heritage," Mr Moore said.

"We have 12 500 square kilometres of navigable waters, 2 140 kilometres of coastline, handle more than $60 billion worth of port trade each year and have more than 465 000 licensed recreational and commercial vessel operators."

"This six-month review by the Waterways Acting CEO, Chris Oxenbould, spells out the need for a strong maritime regulator in NSW.

"The review examined the consistency of the practices throughout the State and any duplication of activities with other agencies, as well as the existing revenue streams.

"The review made twenty recommendations to deliver better service to recreational and commercial vessel owners, ports, shipping and Government."

Mr Moore said the main changes to be adopted are:

- greater transparency in the use of fees collected from recreational and commercial vessels;
- a clearly stated objective and a list of functions which will be incorporated in legislation;
- a new structure to incorporate the new responsibilities and better align with customers and stakeholders;
- a revitalised infrastructure program to deliver more boating facilities;
- an enhanced focus on environmental responsibilities;
- a drive for efficiencies and reduced administration costs, with savings invested in boating programs and infrastructure, and
- a name change to capture the broader responsibilities of the Authority.

Queensland Industry News

The end of the financial year definitely hasn't put a dampener on marine activity on the Gold Coast.

Crusader Catamarans are pleased with the progress on a luxury 17 m motor-sailer currently under construction in Toowoomba. The much-anticipated prototype is expected to be completed near the end of the year.

Sunrunner Sport Cruises are currently involved with the construction of their new 8.5 m cruiser. The vessel is destined for an October release.

Azzura Yachts have confirmed the signing of a contract to build a 29.5 m luxury motor yacht. Following the success of the 2003 construction of the 30.5 m motor yacht *Oscar,* the new vessel will feature similar traditional styling and all luxury inclusions expected on a multi-million dollar vessel. Local Gold Coast company, Oceanic Yacht Design, have been contracted to carry out all engineering and surveying of the vessel.

Coomera-based manufacturer, Riviera Marine, are riding the success of the Sanctuary Cove Boat Show and are keeping busy with a number of new models under construction in their R&D facility.

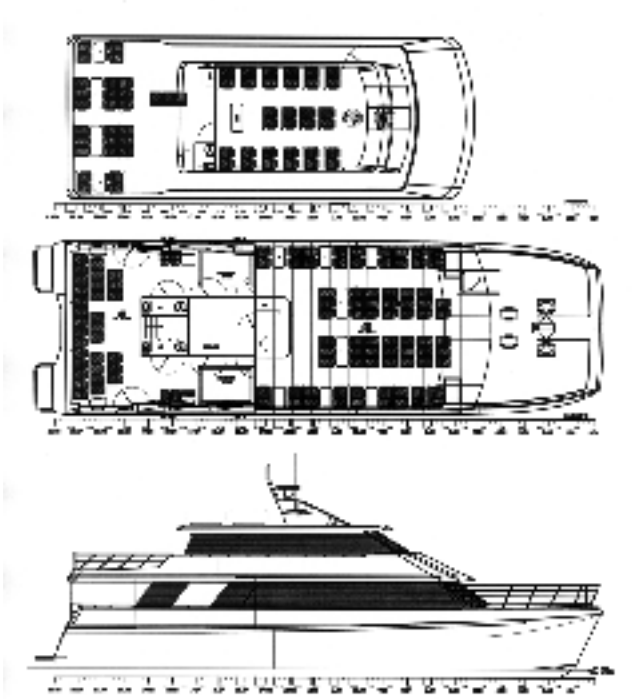
The design office of Sea Transport Solutions is busy and currently designing a 30 m double-ender car ferry for Kingfisher, a 62 m ro-pax ferry for Sea Lease, and preliminary design work is in hand for a 40 m 25 kn aluminium ferry. July also saw the departure of the newly-completed 47 m ferry *Island Link* to its owner in the Bahamas.

In the Brisbane region, a 23.5 m catamaran ferry, *Arafura Pearl*, built by Aluminium Marine at Thornlands has been delivered to Sea Cat Ferries and Charters of Darwin. She will provide a three-day-a-week service between Darwin and Melville Island, better known as the Tiwi Islands. The vessel has a cruising speed of 25 kn which will enable the voyage to be made in two hours. The vessel was designed by Stephen and Gravlev Pty Ltd, based at Manly in Brisbane. The owner has reported back to the designers that the rough-water capability of the vessel is excellent. Seating is provided for 100 passengers in the air-conditioned saloons on the main and upper decks, with additional external seating on the aft decks. As well as providing a ferry service, the vessel is designed for harbour cruises, with a forward door giving access to the foredeck area for passengers.

Arafura Pearl underway at 27 kn
(Photo courtesy Aluminium Marine)

Principal Particulars of *Arafura Pearl:*

Length Overall	23.5 m
Length Measured	22.7 m
Length WL	22.2 m
Beam	7.4 m
Depth	2.77 m
Fuel Capacity	3 800 L
FW Capacity	2 000 L
Sullage Capacity	1 000 L
Engines	Two MTU 12V 183TE02
Power	612 kW each at 2100 rpm
Speed	28 kn max 25 kn cruise
Class	1C (100 Passengers) 1D (200 Passengers)



General Arrangement of *Arafura Pearl*
(Drawing courtesy Aluminium Marine)

Brisbane Ship Constructions report a successful completion of trials of boats for the Chevron project, with the boats exceeding design and contract performance and speed. They achieved 32 kn in light condition and 29.8 kn at full load, compared with a full-load contract requirement of 29 kn and the shipyard's design estimate of 29.5 kn. The boats have a low-wash configuration with scantlings and design freeboards approved for coastal operations.

Norman R Wright and Sons of Brisbane have completed *Odern*, a custom designed and built motor yacht.

The motor yacht *Odern*
(Photograph courtesy Norman R Wright and Sons)

In north Queensland, NQEA Australia is currently proceeding with the fabrication of a 63 m SOLAS passenger ship, a 35 m private motor yacht and two 22 m catamaran ferries.

Brian Robson

Oceanfast Delivery

Luxury motor-yacht builder Oceanfast has delivered the luxurious 53 m *Sea Bowld* to its owner; this is the company's second luxury motor yacht to be completed this year.

With internal and external design by Sam Sorgiovanni to an exacting owner brief, *Sea Bowld* challenges the traditional luxury motor yacht shape. Retaining a sleek, smooth monohull and incorporating unique superstructure styling, the vessel looks superb and her owner is delighted.

From a technical viewpoint, *Sea Bowld* was engineered for high performance in all sea conditions utilising the proven aluminium skills and stabilisation systems for which the Oceanfast yard is famous.

Oceanfast General Manager, Mr Brad Draper, said the vessel demonstrated Oceanfast's renowned craftsmanship.

"*Sea Bowld* will continue to demonstrate to the world that Oceanfast prides itself on customisation and dedication to quality. We are very proud of the vessel which displays a spectacular finish and a striking exterior and is certain to turn heads," he said.

Sea Bowld underway
(Photo courtesy Oceanfast)

Austal in US Navy Project

Austal is one step from a construction contract for the United States Navy's Littoral Combat Ship (LCS) project after the US Department of Defense announced in May that it had awarded a $US78.8 million final-design contract to prime contractor Bath Iron Works, a General Dynamics company, which is teamed with Austal. The US Navy has nominated the LCS project as its number-one priority and has identified a need for 60 vessels, with a total value of around $US14 billion over a 15 year period.

Austal is the vessel designer and builder for the General Dynamics team which is one of two consortiums selected for the final design phase. The contracts include options to complete detail design and construction of a lead ship of this new high-speed surface-ship class and it is anticipated that both teams will have contract options exercised to build two vessels each.

Austal's Executive Chairman, Mr John Rothwell, said that the announcement was a very positive indication that the company would soon be building its first ship for the US Navy.

An impression of the LCS design
(Image courtesy Austal Ships)

"The team is now in the final stage before the first construction contracts are awarded, and we expect this to lead to a shipbuilding contract, probably in the second half of next year," he said.

Austal would build the lead and follow-up ships at its shipyard in Mobile, Alabama. Austal expects that it may begin constructing its first vessel in late 2005 or early 2006, a time frame that suits the company's plans for staged development of its US facilities and workforce to the level required for efficient manufacture of vessels of this size. Orders for the next series of operational ships are expected to be placed while the initial vessels are being evaluated.

Commenting on the development of Austal's defence business, Mr Rothwell said that recent successes pointed to the possibility for continued growth in this market.

"LCS alone has the potential to expand our US operations to be larger than our current Australian shipbuilding activities, and there is another significant US military project for high-speed theatre-support vessels in the offing," he said.

"Five years ago we took the initiative to establish a shipyard in the United States and that foresight is now being rewarded. Driven by the defence market, US demand for Austal's products is now set to surpass our initial expectations, and we are now ready to implement our plans for additional shipbuilding facilities and a larger workforce to provide the necessary production capacity."

Although the ships will be built in the United States, there has already been a substantial benefit flow back to Australia where all ship design is carried out. Austal has already assembled a dedicated team of over 50 naval architects, engineers and other designers for the final-design phase, creating local employment in the process.

"The company's important role in the LCS program substantially raises our international profile in military circles, and we are also examining other opportunities for further development of our defence business," Mr Rothwell added.

In the longer term, this could include the design and construction of larger naval ships in Australia, including LCS-type vessels for international navies which may follow the lead of the US. Other navies are already examining the use of high-speed ships for both combat and support operations, and in this regard the selection of the General Dynamics team for the final-design stage is an important endorsement of Austal's innovative aluminium ship technology.

"Being asked to complete a design for a new generation of warship for the world's largest and most-powerful navy is clear recognition of our leadership in the field of fast ships for defence applications," Mr Rothwell said. "It is also very satisfying that an Australian-owned company can export such important technology to a globally-significant, cutting-edge project such as this — it speaks volumes for the 'can do' attitude of our employees."

Austal delivers Tahitian Cat

Specifically designed and built to meet the requirements of Tahitian ferry company Aremiti Cruise, the Austal Auto Express 56 catamaran, *Aremiti 5*, is well equipped to handle the demanding challenges of a providing a vital ferry service between the French Polynesian islands of Papeete, Morea and Bora Bora.

The new ship is the fourth ferry in the Aremiti fleet and joins two other Austal-built cruise yachts in Tahitian waters, *Tu Moana* and *Tia Moana*. Those stylish vessels were built for Bora Bora Cruises, a company operated by Mehiti Degage, daughter of Aremiti Cruise owner Eugène Degage. Austal's existing relationship with Bora Bora Cruises was a significant factor in securing the order for the new fast ferry, a vessel for which the customer required a tailored fitout of a similarly high quality, despite its very different role.

With capacity for up to 700 passengers and 30 cars, *Aremiti 5* has a speed of 35 kn at 90% MCR. It is powered by four MTU 16V 4000 M70 diesel engines, each providing a maximum power output of 2320 kW at 2000 rpm. Each engine drives a Kamewa 71 SII waterjet through a Reintjes VLJ 930 gearbox.

Like the Bora Bora Cruises yachts, the interior has been developed by Austal in conjunction with Tillberg Design and Aremiti Cruise. The focus in the interior has been to produce a level of fitout that is both economical and sensible for the ferry's role, while also providing passengers with a comfortable travelling experience. Passenger facilities on the air-conditioned vessel include a licensed café, television and video monitors, and a mixture of table-and-chair arrangements and aircraft-style seating.

The vehicle space on *Aremiti 5* is located aft and can accommodate up to 30 cars. To cater for Aremiti Cruise's shore-side arrangements, the ship is configured for a fast and efficient turnaround via ramps over the stern and port side of the vessel. On each side, outboard of the stern ramp, there are pedestrian walkways for foot passengers. The walk-way on the port side is sufficiently wide for wheelchair access.

Throughout *Aremiti 5* the floors are covered with high-quality materials for the wide walkways and other high-traffic areas. Similarly prudent choices have been made in selecting the ceilings and aluminium honeycomb panelling.

Passenger seating is located on three decks. On the upper deck, stylish Ocean Tourist aircraft-style seating is provided for 346 passengers in the forward and midships lounges. Each seat comes complete with fold-down tables and information pockets, and the use of light tan covers helps to create a comforting environment. Views ahead of the ship are always an attraction, and passengers in the forward lounge can relax in comfort while enjoying views around the horizon.

Aremiti 5 at speed on trials
(Photo courtesy Austal Ships)

Separating those two lounges is an amenities block that also houses a crew room featuring comfortable sofa seating around two tables, food-preparation equipment and colour TV monitor with VCR.

In the aft lounge, where seating is provided for 156 passengers, a licensed café serves beverages and hot and cold snacks. Although enclosed, this area has an outdoor feel accentuated by smart Ocean Outdoor deck-chair style seating. Outboard of the main dining area, alongside the windows, are rows of three aircraft-style seats.

Below, on the main deck, a lounge with aircraft-style seating for 128 passengers has been provided forward of the vehicle deck. Like the main lounge above, the seating is upholstered in a light tan fabric, designed for easy cleaning. Four aisles separate the seating blocks, which provide for seating configurations of three across the entire lounge.

Passenger entertainment and communication is catered for through a public-address system that can be operated from both the café and the bridge, incorporating entertainment audio distribution and general alarm.

Video monitors are distributed through the passenger saloon and audio is distributed via ceiling-mounted speakers from the VCR, compact disc player, cassette player and AM/FM tuner, which are all operated from an entertainment rack mounted in the kiosk.

On the bridge deck, 70 Ocean Steamer seats are available for passengers wishing to take in sun and fresh-air breezes as the ferry speeds its way between the stunning islands.

Aremiti 5 operates with a crew of 10, including a three-person bridge team. The master is seated to the starboard side of the bridge and the first officer to the port side while the chief engineer is situated to starboard and behind the master.

Featured among the array of modern electronics on the carefully arranged bridge is the Marine Link ship-control and monitoring system that was developed by Austal Ships and features on most of its contemporary deliveries. This system allows extensive monitoring of machinery and systems throughout the vessel as well as providing a powerful on-line system to manage all user manuals as well as other ship's drawings and documentation.

For harbour manoeuvring the vessel is fitted with external bridge wings, providing the master with full and uncluttered views along the ship's side.

The vessel is fitted with a Seastate motion-control system consisting of T-foils forward and variable interceptors aft.

Principal Particulars

Length OA	56.6 m
Length WL	49.8 m
Beam	14.0 m
Hull depth moulded	5.0 m
Hull draft (maximum)	1.9 m
Deadweight (maximum)	117 t
Crew	10
Passengers	700
Vehicles	30 cars
Axle loads	1.5 t
Vehicle deck clear height	2.6 m
Vehicle deck access	5.0 m long x 6.0 m wide (aft ramp) 3.0 m long x 3.8 m wide (port side ramp)
Fuel	22 000 L
Fresh water	4 000 L
Black & grey water	1 500 L
Lub Oil	400 L
Hydraulic Oil	200 L
Bilge holding	1 600 L
Sludge	900 L

Propulsion

Engines	Four MTU 16V 4000 M70 each 2320 kW at 2000 rpm
Gearboxes	Four Reintjes VLJ 930
Waterjets	Four Kamewa 71 SII
Speed	35 kn at 90% MCR with 89 t of deadweight
Motion Control System	Seastate T-foils forward and variable interceptors aft

Survey

Classification	Germanischer Lloyd ✠ 100 A5, HSC-Passenger B, OC3 High Speed Passenger/Ro-Ro

NWBS Delivers Army Watercraft 03

North West Bay Ships in Hobart has delivered the hull and superstructure of a 25 m aluminium landing craft. The watercraft comprises an aluminium hull with bow and stern doors, waterjet propulsion and self-contained crew accommodation. It is capable of independent operations or as part of the overall system to transfer an army battalion between ship and shore. It is capable of carrying the range of Australian army vehicles from Land Rovers to Leopard tanks. Total cargo capacity is 65 t, propelled at 11 kn via two Detroit 6062 main engines and Doen DJ260 waterjets.

Australian Defence Industries was awarded the contract to design and construct six amphibious watercraft, to operate in conjunction with the Royal Australian Navy's amphibious transport ships, HMAS *Kanimbla* and HMAS *Manoora*. The watercraft are designed and constructed to Det Norske Veritas Class notation ✠1A1 LC Crew R1 EO and to meet the operational requirements of the Australian Defence Force. ADI are building the vessels at their facility in Newcastle.

To improve the delivery schedule, ADI sub-contracted the hull and superstructure alloy fabrication of Hull 03 to NWBS.

Starting construction in April, NWBS shipped the completed hull ahead of schedule at the end of July from Hobart as deck cargo aboard *Southern Salvor*, a 50 m anchor-handling tug supply vessel, built at Rotterdam in 1968 and operating periodically across Bass Strait.

The first watercraft is currently undergoing sea trials. Delivery of the sixth vessel is scheduled for July 2005.

Watercraft Hull 03 being lifted aboard *Southern Salvor* for delivery (Photograph courtesy NWBS)

Kuwait Patrol Boats Delivered

Austal has delivered three 22 m patrol boats to the Kuwait Coast Guard (KCG). In addition to the three crew, *Kassir*, *Dastoor* and *Mahroos* can each carry 41 people and will be used primarily for the transport of KCG crew and personnel to outlying islands at speeds of approximately 25 kn.

The vessels were launched three months ahead of schedule and met all performance criteria on sea trials in Australian waters prior to being shipped to the Gulf region. They arrived on schedule in March this year and their entry into service was quickly expedited after they successfully completed acceptance sea trials off the Kuwait coast.

The contract was awarded in January last year after a highly-competitive international tender process. Austal's proposal was based on an aluminium monohull similar to those provided to the police force in NSW in 2000. The success of those two 22 m police boats and seven 16 m vessels delivered as part of the same contract was vital in securing the KCG contract.

"The personnel from Kuwait who inspected the NSW boats prior to contract were clearly impressed by their quality and the excellent seagoing capabilities they demonstrated," Austal Sales Manager, Mr Lou Pittorino, explained.

In addition to the vessels' strong performance and the low-maintenance requirements of their aluminium structure, Austal's ability to design and construct customised vessels within the budgetary parameters set out by the Kuwait Ministry of Interior was also instrumental in securing the order.

The interior of the patrol boats combines practicality with comfort and safety. Aircraft-style seating for personnel in transit is located forward on the lower deck where there is also ample storage space for their effects in overhead lockers and a forward store.

The wheelhouse sits atop the raised forecastle deck and contains a spacious bridge ahead of an amenities area. In addition to the port-side galley with food store, fridge, freezer and cooktop this includes a head and general-storage compartment. The bridge has the standard arrangement for three person operations and features forward-raked windows to maximise volume while minimising heat and glare from the sun.

During the design stage Austal had to take into account the severe climatic conditions of the Arabian Gulf. It was a contractual obligation that the vessels were capable of all-weather operation in sea conditions up to Beaufort 6. Austal was successful in making the vessels highly effective and versatile in these conditions, whilst also incorporating reliability, low-maintenance and a straightforward approach to operations.

The vessels are powered by two MTU diesel engines producing a total of 1470 kW, driving two fixed-pitch propellers. This delivers a maximum speed of 25 kn, with a range of up to 325 n miles with a 10% fuel reserve.

Kassir, *Dastoor* and *Mahroos* on trials prior to delivery (Photo courtesy Austal Ships)

Principal Particulars

Length OA	21.6 m
Length WL	19.6 m
Beam (moulded)	5.96 m
Hull depth (moulded)	3.6 m
Hull draft (maximum)	1.5 m
Crew	3
Additional personnel	41
Fuel (maximum)	6 000 L
Range (with 10% reserve)	325 n miles

Propulsion

Engines	Two MTU 12V 183 TE92; eaach 735 kW at 2300 rpm
Gearboxes	Two ZF 1900A
Propulsion	Two Veem fixed pitch
Speed (fully loaded)	25.0 kn at 100% MCR

New Research Ship from Austal

A newly-ordered research/pleasure boat will blend the customised comfort and features expected by guests on private and tourism vessels with the functionality and practicality of a working vessel. To be built by Austal Ships (Image Marine) for a private owner, the highly-customised 37.7 m aluminium monohull will be delivered to the Bahamas for mid-2005.

Image Marine Sales and Marketing Manager, Mr Mark Stothard, said the vessel combines the aesthetics and function of a supply vessel with the facilities and feel of a dive live-aboard vessel. "The client is a keen underwater researcher and documentary maker, and saw the oil-rig supply and support monohull *Kurnai Tide* on the Austal website. Our design team created a proposal using the supply boat as a basis and incorporated live-aboard-style facilities to create a private vessel that can be used for both research and pleasure," Mr Stothard said.

While the exterior of the vessel will be similar to that of an offshore workboat, onboard the vessel will display the features of a dive live-aboard, including dive compressor, desalinator and a large storage area for dive gear and two tenders. These facilities will be equally useful for underwater research and recreational diving. Teak decking provides an air of sophistication and ample storage space is available for tenders and other water-sports equipment.

The accommodation for six guests and four crew will be provided in five suites, each with its own ensuite bathroom. Fitout will predominantly be undertaken by the shipbuilder; however, at the owner's request, the Australian shipyard will host a group of Italian artisans who will create and assemble the three guest suites and the lounge areas.

Two large entertaining areas are located on the main deck — a lounge-dining area and a TV lounge. A crew mess is located forward of the commercial-kitchen-quality galley, as are stairs leading both up to the bridge and down to the lower deck.

With the capacity to remain at sea for up to 28 days, the vessel will be powered by twin diesel engines, giving speeds up to 18.5 kn.

Principal Particulars

Length OA	37.7 m
Length WL	34.4 m
Beam moulded	8.0 m
Hull depth moulded	2.0 m
Guests	6
Guest suites	Three double berth, all with ensuites
Crew	4

Propulsion

Engines	Two Caterpillar 3508
Gearboxes	Two Reintjes WVS 430/1
Propellers	Two fixed pitch
Speed	18.5 knots

An impression of the new research ship for the Bahamas
(Image courtesy Austal Ships)

Defence Buys New Tanker to Replace *Westralia*

Defence has purchased a $50 million commercial tanker that will be reconfigured and used to replace the Royal Australian Navy's ageing current auxiliary oiler, HMAS *Westralia*, Defence Minister Robert Hill announced on 3 June.

The ship, currently named *Delos*, is a brand-new double-hulled, environmentally-sustainable oil tanker. It was built in the Republic of Korea by the Hyundai Mipo Dockyard Company as part of a four-ship build program for the Greek shipping company Tsakos Energy Navigation.

"At 176 m long and 37 000 t deadweight, the ship is similar in size to *Westralia*," Senator Hill said.

"It will be modified so that it has the latest technology and equipment capable of refuelling a range of Navy vessels, including the Anzac and guided-missile frigates and the new air-warfare destroyers that will enter into service from 2013."

Senator Hill said that the ship was selected from a field of eleven ships on the commercial market that were evaluated in a competitive process. In choosing the vessel, Defence consulted with Teekay Shipping Australia, who provide ongoing technical and commercial assistance in the support of Navy's in-service auxiliary ships.

Delos on trials
(Photo courtesy Department of Defence)

Delos has been leased for six months to Teekay Shipping under a standard charter contract arrangement. The lease allows Defence to generate income in the period until modification work for her new role commences, avoid the significant costs associated with mooring the vessel, and allow the testing of the vessel's engineering systems at an early stage.

Defence intends to release the Request for Tender for the design, initial logistic support and modification of *Delos* by mid-September 2004, with the successful tenderer to be contracted by the first quarter of 2005.

Some of the specific modifications sought include:

- the installation of a replenishment-at-sea rig and flight deck for daylight operations;
- various habitability and accommodation modifications including hotel services (heating, ventilation, air-conditioning, freshwater, and sewerage) for Navy personnel; and
- a number of navalisation packages (including the introduction of the rigid hulled inflatable boats and a related crane, and Navy life-saving and damage-control modifications).

The modifications to the ship, expected to cost between $50 and $70 million, will be undertaken in Australia, creating new jobs and consolidating the high-tech and specialised skills of our naval shipbuilding and repair sector.

Delos at Kurnell during a recent visit to Sydney
(Photo John Jeremy)

In order to meet RAN operational requirements in the 2006–07 period, Defence intends to let a single request for tender to competitively contract for the design, initial logistic support, and modification of the ship. The successful tenderer for the prime contract will be sought from the members of the existing Navy Repair and Refit Panel, being ADI, Forgacs, United Kilpatrick Green and Tenix. It is expected that some of these companies may team with design and logistic-support experts in responding to the tender.

Yemen Patrol Boat Progress

Just four months after launching the first vessel in the class, and exactly one year after signing the contract, Australian shipbuilder Austal has launched six of the 10 fast patrol boats it is building for the Republic of Yemen.

The remaining four 37.5 m vessels were then at various stages of construction within Austal's enclosed shipbuilding facilities in Henderson, Western Australia, and the project is on schedule for completion by the end of the year.

Based on the eight Bay-class patrol boats which Austal delivered to the Australian Customs Service in 1999–2000, the 37.5 m deep-V monohulls offer exceptional value for money by combining commercial shipbuilding techniques and commercial-off-the-shelf equipment. The aluminium construction contributes to both excellent high-speed performance and through-life economies due to reduced propulsive-power and maintenance requirements.

Five completed patrol boats for Yemen alongside at Austal
(Photo courtesy Austal Ships)

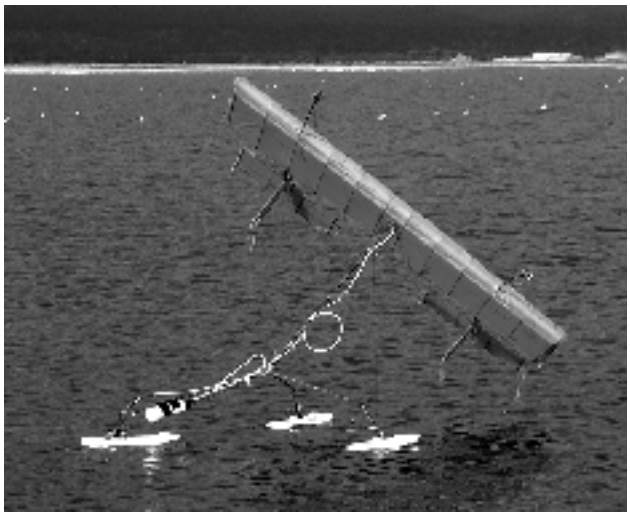
The boats are powered by twin 1305 kW Caterpillar diesels and have a sprint speed of 29 kn and an operating range exceeding 1000 n miles. They will be armed with a 25 mm twin-barrelled naval gun and two 12.7 mm heavy machine guns. The three crew and sixteen sailors will be well accommodated with separate mess areas, laundry, galley and an operations room.

Defence Scientist Designs World Record Sailing Craft

An Australian defence scientist has created the design for a revolutionary sailing craft, based on a wing-borne hydrofoil concept, which he believes will break the world sailing speed record.

Mr Stephen Bourn, a mathematical scientist with the Adelaide-based Defence Science and Technology Organisation (DSTO), says his design will allow the craft to travel at more than twice the speed of the wind in which it is sailing. He also believes the design has potential applications for Defence, including wings for lightweight unmanned aircraft and high-speed hydrofoils for naval boats.

The theory has been proven on a series of radio-controlled models. The craft incorporates a wing-like sail, submerged hydrofoils and a cockpit for one 'pilot'.



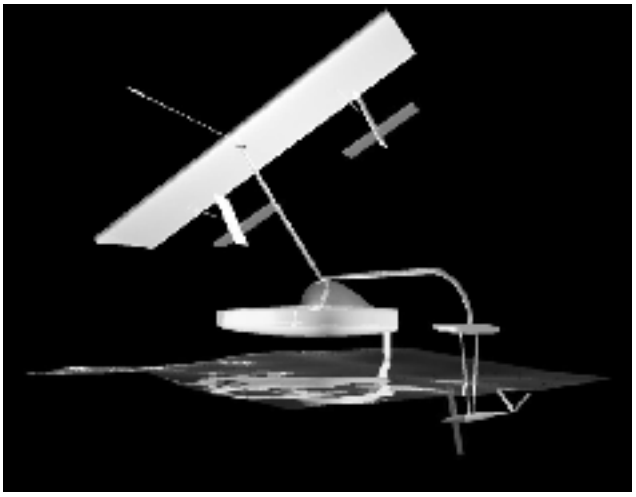
A model of the hydrofoil sailing craft
(Photo courtesy DSTO)

"With sufficient wind and speed the hull will lift completely clear of the water surface, the craft will fly, leaving only the submerged hydrofoil struts cutting the surface," Mr Bourn said.

"The air-borne hull means much lower drag," he said. "The relative positioning of the wing, hull and hydrofoil is inherently stable and there is no risk of capsize as sail force increases, unlike conventional craft. This allows a much higher power-to-weight ratio and, combined with lower drag, the result is much higher maximum speed."

Mr Bourn believes that the new design has the potential to shatter the full range of performance expectations set by conventional yachts, skiffs, catamarans, sailboards and kites, and to challenge the outright speed record.

The initial design is for a craft with an eight-metre wingspan. The craft will fly at a maximum speed exceeding 30 knots



An impression of the completed craft
(Image courtesy DSTO)

whenever the wind exceeds 15 knots. It will sail upwind and downwind faster than the wind. The sail and hydrofoil are pivoted to allow the pilot full control, using two joysticks, of the height, speed and direction of the craft. The craft will be launched from the beach, will be self-righting and transported by trailer.

"The idea came from a fresh look at the basic principles of sailing, and the absolute limits of performance," Mr Bourn said. "Almost as a revelation, I discovered a new fundamental 'law of motion' applicable to all sailing craft."

Mr Bourn has written a prize winning technical paper and has been granted international patents. He has undertaken thorough analysis of the design, simulating its performance on computer.

Goodbye to the Navy's Last Steam Ship

Defence Minister Robert Hill paid tribute to more than three decades of service by the Royal Australian Navy's last guided-missile destroyer, *Brisbane*, as the ship was officially handed over to the Queensland Government during a ceremony at Garden Island in Sydney on 13 July.

The ceremony was attended by the Member for Fisher, Peter Slipper, who successfully fought for the Howard Government to gift the ship to Queensland so that it could be sunk as a diving wreck off Mooloolaba near Mudjimba Island on the Sunshine Coast. Some parts of *Brisbane,* including the ship's bridge, have been sent to the Australian War Memorial in Canberra for preservation.

Senator Hill said that the Howard Government had agreed to contribute up to $3 million to assist with the preparation of the ship as an artificial reef and dive site.

During her 34 years of service, more than 7000 personnel sailed in the 'Steel Cat' and had the theme song of 'Proud Mary'. *Brisbane* and her crew served with distinction in two wars, Vietnam and the 1991 Gulf War and, until recently, was the last Australian warship to fire her guns in anger. *Brisbane* also had numerous tours of duty in the South East Asian and Pacific Regions and attended the Queen's Silver Jubilee celebrations in Great Britain in 1977. *Brisbane* won numerous awards, including the Australian Meritorious Unit Citation for service in the 1991 Gulf War, and the Duke of Gloucester Cup for the most outstanding ship in the RAN in 1971, 1980 and 1996. *Brisbane* was the last of the steam-powered ships to serve in the RAN, and the last of her class to be paid off, which in their day were Navy's primary anti-air and surface warfare capability.

Brisbane left Sydney under tow for Queensland on 16 July.

Brisbane leaving Sydney for the last time
(Photo John Jeremy)

Ships' Air Defence Missile System Upgrade

Four of Australia's Adelaide-class guided-missile frigates will be capable of firing the SM-2 missile after the Government approved a $550 million upgrade of their area air-defence missile systems, Defence Minister Robert Hill announced on 15 July.

Senator Hill said the upgrade of HMA Ships *Darwin*, *Melbourne*, *Newcastle* and *Sydney* by early 2009 would significantly improve the air-warfare capabilities of the Royal Australian Navy.

"The SM-2 missile is a member of the Standard Missile family produced by Raytheon, and a highly capable modern variant of the ageing SM-1 missile system currently used on the FFGs," Senator Hill said.

"SM-2 benefits from significant improvements in communication techniques, advanced signal processing and propulsion improvements. The missile has an improved range to more than 50 n miles and enhanced performance against modern anti-ship missiles and aircraft.

"The upgrade will significantly extend the range of the area air-defence region and provide greater potential for target intercept and destruction — a major capability boost for the Navy and a great asset for potential coalition operations.

"The SM-2 missile, or a derivative of it, will also be incorporated into our future air-warfare destroyers."

Senator Hill said that the Government selected the SM-2 missile following a stringent testing and evaluation program with the assistance of the United States Navy.

The project covers the acquisition of SM-2 missiles and their integration into the FFGs. Missiles purchased will be both the training and live variants.

NWBS Completes Phase Two of Bermuda Ferry Project

North West Bay Ships in Hobart has completed acceptance trials of two Teknicraft-designed 23 m catamarans for the Government of Bermuda's Ministry of Transport. Due to enter service in July 2004, the two vessels were shipped as deck cargo on the vessel *Cec Light* from Australia to Bermuda, where they arrived safely on 28 July.

The introduction of the two vessels, *Tempest* and *Venturilla*, represents a significant increase in speed for the Department of Marine and Ports Services. Francis Richardson, Designate Director, comments "Phase One of our high-speed ferry program involved the acquisition of *Serenity* and *Resolute*, two 25 m catamarans from Gladding Hearn, USA. With a service speed of 23 knots, these two vessels met public demand for a faster service. The two new NWBS/Teknicraft vessels have a service speed of 28 knots and will provide faster transit for the existing longer routes out to St Georges. Importantly, the new vessels have approximately half the draft of our current ferries, enabling new routes to be established."

The names for the vessels were selected from 3400 entries received in a naming competition. *Tempest* was submitted, evoking feelings of power and strength, from Shakespeare's play of the same name which is based on the strength of a hurricane. *Venturilla* was the name of the first black man ever to arrive on the island — the man was travelling on a Spanish ship that was stuck on the reef and was 'fortunate' enough to be nominated to go ashore and investigate noises that the Spaniards thought were devils.

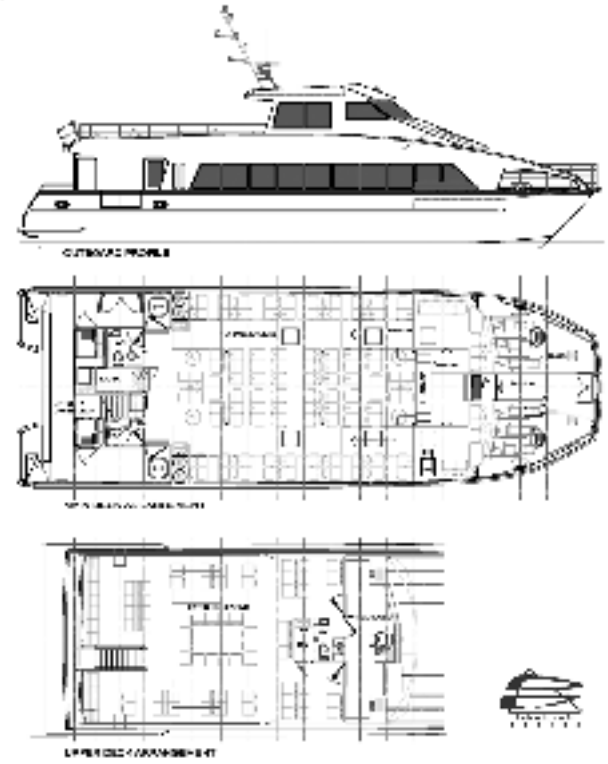
North West Bay Ships was chosen to build the vessels after being short listed with other shipbuilders from the USA and New Zealand.

Tempest, built by NWBS for Bermuda
(Photograph courtesy NWBS)

Hull

Tempest and *Venturilla* were designed by New Zealand firm Teknicraft and feature asymmetrical hulls and a fixed lifting foil. Smaller in size than the existing catamarans, the 23 m vessels nonetheless have the same internal seating capacity for 104 passengers, with a further 73 seats on the open upper deck.

The hull shape is based upon previous designs by Teknicraft and the hull and cabin are fabricated from aluminium. The lifting foil is fitted at approximately midships and lifts the vessel onto the plane gently from about 16 kn, raising the hull some 300–400 mm. The vessels have been designed and built in accordance with Lloyd's Register, to class notation ✠100A1 SSC Passenger (A) Catamaran, HSC, G2 Bermuda Service, Machinery LMC.



General Arrangement of 23 m Catamarans for Bermuda
(Drawing courtesy Teknicraft)

Main Engines

Four Detroit-MTU 8V2000 M70 engines, rated at 525 kW brake power at 2100 rpm are installed, each direct driving a Hamilton HJ362 waterjet via GWB universal shafts. The engines are of similar configuration to the Gladding Hearn vessels to standardise service and spare parts.

Teknicraft report that "Designed for operation at 28 kn at 85% MCR, the vessels exceeded the contract speed, achieving 30 kn loaded at 85% power. Maximum speed recorded during trials was 40 kn". The vessels accelerate normally up to 20 knots, but once foil borne, the speed increases rapidly to 37 kn at full power when half loaded.

A two-hour endurance trial was run with no alarms or intervention required. This was followed by an eight-hour service trial, replicating both short (5 min) and long (30 min) runs, frequent berthing, and rapid acceleration.

Passenger Saloon

Both vessels are arranged to accommodate bow loading, and side loading is also possible at the aft quarter decks. The bow features space for the shore-based boarding ramp and for carriage of 6 mopeds. Passengers enter via forward-facing doors into a spacious lobby/luggage area featuring large overhead atrium windows. Seating consists of 104 Beurteaux Ocean Diner seats inside, arranged in a combination of

forward- and aft-facing seats and small conversational group seating. Beurteaux Ocean Tables in various shapes are provided for approximately 50% capacity.

Kiosk and toilet facilities are provided at the aft end of the cabin. Ayres panels are used for side linings, the ceiling is Dampa linear ceiling, and the deck coverings are a combination of carpet and non-slip embossed rubber. The main cabin is fully air conditioned.

Passenger access to the upper decks is via a stairway aft where additional Beurteaux Ocean Steamer seating is provided for 73 persons. A full-width wheelhouse provides partial protection for upper deck passengers.

Wheelhouse

The wheelhouse is located on the upper deck and is set up for single-person operation. Equipment on the bridge includes a Furuno 1932 radar, Datamarine D3001 depth sounder, Ritchie compass, Northstar 952 XD GPS and an Icom VHF radio. The console layout was determined in conjunction with Bermuda's Department of Marine and Ports Services operational staff. Crew lockers and a crew WC are located on the wheelhouse aft bulkhead.

A Hamilton MECS steering system is installed, allowing steering from either a joystick mounted on the central helm chair or a wheel. Bridge wings are fitted port and starboard, providing excellent visibility as the vessel will be berthing frequently.

Service

The vessels' livery was provided by the Department of Marine and Ports Services and targets tourists. In addition to running commuter ferry services, the vessels will be used to ferry passengers from visiting cruise ships to local attractions. Francis Richardson comments "The boats look fantastic and are finished to a very high standard. *Serenity* and *Resolute* raised the public's expectation and we are confident that *Tempest* and *Venturilla* will be equally favourably received". The new vessels will be pressed into service, allowing *Serenity* and *Resolute* (which have been running a gruelling 18-hour-a-day service almost continuously for 2 years) some much needed maintenance time.

Tempest and *Venturilla* at speed
(Photograph courtesy NWBS)

Venturilla being lifted aboard *Cec Light* in Hobart for transport to Bermuda
(Photograph courtesy NWBS)

Hydrographic/Patrol Vessel from Kamira Holdings

A 9 m fibreglass monohull to a design by Kamira Holdings and built by the Vigormax shipyard in Johore Bahru, Malaysia, has recently entered service for the owner, Northpoint in Port Kalang, Malaysia. The first vessel, *Pendekar III*, will mainly be used for hydrographic survey work and as a general-purpose workboat within the port, but will also be used to meet the new International Ship and Port Security (ISPS) Code requirements.

Principal Particulars

The principal particulars of the new vessel are as follows:

Length OA	9.00 m
Length WL	8.25 m
Beam	3.50 m
Draught	0.90 m
Displacement	5.00 t lightship
	5.85 t loaded
Engines	Two Cummins 4BTA
	each 112 kW @ 2800 rpm
Gearboxes	Two ZF 45A
Genset	Onan 7 kVA
Fuel	500 L
Water	200 L
Speed	24 kn

Kamira Holdings' *Pendekar III* under construction
(Photograph courtesy Kamira Holdings)

Pendekar III alongside
(Photograph courtesy Kamira Holdings)

Pendekar III under way
(Photograph courtesy Kamira Holdings)

Profile of Kamira Holdings' *Pendekar III*
(Drawing courtesy Kamira Holdings)

Design

The design was originally intended as a patrol boat but, in this case, will also be used for hydrographic survey, as a small ferry, work boat and lines boat. The builder operates a fleet of harbour service craft including pilot, tug, work, mooring and passenger boats, and almost all of the company's production is destined for the company fleet.

The hull mould has been built with a length of 9 m to cater for passenger service, hence the relatively wide beam at 3.5 m. There is a moderate warp in the hull bottom to accommodate the weight of the cabin forward and the combination of short hull, wide beam and warp is not always ideal. The extra length always works well with warped hulls.

The layout is simple with a small cuddy cabin forward and an open-plan wheelhouse and main deck. The patrol-vessel version has an enclosed, air-conditioned wheelhouse.

Construction

The hull is solid GRP laminate with top-hat frames and stringers, while the deck and cabin are of balsa-core sandwich construction. The scantlings conform to AS4132.

Managing Director of Kamira Holdings, Greg Cox, says "We have found that high-tech laminates are a waste of time in these commercial applications, particularly lightweight sandwich hull laminates. To fully utilise codes such as AS4132, the sandwich skins must be thin, otherwise the total weight of skins, core and core bedding is roughly the same as a solid skin. Most south-east Asian waters are littered with debris, and thin laminates cannot withstand constant impacts. We only revert to sandwich hulls for larger vessels where the skin weights are higher."

There are three main mouldings: the hull; the deck, which incorporates all deck, coamings and the cabin/console area up to window height; and the bolt-on cabin top.

Performance

With twin 112 kW engines and propellers operating in shallow tunnels, the patrol version can achieve 24 kn at half load. All of the other intended variants have speeds from 16 to 24 knots, the warped hull being at its practical limit at this length.

The photograph of the vessel under way shows the client-supplied Thai-teak garden furniture on the aft deck, which never showed up in the specification or the weight estimate!

Crowther Design's *Whaling City Express*

Whaling City Express was delivered in June to operator New England Fast Ferry Company, and is the first of two new 28 m vessels that will operate a combined commuter and light-freight service from New Bedford to Martha's Vineyard, Massachusetts, USA. A sister ship to *Whaling City Express* is due for completion in February 2005.

New England Fast Ferry have already successfully completed one season of operation with their smaller 20 m Crowther Design ferry, operating between Providence and Newport in Rhode Island.

Principal Particulars

Length OA	27.94 m
Length WL	24.66 m
Beam OA	8.53 m
Draft (prop)	1.99 m
Draft (hull)	1.37 m
Passenger Seating	
Internal	126 (main deck) 28 (upper deck)
External	38
Crew	4
Fuel	10 192 L
Fresh water	1987 L
Deadweight	25.0 t
Engines	Two MTU 16V 2000 M70 each 1050 kW @ 2100 rpm
Gearbox	Two ZF 2050A Gearbox
Speed	30.5 kn

Gensets	Two Northern Lights 55 kVA single phase
Survey	US Coast Guard Subchapter T
Construction	Aluminium

Crowther Design's *Whaling City Express*
(Photograph courtesy Crowther Design)

Build

Due to the tight delivery schedule, Crowther Design, Derecktor Shipyard and Kvichak Marine worked closely together to develop a unique build program. Kvichak Marine built the vessel up to the main deck, split the vessels into three pieces and trucked the components from the west coast to the east coast. Derecktor concurrently built the superstructure and joined the hulls, bridge structure and superstructure at their Mamaroneck facility in New York. The vessel was launched and delivered on schedule.

Propulsion

The vessel is fitted with two Detroit Diesel 16V 2000 M70 diesel engines, each producing a maximum of 1050 kW. Henley propellers are driven via a ZF 2250 reduction marine gear giving a laden top speed of 30.5 knots. A pair of NiBrAl wedge rudders were also provided by Henley. A Maritime Dynamics active-interceptor ride-control system is fitted, reducing accelerations and improving passenger comfort in a seaway.

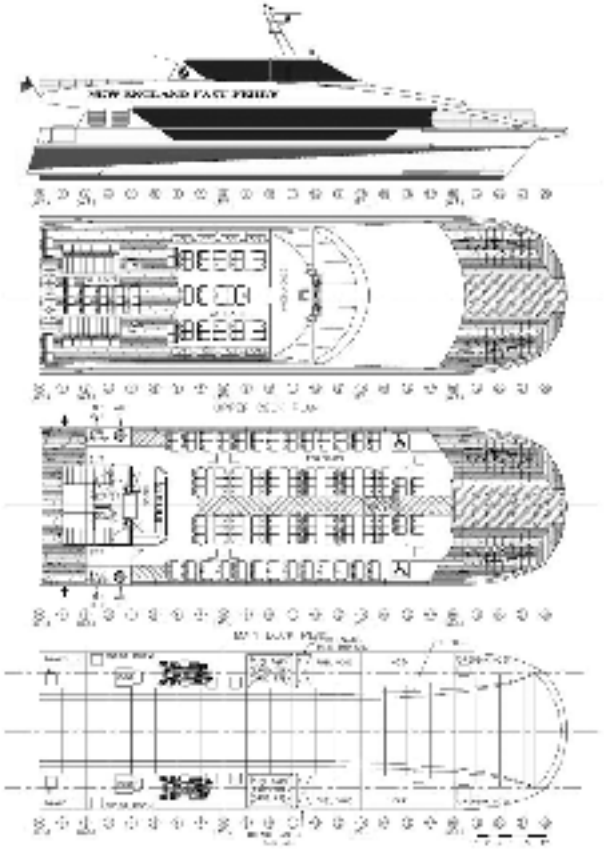
Arrangement

The vessel has seating for a full passenger complement internally and a further 38 seats outside. This vessel features large floor-to-ceiling windows on the main deck, which allow passengers to fully appreciate their surroundings. A kiosk is located at the aft end of the main saloon incorporating a fridge, freezer and providing light meals and refreshments.

The wheelhouse is arranged to provide a 360 degree vision field, with two wing stations for side berthing. Heated forward-facing wheelhouse windows prevent forward vision being obstructed by frost or condensation.

Dubbed by owners a 'wo-wo' (walk on-walk off), loading and unloading is via a bow ramp through a sliding weathertight door, negating the possibility of slamming in high wind. The bow-loading configuration was adapted to meet the bow-loading infrastructure already in place at a number of ports in the New England area, including the Vineyard.

A centre aisle is provided for the stowage of light freight. Transport of light fright such as mail and perishable food is in high demand, and the operators have taken the opportunity



General Arrangement of *Whaling City Express*
(Drawing courtesy Crowther Design)

to allow for the combination of passengers and freight.

The vessel is Americans-with-Disabilities-Act (ADA) compatible, providing wide aisles, lowered kiosk benches and ramp access from the bow. Two ADA-compatible heads cater for both sexes. Wheelchair anchor points allow wheelchair-bound passengers to travel in safety.
Particular attention has been paid to the harsh operational environment during the winter months, with reinforced shell plating on the vessel's bows and high-strength stems. Under-deck heating is used to prevent the build up of ice on the foredeck passenger ramp.

The clean helm layout on *Whaling City Express*
(Photograph courtesy Crowther Design)

Service

A number of operators provide a passenger service to and from the Vineyard, however New England Fast Ferry have reported consistent full capacity voyages. This looks to

continue when the sister ship is delivered in February 2005. Jim Barker, of New England Fast Ferry stated "We are very happy with the vessel developed by Crowther Design. The speed, low-wash properties and seakeeping comfort exceeded our design expectations. The success of the first vessel has given New England Fast Ferry the confidence to place an immediate order for a sister ship".

Landing Craft from Kamira Holdings

Five 23 m aluminium catamaran landing craft to a design by Kamira Holdings were delivered late last year from the NGV Tech shipyard in Singapore to the Royal Malaysian Marine Police.

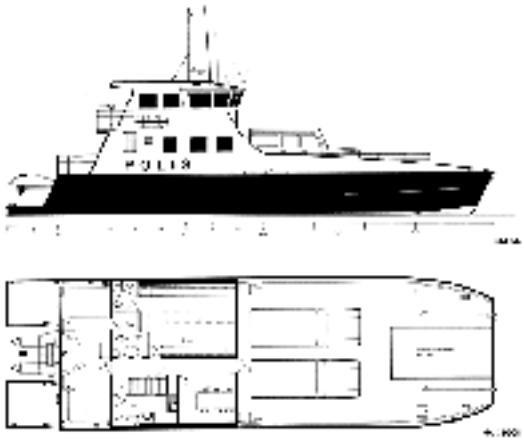
The Royal Malaysian Marine Police previously had two slow-speed steel landing craft. They identified a need to service island and remote areas, providing both policing and other civil duties, such as replenishment and disaster relief. These vessels were located in East Malaysia (Sabah/ Sarawak) and the number of islands there makes a slow-speed landing craft impractical. Also, they had an occasional need for a mothership from which they could conduct operations using other small vessels, such as their 10.5 m strike craft. The larger 22 m PA-class vessels don't really have that capacity as they don't have the deck space or reserves to supply other vessels.

Principal Particulars

The principal particulars of the new vessels are as follows:

Length OA	22.80 m
Length WL	21.80 m
Beam	7.20 m
Depth	3.05 m
Draught	1.60 m
Displacement	38.55 t light
	60.49 t full
	54.63 t contract
Main Engines	Two Daewoo V222TIM (3 vsls) each 588kW at 2100 rpm
	Two MAN 2042 LE401 (2 vessels) each 588kW at 2100 rpm
Gearboxes	Two ZF 155A, 1.971:1 ratio
Propellers	Two 860 mm dia. 5 blade Stone Marine Singapore
Generators	Two Daewoo 28 kVA
Fuel Capacity	8 000 L ship's supply
	6 000 L strike-craft refuelling or cargo
	14 000 L total
Fresh Water	2 200 L
	10 000 L extra cargo (2 vessels)
Deck Cargo	Two Land Rover Defender
Crew	7
Passengers	30
Speed	25 kn at contract displacement
	20 knots cruising
Range	640 n miles at 20 kn on 8 000 L
Windlass	Two Muir VRC4000
Armament	Two 12.7 mm machine guns plus small arms
Liferafts	Two 20 man Viking

Two of Kamira Holdings' 23 m Catamaran Landing Craft for the Royal Malaysian Marine Police (Photograph courtesy Kamira Holdings)



General Arrangement of Kamira Holdings' 23 m Landing Craft (Drawing courtesy Kamira Holdings)

Design

The Royal Malaysian Marine Police set the basic dimensions. The slightly narrow beam of 7.2 m and the cruising speed of 22 kn required the hulls to be kept relatively narrow, with a demihull chine beam of only 2 m. The other constraints, of a maximum draft of 1.7 metres and the need to beach the vessels, made the balance between the required buoyancy, hull depth and tunnel width critical.

The hulls forward have a cutaway forefoot, a 20 mm thick flat on the keel, and 12 mm plating to enable beaching. The propellers aft are positioned in shallow tunnels to reduce the draft and are protected by full-depth skegs.

The cargo deck is reinforced to take the weight of two Land Rovers as well as loose cargo. Two of the vessels have an increased water capacity of 10 tonnes for shore-replenishment operations.

The ramp is manually operated using the anchor winches and cables. This is a simple system that cuts down costs and reduces maintenance, although it requires hands-on handling (as opposed to push-button). The ramp is in two parts: the hinged ramp forms a continuation of the catamaran bridge-deck structure, with hinges located above the deck for servicing; the sliding ramp runs in tracks along the hinged ramp and forms an extension. With the hinged ramp in the fully-lowered position, the sliding ramp acts like a simple link span between vessel and beach, and is free to move up and down but is pinned to stop in-and-out movement.

The main deck has been designed on one level. The need for adequate tunnel clearance for good seakeeping conflicts with the requirement for beach landing, for which you want the deck as close to the water as possible. Rather than have a high foredeck and lower aft deck, the deck was kept level. This has kept the tunnel top well away from waves, and the narrow beam means that fast rolling high in the superstructure is less of a problem.

The aft decks (for the aft 2.4 m of vessel) are cut down to within 600 mm of the waterline and are used for strike-craft operations.

Performance

Performance-wise, the design was tank tested at the Australian Maritime College in Launceston. Even using the most optimistic tank results, the final trials speeds were about 2 kn faster than expected, and 3 kn faster than the contract condition. Everyone is pleased with the performance and handling, even those who were sceptical at the beginning about the suitability of a catamaran and of the design itself.

Managing Director of Kamira Holdings, Greg Cox, says "Provided such catamaran vessels are built slightly more robustly than an equivalent passenger catamaran, there is reasonable opportunity for expansion of catamaran patrol craft in the region. Catamarans work well there, where the water is a little calmer most of the time (but not all the time), and the larger deck area is useful. However, the thin plating often used in passenger vessels does not work well in the region, as they work their vessels hard and the heat and humidity can lead to internal corrosion."

EDUCATION NEWS

Australian Maritime College

Research into Parametric Rolling

AMC has recently received funding from AMSA to conduct research into parametric rolling of containerships in head seas. The specific tasks are:

- to conduct free-running model experiments to reproduce the parametric rolling phenomenon and quantify its variations with operational parameters, and
- to develop operational guidelines for masters to avoid severe parametric rolling.

Please contact Jinzhu Xia of AMC or Rob Gehling of AMSA for more information.

Visiting French Students

A whiff of camembert, garlic and croissants is in the air, as AMC hosts four intern students from France. Three of the students are from Ecole Nationale Superieure des Ingenieurs des Etudes et Techniques d'Armement (ENSIETA), an engineering school in Brest, the regional capital of Brittany. In France, after leaving school, prospective engineering students study an intensive course for two years, focussing on the fundamentals of mathematics, physics, chemistry and mechanics. Then they undertake a three-year degree program at an engineering school. It is only in the third year of the degree course that they specialise in their chosen field, e.g. naval architecture.

Yannick d'Armancourt is at the end of the degree course at ENSIETA and therefore is required to undertake a five-month industry placement. He is currently investigating the performance of yachts downwind in waves under the supervision of Dr Giles Thomas. Sophie Merlin and Olivier Truttmann are about to commence their final year of study and are required to complete a two-month placement. Sophie is working under the supervision of Dr Prasanta Sahoo investigating trimaran resistance, whilst Olivier, whose supervisor is Dr Ganga Prusty, is designing a finite-element composite panel for use in ANSYS.

Thomas Bassett is also at the AMC on a two-month research internship from the National Institute for Advanced Technologies (ENSTA) in Paris. Thomas is working on global wave loads on high-speed craft during bow-diving events.

Yacht Design and Technology

A new elective unit, Yacht Design and Technology, has been introduced into the final year of the BEng (Naval Architecture) degree course. The aims of the course include providing students with: a sound understanding of the mechanics of sailing and the major aspects of yacht technology; the ability to carry out preliminary yacht-design work; and the capability to conduct design-evaluation studies. The unit coordinator is Dr Giles Thomas, whilst also lecturing on the course will be David Lyons and Jonathan Binns.

Recent Seminars

Dr Yuriy Drobyshevski, Senior Naval Architect with Icon Engineering based in Perth, gave a presentation covering two related topics on 13 July 2004. The first part gave a general overview of the type of work Icon Engineering is regularly involved with. The second topic was more specific, dealing with a variety of engineering aspects involved in float-over installations of topsides upon oil and gas jackets. This was directly related to a study involving a series of model-scale tests being conducted in AMC's Model Test Basin and is covered in more detail in the undergraduate-student research project reports.

Mr Bill Wright, Managing Director of Norman R. Wright and Sons in Brisbane, is a regular visitor to AMC and has always been kind enough to make a presentation to AMC students, staff and visitors whenever he is in town. On Thursday 29 July Bill once again gave a very interesting and extremely informative talk to a crowd of over 80 people in the AMC Auditorium. This latest presentation covered the recent development of a 17.7 m fast sport-fishing boat in which Bill provided an highly detailed description of all facets of the design, tank testing, construction and trials. The talk was well supported by over 80 figures and photographs delivered in chronological order, and highlighted several lessons learnt from previous vessels which his company has built. The high level of interest from the audience was confirmed by the record number of questions Bill fielded at the end (estimated at over 20).

On 28 July AMC hosted a presentation by Professor Peter Jackson as part of his Australia-wide tour sponsored by EA and RINA. Peter, who presented *An Engineer Goes Sailing*, spent 27 years at the University of Auckland where he

established the Yacht Research Unit. He has recently taken up a new position at the University of Canterbury as Provice Chancellor of the College of Engineering. Some 100 people heard Peter talk about the fundamentals of sailing mechanics and the modern techniques employed to predict their performance. For his presentation Peter was able to draw on his experience as performance analyst for the Team New Zealand America's Cup syndicate.

Trevor Faust from Marine and Safety Tasmania (MAST) visited AMC on Tuesday 4 May 2004. Trevor, who graduated from the College in the mid 1980s, gave a lecture to the 4th year BEng naval architecture students on *Marine Fire Safety in Ship Design*. He also discussed the recent development of appropriate standards for coastal vessels in Australia. The new standard, known as National Standard for Commercial Vessels , will supersede the Uniform Shipping Law Code,which is currently used throughout Australia.

ABC Science Show *Catalyst*

On Thursday 27 May the ABC program *Catalyst* featured footage of AMC's Model Test Basin, showing the AMC Ship Hydrodynamics Centre's testing of an Australian innovation designed to convert wave power into 'green' renewable energy. The company involved, Energetech Australia, has conducted three series of experiments in the MTB over the last twelve months and is also providing support for an undergraduate student research project (discussed elsewhere in this report). Work on a different project being conducted in AMC's Cavitation Tunnel will feature on a later episode of *Catalyst*.

Overseas Visit

The Head of the Department of Maritime Engineering, Dr Norman Lawrence, travelled overseas between 4–15 June to attend a conference hosted by the University of Wolverhampton, UK and presented a paper titled *Innovation, Good Practice and Research in Engineering Education.* During his visit to the UK, Norman also visited the Universities of Newcastle, Glasgow and Strathclyde and, in Singapore, the Ngee Ann Polytechnic.

AMC Lecturer at Dry Docking of Anzac Frigate

On Saturday 11 June, Henk Kortekaas, lecturer in marine engineering, supervised the dry-docking of the Anzac-class frigate HMAS *Toowoomba* at the Tenix shipyard in Williamstown. One of the students of AMC Search's Dockmaster course recently became dockmaster at the yard and Henk provided supervision of the process. Neil Pollard of AMC Search was also present and took professional photographs that will finetune the above course.

Overviewof AMC Engineering Higher Degree by Research Projects

David Clarke, PhD Candidate — *Viscous Flow about Underwater Bodies*

The research aims to examine the flow around two bluff bodies at a number of angles of incidences when the bodies are subject to transitional flow conditions. The boundary-layer condition, body pressure, body force and moments, and flow direction are determined using experimental techniques. The suitability of computational techniques for modelling the flow over these bodies will then be examined. David is a full time employee of DSTO and is a regular visitor to AMC to conduct experiments in the cavitation tunnel.

Jonathan Binns, PhD Candidate — *Investigation into Capsizing and Re-righting Tendencies of Modern Sailing Yachts*

The main objective of this project is to improve the safety of modern sailing yachts by developing an understanding of the re-righting tendencies through physical and theoretical modelling with 'real world' correlation. Through using the models developed, the effects of full form and stability parameters will then be investigated, resulting in scientifically-deduced measures of sailing yacht safety.

Tim Lilienthal, PhD Candidate — *Dynamic Stability in Following Seas*

The objective of this project is to create an assessment method for dynamic stability in following seas. The assessment method uses a time-domain motions program and model experiments as an alternative technique. The outcome will include a technique to assist the mariner in avoiding dangerous situations in following seas.

Jonathan Duffy, PhD Candidate — *Investigation into Ship-bank Interaction and Ship Squat for the Purpose of Ship-handling Simulation*

The objective of this research is to investigate the mathematical modelling of ship-bank interaction and ship squat for the purpose of ship-handling simulation. The project used a two-dimensional panel method to compute the pressure distribution around the waterline of a full-form vessel travelling in close proximity to a lateral wall, followed by computation of steady-state bank-induced sway force and yaw moment using the three-dimensional panel method, ShipFlow. Further experimental investigations, mathematical modelling and theoretical research have also been completed.

Bryce Pearce, PhD Candidate — *Ventilated Super-cavitating Hydrofoils for Ride Control of High-speed Craft*

This project involves the development of an experimental program for the application of a patented device to the ride control of high-speed craft. The trailing edge of a foil is fitted with an interceptor that can act on either the upper or lower face to produce lift in either direction with fast response. Techniques will be developed for investigating the method of establishing and re-establishing the ventilated cavity associated with the interceptor, the flow of gas required and the optimisation of the system for prototype realisation.

Kishore Kantimahanthi, PhD Candidate — *Use of Foils for the Dynamic Support of Catamarans*

This project has involved catamaran tests with a single foil, and interceptors at 2 mm depth. These tests are important to investigate the behaviour of the catamaran with regard to the reduction of the total resistance. The results show that there is a reduction in the trim of the catamaran when compared to the catamaran with foil only. There is no reduction in the total resistance of the catamaran when

compared to that of bare hull tests, except at high speeds. However, the resistance is less than that of the catamaran with foil only. Further research will involve numerical modelling and data analysis.

Mohan Anantharaman, PhD Candidate — *CFD Modelling of Marine Diesel Engine Residual Fuel Ignition and Combustion*

This project will involve computational fluid dynamics analysis of ignition and combustion of residual fuels with varying properties and then correlation with actual measurements obtained at fuel testing laboratories and/or in real marine engines. The objective of this project is to predict behaviour of various types of residual fuels in large marine propulsion engines in real time.

Nabeel Ashraf, PhD Candidate — *Ignition Variability of Heavy Fuel Oil: Interaction of Turbulence and Ignition Chemistry*

This project aims to model and measure the complex processes involved in ignition of heavy-fuel-oil sprays in transient combustion using computational fluid dynamics and experimentation.

Roberto Ojeda, PhD Candidate — *Geometric Non-linear Static and Dynamic Analysis of Composite Stiffened Plates and Shells by Method of Finite Elements*

The objective of this project is to provide an efficient finite element formulation along with an experimental validation for linear/non-linear, plate/shell, isotropic/orthotropic material use, and open/closed stiffener configuration with straight/arbitrary orientation of stiffener within the structure.

Henk Kortekaas, Masters Candidate — *Development of Predictive Emission Monitoring Systems for In-service Marine Diesel Engines*

This project will involve acquiring and analysing data on marine diesel engine emissions. The main targets will be Sulzer and/or MAN B&W slow-speed engines, but medium-speed engines may also be included. The data will define the way in which NOx emissions vary with engine type and engine operating conditions. This will allow the model to be set up for various engine types.

Martin Hannon, PhD Candidate — *Deck Diving of High-speed Catamarans in Following Seas*

This project has involved semi-captive model experiments measuring the force on the cross-deck structure in following seas, followed by experiments in calm water to develop an empirical relationship to predict the force as a function of angle, depth of immersion, angle of deadrise and relative velocity. Free-to-surge model experiments were also conducted to validate the theoretical predictions and the mathematical model in surge, heave and trim. The project has also involved research extending the analysis to the irregular sea state, using the mathematical model and time-domain simulation.

Alexander Robbins, Masters Candidate — *A Tool for the Prediction of Wave Wake for High-speed Catamarans in Deep Water*

This project involved the determination of hullform parameters affecting wave wake, involving a testing program and validation conducted with computational fluid dynamics and scale-model tests. The project resulted in the development of a simple prediction technique to predict the wave-wake height, which was validated, then used to develop a tool for predicting the wave wake for high-speed catamarans in deep water. This tool allows designers to rank hullforms within a given variable range. This candidate's thesis is presently under examination.

Giles Thomas
Gregor Macfarlane

Overview of Some AMC Engineering Undergraduate Degree Final Year Research Projects

Suzanne Hayne — *Float-over Deck Installation Study*

Float-over installations have a reduced installation time, compared to crane installation, due to the integrated deck being installed as one module, which allows for testing and pre-commissioning onshore. Float-over installations involve the platform superstructure being loaded onto a barge and then accurately positioned next to or in-between the jacket or similar base. The relationship between fender restoring forces, barge motions and sea state is crucial to accurately predict the motions of the barge at manning/work points and to ensure minimal impact loadings on the jacket. The primary objective of this project is to determine the range of sea states in which a cantilevered float-over installation can be conducted safely. This involved the setup and conduct of a series of scale model experiments to investigate the maximum wave induced contact loads and barge motions, when the two are docked together in a cantilevered arrangement.

Barge model under test
(Photo courtesy AMC)

The test program completed to date has included motion-decay testing in still water and dynamic testing in regular seas, using constant mooring-line tension and four pairs of springs with varying stiffnesses. The data obtained was used to develop graphs of the response amplitude operators of

motions and of surge load on the jacket/fender. The model utilised a typical symmetrical barge with two springs attached forward on a perpendicular support with a sliding-shoe attachment, as can be seen in the photograph. This allowed the barge not to be restricted in the longitudinal motions and restrained transversely at the docking points. The barge and spring system is fixed to a stiff support to simulate the barge being moored to the jacket, which eliminates significant surge and sway motions. Mooring lines were simulated using four cords with the correct longitudinal stiffness and pretension. The mooring lines are in pretension and not kept static in order to allow the tension in the lines to increase causing a dynamic load.

Supervisors: Dr Jinzhu Xia (AMC)
Gregor Macfarlane (AMC)
Dr Yuriy Drobyshevski (Icon Engineering)

Suzanne Hayne

Holley Lees — *Design and Testing of a Skirt to Improve the Efficiency of the Energetech Wave Energy Converter*

Energetech Australia has developed a unique near-shore system for converting ocean-wave energy into usable electricity. To date, three phases of physical scale model tests have been conducted in the AMC Model Test Basin by AMC staff specialising in experimental hydrodynamics. The models are geometrically and kinematically similar to the 300 kW prototype demonstration wave-energy plant to be installed off the south breakwater at Port Kembla, New South Wales in October 2004.

Holley Lees, a BEng (Ocean Engineering) student, has tapped into the existing collaboration between AMC and Energetech to conduct a related study as part of her final-year research project. The primary aim of this project is to quantify the magnitude of any losses due to wave energy passing between the wave wall and the seabed and to investigate various methods of extending the wave wall in order to reduce these losses. The extension to the wave wall is required to reduce losses in normal operating conditions (wave heights of the order of 1 to 3 m) but not cause overstressing of the system during periods of extreme wether conditions (wave heights in excess of 4 m).

The model wave-energy plant under test in waves
(Photo courtesy AMC)

As part of Holley's study, an additional series of model tests has been conducted over a wide range of operational conditions, an example of which is shown in the photograph. Wave heights were varied between 1and 3 m, and wave periods ranged from 6 to 12 s. Continuous measurements have been obtained of mooring line forces, structure motions and loads, chamber and turbine pressures and wave elevations. The measurements of the water level and pressures within an oscillating water column chamber are being used to determine the power output for each variation to the wave wall and compared against the benchmark case.

Analysis to date has shown that there is the possibility of a notable increase in efficiency due to the addition of a skirt beneath the wave wall. Further work planned as part of this project includes the determination of the:

- wave conditions where the skirt will allow energy past the structure;
- forces to which the skirt and main structure will be exposed;
- skirt design to meet the requirements mentioned above;
- method of connection of the skirt to the main structure;
- material properties required for the skirt to withstand the environment beneath the wave wall; and
- costing analysis.

Following completion of analysis and final design, it is anticipated that a final series of model tests will be conducted to verify the design work undertaken.

Supervisors: Dr Jinzhu Xia (AMC)
Gregor Macfarlane (AMC)
Dr Tim Finnegan (Energetech Australia Pty Ltd)

Holley Lees

Oliver Mills — *Time-domain Simulation of Ship-based Crane-deployment Operations*

In cooperation with the Department of Defence, this research project aims to develop a software code that is able to accurately simulate the deployment operations of ship-based cranes. Utilising motion data from a simulation package known as Fredyn, the code intends to provide the ability to analysis the motions of cargo being deployed from a ship's deck, both numerically and visually, in a variety of 3D packages. While the primary focus of this project is the industry 3D package Rhinoceros, the code is being developed in a stand-alone modular fashion so that it can also be easily applied to other 3D packages in the future.

Supervisors Dr Giles Thomas (AMC)
Kerry Johnson (Department of Defence)

Oliver Mills

Oscar Palos — *Investigation into the Stability of Canting-keel Sailing Yachts in Large Breaking Waves*

Since new regulations have been introduced governing the design and use of canting keels, it is important to understand their influence on stability, particularly in large breaking waves.

An existing yacht model has been modified with a newly-designed and built keel, bulb and lifting surface. A canting

mechanism allows the keel to be in either an upright position, canted at 35 degrees (approximately 10 degrees of static heel) or 78 degrees (approximately 20 degrees of static heel). Model tests in solitary breaking waves have been carried out with four cameras being used to record the motion of the yacht. Following video analysis, data such as heel angles, velocities and accelerations may be calculated and comparisons, such as the amount of energy necessary to heel the yacht to a particular heel angle, made.

Supervisors Dr Giles Thomas (AMC)
Jonathan Binns (AMC)

Oscar Palos

Anton Schmieman — *Added Resistance of Catamarans*

During the design phase of any new vessel, it is important to have an estimate of the added resistance of the vessel when operating in waves. In the past this has been accounted for by simple speed margins, and has often been based on test results extrapolated well beyond their existing range. No known statistical data exists for the added resistance of a catamaran in a seaway.

As the design progresses towards completion and moves on to sea trials, the designer must have confidence in speeds theoretically predicted. A greater knowledge of the added resistance of catamaran forms would be an advantage at this stage of design. Model-scale experimental work seems the obvious choice for gathering more information, as the testing can be performed within a controlled environment using regular waves, with no interference due to wind, current, or depth as would normally be found in full-scale trials.

There are two main objectives of the project, each with distinct outcomes:

1. To measure the added resistance of two existing catamaran models, to give the designer a better understanding of the nature of the problem. As has been stated, no known data exists for the numerous high-speed catamarans in operation around the world.
2. By completing a series of tests, at differing speeds and headings of 0º and 180º, it is hoped that a function can be defined which describes the added resistance of a catamaran in waves at any heading between these two tested values. This would be an invaluable tool for the designers of high-speed catamarans, especially during sea trials, which often cannot be held under ideal calm-water circumstances.

To date, the work completed includes an investigation into existing research publications, as well as a series of model-scale tests in the AMC Towing Tank. The data from the model testing is currently being analysed. Preliminary results using raw data show expected trends, and analysis methods are being investigated to ensure that final results are as accurate as possible.

Supervisors: Gregor Macfarlane (AMC)
Dr Tony Armstrong (Austal Ships)

Anton Schmieman

Tom Ryan — *Reduction of Pitch Motion by use of Bow Fins on Prawn Trawlers*

This project is investigating the effect of passive bow foils to reduce motions of prawn trawlers, under the supervision of Dr Giles Thomas. This collaborative project with David Sterling of DJSTGS and Tim Gourlay of Curtin University, aims to provide prawn trawler operators with a simple system that may be retro-fitted to existing vessels to reduce hazardous on-board motions. A set of towing tank experiments has recently been completed which showed reductions in the heave and pitch response when a set of bow foils were fitted to a trawler model.

Supervisor Dr Giles Thomas (AMC)

Tom Ryan

The University of New South Wales

Undergraduate News

Inclining Experiment

Sydney Heritage Fleet provided access to their yacht *Boomerang* for the third-year students to conduct an inclining experiment at Rozelle Bay on 12 May. The students conducted the experiment with the guidance of lecturer Mr Phil Helmore. The day was far from perfect for an inclining, with the wind gusting at 15–25 kn from the south to southwest, and some rain during the pendulum readings. However, the experiment was continued, as it was more important for the students to complete the experiment than to obtain a perfect set of results, and they made a good job of their first inclining. The theory of stability is fascinating, but seeing it in practice at an inclining makes it come *to life* for the students.

Making use of the inclining of *Boomerang* as a first outing for his new U-tube apparatus was Sean Cribb, who is investigating the use of U-tubes in inclining experiments for his thesis project. Interestingly, the U-tube gave results for *wd/a* which were almost identical with the *mean* of the forward and aft pendulum results on this vessel.

Thesis Projects

Among the other interesting undergraduate thesis projects this year are the following:

- Anthony Brann is investigating the air and wind resistance of small vessels by testing a model in the wind tunnel for comparison with the results from analysis using the computational fluid dynamics package, Fluent.
- Jamie Howden is using Lawry Doctors' program Hydros to predict the wave generation of his family ski boat for comparison with measurements to be taken by the Water Research Laboratory on Manly Dam. The shape of the hull was lifted at UNSW by the Cyrax laser machine from the School of Surveying and Spatial Information Systems, and points imported to Maxsurf for hull generation and then export to Hydros.
- Felix Scott is using Lawry Doctors' program Hydros to predict the resistance of a range of catamaran hullforms, from which a regression equation will be generated for use in the design office. He has already tested a

catamaran model of a modified Series 64 hullform at the Australian Maritime College for confirmation of the Hydros results.

Two more interesting undergraduate thesis projects just getting under way with mid-year starts are the following:

- Ruth Jago is investigating the use of composites for marine propellers; this will initially look at the strength characteristics of composites when used for propellers and the possible advantages, the direct analysis of strength using finite-element analysis, and then optimising the design to take full advantage of the composite characteristics.
- John Hayes is investigating the project management aspect of the *John Oxley* restoration project for the Australian Heritage Fleet; project management is currently being tackled by volunteer Hette Mollema on a part-time basis, and there is plenty of scope for a thesis project to contribute to the work.

Graduation

At the graduation ceremony on Saturday 22 May, Carl Vlazny graduated with his degree in naval architecture. Carl is now employed by Seawind Catamarans at Bellambi, NSW.

Phil Helmore

Naval Architects at Play

During the mid-year break, Year 3 naval architecture student Michael Halkes and recent UNSW naval architecture graduate Martin Johnson (now working for Bethwaite Design in Sydney) travelled overseas to Lake Garda in Italy to compete in the B14 World Championships. The B14 is the 14 ft (4.27 m) skiff designed by Sydney-based 18 ft (5.49 m) skiff champion, Julian Bethwaite, in 1986. Their boat was one of six from Australia, including two-time national champion, Guy Bancroft, and the NSW state champion, Richie Reynolds.

Thirty-seven boats competed at the regatta, and Michael and Martin got off to a good start in the first race with a fourth-place finish. They managed to improve this position every day with strong finishes in the top seven, including two firsts and a second, which put them into third place overall with one day to go. With only one point covering the first three boats, the final day of the B14 world title was set for a classic battle of nerves. Former world champion, Tim Fells from the UK, showed his experience to hold off the challengers for a second place in the last race and secured the title. Michael and Martin finished third overall, which is one of the highest placings an Australian boat has ever achieved overseas in the B14 class.

Michael and Martin will be defending their title as the fastest B14 in Australia at the national titles which will be held at Port Dalrymple Yacht Club in Tasmania towards the end of December.

Michael Halkes

Post-graduate and Other News

Noel Riley Retires from Lecturing

At the end of Session 1 this year, Noel Riley completed twenty-five years of almost-continuous teaching at UNSW and decided to hang up his teaching spurs. He began in 1980, when he was invited to take over some lectures in the naval architecture degree plan between when Frank Bartlett left and Prabhat Pal arrived. Since then, he has given outstanding assistance with lectures, investing much time in the preparation of a printed set of lecture notes, and in expounding on those with stories of successes and failures in the marine industry. It is of great benefit to the students to receive the experience of such practitioners of the craft, who can contribute so much to their practical knowledge.

In order to mark Noel's retirement and silver jubilee in teaching at UNSW, the naval architecture staff (Lawry Doctors, Mac Chowdhury and Phil Helmore) and their partners took Noel and Donela out to dinner in late July. There they reminisced, dreamed, and philosophised about a wide range of topics.

Other Retirements

Dr Hugh Stark (solid mechanics) and Dr John Challen (vibrations) have recently retired from the School of Mechanical and Manufacturing Engineering. John's position as Executive Assistant to the Head of School has been taken over by A/Prof. Philip Mathew.

Presentation by Gangadara Prusty

Dr Gangadhara Prusty, a lecturer at the Australian Maritime College in Launceston, gave a presentation on *Structural Engineering Research at AMC* to the School of Mechanical and Manufacturing Engineering on 21 July attended by ten. Dr Prusty has more than fourteen years of experience in research and teaching in diverse areas of structural engineering. His presentation covered some of his activities in his previous and current research in areas such as finite-element analysis of stiffened structures, laminated composite and sandwich structures, failure analysis of laminated composites and reliability-centred maintenance.

Other projects have included the post-fire structural behaviour of laminate composite stiffened and unstiffened plates, the structural optimisation of a moth-class sailing dinghy using finite-element analysis, retrofication of reinforced-concrete beams using CFRP plating, the development of design curves for stiffened panels composed of isotropic FRP and sandwich panels under fatigue loading.

Some of his own previous work concerned a theoretical and experimental investigation of the progressive failure of stiffened curved panels, with the stiffener at an arbitrary orientation. There are three common approaches to the problem, and he used the total discount approach, with the Tsai-Wu failure criterion. These, combined with his new approach to the arbitrary orientation of the stiffener, have yielded results in good agreement with the experiments. One surprising conclusion is that the effect of the stiffeners is minimal, as the failure usually begins in the bonding of the stiffener to the laminate panel.

Australia's Top 100 Engineers

Engineers Australia has compiled, and recently published, an inaugural list of the 100 most influential engineers in Australia. Dietrich Georg, Editor of the journal *Engineers Australia*, says that they set out to challenge the often-held perception that engineers, while making a major contribution to the wellbeing of society, rarely moved into top decision-

making positions themselves. The list shows that, contrary to this perception, there are engineers in the senior echelons in a number of areas. In fact, EA had to apply strict criteria to reduce the number of names on the list to 100, which finally comprised 37 from industry, 8 from professional associations, 19 from consulting, 25 from academia/research, 5 from defence and 6 other.

Almost one quarter of the top 100 are either staff or alumni of The University of New South Wales. Acting Vice-chancellor (and former Dean of the Faculty of Engineering), Prof. Mark Wainwright, was recognised for his top decision-making position and major contribution to engineering. Current Dean of the Faculty of Engineering, Prof. Brendon Parker, was recognised for his contribution to engineering and overseeing the largest faculty of engineering in Australia, with about 7500 students. Scientia Professor and Executive Director of the Centre for Advanced Silicon Photovoltaics and Photonics, Prof. Martin Green, was recognised for his contribution to solar cell development.

In addition, the list includes 21 alumni of UNSW, now in respected positions in industry, professional associations, consulting, academia/research and defence. For the full report, see the June 2004 issue of *Engineers Australia*.

Phil Helmore

FROM THE CROW'S NEST

Australia's Top 100 Engineers

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Included in the top 100 were two in the marine industry. Naval architect Phil Hercus, Executive Chairman of Incat Designs – Sydney, was recognised in the consulting category for his contribution as a world leader in the design of large, fast, wave-piercing catamaran ferries. Shipbuilder Don Fry, Chairman and owner of NQEA Australia in Cairns, was recognised in the industry category for his contribution in building more than 220 ships and watercraft, including 50 vessels for the RAN (all of which are still in service), and designing and building innovative sugar-processing equipment.

There are others in the marine industry who, many would claim, should also be on the list. However, looking at the broader picture, 2 out of the top 100 is 2%. If there are 500 practising naval architects and engineers in the marine industry in Australia, and 50 000 practising engineers in total, 500 out of 50 000 is only 1% and, with 2% representation in the top 100, the marine industry has done well.

For the full report, see the June 2004 issue of *Engineers Australia*.

Female Commanding Officers

A report in the May/June 2004 issue of *Professional Skipper* (NZ) indicates that the Royal Navy has recently appointed its first female commanding officer. She is LEUT Charlotte Atkinson and has been appointed Commanding Officer of the minesweeper, HMS *Brecon.*

The Fleet Public Affairs Office of the Royal Australian Navy says that the first female Commanding Officer of a Royal Australian Navy ship was on a Paluma-class Survey Motor Launch, HMAS *Shepparton*, way back in October 1997. Since then, female officers have commanded Fremantle-class patrol boats and Landing Craft Heavy ships.

The Royal Australian Navy also currently has female Executive Officers on Anzac-class and Adelaide-class guided-missile frigates, and an all-female command crew (Commanding Officer and Navigator) on a Fremantle-class patrol boat.

Queen Victoria Construction Postponed

Queen Victoria is the new cruise liner to be built for Cunard Steamship Lines at Fincantieri's Marghera shipyard (near Venice), Italy. Initially, the ship was intended to be ready in early 2005. However, a restructuring by Cunard's parent company, Carnival Corporation, saw this unit being transferred to P&O as *Arcadia*. Another ship, of the same basic design, but more in keeping with Cunard's interior style, has been ordered from Fincantieri to be commissioned as *Queen Victoria* in 2007. At 85 000 GT, *Queen Victoria* will be the second-largest Cunard ship ever built, after her big sister, *Queen Mary 2*.

Phil Helmore

Alvin to be Replaced

After 40 years of scientific research the US research submersible *Alvin* will be replaced by a new, deeper-diving vehicle.

The US National Science Foundation (NSF) will provide funding for the vehicle through a cooperative agreement with the Woods Hole Oceanographic Institution.

The replacement vehicle will be capable of reaching more than 99 percent of the sea floor to depths of 6 500 m and conducting a broader range of research projects around the world. When completed in 2008, it will be the most capable deep-sea research vehicle in the world. *Alvin*, which has undergone nearly continuous upgrades since its launch in 1964, dives to 4,500 m.

The four-year design and construction project is expected to cost $US21.6 million and will be funded largely by NSF. The replacement sub will present a number of technical challenges. New types of flotation material, capable of withstanding pressures of nearly 69 MPa at 6 500 m depth, must be fabricated and certified for use. Forging and welding the 75 mm thick titanium personnel sphere is complex. New types of batteries to power the vehicle will be required, and a variable-ballast system must be designed to adjust for changes in payload, and to enable the sub to descend and ascend, and hover to conduct research in the mid- water zone.

THE INTERNET

Ellen Macarthur's Transatlantic Record

Ellen Macarthur on her giant 23 m trimaran *B&Q* recently broke the female solo transatlantic west-east sailing record, and only missed the outright record by 75 minutes after battling across the north Atlantic for a week on her very first attempt.

B&Q crossed the start line off the Ambrose Light, New York, USA, on Monday 21 June at 2210 GMT, and crossed the finish line off the Lizard, UK, a week later. The finish time was recorded by an official observer from the World Sailing Speed Records Council by line of sight from The Lizard. Ellen completed the 2925 n mile course in 7 days, 3 hours, 49 minutes and 57 seconds, establishing the new female record at an average speed of 17.02 kn. The previous female record was held by Florence Arthaud on her 18 m trimaran, *Pierre 1er,* whose record of 9 d 22 h 5 min at an average speed 12.25 kn had stood since 1990. The outright west-east solo record stands at 7 d 2 h 34 m 42 s at an average speed of 17.15 knots, set in June 1994 by Laurent Bourgnon on his 18 m trimaran, *Primagaz*.

B&Q achieved a best 24-hour distance of 526 n miles between 0138 GMT on 23 June to 0138 GMT on 24 June, just 14 n miles short of the solo 24 hour record distance. The performance of the boat has exceeded all expectations so far since her construction by Boatspeed in Gosford and launch in Sydney in January this year.

Ellen will next consider whether to make a winter attempt on the round-the-world solo record held by Francis Joyon.

Full details may be found at www.teamkingfisher.com/uk/default.asp.

Perfect Ship Pictures

PictureAustralia is an online portal giving access to images from many Australian museums and cultural organizations. The collection covers many aspects of Australiana, from artworks (paintings, drawings, prints, posters, fine art, abstract art and portraits) and photographs to objects such as sculpture, costumes, ships and weapons. Of interest to naval architects, there are nearly 28 000 pictures of ships alone, including many of the Australian National Maritime Museum's most sought-after ship portraits and photographs.

The project began in 1998 as ImageSearch, a joint venture between the Australian War Memorial, the National Library of Australia and the state libraries of New South Wales, Tasmania and Victoria. PictureAustralia was launched in 2000 by the National Library of Australia, and celebrated the placement of the one-millionth image in the collection on Anzac Day this year. The collection is continually being expanded as copyright status is checked and detailed information about the image is provided in internationally-accepted metadata format.

The images are stored in a searchable database which may be accessed either through www.pictureaustralia.org or www.anmm.gov.au/lib/pictures.htm.

Radio-controlled Yachting

Radio-controlled yachting is alive and well in all states and the ACT.

The international one-metre (IOM) class is the newest international radio-sailing class, but has generated a strong worldwide following since it was adopted as an international class in 1988. The IOM is a simple and relatively-inexpensive racing yacht whose class rules are aimed at controlling costs and enabling the amateur builder to produce a competitive yacht. The rules are tight, with three one-design rigs permitted and restrictions on construction materials, draft, maximum length (one metre), ballast mass and minimum overall mass (four kilograms).

In Australia the IOM is the fastest-growing class with over 600 boats registered and fleets sailing in all states and the ACT. At the last world titles, Australians placed 2nd, 3rd, 4th and 10th. The next Australian championships will be held at Kogarah, NSW, in January 2005. Australia will host the next world championships in Mooloolaba, Qld, in September 2005.

Full details of the classes, the class rules, contacts for state organisations, and the forthcoming Australian and world championships may all be reached from the Australian Radio Yachting website, www.radiosailing.org.au.

Virtual Tour of *Spirit of Ontario I*

Spirit of Ontario I, the most powerful diesel-engined fast catamaran in the world, was built by Austal Ships in Fremantle and recently delivered to Canadian American Transportation Systems for the Rochester, New York, to Toronto, Ontario, service across Lake Ontario. Details of the vessel were provided in the May 2004 issue of *The ANA*.

You can now take a virtual tour of the vessel, inspecting nine interior spaces and the exterior by way of video clips. You will need to have Windows Media Player installed (Internet Explorer will prompt you for this; Netscape won't). Visit the Canadian American Transportation Systems website at ww.catsfastferry.com/index.asp, and click on the links to The Ferry/Virtual Tour.

Phil Helmore

Register of Australian and New Zealand Ships and Boats

The Register of Australian and New Zealand Ships and Boats was commenced in 2001. It currently has more than 25 000 entries for vessels built as early as 1750, right up to the present day. It is hoped to publish the register on CD.

The register can be used by people seeking information on a vessel, or by people who want to input information on a vessel. The following criteria apply:

- Vessels owned in Australia or New Zealand or representing the British Government in Australia. It includes naval, commercial and recreational vessels.

- Pre-1980: Vessels of length greater than 18 feet (5.5 metres) and having a name.
- Post-1980: Vessels of length greater than 48 feet (15 metres).
- Vessels on the British Australian Register (up to 1982).
- Vessels of interest due to achievement, loss, uniqueness, traditional construction, etc.

The record also includes the designer if that can be determined. Thus, it provides a record of practising naval architects/designers in Australia and New Zealand as well as shipbuilders.

Do you want to find out information on a ship or boat that might be on the register? It could be a ship or boat that you or your family own or have owned, or have built, or designed, or a ship or boat associated with your ancestors or that interests you. Please provide what information you have on the vessel in the questionnaire on the web page and I will see whether I have any information and send it back to you.

Do you have information on a vessel, past or present, that you would like to add to the register? If so, then please use the form on the web page. If you give your name, you will be acknowledged as a source on the database.

The register may be found at http://home.iprimus.com.au/mflapan/shipinfo.htm.

Mori Flapan

INDUSTRY NEWS

Wärtsilä Power for Long-Distance Towage

Wärtsilä Corporation has been awarded a contract to provide propulsion plants for a pair of deep-sea tugs being built by Niigata Shipbuilding & Repair, Inc. in Japan for the Rotterdam-based towage contractor Fairmount Marine BV.

The 75 m long tugs will each be powered by a complete Wärtsilä propulsion system, comprising Wärtsilä engines, Wärtsilä gearboxes, Lips controllable-pitch propellers, Lips high-efficiency nozzles and a Lipstronic integrated control and manoeuvring system.

The four Wärtsilä 6L32 diesel engines in each tug deliver a combined maximum output of 12 000 kW at 750 rpm. The engines are connected to a pair of twin-in/single-out gearboxes with a secondary driven 1 200 kW power take-off for electricity generation at sea. The two Lips CP propellers run in special high-performance HR nozzles, which generate up to 8% greater thrust than conventional nozzles, in both bollard-pull and free-running conditions. This means that the Niigata-built tugs will have a maximum bollard pull as high as 200 t, and still maintain a free-running speed of 16.5 kn. The Lipstronic control system ties together the control and monitoring of the machinery installation and includes a Lipsstick joystick system for simultaneous control of propellers, rudders and thrusters.

To be named *Fairmount Sherpa* and *Fairmount Summit*, the tugs are intended for long-distance deep-sea towage. They will, however, be fully equipped to work as anchor-handling tugs serving offshore rigs and floating production, storage and offloading vessels. The vessels are scheduled for delivery in May and October 2005.

Artist's impression of *Fairmount Sherpa*
(Image courtesy Wärtsilä)

Wärtsilä Power for Ultra Voyager Cruise Ship

Wärtsilä Corporation has been awarded a contract by Kvaerner Masa-Yards Inc. in Finland to supply six Wärtsilä 12V46 diesel engines as prime movers for the main generating sets for the Ultra Voyager cruise ship recently ordered by Royal Caribbean Cruises Ltd (RCCL).

Due for delivery in May 2006, the Ultra Voyager is a development of the five Voyager-class cruise ships built by Kvaerner Masa-Yards for RCCL. The 160 000 GTship will carry 3 600 passengers with two persons in each cabin, and have about 15 percent more passenger space than its predecessors. The ship will cruise principally in the Caribbean.

The Wärtsilä engines will form a 75.6 MW diesel-electric power plant supplying all power needs of the ship, including propulsion, ancillaries, hotel services, etc. The engines will be delivered during this year.

This is the latest of a long line of RCCL cruise ships powered by Wärtsilä diesel engines. These include four delivered from France in 1995–1998 and five Voyager-class ships from Finland in 1999–2003 in addition to several earlier deliveries.

Most Powerful Common-rail Engine Successfully Tested

The first 12-cylinder Sulzer RT-flex96C low-speed marine engine developed by Wärtsilä Corporation has successfully completed its official shop test. With a maximum continuous power output of 68 640 kW at 102 rpm, it is the most-powerful engine so far to employ common-rail technology.

The engine is one of four ordered in 2003 for the propulsion of four 7700 TEU post-Panamax container liners contracted by Blue Star Reederei, a subsidiary of P&O Nedlloyd BV, with the Japanese shipbuilding group IHI Marine United Inc.

Built under licence by Diesel United Ltd in Aioi, Japan, it was first started on 17 May 2004 and completed its official shop test on 7 June.

After the initial adjustments and running-in, the engine has been subjected to an extensive series of tests. Optimisation of the Sulzer RT-flex system with this size of engine was

completed with an eight-cylinder Sulzer RT-flex96C during March/April at another licensee, HSD Engine Co. Ltd in Korea. Further tests, however, have been made with the 12-cylinder engine into the performance of the engine with its common-rail systems. Throughout the tests, the engine has run extremely satisfactorily, without any difficulties. Its performance has fully met expectations.

Sulzer RT-flex engines are the most advanced large marine engines available for ship propulsion today. They are the first low-speed diesel 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 smokeless operation at all operating speeds, lower fuel consumption, reduced maintenance costs, and lower steady-operating speeds for better manoeuvring.

Owing to its number of cylinders, the Sulzer 12RT-flex96C at Diesel United has demonstrated a remarkable ability for stable running at very low speeds. For example, on the test bed it has run steadily at seven revolutions per minute.

The much-improved quality of combustion achieved in RT-flex engines which allows such low, stable speeds, together with smokeless operation across the speed range, has proved in service to leave RT-flex engines very clean with consequent benefits for maintenance.

With the successful testing of the Sulzer RT-flex96C engine, common-rail technology has been proven to be an excellent step forward for all sizes of diesel engines, from automotive engines up to the largest low-speed two-stroke engines. For Sulzer RT-flex engines, a key virtue of common-rail systems has been that they can be modular with standardised hardware applicable to more than one engine-bore size. Standardised software is, of course, employed for all RT-flex engine types.

At the top of the Sulzer RT-flex range, the RT-flex96C engine has been extremely successful in the market. In total, 64 engines have been ordered since the engine type was introduced at the beginning of 2003.

Overall, confirmed orders have been placed for a total of 110 RT-flex engines aggregating 4633 MW. In addition to the 64 Sulzer RT-flex96C engines, the engines in service and on order include seven Sulzer RT-flex84T-D engines for VLCCs, two Sulzer RT-flex68T-B engines for Aframax tankers, 17 Sulzer RT-flex60C engines and 15 Sulzer RT-flex58T-B engines for various ship types, and five Sulzer RT-flex50 engines for bulk carriers.

The first series-built Sulzer RT-flex production engine in operation — the 6-cylinder Sulzer RT-flex58T-B in the bulk carrier *Gypsum Centennial* — entered service in September 2001. It now has more than 15 000 running hours. More recently, further Sulzer RT-flex engines have been built at Wärtsilä's Trieste factory in Italy, and by licensees in Korea, Japan and China, and today there are eight RT-flex engines in service at sea.

The Sulzer RT-flex96C is adapted from the well-established Sulzer RTA96C engine, the most powerful Sulzer low-speed marine engine type. This is a popular prime mover for the world's largest types of container liners. There are 226 Sulzer RTA96C and RT-flex96C engines in service or on order with an aggregate power output of 13 130 MW.

Introduced in 1994, the Sulzer RTA96C engine has successfully made its mark in the propulsion of large container ships. All the engines are employed in this application, in ships with container capacities from 3 700 to more than 8 000 TEU. The first engines entered service in October 1997.

Initially there was an emphasis on engines with 10, 11 and 12 cylinders in-line, giving adequate power in a single engine to suit the newer generation of large post-Panamax container liners. Some 155 of the engines delivered or on order have 10, 11 or 12 cylinders. In 2001, the power range covered by the Sulzer RTA96C, and now also by the RT-flex96C, was extended to 80 080 kW by the addition of a 14-cylinder model and an increase in cylinder power to 5720 kW for all cylinder numbers. More recently, advantage has been taken of the high cylinder output of the Sulzer RTA96C and RT-flex96C to provide compact, high-output engines with down to seven cylinders.

SHIP-SINKING MONSTER WAVES

Once dismissed as a nautical myth, freakish ocean waves that rise as tall as ten-storey apartment blocks have been accepted as a leading cause of large-ship losses. Results from the European Space Agency's ERS satellites helped establish the widespread existence of these 'rogue' waves and are now being used to study their origins.

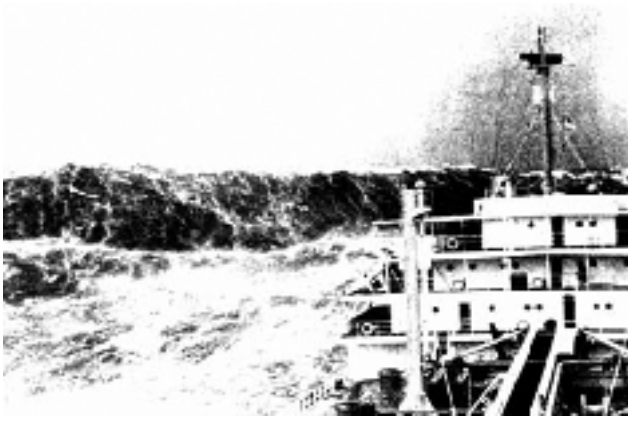
Severe weather has sunk more than 200 supertankers and container ships exceeding 200 metres in length during the last two decades. Rogue waves are believed to be the major cause in many such cases.

Mariners who survived similar encounters have had remarkable stories to tell. In February 1995 the cruiser liner *Queen Elizabeth II* met a 29-m high rogue wave during a hurricane in the North Atlantic that Captain Ronald Warwick described as "a great wall of water… it looked as if we were going into the White Cliffs of Dover." And, within the week between February and March 2001, two cruise ships — *Bremen* and *Caledonian Star* — had their bridge windows smashed by 30-m rogue waves in the South Atlantic, the former ship left drifting without navigation or propulsion for a period of two hours.

"The incidents occurred less than a thousand kilometres apart from each other," said Wolfgang Rosenthal — Senior Scientist with the GKSS Forschungszentrum GmbH research centre, located in Geesthacht in Germany — who has studied rogue waves for years. "All the electronics were switched off in *Bremen* as they drifted parallel to the waves and, until they were turned on again, the crew were thinking it could have been their last day alive.

"The same phenomenon could have sunk many less-lucky vessels: two large ships sink every week on average, but the cause is never studied in the same detail as an air crash. It simply gets put down to 'bad weather'."

This rare photo of a rogue wave was taken by first mate Philippe Lijour aboard the supertanker *Esso Languedoc* during a storm off Durban in South Africa in 1980. The mast seen to starboard in the photo stands 25 m above mean sea level. The wave approached the ship from behind before breaking over the deck, but in this case caused only minor damage. The mean wave height at the time was between 5 and 10 m.
(Photo Phillipe Lijour)



A merchant ship labouring in heavy seas as a huge wave looms ahead. Huge waves are common near the 100-fathom curve on the Bay of Biscay.
(NOAA Photo Library)

Rogue waves are most common in the Agulhas current off the east coast of South Africa, with numerous well-documented cases of extreme individual waves, including some striking photographs of damaged ships. This bow damage was received by Norwegian tanker *Wilstar* in 1974.
(Photo DLR)

Offshore platforms have also been struck: on 1 January 1995 the Draupner oil rig in the North Sea was hit by a wave whose height was measured by an onboard laser device at 26 m, with the highest waves around it reaching 12 metres. Objective radar evidence from this and other platforms — radar data from the North Sea's Goma oilfield recorded 466 rogue wave encounters in 12 years — helped convert previously-sceptical scientists, whose statistics showed such large deviations from the surrounding sea state should occur only once every 10 000 years.

The fact that rogue waves actually take place relatively frequently has major safety and economic implications, since current ships and offshore platforms are built to withstand maximum wave heights of only 15 metres.

In December 2000 the European Union initiated a scientific project called MaxWave to confirm the widespread occurrence of rogue waves, model how they occur, and consider their implications for ship- and offshore-structure design criteria. As part of MaxWave, data from ESA's ERS radar satellites were first used to carry out a global rogue wave census.

"Without aerial coverage from radar sensors we had no chance of finding anything," added Rosenthal, who headed the three-year MaxWave project. "All we had to go on was radar data collected from oil platforms. So we were interested in using ERS from the start." ESA's twin spacecraft ERS-1 and 2 — launched in July 1991 and April 1995 respectively — both have a Synthetic Aperture Radar (SAR) as their main instrument.

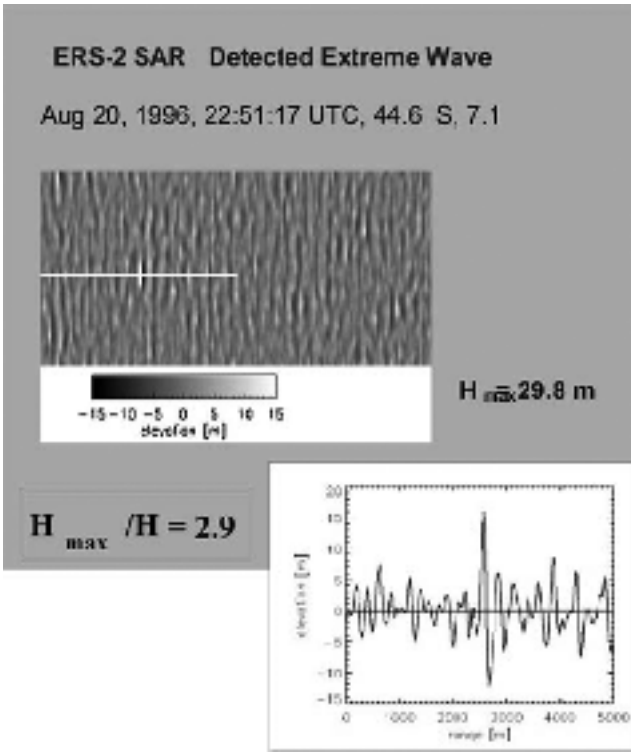
The SAR works in several different modes; while over the ocean it works in wave mode, acquiring 10 by 5 km 'imagettes' of the sea surface every 200 km. These small imagettes are then mathematically transformed into averaged-out breakdowns of wave energy and direction, called ocean-wave spectra. ESA makes these spectra publicly available; they are useful for weather centres to improve the accuracy of their sea-forecast models.

"The raw imagettes are not made available, but with their resolution of ten metres we believed they contained a wealth of useful information by themselves," said Rosenthal. "Ocean wave spectra provide mean sea-state data but imagettes depict the individual wave heights including the extremes we were interested in.

"ESA provided us with three weeks' worth of data — around 30 000 separate imagettes — selected around the time that *Bremen* and *Caledonian Star* were struck. The images were processed and automatically searched for extreme waves at the German Aerospace Centre (DLR)."

Despite the relatively brief length of time the data covered, the MaxWave team identified more than ten individual giant waves around the globe above 25 m in height.

"Having proved that they exist, in higher numbers than anyone expected, the next step is to analyse if they can be forecasted," Rosenthal added. "MaxWave formally concluded at the end of last year, although two lines of work are carrying on from it — one is to improve ship design by learning how ships are sunk, and the other is to examine more satellite data with a view to analysing whether forecasting is possible."



A giant wave detected during a global census using three weeks of raw ERS-2 SAR imagette data, carried out by the German Aerospace Centre (DLR). This SAR data set was inverted to individual wave heights and investigated for individual wave height and steepness.
The wave shown here has a height of 29.8 m.
(DLR image)

A new research project called WaveAtlas will use two years worth of ERS imagettes to create a worldwide atlas of rogue wave events and carry out statistical analyses. The principal investigator is Susanne Lehner, Associate Professor in the Division of Applied Marine Physics at the University of Miami, who also worked on MaxWave while at DLR, with Rosental a co-investigator on the project.

"Looking through the imagettes ends up feeling like flying, because you can follow the sea state along the track of the satellite," Lehner said. "Other features like ice floes, oil slicks and ships are also visible on them, and so there's interest in using them for additional fields of study.

"Only radar satellites can provide the truly global data sampling needed for statistical analysis of the oceans, because they can see through clouds and darkness, unlike their optical counterparts. In stormy weather, radar images are thus the only relevant information available."

So far, some patterns have already been found. Rogue waves are often associated with sites where ordinary waves encounter ocean currents and eddies. The strength of the current concentrates the wave energy, forming larger waves — Lehner compares it to an optical lens, concentrating energy in a small area.

This is especially true in the case of the notoriously dangerous Agulhas current off the east coast of South Africa, but rogue wave associations are also found with other currents such as the Gulf Stream in the North Atlantic, interacting with waves coming down from the Labrador Sea. However, the data show that rogue waves also occur well away from currents, often occurring in the vicinity of weather fronts and lows. Sustained winds from long-lived storms exceeding 12 hours may enlarge waves moving at an optimum speed in sync with the wind — too quickly and they'd move ahead of the storm and dissipate, too slowly and they would fall behind.

"We know some of the reasons for the rogue waves, but we do not know them all," Rosenthal concluded. The WaveAtlas project is scheduled to continue until the first quarter of 2005.

A giant wave produced with a hydraulically-powered wave generator in the Giant Wave Tank in Hanover in 2002.
(Photo Technical University of Berlin)

THE PROFESSION

Professional Engineers Remuneration Survey

Salaries paid to professional engineers have increased steadily over the last twelve months according to the results of the latest Association of Professional Engineers, Scientists and Managers, Australia (APESMA)/Engineers Australia (EA) professional engineers remuneration survey.

The survey, conducted in March of this year and released in June, reported an average annual increase in professional engineer salaries of 4.7%. This compares to an average annual increase of 4.7% reported at the same time last year. In comparison, the Australian Bureau of Statistics' Consumer Price Index rose by 2% in the twelve months to the end of March 2004, whilst the Average Weekly Earnings series reported an average rise of 5.7% in the twelve months to the end of November 2003.

According to the survey, base salaries rose by an average of 5.1% in the private sector, and 4.3% in the public sector. The largest increase of 5.7% was experienced by the mining/quarrying industry, and the smallest increase of 3.5% was experienced by the non-metallic minerals industry. Other indicative increases were consulting and technical services 5.1%, fabricated metal 5.0%, defence 4.9%, education 4.1% and public administration 3.9%.

Contract Rates

The APESMA/EA survey states that a trend in the employment of professional engineers is the increasing number opting to practise 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.

The Australian Bureau of Statistics estimates that up to 20 per cent of the workforce is now engaged in non- standard work arrangements, with professionals operating as independent contractors or consultants among the fastest-growing group.

Ultimately, the hourly rate charged depends on the market for the service provided. If you are a contractor or are employing contractors, then you need to know what is included in a fair charge-out rate and Page 4 of the summary survey, relating to contract rates, is a must-read for you.

Graduate Salaries

The APESMA/EA survey shows that graduate engineer respondents commencing work during the last twelve months earned a median base salary of $41 700 on commencement, with 80% of salaries in the range $36 500–50 000. Over 90% of graduate respondents began on salaries higher than minimum rates prescribed in the major professional engineer awards.

For further details, a six-page summary of the survey is available on the web at www.apesma.asn.au/surveys. The full report is a 132-page document, available in hard copy only from APESMA for $198 (discounted for members).

Public Comment on NSCV Part C Section 4

The National Marine Safety Committee has called for public comment on the draft National Standard for Commercial Vessels, Part C Section 4 — Fire Safety. This section covers fire protection and will replace Sections 5F (Structural Fire Protection) and 11 (Fire Appliances) of the USL Code. It has been developed with input from both industry and government representatives.

The NMSC has developed an Excel spreadsheet to point to applicable sections of the fire-safety rules, depending on input for your vessel.

Mori Flapan made a presentation on the new fire safety section to a combined meeting of the RINA and IMarEST in Sydney on 29 July (see separate report in the *News from the NSW Section* column in this issue).

Part C Section 4, its RIS and the spreadsheet are available for download from the NMSC website www.nmsc.gov.au, or can be obtained in hard copy (and the spreadsheet on CD) on request to the NMSC by phone (02) 9247 2124, fax 9247 5203 or email secretariat@nmsc.gov.au. Comments can be lodged with the secretariat on the above contacts, or by mail to PO Box 1773, Rozelle NSW 2039.

The deadline for comments is 31 August, so don't delay, get your copy and comment today!

Public Comment on NSCV Part C Section 3

The National Marine Safety Committee has released an issues paper for public comment on the National Standard for Commercial Vessels, Part C Section 3 — Construction. This section will cover construction, and will replace Sections

- 5A Preliminary
- 5B Structural Strength
- 5G Design Loadings (AS4132.1)
- 5H Aluminium (AS4132.2)
- 5I Copper-nickel Alloy
- 5J Ferro-cement
- 5K Fibre-reinforced Plastics (AS4132.3)
- 5L Steel
- 5M Timber

of the USL Code.

The NMSC is about to commence drafting of the construction section, and is asking for public comment on the current USL Code and AS4132 provisions, problems and improvements, obsolete or redundant provisions, etc., suggestions for relevant national/international standards or classification society rules which could replace the USL Code and AS4132 provisions, technological changes which need to be addressed, and the like.

The issues paper enumerates some of the areas to which submissions might relate, describes the work to date, discusses some of the issues which have already been recognised, and presents some of the possible approaches which could be taken in the drafting of the new construction section.

The issues paper for Part C Section 3 is available for download from the NMSC website www.nmsc.gov.au, or can be obtained in hard copy on request to the NMSC by phone (02) 9247 2124, fax 9247 5203 or email secretariat@nmsc.gov.au. Comments can be lodged with the secretariat on the above contacts, or by mail to PO Box 1773, Rozelle NSW 2039.

The deadline for comments on the issues is 31 August, so don't delay, get your copy and comment today!

Phil Helmore

NMSC Incorporates

The National Marine Safety Committee has been incorporated as an association, with each of the state and territory marine safety agencies as its members. The new legal arrangement will assist in balancing commitments from each member organisation.

The new incorporated body has also moved offices to Maritime Trade Towers, Level 11, 207 Kent St, Sydney. The phone number has changed to (02) 9247 2124 and fax to (02) 9247 5203.

The incorporation this year followed NMSC's review of organizational arrangements necessary to implement the Marine Safety 2003–05 strategy endorsed by the Australian Transport Council. NMSC's independent Chair, Des Powell, continues in the role, and Maurene Horder's title has changed from Director to Chief Executive Officer.

Safety Lines, April 2004

MEMBERSHIP NOTES

AD Council meetings

The Australian Division Council met on 9 June, with teleconference links to all members and the President, Rob Gehling, in the chair. Matters, other than routine, which were discussed included:

- National Professional Engineers Register: An application for registration and inclusion of naval architects in the NPER register had been made to the National Engineering Registration Board (NERB) and this application had been rejected by the Board. It was decided to rework the original document, noting the comments made by the Board and to resubmit the application. The President would discuss the new application with the Registrar of the NERB prior to its submission for consideration by the Board at its next meeting.
- Student Members: In view of the large number of student members, mainly from the Australian Maritime College (AMC) and The University of New South Wales (UNSW), the Chief Executive of RINA had been asked to provide the criteria used by RINA for determination as a student member. The President had discussed the matter with the Chief Executive and, following the discussion, the possibility of enrolment of students other than full-time students at the AMC and UNSW as student members would be pursued.
- The Maritime Australia Award: This award, to be made by the Australian Naval Institute, would be in the form of a two-year grant for research and development in a maritime activity and was announced during the closing ceremony of the Pacific International Maritime Conference 2004. At least $10 000 each year will be made to the winning project, and the grant will be awarded to the most promising research or development proposal, to be judged by a committee of experts from the various fields of maritime endeavour. The intent of the award is that it be available to the widest range of potential researchers and innovators, rather than to just one sphere of maritime endeavour.

  The Australian Division of RINA had been invited to participate in the Award by the provision of some limited financial support, together with support with definition of the terms and conditions and participation in judging. The Division, as members would be aware, receives limited funding from London and our Divisional financial commitments preclude the Division from providing funds for the award. The Chief Executive of RINA was asked if the Institution might be able to provide some funding. The Chief Executive felt there would be little support by the RINA Council, as the award could be seen to advantage only members of RINA in Australia. The Chief Executive did offer to provide advertising of the award in the RINA Journals.

  As the Division is unable to offer financial assistance, our President would write to the President of the Australian Naval Institute, explaining the Division's inability to provide financial assistance and offering every support and assistance by way of advertising in RINA Journals, *The Australian Naval Architect*, and in establishing conditions for the Award and in judging applications for the award.
- RINA Members in South Australia: Council considered the position of members in South Australia. As there are approximately fifteen members in that State, i.e. too few to establish a Section of the Division, Council believed that there was a need to provide some activities for members in South Australia, and it had been suggested that it might be possible to attend IMarEST Technical Meetings and some other activities. It was decided to establish a South Australian sub-Committee of Council to arrange activities for members in South Australia. Mr Peter Crosby was appointed as co-ordinator and Mr Mike Warren as a member, together with others appropriate for the operation of the sub-Committee.
- RINA Council Meeting in London: The meeting was held on 28 April 2004 and your President attended in person. Council approved the implementation of a Corporate Partner Scheme. Companies would be invited to join the Scheme and, in return for a fee, would be entitled to certain privileges and undertake certain

obligations. They would be offered reduced fees for attendance at RINA conferences and reduced advertising rates in RINA journals, together with other inducements.

The Australian Division Council expressed concern for a possible reduction in sponsorship for the Pacific International Maritime Conference from Australian-based companies who might become Corporate Partners. They might also expect reduced fees at this conference, together with other conferences sponsored by the Australian Division and reduced advertising rates in *The Australian Naval Architect*. Rather than wait until the next RINA Council meeting in London, the President offered to take these matters up with the Chief Executive and suggest that London might have to consider providing financial compensation to the Division should the Division suffer financial loss due to participation in the scheme by Australian-based companies.

- One further matter raised at the London meeting was the introduction of a 'mentoring scheme'. It was proposed that naval architects in training be assigned a member of the Institution, within the profession, who would act as a mentor to provide guidance and assistance. The Australian Division Council thought that this could involve the Division in a large workload when the significant number of student members alone is considered. The scheme is to be introduced by the Chief Executive and Council awaits further information.

The next Australian Division Council meeting is scheduled for 29 September 2004.

The Walter Atkinson Award 2003

Walter Atkinson was a Geordie who arrived in Australia with a solid background in shipbuilding from the Tyneside in Newcastle, UK. He spent time as the Hull Overseer at Cockatoo Island Dockyard, and at Navy Office in Melbourne. He finished up as Superintending Naval Architect at HMA Naval Dockyard, Garden Island, and was still employed there when he died after a short illness in 1970. He was a founding member of the Australian Branch (as it was then) of the Royal Institution of Naval Architects, and a long-serving member of council. He was widely respected for his "people skills" and for his practical shipbuilding knowledge.

To perpetuate his memory, the Council of the Australian Branch resolved in 1971 to present a Walter Atkinson Award, annually at its discretion, to a selected paper presented at a meeting of the Institution in Australia. The Council of the Australian Division broadened the eligibility criteria for 2002 onwards and re-worded the object: "to stimulate increased interest in the preparation, and to raise the standard, of technical papers presented to the naval architecture community in Australia." Written technical papers, first presented at a maritime conference or RINA meeting within Australia, or first published in a maritime journal within Australia, during the year are eligible, and all authors are eligible. The award is currently valued at $250.

The Executive Committee of Council of the Australian Division has agreed to the recommendation of the WAA Committee that the Walter Atkinson Award for 2003 be presented to Michael Andrewartha, Lawrence Doctors, Kishore Kantimahanthi and Paul Brandner for their paper *Application of Hydrofoils to Improve Performance of High-speed Catamarans*, published in *The ANA* in November 2003.

The Executive Committee also agreed to the recommendation that Lina Diaz be commended for her paper *Submissions for Survey and Classification: Do Yours Make the Grade?* published in *The ANA* in February 2003.

Congratulations to all!

Keith Adams
Secretary

RINA Council and Committee Members

To keep members up-to-date with who is doing the hard yards on their behalf in Australia, current council, section and committee members are as follows:

Australian Division

President	Robin Gehling
Vice-president	Stuart Cannon
Secretary	Keith Adams
Treasurer	Allan Soars
Members nominated by Sections	
	Shaun Ritson (WA)
	Martin Williams (NSW)
	Stuart Cannon (Vic)
	Brian Hutchison (Qld)
	Gordon MacDonald (ACT)
	Giles Thomas (Tas)
Members appointed by Council	
	Jim Black
	Werner Bundschuh
	Mike Seward
	Mark Smallwood
	Andy Tait
	Mike Warren
Website	Mike Warren, Jude Stanislaus

ACT Section

Chair	Gordon MacDonald
Deputy Chair	Dave Magill
Secretary	Kate Linley
Treasurer	Nick Whyatt
Members	Alistair Allen
	Roger Duffield
	Robin Gehling
	Martin Grimm
	Wade Limpus
Website	Wade Limpus

NSW Section

Chair	Phil Helmore
Deputy Chair	Graham Taylor
Secretary	Lina Diaz
Treasurer	Adrian Broadbent
Members	Craig Boulton
	David Firth
	Don Gillies
	Bruce McRae
	Grahame Parker

	Andrew Tuite
	Martin Williams
Website	Bruce McRae, Andrew Tuite

Queensland Section

Chair	Bill Barlow
Deputy Chair	Dion Alston
Secretary/Treasurer	Brian Hutchison
Members	Ross Burchill
	Adam Podlezanski
	James Stephen
	Alan Prigg
	Brian Robson
	Gillian Carter
Website	Brian Robson, Brian Hutchison

Tasmanian Section

Chair	Gregor Macfarlane
Secretary	Misha Merzliakov
Treasurer	Ian Lund
Members	Noel Dunstan
	Ian Larkins
	Oliver Mills
	Alan Muir
	Giles Thomas
Website	Gregor MacFarlane, Oliver Mills

Victorian Section

Chair	Craig Gardiner
Secretary	Samantha Tait
Treasurer	Ken Hope
Members	Stuart Cannon
	Mark Smallwood
Website	Stuart Cannon, Samantha Tait

Western Australian Section

Chair	Shaun Ritson
Deputy Chair	Ken McAlpine
Secretary	Bronwyn Adamson
Treasurer	Damien Smith
Members	Tim Gourlay
	Rohan Irvin
	Manus Martens
	Breytan Menezes
	Pete Randhawa
	Colin Spence
Website	Tim Gourlay

Publications Sub-committee of Council

Editor-in-chief (*The ANA*)	John Jeremy
Technical Editor (*The ANA*)	Phil Helmore
Member	Noel Riley

Safety Group

Chair	Robin Gehling
Members	Adrian Mnew
	Andrew Tuite

Walter Atkinson Award Committee

Chair	Brian Hutchison
Members	Lance Marshall
	Brian Robson

RINA London

Council Members	Bryan Chapman
	Robin Gehling (*ex officio*)
	Noel Riley
Safety Committee	Robin Gehling
Small Craft	Noel Riley
High-speed Vessels	Tony Armstrong
	Phil Hercus

RINA/Engineers Australia Joint Board of Naval Architecture

Chair	Bryan Chapman
Member	Robin Gehling

Australian Maritime College Industry Advisory Group

Member	Noel Riley

Marine Safety Victoria Marine Industry Advisory Group

Members	Bryan Chapman
	Mark Hughes
	Martin Jaggs
	Adrian Mnew
	Dennis Pratt

National Marine Safety Committee Industry Advisory Group

Member	Bryan Chapman

National Professional Engineers Register Naval Architecture Competency Panel

Chair	Jim Black
Members	Tony Armstrong
	Werner Bundschuh
	Stuart Cannon
	Bryan Chapman
	Laurie Doctors
	Gordon MacDonald
	Allan Taylor

Pacific 2006 Organising Committee

Chair	John Jeremy
Members	Keith Adams
	Laurie Prandolini

Standards Australia Committee AV006 Machinery Noise

Member	Mark Smallwoood

Standards Australia Committee CS051 Yachting Harnesses and Lines

Member	Bruce McRae

Standards Australia Committee ME059 Shipbuilding

Member	Bryan Chapman

Phil Helmore

NAVAL ARCHITECTS ON THE MOVE

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

Alistair Allan has moved on from the Directorate of Navy Platform Systems and has taken up a position with the Defence Materiel Organisation in Canberra, working on the air-warfare destroyer project.

Phil Brown has moved on from Tenix Shipbuilding (WA) and has taken up the position of General Manager of the Anzac Alliance, a joint venture between Tenix Defence, Saab and the Department of Defence for upgrading the Anzac-class anti-ship missile defences. Ken Pierce has taken over as General Manager of Tenix Shipbuilding (WA).

John Butler has taken up a position as a naval architect with Incat Designs – Sydney in Sydney.

Levi Catton is currently on rotational development from the Directorate of Navy Platform Systems, working at Austal Ships in Fremantle.

Tony Chigwell has recently arrived from the UK to take up the position of Technical Manager with SP Systems in Sydney. SP Systems is the Australian Branch of SP Technologies, providing composite engineering technology to the Australia–New Zealand region.

Joe Cole has been working with the Defence Materiel Organisation in Canberra on the Armidale-class Patrol Boat Project, and has recently taken up a position in their on-site office at Austal Ships in Fremantle.

Patrick Couser has moved on within Formation Design Systems, and travelled to France by way of Dubai and Spain. He has taken up residence in Bagneres de Bigorre in the French Pyrenees, where he flies the Formation Design Systems flag.

Lina Diaz continues consulting, but has now set up her own company and is consulting as Blue Water Design in Sydney.

Gooitzen Eggink has taken up a position as a naval architect with Formation Design Systems in Fremantle. He graduated from Haarlem University in The Netherlands, having done some of his student project work with Formation Design Systems in Fremantle.

Tommy Ericson has moved on within Brisbane Ship Construction and has now been appointed Production Coordinator as well as Design Engineer at the BSC Marine Group in Brisbane.

Mark Evans has moved on from Austal Ships and has taken up a position with London Offshore Consultants Australia in Perth in order to further his specialist interest in hydrodynamics. Mark obtained his degree from the University of Southampton, and worked on the design of RV *Triton* at Qinetiq, where he was responsible for the seakeeping analysis.

David Firth has moved on from Det Norske Veritas and has taken up a position as a composites engineer with SP Systems in Sydney. He has also accepted a position on the NSW Section Committee of RINA.

Tristan Harris has moved on from Simply Wireless, and has opened a salad-and-pasta bar in the Macquarie Centre in Sydney, in partnership with his parents' business, Harris Farm Markets.

Peter Goodin has moved on from the Anzac Ship Project Management Office in Williamstown, after fourteen years with the Department of Defence, and has taken up a position as a senior naval architect with Australian Maritime Technologies, almost next door, in Williamstown.

Anthony Gray has taken up a position as a naval architect with Austal Ships in Fremantle. He arrived fresh from Plymouth, UK, where he worked for DML Devonport (Royal Dockyard Devonport) after graduating from Southampton University in 1996.

Gillian Gray (nee Fisher) has arrived from the UK with her husband, Anthony Gray. She graduated in naval architecture from the University of Strathclyde, doing her thesis on the slamming characteristics of high-speed craft. She is looking for work in the Perth–Fremantle area.

Dean Gregorevic, has moved on within the McDermott organization and, from McDermott SE Asia in Dubai, UAE, has taken up the position of Field Engineer with McDermott Industries Australia in Perth.

Martin Grimm has returned to the Directorate of Navy Platform Systems at the Department of Defence in Canberra, after an enjoyable year at Seastate in Fremantle, where he was primarily involved with ship motions while on leave without pay from the Department. He has returned to naval hydrodynamics.

Steve Harler has moved on from McAlpine Marine Design and, after a short break from the daily grind, has taken up a position as a subsea engineer with Seatrac in Perth.

Hason Ho, a recent graduate of The University of New South Wales in both naval architecture and aerospace engineering, has taken up a position as a mechanical design engineer at Argus Technologies in Sydney, working with antennas and radars. Currently the company is working mostly on civil telecommunications projects, but they have military projects coming up and he will be working on aircraft and ship radars. He gets to play with FEA and CFD, putting everything he has learned into practice. His only problem is having to wake up at 6 am every day and returning home at 7 pm which, he says, is a big difference from his lazy student lifestyle! No-one who knows him ever called Hason *lazy*.

Peter Holmes has moved on from his position as cook/deckhand on the charter catamaran *Tongarra* in the Whitsundays, and has embarked on a six-week tour of Japan and the UK before looking for work in the UK or western Europe.

Wade Limpus has moved on from the Directorate of Navy Platform Systems, and has taken up a position with the Chief Finance Office of the Department of Defence in Canberra.

Kate Linley has taken up a position as a Senior Marine Surveyor with the Australian Maritime Safety Authority in Canberra. She arrived from the UK two years ago, fresh

from the Royal Fleet Auxiliary with a master's certificate of competency, and degrees in naval architecture and marine engineering from the University of Southampton as well. She has recently taken on the position of Secretary of the ACT Section of RINA.

Trevor Rabey has moved on from consulting and has taken up a position as a senior consultant with Tracey Brunstrom & Hammond in North Sydney, providing project management and strategic management services to the construction industry.

David Shelton has moved on from Transport SA, and has taken up a position as Regional Manager Eastern Victoria with VicRoads in Traralgon, Victoria.

Damien Smith has moved on from Austal Ships and is now consulting as Damien Smith in Fremantle, and has been busy. He is commercialising one of his control-valve designs with Optimum Control, the company he worked for in Sydney while a student. He also has 11.5 m and 13 m motor boats under construction for clients in Fremantle and Henderson, and will be heading off with the C-class catamarans to challenge for the Little America's Cup in September. On top of all that, he married Janelle in mid May.

Evan Spong has moved on from Qinetiq in the UK, and has taken up a position for the next three years with the Prada team in Milan, Italy, using CFD to analyse and enhance the performance of Italy's next challenger for the America's Cup.

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
Martin Grimm
Tony Armstrong

AUSTRALIAN MUSEUM EUREKA PRIZE

At the Australian Museum Eureka Prize ceremony on 10 August, Alan Taylor MRINA was announced as joint winner with Geoff Rigby and Gustaaf Hallegraeff of the $10 000 Sherman prize for environmental research.

More "marine rabbits" on every ship

Imagine if every jumbo jet landing in Australia dumped a cargo of animals from its homeland — rabbits, rats, cockroaches, mosquitoes. That's what used to happen when ships arrived in Australia. They discharged their ballast water, releasing foreign marine plants and animals into our coastal waters.

Today a 15-year Australian campaign has resulted in a global agreement to save the world's oceans from the scourge of these "marine rabbits" and has also won the $10 000 Sherman Eureka Prize for Environmental Research for the men who drove the science and engineering that underpinned the campaign.

"Thanks to the work of Geoff Rigby, Alan Taylor and Gustaaf Hallegraeff, an environmental threat has been greatly reduced," says Brian Sherman AM, President of the Australian Museum Trust.

World trade depends on the ships that carry 80% of international freight. And ships need ballast water to stay afloat safely. So our new cars, computers and clothes are delivered, along with millions of tonnes of ballast water carrying foreign marine plants and animals.

The introduction of these foreign creatures can have a devastating impact on marine environments. The zebra mussel now blocks power-station intakes in America's Great Lakes and costs two billion dollars a year to control. The North American comb jelly has wiped out the anchovy fisheries in the Black Sea. And Japanese starfish are mounting their own invasion of Melbourne's Port Phillip Bay.

Fifteen years ago in Tasmania, shellfish farms were being closed due to toxins that could cause human paralysis. Gustaaf Hallegraeff showed that the cause was toxic algae from ballast water discharged at a woodchip port.

His warning call was heeded. The government introduced shipping guidelines. And two engineers from BHP — Geoff Rigby and Alan Taylor — starting working with Gustaaf to explore how the company's fleet of 20 ships could operate without risk to the marine environment.

The team developed several options for countering the problem, including deep-ocean water exchange, and an ingenious way of using waste heat from the ship's engines to treat ballast water.

It's not been an easy road. The shipping industry was sceptical, and few people believed a technical solution was possible. But today, not only is Australia's marine environment better protected, but the team's work has led to an historic International Maritime Organisation convention to protect the world's coastal waters.

"It's a remarkable achievement" says Brian Sherman. "And the team is still working to help the shipping industry develop practical, cost-effective ways of meeting the new rules."

The Sherman Eureka Prize is awarded for research in any field of the biological, physical, mathematical or biomedical sciences leading to the resolution of an environmental problem or the improvement of our natural environment.

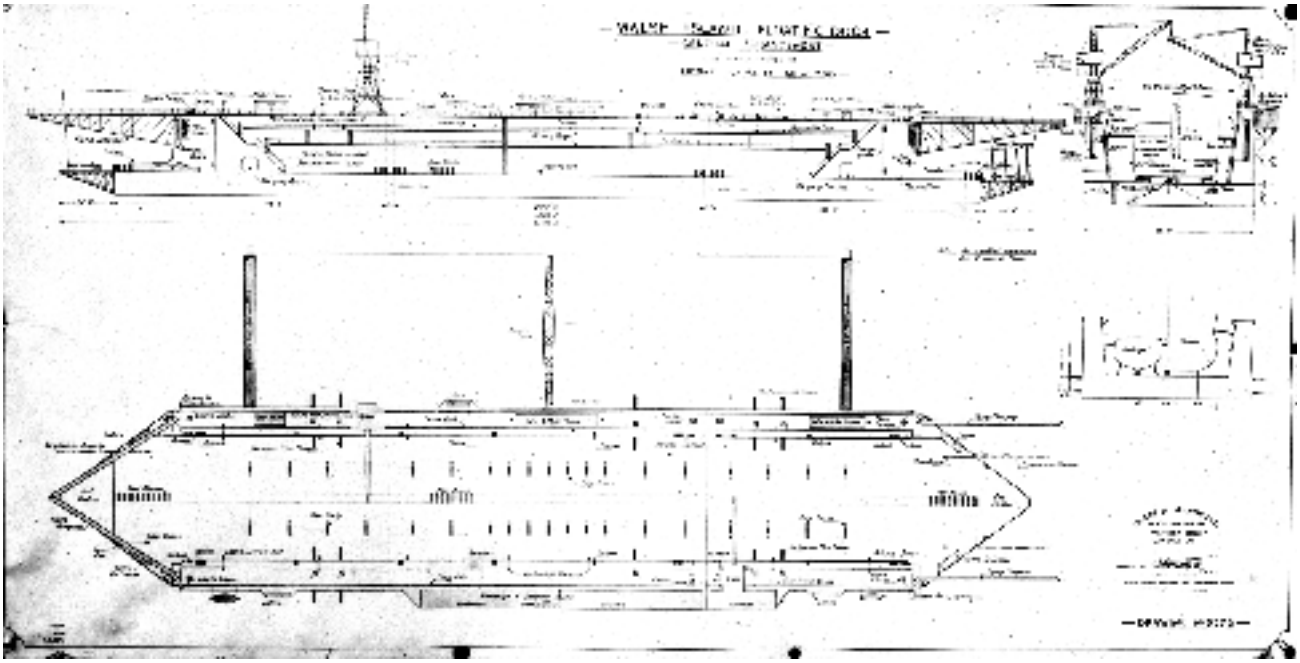
Australian Museum Website

HMA Ships *Newcastle*, *Parramatta*, *Success* and *Rankin* have recently participated in the major multi-national naval exercise RIMPAC 2004 involving some 17 000 service people and 40 ships from Australia and seven other nations. *Success* is one of the RAN's largest ships, but is dwarfed in this photograph of replenishment operations with USS *Rushmore* (LSD 47), left, and USS *Tarawa* (LHA1), right.
(US Navy photograph)

The US Navy's newest and most advanced nuclear-powered attack submarine and the lead ship of its class, *Virginia* (SSN 774), returns to the General Dynamics Electric Boat shipyard following the successful completion of its first voyage in open seas called "alpha" sea trials. *Virginia* and the rest of the ships of its class are designed specifically to incorporate emergent technologies that will provide new capabilities to meet new threats. *Virginia* will be delivered to the US Navy later this year.
(US Navy photo by General Dynamics Electric Boat)

FROM THE ARCHIVES

The above photograph shows the launching at Whyalla of the Union Steamship Company's *Seaway Queen* on 19 November 1963. The 107.89 m LBP roll-on/roll-off ferry was of hybrid design with lift-on/lift-off cargo facilities as well. Completed in 1964, she served with the Union Company until 1980. In the background her identical sister *Seaway King* is under construction. She was launched 8 weeks later. The 21 600 t dwt bulk carrier *Gerringong* is in the left foreground.
(Photo Bryan Chapman collection)



To supplement Lindsay Emmett's article on the Walsh Island Dockyard in the May edition of *The Australian Naval Architect*, we reproduce this General Arrangement drawing of the Walsh Island floating dock. The dock was designed by the well-known British firm of dock designers and consultants, Clark and Standfield
(John Jeremy Collection)

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