THE AUSTRALIAN NAVAL ARCHITECT

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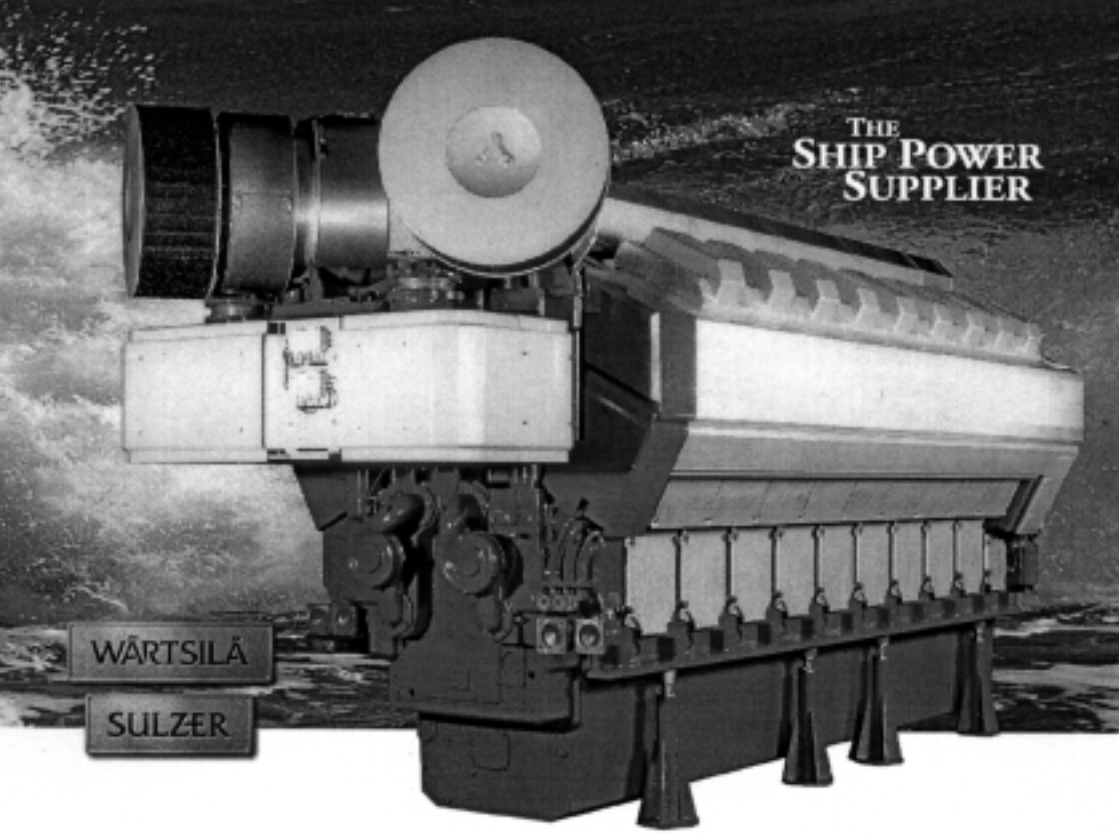

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THE AUSTRALIAN NAVAL ARCHITECT

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Cover Photo:

Joint Venture in the Derwent River with HMAS *Brisbane* and HMNZS *Canterbury*. (Photo courtesy Incat Australia)

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From the Division President

A few weeks ago I wrote to long-standing Graduate members of the Division encouraging them to upgrade their status to that of Member. One of the Graduates to whom I wrote was interested enough to reply to my letter, telling me why he hadn't felt it necessary to go through the upgrading process. He also expressed the feeling that RINA's funding of the Division was inequitable and that upgrading to Member would really result only in more of his money going to the Institution in London.

I had to agree that his sentiments were not unreasonable and were probably shared by others. In preparing my own response I also had to consider my own reasons not only for becoming a Member of the Institution, but for joining it in the first place. I thought you might be interested in them, so here is an extract from my letter in reply:

'From a personal perspective, I joined RINA, SNAME and IEAust. as a student, more years ago than I care to remember. As it became appropriate I upgraded my membership of each of these organisations to Graduate and Member and my combined annual subscriptions now exceed $1,000. To me membership of the appropriate professional bodies was a matter of principle. I felt, and still feel, that if I wanted to call myself a naval architect and engineer I had to belong to the bodies which were formed to advance the theory and practice of naval architecture and engineering. While there are other benefits they have never been a large issue in my reckoning and I have to admit that at times their value may be perceived as nebulous.

I understand that not everybody feels the same as I do and my comments above are intended only to give an indication of my own feelings.

From an Institution perspective I want to comment on the money issue. I understand your comments about the modest proportion of members' subscriptions that is returned to the Division and this has been a point of contention between the Division and the parent body for some time. However I think we have to be realistic. A couple of years ago the Division made strong representations to the parent body for a significant funding increase. These representations were backed by soundly based budget figures and consequently were reasonably successful. As a result provided prudence is exercised the Division now is able to operate satisfactorily within its budget. While only a modest proportion of my RINA dues is returned to the Division I have to accept this as the cost of belonging to an international body. None of my SNAME subscription is returned to me, and I get more from RINA than I think I would from any Australian-based professional naval architects body.'

From time to time people tell me that they don't see any real benefits in membership of professional institutions — that they can gain access to publications and transactions, often free of charge, through libraries, colleagues etc. and that technical conferences are generally open to all interested persons, so why bother?

These attitudes are understandable. They are also, in the long run, self-defeating. The various professional bodies provide irreplaceable forums for the exchange of information critical to the development of our field of professional endeavour. Without these forums we would all end up as isolated individuals working away in our own little worlds, rather like the medieval alchemists. There are times when the issue of what we individually may contribute is at least as important as what we may gain.

I'm proud to be a Member of RINA, as I am to be a Member of my other professional bodies. It means that I can feel that if nothing else I am making my own small contribution to the development of my field of professional endeavour.

Bryan Chapman

Editorial

The Royal Australian Navy has been very prominent in the Australian response to the large number of water-borne illegal entrants to our coastal waters over the last few months. The response has included the deployment of guided missile frigates, Anzac frigates and logistic support ships. It is against this background that the tendering process to replace the RAN's Fremantle class patrol boats is proceeding.

The Request for Tender (RFT) has a number of novel features which are, I expect, providing some

interesting challenges for Australian shipbuilders. The new ships may be bought outright by the Commonwealth as in the past, or alternatively provided by the selected contractor as a capability for the nominated period of twenty years. Tenderers have considerable flexibility to vary the number of ships, their availability, performance, support arrangements and personnel numbers to provide the 'output requirements' at minimum capital and life cycle costs. For example, the new ships' hulls could be constructed from any material — there is no stated preference.

From the stated requirements, it is reasonable to expect that the new ships will be somewhat larger than the Fremantle class patrol boats. However, there is an implied size constraint in that tenderers' attention is drawn to the limits imposed by the current facilities in Darwin and Cairns, which can cater for ships no bigger than about 50 m long, 10 m in beam and 20 m in height. The RFT warns that the cost of any necessary modifications to accommodate larger vessels will be taken into account in evaluating the total cost of proposed solutions. It is likely to be a bold tenderer that will offer a ship outside these size limits.

When the Attack class patrol boats were bought in the 1960s, it was not expected that they would be called upon to undertake as wide a range of tasks as ultimately came their way. The Fremantle class (designed in the 1970s) were larger and reflected the increased demands placed upon the patrol boat fleet. They have limitations, as illustrated in Bruce McNeice's article *Seakeeping Characteristics of Patrol Boats* in this edition of *The ANA*. He shows how important seakeeping is to the mission of the patrol boats, noting that in the operating environment that can be expected 36% of the time (i.e. Sea State 4) one third of the crew can be suffering from some degree of seasickness. The first two attributes on his list of improvements are a larger displacement and increased waterline length.

I suspect that more Australians than ever before now realise just how far away Christmas Island and Ashmore Reef are from the Australian mainland. The RAN has enormous territory to cover, a big challenge for 50 m patrol boats. It is an expensive solution to use Anzac frigates to guard our waters against illegal immigrants. Perhaps we should be re-examining the option of replacing at least some of the RAN's patrol boats with an offshore patrol ship of around 1500 t, capable of keeping the seas for longer periods, and ideally operating a small helicopter to greatly magnify the ship's surveillance capability.

John Jeremy

The last Oberon class submarine to serve in the RAN — HMAS *Otama*. The now decommissioned submarine is to be transferred to the Victorian community of Hastings. She will be preserved ashore. (Photo John Jeremy Collection)

NEWS FROM THE SECTIONS

ACT

During the afternoon of 16 August Mr Ric Fitch, Manager Planning, Policy and Liaison for the Australian Customs Service Coastwatch organisation provided RINA members with an informative presentation on the activities of Coastwatch before showing the participants the operations centre in action.

Mr Fitch gave a brief background to the evolution of what today is Coastwatch. In the late 1960s quarantine commenced with the aim of controlling the introduction of diseases and national fishing zones were declared. The 1970s saw an increasing incidence of illegal fishing activities, the arrival of refugees in Australia and the extension of our Exclusive Economic Zone out to 200 n miles. At that time the Department of Transport took responsibility for the customs surveillance duties with a reliance on RAAF and RAN assets only. In the early 1980s the Federal Police took over this responsibility and later that decade it was transferred to the Australian Customs Service where it remains (pending the outcome of the next Federal election?) While Coastwatch continues to draw on the assets of the RAAF and RAN, from the 1990s onwards there was a steady increase in the assets available to Coastwatch, including both the Customs Service marine fleet and contracted surveillance aircraft.

The arrival of illegal immigrants on the East Coast by boat in 1999 prompted a reinforcing of Coastwatch. Ric pointed out that Coastwatch is not a self-tasking organisation but, rather, it provides a service to its various clients. These include Australian Fisheries Management Agency, Australian Quarantine and Inspection Service, Department of Immigration and Multicultural Affairs, Environment Australia, Great Barrier Reef Marine Park Authority, AMSA, Australian Federal Police, Australian Customs Service Border Division, and various state agencies though their federal counterparts. With such a diversity of clients, it was important to coordinate surveillance tasks such that maximum effectiveness was achieved for all agencies, surely not an easy task but one that Ric seemed to have come to terms with! On the morning of the visit to Coastwatch an illegal immigrant vessel had been detected which was subsequently going to create particular political and media attention!

MARENSA arranged a meeting on the evening of 12 September in which Mr Adrian Mensforth, currently Principal Engineer Strategy and Development with Tenix Defence Pty Ltd in Melbourne, provided a presentation on lessons learned with the installation of the Identification Friend or Foe (IFF) antenna on the Anzac class frigates. Adrian provided such a clear and straightforward presentation that not only the electrical engineers but also the naval architects amongst the group could readily understand the basic principles and problems which he described. Essentially, the performance of this antenna had been compromised by its positioning on the ship, surrounded by structural items and other antenna systems. Adrian outlined the systematic approach that was taken to first quantify the performance of the system, then to identify its shortcomings and, finally, to develop means of overcoming those problems. The presentation described what appears to have been a well-planned and executed troubleshooting task and this success could undoubtedly be attributed to a good appreciation of the physics of the system by those personnel finally called in to resolve the problems being experienced.

On the evening of 17 October Mr Peter Clark, Senior Engineer with the Navy Systems Branch, Department of Defence presented a review of the findings of the HMAS *Westralia* engine-room fire based on the Board of Inquiry report into the incident. The fire sadly resulted in the death of four crew members. The chain of circumstances that led to the fire was described during the presentation. The previously fitted rigid fuel lines on the ship had suffered from chronic fuel leakage problems and this had prompted the decision to convert the lines over to flexible hoses. As the ship was in class with Lloyd's Register, advice had been sought by the contractor from LR for approved hoses and this was provided. Unfortunately, in the process of selecting the hoses to be fitted, focus was placed on one aspect of the Lloyd's guidance,

being that the hose should have external brading, but the entirety of the guidance was not followed. The result was that a LR-approved hose type that may have otherwise been fitted was rejected as unsuitable while the hoses that were fitted, although meeting one of the LR requirements, were not approved and certainly could not withstand the peak pressures experience in operation.

One of Peter's key observations was that each of the parties involved had assumed too much of the other parties. It was apparent that the prime contractor was not aware that the equipment installer did not have the necessary technical support for this task and, likewise, the installer had an expectation that the prime contractor had the necessary technical expertise when accepting the selected hoses. It was also observed that the approval process for configuration changes was considered to be 'bureaucratic' and perhaps in a wish to expedite the fitting of 'improved' fuel lines, the correct approval process was not followed. Simon Fisk, also a Senior Engineer with the branch and involved with examination of the fire fighting measures and systems for the Board of Inquiry, also provided a summary of that aspect of the accident and some of the outcomes. The presentation generated considerable discussion on the factors that contributed to the accident, but a consistent theme was how authority and responsibility is to be properly assigned for critical decisions.

Martin Grimm.

Queensland

The Queensland Section Committee met on 7 August with teleconferencing between Brisbane, the Sunshine Coast and Cairns. Routine section business was discussed at this meeting and the idea of developing and maintaining a state register of practising naval architects and ship and boatbuilders was agreed.

Our quarterly technical meeting was held on 4 September at the Yeronga Institute of TAFE. This meeting was attended by fourteen members and visitors and was linked to Cairns via a teleconference link. The technical presentation was given by James Stephen and Jens Gravlev of Stephen and Gravlev Pty Ltd on *The Design and Construction of the 27 m Passagemaker Catamaran*, which is currently under construction at Aluminium Marine in Brisbane. The presentation addressed the user requirements, the hydrodynamic testing and design and the construction features of this one-off design.

Brian Robson

Tasmania

Dr Laurie Goldsworthy was an invited speaker at two one-day workshops on NO_x emissions from ships' engines in Taiwan. The workshops had participants from government and the shipping industry and were organised by the National Kaohsiung Institute of Marine Technology (NKIMT) and sponsored by the Taiwan government. Dr Goldsworthy also presented lectures to students at NKIMT. The hospitality provided by NKIMT was generous. A couple of typhoons disrupted proceedings to some extent.

Jon Duffy, a research associate with the Ship Hydrodynamics Centre, attended the Coasts and Ports 2001 Conference on the Gold Coast where he presented the paper *The Effect of Channel Design on Ship Operation in a Port*. This research forms a part of Jon's PhD studies at AMC and has involved work within the Towing Tank and Ship Handling Simulator. Jon received the PIANC Young Author's Award for his presentation.

Dr Martin Renilson presented his paper *The Effect of Hull Form on Loss of Stability and Heel Yaw Coupling for High Speed Monohulls* at the FAST 2001 Conference in Southampton in September. This paper was co-written by Martin (while at AMC), AMC Master of Philosphy student Trevor Manwarring and Simon Kelly of Logistics Technology International, Melbourne.

Henk Kortekaas gave a presentation on *The building of P&O Nedlloyd Southampton Class Vessels* recently at the AMC Launceston. 'The ideal ship will never be built…. there is always room for improvement' were the words of Chief Naval Architect for P&O Nedlloyd, Hans Huisman when he briefed his Kure site team before they headed off for Japan in 1997 to supervise the building of the world's four largest container ships. The 6 690 TEU ships have an overall length of 299.99 m and a beam of 42.8 m. They were built by IHI at Kure, Japan.

Nedlloyd Southampton

The ships are powered by a two-stroke (Diesel United) DU-Sulzer 12RTA96C engine developing 65 880 MW (approximately 90 000 hp) at 100 rpm giving a speed of 26.4 kn. The fuel consumption is approximately 266 t/day.

A shaft generator has been fitted around the main propeller shaft and is used when the ship is at sea to make use of the relatively cheap heavy fuel when the main engine is running. The generator is a Brush Electrical Machines (BEM) 28-pole statically-excited machine generating at 800 V. Due to the low and varying propeller speed (60 to 100 rpm) the output of the generator is at a varying low frequency in the range of 14 to 23 Hz, which is converted to 60 Hz for ship's use and transformed to 6 600 V. The 60 Hz frequency was chosen to make use of shore power all around the world when vessels are in dry docks or otherwise. This conversion is performed by a Synchrosil high-power converter system with parallel circuits to minimise the production of harmonics in the ship's network. Harmonics only generate heat and this is a loss. The 6.6 kV is also used for distribution around the ship. The 6.6 kV output of the shaft generator system is rated at 3.5 MW, making it one of the largest shaft generators of this type. A 5 m section of the propeller shaft was sent to Brush Electrical Machines works in Loughborough, UK, to be fitted with the rotor hub components and then tested with its stator. Because of the characteristics of the shaft generator system, a synchronous condenser has been supplied to correct the power factor. A 6.6 kV harmonic filter has been connected to the system in order to smooth the output voltage waveforms.

Owing to the slow speed of the propeller shaft, it is not possible to supply the necessary rotor power from a brushless exciter, normally used on this type of generator. A separate static exciter of type HTTDES has therefore been used to supply the rotor field winding by means of sliprings and brushes, this equipment being manufactured as part of the main converter cabinet. BEM also supplied the four 6.6 kV MAK diesel-driven generators for each ship. These are each rated at 3.6 MW running at 600 rpm engine speed.

BEM Projects designed a Prismic Power Management System (PMS) for automatic control and monitoring of the main power generation and distribution system. The Prismic hardware has been fitted into a central control panel, thus providing local control of the 6.6 kV system in the main switch-room. It has been designed to interface with the ship's central data-management computers and the bridge control systems to enable remote control and monitoring of the systems from computer terminals distributed around the ship.

There is also an electrically-driven Kawasaki bow thruster, which is powered by a BEM 960 rpm vertical shaft induction motor, rated at 2.6 MW. The starter unit for the bow thruster has been included in the main 13 panel 6.6 kV switchboard which uses Hawker Siddeley Hawkvac 15 circuit breakers.

On the navigational side the ships have been equipped with Kelvin Hughes Integrated Bridge Systems, which feature Kelvin Hughes Ninas 9000 IBS to Lloyds Nav 1 classification and includes two Nucleus 2 6000A ARPA radars and a Nucleus 2 5000 True Motion radar. Two X-band and one S-band antennas and transceivers can be inter-switched between the displays. A Nucleus 2 MFD/ECDIS has been approved by UK Hydrographic Office ARCS.

The MFD and the conning display provide the navigator with all the relevant information needed for preparing and proceeding with safe passage planning and operation. An engine controlling and monitoring station is also provided on the bridge. Finally, an ECTAB chart table was fitted into the Ninas 9000 consoles, which also contains equipment from third party suppliers. The versatility of the Ninas 9000 consoles means other manufac-

turers' equipment can be incorporated into the bridge, allowing the ship owner to design the bridge to fit their ergonomic and operational requirements.

Martin Hannon
Gregor MacFarlane
Henk Kortekaas

Western Australia

In early August members visited the premises of Veem Engineering. An excellent foundry tour included stage-by-stage examples of propeller and ride-control fin construction.

At the end of August a presentation was made on *The Boat of Magan* which could be described as the world's first composite boat. Maritime archaeologist and boatbuilder Tom Vosmer described how an international team is attempting to design and build a replica of the boats used in Oman some 4 000 years ago. The boats were known to be built of reeds and bitumen, but their scantlings, displacement and even their length are a source of conjecture. The discussion that followed tested the outside-the-box thinking of naval architects.

The September talk was presented by Prof. Beverley Ronalds, Director of the Centre for Oil and Gas Engineering at UWA, on *The Structural Reliability of NWS Platforms Under Cyclonic Loading*. A key determinant of the structural reliability of an offshore platform subjected to storm overload is the relationship between environmental load and return period. Other researchers have noted that the long term environmental load distribution varies around the world's oceans and have published non-dimensionalised relationships for the North Sea and the Gulf of Mexico. Recent work at the Centre for Oil and Gas Engineering has shown that the critical long-term environmental load distribution that governs platform failure is also highly dependent on platform topology. The wide variation in the critical load distributions has important implications for the design of offshore platforms, including the choice of partial load factor to achieve consistent reliability levels. This work was prompted by the failure of a monopod platform on the North West Shelf in 1996 during a tropical cyclone.

The October meeting comprised student presentations by Kristoffer Grande and Kim Klaka, both research students at the Centre for Marine Science at Curtin University.

Kristoffer Grande presented the topic of his Masters research, *Prediction of Slamming Occurrences in Catamarans*. High-speed catamaran ferries and high-speed sailing catamarans share a common problem — slamming in rough seas. A research project is being undertaken to predict the conditions under which slamming occurs for power and sailing catamarans. A brief review of the work done to date, including some preliminary findings was given, as well as an overview of remaining work.

Kim Klaka presented aspects of his PhD work on *The Roll Motion of Yachts at Anchor*. A time-domain computer model of roll motion has been developed in order to identify the dominant roll excitation and damping sources, based on a strip-wise Morison formulation. A series of full-scale validation experiments was conducted on a sailing yacht, in both calm water and in ocean waves. The results showed that the keel, rudder and sailing dominated the damping while the canoe body contributed very little.

The inaugural RINA Beer Can Challenge was held on 22 October, to great acclaim. More details in next edition of *The ANA*.

Tony Armstrong

New South Wales

The NSW Section Committee met on 15 August and, other than routine matters, discussed the RINA website (Jennifer Knox to become familiar with editing the NSW Section area); arrangements for Pacific 2002 and the visit of the CEO; SMIX Bash 2001 (possible sponsorships, numbers and time for budgeting, ticketing and advertising); the Walter Atkinson Award for 2000; the Treasurer's report; and the venue for technical meetings in 2002 (the Portside Centre is heavily booked and too expensive at $605 room only; the Harricks Auditorium at IEAust appears to be booked out for 2002 by IEAust societies, to which they give preference anyway, so this venue is not looking good; further venues will be investigated).

The NSW Section Committee also met on 11 October and, other than routine matters, discussed the Walter Atkinson Award for 2000 (made to Bruce McRae and Jonathon Binns); the venue for technical meetings in 2002 (North Sydney Leagues

Club at Cammeray is good, but has little public transport; further venues will be investigated); SMIX Bash 2001 (sponsorship, numbers, costs and advertising); the budget for 2002 (highly dependent on venue and to be discussed at next meeting); the program of technical meetings for 2002 (six topics suggested); and the Treasurer's report (accounts for 2000 finalised — hooray!)

Alex Robbins of Incat Designs gave a presentation on *Regression Analysis of a Parametric Series of Low-wash Hullforms* to a meeting at UNSW attended by thirty on 8 August. Alex presented a progress report on his master's degree thesis project at the Australian Maritime College, an investigation of the hullform parameters which influence the wash of a catamaran. It is believed that some parameters have a greater influence than others on wash, and the knowledge of this could be of great use to a designer.

A series of hullforms has been created from a parent hull, and the hullforms were run in Shipflow, the CFD program available at AMC. A significant amount of time has been spent on validation, testing models in the towing tank and comparing with the Shipflow predictions, and good correlation has been found.

The parameters influencing the wave wake will be narrowed to include the three most significant ones. Wave-wake free-surface profiles will then be generated for a full range of hullforms over a range of speeds. Longitudinal cuts, at varying offsets from the ship's track, will be taken of the free surface, and the cuts analysed in the standard way. The results will then be placed into a database, able to be accessed via a regression analysis program. This will enable a designer to input several coefficients for a hullform and, for a given speed and offset from the track, obtain a prediction of the likely wash for his/her hullform. This work is being done for the deep-water condition only. However if successful, it will be extended to the shallow-water condition.

This was a practical presentation, from the point of view of a practising naval architect, and Alex illustrated his presentation with photographs of the model and towing tank set-up, details of the models and testing, and graphs. The vote of thanks was proposed by A/Prof. Lawry Doctors.

Peter Kneipp of MTU Australia gave a presentation on *MTU Engine Developments* to a meeting of the IMarEST on 22 August. Recent requirements for diesel engines in the marine environment have become increasingly restrictive, particularly regarding emission control and fuel consumption. The areas within diesel engine research with potential for further development are confined to the turbocharger system, the fuel injection system and the electronic engine controls and management system.

Peter's presentation introduced the technical solutions in these fields and discussed the impact on the overall performance of a modern diesel engine. Maintenance aspects were also considered, specifically taking into account the optimisation of downtimes required for scheduled overhauls of propulsion engines in today's commercial vessels.

Rob Tulk of North West Bay Ships gave a presentation on *Aluminium Yachts and Icebergs* to a joint meeting with the IMarEST attended by twenty-eight on 26 September. Rob took part in Expedition Icebound 2001 in January and February this year, on board *Spirit of Sydney*, an 18.4 m (60 ft) aluminium yacht built in 1984 for Ian Kiernan for the 1986 BOC Challenge. The principal aim, apart from a holiday, was to see Commonwealth Bay (one of the windiest places on earth, with winds of over 300 km/h) and Mawson's Hut. They had a paid skipper with Antarctic experience on board, Rob, another experienced sailor, and seven trippers. Typical wear for high-latitude sailing includes two pairs of thermal underwear, three pairs of socks, fleecy jacket, seaboots, overgear, and goggles to protect the eyes from flying spray which turns to ice! Other features of high-latitude sailing include ice falling from the sails (a real problem when tacking), ice damage to the hull, reduction in battery efficiency (takes ten times as long to recharge), and watertight compartments being absolutely essential (liferafts are a non-starter in pack ice!)

The trip went mostly according to plan until they reached Commonwealth Bay, having successfully found a way around the pack ice. As they neared their destination, the wind built up, eventually reaching 65 kn, and they headed offshore without landing. The first real problem came with a steering cable shearing the side off one of the guide pulleys. Collisions with ice while a temporary repair

was effected resulted in the starboard tiller arm snapping off, leaving the rudder swinging aimlessly. While running under stormsail, when they gybed, the main steering quadrant exploded and, within minutes, they were side-on, pounding onto the weather side of the pack ice under 50 to 60 knots of wind, with no way to extricate themselves.

At the mercy of the pack, they found themselves drifting between two large icebergs, where the pack ice had been crushed and forced under one of the bergs. They set off their EPIRB, and were ready to abandon the vessel, but slipped clear of the second iceberg and then out of the pack ice some 36 hours later. While waiting for help to arrive, they managed to jury rig the port steering to what little was left of the port rudder (working with head down into a hatch through a deck having 200 mm freeboard (on the sugar scoop), with water at –1°C cascading over everything, including frozen fingers!), to find and patch the three holes that were punched in the sides of the vessel (behind the moulded fibreglass linings which had to be demolished in the process), and to get the main engine running after the sea inlets became frozen with ice.

The start of a bad day between icebergs (above)

Home at last — and somewhat the worse for wear (below)
(Photos courtesy Rob Tulk)

The French research vessel *L'Astrolabe* came within hailing distance, but would not lift off only part of the crew; it had to be all or nothing. In the end it was nothing, and the interpersonal dynamics following that episode were interesting and heated! The return trip to Hobart took 20 days (compared to 7 outbound), at an average speed of 2.9 knots over the 1400 n miles. However, they probably sailed twice as far, with only part of the port rudder remaining and unable to point any higher than about 50° to windward. Changing tacks could take anything up to an hour and a half of dedicated work!

As if sufficient had not already happened to test their mettle, they received a storm warning at about latitude 60°S. This meant winds of Beaufort 12, sea state 8 and, with almost no steering, was of more real concern to them regarding survival than when trapped against the ice. They elected to push the vessel on as hard as they dared (5 to 6 knots, compared to their average of 3), splitting stiffeners away from the plating in the process, but managed to avoid the worst of it and to survive without knockdown or broaching. The worst result of the storm was a complete electrical failure, which highlighted the need for access to everything, including the genset. The sight of the Derwent Light and the calm water of Constitution Dock were most welcome.

Rob illustrated his presentation with superb photographs all the way through, and gave a candid but philosophical view of a holiday adventure which was action packed, and some good insights into the design of vessels for high-latitude operations. The vote of thanks was proposed by Don Gillies.

Greg Cox of Kamira Holdings gave a presentation on *Compressed Natural Gas as a Marine Fuel* to a joint meeting with the IMarEST attended by twenty-seven on 24 October. The marine industry's absolute dependence on fossil fuels leaves it exposed to fluctuations in oil prices as well as increased demands for cleaner, less-polluting transport. For certain vessels on dedicated, short-haul routs, the option of using gaseous fuels provides a real alternative. Greg's presentation provided an overview of two gaseous fuel options — natural gas (in both liquefied and compressed forms) and liquefied petroleum gas (principally propane). He started with a physical description of the properties of each gas, including relative densities and energy content (1 m^3 of gas has about the same energy content as 1 L of diesel fuel); types of engine which can use gaseous fuels: gas engines, dual-fuel engines, spark ignition engines (common in buses) and gas turbine engines; storage, and the construction and testing of spun carbon-fibre tanks; decanting, and the need for a proper sequencer when charging cylinders on board a vessel from shore-based storage; and ultimate consumption on board, particularly relating to safety and economics, and emissions, which are significantly lower for gaseous fuels than for solid or liquid fuels.

Many vessels and routes will never be suited to gaseous fuels, but there is the potential to convert existing inshore services to gas where fuel prices are high and urban emissions are an issue. Similar public-transport gaseous-fuel conversions are common in the bus and taxi industries and the technology to do so has been available for many years. From an environmental perspective, whether it is wash or emissions, the operation of high-speed ferries on coastal and sheltered-water routes fall far short of the standards being set for equivalent forms of land-based transport. Provided that the unfounded fears of gaseous fuels can be overcome, there exist very real environmental, operational and economic benefits in applying this existing technology to specific short-haul ferry services. This applies mainly where the price differential between diesel and gas is high, such as in North America, rather than in Australia where it is lower. The technology is less applicable to long-haul routes due to the problems of storage (the number of cylinders required becomes excessive). As a rule of thumb, if more than 5 000 m^3 of gas are required, then you should really be considering another type of fuel.

Greg showed a video of the manufacture and testing of the spun carbon-fibre plastic-lined storage cylinders, and the testing was particularly impressive, including fire, gunfire, and end-on drop tests — no damage was sustained in falls which would damage most other materials.

The vote of thanks was proposed by Jack van Dyke.

Phil Helmore

LETTERS TO THE EDITOR

Dear Sir,

I refer to the letter by Tony Armstrong in the May 2001 issue of *The Australian Naval Architect*. First of all, I would like to say 'nice job!' to Tony for his trials on investigating the dropping-water-level effect in U-tubes. I found it very interesting; however, I do have some different thoughts about that phenomenon.

I noticed one interesting point in Tony's results. The water level rose between the end of a trial and the beginning of the next trial. Also, from noon on the day before to the morning of the day after each trial, the atmospheric temperature always decreased. It suggests that the water should contract during that time and so the water level should drop. In addition, the evaporation process of the water and the suspension of the bubble gas, as Tony mentioned, also contribute to the drop of the water level. Obviously, it was not what happened during the trials.

In my opinion, the cause of the dropping effect cannot be attributed to the water alone. My guess is that the thermal expansion process of the tube caused the drop of level during the day as the result of the tube expansion, and the rise of level during the night as the result of the tube contraction. The dramatic drop of level in the first trial might be explained by the suspension of gas in the liquid. And the gradually drop of level during the whole experiment might be the result of the evaporation process.

However, this just a guess, and I am looking forward to hearing the results of his next experiment.

Minh Pham
UNSW Student

Dear Sir,

As a third year student of naval architecture, I thought it may be interesting to reflect on the ever increasing influence of computer technology on the profession.

Arguably the oldest of all engineering professions, naval architecture has been especially reliant on tradition and history. In the times before the rigorous use of science and mathematics in ship design, experience was perhaps the greatest asset of any naval architect. As science progressed, rational ship design improved, but lengthy calculations made accuracy tedious and limited optimisation.

The past thirty or so years have seen significant advances in naval architecture, many of which can be attributed to the use of the computer. We are now able to employ all kinds of software to aid in the design process. From the replacement of the drafting table with CAD programs to the use of computational fluid dynamics, 3D modelling and finite element analysis, computing power has become an integral and inescapable reality in ship design. Weeks of tedious calculation can now be done at the click of a button and design modifications no longer involve what they used to. Even tank testing of ship models may soon be superseded by the use of sophisticated computer programs.

Thus the digital revolution has had a significant impact on naval architecture. In my opinion, the extent and pace of change in the last few decades make naval architecture one of the most dynamic of the engineering disciplines. I am sure the next few decades will prove as exciting as the last.

Nigel Lynch
UNSW Student

[During a recent visit to the Powerhouse Museum in Sydney, I found it sobering to see a Fuller Calculator (cylindrical slide rule) and a planimeter on display (both of which are still on my desk, albeit unused), quite close to the start of the computer technology exhibition. Nigel Lynch is quite correct — the computer has made a dramatic change to the practice of naval architecture since I first used one in 1964 and I suspect we are only just beginning to see the benefits it will bring — *Ed.*]

Dear Sir,

Just a friendly reminder of something 'not quite right' published in the last edition of *The ANA*.

Referring to HMS *Hood*, *From the Archives* states in paragraph 4 'She was the largest warship in the world during the first ten years of her

life, and cruised all over the world.'

Correction; she was the largest warship afloat until her demise on 24 May 1941! *Janes Fighting Ships WWII* (published in 1947) gives the full load displacement of HMS *Hood* as 46 200 tons and that of *Bismarck* as 45 000 tons.

Andy McNeill

[Quite right. The sentence should have read 'She was the largest warship in the world and during the first ten years of her life cruised all over the world.' See *Hood, Design and Construction* by Maurice Northcott, Bivouac Books 1975, p. 19 — *Ed.*]

RINA Members!

The ANA is your Journal, and relies on your input. If you know of some interesting news, let the editors know; don't assume that, because you know, everyone else does too.

The editors can only publish what they receive or generate, so the more contributions the better to maintain the Australia-wide coverage.

COMING EVENTS

NSW

SMIX Bash 2001

As most readers of *The ANA* will already know, the inaugural Sydney Maritime Industry Xmas party (SMIX Bash), was held last year on board *James Craig*, and was generally voted a resounding success. Capitalising on this, a bigger and better party (SMIX Bash 2001) is planned for this year.

As was the case last year, the event is being jointly organised by the NSW Section of RINA and the Sydney Barnch of IMarEST, and funded in part by the generous sponsorship of a number of prominent companies in the maritime industry. This allows the cost of registration to be held at such a level that a wide cross-section of people with interest in all matters maritime, including students, will be able to attend.

SMIX Bash provides an opportunity for people to meet others who they do not encounter in their day-to-day activities but with whom they share a common maritime interest, be it in ship and boat design, construction, survey, classification, operation, management, navigation, brokerage, repair, equipment/material supply, pilotage, towage, research, training etc. SMIX Bash also welcomes people who have no day-to-day involvement with the maritime industry but who have a love and fascination of those industries. Partners of those attending are also encouraged to come along, as it is intended the event be a 'fun' social occasion as well as a get-together of industry hacks! There will be *no* speeches other than a *one* minute welcome from the chairman of the organising committee.

This year the function is to be held on Thursday 6 December, and will run from 5.30pm to 9.30pm. Finger-food and drinks (beer, wine, and soft drinks) will be served throughout the evening, and guests are welcome to arrive at any time and stay as long as they like. The venue is once again on board *James Craig*, which will be on her normal berth at No.7 Pyrmont, adjacent to the Australian National Maritime Museum, Darling Harbour. Access is easy by public transport or car, and there is ample parking. A large awning is rigged over the main deck against the event of a damp evening.

All readers of *The ANA* are invited to attend SMIX Bash 2001, and are urged to bring partners and friends, and to spread the word among their colleagues in the industry. The cost is $20 per head, and reservations should be confirmed by phone to Bob Dummett, on (02) 9918 7062. Numbers are not unlimited, and prepayment (with names of all guests) to Bob at 78 Hilltop Rd, Clareville 2107, will guarantee your place(s).

Queensland

The next meeting of the Queensland Section will be a combined committee meeting and technical meeting to be held at the Yeronga Institute of TAFE on 4 December. The committee meeting will

MARITIME TECHNOLOGY FOR THE 21ST CENTURY

PACIFIC 2002

INTERNATIONAL MARITIME CONFERENCE

ORGANISED BY
THE ROYAL INSTITUTION OF NAVAL ARCHITECTS
THE INSTITUTION OF ENGINEERS AUSTRALIA
THE INSTITUTE OF MARINE ENGINEERS

IN CONJUNCTION WITH

PACIFIC 2002

ROYAL AUSTRALIAN NAVY

SYDNEY CONVENTION & EXHIBITION CENTRE, DARLING HARBOUR, SYDNEY, AUSTRALIA

29 - 31 JANUARY 2002

The theme for this important International Maritime Conference will be maritime technology for the 21st century, and will embrace all facets of marine design, technology and matters operational. Registration for the Conference will give access to the associated PACIFIC 2002 Exposition. The three day Conference will have two concurrent streams to enhance the choice for registrants.

One day workshop/seminars on the specialised topics of Maritime History (in association with the Australian National Maritime Museum & the Sydney Heritage Fleet) and Maritime Education (in association with the Australian Maritime College & the University of NSW) are being held on a fourth day – Friday 1 February.

The PACIFIC 2002 Maritime Exposition will be a focal point for discussion and display of the latest developments in maritime design and technology, and provide a meeting place for industry representatives to exchange ideas and establish personal and business contacts or renew those made at the very successful SEA AUSTRALIA 2000 Conference held at the same venue in February, 2000.

FOR FULLER DETAILS CONTACT

Tout Hosts, GPO Box 128, Sydney, NSW 2001, Australia
Facsimile 61 2 9262 3135 Email pacificimc@tourhosts.com.au or visit the website at www.tourhosts.com.au

commence at 1730 and the technical meeting will commence at 1830. The technical presentation will be *An Update on the National Standard Development* by Werner Bundschuh from Queensland Transport.

ACT

The RINA/IMarE Canberra joint annual dinner is proposed for relatively early in the New Year. Details will be circulated to local members when plans have progressed a little further.

Pacific 2002

The Pacific 2002 International Maritime and Naval Exposition will include two conferences and an exhibition:

Pacific 2002 International Maritime Conference is being organised by the Royal Institution of Naval Architects, The Institute of Marine Engineers, and the Institution of Engineers, Australia.

Sea Power 2002 — Naval Capability in the 21st Century Conference is being organised by the Royal Australian Navy.

Pacific 2002 International Maritime and Naval Exhibition is being organised by the Aerospace, Maritime and Defence Foundation of Australia.

All will be held at the Sydney Convention and Exhibition Centre, Darling Harbour, from Tuesday 29 January to Friday 1 February 2002.

Maritime Education Seminar

A Maritime Education Seminar will be held in association with Pacific 2002 at the Sydney Convention and Exhibition Centre, Darling Harbour on 1 February 2002. Papers have already been received from Universities, TAFE and Naval Colleges, regulators, consultants, shipbuilders and shipowners. The opening address will be delivered by Prof. Chengi Kuo from Strathclyde University. Further information may be obtained from Laurie Prandolini on (02) 9878 1914 or email sbimare@msn.com.au.

Maritime History Seminar

A Maritime History Seminar will be held in association with Pacific 2002 at the Australian National Maritime Museum, Darling Harbour on 1 February 2002. This Seminar will look at aspects of the history and preservation issues surrounding ship and boat building industries, machinery and equipment, and ports and harbours. In the morning sessions key speakers will give papers on these topics, and in the afternoon there will be a series of panel and discussion sessions on the issues raised. During the day there will also be an opportunity to go on tours of the Australian·National Maritime Museum exhibition building, the Wharf 7 Maritime Heritage Centre (home to the Sydney Heritage Fleet and Australian National Maritime Museum collections) and *James Craig*, Sydney Heritage Fleet's restored three-masted barque. Further information may be obtained from Michael Crayford on (02) 9298 3745 or email mcrayford@anmm.gov.au.

Inaugural Conference of the Submarine Institute of Australia Inc.

This conference will be held between 5 and 8 June 2002 at the Western Australian Maritime Museum, Fremantle.

To promote informed discussion and research in the fields of submarine operations, engineering, history and commercial sub-sea engineering - otherwise known as submarine matters.

Full details are available at www.congresswest.com.au/submarines/ or by contacting Jodi Brauer onconwes@congresswest.com.au, telephone (08) 9322 6906, or fax 9322 1734.

Maritime Archaeology/Naval Architecture Conference

Following August's technical meeting in WA on *The Boat of Magan* (the world's first composite boat), presenter Tom Vosmer has issued an to invitation to this conference which will be held from 2 to 5 July 2002 in Genoa. While the conference is primarily archaeological, a paper from a naval architect involved in consultation on the design and construction of the vessel would be welcome. Expenses related to the conference could be covered for someone making significant contributions to the design or consultative processes for *Nave di Magan*. For further details contact Tom Vosmer at tvosmer@usa.net or telephone/fax (08) 9336 1716.

Activity at Oceanfast

The 57 m long, 10.5 m beam luxurious private motor yacht *Sagitta* was delivered to the Mediterranean in July by her Western Australian builders, Oceanfast. Under construction for 15 months, *Sagitta* has a hard-chine semi-displacement aluminium hull and composite superstructure.

Designed by leading yacht designer Jon Bannenberg, *Sagitta* is able to maintain cruising speeds of up to 22 knots, at the same time employing a unique ride control mechanism to ensure a smooth and comfortable ride for all on board. Operated by a forward hydroplane as well as an innovative arrangement of stabilising fins, this system is controlled by computer and is a credit to the supplier, Seastate.

Exterior and interior space is extremely generous, with six large staterooms offering accommodation for 12 guests. Large lounge and entertainment areas dominate the upper saloon and feature the most exquisite furniture, exclusively custom designed, built and fitted by Oceanfast. Natural light floods the upper saloon by floor-to-ceiling glass encasing the entertaining areas. Skylights are a prominent design feature in the lounge saloons, allowing warm sunlight to descend the main staircase leading to the main and lower decks of the vessel.

At anchor, guests and owners of *Sagitta* will enjoy the range of transport and water-sport equipment on the vessel, housed on the aft main deck. Water craft include two Wave Runner jet skis and two tender vessels — a 6.7 m semi-inflatable sports tender and a 6.9 m Boston Whaler guest tender, specifically customised to match the colour scheme of *Sagitta*. Two scooters are stowed at the aft end of the main deck for land activities.

Power is provided by twin MTU 16V 4000 M 90 engines producing 2720 kW each, turning five-blade propellers for smoothness and performance. This package, together with the hard-chine semi-displacement hull form allows the ship to cruise at a comfortable 20-22 kn depending on load. *Sagitta's* fuel tanks hold 142 000 L of fuel, allowing a range of up to 3 000 n miles.

Sagitta on trials
(Photo courtesy Oceanfast)

Mercedes III
(Image courtesy Oceanfast)

The busy Western Australian yard currently employs some 350 people and recently launched another motor yacht, a 30 m private sportsfisherman. The yard is full of activity, and many of the ships under construction are repeat orders for their owners such as the 69.5 m Greg Norman Expedition Yacht *Aussie Rules* (due for delivery in July 2002), the 54 m *Perfect Prescription* and the 56.5 m *Mercedes III*.

To compete with the industry's growing demands and new developments, Oceanfast has recently opened a new state-of-the-art waterfront facility to aid the construction of large super yachts up to 120 m in length. With an ongoing dedication to building the world's best in luxury yachts, the new facility incorporates large construction bays complete with integrated office facilities and viewing mezzanine platforms around each hall. In addition to the most advanced design and construction systems in place, each shipbuilding hall features 20.8 m overhead crane clearance, automated doors and an integrated rail system providing direct launch access to the existing slipway and the deep waters of Cockburn Sound.

Aussie Rules is the first ship to be built in the new facility. The yacht has a full aluminium displacement hull with a composite superstructure. The international sportsman signed a contract with

Perfect Prescription
(Image courtesy Oceanfast)

Oceanfast on 10 May 2000 to establish the 'Norman Expedition Yachts' series of luxury yachts.

Aussie Rules will provide the exploration essentials typical of a commercial expedition vessel without sacrificing the luxury of a traditional yacht. Its design and engineering will allow her to undergo a broad range of expeditions and voyages and features a 12.8 metre sportsfisherman and other watercraft including tenders and submersibles on her aft deck.

On Saturday 13 October the top deck superstructure was transported from Oceanfast's composite fibreglass factory to the main waterfront facilities. It will be pre-outfitted with engineering and electrical systems and completely faired and painted before being positioned on the sun deck later this year. At 16 m long and 8 m wide it has been specifically built as a module in high-tech composite fibreglass. The structure also incorporates an outdoor seating area and a large communications mast and crow's nest, which can accommodate five people and will provide an excellent vantage point 17 m above sea level. It is also one of four places on the yacht where there is a station from which the master can control the vessel.

The owner's private sun deck features an outdoor jacuzzi/pool and bar area and the superstructure module will be fitted out with a state-of-the-art cinema lounge equipped with all the latest audio-visual gear. There is an observation lounge in the forward section that features timber décor and will offer superb panoramic views when the yacht is underway.

The general particulars of the yachts now under construction are:

Aussie Rules

Overall Length:	69.5 m
Beam:	11.6 m
Hull type:	Full displacement, aluminium
Superstructure:	Composite
Guests:	12
Crew:	14
Engines:	Two Caterpillar 1500 kW
Speed:	15.5 kn
Range:	Approx. 8 000 n miles
Yacht Design:	Sam Sorgiovanni

The superstructure for *Aussie Rules* arriving at the new Oceanfast building facility.
(Photo courtesy Oceanfast)

Perfect Prescription

Overall Length:	54 m
Beam:	10 m
Hull type:	Full displacement, steel
Superstructure:	Composite
Guests:	10
Crew:	12
Engines:	Two 1700 kW
Speed:	17.5 kn
Yacht Design:	Tim Heywood
Delivery:	March 2003

Mercedes III

Overall Length:	56.5 m
Beam:	10 m
Hull type:	Full displacement, steel
Superstructure:	Composite
Guests:	10
Crew:	12
Engines:	Two 1100 kW
Speed:	15 kn
Yacht Design:	Jon Bannenberg
Delivery:	June 2003

A model of *Aussie Rules*
(Photo courtesy Oceanfast)

Patrol Boats Request for Tender

Tenders have been called for new ships to replace the RAN's patrol boats.

The Navy currently operates fifteen 42 m Fremantle class patrol boats armed with 40 mm guns. These patrol boats are almost 25 years old and are nearing the end of their working life.

The new vessels will be slightly larger and able to cope with heavier seas.

The new patrol boats will continue to provide vital operational training platforms for Navy personnel. The Navy contributes 1800 patrol boat days each year to Coastwatch operations protecting Australia's coastlines.

The contract for the new patrol boats will cover both construction and through-life support of the vessels. The construction component of the contract will be worth up $450 million dollars. The first new vessel will begin patrolling our waters in late 2004.

The Government has indicated that it expects the construction to take place largely in Australia. This Request for Tender includes the option to pursue the patrol boat project under private financing arrangements, and consequently seeks bids under a privately-financed arrangement or direct purchase by the Government. It is expected that a single business entity will take responsibility, not only for supplying the patrol boats, but also maintaining and supporting them for the duration of their 15 – 20 year life span.

Austal and DMS to bid for New Patrol Boats

Austal Limited and Defence Maritime Services (DMS) recently announced an agreement to jointly tender for the replacement patrol boat project for the Royal Australian Navy (SEA 1444). The tender combines the need for construction, through-life logistics support, training and possibly the financing of the boats in a single contract.

Austal, a leader in commercial, high-performance vessel design and construction and DMS, the specialist provider of services, training and logistic support to the Royal Australian Navy, are both highly respected locally and internationally for their skills and experience. Austal's role in the joint tender will be the design and eventual construction of the patrol boats. DMS will provide logistic and maintenance support of the vessels through their operational life as well as training of naval crews.

DMS was established in 1997 to provide specialised support and asset management services to the Royal Australian Navy. This followed P&O and Serco's successful tender for the outsourcing of the RAN Port Services and Support Craft contract which saw the company purchase over $50 million worth of ships and other small craft. All the craft, including two 72 m multi-purpose vessels equipped for submarine escape and rescue, are maintained and supported by the infrastructure established by DMS.

HMAS Success refit

HMAS *Success* is undergoing a major refit at ADI, Garden Island, Sydney. The contract for the refit, worth about $30 million, has been awarded to ADI. The contract was signed on board HMAS *Success* at Garden Island on 5 September. The refit is expected to take about five months and all trials are planned to be completed by February 2002.

The 15-year-old, 17 933 t HMAS *Success* was built at Cockatoo Dockyard in Sydney and can replenish diesel and aviation fuel as well as goods such as food, fresh water, munitions, stores and spares to other Navy ships at sea.

The contract covers the overhaul of the ship's engines, refurbishing the cargo fuel tanks and associated fuel-transfer systems, and overhauling accommodation services such as air conditioning. An upgraded galley and crew cafeteria will be installed along with other enhancements, such as solid-waste disposal equipment and reworked cargo storage arrangements.

HMAS *Success*

Submarine Refits for Adelaide

The Federal Government has announced that all future Full Cycle Dockings (Refits) of the Collins class submarines will be carried out in Adelaideby the Australian Submarine Corporation.

Each refit of a submarine costs about $70 million and takes some twelve months. The six Collins class submarines will refit every seven years over their twenty-eight year lives, and eighty per cent of the refit expenditure will be spent locally, injecting approximately $1 billion into the local Adelaide economy over the life of the Collins class project. The first round of refits will cost at least $336 million.

The Government's decision emphasises the strategic need to sustain ASC's core competency and workforce in submarine construction, modification, repair and maintenance. The capability now in place in Osborne, coupled with a diverse supporting network of local small-to-medium enterprises serves as a strategic asset for the through-life support.

NWB Ships Delivers Catamaran

North West Bay Ships delivered its latest vessel in October, a 33 m catamaran to Fantasea Cruises for inter-island operations within the Whitsunday group. The vessel was designed as a low-wash ferry, but with sufficient freeboard and seakeeping ability to handle tourist operations out to the reef in seas of up to 2 m significant wave height.

The name of the vessel was going to be *Five* (in sequence), but the owner rated its looks as 'ten out of ten', and so the name changed to *Ten*.

Principal particulars of the vessel are:

Length OA	33.3 m
Length WL	31.6 m
Beam	8.4 m
Deadweight	27 t
Pax capacity	270
Main Engines	Two Deutz TBD616V16 each 936 kW at 2100 rpm
Speed	32 kn at 90% MCR fully loaded

Rob Tulk

NWB Ships' latest delivery to Fantasea Cruises
(Photo courtesy NWB Ships)

Feasibility Study to examine AE2

A feasibility study into whether a Royal Australian Navy submarine that lies in waters off the northern coast of Turkey could be successfully raised to the surface is expected to begin later this year. HMA submarine AE2 was one of two British E-class submarines acquired by the RAN in 1914. AE2 holds a unique place in Australia's military history, having penetrated the Dardanelles on 25 April 1914, harassing enemy ships by firing and charging at them for the next four days until suffering a direct hit on her engine room.

The RAN and Turkish Navy are expected to commence discussions later this year on the development of a collaborative feasibility study into the future of AE2. The study, to be completed by by Anzac Day 2003, will examine whether raising and/or preserving the former HMAS AE2 is actually possible. Those findings will assist a Defence-led Interdepartmental Working Group (IDWG), comprising representatives from the Departments of Prime Minister and Cabinet, Foreign Affairs and Trade, Attorney-General's, Veterans' Affairs, Environment and Heritage (Environment Australia), and the Australian War Memorial, which is examining options for the future management of AE2.

The exact resting-place of AE2 remained unknown until Mr Selcuk Kolay, of the Turkish Bodrum Museum of Maritime Archaeology, discovered her on 11 June 1998 at a depth of 72 m. An Australian team of archaeologists and divers from the NSW Heritage Office dived on the wreck in October 1998 and confirmed that the wreck was indeed AE2. They found AE2 in extremely good condition, sitting on the bottom, well buried in mud with the exception of the conning tower and the tips of both propellers.

Old Girl Salutes the New Breed

It was a spectacular site on Hobart's Derwent River when the Incat-built 96 m Wave Piercing Sealift Catamaran *Joint Venture* (HSV X1) welcomed the Royal Australian Navy's Guided Missile Destroyer HMAS *Brisbane* into port (see cover photograph).

Joint Venture, fresh from her conversion from a commercial passenger and freight ship to a theatre logistics vessel, presented a stark contrast to the distinguished stalwart HMAS *Brisbane*, then nearing the end of her active service. They were joined by the Royal New Zealand Navy's Leander class frigate HMNZS *Canterbury***,** making it an impressive meeting of nations as the three quite different craft engaged in vessel manoeuvres.

Joint Venture was on the first stage of sea trials prior to her departure on a three-week delivery voyage to the United States, where she will enter service with the US military.

Captains of the three craft compared notes, by ship's radio, with much boasting about size and vessel speed and capabilities, the crew of the 'steel cat' (as HMAS *Brisbane* has been affectionately known) dubbing the aluminium Incat craft as the 'shiny fast cat'. *Joint Venture*'s speeds of over 40 knots were in contrast to the slower more conventional military vessels she encountered in the Derwent.

Formerly known as *Incat 050*, the new name *Joint Venture* is in recognition of the partnership of component commands from the US Navy, Army, Marine Corps, US Special Operations Command and Coast Guard. Together they will explore the operational implications and opportunities of new marine technologies that are bringing higher speeds, longer ranges and increased payload capacities to surface vessels.

The ship was given a major refit during September, and was fitted with a helicopter deck, stern quarter ramp, RIB deployment gantry, troop facilities and crew accommodation. The ship is now capable of carrying 363 persons, military equipment and vehicles over 1 100 n miles at a speed greater than 35 knots.

During the charter period, Bollinger/Incat USA will provide maintenance support. *Joint Venture* was commissioned in Norfolk, Virginia in October.

Joint Venture
(Photo courtesy Incat Australia)

New South Wales News

New Design

Incat Designs continues to be very busy despite the recent world events. Work is continuing on the 46 m catamaran for Iran, the 23 m sport-fishing vessel and the 26 m vessel for Putin Bay with all designs due for completion soon.

Next year's program looks healthy, with two projects already scheduled and a further three projects due for confirmation in the next month. It is expected that details of these projects will be announced in the next issue of *The ANA*.

New Construction

During the past three months Incat-designed vessels have been introduced into service on both coasts of the USA.

Mendocino, built by Nichols Bros, was delivered to San Francisco operator Golden Gate Bridge Highway and Transportation system following a successful design-and-build cooperation between Nichols Bros and Incat Designs. The vessel was designed for commuter functionality with wide embarkation doors and aisles to facilitate faster loading and unloading. Other design features included stowage for bikes and a seating arrangement which reduced the effects of passengers blocking other seats.

Principal particulars are:

Length OA	43.27 m
Beam	10.45 m
Draught	1.80 m
Main Engines	4 x Cummins KTA 50
Power	4 x 1350 kW
Gearboxes	4 x ZF BU460
Waterjets	4 x Hamilton HM571
Speed	39 kn
Seating	408 x Beurteaux interior and exterior seats

Athena, built by Gladding-Hearn, was introduced on a route between Newport, Rhode Island, and Block Island (at the head of Long Island Sound). The vessel was designed and built in approximately five months, after the vessel's parameters were altered at the last minute. The vessel has proven very successful for its owners, Island Hi-Speed Ferries, and the local community have thoroughly embraced the improved mode of transport to the island.

Principal particulars of the vessel are:

Length OA	30.40 m
Beam	9.35 m
Draught	2.00 m
Main Engines	4 x Cat 3412E
Power	4 x 820 kW
Gearboxes	4 x ZF 1950
Waterjets	4 x Hamilton HM521
Speed	34 kn
Ride Control	MDI trim tab RCS
Seating	250 x Turnball interior and exterior seats

Athena Leaving Block Island
(Photo courtesy Incat Designs)

Delivery

Blue Line Cruises has added an impressive vessel to its Sydney harbour fleet with the delivery of the 34 m dinner-cruise catamaran *Magistic Two*. Specifically designed and outfitted to offer its passengers the ultimate in water-borne dining and entertainment, it is the first multihull of its type to be completed by WA shipbuilder Image Marine. Blue Line Cruises engaged Spear Green Design, Sydney-based designers, stylists and marine interior designers, to develop the initial concepts for *Magistic Two*. The concept for the interiors, also by Spear Green Design, is a fusion of European and Australian styles and materials, incorporating dark timber finishes, simple geometry and refined clean looks.

Principal particulars of the vessel are:

Length OA	34 m
Length Wl	31.80 m
Beam	13.50 m
Depth	3.55 m
Draft	1.60 m
Displacement	150 t
Passengers	360
Main engines	2 x Cummins 7CTA @ 220 kW
Speed	9 kn

Work Boat World, October 2001

This vessel is also described with a profile drawing in The ANA*, February 2001* — Ed.

Refit

An ambitious rejuvenation project has seen the second of Sydney's Freshwater class double-ended commuter ferries receive a new lease of life. The *Narrabeen* refit follows pre-Olympic work on *Collaroy*, with two more vessels set to follow when *Narrabeen* left Australian Defence Industries' Garden Island drydock in mid-September.

Apart from giving *Narrabeen* a much-needed facelift, the work by ADI included improvements and modifications which will see the vessel serving Sydney commuters for many years to come. While *Narrabeen*'s operational profile means she is full of commuters at peak times, the 70 m vessel is often under-utilised at quieter times of the day. To improve the vessel's versatility, the upper deck has now been configured to accommodate functions and conferences in addition to commuters when required.

In order to refit the vessel, all passenger areas were essentially gutted and fitted with new deckhead and bulkhead linings, seating, flooring, toilets, fittings and lighting. Structural work included removing upward stairways from the upper deck passenger areas, new access ways to the bridges, and cutting new window boxes to give standing passengers a view of the horizon. A larger and better-equipped kiosk has been fitted on the main deck, and a dumb waiter has been installed for transferring food and drinks to the upper deck servery. New seats, designed to handle the rigours of a commuter ferry, were supplied by Technoseat.

Other modifications included a new crew communication system, PA system, CCTV system, ITIM fire detection system, and new air-conditioning system in the crew accommodation area. A 50 kVA Perkins genset was installed to meet the increased electrical load.

Work Boat World, October 2001

Around and About

Well, the *first* retirement didn't last long. Engine sales legend, Joe Natoli, who retired in June, heard the bugle call and has taken up a position as Senior Engineer for TSF Engineering at Warriewood, several days per week. And the war-horse snuffs the battle with delight!

The Stage 3 expansion of the Port Waratah coal-handling facility near Newcastle will create one of the world's largest dry bulk ship terminals with a projected annual output of 89 Mt. Due for completion in September, the expansion work was carried out by contracting engineer Barclay Mowlem for the client Bechtel. The new loader will be able to load a 60 000 t ship in about 36 h. Average belt speed will be 5.2 m/s, which will allow the movement of between 6 600 t/h and 10 500 t/h. Project expenditure was $345 m, of which 95 was spent in Australia and 70% in the local Hunter region.

The Sydney Heritage Fleet's website gives details of their major assets and projects at www.seaheritage.asn.au. Details of *John Oxley*, and regular updates on progress on her restoration can be seen at www.seaheritage.asn.au/joox/joox.html.

The Sydney Heritage Fleet expects to receive a grant for the slipping and restoration of the hull of *Kanangra* from a benefactor who wishes to remain anonymous.

The report of the review of Sydney Ferries is available at www.transport.nsw.gov.au under the 'What's New' icon.

Sydney to Hobart Race Safety Issues

Jonathon Binns and Tony Boyle of the Australian Maritime College gave a presentation on *Sydney to Hobart Race Safety Issues* to a meeting of the Maritime Engineering Panel of the IEAust at Engineering House attended by fifty-two on 15 October. Jonathon is currently doing his PhD at the AMC on *The Re-righting Tendencies of Modern Sailing Yachts*, and Tony is a Senior Lecturer with the Faculty of Maritime Transport

and Engineering, and has been six years as manager of the Emergency Response Centre. To aid the study of the safety of offshore sailing yachts the relevant areas can be divided into three broad groups: those dealing with human factors, those dealing with design factors, and weather prediction. After the tragic events of the 1998 Sydney to Hobart Yacht Race, all three groups were examined in detail and have been improved a great deal. At the AMC the safety of life at sea is constantly under investigation; ways of quantifying and thereby reducing the risk posed to those who go to sea are the direct outcomes. Recently these paradigms have been directly applied to offshore sailing yachts.

Jonathon presented the results of some of his research, both theoretical and experimental. After a brief introduction to *GZ* curves, he showed the application of some of the existing rules to the 1998 Sydney to Hobart fleet. The IMS Categories are not good at discriminating between casualties and non-casualties. Similarly, the IMS Limit of Positive Stability (LPS) does not discriminate well; nor does the ISO draft international standard ISO 12217:1999 or the UK Code of Practice for Sailing Vessels. He also described the experiments he has done, using solitary waves and irregular wave spectra to determine not only the size of wave required to capsize, but the expected length of time inverted following a capsize.

Tony Boyle described some of the human factors they have investigated, including where masters and crews like to stow their liferafts (about half prefer on deck, half prefer below, for a variety of reasons). They have carried out experiments in Bass Strait which show that breaking waves make it difficult to maintain contact with a raft, and others which show that circular rafts maintain shape better when subjected to a hole in the floor (à la *Winston Churchill).* Experiments in the pool with liferafts showed that a liferaft could be paddled 9 m in 38 s with a proper paddle, but that the same distance took 81 s with the paddles provided in one brand-name raft and which some people had difficulty recognising as paddles! Tests showed that a boarding ramp makes for easier boarding of the raft than a ladder. Tests with trained and untrained groups showed that success in boarding a raft, escaping from a raft, righting a raft, rescuing a person in the water onto a raft, and hooking up a helicopter rescue strop, all increased with training from around 40% to 100%. This has led to the recommendation that 50% of the crew of each competing vessel must have undergone a one-day survival training course (valid for five years). Other recommendations include SOLAS liferafts in lieu of coastal (despite the additional cost), additional and revised equipment for rafts (RFD will have a new raft available this year).

Phil Helmore

Queensland News

In the Brisbane area**,** Aluminium Marine is continuing with the general outfitting of the 27 m Passagemaker catamaran with launching due early in the New Year. Brisbane Ship Constructions has won an order for a 15 m patrol boat for the Department of Primary Industries. Lightning Boats is still fitting out a 24 m catamaran night-cruise vessel for Sydney Harbour.

Oxford Yachts, in a joint venture with Crowther Multihulls, has won an order for ten 15 m oil rig crew boats for Venezuela.

South Pacific Marine has recently completed the construction of a 24 m aluminium cruise vessel, *Olympic Storm,* for Sydney Harbour. This vessel is currently being fitted out by its owner and will start operation in November.

Stingray Boats has delivered a 9 m monohull search and rescue vessel for the Burketown Volunteer Marine Rescue. This vessel is powered by two Yamaha 170 kW four-stroke outboard engines, which will give the vessel a speed of 40 kn in the fully-loaded condition.

Queensland Ships and Pacific Boats are now trading as Deep Vee Pty Ltd.

Brian Robson

Speed and Distance Sailing Records

Felix Scott

All offshore records are in danger...

The Trans-Atlantic Record

After three previous attempts, Steve Fossett's carbon fibre maxi-cat *PlayStation*, with a crew of ten, finally stretched her legs across the Atlantic, breaking the 11-year-old outright west-to-east trans-Atlantic record. After resisting more than twenty-one previous attempts over ten years, Serge Madec's robust 1990 record time of 6 d 13 h, set with the 22.5 m catamaran *Jet Services V*, was toppled by almost 44 hours.

PlayStation headed out from New York on the afternoon of Friday 5 October in light southerly winds of 15 kn. She passed the Ambrose light at the head of a large North Atlantic storm front. The strategy was to surf the favourable southerly winds at the leading edge of this fast-moving low-pressure system. Oil platforms off Sable Island warned the *PlayStation* crew of the oncoming storm with 50 kn winds and 6 m seas, unaware that the big cat was planning to ride the edge of the storm all the way across the Atlantic.

The storm rolled on toward Europe and *PlayStation* flew before it on a near-perfect rhumb line course. She covered 2885 n miles, reaching The Lizard, Cornwall, in 4 d 17 h 28 m 6 s, at an average speed of 25.42 kn. Also, during the period 2200 GMT on 6 October to 2200 GMT on 7 October, she raised the outright 24 h distance travelled record to 687.17 n miles, an average speed of 28.36 kn!

PlayStation is the oldest, largest and most heavily canvassed of the new generation maxi cats. Built by Cooksons in New Zealand, *PlayStation* was originally 32 m long. It became apparent that she had a tendency to pitch heavily, causing both speed reduction and forward cross-beam slamming problems. Due to these motion problems she was lengthened and also given more bow freeboard prior to 'The Race'. For 'The Race' she carried her old set of sails, but was forced to retire with sail problems whilst still in the Atlantic. She currently holds the outright Newport–Bermuda and Miami–New York records. Principal particulars of *PlayStation* and *Jet Services V* for comparison are as follows:

	PlayStation	***Jet Services V***
Designer	Morelli/Melvin	Gilles Ollier
Length OA	38 m	22.5 m
Beam	18.3 m	13 m
Displacement	26 t (approx.)	9 t (approx.)
Sail area	676 m^2	300 m^2
Crew	10	6
Distance travelled	2885 n miles	3060 n miles
Time	4 d 17 h 28 m 6 s	6 d 13 h 3 m 32 s
Average Speed	25.42 kn	19.48 kn

One of the Ollier cats, *Team Adventure*, attempted the trans-Atlantic record earlier this year but, after covering the first 367 n miles in 14 h, she hit a floating object and damaged her bow. Repairs are expected to cost $USD250–500 000 and she will be back in the water by May 2002.

The Boats

The obvious question one would ask about these vessels is which is the fastest? There has not yet been a conclusive show of clear speed dominance from any of these vessels at this early stage. The only time they have all gathered together at once was for 'The Race'. The outcome was not conclusive. *PlayStation* was an early withdrawal and two of the other Ollier cats had been launched just before the event with little development time. Structural damage also affected some of the boats. Nevertheless the design

Playstation under reduced sail
(Photo courtesy Gilles Martin-Raget)

camps have produced rather different vessels.

PlayStation, from the drawing board of Americans Gino Morelli and Pete Melvin, is along the lines of an overgrown Tornado, combining elliptical-section wave-piercing hulls with high freeboard. Her rig is conservative, stepping a fixed carbon mast with spreaders and diamonds. She sets a heavily-roached mainsail with an enormously loaded mainsheet, countered by a number of roller-furled headsails. Her expansive sail area is countered by a hefty 18.3 m beam, making her very stiff.

Frenchmen Gilles Ollier and Yan Penfornis' cats, *Club Med, Team Adventure* and *Innovation Explorer,* are the product of ten years of research and development. They are, in comparison, shorter and have less overall beam, with spreaderless rotating-wing masts setting more moderate-roach mainsails. Hanked headsails are set off on a simple, single-piece bowsprit which extends from the main beam over the forward beam. This sprit takes all the headsail loads and removes the need for a dolphin striker forward. Weight, lift and buoyancy have been centred aft of the mast, with weight especially kept well aft. The Ollier cats have high-buoyancy hulls with low wetted surface. Waterline length has been maximised with plumb bows and bluff sterns. The superstructure above the water has been aerodynamically designed to minimise drag from the apparent wind. The moderate beam makes the boats a little tender. These boats are fully powered and on one hull in 12–13 kn of wind. Apparently Ollier deliberately misinformed the media that his boats were beamier than designed, hoping other designers would go down the path of maximising stiffness.

There appear to be two distinct design camps here, with the Americans trying to maximise power, whilst the French are trying to minimise drag.

It is interesting at this point to recall Open 60 monohull development. There were, in effect, no rules except for a maximum vessel length of 60 ft (18.23 m). Initially the designs diverged into two distinct types. There were the thin, light, lightly-loaded, low-drag vessels competing with the very wide, highly-loaded, water-ballasted, skimming-dish vessels with larger sails and greater power. The wider boats prevailed by popularity without conclusion about which was the dominant design but now, as these

Innovation Explorer
(Photo courtesy Gilles Martin-Raget)

vessels reach the sixth generation, the beam is reducing again as designers look not only to improve the safety, but also to reduce loading and drag.

In the maxi multihull arena, Olivier de Kersauson's trimaran, *Geronimo*, from the design office of Marc van Petegham and Vincent Lauriot Prevost, provides a whole new perspective to the debate. De Kersauson feels that, despite the extra cost of a trimaran with three non-identical hulls, there are speed, safety and structural advantages. *Geronimo* should weigh the same as the cats due to having only one set of controls in one cockpit with one engine. The spreaderless rotating mast is stepped on the strongest part of the boat (the central hull), and at low wind speeds she has less wetted area than the cats (until they lift a hull). Her extra beam means she is able to carry more sail, and she is sailed from the central hull in the aft part of the vessel, making her safer for the crew.

Geronimo's designers are mostly involved with the Open 60 trimarans in Europe. Although *Geronimo* has a simple set up, she has provision in the design for Open 60 'go-fast' tweaks such as canting mast, extra rudders, outrigger foils and a bowsprit. De Kersauson plans to attempt the around-the-world record this summer.

Geronimo
(Photo courtesy Benoit Stichelbaut)

Principal particulars of *PlayStation*, the Ollier cats and *Geronimo* for comparison are as follows:

	PlayStation	*Club Med Team Adventure Innovation Explorer*	*Geronimo*
Hull type	Catamaran	Catamaran	Trimaran
Length OA	38 m	32.5–33.5 m	34 m
Beam	18.3 m	16.5 m	21 m
Displacement	24–26 t (approx.)	19–20 t (approx.)	20 t
Sail area			
Upwind	676 m^2	610 m^2	535 m^2
Downwind	1081 m^2	800 m^2	915 m^2
Best 24 h run	687.17 n miles	655.20 n miles	to come

The Ollier cats are all of the same design, but have different lengths overall because of varying transom lengths.

The Questions

Once again, and not since the early nineties, the debate has been raised as to whether a catamaran is a preferable option to a trimaran. With the Open 60 multihull rule developed in the late eighties limiting racing boat length to 60 ft, designers have gone down the path of maximum power (i.e. maximum righting moment), and so 60 ft trimarans with 60 ft beam have dominated. Very wide racing catamarans encounter difficulties in providing bending and torsional stiffness for the rig platform. In a trimaran the central hull provides the stiff structure. With a large boat, available power is not the primary limiting factor, and so the debate goes on. Perhaps in the future another syndicate will create a high performance 33–34 m monohull so that the debate can be extended to include all three major types (numbers of hulls) of sailing craft!

Can the around-the-world mark drop below 60 days (currently standing at 62 d 6 h)? Can the 24 h distance record rise above 700 n miles? Most of the people involved with these boats think that both are possible.

Felix Scott is a UNSW student with a keen interest in the speed and distance sailing records.

THE INTERNET

Sailing Simulator

Sailing is about controlling several parameters at the same time, and obtaining good boat speed is essential. Det Norske Veritas Software has put together the most challenging of these parameters into an Internet-based sailing simulator which is purpose built for the Open 60 class. In the simulation mode the user can freely steer the boat, hoist and lower sails, and watch how the boat behaves in different conditions. Want to test your sailing skills against other sailors on the web? The sailing simulator also offers a games mode, where the user may select either an Olympic course or a Volvo Ocean Race course to use the 3D model of Knut Frostad's *djuice dragons* to race against the best 'virtual' sailors. Good boat speed is essential for successful racing for all courses — each time the boat crosses the finish line the total time is recorded on-line and the list of fastest times is updated. Find out all about it at www.dnv.com/software.

Phil Helmore

EDUCATION NEWS

University of New South Wales

Undergraduate News

On 15 and 16 August A/Prof. Lawry Doctors visited the Australian Maritime College with the third-year naval architecture students from UNSW who are studying ship hydromechanics. The experience that they gained by using the towing tank for resistance and motion tests together with the inspection of the other experimental facilities (the shiphandling simulator, the cavitation tunnel, the circulating-water tunnel, the ship-model basin, and the vessels at Beauty Point) was most valuable and was a great addition to their theoretical studies at UNSW. They were grateful to Mr Gregor Macfarlane for organizing the tour; he contributed a considerable amount of time to this project. In addition, Dr Paul Brandner, Mr John Wakeford, Mr Peter Guy, and Mr Ian Smith assisted with the tour itself.

By way of thanks, Lawry gave a presentation on 15 August of his theoretical work related to the predictions of wave-wake characteristics of high-speed vessels to AMC staff and students, and was pleased that there was a good roll-up. The presentation was arranged by Dr Prasanta Sahoo.

At the graduation ceremony on 12 October, the following graduated with degrees in naval architecture:

Sean Ilbery (Honours Class 2, Division 2)
Nick van den Hengel

They are now employed as follows:

Sean Ilbery	Contracting to Strategic Marine, Fremantle
Nick van den Hengel	Australian Submarine Corporation, Adelaide

Congratulations to all.

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

Hason Ho *CFD Analysis of Non-conventional Propellers*

Nick Hutchins *Transom-stern Wake Analysis*

Greg Shannon *Optimisation of a Fishing Vessel Hull Using CFD*

In addition, presentations on the following naval architecture-related projects were also made:

Darren Bemrose *Remotely-operated Vehicle for Underwater Exploration*

Mark Mojsin A*utomated Control of a Multiple-cushion Hovercraft for Minimisation of Wave Generation*

Stephen Ward *Optimisation Techniques for High-speed Monohull Ferries*

RINA and Austal Ships jointly offered an award of $500 and a certificate for the best presentation at the conference by a student member on a naval architectural project. Assessment was made on the basis of marks awarded by School staff, with marks being standardised to remove the effects of marker variability. The award went to Hason Ho for his presentation on *CFD Analysis of Non-conventional Propellers*, and was announced by Ms Tracie Barber, the Conference Coordinator, at the thesis conference dinner at the Moore Park Golf Club on the evening of 5 October. Hason's award and certificate have since arrived from London. Congratulations, Hason!

Also at the thesis conference dinner, the School's 154 final-year students made their annual award for Lecturer of the Year, inaugurated in 1995. This year the Lecturer of the Year award went to Dr Berman Kayis. Several light-hearted awards were also made to students on the spur of the moment, including the Sexy Nose award to Adrian Santoso, and Princess of the Evening to Netty Sari.

Post-graduate and Other News

Also at the School's graduation ceremony on 12 October, Jubeom Lim received his Master of Engineering Science degree by coursework and a project on *Automated Drawing of Ship Propellers with Computer-aided Drafting.* Jubeom has now taken up a position with Schefenacker Vision Systems Australia, who manufacture car mirrors *inter alia*, in Adelaide.

Dr Peter Majumdar, Associate Director, US Office of Naval Research — Europe in London, England, has been on an extended visit to Australia. He was able to make time to visit the School

of Mechanical and Manufacturing at UNSW in August. On August 6, he participated in a research-progress meeting of the Cooperative Research Centre for Aerospace Structures, during which he heard about the work being led by Professor D.W. Kelly on the subject of designer-woven composite joints, which exhibit considerably enhanced strength properties.

On August 8, he attended the RINA presentation at UNSW by Mr Alex Robbins of Incat Designs on *A Regression Analysis of a Parametric Series of Low-wash Hullforms*. During that week, he also had the opportunity to meet with naval architecture staff and to learn about the activities of the naval architecture program.

Assoc. Prof. Lawry Doctors had arranged for Dr Majumdar to visit Incat Tasmania Pty Ltd in Hobart and accompanied him to this shipyard on August 13. The visit was hosted by Mr Tim Roberts, Research and Development Manager, who showed the modifications to the catamaran that has been be leased by the US Army for a two-year period. On August 14, they visited North West Bay Ships Pty Ltd in Margate, south of Hobart, where Mr Ray Gumley, Shipyard Manager, explained the features of their new foil-assisted trimaran, which was about to be launched. After that, they were able to board the novel vessel for a test run, during which its high-speed and extremely-low-wave-wake characteristics were amply demonstrated. This opportunity strengthened the case, expressed previously by other naval architects, that hydrofoils have excellent possibilities in this regard.

During his time in Australia, Dr Majumdar also made a number of visits to personnel in the Royal Australian Navy in Canberra and in Sydney, as well as to the Defence Science and Technology Organisation in Melbourne.

The Sixth International Conference on Fast Sea Transportation (FAST '01) was held at the University of Southampton in Southampton on 4–6 September 2001. The total number of delegates was 208, of whom six had travelled from Australia. As is traditional with this biennial conference, there was a number of themes, including monohulls, catamarans, surface-effect ships, wing-in-ground-effect craft, materials, manufacturing processes, hydrodynamics, structural response, propulsors, economics, wash prediction, machinery, regulatory, and human factors.

Of the seventy-five papers presented, the following were by attendees from Australia:

(1) *The Effect of Hull Form on Loss of Stability and Heel-Yaw Coupling for High-Speed Monohulls*, by Martin Renilson and Simon Kelly.

(2) *Focussing the Wave-Wake System of a High-Speed Marine Ferry*, by Lawrence Doctors, Stephen Phillips, and Alexander Day.

(3) *Concept Evaluation for High-speed Low-wash Vessels*, by Alexander Day and Lawrence Doctors.

(4) *Gaseous Fuels for Passenger Vessel Applications*, by Greg Cox.

(5) *Experimental Validation of the Calculated Flow in a Waterjet Steering and Reversing Unit*, by Gregory Seil.

(6) *Preliminary Design of High-speed Monohull Ferries*, by Prabhat Pal and Dugald Peacock.

(7) *How Many Foils? A Study of Multiple Hydrofoil Configurations*, by Michael Andrewartha and Lawrence Doctors.

(8) *Slamming Response of Large High-speed Catamarans*, by Giles Thomas, Michael Davis and James Whelan.

It was good to see, once again, the large contribution to FAST from Australia. The next conference in the series, namely FAST '03, will take place in September 2003 in Italy.

Phil Helmore
Lawry Doctors

Curtin University

The Centre for Marine Science and Technology, in conjunction with UWA, Melbourne University and the Norwegian University of Science and Technology, is offering top up scholarships to outstanding Australian resident PhD candidates who are applying for an Australian Postgraduate Award. The supervisory team consists of the following members:

- Dr. Jinzhu Xia, Curtin University of Technology
- A/Prof. Nick Haritos, Melbourne University
- Prof. Beverley Ronalds, University of Western Australia

•Prof. Odd Faltinsen, Norwegian University of Science and Technology

The overall objective of this research programme is to expand Australia's knowledge base and research capability in deep-water offshore structures and to meet the ever-demanding met-ocean challenges in the relatively young offshore oil and gas industry.

Offshore oil and gas production is becoming one of Australia's most important energy industries. Western Australia currently ranks fourth in World liquefied natural gas (LNG) production. However, Australian offshore oil and gas production has so far only been active in relatively shallow waters. This is partly due to the high cost involved in deep-water production and partly due to the fact that there is a lack of in-depth knowledge of deep-water structures. With the excitement of new offshore discoveries in Australian waters, there is an increasing demand in the study and development of deep-water offshore structures to ensure safe and cost-effective operation and production.

As Australian and international offshore oil and gas exploration and production extends to deeper and deeper waters, novel structural concepts are continuously being developed to meet the ever-challenging ocean environments. A common feature of many of the offshore structures being developed for application in deeper waters is that they exhibit some degree of compliancy to ameliorate the effects of wave loading and to reduce structural weight and cost. The compliant nature of these structures, through their capacity to deform significantly under wave action and other environmental loadings, means that structural dynamics and fluid-structure interaction play important roles in their operational behaviour. As an example, two compliant towers which are now the tallest free-standing structures in the world, were installed in 1998 in the Gulf of Mexico in water depths of more than 500 m. Due to the global flexibility of the supporting towers, the topsides and upper parts of such structures can move significantly under the excitation of wind, current and waves which demonstrates a typical fluid-structure interaction problem. In order to ensure safe and cost-effective design, operation and maintenance, it is crucial to study the dynamic and interaction problems for the determination of the operability of compliant platforms and the strength, stability and fatigue life of such structures.

Dynamic fluid-structure interaction of ships and very large floating structures such as floating airports, have been extensively investigated under the topic *hydroelasticity* since the late 1970s. Counterpart work in the relatively young offshore oil and gas engineering field, however, is an area that requires further fundamental research. This research programme aims to develop hydroelasticity theories and modelling techniques for compliant offshore structures and to provide new analysis tools for the development of platforms in deep-water ocean environments.

The PhD work would involve one or more of the following:

- Theoretical and mathematical modelling of dynamic interaction of a compliant offshore structure with the surrounding waves and winds;
- Development of hydroelastic computer software for loading and response prediction of a compliant offshore structure;
- Scale model testing of a compliant offshore structure which satisfies both structural and hydrodynamic similarity laws; and
- Conceptual configuration of a compliant offshore tower for Australian water and its response prediction based on the new modelling techniques.

For more details contact contact Dr Jinzhu Xia at CMST on phone (08) 9266 4696, fax 9266 4799 or email j.xia@curtin.edu.au.

Kim Klaka

Australian Maritime College

New Ship and Ocean Structures Lecturer

Mr B. Gangadhara Prusty joined the Department of Naval Architecture and Ocean Engineering at AMC as a Lecturer on 31 August 2001. Gangadhara graduated in Civil Engineering in 1985 and an ME in Structural Engineering in 1988, following which he joined the Department of Civil Engineering, Regional Engineering College, Rourkela, India as a faculty member. He has submitted his PhD thesis entitled *Static, Dynamic, Buckling and Failure Analyses of Composite Stiffened Shell Structures: A Finite Element*

Approach to the Indian Institute of Technology, Kharagpur, India. His current research includes finite element analysis of structural engineering problems, fibre-reinforced composites and reinforced concrete structures. He has several publications in refereed journals and conference proceedings.

Presentation of Final Year Undergraduate Research Theses

The Department of Naval Architecture and Ocean Engineering held their annual undergraduate thesis conference on Saturday 27 October. The conference was opened by AMC Principal Dr Neil Otway and guests/invited moderators included Dr Tony Armstrong of Austal Ships, Dr Seref Aksu and Mr Greg Wright of DSTO and Mr Christopher Carra of BHP Petroleum. The presentations included:

Matthew Allen *Underwater Cable Model for ROV Operation*

Peter Guirguis *Morison Analysis of Offshore Structures*

Daniel Headley *Investigation and Development of Hull Forms for the Generation of Optimal Surfing Waves*

Peter Hinds *An Investigation Into Shallow Water Wave Wake*

Charles Jesudasan *Green Water Loading on a FPSO Bow in Shallow Water*

Katsuhiko Kiso *CFD Analysis of Trimaran Resistance*

Tim Nicol *An Investigation of Turbulence Arising from a Towed Depressor Unit*

Bryce Pearce *Large Full-Form Vessel Resistance Prediction Through Regression Analysis*

Adam Schwetz *Calm Water Resistance of Semi-displacement High-speed Catamarans*

Colin Spence *Investigation into Effects of Asymmetrical Ballasting on the Re-righting Tendencies of Capsized Sailing Vessels*

Isikeli Waqa *Investigation of a Method for Prevention and/or Detection of Hydrate Buildup in Deepwater Pipelines*

Stephen Watt *Stability & Capsizing in Waves*

Bruce Williams *Wave Run-up on a Vertical Circular Cylinder*

Marc Wilson *An Investigation of Turbulence Arising from a Towed Depressor Unit*

Andrew Wright *Investigation of Crack development in a Diesel Engine Cylinder Head*

2001 AMC Rat Trap Races

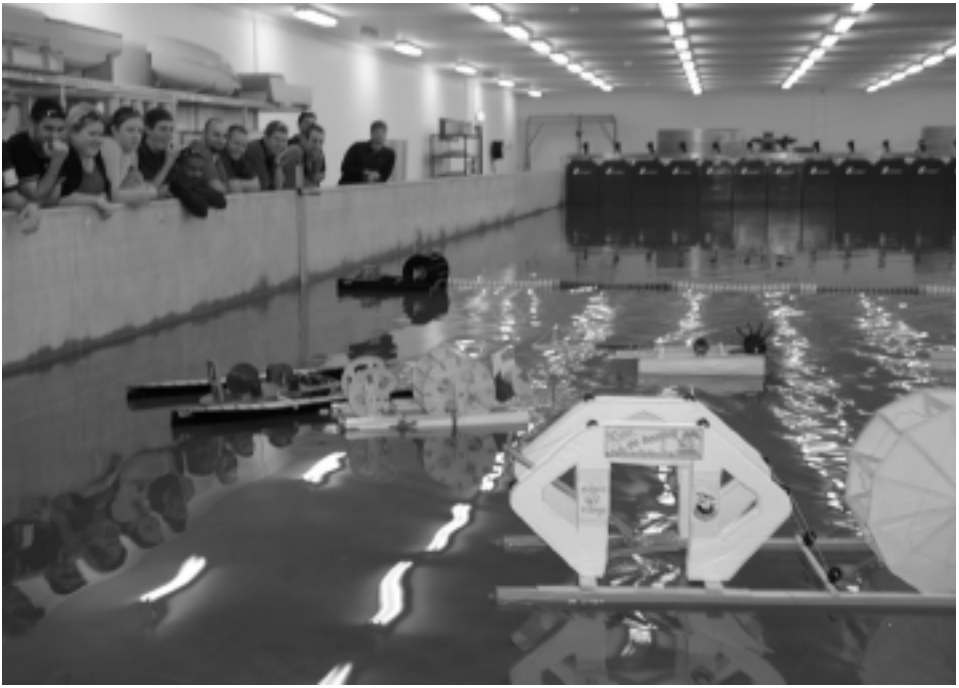
More than 20 first-year naval architecture students were again involved in the AMC's annual Rat Trap Races. Students are required to design and construct a vessel using a rat trap as the sole source of propulsive power. Apart from this simple rule, anything goes! The vessels are put through their paces over a 10 m course set out in the college's new wave tank. Many novel designs utilising the rat trap made it to the water. Team *Spring Loaded* beat the previous year's record with a time of 14.53 seconds fot the 10 m [*= 0.688 m/s = 1.34 kn* — Ed.]. The team built two catamaran vessels of varying lengths and investigated a range of paddle wheel arrangements (utilising an old LP record collection for construction materials!) to come up with their winning design (see photo next page).

UNSW Naval Architects Visit AMC

In August this year the University of New South Wales third-year naval architects made their annual visit to the Australian Maritime College to use the towing tank and other facilities. Lawry Doctors gave a presentation on *The Wave Generation Characteristics of Single and Multi-hull vessels* and then the Tasmanian Section invited the UNSW students out for dinner. A number of members of the Tasmanian Section attended, including a large group of third- and fourth-year AMC students who had been specially invited to compare notes on course work, job opportunities, mutual interests and local pubs. The whole evening was a great success; all enjoying meeting new people and the exchange of ideas. Later the AMC students went on to show the UNSW students the Launceston nightlife and a few heavy heads greeted Lawry on Thursday morning!

The Australian Maritime Hydrodynamics Research Centre

The Minister for Industry, Science and Resources, Senator Nick Minchin, announced on Tuesday 21 August that AMC's submission to establish the Australian Maritime Hydrodynamic Research



Rat Trap boats racing in the model test basin (above)

Spring Loaded with the Winning Team — Scott Clark, Nick Billet Suzanne Hayne, and Mark Hughes (below) (Photos courtesy AMC)

Centre was successful. AMC will receive about $4.5 million over 5 years from the Commonwealth Government to support the Centre. The funding is allocated under the Major National Research Facilities Program of AusIndustry, an arm of the Commonwealth Department of Industry, Science and Resources.

Specific activities which will be facilitated by research in the Hydrodynamics Centre include the development of underwater and surface naval platforms, the advancement of high-speed craft design, increased realism in the modelling of simulated port areas and navigation channels, an improved capacity to undertake calm water and seakeeping experiments within a controlled environment, and an advanced capability for research into the hydrodynamic performance of fishing gear and aquaculure sea cages.

AMC's succesful submission to AusIndustry took account of the institution's already formidable array of hydrodynamic facilities and associated expertise. This comprises:

- the Towing Tank, used for conducting experiments on scale models of ocean going vessels and structures;
- the Cavitation Tunnel for investigating flow around ships and underwater bodies, sonar appendages, propellers and waterjets;
- the Integrated Marine Simulator, with its capability to provide ship port and navigation channel modelling;
- the Circulating Water Channel (Flume Tank) used for experiments on fishing gear and aquaculture equipment; and
- the Model Test Basin, used for hydrodynamic experiments geared towards shallow water operations.

The success of AMC's bid will allow for the following upgrades and expansion to hydrodynamic infrastructure and staffing to occur:

- The length of the test section of the Towing Tank will be doubled, providing higher maximum speeds and longer test runs. The smoothness of the carriage ride will also be improved;
- New components will be added to the Cavitation Tunnel, including a downstream tank, diffuser and skimmer. This will enable the test section to be run either full or with a free surface and to control a range of fundamental water properties. This upgrade will facilitate investigations involving the study of two-phase flows including cavitation, steady and unsteady flows, turbulence and hydroacoustics. Some modifications will also be made to the cavitation Tunnel building.
- The precision in modelling of ship behaviour in port areas and navigation channels within the Ship-Handling Simulator will be increased. Two full time researchers will be employed to develop techniques to significantly improve the realism of the modelled port areas and navigation channels, including the ability to simulate a ship's reaction to bank, swell, current; and wind effects.
- The data acquisition equipment and instrumentation for the Flume Tank will be updated in order to broaden the research capability of the facility.
- A computer system will be acquired to centralise, manipulate and archive data from the various facilities.
- A further three full time research staff plus a Centre Manager and administrative support will be employed.

The bid also emphasised AMC's strong links with industry and with other providers of research and development expertise in the higher education sector, both in Australia and overseas. Co-proponents, the Defence Science and Technology Organisation (DSTO) — Maritime Platforms Division and the University of Tasmania, will also participate in the centre, with contributions of a predominantly in-kind nature.

Since the announcement, the Prime Minister, John Howard, made a visit to AMC on 24 August. He was guided on a tour of some of AMC's facilities including the Cavitation Tunnel, Towing Tank and Ship-Handling Simulator. This was followed by a lunch with the AMC team which prepared the submission, including all of the facility managers. On 12 September the Minister for Industry, Science and Resources, Senator Nick Minchin, also visited AMC to present certificates to AMC, the University of Tasmania and DSTO in relation to the

successful bid. Senator Minchin also had a tour of some of AMC's facilities.

Other News from AMC

Jonathon Binns and Dr Tim Gourlay are working on a virtual sailing project. An agreement to develop the software for an existing Laser class sailing simulator between the AMC and Virtual Sailing Pty Ltd was reached in September. This will provide a significant contribution to the existing simulator, facilitating further performance enhancements, as well as opening up the possibility of a more straightforward simulation of other boat classes than is possible with the existing software. Exporting the simulator by Virtual Sailing has begun in earnest and this project is growing on a daily basis. It is the long-term goal of both the AMC and Virtual Sailing to develop the project into a fully-rounded research investigation. Readers interested in the Virtual Sailing simulator can look it up on the web at www.virtualsailing.com.au

Two Australian Research Council (ARC) grant applications involving Paul Brandner have been successful. The first, a Linkage Infrastructure, Equipment and Facilities Grant for $195 000 in 2002 is a joint project with Greg Walker of UTas. It is entitled *Control of Free Dissolved Gas Content in a Cavitation Tunnel*. The second is a Discovery grant for $175 000 over three years and involves PhD student Jonathon Binns. It is entitled *The Influence of Sway-roll Coupling on the Dynamics of an Inverted Sailing Yacht in Waves*. This grant will greatly enhance and extend the existing work in the area of re-righting. Due to start next year, it will run until 2004, and will not only increase the AMC's ability to investigate re-righting phenomena but will also feed into the rapidly increasing infrastructure of the college.

The development of hydrodynamic test equipment for the Tom Fink Cavitation Tunnel by AMC's Paul Brandner and Dr Greg Walker (School of Engineering, University of Tasmania) was submitted as an entry to the Tasmanian Division of the Institution of Engineers' 2001 Engineering Excellence Awards. This submission was successful in winning one of the six awards announced on Friday night.

Dr Tim Gourlay recently participated in the *International Workshop on Stability and Operational Safety of Ships*, held in Trieste, Italy, in mid-September. As the only Australian participant, Tim was able to meet and exchange ideas with the world leaders in this field, as well as discussing recent research at AMC in the areas of dynamic stability, deck-diving of catamarans and re-righting of sailing yachts. He returns with plenty of ideas for further research!

Martin Hannon
Gregor MacFarlane
Henk Kortekaas

The Model Test Basin at the Australian Maritime College
(Photo courtesy AMC)

AMC Students Visit *L'Astrolabe* in Dock in Launceston

L'Astrolabe of Seaward Abeilles SA chartered by the French l'Institut Polair came to Launceston recently mainly for CP propeller repairs. During the previous dry docking, cracks were found in the crankpin rings of both CP propellers. As new parts had not been readily available, the Bureau Veritas Surveyor had allowed the vessel to sail under limited power until the replacement parts could be fitted.

AMC students, technicians and two lecturers paid a visit to the vessel and were taken on a guided tour by the French master, Gerard Daudon, who proudly showed the entire vessel from engine room to wheelhouse and helicopter hangar.

Both CP propellers had been dismantled and Rolls Royce (Ulstein CPP) representative Paul Poh explained the intricacies of the system and its control. Because of the unique opportunity to inspect the interior of CP propellers, permission was asked to show the 26 marine engineering students around as well. Permission was granted and the next day the vessel was flooded with eager students.

The vessel was built in 1986 by Ferguson Ailsa Shipbuilders Ltd, Glasgow (UK), as a supply vessel. In 1988 she was converted by Siren Shipyard, Le Havre (France), into a polar scientific research vessel. She now has a first-class icebreaker classification and can carry 57 people. For a number of years now *L'Astrolabe* has been operating from Hobart, supplying Australian Antarctic bases.

L'Astrolabe
(Photo courtesy AMC)

Seakeeping Characteristics of Patrol Boats

Bruce McNeice
Navy Systems Branch, Department of Defence

Seakeeping describes the motions and seakindliness of a ship in a seaway. Seakeeping performance is a major factor in operational effectiveness, as good seakeeping qualities allow ships to successfully execute their missions in adverse conditions. Excessive ship motions in rough weather can have considerable effect on:

- ship speed;
- crew effectiveness and safety;
- ability to undertake specific activities, such as launching and recovering boats;
- weapon and sensor effectiveness;
- ship serviceability and reliability; and
- fuel consumption.

Increased operational effectiveness requires that modern naval ships, with their sophisticated systems, be designed to known operating capabilities in their intended operating environment. This places a greater emphasis on seakeeping performance as an essential ship capability that must be addressed at an early stage in the ship design process.

The primary peacetime role of RAN patrol boats is supporting the Civil Surveillance Program. This includes surveillance and surface response in all but Antarctic Regions of the Australian EEZ. RAN seakeeping requirements for patrol-boat sized ships have been selected to exclude operating in Antarctic regions for any significant duration as the requirements to operate in such zones have a dominant effect on size and type of ship required. Aside from supporting the Civil Surveillance Program, RAN patrol boats provide support to wider Defence Policy as it applies to our region.

To complete these roles successfully, a certain degree of ship performance is required to allow operations to be maintained without undue interruption. The response of the ship in different wave heights will determine the operating limits of the ship. In the Australian region the significant wave heights ($H_{1/3}$) occur with a frequency as indicated in Table 1. From this table it can be seen that, to operate uninterrupted 90% of the time, the ship must be capable of operating in seas with a significant wave height of 4.0 m (top of Sea State 5).

The Fremantle Class exhibits the typical performance of a small, relatively fast monohull
(RAN Photograph)

$H_{1/3}$ [m]	Average Occurrence [%]	Cumulative Probability [%]	Sea State
<0.5	10	10	2 and below
0.5-1.25	23	33	3
1.25-2.5	36	69	4
2.5-4.0	21	90	5
4.0-6.0	7	97	6
>6.0	3	100	7 and above

Table 1 Frequency of Wave Heights in Australian Waters

Evaluating the Fremantle class Patrol Boat

Recent investigations quantifying the performance of the current RAN patrol boat fleet are nearing completion. This has involved numerical simulation and a survey of crews. Before discussing the characteristics identified by these evaluations for the Fremantle class patrol boat three factors should be noted. The first is that the Fremantle class patrol boat (FCPB) is a great improvement on the former Attack class patrol boat. Secondly the mission of the patrol boat has changed since the Fremantles came into service in the early 1980s and, consequently, the design was not necessarily intended for the role it now plays. The third factor to be noted is that seakeeping evaluation techniques have greatly improved in the last decade through ongoing international cooperative research programs in which the RAN is involved. This has allowed a greater understanding of seakeeping, performance specification and evaluation in the design stage.

Seakeeping evaluation in relation to crew performance has moved away from individual motion limits such as roll angle, pitch angle and heave to consider performance measures. Parameters such as Motion Induced Interruptions (MII) and Motion Sickness Incidence (MSI) that are easier to relate to crew performance are beginning to replace the more traditional limits. MII is defined as the number of times in a given period that a person would need to hold on in order to prevent sliding or toppling, and MSI is defined as the percentage of crew likely to vomit when continuously subjected to motions for a specified period. Currently the RAN standard materiel requirements for Seakeeping (A016464) states the limits of these motions to be 1 MII per minute and 20% of crew vomiting when continuously exposed to the limiting sea condition for 4 hours. DSTO is continuing to calibrate a method of determining MSI in an objective manner with actual sickness incidence on RAN ships. This may lead to some refinement of the requirements in this area. Other performance measures for a ship include slamming, deck wetness and propeller emergence.

How the Fremantle class Vessels Perform

Both the numerical and survey results indicated that the Fremantle class vessels exhibit the typical performance of a small, relatively fast monohull, however, certain areas of the design could be improved. The ship is no longer able to safely complete a full range of tasks in a significant wave height of 2.5 m (top of Sea State 4). Moving into Sea State 5, tasks such as launch and recovery of sea boats become dangerous and, even in the higher range of Sea State 4, some areas of the ship become particularly uncomfortable. Both the survey and numerical analysis indicated that junior sailors spaces, the ships office and communications centre are areas where many tasks become difficult in moderate seas. These areas suffer the most from ship motions and the result is increased difficulty when working in these areas. It is not surprising to note that these areas are forward in the ship where higher acceleration levels are encountered.

From a seakeeping perspective, travelling in following seas results in the lowest motions; however,

dynamic stability considerations such as avoidance of broach and surf riding must then be considered. The survey responses from the commanding officers indicated that operating in moderate beam seas was undesirable due to the MII caused by considerable roll. For this reason, bow or stern quartering is often a better heading. Despite the implications for slamming and deck wetness the commanding officers of the FCPBs have indicated that heading directly into the seas is often the most desirable as far as crew safety is concerned.

The commanding officers have indicated that when selecting any heading, crew safety is the highest priority. Following this, in head seas, equipment damage and slamming were of concern; in beam seas roll and equipment damage and in following seas, broaching and surf riding were in the top three concerns.

The dilemma facing the FCPBs is that roll is the greatest concern when considering the tasks to be completed on board, but pitch and heave motions become significant for crew during 'rest' periods. The result of inadequate rest is increased fatigue and motion sickness. It was reported that a combination of roll, pitch and heave in bow and stern quartering seas (which can create a cork-screw effect) will often reduce the magnitude of any one component but usually will greatly increase sickness incidence.

Effect of Ship Motions

The survey completed by 138 crew members from eight of the RAN FCPB fleet, asked the usual degree of sea sickness experienced. The categories included:

- never;
- mild (headache, more than usual tiredness);
- moderate (sleeplessness, more than usual irritability, nausea); and
- extreme (actual vomiting and general sea sickness enough to prevent you from performing your normal duties).

In response 30% claimed never to suffer seasickness, 26% mild doses, 28% moderate and 16% extreme sea sickness when seasick on the FCPBs.

Frequency of seasickness was questioned with responses sought for calm (0-1.25m seas), moderate (1.25-2.5m seas), rough (2.5-4.0m seas) and very rough seas (4.0-6.0m seas). The response could be not at all, occasionally, frequently, nearly always or always.

In calm conditions 6% indicated that they have some degree of seasickness either occasionally or frequently whilst the remaining 94% never get seasick. This decreases to 67% never getting seasick in moderate seas, 44% in rough seas and 35% in very rough seas. In rough conditions 31% frequently to always suffer seasickness and this increases to 39% in very rough seas.

Apart from these statistics, two other clear trends came from the survey. They were that in moderate seas (Sea State 4) 73% of respondents believed they took longer to complete tasks and 76% used more caution to complete tasks.

These results clearly indicate that adverse seakeeping characteristics have a significant influence over operating efficiency. In the operating environment that can be expected 36% of the time (i.e. Sea State 4), one third of the crew could be expected to be suffering some degree of seasickness and most of the crew are taking additional time and caution to complete tasks. The impact of seakeeping on the mission of these patrol boats can therefore be significant.

It should be noted that one of the requirements for the new patrol boats has been stated to be that the seakeeping characteristics are to be better than the FCPBs. So how would a new patrol boat differ from the FCPBs to improve seakeeping?

Improving Seakeeping Performance through Design

The following thirteen attributes lead to good seakeeping characteristics. These are not the only way of

achieving good seakeeping performance but are some of the more significant and simple ways to improve a ship at the design stage.

1. A larger displacement.
2. A greater waterline length (within the constraints of the design) although slamming can become a problem for some ship length, speed and wave combinations.
3. Increased waterplane area, particularly forward, is very beneficial.
4. V-shaped sections forward that minimise slamming at the keel and bow flare.
5. An absence of flat sections aft that causes stern slamming in relatively small seas.
6. Adequate freeboard to minimise deck wetness, especially forward. There is good reason for a forecastle and deck sheer!
7. Ensure adequate propeller submergence to avoid emergence in waves. This will also increase propulsive efficiency.
8. Keep manned spaces away from forward and aft extremities of the ship and, preferably, as close to midships (or a little aft of it) as possible.
9. Keep *GM* low enough that roll motions are not too rapid but stability is maintained. A large *GM* will contribute to high lateral accelerations and motion induced interruptions.
10. If possible, fit roll damping or stabilisation systems (starting with bilge keels, then tanks if maximum operating speed is low (say 16 kn) and fins if usual operating speed is high).
11. Flared hull sides can have an advantage in that beam can be reduced to minimise powering or roll stiffness while stability is maintained at larger heel angles.
12. Motion Induced Interruptions (MII) increase the higher up in the ship you are. If possible, have manned spaces low in the ship (although this may be contrary to safety considerations in the case of collisions, etc.)
13. Ensure that rudders and skegs are adequately sized such that good directional control of the boat can be maintained in following seas and the risk of broaching may be reduced.

It is recognised that other trade-offs may make some of these aspects virtually impossible to meet. A decision on the importance of seakeeping needs to be made early in the design stage so that the hull can be defined. If sufficient attention is not given to this area then considerable effort may be required to address problems during sea trials or before acceptance into naval service.

Acknowledgements

The author takes this opportunity to thank the crew of the RAN FCPB fleet who participated in the seakeeping survey. Such feedback should help to ensure that future RAN patrol craft are designed with greater attention to seakeeping performance. This will be appreciated by future crews and those planning naval operations.

References

1. A016608, *Seakeeping Analysis of the Fremantle Class Patrol Boat*, Revision 1, RAN, August 2001.
2. *Seakeeping Survey of the Fremantle Class Patrol Boat*, Unpublished.
3. A016464, *Standard Materiel Requirements for RAN Ships and Submarines , Volume 3: Hull System Requirements, Part 6: Seakeeping*, Revision 0, RAN, December 2000.
4. Hogben, N. et al, *Global Wave Statistics*, compiled and edited by British Maritime Technology Limited, Unwin Brothers Ltd, 1986.
5. Lloyd, A. R. J. M., *Seakeeping — Ship Behaviour in rough weather*, Ellis Horwood Limited, 1989.
6. Kehoe, Capt J.W. et al., Seakeeping and Combat System Performance — The Operators' Assessment, *Naval Engineers Journal*, May 1983.
7. Bales, N. K. and Cieslowski, D. S., A Guide to Generic Seakeeping Performance Assessment, *Naval Engineers Journal*, April 1981.

FROM THE CROWS NEST

Tipping the Playing Field, Again

The Committee of European Shipbuilders' Associations (CESA) has called for a resumption of state aid for European shipbuilders ahead of a meeting of European Union foreign ministers in Brussels on 8 October. CESA also called on the ministers to press ahead with an international trade complaint at the World Trade Organization over alleged public support for shipyards of Korea, and called for the ministers to override UK-led opposition to a resumption of [European] subsidies, which were phased out at the end of last year.

Marine Digital (newsletter@marinedigital.com), 12 October 2001

The Australian Shipbuilders Association was aware of this proposal for resumption of state aid, and sent a delegation to Canberra in late September, and the point was made to all of the relevant politicians of various persuasions. In particular, the Minister promised to monitor the situation closely and to assist the Australian Industry if necessary (i.e. via a subsidy) if industry assistance was introduced in Europe or Korea.

The WWSR

The British have a new boat, *Quicksilver*, a reverse three-pointer under the engineering of Ken Norris (who worked with Donald Campbell) being tested for a tilt at the world water speed record, possibly late this year. The Swedes are also building a boat, *Miss Scandinavia*, a catamaran-type which is about half-completed in Stockholm, for their tilt at the record, possibly next year. Both boats are shown on Ken Warby's website www.kenwarby.com.

Ken Warby has completed his new boat and has fired up the jet engine in his driveway (see photograph!), and initial trials on the water are expected soon. He is still awaiting major sponsorship so, if you know of a company which wants stratospheric publicity when the record is broken, ask them to log on to the website and let Ken know. Interest in the WWSR is attested by the fact that the site has had more than 23 000 visitors in about 24 months, and there are hundreds of comments on the guest book page.

Ken says that he is quite happy to sit back and let the Brits have a go, as it will be much more fun taking the record from someone other than himself. A recent entry on the comments page of Ken's website says "Don't wait for the Brits to make your runs, Ken, or you'll be an old man. They tested a jet engine powered model of *Quicksilver* on Lake Windermere in front of several dozen racers and speed freaks a few days ago, and it nosedived, just as you expected."

Initial Firing of the Jet Engine in Ken Warby's New Boat
(Photo *Scream and Fly* Magazine)

New Chair for ANMM

The new Chair of the Australian National Maritime Museum is Mark Bethwaite, whose appointment was announced recently by the Minister form the Arts, The Hon. Peter McGauran. Mark has achieved distinction in both the business and sailing worlds: he is currently MD and CEO of the leading business lobby group, Australian Business Limited. An engineer by training, he has held high-level positions in the Australian mining industry, including periods as MD and CEO of North Limited, and MD of North Broken Hill Holdings Ltd. He was a member of the Australian yachting teams for three Olympic games. He competed in the flying dutchman class at the Munich games in 1972 and at the Montreal games in 1976, and in the Soling class at the Moscow games in 1980. He was the world champion in the Soling and J24 classes in 1982, for which he was named Australian of the Year. Mark succeeds Peter Doyle and Kay Cottee as Chair. Kay remains as Patron of Members at the ANMM, and is presently completing a new yacht in which she intends to circumnavigate Australia.

Signals, September/November 2001

Volvo Ocean Race

The Volvo Ocean Race started from Southampton, England, on 23 September 2001. The nine-leg race will visit ten ports and cover a distance of around 33 000 n miles (a rhumb-line distance of 14 000 n miles). The race will take about ten months, racing through four oceans, and will finish in Kiel, Germany, in June 2002.

This flat-out race around the world grew out of the Whitbread round-the-world race which ran seven times from its inception in 1973.The race became a test-bed of technology, spawning maxi-sized competitors before settling into more evenly-matched racing with the development of a single class to contest it, the Whitbread 60 class. These were the predecessors of the current Bruce Farr-designed Volvo Ocean 60 class.

The Australian flag will be flown from the stern of one of the participating yachts, *Team News Corp*. Although skippered by British Olympic yachtsman Jez Fanstone and directed by New Zealander Ross Field (double race winner), *Team News Corp* will sail for Australia. There will also be an Australian, Peter 'Spike' Doriean, crewing on board the Norwegian entry *djuice dragons*, skippered by Knut Frostad.

The yachts are expected to arrive in Sydney around 4 December at the end of the second leg from Capetown, South Africa. They will berth at the Sydney Stopover Village, adjacent to the ANMM and extending from Pyrmont Bay Park to Harbourside Shopping Centre, Darling Harbour. The Sydney Stopover Village opens on 1 December and entry is free to the public.

The yachts then depart on 26 December along with approximately 100 other yachts on the annual ocean classic, the Sydney to Hobart Yacht Race. After a short pit stop in Hobart, the fleet will continue across the Tasman Sea to Auckland, New Zealand. From there, the yachts round Cape Horn and visit Rio de Janeiro, Miami, Baltimore/Annapolis, La Rochelle, and Gothenburg before crossing the finish line in Kiel.

For keeping up-to-date with the race and current positions, visit the official race website at www.volvooceanrace.org. For further details of the Sydney Stopover Village, visit the coordinating body's website at www.waterways.gov.au.

$10 m Catamaran Contract

Western Australian shipbuilder Austal Ships has signed a $10 million contract with Portuguese ferry operator Transtejo. The deal, to build two low-wash river catamarans, could bring further opportunities to Portugal, Austal's managing director Bob McKinnon said.

Engineers Australia, September 2001

New Name for IMarE

The Institute of Marine Engineers (IMarE) has received official approval from Her Majesty's Privy Council to change its name to The Institute of Marine Engineering, Science and Technology (IMarEST). The change of name is coupled with the formation of new professional categories, decoupling membership requirements from the UK Engineering Council, and placing a greater emphasis on competence to practise. Existing mem-

bers maybe eligible to upgrade their current membership's category, and a much greater number of the marine community will now have the opportunity to join the institute. The official launch of the IMarEST is planned for next spring (in UK, i.e. next autumn in Australia) following the AGM.

IMarE Press Release, 9 August 2001

Tenix Defence: New Name and Structure

The largest Australian-owned defence contractor became Tenix Defence Pty Ltd from 9 August 2001, with a new structure to align it to the Department of Defence. Formerly Tenix Defence Systems, the renamed Tenix Defence has four divisions: aerospace, electronic systems, land, and marine. The major change is in the marine division, which brings together the administration of Tenix Defence's shipyards in Williamstown, Vic., and Henderson, WA. The US$3.1 billion Anzac ship project has been brought back into Tenix Defence and is managed as a separate project.

The changes follow the appointment in September of of Robert Salteri as CEO of Tenix Defence. Harley Tacey, who had been acting CEO, became Executive General Manager, Strategy and Development, at the same time. Tenix Group MD, Paul Salteri, said the move was aimed at focussing the company more closely on its customers. 'The move to Tenix Defence brings the defence side of Tenix into line with the commercial side, which operates under Tenix Industries Pty Ltd,' Mr Salteri said. 'The change to the divisional structure is important, because it aligns Tenix Defence to the structure of the Defence Materiel Organisation.'

Work Boat World, October 2001

Phil Helmore

INDUSTRY NEWS

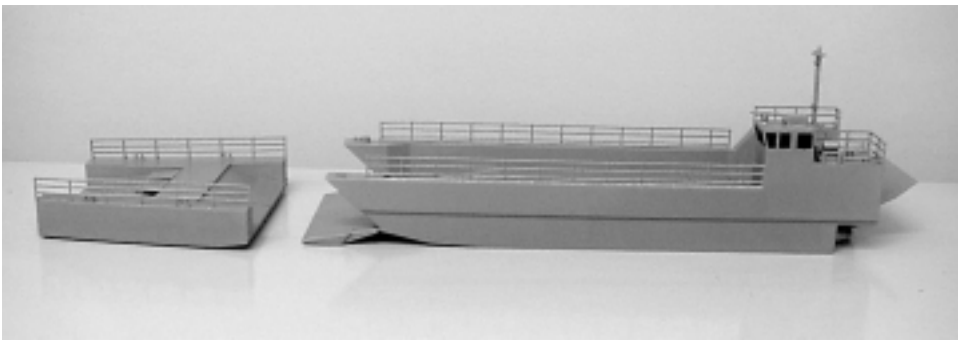
New Amphibious Watercraft for the Army

On 1 October 2001 the Minister for Defence announced that Newcastle shipbuilder ADI Limited had been selected as the preferred tenderer to build six amphibious watercraft for the Australian Army. The acquisition and set-up cost of the project is approximately $30 million. The through-life support costs will be approximately an additional $15 million. The project will create 40 jobs in the Newcastle area.

The watercraft are lightweight, but extremely strong, vessels powered by two diesel engines and waterjet propulsion. They will be carried on the decks of the Royal Australian Navy's transport ships HMAS *Manoora* and HMAS *Kanimbla*. They will provide the Australian Army with an important new capacity to move tanks, vehicles, soldiers and supplies to a beach in a significantly shorter time than can presently be achieved.

ADI tendered its own design of aluminium watercraft which was a clear winner, with its very large carrying capacity and shallow draught.The first amphibious watercraft will enter service in early 2003.

A model of the new watercraft to be built by ADI for the Australian Army.



Wärtsilä LNG-fuelled engines for offshore vessels

Wärtsilä Corporation has received a contract to deliver eight dual-fuel engines for a pair of 4 000 grt offshore supply vessels building at Kleven Verft A/S in Norway for Norwegian owners. The engines will run on liquefied natural gas (LNG) to reduce NO_x emissions.

The vessels have diesel-electric propulsion. Each vessel will have four Wärtsilä 6L32DF dual-fuel engines, each of 2 020 kW output at 720 rpm driving the main generating sets. Propulsion will be provided by two electrically-driven azimuthing thrusters, and the diesel-electric plant will also supply all shipboard power requirements. The vessels, measuring 94.9 m long by 20.4 m beam, will have a maximum speed of 17.2 kn.

The two vessels have been ordered by the Norwegian owners Eidesvik AS and Simon Møkster Shipping AS, and their design was developed together with the ship consultant Vik-Sandvik AS. When delivered in 2003, the vessels will be long-term chartered to Statoil and employed delivering supplies to oil and gas platforms in the North Sea.

Natural gas is an unusual fuel in the marine world, and these are the first vessels to use it in the offshore supply vessel industry. The fuel has environmental benefits; it burns very cleanly and NO_x emissions can be much reduced. This is important in Norway, which undertook to reduce by 2010 national NO_x emissions by about a third from the 1999 level. In the case of these supply vessels, the savings in NO_x emissions, estimated at 390 t per year, will be taken as a credit to offset emissions at Statoil's land-based facilities.

These vessels give a unique opportunity for Wärtsilä's 32DF dual-fuel engines. They run simultaneously on natural gas and diesel oil, and can be switched over from gas to liquid fuel automatically should the gas supply be interrupted while continuing to deliver full power. The environmental benefits extend beyond NO_x emissions, which are about one-tenth those of the standard diesel version. The combination of the 32DF engine's low fuel consumption and its maximum use of natural gas means the 32DF also has low CO_2 emissions.

The Wärtsilä 32DF engine was introduced in 2000 to marine applications to meet the requirements of a new safety class for installations with a gas pressure of less than 10 bar in a single-pipe arrangement. It thus provides an alternative to the Wärtsilä 32GD gas-fuelled engine, which has been highly successful in the offshore market.

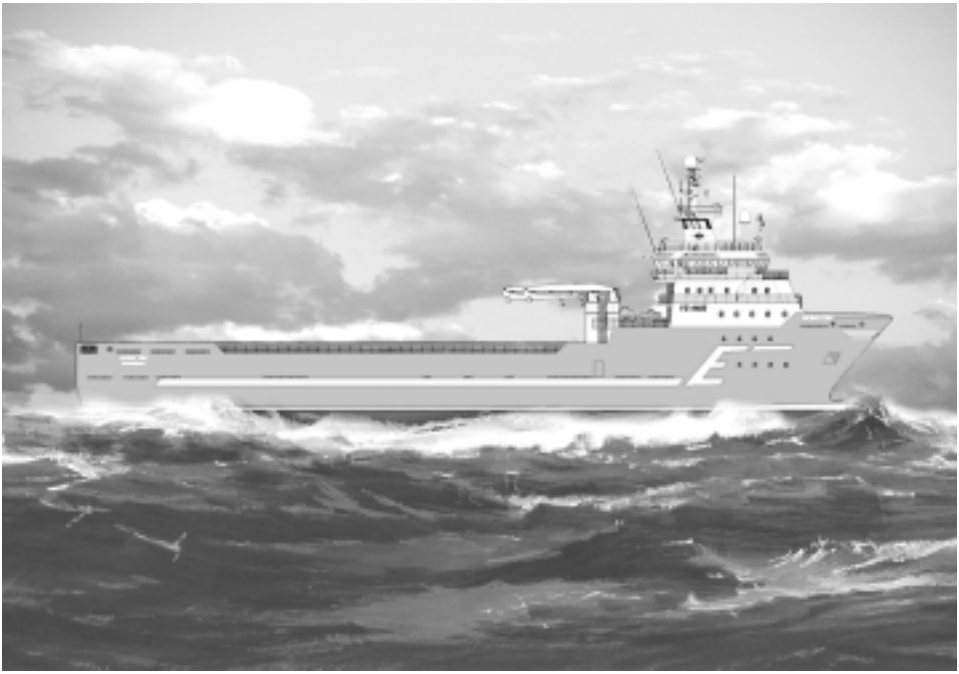
Whereas the gas-diesel engine (as in the Wärtsilä 32GD type) injects high-pressure gas fuel into the engine cylinders, the 32DF type employs gaseous fuels at low pressures. In gas mode, the 32DF engine operates according to the lean-burn Otto process. Gas is admitted into the air inlet channels to individual cylinders during the intake stroke to give a lean, premixed air-gas mixture in the engine combustion chamber. Reliable ignition is obtained by injecting a small quantity of diesel oil directly into the combustion chamber as pilot fuel. The 32DF engines use a "micro-pilot" injection with less than one per cent of the fuel energy requirement at nominal load.

An important contribution to satisfactory running of the Wärtsilä 32DF engine comes from the application of full electronic control. It uses an electronic control system based on the Wärtsilä WECS 8000 system. When running on gas with a premixed air-gas mixture and micro-pilot injection, the combustion must be closely controlled to prevent knocking and misfiring. The WECS 8000 control system provides control of the air-gas ratio, and the quantity and timing of the pilot fuel injection to keep every cylinder at the correct operating point between the knock and misfiring limits. The pilot fuel system is a common-rail system with one engine-mounted high-pressure pump supplying diesel oil to the injection valves at a constant pressure of 900 bar. The gas fuel is supplied to the engine at a pressure of less than four bar.

Wärtsilä has considerable experience in gas-fuelled engines. In addition to the above-mentioned gas-diesel engines in offshore applications, engines of the dual-fuel and spark-ignition types have been developed, manufactured and delivered for some years in stationary power plants on land. They are

offered with unit powers in the range of 3.5 to 20 MW. Owing to their environmental benefits, such engines now form a major part of the company's power plant business.

Artist's impression of the pair of 4 000 grt offshore supply vessels which will each be equipped with four Wärtsilä 6L32DF dual-fuel engines
(Image courtesy Wärtsilä)



VT to build destroyer-sized cat

UK commercial shipbuilding has been given a long-overdue shot in the arm, following a new agreement between south coast yard Vosper Thornycroft and Australian fast ferry designer Incat Design covering the next generation of the wave piercing ro/pax catamaran. The partners have agreed to build a new version of the innovative vessel type, initially for European consumption and addressing conflicting market demands for high speed and heavy load capability, at a realistic cost.

In the first instance, a 145 m length, 30 kn plus, ro/pax cat has been offered in a variety of payload configurations, ranging from 1 000 t to 1 650 t. The wave-piercing ro/pax cat is being designed to carry a combination of heavy freight vehicles, cars, passengers and containerised goods. In its first configuration, the 145 m length vessel will be of 1 650 dwt, and capable of carrying 34 trucks and 374 cars, or 543 cars only, and 1 000 passengers.

Hull construction will be from high-tensile steel, while the independently-mounted superstructure will be of aluminium. The wave-piercing ro/pax cat will be powered by heavy-fuel oil engines, with Wärtsilä committing its 38B engine to the project. This engine burns HFO 380 CST grade fuel, in an intentional bid to rein in operating costs.

Lloyds List 6 September 2001

Wärtsilä dual-fuel engined power module for FPSO upgrade

Wärtsilä Corporation has supplied a 5 800 kW power module to Bergesen d.y. Offshore AS, Norway, for installation on board the FPSO vessel *Berge Hus*. The module is powered by a Wärtsilä 18V32DF dual-fuel engine, which will burn produced gas.

Currently being converted into an FPSO (floating production, storage and offloading) vessel from a VLCC tanker at the Jurong shipyard in Singapore, *Berge Hus* is destined for operation on the Ceiba oil field off Equatorial Guinea. Oil was reached in the Ceiba field by another Bergesen FPSO vessel, *Sendje Berge*, in November 2000. The sister ship *Berge Hus* will take over work on that field in the first quarter of 2002 to complete the planned ten production wells and four water-injection wells, and continue handling the crude oil produced from the field.

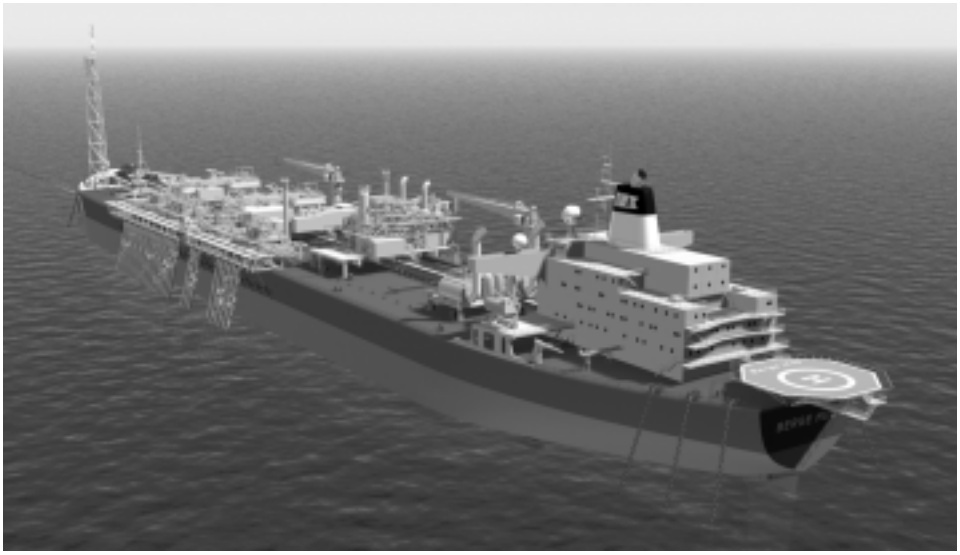
The Wärtsilä power modules are ready-made units designed and built specifically for the offshore oil and gas industry. They meet all the requirements for the application in terms of safety, reliability, quick installation and rapid commissioning, as well as complying with all relevant regulations including classification requirements.

The power modules are designed and assembled by Wärtsilä as total packages complete with all necessary ancillaries and can be test run with natural gas or diesel fuel oil before delivery to the site. Wärtsilä supplies the power modules as an EPC contractor, including responsibility for transport, test running and commissioning of the plant.

The ancillaries include such facilities as cooling heat exchangers, fuel handling system, starting air system, tanks, switchgear, electrical and control equipment, ducts for air intake and exhaust gases, ventilation system, exhaust silencer and stack.

In the case of the power module for the *Berge Hus*, the engine is a Wärtsilä 18V32DF dual-fuel engine with a maximum continuous output of 6 030 kW at 720 rpm. The complete unit measures 17.7 m long by 5.4 m wide and 6.0 m high, or 13 m including the exhaust stack. It weighs 201 tonnes for transport and 225 tonnes when in operation with all supplies (fuel, water and lubricating oil). It has fire insulation to class A60, and a noise level of less than 85 dB(A) at 1 m.

The FPSO vessel *Berge Hus* is equipped with a 5800 kW Power Module, which is powered by an 18-cylinder Wärtsilä 32DF dual-fuel engine (below)
(Image courtesy Wärtsilä)



Wärtsilä EnviroEngines for *Queen Mary 2*

Wärtsilä Corporation will deliver four Wärtsilä 46 EnviroEngines totalling 67.2 MW power output for Cunard Line's new luxury transatlantic liner, *Queen Mary 2*. These engines will incorporate the latest common-rail fuel injection technology for operation without any visible smoke.

Due for delivery in late 2003 by the French shipbuilder Chantiers de l'Atlantique in Saint Nazaire, *Queen Mary 2* will be the world's largest passenger vessel. Measuring 345 m long by 40 m beam and drawing 10 m, the 150 000 grt liner will have a maximum speed of about 30 kn. Electrical power for propulsion and all shipboard services will be generated by a 115.5 MW combined diesel- and gas turbine-electric power plant. Propulsion will be by four electrically driven podded drives, two fixed and two azimuthing.

The four Wärtsilä 16V46 EnviroEngines will be manufactured at Wärtsilä's Turku factory in Finland. They are due to be shipped in June 2002. The engines will each have a maximum continuous output of 16 800 kW at 514 rpm. For redundancy, the diesel generating sets will be housed in two separate engine rooms on board *Queen Mary 2*.

The Wärtsilä EnviroEngine arose from a joint project between Carnival Corporation, the parent company for Cunard Line, and Wärtsilä Corporation to develop a new 'earth-friendly' power system. The Wärtsilä 46 EnviroEngines use an electronically-controlled common rail fuel injection system which enables injection pressures to be kept sufficiently high at all engine loads and speeds — even at the lowest levels — to achieve clean combustion with no visible smoke emissions. The EnviroEngines will be particularly beneficial for use in port, as they are designed to produce no visible emissions even when lightly loaded for producing energy for lighting, air conditioning and other hotel systems.

Wärtsilä EnviroEngines are one of the most environmentally friendly solutions for ship power plants. Not only are they designed to have no visible smoke at any load, and even when starting or during transient load changes but, in common with other Wärtsilä diesel engine types, they also meet current limits for NO_x emissions. In addition, their good fuel economy gives lower CO2 emissions than alternative types of prime movers.

Wärtsilä Power the New Bay-class Landing Ships

Wärtsilä Corporation has received the contract to supply the diesel generating sets for two new Bay-class Alternative Landing Ships Logistic (ALSL) building for the UK Royal Fleet Auxiliary.

The four main diesel-generating sets in each ship will be powered by Wärtsilä 26 diesel engines, each ship having two Wärtsilä 8L26 and two Wärtsilä 12V26 engines. Wärtsilä will also deliver an emergency diesel generating set to each ship. Additional ship sets for a further two vessels to be built at BAE Systems, Govan yard will also be supplied, subject to pending optional contract.

The first two ships, newbuilding numbers 141 and 142, are to be built at Swan Hunter (Tyneside) Ltd in the UK. The twin-screw vessels will have diesel-electric propulsion. With an overall length of 176.6 m and displacement of 16 160 t, they will provide tactical sea-lift as part of an amphibious group, and also be used for routine military transport and logistic support. They will carry troops and their vehicles, including main battle tanks and landing craft.

This latest order follows the successful completion of previous contracts for the UK Ministry of Defence for Wärtsilä main propulsion machinery. Wärtsilä Corporation has a growing number of ship references for its main propulsion and power generation machinery among navies and coast guards around the world.

THE END OF AN ERA

HMAS *Brisbane* rounding Bradley's Head under her own power for the last time on 10 October 2001, streaming a long paying-off pennant and a trail of green and yellow smoke.
(Photograph John Jeremy)

The last steam-powered ship in the Royal Australian Navy, the guided missile destroyer HMAS *Brisbane*, paid off on 19 October 2001. The last of three Charles F. Adams Class DDGs to serve in the RAN, *Brisbane* was built by the Defoe Shipbuilding Company in the USA, and commissioned on 16 December 1967.

The 4 720 t destroyer is the second Australian ship to bear the name, the first being a First World War light cruiser, which was built by Cockatoo Dockyard in Sydney and served the RAN from 1916 until its disposal in 1935.

During her 34 year service, *Brisbane* visited its namesake city no fewer than 23 times, steamed over one million nautical miles and undertook numerous tours of duty in the South East Asian and Pacific regions. Highlights included two tours of Vietnam in 1969 and 1971, where she served with distinction. She took part in the Cyclone Tracey clean-up operations, attended the Queen's Silver Jubilee in Great Britain in 1977, and completed two deployments to the north-west Indian Ocean in 1981 and 1984 in support of USN Operations during the Tanker War in the Persian Gulf. She also served in the Persian Gulf during the Gulf War in 1990-91. HMAS *Brisbane* was the last RAN ship to have fired its guns in anger in Vietnam, and was the last in commission to have served in two wars.

There can be no doubt that the decision in the early 1960s to buy the destroyers *Perth*, *Hobart* and *Brisbane* from the United States was a milestone in the history of the RAN and the ships served the nation with great distinction during the last third of the 20th century.

Brisbane has been given to the Queensland Government and, after stripping, will be sunk off the Queensland coast as a dive wreck. All three of the DDGs will lie at rest in Australian waters.

VALE

Bob Halliday

It is with sadness that *The ANA* records the passing of Robert (Bob) Fletcher Halliday, formerly Senior Lecturer in the Department of Mechanical Engineering at the University of Sydney, on 8 August 2001, at the age of 78 years.

Bob was well known in the naval architecture community in Australia for his long-standing devotion to the profession. He lectured and researched at the University of Sydney for almost four decades, having taken up an appointment there not long after the Second World War. One of his first tasks, in fact, was to complete the 60 m towing tank which, at that time, consisted only of an empty concrete basin. He was responsible for the installation of the rails, the construction of the ingenious cable-hauled carriage and a series of carefully-crafted dynamometers, as well as the electronic recording systems.

Those engineers and engineers-in-the-making who knew Bob were most fortunate. For, by having detailed discussions with him (which were never short), they always came away with a considerably enhanced knowledge of some aspect or another of 'tankery', in particular, or of ship hydrodynamics in general.

His knowledge was vast and well founded. In the practical area, he knew how to construct reliable equipment that worked well in a consistent manner and which never failed to work. A remarkable example of this was an early dynamometer (circa 1968) that employed a sub-carriage mounted on rotating and longitudinally oscillating shafts. Due to the rotation, the dynamometer suffered zero longitudinal friction, so that a precise drag on the ship model would be recorded. The purpose of the oscillation was to prevent the rotating shafts from wearing in one area only.

He designed one of the world's first model yacht dynamometers; this was capable of setting the model at the required displacement, heel and leeway angle. In this way, the hulls of the America's Cup contenders *Gretel* and *Dame Pattie* (designed by the late Alan Payne and Warwick Hood, respectively) could be optimized in a systematic way. *Gretel* won the second race in the 'best of seven' series in 1962, and this was a magnificent achievement for a first-time contender in this highly-regarded competition.

His knowledge of ship hydrodynamics was advanced. At the time when the University of Sydney possessed the very first computer in Australia in the 1960s, the Silliac, he had already written a code in machine language for evaluating the Michell integral for the wave resistance of an arbitrary hull. To do this task in a robust fashion, he utilized a number of self-taught tricks in the area of numerical methods, before this term was even known to practising engineers of any type in this country.

Another extraordinary device that he devised was a 'hydrostatic computer' for determining the free-trimming righting-arm curve of a vessel while balanced on a wave. In essence, the model vessel was represented by an aluminium tubular spine, to which were attached the 'transverse sections' of the vessel, cut out of styrofoam. The thicknesses of the sections depended on the section number, and were in the ratio: 1, 4, 2, 4, ... 1, according to Simpson's First Rule. A weight, whose height could be adjusted, was attached to the spine, so that the vertical centre of gravity could be adjusted. This 'virtual' ship model was then placed in a longitudinally-subdivided tank with each subtank (one for each ship section) filled with water to the appropriate level, thus simulating the profile of the required water wave. This clever device probably 'computed' the righting moment as quickly as a modern digital computer and, certainly, without any possibility of a programming or input error.

Everything that Bob Halliday did had a profound educational influence on his friends, students, and professional colleagues. His influence on the Australian maritime community was profound. He will be missed.

Lawry Doctors

Bob Halliday's 'hydrostatic computer' was designed, and used first by Cecil Boden, to analyse

the stability of the tuna vessel, Estelle Star*, which never passed the MSB's stability criteria but which, in the hands of her doyen skipper, Ken Tidswell, fished successfully for many years —* Ed.

Don Williams

Don Williams, engineer and administrator, died on 7 August 2001 in Adelaide, aged 63. Don spent a large part of his career with rail corporation Australian National, which he led as Chief Executive from 1979 to 1988 and thereafter as Chairman. In 1988 he was appointed Managing Director of the newly-established Australian Submarine Corporation, and presided over the launching of the first Collins-class submarine built by the corporation in 1993. He took over as Chairman of the Australian Maritime Engineering Cooperative Research Centre in 1993, succeeding the inaugural Chairman, Phil Hercus, and held that position until the demise of the AME CRC in June 2000. In 1997 he joined Kinhill Engineers (now Brown and Root), and helped put together the financial and technical package for the Alice Springs to Darwin railway. He was appointed an officer of the Order of Australia in 1992.

Phil Helmore

CENTENARY OF FEDERATION DEFENCE HISTORY

Very few Australians would be aware that 15 403 Australian soldiers were casualties of the influenza pandemic that hit the European battlefields in 1916–17, or that 1 845 000 000 rounds of small arms ammunition were produced in Australia in the period 1940–45.

The Minister Assisting the Minister for Defence, Bruce Scott, revealed these little known facts and statistics at Melbourne's Victoria Barracks on 5 September when he launched the sixth volume, entitled *Australian Defence: Sources and Statistics*, in the seven-part Centenary History of Defence series.

Australian Defence: Sources and Statistics, compiled by Professor Joan Beaumont of Deakin University, is one of a series of works by noted Australian military historians and chronicles the contribution of defence matters to the nation's first hundred years', said Mr Scott. 'Professor Beaumont's volume not only contains a wealth of statistical data on a century of Australian Defence Force participation in war and peace, but also guides readers to the sources of further research in a wide range of Defence-related areas', he said.

The series, although not an official history, is a collaboration between the Department of Defence and The University of New South Wales' University College at the Australian Defence Force Academy. The idea for an Australian Centenary History of Defence originated in the early 1990s with a group of academics at University College, The University of New South Wales' subsidiary that delivers tertiary education to Defence people at the Australian Defence Force Academy. They were able to sell the idea to the Department of Defence which has provided funding assistance and access to Departmental sources. Oxford University Press was selected to publish the work.

The Australian Centenary History of Defence is an academic work rather than an official history. It consists of seven volumes which encapsulate the place of Defence as an integral element of Australia's development in the century since Federation. The volumes in the series are:

Volume 1: *The Australian Army* by Professor Jeffrey Grey
Volume 2: *The Royal Australian Air Force* by Dr Alan Stephens
Volume 3: *The Royal Australian Navy* by Dr David Stevens
Volume 4: *Making the Australian Defence Force* by Dr David Horner
Volume 5: *The Department of Defence* by Professor Eric Andrews
Volume 6: *Australian Defence: Sources and Statistics* by Professor Joan Beaumont
Volume 7: *An Atlas of Australian Wars* by Lieutenant General (Retd) H.J. Coates

PROFESSIONAL NOTES

News from the NMSC

Safety Equipment Standards

The current USL Code Sections 10 and 13 which specify safety equipment for commercial vessels are currently being redrafted as Part C Section 7A of the new National Standard for Commercial Vessels (NSCV). It is expected that the draft of Section 7A will be available for public comment by the new year.

The NMSC is now seeking public comment on the draft National Standard for Recreational Boat Safety-Equipment. The draft standard has been developed in response to public demand for nationally-consistent safety equipment requirements. The standard specifies the minimum safety equipment required to be carried on board a recreational boat, as well as the standard that the equipment should meet. A copy of the draft standard can be downloaded from the NMSC website at www.nmsc.gov.au, or a hard copy obtained from the NMSC Secretariat by phoning (02) 9555 2879 during office hours or by sending an e-mail message to secretariat@nmsc.gov.au. Comments should be forwarded to the NMSC Secretariat by post to M. Flapan, NMSC Secretariat, PO Box 1773, Rozelle NSW 2039, fax (02) 9818 8047 or email secretariat@nmsc.gov.au. The closing date for comments is 30 November 2001.

New NSCV Standard for Fast Craft Progressing Well

A meeting of the joint industry/government reference group met on 19 September to consider the public comment received on the draft NSCV standard for Fast Craft and the Regulatory Impact Statement (RIS) mentioned the August issue of *The ANA*. The recommendations of the reference group will be put before the National Marine Safety Committee meeting in November.

The reference group participated in a risk-management workshop to consider issues associated with smaller seagoing and sheltered-water fast passenger vessels in preparation for developing the next series of standards applicable to fast craft. These standards, applicable to so-called Category F2 fast craft, will be subject to public comment at a future date.

Fire Safety Issues Paper Comment Period Extended

The fire safety issues paper mentioned in the August issue of *The ANA* was due to close for public comment on 2 November. The issue paper is a precursor to the up-coming review of fire safety requirements for commercial vessels in Australia. Due to a shift in the scheduling of the work program, the public comment period has been extended till 31 December. A copy of the issues paper can be downloaded from the NMSC website at www.nmsc.gov.au, or a hard copy obtained from the NMSC Secretariat by phoning (02) 9555 2879 during office hours or by sending an e-mail message to secretariat@nmsc.gov.au. Comments should be forwarded to the NMSC Secretariat by post to M. Flapan, NMSC Secretariat, PO Box 1773, Rozelle NSW 2039, fax (02) 9818 8047 or email secretariat@nmsc.gov.au. The closing date for comments is now 31 December 2001.

Mori Flapan

UNSW Graduate Salaries

The 2000 Graduate Destination Survey (GDS) shows that UNSW graduates [overall, not just engineering graduates — *Ed.*] continue to fare well in the job market. The annual GDS measures the first destination of students after graduation. The most recent GDS (which assessed the employment outcomes of students graduating between October 1999 and May 2000) revealed the best employment

figures for UNSW bachelor degree graduates for more than ten years, with 84% of respondents either employed or in full-time study, and only 2% still seeking full-time employment. This compares well against an unemployment rate of around 10% for this age group in NSW as a whole.

The survey showed that women graduates overall reported less favourable employment outcomes than men, but this appears to reflect the distribution of female students throughout the faculties, and the different choices and career paths open to graduates from diffeerent faculties. In some faculties, especially those with a strong vocational or professional orientation, or those which are science based, women appear to be having equal or greater success in gaining employment on graduation.

The survey also showed that median starting salaries of UNSW bachelor degree graduates during 2000 were $36 300 (and $55 000 for higher-degree graduates), the highest of any university in NSW and 10% greater than the Australian university average of $33 000.

UniKen, October 2001

Phil Helmore

MISSING IN ACTION

Four members have to be reported as AWOL in this edition. They are:

Mr W Benn from Lilydale, Victoria,
Mr J Ekin from Cottesloe, Western Australia,
Mr D Firth from Willoughby, NSW and
Mr M Grech from Launceston, Tasmania.

If anyone knows the present location of these members, please let Keith Adams know on (02) 9876 4140, fax (02) 9876 5421 or email kadams@zeta.org.au.

It is requested that members who have their postal address as 'care of' an institution like the Australian Maritime College, consider changing their postal address to their home address to reduce the amount of mail returned to the RINA at the end of semesters or other changes of circumstance.

The multi-purpose diving support vessel *Rockwater 2* moving towards shallow water with the wreck of the Japanese fishing vessel *Ehime Maru* (sunk in collision with the US submarine *Greenville*) slung beneath the hull. After the remains of those lost in the collision have been removed from the wreck by divers, *Ehime Maru* will be dumped in deep water off Hawaii.
(US Navy photograph)

MEMBERSHIP NOTES

AD Council meeting

The Australian Division Council met on 22 August, with teleconference links to all members and John Jeremy in the chair in Sydney. Matters, other than routine, which were discussed included:

- Council membership: The President welcomed new Council member Gregor Macfarlane (Tasmania), and acknowledged the acceptance of Council membership by Mike Warren (South Australia) who was unfortunately unable to attend.
- the Australian Division and Sections pages of the website: Managers and section editors for the site were appointed and Operation of the site was discussed (see report below). Some of the legal issues were discussed.
- The Walter Atkinson Award for 2000: The winners for 2000 were Bruce McRae and Jonanthon Binns, for their paper *America's Cup Technology Trickle-down* (see report below).
- Forward planning: The portfolio basis of handling the Division workload has been progressed in the areas of recruitment (WA developing a plan of action), marine safety (comments being prepared on NMSC draft document on fast craft), and promotion and prizes (discussions are in progress).
- RINA London Council meeting in July: Agreed to 10% reduction in fees for members who are also members of IEAust; this now awaits ratification by IEAust prior to implementation. Also, RINA has been granted consultative status at IMO; Australian comments can be voiced via Robin Gehling, our representative on the RINA Safety Committee.
- The IEAust/RINA Joint Board: Competency standards for a general area of practice of naval architecture was considered via generic standards with specific provisions for naval architecture. A competency panel is being formed. The career planner and logbook currently used by IEAust is considered appropriate without modification.

The next Australian Division Council meeting is scheduled for Wednesday 5 December.

Updated AD Website

At the AD Council meeting on 22 August, Tim Dillenbeck was appointed Manager of the Australian Division and Sections pages of the RINA website, and David Gosling was appointed Technical Manager. Editors were appointed as follows:

Australian Division: David Gosling and Tim Dillinbeck;
WA: Kim Klaka and Steve Harler;
Qld.: Brian Hutchison and Brian Robson;
NSW: Jennifer Knox and David Gosling;
ACT: Bruce McNeice and Ian Laverock;
Vic.: Samantha Tait and Stuart Cannon; and
Tas.: Martin Hannon and Gregor Macfarlane.

The Australian Division site is reached by pointing your favourite web browser to www.rina.org.uk and following the links to Institution/Branches/Australian Division. Information has now been loaded onto most of the division and sections pages (except for the forums). Editorial control of the Division pages has now passed to the Technical Manager, David Gosling. If you think of something you would like to see (or change, or correct) on your division pages, then contact David by phone on (02) 9563 8771 or email davidg@waterways.nsw.gov.au.

Section pages are reached by clicking on the link on the Division page. Section activities are listed on the Program of Meetings pages, reached by clicking on that link near the top of each section page. Activities are shown by a title and a brief description. Click on the title bar of any activity and full details will be shown. If you think of something you would like to see (or change, or correct) on your section page, then contact your section editor.

Apointments vacant covers both positions vacant and posting of resumes for positions wanted. The Appointments Vacant page is reached by clicking on that link on the Australian Division page. Appointments are shown by a title and a brief description. Click on the title bar of any appointment and full details will be shown. There is a fee of $200 for any Position Vacant advertisement, and

$20 (members) or $50 (non-members) for posting of Resumes. Advertisements remain on the site until the position is filled or three months have passed. All appointments vacant are handled by the Technical Manager, David Gosling, who can be contacted by phone on (02) 9563 8771 or email davidg@waterways.nsw.gov.au.

If you have not yet visited the updated site, then be brave. It is worth the effort!

The Walter Atkinson Award 2000

The Walter Atkinson Award for 2000 has been awarded using the new system of nomination outlined in *The ANA*, February 2001. Under this system, each section nominates their choice for the Walter Atkinson Award to the Division, except that South Australian and Northern Territorian members nominate direct to the Division. The nominations received were as follows:

- Don Fry, *Hydrographic Ships for the RAN*, presented at Sea Australia 2000 (nominated by the Queensland Section);
- Bruce McRae and Jonathon Binns (co-author A. Dovell ineligible; not a member of RINA), *America's Cup Technology Trickle Down*, published in *The ANA*, May 2000 (nominated by the NSW Section); and
- Patrick Couser, *Seakeeping Analysis for Preliminary Design*, presented at Ausmarine 2000 (nominated by the Western Australian Section).

The three nominations were then considered by a Division sub-committee of three which was chaired by Brian Hutchison, and each paper was scored rigorously against the Award selection criteria. All papers were highly commended by the sub-committee.

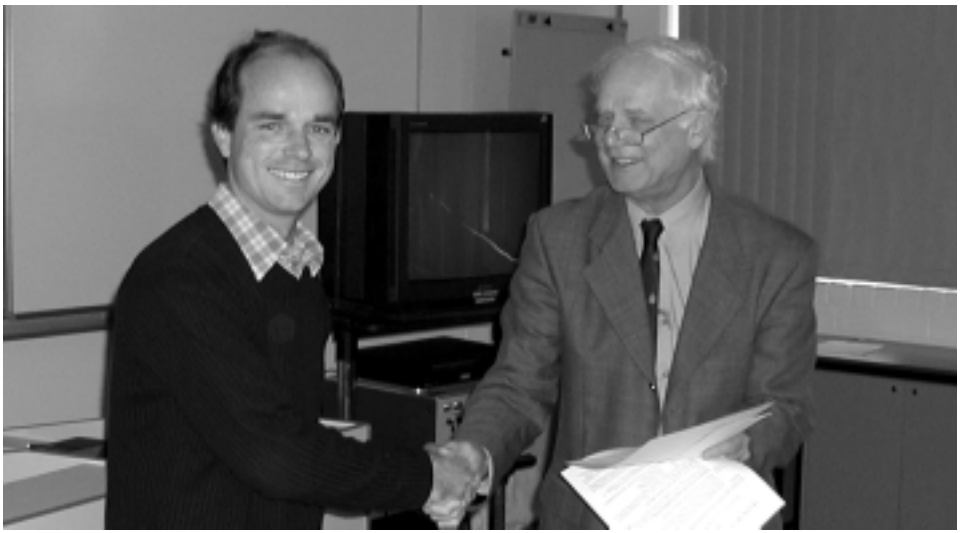
The winners for 2000 were Bruce McRae and Jonanthon Binns, for their paper *America's Cup Technology Trickle-down*. Congratulations, Bruce and Jonathon!

The presentation of the award to Bruce McRae took place at the final technical meeting of the NSW Section for 2001 at the Rugby Club on Wednesday 24 October. The presentation of the cheque and certificate was made by Australian Division Council Member, Phil Helmore.

The presentation of the award to Jonathon Binns took place at the Final Year Research Thesis Presentations at the Australian Maritime College on Saturday 27 October. The presentation of the cheque and certificate was made by Australian Division Council Member, Tony Armstrong.

Phil Helmore
Gregor Macfarlane

Presentation of the 2000 Walter Atkinson Award to Jonathon Binns by Tony Armstrong
(Photo courtesy Gregor Macfarlane)



NAVAL ARCHITECTS ON THE MOVE

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

Habibul Ahmed has moved on from WaveMaster International and has returned to take up a position as a naval architect with Austal Ships in Fremantle.

Andrew Baker moved on from Phil Curran Design about a year-and-a-half ago and took up a position as a naval architect with Gavin Mair Marine Design for about nine months. About six months ago he started his own consultancy, Andrew Baker Marine Consulting, working from home (about five minutes drive inland of Henderson). He has been busy, with most of his work being subcontract work for Phil Curran, Gavin Mair or Steve Bruyn (who specialises in aluminium workboats). Andrew writes that he tends to concentrate on structural design (particularly FRP) and stability work, but having a background of working for small businesses means that he can do all kinds of jobs when required.

Les Bryant, a recent graduate of the Australian Maritime College, has taken up a position with the Maritime Safety Branch of Queensland Transport.

Mitch Carmock, a recent graduate of the Australian Maritime College, achieved his engineer's Charge Qualification in almost record time in February this year, and will become the engineer officer of one of the hydrographic ships operating out of Cairns later in the year.

Samuel Christie-Johnson has moved on from his trainee engineer position on board HMAS *Manoora*, having recently been awarded his marine engineer's Certificate of Competency, and now been posted to the Amphibious Ship Program Office. Chris will sit for his marine engineer's Charge Qualification later this year, which will qualify him to be the Engineer Officer of a major fleet unit.

Jon Duffy has spent the last three years working towards his PhD at the Australian Maritime College and hopes to submit his thesis early in 2002. He has taken up a full-time position as a Research Associate with the Ship Hydrodynamics Centre at the AMC.

Paul Duncan, a recent graduate of the Australian Maritime College, has moved on from Australian Marine Technologies and taken up a position with Pacific Jets in Melbourne.

John Gould moved on within the Austal Group and spent two years with Seastate in Fremantle, and has recently returned, consulting as Jon Gould and Co., to the offshore industry and is based in Fremantle.

Sean Ilbery has moved on from North West Bay Ships in Sydney and has taken up a position contracting to Strategic Marine in Fremantle.

Peter Ivanac, a recent graduate of the Australian Maritime College, has taken up a position with Veem Engineering in Fremantle.

Frank Jarosek moved on within the WA Department of Transport, and took up the position of Manager Commercial Vessel Safety about two-and-a-half years ago.

Andrew Jeffs has moved on from Baird Publications and is now consulting, not in naval architecture but in the commercial marine area of marketing support and PR, with some freelance writing thrown in for good measure. He has not severed ties completely with Bairds, but will still be contributing to the magazines and the books/surveys, so keep an eye out for his bylines (one of which is in the November 2001 issue of *Fishing Boat World*).

Jubeom Lim, a recent graduate of The University of New South Wales with a Master of Engineering Science degree by coursework, has taken up a position with Schefenacker Vision Systems Australia, who manufacture car mirrors *inter alia*, in Adelaide.

Cameron Lowry, a recent graduate of the Australian Maritime College, has returned from London where he worked on a number of consultancies, and has taken up a position as a naval architect with Image Marine in Fremantle.

David Lugg has moved on from Image Marine and has taken up the position of Senior Marine Surveyor (New Construction) with the WA Department of Transport in Fremantle.

David McKellar has moved on from Eptec in Sydney and is outward bound on an overseas trip;

destination and ETA unknown.

John McKillop has moved on from Oceanfast and has taken up a position as Project Naval Architect with Image Marine in Fremantle.

Prabhat Pal has retired from his teaching position in the naval architecture program at The University of New South Wales. Prabhat arrived in Australia in 1981 and was pushed in at the deep end, teaching within days. He taught the design strand for most of his twenty years at UNSW, and built a reputation for research in optimisation and its application to various ship types. A farewell lunch for Prabhat and Anjali was held by the naval architecture staff and their families in early November at a restaurant in Rose Bay. They will move to Perth to be close to the grandchildren.

John Penrose retires in December as Director of the Centre for Marine Science and Technology at Curtin University, after a long and illustrious career of explaining the mysteries of the oceans and its contents.

David Pryce is now on the first leg of an around-the-world sailing expedition, currently off the coast of Tasmania on board a new McIntyre 55 which was launched in early October and is proving itself to be ideal. The websites www.oceanfrontiers.com.au and www.club-ventures.com will cover the expedition with regular updates. There are cameras all over the boat and a documentary is in the pipeline. Friends can find out more about David's deeds on his own website at www.davepryce.com.

Joanna Shea (nee Theleritis), a recent graduate of the Australian Maritime College, has taken up a position with the Institute of TAFE in Hobart.

Piotr Sujkowski has moved on from Oceanfast Marine and has returned to take up a position as a naval architect with Austal Ships in Fremantle.

Longbin Tao has completed his PhD degree in offshore engineering at UWA and taken up a position lecturing at Griffith University, Queensland.

Emma Tongue moved on from Austal Ships and took up a position as Project Naval Architect with Image Marine in Fremantle nearly two years ago.

Guido van der Veen has moved on from Oceanfast Marine and has taken up a position with London Offshore Consultants in Perth.

Alistair Verth, a recent graduate of the Australian Maritime College, has moved on from Pacific Jets in Melbourne and has taken up a position with Geoff Glanville and Co. in Cairns.

Tony Vine has moved on from his two-year position as Engineer Officer (Chief Engineer in merchant-speak) in HMAS *Manoora*. Tony described his two years as 'interesting and challenging', bringing the vessel forward from re-construction, through sea trials, work ups, first-of-class flight trials (where they established the operating parameters for the three flight spots), two operational deployments to Solomon Islands for peacekeeping, and then being heavily involved in *Operation Gold* for Olympic security. He has now taken up a position with the Defence Science and Technology Organisation in Melbourne. Tony says that Year 2000 saw a unique record on board HMAS *Manoora*, when he (Engineering Officer), Chris Miller (Second Engineer) and Samuel Christie-Johnston (Trainee Engineer) were all graduates of the Australian Maritime College.

Mal Waugh has moved on within the Royal Australian Navy and has taken up the position of Submarine Liaison Officer on exchange with the UK Ministry of Defence in Bristol, UK.

Keith Wood has moved up the Sinclair Knight Merz corporate ladder, and is now an associate of the company, based at Armadale, Vic. He is currently providing SKM's technical support to the Australian Army, and expects to be back full-time at Armadale by mid-December.

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

Phil Helmore
Gregor Macfarlane

FROM THE ARCHIVES

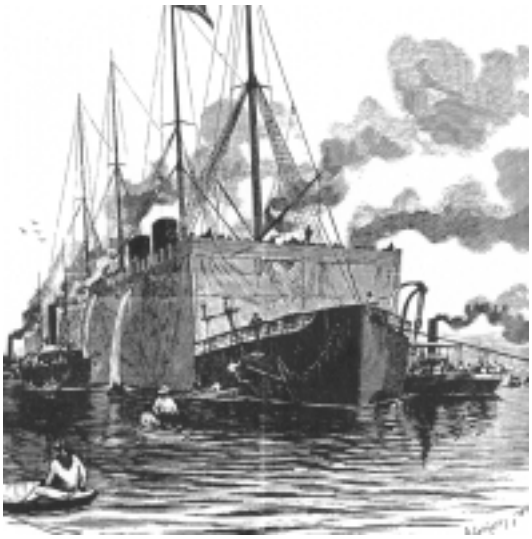
Austral lying on the bottom of Sydney Harbour
(Photo John Jeremy Collection)

In 1881, the Orient Line commissioned a new 5 524 grt passenger ship for their Australian service. *Austral* was the first steel ship in the company's fleet.

Her second voyage was beset with problems. She had engine trouble on the way from England to Cape Town, and was detained there for a week due to an outbreak of smallpox ashore. Engine problems continued for the rest of the voyage with the sails being used whilst repairs were made on the way.

Austral's difficulties continued after arrival in Sydney. On 11 November 1882 she developed a list when coaling and (due to open sidelights) sank in Neutral Bay with the loss of five lives. She was a considerable hazard where she lay in 15 m of water. A cofferdam was built around the upper works of the ship to enable the water to be pumped out and after 122 days on the bottom of the harbour she was raised on 12 March 1883.

Austral was cleaned up and given a minor refit at Cockatoo Island before sailing for England for complete repairs. She returned to service in November 1884 and was finally sold for breaking up in 1902.



Raising *Austral* — as depicted on the front page of *The Illustrated Sydney News* of 17 March 1883.