THE AUSTRALIAN NAVAL ARCHITECT

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THE AUSTRALIAN NAVAL ARCHITECT

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Cover Photo:

HMA Ships *Jervis Bay* and *Melbourne* leaving Dili at the end of the INTERFET operation in East Timor (RAN Photograph)

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The Editor
The Australian Naval Architect
c/o RINA
PO Box No. 976
EPPING, NSW 1710
AUSTRALIA
email: jcjeremy@ozemail.com.au

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From the Division President

Those of you with good memories, or effective library systems, may recall the Division President's column from the October 1998 issue of this journal.

In that column, which was my first as Division President, I described what I saw as my ideal world from a naval architect's viewpoint. This vision included:

- Respect from the community and influence over the industry's development.
- Exposure to government decision-making processes as they affect the maritime community.
- Active and vibrant Sections of the Division in all the Australian maritime engineering communities, and the active provision of relevant services to Division members.
- Strong links with other relevant professional bodies.

Since that column was written there has been good progress in most of these areas. A new Section has been established in Queensland, the Victorian Section is in the process of being revitalized and the New South Wales, Tasmanian, ACT and Western Australian Sections continue to enjoy active and interesting programmes. The agreement between the Institution and IEAust on mutual recognition, dual membership and closer cooperation, while yet to see significant developments, has led to closer ties between the two organisations. Finally we recently saw two of our industry's innovators, in Philip Hercus and Robert Clifford, honoured by the Clunies Ross Foundation for their "development of science and technology in Australia's beneficial interest."

A more detailed report on this last event is given elsewhere in this journal. However I want to extend my congratulations to Phil Hercus and Bob Clifford here. Their innovation and contribution to the industry have been outstanding, and it is pleasing to see them being recognised.

With the recent Annual General Meeting there have been some changes in the Division Council. We say farewell to Bob Herd (Victoria), Geoff Leggatt (WA), John Colquhoun (ACT) and John Benjamin (NSW), and welcome on board Ken Hope (Victoria), Bruce McNiece (WA), Tony Armstrong (WA) and Alan Soars (NSW). I thank all the departing people for their help in the past, particularly Bob Herd, who has been a Division Council member for almost half a century, and John Benjamin, for his able execution of the role of Division Treasurer. To the new arrivals, thank you for coming on board, particularly Alan Soars for agreeing to undertake the Treasurer's role.

To finish this column on the same note as it started, there have been pleasing improvements in the naval architect's place in the world, or at least in the Australian industry, over the last 18 months or so. It is my intention during my remaining time in office as Division President to carry those improvements forward to the maximum extent possible.

Bryan Chapman

Editorial

The recent INTERFET deployment of Australian forces in East Timor has generated considerable well-deserved good publicity for the Australian Defence Force. Whilst much of this publicity has concentrated on the role of the ground forces, the success of the operation depended upon the logistic support provided by the RAAF and the RAN.

The fast catamaran HMAS *Jervis Bay* has been the most visible element of the navy contribution, with the ship continuing to provide a weekly service between Darwin and Dili in support of the Australian contribution to the United Nations presence in East Timor, which is still considerable. The ship has been an outstanding success in this role. Less obvious has been the role of HMA ships *Tobruk* and *Success*, as well as the combat ships that operated with them. *Tobruk* with *Manoora* and two landing craft are providing on-going support to the UNTAET forces.

Although East Timor is very close to Australia, and the operations were conducted in a relatively benign environment, it was necessary for additional support to be provided by other coalition countries and by the use of 'ships taken up from trade' (STUFT). Clearly, Australia's ability to conduct operations away from Australia inde-

pendently rather than in coalition with others is highly dependent on the availability of support shipping. Whilst the RAN's support capability is not insignificant, there will soon be a need to start the process of obtaining replacements. *Westralia* has about seven years service life left, *Success* about fifteen years, *Manoora* and *Kanimbla* perhaps ten to twelve years and *Tobruk* about ten years. It takes about ten years to get a new navy ship from glimmer in the eye to reality. We need to be making progress now.

The present Commonwealth Government has committed itself to increasing Defence spending in coming years. There is a small increase provided in the 2000/01 budget, but much of this is intended to pay for upgrading the combat systems of two of the Collins class submarines. In his press release addressing the budget, the Minister for Defence outlined the progress expected in major projects in the coming year. The submarine *Rankin* and the frigates *Parramatta* and *Ballarat* will be launched, and the frigate *Warramunga* as well as the coastal minehunters *Norman* and *Gascoyne* will be delivered. There are, however, no major naval projects approved in the context of this budget.

The RAN needs to spend money to ensure that the Collins class submarines are fully operational. The navy needs ships to replace the capabilities of the guided missile destroyers now being paid off. The other services have similarly important equipment demands. Defence spending will have to increase considerably in coming years if the ADF's capabilities are not to decrease and we are told that the strategic environment is less predictable than it has been in the recent past. Perhaps the coming Defence White Paper will fill in the gaps. Hopefully, resources will be directed to the support elements of the services (and particularly the Navy) or our ability to operate independently will be severely limited. Can we always rely on our friends for logistic support?

John Jeremy

Letter to the Editor

Dear Sir,

I am interested in the progress of the refitting of *James Craig* by the Sydney Heritage Fleet, and thank you for the regular updates in your *NSW News* column.

However, please forgive me, but I take the liberty of changing into nautical parlance the words of one of your sentences (*The ANA*, February 2000): 'Twenty-first century electrics are now being fitted as unobtrusively as possible, the yards are being *sent up* or *crossed*, and the standing rigging *set up*'. Also, the running rigging is to be *rove off*, and the sails *bent* to the spars.

Similarly, if such a ship is dismantled aloft (*The ANA*, November 1999), then she is *rigged down.* To do this, the yards are *struck* or *sent down*, and the t'gallant masts and topmasts *struck.* The masts are then *unstepped.*

Neil Cormack

Many thanks for keeping us up-to-scratch on terminology — *Ed.*

Coalition support off Dili. HMAS *Success* with USS *Belleau Wood* and the French Navy's *Sirocco* in the background (RAN Photograph)

NEWS FROM THE SECTIONS

Queensland

The Queensland Section met once during the last quarter. Twenty people attended the meeting at the Yeronga Institute of TAFE on 7 March. The Section Committee meeting was followed by the second AGM for the Section and a technical presentation. As usual there was a teleconference link with members in Cairns. The attendance and interest was most gratifying and indicated that the new Section with its present member interest can be assured of continued success. The new Section Committee will be meeting on a quarterly basis during the coming year and will ensure that at least a further four technical presentations will be held during the year to maintain the current interest and support.

At the AGM the outgoing Section Committee presented its report for 1999 which showed that the Section (with one or two exceptions) was generally on track with the goals it set itself for 1999. The Section Committee was re-elected for a second year with the addition of Ron Wright. The new section committee is Brian Robson (Chairman), Geoff Glanville (Deputy Chairman), Brian Hutchison (Hon Secretary/Treasurer) and Ron Wright, Stephen Plummer, Jacqui Rovere, Chris Ramsey, Andrew Harvey as committee members.

Bill Wright, Managing Director, Norman Wright & Sons Pty Ltd, boat builders of Brisbane gave a technical presentation *Pilot Boat Development in Queensland* following the AGM. The presentation covered the historical development of Queensland pilot boats from their beginning up to the present time with emphasis being placed on practical innovations for better boat handling and safety. Many historical photographs and videos of pilot boat handling in high seas supported the presentation and some scale models used for tank testing were available for inspection. The presentation was of a very high standard and raised some very interesting questions from attendees.

Congratulations are also in order for Ron Wright who has logged fifty years membership in the RINA. Ron Wright's name of course is synonymous with design and boat building in Queensland. His entire career has been associated with the firm Norman Wright & Sons Pty Ltd. Ron has been a keen sailor in skiffs and Sharpies over the years and is now a member of the Queensland Section Committee.

Brian Robson

New South Wales

The NSW Section Committee met on 19 April and, other than routine matters, discussed the use of name tags at technical meetings, the Section bank accounts, the revised technical program for 2000, the proposed SMIX Bash, joint meetings with IEAust/MARENSA, the cost of our new venue (the Harricks Auditorium at Eagle House), sponsorship possibilities and Committee membership. Noel Riley has been elected to the RINA Council in London and has resigned from his position on the NSW Section Council. Lina Diaz was proposed for the vacant position. Lina is a recent graduate of The University of New South Wales and is a Trainee Surveyor with Bureau Veritas in Sydney. She has commenced work for her ME in lines lifting using photogrammetry at The University of New South Wales. She was elected unanimously.

The Annual General Meeting of the New South Wales Section of RINA was held at Eagle House on 22 March. The meeting was attended by seventeen and reports were received from the Chair and the Treasurer. In his report, the Chair, Phil Hercus, touched on the change of venue, the technical program, meeting attendances, and the annual dinner.

Noel Riley chaired a panel discussion on *The Design of Fast Craft* at the first joint meeting for 2000 with the IMarE attended by some sixty people on 23 February at the Harricks Auditorium in the IEAust Building at North Sydney. The panel comprised Alan Soars of AMD, Phil Hercus of Incat Designs and Graham Taylor of Holymans who opened the discussion with some comments on 'bitter experience' as an operator

of fast ferries. On the economics of fast ships, he told of the importance of the costs of support, including maintenance, providoring and cleaning, as well as the tendency of some to be over optimistic about the size of the market. More technical issues included the problems of wake (now subject to legislative restriction in Denmark, for example) and engine reliability.

Discussion from the floor started with the topic of the safety of fast ships. With frequent reference to the recent *Sleipner* sinking, the discussion included training procedures (to aircraft practice), helicopter rescue, route approval by Port State authorities and the scope of the HSC Code. The view was expressed that the HSC requirements (particularly after the present revision) will be substantially more demanding than the requirements for conventional ferries; for example, the likely requirement to be able to withstand 100% raking damage to the hulls and the heavy-weather testing of lifesaving equipment.

Comments from the panel suggested that the raking damage requirement might be going too far, but the opinion was also expressed that the impact of the requirement on the larger ferries was manageable. Phil Hercus drew comparison with the automobile industry and suggested that much more could be achieved by the ferry industry. A contrary view was also expressed – the airline industry concentrates on keeping out of harms way rather than assuming an aircraft must be able to survive flying into a mountain. Perhaps we should be concentrating on keeping fast ferries away from the rocks?

The discussion then moved on to operating sea states. It was suggested that the present restrictions are a legacy of the smaller ferries and the larger ships could safely operate in much greater significant wave heights, say 4 to 5 m. In these conditions, the safe evacuation of personnel becomes a critical issue. With higher sea states raised, it was natural that the discussion moved on to passenger comfort and seasickness. The general discomfort of this topic was soon replaced by a discussion of unsatisfactory engine reliability, and suggestions that over-competitive engine manufacturers and the operation of plant for long periods at close to 100% MCR were primary factors. Alan Soars suggested that misalignment of the drive shafting in operation could be a problem, with the strength of the whole engine room structure, not just the machinery seats, needing careful attention.

Reflecting his personal concern about the prospect of a Gosford – Sydney fast ferry passing his own residence and destroying his sea-wall, Noel Riley asked for comments on wake, suggesting that the high powers used inevitably dissipated as heat, through skin friction or wake, and ultimately on his sea-wall. The discussion that followed, ranging from the effects of the wake of large sea-going ferries to the Rivercats on the Parramatta River, concluded that there remains a lot of work to be done on this very real problem. As in many aspects of life, modesty was suggested as the best course — modest weight, modest power and modest speed.

John Jeremy gave a presentation on *Preparing for Olympic Sailing: a Volunteer's Perspective* to a joint meeting with the IMarE attended by 48 on 22 March at Eagle House. John described how he had been convinced to become a volunteer for race management for the Olympic sailing programme by the suggestion that Australia could not provide suitable race management teams and overseas resources would be needed. He told how the Royal Sydney Yacht Squadron had assembled and trained a team of some thirty volunteers to manage the racing on one of the course areas. Olympic sailing will be conducted on seven areas, five in the harbour and two offshore. The RSYS team will be responsible for Course Area B, generally located around Bradley's Head in the harbour.

The Olympic facilities in Rushcutters Bay were given their first major test in September 1998, and passed with flying colours. The race management teams have developed their skills with other major regattas on the harbour in December and at Easter each year, with another major test event in September 1999. With a high priority being given to providing the media with real-time information on sailing events, the use of timing systems linked by radio to the sailing base and, for some classes, differential GPS was prac-

tised during the 1999 test event.

Ian Williams of Ian Williams and Associates gave a presentation on *Improvements in the Safety of Passenger Ferries post*-Estonia to a joint meeting with the IMarE attended by twenty-five on 26 April at Eagle House. Ian began with the background, where more than 800 passengers lost their lives in September 1994 when *Estonia*, a roll-on/roll-off passenger ferry, capsized in the Baltic Sea in heavy weather (just a few years after the capsize of *Herald of free Enterprise*). As a direct consequence, the International Maritime Organisation took immediate action to carry out an in-depth investigation into the safety of this class of vessel.

The investigation was carried out by a panel of experts, and it is to Australia's credit that Ian Williams was invited onto this panel. The panel was instructed by the Maritime Safety Committee to develop recommendations and proposals to amend the International Convention for the Safety of Life at Sea (SOLAS), with particular emphasis on the safety of existing ro-ro passenger ferries.

The panel was appointed in December, held its first technical meeting in January, presented its final report to the MSC in April, and the resulting changes to SOLAS were adopted by a diplomatic conference in November 1995. This was a blistering pace for IMO! All this despite the fact that the causes of the *Estonia* capsize were not known at the time and, even now, are in dispute.

The Panel proposed, and the Conference subsequently adopted, a range of proposals affecting many of the aspects of construction and operation of ro-ro passenger ferries. The most profound changes related to damage stability, but major changes were also made in the regulations governing lifesaving arrangements and construction. The Conference also recognised the pressing need to develop a safety culture on and around passenger ships and the importance of enhanced training.

Ian explored the issues arising from the loss of *Estonia*, the most important SOLAS amendments adopted by the Conference, and subsequent developments associated with the concept of providing for stability with water on deck by an equivalent to the deterministic standard. The results have been successful, as SOLAS now makes specific provision for the damage stability of ro-ro vessels instead of accepting the vehicle deck as the bulkhead deck (as it did previously). Questions for Ian got off to a slow start but they livened up and, half an hour later, the session was drawn to a close with two hands still in the air. Ian has a written paper available, and copies may be obtained by contacting him on (02) 6250 6860 or email ianw@pcug.org.au.

After discussion by the committees of RINA (NSW Section) and IMarE (Sydney Branch), name tags for those present were trialled at the meeting on 26 April. The ongoing purpose is to identify people, but especially the elder brethren to the younger brethren, aiding in contacts. Those who have attended three or more meetings per year have been provided with a permanent tag, and blank tags can be written on-the-spot (or a business card used) by less-frequent attendees. Spelling mistakes attest to the legibility of signatures on previous attendance sheets, and these will be corrected! Your feedback on the name tags is requested.

The NSW Section is using email as much as possible to keep members advised of upcoming meetings while saving on postage. If you have an email address and have not received a notice of three meetings taking place in May, then please advise the Secretary of the NSW Section, Jennifer Knox, on navlight@ozemail.com.au.

Phil Helmore

ACT

Mr Mike Julian of the Australian Maritime Safety Authority and chairman of the IMO Marine Environment Protection Committee presented an interesting discussion on *Marine Environmental Challenges into the New Millennium* on 23 February at the Canberra Southern Cross Yacht Club. Canberra members attending gained an insight into the workings of the IMO including the politics of negotiating agreements between member states. Topics discussed by Mr Julian included all forms of waste, the control of ballast

water to prevent the spread of marine organisms, noise and emission control, and anti-fouling paints. The discussion concluded that an approach which balanced all areas of marine pollution would be ideal; however the committee structure of the IMO inhibits this at the global level.

A RINA workshop on solar boat design was held on Sunday 30 April in conjunction with the 2000 Bayer Solar and Advanced Technology Boat Race. Telopea Park School hosted this event. Further details of the race and workshop are provided elsewhere in this issue.

The Section AGM has provisionally been set for the evening of 25 May at Campbell Park Offices. Further details will be sent to section members when arrangements are finalised.

Beyond the AGM, no further meetings have been arranged for the Section. In an effort to develop a schedule of technical and social meetings for the remainder of the year, the Canberra Section Committee will meet in early May to discuss options.

Bruce McNeice
Martin Grimm

Victoria

On 23 February some twenty members attended a general meeting of members of RINA in Victoria at Port Melbourne. Chairman Bob Herd declined further office (after 43 years service to RINA on the Division Council). The following were elected to a new Section committee: Tom Kirkpatrick (Chairman), Samantha Tait, Tony Armstrong (the younger), with Ken Hope as the Victorian Member on the Division Council and representative to IMarE (Victoria).

Technical meetings continued on the usual third Tuesday of each month. On 21 March Mr M Hines presented an IMarE paper on *Fire Risk Assessment aboard Vessels*, covering the main aspects of a Shell Australia Ltd review of engine room fire risk.

On 18 April Mr Peter Wickham from P&O Maritime Services spoke on *Antarctic Ship Operations — CPP Repairs*. He explained the prime events of hydraulic pressure failure to the CPP of RSV *Aurora Australis* in December 1998 while the ship was in ice about 70 n miles from the Antarctic coast and over 3000 n miles from Australia.

A tube extending the length of the propeller shaft and separating ahead and astern pitch oil pressure supplies fractured at the CPP boss leaving the ship without pitch-setting control for propulsive force. This defect was said to be the first of its type for the particular CPP design. Over a week of radio debate between the ship's engineers and P&O in Melbourne plus intense work, a replacement 'slotted wedge' design for the boss section of the hydraulic tube was agreed and machined on board the RSV. When fitted (with the engineers working by 'feel' to locate the new tube end piece about 30 m down the propeller shaft) the repair restored ahead-pitch oil pressure to allow the RSV to steam back to Hobart at 12 kn, after exiting the ice with the assistance of a Japanese icebreaker.

Ken Hope

Tasmania

The year started with a series of seminars from well-known researchers in the field of naval architecture. On 2 March Professor Don Bass from the Memorial University, Newfoundland Canada spoke on *Time Domain Simulation of Ship Motions*, and on 16 March Dr Andrew Heron, DSTO Melbourne spoke on *Underwater Vehicle Research within AMECRC*. On 6 April Jonathan Binns who is a research scholar at the Australian Maritime College spoke on *America's Cup — Technology Trickle Down*.

A meeting of RINA members in Tasmania was held at the AMC on 5 April. The programme of events for the year was discussed and considerable interest was expressed, particularly amongst students, for a yacht seminar and a tentative date of 29 and 30 July was proposed. The possibility of another seminar on an ocean engineering theme such as coastal engineering or ROV technology was also discussed.

Prasanta Sahoo

COMING EVENTS

NSW Section Technical Meetings

Technical meetings are generally combined with the Sydney Branch of the IMarE and held on the fourth Wednesday of each month in the Harricks Auditorium of the Institution of Engineers Australia, Eagle House, 118 Alfred St, Milsons Point unless notified otherwise. They start at 5:30 pm for 6:00 pm and generally finish by 8 pm. The revised program of meetings remaining for 2000 is as follows:

24 May	Selwyn Oliveira, Alfa Laval, *Innovation in Separator Development*
28 Jun	Peter Dalley, Port Marine, *Controlling the Effects on the Environment by Minimising Waste Water*
26 Jul	Alan Haywood, Maritime Dynamics, *Ride Control Systems*
23 Aug	George Spiliotis, Germanischer Lloyd (Australia), *Application of Class Rules for WIG Craft*
** Sep	Ship Visit to a Wave-piercing Catamaran (in Darling Harbour for the Olympics)
27 Sep	Tomas Hertzell, ABB Alstom Power, *Experience with the GT35 Gas Turbine in Marine Propulsion*
25 Oct	Neil Edwards, Adsteam Marine, *Design and Construction of 62 t Bollard Pull Tugs*
** Nov	SMIX Bash/Annual Dinner
**	Date to be advised

Queensland Section Technical Meeting

The next section meeting will be held on 6 June (probably at the Yeronga Institute of TAFE). Terry Davis, Production manager of Noosa Cats Pty Limited will speak on *The Development of High Speed Offshore Catamarans*. Visitors are most welcome.

Victorian Section Technical Meetings

16 May	*Yacht and Small Craft Propeller Designs*. Specialist local firms Tristream Propellers (folding and ski-boat propellers), Power Equipment Pty Ltd (Gori folding propellers), Seahawk Pty Ltd (Austostream self-feathering yacht propellers) will support demonstration and discussion of innovative successful small propeller designs. Co-ordinator is Ken Hope.
20 Jun	*Corrosion Modelling for Large Vessels* by Craig Gardner of DSTO.
15 Aug	*Composite Reinforcement Technology for FFGs* by Ivan Grabovac of DSTO.
19 Sept	*Sail Training Vessels — Subdivision and Stability Aspects* by Bob Herd.
21 Nov	*Promarine Aluminium Fast Workboats* by Denis Pratt of ProMarine Ltd, Melbourne.

Course on Contract Management

There will be a three-day course on *Contract Management for Ship Construction, Repair and Design* held in Sydney on Wednesday 19 to Friday 21 July by Dr Ken Fisher. The cost is $1 195 to RINA/IMarE members, or $1 295 to non-members. For further information, see the enclosed brochure, or contact Ted Mascarenhas on (02) 9344 5480.

RINA at AUSMARINE

The Western Australian section of RINA are organising their own conference in association with AUSMARINE 2000 in Fremantle, as they did in 1998. The venue is with AUSMARINE at the passenger terminal in Fremantle. People or organisations interested in presenting a paper or sponsoring the event should contact David Lugg on phone (08) 9437 3333, fax (08) 9437 3344 or gordon@imageboats.com.au. RINA members will be notified of details as they develop.

IMarE Conference 2001

The Australia/New Zealand Division of IMarE will host an international maritime conference at the Wellington Convention Bureau, Wellington, New Zealand, from Monday 19 to Wednesday 21 November 2001. The theme of the conference will include latest developments, high-speed craft, fishing vessels, yachts

and all aspects of the marine industry. Details are being developed; watch this space. Further information may be obtained from Mr Barry Coupland, phone +64-4-382 9666, fax 382 6303 or email barry.coupland@marine.co.nz.

Pacific 2002 Maritime Conference

The Royal Institution of Naval Architects, the Institute of Marine Engineers and the Institution of Engineers Australia will host a major conference in Sydney between 29 January and 1 February 2002. Held in association with the Pacific 2002 International Maritime Exhibition, the conference will be held at the Conference Centre in Darling harbour

AUSMARINE 2000

AUSMARINE 2000 will be the fourth time that this national commercial and marine event has been held and it is expected to be at least 20% larger than the last in 1998.

Deliberately located in Fremantle, Western Australia, AUSMARINE is held in the centre of the shipbuilding, marine equipment and commercial fishing hub of the country. Fremantle is a major ship and boat-owning town and is the headquarters for the larger part of the Australian fishing and offshore support industries, as well as being a major naval centre and a base for customs and other important maritime operations. Fremantle is the busiest maritime centre in Australia and is conveniently located to South-East Asia and a worthwhile number of hours closer to Europe than are Australian eastern state ports.

Over the years, AUSMARINE has developed a strong reputation for both the quality and quantity of its visitors and for the satisfaction of its exhibitors. As well, it has always featured a notable conference, which is very well received by various maritime, business and professional associations. For example, the Annual General Meeting of the Australian Shipbuilders Association is held at AUSMARINE, as are meetings of a number of other organisations, such as the Royal Institution of Naval Architects and the Australian Maritime Network.

Thus, AUSMARINE has become the major meeting place of Australia's commercial and military mariners of all kinds. They come to be informed, to gain new ideas and to network with their counterparts from their own and other sectors of the maritime industry. As well as over 2 000 Australian mariners, many hundreds of industry visitors from other parts of the world also attend to look, learn and meet.

AUSMARINE 2000 will again be held in the magnificent facilities of the Overseas Passenger Terminal at Fremantle on 31 October, 1 and 2 November 2000. For further information, please contact either the Melbourne or London offices of Baird Publications.

The second of the RAN's guided missile destroyers, HMAS *Hobart*, paid off in Sydney on 12 May 2000 after 35 years service.
(Photo John Jeremy)

Fremantle,
Western Australia
31 October - 2 November 2000

AUSMARINE 2000

AN INTERNATIONAL EXHIBITION AND CONFERENCE FOR THE COMMERCIAL MARINE INDUSTRY

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IF YOU'RE A COMMERCIAL MARINER YOU CAN'T AFFORD TO MISS AUSMARINE 2000

Government to Review Options for Future Support of Collins Class Submarines

On 5 April the Minister for Defence (the Hon John Moore) and the Minister for Industry, Science and Resources (the Hon Nick Minchin) announced that the Federal Government requested the Australian Industry Development Corporation (AIDC) to issue a notice (that is, to exercise its 'pre-emptive rights') to Kockums Pacific Pty Ltd in respect of its 49% shareholding in the Australian Submarine Corporation Pty Ltd (ASC).

The AIDC became entitled to issue the notice following the acquisition of the Kockums Pacific Pty Ltd parent company, Celsius Pacific AB, by SAAB AB, earlier this year.

The Government emphasised that the notice does not commit the AIDC to taking up ownership of the shares.

This action has been taken to preserve the Commonwealth's options in relation to ownership and control of ASC. The Commonwealth's principal objective in this matter is to ensure the best possible arrangements for bringing the Collins class submarines to a fully operational state and supporting them throughout their operational life.

The Ministers said that in taking this step, the Government was not ruling out any options, including German submarine manufacturer HDW AG taking an equity position in ASC.

Launch of Minehunter

The fourth Huon class coastal minehunter *Gascoyne* was launched in Newcastle on Saturday 11 March. *Gascoyne* is the first ship to be launched by ADI Limited under its new ownership of Transfield and Thompson CSF. The first two ships of the class, HMAS *Huon* and HMAS *Hawkesbury* are in service with the RAN, and the third, *Norman*, began sea trials in January and is expected to be handed over in the middle of the year. The keel for the last ship, *Yarra* was 'laid' in June 1999.

Gascoyne is named after the Gascoyne River in Western Australia. The first HMAS *Gascoyne* was a River class frigate built in Sydney by Mort's Dock. She was completed in November 1943 and saw service as a survey ship and convoy escort during the war. Paid off in January 1946, *Gascoyne* remained in reserve in Sydney until recommissioned in June 1959 as a training ship and oceanographic survey ship. She remained in service until February 1966 and was scrapped in 1972.

The third Huon class minehunter *Norman* during trials on Sydney Harbour (Photo John Jeremy)

Austal delivers a record breaker

The Austal Ships' Auto Express 86 *Villum Clausen* was delivered in February this year. She is the first large vehicle-passenger fast ferry to be built outside of Europe to feature gas turbine propulsion and the fastest in the world with the ability to carry over 100 cars.

With a maximum deadweight of around 500 t, the 86 m vehicle-passenger catamaran will operate between Ronne on the Danish island of Bornholm and Ystad in the South-East of Sweden for the Danish Government operated BornholmsTrafikken. Whilst capable of running at 50 knots, *Villum Clausen* will operate at a service speed of 41 knots to comfortably achieve the crossing in 65 minutes. The service will provide up to five return crossings per day in peak season.

Environmental Considerations

To comply with the Danish environmental regulations for fast ferries, which are perhaps the most stringent in the world, Austal has addressed the key issues of environmental noise, wave-wash and exhaust emissions.

The complicated and comprehensive Danish environmental noise regulations demanded special attention to any equipment that generates noise, with the obvious items including main and auxiliary engine exhausts, bow-thrusters, car deck ventilation, ventilation fans for passenger decks and minor machinery spaces. Port location and proximity to dwellings were also addressed. Essentially, all systems were designed and customised for the ports of operation.

Gas turbines were the selected power plant for the vessel for a number of reasons, most notably the improved levels of nitrous oxide emissions.

Danish legislation also requires that fast ferries (when operating at their service speed) generate a wave less than 0.35 m in 3 m of water. Austal Ships, with the assistance of the Danish Hydraulic Institute, has been able to demonstrate the low wash characteristics of the semi-swath hull form of the Auto Express 86.

Ride Control

Passenger comfort is enhanced with the Seastate motion control system. This system which is capable of reducing vertical accelerations by 50%, comprises two T-foils forward and interceptors aft. Each foil and interceptor is powered by a dedicated electrical-hydraulic power pack and is controlled from a digital network. The system can be used to both trim the vessel and to reduce the motion. The configuration of interceptors and T-foils is well suited to designs with higher-than-normal speeds. The foil section has been optimised using computational fluid dynamics to minimise cavitation onset. In addition to significant weight savings, the interceptors have also minimised the structural interference in way of the waterjets' which is particularly beneficial in reducing stress levels.

Vehicle Deck

BornholmsTrafikken opted for a drive-through vehicle deck arrangement for optimum driver convenience and faster turnaround times. Nine main deck lanes and six mezzanine deck lanes (837 lane m) enable a total vehicle payload of' 380 t. A typical configuration would comprise 186 cars or a combination of 10 buses or commercial vehicles (up to 20 t each), 144 cars and 15 motorcycles. The centre lanes for commercial vehicles have an overhead clear height of 4.4 m and a maximum axle load of 12 t.

Interior Design

For the interior design of *Villum Clausen*, Austal worked with BornholmsTrafikken's chosen interior designer, Steen Friis Design of Denmark. The 2000 square metres dedicated to passenger and support services aboard *Villum Clausen* include a business-class lounge, restaurant and bridge deck bar/lounge, children's playground, reception and a shopping area.

Passenger seating has a total capacity of 1 037. The main deck has 597 seats, with 56 in the business-class saloon on the main deck and 384 on the Bridge Deck.

Seating styles were all custom built by Beurteaux Australia to the drawings of Steen Friis. Composite wall panels and furniture predominently feature light alder and pear woodgrain finishes with kiosks and ceiling insets fashioned with a variety of exotic high gloss effects. The comprehensively-equipped galley and storage areas are

faced with hygienic and wipe-clean anodised aluminium.

Wheelhouse and Safety Equipment

The dual-level wheelhouse features 360º vision with docking controlled either centrally or from the wing stations. Bow thrusters are installed forward in each hull and can be fully integrated with the Kamewa waterjets or manually manipulated.

Electronics in the wheelhouse includes a Kelvin Hughes package of radars, navigational equipment and electronic chart navigation (Nucleus2 Ecdis5000, and Nucleus 6000A), CPlath gyro, autopilot and magnetic compasses, Elac Echograph echo sounder, Leica DGPS and GMDSS Sea Area A1 radio installation. The helm chairs also feature the Kelvin Hughes 'Ergopod' system with tracker-ball on the armrest for radar and chart display manipulation.

The engineers' station comprises colour LCD screens to monitor and control the comprehensive systems aboard the vessel. Ride control functionality and monitoring is available from the engineers' station as well as a helm console provided to display pertinent information to the captain.

As required by Danish regulations, the vessel is fitted with a voyage data recorder to store data from the last six months of operation. Data recorded includes ship's speed, heading, water depth, position and time.

Villum Clausen features the first-ever installation of the RFD Marine Evacuation System aboard a high-speed craft. The four MES stations are each capable of evacuating 275 persons, with each system having three self-contained liferafts. Harbour deployment trials successfully demonstrated the evacuation of passengers within the required time frame.

Principal Dimensions

Length Overall	86.6 m
Length (waterline)	74.1 m
Beam (moulded)	24.0 m
Depth (moulded)	7.8 m
Hull draft (approx)	3.2 m

Vehicle Deck Clear Heights

Centre lane	4.4 m
Side lanes	2.2 m
Mezzanine lanes	2.0 m

Payload and Capacities

Passengers		1 037
Vehicles		186 Cars or 10 Coaches and 144 cars 15 Motorcycles
Maximum Deadweight		500 t approx.
Maximum Axle Loads		
Centre lanes	(dual wheels)	12.0 t
	(single wheels)	9.0 t
Side lanes		1.0 t
Mezzanine lanes		0.8 t
Crew		30
Fuel		140 000 litres

Propulsion

Main Engines	Two GE LM 2500 gas turbines of 18 000 kW (25º C) at 3 600 RPM
Gearboxes	Two Renk
Waterjets	Four KaMeWa 112 SII

Performance
(with Ride Control and Bowthruster fitted)

Service Speed (at 485 t DWT and 85% MCR)	41 kn
Fuel Consumption (at 85% MCR) approx	7.4 t/h

En-route to Denmark, *Villum Clausen* broke the record for the longest distance travelled by a ship in 24 hours, covering a distance of 1 063 n miles in a 24 hour period, adding another 45 n miles to the previous record.

The record-breaking journey took place on the passage between Sumatra and Cochin, India, during the ship's delivery voyage. The average speed on the run was 44.29 kn, with a maximum speed of 47.7 kn.

Villum Clausen on trials off Fremantle
(Photo courtesy Austal Ships)

WaveMaster launching

WaveMaster International launched its new generation 50 metre high-speed monohull ferry, one week ahead of schedule, on Saturday 29 April 2000.

The new ferry, recently christened *Speedy* by her owner, has certainly lived up to her name, since construction began just over four months before in December last year. The new vessel emerged for the first time from the enclosed production hall early on the morning of Friday 28 April. The new ship was then transported, by special heavy lift vehicle, to the shiplift.

Although *Speedy* could easily be transported and launched on the same day, local superstition dictates that ships should not be launched on Fridays. For this reason, the actual process of lowering the vessel into the sea took place early on Saturday morning.

Speedy will commence four weeks of demanding sea trials before final acceptance and delivery to her owner in Germany. This new vessel will be the largest aluminium monohull ferry exported by an Australian shipyard to Europe.

Tenix to build research ship

Tenix Shipbuilding, Western Australia, is to build a research ship for the Australian Institute of Marine Science in Townsville.

The new ship, to be named *Cape Ferguson*, will cost $2.5 million and will be 23.9 m long overall with a beam of 7.8 m and a draught of 2.5 m.

The ship will be built in steel to ABS class, and will be powered by two Detriot Diesel 60 Series 6062 GK20/21 engines to give a speed of 10.5 kn. Accommodation will be provided for ten scientists. *Cape Ferguson* is expected to be delivered in October 2000.

News from Victoria

Victoria has three large classic vessels of historical significance. All are afloat and two are sailing.

Afloat in the Melbourne South Wharf dock the barque *Polly Woodside* continues to please a steady stream of visitors. Hull plating wastage is a concern and repair work is being planned if Federal funds become available in 2000. A major problem is: Where to do the work?

Cross-Yarra bridge construction downstream effectively has penned *Polly Woodside* into a short section of the river, denying access to the Williamstown docks. The old dock in which the barque is berthed is of wood construction and of dubious strength. Since it is believed to be the only wooden dock of its size and age still existing in the world, renovation of the dock would be a useful historical investment in its own right. Then *Polly Woodside* could be docked on site at minimal cost.

However, the dock repairs have been estimated by the Maritime Trust Ship Committee (of which Bob Herd is the chair) to absorb almost all the funds likely to become available, not leaving much for ship renovation. And visitors want to see the ship, not a historic dock. It is the usual quandary about funds and priorities.

Alma Doepel, the big old three-masted Bass Strait schooner run by the volunteer trust Sail & Adventure Ltd, is afloat and operational at a Melbourne Victoria Docks wharf. She is reported to require re-survey for the various Port Phillip Bay passenger trips which provide the funds to maintain her for sail training activities. As might be expected with a wood cargo-carrying hull of her size and age, loaded only with ballast for many years, slow hogging of the hull and its rectification is reported to need watching by the operators.

Enterprize, a 27 m LOA by 5.4 m early-1800s topsail schooner of 68 t built in Melbourne 1991–97 is a replica of the first vessel to bring settlers to Melbourne in 1835. She is in good shape and continues operations from Gem Pier, Williamstown, each weekend with short trips or weekend live-aboard Port Phillip Bay cruises.

Ken Hope

News from Queensland

In the Brisbane area, Aluminium Marine has delivered a 20 m catamaran to a local operator. This 150 passenger vessel will service the Moreton Bay islands. Also under construction are two more aluminium catamarans, a 19 m 20 kn passenger ferry for Hinchinbrook and a 25 m catamaran for diving operations off Cairns.

Brisbane Ship Constructions is progressing the design and construction of a 24 m 164 passenger catamaran which is due for delivery in June. Brisbane City Council is assessing a 12 m passenger catamaran from Aus-Boats. The vessel, known as the Kitty Cat is supplementing the existing river ferry service provided by the existing City Cat passenger ferries.

Just launched in Brisbane is a new 12.1 m semi-displacement power catamaran, from Stanyon Marine. This vessel is a high-efficiency cruising power cat which incorporates comfort and space whilst allowing an economical 10 kn cruising speed with a 1000 n mile range and a top speed of 20-25 kn, depending on powering options. The boat's framing was assembled from a computer cutting package from aluminum plate

Two Brisbane-based designers, James Stephen and Jens Gravlev have formed a new marine design company based in Manly, Queensland, Stephen & Gravlev Pty Ltd. One of their specialities is 3D modelling. Currently they are developing new designs for the coastguard and volunteer marine rescue organisations.

Ron Clubb of Clubb Drafting Services has completed a design project for major modifications to a car ferry which involves lengthening the ferry from 49.9 m to 65.9 m, providing a new accommodation block and re-powering. The vessel speed will increase from 9 to 12.5 kn.

Noosa Cat Australia Pty Ltd in Noosa is currently experiencing a business boom with orders for ten catamarans for the New South Wales Water Police and orders for five or six craft for delivery to Los Angeles and Miami in the USA in addition to orders for Papua New Guinea. This company is offering a range of catamarans ranging up to 12 m length. For those who are not familiar with these popular craft, the largest of the range can be seen in the TV series *Water Rats*. The business has a history of only thirteen years and their success can obviously be attributed to good design and quality production.

In North Queensland, NQEA are advancing the completion of the 3 500 tonne dwt hopper suction dredge for the Port of Brisbane Corporation. She was launched on 17 March. Additionally NQEA has commenced work on another 30 m River Runner 150 aluminium low wash

catamaran ferry and a 16 m passenger ferry for undisclosed owners. Subsee Australia are well advanced with the construction of a lightweight 24 m passenger catamaran which will operate a day service to the reef with 110 passengers at a cruise speed of 25 kn. Additionally they have commenced construction on a package of four aluminium dive boats from 9 – 12 m in length.

Cairns Custom Craft are well advanced with construction of a 17 m aluminium catamaran ferry and a robust 7 m aluminium workboat with a steering nozzle and 1.5 t bollard pull. English Engineering has recently completed a heavy-duty seine skiff for a Spanish purse seiner. Only 12 m long, this vessel has a steel weight of 30 t with installed power of 900 kW driving a 1.9 m diameter propeller in a conventional nozzle. The RAN LCH life-of-type extension program continues at Topical Reef Shipyard with the refit of HMAS *Wewak* essentially complete and the refit of HMAS *Balikpapan* now underway

Brian Robson

News From New South Wales

New Construction

Solar Sailor launched the world's first solar and wind powered ferry, *Solar Sailor* on 3 April 2000. The vessel was launched at Huskisson on Jervis Bay, NSW, without the wings or solar arrays fitted (see photograph). The wings and solar arrays were subsequently fitted and she is currently undergoing sea trials on Jervis Bay. The first commercial cruises on Sydney Harbour are expected to take place in May 2000, for which tickets are now being sold. *Solar Sailor* will operate on Sydney Harbour from June 2000. Further information may be found on their website at www.solarsailor.com.au.

Sydney's new SuperCats are being built by ADI Projects to a Graham Parker design. The aluminium hulls are being built by Transfield at Seven Hills, and the first of the new hulls was towed down the river and arrived at Garden Island on 19 April. From there it was lifted onto the Makin-designed super trailer for transport into the nearby building shed. The FRP superstructure is being built by Bass Boats at Garden Island, and the first one was due to be mated-up with the hull about 10 May. Launch is expected

Solar Sailor launching at Huskisson
(Photo courtesy Solar Sailor)

about mid-July and *The ANA* expects to publish a comprehensive article in August.

New Design

Waterways have completed the structural assessments for the prototype approval of the Sydney 38 from the drawing board of Murray, Burns and Dovell, and for the prototype approval of the Northshore 370 from the drawing board of Jutson Yacht Design.

Incat Designs in Sydney have remained busy over the early part of the year completing new designs for US east coast shipbuilders Gladding Hearn. The first, MV *Salcia*, is a 45 m Z-bow catamaran for Boston Harbor Cruises. This, their fourth vessel, is to operate chartered sightseeing trips following a tall-ship race up the US east coast scheduled for this northern summer. The second design is for a series of 43 m Catamaran Ferries for a well-known east coast operator.

Just prior to Easter, *Amaroo 2000* was delivered to Forster, NSW, operator Bill Coombe. The vessel, built by Norman R Wright & Sons, is a 19 m low-draft catamaran ferry. Bill and his family were very excited to get the new vessel and they are now operating daily cruises around Wallis Lake.

The last few weeks have seen a great number of new developments for Incat Designs. Nichols Bros Boat Builders have just signed two contracts for vessels of 44 m in length, one for a Southern Californian operator and the other for Golden Gate Transportation District. Gladding Hearn have also signed contracts for three vessels to be built for an existing client. Contracts are also being finalised to produce designs with three other shipyards based around the world. Details of these vessels will be reported in the next issue. From all this activity, ICD believe they will have 12 vessels launched in 2001. [It looks as if Incat Designs are going to need some more naval architects right about now — Ed.]

Around and About

The *Batavia* replica, currently berthed at Darling Harbour, began an inclining experiment just before Easter under the supervision of Faustmann Marine Design. Unfortunately, about half way through the experiment a gusting nor-easter came up and, because of the large windage on the vessel, the experiment was necessarily postponed.

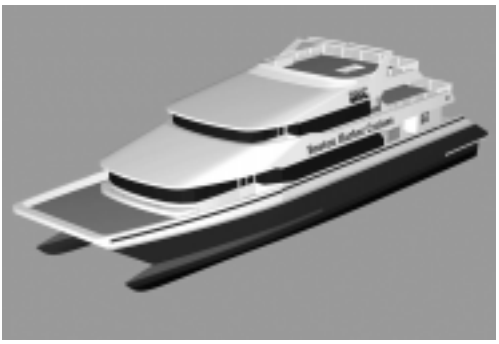
Dr Kevin Fewster, the foundation director of the Australian National Maritime Museum, has moved on to become the director of Australia's largest museum, the Powerhouse Museum at Darling Harbour, NSW. Ms Mary-Louise Williams is now the Acting Director of the Australian National Maritime Museum.

The replica of James Cook's barque *Endeavour*, which was built in WA, will complete her six-year circumnavigation of the globe when she sails back into Sydney Harbour this month. In Hawaii she visited Waimea Bay, where Cook first landed in 1778, and Kealakekua Bay where he and some of his crew were killed a year later. In New Zealand she took part in Wellington's pre-millennium celebrations, visited the America's Cup finals in Auckland, and opened for her last exhibition in New Plymouth on 14 May. From there she cleared for Sydney, expected to pass the Hornby Light on Sunday 28 May. She will berth in Darling Harbour, and will be open to the public from 1 June.

February and March have been busy times (as usual) for cruise vessels visiting Sydney, with around fifteen calls each month (some of these being multiple visits). Among the familiar sights have been *QE2* (on a 24-month world cruise), the new *Oriana*, *Fair Princess*, *Sky Princess*, *Norwegian Star*, and *Marco Polo*. According to *Afloat* (March 2000), Sydney now rivals Alaska as the Asia-Pacific's preferred destination for tourists.

Phil Helmore

A rendering of MV *Salacia* being built by Gladding Hearn



New project for Oceanfast

Golfer Greg Norman has expanded his relationship with Oceanfast, the Western Australian builder of luxury motor yachts, to develop the Norman Expedition Yachts line of luxury yachts inspired by the man they call the Great White Shark.

The first in the series will be Norman's personal expedition yacht. *Aussie Rules* will be a 212 ft aluminum-hulled luxury motor yacht engineered for long-range ocean cruising and exploration.

Aussie Rules and the Norman Expedition Yachts will be an entirely new classification of yacht, unlike any other ever built. Each will provide the exploration essentials typical of a commercial expedition vessel without sacrificing the luxury of a traditional yacht — a marriage of Jacques Cousteau's *Calypso* and a modern-day cruise ship.

Its design and engineering will allow it to undergo a broad range of expeditions and voyages from the Antarctic to the Amazon. Its aft deck will house a 42 ft sportsfisherman and the equipment necessary to offload it and other watercraft including tenders and submersibles. A decompression chamber will be housed in its lazarette.

In Perth for the announcement, Norman said 'Any yacht built is only as good as its specs, and *Aussie Rules* is spec'd out better than any yacht on the ocean. My team and I have worked for more than 10 months, studying different options available around the world, and I finally settled with Oceanfast for many reasons. One, Oceanfast is one of the few builders in the world that could manage a project of this magnitude. Two, they are the premier aluminum boat builder in the world because of their experience generated through Austal Ships. And three, I have a history with Oceanfast, and whenever practical I strive to support Australian products built by Australian people.'

General Particulars

Overall Length:	212 ft
Beam:	38 ft
Guest Cabins:	6 (for 12 guests)
Crew:	14
Engines:	Two 2,000 HP engines
Cruising Speed:	15.5 kn
Range:	Approx. 500 n miles

Aussie Rules is scheduled for delivery in July 2002. Construction will start in October this year. This is the second Oceanfast yacht Norman has owned — the first was an 87 ft sportsfisherman purchased in 1995.

Greg Norman's new yacht *Aussie Rules*.

The 19 m low-draft catamaran ferry recently delivered to NSW operator Bill Coombe by Norman R Wright & Sons (above). The ferry was built to a design by Incat Designs, Sydney
(Photo courtesy Incat Designs)

Speedy by name, and speedy in construction. The 50 m high-speed monohull ferry launched by WaveMaster on 29 April for a German customer (below).
(Photo courtesy WaveMaster International)

Royal visit for Incat

As part of their Australian tour, HM Queen Elizabeth II and HRH the Duke of Edinburgh visited Incat Tasmania's shipbuilding facility at Hobart's Prince of Wales Bay on 28 March.

During the visit they inspected the prefabrication hall, the drawing offices and the fitting-out area.

A highlight of the visit was the inspection of the latest Incat vessel, the 96 m Evolution 10 class wave piercer Incat 056 (to be named *Millenium*) which is at an advanced stage of construction for a major European operator. Queen Elizabeth toured the superstructure of Incat 056 while Prince Philip inspected the starboard engine room of the craft. A demonstration of lifesaving equipment then followed with the 74 m *Condor 10* the centrepiece.

Prior to leaving the yard the Royal party met some of the 1000 strong workforce and their families.

A rather large ship

Freedom Ship International Inc., Florida, recently announced that they had achieved their initial goal of $US50 million in initial unit reservations for the planned Freedom Ship. This massive ship is intended as a mobile city roaming the oceans of the world — not a cruise ship, but a place to live, work, retire, vacation or visit. The ship will have a length of 4 320 ft, beam of 735 ft and height of 340 ft. It will support a fleet of commuter aircraft and hydrofoils and the 'airport' on the upper deck will be capable of landing small commercial aircraft (up to about 40 passengers). Those interested can find out more at www.freedom.ship.com. Amongst the information provided is the following on the safety and stability of the proposed ship:

'As a result of its immense size and its base of over 600 individual air-tight cells, Freedom Ship will be the safest and most stable vessel that has ever set sail. Passengers will rarely sense they are on a ship. With virtually no pitch and roll, seasickness should not be a Freedom Ship experience. The ship's unique construction is such that if all of its 98 external cells were penetrated and flooded (a virtual impossibility) the ship's draft would increase by only 1 foot, with no significant loss in stability or safety. A typical cruise ship is taller than it is wide, while Freedom Ship is less than half as tall as it is wide, giving it dramatically greater stability. This big advantage is increased even more (and substantially) by the enormous weight in Freedom Ship's base (over 30 million pounds of machinery and equipment). Even force-five [sic] hurricane winds would pose no threat to the ship; their only impact would be to increase fuel usage required to move through the storm. The vessel will have unprecedented maneuverability, with an ability to move forward, backward, left, right, and even rotate in place. Every unit will be protected by four-hour firewalls and an automatic sprinkler system. The ship will be impervious to lightning.'

And you thought *Voyager of the Seas* was big! Watch this space.

BOOK REVIEW

Herzogin Cecilie by Neil Cormack

Herzogin Cecilie, a four-masted barque, was launched on 22 April 1902 from the Rickmers yard in Geestemunde, Germany, as a sail training vessel for Nord Deutscher Lloyd. After the First World War she was purchased by Gustaf Erikson for his fleet which was based in Mariehamn in the Åland Islands which divide the Baltic Sea from the Gulf of Bothnia. Erikson loved this ship and she became his flagship, in the last great fleet of sailing ships in the world. *Herzogin Cecilie* ended her days ashore in Starehole Bay, east of Falmouth on the Cornish coast, UK, in 1936.

The chapters in this account divide roughly into periods in the ship's life: events leading up to her building and early voyages; the war years; purchase by Erikson and voyages to Australia; the *Hougomont* saga; analysis of speed-length ratio, lines plan, sail plan and stability; and events leading to the end and personalities associated with the ship.

Appendices include a list of books about *Herzogin Cecilie* and sailing ships; the

Middendorf-Liddel method of calculating cross curves of stability; calculation of the moment of inertia for the 23 ft WL of *Herzogin Cecilie*; a list of the German-built four-masted barques; a list of the Rickmers fleet; stability data of *Herzogin Cecilie*, lines plan, sail plan, hydrostatics, cross curves of stability, and deadweight scale.

This is not the first book about *Herzogin Cecilie*, but it is the most interesting for a naval architect, containing the hydrostatic and stability data (including GZ curves) for the vessel for five conditions of loading, the lines plan, the sail plan, analysis of the hull shape, speed-length ratio and comparisons with other contemporary vessels.

This is a very readable account, in the same class as the great sailing tales like Alan Villiers' *The Set of the Sails* and *Falmouth for Orders*, or Eric Newby's *The Last Grain Race* (in which he sailed in *Moshulu* in 1939 and won). However, unlike those stories, this doesn't give you the taste of salt spray on the yard-arm in a howling gale, but rather the story of a ship and her complete travels, with interesting diversions to discuss the ships she met along the way.

The book is well illustrated, with ninety photographs of ships and personalities, and sixteen diagrams. The ships photographed include many of the ships *Herzogin Cecilie* met (over two hundred are mentioned), and many being photographed at their ports of call in South Australia.

Neil Cormack was born in Largs, SA, into a family of mariners, shipwrights and sailmakers. He became a shipwright himself, then a naval architect, and rose to be Senior Shipwright Surveyor with the SA Department of Marine and Harbours. His interest in square-rigged sailing ships began at an early age when he saw them coming and going from the Largs anchorage at the end of his street. He has been awarded the St Malo Medal by the International Cape Horners for his contribution to the history of the square riggers.

This is a quality hard-backed book of direct interest to naval architects, and to lovers of square riggers. *Herzogin Cecilie* (192 pages) was published by the author in 1996. Copies are available from him at 17 Warwick St, Largs SA 5016, phone (08) 8248 1780.

Phil Helmore

EDITORIAL/RESEARCH ASSISTANT

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The 2000 Bayer Solar and Advanced Technology Boat Race

The 5th annual Solar and Advanced Technology Boat Race was held on Lake Burley Griffin in Canberra on Saturday 29 April. This event is organised by the Australian Science Festival Ltd as part of National Science Week and is one of the highlights during the period. For the last three years Bayer has sponsored the event.

The race is run around a course of approximately 2.5 km. It starts at 10 am and continues for five hours. The rules cater for several classes of entries, summarised as follows:

- Competition: Dimensions limited to 6 m waterline length, 2.5 m overall width and 2.5 m overall height excluding propeller. Solar panels must be commercially available and batteries, if fitted, are limited to 128kg and must be of lead acid type.
- Open Class General: No significant restrictions other than that the energy source must be approved and non-polluting.
- Sub-Class A — Commercial: All items of equipment must be commercially available.
- Sub-Class B — Hybrid: Approved non-polluting energy source in combination with human power. Batteries must be re-chargeable and are limited to a capacity of 5 kWh.
- Sub-Class C — Passenger: Approved non-polluting energy source except human power and able to carry a safe number of passengers.
- Sub-Class D — Schools class: As for Open Class General but specifically for school entries.
- International Solar Class: — Dimensions limited to 6 m waterline length, 3.0 m overall width and 1.5 m overall height. A battery load of up to 50 kg per m^2 of solar panels is allowed up to a limit of 125 kg of batteries.
- Experimental Advanced-Technology Boats: Innovative low-emission vessels.

Further details are outlined in the race rules which are updated each year and are available from the Australian Science Festival Ltd.

Fraser Argue at the helm of ACTEW *SolACT* as he comes in for a crew change after completing another lap of the race course.

Nigel Chauncy of the Alternative Technology Association's *Ampcat 5* team approaches the finish line for the completion of another steady lap. Nigel was able to remain in command of the boat for the entire 5 hours of the race thereby avoiding the down time of a crew change. His fastest lap was the last lap completed in the time limit.

This year conditions were good for the race with minimal cloud cover and clear weather allowing effective use to be made of solar power. None the less, at this time of the year, the sun does not rise far beyond 40 degrees above the horizon in Canberra and measurements taken throughout the day indicate that the available solar energy reached a maximum of 646 watts per square metre at noon. While a number of entries from previous years re-entered again this year with further refinements, several new challengers also appeared in the various classes.

The best-performing boat in the competition class proved to be *Green Choice*, which was formerly an entry of Team AMSA. The craft was handed over to Lake Tuggeranong College last year and was further refined by the college leading to a flawless performance and winning first prize in its class for both endurance and speed for two years running. This boat is based on a trimaran hull supporting a tilting array of Solarex lite series solar panels in an array measuring about 6 m by 2.5 m. The boat is propelled by a sizeable two-blade alloy propeller driven by a T-flux type brushless DC motor via a bevel gear mounted in the azimuthing propeller leg.

Competing for the minor placings in the competition class were the lower-budget entries *AmpCat 5*, *SolACT* and *ZAP*. In a tight finish, *Ampcat 5* completed 17 laps with a 4 minute 33 second lead over *SolACT* which in turn was 1 minutes 23 seconds ahead of ZAP at the end of the five-hour race.

The Alternative Technology Association's *AmpCat 5* is a modified International A class sailing catamaran with close to 125 kg of deep cycle batteries on board combined with ten Solarex MSX-83 panels and five BP 255 panels. An industrial DC motor powered an 18 in diameter by 18 in pitch model-aircraft propeller through a custom-built outboard leg. The combined weight of the boat, crew, batteries, panels, motor and accessories was close to 500 kg.

Prepared by Fraser Argue, an electrical engineer with Canberra's ACTEW Corporation, *SolACT* is a custom-designed home-made catamaran fabricated from expanded polystyrene covered with a thin layer of GRP. This entry was also equipped with a number of batteries and eight Solarex MSX-83 panels and was propelled by a pair of commercial electric outboard units. With overall dimensions of

approximately 6 m x 2.5 m x 0.6 m, it displaced somewhat in excess of 300 kg.

The monohull entry *ZAP* of Dale Siver has been a regular entrant in the race over the last three years and has consistently performed well. This craft was also purpose-built for the race. It has previously entered in the hybrid class where the crew used a paddle to provide some additional power beyond that available from the set of batteries and electric motor. This year it was entered in the competition class and achieved a respectable fourth place.

Undoubtedly the crowd pleaser was Commander Murray Baker with the DSTO entry *Sci Flier* which, in its third year of participating in the race, once again took out the overall speed prize and also the endurance prize in the open class. This year it achieved the greatest endurance across all classes, completing 26 laps during the five-hour race with an average speed of 8.5 kn on the first lap. This entry was rebuilt from a discarded coxless four rowing shell measuring some 12 m on the waterline. It now achieves an impressive sprint speed of around 13 kn when its set of ten deep-cycle 12 V batteries connected in series power its T-flux motor connected to a converted outboard leg. The weight of the batteries alone is 330 kg and this means that the boat has little freeboard to spare. Adequate stability is provided by a pair of outrigger hulls which remain above the water surface when the boat is on an even keel. Despite its narrow width, the main hull has a small positive GM due to the low battery load.

Since the first year of the race when Incat entered their catamaran *Incat 039*, there have been no entries from the shipbuilding industry. Likewise, the participation of tertiary institutions in the race has been relatively limited. While the logistics of preparing and entering a craft in the race are not insignificant, such entries would undoubtedly push the designs to the next level of refinement. Any candidates for 2001?

The RINA Solar Boat Race Workshop

The idea of arranging a meeting in association with the Bayer Solar and Advanced Technology Boat Race had already been discussed by the Committee of the Canberra section of RINA in previous years; however, this year the idea came to fruition. The proposal for a workshop to be held in conjunction with the Bayer Solar and Advanced Technology Boat race was supported by the Australian Science Festival who provided notification of the event in their newsletter for race competitors.

It was decided to hold the workshop on the Sunday morning following the boat race as this would give interstate participants in the race the best possibility to participate in the workshop. Bruce Driver of Telopea Park School near Lake Burley Griffin kindly offered the school as the venue for the workshop. This was despite Bruce having a busy weekend as the teacher managing a group of enthusiastic students from the school with no fewer than three entries in the race the day before the workshop.

The participants of the workshop consisted largely of participants or prospective participants in the solar boat race, this being the target audience.

Several presenters were 'roped into' giving short introductory presentations on various aspects of the design of competitive solar boat entries and these included:

Resistance and propeller selection, Martin Grimm, RINA Canberra and *AmpCat 5* team member.

Battery performance, Richard Elliott, Alternative Technology Association and also *AmpCat 5* team member.

Solar panel performance and the design of Maximum Power Point Trackers, Nigel Chauncy, Alternative Technology Association and also *AmpCat 5* team member and pilot.

Electronic instrumentation, performance measurement and race strategies, Dave Edmunds and Tom Rowlands, teacher and former student respectively of Lake Tuggeranong College, Canberra.

Electric motors and propulsion for solar boat racing applications, Paul Lillington, T-Flux Motors

Pty Ltd, Sydney.

The overall design of the Team AMSA *entry*, Rob Gehling, RINA Canberra and member of the design team for the AMSA entry prepared for the first race in 1996.

The development of the Sci Flier *and the management of this project*, CMDR Murray Baker, Deputy Director of Trials, DSTO Canberra.

Management of a solar boat/car team, Stewart Clode, teacher of Lake Tuggeranong College.

With all these presentations and no shortage of questions from the enthusiastic audience following each topic, it was perhaps no surprise that the schedule slowly slipped and it was not until after 1:40 pm that the chairman, Ian Laverock, was able to draw the workshop to a successful close. The group then moved to the nearby picnic area for a late BBQ lunch and further discussions.

The workshop is now being considered as an annual event in association with the boat race as there was much material and whole subjects which could not be presented in the relatively short time available. In future topics such as trim, stability and weight estimating will also be included to assist budding solar boat builders.

Particularly encouraging was the depth of questions posed by the school students who participated in the workshop. The students and some of their parents were prepared to set aside most of their week-end for the boat race and the workshop the following morning. It was truly a pleasure to be able to give them advice.

Martin Grimm

Commander Murray Baker in the cockpit of *Sci-Flier* prior to the start of the 1999 race. The entry was essentially the same for the 2000 race.

NMSC Workshop on Fast Craft

The National Marine Safety Committee held a workshop on fast craft on Thursday 4 and Friday 5 May to provide industry input on the development of an Australian standard for fast craft. The NMSC is developing a new National Standard for Commercial Vessels to replace the Uniform Shipping Laws Code. The new standard will incorporate an updated USL Code as a prescriptive standard, but there will also be a performance-based standard for those with the expertise to justify their solution. Fast craft forms Part F of the new standard.

The workshop was held at the Landmark Hotel, Sydney, and involved designers, builders, regulators and educators. The workshop examined the need for a joint government and industry approach to risk management, liability, safety, operation and training, and the format included a combination of presentations and workshop sessions. The workshops were in eight groups of about seven participants each, ensuring a mixture of designers, builders, regulators and educators in each group.

The workshop was opened by the Hon. Peter Morris, former Federal Minister for Transport.

Subsequent presentations and workshops on Day 1 were as follows:

- Bruce Phillips, Chair of the NMSC, *Objectives of the Workshop*

  Bruce stated that the task of the NMSC is to achieve national uniformity in marine safety. State sovereignty was alive and well following the adoption of the USL Code, and proliferation of local practices to suit local conditions has led to increasing problems with no regular updates of the code.

- Tony White, Condor Ferries, Consultant to the NSW State Transit Authority, *Ferry Operations in European Waters — Implications for Australia*

  Tony gave many interesting examples of Condor's operations, such as the cross-channel operations leading to a 'night culture' (where all ship husbandry is done between midnight and dawn), random drug and alcohol testing for the crew, the importance of teamwork, the necessity for ride control, and the evaluation of risks and mitigation of consequences. Despite some of the gloomy examples, Tony pointed out that some of the European conditions do not apply in Australia, and that adopting aircraft-style policies can be beneficial.

- Prof. Dennis Else, Chair of the National OH&S Commission, *Safety Obligations and Duty of care*

  Dennis gave examples of how the Occupational Health and Safety Act has been made to apply, and it surely applies to ship operations. Awareness of its implications for operations needs to be increased, and practitioners need to be involved in the formulation of standards.

- Maurene Horder, Director of the NMSC, *Structure of the National Standard for Commercial Vessels*

  Maurene outlined the structure of the new NSCV, wherein Part A gives the safety obligations and is informative only. Parts B through F provide the nationally-agreed standards, and will be mandatory, giving required outcomes. Solutions meeting the required outcomes may be either 'deemed to satisfy' solutions based on prescriptive requirements (as in updated USL Code clauses), or equivalent performance-based solutions proposed *and proven* by the applicant. Not everyone will have the expertise or resources to use performance-based solutions.

- Workshop session, *Approaches to Risk Management*

- Mori Flapan, Technical Adviser, NMSC, *Scope of the Fast Craft Standard*

  Mori outlined how the NMSC had approached the grading of risk to define the three proposed categories of fast craft, and that the objective was to provide craft which operate at speed with levels of safety equivalent to those of conventional vessels under the USL Code.

- Tony Armstrong, R&D Manager, Austal Ships, *A Designer's Perspective*

  Tony was nothing if not controversial, and claimed that the NMSC had not understood the philosophy behind the HSC Code in its drafting of the new standard! The "High Speed Craft" Code is a misnomer; it really means "Light Weight Craft" Code, as speed is referred to only once apart from the definition, which is based on the volume Froude number, and the NMSC had ignored the light weight. It is dangerous to adopt a code without consideration of the underlying philosophy and the total concept.

- Barry Whitby, Marine Manager, Great Adventures, *An Operator's Perspective*

  Barry said that the draft standard went a long way towards providing safety for the craft and all who travel. He gave examples of good and poor design, such as the way stairs should face to avoid people being thrown off in deceleration, and the necessity for seat belts in certain areas. He showed a video of a poor evacuation in smoky conditions, and the lessons to be learned.

- Werner Bundschuh, Acting Director Marine Safety, Queensland Department of Transport, *A Regulator's Perspective*

  Werner concluded that the new approach by the NMSC is a good one, as it avoids reinventing the wheel. The maritime regulator's role is changing from being administrators of ship survey and crew certification to monitoring and delivery of the most cost-effective safety programs. The NSCV separates the standards from the process of how these are to be applied, and this will make it possible for all states to agree on the standards. 'Grandfathering' has been specifically considered in relation to separate aspects of survey. Imposing mandatory standards gives problems at the lower end of the scale; e.g. the largest problem may be from jet-skis — should we ignore them?

- Robin Gehling, Principal Adviser — Technical, Marine Safety and Environmental Strategy, AMSA, *Developments at IMO on the HSC Code — Applications to the Australian Domestic fleet*

  Robin reminded us that the HSC Code was adopted in May 1994 and is mentioned in the USL Code Section 1.8.6, and replaces Sections 5 to 14 for affected vessels. Amendments for HSC 2000 include a thorough revision of buoyancy, stability and subdivision, the extent of raking bottom damage (now 100% for Category B craft), modifications to fire safety, improved accommodation design for collision, and a helicopter pick-up area if voyage length is more than two hours. On the Australian scene, AMSA applies the HSC Code directly to vessels on interstate and international voyages, and would be unlikely to apply it via the NMSC's new NSCV instrument.

- Workshop, *Large and Fast Craft*

Presentations and workshops on Day 2 were as follows:

- Mori Flapan, Technical Adviser, NMSC, *Introduction*
- Tim Dillenbeck, Maritime Services Manager, Det Norske Veritas, *An Approach to Domestic Fast Craft*

  Tim gave an enlightening account of DNV's approach to fast craft via their light craft rules. The essence is in the gradation of risk according to a matrix of vessel speed versus distance from safety, and the requirements increase with both.

- Workshop, *Applying the HSC Code to Smaller Craft*
- David Oliver, Technical Adviser, NMSC, *Training and Crewing Requirements*

  David gave the philosophy behind the NMSC's training and crewing requirements. The HSC

Code requires full implementation of the ISM Code. For small vessels this would be too onerous, and a national system of certification with secondary requirements is proposed.

- Mike Jackson, Marine and Safety Tasmania, *Training under the HSC Code*

  Mike pointed out that the required training is craft specific, and this is most important. In high-speed operations, the following are also important: team structures and procedures, standard operating procedures, the use of checklists, cockpit management, watchkeeping at high speed, passage planning, route organisation, route monitoring, sensor management, collision avoidance, and the ColRegs with respect to HSC; however, none of these are mentioned in the HSC Code.

- Rob Dixon, Secretary, High Speed Craft Masters' Association, *An Operator's Perspective on Training*

  Rob gave a quick outline of the HSCMA, which is a non-union organisation based in WA, and then proceeded with his view of training. He emphasised that there are two main components to training: general marine training, and craft-specific training. Both are essential.

- Workshop, *Training and Crewing*

- John Mansell, Divisional Manager Maritime operations, Maritime Safety Authority of New Zealand, *A Safety Management Approach*

  John started by saying that New Zealand does not have the Federal/State jurisdiction problem which Australia has; they do it all. New legislation in 1995 gave them new maritime rules which require extensive consultation with industry. The have nearly 4 000 eligible vessels, from white-water rafts and river jet-boats to 60 m factory trawlers. They have more experience than Australia with the operation of high-speed craft, and he showed many examples, such as *Albayzin, Condor 10, Top Cat, Jet Raider, Superflyte, Strait Runner, Te Hukatai, Mac Attack, Executor,* and *Shotover Jet,* some of which are seasonal operators. The MSA believes that safety management is the way to go.

- Workshop, *The Challenge in Prescribing for Very High Speed Craft*

- Chris Galloway, Marine Safety Officer, Queensland Department of Transport, *WIGs: a Case Study of a Safety Case Approach to an Unusual Fast Craft*

  Chris began by saying that the safety case approach shares the responsibility between the operator and the regulator, and balances the risk versus the outrage! The safety case foresees the risks involved and then mitigates or prevents them. He outlined how Queensland had gone through the process with a WIG operator, which had provided a steep but beneficial learning curve for both.

- Ian Williams, Ian Williams and Associates, *Summary and Concluding Remarks*

  Ian summarised the areas where there had been consensus and the areas where there had been a lack thereof.

- Maurene Horder thanked all the participants, chairs, organisers, and the reference (steering) group. While on the subject, she called for further volunteers to sit on the reference group. The NMSC will take the input from the workshop, discuss this within the reference group, refine the draft document in light of the comments, and put this forward for further review.

In the workshops, a number of the questions reached a considerable consensus of opinions. One of these was the necessity for the NSCV to use the internationally-agreed HSC Code definition of a high-speed (i.e. light) craft, and then to apply further conditions to it subsequently. Another was the acceptance of the classification society approach of grading the risk, based on speed and distance from safety, in order to provide a continuum, rather than major artificial cut-off points.

Each of the presenters and the chairs were presented with a painted angel-fish, symbolic of the proverb 'give a person a fish, and you feed them for a day; teach them to fish and you feed them for life'. Would fishing lines and training have been more appropriate?

The workshop dinner was held on the Thursday evening, on board the ex-Manly ferry *South Steyne* in Darling Harbour, and for that we extend our thanks to Mori Flapan who was responsible for its organisation. Most of the workshop participants attended, and a great venue, excellent food and superb company provided an unforgettable evening. The sprinters started flagging at about 9:30 pm, but the stayers, including Tony Armstrong, Jan and Phil Hercus, Werner Bundschuh, Annika and Tim Dillenbeck, Robin Gehling, and Mori Flapan, were still lively going down the gangplank at 11:00 pm. It is known that one stayer, in town for the workshop, went on to the Star City casino and, in a risk management exercise, lost $100.

Phil Helmore

EDUCATION NEWS

Curtin University

A very successful one-day workshop entitled 'An Introduction to Seakeeping Analysis' was recently held at Curtin University. This workshop, jointly run by the Centre for Marine Science and Technology (CMST) at Curtin University and Formation Design Systems (FDS), included a hands-on session using the Maxsurf seakeeping analysis program Seakeeper. The workshop was well attended with nine representatives from the local shipbuilding industry taking part. CMST & FDS intend holding more workshops in the future on related topics; interested parties should contact Giles Thomas on (08) 9266 3573 or g.thomas@cmst.curtin.edu.au.

Two new postgraduate students have taken up scholarships to work towards PhDs within the Centre for Marine Science and Technology. Kim Klaka will be working on the topic of the prediction and minimisation of vessel motions at zero speed in sheltered waters. Alec Duncan will be investigating submarine radiated acoustic noise measurement; the aim of this project is to develop a method for determining a submarine's acoustic noise signature using the vessel's own towed array. This would be extremely useful as a means of detecting changes in noise signature without the requirement to visit a fixed noise-ranging facility.

The regular Centre for Marine Science and Technology weekly seminar series has recently hosted two presentations from industry. Firstly, in March, Harry Protoolis from Nautronix presented an overview of the many projects being undertaken by his company in the area of underwater acoustics. Nautronix is a Fremantle-based company that has grown from relatively humble beginnings to a large multi-national organisation. The company began by addressing the offshore oil industry's requirements for accurate undersea positioning through the development of its Acoustic Tracking System (ATS) but has now diversified its acoustic technology into other areas, including the defence sector. Then in April, Dr Greg Bush from Geos, a large commercial oceanography company, spoke about a recent large data-gathering project in the eastern Mediterranean Sea off Egypt. Greg, an ex-CMST PhD student, had managed the project which had great difficulties in keeping measuring equipment on station in the field, given the large fish trawling effort in the area. This had led to the development of a number of innovative solutions to cope with these problems.

Giles Thomas

The University of New South Wales

Undergraduate News

The naval architecture students and staff held a get-together on Wednesday 29 March. This was to enable the students in early years to meet and get to know the final-year students and the staff on a social level, and to discuss the course and

matters of mutual interest. Pizza, chicken, beers and soft-drink were provided and, after a slow start, conversation was flowing pretty freely an hour later! Two first-year students and two post-graduate students attended, in addition to the core third-year and fourth-year students, providing a broad mix.

John Donovan of Det Norske Veritas gave a presentation to the third- and fourth-year naval architecture students on Tuesday 4 April on the classification of ships. John touched on the history of classification, and how, where and why it is done for both large and high-speed vessels. The many questions fielded by John along the way attested to the interest of the students and the importance of classification.

At the graduation ceremony on 11 April, the following graduated with degrees in naval architecture:

Michael Andrewartha	H1 and University Medal
Bill Boddy	
Lina Diaz	
Vasavas Nonsopa	
Simon Robards	H2/1
Jude Stanislaus	
Delwyn Wee	H2/2

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

Michael Andrewartha's University Medal deserves special mention. The medal is awarded for an average mark for all subjects in all years of the degree course (weighted more heavily towards the later years) of 85% or more. To put this in perspective, of our 240 graduates in naval architecture, forty-one have been awarded Honours Class 1, and four have been awarded the University Medal: Michael Andrewartha (2000), Steve Davies (1980), Brian Morley (1974) and Phil Helmore (1970).

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

The Baird Publications Prize 1 for the best performance in Ship Hydrostatics to Dougal Loadman.

The Baird Publications Prize 2 for the best performance in Ship Structures 1 to Sean Ilbery.

The Royal Institution of Naval Architects (Australian Division) Prize for the best ship design project by a student in the final year to Adam Solomons for his design of a 25 m aluminium hard-chine monohull patrol vessel.

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

Congratulations to all on their fine performances.

Post-graduate and Other News

Simon Robards, who graduated from the UNSW naval architecture degree program on 11 April, has commenced work for his PhD under the supervision of A/Prof. Lawry Doctors. He is working on an accurate linearised method for wave resistance prediction using appropriate correction factors. The factors are based on the geometric properties of the hullforms.

Ian Raymond, a research degree student who is investigating the use of high-strength steels under blast conditions, visited The University of Tokyo from 2 September to 18 December 1999. The visit was supported by Nippon Steel Cooperation and the AME CRC. At The University of Tokyo Ian gained experience in structural optimisation methods in the Structural System Laboratory under the supervision of A/Prof. Katsu Suzuki and Prof. Ohtsubo.

While in Tokyo he also visited Yokosuka shipyard in company with others from the Structural System Laboratory. The visit was hosted by S. Kawachi, S. Shibuta, Kozo Abe and H. Komori who showed them through the fabrication and sub-assembly shops by bus. They then walked through the block assembly shop, where they inspected modules under construction, (one of which is shown in Figure 1) and automated welding and flux core welding (shown in Figure 2). From there they inspected the building dock where they saw two ships under construction, and went on board a cargo ship being outfitted alongside the fitting-out quay.

From there they went by boat to the Mega-Floating Platform (MFP) shown in Figures 3 and 4. This is an exciting idea and a development in marine

structures and form. They hope to be able to land light propeller-driven aircraft on the MFP early in 2000. The mega-float Ian's group inspected was Phase 2 of the project, i.e. 1000 m long and 60 m wide. Future use of the MFP idea could be for wharves, airports and a competitor to land reclamation.

Figure 1. Part of a module for a tanker under construction
(Photo courtesy Ian Raymond)

Figure 2. One of the automatic welding machines in operation
(Photo courtesy Ian Raymond)

Figure 3. The Mega-Floating Platform
(Photo courtesy Ian Raymond)

Figure 4. On Board the Mega-Floating Platform
(Photo courtesy Ian Raymond)

A/Prof Lawry Doctors attended the Sixteenth Fast Ferry International Conference and Exhibition held in Nice, France, on February 8 to 10. This event was of particular significance because of the disproportionately large Australian presence there. At the exhibition, ten out of the ninety companies with a stand were Australian. This point was noted by many of our overseas colleagues.

The conference included eighteen papers. Of particular interest was the presentation on the recent grounding of the Australian-built catamaran *Sleipner* in Norwegian waters. This was reported to be due to navigational error; however, the extent of the tragedy was such that it is likely that there will now be a number of changes that will be made to the design rules for such high-speed ferries. Wave generation was the subject

of two papers and the development of new monohulls by Advanced Multihull Designs raised much interest. A paper on the novel so-called monofoil suggested that high transport efficiencies could be obtained from a catamaran fitted with an appropriately shaped single V-foil.

The Fifteenth International Workshop on Water Waves and Floating Bodies was held in Caesarea, Israel, from February 27 to March 1, and contrasted sharply with the Nice gathering. There, a much smaller group of approximately 70 persons participated in 48 talks on the application of mathematics and computers to ship hydrodynamics problems. Prof. Ernie Tuck of the University of Adelaide discussed a strip-theory approach to solving the steady flow past a high-speed monohull.

A/Prof. Lawry Doctors explained how thin-ship theory could be used to good effect to predict the resistance, sinkage and trim of high-speed vessels with a transom stern. Both of these research projects are currently being supported by the Australian Research Council and have important implications for our high-speed industry.

It was certainly good to observe the positive international impact of Australian naval architects — both in the industrial area of design and construction and in the university area of research.

Phil Helmore
Lawry Doctors

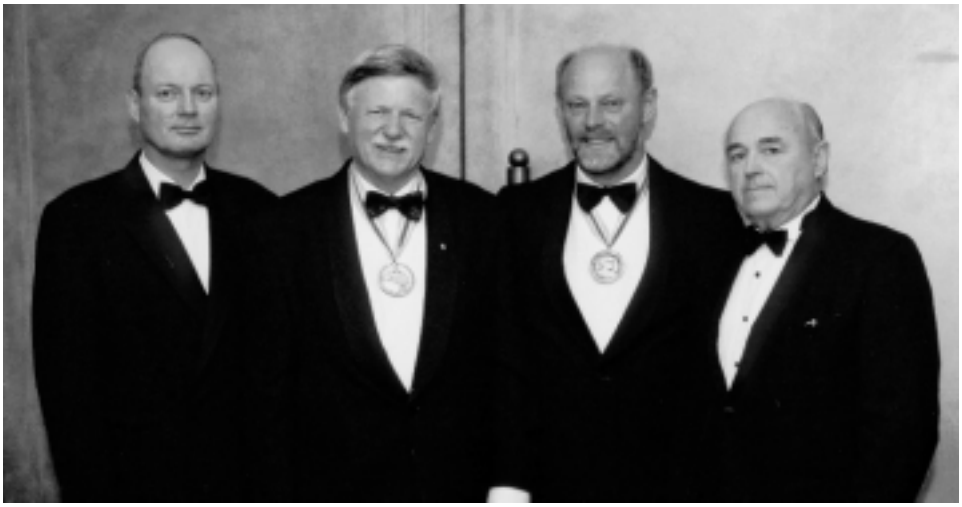
FROM THE CROW'S NEST

Clunies Ross Award to Naval Architect and Shipbuilder

The Clunies Ross National Science and Technology Award was introduced in 1991 to identify those people who have made important contributions to science and its application for the economic, social or environmental benefit of Australia. Since its inception the Award has recognised and honoured the achievement of forty-six outstanding people.

This year's award ceremony was held at the Hotel Sofitel in Melbourne on 29 March. Mr Hugh Morgan, Chairman of the Ian Clunies Ross Memorial Foundation, presented the awards to six outstanding Australians. Among them were Mr Philip Hercus, AO, and Dr Robert Clifford, AO, for their joint services to Australian ship design and ship building. Full citations for the awards may be found on the website at www.cluniesross.org.au.

At the Clunies Ross Awards for 2000, (left to right) Bryan Chapman (President of RINA Australian Division), Phillip Hercus, Robert Clifford, Noel Riley (Past-President, RINA Australian Dvision)



AGM Michell Award to Naval Architect

The highest recognition awarded by the Mechanical College Board of the Institution of Engineers, Australia is the Michell Medal, which honours the famous mechanical engineer, Anthony George Maldon Michell. An Australian, Michell was an outstanding mechanical engineer, responsible for a number of studies in the field of lubrication, for the design of a crankless engine and, in particular, for the invention and development of the tilting-pad thrust bearing which is commonly used in ship shafting. The award is made annually for outstanding service in the profession of Mechanical Engineering.

The Mechanical College Board has named Christopher Norman, a director of Austal Ships, as the recipient for the year 2000. This is the second time since the inauguration of the award that the recipient has hailed from Western Australia.

The presentation of the award took place at a special ceremony at the University of Western Australia in Perth on 4 May. Following the presentation, Mr Norman gave an open-session presentation on *The Design and Construction of Fast Catamaran Ferries.*

John Henry Michell, Anthony's equally-famous brother, was a brilliant mathematician at the University of Melbourne. He was responsible for the remarkable Michell Integral in thin-ship wave-resistance theory, which was published in 1898. This theory has since been extended to be applicable to other types of ships, including modern Australian catamarans with transom sterns. As an interesting footnote, Chris Norman used Michell's Integral as a basis for his undergraduate thesis.

America's Cup Results

Team New Zealand won the 30th America's cup match series, beating the Prada syndicate challenger *Luna Rossa* of Italy 5–0. Full details of all races are still available on the official website www.americascup2000.org.nz.

FDS software and the America's Cup

America One from the St Francis Yacht Club in San Francisco, *Luna Rossa* from the Prada Syndicate and Team New Zealand all used the Maxsurf software (by Formation Design Systems) to create optimised hull shapes which were very similar. Bruce Nelson, the principal designer of *America One*, said that the software is ideal for quickly creating yacht hulls, decks and appendages with high precision and control.

Southern Spars in Auckland also used Multiframe stress analysis software (by Formation Design Systems) to carry out detailed structural analysis of the loads and stresses in the rigging systems of America's Cup boats and to optimise the designs of mast and boom profiles.

Engineers Australia, March 2000

Blackmore's First Lady and *Australia II*

The Australian National Maritime Museum is acquiring *Blackmore's First Lady*, the yacht in which Australian solo sailor Kay Cottee became the first woman to circumnavigate the globe nonstop and unassisted in 1988.

The vessel, an 11.3 m Cavalier specially fitted out by Ms Cottee for the ocean epic, will be included in a new museum exhibition, Remarkable Voyagers. Kay Cottee sailed *Blackmore's First Lady* from Sydney Harbour on 29 November 1987, and arrived home six months later to a tumultuous welcome.

In Remarkable Voyagers, due to open in early 2001, the museum plans to tell Ms Cottee's story along with those of an Australian kayak adventurer and a long-distance ocean swimmer.

This exhibition, with others, will replace the America's Cup winning yacht *Australia II* which is leaving the museum for display in Western Australia.

Afloat, March 2000

Ken Warby Update

Ken Warby's new boat is completes and will make its first official public appearance on

14 January 2000 at an official unveiling at the Cincinnati Travel, Sports and Boat Show. The boat will remain on display at the show until 23 January. It is forecast that the official record attempt will take place some time late in 2001. This will allow for the boat to be displayed and participate in demonstration runs as a lead up to the record attempt.

Ice Ship for Downunder

Sailors and Antarctic adventurers Don and Margie McIntyre have been busy with new initiatives. Their yacht Sprit of Sydney is to be sold and will be replaced by five new McIntyre 55s now under construction for the Together Alone around-the-world race. These yachts will also be used for adventure sailing after the end of this event in April 2002.

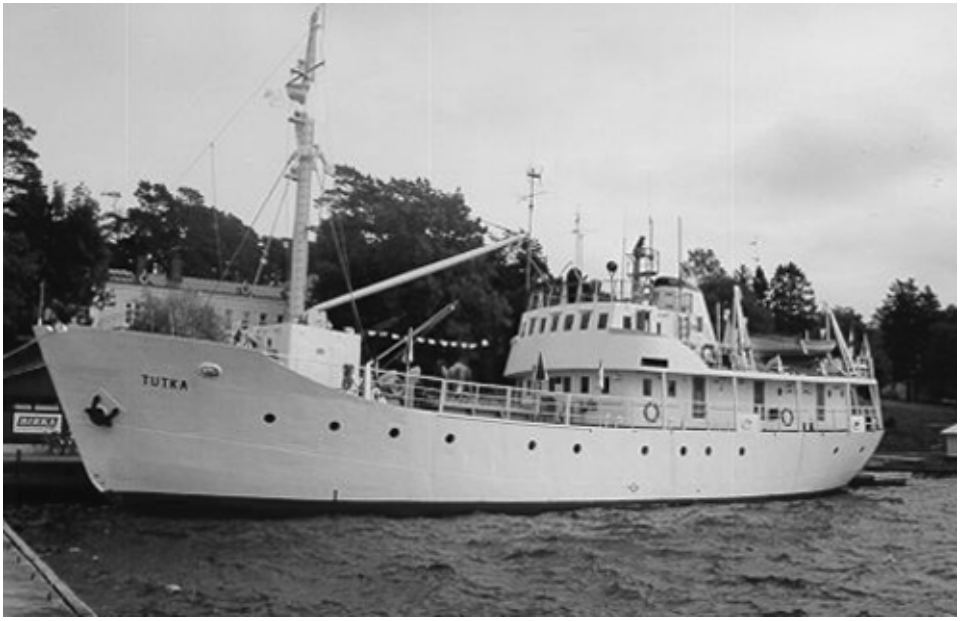
They have recently purchased a 36.7 m, 600 t displacement ice-strengthened passenger ship from the Finnish Government. *Tutka* was built in 1960 and was used as the Finnish state VIP ship and regularly entertained dignitaries like the US and Russian presidents. The 30 passenger ship has a top speed of about 10 kn and a range of up to 7 500 n miles. The ship will be given a refit to comply with current IMO requirements and will be fitted with satellite communications and a helicopter platform. She is expected to arrive in Sydney in late October, and should depart Hobart in mid-December on the first of two Antarctic voyages planned for the coming season.

Don and Margie are currently looking for volunteers to crew the ship for the delivery voyage starting in July. All positions from skipper to deckhand are available. More information can be found at www.oceanfrontiers.com.au/iceship.htm.

Selective Availability turned off

President Clinton recently announced that the intentional degradation of the Global Positioning System (GPS), known as Selective Availability (SA) was to be stopped at midnight on 1 May. The decision to discontinue SA is the latest measure in an on-going effort to make GPS more responsive to civil and commercial users worldwide. Further enhancements including 18 additional satellites are underway. Civilian users should notice a dramatic improvement in GPS accuracy with the discontinuance of SA.

To be renamed, *Tutka* will be the flagship of Ocean Frontiers



A preliminary investigation into the effect of a coach house on the self-righting of a modern racing yacht

Martin Renilson[1], Justin Steel[1] and Andrew Tuite[2]

[1]Australian Maritime College
[2]Crowther Multihulls

ABSTRACT

The ability of modern ocean racing yachts to self-right after capsize has become the focus of a lot of attention as a result of the recent events in the Vendee Globe 1996–97, and the Telstra 1998–99 Sydney to Hobart Yacht Races.

The problem is that these yachts are stable at 180° and, hence, can remain inverted for long periods of time until a sufficiently large wave causes them to roll past their limit of positive stability.

In the past, statical stability has been used as a measure of the likelihood of self-righting. In particular, the limit of positive stability has been used by yacht racing regulations.

Two techniques for conducting self-righting experiments in waves have been developed and used to assess the effect of the coach house on the ability of a modern racing yacht to self-right. Although all the statical stability indicators show that the condition with the coach house should be more likely to self-right, the experiments indicate that the opposite is the case. The reason for this is not clear.

As the safety of yachts is presently assessed using hydrostatic calculations alone, it is therefore strongly recommended that this be investigated further as a matter of urgency.

INTRODUCTION

The ability of modern ocean racing yachts to self-right after capsize has become the focus of a lot of attention as a result of the recent events in the Vendee Globe 1996–97, and the Telstra 1998–99 Sydney to Hobart Yacht Races (Renilson, 1999 and Dovell, 1999)

The problem is that these yachts are stable at 180° and, hence, can remain inverted for long periods of time until a sufficiently large wave causes them to roll past their limit of positive stability.

Little work has been done to identify the parameters which influence the self-righting ability of a yacht, however it has generally been assumed that the limit of positive stability has a major effect (McCurdy, 1985) As a consequence, this has been incorporated into the International Measurement System and used by the Ocean Racing Council to restrict vessels which are less likely to self-right from entering major offshore races (Ocean Racing Council, 1999)

Although it might be assumed that the inverted GM would play a significant role in the likelihood of a vessel self-righting this has not been taken into account.

As calculation of the inverted stability depends on details of the deck layout, the regulations have been simplified by assuming a level deck extending the width of the vessel from the sheer line. This has the effect of excluding the coach house from the calculations.

In order to investigate the factors involved in the self-righting of a modern racing yacht in waves, and to determine the effect of the coach house on this, model experiments were conducted in the towing tank at the Australian Maritime College.

YACHT PARTICULARS

A 12.5 m yacht, typical of the modern IMS style, was specifically designed for this investigation. The principal particulars of the yacht and the 1:12.5 scale model are given in Table 1. The lines plan is given in Figure 1.

Table 1 Principal particulars

	Full scale	Model scale
Length overall (m)	12.5	1.0
Waterline length (m)	11.5	0.92
Waterline beam (m)	2.675	0.214
Displacement (kg)	7 247	3.62
GM (m)	1.213	0.097
Roll radius of gyration (m)	0.587	0.047

As in many documented cases of capsizing the yacht is dismasted, the model was tested without a mast. It was fitted with a removable coach house as shown in Figure 1.

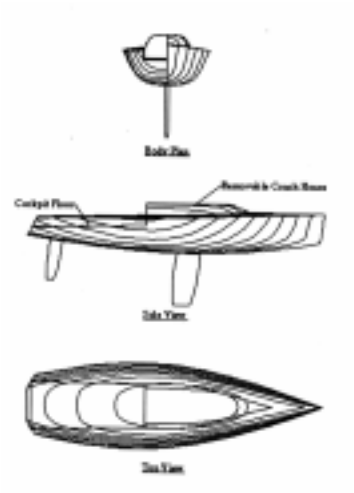


Figure 1 Lines plan

STATICAL STABILITY

The GZ curves for the yacht were obtained for the following three conditions:

1. No coach house (cockpit and deck camber included);
2. Full sized coach house; and
3. IMS condition.

In Condition 3 the assumption of a flat deck used in the IMS calculations was made.

The GZ curves for each of these conditions are given in Figure 2.

The key parameters often used to assess the likelihood of self-righting are given in Table 2 for each of the three conditions.

Table 2 Key parameters from hydrostatics

Condition	1	2	3
Coach house	no	yes	IMS
Limit of positive stability (degrees)	122.4	133.3	122.4
Ratio of areas under GZ curve	0.815	6.54	3.65
Inverted GM (m)	1.938	1.862	2.400
Maximum negative GZ (m)	0.462	0.282	0.425

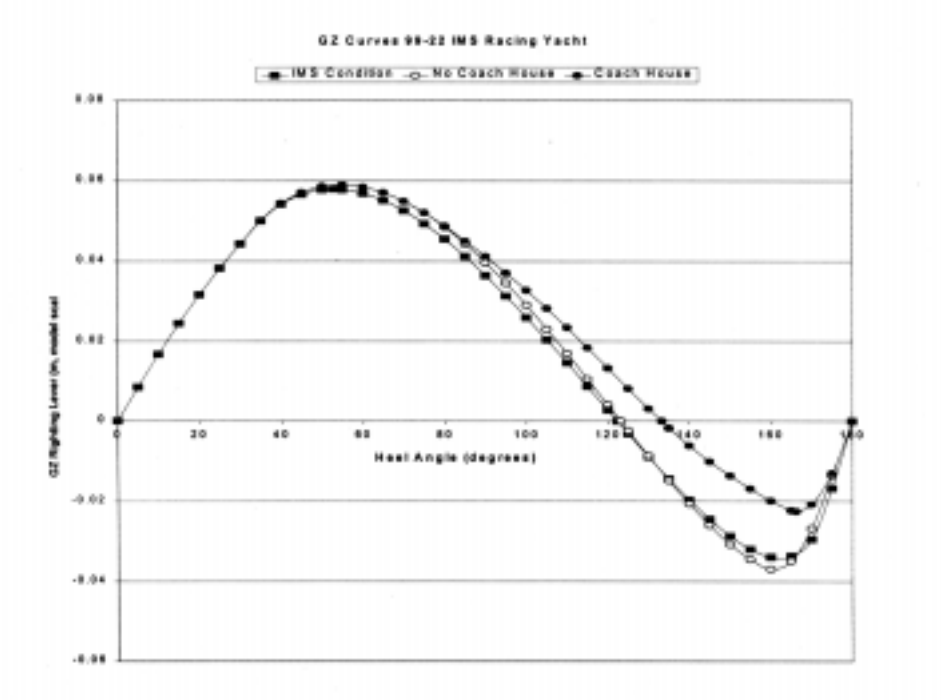


Figure 2 GZ Curves for the three conditions

As can be seen from both Table 2 and Figure 2, Condition 2 (with the coach house) appears to be much more likely to self-right than condition 1. Comparison with condition 3 illustrates the simplification when using the IMS assumption.

EXPERIMENTAL PROCEDURE

In order to test the hypothesis that the hydrostatic particulars alone can be used to assess the likelihood of self-righting in waves, experiments were conducted in the towing tank at the Australian Maritime College.

Two different test procedures were used:

1. Tests in a single breaking wave; and
2. Tests in steep irregular waves.

Tests were limited to the beam sea condition, with the wave approaching the model from the port side when it was upright and the starboard side when it was inverted.

Test procedure in a single breaking wave

The tests in the single breaking waves were used to determine the maximum size of wave that would not self-right the vessel, regardless of its position in the breaking wave.

To generate a single breaking wave the wavemaker was programmed in the time domain to generate two waves with slightly different frequencies. As the second wave with the lower frequency travelled faster than the first one with the higher frequency, the second wave overtook the first one, resulting in a steep breaking wave.

Prior to each test the model was inverted in calm water a known distance from the wavemaker. A breaking wave which caused it to self-right was generated. Then it was inverted again and set up in the same initial position with respect to the breaking wave and the size of the wave reduced by a small amount. This process was repeated until the wave did not self-right the model.

Then the initial position of the model with respect to the breaking wave was adjusted and the same wave was run. If this wave did not self-right the model, the tests were repeated with the same wave and a range of different initial positions of the model with respect to the breaking wave.

If the wave did self-right the model in any of the new positions, the wave height was reduced, and the process repeated until the largest wave which would not self-right the model — regardless of its initial position with respect to the wave — was determined.

The wave height was obtained by recording the surface elevation on video with a marked grid in the background to enable its height to be determined. This was defined as the distance between the lowest point in the trough prior to the crest and the top of the breaking crest. The spray around the crest was ignored. Note that the lowest point and the highest point did not occur at either the same longitudinal distance from the wavemaker, nor at the same time (See Figure 3)

The wave height was determined by playing back the video using the freezeframe facility.

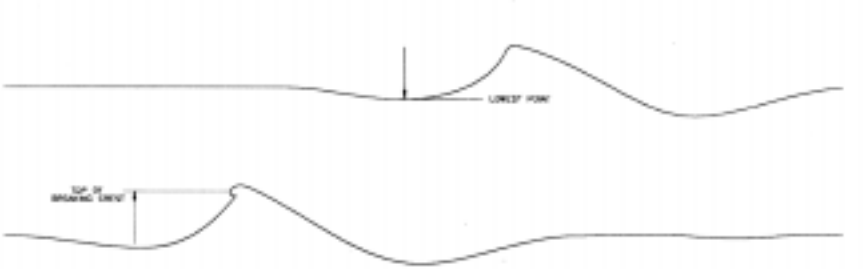


Figure 3 Sketch showing definition of wave height for breaking wave

Test program in steep irregular waves

Steep irregular waves were also used to self-right the model. A two-parameter JONSWAP spectrum was used for all the tests, as this is known to be appropriate to coastal conditions with short steep breaking seas. (Lewis, 1989)

The two parameters required to specify the spectrum were the peak frequency, f_p, and the significant wave height, $H_{1/3}$. Suitable breaking waves were generated with f_p held constant at 0.2 Hz. $H_{1/3}$ was varied to generate different sized waves. This gave steep breaking waves which were considered to be representative of the portion of the wave spectrum which was most likely to self-right the vessel.

Note that the long high waves which would normally exist in the ocean were not modeled. These would have limited influence on self-righting and were impossible to model in the towing tank. This is illustrated in Figure 4.

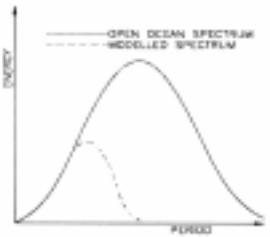


Figure 4 Sketch of JONSWAP spectrum compared to typical ocean waves

For each test configuration the spectra obtained for each individual run were ensemble averaged to give the average spectrum for that condition.

Prior to each test the model was placed in an inverted position beam-on to the direction of wave travel, approximately 16 m from the wavemaker as shown in Figure 5.

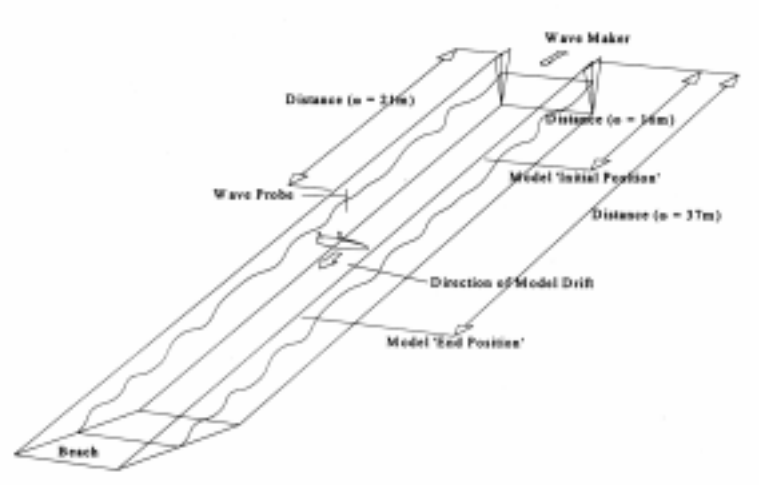


Figure 5 Sketch of set up for irregular wave tests

The wavemaker was started with the appropriate wave spectrum and a 2 s ramp time. When the waves reached the model, timing was commenced. Once the waves had established themselves at the position of the wave probe which was approximately 21 m from the wavemaker, recording of the wave elevation started.

As the model drifted under the action of the waves, it was maintained approximately (± 30°) beam on to the waves using a boat hook from the side of the tank. This was done carefully in a manner that had minimal influence on the model motions, and in particular care was taken not to contact the model just prior to or during it being impacted by a large wave.

Timing was stopped either when the model self-righted or when it reached a position 20 m from the beach, as shown in Figure 5.

RESULTS

Results from tests in single breaking wave

The maximum size of breaking wave that did not self-right the yacht is given in Table 3.

Table 3 Maximum size of wave that did not self-right the yacht

Condition	Wave Height
1. No coach house	3.62 m
2. With coach house	4.12 m

Results from tests in steep irregular waves

The average self-righting times are plotted against average significant wave height in Figure 6 for both conditions tested.

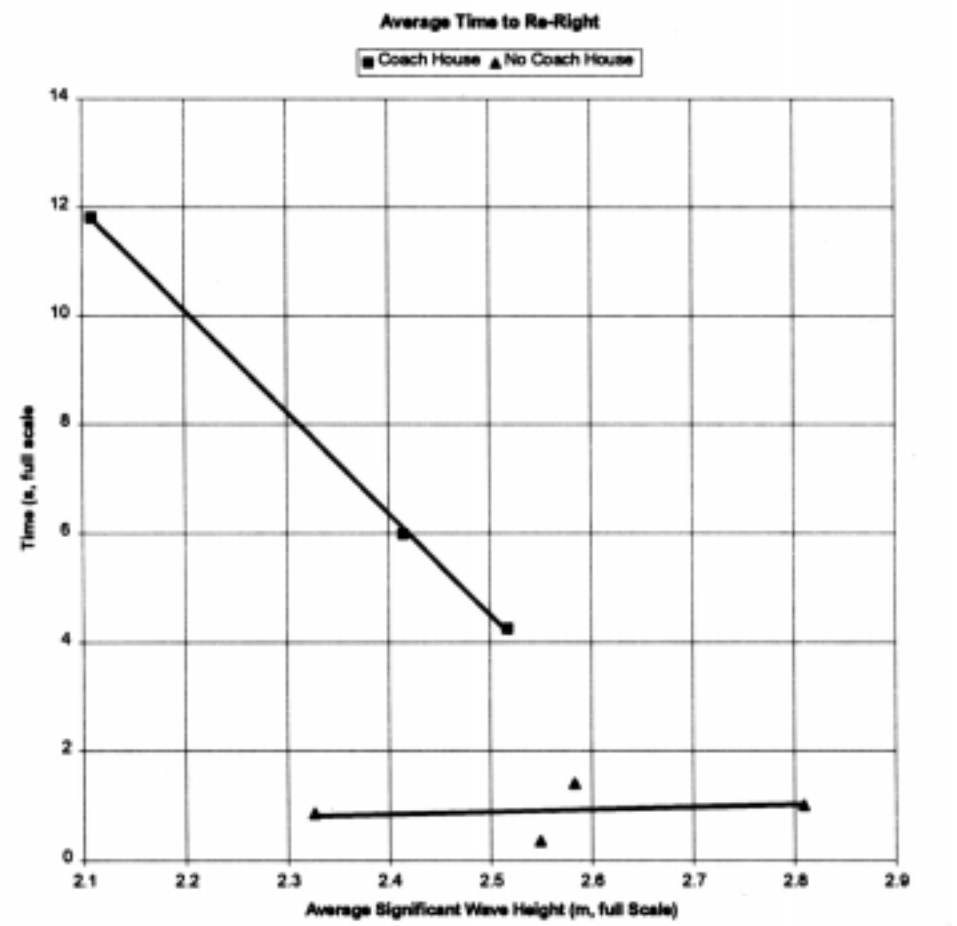


Figure 6 Average times to self-right

DISCUSSION

As can be seen from Table 3, a larger wave was required to self-right the yacht when it had a coach house than when it did not. Also, Figure 6 shows that when the coach house was fitted, the model consistently took longer to self-right than when it was not fitted.

The results from both sets of dynamic tests indicate that the yacht is more likely to self-right when not fitted with a coach house than when it is fitted with one. This is contrary to what was anticipated based on the hydrostatic calculations, where both the larger limit of positive stability and the lower inverted GM for the case with the coach house would imply that this condition should be less stable when inverted.

There is no obvious reason for this anomaly between conclusions that are based on hydrostatics alone, and those obtained from experiments conducted in waves.

From these limited results it is certainly not possible to conclude that coach houses are detrimental to the self-righting ability of a modern racing yacht. Considerably more work is required to investigate

the factors involved, before guidance on the design of a yacht to improve its self-righting ability can be given.

It is, however, important to note that in this case had the designer fitted a coach house with the intention to make this yacht safer – based only on hydrostatic calculations – it would actually have made the yacht less safe. It is therefore clear that it may actually be wrong to use hydrostatic calculations to measure the self-righting ability of a yacht. As this is what is actually done in the racing regulations, it is now time for a careful rethink about the basis of these regulations.

CONCLUDING REMARKS

Two techniques for assessing the likelihood of self-righting of a sailing yacht in waves have been demonstrated.

These methods gave similar results when used to assess the effect of a coach house on self-righting of a modern racing yacht, with both indicating that the coach house is detrimental to the yacht's self-righting ability. This contradicts the assessment made from hydrostatic calculations alone, which indicated that the coach house would make the yacht more likely to self-right.

Although it is certainly not possible from this limited investigation to make any general comment on the effect of coach houses on the self-righting tendency of modern racing yachts, it is very interesting that the conclusion, for the design tested, based on dynamic tests in waves differs from that made using hydrostatic calculations alone.

As the safety of yachts is presently assessed using hydrostatic calculations alone, this is of considerable concern and it is strongly recommended that this be investigated further as a matter of urgency.

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America's Cup Technology Trickle Down

Andy Dovell, Bruce McRae and Jonathan Binns

The preamble of the current IACC Rule states that the first intention of the rule is to produce 'wholesome day sailing' yachts promoting design developments which will 'flow through to the mainstream of yachting', but how far has this goal been achieved?

As background to the way in which technology from the America's Cup can be used by the wider sailing community, it is important to point out the fundamental differences between a typical IACC yacht and one which might be seen more commonly out on the water. To do this we have chosen two other yachts, a typical 36 ft cruiser racer and a typical 40 ft International Measurement System (IMS) racing yacht. For comparison the three yachts have been shown in Figures 1, 2 and 3.

Figure 1 Typical IACC class yacht (left)

Figure 2 Typical 36 ft cruiser/racer yacht (below)

Now we get to the laborious part of yacht design, comparing the numbers. The IMS offers the most comprehensive, independent source for yacht dimensions available and a definitive measure of stability, a great start to any handicapping system. The first numbers to look at are the absolute numbers which, as expected, are very different. Looking at the figures in Table 1 the obvious becomes quantified, that is IACC boats are similar to maxi boats, at about twice the length and five times the weight of yachts sailed by most people.

These three yachts are examined from a non-dimensional perspective in Table 2. Each of the parameters shows a large variation. Therefore the hydrodynamic and aerodynamic balance of forces required to make the sailing boat go forward will arrive at very different solutions for each of these

three boats. It is also worth noting that, from a relative displacement, length and sail area point of view, the IACC yachts are actually very close to typical IMS maxis, which shows what happens when sailing boats go from 40 ft long to being 70 ft long. However, the combination of beam and the righting moment are very much peculiar to IACC yachts. The IACC yacht is extremely narrow for its size and yet has incredibly high stability.

The three yachts being considered here are also built by very different techniques, the basic construction materials being listed in Table 3.

The effect of these construction methods can be seen by the weight distributions shown in Table 4.

Figure 4 shows the differences in the profiles of these three yachts. This drawing is approximately to scale and shows the position of the centre of gravity for each yacht. Typical yachts will have the centre of gravity placed around the DWL, whereas typical IACC yachts will have the centre of gravity about 2.5 m *below* the DWL.

A sailing yacht's speed is largely determined by its

Figure 3 Typical 40 ft IMS racing yacht

Table 1 Comparison of absolute numbers

	Typical IACC	36' Cruiser/Racer	40' IMS Racing
Length on waterline (m) LWL	20 m	9.8 m	10.7 m
Beam on waterline (m) BWL	4.0 m	2.6 m	3.2 m
Displacement (kg)	24,000 kg	4,600 kg	5,500 kg
Sail area (m^2) SA	330 m^2	70 m^2	90 m^2
Upright stability (kg m) RMC	1400 kg m	115 kg m	160 kg m
Angle of vanishing stability	Never	125°	120°

Table 2 Comparison of relative numbers

	Typical IACC	36' Cruiser/Racer	40' IMS Racing
Length beam ratio $\frac{LWL}{BWL}$	5.00	3.77	3.34
Length displacement ratio $\frac{LWL}{\nabla^{1/3}}$	6.99	5.94	6.11
Sail area displacement ratio $\frac{SA}{\nabla^{2/3}}$	40.32	25.73	29.36

Table 3 Construction methods

	Typical IACC	36' Cruiser/Racer	40' IMS Racing
Core	30 mm thick honeycomb nomex	25 mm thick PVC foam	25 mm thick PVC foam
Skins	2 mm thick carbon	1.6 mm thick E-Glass	1.6 mm thick Kevlar/E-Glass
Keel	High Grade Stainless Steel	Lead	Cast Iron
Bulb	Lead	Lead	Lead

Table 4 Weight distributions

	Typical IACC	36' Cruiser/Racer	40' IMS Racing
Rig	1 tonne	0.17 tonnes	0.2 tonnes
Hull and structure	2 tonnes	2.5 tonnes	3.1 tonnes
Keel	2 tonnes	1.5 tonnes	1.6 tonnes
Bulb	19 tonnes	0.5 tonnes	0.6 tonnes

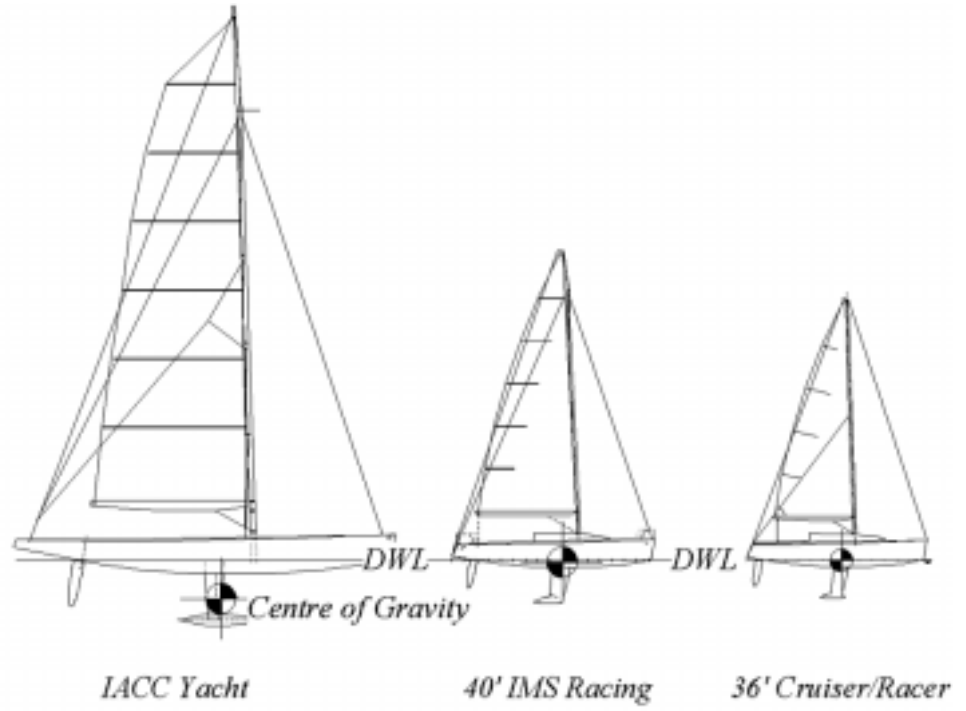


Figure 4 Profiles of examined yachts

sail area working in combination with its righting moment. Putting in more sail area combined with greater righting moment is equivalent to putting a larger engine into a powered vessel. The two methods of increasing the righting moment (i.e. form stability and pendulum stability) work equally effectively in a sailing yacht, however differing amounts of each will create a very different force balance. For example more pendulum stability will mean that the yacht has to heel more before

sufficient righting moment is obtained to stop it from heeling, whereas form stability acts more rapidly at lower angles of heel. Table 4 and Figure 4 show that IACC yachts have a much larger percentage of their total stability as pendulum type stability, and very little as form stability. This accounts a great deal for the difference in sailing heel angle between IACC yachts (at least 25º) and other more common yachts (rarely above 20º).

From this brief analysis of three yachts it is apparent that comparing an IACC yacht to more common yachts is like comparing a V8 touring car to a family wagon. It might seem that little or nothing can be learnt from IACC type yachts; however, having said that, they both use the same basic fuel, both have round wheels with axles, both are driven by people on roads and, most importantly, both would like to go faster.

Now that we have looked at the differences between these boats we can start to look at what can be learnt from the America's Cup and what we should try not to learn.

The corollary of high righting moment and high sail area is high rig loads. If the yacht has more power driving it, it will have more load in the rig pulling it forward. Rigging loads in IACC yachts are nothing short of massive, to illustrate the point we've prepared the simplified schematic in Figure 5.

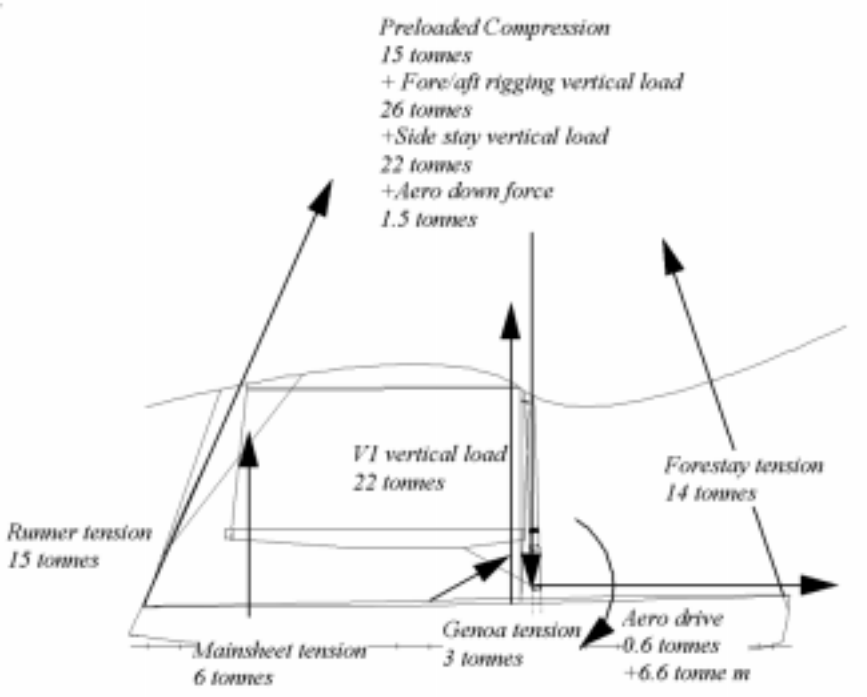


Figure 5 Some of the possible loads on an IACC yacht

It is apparent that one of the main areas of development that takes place on IACC boats is the structure. This is where most of the 'trickle down' can and does occur. The use of materials and techniques born from the America's Cup has virtually become standard for boatbuilders worldwide. Vacuum moulding and high temperature curing processes are now widely used for manufacture of many yacht components including hull panels, stiffeners, and interior joinery. One of the most

visible applications of construction using so-called 'exotics' is yacht masts.

Carbon mast manufacture was refined for the 1992 IACC yachts and has been used through two different techniques. The first is the one-piece method, in which a female mould is made and laid up with carbon fibre. Whilst the laminate is still wet the two halves are brought together and a bag is inflated within it to press the laminate against the mould walls. The second is the two-piece method, whereby the two halves of the mast are allowed to cure. Then the halves are joined with a secondary bond.

This technology has filtered through to a wide variety of yachts within the racing arenas of sailing. Carbon masts come standard with production-line yachts such as the Magic 25 and Sydney 40, and as common options to other racers and cruiser/racers. Carbon masts offer yachts considerable weight savings, which translate directly into righting moment gains, meaning larger 'engines' for the same yacht.

There has been nothing short of a revolution in the manufacture of sails over the last 20 years, and nearly all of it started with the America's Cup. The use of Kevlar/Aramid fibres in sails originated in the America's Cup. These days Kevlar sails are common in most sail wardrobes, which has led to longer-lasting sails that hold their shape much longer than sails made of other materials. The development of manufacturing techniques, which align the Kevlar fibres to the loads, has further increased the useful life of sails.

Figure 6 PBO sails in use

More recent developments in sail cloths have included carbon fibres being used in the 1992 IACC yachts and PBO (basically advanced Aramid fibres) being used in the 2000 IACC yachts. The blue sails seen on recent challengers are the PBO fibres (see Figure 6). The blue is actually UV protection for these fibres. Sails for this Cup have to function in winds anywhere from 7 knots to 25 knots and back down again within the one race. As such, considerable effort went into making mainsails all-round sails, but with very high stiffness and strength. Most of this research is carried out on the yacht, and at $50,000 per mainsail it is hard to imagine any design group doing this outside the America's Cup.

Mast section design for this round of IACC designs has taken a large turn. Typical yachts of this series have been using mast sections of around 500 mm in the fore/aft direction, with the Young America syndicate going out to about 1 000 mm.

Within the IACC rules it is prohibited to have 'permanently bent, deck stepped, rotating or hinged masts'. By increasing the fore and aft dimensions of the masts the teams are trying to get the masts to actually twist off which improves the aerodynamics, and by virtue of the larger sections the boats are then obtaining increases in effective sail area.

IMS yachts have been using large section masts for some time now, but they have probably done this for rating advantages more than aerodynamic gains. In this early form, this technology appears that it might just be taking advantage of the simple wording of the rule; however, it is also bringing mast design to a whole new level of understanding. To get a mast to twist in an aerodynamically efficient way requires advanced knowledge of the loads applied to it. Understanding the loads on masts is beneficial to everyone in the sailing community, from mast insurers to mast premium payers.

This America's Cup is seeing another revolution in deck hardware in which weight savings of up to 60% have been claimed. These weight savings have come about through the use of carbon winch

drums, pedestals and transmission shafts and the use of titanium block cheeks and tangs. These advances will in some way find their way down to the general yachting community, although most likely benefiting grand prix style racers more than any other yacht.

There have undoubtedly been major advances in materials technology made due to the high stress applications, which are inherent in America's Cup yachts. This has necessitated the parallel development of design and analysis software to allow the boundaries of strength versus weight to be explored. While it could certainly be said that most of the software used for finite element analysis, computational fluid dynamics, sail design, and computer-aided drafting has been developed outside the America's Cup arena, the application to modern yacht design has certainly benefited directly from America's Cup experience.

The America's Cup provides the main, if not the only, area in which engineers can test and optimise sailing yachts. In this most recent Cup, two main facilities for testing have been used — the wind tunnel and the towing tank.

The wind tunnel can be used for either sail development (although very small Reynold's numbers mean only fairly subjective studies are possible) or underwater appendage studies. Underwater appendages can be examined in the wind tunnel by assuming a flat free surface and using Reynold's scaling. A typical arrangement will have the keel, bulb and wings mounted upside down in the tunnel as shown in the Figure 7. In this figure the model is on a 25º heel and the wind is coming from the top of the image. For this particular run we were doing some flow visualisation around the bulb/wing interface using smoke.

The wind tunnel used by the Abracadabra Aloha Racing Syndicate was the world class facility at Texas A&M University in College Station, Texas. This facility has a working cross section of 7 ft x 10 ft with a length of 12 ft allowing the use of a 1:3 scale model. The circuit length of the wind tunnel is 398 ft and the maximum diameter in the settling chamber just before the working section is 30 ft. The tunnel is powered with a four bladed 12.5 ft diameter Curtiss Electric propeller, driven at 900 RPM by a 1 250 kVA synchronous electric motor. This arrangement allows for wind speeds of around 270 ft/s, or Reynold's numbers of around 5.4×10^6 per model scale metre. At a scale of 1:3 this means that the Reynold's number achieved in this wind tunnel was about 40% of the Reynold's number achieved by the full scale yacht when sailing to windward. Although the full Reynold's number is never achieved, getting this close is extremely good. A well setup wind tunnel, such as the one described above, can provide the designer with a great amount of information on both forces and moments, and flow visualisation. For the Abracadabra syndicate the wind tunnel was used for optimising bulb volume distribution, wing/bulb and keel/bulb interfaces, wing sweep angle and wing position.

Figure 7 Wind tunnel flow visualisation

The towing tank used by the Abracadabra Syndicate was at the USGS Hydraulics Laboratory, in the Stennis Space Centre in Mississippi. The tank is 450 ft long by 12 ft wide by 18 ft deep. This allowed a model scale of 1:8 to be used, resulting in models about 2.5 m in waterline length. A matrix of speeds, heel and yaw

angles needs to be completed for any sailing yacht model test, resulting in a test matrix of about 110 runs for an IACC yacht, before rough water is examined. Sailing yacht testing is quite different to standard model testing, and the techniques required have been almost entirely developed by America's Cup syndicates. It is worth noting that the tank in Mississippi had only ever been used once for model testing of ships, and by using it again for the America's Cup we were able to open up a virtually-untapped resource in terms of naval architecture in the US. This is typical of the type of trickle down that can occur in applied naval architecture.

The towing tank at the Australian Maritime College (AMC) in Launceston has also been used extensively in the past by America's Cup syndicates. Every Australian syndicate since 1987 has conducted model tests in the tank prior to building the yacht. The tank at the AMC, although small in comparison to others, is still of sufficient size to allow for 1:8 models of IACC yachts to be tested.

The use of these two facilities, however, has tended to focus on the development of things quite peculiar to IACC boats. For example, the flow around an IACC boat is very different to that around most yachts because they are very deep and narrow, and have a very large volume right amidships in the form of the bulb. Also the development of wings for IACC keels has led to the addition of extremely powerful aerofoils which, if applied to more conventional boats, could lead to boat-handling disasters and very expensive grounding exercises. However, it is fairly safe to say that without the America's Cup these two types of facilities might never have been used to develop sailing yachts. Once the initial massive expenditure required to get a new facility producing useful results is overcome, often by America's Cup syndicates, it is much easier for subsequent less-funded projects to use the facilities. This type of trickle down has been very evident within Australia and has had numerous successes.

The America's Cup offers the main area of development to yacht designers, builders, sail-makers, equipment manufacturers and sailors. Not all these developments can be directly applied to other yachts however.

In the context of using America's Cup technology trickle down it is very important to note, and accordingly quantify, the obvious differences between IACC yachts and an average cruising or racing yacht. IACC boats are much bigger, faster and have much higher loads than can be expected in more common yachts and consequently require unique and innovative solutions to problems particular to the class. Aerodynamic and hydrodynamic gains made in the IACC boats rarely have specific applications to everyday yachts, indeed using these advances in other yachts could create more problems than they solve. Having said that, the tools and techniques with which these advances are made would not be available to engineers and boat builders if it were not for the America's Cup, because of high initial set-up and subsequent research costs.

The main gains made in IACC yachts, which have direct applications to common sailing yachts, are in the areas of hull and rig structuring. The gains made all focus on making lighter, stiffer structures and so have the greatest application to racing yachts.

The Authors

Andy Dovell holds a BS in Mechanics and Material Science from John Hopkins University and a ME in Naval Architecture and Offshore Engineering from the University of California at Berkley. For the last eleven years Andrew has been a partner with Iain Murray and Ian Burns in the commercial yacht design business of Murray Burns & Dovell.

Bruce McRae has been a member of the Australian Maritime Engineering CRC Yacht Group since 1994. A recent move has seen Bruce take up a position with the design firm Murray Burns & Dovell.

Jonathan Binns has been working in yacht design and research on a wide variety of yachts since 1995. Currently he is studying for a PhD at the Australian Maritime College in Launceston Tasmania titled *Investigation into re-righting tendencies of modern sailing yachts*.

FORENSIC NAVAL ARCHITECTURE

SOME MARINE CASUALTIES
EXERCISES IN FORENSIC NAVAL ARCHITECTURE
(PART 5)

Robert J Herd

11. HOW STRONG SHOULD CARGO LASHINGS AND CONTAINERS BE?

From time to time all associated with the sea are given stern reminders of the forces of which the sea is capable and the consequences thereof. One such reminder was delivered some fifteen years ago to a roll-on/roll-off container vessel on a voyage from Fremantle to Adelaide, off the south-west corner of Australia.

The vessel was of ro–ro type with a forecastle, two decks and one hold, with provision for carrying international containers in tiers on the upper deck. She was about 190 m overall with 28.2 m moulded breadth, 18 m depth to the upper deck, 8 m designed draught and deadweight at that draught of some 11 700 tonnes. Twin engines of 10 400 brake horse power each were geared to a single shaft with a controllable pitch propeller giving a service speed of 18 knots.

In the course of the voyage from European ports to Australian and New Zealand ports, the vessel called at Fremantle to discharge cargo. On departing Fremantle for the next port of call, Adelaide, the cargo stowage was generally:

Upper deck:	tiered containers up to 3 high
A deck:	MAFI units overstowed with cargo cars tractors reels of sheet steel containers cases reels of paper strapped to bolsters tyres cases harvesters, etc.
A car deck:	motor cars
B deck:	containers harvesters MAFI units overstowed with cargo tractors bolsters
C deck:	bolsters of paper, etc.

The condition of the ship at departure from Fremantle was:

Draught forward	8.25 m
Draught aft	9.20 m
Trim by the stern	1.0 m (approx.)

Metacentric height (fluid)	1.87 m

The stability was in excess of the IMO minimum and was reasonable for the intended voyage.

From departure at the last European port (Genoa), the weather conditions had been light except that between Aden and Fremantle winds up to 18 m/s (Beaufort 8) and sea states up to 7 and swells up to 6 were recorded for a period. No damage was reported during this time.

A weather forecast was obtained at 1700 before departure from Fremantle. This forecast predicted south-westerly winds of 20–30 knots, gradually easing towards morning. On completion of loading and checking of cargo and its security the vessel sailed at about 1900 for Adelaide.

After rounding Rottnest Island, by midnight the course was 200°, wind 220° at 33 knots, sea 220° and state 6, i.e. fine on the starboard bow. The ship was rolling heavily with sharp impacts from the waves on the bow, with seawater flooding the deck cargo, deck machinery and ventilation houses.

The course was altered to 180° and by 0800 the heavy rolling was continuing, up to 20° per side with bow impacts and deck flooding persisting. Three quarters of an hour later, the course was changed to 126°, which brought the wind and sea abaft the starboard beam resulting in continuous heavy rolling. During the morning the cargo and lashings had been under continuous check.

By 1010 the force of the wind had increased sharply and the rolling had increased to 25° per side. At 1037 the Master received reports of cargo moving in containers with resulting sharp jerks in the lashings leading him to decide to turn head to sea to minimise the weather effects.

During the turn to starboard the ship was struck on the starboard side by an unexpectedly large wave of height in excess of 15 metres, which brought the ship to a shuddering stop in its turn and caused a roll to port of 40° followed by a similar roll to starboard.

A large quantity of water fell onto the deck, tearing loose some containers, several of which were lost over the side. Four could be seen floating in the sea. In addition, movement of and damage to cargo occurred on A deck.

A state of emergency was declared and efforts were made first to determine the extent of the cargo movement and damage and then to take appropriate steps to re-secure the affected cargo.

The wind was recorded as 58 knots and wave heights about 15 metres. The ship was maintained head to sea at a forward speed of about 3 knots while waiting for the weather to ease.

The re-securing of cargo on all decks was completed by 2000. By 0400 the next day conditions were easing and a course of 090° for Adelaide was resumed at 0543. By 2000 that day the rolling had ceased.

A survey of the ship and cargo revealed the following damage to the ship and loss of or damage to cargo:

The Ship

Damage was limited to the upper deck where guard rails, piping, the firemain, sprinkler, steam line and fuel tank air pipes forward on the starboard side were either damaged or removed by containers being capsized into the sea. On the port side a ventilation house, guardrails and a lug from the ramp were damaged.

On A deck the side structure had been protected by cargo from impact from a MAFI having a mass of some 60 tonnes which had come adrift, turned through almost 90° and had been cannoning back and forth across the ship.

Upper Deck

Eight containers were lost overboard and fifteen containers capsized. While some of the lost containers and one that had capsized had moved to starboard, the majority had gone to port. Some were resting on their sides on top of intact stacks having slewed through nearly 90°. A stack of two containers had capsized onto the deck still coupled together, while one container had been secured by the crew while hanging over the port side of the ship.

Four stacks of containers had collapsed. Containers from these stacks which had not been lost overboard were generally damaged in some way. Some had been warped, their doors sprung open with reels of paper spilling out or rolling on deck. In one case two bottom tier containers had tilted away from one another and a second-tier container had partially fallen into the resulting gap. Some containers had badly indented sides caused by the impact of cargo not secured and free to move with the ship. The warping of containers was indicative of the failure of lashings at one end with consequent movement of the containers about their other end.

A Deck

The cargo damage was extensive and included:

4 containers

9 tractors

12 cars

1 machine

16 rolls of material

several cases of machine parts

Much of the damage was caused by the MAFI in its travel back and forth across the ship, the side structure being cushioned by tractors at one end of the travel and motor cars at the other. The MAFI had been stowed and lashed on the centre line but a container stowed athwartships on dunnage had broken loose, broken the after lashings of the MAFI and the subsequent movement of the MAFI had broken its forward lashings, causing it to turn through almost 90° from its centreline position.

A number of containers had come loose, causing damage to other cargo. These had been jury lashed by the crew. One container carrying sheets of special glass had taken up a U-shape after having been struck at mid length by another loose container.

B Deck

A case of machinery stowed on a MAFI had collapsed. Slabs of marble stacked on end but apparently unsecured in a container stowed athwartships had moved to the end of the container under rolling forces. Reels of paper strapped to bolsters had collapsed.

C Deck

Reels of paper strapped to bolsters had collapsed.

Following the arrival of the ship in Melbourne the brief given on behalf of the ship owners was to report on the forces and stresses to which the vessel and her cargo had been subjected and on the influence of the stowage and securing of the cargo on these matters.

The practice adopted on this ship for securing containers and other cargo was determined to be:

Upper Deck

First-tier containers were secured to the deck by cones inserted into deck fittings and secured to the container by pins. Second-tier containers were secured to the top corner fittings of the first-tier containers by cones, and to the deck by a pin and rod inserted into the cone with tensioner and elephant's foot at its lower end dropped into a clover leaf fitting in the deck. The rods were crossed and secured inside the lines of the interfaces of the containers (inside lashing). In some cases chain lashings with tensioners were used instead of rods.

The bottom corners of the third tier containers were secured to the top corner fittings of the second-tier containers by twist locks. The top corners of third tier containers where they are stowed in a block were secured to adjacent containers in the block by bridging fittings.

A Deck

A variety of securing devices were used depending on the nature of the cargo. Containers in designated areas were secured by chain lashings with elephant's feet. Car and vehicle lashings were used for cars and tractors, of a strength appropriate for the mass of the vehicle lashed.

B and C Decks

Similar lashing arrangements were used as appropriate for the cargo.

Test certificates for some of the lashings and stacking fittings were sighted. A number of damaged lashings and stacking fittings were collected from both the Upper and A Decks. None of these items could be related to a particular container or stack of containers. Broken lashing rods which had been lying on the deck had been disposed of prior to arrival in Melbourne and could not be examined.

It was evident from the damaged lashings and securing fittings that a number had been pulled from their locations in the deck by containers which were capsizing, while others had become over stressed and had ruptured.

Using the ship motions recorded in the Log and in the Master's Note of Protest, it was evident that the motions and consequently the stresses imposed in containers and their lashings were far in excess of the values cited in standards then in use. For example, container strength was premised on heel one way of 30° with roll period out-to-out of some 12 seconds and with loading on the container wall imposed by a homogeneous load; not, for example by the sharp edge presented by vertically-stowed reels of paper.

At the time of this incident there were a large range of standards for ship motions in use developed by various authorities. These were all examined and applied to the damage and breakages observed.

Conclusion

IMO now have a number of standards for container strength and stowage of cargo, for securing both standard and non-standard cargo etc. While these are all valuable, there remains one outstanding problem. What are reasonable levels for ship motion amplitudes and periods?

How can one draw a line and expect the great majority of voyages to experience values at or below that line? What is the probability that the chosen values will be exceeded, as in the voyage outlined above? An example of this is the 10^{-8} probability used by IMO for the North Atlantic.

No matter how carefully standards for ship motions are drawn up, it seems certain that at some time these standards will be exceeded, with the inevitable result.

PROFESSIONAL NOTES

MARENSA – Challenge or opportunity?

Ian Williams FRINA FIEAust

The existence of MARENSA has caused some puzzlement (as to why a further technical society is needed in Australia) and some concern (as to whether MARENSA has been set up by the Institution of Engineers, Australia in an attempt to take over the functions of the other societies). This brief article is intended to explain what MARENSA is, how it came about and where it fits into the Australian maritime engineering scene.

MARENSA is one of over thirty technical societies that operate under the IEAust umbrella. They have been set up by groups of interested engineers (often, but not exclusively, members of IEAust) to further the technical interests of engineers and others interested in relevant engineering matters. Each operates in its own way, with assistance (but not direction) from IEAust.

MARENSA is a relatively new technical society. It was established in 1997 following a study by the Australian Science Technology and Engineering Council (ASTEC) Future Needs 2010, and the associated Report of the ASTEC Shipping Partnership in September 1996 *Australian Maritime Industries — Priorities in Science and Technology*. MARENSA gives the opportunity to provide an overall focus for the maritime professions in an Australian context. At the present time the interests of maritime professionals are met largely by their membership of overseas organisations. In establishing MARENSA it was seen that while the specialist overseas professional institutions and/or learned societies fulfil an essential role, this role could be complemented by an organisation with an Australasian basis, working with the pre-eminent Australian engineering institution. MARENSA is not in competition with RINA, IMarE or any other institution, but is in an excellent position to meet certain of the needs of those with a professional interest in maritime technology. I see that this complementary role is important in two main areas, education and representation.

On the educational front, the Joint Board, comprising representatives of IEAust and the Royal Institution of Naval Architects, is working on a number of challenging tasks, including:

- the development of a joint RINA/IEAust careers pamphlet;
- competency standards and continuous professional development (CPD);
- discounted joint membership;
- chartered Professional Engineer status and the National Professional Engineers Register; and
- accreditation of naval architecture degree courses.

The processes that are being developed to ensure that the qualifications of Australian maritime engineers (and their CPD) are consistent with both the Australian and international accreditation frameworks are seen as being extremely important to individuals (especially younger members) who increasingly need their qualifications to be recognised world wide.

Australian naval architects as a group have frequently lacked an effective channel to federal or State governments through which to express matters of concern to them. In contrast, IEAust has a long history of effective representation to governments on engineering matters having national or local significance and a presence on significant national engineering consultative forums. MARENSA can provide a means of tapping into these areas of influence on behalf of those working in the field of maritime engineering.

On technical matters, although MARENSA does organise occasional seminars and workshops, it is seen that the best way for the majority of members to get together on a regular basis is to develop arrangements to coordinate with local technical meetings of the established institutions, principally the RINA and IMarE, and to offer papers to these meetings where appropriate. Discussions on arrangements for such coordination have been commenced with the relevant individuals from the institutions and with our own local representatives and will be extended as the year progresses. The MARENSA speaking program, to be developed later in the year in conjunction with its corporate members, is intended to give an opportunity for the participation of relevant technical bodies.

So, does MARENSA present a challenge or opportunity? I see it very clearly as the latter and see no inconsistency between my active participation in both MARENSA and RINA. Recognising that others may have other views, I shall be happy to discuss the issues raised in this article with any reader of *The Australian Naval Architect* and would be particularly keen on any additional suggestions for coordination and collaboration. My e-mail is ianw@pcug.org.au and for more conventional mail my address is below.

Ian Williams
12 Lindrum Crescent
Holt ACT 2615

Ian Williams is currently Chairman of MARENSA. He has been a member of the RINA for over 40 years and has served as the Chairman of the Canberra Section and as a member of Council of the Australian Division.

THE INTERNET

The *Derbyshire* Enquiry

If you are interested in the re-opened *Derbyshire* enquiry, and have lots of time to read, visit www.mv-derbyshire.org.uk. The full transcript, no less, is available. If you simply want a summary of the present opinions on the loss, the first day's transcript which included the attorney general's address is interesting reading. No-one has any excuse for insomnia!

Duyfken's Voyage

The *Duyfken* replica, built by the Fremantle Maritime Museum, has set sail from Fremantle on a voyage which will take her up the coast of Western Australia, through the Indonesian islands, to Papua New Guinea and down the Queensland coast, ending up on the Gold Coast in January 2001. On 19 April she was at Denham, in Shark Bay. On their website you can watch mini-documentaries produced on board, see regularly-updated photographs of the voyage, read the captain's log, and email the crew. Visit www.littledove.org.

Sailing News

For fast-breaking sailing news, visit http://sailing.quokka.com (note no www). This site includes daily updates on almost anything going on in the sailing world, such as the America's Cup, the BT Global Challenge, Sydney to Hobart, Around Alone, the Whitbread, etc. You can also look up details of *PlayStation VLMH*, the Steve Fossett/Richard Branson 32 m maxi-catamaran set to tackle the trans-Atlantic sailing record of 6 d, 13 h, 3 min and 32 s, set in 1990 by Frenchman Serge Medec in the 24.3 m catamaran *Jet Services V*.

Phil Helmore

MEMBERSHIP NOTES

Australian Division Council meeting

The Australian Division Council met on 22 March, with teleconference links to all members and the President, John Colquhoun, in the chair in Sydney.

Matters, other than routine, which were discussed included the funding of sections, reports from Sea Australia 2000, STAB2000 and *The Australian Naval Architect*, implications of the GST for the division and sections, advice to students regarding naval architecture courses in Australia, the RINA Special General Meeting, and the availability of papers for the AGM. The position of Treasurer for the Division was declared vacant, as John Benjamin did not stand for a further term. Alan Soars was proposed for the position and elected unanimously.

At the conclusion of the meeting, the President, John Colquhoun, resigned from Council and Bryan Chapman resumed the mantle of President following his working furlough in the People's Republic of China.

Australian Division General Meeting

The Annual General Meeting of the Australian Division of RINA was held on 22 March at Eagle House in Sydney. The meeting was attended by twenty-nine people and reports were received from the President, John Colquhoun, and the Treasurer, John Benjamin.

Positions on London Council

Following the last RINA Council elections, one of the elected members was unable to take up the position and so Noel Riley, who had stood for election, moved up and is now a member of the RINA Council in London. Noel has subsequently resigned from his position on the NSW Section Committee.

This means that Australia now has two positions on the RINA Council in London, as the President of the Australian Division, Bryan Chapman, also has a seat there. So, if you have something to say about how the RINA is run, then contact your Federal member to do something about it!

Phil Helmore

NAVAL ARCHITECTS ON THE MOVE

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

Australian Design Services, a new division of Austal Ships, has set up at the Image Marine site in Fremantle to supply design services to all the Austal group companies, Austal Ships, Image Marine, Oceanfast Marine and the Austal–Bender joint venture in Alabama, USA. The naval architects will be moving between Australian Design Services and the companies. Contact may be made with all through the Austal Ships head office.

Fred Barrett has returned from his stint with Sparkman and Stephens in New York and is now running his own design consultancy, Mungral Yachts, in Hobart.

Goran Dubljevic has moved on from Air International where he worked on the survey vessels built by NQEA Australia, and has taken up a position as a naval architect with Sinclair Knight Merz, who are now providing the engineering support for Tenix Defence Systems on the Anzac ship project in Williamstown.

Jareth Ekin, a graduand of the Australian Maritime College, has taken up a position with Cougar Catamarans on the Gold Coast.

Graham Jacob has moved on from the WA Department of Transport and has commenced work for his PhD at the University of Tasmania.

John Lembke has moved on from Austal Ships and is travelling overseas, most recently in the USA.

Geoff Leggatt has moved on from WaveMaster

International and has taken up a position as Senior Naval Architect with Oceanfast Marine in Fremantle.

Lance Marshall has moved on from Tenix Defence Systems and has taken up a position as a naval architect with Sinclair Knight Merz, who are now providing the engineering support for Tenix Defence Systems on the Anzac ship project in Williamstown.

Scott McErlane has taken up a position as a naval architect in the Commercial Vessels Branch of the Waterways Authority of NSW in Sydney.

Kevin Porter's many friends will be pleased to know that he has returned to work in the Sydney plan approval office of Lloyd's Register of Shipping. He started back part time in December, and is now back into the swing of things full time.

Trevor Rabey has taken up a position as a naval architect with Sinclair Knight Merz, who are now providing the engineering support for Tenix Defence Systems on the Anzac ship project in Williamstown.

Simon Robards, a recent graduate of The University of New South Wales, has commenced work there for his PhD on resistance prediction of high-speed transom-stern hullforms under the supervision of A/Prof Lawry Doctors.

Jaime Sotelo has moved on from Boeing in Brisbane and has taken up a position as QA lead auditor with Policy Management Systems in North Ryde.

Ruben Spyker has moved on from the Australian Maritime Engineering CRC in Sydney and has taken up a position as a naval architect with the Australian Submarine Corporation in Adelaide.

Nick Stark has moved on from Seastate in ship motion control for Austal Ships and has taken up a position as a programmer with ERG, the electronic ticketing company which provided (among others) the ticketing system for the Hong Kong underground.

Ray Toman has moved on from the Australian Maritime Engineering CRC in Sydney and is now completing the Bass Strait ferry project at The University of New South Wales and consulting as Tasman Ship and Boat on Dangar Island, NSW.

Nick van den Hengel, a graduand of The University of New South Wales, has taken up a position with the Australian Submarine Corporation in Adelaide.

Andy Westwood has moved on with Det Norske Veritas, and has taken up the position of Regional Manager for the People's Republic of China, based in Shanghai.

Keith Wood has moved on from Tenix Defence Systems and has taken up the position of Executive Engineer with Sinclair Knight Merz, who are now providing the engineering support for Tenix Defence Systems on the Anzac ship project in Williamstown.

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.

Phil Helmore

MISSING IN ACTION

We have lost contact with the following members and Keith Adams would welcome any information about their location.

Ms Teresa Hatch, Student member and

S J McDonnell, Student member.

Contact Keith Adams on (02) 9576 4140, fax 9876 5421 or email kadams@zeta.org.au.

FROM THE ARCHIVES

Unfortunately no one came forward with an identification of the photographs in the last 'From the Archives.' They were taken during the Second World War and show the construction of 25 ft 6 in motor dories at a factory in Australia. Further clues follow.

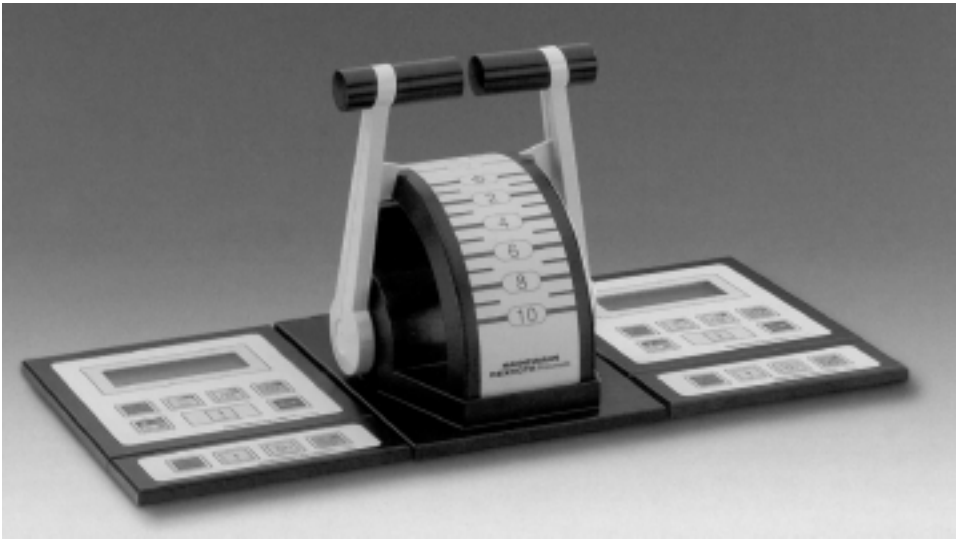
The war in the Pacific, and particularly the island campaign waged by United States and Australian forces, demanded a very large number of small craft and even US resources could not satisfy the need. Australia was called upon to supply the bulk of the craft, particularly in the early stages. The Australian Shipbuilding Board was directed to manage the production of these craft, and by the time that responsibility was transferred to the Small Craft Production Directorate of the Ministry of Munitions in October 1943 a total of 8 862 craft had been ordered. By the end of the war, some 20 000 craft had been built in Australia.

During the final twelve months it was responsible for the programme, the ASB developed some 38 new designs and produced some 1 150 construction drawings with a staff of about thirty. Many Australian boat builders were involved in this enormous task, including well-known firms like Lars Halvorsen & Sons of Sydney and Norman Wright of Brisbane. However, many other firms were introduced to boat building for the first time, including General Motors Holden, The Ford Motor Company, Slazengers, and Concrete Constructions who operated the Green Point yard in Sydney. Some 450 firms were involved in some way. US firms could only supply a small number of the engines needed and Australian industry also rose to that challenge.

By October 1943 a total of 500 motor dories had been ordered for delivery to United States forces and 20 for the Australian Army. Another photograph of these boats under construction is shown below. Can anyone identify the builder? It is thought to have been a firm more used to delivering products on wheels.

Motor dories approaching completion at an Australian factory during World War II, but which one? (Photo John Jeremy collection)

engineering
mannesmann
Rexroth



MAREX OS in any case....
the remote control with CAN bus

The concept

- Open, modular system configuration
- Can be used in any marine propulsion system
- Intelligent and compact basic components
- Control heads with lever follow up

The technology

- Microprocessor based control processing
- Data transfer via CAN bus
- Clear text information via display
- Serial interfaces to external systems

The advantages

- Safe and comfortable manoeuvring
- Minimises design and installation costs
- Simplified display adjustment for commissioning
- Reduced service costs using telediagnosis

Rexroth Marine Technology

Mannesmann Rexroth 3 Valediction Rd Kings Park
Ph (02) 9831 7788 Fax (02) 9831 5553