THE AUSTRALIAN NAVAL ARCHITECT

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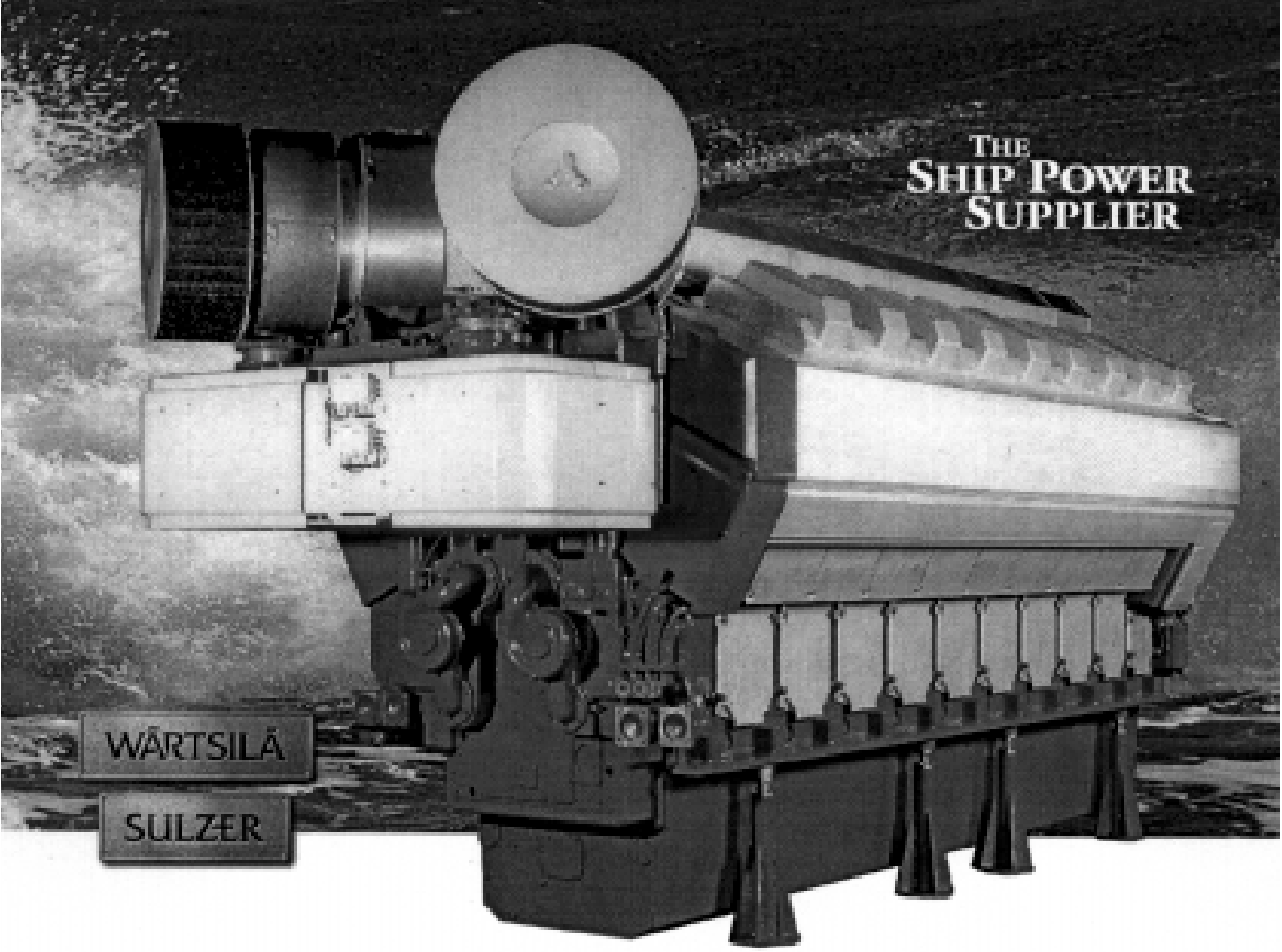

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THE AUSTRALIAN NAVAL ARCHITECT

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The Royal Institution of Naval Architects
(Australian Division)
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Cover Photo:

The 61.5 m catamaran *Sorrento* after launching by Southern Marine Shiplift, Launceston, in January (see page 22).

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From the Division President

It's Time! Time for the Australian Division of RINA to move forward. In the next few weeks the Division will hold its Annual General Meeting and a new Division Council will take office. Yes, I know that to most of you these are events that happen a long way away and have little effect on your lives. That's one of the things it's time to change.

Many things have happened in the Division over the last two or three years. The Division Council has been restructured to make it more representative and responsive to members' needs, new rules and by-laws have been put in place to give the Division more control over its own affairs, and this journal, *The Australian Naval Architect*, has developed as a primary means of keeping members up-to-date with Division activities.

An objective I have set myself for 2001 as Division President is to build on this work and continue the process of reinvigorating the Division. There is still much work to be done, and I look forward to working with the incoming Council to get it done.

The process of electing new members to the Division Council is still in process at the time of writing. Six vacancies are to be filled and I want to acknowledge and express my appreciation of the work done by the retiring members. They are:

Philip Hercus	Ian Laverock
Werner Bundschuh	Robin Gehling
John Jeremy	James Black

All of these people have contributed significantly to Division activities. One person whom I will single out for special mention is Philip Hercus, who has said that he will not seek re-election to the Council. Philip has been a member of Division Council for some years and was one of the leaders in the restructuring process of a few years ago. His contributions will be missed and I thank him for his work in the past.

Finally, in the November 2000 edition of *The Australian Naval Architect*, the Chief Executive of RINA, Trevor Blakeley, announced the election of Australian Division member Bob Herd as an Honorary Fellow of the Institution. This prestigious honour has been awarded to Bob in recognition of his service to the profession of naval architecture both in Australia and abroad. It is an honour not given lightly or frequently by the Institution. The Institution By-Laws allow for no more than fifteen Honorary Fellows at any one time, and at the moment there are only six. In total only 86 Honorary Fellowships have been awarded in the life of the Institution, so Bob is certainly moving into some very distinguished company. On behalf of the Division, I congratulate Bob Herd on his election as Honorary Fellow. His Diploma will be presented to him at the Annual Dinner on 25 April in London.

Bryan Chapman

From the Chief Executive

I would like to thank all those members of the Division whom I met and who gave me such a warm welcome during my recent visit to the Division. This time I was able to meet up with the WA, NSW, ACT, Tasmanian and Queensland Sections. It was a particular pleasure to meet with the Cairns members of the Queensland Section for the first time. My apologies to the members of the Victoria Section, but time did not permit a stop in Melbourne. However, I am looking forward to meeting Bob Herd in London in April, when his services to the Victoria Section and the Division, as well as the maritime industry in Australia, are recognised with the award of his Honorary Fellowship. I also enjoyed the opportunity to sit in on a Division Council meeting.

As always, the purpose of my visit was to meet, listen and inform. I hope I was able to update members on future developments, but primarily I was keen to hear how the Institution can better meet the needs of its members in Australia and elsewhere. A point raised by Council and some other members was how the Institution should seek to appeal more to the younger members of the profession — students and particularly those who graduated over four years ago and have not joined the Institution. Whilst I believe that the Institution has much to offer the naval architect in Australia, I recognise that it must seek to demonstrate to them that it is relevant, both to their needs as naval architects and as Australians. I realise that I may be preaching to the converted, but I would

welcome the views of readers of *The ANA* on how the Institution can better demonstrate that it is indeed relevant to all naval architects in Australia, whether it is by a change in the service it offers or the way in which it promotes itself. Without prejudging the answers, I have a feeling that the answer may lie with the Sections, which is where most members have their contact with the Institution.

I also feel that the advantages and benefits of membership can best be appreciated as a member, and I would therefore appeal to all members to encourage others to follow their lead. If you are able to give me a name, I am happy to write personally to them with an invitation to join the Institution. If it will help to persuade them, I will even offer free membership for a trial period!

That apart, as always, I found the Australian Division to be in good heart and I came away with a number of useful suggestions which I will look at further. It was heartening to see that the Institution's efforts in recent year, to be and present itself as a truly international organisation which happens to have its headquarters in the UK, were being recognised and appreciated.

Thank you once again for your welcome, and I look forward to my next visit to the Division

Trevor Blakeley

Editorial

Following an unprecedented amount of public consultation, the Commonwealth Government released its Defence White paper last December.

The paper seems to have been generally well received, with bipartisan support in the Parliament. In our submission to the Community Consultation Team, we expressed concern at the lack of emphasis on the role of industry in the defence of Australia in the public discussion paper. We also emphasised the importance of planning future naval construction to maximise the opportunities for the maintenance of those skills and capabilities that are important for the support of the ships of the RAN.

The White Paper gives quite a long-term plan for the acquisition of new ships for the RAN, and states the Government's preference for the ships to be built in Australia. Whilst the projects outlined will *sustain* RAN capability over the next two decades rather than expand it, they are significant and, if all the proposed new ships are built locally, then the Australian shipbuilding industry will have a useful defence workload, particularly beyond 2005.

A speculative bar-chart based on the information in the White Paper shows that for the next five years or so, minor projects will dominate (apart from the completion of the Anzac frigates and the Collins-class submarines. The White paper recognises this and suggests that 'Until that new construction program gets underway, (referring to the proposed major surface combatants) the upgrade of the Anzac frigates, planned to start in 2001 and finish in 2007, will help naval shipbuilders retain their physical infrastructure and some of their existing workforce skills.'

Projects to replace the RAN's two replenishment ships and the three amphibious ships will also be underway after about 2005, resulting in a considerable peak in effort, particularly in ship design and project management. These projects provide excellent opportunities for Australian industry input, and it is to be hoped that innovative designs suitable for our particular requirements are selected, rather than the simple adaptation of existing overseas designs.

The considerable workload after 2005 will present challenges for the Department of Defence in meeting the forecast project timescales. In its comments on the role of industry in the defence of Australia, the White paper nominates as a high priority for support from the Australian defence industry 'repair, maintenance and upgrades of major weapons and surveillance platforms.' But the link between new ship construction and the maintenance of this capability is not specifically addressed, and it seems probable that industry and professional organisations like ours will need to be alert to any trend away from local construction as the projects develop.

John Jeremy

Letters to the Editor

Dear Sir,

I was disheartened by the note in *The ANA* of November 2000 reporting on the question 'Do you need a Naval Architect?' (*From the Crow's Nest,* page 33). I was naïve enough to think that these sentiments were something of the past, but I was obviously wrong.

If a shipbuilder thinks he doesn't need a naval architect, or at least somebody with equivalent skills, then he should ask who:

- Defines his customer's requirements in such a way that a vessel to satisfy those requirements may be clearly specified, designed and built?
- Develops the hull form and estimates the hull's resistance so that he can install the correct power?
- Designs and specifies the propeller so that this installed power is converted into forward motion in the most efficient fashion?
- Performs the calculations to estimate the loads on his vessel's structure and derive the scantlings necessary to accept these loads?
- Performs the calculations to ensure that his vessel's stability meets the regulatory requirements and prepares the necessary data so that it may be conveniently operated by the crew?
- Interprets the regulations and provides classification society support to ensure that his vessel is correctly constructed and equipped with the navigational and safety equipment necessary for its proposed service?
- Generally helps him maximise his profit and minimise the likelihood of ending up in court due to in service failure of his vessel?

Bob Herd's series *Forensic Naval Architecture* surely demonstrates the continuing need for naval architectural input to the ship design and operational processes, as does the experience of the Sydney–Hobart race fleet in 1998.

It is always possible, of course, that a shipbuilder may think like a relative of mine, who stated very clearly that he 'never did a tax return', notwithstanding the fact that he was employed at the time and paid PAYE tax. I found that he *didn't* do one either; he paid an accountant to do it! Similarly, our shipbuilder might buy his naval architectural services from outside designers or suppliers, such as propeller manufacturers and towing tanks.

Maybe he hasn't been around for very long. After all it was stated, as far back as 1967, that a major factor in the success of the Japanese shipbuilding industry was 'that Japan has a sufficient number of able university graduates in her shipbuilding industry' (Takezawa, I., Management Control in Shipbuilding in Japan, *Trans. RINA*, Vol. 109 No. 4, 1967).

It is my belief that the shipbuilders who create a secure long-term future for their companies — lasting beyond the entrepreneurial first generation — will be those who can best utilise the skills of professionally qualified staff to develop new products and new ways of manufacturing them.

Bryan Chapman

Dear Sir,

Reading *Naval Architects on the Move* in the last edition of *The ANA*, I thought that members might be interested in my latest move. On 5 January 2001 I retired from the Waterways Authority of NSW after 17 years as a Ship Surveyor there.

I started work in 1956, aged 16 years, as an apprentice Shipwright with the Adelaide Steamship Company at Balmain East, working on the conversion of the company's vessels from coal burners to oil burners as well as general maintenance work.

After two years working mainly in steel fabrication, I decided to transfer my apprenticeship to Brown Bros. in Balmain where I worked for the next six years building fishing trawlers, yachts and power vessels. Boatbuilding continued at Goat Island, building the VIP cruiser *Captain Phillip* and general repairs to the pilot and workboat fleet.

In 1966 I worked as a draftsman with Build-a-Boat Plans. After about three years there, I moved to Eken and Doherty in Chatswood where I stayed for nine years during which time I studied for a certificate in Naval Architecture.

Leaving M. J. Doherty in 1978 due to a downturn in the marine industry, I started my own company as a contract draftsman working on designs for the pleasure boat industry. In 1982 I was contracted to Alan Payne working on the 1983 America's Cup Challenge as well as detail drawings for the *First Fleet* catamaran ferries.

At the end of 1983 I started work as a Ship Surveyor for the MSB (later the Waterways Authority) and worked there till my retirement on 5 January 2001.

Of my skiff designs, five have won Australian Championships and three have been runner-up in World titles. I have also produced a number of cruising yacht designs as well as a large number of fishing vessel designs.

In retirement I intend to build a 9 m timber cruiser for my own use and will be involved in small craft design.

Bill Bollard

[All the best from *The ANA*, Bill! — Ed.]

Dear Sir,

A few weeks ago I met a young sailor who was designing his own sailing yacht. He hadn't done any stability or weight calculations, but was relying on his experience of proportions in other boats. Such a process might work for conventional hull forms but this was a water-ballasted centreboarder, requiring a reasonable grasp of naval architecture to ensure that the vessel floated to its marks and was sufficiently stable. He was going to build it for his own use, so it might be argued that he would harm nobody but himself if the boat proved unseaworthy; but what of his crew, or the next owner when it was sold?

When someone buys a boat that is of novel design or from the drawing board of an unqualified designer, how do they assess whether it is a safe boat? We wouldn't even consider driving a car that was not professionally designed or assessed, let alone an aircraft, so why do we do so with a boat? The answer probably lies in a healthy dislike for regulation and an age-old tradition of the right to go down to the sea and drown ourselves. But what will happen if this yacht is built and then capsizes, drowning a hapless crew member? The lawyers will reap their rewards and the families will weep their tears.

Whose fault was it? The amateur designer who knew just enough to be dangerous? The government for not regulating such activity? RINA for not pushing for higher standards of design? Or am I just scaremongering? The probable outcome, in this particular instance, is that the boat will not float to its marks and will sail like a dog, resulting in disappointment rather than danger. However, the only way of knowing is to do the basic design calculations. Should there be some minimum stability or safety standard that a design must meet? If we regulate in a way that effectively bars amateurs, then we risk stifling new ideas and obstructing highly-motivated young designers — yes, I was one once. We professional naval architects realise that there are guides such as the Australian Standards, the USL Code, the UK RCD etc., but very few designers of small recreational craft look at them. Further, very few of those standards deal with innovative ideas in a satisfactory manner, thus losing their relevance when they are most needed.

Is the Institution (i.e. its members — you, dear reader) happy to live with the risk that lies with the freedom to do as you please? Or should we push to set up yet another regulatory system to shield the community from risk? Answers please, in the next edition of *The ANA*!

Kim Klaka

Dear Sir,

There are only two institutions in Australia catering for the specialised career path of the naval architect, The University of New South Wales and the Australian Maritime College. UNSW is limited in that their degree is almost purely theoretical. The AMC on the other hand is the 'hands on' institution in Australian marine careers. There are many pros and cons for both these establishments, but the major flaw I see is that they are not closely linked. These two institutions should work together, side by side, to rear Australia's marine industry. The technical and theoretical skills and research of the staff at UNSW should be interwoven with the practical know-how of the AMC. For instance, the towing tank should be more available to stu-

dents from both institutions.

The major problem with the estrangement of these two institutions is their locations; i.e they are too far apart. The AMC, located in Launceston, is not within hailing distance of UNSW in Sydney, so to speak. This distance hinders research capabilities and other such anomalies. Also as a student of UNSW, we visit the AMC once within the duration of our degree, and then only for two days, to show us the bare bones of the facilities available there. I see this as a major problem in the furtherance of Australian marine development. If only, somehow, these two institutions could be brought closer, in all senses of the word.

Carl Vlazny
UNSW Student

NEWS FROM THE SECTIONS

New South Wales

The NSW Section Committee met on 1 February and, other than routine matters, discussed the membership of the committee and committee positions (Phil Hercus, our Chair, has retired, and James Fenning, our Treasurer, will not be standing for re-election); the wash-up of the budget from the Sydney Marine Industry Group Christmas (SMIX) Bash (while some monies are still owing, it is believed this will end up revenue-neutral); the technical meeting program for 2001 (our proposed program has yet to be married with the IMarE/Sydney Branch proposed program); the cost of the Harricks Auditorium venue at IEAust (a satisfactory arrangement has been concluded with the IMarE); possible venues for technical meetings in 2001 (several are still under consideration); MARENSA participation in technical meetings; and the date of the AGM (now set for Wednesday 28 March).

The inaugural Sydney Marine Industry Christmas (SMIX) Bash was held on Thursday 7 December on board the beautifully-restored *James Craig* alongside Wharf 7, Darling Harbour from 1700 to 2200. The Bash was organised jointly by the IMarE (Sydney Branch) and RINA (NSW Section). About 170 guests came from the full spectrum of the marine industry, including naval architecture, marine engineering, machinery and equipment supply, regulation, classification, survey, operation,

James Craig underway on Sydney Harbour on 3 December 2000
(Photograph John Jeremy)

management, pilotage, navigation, towage, research, education and training. Equally importantly, the full spectrum of age groups was also represented, from present students to the elders of the marine community.

Sydney turned on a balmy evening, and many partners in attendance enjoyed the view from the decks of *James Craig* and the slight, but unmistakable, movement of the vessel at her berth. Drinks (beer, champagne, wine and soft drinks) and finger foods (sushi, pies, sausage rolls, kebabs, ham-and-tomato rolls and, for afters, profiteroles, strawberries, chocolates and coffee) were provided, and many animated discussions took place. A flash thunderstorm over the north-western suburbs later in the evening provided a spectacular display of lightning, with a small amount of rain at Darling Harbour, and the awnings over the main deck were consequently put to good use for a short time.

Formalities were limited to one short speech, partway through the evening, in which the Chair of the NSW Section and the organising committee, Phil Hercus, welcomed the guests. Phil also paid tribute to Joe Natoli who, in a previous life as Far Eastern Sales Manager for MWM, held the original Sydney marine industry Christmas parties. This year's event was sponsored by MAN B&W, Wartsila NSD, MTU Australia, Det Norske Veritas, Antelope Engineering, Burness Corlett Australia, Graham Parker Designs, and Incat Designs, and our thanks go to these organisations for their generosity. The stayers, who were shown the gangplank at 10:30 pm, rocked on to the Star City Casino across the road and continued the party until the wee small hours.

Phil Helmore

Queensland

The Queensland Section held its quarterly committee meeting on 5 December at the Yeronga Institute of TAFE (teleconferencing with Cairns committee members). This was followed by a technical presentation by Bill Wright, managing director of Norman R Wright and Sons (Boat Builders) Pty Ltd. Bill's presentation was on *Specific Development of Pilot Boats for the Queensland Coast*. A summary paper was provided and the presentation was made with the aid of a number of overheads and a video showing the handling and seakeeping characteristics of their latest pilot boat. The presentation was both informative and entertaining, raising a number of interesting comments and questions from an audience of over twenty members and visitors in both Brisbane and Cairns. The meeting was initially to be held in Southport but logistics problems prevented this and we reverted to Yeronga.

Brian Robson

ACT

Although the ACT section has had no technical meetings recently the section committee has not been idle. We are pleased to announce that Mr Robert Thomson has taken on the role of section chairman and is keen to boost attendance at ACT section meetings.

The RINA Chief Executive, Mr Trevor Blakeley, visited Canberra on 9 February and a summary of this visit will be in the next edition of *The ANA*.

It is now a good opportunity to review the section activities of the past year and look forward to the next. The topics and presenter of each meeting organised by the ACT section in 2000 were as follows:

- *Shock Trial on the RAN Minehunter Coastal*, Bruce McNeice, Department of Defence.
- A social gathering with the RINA President, David Goodrich.
- *Marine Environmental Challenges into the New Millennium*, Mike Julian, AMSA.
- *RINA Solar Boat Workshop*, 9 presenters.
- *Anzac Ship Design Development*, Robert Dunbar, AMT.
- *Philippine Coast Guard Search and Rescue Vessel*, Phil Brown, Tenix Shipbuilding (WA).
- *Prevention of Pollution by Oil Tankers — Can We Improve on Double-Hulls?*, Rob Gehling, AMSA.

Meetings organised by other institutions that members of RINA were invited to:

- *Human Mobility Analysis for Ship Evacu-*

ation, Len Koss, Monash University.

- *Development of the New Naval Ship Rules by Germanischer Lloyd*, Dr Hans Payer, Germanischer Lloyd.

With 2000 behind us we look forward to the coming year with the initial program as outlined in Coming Events elsewhere in this issue.

Bruce McNeice

COMING EVENTS

Australian Division AGM

The Annual General Meeting of the Australian Division of RINA will be held on Wednesday 28 March at 5:30 for 6:00 pm at the Rugby Club, Rugby Place off 31A Pitt St, Sydney; see notice elsewhere in this issue and separate noitce mailed to members). The Australian Division AGM will be followed by a technical meeting of the NSW Section.

NSW Section AGM and Technical Meetings

The Annual General Meeting of the New South Wales Section of RINA will be held on Wednesday 28 March immediately following the Australian Division AGM and the scheduled technical meeting at 5:30 for 6:00 pm at the Rugby Club, Rugby Place off 31A Pitt St, Sydney; see notice mailed to NSW members with this issue).

Technical meetings are generally combined with the Sydney Branch of the IMarE and held on the fourth Wednesday of each month at the Rugby Club, Rugby Place off 31A Pitt St, Sydney (note the new venue!), starting at 5:30 for 6:00 pm and finishing by 8:00 pm. The provisional program of meetings for 2001 (with exceptions noted) is as follows:

28 Feb	Graham Parker, *Sydney's SuperCats* (5:30 pm on board SuperCat at ADI, Garden Island)
28 Mar	Robert Dane, *The Solar Sailor.*
24 Apr	ANI Sales, *Comprehensive Ship Monitoring Systems* (IMarE; Tuesday)
23 May	Panel Discussion, *Do You Have a Future? Continuing Professional Development*
27 Jun	DSTO, *Submarines* (IMarE)
25 Jul	Lawry Doctors, *Hydrodynamics Without Tears: Recent Developments*
15 Aug	Alex Robbins, *Regression Analysis of a Parametric Series of Low-wash Hullforms* (RINA; at UNSW)
22 Aug	MTU Australia, *MTU Engine Developments* (IMarE)
26 Sep	Mike Purdy, *Requirements for RAN's New Patrol Vessels*
24 Oct	Greg Cox, *Compressed Natural Gas as a Marine Fuel* (IMarE)
** Dec	SMIX Bash 2001
**	Date to be advised
IMarE	IMarE meeting
RINA	RINA meeting

The new venue is convenient to all public transport at Circular Quay. There is a parking station next door which has a flat evening rate of $12 after 5 pm, meter parking in the Rocks area (for longer periods the further you walk) free parking at your favourite location outside the CBD (a short train ride away), or free motorcycle parking almost at the front door! There is a bar and a bistro at the club, and catering will be on a buy-your-own basis.

ISSSAR 2001

The Department of Transport and Regional Services will host an International Symposium on Safer Shipping in the APEC Region on Tuesday 6 and Wednesday 7 March 2001. APEC is the acronym for Asia-Pacific Economic Cooperation, and has twenty-one signatories including Australia, New Zealand, Indonesia, Malaysia, Singapore, Korea, Hong Kong, China, Russia, Canada, USA, Mexico, Chile, and Peru. The conference will be held at the Four Points Hotel, Darling Harbour, Sydney. The cost for the symposium alone is $400, or for

both the symposium and the associated NSI conference is $700. Further information may be obtained from Joanne Blackburn on (02) 6274 7982, fax 6274 7744 or email joanne.blackburn@dtrs.gov.au.

NSI 2001

AMSA will host the National Shipping Industry Conference immediately following ISSSAR 2001 on Thursday 8 and Friday 9 March 2001. The conference will be held at the same venue, the Four Points Hotel, Darling Harbour, Sydney. The cost for the conference alone is $400, or for both the conference and the associated ISSSAR symposium is $700. Further information may be obtained from Beverley Atkins on (02) 6279 5032, fax 6279 5858 or email beverley.atkins@amsa.gov.au.

MarTec 2001

The Australia/New Zealand Division of IMarE will host the third international maritime conference at the Plaza International Hotel, Wellington, New Zealand, from Monday 19 to Wednesday 21 November 2001. The conference is being organised by the Wellington Branch in conjunction with the Sydney Branch. The theme of the conference will include latest developments, high-speed craft, fishing vessels, yachts and all aspects of the marine industry. Further information may be obtained from Mr Barry Coupland, phone +64-4-385 0408, fax 385 9258 or email barrian@actrix.gen.nz.

PACIFIC 2002 International Maritime Conference

Flushed with the success of their inaugural Sea Australia conference, the organisers are planning the second, the Pacific 2002 International Maritime Conference, to be held in conjunction with the Pacific 2002 Exhibition and the Sea Power 2002 Naval Conference. All will be held at Darling Harbour, NSW, from Tuesday 29 January to Friday 1 February 2002. The International Maritime Conference is being organised by the Royal Institution of Naval Architects, The Institute of Marine Engineers, and the Institution of Engineers, Australia, with a steering committee under the chairmanship of John Jeremy. Further details may be obtained from John on 9326 1779 or email pacificimc@tourhosts.com.au.

ACT Section

The provisional program of meetings for 2001 is as follows:

- April/May — Workshop in conjunction with Solar Boat Race and Science Festival. The date and venue is to be confirmed.
- May 24 — ACT Section Annual General Meeting.
- July — Technical Meeting on a Defence related topic.
- September — Technical Meeting on an AMSA, Customs or ADFA related topic.
- November — Annual Dinner, with a guest speaker.

Additional technical meetings will be included as they arise. Further information is available from Mr Bruce McNeice on (02) 6266 3608 or e-mail: bruce.mcneice@defence.gov.au.

Queensland Section

The Queensland Section will hold its Annual General Meeting at 1730 on 6 March at the Yeronga Institute of TAFE. This meeting will be followed at 1830 with a technical presentation by Brian Robson who will revisit the Design of the RAN FRP Catamaran Minehunters.

RINA Members!

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

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

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CAIRNS – AUSTRALIA. JULY 3-5, 2001

Upgraded Submarines arrive in Perth

On 14 December the Minister for Defence, John Moore, officially welcomed the first two 'fast tracked' Collins Class submarines to their home base of HMAS *Stirling* in Western Australia.

Dechaineux and *Sheean* have undergone an intensive upgrade program over the past 12 months at a cost of $266 million.

The Minister commented 'The successful "fast tracking" of *Dechaineux* and *Sheean* is a significant milestone and justifies the Federal Government's commitment to get behind the troubled Collins project and fix it.

'A new combat system is required and the Defence Department is finalising recommendations to Government on acquisition of the replacement system. Ongoing refinement of other systems will continue for several years.

'The recently released Defence White Paper confirmed the Federal Government's determination to rectify all problems in all six Collins subs. While the Government will not be completely satisfied until the submarines are fully capable and operational, we can, for the first time in the project's history, say with confidence that all these goals are achievable.

'When work is completed, Australia will have a squadron of world class submarines which will

Dechaineux arriving in Western Australia, accompanied by a most appropriate escort.
(RAN Photograph)

deliver an extremely effective and potent strategic defence capability over the next 25 years,' Mr Moore said.

The Minister acknowledged the team effort behind the 'fast track' program, specifically the Defence Science and Technology Organisation (DSTO), the US Navy, the Defence project team, Australian industry, and the Australian Submarine Corporation and its workforce who have implemented the fixes on-time and on-budget.

HMAS *Collins* and HMAS *Rankin* are next in line for the 'fast track' upgrading.

Five of the six Collins-class submarines are now capable of being deployed on operations at varying levels of capability and complexity. Accordingly, the navy decommissioned the last of the Oberon Class submarines, HMAS *Otama,* on 15 December 2000.

The objectives of the 'fast track' program are to deliver increased operational capability quickly and in a cost-effective manner. Immediate measures undertaken have been directed at providing improved self-protection, improved mechanical reliability and high-speed communications.

The increased operational capability of 'fast track' submarines includes:

- improvements to the sonar, and tactical data handling systems and weapons control;
- reduction of noise signature with a program of ongoing improvement;
- upgrades to the existing combat system;
- platform improvements including hull, fin and casing modifications; and
- improvements to propeller, periscope, mast and communications systems.

HMAS *Kanimbla* arriving in Sydney for the first time after her conversion by Forgacs in Newcastle. Able to carry four Blackhawk helicopters or three Sea Kings, *Kanimbla* can carry 450 troops in addition to her ship's company of 120 sailors and 20 soldiers.
(RAN Photograph)

The Lynx in her new colours
(Photo courtesy Incat Tasmania)

Incat's first 98 m Evolution 10B catamaran in New Zealand

Launched as *Incat Tasmania* (hull number 057) and already well known by virtue of her starring role at the Sydney Olympics, the first craft in Incat's 98m Evolution 10B class has been long-term chartered by New Zealand operator Tranz Rail. Now known as *The Lynx,* the craft set out from Hobart on 25 November on the start of her delivery voyage to New Zealand.

Tranz Rail has acquired *The Lynx* after a comprehensive strategic review of its fleet configuration. In the past, Tranz Rail chartered earlier-generation Incat-built vessels from UK operator Condor Ferries to meet the needs of a seasonal fast ferry service.

Entering service between Wellington and Picton on 10 December, *The Lynx* will extend Tranz Rail's fast ferry operation to a year-round service and, with commercial vehicle capacity available, enable the withdrawal of a 28-year-old conventional freight ferry.

The Evolution 10B class extends Incat's ten-year history in the production of high speed wave-piercing ferries and delivers proven technology in a vessel capable of carrying a mix of passengers and freight at speeds of over 40 kn. Owners and operators have the flexibility to configure the vessel to suit seasonal fluctuations whilst maximizing revenue. Deployed on a high-volume tourist route, an operator will opt for maximum car capacity with minimum heavy vehicles by utilising the mezzanine decks. To maximise flexibility during shoulder seasons or to provide a dedicated freight service, the mezzanine decks can be easily stowed to allow a high concentration of heavy highway vehicles.

New Minehunter Launched

Built by ADI Limited, the RAN's fifth new minehunter, the Huon Class HMAS *Diamantina,* was launched in Newcastle on 2 December 2000 by Mrs Maureen Bryden, daughter of the late Commander G. M. Rose, RANR, who was Commissioning Commanding Officer of the first *Diamantina*.

HMAS *Diamantina* is named after the Diamantina River in Queensland. The original *Diamantina* was one of twelve River-class frigates built in Australia during World War II and served with distinction in the Pacific. Decommissioned in 1946, she was recommissioned in 1959 and served as a training ship and oceanographic research ship until her final decommissioning in the early '80s.

Three Huon-class minehunters have already been commissioned by the Navy. HMA ships *Huon*, *Hawkesbury* and *Norman* are based at HMAS *Waterhen* in Sydney. HMAS *Gascoyne* will be delivered in February 2001, with a sixth ship, *Yarra*, due to be delivered in September 2002.

Image Marine delivers *White Rabbit*

Featuring a stylish profile, an abundance of deck space and an array of on-board facilities, Image Marine's latest cruise catamaran, the recently-delivered 36 m *White Rabbit* provides the perfect cruise environment for her discerning owner.

Image has extensive experience in supplying high-quality customised vessels to the commercial live-aboard sector; however, the stylish *White Rabbit* is the first to be built exclusively for private operation.

With a cruising speed of approximately 20 kn, *White Rabbit* is based in Singapore and will be used for coastal cruising to destinations such as the Philippines, Indonesia and the Asian region.

Facilities aboard *White Rabbit* are spread over two decks with the spacious upper deck dedicated to the owner's suite, bridge and captain's cabin. Custom designed to meet the needs of the owner, the owner's suite features full-length windows on both sides of the room to optimise ocean views.

The ship is powered by two MTU 12V 2000 M90 series diesel engines driving Veemstar five-bladed propellers through ZF BW190A gearboxes.

Austal releases details on 'microplate technology'

Austal Ships has released details of its latest technical innovation, Microplate Technology. Developed through the company's commitment to vibration control, environmental diligence and the longevity of its high-speed vessels, the innovation has resulted in a radical new approach to the design of jet-room structures.

Announcing details of the new development, Austal Director Chris Norman said that Microplate Technology provides the best aft peak design available to the market, delivering extremely low levels of vibration and structure borne noise and consequently guaranteeing superior fatigue performance.

'As water jets can cause considerable and potentially-damaging vibrations, it is important that a sound knowledge of vibration control with respect to fatigue is employed at the design stage. Austal's Design and Advanced Engineering Departments have developed a sophisticated in-house program dedicated to passive vibration control through design optimisation,' said Mr Norman.

Together with the international classification societies (Germanischer Lloyd and Det Norske Veritas), Austal is able to evaluate the natural frequency of plate panels and plate-stiffener combinations, taking into account the panel's edge constraints and other variables, such as water on one side of the plate panel. Various panels are then tuned to ensure that their harmonics are out-of-phase with the natural operating frequencies generated.

In addition to this vibrational design approach, the global waterjet structure is designed to satisfactorily transmit the watejet thrust and steering loads into the surrounding structure. The design group then creates detailed finite element analysis structural models and the results are assessed to ensure that the fatigue life of the structure is optimised. Particular attention is paid to structural detail in order to avoid discontinuities and other stress-raising features.

The first applications of Microplate Technology were seen in BornholmsTrafikken's 86 m gas turbine Auto Express delivered to Denmark in March 2000, and soon after in the three Auto Express vessels delivered to the Aegean for Minoan Flying Dolphins.

Order for WaveMaster

In December 2000 WaveMaster International announced the award of a repeat order for the design and construction of a new 37 m aluminium monohull ferry for Island Ferries Teo in Ireland.

Island Ferries' first WaveMaster vessel, *Draiocht Na Farriage* was delivered in May 1999 to the stormy north west coast of Ireland, where she has been operating a busy tourist and commuter service from Rossaveal to the Aran Islands. Island Ferries' new ferry will be built to a very similar design and is intended to operate on the same route.

The design and build time for the new ship will be only four months. The hull and superstructure will be built in separate halls to accelerate construction.

This latest order enhances WaveMaster's growing reputation in Europe, and follows the recent delivery by WaveMaster of its new-generation 50 m monohull ferry *Speedy* to Germany.

The new 37 m ferry will be completed concurrently with the series construction of six new 35 m monohull ferries for Berlian Ferries in Singapore, and the major refit and refurbishment of the 44 m aluminium catamaran ferry *PolarStern* for the German operator AG Ems.

General particulars

Length overall:	37.4 m
Length on waterline:	31.0 m
Beam (moulded):	8.0 m
Hull depth (moulded):	3.0 m
Maximum hull draught:	1.3 m
Maximum draught approx:	2.5 m
Passengers:	294
Crew:	6
Deadweight:	29.8 t
Classification:	Germanischer Lloyd
Marine Regulations:	European Communities Official Journal L.144 (1998)

Austal USA Secures Two-vessel contract

Austal Limited is pleased to announce that its US operation, Austal USA, has secured a two vessel order for the construction of two 45.7 m aluminium crew supply vessels to operate in the Gulf of Mexico.

The new vessels have been ordered by Otto Candies LLC of Des Allemands, Louisiana, operators of offshore service vessels, and are scheduled for delivery in early 2002. This contract adds to the 25 m high-speed passenger catamaran already under construction at Austal USA's new facility.

Otto Candies LLC is a key innovator in this market and has already proved the concept with the introduction into the Gulf of a 42.8 m aluminium catamaran, formerly known as *Speeder* and renamed *Seba'an*, a vessel which was originally built by Austal Ships as a very fast ferry (over 40 kn cruise speed) in the mid 1990s.

With a prominent 120 m x 28 m x 22 m construction hall sitting on the Mobile River in downtown Mobile, Austal USA celebrated its official yard opening on 16 February 2001.

The 45.7 m vessels are of monohull design and will be used to service the offshore industry in the Gulf of Mexico with an operating speed of 26 kn. Two forward cabins on the main deck provide comfortable airline-style seating for 80 passengers (rig crew). Accommodation for six vessel operating crew (three twin berths, galley, mess, bathroom and office) is located below the main deck. The aft cargo deck has been designed to carry up to 152.5 t (150 long tons) of cargo.

The vessels will be powered by four Cummins KTA 38 M1 diesel engines driving Hamilton 571 waterjets through Reintjes AWS 430/1 reversing gearboxes. The watejets provide excellent station keeping and manoeuvring whilst crew/cargo transfer takes place with control switched to an aft-facing bridge station.

US Alliance Signals Exciting New Era for Incat

In a major new venture set to further increase Incat's dominance of the fast ship market, an agreement has been signed by Incat Australia with Bollinger Shipyards Inc. of Louisiana, USA, to market and build high-speed vessels in the United States under the flag of Bollinger/Incat USA.

Just as Incat identified the fast ferry niche over a decade ago, the Tasmanian shipbuilder has now identified another area of the marine world in need of radical development. With its sights set on the military, Bollinger/Incat USA is committed to revolutionising the way navies think about and use innovative fast craft technology. As a result, the military and coast guard sectors are showing serious interest in multiple numbers of wavepiercing fast craft.

Bollinger Shipyards Inc. is a leading provider of fast military and coastguard patrol boats from its three construction shipyards. With fourteen shipyards at present, all strategically located between New Orleans and Houston and enjoying direct access to the Gulf of Mexico, Mississippi River and Intracoastal Waterway, Bollinger is the largest vessel repair company in the Gulf of Mexico region. They have a total of forty-two dry-docks in Louisiana and Texas.

Bollinger/Incat USA has been working on a proposal for the military of a wavepiercing craft, similar to the heavy-freight 98 m Evolution 10B class, that can carry 500 persons and a variety of vehicles at speeds of more than 40 kn over long ranges.

Currently, Bollinger/Incat USA is in discussion with three arms of the US Military to charter a craft for trials. Each has its own unique needs and Bollinger/Incat USA is confident that it can supply the craft to exceed their job requirements. From very fast boats for patrol, interception and rescue work to very fast heavy-lift ro-ros required for troop and equipment movements, the possibilities, not just within America, but also worldwide, are immense.

The charter of *HMAS Jervis Bay* to the Royal Australian Navy has served to illustrate the suitability of wavepiercing catamarans as military platforms. While the US military is seen as a bold new arena for the new joint venture it is Bollinger/Incat USA's firm belief that the US market will springboard its defence vessels into the navies of the world.

New Ship for Blue Line Cruises

Western Australian shipbuilder, Image Marine, has announced a new contract to build a 34 m dinner cruise catamaran for Blue Line Cruises for operation in Sydney Harbour.

As part of the Accor Group, the world's largest group in travel and tourism services, Blue Line Cruises have been providing luxury cruising on Sydney Harbour for over 12 years and currently operate three vessels including the *Sydney Showboats* and *Majistic*. The new vessel is scheduled to join Blue Line's fleet in August 2001.

This vessel will be the first of its type to be built specifically for the restaurant/tourism market by Image Marine (an Austal Group company).

The 34 m dinner cruise catamaran has been specifically designed to suit the needs of the client, incorporating a wide beam (13.5 m) and the elimination of structural pillars throughout dining areas to offer the maximum amount of dining and entertainment space for 360 passengers.

With an approximate cruising speed of 5 kn, the well-appointed catamaran will have two separate dining areas spread over two decks. Passenger entertainment is also well catered for with a raised stage on the main deck incorporating audio and lighting systems.

Additional on-board features include a large fully-equipped galley, food preparation areas, numerous storage areas for fresh and frozen produce, and toilet facilities.

General Particulars

Overall Length:	34.0 m
Waterline Length:	31.0 m
Beam:	13.5 m
Passengers:	360
Crew:	25
Propulsion:	Two Cummins 6CTA engines Two MG 5075a gearboxes.
Service Speed:	5 kn

Profile drawing of the new catamaran for Blue Line Cruises.

New South Wales News

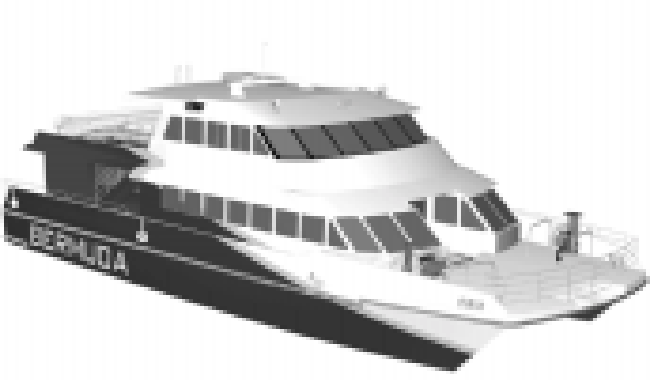
New Design

Incat Designs' workload continues to be heavy with the recent announcement of a 2+2 boat order from Gladding Hearn in Massachusetts, USA, for a series of 25 m catamaran ferries for the Bermudan Department of Transport. The vessels will operate out of the capital of Bermuda, Hamilton, to the outer villages of Dockyard and St George. The vessels will be used to help ease traffic congestion on the island's narrow road system in peak hours, as well as having an overload capacity to transport passengers from the many cruise ships that visit the island each year. Details of the vessels are as follows:

Length:	25.7 m
Beam:	9.2 m
Draft:	1.6 m
Passengers:	250 (200 seated)
Engines:	Two 12V2000
Power:	Two 720 kW
Propeller:	5 blade NiBrAl
Speed:	25 kn

The vessel will load passengers over the bow from custom-built docks located around the island. In addition, the vessels will have the ability to carry small motorcycles on the bow.

A rendering of the design is shown below.



New Construction

BoatSpeed at West Gosford are building a 26 m hi-tech cruising yacht to a design by Paul Stanyon of Coomera, Qld, for a Queensland owner. The high-tech aspects include push-button setting and trimming of sails, water ballast transfer, stowage of equipment, etc. Your editors visited the vessel early in February and saw that the vessel is being finished to an extremely high standard. The proprietors of BoatSpeed, Peter and Sari Ullrich, can be justifiably proud of their achievement. Launching is expected in early March, and we expect to be able to report on this vessel in detail in the May issue of *The ANA*.

Vessels designed by Incat Designs which are nearing completion include the first of the two vessels for Seastreak in New York, due to be launched at the end of February by Gladding Hearn in Massachusetts, USA. Also *Bombard*, a 44 m catamaran for Catalina Express for operation from Long Beach to Catalina Island, Los Angeles, due for delivery in May; and *Golden Gate*, a 43 m catamaran for The Golden Gate Bridge, Highway and Transportation Department for operation from Alameda to Oakland on San Francisco Bay, due for delivery in June; both from Nichols Bros. in Washington (state), USA. Details of the Catalina Express vessel were reported in the August issue of *The ANA*.

New South Wales Premier Bob Carr has officially launched and christened what is being called the largest and most technically-advanced motor yacht built on Australia's eastern seaboard. *Slipstream* was designed by Ed Dubois and built at the Warren Yachts yards at Kincumber, 80 kilometres north of Sydney (See *The ANA*, November 2000). The company said that the 43.4 m by 8.5 m vessel has been constructed entirely of 'space age' composites. Powered by V-12 Caterpillar diesels, the vessel, which has a semi-displacement hull, will have a top speed of 17 kn with a range of 4 827 km, the company said. It has five staterooms, and will be handled by a full-time crew of nine. The company said *Slipstream* is the largest craft yet built by Dave Warren since he established his yard in 1986. The new vessel will undergo extensive sea trials off Sydney in the next few weeks before her new owner, identified only as 'a foreign businessman,' takes delivery.

New Director for ANMM

Ms Mary-Louise Williams has been appointed as Director of the Australian National Maritime Museum at Darling Harbour. The founding director, Dr Kevin Fewster, moved on in early 2000 to become Director of Australia's largest museum, the Powerhouse Museum at Darling Harbour (see *The ANA*, May 2000). Ms Williams has been at the ANMM since May 1988, and has been Acting Director since Dr Fewster's departure. Ms Williams' appointment as Director was announced by the Minister for the Arts and Centenary of Federation, the Hon. Peter McGauran, in November.

Duyfken Replica Due in Sydney

In 1606 the original *Duyfken* from the Verenigde Oostindische Compagnie (Dutch East India Company) under the command of Captain Dirk Hartog, made the first recorded European contact with Australia and its inhabitants. The pewter plate which he nailed to a tree in WA, and the replacement subsequently left by Captain Willem de Vlamingh are both currently on display at the ANMM. The *Duyfken* replica, built by the Fremantle Maritime Museum, is due to arrive at Sydney heads at 4 pm on Saturday 3 March, and she will be escorted up the harbour by a parade of sail to her berth at the ANMM. She will be open for public inspection from Sunday 4 March for a short season. For details visit www.littledove.org.

BT Global Challenge Due in Sydney

On 10 September 2000, twelve identical 22 m steel yachts, making up the fleet of the BT Global Challenge, set sail from Southampton, England for their round-the-world race. They are due in Sydney from 25 February and will berth at the ANMM, with an open day for all to meet the crews and view their yachts on Sunday 4 March. The fourth leg of the race, from Sydney to Cape Town, is due to start at 1 pm on Sunday 11 March on Sydney Harbour. For race progress visit www.btchallenge.com.

Phil Helmore

Queensland News

Over the last six months the Brisbane ship and boat building industry has been very active, with many yards close to capacity and orders stretching well into 2001.

Aluminium Marine has continued building a range of catamarans designed by Sea Speed Pty Ltd. Recent deliveries include the 21 m catamaran *Centurion* to a local Gold Coast operator running up to 150 passengers to the Couran Cove resort. Also completed was a 19 m, 20 kn catamaran passenger ferry *Hinchinbrook Explorer*. Soon to be launched is a 25 m dive catamaran for operation out of Port Douglas.

Aus-Boats has delivered a second 12 m passenger catamaran, *Alley Kat*. This is a sister vessel to the original *Kitty Kat*. Both ferries are now being used as passenger ferries to Stradbroke Island. *Alley Kat* has seating for 60 passengers and cruises at 22 kn and for short trips can take up to 80 passengers.

Brisbane Ship Constructions has delivered a 24 m, 188 passenger catamaran, *Queenslander I*, which is running to Fitzroy Island off Cairns. Under construction is an 18.5 m monohull workboat. This vessel is being built to Lloyds SSC rules and will be for offshore operations as a multi-purpose support vessel. Norman R Wright and Sons are also very busy. Recent deliveries include the 12 m *Picnic Boat* for Norway and a major refit of a 28 m luxury sailing yacht. On the drawing board (or computer screen) is an 18 m fast game boat and two 19.5 m long range motor yachts. Oxford Yachts have started the construction of a 28 m, 32 kn passenger ferry designed by Crowther Multihulls. The vessel is for export, running to an island off Taiwan and is to be classed with BV.

Queensland Ships has completed a number of 7 m to 10 m commercial vessels for Government Departments and the Coastguard organisation. A new 10 m catamaran for the Manly (Brisbane) Coastguard has just been launched. This is a first for the Coastguard as the vessel is being constructed of aluminium and is powered by inboard engines with stern drives. The vessel was designed by Stephen and Gravlev Pty Ltd, a local design company based in Manly. South Pacific Marine delivered a 32 m double-ended car ferry *Manta Ray* which will have a capacity of 18 cars and will operate between the mainland and Fraser Island

On the Gold Coast, Sea Transport Solutions Pty Ltd is busy with a wide variety of design and consulting projects, including the design of the 'jumboisation' of the ro-ro ferry *Sea Spirit*. This vessel is operated by Islands Transport Pty Ltd and will be increased in length from 35 m to 45m. The construction work will be carried out by South Pacific Marine Pty Ltd. Stanyon Marine is undertaking the design of a 14 m catamaran in FRP with special emphasis on operation by disabled persons. The vessel will be fitted with a transom platform that enables the launch of a six-wheel amphibious buggy, and also allows wheelchair access from the wharf. Numerous safety features will be incorporated in the design, including mechanical medical aids, for which a specialist will be commissioned.

John Lund Marine Design Pty Ltd (now trading as Gold Coast Naval Architects) is designing a 25 m long-range motor yacht for an overseas client. The vessel will be constructed locally and will have a steel hull and aluminium superstructure to Bureau Veritas classification. The design emphasis is on practical ocean-going capability rather than opulence.

Brian Robson

Tasmanian News

The 61.5 m displacement catamaran, *Sorrento*, was launched in mid-January 2001 at Southern Marine Shiplift in Launceston. *Sorrento* will join *Queenscliff* (launched in 1993), on the Queenscliff — Sorrento route across Port Phillip Bay, a service which will see each vessel operate close to twelve crossings per day, 365 days per year.

Both vessels were designed by Seward Maritime of Launceston. The hull design of *Sorrento*, which includes a pair of bulbous bows, was based on experience gained from many years operating *Queenscliff*, plus a solid CFD test program using SHIPFLOW followed by scale model tests, both conducted at the AMC in Launceston. Results from this study indicate that *Sorrento* has a very efficient hull form.

Sorrento can carry 700 passengers plus 80 cars in six lanes and three mezzanine lanes in a drive-through configuration similar to *Queenscliff*. Unlike *Queenscliff*, which is of all steel construction, *Sorrento* has a steel hull and vehicle decks with alloy construction for the upper superstructure, stern and bow ramps, mezzanine decks and bow visor.

General particulars

Length overall:	61.35 m
Beam overall:	17.4 m
Depth:	4.5 m
Draft (design):	2.3 m
Displacement (design):	750 t
Design Speed:	13.5 kn
Propulsion:	Two Cummins KTA 38 M1 rated 895 kW at 1800 rpm driving Aquamaster 1201 CRP azimuthing thrusters with contra-rotating propellers designed for removal through aft castles without docking the vessel
Bow Thrusters:	Two Ulstein

Hammann Sewage system
Servowatch ship monitoring system.

Gregor Macfarlane

Sorrento berthed at Southern Marine Shiplift. One of the Australian Maritime College's training vessels, *Wyuna*, is seen on the Syncrolift.

New Opportunities for Australian Industry

On 6 December the Minister for Defence, John Moore said that the Defence White Paper provides unprecedented opportunities for the Australian defence industry sector.

'*Defence 2000: Our Future Defence Force* makes a long-term commitment to a first-class Australian Defence Force in partnership with Australian industry,' Mr Moore said. 'Specifically, industry will benefit from clear guidance contained in the White Paper. There will be greater predicability in acquisition, planning and contracting which will facilitate a more certain, sustainable basis for business planning.'

'The Government retains a strong preference for building new ships in Australia,' Mr Moore said.

A project will start next year to replace the current Fremantle-class patrol boats. The landing ship, HMAS *Tobruk*, will be replaced in 2010 and the support ships, HMAS *Westralia* and *Success*, will be replaced in 2009 and 2015 respectively.

At least three air warfare destroyers are planned, with construction due to start around 2008. Planning will begin next year for replacements for the Fremantle-class patrol boats, with the new boats scheduled to begin entering service in 2004–5. Two amphibious support ships, HMAS *Manoora* and *Kanimbla*, are planned to be replaced by 2015.

DEFENCE WHITE PAPER

The Commonwealth Government released its Defence White paper, entitled *Defence 2000: Our Future Defence Force* on 6 December 2000. The complete document is available from the Defence Review 2000 Secretariat, or online at www.defence.gov.au/whitepaper/. The section on maritime forces will be of particular interest to readers of *The ANA*, and is reproduced below.

'Maritime Forces

8.51 Australia's forces for maritime operations give us the ability to deny an opponent the use of our maritime approaches, and allow us the freedom to operate at sea ourselves. In our maritime strategic environment, the ability to operate freely in our surrounding oceans, and to deny them to others, is critical to the defence of Australia, and to our capacity to contribute effectively to the security of our immediate neighbourhood. Capable maritime forces also provide important options for contributing to regional coalitions in support of our wider strategic interests and objectives.

8.52 Australia's maritime forces consist of our surface fleet — including major combatants, helicopters and support ships; submarines; maritime patrol aircraft; mine hunters; and patrol boats. They also draw on the capabilities of our F/A-18 and F-111 aircraft — which have a potent anti-shipping strike capacity — and on the intelligence and surveillance capabilities falling under the Information Capabilities grouping. They will also draw in the future on our AEW&C aircraft for surveillance.

Capability Goal

8.53 The Government's primary goal for our maritime forces is to maintain an assured capability to detect and attack any major surface ships, and to impose substantial constraints on hostile submarine operations, in our extended maritime approaches. It also intends to maintain the ability to support Australian forces deployed offshore, to contribute to maritime security in our wider region, to protect Australian ports from sea mines, and to support civil law enforcement and coastal surveillance operations.

8.54 The Government's aim is therefore to maintain, in addition to a highly capable air-based maritime-strike capability in the F/A-18 and F-111 fleets, a capable surface fleet able to operate in a wide range of circumstances throughout our maritime approaches and beyond. Our ships should be able to operate effectively with those of the United States, and to contribute to regional coalition operations. Our submarines should be able to operate effectively in high-capability operational environments in the Asia – Pacific region. Our maritime patrol aircraft should have the capacity to operate throughout our region, with high-quality sensors and weapons for attacks on surface ships and submarines. Our patrol boats should be able to make a cost-effective and sustained contribution to civil coastal enforcement and surveillance operations.

Major Issues

Surface Fleet

8.55 By the end of next year, when the last of the guided missile destroyers (DDGs) is decommissioned, Australia's surface fleet will consist of two classes of major warship. The first of those is the six guided missile frigates (FFGs) that entered service between 1980 and 1993. The second class is the ANZAC ships, two of which have now been delivered, with another six scheduled to enter service by 2006. Three key questions about the future shape of the fleet have been considered in developing the Defence Capability Plan.

8.56 The first is the adequacy of ships' defences against the more capable anti-ship missiles that are

proliferating in our region. Without adequate defences, our ships would be limited in their ability to operate against capable regional navies and within range of hostile air forces. A project now under way will provide such defences for the FFGs, but the ANZACs do not have adequate defences and have other significant deficiencies in their combat capabilities.

8.57 The second is the requirement for a long-range air-defence capacity in the fleet. Without such capability, our ships would be more vulnerable to air attack, less capable of defending forces deployed offshore and less capable of contributing effectively to coalition naval operations.

8.58 Third, we have considered the future provision of support ships, which can increase our maritime capability by keeping ships at sea longer and at greater ranges from port. One of our support ships - HMAS *Westralia* - pays off in 2009 and the other in 2015. Our 10-year plan therefore needs to address the replacement of these ships.

8.59 In relation to these issues, the Government's planning is as follows. First, the ANZAC ships are planned to be upgraded to provide a reasonable level of anti-ship missile defences and other enhancements of their combat capabilities, including the fitting of Harpoon anti-ship missiles. This project is scheduled to start in 2001 with upgraded ships in service by 2007.

8.60 Second, the FFGs are planned to be replaced when they are decommissioned from 2013 by a new class of at least three air-defence-capable ships. It is expected that these ships will be significantly larger and more capable than the FFGs. The project is scheduled to commence in 2005–06. The Government's strong preference is to build these ships in Australia, which will provide significant work for Australia's shipbuilding industry.

8.61 Third, the Government plans to replace HMAS *Westralia*, which is a converted commercial tanker, with a purpose-built support ship when it pays off in 2009. We also plan to replace our second support ship, HMAS *Success*, with another ship of the same class when it pays off in 2015. The Government's strong preference is to build these ships in Australia. The project to replace HMAS *Westralia* is planned to start around 2004–05.

8.62 Our Seahawk and Super Seasprite helicopters provide an important and integral part of the surface fleet surveillance, anti-submarine and anti-surface warfare capabilities. The Government plans a major mid-life upgrade of the Seahawk commencing around 2003.

Submarines

8.63 The Government plans to bring all six Collins class submarines to a high level of capability by major improvements to both the platform and combat systems. Modifications already under way to some boats have resulted in major improvements in the acoustic performance of the boats and in the reliability of a number of the ship systems. Interim modifications to the combat system have improved performance. All boats will now be modified for better acoustic performance and reliability and a new combat system will be fitted, with work starting next year. The first boat with the new combat system is planned to be available in 2005–06. A program of ongoing upgrades will also be established.

8.64 In addition, a project is also scheduled to replace our current heavyweight torpedo with a new and more capable weapon beginning in 2002–03. The first new torpedoes are planned to enter service around 2006.

Maritime Patrol Aircraft

8.65 Australia's fleet of 19 P-3C Orion maritime patrol aircraft are undergoing a major upgrade which will provide an excellent capability over coming years. Two additional enhancements have been planned: the fitting of new electro-optical sensors to improve capacity to detect ships under difficult circum-

stances, starting around 2004–05, and the acquisition of a new lightweight torpedo to improve the P-3C's critical submarine-killing capabilities, starting around 2002. A remaining shortfall is self-protection for the aircraft from missiles if they were to be deployed in medium or high threat environments.

8.66 The P-3Cs will reach the end of their current planned life in around 2015. Unless new technology emerges which offers more cost-effective ways to perform the P-3C's roles, the Government would intend to retain the maritime patrol aircraft capability past that date. The Defence Capability Plan therefore provides for a major refurbishment or replacement of the P-3C fleet starting around 2007.

Patrol Boats

8.67 The 15 Fremantle class Patrol Boats are close to the end of their service life. These boats make a critical contribution to coastal surveillance and enforcement, and are accorded a high priority by the Government. On current planning a project will start next year to provide a new class of patrol boat to replace the Fremantles as they are decommissioned. The new boats will preferably be built in Australia and are expected to enter service from 2004–05.

Costs

8.68 Under the Defence Capability Plan the Government anticipates spending an average of $3.5 billion per year on maintenance of current maritime capability over the decade. The expected capital expenditure needed for the capability enhancements outlined above totals around $1.8 billion over the decade, and additional personnel and operating costs amount to about $300 million.'

Source: *Defence 2000: Our Future Defence Force*, pages 87-91.

Batavia Sails Away!

Bill Richards and Jeffrey Mellefont

Australian National Maritime Museum

The first-ever sailing trials for *Batavia* were the realisation of a long-standing dream for the people behind this superb reconstruction of a 17th-century Dutch East-Indiaman. They came as *Batavia*'s time at the Australian National Maritime Museum draws to an end.

Dutch boatbuilder Willem Vos, the driving force behind the reconstruction of the 17th-century sailing ship *Batavia*, crossed the world recently to see his colossal dream come to life. The great three-masted ship that he conceived, built and launched finally went to sea under sail on the blue water outside Sydney Harbour. And Vos was delighted with her performance.

One of the world's best known historical ship replicas, *Batavia* has been visiting the Australian National Maritime Museum as an Olympic year feature. The original *Batavia*, a Dutch East India Company flagship, was wrecked in the Abrolhos Islands off the western coast of Australia on her maiden voyage in 1629.

Willem Vos prepared the plans and directed the building of the replica at a shipyard he established in Lelystad, The Netherlands. It's now more than 25 years since he started, and the project has raised his status from that of a humble builder of small traditional boats to a nationally-known figure in The Netherlands — and has brought him international acclaim as well.

Asked why he decided to rebuild *Batavia*, the softly-spoken shipwright says: 'I had seen many small models of the great Dutch East India Company ships, and I thought it would be good to have a model that you get on board and walk around inside.'

His biggest hurdle was that 17th-century Dutch shipbuilders did not use plans, relying instead on practical knowledge, experience and traditions. Vos and his researchers studied contemporary paintings, scoured Dutch East India Company records and gleaned evidence from shipwrecks, particularly the recently-discovered wreck of the original *Batavia* excavated in Western Australian waters. He then established trade training schools so that he would have the necessary skills on hand to build a ship as it would have been built in the 17th century — shipwrights, block makers and wood carvers, sailmakers and riggers.

The shallow waters around Lelystad had prevented *Batavia* from being deeply ballasted for sailing trials. In Sydney the crew have been able to load many more tonnes of ballast into the bilges and, after careful inclination tests with the aid of a large crane, they have now set sail — with the *Endeavour* replica for company on one occasion.

'It is good that *Batavia* has come to Sydney,' Vos says. 'It is now a sailing ship, not just a museum ship. It was wonderful to be on board under sail. You could hear the hull timbers straining. The whole ship purred like a cat.' Vos said that he was particularly pleased with the vessel's stability in the water, and its response to the whipstaff, a tall vertical pole attached to the tiller which steers the ship.

Sailing master during the sea trials, the captain of Western Australia's 19th-century-style sail training ship *Leeuwin*, Peter Petrov, found *Batavia* completely different to *Leeuwin* or 18th-century replicas such as *Endeavour* and *Bounty*. 'It's the sheer size, 1400 tons compared to *Endeavour*'s 400 tons,' he told us. 'On *Endeavour* — and we had people sailing with us like [*Endeavour* master] Chris Blake — you feel you can overpower her. But *Batavia* is just so big that it's the ship which commands!'

After initial harbour trials and assessing the state of the gear (Petrov judged the integrity of the hull 'fantastic' and the small rudder 'quite responsive') there came a day when the crew was able to set all ten sails heading up the coast, making 4–5 kn knots in fairly light conditions. On another occasion offshore, a southerly came in at 25 or 30 knots and the ship was making 6–7 knots under courses and topsails.

Batavia at the Australian National Maritime Museum
(Photograph John Jeremy)

'Every day we've been out we've been able to do something different,' said Petrov, 'and that's because we've had excellent crew, some of the best people you could ever hope to get together, people who were every bit as good as sailors of the past. Their work is hard and heavy but, in assessing the lessons learned about 17th-century seamanship, we're able to get different points of view from different parts of the deck.' It takes forty people to sail the ship, for raising halyards, handling the braces, wearing ship and furling sails. Two are required on the whipstaff alone.

Petrov praised the ship's stability, although adding that they had to watch out for the gun ports, a vulnerable point in the design of ships of that era which had caused others, like *Mary Rose* and *Vasa*, to flood and founder.

'When you build something like *Batavia*, based on historical evidence, you're not sure why things were done a certain way,' Petrov explained. 'Then when you start to handle it and couple it with the seamanship side of things, the answers come through.' So, for example, he believes that with experience *Batavia*'s crew will be able to tack through the eye of the wind, helped by the spritsail and sprit topsail raised on the bowsprit, which has a big supporting knee taking the strain of turning the ship.

The three ships recently together at the Museum presented different approaches, Petrov pointed out. *James Craig*, where some of the original ship remained, can be called a restoration. *Endeavour*, built from precise Admiralty records, is a true replica. Evidence for *Batavia* is far less complete than either of the two more recent ships, so it's a reconstruction.

'A great thing about this ship is that there's no Hollywood about it!' Petrov emphasises. 'The crew are living on board and when it rains the decks leak and it's just like when you read about that period, and the dreadful conditions people endured! It doesn't take any imagination when you step on board to really understand that.'

Petrov reflected that *Batavia*'s Sydney sailings were just a beginning. 'It's kindled a lot of enthusiasm to go back and learn a lot more about how those 17th-century Dutchmen, who were great mariners, actually did things.'

Batavia is due to return to Lelystad early in 2001. Willem Vos says it's likely the big ship will participate, under sail, in celebrations marking the 400th anniversary of the Dutch East India Company's establishment in 2004.

This article appeared in the journal of the Australian National Maritime Museum, Signals, *December 2000, and is reproduced here with permission.* Batavia*'s time at the ANMM has now been extended until April 2001.*

Port quarter view of *Batavia.*
(Photograph John Jeremy)

Directional Effects on Sinkage, Trim, and Resistance

Lawrence J. Doctors
Phillip J. Helmore
Dougal R. Loadman
Simon W. Robards

The University of New South Wales

Abstract

The influence of fore-and-aft asymmetry of a ship is known to be ignored in the classic thin-ship theory for resistance. In the current work, a more sophisticated approach is utilized in which the sinkage and trim are accounted for within the framework of the same theory. It is shown that the enhanced computer program correctly predicts that vessels with the centre of buoyancy forward of midships suffer a greater sinkage. In addition, the trim is relatively more by the bow. Finally, it is demonstrated that the inclusion of the effects of sinkage and trim in the analysis results in a slightly increased resistance for vessels with the centre of buoyancy forward of midships, in keeping with the experimental evidence.

1 Introduction

Previous work on the subject of prediction of resistance of marine vehicles, such as monohulls and catamarans, has shown that the *trends* in the curve of total resistance with respect to speed can be predicted with excellent accuracy, using the traditional Michell (1898) wave-resistance theory.

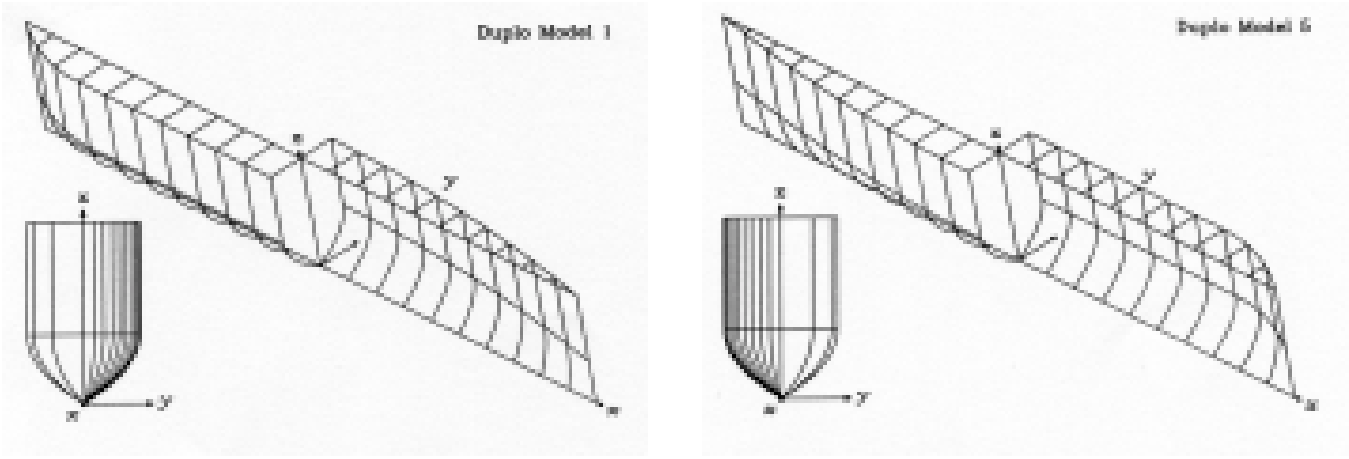
These principles were advanced in the research of Doctors and Day (1997) and Doctors (1998 and 1999). There, transom-stern effects were included in the theory by accounting for the hollow in the water behind the vessel in an approximate manner. The wave resistance was assumed to be simply that of the vessel plus its hollow in the water behind the transom. To this drag they added the so-called hydrostatic resistance, which represents the drag associated with the transom stern not being wetted. A good level of correlation between the predictions and the experimental data for a large set of conditions for the tests on a towing-tank catamaran model was demonstrated.

Following that effort, Doctors and Day (2000a and 2000b) extended the research by performing a detailed analysis of the actual near-field water flow past the vessel, using the rather more complicated formulas presented by Wehausen and Laitone (1960). This permitted the estimation of the sinkage and trim and provided a more intellectually-satisfying determination of the resistance – utilizing a pressure integration over the wetted hull surface — without the need to resort to the use of the concept of the so-called hydrostatic drag.

In the current work, this theory has been applied to a series of vessels which do not possess fore-and-aft symmetry. The purpose of this project was to investigate to what extent fore-and-aft asymmetry plays a role. To this end, it should be noted that the Michell formula itself (which ignores sinkage and trim) is insensitive to this geometric effect.

2 Formulation of the Problem

Figures 1(a) and 1(b) show the main geometric features of the two most extreme of the five test models. These models have been named the Duplo series (because of the way the fore-, aft- and mid-body sections connect to each other for flexibility in shape). In all, there are five models, in which Model 5 is the reverse of Model 1 and Model 4 is the reverse of Model 2. Model 3 is the standard Wigley (1934) model.



(a) Duplo Model 1 (b) Duplo Model 5

Figure 1: Definition of the Problem

Tables 1 and 2 list the principal dimensions and features of the models.

Table 1: Common Vessel Particulars

Item	Symbol	Value
Length	L	1500 mm
Beam	B	150 mm
Draft	T	93.75 mm
Maximum section coefficient	C_M	0.6777

Table 2: Non-common Vessel Particulars

Model Number	Length of Run L_R (mm)	Length of Parallel Middle Body L_M (mm)	Length of Entrance L_E (mm)	Prismatic Coefficient C_P	Displacement Δ (kg)	Longitudinal Centre of Buoyancy LCB (mm)
1	225	525	750	0.7833	11.016	−75.40
2	450	300	750	0.7333	10.313	−40.91
3	750	0	750	0.6667	9.375	0.00
4	750	300	450	0.7333	10.313	40.91
5	750	525	225	0.7833	11.016	75.40

For the purpose of the numerical calculations, the models were represented by a computational grid with 40 panels longitudinally and 8 panels vertically. This computational grid has been found to be sufficiently fine for most practical purposes. The form factors for the viscous resistance were calculated on the basis of the work of Holtrop (1984). These formulas will provide different estimates for the frictional resistance, depending on the direction of travel of the ship model, thus complementing the calculations of the wave resistance noted earlier.

3 Towing-tank Experiments

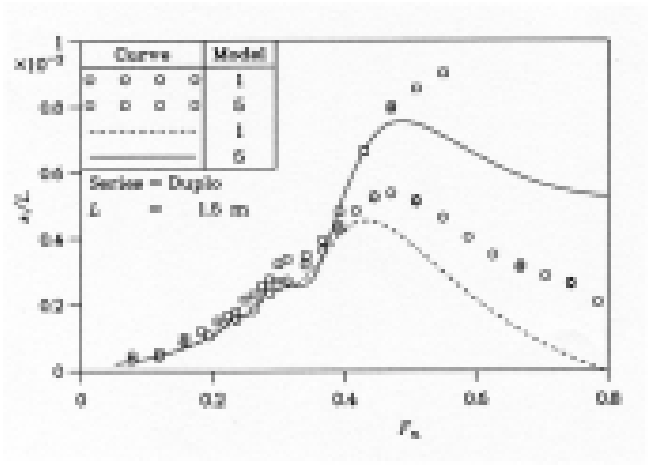
The five models were all tested in the towing tank at the Australian Maritime College during 2000 by the two student authors. The models were tested over a large range of speeds in two conditions. These

were the fixed condition and the free-to-sink-and-trim condition. The vertical movements were measured in the usual fashion at the two towing posts in order to compute the sinkage *s* at the centre of the vessel and the trim by the stern *t*. The steady-state resistance was recorded in the usual manner.

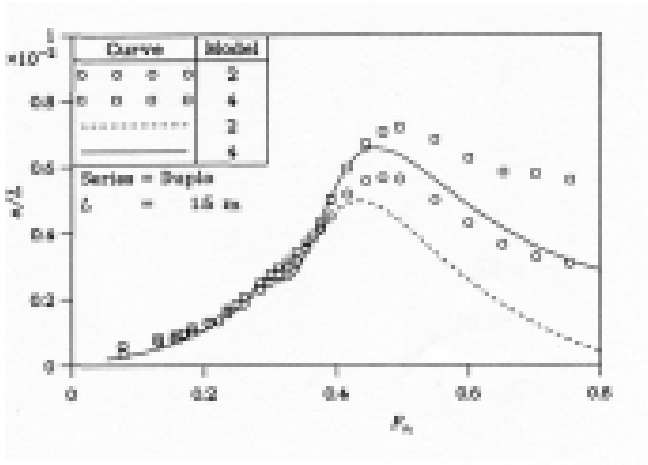
The experiments are described in the thesis of Loadman (2000), where the results of this investigation can be found in greater detail.

4 Numerical Results

Figure 2(a) shows the sinkage-to-length ratio *s/L* as a function of the length Froude number F_n for Model 1 and Model 5. It can be seen that the theory predicts the sinkage in an adequate fashion up to a Froude number of 0.45. Beyond that speed, the theoretical results are low; however, they still correctly predict that Model 5 (LCB forward of midships) undergoes a greater sinkage. Similar comments can be made about the comparison between Model 2 and Model 4 in Figure 2(b).



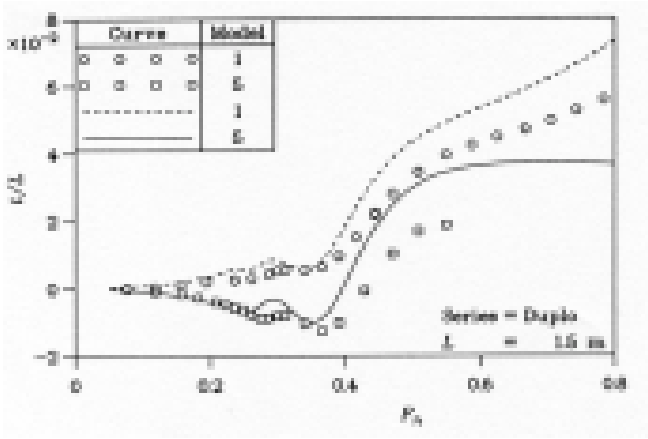
(a) Model 1 and Model 5



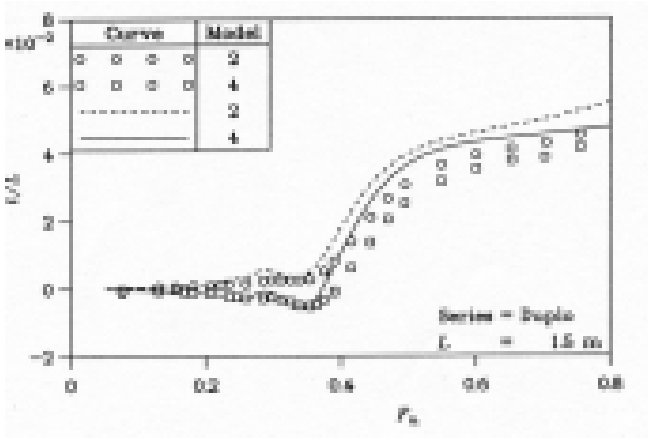
(b) Model 2 and Model 4

Figure 2: Sinkage

The trim by the stern *t* is made dimensionless with respect to the vessel length in Figure 3. In Figure 3(a), it is seen that the theory provides an accurate prediction up to a Froude number of 0.4. Indeed, Model 1 (LCB aft of midships) trims by the stern while Model 5 (LCB forward of midships) trims by the bow. At greater speeds, the absolute predictions are low but the relative predictions are still correct. Similar comments are true for the comparison between the behaviour of Model 2 and Model 4 in Figure 3(b), where it can be noted that the trim is now less for these two models.



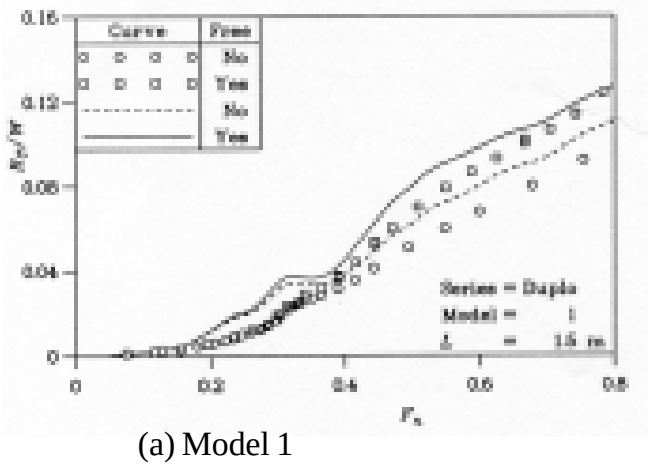
(a) Model 1 and Model 5



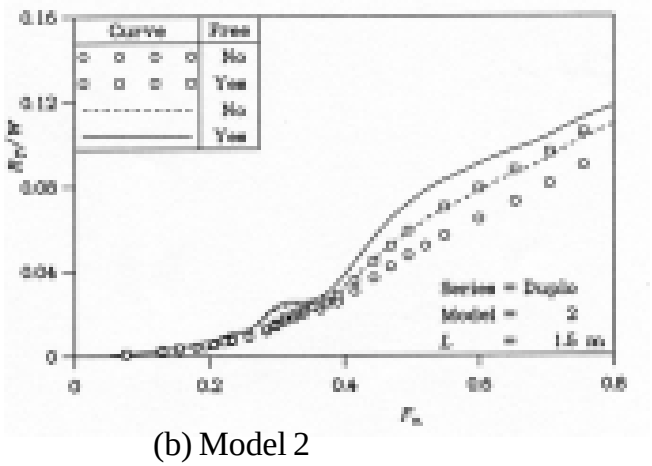
(b) Model 2 and Model 4

Figure 3: Trim

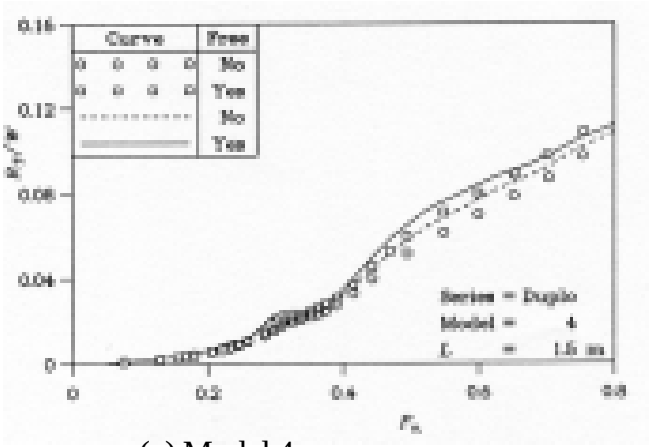
Finally, the total specific resistance is plotted in Figure 4. The total specific resistance is the ratio of the total resistance R_T to the weight W of the vessel. It is noteworthy that the theory correctly predicts that the resistance is greater when the vessel is permitted to sink and trim in the proper manner.



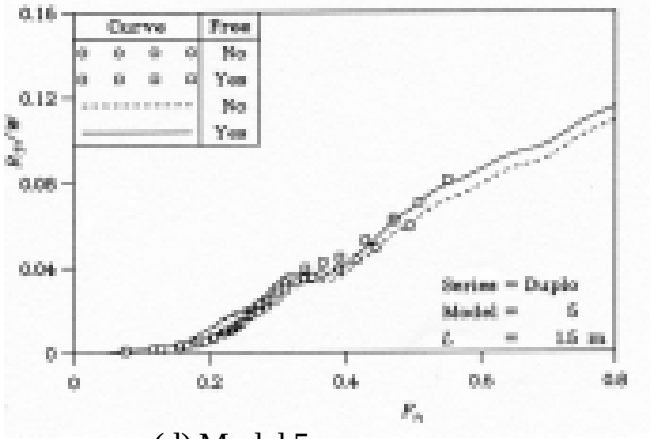
(a) Model 1



(b) Model 2



(c) Model 4



(d) Model 5

Figure 4: Resistance

5 Conclusions

Future research should be directed toward a continuation of this work by increasing the number of towing-tank models, these being a more realistic representation of ships. In particular, it would be worthwhile to study the applicability of the theory to catamarans.

6 Acknowledgments

The authors would like to thank Mr M. Grimm, Directorate of Naval Platform Systems Engineering, Department of Defence, Canberra, for his suggestion of this research topic, as well as for his continuing encouragement in the matter of ship resistance, which is vital to the improvement in the performance of high-speed ships. They gratefully acknowledge the assistance of the Australian Research Council (ARC) Large Grant Scheme (via Grant Number A89917293). They are also appreciative of Mr G. Macfarlane at the Australian Maritime College in Launceston, who was responsible for supervising most of the experimental testing. Full details of this work are available in the work of Loadman (2000).

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FROM THE CROW'S NEST

New Chair for ASA

Bob McKinnon has been appointed the new Chair of the Australian Shipbuilders' Association. Bob is the Managing Director of Austal Ships in Fremantle, and replaces Robert Clifford, the Chairman of Incat Australia in Hobart, who has completed his three-year term.

End of the Shipbuilding Bounty

The Australian Government enacted legislation in 1999 to terminate the long-standing Shipbuilding Bounty (3% of production cost) as from 31 December 2000, and to phase out the newer Shipbuilding Innovation Scheme allowance (up to 2% of production cost) by 30 June 2003. The current disparity between assistance provided to Australian shipbuilders and their European competitors (9% of contract price) continues to widen.

The Shipbuilding Bounty Scheme began in 1947 at 25% of the lowest bid (not the contract) price for vessels of not less than 200 gross construction tons, and increased to 33.33% in the sixties. It reached an all-time high of 45% of the production cost (changed from lowest bid) in 1973, but the lower limit on gross construction tonnage was reduced to 150 to make the subsidy available for fishing vessels. One authority recalls that the overall cost of fishing vessels increased by approximately the amount of the bounty overnight as a result! The bounty progressively reduced to 25% of production cost by 1978 and has continued its slide ever since, passing into history at the end of the second millennium at 3%. Details of the early bounty scheme may be found in Campbell, R. (1988), An Appraisal of Australian Shipbuilding Since 1940, *Proc. Bicentennial Maritime Symposium*, UNSW, Sydney.

New CEO for BV Aust/NZ

Hendrick Homan has been appointed as Chief Executive Officer for Bureau Veritas in Australia and New Zealand, and took up the position in mid-December.

Use of U-tubes for Inclinings

Many naval architects will be aware that the USL code and Marine Orders prohibit the use of U-tube manometers to measure the angle of heel during inclining experiments. The reason for this was recently queried by a shipbuilder, and was referred to Bob Herd, former Chief Naval Architect for the Australian Department of Transport, and the guiding hand behind the stability sections of both documents. Bob's reply is worthy of wide circulation, and is repeated here with his consent.

Department of Transport's experience with U-tube manometers was that they underestimated the heel of the vessel when inclined. Several inclining experiments were conducted with both U-tube manometers and pendulums simultaneously. When reading the manometer measurement, it was found that the rise on one side did not equal the fall on the other side of the vessel. On observing this disparity on a number of occasions, the use of U-tube manometers was prohibited. The use of manometers with a single up-stand is even less reliable, as the disparity between the sides needs to be observed.

There are at least two possible causes for the disparity: friction between the manometer fluid and the tube wall, and flexure in the wall of the flexible cross-link tube due to hydrostatic pressure changes during the experiment. This would cause the measured heights to alter in a manner consistent with an under-estimation of the measured heel. The pendulum method of measuring heel angle is recommended as this subject to minimal external influences, particularly if the pendulum site is protected from the wind.

There may be scope here for an enterprising shipbuilder or undergraduate thesis student (or both!) to re-visit this scene and see what can be done to improve the accuracy of U-tubes, followed by verification on several inclinings simultaneously with pendulums. No doubt the National Marine Safety Committee would be interested in the results for incorporation into the new National Standard for Commercial Vessels.

High-speed Bass Strait Crossing Resumes

TT-Line's express service across Bass Strait with *The Cat* (Incat 046) has resumed. Built in 1997, *The Cat* is a 91 m wavepiercing catamaran with a capacity of up to 900 persons and 227 cars on the 227 n mile route between Melbourne and George Town, Tas. Owned by Bay Ferries Ltd of Canada, *The Cat* operates the northern hemisphere summer between Yarmouth (Canada) and Bar Harbour (USA), before moving south for the southern hemisphere summer in Australia.

Incat the Magazine, v.2 n.9, 2000

Distance Learning

A unique distance-education program is delivering engineering courses from Old Dominion University in the USA to students on a submarine at sea. CD-ROM technology is being used to provide the submarine's officers with course materials while they are deployed off the coast of South America. Each course takes about 90 hours to complete, including interactive lessons, homework assignments, and tests. For further information, visit www.asee.org.

Prism, January 2001

Tin-free Self-polishing Antifouling

The organotin compounds, also referred to as tributyl-tins or TBTs, are effective in antifouling paints, but are toxic to all marine life, do not dissipate in water, and have led to serious concerns over the environmental impact of such coatings. Various legislation has been enacted in response to the concerns, ranging from total bans to severe restrictions, and IMO has recently passed a resolution to ban application of TBT paints from 1 January 2003, and their presence on ships' hulls from 1 January 2008.

Ameron BV of Geldermalsen, The Netherlands, has successfully introduced its ABC#3, an organotin-free self-polishing antifouling, providing owners with similar benefits to, but without the environmental hazard associated with, TBTs. Introduced in 1983, ABC#3 has successfully been

applied to military, commercial and recreational vessels. ABC#3 releases cuprous oxide in a controlled manner via the hydrolysis of the superficial antifouling layer in seawater in combination with the polishing action caused by the motion of the vessel through the water. The outer layer continually wears away, exposing fresh layers of antifouling.

For more information and photographs, see the article or visit www.ameron-bv.com.

HSB International, December 2000

Navigational Error Cited as Cause of *Sleipner* Incident

The report of the Commission appointed by the Norwegian Justice Department to investigate the loss of the 42 m catamaran *Sleipner* was published on 8 November.

The Commission concluded 'Navigational error was the initial cause of the disaster. The navigators did not know where they were when *Sleipner* ran aground. To a large extent the navigators failed to use the available navigational aids and in the established operational procedures. At the decisive time, immediately prior to grounding, both navigators were busy, each adjusting his own radar, which distracted their attention from navigation based on visual observations of lights and course run.'

The Commission considered that the builder, Austal Ships, built the craft in accordance with approved plans and the requirements of the HSC Code, except that the transitional emergency source of electrical power was not located according to the HSC Code requirements and should have been.

The Commission considered that the performance of the classification society, Det Norske Veritas, was not deserving of special comment, despite their not having discovered the improper location of the transitional emergency source of power, and having overlooked minor impairments of watertight integrity between the wet deck and the main deck on sister vessel, *Draupner*.

Fast Ferry International, November 2000.

A number of appraisals of the report have appeared in the marine journals. Fast Ferry International*'s is a good one of eight pages, including diagrams and photographs, but see also (for example)* Work Boat World*, January 2001.*

Stealth Warships

Defence company Tenix has developed a technique to retrofit existing warships with stealth characteristics to make them much harder to detect by radar. The research was unveiled at Tenix's internal engineering conference in Melbourne in November.

Stealth technology uses a combination of special materials to absorb radar energy and special design to scatter radar beams so that they do not return to their source transmitter. That makes them extremely difficult to detect. Proposed stealth ship designs involve low superstructure to minimise radar reflections.

Tenix's system, developed in concert with the Defence Science and Technology Organisation, uses lightweight reflective panels to substantially reduce the radar cross-section of ships with no inherent stealth features. The company said computer modelling indicated that this approach would prove dramatically more effective.

'We are now developing new military vehicles, aircraft diagnostic systems, information systems, sophisticated electronic warfare solutions, training programs and a wide range of other capabilities,' said Tenix Managing Director, Paul Salteri.

Engineers Australia, December 2000

Engineering Excellence Award to RAN Hydrographic Survey Ships

The Australian Engineering Excellence Awards for 2000 were announced on 1 December in Canberra. They are the IEAust's highest awards for engineering projects and products. To be eligible, entries ere required to have won an IEAust Division excellence award in the past year, and are judged on three criteria:

- actual or potential contribution of the work to the national economy;
- impact of the work on the quality of life of the relevant communities; and

- significance of the work as a benchmark of Australian engineering and whether it can be considered to be world's best practice.

No set number of awards is given each year. Six Engineeering Excellence Awards were made in 2000, and from these the winner of the highest award, the Sir William Hudson Award, was selected.

One award went to the Hydrographic Survey Ships for the Royal Australian Navy project, entered by NQEA Australia. This project involved the building at NQEA's Cairns shipyard of two high-technology hydrographic ships for the navy with a charting capability ten times faster than any existing RAN survey ship and a projected cost saving of $100 million to the Federal Government over twenty years. More than 85% of the ship's content was built and supplied locally, with much of the systems and software engineering carried out here. The ships also conform to the latest environmental standards regarding noise and they are highly fuel efficient. The survey capability includes accurate charting of reefs, fishery activities, marine fauna and offshore resource zones.

The Sir William Hudson Award went to the Eastern Distributor Motorway in Sydney, submitted by Leighton Contractors, Maunsell McIntyre and the NSW Roads and Traffic Authority.

Engineers Australia, December 2000

A comprehensive article on these vessels appeared in The ANA, *February 2000.*

Endeavour Circumnavigating Australia

The *Endeavour* replica set sail on from Portland, Vic., on 2 January 2001 on her first circumnavigation of Australia. It is apposite, given the ship's connection with British settlement of Australia, that she will make this voyage in the year of the Centenary of Federation and the 200th anniversary of the first circumnavigation by Matthew Flinders.

Endeavour will sail to Hobart for the Australian Wooden Boat Festival between 10 and 12 February and then sail in Cook's wake northwards. She will anchor in Botany Bay on 29 April, the day of Cook's first landing. She will continue north-about, rounding Cape York and Possession Island before the cyclone season, and will anchor back in Fremantle, her birthplace, on 9 November after four years away and having sailed 64 000 n miles. She will undergo a major refit in Fremantle, setting sail again from there in February 2002 to complete the circumnavigation in Portland. For further information and details of her itinerary, visit www.barkendeavour.com.au.

Signals, December 2000

HTS Motors May Propel US Navy Ships

American Superconductor Corporation of Westborough, Massachusetts, USA, announced in late November that it has received a follow-on contract for US$1.6 million from the US Navy's Office of Naval Research for the design and development of high temperature superconducting (HTS) motors for electric ship propulsion. The company expects to complete this contract within the next six months.

The initial contract was for the preliminary design of a 25 MW AC synchronous HTS ship propulsion motor, and was recently completed. The follow-on contract is to complete the motor design and to start component fabrication and testing.

The company said that its HTS wire today can carry more than one hundred times the power of copper wires with the same dimensions. It has used this increase in power density to design compact HTS ship propulsion motors. These motors are expected to be one-fifth of the size and one-third of the weight of standard induction motors which use copper wire techniology.

Engineering World, *December 2000*

Detentions and Classification Societies

Figures released by the Australian Maritime Safety Authority in January make interesting reading. They show that 125 ships were detained from a total number of 2 926 inspected in Australian ports during 2000. Of these, the percentage of ships detained from the total inspected in Australian ports for each of the major classification societies are

as follows: American Bureau of Shipping 4.2%, Bureau Veritas 4.2%, Nippon Kaiji Kyokai 3.9%, Det Norske Veritas 3.5%, Germanischer Lloyd 2.9% and Lloyd's Register of Shipping 2.6%. These compare with figures for 1999: BV 9.2%, DNV 5.8%, ABS 5.0%, LRS 4.1%, GL 3.7% and NKK 3.4%. Further details of detention figures can be obtained from AMSA's website, www.amsa.gov.au.

It is clear that most of those surveyed have reduced their detention rates, but some more than others so that the relativities have changed. The efforts of the majors to reduce the level of substandard shipping are appreciated. Lloyd's Register of Shipping, for example, now identifies those ships that it punitively disclasses on its website so that any interested party may see the reason why LRS no longer classes the ship and who has taken it on. Emulation by all would be a positive step.

Phil Helmore

HMAS *Huon* after duties on Australia Day starting the tall ship's race on Sydney Harbour. (Photo John Jeremy)

EDUCATION NEWS

The University of New South Wales

Undergraduate News

Feedback on many of the changes introduced in the naval architecture courses (i.e. subjects) in 2000 has been positive. Most third-year students enjoyed the industry visits provided by the new course Ship Practice, and the fourth years the contact with industry practitioners Craig Boulton in Design of High-speed Craft, David Lyons in Design of Yachts, Noel Riley in Ship Standards, and Richard Sproge in Marine Engineering. In addition, the hands-on finite-element experience in Ship Structures 2 was greatly appreciated by the fourth-year students.

Post-graduate and Other News

The Chief Executive of RINA, Trevor Blakeley, visited UNSW on 7 February and met with the naval architecture staff, both full-time and part-time, to discuss matters of mutual interest. These included progress on the RINA careers booklet (in the hands of the Division), the RINA/BAE Systems Award (an Australian sponsor to be sought), streamlining of student member applications (working well; new members from Session 1 in 2001 due in early March); a request from Auckland and Massey Universities in New Zealand and the New Zealand Division of RINA to help organise a yacht design conference in Auckland in January 2002, coinciding with the Volvo Around-the-world yachts in Auckland); UNSW participation in the RINA/Lloyd's-sponsored Safer Ships Design competition (principally by way of suitable undergraduate or post-graduate theses), the mistimed advice to last year's final-year students that they had been transferred to Graduate status; and the possibility of RINA scholarships for naval architecture students to attend universities in Australia, as in the UK (not possible, as the UK ones are funded from dedicated trusts).

Following the meeting, the Chief Executive was squired to lunch at the AGSM on campus by the group. Some topics were further elaborated, and the lunch-table discussions were wide-ranging and interesting.

The RINA has now run an end-of-year conference in London on the subject of the hydrodynamics of high-speed ferries on an almost annual ba-

sis for some years now. On 7 and 8 November 2000, afficionados of wave wash and motion control met in order to present their latest contributions in these areas. There were thirteen papers on the subject of wave-wake problems and five papers on motion control. In all, there were seventy-six participants, with five delegates from Australia who delivered three papers — a very high proportion indeed.

Mr Greg Cox of Kamira Holdings discussed his ideas on the best shape for a river vessel with regard to wash generation. His comments were thought-provoking to say the least, as he suggested that catamarans are not significantly better than monohulls. He showed an impressive picture of the RiverCat travelling at the critical speed in a very constricted region of the Parramatta river, generating a strong transverse wave. This condition, incidentally, is impossible to overcome according to linear wave theory. All river vessels would create the same large transverse wave in such a restricted waterway.

Mr Gregor Macfarlane and Dr Martin Renilson of the Australian Maritime College presented their extensive data-base system in which wave-wake information from around 80 vessels can be compared. The AMC is fortunate in having carefully amassed this data over some years, allowing one to compare the wave-wake generation for different vessels in a consistent manner. That is, vessel dimensions, displacement, speed, as well as offset of the wave-measuring device, are used to plot the wave-height data in a truly fair way. They clearly demonstrated the overall superiority of catamarans over monohulls on a size-for-size basis.

A/Prof. Lawrence Doctors of UNSW and Dr Sandy Day of the University of Glasgow described their theoretical research into a wave-cancellation ferry concept requiring a multi-cushion hovercraft. It was amply demonstrated that it is possible to practically eliminate the wave system for speeds up 21 kn for a 30 m craft having a displacement of 60 t. This concept requires adjusting the cushion pressures in a carefully-prescribed manner depending on the speed of the vessel. As noted above with respect to the RiverCat operating at the critical condition, the same difficulty would apply to the current concept in a restricted waterway.

The idea of such a specialised topic, such as wake wash, for a conference might seem to be risky for the organisers; however, it was felt by all the participants that it worked extremely well and that much was learned by the participants. A/Prof Doctors offered to host the 2001 meeting in a more central location, such as the UNSW campus in Sydney, and we now await the outcome of this generous offer to RINA!

Phil Helmore
Lawry Doctors

The start of the 165th Australia Day Regatta in Sydney was a challenge for the competitors and the starter. (Photograph John Jeremy)

The Royal Australian Navy Stability Standard

Peter Hayes
Department of Defence

Introduction

Prior to 1870, stability, which was the province of the naval architect, consisted of an assessment of GM, desirable values having been found through experience. The GZ curve had just been invented, but its significance was yet to be realised. Freeboard was considered a seamanship issue. A new steam and sail warship, HMS *Captain*, which had been privately designed to champion the turret-gun concept, capsized in moderate weather with significant loss of life. This design had a low freeboard, high KG and a limited GZ curve, all exacerbated by weight errors during design and build.

The loss of *Captain* in 1870 led to the establishment of the Committee on Designs by the British Admiralty. The subsequent investigation established the importance of the GZ curve and resulted in the committee setting acceptable minimum properties of GM, GZ_{max} and range of GZ. This approach was adopted by many navies and remained in use until well after World War II. For example, the UK MoD stability criteria up to well after WW II consisted of a minimum GM_{fluid} of 0.61 m (2ft) and a minimum GZ_{max} of 0.31 m (1ft) at no less than 30^{O}. The Type 12 design, which was to become the RAN's River-class Destroyer Escort class (DEs for short) and the UK Leander design, was designed to the stability criteria. This design has the reputation of possessing very good seakeeping qualities.

Damage stability regulations were also slow in developing, evidenced by a number of losses of major warships in the late 1800s from minor collision damage. Peacetime losses of naval and merchant vessels (particularly the loss of the SS *Titanic*) demonstrated the need for a standard on damage stability. World War I intervened and taught a number of lessons, especially the undesirability of longitudinal subdivision. After WW I, the UK determined that damage stability was likely to be the determining factor for warship stability and developed appropriate criteria. The criteria for a fleet destroyer were a minimum GZ and GM of 0.31 m (1ft) and a maximum list of 15^{O} following damage to any two adjacent compartments.

During WW II, the USN fielded a large number of warships, many of which sustained damage to varying degrees. In 1944, during a typhoon in the Pacific Ocean, three destroyers were lost with nearly all hands. Other vessels in the same fleet were nearly lost (several reporting heel angles to 70^{O}+). The analysis of the losses and survivors from this storm and the wealth of statistical data available from the war allowed the USN to revise its stability criteria and address wind/wave heel, lifting weights, stability in turns and damage stability. Relationships were developed for heeling/righting arm and energy requirements which were empirical in nature, being based on engineering judgement of the available data. The new stability criteria were presented in the landmark paper by Sarchin and Goldberg in 1962 [2], and are now often referred to as the Sarchin and Goldberg criteria. The USN standard was subsequently issued as *Design Data Sheet 079-1 (DDS 079-1)* [1].

The RAN, apparently after some deliberation, decided to adopt the USN standard with some minor modifications, mainly to suit the generally smaller RAN vessels. This standard was produced as *Naval Construction Manual A.20 — Stability Criteria and Inclining Experiment Policy for RAN Surface Vessels over 30 Metres in Length* [3], which was a covering document invoking DDS 079-1 with some changes (and which is still the contract document for some of our new build projects). A number of years later (1994) it was rewritten and presented as *Navy (Aust) Standard A015866 Stability of RAN Ships, Boats and Submarines* [4]. This rewrite expanded on the original, covered small ships and introduced boat stability as being essentially in accordance with Australian Standard *AS 1799.1 — Small Pleasure Boats Code, Part 1: General Requirements for Power Boats* [5], but otherwise was

still a covering document over DDS 079-1.

During the period of the existence of the RAN stability standard, there have been a number of procedural changes. These included allowing the superstructure as part of the watertight envelope of the ship, applying downflooding angles, and most importantly, developing a limiting KG Curve concept for all ships. None of these concepts is covered directly by either DDS 079-1 or the RAN covering standard. The Department of Defence (DoD) has also been involved more recently in an international Cooperative Research Navies (CRN) program investigating dynamic stability. This program is delivering results that will influence stability criteria in the future.

More recently, organisational changes have redirected the focus and direction of the former Naval Engineering Services areas within the DoD. There is now a serious requirement to produce a set of standards which give top level requirements and acceptance criteria for these requirements, as well as being prepared in a standard format. Consequently, there has been a rewrite of the RAN Stability Standard, with the opportunity taken to formalise the changes that have occurred to date as well as position the standard to adapt to future developments.

The 1999 edition of the RAN stability standard includes the following changes:

- Formatted into the standard format;
- Stability requirements for submarines removed to a separate standard;
- Set of top level requirements specified;
- The standard load conditions have been updated;
- Full definition of the stability criteria included;
- Additional criteria, such as required areas under the GZ curve, to fix ambiguities and begin addressing dynamic stability;
- Formalised the limiting KG curve; and
- Acknowledged the DoD as final arbiter for all aspects of stability.

This last is very important. No matter how well the standard is written, there will always be circumstances not definitively covered by it or that warrant departure from the specified requirements. The DoD, in the form of its stability specialist section, must have the right to exercise discretion, both with respect to acceptability of stability submissions and in departing from the requirements.

RAN Stability Standard, 1999 Edition

Each of the main sections of the stability standard will be covered below. Only brief descriptions of features will be made, it being assumed that interested parties will examine the standard in detail. Reasons for change will be given where appropriate.

Section 4 — General Stability Requirements

The stability requirements section defines the requirements for adequate stability in broad terms. The basic requirement is that all surface vessels of the RAN shall be provided with sufficient stability and reserve buoyancy to resist the extremes of the marine environment that they may encounter. This requires the definition of environments, limiting conditions such as extent of damage and the standard load conditions that are used for analysis purposes.

The categories of service and associated intact environmental conditions have been specified, shown in Table 1.

Service	Description	Unlimited Environment		Survival Environment	
		Wind Speed B'fort (Knots)	Sea State (metres)	Wind Speed B'fort (knots)	Sea State (metres)
Ocean Unlimited	Stay at sea in all conditions, able to fully resume duties when conditions subside	**10** (55)	**6** (6.00)	**12** (67)	**8** (14)
Ocean Limited	Stay at sea avoiding centres of tropical disturbance, able to fully resume duties when conditions abate	8 (40)	6 (6.00)	10 (55)	7 (9.00)
Coastal	Return to protected waters if wind and sea state limits will be exceeded	7 (33)	5 (4.00)	8 (40)	6 (6.00)
Protected Waters	Waters protected from the full force of ocean waves, such as inside the reef	6 (27)	4 (2.50)	8 (40)	5 (4.00)
Harbour	Fully enclosed and protected waters	6 (27)	3 (1.25)	8 (40)	4 (2.50)

Table 1 – Intact Environmental Requirements

The unlimited environment is for unlimited operations — all possible speeds and headings, all possible wind relative headings — with minimal risk of capsize. The survival environment requires at least a small range of speeds and headings where there is minimal risk of capsize. These definitions have been adopted to tie in with operational capabilities as they are now typically specified.

Each vessel of the RAN is to be provided with sufficient reserve buoyancy and damage stability so that in the event of damage resulting in flooding into part of the vessel, it will not sink or capsize and it will remain at an acceptable attitude. An acceptable attitude in this context is one that will allow recovery or evacuation of crew, allow damage control measures to be effected and allow operational equipment to continue to operate. Safe access to all undamaged areas of the vessel shall be maintained to allow escape, for damage control purposes and to allow other emergency measures to be effected. Safe access through the uppermost deck into damaged areas, at least under calm conditions, shall be maintained to allow de-watering to be effected.

The environmental conditions to be applied in the damaged state have been specified. The RAN previously adopted a minimum wind speed for analysis purposes of 30 knots with an ill defined graduation into the wind speed curve presented in DDS 079-1. The wind speed requirement has now been redefined into an unambiguous curve.

The extent of damage has been refined. Previously, the extent of damage varied from one compartment to two compartments to a percentage length opening as ship length increased. This resulted in a step function for the minimum compartment length, which meant that design solutions just past the step would tend to be avoided. An analysis of existing and past RAN vessels indicated that there was merit in extending the percentage length opening concept down to relatively small lengths. By selecting appropriate percentage values, all vessels either met or could have been easily redesigned to meet the percentage opening requirement. The extents of damage now required are shown in Table 2.

Vessel Type	LWL	Damage Requirements
Combat Vessel	≥ 30m	15% opening any position
	< 30m	1 compartment flooded
Combat Support Vessel, Patrol Vessel	≥ 30m	12.5% opening any position
	< 25m	1 compartment flooded
Non Combat Vessels	≥ 30m	10% opening any position
	< 30m	1 compartment flooded

Table 2 – Damage Length Requirements

The percentage opening lengths will typically be achieved by a 2, 3 or 4 compartment standard, depending on the solution the designer wishes to adopt. Required compartment lengths and total flooded length reduce as higher numbers of compartments are adopted.

Counter flooding as a measure to reduce list after damage has been addressed in the standard. The requirements are:

- Total time to effect counter flooding is to be less than 15 minutes (allowing 5 minutes to find and actuate valves if required)
- All valves to be able to be hand operated from above the flooded waterline
- Stability before, during and after counter flooding (e.g. area and ordinate ratios and GM) to be satisfactory; and
- Counter flooding (so as to comply with the stability requirements) to compartments other than tanks or longitudinally (i.e. to anything but an opposite tank) is not allowed.

Standard loading conditions, consistent with the type and service of the vessel, are to be defined to allow adequate assessment of the trim and stability characteristics of the vessel (or class) throughout the range of typical and special operating conditions that may apply. The standard load conditions that must be defined consist of:

(a) Full Load or Departure Condition;

(b) Minimum Operating or Arrival Condition;

(c) Emergency Arrival Condition; and

(d) Emergency Troop Lift Conditions.

In addition to the above, any intermediate conditions that may be worse or otherwise warrant special investigation are also to be defined. Requirements for the definition of the standard load conditions are presented in an appendix. A number of ambiguities have been corrected, as well as addressing more recent developments. Where water ballast must be taken on between the Full Load and Minimum Operating conditions, advice on when this should occur must be provided. This particularly applies if the ship is damage limited. In the case of cargo vessels, a number of cargo states are defined, with Departure and Arrival conditions being the equivalent of the Full load and Minimum Operation conditions.

The standard loading conditions are built on the Lightship Condition which is defined to be the weight of the ship plus those items which are not consumable during a typical voyage, and not subject to frequent change. It is, in effect, the weight of the ship complete in all respects, ready to have crew, load variables and cargo taken on board for a voyage. Other loading conditions are derived from the Lightship Condition. Generally, the logical worst-case disposition of load variables, consistent with the load condition in question, would be assumed. However, each vessel (or class) is unique and may require specific treatment to define a set of load conditions that adequately allows assessment of the trim and stability.

Consequently, the load condition definitions presented in the standard are not intended to be prescriptive — rather they present the base definition that may be varied on a case by case analysis.

Clean water ballast only is allowed for adjusting trim and stability for all operational conditions. The Emergency Arrival Condition is intended for the case where the vessel has been forced to remain at or return to sea past the Minimum Operating Condition. The vessel is still required to fully comply with the stability criteria. Consequently, dirty liquid ballast, utilising the minimum number of fuel tanks consistent with trim and stability requirements, may be required.

Boats, which are defined as vessels up to 15 m in length and which do not rely on watertight subdivision to limit flooding effects, must comply with the requirements of AS1799.1—1992 Small Pleasure Boats Code. A small number of variations to the standard have been defined, primarily:

- An inclining experiment may be substituted for the inclining test and then compliance calculated;
- Additional requirements for RIBs;
- Swamp tests for all boats (which can be substituted with suitable calculations); and
- Boats with enclosed sections are to meet the swamp test requirement with the total boat swamped.

Section 5 — Proof and Maintenance of Adequate Stability

The provision and maintenance of adequate stability is defined by the stability criteria adopted together with proof that the vessel complies with these criteria. Ultimately, the weight and centres of the vessel are compared against limiting values derived from the stability criteria adopted.

The weight and centres of gravity change through a vessel's life as the vessel is refitted with updated equipment and facilities. Other causes include unauthorised changes and collecting stores above authorised levels. A certain level of growth can be tolerated depending on the stability margins of the vessel. In order to ascertain the actual centres of gravity of a vessel as built or in service, regular inclining experiments are performed.

The stability criteria employed to prove adequate stability must comply with the requirements of Section 4. Criteria may be proposed, together with documentation proving that these criteria will provide adequate levels of stability commensurate with the service of the vessel. Alternatively, 'deemed to comply' criteria are presented in following sections. These 'deemed to comply' criteria may be employed without any need to prove adequacy.

Irrespective of the stability criteria employed, a limiting KG curve shall be prepared for each vessel or class of vessels. The limiting KG curve is a line (or series of line segments) that defines the highest KG versus displacement that the ship can have and still comply with all the requirements of the stability criteria. The limiting KG curve is discussed in more detail below.

Also included in this section are requirements for the presentation of stability information, requirements for inclining experiments and requirements for managing the stability status throughout the life of the vessel.

Section 6 — Ship Dynamic Stability Criteria

Stability criteria guidelines utilising dynamic stability analysis are currently being developed through a Cooperative Research Navies (CRN) program. The RAN is a member of this program. When developed, an adaptation of the guidelines appropriate to RAN operational conditions will be adopted and presented in this section.

Section 7 — Ship Static Stability Criteria

The stability criteria presented in this section are based on the static (i.e. still water) righting-arm curve applicable at the particular displacement and KG being examined. The acceptable values of coeffi-

cients derived from these curves are empirical in nature and are the result of many years of operational experience by the RAN and many other navies. These criteria are deemed to comply with the requirements of Section 4. If these criteria are to be used, they shall be used in their entirety and to the exclusion of other criteria covering the same stability components.

The intact and damage criteria are essentially as given in DDS 079-1 but with some additions and enhancements. The criteria are now fully defined in the RAN standard.

Beam wind and rolling is the main intact capsizing influence that was covered by the Sarchin and Goldberg criteria. This is understandable, considering the analysis that led to these criteria. Dynamic stability is to a certain extent influenced by the shape of and area under the GZ curve. The Sarchin and Goldberg criteria do not specifically address dynamic stability — there must be an implicit assumption that by complying with the Sarchin and Goldberg criteria, there will be adequate dynamic stability provided. This is not necessarily so.

When the UK rewrote its stability criteria, it retained the original GM/GZ criteria, adopted the Sarchin and Goldberg criteria, and included a version of the IMO area criteria. Existing vessels were analysed against the IMO areas and it was found that factoring them by 1.5 reasonably matched the capabilities of these vessels. The 1.5 factored areas were adopted by the UK.

More recently, UK MoD-sponsored dynamic stability model tests (broaching in following seas) were being conducted as part of a program to further understand dynamic stability and to validate a dynamic stability computer program. The analysis of the preliminary results indicated that there appeared a strong relationship to the area under the GZ curve (UK MoD values required for adequate dynamic stability) and a long range to the positive GZ curve (approximately to 90^{O}) with dynamic stability. These are tentative and may change after further analysis/model testing.

Other research to date, reported by de Kat et al [6], indicates a strong relationship to the total range of stability (about 90^{O} being required) and areas under the GZ curve, particularly the total area. Examination of the available data together with the typical performance of RAN vessels indicates a total area of 25 m-deg as being a suitable starting point for this parameter. This value will be refined after further research. Many of the RAN vessels did not achieve a range of the GZ curve to 90^{O}. However, those combat vessels (frigate types) which are believed to exhibit superior dynamic stability behaviour did achieve a GZ range better than 90^{O}.

From the above, the characteristics of the GZ curve are important for providing dynamic stability. Even though the data may be limited, it cannot be ignored and, consequently, it was decided to include the UK MoD criteria defining the GZ curve together with a required total area of 25 m-deg for all vessels and a required range of 90^{O} for combat vessels in the RAN intact criteria.

The DDS 079-1 criteria have been retained, but with some additional criteria imposed. The range of the GZ curve allowed is limited to 70^{O} (which is considered the useful limit for analysis) or to the downflooding angle, whichever is less. Downflooding has been introduced as a limit as the nature of downflooding points have changed with time (originally the light and air space and ventilators, but now includes direct trunking to engines with catastrophic effects for water ingress). The angle at the point of intersection of the wind heeling arm and the righting arm has been set to a maximum of 30^{O} to balance ship stiffness with sail area effects.

The remaining intact criterion (high speed turning, towing, personnel crowding and lifting heavy weights) have been essentially retained as presented by Sarchin and Goldberg. These criteria are all analysed separately.

A beaching criteria has been introduced, which addresses the three phases involved: preparing for the evolution, approaching and leaving the beach, and while grounded. Preparation for the beaching opera-

tion may involve a special liquid state (e.g. HMAS *Tobruk*, a heavy landing ship, is required to be at about 12% fuel which may require ballast until about to beach to preserve adequate stability). It is assumed that relatively calm conditions will prevail while grounded, so only a reasonable GM_{fluid} (500 mm) after allowing for grounding upthrust is specified.

Reserve buoyancy has been redefined, and requires (after symmetric damage at the deepest draught):

- The margin line is not submerged at the static equilibrium attitude;
- All intact areas of the ship can be safely entered without the risk of flooding; the sills of hatches and doors that must be used for entry into and exit from intact areas of the ship are above the local V line;
- There are no permanent openings in the transverse watertight bulkheads below the V lines;
- There are no openings that would allow down flooding into the intact areas of the vessel for heel angles up to the downflooding angle; and
- WT doors through transverse WT bulkheads bounding the damage are located so that the sill is above the flooding still-water surface.

Approval may be given for WT doors through transverse WT bulkheads bounding the damage to be located with the sill below the flooding still-water surface. These doors should normally be secured shut, or arrangements provided so that the doors can be shut against the head of water, such as would be provided by sliding WT doors. The type, construction and installation of these WT doors must be to a modern, approved design and installation/operation/maintenance procedure, irrespective of the age of the vessel. Approval is considered on a case by case basis.

The damage criteria are essentially as specified in DDS 079-1, with some minor variations. The damage stability criteria consist of an area ratio requirement (as previously required) and an ordinate ratio requirement which had not previously been required. A minimum GM_{fluid} at 0^{O} heel of 50 mm has also been set. This is to prevent the angle of static list being influenced or caused by loll, which could present a dangerous condition for the ship when applying damage control (DC) measures to correct a list. The requirement of a maximum static list of 15^{O} has been retained.

The previous standard treated small ships (< 30 m) differently to large ships, but only in the criteria applied in the treatment of damage stability. For small ships, there was a required area above the heeling arm curve value whereas for large ships a required area ratio. Experience with RAN small ships has shown that when damage stability governed (rarely due to only being to a one compartment standard) the area ratio typically exceeded the large ship requirement. Accordingly, it was decided to treat all ships on the same basis for assessing damage stability.

Special craft include such vessels as hydrofoils, air cushion vehicles, surface-effect vessels and some multihulls. The RAN has no vessels in its permanent inventory that can be classed as special craft, and has no significant experience with such craft. Consequently, this section was simply adapted from the requirements provided in DDS 079-1, with minor departures to suit the variations which have already been developed for conventional ships.

The one exception is the new HMAS *Jervis Bay*, which is a leased wavepiercing catamaran. While this vessel is used in a manner consistent with its commercial design and rating, it will continue to be assessed under the appropriate commercial stability requirements.

Appendix — Limiting KG Curve

The limiting KG curve is the distillation of an extensive series of intact and damage stability calculations into a result that can be used on a daily basis. This is particularly important where the limiting stability criteria require significant effort to evaluate. An example is a ship limited by damage — it would be

impracticable to expect ship's staff to perform a complete damage stability analysis daily to prove compliance with the stability standard. Setting a limiting KG curve which is valid for the life of the vessel (unless significantly modified) also avoids having to redo the analysis each time conditions change (for example after each inclining due to lightship growth).

The limiting KG curve is a line (or series of line segments) that define(s) the highest KG versus displacement that the ship can have and still comply with the stability criteria under all loading conditions that may occur during the life of the vessel. It is calculated by trialling ever higher KGs until values are found where the various intact and damage criteria change from pass to fail. Experience has found, for example, that the area ratio requirement may govern for part of the displacement range, to be replaced by the ordinate ratio requirement for another part of the displacement range. Hence, it is important to calculate the limiting KG for each component of the criteria. The result is a large number of plotted lines, the lowest locus being the limiting KG. Experience indicates that the intact criteria tend to govern at lower displacements while damage criteria tend to govern at higher displacements, with the overall curve being concave down.

A vessel can arrive at a particular displacement any number of ways. For example, normal loading and a particular fuel sequence will result in a given displacement, which could also be arrived at (but probably at a different trim) by loading emergency cargo on the flight deck and being further along the fuel sequence. If damage stability is being considered, there are any number of tank states that could apply in the damaged area, from all empty through to all full. Exacerbating this is the common occurrence of the lightship weight growing with time. Trying to predict all the possible permutations of trim, tank state, etc. for a given displacement ahead of time can be a rather pointless exercise. By way of example, the RAN FFGs have gained so much weight since design that what originally was the Full Load displacement is now the Minimum Operating displacement! Hence, it is important to use assumptions that make the analysis essentially independent of tank state and other load variables.

An example limiting KG curve is presented below. The light lines represent the limiting KG due to various criteria. The two lines rising with displacement are typical of intact criteria, those that are somewhat horizontal are typical of the 15^{O} limiting heel after damage criteria, and the falling lines typical of the damage margin line and area ratio criteria. Also to be noted is that at some high displacement, the margin line criteria for end damage will cause the limiting KG to fall rapidly to minus infinity. The heavy line is the lowest locus of the various limiting curves and therefore constitutes the limiting KG curve for the ship. The stars are ship conditions showing compliance with the limiting KG curve.

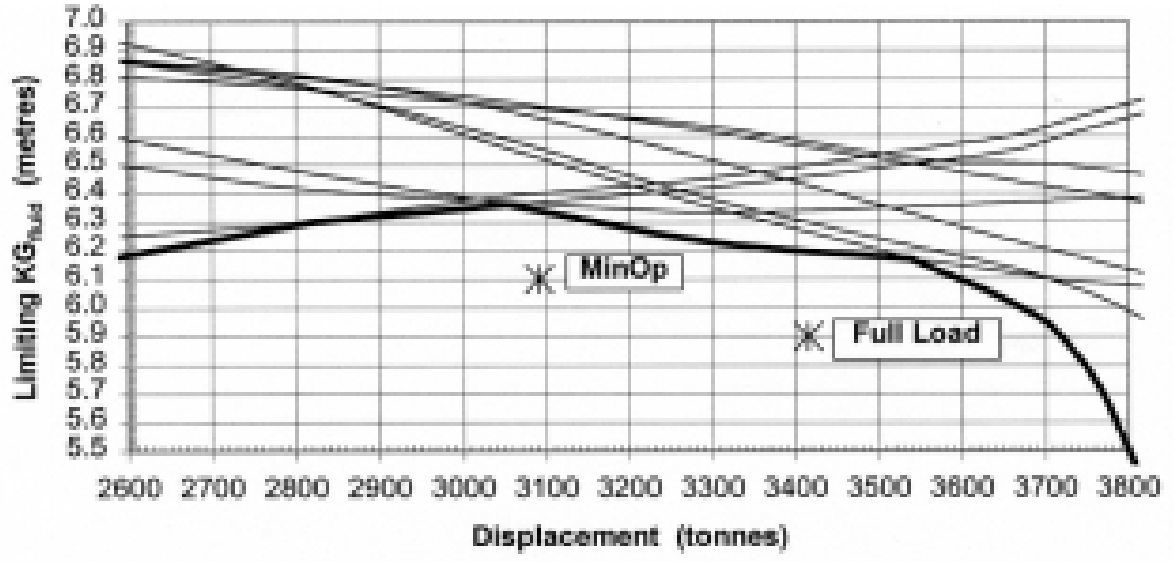

Figure 1 - Example Limiting KG Curve

Applicability to existing vessels

The static stability criteria defined in the new issue of the RAN stability standard are considered to define an acceptable level of safety for RAN vessels, and update or correct as necessary criteria previously defined. Consequently, they will be applied to all RAN surface vessels. Where existing vessels do not pass, decisions will be made with respect to relaxing requirements. This may simply involve setting liquid state restrictions or it may involve formal waivers. There may be serious questions raised regarding the allowed operational environment or even the future of some vessels.

Current Developments

A number of developments are currently being progressed:

- Roll-back angle study;
- Dynamic Stability; and
- International Naval Stability Standards Working Group.

Roll Back

Within DDS 079-1 is a simple graph relating the roll back angle to displacement in a 2.44 m (8 ft) sea. This is used for V-lines and damage stability analysis. The RAN standard uses a similar graph, derived from the one in the USN standard as an interim measure. However, it is believed that we can do better. At the least, GM should also be a variable.

A joint model test program was initiated with the Australian Maritime College wherein a series of models were tested for roll response in beam seas. The test program has been completed, and the results are currently being analysed. Since there were a limited number of model tests, additional data will be generated by using a seakeeping program. A revised graph should be issued in the near future.

An extension of this exercise could be seakeeping analysis in head seas. This is applicable to survival conditions for intact analysis. Currently, a blanket 25^{O} roll back is used. Again, surely we can do better. The problem is how much side energy to assume (done with a spreading function in seakeeping analysis parlance) as no sea is unidirectional — due to various factors such as a number of wave sources.

Dynamic Stability

The RAN has been involved for some years with other navies (USN, US Coast Guard, Canadian Defence Forces, Royal Netherlands Navy, Royal Navy) and MARIN in a Cooperative Research Navies program investigating dynamic stability. The CRN has primarily developed a dynamic stability computer program called FREDYN. This is a time domain seakeeping program that can handle intact and damage cases. This program has matured such that it is now be possible to investigate dynamic stability in both intact and damaged conditions.

Currently, the biggest problem with dynamic stability analysis using this program is the sheer amount of time it takes to run a comprehensive analysis and to process the data obtained. The challenge is to develop a methodology for the analysis so that results will be repeatable, and then to present these results in a useable format. It is highly unlikely in the near to medium future that dynamic stability analysis could be satisfactorily performed daily at sea. It therefore appears that the most useable format is likely to be a limiting KG curve and polar diagrams showing hazardous operating conditions.

The RAN has sponsored a study program with AMC aimed at determining a methodology for developing a limiting KG curve based on dynamic stability analysis. This is a three-year program that is due to start in 2000.

The environmental condition definitions in the RAN stability standard include unlimited operations and

survival environments in anticipation of dynamic stability criteria being introduced. The intention is that for unlimited operation, there should be no speed/heading/wind direction combination that would result in a capsize. Under survival conditions, there should be a reasonable range of speed/heading combinations for any relative wind direction that should not result in a capsize. Whether this concept can be developed into workable criteria and what constitutes 'reasonable' will be the subject of future research.

Naval Stability Standards Working Group

A meeting was convened amongst the CRN participants in early 1999 to discuss the development of naval stability standards. The CRN is a research group and is not responsible for the development of naval stability standards for the participating navies. Such responsibility rests with the respective navies and their naval engineering organisations. However, there is much commonality in the various naval stability standards, and a common body of research by the CRN could be applied in developing dynamic stability assessment methodologies. Consequently, the establishment of a working group comprising member navies of the CRN was discussed and agreed as an appropriate mechanism for the dissemination of new stability approaches and guidelines for rational stability criteria.

The Terms of Reference for this working group have been agreed upon. The objective is to develop a shared view on the future of naval stability assessment and develop a draft set of stability guidelines which can be utilised by the participating navies at their discretion. To meet this objective, the Naval Stability Standards Working Group will consider a number of working points, culminating in the development of a draft Naval Stability Standard Guidelines document. A limited number of meetings have occurred to date. The RAN is an active participant in this working group and will be incorporating those guidelines appropriate to the Australian environment as they are developed.

The Future Standard

The development of dynamic stability tools and criteria have the potential for transforming naval stability standards. As the dynamic stability methods develop to maturity, these will become the primary measures of adequate stability. The other measures of stability, the current criteria, will be re-evaluated and adjusted so that they define vessels that would comply with the dynamic stability requirements. Since these criteria at best approximate the requirements of dynamic stability, they will of necessity include larger factors of safety, and would therefore give a lower limiting KG than could be obtained by an extensive dynamic stability analysis. This means that the existing criteria would be useful for concept analysis and for those offices unable to perform a dynamic stability analysis.

Conclusions

The RAN stability standard has been updated and is available for all to use. The update has been largely incremental rather than radical, formalising current practises and setting the scene for future developments, particularly in the field of dynamic stability.

Probably the most important change has been the formalising of the limiting KG curve concept as applied to RAN vessels, together with guidelines for the preparation of this curve. The limiting KG curve concept is considered important for the future as it allows dissemination of the results of involved stability analyses such as dynamic stability to the operator in a useable format.

Acknowledgements

The author would like to thank fellow staff in the Directorate of Naval Platform Ship Engineering, Naval Material Requirements, for supporting this effort and providing valuable constructive criticism. The views expressed in this paper are those of the author and not necessarily those of the Department of Defence.

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Peter Hayes is the senior naval architect in charge of the stability sub-section within the Directorate of Naval Platform Systems Engineering, Naval Material Requirements of the Department of Defence. He is the author of the new issue of the RAN ship and boat stability standard. This paper was presented at STAB 2000, Launceston, Tasmania, in February 2000.

The Walter Atkinson Award

The Man

Walter Atkinson was a Geordie who arrrived in Australia with a solid background in shipbuilding from the Tyneside in Newcastle, UK. He spent time as the Hull Overseer at Cockatoo Island Dockyard on (among others) the construction of the Daring class destroyers *Voyager* and *Vendetta,* and at Navy Office in Melbourne where he oversaw (among others) the conversion of *Centaur* to a hospital ship. He finished up as Superintending Naval Architect at HMA Naval Dockyard, Garden Island, and was still employed there when he died after a short illness in 1970. He was a founding member of the Australian Branch (as it was then) of the Royal Institution of Naval Architects, and a long-serving member of council. He was widely respected for his "people skills" and for his practical shipbuilding knowledge.

The Award

To perpetuate his memory, the Council of the Australian Branch resolved in 1971 to present a Walter Atkinson Award, annually at its discretion, to a selected paper presented at a meeting of the Institution in Australia. The object of the award was to stimulate increased interest in the preparation, and to raise the standard, of technical papers presented to the Institution.

The award was originally valued at approximately $25.00 and the inaugural presentation, made in 1972, was an impressive painting of the clipper ships *Ariel* and *Taeping* racing under full sail. The Award is now valued at around $250.00, and is currently assessed, on behalf of the Division, by a sub-committee

of Council.

Current guidelines for the Award are:

- All members of the RINA Australian Division are eligible, with the exception of members of the Division Council.
- The paper must be presented at a RINA meeting or maritime conference or published in a journal within Australia during the current year.
- The paper must be a technical paper, not simply a lecture, and it must be more than just a promotional presentation.

The Sub-committee will consider such selection criteria as:

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

The current terms of the award include not only RINA meetings, but any Australian maritime conference or journal. This means that papers presented at STAB2000, Sea Australia 2000 or Ausmarine 2000 conferences (for example), and papers published in *The ANA* are also eligible for the award for 2000.

The Walter Atkinson Award has been awarded in most years since its inception, although rarely in recent years. It is expected that the award will now be made annually whenever Division funds permit.

Nominations for 2000

Nominations for the Walter Atkinson Award for papers presented in 2000 are therefore requested.

We are trialing a new system for making the award whereby, to spread the assessment task, nominations will be made through the Sections. If you wish to nominate a paper for the award, your nomination should be in writing (which includes email or fax) and include a copy of the paper in a form suitable for distribution (for assessment). These should be received by the Secretary of your local Section (or, for NT or SA residents, the Division Secretary) by 30 April 2001. Sections then consider the papers nominated to them and each make one recommendation to the Australian Division by 31 May. The Division will then consider the recommendations from the Sections and decide the award by 30 June, and the award will be announced in the August issue of *The ANA*.

So, think which was your favourite paper you saw presented or read in 2000 and don't delay, nominate today!

Phil Helmore

MISSING IN ACTION

Several more members have gone missing in action since the last edition of *The Australian Naval Architect*. If anyone knows of their present location, Keith Adams would appreciate advice. He can be contacted on (02) 9876 4140, fax (02) 9876 5421 or email kadams@zeta.org.au.

The following student members, all from the AMC, Launceston, have moved on without advising change of address: Ms M. Boag, Messrs P. Hinds, S. J. McGoldrick, B. M. Walpole and T. C. Williams.

Graduate members missing are (with last known addresses) Messrs G. Carter (Fock Street, Mowbray, Tasmania), and L. J. Mayer (Blacks Beach, Queensland).

FORENSIC NAVAL ARCHITECTURE

SOME MARINE CASUALTIES EXERCISES IN FORENSIC NAVAL ARCHITECTURE (PART 7)

Robert J. Herd

13. ADVENTURES IN MARITIME LAW

In the Introduction to these Exercises (1) I indicated my intention to conclude with some views on my experience in legal fora and lessons which may be learned therefrom. I have reviewed eleven of the casualty investigations with which I have been associated, covering a wide range of vessels and circumstances.

In the course of my life I have received two significant baptisms of fire. The first was delivered out of the blue by Japanese bombers one November evening in 1942 off the North East Coast of New Guinea. The second, also delivered out of the blue, was of a totally different character.

After coming to the office as normal on Friday 14 February 1964, I found myself at 2 pm standing on the end of a dry dock at Cockatoo Island looking up at the bow of HMAS *Melbourne*, damaged in the collision with HMAS *Voyager*, and being asked by Counsel assisting the Royal Commission appointed to inquire into the loss, and his Junior — 'What caused it?'

There then ensued some months as a technical adviser involved in research, analysis, plots and replots of probable courses, daily attendance at the Commission hearings and, finally, appearance as an Expert Witness.

This was my first experience in a Court of any type and the 'expert' grated a little as I remembered the definition — a person who knows more and more about less and less. By the time I was called to the witness box I had become familiar with the procedures and had had the opportunity to observe the barristers in action, note their different approaches and observe the courtesy extended by the Judge to the witnesses, particularly those from *Voyager*, many of whom were showing the after effects of their ordeal.

Apart from the results of my observations and an instruction to restrict expressions of opinion to technical matters, I had neither then, nor since, any training or instruction in the process of being an expert witness. The proceedings of the Royal Commission have been formally summarised in the Commission's Report (2). However for a more 'flesh and blood' account of the Commission proceedings and much useful background, Tom Frame's book (3) is recommended reading.

It was with great interest that I have noted that the Institution in London has taken steps to inform and train naval architects in the skills necessary to be an effective expert witness. A paper presented in London in 1977 by Michael Thomas QC, a barrister specialising in Admiralty and Maritime matters (4) gives much useful advice which, despite any possible differences between UK and Australian practices, could be of considerable benefit to the novice expert witness (or witness as to fact) in naval architectural matters.

The Institution maintains an Expert Witness Register of members who offer their services as an expert witness or as an arbitrator in the naval architecture and marine technology fields. (5).

In April 1998 The Institution conducted a two-day International Seminar, *Marine Experts and the Legal process*. (6). This was reported on by Eric Tupper (7) who notes:

'In most cases, expert witnesses find that they do not need to appear in the witness box, the courts relying on their written reports. This emphasises the need for would-be expert witnesses to develop

skills in writing such reports. Also, for those cases where a courtroom appearance is required, special skills are needed'.

To fill these needs the Institution arranged two one-day courses in September and October 1998, repeated in November 1999.

The civil law in England was radically altered on 26 April 1999 with the new civil procedure rules having a big impact on experts. An outline of these changes is given in RINA Affairs, September 1999 (8) together with a comment from Judge Paul Collins, who was heavily involved in the implementation of the new rules, that he would like to see professional bodies accredit training in report writing and courtroom skills.

It would be of benefit, particularly to younger members if such training were to be arranged by the Division, possibly in conjunction with another learned society such as The Institution of Engineers, Australia.

The question of forensic engineering, particularly in the investigation of failures, with or without litigation was raised some years ago (9), but the writer is unaware of any follow up.

Eric Tupper's report on the two-day International Seminar raised some serious questions from John English (10). These were responded to by Eric Tupper (11), but the questions raised are, I feel, of significance for the naval architect expert, and I'll briefly cover the questions in discussing my own experiences.

Since 1964 I have been involved in a wide range of legal fora. In the eighteen years I served as the Department of Transport naval architect, at no time did such duty ever appear in the Duty Statement appropriate to my position.

Legal work divided into two categories, inquisitional (Royal Commissions, Courts of Marine Inquiry for example) and adversarial, (Supreme Court actions for example).

However, I found in the only Coronial Inquest in which I was involved that the course of the Inquest was fiercely adversarial. I was assisting a senior technical officer of another Government. We were not provided with any legal representation at all. Consequently the eminent QC who appeared for the manufacturer of the boat in question had freedom to examine us without either of us having a similar right in respect of the QC's witnesses.

The method of inquiry into marine accidents (incidents?) established under the Navigation Act 1912 and the Navigation (Courts of Marine Inquiry) Regulations provided for a Preliminary Inquiry to be conducted by a suitably-qualified person. If he was of the opinion that the matter should go to a Court and if his recommendation was accepted, then a Court would be convened. The evidence would be presented and witnesses called by Counsel for the Departmental Representative who was an independent officer.

The practice today is different. The Navigation (Courts of Marine Inquiry) Regulations have been repealed. In their place are the Navigation (Marine Casualty) Regulations (12). These Regulations provide for Investigation of Incidents and a Board of Marine Inquiry. To the writer's knowledge, no Boards of Marine Inquiry have been appointed. No doubt such appointment would be made if the Incident were to be considered of sufficient magnitude and severity.

The first hurdle confronting the expert witness, whether novice or experienced, is to establish one's credibility in respect of the particular circumstances of the subject of the case. In my case, the fact that I had been to sea, albeit for a limited time, stood me in good stead in conjunction with my qualifications and experience.

Nowadays the novice need not be completely on his own. Two books (13 and 14) which highlight the techniques of examination and cross-examination will give guidance as to the form the questions may take and the variety of techniques used by barristers.

A leading naval architect, David Doust has recently published a book *The Expert Witness* (15), directed particularly towards the marine practitioner. To date the writer has not sighted a copy of this work

However the work which I have found to be of greatest benefit is Ian Freckelton's *The Trial of The Expert* (16).

A thread which runs through all my Court experiences is the need to establish the truth of the matter at hand. One swears to tell 'the truth, the whole truth etc.' but, as a famous identity said two thousand years ago — 'What is truth?' (17).

In preparing the defence in an action following a major loss, another expert proposed to our eminent leader a series of experiments which he said would establish the truth. Our leader's response was along the lines of — 'The truth? I'm not interested in the truth, I only want to win my case.'

[To be concluded]

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THE INTERNET

Another Naval Architect in the Antarctic

The 19 metre Australian expedition yacht *Spirit of Sydney* sailed in the 2000 Sydney to Hobart yacht race, coming in 28th across the line and 4th on handicap. She then underwent a transformation from racing machine to expedition vessel, and set sail for Antarctica from Hobart on 11 January with Sydney naval architect Rob Tulk on board. Rob is having a well-earned break from North West Bay Ships, and follows David Pryce (who is now preparing for the Together Alone race, due to start from Sydney in November this year) to the Antarctic on *Spirit of Sydney*. Any sea-time is good experience for *every* naval architect!

On 30 January the vessel became trapped in thick pack ice, disabled with steering and engine problems, which the crew got stuck into repairing. The vessel was approximately 50 n miles from the French Antarctic base at Dumont d'Urville, 1500 n miles south of Hobart. The yacht, with ten people on board, is a veteran of eight previous Antarctic Expeditions and was returning from Cape Dension in Commonwealth Bay, the site of Mawson's Hut.

Repairs were effected twenty-four hours later, and on 4 February the vessel was sailing carefully northwards. Information on *Spirit of Sydney* and her current situation report can be found at www.oceanfrontiers.com.au.

Revitalisation of US Shipbuilding

United States Lines, a division of American Classic Voyages Co., has contracted for two 1 900 passenger, 72 000 GRT cruise ships under the *Project America* initiative. These are the largest cruise ships ever built in the United States. The vessels are being constructed at Ingalls Shipbuilding, Inc., a division of Litton Ship Systems, in Pascagoula, Mississippi. The first keel was laid in December 2000, and the vessels are scheduled to enter service in Hawaii in 2003 and 2004. These are the first major ocean-going passenger ships to be built in the United States in more than 40 years. For more information, see www.amcv.com.

The Mariner's Museum

The Mariners' Museum, one of the largest international maritime museums in the world, located in Newport News, Virginia, USA, is dedicated to illuminating mankind's experience with the sea and the events that shaped the course and progress of civilization. The Mariners' Museum and South Street Seaport Museum of New York City have formed an alliance to enable the two institutions to share collections, exhibitions, educational services, publications, and other related endeavors. In 1998, Congress designated the two museums America's National Maritime Museum. For an extensive and well-laid-out site, visit www.mariner.org.

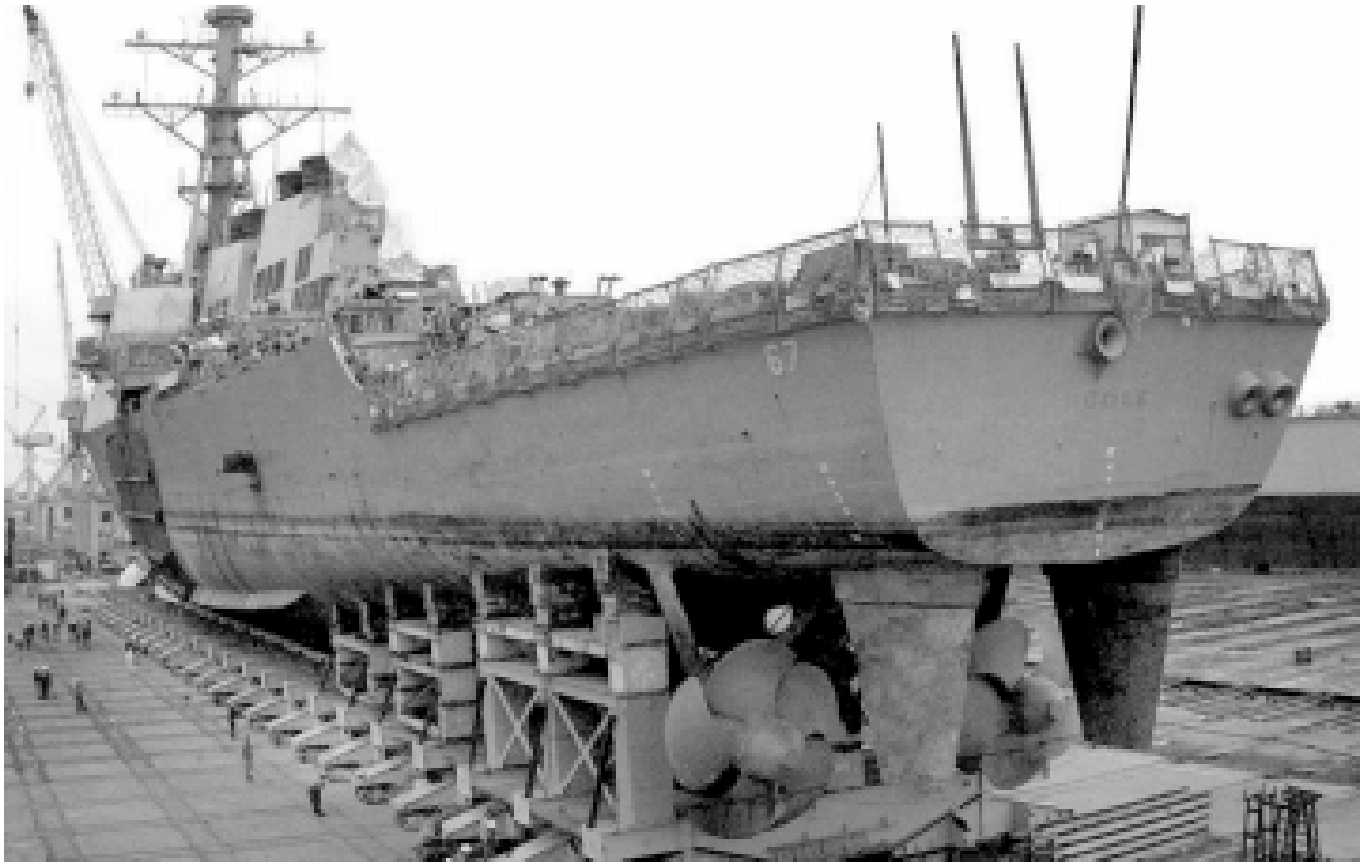
Ship Design Application Database

The US National Shipbuilding Research and Documentation Centre, Ship Design Application Database was created to provide a source where world class commercial foreign ship design elements could be documented by photographs and text and could be accessed by the World Wide Web. This is a very powerful tool that can benefit ship designers and engineers in new-construction commercial shipbuilding, as well as commercial ship repair projects. The database has hundreds of pictures and text that can be searched by category (i.e. electrical, piping, structure), system (i.e. handrails, fire main, hangers) and location (i.e. main deck, accommodations, engine room). It includes many different types of foreign built ships including tankers, containerships, cruise ships, ro-ros and others. The countries of origin are also very diverse and include Germany, Italy, France, Korea, Japan and others. Class Societies for these ships are ABS, DNV, Lloyds, RINA and GL. Many of these design elements are world-class, cost effective, and are class society approved which can help designers and engineers in the United States compare different world class design elements in an effort to reduce our shipbuilding costs and become more competitive in a global market.

The database is available at the National Shipbuilding Research and Documentation Centre's web site, www.nsnet.com/shipdesigndatabase.

RECOVERY OF USS *COLE*

In the last edition of *The ANA* we reported on the recovery of the damaged US destroyer USS *Cole* from Aden. On arrival in the United States, a temporary patch was welded over the large hole in the ship's side (above) before the ship was refloated and moved ashore for repairs (below). The repairs, by Ingalls Shipbuilding in Pascagoula, Mississippi, are now estimated to cost $US250 million. (US Navy photographs)



INDUSTRY NEWS

CATIA selected by ADI Limited for FFG Upgrade Project

CONCENTRIC Asia Pacific has announced that the ADI FFG Upgrade Project will implement CATIA as its primary CAD/CAM/CAE solution for the upgrade of the RAN's six FFG-class frigates, as part of the $1 billion project won last year.

ADI Limited is undertaking total ship systems responsibility for the upgrade and the associated detailed design work required to implement the project. As the FFG Upgrade design authority, ADI is carrying out the overall system engineering and is working closely with its subcontractors to ensure the program's requirements are met.

The FFG Upgrade program follows ADI Limited's construction of the world-leading Huon class minehunters for the RAN which also utilised advanced design capabilities provided by CATIA. CATIA was selected by ADI after an extensive technical validation of a number of ship/mechanical design packages. As a result of this comparison with other products using actual data, CATIA was chosen as the preferred product. ADI will use CATIA for the structural, electrical and outfitting requirements of the project, taking advantage of CATIA's extensive shipbuilding applications.

CONCENTRIC Asia Pacific is a leading provider of engineering technology solutions and knowledge-based services and, as a Dassault Systemes and IBM Business Partner, is the sole reseller of CATIA and ENOVIA Solutions in Australia and New Zealand. Supported by specialist expertise, CONCENTRIC provides extensive and comprehensive services and support to customers across the Asia–Pacific region, including outsourcing and training, which includes accredited certificate courses, translations, consulting, systems implementation and integration.

Information on CONCENTRIC Asia Pacific is available at www.concentric.com.au.

DD 21 Alliance Development Agreement with Dassault Systemes

The DD 21 Alliance announced on 29 January 2001 a development acceleration agreement with Dassault Systemes on CATIA Version 5 and ENOVIA to support the complete Product Lifecycle Management (PLM) of the US Navy's Zumwalt-class Land Attack Destroyer (DD 21). Under the agreement, Dassault Systemes will develop dedicated shipbuilding software solutions as requested by the Alliance.

The DD 21 Alliance, Bath Iron Works and Litton's Ingalls Shipbuilding, was formed to accomplish the DD 21 five-phase program for radical breakthrough capabilities. By aggressively applying advanced technologies, DD 21 exemplifies the transformation of the military industrial complex as the first class of the US Navy's Surface Combatants for the 21st century. DD 21 must incorporate revolutionary ship survivability/signature levels, modern combat capabilities and automated systems to increase effectiveness while reducing crew size and lowering overall ship life-cycle cost.

The CATIA / ENOVIA platform was selected to meet the DD 21 stringent design, budget, schedule and collaboration requirements. With its inherent advanced technologies in object modelling, constraint management, and knowledge-based engineering, CATIA/ENOVIA is ideally suited for dedicated shipbuilding application tools as required by DD 21. The agreement funds Dassault Systemes to accelerate the development of these tools on top of existing CATIA/ENOVIA features to gain differentiating functionality. The tools being built on CATIA Version 5 features products such as Structural Hull, Smart Diagrams, Piping, HVAC, and Electrical.

First Sulzer common-rail engine successfully passes official shop test

The official shop test of the first modern large diesel engine with common-rail fuel injection, a Sulzer 6RT-flex58T-B, has been successfully completed. This revolutionary engine has no camshaft and runs with electronic control of all key engine functions to give flexibility in operation and reduced exhaust emissions.

The engine has a maximum continuous power of 12,750 kW and was built under licence from Wärtsilä Corporation by Hyundai Heavy Industries Co. Ltd at their Ulsan works, Korea. It will be installed in a 47 000 tdw bulk carrier building for Gypsum Transportation Ltd at Hyundai Mipo Dockyard in Korea.

As this is the first production engine built with the Sulzer RT-flex common-rail system, its manufacture has involved very close co-operation between Wärtsilä, Hyundai Heavy Industries and Hyundai Mipo Dockyard. The engine tests at Ulsan were undertaken with support from Wärtsilä engineers.

This RT-flex engine was first started on 5 January 2001, and completed its official shop test on 16 January. Soon after starting, it developed full power. It went through all tests without difficulty.

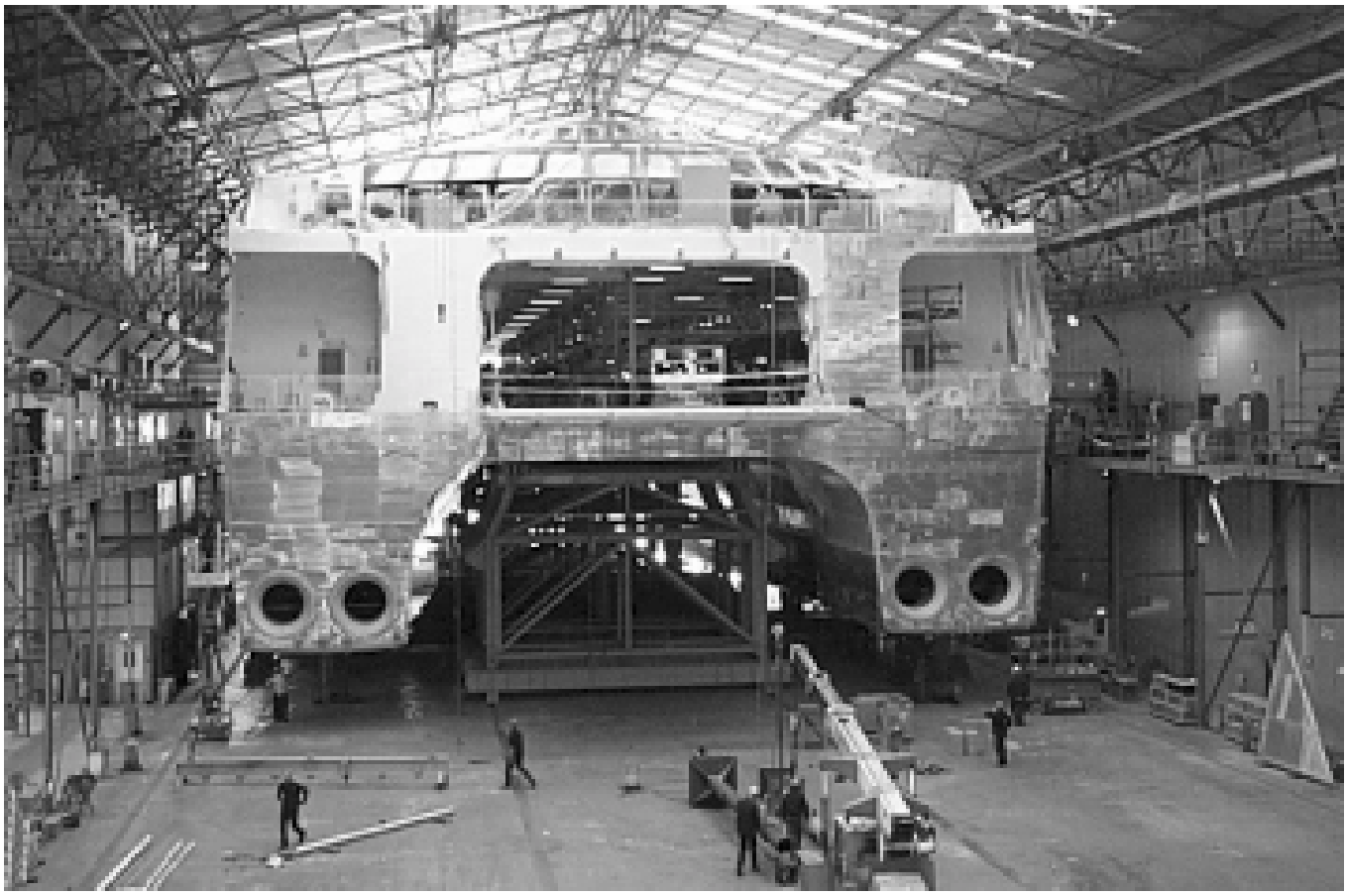
The success of these tests on the first production engine was largely the result of the comprehensive research and development programme undertaken on a full-sized research engine in the Diesel Technology Centre in Switzerland.

The Sulzer 6RT-flex58T-B tested is basically a version of the existing 'classic' RTA58T-B low-speed marine diesel engine but with the Sulzer RT-flex system to give a camshaft-less engine. Common-rail technology with full electronic control is applied to the fuel injection, the exhaust valve operation, and the starting air system. All these functions are controlled within the Sulzer RT-flex concept using the WECS 9500 engine control system. The RT-flex common-rail fuel system operates on the same grades of heavy fuel, up to 700 cSt viscosity, as is usual for 'classic' Sulzer RTA-series engines.

In December 2000, the second order was received for Sulzer RT-flex diesel engines. Two 7RT-flex60C engines were ordered from Wärtsilä's Trieste factory in Italy to power two 13 200 tdw reefers which will be built in Portugal.

The first Sulzer RT-Flex common-rail engine completing its shop test. This 6RT-flex58T-B engine develops 12 750 kW.

AUSTAL ACTIVITY



Austal's latest vessel, Hull No. 114, is their largest to date, and was launched in mid-January. The wheelhouse was built outside the shed, as there was barely enough room for the main hull inside. The mating of the wheelhouse and hull was something of an engineering feat and, despite speculation among onlookers that it wasn't going to fit, was completed successfully. (Photos courtesy Austal Ships).

PROFESSIONAL NOTES

Call for Comment on NSCV

The National Marine Safety Committee is calling for public comment on a number of sections of the new National Standard for Commercial Vessels (NSCV) and recreational boating safety initiatives. The following summary lists safety modules released for public comment.

(a) National Standard for Commercial Vessels

Part A – Safety Obligations (until 30 March 2001)
Part B — General Requirements (until 30 March 2001)
Part C Section 5 — Engineering (until 30 March 2001)

(b) Recreational boating

Discussion Paper, Recreational Boat Safety Equipment (until 16 February 2001)

The documents and information on how to comment on them are available from NMSC's web site www.nmsc.gov.au.

It is recommended that, if you currently use the USL Code or otherwise have an interest in the NSCV, then you read the relevant documents and comment on them. Time is becoming short! — Ed.

Prioritised Work Program Developments

The following summary identifies stageswhich key projects have reached under the National Marine Safety Committee's prioritised work program

(a) National Standard for Commercial Vessels

Part C Section 4 — Fire Safety: the initial draft is complete and the document is being reviewed by the project's reference group.
Part C Section 7 — Equipment: the initial draft document is being reviewed and a draft Regulatory Impact Statement is being prepared for the Office of Regulation Review
Part D — Crew Qualifications: for final review prior to sign off and forwarding to the Australian Transport Council for approval.
Part E — Operations: the initial draft document is being drafted and a Regulatory Impact Statement prepared so both can be released for public comment prior to submission to the Office of Regulation Review.
Part F Section 1, Subsections 1A and 1B — Fast Craft: will be released for public comment shortly.

(b) Recreational boating safety

Rec 4 Project, National Compliance Plate Program: NMSC will present a comprehensive recreational boating National Compliance Plates Program for endorsement at a major national conference of more than 200 leading recreational boating industry, community and government stakeholders, planned for April 2001.

(c) National consistency/marine safety administration

Tech 3 Project, National Register of Vessel Exemptions: initial draft of the Scope of Requirements is complete and under project team and NSW Waterways IT review
Tech 4 Project, National Register of Compliant Equipment: endorsed by NMSC and under development by Standards Australia

(d) National consistency in survey

NMSC is implementing a national action plan that will deliver a package on national consistency in marine survey to the Australian Transport Council in March 2001.

New Guidance Manuals Released

The National Marine Safety Committee has published and released the following guidance manuals*:*

Guidelines for Recreational Boat Operator Competencies;
Guidelines for Onboard Safety Training — Australian Domestic Vessels; and
Recognition of Australian Defence Force Marine Qualifications.

This brings to six the manuals published during 2000, the others being

Guidelines for Australian Marine Pilotage Standards;
Administrative Protocol for the Recognition of Vessel Certificates of Survey; and
Principles for a Common National Standard for Recreational Boat Operator Licences.
Guidance manuals are available through NMSC's web site, www.nmsc.gov.au, or in hard copy from NMSC's secretariat phone (02) 9555 2954.

Warwick Cooper

Graduate Salaries

The annual Graduate Destination Survey for 2000, conducted by the Graduate Careers Council of Australia, shows that graduates with a bachelor's degree in engineering started with a median salary of $37 000, ranked fifth among all graduates. Starting salaries for engineering graduates were ranked behind the professions of dentistry ($50 000), medicine ($45 000), optometry ($40 000), mathematics ($38 000), and tied with graduates in computer science. Female graduate engineers earned slightly more than their male counterparts ($38 000).

Across the disciplines, mining engineers had the highest median starting salary ($46 500), followed by electrical, electronic, and computer engineers ($39 000), aeronautical and chemical engineers ($38 000), mechanical engineers ($36 000), civil engineers ($35 000) and surveyors ($32 000). Other engineers not covered in the above categories started on a median salary of $36 000.

*Engineers Australia***,** January 2001

THE ROYAL INSTITUTION OF NAVAL ARCHITECTS
AUSTRALIAN DIVISION

NOTICE OF ANNUAL GENERAL MEETING

Notice is hereby given that the Annual General Meeting of the Australian Division of the Royal Institution of Naval Architects will be held at the Rugby Club, Rgby Place off 31A Pitt St, Sydney, on Wednesday, 28 March 2001 commencing at 5:30 for 6:00 pm Sydney time.

AGENDA

1. Opening
2. Apologies
3. Confirmation of the Minutes of the AGM held in Sydney on Wednesday, 22 March 2000.
4. To receive the President's report.
5. To receive, consider and adopt the Financial Statements and Auditor's report for the year ended 31 December 2000.
6. Election of Australian Division Council members.
7. Other business.

Keith M. Adams
Secretary
February 2001

NAVAL ARCHITECTS ON THE MOVE

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

Bill Bollard has retired from his position as Surveyor at the Waterways Authority of NSW. Bill has provided highlights of his career in *Letters to the Editor* elsewhere in this issue.

Dawei Cai has moved on from Advanced Multihull Designs and has taken up a position as a naval architect with Incat Designs in Sydney.

Hugh Cooke has retired from the position of Vessel Survey Manager at the Waterways Authority of NSW. Hugh served his time as a shipwright at HMA Naval Dockyard, Garden Island, and then worked as a draftsman at the Australian Shipbuilding board under Gordon Clarke. He obtained his naval architecture certificate from Sydney Technical College under Noel Riley and the late Cecil Boden. He moved to the Maritime Services Board as a surveyor, and rose to become their Senior Shipwright Surveyor, and then Commercial Vessels Manager and Vessel Survey Manager with the Waterways Authority. He is highly respected for his fine blend of theory and practical know-how. His never-failing help and guidance to those at the drawing board and his good humour are a significant loss to the industry.

Ben Duncan, a recent graduate of the Australian Maritime College, has taken up a position as a naval architect with Oceanfast Marine in Fremantle.

Greg Hampson has returned from working for Kvaerner in Aberdeen, Scotland, and is based back in Perth, WA.

Sean Ilbery, a graduand of The University of New South Wales, has taken up a position as a naval architect with North West Bay Ships in Sydney.

Stephen Jones has moved on from the Royal Australian Navy and has taken up a position with Tenix Shipbuilding (WA) in Fremantle.

Clive King has moved on after nine years at the Australian Submarine Corporation in Adelaide, where he was initially the Production Engineer and later the Principal Naval Representative (Post Delivery Availability) for the Collins-class submarine project. He has now taken up the position of Maintenance Engineering Manager-ILS (Integrated Logistics Support) for DG (Director-General) Submarines at the Department of Defence in Canberra.

Cameron Lowry has moved on from Stewart Marine Designs in Cairns to work as a consultant naval architect in London, UK.

John McKillop has moved on from WaveMaster International and has taken up a position as a naval architect with Oceanfast Marine in Fremantle.

Teresa Michell who is consulting as Teresa Michell Maritime Solutions in Sydney (see *The ANA*, November 1999) has moved on from North West Bay Ships and now includes Incat Designs among her clients.

Kathryn Murphy has moved on from North West Bay Ships in Hobart to commence a new career as a firefighter.

Ian Sargeant has moved on from Advanced Multihull Designs and has taken up a position as a naval architect with Incat Designs in Sydney.

Guido van der Veen has moved on from IHC Gusto Engineering in The Netherlands and has taken up a position with Oceanfast Marine in Fremantle.

Malcolm Waugh continues with the Royal Australian Navy and has moved to the UK for a couple of years to complete his Masters degree.

Nigel Winter has moved on from Veem Engineering and has taken up a position as a naval architect with Oceanfast Marine in Fremantle.

This column is intended to keep everyone (and, in particular, the friends you only see occasionally) updated on where you have moved to. It consequently relies on input from everyone. Please advise the editors when you up-anchor and move on to bigger, better or brighter things, or if you know of a move anyone else has made in the last three months. It would also help if you would advise Keith Adams when your mailing address changes to reduce the number of copies of *The Australian Naval Architect* emulating boomerangs (see *Missing in Action* on page 50).

Phil Helmore

MEMBERSHIP NOTES

AD Council meetings

The Australian Division Council met on 6 December, with teleconference links to all members and the President, Bryan Chapman, in the chair in Sydney. Matters, other than routine, which were discussed included RINA membership of the IEAust accreditation panel for UNSW, the Australian Division's web-site, MARENSA, the RINA/IEAust joint board (including the proposed joint RINA/IEAust tertiary awards), and reports on the activities of the High-speed Vessels, Safety and Small Craft Committees of RINA.

The Australian Division Council also met on 7 February, with teleconference links to all members, the President, Bryan Chapman, in the chair in Sydney and the Chief Executive, Trevor Blakeley, attending in Sydney. Matters, other than routine, which were discussed included the RINA/IEAust Joint Board; the Australian Division's website (approval was given in principle for the relocation and expansion of the site); MARENSA; a report from the President on the RINA Council meeting which Mr Riley and he had attended by teleconference; the concern of the Division at safety features of the Sydney to Hobart Yacht Race (especially structural integrity, stability and training — a letter to RINA Council will be despatched); the lack of industry participation in the re-writing of the USL Code (the Division has not been kept informed of developments); and the award of the Walter Atkinson Prize for 2000 (approval was given for its award in 2000 and subsequent years when funds are available — nominations are called for elsewhere in this issue).

The next AD Council meeting is scheduled for Wednesday 16 May.

Applications for Membership

It may be useful for people working in the maritime field to know that, if they are already a Member or Fellow of the Institution of Engineers, Australia then, under the RINA/IEAust Heads of Agreement, they can now become members of the RINA at a level equivalent to their IEAust membership without further examination or interview. Members of IEAust who become members of RINA in this way do not have to pay an admission fee.

RINA Website

The RINA website is currently undergoing redevelopment offline and is likely to be updated to the new format, which incorporates a number of significant improvements, in about mid-March. Watch this space!

Phil Helmore

RINA Council adopts Teleconferencing

Teleconferencing has been introduced for meetings of the RINA Council in London. The first Council meeting of this type was held on 7 February (8 February AEST) and included the Division President, Institution Council member Noel Riley and the President of the New Zealand Division.

This is a worthwhile development for Division members, as it should enable the Division to play a more active part in the activities of the Institution internationally.

A related development is the election of several more non-UK members to the RINA Council. The Council now includes members from Singapore, Denmark, Greece, Canada, Australia (2) and New Zealand.

The Chief Executive, Trevor Blakeley, has made it one of his personal objectives to make RINA an international body. It appears that he is making some progress.

Bryan Chapman

FROM THE ARCHIVES

This dramatic photograph of the battle cruiser HMS *Repulse* was taken during exercises in 1920. The approaching sixtieth anniversary of her loss on 10 December 1941 recalls an historic action in the opening days of the Pacific war. With the battleship *Prince of Wales*, *Repulse* was attacked by Japanese torpedo bombers near Singapore. Both ships were lost in the action, with 513 men losing their lives in *Repulse*. The action convinced many of the superiority of aircraft over the capital ships that had dominated the fleets of major powers for many decades.

Repulse and her sister ship *Renown* were ordered as part of the 1914 emergency war program. Design work began on the morning of 19 December 1914, the design was approved on 29 December, both were laid down on 25 January 1915 and *Repulse* (built by John Brown on Clydebank) was completed on 18 August 1916. The Battle of Jutland in May 1916 demonstrated the weaknesses of the battlecruiser concept, but by then little could be done to improve the design of these ships.